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INTRODUCTION

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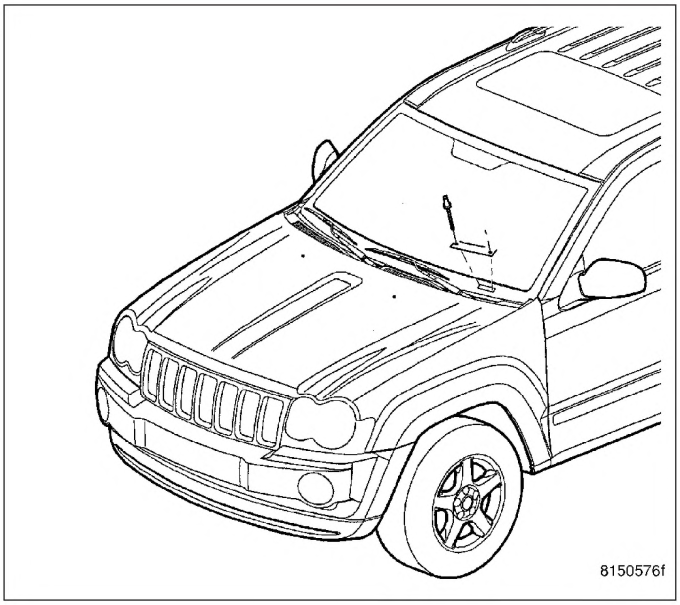
VEHICLE IDENTIFICATION NUMBER

DESCRIPTION

The Vehicle Identification Number (VIN) plate is attached to the top left side of the instrument panel. The VIN contains 17 characters that provide data concerning the vehicle. Refer to the decoding chart to determine the identification of a vehicle.

To protect the consumer from theft and possible fraud the manufacturer is required to include a Check Digit at the ninth position of the Vehicle Identification Number. The check digit is used by the manufacturer and government agencies to verify the authenticity of the vehicle and official documentation. The formula to use the check digit is not released to the general public.



VEHICLE IDENTIFICATION NUMBER DECODING CHART

POSITION	INTERPRETATION	CODE = DESCRIPTION
1	Country of Origin	1 = Manufactured By DaimlerChrysler Corporation
2	Make	J = Jeep
3	Vehicle Type	4 = MPV Less Side Air Bags 8 = MPV With Side Air Bags
4	Gross Vehicle Weight Rating	G = 5001-6000 lbs.
5	Vehicle Line (WK)	S = Grand Cherokee 4X2 R = Grand Cherokee 4X4
5	Vehicle Line (WH)	C = Grand Cherokee 4X4 (LHD) D = Grand Cherokee 4X4 (RHD)
6	Series	4 = Grand Cherokee LAREDO 5 = Grand Cherokee LIMITED E = 5 Speed Auto
7	Body Style	8 = Sport Utility 4 Door
8	Engine	K = 3.7K 6 cyl. MPI Gasoline N = 4.7L 8 cyl. MPI Gasoline 2 = 5.7L 8 cyl. HEMI Multiple Displacement Gasoline M = 3.0L 6 cyl. Turbo Diesel
9	Check Digit	0 through 9 or X
10	Model Year	5=2005
11	Assembly Plant	C = Jefferson North Assembly Y = Chrysler Steyer Assembly
12 thru 17	Vehicle Build Sequence	

VEHICLE EMISSION CONTROL INFORMATION (VECI)

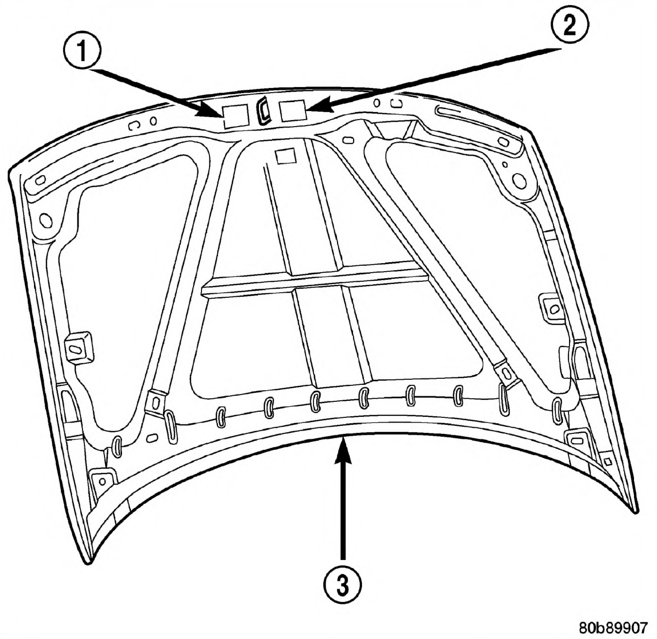
DESCRIPTION

All vehicles are equipped with a combined vehicle emission control information (VECI) label(s). The label is located in the engine compartment on the vehicle hood. Two labels are used for vehicles built for sale in the country of Canada.

The VECI label(s) contain the following:

- Engine family and displacement
- Evaporative family
- Emission control system schematic
- Certification application
- Spark plug and gap

The label also contains an engine vacuum schematic. There are unique labels for vehicles built for sale in the state of California and the country of Canada. Canadian labels are written in both the English and French languages. These labels are permanently attached and cannot be removed without defacing information and destroying label.



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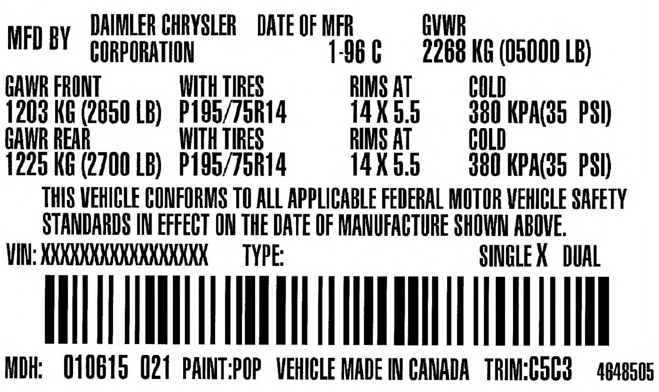
VEHICLE CERTIFICATION LABEL

DESCRIPTION

A vehicle certification label is attached to every DaimlerChrysler Corporation vehicle. The label certifies that the vehicle conforms to all applicable Federal Motor Vehicle Standards. The label also lists:

- Month and year of vehicle manufacture.
- Gross Vehicle Weight Rating (GVWR). The gross front and rear axle weight ratings (GAWR's) are based on a minimum rim size and maximum cold tire inflation pressure.
- Vehicle Identification Number (VIN).
- Type of vehicle.
- Type of rear wheels.
- Bar code.
- Month, Day and Hour (MDH) of final assembly.
- Paint and Trim codes.
- Country of origin.

The label is located on the driver-side door shut-face.



MFD BY DAIMLER CHRYSLER CORPORATION DATE OF MFR 1-96 C GVWR 2268 KG (05000 LB)

GAWR FRONT	WITH TIRES	RIMS AT	COLD
1203 KG (2650 LB)	P195/75R14	14 X 5.5	380 KPA(35 PSI)
GAWR REAR	WITH TIRES	RIMS AT	COLD
1225 KG (2700 LB)	P195/75R14	14 X 5.5	380 KPA(35 PSI)

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: XXXXXXXXXXXXXXXXX TYPE: SINGLE X DUAL

MDH: 010615 021 PAINT:POP VEHICLE MADE IN CANADA TRIM:C5C3 4648505

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FASTENER IDENTIFICATION

DESCRIPTION

The SAE bolt strength grades range from grade 2 to grade 8. The higher the grade number, the greater the bolt strength. Identification is determined by the line marks on the top of each bolt head. The actual bolt strength grade corresponds to the number of line marks plus 2. The most commonly used metric bolt strength classes are 9.8 and 10.9. The metric strength class identification number is imprinted on the head of the bolt. The higher the class number, the greater the bolt strength. Some metric nuts are imprinted with a single-digit strength class on the nut face. Refer to the Fastener Identification and Fastener Strength Charts.

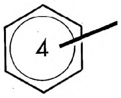
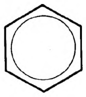
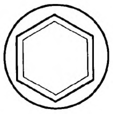
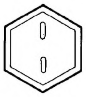
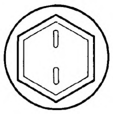
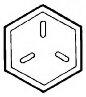
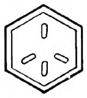
Bolt Markings and Torques - Metric

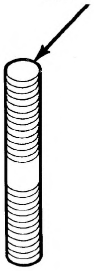
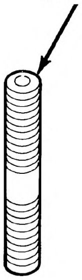
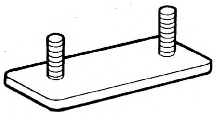
Bolt Markings	8.8/8.9		10.9		12.9	
Bolt Dia.	N·m	Ft. Lbs.	N·m	Ft. Lbs.	N·m	Ft. Lbs.
6	12	105*	14	120*	16	12
8	25	250*	32	23	38	28
10	54	40	60	45	74	55
12	95	70	108	80	135	100
14	155	115	175	130	216	160
16	243	180	324	210	324	240
* Inch Lbs.						

Bolt Markings and Torques - U. S. Customary

Bolt Markings	Grade 5		Grade 8	
Bolt Dia.	N·m	Ft. Lbs	N·m	Ft. Lbs
1/4 - 20	10	95*	14	125*
1/4 - 28	10	95*	17	150*
5/16 - 18	22	200*	30	270*
5/16 - 24	26	240*	33	300*
3/8 - 16	40	30	55	40
3/8 - 24	47	35	60	45
7/16 - 14	68	50	88	65
7/16 - 20	74	55	95	70
1/2 - 13	101	75	135	100
1/2 -20	115	85	150	110
9/16 - 12	135	105	182	135
9/16 - 18	155	115	202	150
5/8 - 11	202	150	263	195
5/8 - 18	215	160	284	210
3/4 - 10	230	170	297	220
3/4 - 16	236	175	304	225
7/8 - 14	405	300	540	400
* Inch Lbs.				

HOW TO DETERMINE BOLT STRENGTH

	Mark	Class
Hexagon head bolt	 Bolt head No. 4 —	4T
	5 —	5T
	6 —	6T
	7 —	7T
	8 —	8T
	9 —	9T
	10 —	10T
	11 —	11T
	 No mark	4T
Hexagon flange bolt w/washer hexagon bolt	 No mark	4T
Hexagon head bolt	 Two protruding lines	5T
Hexagon flange bolt w/washer hexagon bolt	 Two protruding lines	6T
Hexagon head bolt	 Three protruding lines	7T
Hexagon head bolt	 Four protruding lines	8T

	Mark	Class
Stud bolt		4T
		6T
Welded bolt		4T

95IN-4

FASTENER USAGE

DESCRIPTION

FASTENER USAGE

WARNING: Use of an incorrect fastener may result in component damage or personal injury.

Fasteners and torque specifications references in this Service Manual are identified in metric and SAE format.

During any maintenance or repair procedures, it is important to salvage all fasteners (nuts, bolts, etc.) for reassembly. If the fastener is not salvageable, a fastener of equivalent specification must be used.

THREADED HOLE REPAIR

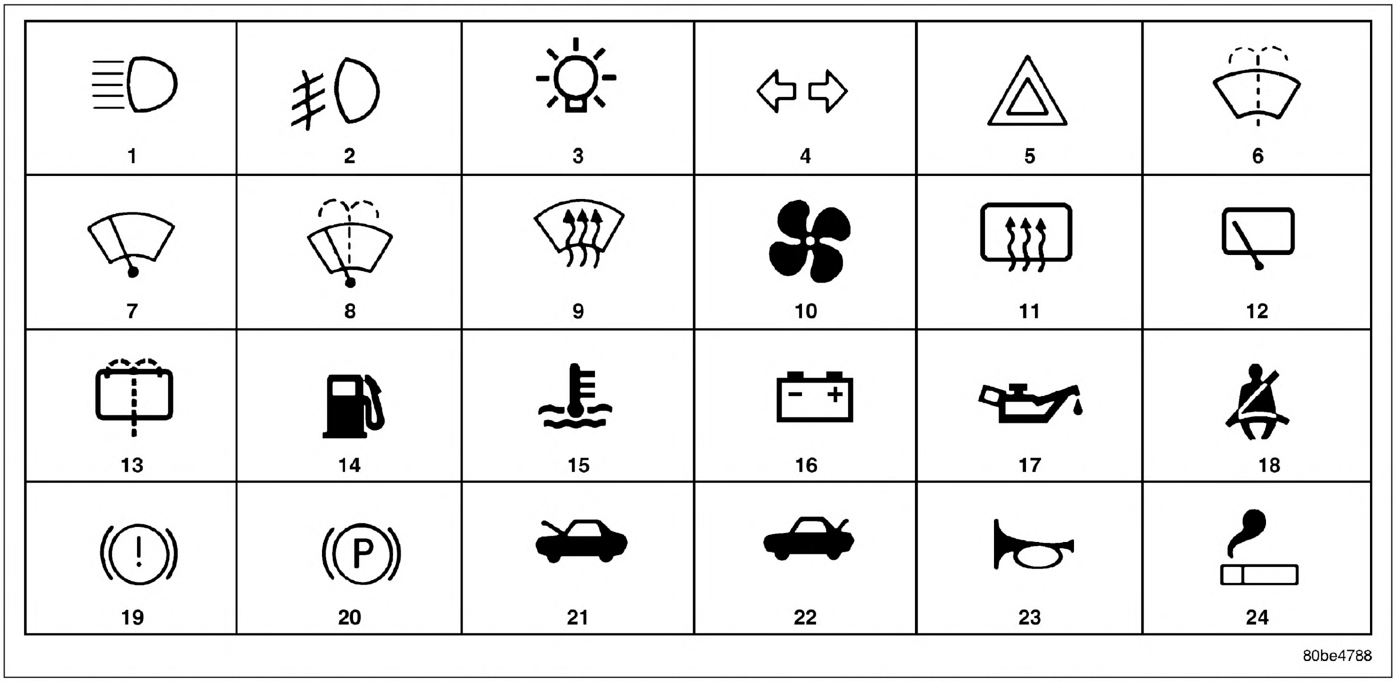
DESCRIPTION

THREADED HOLE REPAIR

Most stripped threaded holes can be repaired using a Helicoil®. Follow the vehicle or Helicoil® recommendations for application and repair procedures.

INTERNATIONAL SYMBOLS

DESCRIPTION - INTERNATIONAL SYMBOLS



The graphic symbols illustrated in the following International Control and Display Symbols Chart are used to identify various instrument controls. The symbols correspond to the controls and displays that are located on the instrument panel.

METRIC SYSTEM

DESCRIPTION

The metric system is based on quantities of one, ten, one hundred, one thousand and one million.

The following chart will assist in converting metric units to equivalent English and SAE units, or vise versa.

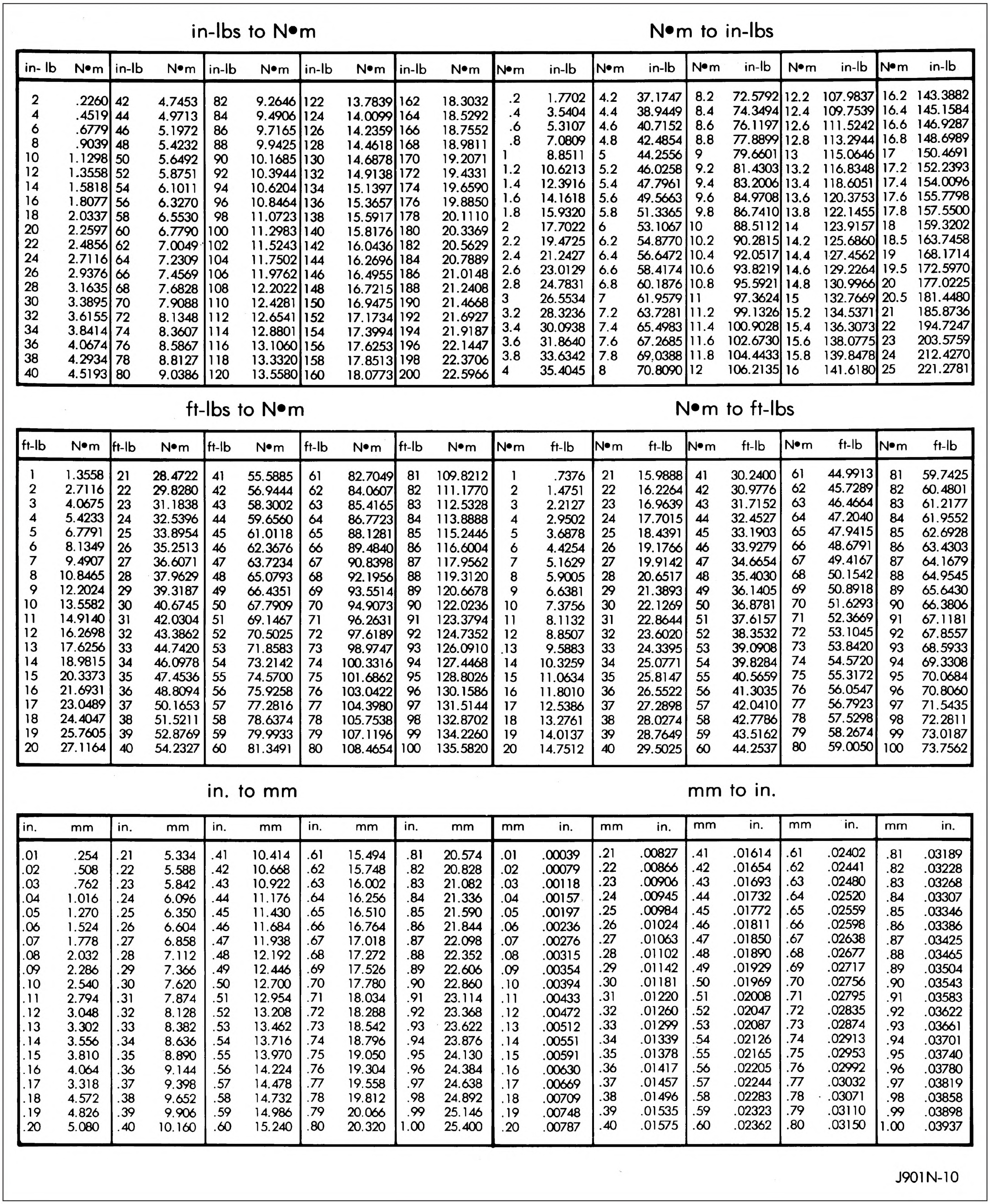
CONVERSION FORMULAS AND EQUIVALENT VALUES

MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
in-lbs	x 0.11298	= Newton Meters (N·m)	N·m	x 8.851	= in-lbs
ft-lbs	x 1.3558	= Newton Meters (N·m)	N·m	x 0.7376	= ft-lbs
Inches Hg (60° F)	x 3.377	= Kilopascals (kPa)	kPa	x 0.2961	= Inches Hg
psi	x 6.895	= Kilopascals (kPa)	kPa	x 0.145	= psi
Inches	x 25.4	= Millimeters (mm)	mm	x 0.03937	= Inches
Feet	x 0.3048	= Meters (M)	M	x 3.281	= Feet
Yards	x 0.9144	= Meters	M	x 1.0936	= Yards
mph	x 1.6093	= Kilometers/Hr. (Km/h)	Km/h	x 0.6214	= mph
Feet/Sec	x 0.3048	= Meters/Sec (M/S)	M/S	x 3.281	= Feet/Sec
mph	x 0.4470	= Meters/Sec (M/S)	M/S	x 2.237	= mph
Kilometers/Hr. (Km/h)	x 0.27778	= Meters/Sec (M/S)	M/S	x 3.600	Kilometers/Hr. (Km/h)

COMMON METRIC EQUIVALENTS

1 inch = 25 Millimeters	1 Cubic Inch = 16 Cubic Centimeters
1 Foot = 0.3 Meter	1 Cubic Foot = 0.03 Cubic Meter
1 Yard = 0.9 Meter	1 Cubic Yard = 0.8 Cubic Meter
1 Mile = 1.6 Kilometers	

Refer to the Metric Conversion Chart to convert torque values listed in metric Newton- meters (N·m). Also, use the chart to convert between millimeters (mm) and inches (in.).



in-lbs to N•m

in- lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m
2	.2260	42	4.7453	82	9.2646	122	13.7839	162	18.3032
4	.4519	44	4.9713	84	9.4906	124	14.0099	164	18.5292
6	.6779	46	5.1972	86	9.7165	126	14.2359	166	18.7552
8	.9039	48	5.4232	88	9.9425	128	14.4618	168	18.9811
10	1.1298	50	5.6492	90	10.1685	130	14.6878	170	19.2071
12	1.3558	52	5.8751	92	10.3944	132	14.9138	172	19.4331
14	1.5818	54	6.1011	94	10.6204	134	15.1397	174	19.6590
16	1.8077	56	6.3270	96	10.8464	136	15.3657	176	19.8850
18	2.0337	58	6.5530	98	11.0723	138	15.5917	178	20.1110
20	2.2597	60	6.7790	100	11.2983	140	15.8176	180	20.3369
22	2.4856	62	7.0049	102	11.5243	142	16.0436	182	20.5629
24	2.7116	64	7.2309	104	11.7502	144	16.2696	184	20.7889
26	2.9376	66	7.4569	106	11.9762	146	16.4955	186	21.0148
28	3.1635	68	7.6828	108	12.2022	148	16.7215	188	21.2408
30	3.3895	70	7.9088	110	12.4281	150	16.9475	190	21.4668
32	3.6155	72	8.1348	112	12.6541	152	17.1734	192	21.6927
34	3.8414	74	8.3607	114	12.8801	154	17.3994	194	21.9187
36	4.0674	76	8.5867	116	13.1060	156	17.6253	196	22.1447
38	4.2934	78	8.8127	118	13.3320	158	17.8513	198	22.3706
40	4.5193	80	9.0386	120	13.5580	160	18.0773	200	22.5966

N•m to in-lbs

N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb
.2	1.7702	4.2	37.1747	8.2	72.5792	12.2	107.9837	16.2	143.3882
.4	3.5404	4.4	38.9449	8.4	74.3494	12.4	109.7539	16.4	145.1584
.6	5.3107	4.6	40.7152	8.6	76.1197	12.6	111.5242	16.6	146.9287
.8	7.0809	4.8	42.4854	8.8	77.8899	12.8	113.2944	16.8	148.6989
1	8.8511	5	44.2556	9	79.6601	13	115.0646	17	150.4691
1.2	10.6213	5.2	46.0258	9.2	81.4303	13.2	116.8348	17.2	152.2393
1.4	12.3916	5.4	47.7961	9.4	83.2006	13.4	118.6051	17.4	154.0096
1.6	14.1618	5.6	49.5663	9.6	84.9708	13.6	120.3753	17.6	155.7798
1.8	15.9320	5.8	51.3365	9.8	86.7410	13.8	122.1455	17.8	157.5500
2	17.7022	6	53.1067	10	88.5112	14	123.9157	18	159.3202
2.2	19.4725	6.2	54.8770	10.2	90.2815	14.2	125.6860	18.5	163.7458
2.4	21.2427	6.4	56.6472	10.4	92.0517	14.4	127.4562	19	168.1714
2.6	23.0129	6.6	58.4174	10.6	93.8219	14.6	129.2264	19.5	172.5970
2.8	24.7831	6.8	60.1876	10.8	95.5921	14.8	130.9966	20	177.0225
3	26.5534	7	61.9579	11	97.3624	15	132.7669	20.5	181.4480
3.2	28.3236	7.2	63.7281	11.2	99.1326	15.2	134.5371	21	185.8736
3.4	30.0938	7.4	65.4983	11.4	100.9028	15.4	136.3073	22	194.7247
3.6	31.8640	7.6	67.2685	11.6	102.6730	15.6	138.0775	23	203.5759
3.8	33.6342	7.8	69.0388	11.8	104.4433	15.8	139.8478	24	212.4270
4	35.4045	8	70.8090	12	106.2135	16	141.6180	25	221.2781

ft-lbs to N•m

ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m
1	1.3558	21	28.4722	41	55.5885	61	82.7049	81	109.8212
2	2.7116	22	29.8280	42	56.9444	62	84.0607	82	111.1770
3	4.0675	23	31.1838	43	58.3002	63	85.4165	83	112.5328
4	5.4233	24	32.5396	44	59.6560	64	86.7723	84	113.8888
5	6.7791	25	33.8954	45	61.0118	65	88.1281	85	115.2446
6	8.1349	26	35.2513	46	62.3676	66	89.4840	86	116.6004
7	9.4907	27	36.6071	47	63.7234	67	90.8398	87	117.9562
8	10.8465	28	37.9629	48	65.0793	68	92.1956	88	119.3120
9	12.2024	29	39.3187	49	66.4351	69	93.5514	89	120.6678
10	13.5582	30	40.6745	50	67.7909	70	94.9073	90	122.0236
11	14.9140	31	42.0304	51	69.1467	71	96.2631	91	123.3794
12	16.2698	32	43.3862	52	70.5025	72	97.6189	92	124.7352
13	17.6256	33	44.7420	53	71.8583	73	98.9747	93	126.0910
14	18.9815	34	46.0978	54	73.2142	74	100.3316	94	127.4468
15	20.3373	35	47.4536	55	74.5700	75	101.6862	95	128.8026
16	21.6931	36	48.8094	56	75.9258	76	103.0422	96	130.1586
17	23.0489	37	50.1653	57	77.2816	77	104.3980	97	131.5144
18	24.4047	38	51.5211	58	78.6374	78	105.7538	98	132.8702
19	25.7605	39	52.8769	59	79.9933	79	107.1196	99	134.2260
20	27.1164	40	54.2327	60	81.3491	80	108.4654	100	135.5820

N•m to ft-lbs

N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
1	.7376	21	15.9888	41	30.2400	61	44.9913	81	59.7425
2	1.4751	22	16.2264	42	30.9776	62	45.7289	82	60.4801
3	2.2127	23	16.9639	43	31.7152	63	46.4664	83	61.2177
4	2.9502	24	17.7015	44	32.4527	64	47.2040	84	61.9552
5	3.6878	25	18.4391	45	33.1903	65	47.9415	85	62.6928
6	4.4254	26	19.1766	46	33.9279	66	48.6791	86	63.4303
7	5.1629	27	19.9142	47	34.6654	67	49.4167	87	64.1679
8	5.9005	28	20.6517	48	35.4030	68	50.1542	88	64.9545
9	6.6381	29	21.3893	49	36.1405	69	50.8918	89	65.6430
10	7.3756	30	22.1269	50	36.8781	70	51.6293	90	66.3806
11	8.1132	31	22.8644	51	37.6157	71	52.3669	91	67.1181
12	8.8507	32	23.6020	52	38.3532	72	53.1045	92	67.8557
.13	9.5883	33	24.3395	53	39.0908	73	53.8420	93	68.5933
14	10.3259	34	25.0771	54	39.8284	74	54.5720	94	69.3308
15	11.0634	35	25.8147	55	40.5659	75	55.3172	95	70.0684
16	11.8010	36	26.5522	56	41.3035	76	56.0547	96	70.8060
17	12.5386	37	27.2898	57	42.0410	77	56.7923	97	71.5435
18	13.2761	38	28.0274	58	42.7786	78	57.5298	98	72.2811
19	14.0137	39	28.7649	59	43.5162	79	58.2674	99	73.0187
20	14.7512	40	29.5025	60	44.2537	80	59.0050	100	73.7562

in. to mm

in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
.01	.254	.21	5.334	.41	10.414	.61	15.494	.81	20.574
.02	.508	.22	5.588	.42	10.668	.62	15.748	.82	20.828
.03	.762	.23	5.842	.43	10.922	.63	16.002	.83	21.082
.04	1.016	.24	6.096	.44	11.176	.64	16.256	.84	21.336
.05	1.270	.25	6.350	.45	11.430	.65	16.510	.85	21.590
.06	1.524	.26	6.604	.46	11.684	.66	16.764	.86	21.844
.07	1.778	.27	6.858	.47	11.938	.67	17.018	.87	22.098
.08	2.032	.28	7.112	.48	12.192	.68	17.272	.88	22.352
.09	2.286	.29	7.366	.49	12.446	.69	17.526	.89	22.606
.10	2.540	.30	7.620	.50	12.700	.70	17.780	.90	22.860
.11	2.794	.31	7.874	.51	12.954	.71	18.034	.91	23.114
.12	3.048	.32	8.128	.52	13.208	.72	18.288	.92	23.368
.13	3.302	.33	8.382	.53	13.462	.73	18.542	.93	23.622
.14	3.556	.34	8.636	.54	13.716	.74	18.796	.94	23.876
.15	3.810	.35	8.890	.55	13.970	.75	19.050	.95	24.130
.16	4.064	.36	9.144	.56	14.224	.76	19.304	.96	24.384
.17	3.318	.37	9.398	.57	14.478	.77	19.558	.97	24.638
.18	4.572	.38	9.652	.58	14.732	.78	19.812	.98	24.892
.19	4.826	.39	9.906	.59	14.986	.79	20.066	.99	25.146
.20	5.080	.40	10.160	.60	15.240	.80	20.320	1.00	25.400

mm to in.

mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
.01	.00039	.21	.00827	.41	.01614	.61	.02402	.81	.03189
.02	.00079	.22	.00866	.42	.01654	.62	.02441	.82	.03228
.03	.00118	.23	.00906	.43	.01693	.63	.02480	.83	.03268
.04	.00157	.24	.00945	.44	.01732	.64	.02520	.84	.03307
.05	.00197	.25	.00984	.45	.01772	.65	.02559	.85	.03346
.06	.00236	.26	.01024	.46	.01811	.66	.02598	.86	.03386
.07	.00276	.27	.01063	.47	.01850	.67	.02638	.87	.03425
.08	.00315	.28	.01102	.48	.01890	.68	.02677	.88	.03465
.09	.00354	.29	.01142	.49	.01929	.69	.02717	.89	.03504
.10	.00394	.30	.01181	.50	.01969	.70	.02756	.90	.03543
.11	.00433	.31	.01220	.51	.02008	.71	.02795	.91	.03583
.12	.00472	.32	.01260	.52	.02047	.72	.02835	.92	.03622
.13	.00512	.33	.01299	.53	.02087	.73	.02874	.93	.03661
.14	.00551	.34	.01339	.54	.02126	.74	.02913	.94	.03701
.15	.00591	.35	.01378	.55	.02165	.75	.02953	.95	.03740
.16	.00630	.36	.01417	.56	.02205	.76	.02992	.96	.03780
.17	.00669	.37	.01457	.57	.02244	.77	.03032	.97	.03819
.18	.00709	.38	.01496	.58	.02283	.78	.03071	.98	.03858
.19	.00748	.39	.01535	.59	.02323	.79	.03110	.99	.03898
.20	.00787	.40	.01575	.60	.02362	.80	.03150	1.00	.03937

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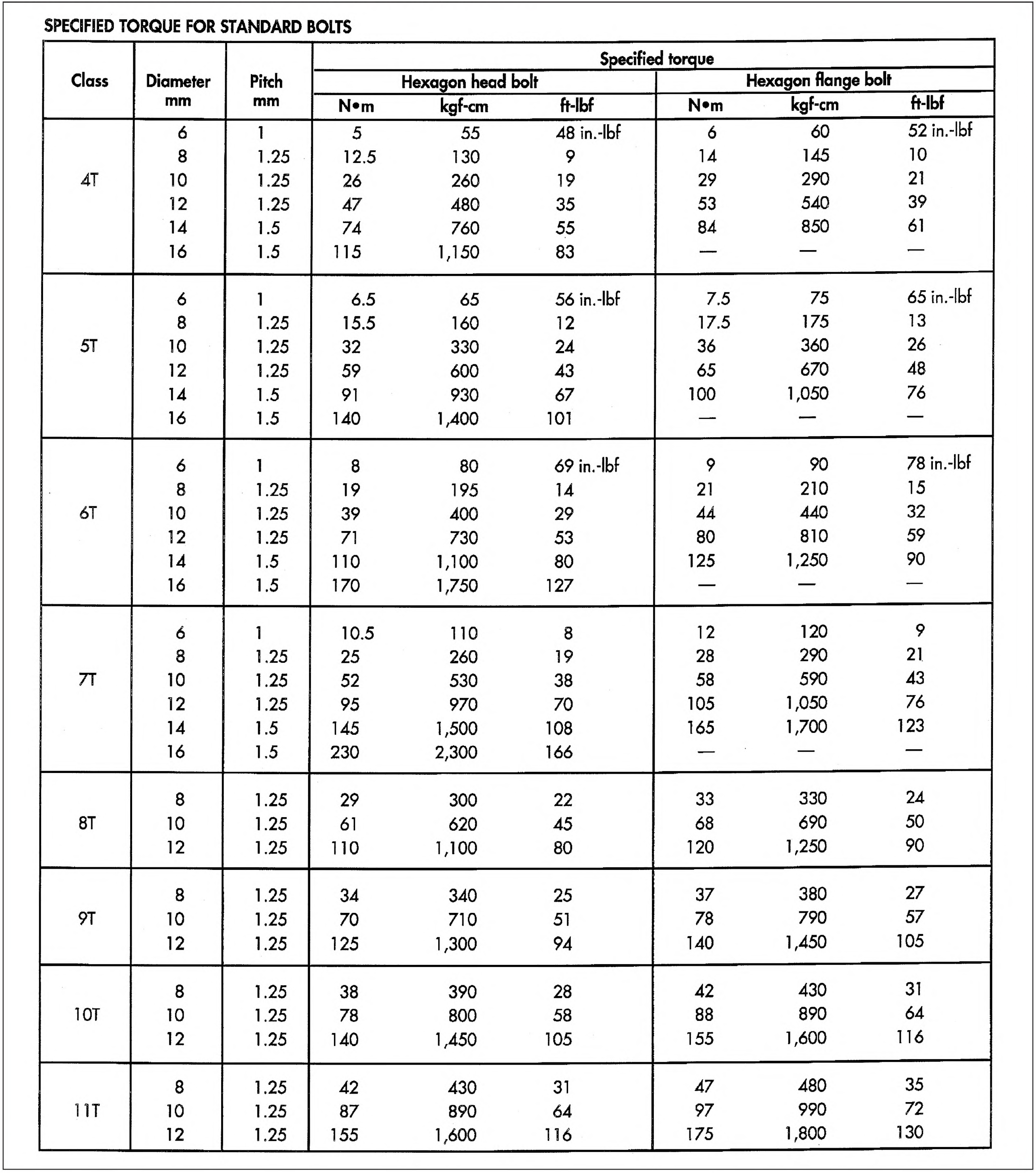
TORQUE REFERENCES

DESCRIPTION

Individual Torque Charts appear within many or the Groups. Refer to the Standard Torque Specifications Chart for torque references not listed in the individual torque charts.



SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N•m	kgf-cm	ft-lbf	N•m	kgf-cm	ft-lbf
4T	6	1	5	55	48 in.-lbf	6	60	52 in.-lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	—	—	—
5T	6	1	6.5	65	56 in.-lbf	7.5	75	65 in.-lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	—	—	—
6T	6	1	8	80	69 in.-lbf	9	90	78 in.-lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	—	—	—
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	—	—	—
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

LUBRICATION & MAINTENANCE

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FLUID TYPES

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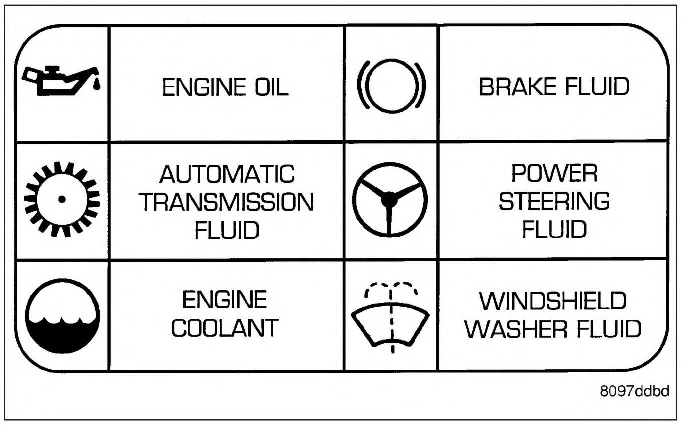
INTERNATIONAL SYMBOLS

DESCRIPTION

DaimlerChrysler Corporation uses international symbols to identify engine compartment lubricant and fluid inspection and fill locations.


ENGINE OIL
BRAKE FLUID
AUTOMATIC TRANSMISSION FLUID
POWER STEERING FLUID
ENGINE COOLANT
WINDSHIELD WASHER FLUID
8097ddbd

PARTS & LUBRICANT RECOMMENDATION

DESCRIPTION

LUBRICANT RECOMMENDATIONS

Chassis

Component	Fluid, Lubricant, or Genuine Part
Steering Gear & Linkage, Ball Joints, Prop Shafts & Yokes, Wheel Bearings	Mopar® Multi-Purpose Lubricant NLGI Grade 2 EP, GC-LB

Body

Component	Fluid, Lubricant, and Genuine Part
Hinges:	
Door & Hood	Mopar® Engine Oil
Swing Gate	Mopar® Multi-Purpose Lube NLGI Grade 2 EP, GC-LB
Latches: Door, Hood/Safety Catch, Swing Gate	Mopar® Multi-Purpose Lube NLGI Grade 2 EP, GC-LB
Seat Regulator & Track	Mopar® Multi-Purpose Lube NLGI Grade 2 EP, GC-LB
Lock Cylinders	Mopar® Lock Cylinder Lube

FLUID TYPES

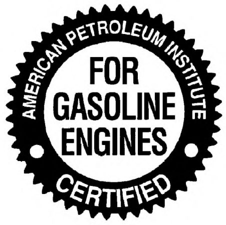
When service is required, DaimlerChrysler Corporation recommends that only Mopar® brand parts, lubricants and chemicals be used. Mopar® provides the best engineered products for servicing DaimlerChrysler Corporation vehicles.

Only lubricants bearing designations defined by the following organization should be used to service a Chrysler Corporation vehicle.

- Society of Automotive Engineers (SAE)
- American Petroleum Institute (API)
- National Lubricating Grease Institute (NLGI)

API QUALITY CLASSIFICATION

This symbol on the front of an oil container means that the oil has been certified by the American Petroleum Institute (API) to meet all the lubrication requirements specified by DaimlerChrysler Corporation.



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GEAR LUBRICANTS

SAE ratings also apply to multigrade gear lubricants. In addition, API classification defines the lubricants usage. Such as API GL-5 and SAE 75W-90.

FLUID TYPES

DESCRIPTION

ENGINE OIL

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

When service is required, DaimlerChrysler Corporation recommends that only Mopar® brand parts, lubricants and chemicals be used. Mopar® provides the best engineered products for servicing DaimlerChrysler Corporation vehicles.

Only lubricants bearing designations defined by the following organization should be used.

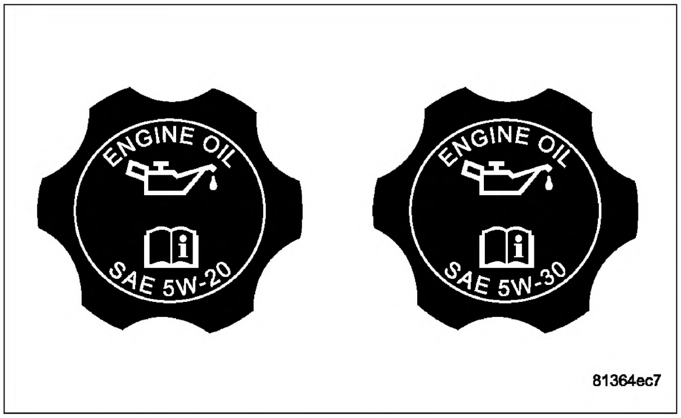
- Society of Automotive Engineers (SAE)
- American Petroleum Institute (API)
- National Lubricating Grease Institute (NLGI)
- Association des Constructeurs Européens d' Automobiles (European Automobile Manufacturers Association) (ACEA)

API SERVICE GRADE CERTIFIED

Use an engine oil that is API Certified. MOPAR® provides engine oils, that meet or exceed this requirement.

SAE VISCOSITY

An SAE viscosity grade is used to specify the viscosity of engine oil. Use only engine oils with multiple viscosities such as 5W-30 or 10W-30. These are specified with a dual SAE viscosity grade which indicates the cold-to-hot temperature viscosity range. **For 3.7L/4.7L engines SAE 5W-30 engine oil is recommended for all operating temperatures. For 5.7L engines, SAE 5W-20 engine oil is recommended for all operating temperatures. Vehicles with 5.7L engines equipped with Multiple Displacement System, (MDS), must use SAE 5W-20 oil. Failure to do so may result in improper operation of the Multiple Displacement System (MDS).These engine oils improve low temperature starting and vehicle fuel economy. Refer to your engine oil filler cap for the recommended engine oil viscosity for your vehicle.**



ACEA Categories

For countries that use the ACEA European Oil Categories for Service Fill Oils, use engine oils that meet the requirements of ACEA A1/B1, A2/B2, or A3/B3.

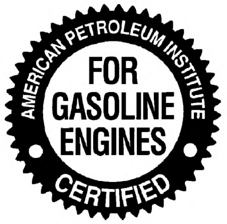
ENERGY CONSERVING OIL

An Energy Conserving type oil is recommended for gasoline engines. The designation of ENERGY CONSERVING is located on the label of an engine oil container.

CONTAINER IDENTIFICATION

Standard engine oil identification notations have been adopted to aid in the proper selection of engine oil. The identifying notations are located on the front label of engine oil plastic bottles and the top of engine oil cans.

This symbol means that the oil has been certified by the American Petroleum Institute (API). Diamler-Chrysler only recommend API Certified engine oils. Use Mopar® engine oil or equivalent.



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SYNTHETIC ENGINE OILS

There are a number of engine oils being promoted as either synthetic or semi-synthetic. If you chose to use such a product, use **only** those oils that meet the American Petroleum Institute (API) and SAE viscosity standard. Follow the service schedule that describes your driving type.

ENGINE OIL ADDITIVES/SUPPLEMENTS

The manufacturer **does not recommend** the addition of any engine oil additives/supplements to the specified engine oil. Engine oil additives/supplements should not be used to enhance engine oil performance. Engine oil additives/supplements should not be used to extend engine oil change intervals. No additive is known to be safe for engine durability and can degrade emission components. Additives can contain undesirable materials that harm the long term durability of engines by:

- Doubling the level of Phosphorus in the engine oil. The ILSAC (International Lubricant Standard Approval Committee) GF-2 and GF-3 standards require that engine oil contain no more than 0.10% Phosphorus to protect the vehicles emissions performance. Addition of engine oil additives/supplements can poison, from the added sulfur and phosphorus, catalysts and hinder efforts to guarantee emissions performance to 80,000 miles.
- Altering the viscosity characteristics of the engine oil so that it no longer meets the requirements of the specified viscosity grade.
- Creating potential for an undesirable additive compatibility interaction in the engine crankcase. Generally it is not desirable to mix additive packages from different suppliers in the crankcase; there have been reports of low temperature engine failures caused by additive package incompatibility with such mixtures.

GEAR LUBRICANTS

SAE ratings also apply to multigrade gear lubricants. In addition, API classification defines the lubricants usage. Such as API GL-5 and SAE 75W-90.

ENGINE COOLANT

ETHYLENE-GLYCOL MIXTURES

CAUTION: Richer antifreeze mixtures cannot be measured with normal field equipment and can cause problems associated with 100 percent ethylene-glycol.

The required ethylene-glycol (antifreeze) and water mixture depends upon the climate and vehicle operating conditions. The recommended mixture of 50/50 ethylene-glycol and water will provide protection against freezing to -37° C (-35° F). The antifreeze concentration **must always** be a minimum of 44 percent, year-round in all climates. **If percentage is lower than 44 percent, engine parts may be eroded by cavitation, and cooling system components may be severely damaged by corrosion.** Maximum protection against freezing is provided with a 68 percent antifreeze concentration, which prevents freezing down to -67.7° C (-90° F). A higher percentage will freeze at a warmer temperature. Also, a higher percentage of antifreeze can cause the engine to overheat because the specific heat of antifreeze is lower than that of water.

Use of 100 percent ethylene-glycol will cause formation of additive deposits in the system, as the corrosion inhibitive additives in ethylene-glycol require the presence of water to dissolve. The deposits act as insulation, causing temperatures to rise to as high as 149° C (300° F). This temperature is hot enough to melt plastic and soften solder. The increased temperature can result in engine detonation. In addition, 100 percent ethylene-glycol freezes at 22° C (-8° F).

PROPYLENE-GLYCOL MIXTURES

It's overall effective temperature range is smaller than that of ethylene-glycol. The freeze point of 50/50 propylene-glycol and water is -32° C (-26° F). 5° C higher than ethylene-glycol's freeze point. The boiling point (protection against summer boil-over) of propylene-glycol is 125° C (257° F) at 96.5 kPa (14 psi), compared to 128° C (263° F) for ethylene-glycol. Use of propylene-glycol can result in boil-over or freeze-up on a cooling system designed for ethylene-glycol. Propylene glycol also has poorer heat transfer characteristics than ethylene glycol. This can increase cylinder head temperatures under certain conditions.

Propylene-glycol/ethylene-glycol Mixtures can cause the destabilization of various corrosion inhibitors, causing damage to the various cooling system components. Also, once ethylene-glycol and propylene-glycol based coolants are mixed in the vehicle, conventional methods of determining freeze point will not be accurate. Both the refractive index and specific gravity differ between ethylene glycol and propylene glycol.

HOAT COOLANT

WARNING: ANTIFREEZE IS AN ETHYLENE-GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE-GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

CAUTION: Use of Propylene-Glycol based coolants is not recommended, as they provide less freeze protection and less corrosion protection.

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and engine block. Then coolant carries the heat to the radiator where the tube/ fin radiator can transfer the heat to the air.

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769), or the equivalent ethylene-glycol base coolant with organic corrosion inhibitors (called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% ethylene-glycol and 50% distilled water to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

CAUTION: Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769) may not be mixed with any other type of antifreeze. Mixing of coolants other than specified (non-HOAT or other HOAT), may result in engine damage that may not be covered under the new vehicle warranty, and decreased corrosion protection.

COOLANT PERFORMANCE

The required ethylene-glycol (antifreeze) and water mixture depends upon climate and vehicle operating conditions. The coolant performance of various mixtures follows:

Pure Water- Water can absorb more heat than a mixture of water and ethylene-glycol. This is for purpose of heat transfer only. Water also freezes at a higher temperature and allows corrosion.

100 percent Ethylene-Glycol - The corrosion inhibiting additives in ethylene-glycol need the presence of water to dissolve. Without water, additives form deposits in system. These act as insulation causing temperature to rise to as high as 149°C (300°F). This temperature is hot enough to melt plastic and soften solder. The increased temperature can result in engine detonation. In addition, 100 percent ethylene-glycol freezes at -22°C (-8°F).

50/50 Ethylene-Glycol and Water - Is the recommended mixture, it provides protection against freezing to -37°C (-34°F). The antifreeze concentration **must always** be a minimum of 44 percent, year-round in all climates. If percentage is lower, engine parts may be eroded by cavitation. Maximum protection against freezing is provided with a 68 percent antifreeze concentration, which prevents freezing down to -67.7°C (-90°F). A higher percentage will freeze at a warmer temperature. Also, a higher percentage of antifreeze can cause the engine to overheat because specific heat of antifreeze is lower than that of water.

CAUTION: Richer antifreeze mixtures cannot be measured with normal field equipment and can cause problems associated with 100 percent ethylene-glycol.

COOLANT SELECTION AND ADDITIVES

The use of aluminum cylinder blocks, cylinder heads and water pumps requires special corrosion protection. Only Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (glycol base coolant with corrosion inhibitors called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% distilled water to obtain to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

CAUTION: Do not use coolant additives that are claimed to improve engine cooling.

AXLE

NOTE: DaimlerChrysler recommends using Mopar® lubricants or lubricants of equal quality

FRONT AXLE

- 200MM - Mopar® Synthetic Gear Lubricant 75W-140

REAR AXLE

- 213MM - Mopar® Synthetic Gear Lubricant 75W-140

NOTE: Vari-lok® equipped axles require 118 ml (4 ounces) of Limited Slip Additive be added to the lubricant.

TRANSFER CASE

Recommended lubricant for the NV140 transfer case is Mopar® ATF+4, Automatic Transmission Fluid. Recommended lubricant for the NV245 transfer case is Mopar® NV245/247 Transfer Case Fluid.

AUTOMATIC TRANSMISSION FLUID

NOTE: Refer to Service Procedures in this group for fluid level checking procedures.

Mopar® ATF +4, Automatic Transmission Fluid is the recommended fluid for DaimlerChrysler automatic transmissions.

Dexron II fluid IS NOT recommended. Clutch chatter can result from the use of improper fluid.

Mopar® ATF +4, Automatic Transmission Fluid when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** ATF+4 also has a unique odor that may change with age. Consequently, odor and color cannot be used to indicate the fluid condition or the need for a fluid change.

FLUID ADDITIVES

DaimlerChrysler strongly recommends against the addition of any fluids to the transmission, other than those automatic transmission fluids listed above. Exceptions to this policy are the use of special dyes to aid in detecting fluid leaks.

Various “special” additives and supplements exist that claim to improve shift feel and/or quality. These additives and others also claim to improve converter clutch operation and inhibit overheating, oxidation, varnish, and sludge. These claims have not been supported to the satisfaction of DaimlerChrysler and these additives **must not be used.** The use of transmission “sealers” should also be avoided, since they may adversely affect the integrity of transmission seals.

POWER STEERING FLUID

This system requires the use of hydraulic system/power steering fluid which meets Daimler Chrysler specification MS-10838, such as Mopar part number 05142893AA, or equivalent, DO NOT MIX POWER STEERING FLUID TYPES. Damage may result to the power steering pump and system if any other fluid is used, and DO NOT OVER-FILL.

OPERATION - AUTOMATIC TRANSMISSION FLUID

The automatic transmission fluid is selected based upon several qualities. The fluid must provide a high level of protection for the internal components by providing a lubricating film between adjacent metal components. The fluid must also be thermally stable so that it can maintain a consistent viscosity through a large temperature range. If the viscosity stays constant through the temperature range of operation, transmission operation and shift feel will remain consistent. Transmission fluid must also be a good conductor of heat. The fluid must absorb heat from the internal transmission components and transfer that heat to the transmission case.

FLUID CAPACITIES

SPECIFICATIONS - FLUID CAPACITIES

DESCRIPTION	SPECIFICATION
FUEL TANK	20 U.S. Gallons (76 Liters)****
Engine Oil - with Filter - 3.7L	4.7 L (5.0 qts.)
Engine Oil - with Filter - 4.7L	5.6 L (6.0 qts.)
Engine Oil - with Filter - 5.7L	6.6 L (7.0 qts.)
Cooling System - 3.7L	10.0 L (9 qts.)***
Cooling System - 4.7L	13.7 L (14.5 qts.)***
Cooling System - 5.7L	13.7 L (14.5 qts.)***
POWER STEERING SYSTEM	
Power steering fluid capacities are dependent on engine/chassis options as well as steering gear/cooler options. Depending on type and size of internal cooler, length and inside diameter of cooler lines, or use of an auxiliary cooler, these capacities may vary. Refer to 19, Steering for proper fill and bleed procedures.	
AUTOMATIC TRANSMISSION	
Service Fill - 545RFE	2WD - 5.2 L (11 pts.) 4WD - 6.2 L (13 pts.)
Service Fill - NAG1	5.0 L (10.6 pts.)
O-haul Fill - 545RFE	13.33 L (28.0 pts.)
O-haul Fill - NAG1	7.7 L (16.3 pts)
Dry fill capacity Depending on type and size of internal cooler, length and inside diameter of cooler lines, or use of an auxiliary cooler, these figures may vary. (Refer to appropriate 21 - TRANSMISSION/AUTOMATIC/FLUID - STANDARD PROCEDURE).	
TRANSFER CASE	
NV140	0.65L (1.4 pts.)
NV245	1.8L (3.8 pts.)

DESCRIPTION	SPECIFICATION
FRONT AXLE ± 0.3 L (2 oz.)	
C200F	1.7 L (57.5 oz.)
C200FE	1.7 L (57.5 oz.)
REAR AXLE ± 0.3 L (2 oz.)	
C213R	2.07 L (70 oz.)*
C213RE	2.24L (75.5 oz.)
*Vari-Lok, add 0.07 L (2.5 oz.) of Friction Modifier.	
*** Includes 0.9L (1.0 qts.) for coolant reservoir.	
****Nominal refill capacities are shown. A variation may be observed from vehicle to vehicle due to manufacturing tolerance and refill procedure.	

FLUID FILL/CHECK LOCATIONS

INSPECTION - FLUID FILL/CHECK LOCATIONS

The fluid fill/check locations and lubrication points are located in each applicable group.

MAINTENANCE SCHEDULES

DESCRIPTION

MAINTENANCE SCHEDULES

There are two maintenance schedules that show the **required** service for your vehicle.

First is Schedule ″**B**″. It is for vehicles that are operated under the conditions that are listed below and at the beginning of the schedule.

- Day or night temperatures are below 32°F (0°C)
- Stop and go driving
- Excessive engine idling
- Driving in dusty conditions
- Short trips of less than 10 miles (16.2 km)
- More than 50% of your driving is at sustained high speeds during hot weather, above 90°F (32°C)
- Trailer towing
- Taxi, police, or delivery service (commercial service)
- Off-road or desert driving
- **If equipped for and operated with E-85 (ethanol) fuel.**

NOTE: Most vehicles are operated under the conditions listed for Schedule “B.”

NOTE: If ANY of these apply to you, change your engine oil every 3,000 miles (5 000 km) or 3 months, whichever comes first, and follow the maintenance recommendations in “Maintenance Schedule B.”

NOTE: If ANY of these apply to you then flush and replace your engine coolant every 102,000 miles (163 000 km) or 60 months, whichever comes first, and follow “Schedule B” of the “Maintenance Schedules” section of this manual.

Second is Schedule “**A**”. It is for vehicles that are not operated under any of the conditions listed under Schedule “B.”

Use the schedule that best describes your driving conditions. Where time and mileage are listed, follow the interval that occurs first.

CAUTION: Failure to perform the required maintenance items may result in damage to the vehicle.

At Each Stop for Fuel

- Check the engine oil level about 5 minutes after a fully warmed engine is shut off. Checking the oil level while the vehicle is on level ground will improve the accuracy of the oil level reading. Add oil only when the level is at or below the ADD or MIN mark.
- Check the windshield washer solvent, add as required.

Once a Month

- Check the tire pressure and look for unusual wear or damage.
- Inspect the battery and clean and tighten the terminals as required.
- Check the fluid levels of the coolant reservoir, brake master cylinder, and transmission, and add as needed.
- Check all lights and all other electrical items for correct operation.

At Each Oil Change

- Change the engine oil filter.
- Inspect the exhaust system.
- Inspect brake hoses.
- Check the engine coolant/anti-freeze level, hoses, and clamps.
- After completion of off-road operation, the underside of the vehicle should be thoroughly inspected. Examine threaded fasteners for looseness.

Schedule “B”

Follow this schedule if you usually operate your vehicle under one or more of the following conditions.

- Day or night temperatures are below 32°F (0°C)
- Stop and go driving
- Excessive engine idling
- Driving in dusty conditions
- Short trips of less than 10 miles (16.2 km)
- More than 50% of your driving is at sustained high speeds during hot weather, above 90°F (32°C)
- Trailer towing
- Taxi, police, or delivery service (commercial service)
- Off-road or desert driving
- **If equipped for and operated with E-85 (ethanol) fuel.**

NOTE: If ANY of these apply to you, change your engine oil every 3,000 miles (5 000 km) or 3 months, whichever comes first, and follow the maintenance recommendations in “Maintenance Schedule B.”

NOTE: If ANY of these apply to you then flush and replace your engine coolant every 102,000 miles (163 000 km) or 60 months, whichever comes first, and follow “Schedule B” of the “Maintenance Schedules” section of this manual.

Miles (Kilometers)	**3,000 (5 000)**	**6,000 (10 000)**	**9,000 (14 000)**	**12,000 (19 000)**	**15,000 (24 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Drain and refill the front and rear axles.				X	
Inspect the brake linings.				X	
Clean and lubricate the brake caliper pins.				X	

Miles **(Kilometers)**	**18,000** **(29 000)**	**21,000** **(34 000)**	**24,000** **(38 000)**	**27,000** **(43 000)**	**30,000** **(48 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Drain and refill the front and rear axles.			X		
Inspect the brake linings.			X		
Clean and lubricate the brake caliper pins.			X		
Drain the transfer case and refill.					X

Miles **(Kilometers)**	**33,000** **(53 000)**	**36,000** **(58 000)**	**39,000** **(62 000)**	**42,000** **(67 000)**	**45,000** **(72 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Drain and refill the front and rear axles.		X			
Inspect the brake linings.		X			
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Clean and lubricate the brake caliper pins.		X			

Miles **(Kilometers)**	**48,000** **(77 000)**	**51,000** **(82 000)**	**54,000** **(86 000)**	**57,000** **(91 000)**	**60,000** **(96 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Inspect the ignition cables, replace if necessary (5.7L Only).					X
Inspect drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Clean and lubricate brake caliper pins.	X				X
Inspect the brake linings.	X				X
Drain and refill the front and rear axles.	X				X
Drain and refill the automatic transmission fluid, and replace main sump filter (4.7L/5.7L Only).‡					X

Miles **(Kilometers)**	**48,000** **(77 000)**	**51,000** **(82 000)**	**54,000** **(86 000)**	**57,000** **(91 000)**	**60,000** **(96 000)**
Drain and refill the transfer case fluid.					X
Flush and replace engine coolant/anti-freeze at 60 months, if not done at 102,000 miles (163 000 km).					X

NOTE: ‡ Applies only if vehicle is used for frequent trailer towing, or fleet/commercial service.

Miles **(Kilometers)**	**63,000** **(101 000)**	**66,000** **(106 000)**	**69,000** **(110 000)**	**72,000** **(115 000)**	**75,000** **(120 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Inspect the brake linings.				X	
Clean and lubricate the brake caliper pins.				X	
Drain and refill the front and rear axle fluid.				X	

Miles **(Kilometers)**	**78,000** **(125 000)**	**81,000** **(130 000)**	**84,000** **(134 000)**	**87,000** **(139 000)**	**90,000** **(144 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Drain and refill the transfer case fluid.					X
Inspect the brake linings.			X		
Clean and lubricate the brake caliper pins.			X		
Drain and refill the front and rear axle fluid.			X		

Miles **(Kilometers)**	**93,000** **(149 000)**	**96,000** **(154 000)**	**99,000** **(158 000)**	**102,000** **(163 000)**	**105,000** **(168 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Inspect the brake linings.		X			
Clean and lubricate the brake caliper pins.		X			
Drain and refill the front and rear axle fluid.		X			
Flush and replace the engine coolant/anti-freeze, if not done at 60 months.				X	

Miles **(Kilometers)**	**108,000** **(173 000)**	**111,000** **(178 000)**	**114,000** **(182 000)**	**117,000** **(187 000)**	**120,000** **(192 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Inspect the ignition cables, replace if necessary (5.7L Only).					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Inspect the brake linings.	X				X
Clean and lubricate the brake caliper pins.	X				X
Drain and refill the front and rear axle fluid.	X				X
Drain and refill the automatic transmission fluid, replace main sump filter, and spin-on cooler return filter (if equipped). (4.7L/5.7L Only).‡					X
Drain and refill the transfer case fluid.					X
Flush and replace the engine coolant/anti-freeze at 120 months, if not replaced at 102,000 miles (163 000 km).					X

NOTE: ‡ Applies only if vehicle is used for frequent trailer towing, or fleet/commercial service.

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

◊ This maintenance is recommended by the manufacturer to the owner, but is not required to maintain emissions warranty.

Schedule “A”

Miles **(Kilometers)** **[Months]**	**6,000** **(10 000)** **[6]**	**12,000** **(19 000)** **[12]**	**18,000** **(29 000)** **[18]**	**24,000** **(38 000)** **[24]**	**30,000** **(48 000)** **[30]**
Change the engine oil and engine oil filter.	X	X	X	X	X
Rotate the tires.	X	X	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.					X
Replace the spark plugs.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Inspect the brake linings.			X		
Clean and lubricate the brake caliper pins.			X		
Drain the transfer case and refill.					X

Miles **(Kilometers)** **[Months]**	**36,000** **(58 000)** **[36]**	**42,000** **(67 000)** **[42]**	**48,000** **(77 000)** **[48]**	**54, 000** **(86 000)** **[54]**
Change the engine oil and engine oil filter.	X	X	X	X
Rotate the tires.	X	X	X	X
Inspect the brake linings.	X			X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X	
Clean and lubricate the brake caliper pins.	X			X

Miles **(Kilometers)** **[Months]**	**60,000** **(96 000)** **[60]**	**66,000** **(106 000)** **[66]**	**72,000** **(115 000)** **[72]**	**78,000** **(125 000)** **[78]**
Change the engine oil and engine oil filter.	X	X	X	X
Rotate the tires.	X	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.	X			
Inspect the PCV Valve, replace if necessary. ◊	X			
Replace the spark plugs.	X			
Inspect the ignition cables, replace if necessary (5.7L Only).	X			
Inspect the drive belt, replace if necessary.	X			
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X	
Flush and replace the engine coolant/anti-freeze, at 60 months if not done at 102,000 miles (163 000 km).	X			
Inspect the brake linings.			X	
Clean and lubricate the brake caliper pins.			X	
Drain the transfer case and refill.	X			

Miles **(Kilometers)** **[Months]**	**84,000** **(134 000)** **[84]**	**90,000** **(144 000)** **[90]**	**96,000** **(154 000)** **[96]**	**102, 000** **(163 000)** **[102]**
Change the engine oil and engine oil filter.	X	X	X	X
Rotate the tires.	X	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.		X		
Inspect the PCV Valve, replace if necessary. ◊		X		
Replace the spark plugs.		X		
Inspect the drive belt, replace if necessary.		X		
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X	
Clean and lubricate the brake caliper pins.		X		
Inspect the brake linings.		X		
Flush and replace the engine coolant/anti-freeze if not replaced at 60 months.				X
Drain the transfer case and refill.		X		

Miles **(Kilometers)** **[Months]**	**108,000** **(173 000)** **[108]**	**114,000** **(182 000)** **[114]**	**120,000** **(192 000)** **[120]**
Change the engine oil and engine oil filter.	X	X	X
Rotate the tires.	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.			X
Inspect the PCV Valve, replace if necessary. ◊			X
Replace the spark plugs.			X
Inspect the ignition cables, replace if necessary (5.7L Only).			X
Inspect the drive belt, replace if necessary.			X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X
Inspect the brake linings.	X		
Clean and lubricate the brake caliper pins.	X		
Flush and replace the engine coolant/anti-freeze if not done at 102,000 miles (163 000 km).			X
Drain the transfer case and refill.			X

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

◊ This maintenance is recommended by the manufacturer to the owner, but is not required to maintain emissions warranty.

WARNING: You can be badly injured working on or around a motor vehicle. Do only that service work for which you have the proper equipment. If you have any doubt about your ability to perform a service job, take your vehicle to a competent mechanic.

MAINTENANCE SCHEDULES - GASOLINE ENGINES - EXPORT

There are two maintenance schedules that show the **required** service for your vehicle.

First is Schedule ″**B**″. It is for vehicles that are operated under the conditions that are listed below and at the beginning of the schedule.

- Day or night temperatures are below 32°F (0°C)
- Stop and go driving
- Excessive engine idling
- Driving in dusty conditions
- Short trips of less than 10 miles (16.2 km)
- More than 50% of your driving is at sustained high speeds during hot weather, above 90°F (32°C)
- Trailer towing
- Taxi, police, or delivery service (commercial service)
- Off-road or desert driving
- **If equipped for and operated with E-85 (ethanol) fuel.**

NOTE: Most vehicles are operated under the conditions listed for Schedule “B.”

NOTE: If ANY of these apply to you, change your engine oil every 3,000 miles (5 000 km) or 3 months, whichever comes first, and follow the maintenance recommendations in “Maintenance Schedule B.”

NOTE: If ANY of these apply to you then flush and replace your engine coolant every 102,000 miles (163 000 km) or 60 months, whichever comes first, and follow “Schedule B” of the “Maintenance Schedules” section of this manual.

Second is Schedule “**A**”. It is for vehicles that are not operated under any of the conditions listed under Schedule “B.”

Use the schedule that best describes your driving conditions. Where time and mileage are listed, follow the interval that occurs first.

CAUTION: Failure to perform the required maintenance items may result in damage to the vehicle.

At Each Stop for Fuel

- Check the engine oil level about 5 minutes after a fully warmed engine is shut off. Checking the oil level while the vehicle is on level ground will improve the accuracy of the oil level reading. Add oil only when the level is at or below the ADD or MIN mark.
- Check the windshield washer solvent, add as required.

Once a Month

- Check the tire pressure and look for unusual wear or damage.
- Inspect the battery and clean and tighten the terminals as required.
- Check the fluid levels of the coolant reservoir, brake master cylinder, and transmission, and add as needed.
- Check all lights and all other electrical items for correct operation.

At Each Oil Change

- Change the engine oil filter.
- Inspect the exhaust system.
- Inspect brake hoses.
- Check the engine coolant/anti-freeze level, hoses, and clamps.
- After completion of off-road operation, the underside of the vehicle should be thoroughly inspected. Examine threaded fasteners for looseness.

Schedule “B”

Follow this schedule if you usually operate your vehicle under one or more of the following conditions.

- Day or night temperatures are below 32°F (0°C)
- Stop and go driving
- Excessive engine idling
- Driving in dusty conditions
- Short trips of less than 10 miles (16.2 km)
- More than 50% of your driving is at sustained high speeds during hot weather, above 90°F (32°C)
- Trailer towing
- Taxi, police, or delivery service (commercial service)
- Off-road or desert driving
- **If equipped for and operated with E-85 (ethanol) fuel.**

NOTE: If ANY of these apply to you, change your engine oil every 3,000 miles (5 000 km) or 3 months, whichever comes first, and follow the maintenance recommendations in “Maintenance Schedule B.”

NOTE: If ANY of these apply to you then flush and replace your engine coolant every 102,000 miles (163 000 km) or 60 months, whichever comes first, and follow “Schedule B” of the “Maintenance Schedules” section of this manual.

Miles **(Kilometers)**	**3,000** **(5 000)**	**6,000** **(10 000)**	**9,000** **(14 000)**	**12,000** **(19 000)**	**15,000** **(24 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Drain and refill the front and rear axles.				X	
Inspect the brake linings.				X	
Clean and lubricate the brake caliper pins.				X	

Miles **(Kilometers)**	**18,000** **(29 000)**	**21,000** **(34 000)**	**24,000** **(38 000)**	**27,000** **(43 000)**	**30,000** **(48 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Drain and refill the front and rear axles.			X		
Inspect the brake linings.			X		
Clean and lubricate the brake caliper pins.			X		
Drain the transfer case and refill.					X

Miles **(Kilometers)**	**33,000** **(53 000)**	**36,000** **(58 000)**	**39,000** **(62 000)**	**42,000** **(67 000)**	**45,000** **(72 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Drain and refill the front and rear axles.		X			
Inspect the brake linings.		X			
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Clean and lubricate the brake caliper pins.		X			

Miles **(Kilometers)**	**48,000** **(77 000)**	**51,000** **(82 000)**	**54,000** **(86 000)**	**57,000** **(91 000)**	**60,000** **(96 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Inspect the ignition cables, replace if necessary (5.7L Only).					X
Inspect drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Clean and lubricate brake caliper pins.	X				X
Inspect the brake linings.	X				X
Drain and refill the front and rear axles.	X				X
Drain and refill the automatic transmission fluid, and replace main sump filter (4.7L/5.7L Only).‡					X
Drain and refill the transfer case fluid.					X
Flush and replace engine coolant/anti-freeze at 60 months, if not done at 102,000 miles (163 000 km).					X

NOTE: ‡ Applies only if vehicle is used for frequent trailer towing, or fleet/commercial service.

Miles **(Kilometers)**	**63,000** **(101 000)**	**66,000** **(106 000)**	**69,000** **(110 000)**	**72,000** **(115 000)**	**75,000** **(120 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Inspect the brake linings.				X	
Clean and lubricate the brake caliper pins.				X	
Drain and refill the front and rear axle fluid.				X	

Miles **(Kilometers)**	**78,000** **(125 000)**	**81,000** **(130 000)**	**84,000** **(134 000)**	**87,000** **(139 000)**	**90,000** **(144 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Drain and refill the transfer case fluid.					X
Inspect the brake linings.			X		
Clean and lubricate the brake caliper pins.			X		
Drain and refill the front and rear axle fluid.			X		

Miles **(Kilometers)**	**93,000** **(149 000)**	**96,000** **(154 000)**	**99,000** **(158 000)**	**102,000** **(163 000)**	**105,000** **(168 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.		X		X	
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Inspect the brake linings.		X			
Clean and lubricate the brake caliper pins.		X			
Drain and refill the front and rear axle fluid.		X			
Flush and replace the engine coolant/anti-freeze, if not done at 60 months.				X	

Miles **(Kilometers)**	**108,000** **(173 000)**	**111,000** **(178 000)**	**114,000** **(182 000)**	**117,000** **(187 000)**	**120,000** **(192 000)**
Change the engine oil and engine oil filter, if not replaced at 3 months.	X	X	X	X	X
Rotate the tires.	X		X		X
Inspect the engine air cleaner filter, replace if necessary.					X
Inspect the PCV Valve, replace if necessary. ◊					X
Replace the spark plugs.					X
Inspect the ignition cables, replace if necessary (5.7L Only).					X
Inspect the drive belt, replace if necessary.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X		X
Inspect the brake linings.	X				X
Clean and lubricate the brake caliper pins.	X				X
Drain and refill the front and rear axle fluid.	X				X
Drain and refill the automatic transmission fluid, replace main sump filter, and spin-on cooler return filter (if equipped). (4.7L/5.7L Only).‡					X
Drain and refill the transfer case fluid.					X
Flush and replace the engine coolant/anti-freeze at 120 months, if not replaced at 102,000 miles (163 000 km).					X

NOTE: ‡ Applies only if vehicle is used for frequent trailer towing, or fleet/commercial service.

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

◊ This maintenance is recommended by the manufacturer to the owner, but is not required to maintain emissions warranty.

Schedule “A

Miles **(Kilometers)** **[Months]**	**6,000** **(10 000)** **[6]**	**12,000** **(19 000)** **[12]**	**18,000** **(29 000)** **[18]**	**24,000** **(38 000)** **[24]**	**30,000** **(48 000)** **[30]**
Change the engine oil and engine oil filter.	X	X	X	X	X
Rotate the tires.	X	X	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.					X
Replace the spark plugs.					X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.		X		X	
Inspect the brake linings.			X		
Clean and lubricate the brake caliper pins.			X		
Drain the transfer case and refill.					X

Miles **(Kilometers)** **[Months]**	**36,000** **(58 000)** **[36]**	**42,000** **(67 000)** **[42]**	**48,000** **(77 000)** **[48]**	**54, 000** **(86 000)** **[54]**
Change the engine oil and engine oil filter.	X	X	X	X
Rotate the tires.	X	X	X	X
Inspect the brake linings.	X			X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X	
Clean and lubricate the brake caliper pins.	X			X

Miles **(Kilometers)** **[Months]**	**60,000** **(96 000)** **[60]**	**66,000** **(106 000)** **[66]**	**72,000** **(115 000)** **[72]**	**78,000** **(125 000)** **[78]**
Change the engine oil and engine oil filter.	X	X	X	X
Rotate the tires.	X	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.	X			
Inspect the PCV Valve, replace if necessary. ◊	X			
Replace the spark plugs.	X			
Inspect the ignition cables, replace if necessary (5.7L Only).	X			
Inspect the drive belt, replace if necessary.	X			
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X	
Flush and replace the engine coolant/anti-freeze, at 60 months if not done at 102,000 miles (163 000 km).	X			
Inspect the brake linings.			X	
Clean and lubricate the brake caliper pins.			X	
Drain the transfer case and refill.	X			

Miles **(Kilometers)** **[Months]**	**84,000** **(134 000)** **[84]**	**90,000** **(144 000)** **[90]**	**96,000** **(154 000)** **[96]**	**102, 000** **(163 000)** **[102]**
Change the engine oil and engine oil filter.	X	X	X	X
Rotate the tires.	X	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.		X		
Inspect the PCV Valve, replace if necessary. ◊		X		
Replace the spark plugs.		X		
Inspect the drive belt, replace if necessary.		X		
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X	
Clean and lubricate the brake caliper pins.		X		
Inspect the brake linings.		X		
Flush and replace the engine coolant/anti-freeze if not replaced at 60 months.				X
Drain the transfer case and refill.		X		

Miles **(Kilometers)** **[Months]**	**108,000** **(173 000)** **[108]**	**114,000** **(182 000)** **[114]**	**120,000** **(192 000)** **[120]**
Change the engine oil and engine oil filter.	X	X	X
Rotate the tires.	X	X	X
Inspect the engine air cleaner filter, and replace if necessary.			X
Inspect the PCV Valve, replace if necessary. ◊			X
Replace the spark plugs.			X
Inspect the ignition cables, replace if necessary (5.7L Only).			X
Inspect the drive belt, replace if necessary.			X
Lubricate the upper knuckle ball stud at steering & suspension ball joints.	X		X
Inspect the brake linings.	X		
Clean and lubricate the brake caliper pins.	X		
Flush and replace the engine coolant/anti-freeze if not done at 102,000 miles (163 000 km).			X
Drain the transfer case and refill.			X

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

◊ This maintenance is recommended by the manufacturer to the owner, but is not required to maintain emissions warranty.

WARNING: You can be badly injured working on or around a motor vehicle. Do only that service work for which you have the knowledge and the right equipment. If you have any doubt about your ability to perform a service job, take your vehicle to a competent mechanic.

SUSPENSION

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WHEEL ALIGNMENT

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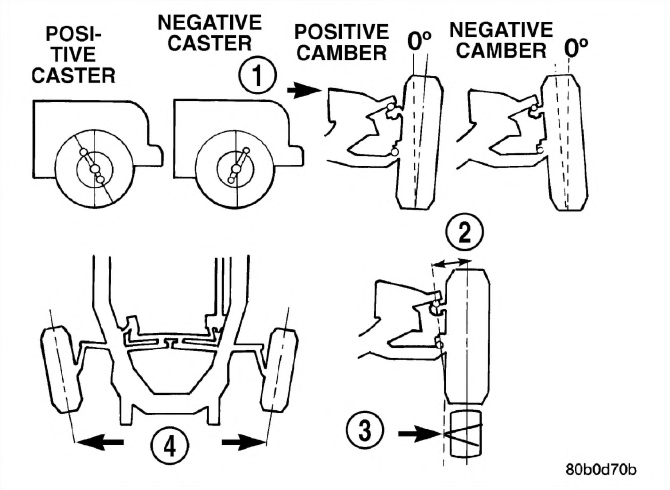
WHEEL ALIGNMENT

DESCRIPTION

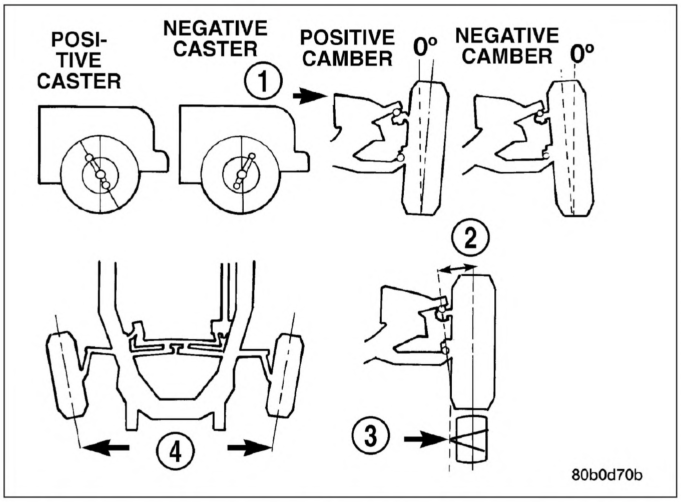
NOTE: Suspension components with rubber/urethane bushings should be tightened with the vehicle at normal ride height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur.

Wheel alignment involves the correct positioning of the wheels in relation to the vehicle. The positioning is accomplished through suspension and steering linkage adjustments. An alignment is considered essential for efficient steering, good directional stability and to minimize tire wear. The most important measurements of an alignment are caster, camber and toe.



CAUTION: Never attempt to modify suspension or steering components by heating or bending.

OPERATION



- **CASTER (1)** is the forward or rearward tilt of the steering knuckle from vertical. Tilting the top of the knuckle forward provides less positive caster. Tilting the top of the knuckle rearward provides more positive caster. Positive caster promotes directional stability. This angle enables the front wheels to return to a straight ahead position after turns.
- **CAMBER (2)** is the inward or outward tilt of the wheel relative to the center of the vehicle. Tilting the top of the wheel inward provides negative camber. Tilting the top of the wheel outward provides positive camber. Incorrect camber will cause wear on the inside or outside edge of the tire.
- **TOE (4)** is the difference between the leading inside edges and trailing inside edges of the front tires. Wheel toe position out of specification cause's unstable steering, uneven tire wear and steering wheel off- center. The wheel toe position is the **final** front wheel alignment adjustment.
- **THRUST ANGLE (3)** is the angle of the rear axle relative to the centerline of the vehicle. Incorrect thrust angle can cause off-center steering and excessive tire wear. This angle is not adjustable, damaged component(s) must be replaced to correct the thrust angle.

DIAGNOSIS AND TESTING

PRE-ALIGNMENT INSPECTION

Before starting wheel alignment, the following inspection and necessary corrections must be completed. Refer to Suspension and Steering System Diagnosis Chart below for additional information.

1. Inspect tires for size, air pressure and tread wear.
2. Inspect front wheel bearings for wear.
3. Inspect front wheels for excessive radial or lateral runout and balance.
4. Inspect ball studs, linkage pivot points and steering gear for looseness, roughness or binding.
5. Inspect suspension components for wear and noise.
6. Check suspension ride height.
7. Road test the vehicle.

SUSPENSION AND STEERING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
FRONT END NOISE	1. Loose or worn wheel bearing.	1. Replace wheel bearing.
	2. Loose or worn steering or suspension components.	2. Tighten or replace components as necessary.
	3. Loose or worn steering or suspension components.	3. Tighten or replace components as necessary.
EXCESSIVE PLAY IN STEERING	1. Loose or worn wheel bearing.	1. Replace wheel bearing.
	2. Loose or worn steering or suspension components.	2. Tighten or replace components as necessary.
	3. Loose or worn steering gear.	3. Replace steering gear.
FRONT WHEELS SHIMMY	1. Loose or worn wheel bearing.	1. Replace wheel bearing.
	2. Loose or worn steering or suspension components.	2. Tighten or replace components as necessary.
	3. Tires worn or out of balance.	3. Replace or balance tires.
	4. Alignment.	4. Align vehicle to specifications.
VEHICLE INSTABILITY	1. Loose or worn wheel bearing.	1. Replace wheel bearing.
	2. Loose or worn steering or suspension components.	2. Tighten or replace components as necessary.
	3. Tire pressure.	3. Adjust tire pressure.
	4. Alignment.	4. Align vehicle to specifications.
EXCESSIVE STEERING EFFORT	1. Loose or worn steering gear.	1. Replace steering gear.
	2. Column coupler binding.	2. Replace coupler.
	3. Tire pressure.	3. Adjust tire pressure.
	4. Alignment.	4. Align vehicle to specifications.
VEHICLE PULLS TO ONE SIDE	1. Tire pressure.	1. Adjust tire pressure.
	2. Tire.	2. Criss-Cross Front Tires.
	3. Alignment.	3. Align vehicle to specifications.
	4. Loose or worn steering or suspension components.	4. Tighten or replace components as necessary.
	5. Radial tire lead.	5. Rotate or replace tire as necessary.
	6. Brake pull.	6. Repair brake as necessary.
	8. Ride height.	8. Measure and adjust ride height.

STANDARD PROCEDURE

CAMBER, CASTER AND TOE ADJUSTMENT

NOTE: SUSPENSION HEIGHT MEASUREMENT MUST BE PERFORMED BEFORE AN ALIGNMENT.

Camber and caster angle adjustments involve changing the position of the lower control arm with the slots in the frame brackets to move the lower control arm inwards or outwards for proper adjustment. **This can be achieved by using a long pry bar with a curved tip and inserting the pry bar into the lower control arm frame brackets and prying inwards or outwards.**

NOTE: Camber and caster adjustments must be made at the lower control arm Do not use the upper control arm for Camber and Caster adjustments.

NOTE: When the lower control arm pivot bolts are loosened the lower control arm will normally go outwards automatically with the weight of the vehicle.

CASTER

Moving the rear position of the lower control arm at the frame in or out, will change the caster angle significantly and camber angle only slightly. To maintain the camber angle while adjusting caster, move the rear of the lower control arm in or out. Then move the front of the lower control arm slightly in the opposite direction.

CAMBER

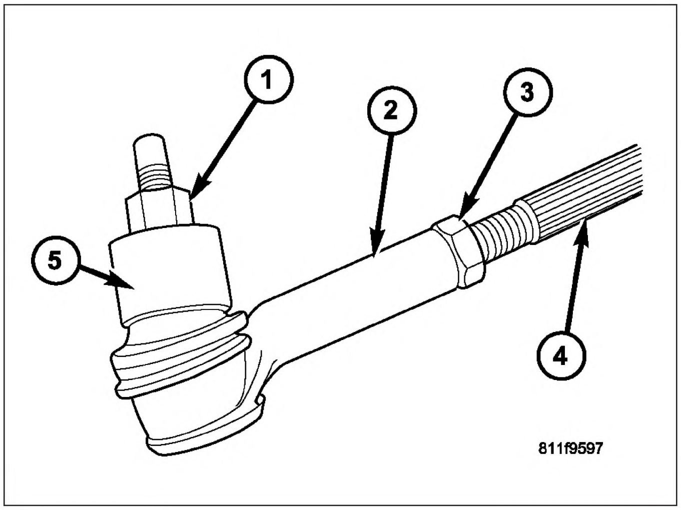
Move both the front and rear of the lower control arm together in or out. This will change the camber angle significantly and caster angle slightly.

After adjustment is made tighten the lower control arm bolt & nuts to **FRONT**169 N·m (125 ft. lbs.) and the **REAR** 88 N·m (65 ft. lbs.).

TOE ADJUSTMENT

The wheel toe position adjustment is the final adjustment.

1. Start the engine and turn wheels both ways before straightening the wheels. Secure the steering wheel with the front wheels in the straight-ahead position.
2. Loosen the tie rod jam nuts (3).



NOTE: Each front wheel should be adjusted for one-half of the total toe position specification. This will ensure the steering wheel will be centered when the wheels are positioned straight-ahead.

3. Adjust the wheel toe position by turning the inner tie rod (4) as necessary.
4. Tighten the tie rod jam nut (3) to 75N·m (55 ft. lbs.).
5. Verify the specifications.
6. Turn off engine.

TOE ADJUSTMENT

SUSPENSION HEIGHT MESUREMENT MUST BE PERFORMED BEFORE AN ALIGNMENT.

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1. Start the engine and turn wheels both ways before straightening the wheels. Secure the steering wheel with the front wheels in the straight-ahead position.
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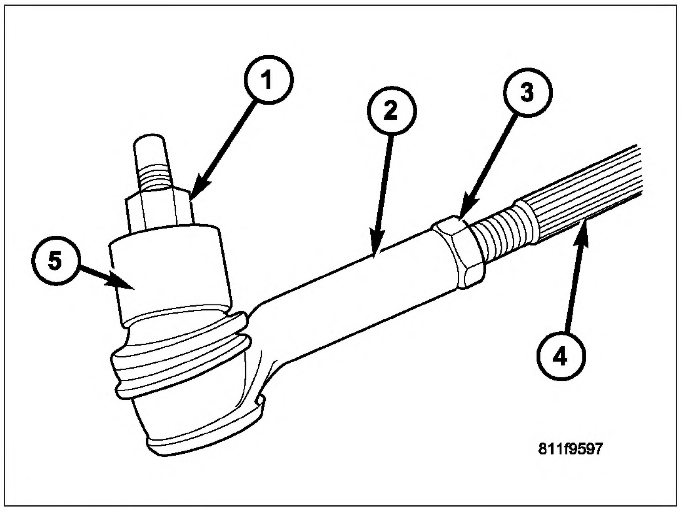

3. Adjust the wheel toe position by turning the inner tie rod (4) as necessary.
4. Tighten the tie rod jam nut (3) to 75N·m (55 ft. lbs.).
5. Verify the specifications.
6. Turn off engine.

SPECIFICATIONS

ALIGNMENT

NOTE: Specifications are in degrees.

FRONT

SPECIFICATIONS

DESCRIPTION	SPECIFICATION		
PREFERRED	CASTER 4.0°	CAMBER − 0.25°	TOTAL TOE-IN + 0.25°
RANGE	3.55° to 4.45°	+ 0.15° to - 0.70°	0° to + 0.5°
MAX RT/LT DIFFERENCE	0.5°	0.5°	0.5°

REAR AXLE

SPECIFICATIONS

DESCRIPTION	SPECIFICATION		
PREFERRED	CAMBER -.25°	THRUST ANGLE 0°	TOTAL TOE-IN +.25°
RANGE	0° ± 0.5°	0° ± 0.25°	0° + 0.5°

FRONT

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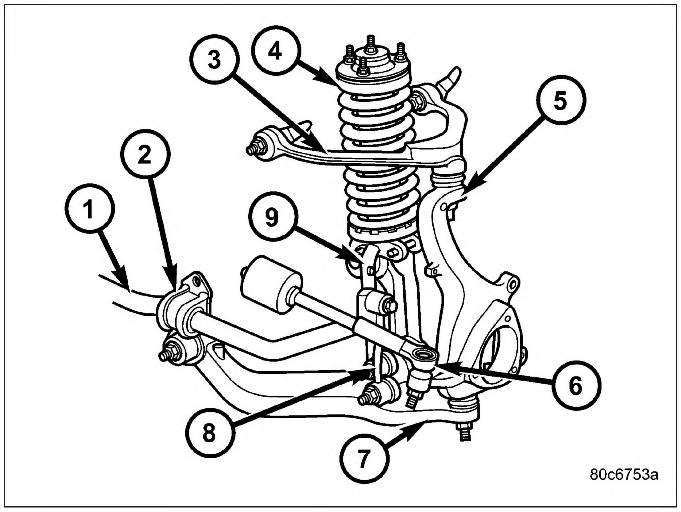
FRONT

DESCRIPTION

NOTE: Suspension components with rubber/urethane bushings should be tightened with the vehicle at normal ride height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur.

The front suspension is designed to allow each wheel to adapt to different road surfaces independently. The wheels are mounted to hub bearings on the steering knuckle spindles. The double-row hub bearings are sealed and lubricated for life. The steering knuckles turn (pivot) on ball joints integral to the outboard portion of the upper control arms and pressed into the lower steering knuckle. The ball joints are lubricated for life.



SPECIFICATIONS

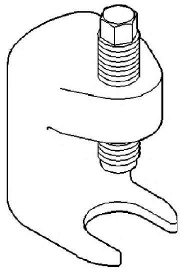
TORQUE CHART

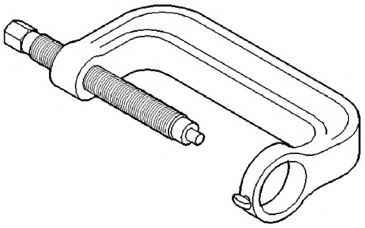
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Shock Absorber Upper Nuts	95	70	—
Shock Absorber Clevis Bracket	81	60	—
Clevis Bracket to Lower Control Arm	169	125	—
Upper Control Arm Bolt/Nut to Body	122	90	—
Lower Control Arm Bolt	142	105	—
Lower Control Arm Bolt/Nut Front Pivot	169	125	—
Upper Ball Joint Nut	75	55	—
Lower Ball Joint Nut	95	70	—
Stabilizer Bar Retainer Bolts	142	105	—
Stabilizer Bar Link Upper Nut	135	100	—
Stabilizer Bar Link Lower Bolt	115	85	—
Hub Bearing Knuckle Bolts	136	100	—

SPECIAL TOOLS

FRONT SUSPENSION





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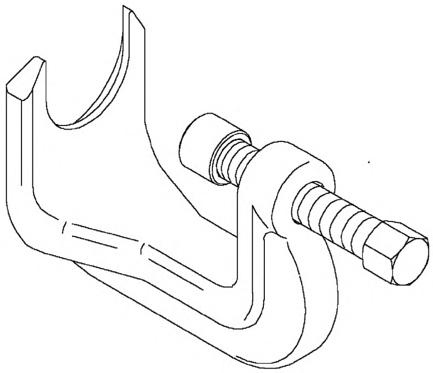
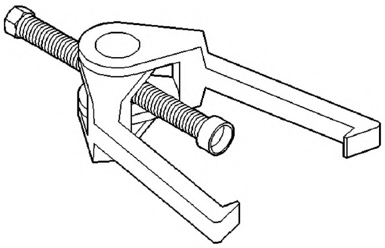
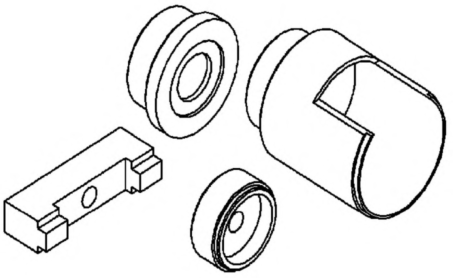
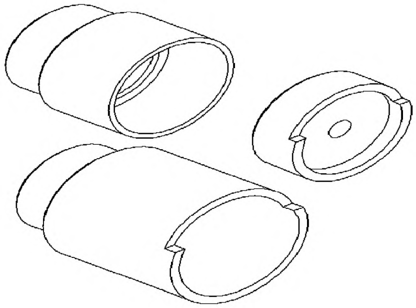


PULLER - 8677

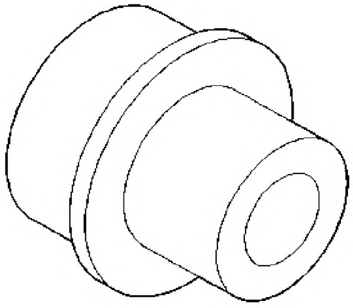




CLEVIS BUSHING - 9653



BALL JOINT - 9654



BALL JOINT - C-4212-3

BUSHINGS

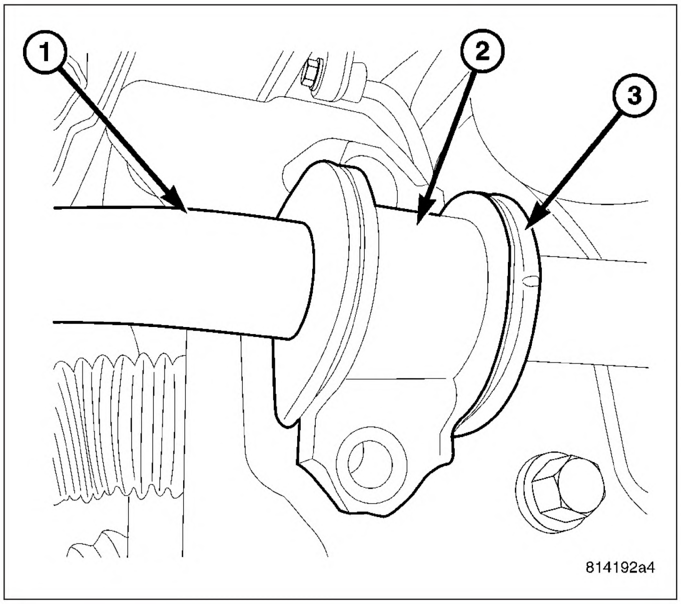
DESCRIPTION

Suspension components with rubber/urethane bushings should be tightened with the vehicle at normal ride height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort could be affected and premature bushing wear may occur.

REMOVAL

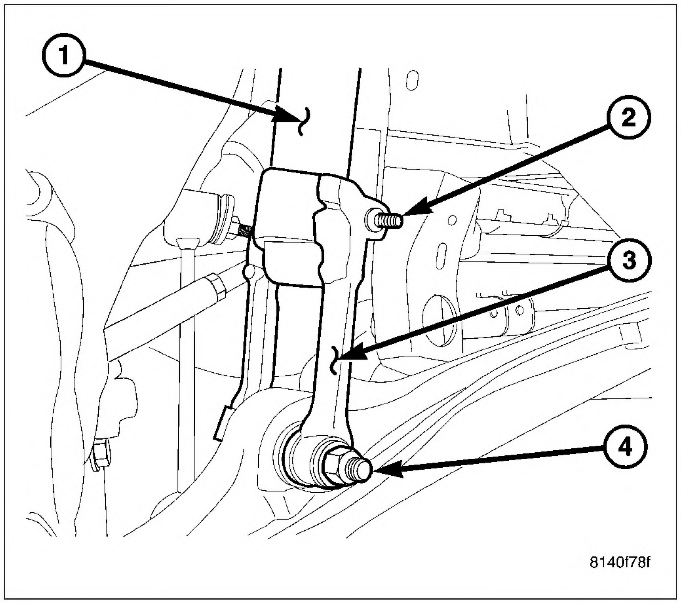
STABILIZER BAR TO FRAME BUSHING

1. Raise and support the vehicle.
2. Remove the front splash shield.
3. Remove the two stabilizer barretainer bracket bolts (2).
4. Remove the bushing clamp (2).
5. Remove the stabilizer bar bushing (3).



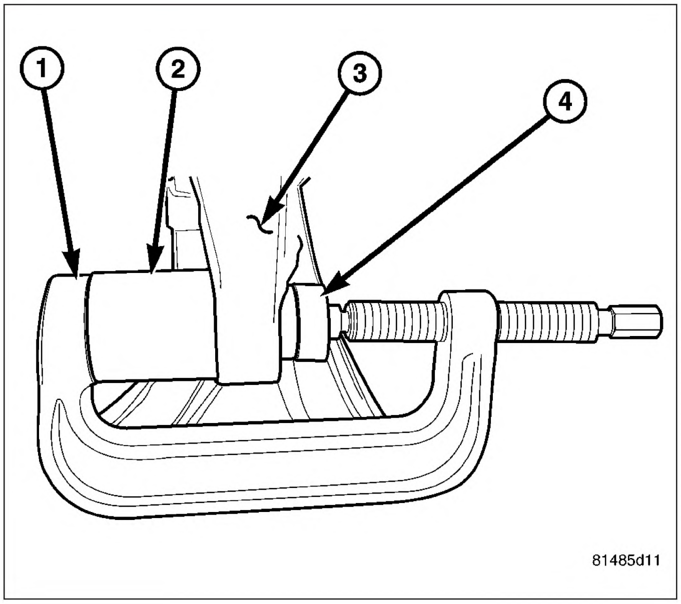
CLEVIS BRACKET BUSHING

1. Remove the clevis bracket (3) from the shock (1) (Refer to 2 - SUSPENSION/FRONT/CLEVIS BRACKET - REMOVAL).



NOTE: Extreme pressure lubrication must be used on the threaded portions of the tool. This will increase the longevity of the tool and insure proper operation during the removal and installation process.

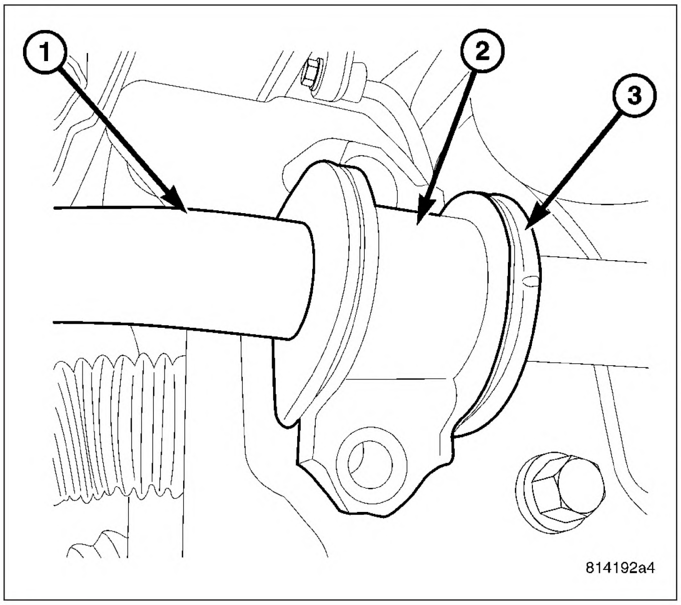
2. Press the bushing out using special tools C-4212-F (Press) (1), 9653–1 (driver) (4) and 9653–2 (Receiver) (2) from the lower control arm (3).



INSTALLATION

STABILIZER BAR TO FRAME BUSHING

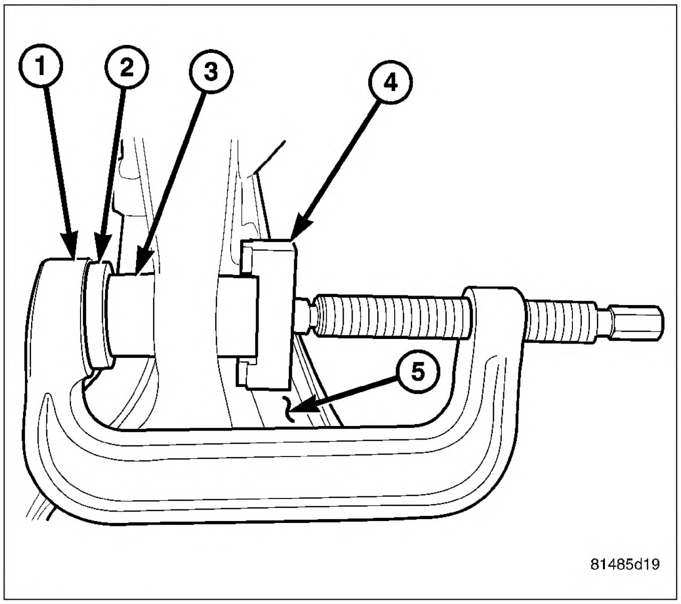
1. Install the stabilizer bar bushing (3) to the bar (1).
2. Install the stabilizer bar bushing reatainer bracket (2) bolts and tighten the two mounting bolts.
3. Install the front splash shield.
4. Lower the vehicle.



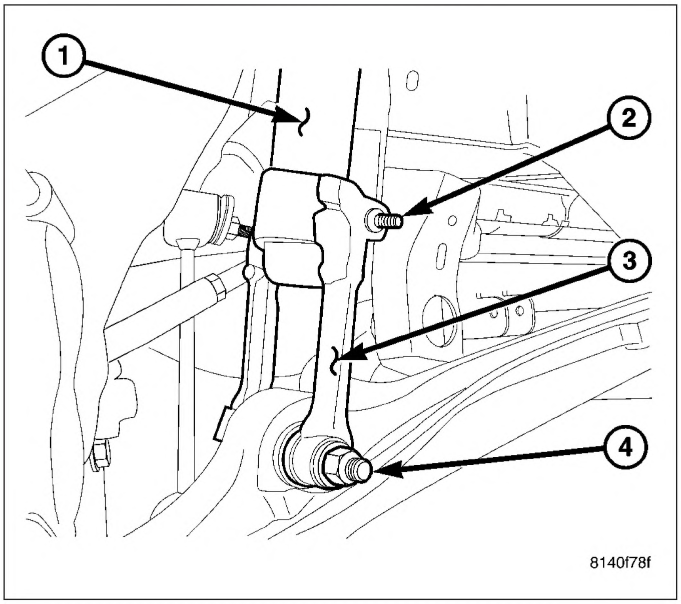
CLEVIS BRACKET BUSHING

NOTE: Extreme pressure lubrication must be used on the threaded portions of the tool. This will increase the longevity of the tool and insure proper operation during the removal and installation process.

1. Install the new clevis bracket bushing (3) into the lower control arm (5) using tools C-4212-F (Press) (1), 9653–3 (driver) (2), 9653–4 (Depth gauge) (4) the depth gauge will automatically set the depth of the bushing (3) in the control arm (5).



2. Install the clevis bracket (3) to the shock (1) (Refer to 2 - SUSPENSION/FRONT/CLEVIS BRACKET - INSTALLATION).



HUB / BEARING

DESCRIPTION

The bearing used on the front hub of this vehicle is the combined hub and bearing unit type assembly. This unit assembly combines the front wheel mounting hub (flange) and the front wheel bearing into a one piece unit. The wheel mounting studs are the only replaceable component of the hub/bearing assembly.

OPERATION

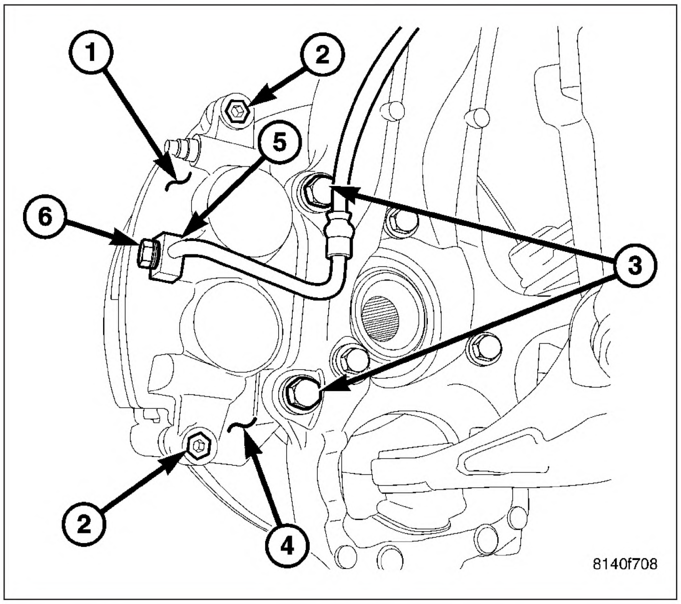
The hub/bearing assembly is mounted to the steering knuckle and is retained by three mounting bolts accessible from the back of the steering knuckle. The hub/bearing unit is not serviceable and must be replaced as an assembly if the bearing or the hub is determined to be defective.

REMOVAL

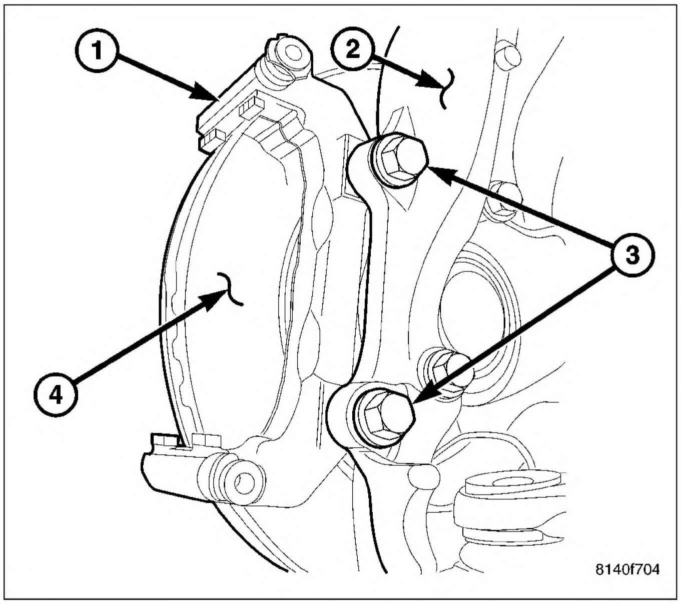
1. Raise and support the vehicle.
2. Remove the wheel and tire assembly.

Support the caliper, Do not let the caliper hang by the hose.

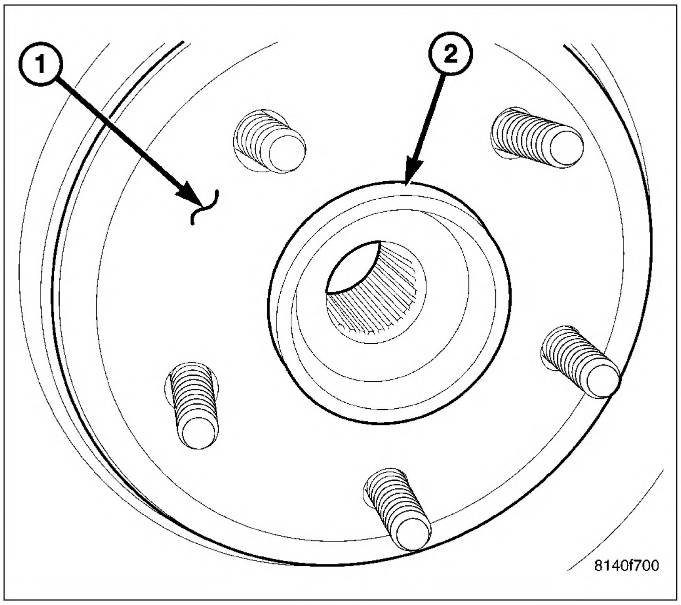
3. Remove the disc brake caliper (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL).



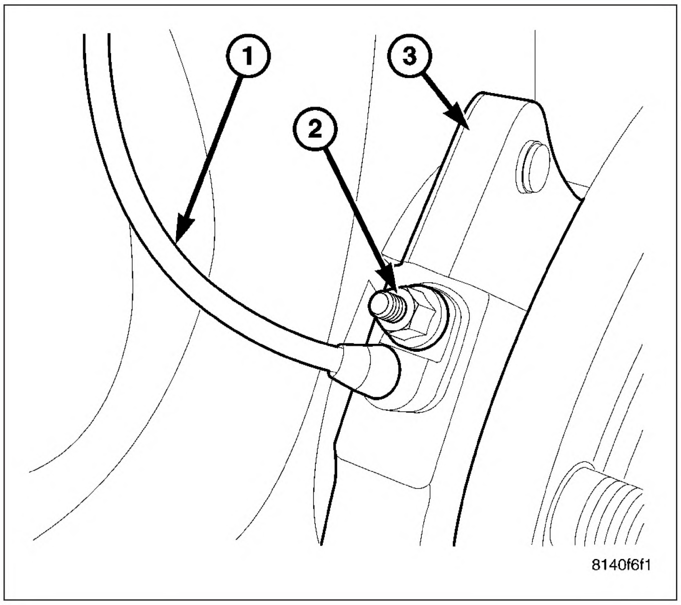
4. Remove the brake caliper adaptor (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER ADAPTER - REMOVAL).



5. Remove and discard the o-ring (2) and then remove the disc brake rotor (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).

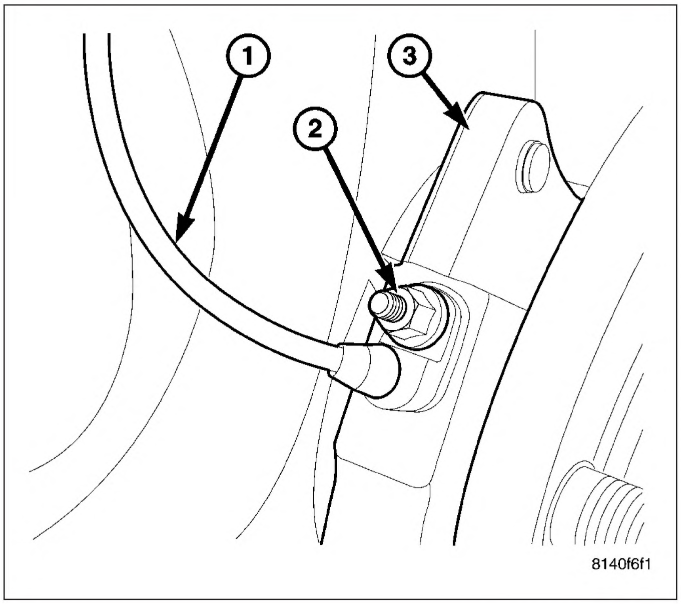


6. Remove the wheel speed sensor nut (2).
7. Remove the wheel speed sensor (Refer to 5 - BRAKES/ELECTRICAL/FRONT WHEEL SPEED SENSOR - REMOVAL).
8. Remove the 3 hub bearing mounting bolts from the back of the steering knuckle. Remove hub bearing (3) from the steering knuckle.

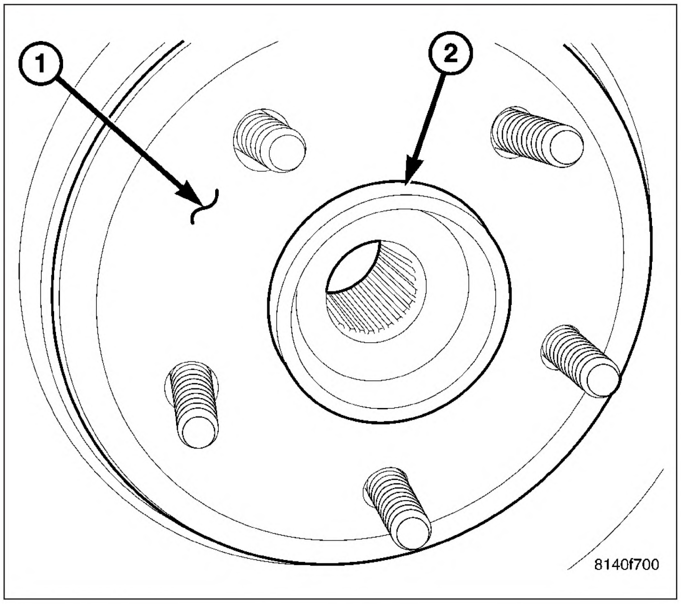


INSTALLATION

1. Install the hub bearing (3) to the knuckle.
2. Install the hub bearing to knuckle and the 3 bolts then tighten to 136 N·m (100 ft. lbs.).
3. Install the wheel speed sensor (Refer to 5 - BRAKES/ELECTRICAL/FRONT WHEEL SPEED SENSOR - INSTALLATION).
4. Install the wheel speed sensor nut (2).



5. Install the brake rotor (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION).


1
2
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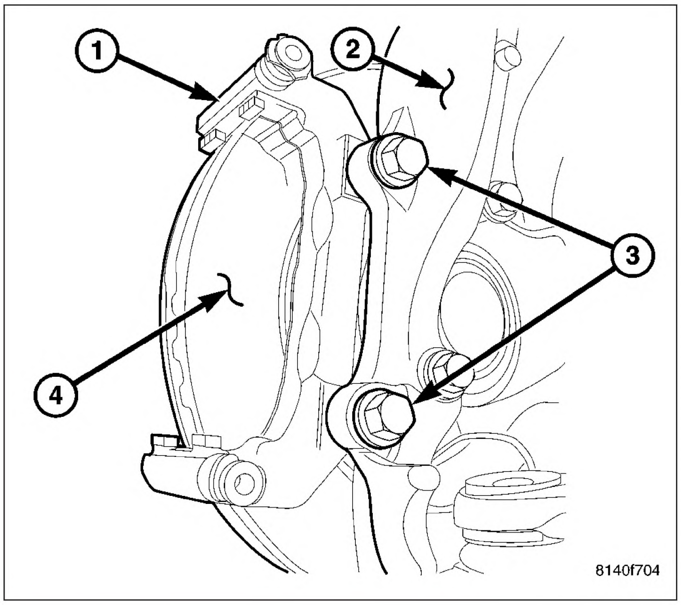
6. Install the brake caliper adaptor (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER ADAPTER - INSTALLATION).


1
2
3
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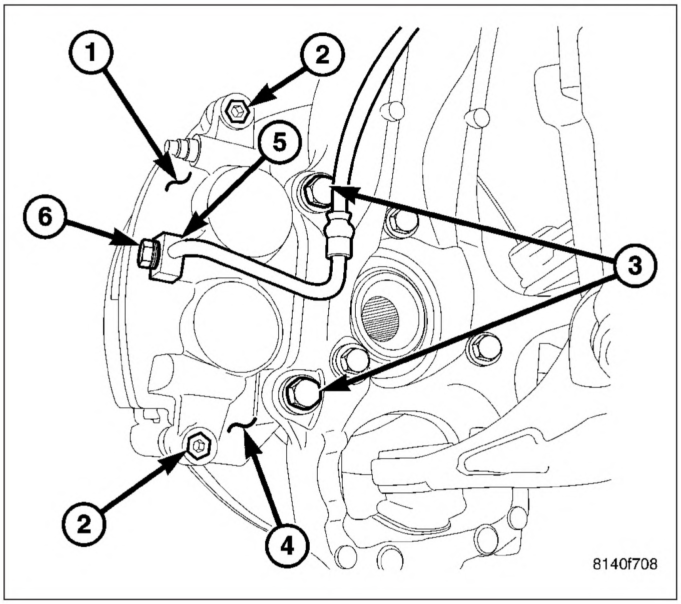
7. Install the caliper (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).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6
3
2
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8140f708

8. Install the wheel and tire assembly (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE).

9. Remove the support and lower the vehicle.

KNUCKLE

DESCRIPTION

The knuckle is a single casting with legs machined for the upper and lower ball joints. The knuckle also has machined mounting locations for the front brake calipers and hub bearing.

OPERATION

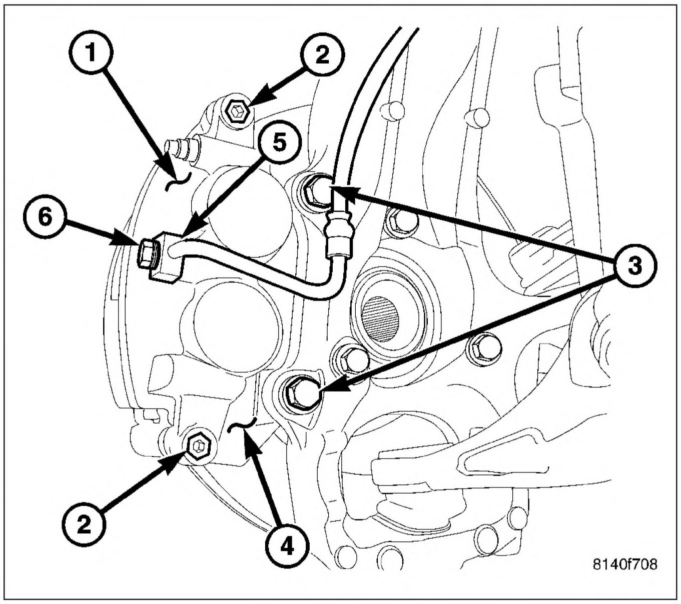
The steering knuckle pivot between the upper and lower ball joint. Steering linkage attached to the knuckle allows the vehicle to be steered.

REMOVAL

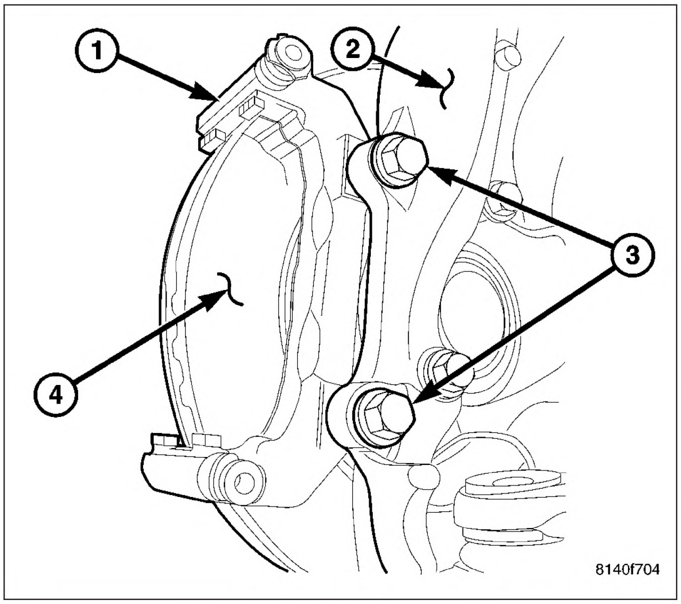
1. Raise and support the vehicle.
2. Remove the tire and wheel assembly.

CAUTION: Never allow the disc brake caliper to hang from the brake hose. Damage to the brake hose will result. Provide a suitable support to hang the caliper securely.

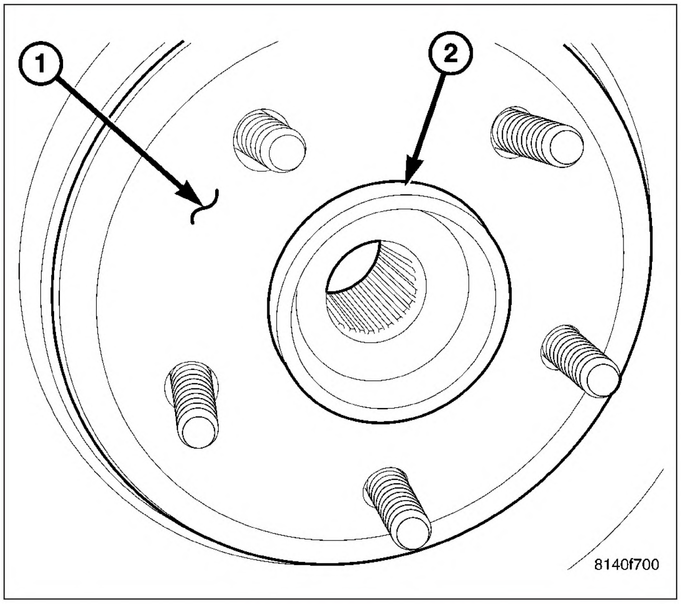
3. Remove the brake caliper (1).



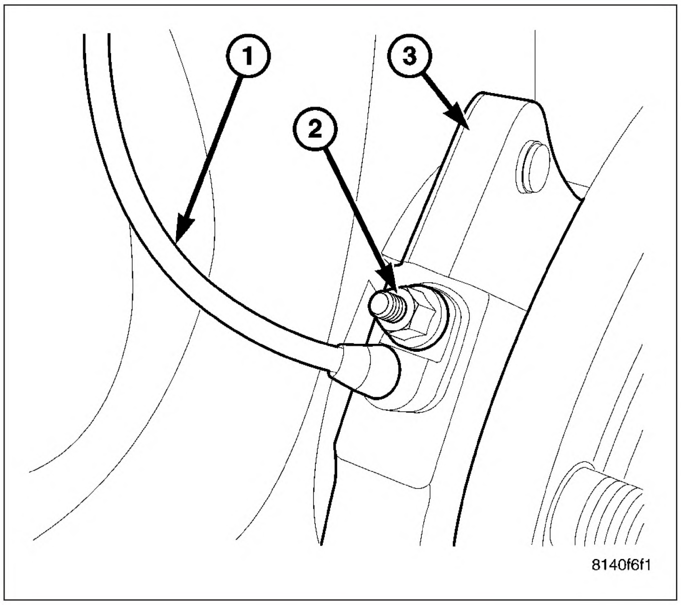
4. Remove the caliper adapter (1). (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER ADAPTER - REMOVAL).



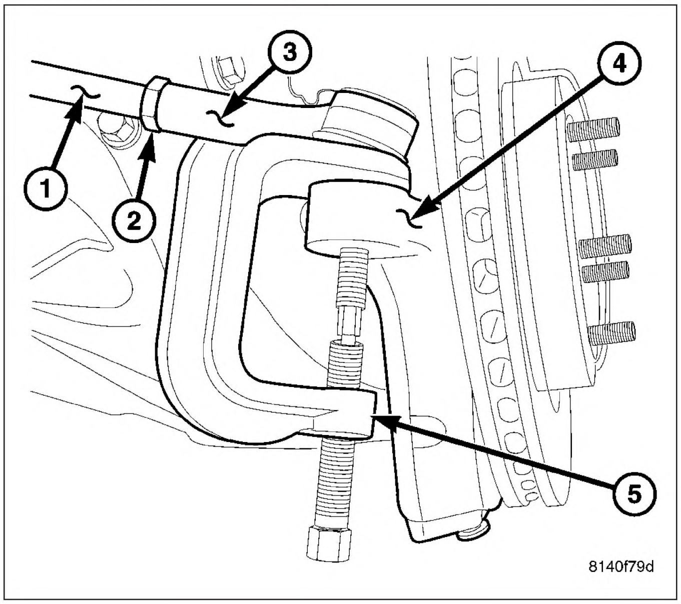
5. Remove the o-ring (2) and discard then remove disc brake rotor (1). (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).



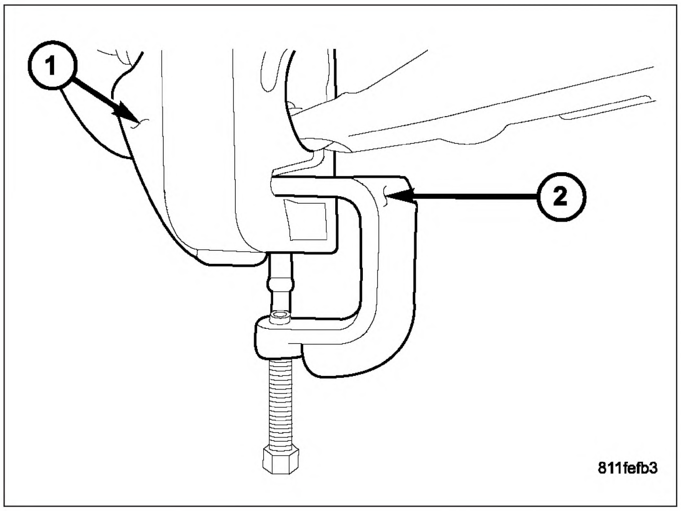
6. Remove the wheel speed sensor (2). (Refer to 5 - BRAKES/ELECTRICAL/FRONT WHEEL SPEED SENSOR - REMOVAL).
7. Remove the axle shaft nut. (if equipped with four wheel drive)
8. Remove the hub/bearing (3). (Refer to 2 - SUSPENSION/FRONT/HUB / BEARING - REMOVAL).



9. Remove the outer tie rod end retaining nut.
10. Seperate the outer tie rod end (3) from the steering knuckle using special tool 8677(5). (Refer to 19 - STEERING/LINKAGE/TIE ROD END - REMOVAL).



11. Remove the lower ball joint nut.
12. Seperate the lower ball joint from the knuckle (1) using tool C–4150A (2).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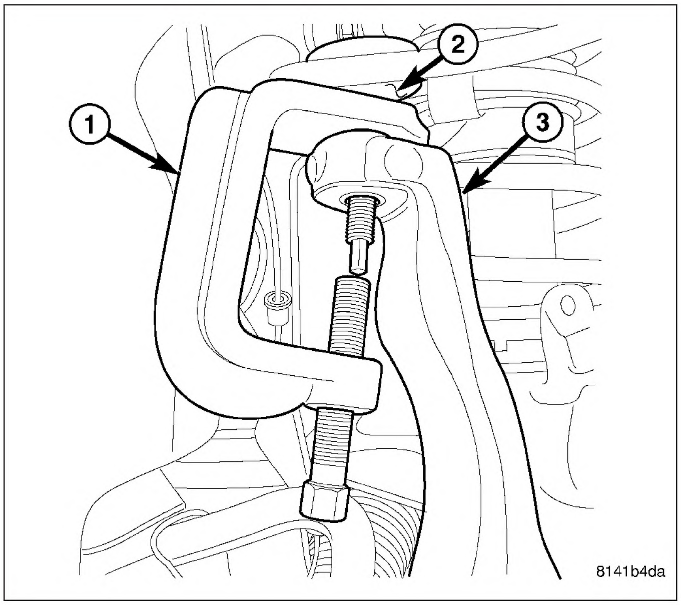
13. Remove the upper ball joint nut.
14. Seperate the upper ball joint (2) from the knuckle (3) using tool 8677 (1).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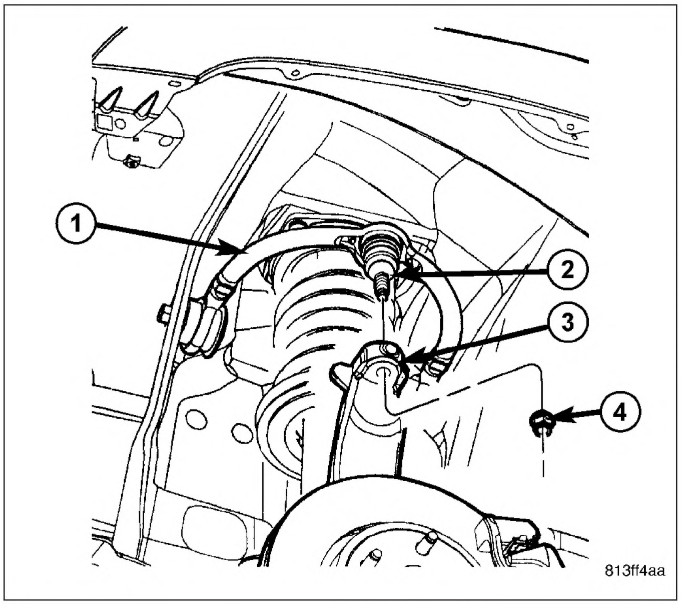
15. Remove the knuckle (3) from the vehicle.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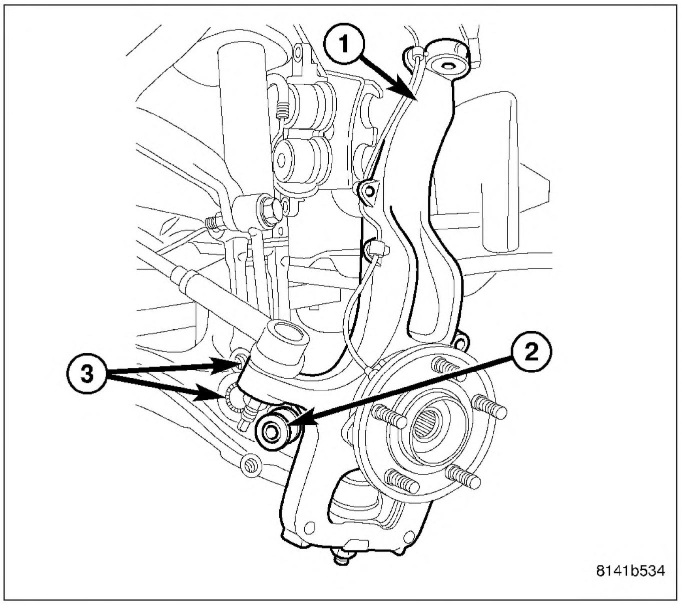
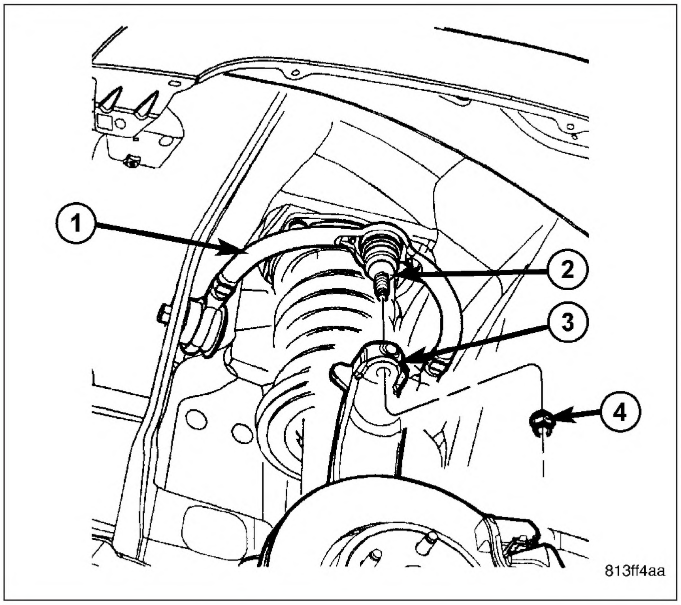
INSTALLATION

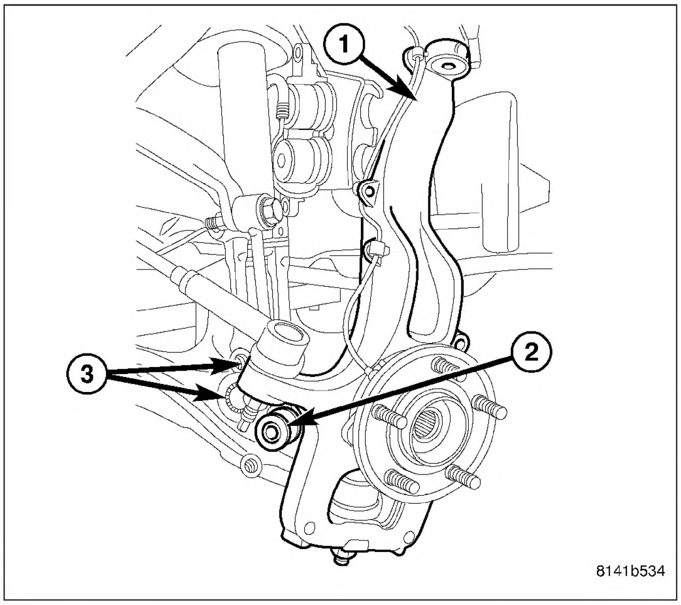
1. Install the knuckle (1) to the vehicle.
2. Install the lower ball joint into the knuckle.
3. Install the lower ball joint nut. Tighten the nut to 81 N·m (60 ft.lbs.).



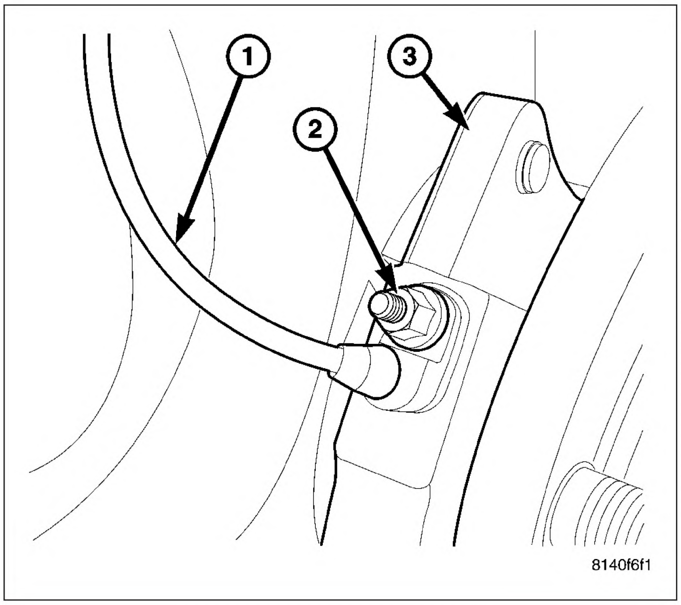
4. Install the upper ball joint (2) into the knuckle (3)
5. Install the upper ball joint nut (4). Tighten the nut to 81 N·m (60 ft.lbs.).



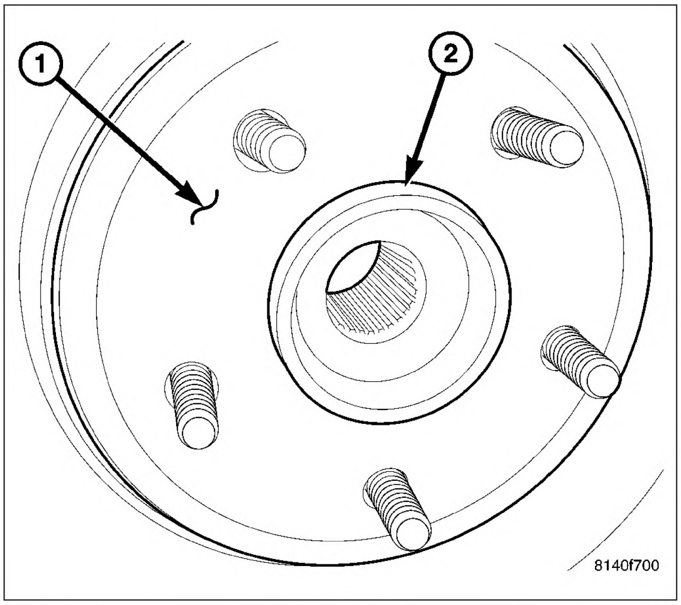
6. Install the outer tie rod end to the steering knuckle. (Refer to 19 - STEERING/LINKAGE/TIE ROD END - INSTALLATION).



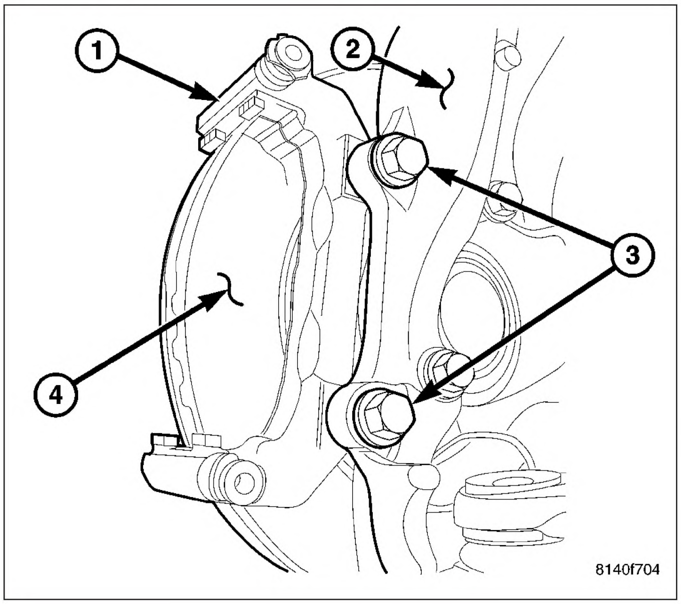
7. Install the hub/bearing (3), Tighten to 136 N·m (100 ft.lbs.). (Refer to 2 - SUSPENSION/FRONT/HUB / BEARING - INSTALLATION).
8. Install the axle shaft nut. Tighten the nut to 135 N·m (96 ft.lbs.).(if equipped with four wheel drive).
9. Install the wheel speed sensor (2). (Refer to 5 - BRAKES/ELECTRICAL/FRONT WHEEL SPEED SENSOR - INSTALLATION).



10. Install the disc brake rotor (1). (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION).



11. Install the caliper adapter (1). (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER ADAPTER - INSTALLATION).
12. Install the tire and wheel assembly. (Refer to 22 - TIRES/WHEELS/WHEELS - STANDARD PROCEDURE).
13. Perform wheel alignment (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).



LOWER BALL JOINT

DIAGNOSIS AND TESTING

LOWER BALL JOINT

NOTE: If the ball joint is equipped with a lubrication fitting, grease the joint then road test the vehicle before performing test.

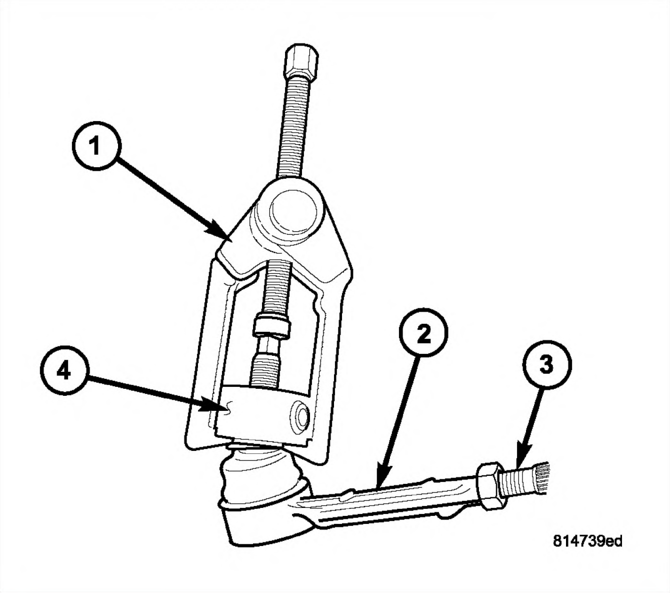
1. Raise the front of the vehicle. Place safety floor stands under both lower control arms as far outboard as possible. Lower the vehicle to allow the stands to support some or all of the vehicle weight.
2. Mount a dial indicator solidly to the topside of the lower control arm and then zero the dial indicator.
3. Position the indicator plunger against the bottom surface of the steering knuckle.

NOTE: The dial indicator plunger must be perpendicular to the machined surface of the steering knuckle.

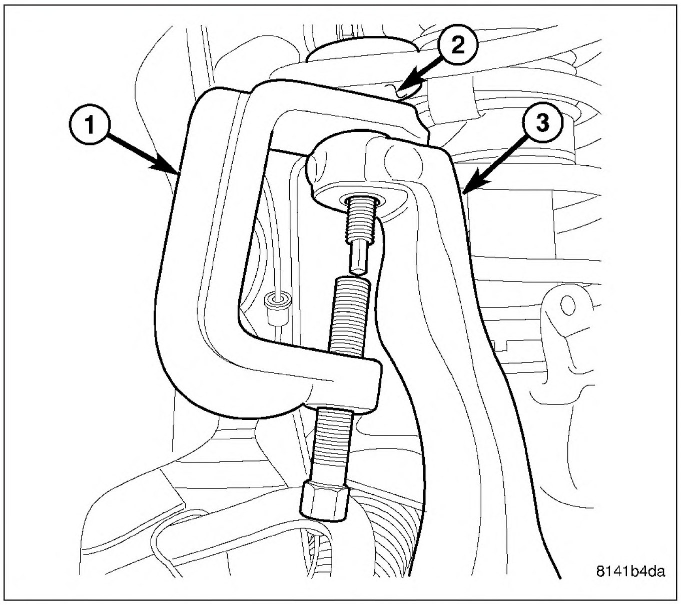
4. Position a pry bar under the tire assembly. Pry upwards on the tire assembly.
5. If the travel exceeds 0.5 mm (0.020 in.), replace the lower ball joint (Refer to 2 - SUSPENSION/FRONT/LOWER BALL JOINT - REMOVAL).

REMOVAL

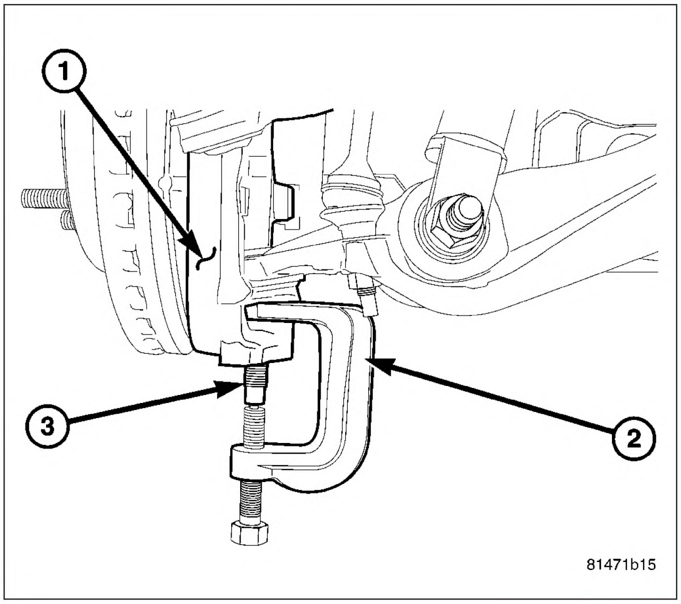
1. Remove the tire and wheel assembly.
2. Remove the brake caliper and rotor (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).
3. Disconnect the tie rod (1) from the steering knuckle using special tool C-3894-A (1) (Refer to 19 - STEERING/LINKAGE/TIE ROD END - REMOVAL).



4. Separate the upper ball joint (2) from the knuckle (3) using special tool 8677 (1).



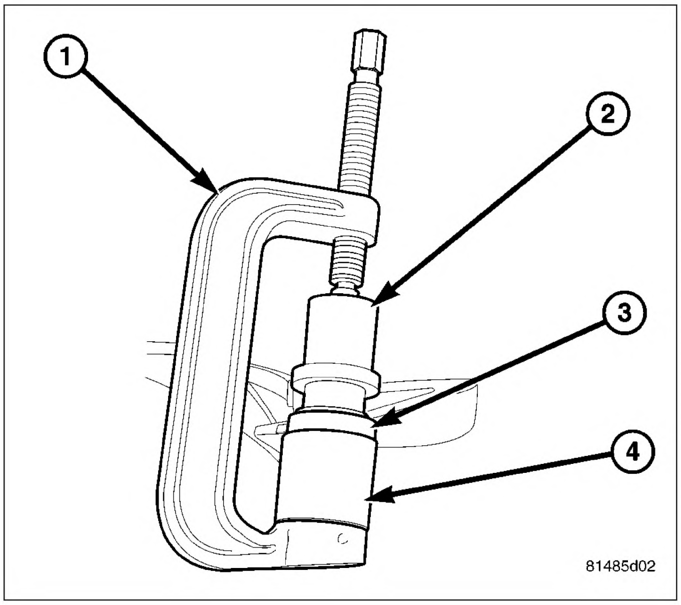
5. Separate the lower ball joint (3) from the steering knuckle (1) using special tool 8677 (2).



6. Remove the steering knuckle (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - REMOVAL).
7. Move the halfshaft to the side and support the halfshaft out of the way **4X4 only**.
8. Chisel out the ball joint stakes.

NOTE: Extreme pressure lubrication must be used on the threaded portions of the tool. This will increase the longevity of the tool and insure proper operation during the removal and installation process.

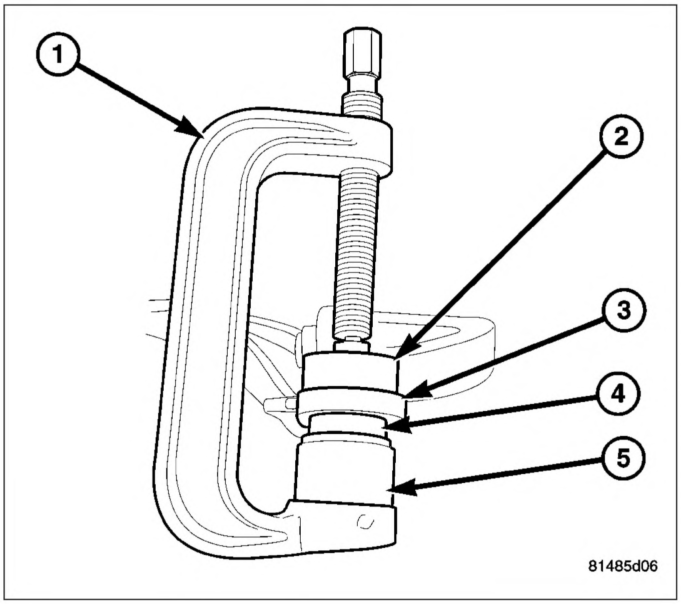
9. Press the ball joint from the lower control arm (3) using special tools C-4212-F (PRESS) (1), C–4212–3 (Driver) (2) and 9654–3 (Receiver) (4).



INSTALLATION

NOTE: Extreme pressure lubrication must be used on the threaded portions of the tool. This will increase the longevity of the tool and insure proper operation during the removal and installation process.

1. Install the ball joint (4) into the control arm (3) and press in using special tools C-4212-F (press) (1), 9654–1 (Driver) (5) and 9654–2 (Receiver) (2).



2. Stake the ball joint flange in four evenly spaced places around the ball joint flange, using a chisel and hammer.
3. Remove the support for the halfshaft and install into position **4X4 only**.
4. Install the steering knuckle (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - INSTALLATION).
5. Install the tie rod end into the steering knuckle (Refer to 19 - STEERING/LINKAGE/TIE ROD END - INSTALLATION).
6. Install and tighten the halfshaft nut to 251 N·m (185 ft. lbs.). (If Equipped).
7. Install the brake caliper and rotor (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION).
8. Install the tire and wheel assembly (Refer to 22 - TIRES/WHEELS/WHEELS - STANDARD PROCEDURE).
9. Check the vehicle ride height (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).
10. Perform a wheel alignment (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

LOWER CONTROL ARM

DESCRIPTION

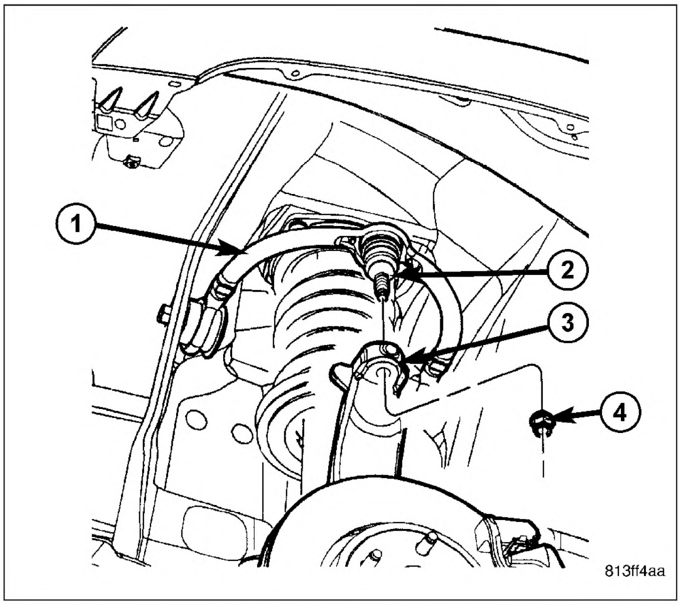
The front lower suspension arms are cast iron.

OPERATION

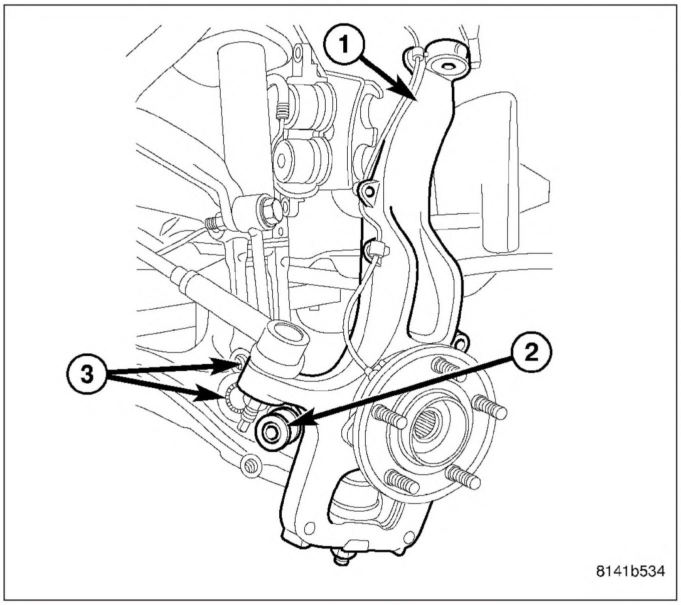
The bushings provide isolation from the road. The arms mount to the cradle bracket and the knuckle. The arm and bushings provide location and react to loads from the road.

REMOVAL

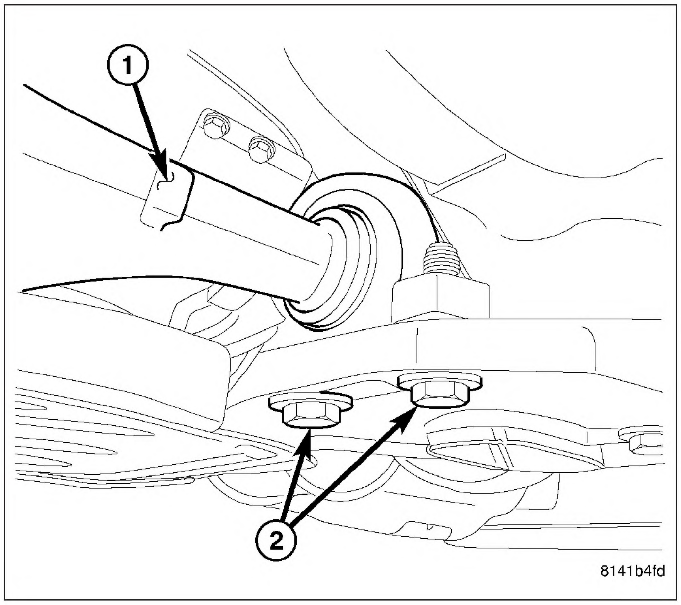
1. Raise and support the vehicle.
2. Remove the tire and wheel assembly.
3. Remove the steering knuckle (3). (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - REMOVAL).



4. Remove the shock clevis bracket (2) from the lower control arm.

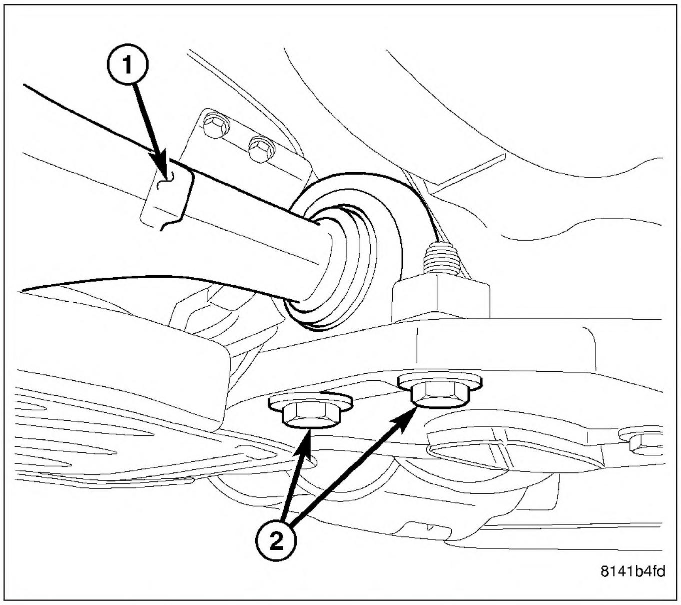


5. Remove the nut and bolt from the front of the lower control arm.
6. Remove the rear bolts and flag nuts from the lower control arm.
7. Remove the lower control arm from the vehicle.

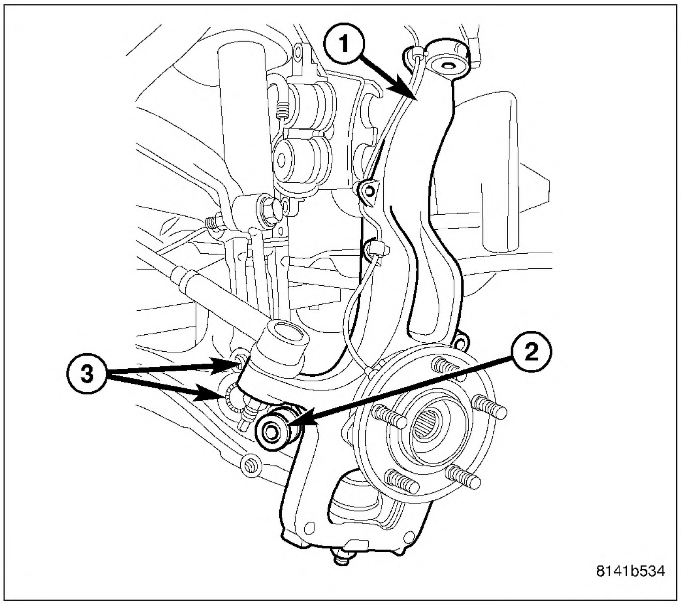


INSTALLATION

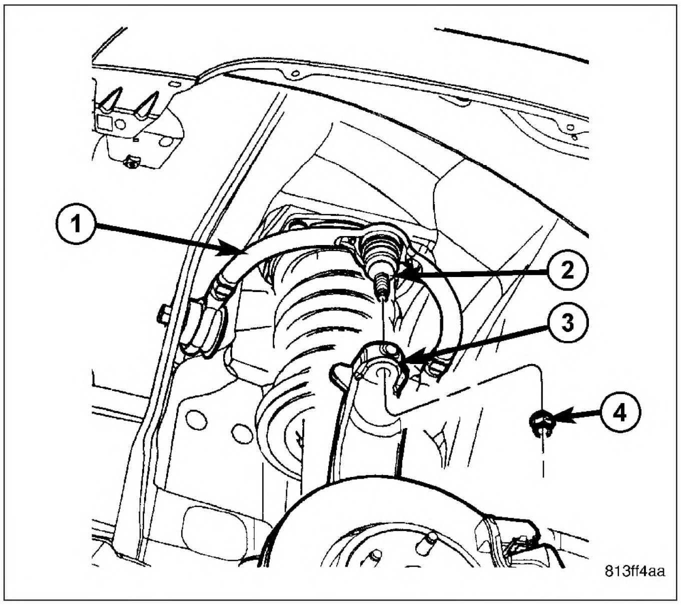
1. Position the lower suspension arm into the frame rail bracket.
2. Install the rear bolts for the lower control arm to the frame, Tighten to 142 N·m (105 ft lbs).
3. Install the nut and bolt for the front of the lower control arm Tighten to 169 N·m (125 ft lbs).



4. Install the lower clevis bolt (2) at the lower control arm and tighten to 88 N·m (65 ft. lbs.).



5. Install the steering knuckle (3) and tighten the nut to 75 N·m (55 ft. lbs.) (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - INSTALLATION).



6. Install the tire and wheel assembly.
7. Lower the vehicle.
8. Perform wheel alignment (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

SHOCK

DESCRIPTION

The top of the shock absorbers are bolted to the body. The bottom of the shocks are bolted to the lower control arm. The standard shocks have conventional twin tube construction and are low pressure gas charged. Gas charging prevents cavitation during rough road operation.

OPERATION

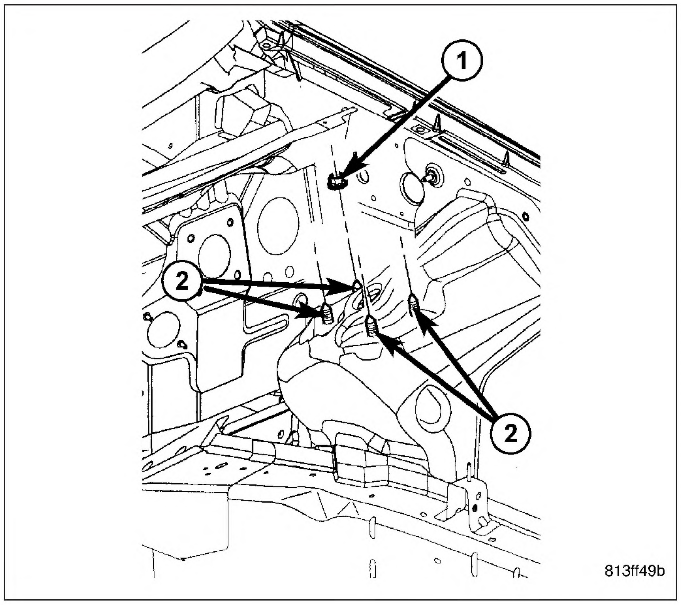
The shock absorbers dampen jounce and rebound motion of the vehicle over various road conditions and limit suspension rebound travel.

REMOVAL

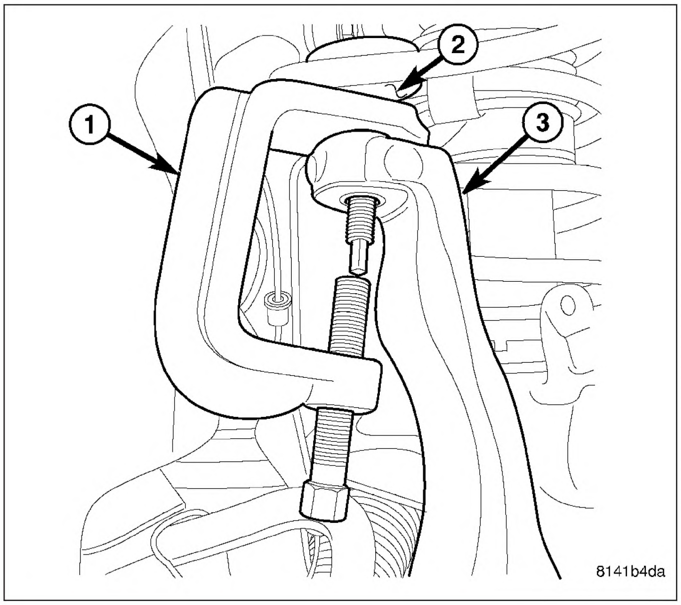
RIGHT FRONT

1. Remove the air box cover and air intake hose.
2. Disconnect the cruise control servo electrical connector.
3. Remove the coolant reservoir mounting bolt and move the coolant reservoir off to the side.

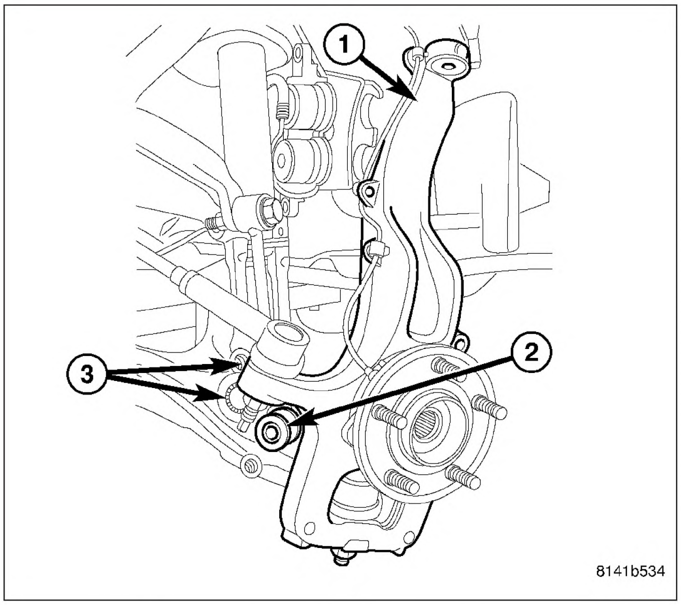
4. Remove the four upper shock mounting nuts (1).



5. Raise and support the vehicle.
6. Remove the tire.
7. Remove the two brake caliper adapter bolts.
8. Support the brake caliper adaptor and caliper. **Do not allow the caliper to hang by the brake hose.**
9. Remove the disc brake rotor.
10. Remove the upper ball joint nut.
11. Separate the upper ball joint (2) from the knuckle (3) using special tool 8677(1).



12. Remove the lower clevis bolt (2) at the lower control arm.
13. Remove the lower stabilizer bolt (3) at the lower control arm.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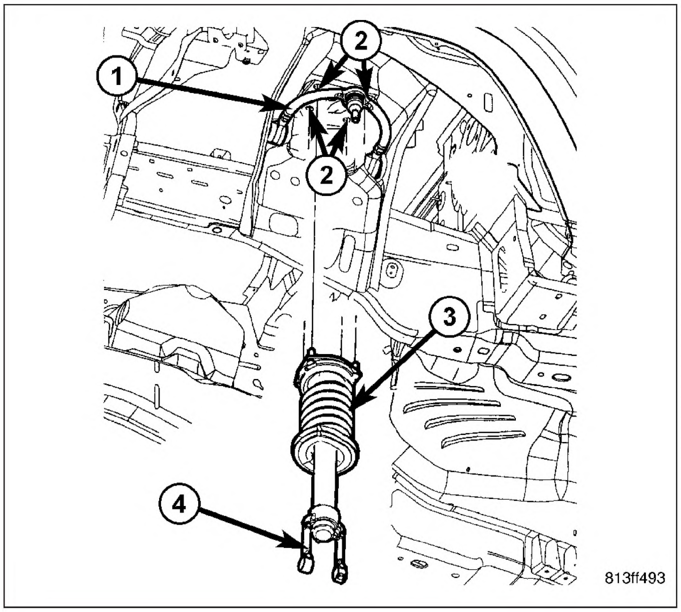
14. Remove the shock from the vehicle.
15. Remove the spring if necessary (Refer to 2 - SUSPENSION/FRONT/SPRING - REMOVAL).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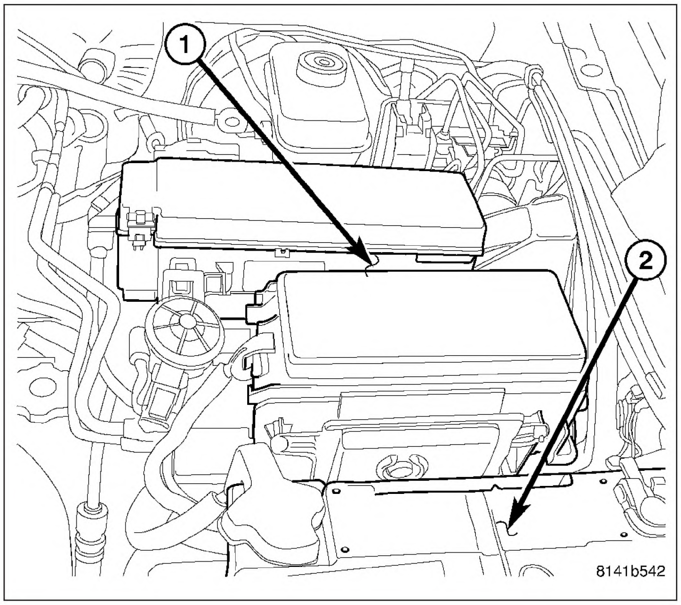
LEFT FRONT

1. Remove the air box cover and air intake hose.
2. Remove the 3 PDC bracket nuts (1).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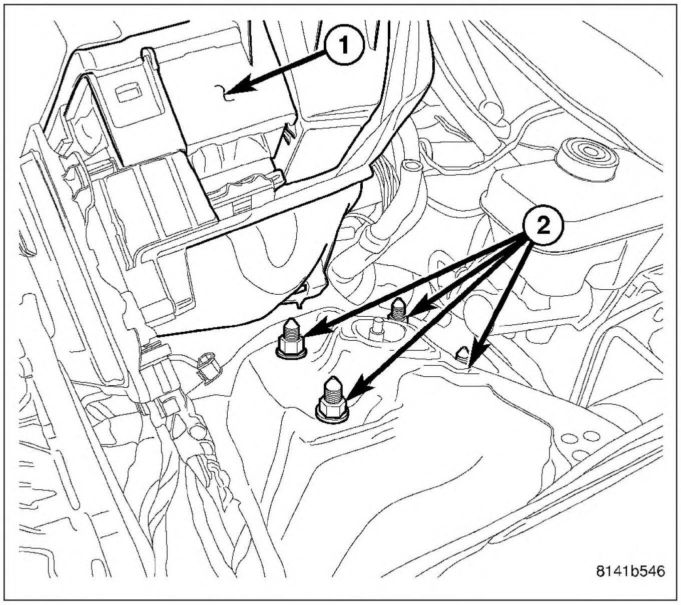
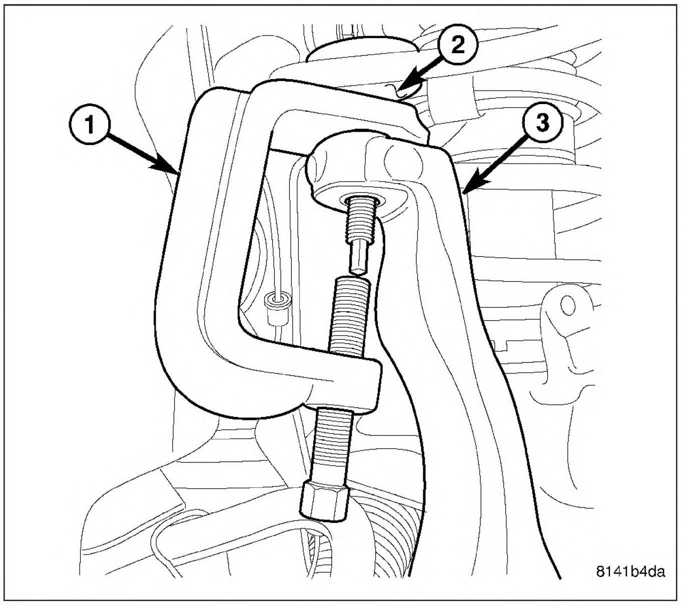
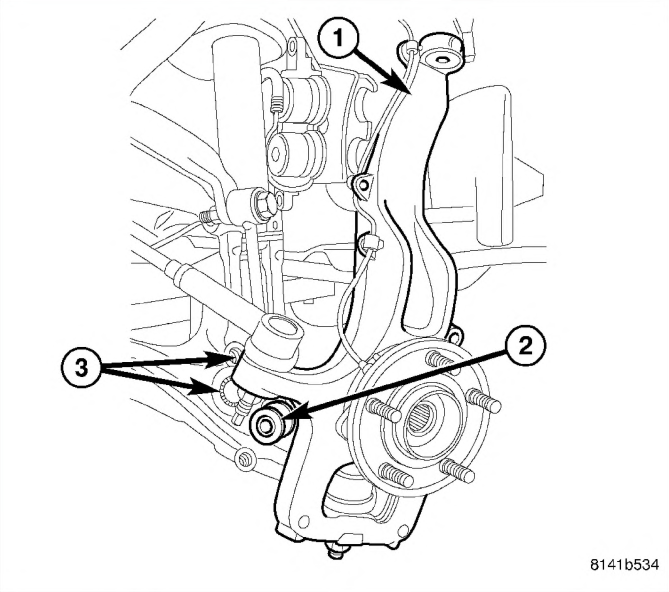
3. Move the PDC (1) off to the side to access the four upper shock mount nuts (2).
4. Remove the four upper shock mount nuts (2).



5. Raise and support the vehicle.
6. Remove the tire.
7. Remove the two brake caliper adapter bolts.
8. Support the brake caliper adaptor and caliper. **Do not allow the caliper to hang by the brake hose.**
9. Remove the disc brake rotor.
10. Remove the upper ball joint nut.
11. Separate the upper ball joint (2) from the knuckle (3) using special tool 8677 (1).



12. Remove the lower clevis bolt (2) at the lower control arm.
13. Remove the lower stabilizer bolt (3) at the lower control arm.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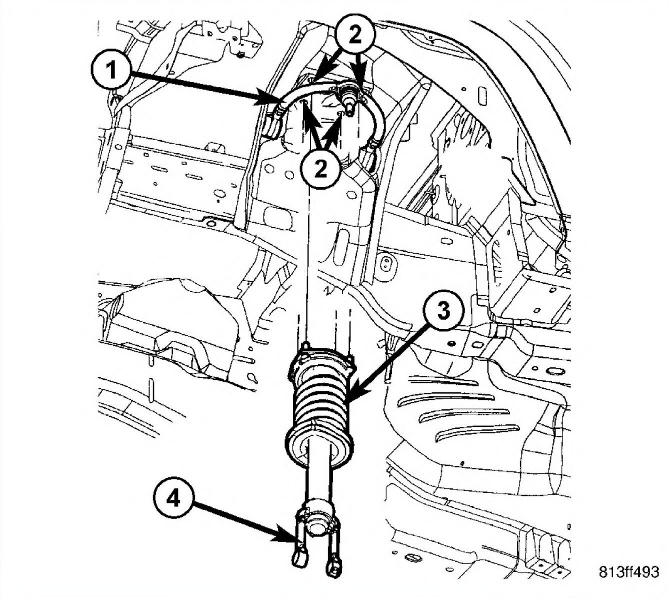
14. Remove the shock (3) from the vehicle.
15. Remove the spring if necessary (Refer to 2 - SUSPENSION/FRONT/SPRING - REMOVAL).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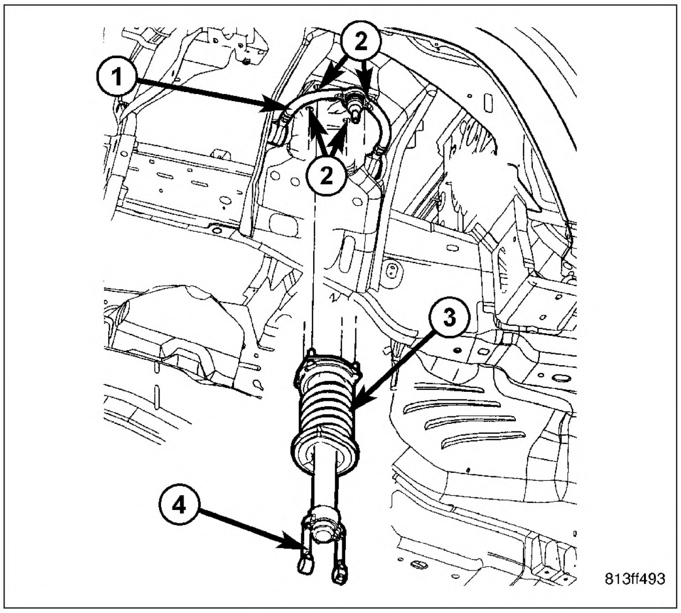
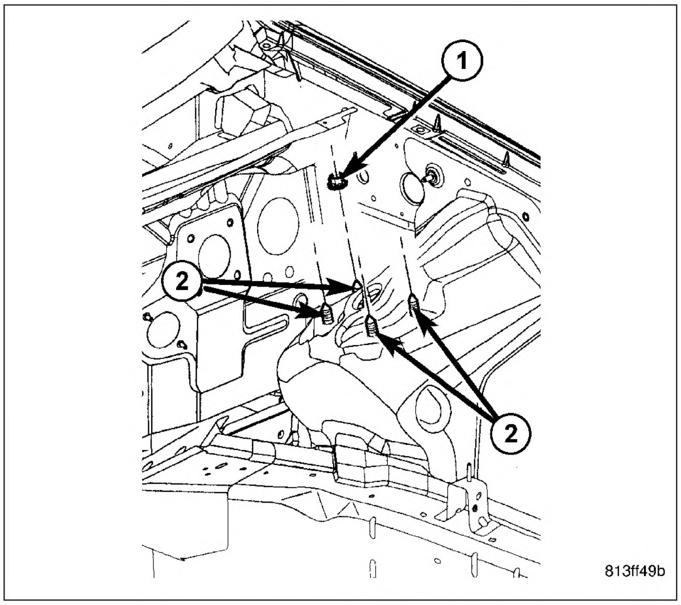
INSTALLATION

RIGHT FRONT

1. Install the clevis bracket (4) to the shock (3) and tighten to 122 N·m (90 ft. lbs.)..
2. Install the shock assembly (3) to the vehicle.

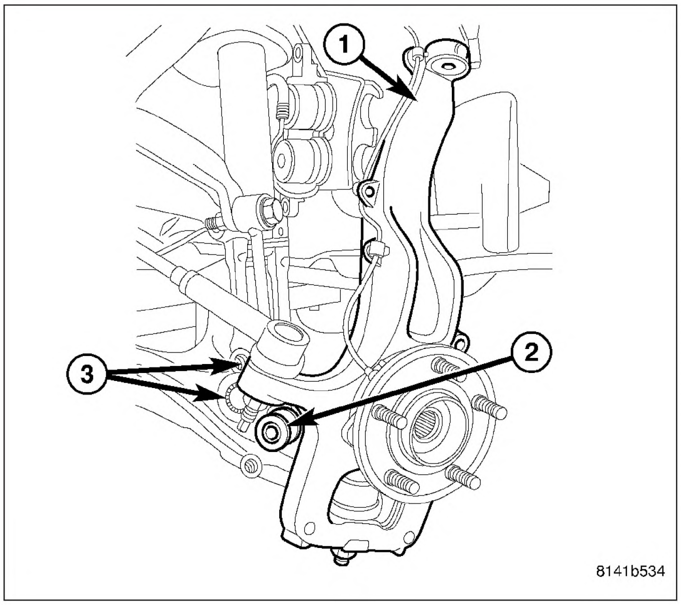


3. Install the four upper shock nuts (1), Tighten to 95 N·m (70 ft. lbs.).



4. Install the coolant reservoir bolt.
5. Reconnect the cruise control servo wiring connector.
6. Install the air box cover and air intake hose.
7. Raise the vehicle up.

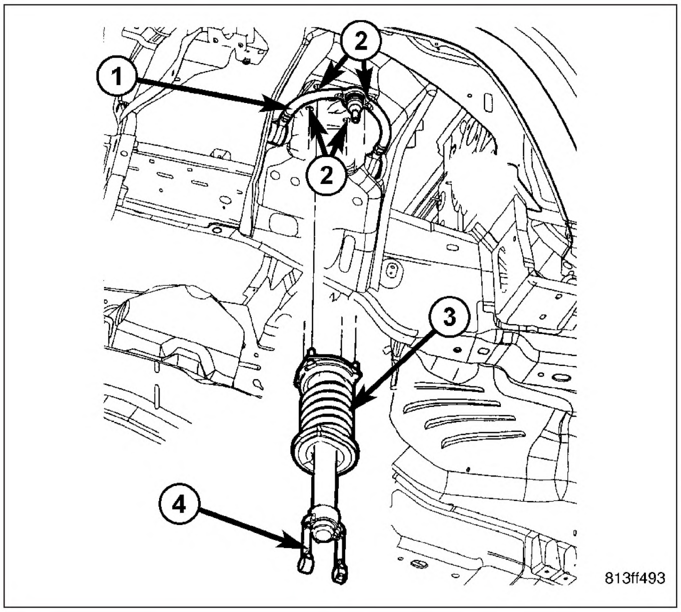
8. Install the lower stabilizer bolt (2) at the lower control arm.
9. Install the lower clevis bolt (3) at the lower control arm and tighten to 169 N·m (125 ft. lbs.).
10. Install the upper ball joint into the knuckle (1) and tighten the nut to 75 N·m (55 ft. lbs.).
11. Install the disc brake rotor.



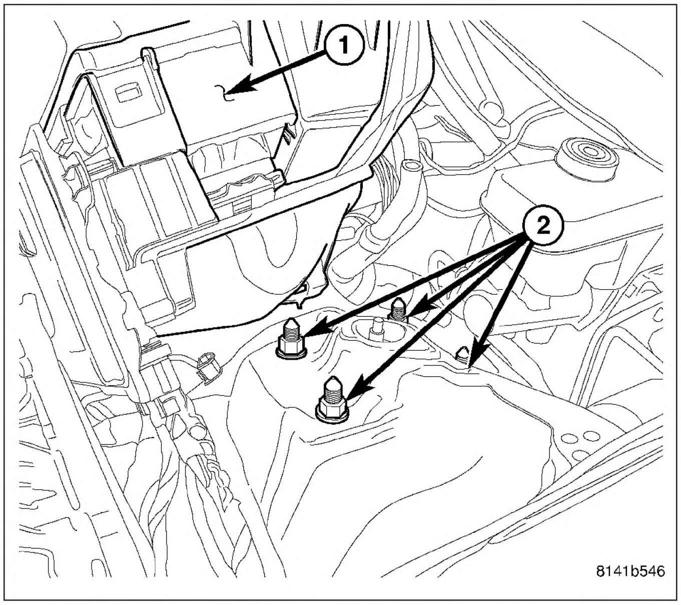
12. Install the caliper adaptor mounting bolts to 176 N·m (130 ft. lbs.).
13. Install the tire and wheel assembly.
14. Lower the vehicle.

LEFT FRONT

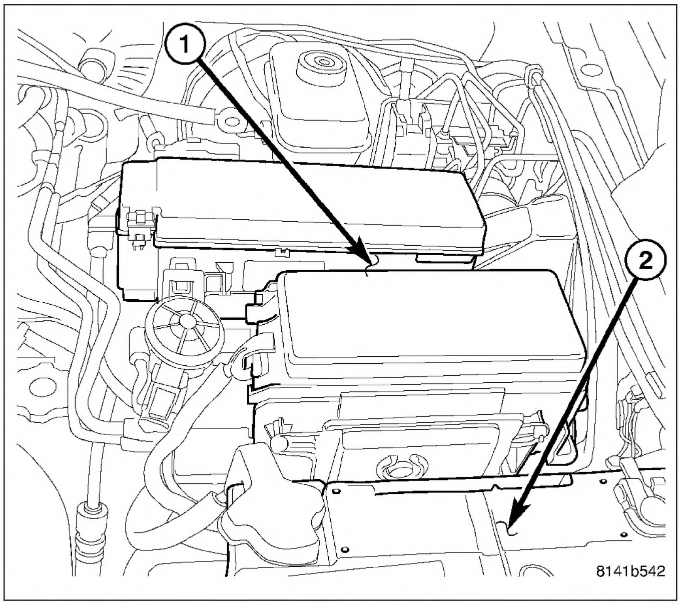
1. Install the clevis bracket (4) to the shock (3) and tighten to 122 N·m (90 ft. lbs.)..
2. Install the shock assembly (3) to the vehicle.



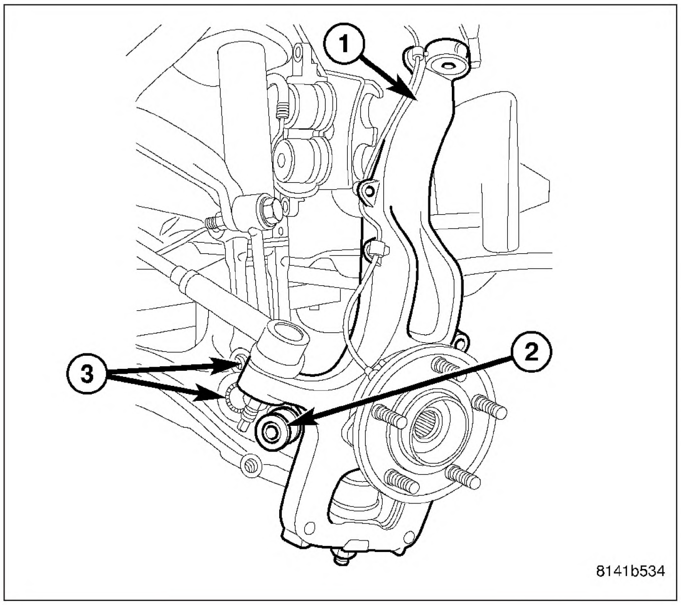
3. Install the four upper shock nuts (2), Tighten to 95 N·m (70 ft. lbs.).



4. Install the 3 PDC (1) bracket nuts.



5. Raise the vehicle up.
6. Install the lower stabilizer bolt (2) at the lower control arm and tighten to 115 N·m (85 ft. lbs.).
7. Install the lower clevis bolt (3) at the lower control arm and tighten to 169 N·m (125 ft. lbs.).
8. Install the upper ball joint into the knuckle (1) and tighten the nut to 75 N·m (55 ft. lbs.).
9. Install the disc brake rotor.



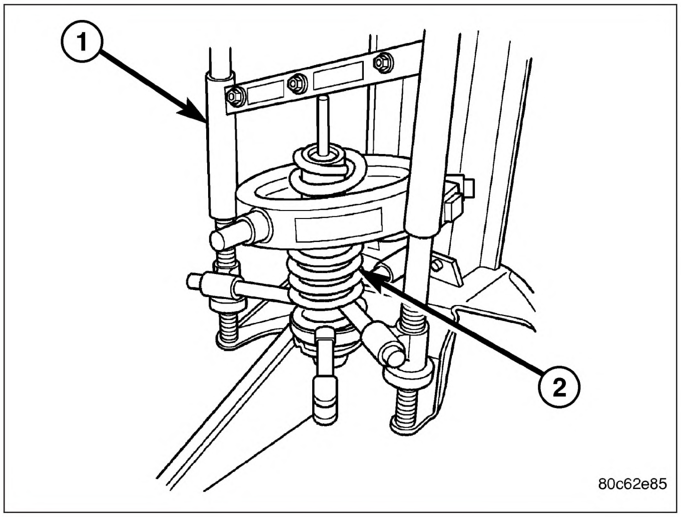
10. Install the caliper adaptor mounting bolts to 176 N·m (130 ft. lbs.).

11. Install the tire and wheel assembly.
12. Lower the vehicle.

SPRING

REMOVAL

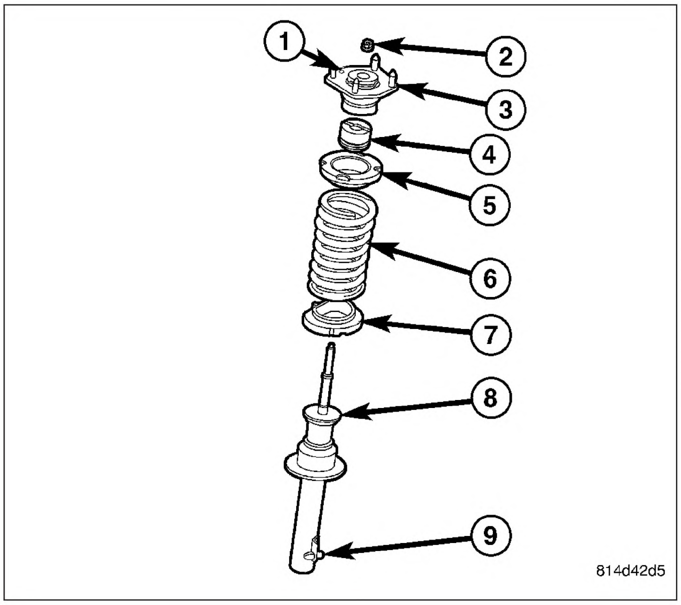
1. Remove the shock (Refer to 2 - SUSPENSION/FRONT/SHOCK - REMOVAL).
2. Install the shock assembly in the Branick 7200® spring removal/installation tool or equivalent (1).
3. Compress the spring (2).



4. Remove the upper shock nut (2).

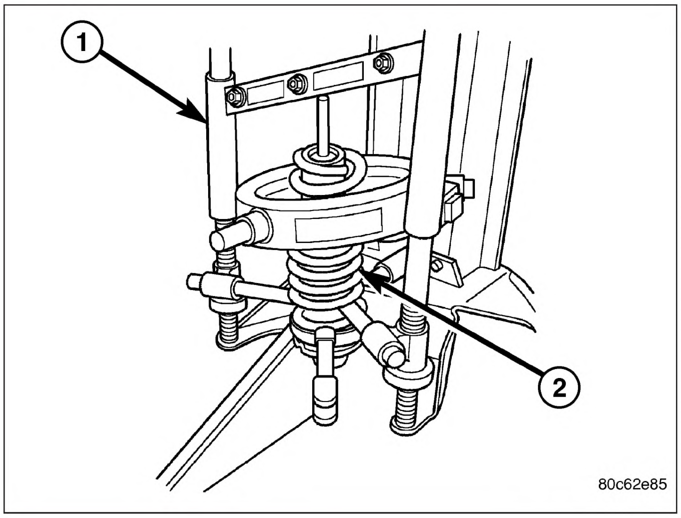
NOTE: The nub (1) in the upper shock mount (3) must be 180° from the centerline of the lower bracket (9) on the shock (8) for proper installation.

5. Remove the shock (8).
6. Remove the shock upper mounting plate (3).
7. Remove and inspect the upper (5) and lower (7) spring isolators.



INSTALLATION

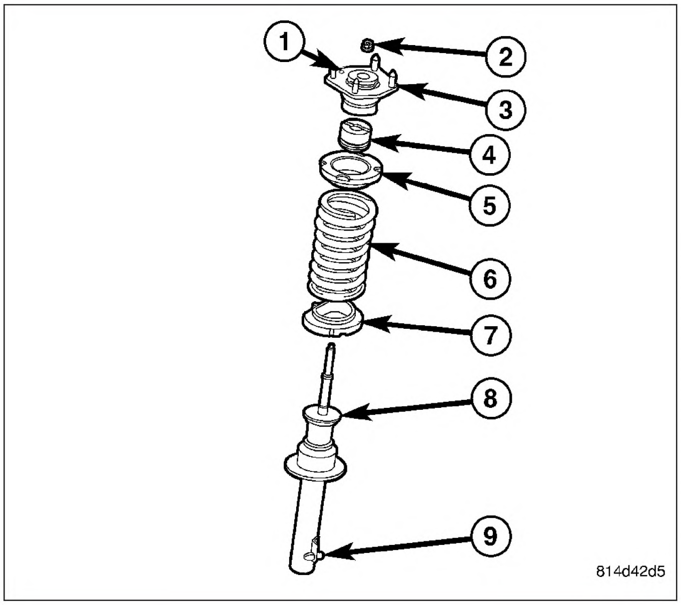
1. Compress the spring (2).



2. Install the lower isolator (7).
3. Position the shock (8) into the coil spring (6) **make sure the jounce bumper (4) is on the shock rod**.
4. Install the upper isolator (5).

NOTE: For proper orientation the nub hole (1) in the upper shock plate (3) must be 180° in a centerline from the bracket (9) at the bottom of the shock (8).

5. Install the upper shock mounting plate (3).
6. Install the shock upper mounting nut (2) Tighten to 39 N·m (25 ft. lbs.).
7. Decompress the spring.
8. Remove the shock assembly from the spring compressor tool (1).
9. Install the shock assembly (Refer to 2 - SUSPENSION/FRONT/SHOCK - INSTALLATION).



STABILIZER BAR

DESCRIPTION

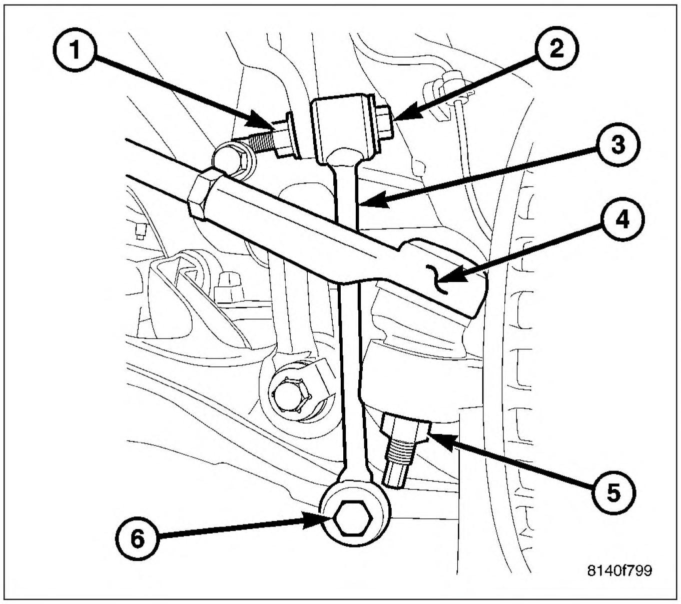
The bar extends across the front underside of the chassis and is mounted to the cradle. Links are connected from the bar to the lower control arms. The stabilizer bar and links are isolated by rubber bushings.

OPERATION

The stabilizer bar is used to control vehicle body sway during turns. The spring steel bar helps to control the vehicle body in relationship to the suspension.

REMOVAL

1. Raise and support the vehicle.
2. Remove the front splash shield.
3. Remove the stabilizer bar link upper nut (1) & bolt (2).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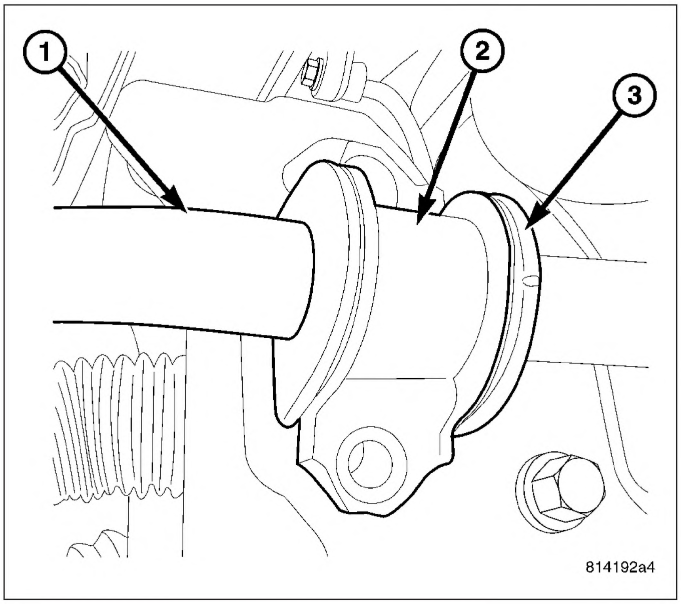
4. Remove the two stabilizer bushing clamp bolts (2).
5. Remove the stabilizer bar (1).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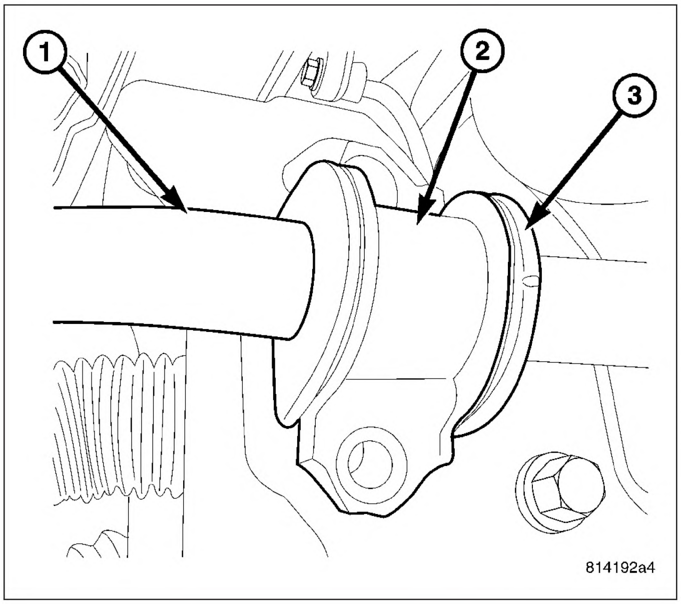
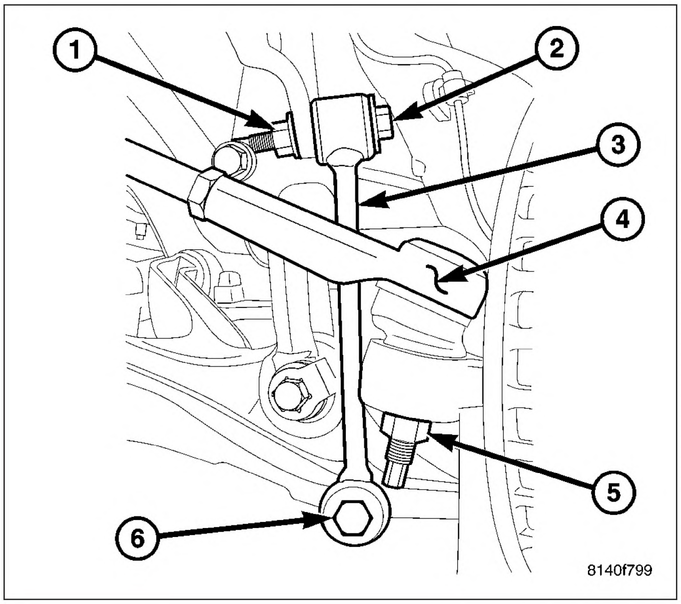
INSTALLATION

1. Install the stabilizer bar (1) to the vehicle.
2. Install the stabilizer bushing clamp (2) and tighten the bolts to 142 N·m (105 ft. lbs.).



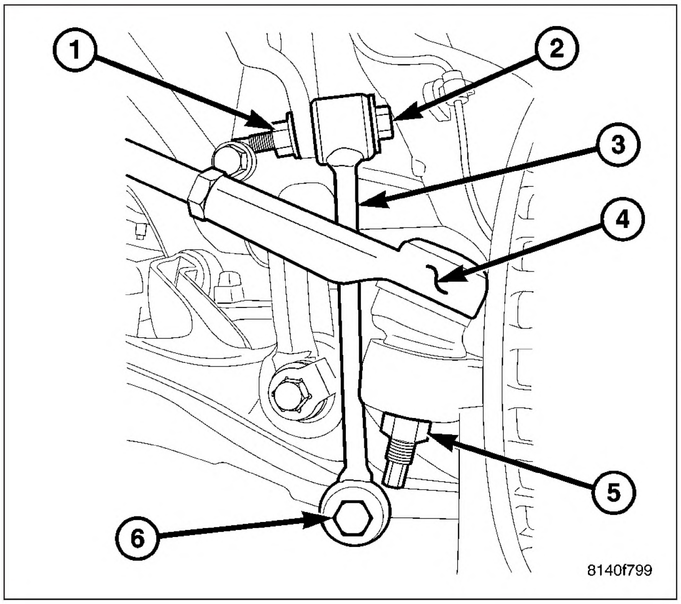
3. Install the upper stabilizer link (3) and tighten nut (1) & bolt (2) to 135 N·m (100 ft. lbs.).
4. Install the front splash shield.
5. Lower the vehicle.



STABILIZER LINK

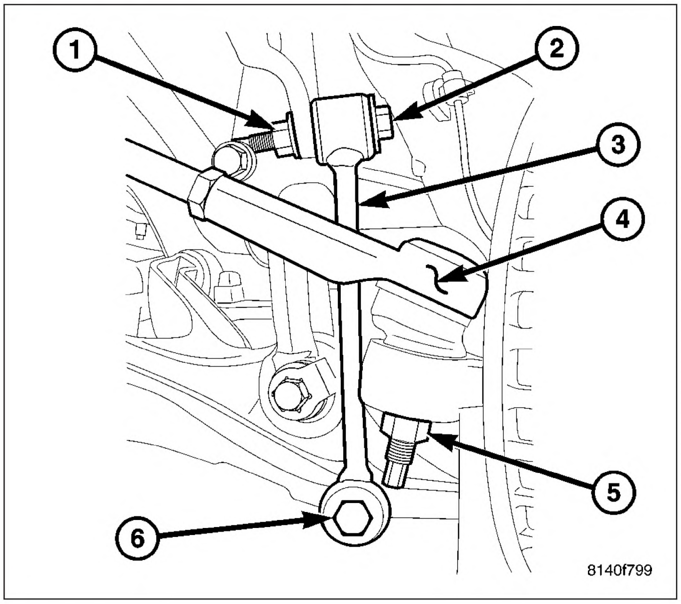
REMOVAL

1. Raise and support the vehicle.
2. Remove the tire and wheel assembly.
3. Remove the upper link bolt/nut (1&2).
4. Remove the lower link bolt (6).
5. Remove the stabilizer link (3).



INSTALLATION

1. Install the stabilizer link (3) to the vehicle.
2. Install the lower link bolt (6) and tighten to 115 N·m (85 ft. lbs.)
3. Install the upper link bolt/nut (1&2) and tighten to 135 N·m (100 ft. lbs.).
4. Install the tire and wheel assembly.
5. lower the vehicle.



UPPER BALL JOINT

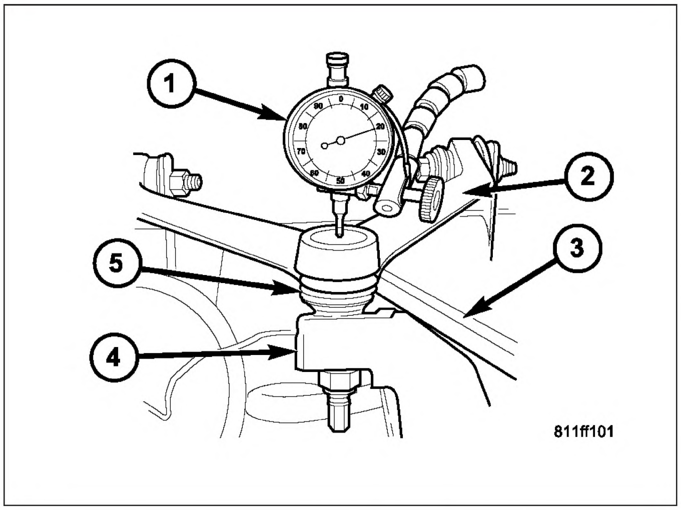
DIAGNOSIS AND TESTING

UPPER BALL JOINT

1. Raise the front of the vehicle. Place safety floor stands under both lower control arms as far outboard as possible. Lower the vehicle to allow the stands to support some or all of the vehicle weight.
2. Remove the front tires.
3. Mount a dial indicator (1) solidly to the frame and then zero the dial indicator.
4. Position dial indicator plunger on the topside of the upper ball joint (5).

NOTE: The dial indicator plunger must be perpendicular to the machined surface of the ball joint.

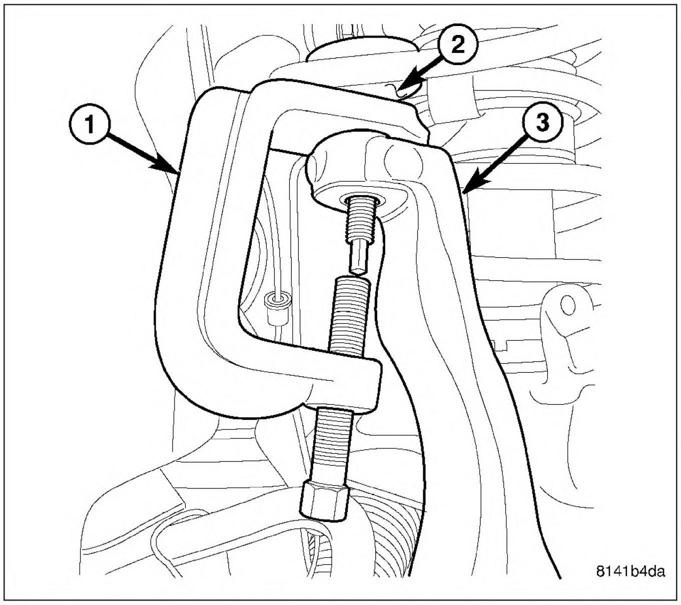
NOTE: Use care not to pry or tear the ball joint boot, when checking the free play.



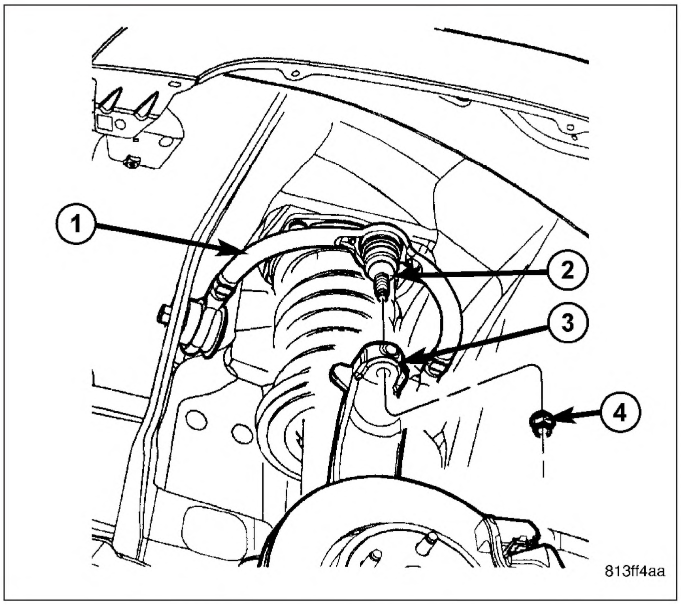
5. Position a pry bar (3) between the steering knuckle (4) and the upper control arm (2). Pry upwards on the upper control arm.
6. If the travel exceeds 0.5 mm (0.020 in.), replace the upper ball joint (Refer to 2 - SUSPENSION/FRONT/UPPER BALL JOINT - REMOVAL).
7. If the upper ball joint is within specs reinstall the front tires (Refer to 22 - TIRES/WHEELS/WHEELS - STANDARD PROCEDURE).

REMOVAL

1. Raise vehicle and support the axle.
2. Remove the tire and wheel.
3. Remove the upper ball joint retaining nut.
4. Separate the upper ball joint (2) from the knuckle (3) using special tool #8677 (1).

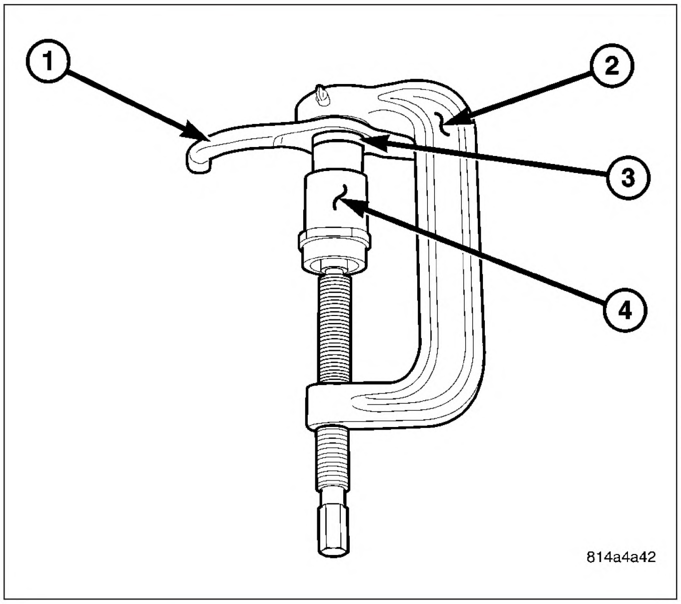


5. Remove the wheel speed sensor wire from the upper control arm (1).
6. Move the knuckle (3) out of the way to allow ball joint removal tool access.



NOTE: Extreme pressure lubrication must be used on the threaded portions of the tool. This will increase the longevity of the tool and insure proper operation during the removal and installation process.

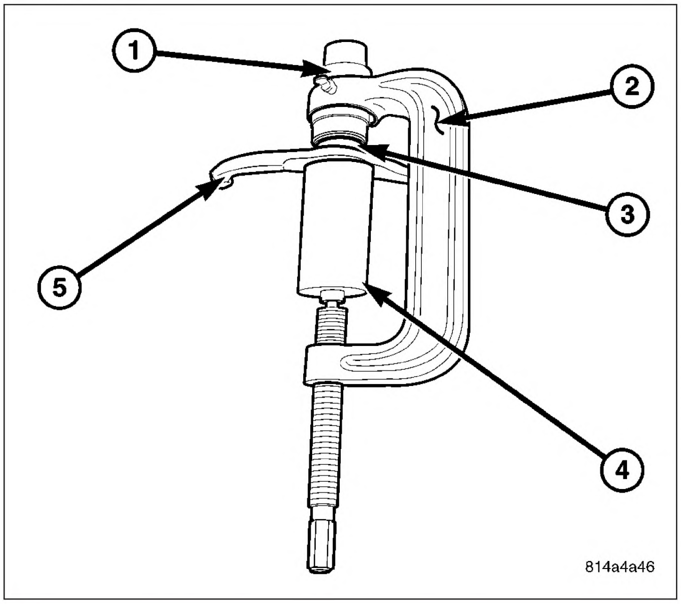
7. Press the ball joint from the upper control arm (1) using special tools C-4212-F (PRESS) (2) and 9652 (Driver) (3).



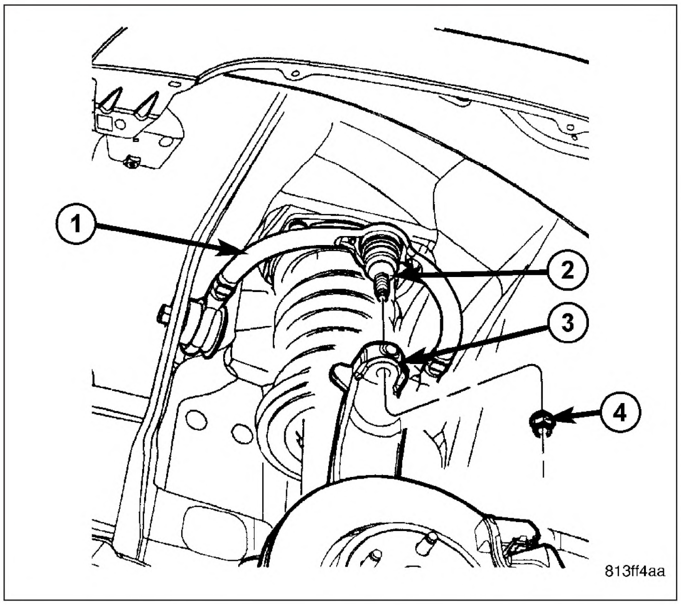
INSTALLATION

NOTE: Extreme pressure lubrication must be used on the threaded portions of the tool. This will increase the longevity of the tool and insure proper operation during the removal and installation process.

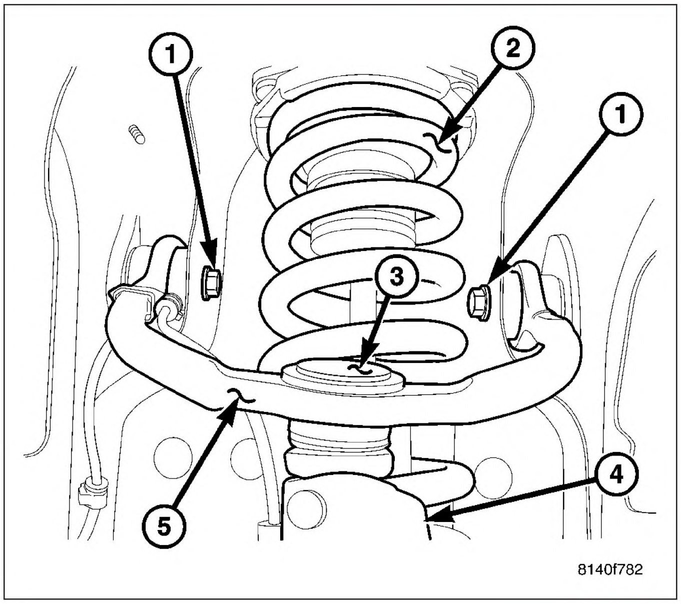
1. Install the ball joint (4) into the upper control arm (5) and press in using special tools C-4212-F (press) (2), 9652 (Driver) (1) and 8975–2 (Receiver) (4).



2. Install the upper ball joint (2) into the knuckle (3).
3. Install the upper ball joint retaining nut (4) and tighten to 75 N·m (55 ft. lbs.).



4. Install the wheel speed sensor wire to the upper control arm.
5. Install the tire and wheel.
6. Remove the supports and lower the vehicle.
7. Perform a wheel alignment (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).



UPPER CONTROL ARM

DESCRIPTION

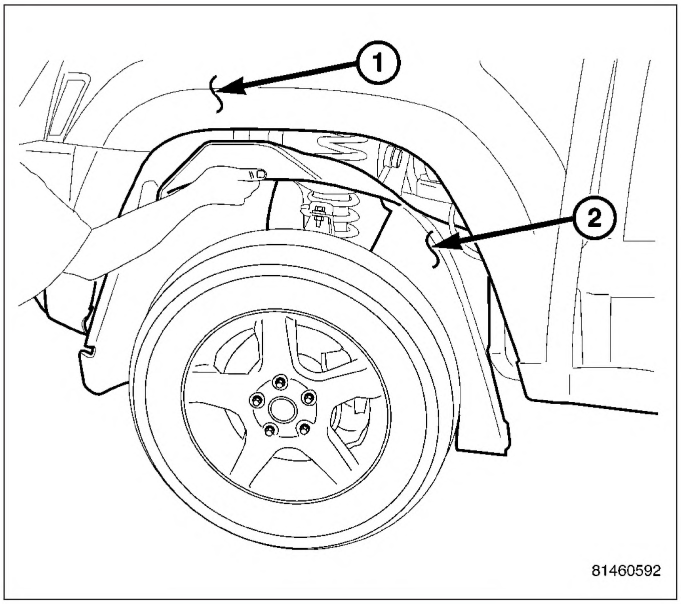
The upper suspension arms are forged steel and use rubber bushings at each end of the arm.

OPERATION

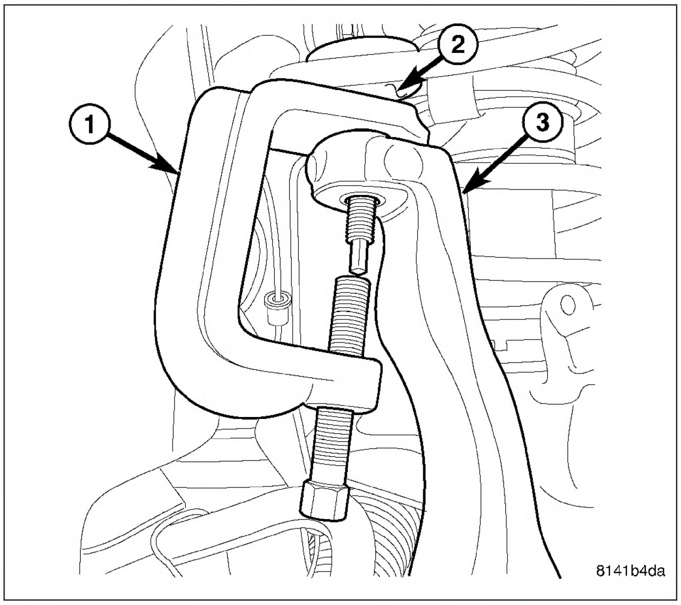
The arms mount to the unibody frame rail bracket and the knuckle. The arm and bushings provide location and react to loads from the road. The bushings provide isolation from the road.

REMOVAL

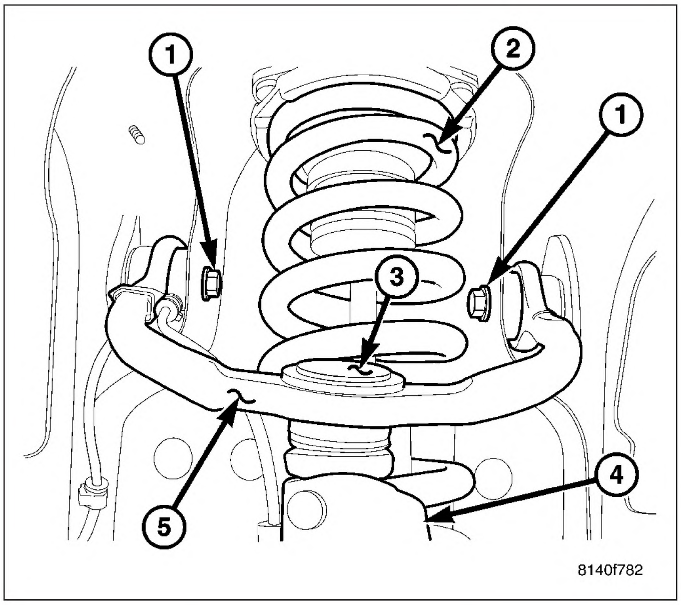
1. Raise vehicle and support the axle.
2. Remove the tire and wheel.
3. Remove the inner fender well (2).



4. Remove the upper ball joint retaining nut.
5. Seperate the upper ball joint (2) from the knuckle (3) using special tool #8677 (1).

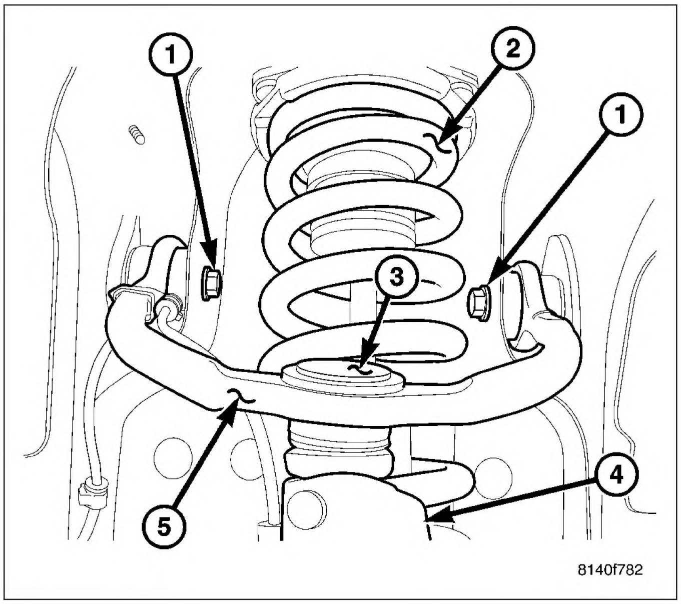


6. Remove the wheel speed sensor wire from the upper control arm (5).
7. Remove the nut and bolt (1) securing the upper control arm (5) to the body.
8. Remove the upper control arm (5) from the vehicle.

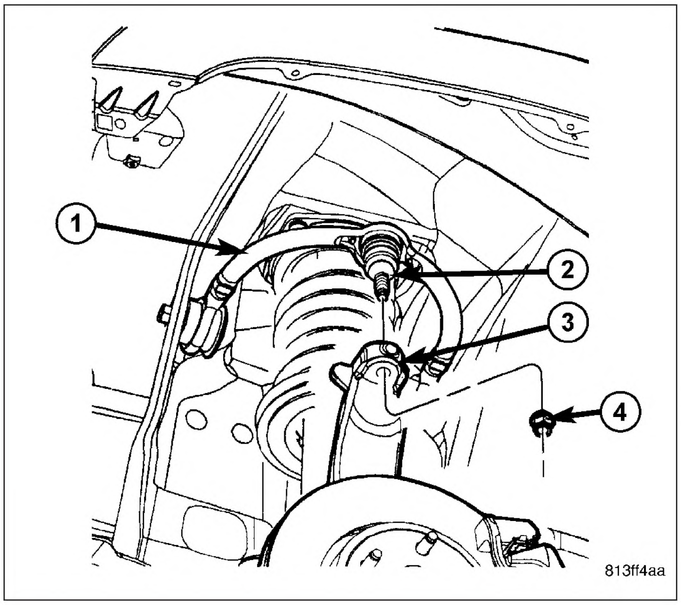


INSTALLATION

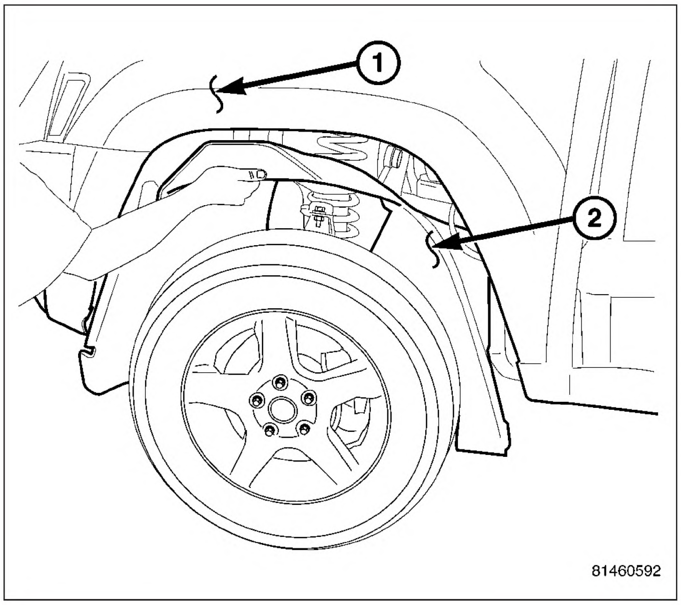
1. Install the upper control arm (5) to the vehicle.
2. Install the nut and bolt (1) securing the upper control arm (5) to the body.
3. Install the wheel speed sensor wire to the upper control arm (5).



4. Install the upper ball joint (2) into the knuckle (3).
5. Install the upper ball joint retaining nut (4) and tighten the nut to 81 N·m (60 ft.lbs.).



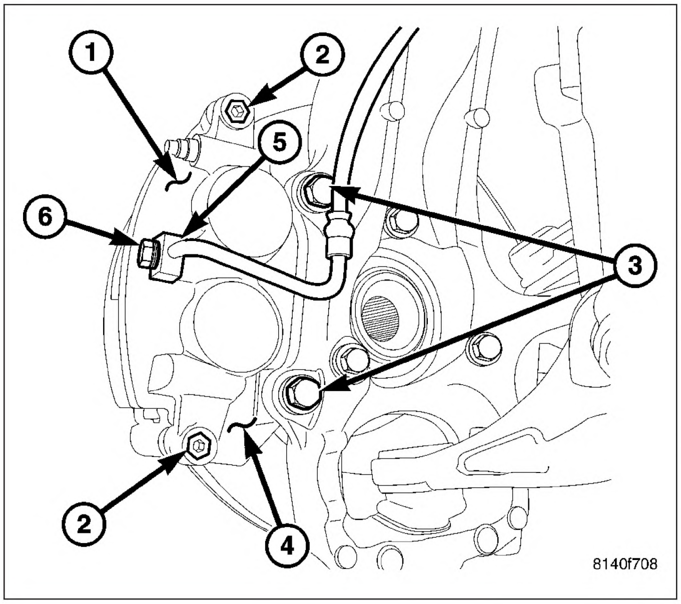
6. Install the inner fender well (2).
7. Install the tire and wheel.
8. Remove the supports and lower the vehicle.
9. Perform a wheel alignment (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).



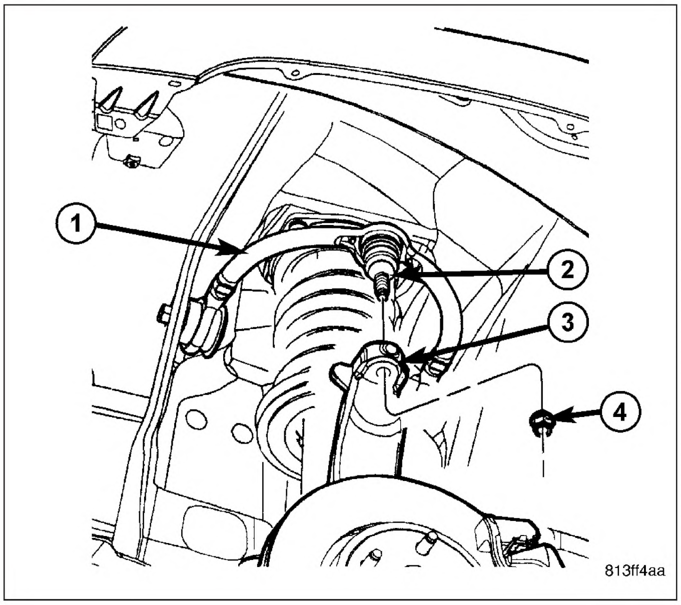
CLEVIS BRACKET

REMOVAL

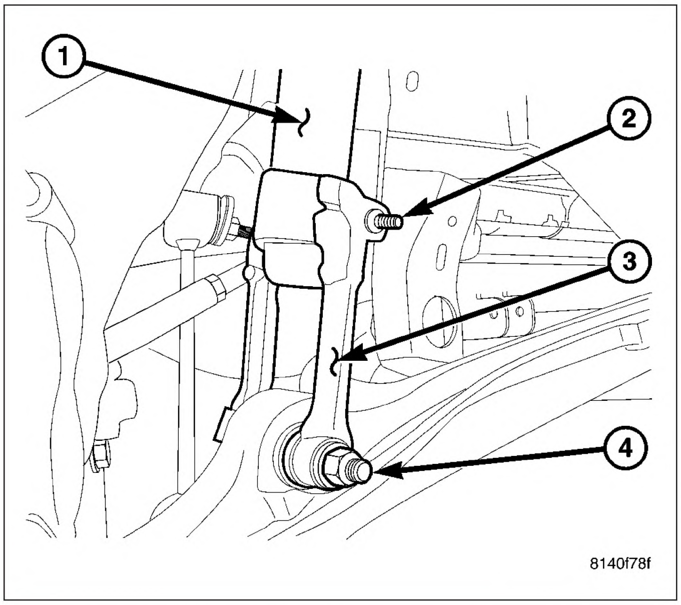
1. Raise and support the vehicle.
2. Remove the tire.
3. Remove the two brake caliper adapter bolts (3).
4. Support the brake caliper adaptor and caliper. **Do not allow the caliper to hang by the brake hose.**



5. Remove the disc brake rotor.
6. Remove the upper ball joint nut (4).
7. Separate the upper ball joint (2) from the knuckle (3) using special tool 8677.



8. Remove the clevis bolt (2) at the shock (1).
9. Remove the lower clevis bolt/nut (4) at the lower control arm.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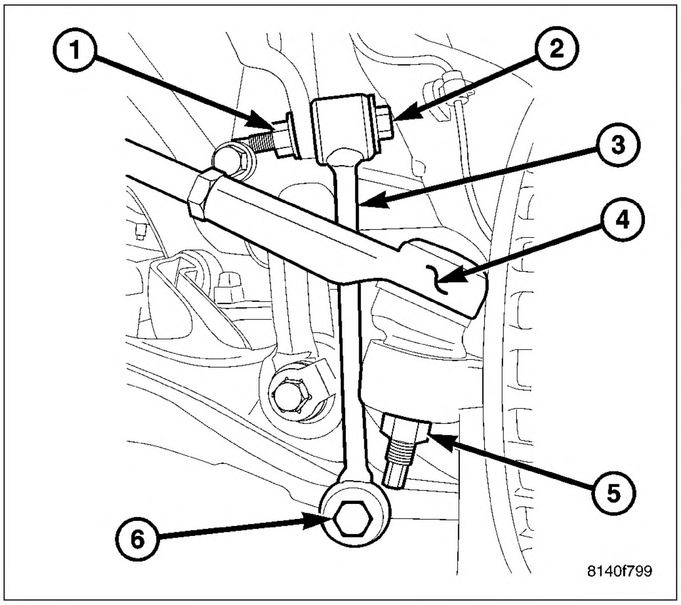
10. Remove the lower stabilizer link bolt (6).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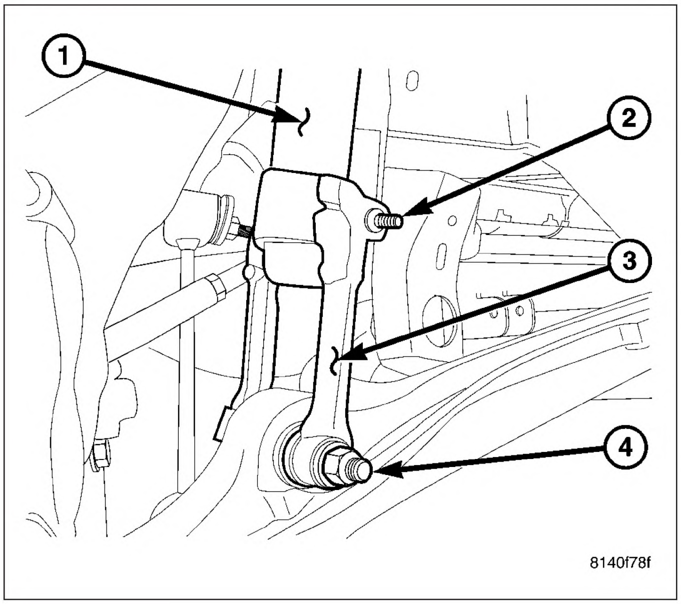
11. Remove the clevis bracket (3).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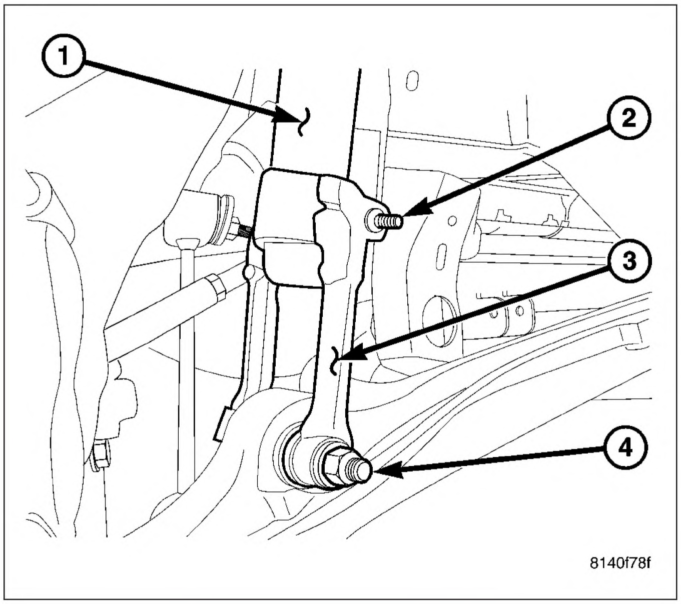
INSTALLATION

1. Install the clevis bracket (3) to the shock (1) and tighten to 122 N·m (90 ft. lbs.)..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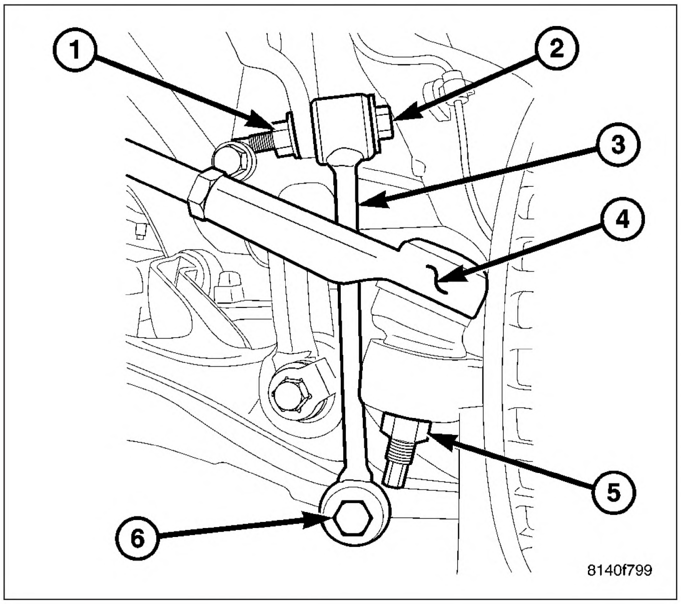
2. Install the lower stabilizer link bolt (6) and tighten to 115 N·m (85 ft. lbs.)..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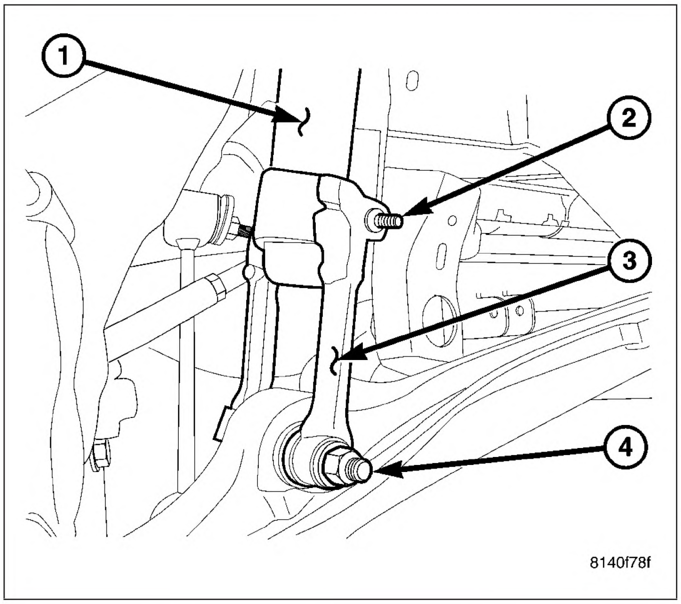
3. Install the lower clevis bolt/nut (4) at the lower control arm and tighten to 169 N·m (125 ft. lbs.)..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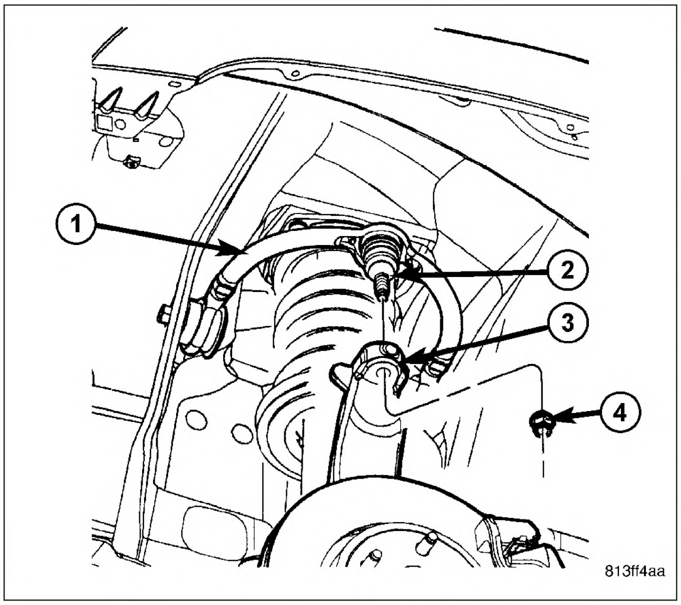
4. Install the upper ball joint (2) into the knuckle (3) and tighten the nut to 75 N·m (55 ft. lbs.).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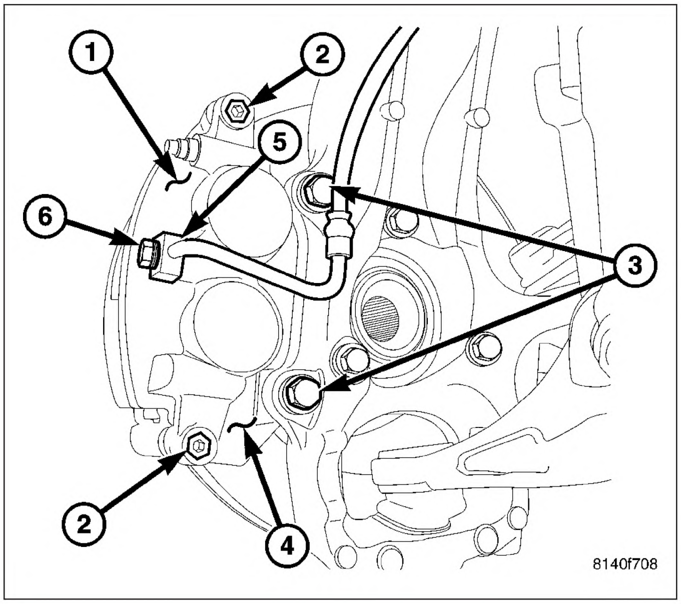
5. Install the disc brake rotor.
6. Install the caliper adaptor mounting bolts (3) to 25 N·m (18 ft. lbs.).
7. Install the tire and wheel assembly.
8. Lower the vehicle.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REAR

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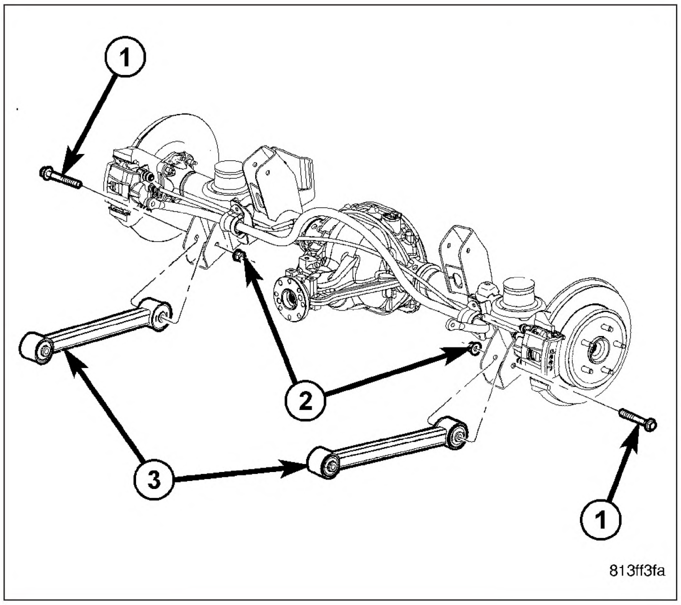
REAR

DESCRIPTION

The rear suspension is comprised of :

- Drive axle
- Shock absorbers
- Coil springs
- Lower suspension arms (3)
- Upper suspension arm
- Stabilizer bar



CAUTION: Suspension components with rubber/urethane bushings should be tightened with the vehicle at normal ride height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. This will maintain vehicle ride comfort and prevent premature bushing wear.

WARNING

WARNING: Suspension components with rubber bushings must be tightened with the vehicle at normal ride height. It is important to have the springs supporting the weight of the vehicle when the fasteners are torqued. If springs are not at their normal ride position, vehicle ride comfort will be affected and cause premature bushing wear.

DIAGNOSIS AND TESTING - REAR SUSPENSION

CONDITION	POSSIBLE CAUSES	CORRECTION
VEHICLE INSTABILITY	1. Loose or worn wheel bearings. 2. Loose, worn or bent suspension components. 3. Tire pressure.	1. Replace wheel bearings. 2. Inspect, tighten or replace components as necessary. 3. Adjust tire pressure.
VEHICLE PULLS TO ONE SIDE	1. Weak or broken spring. 2. Alignment. 3.Tires. 4. Brakes.	1. Replace spring. 2. Align vehicle to specifications. 3. Replace tires. 4. Repair as necassary.
KNOCKING, RATTLING OR SQUEAKING	1. Worn shock bushings. 2. Loose shock mounting. 3. Shock valve. 4. Weak or broken spring. 5. Loose, worn or bent suspension components.	1. Replace shock. 2. Tighten to specifications. 3. Replace shock. 4. Replace spring. 5. Inspect, tighten or replace components as necessary.
IMPROPER TRACKING	1. Loose, worn or bent suspension components. 2. Bent axle.	1. Inspect, tighten or replace components as necessary. 2.Replace axle.

SPECIFICATIONS

TORQUE CHART

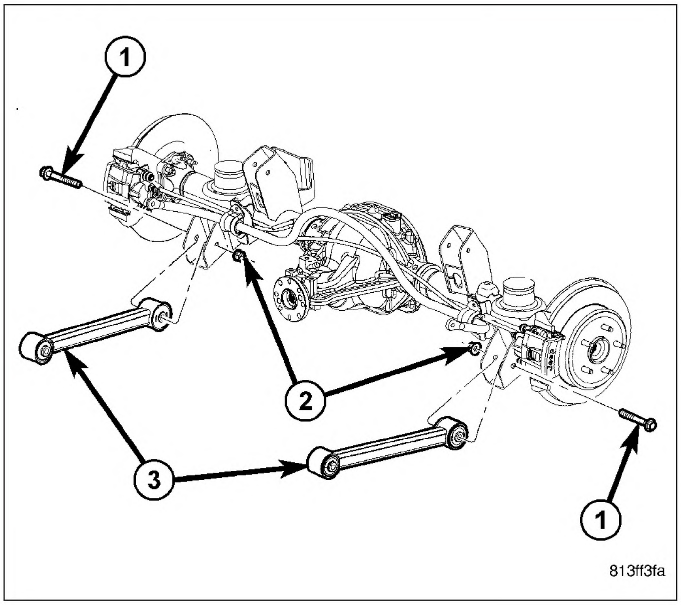
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Shock Absorber Upper Bolt	95	70	—
Shock Absorber Lower Bolt	115	85	—
Suspension Arms Lower Axle Bracket Nut	210	155	—
Suspension Arms Lower Frame Bracket Nut	176	130	—
Suspension Arms Upper Axle Bracket Nut	136	100	—
Suspension Arms Upper Frame Bracket Nut	129	95	—
Track Bar to Axle	190	140	—
Track Bar to Rear Structure	190	140	—
Stabilizer Bar Retainer Bolts	46	34	—
Stabilizer Link Nut to Stabilizer Bar	88	65	—
Stabilizer Link to Body Bolt	102	75	—
Jounce Bumper Bolt to Body	54	40	—

LOWER CONTROL ARM

DESCRIPTION

The lower suspension arms (3) are tubular steel and use a voided oval bushing at the arm on the axle side.



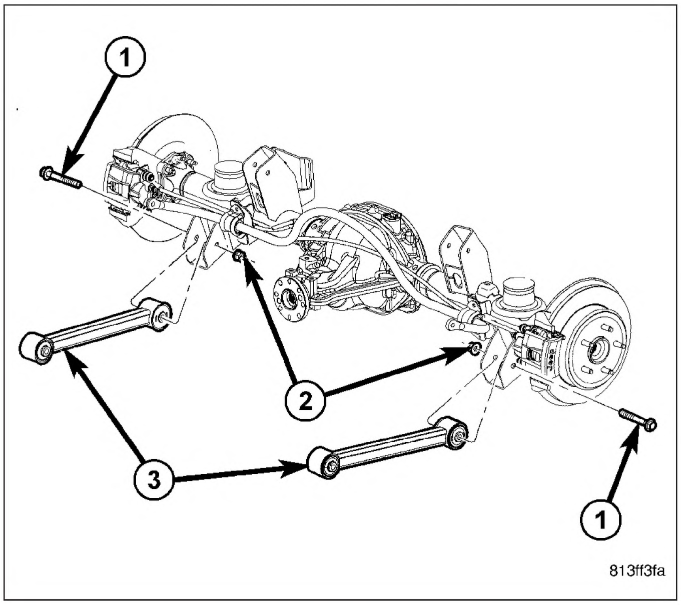
OPERATION

The bushings provide isolation from the axle. The arms mount to the unibody frame rail bracket and the axle brackets. The arm and bushings provide location and react to loads.

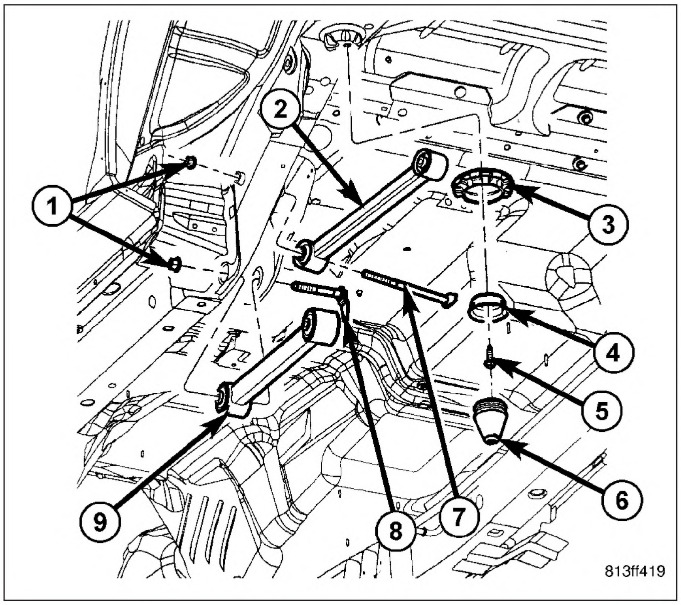
REMOVAL

LEFT SIDE

1. Raise the vehicle and support the rear axle.
2. Remove the fuel tank (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - REMOVAL).
3. Remove the lower suspension arm nut (2) and bolt (1) from the axle bracket.



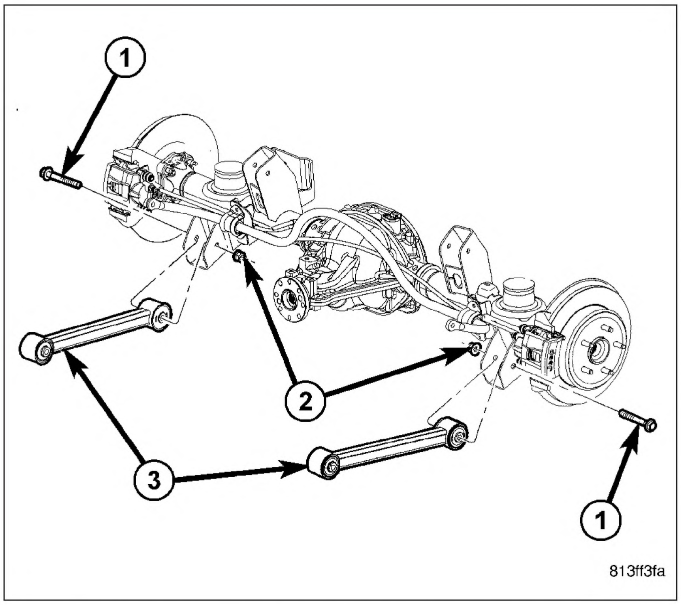
4. Remove the nut (1) and bolt (8) from the frame rail and remove the lower suspension arm (9).



RIGHT SIDE

1. Raise the vehicle and support the rear axle.

2. Remove the lower suspension arm nut (2) and bolt (1) from the axle bracket.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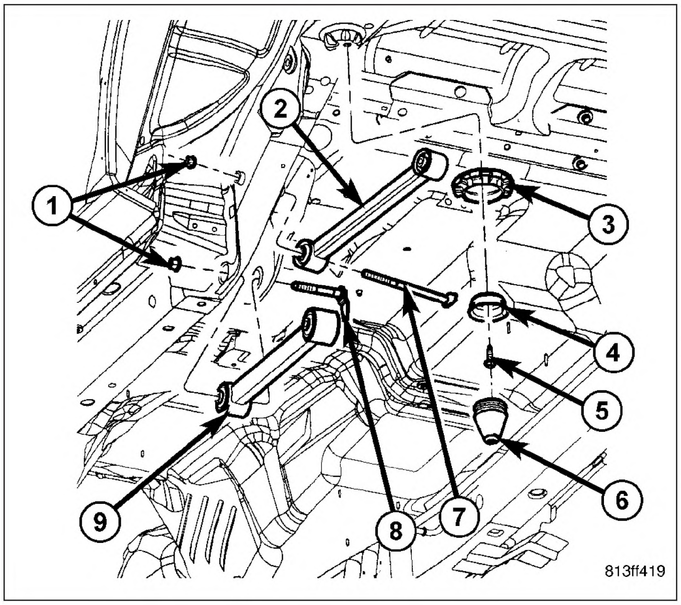
3. Remove the nut (1) and bolt (8) from the frame rail and remove the lower suspension arm (9).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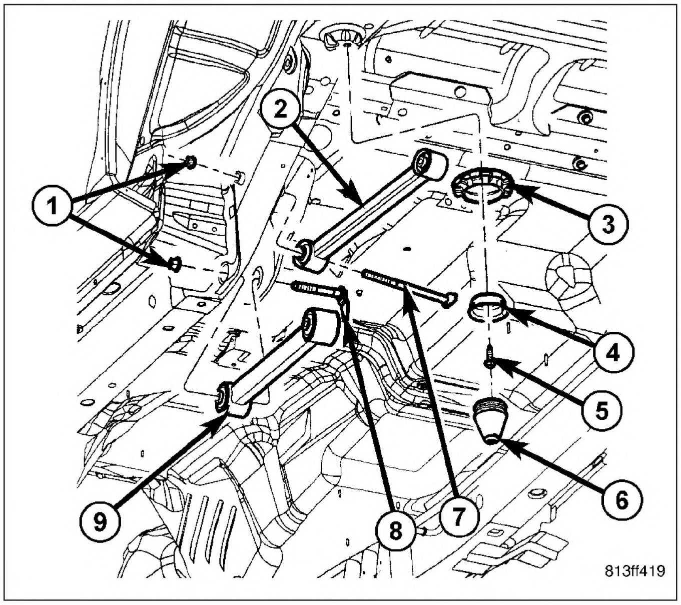
INSTALLATION

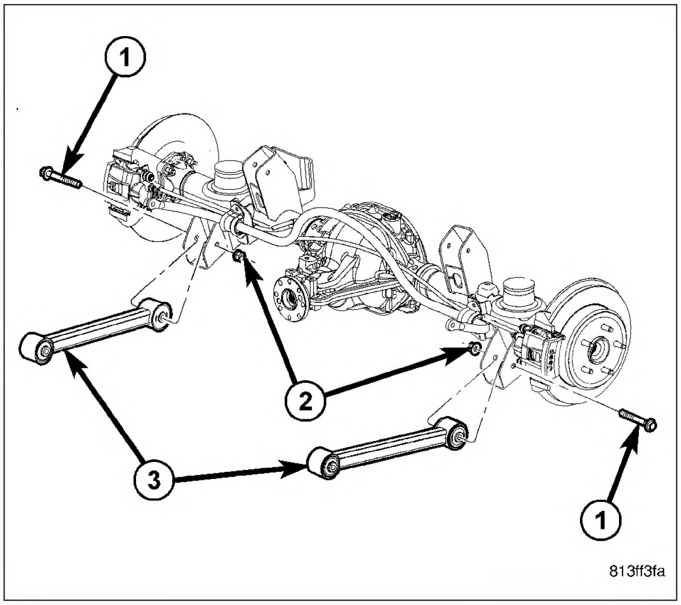
LEFT SIDE

NOTE: All torques should be done with vehicle on the ground with full vehicle weight.

1. Position the lower suspension arm (9) in the frame rail.
2. Install the frame rail bracket bolt (8) and nut (1) tighten to176 N·m (130 ft. lbs.).



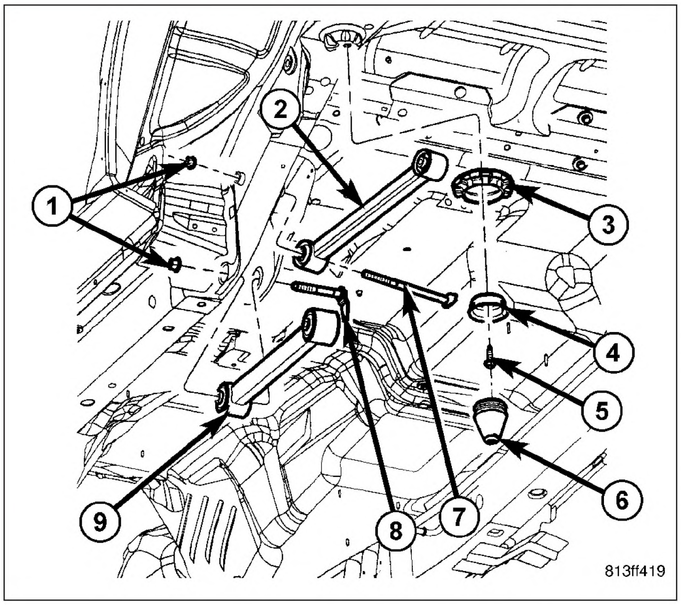
3. Position the lower suspension arm(3) in the axle bracket.
4. Install the axle bracket bolt (1) and nut (2) Tighten to 210 N·m (155 ft. lbs.).
5. Install the fuel tank (Refer to 14 - FUEL SYSTEM/ FUEL DELIVERY/FUEL TANK - INSTALLATION).
6. Remove the supports and lower the vehicle.



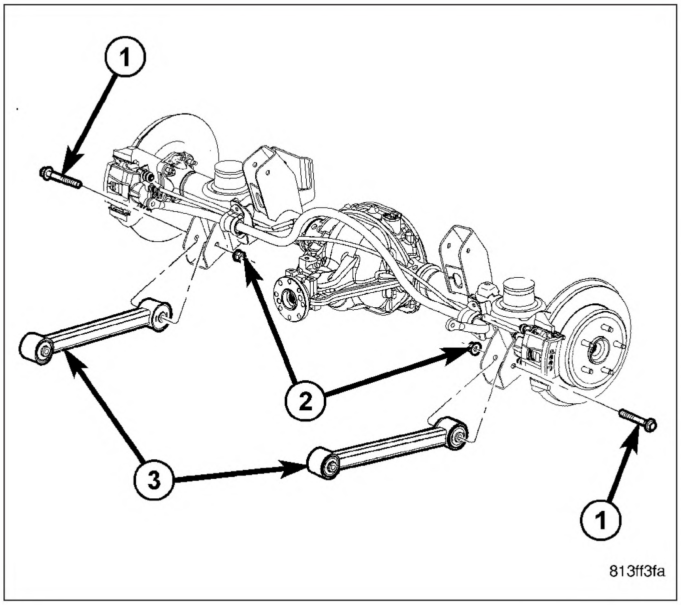
RIGHT SIDE

NOTE: All torques should be done with vehicle on the ground with full vehicle weight.

1. Position the lower suspension arm (9) in the frame rail.
2. Install the frame rail bracket bolt (8) and nut (1) tighten to176 N·m (130 ft. lbs.).



3. Position the lower suspension arm(3) in the axle bracket.
4. Install the axle bracket bolt (1) and nut (2) Tighten to 210 N·m (155 ft. lbs.).
5. Remove the supports and lower the vehicle.



UPPER CONTROL ARM

DESCRIPTION

The suspension arm uses bushings to isolate road noise. The suspension arm is bolted through bushings to a bracket at the body and axle.

OPERATION

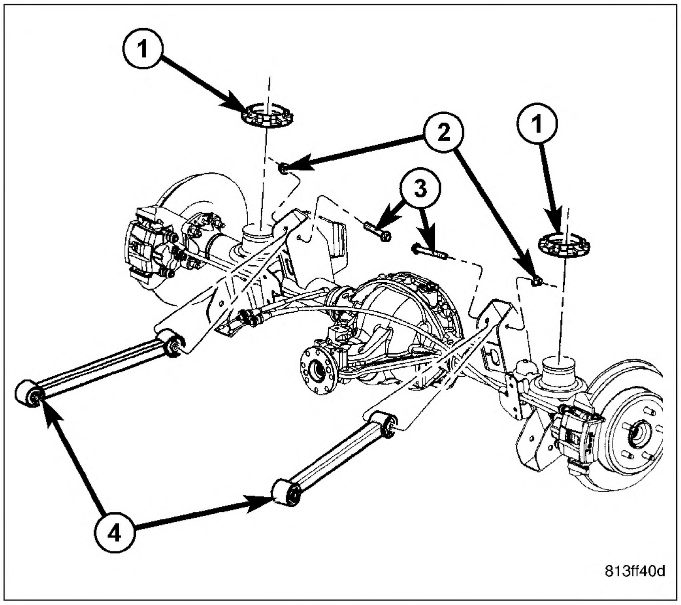
The upper suspension arm provides fore/aft and lateral location of the rear axle. The suspension arm travel is limited through the use of jounce bumpers in compression and shock absorbers in rebound.

REMOVAL

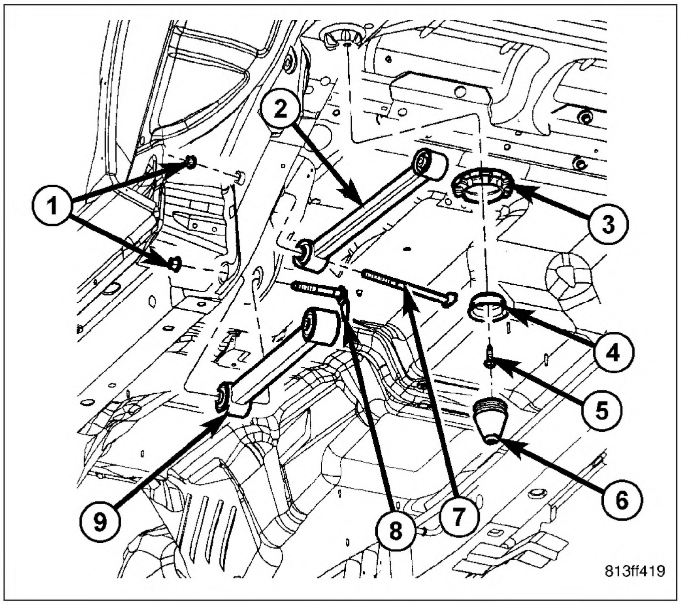
LEFT SIDE

1. Raise and support the vehicle.
2. Support the rear axle.
3. Lower the fuel tank in order to gain access to the bolt (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - REMOVAL).

4. Remove the upper suspension arm nut (2) and bolt (3) from the axle bracket.


1
2
1
3
4
813ff40d

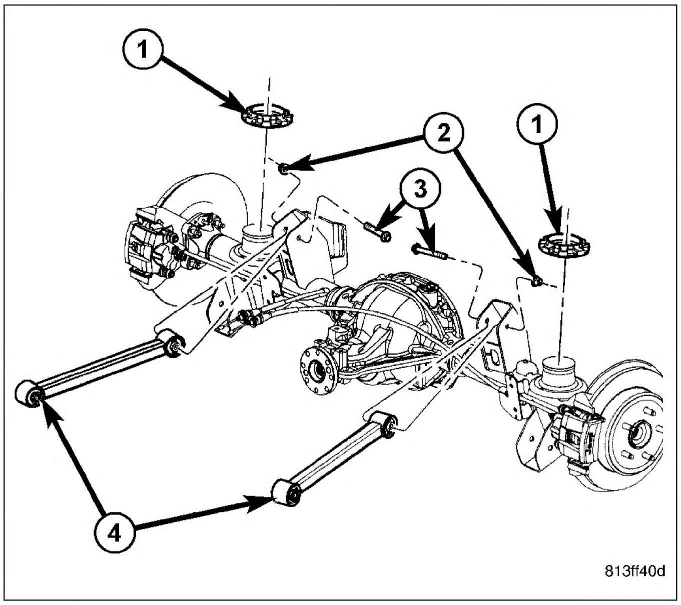
5. Remove the nut (1) and bolt (5) from the frame rail and remove the upper suspension arm (2).


2
1
3
4
5
6
9
8
7
813ff419

RIGHT SIDE

1. Raise and support the vehicle.
2. Support the rear axle.

3. Remove the upper suspension arm nut (2) and bolt (3) from the axle bracket.


1
2
1
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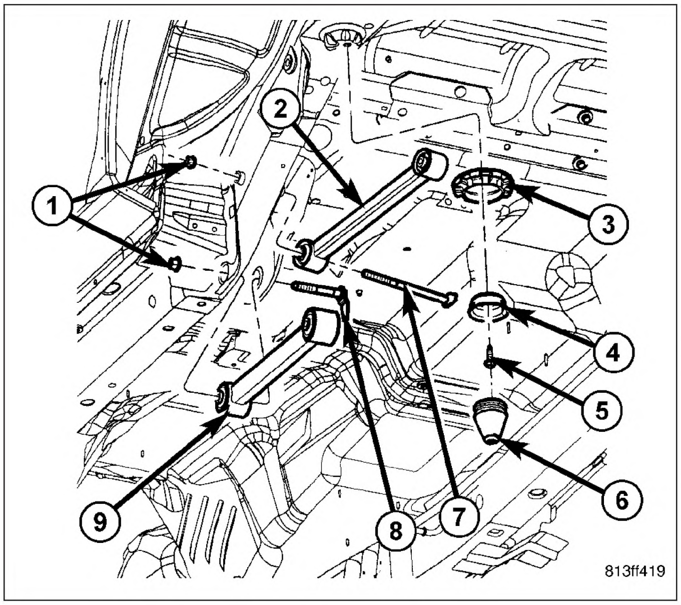
813ff40d

4. Remove the nut (1) and bolt (5) from the frame rail and remove the upper suspension arm (2).

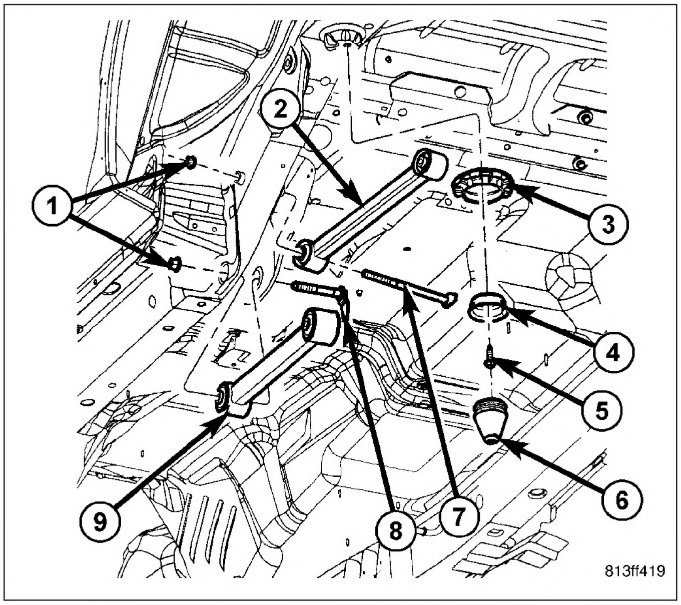

2
1
3
4
5
6
9
8
7
813ff419

INSTALLATION

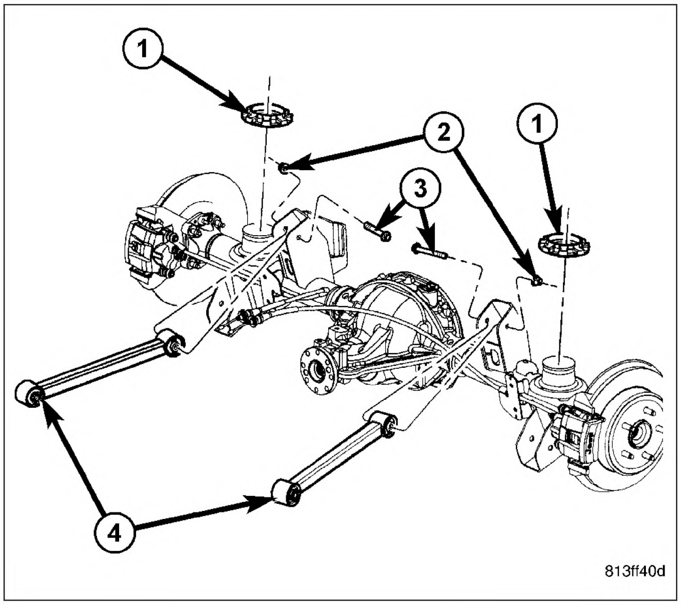
LEFT SIDE

NOTE: All torques should be done with vehicle on the ground with full vehicle weight.

1. Position the upper suspension arm (2) in the frame rail bracket.
2. Install the mounting bolt (5) and nut (1) tighten to 129 N·m (95 ft. lbs.).



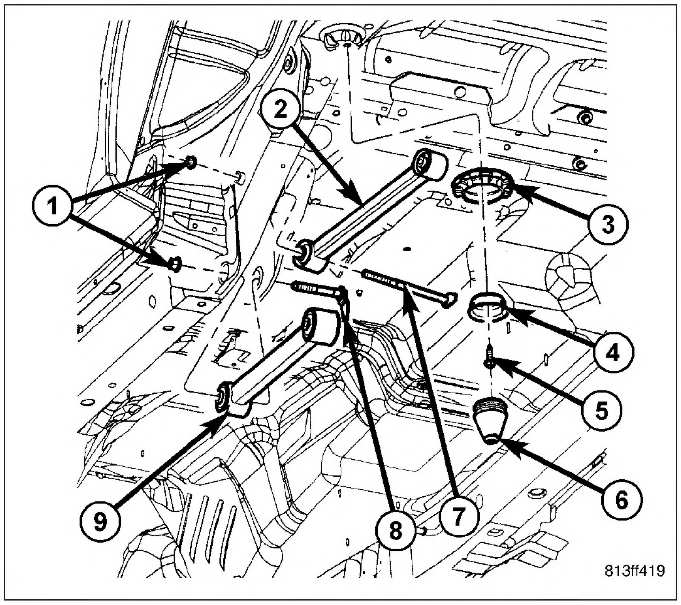
3. Position the upper suspension arm (4) in the axle bracket.
4. Install the mounting bolt (3) and nut (2) tighten to 136 N·m (100 ft. lbs.).
5. Raise the fuel tank back into place and secure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/ FUEL TANK - INSTALLATION).
6. Remove the supports and lower the vehicle.



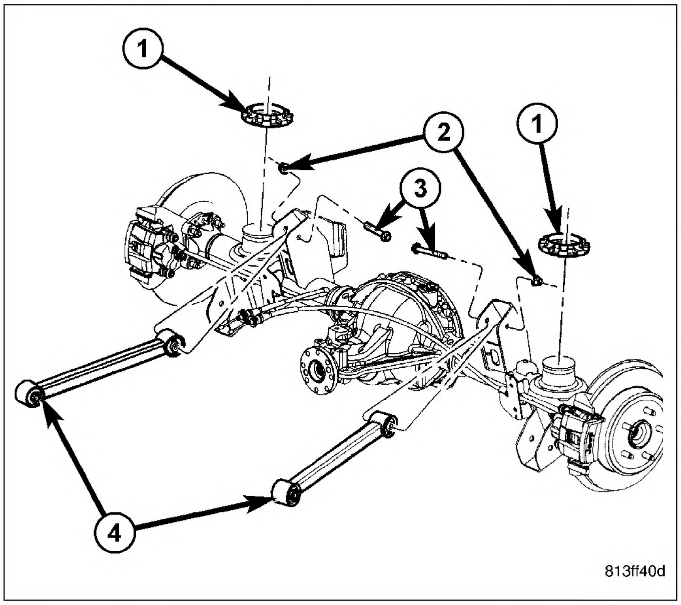
RIGHT SIDE

NOTE: All torques should be done with vehicle on the ground with full vehicle weight.

1. Position the upper suspension arm (2) in the frame rail bracket.
2. Install the mounting bolt (5) and nut (1) tighten to 129 N·m (95 ft. lbs.).



3. Position the upper suspension arm (4) in the axle bracket.
4. Install the mounting bolt (3) and nut (2) tighten to 136 N·m (100 ft. lbs.).
5. Remove the supports and lower the vehicle.



SHOCK

DESCRIPTION

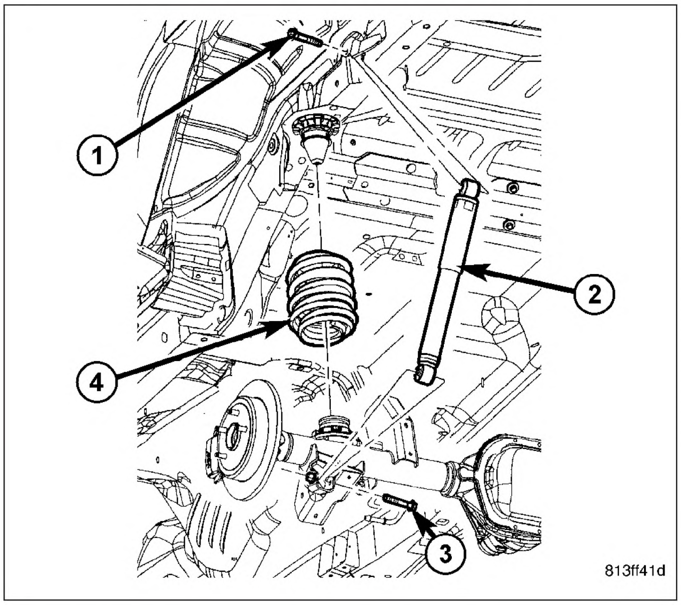
The top of the shock absorbers are bolted to the body. The bottom of the shocks are bolted to the axle brackets. The standard shocks have conventional twin tube construction and are low pressure gas charged. Gas charging prevents cavitation during rough road operation.

OPERATION

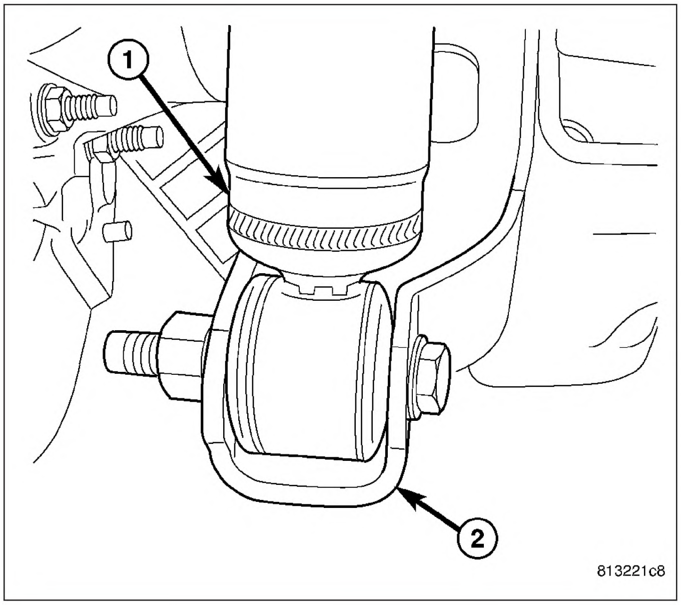
The shock absorbers dampen jounce and rebound motion of the vehicle over various road conditions and limit suspension rebound travel.

REMOVAL

1. Raise and support the vehicle. Position a hydraulic jack under the axle to support the axle.
2. Remove the upper nut and bolt (1) from the frame bracket.

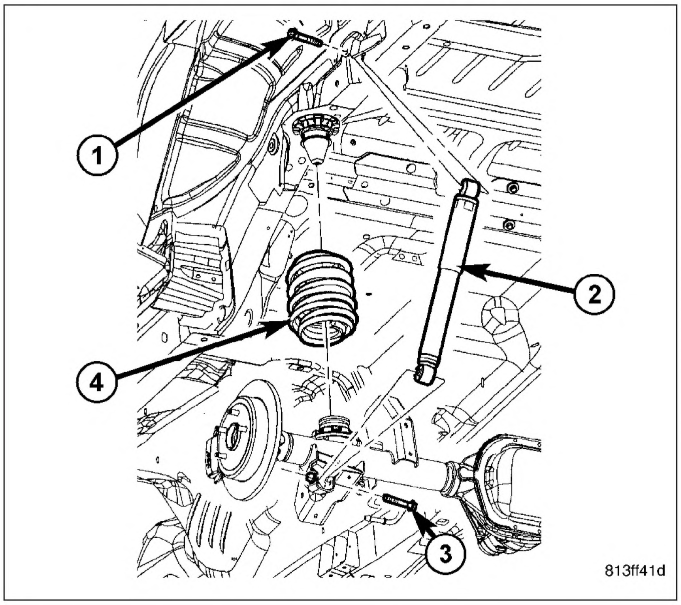


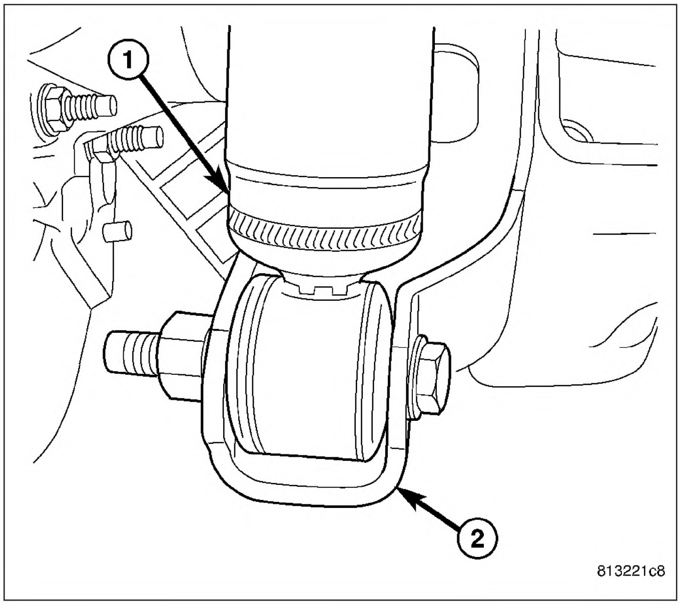
3. Remove the lower nut and bolt from the axle bracket (2). Remove the shock absorber (1).



INSTALLATION

1. Install the shock absorber (2) in the frame bracket and install the bolt (1) and nut.





2. Install the shock absorber (1) in the axle bracket (2) and install the bolt and nut.
3. Tighten the upper mounting nuts to 95 N·m (70 ft. lbs.). Tighten the lower mounting nuts to 115 N·m (85 ft. lbs.).
4. Remove the supports and lower the vehicle.

SPRING

DESCRIPTION

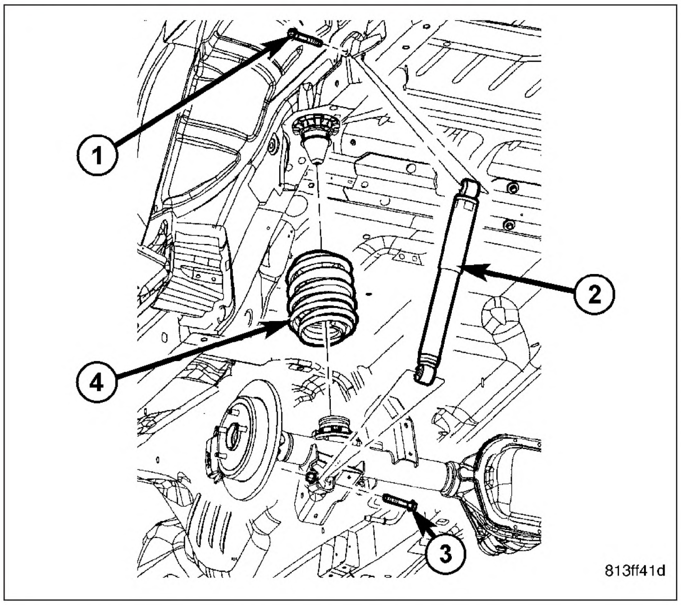
The coil springs mount up in the wheelhouse which is part of the unitized body bracket. A rubber doughnut isolator is located between the top and bottom of the spring. The isolators provide road noise isolation

OPERATION

The coil springs control ride quality and maintain proper ride height.

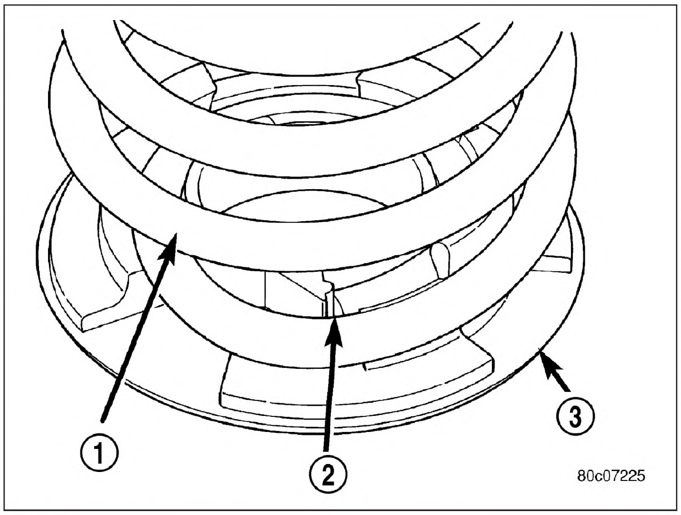
REMOVAL

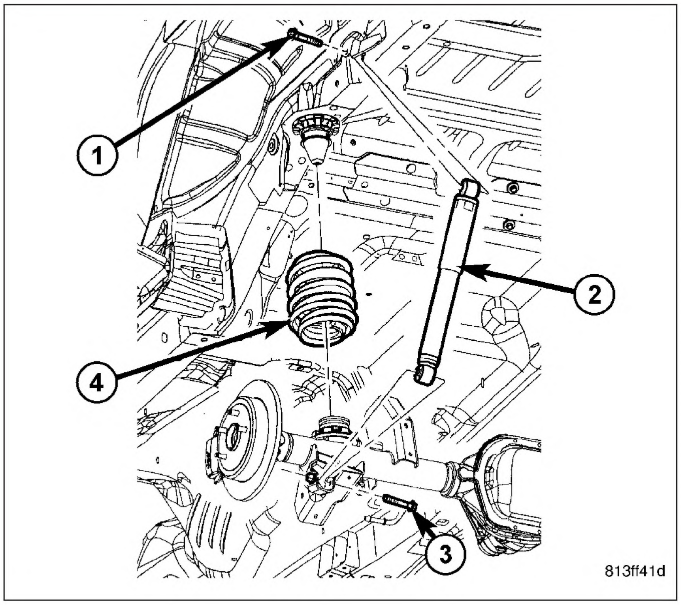
1. Raise and support the vehicle. Position a hydraulic jack under the axle to support the axle.
2. Remove the wheel and tire assemblies.
3. Remove the lower shock bolt (3) from the axle bracket.
4. Remove the stabilizer bar link from the body rail.
5. Lower the hydraulic jack and tilt the axle and remove the coil spring (4).
6. Remove and inspect the spring isolators.



INSTALLATION

1. Install the upper isolator.
2. Install the lower isolator (3).
3. Pull down on the axle and position the coil spring (1) in the lower isolator.
4. Raise the axle with the hydraulic jack.
5. Install the shock absorber (3) to the axle bracket and tighten to 115 N·m (85 ft. lbs.).
6. Install the stabilizer bar link to the body rail, tighten to 102 N·m (75 ft. lbs.).
7. Install the wheel and tire assemblies.
8. Remove the supports and lower the vehicle.

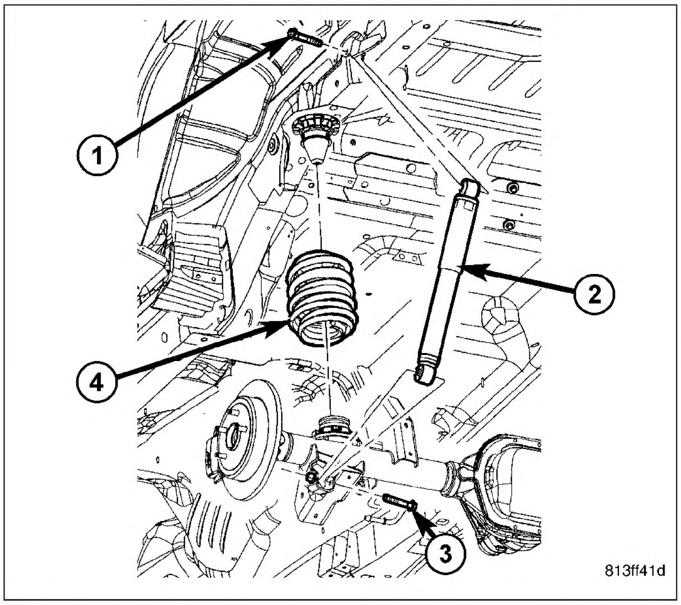




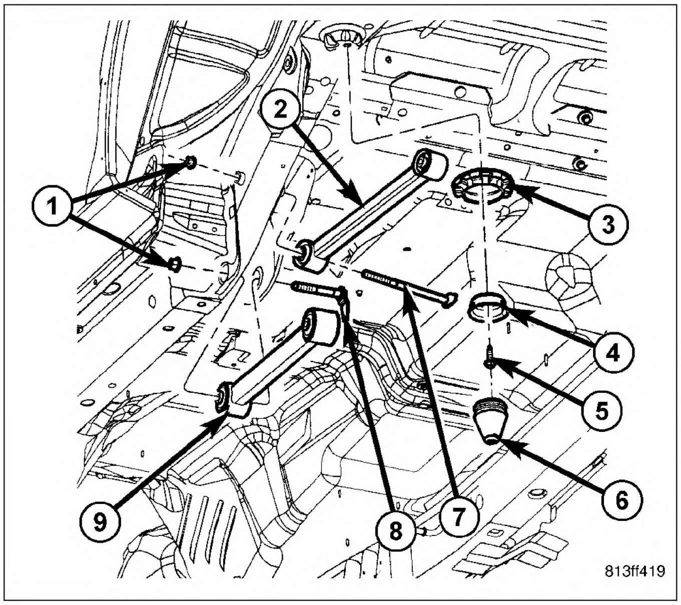
JOUNCE BUMPER

REMOVAL

1. Raise and support the vehicle. Position a hydraulic jack under the axle to support the axle.
2. Remove the wheel and tire assemblies.
3. Remove the lower shock bolt (3) from the axle bracket.
4. Remove the stabilizer bar link from the body rail.
5. Lower the hydraulic jack and tilt the axle and remove the coil spring (4).



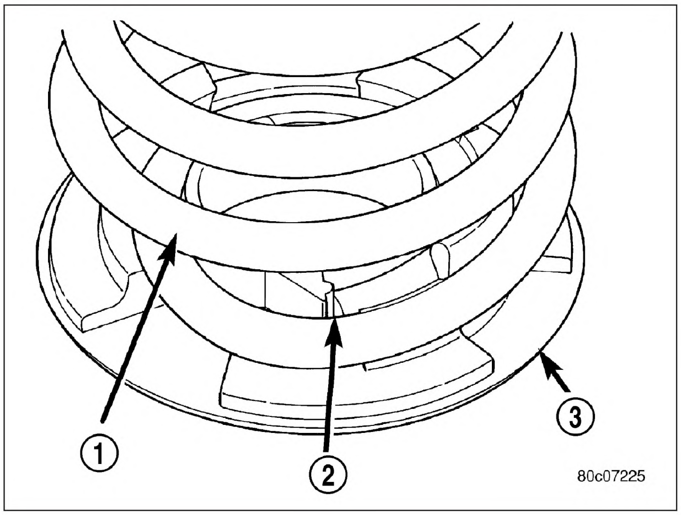
6. Remove the jounce bumper (6).



INSTALLATION

1. Install the jounce bumper, Tighten to 54 N·m (40 ft. lbs.).
2. Install the upper isolator.

3. Install the lower isolator (1).
4. Pull down on the axle and position the coil spring in the lower isolator.
5. Raise the axle with the hydraulic jack.
6. Install the shock absorber to the axle bracket and tighten to 115 N·m (85 ft. lbs.)..
7. Install the stabilizer bar link to the body rail, Tighten to 102 N·m (75 ft. lbs.).
8. Install the wheel and tire assemblies.
9. Remove the supports and lower the vehicle.



STABILIZER BAR

DESCRIPTION

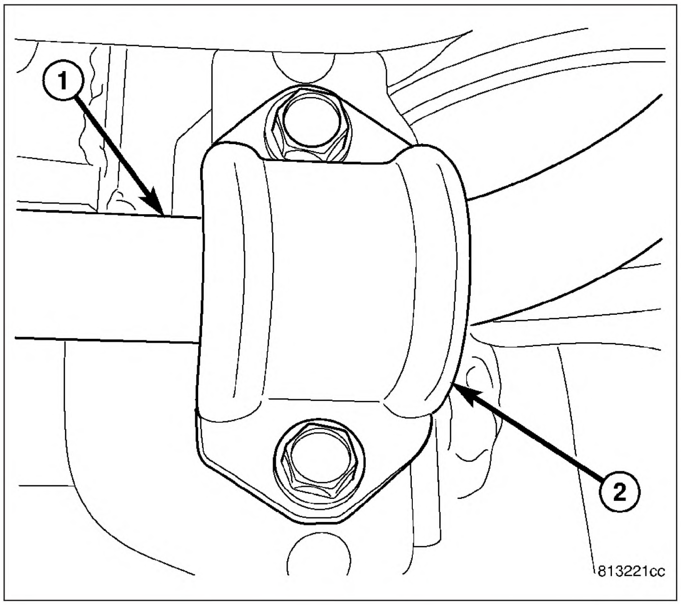
The stabilizer bar extends across the front of the rear axle. Links are connected between the bar and frame rail. The stabilizer bar has a bushing at the body attachment and a ball joint at the stabilizer bar attachment.

OPERATION

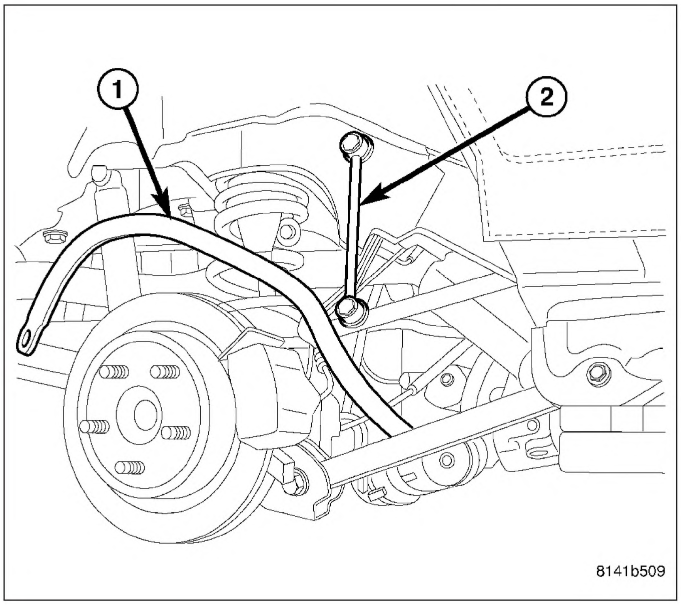
The stabilizer bar is used to control vehicle body roll, during turns. The bar helps control the vehicle body in relationship to the suspension.

REMOVAL

1. Raise and support the vehicle.
2. Remove both rear tire assemblies.
3. Remove the stabilizer bar links from stabilizer bar.
4. Remove the stabilizer bar retainer bolts from the retainer (2).

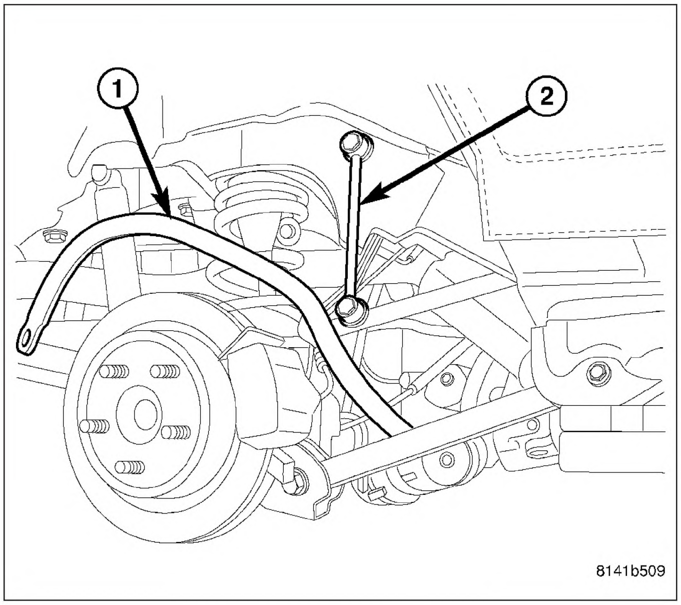


5. Remove the stabilizer bar (1) by twisting it out and around the rotor and caliper from the right rear side of the vehicle.

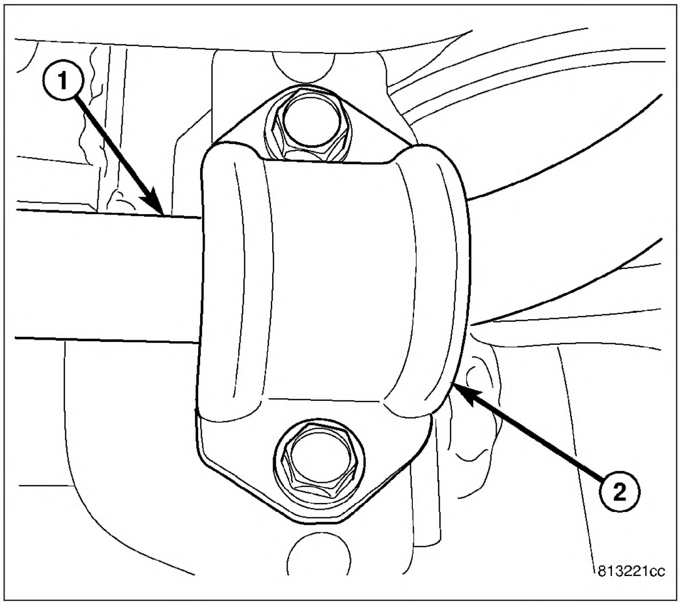


INSTALLATION

1. Twist and rotate to position the stabilizer bar (1) on the axle from the right rear side of the vehicle.



2. Install the retainers (2) and bolts. Ensure the bar is centered with equal spacing on both sides. Tighten the bolts to 54 N·m (40 ft. lbs.).



3. Install the links to the stabilizer bar.
4. Tighten the nuts at the stabilizer bar to 88 N·m (65 ft. lbs.).
5. Install the tire and wheel assemblies.
6. Remove support and lower the vehicle.

STABILIZER LINK

REMOVAL

1. Raise and support the vehicle.
2. Remove the rear tire.
3. Support the rear axle with a jack.
4. Remove the upper link bolt at the frame.
5. Remove the lower link nut at the stabilizer bar.
6. Remove stabilizer link.

INSTALLATION

1. Install the upper bolt for the stabilizer link to the frame and tighten to 102 N·m (75 ft. lbs.).
2. Install the stabilizer link to the stabilizer bar.
3. Install the nut and tighten to 88 N·m (65 ft. lbs.).
4. Remove the jack and lower the vehicle.

BUSHINGS

REMOVAL

1. Raise and support vehicle.
2. Remove the stabilizer bushing clamp.
3. Remove the bushing from the stabilizer bar.

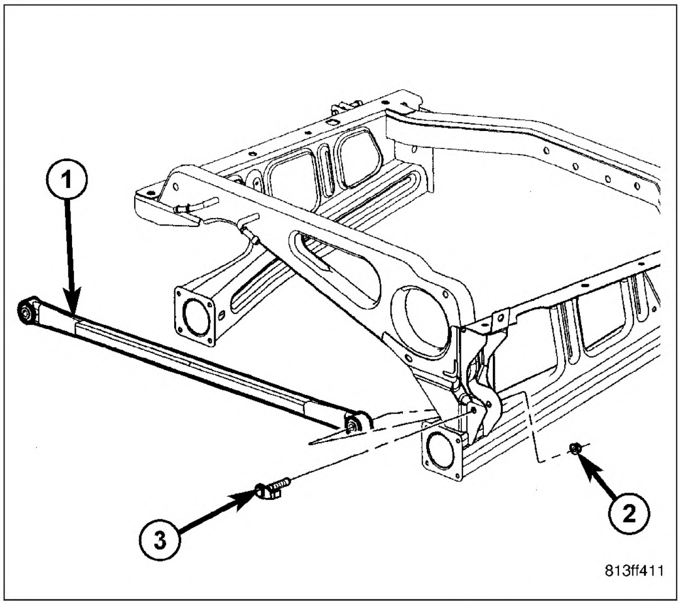
INSTALLATION

1. Install the bushing to the stabilizer bar.
2. Install the stabilizer bar bushing clamp and bolts. Tighten the bolts to 46 N·m (34 ft.lbs.).
3. Lower the vehicle.

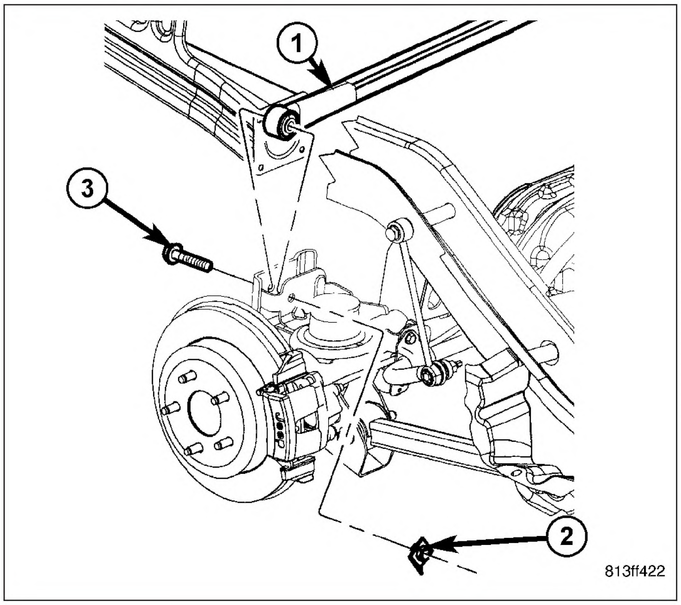
TRACK BAR

REMOVAL

1. Raise and support the vehicle. Position a hydraulic jack under the axle to support the axle.
2. Remove the track bar bolt (3) and nut (2) from the frame bracket.
3. Remove the left lower shock bolt at the axle.
4. Pry in between the coil springs to remove track bar bolt.

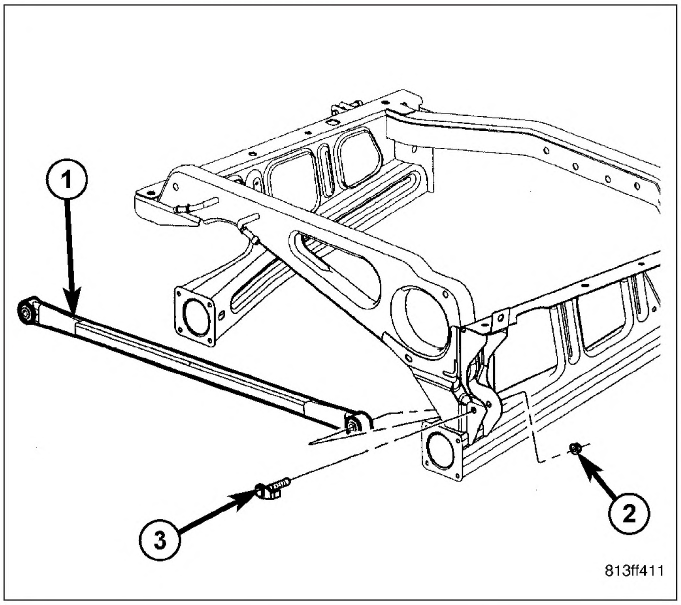


5. Remove the track bar bolt (3) and nut (2) from the axle bracket.

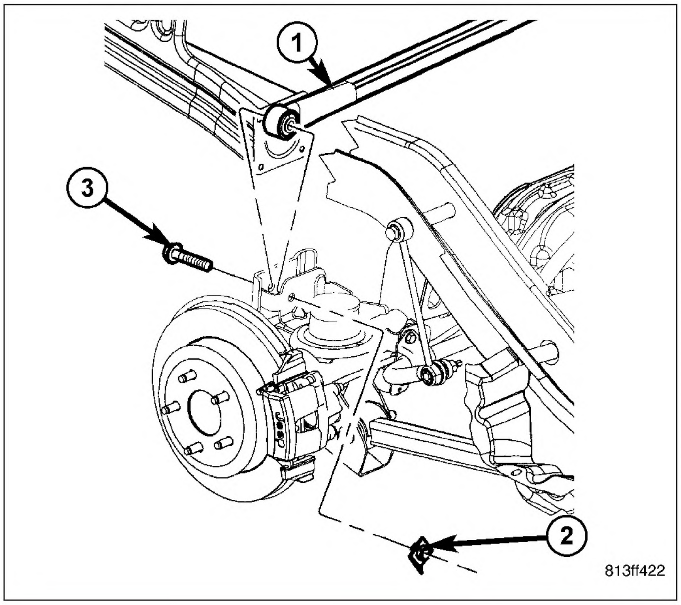


INSTALLATION

1. Install the track bar (1) to the vehicle.
2. Pry in between the coil springs to install track bar bolt (3).
3. Install the track bar bolt (3) and nut (2) in the frame bracket.



4. Install the track bar (1) into the axle bracket.
5. Install the track bar bolt (3) and nut (2) in the axle bracket.
6. Install the left lower shock bolt to the axle Tighten to 115 N·m (85 ft. lbs.).
7. Remove the supports and lower the vehicle.
8. Tighten the upper mounting nuts to 190 N·m (140 ft. lbs.). Tighten the lower mounting nuts to 190 N·m (140 ft. lbs.). **with full vehicle weight.**



DIFFERENTIAL & DRIVELINE

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DIFFERENTIAL & DRIVELINE - ELECTRICAL DIAGNOSTICS

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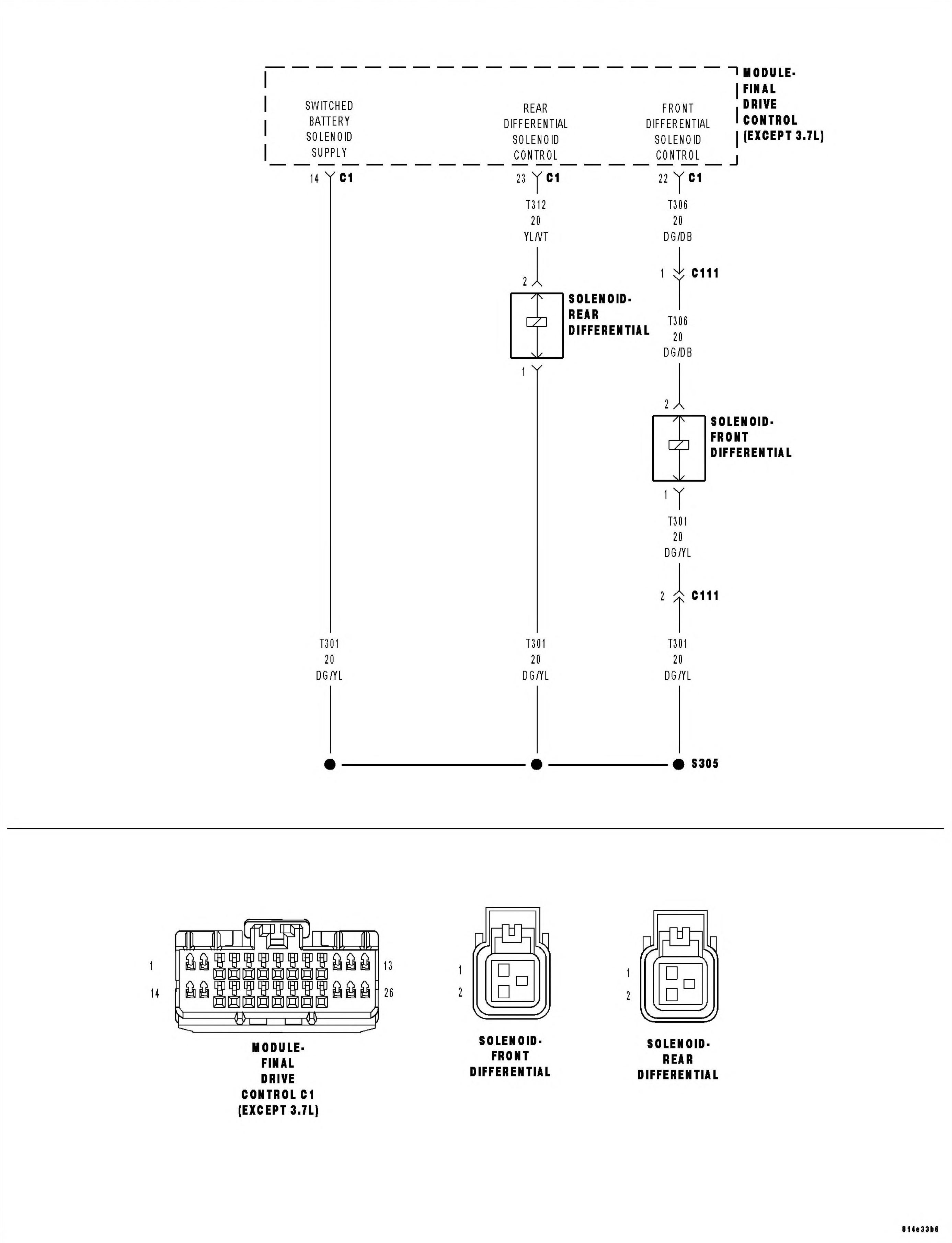
DIFFERENTIAL & DRIVELINE - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

C1417–FRONT DIFFERENTIAL CONTROL CIRCUIT LOW


MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED BATTERY SOLENOID SUPPLY
REAR DIFFERENTIAL SOLENOID CONTROL
FRONT DIFFERENTIAL SOLENOID CONTROL
14 C1
23 C1
22 C1
T312 20 YL/VT
T306 20 DG/DB
1 C111
2
1
SOLENOID-
REAR
DIFFERENTIAL
T306 20 DG/DB
2
1
SOLENOID-
FRONT
DIFFERENTIAL
T301 20 DG/YL
2 C111
T301 20 DG/YL
T301 20 DG/YL
T301 20 DG/YL
S305
1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
1
2
SOLENOID-
FRONT
DIFFERENTIAL
1
2
SOLENOID-
REAR
DIFFERENTIAL
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C1417–FRONT DIFFERENTIAL CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Solenoid is active, no solenoid supply circuit DTCs are present and battery voltage is normal.
- **Set Condition:**
  The FDCM detects the Front Differential Solenoid Control is shorted low.

Possible Causes
FRONT DIFFERENTIAL SOLENOID
(T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
(T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT OPEN
(T301) SWITCHED BATTERY SOLENIOD SUPPLY OPEN/SHORTED TO GROUND
FDCM

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 8

---

2. FRONT DIFFERENTIAL SOLENOID OPERATION

Turn the ignition off.

Disconnect the Front Differential Solenoid harness connector.

Ignition on, engine not running.

Using a 12-volt test light, jump across from the (T301) Switch Battery Solenoid Supply circuit and the (T306) Front Differential Solenoid Control circuit in the Front Differential Solenoid harness connector.

With the DRBIII®, actuate the Front Differential Solenoid.

Does the test light illuminate brightly and flash on and off?

Yes >> Inspect the Front Differential Solenoid Jumper harness, repair/replace as necessary. If OK, replace the Front Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Go To 3

C1417–FRONT DIFFERENTIAL CONTROL CIRCUIT LOW (CONTINUED)

3. (T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the FDCM harness connector.

Measure the resistance of the (T306) Front Differential Solenoid Control circuit at the FDCM harness connector to ground.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the Front Differential Solenoid Control circuit.
Perform FDCM VERIFICATION TEST.

No >> Go To 4

---

4. (T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT OPEN

Measure the resistance of the (T306) Front Differential Solenoid Control circuit between the Front Differential Solenoid harness connector and the FDCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (T306) Front Differential Solenoid Control circuit.
Perform FDCM VERIFICATION TEST

---

5. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance of the (T301) Switched Battery Solenoid Supply circuit at the FDCM harness connector to ground.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (T301) Switched Battery Solenoid Supply circuit.
Perform FDCM VERIFICATION TEST.

No >> Go To 6

---

6. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT OPEN

Measure the resistance of the (T301) Switched Battery Solenoid Supply circuit between the Front Differential Solenoid harness connector and the FDCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (T301) Switched Battery Solenoid Supply circuit.
Perform FDCM VERIFICATION TEST

Go To 7

C1417–FRONT DIFFERENTIAL CONTROL CIRCUIT LOW (CONTINUED)

7. FDCM

NOTE: Before continuing, check the FDCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST

No >> Replace and program the Final Drive Control Module in accordance with Service Information.
Perform FDCM VERIFICATION TEST.

---

8. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

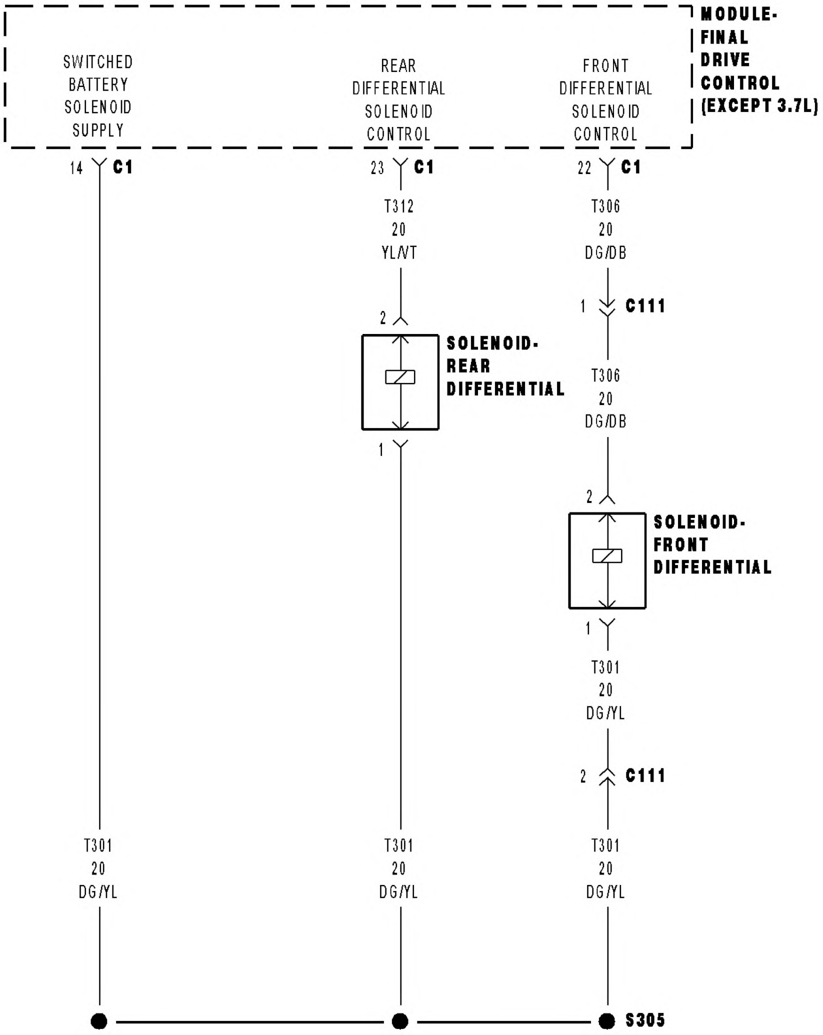
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

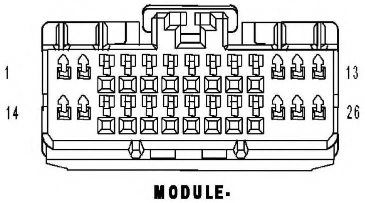
Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

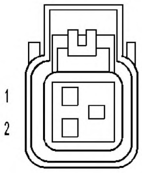
No >> Test Complete.

C1418–FRONT DIFFERENTIAL CONTROL CIRCUIT HIGH

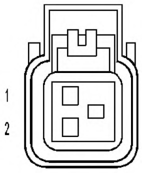

MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED BATTERY SOLENOID SUPPLY
REAR DIFFERENTIAL SOLENOID CONTROL
FRONT DIFFERENTIAL SOLENOID CONTROL
14 C1
23 C1
22 C1
T312 20 YL/VT
T306 20 DG/DB
1 C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306 20 DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301 20 DG/YL
2 C111
T301 20 DG/YL
T301 20 DG/YL
T301 20 DG/YL
S305



**MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)**



**SOLENOID-
FRONT
DIFFERENTIAL**



**SOLENOID-
REAR
DIFFERENTIAL**

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C1418–FRONT DIFFERENTIAL CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Solenoid is active, no solenoid supply circuit DTCs are present and battery voltage is normal.
- **Set Condition:**
  The FDCM detects the Front Differential Solenoid Control is high.

Possible Causes
FRONT DIFFERENTIAL SOLENOID
(T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT
FDCM

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 6

---

2. FRONT DIFFERENTIAL SOLENOID OPERATION

Turn the ignition off.

Disconnect the Front Differential Solenoid harness connector.

Ignition on, engine not running.

Using a 12-volt test light, jump across from the (T306) Front Differential Solenoid Control circuit and the (T301) Switched Battery Solenoid Supply circuit in the Front Differential Solenoid harness connector.

With a DRBIII®, actuate the Front Differential Solenoid.

Does the test light flash on and off?

Yes >> Inspect the Front Differential Solenoid Jumper harness connector, repair/replace as necessary. If OK, replace the Front Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Go To 3

C1418–FRONT DIFFERENTIAL CONTROL CIRCUIT HIGH (CONTINUED)

3. (T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the FDCM harness connector.

Turn the ignition on.

Measure the voltage on the (T306) Front Differential Solenoid Control circuit at the FDCM harness connector.

Does the voltmeter indicate voltage present?

Yes >> Repair the short to voltage in the (T306) Front Differential Solenoid Control circuit.
Perform FDCM VERIFICATION TEST.

No >> Go To 4

4. (T306) FRONT DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT

Measure the resistance between the (T306) Front Differential Solenoid Control circuit and the (T301) Switched Battery Solenoid Supply circuit in the FDCM harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (T306) Front Differential Solenoid Control circuit and the (T301) Switched Battery Solenoid Supply circuit.
Perform FDCM VERIFICATION TEST

No >> Go To 5

5. FDCM

NOTE: Before continuing, check the FDCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST

No >> Replace and program the Final Drive Control Module in accordance with Service Information.
Perform FDCM VERIFICATION TEST.

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

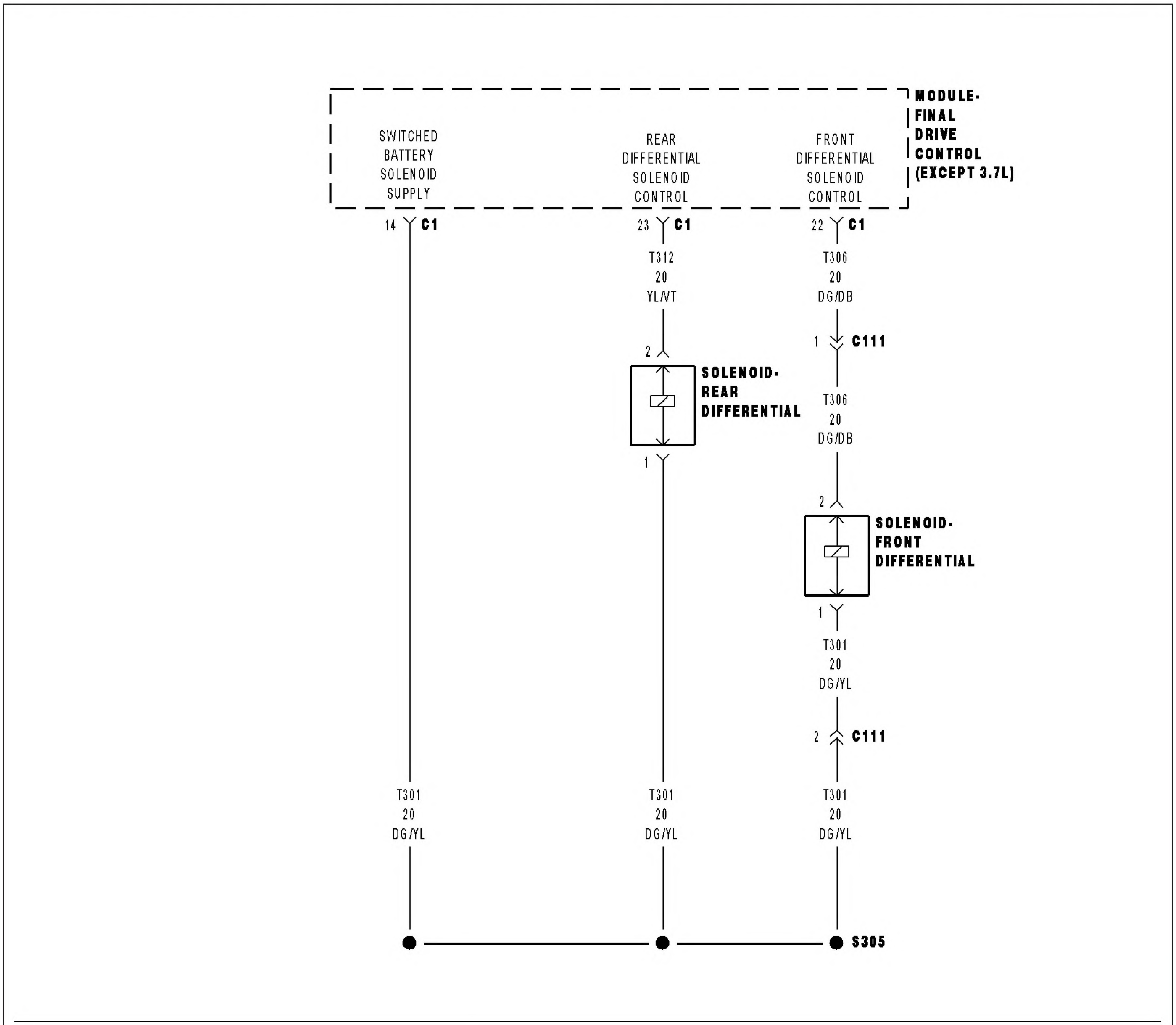
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

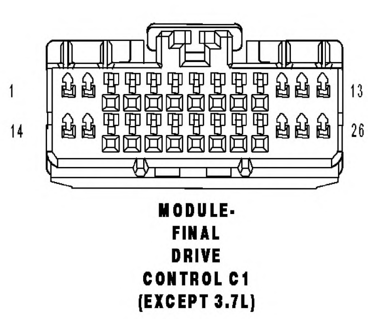
Were there any problems found?

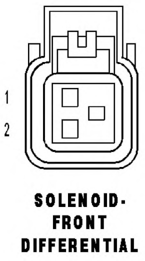
Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

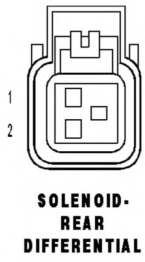
No >> Test Complete.

C141A-FRONT DIFFERENTIAL CONTROL CIRCUIT “CURRENT” PERFORMANCE


MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED
BATTERY
SOLENOID
SUPPLY
REAR
DIFFERENTIAL
SOLENOID
CONTROL
FRONT
DIFFERENTIAL
SOLENOID
CONTROL
14 C1
23 C1
22 C1
T312
20
YL/VT
T306
20
DG/DB
1 C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306
20
DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301
20
DG/YL
2 C111
T301
20
DG/YL
T301
20
DG/YL
T301
20
DG/YL
S305


1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)


1
2
SOLENOID-
FRONT
DIFFERENTIAL


1
2
SOLENOID-
REAR
DIFFERENTIAL

814e33b6

C141A-FRONT DIFFERENTIAL CONTROL CIRCUIT “CURRENT” PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The ignition on. No Solenoid DTCs present.
- **Set Condition:**
  The FDCM detects a current feedback when the solenoid is not active.

Possible Causes
WIRING HARNESS INSPECTION
FDCM

Diagnostic Test

1. ACTIVE DTC

NOTE: You must diagnose any Solenoid circuit (Low or High) DTCs first if set along with this DTC before continuing.

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 3

---

2. WIRING HARNESS INSPECTION

Inspect the wiring harness from both solenoids to the FDCM. Ensure that the harness has routed correctly.

Inspect the FDCM harness connector and Differential Solenoid connectors. Ensure the terminals are clean and no damage is present.

Was the wiring harness and connectors OK?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Replace the FDCM in accordance with the Service Manual.
Perform FDCM VERIFICATION TEST.

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

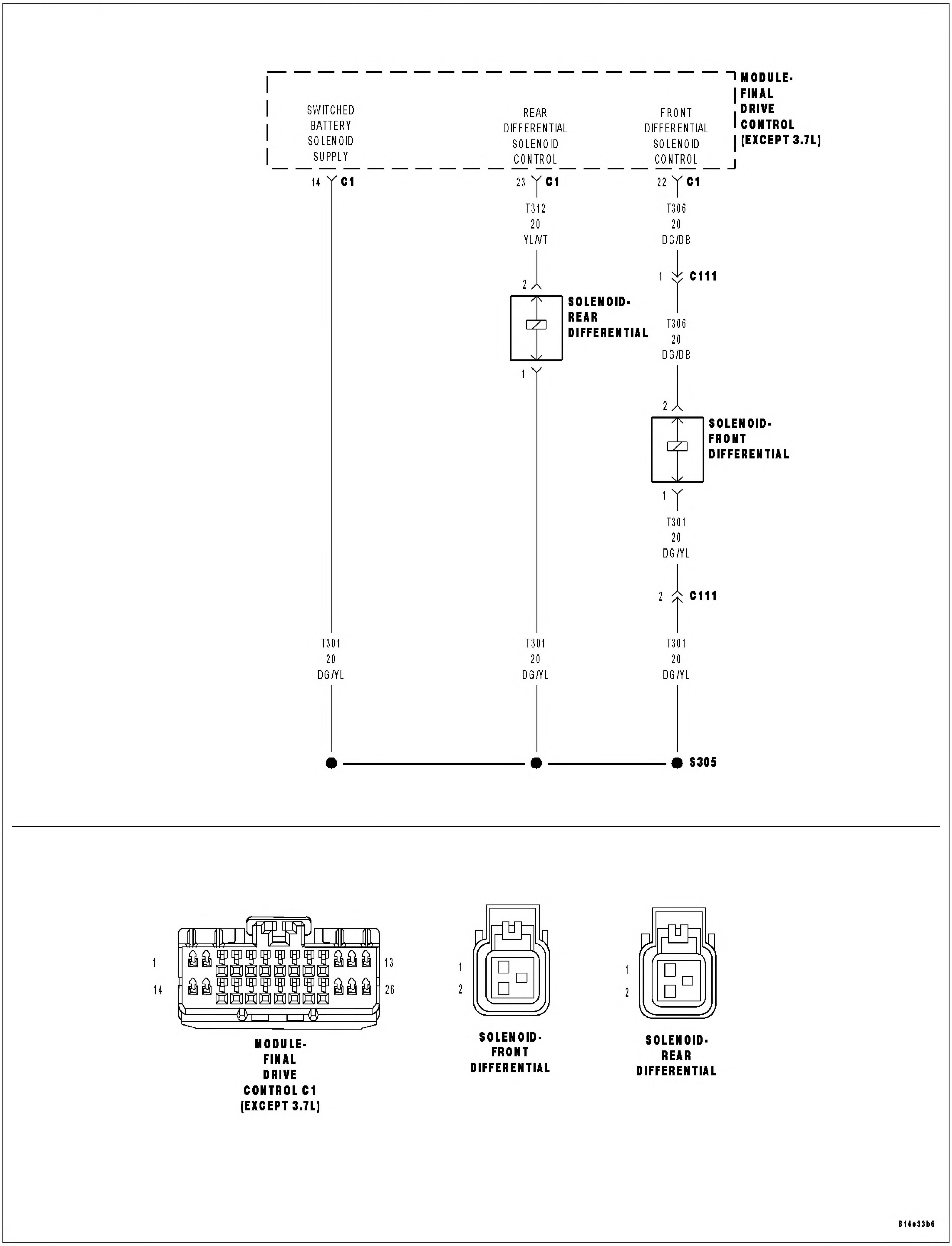
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Test Complete.

C141B—FRONT DIFFERENTIAL CLUTCH PERFORMANCE


MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED
BATTERY
SOLENOID
SUPPLY
REAR
DIFFERENTIAL
SOLENOID
CONTROL
FRONT
DIFFERENTIAL
SOLENOID
CONTROL
14
C1
23
C1
22
C1
T312
20
YL/VT
T306
20
DG/DB
1
C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306
20
DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301
20
DG/YL
2
C111
T301
20
DG/YL
T301
20
DG/YL
T301
20
DG/YL
S305
1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
1
2
SOLENOID-
FRONT
DIFFERENTIAL
1
2
SOLENOID-
REAR
DIFFERENTIAL
814e33b6

C141B—FRONT DIFFERENTIAL CLUTCH PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The ignition on. No Solenoid DTCs present.
- **Set Condition:**
  The solenoid duty cycle is greater than 95% and the wheel slippage is greater than 50%.

Possible Causes
WIRING HARNESS INSPECTION
DIFFERENTIAL (MECHANICAL)
FRONT DIFFERENTANTIAL SOLENOID

Diagnostic Test

1. ACTIVE DTC

NOTE: You must diagnose any Solenoid circuit (Low or High) DTCs first if set along with this DTC before continuing.

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 4

---

2. WIRING HARNESS INSPECTION

Inspect the wiring harness from both solenoids to the FDCM. Ensure that the harness has routed correctly.

Inspect the FDCM harness connector and Differential Solenoid connectors. Ensure the terminals are clean and no damage is present.

Was the wiring harness and connectors OK?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Go To 3
Perform FDCM VERIFICATION TEST.

---

3. INSPECTION DIFFERENTIAL

Ensure the Differential is operating properly. Refer to 3–Differential & Driveline Service Information.

Inspect the Differential for external fluid leaks. Repair as necessary, refer to 3–Differential & Driveline Service Information.

Is the Differential operating properly?

Yes >> Replace the Front Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

C141B—FRONT DIFFERENTIAL CLUTCH PERFORMANCE (CONTINUED)

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

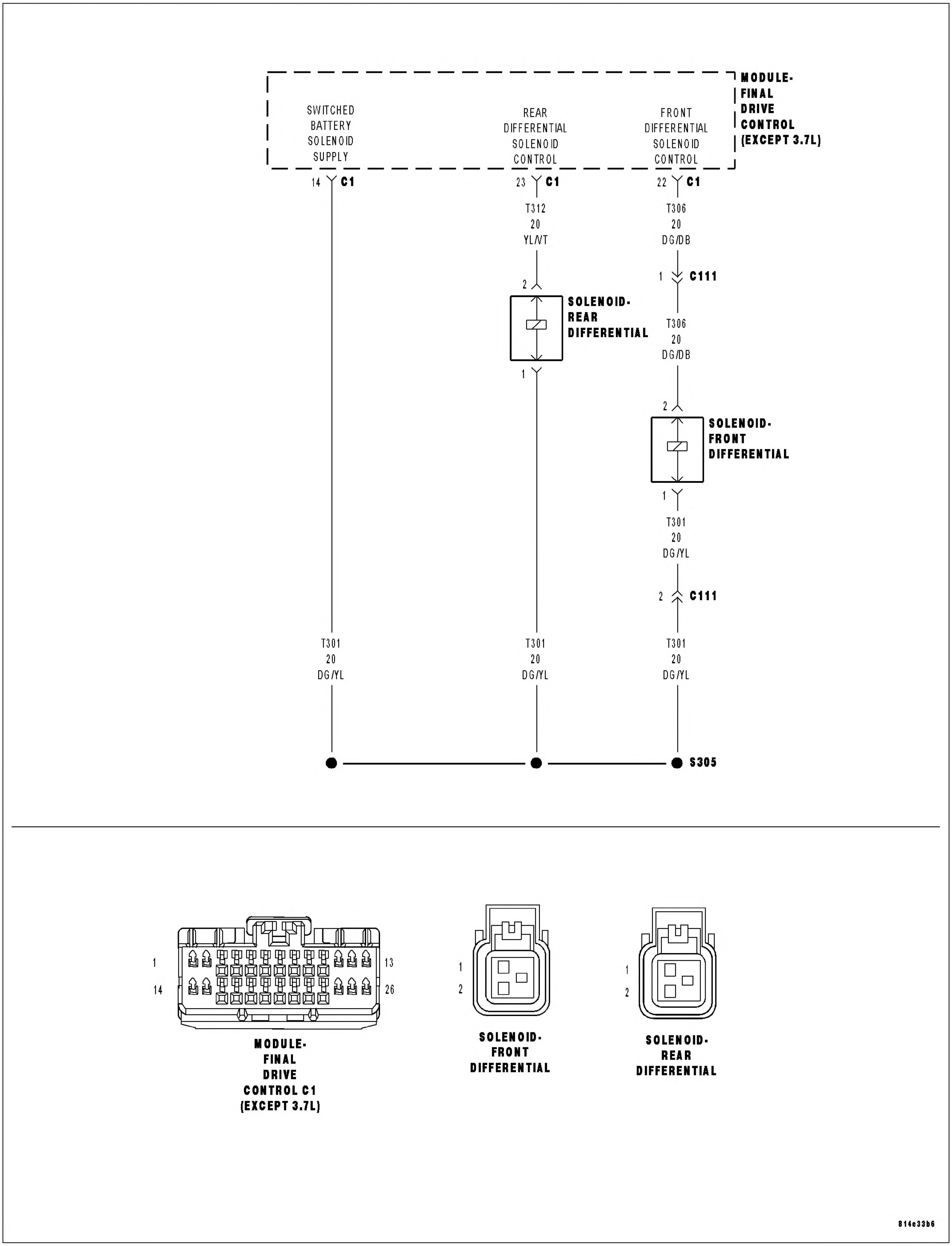
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Test Complete.

C141D–REAR DIFFERENTIAL CONTROL CIRCUIT LOW


MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED BATTERY SOLENOID SUPPLY
REAR DIFFERENTIAL SOLENOID CONTROL
FRONT DIFFERENTIAL SOLENOID CONTROL
14 C1
23 C1
22 C1
T312 20 YL/VT
T306 20 DG/DB
1 C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306 20 DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301 20 DG/YL
2 C111
T301 20 DG/YL
T301 20 DG/YL
T301 20 DG/YL
S305
1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
1
2
SOLENOID-
FRONT
DIFFERENTIAL
1
2
SOLENOID-
REAR
DIFFERENTIAL
814e33b6

C141D–REAR DIFFERENTIAL CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Solenoid is active, no solenoid supply circuit DTCs are present and battery voltage is normal.
- **Set Condition:**
  The FDCM detects the Rear Differential Solenoid Control is shorted low.

Possible Causes
REAR DIFFERENTIAL SOLENOID
(T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
(T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT OPEN
(T301) SWITCHED BATTERY SOLENIOD SUPPLY OPEN/SHORTED TO GROUND
FDCM

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 8

---

2. REAR DIFFERENTIAL SOLENOID OPERATION

Turn the ignition off.

Disconnect the Rear Differential Solenoid harness connector.

Ignition on, engine not running.

Using a 12-volt test light, jump across from the (T301) Switch Battery Solenoid Supply circuit and the (T312) Rear Differential Solenoid Control circuit in the Rear Differential Solenoid harness connector.

With the DRBIII®, actuate the Rear Differential Solenoid.

Does the test light illuminate brightly and flash on and off?

Yes >> Inspect the Rear Differential Solenoid Jumper harness, repair/replace as necessary. If OK, replace the Rear Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Go To 3

C141D–REAR DIFFERENTIAL CONTROL CIRCUIT LOW (CONTINUED)

3. (T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the FDCM harness connector.

Measure the resistance of the (T312) Rear Differential Solenoid Control circuit at the FDCM harness connector to ground.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the Rear Differential Solenoid Control circuit.
Perform FDCM VERIFICATION TEST.

No >> Go To 4

---

4. (T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT OPEN

Measure the resistance of the (T312) Rear Differential Solenoid Control circuit between the Rear Differential Solenoid harness connector and the FDCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (T312) Rear Differential Solenoid Control circuit.
Perform FDCM VERIFICATION TEST

---

5. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance of the (T301) Switched Battery Solenoid Supply circuit at the FDCM harness connector to ground.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (T301) Switched Battery Solenoid Supply circuit.
Perform FDCM VERIFICATION TEST.

No >> Go To 6

---

6. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT OPEN

Measure the resistance of the (T301) Switched Battery Solenoid Supply circuit between the Rear Differential Solenoid harness connector and the FDCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (T301) Switched Battery Solenoid Supply circuit.
Perform FDCM VERIFICATION TEST

Go To 7

C141D–REAR DIFFERENTIAL CONTROL CIRCUIT LOW (CONTINUED)

7. FDCM

NOTE: Before continuing, check the FDCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST

No >> Replace and program the Final Drive Control Module in accordance with Service Information.
Perform FDCM VERIFICATION TEST.

---

8. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

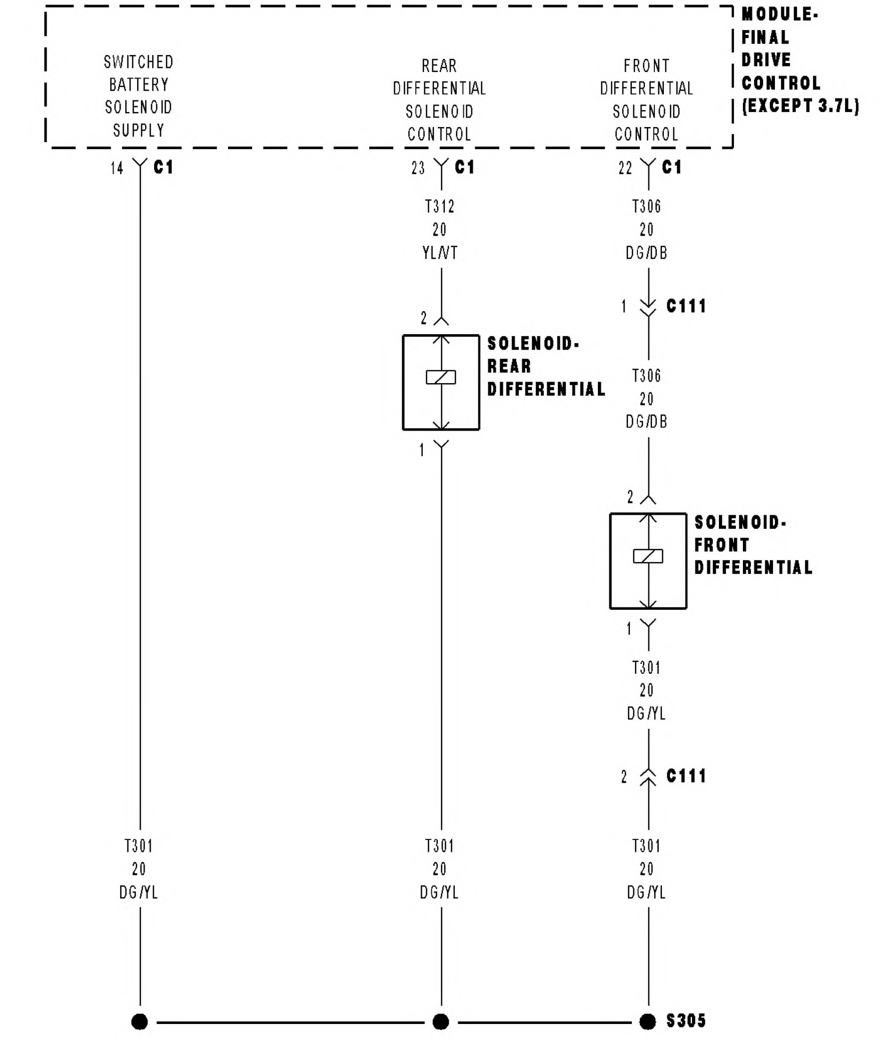
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

Were there any problems found?

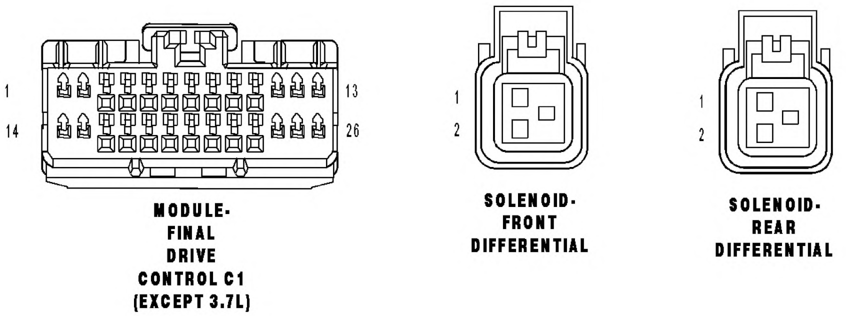
Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Test Complete.

C141E–REAR DIFFERENTIAL CONTROL CIRCUIT HIGH



MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED
BATTERY
SOLENOID
SUPPLY
REAR
DIFFERENTIAL
SOLENOID
CONTROL
FRONT
DIFFERENTIAL
SOLENOID
CONTROL
14 C1
23 C1
22 C1
T312
20
YL/VT
T306
20
DG/DB
1 C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306
20
DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301
20
DG/YL
2 C111
T301
20
DG/YL
T301
20
DG/YL
T301
20
DG/YL
S305



1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
1
2
SOLENOID-
FRONT
DIFFERENTIAL
1
2
SOLENOID-
REAR
DIFFERENTIAL

814e33b6

C141E–REAR DIFFERENTIAL CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Solenoid is active, no solenoid supply circuit DTCs are present and battery voltage is normal.
- **Set Condition:**
  The FDCM detects the Rear Differential Solenoid Control is high.

Possible Causes
REAR DIFFERENTIAL SOLENOID
(T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT
FDCM

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 6

---

2. REAR DIFFERENTIAL SOLENOID OPERATION

Turn the ignition off.

Disconnect the Rear Differential Solenoid harness connector.

Ignition on, engine not running.

Using a 12-volt test light, jump across from the (T312) Rear Differential Solenoid Control circuit and the (T301) Switched Battery Solenoid Supply circuit in the Rear Differential Solenoid harness connector.

With a DRBIII®, actuate the Rear Differential Solenoid.

Does the test light flash on and off?

Yes >> Inspect the Rear Differential Solenoid Jumper harness connector, repair/replace as necessary. If OK, replace the Rear Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Go To 3

C141E–REAR DIFFERENTIAL CONTROL CIRCUIT HIGH (CONTINUED)

3. (T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the FDCM harness connector.

Turn the ignition on.

Measure the voltage on the (T312) Rear Differential Solenoid Control circuit at the FDCM harness connector.

Does the voltmeter indicate voltage present?

Yes >> Repair the short to voltage in the (T312) Rear Differential Solenoid Control circuit.
Perform FDCM VERIFICATION TEST.

No >> Go To 4

4. (T312) REAR DIFFERENTIAL SOLENOID CONTROL CIRCUIT SHORTED TO (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT

Measure the resistance between the (T312) Rear Differential Solenoid Control circuit and the (T301) Switched Battery Solenoid Supply circuit in the FDCM harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (T312) Rear Differential Solenoid Control circuit and the (T301) Switched Battery Solenoid Supply circuit.
Perform FDCM VERIFICATION TEST

No >> Go To 5

5. FDCM

NOTE: Before continuing, check the FDCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST

No >> Replace and program the Final Drive Control Module in accordance with Service Information.
Perform FDCM VERIFICATION TEST.

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

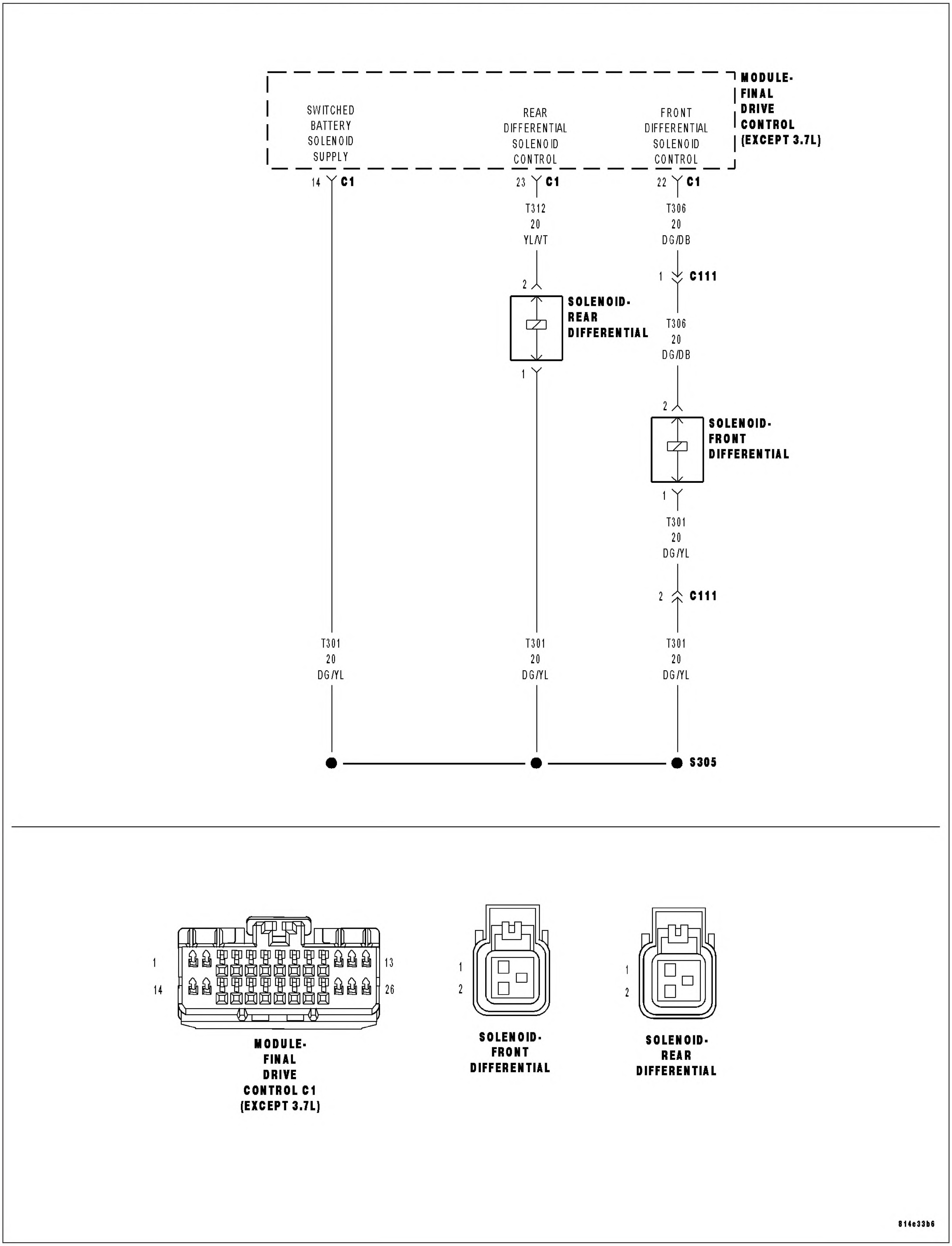
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Test Complete.

C1420— REAR DIFFERENTIAL CONTROL CIRCUIT "CURRENT" PERFORMANCE


MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED BATTERY SOLENOID SUPPLY
REAR DIFFERENTIAL SOLENOID CONTROL
FRONT DIFFERENTIAL SOLENOID CONTROL
14 C1
23 C1
22 C1
T312 20 YL/VT
T306 20 DG/DB
1 C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306 20 DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301 20 DG/YL
2 C111
T301 20 DG/YL
T301 20 DG/YL
T301 20 DG/YL
S305
1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
1
2
SOLENOID-
FRONT
DIFFERENTIAL
1
2
SOLENOID-
REAR
DIFFERENTIAL
814e33b6

C1420— REAR DIFFERENTIAL CONTROL CIRCUIT “CURRENT” PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The ignition on. No Solenoid DTCs present.
- **Set Condition:**
  The FDCM detects a current feedback when the solenoid is not active.

Possible Causes
WIRING HARNESS INSPECTION
FDCM

Diagnostic Test

1. ACTIVE DTC

NOTE: You must diagnose any Solenoid circuit (Low or High) DTCs first if set along with this DTC before continuing.

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 3

---

2. WIRING HARNESS INSPECTION

Inspect the wiring harness from both solenoids to the FDCM. Ensure that the harness has routed correctly.

Inspect the FDCM harness connector and Differential Solenoid connectors. Ensure the terminals are clean and no damage is present.

Was the wiring harness and connectors OK?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Replace the FDCM in accordance with the Service Manual.
Perform FDCM VERIFICATION TEST.

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

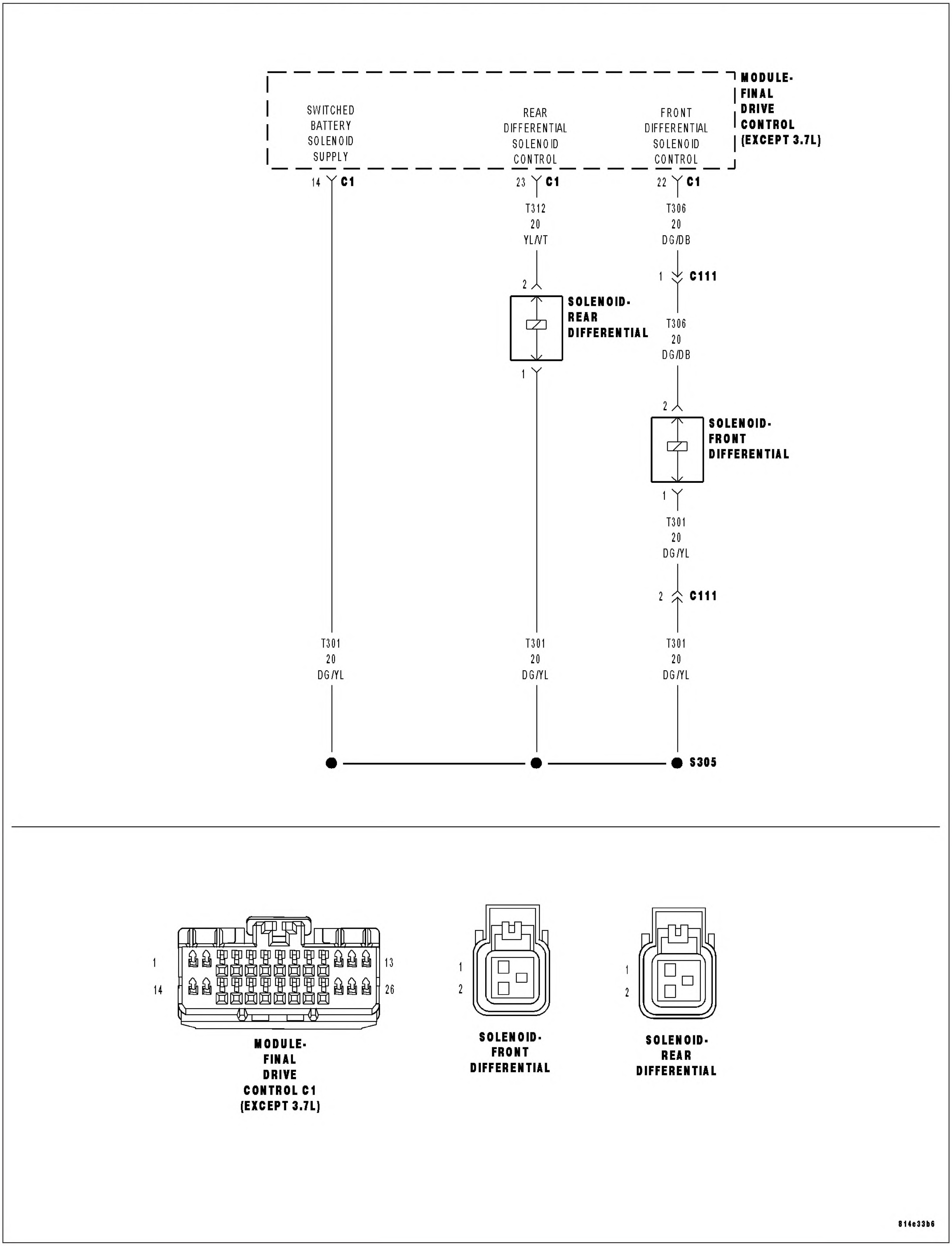
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Test Complete.

C1421— REAR DIFFERENTIAL CLUTCH PERFORMANCE


MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED BATTERY SOLENOID SUPPLY
REAR DIFFERENTIAL SOLENOID CONTROL
FRONT DIFFERENTIAL SOLENOID CONTROL
14 C1
23 C1
22 C1
T312 20 YL/VT
T306 20 DG/DB
1 C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306 20 DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301 20 DG/YL
2 C111
T301 20 DG/YL
T301 20 DG/YL
T301 20 DG/YL
S305
1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
1
2
SOLENOID-
FRONT
DIFFERENTIAL
1
2
SOLENOID-
REAR
DIFFERENTIAL
814e33b6

C1421— REAR DIFFERENTIAL CLUTCH PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The ignition on. No Solenoid DTCs present.
- **Set Condition:**
  The solenoid duty cycle is greater than 95% and the wheel slippage is greater than 50%.

Possible Causes
WIRING HARNESS INSPECTION
DIFFERENTIAL (MECHANICAL)
REAR DIFFERENTANTIAL SOLENOID

Diagnostic Test

1. ACTIVE DTC

NOTE: You must diagnose any Solenoid circuit (Low or High) DTCs first if set along with this DTC before continuing.

Ignition on, engine not running.

With the DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 4

2. WIRING HARNESS INSPECTION

Inspect the wiring harness from both solenoids to the FDCM. Ensure that the harness has routed correctly.

Inspect the FDCM harness connector and Differential Solenoid connectors. Ensure the terminals are clean and no damage is present.

Was the wiring harness and connectors OK?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Go To 3
Perform FDCM VERIFICATION TEST.

3. INSPECTION DIFFERENTIAL

Ensure the Differential is operating properly. Refer to 3–Differential & Driveline Service Information.

Inspect the Differential for external fluid leaks. Repair as necessary, refer to 3–Differential & Driveline Service Information.

Is the Differential operating properly?

Yes >> Replace the Rear Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

C1421— REAR DIFFERENTIAL CLUTCH PERFORMANCE (CONTINUED)

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

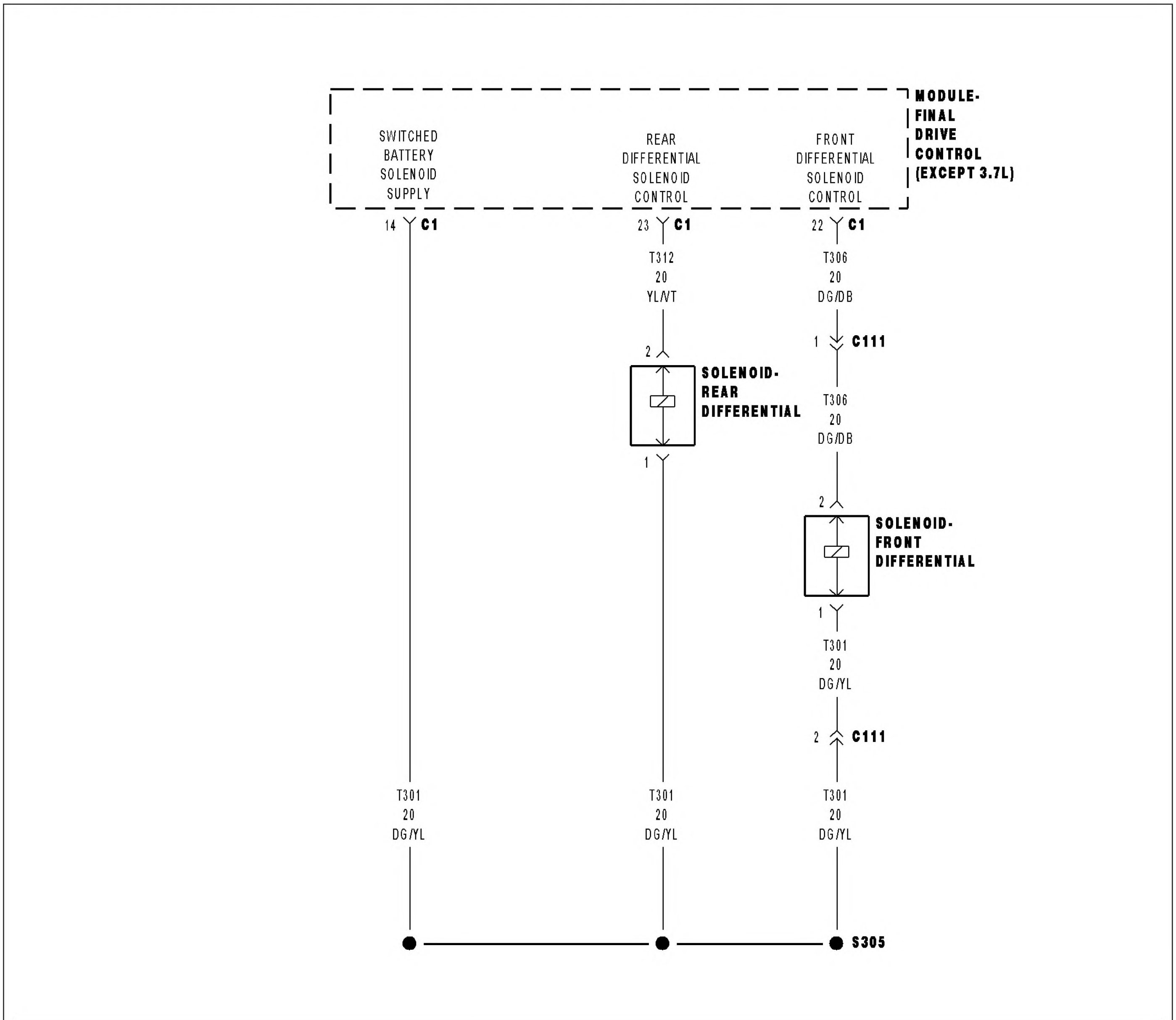
Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

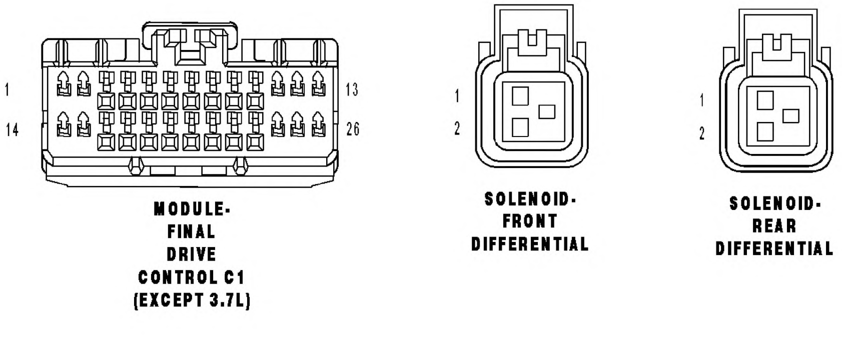
Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Test Complete.

C2109–DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW


MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
SWITCHED BATTERY SOLENOID SUPPLY
REAR DIFFERENTIAL SOLENOID CONTROL
FRONT DIFFERENTIAL SOLENOID CONTROL
14 C1
23 C1
22 C1
T312 20 YL/VT
T306 20 DG/DB
1 C111
2
SOLENOID-
REAR
DIFFERENTIAL
1
T306 20 DG/DB
2
SOLENOID-
FRONT
DIFFERENTIAL
1
T301 20 DG/YL
2 C111
T301 20 DG/YL
T301 20 DG/YL
T301 20 DG/YL
S305


1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
1
2
SOLENOID-
FRONT
DIFFERENTIAL
1
2
SOLENOID-
REAR
DIFFERENTIAL
814e33b6

C2109–DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The FDCM recognizes the Switched Battery Solenoid Supply circuit voltage is too low.

Possible Causes
FRONT DIFFERENTIAL SOLENOID
REAR DIFFERENTIAL SOLENOID
(T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT SHORTED TO GROUND
FDCM

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a DRBIII®, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 6

---

2. FRONT DIFFERENTIAL SOLENOID

Turn the ignition off.

Disconnect the Front Differential Solenoid harness connector.

Turn the ignition on.

With the DRBIII®, actuate the Front Differential Solenoid.

Measure the voltage of the (T301) Switched Battery Solenoid Supply circuit in the Front Differential Solenoid harness connector.

Is the voltage 12 volts?

Yes >> Inspect the Front Differential Solenoid Jumper harness, repair/replace as necessary. If OK, replace the Front Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Go To 3

C2109–DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW (CONTINUED)

3. REAR DIFFERENTIAL SOLENOID

Turn the ignition off.

Disconnect the Rear Differential Solenoid harness connector.

Turn the ignition on.

With the DRBIII®, actuate the Rear Differential Solenoid.

Measure the voltage of the (T301) Switched Battery Solenoid Supply circuit in the Rear Differential Solenoid harness connector.

Is the voltage 12 volts?

Yes >> Inspect the Rear Differential Solenoid Jumper harness, repair/replace as necessary. If OK, replace the Rear Differential Solenoid.
Perform FDCM VERIFICATION TEST.

No >> Go To 4

---

4. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the FDCM harness connector.

Measure the resistance of the (T301) Switch Battery Solenoid Supply circuit at the FDCM harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (T301) Switch Battery Solenoid Supply circuit.
Perform FDCM VERIFICATION TEST.

No >> Go To 5

---

5. FDCM

NOTE: Before continuing, check the FDCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST

No >> Replace and program the Final Drive Control Module in accordance with Service Information.
Perform FDCM VERIFICATION TEST.

C2109–DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle test the wiring harness and connectors while checking for shorted and open circuits.

Using the DRBIII®, monitor the data related to this circuit while performing the wiggle test. Look for the data to change or for the DTC to reset.

Were there any problems found?

Yes >> Repair as necessary.
Perform FDCM VERIFICATION TEST.

No >> Test Complete.

FDCM VERIFICATION TEST

Diagnostic Test

1. PERFORM FDCM VERIFICATION TEST

NOTE: If the SKIM, PCM or FCM was replaced, refer to the service information for proper programming procedures.

1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors.
2. Ensure that all accessories are turned off.
3. Ensure that the battery is fully charged.
4. If the FDCM was replaced as part of the repair you must program the new FDCM using the scan tool.
5. With the scan tool, record and erase all DTC(s) from the FDCM
6. Start and run the engine for 2 minutes while operating all functions of the system that caused the original concern.
7. Turn the ignition off, wait 5 seconds, then turn the ignition on. Using the scan tool, read DTC(s) from the FDCM.

Are any FDCM DTC(s) present or is the original condition still present?

Yes >> The repair is not complete. Refer to the related category for the DTC or symptom that is still present.

No >> The repair is complete.

DIFFERENTIAL & DRIVELINE - SERVICE INFORMATION

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PROPELLER SHAFT

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PROPELLER SHAFT

DIAGNOSIS AND TESTING

VIBRATION

DRIVELINE VIBRATION

Drive Condition	Possible Cause	Correction
Propeller Shaft Noise	1) Undercoating or other foreign material on shaft.	1) Clean exterior of shaft and wash with solvent.
	2) Loose or bent U-joint yoke or excessive runout.	2) Install new yoke.
	3) Incorrect driveline angularity.	3) Measure and correct driveline angles.
	4) Worn U-joint bearings.	4) Install new propeller shaft.
	5) Propeller shaft damaged or out of balance.	5) Installl new propeller shaft.
	6) Broken rear spring.	6) Install new rear spring.
	7) Excessive runout or unbalanced condition.	7) Re-index propeller shaft, test, and evaluate.
	8) Excessive drive pinion gear shaft runout.	8) Re-index propeller shaft and evaluate.
Universal Joint Noise	1) Loose U-joint flange screws.	1) Install new screws and tighten to proper torque.
	2) Lack of lubrication.	2) Install new propeller shaft.

Tires that are out-of-round, or wheels that are not balanced, will cause a low frequency vibration.

Brake rotors that are unbalanced will cause a harsh, low frequency vibration.

Driveline vibration can also result from loose or damaged engine mounts.

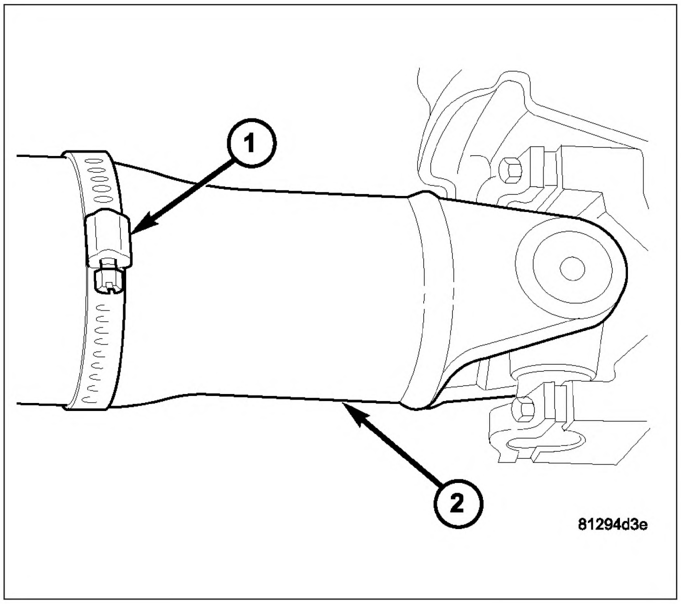
Propeller shaft vibration increases as the vehicle speed is increased. A vibration that occurs within a specific speed range is not usually caused by a propeller shaft being unbalanced. Defective universal joints, or an incorrect propeller shaft angle, are usually the cause of such a vibration.

BALANCE

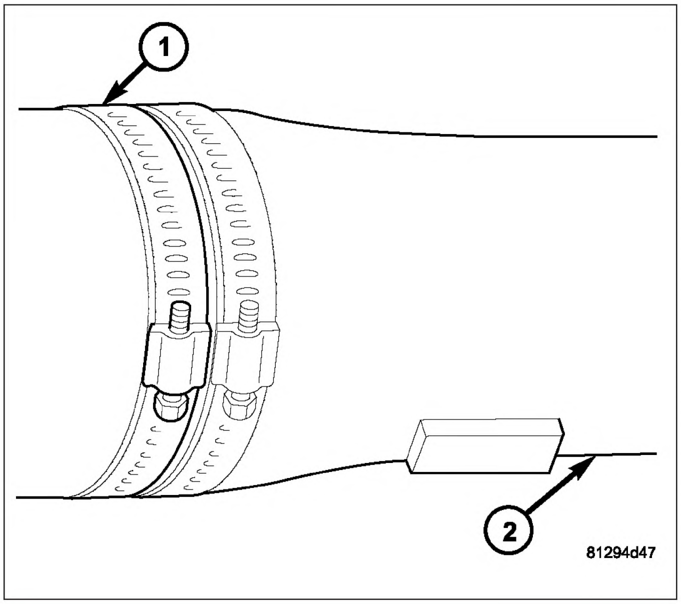
NOTE: Removing and re-indexing the propeller shaft 90° rear axle 45° trans case or front axle relative to the yoke may eliminate some vibrations.

If propeller shaft is suspected of being unbalanced, it can be verified with the following procedure:

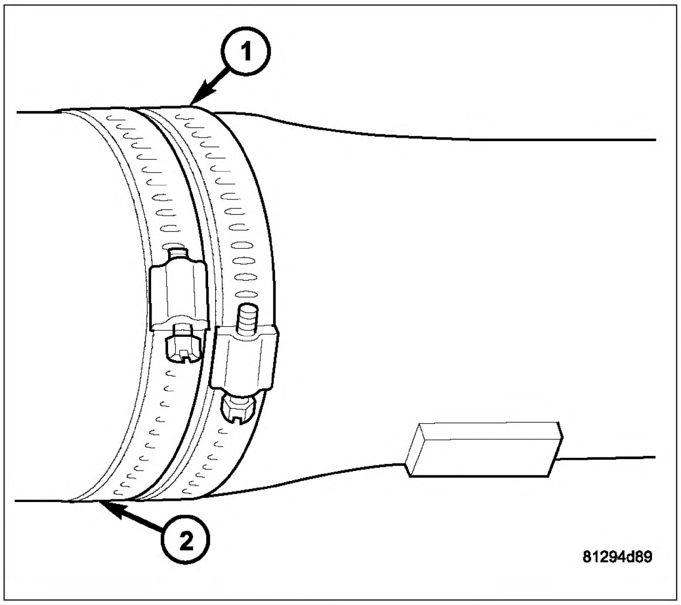
1. Raise the vehicle.
2. Clean all the foreign material from the propeller shaft and the universal joints.
3. Inspect the propeller shaft for missing balance weights, broken welds, and bent areas.
4. Inspect the universal joints to ensure that they are not worn, are properly installed, and are correctly aligned with the shaft.
5. Check the universal joint flange screws torque.
6. Remove the wheels and tires. Install the wheel lug nuts to retain the brake drums or rotors.
7. Mark and number the shaft six inches from the yoke end at four positions 90° or 45° apart depending on flange.
8. Run and accelerate the vehicle until vibration occurs. Note the intensity and speed the vibration occurred. Stop the engine.
9. Install a screw clamp (1) at position 1.



10. Start the engine and re-check for vibration. If there is little or no change in vibration, move the clamp to one of the other three positions. Repeat the vibration test.
11. If there is no difference in vibration at the other positions, the source of the vibration may not be propeller shaft.
12. If the vibration decreased, install a second clamp (1) on the shaft (2) and repeat the test.



13. If the additional clamp causes an additional vibration, separate the first clamp (1) and second clapm (2) (1/4 inch above and below the mark). Repeat the vibration test.
14. Increase distance between the clamp screws and repeat the test until the amount of vibration is at the lowest level. Bend the slack end of the clamps so the screws will not loosen.
15. If the vibration remains unacceptable, apply the same steps to the front end of the propeller shaft.
16. Install the wheel and tires. Lower the vehicle.



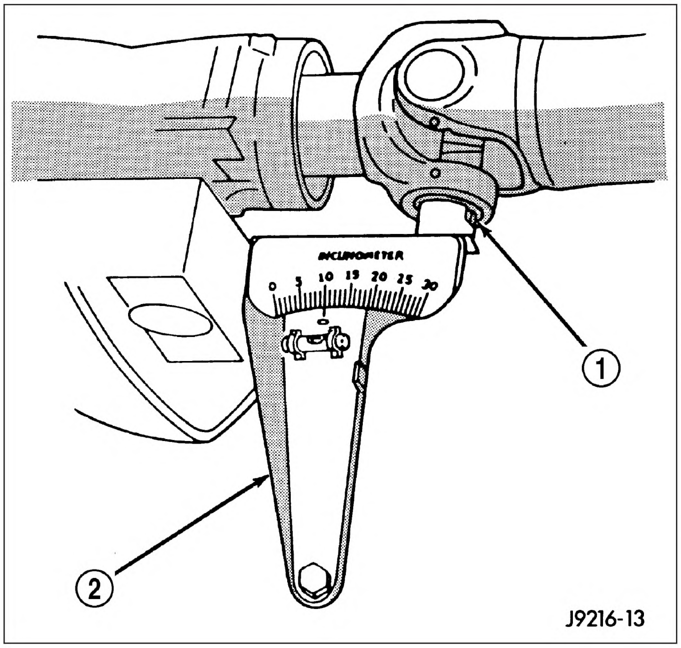
STANDARD PROCEDURE

PROPELLER SHAFT ANGLE

To obtain front (output) angle on the C/V front propeller shaft, place Inclinometer 7663 on the machined ring of the pinion flange. To obtain propeller shaft angle measurement on the C/V front propeller shaft, place inclinometer on the propeller shaft tube. To obtain rear (output) angle on rear propeller shaft use transfer case/transmission flange.

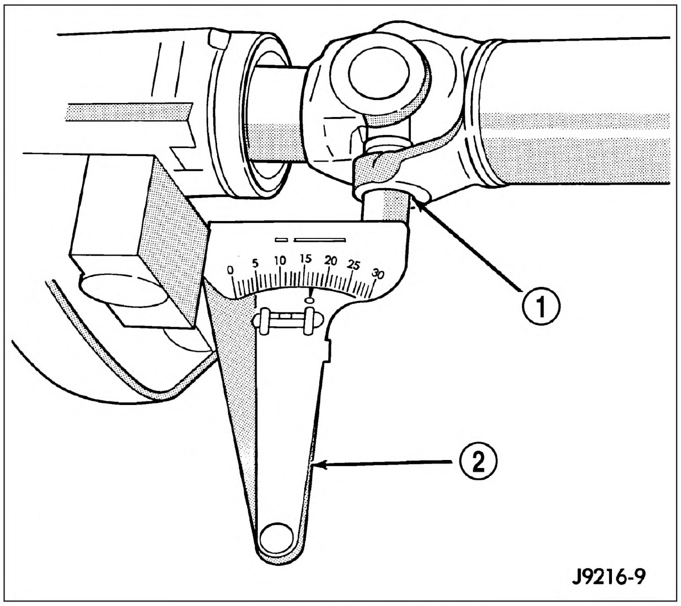
1. Raise and support the vehicle at the axles as level as possible. Allow the wheels and propeller shaft to turn.
2. Remove universal joint snap rings if equipped, so inclinometer base sits flat.
3. Rotate shaft until transmission/transfer case output yoke bearing cap is facing downward.

NOTE: Always make measurements from front to rear and from the same side of the vehicle.

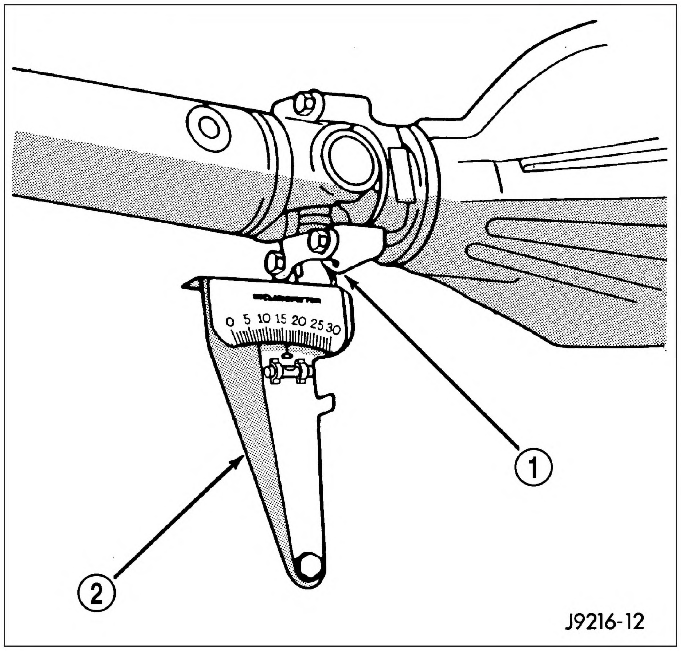


4. Place inclinometer (1) on yoke bearing cap (2) or pinion flange ring parallel to the shaft. Center bubble in sight glass and record measurement. This measurement will give you the transmission or Output Yoke Angle (A).

5. Rotate propeller shaft 90 degrees and place inclinometer (2) on yoke bearing cap (1) or propeller shaft tube on C/V propeller shaft, parallel to the shaft. Center bubble in sight glass and record measurement. This measurement can also be taken at the rear end of the shaft. This measurement will give you the propeller shaft angle (C)
6. Subtract smaller figure from larger (C minus A) to obtain transmission output operating angle.



7. Rotate propeller shaft 90 degrees and place inclinometer (2) on pinion yoke bearing cap (1) parallel to the shaft. Center bubble in sight glass and record measurement. This measurement will give you the pinion shaft or input yoke angle (B).
8. Subtract smaller figure from larger (C minus B) to obtain axle Input Operating Angle.



RULES

Good cancellation of U-joint operating angles is within 1degree.

Operating angles less than 3 degrees (U-joint system).

Operating angles less than 10 degrees for constant velocity joint.

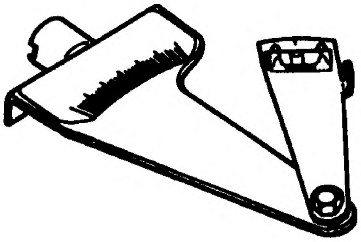
At least 1/2 of one degree continuous operating (propeller shaft) angle. On one U-joint system less than 1 1/2 degree operating angle.

SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Front Shaft - Pinion Flange Bolts	108	80	-
Front Shaft - Transfer Case Flange Bolts	32	24	-
Rear Shaft - Pinion Flange Bolts	108	80	-
Rear Shaft - Transfer Case Flange Bolts	108	80	-
Rear Shaft - Transmission Flange Bolts	108	80	-

SPECIAL TOOLS

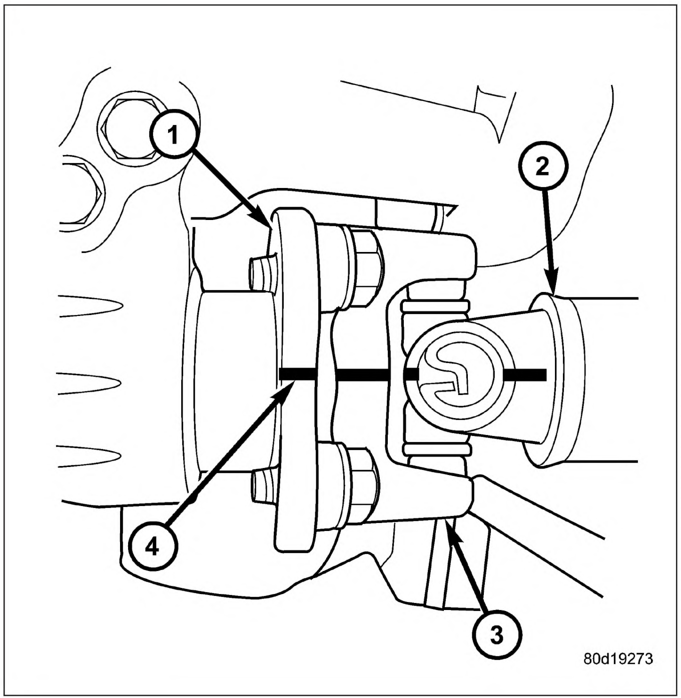


INCLINOMETER 7663

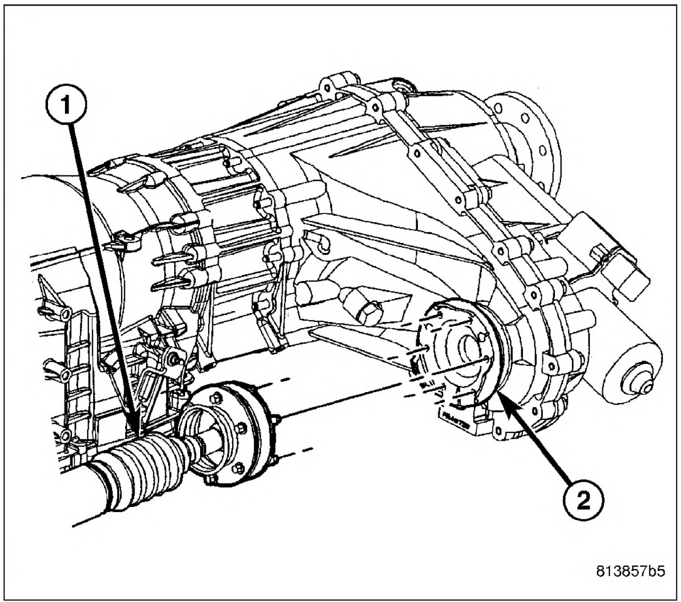
PROPELLER SHAFT-FRONT

REMOVAL

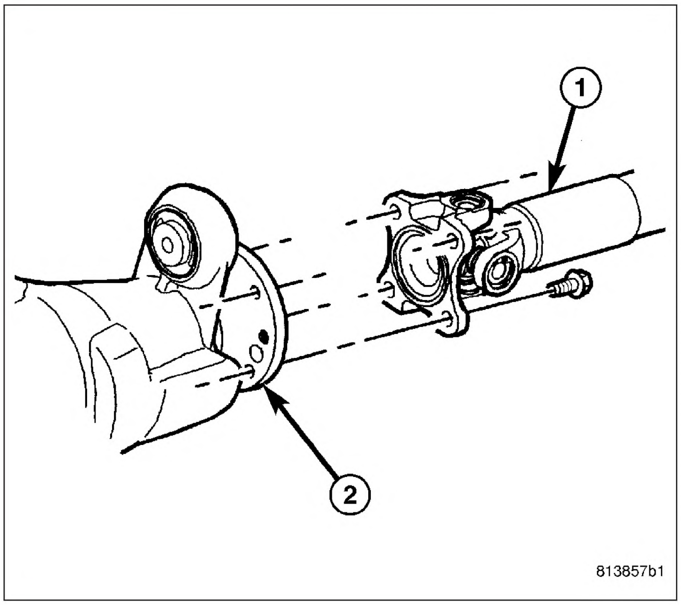
1. With vehicle in neutral, position vehicle on hoist.
2. Mark a line across the axle pinion flange (1), propeller shaft (2), flange yoke (3) and transfer case for installation reference.
3. Support the transmission and the transmission crossmember.



4. Remove propeller shaft (1) from transfer case flange (2).

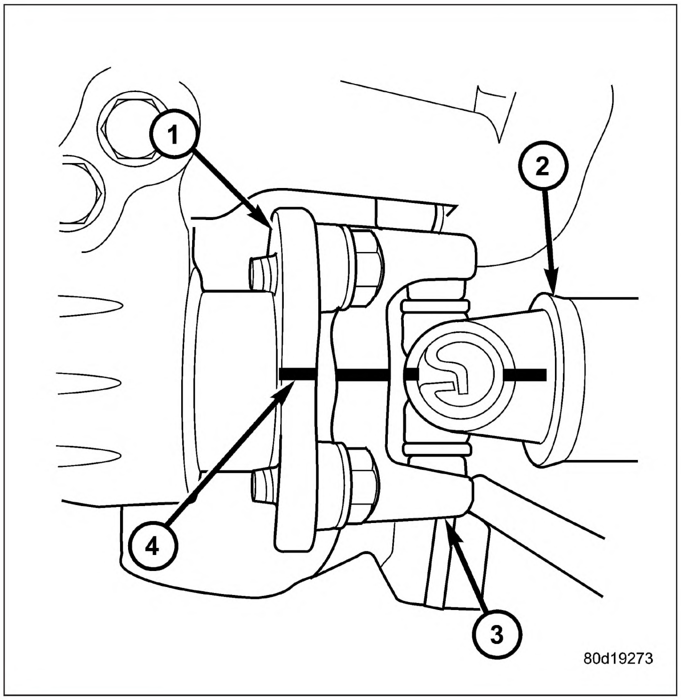


5. Remove propeller shaft (1) from axle pinion flange (2).

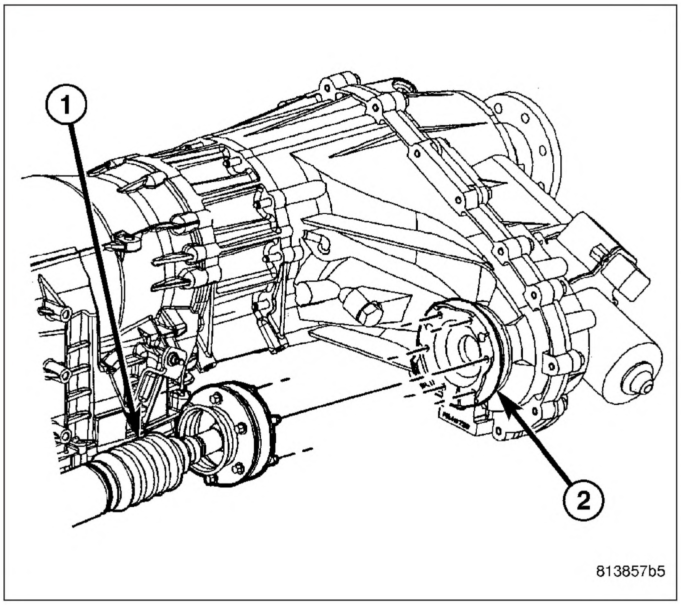


INSTALLATION

1. Install the shaft between companion flanges.
2. Install shaft (2) with reference marks (4) aligned on companion flanges (3).
3. Install bolts to axle pinion flange (1) and tighten bolts to 108 N·m (80 ft. lbs.).



4. Install shaft (1) on transfer case flange (2).
5. Install bolts to transfer case flange (2) and tighten bolts to 32 N·m (24 ft. lbs.).
6. Install transmission crossmember.

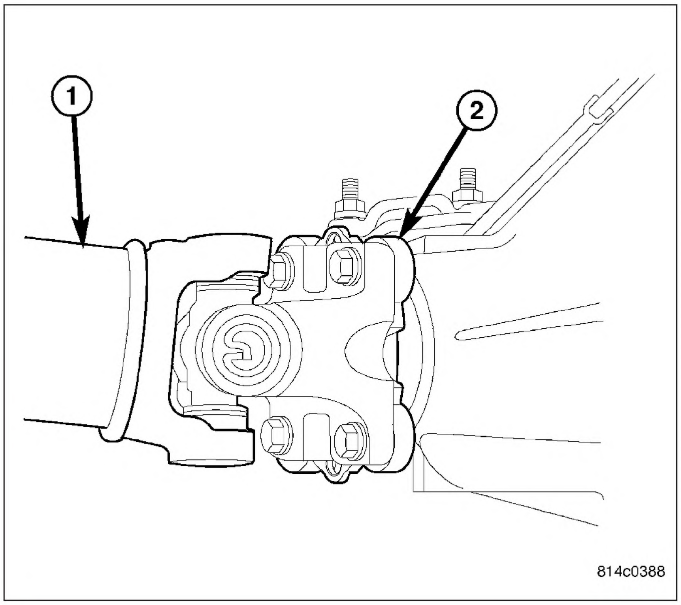


PROPELLER SHAFT-REAR

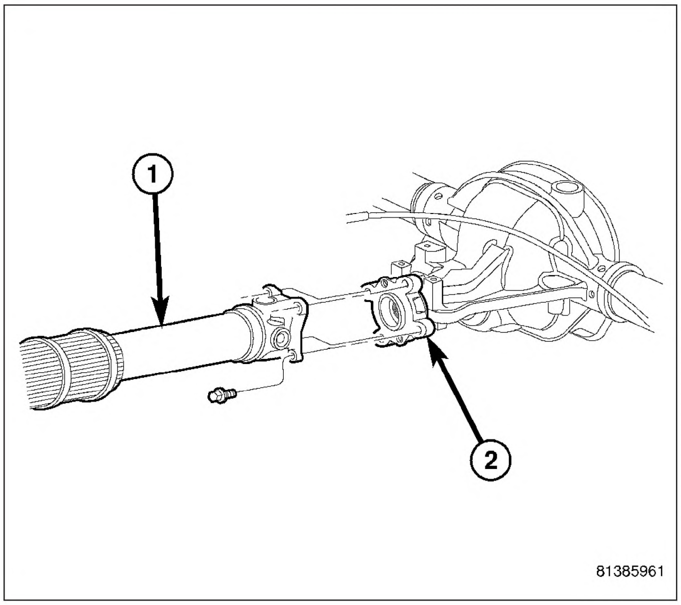
REMOVAL

NOTE: The propeller shaft slip joint boot can be replaced. Place reference marks on both sections of the shaft to ensure proper assemble.

1. With vehicle in neutral, position vehicle on hoist.
2. Mark the propeller shaft (1) pinion flange (2), transmission/transfer case flanges and for installation reference.



3. Remove propeller shaft (1) from axle pinion flange (2).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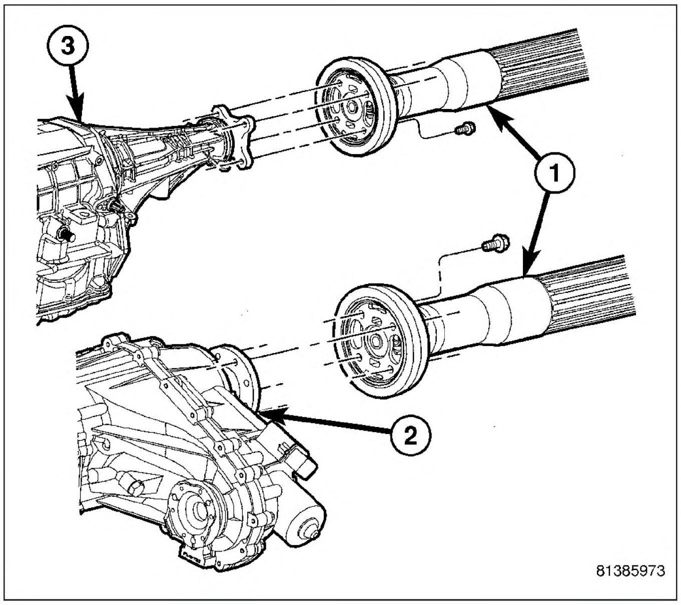
81385961

4. Remove propeller shaft (1) from vehicle transfer case flange (2) or transmission flange (3).
5. Remove propeller shaft from vehicle.


3
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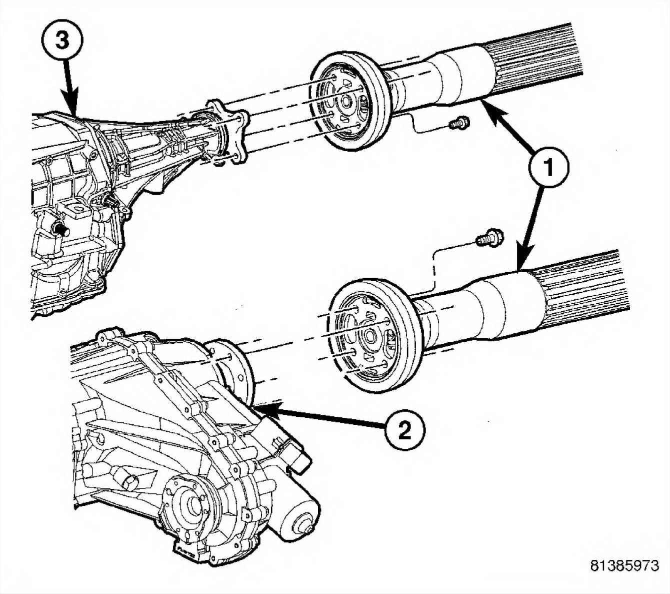
81385973

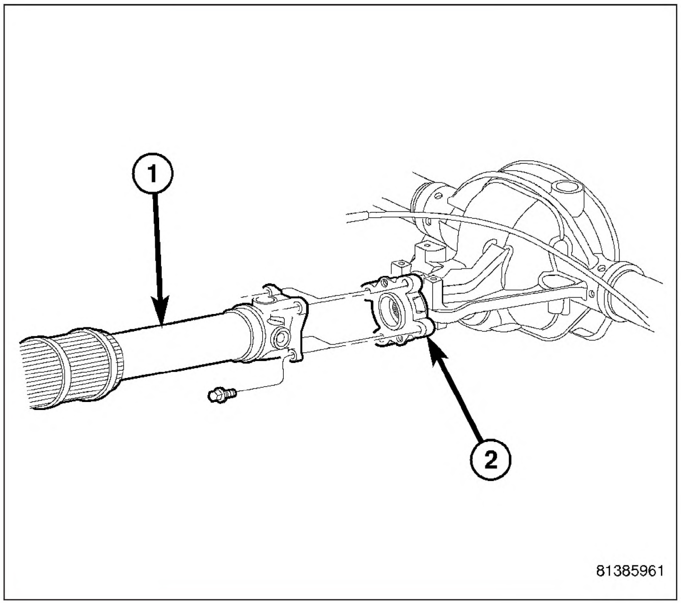
INSTALLATION

NOTE: Inspect propeller shaft boot for damage and replace if necessary.

1. Install propeller shaft (1) with all reference marks aligned.
2. Install shaft (1) on transfer case (2) or transmission (3) with reference marks aligned and tighten flange bolts to 108 N·m (80 ft. lbs.).



3. Install axle pinion flange (2) bolts and tighten to 108 N·m (80 ft. lbs.).



HALF SHAFT

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HALF SHAFT

CAUTION

CAUTION:: Failure to follow these instructions will result in damage. Never grasp half shaft assembly by the boots. This may cause the boot to pucker or crease and reduce the service life of the boot.
Avoid over angulating or stroking the C/V joints when handling the half shaft.
Half shafts exposed to battery acid, transmission fluid, brake fluid, differential fluid or gasoline may cause the boots to deteriorate.

DIAGNOSIS AND TESTING

HALF SHAFT

Check inboard and outboard C/V joint for leaking grease. This is a sign of boot or boot clamp damage.

NOISE/VIBRATION IN TURNS

A clicking noise or vibration in turns could be caused by a damaged outer C/V or inner tripod joint seal boot or seal boot clamps. This will result in the loss/contamination of the joint grease, resulting in inadequate lubrication of the joint. Noise could also be caused by another component of the vehicle coming in contact with the half shafts.

CLUNKING NOISE DURING ACCELERATION

This noise may be a damaged or worn C/V joint. A torn boot or loose/missing clamp on the inner/outer joint which has allowed the grease to be lost will damage the C/V joint.

SHUDDER/VIBRATION DURING ACCELERATION

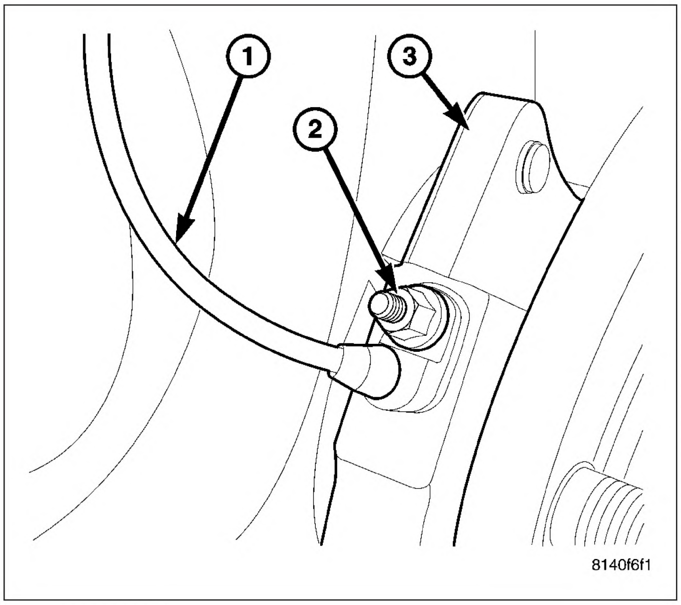
This could be a worn/damaged inner tripod joint or a sticking tripod joint. Improper wheel alignment may also cause a shudder or vibration.

VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of out of balance front tires or tire/wheel runout. Foreign material (mud, etc.) packed on the backside of the wheel(s) will also cause a vibration.

REMOVAL

1. With vehicle in neutral, position vehicle on hoist.
2. Remove half shaft hub/bearing nut.
3. Remove wheel speed sensor (1) from hub/bearing (3).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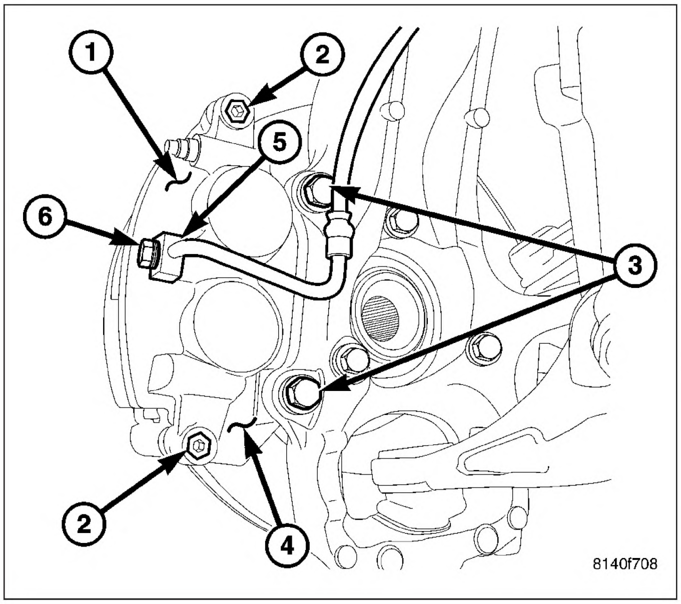
4. Remove brake calipers bolts (2) and remove calipers (1) from caliper adapters (4).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3
2
4
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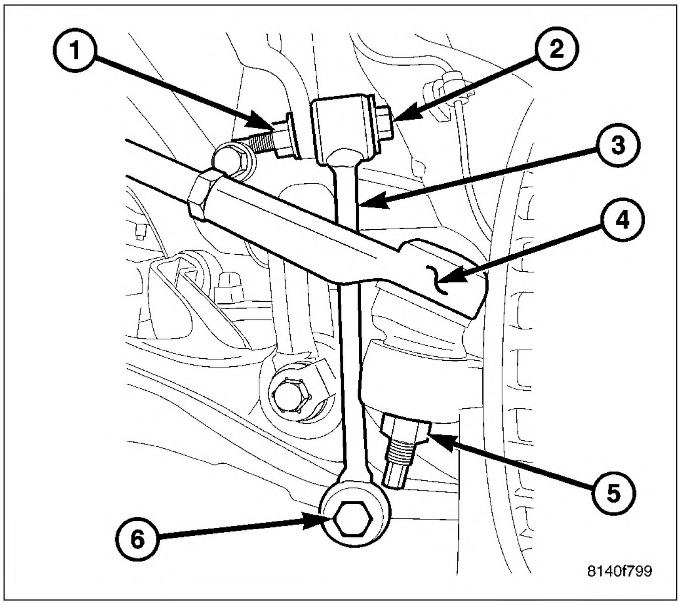
5. Remove lower stabilizer link (3) bolt (6) from control arm.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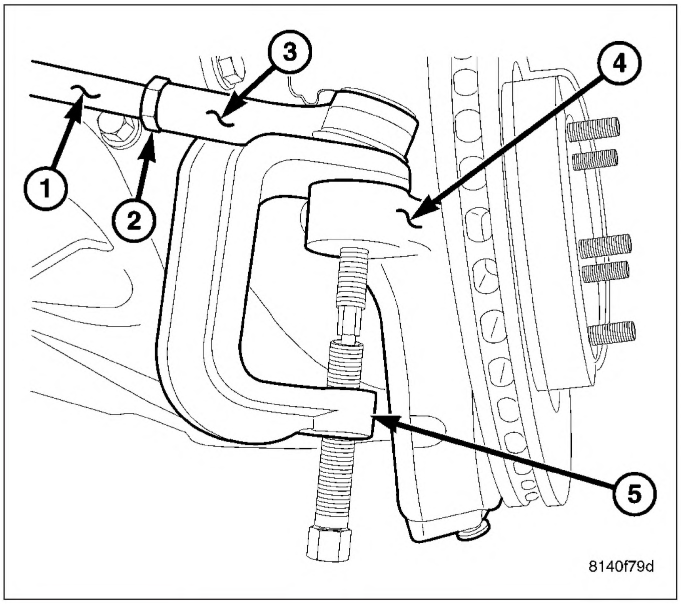
6. Remove outer tie rod end nuts and separate tie rods (3) from knuckles (4) with Remover 8677 (5).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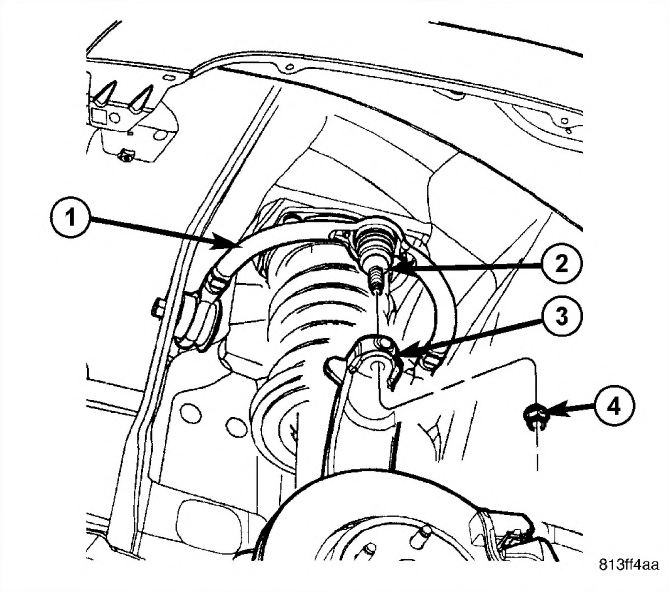
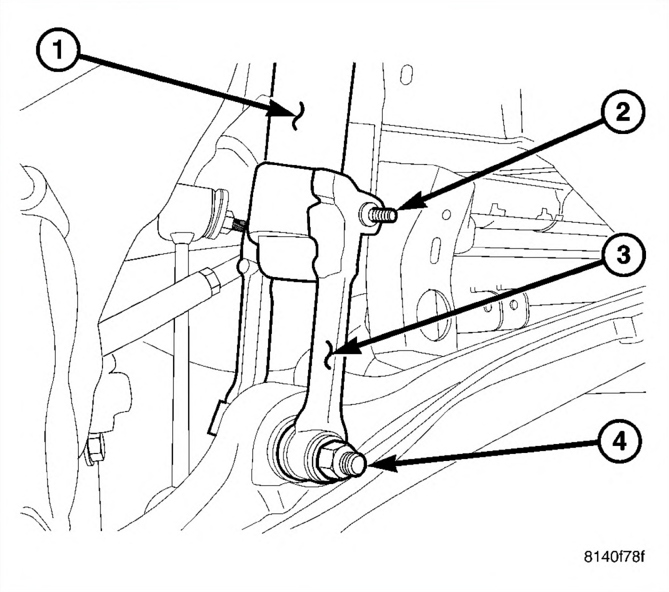
8140f79d

7. Remove upper ball joint nuts (4) and separate ball joints (2) from knuckles (3) with Remover 8677.

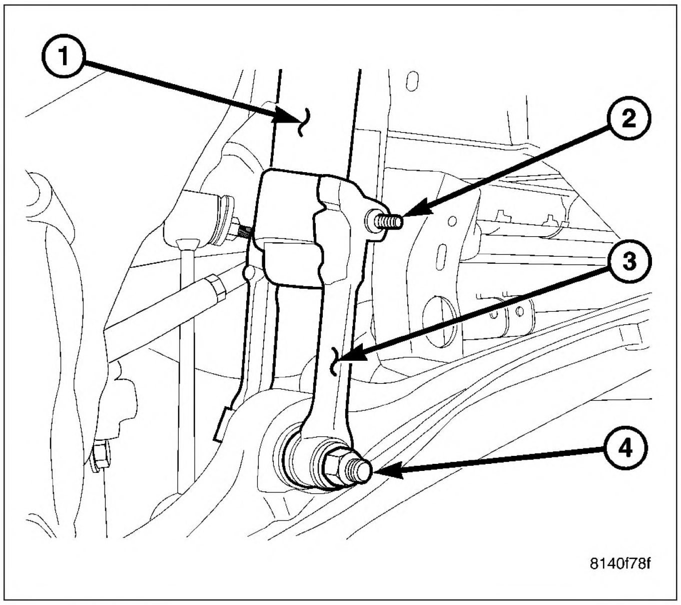


8. Remove shock clevis (3) bolt and nut (4) from lower control arm
9. Lean the knuckle out and push half shaft out of the hub/bearing.
10. Pry half shafts from axle/axle tube with pry bar.

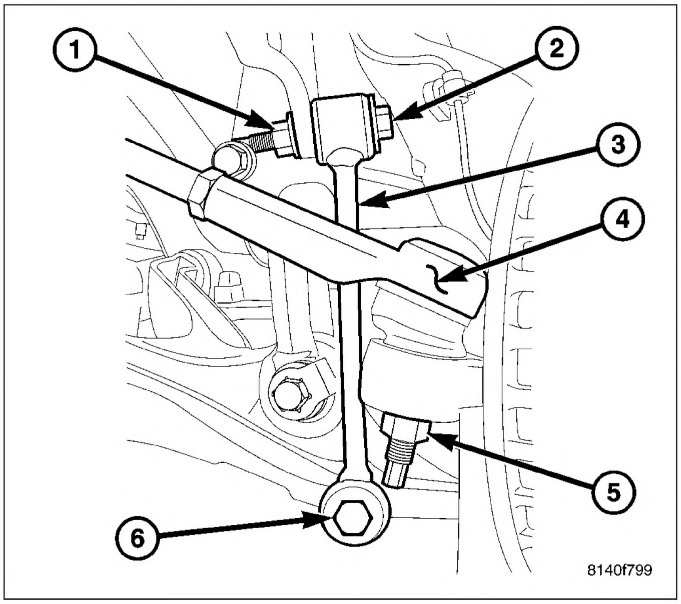


INSTALLATION

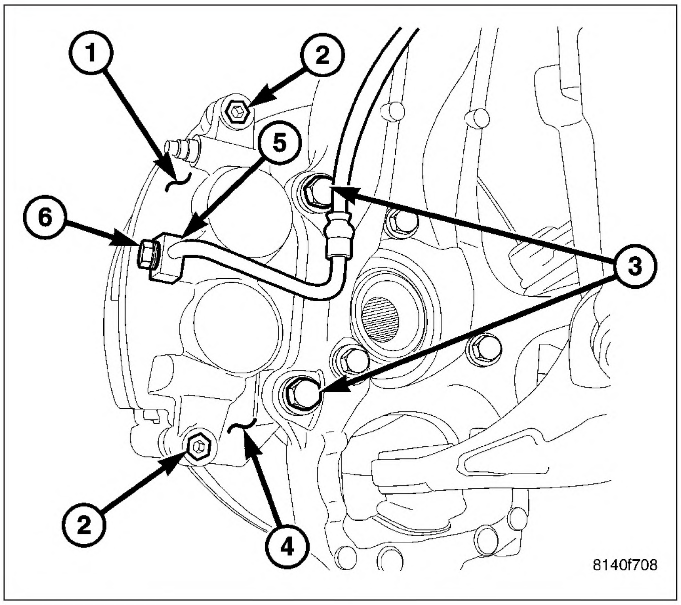
1. Install half shaft on the axle and through the hub/bearing. Verify half shaft has engaged.
2. Install shock clevis (3) on lower control arm and tighten nut to specifications.
3. Install upper control arm on knuckle and tighten ball joint nut to specifications.



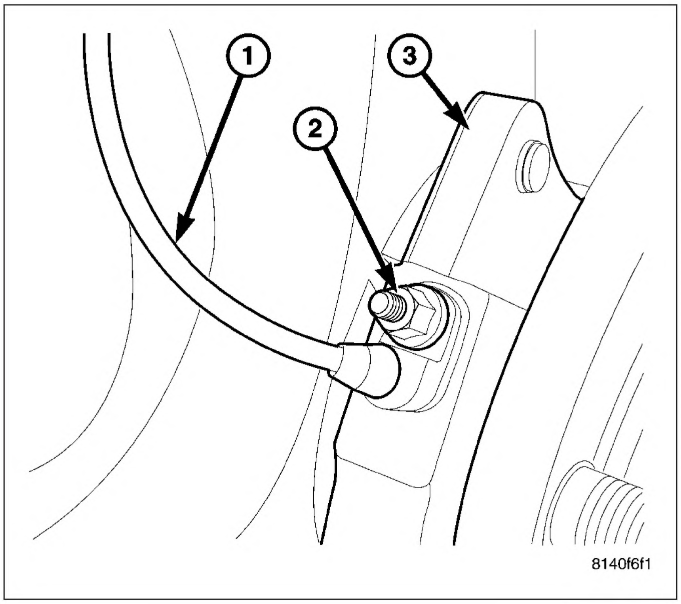
4. Install tie rod end (4) on knuckle and tighten to specifications.
5. Install stabilizer link (3) on lower control arm and tighten to specifications.



6. Install caliper (1) on caliper adapter (3) and tighten to specifications.



7. Install wheel speed sensor (1) on the hub/bearing (3).
8. Install half shaft hub/bearing nut and tighten to 135 N·m (100 ft. lbs.).

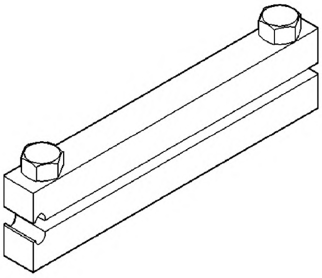


SPECIFICATIONS - HALF SHAFT

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Half Shaft Hub/Bearing Nut	135	100	-

SPECIAL TOOLS



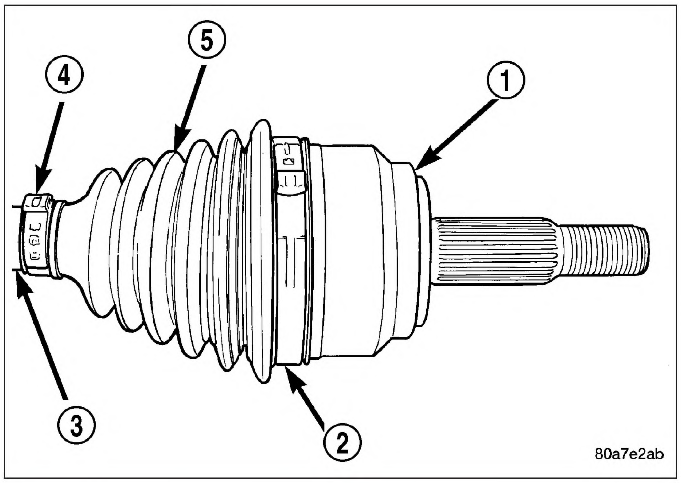
CLAMP INSTALLER C-4975-A

CV BOOT-OUTER

REMOVAL

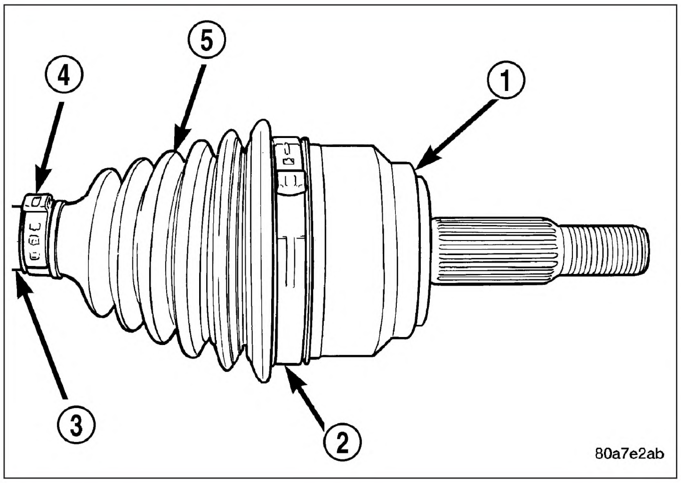
NOTE: CV joint is serviced with the shaft, the boot can be serviced separately

1. Remove inner CV boot and joint.
2. Cut outer CV boot (5) clamps (2) (4).
3. Cut boot off CV housing (1) and shaft (3).



INSTALLATION

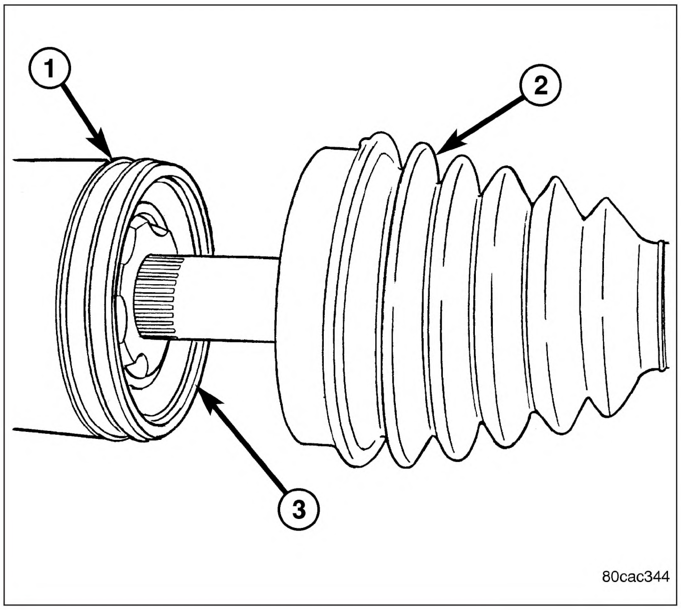
1. Clean the CV joint then apply new grease to the joint.
2. Slid the new boot (5) on to the shaft (3) and on the CV housing (1).
3. Install boot clamps (2) (4) in original locations.
4. Install inner CV joint and boot,



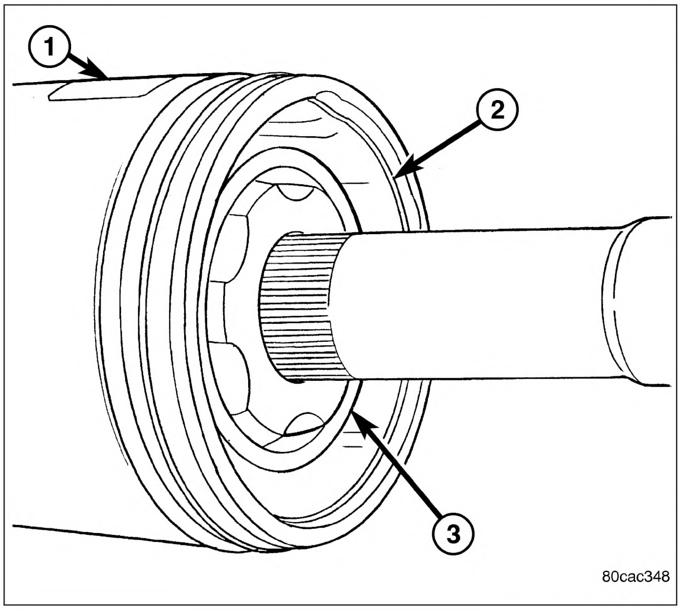
CV JOINT/BOOT-INNER

REMOVAL

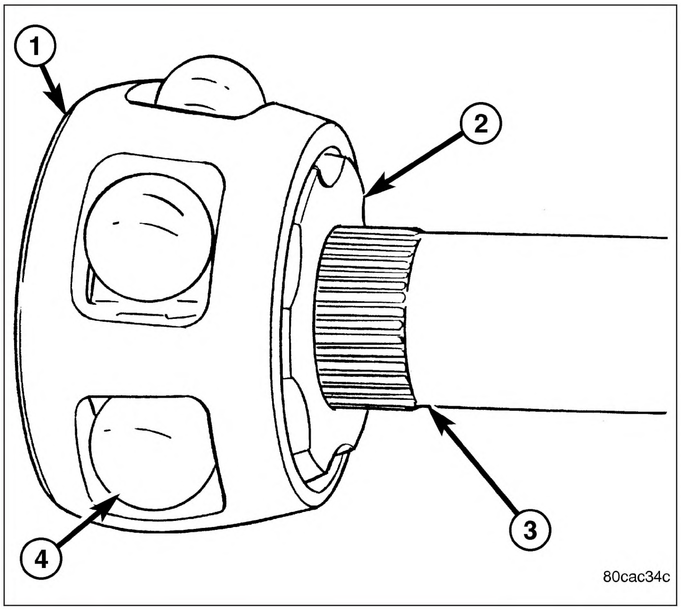
1. Clamp shaft in a vise (with soft jaws) and support C/V joint (1).
2. Remove clamps with a cut-off wheel or grinder.
3. Slide boot down (2) the shaft.



4. Remove lubricant from housing (1) to expose the C/V snap ring (2) and remove snap ring.



5. Remove bearings (4) from the cage (1).
6. Rotate cage (1) 30° and slide cage off the inner race (2) and down the shaft (3).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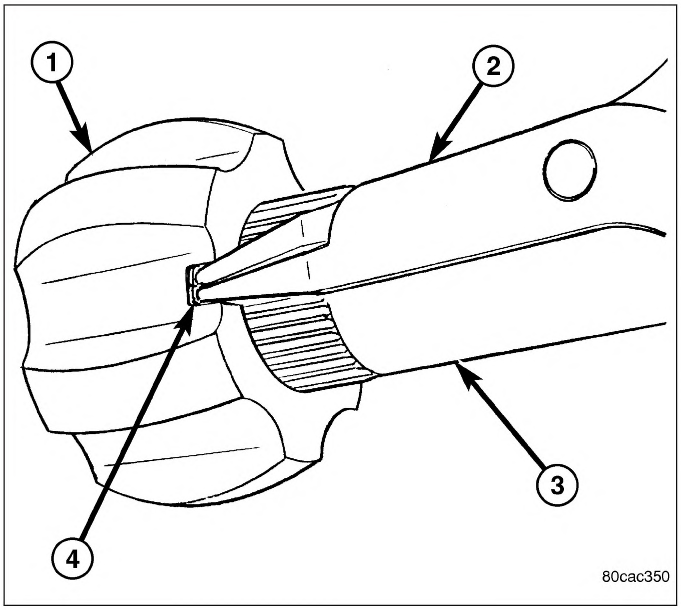
7. Remove spread inner race (1) snap ring (4) and remove race (1) from the shaft (3).
8. Remove boot from the shaft and discard.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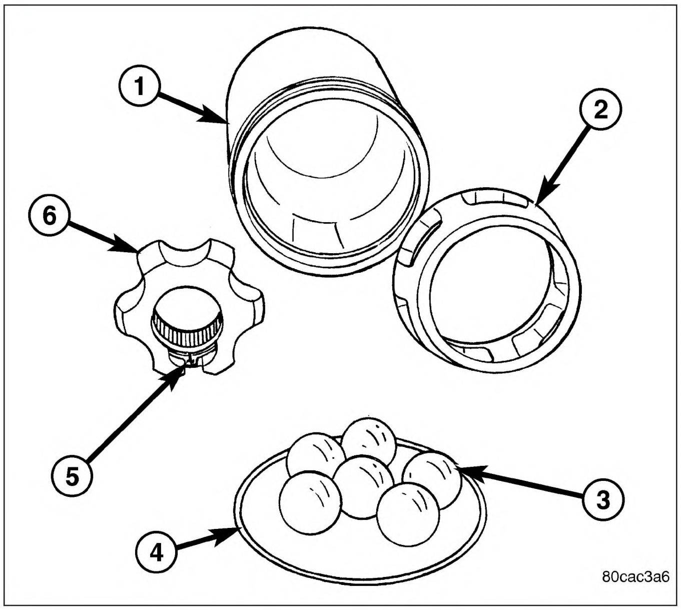
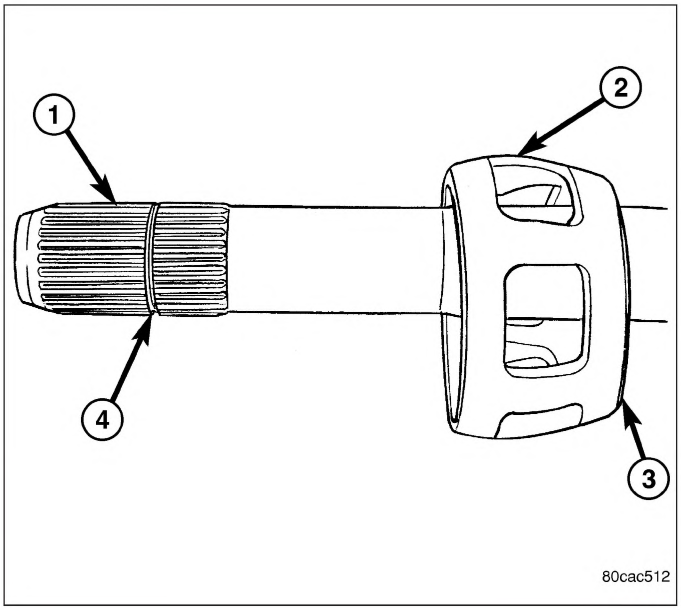
9. Clean and inspect housing (1), cage (2), bearings (3), housing snap-ring (4), inner race snap-ring (5) and inner race (6) for wear or damage.

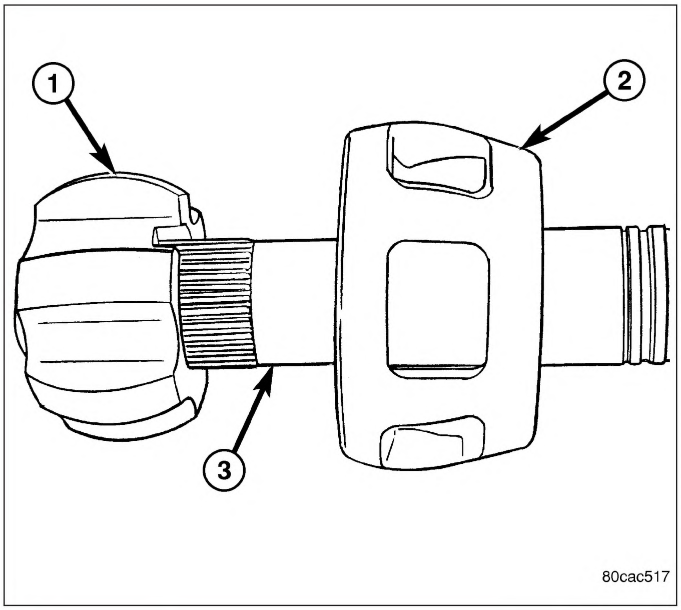


INSTALLATION

1. Apply a coat of grease supplied with the joint/boot to the C/V joint components before assembling them.
2. Place new clamps on the new boot and slide boot down the shaft.
3. Slide cage (2) onto the shaft (1) with the small diameter (3) end towards the boot.



4. Install the inner race (1) onto the shaft (3). Pull on the race to verify snap ring has engaged.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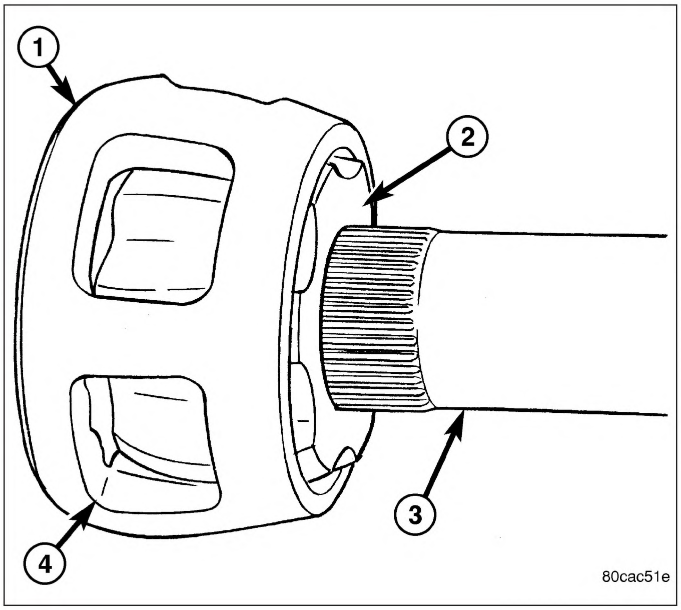
5. Align cage (1) with the inner race (2) and slide over the race.
6. Turn the cage 30° to align the cage windows (4) with the race (2).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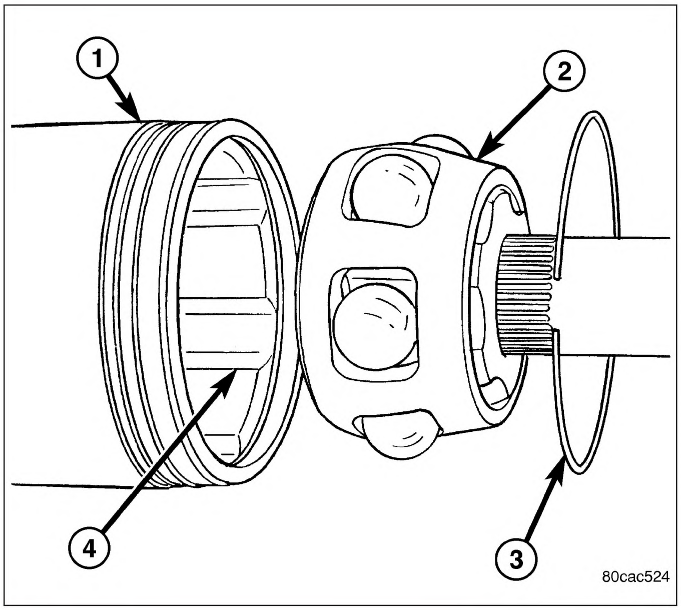
7. Apply grease to the inner race and bearings and install the bearings.
8. Apply grease to the housing bore (4) then install the bearing assembly (2) into the housing (1).
9. Install the housing snap ring (3) and verify it is seated in the groove.
10. Fill the housing and boot with the remaining grease.
11. Slide the boot onto the C/V housing into it's original position. Ensure boot is not twisted and remove any excess air.
12. Secure both boot clamps with Clamp Installer C-4975A. Place tool on clamp bridge and tighten tool until the jaws of the tool are closed.



FRONT AXLE - C200F

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FRONT AXLE - C200F

DIAGNOSIS AND TESTING

FRONT AXLE - C200F

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, tooth contact, worn/damaged gears or the carrier housing not having the proper offset and squareness.

Gear noise usually happens at a specific speed range. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the peak-noise range. If the noise stops or changes greatly:

- Check for insufficient lubricant.
- Incorrect ring gear backlash.
- Gear damage.

Differential side gears and pinions can be checked by turning the vehicle. They usually do not cause noise during straight-ahead driving when the gears are unloaded. The side gears are loaded during vehicle turns. A worn pinion mate shaft can also cause a snapping or a knocking noise.

BEARING NOISE

The axle shaft, differential and pinion bearings can all produce noise when worn or damaged. Bearing noise can be either a whining, or a growling sound.

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched because it rotates at a faster rate. Drive the vehicle and load the differential. If bearing noise occurs, the rear pinion bearing is the source of the noise. If the bearing noise is heard during a coast, the front pinion bearing is the source.

Differential bearings usually produce a low pitch noise. Differential bearing noise is similar to pinion bearing noise. The pitch of differential bearing noise is also constant and varies only with vehicle speed.

Axle shaft bearings produce noise and vibration when worn or damaged. The noise generally changes when the bearings are loaded. Road test the vehicle. Turn the vehicle sharply to the left and to the right. This will load the bearings and change the noise level. Where axle bearing damage is slight, the noise is usually not noticeable at speeds above 30 mph.

LOW SPEED KNOCK

Low speed knock is generally caused by a worn U-joint or by worn side-gear thrust washers. A worn pinion shaft bore will also cause low speed knock.

VIBRATION

Vibration at the rear of the vehicle is usually caused by:

- Damaged drive shaft.
- Missing drive shaft balance weight(s).
- Worn or out of balance wheels.
- Loose wheel lug nuts.
- Worn U-joints or C/V joints.
- Loose/broken springs.
- Damaged axle shaft bearing(s).
- Loose pinion gear nut.
- Excessive pinion yoke run out.
- Bent axle shaft(s).

Check for loose or damaged front end components or engine/transmission mounts. These components can contribute to what appears to be a rear end vibration. Do not overlook engine accessories, brackets and drive belts.

DRIVELINE SNAP

A snap or clunk noise when the vehicle is shifted into gear (or the clutch engaged) can be caused by:

- High engine idle speed.
- Transmission shift operation.
- Loose engine/transmission/transfer case mounts.
- Worn U-joints or C/V joints.
- Loose spring mounts.
- Loose pinion gear nut and yoke.
- Excessive ring gear backlash.
- Excessive side gear to case clearance.

The source of a snap or a clunk noise can be determined with the assistance of a helper. Raise the vehicle on a hoist with the wheels free to rotate. Instruct the helper to shift the transmission into gear. Listen for the noise, a mechanics stethoscope is helpful in isolating the source of a noise.

DIAGNOSTIC CHART

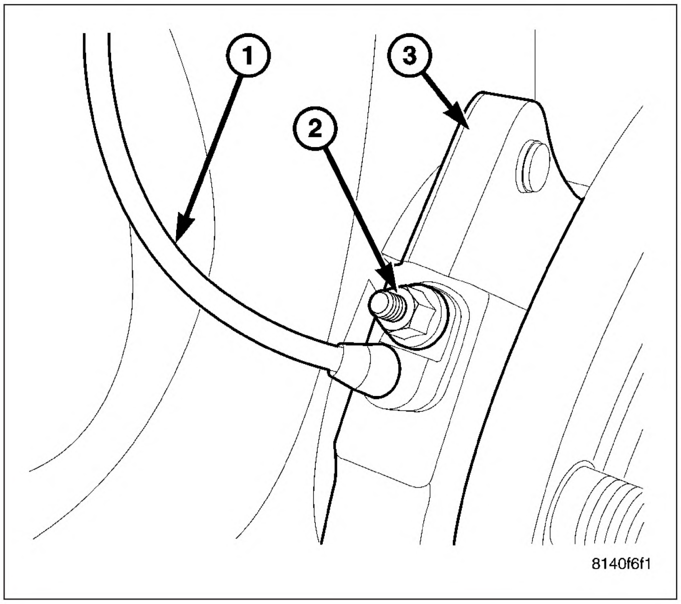
Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose.	1. Tighten loose nuts.
	2. Faulty, brinelled wheel bearing.	2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube.	1. Inspect axle tube alignment. Correct as necessary.
	2. Bent or sprung axle shaft.	2. Inspect and correct as necessary.
	3. End-play in pinion bearings.	3. Refer to pinion pre-load information and correct as necessary.
	4. Excessive gear backlash between the ring gear and pinion.	4. Check adjustment of the ring gear and pinion backlash. Correct as necessary.
	5. Improper adjustment of pinion gear bearings.	5. Adjust the pinion bearings pre-load.
	6. Loose pinion yoke nut.	6. Tighten the pinion yoke nut.
	7. Scuffed gear tooth contact surfaces.	7. Inspect and replace as necessary.
Axle Shaft Broke	1. Misaligned axle tube.	1. Replace the broken shaft after correcting tube mis-alignment.
	2 Vehicle overloaded.	2. Replace broken shaft and avoid excessive weight on vehicle.
	3. Erratic clutch operation.	3. Replace broken shaft and avoid or correct erratic clutch operation.
	4. Grabbing clutch.	4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly.
	2. Excessive ring gear backlash.	2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly.
	3. Vehicle overloaded.	3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight.
	4. Erratic clutch operation.	4. Replace case and inspect gears and bearings for further damage. Avoid erratic use of clutch.

Condition	Possible Causes	Correction
Differential Gears Scored	1. Insufficient lubrication.	1. Replace scored gears. Fill differential with the correct fluid type and quantity.
	2. Improper grade of lubricant.	2. Replace scored gears. Fill differential with the correct fluid type and quantity.
	3. Excessive spinning of one wheel/tire.	3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.
Loss Of Lubricant	1. Lubricant level too high.	1. Drain lubricant to the correct level.
	2. Worn axle shaft seals.	2. Replace seals.
	3. Cracked differential housing.	3. Repair as necessary.
	4. Worn pinion seal.	4. Replace seal.
	5. Worn/scored yoke.	5. Replace yoke and seal.
	6. Axle cover not properly sealed.	6. Remove, clean, and re-seal cover.
Axle Overheating	1. Lubricant level low.	1. Fill differential to correct level.
	2. Improper grade of lubricant.	2. Fill differential with the correct fluid type and quantity.
	3. Bearing pre-loads too high.	3. Re-adjust bearing pre-loads.
	4. Insufficient ring gear backlash.	4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading.	1. Replace gears. Examine other gears and bearings for possible damage.
	2. Erratic clutch operation.	2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation.
	3. Ice-spotted pavement.	3. Replace gears and examine remaining parts for damage.
	4. Improper adjustments.	4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.

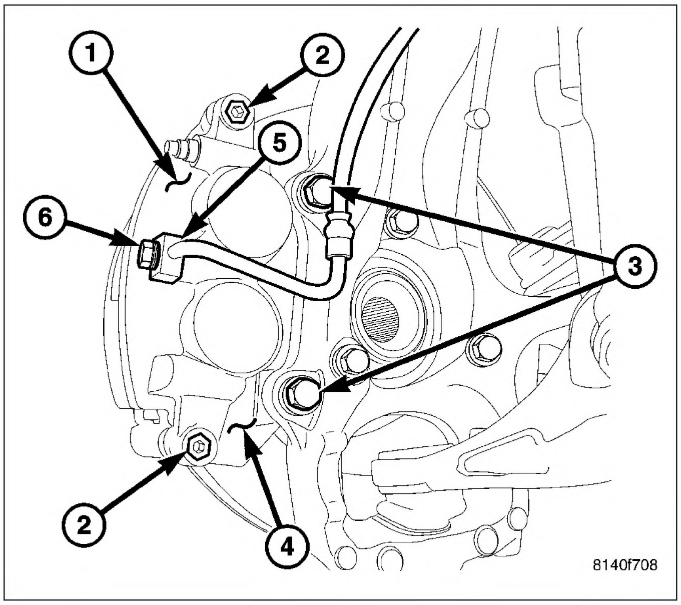
Condition	Possible Causes	Correction
Axle Noise	1. Insufficient lubricant.	1. Fill differential with the correct fluid type and quantity.
	2. Improper ring gear and pinion adjustment.	2. Check ring gear and pinion contact pattern.
	3. Unmatched ring gear and pinion.	3. Replace gears with a matched ring gear and pinion.
	4. Worn teeth on ring gear and/or pinion.	4. Replace ring gear and pinion.
	5. Loose pinion bearings.	5. Adjust pinion bearing pre-load.
	6. Loose differential bearings.	6. Adjust differential bearing pre-load.
	7. Mis-aligned or sprung ring gear.	7. Measure ring gear run-out. Replace components as necessary.
	8. Loose differential bearing cap bolts.	8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued tot he proper specification.
	9. Housing not machined properly.	9. Replace housing.

REMOVAL

1. With vehicle in neutral, position vehicle on hoist.
2. Remove skid plate.
3. Remove differential housing drain plug and drain fluid.
4. Mark front propeller shaft and pinion flange. Remove propeller shaft from pinion flange.
5. Remove half shaft hub/bearing nuts.
6. Remove wheel speed sensors (1) from hub/bearings (3).



7. Remove brake calipers bolts (2) and remove calipers (1) from caliper adapters (4).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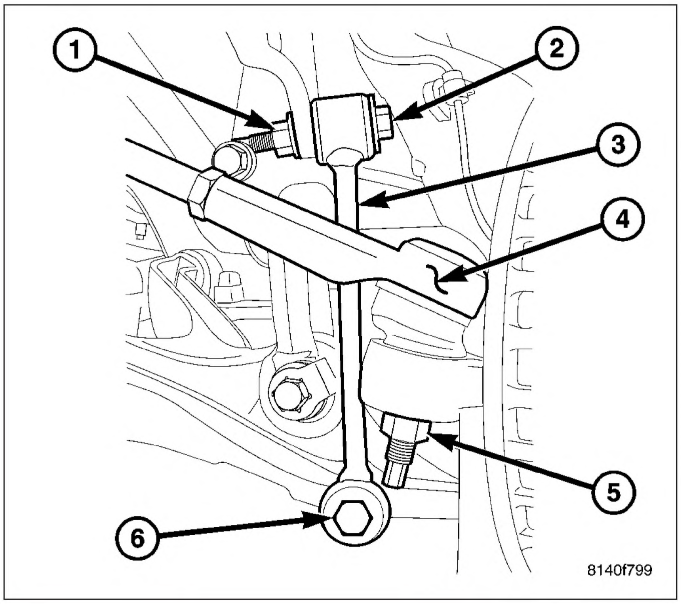
8. Remove stabilizer links (3) bolts (6) from lower control arms.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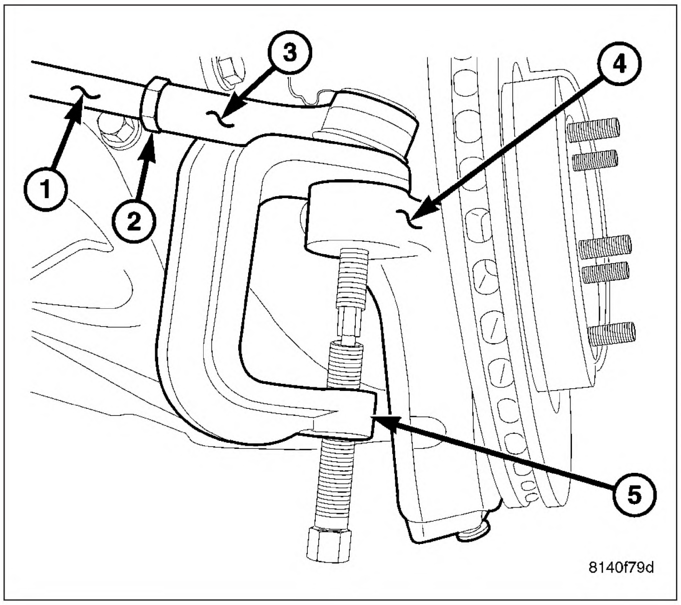
9. Remove outer tie rod end nuts and separate tie rods (3) from knuckles (4) with Remover 8677 (5).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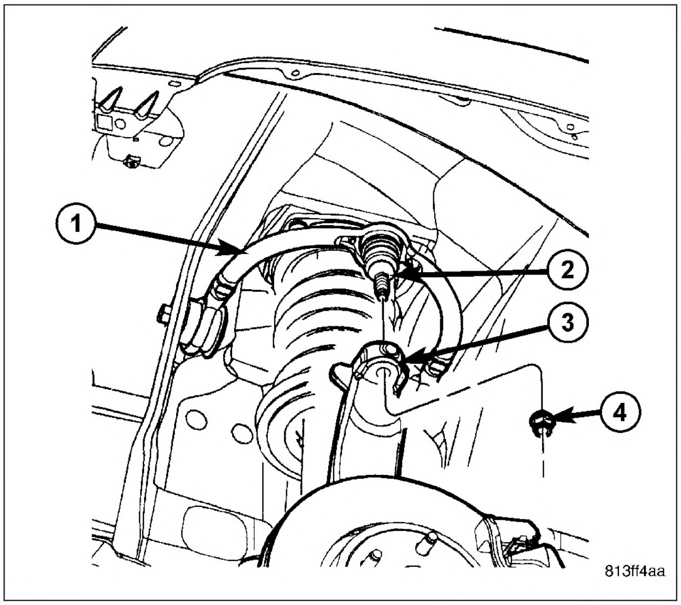
10. Remove upper ball joint nuts (4) and separate ball joints (2) from knuckles (3) with Remover 8677.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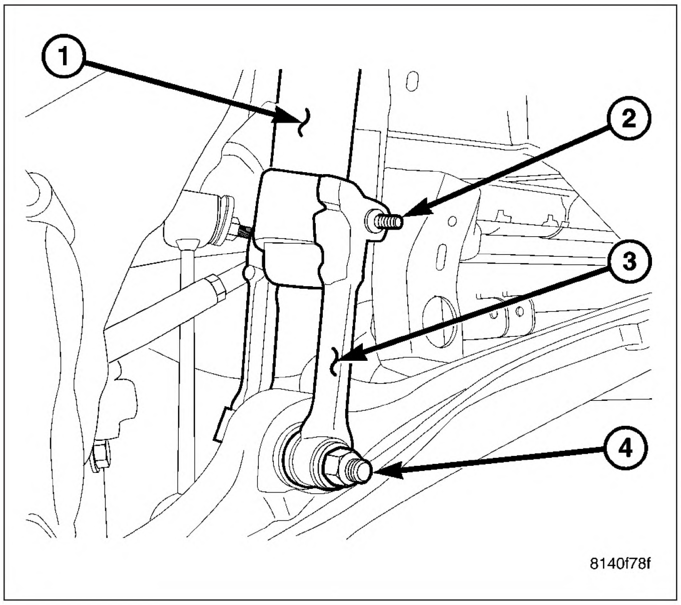
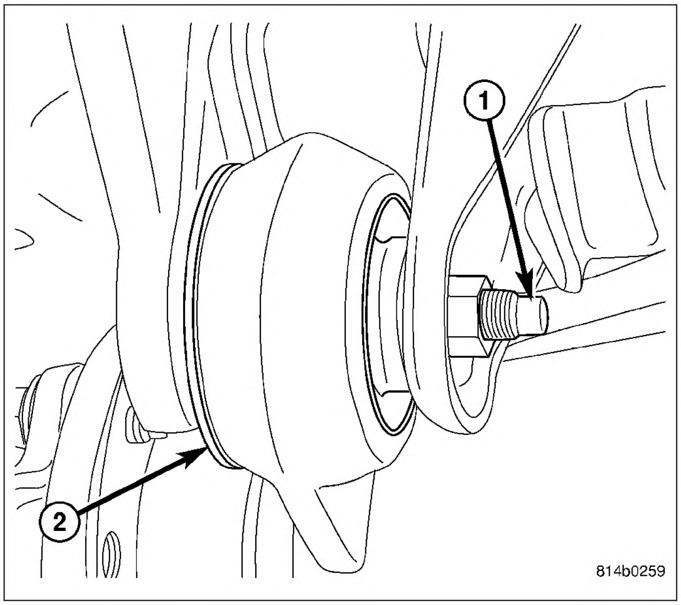
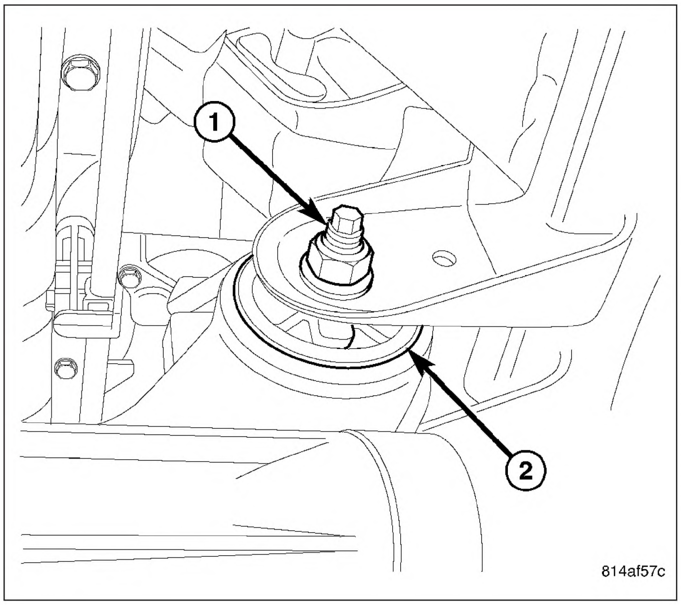
11. Remove lower shock clevis (3) nuts bolts (2) from lower control arm.
12. Lean the knuckles out and push half shafts out of the hub/bearings.
13. Pry half shafts off the axles.
14. Remove differential vent hose.



15. Support axle with a lift/jack.
16. Remove bolt (1) from differential bushing (2).



17. Remove bolt (1) from axle tube bushing (2).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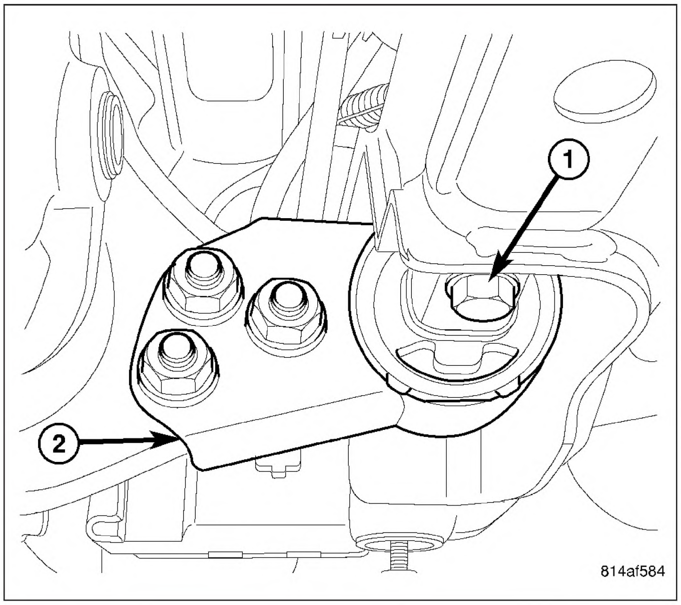
18. Remove bolts (1) from differential cover bracket (2) bushing.
19. Lower axle and from vehicle.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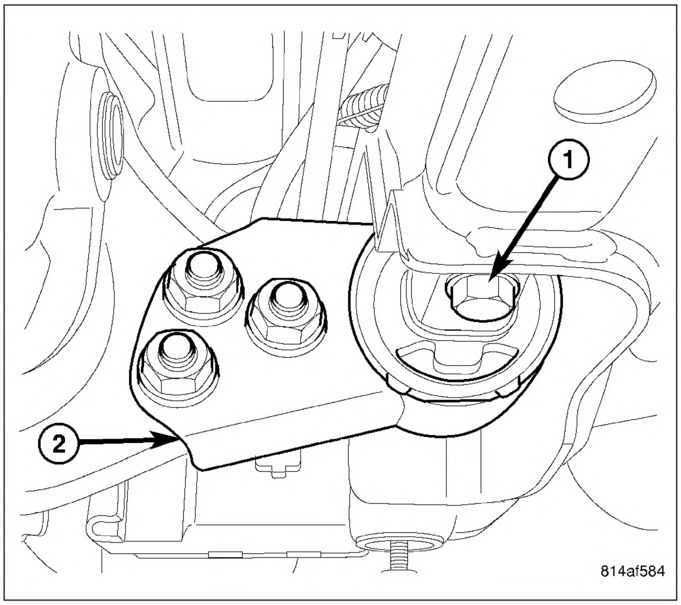
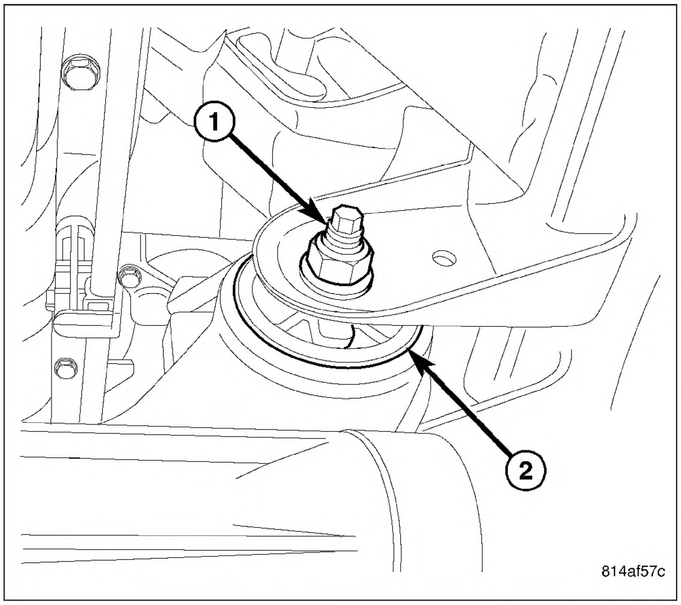
INSTALLATION

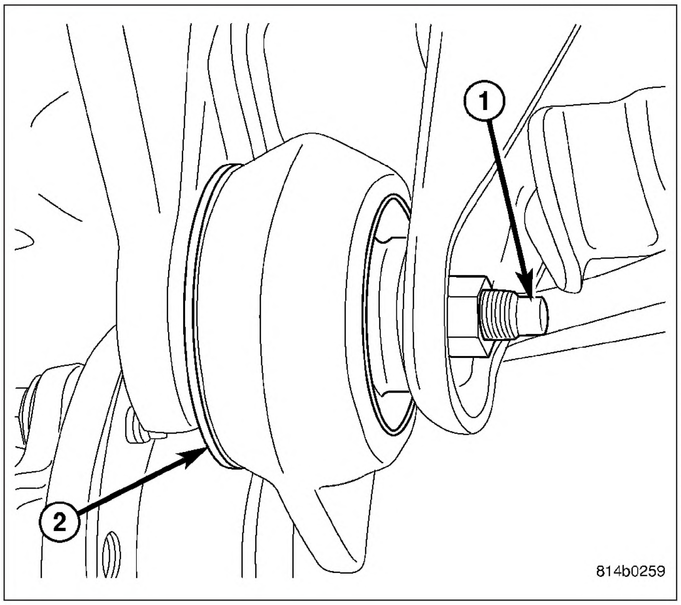
1. Raise axle to vehicle.
2. Install differential cover axle bracket (2) bushing bolts (1) and tighten bolts to 47 N·m (35 ft. lbs.)



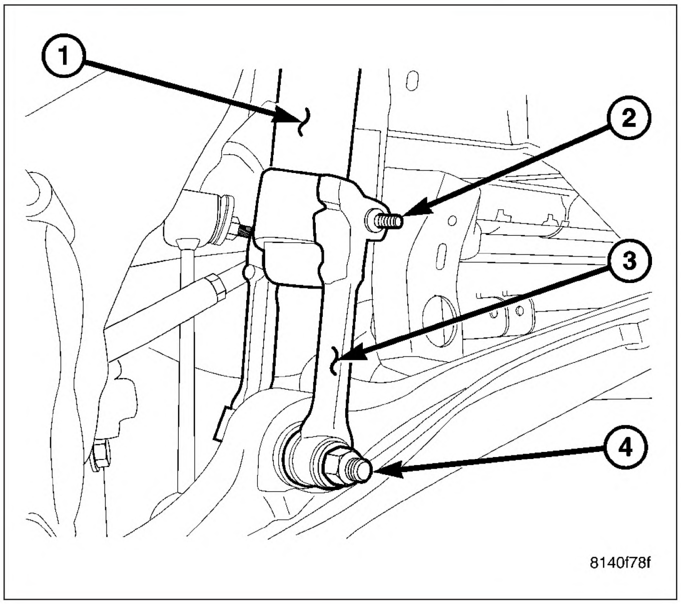
3. Install axle tube bushing bolt and nut. Tighten nut to 95 N·m (70 ft. lbs.)



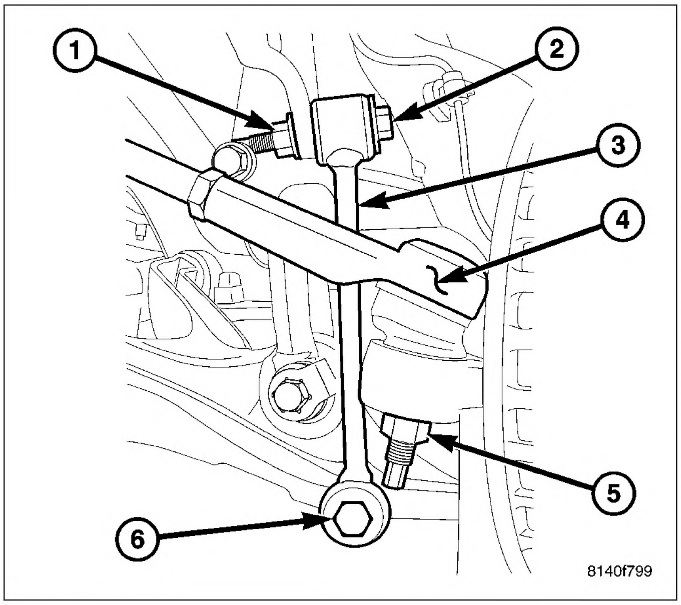
4. Install differential bushing bolt and nut. Tighten nut to 95 N·m (70 ft. lbs.)
5. Install differential vent hose.



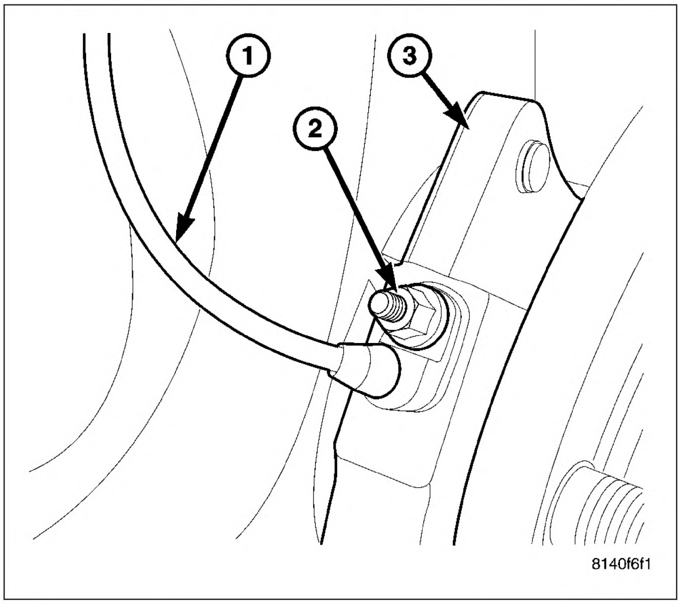
6. Install half shaft into axle and knuckles. Verify axle are engaged in the axle.
7. Install clevis (3) bolt and nut (4) on lower control arms and tighten to specification.



8. Install upper control arms on knuckles and tighten ball joint nuts to specifications.
9. Install tie rod ends (4) and nuts (5) on knuckles and tighten to specifications.
10. Install stabilizer bar links (2) and bolts (6) on lower control arms and tighten to specifications.



11. Install brake calipers on knuckles.
12. Install wheel speed sensor (1) on hub/bearing (3).
13. Install half shaft hub nuts and tighten to 135 N·m (100 ft. lbs.).
14. Install propeller shaft on pinion flange with reference marks aligned.
15. Install drain plug and tighten to 60 N·m (44 ft. lbs.).
16. Fill differential housing and install fill plug. Tighten plug to 60 N·m (44 ft. lbs.).
17. Install skid plate.



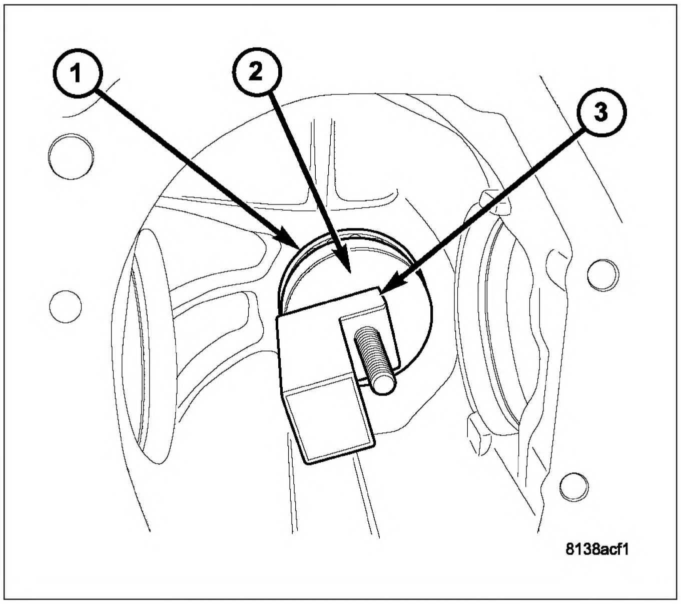
ADJUSTMENTS

ADJUSTMENT

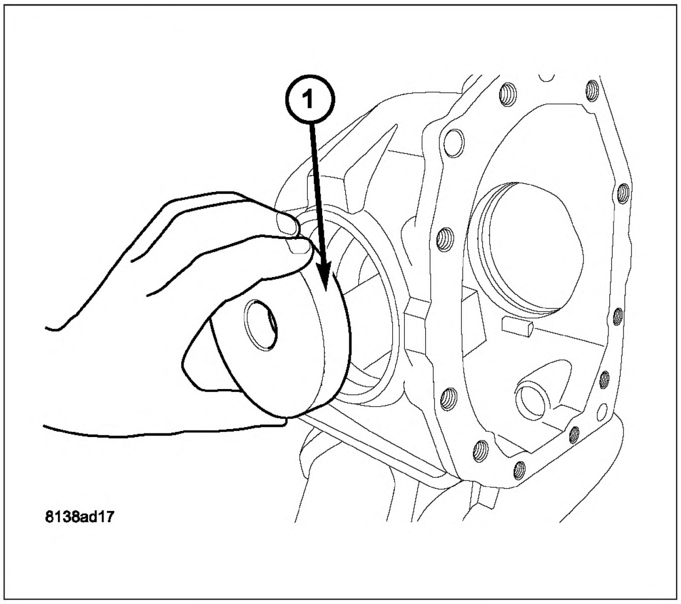
PINION DEPTH MEARSUREMENT

NOTE: Take measurement with pinion shim removed and rear bearing cup in place.

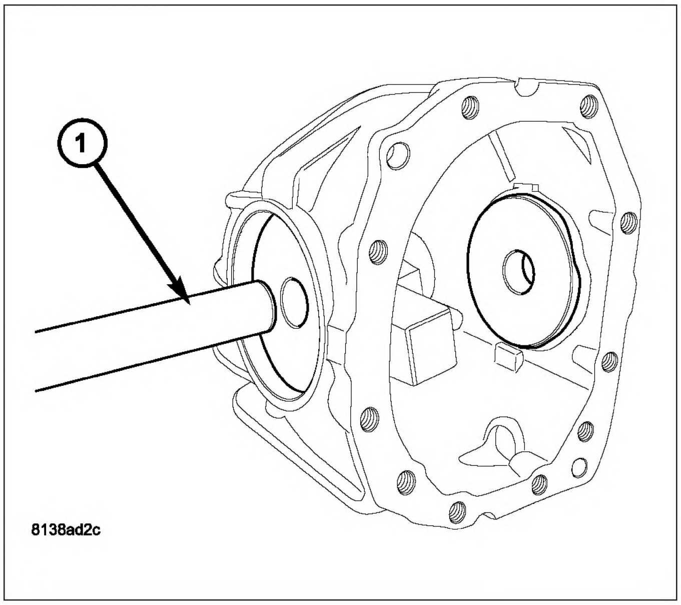
1. Install Pinion Height Block 6739 (3), Pinion Block 9534 (2), and pinion head bearing cone (1) onto Screw 6741. Install assembly into axle housing and through bearing and cups.
2. Install pinion front bearing and Cone 6740. Tighten Cone 6740 by hand until 3.4 N·m (30 in. lbs.) of rotating torque is measured at Screw 6741.



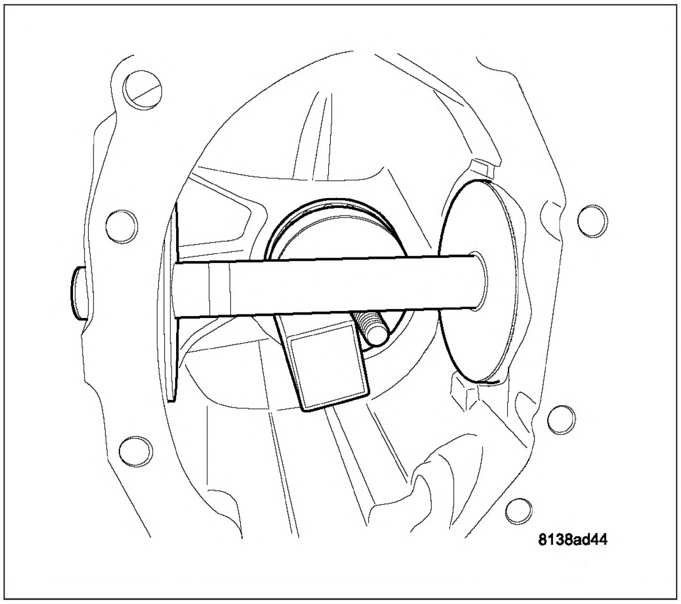
3. Install Arbor Discs 9538 (1).



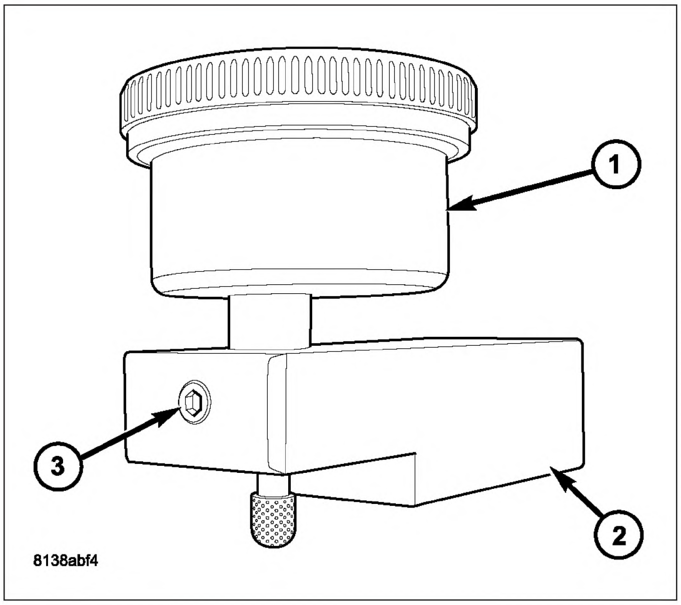
4. Install Arbor Bar D-115-3 (1).



5. Verify pinion depth setup is as shown.



6. Install Dial Indicator 9524 (1) to Scooter Block D-115-2A (2). Secure with set-screw (3).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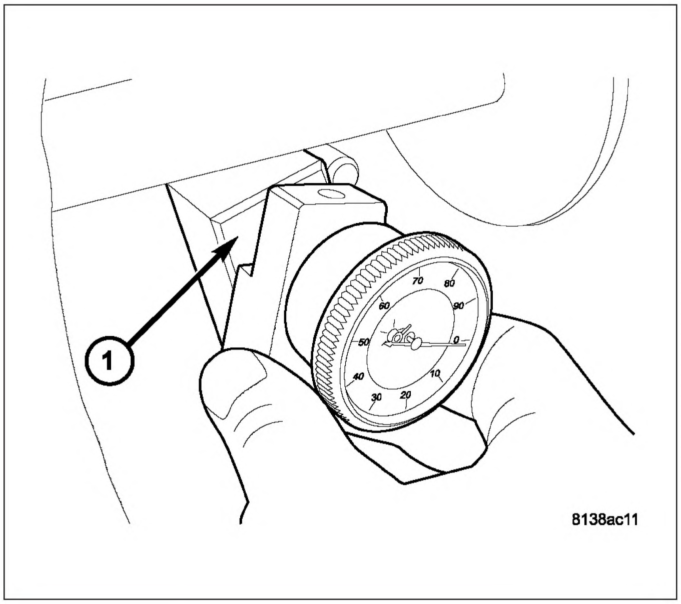
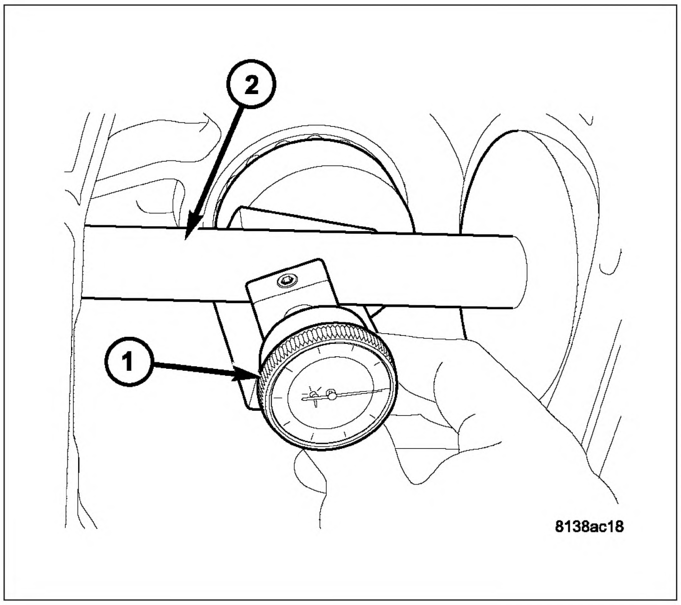
7. Install Indicator/Block assembly to top of Height Block 6739 (1). Zero indicator on top surface.



8. Slide indicator probe off of height block and onto Arbor Bar D-115-3 (2). As indicator contacts Arbor Bar (2), indicator needle will rotate clockwise. Continue moving indicator probe to the crest of the arbor bar and record the highest reading. Then add 4 mm (0.157 in.) to the recorded reading. This will give you the correct shim selection for pinion height.



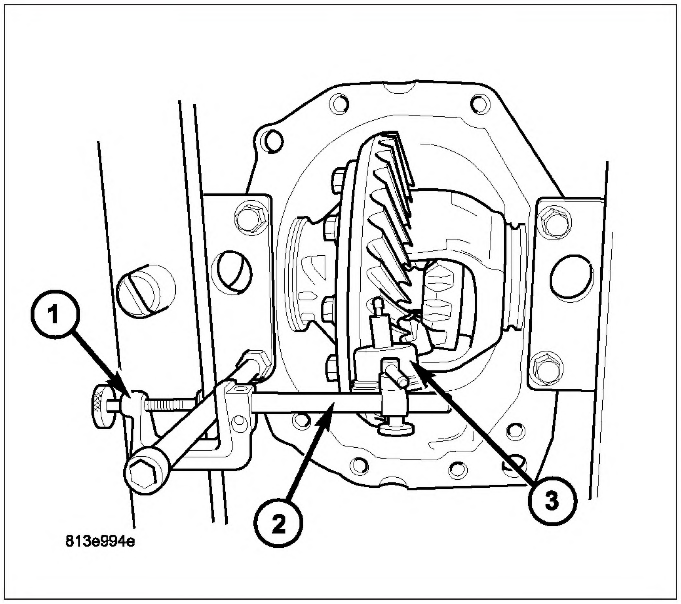
DIFFERENTIAL SIDE BEARING PRELOAD

Differential side bearing preload is predetermined. The select snap rings in the differential housing will provide the correct differential side bearing preload. These snap can be adjusted to obtain the correct ring gear backlash measurement.

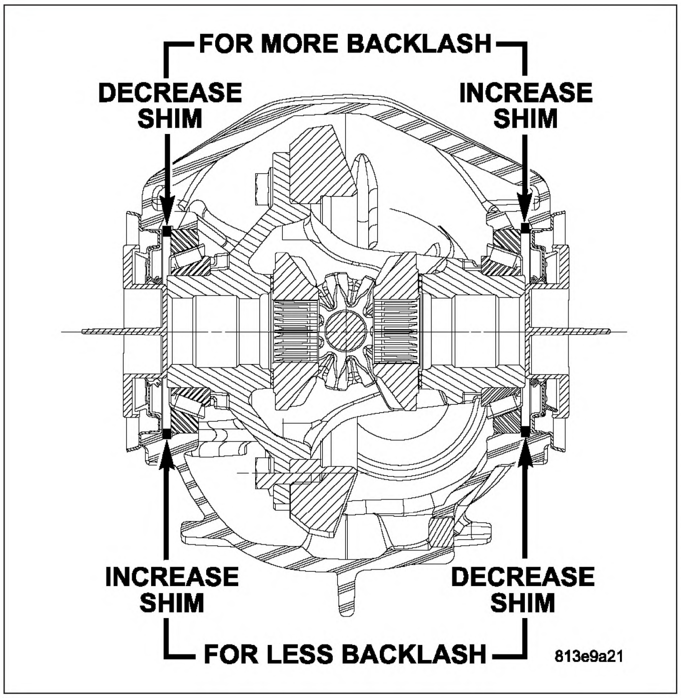
RING GEAR BACKLASH MEASUREMENT

NOTE: If Spreader W-129-B is installed, make sure tension on axle housing is relieved.

1. Set up Dial Indicator Set C-3339-A with Clamp SP-5426 (1), Post SP-5425-B (2) and Metric Dial Indicator 9524 (3) to measure ring gear backlash:
2. Rotate ring gear one direction to take up clearance to pinion. Verify indicator tip is in contact with ring gear and zero indicator. Rotate ring gear back and forth and record measurement. Ring gear backlash should be 0.13-0.18 mm (0.005-0.007 in.). Verify back lash measurement in four (4) positions.



3. If backlash measurement is less than 0.13 mm (0.005 in.), it is necessary to decrease the snap ring thickness on the ring gear side, and increase the thickness on the pinion side equal amounts.
4. If backlash measurement is greater than 0.18 mm (0.007 in.), it is necessary to increase the snap ring thickness on the ring gear side, and decrease the thickness on the pinion side equal amounts.

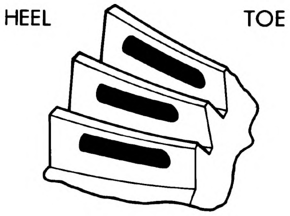
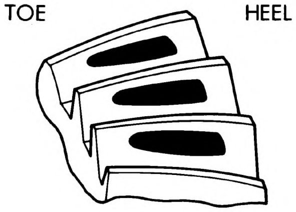
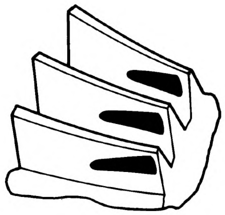
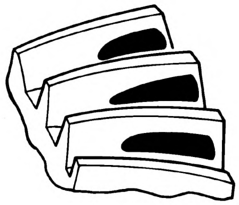
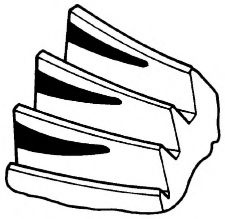
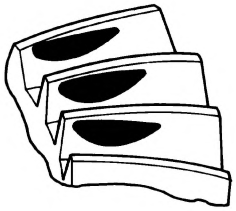
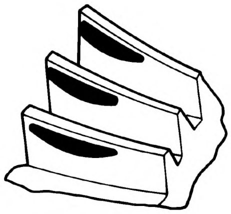
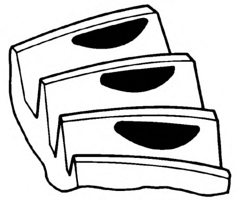
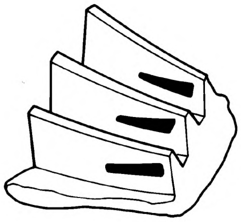
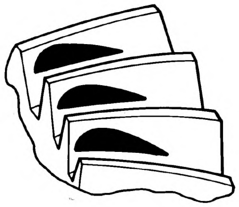


GEAR CONTACT PATTERN

The ring gear and pinion teeth contact patterns will show if the pinion depth is correct in the housing. It will also show if the ring gear backlash has been adjusted correctly. The backlash can be adjusted within specifications to achieve desired tooth contact patterns.

1. Apply a thin coat of hydrated ferric oxide or equivalent to the drive and coast side of the ring gear teeth.
2. Wrap, twist, and hold a shop towel around the pinion yoke to increase the turning resistance of the pinion. This will provide a more distinct contact pattern.
3. With a boxed end wrench on a ring gear bolt, rotate the differential case one complete revolution in both directions while a load is being applied from shop towel.

The areas on the ring gear teeth with the greatest degree of contact against the pinion teeth will squeegee the compound to the areas with the least amount of contact. Note and compare patterns on the ring gear teeth to Gear Tooth Contact Patterns chart and adjust pinion depth and gear backlash as necessary.

DRIVE SIDE OF RING GEAR TEETH	COAST SIDE OF RING GEAR TEETH	
		DESIRABLE CONTACT PATTERN. PATTERN SHOULD BE CENTERED ON THE DRIVE SIDE OF TOOTH. PATTERN SHOULD BE CENTERED ON THE COAST SIDE OF TOOTH, BUT MAY BE SLIGHTLY TOWARD THE TOE. THERE SHOULD ALWAYS BE SOME CLEARANCE BETWEEN CONTACT PATTERN AND TOP OF THE TOOTH.
		RING GEAR BACKLASH CORRECT. **THINNER** PINION GEAR DEPTH SHIM REQUIRED.
		RING GEAR BACKLASH CORRECT. **THICKER** PINION GEAR DEPTH SHIM REQUIRED.
		PINION GEAR DEPTH SHIM CORRECT. **DECREASE** RING GEAR BACKLASH.
		PINION GEAR DEPTH SHIM CORRECT. **INCREASE** RING GEAR BACKLASH.

J9003-24

Gear Tooth Contact Patterns

SPECIFICATIONS - C200F

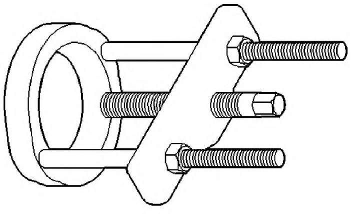
SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Axle Ratio	3.07, 3.55, 3.73
Ring Gear Diameter	200 mm (7.873 in.)
Ring Gear Backlash	0.13-0.18 mm (0.005-0.007 in.)
Pinion Bearing Preload	1.5-1.9 N·m (13-17 in. lbs.)

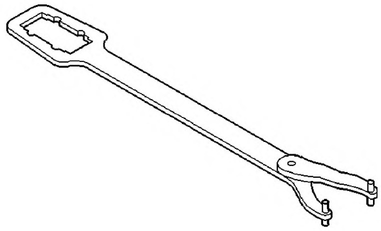
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Pinion Nose Bushing Nut	95	70	-
Axle Tube Bushing Nut	95	70	-
Differential Cover Bracket Bushing Bolts	47	35	-
Bracket to Differential Cover Nuts	117	86	-
Ring Gear Bolts	102	75	-
Differential Cover Bolts	56	41	-
Drain/Fill Plug	60	44	-
Axle Tube to Differential Bolts	56	41	-
Axle Dampener Nuts	56	41	-

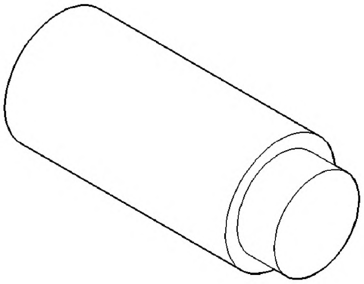
SPECIAL TOOLS



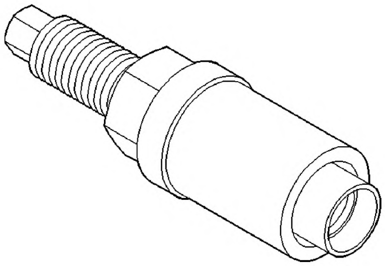
PULLER/PRESS C-293-PA



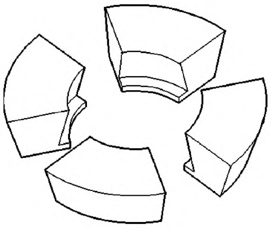
FLANGE WRENCH C-3281



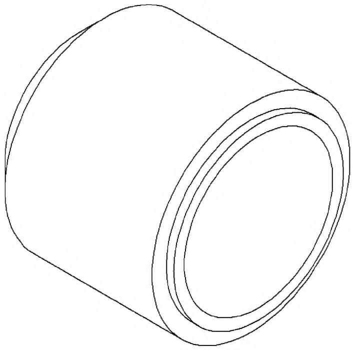
ADAPTER PLUG C-293-3



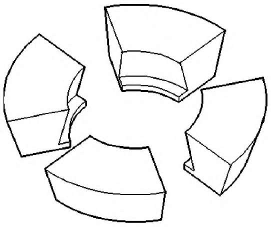
FLANGE INSTALLER C-3718



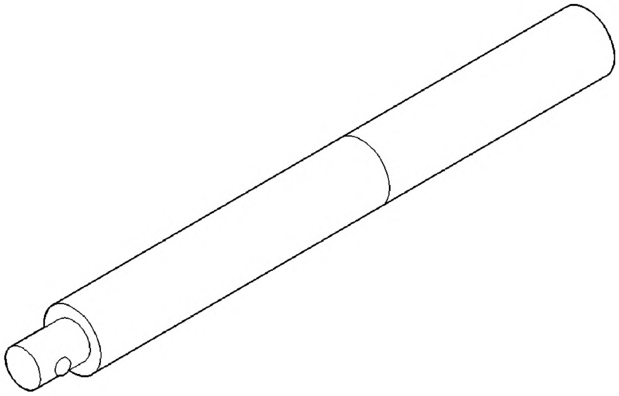
ADAPTERS C-293-37



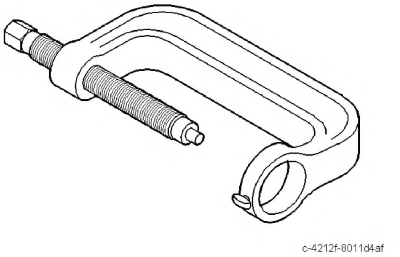
SEAL INSTALLER C-3972A



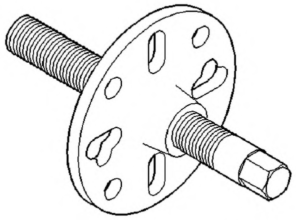
ADAPTERS C-293-48



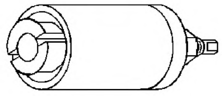
HANDLE C-4171



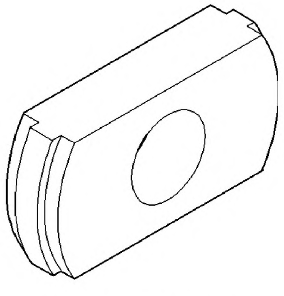
PRESS - C-4212F



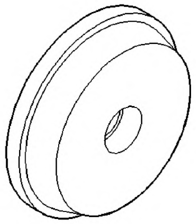
PULLER C-452



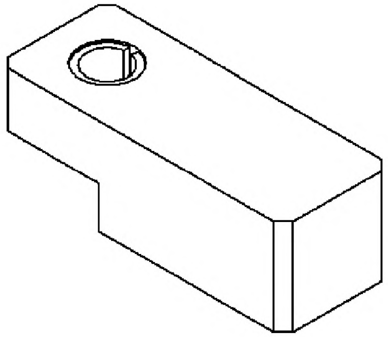
BEARING REMOVER C-4660A



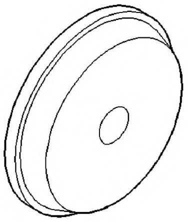
REMOVER D-103



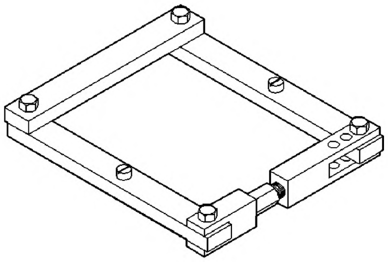
INSTALLER D-111



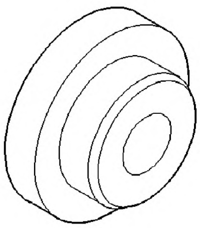
SCOOTER BLOCK D-115-2A



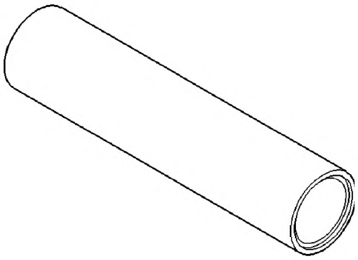
INSTALLER D-129



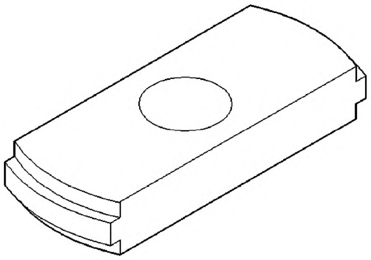
SPREADER W-129-B



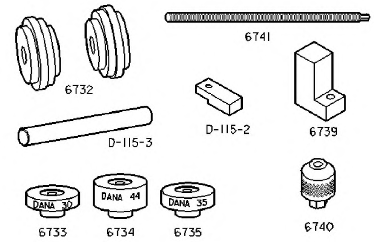
INSTALLER 5063



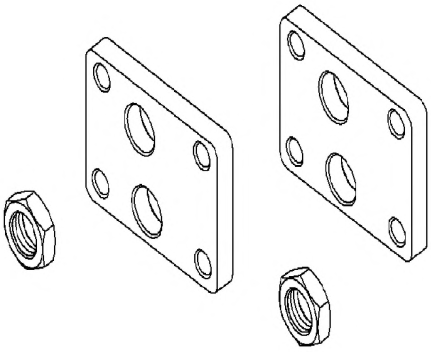
INSTALLER 6448A



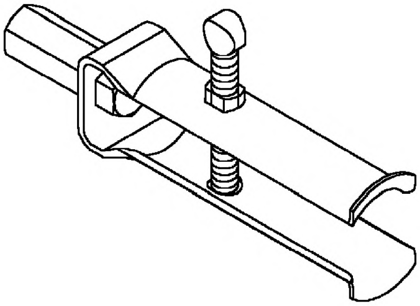
REMOVER 9084


6741
6732
D-115-3
D-115-2
6739
DANA 30
DANA 44
DANA 35
6733
6734
6735
6740

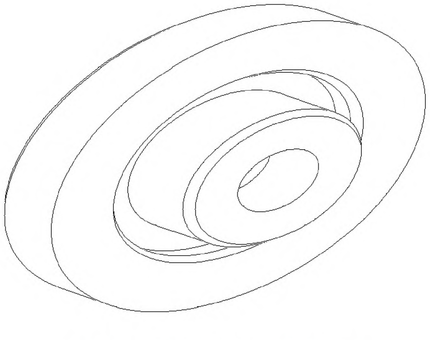
PINION GAUGE SET 6774



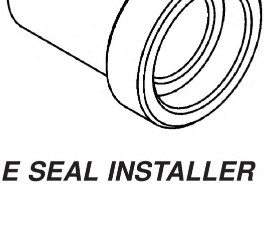
SPREADER ADAPTERS 9669



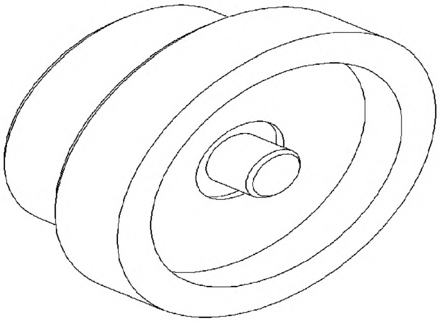
SEAL REMOVER 7794-A



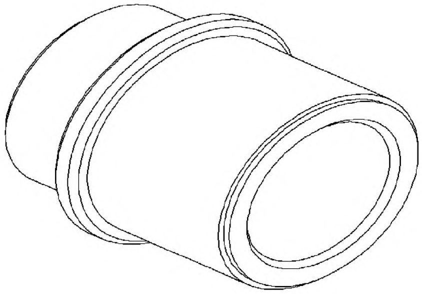
SEAL INSTALLER 9504



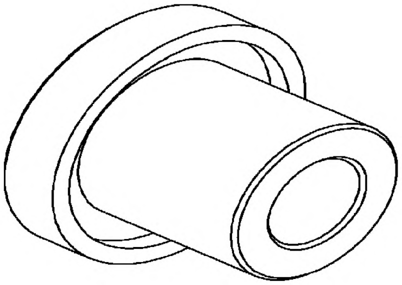
AXLE SEAL INSTALLER 8402



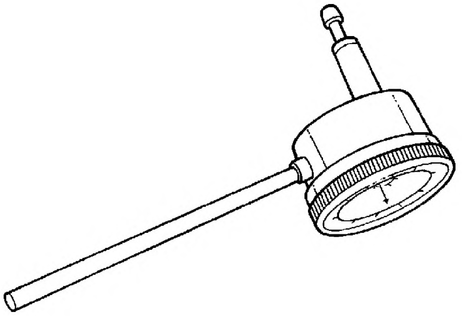
BUSHING RECEIVER/INSTALLER 9511



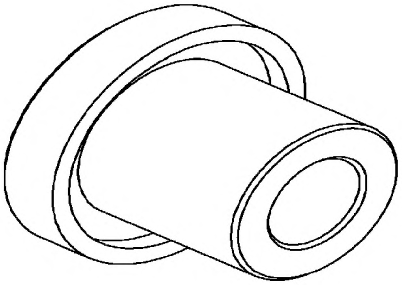
BUSHING REMOVER 9512



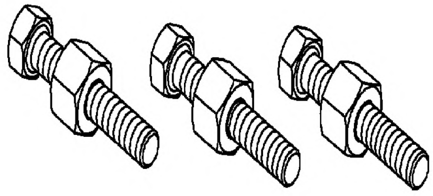
BEARING INSTALLER 9535



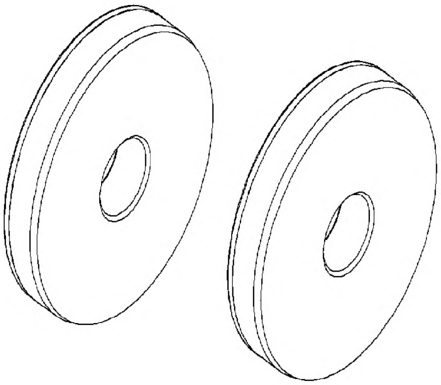
DIAL INDICATOR 9524



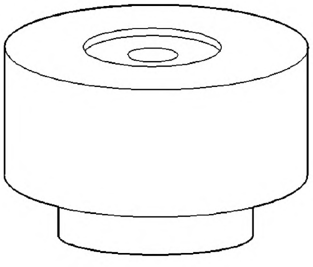
BUSHING RECEIVER 9536



RING GEAR INSTALLER 9533



ARBOR DISC 9538

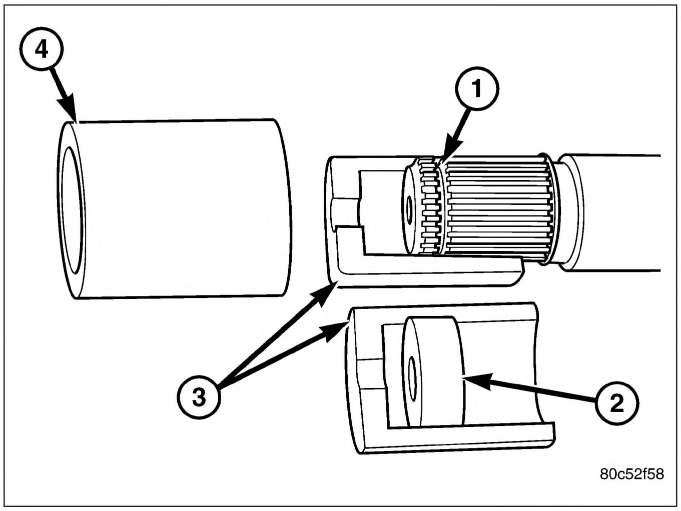


PINION BLOCK 9534

AXLE SHAFTS

REMOVAL

1. Remove half shaft from vehicle.
2. Clean axle seal area.
3. Remove snap ring and O-ring from the axle shaft.
4. Remove axle (1) with Remove 8420A (2) (3) (4) and slid hammer.



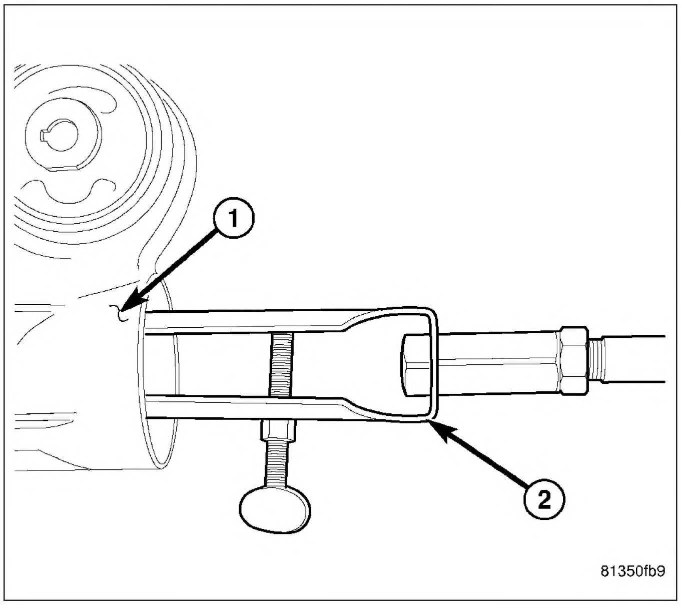
INSTALLATION

1. Lubricate bearing bore and seal lip with gear lubricant.
2. Install axle shaft and engage shaft into side gear. Push firmly on axle shaft to engage snap-ring.
3. Check the differential fluid level and add fluid if necessary.
4. Install half shaft.
5. Install skid plate, if necessary.

AXLE SHAFT SEALS

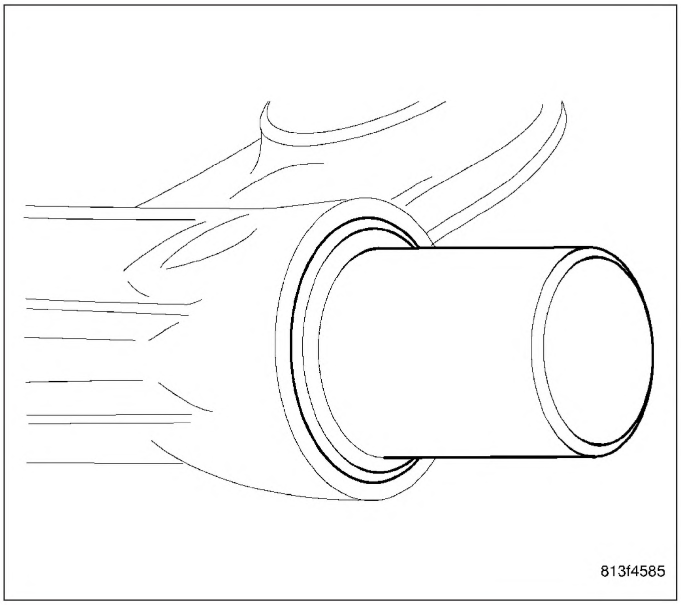
REMOVAL

1. Remove axle shaft.
2. Remove axle shaft tube (1) seal with Remover 7794-A (2) and slid hammer.



INSTALLATION

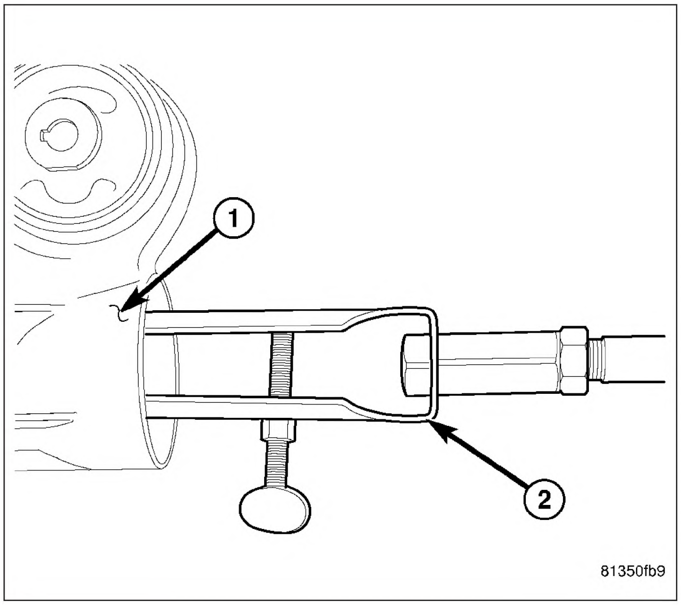
1. Install axle (1) seal with Installer 8402 (2) and hammer.
2. Install axle shaft.



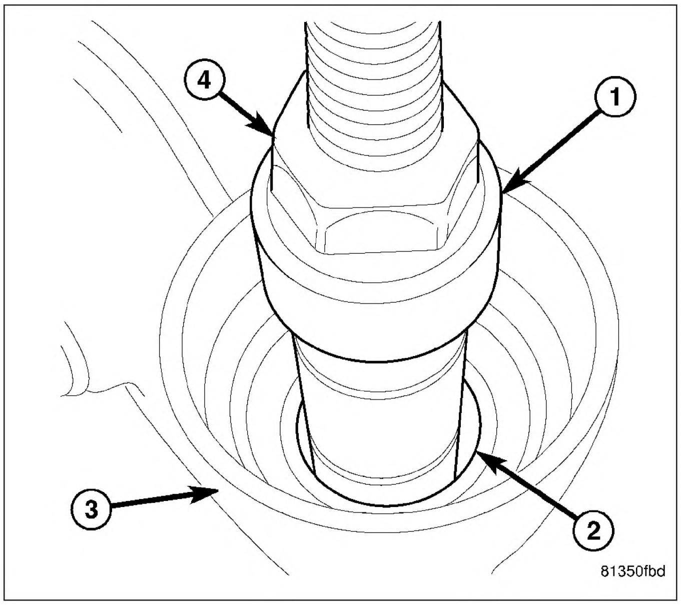
AXLE BEARINGS

REMOVAL

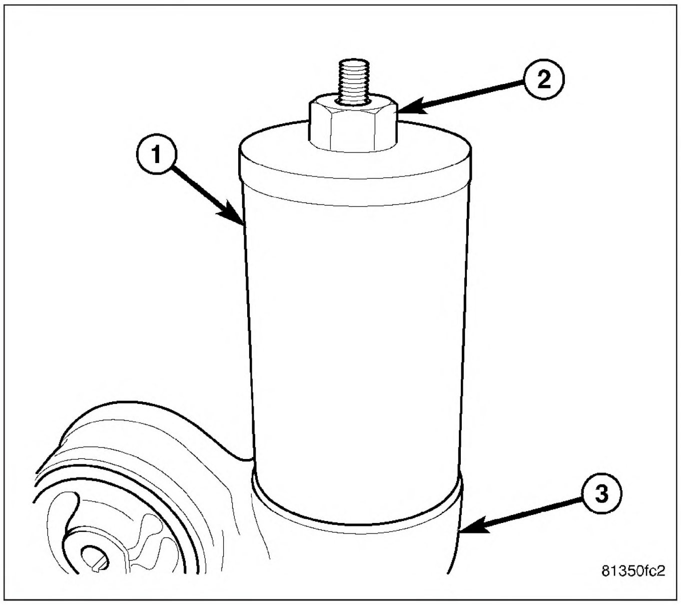
1. Remove axle shaft.
2. Remove axle shaft tube (1) seal with Remover 7794-A (2) and slid hammer.



3. Install axle bearing remover C-4660-A (1) into the axle bearing (2) in the axle tube (3) and tighten remover nut (4).

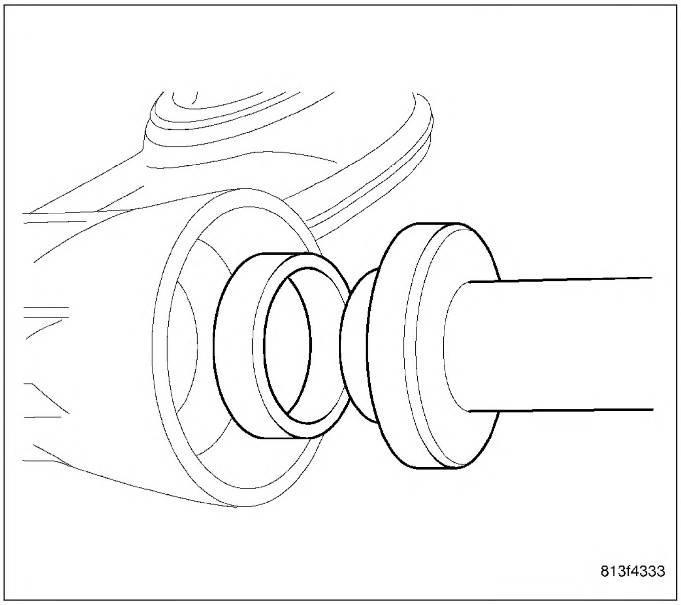

4
1
3
2
81350fbd

4. Install bearing Reciever 9537 (1) and nut (2) on remover and tube (3). Tighten nut (2) and draw bearing into reciever (1).


2
1
3
81350fc2

INSTALLATION

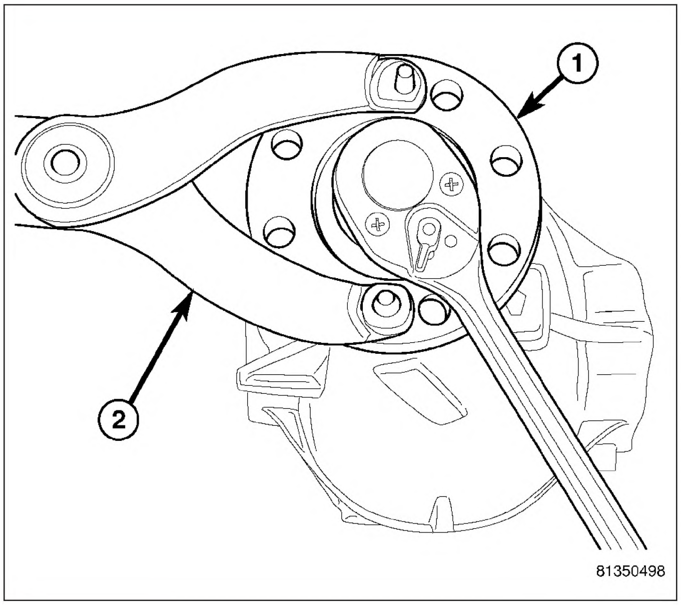
1. Install axle bushing (1) with Installer 5063 (2) and hammer.
2. Install axle shaft and seal.



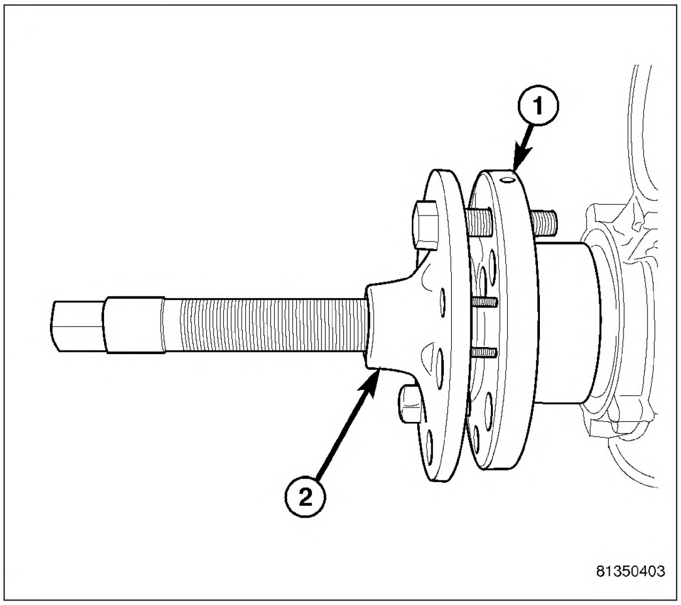
PINION SEAL

REMOVAL

1. Remove wheels.
2. Push back brake pads and release hand brake.
3. Remove propeller shaft.
4. Rotate pinion with inch pound torque and record torque to rotate.
5. Mark installation position of collared nut with respect to drive pinion.
6. Bend pinion nut lock back with a punch and hammer.
7. Hold pinion flange (1) with Wrench C-3281(2) and remove pinion nut.

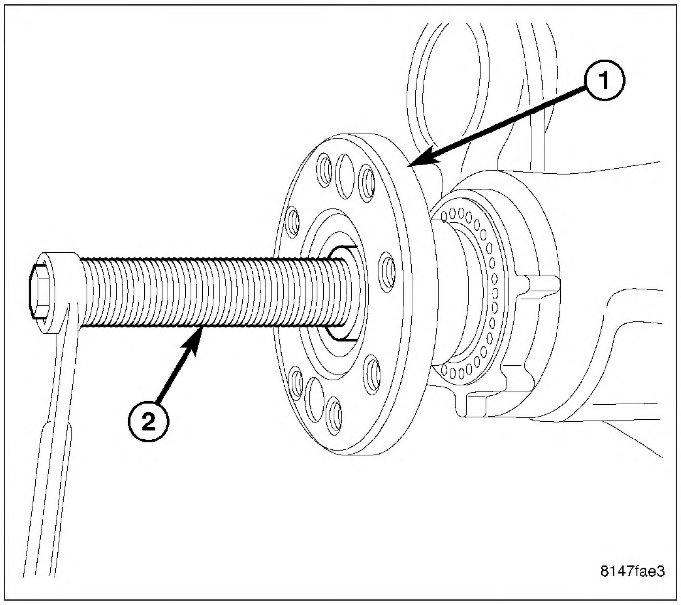


8. Remove pinion flange (1) with Puller C-452 (2).
9. Remove pinion seal with a seal pick.

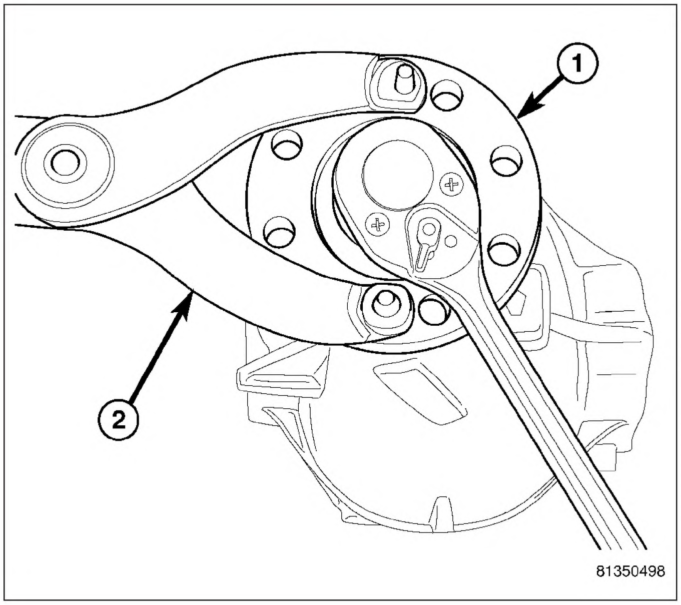


INSTALLATION

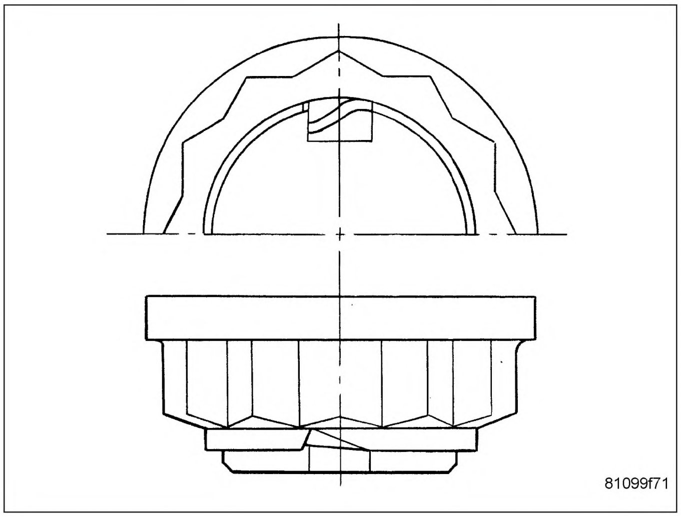
1. Install pinion seal with Installer C-3972A and Handle C-4171.
2. Install pinion flange (1) on pinion with Installer 9616 (2). Tap flange on pinion, then thread installer center bolt on pinion shaft and draw flange onto the pinion.



3. Install **new** pinion collared nut and carefully tighten nut in stages holding flange (1) with Wrench C-3281(2). Check torque to rotate after each stage, until previously value of torque to rotate is exceeded by 0.5 N·m. (4.4 in. lbs.).



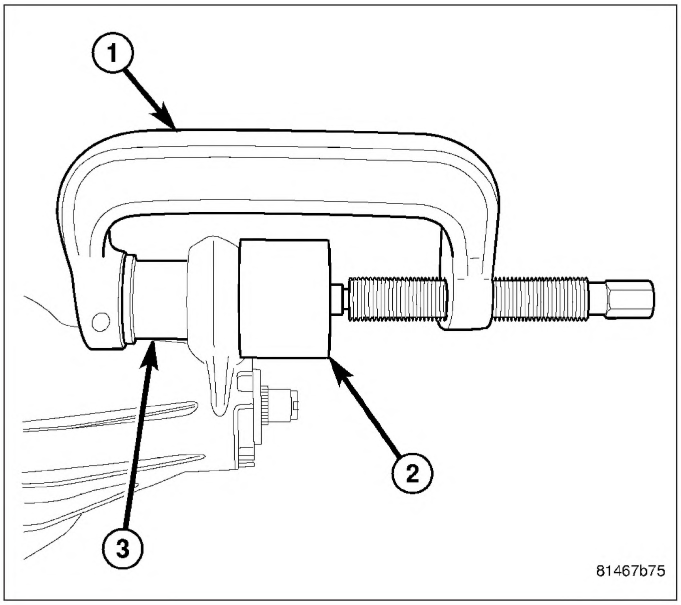
4. Cut the pinion nut collar.
5. Bend nut collar so it touches the wall of the slot in the pinion shaft.
6. Connect propeller shaft to pinion flange.
7. Install wheel and tires.
8. Operate brake pedal several times until brake pads contact brake discs (brake pressure built up).



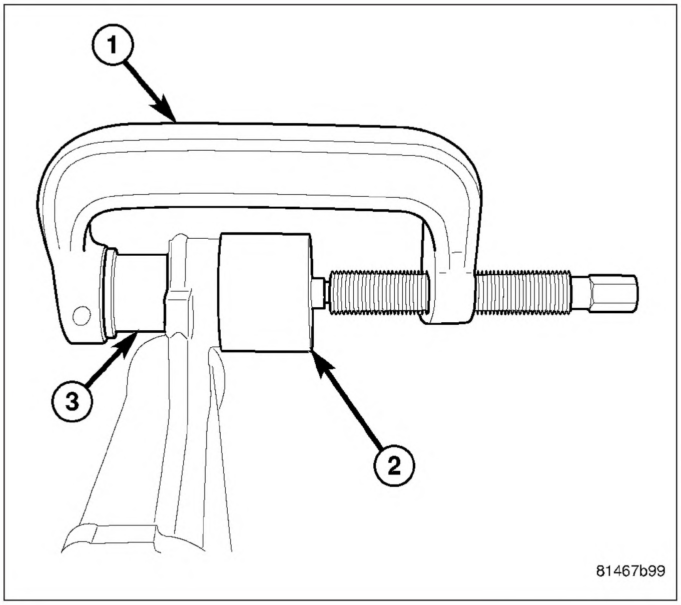
BUSHINGS-AXLE

REMOVAL

1. Remove axle from vehicle.
2. Remove pinion flange.
3. Remove pinion nose bushing with Press C-4212F (1) Receiver 9536 (2) and Remover 9512 (3).

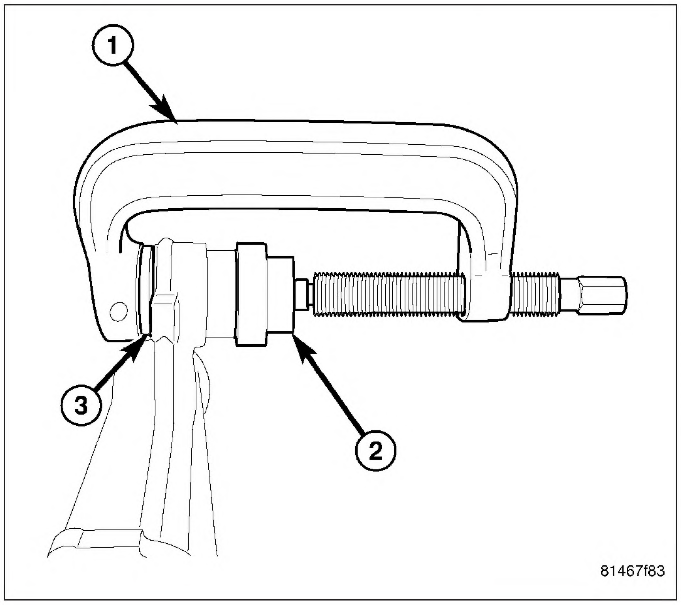


4. Remove axle tube bushing with Press C-4212F (1) Receiver 9536 (2) and Remover 9512 (3).

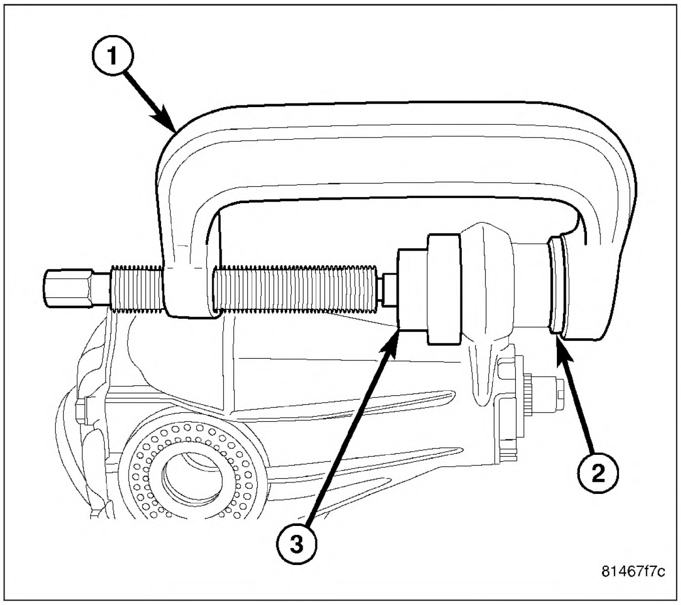


INSTALLATION

1. Install axle tube bushing with Press C-4212F (1), Installer 9511 (2) and Receiver 9536-2 (3).



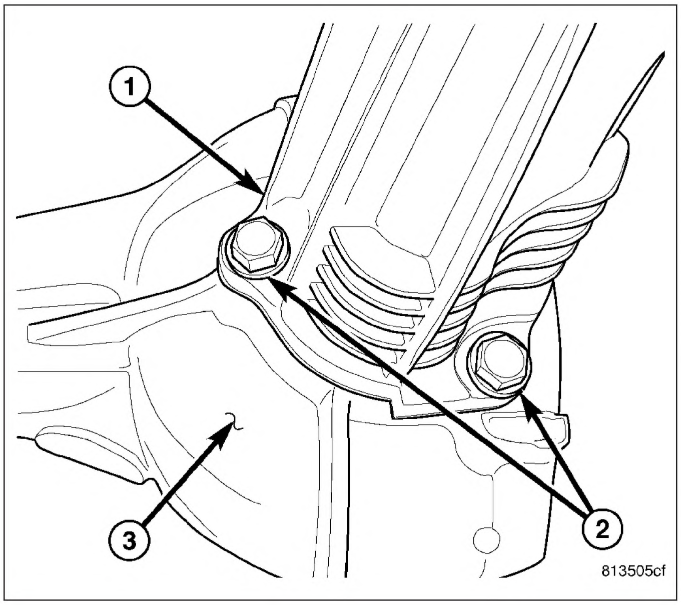
2. Install pinion nose bushing with Press C-4212F (1), Installer 9536-2 (2) and Receiver 9511(3).
3. Install new pinion seal, pinion flange and new pinion nut.



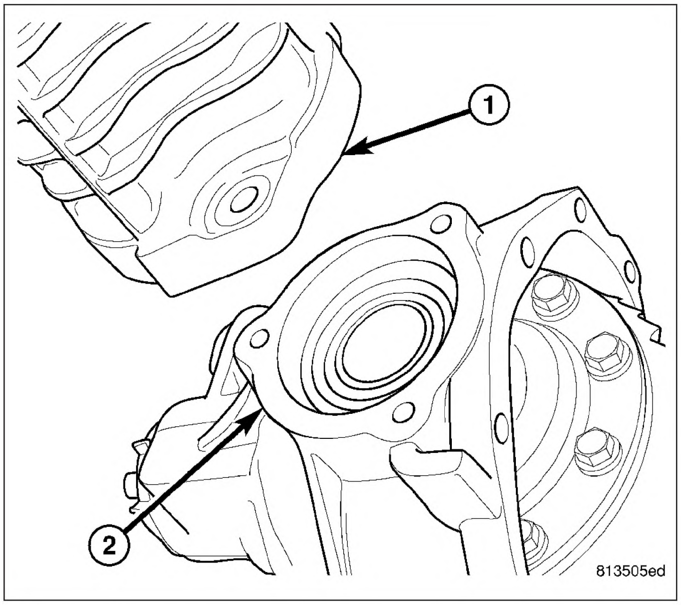
DIFFERENTIAL

REMOVAL

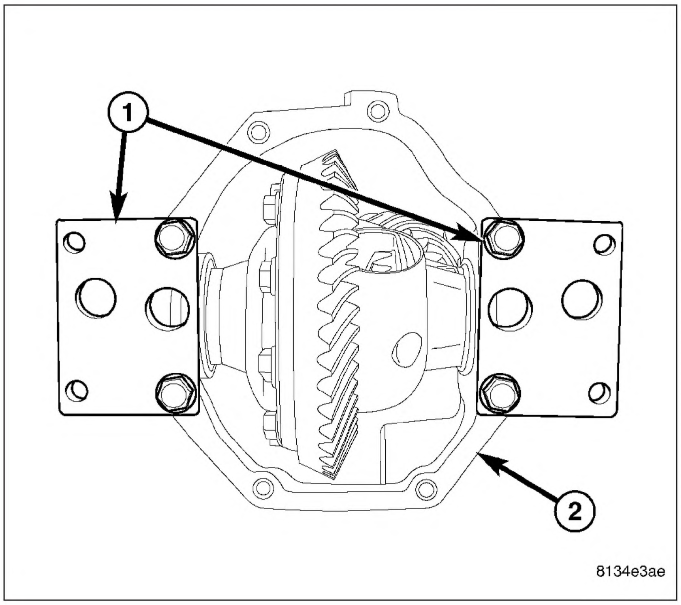
1. Remove half shafts and axle shaft.
2. Remove differential cover.
3. Remove three axle tube (1) mounting bolts (2) from differential housing (3).



4. Tap axle tube (1) and pull tube off differential housing flange (2).
5. Remove half shaft differential housing seal with seal pick.



6. Bolt spreader Adapters 9669 (1) to differential housing (2).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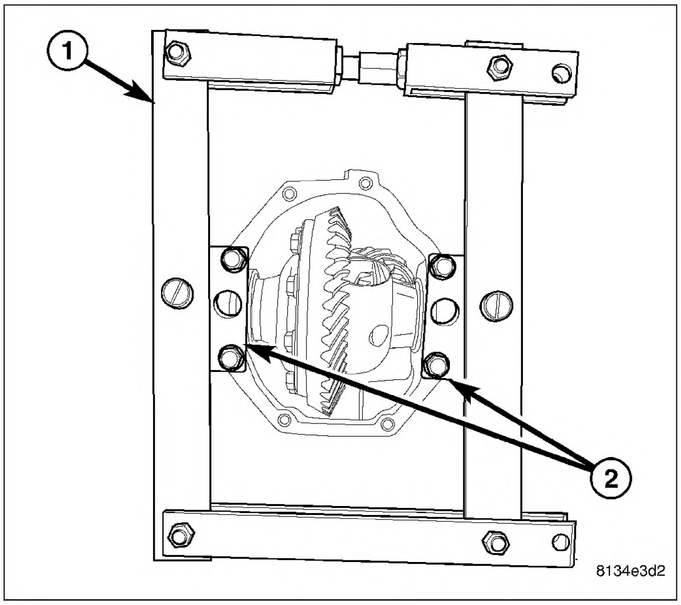
7. Install Spreader W-129-B (1) on adapters (2).
8. Spread case .3mm (0.011 in.).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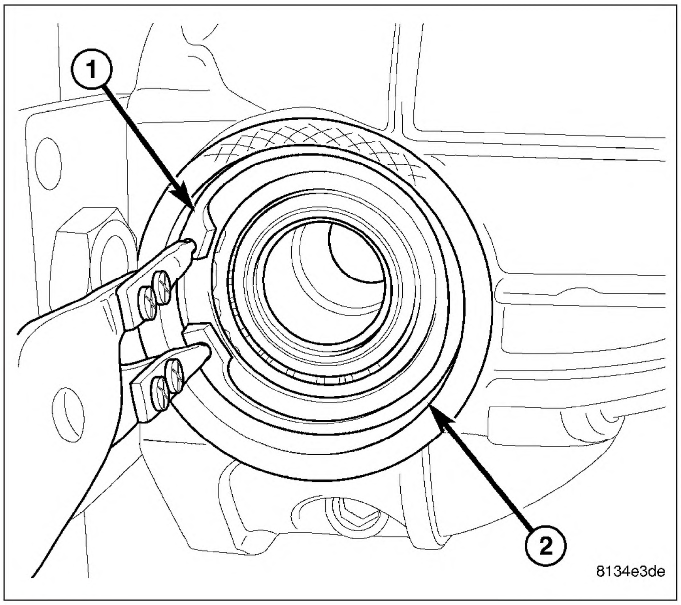
9. Remove select snap-rings (1) from differential housing bearing bores (2).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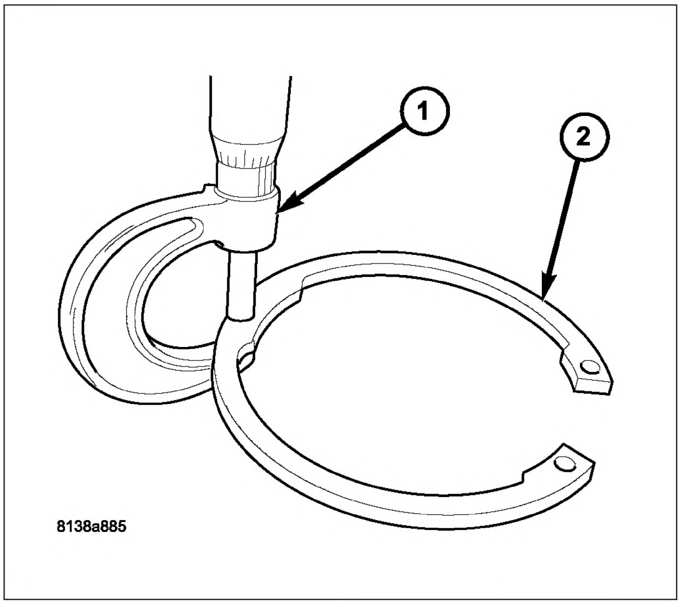
10. Measure select snap-rings (2) and mark the size and location of the snap-rings.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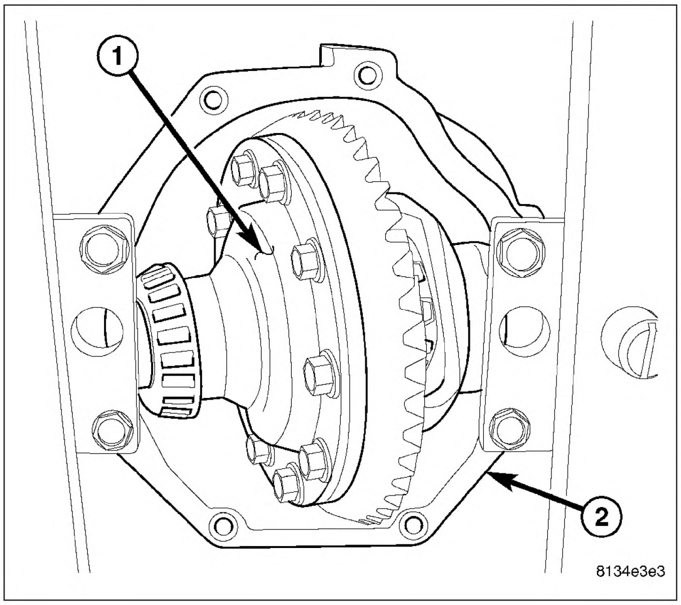
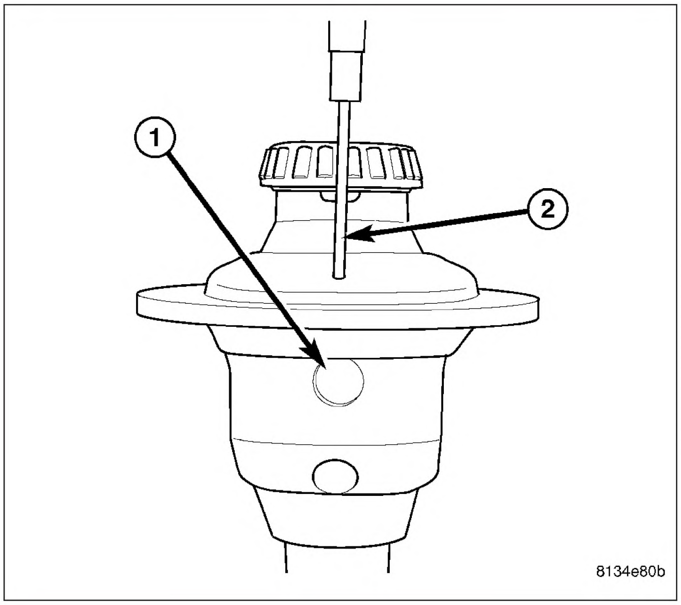
11. Tilt differential case (1) out of the housing (2) and remove case.
12. Loosen spreader.

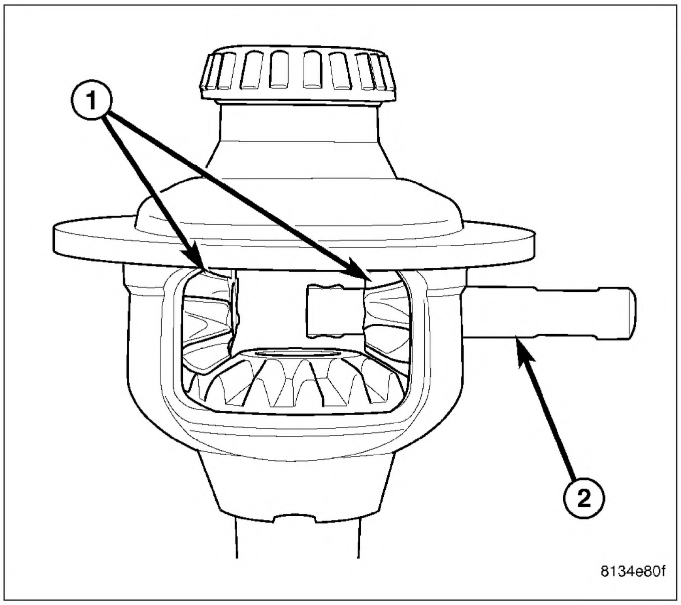


DISASSEMBLY

1. Remove **left hand thread** ring gear bolts.
2. Drive ring gear of the case with a soft hammer.
3. Remove pinion mate shaft (1) lock pin with a punch (2) and hammer.



4. Remove pinion gears (1) mate shaft (2) from the case.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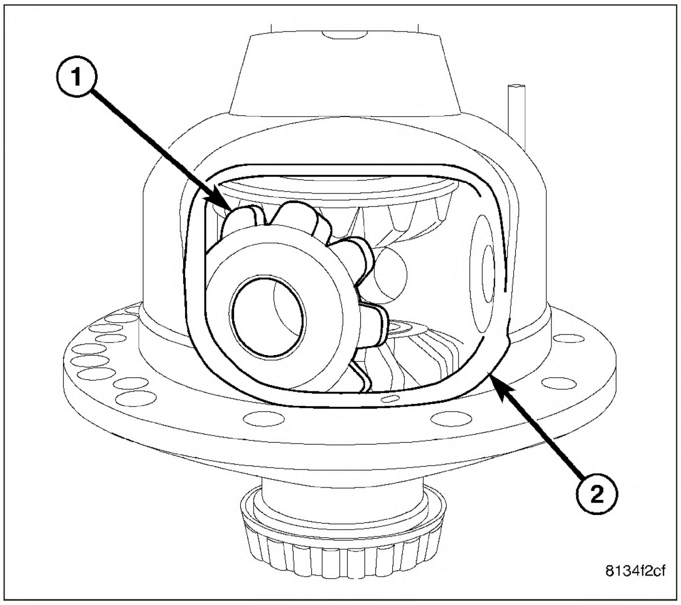
5. Rotate pinion gears (1) with washers to differential window (2) and remove gears through window.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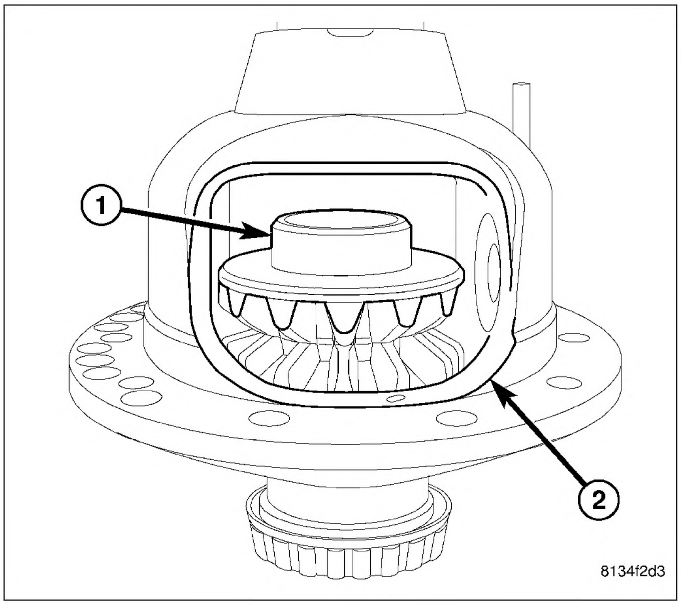
6. Remove upper side gear (1) throught differential window (2).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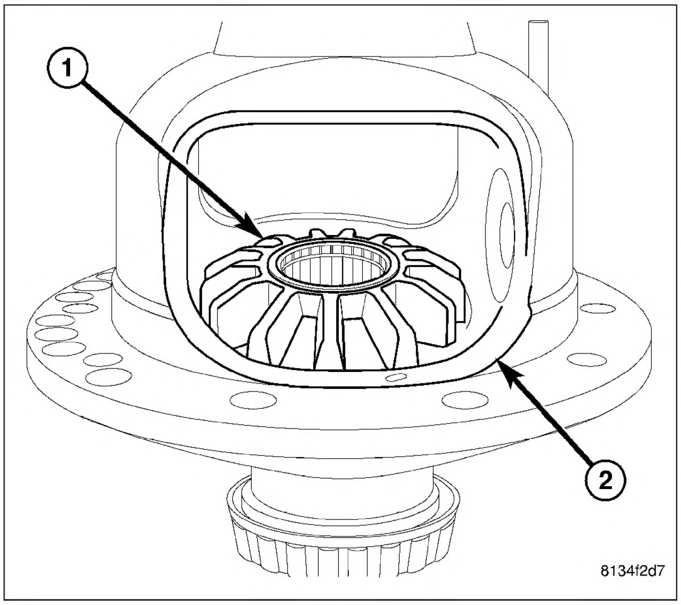
7. Remove lower side gear (1) throught differential window (2).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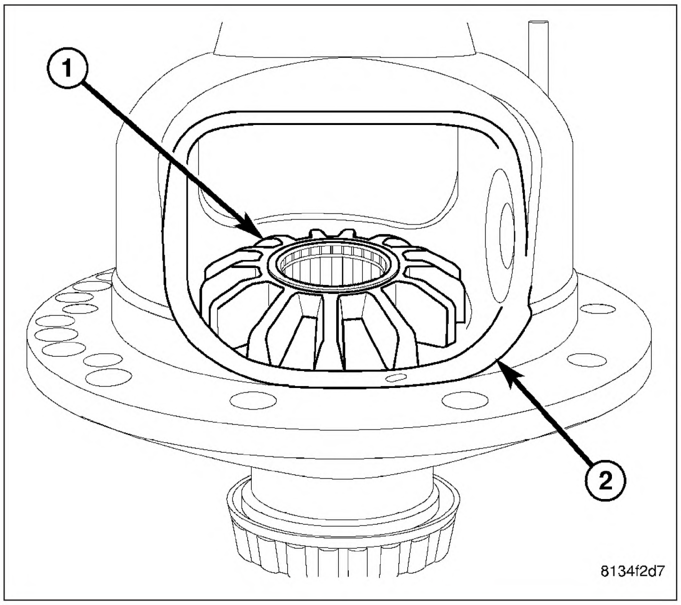
ASSEMBLY

1. Install lower side gear (1) through differential window (2).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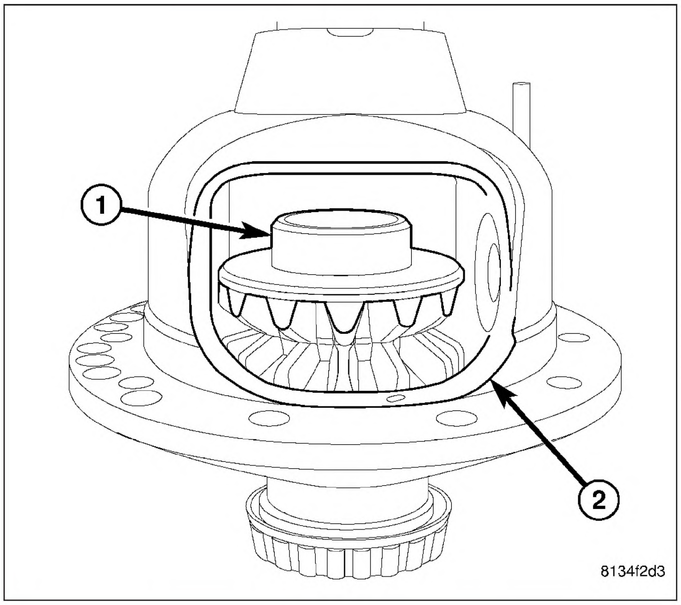
2. Install upper side gear (1) through differential window (2).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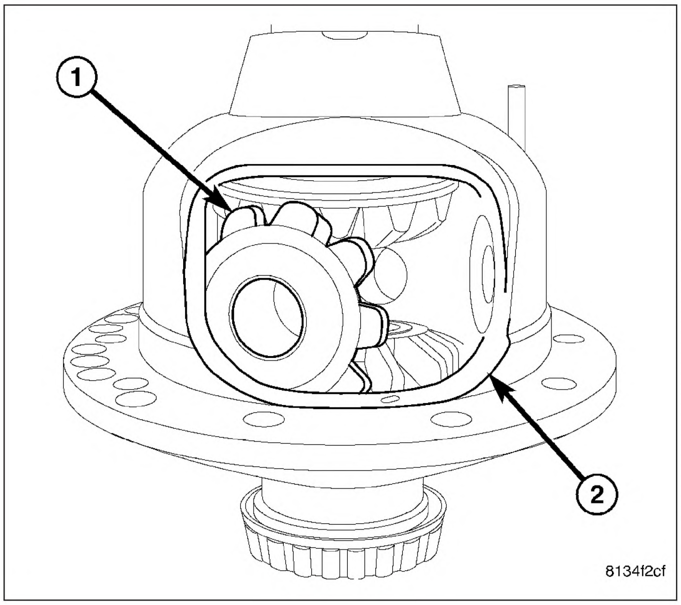
3. Install pinion gears (1) with washers into differential window (2) and rotate gears till aligned with pinion shaft hole.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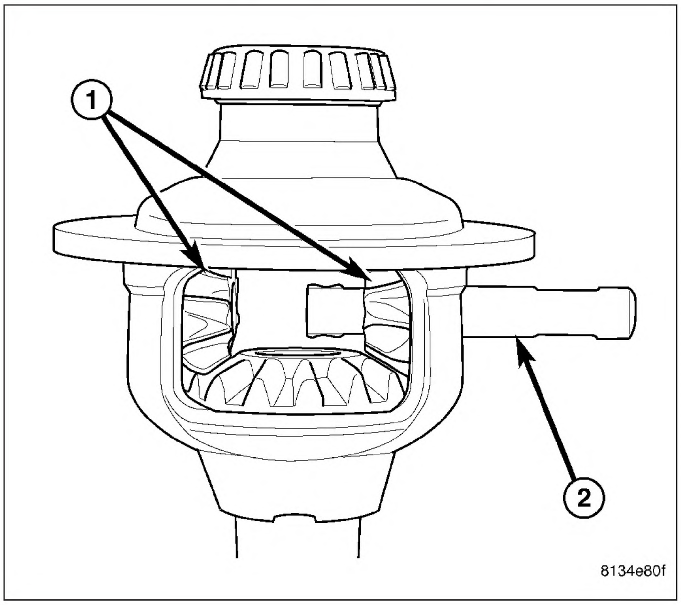
4. Install pinion gears (1) mate shaft (2) into the case.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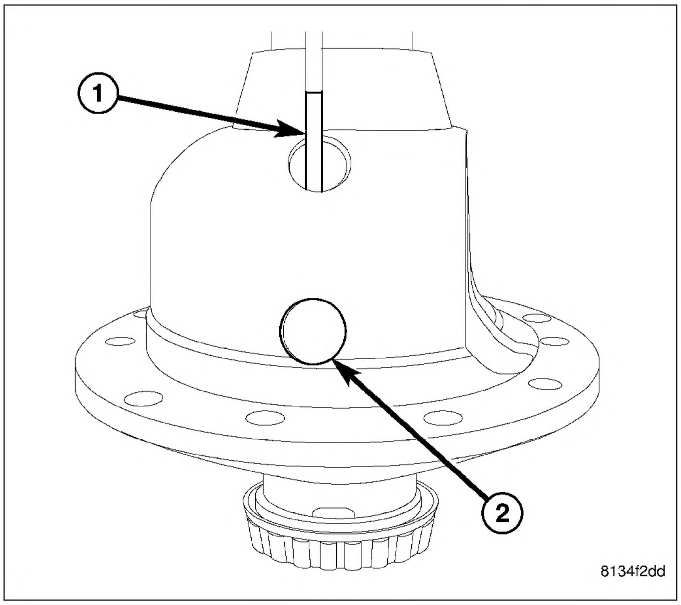
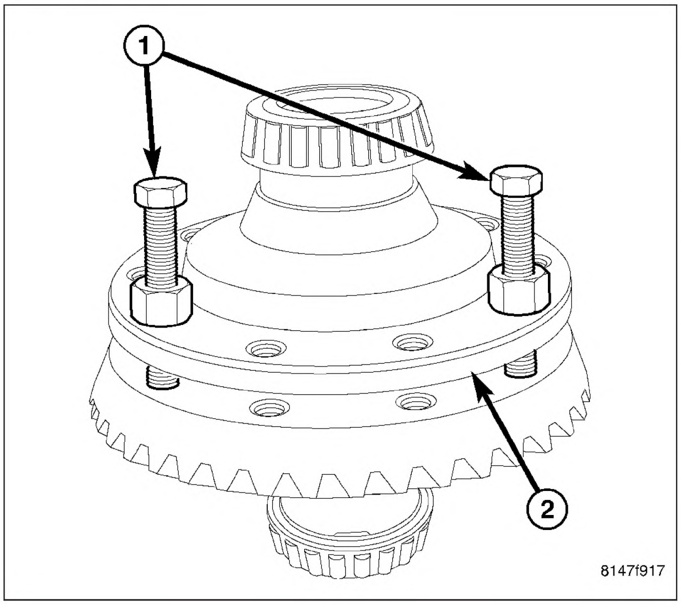
5. Install

6. Install pinion mate shaft lock pin (1) with a hammer and punch, into the differential case and mate shaft (2).

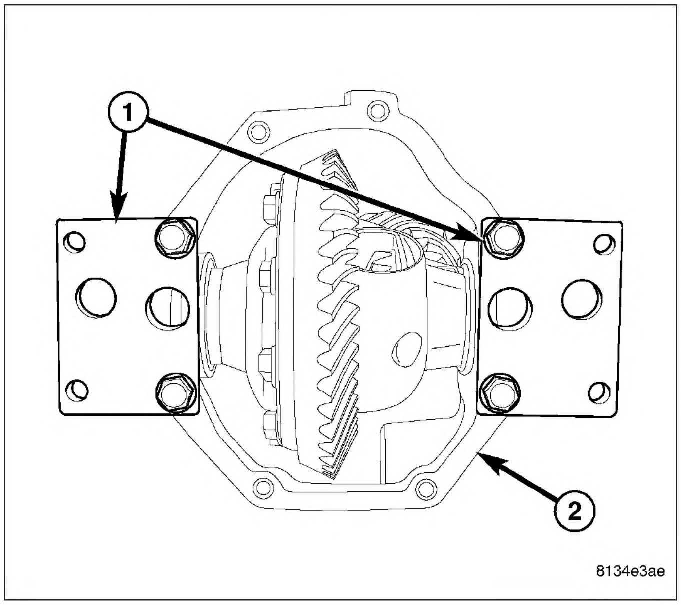


7. Install **left hand thread** ring gear Installer Bolts 9533 (1) through differential (2) and into ring gear (3). Tighten nuts on installer bolts evenly and draw ring gear onto differential case.
8. Remove installer bolts and install new **left hand thread** ring gear bolts and tighten to 102 N·m (75 ft. lbs.).



INSTALLATION

1. Bolt spreader Adapters 9226 (1) to differential housing (2).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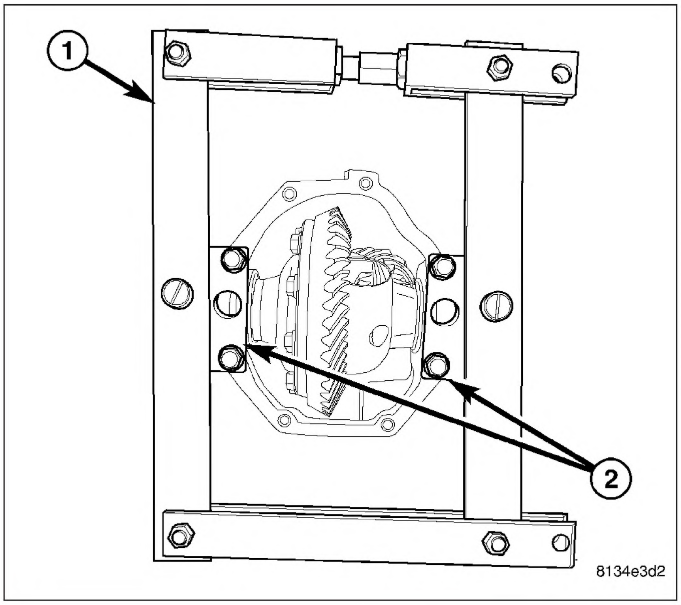
2. Install Spreader W-129-B (1) on adapters (2).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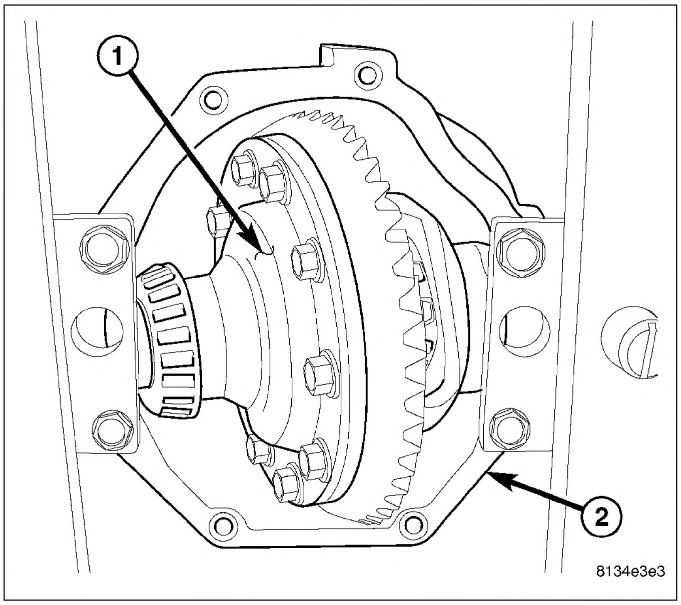
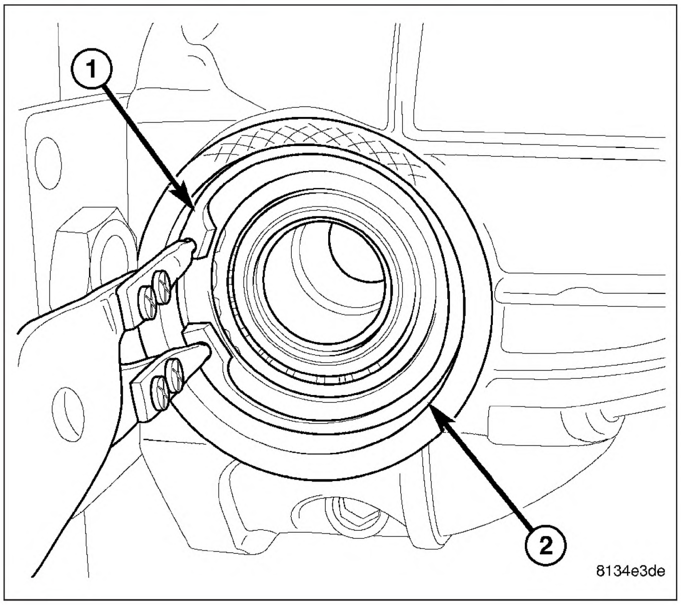
3. Tilt differential case (1) into the housing (2).
4. Install bearing cups into their original housing bores.

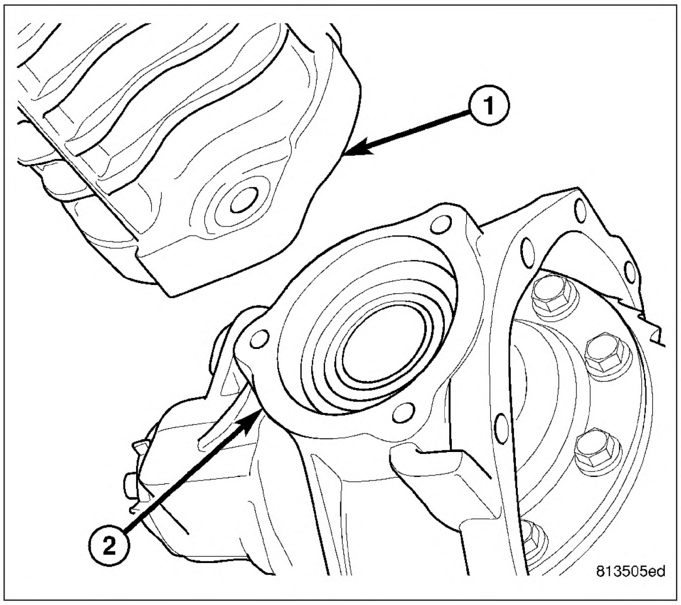


5. Install one differential select snap-ring (1) into it's original housing bore (2).
6. Spread the housing and install the other differential select snap-ring.
7. Loosen the spreader.



8. Lube new o-ring and install on axle tube (1).
9. Align axle tube (1) with differential housing flange (3) and push tube into place.

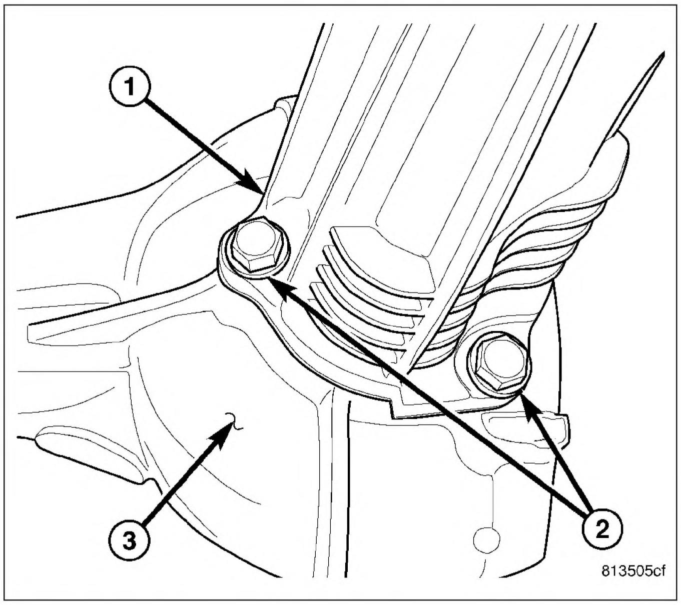
CAUTION: The tube must be perfectly aligned to the housing to prevent damage to the o-ring. Failure to follow these instructions will result in a leak.



10. Install axle tube (1) bolts (2) and tighten to 56 N·m (41 ft. lbs.).
11. Install half shaft seal with Installer 9504 and Handle C-4171.
12. Apply a 6.35 mm (1/4 in.) bead of Mopar® Gear Sealant RTV Silicone Rubber Adhesive MS-GF44D or equivalent to the differential case.

CAUTION: If housing cover is not installed within 3 to 5 minutes, the differential case must be cleaned and new RTV applied. Failure to follow these instructions will result in a leak.

13. Install cover and tighten cover bolts in a criss-cross pattern to 56 N·m (41 ft. lbs.).



SEAL-DIFFERENTIAL

REMOVAL

1. Remove half shaft from axle.
2. Pry seal out with a seal pick.

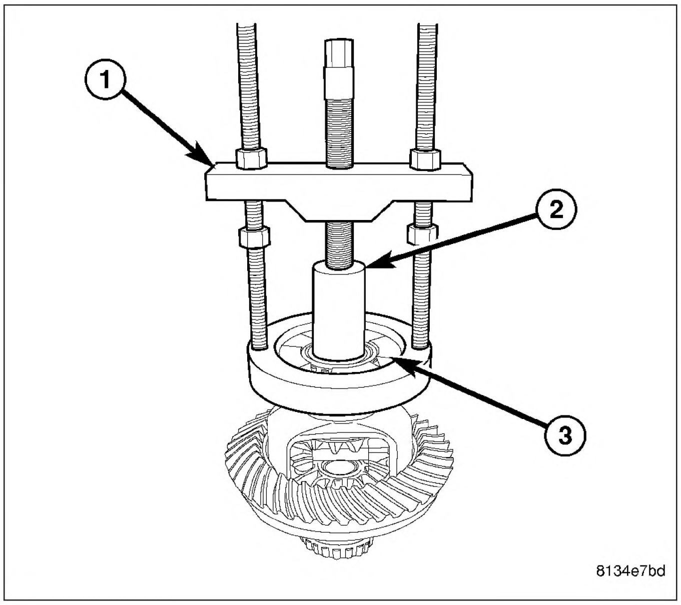
INSTALLATION

1. Install differential seal with Install 9504 and Handle C-4171.
2. Install half shaft.

DIFFERENTIAL CASE BEARINGS

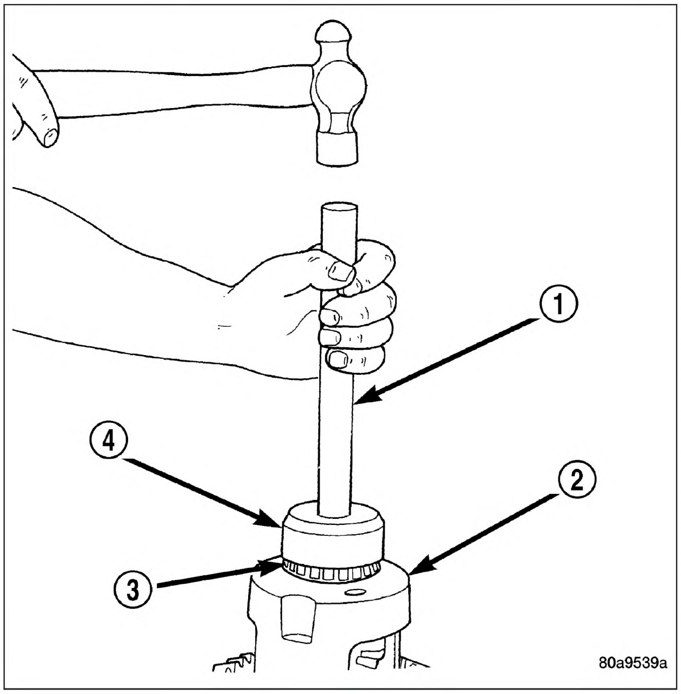
REMOVAL

1. Remove differential from housing.
2. Remove differential bearings with Puller C-293-PA (1), Plug C-293-3 (2) and four Adapters C-293-48 (3).



INSTALLATION

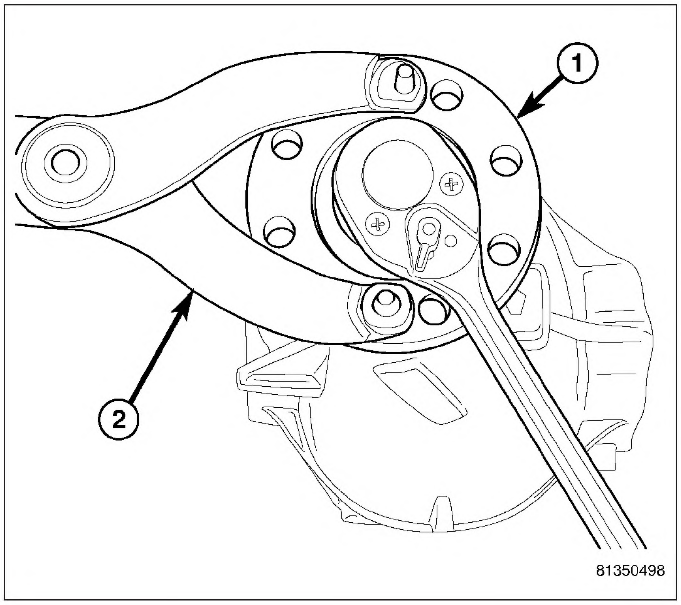
1. Install differential case (2) bearings (3) with Installer 9535 (4) and Handle C-4171(1).
2. Install differential into the housing.



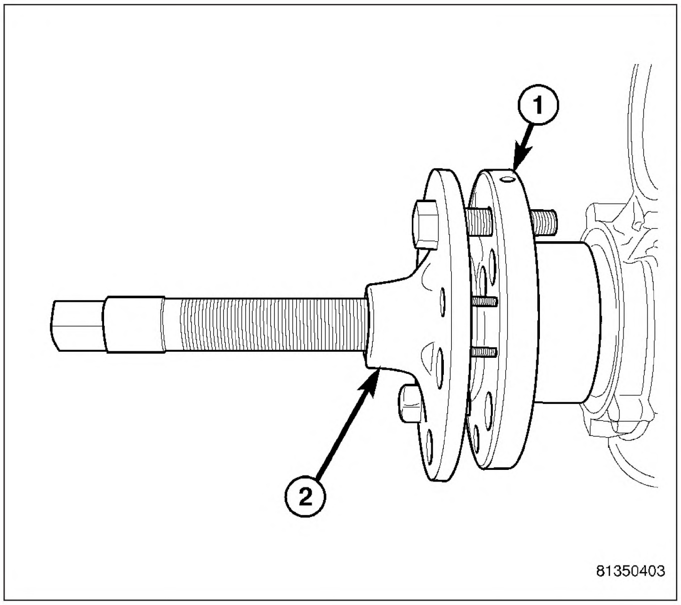
PINION GEAR/RING GEAR/TONE RING

REMOVAL

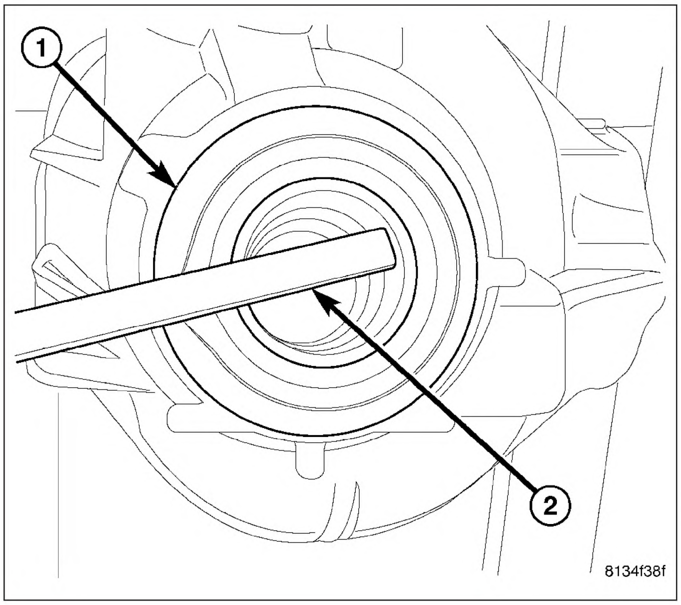
1. Remove differetial from housing.
2. Bend pinion nut lock tab back.
3. Remove pinion flange (1) nut with flange Holder C-328 (2).



4. Remove pinion flange (1) with Puller C-452 (2).



5. Drive pinion gear out of the housing with a soft hammer.
6. Remove pinion seal (1) with a pry bar (2).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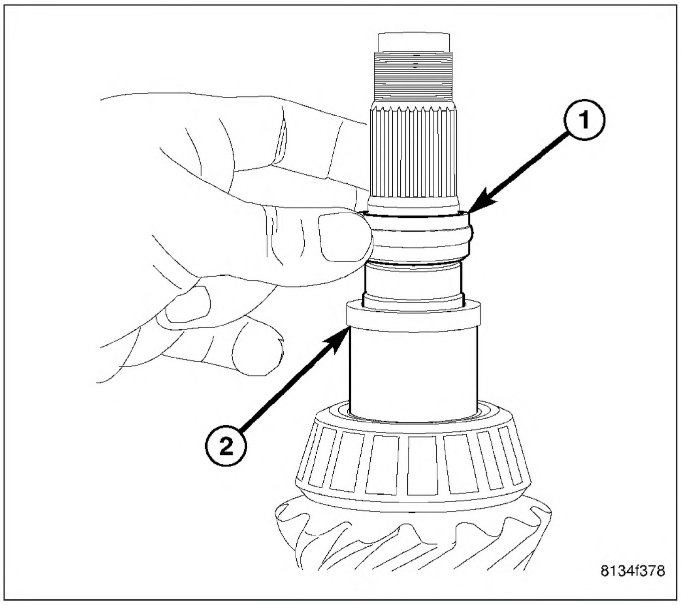
8134f38f

7. Remove collapsible spacer (1) from pinion shaft (2).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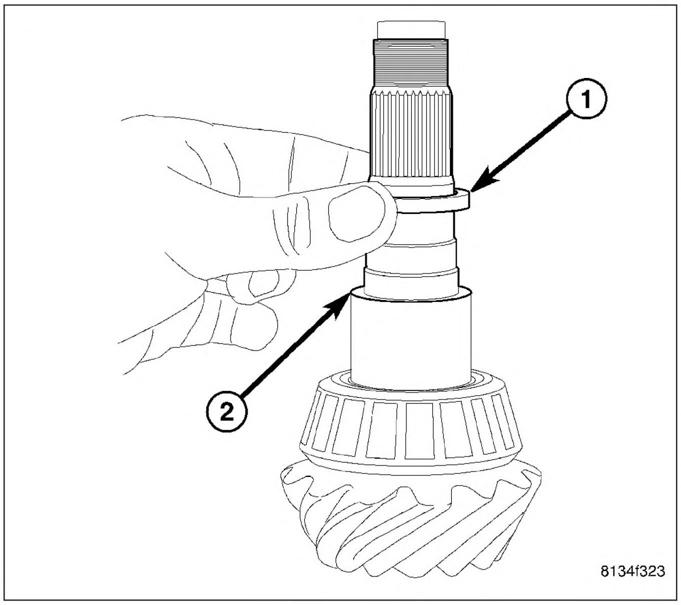
8. Remove spacer (1) from pinion shaft (2).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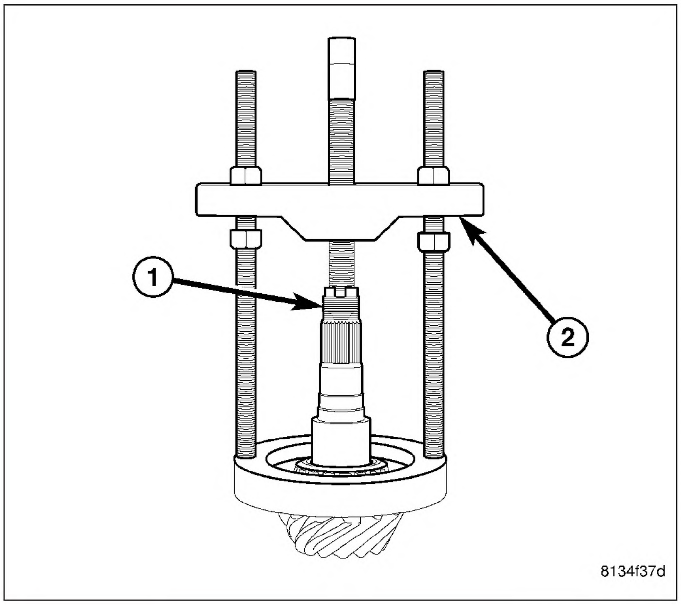
8134f323

9. Remove rear pinion bearing from pinion shaft (1) with Puller C-293-PA (2) and four Adapters C-293-37.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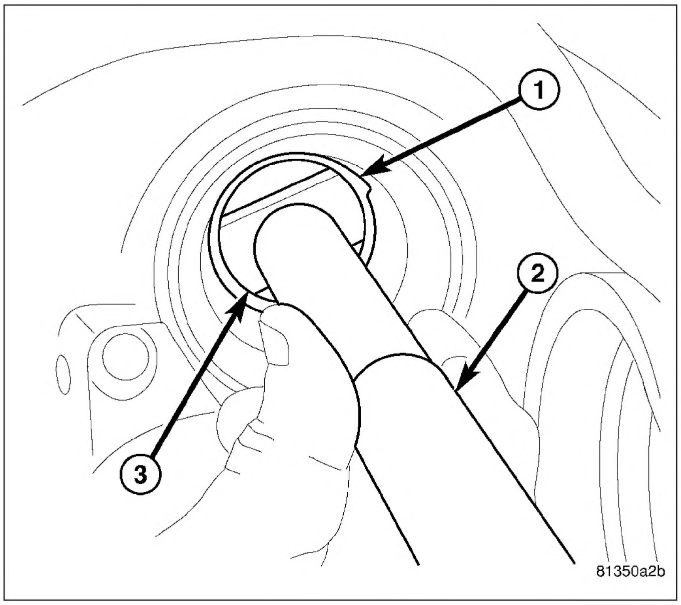
10. Remove front pinion bearing cup (1) with Handle C-4171 (2) and Remover D-103 (3).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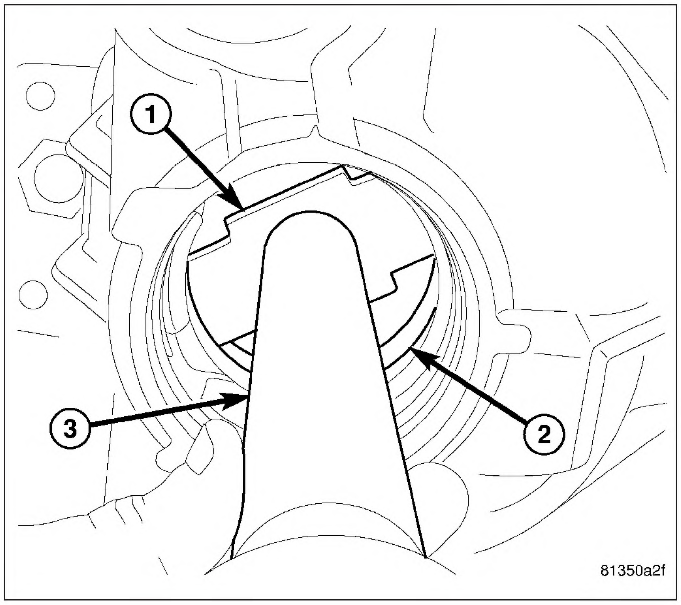
11. Remove rear pinion bearing cup (1) with Remover 9884 (2) and Handle C-4171.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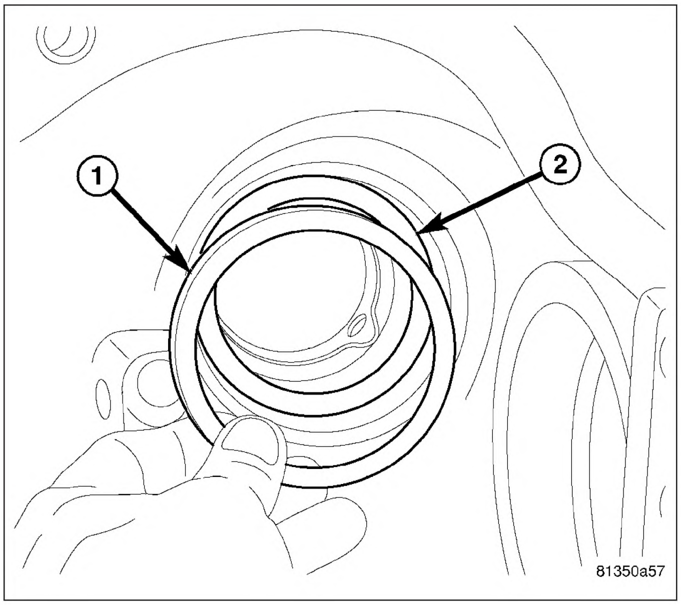
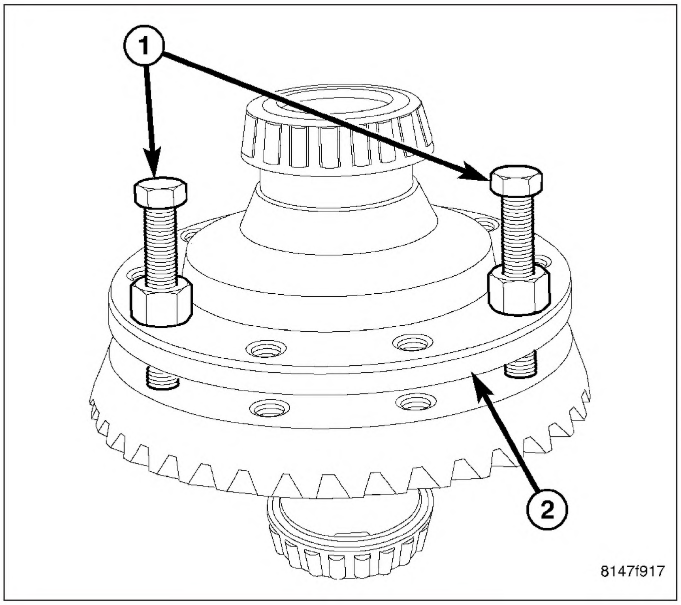
12. Remove pinion height select shim (1) from rear pinion bearing cup bore (2).

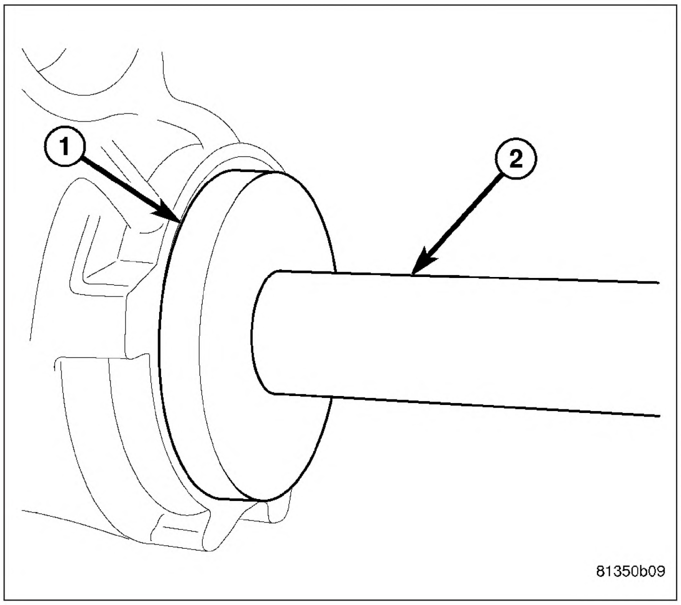


INSTALLATION

1. Install **left hand thread** ring gear Installer Bolts 9533 (1) through differential (2) and into ring gear (3). Tighten nuts on installer bolts evenly and draw ring gear onto differential case.
2. Remove installer bolts and install new **left hand thread** ring gear bolts and tighten to 102 N·m (75 ft. lbs.).



3. Install front pinion bearing cup into housing, with Installer D-129 (1) and Handle C-4171 (2).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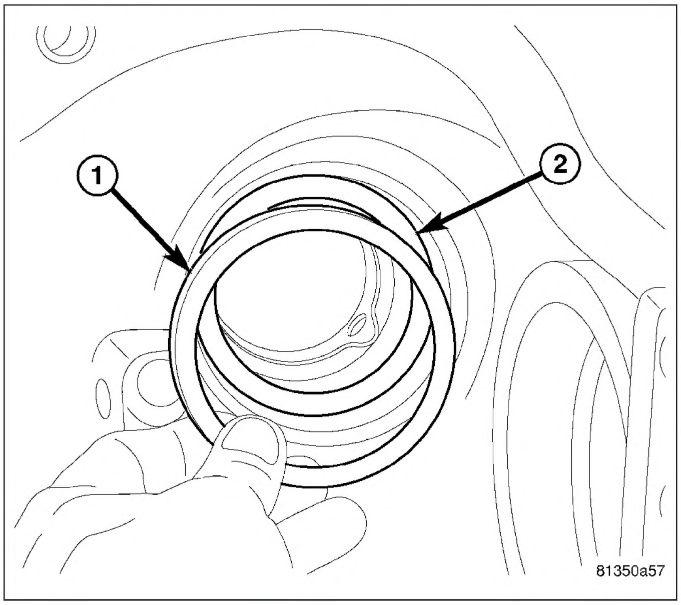
4. Install pinion depth shim (1) in rear pinion bearing cup bore (2).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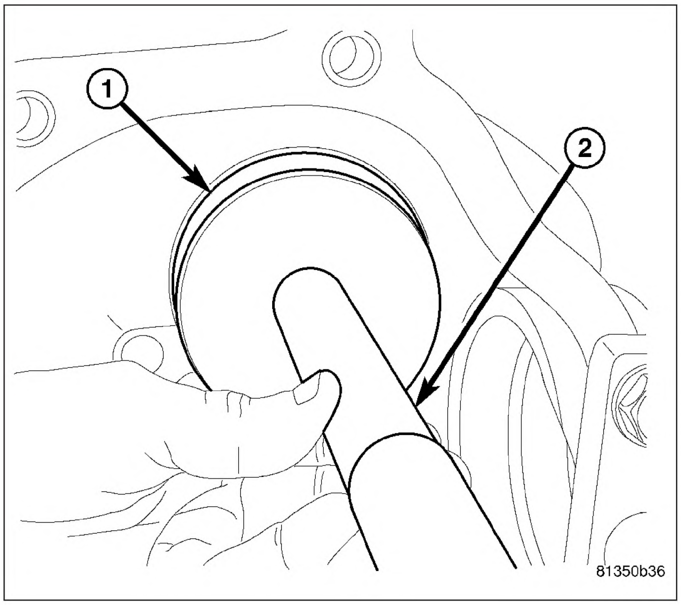
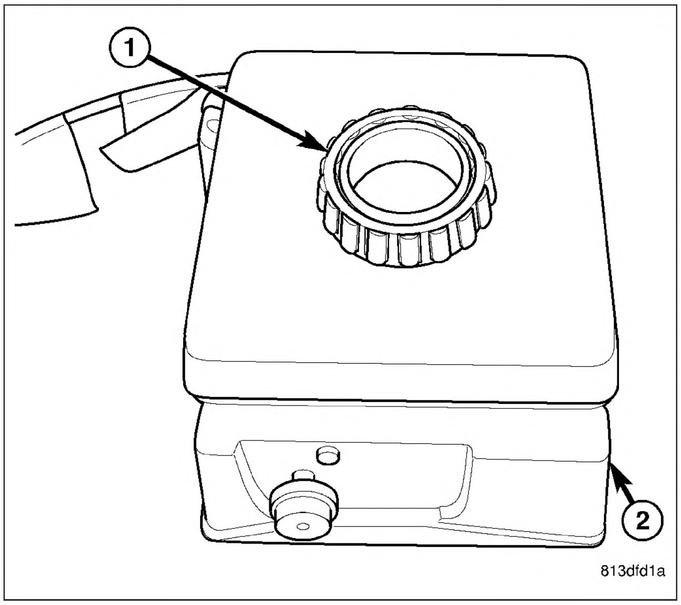
5. Install rear pinion bearing cup into housing, with Installer D-111 (1) and Handle C-4171 (2).



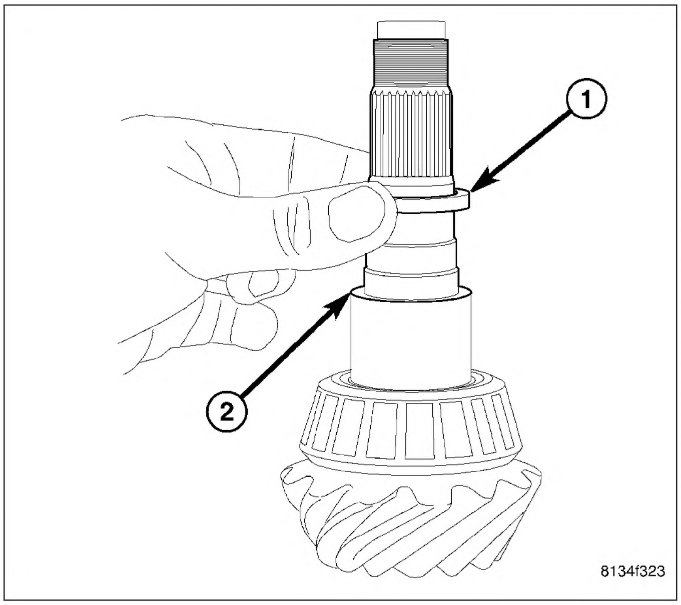
WARNING: Use welding gloves when handling heated components.

CAUTION: A bearing heater is used to assembly some components. Use only an approved heater and only heat components to 100 - 177 Celsius (212 - 350 ° Fahrenheit). Never leave components on heater for and extended amount of time. If component is discolored after heating, component has been overheated and must not be used. Failure to follow these instructions will result in damage.

6. Heat rear pinion bearing (1) with bearing heater (2).
7. Using welding gloves, install rear bearing on pinion shaft.



8. Install spacer (1) from pinion shaft (2) with the beveled side facing the gear.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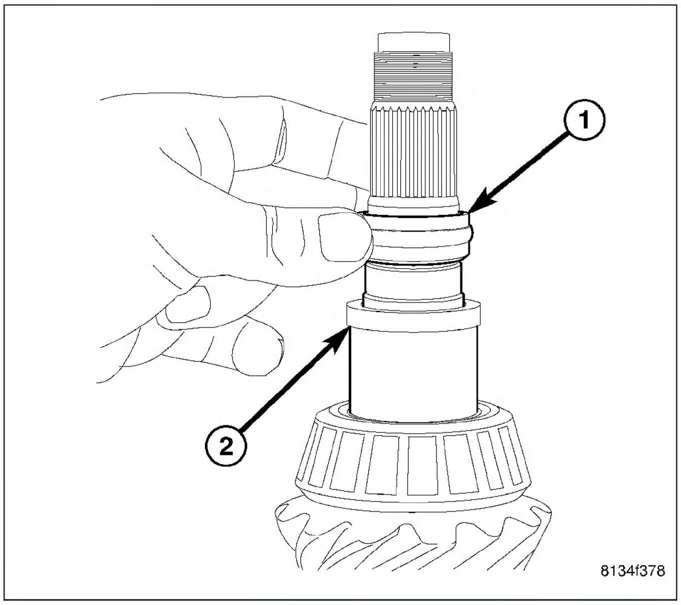
9. Install collapsible spacer (1) from pinion shaft (2).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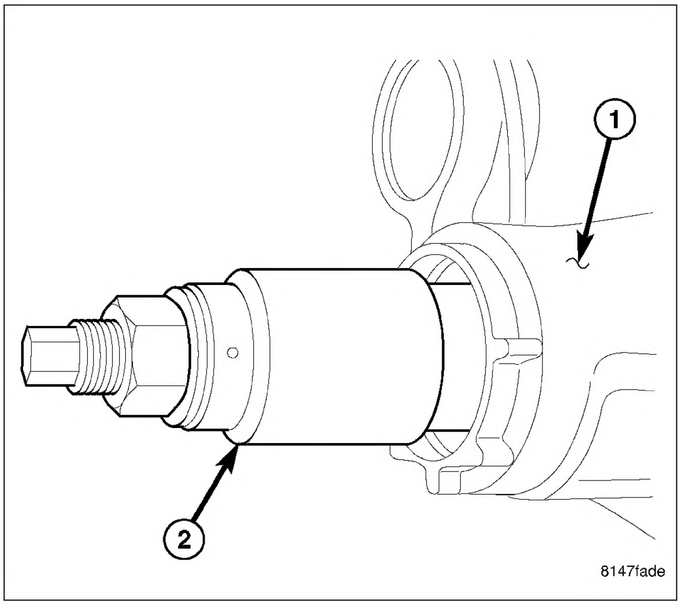
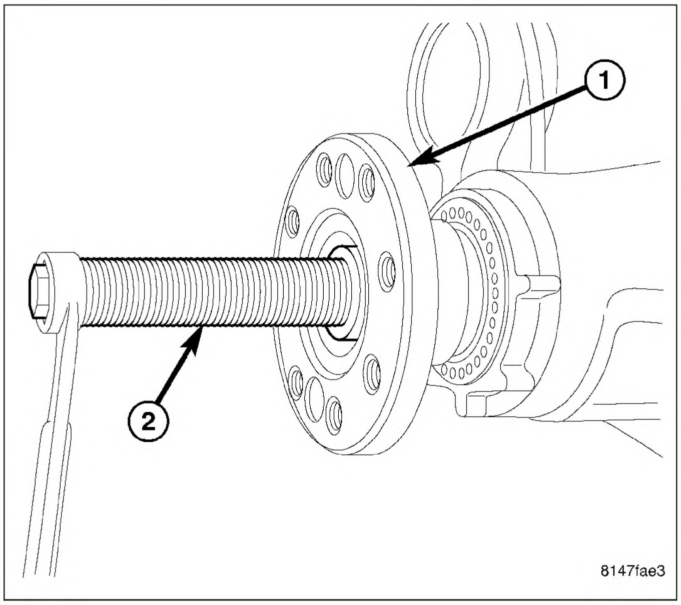
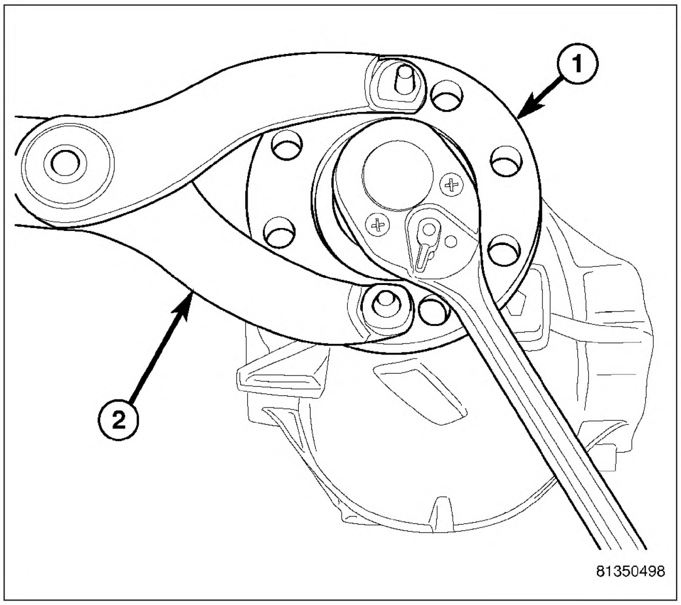
10. Install pinion in housing.
11. Install front pinion bearing into the housing (1) on the pinion shaft with Installer 9616 (2). Thread installer onto the pinion shaft then tighten installer nut.



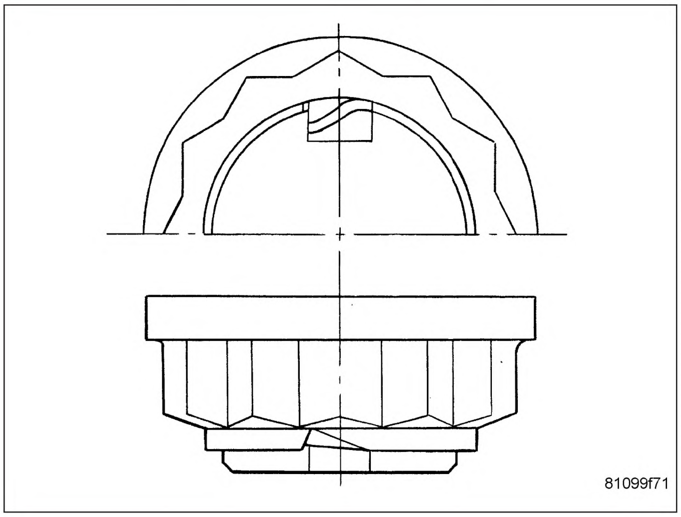
12. Install pinion seal with Installer 9514.
13. Install pinion flange (1) on pinion with Installer 9616 (2). Tap flange on pinion, then thread installer center bolt on pinion shaft and draw flange onto the pinion.



14. Hold pinion flange (1) with Flange Wrench C-3281 (2) and tighten pinion nut until torque to rotate is 1.5 to 1.9 N·m (13 to 17 in. lbs.).



15. Cut the pinion nut collar.
16. Bend nut collar so it touches the wall of the slot in the pinion shaft.
17. Install differential.



FRONT AXLE - C200FE

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FRONT AXLE - C200FE

DIAGNOSIS AND TESTING

FRONT AXLE - C200FE

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, tooth contact, worn/damaged gears or the carrier housing not having the proper offset and squareness.

Gear noise usually happens at a specific speed range. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the peak-noise range. If the noise stops or changes greatly:

- Check for insufficient lubricant.
- Incorrect ring gear backlash.
- Gear damage.

Differential side gears and pinions can be checked by turning the vehicle. They usually do not cause noise during straight-ahead driving when the gears are unloaded. The side gears are loaded during vehicle turns. A worn pinion mate shaft can also cause a snapping or a knocking noise.

BEARING NOISE

The axle shaft, differential and pinion bearings can all produce noise when worn or damaged. Bearing noise can be either a whining, or a growling sound.

Pinion bearings have a constant-pitch noise. This noise changes only with vehicle speed. Pinion bearing noise will be higher pitched because it rotates at a faster rate. Drive the vehicle and load the differential. If bearing noise occurs, the rear pinion bearing is the source of the noise. If the bearing noise is heard during a coast, the front pinion bearing is the source.

Differential bearings usually produce a low pitch noise. Differential bearing noise is similar to pinion bearing noise. The pitch of differential bearing noise is also constant and varies only with vehicle speed.

Axle shaft bearings produce noise and vibration when worn or damaged. The noise generally changes when the bearings are loaded. Road test the vehicle. Turn the vehicle sharply to the left and to the right. This will load the bearings and change the noise level. Where axle bearing damage is slight, the noise is usually not noticeable at speeds above 30 mph.

LOW SPEED KNOCK

Low speed knock is generally caused by a worn U-joint or by worn side-gear thrust washers. A worn pinion shaft bore will also cause low speed knock.

VIBRATION

Vibration at the rear of the vehicle is usually caused by:

- Damaged drive shaft.
- Missing drive shaft balance weight(s).
- Worn or out of balance wheels.
- Loose wheel lug nuts.
- Worn U-joints or C/V joints.
- Loose/broken springs.
- Damaged axle shaft bearing(s).
- Loose pinion gear nut.
- Excessive pinion yoke run out.
- Bent axle shaft(s).

Check for loose or damaged front end components or engine/transmission mounts. These components can contribute to what appears to be a rear end vibration. Do not overlook engine accessories, brackets and drive belts.

DRIVELINE SNAP

A snap or clunk noise when the vehicle is shifted into gear (or the clutch engaged) can be caused by:

- High engine idle speed.
- Transmission shift operation.
- Loose engine/transmission/transfer case mounts.
- Worn U-joints or C/V joints.
- Loose spring mounts.
- Loose pinion gear nut and yoke.
- Excessive ring gear backlash.
- Excessive side gear to case clearance.

The source of a snap or a clunk noise can be determined with the assistance of a helper. Raise the vehicle on a hoist with the wheels free to rotate. Instruct the helper to shift the transmission into gear. Listen for the noise, a mechanics stethoscope is helpful in isolating the source of a noise.

DIAGNOSTIC CHART

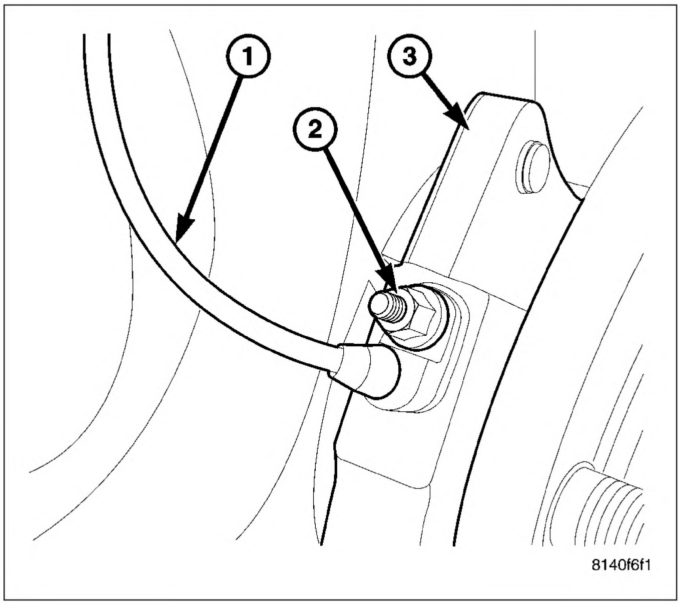
Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose.	1. Tighten loose nuts.
	2. Faulty, brinelled wheel bearing.	2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube.	1. Inspect axle tube alignment. Correct as necessary.
	2. Bent or sprung axle shaft.	2. Inspect and correct as necessary.
	3. End-play in pinion bearings.	3. Refer to pinion pre-load information and correct as necessary.
	4. Excessive gear backlash between the ring gear and pinion.	4. Check adjustment of the ring gear and pinion backlash. Correct as necessary.
	5. Improper adjustment of pinion gear bearings.	5. Adjust the pinion bearings pre-load.
	6. Loose pinion yoke nut.	6. Tighten the pinion yoke nut.
	7. Scuffed gear tooth contact surfaces.	7. Inspect and replace as necessary.
Axle Shaft Broke	1. Misaligned axle tube.	1. Replace the broken shaft after correcting tube mis-alignment.
	2 Vehicle overloaded.	2. Replace broken shaft and avoid excessive weight on vehicle.
	3. Erratic clutch operation.	3. Replace broken shaft and avoid or correct erratic clutch operation.
	4. Grabbing clutch.	4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly.
	2. Excessive ring gear backlash.	2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly.
	3. Vehicle overloaded.	3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight.
	4. Erratic clutch operation.	4. Replace case and inspect gears and bearings for further damage. Avoid erratic use of clutch.

Condition	Possible Causes	Correction
Differential Gears Scored	1. Insufficient lubrication.	1. Replace scored gears. Fill differential with the correct fluid type and quantity.
	2. Improper grade of lubricant.	2. Replace scored gears. Fill differential with the correct fluid type and quantity.
	3. Excessive spinning of one wheel/tire.	3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.
Loss Of Lubricant	1. Lubricant level too high.	1. Drain lubricant to the correct level.
	2. Worn axle shaft seals.	2. Replace seals.
	3. Cracked differential housing.	3. Repair as necessary.
	4. Worn pinion seal.	4. Replace seal.
	5. Worn/scored yoke.	5. Replace yoke and seal.
	6. Axle cover not properly sealed.	6. Remove, clean, and re-seal cover.
Axle Overheating	1. Lubricant level low.	1. Fill differential to correct level.
	2. Improper grade of lubricant.	2. Fill differential with the correct fluid type and quantity.
	3. Bearing pre-loads too high.	3. Re-adjust bearing pre-loads.
	4. Insufficient ring gear backlash.	4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading.	1. Replace gears. Examine other gears and bearings for possible damage.
	2. Erratic clutch operation.	2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation.
	3. Ice-spotted pavement.	3. Replace gears and examine remaining parts for damage.
	4. Improper adjustments.	4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.

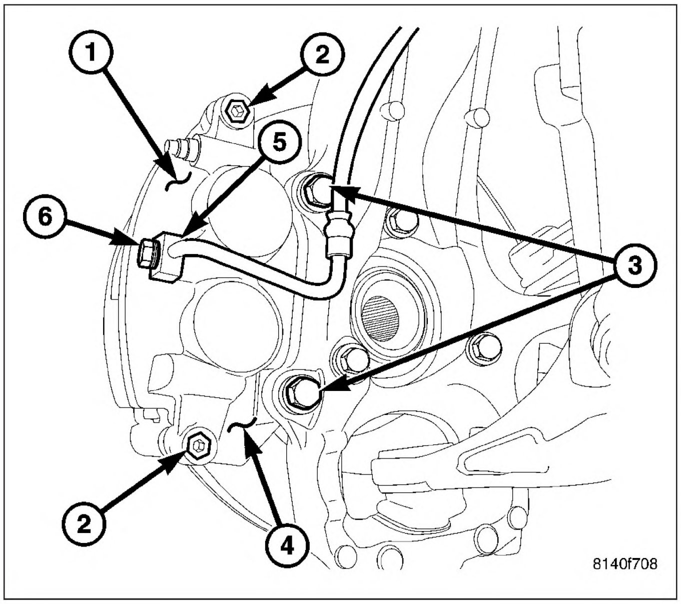
Condition	Possible Causes	Correction
Axle Noise	1. Insufficient lubricant.	1. Fill differential with the correct fluid type and quantity.
	2. Improper ring gear and pinion adjustment.	2. Check ring gear and pinion contact pattern.
	3. Unmatched ring gear and pinion.	3. Replace gears with a matched ring gear and pinion.
	4. Worn teeth on ring gear and/or pinion.	4. Replace ring gear and pinion.
	5. Loose pinion bearings.	5. Adjust pinion bearing pre-load.
	6. Loose differential bearings.	6. Adjust differential bearing pre-load.
	7. Mis-aligned or sprung ring gear.	7. Measure ring gear run-out. Replace components as necessary.
	8. Loose differential bearing cap bolts.	8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued tot he proper specification.
	9. Housing not machined properly.	9. Replace housing.

REMOVAL

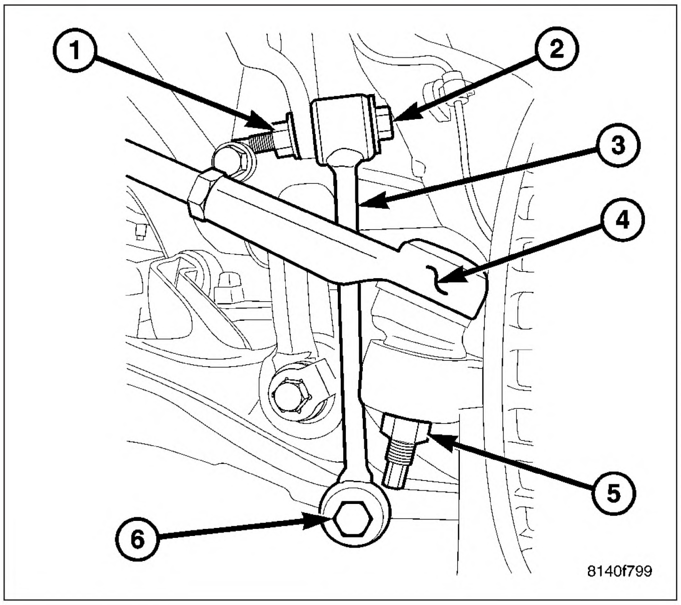
1. With vehicle in neutral, position vehicle on hoist.
2. Remove skid plate.
3. Remove differential housing drain plug and drain fluid.
4. Mark front propeller shaft and pinion flange. Remove propeller shaft from pinion flange.
5. Remove half shaft hub/bearing nuts.
6. Remove wheel speed sensors (1) from hub/bearings (3).



7. Remove brake calipers bolts (2) and remove calipers (1) from caliper adapters (4).



8. Remove stabilizer links (3) bolts (6) from lower control arms.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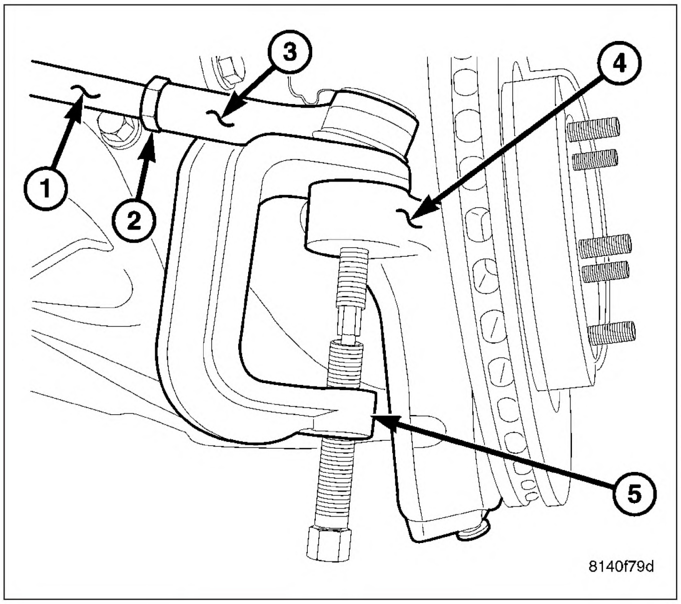
9. Remove outer tie rod end nuts and separate tie rods (3) from knuckles (4) with Remover 8677 (5).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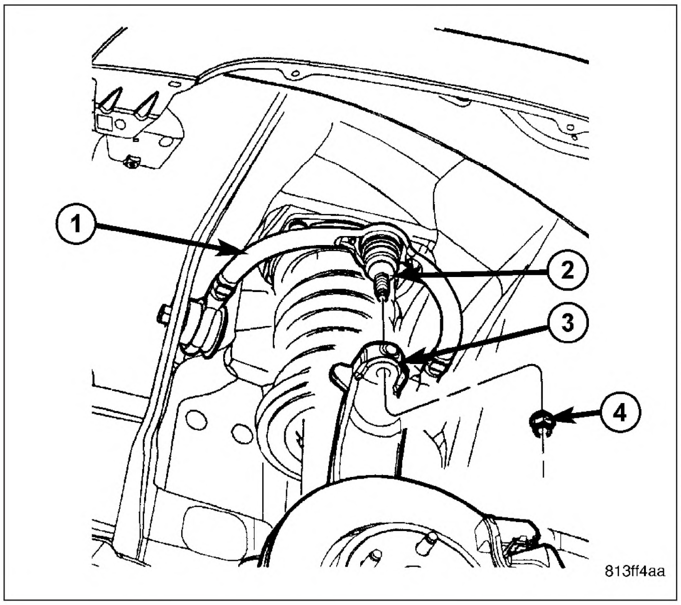
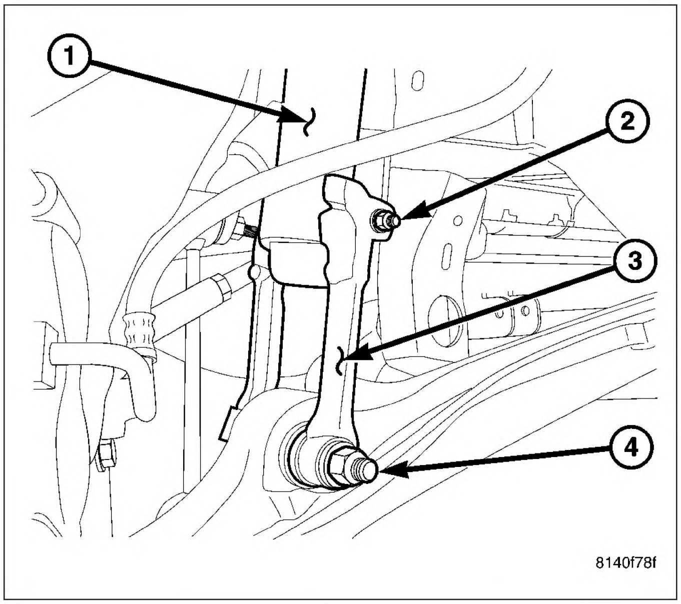
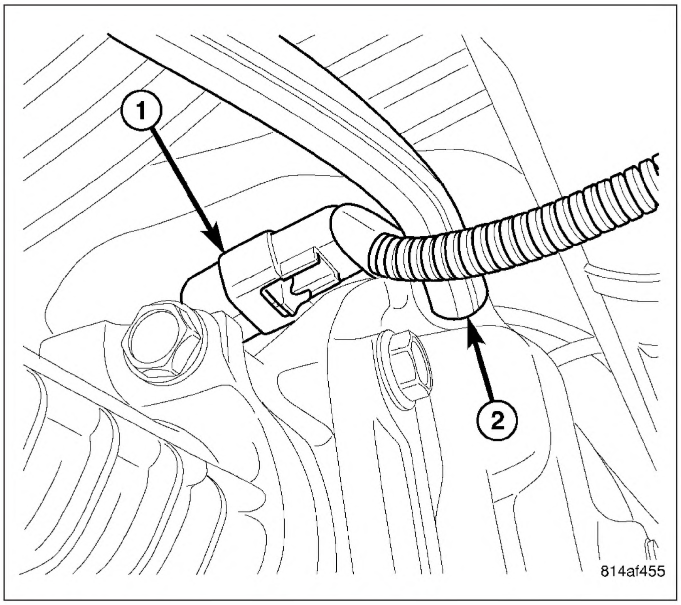
10. Remove upper ball joint nuts (4) and separate ball joints (2) from knuckles (3) with Remover 8677.



11. Remove lower shock clevis (3) nuts bolts (2) from lower control arm.
12. Lean the knuckles out and push half shafts out of the hub/bearings.
13. Pry half shafts off the axles.



14. Remove ELSD connector (1) from axle.
15. Remove differential vent hose (2).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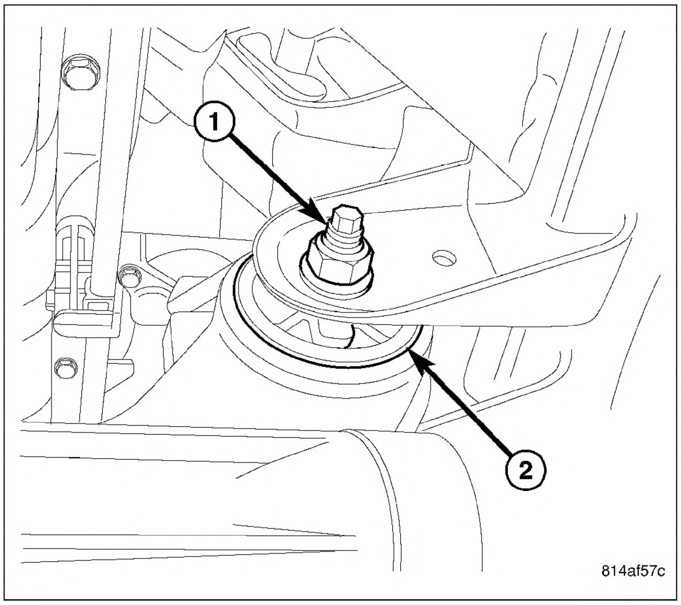
16. Remove bolt (1) from axle tube bushing (2).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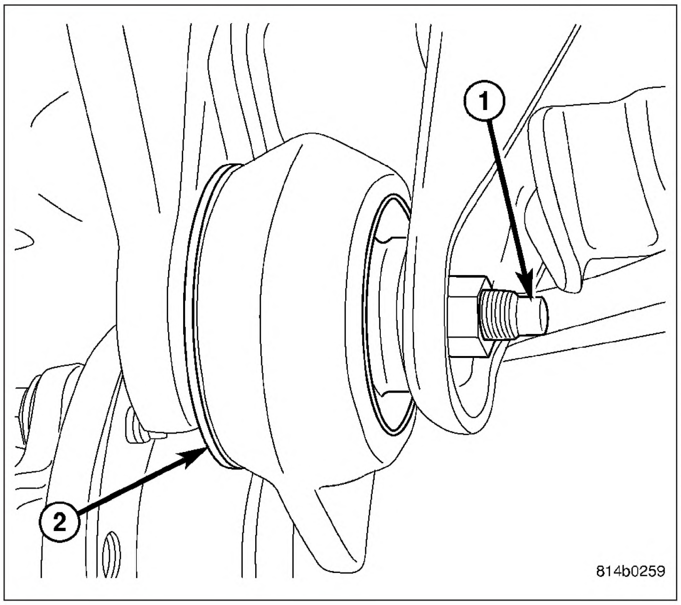
17. Remove bolt (1) from pinion nose bushing (2).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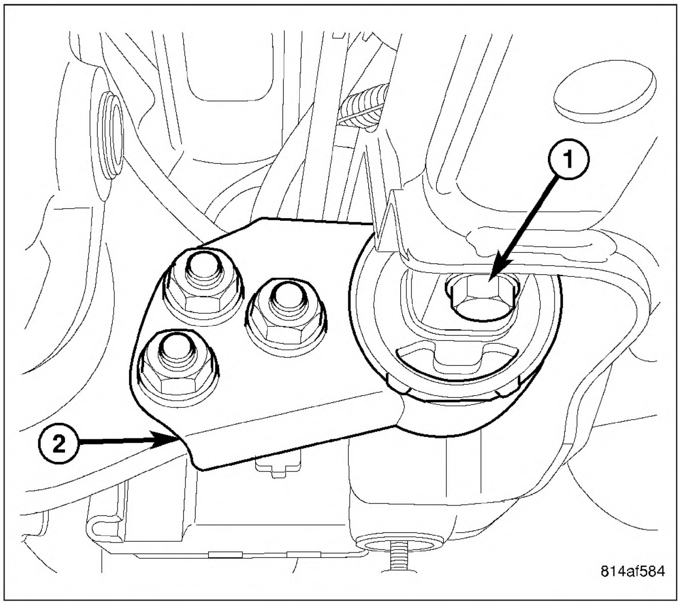
18. Support axle with a lift/jack.
19. Remove bolts (1) from differential cover bracket bushing (2).
20. Lower axle from vehicle.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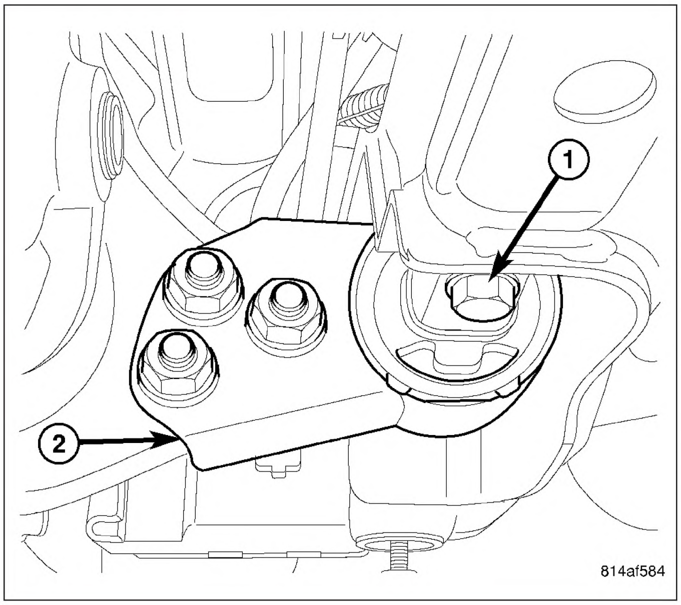
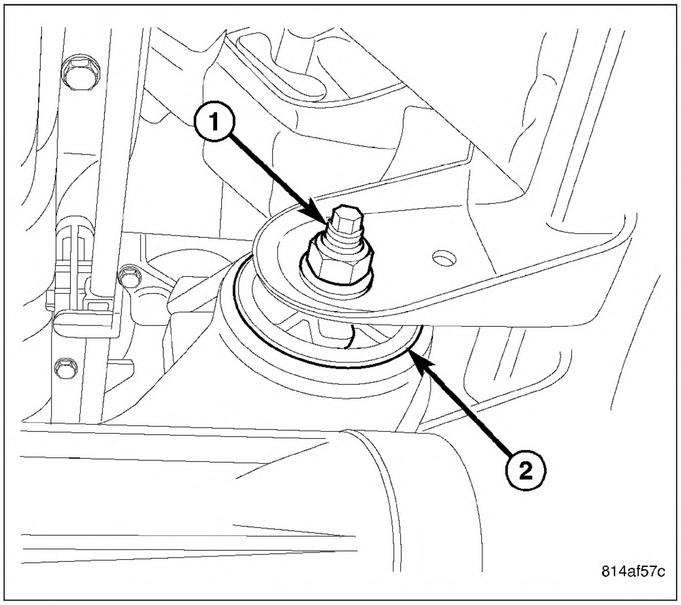
INSTALLATION

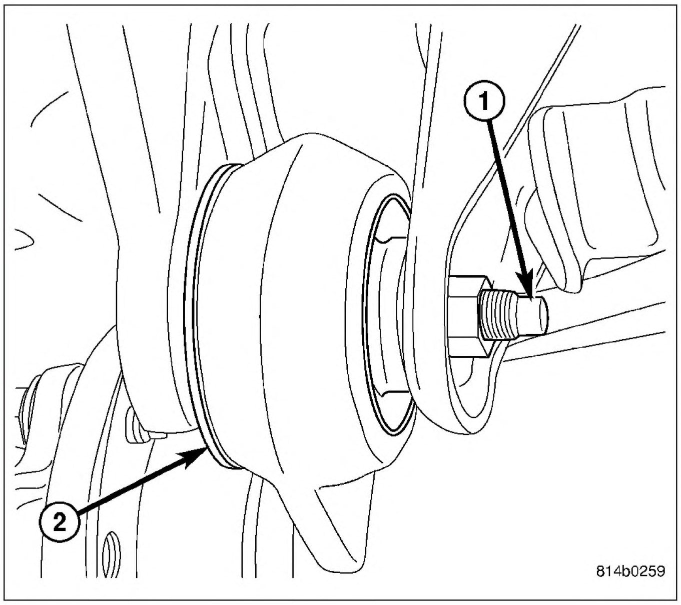
1. Raise axle to vehicle.
2. Install differential cover bracket bushing (2) bolts (1) and tighten bolts to 47 N·m (35 ft. lbs.)



3. Install axle tube bushing (2) bolt (1) and nut. Tighten nut to 95 N·m (70 ft. lbs.)



4. Install differential bushing (2) bolt (1) and nut. Tighten nut to 95 N·m (70 ft. lbs.)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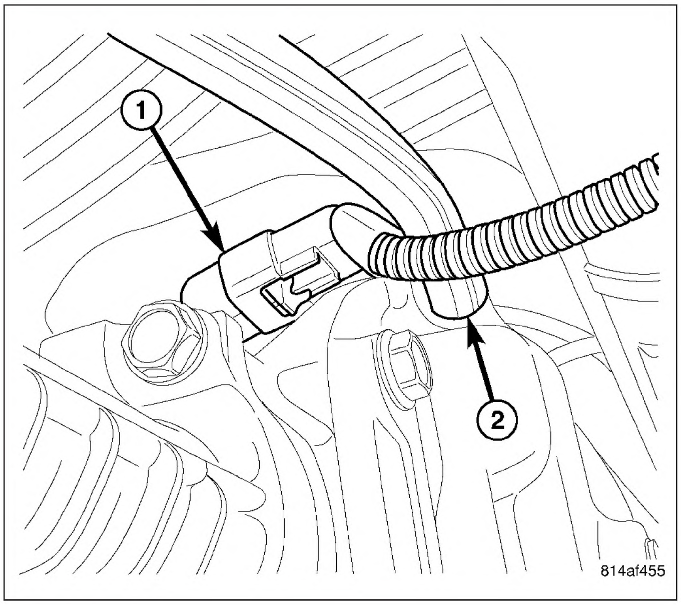
5. Install ELSD connector (1) and differential vent hose (2).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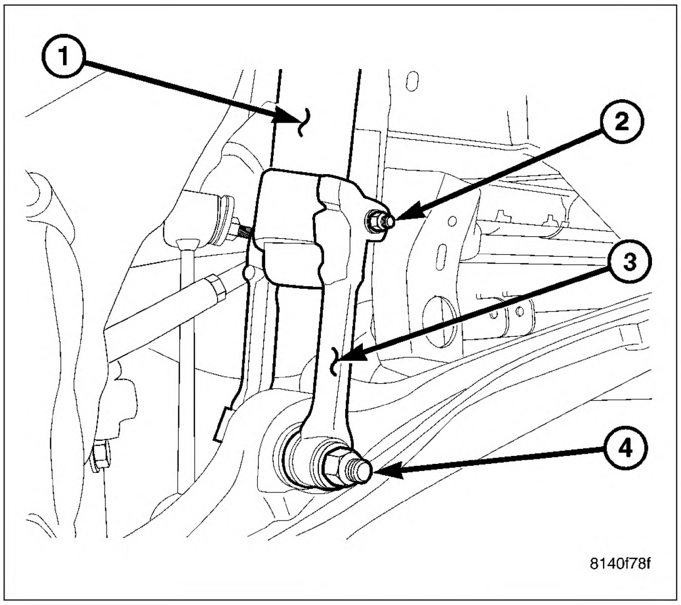
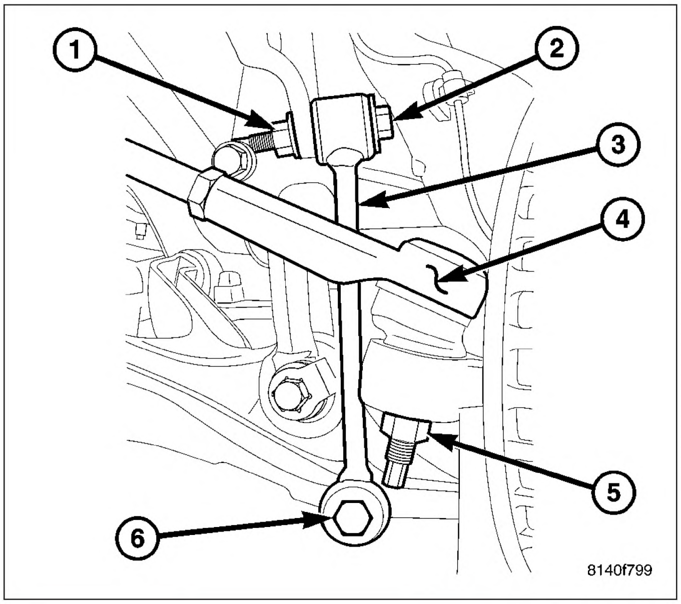
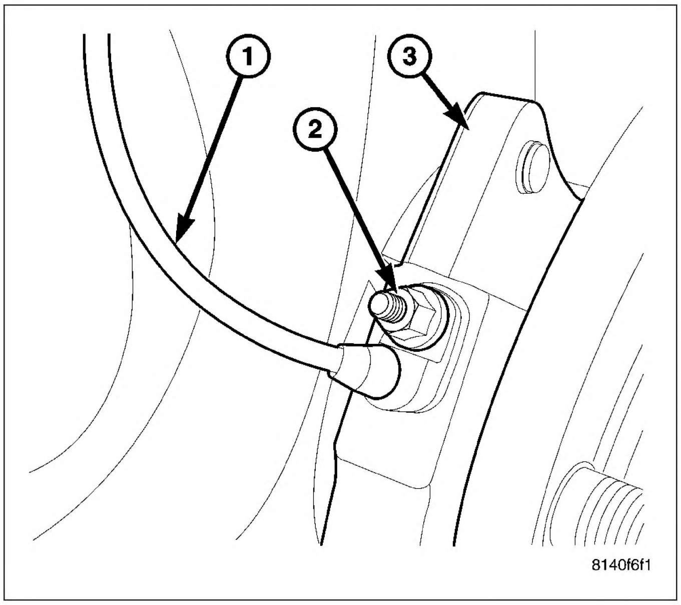
6. Install half shaft into axle and knuckles. Verify axle are engaged in the axle.
7. Install clevis (3) bolt and nut (4) on lower control arms and tighten to specification.



8. Install upper control arms on knuckles and tighten ball joint nuts to specifications.
9. Install tie rod ends (4) and nuts (5) on knuckles and tighten to specifications.
10. Install stabilizer bar links (2) and bolts (6) on lower control arms and tighten to specifications.



11. Install brake calipers on knuckles.
12. Install wheel speed sensor (1) on hub/bearing (3).
13. Install half shaft hub nuts and tighten to 135 N·m (100 ft. lbs.).
14. Install propeller shaft on pinion flange with reference marks aligned.
15. Install drain plug and tighten to 60 N·m (44 ft. lbs.).
16. Fill differential housing and install fill plug. Tighten plug to 60 N·m (44 ft. lbs.).
17. Install skid plate.



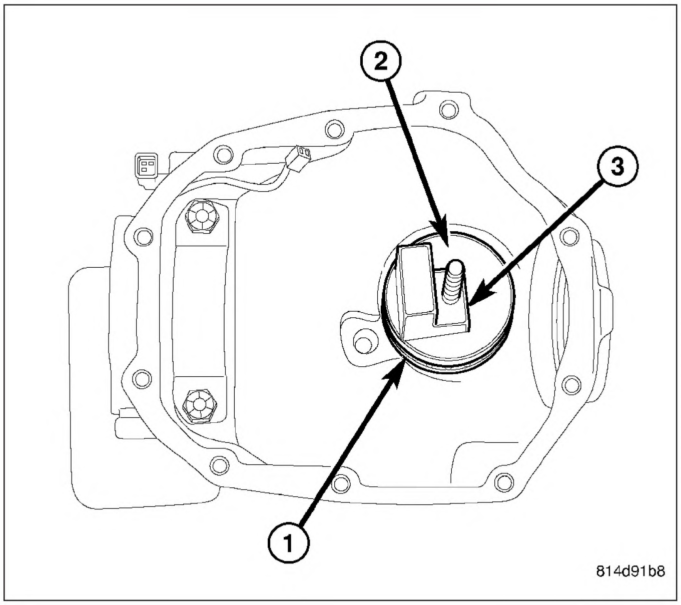
ADJUSTMENTS

ADJUSTMENT

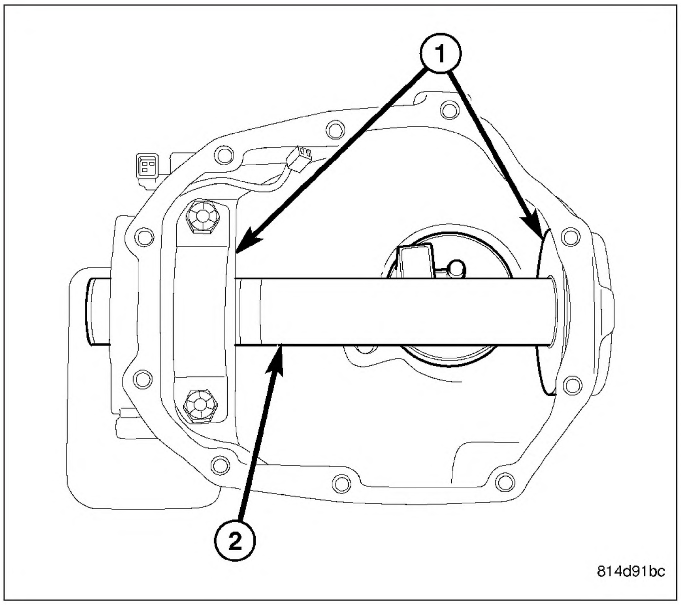
PINION DEPTH MEARSUREMENT

NOTE: Take measurement with pinion shim removed and rear bearing cup in place.

1. Install Pinion Height Block 6739 (3), Pinion Block 9534 (2), and pinion head bearing cone (1) onto Screw 6741. Install assembly into axle housing and through bearing and cups.
2. Install pinion front bearing and Cone 6740. Tighten Cone 6740 by hand until 3.4 N·m (30 in. lbs.) of rotating torque is measured at Screw 6741.



3. Install Arbor Discs 9538 (1) and Arbor Bar D-115-3 (2).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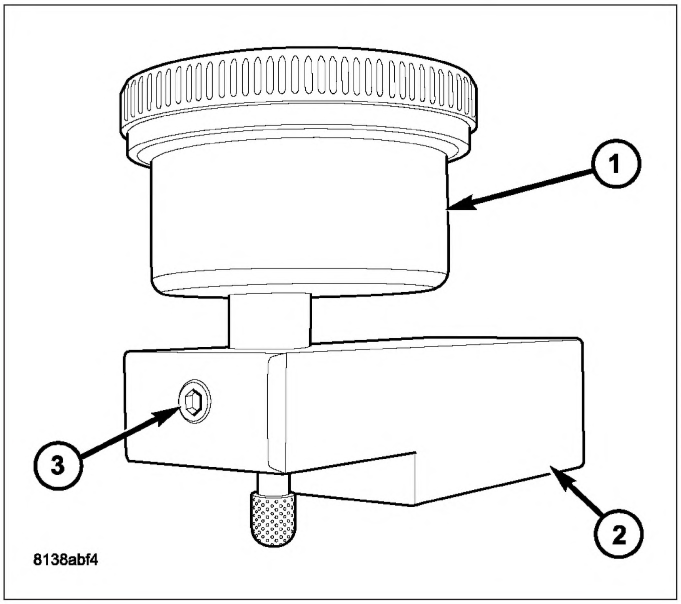
4. Install Dial Indicator 9524 (1) to Scooter Block D-115-2A (2). Secure with set-screw (3).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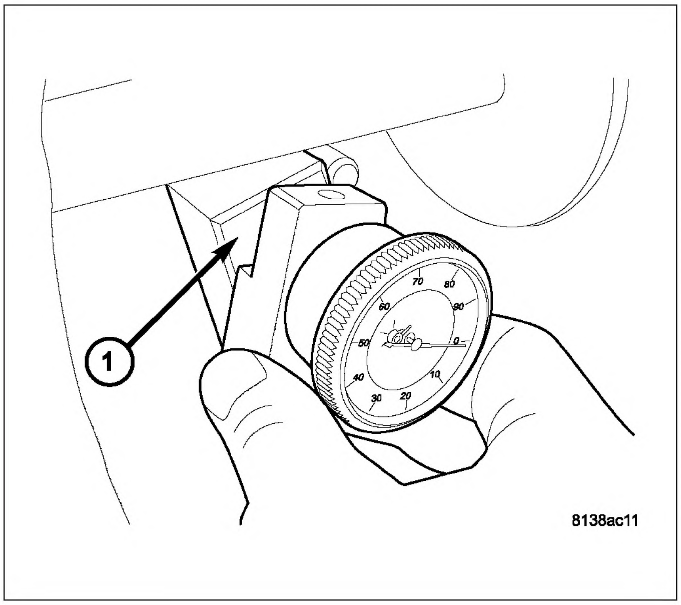
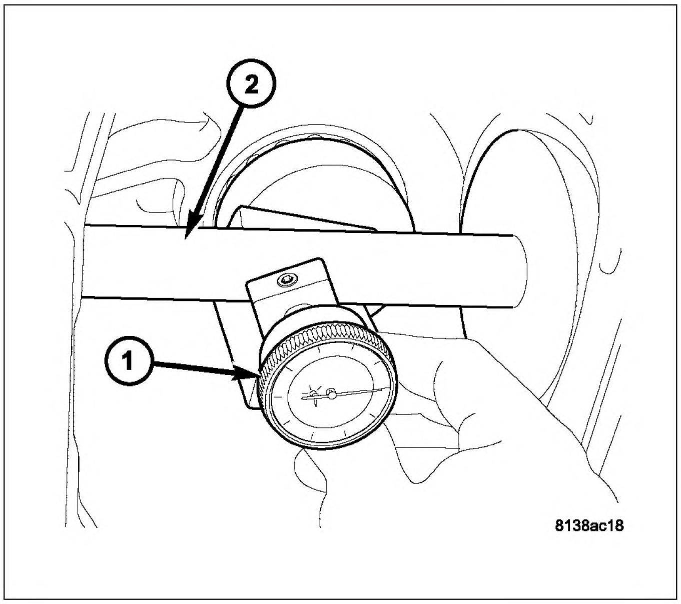
5. Install Indicator/Block assembly to top of Height Block 6739 (1). Zero indicator on top surface.



6. Slide indicator probe off of height block and onto Arbor Bar D-115-3 (2). As indicator contacts Arbor Bar (2), indicator needle will rotate clockwise. Continue moving indicator probe to the crest of the arbor bar and record the highest reading. Then add 4 mm (0.157 in.) to the recorded reading. This will give you the correct shim selection for pinion height.

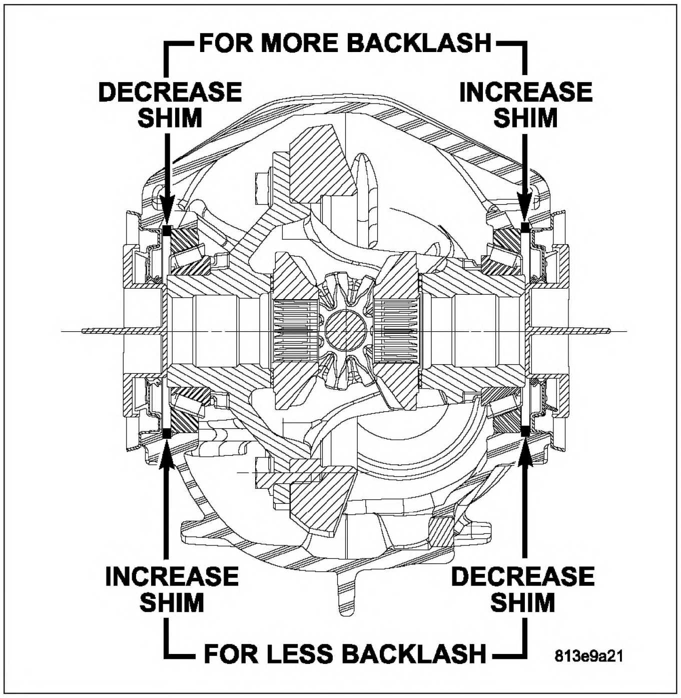


DIFFERENTIAL SIDE BEARING PRELOAD

Differential side bearing preload is predetermined. The select snap rings in the differential housing will provide the correct differential side bearing preload. These snap can be adjusted to obtain the correct ring gear backlash measurement.

RING GEAR BACKLASH MEASUREMENT

1. Set up Dial Indicator Set C-3339-A with Clamp SP-5426 (1), Post SP-5425-B (2) and Metric Dial Indicator 9524 (3) to measure ring gear backlash:
2. Rotate ring gear one direction to take up clearance to pinion. Verify indicator tip is in contact with ring gear and zero indicator. Rotate ring gear back and forth and record measurement. Ring gear backlash should be 0.13-0.18 mm (0.005-0.007 in.). Verify back lash measurement in four (4) positions.
3. If backlash measurement is less than 0.13 mm (0.005 in.), it is necessary to decrease the snap ring thickness on the ring gear side, and increase the thickness on the pinion side equal amounts.
4. If backlash measurement is greater than 0.18 mm (0.007 in.), it is necessary to increase the snap ring thickness on the ring gear side, and decrease the thickness on the pinion side equal amounts.

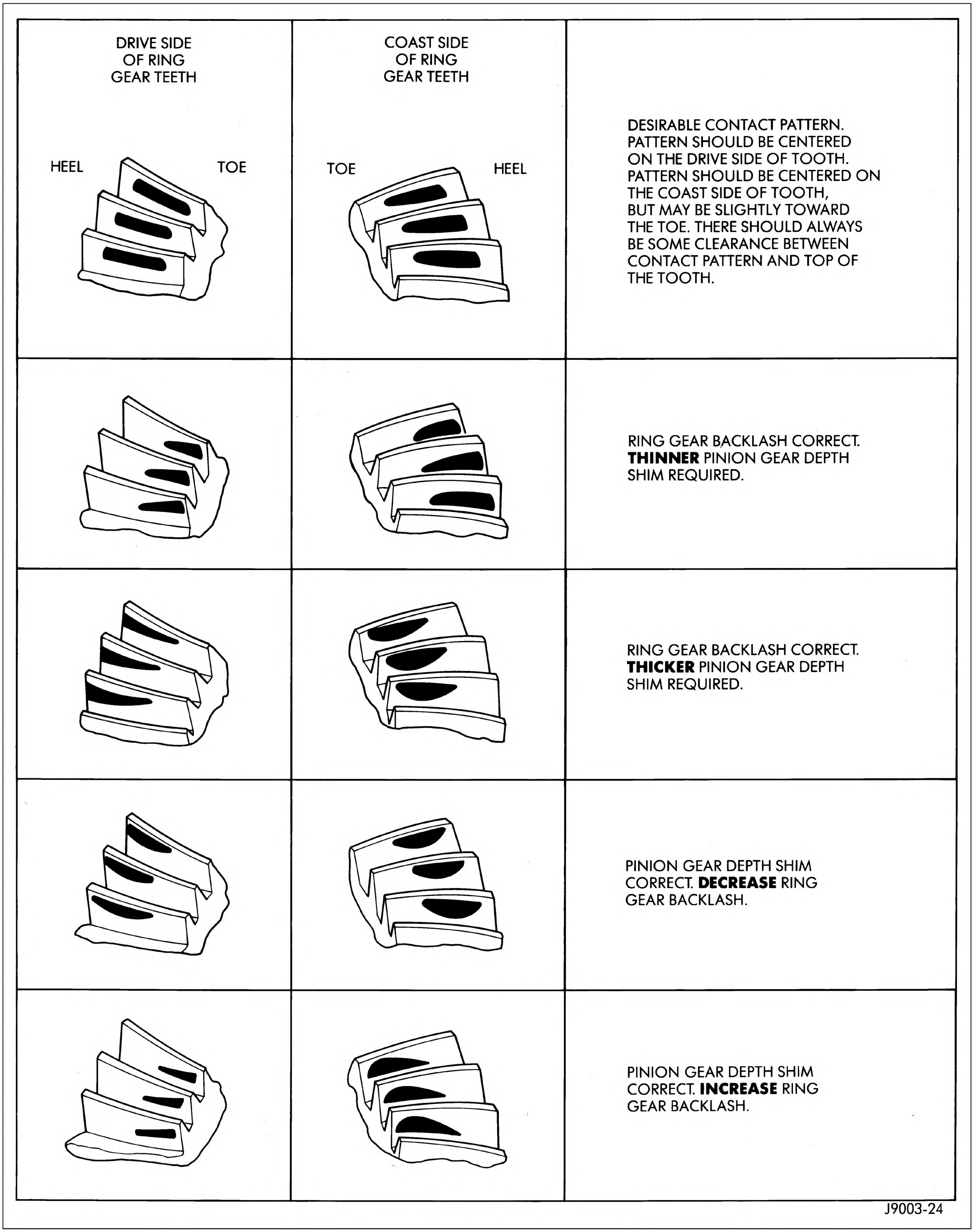


GEAR CONTACT PATTERN

The ring gear and pinion teeth contact patterns will show if the pinion depth is correct in the housing. It will also show if the ring gear backlash has been adjusted correctly. The backlash can be adjusted within specifications to achieve desired tooth contact patterns.

1. Apply a thin coat of hydrated ferric oxide or equivalent to the drive and coast side of the ring gear teeth.
2. Wrap, twist, and hold a shop towel around the pinion yoke to increase the turning resistance of the pinion. This will provide a more distinct contact pattern.
3. With a boxed end wrench on a ring gear bolt, rotate the differential case one complete revolution in both directions while a load is being applied from shop towel.

The areas on the ring gear teeth with the greatest degree of contact against the pinion teeth will squeegee the compound to the areas with the least amount of contact. Note and compare patterns on the ring gear teeth to Gear Tooth Contact Patterns chart and adjust pinion depth and gear backlash as necessary.


DRIVE SIDE OF RING GEAR TEETH
COAST SIDE OF RING GEAR TEETH
HEEL
TOE
TOE
HEEL
J9003-24

DESIRABLE CONTACT PATTERN. PATTERN SHOULD BE CENTERED ON THE DRIVE SIDE OF TOOTH. PATTERN SHOULD BE CENTERED ON THE COAST SIDE OF TOOTH, BUT MAY BE SLIGHTLY TOWARD THE TOE. THERE SHOULD ALWAYS BE SOME CLEARANCE BETWEEN CONTACT PATTERN AND TOP OF THE TOOTH.

RING GEAR BACKLASH CORRECT. **THINNER** PINION GEAR DEPTH SHIM REQUIRED.

RING GEAR BACKLASH CORRECT. **THICKER** PINION GEAR DEPTH SHIM REQUIRED.

PINION GEAR DEPTH SHIM CORRECT. **DECREASE** RING GEAR BACKLASH.

PINION GEAR DEPTH SHIM CORRECT. **INCREASE** RING GEAR BACKLASH.

Gear Tooth Contact Patterns

SPECIFICATIONS - C200FE

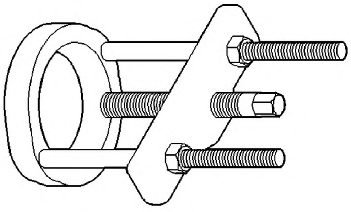
SPECIFICATIONS

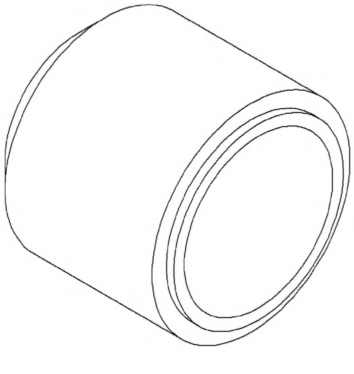
DESCRIPTION	SPECIFICATION
Axle Ratio	3.07, 3.55, 3.73
Ring Gear Diameter	200 mm (7.873 in.)
Ring Gear Backlash	0.13-0.18 mm (0.005-0.007 in.)
Pinion Bearing Preload	1.5-1.9 N·m (13-17 in. lbs.)

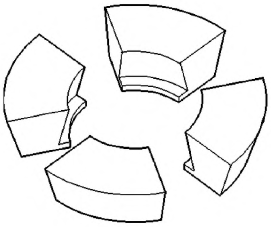
TORQUE SPECIFICATIONS

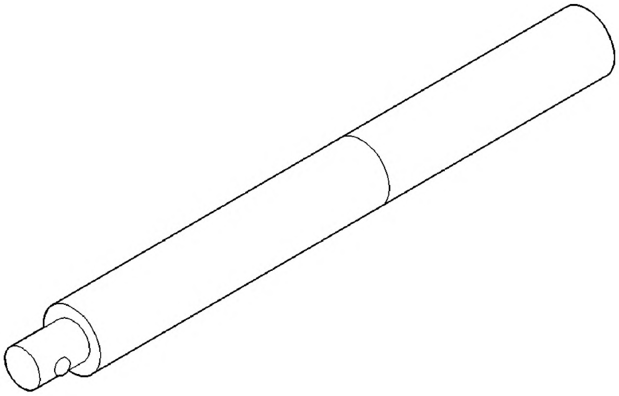
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Pinion Nose Bushing Nut	95	70	-
Axle Tube Bushing Nut	95	70	-
Differential Cover Bracket Bushing Bolts	47	35	-
Bracket to Differential Cover Nuts	117	86	-
Ring Gear Bolts	102	75	-
Differential Cover Bolts	56	41	-
Differential Bearing Cap Bolts	135	100	-
Axle Tube to Differential Bolts	56	41	-
Fill/Drain Plug	60	44	-
Axle Dampener Nuts	56	41	-

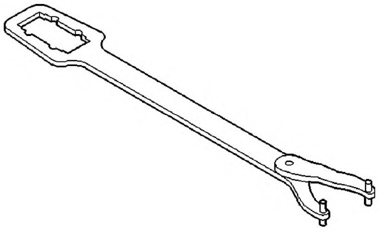
SPECIAL TOOLS

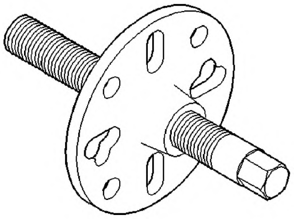

PULLER/PRESS C-293-PA

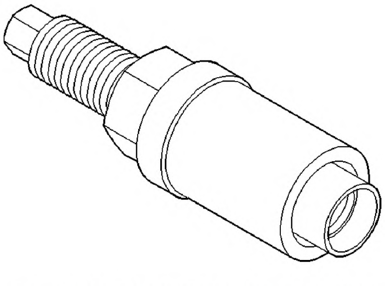

SEAL INSTALLER C-3972A

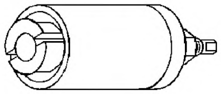

ADAPTERS C-293-37

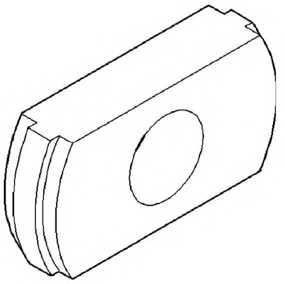

HANDLE C-4171

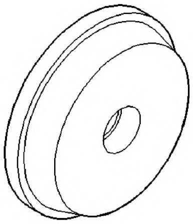

FLANGE WRENCH C-3281

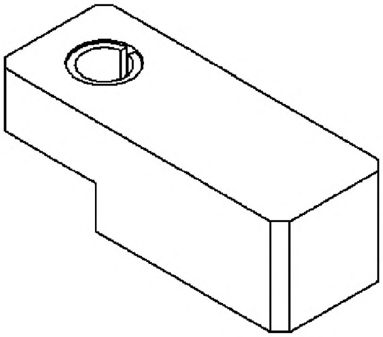

PULLER C-452

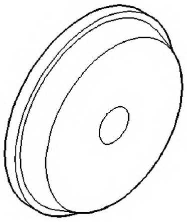

FLANGE INSTALLER C-3718

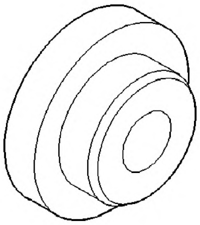

BEARING REMOVER C-4660-A

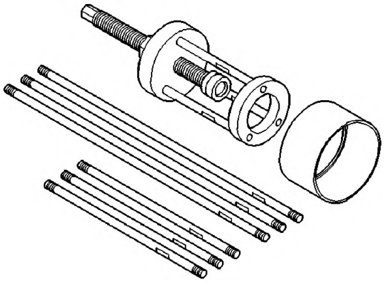

REMOVER D-103

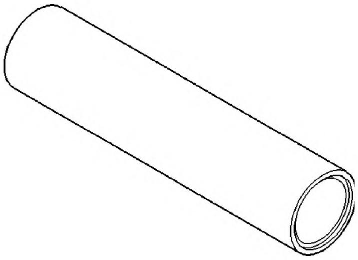

INSTALLER D-111

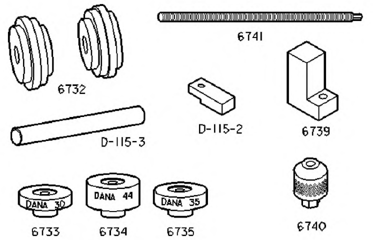

SCOOTER BLOCK D-115-2A


INSTALLER D-129


INSTALLER 5063


PULLER 6444


INSTALLER 6448A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6732
D-115-2
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D-115-3
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DANA 44
DANA 35
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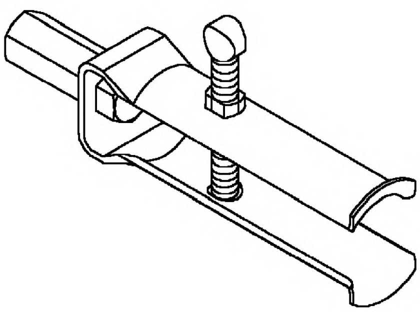
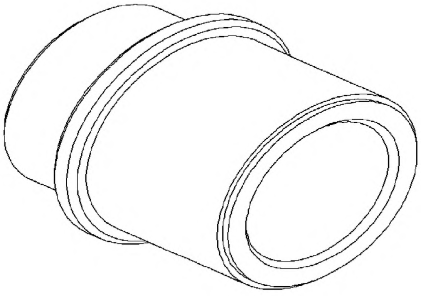
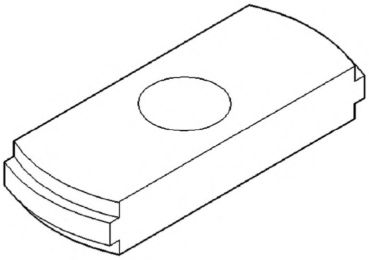
PINION GAUGE SET 6774



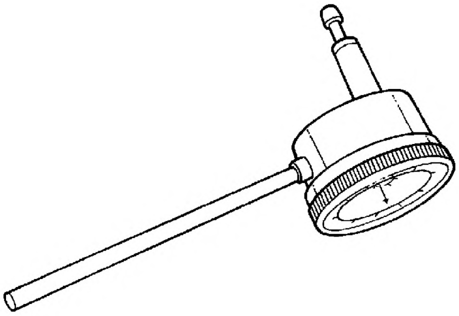
SEAL REMOVER 7794-A



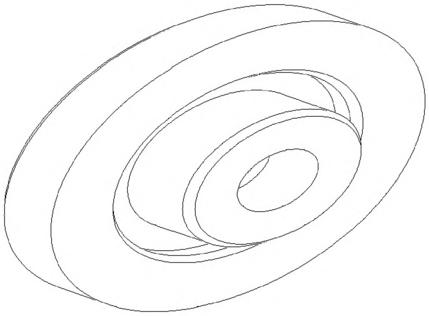
BUSHING REMOVER 9512



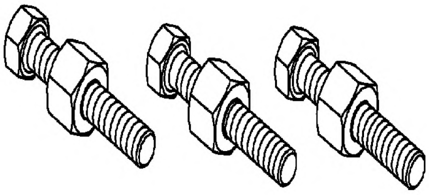
REMOVER 9084



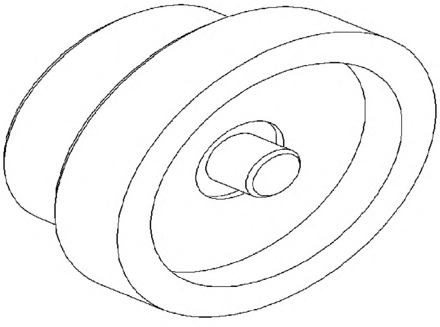
DIAL INDICATOR 9524



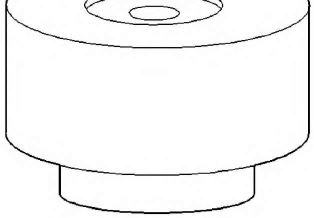
SEAL INSTALLER 9504



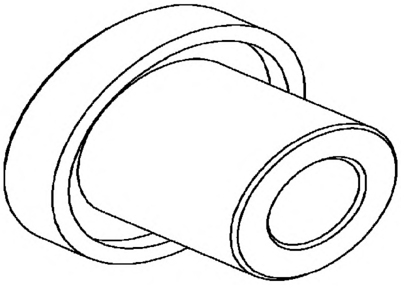
RING GEAR INSTALLER 9533



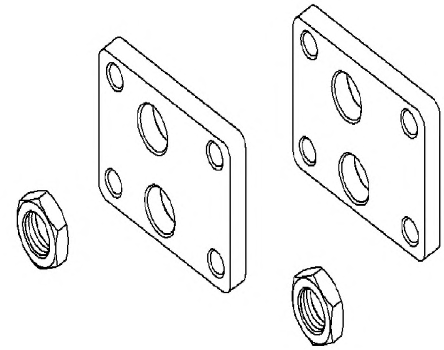
BUSHING RECEIVER/INSTALLER 9511



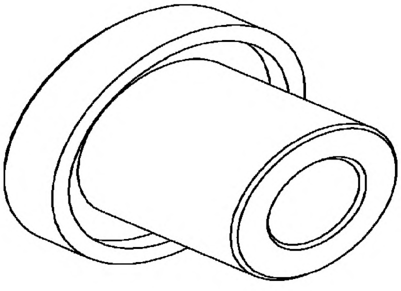
PINION BLOCK 9534



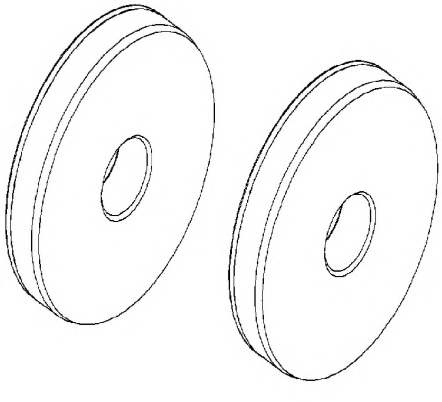
BEARING INSTALLER 9535



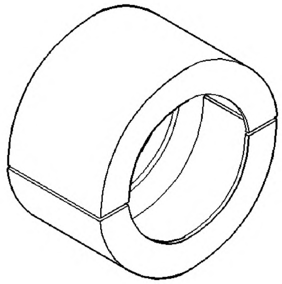
SPREADER ADAPTERS 9669



BUSHING RECEIVER 9536



ARBOR DISC 9538

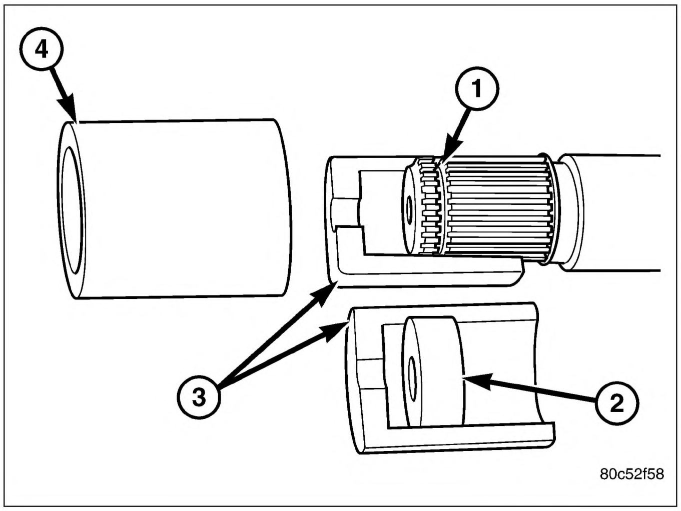


JAWS 9641

SHAFT-AXLE

REMOVAL

1. Remove half shaft from vehicle.
2. Clean axle seal area.
3. Remove snap ring and O-ring from the axle shaft.
4. Remove axle (1) with Remove 8420A (2) (3) (4) and slid hammer.



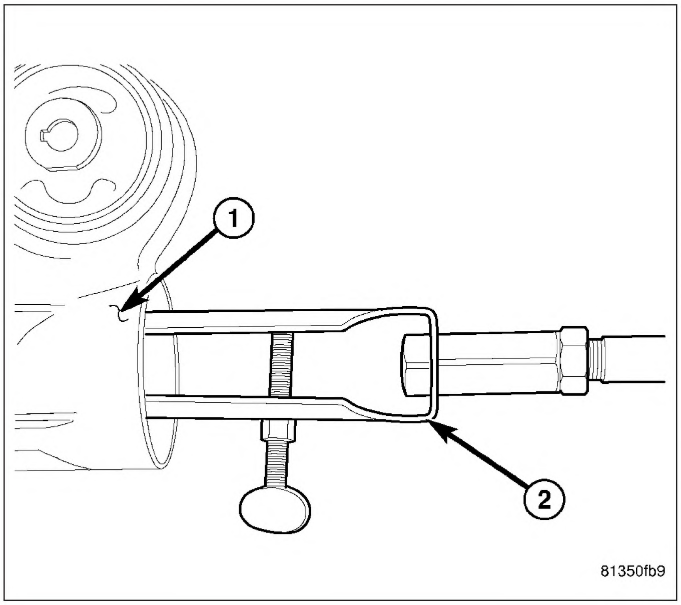
INSTALLATION

1. Lubricate bearing bore and seal lip with gear lubricant.
2. Install axle shaft and engage shaft into side gear. Push firmly on axle shaft to engage snap-ring.
3. Check the differential fluid level and add fluid if necessary.
4. Install half shaft.
5. Install skid plate, if necessary.

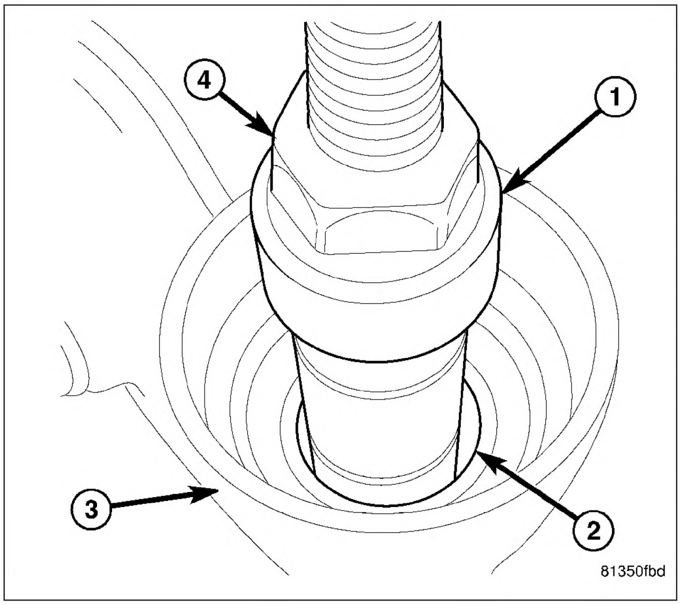
BEARINGS-AXLE

REMOVAL

1. Remove axle shaft.
2. Remove axle shaft tube (1) seal with Remover 7794-A (2) and slid hammer.



3. Install axle bearing remover C-4660-A (1) into the axle bearing (2) in the axle tube (3) and tighten remover nut (4).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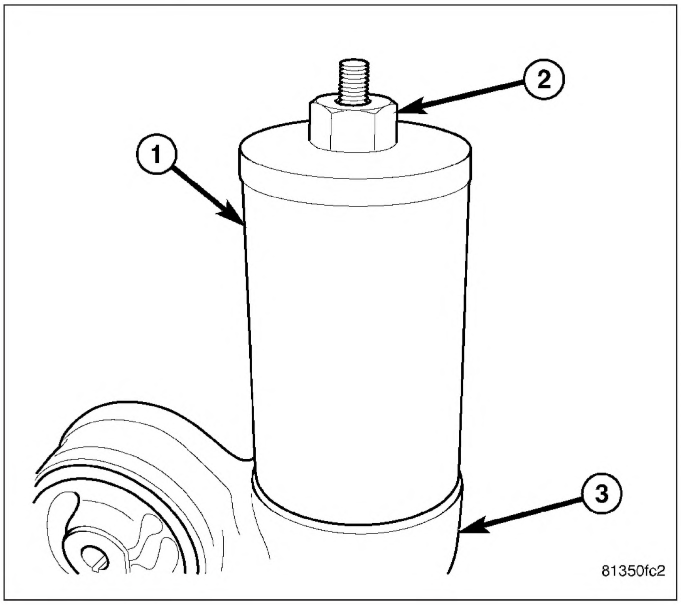
4. Install bearing Reciever 9537 (1) and nut (2) on remover and tube (3). Tighten nut (2) and draw bearing into reciever (1).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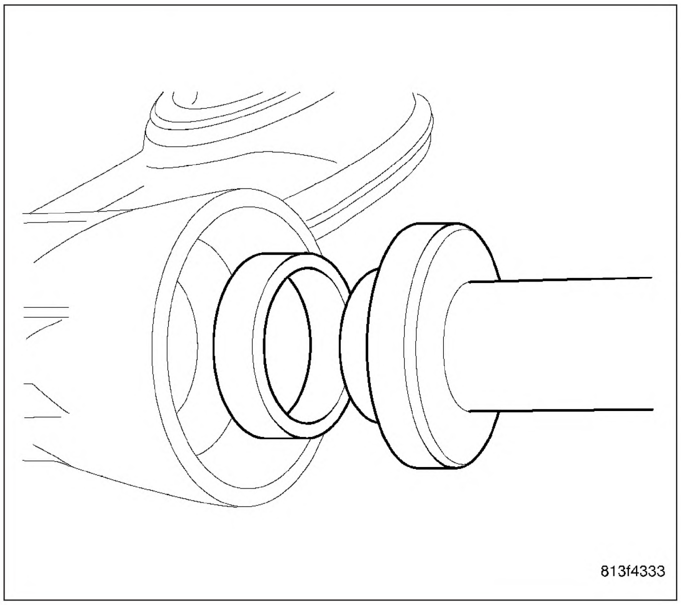
INSTALLATION

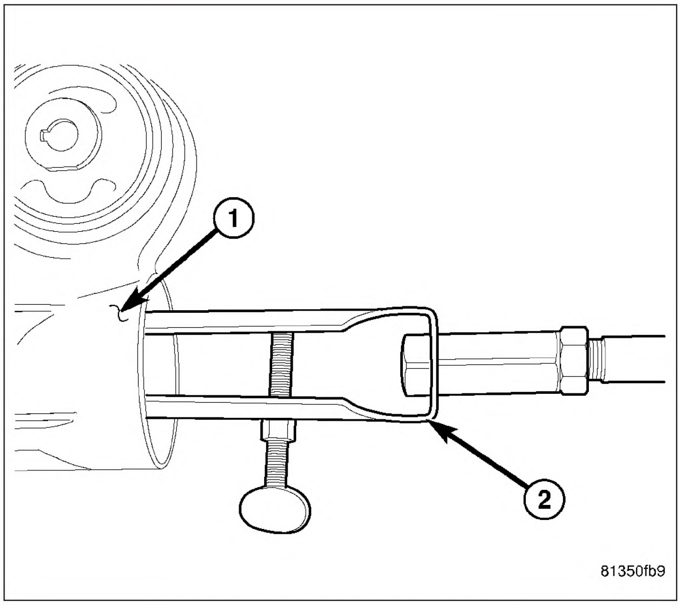
1. Install axle bushing (1) with Installer 5063 (2) and hammer.
2. Install axle shaft and seal.



SEAL-AXLE SHAFT

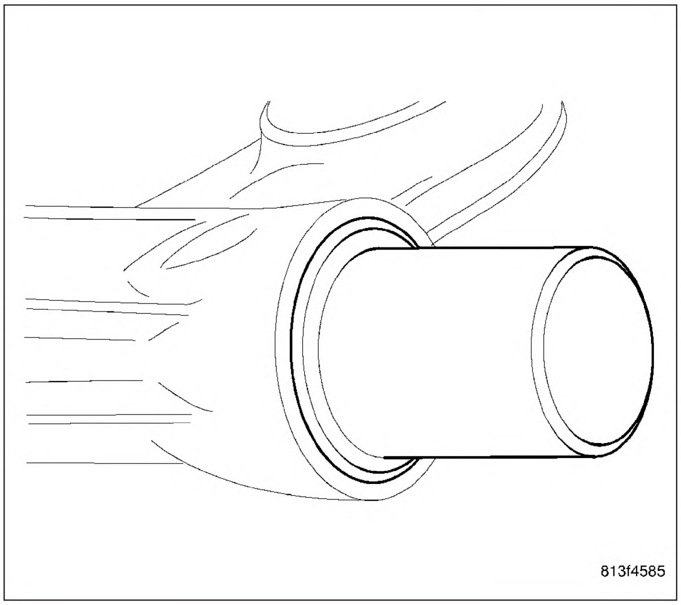
REMOVAL

1. Remove axle shaft.
2. Remove axle shaft tube (1) seal with Remover 7794-A (2) and slid hammer.



INSTALLATION

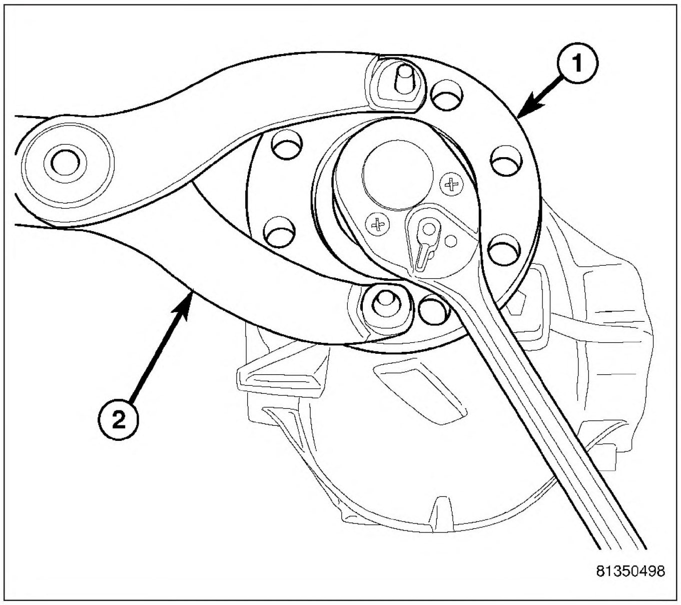
1. Install axle (1) seal with Installer 8402 (2) and hammer.
2. Install axle shaft.



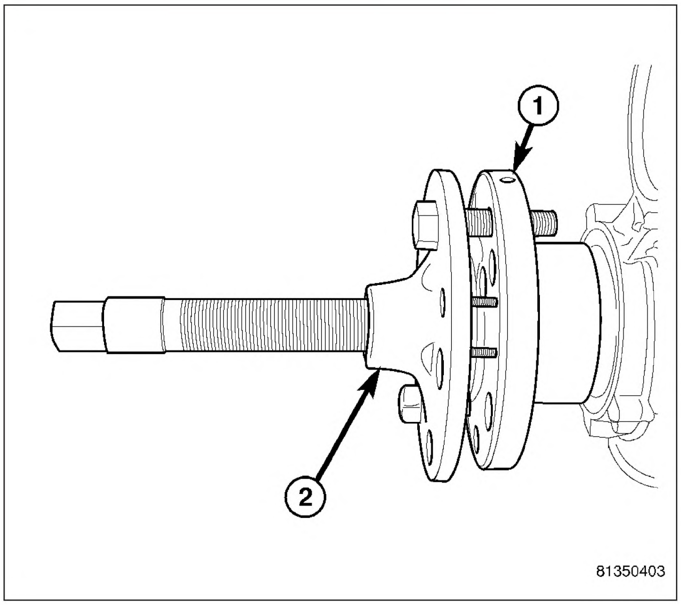
SEAL-PINION

REMOVAL

1. Remove wheels.
2. Push back brake pads and release hand brake.
3. Remove propeller shaft.
4. Rotate pinion with inch pound torque and record torque to rotate.
5. Mark installation position of collared nut with respect to drive pinion.
6. Bend pinion nut lock back with a punch and hammer.
7. Hold pinion flange (1) with Wrench C-3281(2) and remove pinion nut.

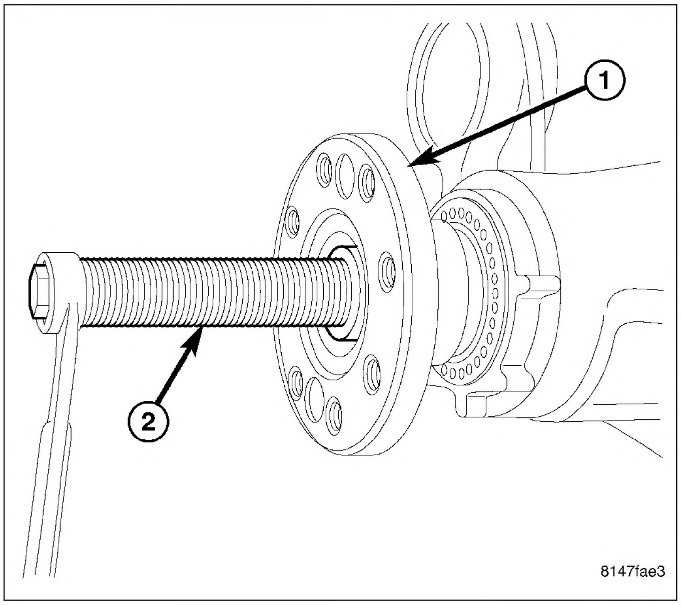


8. Remove pinion flange (1) with Puller C-452 (2).
9. Remove pinion seal with a seal pick.

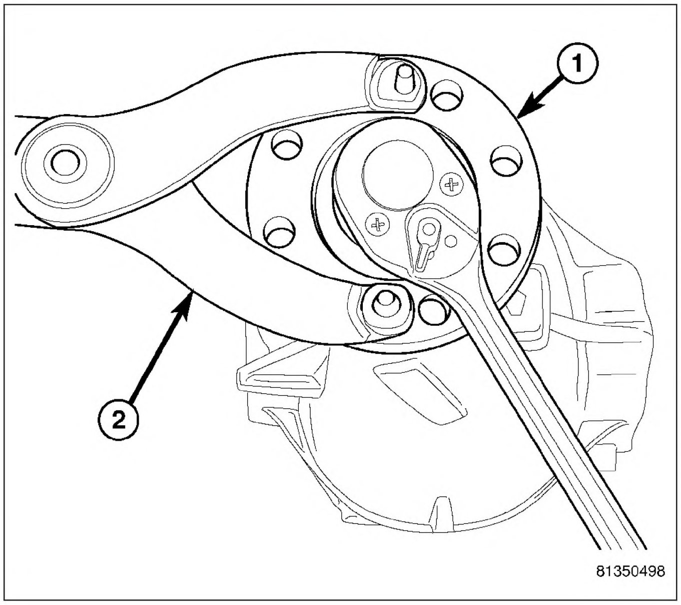


INSTALLATION

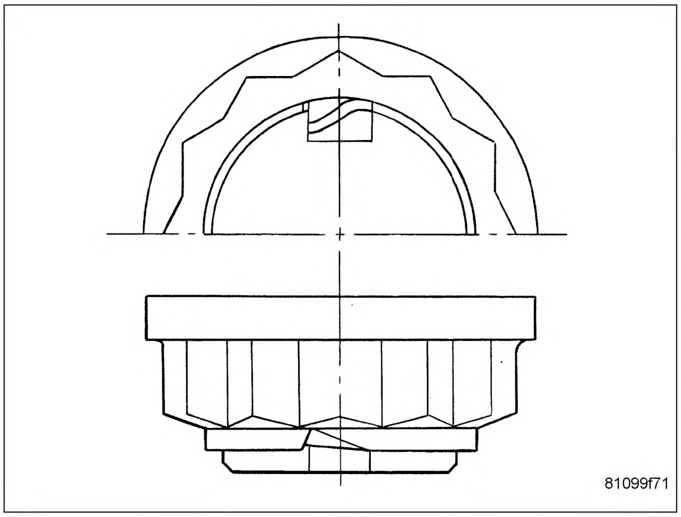
1. Install pinion seal with Installer C-3972A and Handle C-4171.
2. Install pinion flange (1) on pinion with Installer 9616 (2). Tap flange on pinion, then thread installer center bolt on pinion shaft and draw flange onto the pinion.



3. Install **new** pinion collared nut and carefully tighten nut in stages holding flange (1) with Wrench C-3281(2). Check torque to rotate after each stage, until previously value of torque to rotate is exceeded by 0.5 N·m. (4.4 in. lbs.).



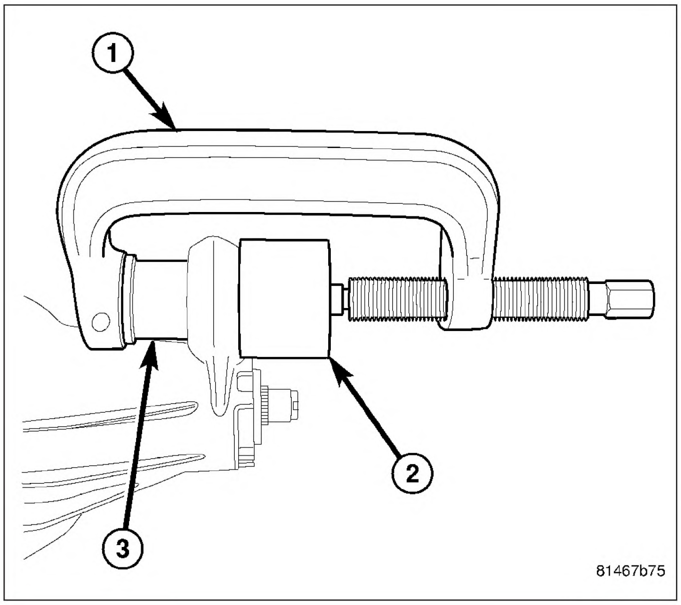
4. Cut the pinion nut collar.
5. Bend nut collar so it touches the wall of the slot in the pinion shaft.
6. Connect propeller shaft to pinion flange.
7. Install wheel and tires.
8. Operate brake pedal several times until brake pads contact brake discs (brake pressure built up).



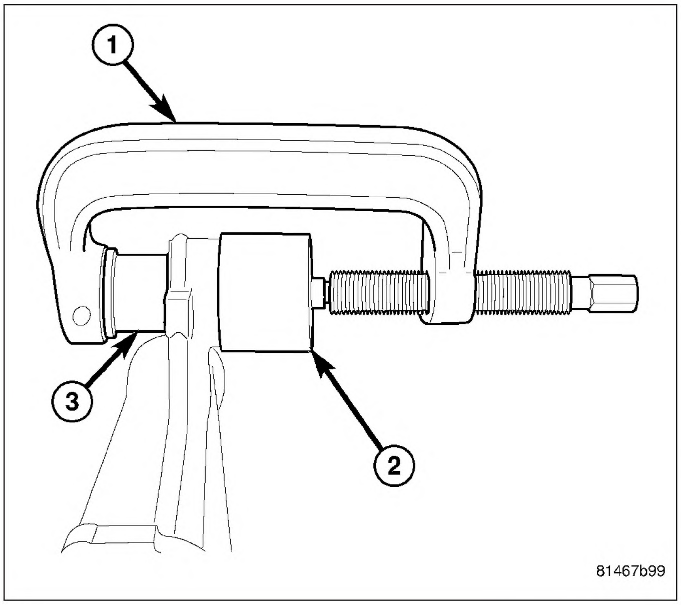
BUSHINGS-AXLE

REMOVAL

1. Remove axle from vehicle.
2. Remove pinion flange.
3. Remove pinion nose bushing with Press C-4212F (1) Receiver 9536 (2) and Remover 9512 (3).

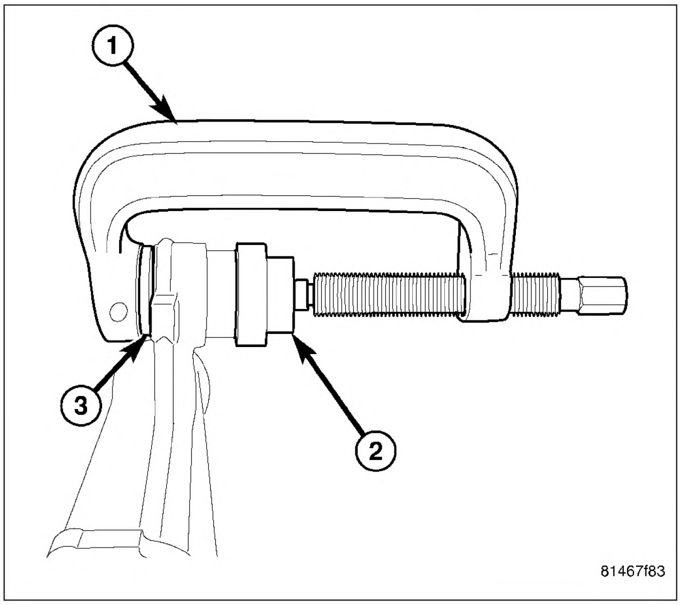


4. Remove axle tube bushing with Press C-4212F (1) Receiver 9536 (2) and Remover 9512 (3).

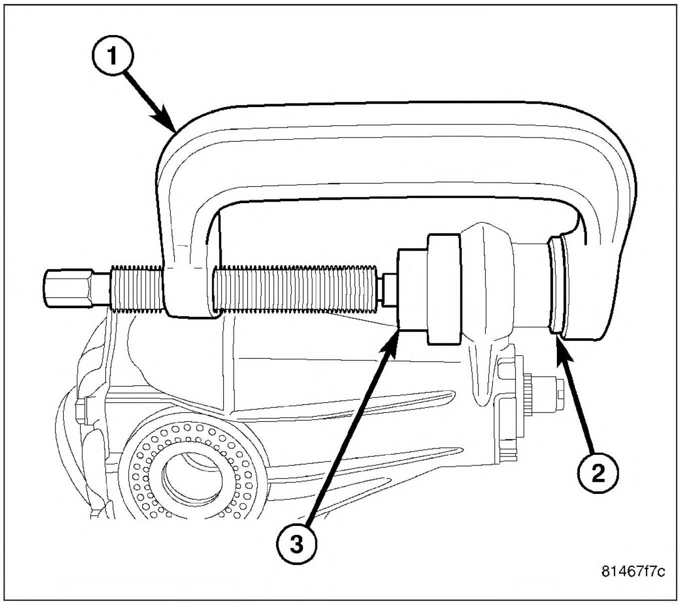


INSTALLATION

1. Install axle tube bushing with Press C-4212F (1), Installer 9511 (2) and Receiver 9536-2 (3).



2. Install pinion nose bushing with Press C-4212F (1), Installer 9536-2 (2) and Receiver 9511(3).
3. Install new pinion seal, pinion flange and new pinion nut.



SEAL-DIFFERENTIAL

REMOVAL

1. Remove half shaft from axle.
2. Pry seal out with a seal pick.

INSTALLATION

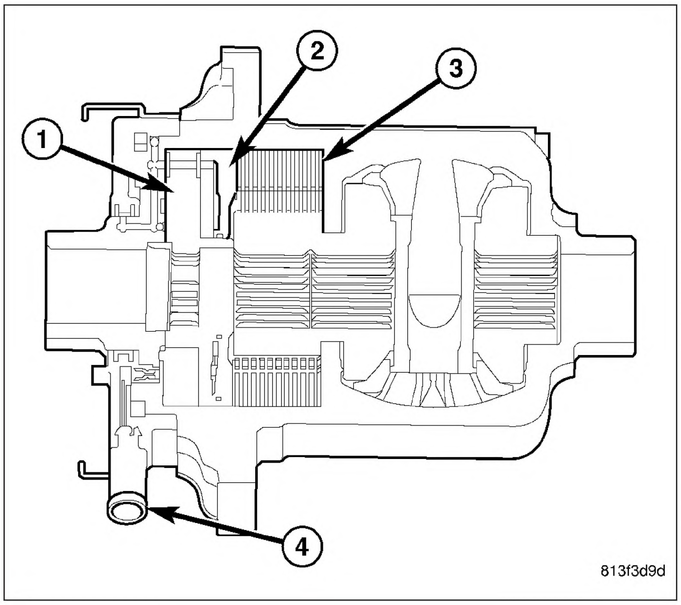
1. Install differential seal with Install 9504 and Handle C-4171.
2. Install half shaft.

DIFFERENTIAL-ELSD

OPERATION

A gerotor pump (1) creates oil flow through the filter (4) whenever left and right wheels spin at different speeds and the solenoid valve is activated. The oil flow is restricted by a Pressure Regulating Valve (PRV) to build oil pressure. Pressurized oil is then fed to a piston (2) chamber. The piston compresses the clutch pack (3) providing additional torque to the lower speed wheel.

When the antilock brakes are activated the differential solenoid is switched off and pressure is bleed off the clutch pack.



DIAGNOSIS AND TESTING

DIFFERENTIAL-ELSD

HYDRAULIC

CONDITION	POSSIBLE CAUSES	CORRECTION
No Lock Up	1. Pump Seals Leaking 2. Clutch Worn 3. Solenoid Valve 4. Pluged Filter 5. Final Drive Control Module	1. Replace Differential 2. Replace Differential 3. Replace Solenoid 4. Clean Filter 5. Replace Control Module

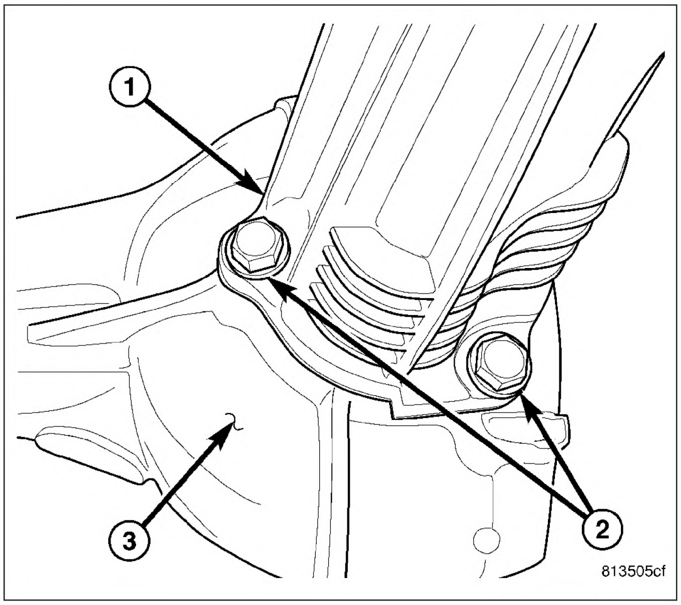
Raise vehicle and rotate tires in the opposite direction at the same time. This will make any oil left in the piston chamber apply pressure to the clutch and create some drag on the wheels. The wheels will not lock because the differntial solenoid is not activated.

SOLENOID

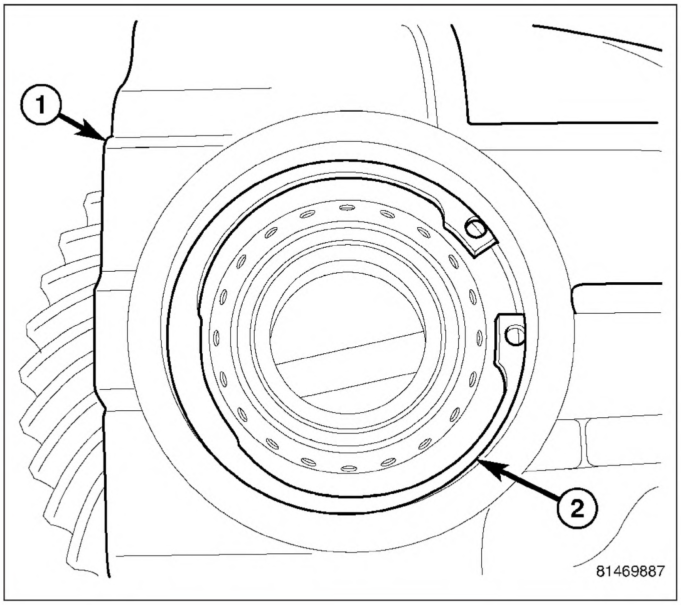
With solenoid disconnected resistance across the solenoid should be 13.5 to 14.5 ohms at 25°Celsius (77° Fahrenheit). To replace the solenoid diconnect wire connector then squeeze the retension clip and pull solenoid up.

REMOVAL

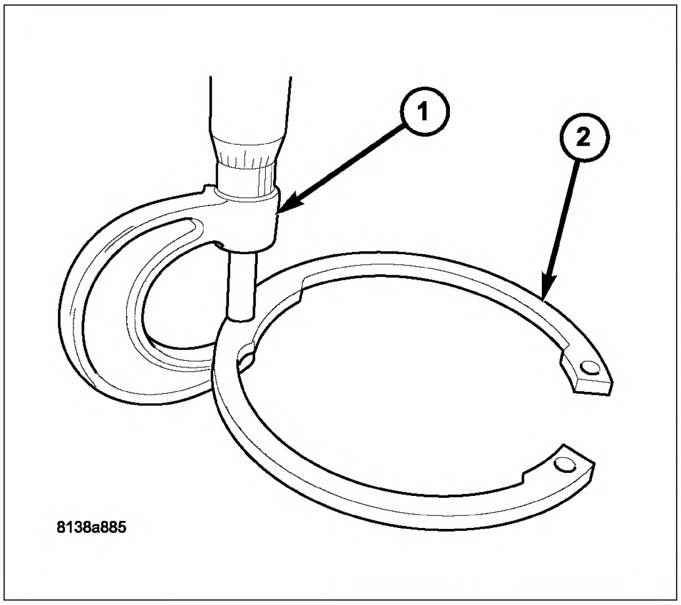
1. Remove half shafts and axle shaft.
2. Remove differential cover.
3. Remove three axle tube (1) mounting bolts (2) from differential housing (3).
4. Tap axle tube (1) and pull tube off differential housing (3) flange.
5. Bolt spreader Adapters 9669 to differential housing (2).
6. Install Spreader W-129-B on adapters.
7. Spread case .3mm (0.011 in.).



8. Remove differential housing seal with seal pick.
9. Remove differential housing (1) snap ring (2).



10. Measure (1) snap ring (2) and mark ring for location.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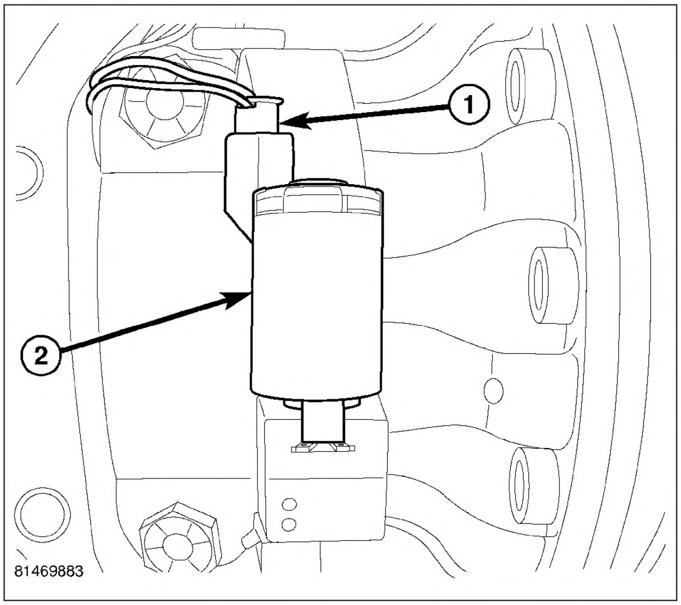
11. Remove solenoid valve connector (1) from ELSD solenoid valve (2).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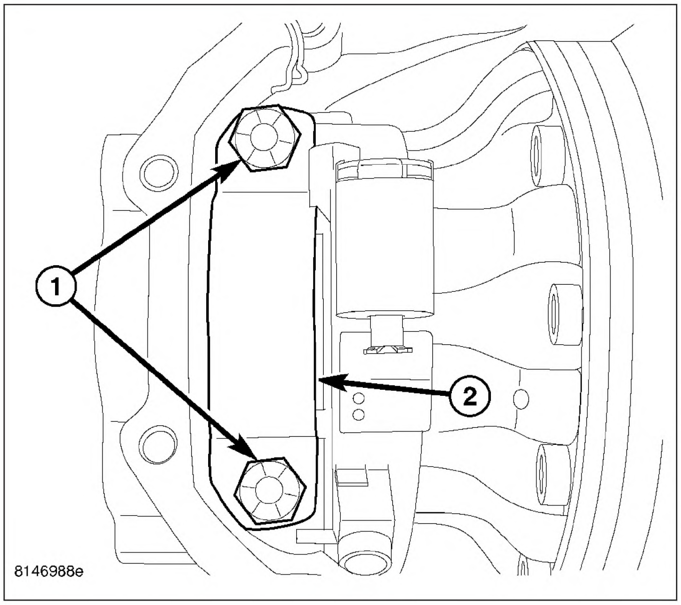
12. Remove differential bearing cap bolts (1) and cap (2).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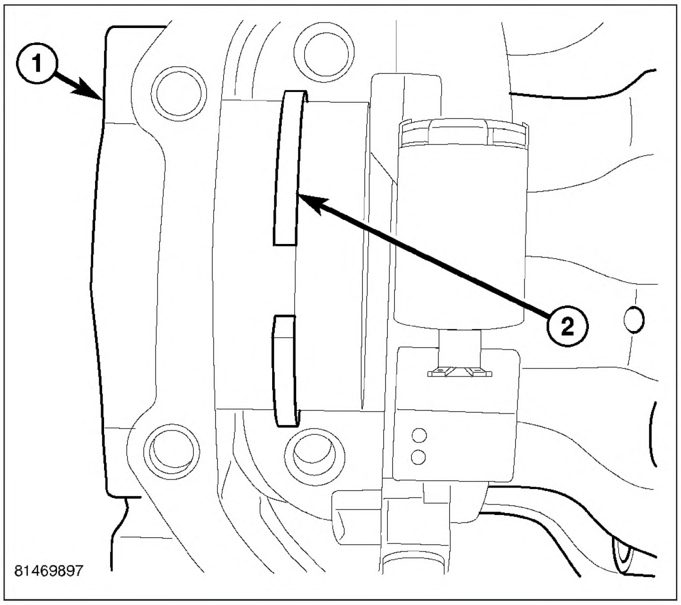
13. Remove axle tube side differential housing (1) snap ring (2).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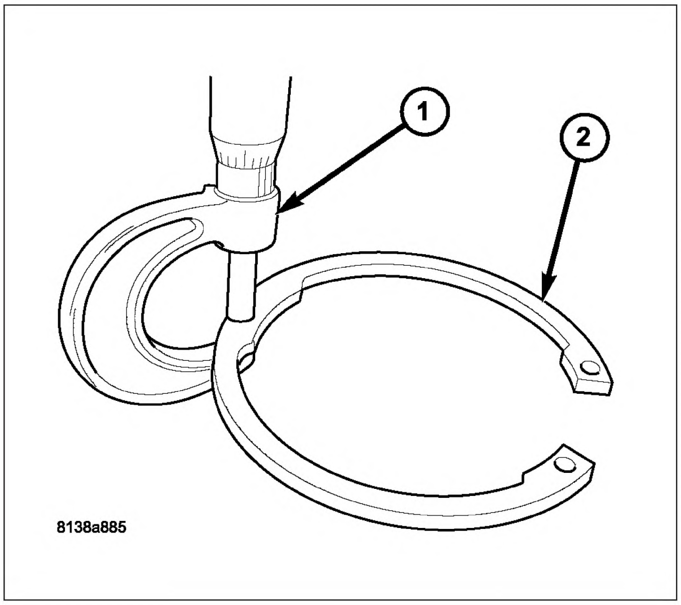
14. Measure (1) snap ring (2) and mark ring for location.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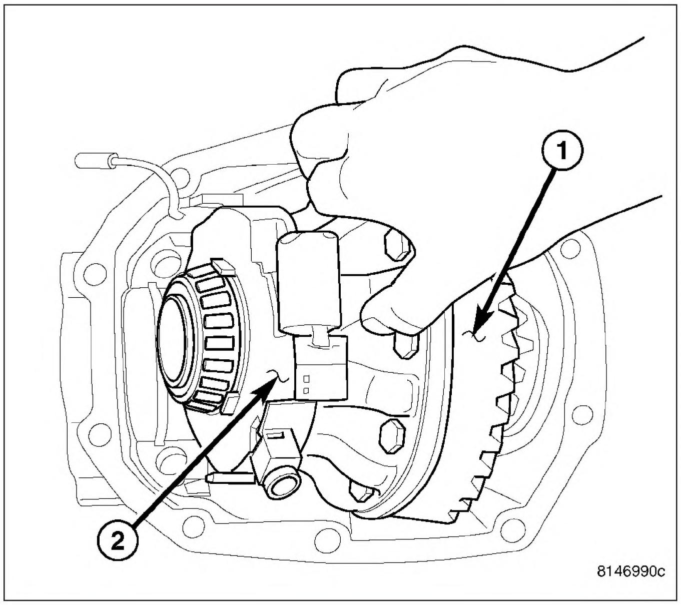
15. Slid differential assembly (1) to the right and tilt ELSD pump (2) and differential out of the housing.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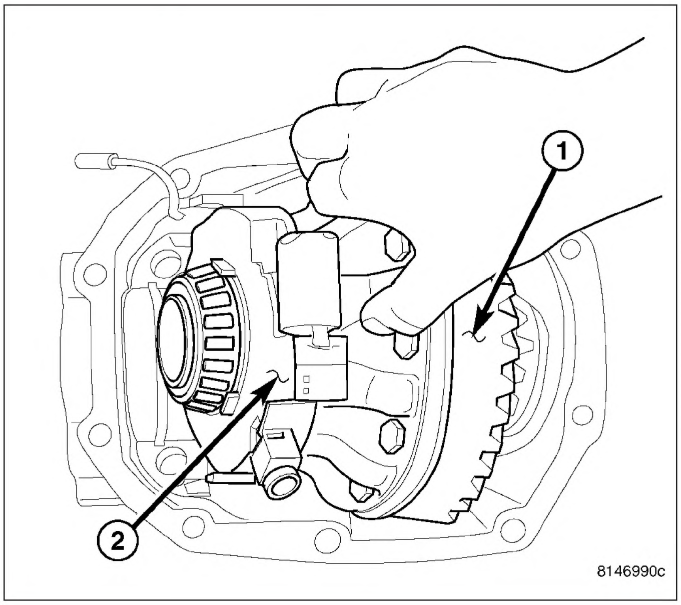
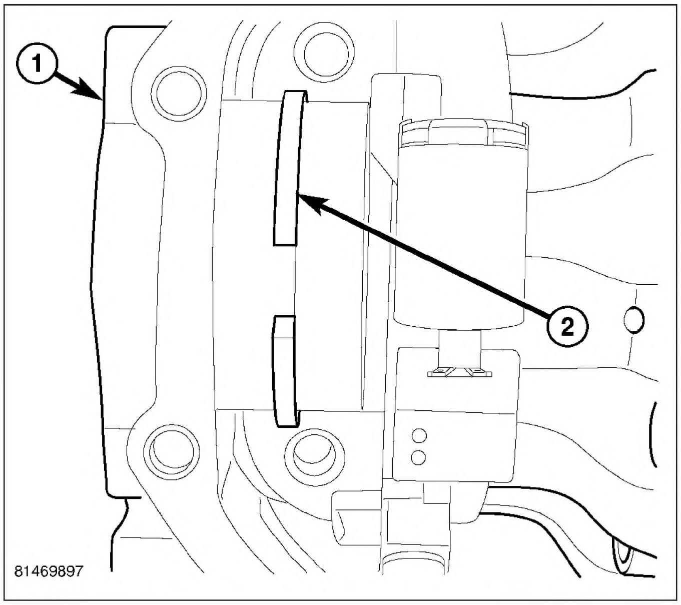
INSTALLATION

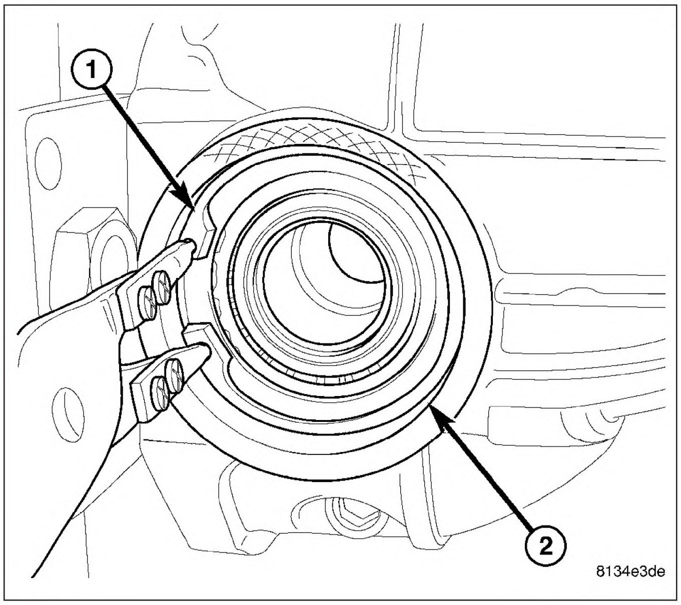
1. Bolt spreader Adapters 9669 to the differential housing.
2. Install Spreader W-129-B on adapters and spread case 3mm (0.011in.).
3. Slide differential assembly (1) into the right of the housing. Then slide ELSD pump (2) and differential into housing.



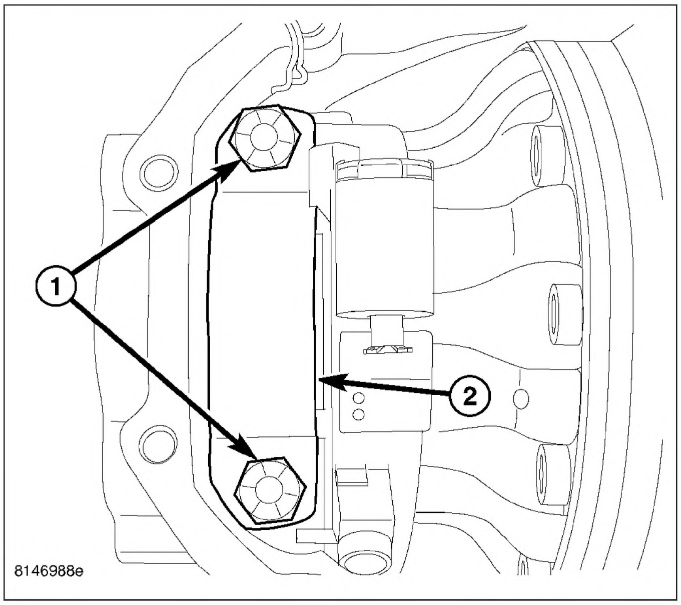
4. Install differential bearing cups into their original locations.
5. Install axle tube side differential housing (1) snap ring (2).



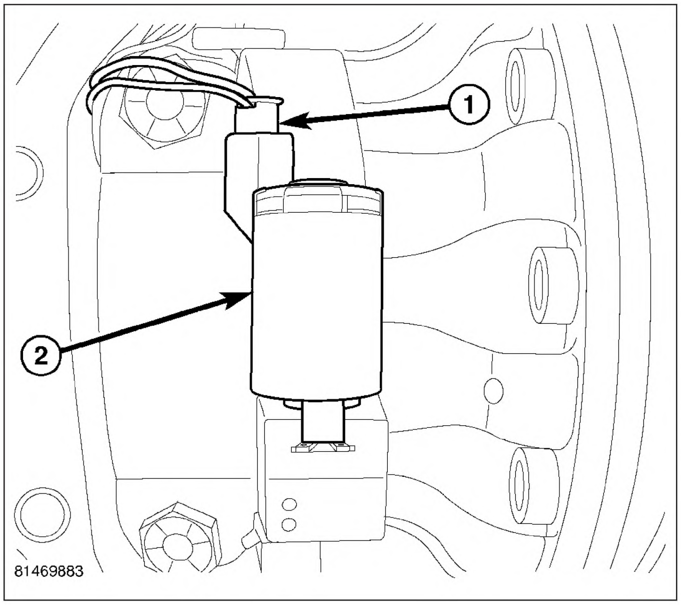
6. Install snap ring (1) into differential housing (2).
7. Install differential housing seal with Installer 9505 and Handle C-4171.



8. Install differential bearing cap (2) between ELSD anti rotation tabs. Install bearing cap bolts (1) finger tight. Remove spreader then tighten bearing cap bolts to 135 N·m (100 ft. lbs.).

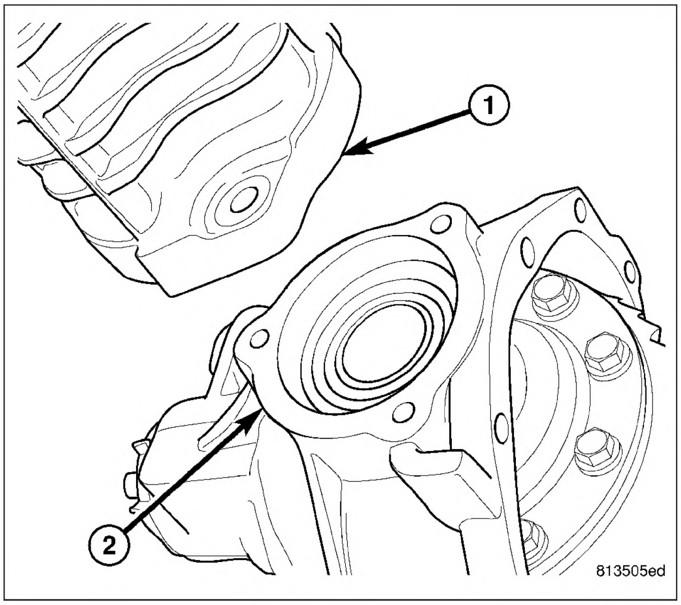


9. Install solenoid valve connector (1) to ELSD solenoid valve (2).



10. Lube new o-ring and install on axle tube (1).
11. Align axle tube (1) with differential housing flange (3) and push tube into place.

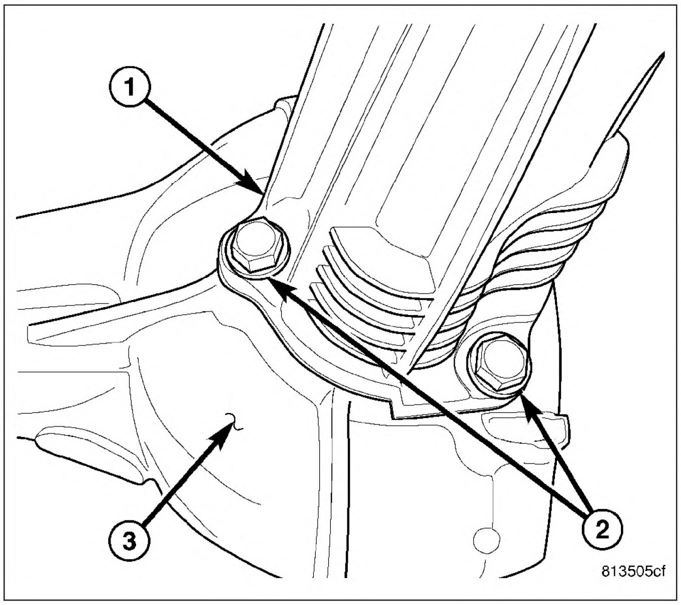
CAUTION: The tube must be perfectly aligned to the housing to prevent damage to the o-ring. Failure to follow these instructions will result in a leak.



12. Install three axle tube (1) mounting bolts (2) and tighten to 56 N·m (41 ft. lbs.).
13. Apply a 6.35mm (1/4 in.) bead of Mopar® Gear Sealant RTV Silicone Rubber Adhesive MS-GF44D or equivalent to the differential case.

CAUTION: If housing cover is not installed within 3 to 5 minutes, the differential case must be cleaned and new RTV applied. Failure to follow these instructions will result in a leak.

14. Install cover and tighten cover bolts in a criss-cross pattern to 56 N·m (41 ft. lbs.).

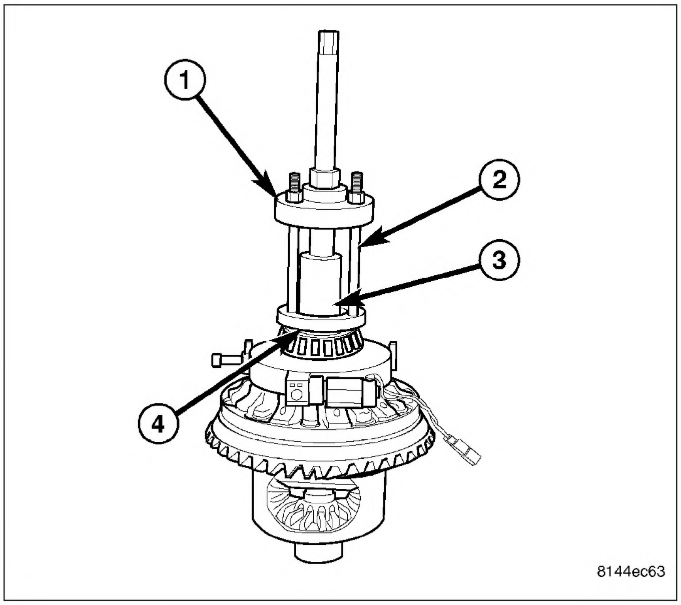


BEARINGS- ELSD DIFFERENTIAL CASE

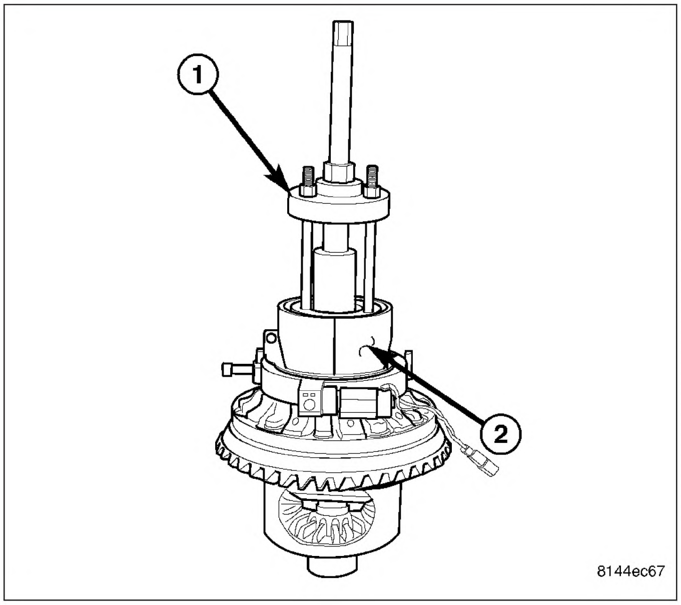
REMOVAL

CAUTION: Do not disturb the ELSD pump after bearing has been removed. Failure to follow these instructions will damage the pump seals.

1. Install Plug SP 3298 (3) Into the differential axle shaft hole.
2. Remove differential case bearings with Puller 6444 (1), Puller Rods 6444-4 (2) and Puller Flange 6444-1(4). Position puller on the differential.



3. Position Puller (1) Jaws 9641(2) around the case bearing and puller flange.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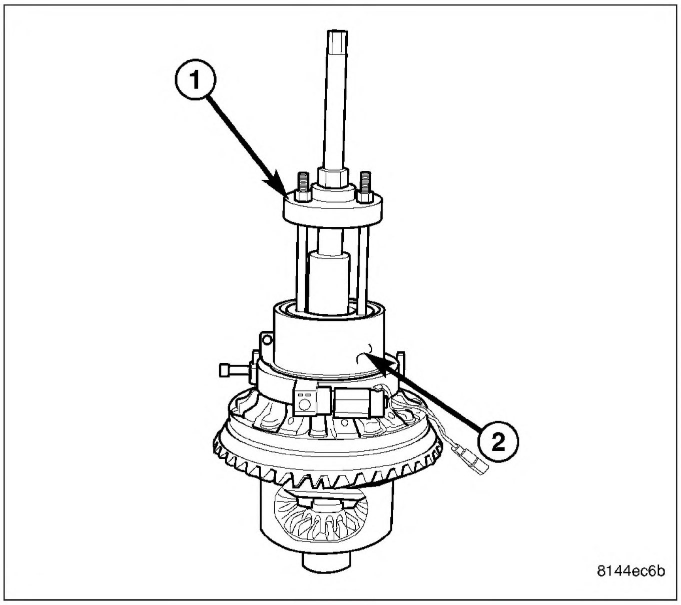
4. Position Puller (1) Collar 6444-8 (2) around the puller jaws.
5. Tighten the puller nut and remove differential case bearing.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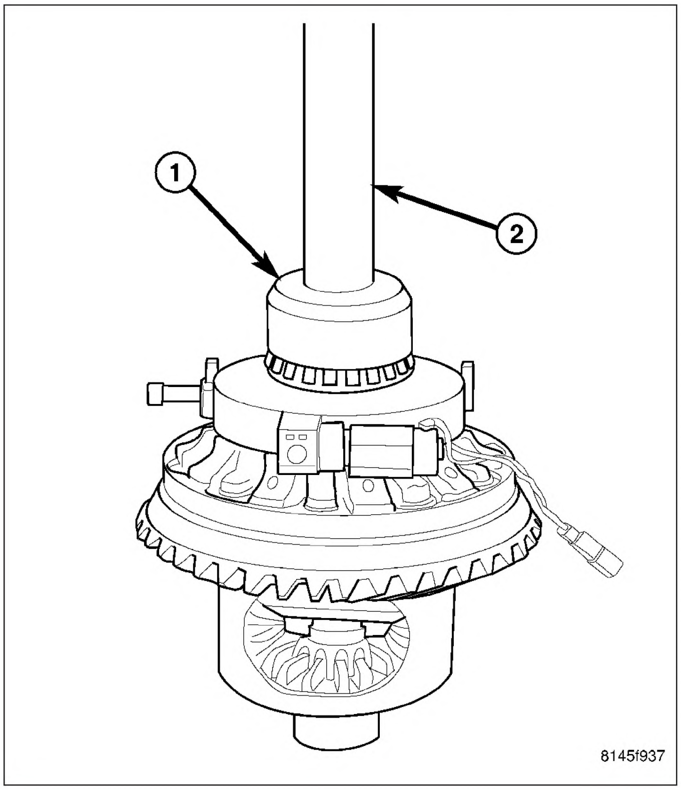
INSTALLATION

CAUTION: Do not disturb the ELSD pump after bearing has been removed. Failure to follow these instructions will damage the pump seals.

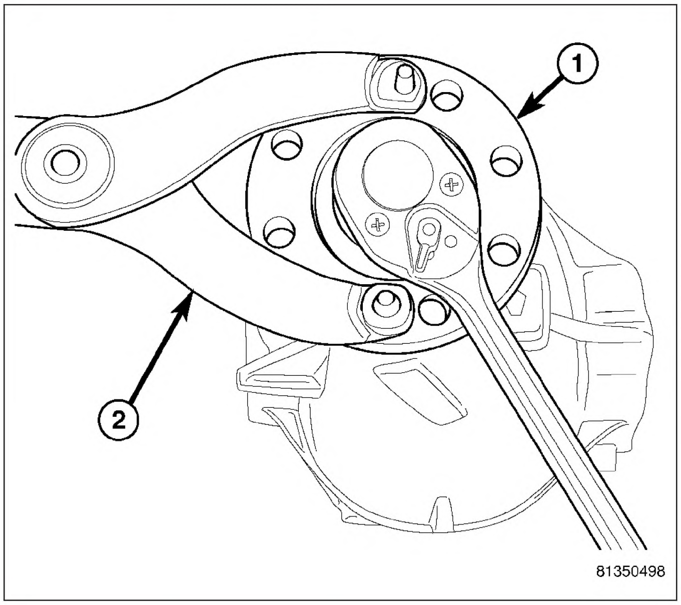
1. Install differential case bearing with Installer 9535 (1) and Handle C-4171 (2).



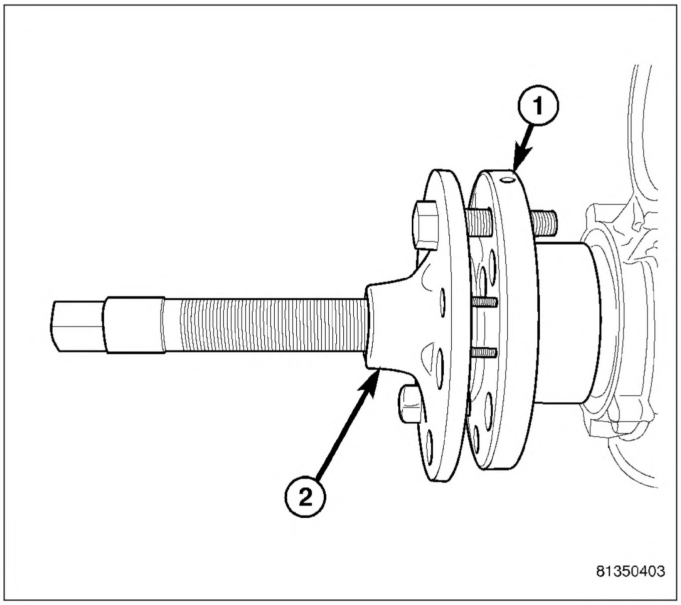
GEAR-PINION/RING

REMOVAL

1. Remove differetial from housing.
2. Bend pinion nut lock tab back.
3. Remove pinion flange (1) nut with flange Holder C-328 (2).



4. Remove pinion flange (1) with Puller C-452 (2).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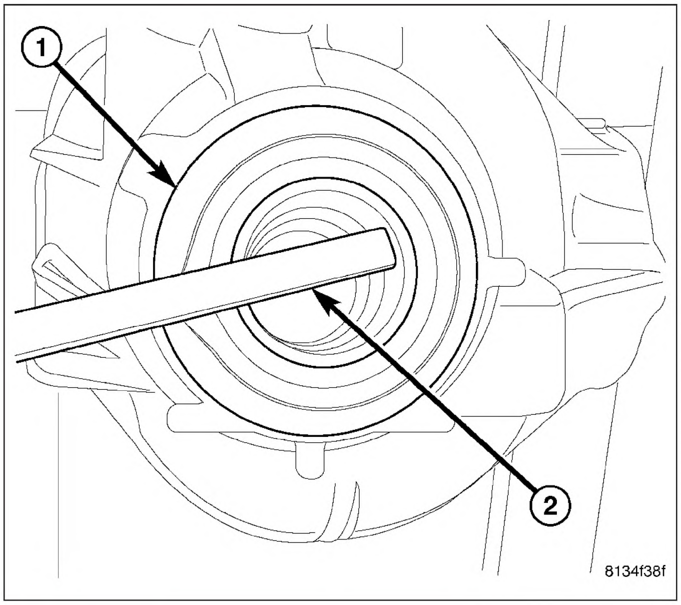
5. Drive pinion gear out of the housing with a soft hammer.
6. Remove pinion seal (1) with a pry bar (2).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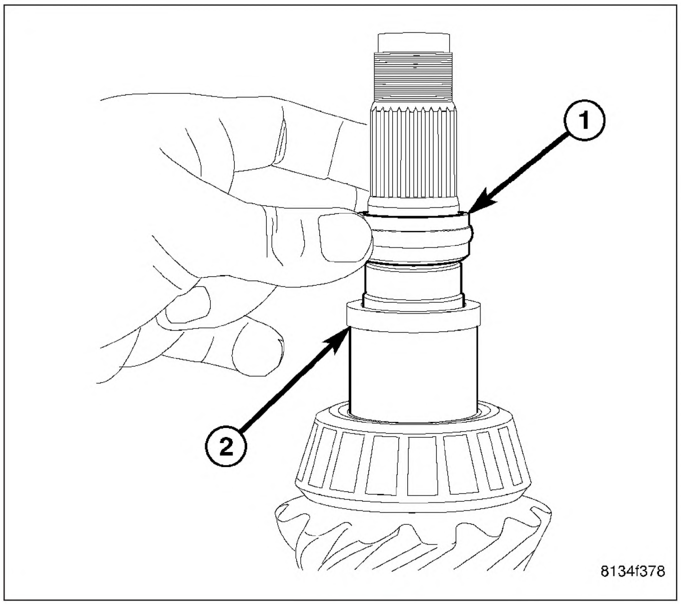
7. Remove collapsible spacer (1) from pinion shaft (2).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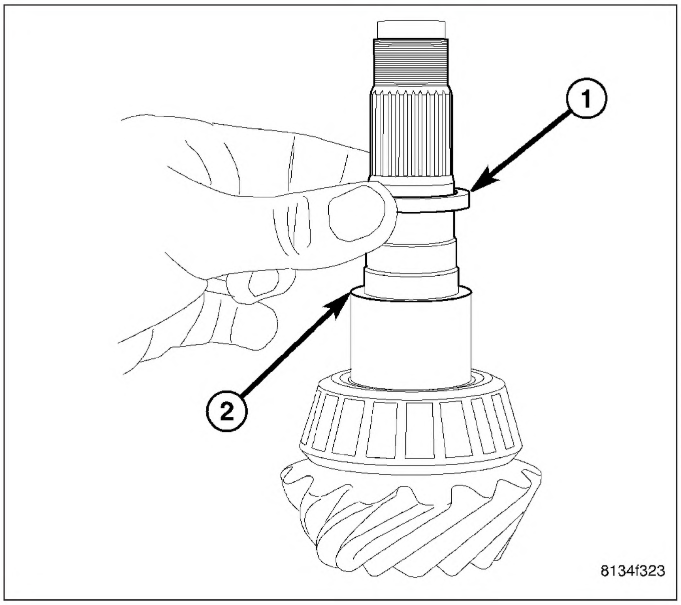
8. Remove spacer (1) from pinion shaft (2).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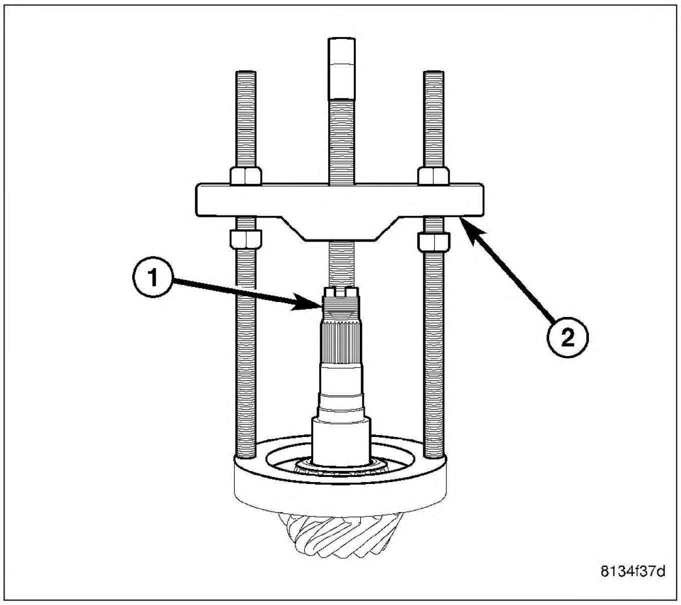
9. Remove rear pinion bearing from pinion shaft (1) with Puller C-293-PA (2) and four Adapters C-293-37.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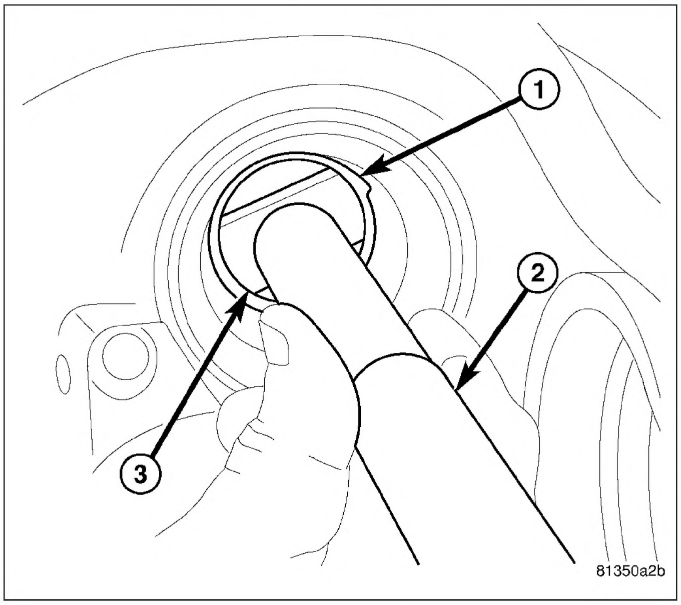
10. Remove front pinion bearing cup (1) with Handle C-4171 (2) and Remover D-103 (3).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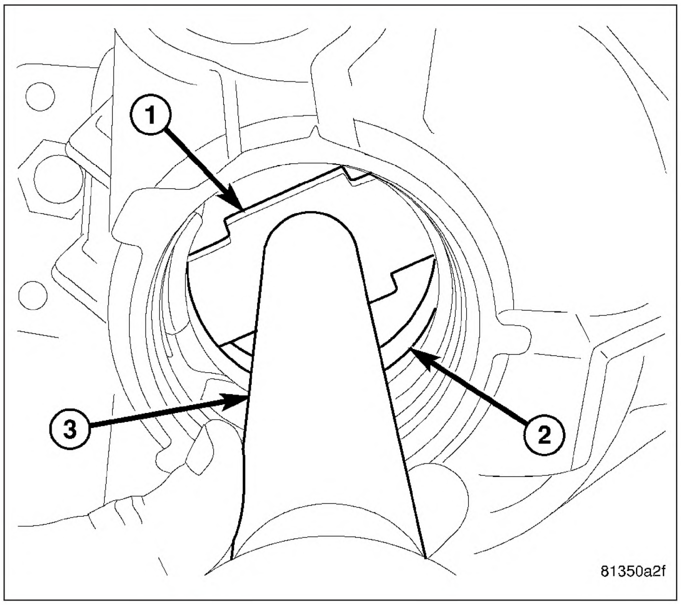
11. Remove rear pinion bearing cup (1) with Remover 9884 (2) and Handle C-4171.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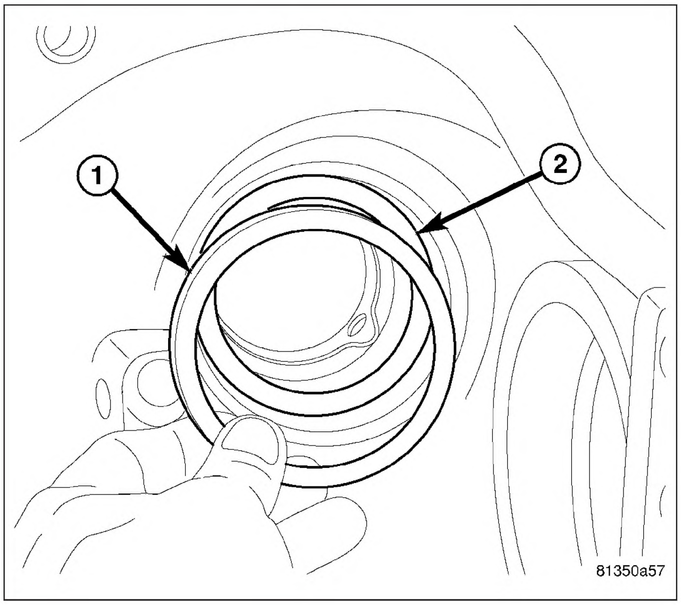
12. Remove pinion height select shim (1) from rear pinion bearing cup bore (2).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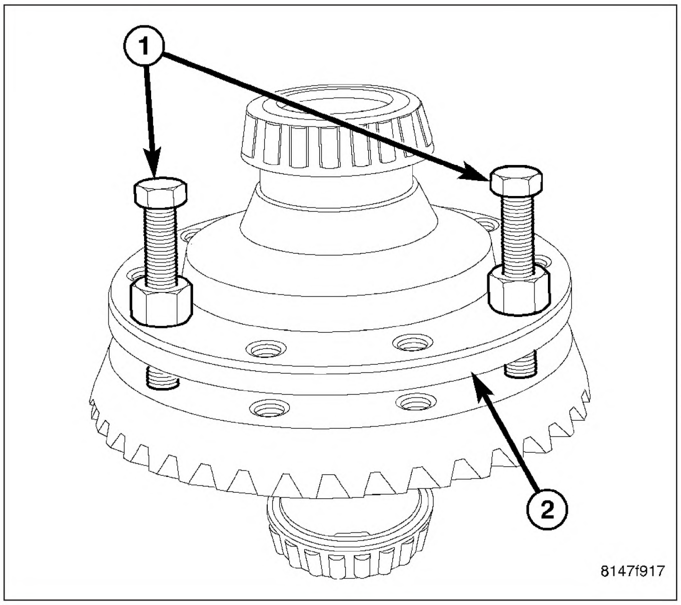
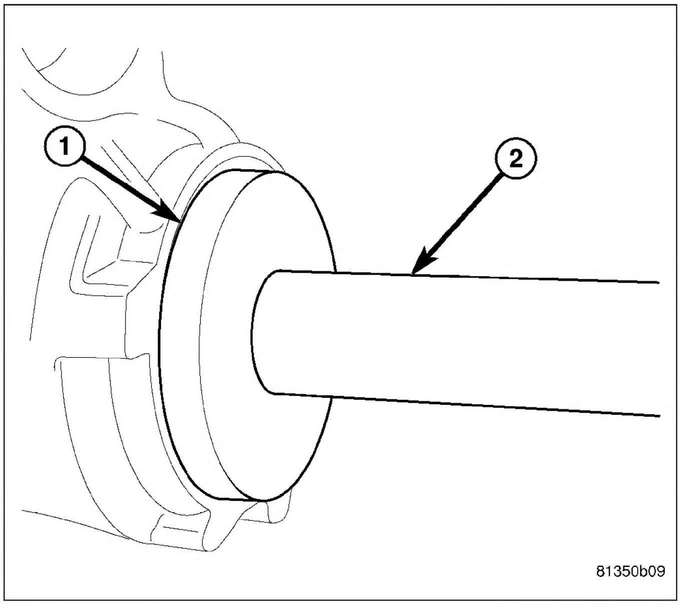
INSTALLATION

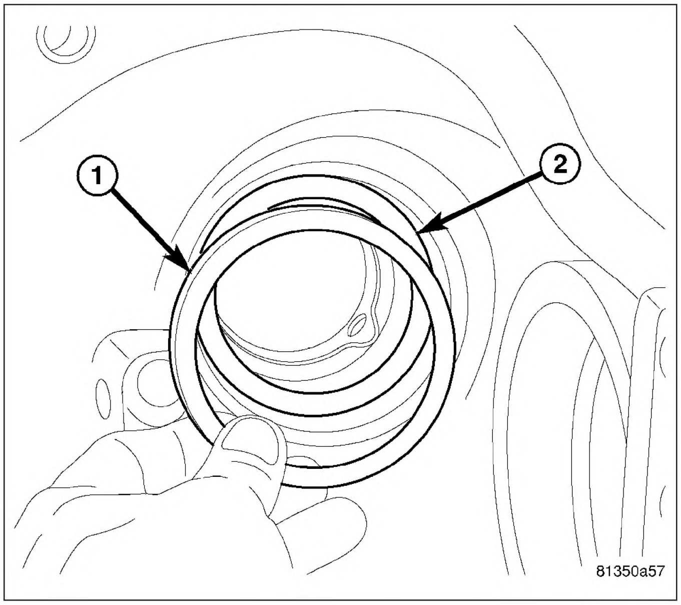
1. Install **left hand thread** ring gear Installer Bolts 9533 (1) through differential (2) and into ring gear (3). Tighten nuts on installer bolts evenly and draw ring gear onto differential case.
2. Remove installer bolts and install new **left hand thread** ring gear bolts and tighten to 102 N·m (75 ft. lbs.).



3. Install front pinion bearing cup into housing, with Installer D-129 (1) and Handle C-4171 (2).



4. Install pinion depth shim (1) in rear pinion bearing cup bore (2).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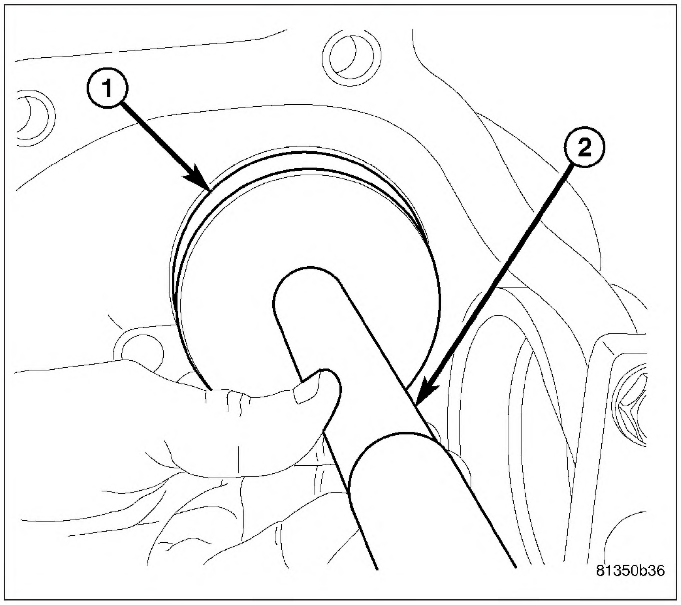
5. Install rear pinion bearing cup into housing, with Installer D-111 (1) and Handle C-4171 (2).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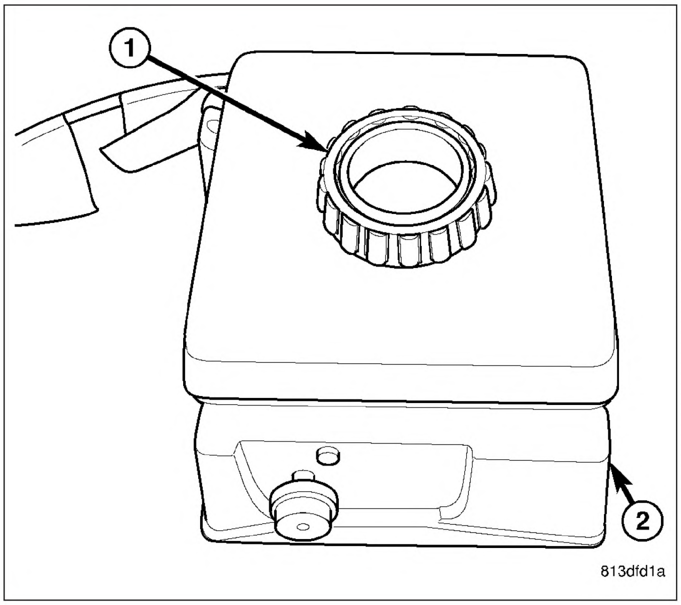
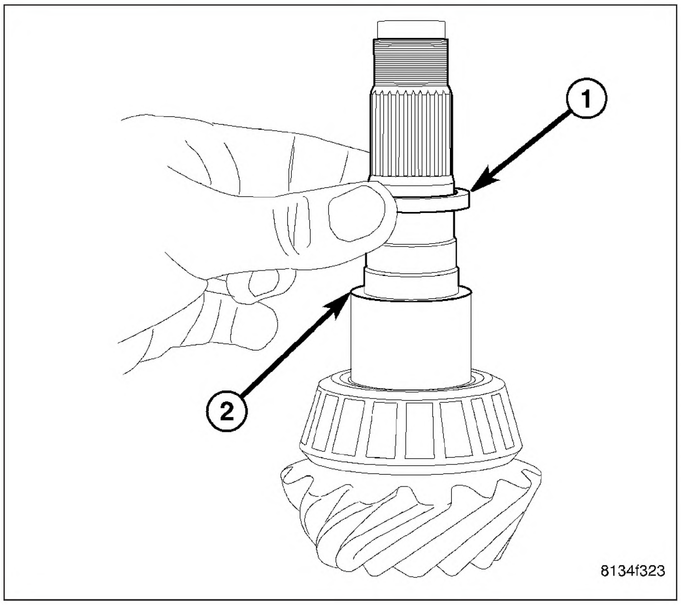
WARNING: Use welding gloves when handling heated components.

CAUTION: A bearing heater is used to assembly some components. Use only an approved heater and only heat components to 100 - 177 Celsius (212 - 350 ° Fahrenheit). Never leave components on heater for and extended amount of time. If component is discolored after heating, component has been overheated and must not be used. Failure to follow these instructions will result in damage.

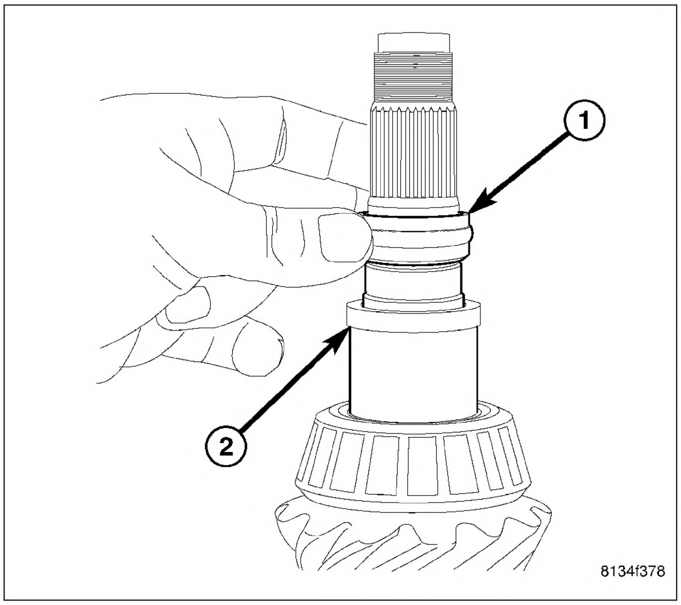
6. Heat rear pinion bearing (1) with bearing heater (2).
7. Using welding gloves, install rear bearing on pinion shaft.



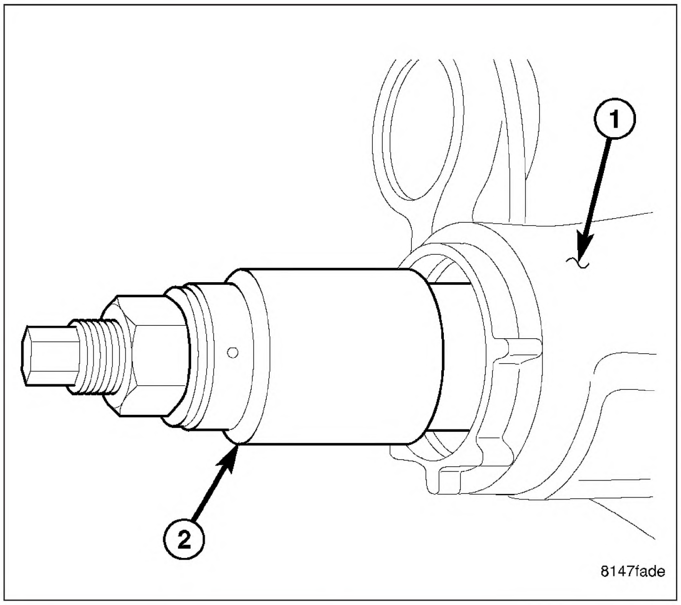
8. Install spacer (1) from pinion shaft (2) with the beveled side facing the gear.



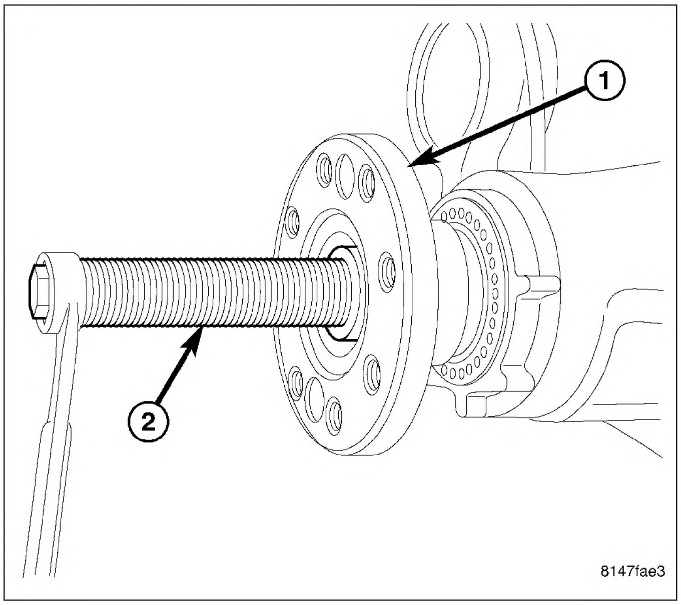
9. Install collapsible spacer (1) from pinion shaft (2).



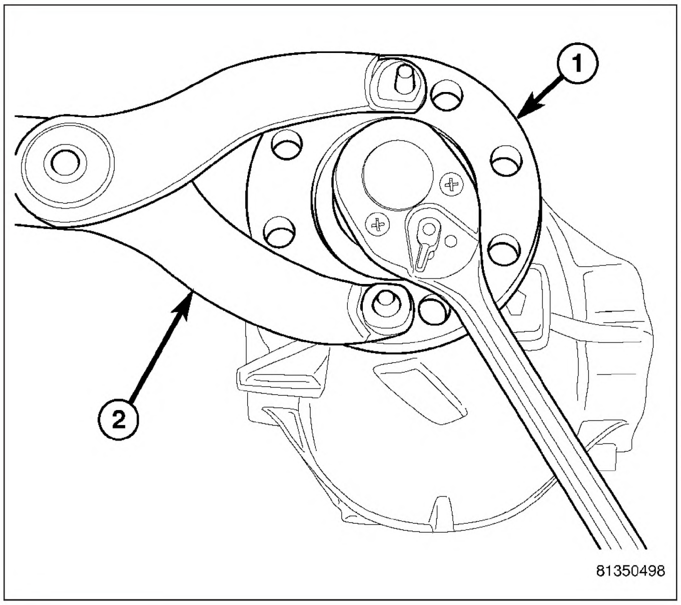
10. Install pinion in housing.
11. Install front pinion bearing into the housing (1) on the pinion shaft with Installer 9616 (2). Thread installer onto the pinion shaft then tighten installer nut.



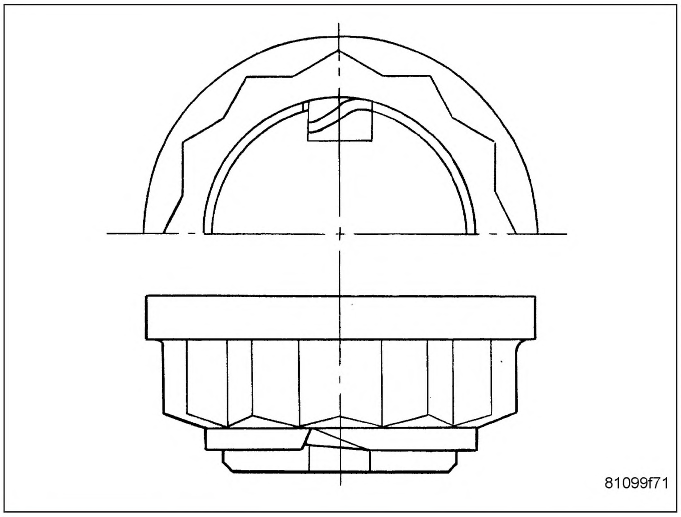
12. Install pinion seal with Installer 9514.
13. Install pinion flange (1) on pinion with Installer 9616 (2). Tap flange on pinion, then thread installer center bolt on pinion shaft and draw flange onto the pinion.



14. Hold pinion flange (1) with Flange Wrench C-3281 (2) and tighten pinion nut until torque to rotate is 1.5 to 1.9 N·m (13 to 17 in. lbs.).



15. Cut the pinion nut collar.
16. Bend nut collar so it touches the wall of the slot in the pinion shaft.
17. Install differential.



REAR AXLE - C213R

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REAR AXLE - C213R

DIAGNOSIS AND TESTING

REAR AXLE - C213R

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, incorrect pinion depth, tooth contact, worn/damaged gears, or the carrier housing not having the proper offset and squareness.

Gear noise usually happens at a specific speed range. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the peak-noise range. If the noise stops or changes greatly check for:

- Insufficient lubricant.
- Incorrect ring gear backlash.
- Gear damage.

Differential side and pinions gears, usually do not cause noise during straight-ahead driving, when the gears are unloaded. The side gears are loaded during turns. A worn pinion mate shaft can also cause a snapping or a knocking noise.

BEARING NOISE

Bearing noise can be either a whining or a growling sound.

Pinion bearings have a constant high pitch noise, because it rotates at a faster rate. This noise changes with vehicle speed. If noise is heard under a load, the rear pinion bearing is the source. If noise is heard during a coast, the front pinion bearing is the source.

Differential bearings usually produce a low pitch noise. The differential bearing noise is constant and varies only with vehicle speed.

Axle shaft bearing noise generally changes when the bearings are loaded. Turn vehicle sharply to the left and the right during a road test. This will load and unload the bearings and change the noise level. If axle bearing damage is slight, the noise is usually not noticeable at speeds above 30 m.p.h.

LOW SPEED KNOCK

Low speed knock is generally caused by:

- Worn U-joints/CV joint.
- Worn side-gear thrust washers.
- Worn pinion shaft bore.

VIBRATION

Vibration at the rear of the vehicle is usually caused by:

- Damaged drive shaft.
- Missing drive shaft balance weight(s).
- Worn or out-of-balance wheels.
- Loose wheel lug nuts.
- Worn U-joints/CV joint.
- Loose/broken springs.
- Damaged axle shaft bearing(s).
- Loose pinion gear nut.
- Excessive pinion yoke run out.
- Bent axle shaft(s).

Check for loose or damaged front-end components or engine/transmission mounts. These components can contribute to what appears to be an axle vibration. Also look at engine accessories, brackets and drive belts.

NOTE: All driveline components should be examined before starting any repair.

DRIVELINE SNAP

A snap or clunk noise when the vehicle is shifted into gear or the clutch engaged, can be caused by:

- High engine idle speed.
- Transmission shift operation.
- Loose engine/transmission/transfer case mounts.
- Worn U-joints/CV joint.
- Loose spring mounts.
- Loose pinion gear nut and yoke.
- Excessive ring gear backlash.
- Excessive side gear to case clearance.

To determined the source of a snap/clunk noise, raise vehicle on a hoist with the wheels free to rotate. Have a helper shift the transmission into gear and listen for the noise.

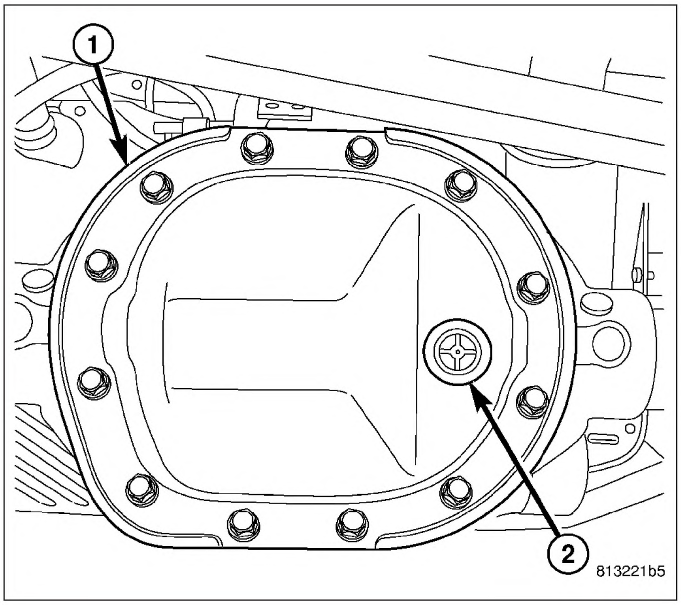
DIAGNOSTIC CHART

Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose.	1. Tighten loose nuts.
	2. Faulty, brinelled wheel bearing.	2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube.	1. Inspect axle tube alignment. Correct as necessary.
	2. Bent or sprung axle shaft.	2. Inspect and correct as necessary.
Axle Shaft Broke	1. Misaligned axle tube.	1. Replace the broken shaft after correcting tube mis-alignment.
	2 Vehicle overloaded.	2. Replace broken shaft and avoid excessive weight on vehicle.
	3. Erratic clutch operation.	3. Replace broken shaft and avoid or correct erratic clutch operation.
	4. Grabbing clutch.	4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly.
	2. Excessive ring gear backlash.	2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly.
	3. Vehicle overloaded.	3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight.
	4. Erratic clutch operation.	4. Replace case and inspect gears and bearings for further damage. Avoid erratic use of clutch.
Differential Gears Scored	1. Insufficient lubrication.	1. Replace scored gears. Fill differential with the correct fluid type and quantity.
	2. Improper grade of lubricant.	2. Replace scored gears. Fill differential with the correct fluid type and quantity.
	3. Excessive spinning of one wheel/tire.	3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.
Loss Of Lubricant	1. Lubricant level too high.	1. Drain lubricant to the correct level.
	2. Worn axle shaft seals.	2. Replace seals.
	3. Cracked differential housing.	3. Repair as necessary.
	4. Worn pinion seal.	4. Replace seal.
	5. Worn/scored companion flange.	5. Replace flange and seal.
	6. Axle cover not properly sealed.	6. Remove, clean, and re-seal cover.

Condition	Possible Causes	Correction
Axle Overheating	1. Lubricant level low.	1. Fill differential to correct level.
	2. Improper grade of lubricant.	2. Fill differential with the correct fluid type and quantity.
	3. Bearing pre-loads too high.	3. Re-adjust bearing pre-loads.
	4. Insufficient ring gear backlash.	4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading.	1. Replace gears. Examine other gears and bearings for possible damage.
	2. Erratic clutch operation.	2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation.
	3. Ice-spotted pavement.	3. Replace gears and examine remaining parts for damage.
	4. Improper adjustments.	4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	1. Insufficient lubricant.	1. Fill differential with the correct fluid type and quantity.
	2. Improper ring gear and pinion adjustment.	2. Check ring gear and pinion contact pattern. Adjust backlash or pinion depth.
	3. Unmatched ring gear and pinion.	3. Replace gears with a matched ring gear and pinion.
	4. Worn teeth on ring gear and/or pinion.	4. Replace ring gear and pinion.
	5. Loose pinion bearings.	5. Adjust pinion bearing pre-load.
	6. Loose differential bearings.	6. Adjust differential bearing pre-load.
	7. Mis-aligned or sprung ring gear.	7. Measure ring gear run-out. Replace components as necessary.
	8. Loose differential bearing cap bolts.	8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued to the proper specification.
	9. Housing not machined properly.	9. Replace housing.

REMOVAL

1. With vehicle in neutral, position on hoist.
2. Remove differential cover (1) and drain fluid.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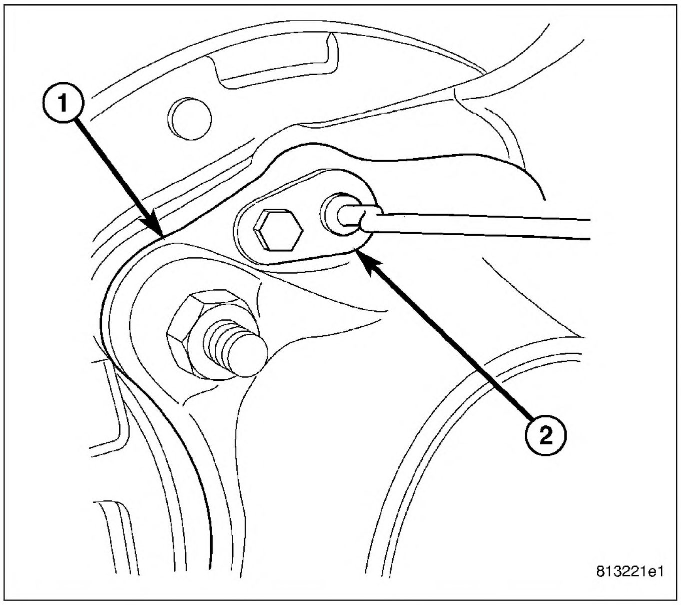
3. Remove calipers and rotors.
4. Remove speed sensors (2) from axle tube (1) flange.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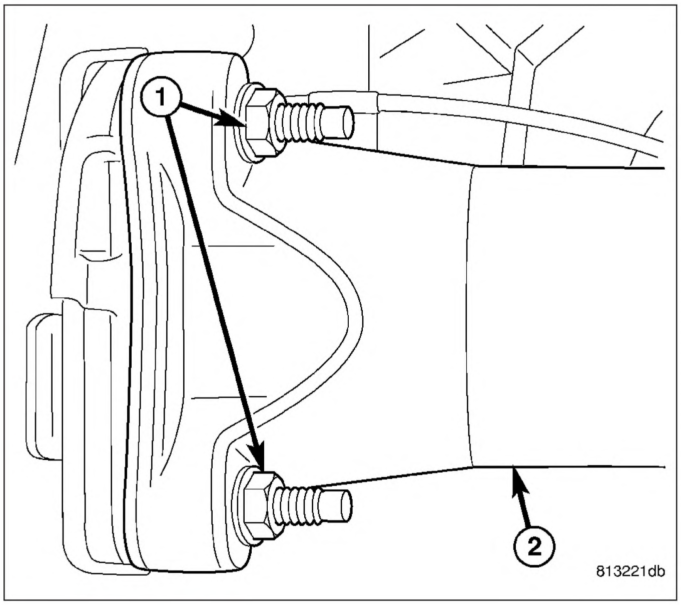
5. Remove axle flange nuts (1) from axle (2).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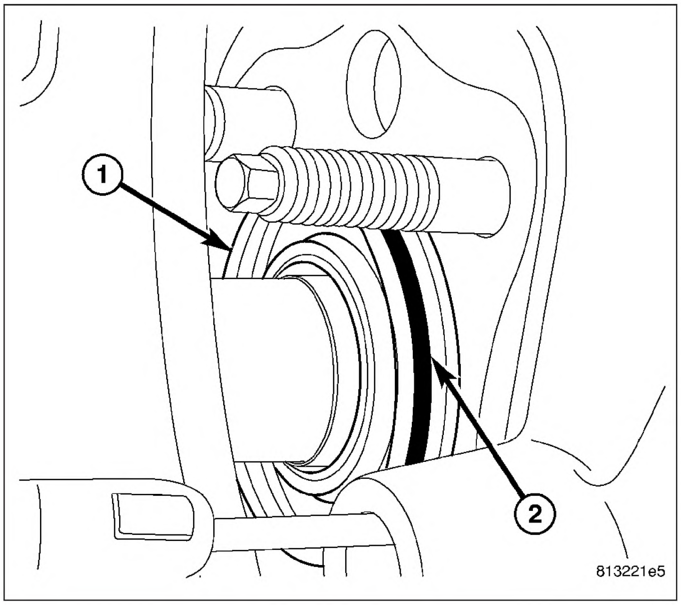
6. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
7. Remove O-ring (2) from the axle bearing.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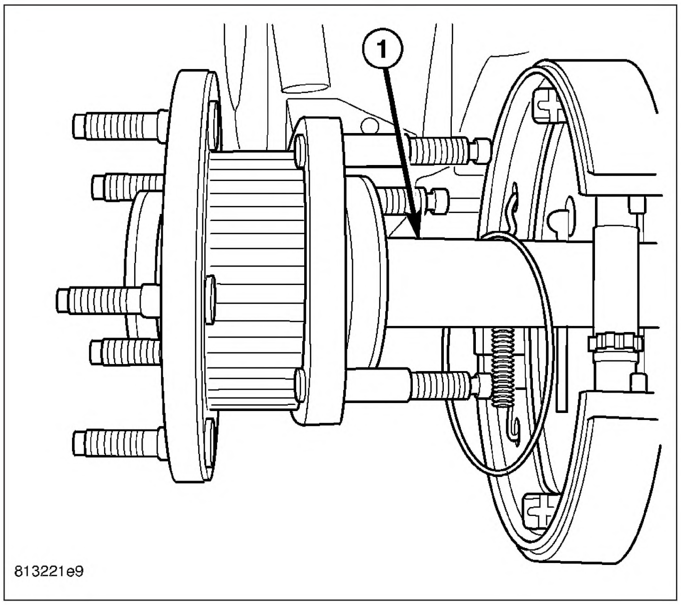
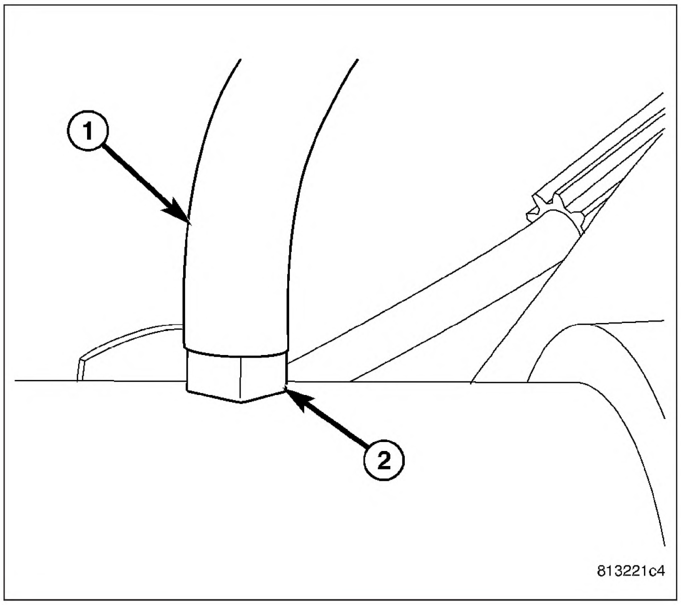
8. Remove axle shaft (1) from axle tube and backing plate.



9. Remove axle vent hose (1) from axle vent (2) and cover bracket.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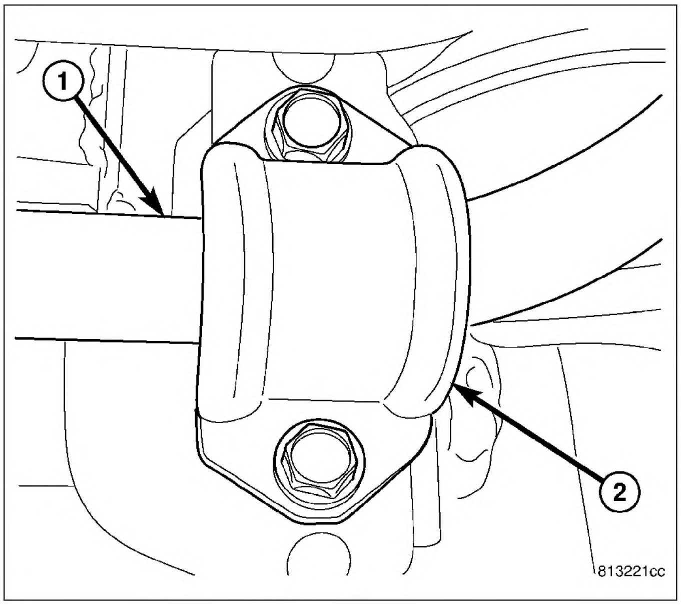
10. Remove propeller shaft.
11. Remove stabilizer bar (1) clamp (2) from axle.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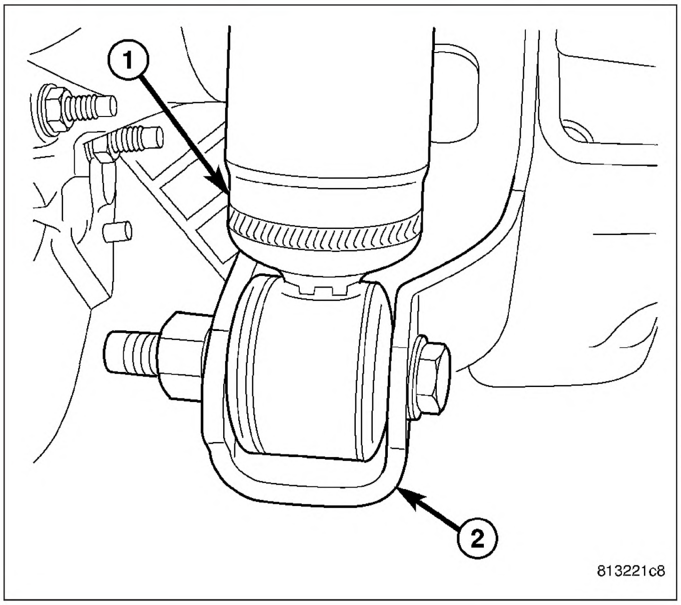
12. Support axle with jack.
13. Remove track bar from axle.
14. Remove shock absobers (1) from axle brackets (2).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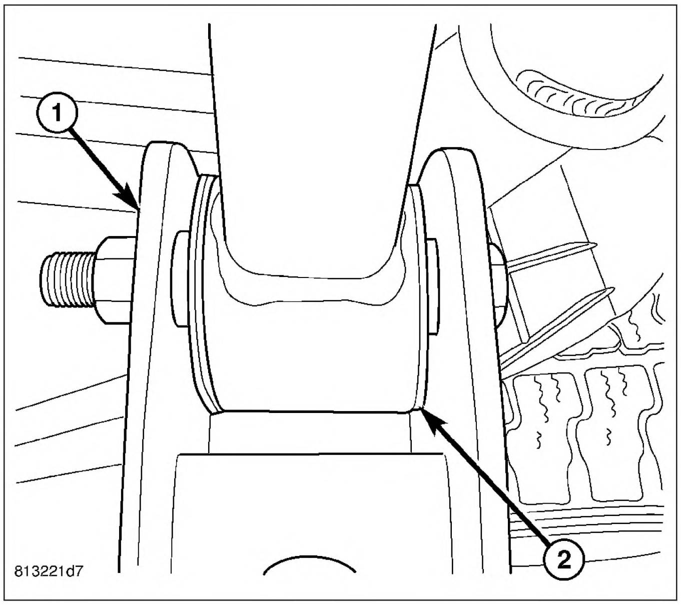
15. Remove upper control arms (2) from axle brackets (1).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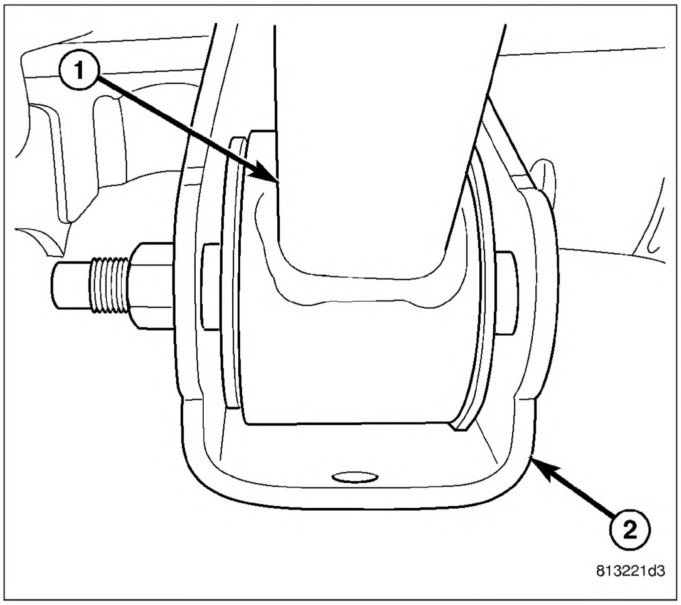
16. Remove lower control arms (1) from axle brackets (2).
17. Lower axle from vehicle and remove coil springs and insulators.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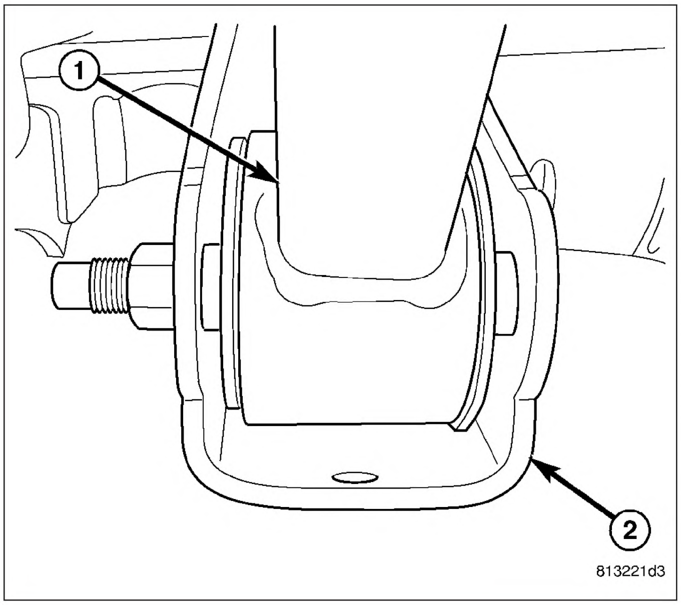
INSTALLATION

1. Install coil springs and insulators. Raise axle into place.
2. Install lower control arms (1) to axle brackets (2).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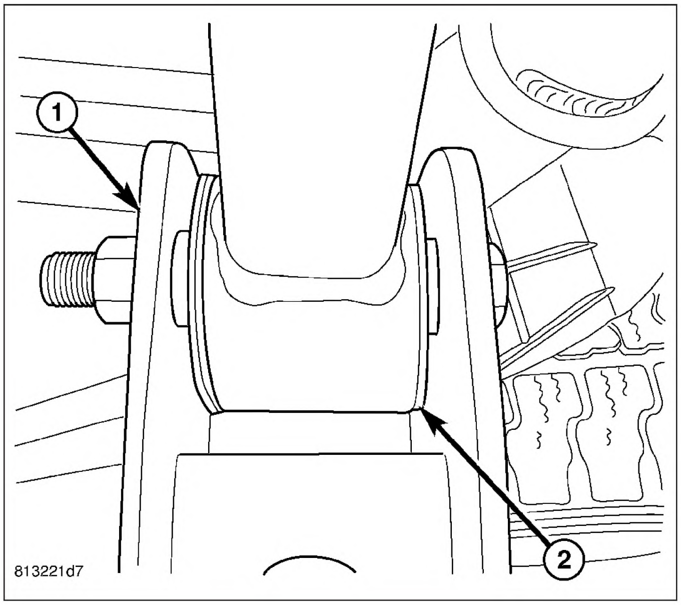
3. Install upper control arms (2) to axle brackets (1).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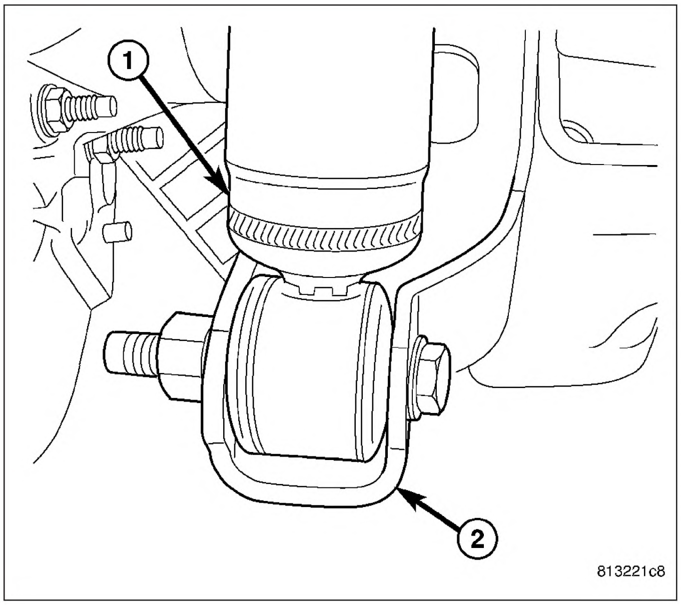
4. Install shock absobers (1) to axle brackets (2).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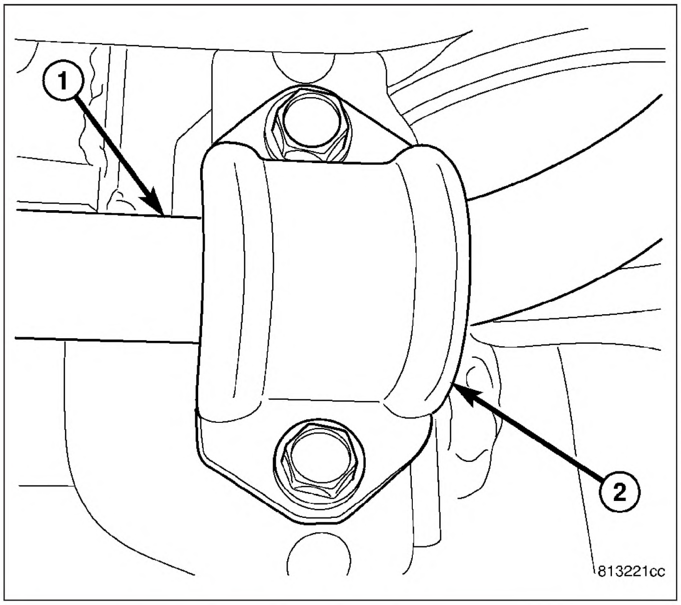
5. Install stabilizer bar (1) and clamps (2) to axle.
6. Install propeller shaft.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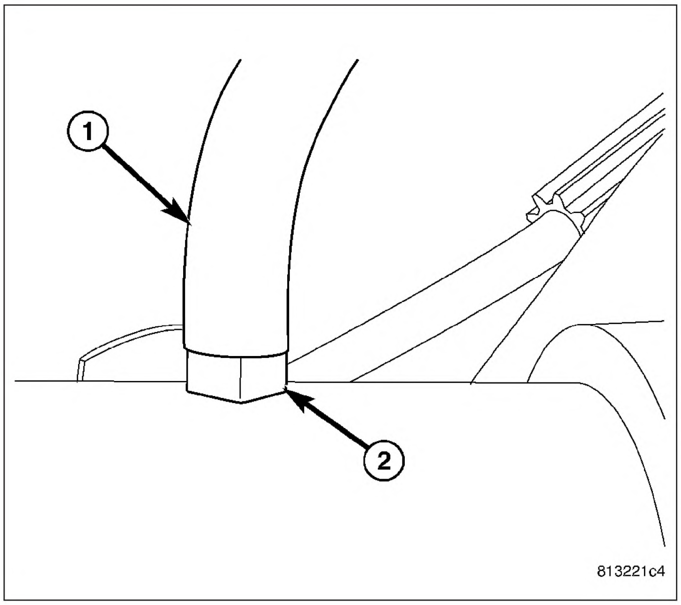
7. Install axle vent hose (1) to axle vent (2) and cover bracket.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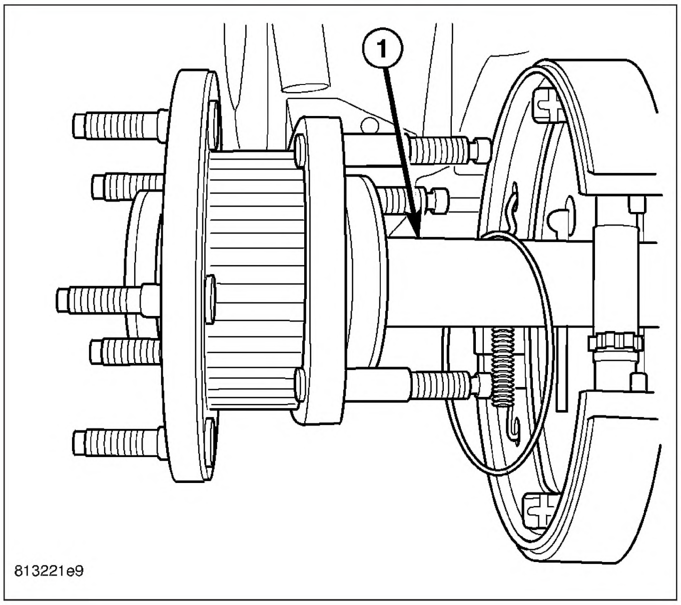
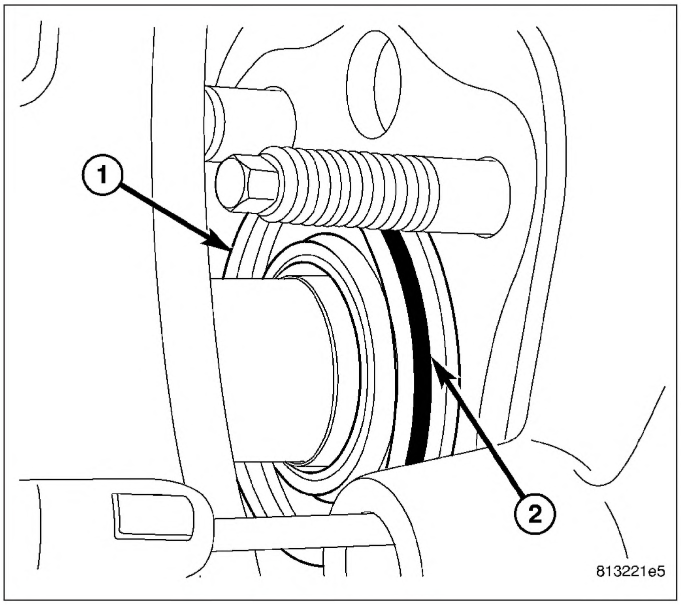
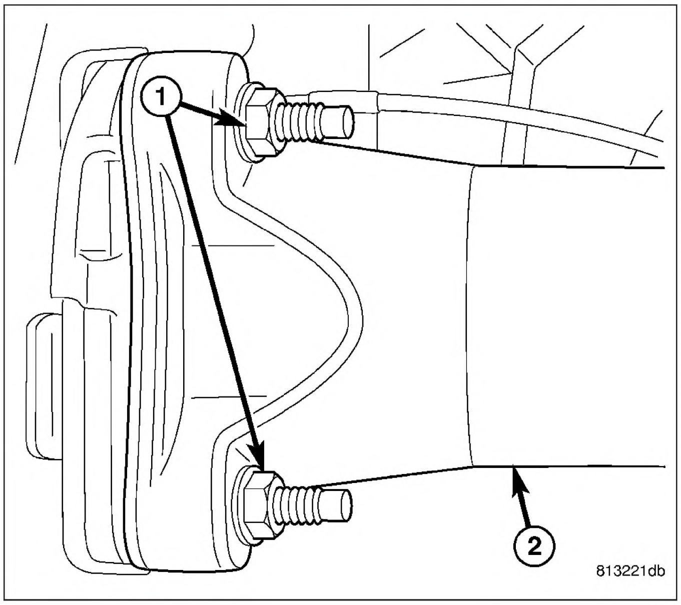
8. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



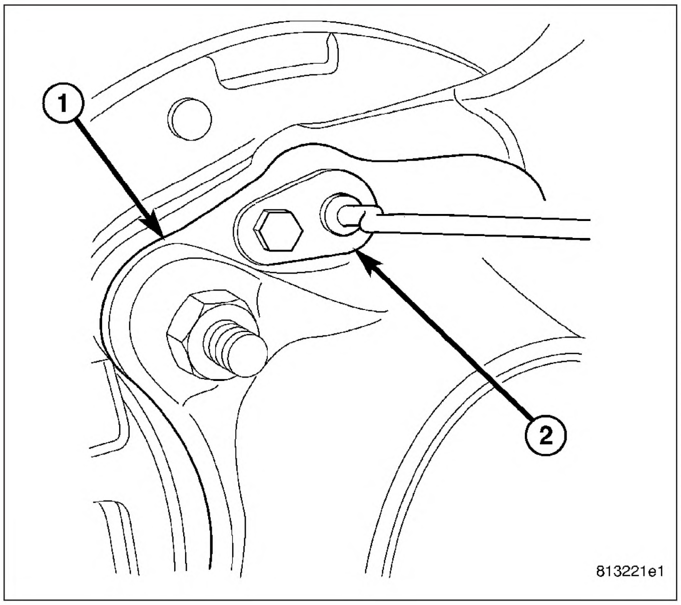
9. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
10. Install O-ring (2) axle bearing.



11. Push axle into axle tube.
12. Install axle (2) flange nuts (1) and tighten to 119 N·m (88 ft. lbs.).

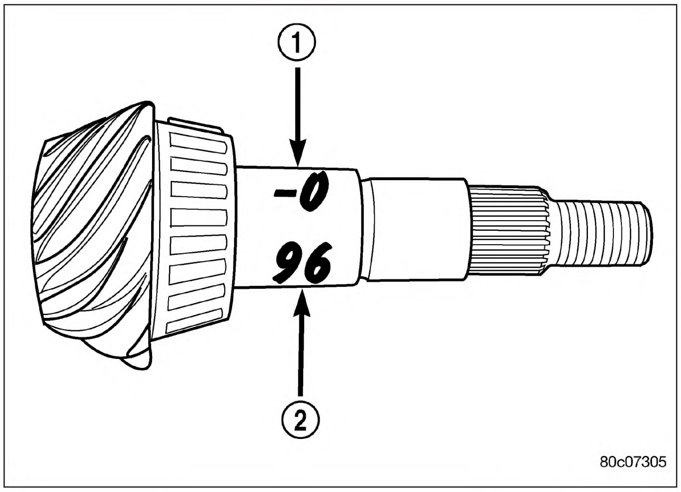


13. Install speed sensors (2) in axle tube (1) flange.
14. Install calipers and rotors.
15. Install differential cover, fill differential and install fill plug.



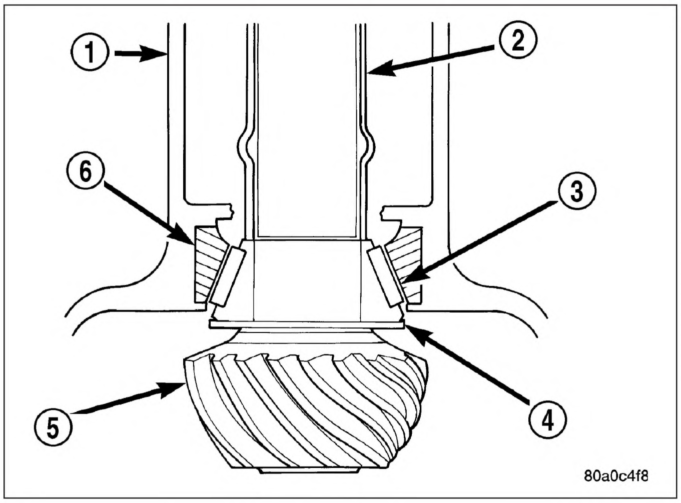
ADJUSTMENTS

Ring gear and pinion are supplied as matched sets. Identifying numbers for the ring gear and pinion are painted onto the pinion gear shaft and the side of the ring gear. A plus (+) number, minus (–) number or zero (0) along with the gear set sequence number (2) (01 to 99) is on each gear. This first number (1) the amount (in thousandths of an inch) the depth varies from the standard depth setting of a pinion marked with a (0). The next two numbers are the sequence number of the gear set. The standard depth provides the best teeth contact pattern.



Compensation for pinion depth variance is achieved with select shims (4). The shims are placed behind the rear pinion bearing.

If installing a new gear, note the depth variance number of the original and replacement pinion. Add or subtract this number from the original depth shim/oil slinger to compensate for the difference in the depth variances. The numbers represent thousands of an inch deviation from the standard. If the number is negative, add that value to the required thickness of the depth shims. If the number is positive, subtract that value from the thickness of the depth shim.



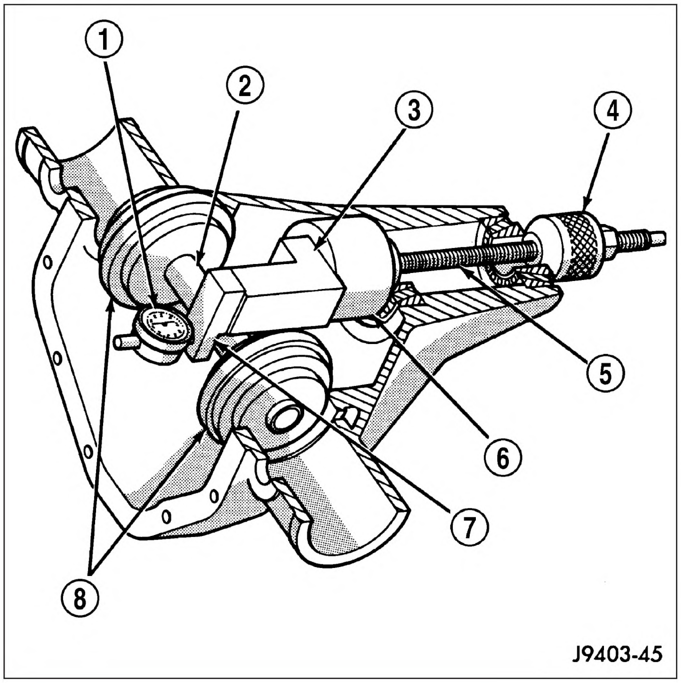
Pinion Gear Depth Variance Chart: Note where Old and New Pinion Marking columns intersect. Intersecting figure represents plus or minus the amount needed.

PINION GEAR DEPTH VARIANCE

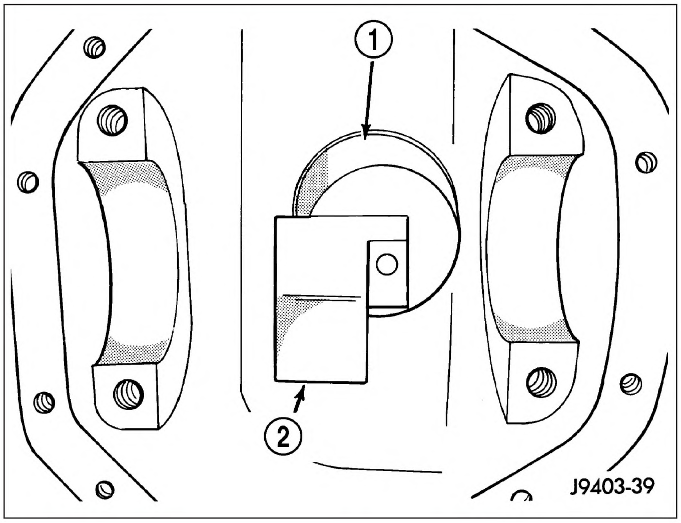
Original Pinion Gear Depth Variance	Replacement Pinion Gear Depth Variance								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

PINION DEPTH MEASUREMENT

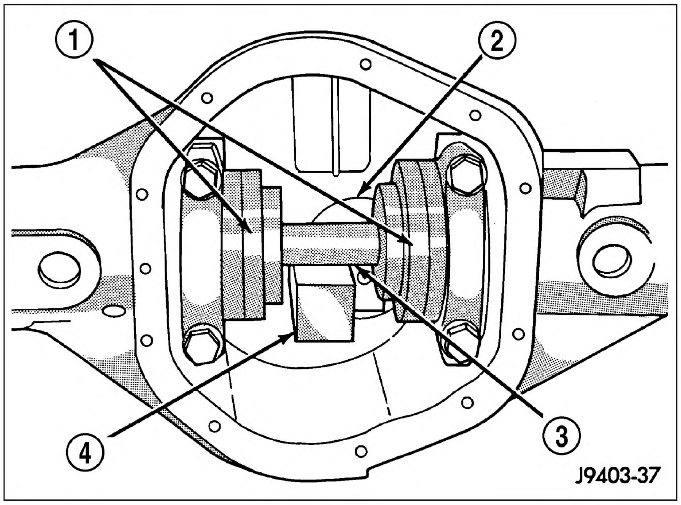
Measurements are taken with pinion bearing cups and pinion bearings installed in the housing. Take measurements with Pinion Gauge Set and Dial Indicator C-3339 (1).



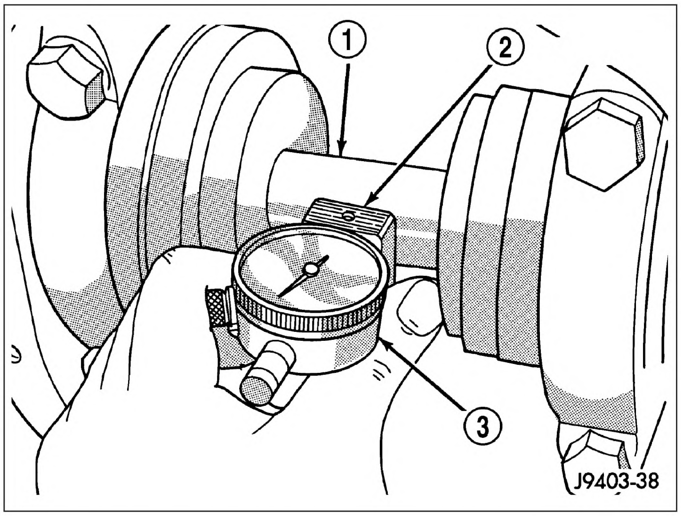
1. Assemble Pinion Height Block 6739 (2), Pinion Block 8540 (1) and rear pinion bearing onto Screw 6741.
2. Insert assembled height gauge components, rear bearing and screw into housing through pinion bearing cups.



3. Install front pinion bearing and Cone-Nut 6740 on the screw. Tighten Cone-Nut until Torque To Rotate screw is 3.4 N·m (30 in. lbs.).
4. Place Arbor Disc 8541A (1) on Arbor D-115-3 (3) and position in the housing side bearing cradles. Install differential bearing caps on arbor discs and tighten cap bolts to 41 N·m (30 ft. lbs.).



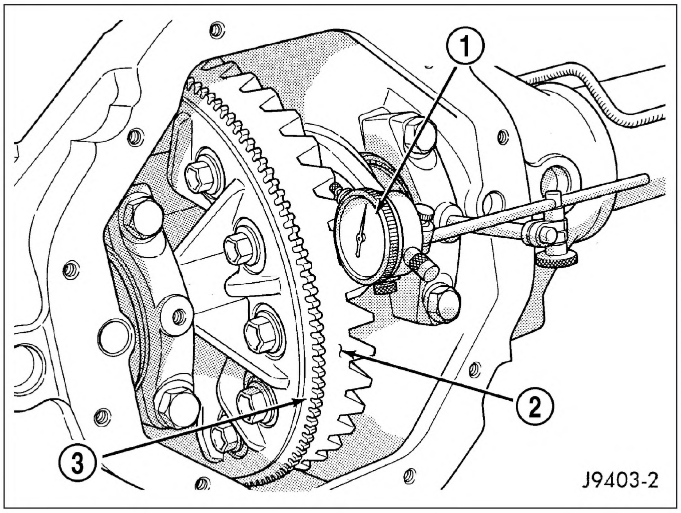
5. Assemble Dial Indicator C-3339 (3) into Scooter Block D-115-2 (2) and secure set screw.
6. Place Scooter Block with Dial Indicator on the pinion height block, so dial probe and scooter block is flush against the pinion height block. Hold scooter block in place and zero the dial indicator. Tighten dial indicator face lock screw.
7. Slide the dial indicator probe over the edge of the pinion height block and on to the arbor bar (1). With the scooter block against the pinion height block.
8. When dial probe contacts the arbor bar, the dial pointer will turn clockwise. Continue moving the dial indicator to the crest of the arbor bar and record the highest reading.
9. Select a shim equal to the dial indicator reading, plus the drive pinion gear depth variance number marked on the shaft of the pinion. For example, if the depth variance is –2, add +0.002 in. to the dial indicator reading. Then subtract 0.04064 mm (0.0016 in.) from the total measurement. This will be the correct shim selection for the pinion height.



DIFFERENTIAL BEARING PRELOAD AND GEAR BACKLASH

The following must be considered when adjusting bearing preload and gear backlash:

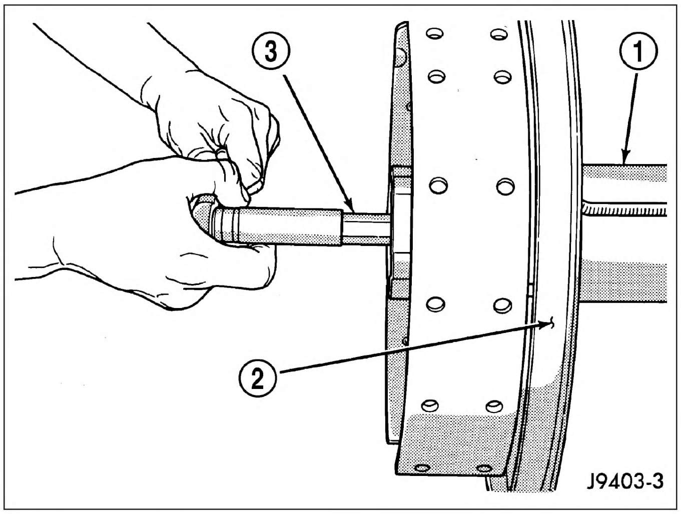
- The maximum ring gear backlash variation is 0.003 inch (0.076 mm).
- Mark the gears so the same teeth are meshed during all backlash measurements.
- Maintain the torque while adjusting the bearing preload and ring gear backlash.
- Excessive adjuster torque will introduce a high bearing load and cause premature bearing failure. Insufficient adjuster torque can result in excessive differential case free-play and ring gear noise.
- Insufficient adjuster torque will not support the ring gear correctly and can cause excessive differential case free-play and ring gear noise.



NOTE: The differential bearing cups will not always immediately follow the threaded adjusters as they are moved during adjustment. To ensure accurate bearing cup responses to the adjustments:

- **Maintain the gear teeth engaged (meshed) as marked.**
- **The bearings must be seated by rapidly rotating the pinion gear a half turn back and forth.**
- **Do this five to ten times each time the threaded adjusters are adjusted.**

1. Use Wrench C-4164 to adjust each threaded adjuster inward until the differential bearing free-play is eliminated. Allow some ring gear backlash approximately 0.25 mm (0.01 in.) between the ring and pinion gear. Seat the bearing cups with the procedure described above.
2. Install dial indicator (1) and position the plunger against the drive side of a ring gear tooth (2). Measure the backlash at 4 positions (90 degrees apart) around the ring gear. Locate and mark the area of minimum backlash.
3. Rotate the ring gear to the position of the least backlash. Mark the gear so that all future backlash measurements will be taken with the same gear teeth meshed.



4. Loosen the right-side, tighten the left-side threaded adjuster with Adjuster Wrench C-4164 (3). Obtain backlash of 0.076 - 0.102 mm (0.003 - 0.004 in.) with each adjuster tightened to 14 N·m (10 ft. lbs.). Seat the bearing cups with the procedure described above.
5. Tighten the differential bearing cap bolts to 95 N·m (70 ft. lbs.).
6. Tighten the right-side threaded adjuster to 102 N·m (75 ft. lbs.). Seat the bearing cups with the procedure described above. Continue to tighten the right-side adjuster and seat bearing cups until the torque remains constant at 102 N·m (75 ft. lbs.)
7. Measure the ring gear backlash. The range of backlash is 0.15 - 0.203 mm (0.006 - 0.008 in.).
8. Continue increasing the torque at the right-side threaded adjuster until the specified backlash is obtained.

NOTE: The left-side threaded adjuster torque should have approximately 102 N·m (75 ft. lbs.). If the torque is considerably less, the complete adjustment procedure must be repeated.

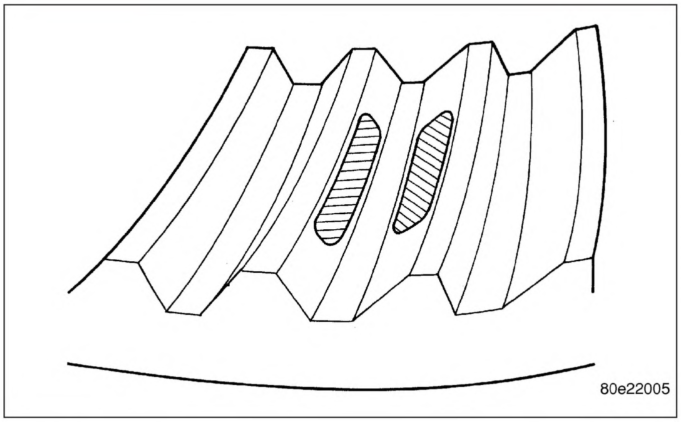
9. Tighten the left-side threaded adjuster until 102 N·m (75 ft. lbs.) torque is indicated. Seat the bearing rollers with the procedure described above. Do this until the torque remains constant.

10. Install the threaded adjuster locks and tighten the lock screws to 10 N·m (90 in. lbs.).
11. After the proper backlash is achieved, perform the Gear Contact procedure.

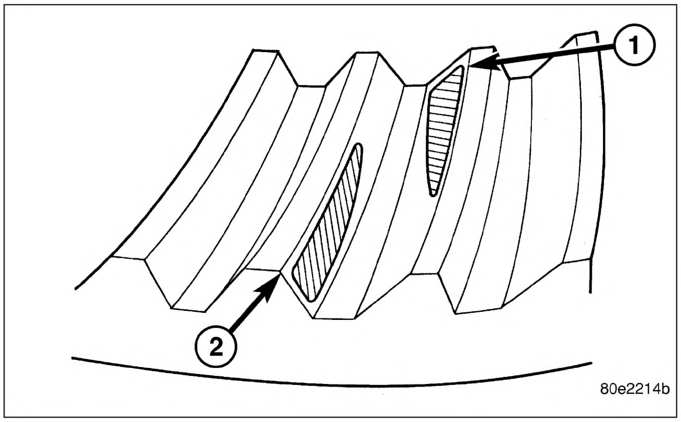
GEAR CONTACT PATTERN

1. Wipe clean each tooth of the ring gear.
2. Apply gear marking compound to all of the ring gear teeth.
3. Verify bearing cap bolts are torque specification.
4. Apply parking brakes lightly to create at 14 N·m (10 ft. lbs.) pinion rotating torque.
5. Rotate the pinion/pinion yoke 4 full revolutions in each directions.
6. Read gear tooth contact pattern.

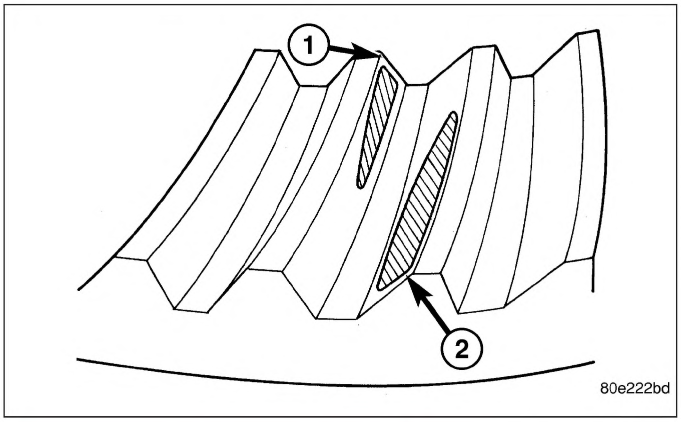
Gear contact pattern is correct. Backlash and pinion depth is correct.



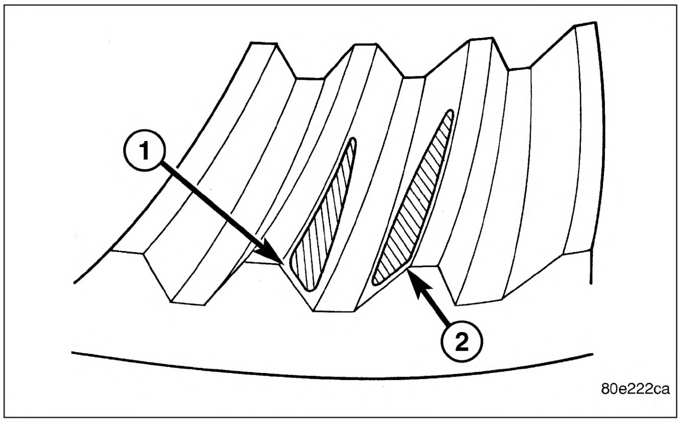
Ring gear is too far away from the pinion gear, coast side toe (1) drive side heel (2). Decrease backlash by moving ring closer to the pinion gear using the adjusters.



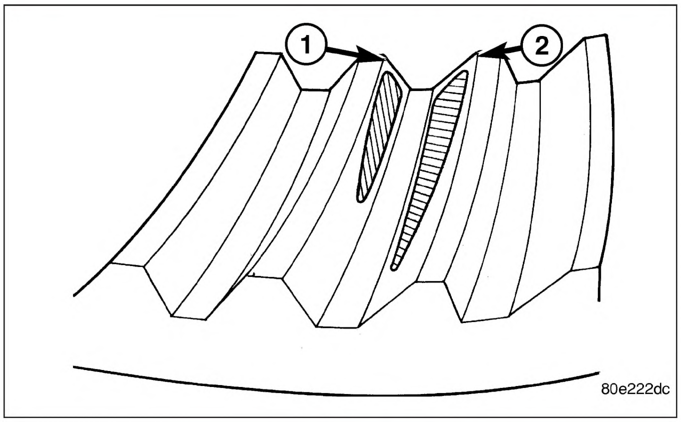
Ring gear is too close to the pinion gear, drive side toe (1) coast side heel (2). Increase backlash by moving ring away from the pinion gear using the adjusters.



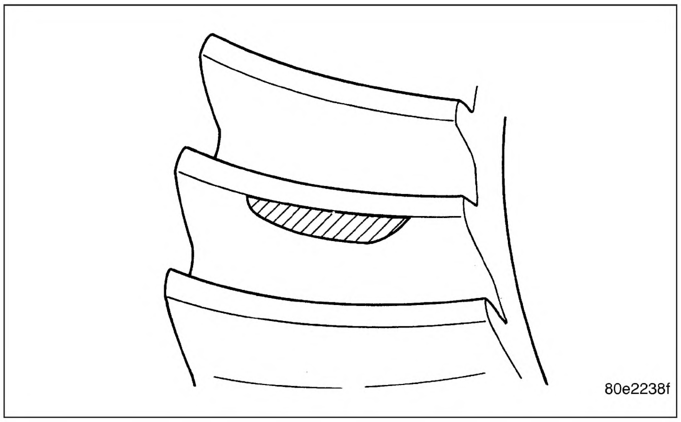
Ring gear is too far away from the pinion gear, drive side heel (1) coast side heel (2). Decrease backlash by moving ring gear closer to the pinion gear using the adjusters.



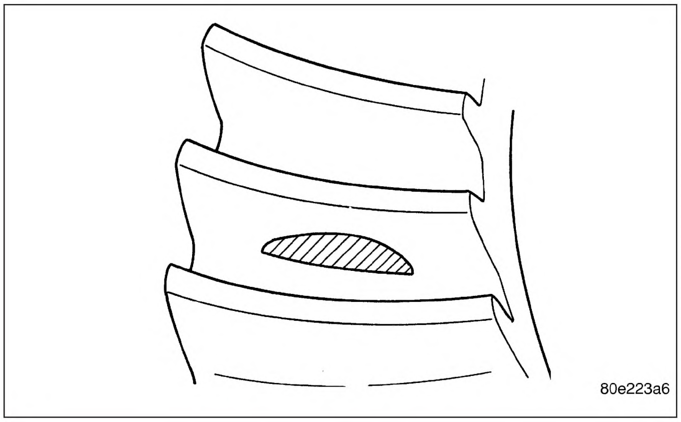
Ring gear is too close to the pinion gear, drive side toe (1) coast side toe (2). Increase backlash by moving ring gear away from the pinion gear using the adjusters.



Pinion gear is set too low. Increase pinion gear height, by increasing pinion depth shim thickness.



Pinion gear is set too high. Decrease pinion height by decreasing the pinion depth shim thickness.



SPECIFICATIONS

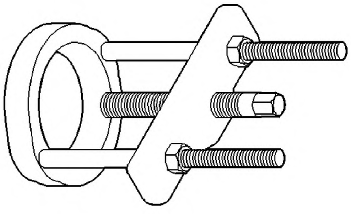
AXLE SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Axle Ratio	3.21, 3.55, 3.73
Differential Case Flange Runout	0.076 mm (0.003 in.)
Differential Case Clearance	0.12 mm (0.005 in.)
Ring Gear Diameter	209.5 mm (8.25 in.)
Ring Gear Backlash	0.12-0.20 mm (0.005-0.008 in.)
Ring Gear Runout	0.12 mm (0.005 in.)
Pinion Bearing Preload - Original Bearings	1-2 N·m (10-20 in. lbs.)
Pinion Bearing Preload - New Bearings	1.7-4 N·m (15-35 in. lbs.)

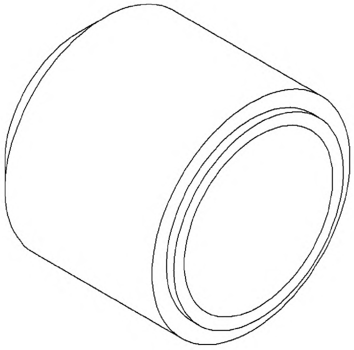
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Differential Cover Bolts	41	30	-
Bearing Cap Bolts	136	100	-
Ring Gear Bolts	102	75	-
Pinion Nut Minimum	285	210	-
Adjuster Lock Screw	11	8	-
Pinion Shaft Lock Screw	26	19	-
Axle Flange Nuts	119	88	-

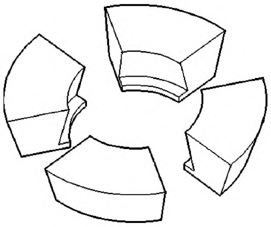
SPECIAL TOOLS



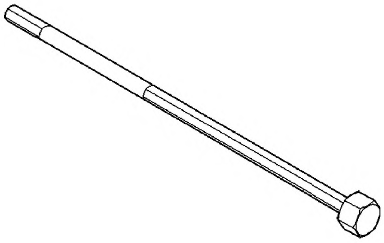
PULLER/PRESS C-293-PA



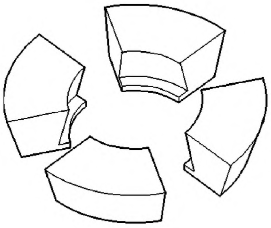
SEAL INSTALLER C-3972A



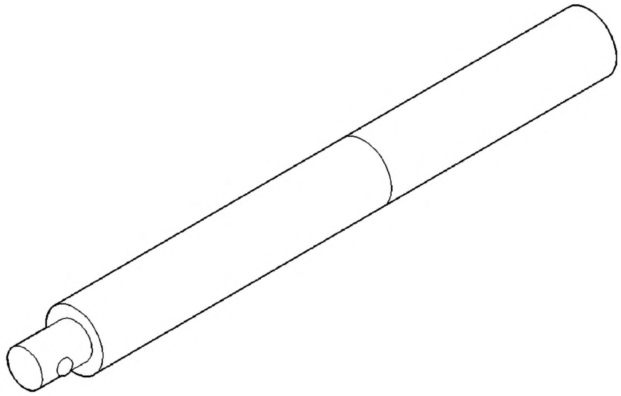
ADAPTERS C-293-47



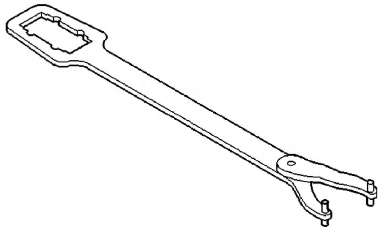
ADJUSTMENT WRENCH C-4164



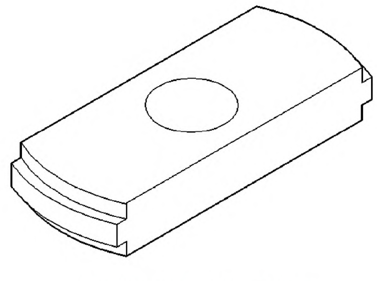
ADAPTERS C-293-48



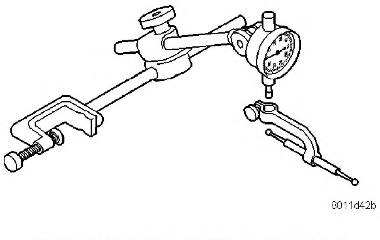
HANDLE C-4171



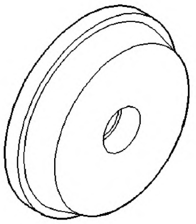
FLANGE WRENCH C-3281



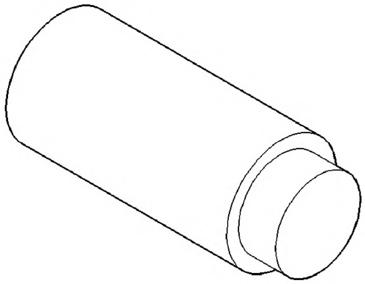
REMOVER C-4307



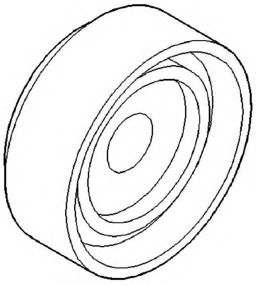
DIAL INDICATOR C-3339



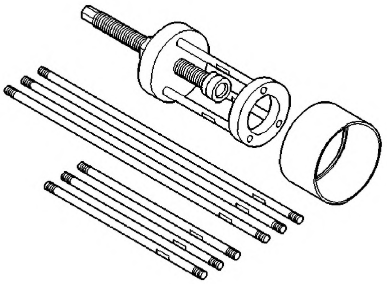
INSTALLER C-4308



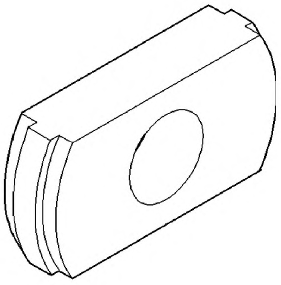
ADAPTER PLUG SP-3289



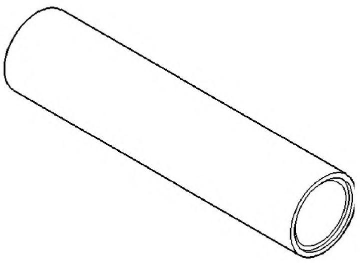
INSTALLER C-4340



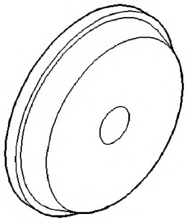
PULLER 6444



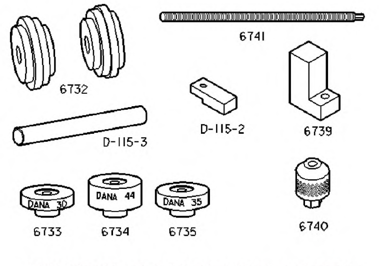
REMOVER C-4345



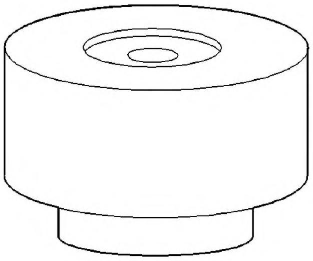
INSTALLER 6448A



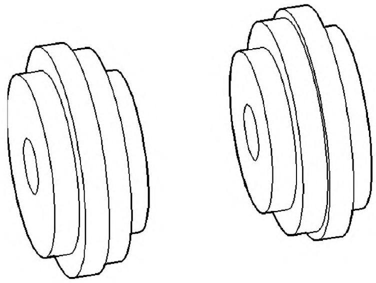
INSTALLER D-130


6741
6732
D-115-2
6739
D-115-3
DANA 30
DANA 44
DANA 35
6733
6734
6735
6740

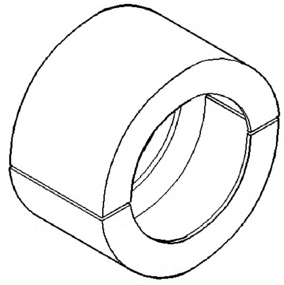
PINION GAUGE SET 6774



PINION BLOCK 8540



ARBOR DISCS 8541A

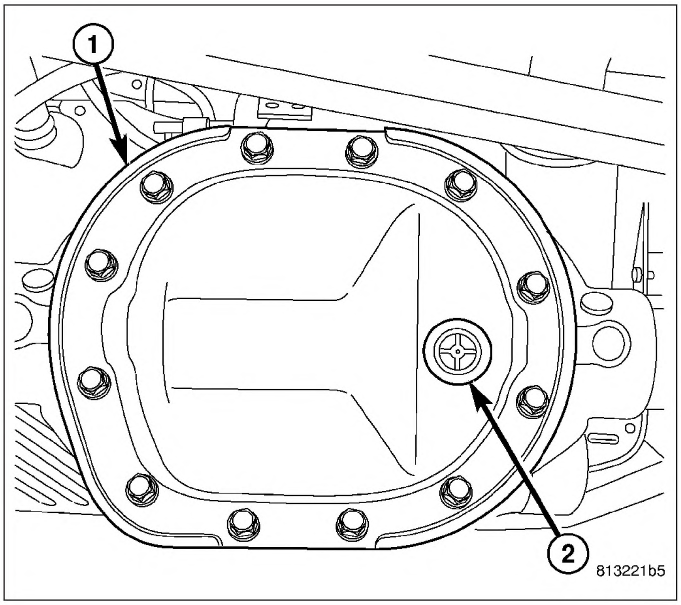


JAWS 9639

DIFFERENTIAL COVER

REMOVAL

1. With vehicle in neutral, position on hoist.
2. Remove differential cover (1) fill plug (2).
3. Remove differential cover (1) and drain fluid.

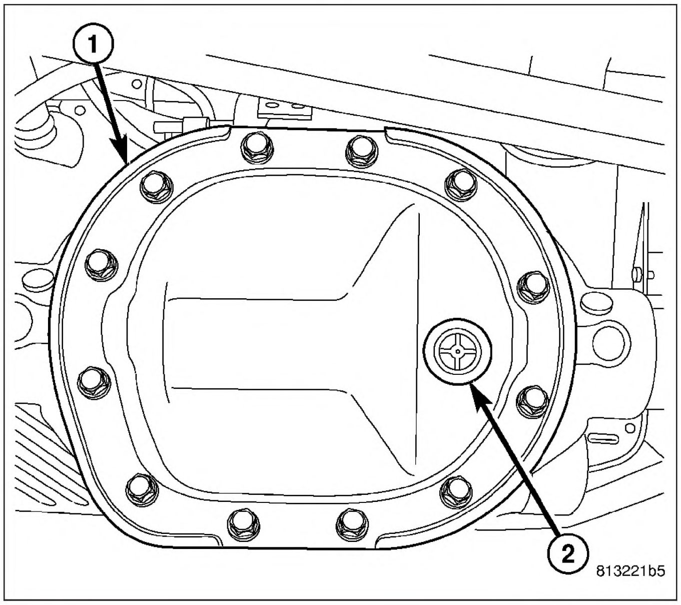


INSTALLATION

1. Apply a 6.35mm (1/4 in.) bead of Mopar® Gear Sealant RTV Silicone Rubber Adhesive MS-GF44D or equivalent to the cover.

CAUTION: If housing cover is not installed within 3 to 5 minutes, the cover must be cleaned and new RTV applied. Failure to follow these instructions will result in a leak.

2. Install cover and tighten cover (1) bolts in a criss-cross pattern to 41 N·m (30 ft. lbs.).

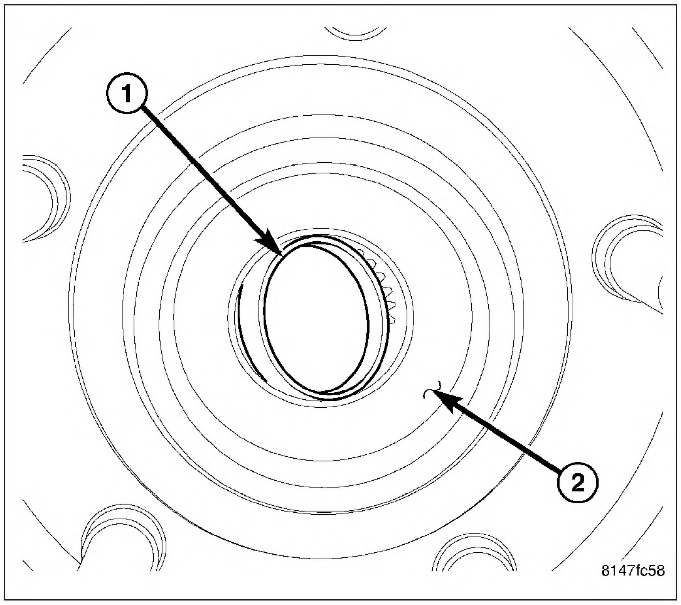


3. Fill differential and install fill plug.

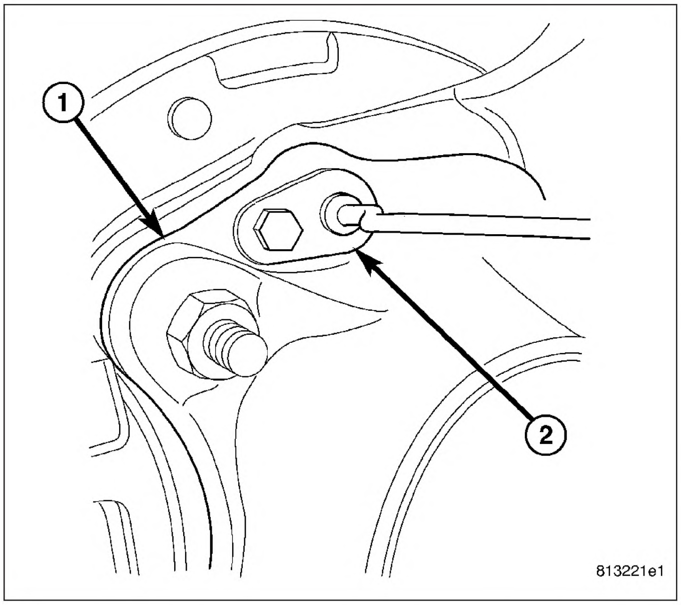
AXLE SHAFTS

REMOVAL

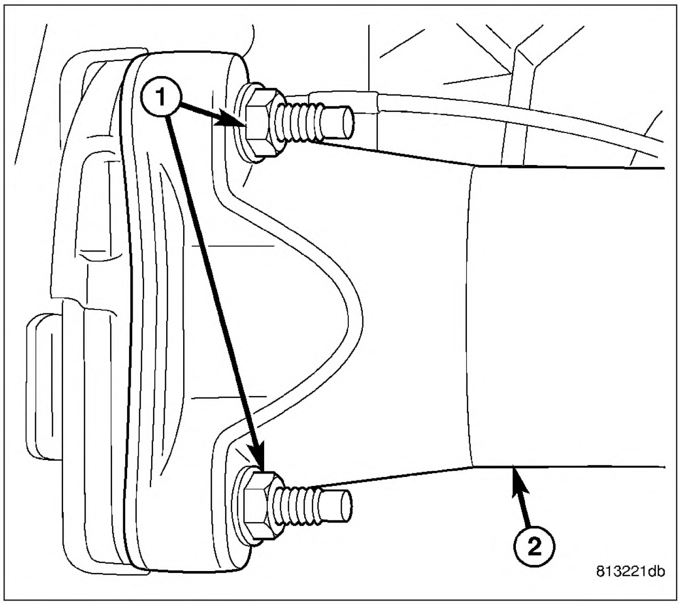
1. With vehicle in netural, position on hoist.
2. Remove calipers and rotors.
3. Tap axle end plug (1) loose from the axle flange (2) with a hammer and punch. Pull plug (1) out of axle flange (2).



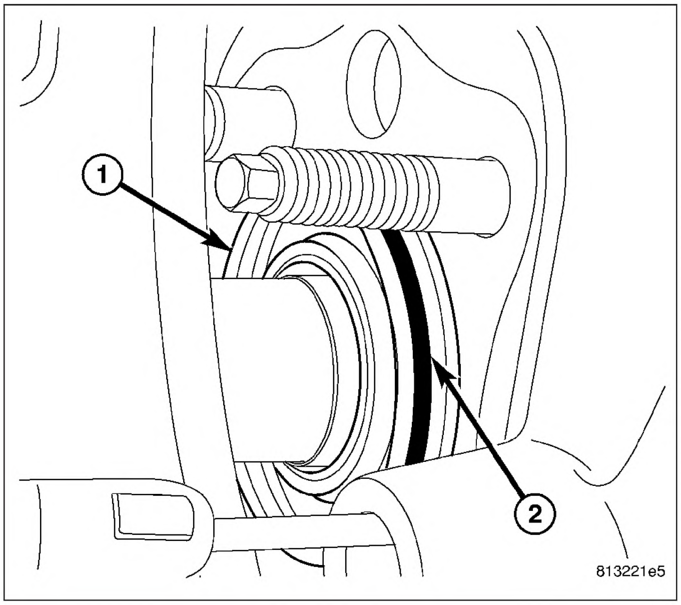
4. Remove speed sensors (2) from axle tube (1) flange.



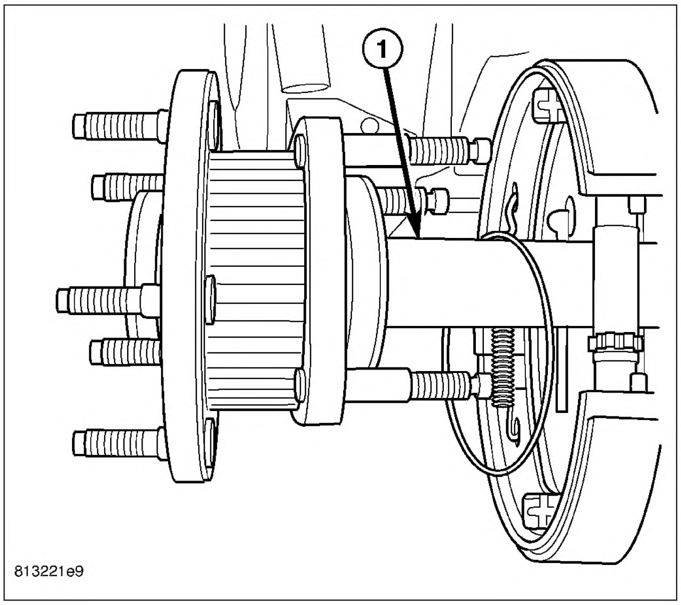
5. Remove axle flange nuts (1) from axle (2).


1
2
813221db

6. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
7. Remove O-ring (2) from the axle bearing.

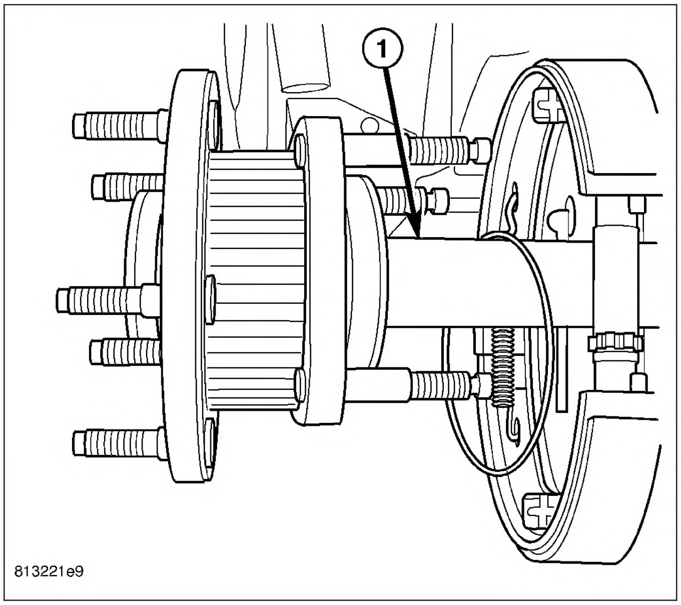

1
2
813221e5

8. Slide axle shaft (1) from axle tube and backing plate.
9. Tap axle shaft out of the bearing and axle flange through the plug hole with a hammer and brass drift.

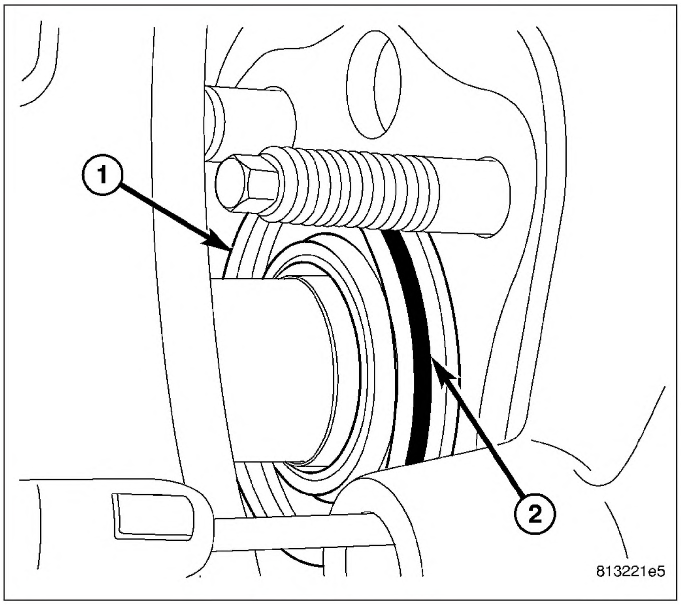


INSTALLATION

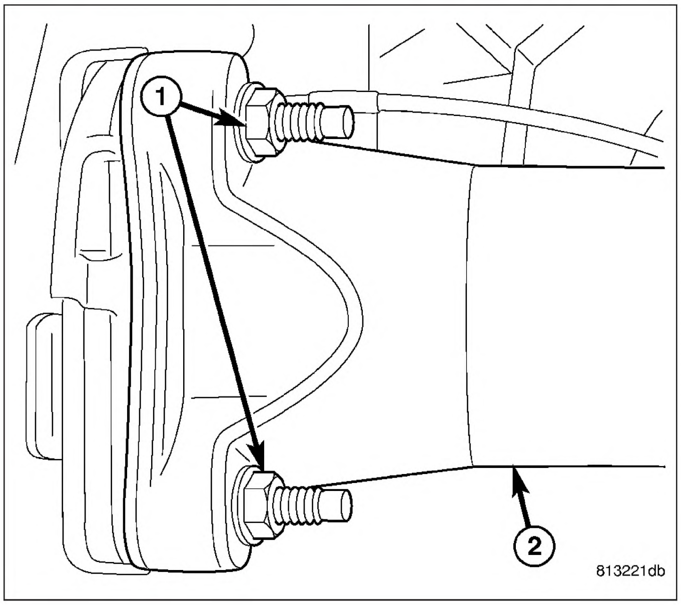
1. Tap axle shaft into through axle bearing into axle flange.
2. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



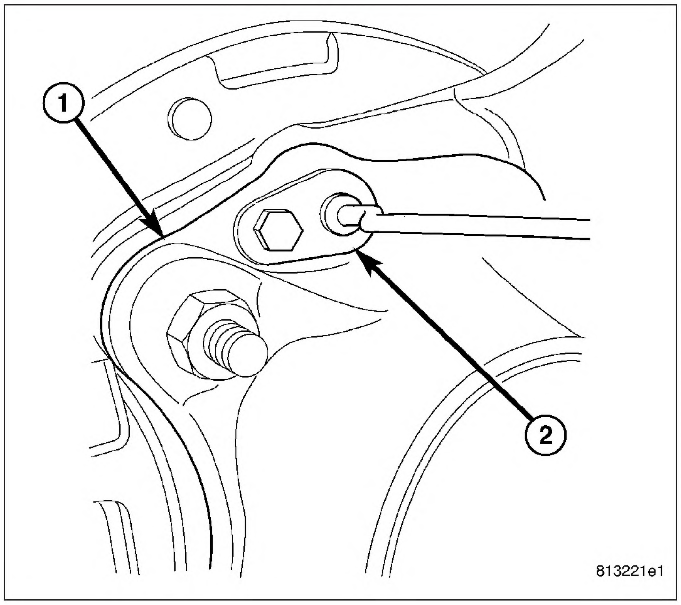
3. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
4. Install O-ring (2) axle bearing.



5. Push axle into axle tube.
6. Install axle (2) flange nuts (1) and tighten to 119 N·m (88 ft. lbs.).



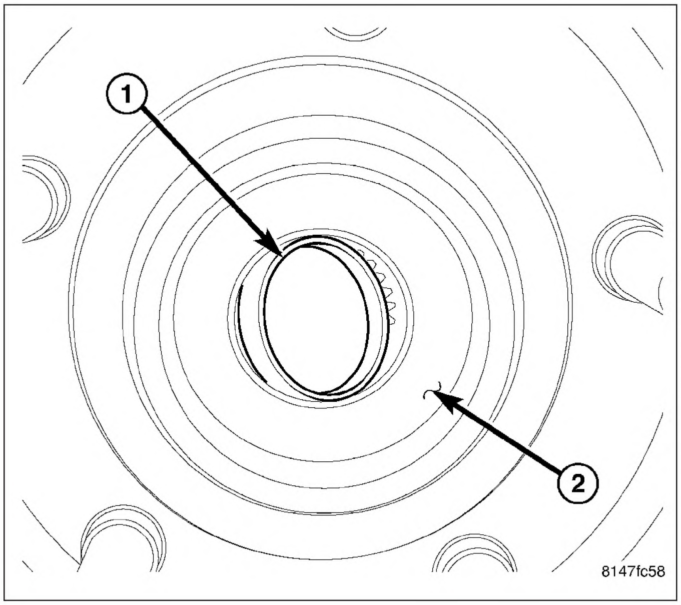
7. Install speed sensors (2) in axle tube (1) flange.
8. Coat new axle flange plug with Mopar® Stud N' Bearing Mount Adhesive or equivalent and install plug.
9. Install calipers and rotors.



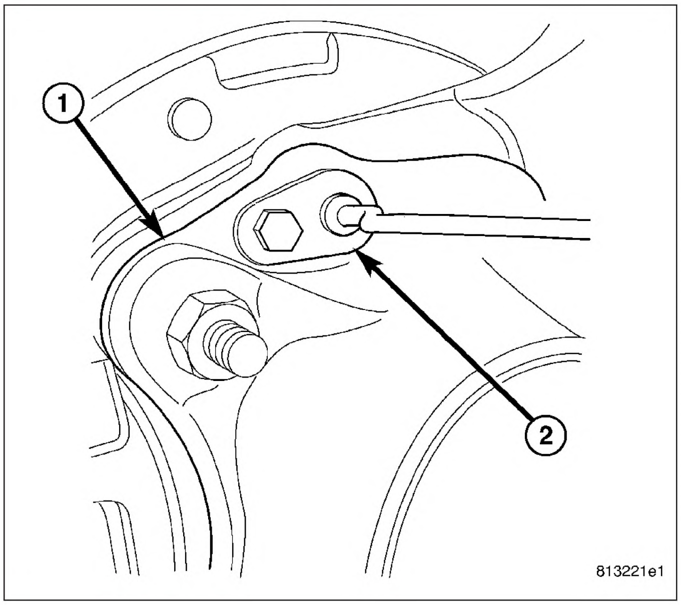
AXLE BEARINGS

REMOVAL

1. With vehicle in netural, position on hoist.
2. Remove calipers and rotors.
3. Tap axle end plug (1) loose from the wheel flange (2) with a hammer and punch. Pull plug (1) out of wheel flange (2).



4. Remove speed sensors (2) from axle tube (1) flange.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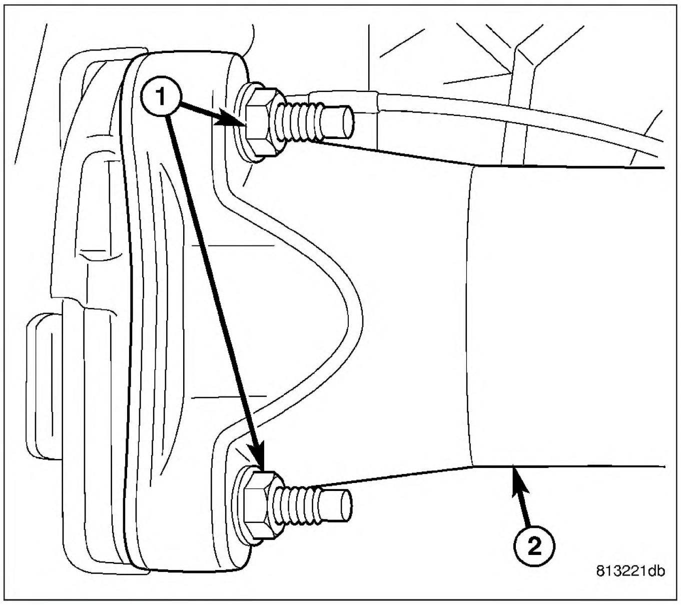
5. Remove axle flange nuts (1) from axle (2).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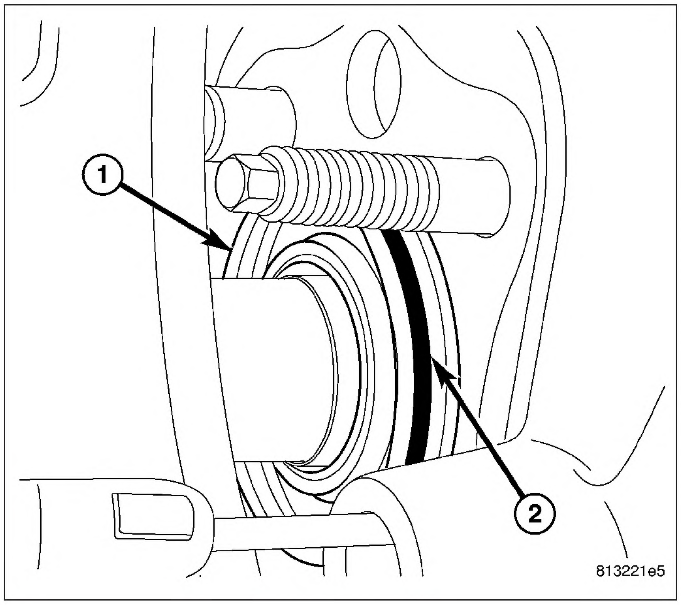
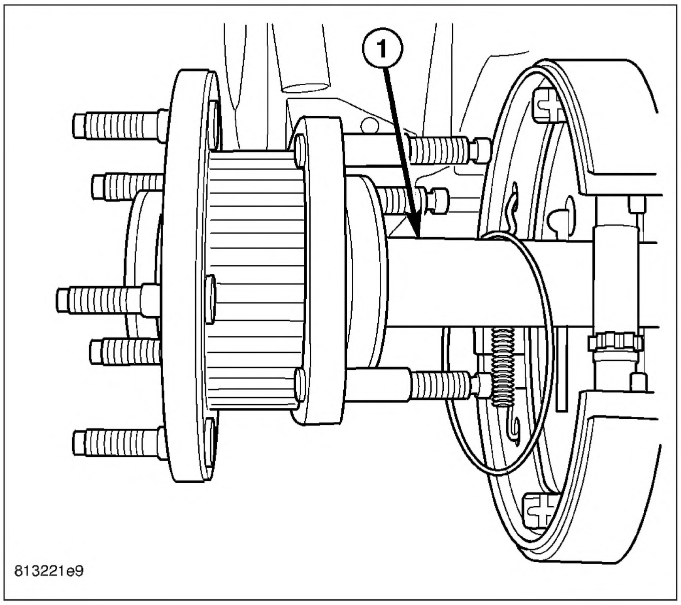
6. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
7. Remove O-ring (2) from the axle bearing.

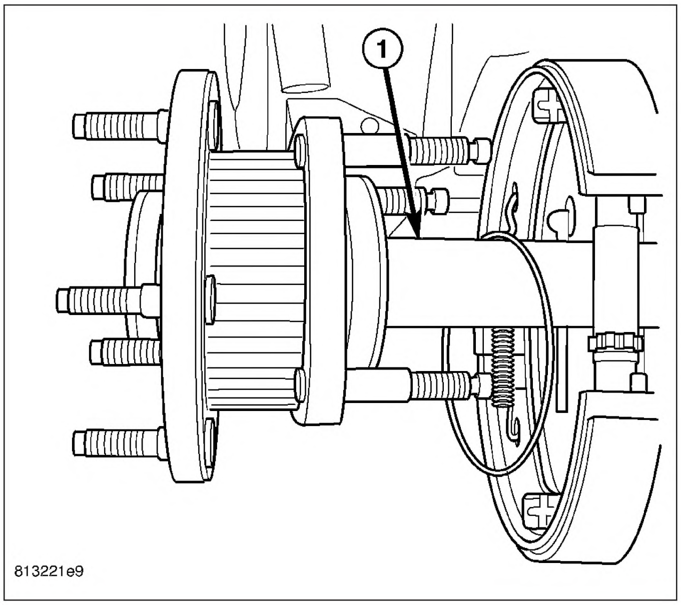


8. Slide axle shaft (1) from axle tube and backing plate.
9. Tap axle shaft out of the wheel flange and axle bearing through the plug hole with a hammer and brass drift.
10. Remove axle flange bolts.

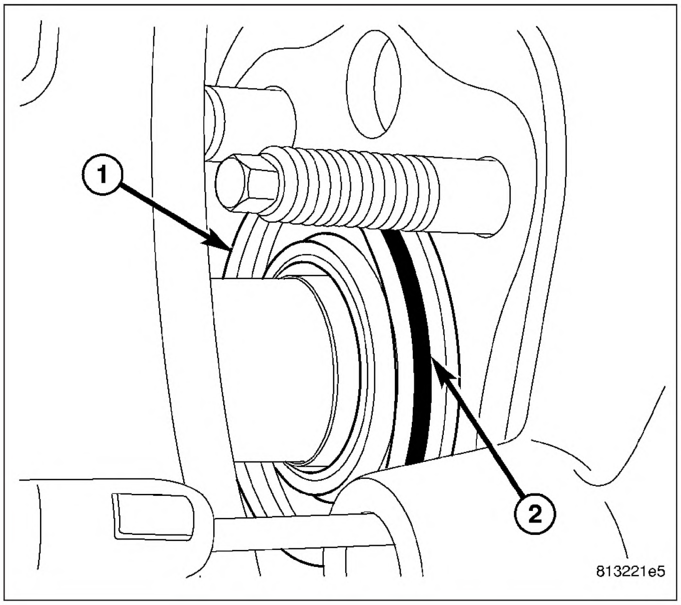


INSTALLATION

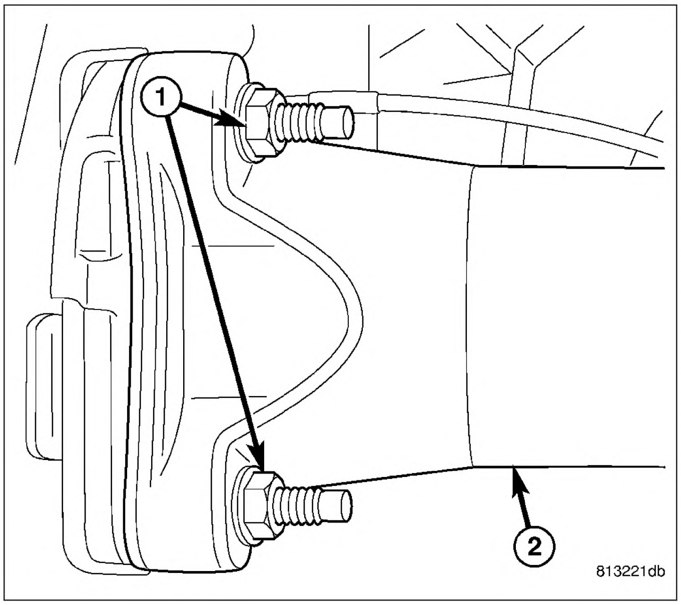
1. Install axle flange bolts into axle flange.
2. Tap axle shaft through axle bearing into wheel flange.
3. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



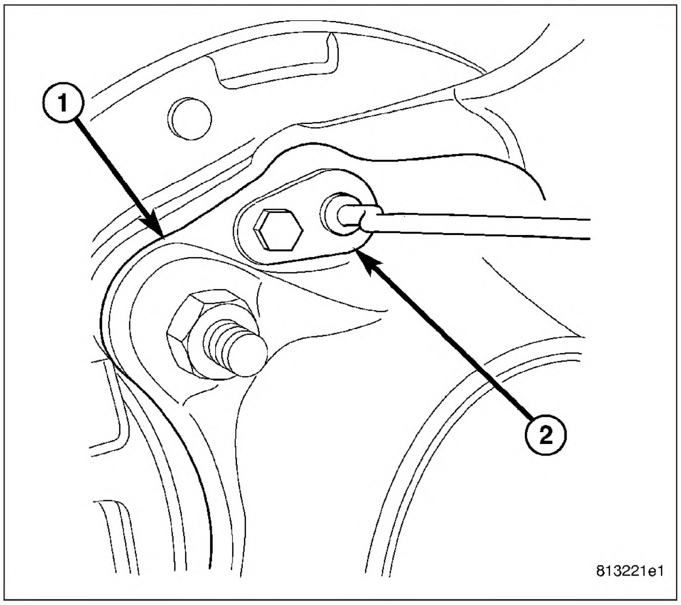
4. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
5. Install O-ring (2) axle bearing.



6. Push axle into axle tube.
7. Install axle (2) flange nuts (1) and tighten to 119 N·m (88 ft. lbs.).



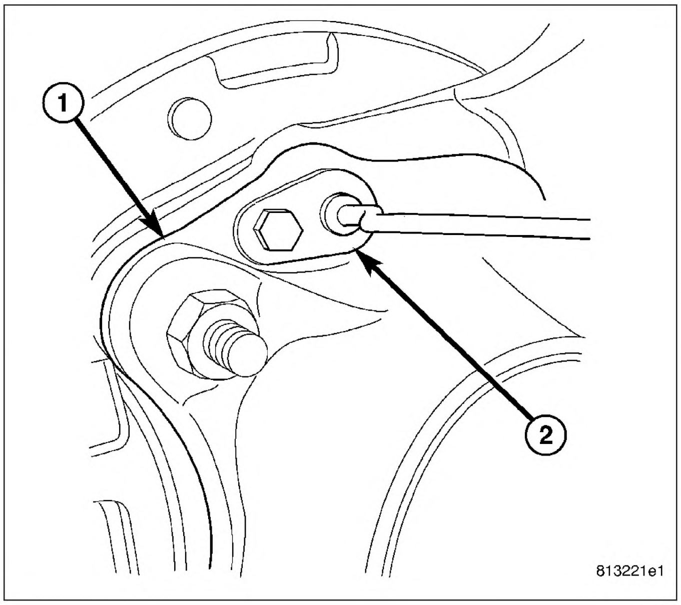
8. Install speed sensors (2) in axle tube (1) flange.
9. Coat new axle flange plug with Mopar® Stud N' Bearing Mount Adhesive or equivalent and install plug.
10. Install calipers and rotors.



AXLE SHAFT SEALS

REMOVAL

1. With vehicle in netural, position on hoist.
2. Remove calipers and rotors.
3. Remove speed sensors (2) from axle tube (1) flange.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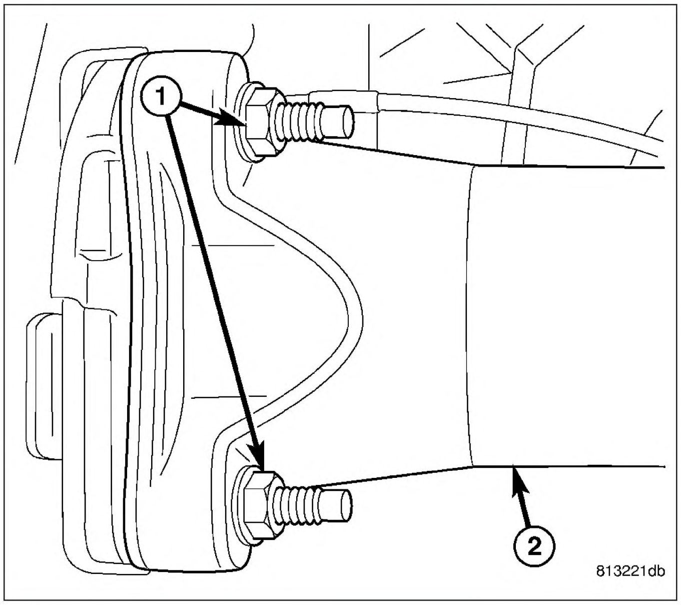
4. Remove axle flange nuts (1) from axle (2).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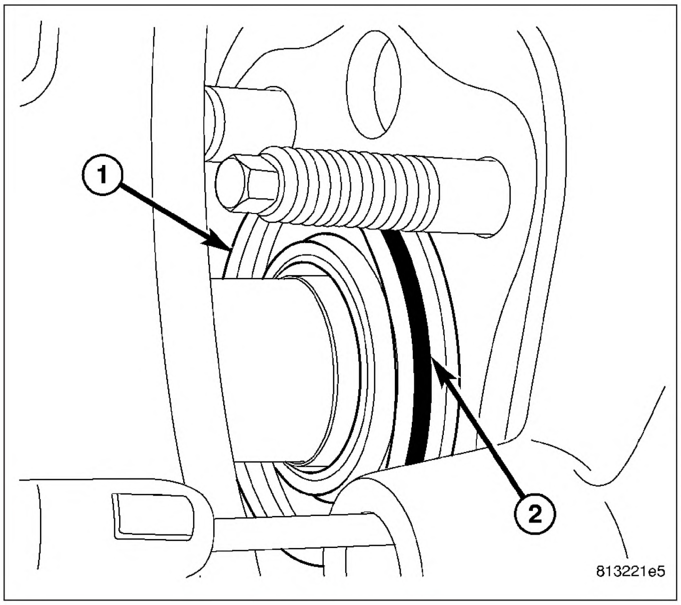
5. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
6. Remove O-ring (2) from the axle bearing.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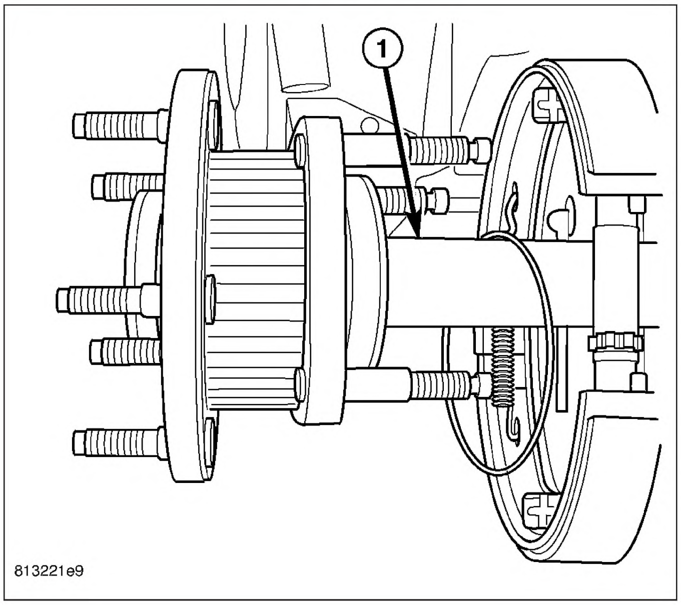
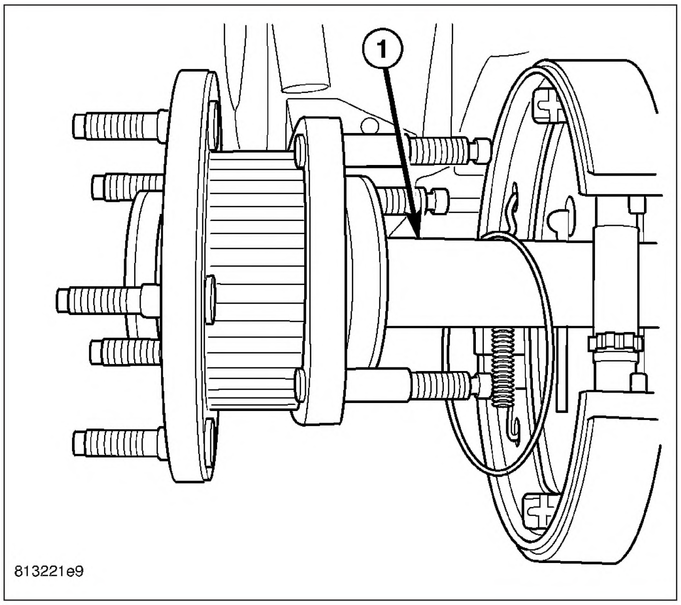
7. Remove axle shaft (1) from axle tube and backing plate.

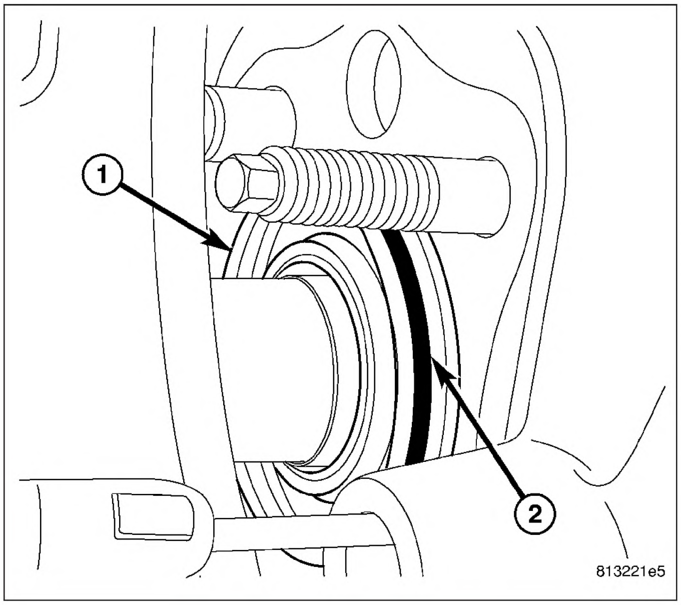


INSTALLATION

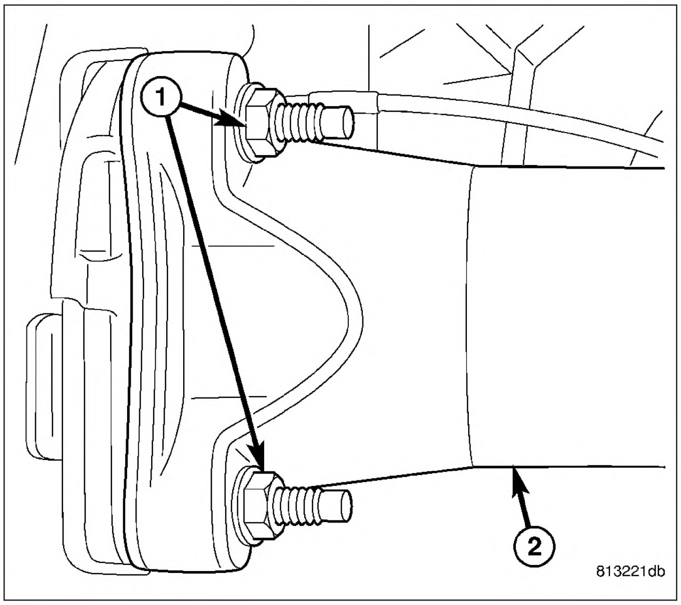
1. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



2. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
3. Install new O-ring (2) on axle bearing (1).



4. Push axle into axle tube.
5. Install axle (2) flange nuts (1) and tighten to 119 N·m (88 ft. lbs.).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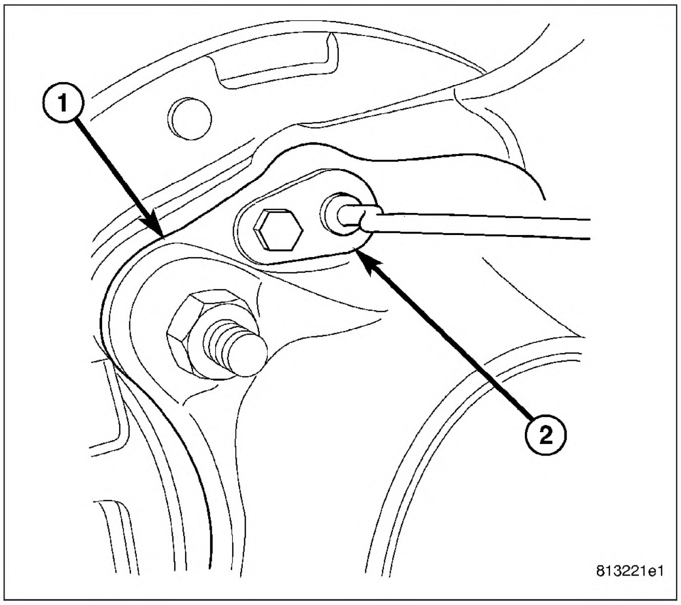
6. Install speed sensors (2) in axle tube (1) flange.
7. Install calipers and rotors.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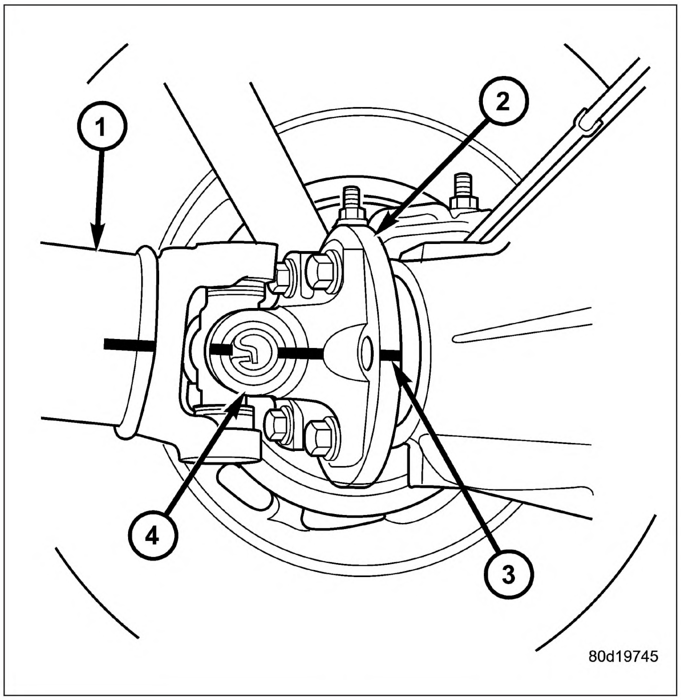
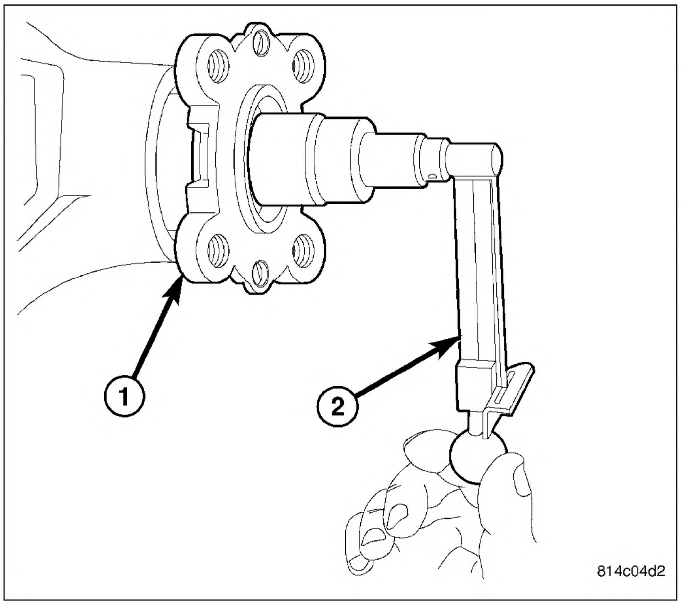
PINION SEAL

REMOVAL

1. With vehicle in neutral, position vehicle on hoist.
2. Mark a reference line across the axle flange (3) and propeller shaft flange (4).

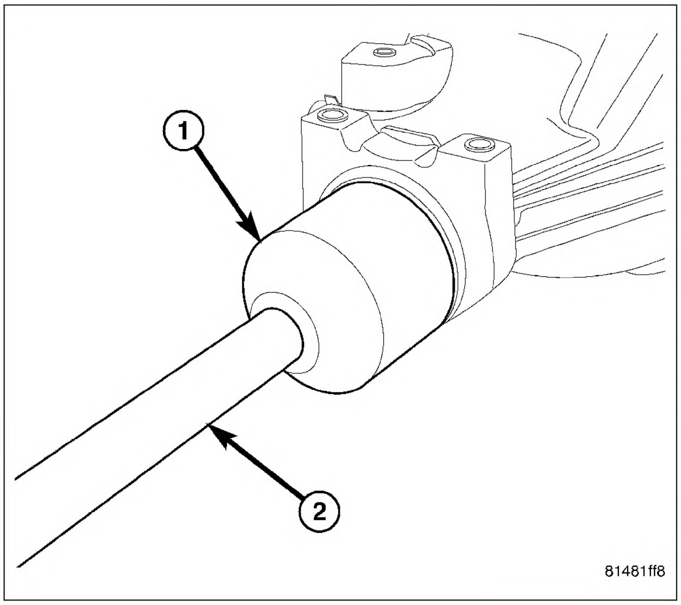


3. Remove propeller shaft
4. Remove brake calipers and rotors to prevent any drag.
5. Rotate flange three or four times and verify flange rotates smoothly.
6. Measure torque to rotating pinion flange (1) with a inch pound torque wrench (2). Record reading for installation reference.
7. Hold pinion flange with Wrench C-3281 and remove pinion nut and washer.
8. Remove flange with two jaw puller.
9. Remove pinion seal with a seal pick or slide-hammer mounted screw.



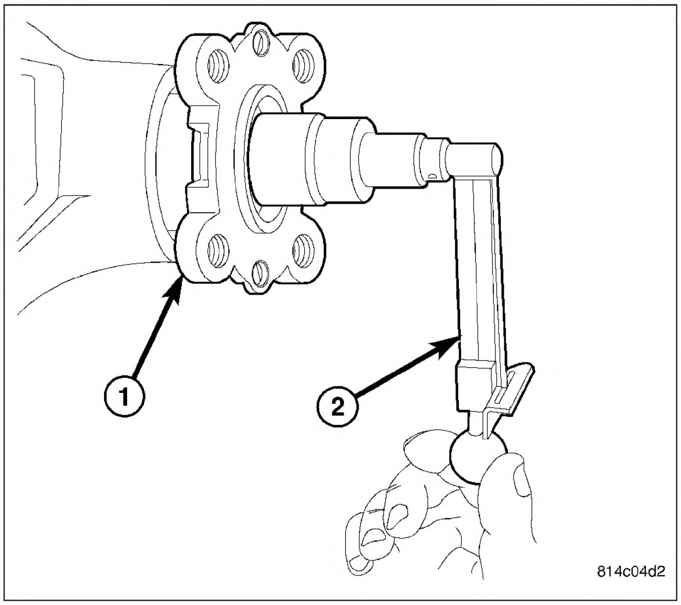
INSTALLATION

1. Apply a light coating of gear lubricant on the lip of pinion seal.
2. Install **new** pinion seal with Installer C-3972A (1) and Handle C-4171 (2).
3. Install flange on the end of the shaft with the reference marks aligned.
4. Install flange on pinion shaft with Installer C-3718 and Wrench C-3281.
5. Install pinion washer and a **new** pinion nut. The convex side of the washer must face outward.



CAUTION: Do not exceed the minimum tightening torque when installing the companion flange retaining nut at this point. Failure to follow these instructions can damage the collapsible spacer or bearings.

6. Hold flange with Wrench C-3281and tighten pinion nut to 285 N·m (210 ft. lbs.). Rotate pinion several revolutions to ensure bearing rollers are seated.
7. Rotate pinion flange (1) with an inch pound torque wrench (2). Rotating torque should be equal to the reading recorded during removal plus an additional 0.56 N·m (5 in. lbs.).



CAUTION: Never loosen pinion nut to decrease pinion bearing rotating torque and never exceed specified preload torque. If rotating torque is exceeded, a new collapsible spacer must be installed. Failure to follow these instructions can damage the collapsible spacer or bearings.

8. If rotating torque is low use Holder 6719, to hold flange and tighten pinion nut in 6.8 N·m (5 ft. lbs.) increments until proper rotating torque is achieved.

NOTE: The seal replacement is unacceptable if final pinion nut torque is less than 285 N·m (210 ft. lbs.).

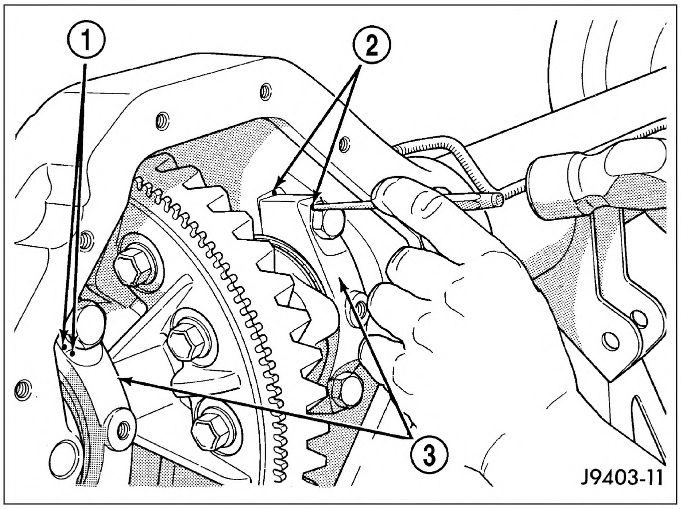
NOTE: The bearing rotating torque should be constant during a complete revolution of the pinion. If the rotating torque varies, this indicates a binding condition.

9. Install propeller shaft.
10. Install rear brake components.

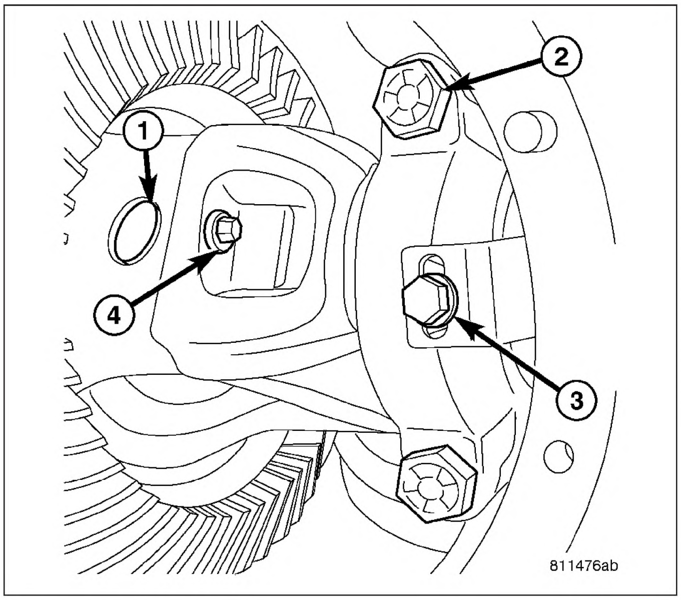
DIFFERENTIAL

REMOVAL

1. Remove differential cover.
2. Remove axle shafts.
3. Remove ABS sensor from housing.
4. Mark differential housing and bearing caps (3) for installation reference.

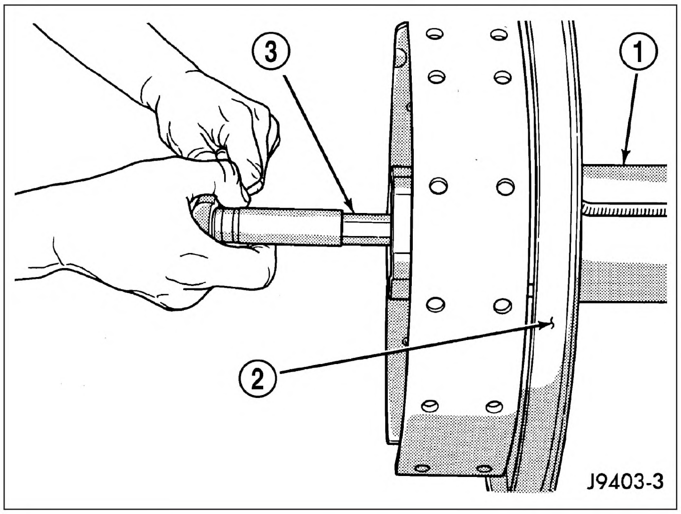


5. Remove bearing adjuster lock bolt (3) from bearing caps.



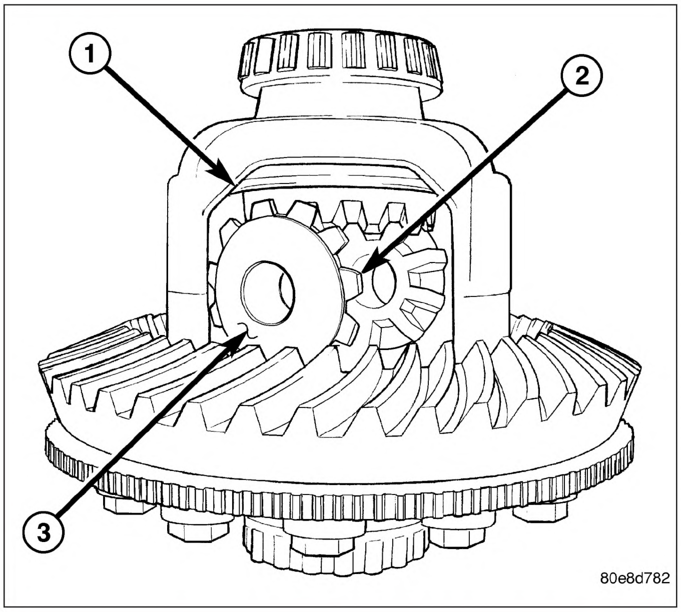
6. Loosen differential bearing cap bolts.
7. Loosen differential bearing adjusters through the axle tubes (1) with Wrench C-4164 (3).
8. Hold differential case while removing bearing caps and adjusters.
9. Remove differential case and tag differential bearing cups and adjusters to indicate location.
10. Clean housing cavity with flushing oil, light engine oil or a lint free cloth.

NOTE: Do not use steam, kerosene or gasoline to clean the housing.

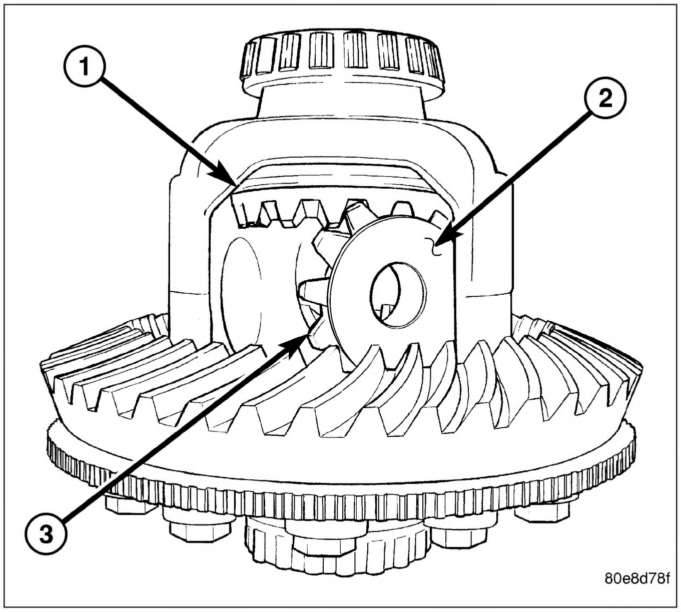


DISASSEMBLY

1. Rotate one pinion gear (2) with thrust washer (3) to the differential window (1). Remove gear and thrust washer.



2. Rotate remaining pinion gear (3) with thrust washer (2) to the differential window (1). Remove gear and washer.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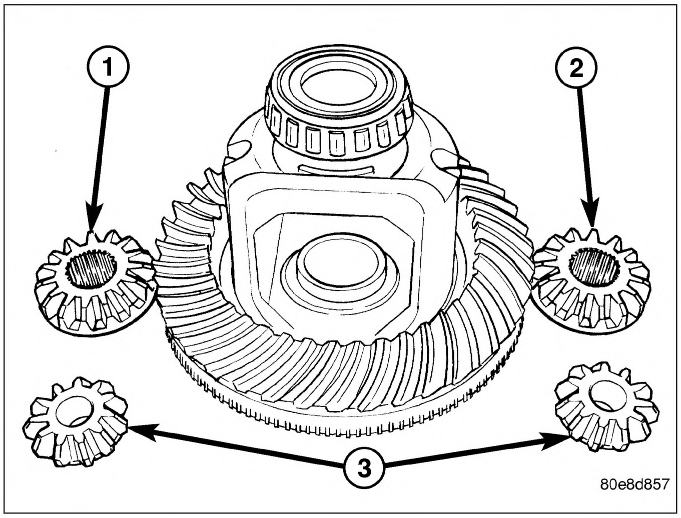
3. Remove differential side gears (1) (2) and thrust washers.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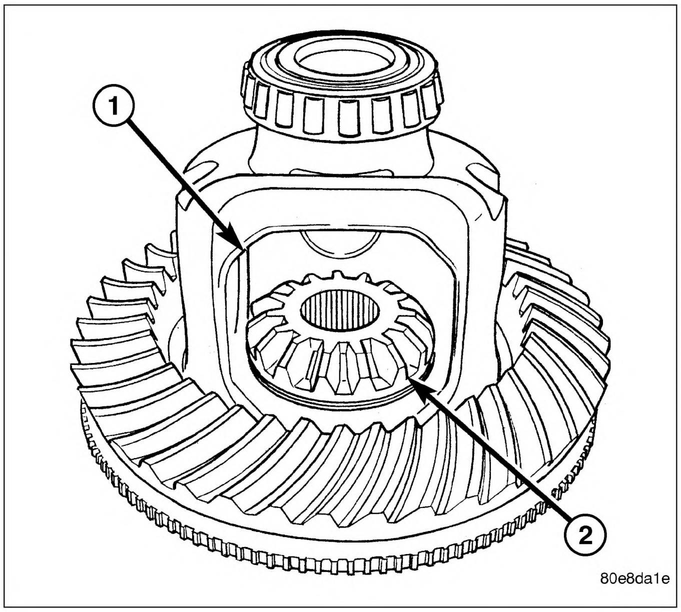
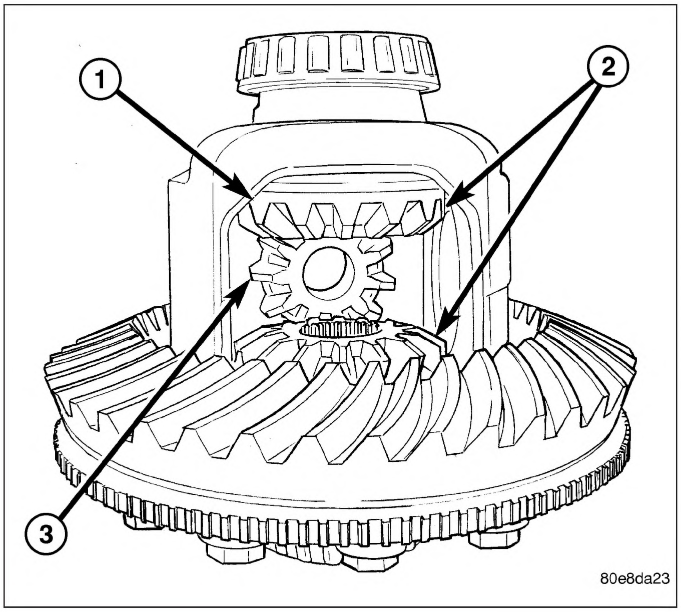
ASSEMBLY

NOTE: If same gears and thrust washers are being used, install them into their original locations.

1. Lubricate all differential components with axle lubricant.
2. Install differential side gears (2) and thrust washers.



3. Install first pinion gear (3) with thrust washer into differential window (1) and side gears (2). Rotate pinion gear into the case.
4. Install remaining pinion gear and thrust washer. Rotate gears to align hole in the pinion gears with hole in the differential case.
5. Slide pinion shaft into the case and through the pinion gears to align the gears.

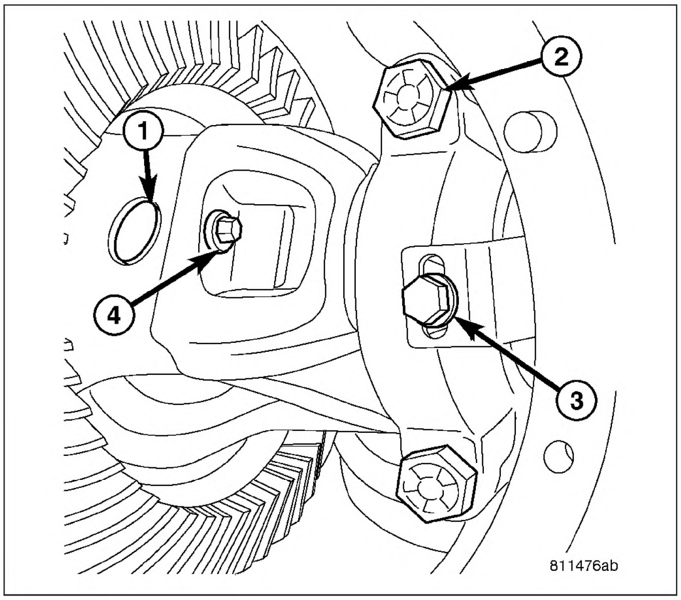


INSTALLATION

1. Apply a coat of hypoid gear lubricant to differential bearings, bearing cups and threaded adjusters.

NOTE: Grease can be used to keep the adjusters in position.

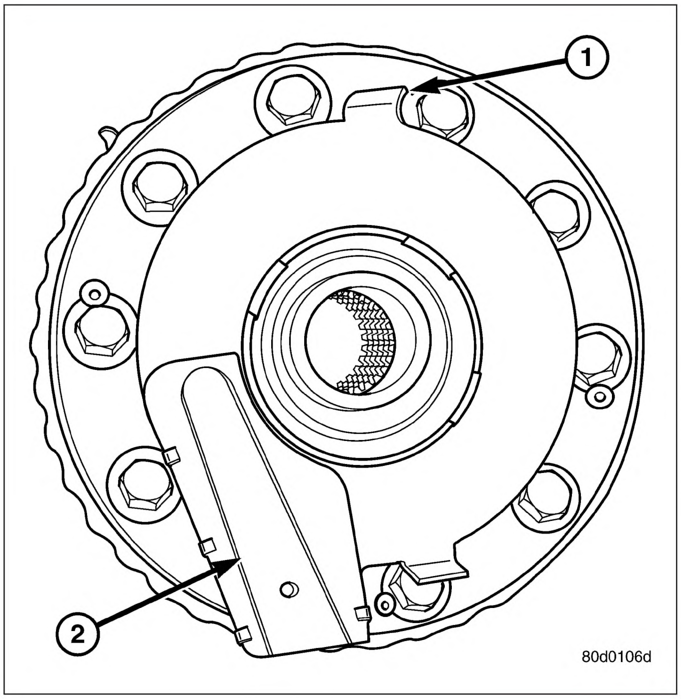
2. Install differential assembly into the housing.
3. Install differential bearing caps in their original locations.
4. Install bearing cap bolts and tighten upper bolts to 14 N·m (10 ft. lbs.). Tighten lower bolts finger-tight until the bolt head is seated.
5. Perform differential bearing preload and adjustment procedure.
6. Tighten bearing cap bolts (2) to 135 N·m (100 ft. lbs).
7. Install adjuster locks (3) on bearing caps and tighten bolts to 11 N·m (8 ft. lbs.).
8. Install axle shafts.
9. Install differential cover.



DIFFERENTIAL-VARI-LOK

OPERATION

A gerotor pump and clutch pack are used to provide the torque transfer capability. One axle shaft is splined to the gerotor pump and one differential side gears, this provides input to the pump. Anti-rotation tabs (1) on the pump hold the oil feed tube (2) down in the differential lubricant. As a wheel begins to lose traction, the speed differential is transmitted from one side of the differential to the other through the side gears. The motion of one side gear relative to the other turns the inner rotor of the pump. Since the outer rotor of the pump is grounded to the differential case, the inner and outer rotors are moving relative to each other, which creates pressure in the pump. The tuning of the front and rear axle orifices and valves inside the gerotor pump are unique. Each system has a torque-limiting pressure relief valve to protect the clutch pack, which also facilitates vehicle control under extreme side-to-side traction variations. The resulting pressure is applied to the clutch pack and the transfer of torque is completed. Vari-lok® system is less subject to wear, remaining more consistent over time in its ability to transfer torque.



DIAGNOSIS AND TESTING-VARI-LOK

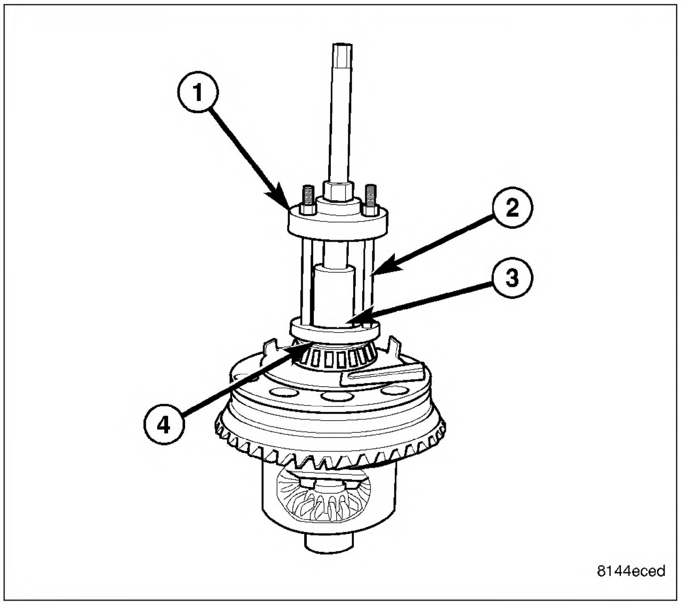
1. Park the vehicle on a level surface or raise vehicle on hoist so that the vehicle is level.
2. Remove the axle fill plug.

3. Verify that the axle fluid level is correct. The fluid level is correct if the fluid is level with the bottom of the fill hole.
4. Shift the transfer case into the 4WD full-time position.
5. Drive the vehicle in a tight circle for 2 minutes at 5mph to fully prime the pump.
6. Block the tires opposite the axle to be tested to prevent the vehicle from moving.
7. Shift the transfer case into the 4WD Low position and the transmission into the Park position.
8. Raise both the wheels of the axle to be tested off of the ground.
9. Rotate the left wheel by hand at a minimum of one revolution per second while an assistant rotates the right wheel in the opposite direction.
10. The left wheel should spin freely at first and then increase in resistance within 5 revolutions until the wheels cannot be continuously rotated in opposite directions.
11. The Vari-lok® differential has engaged properly if the wheels cannot be rotated in opposite directions for a moment. After the wheels stop rotating for a moment, the fluid pressure will drop in the differential and the wheels begin to rotate once again.
12. If the system does not operate properly, replace the Vari-lok® differential.

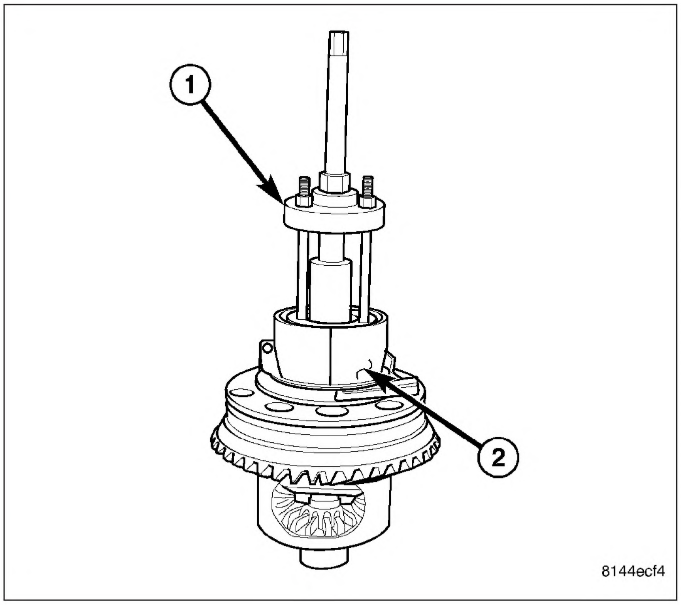
BEARINGS-VARI-LOK DIFFERENTIAL CASE

REMOVAL

1. Install Plug SP 3298 (3) Into the differential axle shaft hole.
2. Remove differential case bearings with Puller 6444 (1), Puller Rods 6444-4 (2) and Puller Flange 6444-1(4). Position puller on the differential.



3. Position Puller (1) Jaws 9639 (2) around the case bearing and puller flange.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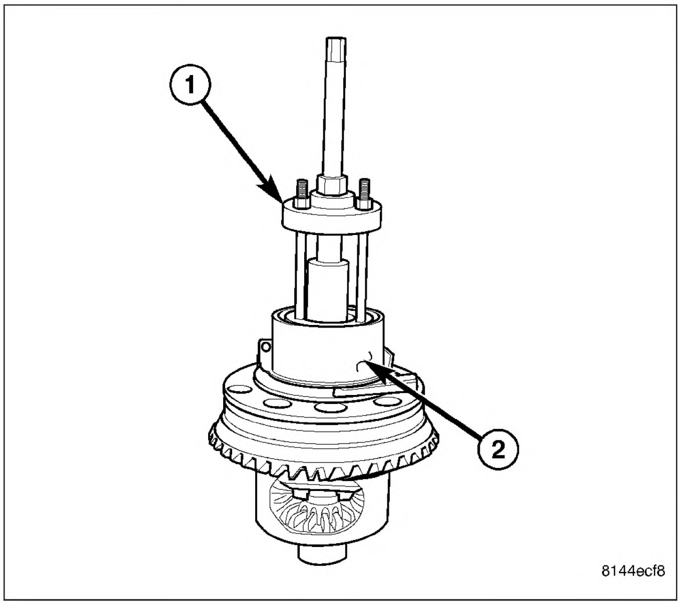
4. Position Puller (1) Collar 6444-8 (2) around the puller jaws.
5. Tighten the puller nut and remove differential case bearing.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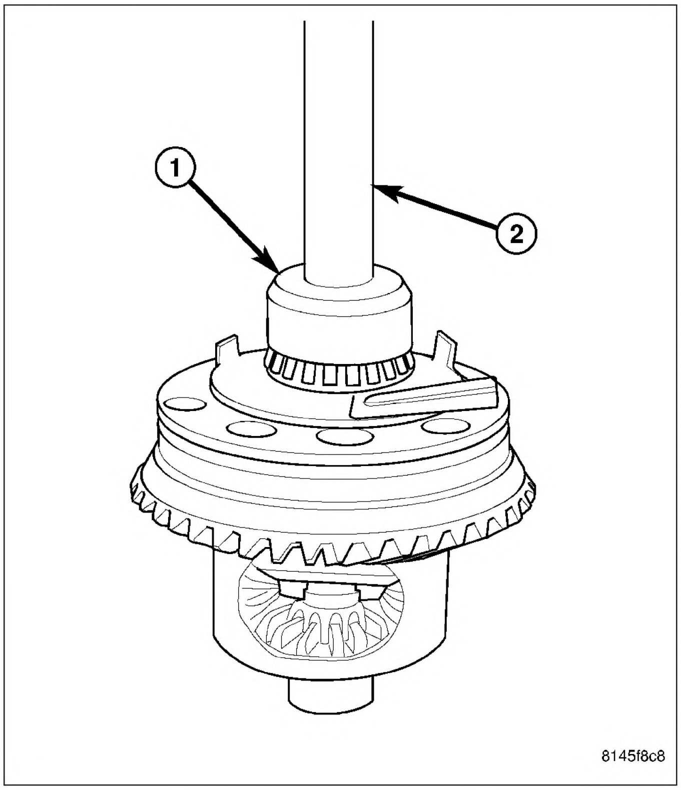
INSTALLATION

1. Install differential case bearing with Installer C-4340 (1) and Handle C-4171 (2).

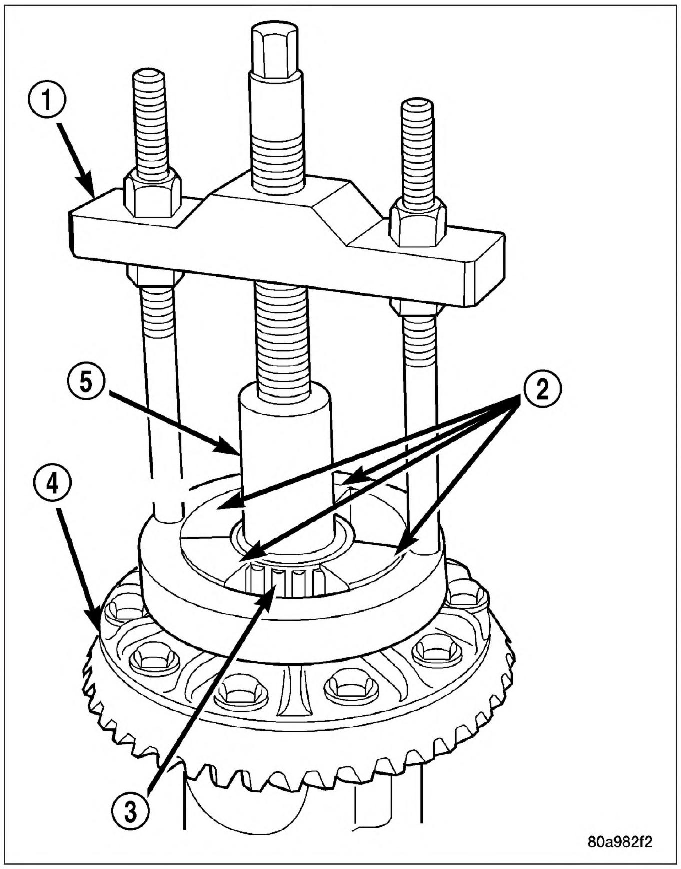


CAUTION: Vari-lok®, plenum must be seated against the differential case, prior to installing the ring gear side differential bearing. Failure to follow these instructions will damage the Vari-lok® plenum.

BEARINGS-DIFFERENTIAL CASE

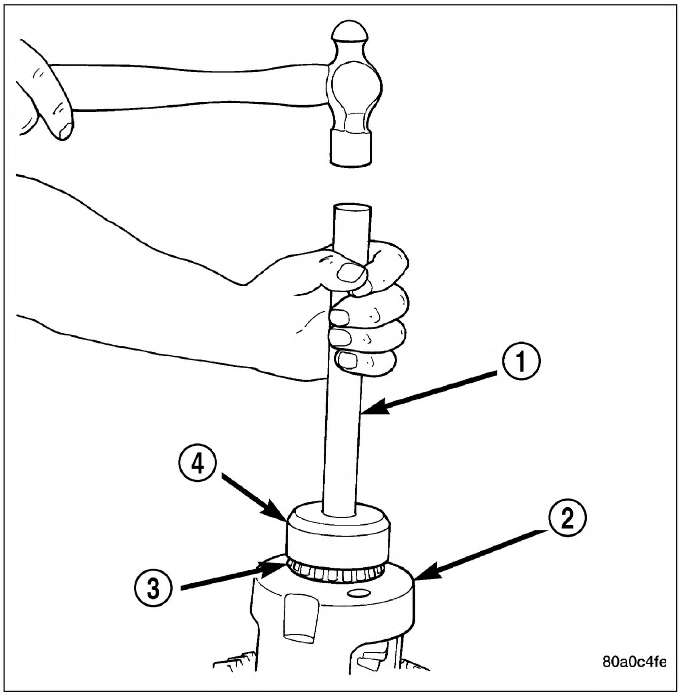
REMOVAL

1. Remove differential case from axle.
2. Remove differential bearings (3) from the case with Puller/Press C-293-PA (1) and Adapters C-293-48 (2) and Plug SP-3289 (5).



INSTALLATION

1. Install differential side bearings (3) with Installer C-4340 (4) and Handle C-4171 (1).
2. Install differential case in axle.

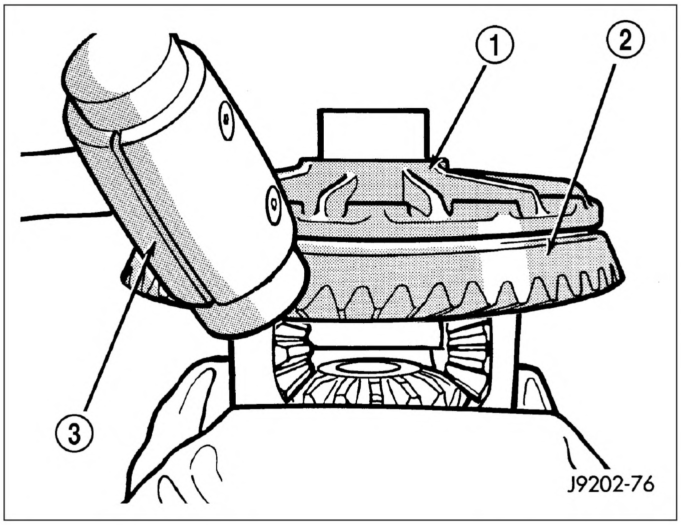


PINION GEAR/RING GEAR

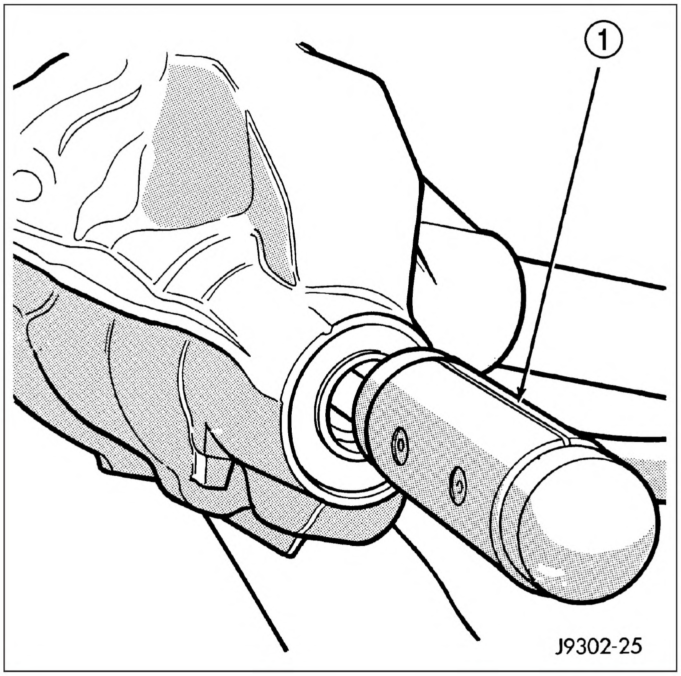
REMOVAL

NOTE: The ring gear and pinion are serviced in a matched set. Never replace one gear without replacing the matching gear.

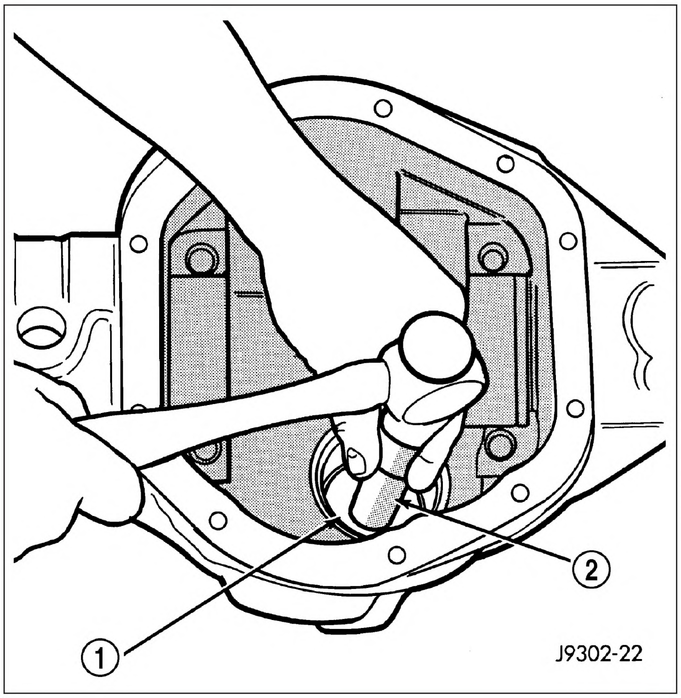
1. Remove differential from axle housing.
2. Place differential case in vise with soft metal jaw protectors.
3. Remove ring gear bolts and drive ring gear (2) off differential case with a soft hammer (3).



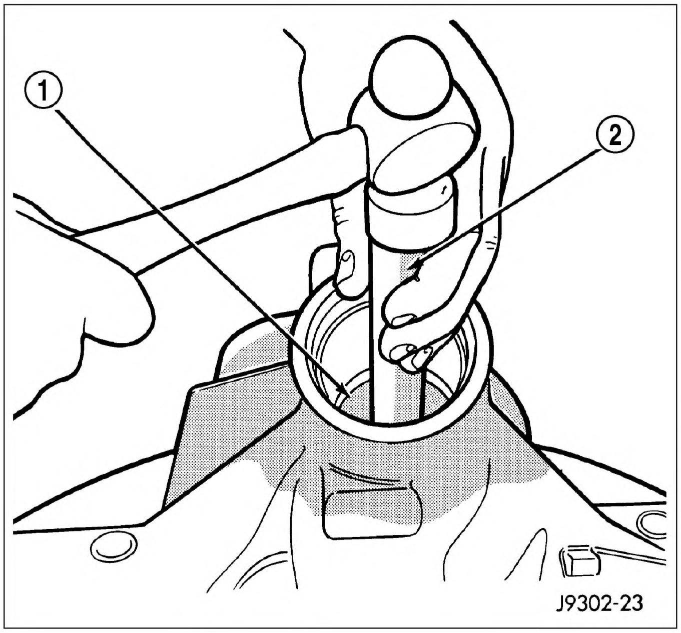
4. Hold pinion flange with Wrench C-3281 and remove pinion nut.
5. Remove pinion flange with two jaw puller.
6. Remove pinion from housing with a soft hammer (1).



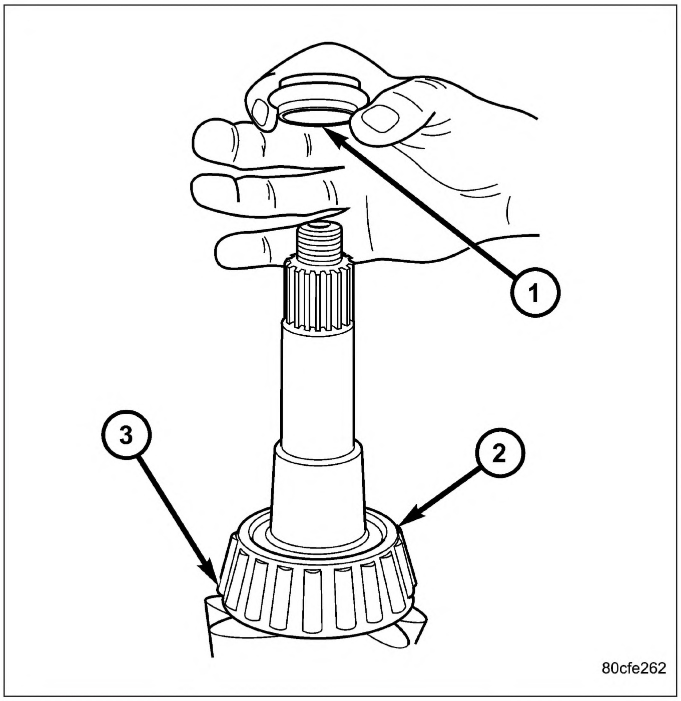
7. Remove pinion seal with a pry tool or slide-hammer mounted screw.
8. Remove oil slinger if equipped and front pinion bearing.
9. Remove front pinion bearing cup with Remover C-4345 (1) and Handle C-4171 (2).



10. Remove rear bearing cup from housing with Remover C-4307 (1) and Handle C-4171 (2).



11. Remove collapsible preload spacer (1) from pinion gear.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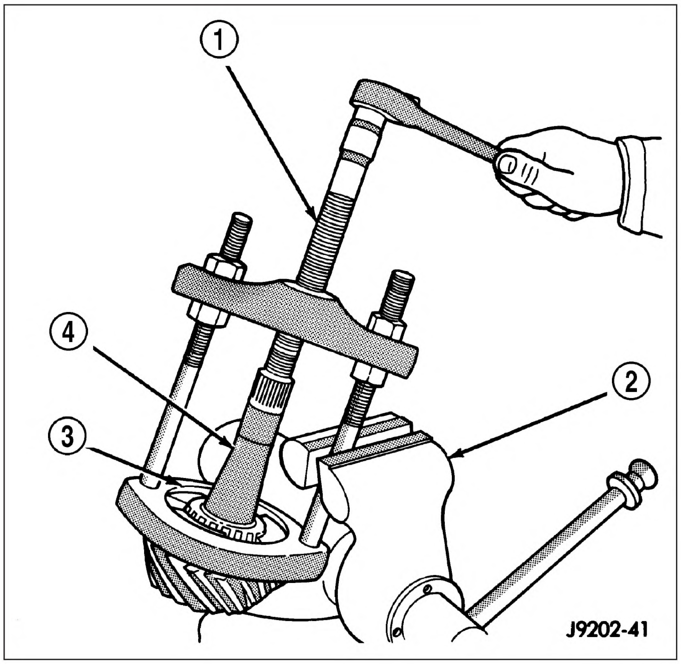
12. Remove rear bearing from pinion with Puller/ Press C-293-PA (1) and Adapters C-293-47 (3).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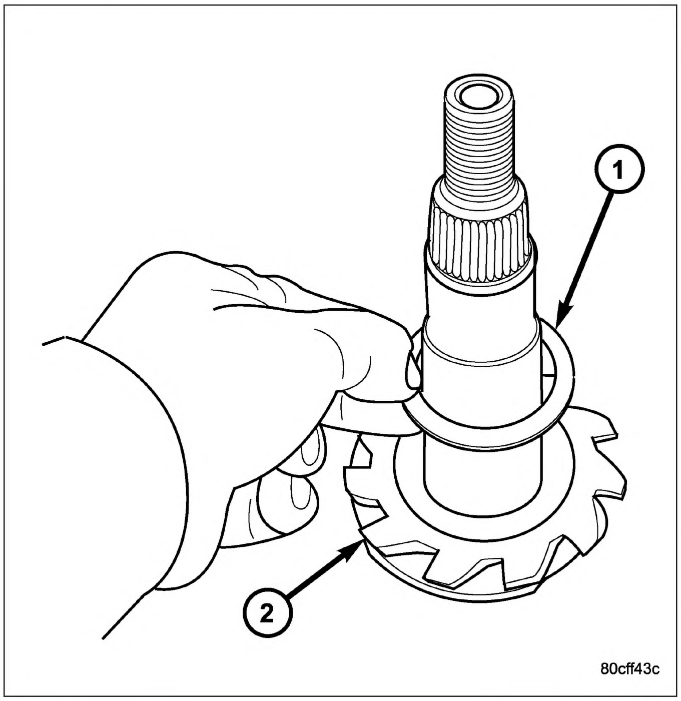
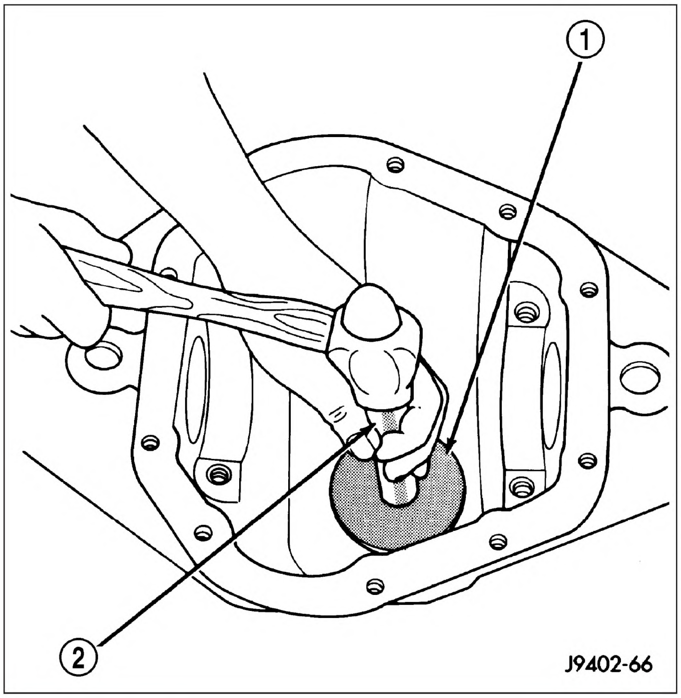
13. Remove depth shims (1) from pinion gear (2) and record shim thickness.



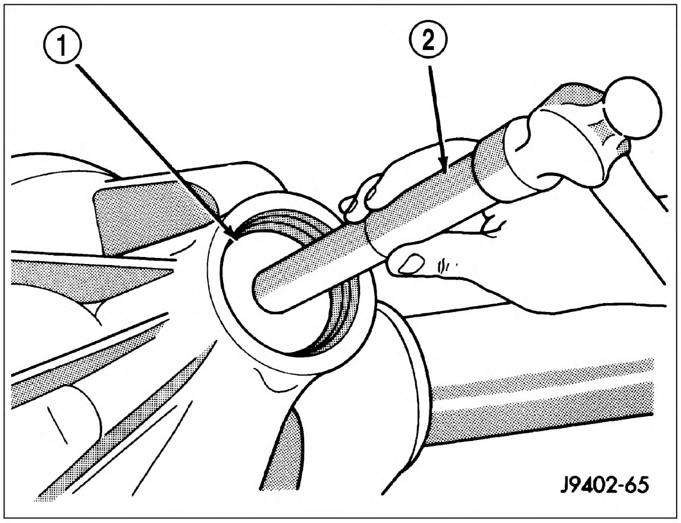
INSTALLATION

NOTE: Ring and pinion gears are a matched set. Do not replace one gear without replacing the other matching gear. If ring and pinion gears or bearings are replaced, Refer to Adjustments for Pinion Gear Depth Setting.

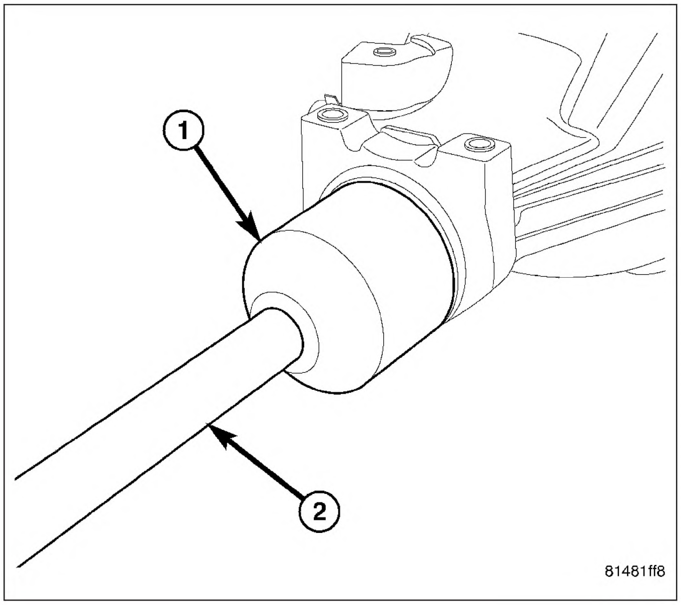
1. Apply Mopar Door Ease or stick lubricant to outside surface of pinion bearing cups.
2. Install rear pinion bearing cup with Installer C-4308 (1) and Handle C-4171 (20).



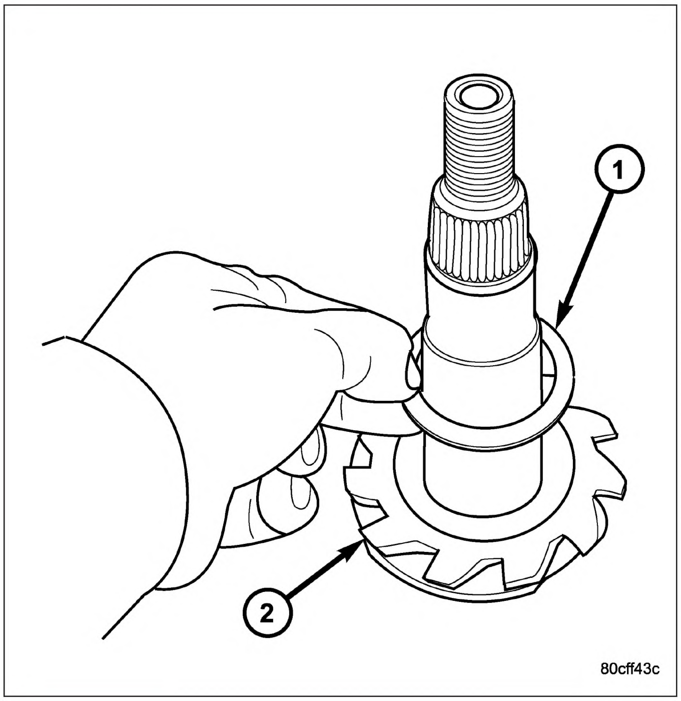
3. Install front pinion bearing cup with Installer D-130 (1) and Handle C-4171 (2).



4. Install front pinion bearing.
5. Apply a light coating of gear lubricant on the lip of pinion seal. Install seal with Installer C-3972A (1) and Handle C-4171 (2).



6. Install proper thickness depth shim (1) on pinion gear (2).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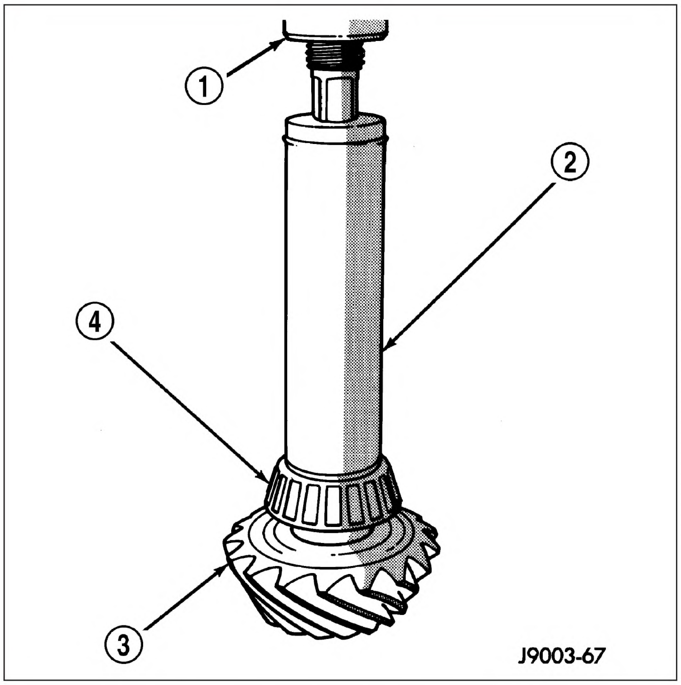
7. Install rear bearing (4) and slinger if equipped, on pinion gear (3) with Installer 6448A (2) and a press (1).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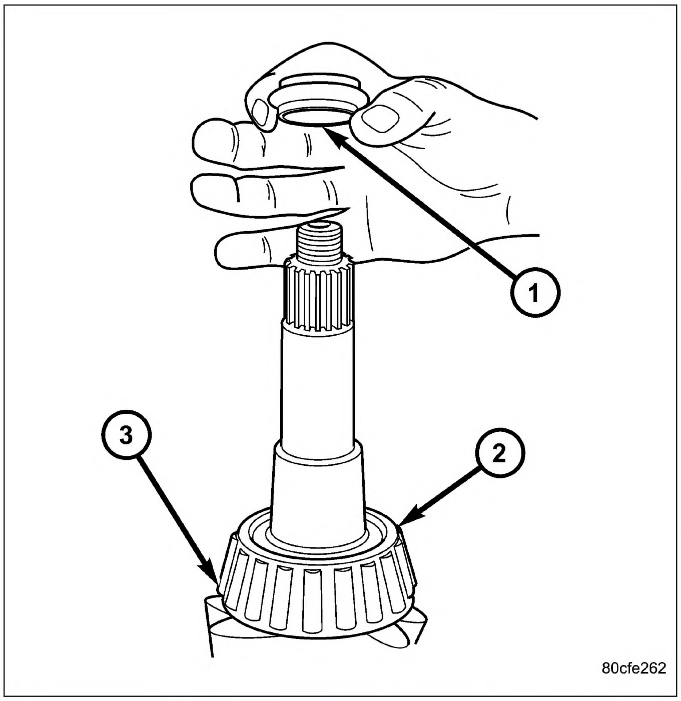
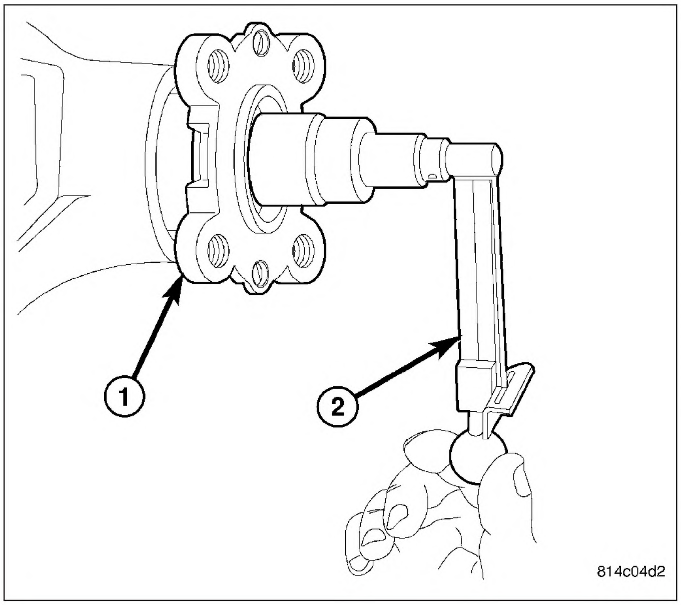
8. Install **new** collapsible spacer (1) on pinion gear and install pinion in housing.
9. Tap pinion flange onto the pinion.
10. Install flange washer and a new nut on pinion and tighten pinion nut until there is zero end-play.
11. With a torque wrench and Flange Wrench C-3281 tighten the pinion nut to 285 N·m (210 ft. lbs.).

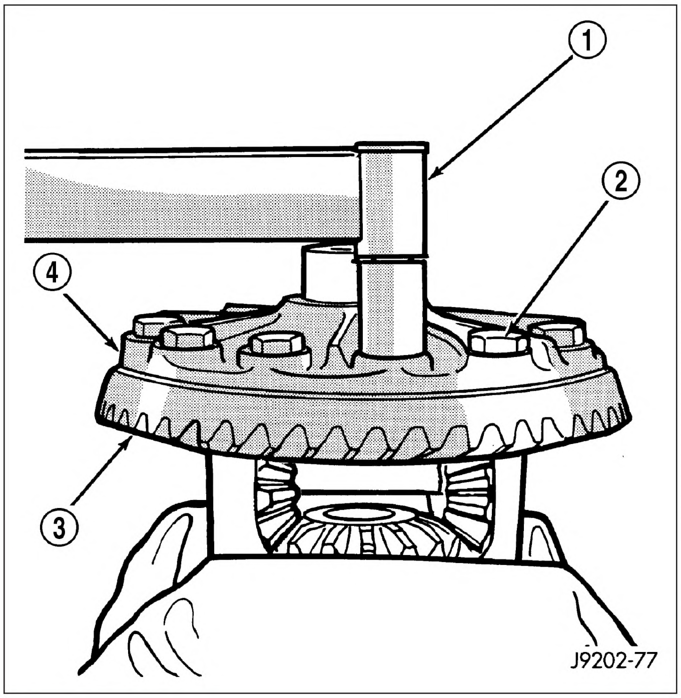
CAUTION: Never loosen pinion nut to decrease pinion bearing rotating torque and never exceed specified preload torque. If preload torque or rotating torque is exceeded a new collapsible spacer must be installed. Failure to follow these instructions will result in damage.



12. Slowly tighten the nut in 6.8 N·m (5 ft. lbs.) increments until the desired rotating torque is achieved. Measure rotating torque frequently with an inch pound torque wrench (2) to avoid over crushing the collapsible spacer.
13. The pinion rotating torque should be:
    - Original Bearings: 1 to 3 N·m (10 to 20 in. lbs.).
    - New Bearings: 2 to 5 N·m (15 to 35 in. lbs.).



14. Position exciter ring on differential case. With a brass drift slowly and evenly tap the exciter ring into position.
15. Position ring gear on the differential case and start two ring gear bolts. This will provide case-to-ring gear bolt hole alignment.
16. Invert the differential case in the vise.
17. Install **new** ring gear bolts (2) and alternately tighten to 102 N·m (75 ft. lbs.).



CAUTION: Never reuse the ring gear bolts. Failure to follow these instructions may result in fractured bolts causing extensive damage.

18. Install differential in housing and verify gear mesh, backlash and contact pattern.
19. Install differential cover.

REAR AXLE - C213RE

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REAR AXLE - C213RE

DIAGNOSIS AND TESTING

REAR AXLE - C213RE

GEAR NOISE

Axle gear noise can be caused by insufficient lubricant, incorrect backlash, incorrect pinion depth, tooth contact, worn/damaged gears, or the carrier housing not having the proper offset and squareness.

Gear noise usually happens at a specific speed range. The noise can also occur during a specific type of driving condition. These conditions are acceleration, deceleration, coast, or constant load.

When road testing, first warm-up the axle fluid by driving the vehicle at least 5 miles and then accelerate the vehicle to the speed range where the noise is the greatest. Shift out-of-gear and coast through the peak-noise range. If the noise stops or changes greatly check for:

- Insufficient lubricant.
- Incorrect ring gear backlash.
- Gear damage.

Differential side and pinions gears, usually do not cause noise during straight-ahead driving, when the gears are unloaded. The side gears are loaded during turns. A worn pinion mate shaft can also cause a snapping or a knocking noise.

BEARING NOISE

Bearing noise can be either a whining or a growling sound.

Pinion bearings have a constant high pitch noise, because it rotates at a faster rate. This noise changes with vehicle speed. If noise is heard under a load, the rear pinion bearing is the source. If noise is heard during a coast, the front pinion bearing is the source.

Differential bearings usually produce a low pitch noise. The differential bearing noise is constant and varies only with vehicle speed.

Axle shaft bearing noise generally changes when the bearings are loaded. Turn vehicle sharply to the left and the right during a road test. This will load and unload the bearings and change the noise level. If axle bearing damage is slight, the noise is usually not noticeable at speeds above 30 m.p.h.

LOW SPEED KNOCK

Low speed knock is generally caused by:

- Worn U-joints/CV joint.
- Worn side-gear thrust washers.
- Worn pinion shaft bore.

VIBRATION

Vibration at the rear of the vehicle is usually caused by:

- Damaged drive shaft.
- Missing drive shaft balance weight(s).
- Worn or out-of-balance wheels.
- Loose wheel lug nuts.
- Worn U-joints/CV joint.
- Loose/broken springs.
- Damaged axle shaft bearing(s).
- Loose pinion gear nut.
- Excessive pinion yoke run out.
- Bent axle shaft(s).

Check for loose or damaged front-end components or engine/transmission mounts. These components can contribute to what appears to be an axle vibration. Also look at engine accessories, brackets and drive belts.

NOTE: All driveline components should be examined before starting any repair.

DRIVELINE SNAP

A snap or clunk noise when the vehicle is shifted into gear or the clutch engaged, can be caused by:

- High engine idle speed.
- Transmission shift operation.
- Loose engine/transmission/transfer case mounts.
- Worn U-joints/CV joint.
- Loose spring mounts.
- Loose pinion gear nut and yoke.
- Excessive ring gear backlash.
- Excessive side gear to case clearance.

To determined the source of a snap/clunk noise, raise vehicle on a hoist with the wheels free to rotate. Have a helper shift the transmission into gear and listen for the noise.

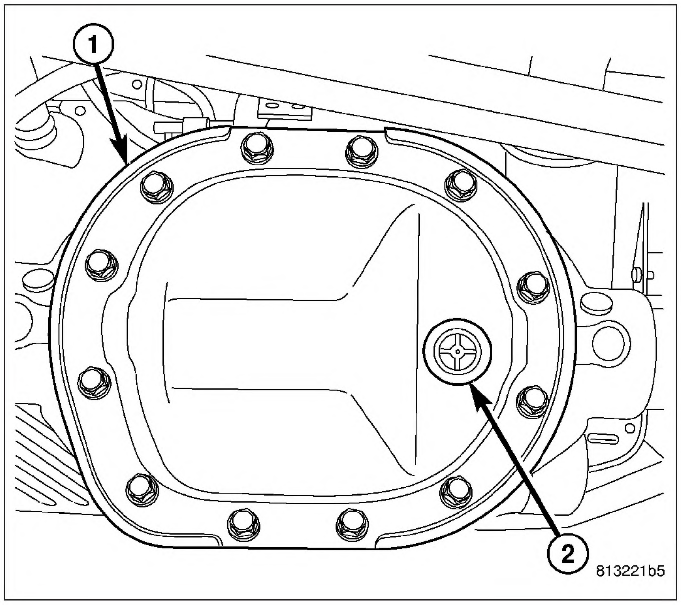
DIAGNOSTIC CHART

Condition	Possible Causes	Correction
Wheel Noise	1. Wheel loose.	1. Tighten loose nuts.
	2. Faulty, brinelled wheel bearing.	2. Replace bearing.
Axle Shaft Noise	1. Misaligned axle tube.	1. Inspect axle tube alignment. Correct as necessary.
	2. Bent or sprung axle shaft.	2. Inspect and correct as necessary.
Axle Shaft Broke	1. Misaligned axle tube.	1. Replace the broken shaft after correcting tube mis-alignment.
	2 Vehicle overloaded.	2. Replace broken shaft and avoid excessive weight on vehicle.
	3. Erratic clutch operation.	3. Replace broken shaft and avoid or correct erratic clutch operation.
	4. Grabbing clutch.	4. Replace broken shaft and inspect and repair clutch as necessary.
Differential Cracked	1. Improper adjustment of the differential bearings.	1. Replace case and inspect gears and bearings for further damage. Set differential bearing pre-load properly.
	2. Excessive ring gear backlash.	2. Replace case and inspect gears and bearings for further damage. Set ring gear backlash properly.
	3. Vehicle overloaded.	3. Replace case and inspect gears and bearings for further damage. Avoid excessive vehicle weight.
	4. Erratic clutch operation.	4. Replace case and inspect gears and bearings for further damage. Avoid erratic use of clutch.
Differential Gears Scored	1. Insufficient lubrication.	1. Replace scored gears. Fill differential with the correct fluid type and quantity.
	2. Improper grade of lubricant.	2. Replace scored gears. Fill differential with the correct fluid type and quantity.
	3. Excessive spinning of one wheel/tire.	3. Replace scored gears. Inspect all gears, pinion bores, and shaft for damage. Service as necessary.
Loss Of Lubricant	1. Lubricant level too high.	1. Drain lubricant to the correct level.
	2. Worn axle shaft seals.	2. Replace seals.
	3. Cracked differential housing.	3. Repair as necessary.
	4. Worn pinion seal.	4. Replace seal.
	5. Worn/scored companion flange.	5. Replace flange and seal.
	6. Axle cover not properly sealed.	6. Remove, clean, and re-seal cover.

Condition	Possible Causes	Correction
Axle Overheating	1. Lubricant level low.	1. Fill differential to correct level.
	2. Improper grade of lubricant.	2. Fill differential with the correct fluid type and quantity.
	3. Bearing pre-loads too high.	3. Re-adjust bearing pre-loads.
	4. Insufficient ring gear backlash.	4. Re-adjust ring gear backlash.
Gear Teeth Broke	1. Overloading.	1. Replace gears. Examine other gears and bearings for possible damage.
	2. Erratic clutch operation.	2. Replace gears and examine the remaining parts for damage. Avoid erratic clutch operation.
	3. Ice-spotted pavement.	3. Replace gears and examine remaining parts for damage.
	4. Improper adjustments.	4. Replace gears and examine remaining parts for damage. Ensure ring gear backlash is correct.
Axle Noise	1. Insufficient lubricant.	1. Fill differential with the correct fluid type and quantity.
	2. Improper ring gear and pinion adjustment.	2. Check ring gear and pinion contact pattern. Adjust backlash or pinion depth.
	3. Unmatched ring gear and pinion.	3. Replace gears with a matched ring gear and pinion.
	4. Worn teeth on ring gear and/or pinion.	4. Replace ring gear and pinion.
	5. Loose pinion bearings.	5. Adjust pinion bearing pre-load.
	6. Loose differential bearings.	6. Adjust differential bearing pre-load.
	7. Mis-aligned or sprung ring gear.	7. Measure ring gear run-out. Replace components as necessary.
	8. Loose differential bearing cap bolts.	8. Inspect differential components and replace as necessary. Ensure that the bearing caps are torqued to the proper specification.
	9. Housing not machined properly.	9. Replace housing.

REMOVAL

1. With vehicle in neutral, position on hoist.
2. Remove differential cover (1) and drain fluid.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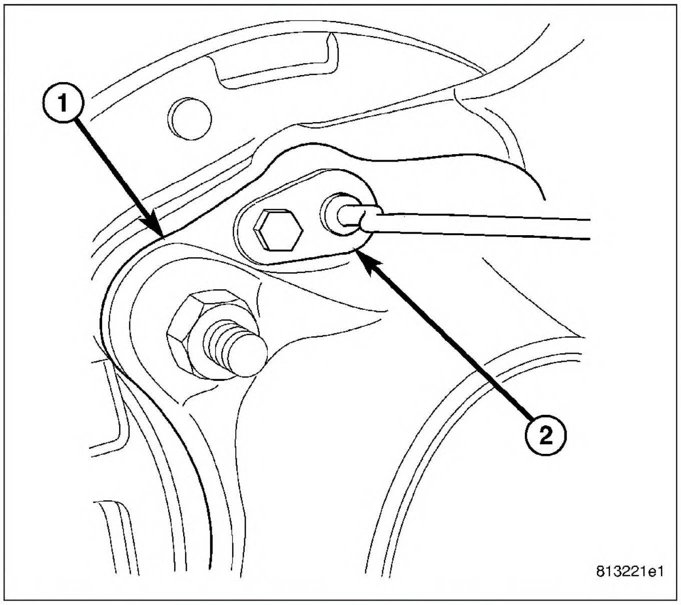
3. Remove calipers and rotors.
4. Remove speed sensors (2) from axle tube (1) flange.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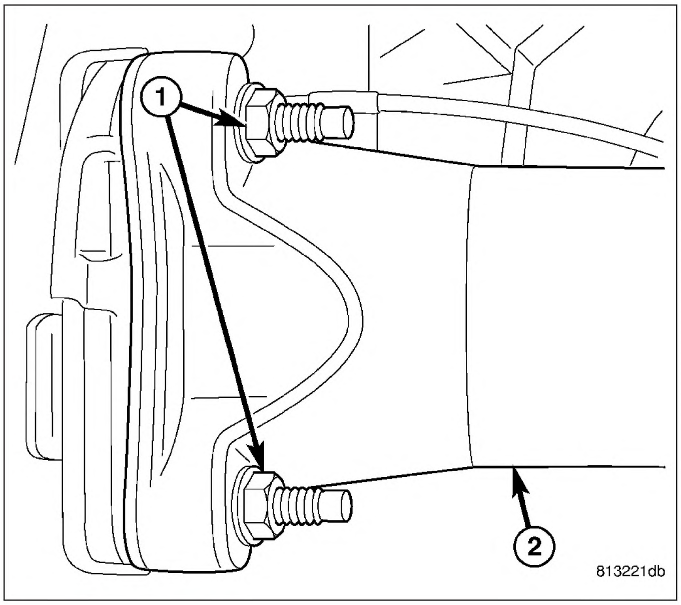
5. Remove axle flange nuts (1) from axle (2).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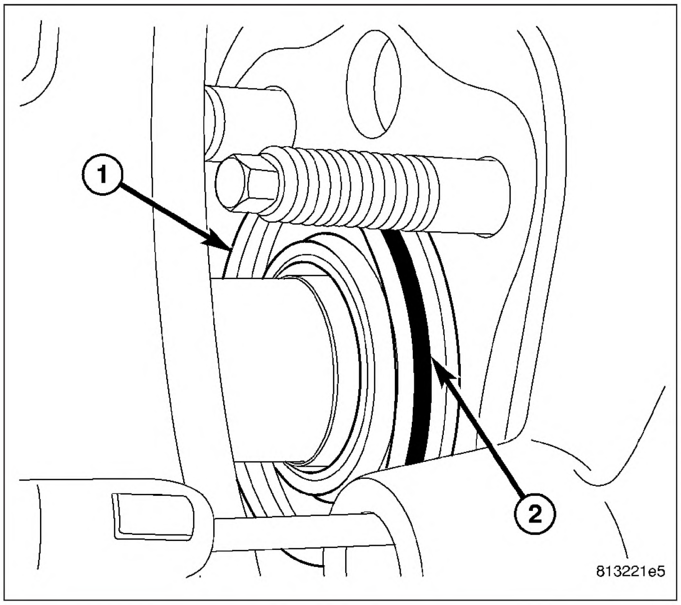
6. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
7. Remove O-ring (2) from the axle bearing.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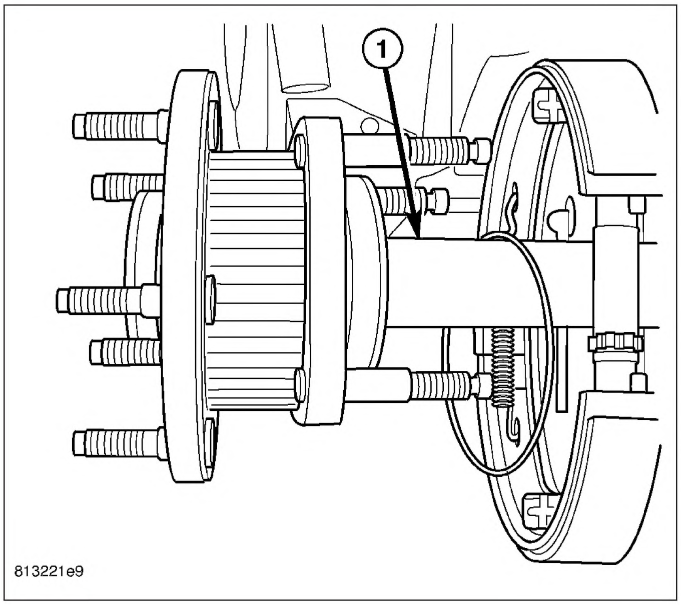
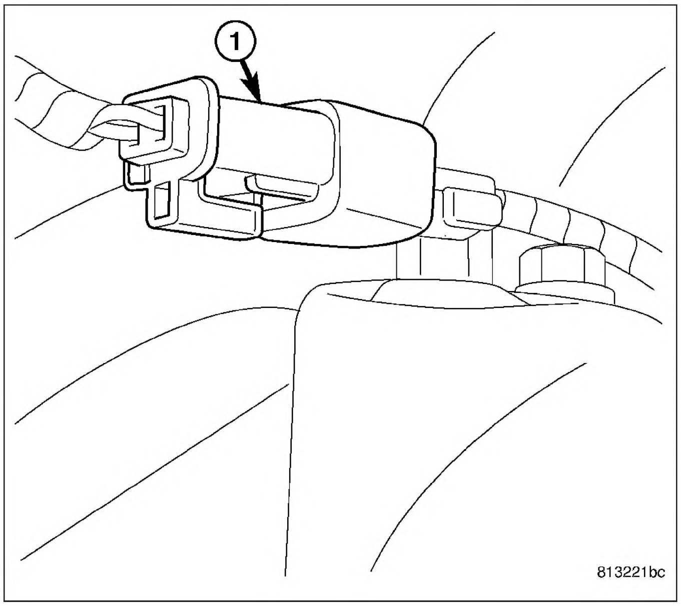
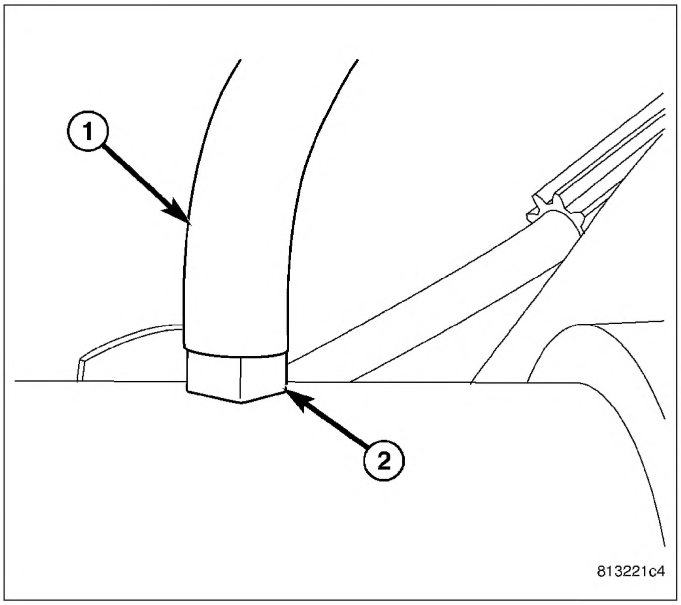
8. Remove axle shaft (1) from axle tube and backing plate.



9. Remove ELSD connector (1) if equipped.



10. Remove axle vent hose (1) from axle vent (2) and cover bracket.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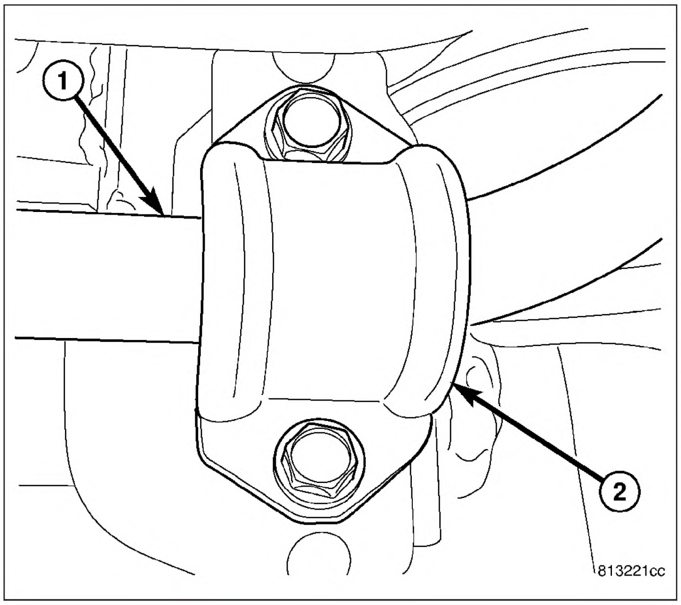
11. Remove propeller shaft.
12. Remove stabilizer bar (1) clamp (2) from axle.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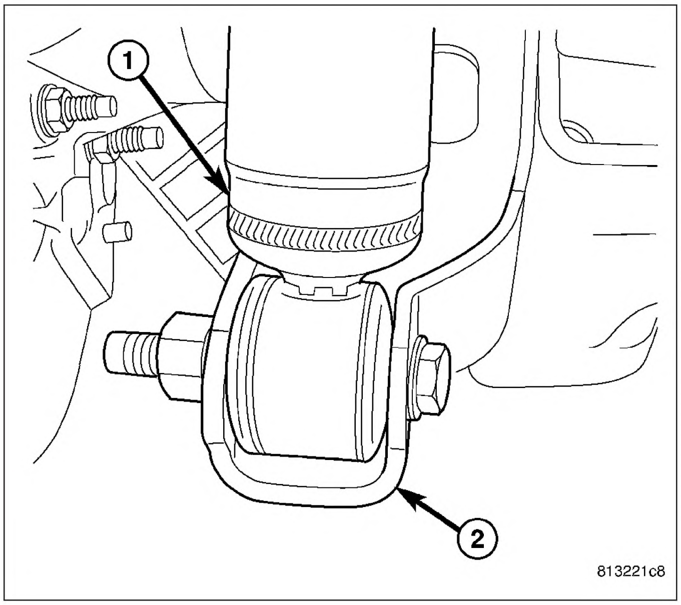
13. Support axle with jack.
14. Remove track bar from axle.
15. Remove shock absobers (1) from axle brackets (2).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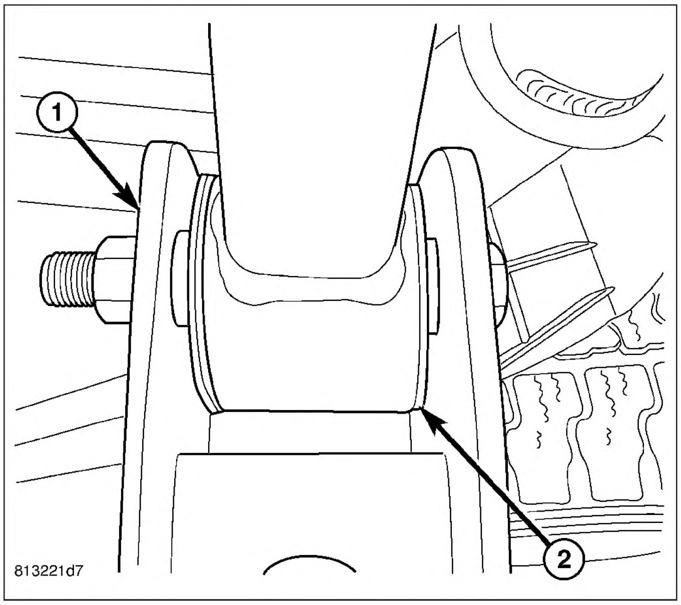
16. Remove upper control arms (2) from axle brackets (1).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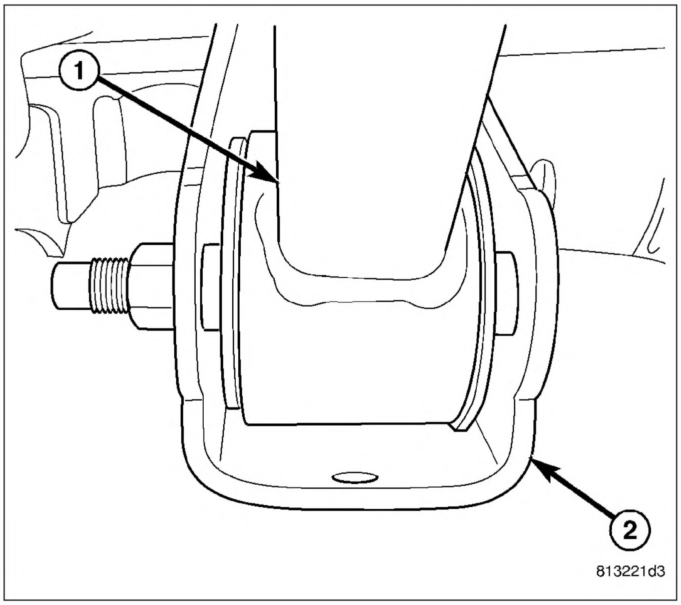
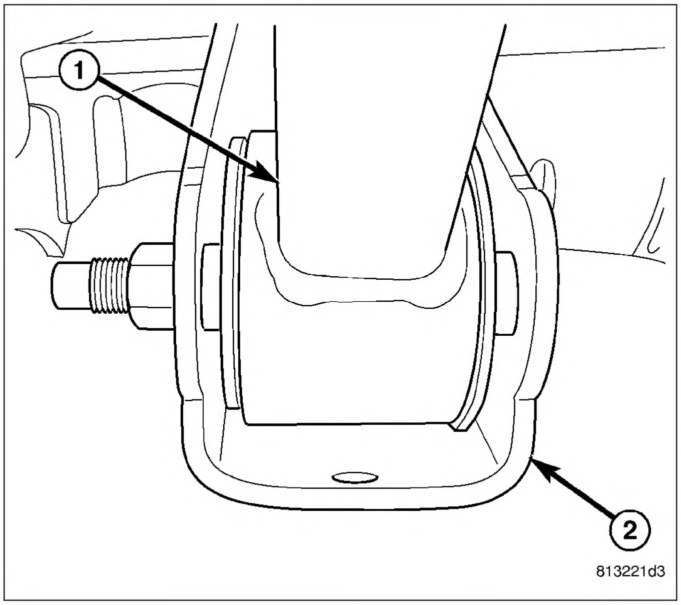
17. Remove lower control arms (1) from axle brackets (2).
18. Lower axle from vehicle and remove coil springs and insulators.

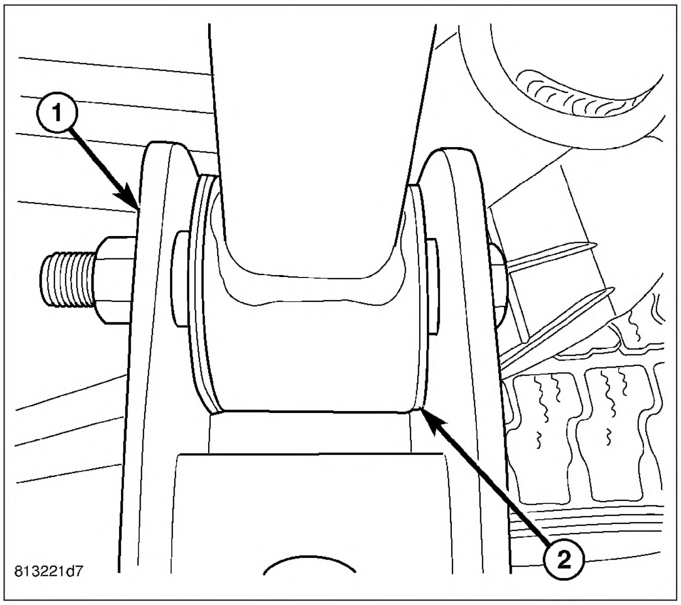


INSTALLATION

1. Install coil springs and insulators. Raise axle into position.
2. Install lower control arms (1) to axle brackets (2).



3. Install upper control arms (2) to axle brackets (1).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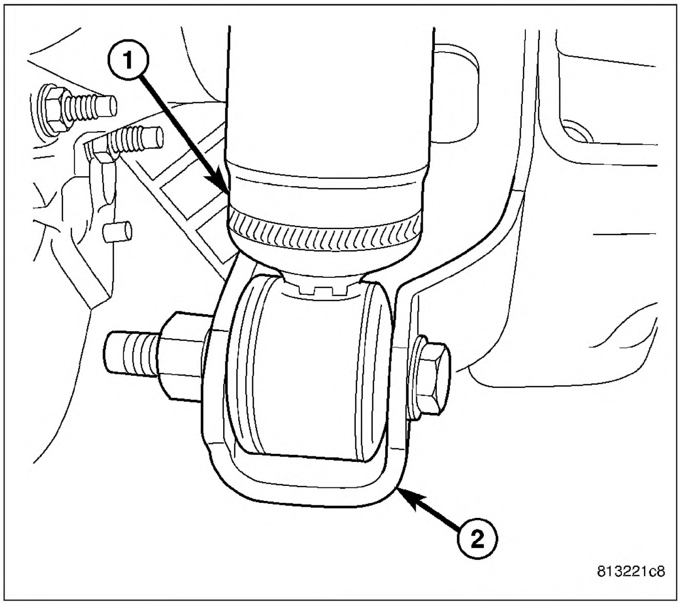
4. Install shock absobers (1) to axle brackets (2).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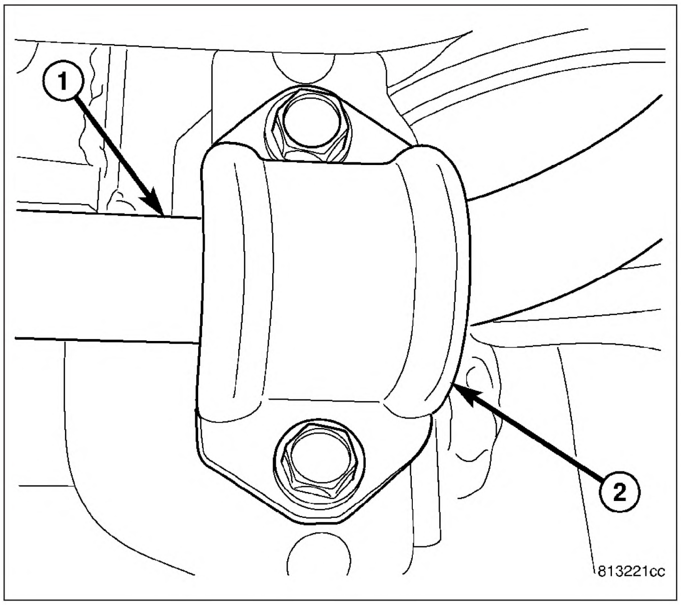
5. Install stabilizer bar (1) and clamps (2) to axle.
6. Install propeller shaft.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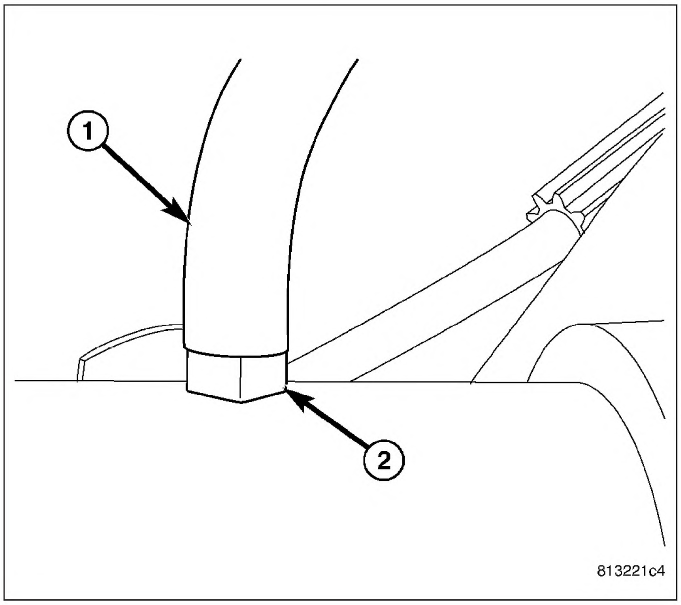
7. Install axle vent hose (1) to axle vent (2) and cover bracket.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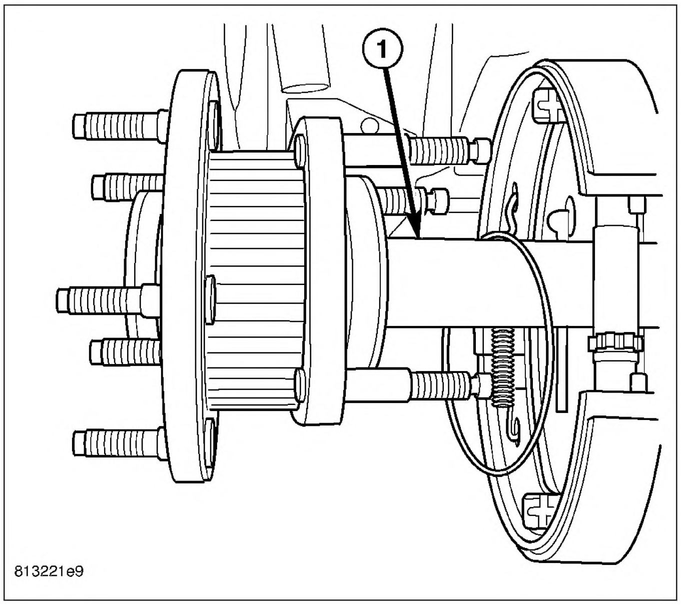
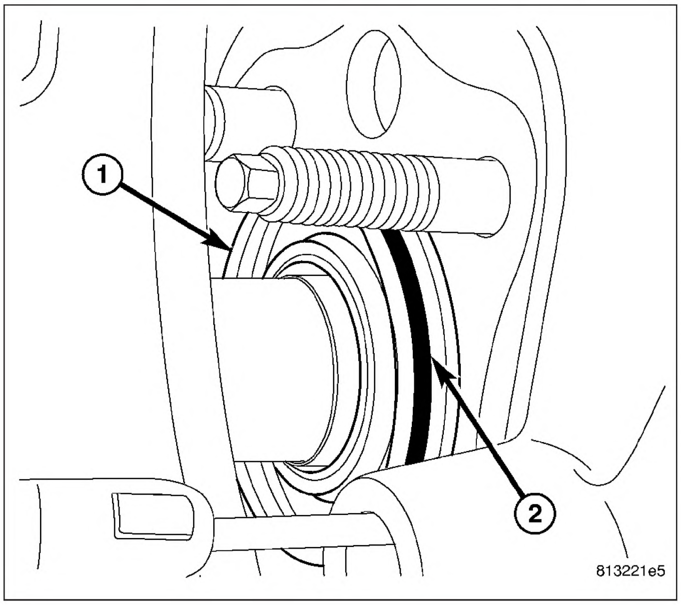
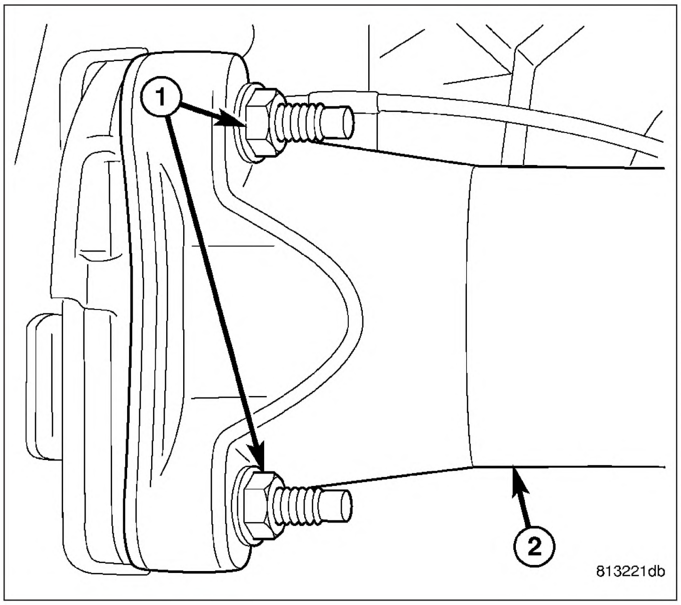
8. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



9. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
10. Install O-ring (2) on axle bearing.



11. Push axle into axle tube.
12. Install axle (2) flange nuts (1) and tighten nuts to 119 N·m (88 ft. lbs.).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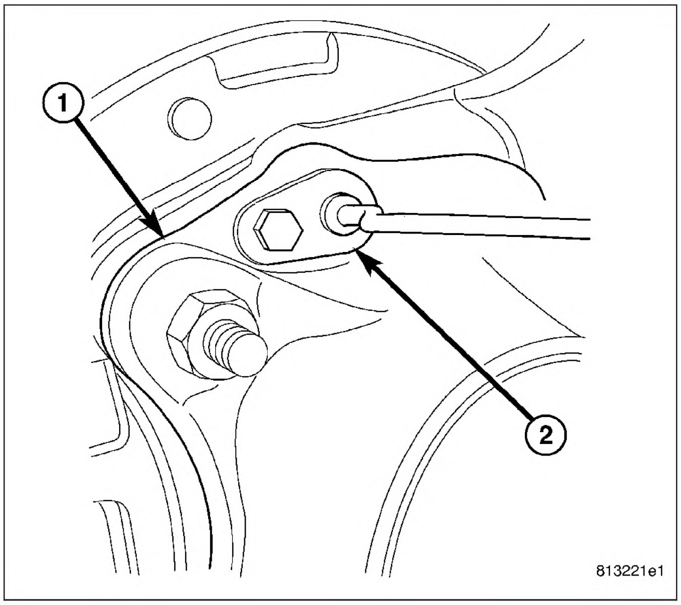
13. Install speed sensors (2) in axle tube (1) flange.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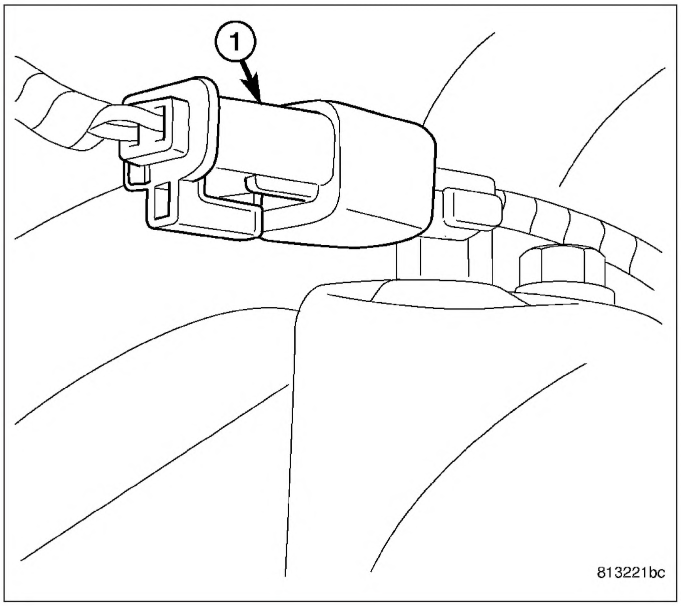
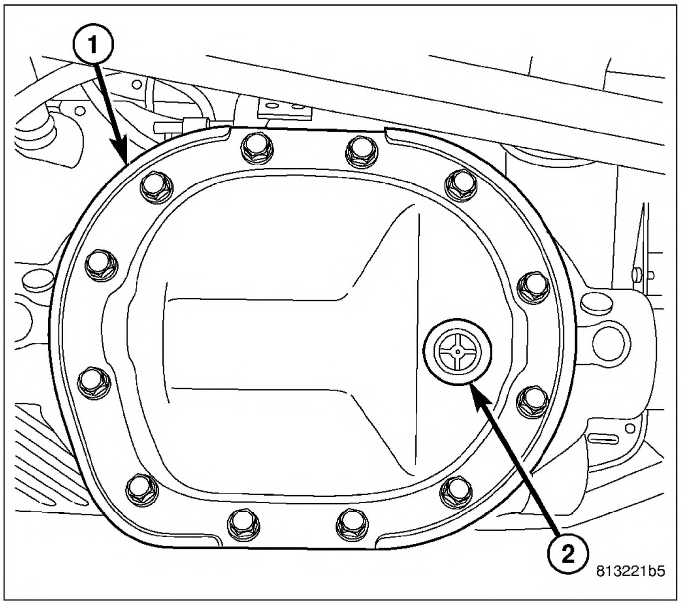
14. Install ELSD connector (1).

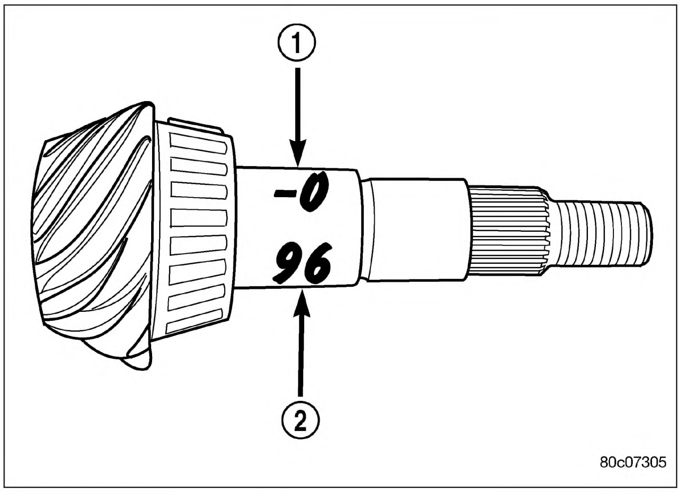


15. Install calipers and rotors.
16. Install differential cover (1) fill differential and install fill plug (2).



ADJUSTMENTS

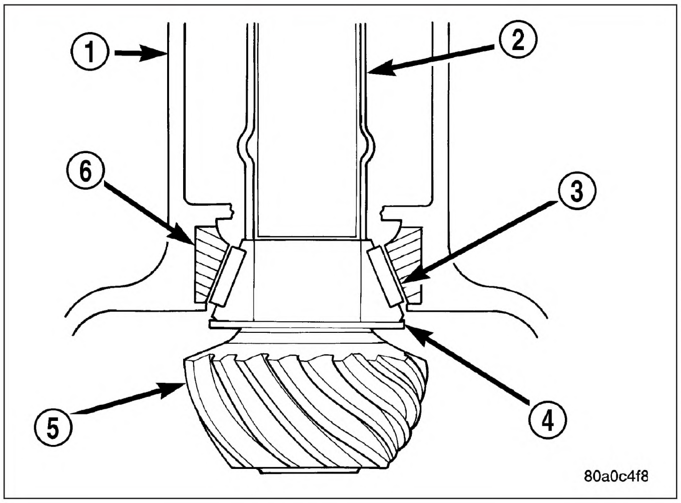
Ring gear and pinion are supplied as matched sets. Identifying numbers for the ring gear and pinion are painted onto the pinion gear shaft and the side of the ring gear. A plus (+) number, minus (–) number or zero (0) along with the gear set sequence number (2) (01 to 99) is on each gear. This first number (1) the amount (in thousandths of an inch) the depth varies from the standard depth setting of a pinion marked with a (0). The next two numbers are the sequence number of the gear set. The standard depth provides



the best teeth contact pattern.

Compensation for pinion depth variance is achieved with select shims (4). The shims are placed behind the rear pinion bearing.

If installing a new gear, note the depth variance number of the original and replacement pinion. Add or subtract this number from the original depth shim/oil slinger to compensate for the difference in the depth variances. The numbers represent thousands of an inch deviation from the standard. If the number is negative, add that value to the required thickness of the depth shims. If the number is positive, subtract that value from the thickness of the depth shim.



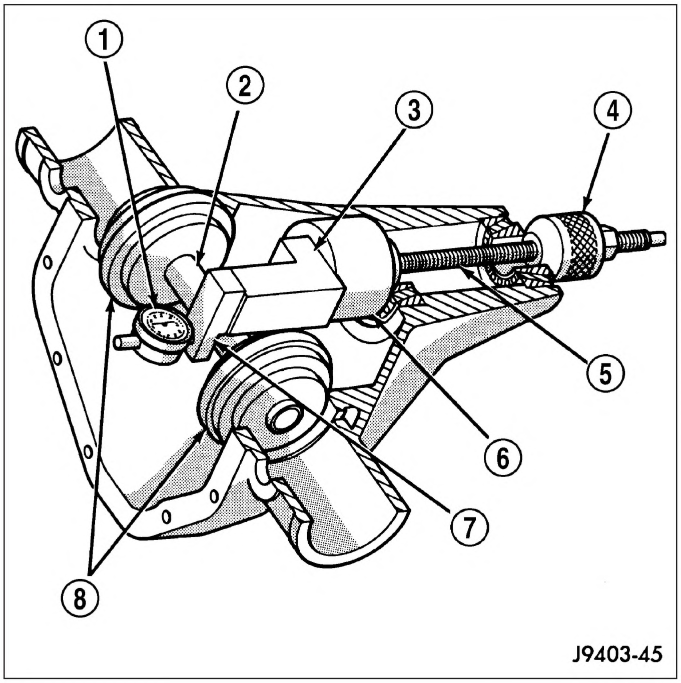
Pinion Gear Depth Variance Chart: Note where Old and New Pinion Marking columns intersect. Intersecting figure represents plus or minus the amount needed.

PINION GEAR DEPTH VARIANCE

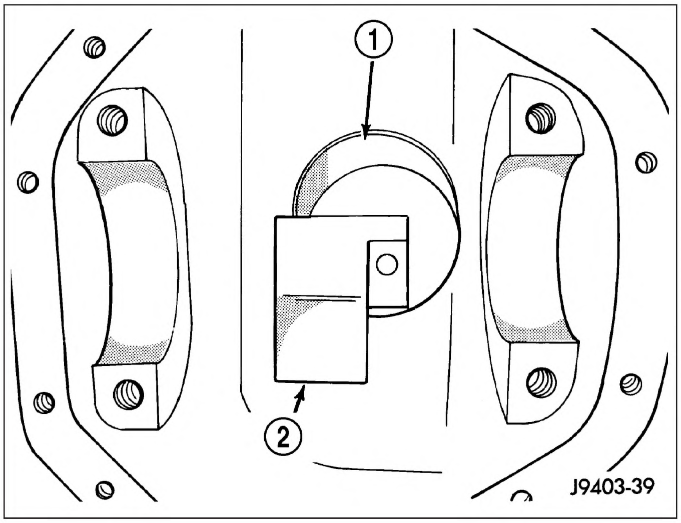
Original Pinion Gear Depth Variance	Replacement Pinion Gear Depth Variance								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

PINION DEPTH MEASUREMENT

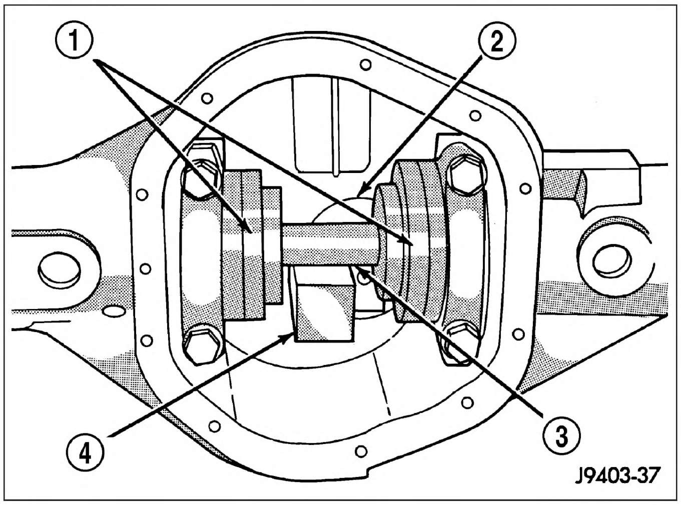
Measurements are taken with pinion bearing cups and pinion bearings installed in the housing. Take measurements with Pinion Gauge Set and Dial Indicator C-3339 (1).



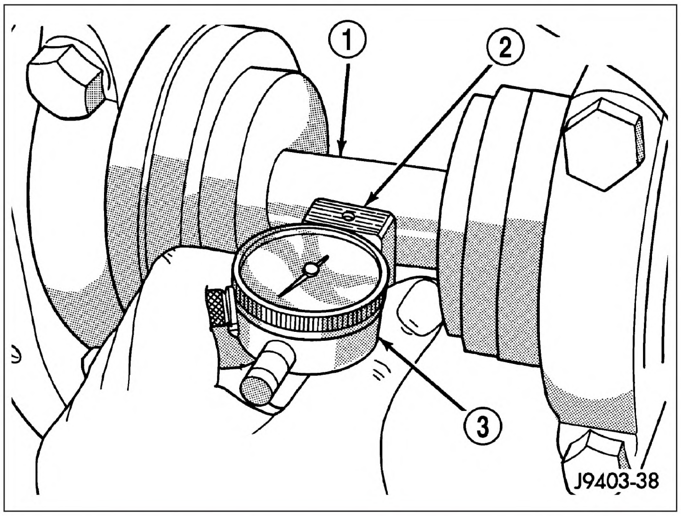
1. Assemble Pinion Height Block 6739 (2), Pinion Block 8540 (1) and rear pinion bearing onto Screw 6741.
2. Insert assembled height gauge components, rear bearing and screw into housing through pinion bearing cups.



3. Install front pinion bearing and Cone-Nut 6740 on the screw. Tighten Cone-Nut until Torque To Rotate screw is 3.4 N·m (30 in. lbs.).
4. Place Arbor Disc 8541A (1) on Arbor D-115-3 (3) and position in the housing side bearing cradles. Install differential bearing caps on arbor discs and tighten cap bolts to 41 N·m (30 ft. lbs.).



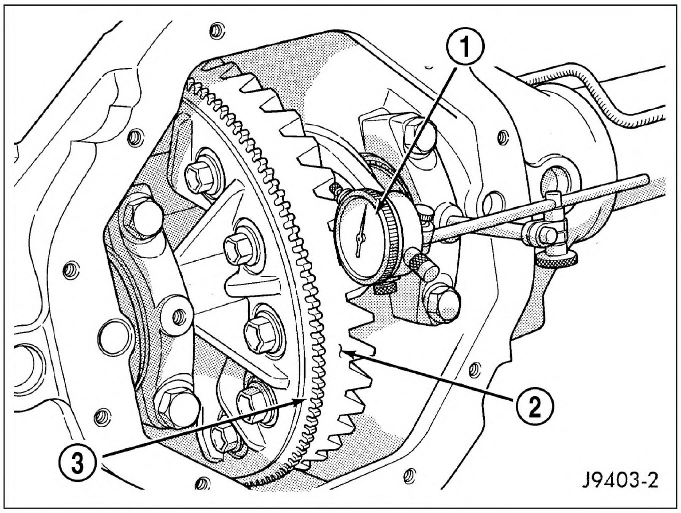
5. Assemble Dial Indicator C-3339 (3) into Scooter Block D-115-2 (2) and secure set screw.
6. Place Scooter Block with Dial Indicator on the pinion height block, so dial probe and scooter block is flush against the pinion height block. Hold scooter block in place and zero the dial indicator. Tighten dial indicator face lock screw.
7. Slide the dial indicator probe over the edge of the pinion height block and on to the arbor bar (1). With the scooter block against the pinion height block.
8. When dial probe contacts the arbor bar, the dial pointer will turn clockwise. Continue moving the dial indicator to the crest of the arbor bar and record the highest reading.
9. Select a shim equal to the dial indicator reading, plus the drive pinion gear depth variance number marked on the shaft of the pinion. For example, if the depth variance is –2, add +0.002 in. to the dial indicator reading. Then subtract 0.04064 mm (0.0016 in.) from the total measurement. This will be the correct shim selection for the pinion height.



DIFFERENTIAL BEARING PRELOAD AND GEAR BACKLASH

The following must be considered when adjusting bearing preload and gear backlash:

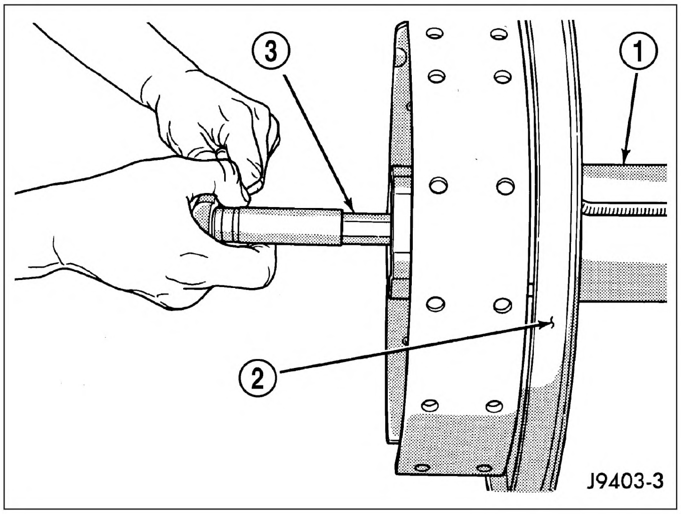
- The maximum ring gear backlash variation is 0.003 inch (0.076 mm).
- Mark the gears so the same teeth are meshed during all backlash measurements.
- Maintain the torque while adjusting the bearing preload and ring gear backlash.
- Excessive adjuster torque will introduce a high bearing load and cause premature bearing failure. Insufficient adjuster torque can result in excessive differential case free-play and ring gear noise.
- Insufficient adjuster torque will not support the ring gear correctly and can cause excessive differential case free-play and ring gear noise.



NOTE: The differential bearing cups will not always immediately follow the threaded adjusters as they are moved during adjustment. To ensure accurate bearing cup responses to the adjustments:

- **Maintain the gear teeth engaged (meshed) as marked.**
- **The bearings must be seated by rapidly rotating the pinion gear a half turn back and forth.**
- **Do this five to ten times each time the threaded adjusters are adjusted.**

1. Use Wrench C-4164 to adjust each threaded adjuster inward until the differential bearing free-play is eliminated. Allow some ring gear backlash approximately 0.25 mm (0.01 in.) between the ring and pinion gear. Seat the bearing cups with the procedure described above.
2. Install dial indicator (1) and position the plunger against the drive side of a ring gear tooth (2). Measure the backlash at 4 positions (90 degrees apart) around the ring gear. Locate and mark the area of minimum backlash.
3. Rotate the ring gear to the position of the least backlash. Mark the gear so that all future backlash measurements will be taken with the same gear teeth meshed.
4. Loosen the right-side, tighten the left-side threaded adjuster with Adjuster Wrench C-4164 (3). Obtain backlash of 0.076 - 0.102 mm (0.003 - 0.004 in.) with each adjuster tightened to 14 N·m (10 ft. lbs.). Seat the bearing cups with the procedure described above.
5. Tighten the differential bearing cap bolts to 95 N·m (70 ft. lbs.).
6. Tighten the right-side threaded adjuster to 102 N·m (75 ft. lbs.). Seat the bearing cups with the procedure described above. Continue to tighten the right-side adjuster and seat bearing cups until the torque remains constant at 102 N·m (75 ft. lbs.)
7. Measure the ring gear backlash. The range of backlash is 0.15 - 0.203 mm (0.006 - 0.008 in.).
8. Continue increasing the torque at the right-side threaded adjuster until the specified backlash is obtained.

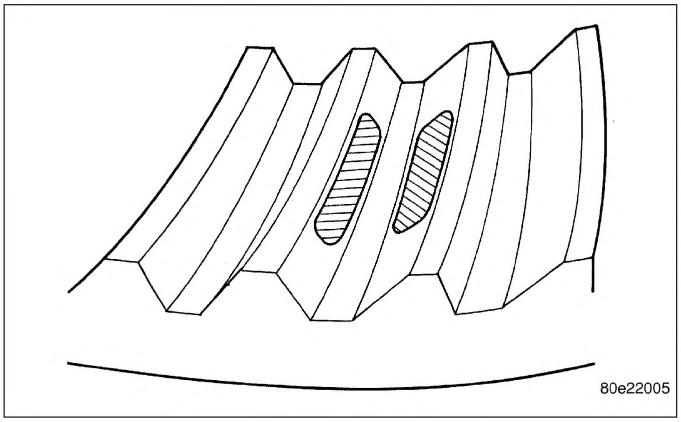


NOTE: The left-side threaded adjuster torque should have approximately 102 N·m (75 ft. lbs.). If the torque is considerably less, the complete adjustment procedure must be repeated.

9. Tighten the left-side threaded adjuster until 102 N·m (75 ft. lbs.) torque is indicated. Seat the bearing rollers with the procedure described above. Do this until the torque remains constant.
10. Install the threaded adjuster locks and tighten the lock screws to 10 N·m (90 in. lbs.).
11. After the proper backlash is achieved, perform the Gear Contact procedure.

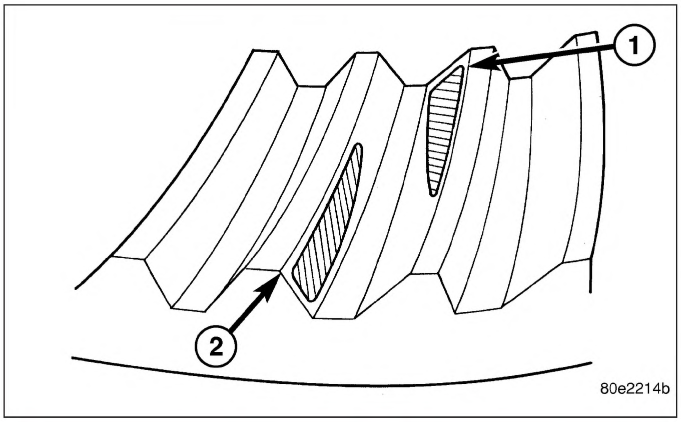
GEAR CONTACT PATTERN

1. Wipe clean each tooth of the ring gear.
2. Apply gear marking compound to all of the ring gear teeth.
3. Verify bearing cap bolts are torque specification.
4. Apply parking brakes lightly to create at 14 N·m (10 ft. lbs.) pinion rotating torque.
5. Rotate the pinion/pinion yoke 4 full revolutions in each directions.
6. Read gear tooth contact pattern.

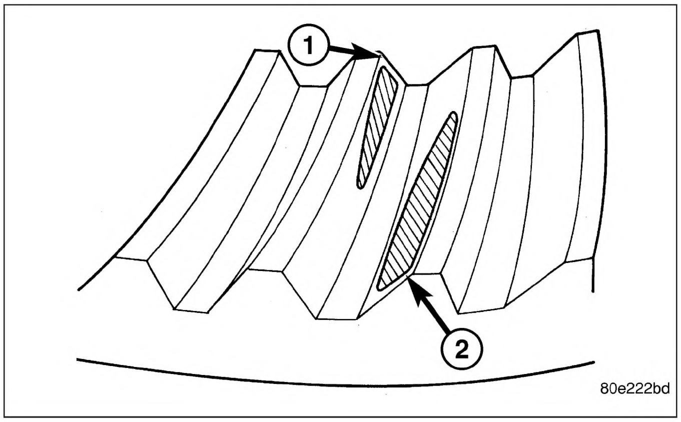


Gear contact pattern is correct. Backlash and pinion depth is correct.

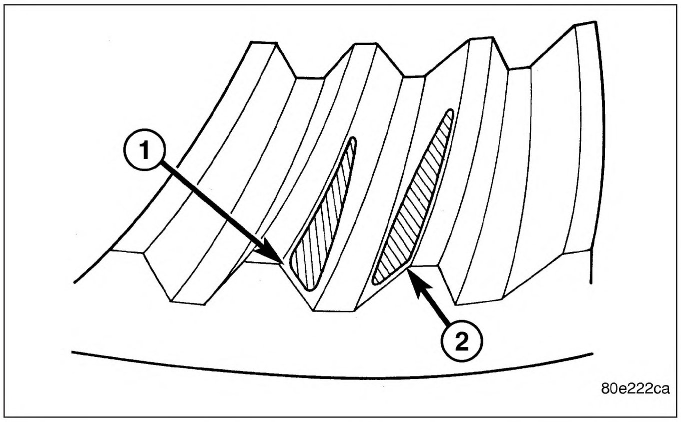
Ring gear is too far away from the pinion gear, coast side toe (1) drive side heel (2). Decrease backlash by moving ring closer to the pinion gear using the adjusters.



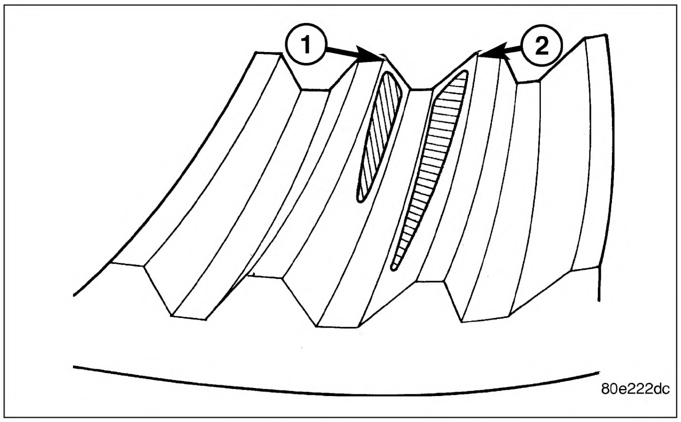
Ring gear is too close to the pinion gear, drive side toe (1) coast side heel (2). Increase backlash by moving ring away from the pinion gear using the adjusters.



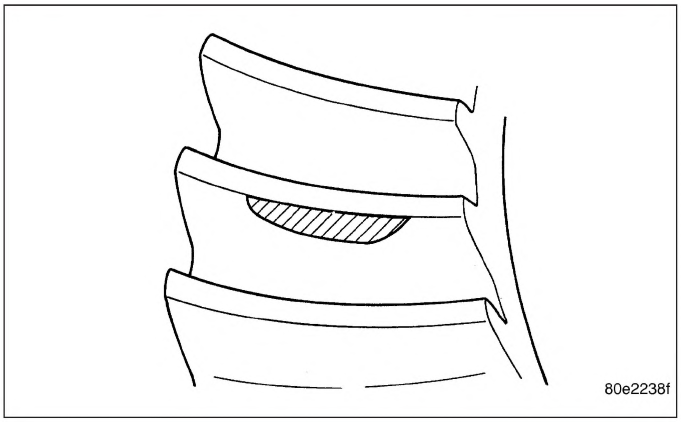
Ring gear is too far away from the pinion gear, drive side heel (1) coast side heel (2). Decrease backlash by moving ring gear closer to the pinion gear using the adjusters.



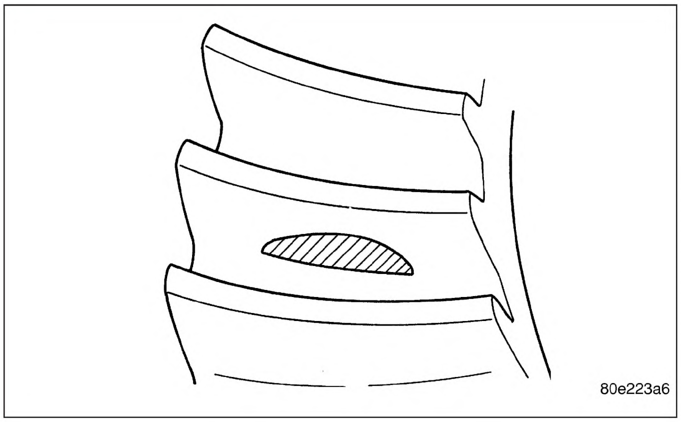
Ring gear is too close to the pinion gear, drive side toe (1) coast side toe (2). Increase backlash by moving ring gear away from the pinion gear using the adjusters.



Pinion gear is set too low. Increase pinion gear height, by increasing pinion depth shim thickness.



Pinion gear is set too high. Decrease pinion height by decreasing the pinion depth shim thickness.



SPECIFICATIONS

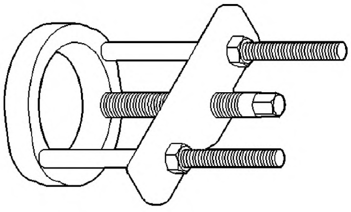
AXLE SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Axle Ratio	3.07, 3.55, 3.73
Differential Case Flange Runout	0.076 mm (0.003 in.)
Differential Case Clearance	0.12 mm (0.005 in.)
Ring Gear Diameter	209.5 mm (8.25 in.)
Ring Gear Backlash	0.12-0.20 mm (0.005-0.008 in.)
Ring Gear Runout	0.12 mm (0.005 in.)
Pinion Bearing Preload - Original Bearings	1-2 N·m (10-20 in. lbs.)
Pinion Bearing Preload - New Bearings	1.7-4 N·m (15-35 in. lbs.)

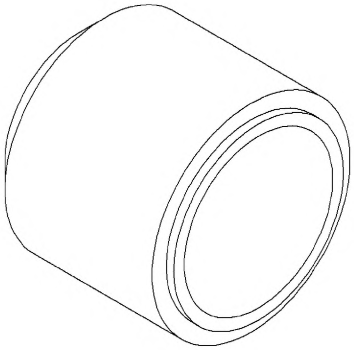
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Differential Cover Bolts	41	30	-
Bearing Cap Bolts	136	100	-
Ring Gear Bolts	102	75	-
Pinion Nut Minimum	285	210	-
Adjuster Lock Screw	11	8	-
Pinion Shaft Lock Screw	26	19	-
Axle Flange Nuts	119	88	-

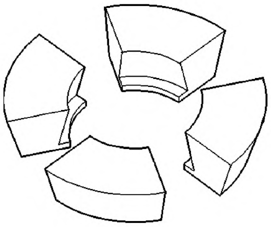
SPECIAL TOOLS



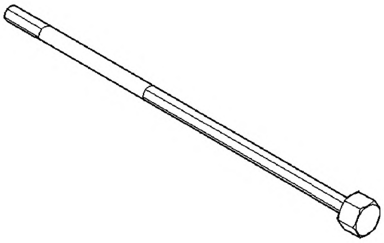
PULLER/PRESS C-293-PA



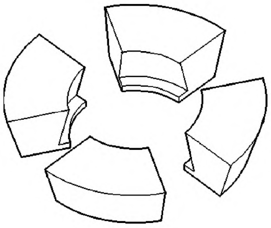
SEAL INSTALLER C-3972A



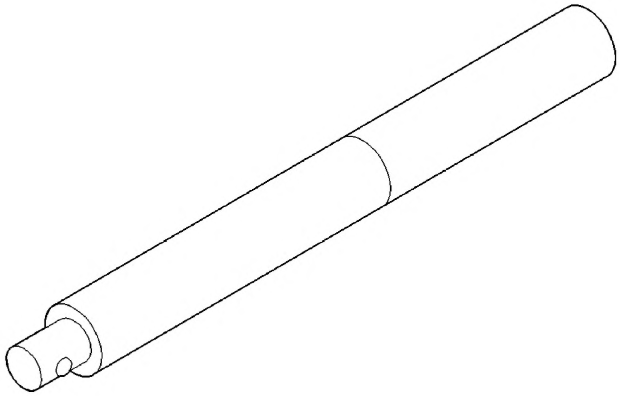
ADAPTERS C-293-47



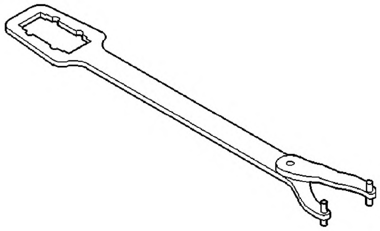
ADJUSTMENT WRENCH C-4164



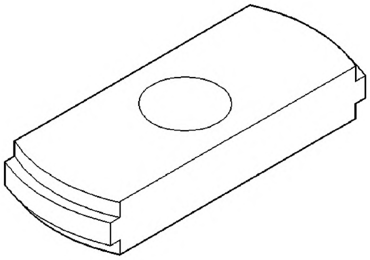
ADAPTERS C-293-48



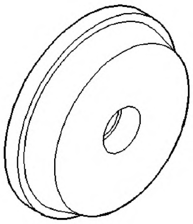
HANDLE C-4171



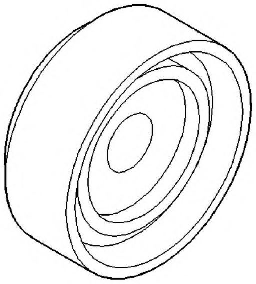
FLANGE WRENCH C-3281



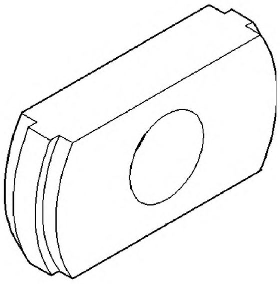
REMOVER C-4307



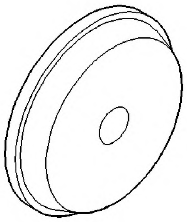
INSTALLER C-4308



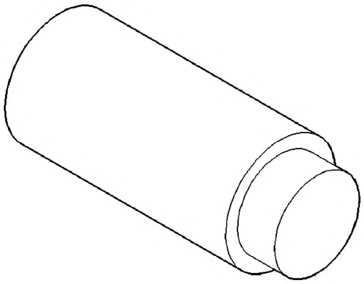
INSTALLER C-4340



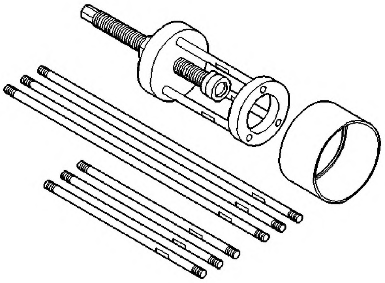
REMOVER C-4345



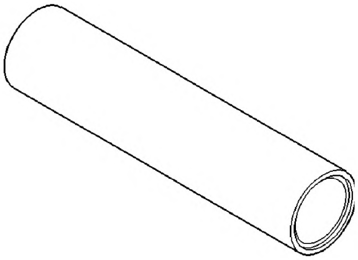
INSTALLER D-130



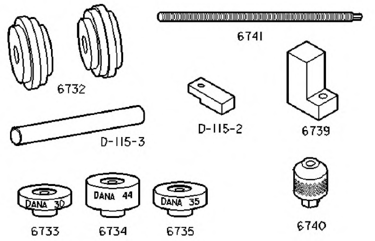
ADAPTER PLUG SP-3289



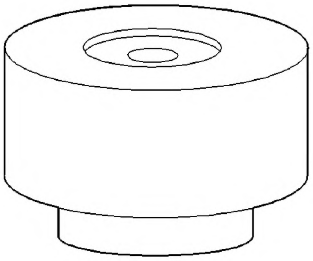
PULLER 6444



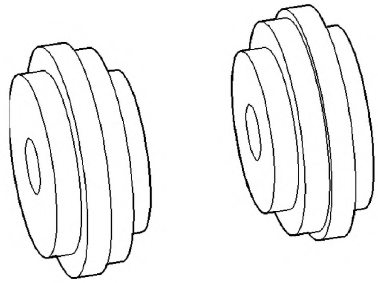
INSTALLER 6448A


6741
6732
D-115-2
6739
D-115-3
DANA 30
DANA 44
DANA 35
6733
6734
6735
6740

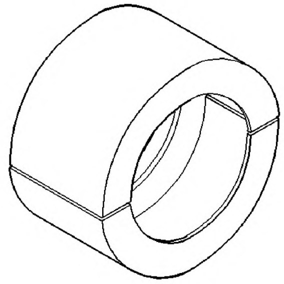
PINION GAUGE SET 6774



PINION BLOCK 8540



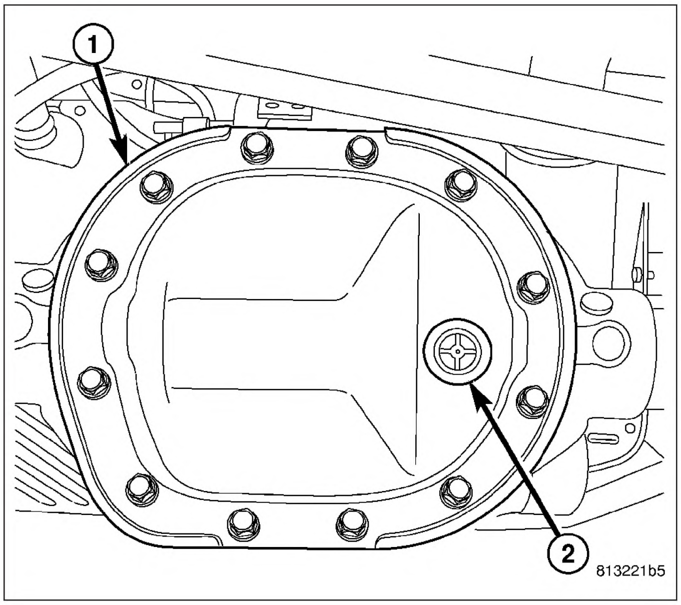
ARBOR DISCS 8541A



DIFFERENTIAL COVER

REMOVAL

1. With vehicle in neutral, position on hoist.
2. Remove fill plug (2).
3. Remove differential cover (1).
4. Drain fluid.

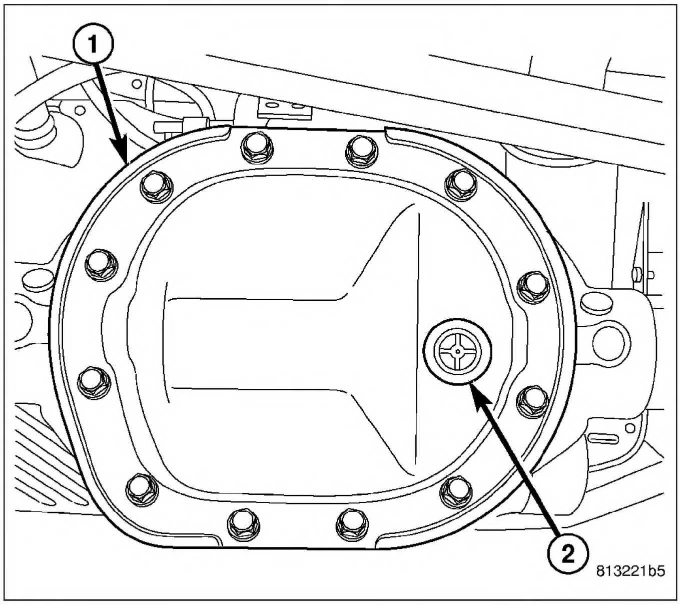


INSTALLATION

1. Apply a 6.35mm (1/4 in.) bead of Mopar® Gear Sealant RTV Silicone Rubber Adhesive MS-GF44D or equivalent to the cover.

CAUTION: If housing cover is not installed within 3 to 5 minutes, the cover must be cleaned and new RTV applied. Failure to follow these instructions will result in a leak.

2. Install cover and tighten cover (1) bolts in a criss-cross pattern to 41 N·m (30 ft. lbs.).

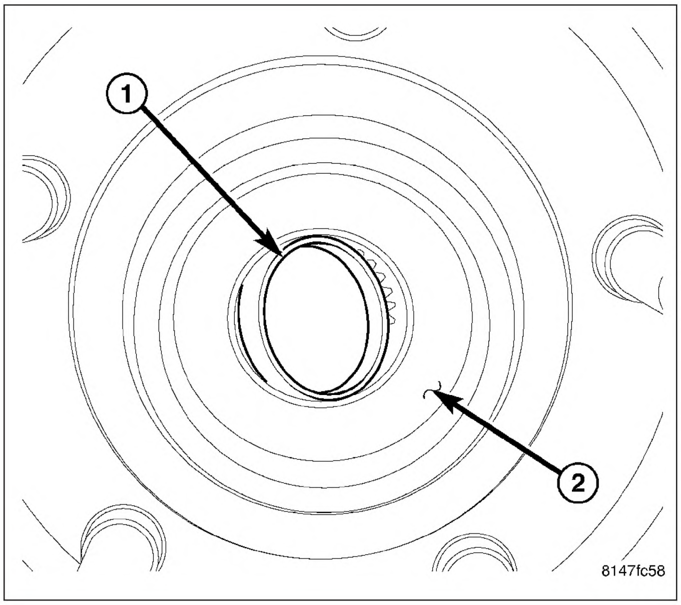


3. Fill differential and install fill plug.

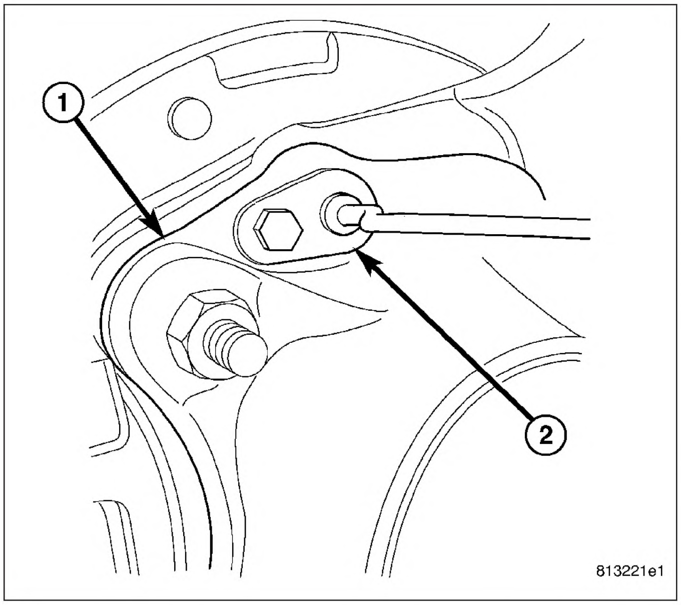
AXLE SHAFTS

REMOVAL

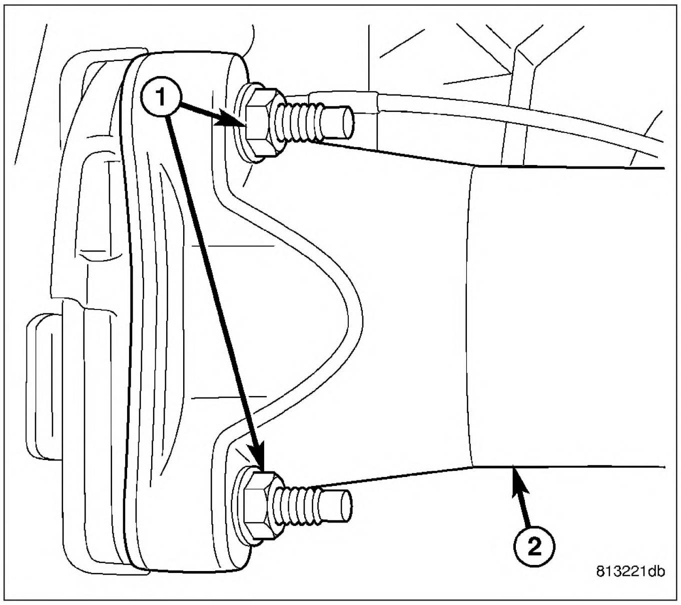
1. With vehicle in netural, position on hoist.
2. Remove calipers and rotors.
3. Tap axle end plug (1) loose from the axle flange (2) with a hammer and punch. Pull plug (1) out of axle flange (2).



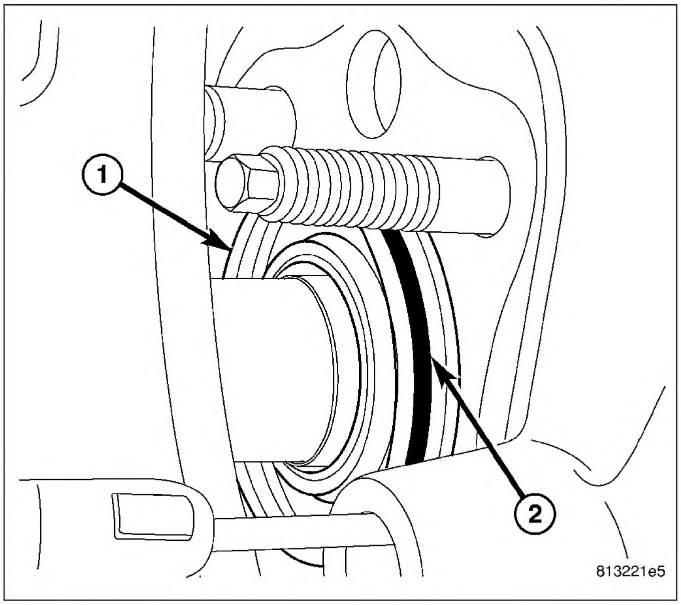
4. Remove speed sensors (2) from axle tube (1) flange.



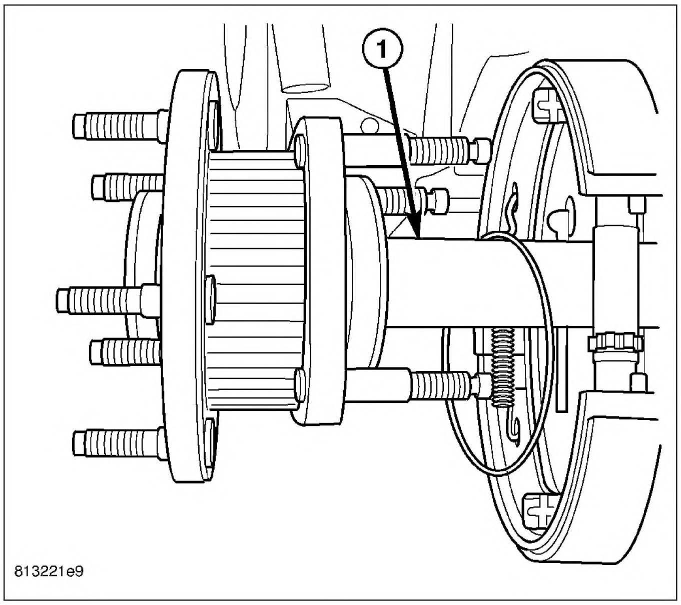
5. Remove axle flange nuts (1) from axle (2).


1
2
813221db

6. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
7. Remove O-ring (2) from the axle bearing.

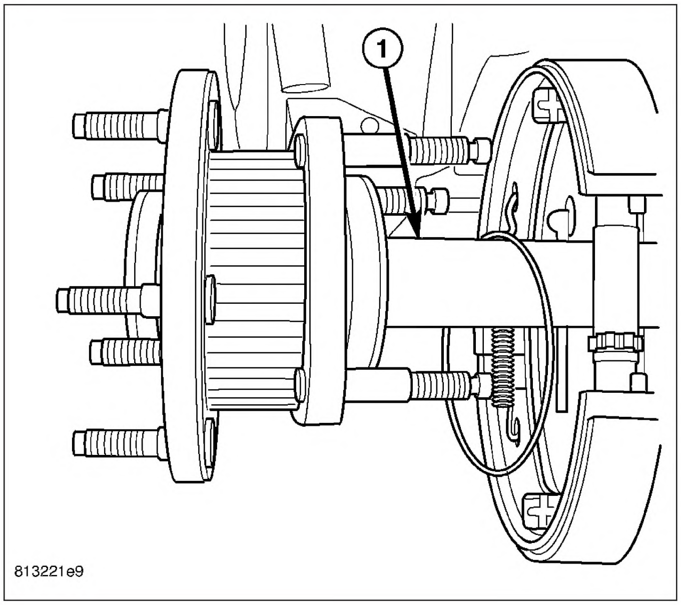

1
2
813221e5

8. Slide axle shaft (1) from axle tube and backing plate.
9. Tap axle shaft out of the bearing and axle flange through the plug hole with a hammer and brass drift.

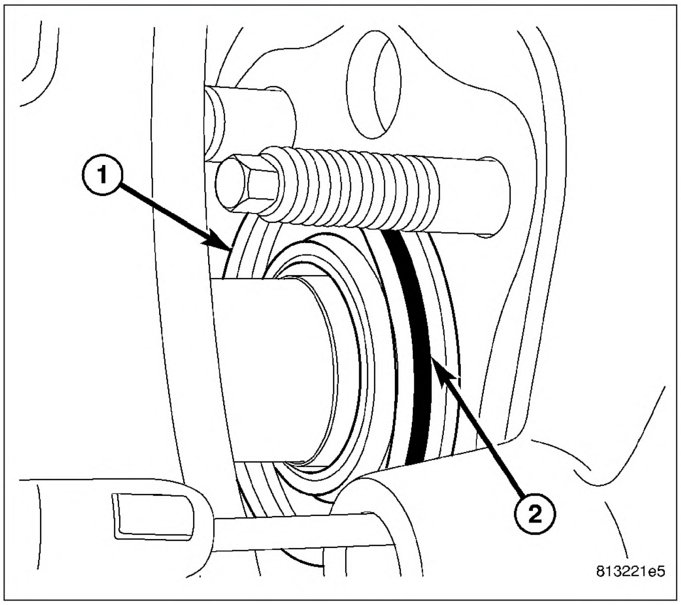


INSTALLATION

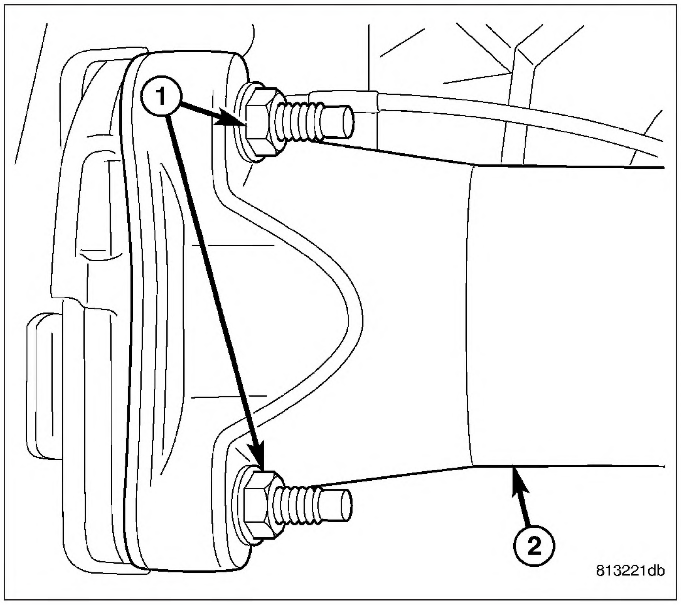
1. Tap axle shaft into through axle bearing into axle flange.
2. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



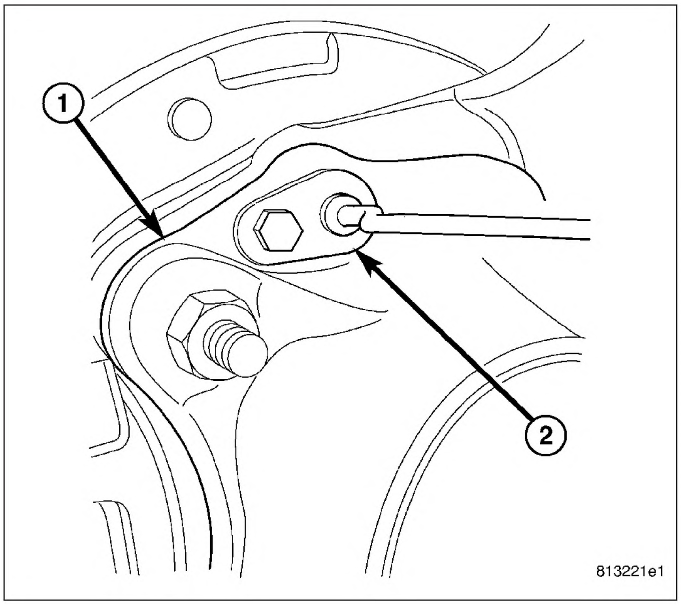
3. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
4. Install O-ring (2) axle bearing.



5. Push axle into axle tube.
6. Install axle (2) flange nuts (1) and tighten to 119 N·m (88 ft. lbs.).



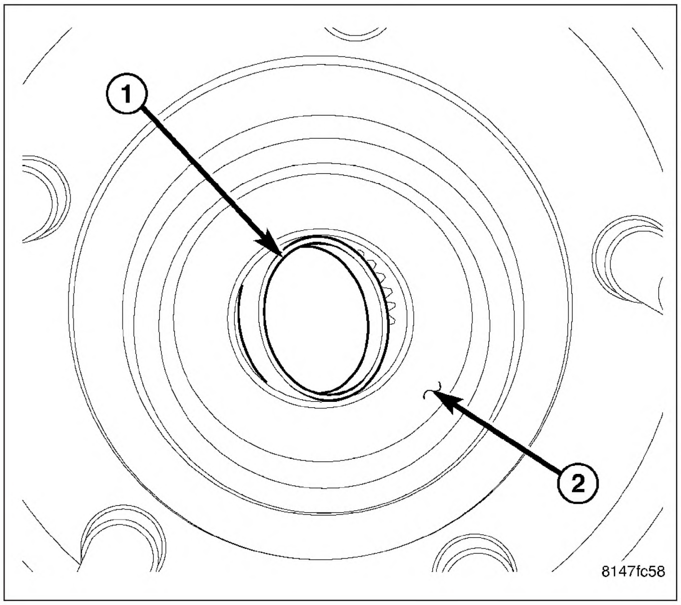
7. Install speed sensors (2) in axle tube (1) flange.
8. Coat new axle flange plug with Mopar® Stud N' Bearing Mount Adhesive or equivalent and install plug.
9. Install calipers and rotors.



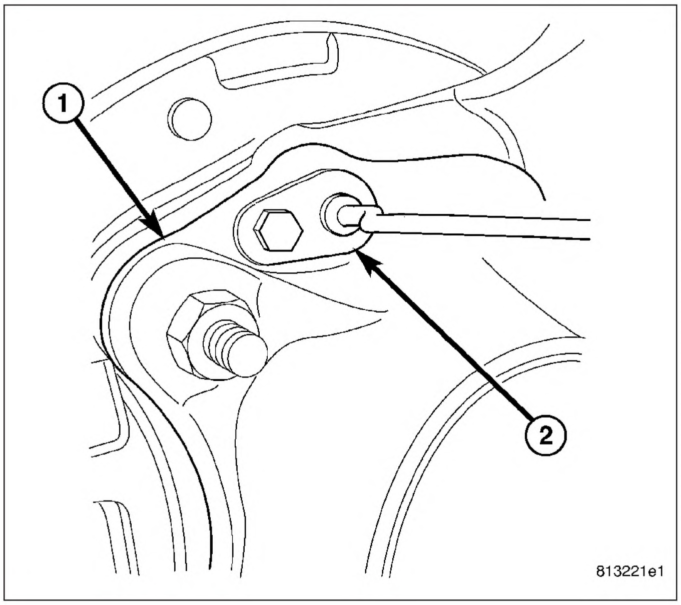
AXLE BEARINGS

REMOVAL

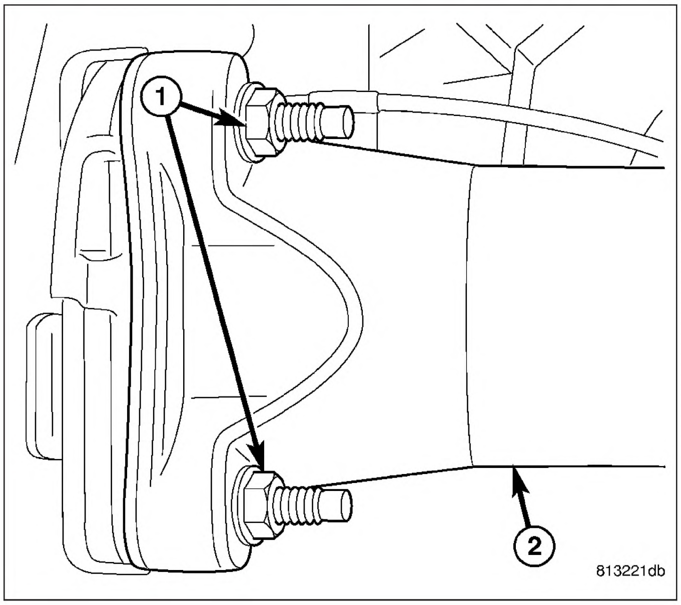
1. With vehicle in netural, position on hoist.
2. Remove calipers and rotors.
3. Tap axle end plug (1) loose from the wheel flange (2) with a hammer and punch. Pull plug (1) out of wheel flange (2).



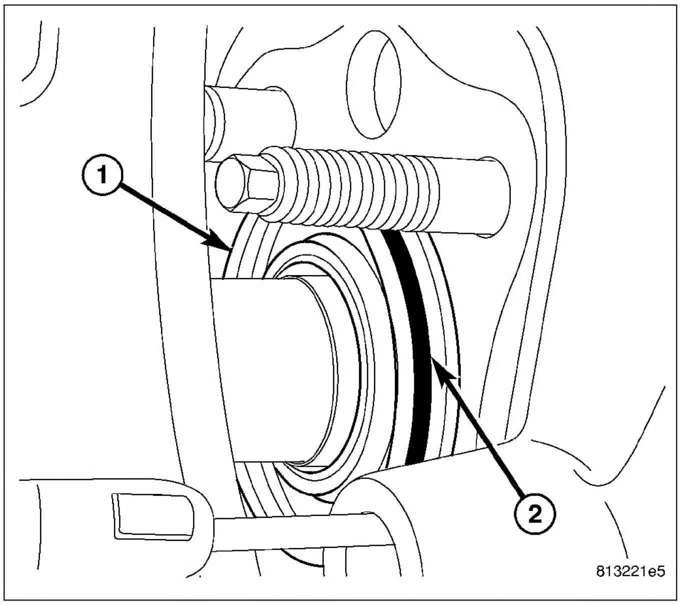
4. Remove speed sensors (2) from axle tube (1) flange.


1
2
813221e1

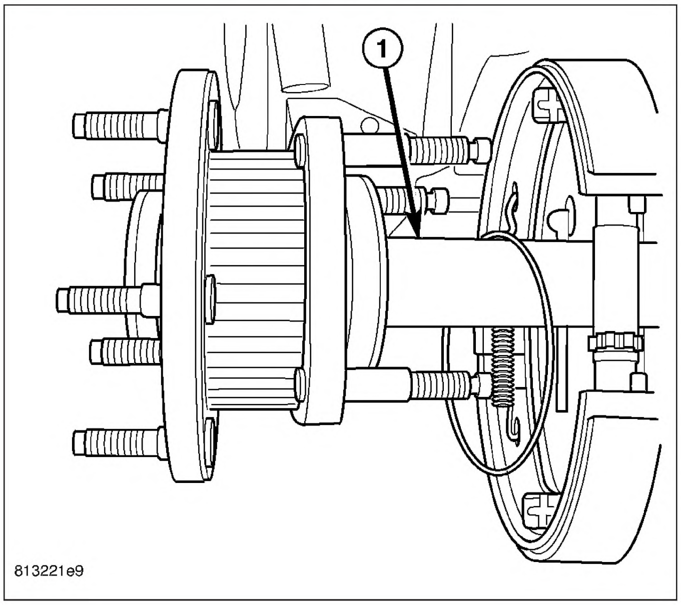
5. Remove axle flange nuts (1) from axle (2).


1
2
813221db

6. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
7. Remove O-ring (2) from the axle bearing.

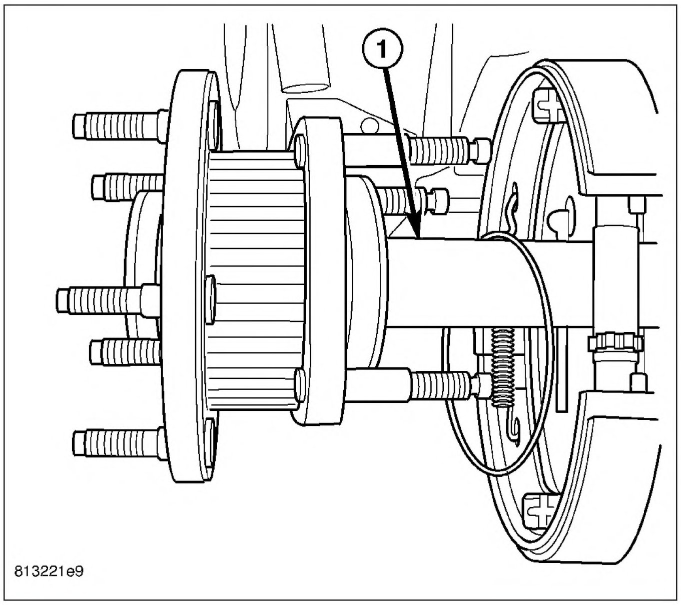


8. Slide axle shaft (1) from axle tube and backing plate.
9. Tap axle shaft out of the wheel flange and axle bearing through the plug hole with a hammer and brass drift.
10. Remove axle flange bolts.

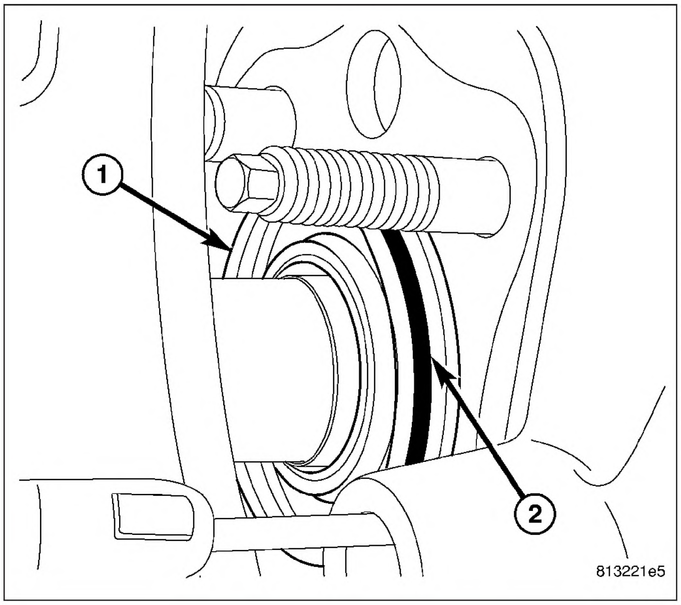


INSTALLATION

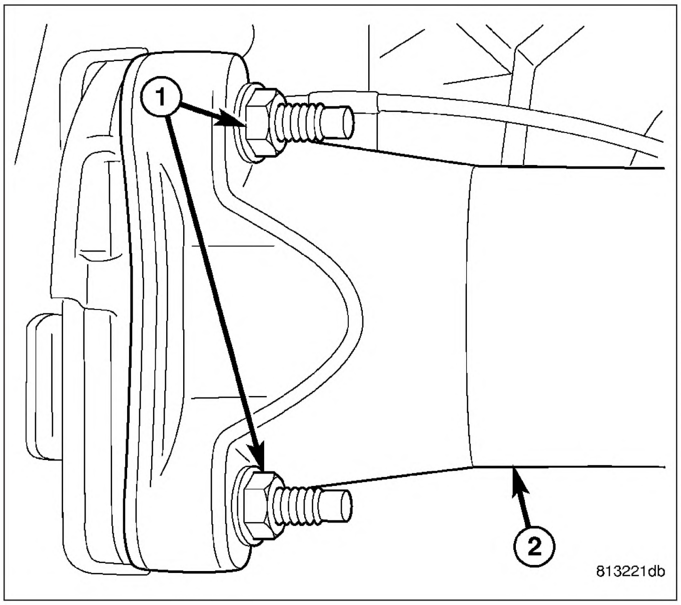
1. Install axle flange bolts into axle flange.
2. Tap axle shaft through axle bearing into wheel flange.
3. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



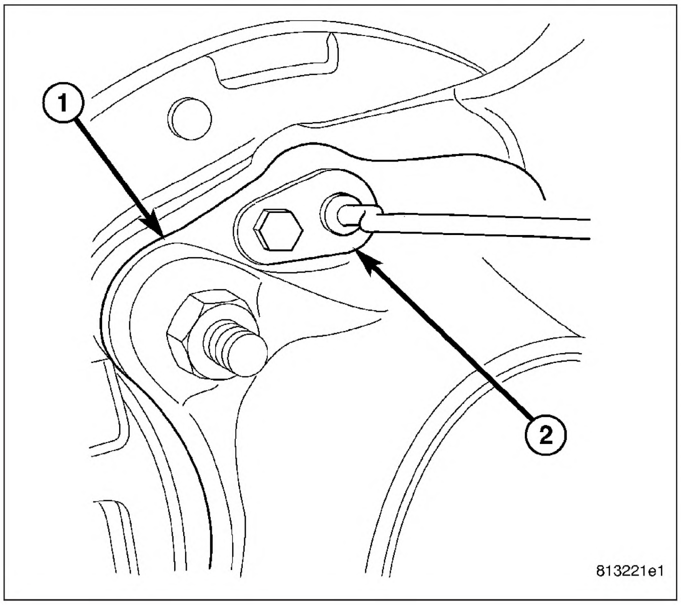
4. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
5. Install O-ring (2) axle bearing.



6. Push axle into axle tube.
7. Install axle (2) flange nuts (1) and tighten to 119 N·m (88 ft. lbs.).



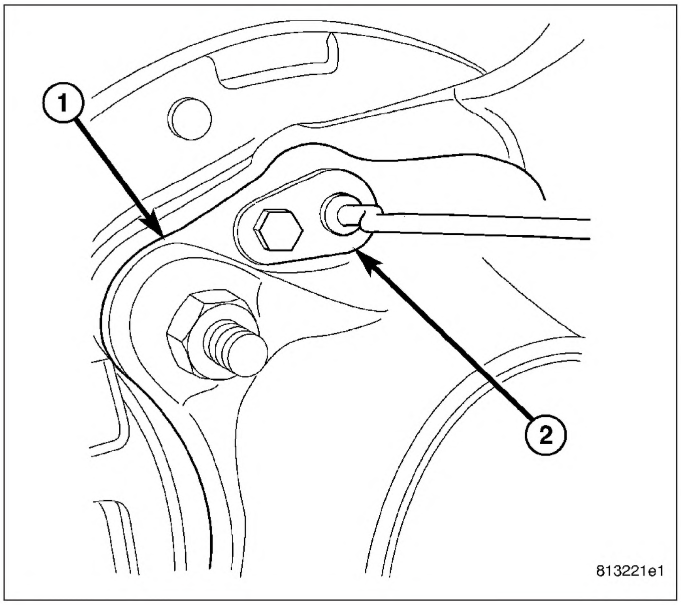
8. Install speed sensors (2) in axle tube (1) flange.
9. Coat new axle flange plug with Mopar® Stud N' Bearing Mount Adhesive or equivalent and install plug.
10. Install calipers and rotors.



AXLE SHAFT SEALS

REMOVAL

1. With vehicle in netural, position on hoist.
2. Remove calipers and rotors.
3. Remove speed sensors (2) from axle tube (1) flange.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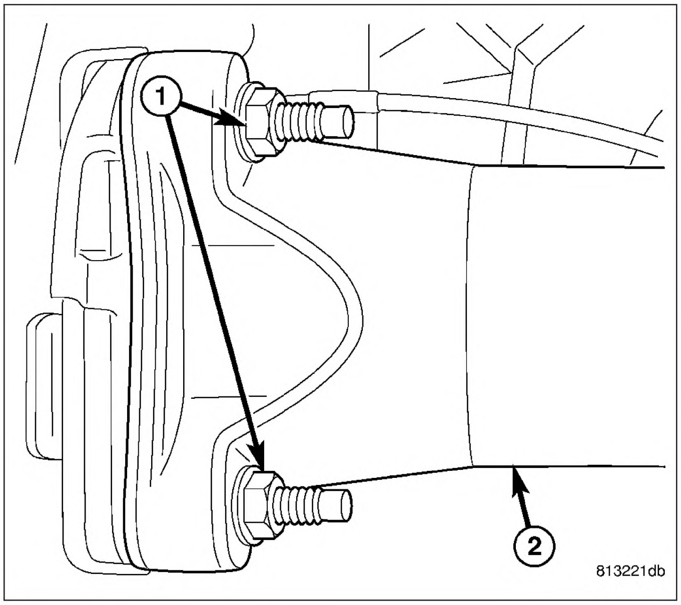
4. Remove axle flange nuts (1) from axle (2).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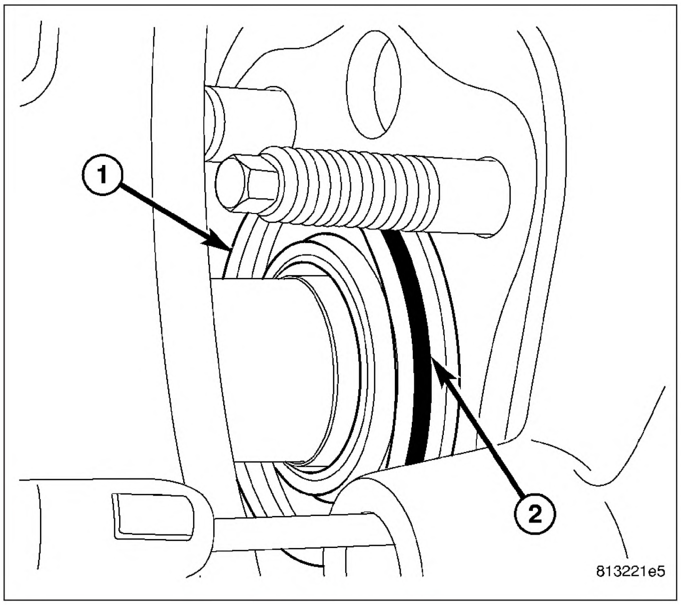
5. Pull axle shaft and backing plate out of axle tube until axle bearing (1) is exposed.
6. Remove O-ring (2) from the axle bearing.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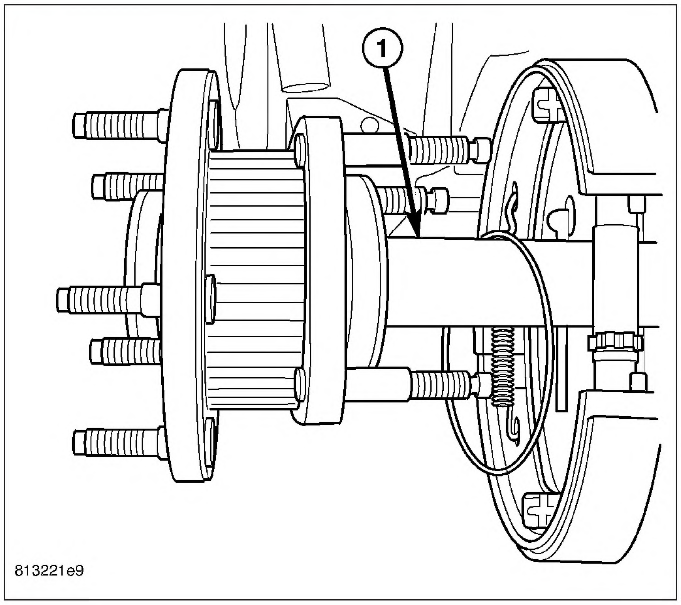
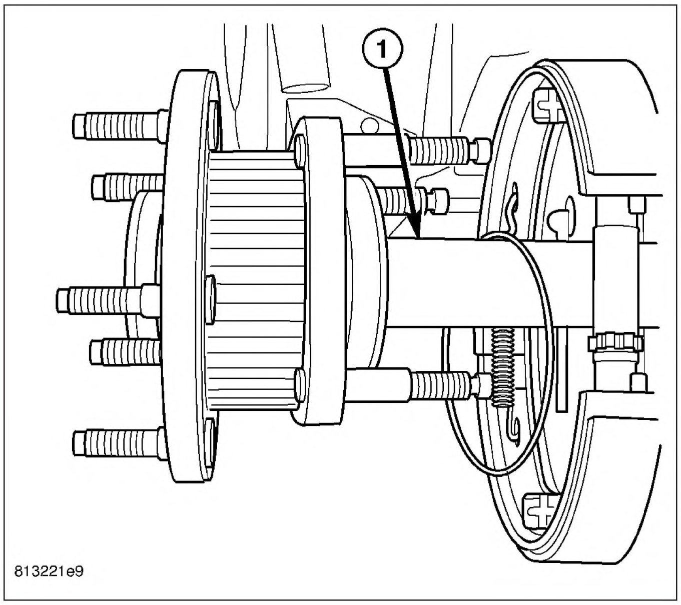
7. Remove axle shaft (1) from axle tube and backing plate.

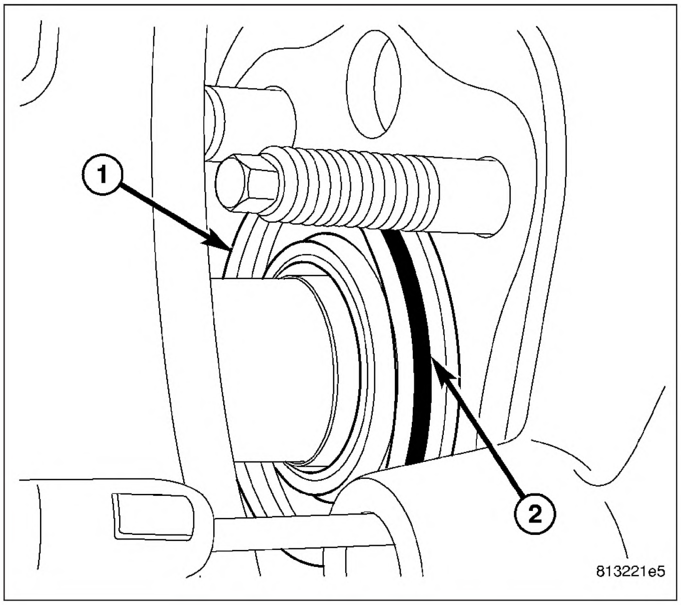


INSTALLATION

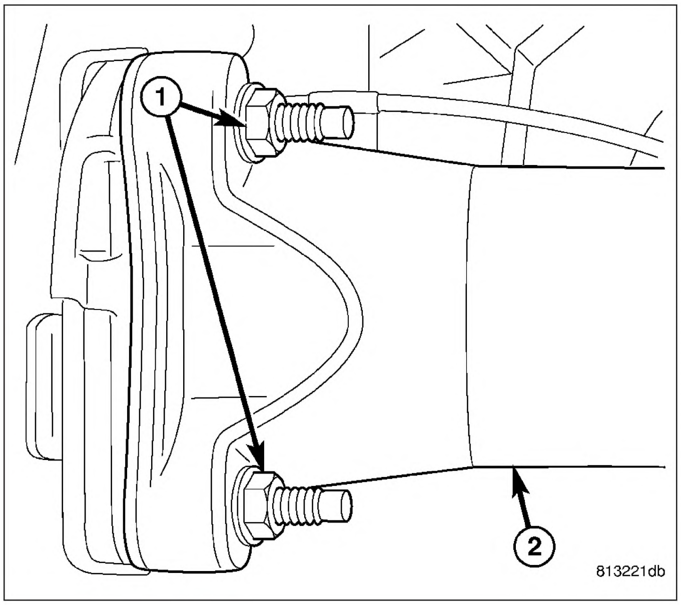
1. Install axle shaft (1) into axle tube and backing plate with new o-ring on axle.



2. Slip O-ring (2) through backing plate, then push axle through backing plate until bearing (1) is exposed.
3. Install new O-ring (2) on axle bearing (1).



4. Push axle into axle tube.
5. Install axle (2) flange nuts (1) and tighten to 119 N·m (88 ft. lbs.).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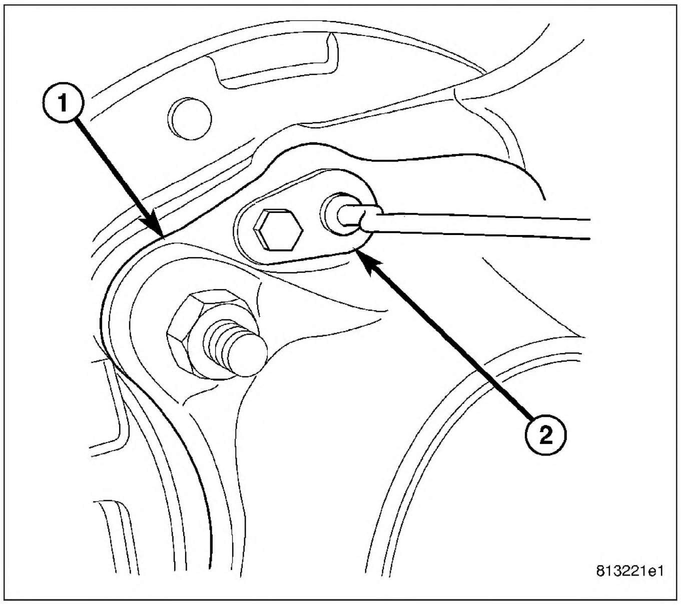
6. Install speed sensors (2) in axle tube (1) flange.
7. Install calipers and rotors.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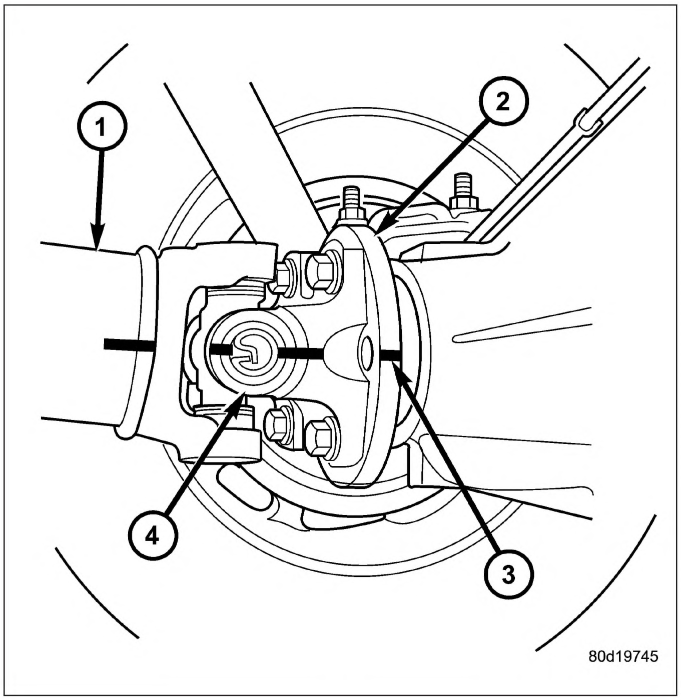
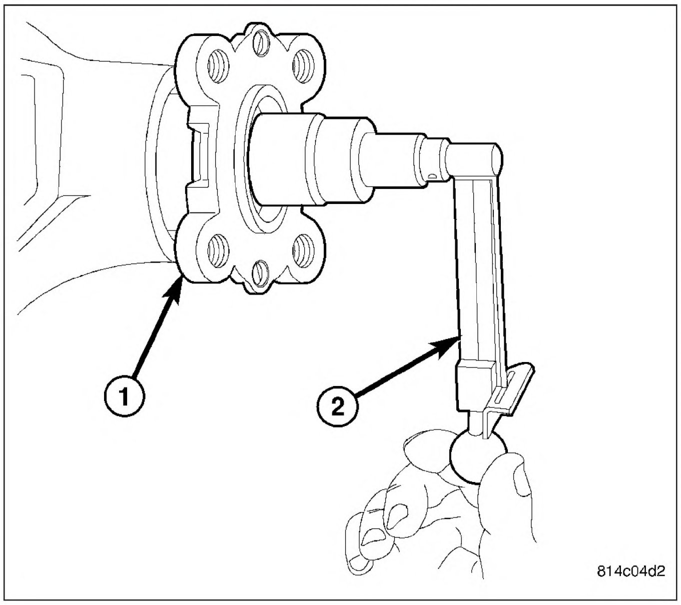
PINION SEAL

REMOVAL

1. With vehicle in neutral, position vehicle on hoist.
2. Mark a reference line across the axle flange (3) and propeller shaft flange (4).

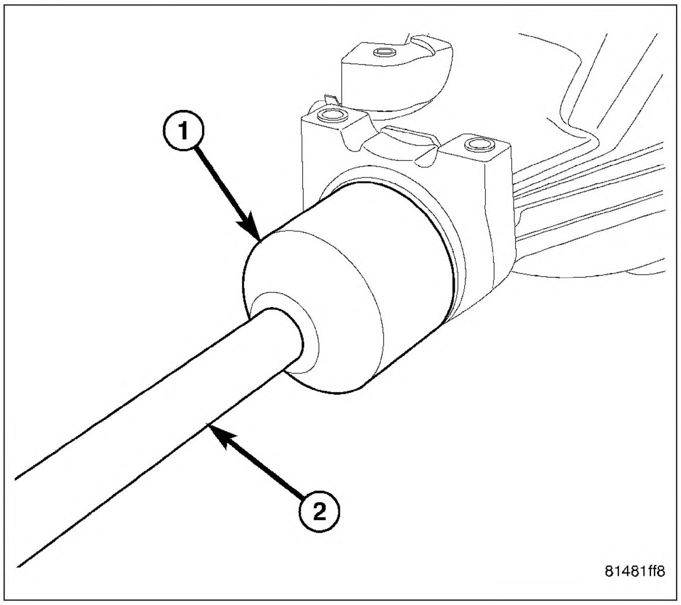


3. Remove propeller shaft
4. Remove brake calipers and rotors to prevent any drag.
5. Rotate flange three or four times and verify flange rotates smoothly.
6. Measure torque to rotating pinion flange (1) with a inch pound torque wrench (2). Record reading for installation reference.
7. Hold pinion flange with Wrench C-3281 and remove pinion nut and washer.
8. Remove flange with two jaw puller.
9. Remove pinion seal with a seal pick or slide-hammer mounted screw.



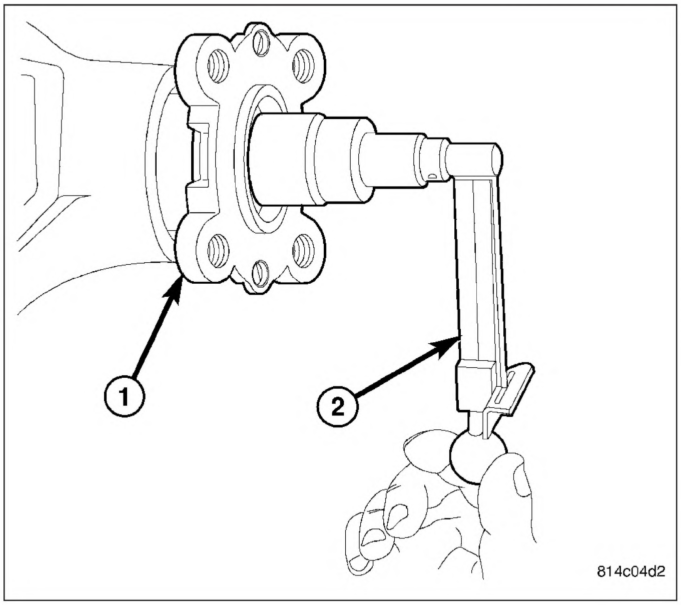
INSTALLATION

1. Apply a light coating of gear lubricant on the lip of pinion seal.
2. Install **new** pinion seal with Installer C-3972A (1) and Handle C-4171 (2).
3. Install flange on the end of the shaft with the reference marks aligned.
4. Install flange on pinion shaft with Installer C-3718 and Wrench C-3281.
5. Install pinion washer and a **new** pinion nut. The convex side of the washer must face outward.



CAUTION: Do not exceed the minimum tightening torque when installing the companion flange retaining nut at this point. Failure to follow these instructions can damage the collapsible spacer or bearings.

6. Hold flange with Wrench C-3281and tighten pinion nut to 285 N·m (210 ft. lbs.). Rotate pinion several revolutions to ensure bearing rollers are seated.
7. Rotate pinion flange (1) with an inch pound torque wrench (2). Rotating torque should be equal to the reading recorded during removal plus an additional 0.56 N·m (5 in. lbs.).



CAUTION: Never loosen pinion nut to decrease pinion bearing rotating torque and never exceed specified preload torque. If rotating torque is exceeded, a new collapsible spacer must be installed. Failure to follow these instructions can damage the collapsible spacer or bearings.

8. If rotating torque is low use Holder 6719, to hold flange and tighten pinion nut in 6.8 N·m (5 ft. lbs.) increments until proper rotating torque is achieved.

NOTE: The seal replacement is unacceptable if final pinion nut torque is less than 285 N·m (210 ft. lbs.).

NOTE: The bearing rotating torque should be constant during a complete revolution of the pinion. If the rotating torque varies, this indicates a binding condition.

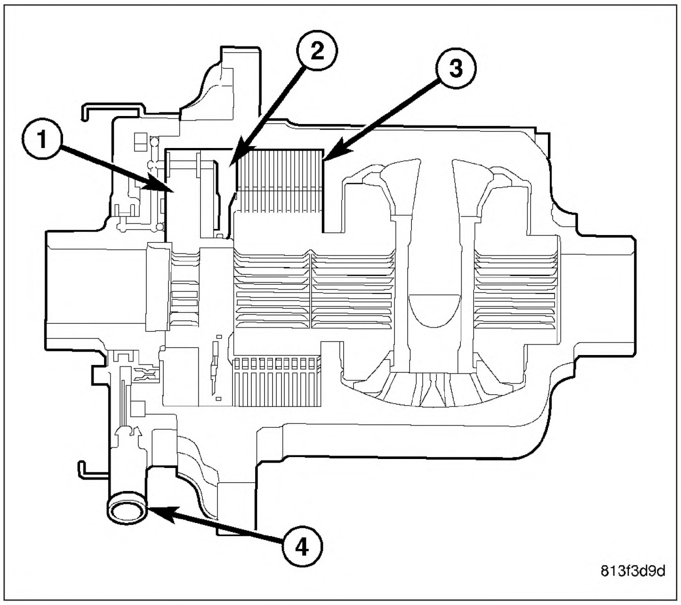
9. Install propeller shaft.
10. Install rear brake components.

DIFFERENTIAL-ELSD

OPERATION

A gerotor pump (1) creates oil flow through the filter (4) whenever left and right wheels spin at different speeds and the solenoid valve is activated. The oil flow is restricted by a Pressure Regulating Valve (PRV) to build oil pressure. Pressurized oil is then fed to a piston (2) chamber. The piston compresses the clutch pack (3) providing additional torque to the lower speed wheel.

When the antilock brakes are activated the differential solenoid is switched off and pressure is bleed off the clutch pack.



DIAGNOSIS AND TESTING

DIFFERENTIAL-ELSD

HYDRAULIC

CONDITION	POSSIBLE CAUSES	CORRECTION
No Lock Up	1. Pump Seals Leaking 2. Clutch Worn 3. Solenoid Valve 4. Pluged Filter 5. Final Drive Control Module	1. Replace Differential 2. Replace Differential 3. Replace Solenoid 4. Clean Filter 5. Replace Control Module

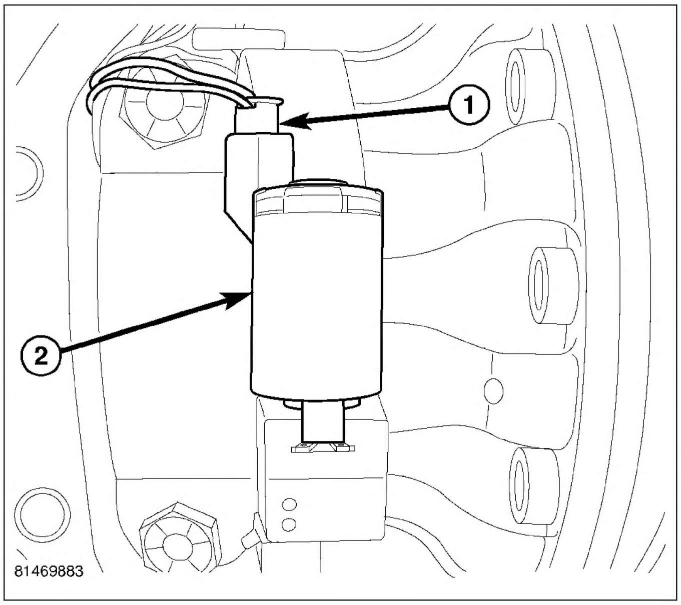
Raise vehicle and rotate tires in the opposite direction at the same time. This will make any oil left in the piston chamber apply pressure to the clutch and create some drag on the wheels. The wheels will not lock because the differntial solenoid is not activated.

SOLENOID

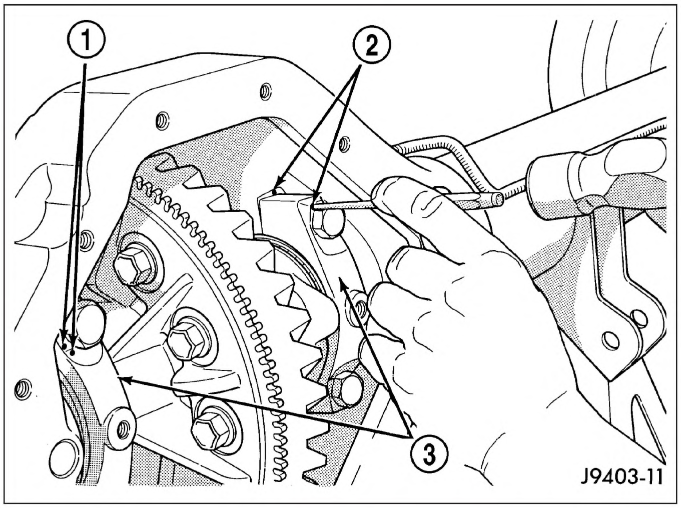
With solenoid disconnected resistance across the solenoid should be 13.5 to 14.5 ohms at 25°Celsius (77° Fahrenheit). To replace the solenoid diconnect wire connector then squeeze the retension clip and pull solenoid up.

REMOVAL

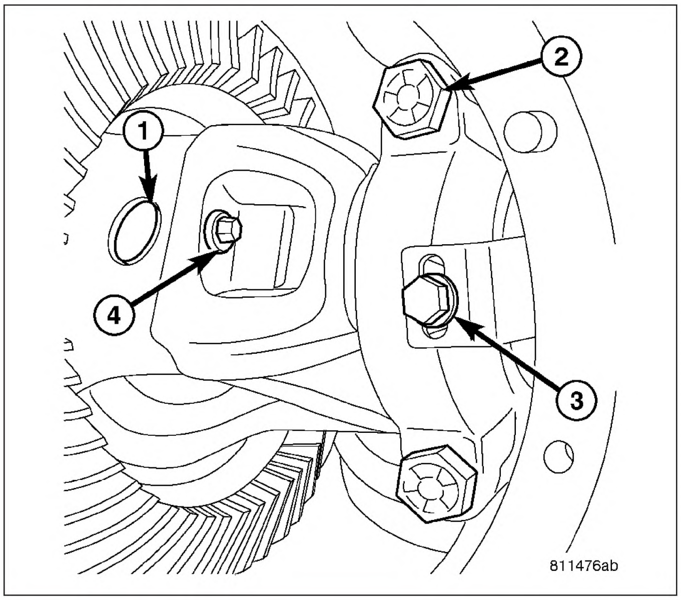
1. Remove differential cover.
2. Remove axle shafts.
3. Remove ABS sensor from housing.
4. Remove solenoid valve connector (1) from ELSD solenoid valve (2).



5. Mark differential housing and bearing caps (3) for installation reference.

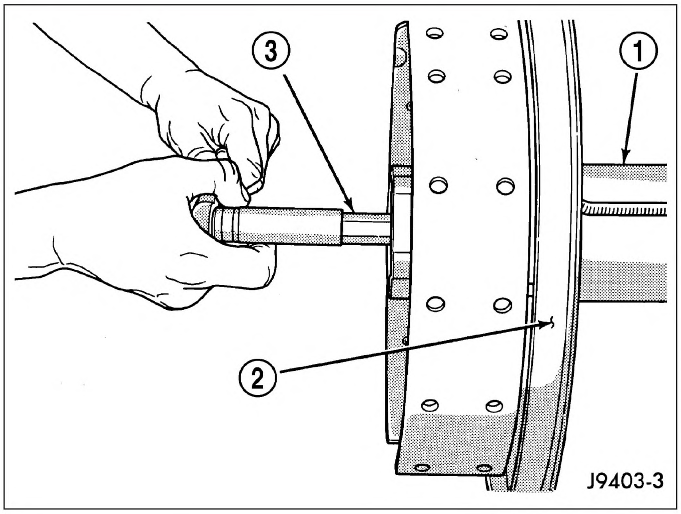


6. Remove bearing adjuster lock bolt (3) from bearing caps.



7. Loosen differential bearing cap bolts.
8. Loosen differential bearing adjusters through the axle tubes (1) with Wrench C-4164 (3).
9. Hold differential case while removing bearing caps and adjusters.
10. Remove differential case and tag differential bearing cups and adjusters to indicate location.
11. Clean housing cavity with flushing oil, light engine oil or a lint free cloth.

NOTE: Do not use steam, kerosene or gasoline to clean the housing.

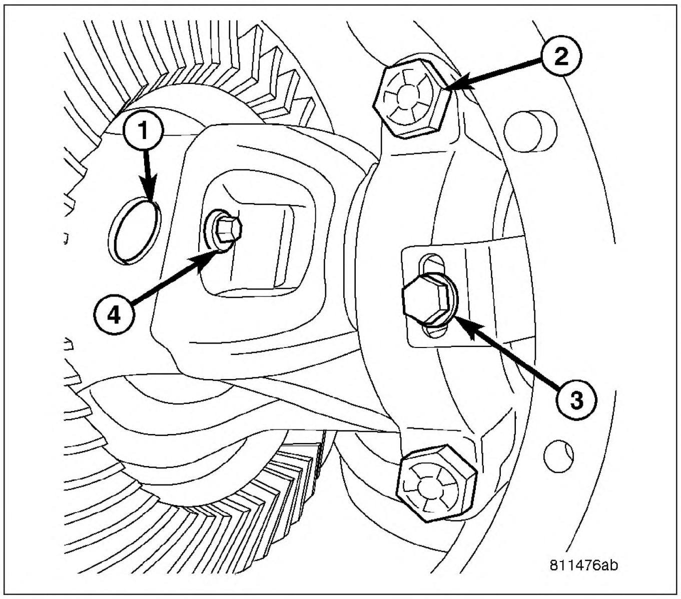


INSTALLATION

1. Apply a coat of hypoid gear lubricant to differential bearings, bearing cups and threaded adjusters.

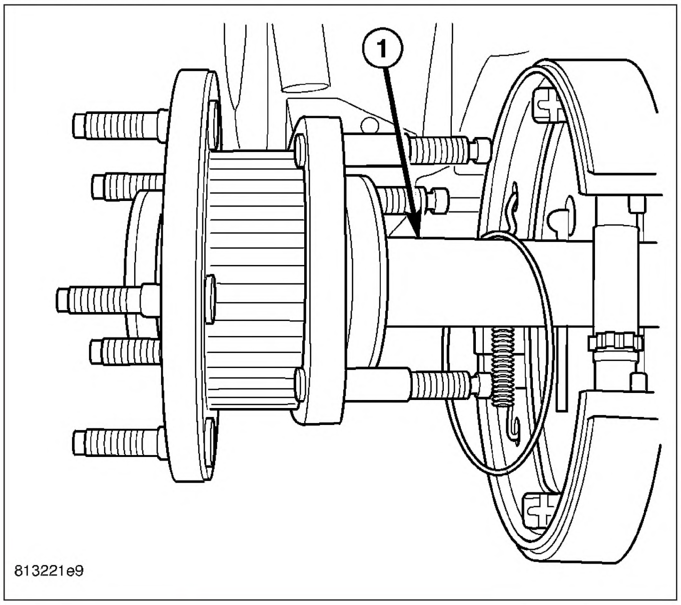
NOTE: Grease can be used to keep the adjusters in position.

2. Install differential assembly into the housing.
3. Install differential bearing caps in their original locations.
4. Install bearing cap bolts and tighten upper bolts to 14 N·m (10 ft. lbs.). Tighten lower bolts finger-tight until the bolt head is seated.
5. Perform differential bearing preload and adjustment procedure.
6. Tighten bearing cap bolts (2) to 135 N·m (100 ft. lbs).

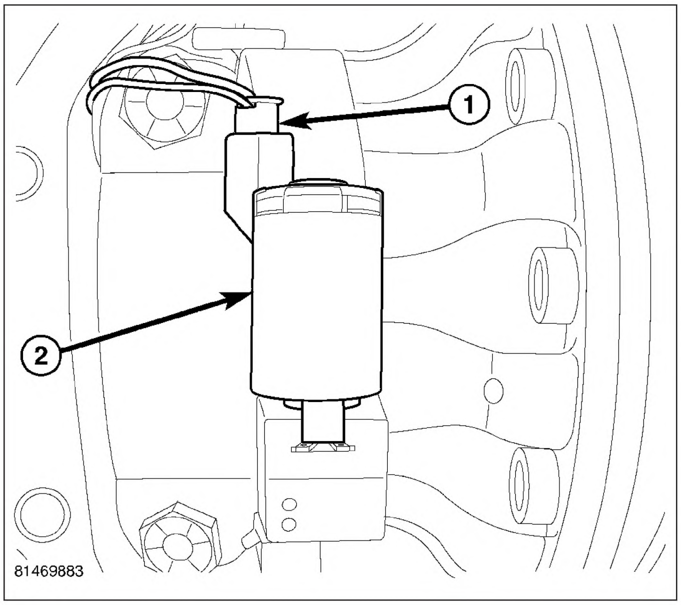


7. Install adjuster locks (3) on bearing caps and tighten bolts to 11 N·m (8 ft. lbs.).

8. Install axle shafts (1).



9. Install solenoid valve connector (1) to ELSD solenoid valve (2).
10. Install differential cover.

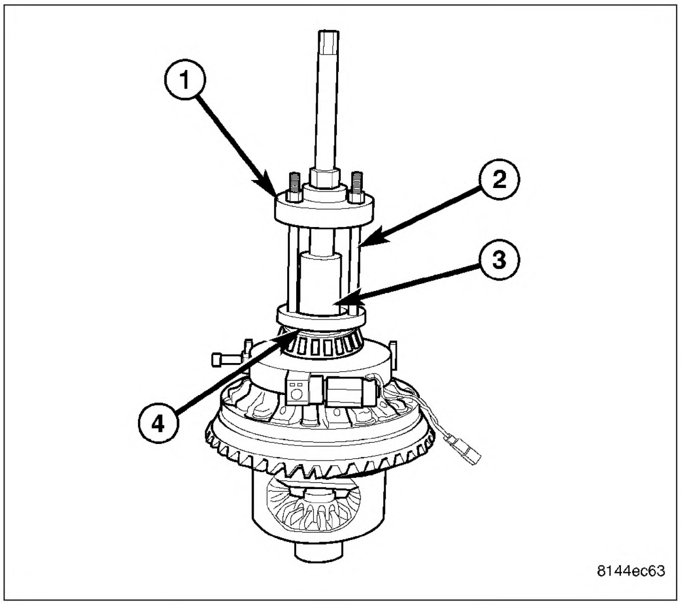


BEARINGS-DIFFERENTIAL CASE

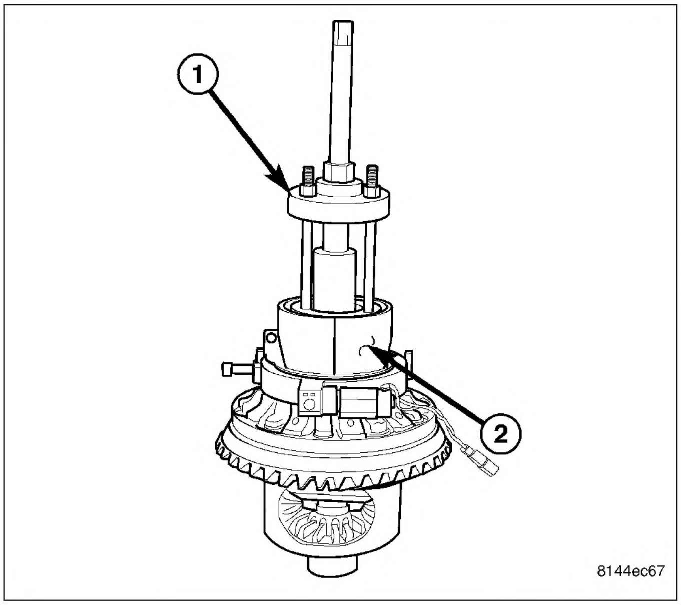
REMOVAL

CAUTION: Do not disturb the ELSD pump after bearing has been removed. Failure to follow these instructions will damage the pump seals.

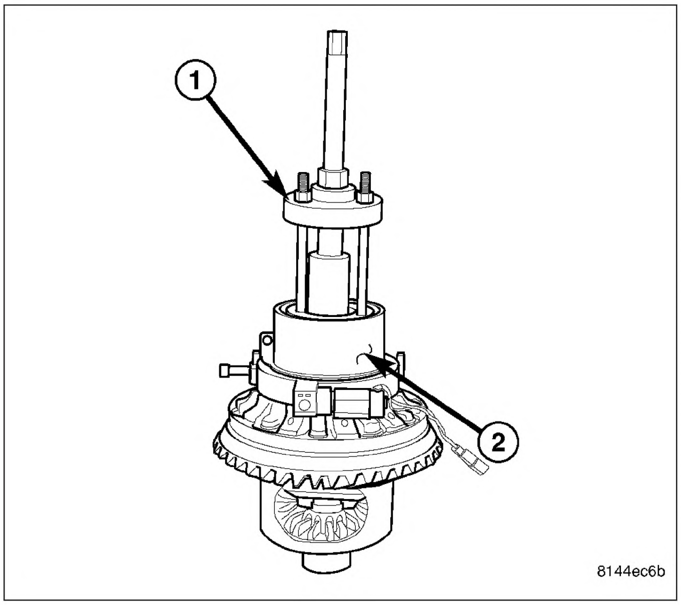
1. Install Plug SP 3298 (3) Into the differential axle shaft hole.
2. Remove differential case bearings with Puller 6444 (1), Puller Rods 6444-4 (2) and Puller Flange 6444-1(4). Position puller on the differential.



3. Position Puller (1) Jaws 9641(2) around the case bearing and puller flange.



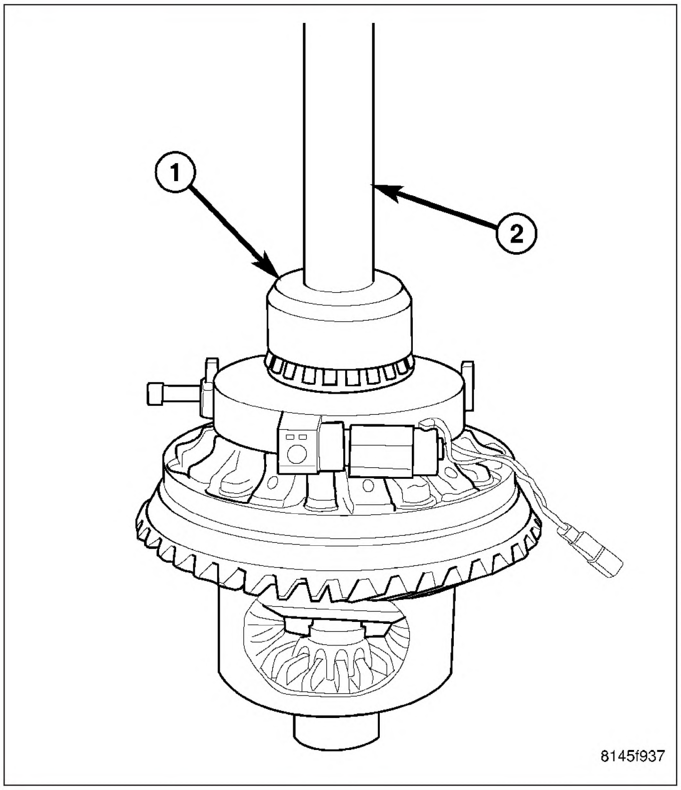
4. Position Puller (1) Collar 6444-8 (2) around the puller jaws.
5. Tighten the puller nut and remove differential case bearing.



INSTALLATION

CAUTION: Do not disturb the ELSD pump after bearing has been removed. Failure to follow these instructions will damage the pump seals.

1. Install differential case bearing with Installer C-4340 (1) and Handle C-4171 (2).

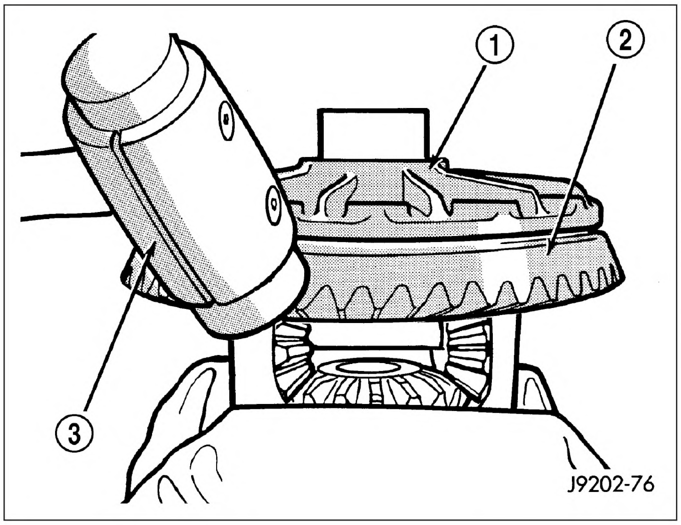


PINION GEAR/RING GEAR

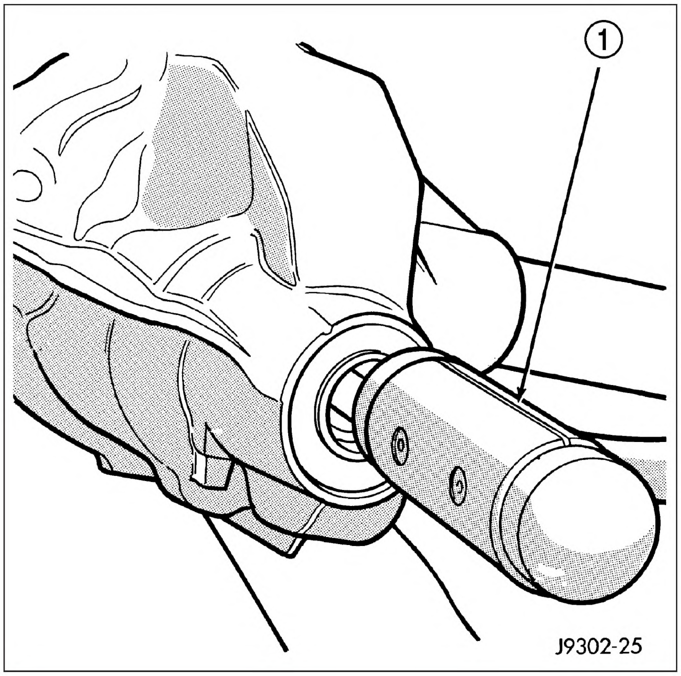
REMOVAL

NOTE: The ring gear and pinion are serviced in a matched set. Never replace one gear without replacing the matching gear.

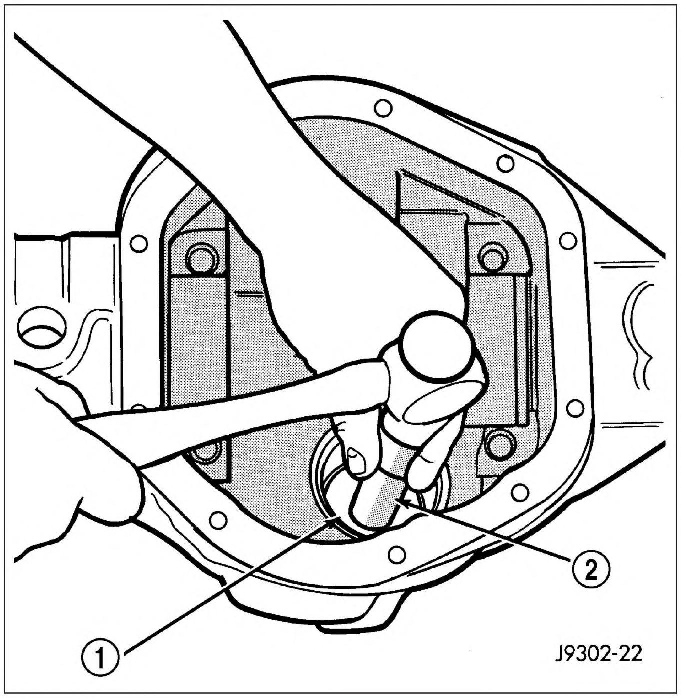
1. Remove differential from axle housing.
2. Place differential case in vise with soft metal jaw protectors.
3. Remove ring gear bolts and drive ring gear (2) off differential case with a soft hammer (3).



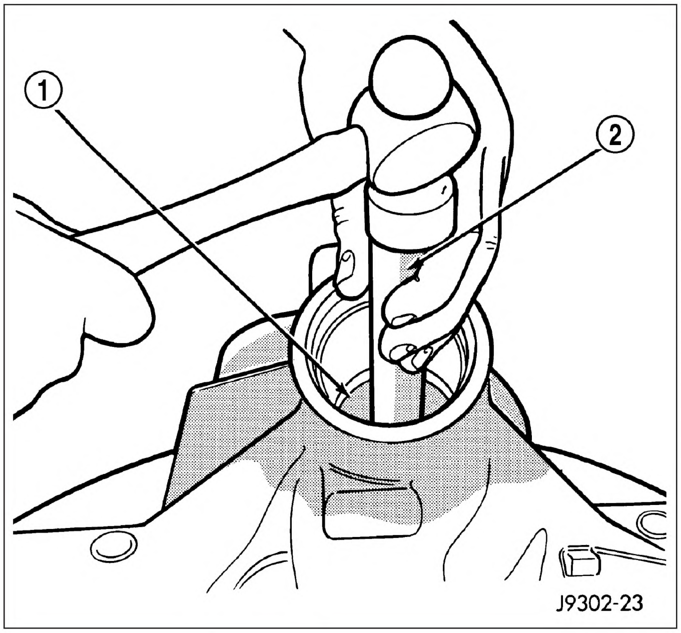
4. Hold pinion flange with Wrench C-3281 and remove pinion nut.
5. Remove pinion flange with two jaw puller.
6. Remove pinion from housing with a soft hammer (1).



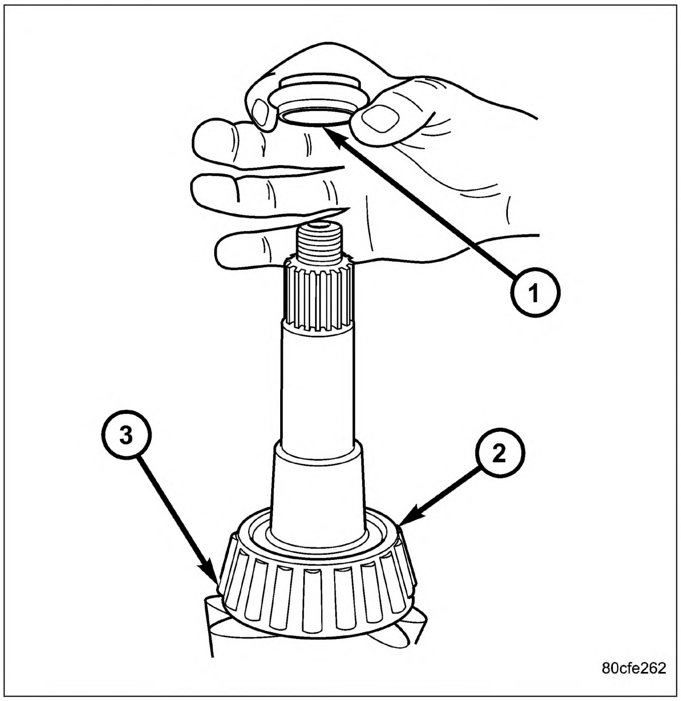
7. Remove pinion seal with a pry tool or slide-hammer mounted screw.
8. Remove oil slinger if equipped and front pinion bearing.
9. Remove front pinion bearing cup with Remover C-4345 (1) and Handle C-4171 (2).



10. Remove rear bearing cup from housing with Remover C-4307 (1) and Handle C-4171 (2).



11. Remove collapsible preload spacer (1) from pinion gear.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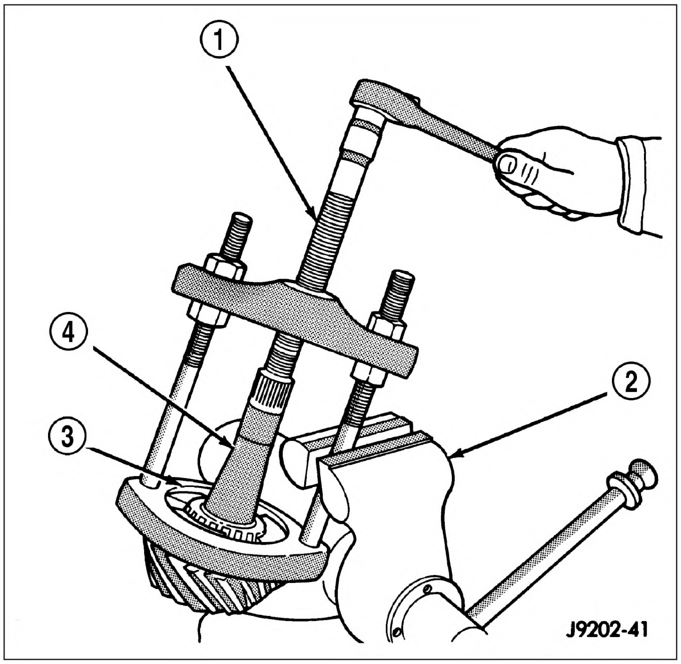
12. Remove rear bearing from pinion with Puller/ Press C-293-PA (1) and Adapters C-293-47 (3).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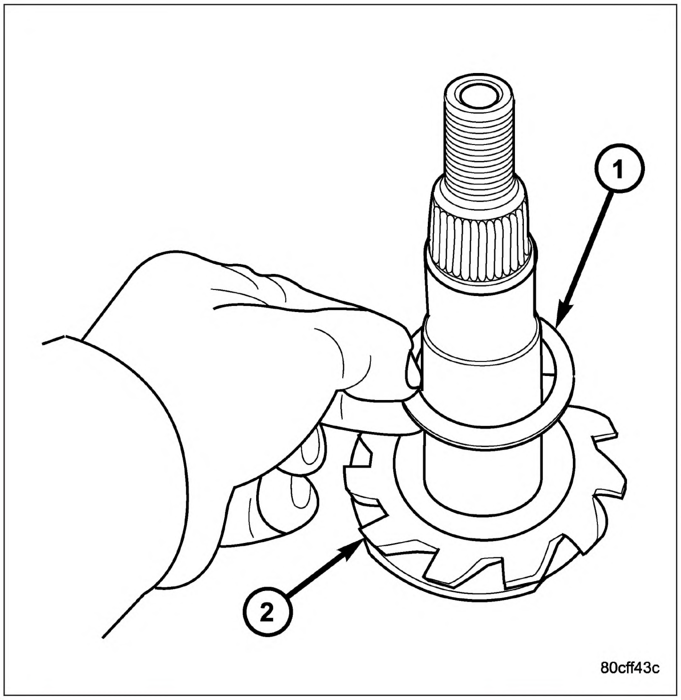
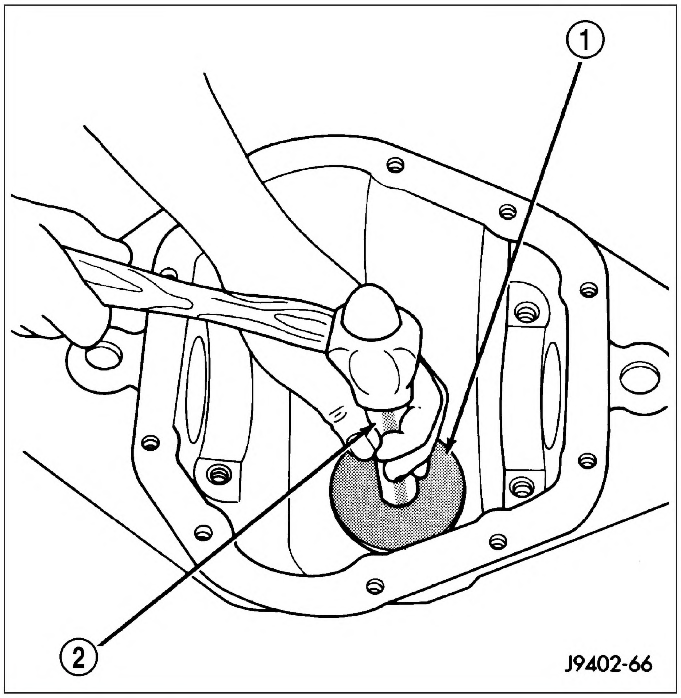
13. Remove depth shims (1) from pinion gear (2) and record shim thickness.



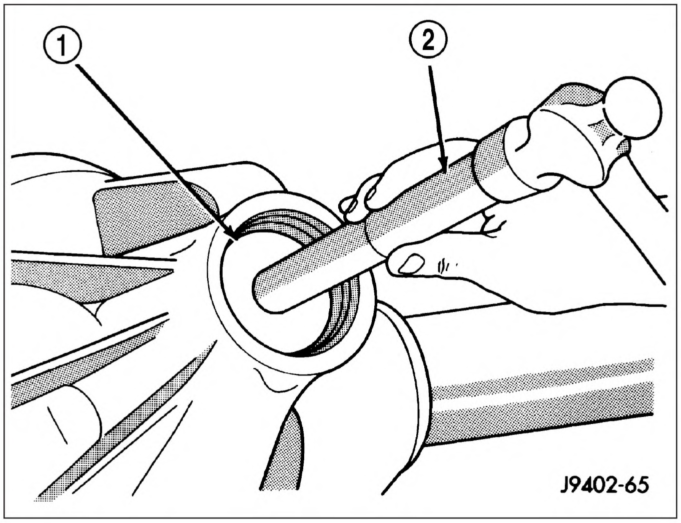
INSTALLATION

NOTE: Ring and pinion gears are a matched set. Do not replace one gear without replacing the other matching gear. If ring and pinion gears or bearings are replaced, Refer to Adjustments for Pinion Gear Depth Setting.

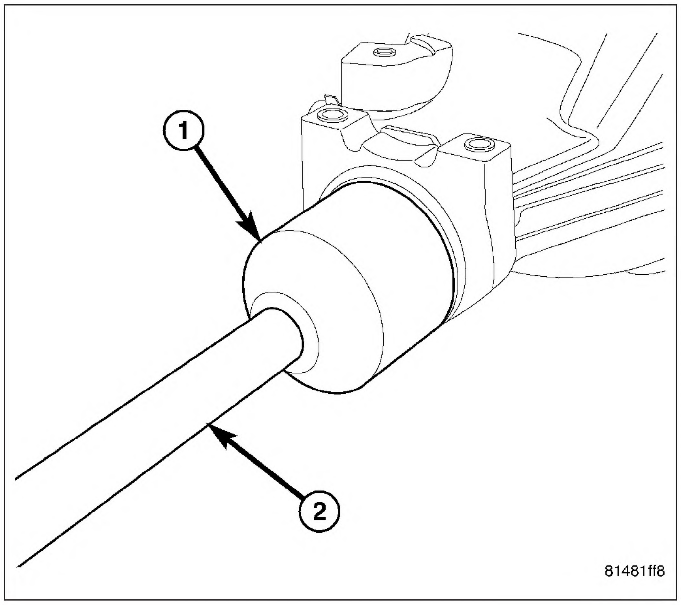
1. Apply Mopar Door Ease or stick lubricant to outside surface of pinion bearing cups.
2. Install rear pinion bearing cup with Installer C-4308 (1) and Handle C-4171 (20).



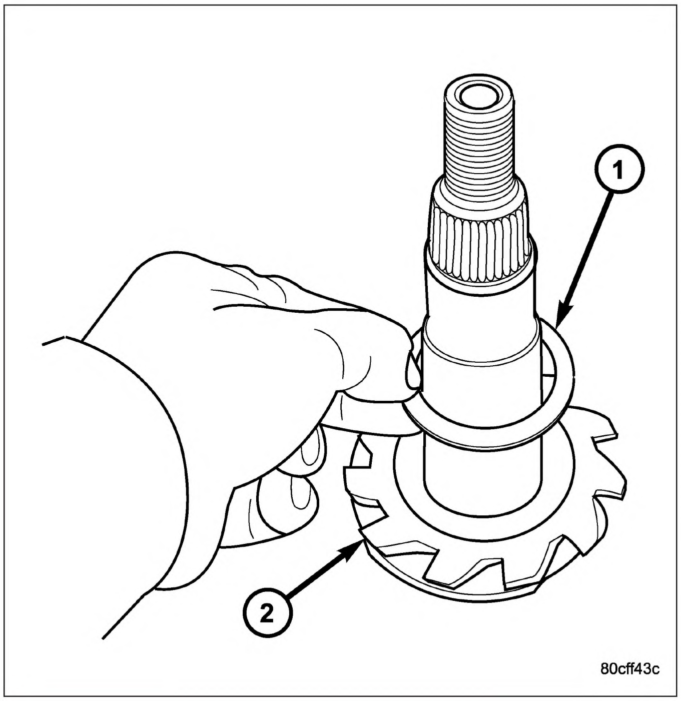
3. Install front pinion bearing cup with Installer D-130 (1) and Handle C-4171 (2).



4. Install front pinion bearing.
5. Apply a light coating of gear lubricant on the lip of pinion seal. Install seal with Installer C-3972A (1) and Handle C-4171 (2).



6. Install proper thickness depth shim (1) on pinion gear (2).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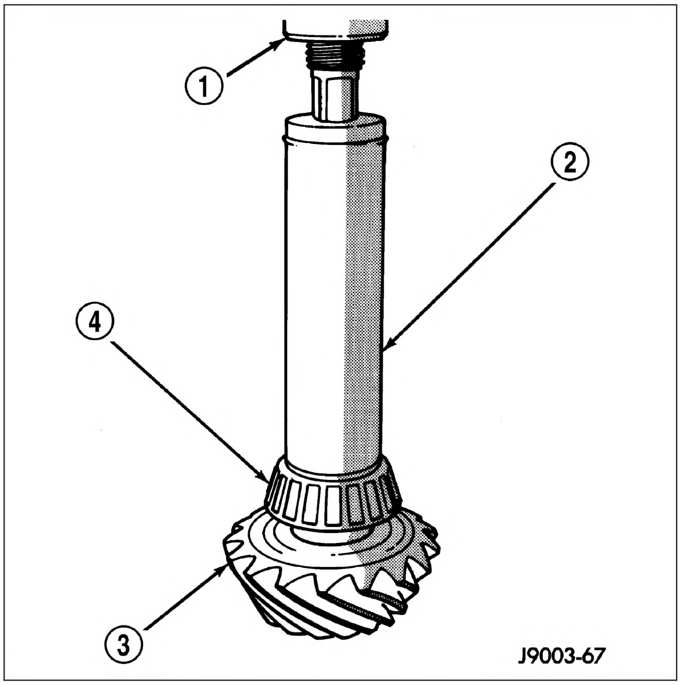
7. Install rear bearing (4) and slinger if equipped, on pinion gear (3) with Installer 6448A (2) and a press (1).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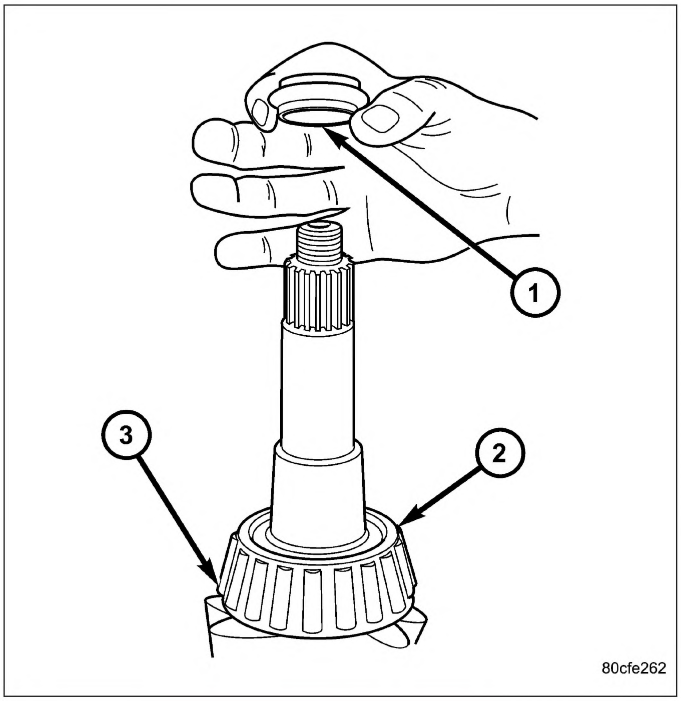
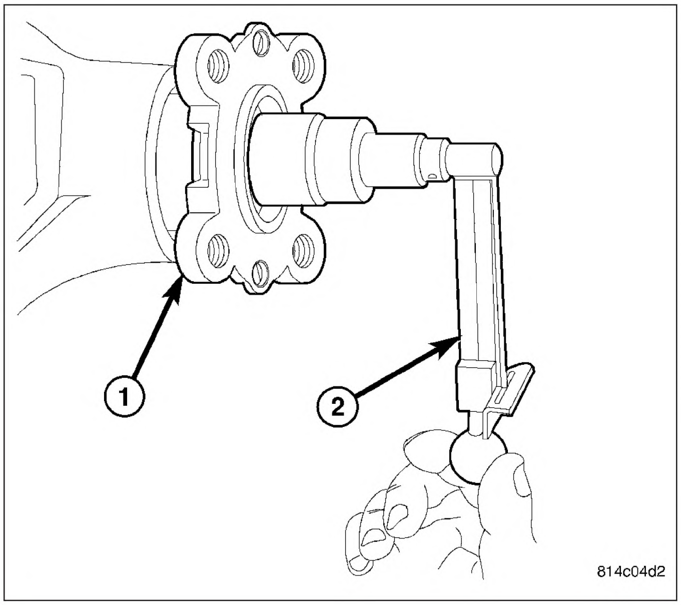
8. Install **new** collapsible spacer (1) on pinion gear and install pinion in housing.
9. Tap pinion flange onto the pinion.
10. Install flange washer and a new nut on pinion and tighten pinion nut until there is zero end-play.
11. With a torque wrench and Flange Wrench C-3281 tighten the pinion nut to 285 N·m (210 ft. lbs.).

CAUTION: Never loosen pinion nut to decrease pinion bearing rotating torque and never exceed specified preload torque. If preload torque or rotating torque is exceeded a new collapsible spacer must be installed. Failure to follow these instructions will result in damage.



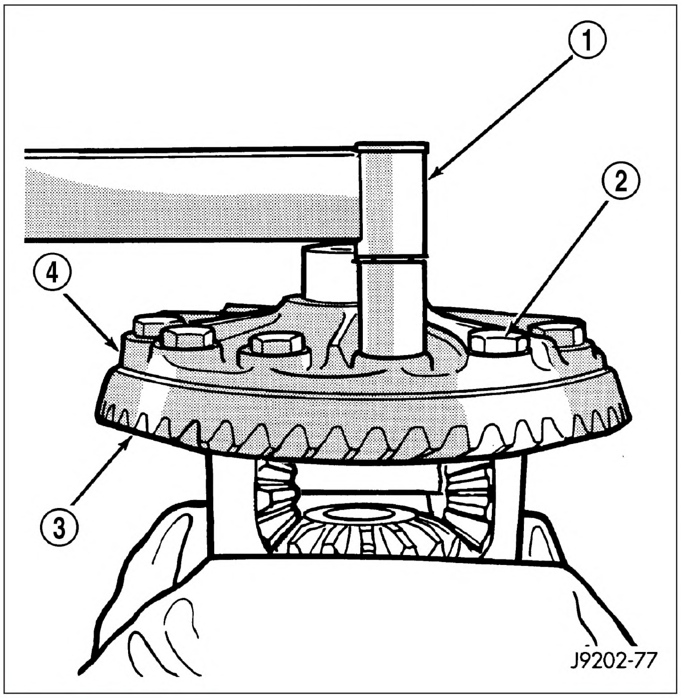
12. Slowly tighten the nut in 6.8 N·m (5 ft. lbs.) increments until the desired rotating torque is achieved. Measure rotating torque frequently with an inch pound torque wrench (2) to avoid over crushing the collapsible spacer.
13. The pinion rotating torque should be:
    - Original Bearings: 1 to 3 N·m (10 to 20 in. lbs.).
    - New Bearings: 2 to 5 N·m (15 to 35 in. lbs.).



14. Position exciter ring on differential case. With a brass drift slowly and evenly tap the exciter ring into position.
15. Position ring gear on the differential case and start two ring gear bolts. This will provide case-to-ring gear bolt hole alignment.
16. Invert the differential case in the vise.
17. Install **new** ring gear bolts (2) and alternately tighten to 102 N·m (75 ft. lbs.).

CAUTION: Never reuse the ring gear bolts. Failure to follow these instructions may result in fractured bolts causing extensive damage.

18. Install differential in housing and verify gear mesh, backlash and contact pattern.
19. Install differential cover.



BRAKES

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BRAKES - BASE - SERVICE INFORMATION

DESCRIPTION

Dual piston disc brake calipers are used on the front. Single piston disc brake calipers are used on the rear. Ventilated disc brake rotors are used on the front and solid rotors are used on the rear.

Power brake assist is supplied by a vacuum operated, dual diaphragm power brake booster. The master cylinder used for all applications has an aluminum body and nylon reservoir with single filler cap. A fluid level indicator is mounted to the side of the reservoir.

The braking force of the rear wheels is controlled by electronic brake distribution (EBD). The EBD functions like a rear proportioning valve. The EBD system uses the ABS system to control the slip of the rear wheels in partial braking range. The braking force of the rear wheels is controlled electronically by using the inlet and outlet valves located in the HCU.

Factory installed brake linings on all models consists of organic base material combined with metallic particles.

DIAGNOSIS AND TESTING - BASE BRAKE SYSTEM

Base brake components consist of the brake shoes, calipers, rear park brake drums/rotors, front brake rotors, brake lines, master cylinder, booster, HCU and parking brake shoes.

Brake diagnosis involves determining if the problem is related to a mechanical, hydraulic, electrical or vacuum operated component.

The first diagnosis step is the preliminary check.

PRELIMINARY BRAKE CHECK

1. Check condition of tires and wheels. Damaged wheels and worn, damaged, or underinflated tires can cause pull, shudder, vibration, and a condition similar to grab.
2. If complaint was based on noise when braking, check suspension components. Jounce front and rear of vehicle and listen for noise that might be caused by loose, worn or damaged suspension or steering components.
3. Inspect brake fluid level and condition. Note that the brake reservoir fluid level will decrease in proportion to normal lining wear. **Also note that brake fluid tends to darken over time. This is normal and should not be mistaken for contamination.**
    a. If fluid level is abnormally low, look for evidence of leaks at calipers, brake lines, master cylinder, and HCU.
    b. If fluid appears contaminated, drain out a sample to examine. System will have to be flushed if fluid is separated into layers, or contains a substance other than brake fluid. The system seals, cups, hoses, master cylinder, and HCU will also have to be replaced after flushing. Use clean brake fluid to flush the system.
4. Check parking brake operation. Verify free movement and full release of cables and lever. Also note if vehicle was being operated with parking brake partially applied.
5. Check brake pedal operation. Verify that pedal does not bind and has adequate free play. If pedal lacks free play, check pedal and power booster for being loose or for bind condition. Do not road test until condition is corrected.
6. Check booster vacuum check valve and hose.
7. If components checked appear OK, road test the vehicle.

ROAD TESTING

1. If complaint involved low brake pedal, pump pedal and note if it comes back up to normal height.
2. Check brake pedal response with transmission in neutral and engine running. Pedal should remain firm under constant foot pressure.
3. During road test, make normal and firm brake stops in 25-40 mph range. Note faulty brake operation such as low pedal, hard pedal, fade, pedal pulsation, pull, grab, drag, noise, etc.
4. Attempt to stop the vehicle with the parking brake only (do not exceed 25 mph) and note grab, drag, noise, etc.

PEDAL FALLS AWAY

A brake pedal that falls away under steady foot pressure is generally the result of a system leak. The leak point could be at a brake line, fitting, hose, or caliper. If leakage is severe, fluid will be evident at or around the leaking component.

Internal leakage (seal by-pass) in the master cylinder caused by worn or damaged piston cups, may also be the problem cause.

An internal leak in the ABS system may also be the problem with no visual fluid leak.

LOW PEDAL

If a low pedal is experienced, pump the pedal several times. If the pedal comes back up, the most likely causes are worn linings, rotors, or calipers are not sliding on the slide pins. The proper course of action is to inspect and replace all worn component.

SPONGY PEDAL

A spongy pedal is most often caused by air in the system. However substandard brake hoses can cause a spongy pedal. The proper course of action is to bleed the system, and replace substandard quality brake hoses if suspected.

HARD PEDAL OR HIGH PEDAL EFFORT

A hard pedal or high pedal effort may be due to lining that is water soaked, contaminated, glazed, or badly worn. The power booster, check valve, check valve seal/grommet or vacuum leak could also cause a hard pedal or high pedal effort.

PEDAL PULSATION

Pedal pulsation is caused by components that are loose, or beyond tolerance limits.

The primary cause of pulsation are disc brake rotors with excessive lateral runout or thickness variation. Other causes are loose wheel bearings or calipers and worn, damaged tires.

NOTE: Some pedal pulsation may be felt during ABS activation.

BRAKE DRAG

Brake drag occurs when the lining is in constant contact with the rotor or drum. Drag can occur at one wheel, all wheels, fronts only, or rears only.

Drag is a product of incomplete brake release. Drag can be minor or severe enough to overheat the linings, rotors and park brake drums.

Minor drag will usually cause slight surface charring of the lining. It can also generate hard spots in rotors and park brake drums from the overheat-cool down process. In most cases, the rotors, wheels and tires are quite warm to the touch after the vehicle is stopped.

Severe drag can char the brake lining all the way through. It can also distort and score rotors to the point of replacement. The wheels, tires and brake components will be extremely hot. In severe cases, the lining may generate smoke as it chars from overheating.

Common causes of brake drag are:

- Parking brake partially applied.
- Loose/worn wheel bearing.
- Seized caliper.
- Caliper binding.
- Loose caliper mounting.
- Mis-assembled components.
- Damaged brake lines.

If brake drag occurs at the front, rear or all wheels, the problem may be related to a blocked master cylinder return port, faulty power booster (binds-does not release) or the ABS system.

BRAKE FADE

Brake fade is usually a product of overheating caused by brake drag. However, brake overheating and resulting fade can also be caused by riding the brake pedal, making repeated high deceleration stops in a short time span, or constant braking on steep mountain roads. Refer to the Brake Drag information in this section for causes.

BRAKE PULL

Front brake pull condition could result from:

- Contaminated lining in one caliper
- Seized caliper piston
- Binding caliper
- Loose caliper
- Rusty caliper slide surfaces
- Improper brake shoes
- Damaged rotor
- Wheel alignment.
- Tire pressure.

A worn, damaged wheel bearing or suspension component are further causes of pull. A damaged front tire (bruised, ply separation) can also cause pull.

A common and frequently misdiagnosed pull condition is where direction of pull changes after a few stops. The cause is a combination of brake drag followed by fade at one of the brake units.

As the dragging brake overheats, efficiency is so reduced that fade occurs. Since the opposite brake unit is still functioning normally, its braking effect is magnified. This causes pull to switch direction in favor of the normally functioning brake unit.

An additional point when diagnosing a change in pull condition concerns brake cool down. Remember that pull will return to the original direction, if the dragging brake unit is allowed to cool down (and is not seriously damaged).

REAR BRAKE DRAG OR PULL

Rear drag or pull may be caused by improperly adjusted park brake shoes or seized parking brake cables, contaminated lining, bent or binding shoes or improperly assembled components. This is particularly true when only one rear wheel is involved. However, when both rear wheels are affected, the master cylinder or ABS system could be at fault.

BRAKES DO NOT HOLD AFTER DRIVING THROUGH DEEP WATER PUDDLES

This condition is generally caused by water soaked lining. If the lining is only wet, it can be dried by driving with the brakes very lightly applied for a mile or two. However, if the lining is both soaked and dirt contaminated, cleaning and or replacement will be necessary.

BRAKE LINING CONTAMINATION

Brake lining contamination is mostly a product of leaking calipers or worn seals, driving through deep water puddles, or lining that has become covered with grease and grit during repair. Contaminated lining should be replaced to avoid further brake problems.

WHEEL AND TIRE PROBLEMS

Some conditions attributed to brake components may actually be caused by a wheel or tire problem.

A damaged wheel can cause shudder, vibration and pull. A worn or damaged tire can also cause pull.

NOTE: Propshaft angle can also cause vibration/shudder.

Severely worn tires with very little tread left can produce a grab-like condition as the tire loses and recovers traction. Flat-spotted tires can cause vibration and generate shudder during brake operation. Tire damage such as a severe bruise, cut, ply separation, low air pressure can cause pull and vibration.

BRAKE NOISES

Some brake noise is common on some disc brakes during the first few stops after a vehicle has been parked overnight or stored. This is primarily due to the formation of trace corrosion (light rust) on metal surfaces. This light corrosion is typically cleared from the metal surfaces after a few brake applications causing the noise to subside.

BRAKE SQUEAK/SQUEAL

Brake squeak or squeal may be due to linings that are wet or contaminated with brake fluid, grease, or oil. Glazed linings and rotors with hard spots can also contribute to squeak. Dirt and foreign material embedded in the brake lining will also cause squeak/squeal.

A very loud squeak or squeal is frequently a sign of severely worn brake lining. If the lining has worn through to the brake shoes in spots, metal-to-metal contact occurs. If the condition is allowed to continue, rotors may become so scored that replacement is necessary.

NOTE: The front outer brake shoes are equipped with a wear indicator. The indicator will produce an audible noise when it contacts the rotor surface.

BRAKE CHATTER

Brake chatter is usually caused by loose or worn components, or glazed/burnt lining. Rotors with hard spots can also contribute to chatter. Additional causes of chatter are out-of-tolerance rotors, brake lining not securely attached to the shoes, loose wheel bearings and contaminated brake lining.

THUMP/CLUNK NOISE

Thumping or clunk noises during braking are frequently **not** caused by brake components. In many cases, such noises are caused by loose or damaged steering, suspension, or engine components.

STANDARD PROCEDURE

MANUAL BLEEDING

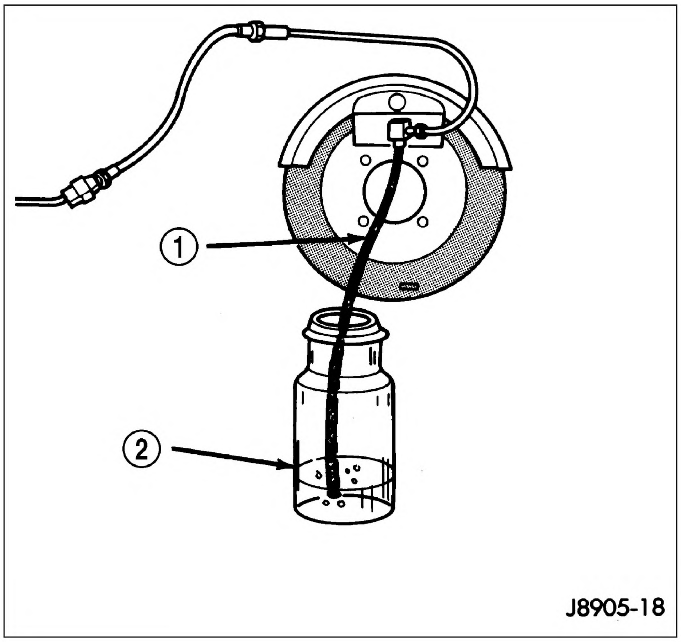
Use Mopar brake fluid, or an equivalent quality fluid meeting SAE J1703-F and DOT 3 standards only. Use fresh, clean fluid from a sealed container at all times.

Do not pump the brake pedal at any time while bleeding. Air in the system will be compressed into small bubbles that are distributed throughout the hydraulic system. This will make additional bleeding operations necessary.

Do not allow the master cylinder to run out of fluid during bleed operations. An empty cylinder will allow additional air to be drawn into the system. Check the cylinder fluid level frequently and add fluid as needed.

Bleed only one brake component at a time in the following sequence:

1. Fill the master cylinder reservoir with brake fluid.
2. If calipers are overhauled, open all caliper bleed screws. Then close each bleed screw as fluid starts to drip from it. Top off master cylinder reservoir once more before proceeding.
3. Attach one end of bleed hose to bleed screw and insert opposite end in glass container partially filled with brake fluid. Be sure end of bleed hose is immersed in fluid.
4. Open up bleeder, then have a helper press down the brake pedal. Once the pedal is down close the bleeder. Repeat bleeding until fluid stream is clear and free of bubbles. Then move to the next wheel.



PRESSURE BLEEDING

Use Mopar brake fluid, or an equivalent quality fluid meeting SAE J1703-F and DOT 3 standards only. Use fresh, clean fluid from a sealed container at all times.

Do not pump the brake pedal at any time while bleeding. Air in the system will be compressed into small bubbles that are distributed throughout the hydraulic system. This will make additional bleeding operations necessary.

Do not allow the master cylinder to run out of fluid during bleed operations. An empty cylinder will allow additional air to be drawn into the system. Check the cylinder fluid level frequently and add fluid as needed.

Bleed only one brake component at a time in the following sequence:

Follow the manufacturers instructions carefully when using pressure equipment. Do not exceed the tank manufacturers pressure recommendations. Generally, a tank pressure of 51-67 kPa (15-20 psi) is sufficient for bleeding.

Fill the bleeder tank with recommended fluid and purge air from the tank lines before bleeding.

Do not pressure bleed without a proper master cylinder adapter. The wrong adapter can lead to leakage, or drawing air back into the system. Use adapter provided with the equipment or Adapter 6921.

SPECIFICATIONS

BRAKE COMPONENTS

SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Front Disc Brake Caliper Type	Floating
Front Disc Brake Caliper Piston	48 mm (1.889 in.)
Front Disc Brake Rotor Type	Ventilated
Front Disc Brake Rotor Diameter	328 mm (12.91 in.)
Front Disc Brake Rotor Max. Runout	0.02 mm (0.00079 in.)
Front Disc Brake Rotor Max. Thickness Variation	0.009 mm (0.00035 in.)
Front Disc Brake Rotor Min. Thickness	28.5 mm (1.122 in.)
Rear Disc Brake Caliper Type	Floating
Rear Disc Brake Caliper Piston	48 mm (1.889 in.)
Rear Disc Brake Rotor Type	Solid
Rear Disc Brake Rotor Diameter	320 mm (12.6 in.)
Rear Disc Brake Rotor Max. Runout	0.02 mm (0.00079 in.)
Rear Disc Brake Rotor Max. Thickness Variation	0.009 mm (0.00035 in.)
Rear Disc Brake Rotor Min. Thickness	12.5 mm (0.4921 in.)
Rear Disc Brake Rotor Drum Max. Diameter	206.5 mm (8.13 in.)
Brake Booster Type	Dual Diaphragm

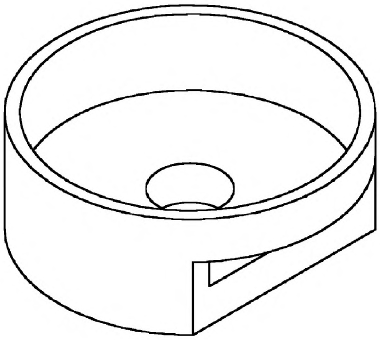
TORQUE CHART

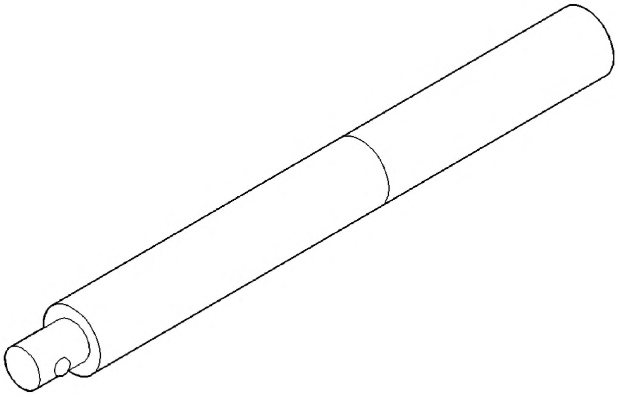
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Brake Pedal Support Bolt	24	17	—
Brake Pedal Pivot Nut	31	23	—
Brake Pedal Bracket Adjustable pedals	28	21	250
Brake Pedal Bracket To Dash	28	—	250
Brake Booster Mounting Nuts	39	29	—
Master Cylinder Mounting Nuts	25	18	—
Master Cylinder Primary Brake Line	23	—	200
Master Cylinder Secondary Brake Line	23	—	200
Front Caliper Slide Pins	25	18	221
Front Caliper Anchor Bolts	169	125	—
Front Caliper Brake Hose Banjo Bolt	31	23	275
Front Caliper Bleed Screw	10	—	88
Rear Caliper Slide Pins	25	18	221
Rear Caliper Brake Hose Banjo Bolt	31	23	275
Rear Caliper Bleed Screw	16	—	144

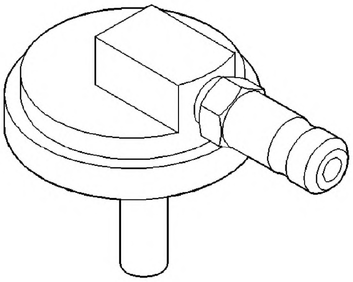
SPECIAL TOOLS

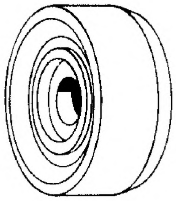
BASE BRAKES

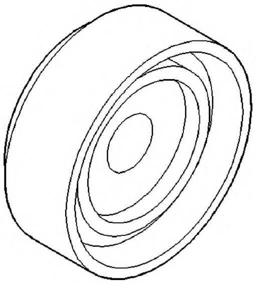


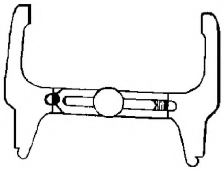


Handle C-4171





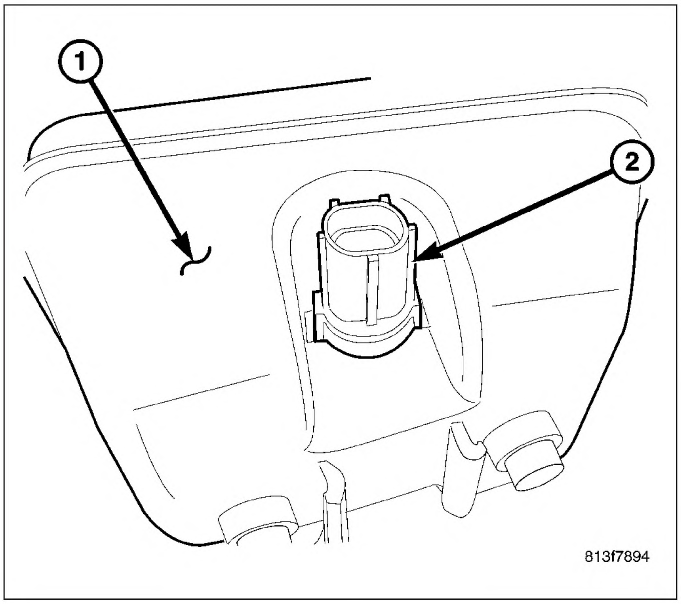




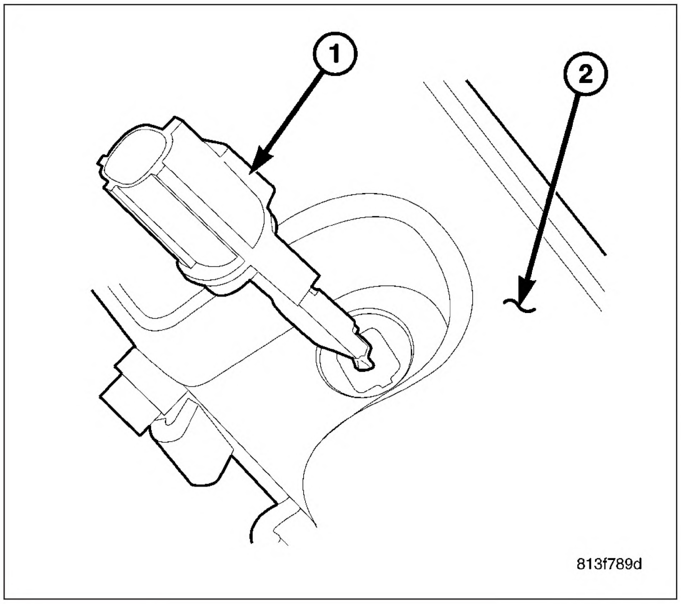
SENSOR-BRAKE FLUID LEVEL

REMOVAL

1. Remove the wire connector from the fluid level sensor (2).

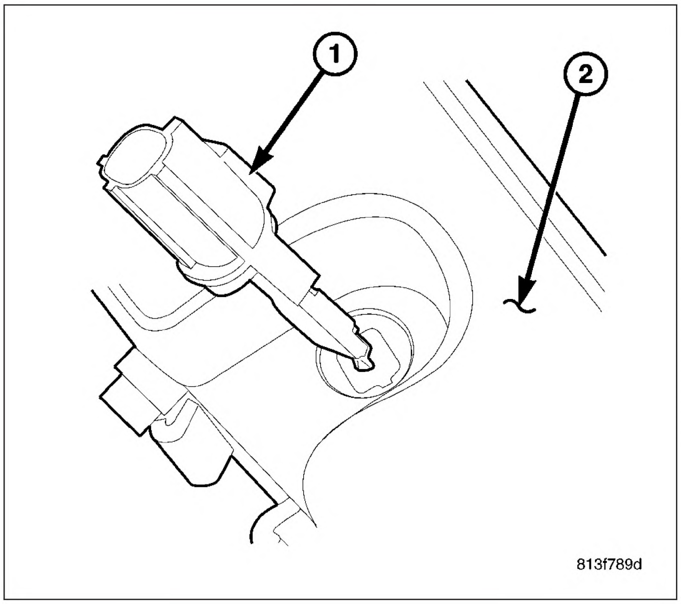


2. From the same side of the master cylinder reservoir (1) release the sensor locking taps with a small screw driver.
3. Pull the sensor (1) out of the reservoir (2) from the connector side of the sensor.

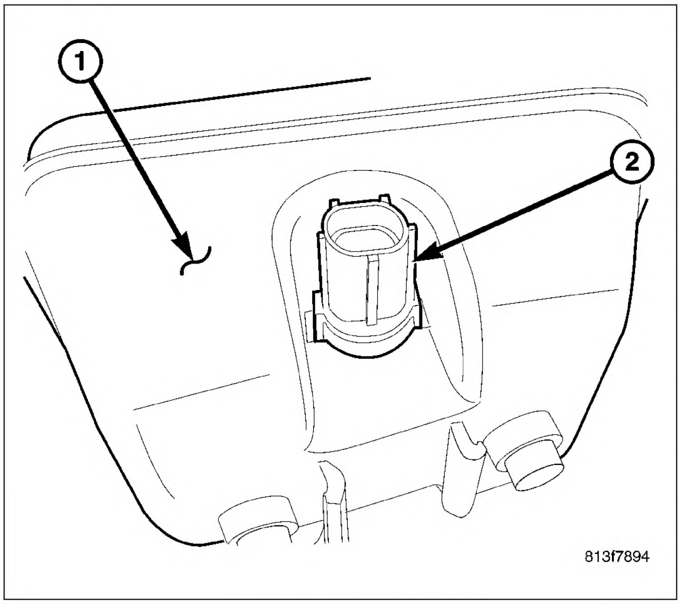


INSTALLATION

1. Install the sensor (1) with a new o-ring into the reservoir (2) until the locking tabs are engaged.



2. Install the wire connector to the fluid level sensor (2).



RED BRAKE WARN INDICATOR SWITCH

DESCRIPTION

A red warning lamp is used for the service brake portion of the hydraulic system. The lamp is located in the instrument cluster.

OPERATION

The lamp is turned on momentarily when the ignition switch is turn to the on position. This is a self test to verify the lamp is operational.

The red warning light alerts the driver if the fluid level is low or the parking brakes are applied. A red warning lamp with an amber warning lamp may indicate a electronic brake distribution fault.

DIAGNOSIS AND TESTING - RED BRAKE WARNING LAMP

The red warning lamp illuminates when the parking brake is applied or when the fluid level in the master cylinder is low. It will also illuminate at start up as part of a bulb check.

If the light comes on, first verify that the parking brakes are fully released. Then check pedal action and fluid level. If a problem is confirmed, inspect the brake hydraulic system for leaks.

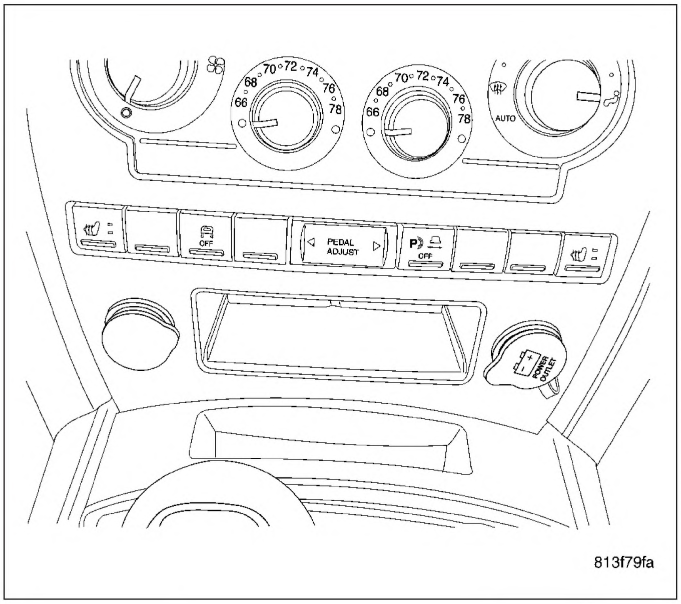
A red warning lamp with a amber warning lamp may indicate a electronic brake distribution fault.

ADJUSTABLE PEDAL SWITCH

DESCRIPTION

The adjustable pedals switch are mounted in the instrument panel. The switch is part of the lower instrument panel switch pod assembly. If the switch is damaged or inoperative the complete switch pod assembly must be replaced.

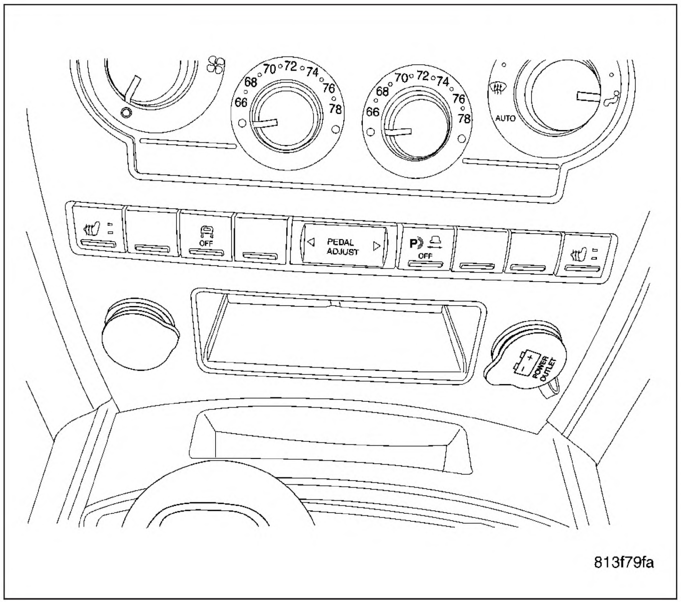
Pressing the switch will either move the pedals forward toward you or rearward away from you.


66
68
70
72
74
76
78
66
68
70
72
74
76
78
AUTO
OFF
PEDAL ADJUST
OFF
POWER OUTLET

813f79fa

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the instrument panel center bezel, (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
3. Remove the lower instrument panel switch pod fasteners.
4. Remove the lower instrument panel switch pod from the vehicle.

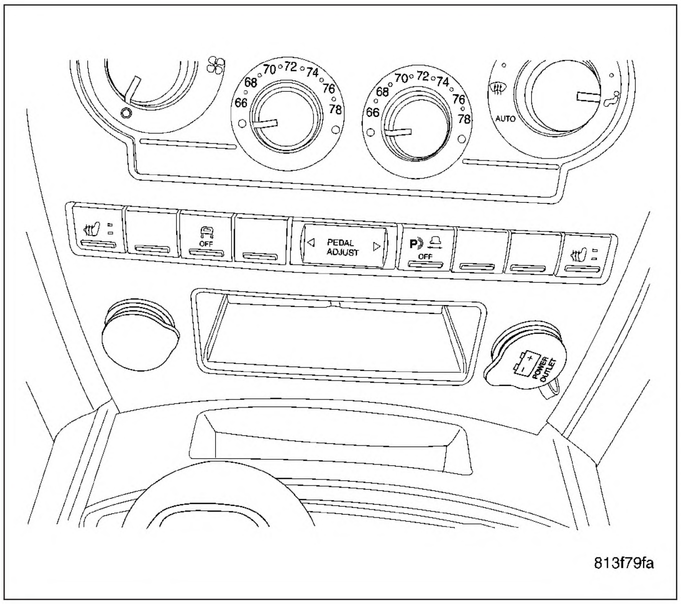

66
68
70
72
74
76
78
66
68
70
72
74
76
78
AUTO
OFF
PEDAL ADJUST
OFF
POWER OUTLET

813f79fa

INSTALLATION

NOTE: There are different instrument panel switch pods available based on the option content of the vehicle. Ensure the switch pod being installed matches the vehicle options.

1. Position the lower instrument panel switch pod into the instrument panel center bezel.
2. Install the lower instrument panel switch pod fasteners.
3. Install the instrument panel center bezel, (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).
4. Connect the battery negative cable.
5. Verify system operation.



BRAKE LINES

DESCRIPTION

Flexible rubber hose is used at both front brakes, rear brakes and at the rear axle junction block. Double walled steel tubing is used. Double inverted style and ISO style flares are used on the brake lines.

DIAGNOSIS AND TESTING - BRAKE HOSES AND LINES

Flexible rubber hose is used at both front and rear brakes and at the rear axle junction block. Inspect the hoses whenever the brake system is serviced, at every engine oil change, or whenever the vehicle is in for service.

Inspect the hoses for surface cracking, scuffing, or worn spots. Replace any brake hose immediately if the fabric casing of the hose is exposed due to cracks or abrasions.

Also check brake hose installation. Faulty installation can result in kinked, twisted hoses, or contact with the wheels and tires or other chassis components. All of these conditions can lead to scuffing, cracking and eventual failure.

The steel brake lines should be inspected periodically for evidence of corrosion, twists, kinks, leaks, or other damage. Heavily corroded lines will eventually rust through causing leaks. In any case, corroded or damaged brake lines should be replaced.

Factory replacement brake lines and hoses are recommended to ensure quality, correct length and superior fatigue life. Care should be taken to make sure that brake line and hose mating surfaces are clean and free from nicks and burrs. Also remember that right and left brake hoses are not interchangeable.

Use new copper gaskets at all caliper connections. Be sure brake line connections are properly made (not cross threaded) and tightened to recommended torque.

STANDARD PROCEDURE

STANDARD PROCEDURE - DOUBLE INVERTED FLARING

A preformed metal brake tube is recommended and preferred for all repairs. However, double-wall steel tube can be used for emergency repair when factory replacement parts are not readily available.

Special bending tools are needed to avoid kinking or twisting of metal brake tubes. Special flaring tools are needed to make a double inverted flare or ISO flare.

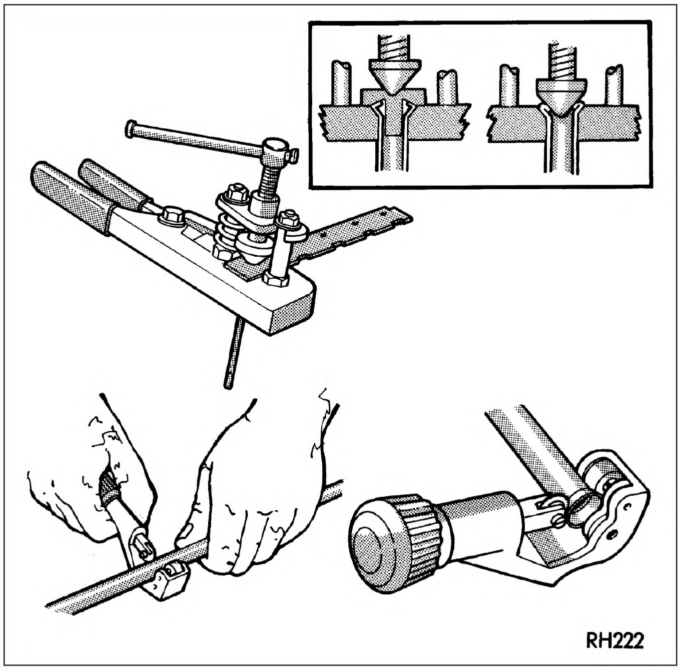
1. Cut off damaged tube with Tubing Cutter.
2. Ream cut edges of tubing to ensure proper flare.

3. Install replacement tube nut on the tube.
4. Insert tube in flaring tool.
5. Place gauge form over the end of the tube.
6. Push tubing through flaring tool jaws until tube contacts recessed notch in gauge that matches tube diameter.
7. Tighten the tool bar on the tube
8. Insert plug on gauge in the tube. Then swing compression disc over gauge and center tapered flaring screw in recess of compression disc.
9. Tighten tool handle until plug gauge is squarely seated on jaws of flaring tool. This will start the inverted flare.
10. Remove the plug gauge and complete the inverted flare.

STANDARD PROCEDURE - ISO FLARING

A preformed metal brake tube is recommended and preferred for all repairs. However, double-wall steel tube can be used for emergency repair when factory replacement parts are not readily available.

Special bending tools are needed to avoid kinking or twisting of metal brake tubes. Special flaring tools are needed to make a double inverted flare or ISO flare.

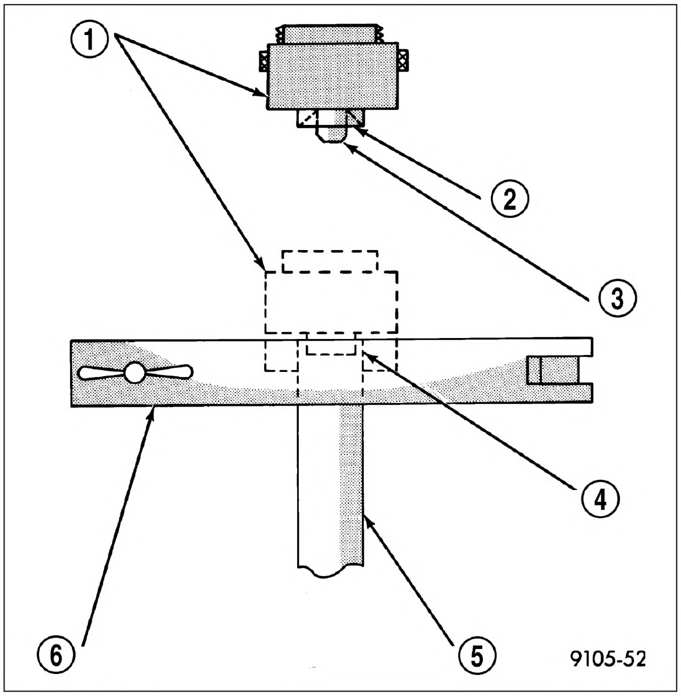


To make a ISO flare use Snap-On® Flaring Tool TFM-428 or equivalent.

1. Cut off damaged tube with Tubing Cutter.
2. Remove any burrs from the inside of the tube.
3. Install tube nut on the tube.
4. Position the tube in the flaring tool flush with the top of the tool bar. Then tighten the tool bar on the tube.
5. Install the correct size adaptor on the flaring tool yoke screw.
6. Lubricate the adaptor.
7. Align the adaptor and yoke screw over the tube.
8. Turn the yoke screw in until the adaptor is squarely seated on the tool bar.

REMOVAL - PRIMARY/SECONDARY BRAKE TUBES

1. Install a brake pedal prop rod.
2. Siphon the master cylinder reservoir.
3. Remove the Primary or Secondary brake tubes at the master cylinder.
4. Remove the Primary or Secondary brake tubes at the HCU.



INSTALLATION - PRIMARY/SECONDARY BRAKE TUBES

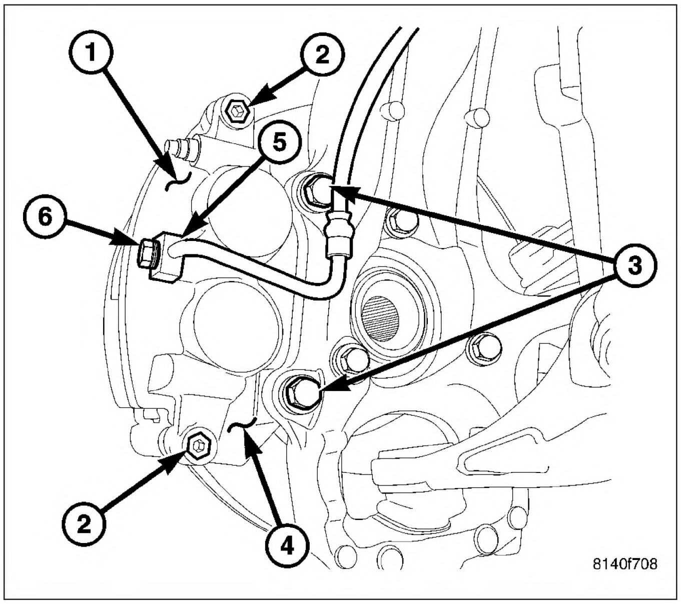
1. Install the primary or secondary brake tubes to the master cylinder.
2. Install the primary or secondary brake tubes to the HCU.
3. Remove the brake pedal prop rod.
4. Fill and bleed the brake system.

BRAKE PADS / SHOES

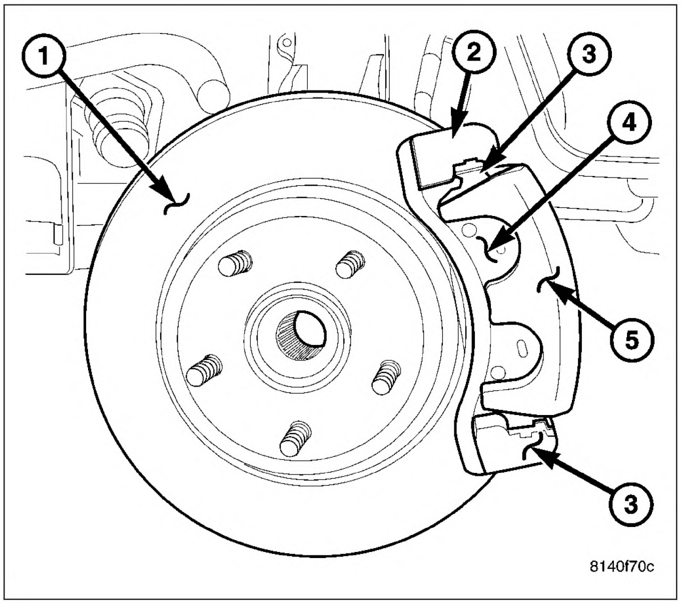
REMOVAL

FRONT DISC BRAKE SHOES

1. Raise and support vehicle.
2. Remove wheel and tire assembly.
3. Drain small amount of fluid from master cylinder brake reservoir with **clean** suction gun.
4. Remove the 2 caliper mounting bolts (2).
5. Compress the caliper and remove from the adaptor (4).
6. Secure caliper (1) to nearby suspension part with wire. **Do not allow brake hose to support caliper weight.**

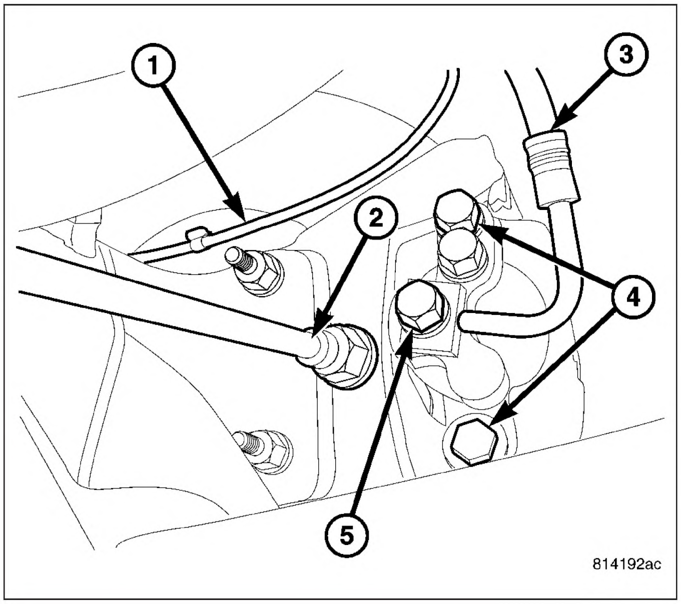


7. Remove the inboard and outboard brake pads (4) from the caliper adapter (2).
8. Remove the anti-rattle clips (3) from the brake caliper adapter (2).

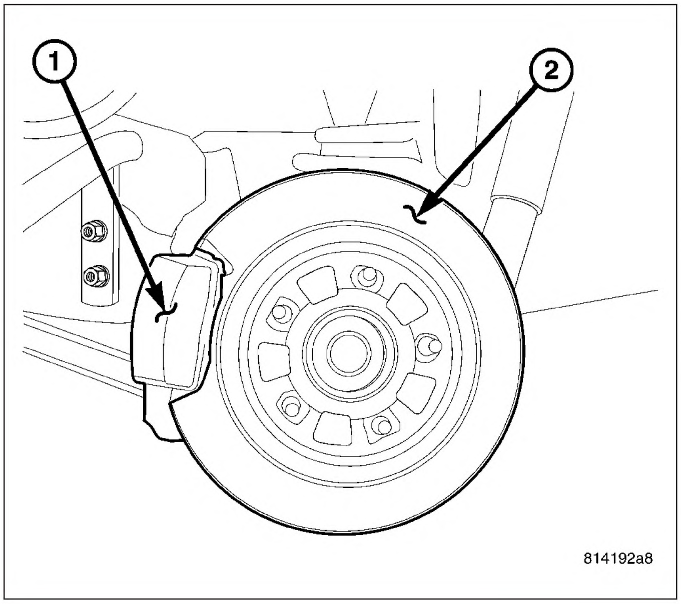


REAR DISC BRAKE PADS

1. Raise and support vehicle.
2. Remove rear wheel and tire assembly.
3. Drain small amount of fluid from master cylinder brake reservoir with a **clean** suction gun.
4. Bottom caliper pistons into the caliper by prying the caliper over.
5. Remove the caliper slide pins (4).



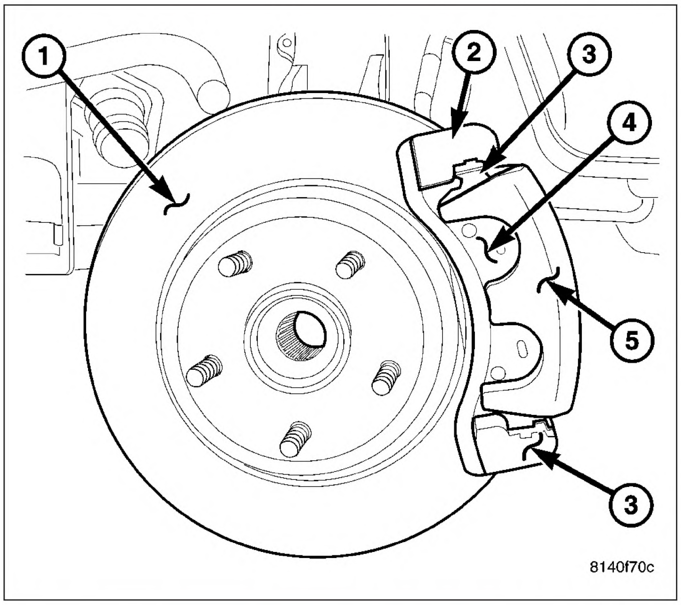
6. Remove caliper (1) from the anchor.
7. Secure caliper (1) to nearby suspension part with wire. **Do not allow brake hose to support caliper weight.**
8. Remove the inboard & outboard brake pads from the caliper.



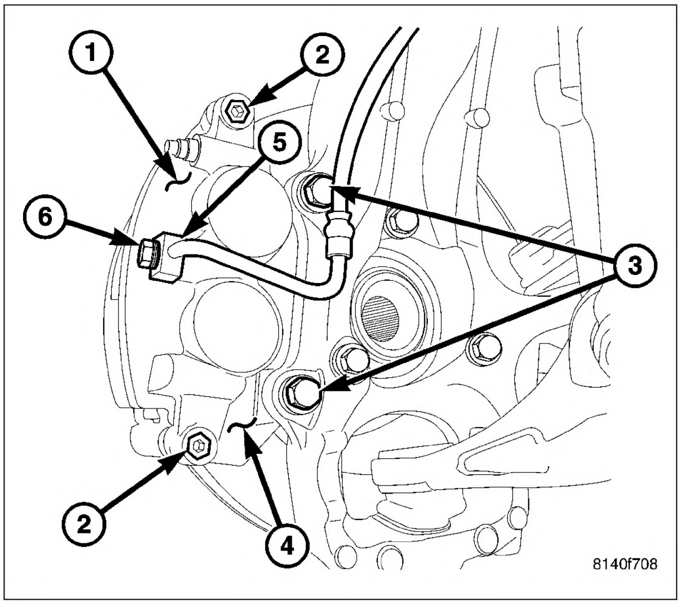
INSTALLATION

FRONT DISC BRAKE SHOES

1. Remove and clean all rust and debris from the anti-rattle clip mounting surfaces (3) on the brake caliper adapter (2).
2. Install new anti-rattle clips (3) into the caliper adapter (2).
3. Install the inboard and outboard brake pads (4) onto the caliper adapter (2).
4. Install caliper (5) on the caliper adapter (2).

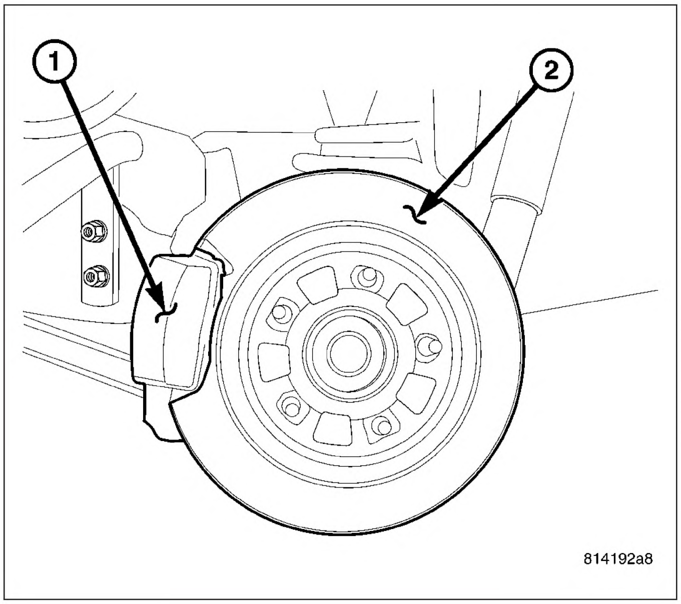


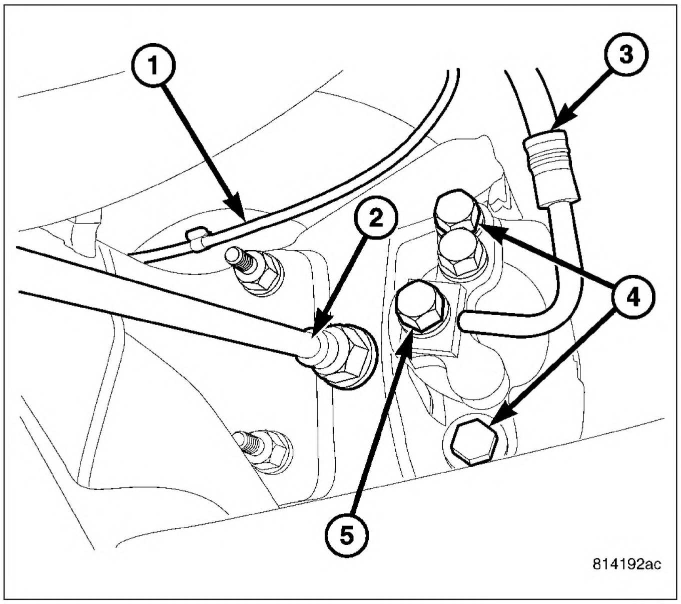
5. Install the caliper slide pin bolts (2) and tighten to 72 N·m (53 ft. lbs.).
6. Install wheel and tire assembly.
7. Remove support and lower vehicle.
8. Pump brake pedal until caliper pistons and brake pads are seated and a firm brake pedal is obtained.
9. Fill brake fluid.



REAR DISC BRAKE PADS

1. Install the inboard & outboard brake pads onto the caliper.
2. Lubricate the slide pins and slide pin bushings with caliper slide grease or the grease provided with the brake pads.
3. Install caliper (1) on the anchor.





4. Install the caliper slide pin bolts (4) and tighten to 25 N·m (18 ft. lbs.).
5. Install wheel and tire assembly.
6. Remove support and lower vehicle.
7. Pump brake pedal until caliper piston and brake pads are seated and a firm brake pedal is obtained.
8. Fill brake fluid level if necessary.

DISC BRAKE CALIPERS

DESCRIPTION

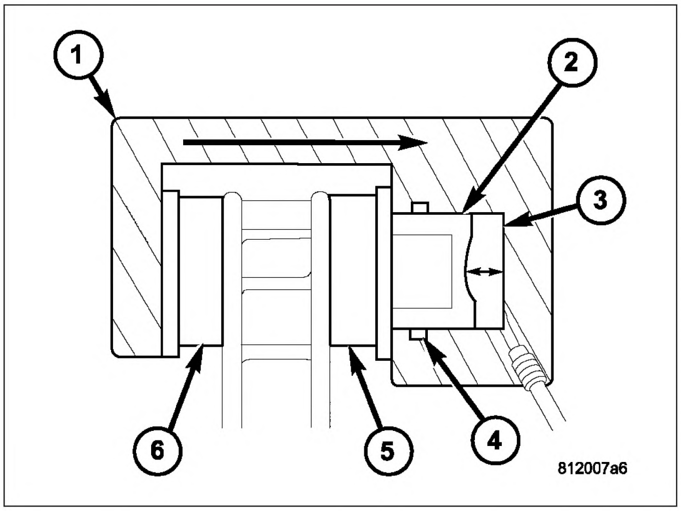
The calipers are a single piston type in the rear and dual piston type in the front. The calipers are free to slide laterally, this allows continuous compensation for lining wear.

OPERATION

When the brakes are applied fluid pressure is exerted against the caliper piston (2). The fluid pressure is exerted equally and in all directions. This means pressure exerted against the caliper piston and within the caliper bore will be equal.

Fluid pressure applied to the piston is transmitted directly to the inboard brake pad (5). This forces the pad lining against the inner surface of the disc brake rotor. At the same time, fluid pressure within the piston bore forces the caliper to slide inward on the mounting bolts. This action brings the outboard brake pad lining (6) into contact with the outer surface of the disc brake rotor.

In summary, fluid pressure acting simultaneously on both piston and caliper, produces a strong clamping action. When sufficient force is applied, friction will attempt to stop the rotors from turning and bring the vehicle to a stop.

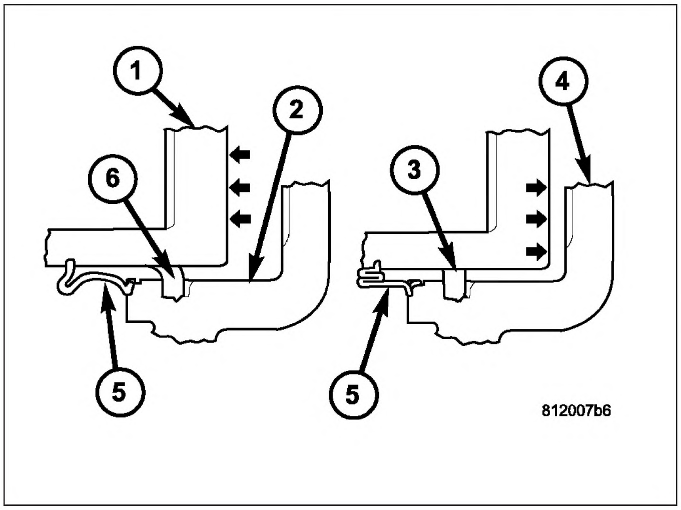


Application and release of the brake pedal generates only a very slight movement of the caliper and piston. Upon release of the pedal, the caliper and piston return to a rest position. The brake pads do not retract an appreciable distance from the rotor. In fact, clearance is usually at, or close to zero. The reasons for this are to keep road debris from getting between the rotor and lining and in wiping the rotor surface clear each revolution.

The caliper piston seal (4) controls the amount of piston (2) extension needed to compensate for normal lining wear.

During brake application, the seal is deflected outward by fluid pressure and piston movement(6). When the brakes (and fluid pressure) are released, the seal relaxes and retracts the piston (3).

The amount of piston retraction is determined by the amount of seal deflection. Generally the amount is just enough to maintain contact between the piston and inboard brake pad.

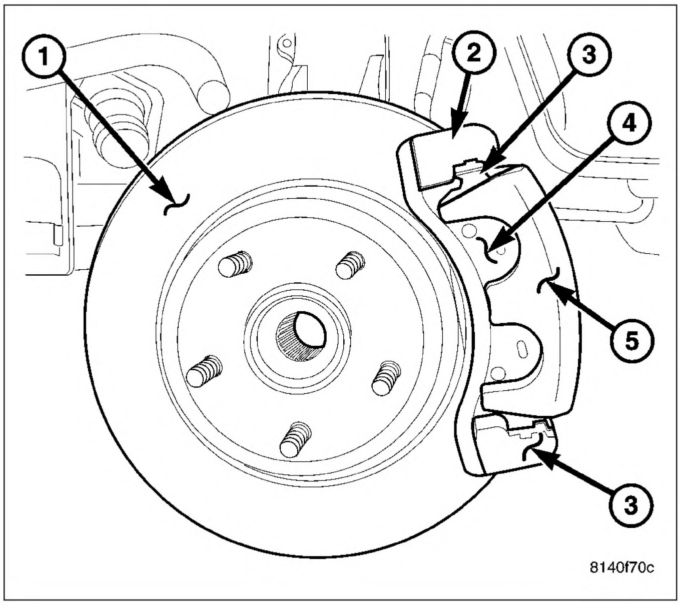


REMOVAL

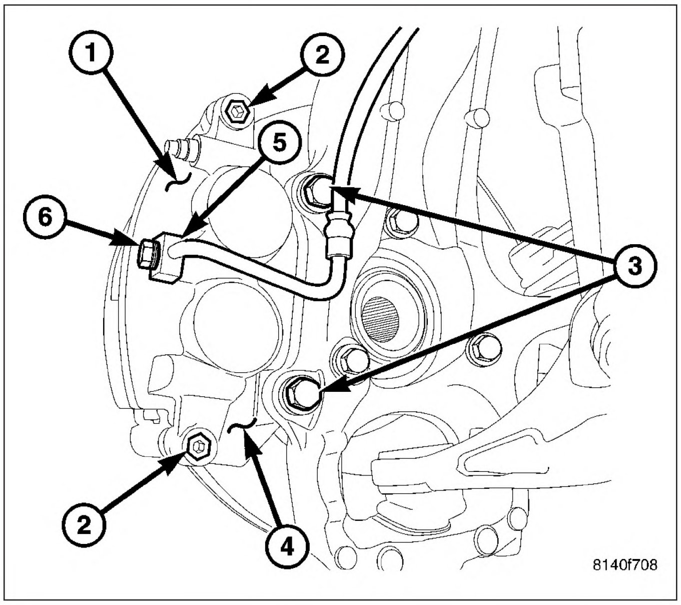
FRONT DISC BRAKE CALIPER

1. Raise and support vehicle.
2. Remove front wheel and tire assembly.
3. Drain small amount of fluid from master cylinder brake reservoir with **clean** suction gun.

4. Bottom caliper pistons into the caliper (5) by prying the caliper over.



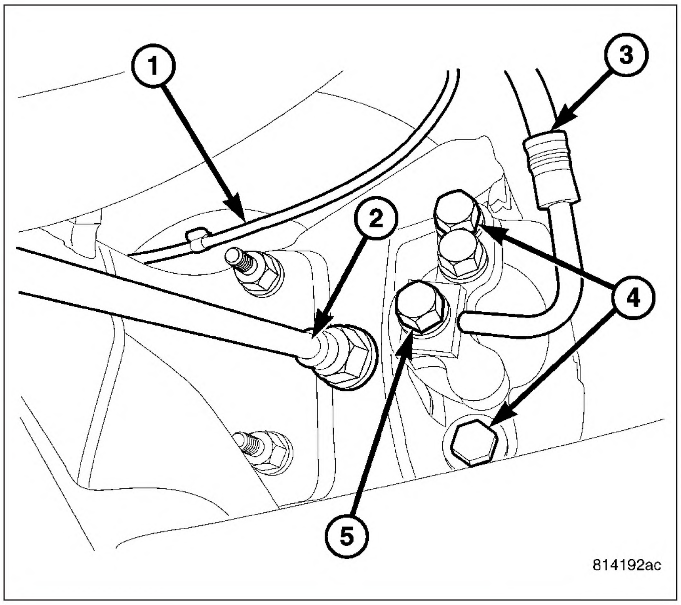
5. Remove brake hose banjo bolt and gasket washers (6). Discard gasket washers.
6. Remove the caliper slide bolts (2).
7. Remove the caliper (1) from the adapter (4).



REAR DISC BRAKE CALIPER

1. Raise and support vehicle.
2. Remove rear wheel and tire assembly.
3. Drain small amount of fluid from master cylinder brake reservoir with a **clean** suction gun.

4. Bottom caliper pistons into the caliper by prying the caliper over.
5. Remove brake hose (3) banjo bolt (5) and discard gasket washers.
6. Remove the caliper slide pins (4).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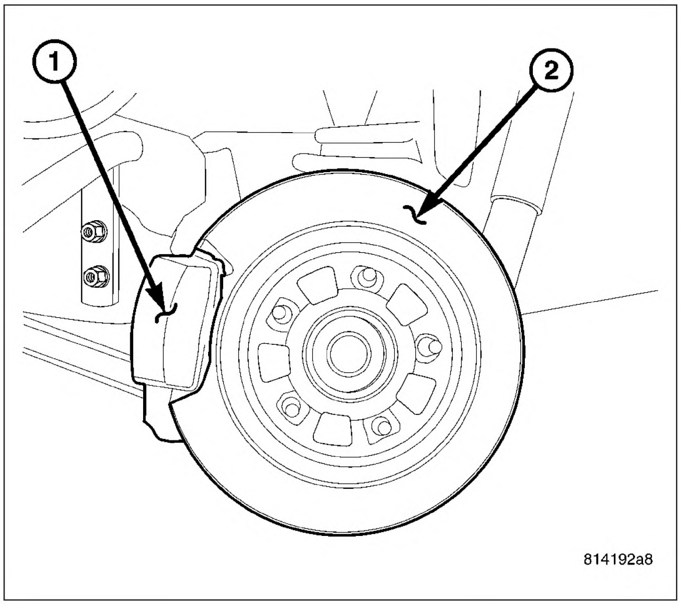
7. Remove caliper (1) from the anchor.
8. Remove the brake pads.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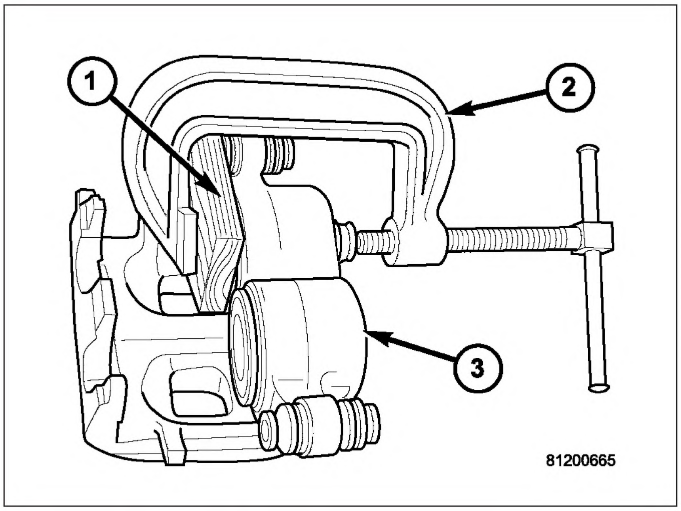
DISASSEMBLY

1. Drain the brake fluid from caliper.
2. C-clamp (2) a block of wood (1) over one piston.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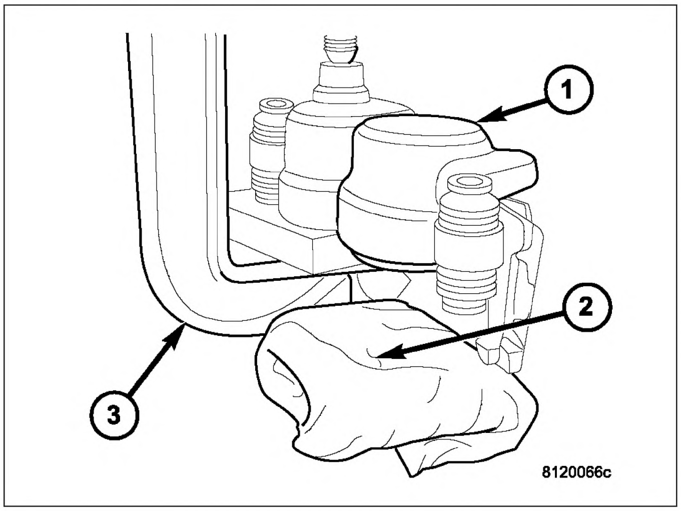
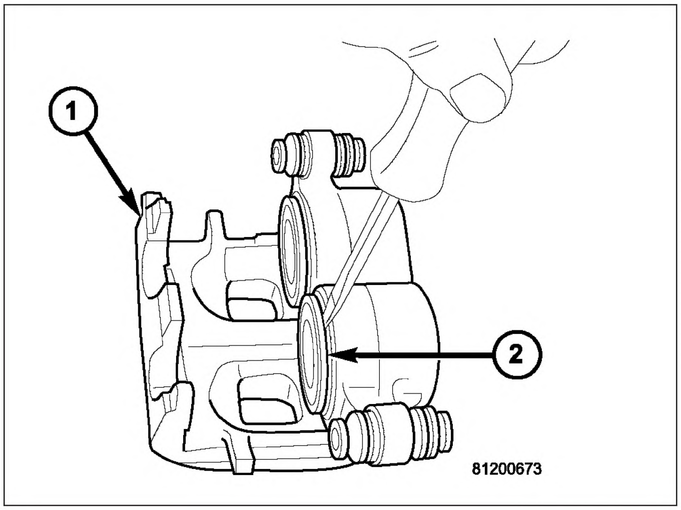
3. Take another piece of wood and pad it with one-inch thickness of shop towels (2). Place this piece in the outboard shoe side of the caliper in front of the other piston. This will cushion and protect caliper piston during removal.
4. To remove the caliper piston direct **short bursts of low pressure air** with a blow gun through the caliper brake hose port. Use only enough air pressure to ease the piston out.

CAUTION: Do not blow the piston out of the bore with sustained air pressure. This could result in a cracked piston.

WARNING: NEVER ATTEMPT TO CATCH THE PISTON AS IT LEAVES THE BORE. THIS COULD RESULT IN PERSONAL INJURY.

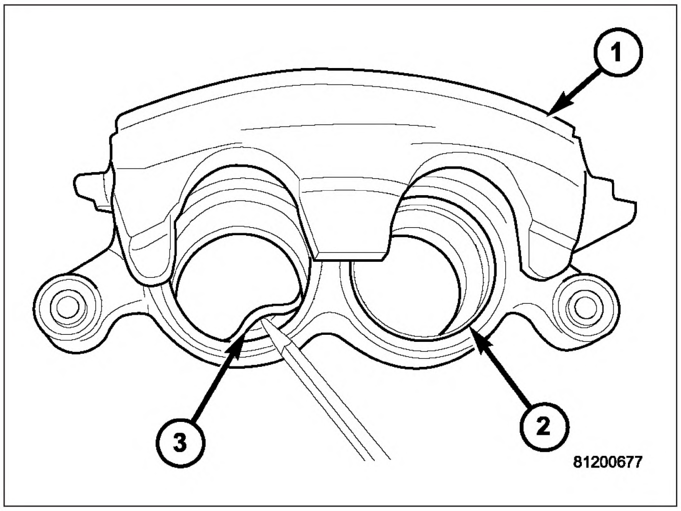


5. Remove the C-clamp and block of wood from the caliper and clamp it over the dust boot of the first piston removed. This will seal the empty piston bore.
6. Move the padded piece of wood in front of the other piston.
7. Remove the second piston using the same procedure with **short bursts of low pressure air**.
8. Remove piston dust boots (2) with a suitable pry tool.

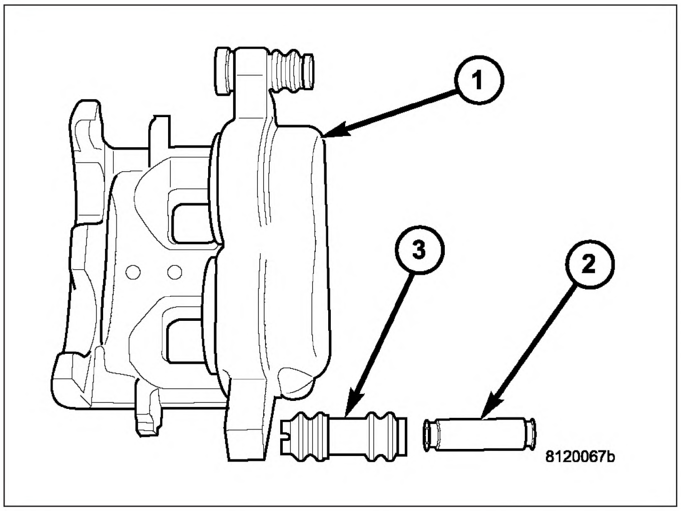


CAUTION: Do not scratch piston bore while removing the seals.

9. Remove piston seals (3) from caliper (1).



10. Push caliper mounting bolt bushings (3) out of the boot seals (2) and remove the boot seals from the caliper (1).
11. Remove caliper bleed screw.



CLEANING - DISC BRAKE CALIPER

Clean the caliper components with clean brake fluid or brake clean only. Wipe the caliper and piston dry with lint free towels or use low pressure compressed air.

CAUTION: Do not use gasoline, kerosene, paint thinner, or similar solvents. These products may leave a residue that could damage the piston and seal.

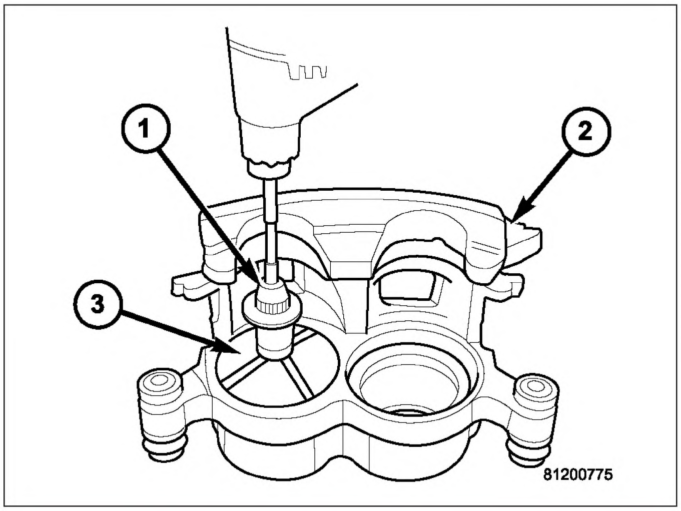
INSPECTION

The piston is made from a phenolic resin (plastic material) and should be smooth and clean.

The piston must be replaced if cracked or scored. Do not attempt to restore a scored piston surface by sanding or polishing.

CAUTION: If the caliper piston is replaced, install the same type of piston in the caliper. Never interchange phenolic resin and steel caliper pistons. The pistons, seals, seal grooves, caliper bore and piston tolerances are different.

The bore can be **lightly** polished with a brake hone (3) to remove very minor surface imperfections. The caliper should be replaced if the bore is severely corroded, rusted, scored, or if polishing would increase bore diameter more than 0.025 mm (0.001 inch).



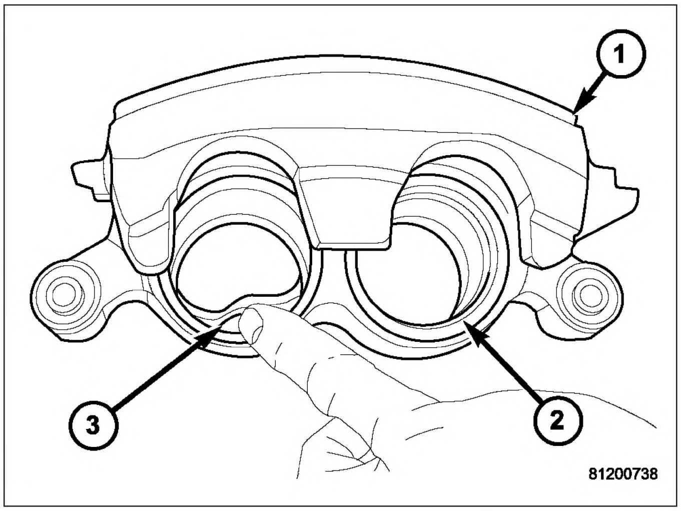
ASSEMBLY

CAUTION: Dirt, oil, and solvents can damage caliper seals. Insure assembly area is clean and dry.

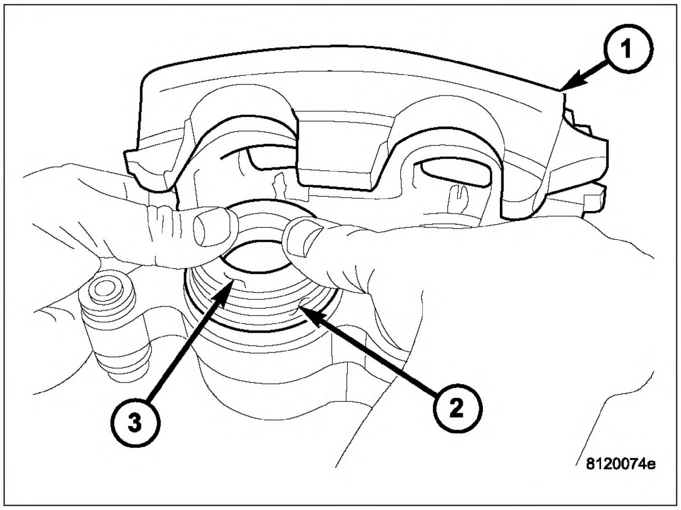
1. Lubricate caliper pistons, piston seals and piston bores with clean, fresh brake fluid.

NOTE: Verify seal is fully seated and not twisted.

2. Install new piston seals (3) into caliper bores (2).



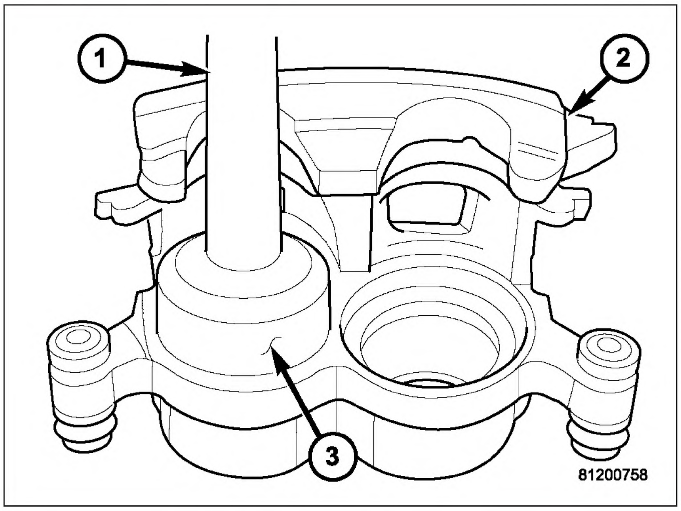
3. Lightly lubricate lip of new boot with silicone grease. Install boot on piston and work boot lip into the groove at the top of piston (3).
4. Stretch boot (2) rearward to straighten boot folds, then move boot forward until folds snap into place.
5. Install piston (3) into caliper bore and press piston down to the bottom of the caliper bore by hand or with hammer handle.



6. Seat dust boot in caliper (2) with Handle C-4171 (1) and Installer (3):
   - 54 mm caliper: Installer C-3716-A
7. Install the second piston and dust boot.
8. Lubricate caliper mounting bolt bushings, boot seals and bores with Mopar brake grease or Dow Corning® 807 grease only.

CAUTION: Use of alternative grease may cause damage to the boots seals.

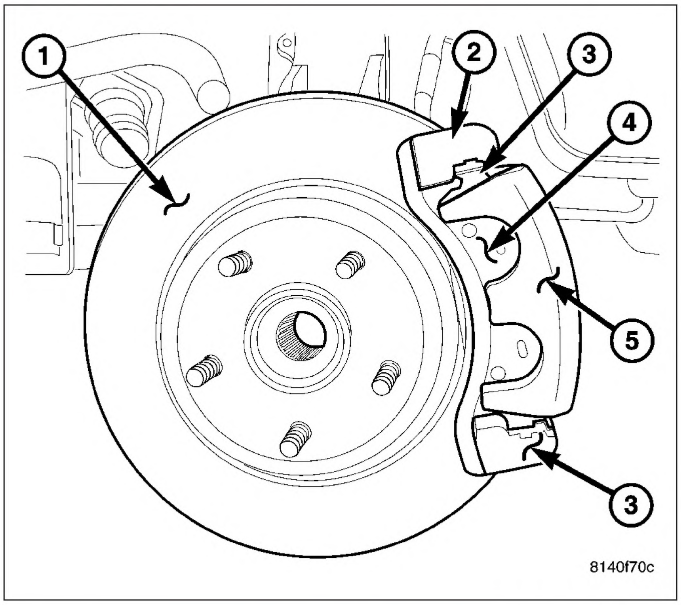
9. Install the boot seals into the caliper seal bores and center the seals in the bores.
10. Install mounting bolt bushings into the boot seals and insure seal lip is engaged into the bushing grooves at either end of the bushing.
11. Install caliper bleed screw.

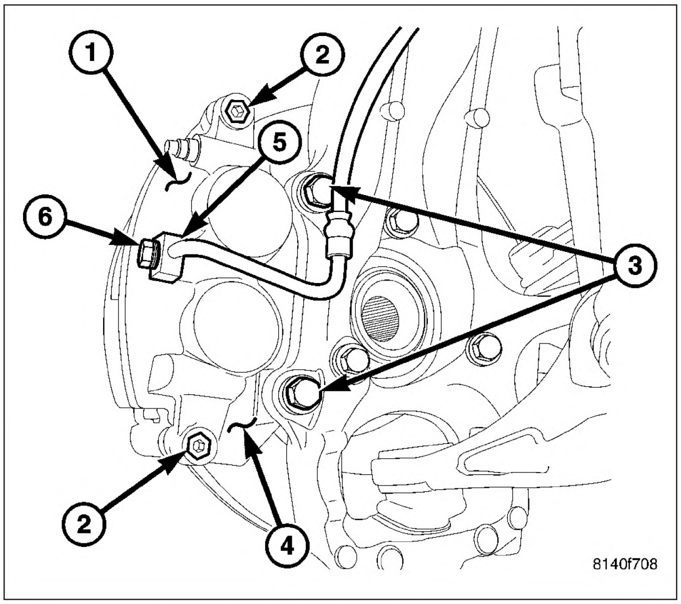


INSTALLATION

FRONT DISC BRAKE CALIPER

1. Install the caliper (5) on the adapter (2).





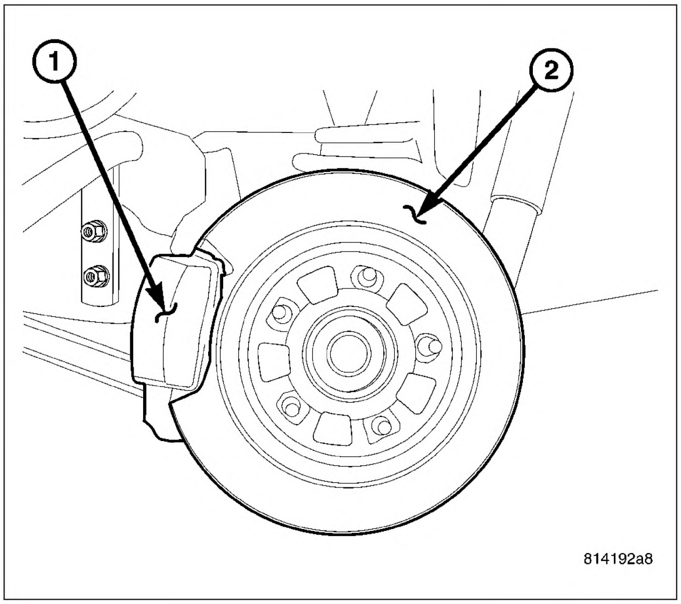
2. Caliper slide pins should be free from debris and lightly lubricated..
3. Install the caliper slide pin bolts (2) and tighten to 72 N·m (53 ft. lbs.).
4. Gently lift one end of the slide pin boot to equalize air pressure, then release the boot and verify that the boot is fully covering the slide pin.

CAUTION: Verify brake hose is not twisted or kinked before tightening banjo bolt.

5. Install brake hose (5) to caliper (1) with **new copper washers (6)** and tighten banjo bolt (6) to 31 N·m (23 ft. lbs.).
6. Fill and bleed brake system.
7. Install wheel and tire assemblies.
8. Remove supports and lower vehicle.
9. Verify brake fluid level.

REAR DISC BRAKE CALIPER

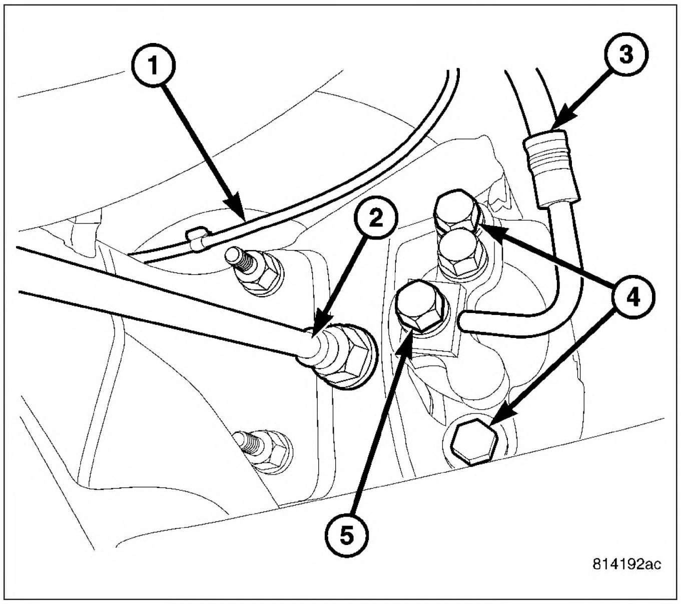
1. Install the brake pads.
2. Lubricate the slide pins and slide pin bushings with caliper slide grease or the grease provided with the caliper.
3. Install the caliper (1) on the anchor.



4. Install the caliper slide pin bolts (4) and tighten to 35 N·m (26 ft. lbs.).

CAUTION: Verify brake hose is not twisted or kinked before tightening fitting bolt.

5. Install brake hose (3) to caliper with a **new** gasket washers and tighten banjo bolt (5) to 31 N·m (23 ft. lbs.).
6. Fill and bleed brake system.
7. Install wheel and tire assemblies.
8. Remove supports and lower vehicle.



FLUID

DIAGNOSIS AND TESTING

BRAKE FLUID CONTAMINATION

Indications of fluid contamination are swollen or deteriorated rubber parts.

Swollen rubber parts indicate the presence of petroleum in the brake fluid.

To test for contamination, put a small amount of drained brake fluid in clear glass jar. If fluid separates into layers, there is mineral oil or other fluid contamination of the brake fluid.

If brake fluid is contaminated, drain and thoroughly flush system. Replace master cylinder, proportioning valve, caliper seals, wheel cylinder seals, Antilock Brakes hydraulic unit and all hydraulic fluid hoses.

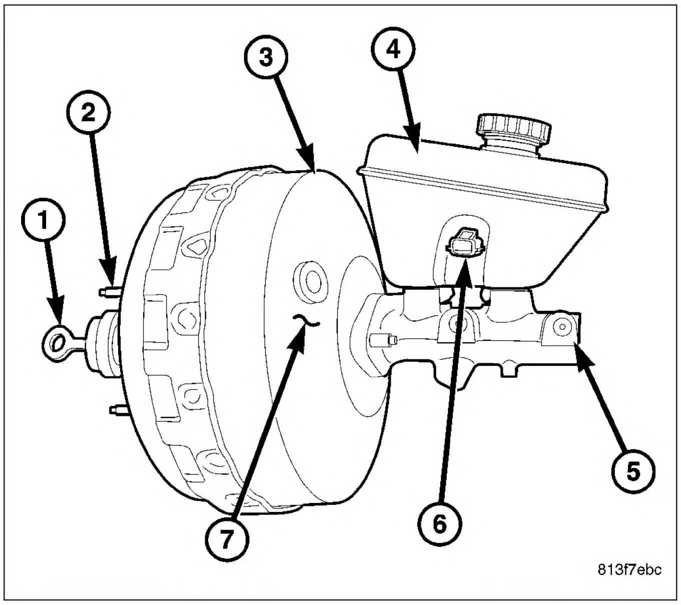
STANDARD PROCEDURE

BRAKE FLUID LEVEL

Always clean the master cylinder reservoir (4) and cap before checking fluid level. If not cleaned, dirt could enter the fluid.

The fluid fill level is indicated on the side of the master cylinder reservoir (4).

The correct fluid level is to the MAX indicator on the side of the reservoir. If necessary, add fluid to the proper level.



SPECIFICATIONS

BRAKE FLUID

The brake fluid used in this vehicle must conform to DOT 3 specifications and SAE J1703 standards. No other type of brake fluid is recommended or approved for usage in the vehicle brake system. Use only Mopar brake fluid or an equivalent from a tightly sealed container.

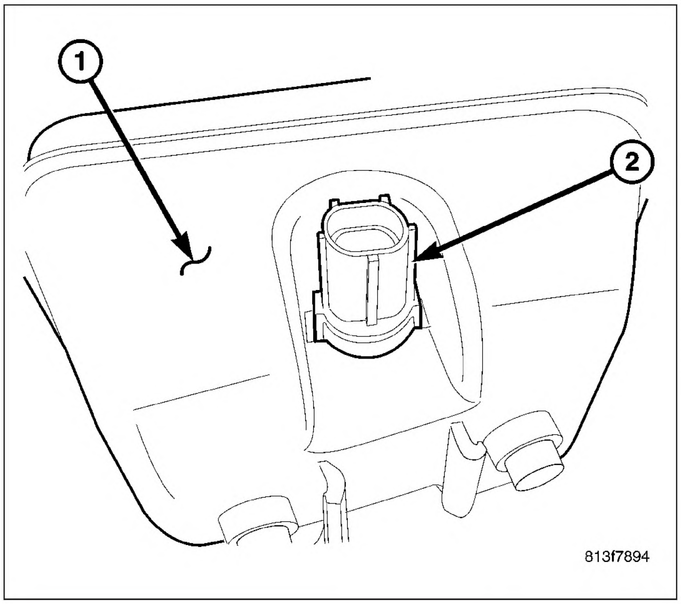
CAUTION: Never use reclaimed brake fluid or fluid from an container which has been left open. An open container of brake fluid will absorb moisture from the air and contaminate the fluid.

CAUTION: Never use any type of a petroleum-based fluid in the brake hydraulic system. Use of such type fluids will result in seal damage of the vehicle brake hydraulic system causing a failure of the vehicle brake system. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid, etc.

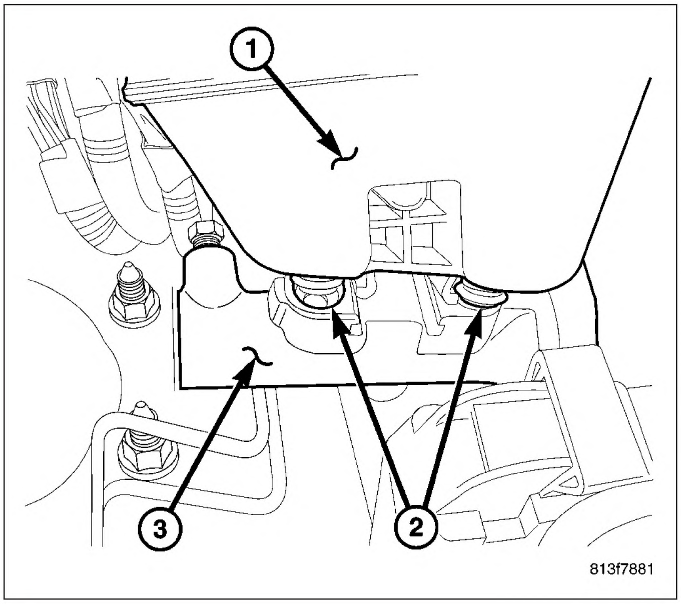
FLUID RESERVOIR

REMOVAL

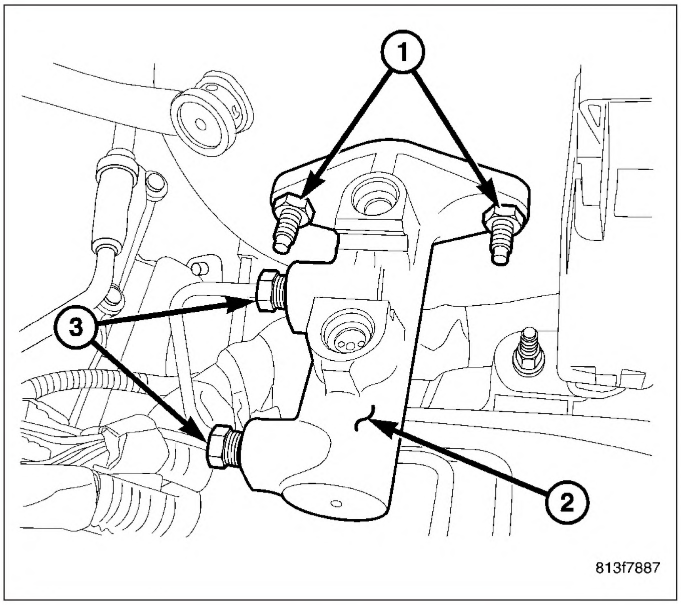
1. Install a brake pedal prop rod.
2. Remove reservoir cap and remove fluid with a **clean**suction gun.
3. Remove the wire connector from the brake fluid level sensor (2).



4. Remove the fluid reservoir (1) from the master cylinder (3).



5. Pull the reservoir straight up out of the cylinder (2).
6. Remove and discard grommets from the cylinder body (2).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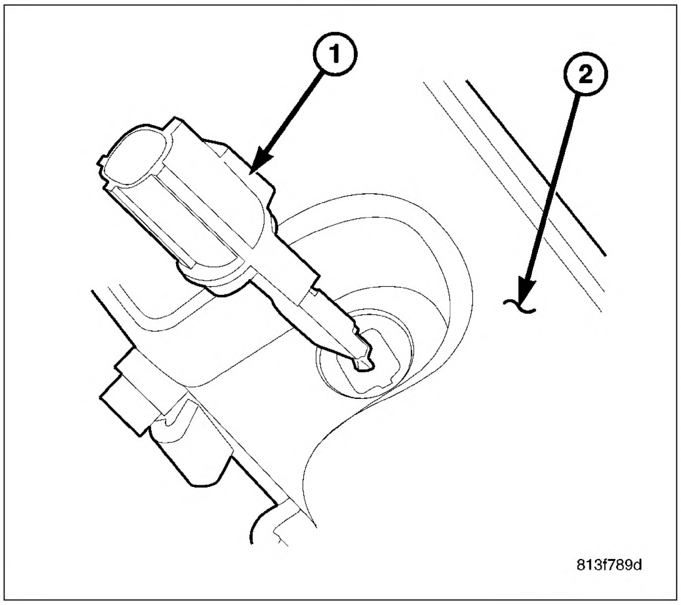
7. Remove the fluid level sensor (1) from the reservoir (2) if needed.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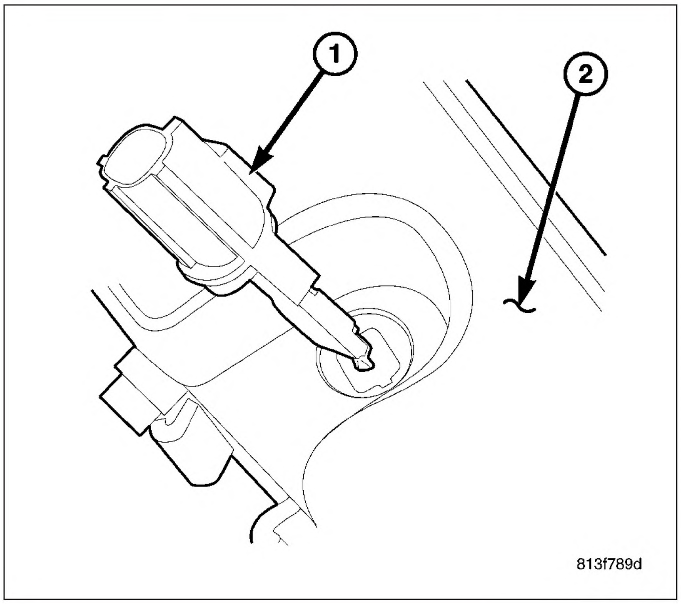
INSTALLATION

1. Install the fluid level sensor (1) into the reservoir (2) if removed.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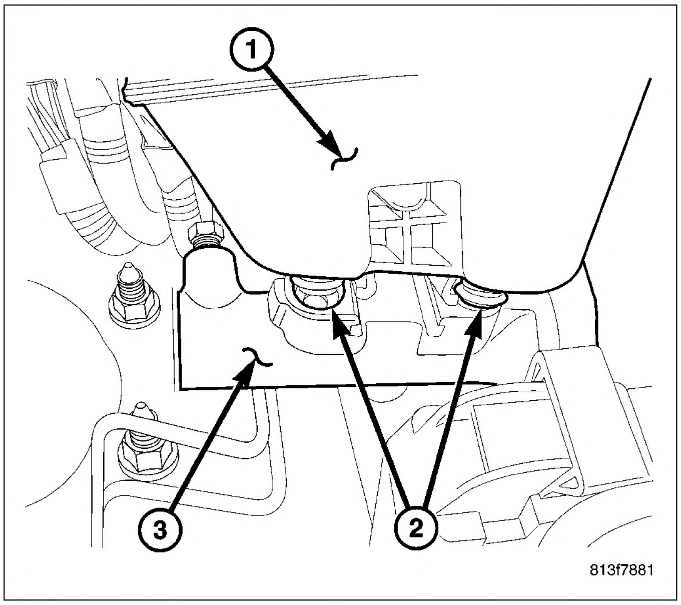
2. Lubricate new o-rings (2) with clean brake fluid.

CAUTION: Do not use tools to install the o-rings. Tools may cut, or tear the o-rings. Install the o-rings using finger pressure only.

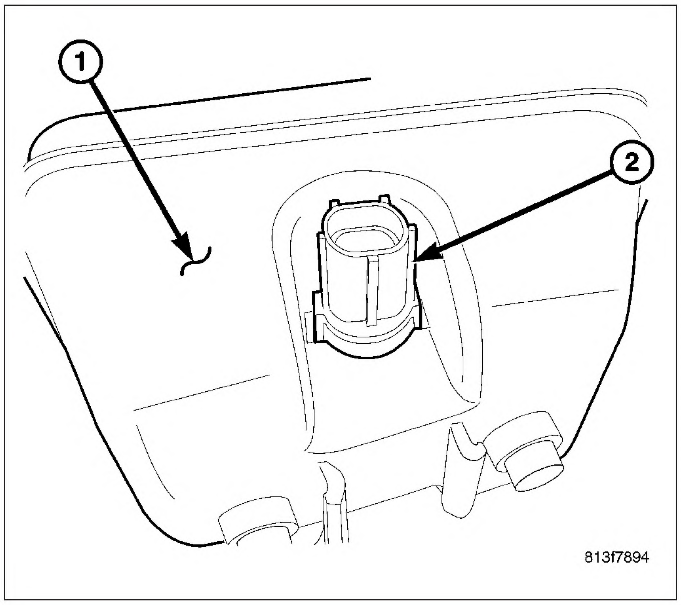
3. Start reservoir in o-rings then press the reservoir straight down to seat the reservoir into the cylinder o-rings.

CAUTION: Do not rock the reservoir during installation.

4. Verify retaining tabs are seated.



5. Install the wire connector to the brake fluid level sensor (2).
6. Remove brake pedal prop rod.
7. Fill master cylinder.

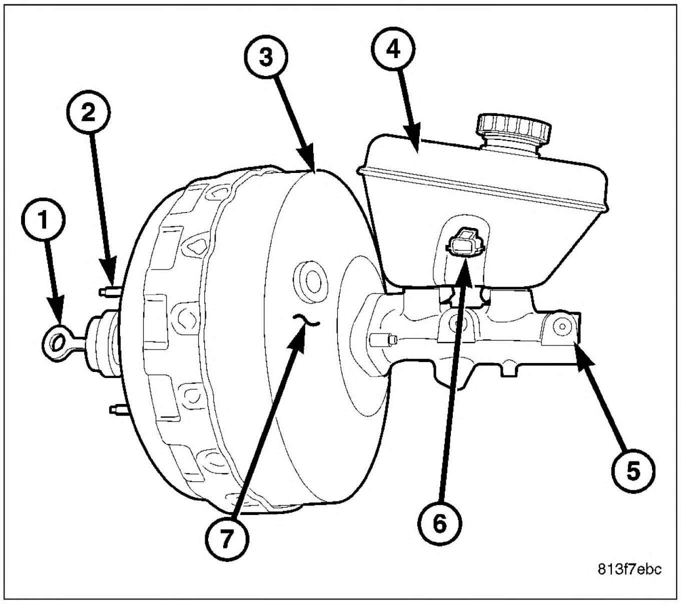


MASTER CYLINDER

DESCRIPTION

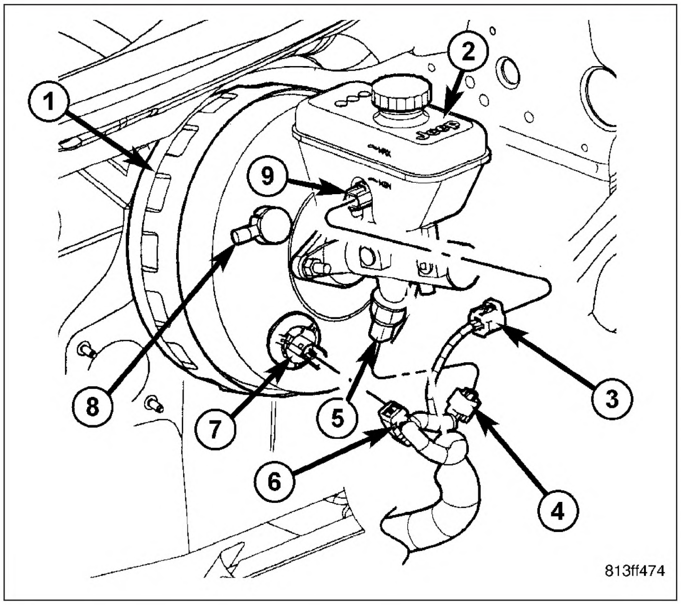
BASE MASTER CYLINDER WITHOUT ESP

The master cylinder body (5) is made of aluminum and contains a primary and secondary piston assembly. The cylinder body including the piston assemblies are not serviceable. If diagnosis indicates an internal problem with the cylinder body (5), it must be replaced as an assembly. The master cylinder has a removable reservoir (4) and fluid level indicator (6). The reservoir, reservoir grommets, reservoir cap and fluid level switch are the only replaceable parts on the master cylinder.



MASTER CYLINDER WITH ESP

The master cylinder body is made of aluminum and contains a primary and secondary piston assembly. The cylinder body including the piston assemblies are not serviceable. If diagnosis indicates an internal problem with the cylinder body, it must be replaced as an assembly. The master cylinder with ESP has a pressure switch (5) on the master cylinder. The reservoir (2), reservoir grommets, reservoir cap, pressure switch (5), solenoid connector (7) and fluid level switch (9) are the only replaceable parts on the master cylinder.



OPERATION

The master cylinder bore contains a primary and secondary piston. The primary piston supplies hydraulic pressure to the front brakes. The secondary piston supplies hydraulic pressure to the rear brakes. The master cylinder reservoir stores reserve brake fluid for the hydraulic brake circuits.

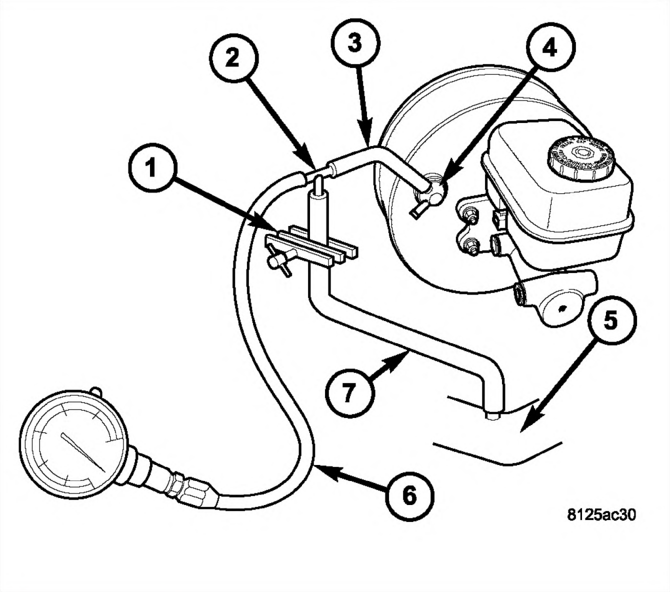
DIAGNOSIS AND TESTING

MASTER CYLINDER/POWER BOOSTER

1. Start engine and check booster vacuum hose connections. A hissing noise indicates vacuum leak. Correct any vacuum leak before proceeding.
2. Stop engine and shift transmission into Neutral.
3. Pump brake pedal until all vacuum reserve in booster is depleted.
4. Press and hold brake pedal under light foot pressure. The pedal should hold firm, if the pedal falls away master cylinder is faulty (internal leakage).
5. Start engine and note pedal action. It should fall away slightly under light foot pressure then hold firm. If no pedal action is discernible, power booster, vacuum supply, or vacuum check valve is faulty. Proceed to the POWER BOOSTER VACUUM TEST.
6. If the POWER BOOSTER VACUUM TEST passes, rebuild booster vacuum reserve as follows: Release brake pedal. Increase engine speed to 1500 rpm, close the throttle and immediately turn off ignition to stop engine.
7. Wait a minimum of 90 seconds and try brake action again. Booster should provide two or more vacuum assisted pedal applications. If vacuum assist is not provided, booster is faulty.

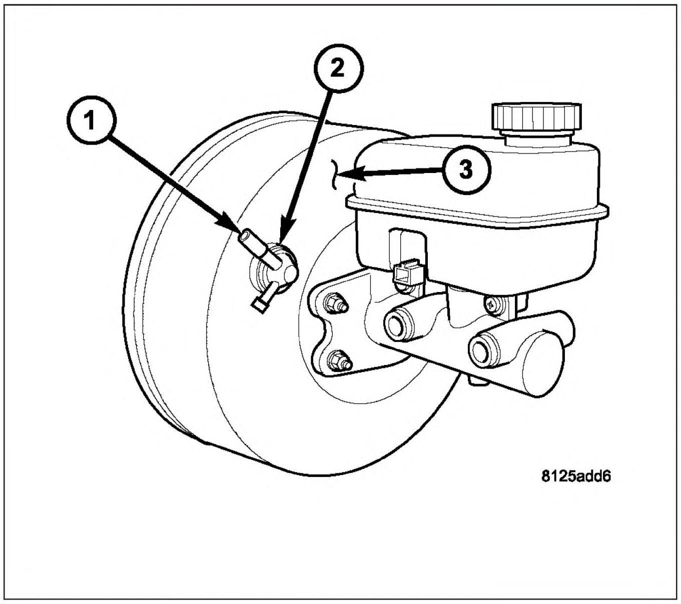
POWER BOOSTER VACUUM TEST

1. Connect vacuum gauge (6) to booster check valve (4) with short length of hose (3) and T-fitting (2).
2. Start and run engine at curb idle speed for one minute.
3. Observe the vacuum supply. If vacuum supply is not adequate, repair vacuum supply.
4. Clamp (1) hose (7) shut between intake vacuum source (5) and check valve (4).
5. Stop engine and observe vacuum gauge (6).
6. If vacuum drops more than one inch HG (33 millibars) within 15 seconds, booster diaphragm or check valve is faulty.



POWER BOOSTER CHECK VALVE TEST

1. Disconnect vacuum hose from check valve (1).
2. Remove check valve (1) and valve seal (2) from booster (3).
3. Use a hand operated vacuum pump for test.
4. Apply 15-20 inches vacuum at large end of check valve.
5. Plug off the small end to prevent vacuum leakage.
6. Vacuum should hold steady. If gauge on pump indicates vacuum loss, check valve is faulty and should be replaced.

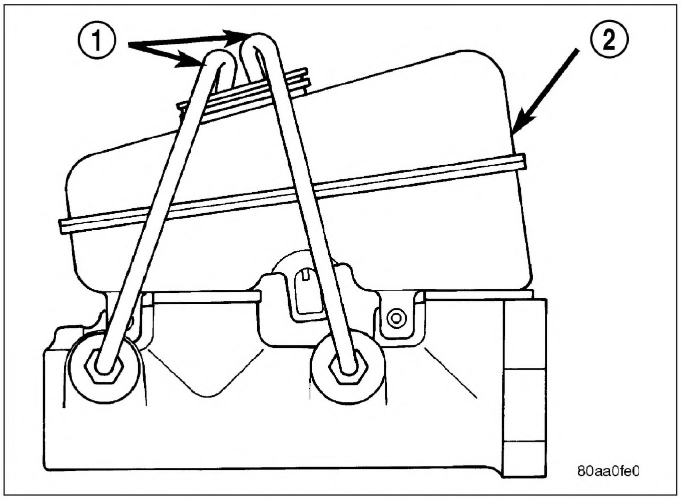


STANDARD PROCEDURE

MASTER CYLINDER BLEEDING

A new master cylinder should be bled before installation on the vehicle. Required bleeding tools include bleed tubes and a wood dowel to stroke the pistons. Bleed tubes can be fabricated from brake line.

1. Mount master cylinder in vise.
2. Attach bleed tubes to cylinder outlet ports (1). Then position each tube end into reservoir (2).
3. Fill reservoir with fresh brake fluid.
4. Press cylinder pistons inward with wood dowel. Then release pistons and allow them to return under spring pressure. Continue bleeding operations until air bubbles are no longer visible in fluid.



REMOVAL

1. Siphon the master cylinder.
2. Remove the primary brake tube at the master cylinder.
3. Remove the primary brake tube from the HCU.
4. Remove the secondary brake tube at the master cylinder.
5. Remove the secondary brake tube at the HCU
6. Disconnect the brake fluid level switch from the master cylinder.
7. Remove the 2 master cylinder mounting nuts.
8. Remove the master cylinder.

INSTALLATION

NOTE: Bleed new master cylinder on bench before installation.

1. Install the master cylinder with new gasket and nuts.
2. Reconnect the brake fluid level electrical connector.
3. Install the secondary brake tube at the HCU.
4. Install the secondary brake tube at the master cylinder.
5. Install the primary brake tube at the HCU.
6. Install the primary brake tube at the master cylinder.
7. Fill and bleed brake system.

PEDAL

DESCRIPTION

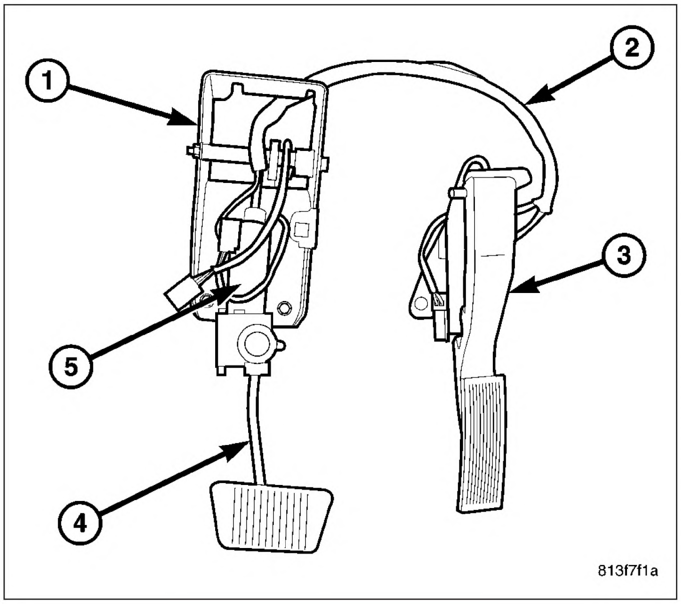
NON—ADJUSTABLE PEDAL

A suspended-type brake pedal is used, the pedal pivots on a shaft mounted in the pedal support bracket. The bracket is attached to the dash panel.

The brake pedal assembly and pedal pad are the only serviceable component.

ADJUSTABLE PEDALS

The Adjustable Pedals System (APS) is designed to enable the fore and aft repositioning of the brake and accelerator pedals. This results in improved ergonomics in relation to the steering wheel for taller and shorter drivers. Being able to adjust the pedal positions also allows the driver to set steering wheel tilt and seat position to the most comfortable position. The position of the brake (4) and accelerator pedals (3) can be adjusted without compromising safety or comfort in actuating the pedals. Repositioning the pedals does not change the effort required for actuation.



Change of pedal position is accomplished by means of a motor driven screw (5). Operating the adjustable pedal switch activates the pedal drive motor (5). The pedal drive motor turns a screw that changes the position of the brake (4) and accelerator pedals (3). The pedal can be moved rearward (closer to the driver) or forward (away from driver). The brake pedal is moved on its drive screw to a position where the driver feels most comfortable.

The accelerator pedal (3) is moved at the same time and the same distance as the brake pedal. The accelerator pedal adjustment screw is turned by a flexible shaft slaved off the brake adjustment screw.

Neither the pedal drive motor nor drive mechanism are subject to the mechanical stress of brake or accelerator application.

- SYSTEM FEATURES:
  - Range of Adjustment: The pedals may be adjusted up to 3 in. (75 mm)
  - Pedal Adjustment Speed: 0.5 in./sec (12.5 mm/sec)
  - Pedal Adjustment Inhibitors: Pedal adjustment is inhibited when the vehicle is in reverse or when cruise control is activated.
  - Memory: An optional memory feature is available. This allows storing of one or two preferred pedal positions in the Adjustable Pedal Module (APM). A preferred position can be stored and recalled

using the door-mounted switches. A stored pedal position can be recalled (but not stored) using the Remote Keyless Entry (RKE).

- Adjustable Pedal Feedback Message: The Electronic Vehicle Information Center (EVIC) will display a message when the APS is disabled. ie: ″Adjustable Pedal Disabled - Cruise Control Engaged″ or ″Adjustable Pedal Disabled - Vehicle in Reverse″.
- Damage Prevention: Foot pressure or debris can stall pedal adjustment. In order to avoid damage to system components during pedal adjustment, the APM will monitor pedal position sensor voltage. If the APM does not detect expected voltage change within 1.5 seconds, it will cut power to the adjustable pedal motor.

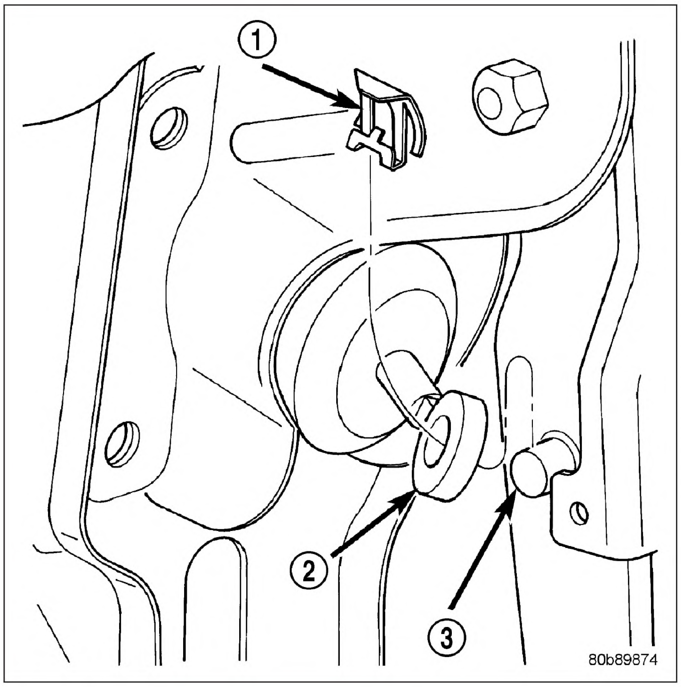
OPERATION

The brake pedal is attached to the booster push rod. When the pedal is depressed, the primary booster push rod is depressed which moves the booster secondary rod. The booster secondary rod depresses the master cylinder piston.

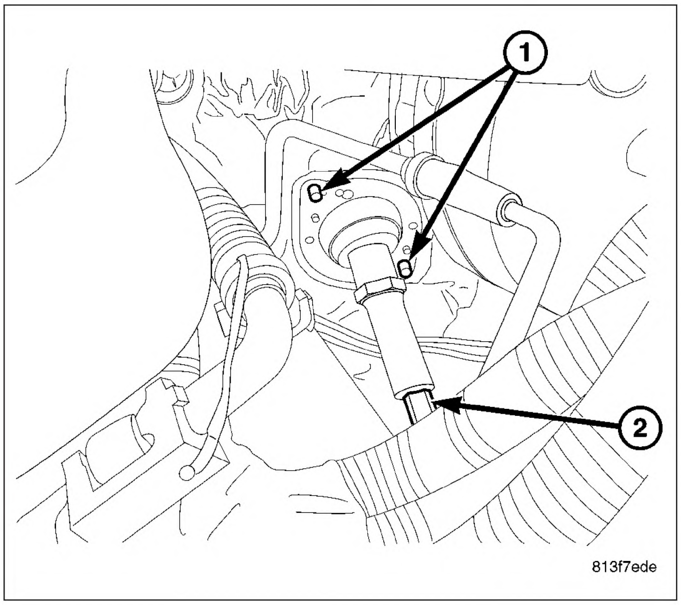
REMOVAL

NON-ADJUSTABLE PEDAL

1. Disconnect the negative battery cable.
2. Remove retainer clip (1) that holds booster to pedal pin (3).
3. Remove the power brake booster (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - REMOVAL).



4. Lock the steering wheel into place.
5. Remove the 2 intermediate shaft bearing nuts (1).

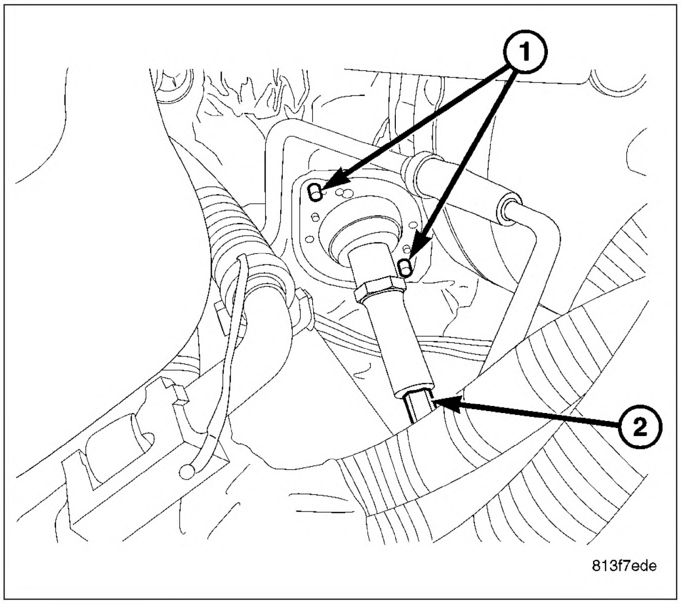


6. Remove the lower steering shaft pinch bolt.
7. Remove the lower steering shaft off the column.
8. Loosen the brake pedal sled upper nuts
9. Remove the brake pedal assembly from the vehicle.

ADJUSTABLE PEDALS

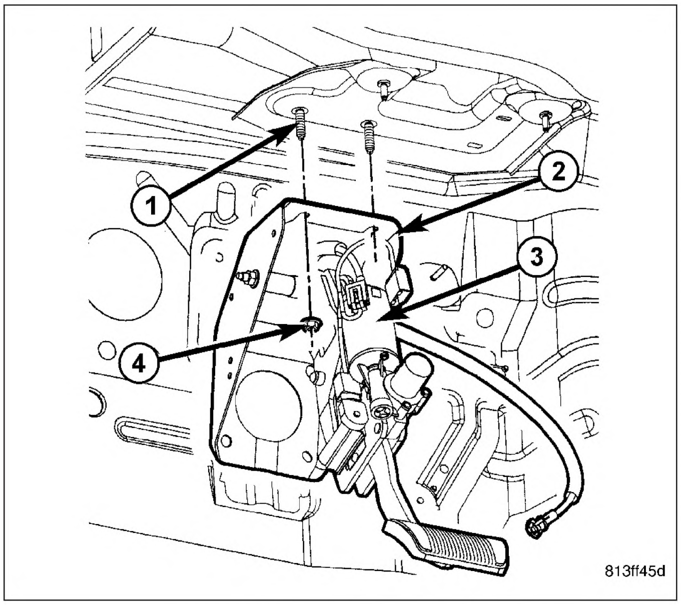
NOTE: If possible put the pedals in the full forward position.

1. Disconnect the negative battery cable.
2. Remove the power brake booster (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - REMOVAL).
3. Remove the 2 intermediate shaft bearing nuts (1).

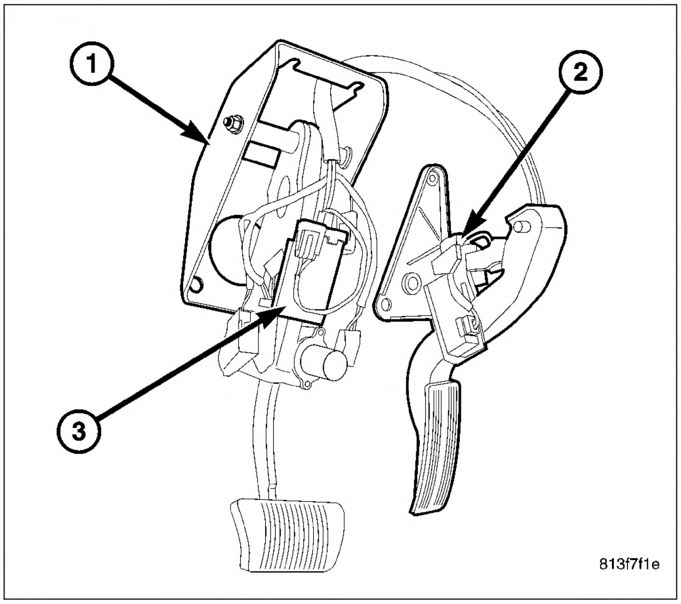


4. Remove the lower steering shaft pinch bolt.
5. Remove the lower steering shaft off the column.
6. Lock the steering wheel into place.
7. Disconnect the pedal motor electrical connector.

8. Disconnect the accelerator pedal cable.
9. Disconnect the 2 accelerator pedal mounting nuts (4).



10. Loosen the brake pedal sled (1) upper nuts
11. Remove the brake pedal/accelerator pedal assembly (2&3) from the vehicle.

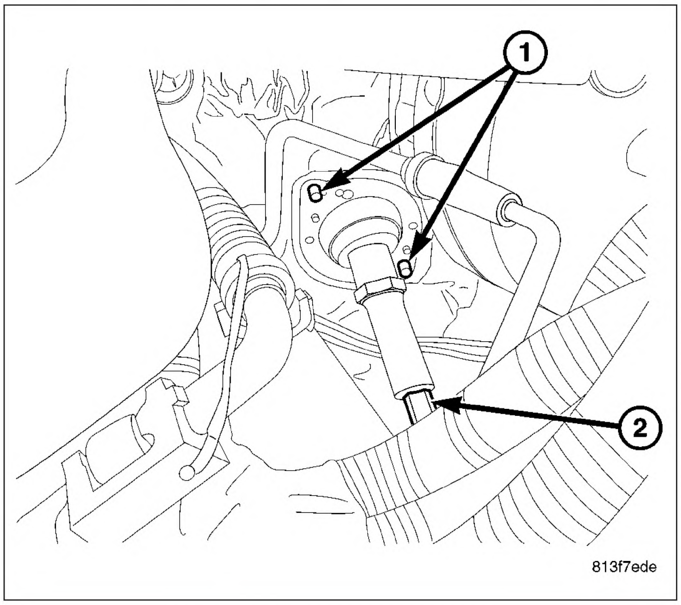


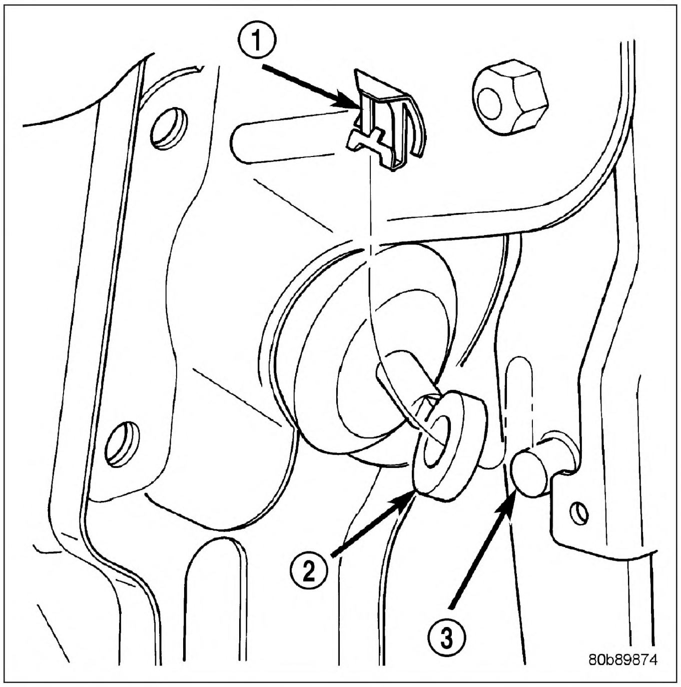
INSTALLATION

NON-ADJUSTABLE PEDAL

1. Install the pedal assembly to the vehicle.
2. Tighten the upper brake pedal sled nuts.

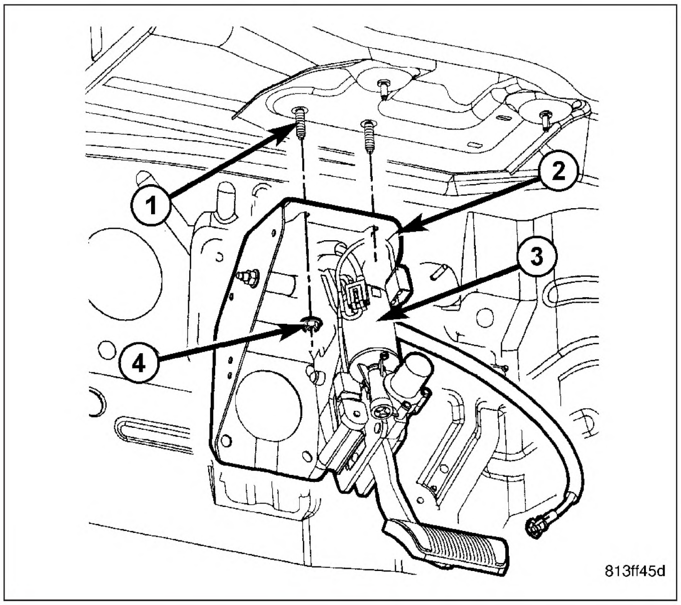
3. Install the lower steering shaft to the column.
4. Install the lower steering shaft pinch bolt at the column.
5. Unlock the steering wheel.
6. Install the 2 intermediate shaft bearing nuts (1).
7. Install the power brake booster (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - INSTALLATION).
8. Install booster push rod (2) on pedal pin (3) and install retainer clip (1) on pedal pin.
9. Reconnect the negative battery cable.
10. Fill and bleed brake system.
11. Check and adjust stop lamp switch if necessary.



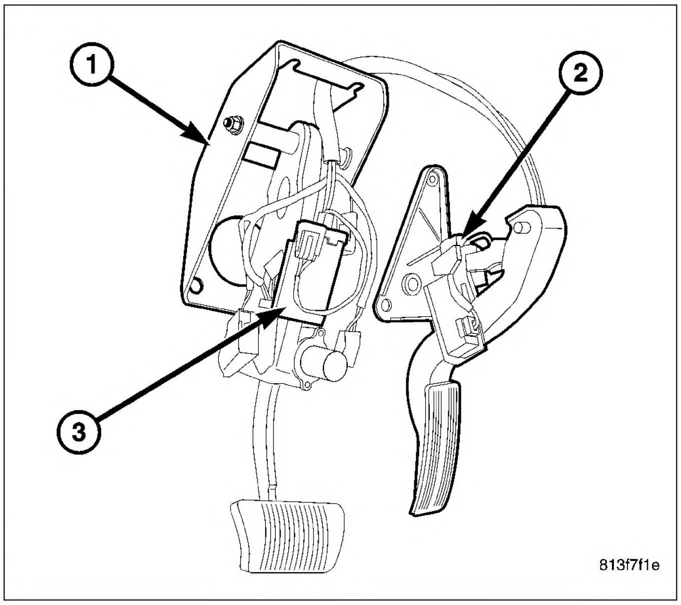


ADJUSTABLE PEDAL

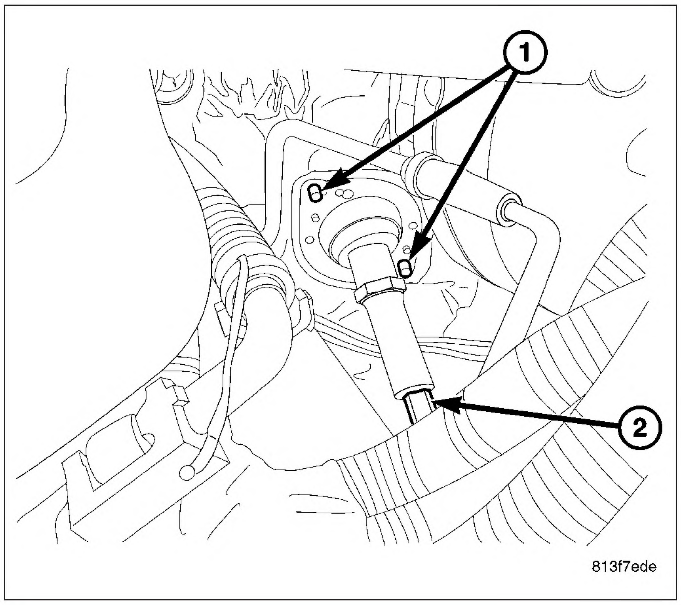
1. Install the pedal assembly (2) to the vehicle.
2. Tighten the upper brake pedal sled nuts (4).



3. Install and tighten the 2 accelerator pedal (2) nuts to 28 N·m (21 ft. lbs.).
4. Reconnect the accelerator pedal cable.
5. Reconnect the pedal motor electrical connector.



6. Install the lower steering shaft to the column.
7. Install the lower steering shaft pinch bolt at the column.
8. Unlock the steering wheel.
9. Install the 2 intermediate shaft bearing nuts (1).
10. Install the power brake booster (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - INSTALLATION).
11. Reconnect the negative battery cable.
12. Fill and bleed brake system.



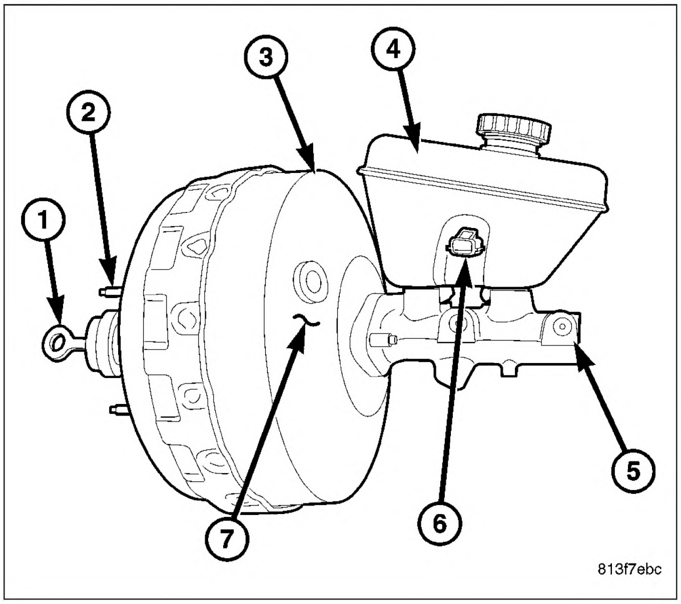
POWER BRAKE BOOSTER

DESCRIPTION

BASE POWER BRAKE BOOSTER WITHOUT ESP

The booster assembly consists of a housing divided into separate chambers by two internal diaphragms. The outer edge of each diaphragm is attached to the booster housing (3).

Two push rods are used in the booster. The primary push rod (1) connects the booster to the brake pedal. The secondary push rod connects the booster to the master cylinder to stroke the cylinder pistons.

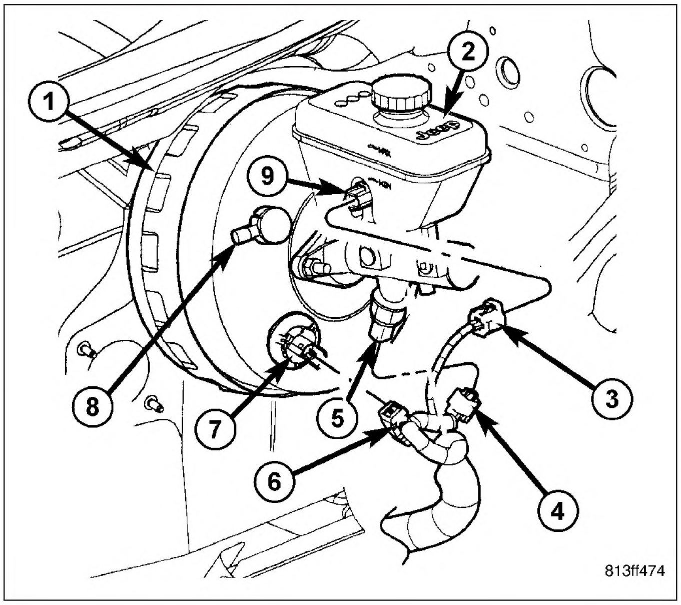


POWER BRAKE BOOSTER WITH ESP

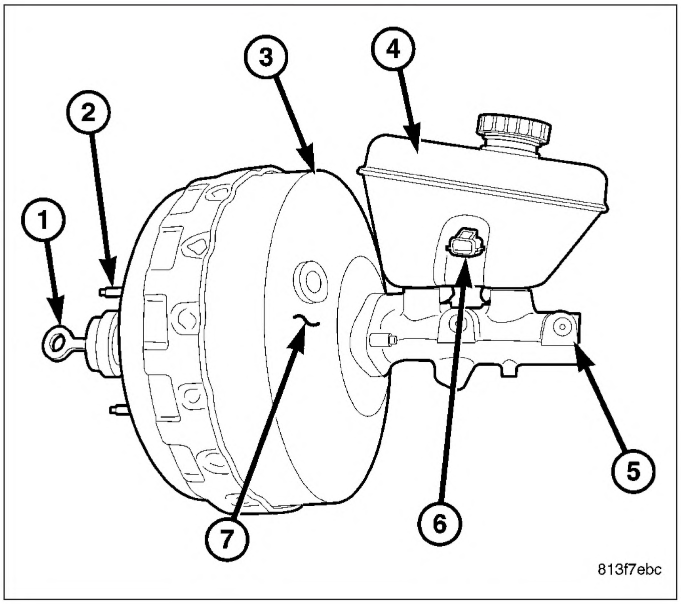
The booster assembly consists of a housing divided into separate chambers by two internal diaphragms. The outer edge of each diaphragm is attached to the booster housing (1).

Two push rods are used in the booster. The primary push rod connects the booster to the brake pedal. The secondary push rod connects the booster to the master cylinder to stroke the cylinder pistons.

Power brake boosters with ESP will have a travel sensor (7).



OPERATION



The atmospheric inlet valve is opened and closed by the primary push rod. Booster vacuum supply is through a hose attached to an intake manifold fitting at one end and to the booster check valve (7) at the other. The vacuum check valve in the booster housing is a one-way device that prevents vacuum leak back.

Power assist is generated by utilizing the pressure differential between normal atmospheric pressure and a vacuum. The vacuum needed for booster operation is taken directly from the engine intake manifold. The entry point for atmospheric pressure is through a filter and inlet valve at the rear of the housing.

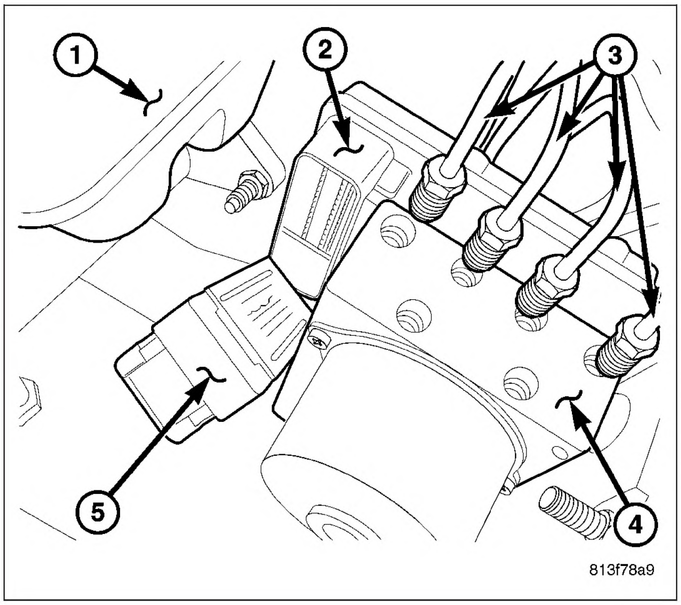
The chamber areas forward of the booster diaphragms are exposed to vacuum from the intake manifold. The chamber areas to the rear of the diaphragms, are exposed to normal atmospheric pressure of 101.3 kilopascals (14.7 pounds/square in.).

Brake pedal application causes the primary push rod (1) to open the atmospheric inlet valve. This exposes the area behind the diaphragms to atmospheric pressure. The resulting pressure differential provides the extra apply force for power assist.

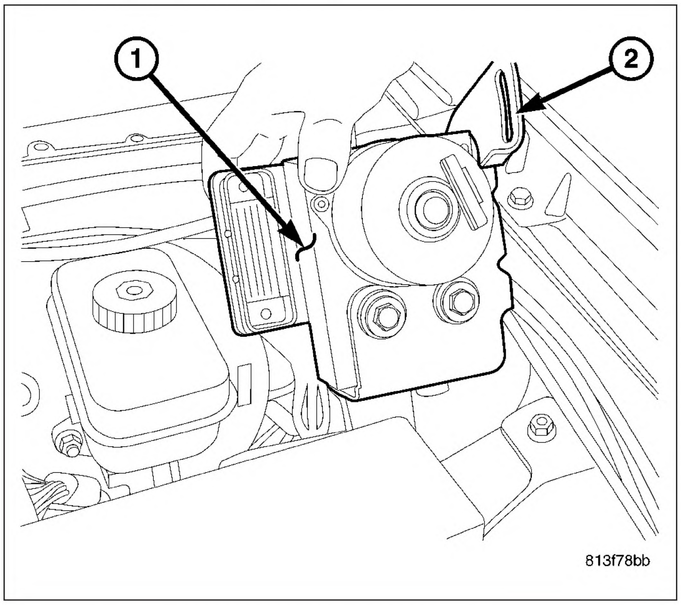
The booster check valve, check valve grommet (7) and booster seals are serviceable.

REMOVAL

1. Siphon the master cylinder.
2. Remove the primary brake line at the master cylinder.
3. Remove the primary brake line from the HCU (4).
4. Remove the secondary brake line at the master cylinder.
5. Remove the secondary brake line at the HCU (4).
6. Remove the 4 chassis lines (3) at the HCU.
7. Disconnect the HCU electrical connector (5).



8. Remove the 3 mounting nuts at the HCU bracket (2).
9. Remove the HCU(1) with the bracket from the vehicle.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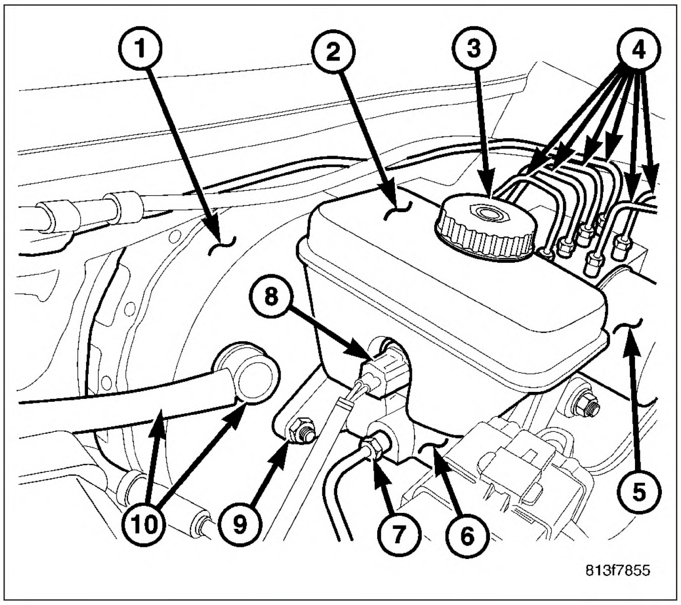
10. Disconnect the brake fluid level sensor electrical connector (8) from the fluid reservoir (2).
11. Remove the 2 master cylinder mounting nuts (9).
12. Remove the master cylinder (6).
13. Disconnect vacuum hose at booster check valve (10).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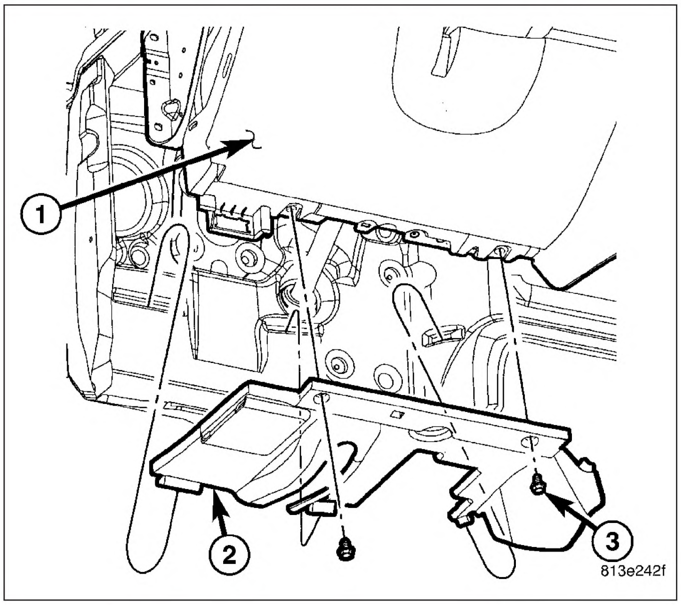
14. Remove the hush panel (2).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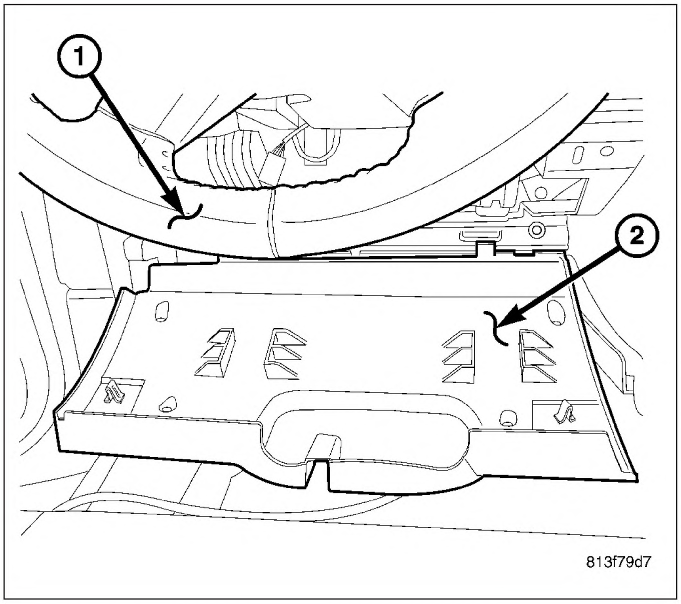
15. Remove the steering column opening cover (2) and hush panel.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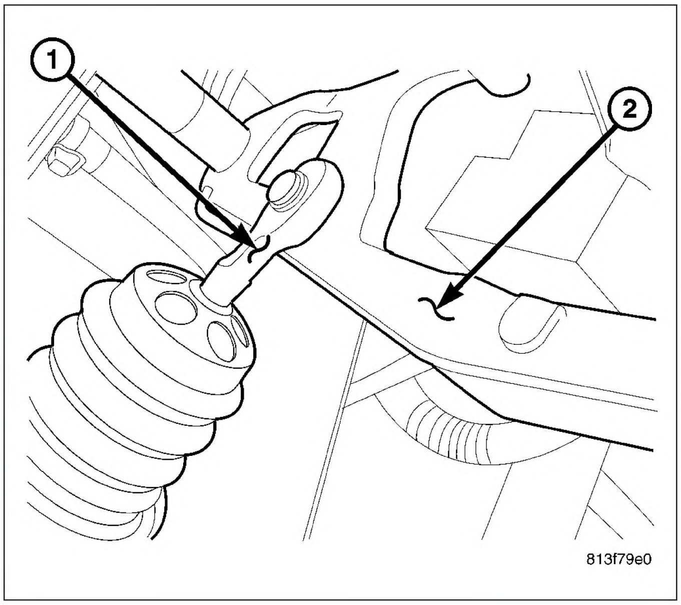
16. Remove retainer clip that holds booster push rod (1) on pedal pin (2). Then slide push rod off pin.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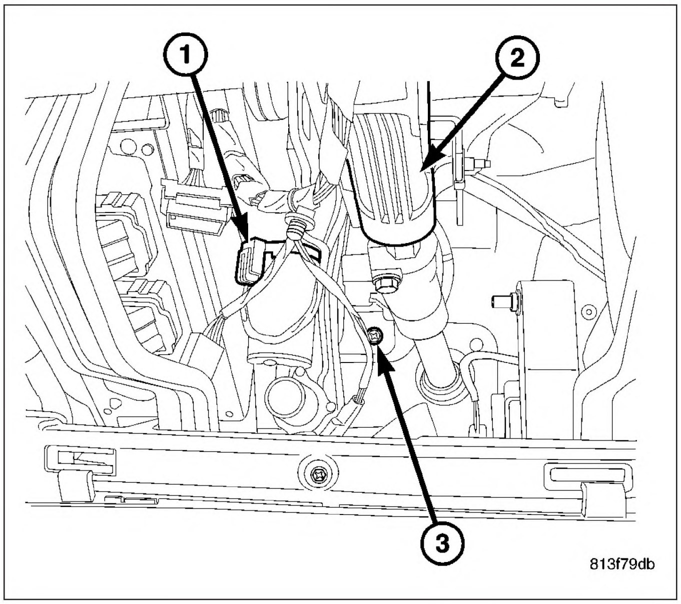
17. Disconnect the brake lamp switch wire connector.
18. Remove the brake lamp switch.
19. Remove four nuts (3) that attach booster to dash panel.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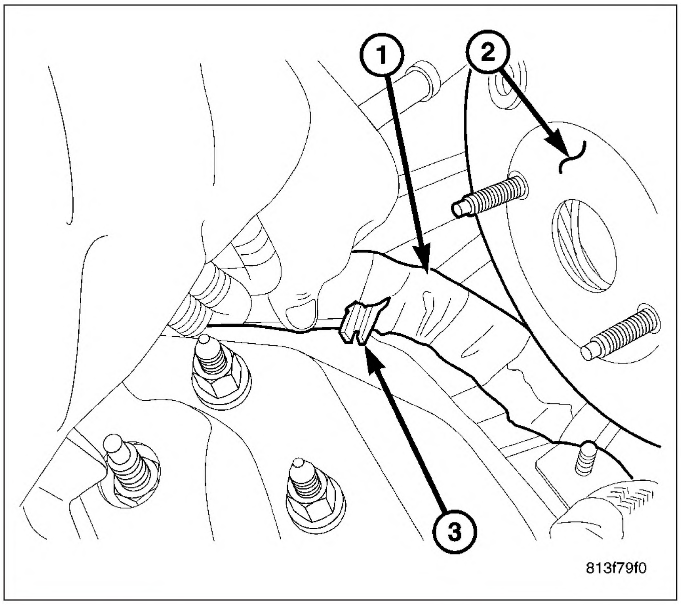
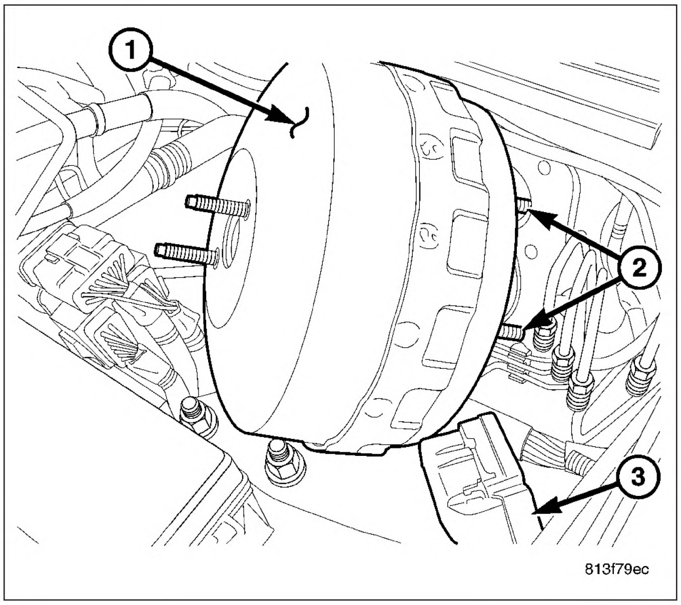
20. In the engine compartment, disconnect the wire harness routing clips (3) and move the harness (1) to the side and downward.

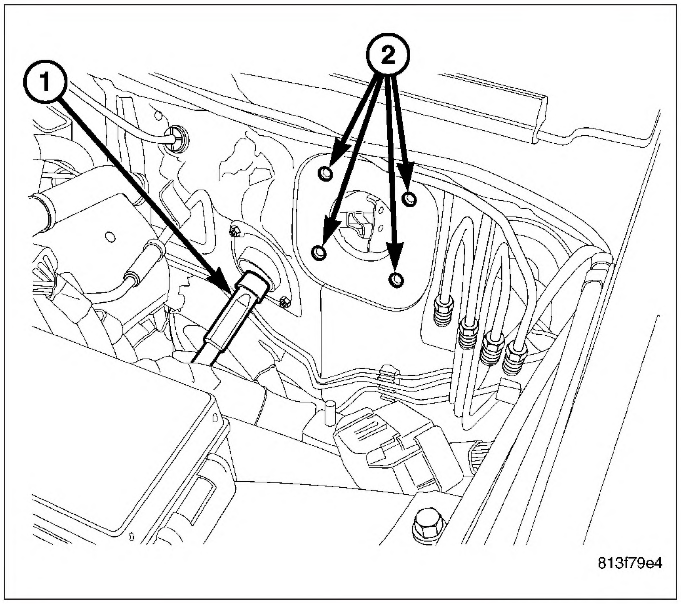


21. Remove the booster (1) from the vehicle.

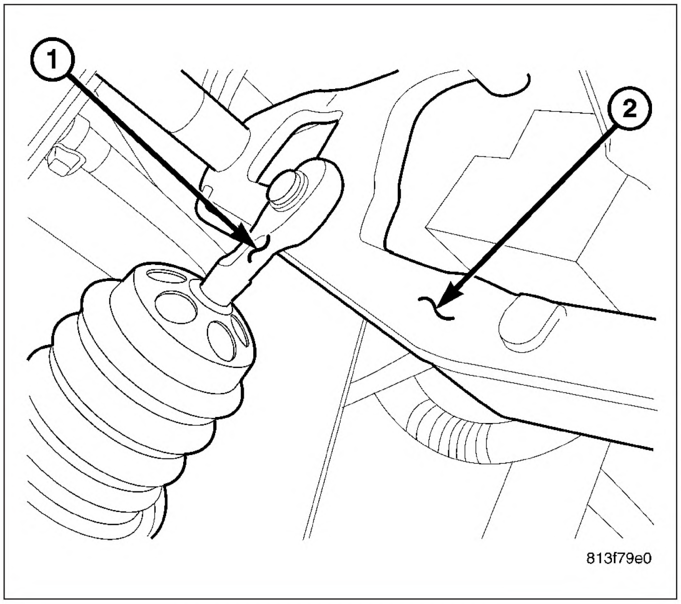


INSTALLATION

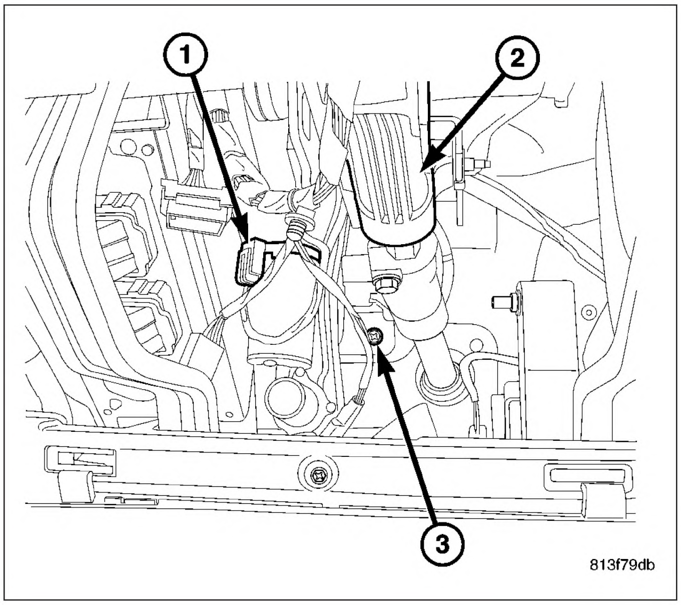
1. Check condition of grommet that secures check valve in booster. Replace grommet if cut, torn, or loose.
2. Install new booster dash seal.
3. Align and position booster in the mounting holes (2) of the dash panel.



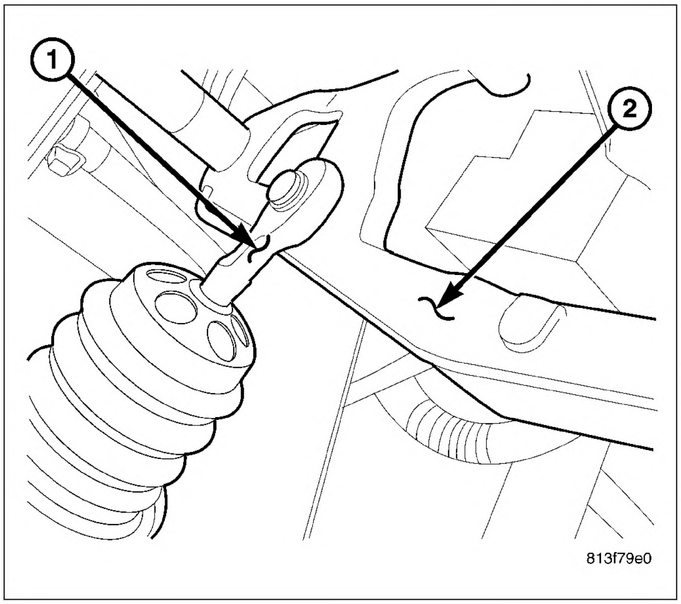
4. Inside the vehicle, Lubricate pedal pin Mopar multi-mileage grease.



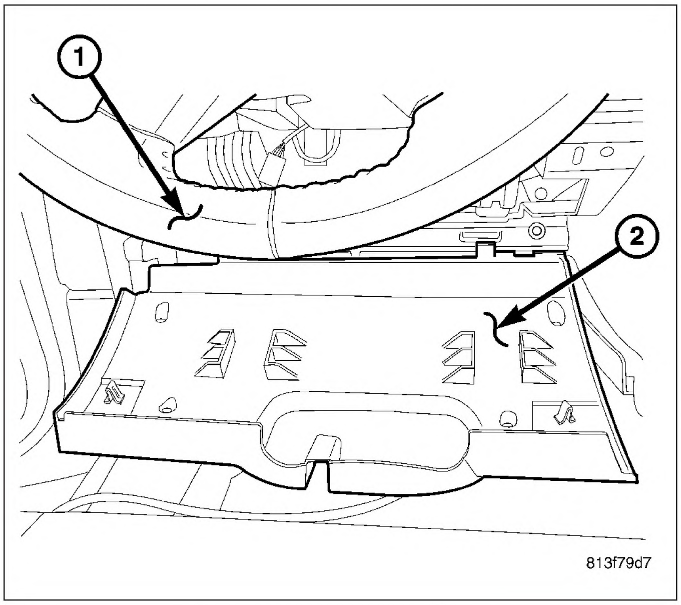
5. Install booster attaching nuts (3) on studs. Tighten attaching nuts to 39 N·m (29 ft. lbs.).



6. Slide booster push rod (1) on pedal pin. Then secure rod to pin with retainer clip.
7. Install a new brake lamp switch and reconnect the electrical connector.



8. Install the steering column opening cover (2).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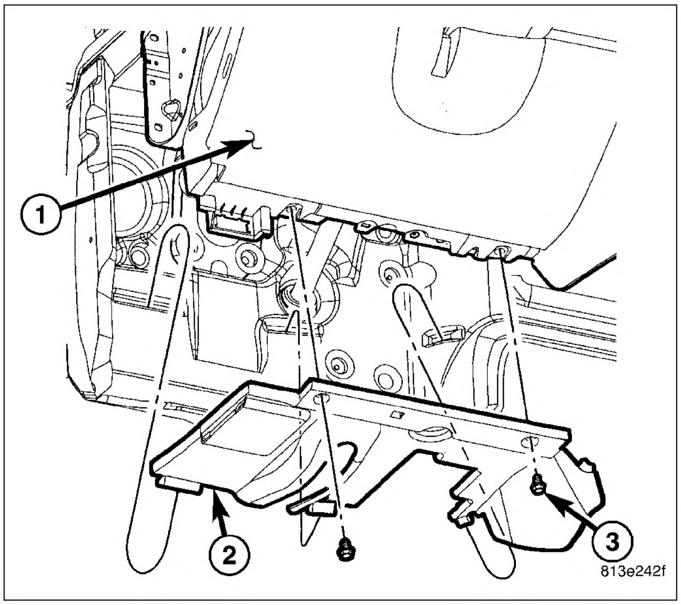
9. Install the hush panel (2).
10. In engine compartment, attach vacuum hose to booster check valve (1).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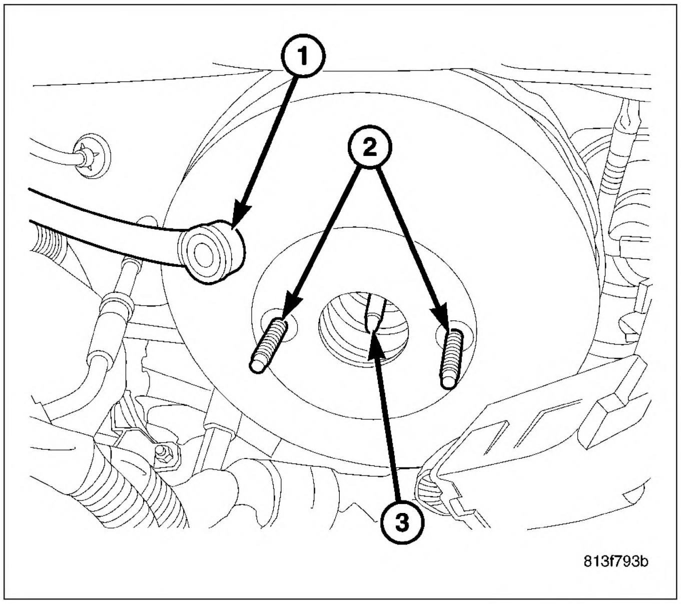
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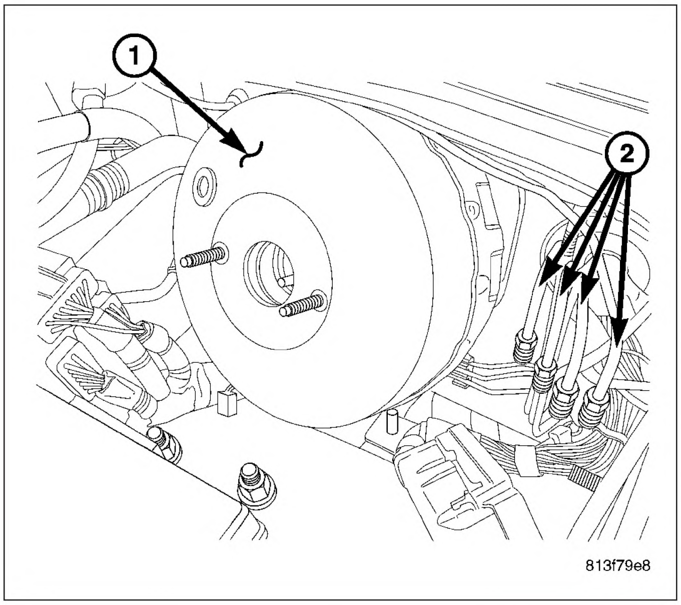
11. Install the master cylinder to the power brake booster (1) with new gasket and nuts.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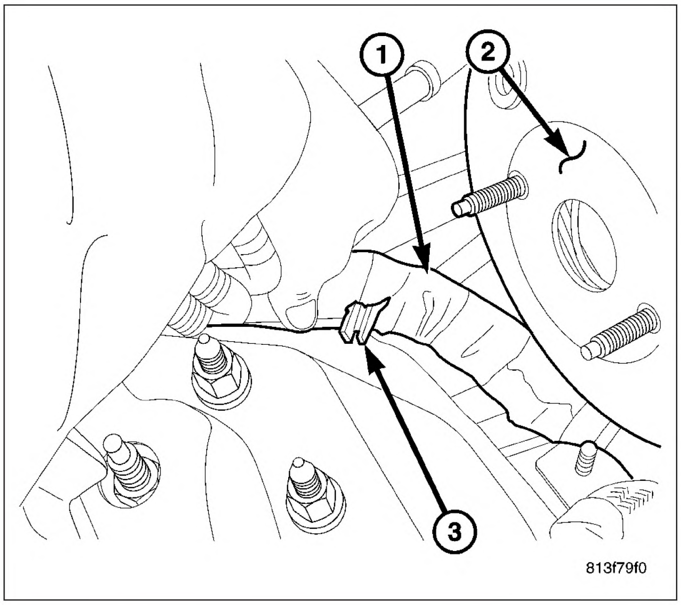
12. Reroute the wire harness (1) back into position and install the routing clip (3).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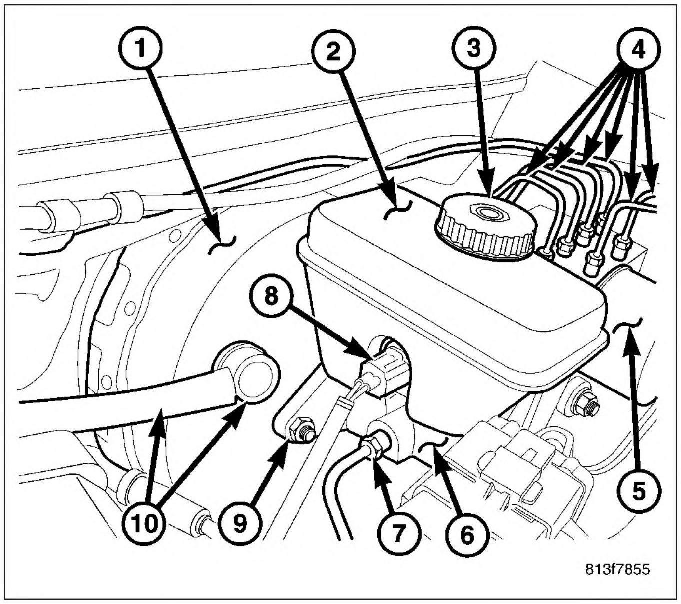
13. Reconnect the brake fluid level electrical connector (8).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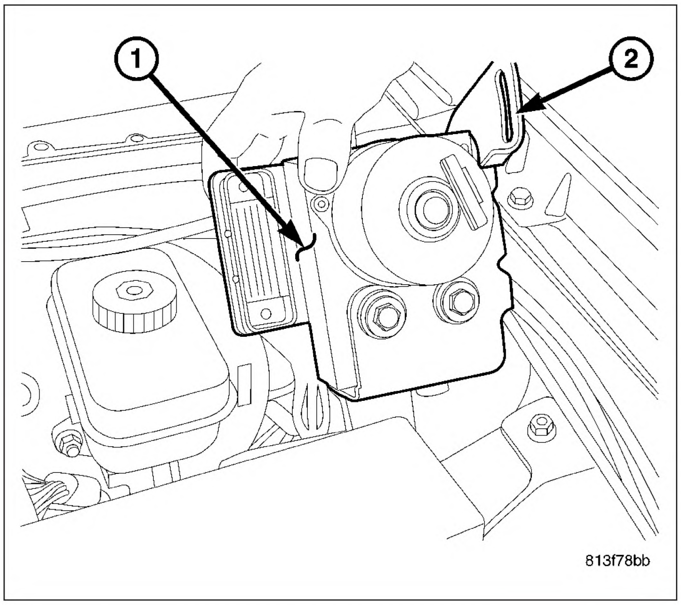
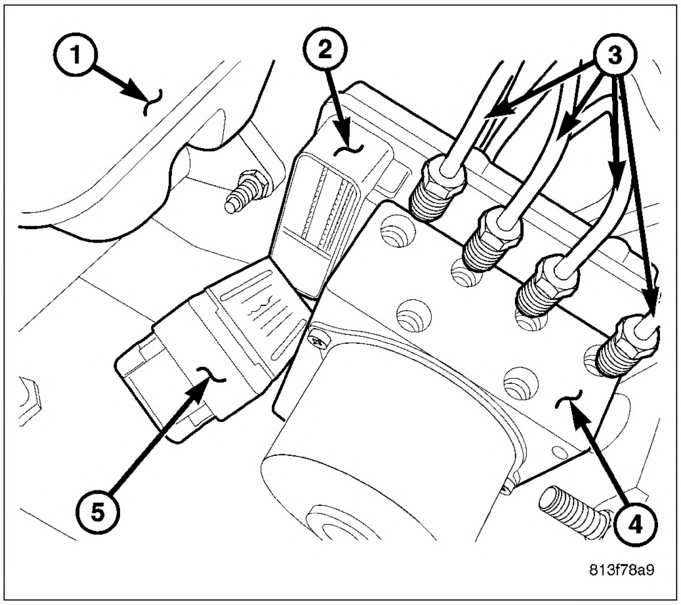
14. Install the HCU (1) with bracket (2) to the vehicle and tighten the 2 mounting nuts.



15. Reconnect the HCU electrical connector (5).
16. Install the 4 chassis lines (3) at the HCU (4).
17. Install the secondary brake line at the HCU (4).
18. Install the secondary brake line at the master cylinder.
19. Install the primary brake line at the HCU (4).
20. Install the primary brake linre at the master cylinder.
21. Fill and bleed brake system.



ROTORS

DIAGNOSIS AND TESTING

FRONT DISC BRAKE ROTOR

ROTOR MINIMUM THICKNESS

Rotor minimum usable thickness is 28.5 mm (1.122 in.). Do not resurface a rotor if machining would cause thickness to fall below this limit.

Measure rotor thickness at the center of the brake shoe contact surface. Replace the rotor if worn below minimum thickness, or if refinishing would reduce thickness below the allowable minimum.

FRONT ROTOR THICKNESS VARIATION

Variations in rotor thickness will cause pedal pulsation, noise and shudder.

Measure rotor thickness a minimum of six points around the rotor face. Position the micrometer approximately 19 mm (3/4 in.) from the rotor outer circumference for each measurement.

Thickness should not vary by more than 0.0127 mm (0.0005 in.) from point to point on the rotor. Refinish or replace the rotor if necessary.

NOTE: A hub mounted on-vehicle lathe is recommended. This type of lathe trues the rotor to the vehicles hub/bearing.

Front rotors and hub/bearings are matched mounted for minimum lateral runout. Before removing the rotor, mark the rotor and hub/bearing to maintain original orientation.

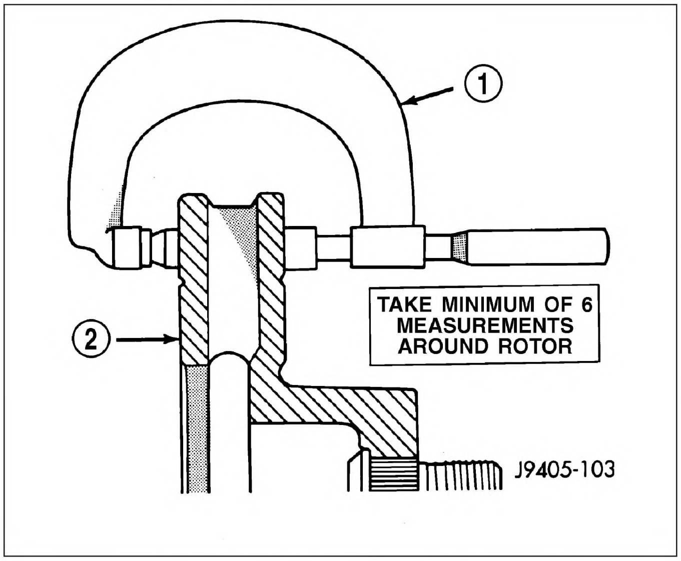
FRONT ROTOR LATERAL RUNOUT

Check rotor lateral runout whenever pedal pulsation, or rapid, uneven brake lining wear has occurred.

The rotor must be securely clamped to the hub to ensure an accurate runout measurement. Secure the rotor with a minimum of 3 lug nuts and large diameter flat washers on each stud.

Use a dial indicator to check lateral runout.

Maximum allowable rotor lateral runout is 0.05 mm (0.002 in.).



REAR DISC BRAKE ROTOR

ROTOR MINIMUM THICKNESS

Minimum usable thickness of the rear disc brake rotor is 12.5 mm (0.492 in.). The thickness specification is located on the center section of the rotor.

Never resurface a rotor if machining would cause thickness to fall below this limit.

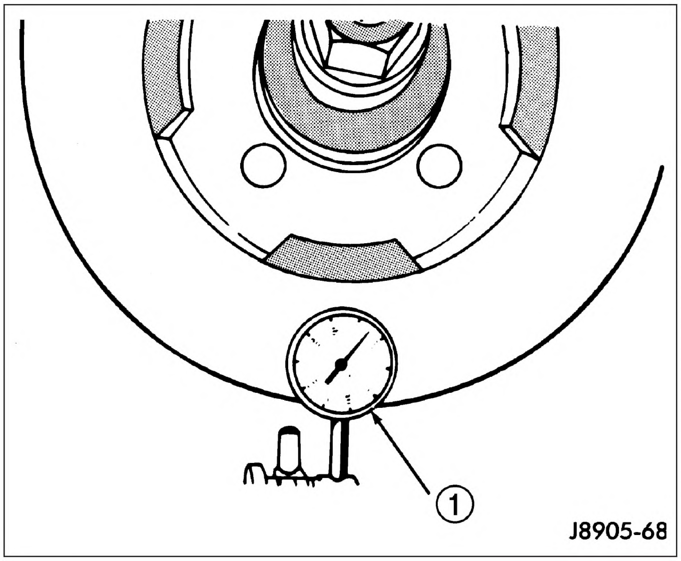
Measure rotor thickness at the center of the brake shoe contact surface. Replace the rotor if worn below minimum thickness, or if refinishing would reduce thickness below the allowable minimum.

REAR ROTOR THICKNESS VARIATION

Variations in rotor thickness will cause pedal pulsation, noise and shudder.

Measure rotor thickness at a minimum of six points around the rotor face. Position the micrometer approximately 19 mm (3/4 in.) from the rotor outer circumference for each measurement.

Thickness should not vary by more than 0.0127 mm (0.0005 in.) from point to point on the rotor. Refinish or replace the rotor if necessary.



REAR ROTOR LATERAL RUNOUT

Check rotor lateral runout whenever diagnosis indicates pedal pulsation and rapid, uneven brake lining wear.

The rotor must be securely clamped to the hub to ensure an accurate runout measurement. Secure the rotor with the wheel nuts and 4 or 5 large diameter flat washers on each stud.

Use a dial indicator to check lateral runout. Maximum allowable lateral runout is 0.20 mm (0.0007 in.).

STANDARD PROCEDURE - DISC BRAKE ROTOR MACHINING

NOTE: A hub mounted on-vehicle lathe is recommended. This type of lathe trues the rotor to the vehicles hub/bearing.

The disc brake rotor can be machined if scored or worn. The lathe must machine both sides of the rotor simultaneously with dual cutter heads. The rotor mounting surface must be clean before placing on the lathe. Equipment capable of machining only one side at a time may produce a tapered rotor.

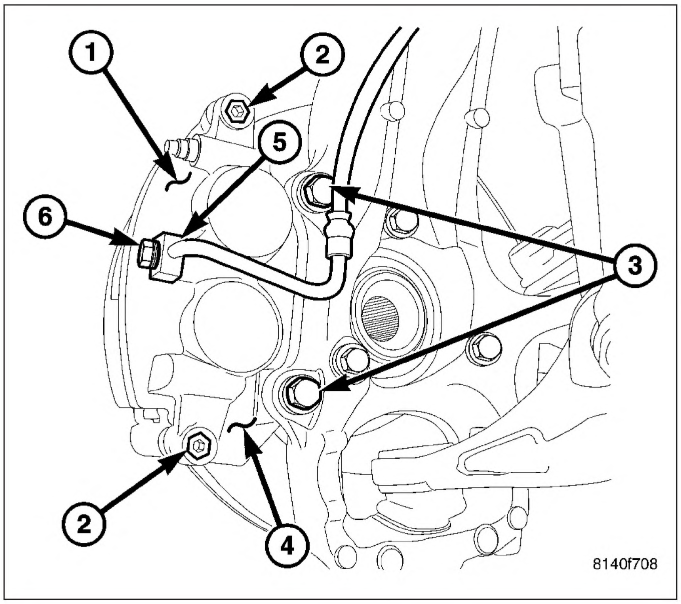
CAUTION: Brake rotors that do not meet minimum thickness specifications before or after machining must be replaced.

REMOVAL

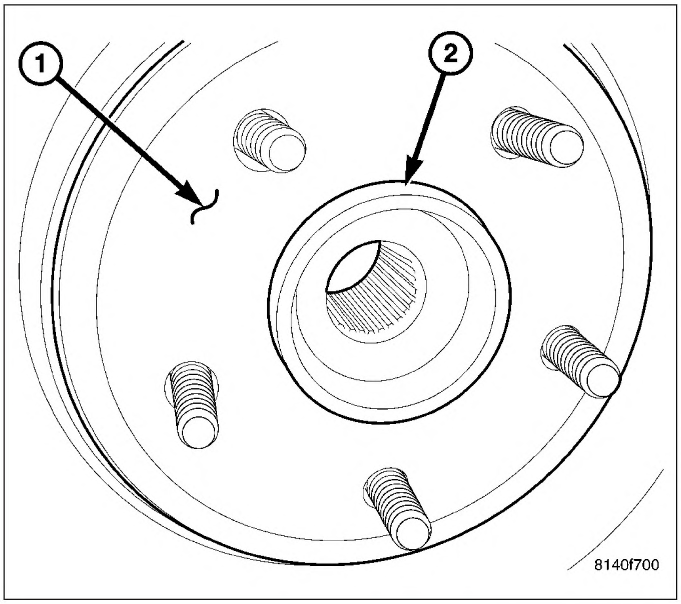
FRONT DISC BRAKE ROTOR

NOTE: Front rotors and hub/bearings are matched mounted for minimum lateral runout. Before removing the rotor, mark the rotor and hub/bearing to maintain original orientation.

1. Raise and support the vehicle.
2. Remove wheel and tire assembly.
3. Remove the caliper adapter mounting bolts (3) and remove the caliper adapter from the steering knuckle.

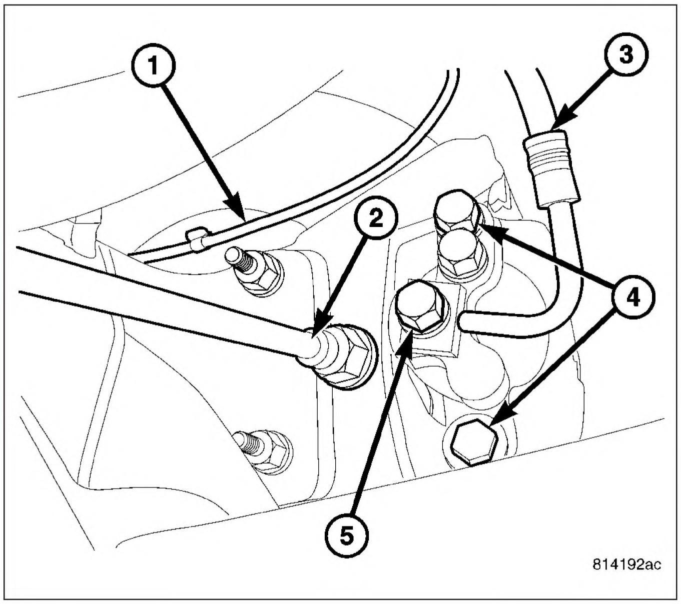


4. Secure caliper anchor assembly to nearby suspension part with a wire. **Do not allow brake hose to support caliper weight.**
5. Remove and discard the o-ring (2) securing the disc brake rotor (1) on the hub.
6. Remove the disc brake rotor from hub/bearing.

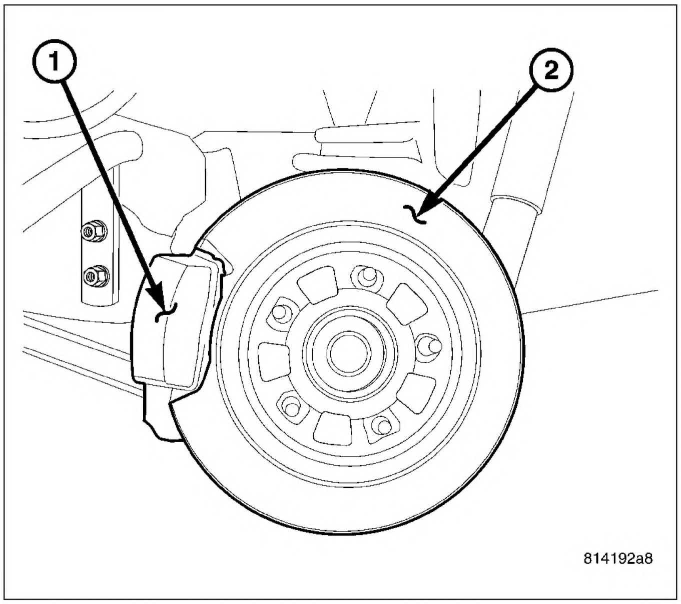


REAR DISC BRAKE ROTOR

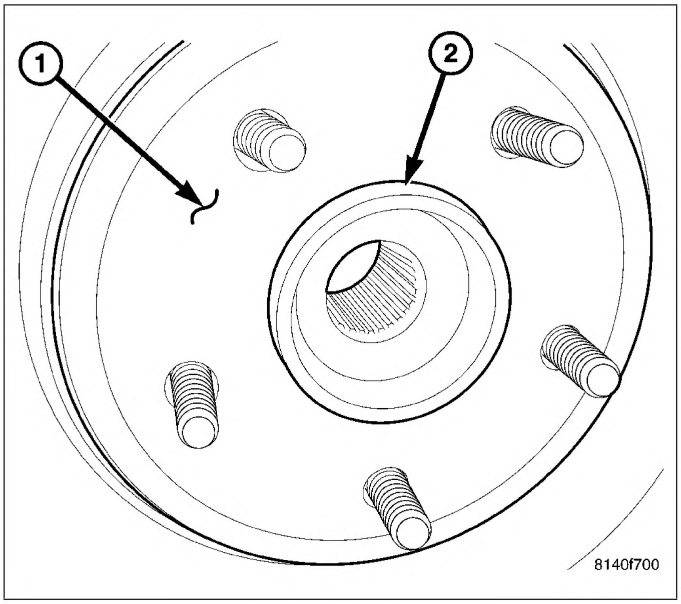
1. Raise and support the vehicle.
2. Remove wheel and tire assembly.
3. Remove the caliper slide bolts (4).



4. Remove caliper (1).
5. Secure caliper assembly (1) to nearby suspension part with wire. **Do not allow brake hose to support caliper weight.**



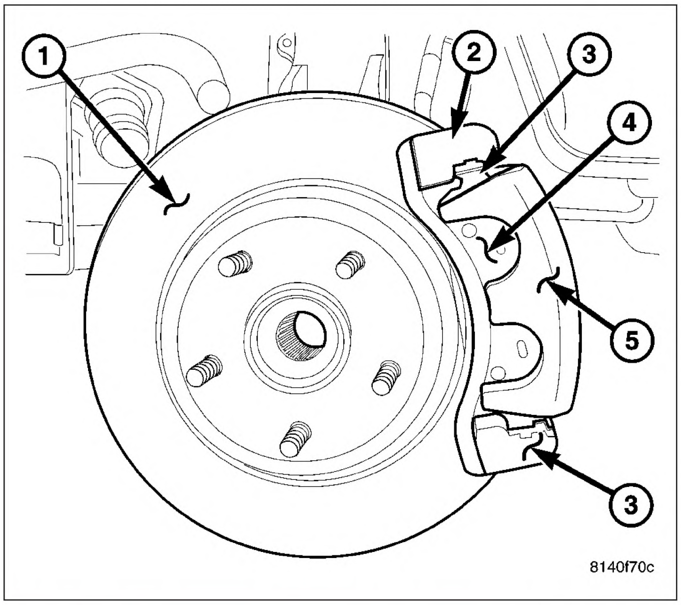
6. Remove and discard the o-ring (2) securing rotor (1) to axle studs.
7. Remove rotor (1) off axle studs.



INSTALLATION

FRONT DISC BRAKE ROTOR

1. Install the rotor (1) on hub studs.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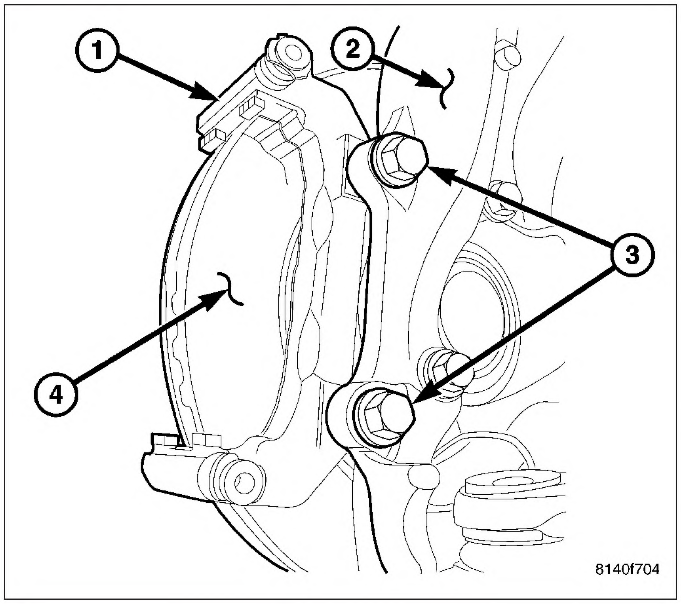
2. Install the caliper adapter (1) on the knuckle (2). Install adapter bolts (3) and tighten to 90-115 N·m (66-85 ft. lbs.).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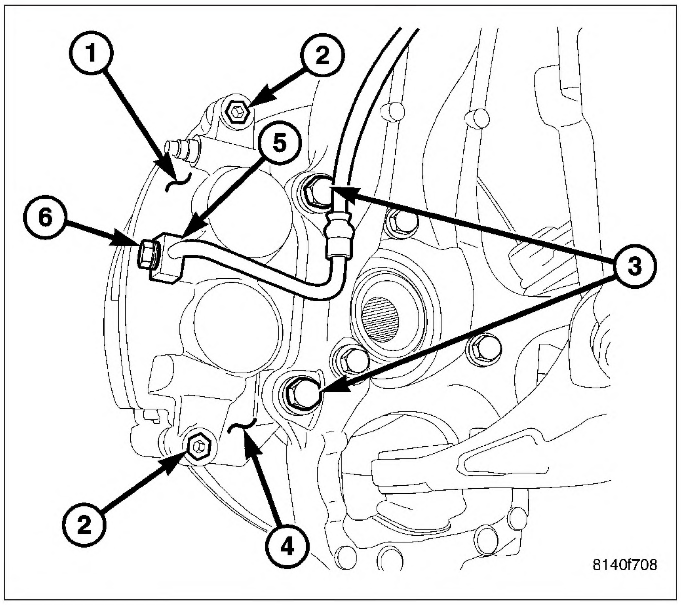
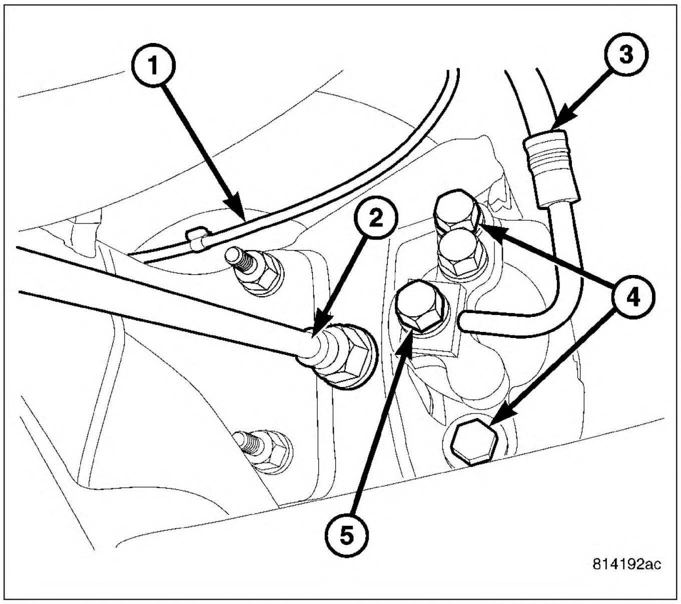
NOTE: Caliper slide pins should be free from debris and lightly lubricated.

3. Install the caliper (1) to the caliper adapter (4) and tighten the bolts to 72 N·m (53 ft. lbs.).
4. Gently lift one end of the slide pin boot to equalize air pressure, then release the boot and verify that the boot is fully covering the slide pin.
5. Install wheel and tire assembly.
6. Remove support and lower the vehicle.
7. Pump brake pedal to seat caliper pistons and brake pads. Do not move vehicle until firm brake pedal is obtained.

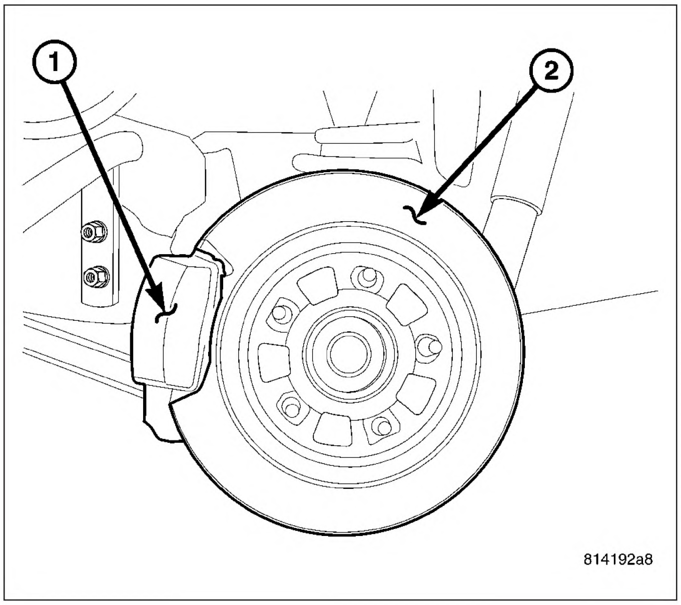


REAR DISC BRAKE ROTOR

1. Install rotor on axle studs.
2. Install the caliper assembly.
3. Install caliper slide bolts (4) and tighten to 90-115 N·m (66-85 ft. lbs.).



4. Install wheel and tire assembly.
5. Remove support and lower the vehicle.
6. Pump brake pedal until caliper pistons and brake shoes are seated.



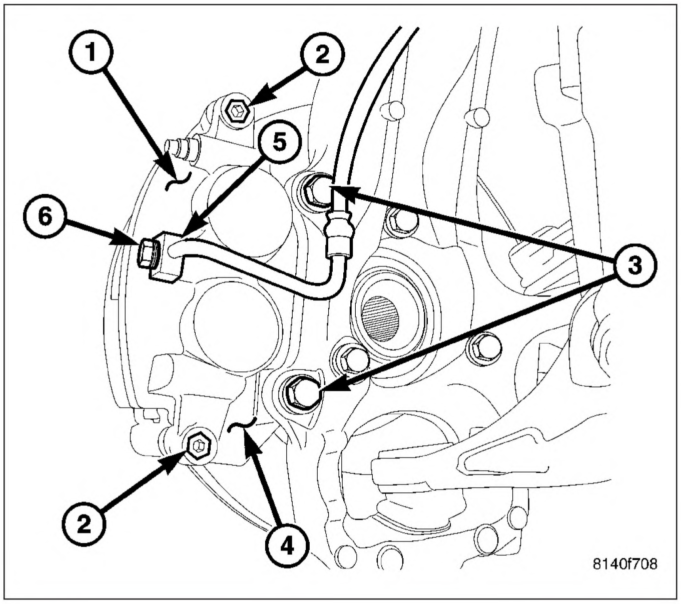
DISC BRAKE CALIPER ADAPTER

REMOVAL

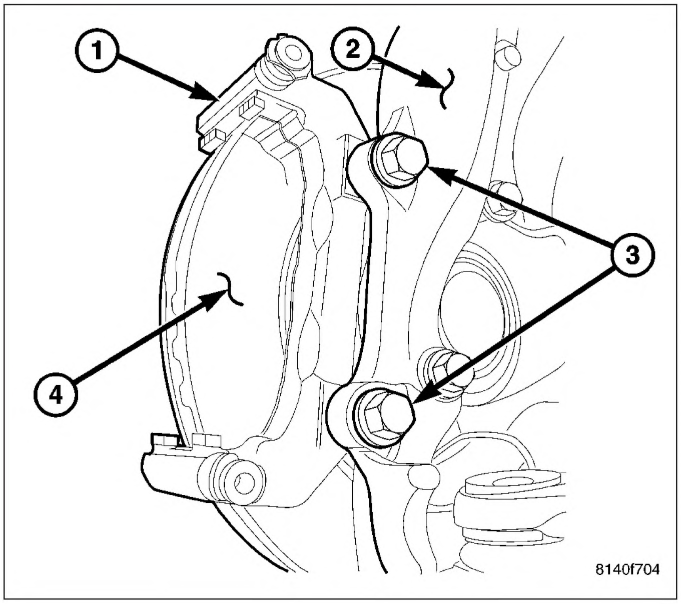
1. Raise and support the vehicle.
2. Remove the front wheel and tire assembly.
3. Remove the caliper (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL).
4. Remove the disc brake caliper (1) from the adapter (4).

CAUTION: Never allow the disc brake caliper to hang from the brake hose. Damage to the brake hose will result. Provide a suitable support to hang the caliper securely.

5. Remove the inboard and outboard brake pads. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL).

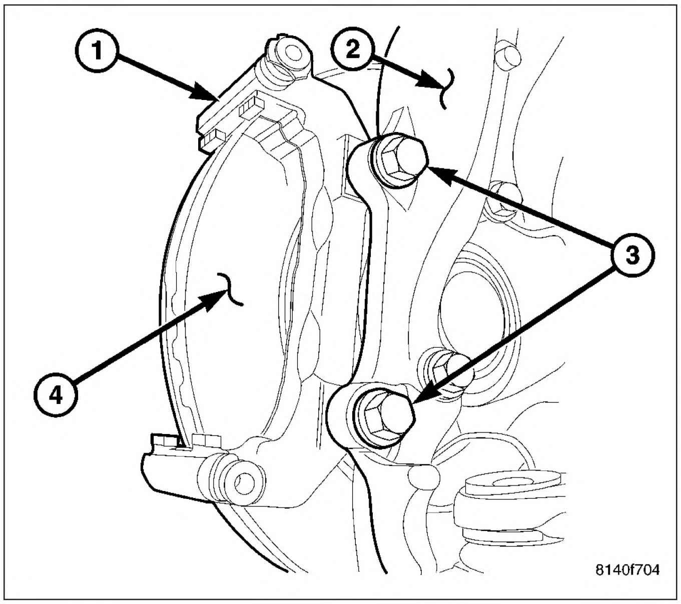


6. Remove the caliper adapter mounting bolts (3).

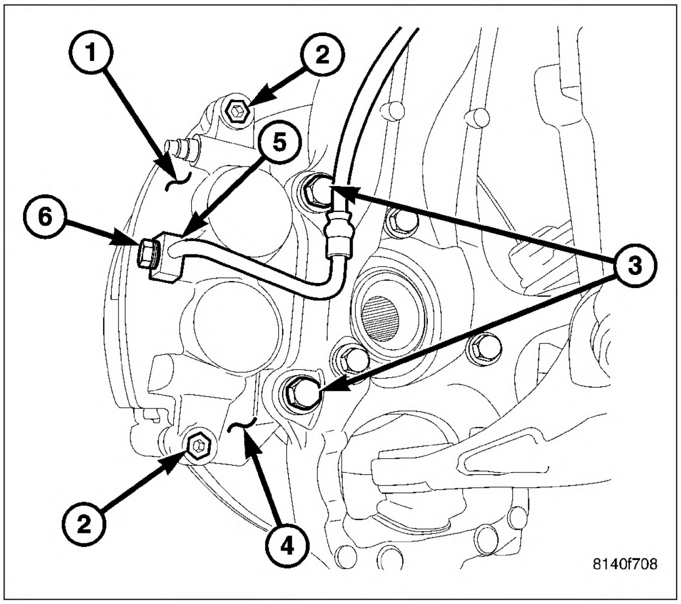


INSTALLATION

1. Install the caliper adapter mounting bolts (3). Tighten the mounting bolts to 169 N·m (125 ft.lbs).
2. Install the inboard and outboard pads. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - INSTALLATION).



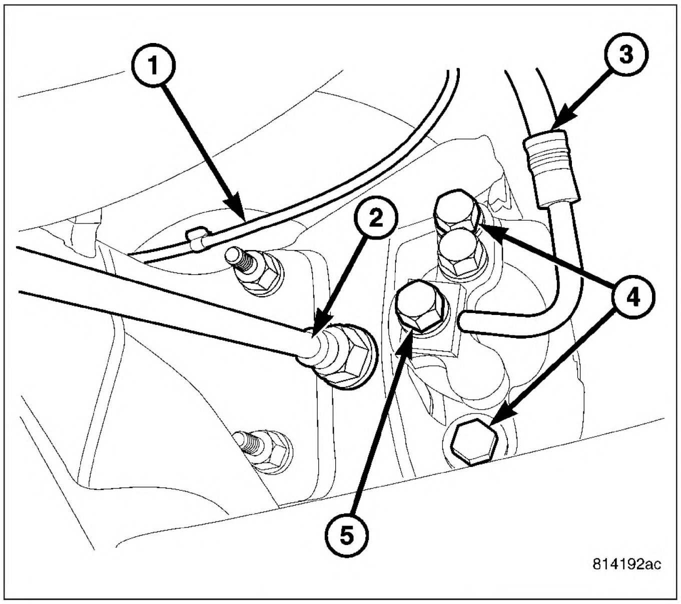
3. Install the caliper (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).
4. Install the tire and wheel assembly. (Refer to 22 - TIRES/WHEELS/WHEELS - STANDARD PROCEDURE).



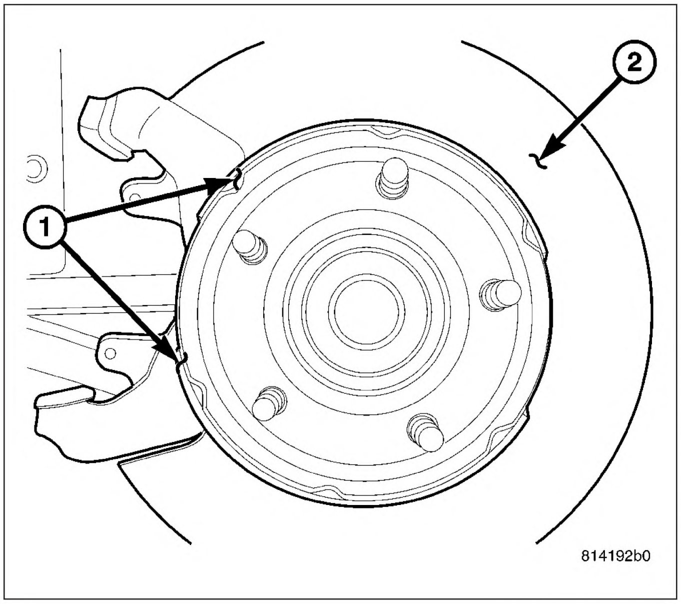
SUPPORT PLATE

REMOVAL

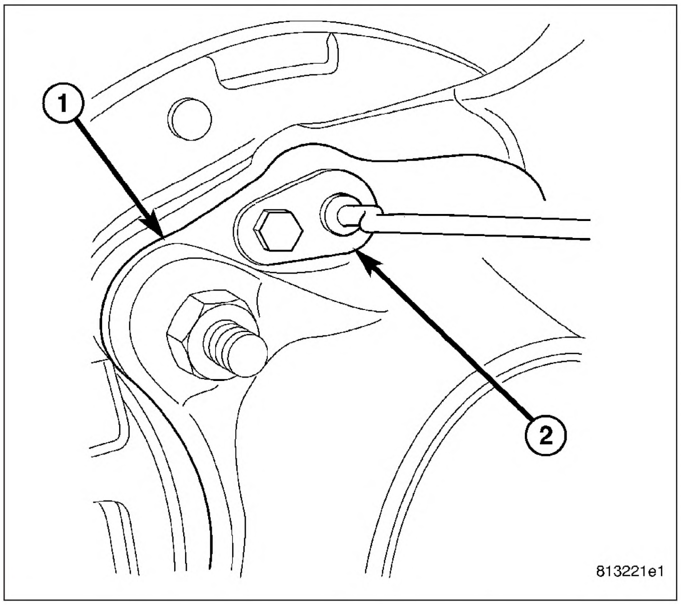
1. Remove wheel and tire assembly.
2. Remove the disc brake caliper slide bolts (4) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL).



3. Remove the rotor (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).



4. Remove the wheel speed sensor (2).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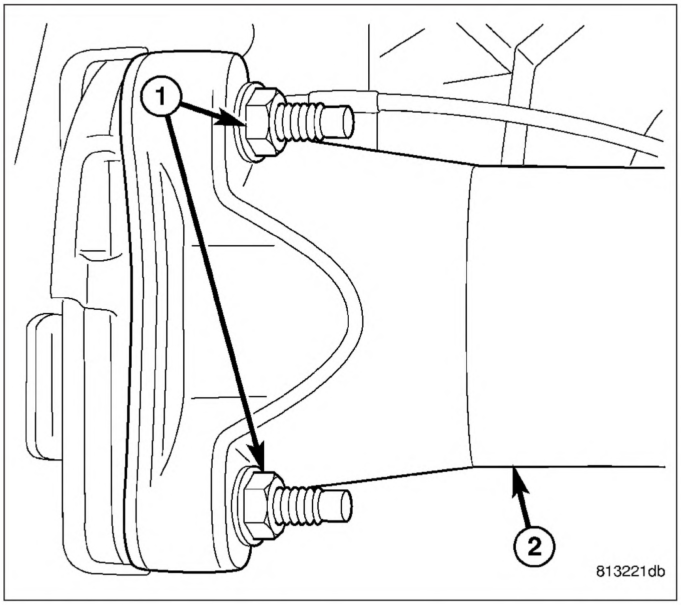
5. Remove the axle flange nuts (1).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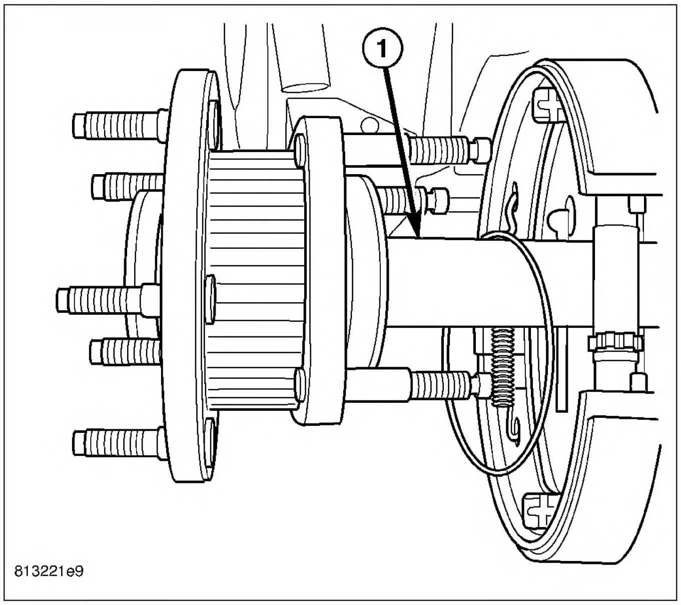
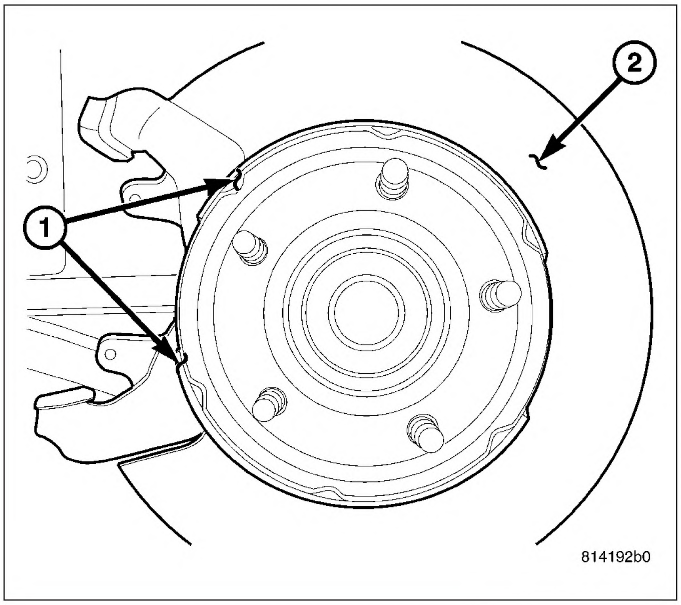
6. Remove the axle shaft (1) (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR AXLE - C213R/AXLE SHAFTS - REMOVAL).



7. Remove the park brake shoes (1) (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - REMOVAL).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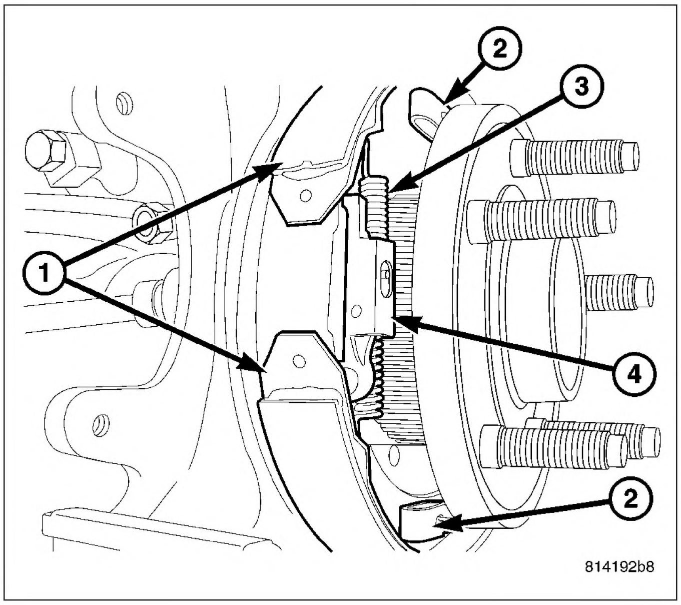
8. Remove the parking brake cable from the brake actuator lever (4).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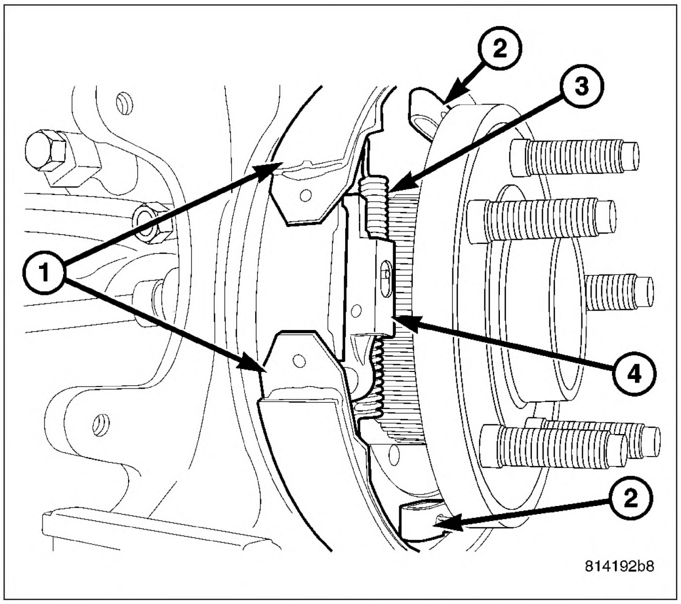
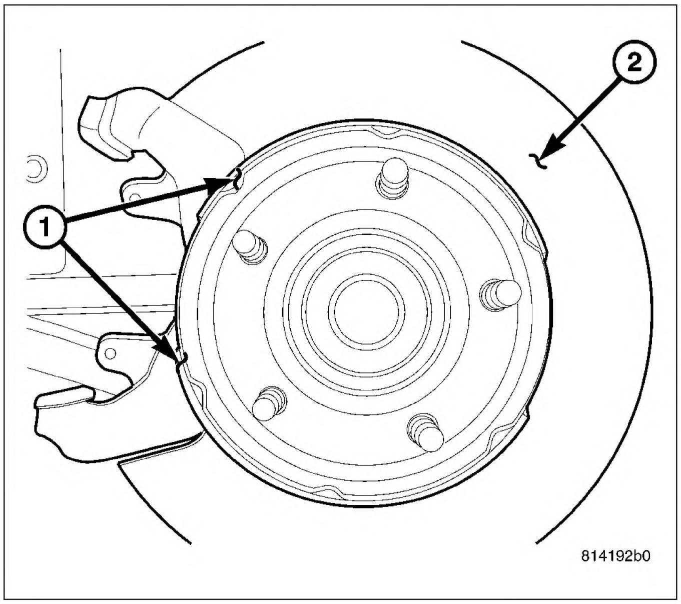
9. Remove the support plate from the axle tube.

INSTALLATION

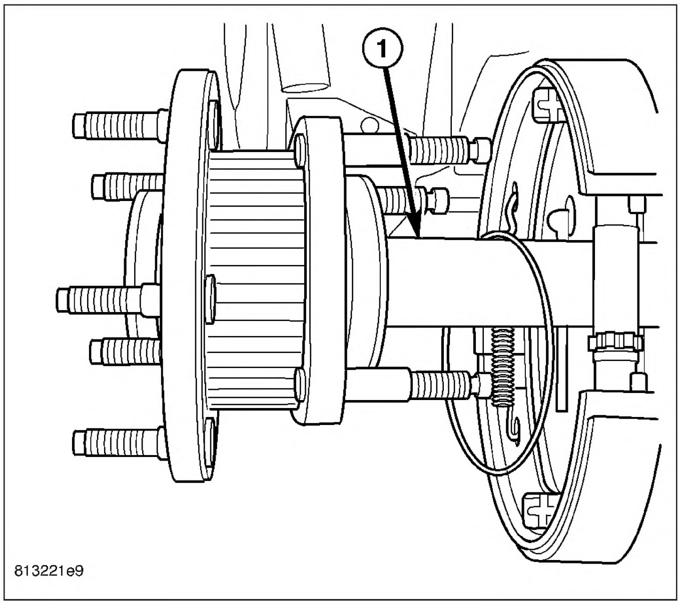
1. Install support plate on axle flange. Tighten attaching bolts (3) to 115 N·m (85 ft. lbs.).
2. Install parking brake cable in the brake actuator lever (4).



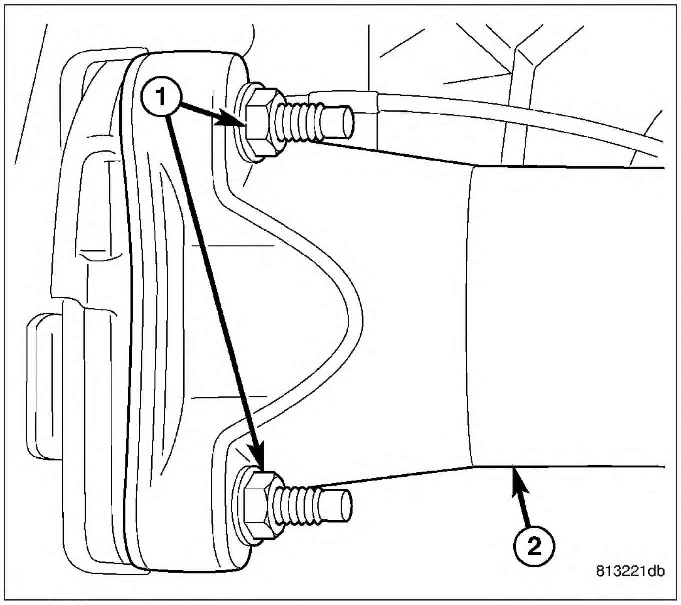
3. Install the park brake shoes (1) (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - INSTALLATION).



4. Install axle shaft (1), (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR AXLE - C213R/AXLE SHAFTS - INSTALLATION).



5. Install the axle shaft flange nuts (1).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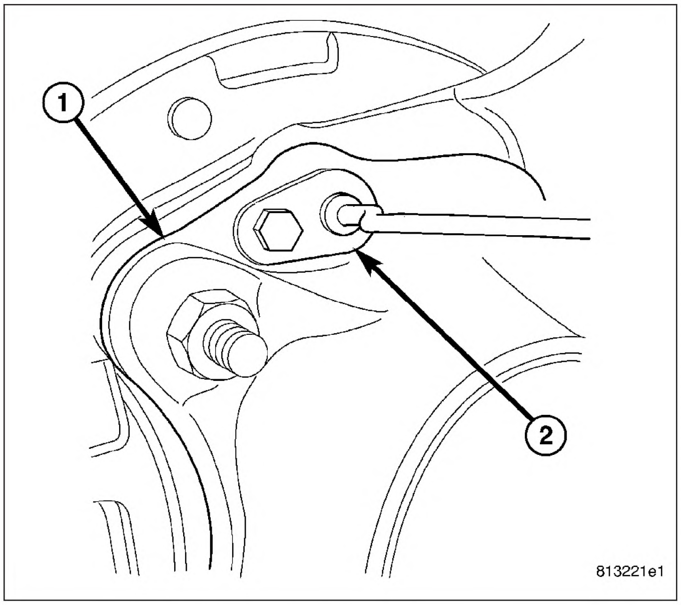
6. Install the wheel speed sensor (2).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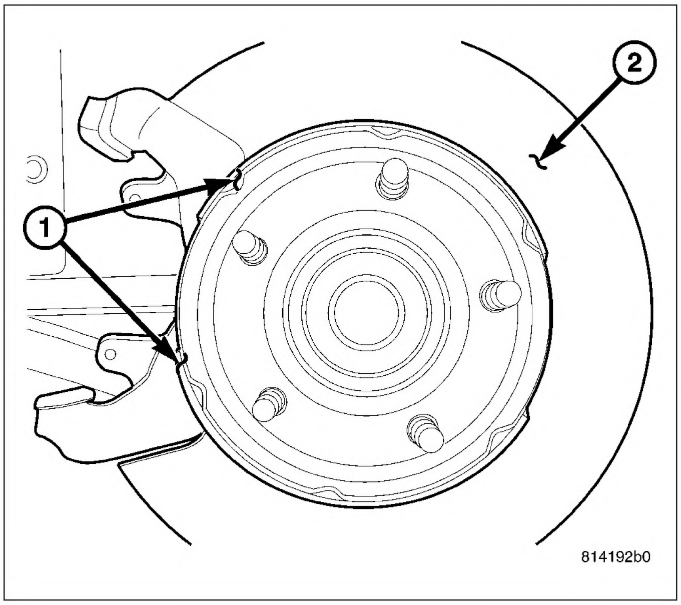
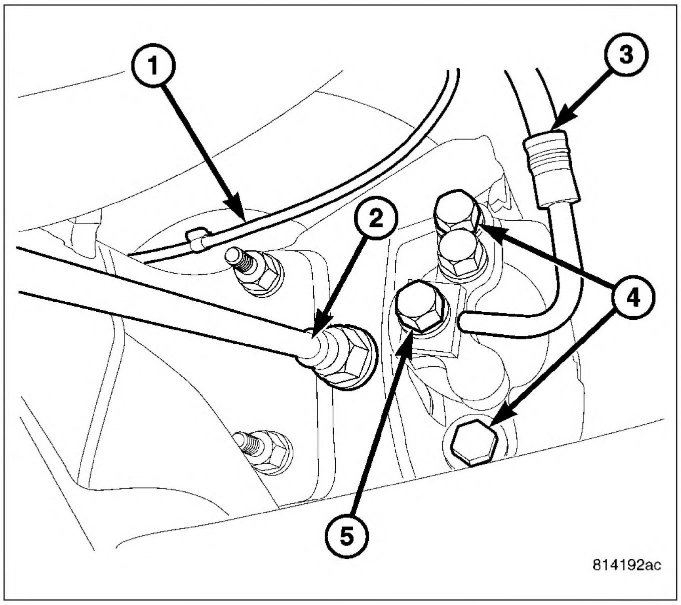
7. Adjust brake shoes to drum with brake gauge (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENTS).

8. Install the rotor (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION).



9. Install the caliper and the slide bolts (4) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).
10. Install the wheel and tire assembly (Refer to 22 - TIRES/WHEELS/WHEELS - STANDARD PROCEDURE).



PARKING BRAKE

OPERATION

The parking brakes operated by a automatic tensioner mechanism built into the hand lever and cable system. The front cable is connected to the hand lever and the equalizer. The rear cables attached to the equalizer and the parking brake shoe actuator.

A set of drum type brake shoes are used for parking brakes. The shoes are mounted to the rear disc brake adaptor. The parking brake drum is integrated into the rear disc brake rotor.

Parking brake cable adjustment is controlled by an automatic tensioner mechanism. The only adjustment if necessary is to the park brake shoes if the linings are worn.

DIAGNOSIS AND TESTING - PARKING BRAKE

NOTE: Parking brake adjustment is controlled by an automatic cable tensioner and does not require adjustment. The only adjustment that may be necessary would be to the park brake shoes if they are worn.

The parking brake switch is in circuit with the red warning lamp in the dash. The switch will cause the lamp to illuminate only when the parking brakes are applied. If the lamp remains on after parking brake release, the switch or wires are faulty.

If the red lamp comes on a fault has occurred in the front or rear brake hydraulic system.

If the red warning lamp and yellow warning lamp come on, the electronic brake distribution may be at fault.

In most cases, the actual cause of an improperly functioning parking brake (too loose/too tight/won't hold), can be traced to a parking brake component.

NOTE: The leading cause of improper parking brake operation, is excessive clearance between the parking brake shoes and the shoe braking surface. Excessive clearance is a result of lining and/or drum wear, drum surface machined oversize.

Excessive parking brake lever travel (sometimes described as a loose lever or too loose condition), is the result of worn brake shoes, improper brake shoe adjustment, or improperly assembled brake parts.

A too loose condition can also be caused by inoperative or improperly assembled parking brake shoe parts.

A condition where the parking brakes do not hold, will most probably be due to a wheel brake component.

Items to look for when diagnosing a parking brake problem, are:

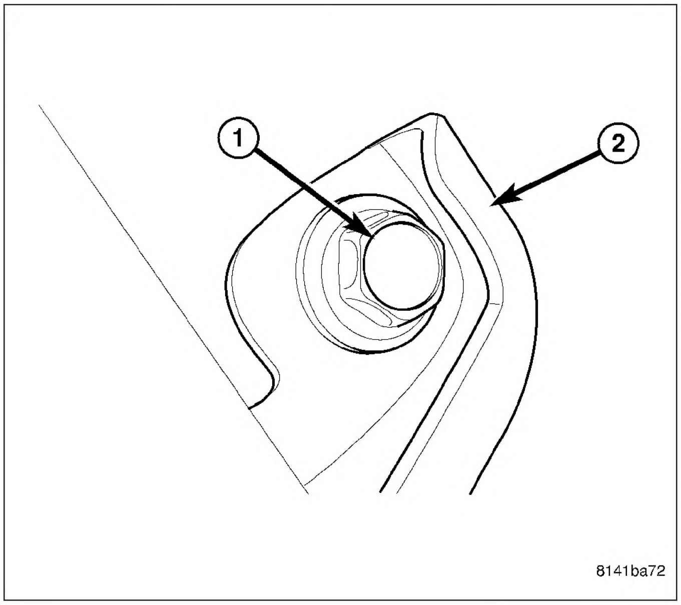
- Brake shoe wear
- Drum surface (in rear rotor) machined oversize
- Front cable not secured to lever
- Rear cable not attached to actuator
- Rear cable seized
- Parking brake lever not seated
- Parking brake lever bind

CABLES

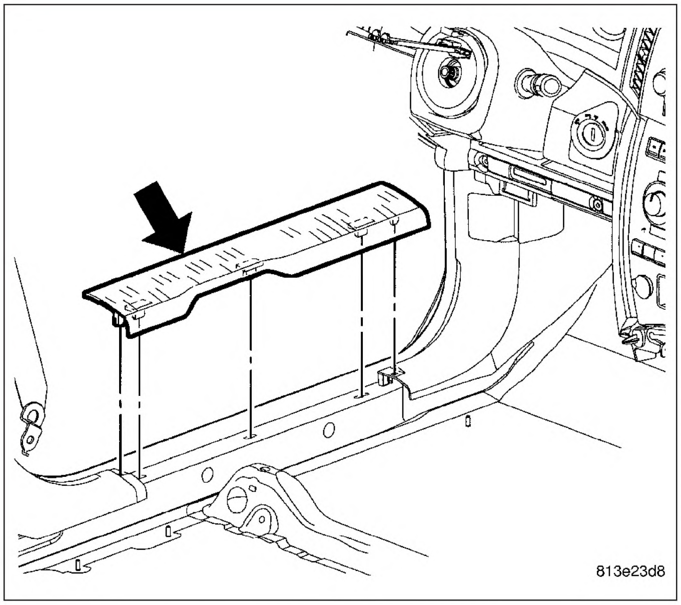
REMOVAL

FRONT PARKING BRAKE CABLE

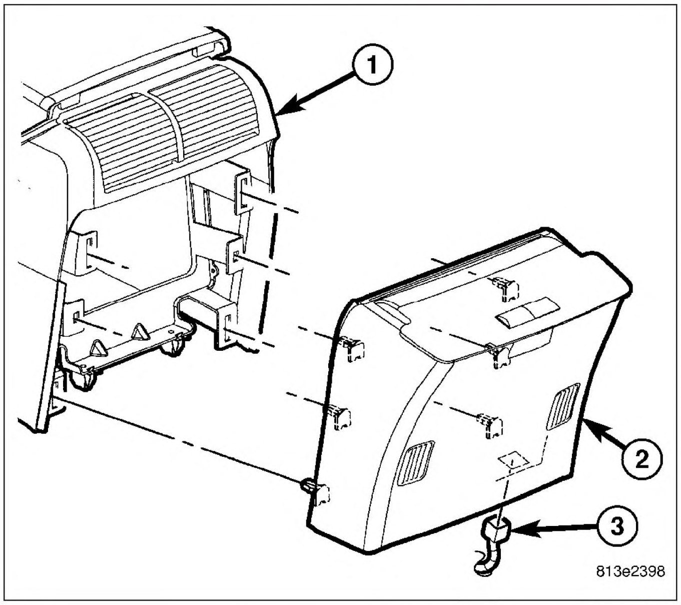
1. Disconnect the negative battery cable.
2. Remove the drivers seat (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).



3. Remove the left sill plate.
4. Remove the left B-pillar trim panel (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).



5. Remove the console rear cover (2) or the DVD player (if equipped).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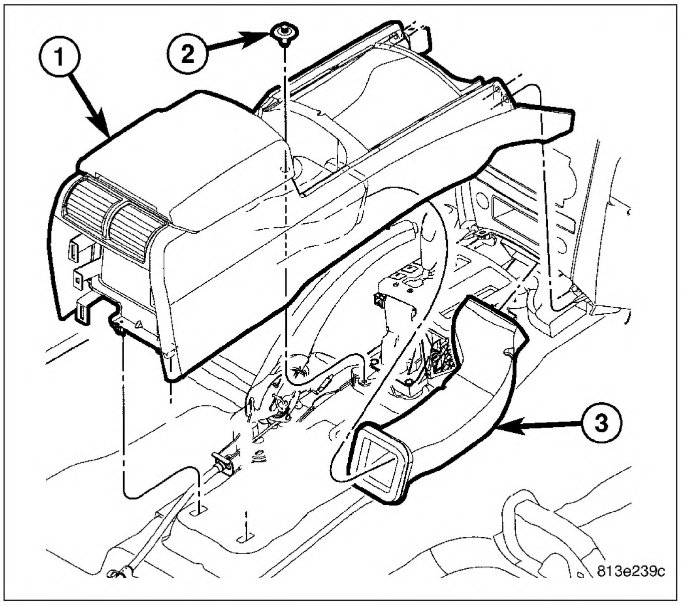
6. Remove center console (1) , (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).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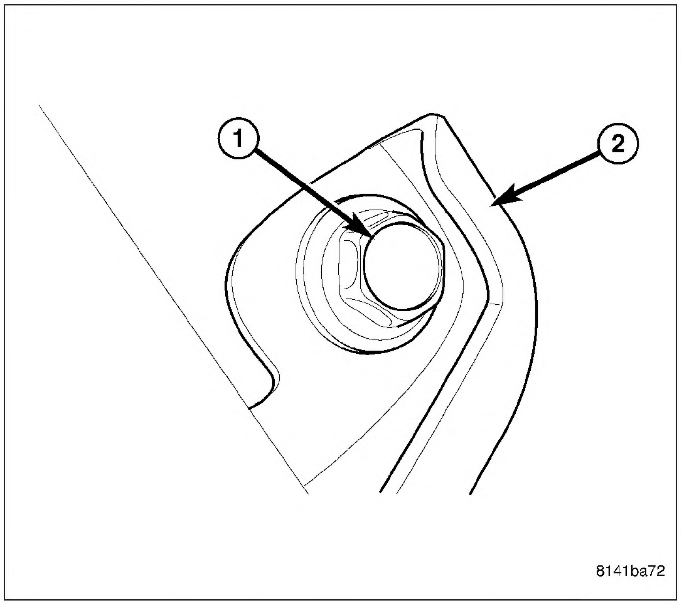
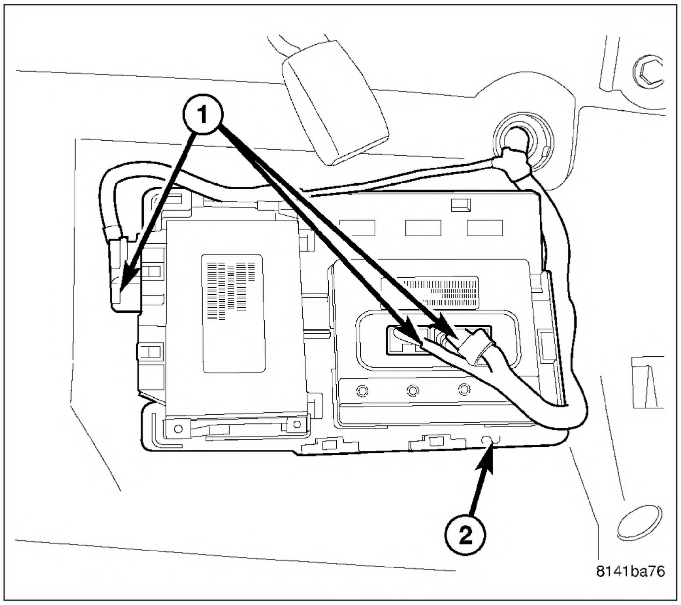
7. Remove the rear seat bottom (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).

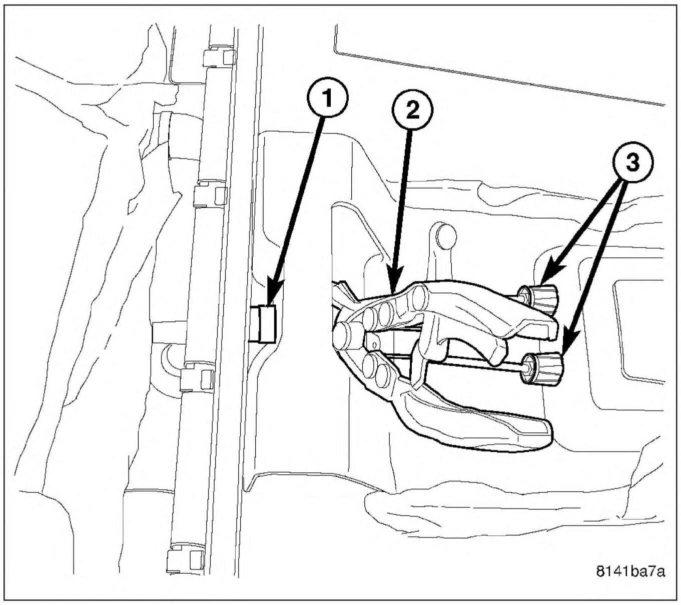


8. Disconnect the modules electrical connectors (1).
9. Remove the module mounting nuts from the bracket (2).



10. Remove the rear sill plates.
11. Pull and roll the rear carpet upwards to gain access to the front park brake cable.

12. Lock out the front park brake cable.
13. Remove the front cable (2) at the equalizer (1).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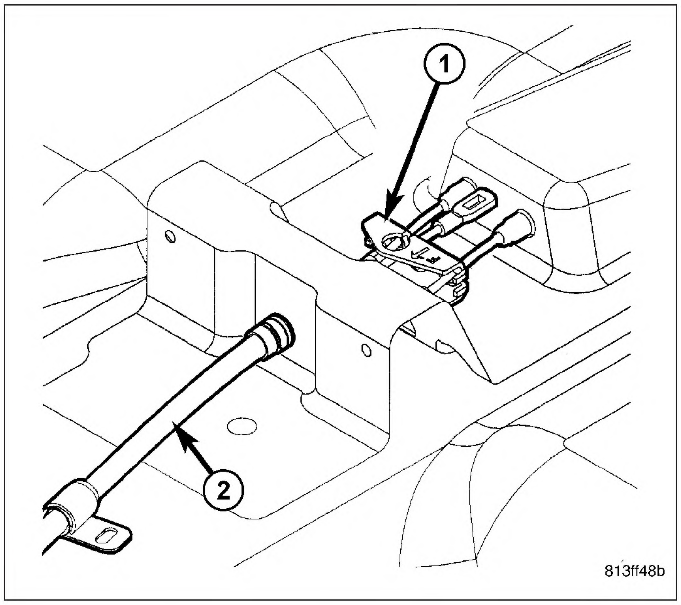
14. Remove the 2 front cable routing clamps and the 3 nuts (2&4).
15. Remove the front cable at the rear floor bracket.
16. Remove the front cable (3) at the hand lever (1).
17. Remove the front cable at the hand lever mounting bracket.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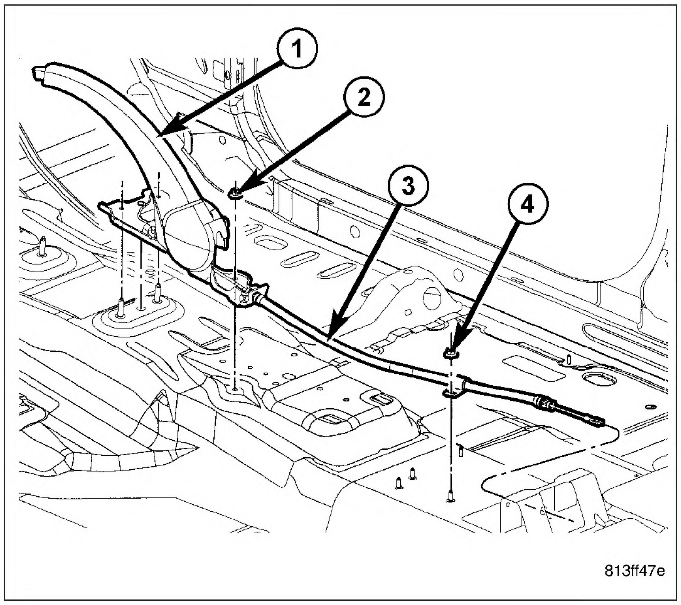
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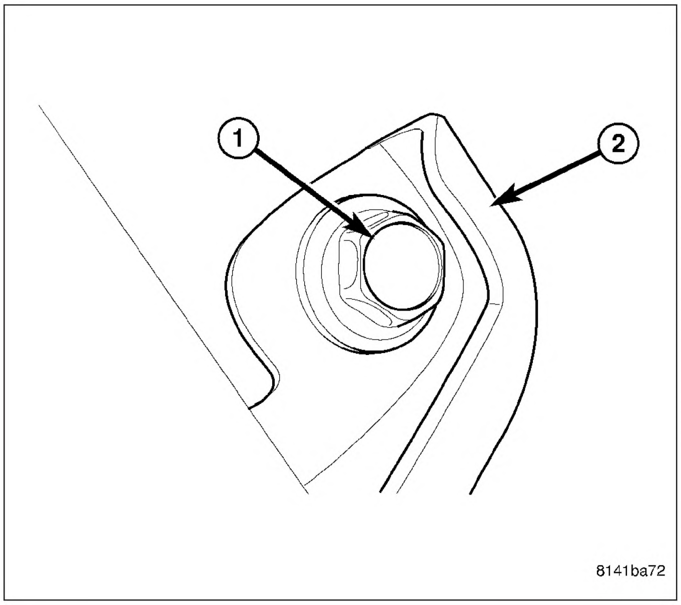
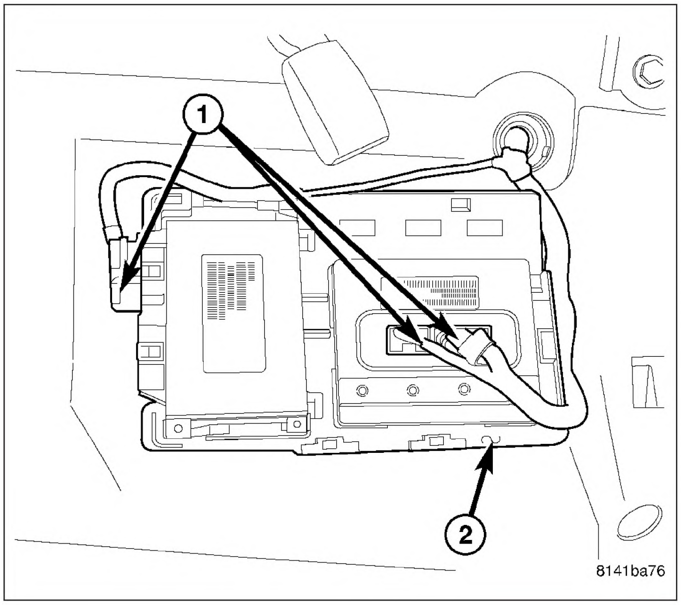
REAR PARKING BRAKE CABLES

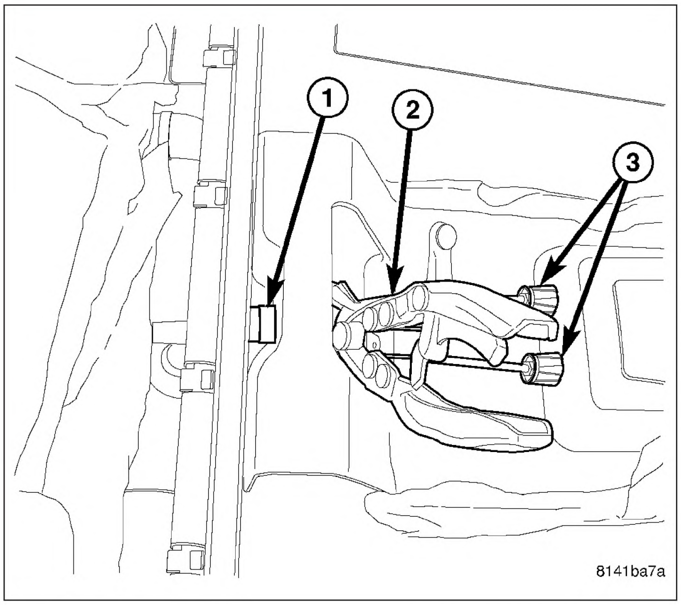
1. Remove the rear seat bottom (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).





2. Disconnect the (FDCM) final drive control module electrical connectors (1).
3. Remove the (FDCM) module bracket (2) mounting nuts.
4. Remove the rear sill plates.
5. Roll the carpet back to access the rear park brake cables.

6. Lock-out the park brake cable (1).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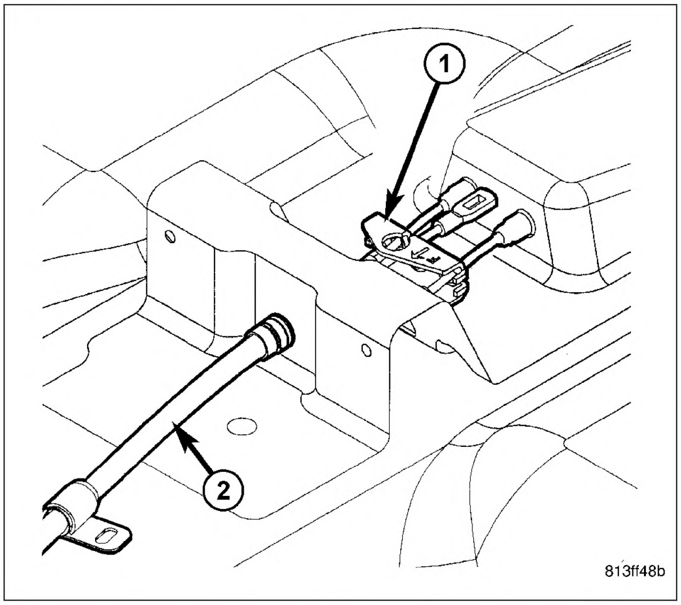
7. Disconnect the brake cables from the equalizer (1).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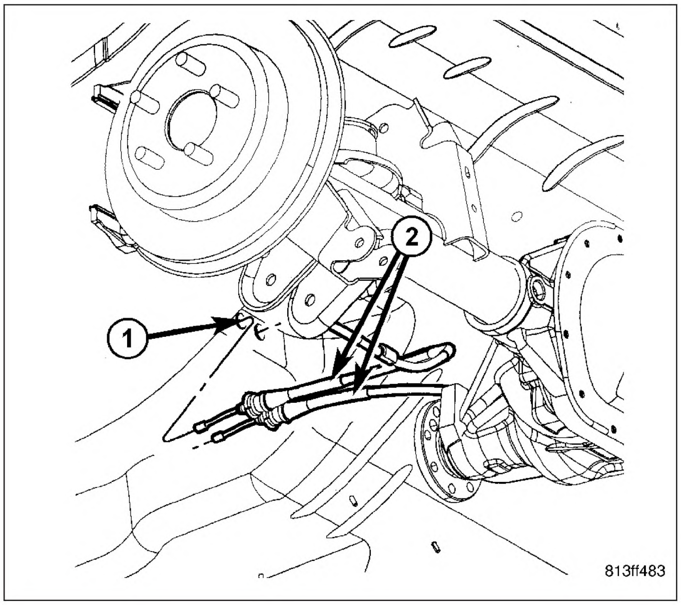
8. Remove the park brake cables (2) thru the floor (1).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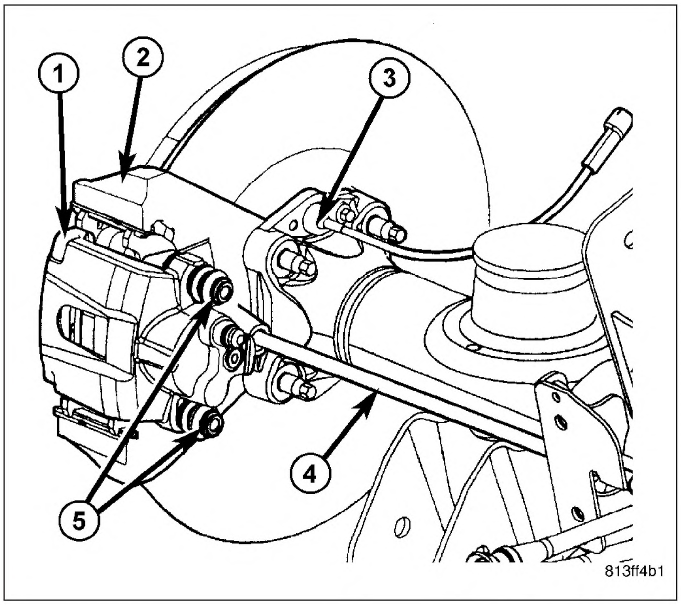
9. Raise and support the vehicle.
10. Remove the tire and wheel assembly.
11. Remove the rear caliper (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL).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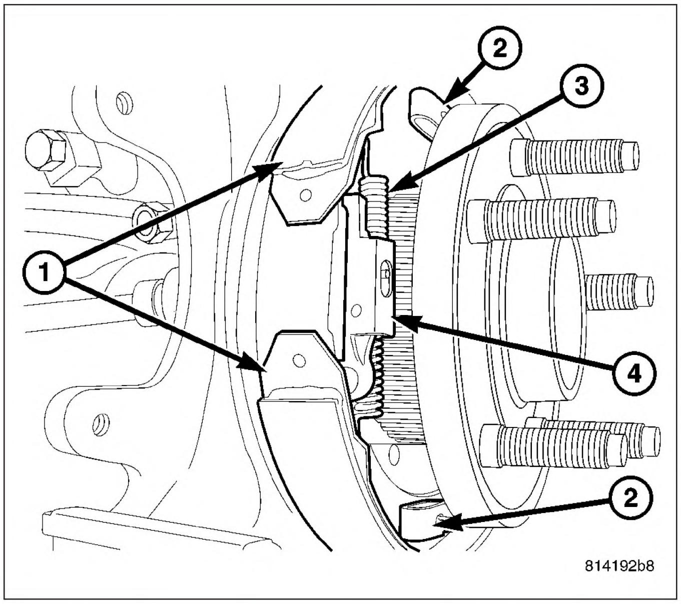
12. Remove the disc brake rotor.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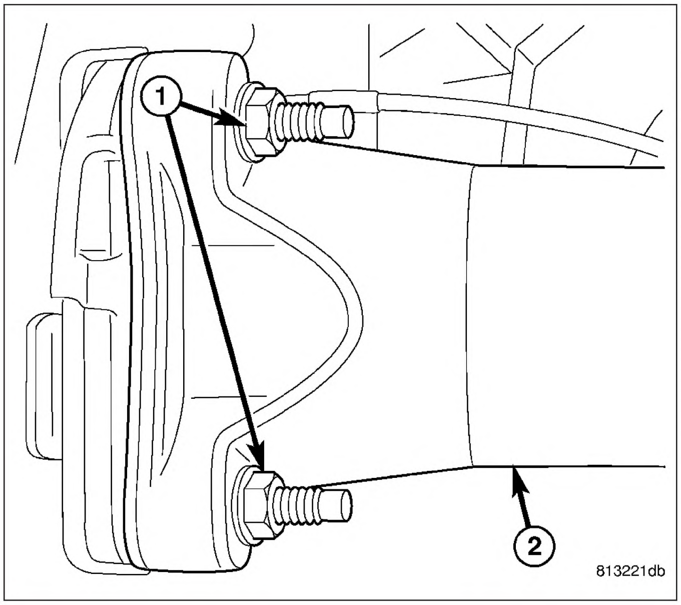
13. Remove the axle flange bolts (1).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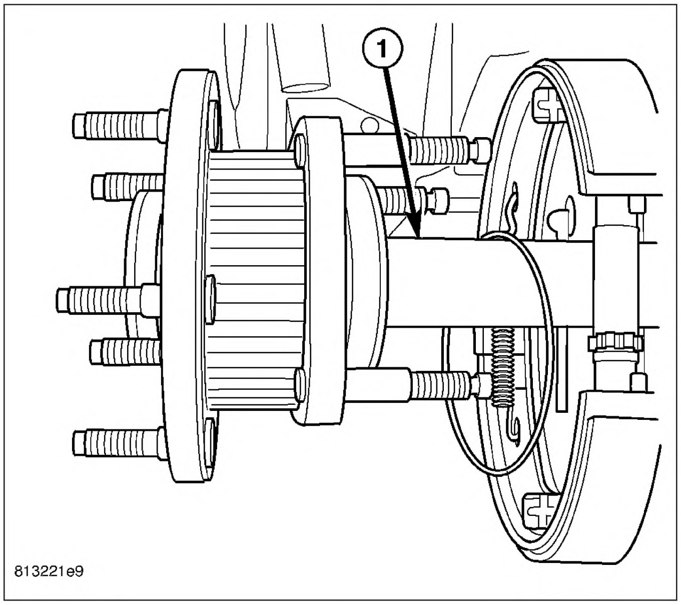
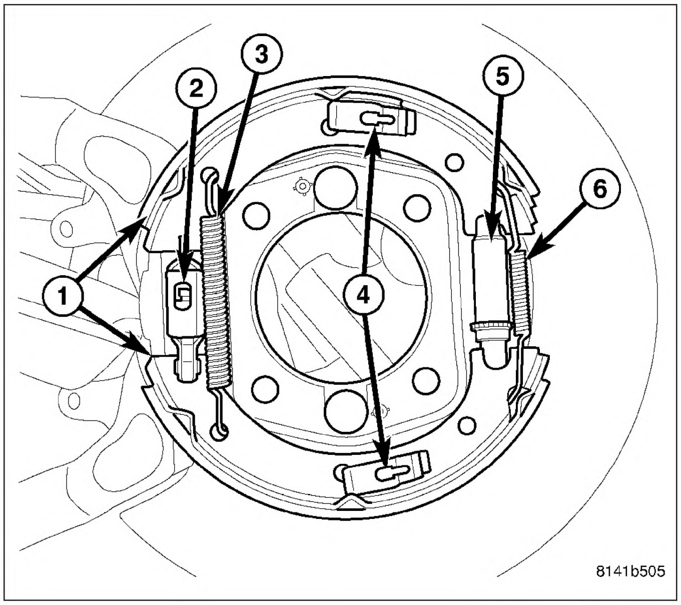
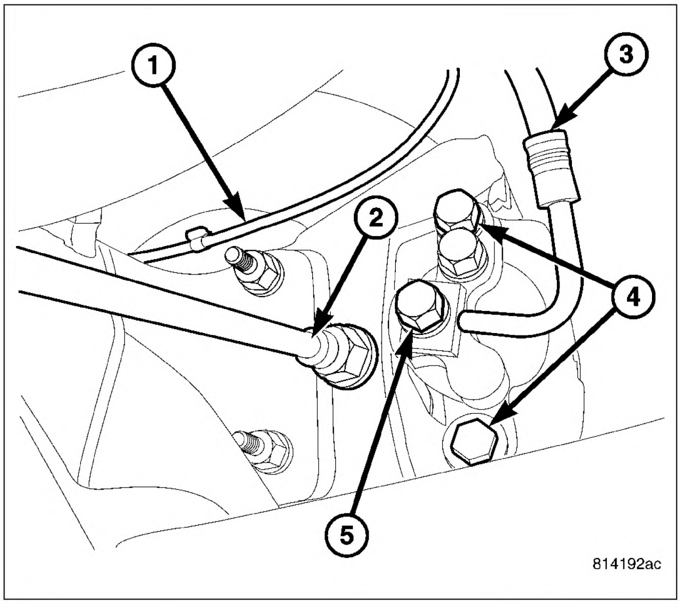
14. Remove the axle (1).



15. Disconnect the park brake cable at the brake actuator lever (2).
16. Disconnect the rear park brake shoes (1) (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - REMOVAL).



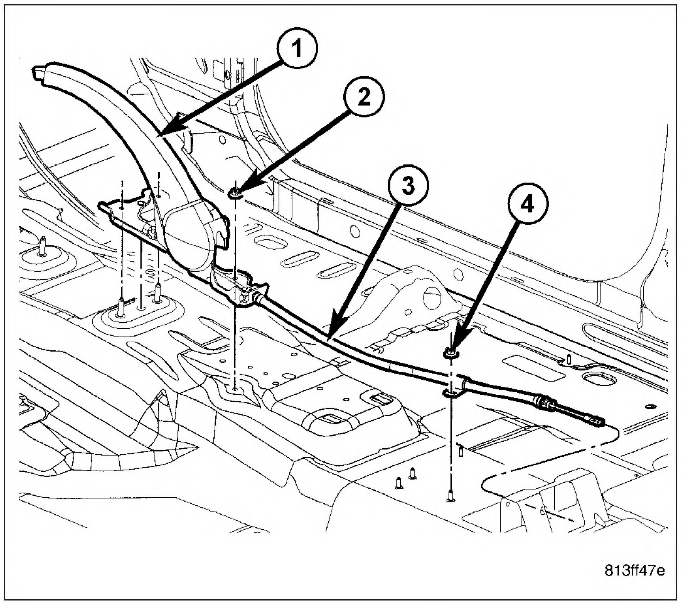
17. Remove the park brake cable (2) thru the support plate.
18. Remove the stabilizer bar bushing clamp bolts.
19. Remove the 2 push pins for the park brake cable to the axle.
20. Remove the cable (2) from the vehicle.



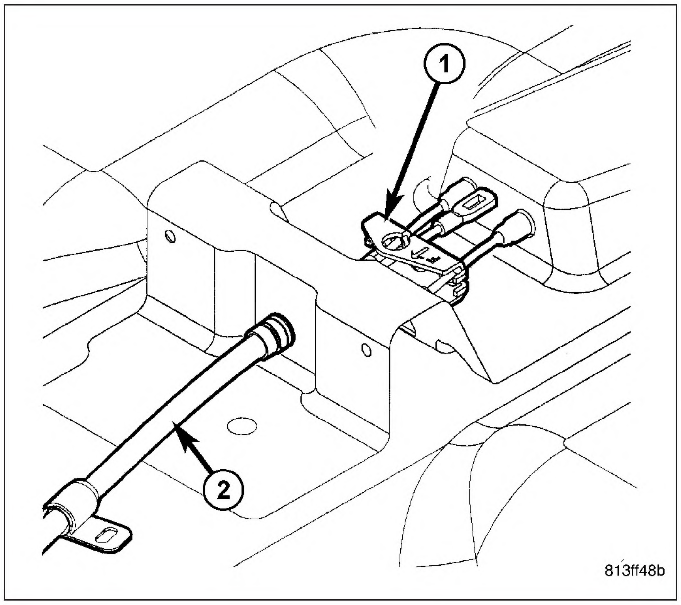
INSTALLATION

FRONT PARKING BRAKE CABLE

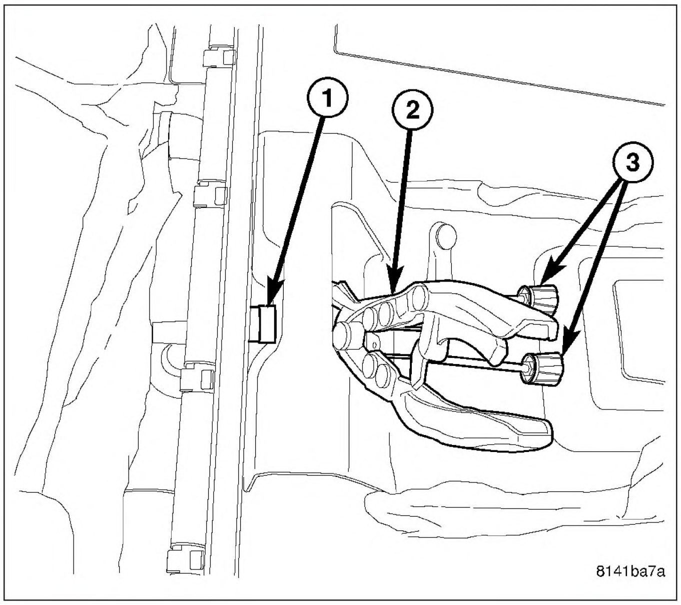
1. Install the front cable (3) at the hand lever mounting bracket (1).
2. Install the front cable (3) at the hand lever (1).
3. Install the front cable at the rear floor bracket.
4. Install the 2 front cable routing clamps and the 3 nuts (2&4).



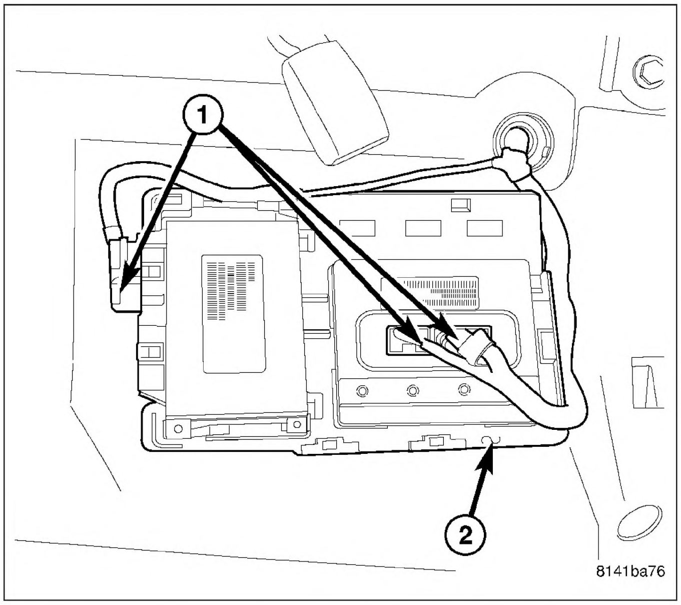
5. Install the front cable (2) at the equalizer (1).



6. Unlock the front park brake cable (1).

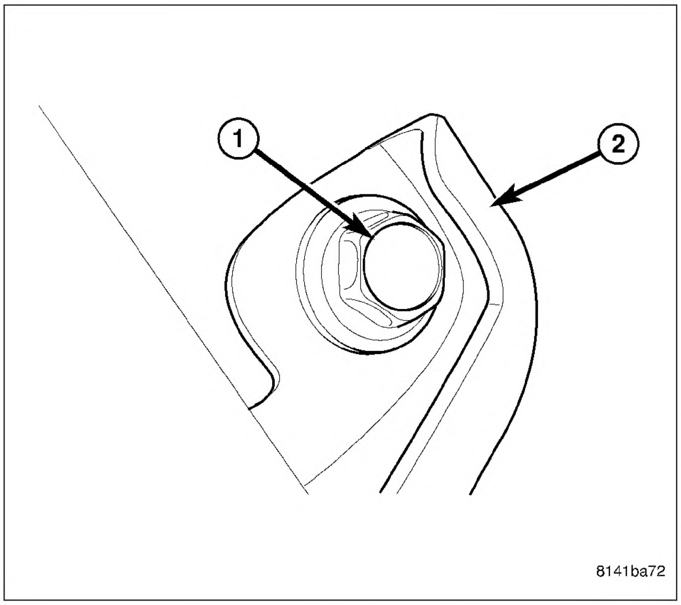


7. Install the rear carpet back in place.
8. Install the module bracket (2) mounting nuts.
9. Reconnect the module electrical connectors (1).

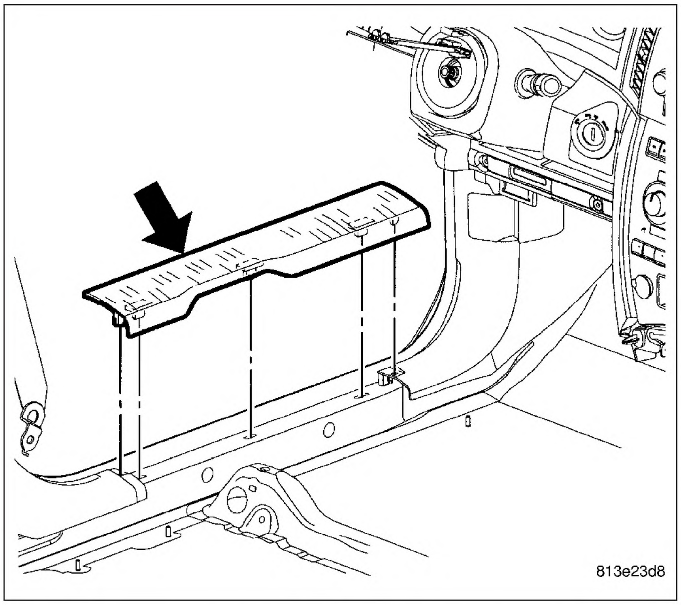


10. Install the rear sill plates.

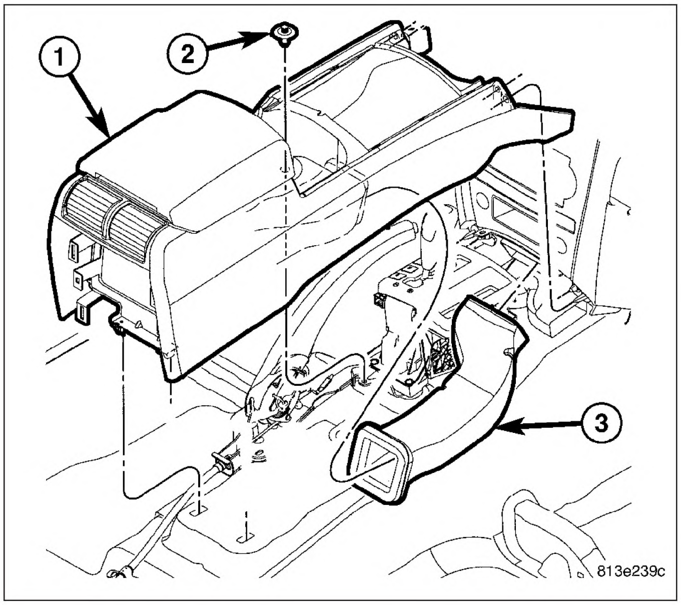
11. Install the drivers seat (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).



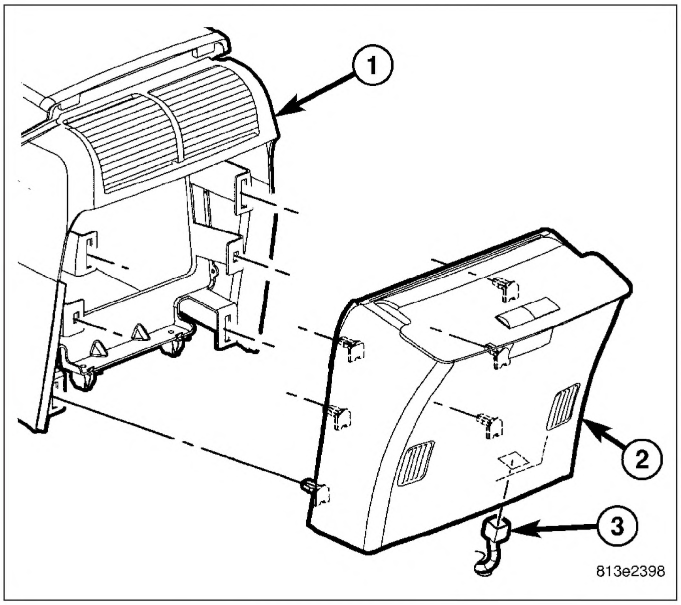
12. Install the left B-pillar trim panel (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).
13. Install the left sill plate.



14. Install the center console (1) (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).



15. Install the console rear cover (2) or the DVD player (if equipped).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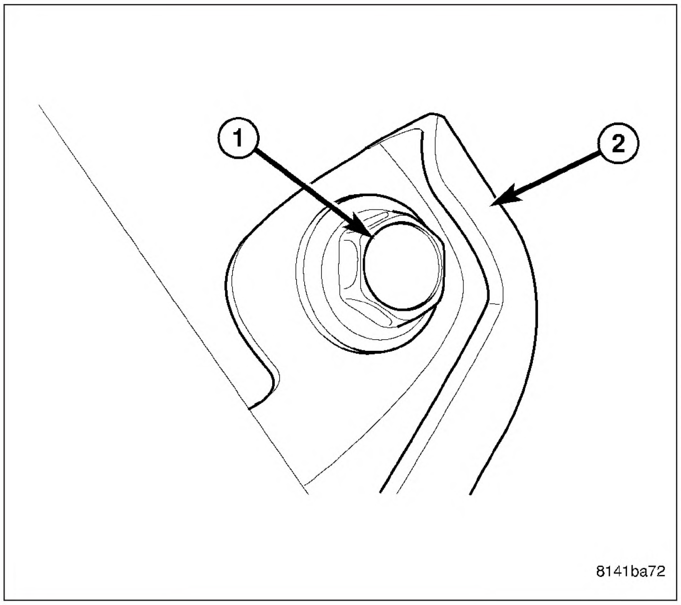
16. Install the rear seat bottom (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).
17. Reconnect the negative battery cable.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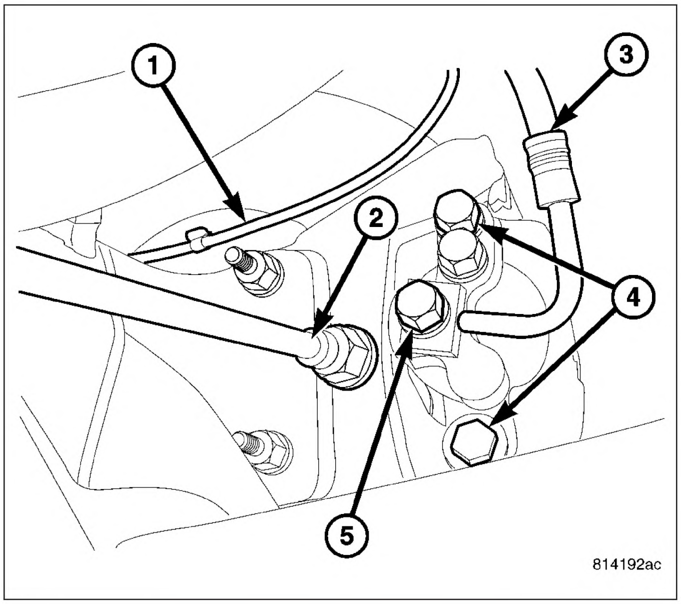
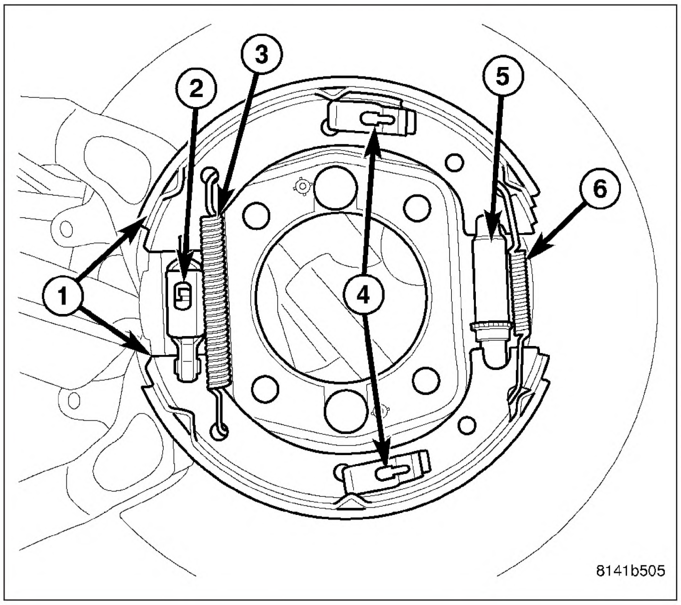
REAR PARKING BRAKE CABLES

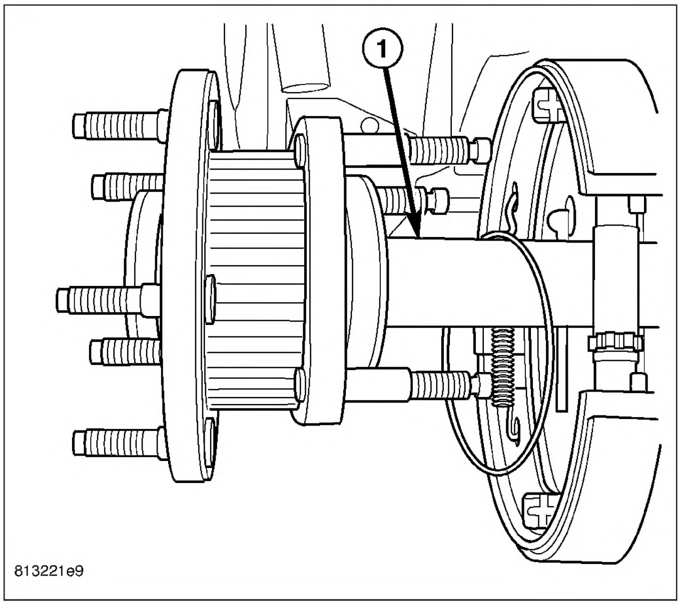
1. Install the cable (2) to the vehicle.
2. Install the 2 push pins for the park brake cable to the stabilizer bar bracket.
3. Install the stabilizer bar bushing clamp bolts.
4. Install the park brake cable (2) into the support plate.



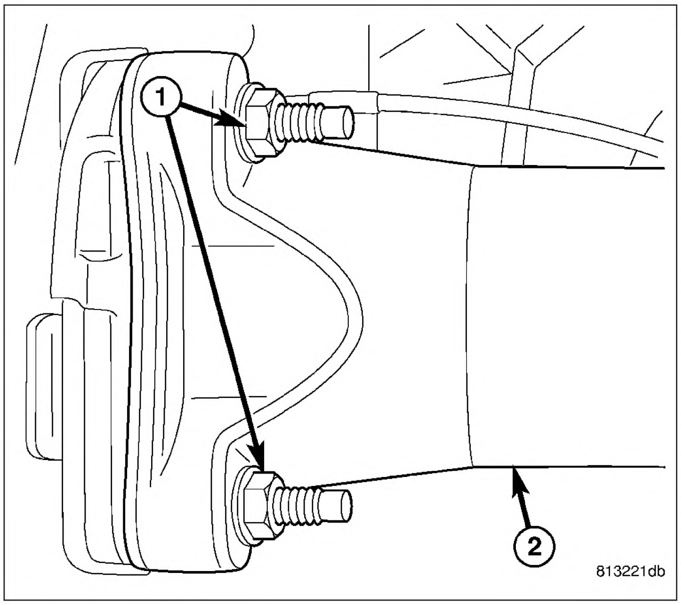
5. Reconnect the park brake cable at the brake actuator lever (2).
6. Reconnect the rear park brake shoes (1) (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - INSTALLATION).



7. Install the axle shaft (1).



8. Install the axle flange nuts (1). (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR AXLE - C213R/AXLE SHAFTS - INSTALLATION).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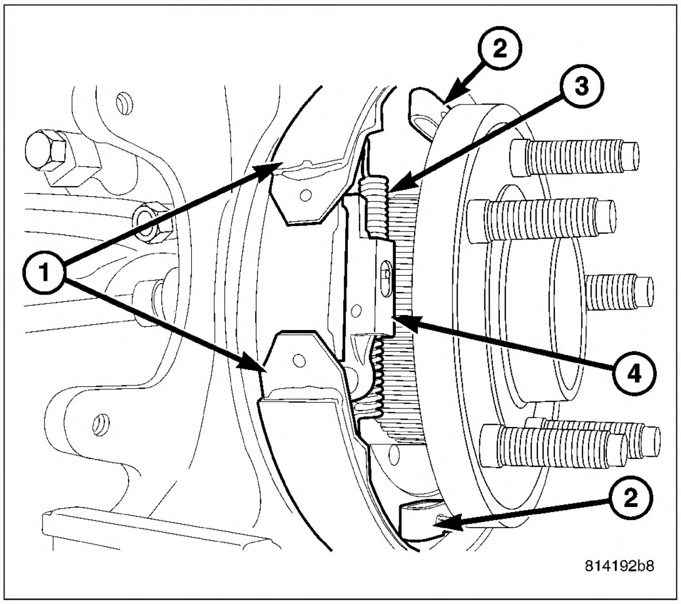
9. Adjust rear park brake shoes (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENTS).
10. Install the disc brake rotor.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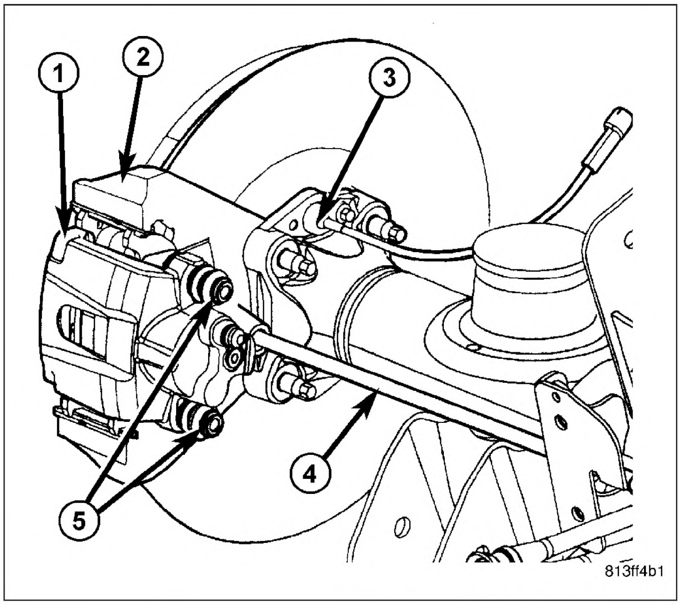
11. Install the rear caliper (1) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).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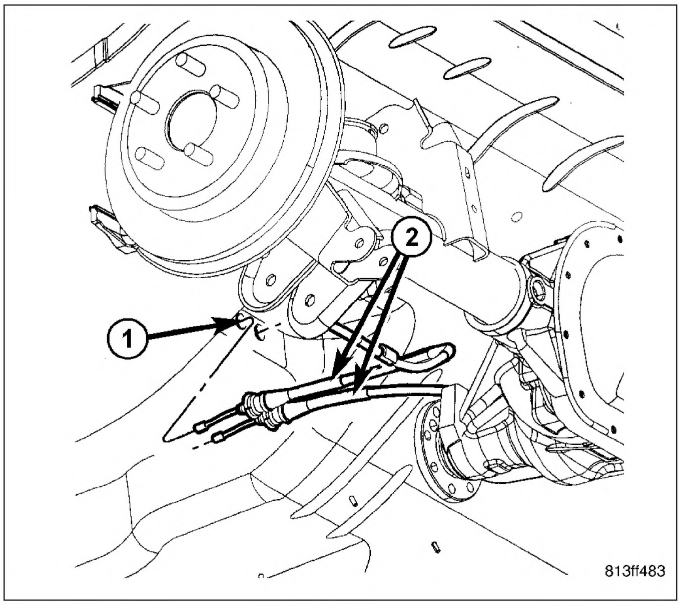
12. Install the park brake cables (2) thru the floor (1).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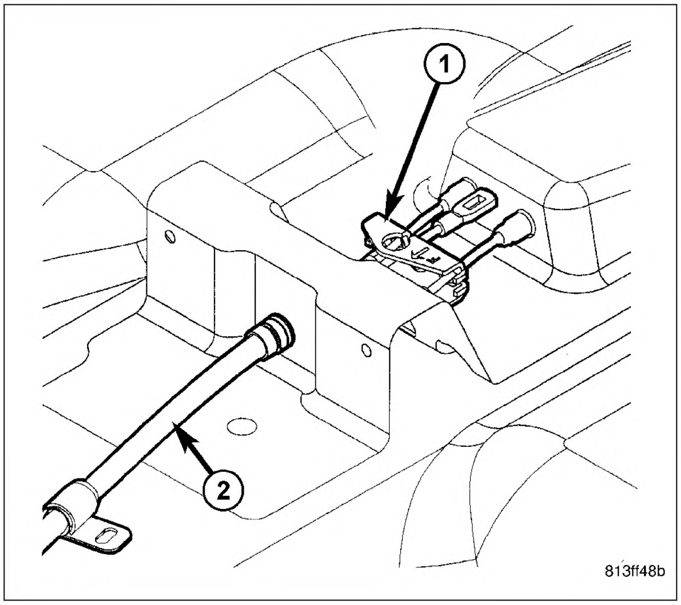
13. Install the tire and wheel assembly.
14. Lower the vehicle.
15. Reconnect the brake cables to the equalizer (1).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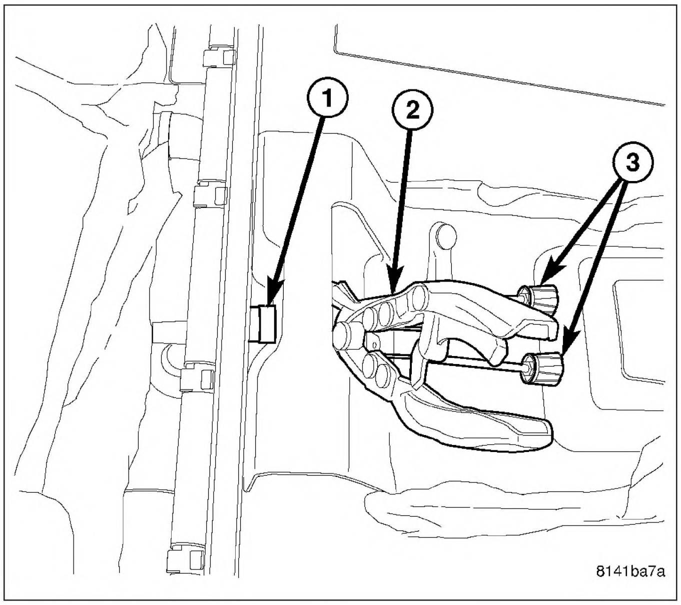
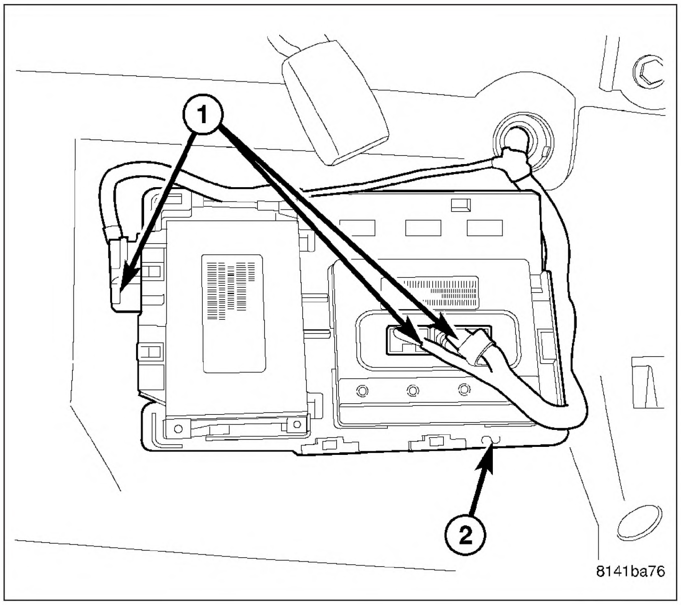
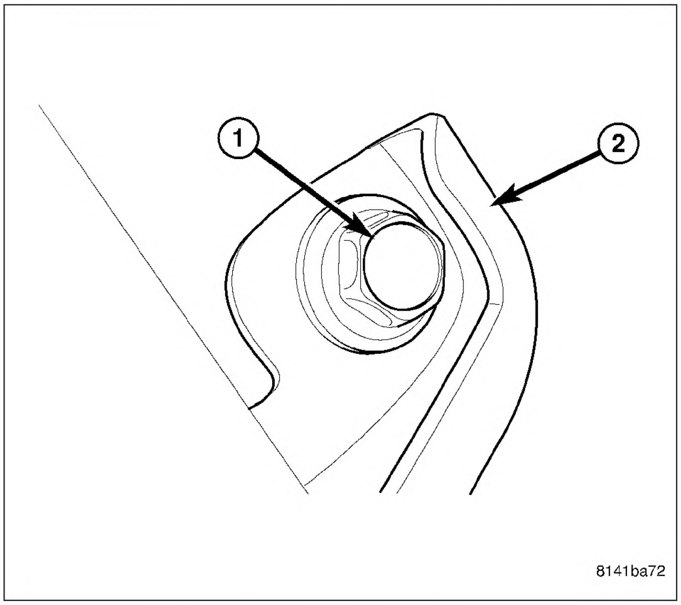
16. Unlock the park brake cable (1).



17. Fold down the rear carpet.
18. Install the rear sill plates.
19. Install the (FDCM) module bracket (2) mounting nuts.
20. Reconnect the (FDCM) module electrical connectors (1).



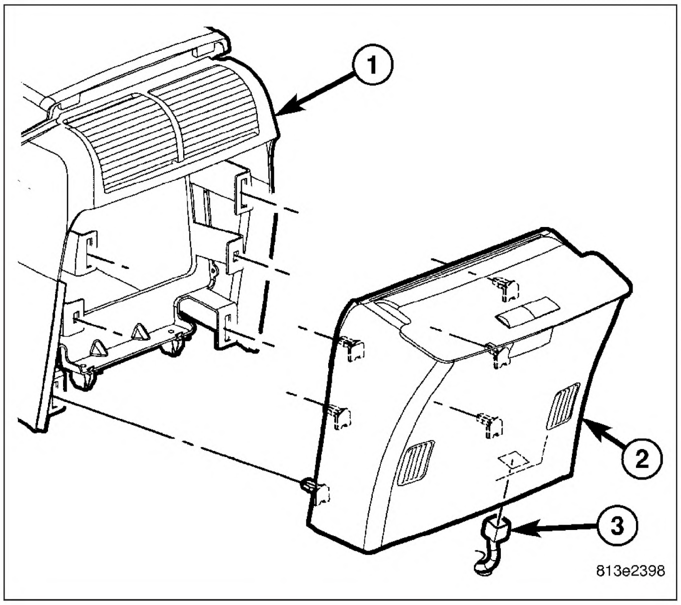
21. Install the rear seat bottom (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).
22. Verify parking brake operation.



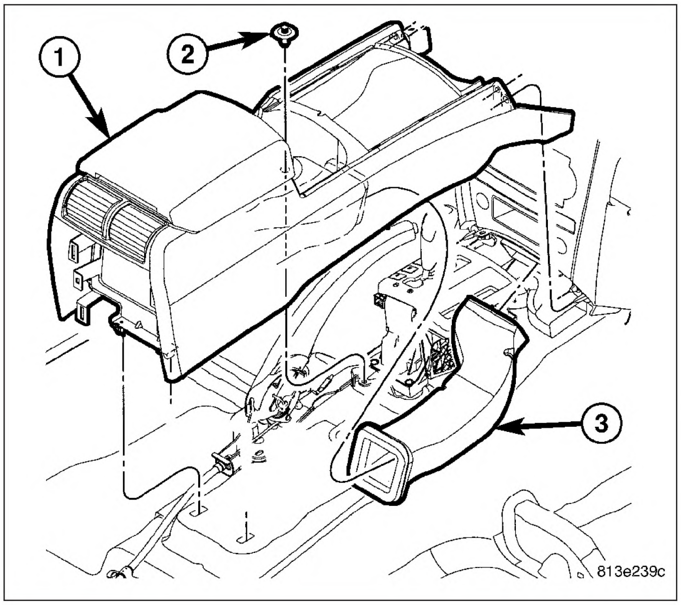
LEVER

REMOVAL

1. Remove the console rear cover (2) or DVD player (if equipped).

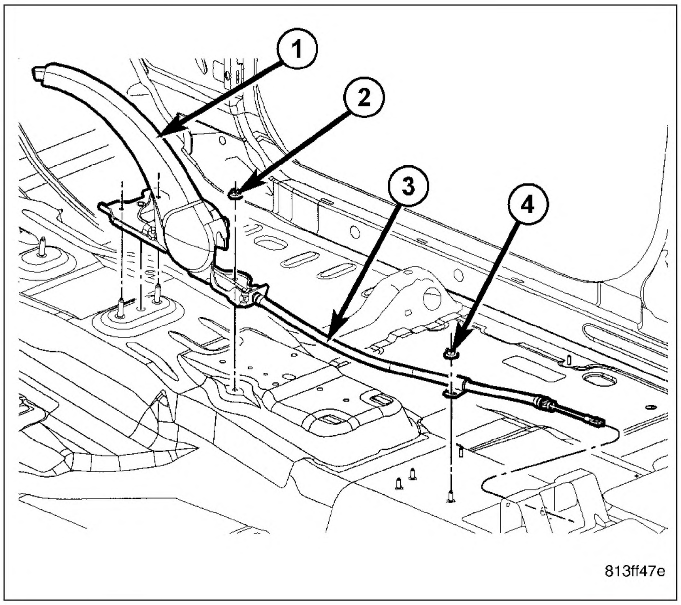


2. Remove the center console (1), (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).



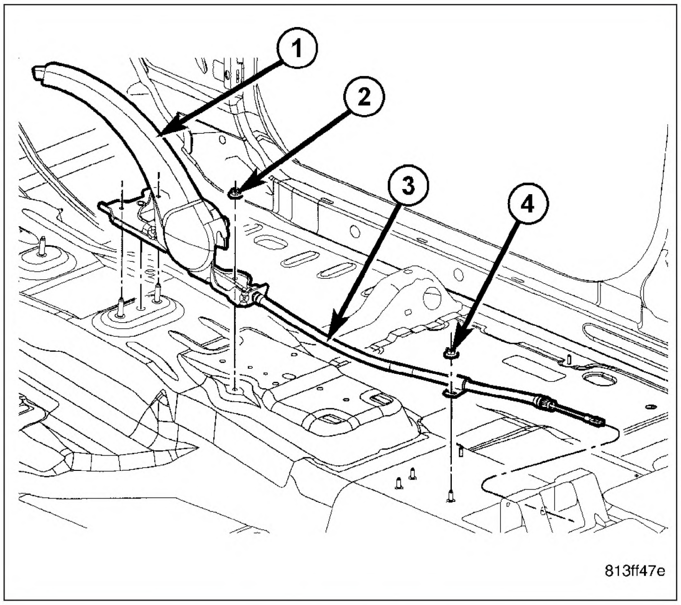
3. Disconnect the park brake switch wire connector.
4. Lock out the park brake hand lever.

5. Disconnect the front cable (3) at the hand brake lever (1).
6. Remove the 3 hand brake lever mounting bolts.
7. Disconnect the wire harness routing clips to the lever.
8. Pull the hand lever (1) up to remove the front cable (3).

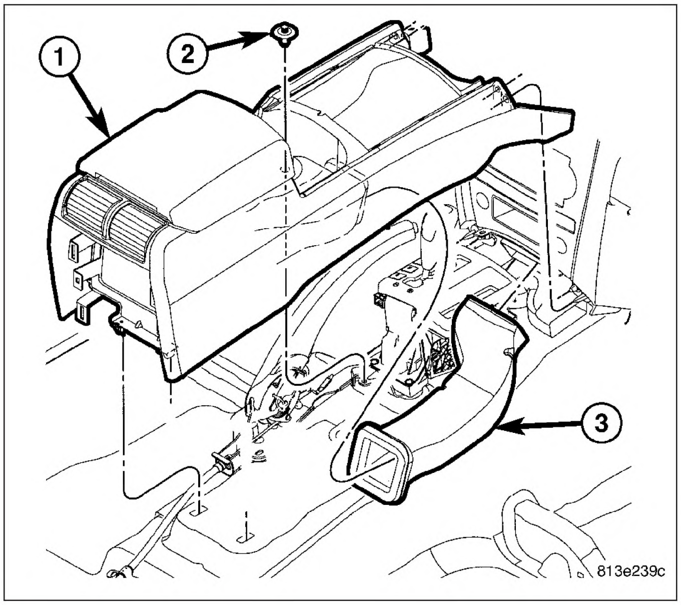


INSTALLATION

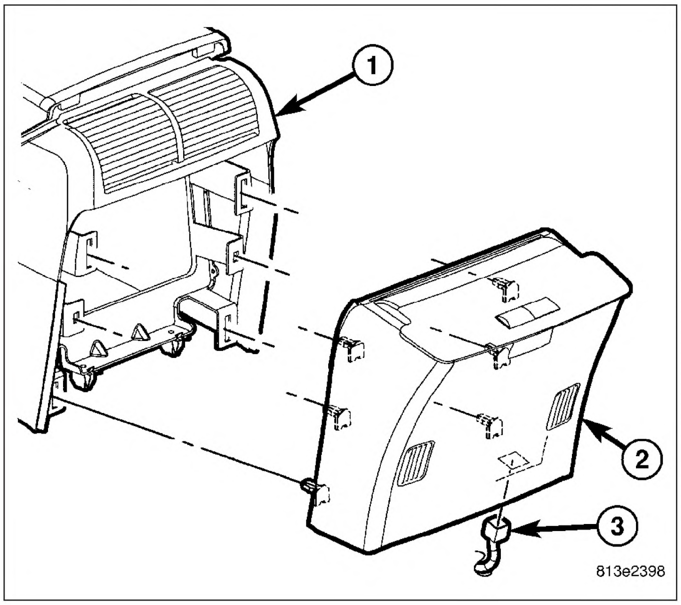
1. Reconnect the wire harness routing clips to the lever.
2. Reconnect the front cable (3) at the hand brake lever (1).
3. Install the 3 hand brake lever (1) mounting bolts.
4. Unlock out the park brake hand lever (1).
5. Reconnect the park brake switch wire connector.
6. Check the operation of the parking brake lever (1) and cable (3).



7. Install the center console (1) , (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).



8. Install the rear cover (2) or the DVD player (if equipped).



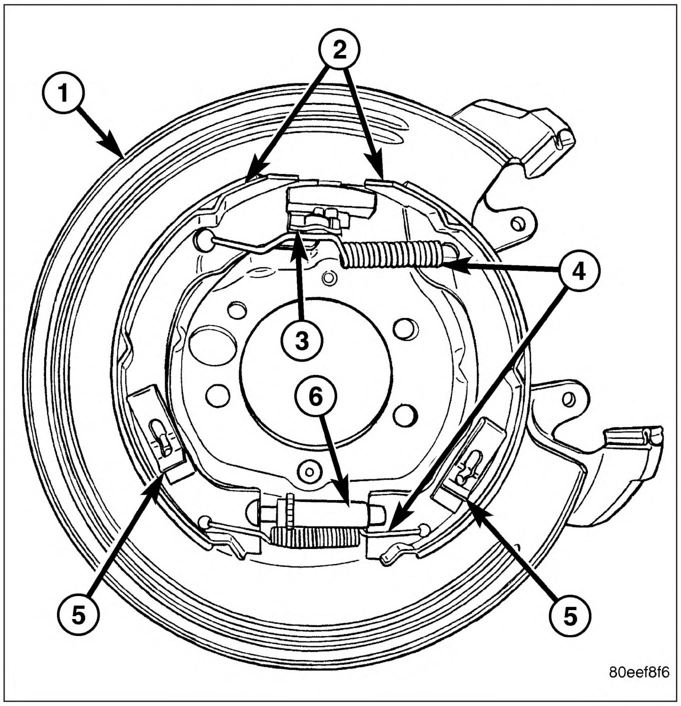
SHOES

DESCRIPTION

Drum in hat park brakes are dual shoe, internal expanding units with an automatic self adjusting mechanism.

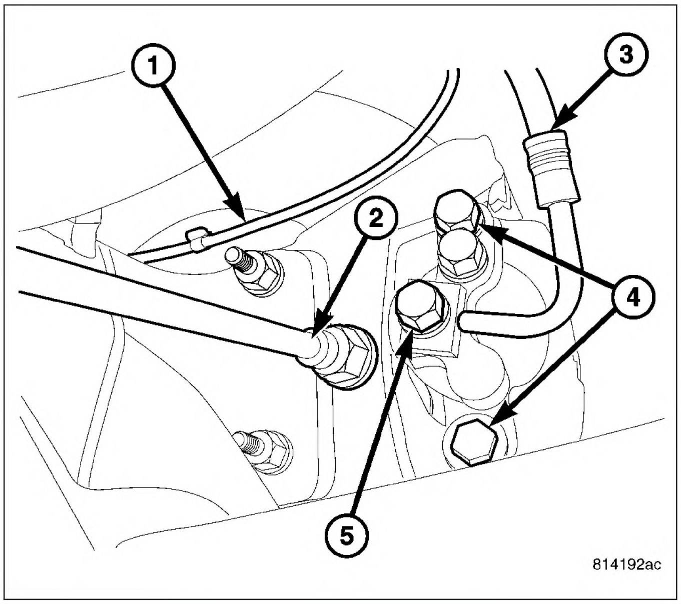
OPERATION

When the parking brake pedal is depressed the brake cable pulls the brake shoes outward against the brake drum. When the brake pedal is released the return springs attached to the brake shoes pull the shoes back to there original position.

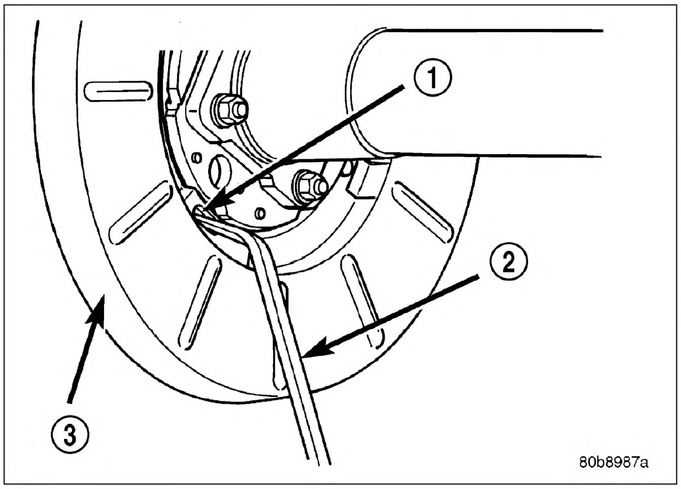


REMOVAL

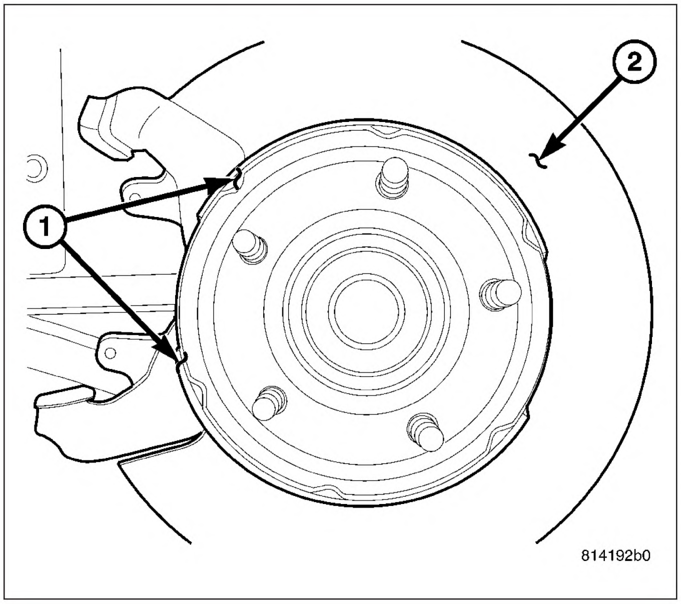
1. Raise vehicle.
2. Remove rear wheel and tire assembly.
3. Remove the 2 caliper bolts (4) then remove the caliper **Support the caliper, Do not let the caliper hang by the brake hose.**.



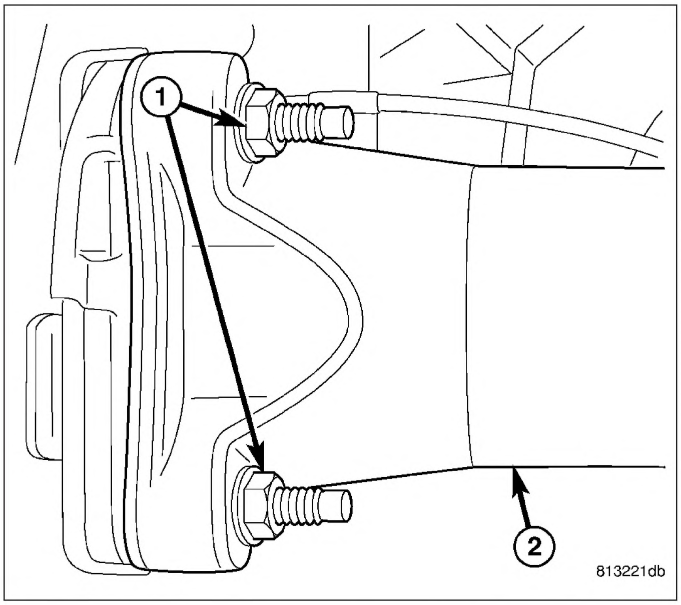
4. Remove rubber access plug (1) from back of rear disc brake support plate (3).
5. If necessary retract parking brake shoes with brake adjuster tool (2). Position tool at top of star wheel and rotate wheel.



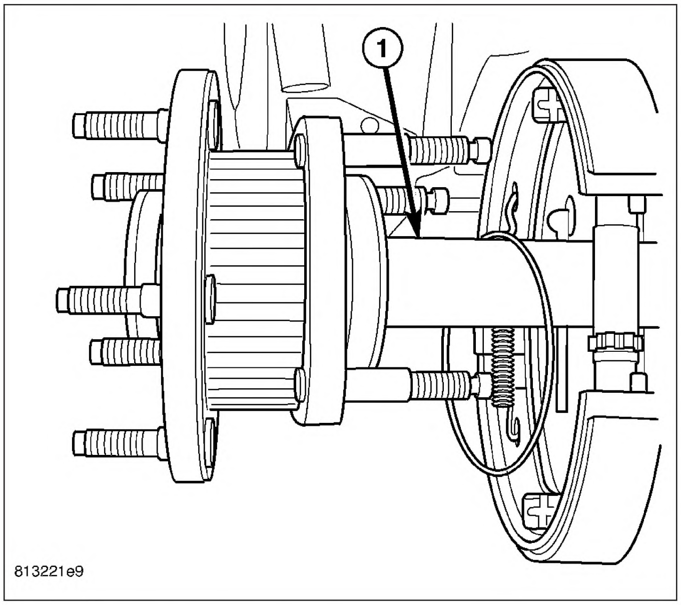
6. Remove rotor from axle hub flange.



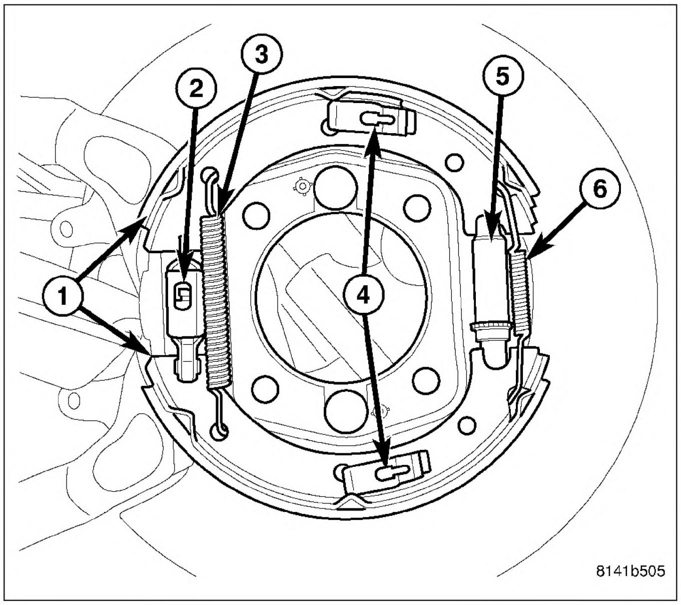
7. Remove the four axle flange nuts (1).



8. Remove the axle shaft (1) from the rear differential (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR AXLE - C213R/AXLE SHAFTS - REMOVAL).



9. Remove the shoe to shoe return spring (6) with needle nose pliers & then remove the adjuster (5).
10. Remove the shoe to shoe return spring (3) with brake pliers.
11. Remove shoe hold-down clips (4) and pins. Clip is held in place by pin which fits in clip notch. To remove clip, first push clip ends together and slide clip until head of pin clears narrow part of notch. Then remove clip (4) and pin.
12. Remove shoes (1) off the actuator lever (2) for the park brake then remove the shoes (1).



CLEANING - REAR DRUM IN HAT BRAKE

Clean the individual brake components, including the support plate exterior, with a water dampened cloth or with brake cleaner. Do not use any other cleaning agents. Remove light rust and scale from the brake shoe contact pads on the support plate with fine sandpaper.

INSPECTION - REAR DRUM IN HAT BRAKE

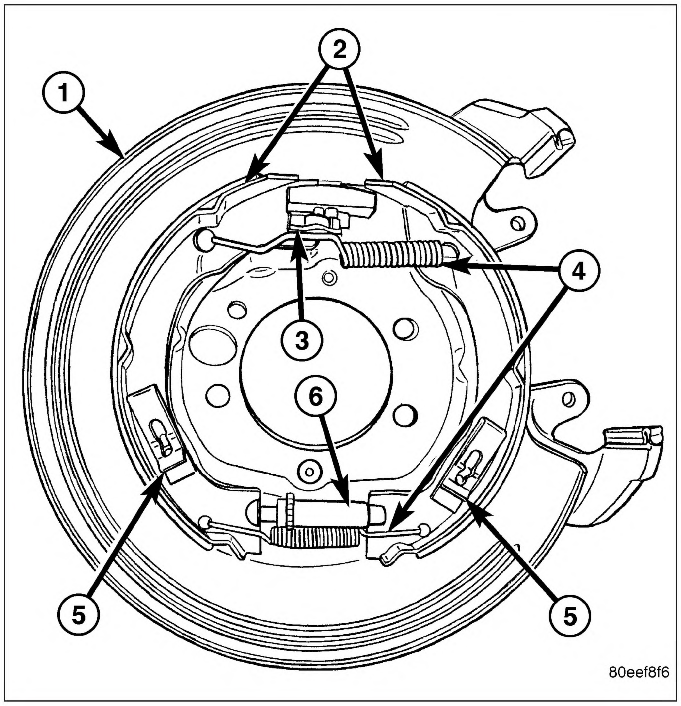
As a general rule, riveted brake shoes should be replaced when worn to within 0.78 mm (1/32 in.) of the rivet heads. Bonded lining should be replaced when worn to a thickness of 1.6 mm (1/16 in.).

Examine the lining contact pattern to determine if the shoes are bent or the drum is tapered. The lining should exhibit contact across its entire width. Shoes exhibiting contact only on one side should be replaced and the drum checked for runout or taper.

Inspect the adjuster screw assembly. Replace the assembly if the star wheel or threads are damaged, or the components are severely rusted or corroded.

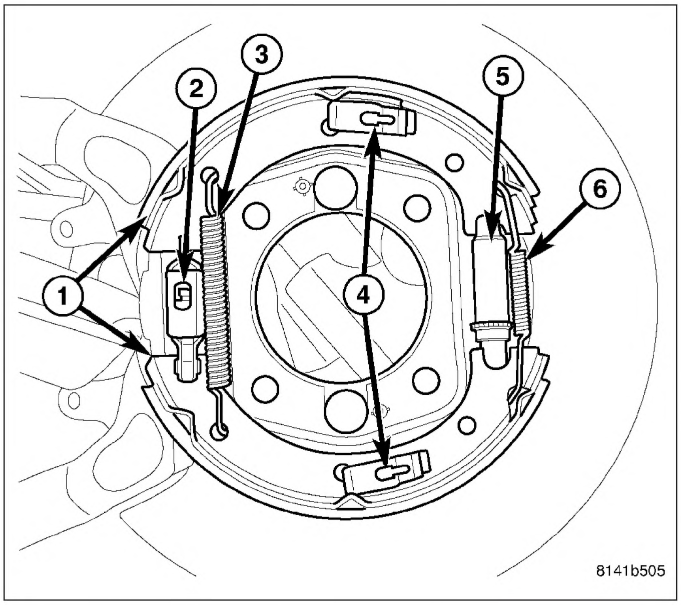
Discard the brake springs and retainer components if worn, distorted or collapsed. Also replace the springs if a brake drag condition had occurred. Overheating will distort and weaken the springs.

Inspect the brake shoe contact pads on the support plate, replace the support plate if any of the pads are worn or rusted through. Also replace the plate if it is bent or distorted.

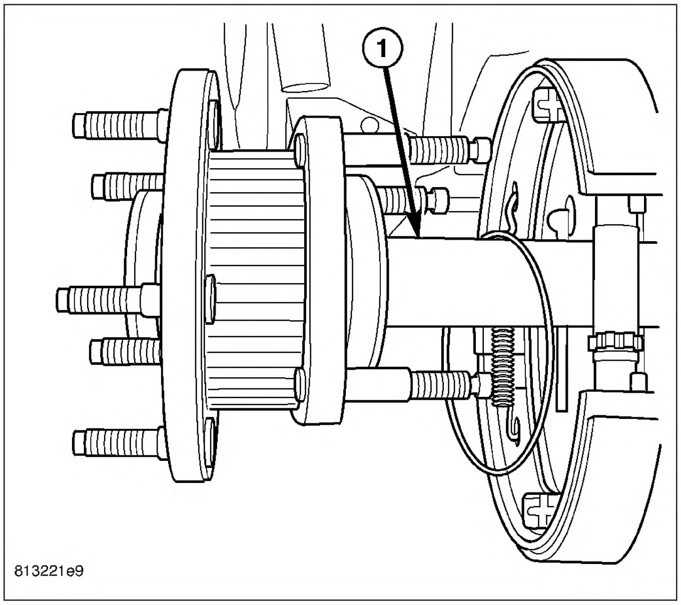


INSTALLATION

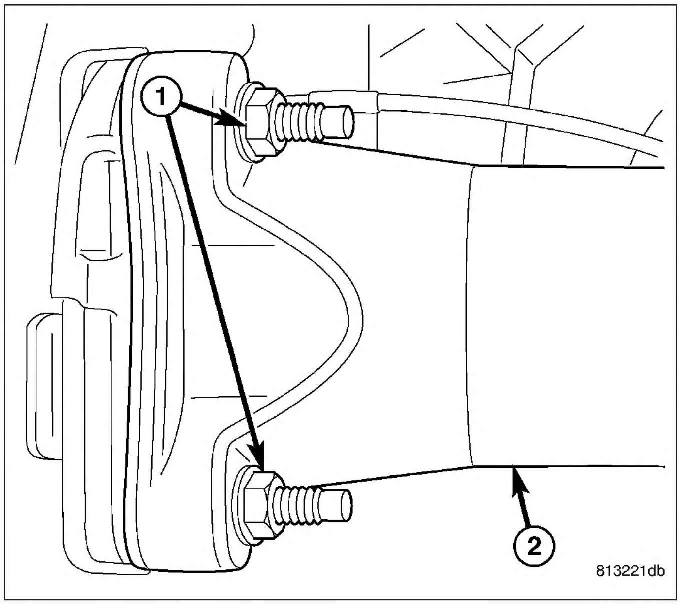
1. Install the park brake shoes (1) onto the actuator lever (2).
2. Install shoes on support plate with hold down clips and pins (4). Be sure shoes are properly engaged in the park brake actuator lever (2).
3. Install thr return spring (3).
4. Lubricate and install adjuster screw assembly (5). Be sure notched ends of screw assembly are properly seated on shoes and that star wheel is aligned with access hole in the support plate.
5. Install shoe to shoe adjuster spring (6). Needle nose pliers can be used to connect spring to each shoe.



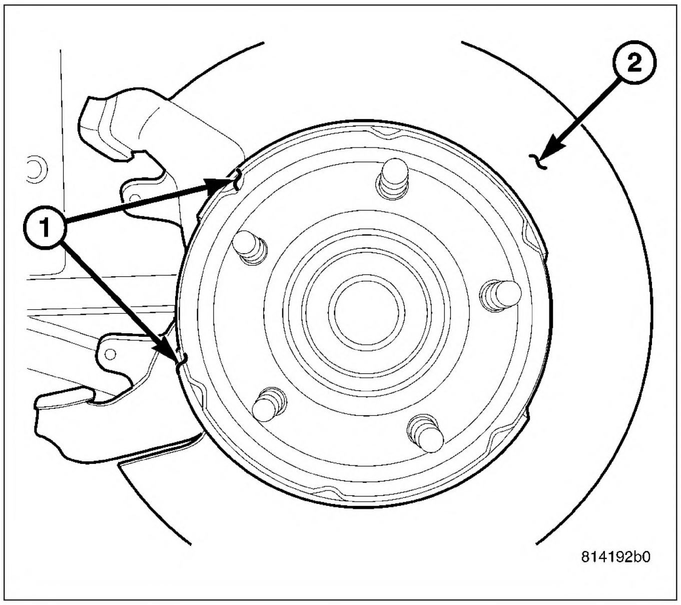
6. Install the axle shaft (1) to the rear differential (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR AXLE - C213R/AXLE SHAFTS - INSTALLATION).



7. Install and tighten the axle flange nuts (1).



8. Install rotor to the axle hub.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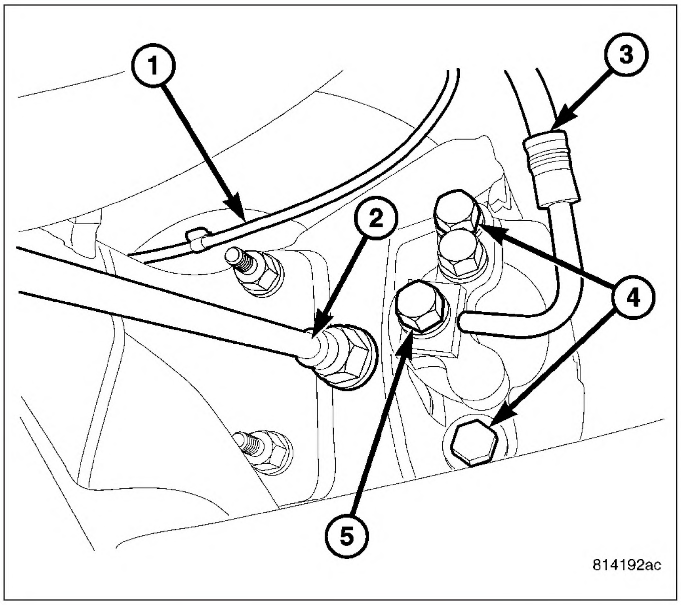
9. Install the caliper and the 2 mounting bolts (4) to 90-115 N·m (66-85 ft. lbs.).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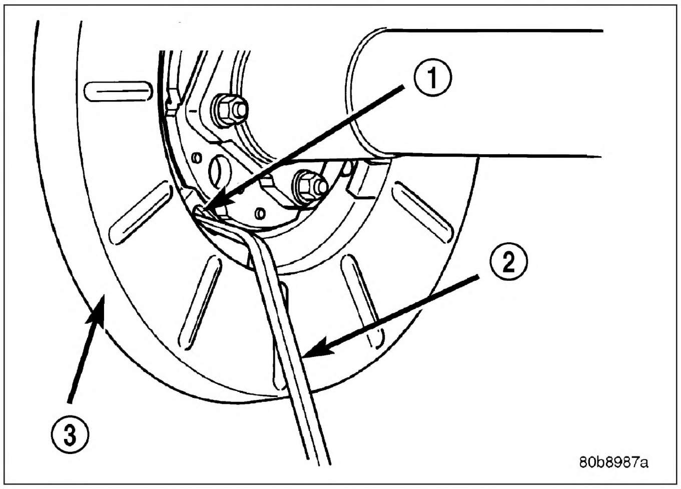
10. Adjust the parking brake shoes.
11. Install wheel and tire assembly.
12. Lower vehicle and verify correct parking brake operation.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ADJUSTMENTS

ADJUSTMENT - REAR DRUM IN HAT PARK BRAKE (ROTOR REMOVED)

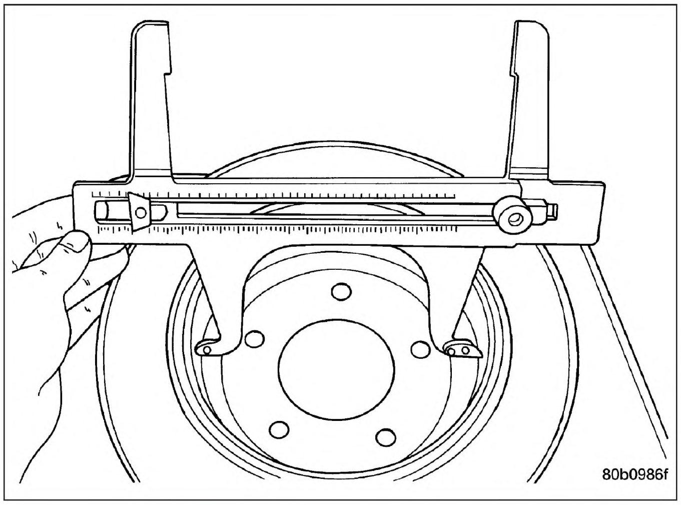
Under normal circumstances, the only time adjustment is required is when the shoes are replaced, removed for access to other parts, or when one or both rotors are replaced.

Adjustment can be made with a standard brake gauge or with adjusting tool. Adjustment is performed with the complete brake assembly installed on the backing plate.

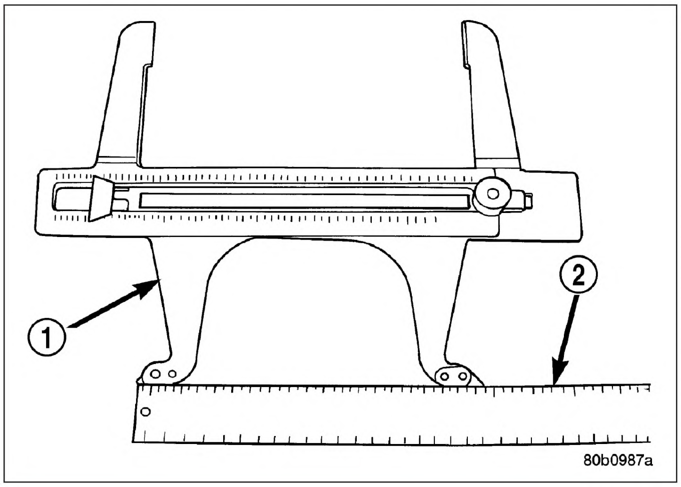
CAUTION: Before adjusting the park brake shoes be sure that the park brake pedal is in the fully released position. If park brake pedal is not in the fully released position, the park brake shoes can not be accurately adjusted.

1. Raise vehicle.
2. Remove tire and wheel.
3. Remove disc brake caliper from caliper adapter (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL).
4. Remove rotor from the axleshaft (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).

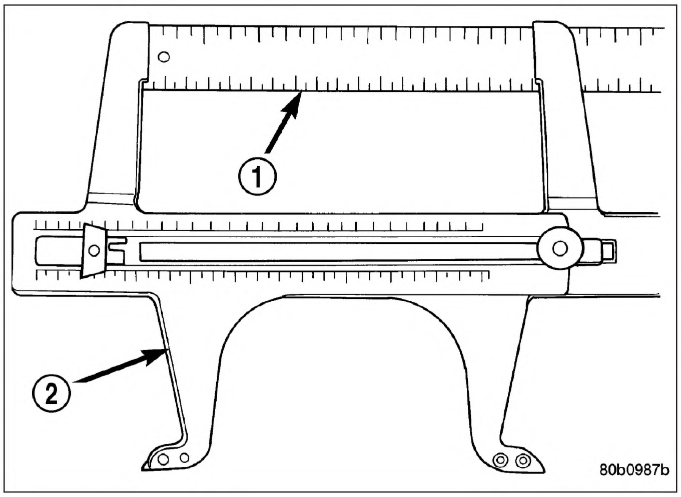
NOTE: When measuring the brake drum diameter, the diameter should be measured in the center of the area in which the park brake shoes contact the surface of the brake drum.



5. Using Brake Shoe Gauge, Special Tool C-3919 (1), or equivalent, **accurately** measure the inside diameter of the park brake drum portion of the rotor.
6. Using a ruler (2) that reads in 64th of an inch, accurately read the measurement of the inside diameter of the park brake drum from the special tool.



7. Reduce the inside diameter measurement of the brake drum that was taken using Special Tool C-3919 (2) by 1/64 of an inch. Reset Gauge, Brake Shoe, Special Tool C-3919 (2) or the equivalent used, so that the outside measurement jaws are set to the reduced measurement.
8. Place Gauge, Brake Shoe, Special Tool C-3919 (2) , or equivalent over the park brake shoes. The special tool must be located diagonally across at the top of one shoe and bottom of opposite shoe (widest point) of the park brake shoes.
9. Using the star wheel adjuster, adjust the park brake shoes until the lining on the park brake shoes just touches the jaws on the special tool.
10. Repeat step 8 above and measure shoes in both directions.



11. Install brake rotor on the axleshaft (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION).
12. Rotate rotor to verify that the park brake shoes are not dragging on the brake drum. If park brake shoes are dragging, remove rotor and back off star wheel adjuster one notch and recheck for brake shoe drag against drum. Continue with the previous step until brake shoes are not dragging on brake drum.
13. Install disc brake caliper on caliper adapter (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).
14. Install wheel and tire.
15. Tighten the wheel mounting nuts in the proper sequence until all nuts are torqued to half the specified torque. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).
16. Lower vehicle.

CAUTION: Before moving vehicle, pump brake pedal several times to ensure the vehicle has a firm enough pedal to stop the vehicle.

NOTE: After parking brake lining replacement, it is recommended that the parking brake system be conditioned prior to use. This is done by making one stop from 25 mph on dry pavement or concrete using light to moderate force on the parking brake hand lever.

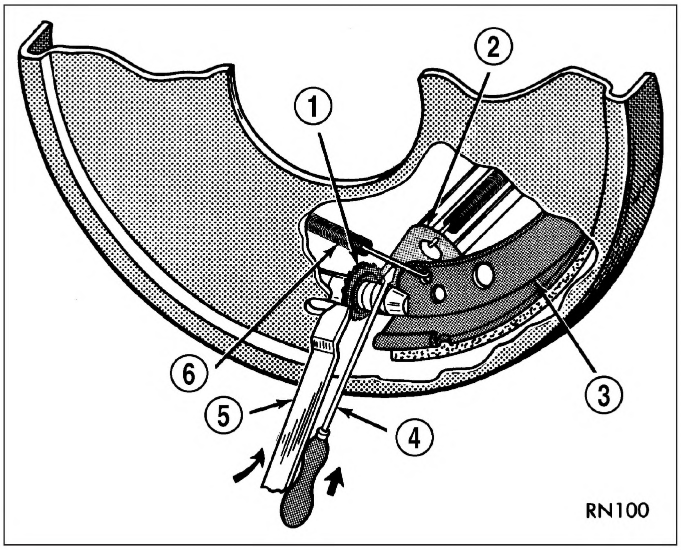
17. Road test the vehicle to ensure proper function of the vehicle's brake system.

ADJUSTMENT - WITH ADJUSTING TOOL

Adjustment can be made with a standard brake gauge or with adjusting tool. Adjustment is performed with the complete brake assembly installed on the backing plate.

1. Be sure parking brake lever is fully released.
2. Raise vehicle so rear wheels can be rotated freely.
3. Remove plug from each access hole in brake support plates.
4. Loosen parking brake cable adjustment nut until there is slack in front cable.
5. Insert adjusting tool through support plate access hole and engage tool in teeth of adjusting screw star wheel.

6. Rotate adjuster screw star wheel (move tool handle upward) until slight drag can be felt when wheel is rotated.
7. Push and hold adjuster lever away from star wheel with thin screwdriver.
8. Back off adjuster screw star wheel until brake drag is eliminated.
9. Repeat adjustment at opposite wheel. Be sure adjustment is equal at both wheels.
10. Install support plate access hole plugs.
11. Adjust parking brake cable and lower vehicle.
12. Depress park brake lever and make sure park brakes hold the vehicle staionary.
13. Release park brake lever.



BRAKES - ABS - SERVICE INFORMATION

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BRAKES - ABS - SERVICE INFORMATION

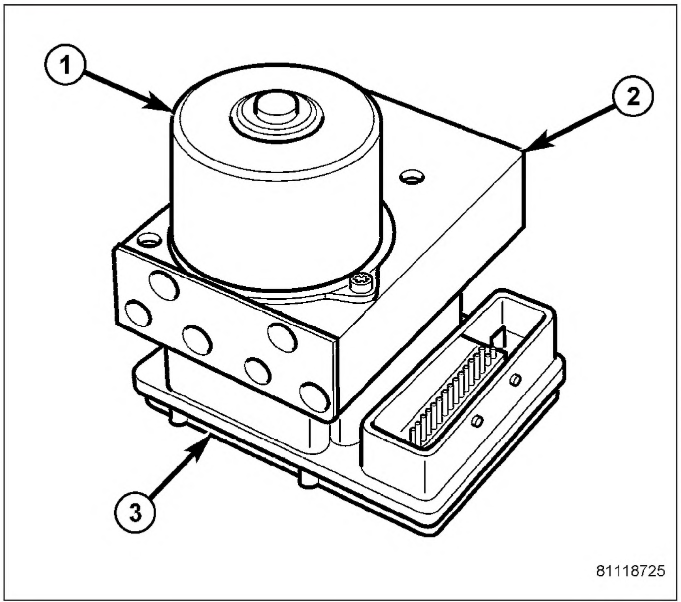
DESCRIPTION

ANTILOCK BRAKE SYSTEM WITH TRACTION CONTROL

This vehicle uses the MK25 Antilock braking system (ABS). This system, a combined ABS and Traction Control system is standard on some vehicles and optional on others.

This antilock brake system uses components of the base brake system, but also features the following components:

- Integrated Control Unit (ICU) - Includes Hydraulic Control Unit (HCU) (2) and Antilock Brake Module (ABM) (3)
- Wheel Speed Sensors (WSS) - Four sensors (one at each wheel)



ABS

The purpose of the antilock brake system (ABS) is to prevent wheel lockup under braking conditions on virtually any type of road surface. Antilock braking is desirable because a vehicle that is stopped without locking the wheels retains directional stability and some steering capability. This allows the driver to retain greater control of the vehicle during braking.

ALL-SPEED TRACTION CONTROL

The traction control system is an all-speed traction control. All-Speed Traction Control enhances mobility and prevents wheel slip when accelerating on slippery surfaces. Depending on how slippery, an automatically activated Winter Mode feature will select lower transmission up-shift speeds. It also provides a measure of directional stability control. Using the wheel-speed sensors, it can detect excessive yaw and help keep the car on the intended course, as for instance, when accelerating around a curve.

With rear-wheel drive, All-Speed Traction Control is effective up to 85 mph (137 km/h); with AWD, All-Speed Traction Control is effective up to 45 mph (72 km/h), which is common among competitive AWD vehicles with traction control.

ELECTRONIC STABILITY PROGRAM

ESP® (Electronic Stability Program), which includes a Brake Assist feature, is standard on some models and optional on others. ESP aids the driver in maintaining vehicle directional stability. ESP will do whatever can be done, within the limits of available traction, to keep the car on course.

ESP uses the ABS with Traction Control allong with the following components to operate:

- Active Brake Booster
- Brake Pressure Switch
- Dynamics Sensor
- Steering Angle Sensor (SAS)

The Active Brake Booster is part of the Power Brake Booster. The Brake Pressure Switch is mounted to the bottom of the Master Cylinder. The Dynamics Sensor that is mounted under the center console, which is near the center of gravity of the car for effective sensing. TheTravel Sensor is mounted in the Power Brake Booster. The Steering Angle Sensor is located in the steering column.

ELECTRONIC VARIABLE BRAKE PROPORTIONING

Vehicles equipped with ABS use electronic variable brake proportioning (EVBP) to balance front-to-rear braking. The EVBP is used in place of a rear proportioning valve. The EVBP system uses the ABS system to control the slip of the rear wheels in partial braking range. The braking force of the rear wheels is controlled electronically by using the inlet and outlet valves located in the integrated control unit (ICU).

EVBP activation is invisible to the customer since there is no pump motor noise or brake pedal feedback.

OPERATION

ANTILOCK BRAKE SYSTEM WITH TRACTION CONTROL

ABS

There are a few performance characteristics of the MK25 Antilock Brake System that may at first seem abnormal, but in fact are normal. These characteristics are described below.

NORMAL BRAKING

Under normal braking conditions, the ABS functions the same as a standard base brake system with a diagonally split master cylinder and conventional vacuum assist.

ABS BRAKING

ABS operation is available at all vehicle speeds above 3–5 mph. If a wheel locking tendency is detected during a brake application, the brake system enters the ABS mode. During ABS braking, hydraulic pressure in the four wheel circuits is modulated to prevent any wheel from locking. Each wheel circuit is designed with a set of electric solenoids to allow modulation, although for vehicle stability, both rear wheel solenoids receive the same electrical signal. Wheel lockup may be perceived at the very end of an ABS stop and is considered normal.

During an ABS event, the integrated control unit (ICU) regulates hydraulic pressure at all 4 of the vehicle’s wheels.

The hydraulic pressure at each front wheel is controlled independently (relative to the amount of slip at each wheel) in order to maximize the braking force generated by the front brakes. The rear wheels are controlled such that the hydraulic pressure at either rear wheel does not exceed that of the highest slip rear wheel in order to maintain vehicle stability.

The system can build and release pressure at each wheel, depending on signals generated by the wheel speed sensors (WSS) at each wheel and received at the Antilock Brake Module (ABM).

NOISE AN BRAKE PEDAL FEEL

During ABS braking, some brake pedal movement may be felt. In addition, ABS braking will create ticking, popping, or groaning noises heard by the driver. This is normal and is due to pressurized fluid being transferred between the master cylinder and the brakes. If ABS operation occurs during hard braking, some pulsation may be felt in the vehicle body due to fore and aft movement of the suspension as brake pressures are modulated.

At the end of an ABS stop, ABS is turned off when the vehicle is slowed to a speed of 3–4 mph. There may be a slight brake pedal drop anytime that the ABS is deactivated, such as at the end of the stop when the vehicle speed is less than 3 mph or during an ABS stop where ABS is no longer required. These conditions exist when a vehicle is being stopped on a road surface with patches of ice, loose gravel, or sand on it. Also, stopping a vehicle on a bumpy road surface activates ABS because of the wheel hop caused by the bumps.

TIRE NOISE AND MARKS

Although the ABS system prevents complete wheel lockup, some wheel slip is desired in order to achieve optimum braking performance. Wheel slip is defined as follows: 0 percent slip means the wheel is rolling freely and 100 percent slip means the wheel is fully locked. During brake pressure modulation, wheel slip is allowed to reach up to 25–30 percent. This means that the wheel rolling velocity is 25–30 percent less than that of a free rolling wheel at a given vehicle speed. This slip may result in some tire chirping, depending on the road surface. This sound should not be interpreted as total wheel lockup.

Complete wheel lockup normally leaves black tire marks on dry pavement. The ABS will not leave dark black tire marks since the wheel never reaches a fully locked condition. However, tire marks may be noticeable as light patched marks.

START-UP AND DRIVE-OFF CYCLES

When the ignition is turned on, a popping sound and a slight brake pedal movement may be noticed. The ABS warning lamp will also be on for up to 5 seconds after the ignition is turned on.

When the vehicle is first driven off, a humming may be heard or felt by the driver at approximately 12–25 mph (20–40 km/h). All of these conditions are a normal function of ABS as the system is performing a diagnosis check.

PREMATURE ABS CYCLING

Symptoms of premature ABS cycling include: clicking sounds from the solenoid valves; pump/motor running; and pulsations in the brake pedal. Premature ABS cycling can occur at any braking rate of the vehicle and on any type of road surface. Neither the red BRAKE indicator lamp, nor the amber ABS indicator lamp, illuminate and no fault codes are stored in the CAB.

Premature ABS cycling is a condition that needs to be correctly assessed when diagnosing problems with the antilock brake system. It may be necessary to use a scan tool to detect and verify premature ABS cycling.

Check the following common causes when diagnosing premature ABS cycling: damaged wheel bearings (causing tone wheel issues); damaged wheel bearing housings where wheel speed sensors mount; and loose wheel speed sensor mounting bolts.

After diagnosing the defective component, repair or replace it as required. When the component repair or replacement is completed, test drive the vehicle to verify that premature ABS cycling has been corrected.

ALL-SPEED TRACTION CONTROL

Traction control systems sense impending wheel spin based on a model of the rate of change of wheel speed under normal traction conditions. The All-Speed Traction Control uses signals from the same wheel speed sensors as ABS to determine when to apply the brakes to one or more wheels and when to reduce engine torque output using the electronic throttle control (ETC) to prevent wheel slip during acceleration. Throttle control makes the vehicle less reliant on brake application alone to maintain traction, increasing the operating speed range and more closely modulates speed, resulting in smoother operation. With All-Speed Traction Control reducing engine torque as well as applying the brakes, it is possible to achieve almost seamless torque application at the wheels.

If the wheel slip is severe enough to require throttle intervention, All-Speed Traction Control will reduce engine torque and sometimes upshift the transmission to avoid the condition. In milliseconds, All-Speed Traction Control interrogates the engine control system to determine the current torque output, determines how much the torque output the current conditions will allow, and signals this requirement to the engine control system, which reduces the torque by partially closing the throttle. With execution of the torque reduction, the brake system reduces brake pressure to make the transition smooth, while maintaining forward progress. By reducing engine power, braking effectiveness is maintained and the system can operate throughout the normal vehicle speed range. That is why the system is identified as providing “all-speed” traction control.

With AWD, where front-wheel slip can occur, the degree of throttle intervention is relatively less than with rear-wheel drive. The difference in speed capability and the degree of throttle intervention between rear-wheel drive and all-wheel drive is due to the fact that non-driven front wheels on a rear-wheel drive vehicle give the system an accurate vehicle speed reference on which to base responses. With AWD, the possibility that the front wheels may also be slipping makes appropriate corrective action more difficult to determine, thus limiting the effective speed range. Offsetting this is the fact that loss of traction is less likely with AWD because torque is transmitted through all four wheels to begin with. In actual driving situations on snow or ice, the rear-wheel drive and AWD systems respond in essentially the same way up to the 45 mph (72 km/h) limit of the AWD system.

When severe wheel slippage is detected (as on snow-covered roads), the Winter Mode feature of All-Speed Traction Control causes the transmission to up-shift to higher gears at lower speeds than normal. Once a slippery launch condition is detected, the transmission will remain in Winter Mode for a minimum of three minutes. After that, if the road is providing normal traction, the system returns to providing normal up-shifts.

ELECTRONIC STABILITY PROGRAM

To determine whether the car is responding properly to cornering commands, ESP uses steering wheel angle, yaw (turning) rate and lateral acceleration sensors (combined into Dynamics Sensor). Using signals from these sensors, in addition to individual wheel speed sensor signals, the system determines appropriate brake and throttle actions. Once initiated, ESP operates much like All-Speed Traction Control, except that the goal is directional stability. If the vehicle yaw response, or rate of turning, is inconsistent with the steering angle and vehicle speed indications, the ESP system applies the brakes and, if necessary closes the throttle, to restore control. This occurs whether the vehicle is turning too rapidly (oversteering) or not rapidly enough (understeering).

ESP notifies the active brake booster electronically of the need for maximum output. A solenoid opens a valve in the booster that immediately applies maximum boost to the master cylinder. A travel sensor in the booster detects the rate and travel of the brake pedal. Above the threshold of an “extreme” brake application, ESP activates the solenoid, thus applying maximum available hydraulic pressure to the brakes. In this type of situation, stopping distance is determined by the ABS system based on available traction, rather than the amount of force that the driver can exert on the brake pedal. This becomes the deciding factor in how quickly the vehicle will stop.

ELECTRONIC VARIABLE BRAKE PROPORTIONING

Upon entry into EVBP the inlet valve for the rear brake circuit is switched ON so that the fluid supply from the master cylinder is shut off. In order to decrease the rear brake pressure, the outlet valve for the rear brake circuit is pulsed. This allows fluid to enter the low pressure accumulator (LPA) in the Hydraulic Control Unit (HCU) resulting in a drop in fluid pressure to the rear brakes. In order to increase the rear brake pressure, the outlet valve is switched off and the inlet valve is pulsed. This increases the pressure to the rear brakes. This back-and-forth process will continue until the required slip difference is obtained. At the end of EVBP braking (brakes released) the fluid in the LPA drains back to the master cylinder by switching on the outlet valve and draining through the inlet valve check valve. At the same time the inlet valve is switched on in case of another brake application.

The EVBP will remain functional during many ABS fault modes. If both the red BRAKE and amber ABS warning indicators are illuminated, the EVBP may not be functioning.

DIAGNOSIS AND TESTING - ANTILOCK BRAKES

The ABS brake system performs several self-tests every time the ignition switch is turned on and the vehicle is driven. The ABM monitors the systems input and output circuits to verify the system is operating correctly. If the on board diagnostic system senses that a circuit is malfunctioning the system will set a trouble code in its memory.

NOTE: An audible noise may be heard during the self-test. This noise should be considered normal.

NOTE: The scan tool is used to diagnose the ABS system. For additional information refer to the Electrical section. For test procedures refer to the Chassis Diagnostic Manual.

STANDARD PROCEDURE - BLEEDING ABS BRAKE SYSTEM

ABS system bleeding requires conventional bleeding methods plus use of the DRB scan tool. The procedure involves performing a base brake bleeding, followed by use of the scan tool to cycle and bleed the HCU pump and solenoids. A second base brake bleeding procedure is then required to remove any air remaining in the system.

1. Perform base brake bleeding. (Refer to 5 - BRAKES - STANDARD PROCEDURE) OR (Refer to 5 - BRAKES - STANDARD PROCEDURE).
2. Connect scan tool to the Data Link Connector.
3. Select ANTILOCK BRAKES, followed by MISCELLANEOUS, then ABS BRAKES. Follow the instructions displayed. When scan tool displays TEST COMPLETE, disconnect scan tool and proceed.
4. Perform base brake bleeding a second time. (Refer to 5 - BRAKES - STANDARD PROCEDURE) OR (Refer to 5 - BRAKES - STANDARD PROCEDURE).
5. Top off master cylinder fluid level and verify proper brake operation before moving vehicle.

SPECIFICATIONS

TORQUE CHART

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
G-Sensor Bolt	5.6	—	50
Hydraulic Control Unit/Controller Antilock Brakes Mounting Bolts	12	9	125
Hydraulic Control Unit/Controller Antilock Brakes Brake Lines	16	—	144
Hydraulic Control Unit/Controller Antilock Brakes CAB Screws	1.8	—	16
Wheel Speed Sensors Front Sensor Bolt	12-14	—	106-124
Wheel Speed Sensors Rear Sensor Bolt	12-14	—	106-124

SENSOR-FRONT WHEEL SPEED

DESCRIPTION

A wheel speed sensor is used at each wheel. The front sensors are mounted to the steering knuckles. The rear sensors are mounted at the outboard end of the axle. Tone wheels are mounted to the outboard ends of the front and rear axle shafts. The gear type tone wheel serves as the trigger mechanism for each sensor.

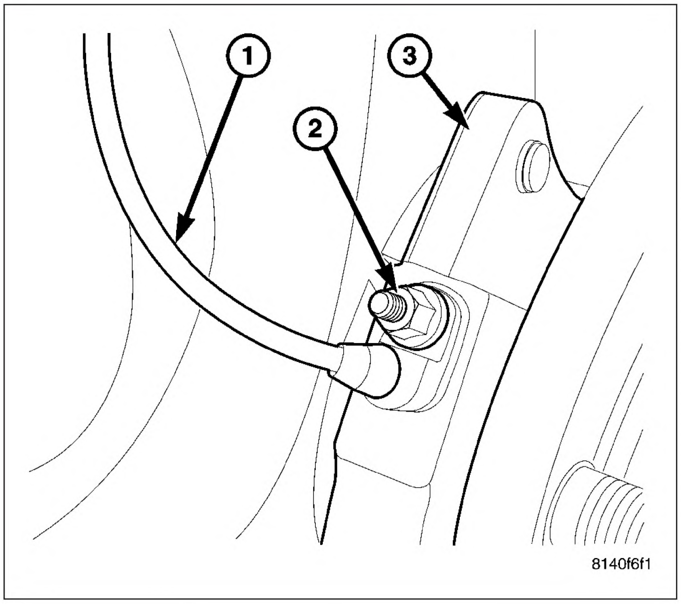
OPERATION

The sensors convert wheel speed into a small digital signal. The ABM sends 12 volts to the sensors. The sensor has an internal magneto resistance bridge that alters the voltage and amperage of the signal circuit. This voltage and amperage is changed by magnetic induction when the toothed tone wheel passes the wheel speed sensor. This digital signal is sent to the ABM. The ABM measures the voltage and amperage of the digital signal for each wheel.

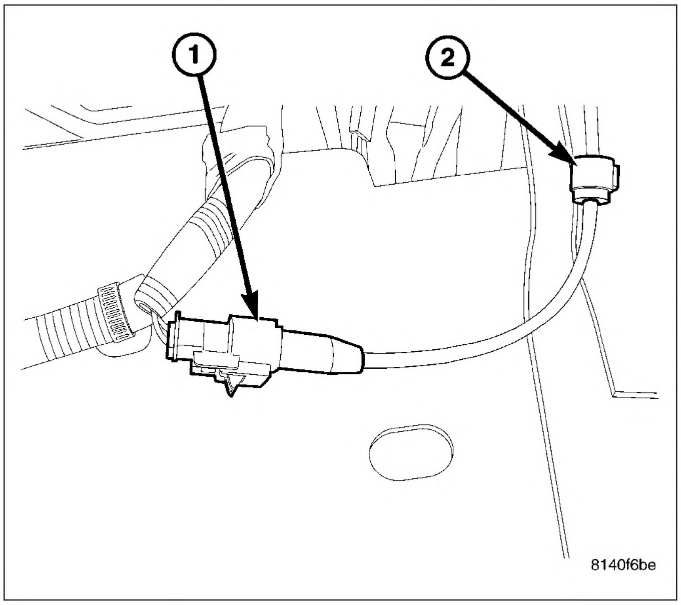
REMOVAL

1. Raise and support the vehicle.
2. Remove the tire and wheel assembly.
3. Remove the caliper adaptor bolts. **Support the caliper and adaptor assembly Do Not let assembly hang by the hose.** (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL).
4. Remove the disc brake rotor (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).

5. Remove the front wheel sensor mounting nut (2) to the hub (3).
6. Remove the wheel speed sensor (1) from the hub (3).

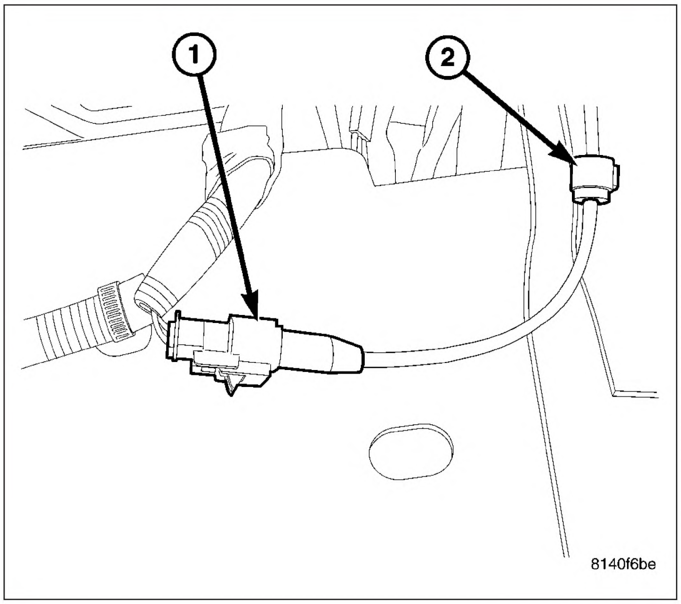


7. Disconnect the wire sensor routing clips (2).
8. Disconnect the wheel speed sensor wire connector (1).
9. Remove the sensor and wire.

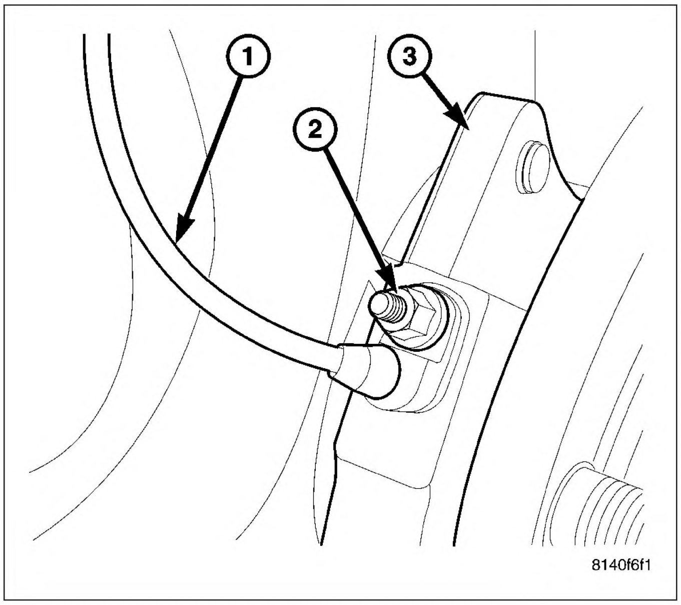


INSTALLATION

1. Reconnect the wheel speed sensor wire connector (1).
2. Reroute and connect the wheel speed sensor wire to the routing clips (2).



3. Install the wheel speed sensor into the hub (3) and the install the mounting nut (2) and tighten the nut to 12-14 N·m (106-124 in. lbs.).
4. Check the sensor wire routing (1). Be sure the wire is clear of all chassis components and is not twisted or kinked at any spot.



5. Install the disc brake rotor (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION).
6. Install the caliper adaptor over the rotor.
7. Install the caliper adaptor bolts and tighten to 90-115 N·m (66-85 ft. lbs.) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).
8. Install the tire and wheel assembly.
9. Remove the support and lower vehicle.

SENSOR-REAR WHEEL SPEED

DESCRIPTION

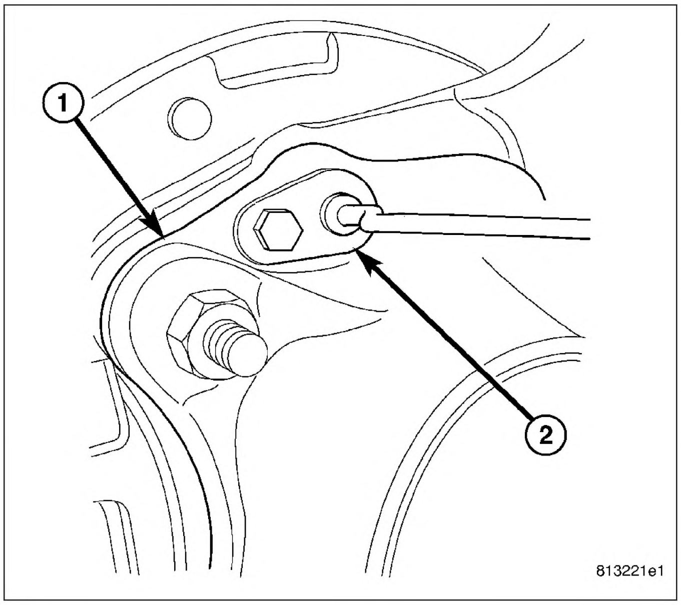
A wheel speed sensor is used at each wheel. The front sensors are mounted to the steering knuckles. The rear sensors are mounted at the outboard end of the axle. Tone wheels are mounted to the outboard ends of the front and rear axle shafts. The gear type tone wheel serves as the trigger mechanism for each sensor.

OPERATION

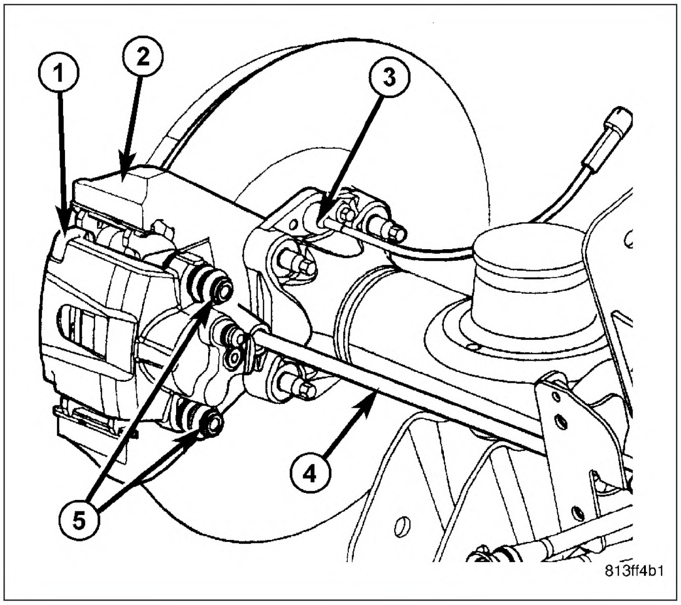
The sensors convert wheel speed into a small digital signal. The ABM sends 12 volts to the sensors. The sensor has an internal magneto resistance bridge that alters the voltage and amperage of the signal circuit. This voltage and amperage is changed by magnetic induction when the toothed tone wheel passes the wheel speed sensor. This digital signal is sent to the ABM. The ABM measures the voltage and amperage of the digital signal for each wheel.

REMOVAL

1. Raise and support the vehicle.
2. Remove the wheel speed sensor mounting bolt (2) from the rear supprt plate (1).

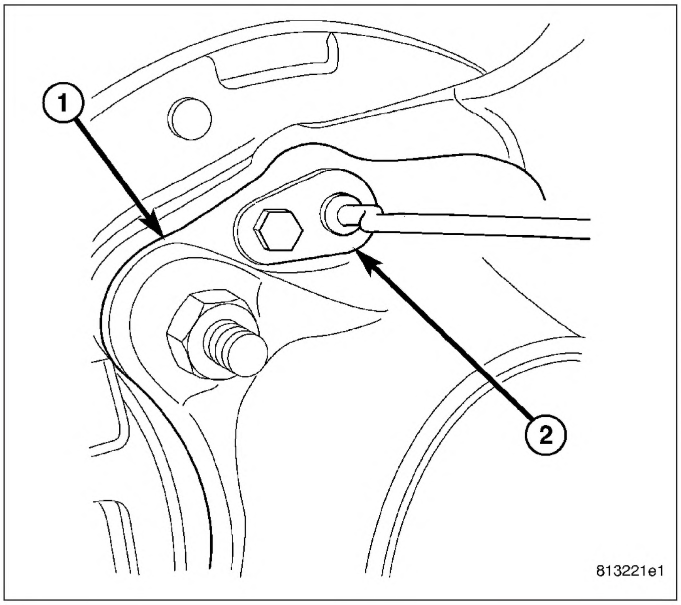


3. Remove the wheel speed sensor (3) the support plate.
4. Disconnect the wheel speed sensor electrical connector (3).

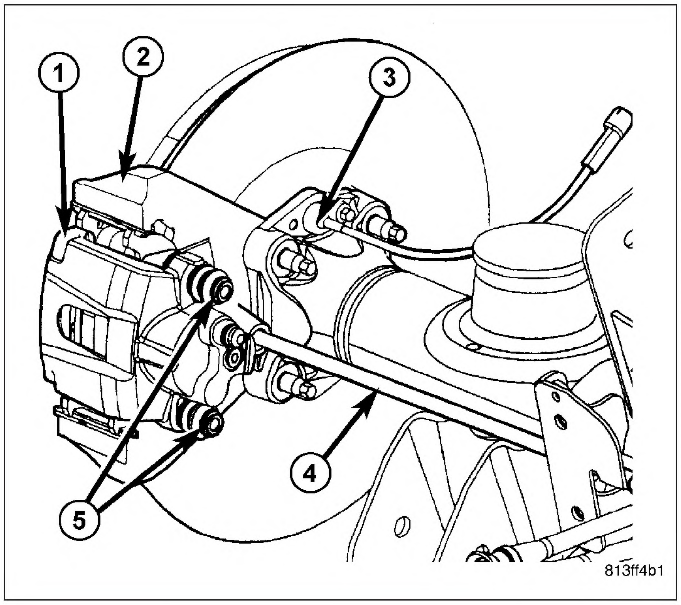


INSTALLATION

1. Insert the wheel speed sensor (2) through the support plate (1).
2. Tighten the wheel speed sensor bolt (2) to 12-14 N·m (106-124 in. lbs.).



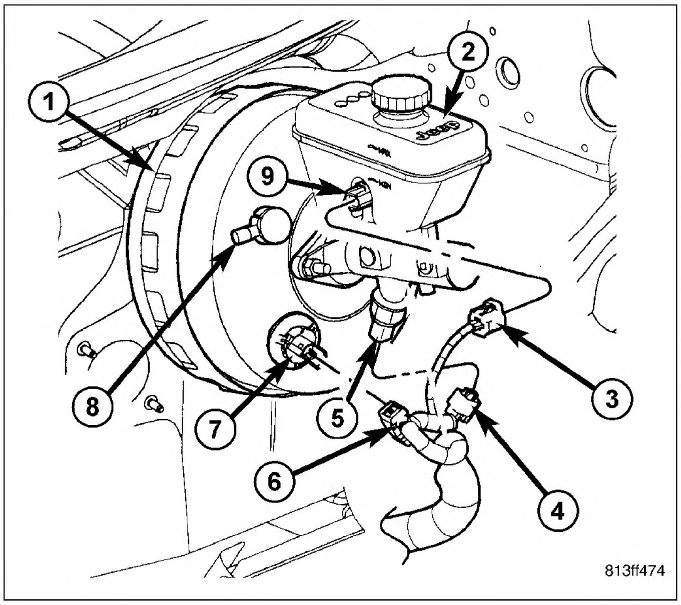
3. Secure the wheel speed sensor wire (3) to the routing clips. Verify that the sensor wire is secure and clear of the rotating components.
4. Reconnect the wheel speed sensor electrical connector (3).
5. Lower the vehicle.



SENSOR-BRAKE PRESSURE

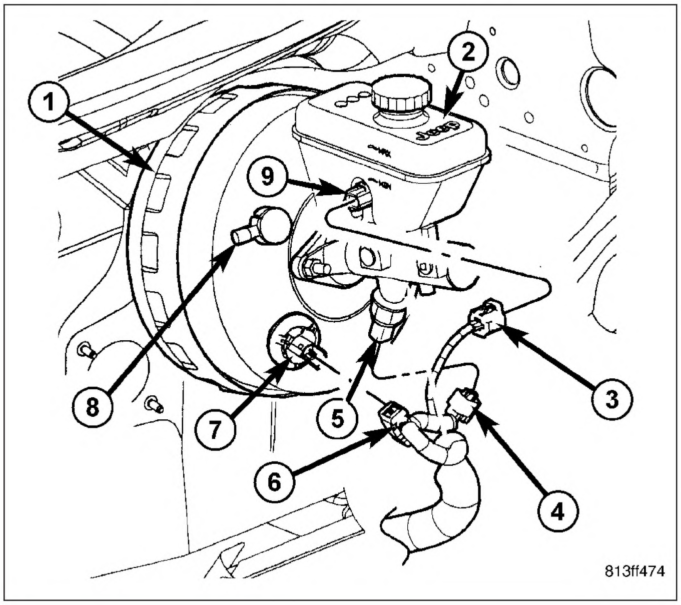
REMOVAL

1. Disconnect wiring harness (4) connector from pressure switch (5).
2. Remove pressure switch (5) on bottom of master cylinder.



INSTALLATION

1. Install pressure switch (5) on bottom of master cylinder. Tighten switch to 28 N·m (250 in. lbs.) torque.
2. Connect wiring harness (4) connector to pressure switch (5).
3. Fill master cylinder fluid reservoir (2) with clean, fresh Mopar® Brake Fluid or equivalent.
4. Perform Verification Test and clear any faults. (Refer to 5 - BRAKES - DIAGNOSIS AND TESTING).

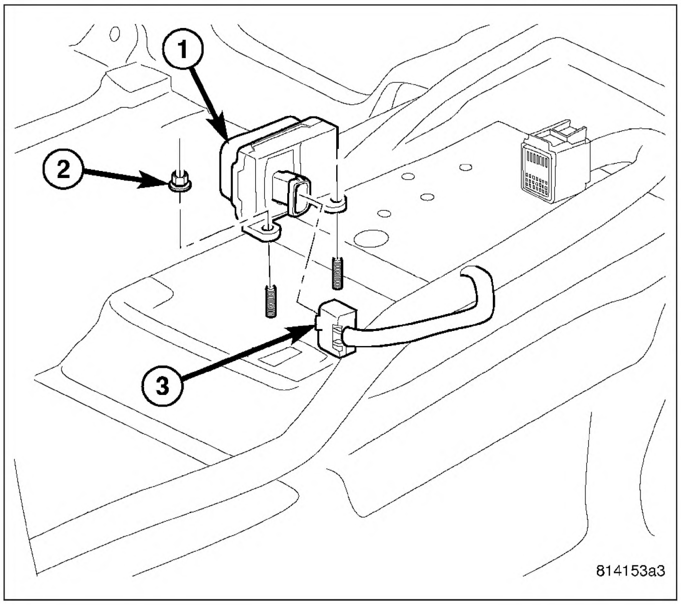


SENSOR-DYNAMICS

DESCRIPTION

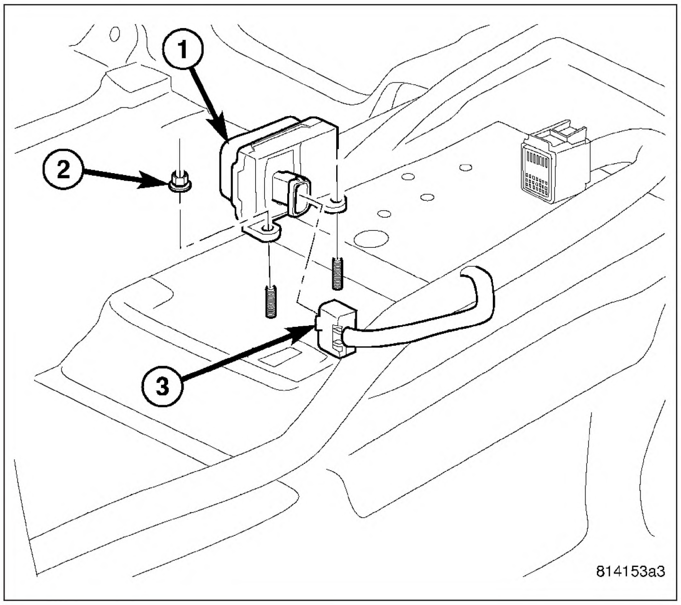
The Yaw Rate and Lateral Acceleration Sensors are housed into one unit known as the Dynamics Sensor (1). The sensor is used to measure side-to-side (Lateral) motion and vehicle rotational sensing (how fast the vehicle is turning - Yaw).

Yaw and Lateral Acceleration Sensors cannot be serviced separately. The entire Dynamics Sensor (1) must be replaced when necessary.



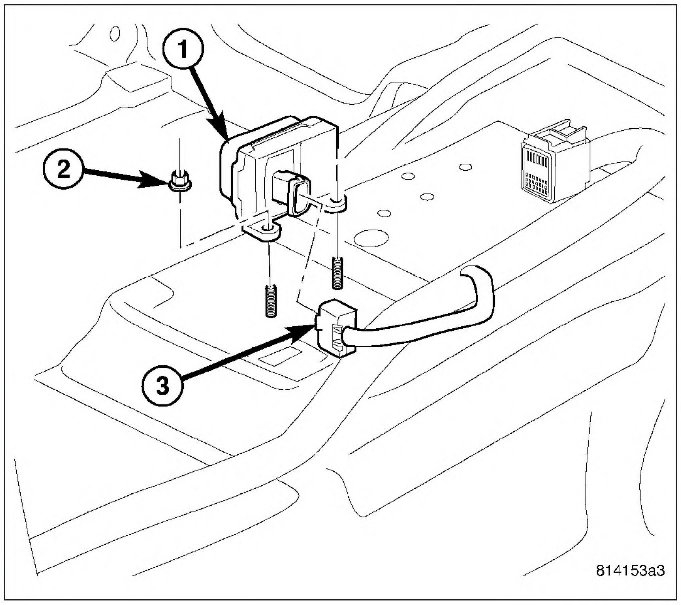
REMOVAL

1. Remove the center console (Refer to 23 - BODY/ INTERIOR/FLOOR CONSOLE - REMOVAL).
2. Disconnect electrical connector (3) from the dynamics sensor (1).
3. Remove the two nuts (2) securing the sensor to the floor.
4. Remove the sensors.



INSTALLATION

1. Install the dynamics sensor (1) to the vehicle.
2. Install the electrical connector (3)
3. Install the two retaining nuts (2).
4. Install the floor console.



SENSOR-STEERING ANGLE

DESCRIPTION

Under transient cornering conditions the lateral acceleration sensor does not measure the true sway force on the car. In order to compensate for this the system uses the driver's steering command (Steering angle sensor) and vehicle speed to estimate the true sway force. This signal is matched with the lateral acceleration sensor signal to ensure a significantly-reduced transient sway of the vehicle body.

REMOVAL

1. For removal of the steering angle sensor (Refer to 19 - STEERING/COLUMN/STEERING CONTROL MODULE - REMOVAL).

INSTALLATION

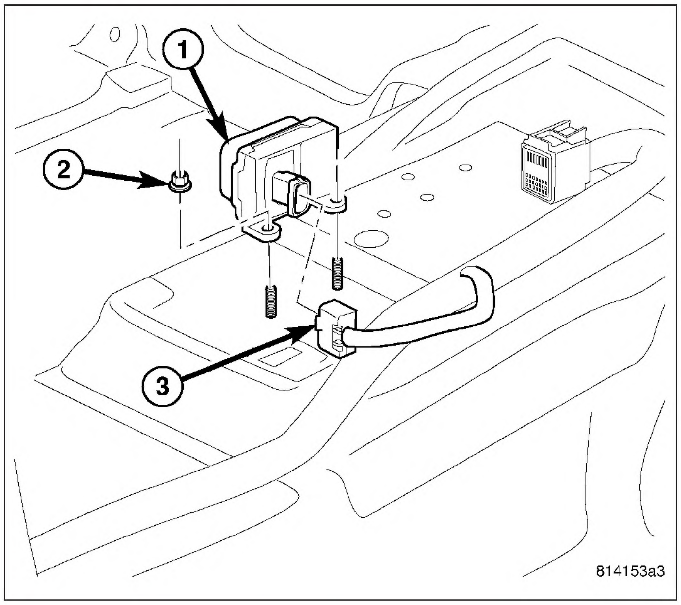
1. For installation of the steering angle sensor (Refer to 19 - STEERING/COLUMN/STEERING CONTROL MODULE - INSTALLATION).

SENSOR-G

DESCRIPTION

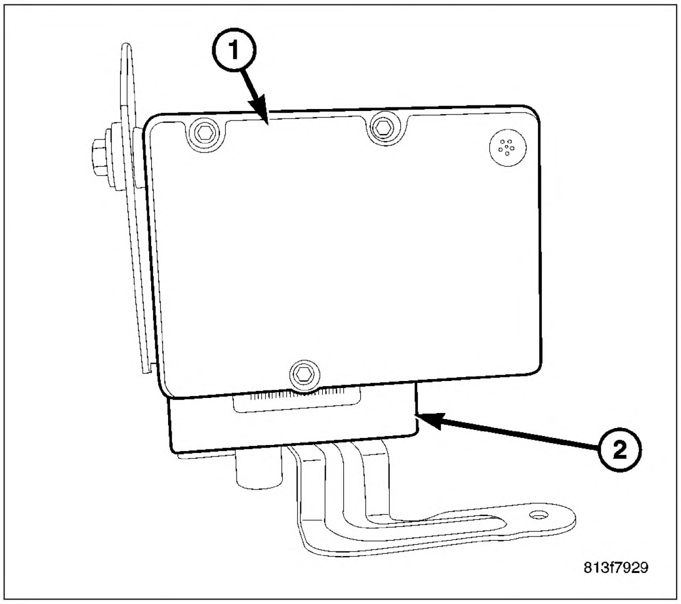
G-SENSOR - WITH ESP

The G-sensor is housed internally in with the dynamics sensor (1) located under the center console. The dynamics sensor component can be replaced as one component only. The G-sensor is not serviceable separately.



G-SENSOR - WITHOUT ESP

The G-sensor is located inside the ABM (Antilock Brake Module) (1). The sensor is not a separate serviceable part from the ABM (1).



HCU (HYDRAULIC CONTROL UNIT)

DESCRIPTION

The HCU consists of a valve body, pump motor, and wire harness.

OPERATION

Accumulators in the valve body store extra fluid released to the system for ABS mode operation. The pump is used to clear the accumulator of brake fluid and is operated by a DC type motor. The motor is controlled by the ABM.

The valves modulate brake pressure during antilock braking and are controlled by the ABM.

The HCU provides three channel pressure control to the front and rear brakes. One channel controls the rear wheel brakes in tandem. The two remaining channels control the front wheel brakes individually.

During antilock braking, the solenoid valves are opened and closed as needed. The valves are not static. They are cycled rapidly and continuously to modulate pressure and control wheel slip and deceleration.

During normal braking, the HCU solenoid valves and pump are not activated. The master cylinder and power booster operate the same as a vehicle without an ABS brake system.

During antilock braking, solenoid valve pressure modulation occurs in three stages, pressure increase, pressure hold, and pressure decrease. The valves are all contained in the valve body portion of the HCU.

PRESSURE DECREASE

The outlet valve is opened and the inlet valve is closed during the pressure decrease cycle.

A pressure decrease cycle is initiated when speed sensor signals indicate high wheel slip at one or more wheels. At this point, the ABM closes the inlet then opens the outlet valve, which also opens the return circuit to the accumulators. Fluid pressure is allowed to bleed off (decrease) as needed to prevent wheel lock.

Once the period of high wheel slip has ended, the ABM closes the outlet valve and begins a pressure increase or hold cycle as needed.

PRESSURE HOLD

Both solenoid valves are closed in the pressure hold cycle. Fluid apply pressure in the control channel is maintained at a constant rate. The ABM maintains the hold cycle until sensor inputs indicate a pressure change is necessary.

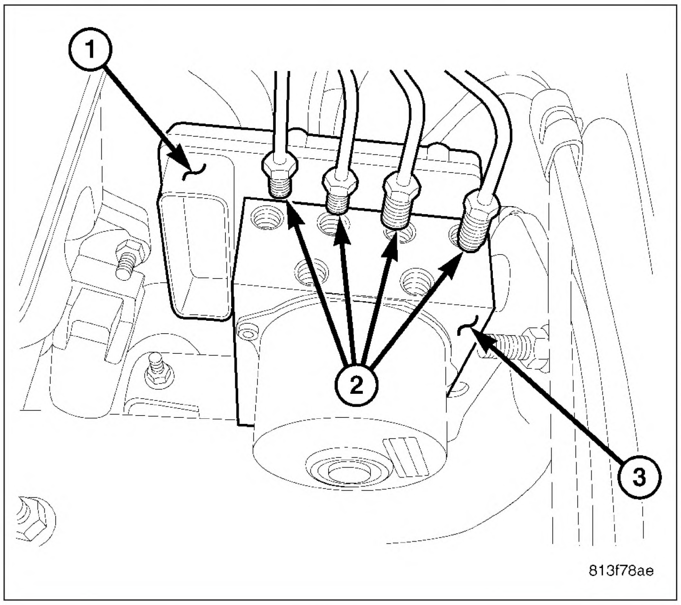
PRESSURE INCREASE

The inlet valve is open and the outlet valve is closed during the pressure increase cycle. The pressure increase cycle is used to counteract unequal wheel speeds. This cycle controls re-application of fluid apply pressure due to changing road surfaces or wheel speed.

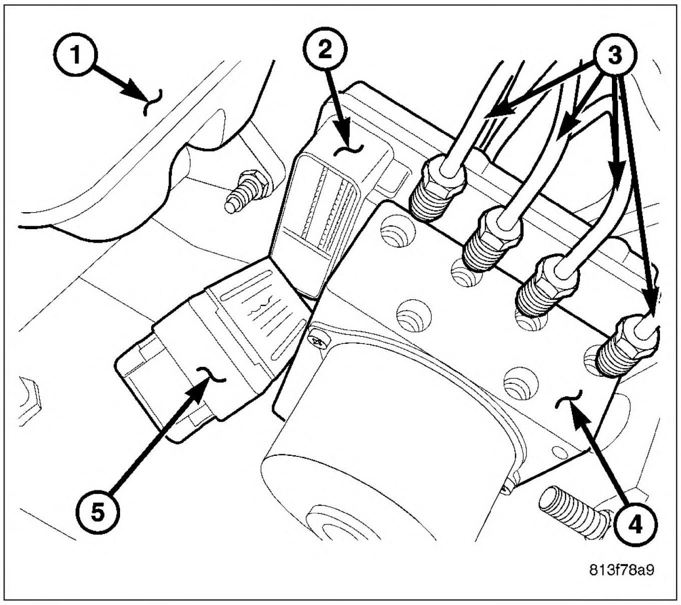
REMOVAL

1. Remove the negative battery cable from the battery.
2. Install a brake pedal prop rod.
3. Siphon the master cylinder.

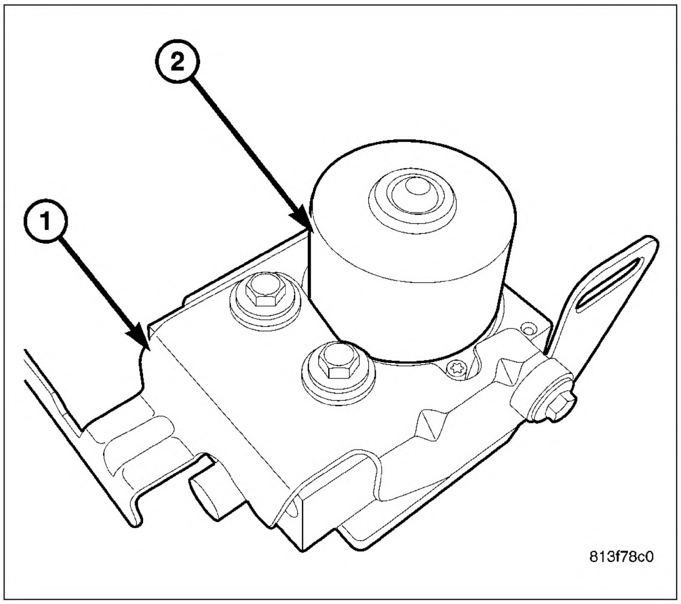
4. Remove the primary brake line at the master cylinder.
5. Remove the primary brake line from the HCU (3).
6. Remove the secondary brake tube at the master cylinder.
7. Remove the secondary brake tube at the HCU (3).
8. Remove the 4 chassis lines (2) at the HCU (3).



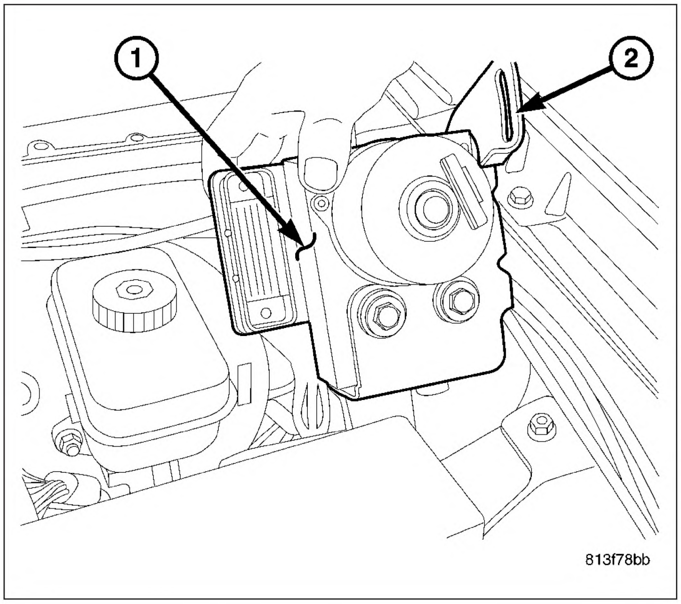
9. Disconnect the HCU electrical connectors (5).



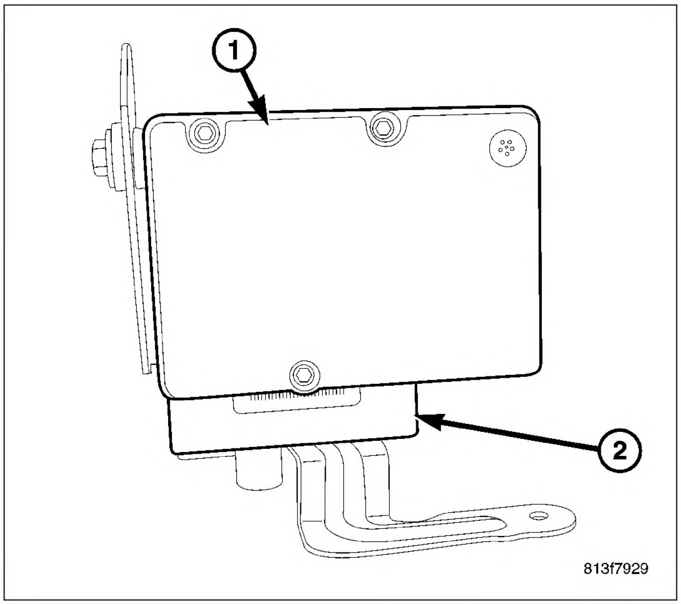
10. Remove the 3 mounting nuts at the HCU bracket (1).



11. Remove the HCU (1) with the bracket (2) from the vehicle.



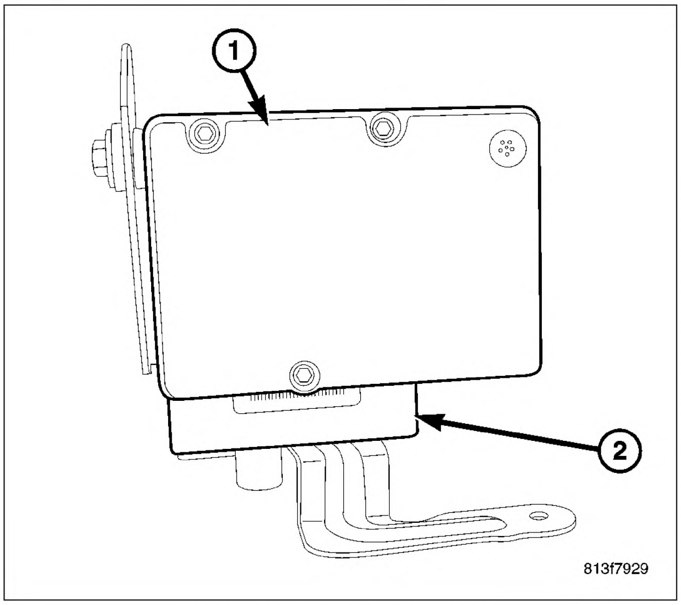
12. Remove the 3 ABM bolts securing the ABM (1) to the HCU (2).



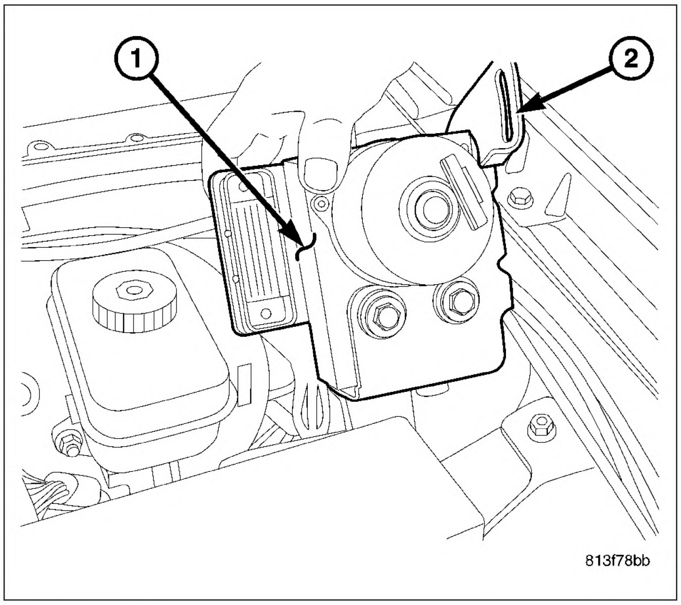
INSTALLATION

NOTE: If the ABM is being replaced with a new ABM is must be reprogrammed with the use of a scan tool.

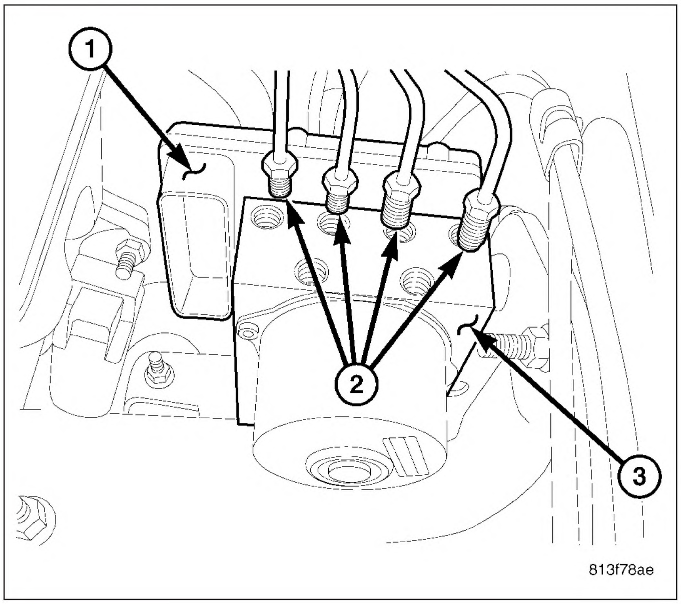
1. Install the 3 ABM (1) mounting bolts to the HCU (2) if removed tighten mounting bolts to 12 N·m (9 ft. lbs.).



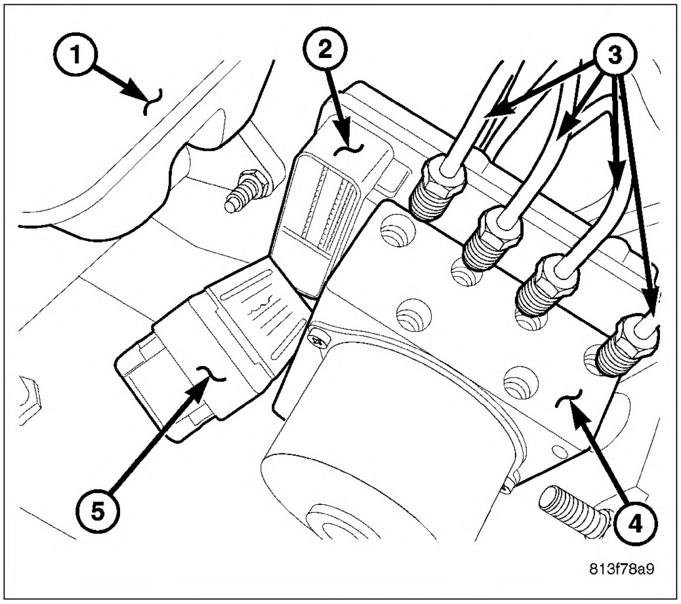
2. Install the HCU (1) with bracket (2) to the vehicle and tighten the 2 mounting nuts.



3. Install the 4 chassis lines (2) at the HCU (3).
4. Install the secondary brake line at the HCU (3).
5. Install the secondary brake line at the master cylinder.
6. Install the primary brake line at the HCU (3).
7. Install the primary brake line at the master cylinder.



8. Reconnect the HCU (4) electrical connector (5).



9. Install negative battery cable to the battery.
10. Remove the brake pedal prop rod.
11. Bleed base and ABS brake systems, (Refer to 5 - BRAKES - STANDARD PROCEDURE).

BOOSTER-ACTIVE BRAKE

DESCRIPTION

The active brake booster is part of the Electronic Stability Program (ESP). It is serviced as part of the power brake booster. For more information on ESP, (Refer to 5 - BRAKES - DESCRIPTION).

BRAKES - BRAKE CONTROLLER ELECTRICAL DIAGNOSTICS

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BRAKES - BRAKE CONTROLLER ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

APS-INTERMITTENT CONDITION

For the Adjustable Pedals System circuit diagrams. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

Diagnostic Test

1.

NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

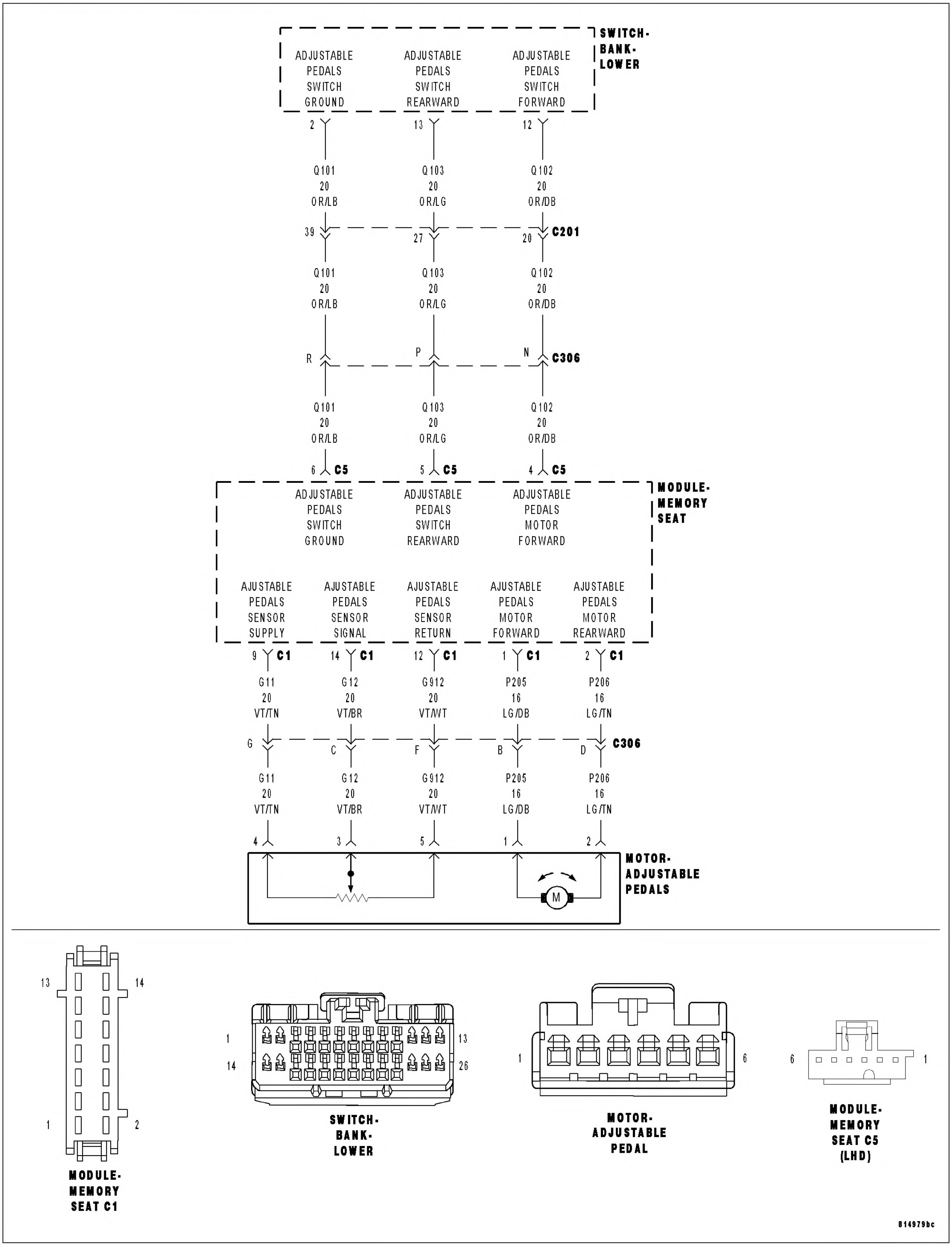
1. Refer to any Technical Service Bulletins (TSBs) that may apply.
2. Review the scan tool information. If possible, try to duplicate the conditions under which the DTC set.
3. Turn the ignition off.
4. Visually inspect the related wire harness. Disconnect all the related harness connectors. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.
5. Perform a voltage drop test on the related circuits between the suspected faulty component and the Memory Seat Module.
6. Inspect and clean all grounds that are related to the most current DTC.
7. If numerous trouble codes were set, use a wiring schematic and look for any common ground or supply circuits
8. Monitor with the scan tool and wiggle the related wire harness to try to interrupt the actuation.
9. Use the scan tool to perform a System Test if one applies to failing component.
10. A co-pilot, data recorder, and/or lab scope should be used to help diagnose intermittent conditions.

Were any problems found during the above inspections?

Yes >> Perform the necessary repairs.
Perform APS VERIFICATION TEST VER - 1.

No >> Test Complete.

B1D56–ADJUSTABLE PEDAL SENSOR CIRCUIT LOW


SWITCH-BANK-LOWER
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS SWITCH FORWARD
2
13
12
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
39
27
20
C201
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
R
P
N
C306
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
6 C5
5 C5
4 C5
MODULE-MEMORY SEAT
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS SENSOR SUPPLY
AJUSTABLE PEDALS SENSOR SIGNAL
AJUSTABLE PEDALS SENSOR RETURN
AJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS MOTOR REARWARD
9 C1
14 C1
12 C1
1 C1
2 C1
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
4
3
5
1
2
MOTOR-ADJUSTABLE PEDALS
M
13
14
1
2
MODULE-MEMORY SEAT C1
1
13
14
26
SWITCH-BANK-LOWER
1
6
MOTOR-ADJUSTABLE PEDAL
6
1
MODULE-MEMORY SEAT C5 (LHD)
814979bc

B1D56–ADJUSTABLE PEDAL SENSOR CIRCUIT LOW (CONTINUED)

For the Adjustable Pedal System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Adjustable Pedal Motor is in active operation.
- **Set Condition:**
  The Memory Seat Module detects a low signal circuit voltage that is not within voltage specification from the Adjustable Pedal Sensor.

Possible Causes
CONNECTOR/TERMINAL DAMAGE
ADJUSTABLE PEDALS SENSOR SUPPLY CIRCUIT SHORTED TO GROUND, OR OPEN
ADJUSTABLE PEDALS SENSOR SIGNAL CIRCUIT SHORTED TO GROUND, OR OPEN
ADJUSTABLE PEDALS SENSOR - INTERNAL FAULT
MEMORY SEAT MODULE - INTERNAL FAULT

Diagnostic Test

1. CHECK FOR DTC B1D56–ADJUSTABLE PEDAL SENSOR CIRCUIT LOW

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, record and erase DTC’s.

Cycle the ignition switch from off to on.

Cycle the Adjustable Pedals Switch forward and rearward.

With the scan tool, read DTC’s

Does the scan tool display: B1D56–ADJUSTABLE PEDAL SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK CONNECTOR/TERMINAL FOR DAMAGE

NOTE: Check all terminals for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Inspect the Memory Seat Module harness connector and Adjustable Pedals Motor harness connector.

Is there any connector or terminal damaged?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

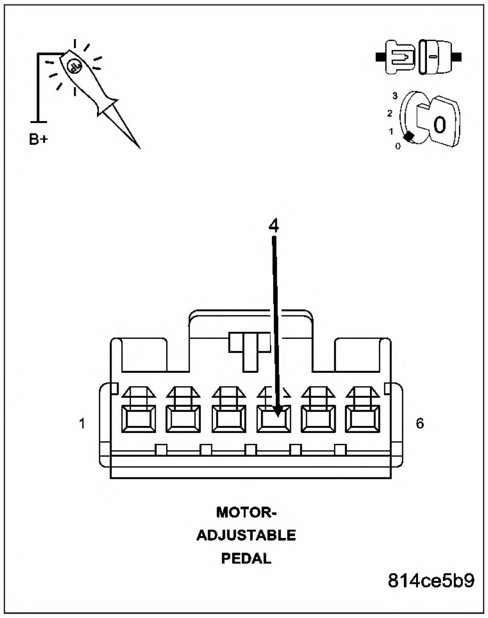
B1D56–ADJUSTABLE PEDAL SENSOR CIRCUIT LOW (CONTINUED)

3. CHECK ADJUSTABLE PEDALS SENSOR SUPPLY CIRCUIT FOR A SHORT TO GROUND

Disconnect the Memory Seat Module harness connector.

Disconnect the Adjustable Pedals Motor harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Sensor Supply circuit.



Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Sensor Supply circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

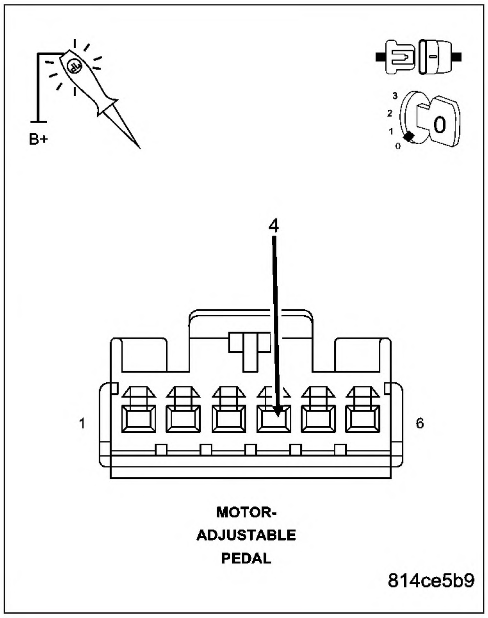
No >> Go To 4

---

4. CHECK ADJUSTABLE PEDALS SENSOR SUPPLY CIRCUIT FOR AN OPEN

Connect a jumper wire between the Adjustable Pedals Sensor Supply circuit and ground at the Memory Seat Module harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Sensor Supply circuit.



Does the test light illuminate brightly

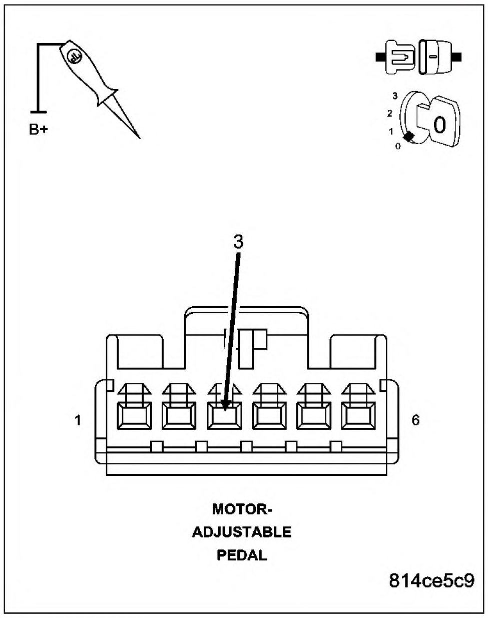
Yes >> Go To 5

No >> Repair the Adjustable Pedals Sensor Supply circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

B1D56–ADJUSTABLE PEDAL SENSOR CIRCUIT LOW (CONTINUED)

5. CHECK ADJUSTABLE PEDALS SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Sensor Signal circuit.



Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Sensor Signal circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

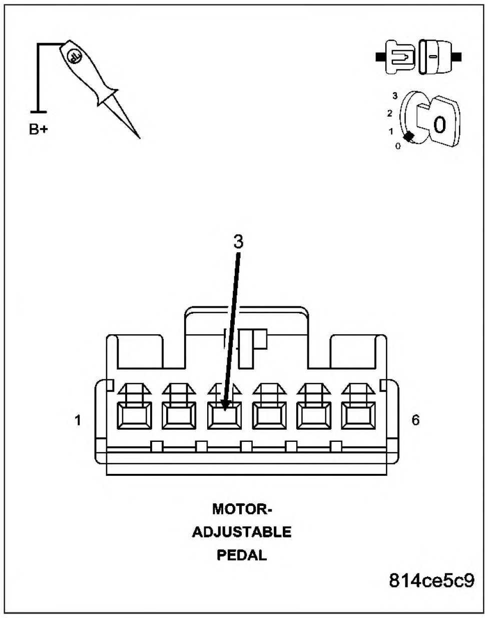
No >> Go To 6

---

6. CHECK ADJUSTABLE PEDALS SENSOR SIGNAL CIRCUIT FOR AN OPEN

Connect a jumper wire between the Adjustable Pedals Sensor Signal circuit and ground at the Memory Seat Module harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Sensor Signal circuit.



Does the test light illuminate brightly?

Yes >> Go To 7

No >> Repair the Adjustable Pedals Sensor Signal circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

B1D56–ADJUSTABLE PEDAL SENSOR CIRCUIT LOW (CONTINUED)

7. CHECK ADJUSTABLE PEDALS SENSOR SUPPLY CIRCUIT VOLTAGE

Connect the Memory Seat Module harness connector.

Turn the ignition on.

Measure the voltage between the Adjustable Pedals Sensor Supply circuit and ground at the Adjustable Pedal Motor harness connector.

Is the voltage between 4.0 and 5.2 volts?

Yes >> Go To 8

No >> Replace and reprogram the Memory Seat Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

---

8. CHECK ADJUSTABLE PEDALS SENSOR SIGNAL CIRCUIT VOLTAGE

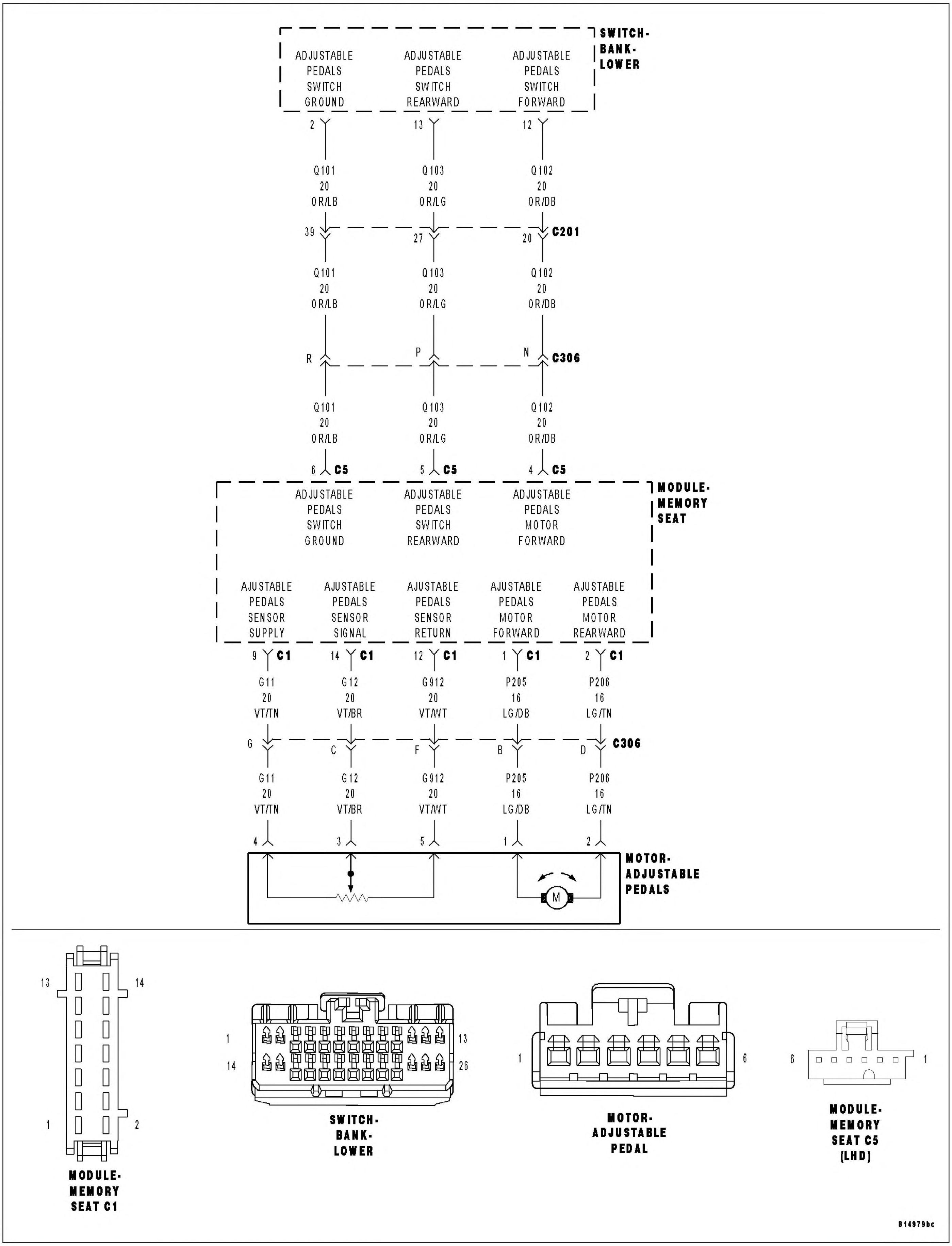
Measure the voltage of the Adjustable Pedals Sensor Signal circuit in the Memory Seat Module harness connector.

Is the voltage above 0.5 volts?

Yes >> Replace and reprogram the Memory Seat Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Replace the Adjustable Pedals Sensor in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

B1D57–ADJUSTABLE PEDAL SENSOR CIRCUIT HIGH


SWITCH-BANK-LOWER
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS SWITCH FORWARD
2
13
12
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
39
27
20
C201
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
R
P
N
C306
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
6 C5
5 C5
4 C5
MODULE-MEMORY SEAT
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS SENSOR SUPPLY
AJUSTABLE PEDALS SENSOR SIGNAL
AJUSTABLE PEDALS SENSOR RETURN
AJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS MOTOR REARWARD
9 C1
14 C1
12 C1
1 C1
2 C1
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
4
3
5
1
2
M
MOTOR-ADJUSTABLE PEDALS
13
14
1
2
MODULE-MEMORY SEAT C1
1
13
14
26
SWITCH-BANK-LOWER
1
6
MOTOR-ADJUSTABLE PEDAL
6
1
MODULE-MEMORY SEAT C5 (LHD)
814979bc

B1D57–ADJUSTABLE PEDAL SENSOR CIRCUIT HIGH (CONTINUED)

For the Adjustable Pedal System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Adjustable Pedal Motor is in active operation.
- **Set Condition:**
  The Memory Seat Module detects a high signal circuit voltage that is not within voltage specification from the Adjustable Pedal Sensor.

Possible Causes
CONNECTOR/TERMINAL DAMAGE
ADJUSTABLE PEDALS SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE
ADJUSTABLE PEDALS SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ADJUSTABLE PEDALS SENSOR - INTERNAL FAULT
MEMORY SEAT MODULE - INTERNAL FAULT

Diagnostic Test

1. CHECK FOR DTC B1D57–ADJUSTABLE PEDAL SENSOR CIRCUIT HIGH

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, record and erase DTC’s.

Cycle the ignition switch from off to on.

Cycle the Adjustable Pedals Switch forward and rearward.

With the scan tool, read DTC’s

Does the scan tool display: B1D57–ADJUSTABLE PEDAL SENSOR CIRCUIT HIGH?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK CONNECTOR/TERMINAL FOR DAMAGE

NOTE: Check all terminals for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Inspect the Memory Seat Module harness connector and the Adjustable Pedal Motor harness connector.

Is there any connector or terminal damaged?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D57–ADJUSTABLE PEDAL SENSOR CIRCUIT HIGH (CONTINUED)

3. CHECK ADJUSTABLE PEDALS SENSOR SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

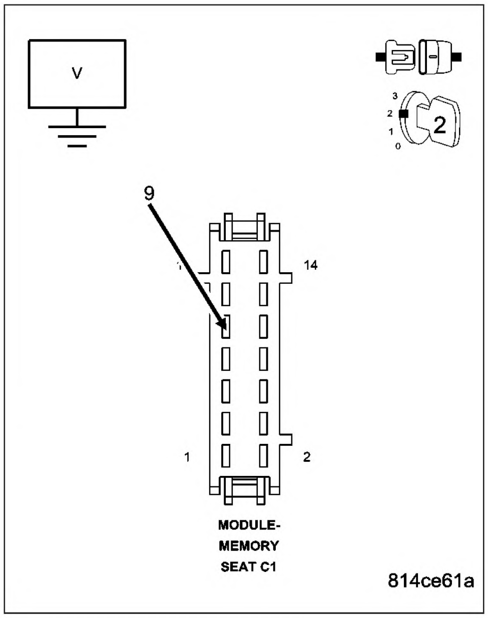
Turn the ignition off.

Disconnect the Memory Seat Module harness connector.

Disconnect the Adjustable Pedal Motor harness connector.

Turn the ignition on.

Measure the voltage between the Adjustable Pedals Sensor Supply circuit and ground.



Is voltage present?

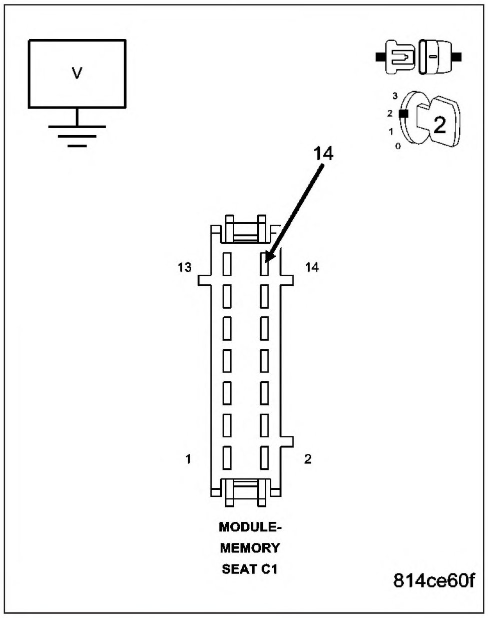
Yes >> Repair the Adjustable Pedals Sensor Supply circuit for a short to voltage.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK ADJUSTABLE PEDALS SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Measure the voltage between the Adjustable Pedals Sensor Signal circuit and ground.



Is voltage present?

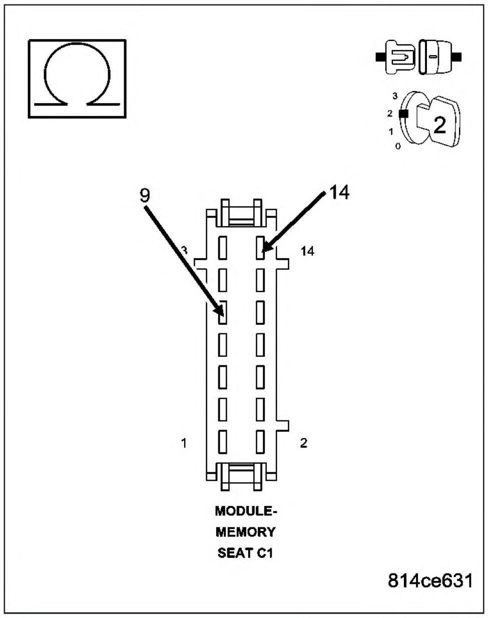
Yes >> Repair the Adjustable Pedals Sensor Signal circuit for a short to voltage.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 5

B1D57–ADJUSTABLE PEDAL SENSOR CIRCUIT HIGH (CONTINUED)

5. ADJUSTABLE PEDAL SENSOR SIGNAL SHORTED TO SENSOR SUPPLY

Measure the resistance between the Adjustable Pedals Sensor Signal circuit and the Sensor Supply circuit.



3
2
1
0
2
9
14
14
1
2
MODULE-MEMORY SEAT C1

814ce631

Is the resistance below 100 ohms?

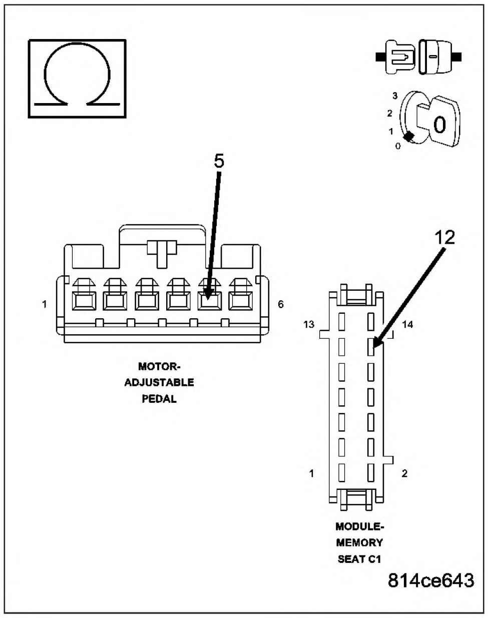
Yes >> Repair the Adjustable Pedals Sensor Signal circuit for a short to the Sensor Supply circuit.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. ADJUSTABLE PEDALS SENSOR RETURN CIRCUIT OPEN

Measure the resistance of the Adjustable Pedals Sensor Return circuit between the Memory Seat Module harness connector and the Adjustable Pedal Motor harness connector.



3
2
1
0
0
5
12
1
6
13
14
1
2
MOTOR-ADJUSTABLE PEDAL
MODULE-MEMORY SEAT C1

814ce643

Is the resistance below 5 ohms?

Yes >> Go To 7

No >> Repair the Adjustable Pedals Sensor Ground circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

B1D57–ADJUSTABLE PEDAL SENSOR CIRCUIT HIGH (CONTINUED)

7. CHECK ADJUSTABLE PEDALS SENSOR SIGNAL CIRCUIT VOLTAGE

Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

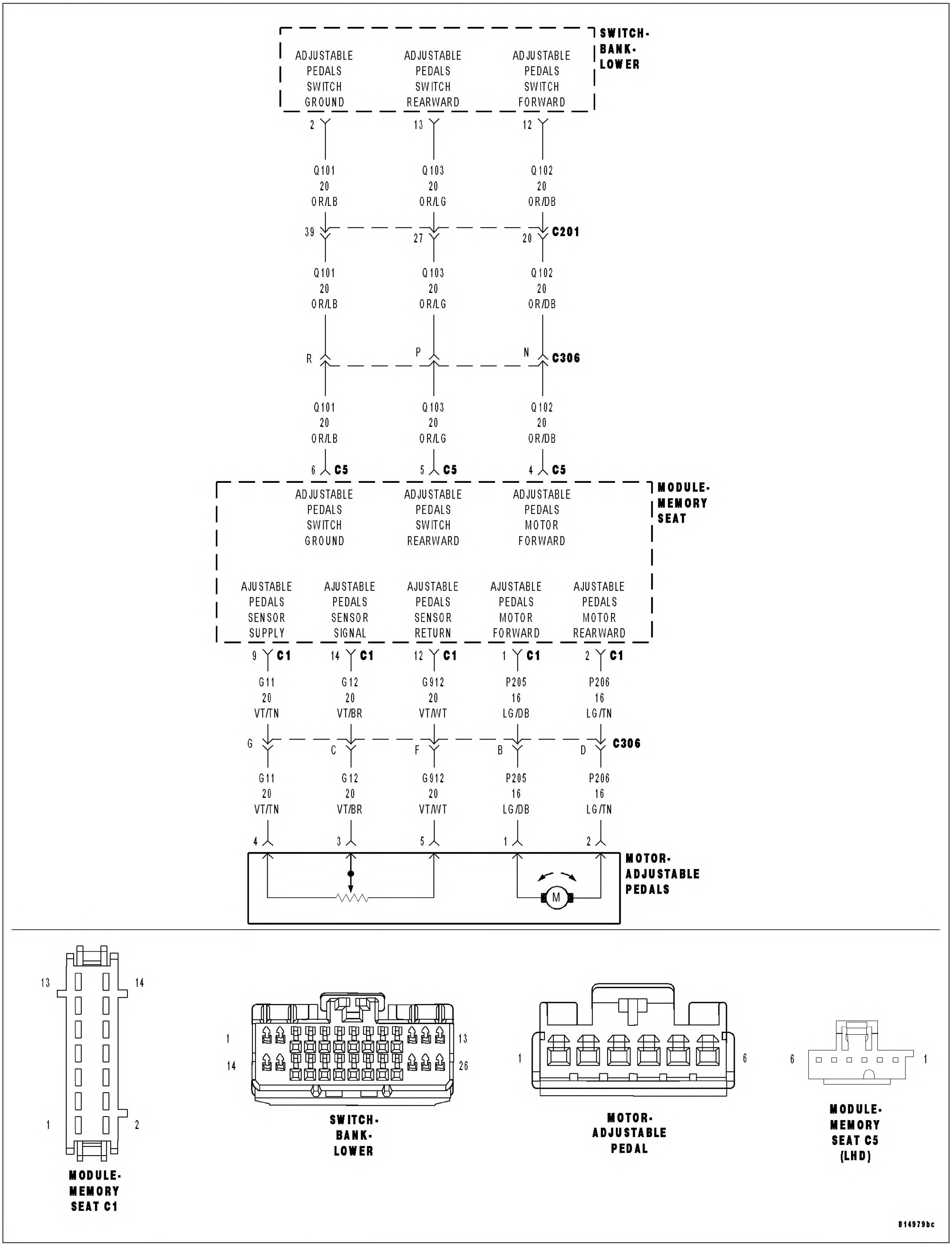
Measure the voltage of the Adjustable Pedals Sensor Signal circuit in the Memory Seat Module harness connector.

Is the voltage below 4.0 volts?

Yes >> Replace and reprogram the Memory Seat Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Replace the Adjustable Pedals Sensor in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

B1D5B–ADJUSTABLE PEDAL SWITCH CIRCUIT PERFORMANCE


SWITCH-BANK-LOWER
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS SWITCH FORWARD
2
13
12
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
39
27
20
C201
R
P
N
C306
6 C5
5 C5
4 C5
MODULE-MEMORY SEAT
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS SENSOR SUPPLY
AJUSTABLE PEDALS SENSOR SIGNAL
AJUSTABLE PEDALS SENSOR RETURN
AJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS MOTOR REARWARD
9 C1
14 C1
12 C1
1 C1
2 C1
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
4
3
5
1
2
M
MOTOR-ADJUSTABLE PEDALS
13
14
1
2
MODULE-MEMORY SEAT C1
1
14
13
26
SWITCH-BANK-LOWER
1
6
MOTOR-ADJUSTABLE PEDAL
6
1
MODULE-MEMORY SEAT C5 (LHD)
814979bc

B1D5B–ADJUSTABLE PEDAL SWITCH CIRCUIT PERFORMANCE (CONTINUED)

For the Adjustable Pedal System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Adjustable Pedals Switch is in active operation.
- **Set Condition:**
  The Memory Seat Module detects an activation of both pedal switches at the same time.

Possible Causes
CONNECTOR/TERMINAL DAMAGE
ADJUSTABLE PEDALS SWITCH REARWARD CIRCUIT SHORTED TO GROUND
ADJUSTABLE PEDALS SWITCH FORWARD CIRCUIT SHORTED TO GROUND
ADJUSTABLE PEDALS SWITCH REARWARD CIRCUIT AND ADJUSTABLE PEDALS SWITCH FORWARD CIRCUIT SHORTED TOGETHER
ADJUSTABLE PEDALS SWITCH - INTERNAL FAULT
MEMORY SEAT MODULE - INTERNAL FAULT

Diagnostic Test

1. CHECK FOR DTC B1D5B–ADJUSTABLE PEDAL SWITCH CIRCUIT PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, record and erase DTC’s.

Cycle the ignition switch from off to on.

Cycle the Adjustable Pedals Switch forward and rearward.

With the scan tool, read DTC’s

Does the scan tool display: B1D5B–ADJUSTABLE PEDAL SWITCH CIRCUIT PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK CONNECTOR/TERMINAL FOR DAMAGE

NOTE: Check all terminals for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Inspect the Memory Seat Module harness connector and Lower Switch Bank harness connector.

Is the Lower Switch Bank or any of the connectors/terminals damaged?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D5B–ADJUSTABLE PEDAL SWITCH CIRCUIT PERFORMANCE (CONTINUED)

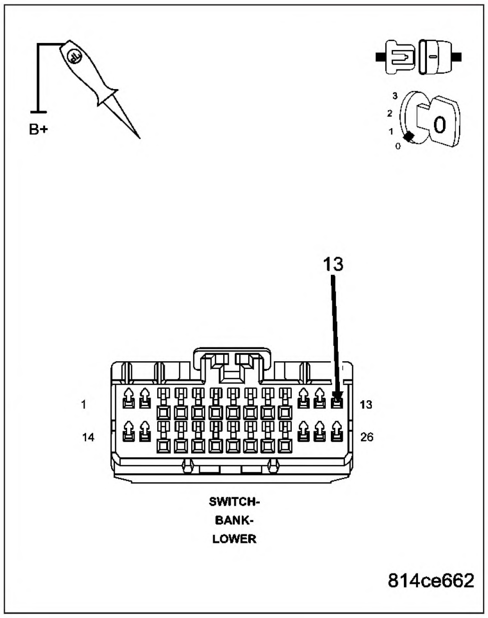
3. CHECK ADJUSTABLE PEDALS SWITCH REARWARD CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Memory Seat Module harness connector.

Disconnect the Lower Switch Bank harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Switch Rearward circuit.



Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Switch Rearward circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 4

---

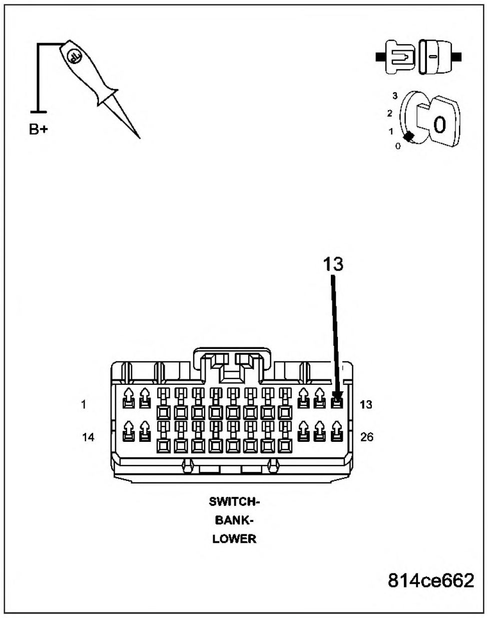
4. CHECK ADJUSTABLE PEDALS SWITCH FORWARD CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Memory Seat Module harness connector.

Disconnect the Lower Switch Bank harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Switch Forward circuit.



Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Switch Forward circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 5

B1D5B–ADJUSTABLE PEDAL SWITCH CIRCUIT PERFORMANCE (CONTINUED)

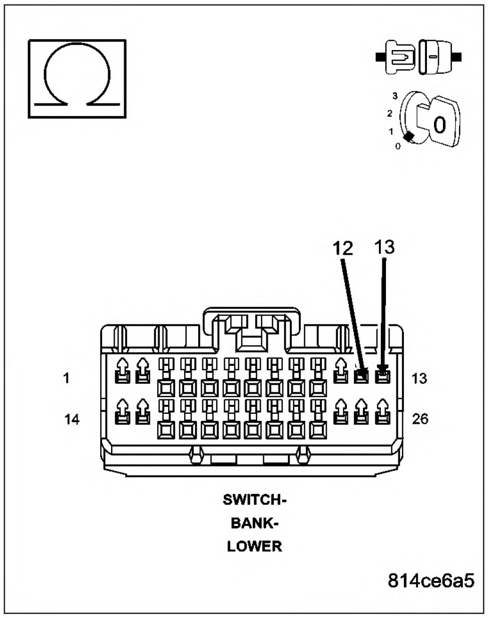
5. CHECK ADJUSTABLE PEDALS SWITCH REARWARD CIRCUIT AND ADJUSTABLE PEDALS SWITCH FORWARD CIRCUIT FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Memory Seat Module harness connector.

Disconnect the Lower Switch Bank harness connector.

Measure the resistance between the Adjustable Pedals Switch Rearward circuit and Adjustable Pedals Switch Forward circuit.



Is the resistance above 5.0 ohms?

Yes >> Go To 6

No >> Repair the Adjustable Pedals Switch Rearward circuit and Adjustable Pedals Switch Forward circuit for a short together.
Perform APS VERIFICATION TEST - VER 1.

---

6. CHECK LOWER SWITCH BANK SHORTED

Turn the ignition off.

Disconnect the Lower Switch Bank harness connector.

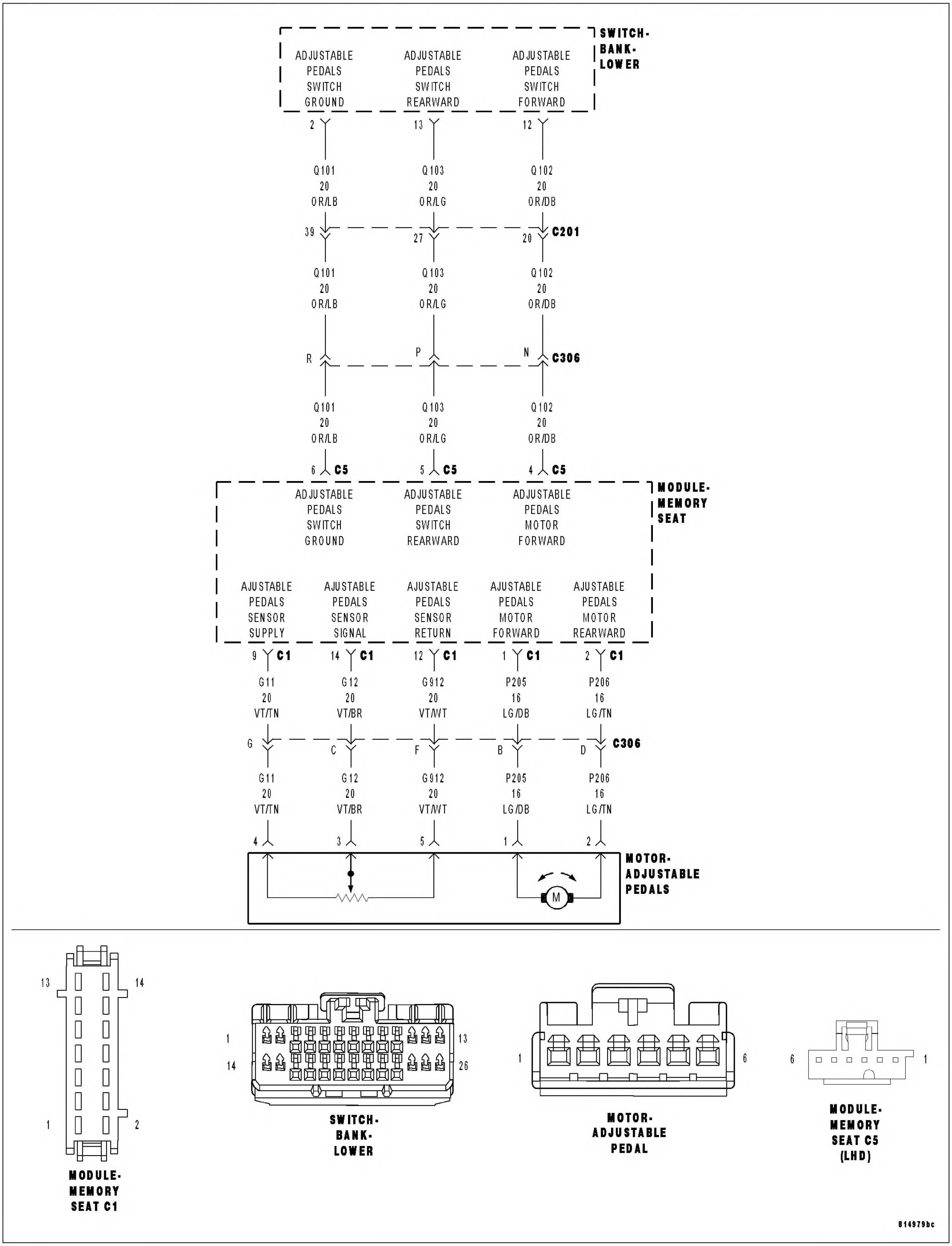
Measure the resistance between the Adjustable Pedals Switch Rearward and Adjustable Pedals Switch Forward terminals at the Lower Switch Bank.

Is the resistance below 5.0 ohms?

Yes >> Replace and reprogram the Memory Seat Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Replace the Lower Switch Bank in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

B1D5C–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK FORWARD


SWITCH-BANK-LOWER
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS SWITCH FORWARD
2
13
12
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
39
27
20
C201
R
P
N
C306
6 C5
5 C5
4 C5
MODULE-MEMORY SEAT
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS SENSOR SUPPLY
AJUSTABLE PEDALS SENSOR SIGNAL
AJUSTABLE PEDALS SENSOR RETURN
AJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS MOTOR REARWARD
9 C1
14 C1
12 C1
1 C1
2 C1
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
4
3
5
1
2
M
MOTOR-ADJUSTABLE PEDALS
13
14
1
2
MODULE-MEMORY SEAT C1
1
13
14
26
SWITCH-BANK-LOWER
1
6
MOTOR-ADJUSTABLE PEDAL
6
1
MODULE-MEMORY SEAT C5 (LHD)
814979bc

B1D5C–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK FORWARD (CONTINUED)

For the Adjustable Pedal System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Adjustable Pedals Switch is in active operation.
- **Set Condition:**
  The Memory Seat Module detects that the Adjustable Pedals Switch has been activated for a time period of more than 50 seconds.

Possible Causes
CONNECTOR/TERMINAL DAMAGE
ADJUSTABLE PEDALS SWITCH FORWARD CIRCUIT SHORTED TO GROUND
ADJUSTABLE PEDALS SWITCH - INTERNAL FAULT
MEMORY SEAT MODULE - INTERNAL FAULT

Diagnostic Test

1. CHECK FOR DTC B1D5C–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK FORWARD

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, record and erase DTC’s.

Cycle the ignition switch from off to on.

Cycle the Adjustable Pedals Switch forward and rearward.

With the scan tool, read DTC’s

Does the scan tool display: B1D5C–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK FORWARD?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK CONNECTOR/TERMINAL FOR DAMAGE

NOTE: Check all terminals for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Inspect the Memory Seat Module harness connector and Lower Switch Bank Switch harness connector.

Is the Adjustable Pedals Switch or any of the connectors/terminals damaged?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D5C–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK FORWARD (CONTINUED)

3. CHECK ADJUSTABLE PEDALS SWITCH FORWARD CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Memory Seat Module harness connector.

Disconnect the Lower Switch Bank harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Switch Forward circuit.

Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Switch Forward circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK LOWER SWITCH BANK SHORTED

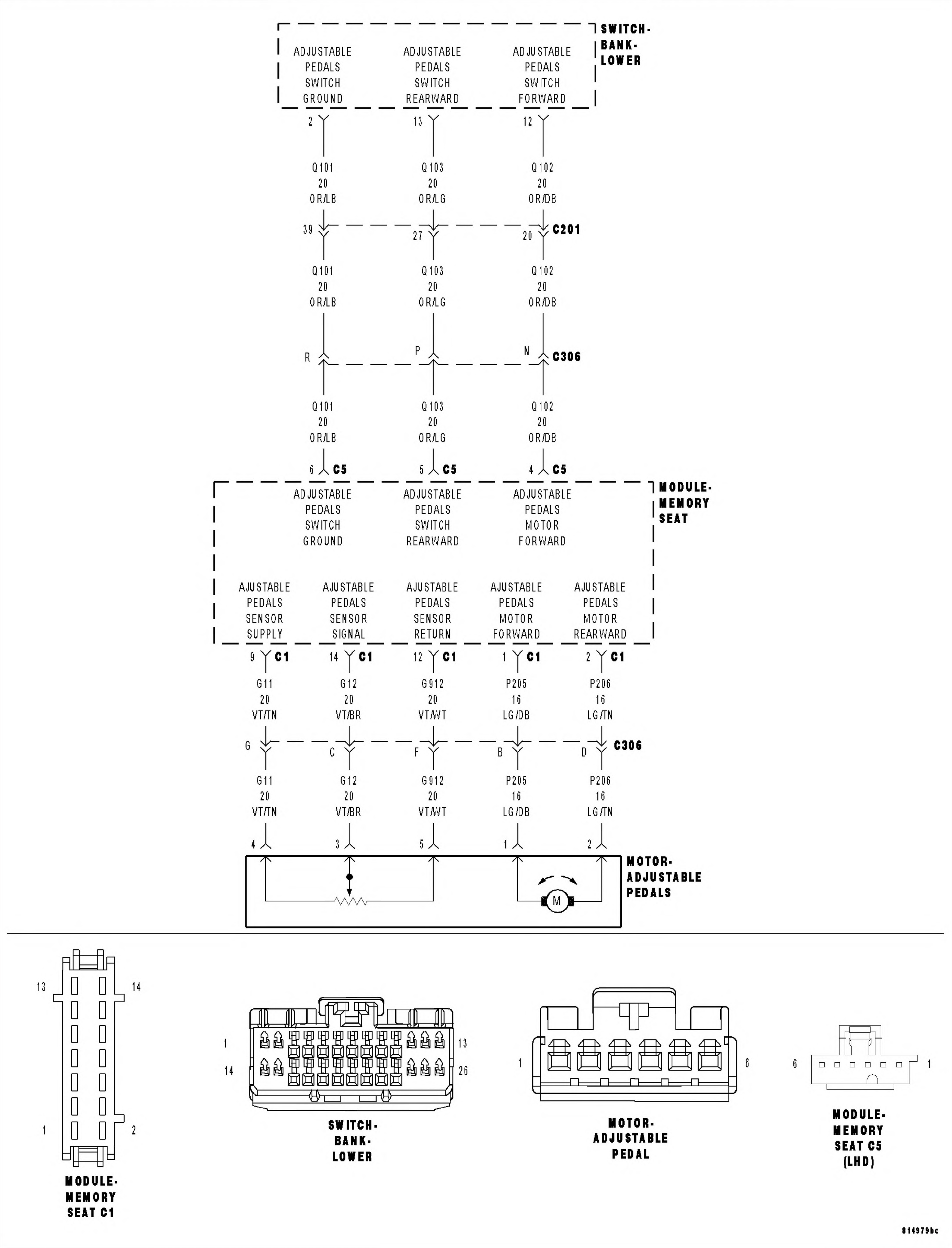
Measure the resistance between the Adjustable Pedals Switch Rearward and Adjustable Pedals Switch Forward terminals at the Lower Switch Bank.

Is the resistance below 5.0 ohms?

Yes >> Replace and reprogram the Memory Seat Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Replace the Lower Switch Bank in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

B1D5D–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK REARWARD


SWITCH-
BANK-
LOWER
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS SWITCH FORWARD
2
13
12
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
39
27
20
C201
R
P
N
C306
6 C5
5 C5
4 C5
MODULE-
MEMORY
SEAT
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS SENSOR SUPPLY
AJUSTABLE PEDALS SENSOR SIGNAL
AJUSTABLE PEDALS SENSOR RETURN
AJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS MOTOR REARWARD
9 C1
14 C1
12 C1
1 C1
2 C1
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
4
3
5
1
2
M
MOTOR-
ADJUSTABLE
PEDALS
13
14
1
2
MODULE-
MEMORY
SEAT C1
1
14
13
26
SWITCH-
BANK-
LOWER
1
6
MOTOR-
ADJUSTABLE
PEDAL
6
1
MODULE-
MEMORY
SEAT C5
(LHD)
814979bc

B1D5D–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK REARWARD (CONTINUED)

For the Adjustable Pedal System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Adjustable Pedals Switch is in active operation.
- **Set Condition:**
  The Memory Seat Module detects that the Adjustable Pedals Switch has been activated for a time period of more than 50 seconds.

Possible Causes
CONNECTOR/TERMINAL DAMAGE
ADJUSTABLE PEDALS SWITCH FORWARD CIRCUIT SHORTED TO GROUND
ADJUSTABLE PEDALS SWITCH - INTERNAL FAULT
MEMORY SEAT MODULE - INTERNAL FAULT

Diagnostic Test

1. CHECK FOR DTC B1D5D–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK REARWARD

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, record and erase DTC's.

Cycle the ignition switch from off to on.

Cycle the Adjustable Pedals Switch forward and rearward.

With the scan tool, read DTC's

Does the scan tool display: B1D5D–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK REARWARD?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform APS VERIFICATION TEST - VER 1.

2. CHECK CONNECTOR/TERMINAL FOR DAMAGE

NOTE: Check all terminals for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Inspect the Memory Seat Module harness connector, and the Lower Switch Bank harness connector.

Is the connectors/terminals damaged?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D5D–ADJUSTABLE PEDAL SWITCH CIRCUIT STUCK REARWARD (CONTINUED)

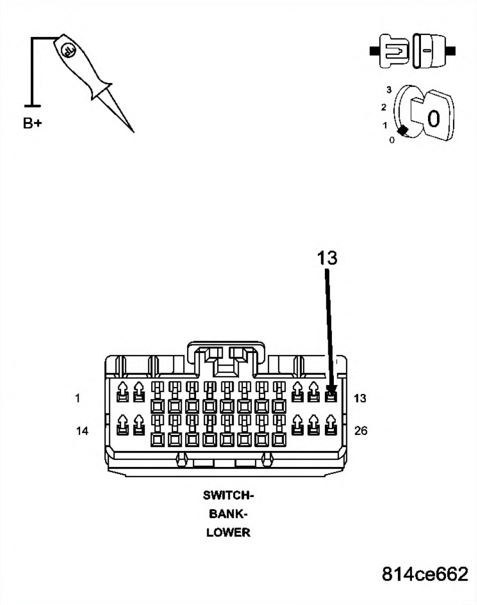
3. CHECK ADJUSTABLE PEDALS SWITCH REARWARD CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Memory Seat Module harness connector.

Disconnect the Lower Switch Bank harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Switch Rearward circuit.



Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Switch Rearward circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK ADJUSTABLE PEDALS SWITCH SHORTED

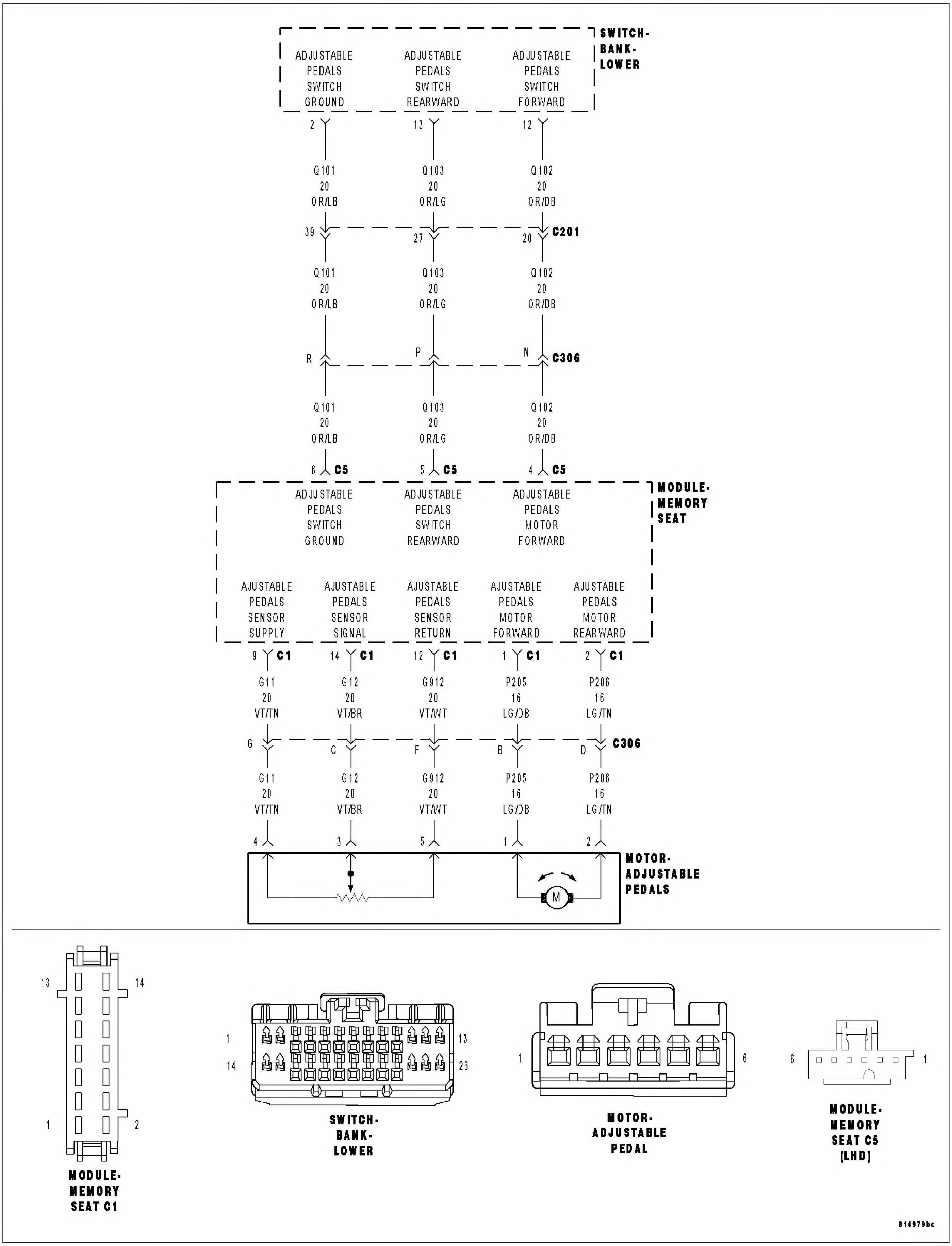
Measure the resistance between the (Adjustable Pedals Switch Rearward and Adjustable Pedals Switch Forward terminals at the Lower Switch Bank.

Is the resistance below 5.0 ohms?

Yes >> Replace and reprogram the Memory Seat Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Replace the Lower Switch Band in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

B1D67–ADJUSTABLE PEDAL CONTROL CIRCUIT PERFORMANCE


SWITCH-BANK-LOWER
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS SWITCH FORWARD
2
13
12
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
39
27
20
C201
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
R
P
N
C306
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
6 C5
5 C5
4 C5
MODULE-MEMORY SEAT
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS SENSOR SUPPLY
AJUSTABLE PEDALS SENSOR SIGNAL
AJUSTABLE PEDALS SENSOR RETURN
AJUSTABLE PEDALS MOTOR FORWARD
AJUSTABLE PEDALS MOTOR REARWARD
9 C1
14 C1
12 C1
1 C1
2 C1
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
4
3
5
1
2
MOTOR-ADJUSTABLE PEDALS
M
13
14
1
2
MODULE-MEMORY SEAT C1
1
14
13
26
SWITCH-BANK-LOWER
1
6
MOTOR-ADJUSTABLE PEDAL
6
1
MODULE-MEMORY SEAT C5 (LHD)
814979bc

B1D67–ADJUSTABLE PEDAL CONTROL CIRCUIT PERFORMANCE (CONTINUED)

For the Adjustable Pedal System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Adjustable Pedals Motor is in active operation.
- **Set Condition:**
  The Memory Seat Module detects that the Adjustable Pedals Motor has been activated for a time period and has not spun with three motor direction commands.

Possible Causes
CONNECTOR/TERMINAL DAMAGE
MECHANICAL FAILURE IN THE ADJUSTABLE PEDALS
ADJUSTABLE PEDALS MOTOR FORWARD CIRCUIT OPEN
ADJUSTABLE PEDALS MOTOR REARWARD CIRCUIT OPEN
RETURN CIRCUIT OPEN
ADJUSTABLE PEDALS MOTOR - INTERNAL FAULT
MEMORY SEAT MODULE - INTERNAL FAULT

Diagnostic Test

1. CHECK FOR DTC B1D67–ADJUSTABLE PEDAL CONTROL CIRCUIT PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, record and erase DTC's.

Cycle the ignition switch from off to on.

Cycle and hold the Adjustable Pedals Switch forward, rearward, and forward at two second intervals.

With the scan tool, read DTC's

Does the scan tool display: B1D67–ADJUSTABLE PEDAL CONTROL CIRCUIT PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK CONNECTOR/TERMINAL FOR DAMAGE

NOTE: Check all terminals for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Inspect the Memory Seat Module harness connector, Adjustable Pedals Motor, and Adjustable Pedals Motor harness connector.

Is the Adjustable Pedals Motor or any of the connectors/terminals damaged?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D67–ADJUSTABLE PEDAL CONTROL CIRCUIT PERFORMANCE (CONTINUED)

3. CHECK ADJUSTABLE PEDALS ASSEMBLY FOR MECHANICAL DAMAGE

Turn the ignition off.

Inspect the Adjustable Pedals Assembly for any physical damage.

NOTE: Check for any conditions that would cause the motor to stall or be stuck.

Is the Adjustable Pedals Assembly damaged or broken?

Yes >> Replace the Adjustable Pedals Assembly in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK ADJUSTABLE PEDALS MOTOR FORWARD CIRCUIT FOR AN OPEN

Disconnect the Memory Seat Module harness connector.

Disconnect the Adjustable Pedals Motor harness connector

Connect a jumper wire between the Adjustable Pedals Motor Forward circuit and ground in the Adjustable Pedal Motor harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Motor Forward circuit.

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the Adjustable Pedals Motor Forward circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

---

5. CHECK ADJUSTABLE PEDALS MOTOR REARWARD CIRCUIT FOR AN OPEN

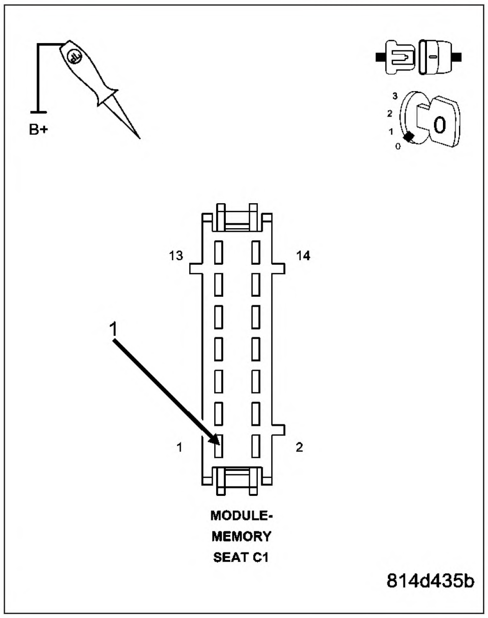
Connect a jumper wire between the Adjustable Pedals Motor Rearward circuit and ground in the Adjustable Pedal Motor harness connector.

Using a 12-volt test light connected to 12-volts, probe the Adjustable Pedals Motor Rearward circuit.

Does the test light illuminate brightly?

Yes >> Go To 6

No >> Repair the Adjustable Pedals Motor Rearward circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

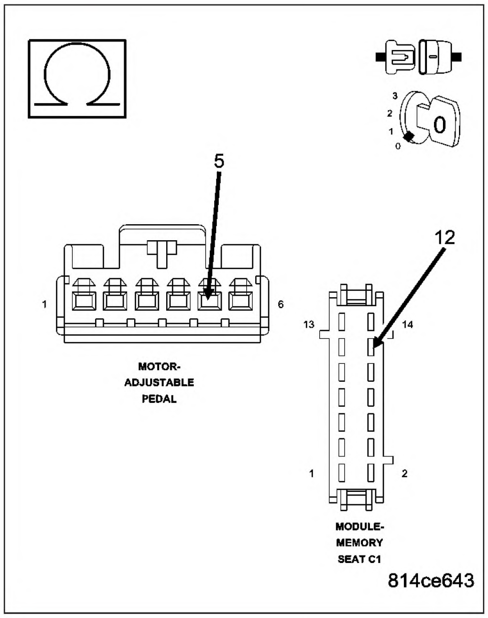


B1D67–ADJUSTABLE PEDAL CONTROL CIRCUIT PERFORMANCE (CONTINUED)

6. CHECK SENSOR RETURN CIRCUIT FOR AN OPEN

Connect a jumper wire between the Sensor Return circuit and ground in the Adjustable Pedal Motor harness connector.

Using a 12-volt test light connected to 12-volts, probe the Sensor Return circuit.



Does the test light illuminate brightly?

Yes >> Go To 7

No >> Repair the Sensor Return circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

---

7. CHECK ADJUSTABLE PEDALS MOTOR

Measure the resistance between the Adjustable Pedals Motor Forward and Adjustable Pedals Motor Rearward terminals at the Adjustable Pedals Motor.

Is the resistance below 100.0 ohms?

Yes >> Replace and reprogram the Memory Seat Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Replace the Adjustable Pedals Motor in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

APS VERIFICATION TEST – VER 1

Diagnostic Test

1.

1. Ensure all accessories are turned off and the battery is fully charged.
2. Connect all previously disconnected components and connectors.
3. If the Memory Seat Module was replaced, reprogram the the Adjustable Pedals hard stop.
4. Start with the Adjustable Pedals going forward.
5. When the Adjustable Pedals reach full travel, continue to apply the Adjustable Pedals Switch for 10 seconds to learn the hard stop.
6. Repeat this step in both travel directions.
7. Verify that the Adjustable Pedals System is disabled with the vehicle in reverse.
8. Verify that the Adjustable Pedals System is disabled when the speed control is activated.
9. Ensure that the ignition is on, and with the scan tool, erase all Diagnostic Trouble Codes from All modules.
10. Fully operate the Adjustable Pedals System.
11. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the scan tool, read DTC's from all modules.
12. If any Diagnostic Trouble Codes are present, return to symptom list and trouble shoot new or recurring symptom.
13. Again, with the scan tool read DTC's. If any DTC's are present, return to Symptom list.
14. If there are no Diagnostic Trouble Codes (DTC's) present, and the customer's concern can no longer be duplicated, the repair is complete.

Are any DTC's present or is the original concern still present?

Yes >> Repair is not complete, refer to appropriate symptom.

No >> Repair is complete.

ABS-INTERMITTENT CONDITION

For the Anti-Lock Brake TCS/ESP circuit diagrams. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

Diagnostic Test

1.

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

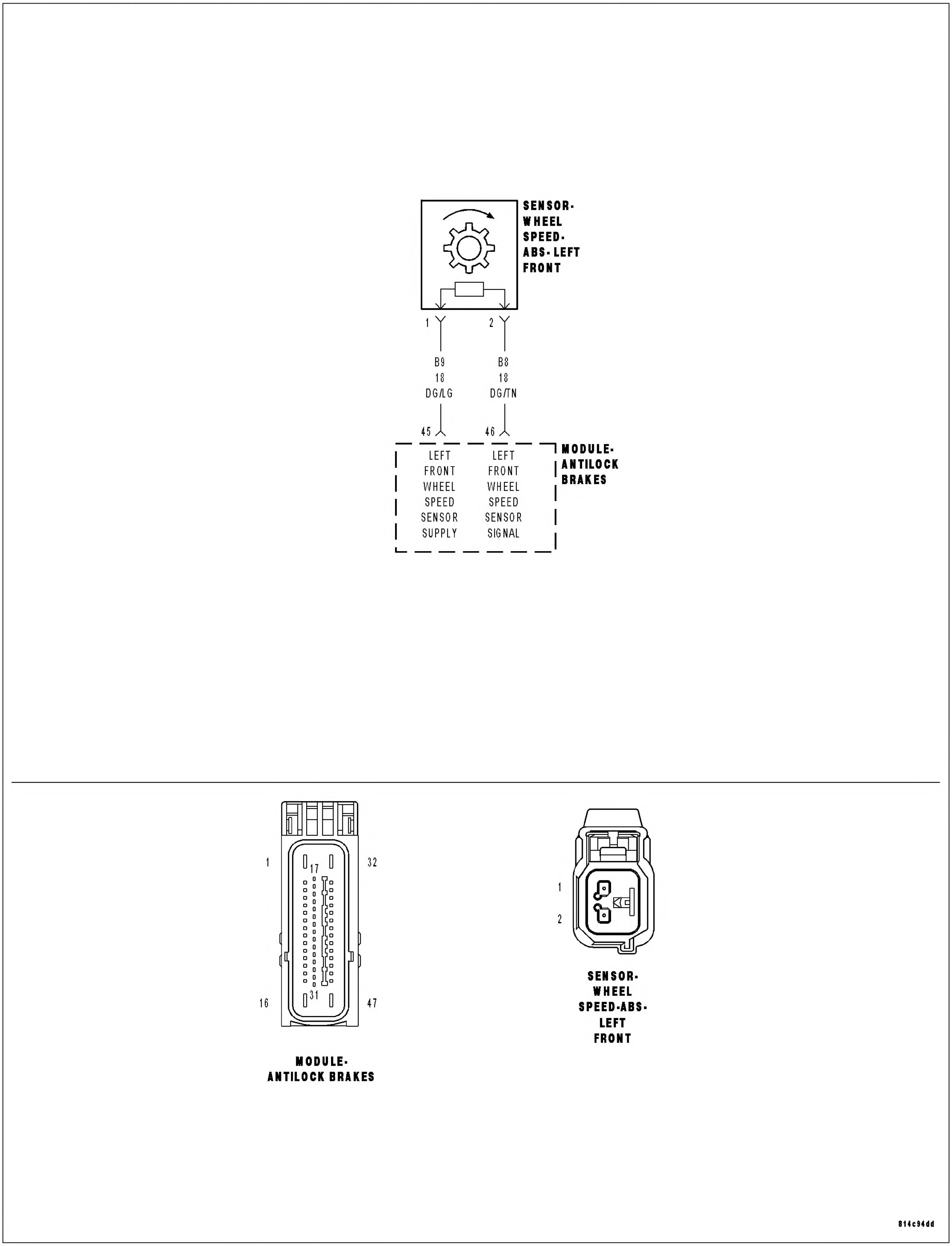
1. Refer to any Technical Service Bulletins (TSBs) that may apply.
2. Review the scan tool Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set.
3. Turn the ignition off.
4. Visually inspect the related wire harness. Disconnect all the related harness connectors. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.
5. Perform a voltage drop test on the related circuits between the suspected faulty component and the Anti-Lock Brake Module.
6. Inspect and clean all PCM, ABS, engine, and chassis grounds that are related to the most current DTC.
7. If numerous trouble codes were set, use a wire schematic and look for any common ground or supply circuits
8. For any Relay DTCs, actuate the Relay with the scan tool and wiggle the related wire harness to try to interrupt the actuation.
9. Use the scan tool to perform a System Test if one applies to failing component.
10. A co-pilot, data recorder, and/or lab scope should be used to help diagnose intermittent conditions.

Were any problems found during the above inspections?

Yes >> Perform the necessary repairs.
Perform ABS VERIFICATION TEST VER - 1.

No >> Test Complete.

C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT


SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
B9
18
DG/LG
B8
18
DG/TN
45
46
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
MODULE-ANTILOCK BRAKES
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
814c94dd

C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Left Front Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B9) LEFT FRONT WSS SUPPLY CIRCUIT
(B9) LEFT FRONT WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
LEFT FRONT WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

With the scan tool, read DTCs.

Does the scan tool display: C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Left Front WSS, Left Front WSS harness connector, and Left Front WSS tone wheel (if applicable).

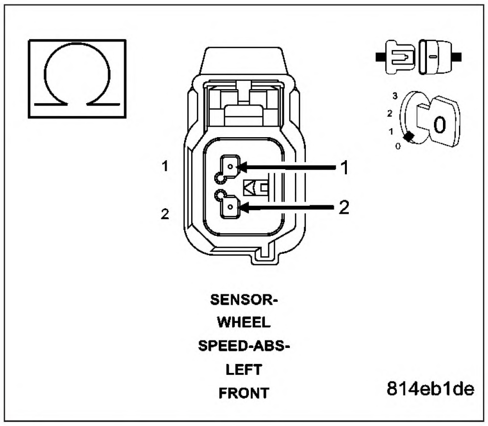
Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

3. (B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B9) LEFT FRONT WSS SUPPLY CIRCUIT


1
2
1
2
0
3
2
1
0
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb1de

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Left Front WSS harness connector.

Measure the resistance between the (B8) Left Front WSS Signal and the (B9) Left Front WSS Supply circuits at the Left Front WSS harness connector.

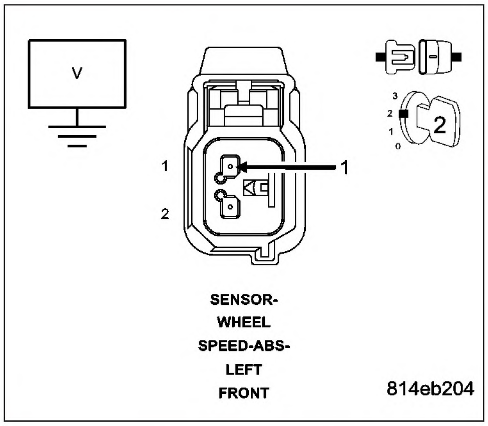
Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B8) Left Front WSS Signal circuit for a short to the (B9) Left Front WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE VOLTAGE ON THE (B9) LEFT FRONT WSS SUPPLY CIRCUIT


V
1
2
1
2
3
2
1
0
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb204

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B9) Left Front WSS Supply circuit in the Left Front WSS harness connector.

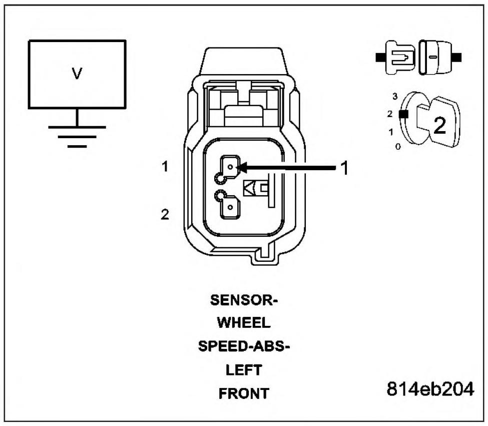
Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5

---

5. (B9) LEFT FRONT WSS SUPPLY CIRCUIT SHORT TO VOLTAGE


V
1
2
1
2
3
2
1
0
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb204

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B9) Left Front WSS Supply circuit.

Is there any voltage present?

Yes >> Repair the (B9) Left Front WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

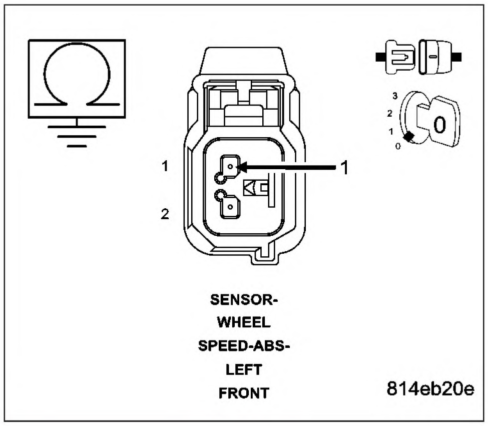
No >> Go To 6

C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

6. (B9) LEFT FRONT WSS SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B9) Left Front WSS Supply circuit.


1
2
1
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb20e

Is the resistance below 5.0 ohms?

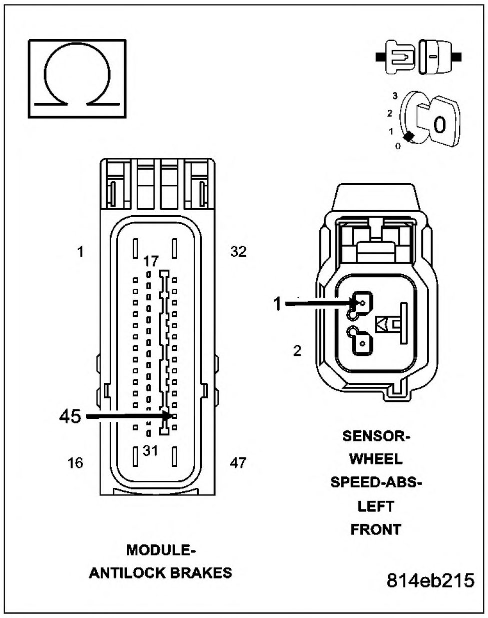
Yes >> Repair the (B9) Left Front WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. (B9) LEFT FRONT WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B9) Left Front WSS Supply circuit.


3
2
1
0
0
1
17
32
45
31
16
47
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
MODULE-
ANTILOCK BRAKES
814eb215

Is the resistance below 5.0 ohms?

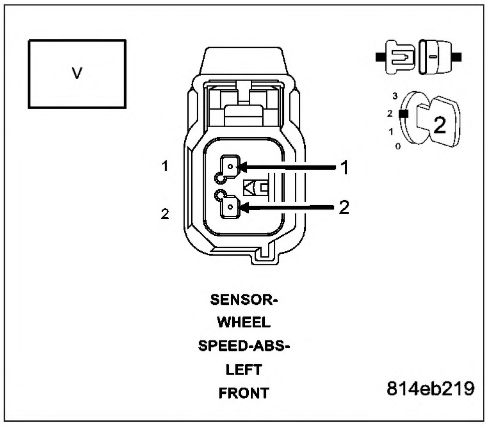
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B9) Left Front WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

8. CHECK THE (B9) LEFT FRONT WSS SUPPLY AND THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE

Measure the voltage between the (B9) Left Front WSS Supply and (B8) Left Front WSS Signal circuits at the Left Front WSS harness connector.


V
3
2
1
0
2
1
2
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb219

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9

---

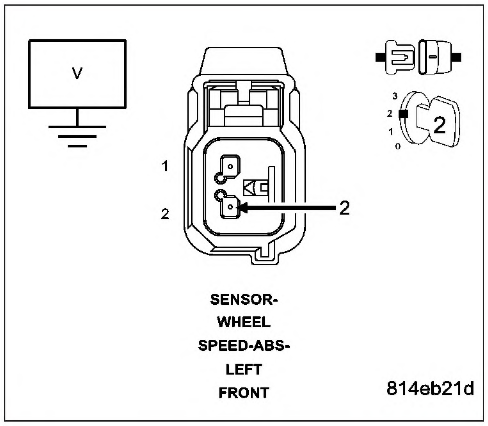
9. (B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B8) Left Front WSS Signal circuit.


V
3
2
1
0
2
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb21d

Is there any voltage present?

Yes >> Repair the (B8) Left Front WSS Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

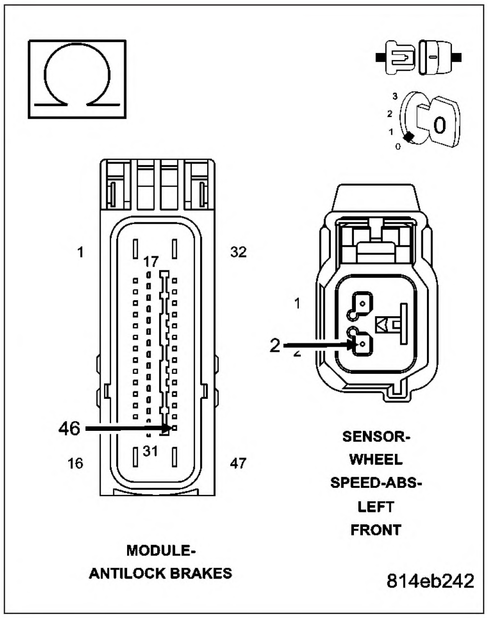
No >> Go To 10

---

10. (B8) LEFT FRONT WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B8) Left Front WSS Signal circuit.


Ω
3
2
1
0
0
1
17
32
46
31
16
47
1
2
2
MODULE-
ANTILOCK BRAKES
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb242

Is the resistance above 5.0 ohms?

Yes >> Repair the (B8) Left Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

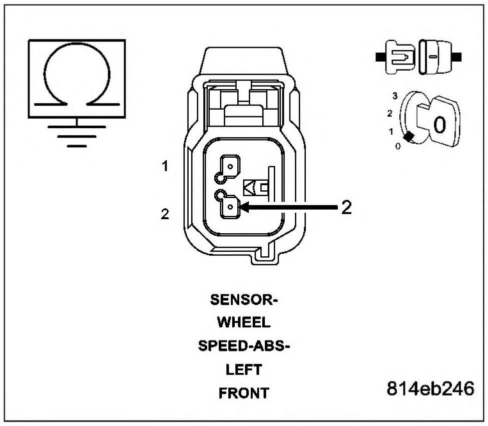
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

11. CHECK THE (B8) LEFT FRONT WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B8) Left Front WSS Signal circuit.



814eb246

Is the resistance below 5.0 ohms?

Yes >> Repair the (B8) Left Front WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

---

12. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE LEFT FRONT WSS HARNESS CONNECTOR

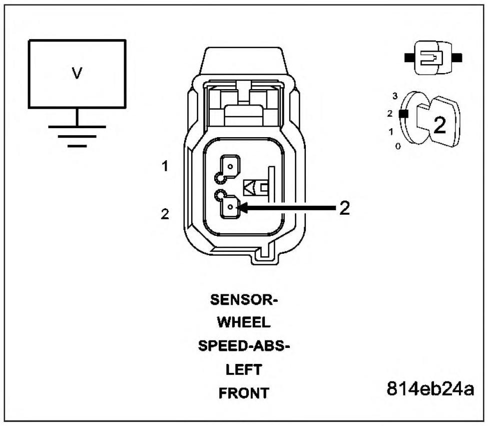
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Left Front WSS harness connector and ground.

Slowly rotate the wheel by hand.



814eb24a

Does the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Left Front WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C100A–LEFT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

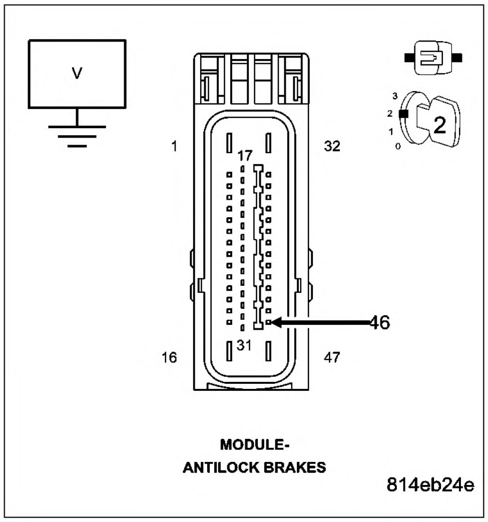
13. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

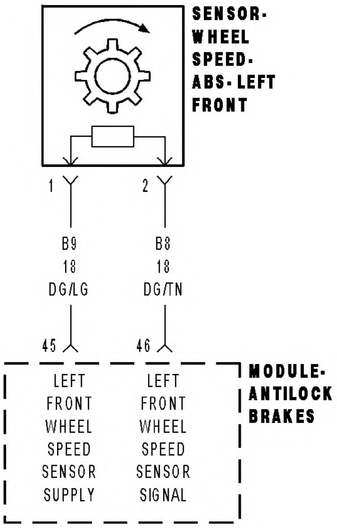


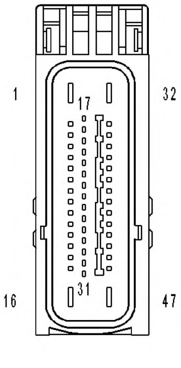
Does the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

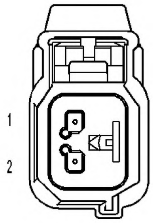
No >> Repair the (B8) Left Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE


SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
B9
18
DG/LG
B8
18
DG/TN
45
46
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
MODULE-ANTILOCK BRAKES


1
17
32
16
31
47

MODULE-ANTILOCK BRAKES



SENSOR-WHEEL SPEED-ABS-LEFT FRONT

814c94dd

C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Left Front Wheel Speed Signal circuit indicates continuously too high or too low wheel speed.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B9) LEFT FRONT WSS SUPPLY CIRCUIT
(B9) LEFT FRONT WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
LEFT FRONT WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

CAUTION: Ensure braking capability is available before road testing.

Drive the vehicle over 25 km/h (15 mph).

Park the vehicle and cycle the ignition switch from off to on.

With the scan tool, read DTCs.

Does the scan tool display: C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Left Front WSS, Left Front WSS harness connector, and Left Front WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

---

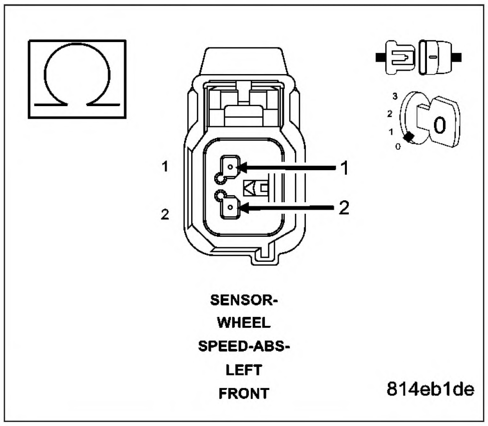
3. (B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B9) LEFT FRONT WSS SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Left Front WSS harness connector.

Measure the resistance between the (B8) Left Front WSS Signal and the (B9) Left Front WSS Supply circuits at the Left Front WSS harness connector.



Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B8) Left Front WSS Signal circuit for a short to the (B9) Left Front WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.

---

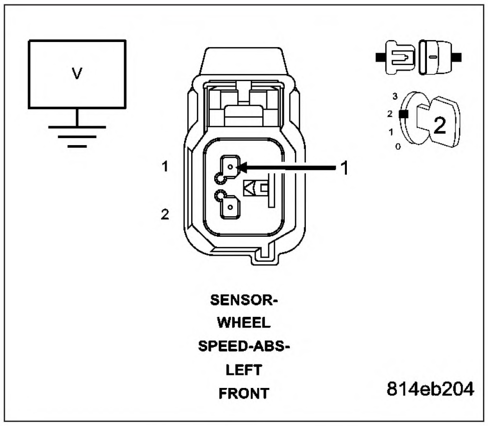
4. CHECK THE VOLTAGE ON THE (B9) LEFT FRONT WSS SUPPLY CIRCUIT

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B9) Left Front WSS Supply circuit in the Left Front WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5

C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

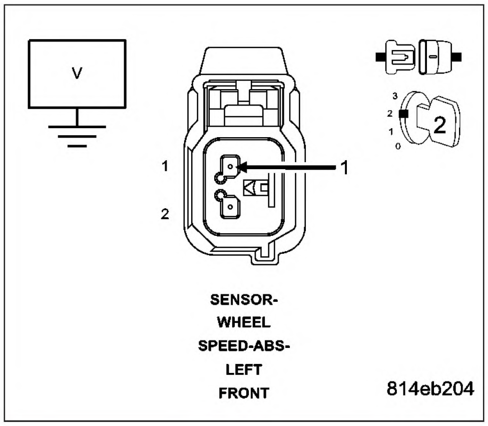
5. (B9) LEFT FRONT WSS SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B9) Left Front WSS Supply circuit.


V
3
2
1
0
2
1
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb204

Is there any voltage present?

Yes >> Repair the (B9) Left Front WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

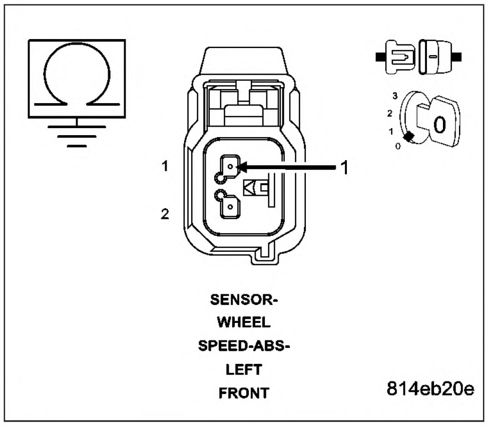
No >> Go To 6

---

6. (B9) LEFT FRONT WSS SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B9) Left Front WSS Supply circuit.


3
2
1
0
0
1
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb20e

Is the resistance below 5.0 ohms?

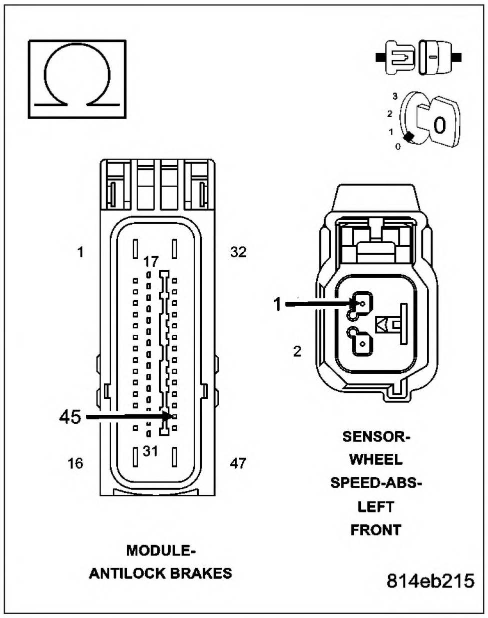
Yes >> Repair the (B9) Left Front WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. (B9) LEFT FRONT WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B9) Left Front WSS Supply circuit.


3
2
1
0
0
1
17
32
1
2
45
31
16
47
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
MODULE-
ANTILOCK BRAKES
814eb215

Is the resistance below 5.0 ohms?

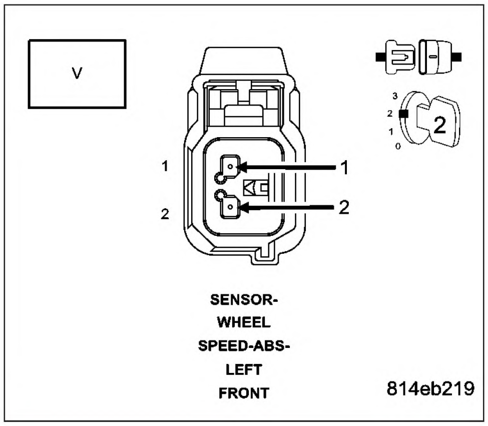
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B9) Left Front WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

8. CHECK THE (B9) LEFT FRONT WSS SUPPLY AND THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE

Measure the voltage between the (B9) Left Front WSS Supply and (B8) Left Front WSS Signal circuits at the Left Front WSS harness connector.


V
3
2
1
0
2
1
2
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb219

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9

---

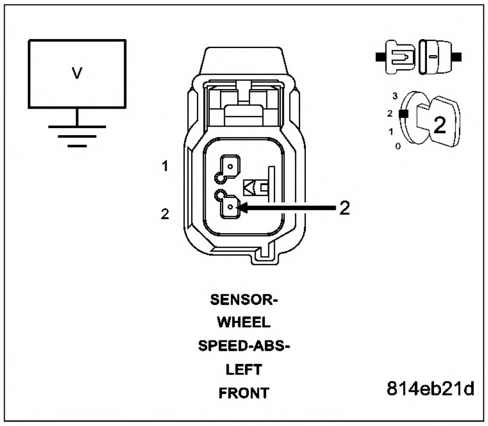
9. (B8) LEFT FRONT WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B8) Left Front WSS Signal circuit.


V
3
2
1
0
2
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814eb21d

Is there any voltage present?

Yes >> Repair the (B8) Left Front WSS Signal circuit for a short to voltage.

Perform ABS VERIFICATION TEST - VER 1.

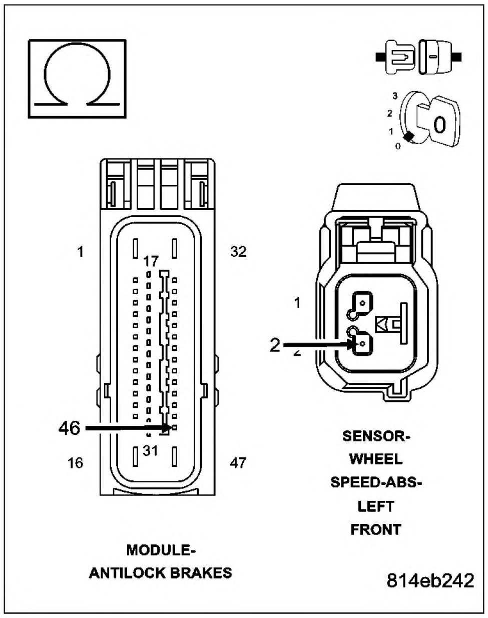
No >> Go To 10

C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

10. (B8) LEFT FRONT WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B8) Left Front WSS Signal circuit.


1
17
32
46
31
16
47
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
MODULE-
ANTILOCK BRAKES
3
2
1
0
0

814eb242

Is the resistance above 5.0 ohms?

Yes >> Repair the (B8) Left Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

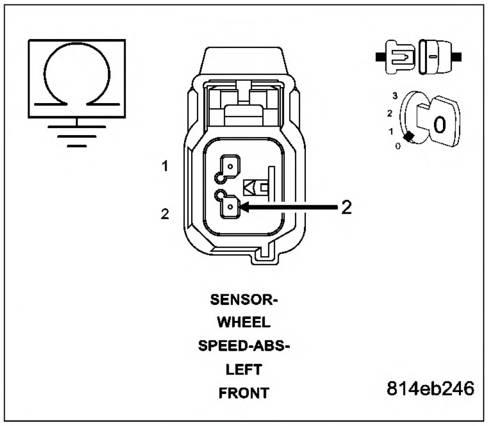
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

11. CHECK THE (B8) LEFT FRONT WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B8) Left Front WSS Signal circuit.


1
2
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
3
2
1
0
0

814eb246

Is the resistance below 5.0 ohms?

Yes >> Repair the (B8) Left Front WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

C1011-LEFT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

12. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE LEFT FRONT WSS HARNESS CONNECTOR

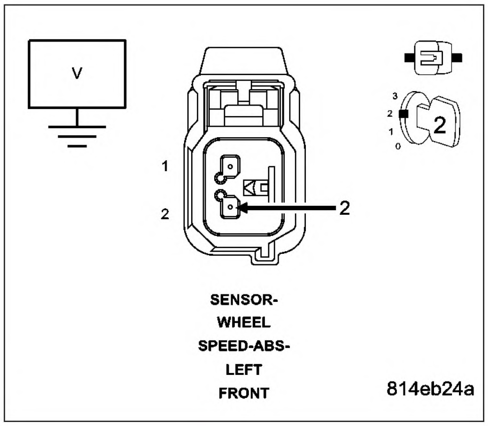
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Left Front WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Left Front WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

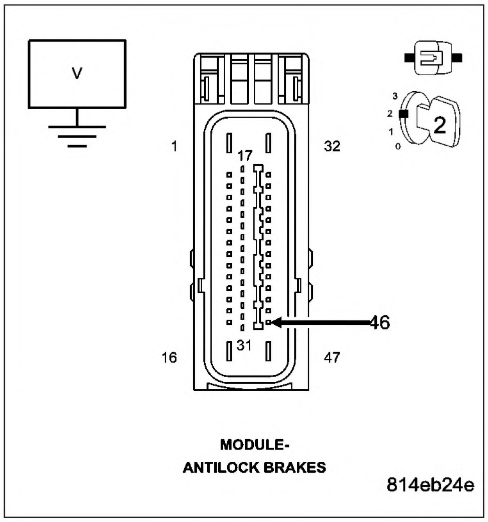
13. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

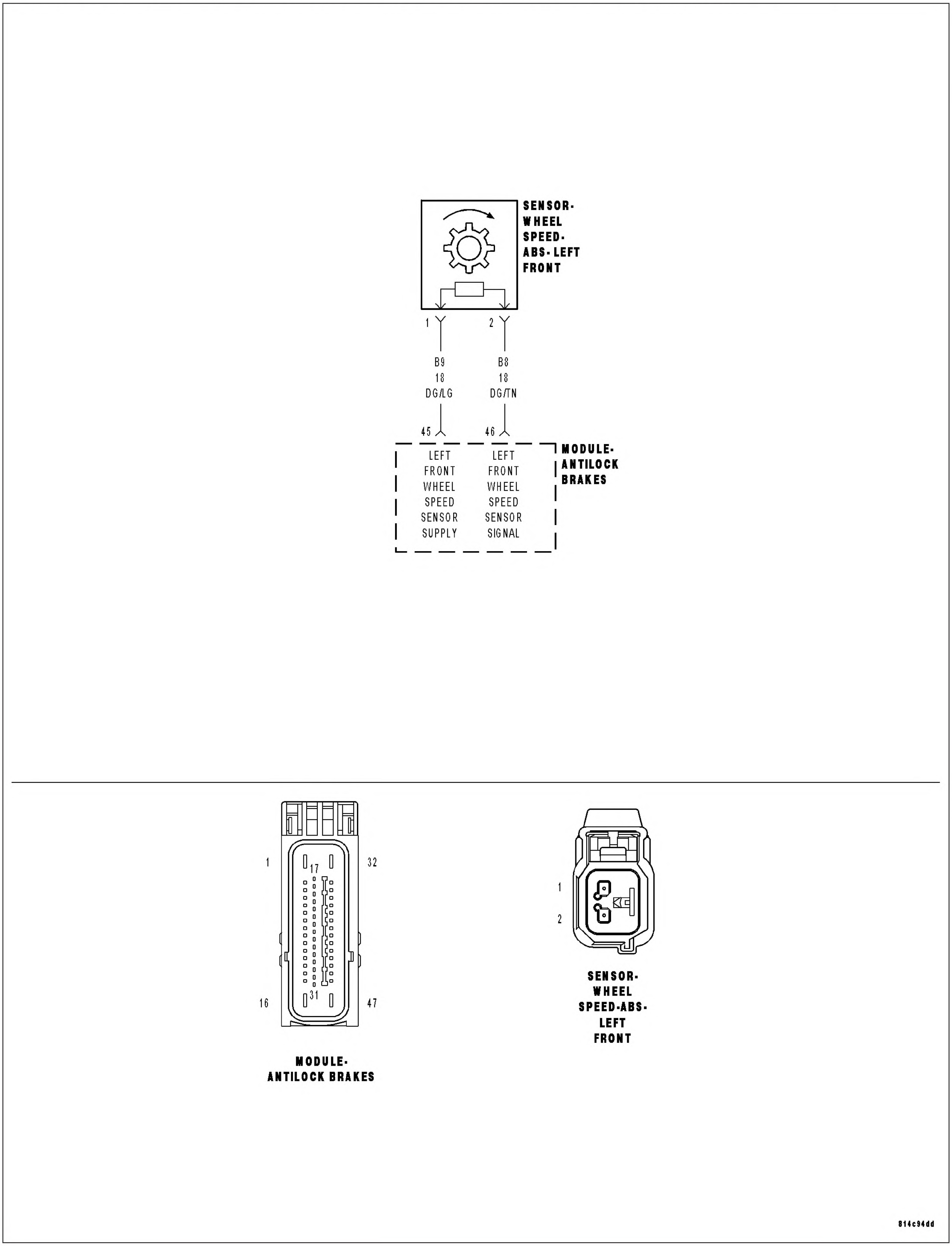


Does the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B8) Left Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1014-LEFT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE


SENSOR-
WHEEL
SPEED-
ABS-LEFT
FRONT
1
2
B9
18
DG/LG
B8
18
DG/TN
45
46
LEFT
FRONT
WHEEL
SPEED
SENSOR
SUPPLY
LEFT
FRONT
WHEEL
SPEED
SENSOR
SIGNAL
MODULE-
ANTILOCK
BRAKES
1
17
32
16
31
47
MODULE-
ANTILOCK BRAKES
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814c94dd

C1014-LEFT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Left Front Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B8) LEFT FRONT WSS SIGNAL CIRCUIT OPEN
LEFT FRONT WSS
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1014-LEFT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the LF WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Left Front WSS, Left Front WSS harness connector, and Left Front WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1014-LEFT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

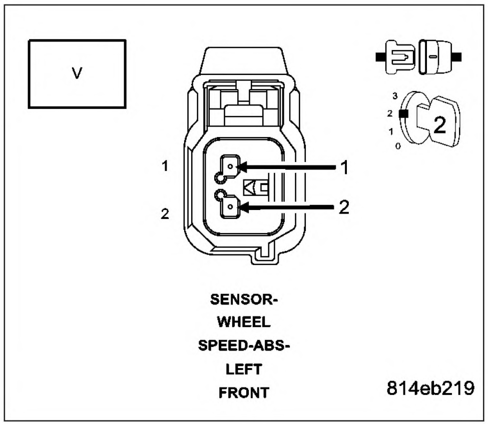
3. CHECK THE VOLTAGE BETWEEN (B9) LEFT FRONT WSS SUPPLY CIRCUIT AND THE (B8) LEFT FRONT WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Left Front WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B9) Left Front WSS Supply and (B8) Left Front WSS Signal circuits at the Left Front WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C100A LEFT FRONT WHEEL SPEED SENSOR CIRCUIT and perform the diagnostic procedure.

Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE LEFT FRONT WSS HARNESS CONNECTOR

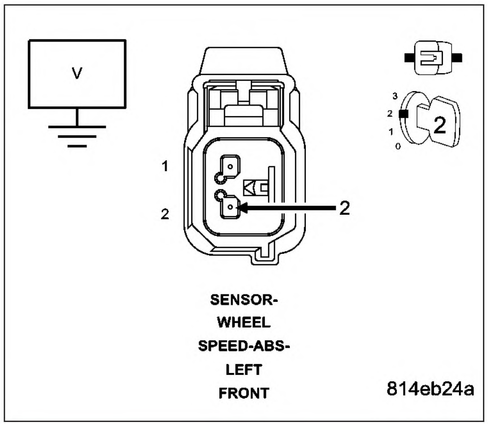
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Left Front WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

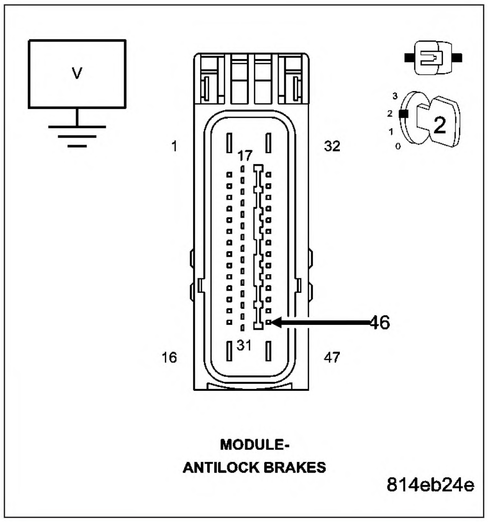
Yes >> Go To 5

No >> Replace the Left Front WSS in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

C1014-LEFT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

5. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR



Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

Does the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

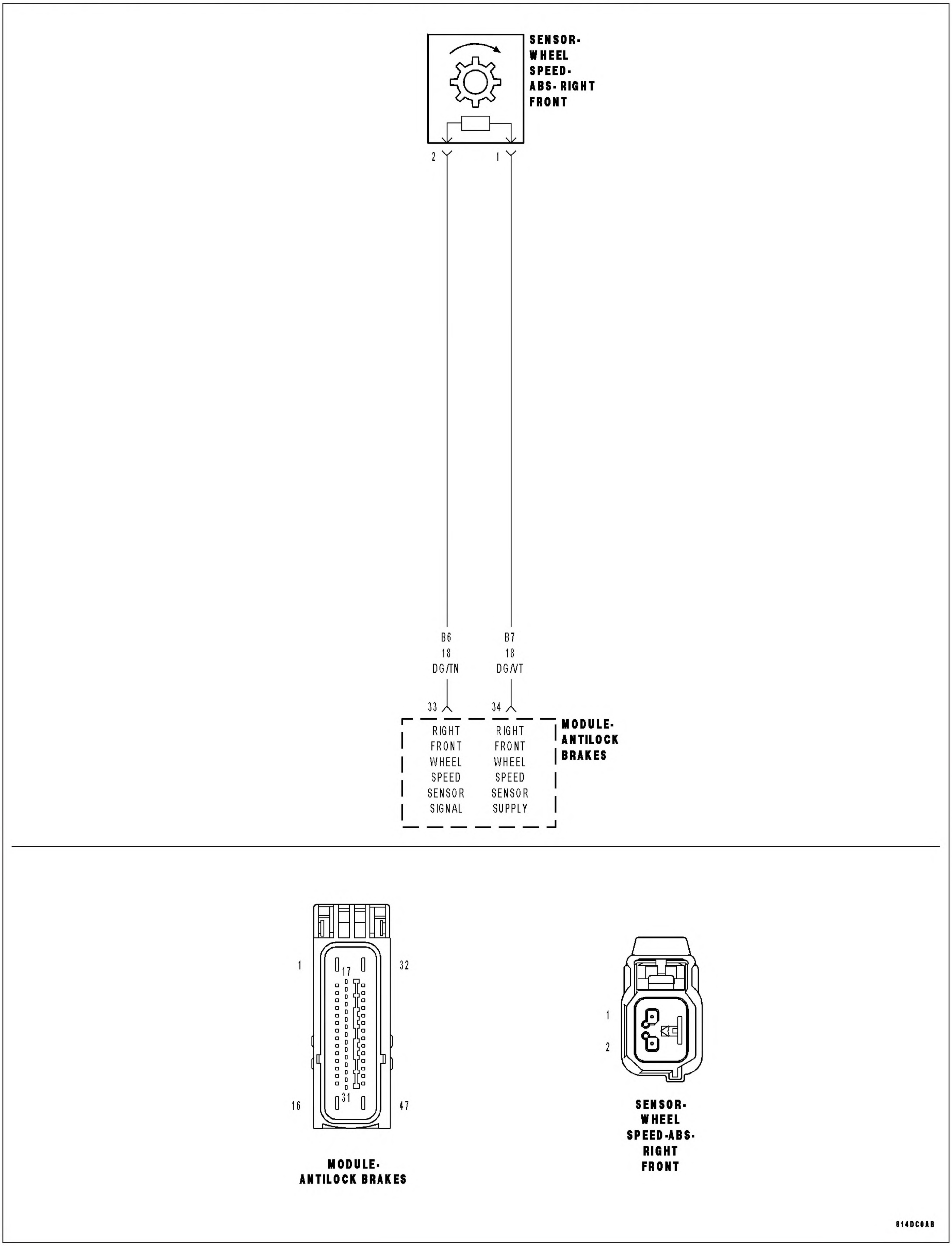
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B8) Left Front WSS Signal circuit for an open.

Perform ABS VERIFICATION TEST - VER 1.

C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
B6
18
DG/TN
B7
18
DG/VT
33
34
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
MODULE-ANTILOCK BRAKES
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
814DC0AB

C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Right Front Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B7) RIGHT FRONT WSS SUPPLY CIRCUIT
(B7) RIGHT FRONT WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
RIGHT FRONT WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

With the scan tool, read DTCs.

Does the scan tool display: C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Right Front WSS, Right Front WSS harness connector, and Right Front WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

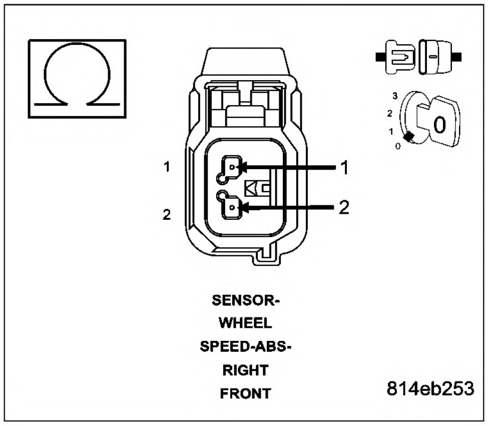
3. (B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B7) RIGHT FRONT WSS SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Right Front WSS harness connector.

Measure the resistance between the (B6) Right Front WSS Signal and the (B7) Right Front WSS Supply circuits at the Right Front WSS harness connector.


Ω
3
2
1
0
0
1
2
1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb253

Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B6) Right Front WSS Signal circuit for a short to the (B7) Right Front WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.

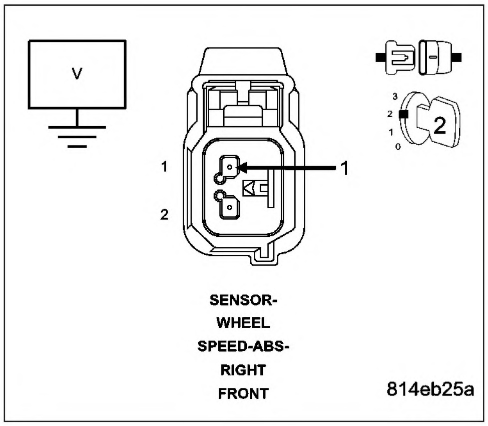
4. CHECK THE VOLTAGE ON THE (B7) RIGHT FRONT WSS SUPPLY CIRCUIT

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B7) Right Front WSS Supply circuit in the Right Front WSS harness connector.


V
3
2
1
0
2
1
2
1
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb25a

Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5

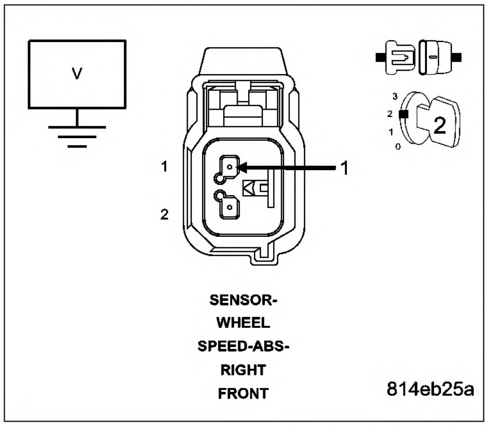
5. (B7) RIGHT FRONT WSS SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B7) Right Front WSS Supply circuit.


V
3
2
1
0
2
1
2
1
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb25a

Is there any voltage present?

Yes >> Repair the (B7) Right Front WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

6. (B7) RIGHT FRONT WSS SUPPLY CIRCUIT SHORT TO GROUND

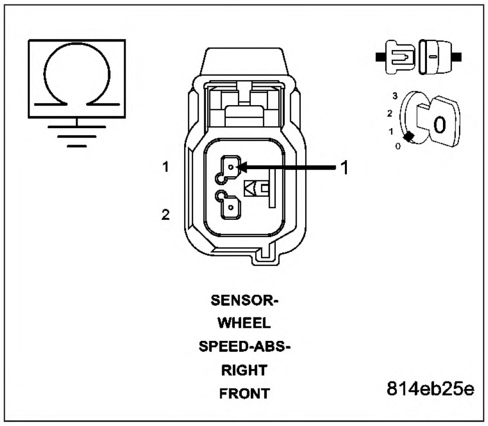
Turn the ignition off.

Measure the resistance between ground and the (B7) Right Front WSS Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (B7) Right Front WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7


1
2
1
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb25e

---

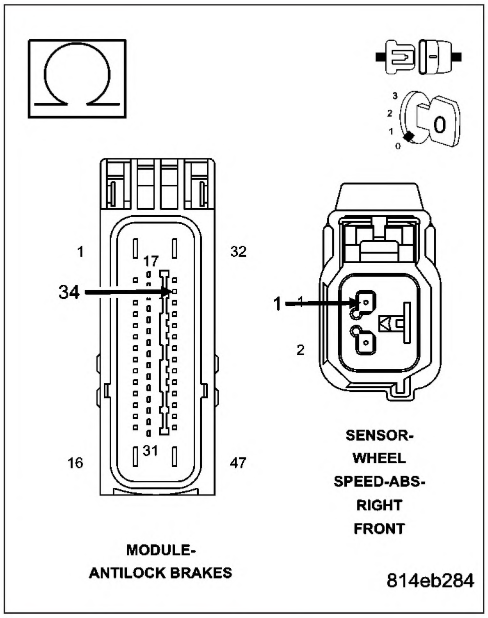
7. (B7) RIGHT FRONT WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B7) Right Front WSS Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

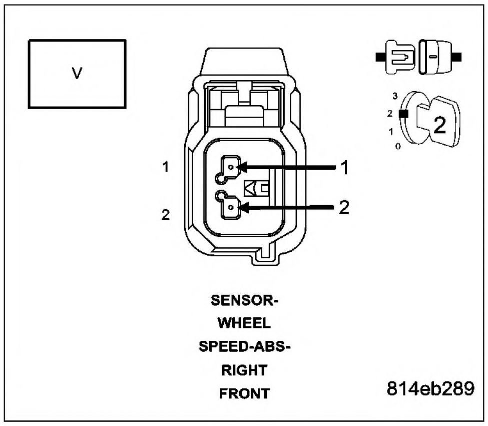
No >> Repair the (B7) Right Front WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.


3
2
1
0
0
1
17
32
34
31
16
47
1
1
2
MODULE-
ANTILOCK BRAKES
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb284

C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

8. CHECK THE (B7) RIGHT FRONT WSS SUPPLY AND THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE

Measure the voltage between the (B7) Right Front WSS Supply and (B6) Right Front WSS Signal circuits at the Right Front WSS harness connector.


V
1
2
1
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb289

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9

---

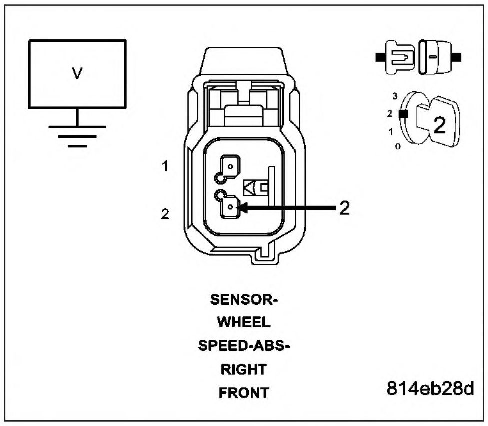
9. (B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B6) Right Front WSS Signal circuit.


V
1
2
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb28d

Is there any voltage present?

Yes >> Repair the (B6) Right Front WSS Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

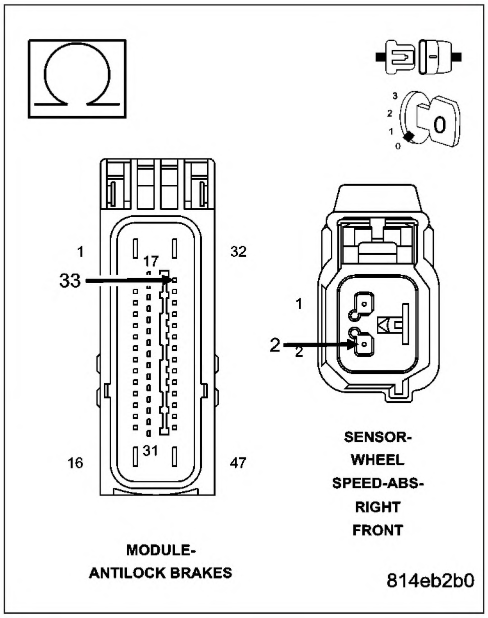
No >> Go To 10

C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

10. (B6) RIGHT FRONT WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B6) Right Front WSS Signal circuit.


1
17
32
33
31
16
47
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
MODULE-
ANTILOCK BRAKES
814eb2b0

Is the resistance above 5.0 ohms?

Yes >> Repair the (B6) Right Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

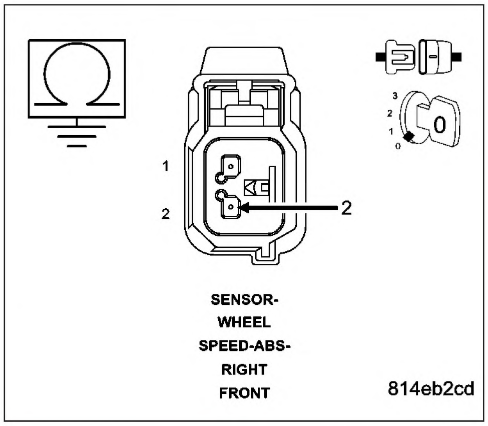
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

11. CHECK THE (B6) RIGHT FRONT WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B6) Right Front WSS Signal circuit.


1
2
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb2cd

Is the resistance below 5.0 ohms?

Yes >> Repair the (B6) Right Front WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

C1015–RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

12. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE RIGHT FRONT WSS HARNESS CONNECTOR

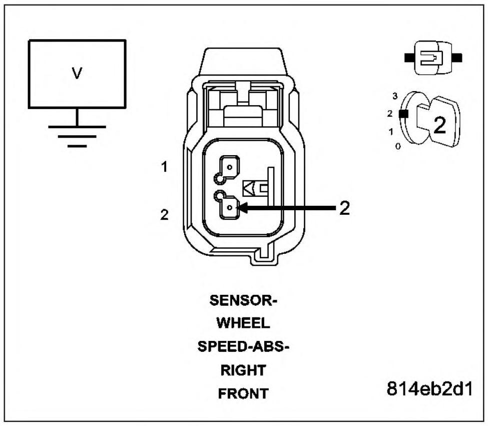
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Right Front WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Right Front WSS in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

---

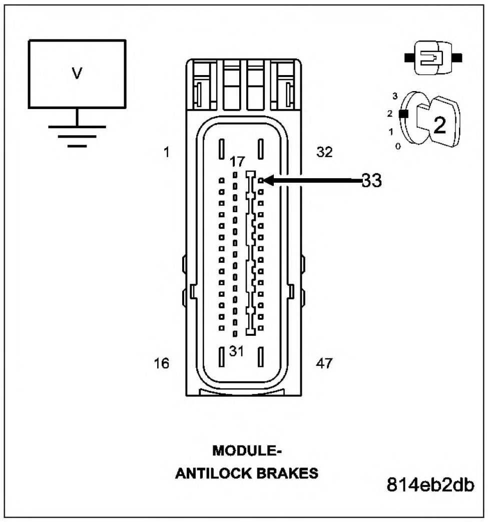
13. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

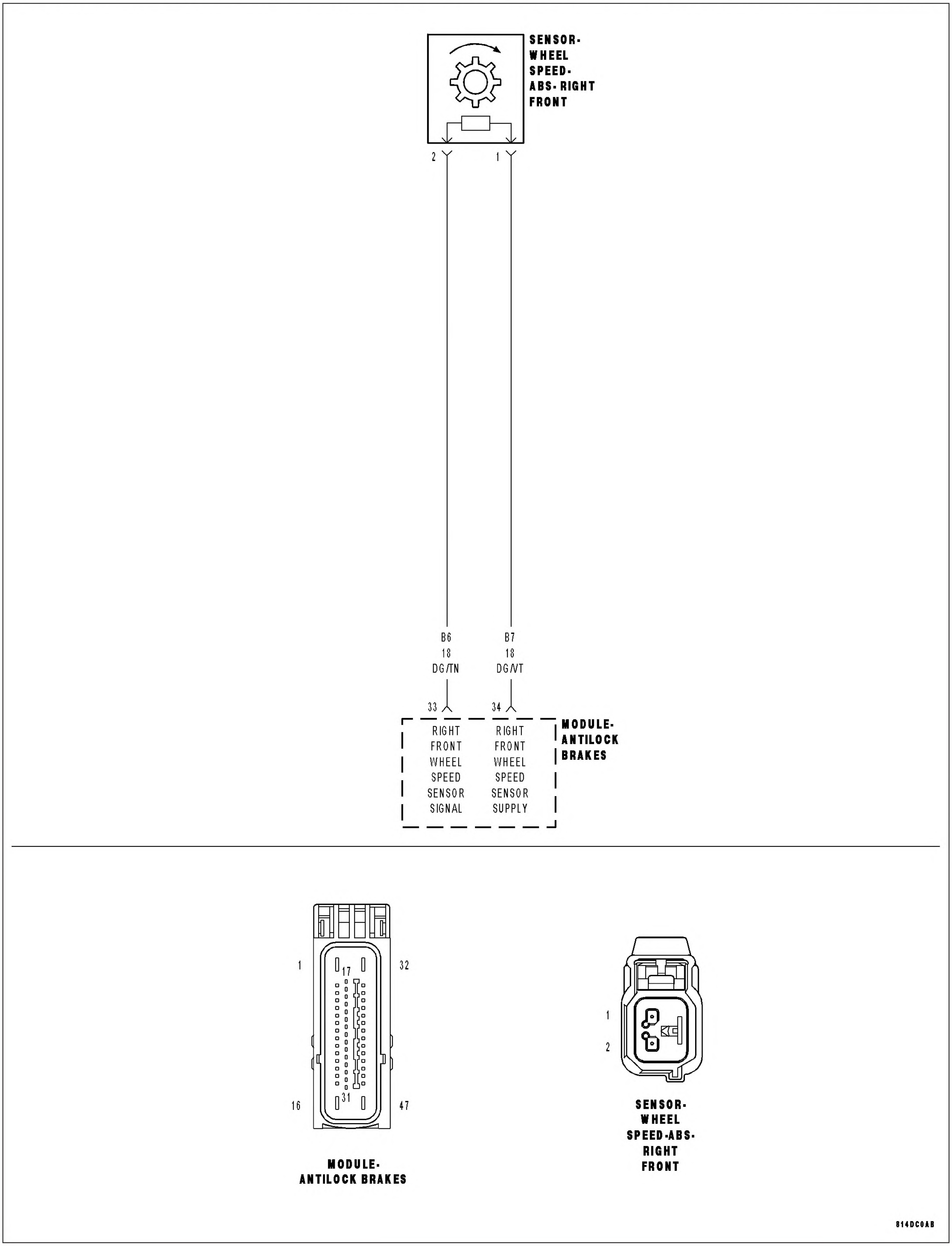
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B6) Right Front WSS Signal circuit for an open.

Perform ABS VERIFICATION TEST - VER 1.

C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
B6
18
DG/TN
B7
18
DG/VT
33
34
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
MODULE-ANTILOCK BRAKES
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
814DC0AB

C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Right Front Wheel Speed Signal circuit indicates continuously too high or too low wheel speed.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B7) RIGHT FRONT WSS SUPPLY CIRCUIT
(B7) RIGHT FRONT WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
RIGHT FRONT WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

CAUTION: Ensure braking capability is available before road testing.

Drive the vehicle over 25 Km/h (15 mph).

Park the vehicle and cycle the ignition switch from off to on.

With the scan tool, read DTCs.

Does the scan tool display: C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Right Front WSS, Right Front WSS harness connector, and Right Front WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. (B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORTED TO THE (B7) RIGHT FRONT WSS SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

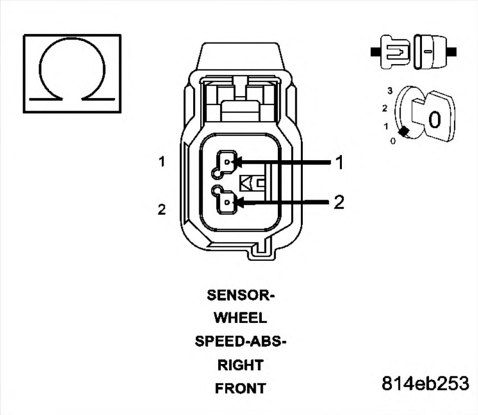
Disconnect the Right Front WSS harness connector.

Measure the resistance between the (B6) Right Front WSS Signal and the (B7) Right Front WSS Supply circuits at the Right Front WSS harness connector.

Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B6) Right Front WSS Signal circuit for a short to the (B7) Right Front WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.



---

4. CHECK THE VOLTAGE ON THE (B7) RIGHT FRONT WSS SUPPLY CIRCUIT

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

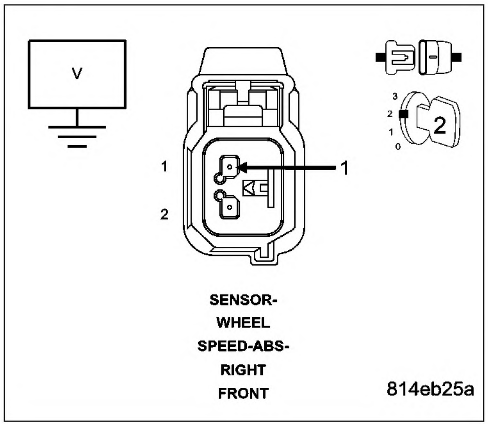
Turn the ignition on.

Measure the voltage of the (B7) Right Front WSS Supply circuit in the Right Front WSS harness connector.

Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5



C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

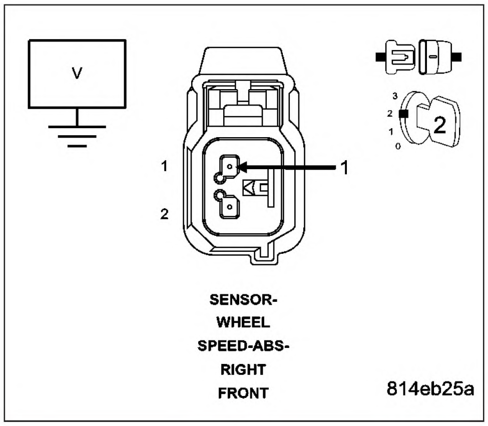
5. (B7) RIGHT FRONT WSS SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B7) Right Front WSS Supply circuit.


V
1
2
1
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb25a

Is there any voltage present?

Yes >> Repair the (B7) Right Front WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

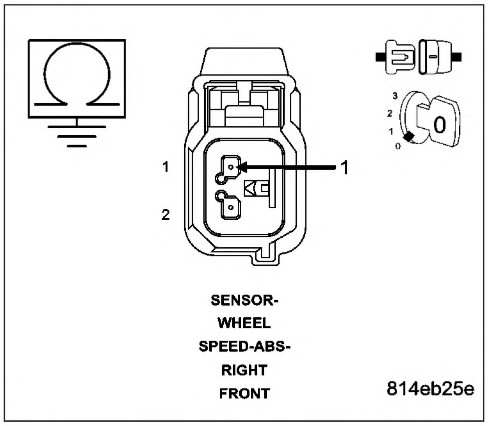
No >> Go To 6

---

6. (B7) RIGHT FRONT WSS SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B7) Right Front WSS Supply circuit.


1
2
1
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb25e

Is the resistance below 5.0 ohms?

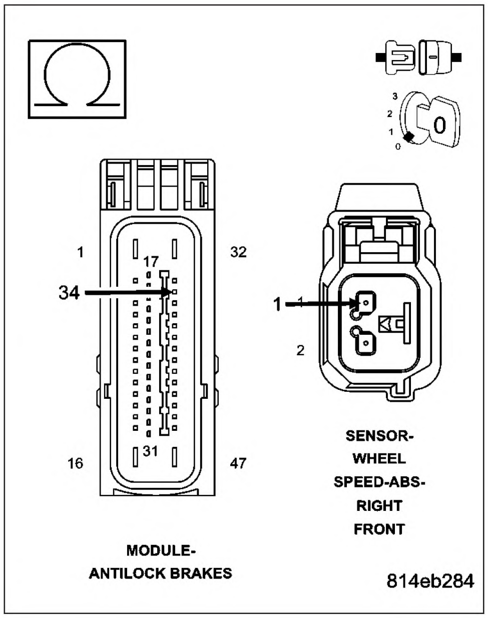
Yes >> Repair the (B7) Right Front WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. (B7) RIGHT FRONT WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B7) Right Front WSS Supply circuit.


3
2
1
0
0
1
17
32
34
16
31
47
1
1
2
MODULE-
ANTILOCK BRAKES
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb284

Is the resistance below 5.0 ohms?

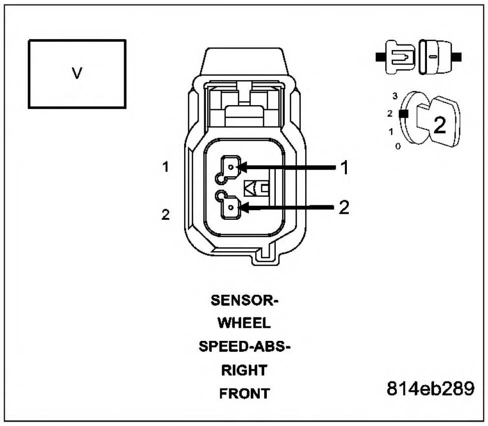
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B7) Right Front WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

8. CHECK THE (B7) RIGHT FRONT WSS SUPPLY AND THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE

Measure the voltage between the (B7) Right Front WSS Supply and (B6) Right Front WSS Signal circuits at the Right Front WSS harness connector.


V
1
2
1
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb289

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9

---

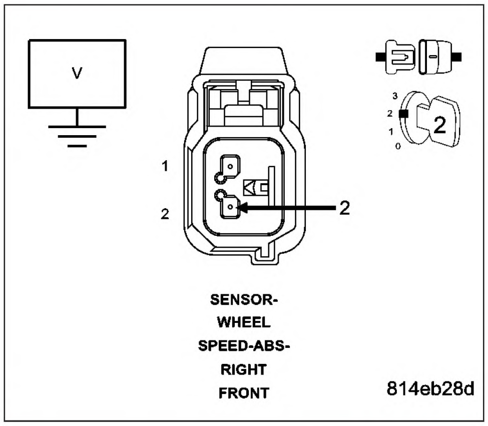
9. (B6) RIGHT FRONT WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B6) Right Front WSS Signal circuit.


V
1
2
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb28d

Is there any voltage present?

Yes >> Repair the (B6) Right Front WSS Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

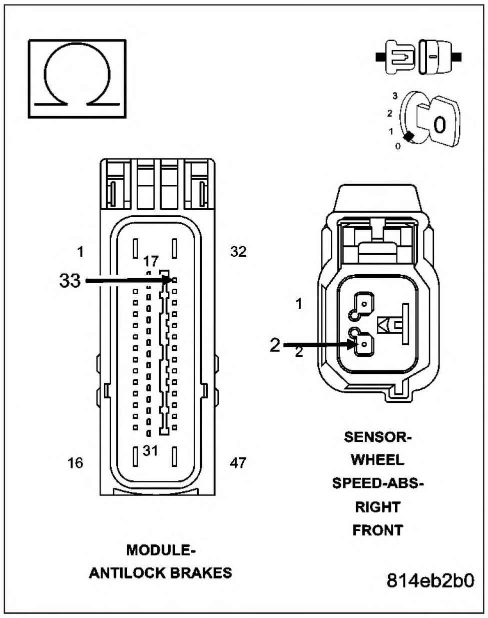
No >> Go To 10

C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

10. (B6) RIGHT FRONT WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B6) Right Front WSS Signal circuit.


1
17
32
33
16
31
47
1
2
2
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
MODULE-
ANTILOCK BRAKES
814eb2b0

Is the resistance above 5.0 ohms?

Yes >> Repair the (B6) Right Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

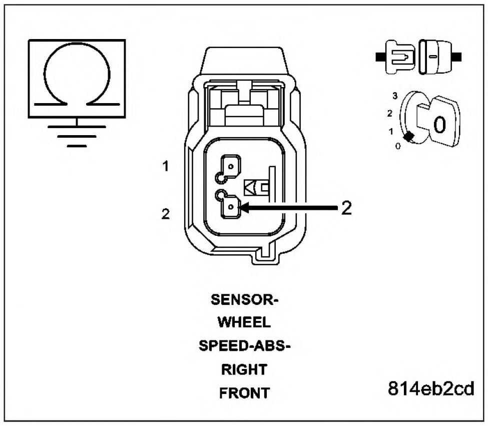
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

11. CHECK THE (B6) RIGHT FRONT WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B6) Right Front WSS Signal circuit.


1
2
2
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
814eb2cd

Is the resistance below 5.0 ohms?

Yes >> Repair the (B6) Right Front WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

C101C-RIGHT FRONT WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

12. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE RIGHT FRONT WSS HARNESS CONNECTOR

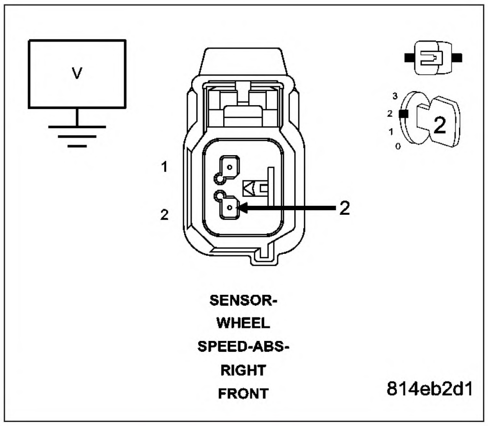
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Right Front WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Right Front WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

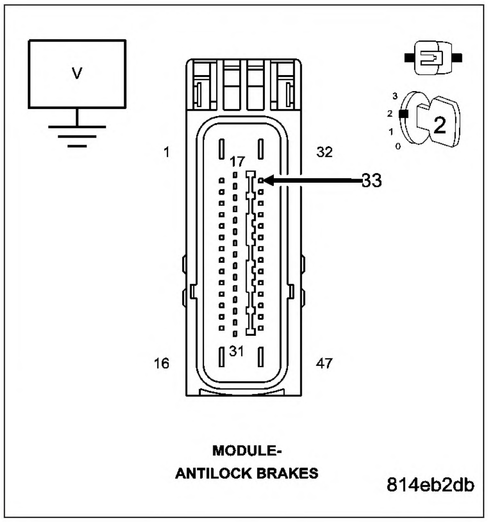
13. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

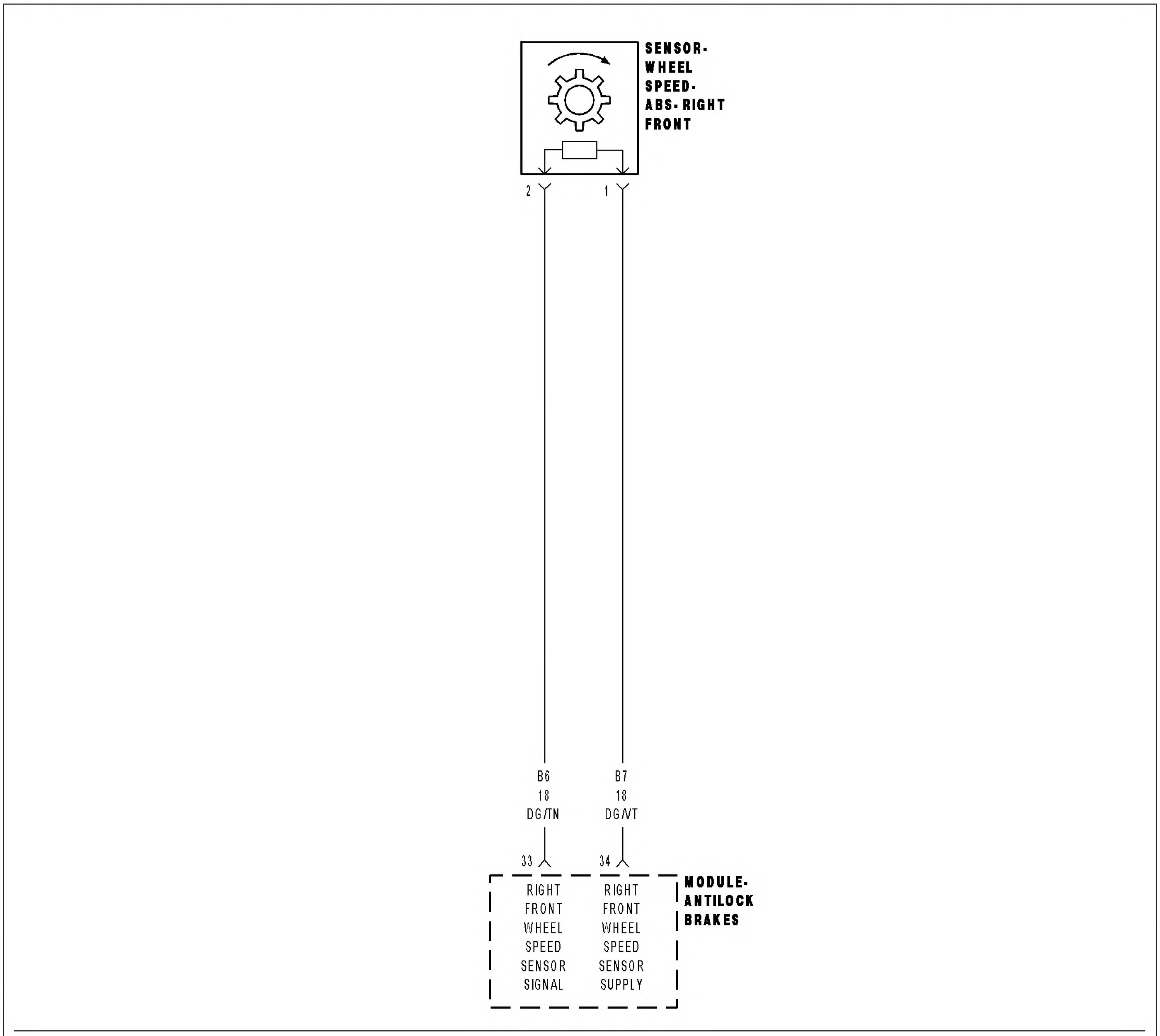


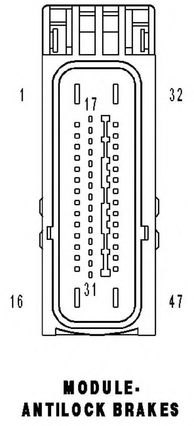
Does the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

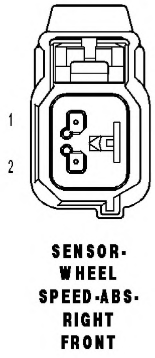
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B6) Right Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C101F-RIGHT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE


SENSOR-
WHEEL
SPEED-
ABS-RIGHT
FRONT
2
1
B6
18
DG/TN
B7
18
DG/VT
33
34
RIGHT
FRONT
WHEEL
SPEED
SENSOR
SIGNAL
RIGHT
FRONT
WHEEL
SPEED
SENSOR
SUPPLY
MODULE-
ANTILOCK
BRAKES


1
17
32
16
31
47
MODULE-
ANTILOCK BRAKES


1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT

814DC0AB

C101F-RIGHT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Right Front Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B6) RIGHT FRONT WSS SIGNAL CIRCUIT OPEN
RIGHT FRONT WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C101F-RIGHT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the RF WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Right Front WSS, Right Front WSS harness connector, and Right Front WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C101F-RIGHT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

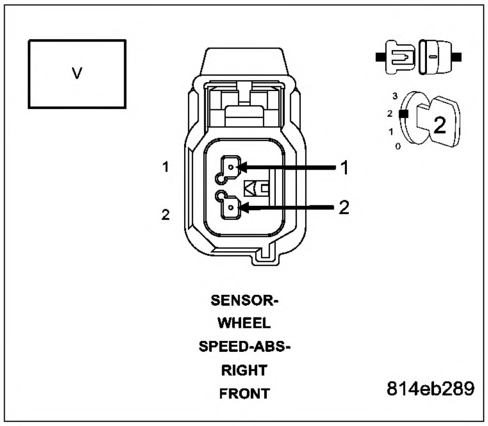
3. CHECK THE VOLTAGE BETWEEN (B7) RIGHT FRONT WSS SUPPLY CIRCUIT AND THE (B6) RIGHT FRONT WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Right Front WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B7) Right Front WSS Supply and (B6) Right Front WSS Signal circuits at the Right Front WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C1015 RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT for the diagnostic repair procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE RIGHT FRONT WSS HARNESS CONNECTOR

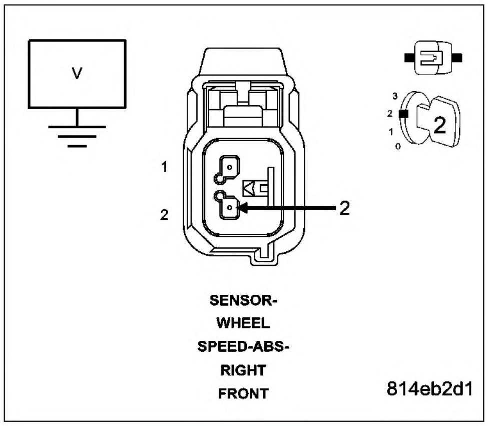
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Right Front WSS harness connector and chassis ground.

Slowly rotate the wheel by hand.



Did the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Go To 5

No >> Replace the Right Front WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C101F-RIGHT FRONT WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

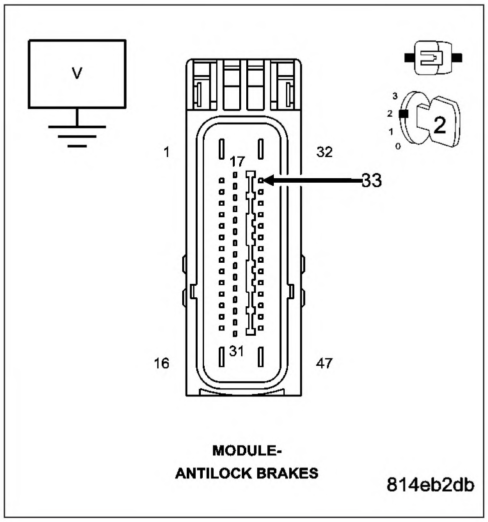
5. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and chassis ground.

Slowly rotate the wheel by hand.



Did the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

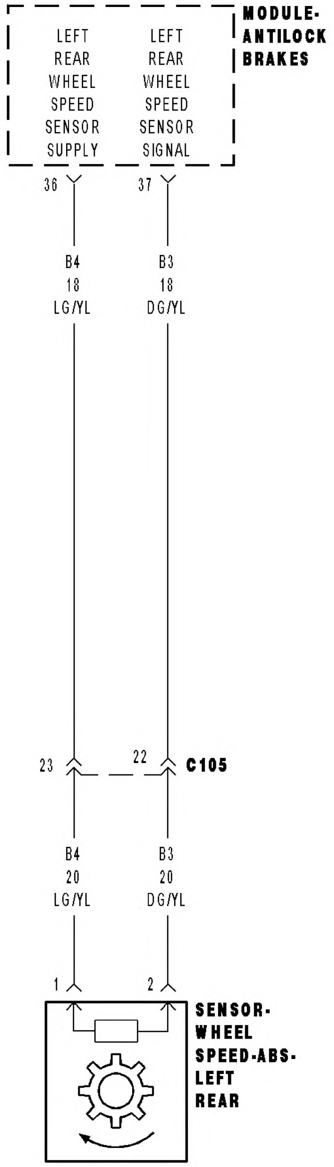
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.

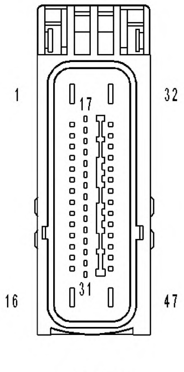
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B6) Right Front WSS Signal circuit for an open.

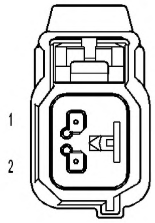
Perform ABS VERIFICATION TEST - VER 1.

C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT


MODULE-
ANTILOCK
BRAKES
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
36
37
B4
18
LG/YL
B3
18
DG/YL
23
22
C105
B4
20
LG/YL
B3
20
DG/YL
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR


1
17
32
16
31
47

**MODULE-
ANTILOCK BRAKES**



**SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR**

814dc11e

C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Left Rear Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B3) LEFT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B4) LEFT REAR WSS SUPPLY CIRCUIT
(B4) LEFT REAR WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B3) LEFT REAR WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
LEFT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

With the scan tool, read DTCs.

Does the scan tool display: C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Left Rear WSS, Left Rear WSS harness connector, and Left Rear WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

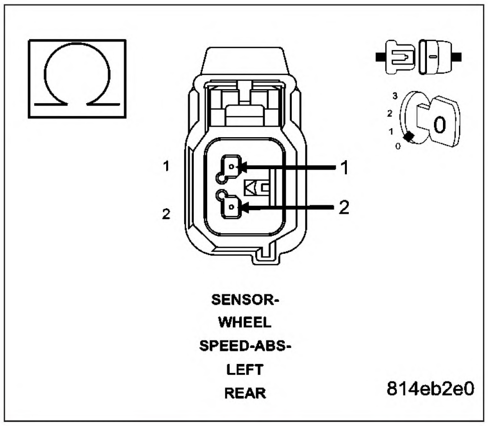
3. (B3) LEFT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B4) LEFT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Left Rear WSS harness connector.

Measure the resistance between the (B3) Left Rear WSS Signal and the (B4) Left Rear WSS Supply circuits at the Left Rear WSS harness connector.


Ω
1
2
1
2
3
2
1
0
0
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814eb2e0

Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B3) Left Rear WSS Signal circuit for a short to the (B4) Left Rear WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.

---

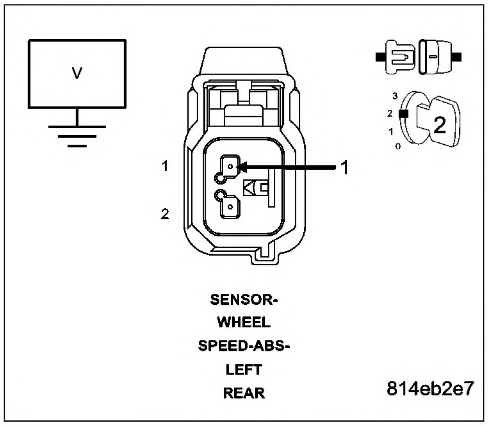
4. CHECK THE VOLTAGE ON THE (B4) LEFT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B4) Left Rear WSS Supply circuit in the Left Rear WSS harness connector.


V
1
2
1
3
2
1
0
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814eb2e7

Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5

---

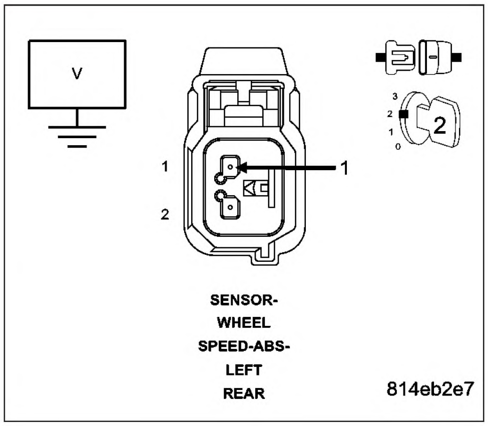
5. (B4) LEFT REAR WSS SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B4) Left Rear WSS Supply circuit.


V
1
2
1
3
2
1
0
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814eb2e7

Is there any voltage present?

Yes >> Repair the (B4) Left Rear WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

6. (B4) LEFT REAR WSS SUPPLY CIRCUIT SHORT TO GROUND

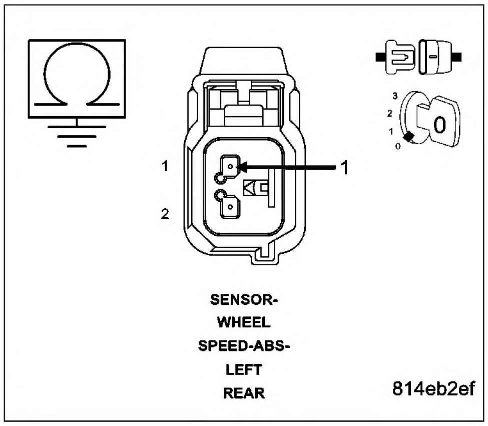
Turn the ignition off.

Measure the resistance between ground and the (B4) Left Rear WSS Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (B4) Left Rear WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7


1
2
1
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814eb2ef

---

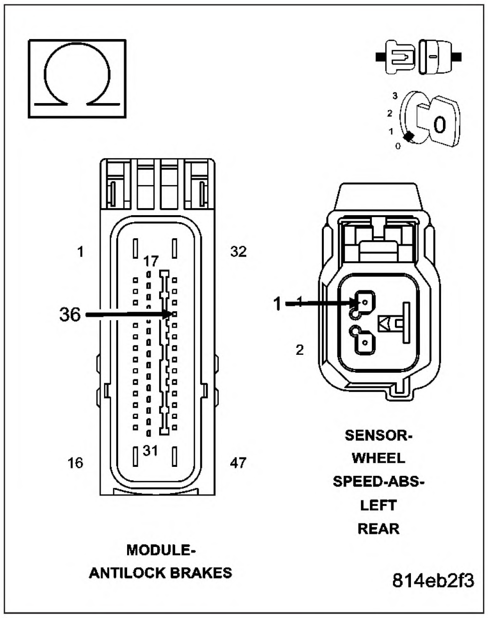
7. (B4) LEFT REAR WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B4) Left Rear WSS Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B4) Left Rear WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.


3
2
1
0
0
1
17
32
36
16
31
47
1
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
MODULE-
ANTILOCK BRAKES
814eb2f3

---

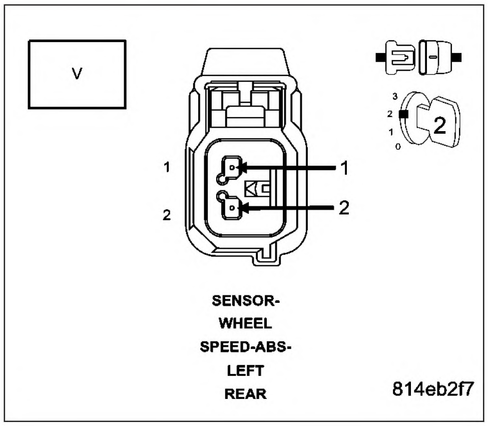
8. CHECK THE (B4) LEFT REAR WSS SUPPLY AND THE (B3) LEFT REAR WSS SIGNAL VOLTAGE

Measure the voltage between the (B4) Left Rear WSS Supply and (B3) Left Rear WSS Signal circuits at the Left Rear WSS harness connector.

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9


V
3
2
1
0
2
1
2
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814eb2f7

C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

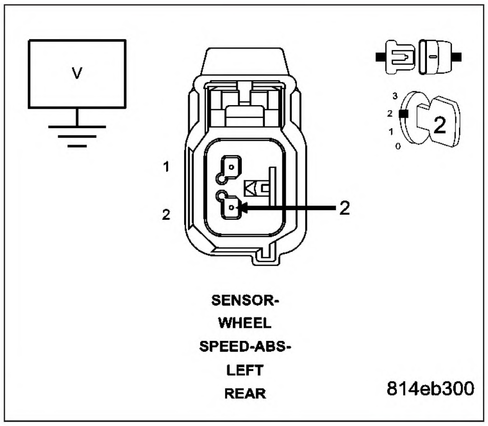
9. (B3) LEFT REAR WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B3) Left Rear WSS Signal circuit.


V
1
2
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814eb300

Is there any voltage present?

Yes >> Repair the (B3) Left Rear WSS Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

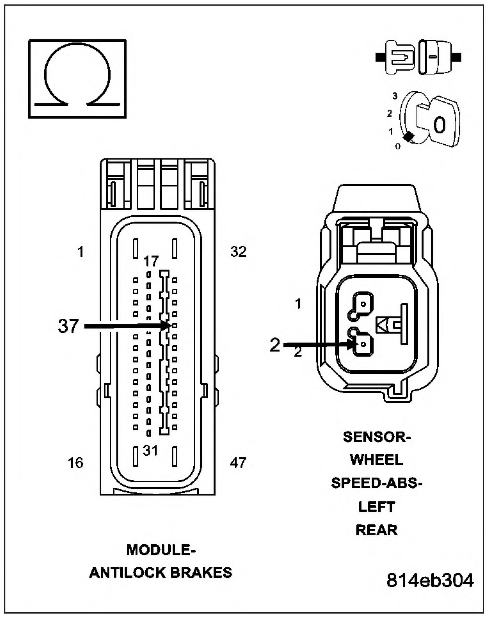
No >> Go To 10

---

10. (B3) LEFT REAR WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B3) Left Rear WSS Signal circuit.


Ω
3
2
1
0
0
1
17
32
37
16
31
47
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
MODULE-
ANTILOCK BRAKES
814eb304

Is the resistance above 5.0 ohms?

Yes >> Repair the (B3) Left Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

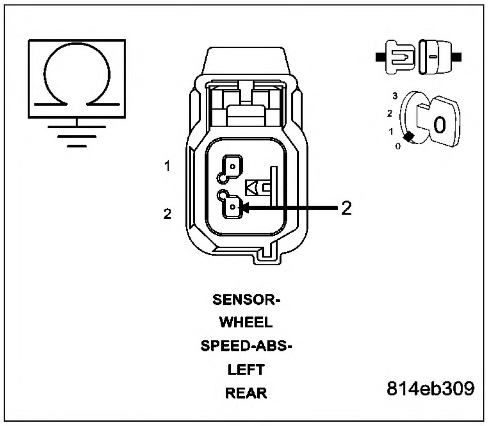
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1020–LEFT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

11. CHECK THE (B3) LEFT REAR WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B3) Left Rear WSS Signal circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (B3) Left Rear WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

---

12. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE LEFT REAR WSS HARNESS CONNECTOR

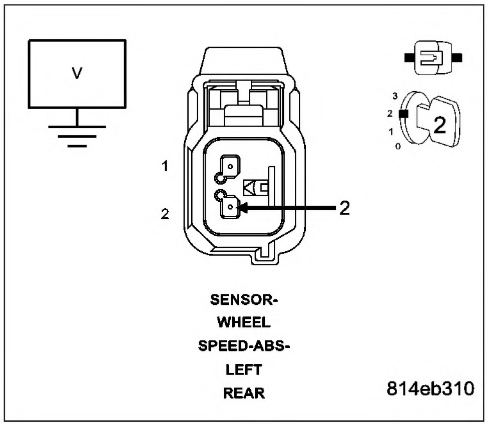
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Left Rear WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Left Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

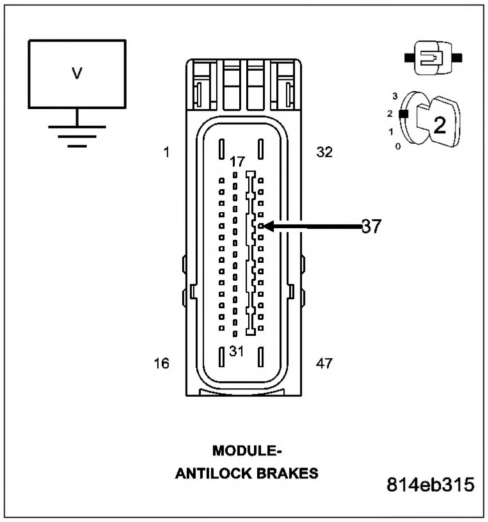
13. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

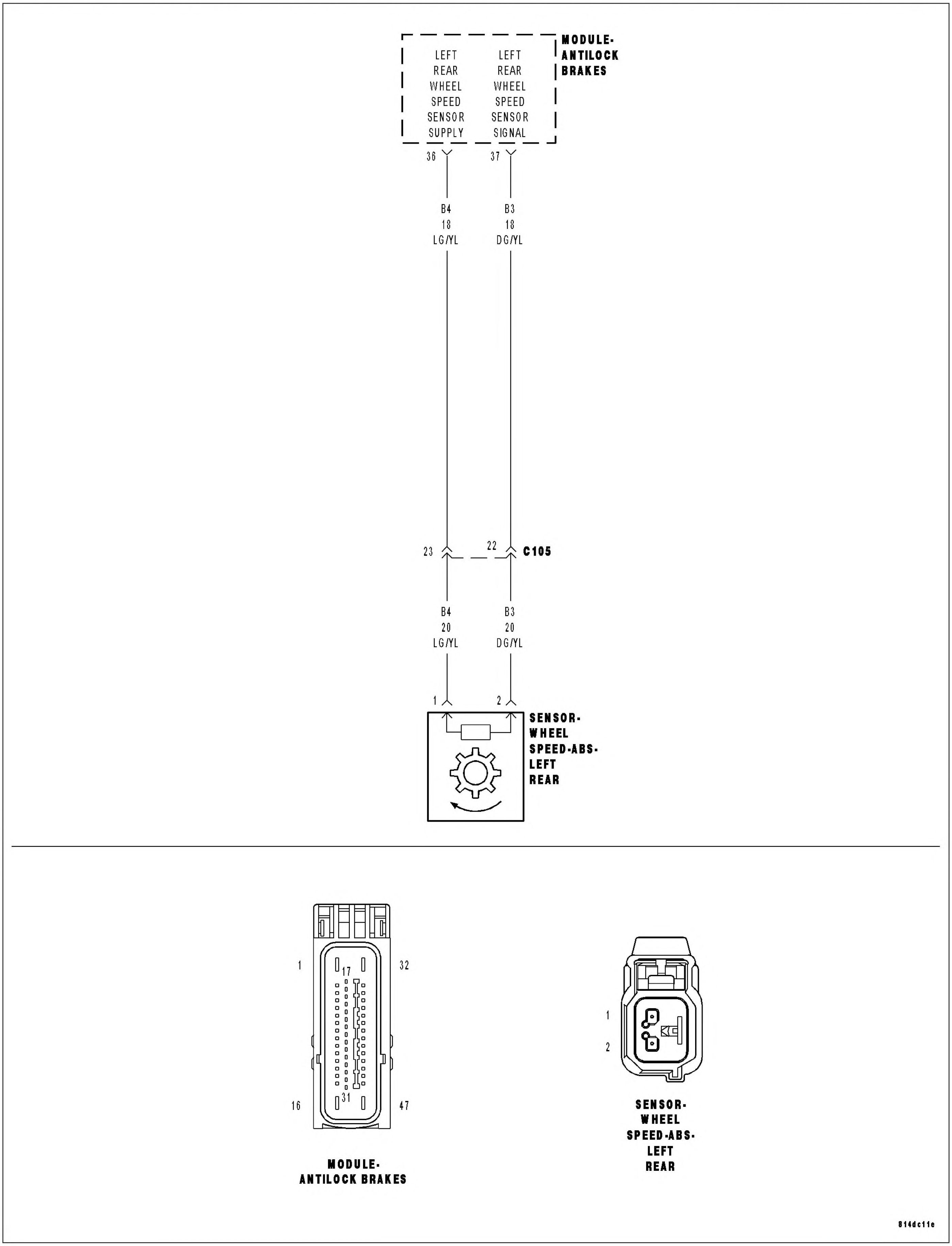


Does the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B3) Left Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE


MODULE-
ANTILOCK
BRAKES
LEFT
REAR
WHEEL
SPEED
SENSOR
SUPPLY
LEFT
REAR
WHEEL
SPEED
SENSOR
SIGNAL
36
37
B4
18
LG/YL
B3
18
DG/YL
23
22
C105
B4
20
LG/YL
B3
20
DG/YL
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
1
17
32
31
16
47
MODULE-
ANTILOCK BRAKES
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814dc11e

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Left Rear Wheel Speed Signal circuit indicates continuously too high or too low wheel speed.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B3) LEFT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B4) LEFT REAR WSS SUPPLY CIRCUIT
(B4) LEFT REAR WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B3) LEFT REAR WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
LEFT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

CAUTION: Ensure braking capability is available before road testing.

Drive the vehicle over 25 Km/h (15 mph).

Park the vehicle and cycle the ignition switch from off to on.

With the scan tool, read DTCs.

Does the scan tool display: C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Left Rear WSS, Left Rear WSS harness connector, and Left Rear WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

---

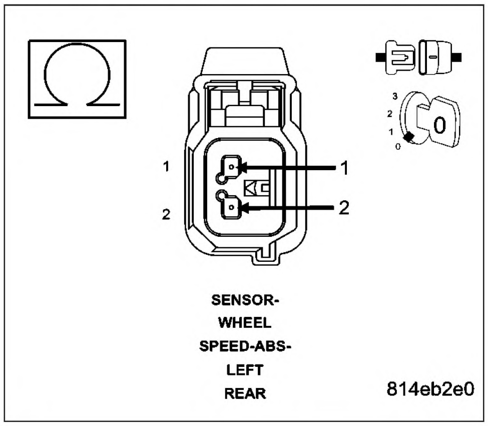
3. (B3) LEFT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B4) LEFT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Left Rear WSS harness connector.

Measure the resistance between the (B3) Left Rear WSS Signal and the (B4) Left Rear WSS Supply circuits at the Left Rear WSS harness connector.



Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B3) Left Rear WSS Signal circuit for a short to the (B4) Left Rear WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.

---

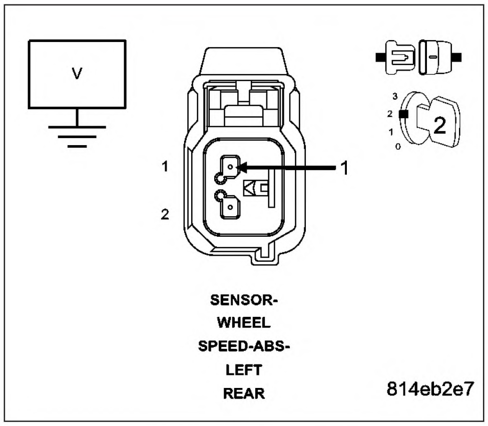
4. CHECK THE VOLTAGE ON THE (B4) LEFT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B4) Left Rear WSS Supply circuit in the Left Rear WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

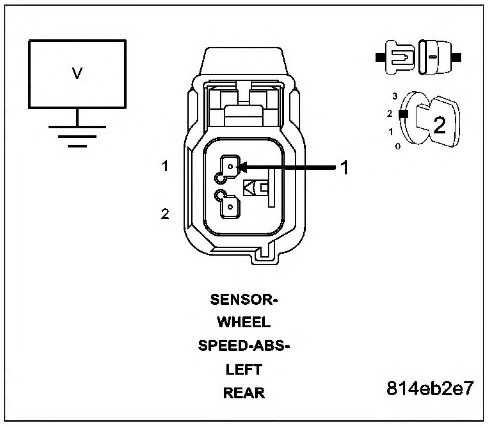
5. (B4) LEFT REAR WSS SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B4) Left Rear WSS Supply circuit.


V
1
2
1
3
2
1
0
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814eb2e7

Is there any voltage present?

Yes >> Repair the (B4) Left Rear WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

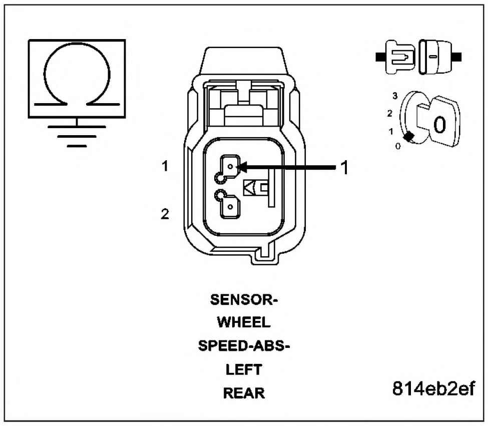
No >> Go To 6

---

6. (B4) LEFT REAR WSS SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B4) Left Rear WSS Supply circuit.


Ω
1
2
1
3
2
1
0
0
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814eb2ef

Is the resistance below 5.0 ohms?

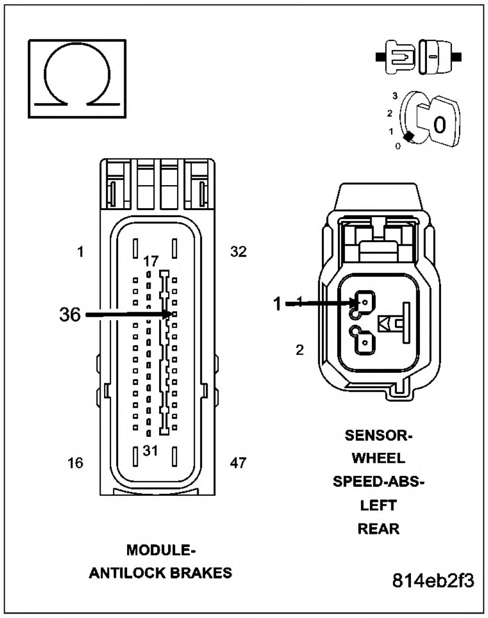
Yes >> Repair the (B4) Left Rear WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

7. (B4) LEFT REAR WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B4) Left Rear WSS Supply circuit.


Ω
3
2
1
0
0
1
17
32
36
1
1
2
16
31
47
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
MODULE-
ANTILOCK BRAKES
814eb2f3

Is the resistance below 5.0 ohms?

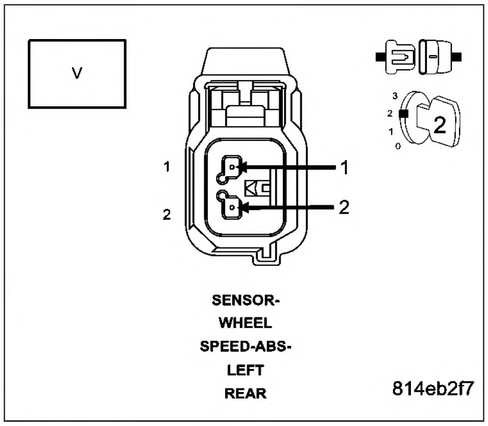
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B4) Left Rear WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

8. CHECK THE (B4) LEFT REAR WSS SUPPLY AND THE (B3) LEFT REAR WSS SIGNAL VOLTAGE

Measure the voltage between the (B4) Left Rear WSS Supply and (B3) Left Rear WSS Signal circuits at the Left Rear WSS harness connector.


V
3
2
1
0
2
1
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814eb2f7

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

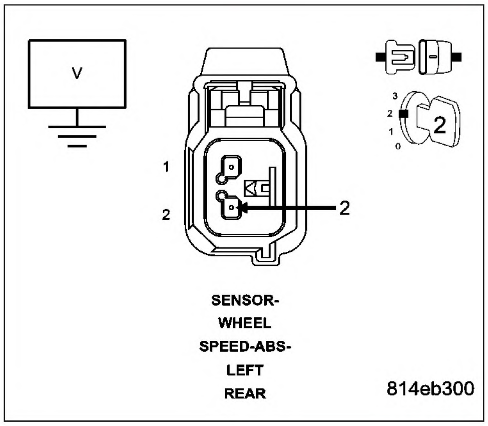
9. (B3) LEFT REAR WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B3) Left Rear WSS Signal circuit.


V
1
2
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814eb300

Is there any voltage present?

Yes >> Repair the (B3) Left Rear WSS Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

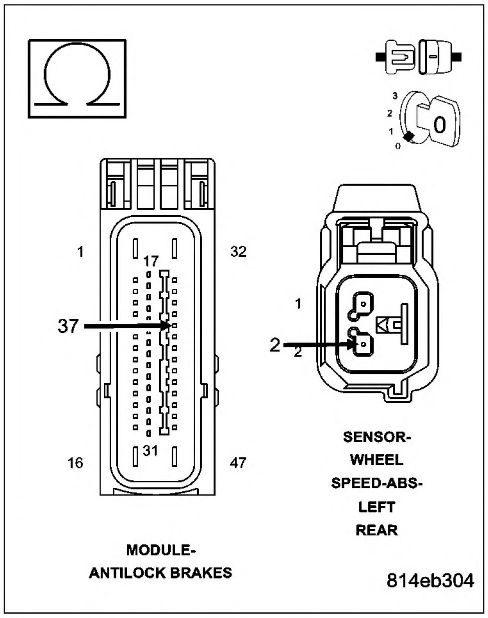
No >> Go To 10

---

10. (B3) LEFT REAR WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B3) Left Rear WSS Signal circuit.


Ω
3
2
1
0
0
1
17
32
37
16
31
47
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
MODULE-
ANTILOCK BRAKES
814eb304

Is the resistance above 5.0 ohms?

Yes >> Repair the (B3) Left Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

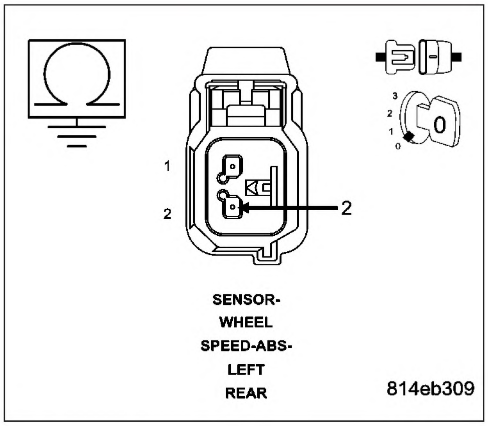
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

11. CHECK THE (B3) LEFT REAR WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B3) Left Rear WSS Signal circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (B3) Left Rear WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

---

12. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE LEFT REAR WSS HARNESS CONNECTOR

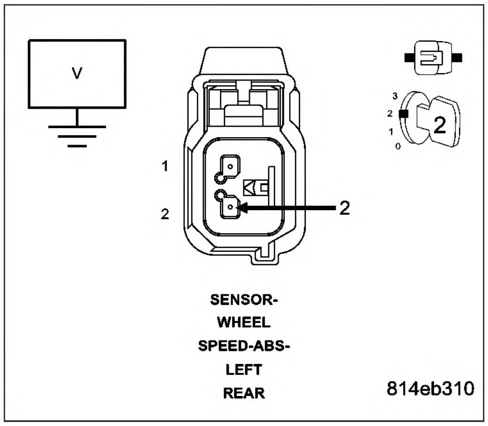
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Left Rear WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Left Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1027-LEFT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

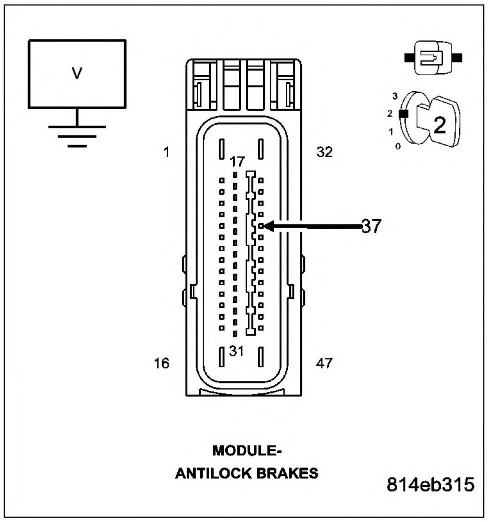
13. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

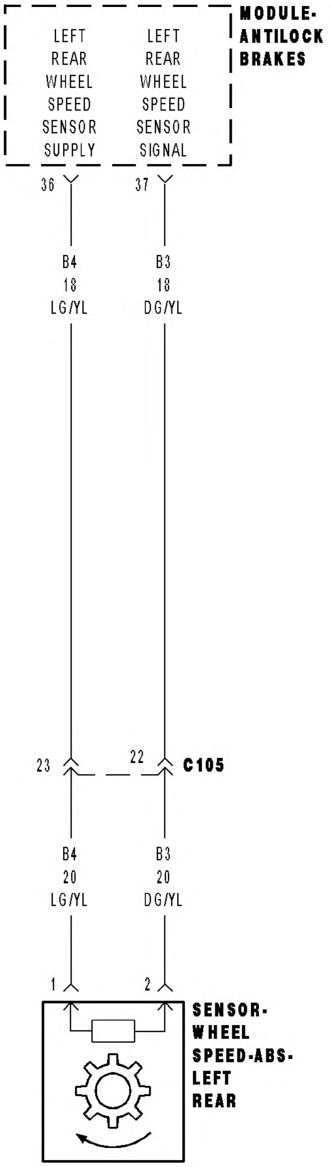


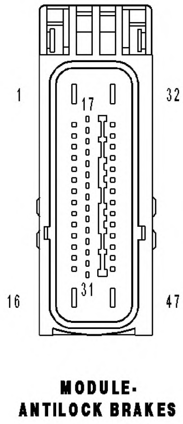
Does the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

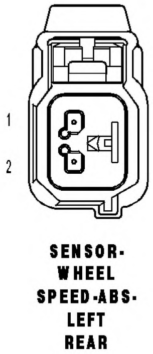
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B3) Left Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C102A-LEFT REAR WHEEL SPEED COMPARATIVE PERFORMANCE


MODULE-
ANTILOCK
BRAKES
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
36
37
B4
18
LG/YL
B3
18
DG/YL
23
22
C105
B4
20
LG/YL
B3
20
DG/YL
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR


1
17
32
16
31
47
MODULE-
ANTILOCK BRAKES


1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814dc11e

C102A-LEFT REAR WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Left Rear Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B3) LEFT REAR WSS SIGNAL CIRCUIT OPEN
LEFT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C102A-LEFT REAR WHEEL SPEED COMPARATIVE PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the LR WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Left Rear WSS, Left Rear WSS harness connector, and Left Rear WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C102A-LEFT REAR WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

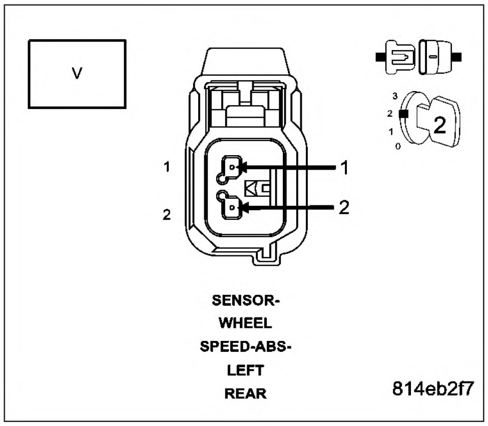
3. CHECK THE VOLTAGE BETWEEN (B4) LEFT REAR WSS SUPPLY CIRCUIT AND THE (B3) LEFT REAR WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Left Rear WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B4) Left Rear WSS Supply and (B3) Left Rear WSS Signal circuits at the Left Rear WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C1020 LEFT REAR WHEEL SPEED SENSOR CIRCUIT for the diagnostic repair procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE LEFT REAR WSS HARNESS CONNECTOR

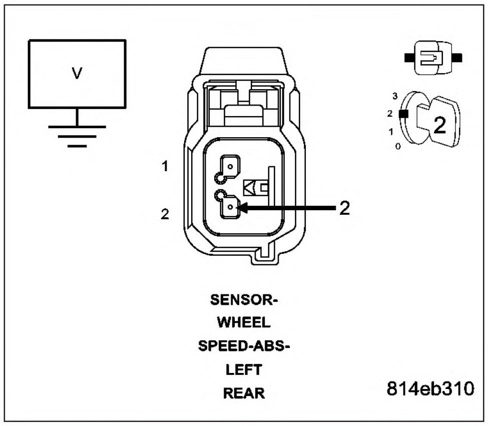
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Left Rear WSS harness connector and chassis ground.

Slowly rotate the wheel by hand.



Did the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Go To 5

No >> Replace the Left Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C102A-LEFT REAR WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

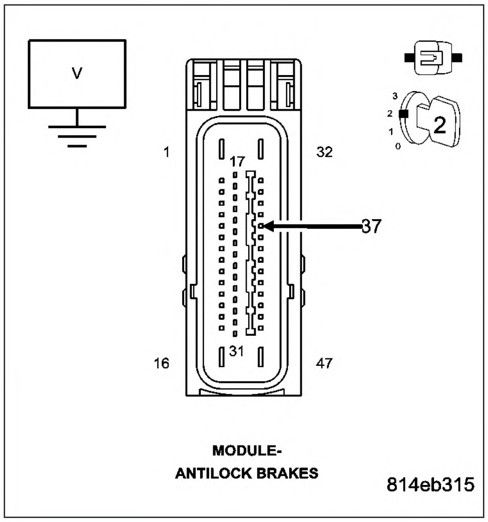
5. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and chassis ground.

Slowly rotate the wheel by hand.

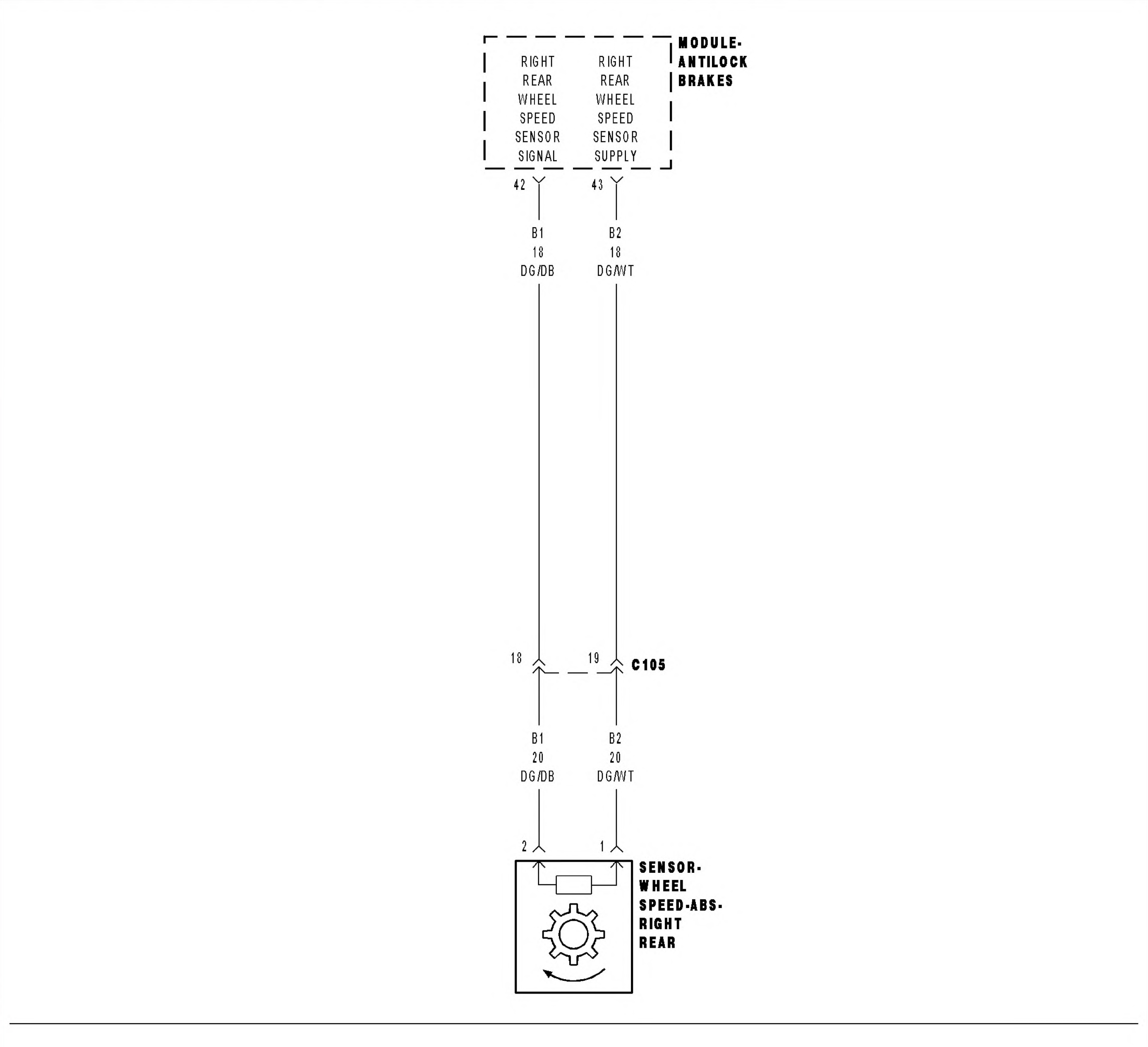


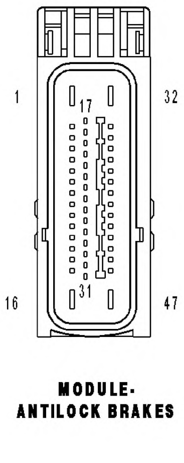
Did the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

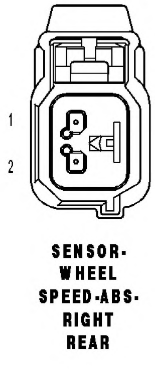
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B3) Left Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT


MODULE-
ANTILOCK
BRAKES
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
42
43
B1
18
DG/DB
B2
18
DG/WT
18
19
C105
B1
20
DG/DB
B2
20
DG/WT
2
1
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR


1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES


1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR

814dc13d

C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Right Rear Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B2) RIGHT REAR WSS SUPPLY CIRCUIT
(B2) RIGHT REAR WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
RIGHT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

With the scan tool, read DTCs.

Does the scan tool display: C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Right Rear WSS, Right Rear WSS harness connector, and Right Rear WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

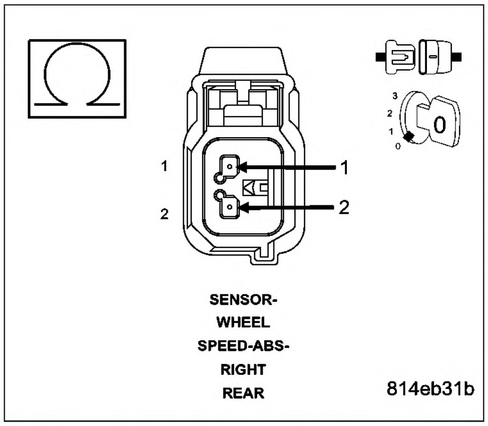
3. (B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B2) RIGHT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Right Rear WSS harness connector.

Measure the resistance between the (B1) Right Rear WSS Signal and the (B2) Right Rear WSS Supply circuits at the Right Rear WSS harness connector.


1
2
1
2
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb31b

Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B1) Right Rear WSS Signal circuit for a short to the (B2) Right Rear WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.

---

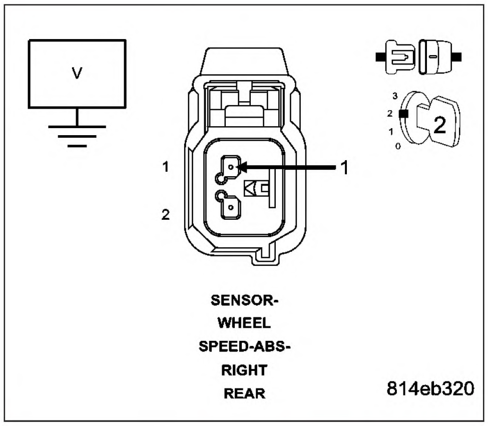
4. CHECK THE VOLTAGE ON THE (B2) RIGHT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B2) Right Rear WSS Supply circuit in the Right Rear WSS harness connector.


V
1
2
1
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb320

Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5

---

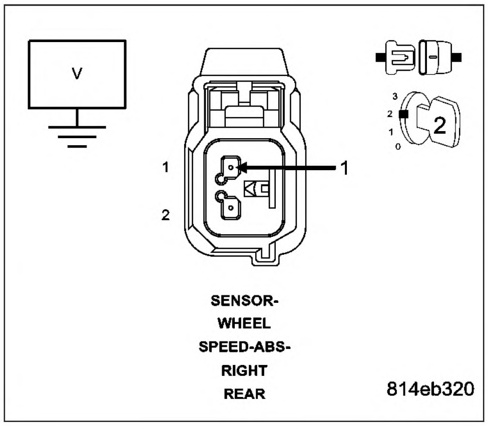
5. (B2) RIGHT REAR WSS SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B2) Right Rear WSS Supply circuit.


V
1
2
1
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb320

Is there any voltage present?

Yes >> Repair the (B2) Right Rear WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

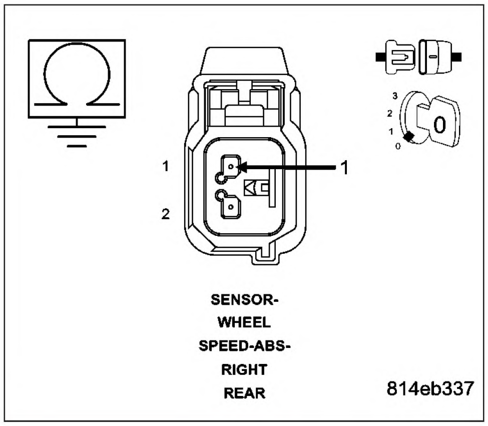
No >> Go To 6

C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

6. (B2) RIGHT REAR WSS SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B2) Right Rear WSS Supply circuit.


1
2
1
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb337

Is the resistance below 5.0 ohms?

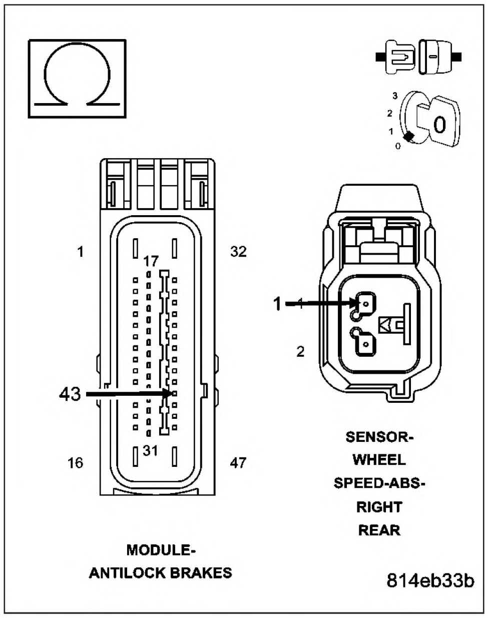
Yes >> Repair the (B2) Right Rear WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. (B2) RIGHT REAR WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B2) Right Rear WSS Supply circuit.


1
32
17
43
16
31
47
1
2
3
2
1
0
0
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
MODULE-
ANTILOCK BRAKES
814eb33b

Is the resistance below 5.0 ohms?

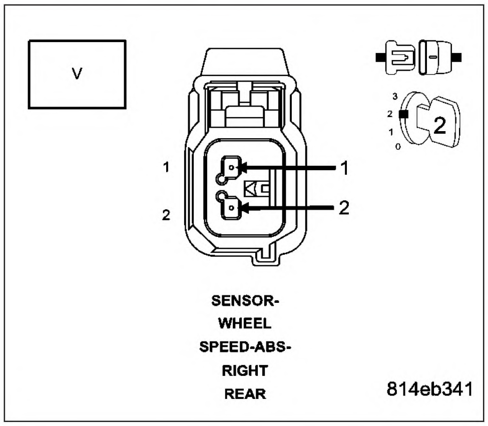
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B2) Right Rear WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

8. CHECK THE (B2) RIGHT REAR WSS SUPPLY AND THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE

Measure the voltage between the (B2) Right Rear WSS Supply and (B1) Right Rear WSS Signal circuits at the Right Rear WSS harness connector.


V
1
2
1
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb341

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9

C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

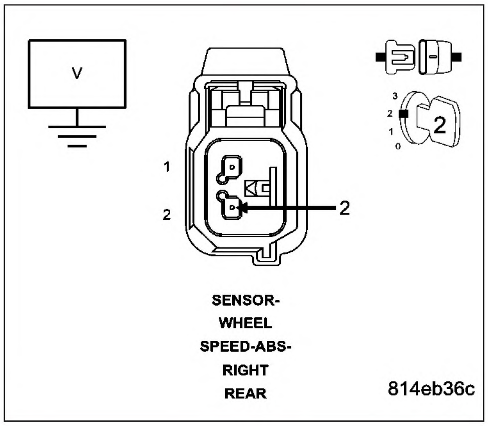
9. (B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B1) Right Rear WSS Signal circuit.


V
1
2
2
2
3
2
1
0
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
814eb36c

Is there any voltage present?

Yes >> Repair the (B1) Right Rear WSS Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

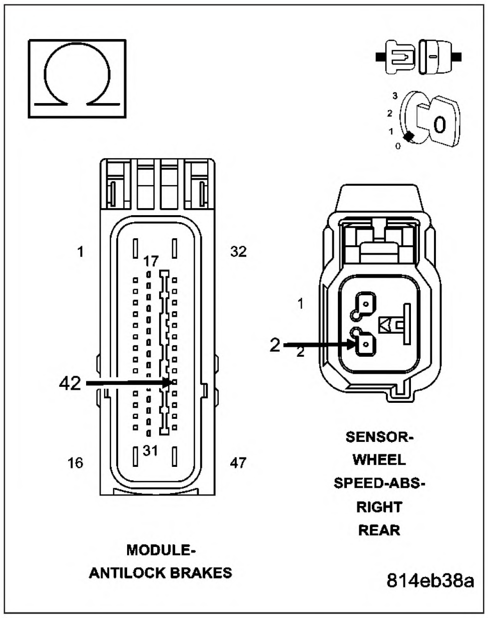
No >> Go To 10

---

10. (B1) RIGHT REAR WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B1) Right Rear WSS Signal circuit.


Ω
3
2
1
0
0
1
17
32
42
16
31
47
1
2
2
MODULE-ANTILOCK BRAKES
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
814eb38a

Is the resistance above 5.0 ohms?

Yes >> Repair the (B1) Right Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

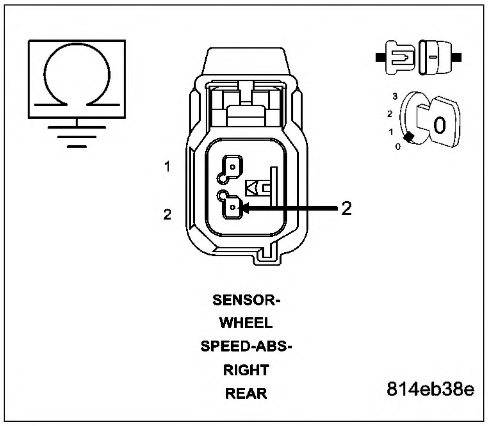
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

11. CHECK THE (B1) RIGHT REAR WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B1) Right Rear WSS Signal circuit.


Ω
3
2
1
0
0
1
2
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
814eb38e

Is the resistance below 5.0 ohms?

Yes >> Repair the (B1) Right Rear WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

C102B–RIGHT REAR WHEEL SPEED SENSOR CIRCUIT (CONTINUED)

12. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE RIGHT REAR WSS HARNESS CONNECTOR

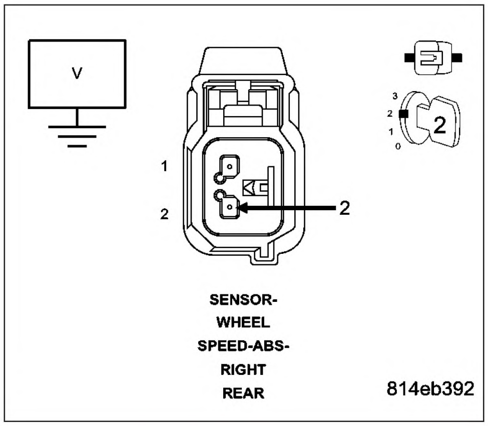
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Right Rear WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Right Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

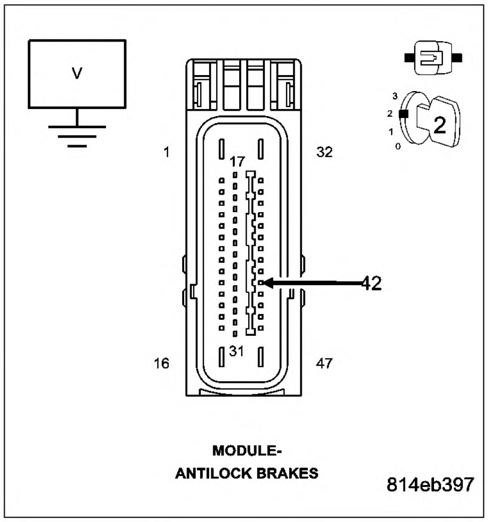
13. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

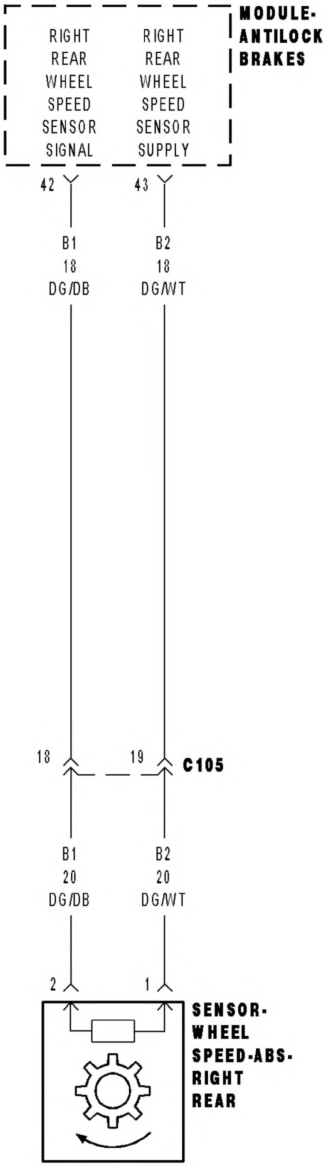


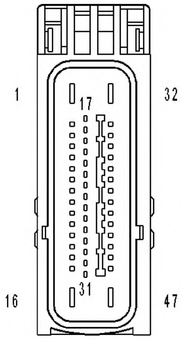
Does the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

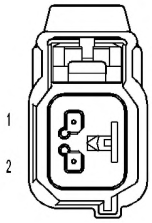
No >> Repair the (B1) Right Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE


MODULE-ANTILOCK BRAKES
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
42
43
B1 18 DG/DB
B2 18 DG/WT
18
19
C105
B1 20 DG/DB
B2 20 DG/WT
2
1
SENSOR-WHEEL SPEED-ABS-RIGHT REAR


1
32
17
31
16
47

MODULE-ANTILOCK BRAKES



SENSOR-WHEEL SPEED-ABS-RIGHT REAR

814dc13d

C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Right Rear Wheel Speed Signal circuit indicates continuously too high or too low wheel speed.

Possible Causes
TERMINAL/CONNECTOR/TONE WHEEL DAMAGE
(B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B2) RIGHT REAR WSS SUPPLY CIRCUIT
(B2) RIGHT REAR WSS SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
RIGHT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

CAUTION: Ensure braking capability is available before road testing.

Drive the vehicle over 25 Km/h (15 mph).

Park the vehicle and cycle the ignition switch from off to on.

With the scan tool, read DTCs.

Does the scan tool display: C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

2. CHECK THE TERMINALS/CONNECTORS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector, Right Rear WSS, Right Rear WSS harness connector, and Right Rear WSS tone wheel (if applicable).

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. (B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORTED TO THE (B2) RIGHT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

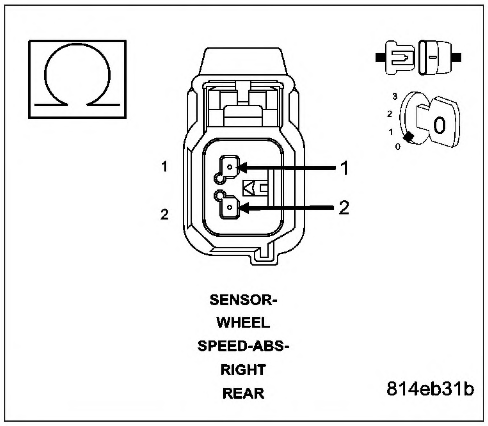
Disconnect the Right Rear WSS harness connector.

Measure the resistance between the (B1) Right Rear WSS Signal and the (B2) Right Rear WSS Supply circuits at the Right Rear WSS harness connector.

Is the resistance above 5.0 ohms?

Yes >> Go To 4

No >> Repair the (B1) Right Rear WSS Signal circuit for a short to the (B2) Right Rear WSS Supply circuit.
Perform ABS VERIFICATION TEST - VER 1.



814eb31b

---

4. CHECK THE VOLTAGE ON THE (B2) RIGHT REAR WSS SUPPLY CIRCUIT

Turn the ignition off.

Connect the Anti-Lock Brake Module harness connector.

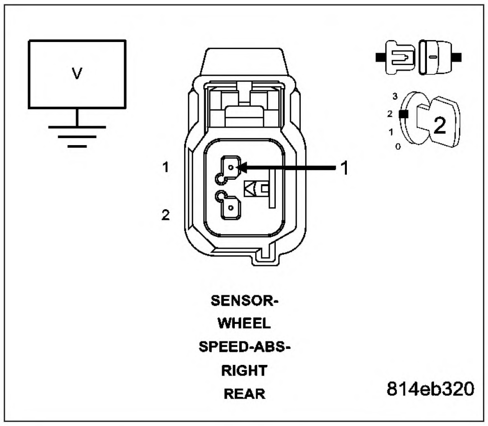
Turn the ignition on.

Measure the voltage of the (B2) Right Rear WSS Supply circuit in the Right Rear WSS harness connector.

Is the voltage above 10 volts?

Yes >> Go To 8

No >> Go To 5



814eb320

C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

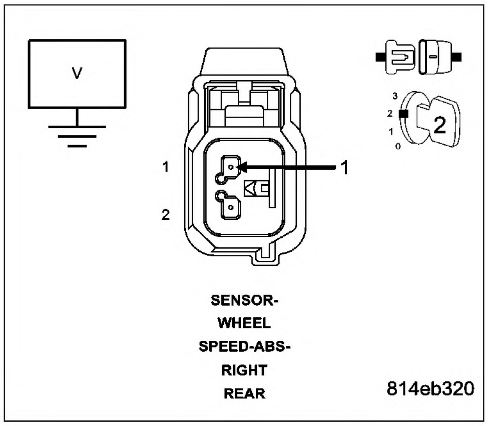
5. (B2) RIGHT REAR WSS SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B2) Right Rear WSS Supply circuit.


V
3
2
1
0
2
1
1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb320

Is there any voltage present?

Yes >> Repair the (B2) Right Rear WSS Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

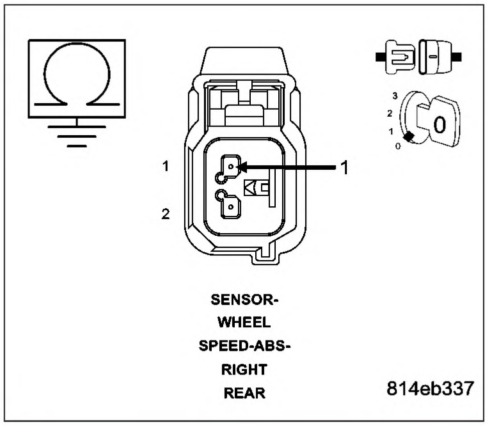
No >> Go To 6

---

6. (B2) RIGHT REAR WSS SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B2) Right Rear WSS Supply circuit.


3
2
1
0
0
1
1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb337

Is the resistance below 5.0 ohms?

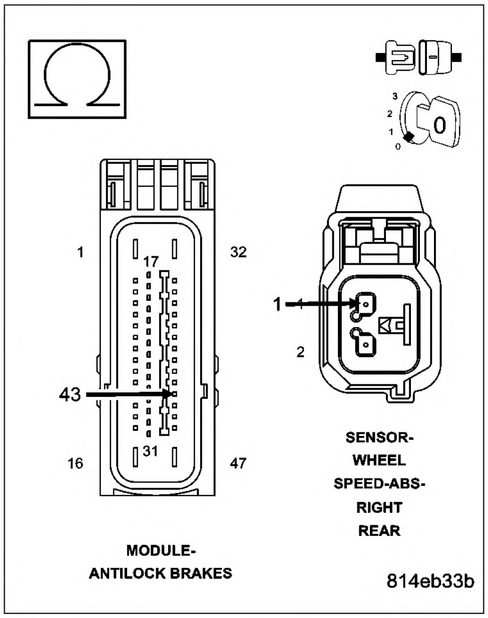
Yes >> Repair the (B2) Right Rear WSS Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. (B2) RIGHT REAR WSS SUPPLY CIRCUIT OPEN

Measure the resistance of the (B2) Right Rear WSS Supply circuit.


3
2
1
0
0
1
17
32
43
31
16
47
1
1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
MODULE-
ANTILOCK BRAKES
814eb33b

Is the resistance below 5.0 ohms?

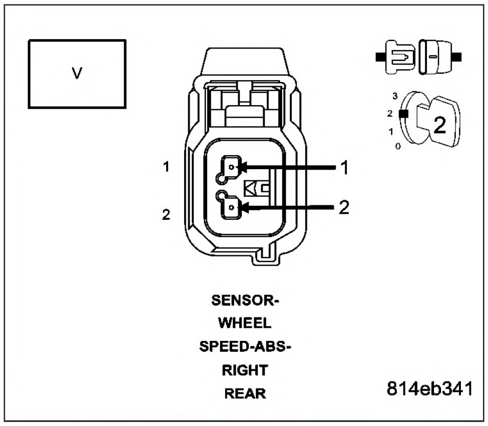
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B2) Right Rear WSS Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

8. CHECK THE (B2) RIGHT REAR WSS SUPPLY AND THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE

Measure the voltage between the (B2) Right Rear WSS Supply and (B1) Right Rear WSS Signal circuits at the Right Rear WSS harness connector.


V
1
2
1
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb341

Is the voltage above 10 volts?

Yes >> Go To 11

No >> Go To 9

---

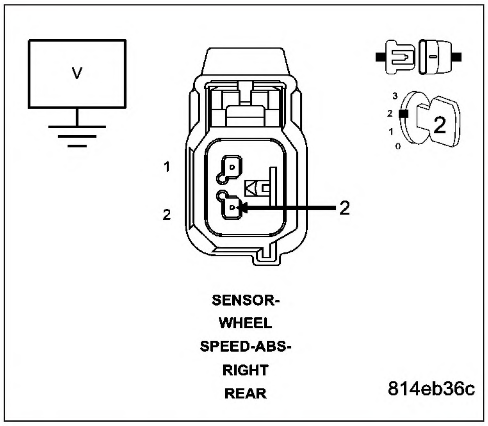
9. (B1) RIGHT REAR WSS SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B1) Right Rear WSS Signal circuit.


V
1
2
2
3
2
1
0
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb36c

Is there any voltage present?

Yes >> Repair the (B1) Right Rear WSS Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

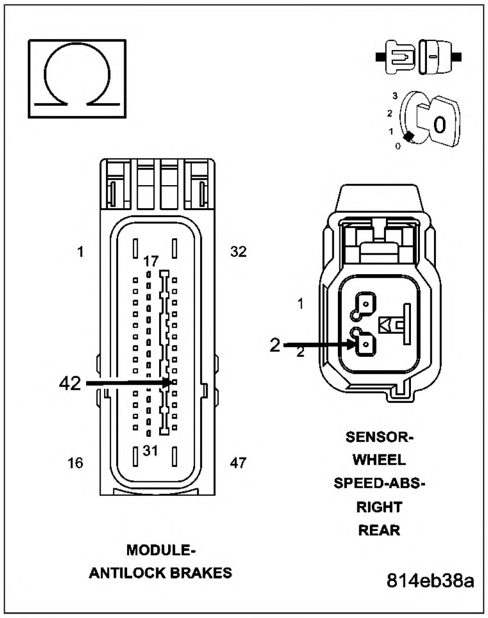
No >> Go To 10

C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

10. (B1) RIGHT REAR WSS SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B1) Right Rear WSS Signal circuit.


1
32
17
42
31
16
47
1
2
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
MODULE-
ANTILOCK BRAKES
814eb38a

Is the resistance above 5.0 ohms?

Yes >> Repair the (B1) Right Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

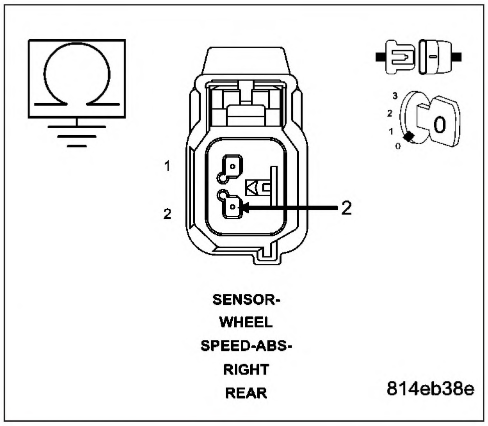
No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

11. CHECK THE (B1) RIGHT REAR WSS SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B1) Right Rear WSS Signal circuit.


1
2
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814eb38e

Is the resistance below 5.0 ohms?

Yes >> Repair the (B1) Right Rear WSS Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

C1032-RIGHT REAR WHEEL SPEED SENSOR SIGNAL ERRATIC PERFORMANCE (CONTINUED)

12. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE RIGHT REAR WSS HARNESS CONNECTOR

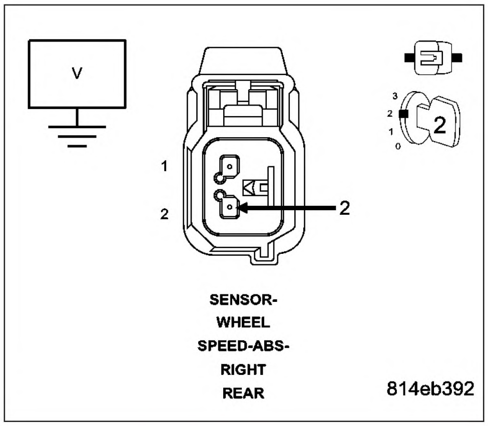
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Right Rear WSS harness connector and ground.

Slowly rotate the wheel by hand.



Does the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Go To 13

No >> Replace the Right Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

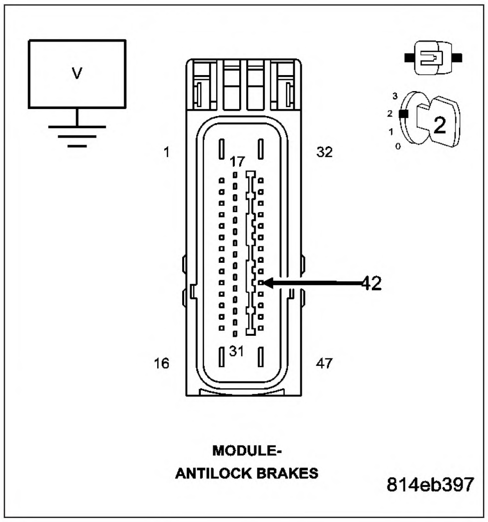
13. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and ground.

Slowly rotate the wheel by hand.

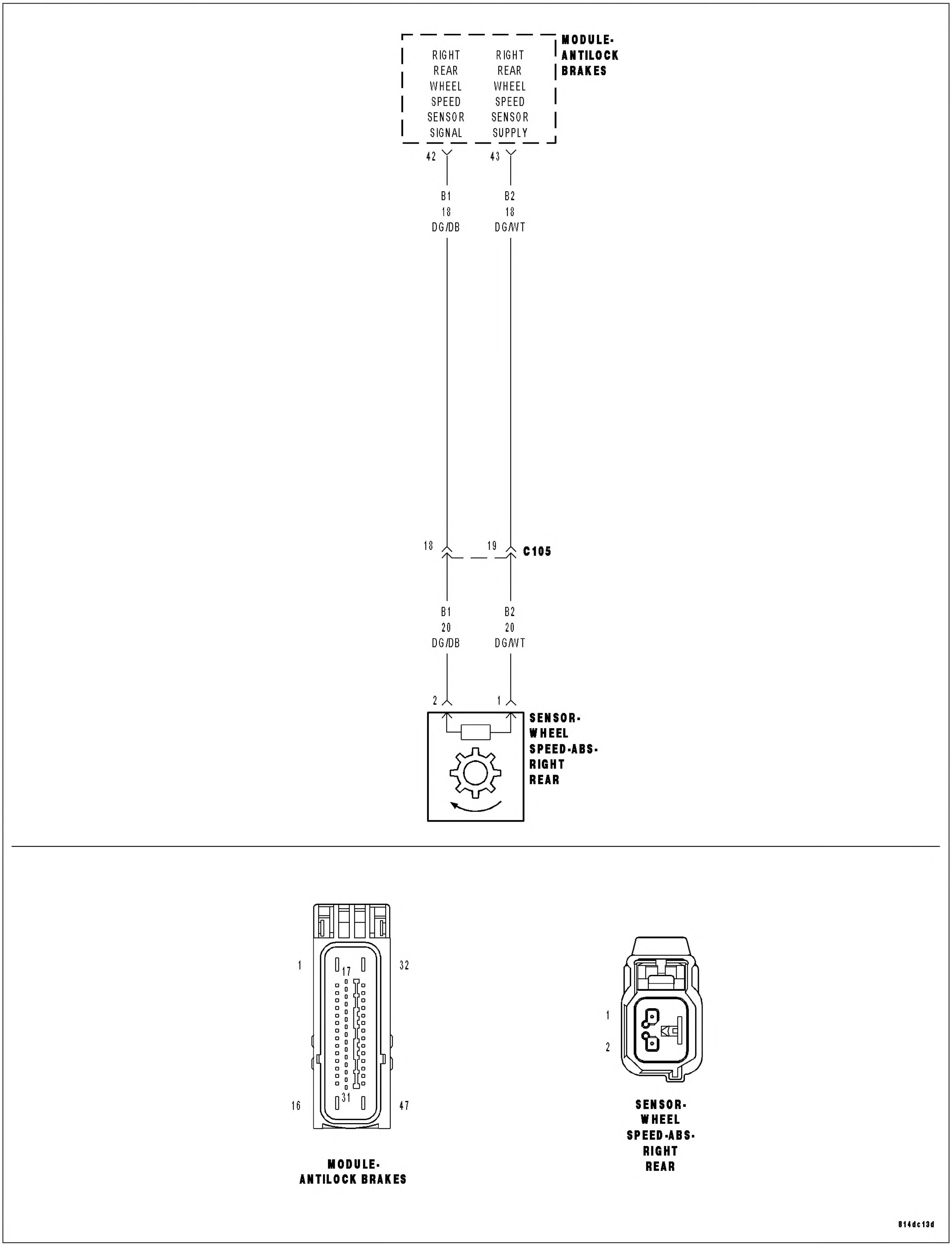


Does the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 and .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B1) Right Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1035-RIGHT REAR WHEEL SPEED COMPARATIVE PERFORMANCE


MODULE-
ANTILOCK
BRAKES
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
42
43
B1
18
DG/DB
B2
18
DG/WT
18
19
C105
B1
20
DG/DB
B2
20
DG/WT
2
1
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
1
17
32
16
31
47
MODULE-
ANTILOCK BRAKES
1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814dc13d

C1035-RIGHT REAR WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Right Rear Wheel Speed Sensor circuit fails the diagnostic test.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B1) RIGHT REAR WSS SIGNAL CIRCUIT OPEN
RIGHT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1035-RIGHT REAR WHEEL SPEED COMPARATIVE PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the RR WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Visually inspect the Anti-Lock Brake Module harness connector, Right Rear WSS, Right Rear WSS harness connector, and Right Rear WSS tone wheel (if applicable) for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1035-RIGHT REAR WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

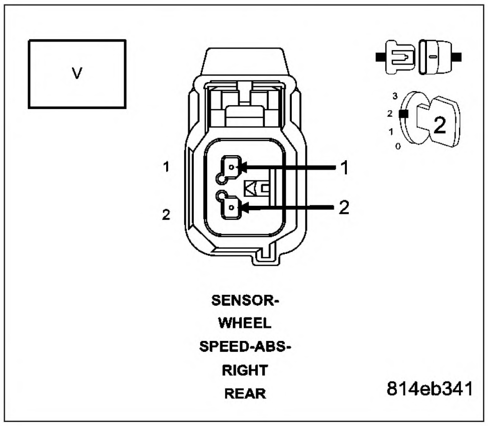
3. CHECK THE VOLTAGE BETWEEN (B2) RIGHT REAR WSS SUPPLY CIRCUIT AND THE (B1) RIGHT REAR WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Right Rear WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B2) Right Rear WSS Supply and (B1) Right Rear WSS Signal circuits at the Right Rear WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C102B RIGHT REAR WHEEL SPEED SENSOR CIRCUIT for the diagnostic repair procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE RIGHT REAR WSS HARNESS CONNECTOR

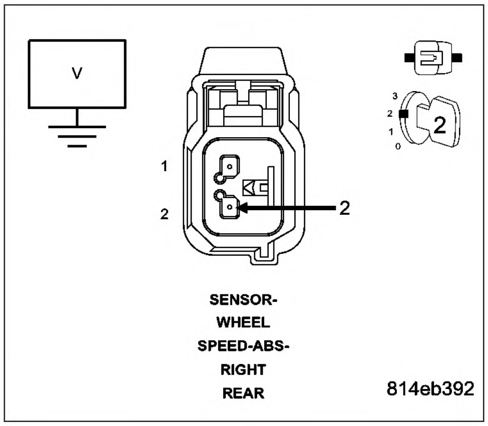
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Right Rear WSS harness connector and chassis ground.

Slowly rotate the wheel by hand.



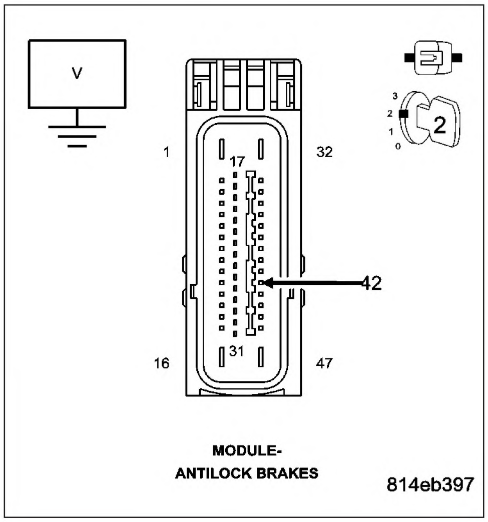
Did the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Go To 5

No >> Replace the Right Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1035-RIGHT REAR WHEEL SPEED COMPARATIVE PERFORMANCE (CONTINUED)

5. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR



Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and chassis ground.

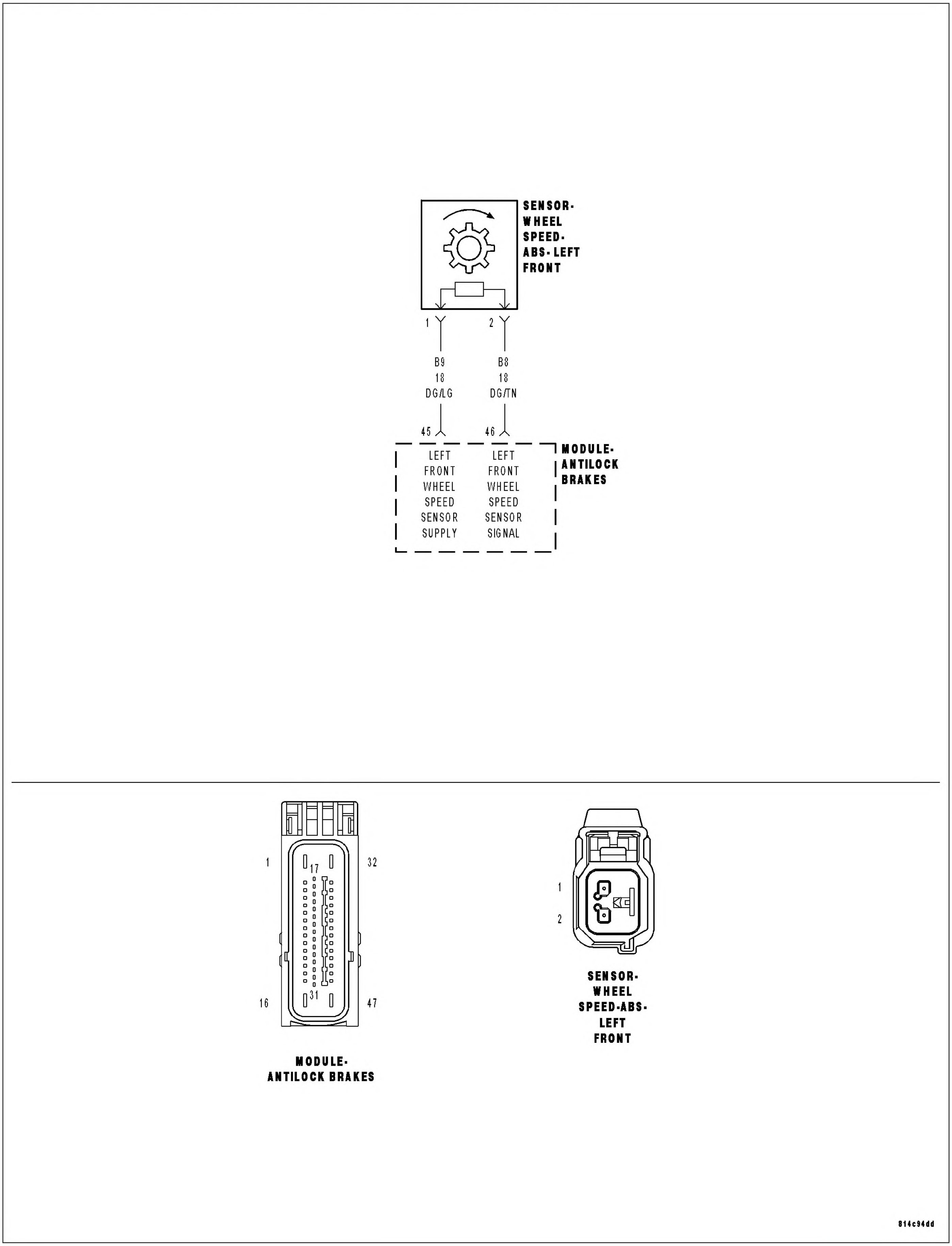
Slowly rotate the wheel by hand.

Did the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B1) Right Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1041-LEFT FRONT TONE WHEEL PERFORMANCE


SENSOR-
WHEEL
SPEED-
ABS-LEFT
FRONT
1
2
B9
18
DG/LG
B8
18
DG/TN
45
46
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
MODULE-
ANTILOCK
BRAKES
1
17
32
16
31
47
MODULE-
ANTILOCK BRAKES
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
FRONT
814c94dd

C1041-LEFT FRONT TONE WHEEL PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects periodic drops of a WSS signal.

Possible Causes
LEFT FRONT TONE WHEEL

Diagnostic Test

1. CHECK FOR A DTC C1041-LEFT FRONT TONE WHEEL PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Test drive the vehicle in a straight line to 40 Km/h (25 mph).

With the scan tool, read DTCs.

Does the scan tool display: C1041-LEFT FRONT TONE WHEEL PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE LEFT FRONT TONE WHEEL FOR DAMAGE

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

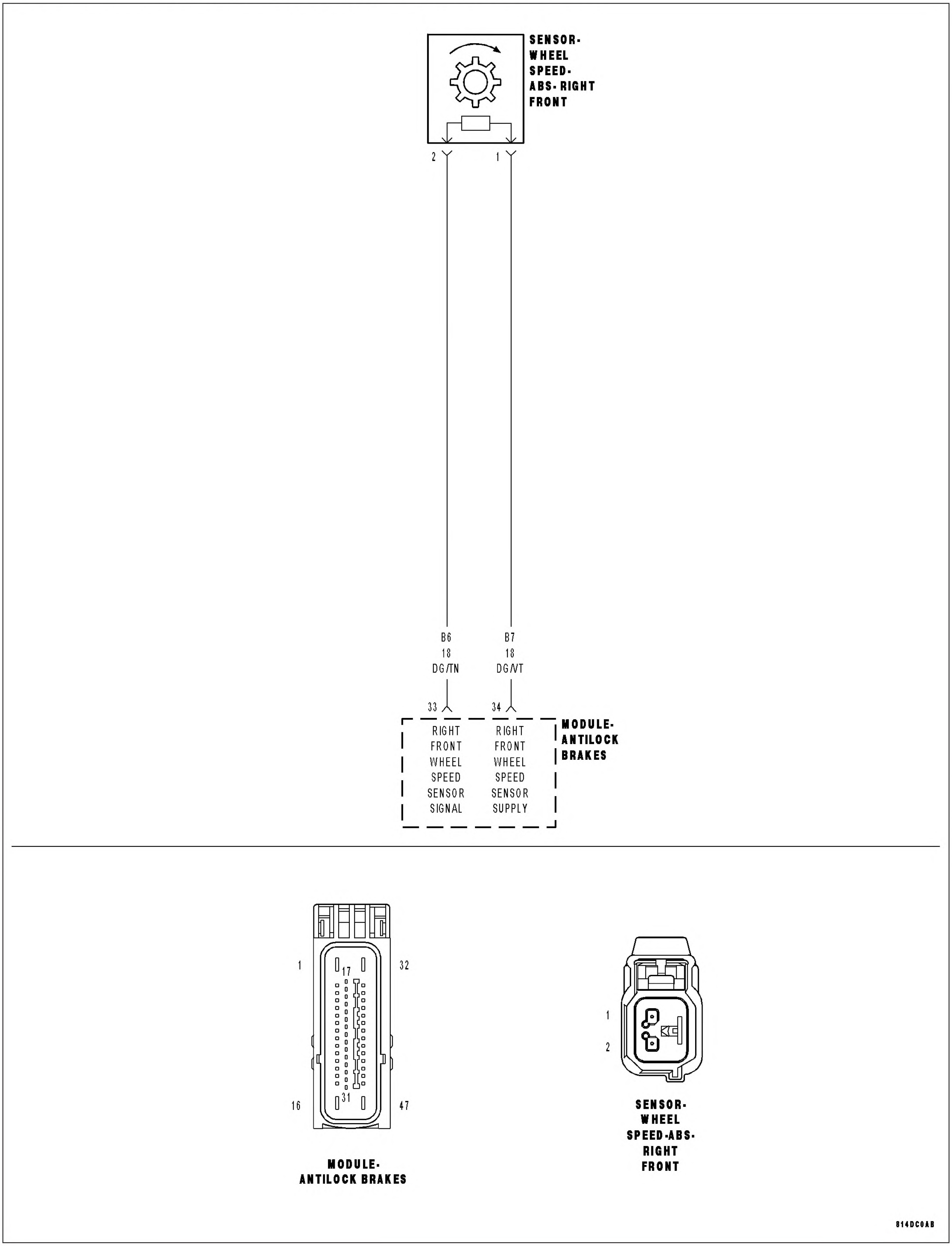
Check the Left Front Tone Wheel for damage.

Were any problems found?

Yes >> Replace the Left Front Tone Wheel in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Test Complete.

C1042-RIGHT FRONT TONE WHEEL PERFORMANCE


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
B6
18
DG/TN
B7
18
DG/VT
33
34
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
MODULE-ANTILOCK BRAKES
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
814DC0AB

C1042-RIGHT FRONT TONE WHEEL PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects periodic drops of a WSS signal.

Possible Causes
RIGHT FRONT TONE WHEEL

Diagnostic Test

1. CHECK FOR A DTC C1042-RIGHT FRONT TONE WHEEL PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Test drive the vehicle in a straight line to 40 Km/h (25 mph).

With the scan tool, read DTCs.

Does the scan tool display: C1042-RIGHT FRONT TONE WHEEL PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE RIGHT FRONT TONE WHEEL FOR DAMAGE

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

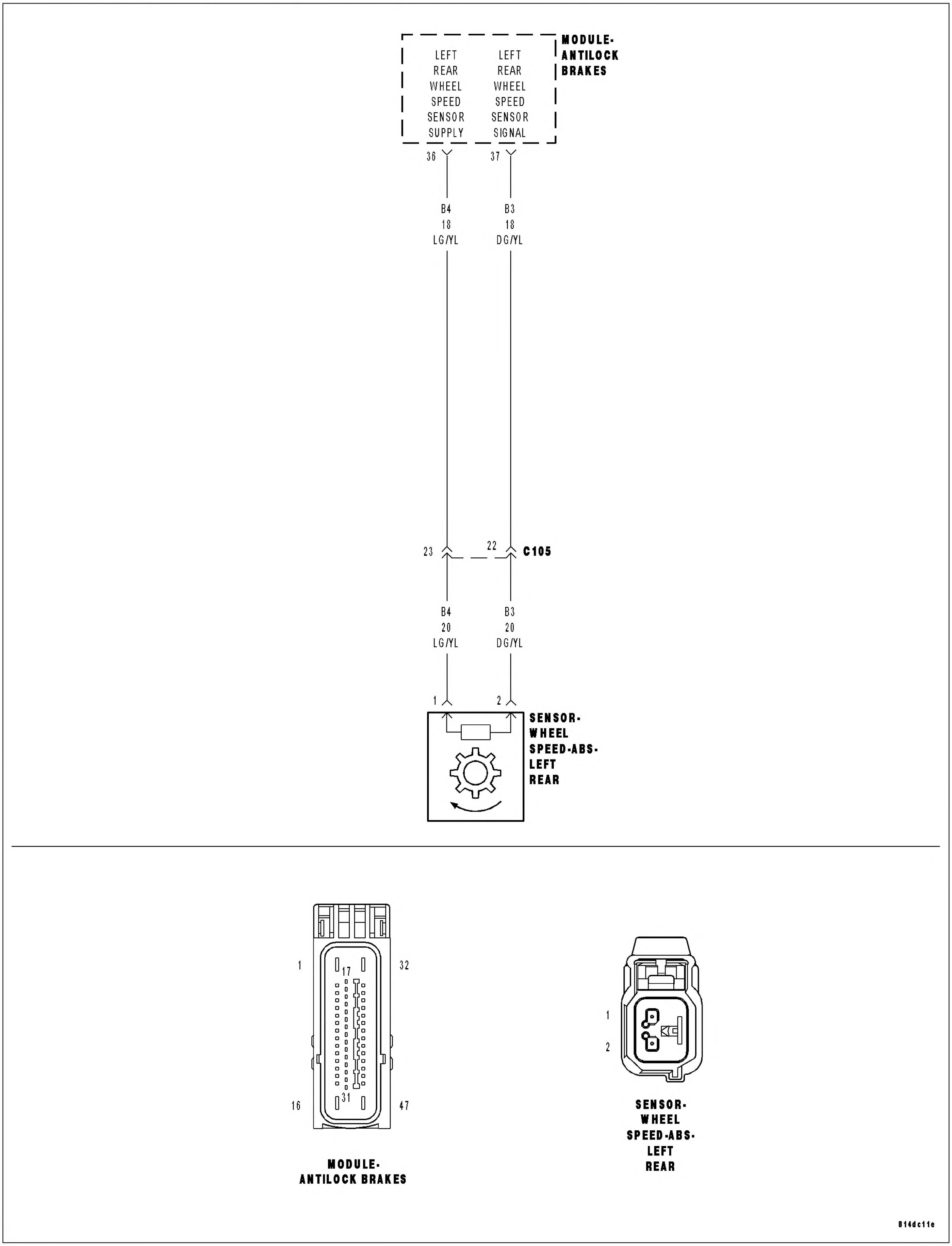
Check the Right Front Tone Wheel for damage.

Were any problems found?

Yes >> Replace the Right Front Tone Wheel in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Test Complete.

C1043-LEFT REAR TONE WHEEL PERFORMANCE


MODULE-ANTILOCK BRAKES
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
36
37
B4 18 LG/YL
B3 18 DG/YL
23
22
C105
B4 20 LG/YL
B3 20 DG/YL
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814dc11e

C1043-LEFT REAR TONE WHEEL PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects periodic drops of a WSS signal.

Possible Causes
LEFT REAR TONE WHEEL

Diagnostic Test

1. CHECK FOR A DTC C1043-LEFT REAR TONE WHEEL PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Test drive the vehicle in a straight line to 40 Km/h (25 mph).

With the scan tool, read DTCs.

Does the scan tool display: C1043-LEFT REAR TONE WHEEL PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE LEFT REAR TONE WHEEL FOR DAMAGE

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

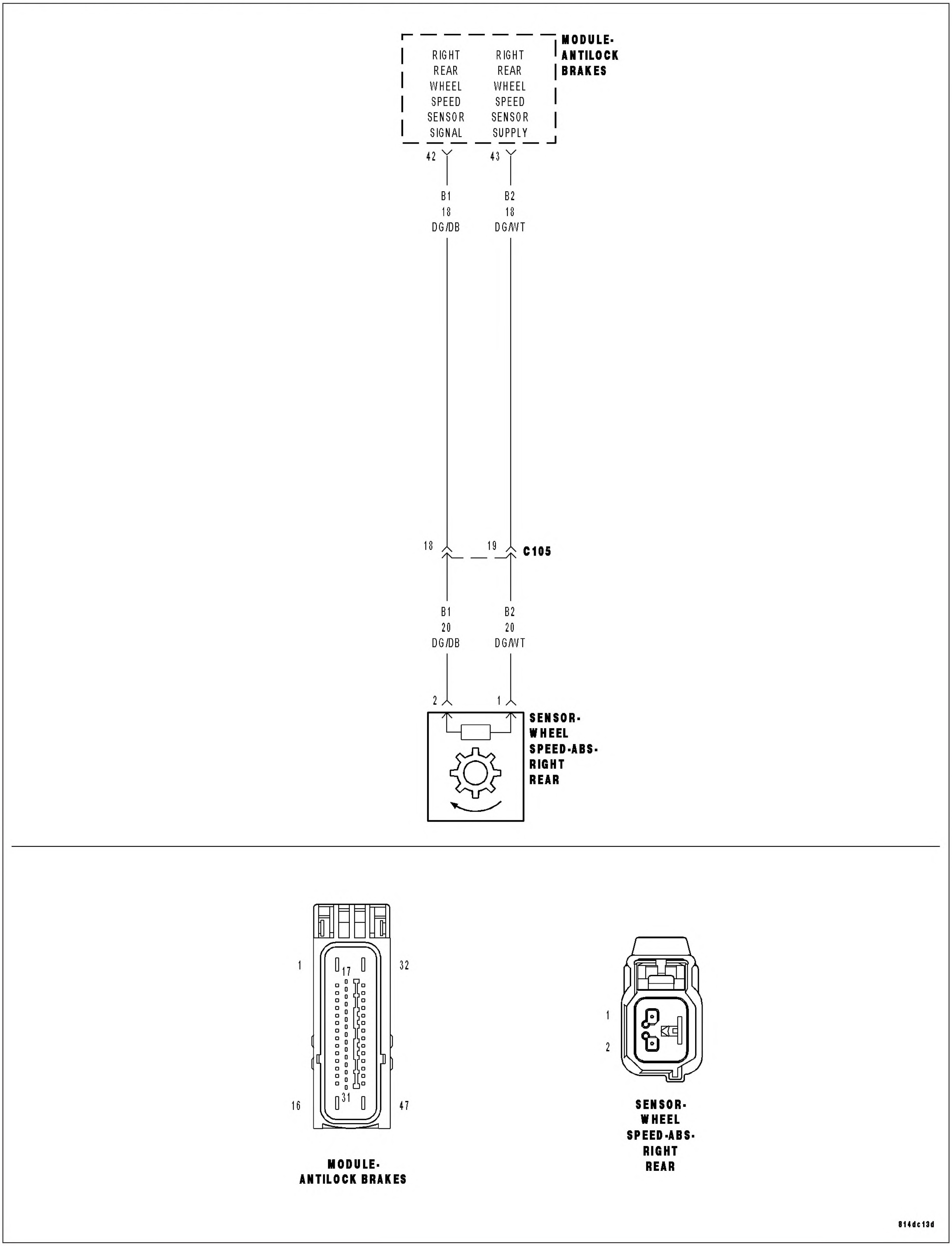
Check the Left Rear Tone Wheel for damage.

Were any problems found?

Yes >> Replace the Left Rear Tone Wheel in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Test Complete.

C1044-RIGHT REAR TONE WHEEL PERFORMANCE


MODULE-ANTILOCK BRAKES
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
42
43
B1 18 DG/DB
B2 18 DG/WT
18
19
C105
B1 20 DG/DB
B2 20 DG/WT
2
1
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
814dc13d

C1044-RIGHT REAR TONE WHEEL PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects periodic drops of a WSS signal.

Possible Causes
RIGHT REAR TONE WHEEL

Diagnostic Test

1. CHECK FOR A DTC C1044-RIGHT REAR TONE WHEEL PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Test drive the vehicle in a straight line to 40 Km/h (25 mph).

With the scan tool, read DTCs.

Does the scan tool display: C1044-RIGHT REAR TONE WHEEL PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE RIGHT REAR TONE WHEEL FOR DAMAGE

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

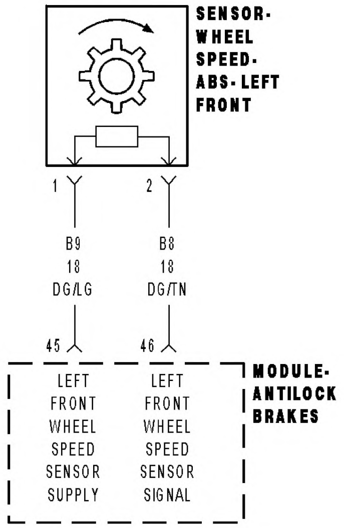
Check the Right Rear Tone Wheel for damage.

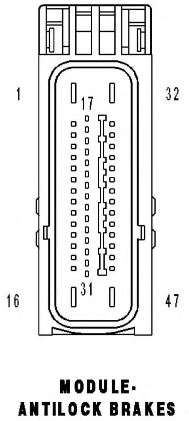
Were any problems found?

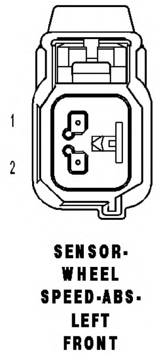
Yes >> Replace the Right Rear Tone Wheel in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Test Complete.

C1046-LEFT FRONT WHEEL PRESSURE PHASE MONITORING


SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
B9
18
DG/LG
B8
18
DG/TN
45
46
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
MODULE-ANTILOCK BRAKES


1
17
32
16
31
47
MODULE-ANTILOCK BRAKES


1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT

814c94dd

C1046-LEFT FRONT WHEEL PRESSURE PHASE MONITORING (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects a pressure reduction phase and the following pressure hold phase is too long.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B8) LEFT FRONT WSS SIGNAL CIRCUIT OPEN
LEFT FRONT WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1046-LEFT FRONT WHEEL PRESSURE PHASE MONITORING

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the LF WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Visually inspect the Anti-Lock Brake Module harness connector, Left Front WSS, Left Front WSS harness connector, and Left Front WSS tone wheel (if applicable) for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1046-LEFT FRONT WHEEL PRESSURE PHASE MONITORING (CONTINUED)

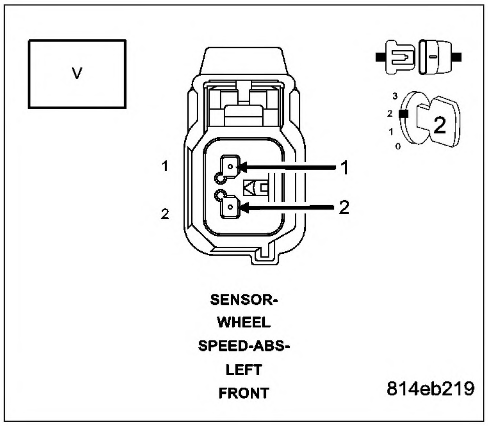
3. CHECK THE VOLTAGE BETWEEN (B9) LEFT FRONT WSS SUPPLY CIRCUIT AND THE (B8) LEFT FRONT WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Left Front WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B9) Left Front WSS Supply and (B8) Left Front WSS Signal circuits at the Left Front WSS harness connector.



814eb219

Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C100A LEFT FRONT WHEEL SPEED SENSOR CIRCUIT for the diagnostic repair procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE LEFT FRONT WSS HARNESS CONNECTOR

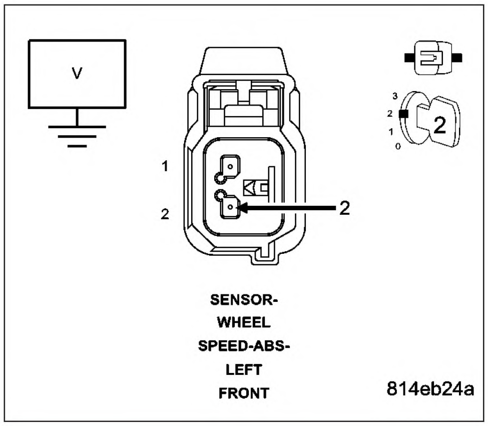
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Left Front WSS harness connector and chassis ground.

Slowly rotate the wheel by hand.



814eb24a

Did the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Go To 5

No >> Replace the Left Front WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1046-LEFT FRONT WHEEL PRESSURE PHASE MONITORING (CONTINUED)

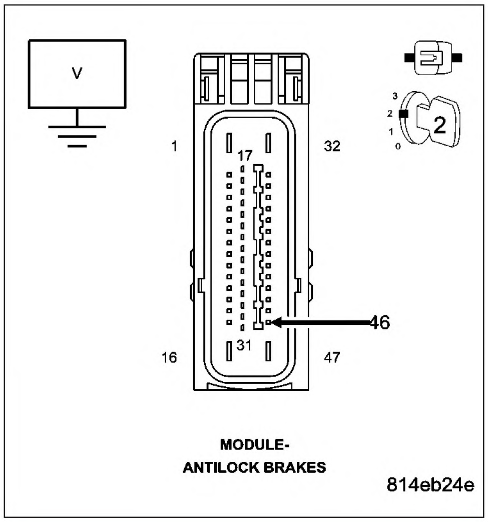
5. CHECK THE (B8) LEFT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B8) Left Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and chassis ground.

Slowly rotate the wheel by hand.

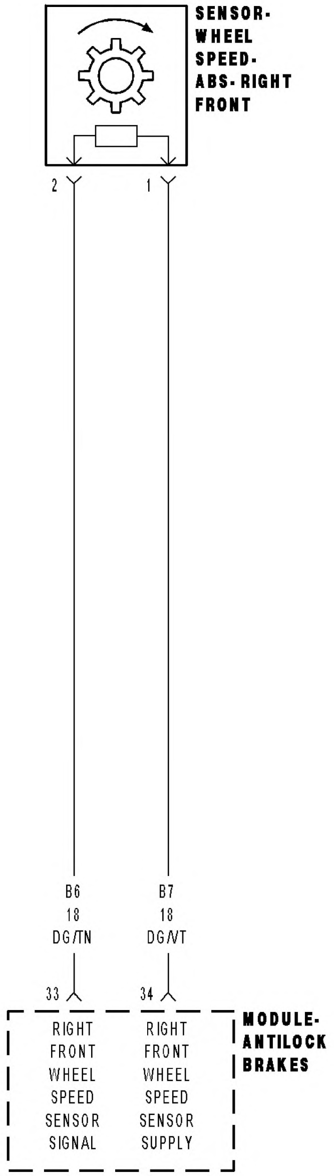


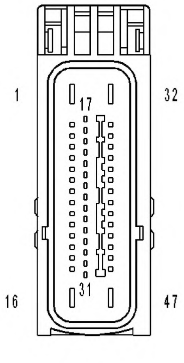
Did the (B8) Left Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

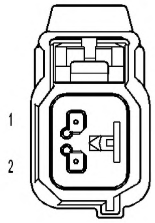
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B8) Left Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1047-RIGHT FRONT WHEEL PRESSURE PHASE MONITORING


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
B6
18
DG/TN
B7
18
DG/VT
33
34
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
MODULE-ANTILOCK BRAKES


1
17
32
16
31
47
MODULE-ANTILOCK BRAKES


1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT

814DC0AB

C1047-RIGHT FRONT WHEEL PRESSURE PHASE MONITORING (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects a pressure reduction phase and the following pressure hold phase is too long.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B6) RIGHT FRONT WSS SIGNAL CIRCUIT OPEN
RIGHT FRONT WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1047-RIGHT FRONT WHEEL PRESSURE PHASE MONITORING

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the RF WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Visually inspect the Anti-Lock Brake Module harness connector, Right Front WSS, Right Front WSS harness connector, and Right Front WSS tone wheel (if applicable) for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1047-RIGHT FRONT WHEEL PRESSURE PHASE MONITORING (CONTINUED)

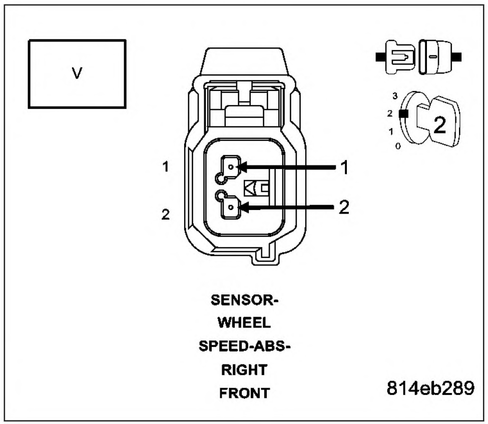
3. CHECK THE VOLTAGE BETWEEN (B7) RIGHT FRONT WSS SUPPLY CIRCUIT AND THE (B6) RIGHT FRONT WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Right Front WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B7) Right Front WSS Supply and (B6) Right Front WSS Signal circuits at the Right Front WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C1015 RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT for the diagnostic repair procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE RIGHT FRONT WSS HARNESS CONNECTOR

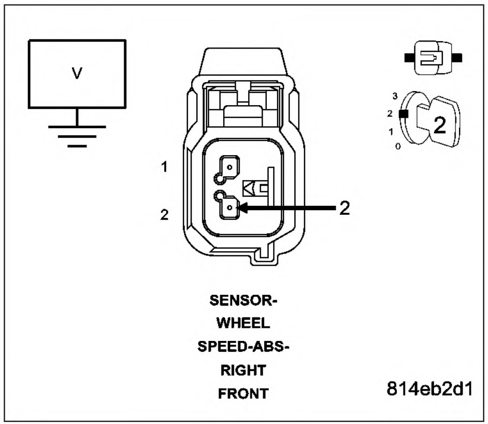
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Right Front WSS harness connector and chassis ground.

Slowly rotate the wheel by hand.



Did the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Go To 5

No >> Replace the Right Front WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1047-RIGHT FRONT WHEEL PRESSURE PHASE MONITORING (CONTINUED)

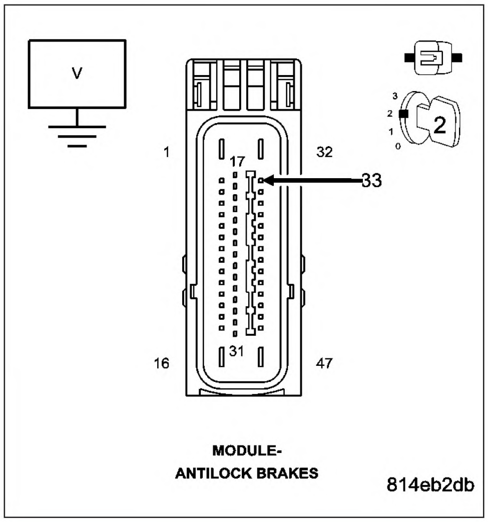
5. CHECK THE (B6) RIGHT FRONT WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR

Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B6) Right Front WSS Signal circuit at the Anti-Lock Brake Module harness connector and chassis ground.

Slowly rotate the wheel by hand.

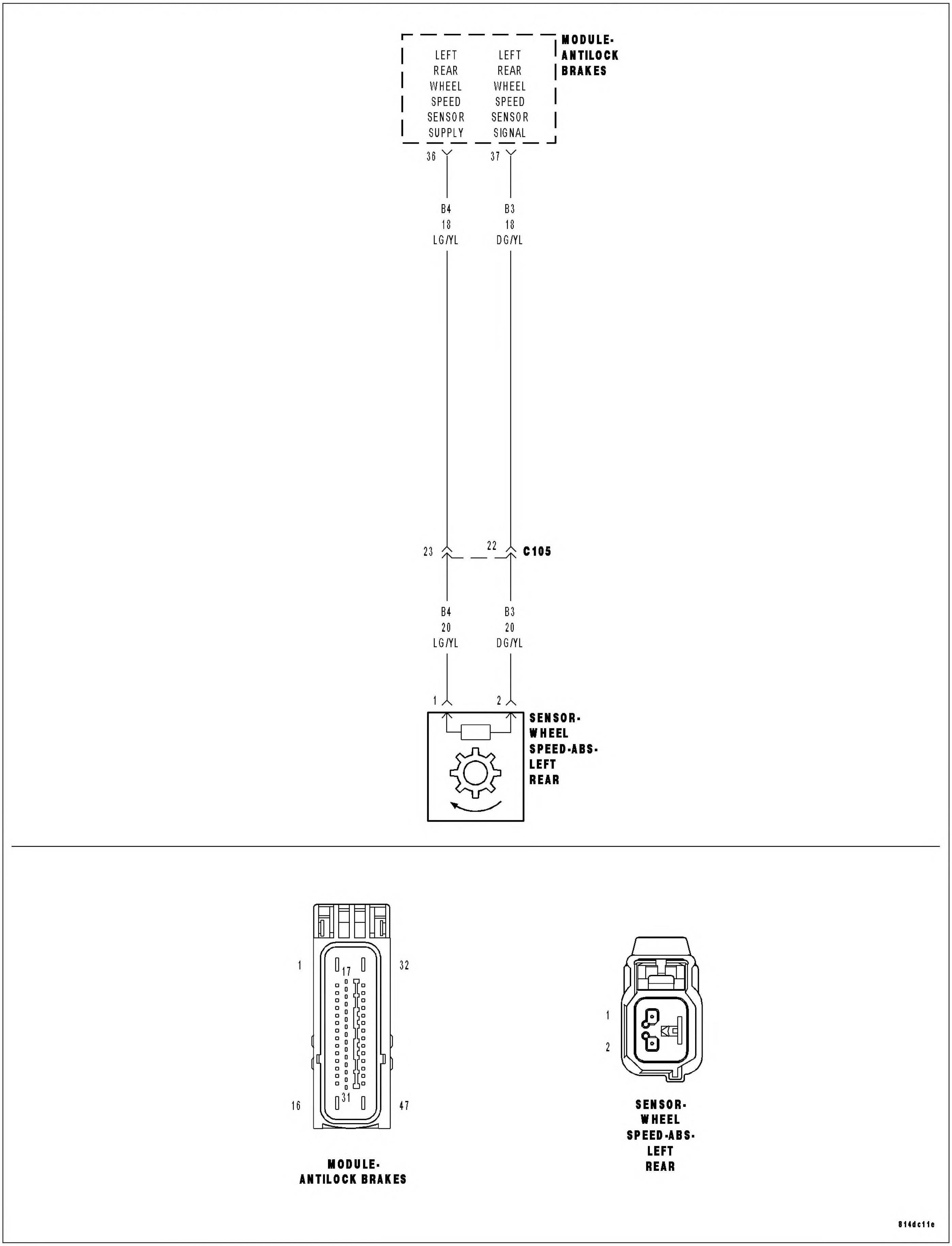


Did the (B6) Right Front WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B6) Right Front WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1048-LEFT REAR WHEEL PRESSURE PHASE MONITORING


MODULE-
ANTILOCK
BRAKES
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
36
37
B4 18 LG/YL
B3 18 DG/YL
23
22
C105
B4 20 LG/YL
B3 20 DG/YL
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
1
2
SENSOR-
WHEEL
SPEED-ABS-
LEFT
REAR
814dc11e

C1048-LEFT REAR WHEEL PRESSURE PHASE MONITORING (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects a pressure reduction phase and the following pressure hold phase is too long.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B3) LEFT REAR WSS SIGNAL CIRCUIT OPEN
LEFT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1048-LEFT REAR WHEEL PRESSURE PHASE MONITORING

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the LR WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Visually inspect the Anti-Lock Brake Module harness connector, Left Rear WSS, Left Rear WSS harness connector, and Left Rear WSS tone wheel (if applicable) for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1048-LEFT REAR WHEEL PRESSURE PHASE MONITORING (CONTINUED)

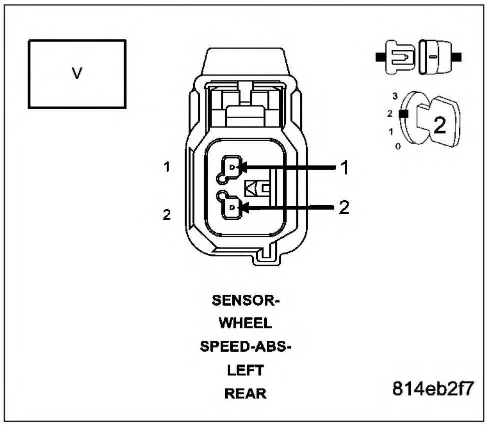
3. CHECK THE VOLTAGE BETWEEN (B4) LEFT REAR WSS SUPPLY CIRCUIT AND THE (B3) LEFT REAR WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Left Rear WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B4) Left Rear WSS Supply and (B3) Left Rear WSS Signal circuits at the Left Rear WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C1020 LEFT REAR WHEEL SPEED SENSOR CIRCUIT for the diagnostic repair procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE LEFT REAR WSS HARNESS CONNECTOR

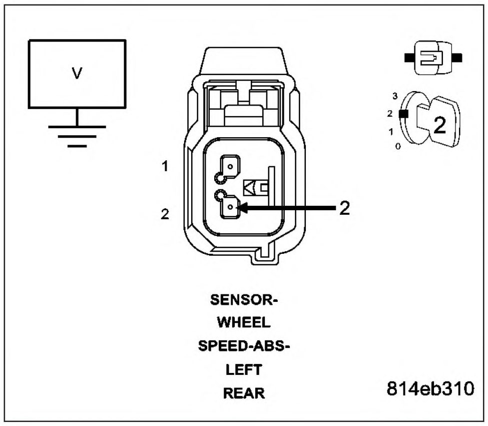
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Left Rear WSS harness connector and chassis ground.

Slowly rotate the wheel by hand.



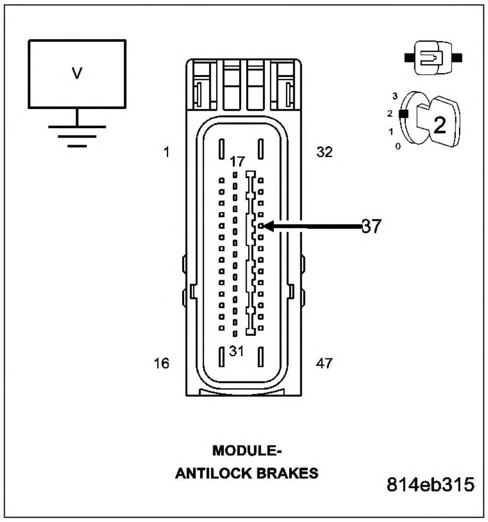
Did the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Go To 5

No >> Replace the Left Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1048-LEFT REAR WHEEL PRESSURE PHASE MONITORING (CONTINUED)

5. CHECK THE (B3) LEFT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR



Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B3) Left Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and chassis ground.

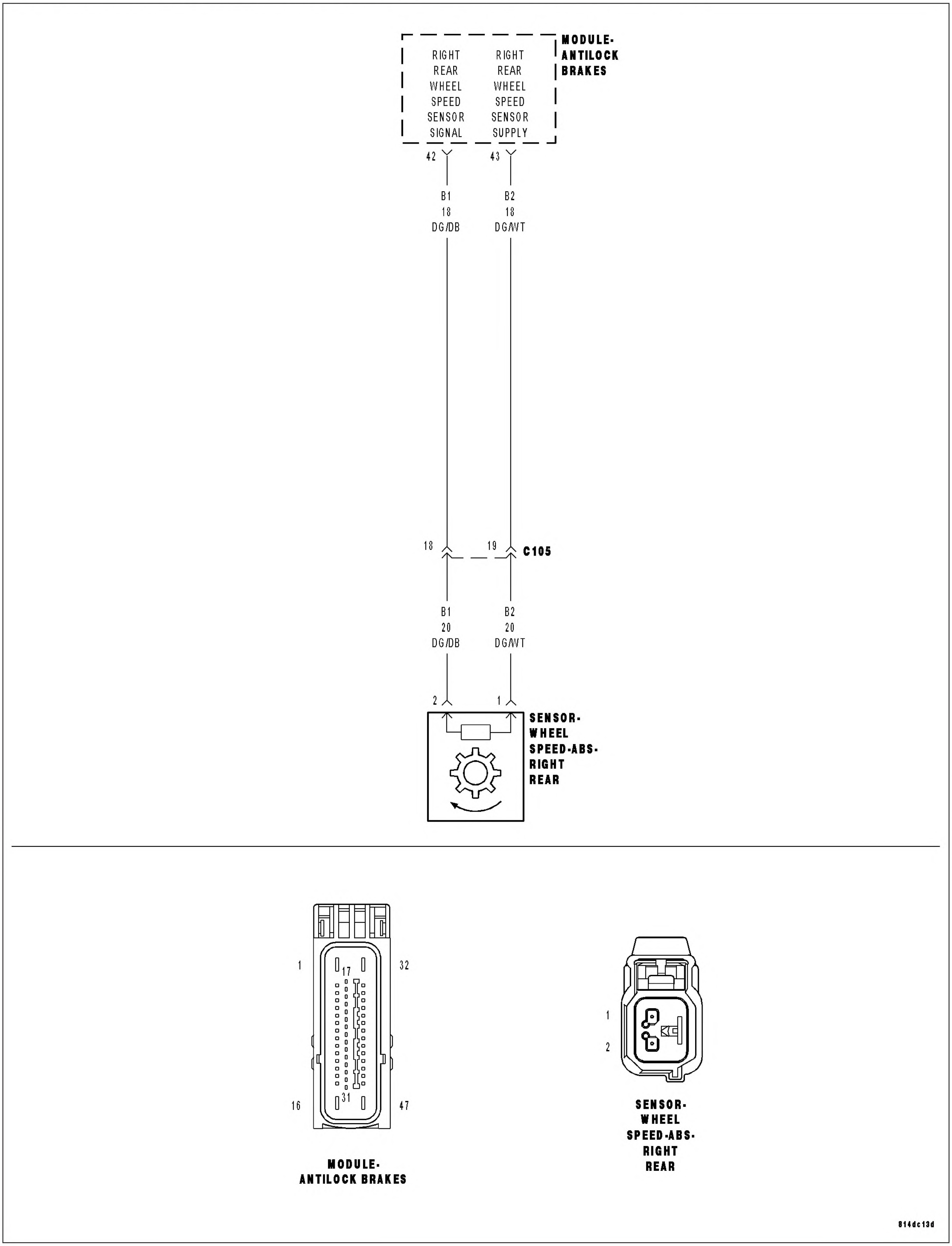
Slowly rotate the wheel by hand.

Did the (B3) Left Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B3) Left Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1049-RIGHT REAR WHEEL PRESSURE PHASE MONITORING


MODULE-
ANTILOCK
BRAKES
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
42
43
B1
18
DG/DB
B2
18
DG/WT
18
19
C105
B1
20
DG/DB
B2
20
DG/WT
2
1
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
1
2
SENSOR-
WHEEL
SPEED-ABS-
RIGHT
REAR
814dc13d

C1049-RIGHT REAR WHEEL PRESSURE PHASE MONITORING (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects a pressure reduction phase and the following pressure hold phase is too long.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS/TONE WHEEL DAMAGE
(B1) RIGHT REAR WSS SIGNAL CIRCUIT OPEN
RIGHT REAR WHEEL SPEED SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1049-RIGHT REAR WHEEL PRESSURE PHASE MONITORING

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle in a straight line to 40 Km/h (25 mph) while monitoring all the WSS speeds with the scan tool.

Did the RR WSS speed differ by 8 Km/h (5 mph) or show NO speed?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS/TONE WHEEL FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

NOTE: Check the tone wheel teeth for missing teeth, cracks, or looseness. Teeth should be perfectly square, not bent, or nicked.

Turn the ignition off.

Visually inspect the Anti-Lock Brake Module harness connector, Right Rear WSS, Right Rear WSS harness connector, and Right Rear WSS tone wheel (if applicable) for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1049-RIGHT REAR WHEEL PRESSURE PHASE MONITORING (CONTINUED)

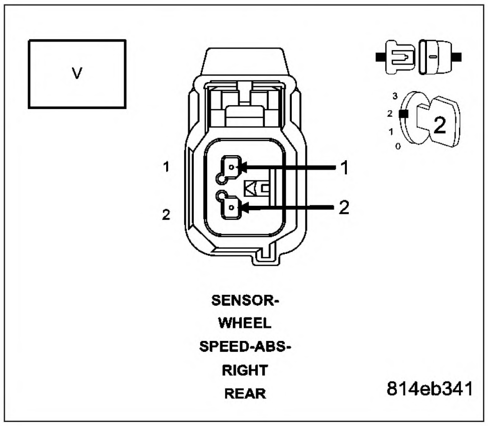
3. CHECK THE VOLTAGE BETWEEN (B2) RIGHT REAR WSS SUPPLY CIRCUIT AND THE (B1) RIGHT REAR WSS SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Right Rear WSS harness connector.

Turn the ignition on.

Measure the voltage between the (B2) Right Rear WSS Supply and (B1) Right Rear WSS Signal circuits at the Right Rear WSS harness connector.



Is the voltage above 10 volts?

Yes >> Go To 4

No >> Refer to DTC-C102B RIGHT REAR WHEEL SPEED SENSOR CIRCUIT for the diagnostic repair procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE RIGHT REAR WSS HARNESS CONNECTOR

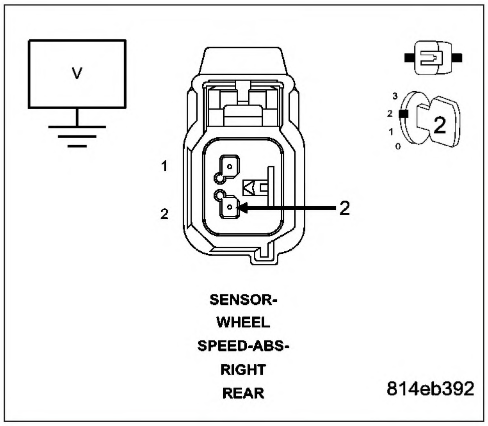
Turn the ignition off.

Reconnect all connectors.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Right Rear WSS harness connector and chassis ground.

Slowly rotate the wheel by hand.



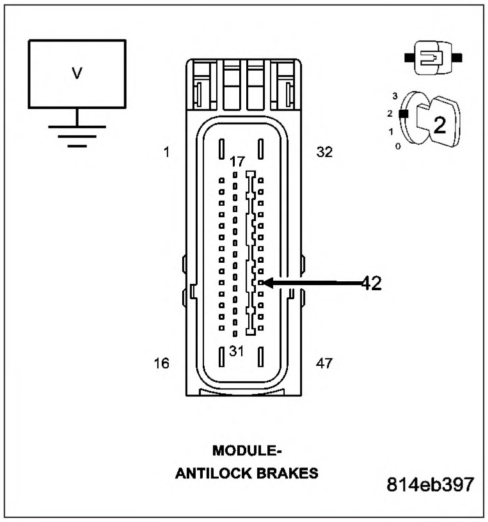
Did the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Go To 5

No >> Replace the Right Rear WSS in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1049-RIGHT REAR WHEEL PRESSURE PHASE MONITORING (CONTINUED)

5. CHECK THE (B1) RIGHT REAR WSS SIGNAL VOLTAGE AT THE ANTI-LOCK BRAKE MODULE HARNESS CONNECTOR



Turn the ignition off.

Turn the ignition on.

While back probing, measure the voltage between the (B1) Right Rear WSS Signal circuit at the Anti-Lock Brake Module harness connector and chassis ground.

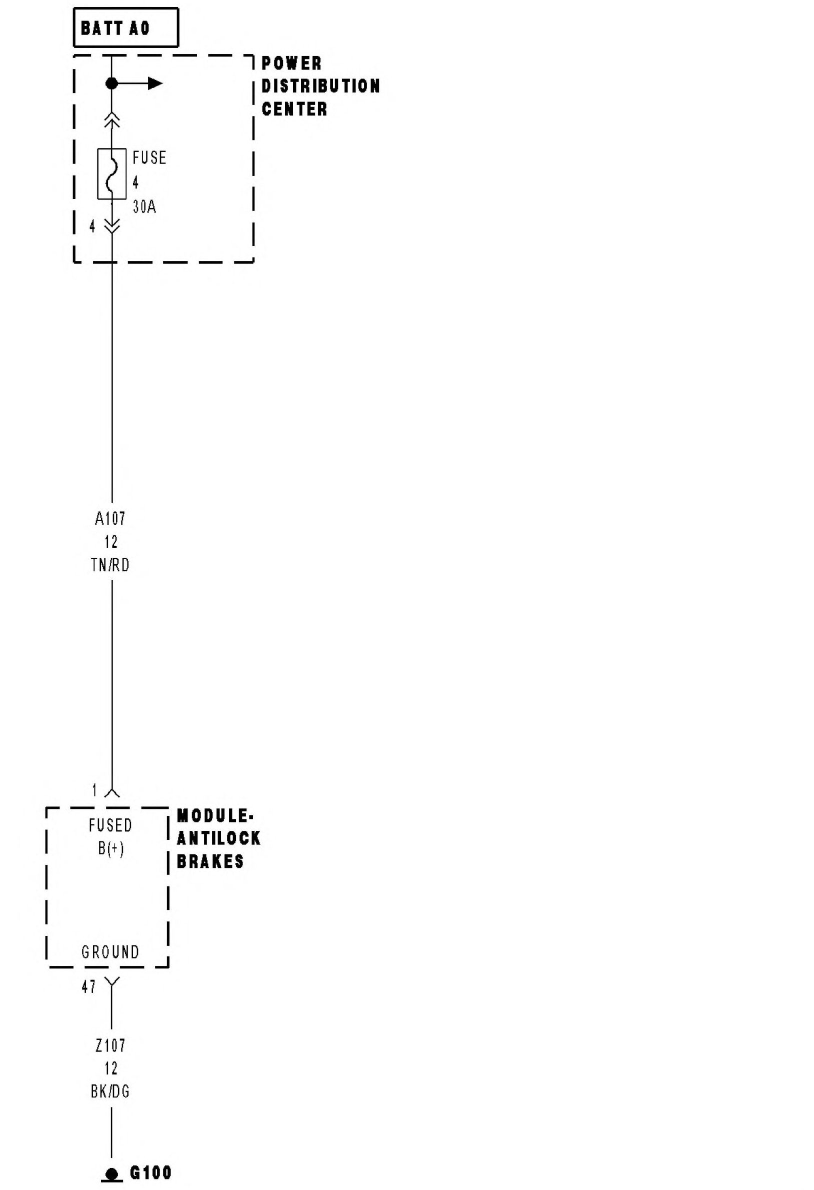
Slowly rotate the wheel by hand.

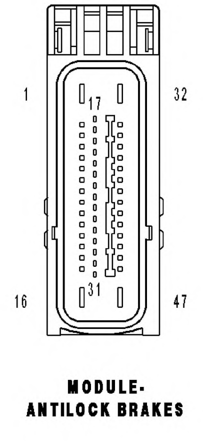
Did the (B1) Right Rear WSS Signal circuit voltage toggle between approximately 1.6 to .8 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B1) Right Rear WSS Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1073-ABS PUMP MOTOR CONTROL CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE
4
30A
4
A107
12
TN/RD
1
FUSED
B(+)
MODULE-ANTILOCK BRAKES
GROUND
47
Z107
12
BK/DG
G100


1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
814dc3ab

C1073-ABS PUMP MOTOR CONTROL CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the ABS Pump Motor circuit fails the diagnostic test.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
ABS PUMP MOTOR FUSE OPEN
(A107) FUSED B(+) CIRCUIT SHORTED TO GROUND OR OPEN
(Z107) GROUND CIRCUIT OPEN
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK THE ABS PUMP MOTOR FOR CONTINUOUS OPERATION

Cycle the ignition from off to on.

Monitor the ABS Pump Motor for continuous operation.

Is the ABS Pump Motor running continuously?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK FOR A DTC C1073-ABS PUMP MOTOR CONTROL CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

CAUTION: Ensure braking capability is available before road testing.

Drive the vehicle over 40 Km/h (25 mph).

Park the vehicle and cycle the ignition switch from off to on.

With the scan tool, read and record DTC's

Does the scan tool display: C1073-ABS PUMP MOTOR CONTROL CIRCUIT?

Yes >> Go To 3

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

C1073-ABS PUMP MOTOR CONTROL CIRCUIT (CONTINUED)

3. CHECK ABS PUMP OPERATION WITH SCAN TOOL

Cycle the ignition from off to on.

With the scan tool, actuate the ABS Pump Motor.

Did the ABS Pump Motor operate?

Yes >> Refer to the INTERMITTENT CONDITION diagnostic procedure.

No >> Go To 4

---

4. CHECK THE ABS PUMP MOTOR FUSE FOR AN OPEN

Turn the ignition off.

Remove and visually inspect the ABS Pump Motor fuse.

Is the ABS Pump Motor fuse open?

Yes >> Go To 5

No >> Go To 6

---

5. CHECK THE (A107) FUSED B(+) FOR A SHORT TO GROUND

Remove ABS Pump Motor fuse.

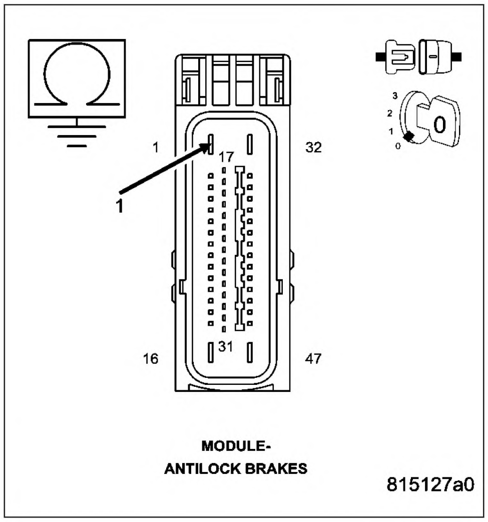
Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between ground and the (A107) Fused B(+) circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (A107) Fused B(+) circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6



---

6. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

Visually inspect the Anti-Lock Brake Module harness connector and (A107) Fused B(+) circuit in the wiring harness for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

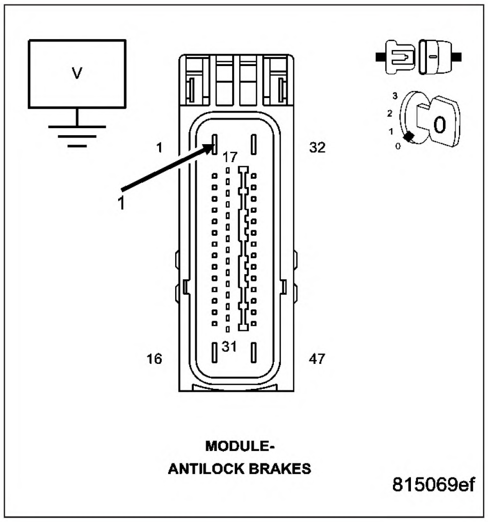
No >> Go To 7

C1073-ABS PUMP MOTOR CONTROL CIRCUIT (CONTINUED)

7. CHECK THE VOLTAGE ON THE (A107) FUSED B(+) CIRCUIT

Install the ABS Pump Motor fuse.

Measure the voltage of the (A107) Fused B(+) circuit.


V
1
17
32
1
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
815069ef

Is the voltage above 10 volts?

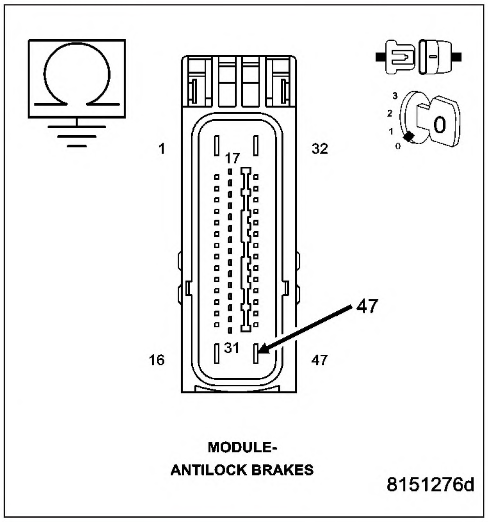
Yes >> Go To 8

No >> Repair the (A107) Fused B(+) circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

8. CHECK THE (Z107) GROUND CIRCUIT FOR AN OPEN

Measure the resistance between ground and the (Z107) Ground circuit.

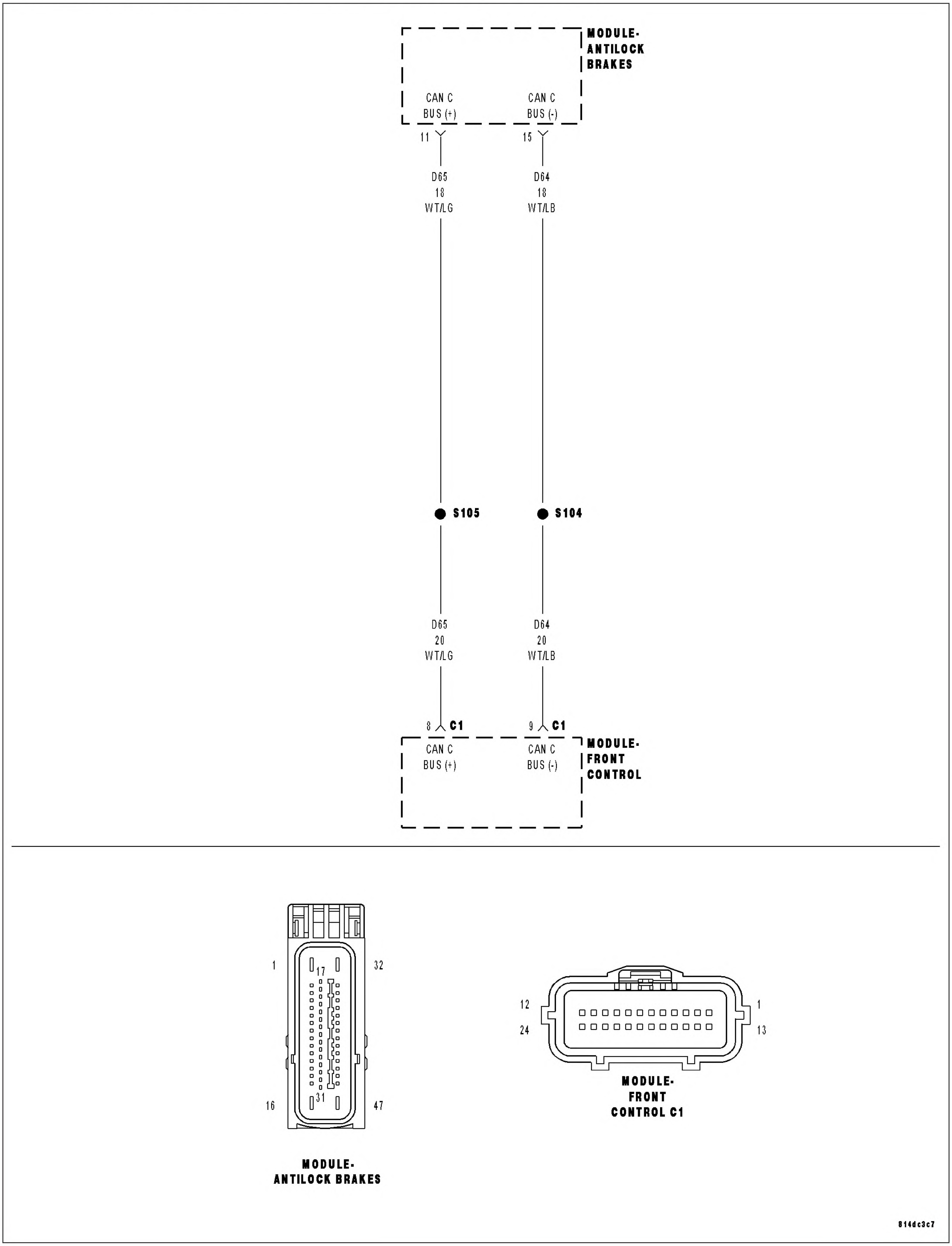

1
17
32
47
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
8151276d

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (Z107) Ground circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1078-TIRE REVOLUTIONS RANGE PERFORMANCE


MODULE-
ANTILOCK
BRAKES
CAN C
BUS (+)
CAN C
BUS (-)
11
15
D65
18
WT/LG
D64
18
WT/LB
S105
S104
D65
20
WT/LG
D64
20
WT/LB
8
C1
9
C1
CAN C
BUS (+)
CAN C
BUS (-)
MODULE-
FRONT
CONTROL
1
17
32
16
31
47
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
814dc3c7

C1078-TIRE REVOLUTIONS RANGE PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects a comparison between the tire circumference value contained in EEPROM and the tire circumference value received on the CAN Bus.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
(D65) CAN C (+) BUS AND (D64) CAN C (-) BUS CIRCUITS SHORTED TOGETHER
(D65) CAN C (+) BUS CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(D64) CAN C (-) BUS CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1078-TIRE REVOLUTIONS RANGE PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC’s.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC’s.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC’s.

Does the scan tool display: C1078-TIRE REVOLUTIONS RANGE PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

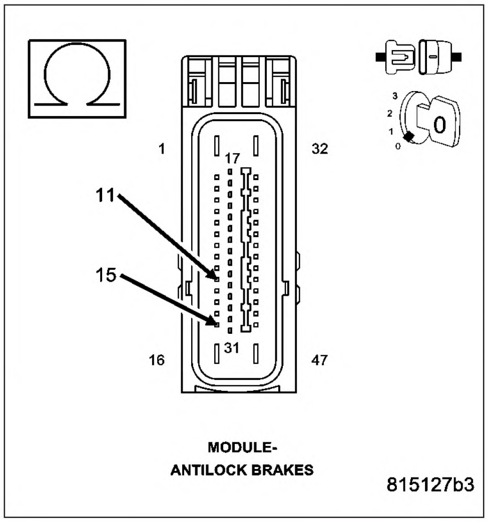
C1078-TIRE REVOLUTIONS RANGE PERFORMANCE (CONTINUED)

3. CHECK THE (D65) CAN C (+) BUS CIRCUIT AND (D64) CAN C (-) BUS CIRCUIT FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (D65) CAN C (+) BUS circuit and the (D64) CAN C (-) BUS circuit.



1
17
32
11
15
16
31
47
3
2
1
0
MODULE-
ANTILOCK BRAKES
815127b3

Is the resistance below 150 ohms?

Yes >> Repair the (D65) CAN C (+) BUS circuit and the (D64) CAN C (-) BUS circuit for a short together.
Perform ABS VERIFICATION TEST - VER 1.

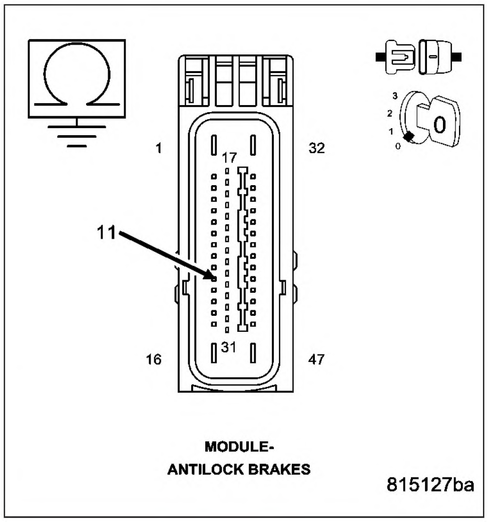
No >> Go To 4

---

4. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR A SHORT TO GROUND

Disconnect the Front Control Module harness connector.

Measure the resistance between the (D65) CAN C (+) BUS circuit and ground.



1
17
32
11
16
31
47
3
2
1
0
MODULE-
ANTILOCK BRAKES
815127ba

Is the resistance below 5.0 ohms?

Yes >> Repair the (D65) CAN C (+) BUS circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

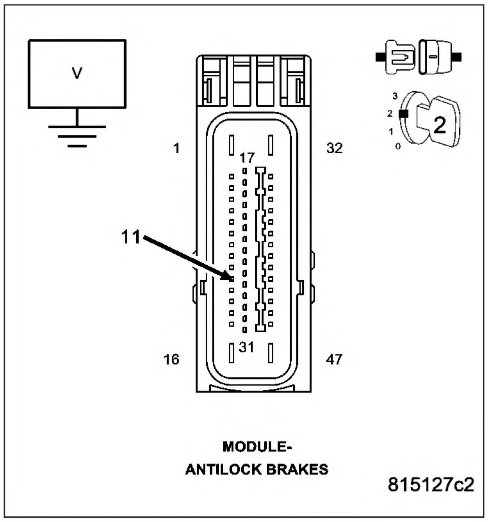
No >> Go To 5

C1078-TIRE REVOLUTIONS RANGE PERFORMANCE (CONTINUED)

5. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (D65) CAN C (+) BUS circuit.


V
1
17
32
11
16
31
47
3
2
1
0
2
MODULE-
ANTILOCK BRAKES
815127c2

Is there any voltage present?

Yes >> Repair the (D65) CAN C (+) BUS circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

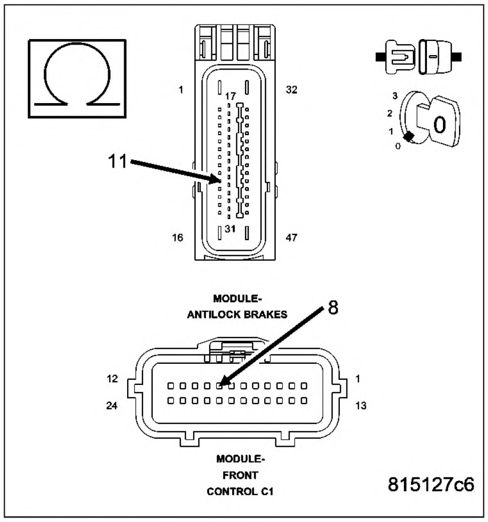
No >> Go To 6

---

6. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR AN OPEN CIRCUIT

Turn the ignition off.

Measure the resistance of the (D65) CAN C (+) Bus circuit.


1
17
32
11
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
8
12
24
1
13
MODULE-
FRONT
CONTROL C1
815127c6

Is the resistance below 5.0 ohms?

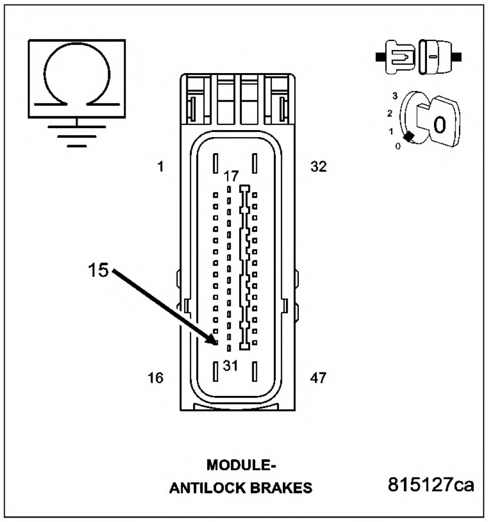
Yes >> Go To 7

No >> Repair the (D65) CAN C (+) BUS circuit for an open circuit.
Perform ABS VERIFICATION TEST - VER 1.

C1078-TIRE REVOLUTIONS RANGE PERFORMANCE (CONTINUED)

7. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (D64) CAN C (-) BUS circuit.


1
17
32
15
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES

815127ca

Is the resistance below 5.0 ohms?

Yes >> Repair the (D64) CAN C (-) BUS circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

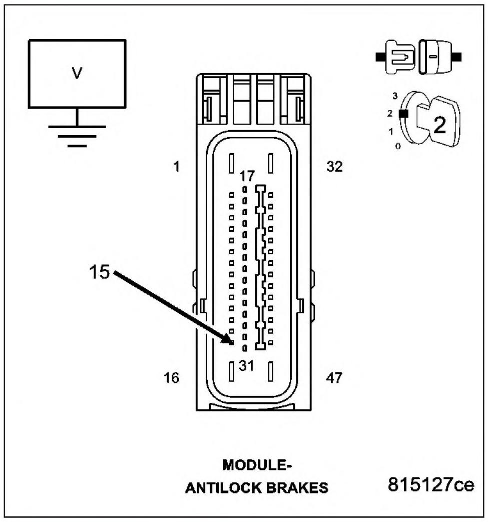
No >> Go To 8

---

8. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (D64) CAN C (+) BUS circuit.


V
1
17
32
15
16
31
47
3
2
1
0
2
MODULE-
ANTILOCK BRAKES

815127ce

Is there any voltage present?

Yes >> Repair the (D64) CAN C (-) BUS circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

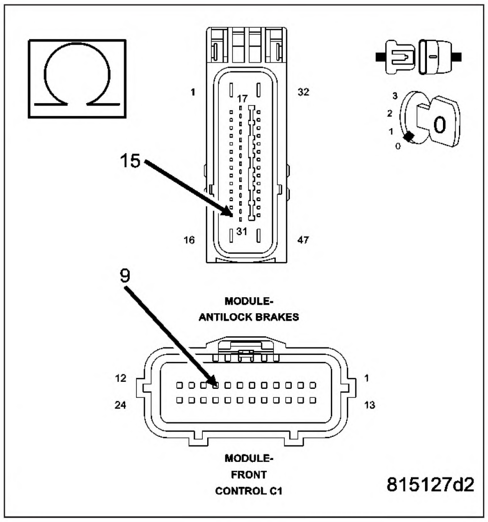
No >> Go To 9

C1078-TIRE REVOLUTIONS RANGE PERFORMANCE (CONTINUED)

9. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR AN OPEN CIRCUIT

Turn the ignition off.

Measure the resistance of the (D64) CAN C (-) Bus circuit.

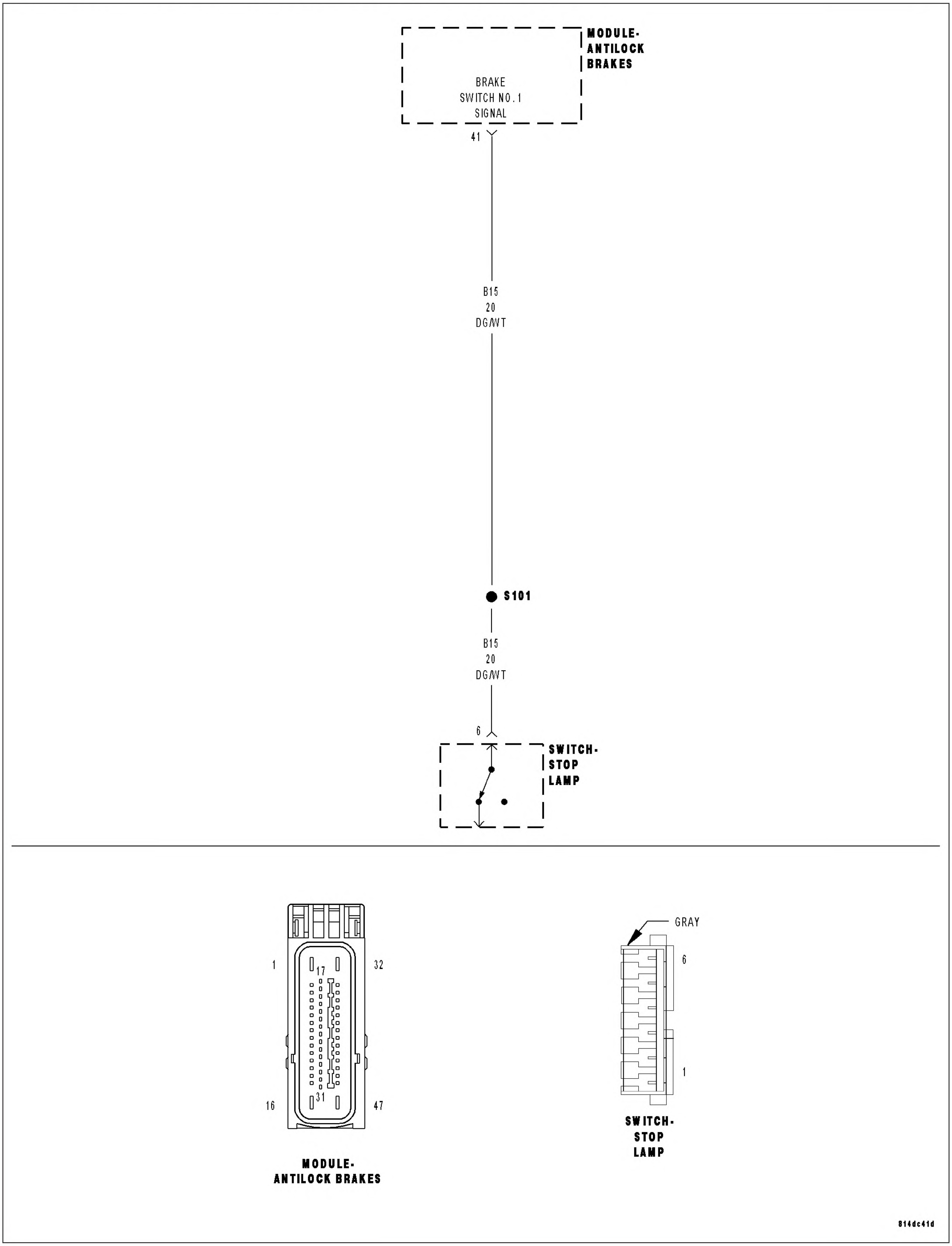

Ω
1
17
32
3
2
1
0
15
16
31
47
9
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
815127d2

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (D64) CAN C (-) BUS circuit for an open circuit.
Perform ABS VERIFICATION TEST - VER 1.

C107D-BRAKE PEDAL SWITCH 1/2 CORRELATION


MODULE-
ANTILOCK
BRAKES
BRAKE
SWITCH NO.1
SIGNAL
41
B15
20
DG/WT
S101
B15
20
DG/WT
6
SWITCH-
STOP
LAMP
1
17
32
31
16
47
MODULE-
ANTILOCK BRAKES
GRAY
6
1
SWITCH-
STOP
LAMP
814dc41d

C107D-BRAKE PEDAL SWITCH 1/2 CORRELATION (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects an implausible signal from the Stop Lamp Switch.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
STOP LAMP SWITCH
(B15) BRAKE SWITCH NO. 1 SIGNAL CIRCUIT OPEN
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C107D-BRAKE PEDAL SWITCH 1/2 CORRELATION

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC's.

Does the scan tool display: C107D-BRAKE PEDAL SWITCH 1/2 CORRELATION?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C107D-BRAKE PEDAL SWITCH 1/2 CORRELATION (CONTINUED)

3. CHECK THE (B15) BRAKE SWITCH NO. 1 SIGNAL CIRCUIT WHILE DEPRESSING AND RELEASING BRAKE PEDAL

NOTE: The voltmeter must be connected to 12 volts to perform this test.

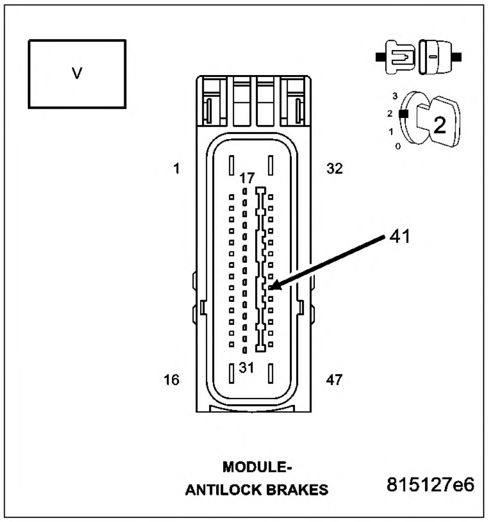
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (B15) Brake Switch No. 1 Signal circuit.

Depress and release the brake pedal.


V
3
2
1
0
2
1
17
32
41
16
31
47
MODULE-
ANTILOCK BRAKES
815127e6

Does the voltage change?

Yes >> Replace the Anti-lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

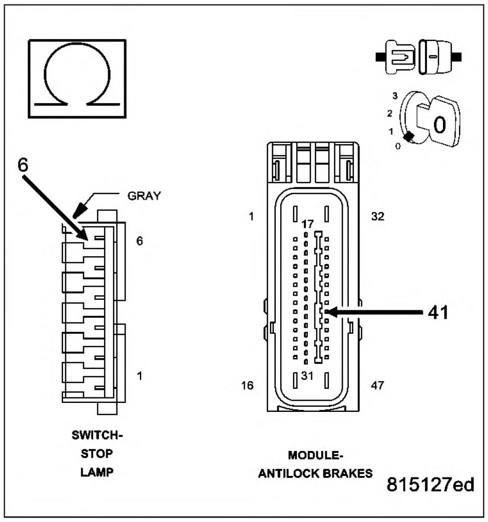
---

4. CHECK THE (B15) BRAKE SWITCH NO. 1 SIGNAL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Stop Lamp Switch harness connector.

Measure the resistance of the (B15) Brake Switch No. 1 Signal circuit.


Ω
3
2
1
0
0
6
GRAY
6
1
SWITCH-
STOP
LAMP
1
17
32
41
16
31
47
MODULE-
ANTILOCK BRAKES
815127ed

Is the resistance below 5.0 ohms?

Yes >> Replace the Stop Lamp Switch in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B15) Brake Switch No. 1 Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1210-G SENSOR INPUT CIRCUIT PERFORMANCE

- **When Monitored:**
  Continuously after power-on reset until vehicle speed exceeds 12.4mph/20 kph for the first time, but not not if the sensor voltage is out of range,
  Or, during diagnostic mode.
  Or, if the monitoring was inhaibited by a corresponding diagnostics command.
  Or, if the wehicle speed has exceeded 12.4 mph/20 kph during the actual ignition cycle.
  Or, if at least one overspinning wheel is detected.
  Or, if one of the control functions is active.
- **Set Condition:**
  A failure is detected if the measured acceleratin signal is higher than 0.8 g longer than the specified detection time.

Possible Causes
MODULE LOOSE OR NOT CORRECTLY MOUNTED
DEFECTIVE SENSOR

Diagnostic Test

1. Module failure

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

The G-sensor is in the ABM if it is TCS only, or in the Sensor Cluster if it has ESP.

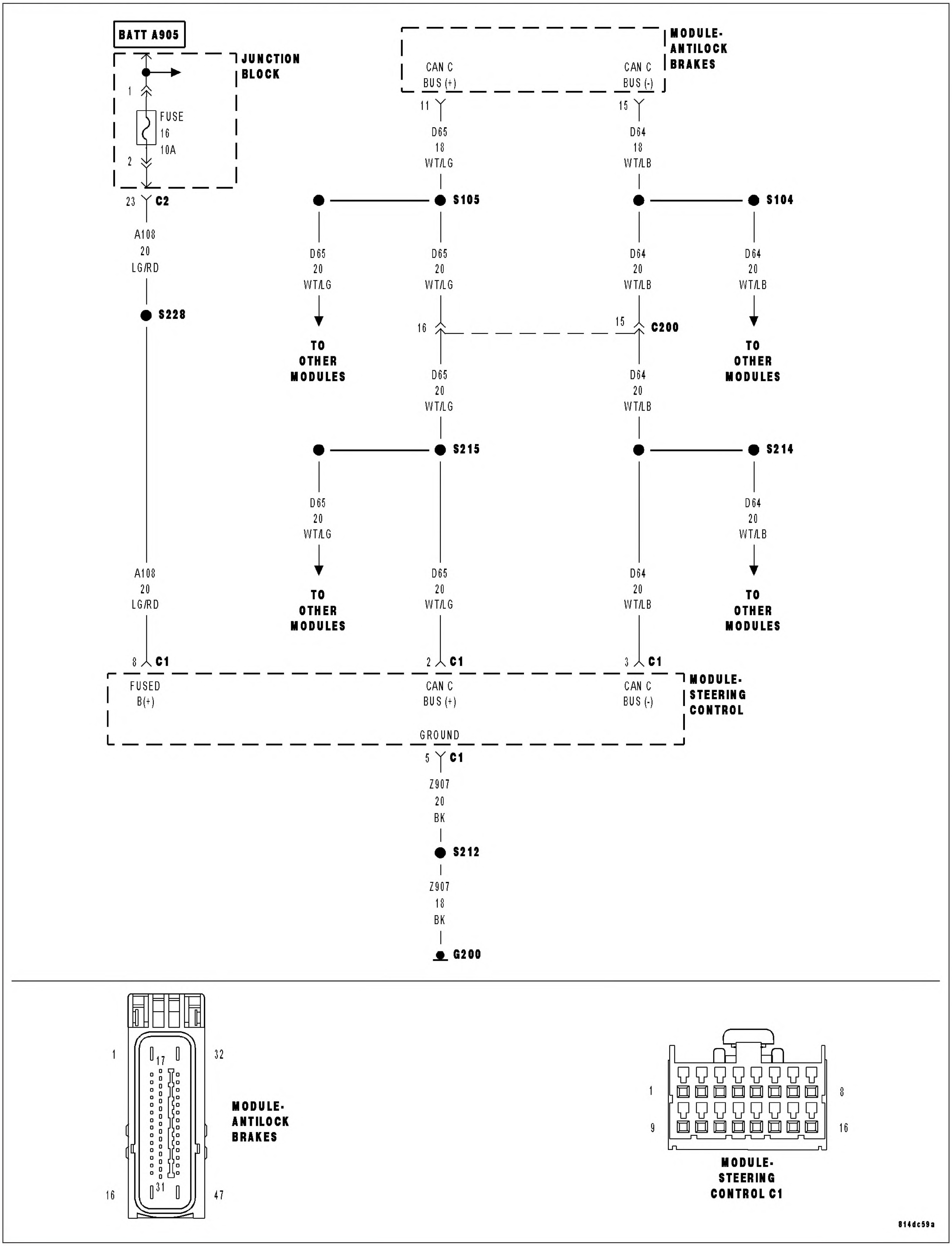
Check the module for correct mounting.

Is the module mounted correctly?

Yes >> Replace the ABM if it is TCS only, or replace the Sensor Cluster if it has ESP.

No >> Mount the module correctly and retest.

C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE


BATT A905
JUNCTION BLOCK
1
FUSE 16 10A
2
23 C2
A108 20 LG/RD
S228
A108 20 LG/RD
8 C1
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
11
15
D65 18 WT/LG
D64 18 WT/LB
S105
S104
D65 20 WT/LG
D65 20 WT/LG
D64 20 WT/LB
D64 20 WT/LB
TO OTHER MODULES
TO OTHER MODULES
16
15
C200
D65 20 WT/LG
D64 20 WT/LB
S215
S214
D65 20 WT/LG
D64 20 WT/LB
TO OTHER MODULES
TO OTHER MODULES
D65 20 WT/LG
D64 20 WT/LB
2 C1
3 C1
FUSED B(+)
CAN C BUS (+)
CAN C BUS (-)
MODULE-STEERING CONTROL
GROUND
5 C1
Z907 20 BK
S212
Z907 18 BK
G200
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
1
8
9
16
MODULE-STEERING CONTROL C1
814dc59a

C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects a calculated steering wheel angle offset is out of the specified range.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
(A108) FUSED B(+) CIRCUIT OPEN
(Z907) GROUND CIRCUIT OPEN
(D65) CAN C (+) BUS AND (D64) CAN C (-) BUS CIRCUITS SHORTED TOGETHER
(D65) CAN C (+) BUS CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(D64) CAN C (-) BUS CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
STEERING CONTROL MODULE

Diagnostic Test

1. CHECK FOR A DTC C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC's.

Does the scan tool display: C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check the Steering Angle Sensor installation.

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE (CONTINUED)

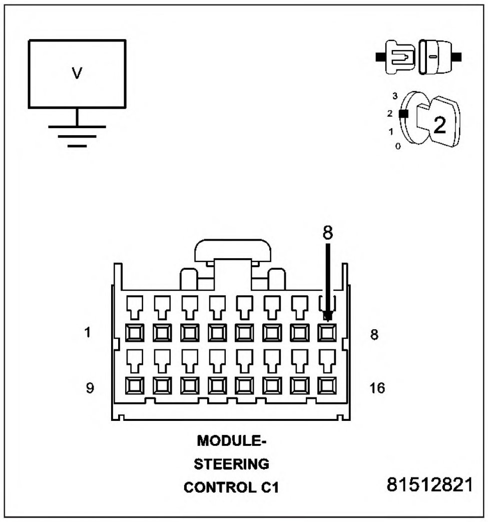
3. CHECK THE VOLTAGE ON THE (A108) FUSED B(+) CIRCUIT

Turn the ignition off.

Disconnect the Steering Control Module harness connector.

Turn the ignition on.

Measure the voltage of the (A108) Fused B(+) circuit.


V
3
2
1
0
2
8
1
8
9
16
MODULE-
STEERING
CONTROL C1
81512821

Is the voltage above 10 volts?

Yes >> Go To 4

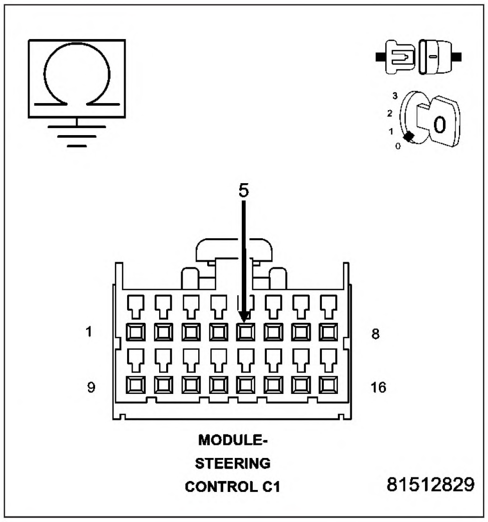
No >> Repair the (A108) Fused B(+) circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE RESISTANCE OF THE (Z907) GROUND CIRCUIT

Turn the ignition off.

Measure the resistance between the (Z907) Ground circuit and ground.


Ω
3
2
1
0
0
5
1
8
9
16
MODULE-
STEERING
CONTROL C1
81512829

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the (Z907) Ground circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

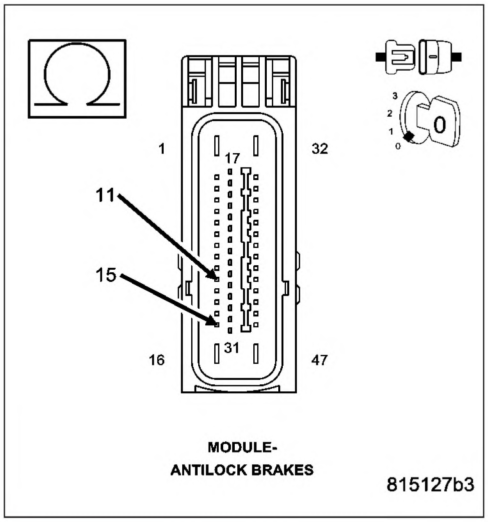
C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE (CONTINUED)

5. CHECK THE (D65) CAN C (+) BUS AND (D64) CAN C (-) BUS CIRCUITS FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (D65) CAN C (+) BUS circuit and the (D64) CAN C (-) BUS circuit.


1
17
32
11
15
31
16
47
MODULE-
ANTILOCK BRAKES
815127b3

Is the resistance below 150 ohms?

Yes >> Repair the (D65) CAN C (+) BUS and the (D64) CAN C (-) BUS circuits for a short together.
Perform ABS VERIFICATION TEST - VER 1.

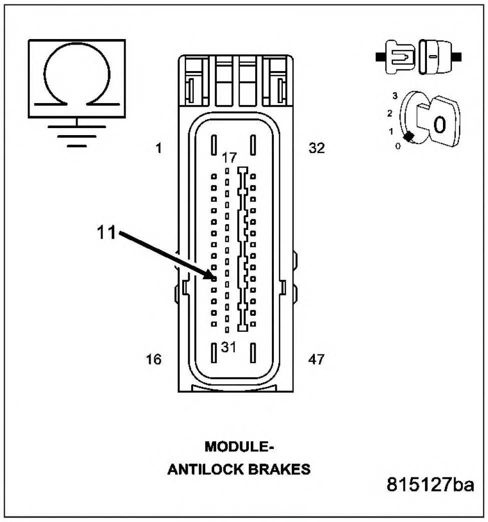
No >> Go To 6

---

6. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D65) CAN C (+) BUS circuit.


1
17
32
11
31
16
47
MODULE-
ANTILOCK BRAKES
815127ba

Is the resistance below 5.0 ohms?

Yes >> Repair the (D65) CAN C (+) BUS circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

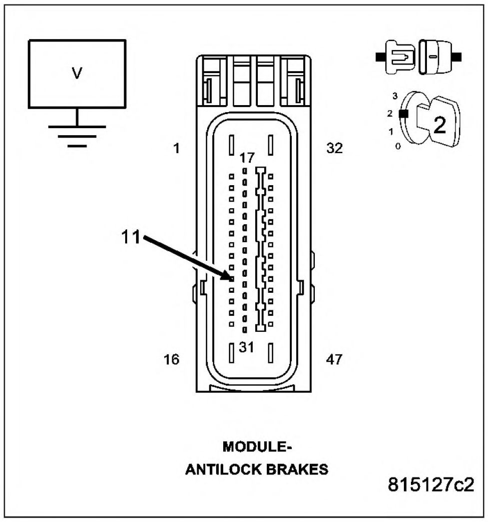
No >> Go To 7

C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE (CONTINUED)

7. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (D65) CAN C (+) BUS circuit.


V
1
17
32
11
16
31
47
3
2
1
0
2
MODULE-
ANTILOCK BRAKES
815127c2

Is there any voltage present?

Yes >> Repair the (D65) CAN C (+) BUS circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

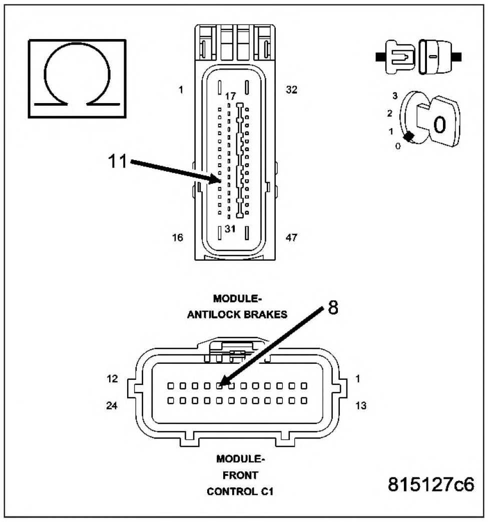
No >> Go To 8

---

8. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR AN OPEN CIRCUIT

Turn the ignition off.

Measure the resistance of the (D65) CAN C (+) Bus circuit.


Ω
1
17
32
11
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
8
12
24
1
13
MODULE-
FRONT
CONTROL C1
815127c6

Is the resistance below 5.0 ohms?

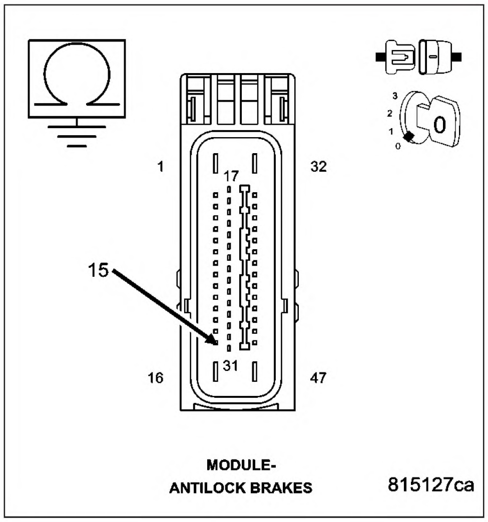
Yes >> Go To 9

No >> Repair the (D65) CAN C (+) BUS circuit for an open circuit.
Perform ABS VERIFICATION TEST - VER 1.

C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE (CONTINUED)

9. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (D64) CAN C (-) BUS circuit.



1
17
32
15
31
16
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
815127ca

Is the resistance below 5.0 ohms?

Yes >> Repair the (D64) CAN C (-) BUS circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

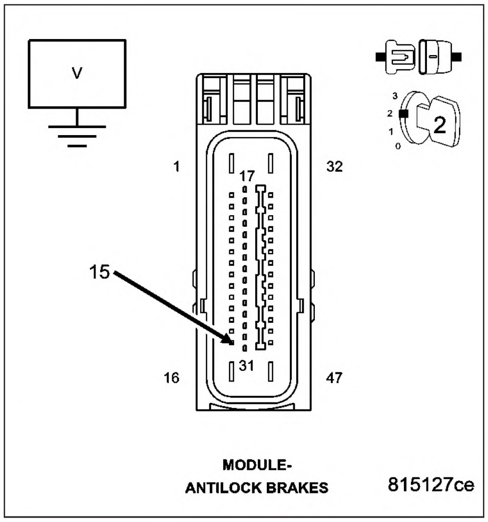
No >> Go To 10

---

10. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (D64) CAN C (+) BUS circuit.



V
1
17
32
15
31
16
47
3
2
1
0
2
MODULE-
ANTILOCK BRAKES
815127ce

Is there any voltage present?

Yes >> Repair the (D64) CAN C (-) BUS circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

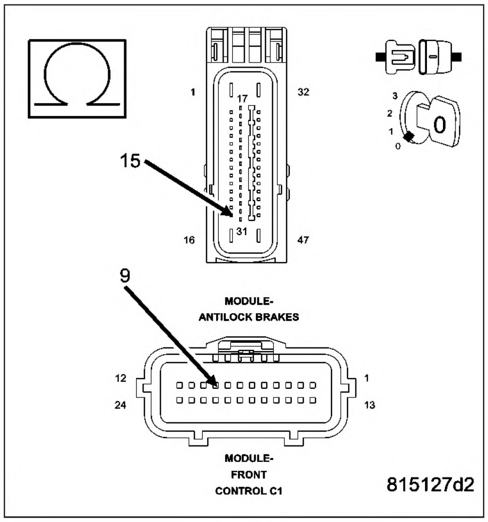
No >> Go To 11

C1219-STEERING ANGLE SENSOR ERRATIC PERFORMANCE (CONTINUED)

11. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR AN OPEN CIRCUIT

Turn the ignition off.

Measure the resistance of the (D64) CAN C (-) Bus circuit.

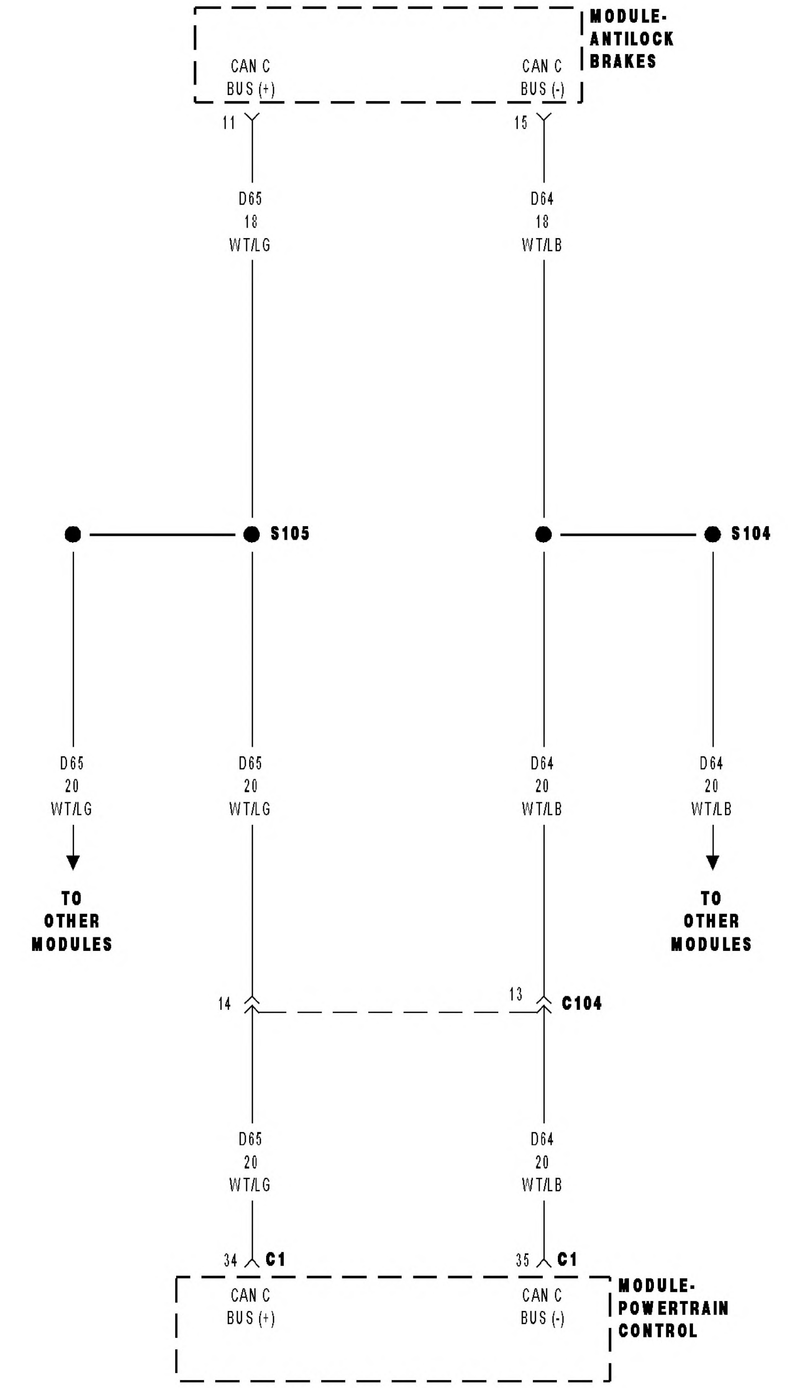

1
17
32
15
31
16
47
3
2
1
0
9
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
815127d2

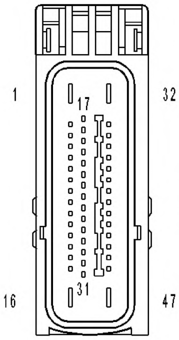
Is the resistance below 5.0 ohms?

Yes >> Replace the Steering Control Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

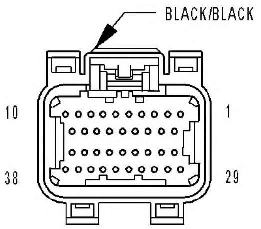
No >> Repair the (D64) CAN C (-) BUS circuit for an open circuit.
Perform ABS VERIFICATION TEST - VER 1.

C121C-TORQUE REQUEST SIGNAL DENIED


MODULE-
ANTILOCK
BRAKES
CAN C
BUS (+)
CAN C
BUS (-)
11
15
D65
18
WT/LG
D64
18
WT/LB
S105
S104
D65
20
WT/LG
D65
20
WT/LG
D64
20
WT/LB
D64
20
WT/LB
TO
OTHER
MODULES
TO
OTHER
MODULES
14
13
C104
D65
20
WT/LG
D64
20
WT/LB
34
C1
35
C1
CAN C
BUS (+)
CAN C
BUS (-)
MODULE-
POWERTRAIN
CONTROL


1
17
32
16
31
47

MODULE-
ANTILOCK
BRAKES


BLACK/BLACK
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C1

814dc608

C121C-TORQUE REQUEST SIGNAL DENIED (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates if engine management relevant for Automatic Yaw Control/Traction Control System control can be accomplished.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
(D65) CAN C (+) BUS AND (D64) CAN C (-) BUS CIRCUITS SHORTED TOGETHER
(D65) CAN C (+) BUS CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(D64) CAN C (-) BUS CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
POWERTRAIN CONTROL MODULE

Diagnostic Test

1. CHECK FOR A DTC C121C-TORQUE REQUEST SIGNAL DENIED

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC’s.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC’s.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC’s.

Does the scan tool display: C121C-TORQUE REQUEST SIGNAL DENIED?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

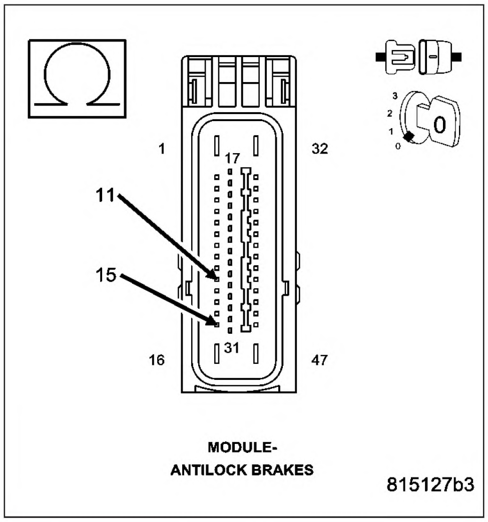
C121C-TORQUE REQUEST SIGNAL DENIED (CONTINUED)

3. CHECK THE (D65) CAN C (+) BUS AND (D64) CAN C (-) BUS CIRCUITS FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (D65) CAN C (+) BUS circuit and the (D64) CAN C (-) BUS circuit.


1
17
32
11
15
16
31
47
3
2
1
0
O
MODULE-
ANTILOCK BRAKES
815127b3

Is the resistance below 150 ohms?

Yes >> Repair the (D65) CAN C (+) BUS and the (D64) CAN C (-) BUS circuits for a short together.
Perform ABS VERIFICATION TEST - VER 1.

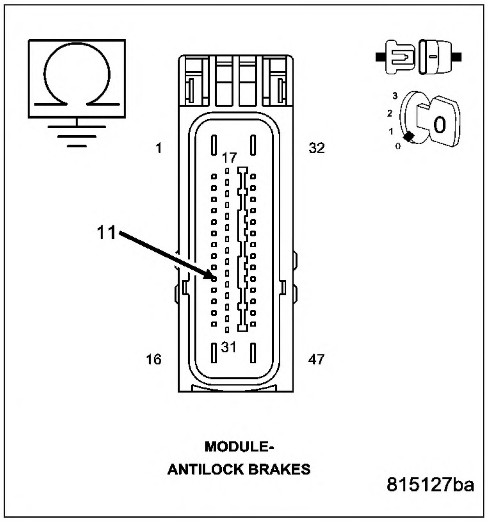
No >> Go To 4

4. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Powertrain Control Module harness connector.

Measure the resistance between ground and the (D65) CAN C (+) BUS circuit.


1
17
32
11
16
31
47
3
2
1
0
O
MODULE-
ANTILOCK BRAKES
815127ba

Is the resistance below 5.0 ohms?

Yes >> Repair the (D65) CAN C (+) BUS circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

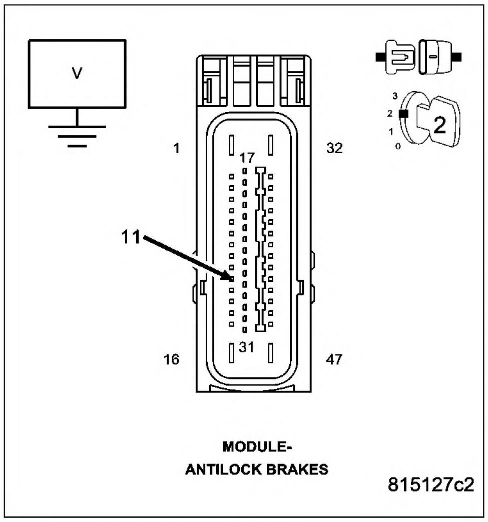
No >> Go To 5

C121C-TORQUE REQUEST SIGNAL DENIED (CONTINUED)

5. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (D65) CAN C (+) BUS circuit.


V
1
17
32
11
16
31
47
3
2
1
0
2
MODULE-
ANTILOCK BRAKES
815127c2

Is there any voltage present?

Yes >> Repair the (D65) CAN C (+) BUS circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

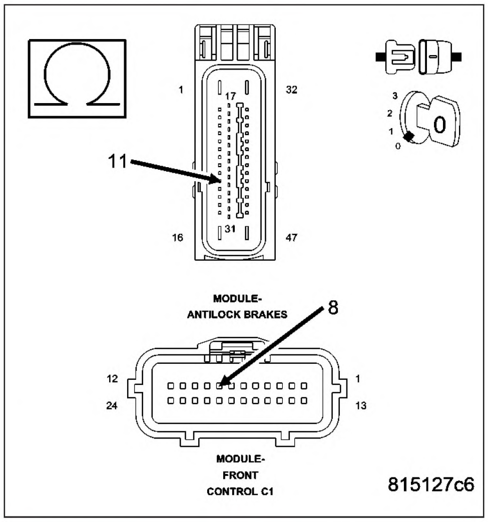
No >> Go To 6

---

6. CHECK THE (D65) CAN C (+) BUS CIRCUIT FOR AN OPEN CIRCUIT

Turn the ignition off.

Measure the resistance of the (D65) CAN C (+) Bus circuit.


Ω
1
17
32
11
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
8
12
24
1
13
MODULE-
FRONT
CONTROL C1
815127c6

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the (D65) CAN C (+) BUS circuit for an open circuit.
Perform ABS VERIFICATION TEST - VER 1.

C121C-TORQUE REQUEST SIGNAL DENIED (CONTINUED)

7. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR A SHORT TO GROUND

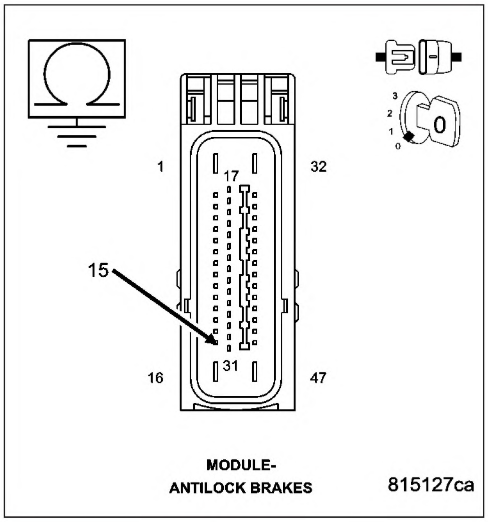
Turn the ignition off.

Measure the resistance between ground and the (D64) CAN C (-) BUS circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (D64) CAN C (-) BUS circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 8


1
17
32
15
31
16
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
815127ca

---

8. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR A SHORT TO VOLTAGE

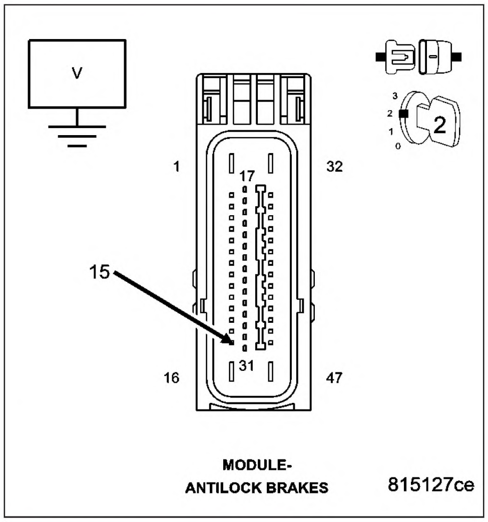
Turn the ignition on.

Measure the voltage of the (D64) CAN C (+) BUS circuit.

Is there any voltage present?

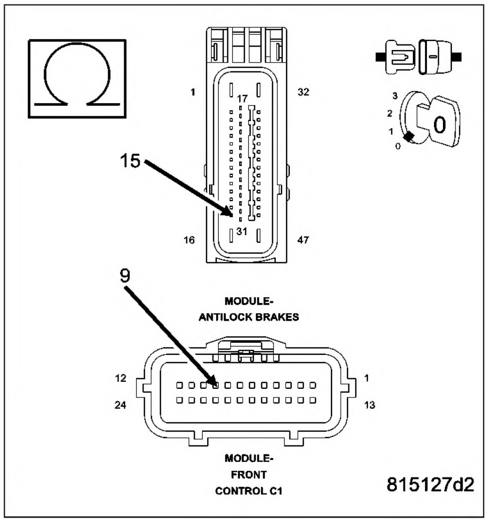
Yes >> Repair the (D64) CAN C (-) BUS circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 9


V
1
17
32
15
31
16
47
3
2
1
0
2
MODULE-
ANTILOCK BRAKES
815127ce

C121C-TORQUE REQUEST SIGNAL DENIED (CONTINUED)

9. CHECK THE (D64) CAN C (-) BUS CIRCUIT FOR AN OPEN CIRCUIT


Ω
1
17
32
15
16
31
47
3
2
1
0
O
9
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
815127d2

Turn the ignition off.

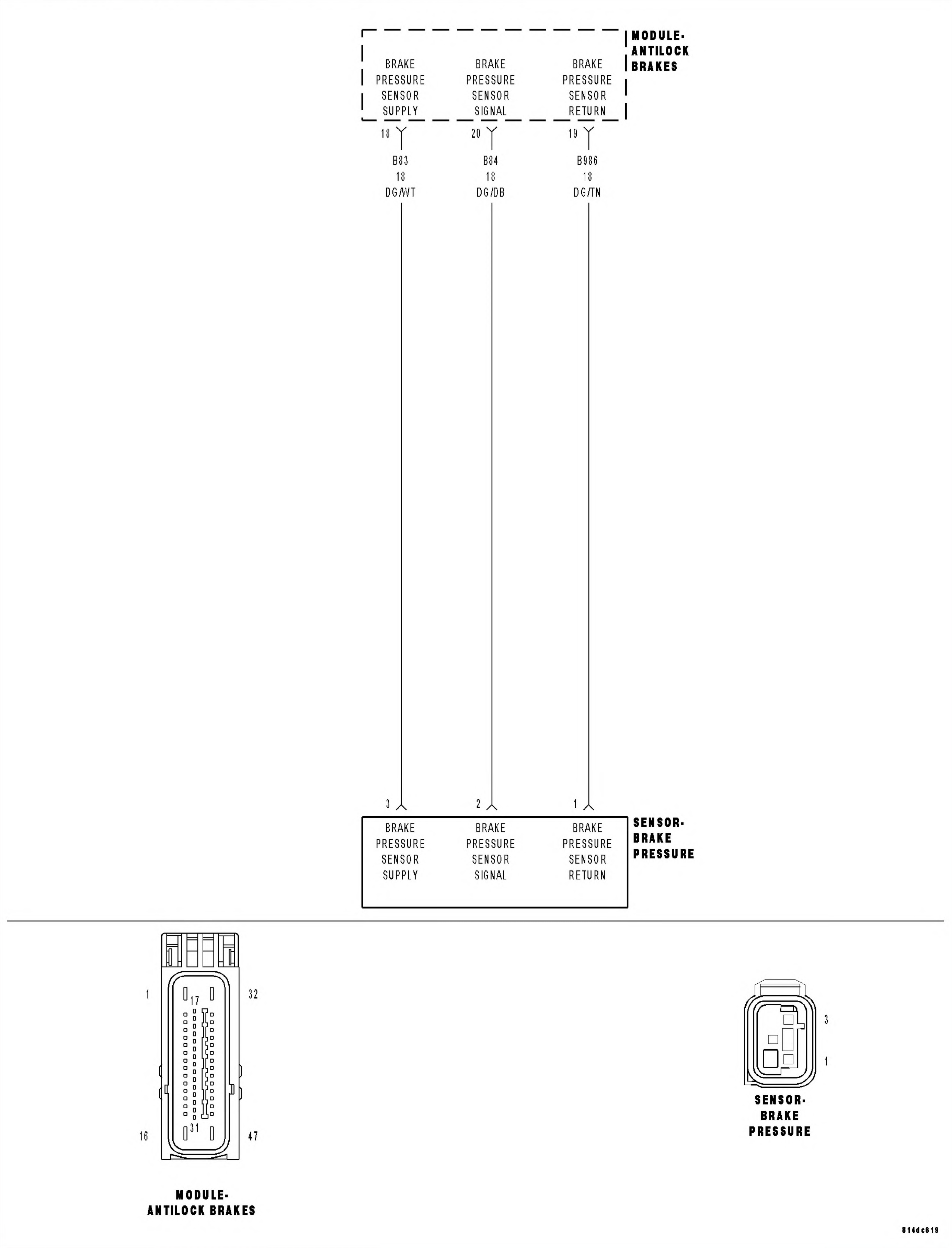
Measure the resistance of the (D64) CAN C (-) Bus circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Powertrain Control Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (D64) CAN C (-) BUS circuit for an open circuit.
Perform ABS VERIFICATION TEST - VER 1.

C121D-BRAKE PRESSURE SENSOR CIRCUIT


MODULE-
ANTILOCK
BRAKES
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
18
20
19
B83
18
DG/WT
B84
18
DG/DB
B986
18
DG/TN
3
2
1
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
SENSOR-
BRAKE
PRESSURE
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
3
1
SENSOR-
BRAKE
PRESSURE
814dc619

C121D-BRAKE PRESSURE SENSOR CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that the Brake Pressure Sensor Signal is out of range.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
AIR IN BRAKE SYSTEM/WORN MECHANICAL COMPONENTS
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
BRAKE PRESSURE SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C121D-BRAKE PRESSURE SENSOR CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Start the engine.

Depress and release the brake pedal.

With the scan tool, read and record DTC's.

Does the scan tool display: C121D-BRAKE PRESSURE SENSOR CIRCUIT?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C121D-BRAKE PRESSURE SENSOR CIRCUIT (CONTINUED)

3. CHECK FOR AIR IN BRAKE SYSTEM AND WORN MECHANICAL COMPONENTS

NOTE: Before continuing the brake system must be bled to verify there is no air in the brake system.

NOTE: Visually inspect for worn brake linings, undersized rotors, binding or frozen calipers.

Was there any air in the brake system or base brake issues found?

Yes >> Repair as needed.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

---

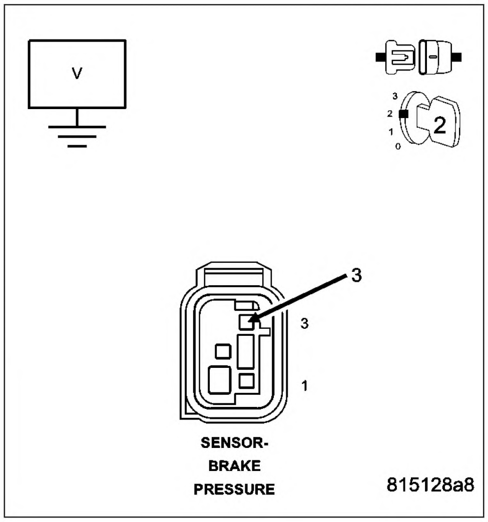
4. CHECK THE VOLTAGE ON THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Brake Pressure Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.



Is the voltage above 4 volts?

Yes >> Go To 8

No >> Go To 5

---

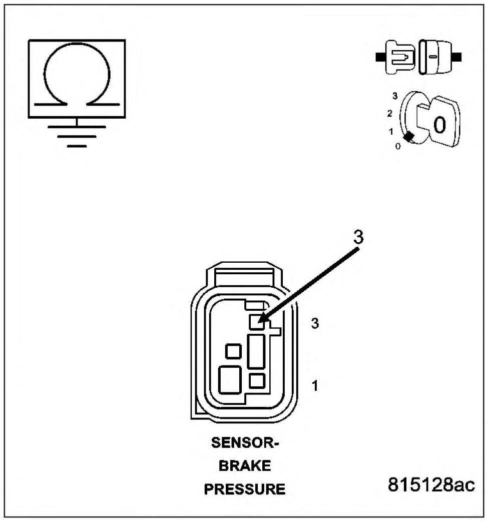
5. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Pressure Sensor harness connector.

Measure the resistance between ground and the (B83) Brake Pressure Sensor Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

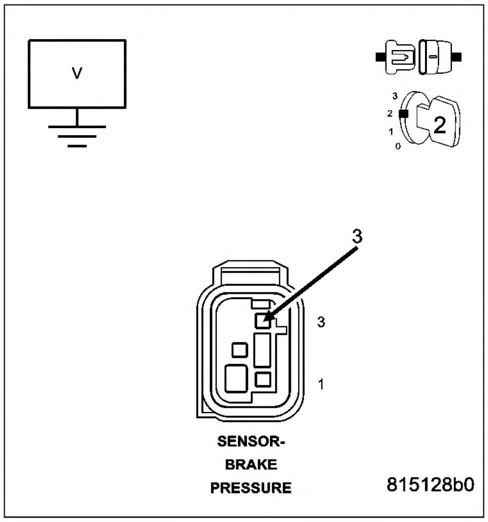
No >> Go To 6

C121D-BRAKE PRESSURE SENSOR CIRCUIT (CONTINUED)

6. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.


V
3
2
1
0
2
3
3
1
SENSOR-
BRAKE
PRESSURE
815128b0

Is there any voltage present?

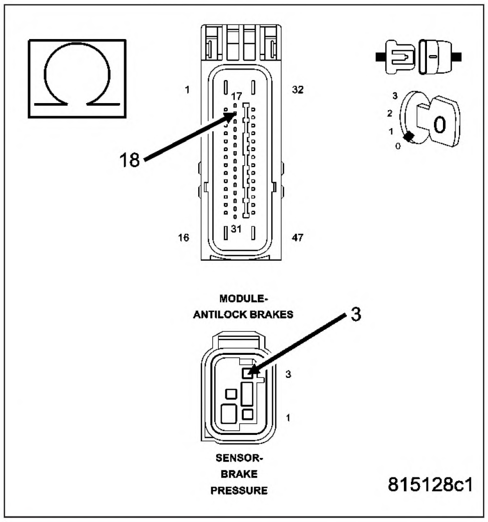
Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR AN OPEN

Measure the resistance of the (B83) Brake Pressure Sensor Supply circuit.


1
17
32
18
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
3
3
1
SENSOR-
BRAKE
PRESSURE
815128c1

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

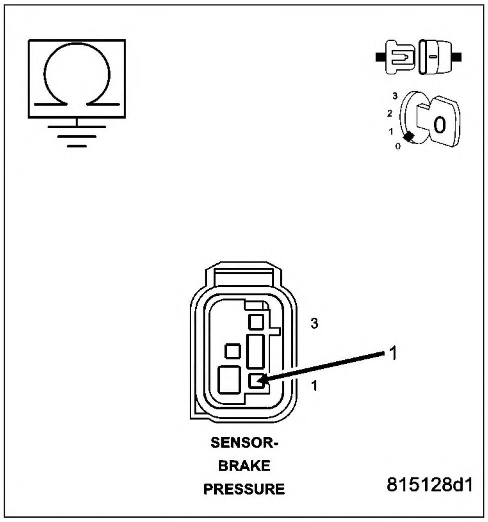
No >> Repair the (B83) Brake Pressure Sensor Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C121D-BRAKE PRESSURE SENSOR CIRCUIT (CONTINUED)

8. CHECK THE RESISTANCE TO GROUND ON THE (B986) BRAKE PRESSURE RETURN CIRCUIT

Turn the ignition off.

Measure the resistance between the (B986) Brake Pressure Return Circuit and ground.


3
2
1
0
0
3
1
1
SENSOR-
BRAKE
PRESSURE
815128d1

Is the resistance below 5.0 ohms?

Yes >> Go To 12

No >> Go To 9

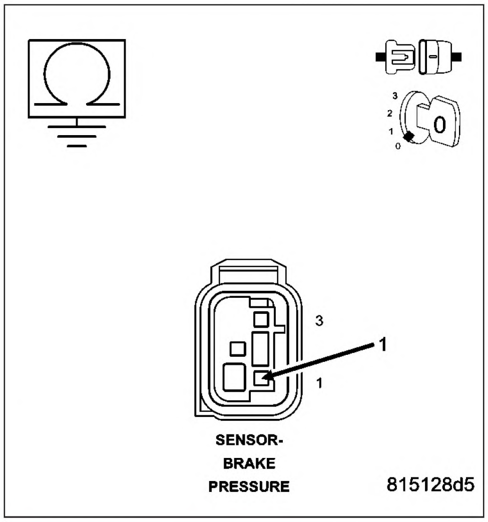
---

9. CHECK THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT FOR SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between ground and the (B986) Brake Pressure Sensor Return circuit.


3
2
1
0
0
3
1
1
SENSOR-
BRAKE
PRESSURE
815128d5

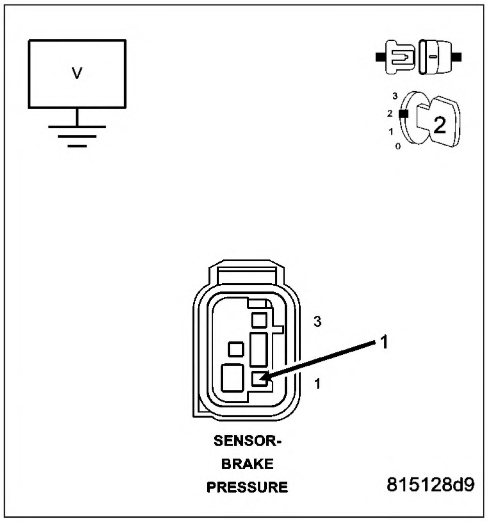
Is the resistance below 5.0 ohms?

Yes >> Repair the (B986) Brake Pressure Sensor Return circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 10

C121D-BRAKE PRESSURE SENSOR CIRCUIT (CONTINUED)

10. CHECK THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT FOR SHORT TO VOLTAGE


V
3
2
1
0
2
3
1
1
SENSOR-
BRAKE
PRESSURE
815128d9

Turn the ignition on.

Measure the voltage of the (B986) Brake Pressure Sensor Return circuit.

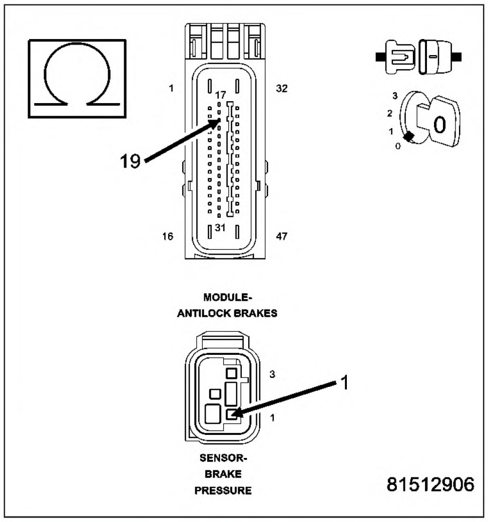
Is there any voltage present?

Yes >> Repair the (B986) Brake Pressure Sensor Return circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 11

---

11. CHECK THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT FOR AN OPEN


1
17
32
19
16
31
47
MODULE-
ANTILOCK BRAKES
3
2
1
0
0
3
1
1
SENSOR-
BRAKE
PRESSURE
81512906

Turn the ignition off.

Measure the resistance of the (B986) Brake Pressure Sensor Return circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B986) Brake Pressure Sensor Return circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C121D-BRAKE PRESSURE SENSOR CIRCUIT (CONTINUED)

12. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT OUTPUT

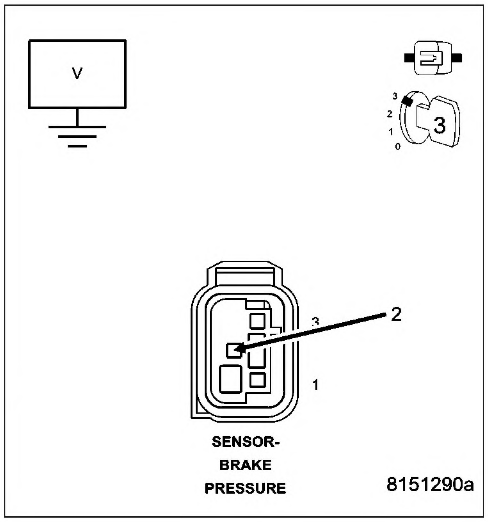
Turn the ignition off.

Reconnect the Anti-Lock Brake Module harness connector.

Reconnect the Brake Pressure Sensor harness connector.

Start the engine.

While back probing, measure the voltage of the (B84) Brake Pressure Sensor Signal circuit at the Brake Pressure Sensor harness connector while depressing and releasing the brake pedal.



8151290a

Is the voltage between 0.50 volts to 4.55 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 13

---

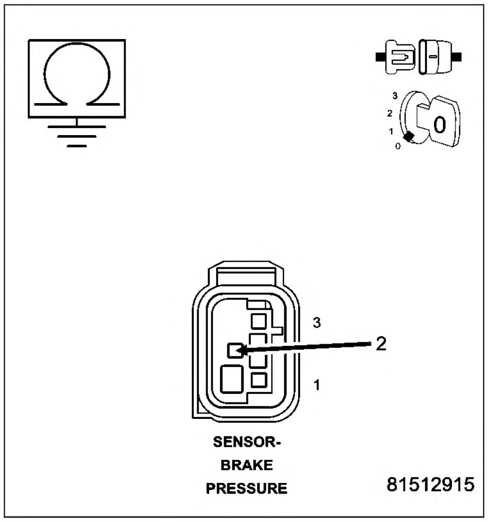
13. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Pressure Sensor harness connector.

Measure the resistance between ground and the (B84) Brake Pressure Sensor Signal circuit.



81512915

Is the resistance below 5.0 ohms?

Yes >> Repair the (B84) Brake Pressure Sensor Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

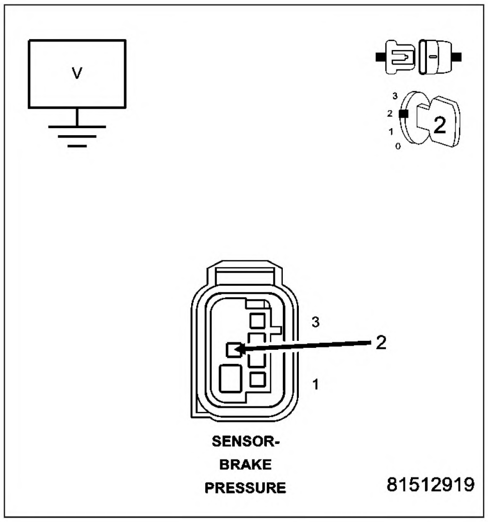
No >> Go To 14

C121D-BRAKE PRESSURE SENSOR CIRCUIT (CONTINUED)

14. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B84) Brake Pressure Sensor Signal circuit.


V
3
2
1
0
2
3
2
1
SENSOR-
BRAKE
PRESSURE
81512919

Is there any voltage present?

Yes >> Repair the (B84) Brake Pressure Sensor Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

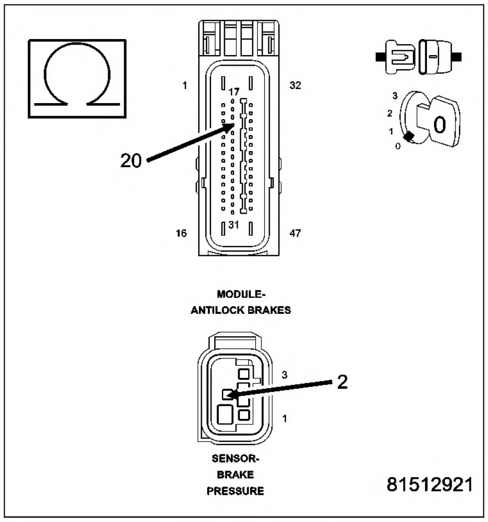
No >> Go To 15

---

15. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT FOR AN OPEN

Turn the ignition off.

Measure the resistance of the (B84) Brake Pressure Sensor Signal circuit.

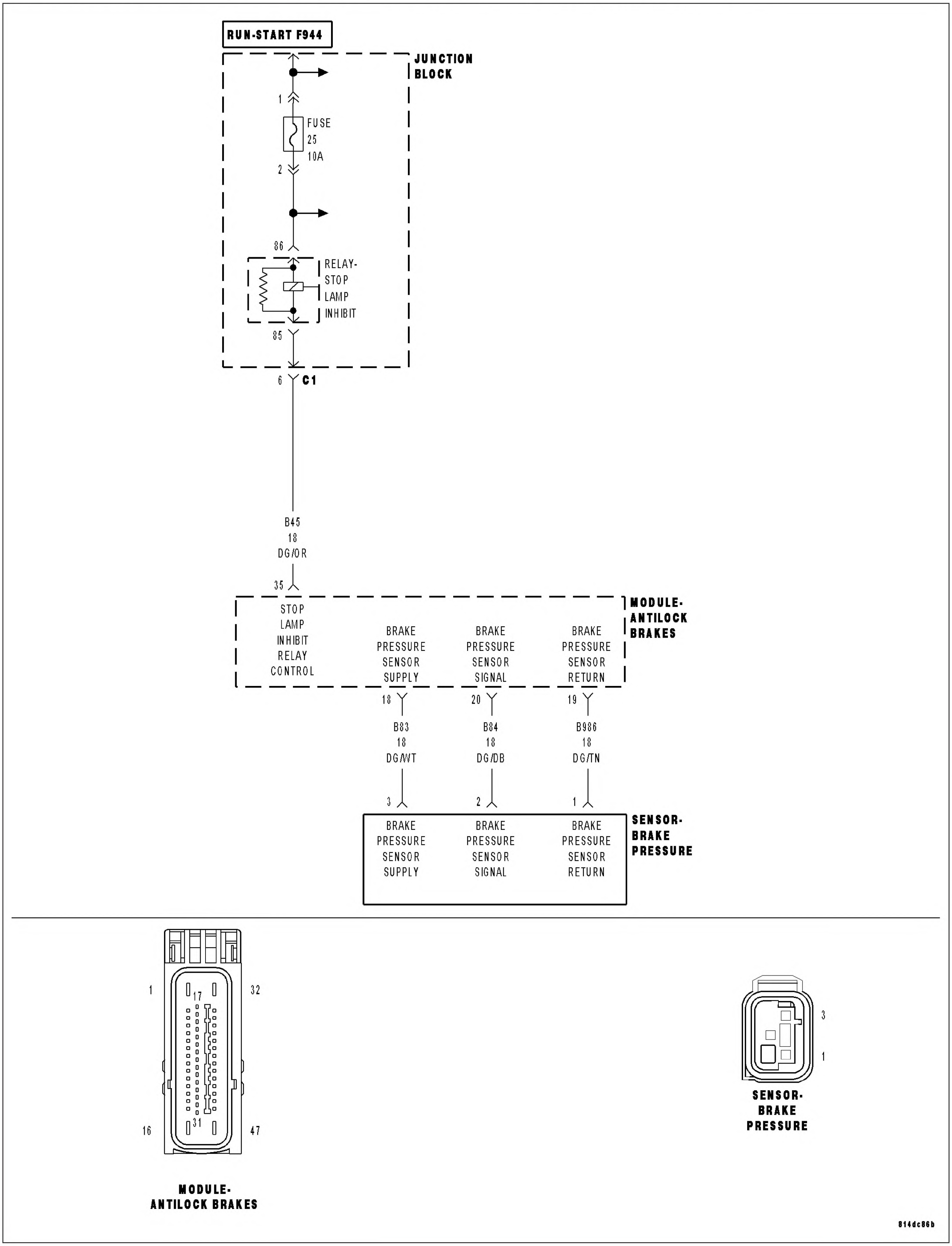

Ω
1
17
32
20
31
16
47
MODULE-
ANTILOCK BRAKES
3
2
1
0
0
3
2
1
SENSOR-
BRAKE
PRESSURE
81512921

Is the resistance below 5.0 ohms?

Yes >> Replace the Brake Pressure Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B137) Brake Pressure Sensor Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE


RUN-START F944
JUNCTION BLOCK
1
FUSE 25 10A
2
86
RELAY-STOP LAMP INHIBIT
85
6 C1
B45 18 DG/OR
35
STOP LAMP INHIBIT RELAY CONTROL
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
MODULE-ANTILOCK BRAKES
18
20
19
B83 18 DG/WT
B84 18 DG/DB
B986 18 DG/TN
3
2
1
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
SENSOR-BRAKE PRESSURE
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
3
1
SENSOR-BRAKE PRESSURE
814dc86b

C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that the Brake Pressure Sensor Signal is out of range.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
AIR IN BRAKE SYSTEM/WORN MECHANICAL COMPONENTS
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT OPEN
(B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT OPEN
(B84) BRAKE PRESSURE SENSOR SIGNAL AND (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUITS SHORTED TOGETHER
(B84) BRAKE PRESSURE SENSOR SIGNAL AND (B986) BRAKE PRESSURE SENSOR RETURN CIRCUITS SHORTED TOGETHER
(B45) STOP LAMP INHIBIT RELAY CONTROL CIRCUIT
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE

NOTE: If any of the following DTC's are present they must be repaired before continuing.

C122A-BRAKE PEDAL FORCE SWITCH CIRCUIT

C122B-BRAKE PEDAL FORCE SWITCH CIRCUIT PERFORMANCE

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Start the engine.

Depress and release the brake pedal.

With the scan tool, read and record DTC's.

Does the scan tool display: C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE (CONTINUED)

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK FOR AIR IN BRAKE SYSTEM AND WORN MECHANICAL COMPONENTS

NOTE: Before continuing the brake system must be bled to verify there is no air in the brake system.

NOTE: Visually inspect for worn brake linings, undersized rotors, binding or frozen calipers.

Was there any air in the brake system or base brake issues found?

Yes >> Repair as needed.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

---

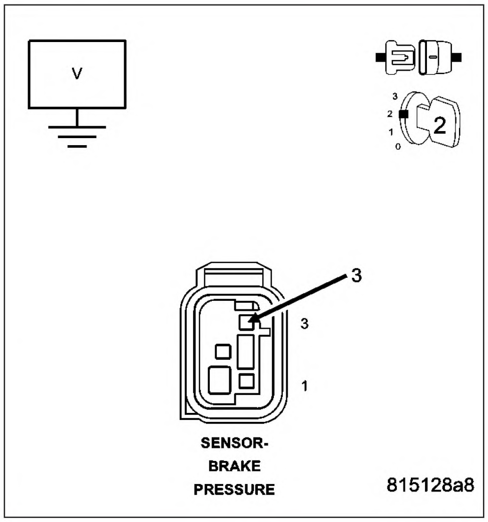
4. CHECK THE VOLTAGE ON THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Brake Pressure Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.



Is the voltage above 4 volts?

Yes >> Go To 8

No >> Go To 5

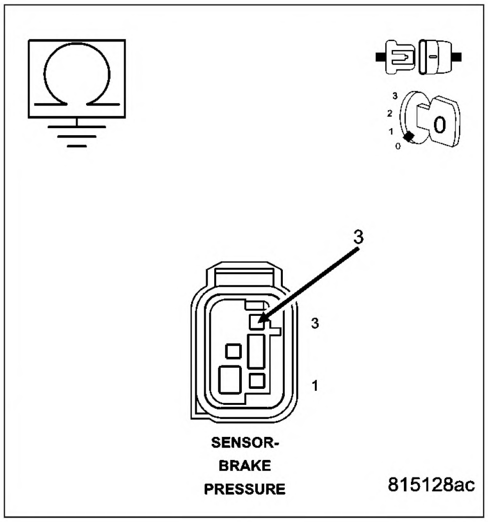
C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE (CONTINUED)

5. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between ground and the (B83) Brake Pressure Sensor Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

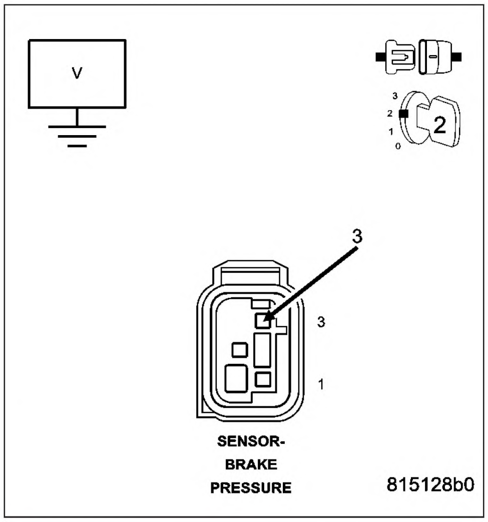
No >> Go To 6

---

6. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.



Is there any voltage present?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

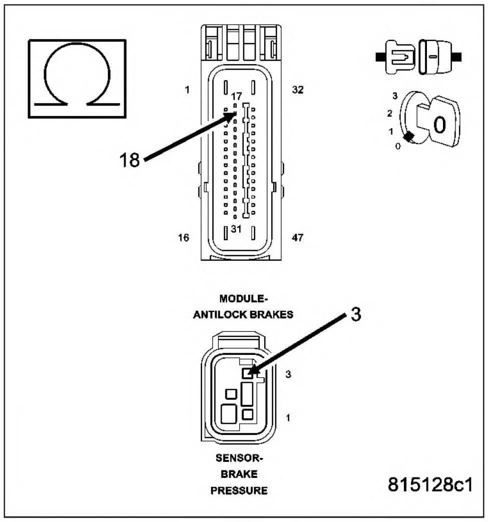
No >> Go To 7

C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE (CONTINUED)

7. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR AN OPEN

Turn the ignition off.

Measure the resistance of the (B83) Brake Pressure Sensor Supply circuit.


1
17
32
18
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
3
3
1
SENSOR-
BRAKE
PRESSURE

815128c1

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

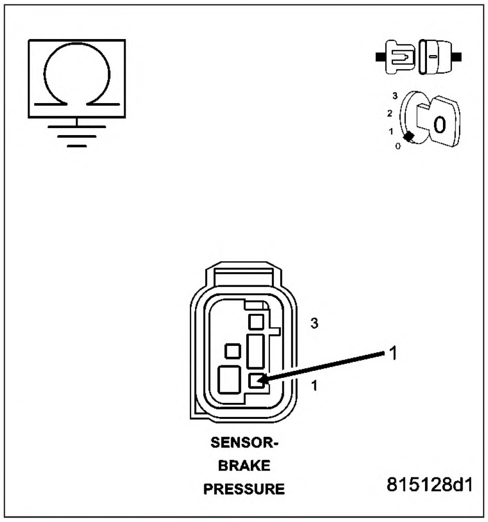
No >> Repair the (B83) Brake Pressure Sensor Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

8. CHECK THE RESISTANCE TO GROUND ON THE (B986) BRAKE PRESSURE RETURN CIRCUIT

Turn the ignition off.

Measure the resistance between the (B986) Brake Pressure Return circuit and ground.


3
2
1
0
0
3
1
1
SENSOR-
BRAKE
PRESSURE

815128d1

Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the (B986) Brake Pressure Return circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE (CONTINUED)

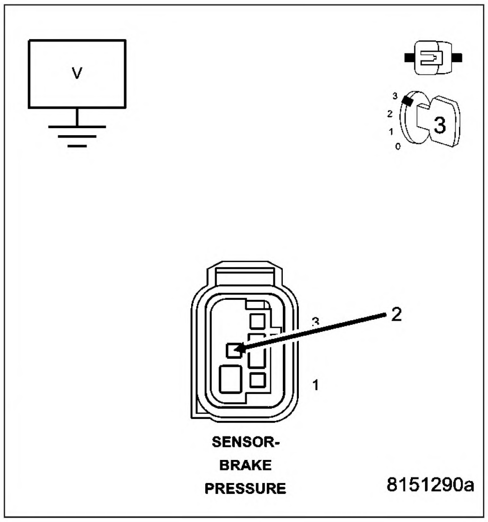
9. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT OUTPUT

Turn the ignition off.

Reconnect the Brake Pressure Sensor harness connector.

Start the engine.

While back probing, measure the voltage of the (B84) Brake Pressure Sensor Signal circuit at the Brake Pressure Sensor harness connector while depressing and releasing the brake pedal.


V
3
2
1
0
3
3
2
1
SENSOR-
BRAKE
PRESSURE
8151290a

Is the voltage between 0.50 volts to 4.55 volts?

Yes >> Go To 13

No >> Go To 10

---

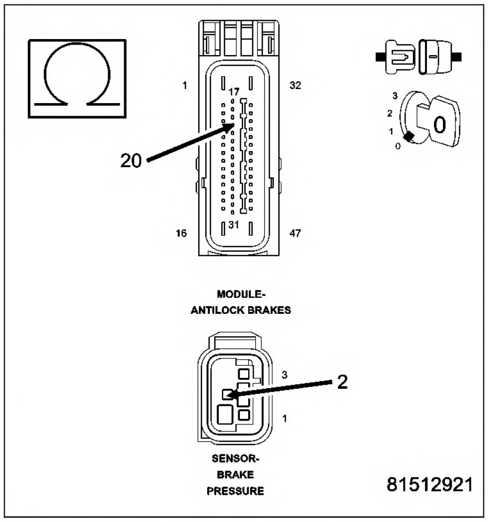
10. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Pressure Sensor harness connector.

Measure the resistance of the (B84) Brake Pressure Sensor Signal circuit.


Ω
1
17
32
20
16
31
47
MODULE-
ANTILOCK BRAKES
3
2
1
0
0
3
2
1
SENSOR-
BRAKE
PRESSURE
81512921

Is the resistance below 5.0 ohms?

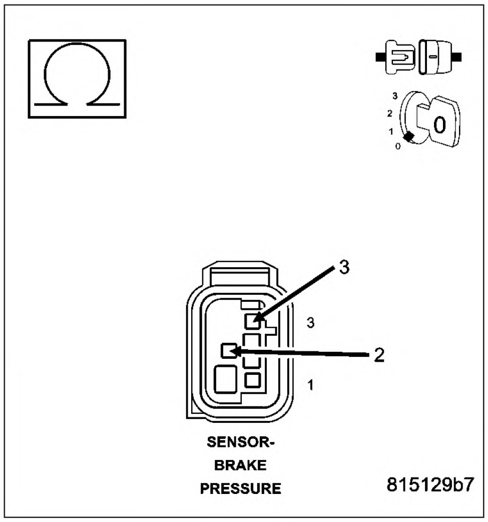
Yes >> Go To 11

No >> Repair the (B84) Brake Pressure Sensor Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE (CONTINUED)

11. CHECK FOR A SHORT BETWEEN THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT AND THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT

Measure the resistance between the (B84) Brake Pressure Sensor Signal circuit and the (B83) Brake Pressure Sensor Supply circuit.



Is the resistance below 150 ohms?

Yes >> Repair the (B83) Brake Pressure Sensor Supply and (B84) Brake Pressure Sensor Signal circuits for a short together.

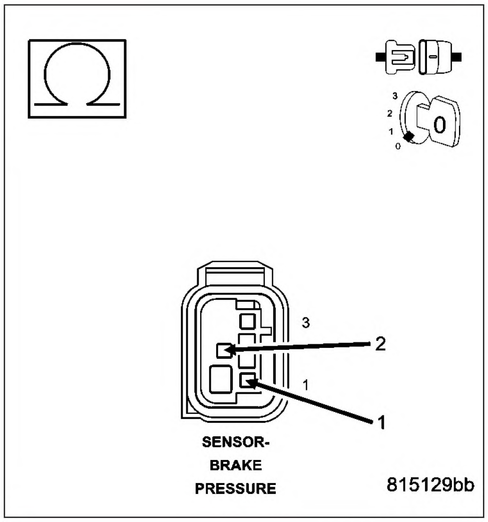
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

---

12. CHECK FOR A SHORT BETWEEN THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT AND THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT

Measure the resistance between the (B84) Brake Pressure Sensor Signal and the (B986) Brake Pressure Sensor Return circuit.



Is the resistance below 150 ohms?

Yes >> Repair the (B84) Brake Pressure Sensor Signal and (B986) Brake Pressure Sensor Return circuits for a short together.

Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 13

C121E-BRAKE PRESSURE SENSOR COMPARATIVE PERFORMANCE (CONTINUED)

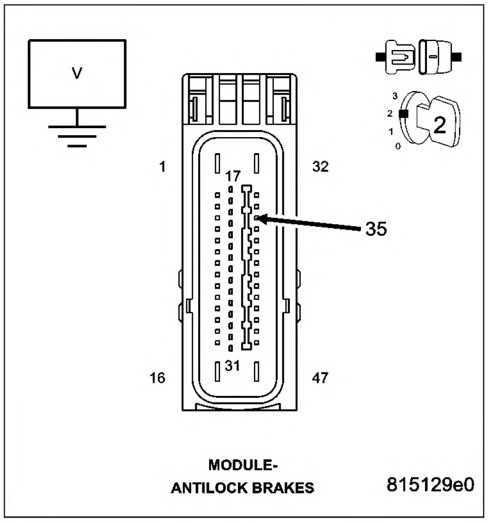
13. CHECK THE (B45) STOP LAMP INHIBIT RELAY CONTROL OPERATION

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage on the (B45) Stop Lamp Inhibit Relay Control circuit while depressing and releasing the brake pedal.

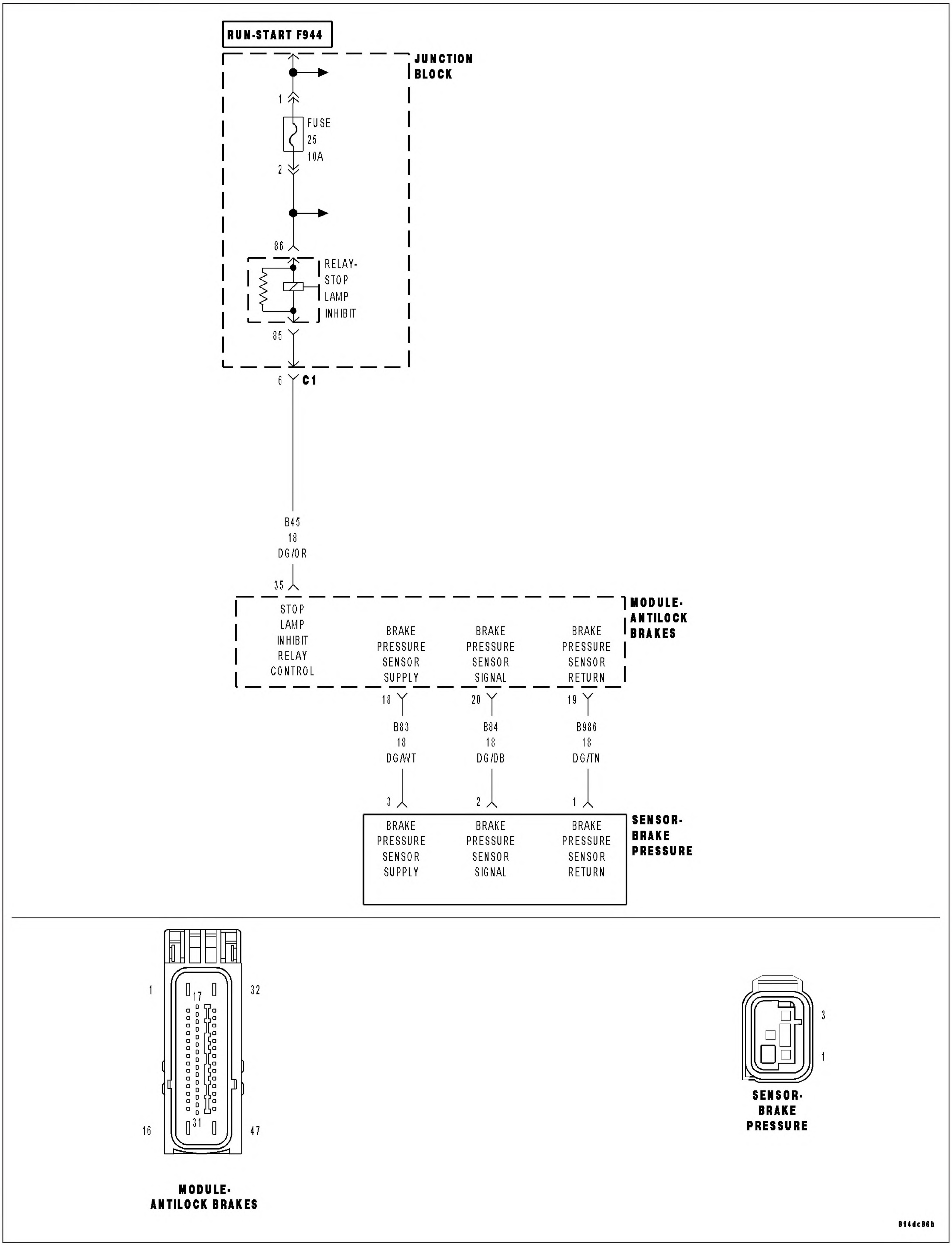


Does the voltage toggle from approximately 0 to 12 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair as needed.
Perform ABS VERIFICATION TEST - VER 1.

C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION


RUN-START F944
JUNCTION BLOCK
1
FUSE
25
10A
2
86
RELAY-STOP LAMP INHIBIT
85
6
C1
B45
18
DG/OR
35
MODULE-ANTILOCK BRAKES
STOP LAMP INHIBIT RELAY CONTROL
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
18
20
19
B83
18
DG/WT
B84
18
DG/DB
B986
18
DG/TN
3
2
1
SENSOR-BRAKE PRESSURE
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
3
1
SENSOR-BRAKE PRESSURE
814dc86b

C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that the Brake Pressure Sensor Signal is not plausible.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
AIR IN BRAKE SYSTEM/WORN MECHANICAL COMPONENTS
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT OPEN
(B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT OPEN
(B84) BRAKE PRESSURE SENSOR SIGNAL AND (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUITS SHORTED TOGETHER
(B84) BRAKE PRESSURE SENSOR SIGNAL AND (B986) BRAKE PRESSURE SENSOR RETURN CIRCUITS SHORTED TOGETHER
(D45) STOP LAMP INHIBIT RELAY CONTROL CIRCUIT
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION

NOTE: If any of the following DTC's are present they must be repaired before continuing.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Start the engine.

Depress and release the brake pedal.

With the scan tool, read and record DTC's.

Does the scan tool display: C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION (CONTINUED)

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK FOR AIR IN BRAKE SYSTEM AND WORN MECHANICAL COMPONENTS

NOTE: Before continuing the brake system must be bled to verify there is no air in the brake system.

NOTE: Visually inspect for worn brake linings, undersized rotors, binding or frozen calipers.

Was there any air in the brake system or base brake issues found?

Yes >> Repair as needed.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

---

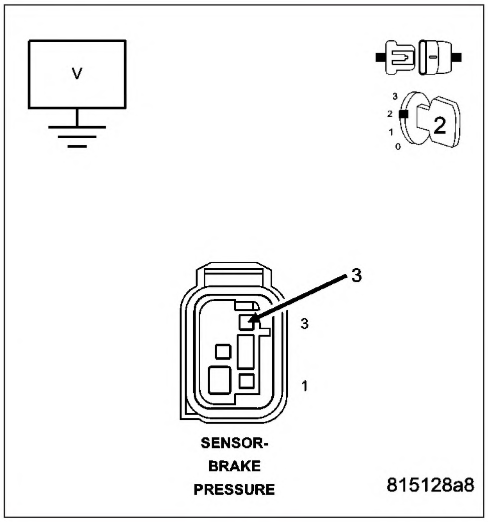
4. CHECK THE VOLTAGE ON THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Brake Pressure Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.



Is the voltage above 4 volts?

Yes >> Go To 8

No >> Go To 5

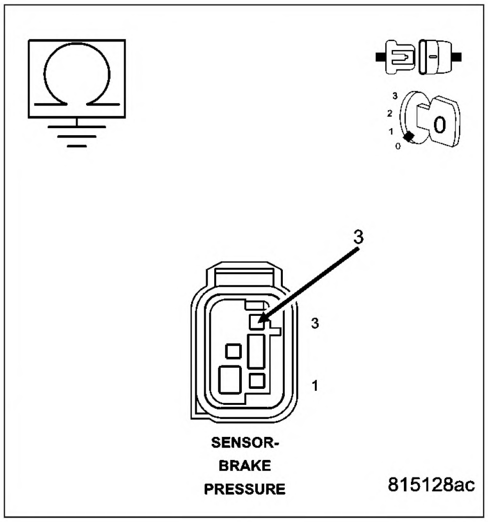
C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION (CONTINUED)

5. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between ground and the (B83) Brake Pressure Sensor Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

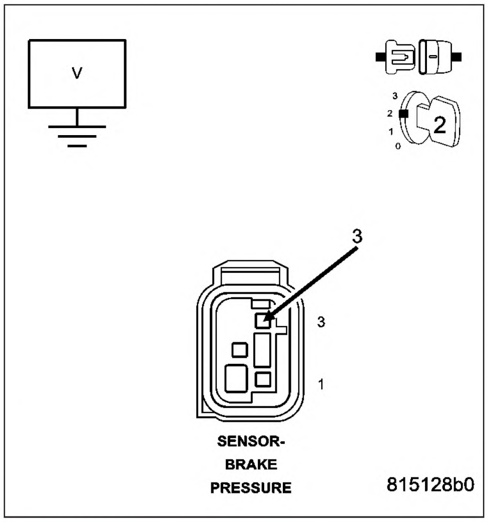
No >> Go To 6

---

6. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.



Is there any voltage present?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION (CONTINUED)

7. CHECK THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT FOR AN OPEN

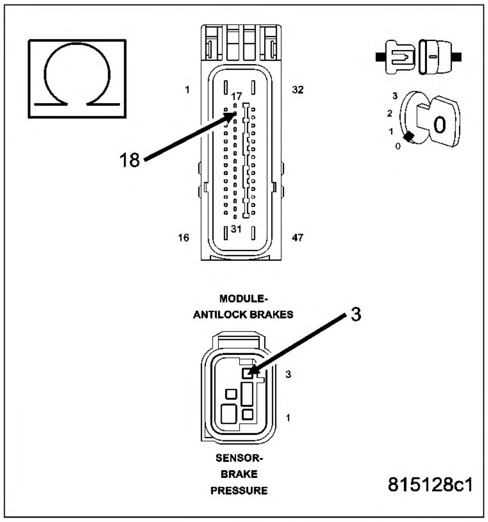
Turn the ignition off.

Measure the resistance of the (B83) Brake Pressure Sensor Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B83) Brake Pressure Sensor Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.


1
17
32
18
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
3
3
1
SENSOR-
BRAKE
PRESSURE
815128c1

---

8. CHECK THE RESISTANCE TO GROUND ON THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT

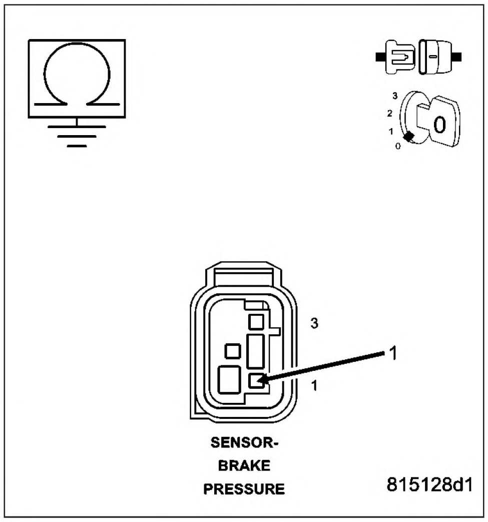
Turn the ignition off.

Measure the resistance between the (B986) Brake Pressure Sensor Return Circuit and ground.

Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the (B986) Brake Pressure Sensor Return circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.


3
2
1
0
0
3
1
1
SENSOR-
BRAKE
PRESSURE
815128d1

C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION (CONTINUED)

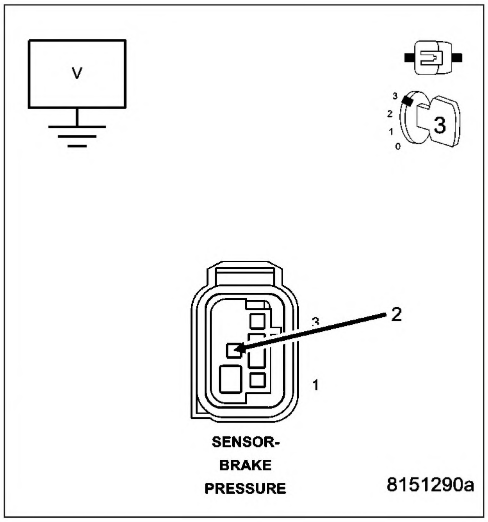
9. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT OUTPUT

Turn the ignition off.

Reconnect the Brake Pressure Sensor harness connector.

Start the engine.

While back probing, measure the voltage of the (B84) Brake Pressure Sensor Signal circuit at the Brake Pressure Sensor harness connector while depressing and releasing the brake pedal.


V
3
2
1
0
3
3
2
1
SENSOR-
BRAKE
PRESSURE
8151290a

Is the voltage between 0.50 volts to 4.55 volts?

Yes >> Go To 13

No >> Go To 10

---

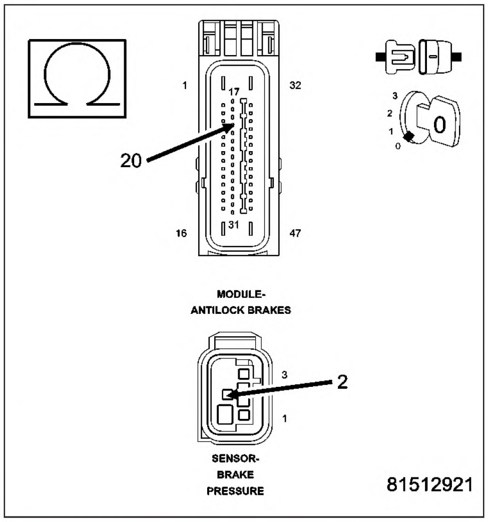
10. CHECK THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Pressure Sensor harness connector.

Measure the resistance of the (B84) Brake Pressure Sensor Signal circuit.


Ω
1
17
32
20
16
31
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
3
2
1
SENSOR-
BRAKE
PRESSURE
81512921

Is the resistance below 5.0 ohms?

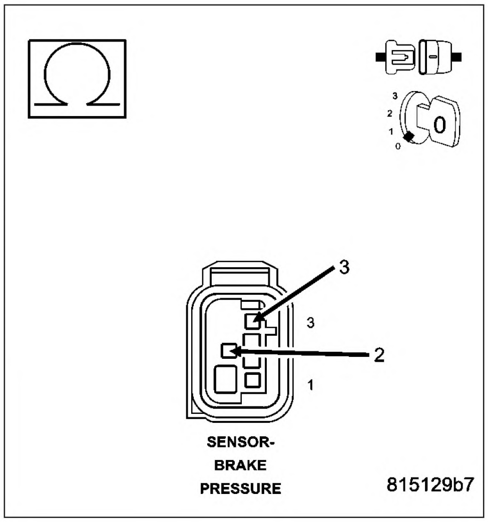
Yes >> Go To 11

No >> Repair the (B84) Brake Pressure Sensor Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION (CONTINUED)

11. CHECK FOR A SHORT BETWEEN THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT AND THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT

Measure the resistance between the (B84) Brake Pressure Sensor Signal circuit and the (B83) Brake Pressure Sensor Supply circuit.



Is the resistance below 150 ohms?

Yes >> Repair the (B83) Brake Pressure Sensor Supply and (B84) Brake Pressure Sensor Signal circuits for a short together.

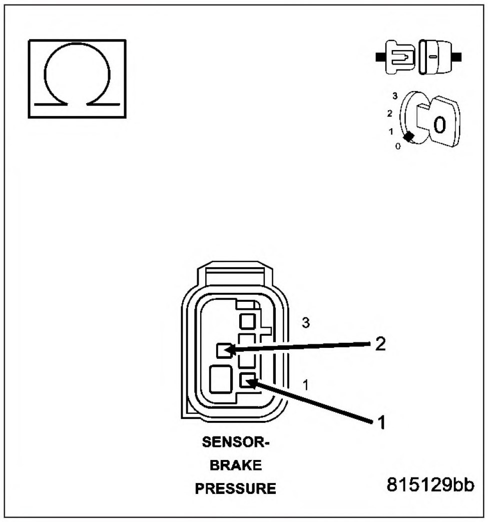
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 12

---

12. CHECK FOR A SHORT BETWEEN THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT AND THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT

Measure the resistance between the (B84) Brake Pressure Sensor Signal and the (B986) Brake Pressure Sensor Return circuit.



Is the resistance below 150 ohms?

Yes >> Repair the (B84) Brake Pressure Sensor Signal and (B986) Brake Pressure Sensor Return circuits for a short together.

Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 13

C1222-BRAKE PEDAL TRAVEL SENSOR/BRAKE PRESSURE SENSOR CORRELATION (CONTINUED)

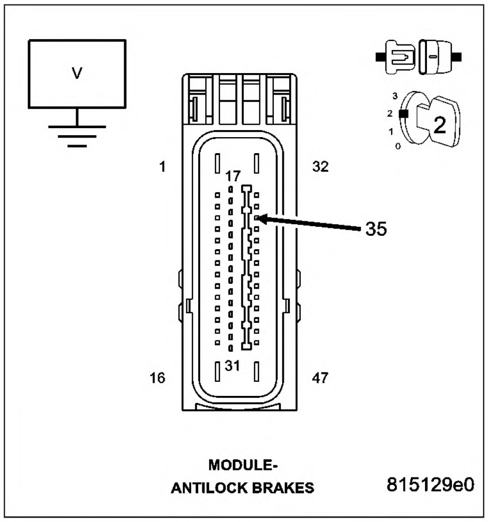
13. CHECK THE (D45) STOP LAMP INHIBIT RELAY CONTROL OPERATION

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage on the (D45) Stop Lamp Inhibit Relay Control circuit while depressing and releasing the brake pedal.

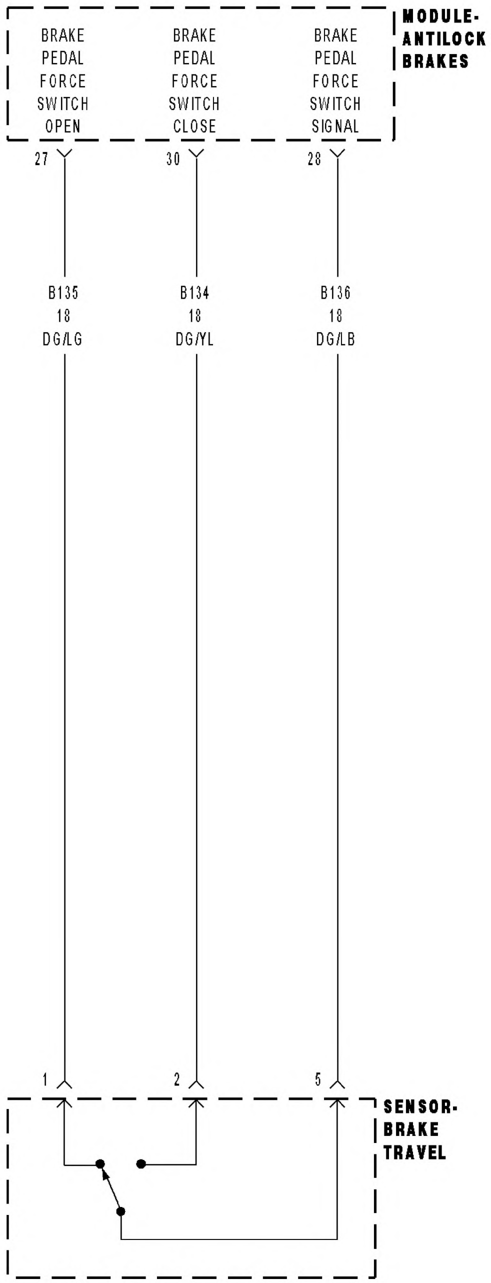


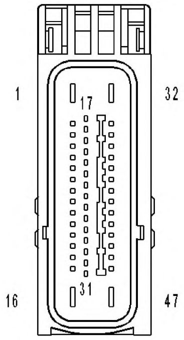
Does the voltage toggle from approximately 0 to 12 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

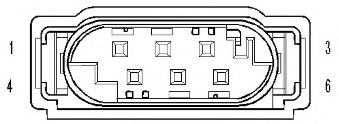
No >> Repair as needed.
Perform ABS VERIFICATION TEST - VER 1.

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT


MODULE-
ANTILOCK
BRAKES
BRAKE PEDAL FORCE SWITCH OPEN
BRAKE PEDAL FORCE SWITCH CLOSE
BRAKE PEDAL FORCE SWITCH SIGNAL
27
30
28
B135
18
DG/LG
B134
18
DG/YL
B136
18
DG/LB
1
2
5
SENSOR-
BRAKE
TRAVEL


1
32
17
31
16
47

**MODULE-
ANTILOCK BRAKES**



**SENSOR-
BRAKE
TRAVEL
(ESP/BSC)**

814DC9FE

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that the Brake Pedal Force Switch signals are invalid or not available.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
(B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
BRAKE TRAVEL SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C122A-BRAKE PEDAL FORCE SWITCH CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

CAUTION: Ensure brake capability is available before road testing.

Test drive vehicle above 24 k/mh (15 mph).

With the scan tool, read and record DTC's.

Does the scan tool display: C122A-BRAKE PEDAL FORCE SWITCH CIRCUIT?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

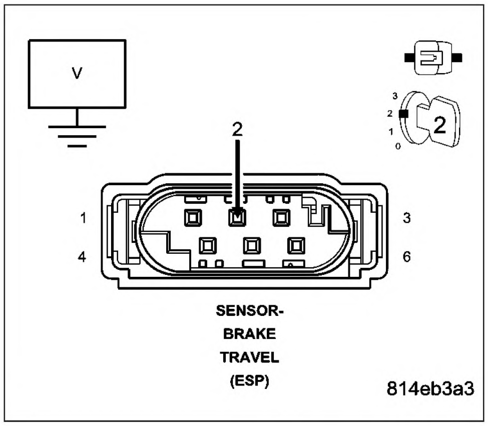
No >> Go To 3

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

3. CHECK THE VOLTAGE ON THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT

Turn the ignition on.

Measure the voltage of the (B134) Brake Pedal Force Switch Close circuit by back probing at the Brake Travel Sensor harness connector.


V
2
3
2
1
0
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3a3

Is the voltage approximately 6 volts?

Yes >> Go To 7

No >> Go To 4

---

4. CHECK THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT FOR A SHORT TO VOLTAGE

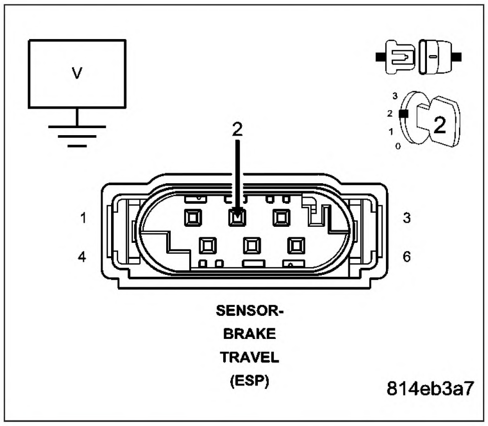
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Travel Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B134) Brake Pedal Force Switch Close circuit.


V
2
3
2
1
0
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3a7

Is there any voltage present?

Yes >> Repair the (B134) Brake Pedal Force Switch Close circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

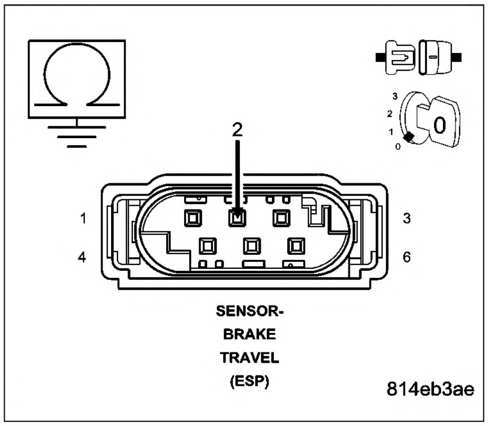
No >> Go To 5

---

5. CHECK THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B134) Brake Pedal Force Switch Close circuit.


Ω
2
3
2
1
0
0
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3ae

Is the resistance below 5.0 ohms?

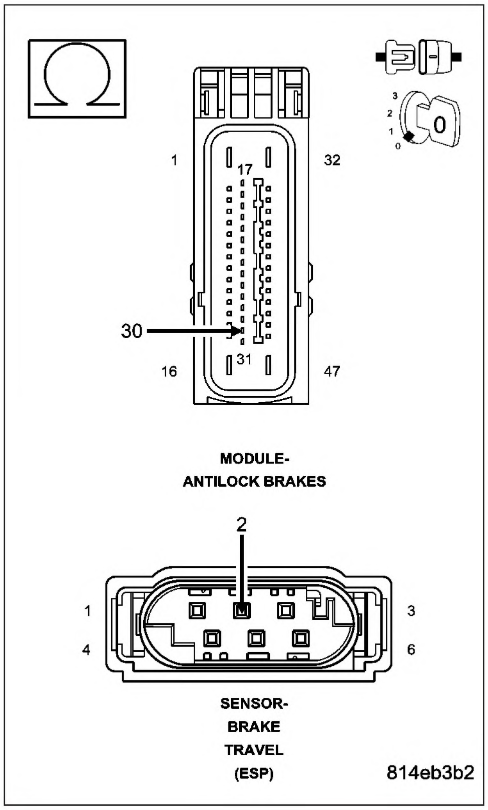
Yes >> Repair the (B134) Brake Pedal Force Switch Close circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

6. CHECK THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT FOR AN OPEN

Measure the resistance of the (B134) Brake Pedal Force Switch Close circuit.


Ω
3
2
1
0
0
1
17
32
30
31
16
47
MODULE-
ANTILOCK BRAKES
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3b2

Is the resistance below 5.0 ohms?

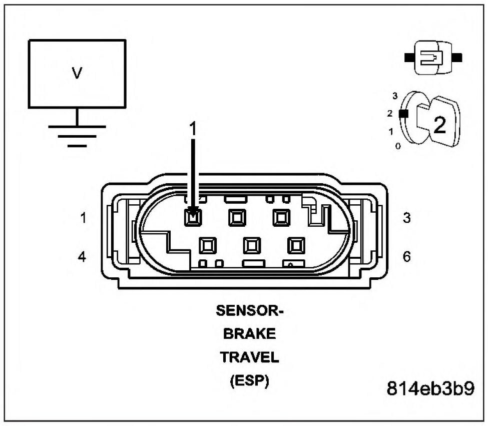
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B134) Brake Pedal Force Switch Close circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

7. CHECK THE VOLTAGE ON THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT

Measure the voltage of the (B135) Brake Pedal Force Switch Open circuit by back probing at the Brake Travel Sensor harness connector.


V
3
2
1
0
2
1
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3b9

Is the voltage approximately 12 volts?

Yes >> Go To 11

No >> Go To 8

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

8. CHECK THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT FOR A SHORT TO VOLTAGE

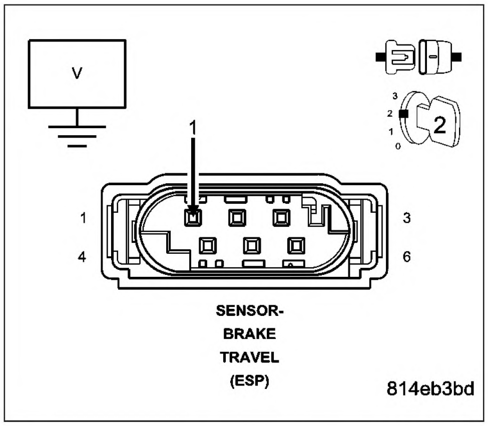
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Travel Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B135) Brake Pedal Force Switch Open circuit.



Is there any voltage present?

Yes >> Repair the (B135) Brake Pedal Force Switch Open circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

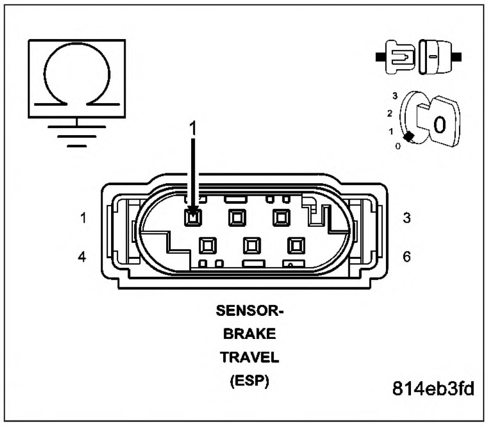
No >> Go To 9

---

9. CHECK THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B135) Brake Pedal Force Switch Open circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (B135) Brake Pedal Force Switch Open circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 10

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

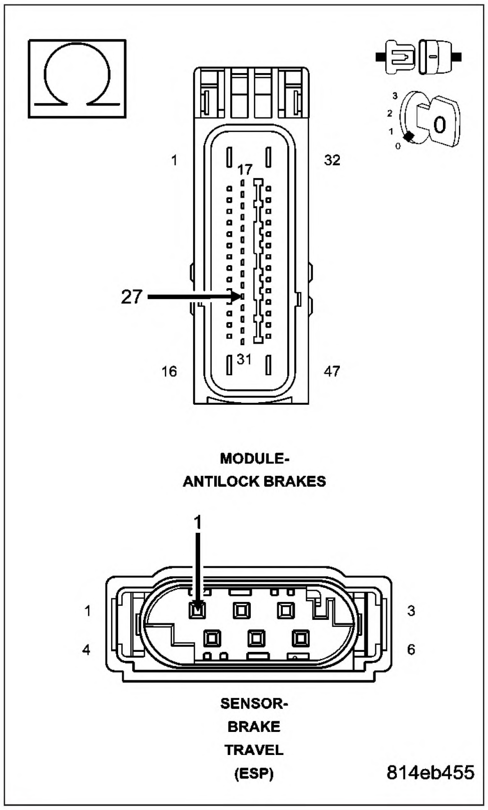
10. CHECK THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT FOR AN OPEN

Measure the resistance of the (B135) Brake Pedal Force Switch Open circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B135) Brake Pedal Force Switch Open circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.



0
3
2
1
0
1
17
32
27
31
16
47
MODULE-
ANTILOCK BRAKES
1
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb455

---

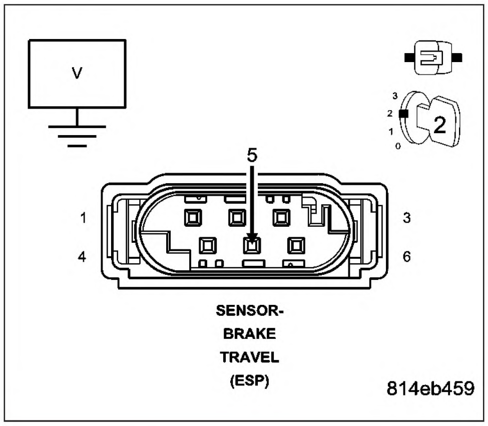
11. CHECK THE VOLTAGE ON THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT

Measure the voltage of the (B136) Brake Pedal Force Switch Signal circuit by back probing at the Brake Travel Sensor harness connector.

Is the voltage approximately 6 volts?

Yes >> Go To 15

No >> Go To 12



V
3
2
1
0
2
5
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb459

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

12. CHECK THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

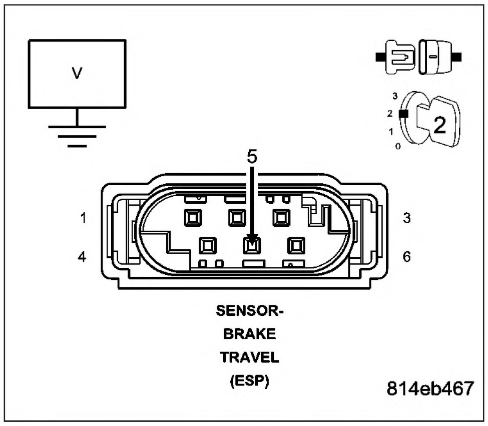
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Travel Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B136) Brake Pedal Force Switch Signal circuit.



Is there any voltage present?

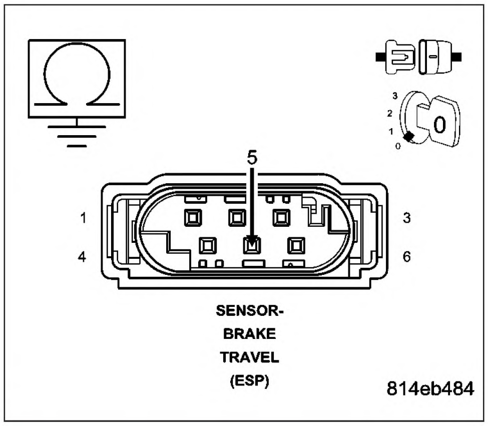
Yes >> Repair the (B136) Brake Pedal Force Switch Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 13

13. CHECK THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B136) Brake Pedal Force Switch Signal circuit.



Is the resistance below 5.0 ohms?

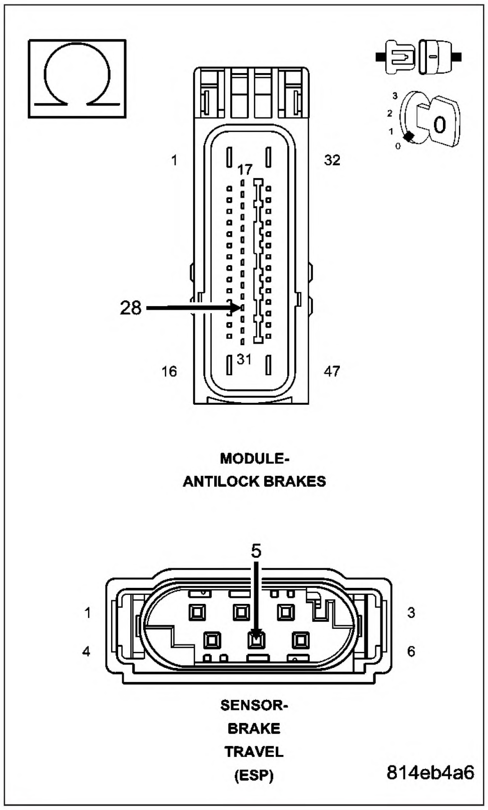
Yes >> Repair the (B136) Brake Pedal Force Switch Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 14

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

14. CHECK THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (B136) Brake Pedal Force Switch Signal circuit.


Ω
3
2
1
0
0
1
17
32
28
31
16
47
MODULE-
ANTILOCK BRAKES
5
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb4a6

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B136) Brake Pedal Force Switch Signal circuit for an open.
Perform ABS VERIFICATION TEST - VER 1
.

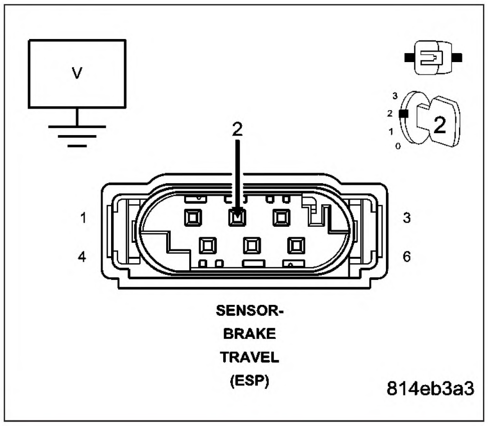
---

15. CHECK THE VOLTAGE ON THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT

Turn the ignition on.

Measure the voltage of the (B134) Brake Pedal Force Switch Close circuit by back probing at the Brake Travel Sensor harness connector.

Depress and hold the brake pedal.


V
3
2
1
0
2
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3a3

Is the voltage approximately 12 volts?

Yes >> Go To 16

No >> Replace the Brake Travel Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C122A-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT (CONTINUED)

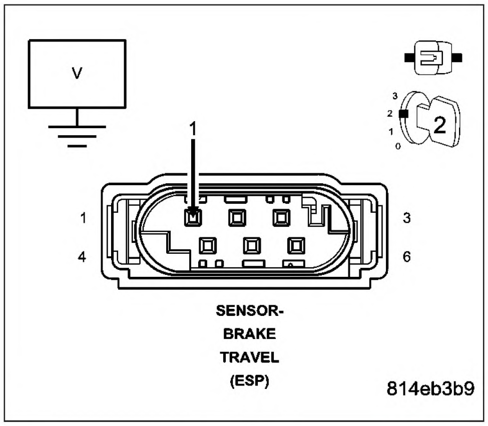
16. CHECK THE VOLTAGE ON THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT

Measure the voltage of the (B135) Brake Pedal Force Switch Open circuit by back probing at the Brake Travel Sensor harness connector. Depress and hold the brake pedal.

Is the voltage approximately 6 volts?

Yes >> Go To 17

No >> Replace the Brake Travel Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.



---

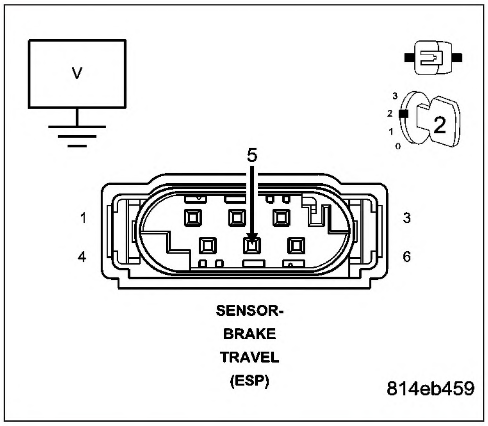
17. CHECK THE VOLTAGE ON THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT

Measure the voltage of the (B136) Brake Pedal Force Switch Signal circuit by back probing at the Brake Travel Sensor harness connector. Depress and hold the brake pedal.

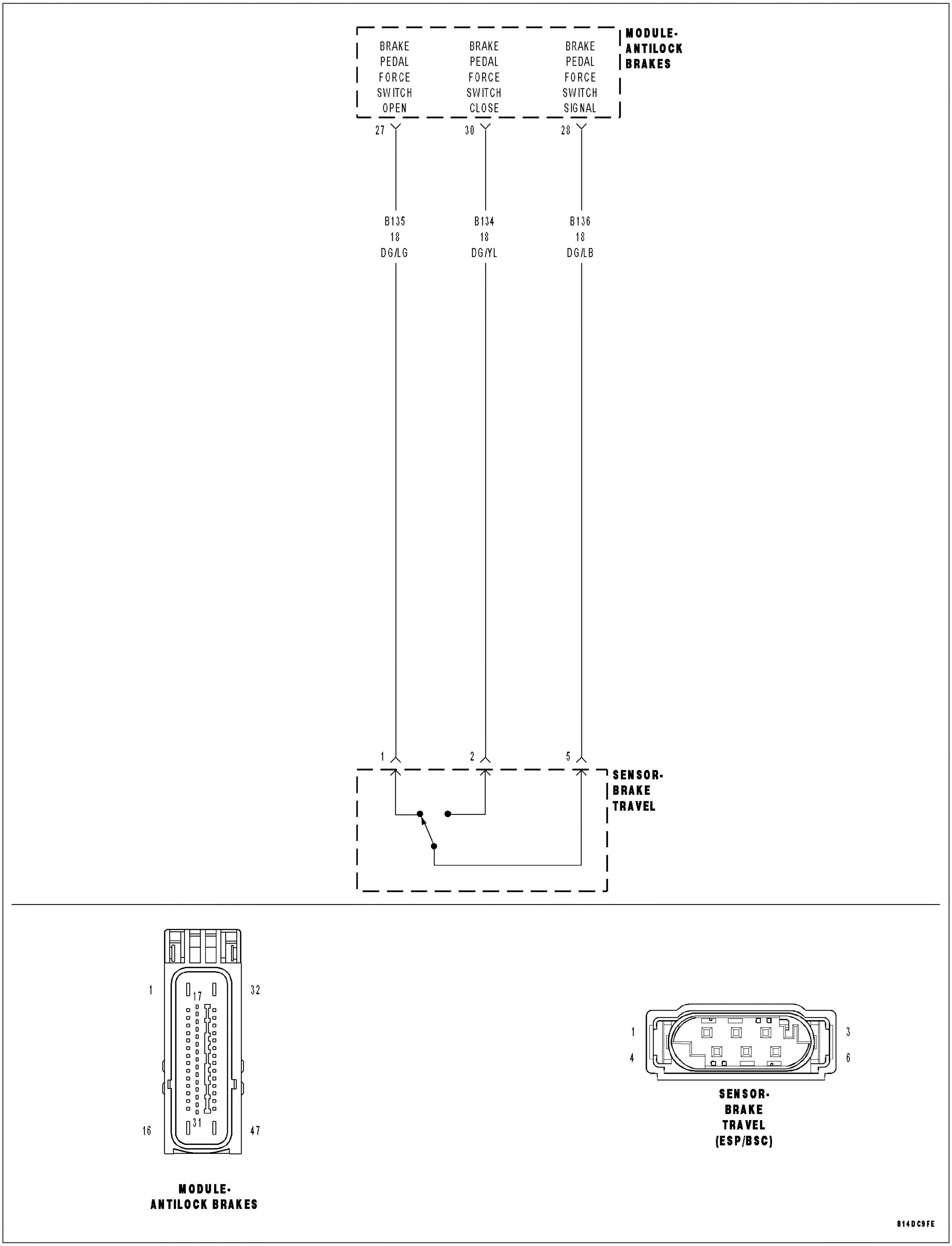
Is the voltage approximately 6 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace the Brake Travel Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.



C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE


MODULE-
ANTILOCK
BRAKES
BRAKE PEDAL FORCE SWITCH OPEN
BRAKE PEDAL FORCE SWITCH CLOSE
BRAKE PEDAL FORCE SWITCH SIGNAL
27
30
28
B135 18 DG/LG
B134 18 DG/YL
B136 18 DG/LB
1
2
5
SENSOR-
BRAKE
TRAVEL
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP/BSC)
814DC9FE

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that the Brake Pedal Force Switch signals are implausible.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
(B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
BRAKE TRAVEL SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C122B-BRAKE PEDAL FORCE SWITCH CIRCUIT PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC’s.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC’s.

CAUTION: Ensure brake capability is available before road testing.

Test drive vehicle above 24 k/mh (15 mph).

With the scan tool, read and record DTC’s.

Does the scan tool display: C122B-BRAKE PEDAL FORCE SWITCH CIRCUIT PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

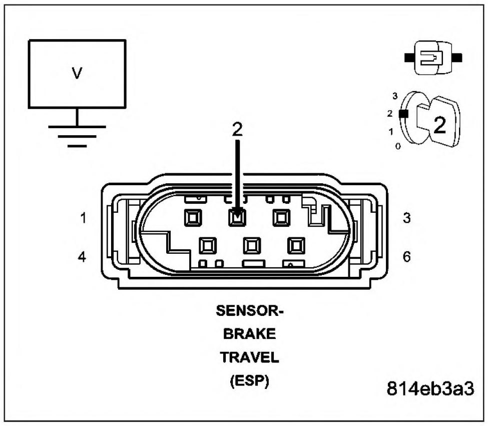
No >> Go To 3

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

3. CHECK THE VOLTAGE ON THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT

Turn the ignition on.

Measure the voltage of the (B134) Brake Pedal Force Switch Close circuit by back probing at the Brake Travel Sensor harness connector.


V
3
2
1
0
2
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3a3

Is the voltage approximately 6 volts?

Yes >> Go To 7

No >> Go To 4

---

4. CHECK THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT FOR A SHORT TO VOLTAGE

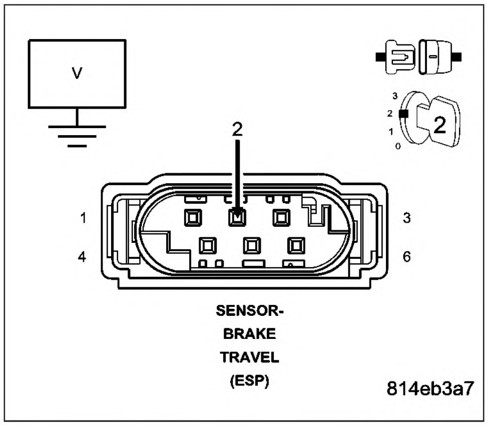
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Travel Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B134) Brake Pedal Force Switch Close circuit.


V
3
2
1
0
2
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3a7

Is there any voltage present?

Yes >> Repair the (B134) Brake Pedal Force Switch Close circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

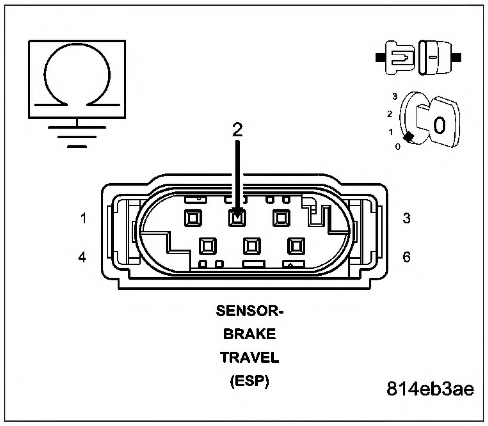
No >> Go To 5

---

5. CHECK THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B134) Brake Pedal Force Switch Close circuit.


Ω
3
2
1
0
0
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3ae

Is the resistance below 5.0 ohms?

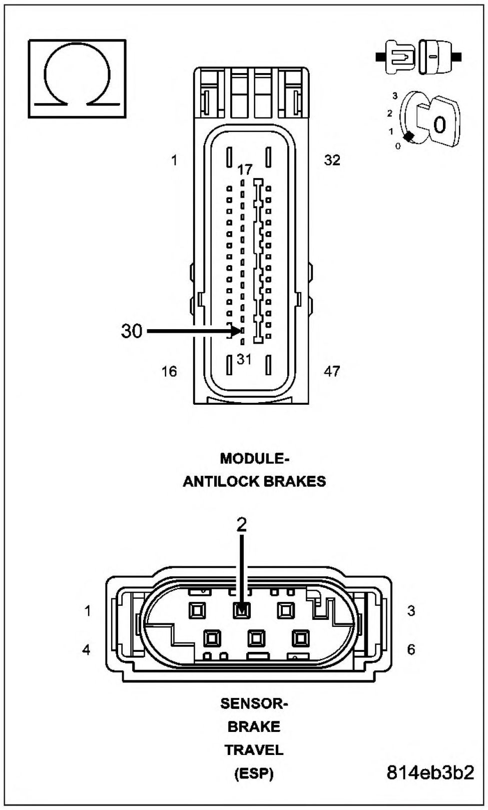
Yes >> Repair the (B134) Brake Pedal Force Switch Close circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

6. CHECK THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT FOR AN OPEN

Measure the resistance of the (B134) Brake Pedal Force Switch Close circuit.


Ω
3
2
1
0
0
1
17
32
30
31
16
47
MODULE-
ANTILOCK BRAKES
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3b2

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

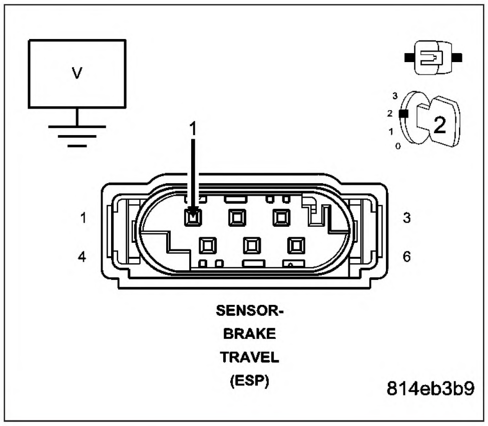
No >> Repair the (B134) Brake Pedal Force Switch Close circuit for an open.

Perform ABS VERIFICATION TEST - VER 1.

---

7. CHECK THE VOLTAGE ON THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT

Measure the voltage of the (B135) Brake Pedal Force Switch Open circuit by back probing at the Brake Travel Sensor harness connector.


V
3
2
1
0
2
1
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3b9

Is the voltage approximately 12 volts?

Yes >> Go To 11

No >> Go To 8

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

8. CHECK THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT FOR A SHORT TO VOLTAGE

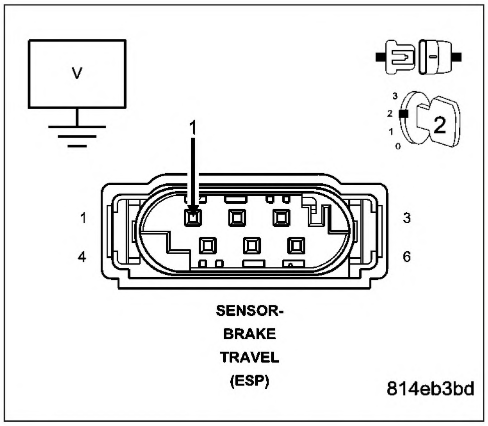
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Travel Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B135) Brake Pedal Force Switch Open circuit.



Is there any voltage present?

Yes >> Repair the (B135) Brake Pedal Force Switch Open circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

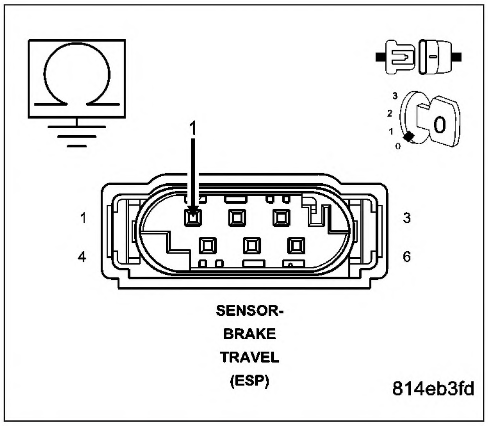
No >> Go To 9

---

9. CHECK THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B135) Brake Pedal Force Switch Open circuit.



Is the resistance below 5.0 ohms?

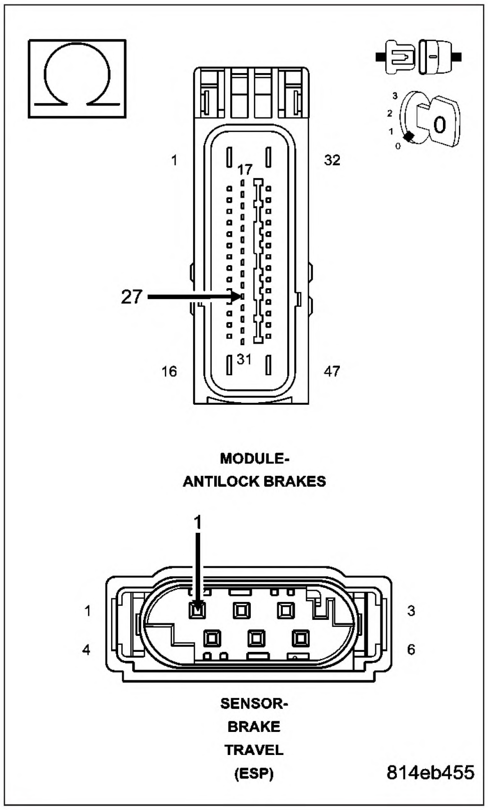
Yes >> Repair the (B135) Brake Pedal Force Switch Open circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 10

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

10. CHECK THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT FOR AN OPEN

Measure the resistance of the (B135) Brake Pedal Force Switch Open circuit.



Ω
3
2
1
0
0
1
17
32
27
31
16
47
MODULE-
ANTILOCK BRAKES
1
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb455

Is the resistance below 5.0 ohms?

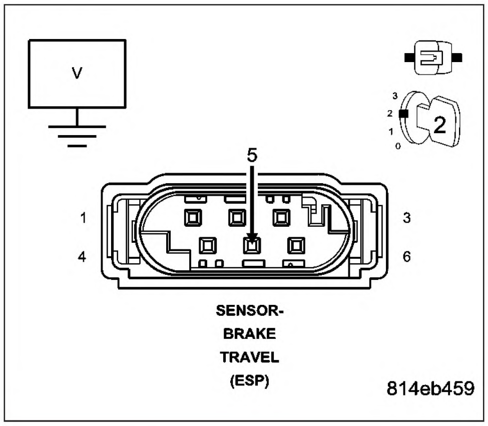
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B135) Brake Pedal Force Switch Open circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

11. CHECK THE VOLTAGE ON THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT

Measure the voltage of the (B136) Brake Pedal Force Switch Signal circuit by back probing at the Brake Travel Sensor harness connector.



V
3
2
1
0
2
5
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb459

Is the voltage approximately 6 volts?

Yes >> Go To 15

No >> Go To 12

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

12. CHECK THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

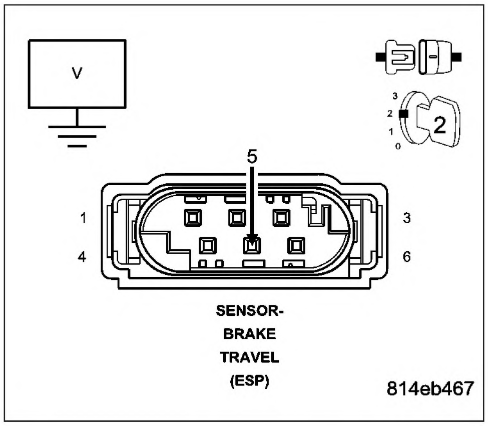
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Brake Travel Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B136) Brake Pedal Force Switch Signal circuit.



Is there any voltage present?

Yes >> Repair the (B136) Brake Pedal Force Switch Signal circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

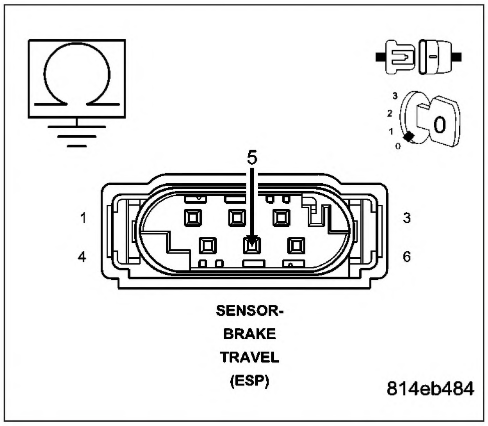
No >> Go To 13

---

13. CHECK THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (B136) Brake Pedal Force Switch Signal circuit.



Is the resistance below 5.0 ohms?

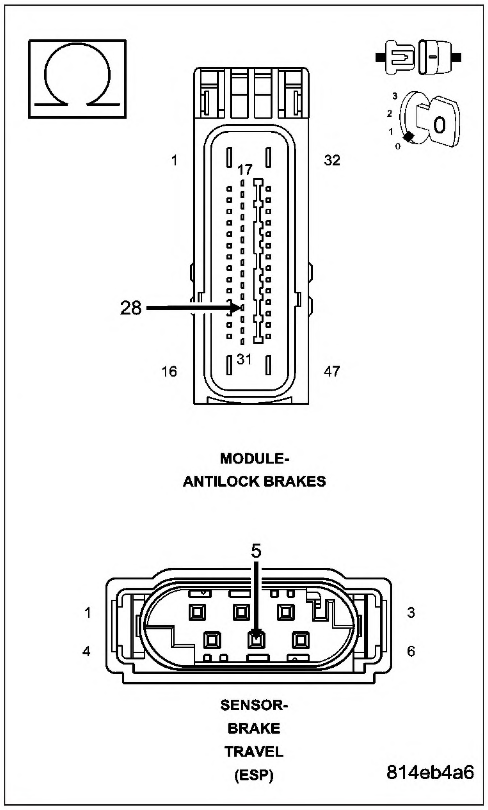
Yes >> Repair the (B136) Brake Pedal Force Switch Signal circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 14

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

14. CHECK THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (B136) Brake Pedal Force Switch Signal circuit.


1
17
32
28
31
16
47
MODULE-
ANTILOCK BRAKES
5
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb4a6

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B136) Brake Pedal Force Switch Signal circuit for an open.

Perform ABS VERIFICATION TEST - VER 1

.

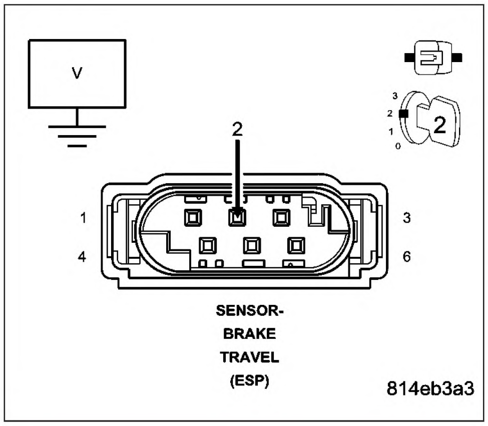
---

15. CHECK THE VOLTAGE ON THE (B134) BRAKE PEDAL FORCE SWITCH CLOSE CIRCUIT

Turn the ignition on.

Measure the voltage of the (B134) Brake Pedal Force Switch Close circuit by back probing at the Brake Travel Sensor harness connector.

Depress and hold the brake pedal.


V
2
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb3a3

Is the voltage approximately 12 volts?

Yes >> Go To 16

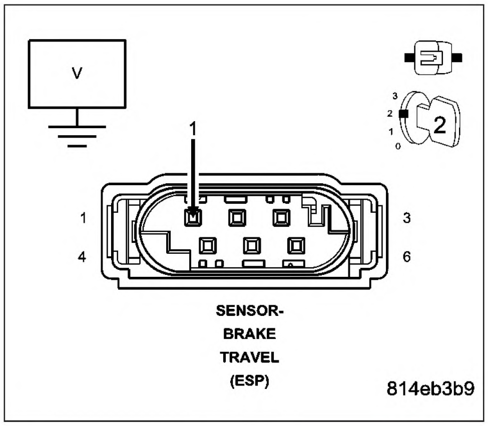
No >> Replace the Brake Travel Sensor in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

C122B-BRAKE BOOSTER PEDAL FORCE SWITCH CIRCUIT PERFORMANCE (CONTINUED)

16. CHECK THE VOLTAGE ON THE (B135) BRAKE PEDAL FORCE SWITCH OPEN CIRCUIT

Measure the voltage of the (B135) Brake Pedal Force Switch Open circuit by back probing at the Brake Travel Sensor harness connector. Depress and hold the brake pedal.



Is the voltage approximately 6 volts?

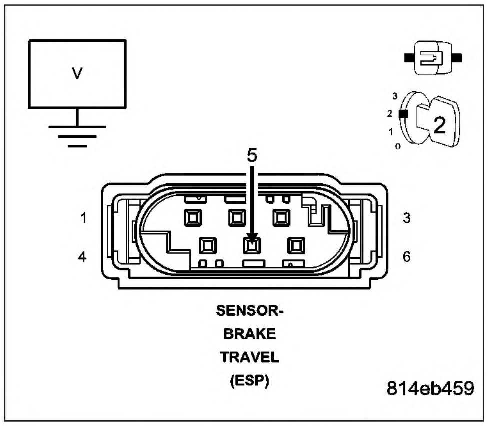
Yes >> Go To 17

No >> Replace the Brake Travel Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

---

17. CHECK THE VOLTAGE ON THE (B136) BRAKE PEDAL FORCE SWITCH SIGNAL CIRCUIT

Measure the voltage of the (B136) Brake Pedal Force Switch Signal circuit by back probing at the Brake Travel Sensor harness connector. Depress and hold the brake pedal.

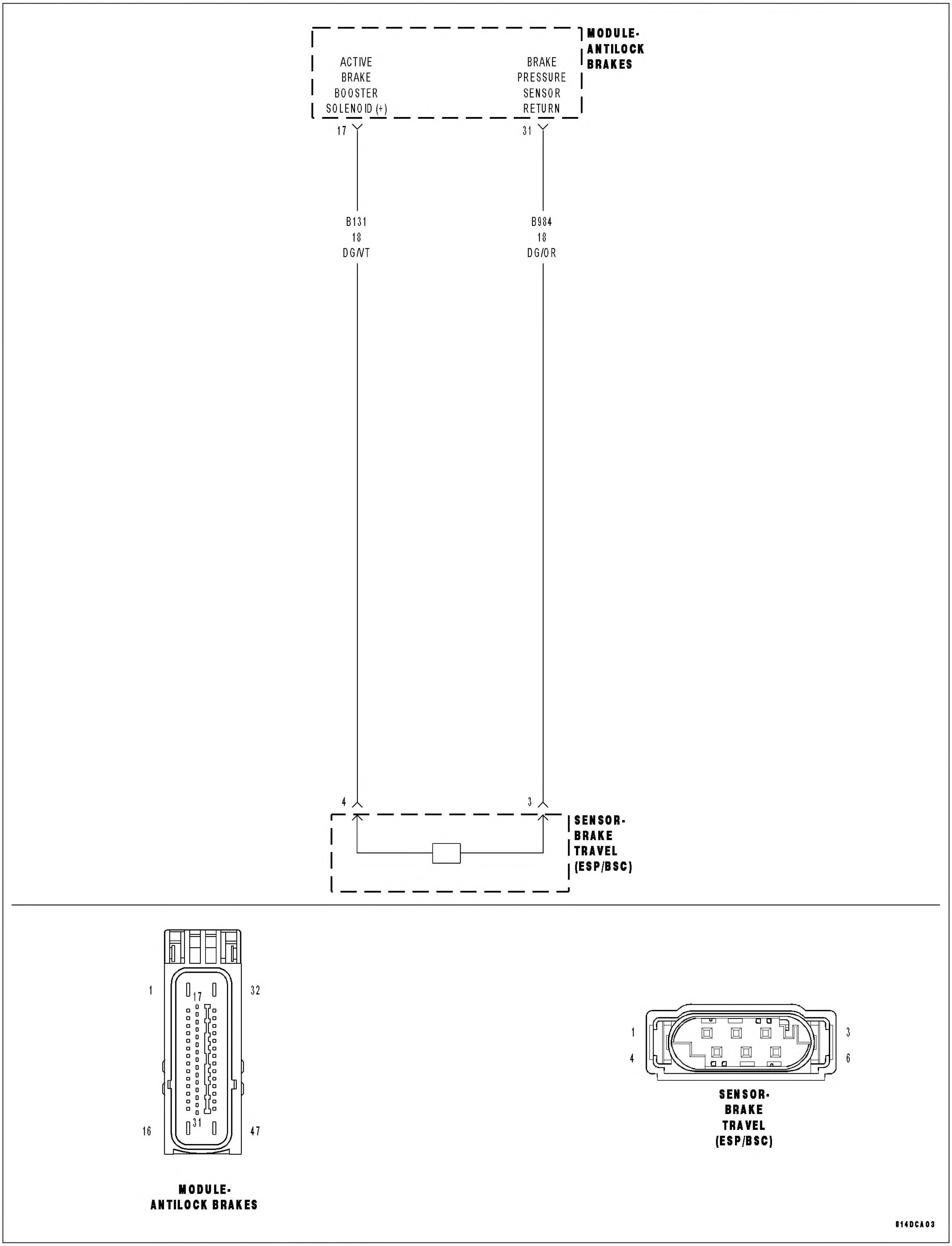


Is the voltage approximately 6 volts?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace the Brake Travel Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C122C-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT SUPPLY VOLTAGE


MODULE-
ANTILOCK
BRAKES
ACTIVE
BRAKE
BOOSTER
SOLENOID (+)
BRAKE
PRESSURE
SENSOR
RETURN
17
31
B131
18
DG/VT
B984
18
DG/OR
4
3
SENSOR-
BRAKE
TRAVEL
(ESP/BSC)
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP/BSC)
814DCA03

C122C-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT SUPPLY VOLTAGE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the Active Brake Booster circuit fails the diagnostic test.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
(B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT SHORTED TO (B984) BRAKE PRESSURE SENSOR RETURN CIRCUIT
(B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT SHORTED TO GROUND, VOLTAGE, OR OPEN
BRAKE TRAVEL SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C122C-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT SUPPLY VOLTAGE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTCs

Does the scan tool display: C122C-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT SUPPLY VOLTAGE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.

Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

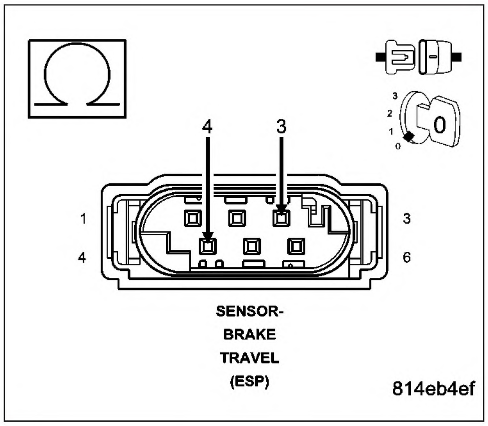
C122C-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT SUPPLY VOLTAGE (CONTINUED)

3. CHECK THE RESISTANCE OF THE ACTIVE BRAKE BOOSTER SOLENOID

Turn the ignition off.

Disconnect the Brake Travel Sensor harness connector.

Measure the resistance between the (B131) Active Brake Booster Solenoid (+) circuit and the (B984) Brake Pressure Sensor Return circuit terminals of the Brake Travel Sensor.



Is the resistance between 1 to 2 ohms?

Yes >> Go To 4

No >> Replace the Brake Travel Sensor in accordance with the Service information.

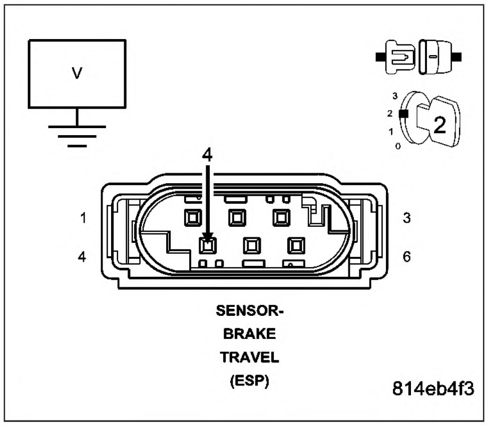
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK THE VOLTAGE ON THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT

Turn the ignition on.

Measure the voltage of the (B131) Active Brake Booster Solenoid (+) circuit in the Brake Travel Sensor harness connector.



Is the voltage above 10 volts?

Yes >> Go To 9

No >> Go To 5

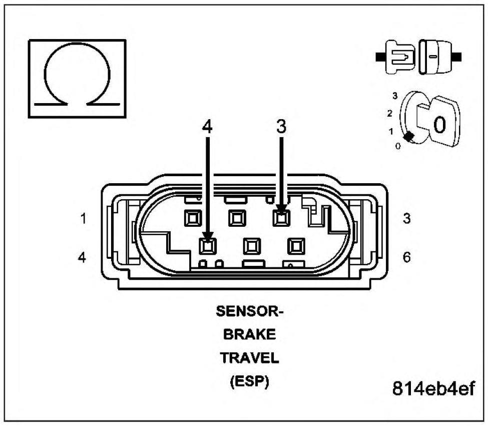
---

5. CHECK FOR A SHORT BETWEEN THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) AND (B984) BRAKE PRESSURE SENSOR RETURN CIRCUITS

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (B131) Active Brake Booster Solenoid (+) circuit and the (B984) Brake Pressure Sensor Return circuit.



Is the resistance below 150 ohms?

Yes >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for a short to the (B984) Brake Pressure Sensor Return circuit.

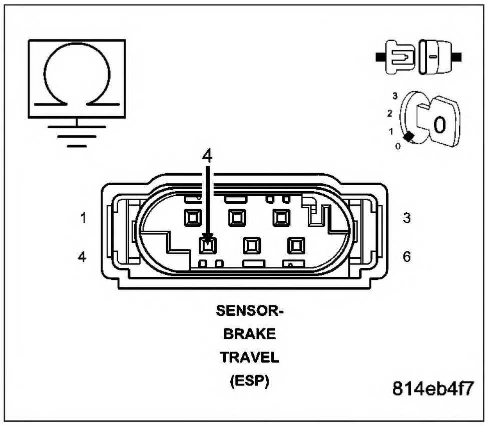
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

C122C-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT SUPPLY VOLTAGE (CONTINUED)

6. CHECK THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (B131) Active Brake Booster Solenoid (+) circuit.


Ω
3
2
1
0
0
4
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb4f7

Is the resistance below 5.0 ohms?

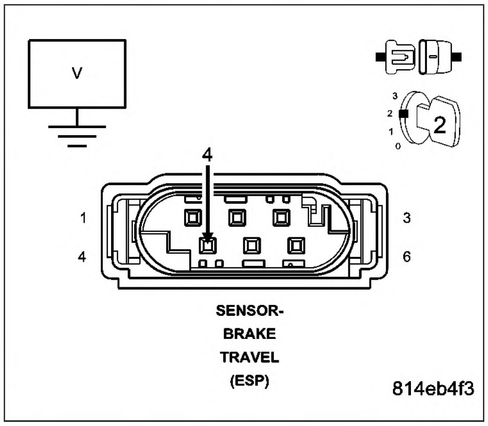
Yes >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

7. CHECK THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B131) Active Brake Booster Solenoid (+) circuit.


V
3
2
1
0
2
4
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb4f3

Is there any voltage present?

Yes >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 8

C122C-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT SUPPLY VOLTAGE (CONTINUED)

8. CHECK THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT FOR AN OPEN

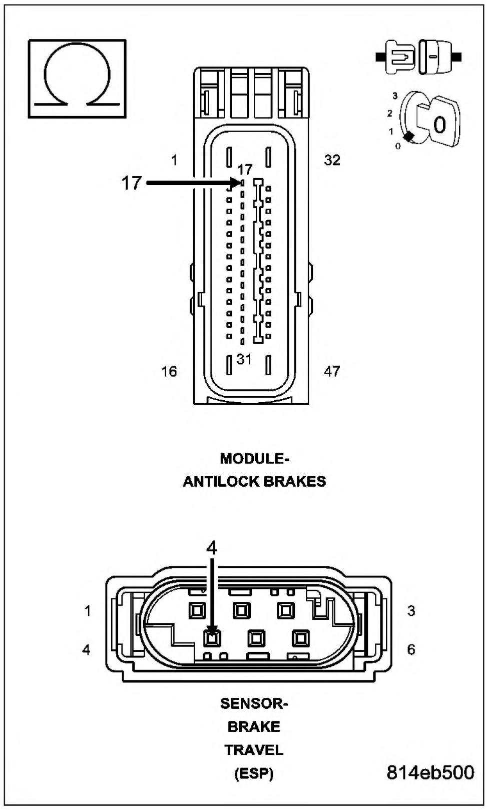
Turn the ignition off.

Measure the resistance of the (B131) Active Brake Booster Solenoid (+) circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.



---

9. CHECK THE ACTIVE BRAKE BOOSTER SOLENOID ACTUATION

Turn the ignition off.

Connect the Brake Travel Sensor harness connector.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Connect a jumper wire between the (B984) Brake Pressure Sensor Return circuit at the Anti-Lock Brake Module harness connector and ground.

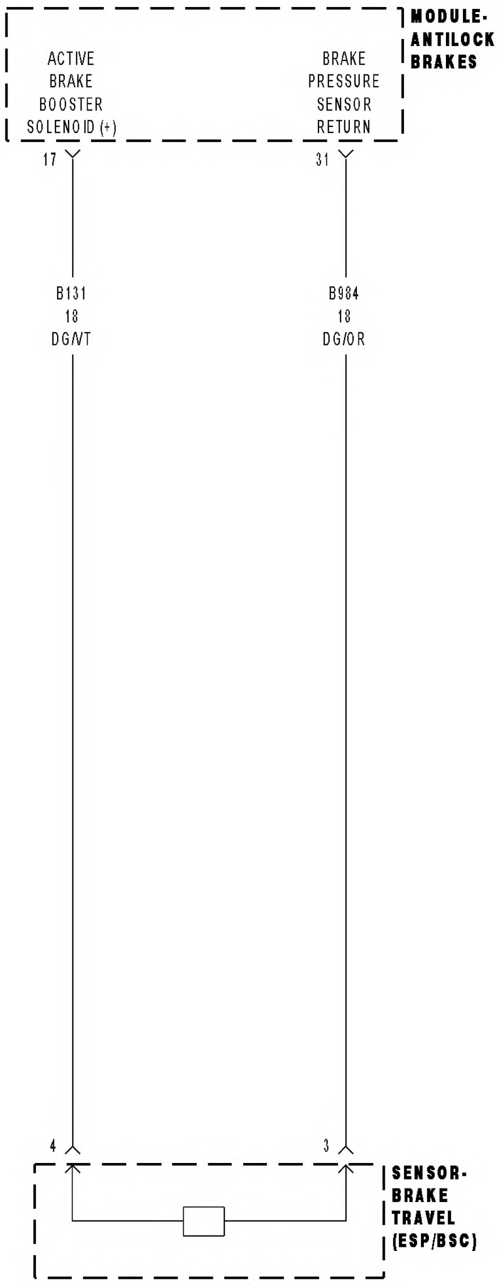
Connect a jumper wire for several seconds between the (B131) Active Brake Booster Solenoid (+) circuit at the Anti-Lock Brake Module harness connector and a fused 12 volt supply.

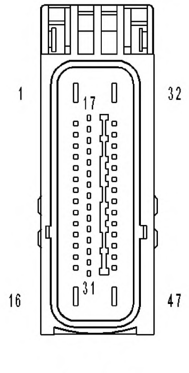
Is there brake application when the (B131) Active Brake Booster Solenoid (+) circuit is jumped to a 12 volt supply and the (B984) Brake Pressure Sensor Return jumped to ground?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

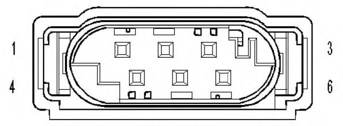
No >> Replace the Brake Travel Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C122D-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT


MODULE-
ANTILOCK
BRAKES
ACTIVE
BRAKE
BOOSTER
SOLENOID (+)
BRAKE
PRESSURE
SENSOR
RETURN
17
31
B131
18
DG/VT
B984
18
DG/OR
4
3
SENSOR-
BRAKE
TRAVEL
(ESP/BSC)


1
32
17
31
16
47

MODULE-
ANTILOCK BRAKES



SENSOR-
BRAKE
TRAVEL
(ESP/BSC)

814DCA03

C122D-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the Active Brake Booster circuit fails the diagnostic test.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
(B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT AND (B132) ACTIVE BRAKE BOOSTER SOLENOID (-) CIRCUIT SHORTED TO TOGETHER
(B132) ACTIVE BRAKE BOOSTER SOLENOID (-) CIRCUIT SHORTED TO GROUND, VOLTAGE, OR OPEN
BRAKE TRAVEL SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C122D-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTCs.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTCs.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTCs

Does the scan tool display: C122D-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.

Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C122D-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT (CONTINUED)

3. CHECK THE RESISTANCE OF THE ACTIVE BRAKE BOOSTER SOLENOID

Turn the ignition off.

Disconnect the Brake Travel Sensor harness connector.

Measure the resistance between the (B131) Active Brake Booster Solenoid (+) circuit and the (B984) Brake Pressure Sensor Return circuit terminals of the Brake Travel Sensor.

Is the resistance between 1 to 2 ohms?

Yes >> Go To 4

No >> Replace the Brake Travel Sensor in accordance with the Service information.
Perform ABS VERIFICATION TEST - VER 1.

---

4. CHECK FOR A SHORT BETWEEN THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) AND (B984) BRAKE PRESSURE SENSOR RETURN CIRCUITS

Turn the ignition off.

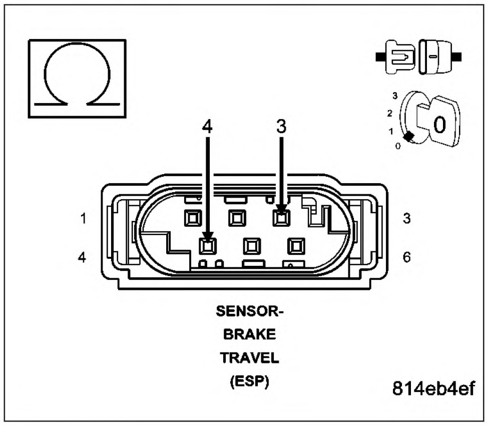
Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (B131) Active Brake Booster Solenoid (+) circuit and the (B984) Brake Pressure Sensor Return circuit.

Is the resistance below 150 ohms?

Yes >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for a short to the (B984) Brake Pressure Sensor Return circuit.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 5



---

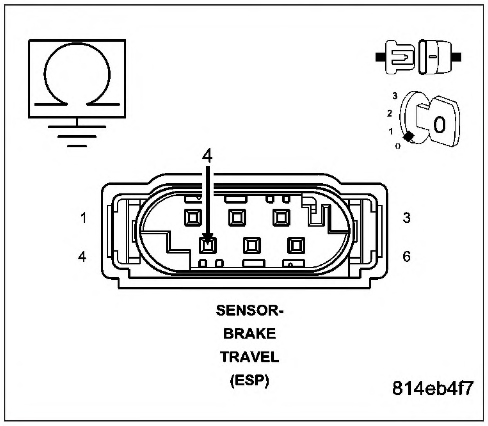
5. CHECK THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (B131) Active Brake Booster Solenoid (+) circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

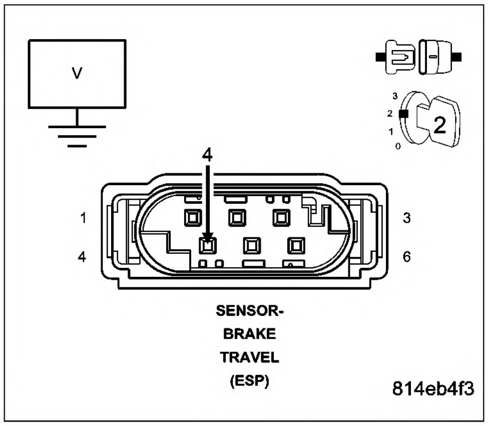


C122D-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT (CONTINUED)

6. CHECK THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B131) Active Brake Booster Solenoid (+) circuit.


V
3
2
1
0
2
4
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb4f3

Is there any voltage present?

Yes >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

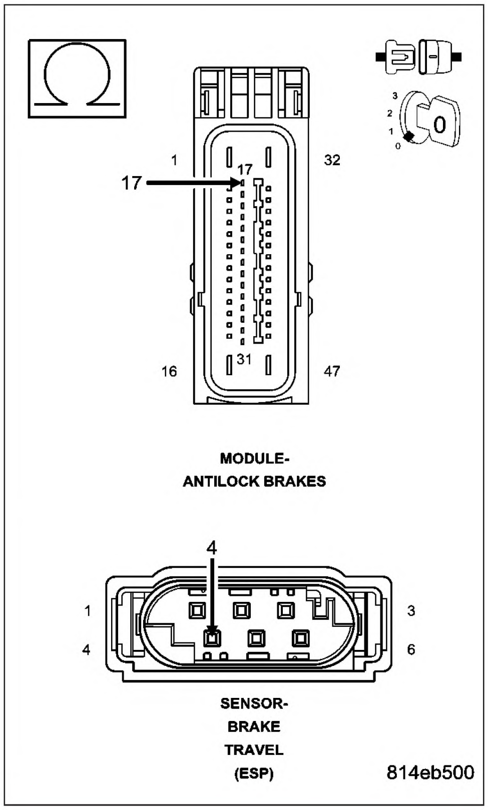
No >> Go To 7

---

7. CHECK THE (B131) ACTIVE BRAKE BOOSTER SOLENOID (+) CIRCUIT FOR AN OPEN

Turn the ignition off.

Measure the resistance of the (B131) Active Brake Booster Solenoid (+) circuit.


Ω
3
2
1
0
0
1
32
17
17
31
16
47
MODULE-
ANTILOCK BRAKES
4
1
3
4
6
SENSOR-
BRAKE
TRAVEL
(ESP)
814eb500

Is the resistance below 5.0 ohms?

Yes >> Go To 8

No >> Repair the (B131) Active Brake Booster Solenoid (+) circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C122D-ACTIVE BRAKE BOOSTER CONTROL CIRCUIT (CONTINUED)

8. CHECK THE ACTIVE BRAKE BOOSTER SOLENOID ACTUATION

Turn the ignition off.

Connect the Brake Travel Sensor harness connector.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Connect a jumper wire between the (B984) Brake Pressure Sensor Return circuit at the Anti-Lock Brake Module harness connector and ground.

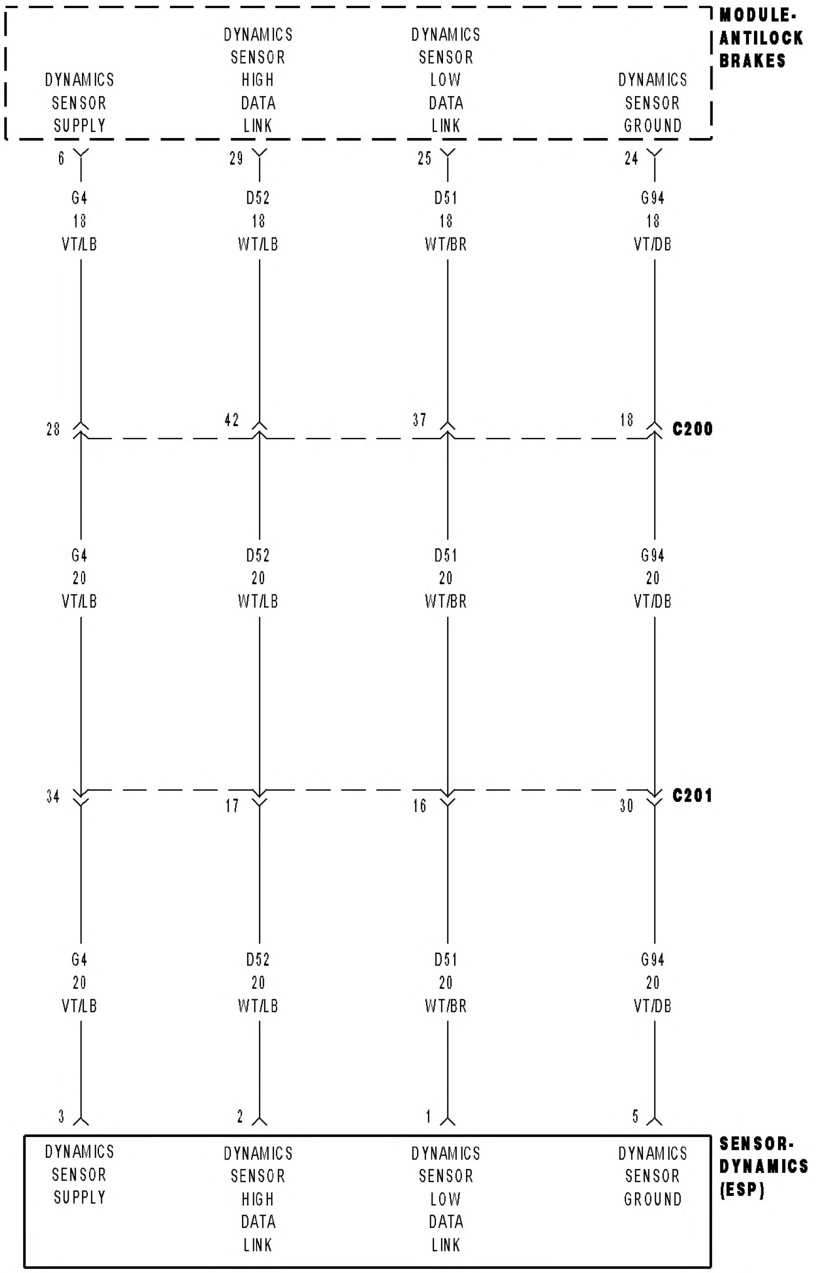
Connect a jumper wire for several seconds between the (B131) Active Brake Booster Solenoid (+) circuit at the Anti-Lock Brake Module harness connector and a fused 12 volt supply.

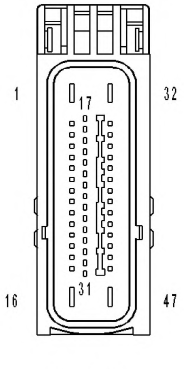
Is there brake application when the (B131) Active Brake Booster Solenoid (+) circuit is jumped to a 12 volt supply and the (B984) Brake Pressure Sensor Return jumped to ground?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

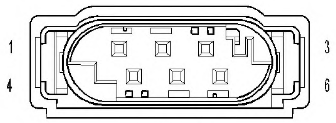
No >> Replace the Brake Travel Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C123A-ESP SYSTEM SENSORS CALIBRATION


MODULE-ANTILOCK BRAKES
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
6
29
25
24
G4 18 VT/LB
D52 18 WT/LB
D51 18 WT/BR
G94 18 VT/DB
28
42
37
18
C200
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
34
17
16
30
C201
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
3
2
1
5
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
SENSOR-DYNAMICS (ESP)


1
17
32
16
31
47

MODULE-ANTILOCK BRAKES



SENSOR-DYNAMICS (ESP)

814DCA07

C123A-ESP SYSTEM SENSORS CALIBRATION (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the Dynamics Sensor stored calibration values are invalid.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
DYNAMICS SENSOR
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C123A-ESP SYSTEM SENSORS CALIBRATION

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.
With the scan tool, read and record DTC’s.
With the scan tool, read and record Freeze Fame information.
With the scan tool, erase DTC’s.
Cycle the ignition switch from off to on.
With the scan tool, read and record DTC’s

Does the scan tool display: C123A-ESP SYSTEM SENSORS CALIBRATION?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.
Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C123A-ESP SYSTEM SENSORS CALIBRATION (CONTINUED)

3. CHECK THE DYNAMICS SENSOR OUTPUT

CAUTION: Ensure brake capability is available before road testing.

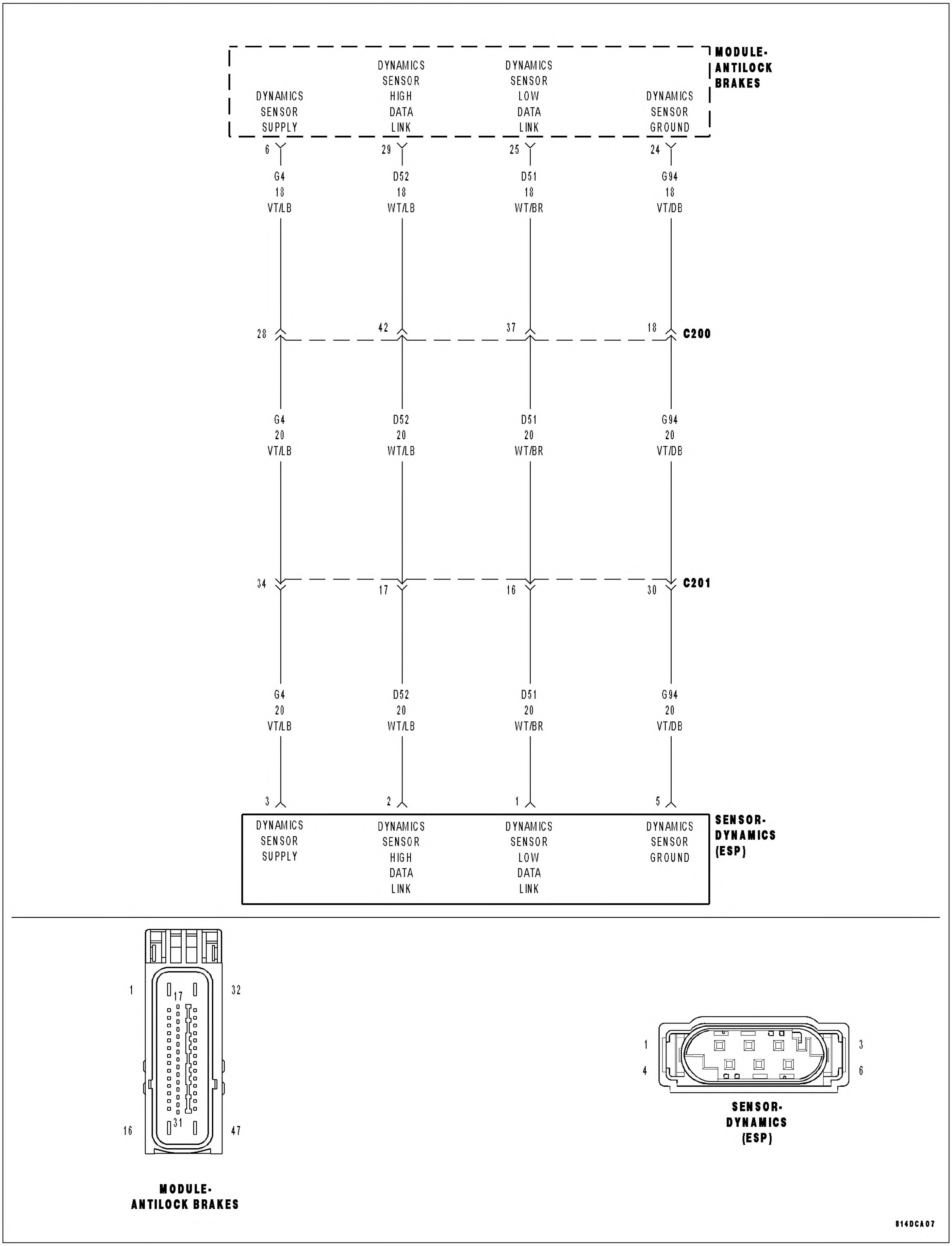
Have an assistant test drive the vehicle while monitoring the Dynamics Sensor operation.

Was the Lateral Sensor output between 0.02 G to 0.16 G and the Yaw Sensor between 1.30° to 5.70°?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace the Dynamics Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C123B-ESP SYSTEM CONTROL TOO LONG


MODULE-ANTILOCK BRAKES
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
6
29
25
24
G4 18 VT/LB
D52 18 WT/LB
D51 18 WT/BR
G94 18 VT/DB
28
42
37
18
C200
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
34
17
16
30
C201
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
3
2
1
5
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
SENSOR-DYNAMICS (ESP)
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
3
4
6
SENSOR-DYNAMICS (ESP)
814DCA07

C123B-ESP SYSTEM CONTROL TOO LONG (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates Dynamics Sensor failure.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
DYNAMICS SENSOR

Diagnostic Test

1. CHECK FOR A DTC C123B-ESP SYSTEM CONTROL TOO LONG

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.
With the scan tool, read and record DTC’s.
With the scan tool, read and record Freeze Fame information.
With the scan tool, erase DTC’s.
Cycle the ignition switch from off to on.
With the scan tool, read and record DTC’s

Does the scan tool display: C123B-ESP SYSTEM CONTROL TOO LONG?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.
Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace the Dynamics Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C1242-GSENSOR INPUT SIGNAL PERFORMANCE

- **When Monitored:**
  Continuously after power-on reset until vehicle speed exceeds 12.4mph/20 kph for the first time, but not not if the sensor voltage is out of range,
  Or, during diagnostic mode.
  Or, if the monitoring was inhaibited by a corresponding diagnostics command.
  Or, if the wehicle speed has exceeded 12.4 mph/20 kph during the actual ignition cycle.
  Or, if at least one overspinning wheel is detected.
  Or, if one of the control functions is active.
- **Set Condition:**
  A failure is detected if the measured acceleratin signal is higher than 0.8 g longer than the specified detection time.

Possible Causes
DEFECTIVE SENSOR

Diagnostic Test

1. Module failure

NOTE: The Sensor Cluster is the same as the Dynamics sensor.
The G-sensor is in the ABM if it is TCS only, or in the Sensor Cluster if it has ESP.

Repair.

Repair

Replace the ABM if it is TCS only, or replace the Sensor Cluster if it has ESP.

C1243-G SENSOR NOT INTIALIZED

- **When Monitored:**
  Continuously after power-on reset until vehicle speed exceeds 12.4mph/20 kph for the first time, but not not if the sensor voltage is out of range,
  Or, during diagnostic mode.
  Or, if the monitoring was inhaibited by a corresponding diagnostics command.
  Or, if the wehicle speed has exceeded 12.4 mph/20 kph during the actual ignition cycle.
  Or, if at least one overspinning wheel is detected.
  Or, if one of the control functions is active.
- **Set Condition:**
  A failure is detected if the measured acceleratin signal is higher than 0.8 g longer than the specified detection time.

Possible Causes
DEFECTIVE SENSOR

Diagnostic Test

1. Module failure

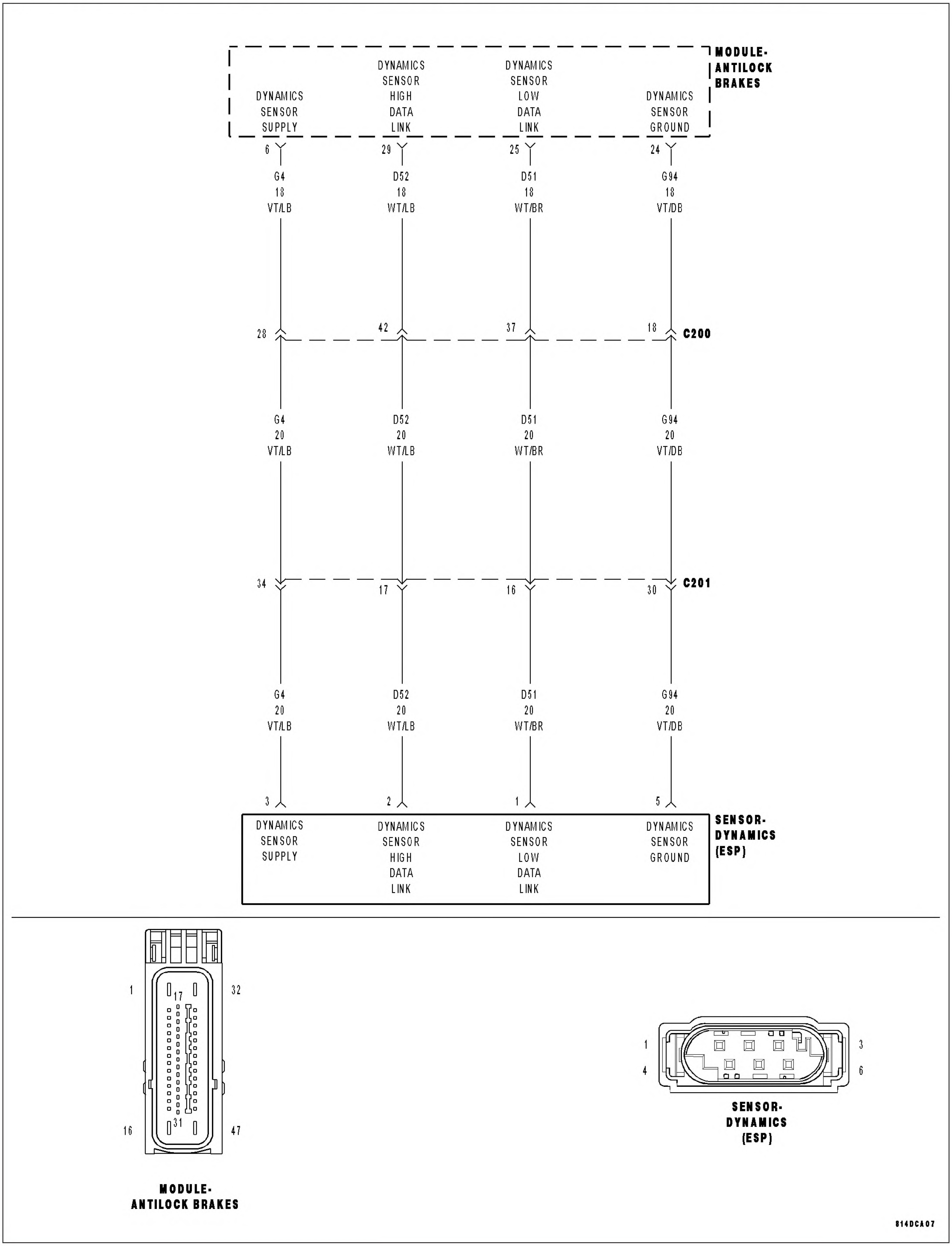
NOTE: The Sensor Cluster is the same as the Dynamics sensor.

The G-sensor is in the ABM if it is TCS only, or in the Sensor Cluster if it has ESP.

Repair

Replace the ABM if it is TCS only, or replace the Sensor Cluster if it has ESP.

C123C-SENSOR CLUSTER MOUNTING/INSTALLATION PERFORMANCE


MODULE-ANTILOCK BRAKES
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
6
29
25
24
G4 18 VT/LB
D52 18 WT/LB
D51 18 WT/BR
G94 18 VT/DB
28
42
37
18
C200
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
34
17
16
30
C201
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
3
2
1
5
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
SENSOR-DYNAMICS (ESP)
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
3
4
6
SENSOR-DYNAMICS (ESP)
814DCA07

C123C-SENSOR CLUSTER MOUNTING/INSTALLATION PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the Sensor Cluster values are invalid.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
IMPROPERLY INSTALLED SENSOR CLUSTER
(G94) SENSOR CLUSTER GROUND CIRCUIT OPEN
SENSOR CLUSTER

Diagnostic Test

1. CHECK FOR A DTC C123C-SENSOR CLUSTER MOUNTING/INSTALLATION PERFORMANCE

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC's

Does the scan tool display: C123C-SENSOR CLUSTER MOUNTING/INSTALLATION PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.

Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C123C-SENSOR CLUSTER MOUNTING/INSTALLATION PERFORMANCE (CONTINUED)

3. CHECK THE DYNAMICS SENSOR INSTALLATION

NOTE: Sensor Cluster installation and mounting bolt torque is crucial for proper operation.

Check the Sensor Cluster for damaged, modified or bent mounting bracket.

Check the Sensor Cluster mounting bolts for loose or over tightened mounting bolts.

Were any problems found?

Yes >> Repair as needed.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK THE RESISTANCE BETWEEN THE (G94) DYNAMICS SENSOR GROUND CIRCUIT AND GROUND

Turn the ignition off.

Disconnect the Sensor Cluster harness connector.

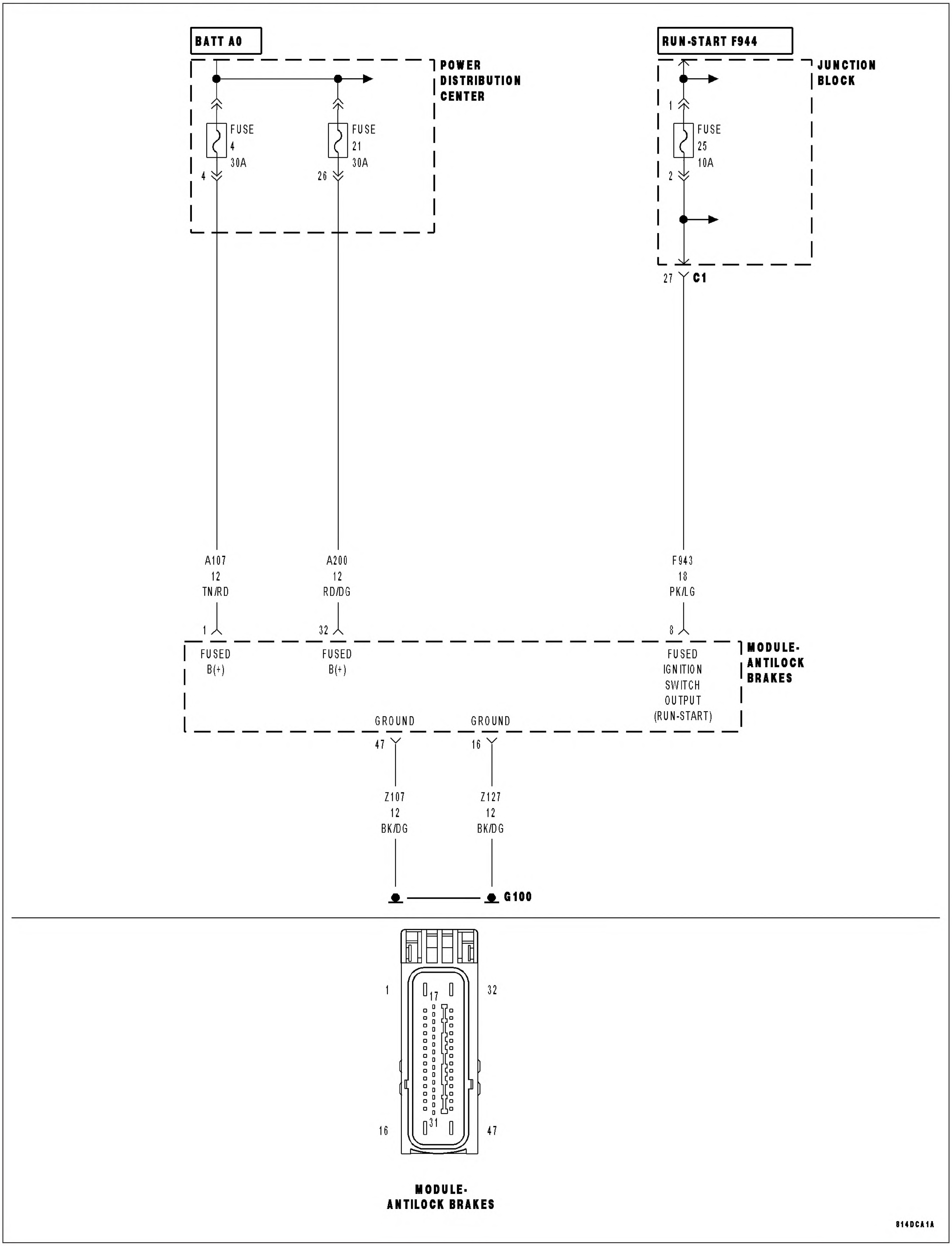
Measure the resistance between the (G94) Sensor Cluster Ground circuit and ground.

Is the resistance below 5.0 ohm?

Yes >> Replace the Sensor Cluster in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (G94) Sensor Cluster Ground circuit for an open circuit.
Perform ABS VERIFICATION TEST - VER 1.

C2100-BATTERY VOLTAGE LOW


BATT A0
RUN-START F944
POWER DISTRIBUTION CENTER
JUNCTION BLOCK
FUSE 4 30A
FUSE 21 30A
FUSE 25 10A
4
26
1
2
27
C1
A107 12 TN/RD
A200 12 RD/DG
F943 18 PK/LG
1
32
8
FUSED B(+)
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-ANTILOCK BRAKES
GROUND
GROUND
47
16
Z107 12 BK/DG
Z127 12 BK/DG
G100
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
814DCA1A

C2100-BATTERY VOLTAGE LOW (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that voltage is below 7.5 volts.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
STARTING AND CHARGING CONDITION
FUSED B(+) CIRCUIT(S) OPEN OR HIGH RESISTANCE
GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A C2100-BATTERY VOLTAGE LOW

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Cycle the ignition from off to on.

With the scan tool, read and record DTC's.

Does the scan tool display: C2100-BATTERY VOLTAGE LOW?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C2100-BATTERY VOLTAGE LOW (CONTINUED)

3. CHECK THE BATTERY AND CHARGING SYSTEM

Turn the ignition off.

Perform a battery and charging system test.

NOTE: Refer to the Service Information for related test(s)/symptom(s).

Does the battery and charging system pass?

Yes >> Go To 4

No >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

---

4. FUSED B(+) CIRCUIT(S) OPEN CIRCUIT OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

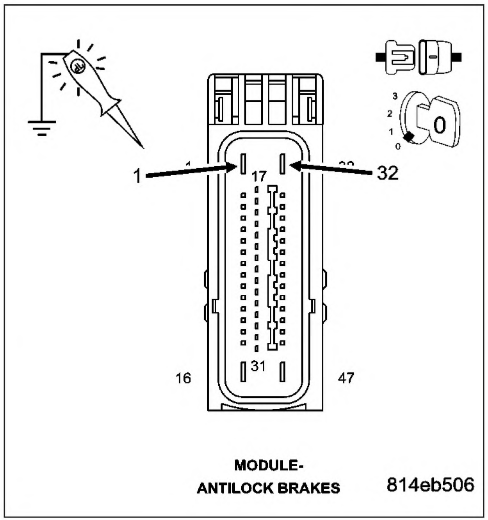
Using a 12–volt test light connected to ground, check the (A107) and the (A200) Fused B+ circuits.

NOTE: The Test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go To 5

No >> Repair the Fused B+ circuit(s) for an open circuit or high resistance.



---

5. GROUND CIRCUIT(S) OPEN CIRCUIT OR HIGH RESISTANCE

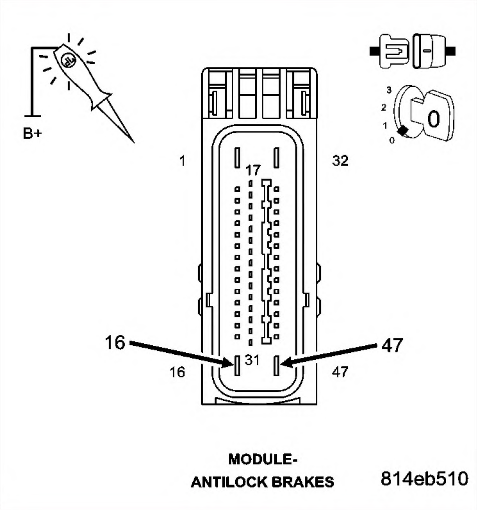
Using a 12–volt test light connected to B+, check (Z107) and (Z127) Ground circuits.

NOTE: The Test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

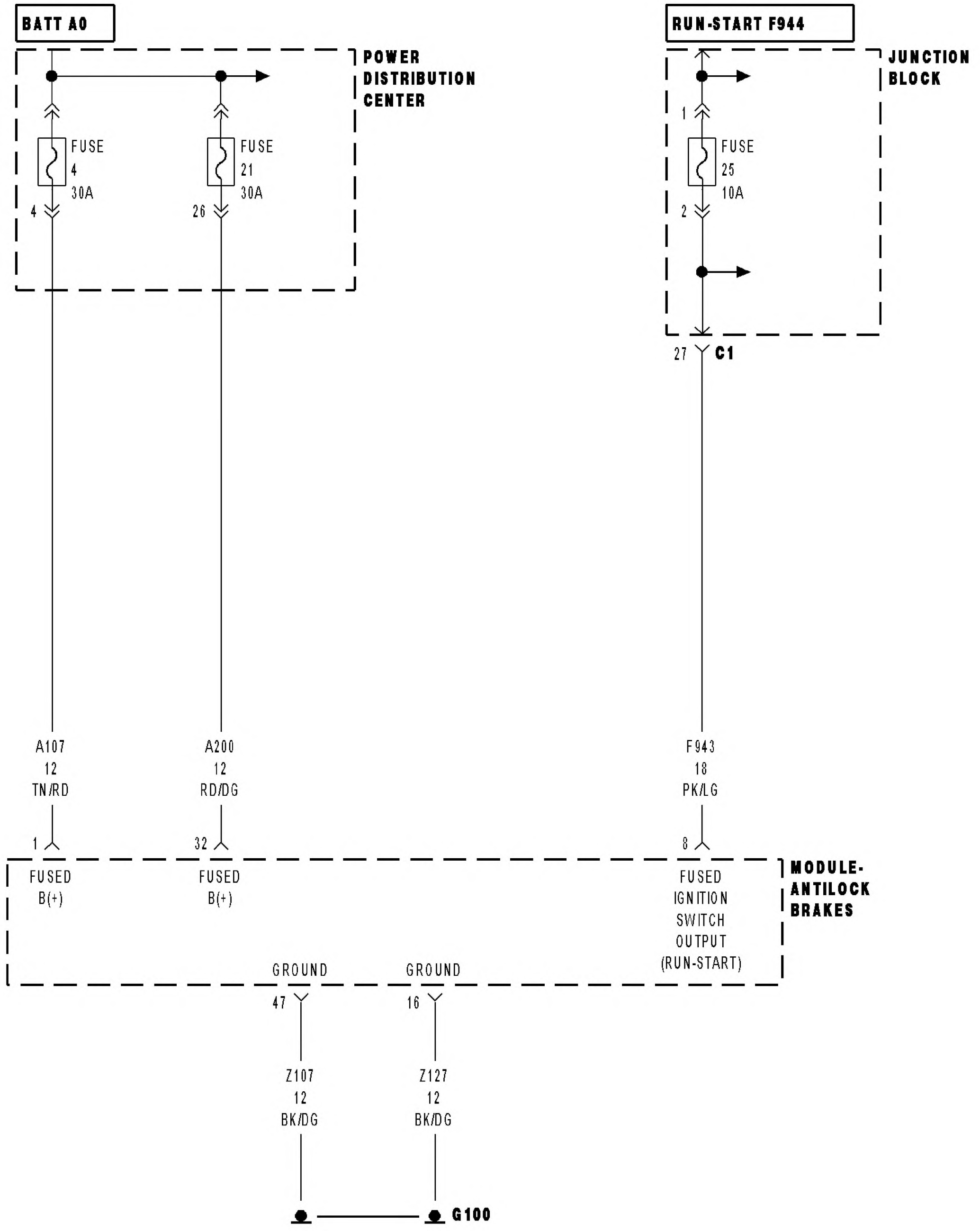
Is the test light illuminated and bright?

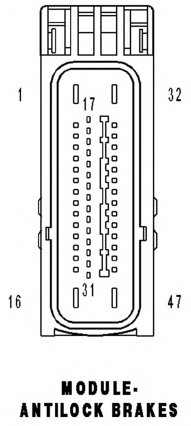
Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the Ground circuit(s) for an open circuit or high resistance.
Perform ABS VERIFICATION TEST - VER 1.



C2101-BATTERY VOLTAGE HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 4 30A
4
FUSE 21 30A
26
RUN-START F944
JUNCTION BLOCK
1
FUSE 25 10A
2
27
C1
A107 12 TN/RD
A200 12 RD/DG
F943 18 PK/LG
1
32
8
FUSED B(+)
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-ANTILOCK BRAKES
GROUND
GROUND
47
16
Z107 12 BK/DG
Z127 12 BK/DG
G100


1
17
32
31
16
47
MODULE-ANTILOCK BRAKES

814DCA1A

C2101-BATTERY VOLTAGE HIGH (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that voltage is above 17 volts.

Possible Causes
BATTERY CHARGER ON VEHICLE
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
STARTING AND CHARGING CONDITION
GROUND CIRCUIT(S) OPEN
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A C2101-BATTERY VOLTAGE HIGH

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.
With the scan tool, read and record DTC's.
With the scan tool, read and record Freeze Fame information.
With the scan tool, erase DTC's.
Cycle the ignition from off to on.
With the scan tool, read and record DTC's.

Does the scan tool display: C2101-BATTERY VOLTAGE HIGH?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK FOR BATTERY CHARGER CONNECTED TO VEHICLE

Is a battery charger connected to the vehicle?

Yes >> Ensure battery is fully charged.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.
Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

C2101-BATTERY VOLTAGE HIGH (CONTINUED)

4. CHECK THE BATTERY AND CHARGING SYSTEM

Turn the ignition off.

Perform a battery and charging system test.

NOTE: Refer to the Service Information for related test(s)/symptom(s).

Does the battery and charging system pass?

Yes >> Go To 5

No >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

---

5. GROUND CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

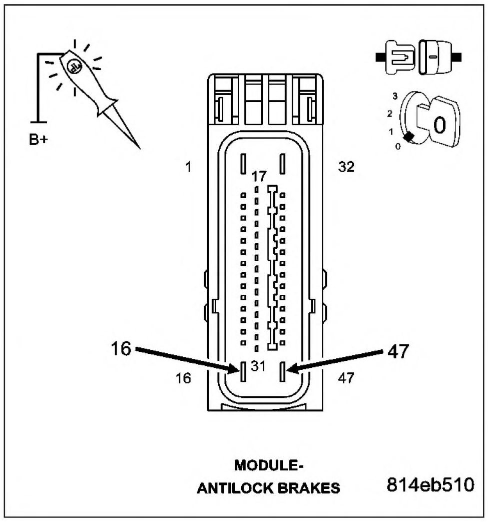
Using a 12–volt Test Light connected to 12 volts, check the (Z107) and (Z127) Ground circuits.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go To 6

No >> Repair the Ground circuit(s) for an open circuit or high resistance.
Perform ABS VERIFICATION TEST - VER 1



---

6. FUSED B(+) CIRCUIT VOLTAGE

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Start the engine.

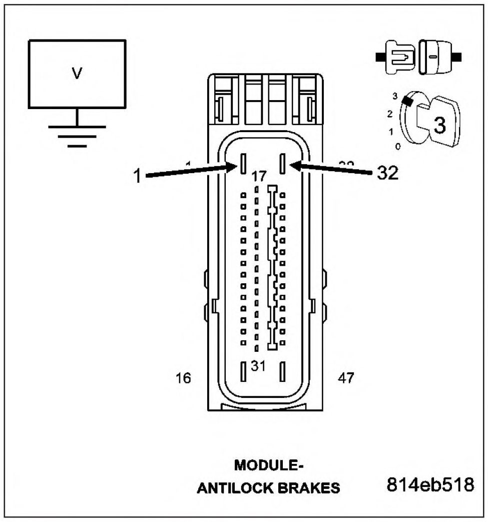
Raise engine speed above 1,800 RPM.

Measure the voltage of the (A107) and (A200) Fused B(+) circuits.

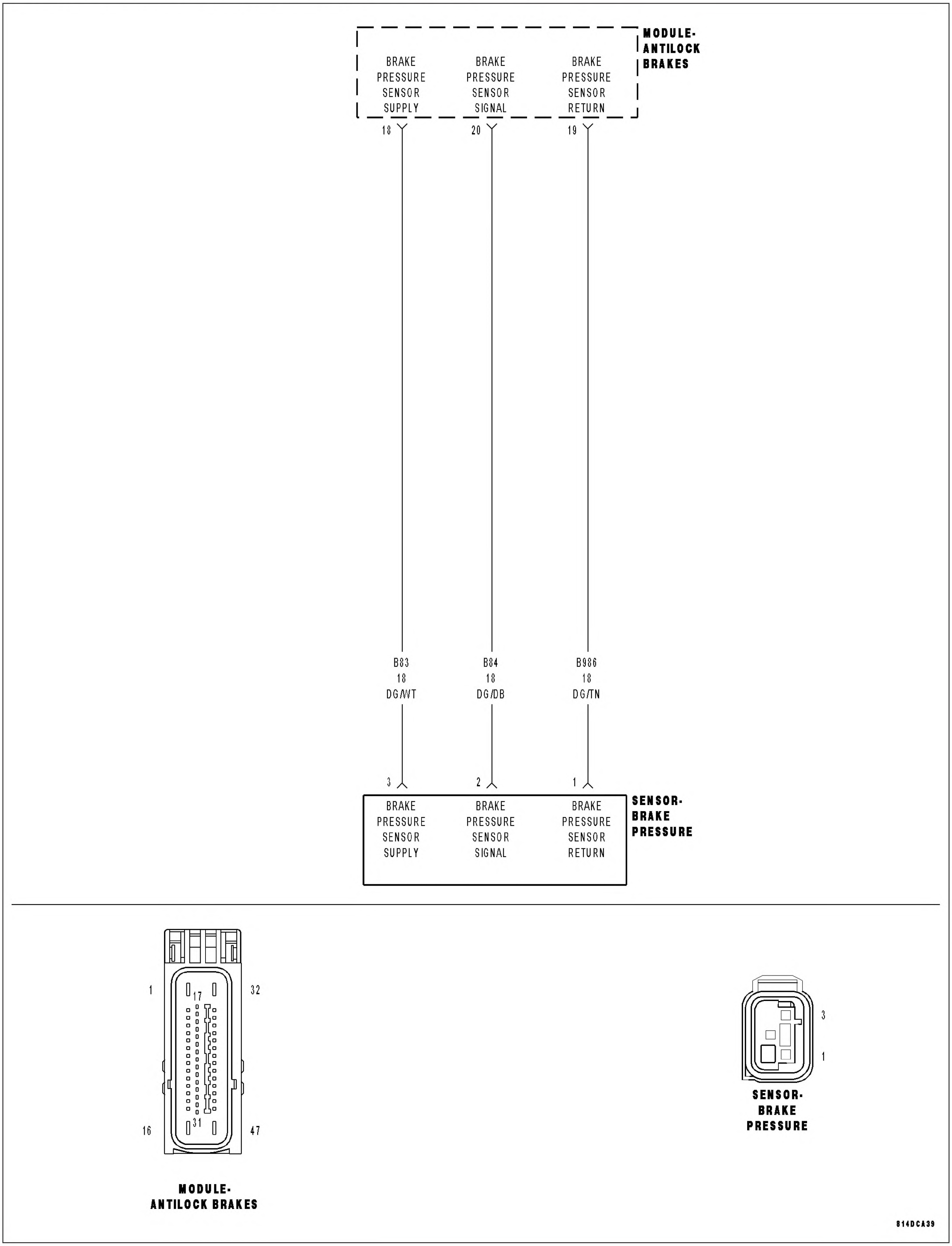
Is the voltage above 17 volts?

Yes >> Refer to the appropriate Service Information for Charging System testing and repair.

No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.



C2111-SENSOR SUPPLY VOLTAGE CIRCUIT LOW


MODULE-
ANTILOCK
BRAKES
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
18
20
19
B83
18
DG/WT
B84
18
DG/DB
B986
18
DG/TN
3
2
1
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
SENSOR-
BRAKE
PRESSURE
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
3
1
SENSOR-
BRAKE
PRESSURE
814DCA39

C2111-SENSOR SUPPLY VOLTAGE CIRCUIT LOW (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that the Brake Pressure Sensor Signal is within the low fault area.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C2111-SENSOR SUPPLY VOLTAGE CIRCUIT LOW

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC’s.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC’s.

Cycle the ignition from off to on.

With the scan tool, read and record DTC’s.

Does the scan tool display: C2111-SENSOR SUPPLY VOLTAGE CIRCUIT LOW?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C2111-SENSOR SUPPLY VOLTAGE CIRCUIT LOW (CONTINUED)

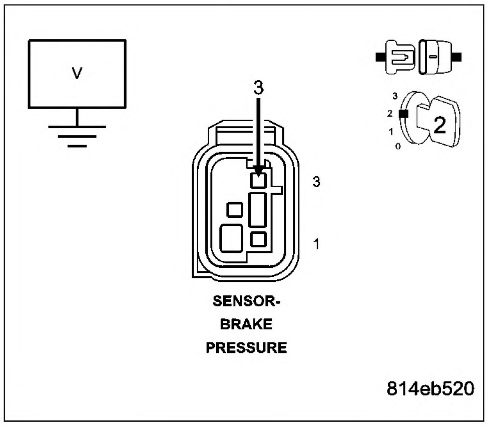
3. CHECK THE VOLTAGE ON THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Brake Pressure Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.



Is the voltage above 4 volts?

Yes >> Go To 7

No >> Go To 4

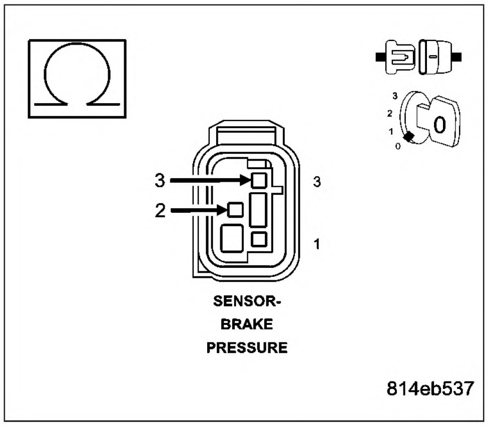
---

4. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (B83) Brake Pressure Sensor Supply circuit and the (B84) Brake Pressure Sensor Signal circuit.



Is the resistance below 150 ohms?

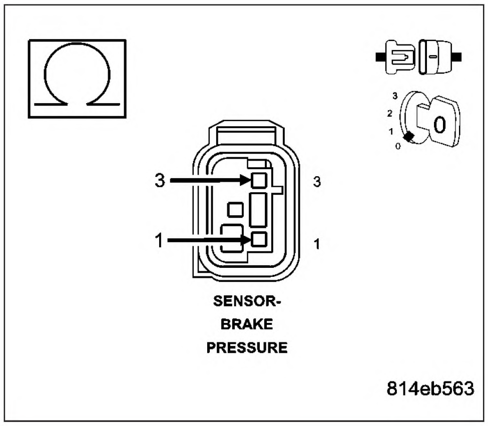
Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to the (B84) Brake Pressure Sensor Signal circuit.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT

Measure the resistance between the (B83) Brake Pressure Sensor Supply circuit and the (B986) Brake Pressure Sensor Return circuit.



Is the resistance below 150 ohms?

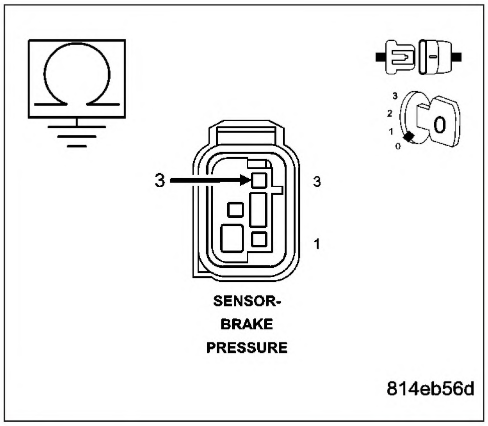
Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to the (B986) Brake Pressure Sensor Return circuit.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

C2111-SENSOR SUPPLY VOLTAGE CIRCUIT LOW (CONTINUED)

6. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (B83) Brake Pressure Sensor Supply circuit.


3
3
1
0
1
2
3
0
SENSOR-
BRAKE
PRESSURE
814eb56d

Is the resistance below 5.0 ohms?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

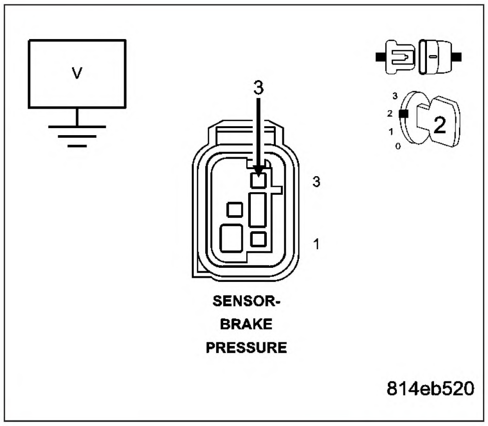
No >> Go To 7

---

7. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.


V
3
3
1
2
0
1
2
3
SENSOR-
BRAKE
PRESSURE
814eb520

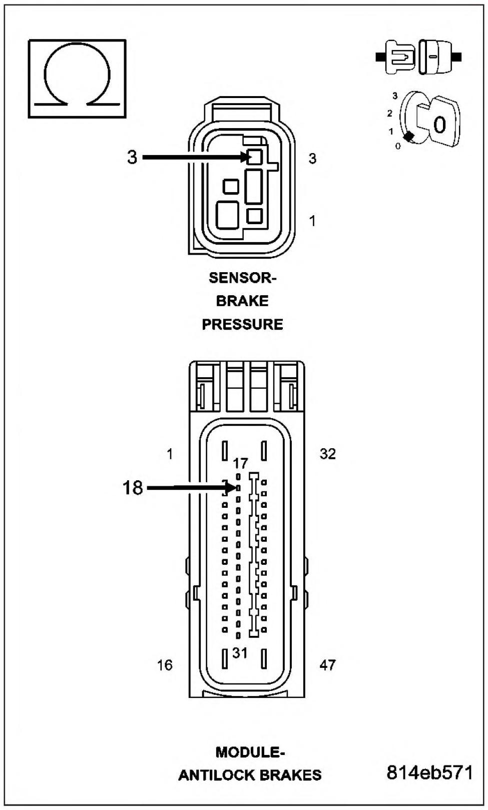
Is there any voltage present?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 8

C2111-SENSOR SUPPLY VOLTAGE CIRCUIT LOW (CONTINUED)

8. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT OPEN


3
3
1
SENSOR-
BRAKE
PRESSURE
1
17
32
18
16
31
47
MODULE-
ANTILOCK BRAKES
814eb571

Turn the ignition off.

Measure the resistance of the (B83) Brake Pressure Sensor Supply circuit.

Is the resistance below 5.0 ohms?

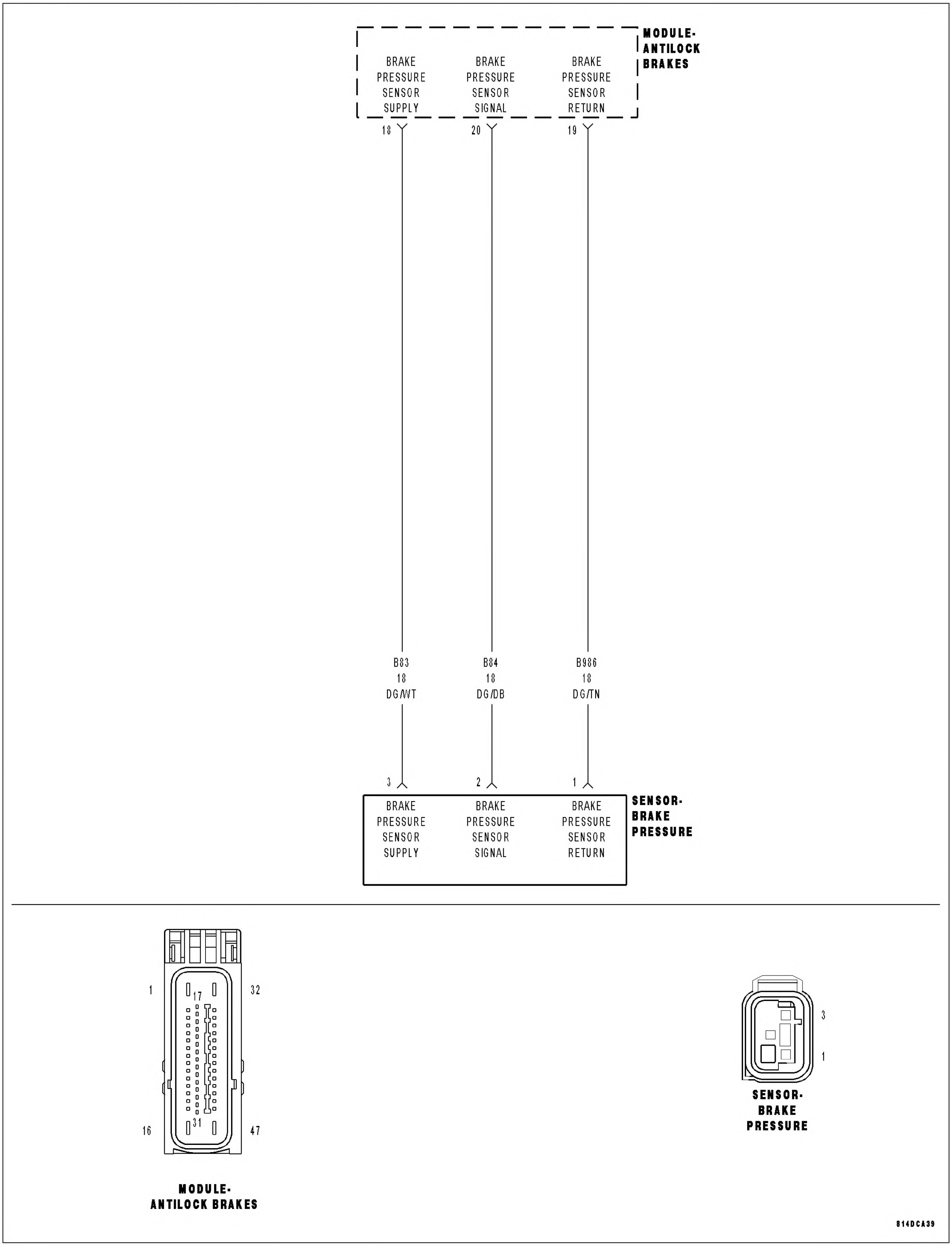
Yes >> Replace the Anti-Lock Brake Module in accordance with Service Information.

Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (B83) Brake Pressure Sensor Supply circuit for an open.

Perform ABS VERIFICATION TEST - VER 1.

C2112-SENSOR SUPPLY VOLTAGE CIRCUIT HIGH


MODULE-ANTILOCK BRAKES
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
18
20
19
B83 18 DG/WT
B84 18 DG/DB
B986 18 DG/TN
3
2
1
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
SENSOR-BRAKE PRESSURE
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
3
1
SENSOR-BRAKE PRESSURE
814DCA39

C2112-SENSOR SUPPLY VOLTAGE CIRCUIT HIGH (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates that the Brake Pressure Sensor Signal is within the high fault area.

Possible Causes
TERMINAL/CONNECTOR/WIRING HARNESS DAMAGE
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (B986) BRAKE PRESSURE SENSOR RETURN CIRCUIT
(B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE OR GROUND
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C2112-SENSOR SUPPLY VOLTAGE CIRCUIT HIGH

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTCs.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTCs.

Cycle the ignition from off to on.

With the scan tool, read and record DTCs.

Does the scan tool display: C2112-SENSOR SUPPLY VOLTAGE CIRCUIT HIGH?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS/WIRING HARNESS FOR DAMAGE

Check all related wiring for bruised, chafed, pierced, or partially broken wires.

Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C2112-SENSOR SUPPLY VOLTAGE CIRCUIT HIGH (CONTINUED)

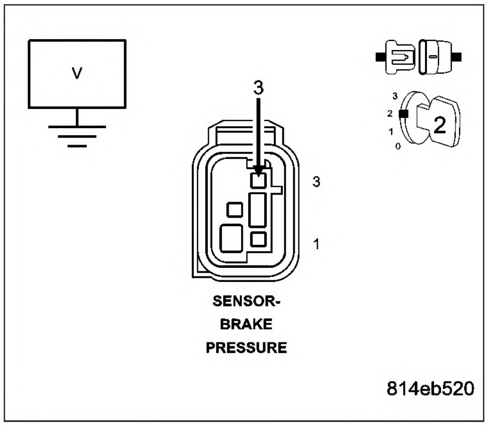
3. CHECK THE VOLTAGE ON THE (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Brake Pressure Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.



Is the voltage above 6 volts?

Yes >> Go To 4

No >> Replace the Brake Pressure Sensor in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

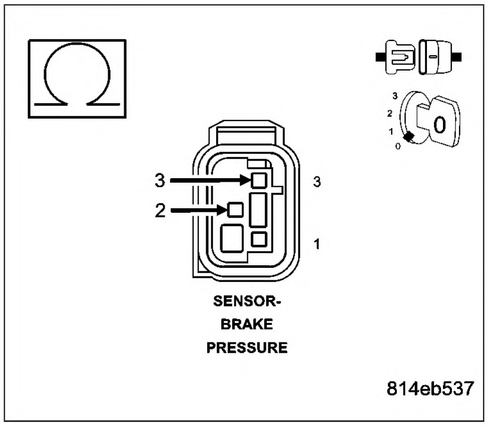
---

4. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (B84) BRAKE PRESSURE SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (B83) Brake Pressure Sensor Supply circuit and the (B84) Brake Pressure Sensor Signal circuit.



Is the resistance below 150 ohms?

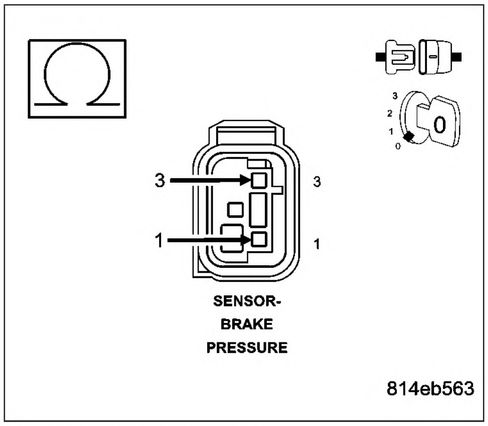
Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to the (B84) Brake Pressure Sensor Signal circuit.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORTED TO THE (986) BRAKE PRESSURE SENSOR RETURN CIRCUIT

Measure the resistance between the (B83) Brake Pressure Sensor Supply circuit and the (986) Brake Pressure Sensor Return circuit.



Is the resistance below 150 ohms?

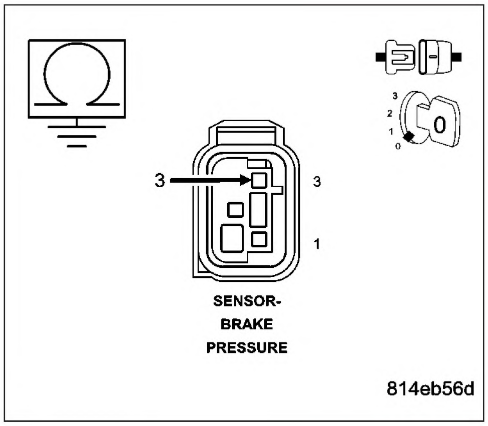
Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to the (986) Brake Pressure Sensor Return circuit.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

C2112-SENSOR SUPPLY VOLTAGE CIRCUIT HIGH (CONTINUED)

6. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (B83) Brake Pressure Sensor Supply circuit.



Is the resistance below 5.0 ohms?

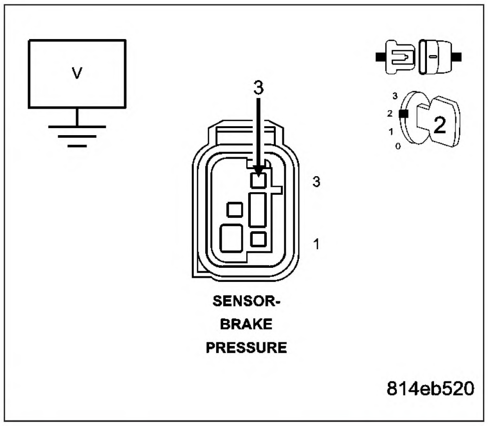
Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

7. (B83) BRAKE PRESSURE SENSOR SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (B83) Brake Pressure Sensor Supply circuit.

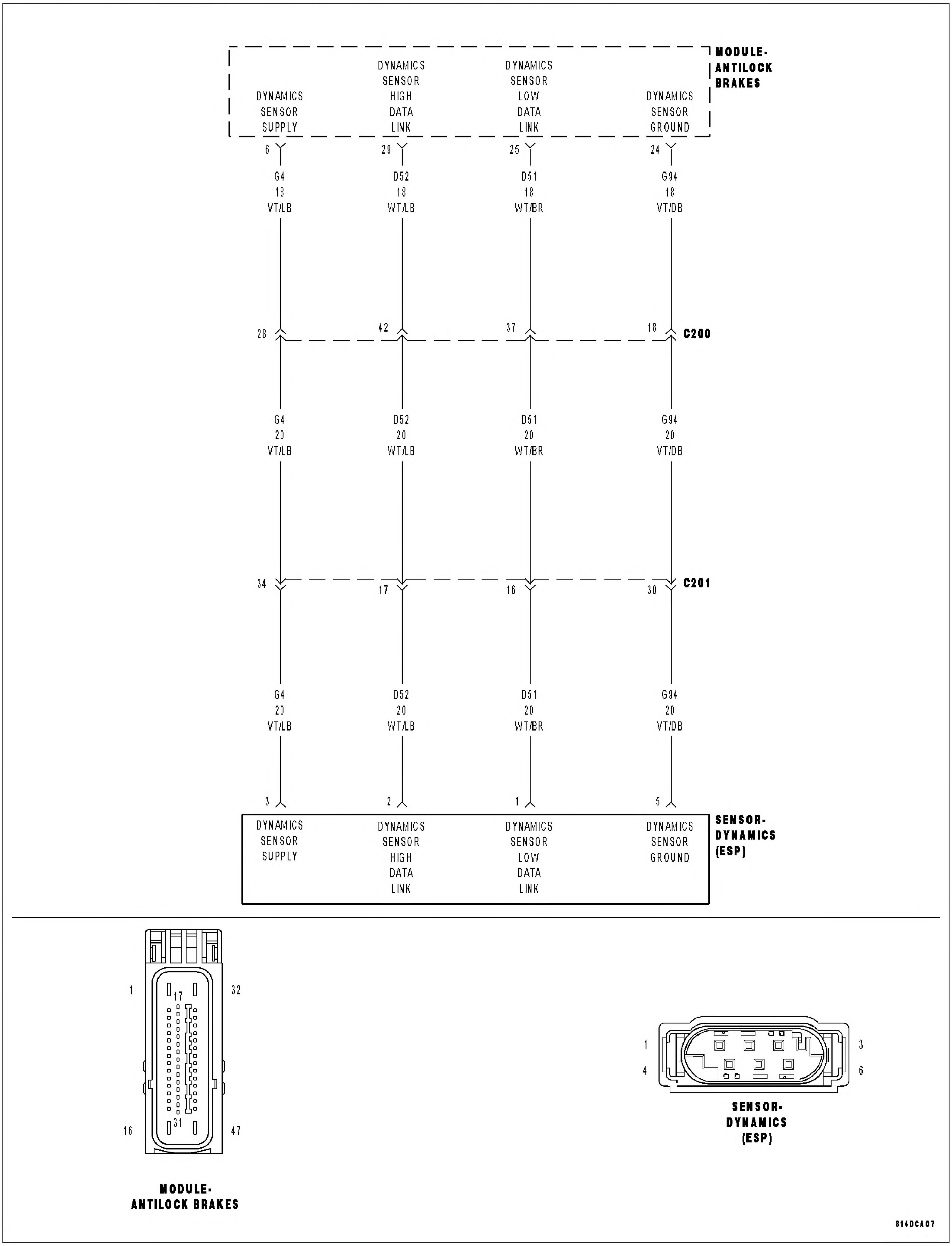


Is there any voltage present?

Yes >> Repair the (B83) Brake Pressure Sensor Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C2114-SENSOR CLUSTER SUPPLY VOLTAGE LOW


MODULE-ANTILOCK BRAKES
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
6
29
25
24
G4 18 VT/LB
D52 18 WT/LB
D51 18 WT/BR
G94 18 VT/DB
28
42
37
18
C200
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
34
17
16
30
C201
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
3
2
1
5
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
SENSOR-DYNAMICS (ESP)
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
3
4
6
SENSOR-DYNAMICS (ESP)
814DCA07

C2114-SENSOR CLUSTER SUPPLY VOLTAGE LOW (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the operating voltage is out of specified range.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
(G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORTED TO GROUND, VOLTAGE, OR OPEN
(G94) SENSOR CLUSTER GROUND CIRCUIT SHORTED TO VOLTAGE OR OPEN
SENSOR CLUSTER
ANTI-LOCK BRAKE MODULE

1. CHECK FOR A DTC C2114-SENSOR CLUSTER SUPPLY VOLTAGE LOW

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.
With the scan tool, read and record DTC's.
With the scan tool, read and record Freeze Fame information.
With the scan tool, erase DTC's.
Cycle the ignition from off to on.
With the scan tool, read and record DTCs

Does the scan tool display: C2114-SENSOR CLUSTER SUPPLY VOLTAGE LOW?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Check all related wiring for bruised, chafed, pierced, or partially broken wires.
Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C2114-SENSOR CLUSTER SUPPLY VOLTAGE LOW (CONTINUED)

3. CHECK THE VOLTAGE ON THE (G4) SENSOR CLUSTER SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Sensor Cluster harness connector.

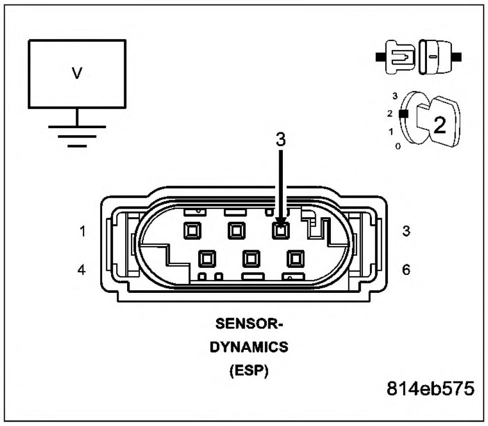
Turn the ignition on.

Measure the voltage of the (G4) Sensor Cluster Supply Circuit.

Is the voltage above 10 volts?

Yes >> Go To 7

No >> Go To 4


V
3
2
1
0
2
3
1
4
3
6
SENSOR-
DYNAMICS
(ESP)
814eb575

---

4. (G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

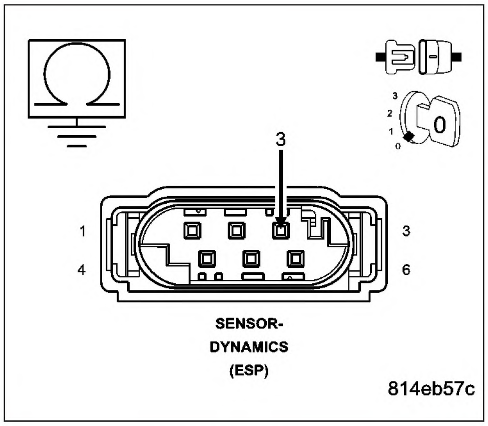
Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between ground and the (G4) Sensor Cluster Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (G4) Sensor Cluster Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 5


Ω
3
2
1
0
0
3
1
4
3
6
SENSOR-
DYNAMICS
(ESP)
814eb57c

---

5. (G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORT TO VOLTAGE

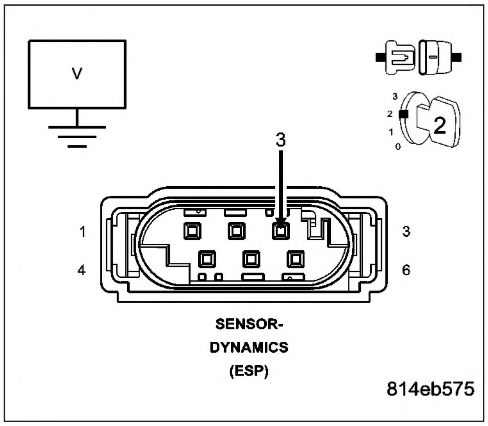
Turn the ignition on.

Measure the voltage of the (G4) Sensor Cluster Supply circuit.

Is there any voltage present?

Yes >> Repair the (G4) Sensor Cluster Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6


V
3
2
1
0
2
3
1
4
3
6
SENSOR-
DYNAMICS
(ESP)
814eb575

C2114-SENSOR CLUSTER SUPPLY VOLTAGE LOW (CONTINUED)

6. (G4) SENSOR CLUSTER SUPPLY CIRCUIT OPEN

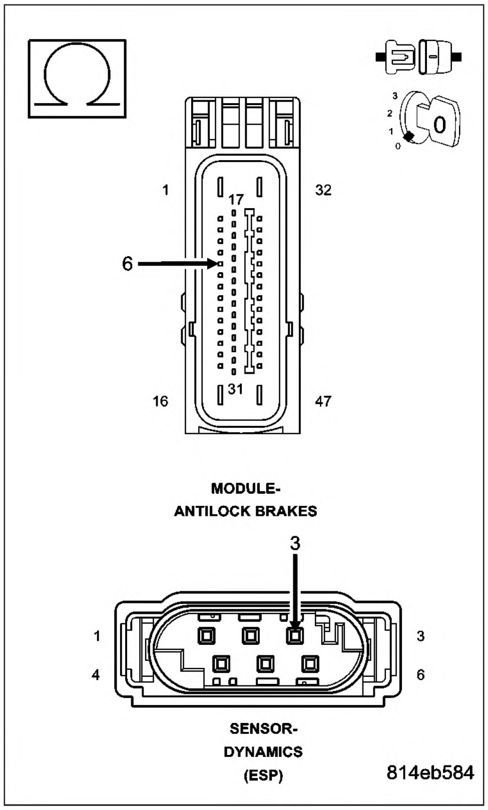
Turn the ignition off.

Measure the resistance of the (G4) Sensor Cluster Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (G4) Sensor Cluster Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.


1
17
32
6
16
31
47
MODULE-
ANTILOCK BRAKES
3
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb584

---

7. SENSOR CLUSTER

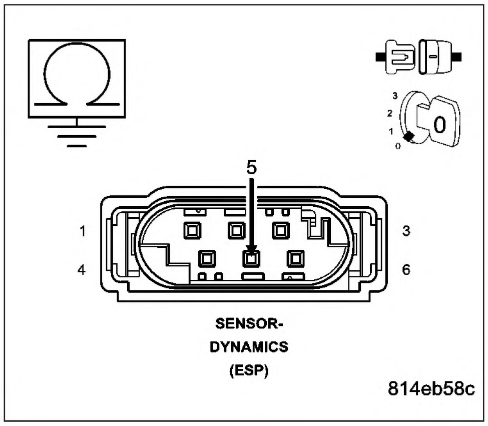
Turn the ignition off.

Measure the resistance between the (G94) Sensor Cluster Ground Circuit and Ground.

Is the resistance below 5.0 ohms?

Yes >> Replace the Sensor Cluster in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 8


5
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb58c

C2114-SENSOR CLUSTER SUPPLY VOLTAGE LOW (CONTINUED)

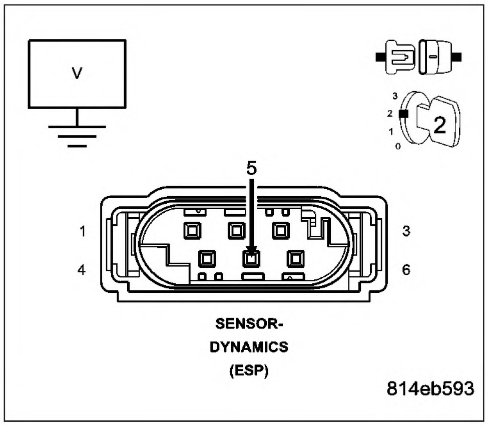
8. (G94) SENSOR CLUSTER GROUND CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (G94) Sensor Cluster Ground circuit.


V
3
2
1
0
2
5
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb593

Is there any voltage present?

Yes >> Repair the (G94) Sensor Cluster Ground circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

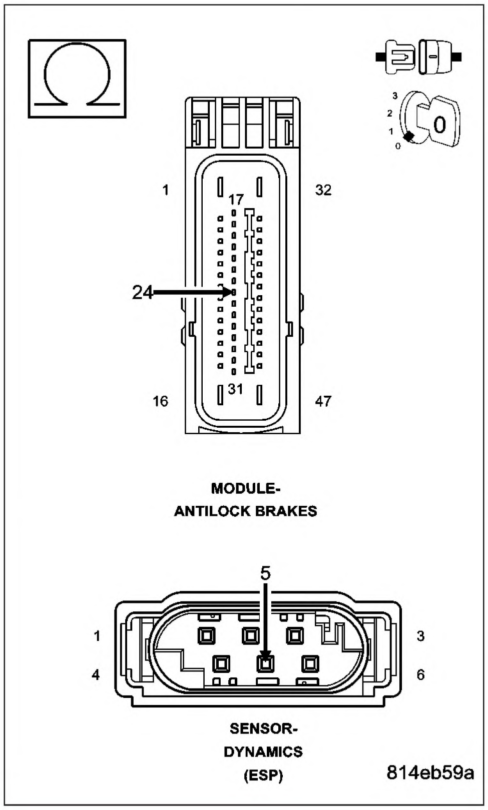
No >> Go To 9

---

9. (G94) SENSOR CLUSTER GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (G94) Sensor Cluster Ground Circuit.

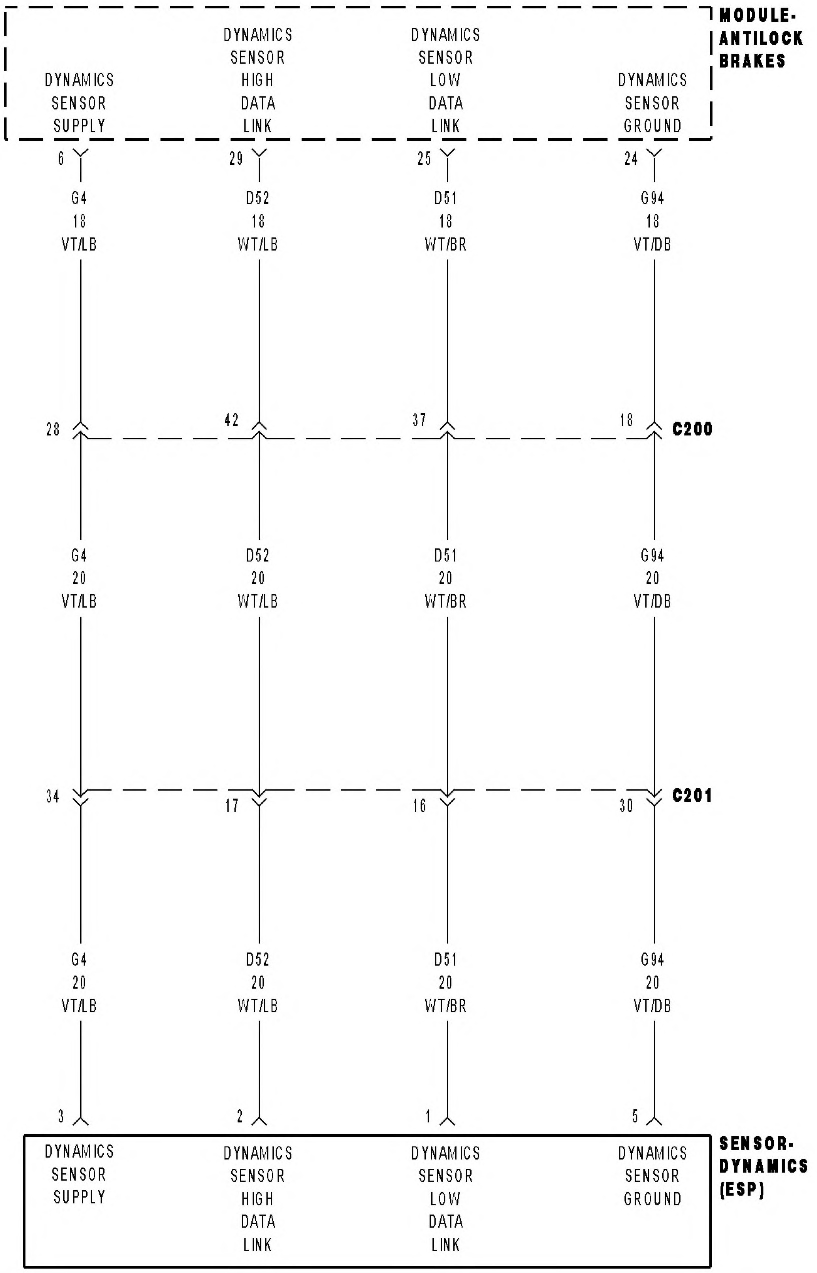

Ω
3
2
1
0
0
1
17
32
24
16
31
47
MODULE-
ANTILOCK BRAKES
5
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb59a

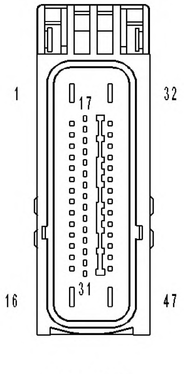
Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

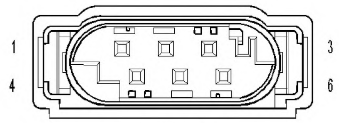
No >> Repair the (G94) Sensor Cluster Ground circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C2115-SENSOR CLUSTER SUPPLY VOLTAGE HIGH


MODULE-ANTILOCK BRAKES
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
6
29
25
24
G4 18 VT/LB
D52 18 WT/LB
D51 18 WT/BR
G94 18 VT/DB
28
42
37
18
C200
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
34
17
16
30
C201
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
3
2
1
5
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
SENSOR-DYNAMICS (ESP)


1
17
32
16
31
47

MODULE-ANTILOCK BRAKES



SENSOR-DYNAMICS (ESP)

814DCA07

C2115-SENSOR CLUSTER SUPPLY VOLTAGE HIGH (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the operating voltage is out of specified range.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
CHARGING SYSTEM
(G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORTED TO GROUND OR VOLTAGE
(G94) SENSOR CLUSTER GROUND CIRCUIT SHORTED TO VOLTAGE OR OPEN
SENSOR CLUSTER
ANTI-LOCK BRAKE MODULE

1. CHECK FOR A DTC C2115-SENSOR CLUSTER SUPPLY VOLTAGE HIGH

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.
With the scan tool, read and record DTC's.
With the scan tool, read and record Freeze Fame information.
With the scan tool, erase DTC's.
Cycle the ignition from off to on.
With the scan tool, read and record DTCs

Does the scan tool display: C2115-SENSOR CLUSTER SUPPLY VOLTAGE HIGH?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Check all related wiring for bruised, chafed, pierced, or partially broken wires.
Check all related connectors for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C2115-SENSOR CLUSTER SUPPLY VOLTAGE HIGH (CONTINUED)

3. CHECK THE VOLTAGE ON THE (G4) SENSOR CLUSTER SUPPLY CIRCUIT

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Turn the ignition off.

Disconnect the Sensor Cluster harness connector.

Start the engine.

Raise engine speed above 1800 RPM.

Measure the voltage of the (G4) Sensor Cluster Supply Circuit.

Is the voltage above 17 volts?

Yes >> Go To 4

No >> Go To 7

4. CHECK THE VOLTAGE ON THE FUSED B(+) CIRCUITS

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

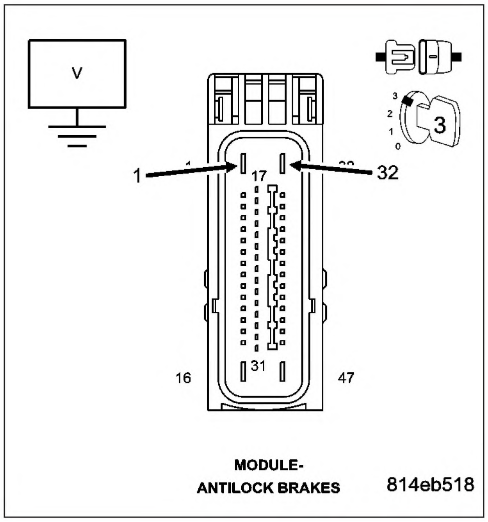
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Start the engine.

Raise engine speed above 1800 RPM.

Measure the voltage of the (A107) and the (A200) Fused B(+) circuits.



Is the voltage above 17 volts?

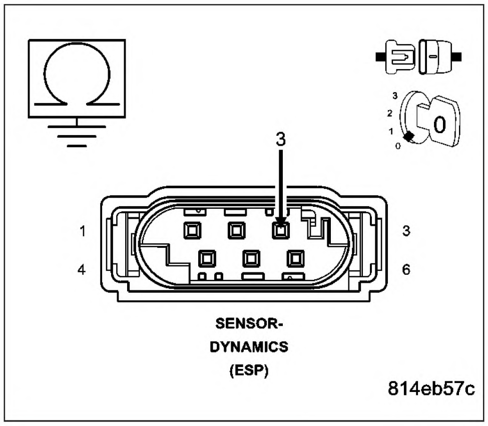
Yes >> Refer to appropriate Service Information for Charging System testing and repair.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 5

5. (G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (G4) Sensor Cluster Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (G4) Sensor Cluster Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

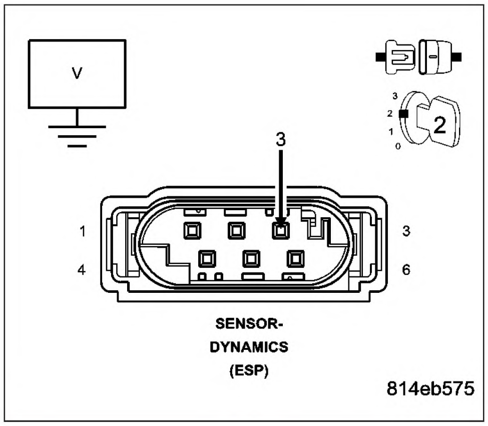
No >> Go To 6

C2115-SENSOR CLUSTER SUPPLY VOLTAGE HIGH (CONTINUED)

6. (G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (G4) Sensor Cluster Supply circuit.



Is there any voltage present?

Yes >> Repair the (G4) Sensor Cluster Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

---

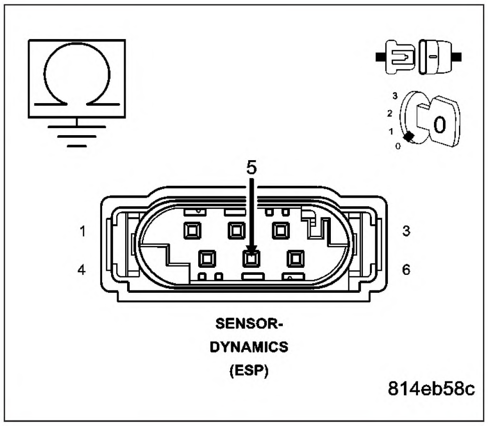
7. SENSOR CLUSTER

Turn the ignition off.

If necessary, disconnect the Sensor Cluster harness connector.

If necessary, connect the Anti-Lock Brake Module harness connector.

Measure the resistance between the (G94) Sensor Cluster Ground Circuit at the Sensor Cluster harness connector and ground.



Is the resistance below 5.0 ohms?

Yes >> Replace the Sensor Cluster in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 8

---

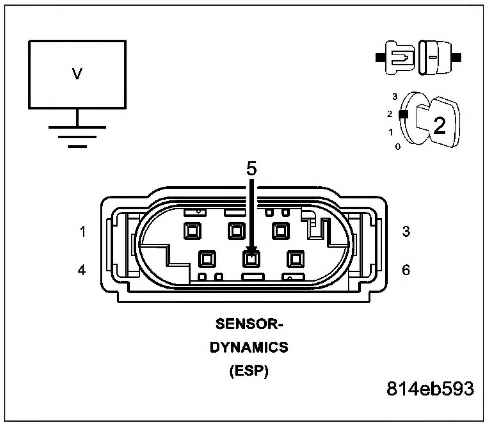
8. (G94) SENSOR CLUSTER GROUND CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (G94) Sensor Cluster Ground circuit.



Is there any voltage present?

Yes >> Repair the (G94) Sensor Cluster Ground circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

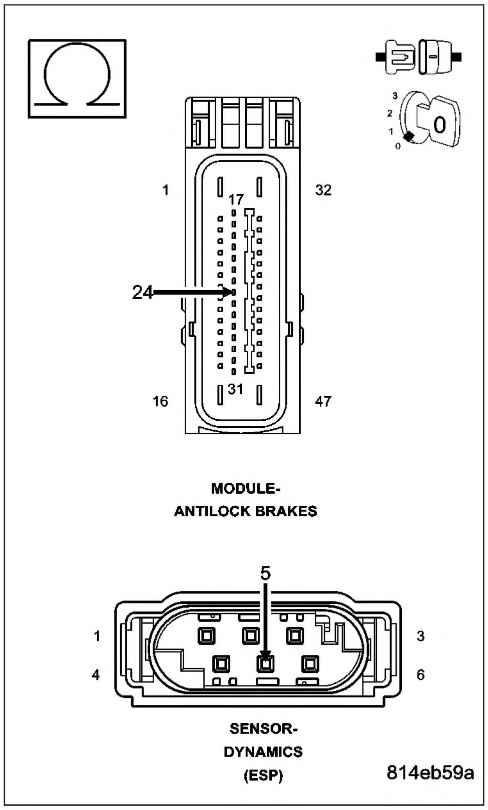
No >> Go To 9

C2115-SENSOR CLUSTER SUPPLY VOLTAGE HIGH (CONTINUED)

9. (G94) SENSOR CLUSTER GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (G94) Sensor Cluster Ground circuit

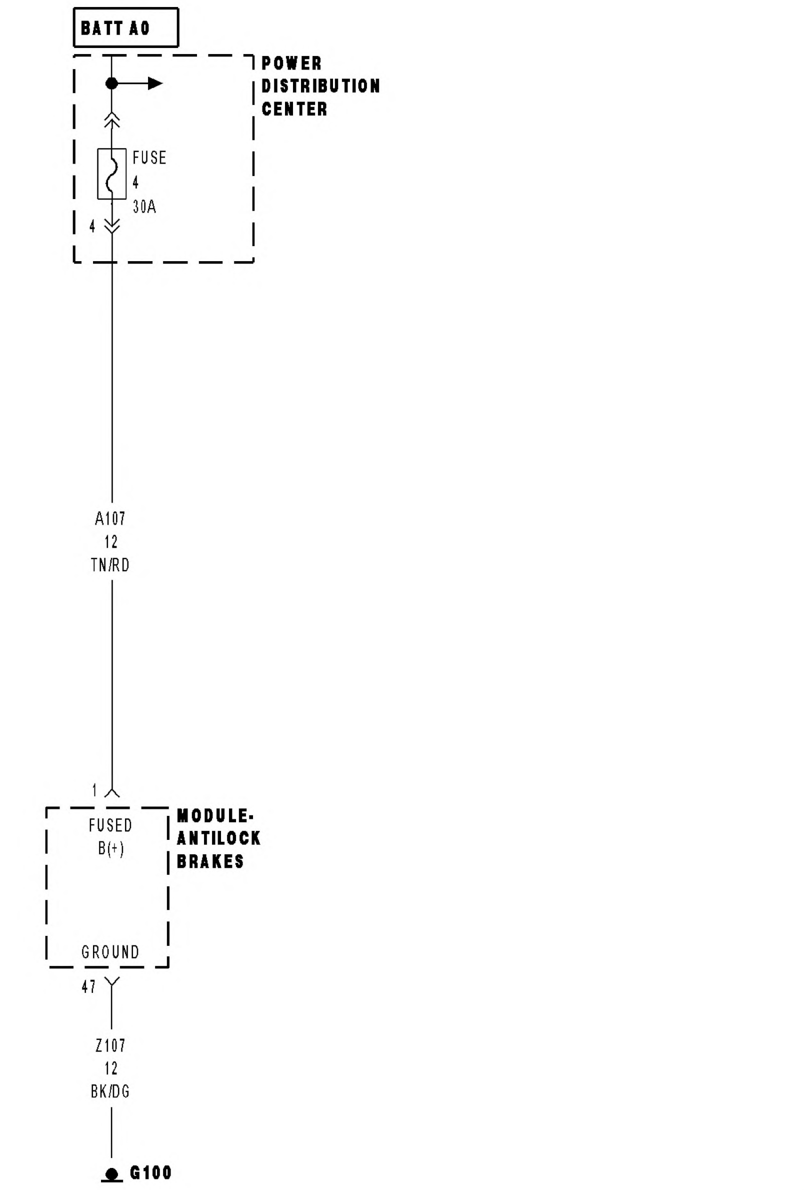

Ω
1
17
32
24
16
31
47
MODULE-
ANTILOCK BRAKES
5
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb59a

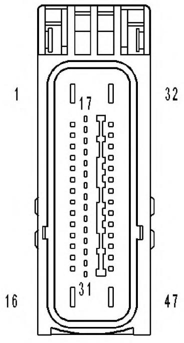
Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (G94) Sensor Cluster Ground circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C2116-ABS PUMP MOTOR SUPPLY LOW VOLTAGE


BATT A0
POWER DISTRIBUTION CENTER
FUSE
4
30A
4
A107
12
TN/RD
1
FUSED B(+)
MODULE-ANTILOCK BRAKES
GROUND
47
Z107
12
BK/DG
G100


1
17
32
16
31
47

MODULE-
ANTILOCK BRAKES

814dc3ab

C2116-ABS PUMP MOTOR SUPPLY LOW VOLTAGE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module indicates the ABS Pump Motor circuit fails the diagnostic test.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
ABS PUMP MOTOR FUSE OPEN
(A107) FUSED B(+) CIRCUIT SHORTED TO GROUND OR OPEN
GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C2116-ABS PUMP MOTOR SUPPLY LOW VOLTAGE

NOTE: This DTC must be active for the results of this test to be valid.
Turn the ignition on.
With the scan tool, read and record DTCs.
With the scan tool, read and record Freeze Fame information.
With the scan tool, erase DTCs.

CAUTION: Ensure braking capability is available before road testing.
Drive the vehicle over 40 Km/h (25 mph).
Park the vehicle and cycle the ignition switch from off to on.
With the scan tool, read and record DTCs

Does the scan tool display: C2116-ABS PUMP MOTOR SUPPLY LOW VOLTAGE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK ABS PUMP OPERATION WITH SCAN TOOL

Cycle the ignition from off to on.
With the scan tool, actuate the ABS Pump Motor.

Did the ABS Pump Motor operate?

Yes >> Refer to the INTERMITTENT CONDITION diagnostic procedure.

No >> Go To 3

C2116-ABS PUMP MOTOR SUPPLY LOW VOLTAGE (CONTINUED)

3. CHECK THE ABS PUMP MOTOR FUSE FOR AN OPEN

Turn the ignition off.

Remove and inspect the ABS Pump Motor fuse.

Is the ABS Pump Motor fuse open?

Yes >> Go To 4

No >> Go To 5

---

4. CHECK THE (A107) FUSED B(+) FOR A SHORT TO GROUND

Turn the ignition off.

Check the (A107) Fused B(+) circuit in the wiring harness for a short to ground.

Is the (A107) Fused B(+) circuit in the wiring harness OK?

Yes >> Go To 5

No >> Repair the (A107) Fused B(+) circuit as necessary. Replace the fuse.
Perform ABS VERIFICATION TEST - VER 1.

---

5. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires. Check all related connectors for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Inspect the Anti-Lock Brake Module harness connector and (A107) Fused B(+) circuit in the wiring harness.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. (A107) FUSED B(+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Using a 12–volt test light connected to ground, check the (A107) Fused B(+) circuit in the Anti-Lock Brake Module harness connector.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go To 7

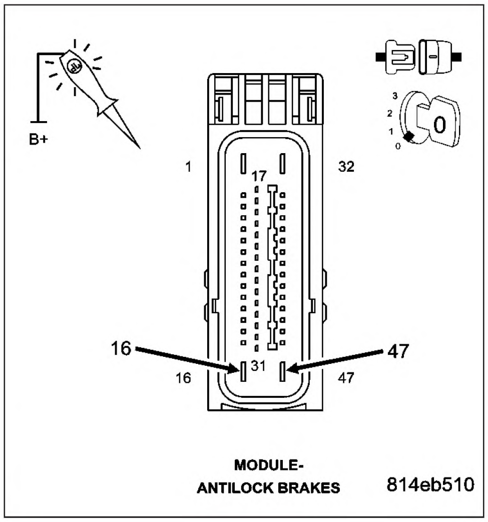
No >> Repair the (A107) Fused B(+) circuit for an open circuit or high resistance.
Perform ABS VERIFICATION TEST - VER 1.

C2116-ABS PUMP MOTOR SUPPLY LOW VOLTAGE (CONTINUED)

7. GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE

Using a 12–volt test light connected to 12–volts, check the (Z107) and (Z127) Ground circuits.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

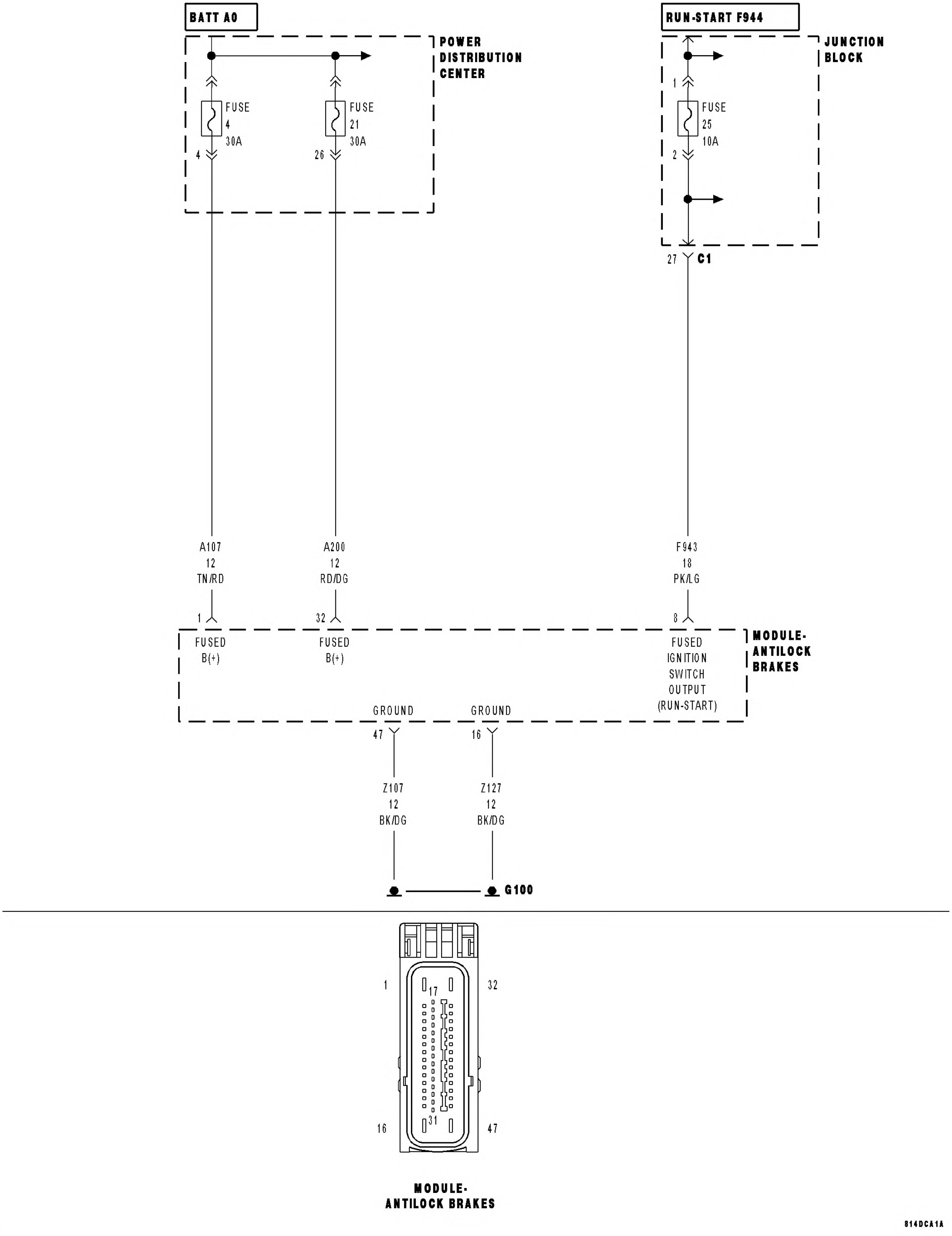


Is the test light illuminated and bright?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the Ground circuit(s) for an open circuit or high resistance.
Perform ABS VERIFICATION TEST - VER 1.

C2200-ANTI-LOCK BRAKE MODULE INTERNAL


BATT A0
POWER DISTRIBUTION CENTER
FUSE 4 30A
4
FUSE 21 30A
26
RUN-START F944
JUNCTION BLOCK
1
FUSE 25 10A
2
27
C1
A107 12 TN/RD
A200 12 RD/DG
F943 18 PK/LG
1
32
8
FUSED B(+)
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-ANTILOCK BRAKES
GROUND
GROUND
47
16
Z107 12 BK/DG
Z127 12 BK/DG
G100
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
814DCA1A

C2200-ANTI-LOCK BRAKE MODULE INTERNAL (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module fails the diagnostic test.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
FUSED B+ CIRCUIT(S) SHORTED TO GROUND, VOLTAGE, OR OPEN
GROUND CIRCUIT(S) OPEN
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C2200-ANTI-LOCK BRAKE MODULE INTERNAL

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTCs.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTCs.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTCs

Does the scan tool display: C2200-ANTI-LOCK BRAKE MODULE INTERNAL?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.

Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C2200-ANTI-LOCK BRAKE MODULE INTERNAL (CONTINUED)

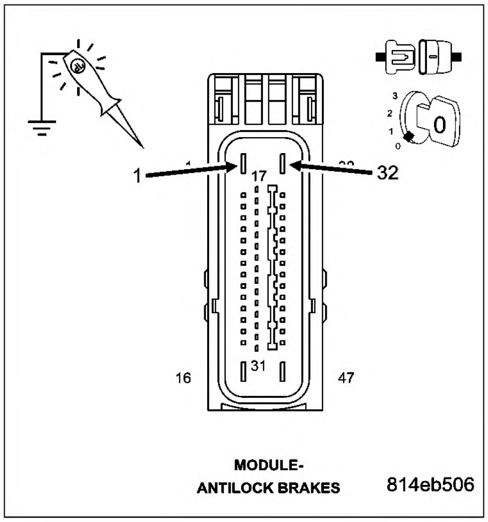
3. FUSED B+ CIRCUIT(S) OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Using a 12–volt test light connected to ground, check the (A107) and (A200) Fused B+ circuits.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.



Is the test light illuminated and bright?

Yes >> Go To 4

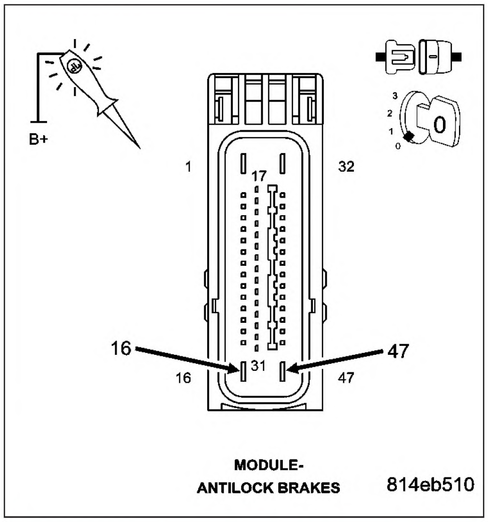
No >> Repair the Fused B+ circuit(s) for an open circuit or high resistance.
Perform ABS VERIFICATION TEST - VER 1.

---

4. GROUND CIRCUIT OPEN OR HIGH RESISTANCE

Using a 12–volt test light connected to 12–volts, check the (Z107) and (Z127) Ground circuits.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

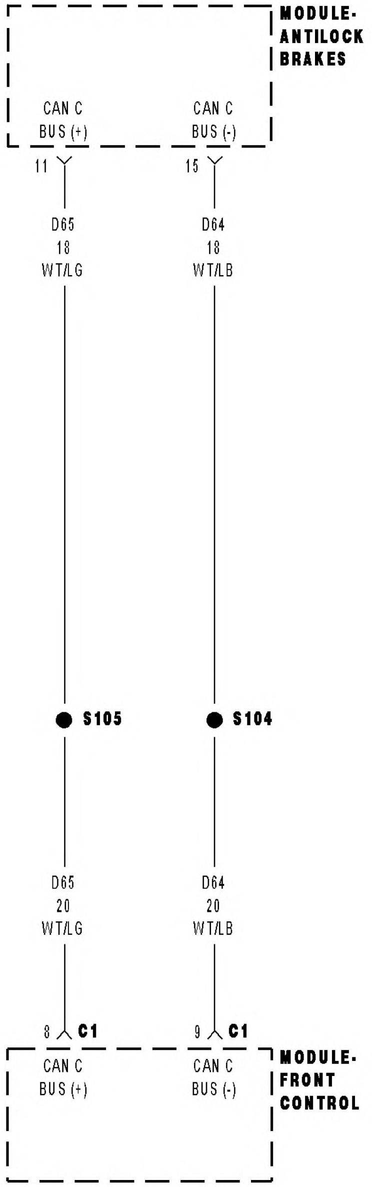


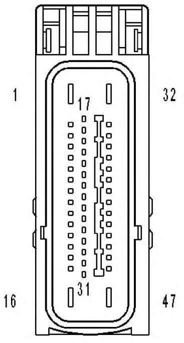
Is the test light illuminated and bright?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

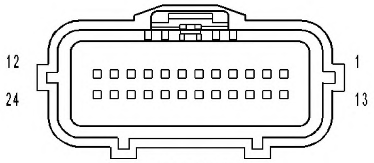
No >> Repair the Ground circuit(s) for an open circuit or high resistance.
Perform ABS VERIFICATION TEST - VER 1.

C2202-ORIGINAL VIN MISMATCH/MISSING


MODULE-
ANTILOCK
BRAKES
CAN C
BUS (+)
CAN C
BUS (-)
11
15
D65
18
WT/LG
D64
18
WT/LB
S105
S104
D65
20
WT/LG
D64
20
WT/LB
8
C1
9
C1
CAN C
BUS (+)
CAN C
BUS (-)
MODULE-
FRONT
CONTROL


1
17
32
16
31
47

MODULE-
ANTILOCK BRAKES


12
24
1
13

MODULE-
FRONT
CONTROL C1

814dc3c7

C2202-ORIGINAL VIN MISMATCH/MISSING (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module fails the diagnostic test.

Possible Causes
ANTI-LOCK BRAKE MODULE

1. ANTI-LOCK BRAKE MODULE CONFIGURATION

The Anti-lock Brake Module hardware check has determined that module configuration does not match vehicle configuration. Verify that the correct module part number is installed in the vehicle.

Turn the ignition on.

With the Scan Tool, verify that the VIN stored in the controller matches the vehicle VIN.

With the Scan Tool, select Clear Stored DTCs.

Cycle the ignition off, then on.

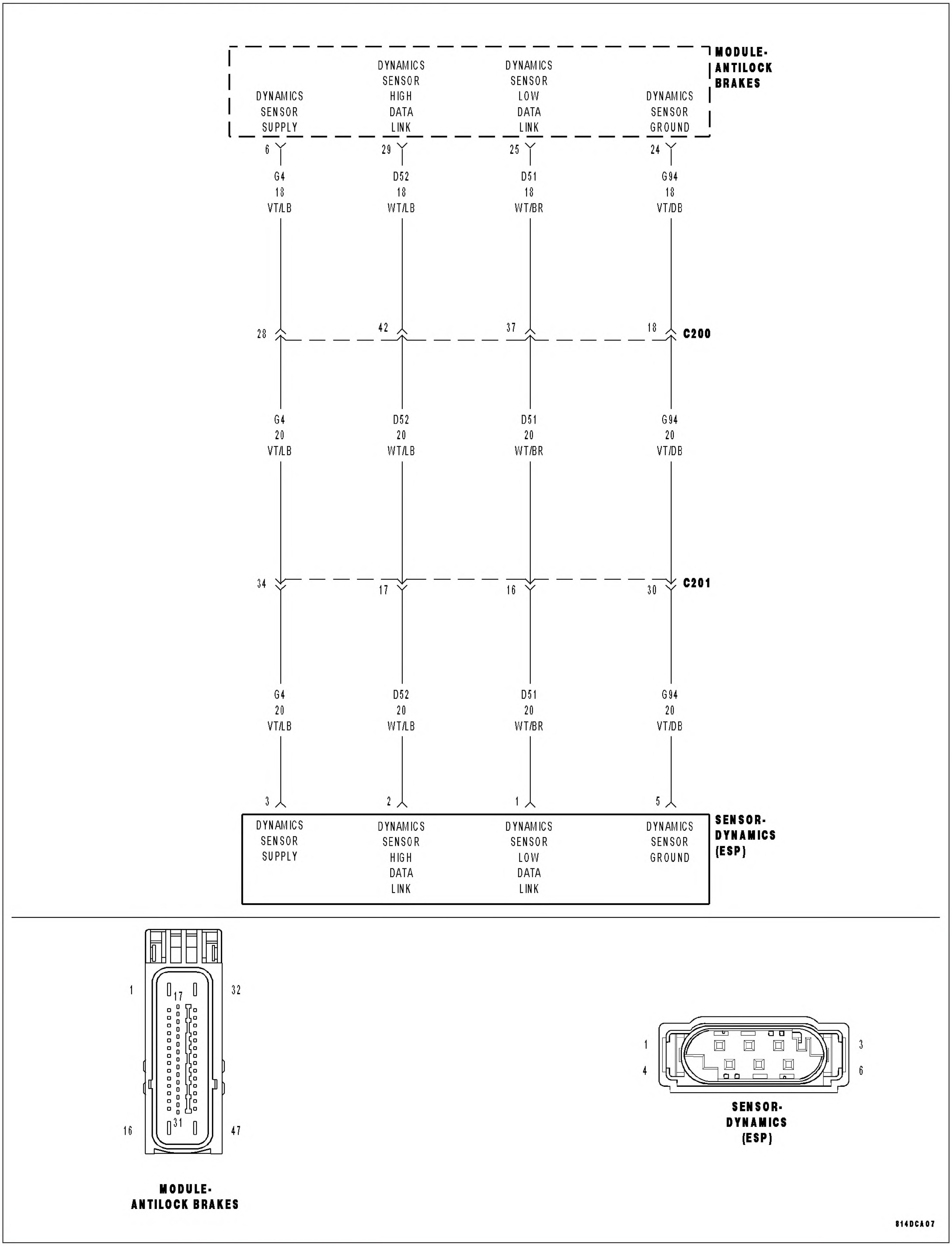
With the Scan Tool, select View DTCs.

Does this DTC reset?

Yes >> Replace the Anti-lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Test complete.
Perform ABS VERIFICATION TEST - VER 1.

C2204-SENSOR CLUSTER INTERNAL


MODULE-
ANTILOCK
BRAKES
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
6
29
25
24
G4 18 VT/LB
D52 18 WT/LB
D51 18 WT/BR
G94 18 VT/DB
28
42
37
18
C200
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
34
17
16
30
C201
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
3
2
1
5
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMICS SENSOR GROUND
SENSOR-
DYNAMICS
(ESP)
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814DCA07

C2204-SENSOR CLUSTER INTERNAL (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module fails the diagnostic test.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
(G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(G94) SENSOR CLUSTER GROUND CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
(D51) SENSOR CLUSTER LOW DATALINK CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
SENSOR CLUSTER
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C2204-SENSOR CLUSTER INTERNAL

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

NOTE: This DTC must be active for the results of this test to be valid.

CAUTION: Ensure brake capability is available before road testing.

Turn the ignition on.
With the scan tool, read DTCs.
Record DTC and Freeze Frame information.
With the scan tool, erase DTCs.
Test drive the vehicle.
With the scan tool, read DTCs

Does the scan tool display: C2204-SENSOR CLUSTER INTERNAL?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Check the Sensor Cluster installation and torque of the mounting bolts.
Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.
Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

C2204-SENSOR CLUSTER INTERNAL (CONTINUED)

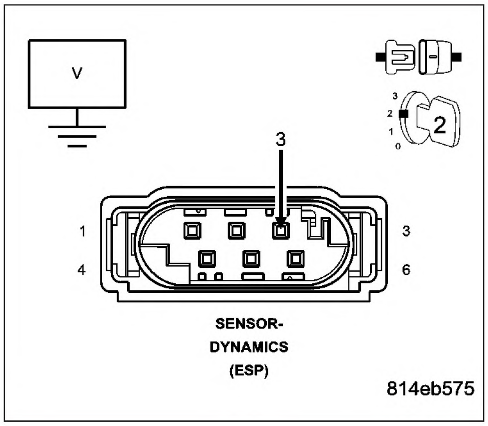
3. CHECK THE VOLTAGE ON THE (G4) SENSOR CLUSTER SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Sensor Cluster harness connector.

Turn the ignition on.

Measure the voltage of the (G4) Sensor Cluster Supply Circuit.


V
3
2
1
0
2
3
1
4
3
6
SENSOR-
DYNAMICS
(ESP)
814eb575

Is the voltage above 10 volts?

Yes >> Go To 7

No >> Go To 4

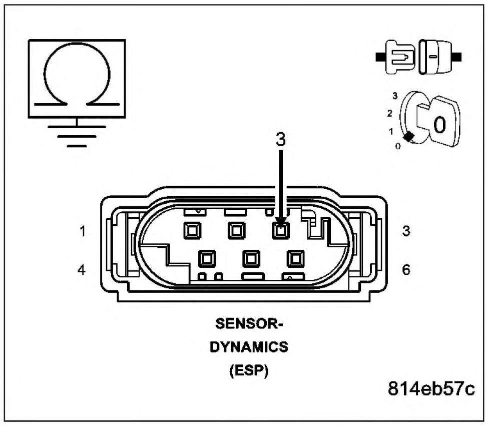
---

4. (G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Measure the resistance between ground and the (G4) Sensor Cluster Supply circuit.


Ω
3
2
1
0
0
3
1
4
3
6
SENSOR-
DYNAMICS
(ESP)
814eb57c

Is the resistance below 5.0 ohms?

Yes >> Repair the (G4) Sensor Cluster Supply circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

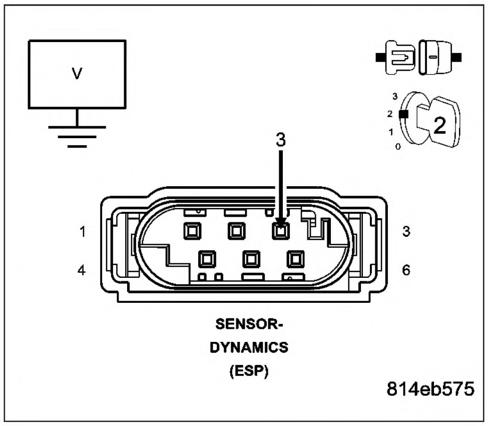
No >> Go To 5

---

5. (G4) SENSOR CLUSTER SUPPLY CIRCUIT SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (G4) Sensor Cluster Supply circuit.


V
3
2
1
0
2
3
1
4
3
6
SENSOR-
DYNAMICS
(ESP)
814eb575

Is there any voltage present?

Yes >> Repair the (G4) Sensor Cluster Supply circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

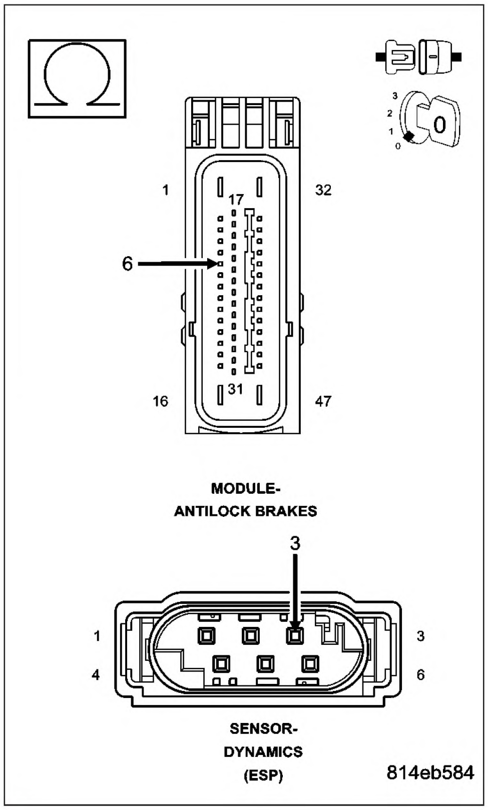
No >> Go To 6

C2204-SENSOR CLUSTER INTERNAL (CONTINUED)

6. (G4) SENSOR CLUSTER SUPPLY CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (G4) Sensor Cluster Supply circuit.


1
32
17
6
31
16
47
MODULE-
ANTILOCK BRAKES
3
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb584

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

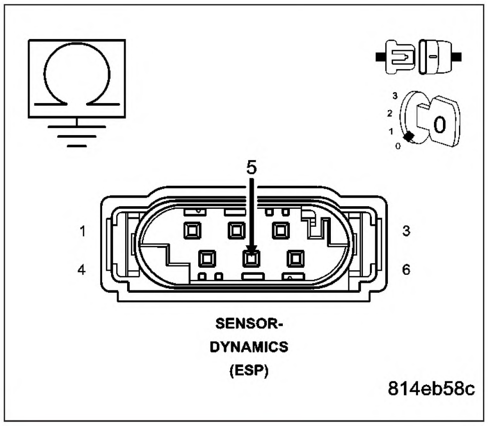
No >> Repair the (G4) Sensor Cluster Supply circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

7. CHECK THE RESISTANCE BETWEEN THE (G94) SENSOR CLUSTER GROUND CIRCUIT AND GROUND

Turn the ignition off.

Using a 12–volt test light connected to 12–volts, check the (G94) Sensor Cluster Ground Circuit at the Dynamics Sensor harness connector.


5
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb58c

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go To 10

No >> Go To 8

C2204-SENSOR CLUSTER INTERNAL (CONTINUED)

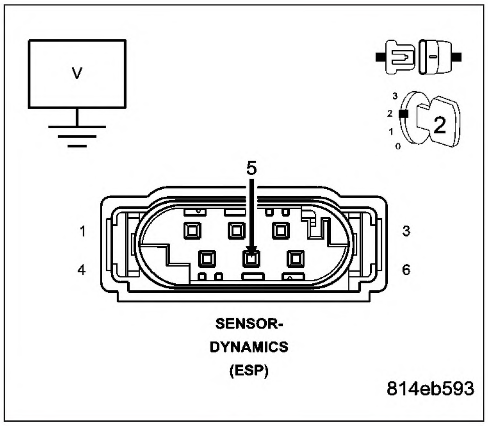
8. (G94) SENSOR CLUSTER GROUND CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (G94) Sensor Cluster Ground circuit.


V
2
3
2
1
0
5
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb593

Is there any voltage present?

Yes >> Repair the (G94) Sensor Cluster Ground circuit for a short to voltage.

Perform ABS VERIFICATION TEST - VER 1.

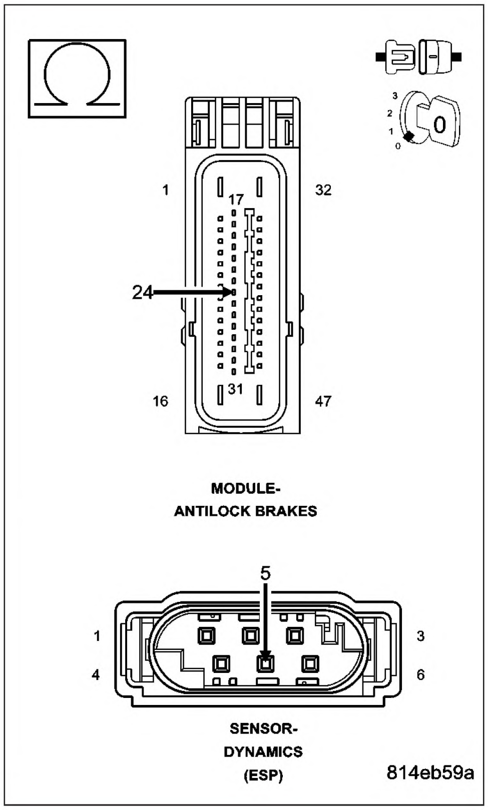
No >> Go To 9

---

9. (G94) SENSOR CLUSTER GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (G94) Sensor Cluster Return circuit.


Ω
0
3
2
1
0
1
17
32
24
16
31
47
MODULE-
ANTILOCK BRAKES
5
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814eb59a

Is the resistance below 5.0 ohms?

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (G94) Sensor Cluster Ground circuit for an open.

Perform ABS VERIFICATION TEST - VER 1.

C2204-SENSOR CLUSTER INTERNAL (CONTINUED)

10. CHECK THE DYNAMICS SENSOR OUTPUT

CAUTION: All previously removed connectors must be connected before test driving the vehicle.

CAUTION: Ensure brake capability is available before road testing.

Have an assistant test drive the vehicle while monitoring the Sensor Cluster operation.

Was the Lateral Sensor output between 0.02 G to 0.16 G and the Yaw Sensor between 1.30° to 5.70°

Yes >> Replace the Anti-Lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 11

---

11. (D52) SENSOR CLUSTER HIGH DATA LINK CIRCUIT SHORT TO VOLTAGE

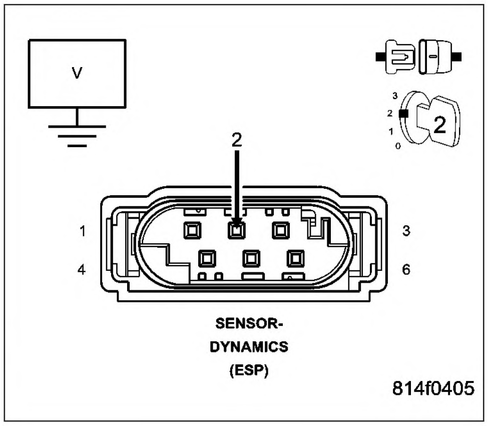
Turn the ignition off.

Disconnect the Sensor Cluster harness connector.

Disconnect the Anti-Lock Brake Module harness connector.

Turn the ignition on.

Measure the voltage of the (D52) Sensor Cluster High Data Link circuit.



Is there any voltage present?

Yes >> Repair the (D52) Sensor Cluster High Data Link circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

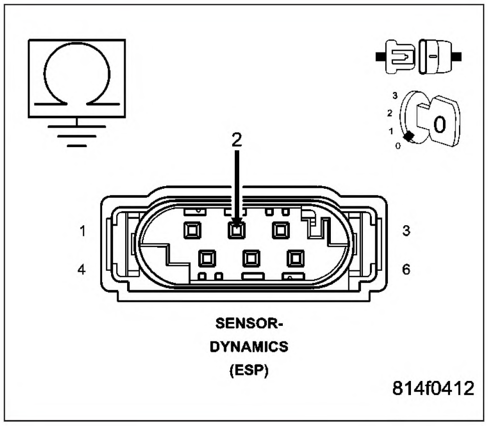
No >> Go To 12

---

12. (D52) SENSOR CLUSTER HIGH DATA LINK CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D52) Sensor Cluster High Data Link circuit.



Is the resistance below 5.0 ohms?

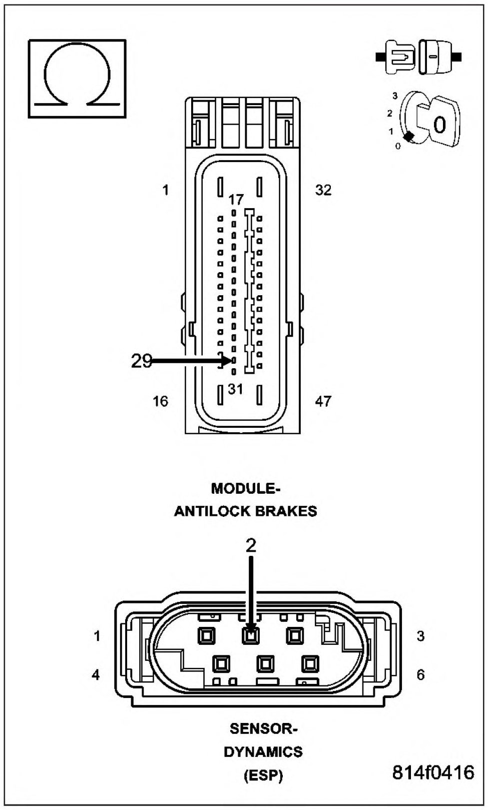
Yes >> Repair the (D52) Sensor Cluster High Data Link circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 13

C2204-SENSOR CLUSTER INTERNAL (CONTINUED)

13. CHECK THE (D52) SENSOR CLUSTER HIGH DATA LINK CIRCUIT FOR AN OPEN

Measure the resistance of the (D52) Sensor Cluster High Data Link circuit.


Ω
0
1
17
32
29
31
16
47
MODULE-
ANTILOCK BRAKES
2
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814f0416

Is the resistance below 5.0 ohms?

Yes >> Go To 14

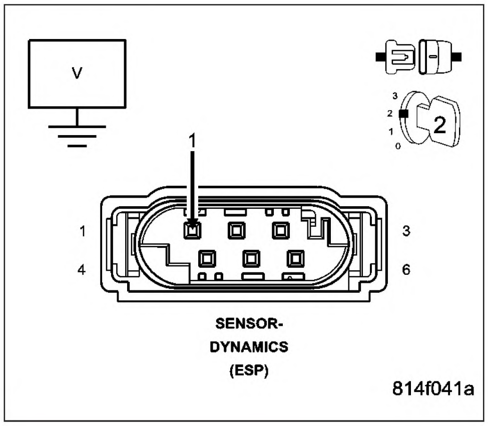
No >> Repair the (D52) Sensor Cluster High Data Link circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

14. CHECK THE (D51) SENSOR CLUSTER LOW DATA LINK CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (D51) Sensor Cluster Low Data Link circuit.


V
2
1
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814f041a

Is there any voltage present?

Yes >> Repair the (D51) Sensor Cluster Low Data Link circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

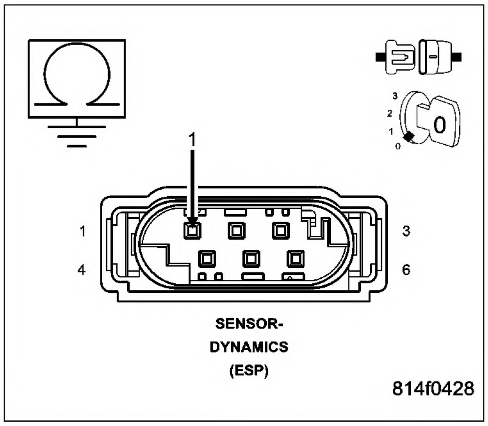
No >> Go To 15

C2204-SENSOR CLUSTER INTERNAL (CONTINUED)

15. CHECK THE (D51) SENSOR CLUSTER LOW DATA LINK CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D51) Sensor Cluster Low Data Link circuit.


1
1
3
4
6
3
2
1
0
0
SENSOR-
DYNAMICS
(ESP)
814f0428

Is the resistance below 5.0 ohms?

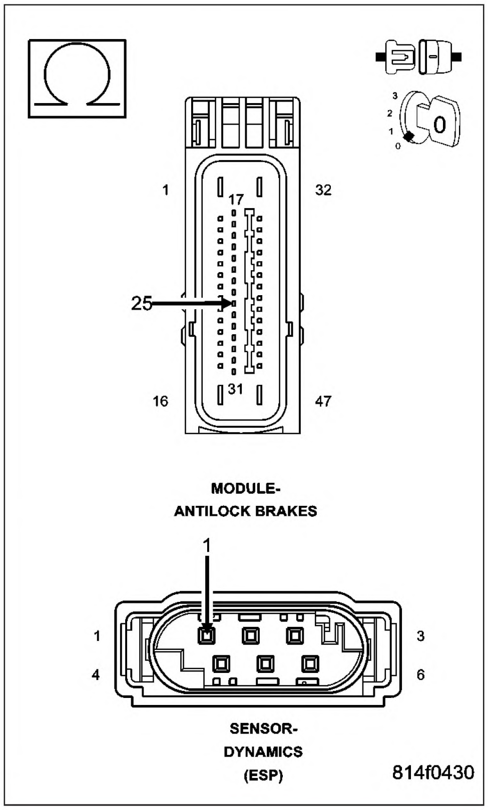
Yes >> Repair the (D51) Sensor Cluster Low Data Link circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 16

---

16. CHECK THE (D51) SENSOR CLUSTER LOW DATA LINK CIRCUIT FOR AN OPEN

Measure the resistance of the (D51) Sensor Cluster Low Data Link circuit.

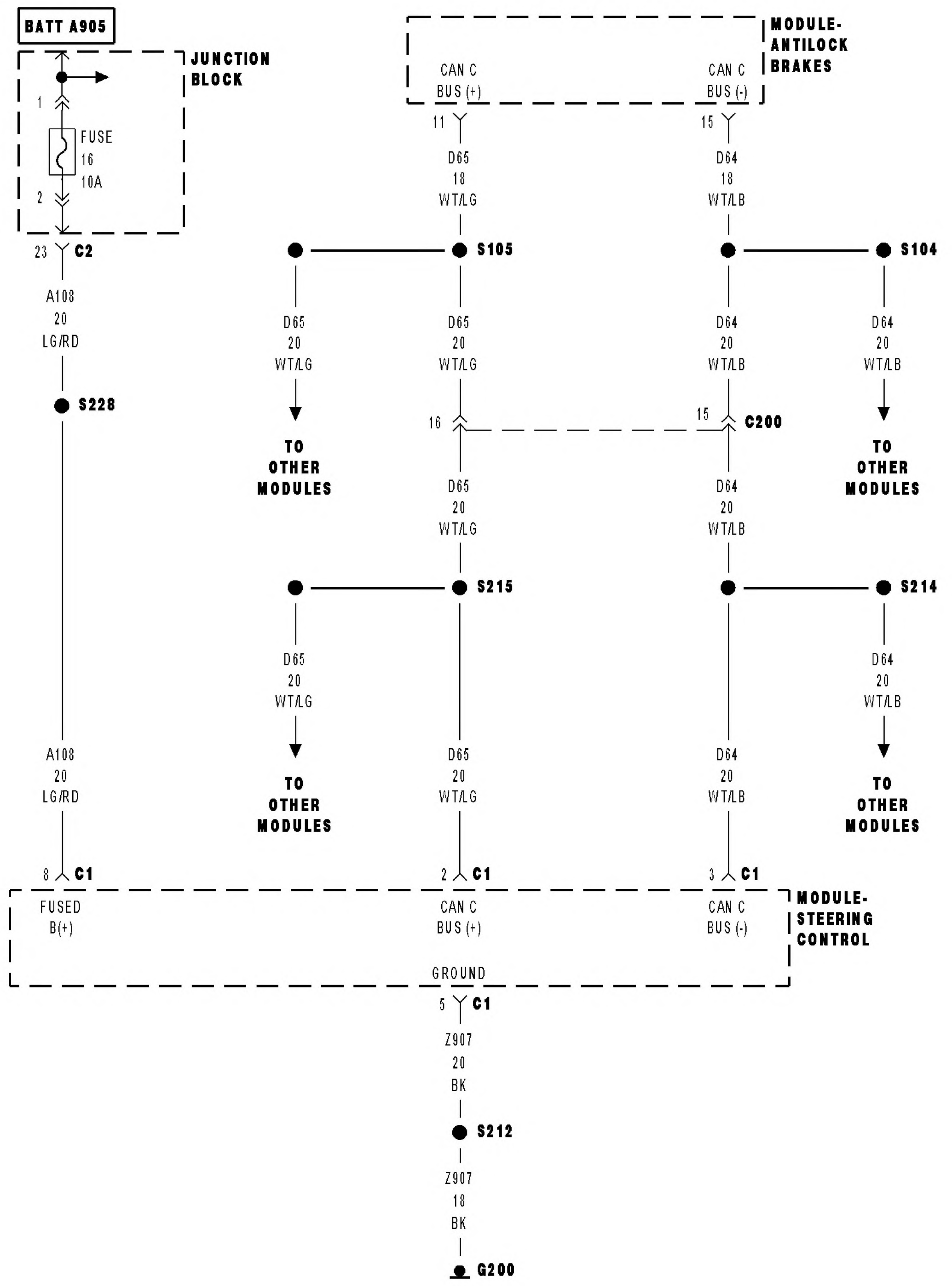

3
2
1
0
0
1
17
32
25
16
31
47
MODULE-
ANTILOCK BRAKES
1
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814f0430

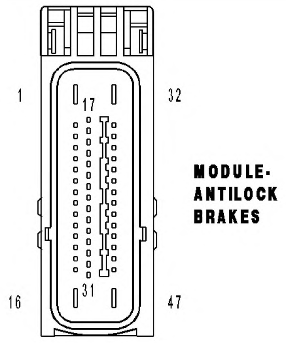
Is the resistance below 5.0 ohms?

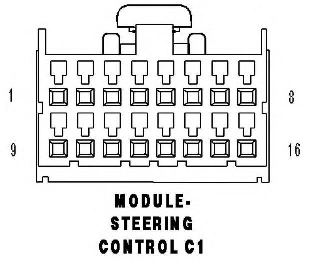
Yes >> Replace the Sensor Cluster in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (D51) Sensor Cluster High Data Link circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

C2205-STEERING ANGLE SENSOR INTERNAL


BATT A905
JUNCTION BLOCK
1
FUSE
16
10A
2
23 C2
A108
20
LG/RD
S228
A108
20
LG/RD
8 C1
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
11
15
D65
18
WT/LG
D64
18
WT/LB
S105
S104
D65
20
WT/LG
TO OTHER MODULES
D65
20
WT/LG
D64
20
WT/LB
D64
20
WT/LB
TO OTHER MODULES
16
15
C200
D65
20
WT/LG
D64
20
WT/LB
S215
S214
D65
20
WT/LG
TO OTHER MODULES
D64
20
WT/LB
TO OTHER MODULES
D65
20
WT/LG
D64
20
WT/LB
2 C1
3 C1
MODULE-STEERING CONTROL
FUSED B(+)
CAN C BUS (+)
CAN C BUS (-)
GROUND
5 C1
Z907
20
BK
S212
Z907
18
BK
G200


1
17
32
16
31
47
MODULE-ANTILOCK BRAKES


1
8
9
16
MODULE-STEERING CONTROL C1

814dc59a

C2205-STEERING ANGLE SENSOR INTERNAL (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects the Steering Angle Sensor has sent the internal failure status.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
COMMUNICATION DTCS PRESENT
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C2205-STEERING ANGLE SENSOR INTERNAL

NOTE: Diagnose and repair any Steering Angle Sensor DTCs in the Steering Column Module before continuing with this test.

NOTE: Diagnose and repair any communication DTCs in the SCM, FCM or PCM before continuing with this test.

NOTE: Diagnose and repair any system under voltage or over voltage DTCs before continuing with this test.

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

With the scan tool, read DTCs

Does the scan tool display: C2205-STEERING ANGLE SENSOR INTERNAL?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.

Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Monitor the scan tool data relative to this circuit while performing a wiggle test on the wiring. Look for the data to change other than as expected or for the DTC to reset.

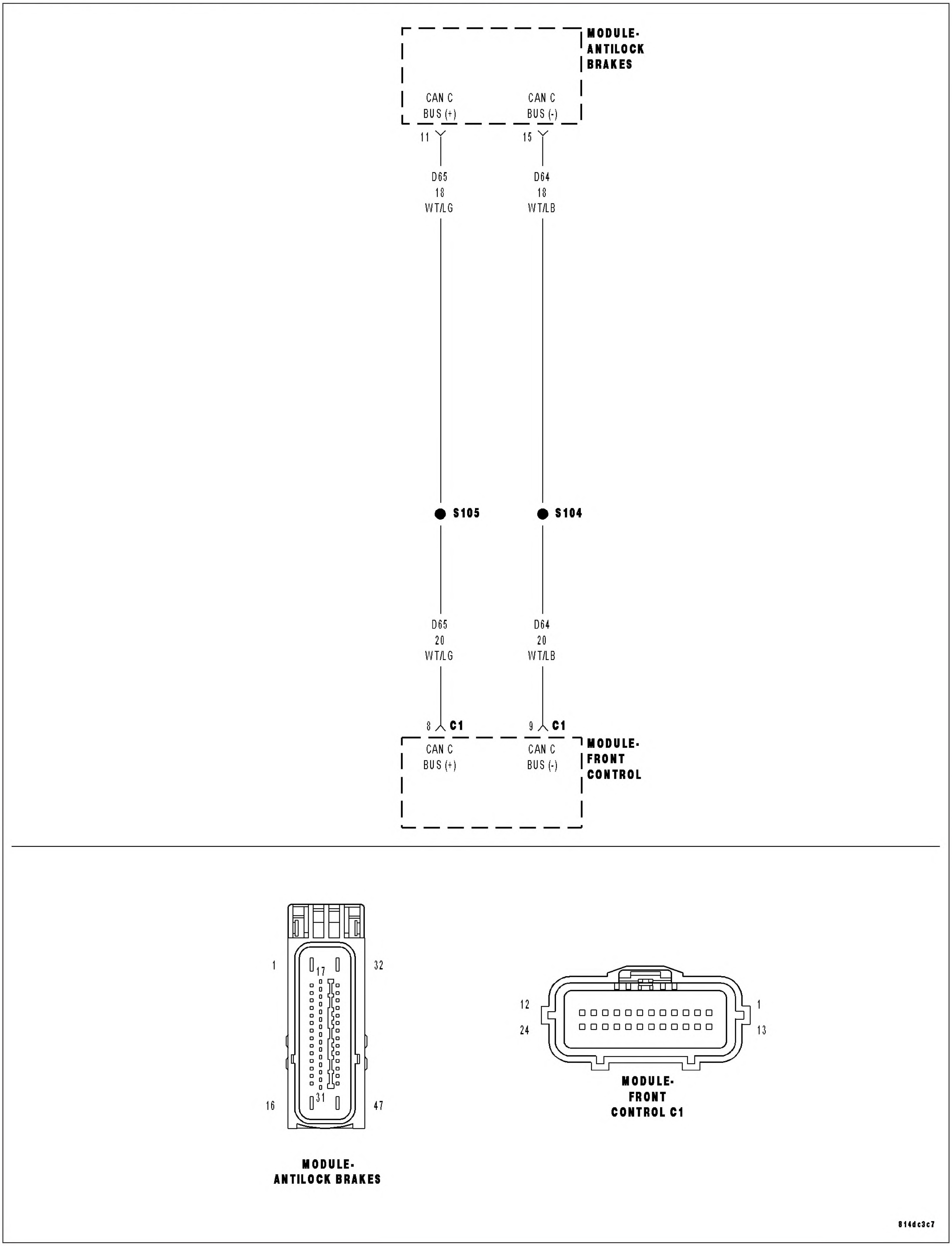
Refer to any Technical Service Bulletins that apply.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace the Anti-lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

C2206-VEHICLE CONFIGURATION MISMATCH


MODULE-
ANTILOCK
BRAKES
CAN C
BUS (+)
CAN C
BUS (-)
11
15
D65
18
WT/LG
D64
18
WT/LB
S105
S104
D65
20
WT/LG
D64
20
WT/LB
8
C1
9
C1
CAN C
BUS (+)
CAN C
BUS (-)
MODULE-
FRONT
CONTROL
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
814dc3c7

C2206-VEHICLE CONFIGURATION MISMATCH (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects the signal from the gateway module relevant for vehicle characteristic is missing for a period greater than the specified fault duration.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
COMMUNICATION DTCS PRESENT
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK FOR A DTC C2206-VEHICLE CONFIGURATION MISMATCH

NOTE: This DTC must be active for the results of this test to be valid.

NOTE: Diagnose and repair any communication DTCs in the FCM or PCM before continuing with this test.

NOTE: Diagnose and repair any system under voltage or over voltage DTCs before continuing with this test.

Turn the ignition on.

With the scan tool, read DTCs.

Record DTC and Freeze Frame information.

With the scan tool, erase DTCs.

Cycle the ignition switch off then on.

With the scan tool, read DTCs

Does the scan tool display: C2206-VEHICLE CONFIGURATION MISMATCH?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.

Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Monitor the scan tool data relative to this circuit while performing a wiggle test on the wiring. Look for the data to change other than as expected or for the DTC to reset.

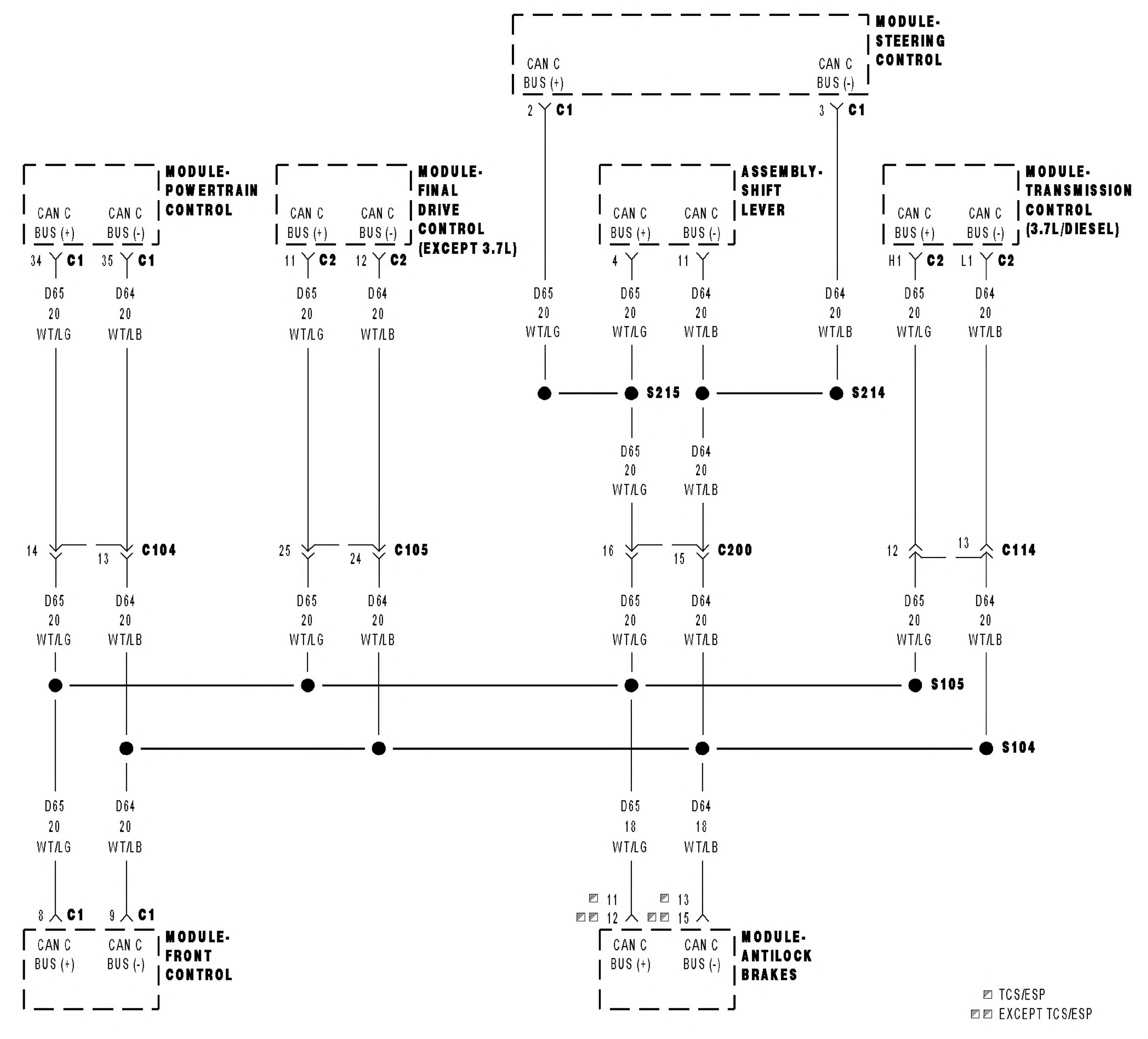
Refer to any Technical Service Bulletins that apply.

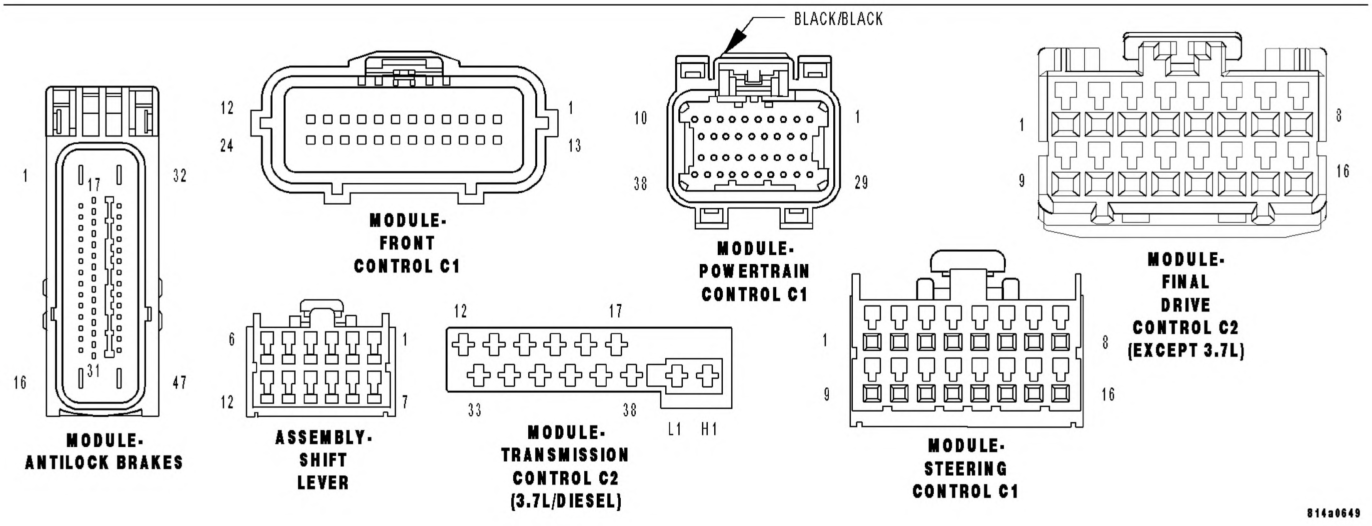
Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace the Anti-lock Brake Module in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

U0002-CAN C BUS OFF PERFORMANCE


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14 C104 13
25 C105 24
16 C200 15
12 C114 13
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
16
31
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK/BLACK
10
38
1
29
MODULE-POWERTRAIN CONTROL C1
1
9
8
16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6
12
1
7
ASSEMBLY-SHIFT LEVER
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
9
8
16
MODULE-STEERING CONTROL C1
814a0649

U0002-CAN C BUS OFF PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The FCM detects a short in either CAN C Bus circuit.

Possible Causes
(D65) CAN C BUS (+) CIRCUIT SHORTED TO GROUND
(D64) CAN C BUS (-) CIRCUIT SHORTED TO GROUND
(D65) CAN C BUS (+) CIRCUIT SHORTED TO VOLTAGE
(D64) CAN C BUS (-) CIRCUIT SHORTED TO VOLTAGE
(D65) CAN C BUS (+) CIRCUIT SHORTED TO (D64) CAN C BUS (-) CIRCUIT
ANTILOCK BRAKE MODULE
POWERTRAIN CONTROL MODULE
SHIFTER LEVER ASSEMBLY (NAG1 ONLY)
TRANSMISSION CONTROL MODULE (NAG1 ONLY)
STEERING CONTROL MODULE
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC’s.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC’s.

Does the scan tool display U0002-CAN C BUS OFF PERFORMANCE as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

U0002-CAN C BUS OFF PERFORMANCE (CONTINUED)

2. ANTILOCK BRAKE MODULE — INTERNAL SHORT

Turn the ignition off.

Disconnect the Antilock Brake Module harness connector.

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display U0002-CAN C BUS OFF PERFORMANCE as active?

Yes >> Go To 3

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Antilock Brake Module in accordance with the service information.
Perform ABS VERIFICATION TEST — VER 1.

---

3. POWERTRAIN CONTROL MODULE — INTERNAL SHORT

Turn the ignition off.

Disconnect the Powertrain Control Module C1 harness connector.

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display U0002-CAN C BUS OFF PERFORMANCE as active?

Yes >> Go To 4

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Powertrain Control Module in accordance with the service information.
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

---

4. SHIFTER LEVER ASSEMBLY (NAG1 ONLY)— INTERNAL SHORT

Turn the ignition off.

NOTE: If the vehicle is not equipped with a NAG1 controller then skip this step.

Disconnect the Shifter Lever Assembly harness connector.

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display U0002-CAN C BUS OFF PERFORMANCE as active?

Yes >> Go To 5

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Shifter Lever Assembly in accordance with the service information.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U0002-CAN C BUS OFF PERFORMANCE (CONTINUED)

5. TRANSMISSION CONTROL MODULE (NAG1 ONLY)— INTERNAL SHORT

Turn the ignition off.

NOTE: If the vehicle is not equipped with a NAG1 controller then skip this step.

Disconnect the Transmission Control Module C2 harness connector.

Turn the ignition on.

With the scan tool, record and erase FCM DTC’s.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC’s.

Does the scan tool display U0002-CAN C BUS OFF PERFORMANCE as active?

Yes >> Go To 6

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Transmission Control Module in accordance with the service information.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

6. STEERING CONTROL MODULE — INTERNAL SHORT

Turn the ignition off.

Disconnect the Steering Control Module harness connector.

Turn the ignition on.

With the scan tool, record and erase FCM DTC’s.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC’s.

Does the scan tool display U0002-CAN C BUS OFF PERFORMANCE as active?

Yes >> Go To 7

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Steering Control Module in accordance with the service information.
Perform BODY VERIFICATION TEST - VER 1.

7. (D65) CAN C BUS (+) CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

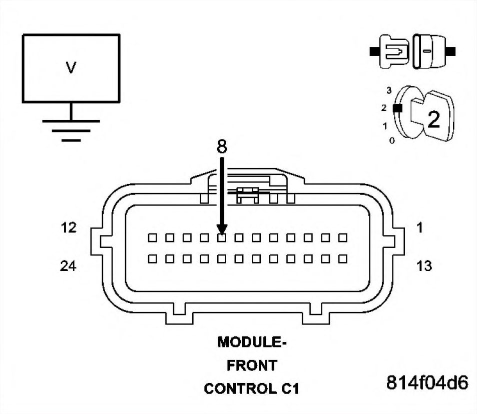
Turn the ignition on.

Measure the voltage between the (D65) CAN C Bus (+) circuit and ground.

Is there any voltage present?

Yes >> Repair the (D65) CAN C Bus (+) circuit for a short to voltage.
Perform BODY VERIFICATION TEST - VER 1.

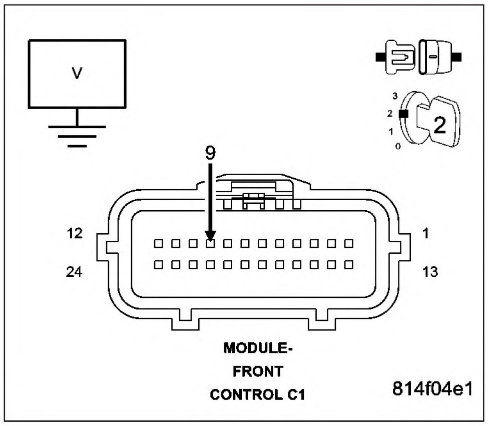
No >> Go To 8



U0002-CAN C BUS OFF PERFORMANCE (CONTINUED)

8. (D64) CAN C BUS (-) CIRCUIT SHORTED TO VOLTAGE

Measure the voltage between the (D64) CAN C Bus (-) circuit and ground.


V
3
2
1
0
2
9
12
24
1
13
MODULE-
FRONT
CONTROL C1
814f04e1

Is there any voltage present?

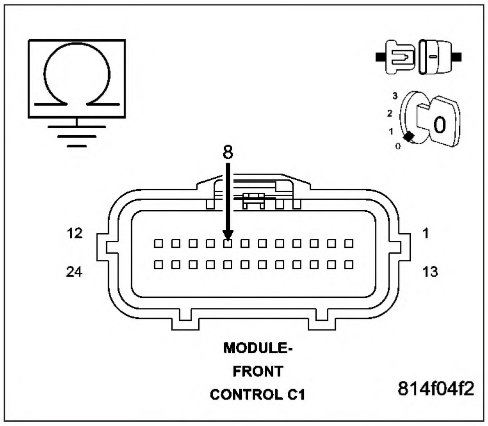
Yes >> Repair the (D64) CAN C Bus (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST - VER 1.

No >> Go To 9

9. (D65) CAN C BUS (+) CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D65) CAN C Bus (+) circuit.


Ω
3
2
1
0
0
8
12
24
1
13
MODULE-
FRONT
CONTROL C1
814f04f2

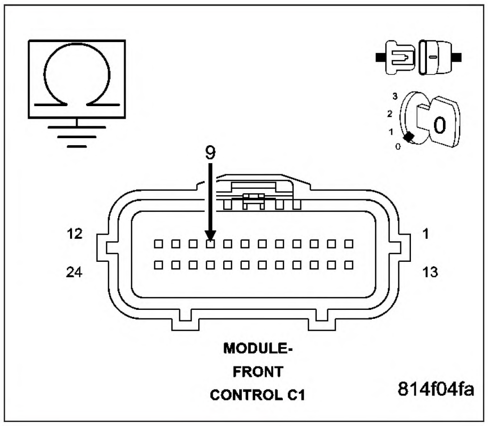
Is any resistance present?

Yes >> Repair the (D65) CAN C Bus (+) circuit for a short to ground.
Perform BODY VERIFICATION TEST - VER 1.

No >> Go To 10

10. (D64) CAN C BUS (-) CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (D64) CAN C Bus (-) circuit.


Ω
3
2
1
0
0
9
12
24
1
13
MODULE-
FRONT
CONTROL C1
814f04fa

Is any resistance present?

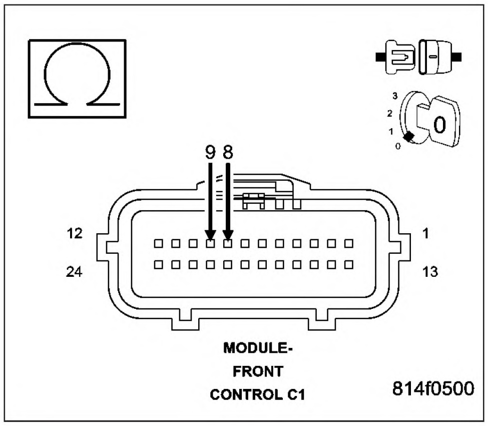
Yes >> Repair the (D64) CAN C Bus (-) circuit for a short to ground.
Perform BODY VERIFICATION TEST - VER 1.

No >> Go To 11

U0002-CAN C BUS OFF PERFORMANCE (CONTINUED)

11. (D65) CAN C BUS (+) CIRCUIT SHORTED TO (D64) CAN C BUS (-) CIRCUIT

Measure the resistance between the (D65) CAN C Bus (+) circuit and the (D64) CAN C Bus (-) circuit.



Is any resistance present?

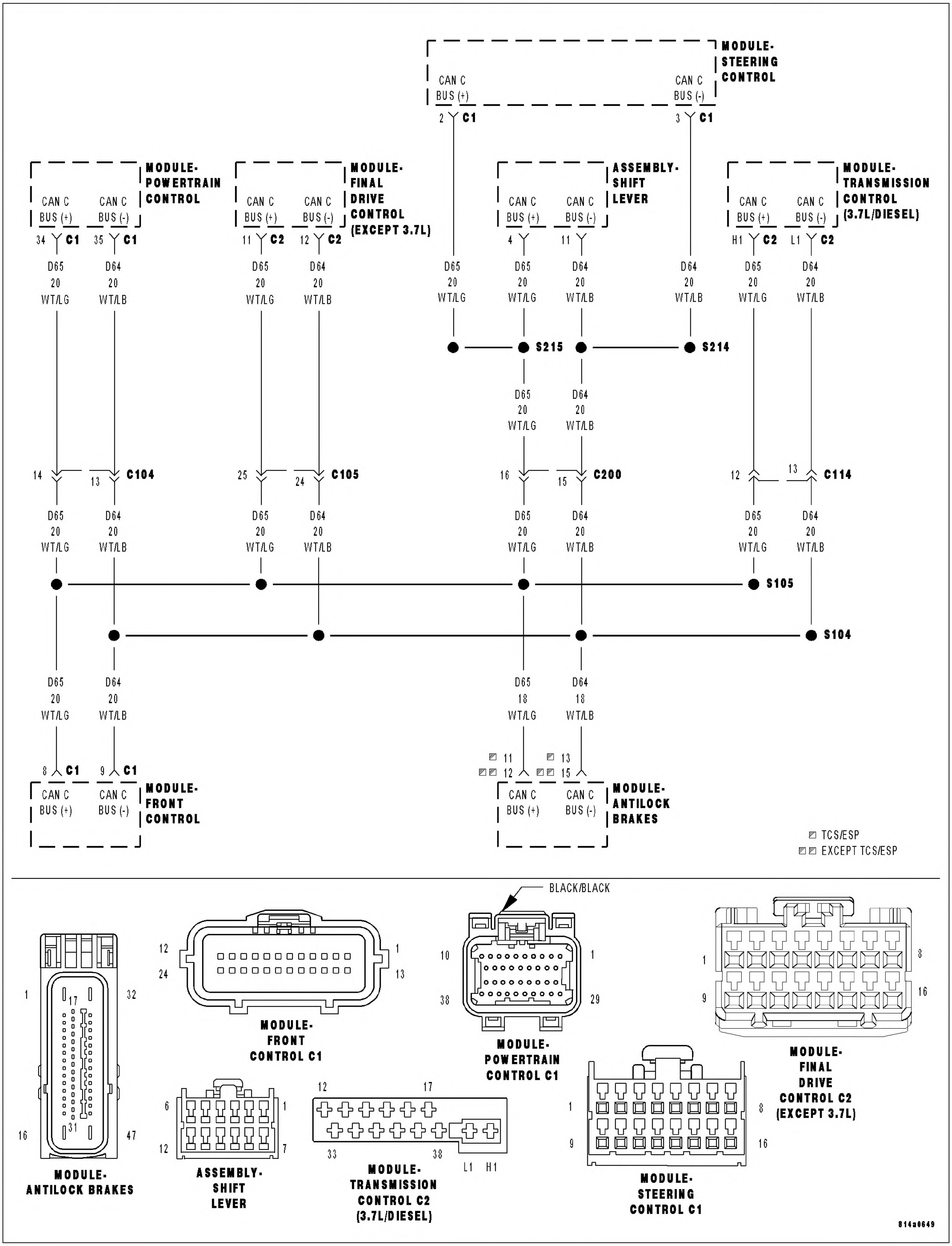
Yes >> Repair the (D65) CAN C Bus (+) circuit for a short to the (D64) CAN C Bus (-) circuit.

Perform BODY VERIFICATION TEST - VER 1.

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1.

U0100-LOST COMMUNICATION WITH ECM/PCM


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14 13 C104
25 24 C105
16 15 C200
12 13 C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
11 12
13 15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1 17 32 16 31 47
MODULE-ANTILOCK BRAKES
12 24 1 13
MODULE-FRONT CONTROL C1
6 1 12 7
ASSEMBLY-SHIFT LEVER
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
10 1 38 29
MODULE-POWERTRAIN CONTROL C1
1 8 9 16
MODULE-STEERING CONTROL C1
1 8 9 16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
814a0649

U0100-LOST COMMUNICATION WITH ECM/PCM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the ECM/PCM for approximately 500ms.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
ECM/PCM
ECM/PCM POWER AND GROUND
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section. Perform BODY VERIFICATION TEST – VER 1.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms. Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 3

U0100-LOST COMMUNICATION WITH ECM/PCM (CONTINUED)

3. VERIFY THAT THE ECM/PCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the ECM/PCM is active on the bus.

Is the ECM/PCM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.
Perform BODY VERIFICATION TEST – VER 1.

---

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

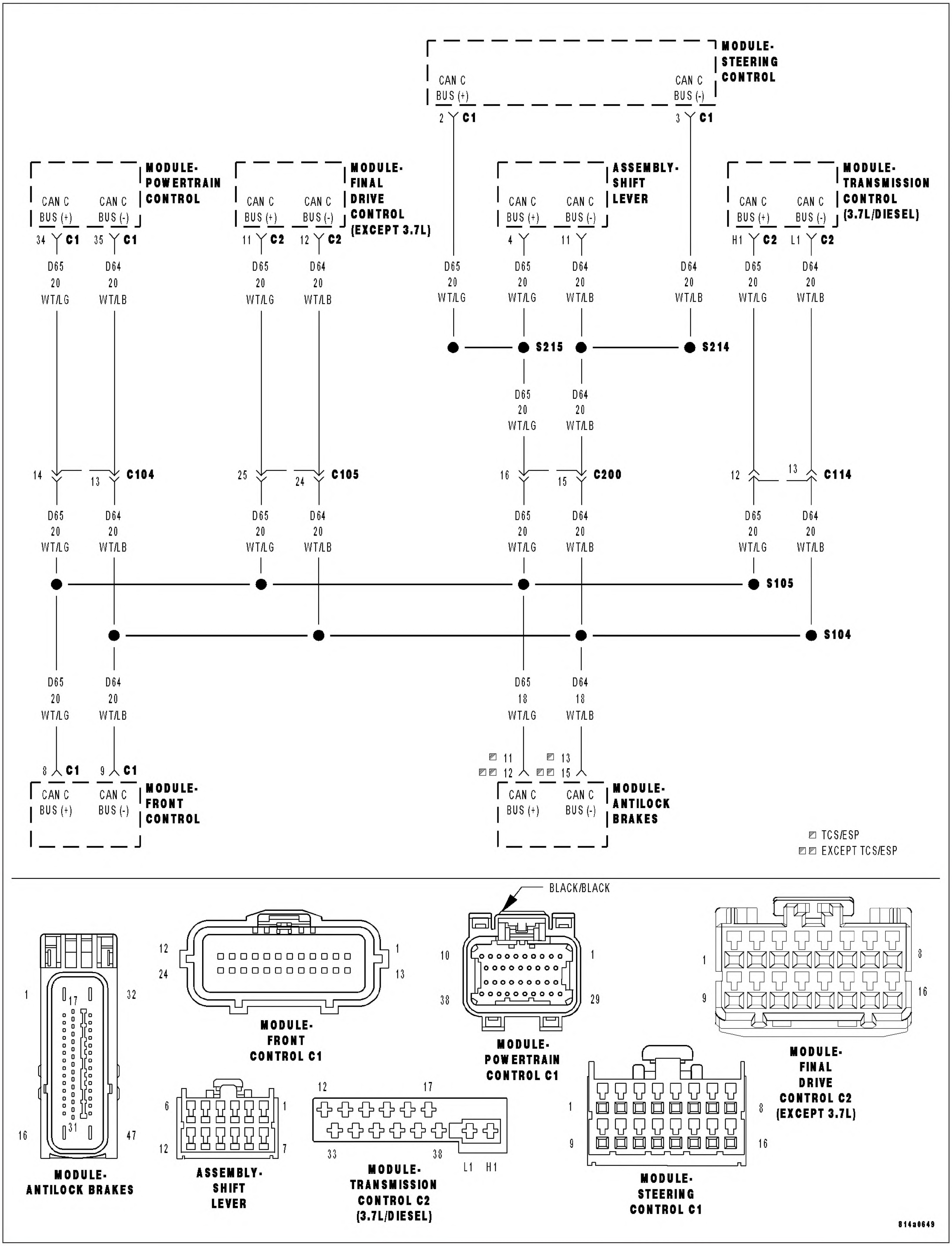
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the ECM/PCM?

Yes >> Replace/update the ECM/PCM in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

U0101-LOST COMMUNICATION WITH TCM


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14
13
C104
25
24
C105
16
15
C200
12
13
C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
10
38
1
29
MODULE-POWERTRAIN CONTROL C1
1
9
8
16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6
12
1
7
ASSEMBLY-SHIFT LEVER
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
9
8
16
MODULE-STEERING CONTROL C1
814a0649

U0101-LOST COMMUNICATION WITH TCM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the TCM for approximately 500ms.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
TCM
TCM POWER AND GROUND
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section. Perform BODY VERIFICATION TEST – VER 1.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms. Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 3

U0101-LOST COMMUNICATION WITH TCM (CONTINUED)

3. VERIFY THAT THE TCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the TCM is active on the bus.

Is the TCM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.
Perform BODY VERIFICATION TEST – VER 1.

---

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

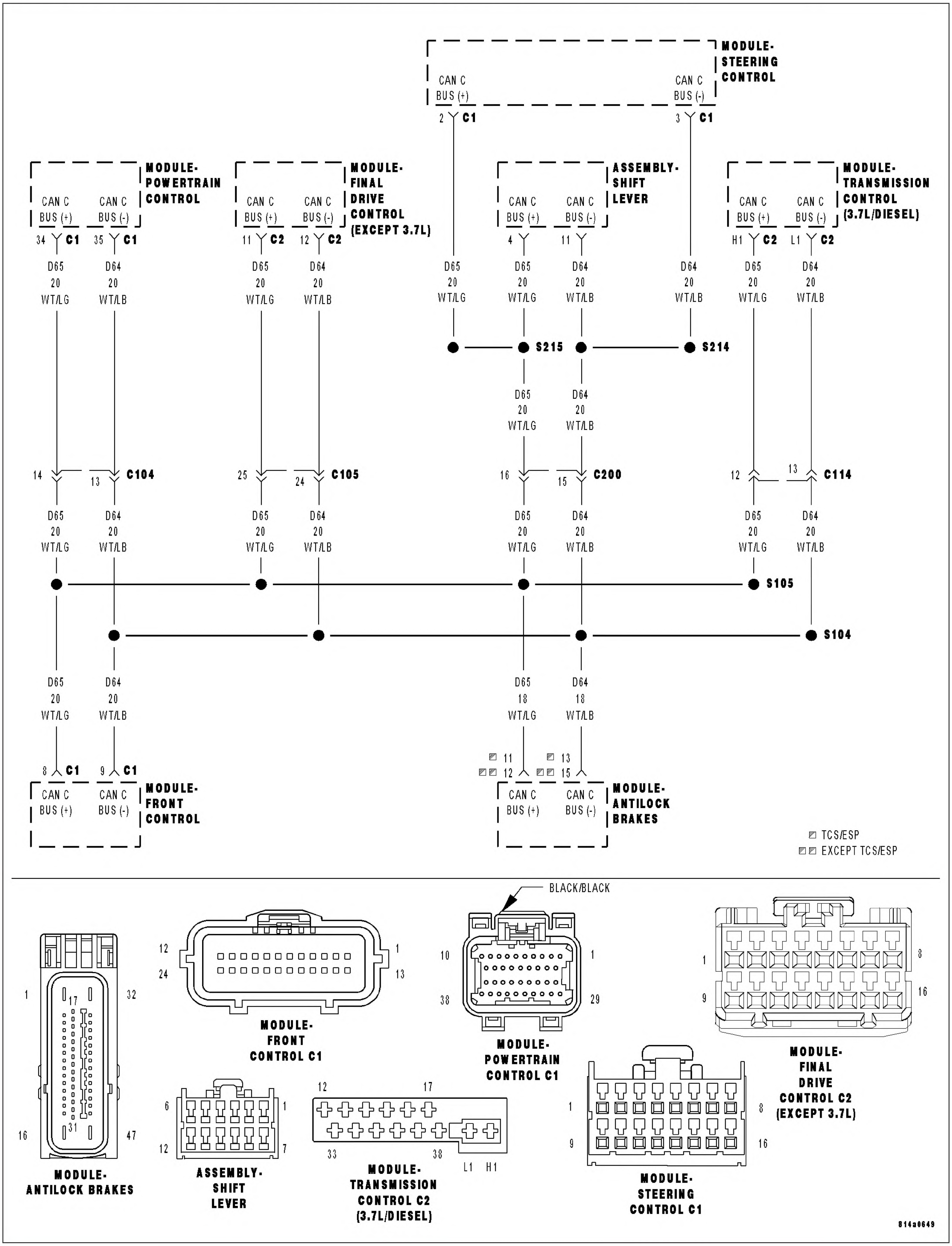
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the TCM?

Yes >> Replace/update the TCM in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

U0114-LOST COMMUNICATION WITH FINAL DRIVE MODULE


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
C104
14
13
C105
25
24
C200
16
15
C114
12
13
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
MODULE-ANTILOCK BRAKES
1
17
32
16
31
47
MODULE-FRONT CONTROL C1
12
24
1
13
MODULE-POWERTRAIN CONTROL C1
10
38
1
29
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
1
9
8
16
ASSEMBLY-SHIFT LEVER
6
12
1
7
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
12
17
33
38
L1
H1
MODULE-STEERING CONTROL C1
1
9
8
16
814a0649

U0114-LOST COMMUNICATION WITH FINAL DRIVE MODULE (CONTINUED)

For the Engine circuit diagram (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ENGINE CONTROL MODULE - SCHEMATIC - ELECTRICAL)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Front Control Module for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FDCM NOT CONFIGURED CORRECTLY
FINAL DRIVE CONTROL MODULE
FINAL DRIVE CONTROL MODULE POWER AND GROUND
MODULE THAT SET THIS DTC

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section. Perform BODY VERIFICATION TEST – VER 1.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FDCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms. Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 3

U0114-LOST COMMUNICATION WITH FINAL DRIVE MODULE (CONTINUED)

3. VERIFY THAT THE FDCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the FDCM is active on the bus.

Is the FCM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.
Perform BODY VERIFICATION TEST – VER 1.

---

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

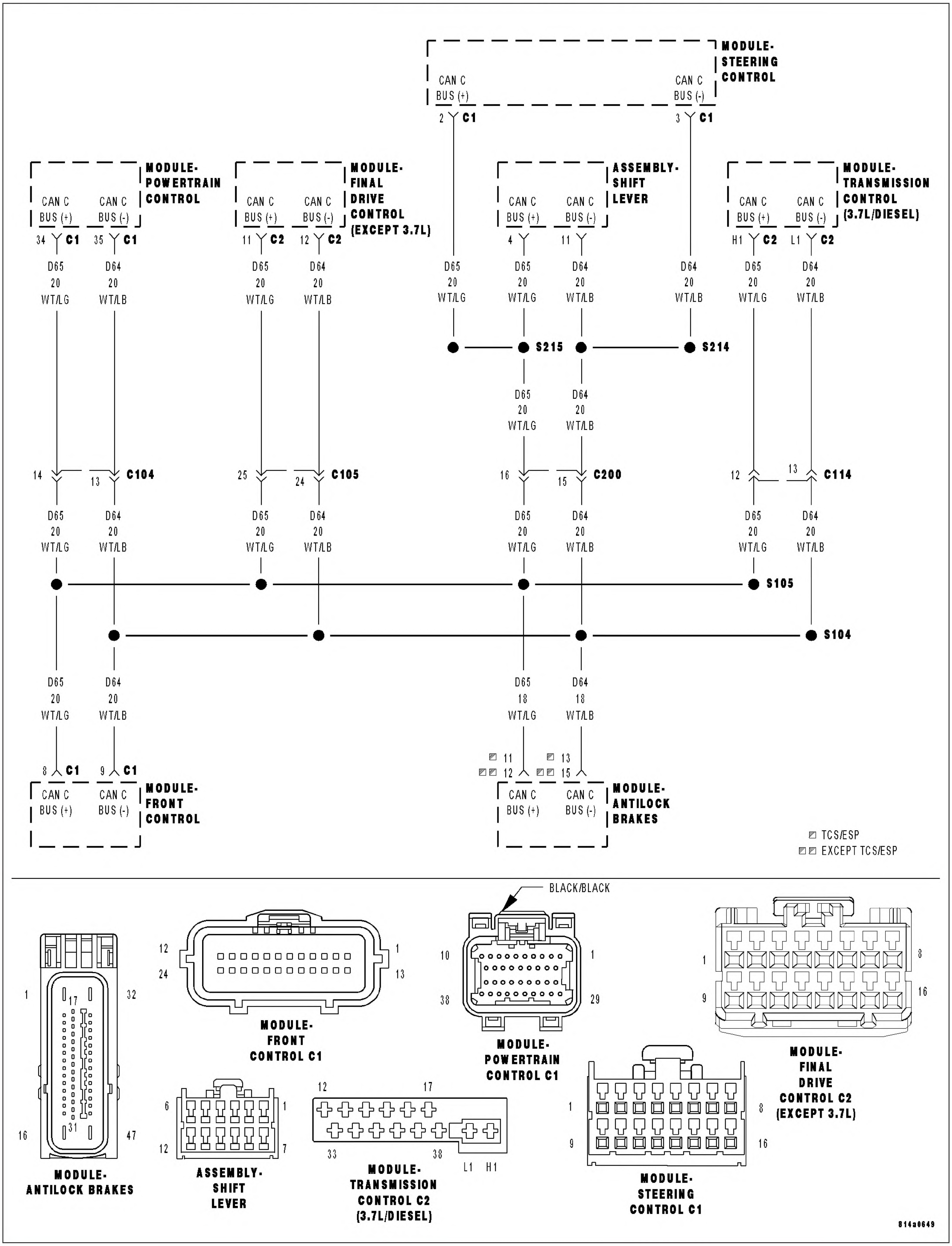
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the FDCM?

Yes >> Replace/update the Final DriveControl Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information
Perform BODY VERIFICATION TEST – VER 1.

U0126-LOST COMMUNICATION WITH STEERING ANGLE SENSOR


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14 13 C104
25 24 C105
16 15 C200
12 13 C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
11 12
13 15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1 32 17 31 16 47
MODULE-ANTILOCK BRAKES
12 1 24 13
MODULE-FRONT CONTROL C1
10 1 38 29
MODULE-POWERTRAIN CONTROL C1
1 8 9 16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6 1 12 7
ASSEMBLY-SHIFT LEVER
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 8 9 16
MODULE-STEERING CONTROL C1
814a0649

U0126-LOST COMMUNICATION WITH STEERING ANGLE SENSOR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Steering Angle Sensor for approximately 500ms.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
STEERING ANGLE SENSOR
STEERING ANGLE SENSOR POWER AND GROUND
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section. Perform BODY VERIFICATION TEST – VER 1.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms. Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 3

U0126-LOST COMMUNICATION WITH STEERING ANGLE SENSOR (CONTINUED)

3. VERIFY THAT THE STEERING ANGLE SENSOR IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the Steering Angle Sensor is active on the bus.

Is the Steering Angle Sensor active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.
Perform BODY VERIFICATION TEST – VER 1.

---

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

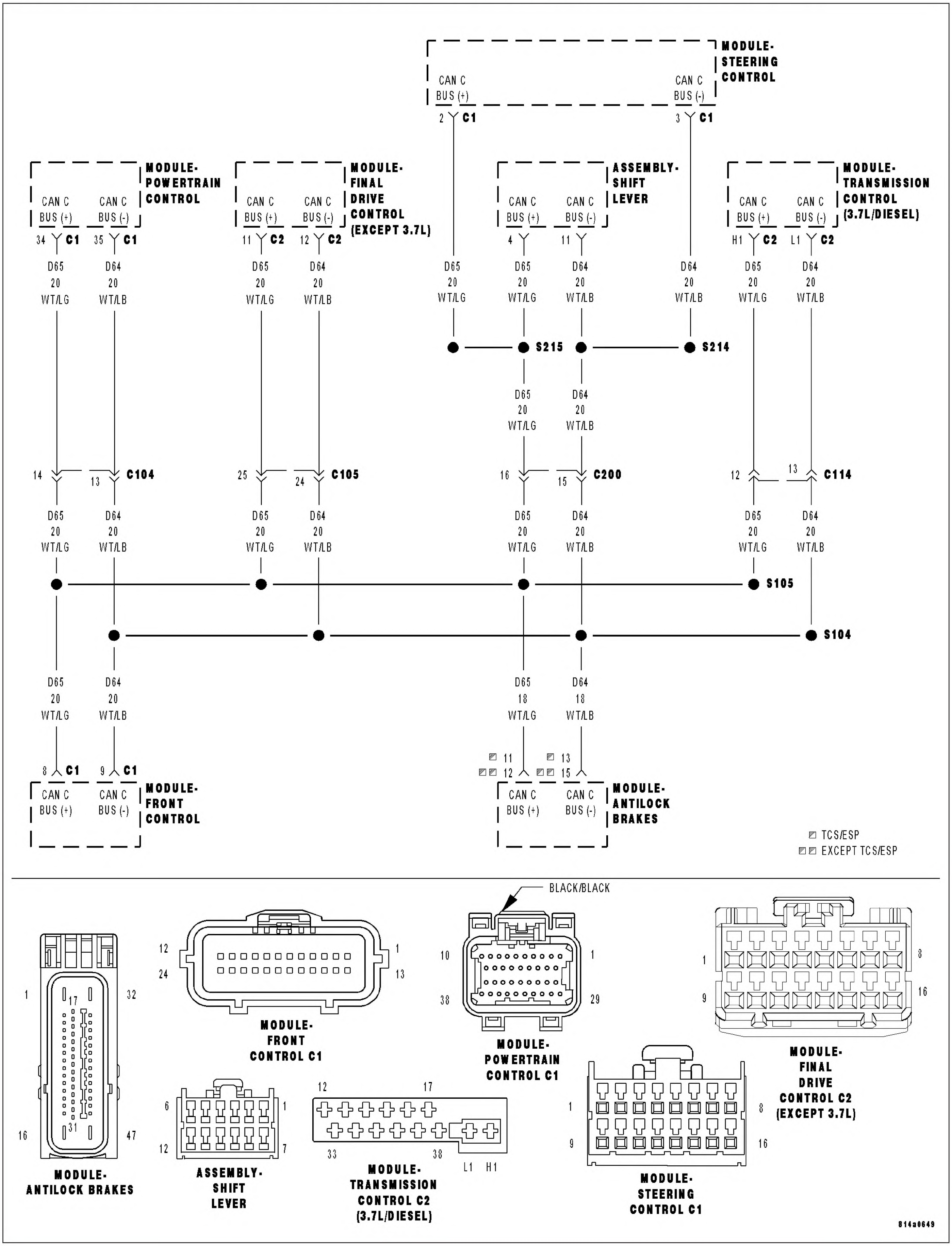
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the STEERING ANGLE SENSOR?

Yes >> Replace/update the Steering Angle Sensor in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE


MODULE-
STEERING
CONTROL
CAN C
BUS (+)
CAN C
BUS (-)
2 C1
3 C1
MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (+)
CAN C
BUS (-)
34 C1
35 C1
MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-
SHIFT
LEVER
4
11
MODULE-
TRANSMISSION
CONTROL
(3.7L/DIESEL)
H1 C2
L1 C2
D65
20
WT/LG
D64
20
WT/LB
S215
S214
D65
18
WT/LG
D64
18
WT/LB
14
13
C104
25
24
C105
16
15
C200
12
13
C114
S105
S104
8 C1
9 C1
MODULE-
FRONT
CONTROL
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-
ANTILOCK
BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1
32
17
16
31
47
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
6
12
1
7
ASSEMBLY-
SHIFT
LEVER
12
17
33
38
L1
H1
MODULE-
TRANSMISSION
CONTROL C2
(3.7L/DIESEL)
1
9
8
16
MODULE-
STEERING
CONTROL C1
814a0649

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Front Control Module for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
FRONT CONTROL MODULE
FRONT CONTROL MODULES POWER AND GROUND
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section. Perform BODY VERIFICATION TEST – VER 1.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms. Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 3

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

3. VERIFY THAT THE FCM IS ACTIVE ON THE BUS

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Verify that the FCM is active on the bus.

Is the FCM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.
Perform BODY VERIFICATION TEST – VER 1.

---

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

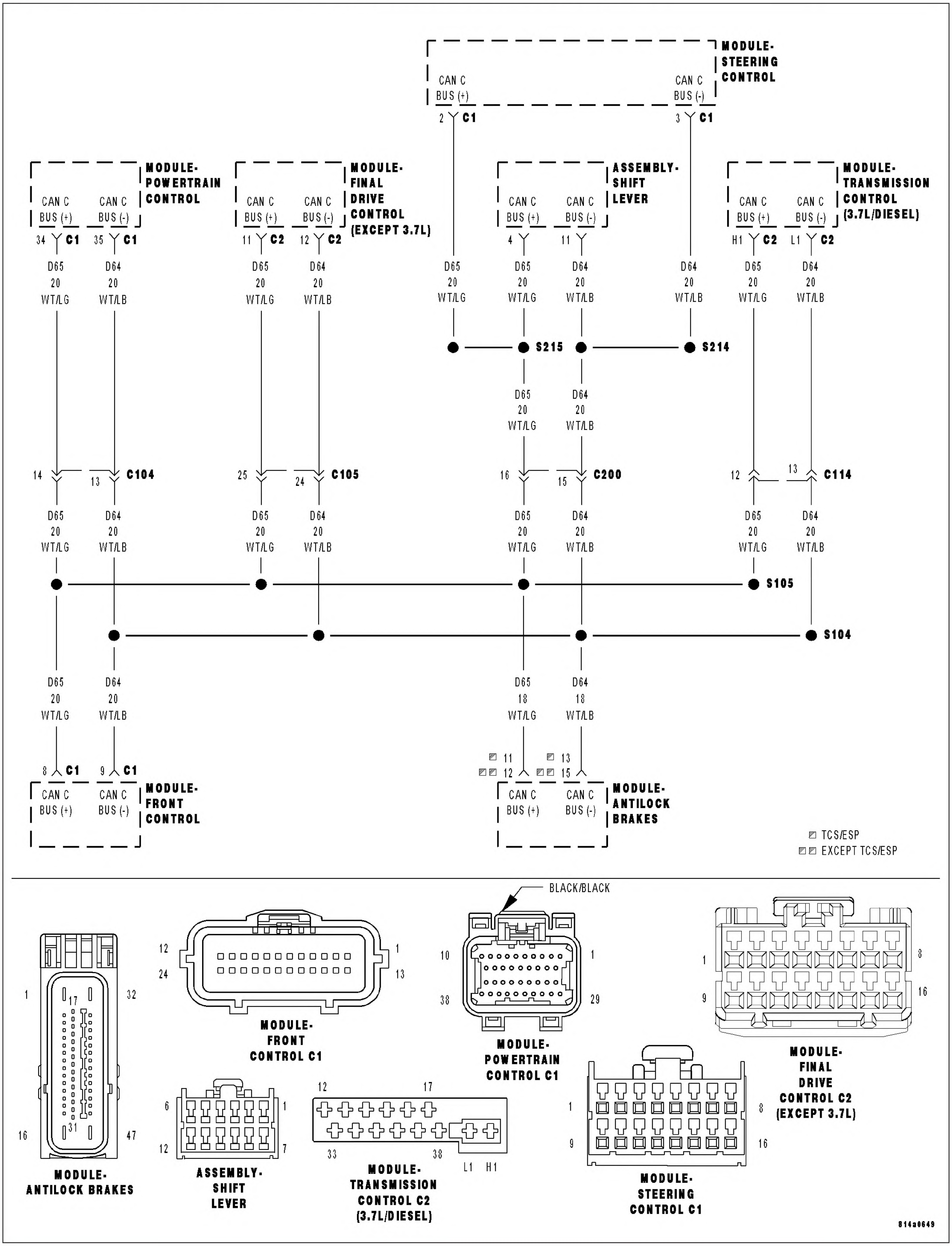
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the FCM?

Yes >> Replace/update the Front Control Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information
Perform BODY VERIFICATION TEST – VER 1.

U0401-IMPLAUSIBLE DATA RECEIVED FROM ECM/PCM


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14
13
C104
25
24
C105
16
15
C200
12
13
C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1
32
17
16
31
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
10
38
1
29
MODULE-POWERTRAIN CONTROL C1
1
9
8
16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6
12
1
7
ASSEMBLY-SHIFT LEVER
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
9
8
16
MODULE-STEERING CONTROL C1
814a0649

U0401-IMPLAUSIBLE DATA RECEIVED FROM ECM/PCM (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, one valid CAN message received at least once, and no U0002-CAN C Bus Off Performance DTC present.
- **Set Condition:**
  When the Anti-Lock Brake Module detects an incorrect CAN message from the Engine Control Module (ECM).

Possible Causes
FCM CAN BUS DTCS
ENGINE DTCS
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK IF FCM CAN BUS DTC'S ARE PRESENT

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

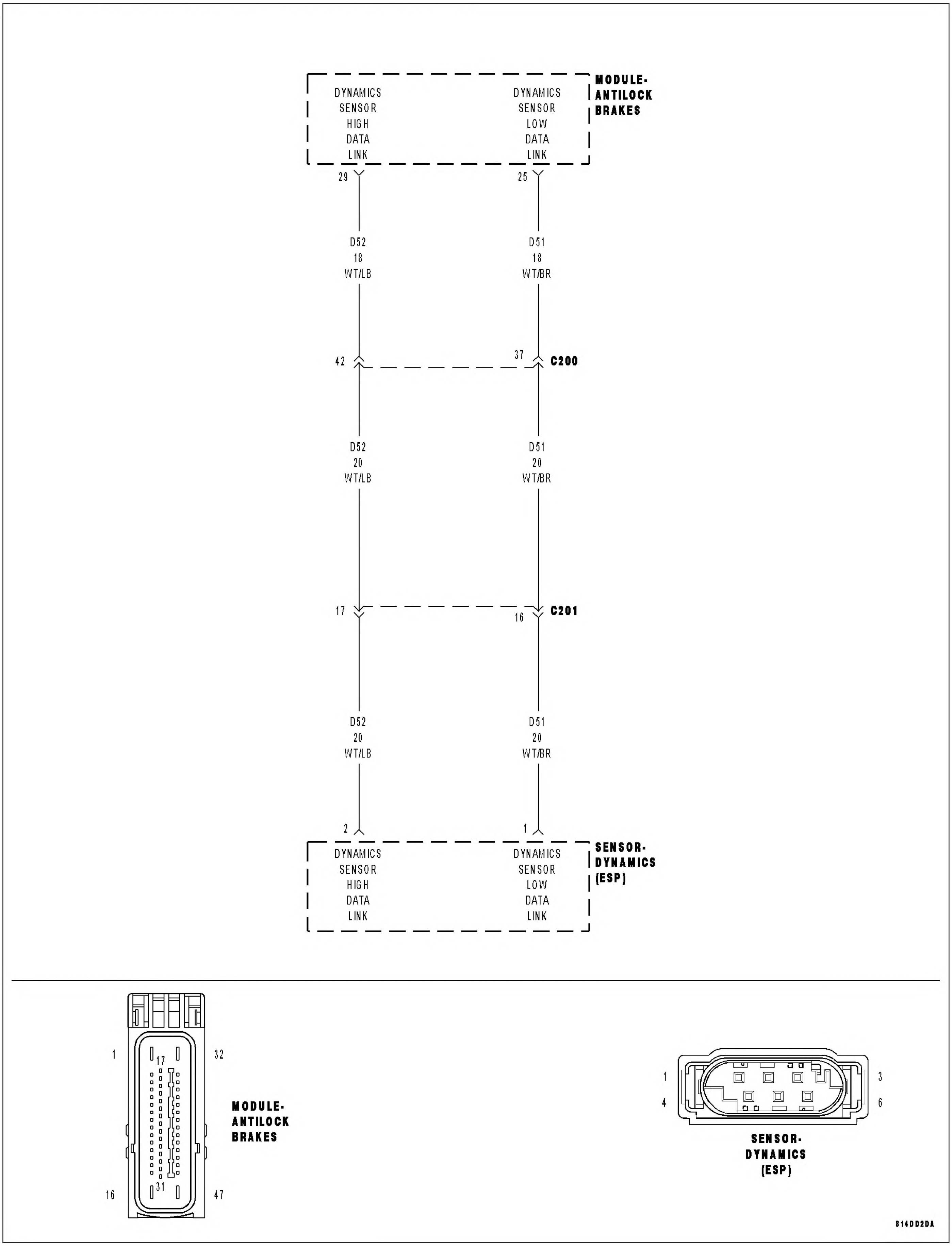
With the scan tool, read Engine DTCs.

Are there any Engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Anti-Lock Brake Module pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Anti-Lock Brake Module per the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

U1003-ESP CAN C BUS PERFORMANCE


MODULE-ANTILOCK BRAKES
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
29
25
D52 18 WT/LB
D51 18 WT/BR
42
37
C200
D52 20 WT/LB
D51 20 WT/BR
17
16
C201
D52 20 WT/LB
D51 20 WT/BR
2
1
SENSOR-DYNAMICS (ESP)
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
3
4
6
SENSOR-DYNAMICS (ESP)
814DD2DA

U1003-ESP CAN C BUS PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects too many CAN Bus off events.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
(D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT SHORTED TO GROUND, VOLTAGE, OR OPEN
(D51) SENSOR CLUSTER LOW DATALINK CIRCUIT SHORTED TO GROUND, VOLTAGE, OR OPEN
SENSOR CLUSTER

Diagnostic Test

1. CHECK FOR A DTC U1003-ESP CAN C BUS PERFORMANCE

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC’s.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC’s.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC’s

Does the scan tool display: U1003-ESP CAN C BUS PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

---

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

Check the Sensor Cluster installation and torque of the mounting bolts.

Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.

Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

U1003-ESP CAN C BUS PERFORMANCE (CONTINUED)

3. CHECK THE (D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT FOR A SHORT TO VOLTAGE

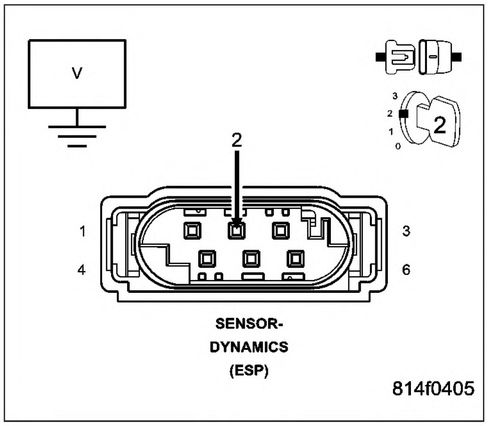
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (D52) Sensor Cluster High Datalink circuit.



Does the test light illuminate brightly?

Yes >> Repair the (D52) Sensor Cluster High Datalink circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

---

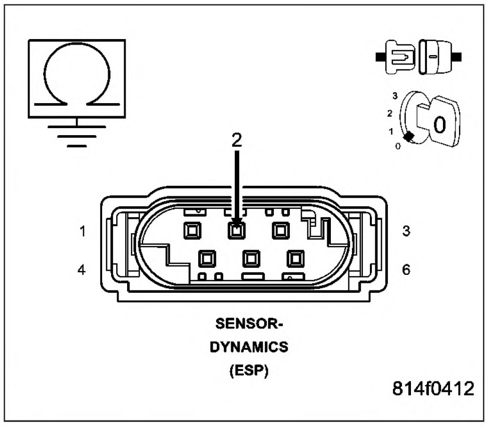
4. CHECK THE (D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Using a 12-volt test light connected to 12-volts, check the (D52) Sensor Cluster High Datalink circuit.



Does the test light illuminate brightly?

Yes >> Repair the (D52) Sensor Cluster High Datalink circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 5

U1003-ESP CAN C BUS PERFORMANCE (CONTINUED)

5. CHECK THE (D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

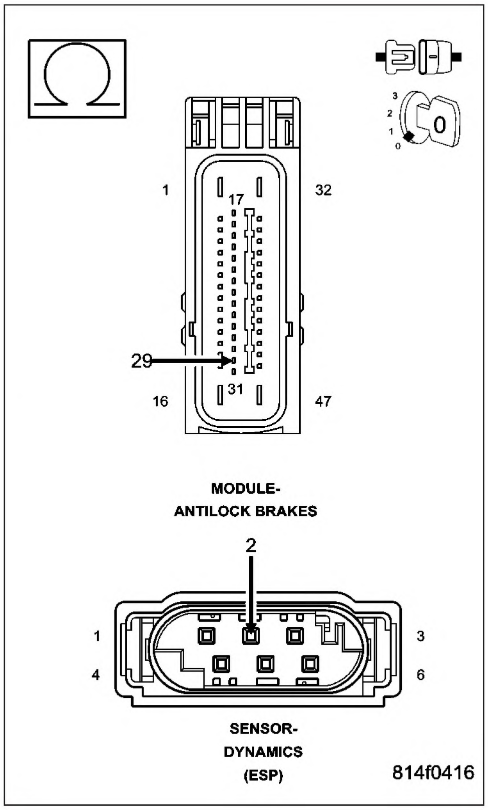
Connect a jumper wire between the (D52) Sensor Cluster High Datalink circuit and ground.

Using a 12-volt test light connected to 12-volts, check the (D52) Sensor Cluster High Datalink circuit.

Does the test light illuminate brightly?

Yes >> Go To 6

No >> Repair the (D52) Sensor Cluster High Datalink circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.



814f0416

---

6. CHECK THE (D51) SENSOR CLUSTER LOW DATALINK CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

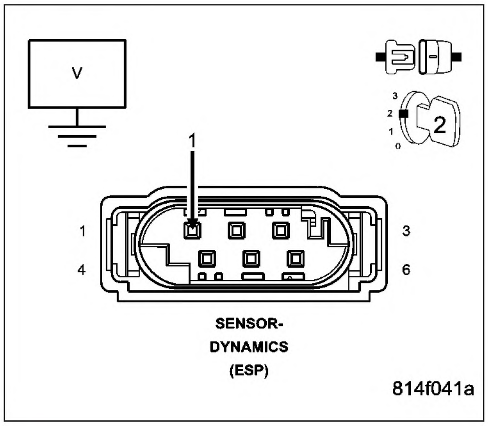
Turn the ignition on.

Using a 12-volt test light connected to ground, check the (D51) Sensor Cluster Low Datalink circuit.

Does the test light illuminate brightly?

Yes >> Repair the (D51) Sensor Cluster Low Datalink circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

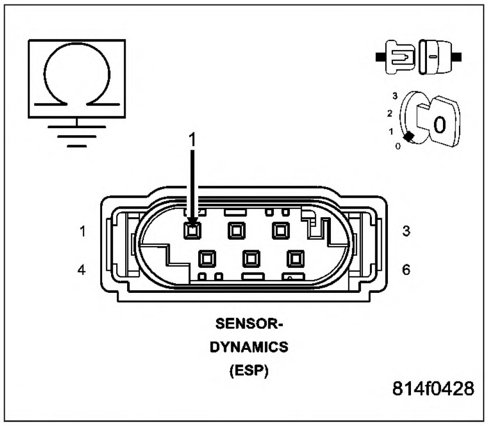
No >> Go To 7



814f041a

U1003-ESP CAN C BUS PERFORMANCE (CONTINUED)

7. CHECK THE (D51) SENSOR CLUSTER LOW DATALINK CIRCUIT FOR A SHORT TO GROUND



Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Using a 12-volt test light connected to 12-volts, check the (D51) Sensor Cluster Low Datalink circuit.

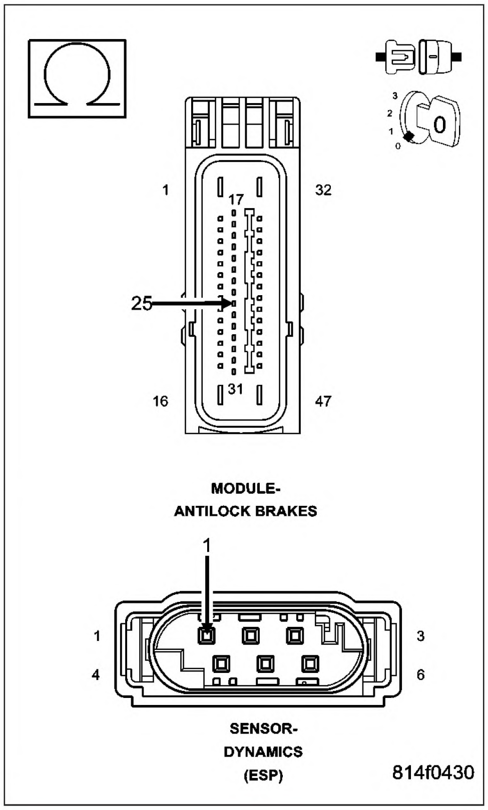
Does the test light illuminate brightly?

Yes >> Repair the (D51) Sensor Cluster Low Datalink circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. CHECK THE (D51) SENSOR CLUSTER LOW DATALINK CIRCUIT FOR AN OPEN



Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Turn the ignition on.

Connect a jumper wire between the (D51) Sensor Cluster Low Datalink circuit and ground.

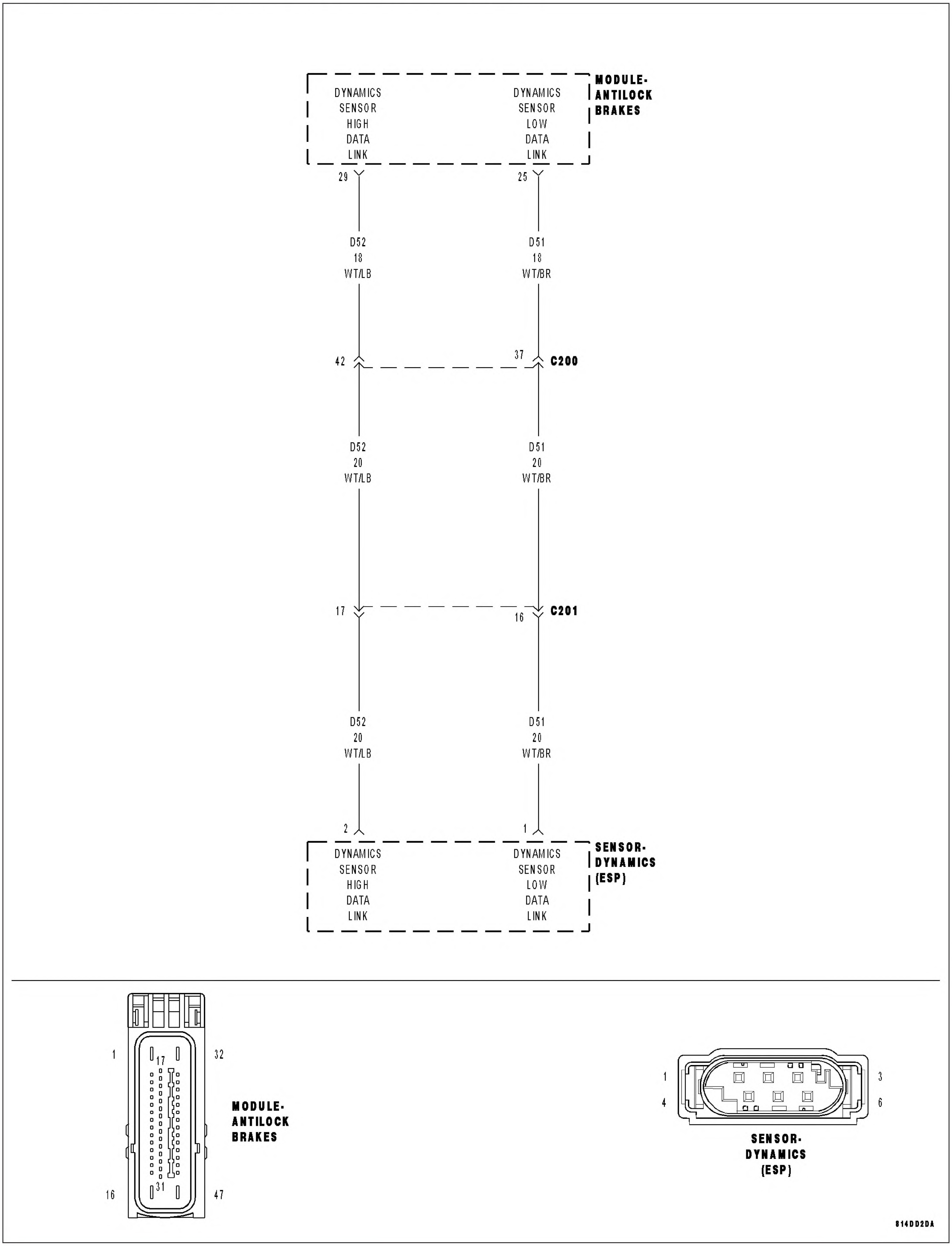
Using a 12-volt test light connected to 12-volts, check the (D51) Sensor Cluster Low Datalink circuit.

Does the test light illuminate brightly?

Yes >> Replace the Sensor Cluster in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (D51) Sensor Cluster Low Datalink circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

U1004-CAN C BUS TRANSMIT PERFORMANCE


MODULE-
ANTILOCK
BRAKES
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
29
25
D52
18
WT/LB
D51
18
WT/BR
42
37
C200
D52
20
WT/LB
D51
20
WT/BR
17
16
C201
D52
20
WT/LB
D51
20
WT/BR
2
1
SENSOR-
DYNAMICS
(ESP)
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
1
17
32
16
31
47
MODULE-
ANTILOCK
BRAKES
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814DD2DA

U1004-CAN C BUS TRANSMIT PERFORMANCE (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects invalid CAN message from the Sensor Cluster.

Possible Causes
WIRING HARNESS, TERMINAL, CONNECTOR DAMAGE
(D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT SHORTED TO GROUND, VOLTAGE, OR OPEN
(D51) SENSOR CLUSTER LOW DATALINK CIRCUIT SHORTED TO GROUND, VOLTAGE, OR OPEN
SENSOR CLUSTER

Diagnostic Test

1. CHECK FOR A DTC U1004-CAN C BUS TRANSMIT PERFORMANCE

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.
With the scan tool, read and record DTC's.
With the scan tool, read and record Freeze Fame information.
With the scan tool, erase DTC's.
Cycle the ignition switch from off to on.
With the scan tool, read and record DTCs

Does the scan tool display: U1004-CAN C BUS TRANSMIT PERFORMANCE?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION diagnostic procedure.
Perform ABS VERIFICATION TEST - VER 1.

2. CHECK THE WIRING HARNESS, TERMINALS, AND CONNECTORS

Check the Sensor Cluster installation and torque of the mounting bolts.
Visually inspect the related wiring harness. Look for any bruised, chafed, pierced, or partially broken wires.
Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

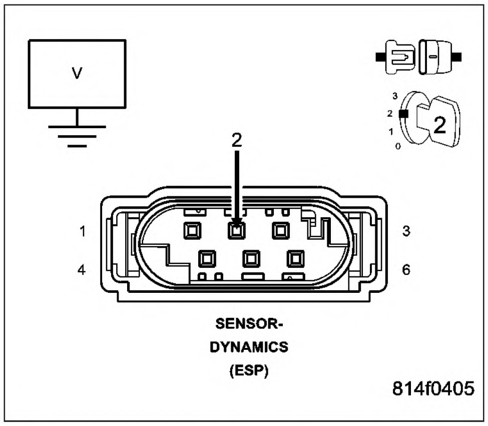
Were any problems found?

Yes >> Repair as necessary.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 3

U1004-CAN C BUS TRANSMIT PERFORMANCE (CONTINUED)

3. CHECK THE (D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT FOR A SHORT TO VOLTAGE



Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (D52) Sensor Cluster High Datalink circuit.

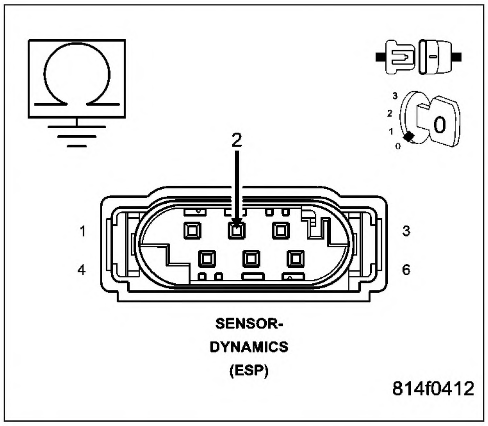
Does the test light illuminate brightly?

Yes >> Repair the (D52) Sensor Cluster High Datalink circuit for a short to voltage.

Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 4

4. CHECK THE (D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT FOR A SHORT TO GROUND



Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Using a 12-volt test light connected to 12-volts, check the (D52) Sensor Cluster High Datalink circuit.

Does the test light illuminate brightly?

Yes >> Repair the (D52) Sensor Cluster High Datalink circuit for a short to ground.

Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 5

U1004-CAN C BUS TRANSMIT PERFORMANCE (CONTINUED)

5. CHECK THE (D52) SENSOR CLUSTER HIGH DATALINK CIRCUIT FOR AN OPEN

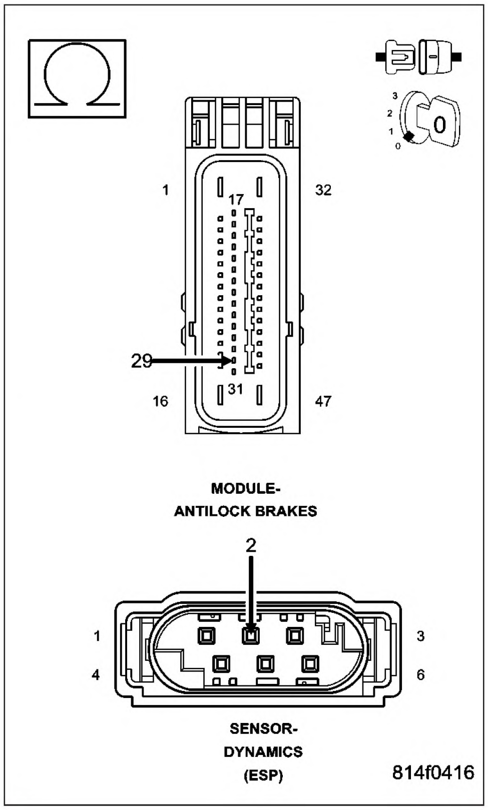
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor harness connector.

Connect a jumper wire between the (D52) Sensor Cluster High Datalink circuit and ground.

Using a 12-volt test light connected to 12-volts, check the (D52) Sensor Cluster High Datalink circuit.


0
3
2
1
0
1
17
32
29
31
16
47
MODULE-
ANTILOCK BRAKES
2
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814f0416

Does the test light illuminate brightly?

Yes >> Go To 6

No >> Repair the (D52) Sensor Cluster High Datalink circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

6. CHECK THE (D51) SENSOR CLUSTER LOW DATALINK CIRCUIT FOR A SHORT TO VOLTAGE

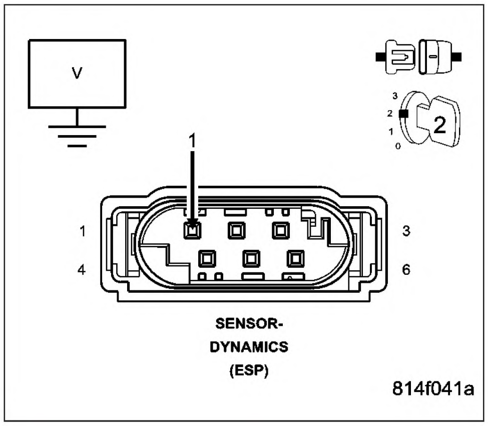
Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (D51) Sensor Cluster Low Datalink circuit.


V
2
3
2
1
0
1
1
3
4
6
SENSOR-
DYNAMICS
(ESP)
814f041a

Does the test light illuminate brightly?

Yes >> Repair the (D51) Sensor Cluster Low Datalink circuit for a short to voltage.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 7

U1004-CAN C BUS TRANSMIT PERFORMANCE (CONTINUED)

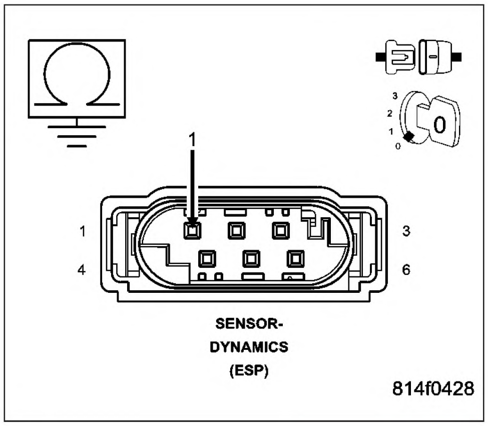
7. CHECK THE (D51) SENSOR CLUSTER LOW DATALINK CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Using a 12-volt test light connected to 12-volts, check the (D51) Sensor Cluster Low Datalink circuit.



Does the test light illuminate brightly?

Yes >> Repair the (D51) Cluster Sensor Low Datalink circuit for a short to ground.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. CHECK THE (D51) SENSOR LOW DATALINK CIRCUIT FOR AN OPEN

Turn the ignition off.

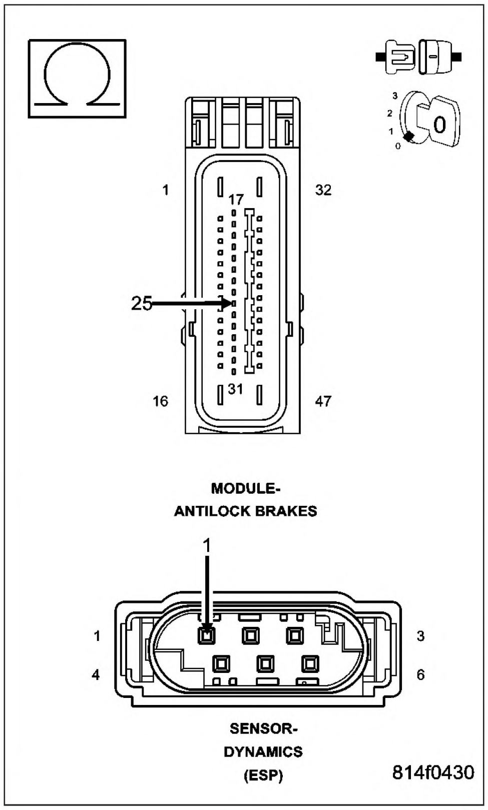
Disconnect the Anti-Lock Brake Module harness connector.

Disconnect the Sensor Cluster harness connector.

Turn the ignition on.

Connect a jumper wire between the (D51) Sensor Cluster Low Datalink circuit and ground.

Using a 12-volt test light connected to 12-volts, check the (D51) Sensor Cluster Low Datalink circuit.

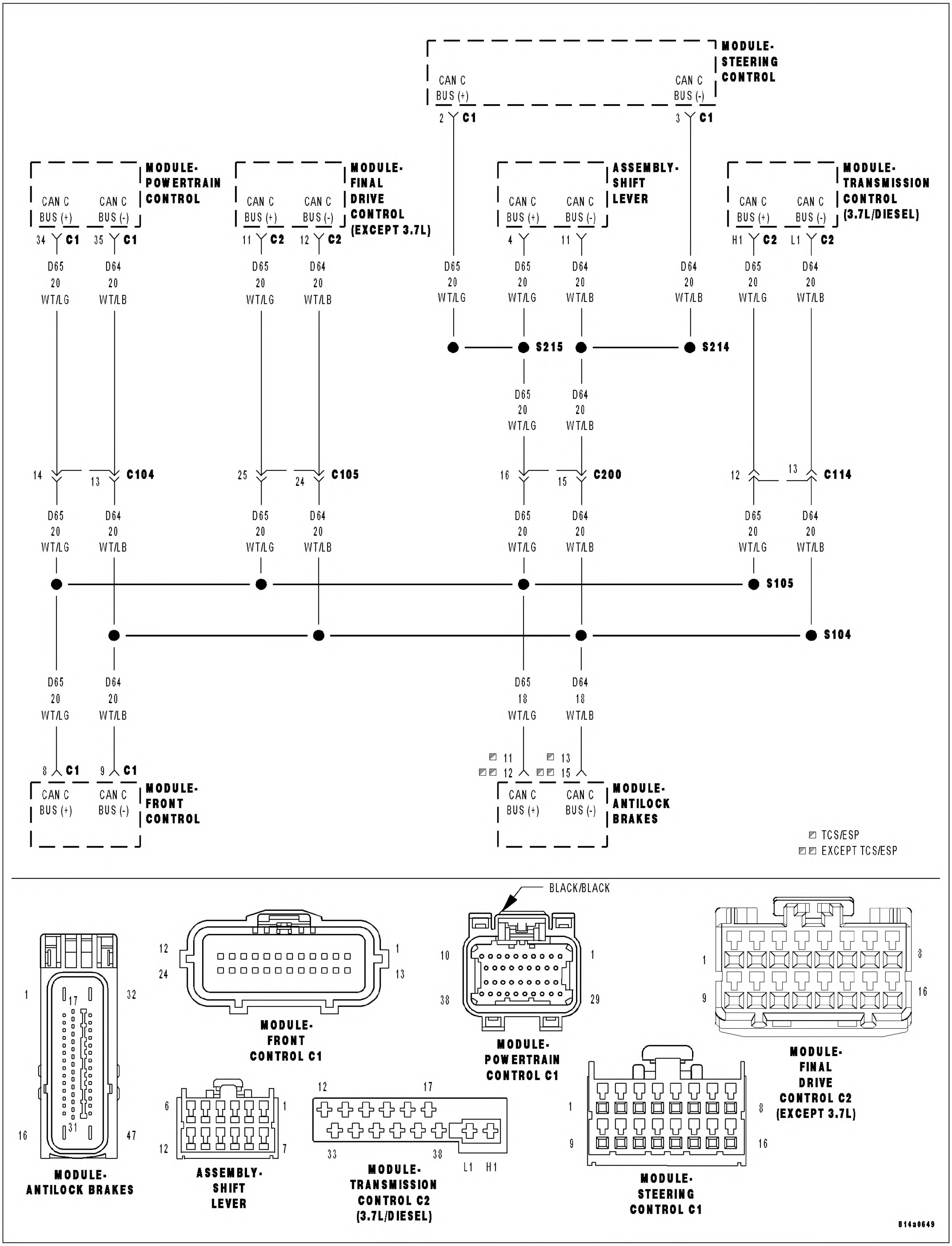


Does the test light illuminate brightly?

Yes >> Replace the Sensor Cluster in accordance with the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (D51) Sensor Cluster Low Datalink circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

U140E-IMPLAUSIBLE VEHICLE CONFIGURATION DATA RECEIVED


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14
13
C104
25
24
C105
16
15
C200
12
13
C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
11
12
13
15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
1
24
13
MODULE-FRONT CONTROL C1
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
8
9
16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6
1
12
7
ASSEMBLY-SHIFT LEVER
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
8
9
16
MODULE-STEERING CONTROL C1
814a0649

U140E-IMPLAUSIBLE VEHICLE CONFIGURATION DATA RECEIVED (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects an incorrect CAN messages from the Engine Control Module (ECM).

Possible Causes
FCM CAN BUS DTCS
ENGINE DTCS
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK IF FCM CAN BUS DTC'S ARE PRESENT

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

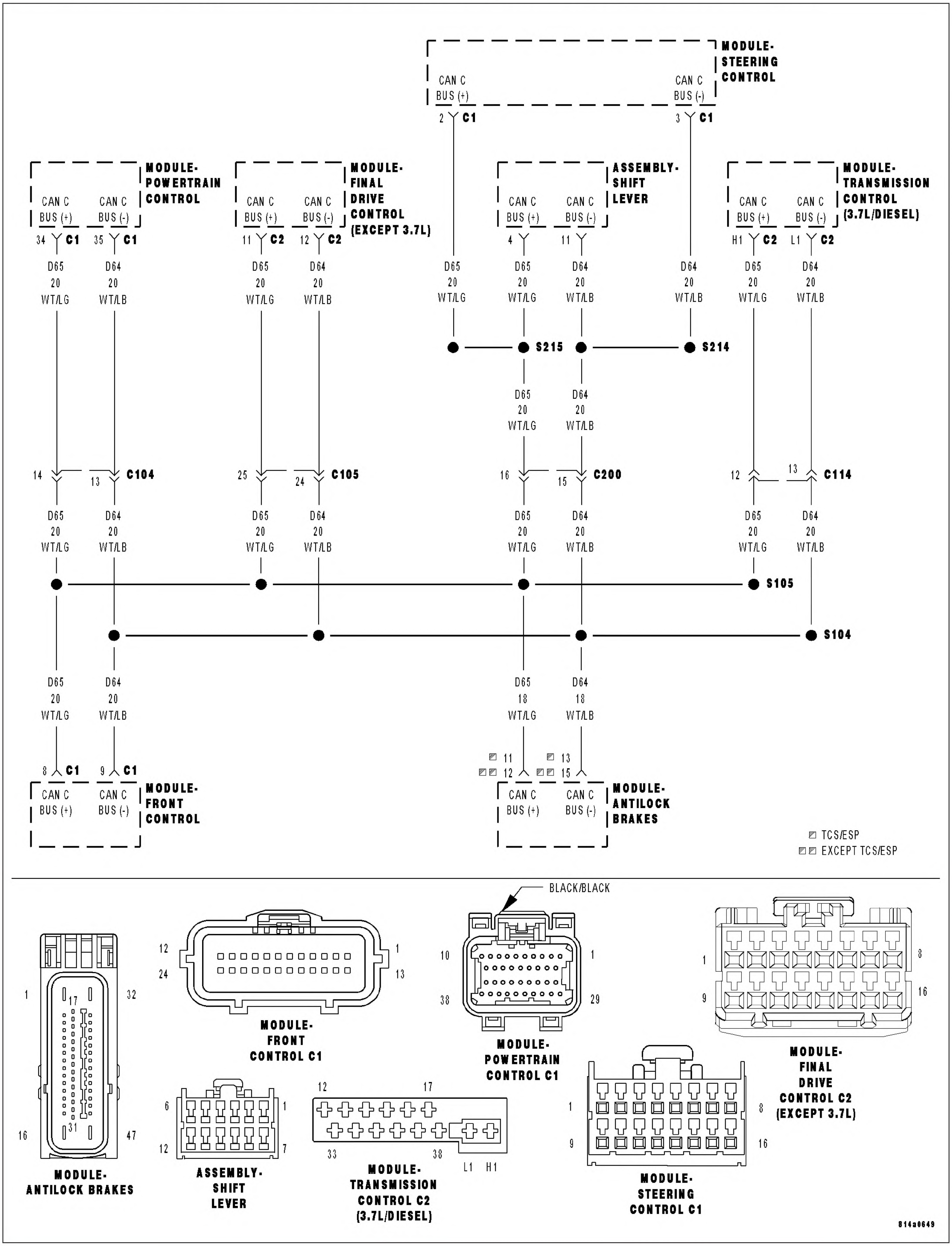
With the scan tool, read Engine DTCs.

Are there any Engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Anti-Lock Brake Module pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Anti-Lock Brake Module per the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

U1501-IMPLAUSIBLE MESSAGE DATA LENGTH RECEIVED FROM PCM


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14
13
C104
25
24
C105
16
15
C200
12
13
C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
11
12
13
15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
10
38
1
29
MODULE-POWERTRAIN CONTROL C1
1
9
8
16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6
12
1
7
ASSEMBLY-SHIFT LEVER
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
9
8
16
MODULE-STEERING CONTROL C1
814a0649

U1501-IMPLAUSIBLE MESSAGE DATA LENGTH RECEIVED FROM PCM (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects an incorrect CAN message from the Engine Control Module (ECM).

Possible Causes
FCM CAN BUS DTCS
ENGINE DTCS
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK IF FCM CAN BUS DTC'S ARE PRESENT

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

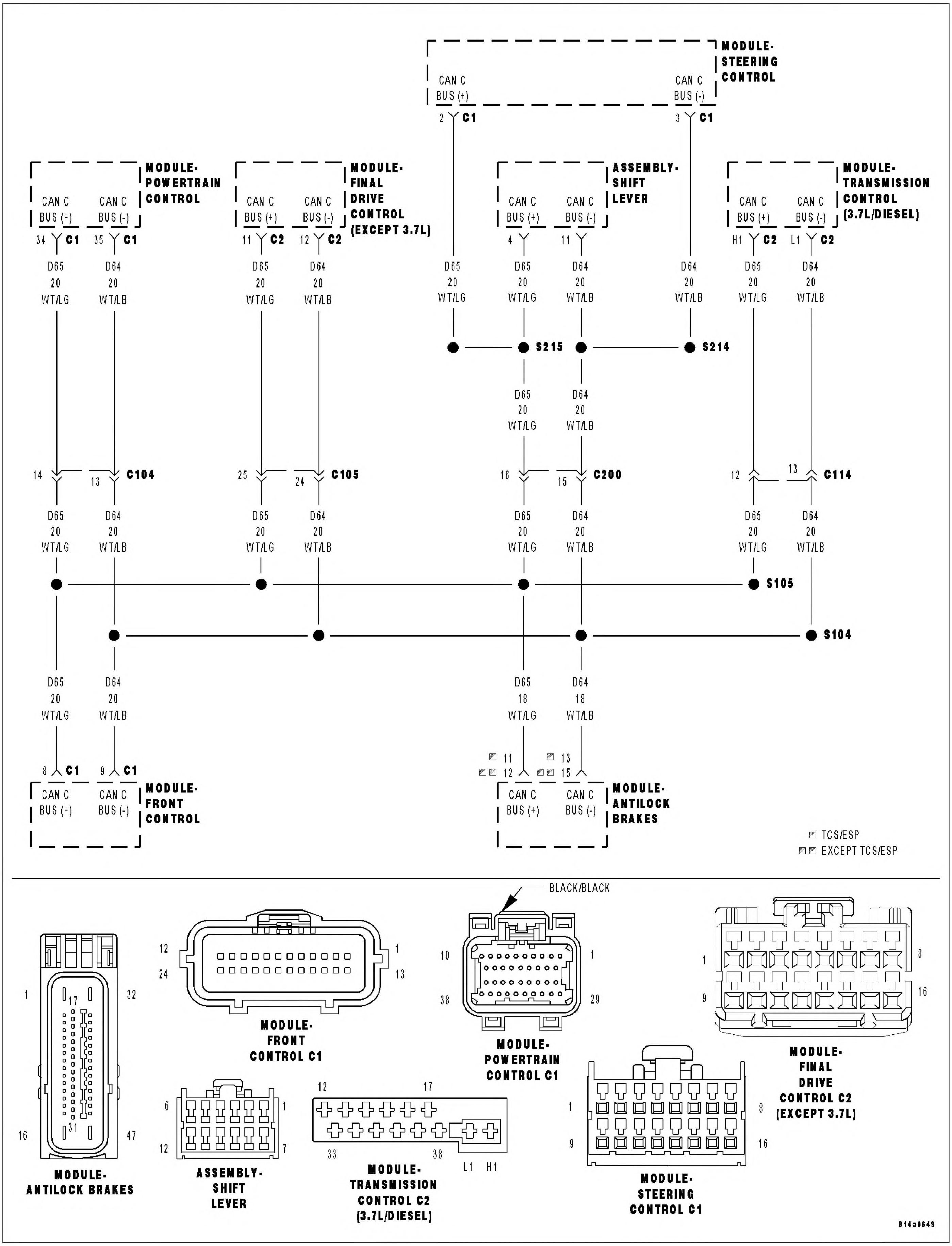
With the scan tool, read Engine DTCs.

Are there any Engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Anti-Lock Brake Module pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Anti-Lock Brake Module per the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

U1502-IMPLAUSIBLE MESSAGE DATA LENGTH RECEIVED FROM TCM


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14
13
C104
25
24
C105
16
15
C200
12
13
C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
11
12
13
15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
1
24
13
MODULE-FRONT CONTROL C1
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
8
9
16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6
1
12
7
ASSEMBLY-SHIFT LEVER
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
8
9
16
MODULE-STEERING CONTROL C1
814a0649

U1502-IMPLAUSIBLE MESSAGE DATA LENGTH RECEIVED FROM TCM (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects an incorrect CAN message from the Transmission Control Module (TCM).

Possible Causes
FCM CAN BUS DTCS
TRANSMISSION DTCS
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK IF FCM CAN BUS DTC'S ARE PRESENT

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK IF TRANSMISSION DTC'S ARE PRESENT

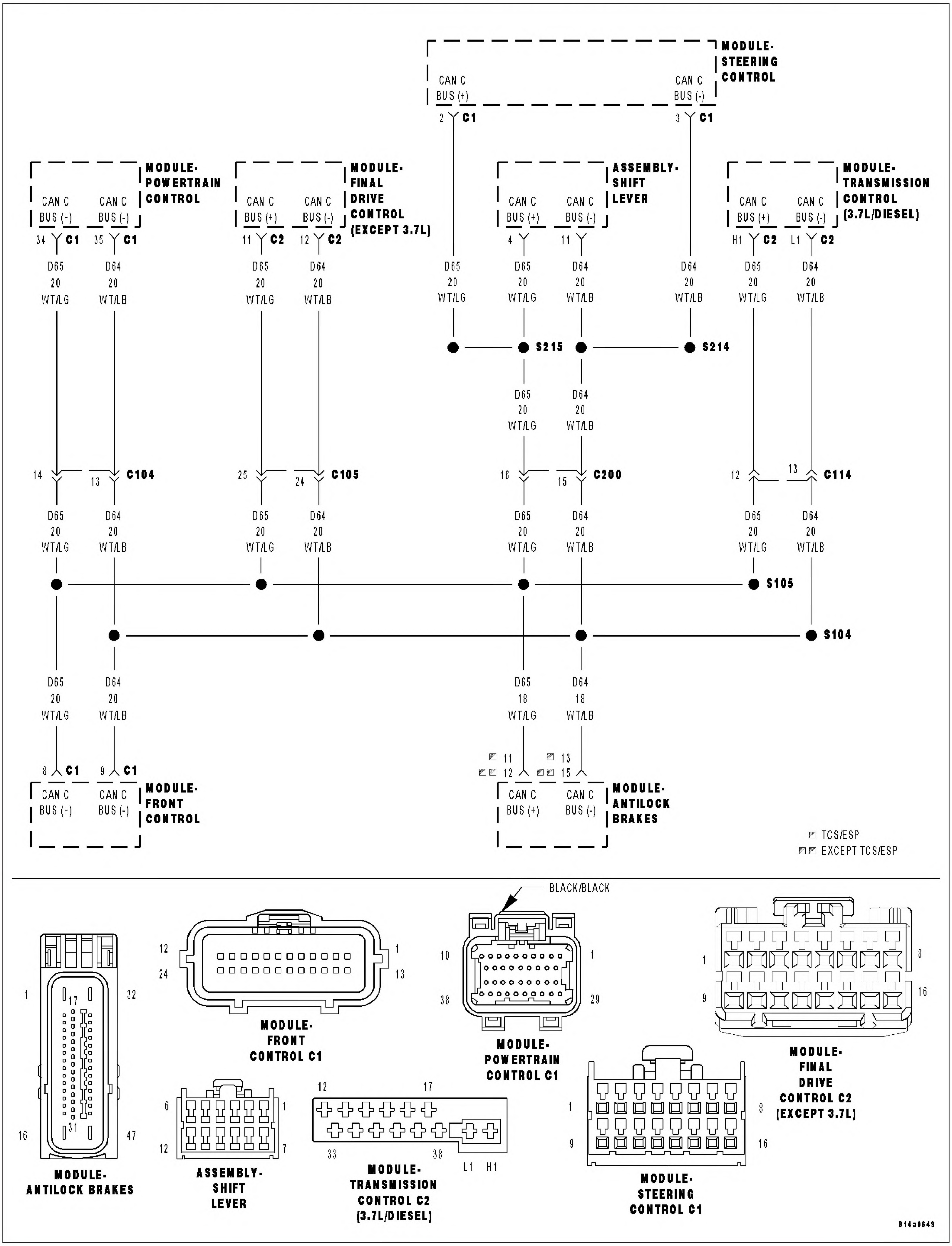
With the scan tool, read Transmission DTCs.

Are there any Transmission DTC's present?

Yes >> Refer to the 21 - TRANSMISSION ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform ABS VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Anti-Lock Brake Module pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Anti-Lock Brake Module per the Service Information.
Perform ABS VERIFICATION TEST - VER 1.

U1503-IMPLAUSIBLE MESSAGE DATA LENGTH RECEIVED FROM FCM


MODULE-
STEERING
CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-
POWERTRAIN
CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-
SHIFT
LEVER
4
11
MODULE-
TRANSMISSION
CONTROL
(3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
14
13
C104
25
24
C105
16
15
C200
12
13
C114
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-
FRONT
CONTROL
11
12
13
15
MODULE-
ANTILOCK
BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1
32
17
31
16
47
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
6
12
1
7
ASSEMBLY-
SHIFT
LEVER
12
17
33
38
L1
H1
MODULE-
TRANSMISSION
CONTROL C2
(3.7L/DIESEL)
1
9
8
16
MODULE-
STEERING
CONTROL C1
814a0649

U1503-IMPLAUSIBLE MESSAGE DATA LENGTH RECEIVED FROM FCM (CONTINUED)

For the Anti-Lock Brake System circuit diagram. (Refer to 5 - BRAKES - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the Anti-Lock Brake Module detects an incorrect CAN message from the Front Control Module (FCM).

Possible Causes
FCM CAN BUS DTCS
ANTI-LOCK BRAKE MODULE

Diagnostic Test

1. CHECK IF FCM CAN BUS DTC'S ARE PRESENT

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING and diagnose the appropriate symptom.

Perform ABS VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Anti-Lock Brake Module pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Anti-Lock Brake Module per the Service Information.

Perform ABS VERIFICATION TEST - VER 1.

ABS VERIFICATION TEST — VER 1

Diagnostic Test

1.

NOTE: If the ABM (Anti-Lock Brake Module) was replaced, it must be initialized using the scan tool. If not initialized, the ABS and ESP indicators will flash continuously with no DTC's. To Initialize the ABM, using the scan tool, select ECU VIEW, select ABS, select MISCELLANEOUS, select INITIALIZE ECU, and follow the directions on the scan tool.

NOTE: The Sensor Cluster is the same as the Dynamics sensor.

1. Turn the ignition off.
2. Connect all previously disconnected components and connectors.
3. Ensure all accessories are turned off and the battery is fully charged.

NOTE: If the vehicle is equipped with ESP (Electronic Stability Program) the Steering Angle Sensor must be calibrated anytime an ABS component or the battery is disconnected. To calibrate the Steering Angle Sensor, start the engine and center the steering wheel. Turn the steering wheel all the way to the left until it stops, turn the steering wheel all the way to the right until it stops and bring the steering wheel back to center.

4. Ensure that the ignition is on, and with the scan tool, erase all Diagnostic Trouble Codes from All modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning.

CAUTION: Ensure braking capability is available before road testing.

5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the scan tool, read DTC's from all modules.
6. If any Diagnostic Trouble Codes are present, return to symptom list and trouble shoot new or recurring symptom.

NOTE: For Sensor Signal and Pump Motor faults, the CAB must sense all 4 wheels at 25 km/h (15 mph) before it will extinguish the ABS Indicator.

CAUTION: Ensure braking capability is available before road testing.

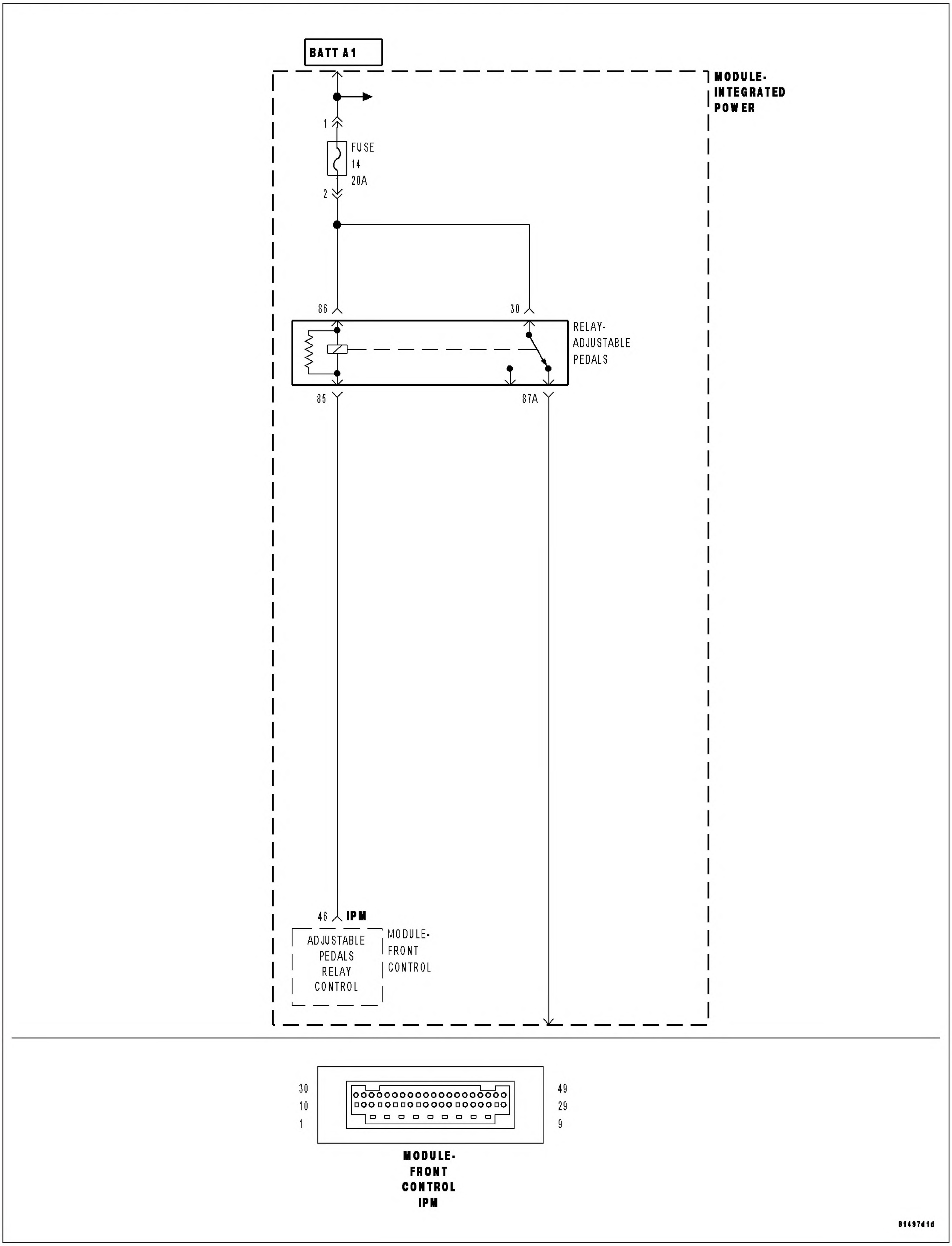
7. If there are no DTC's present after turning ignition on, road test the vehicle for at least 5 minutes. Perform several antilock braking stops.
8. Again, with the scan tool read DTC's. If any DTC's are present, return to Symptom list.
9. If there are no Diagnostic Trouble Codes (DTC's) present, and the customer's concern can no longer be duplicated, the repair is complete.

Are any DTC's present or is the original concern still present?

Yes >> Repair is not complete, refer to appropriate symptom.

No >> Repair is complete.

B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
14
20A
2
86
30
RELAY-
ADJUSTABLE
PEDALS
85
87A
46
IPM
ADJUSTABLE
PEDALS
RELAY
CONTROL
MODULE-
FRONT
CONTROL
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
81497d1d

B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Front Control Module fails the Adjustable Pedal Inhibit Relay circuit.

Possible Causes
TERMINAL/CONNECTOR DAMAGE
ADJUSTABLE PEDALS RELAY
ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
FRONT CONTROL MODULE
INTEGRATED POWER MODULE

Diagnostic Test

1. CHECK FOR A DTC B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC’s.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC’s.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC’s

Does the scan tool display: B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Visually inspect the wiring for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW (CONTINUED)

3. SWAP OUT THE ADJUSTABLE PEDALS RELAY

Turn the ignition off.
Install a substitute relay in place of the Adjustable Pedals Relay.
Turn the ignition on.
With the scan tool, erase DTC's.
Cycle the ignition switch from off to on.
With the scan tool, read and record DTC's

Does the scan tool display: B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW?

Yes >> Go To 4

No >> Replace the Adjustable Pedals Relay in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

---

4. CHECK THE VOLTAGE ON THE FUSED B(+) CIRCUIT FOR THE ADJUSTABLE PEDALS RELAY

Turn the ignition off.
Remove the Adjustable Pedals Relay from the IPM.
Measure the voltage of the internal Fused B(+) circuit at the IPM.

Is the voltage above 10 volts?

Yes >> Go To 5

No >> Replace the IPM in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

---

5. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.
Disconnect the Front Control Module harness connector.
Remove the Adjustable Pedals Relay from the IPM.
Using a 12-volt test light connected to 12-volts, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Relay Control circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.
Disconnect the Front Control Module harness connector.
Remove the Adjustable Pedals Relay from the IPM.
Turn the ignition on.
Using a 12-volt test light connected to ground, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Relay Control circuit for a short to voltage.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 7

B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW (CONTINUED)

7. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Front Control Module harness connector.

Remove the Adjustable Pedals Relay from the IPM.

Connect a jumper wire between the Adjustable Pedals Relay Control circuit and ground.

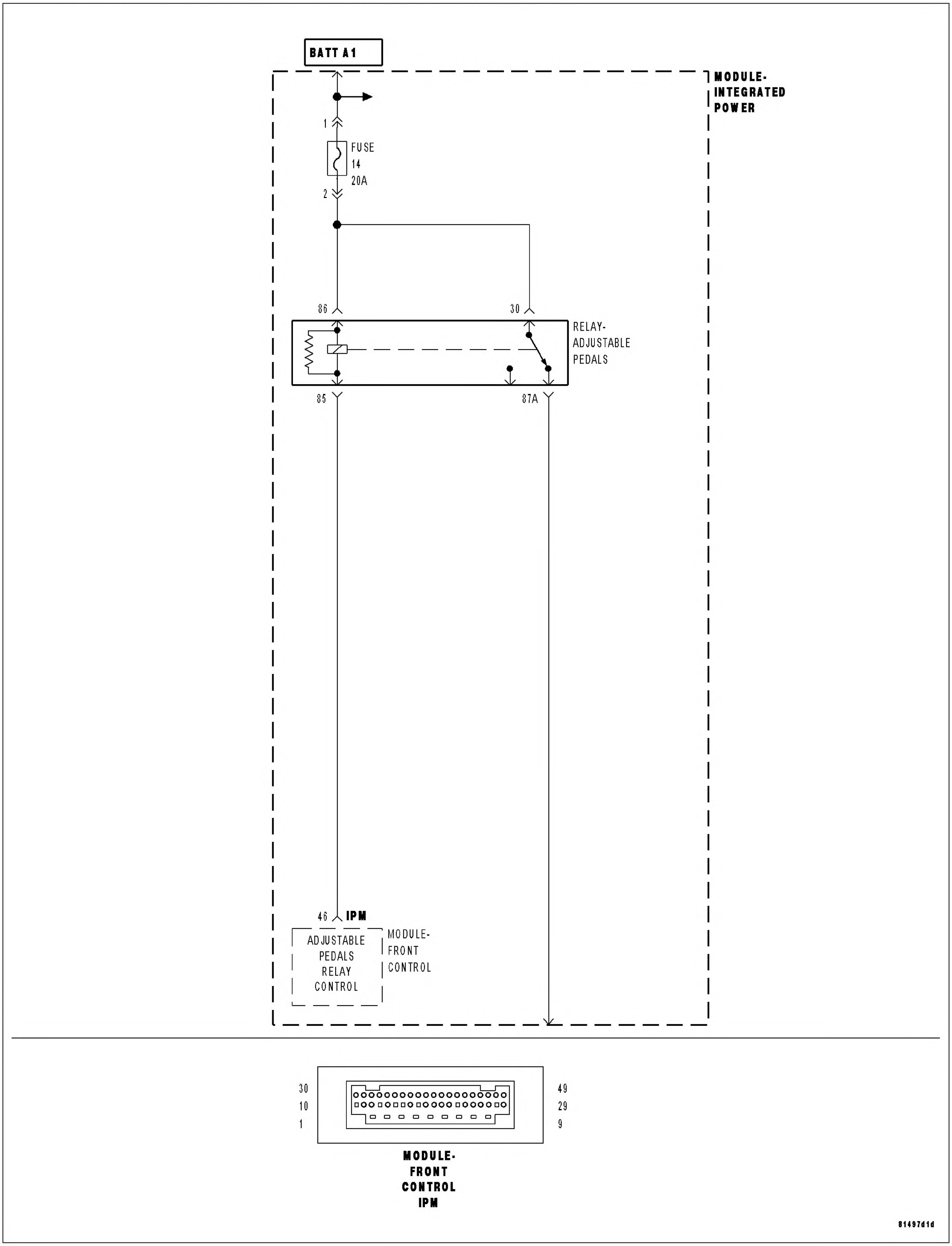
Using a 12-volt test light connected to 12-volts, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly

Yes >> Replace the Front Control Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Repair the Adjustable Pedals Relay Control circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

B1D50-ADJUSTABLE PEDAL INHIBIT CIRCUIT HIGH


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
14
20A
2
86
30
RELAY-
ADJUSTABLE
PEDALS
85
87A
46 IPM
ADJUSTABLE
PEDALS
RELAY
CONTROL
MODULE-
FRONT
CONTROL
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
81497d1d

B1D50-ADJUSTABLE PEDAL INHIBIT CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Front Control Module fails the Adjustable Pedal Inhibit Relay circuit.

Possible Causes
TERMINAL/CONNECTOR DAMAGE
ADJUSTABLE PEDALS RELAY
ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
FRONT CONTROL MODULE
INTEGRATED POWER MODULE

Diagnostic Test

1. CHECK FOR A DTC B1D50-ADJUSTABLE PEDAL INHIBIT CIRCUIT HIGH

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC's

Does the scan tool display: B1D50-ADJUSTABLE PEDAL INHIBIT CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Visually inspect the wiring for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D50-ADJUSTABLE PEDAL INHIBIT CIRCUIT HIGH (CONTINUED)

3. SWAP OUT THE ADJUSTABLE PEDALS RELAY

Turn the ignition off.
Install a substitute relay in place of the Adjustable Pedals Relay.
Turn the ignition on.
With the scan tool, erase DTC's.
Cycle the ignition switch from off to on.
With the scan tool, read and record DTC's

Does the scan tool display: B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW?

Yes >> Go To 4

No >> Replace the Adjustable Pedals Relay in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

---

4. CHECK THE VOLTAGE ON THE FUSED B(+) CIRCUIT FOR THE ADJUSTABLE PEDALS RELAY

Turn the ignition off.
Remove the Adjustable Pedals Relay from the IPM.
Measure the voltage of the internal Fused B(+) circuit at the IPM.

Is the voltage above 10 volts?

Yes >> Go To 5

No >> Replace the IPM in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

---

5. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.
Disconnect the Front Control Module harness connector.
Remove the Adjustable Pedals Relay from the IPM.
Using a 12-volt test light connected to 12-volts, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Relay Control circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.
Disconnect the Front Control Module harness connector.
Remove the Adjustable Pedals Relay from the IPM.
Turn the ignition on.
Using a 12-volt test light connected to ground, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Relay Control circuit for a short to voltage.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 7

B1D50-ADJUSTABLE PEDAL INHIBIT CIRCUIT HIGH (CONTINUED)

7. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR AN OPEN

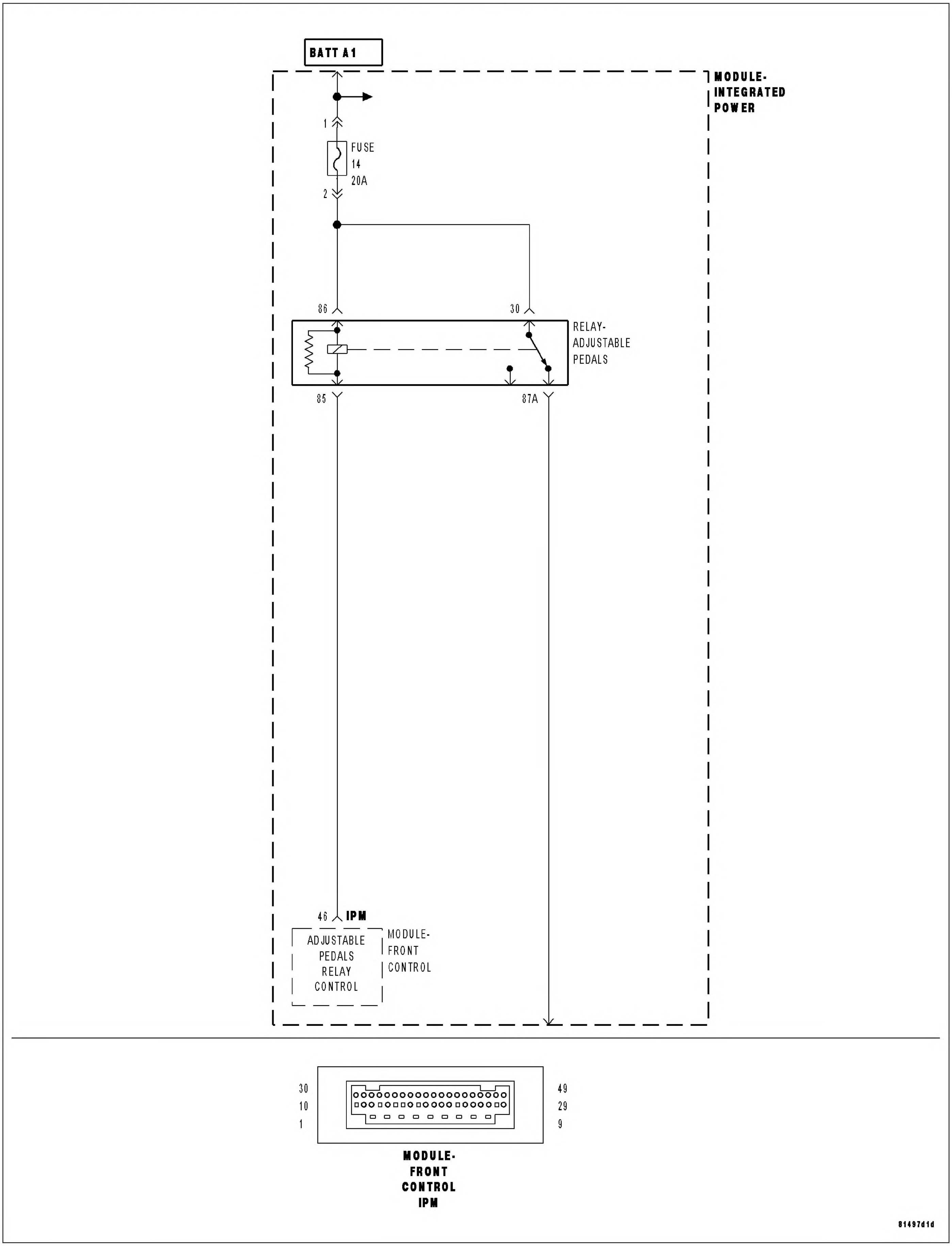
Turn the ignition off.
Disconnect the Front Control Module harness connector.
Remove the Adjustable Pedals Relay from the IPM.
Connect a jumper wire between the Adjustable Pedals Relay Control circuit and ground.
Using a 12-volt test light connected to 12-volts, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly

Yes >> Replace the Front Control Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Repair the Adjustable Pedals Relay Control circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

B1D51-ADJUSTABLE PEDAL INHIBIT CIRCUIT OPEN


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
14
20A
2
86
30
RELAY-
ADJUSTABLE
PEDALS
85
87A
46
IPM
ADJUSTABLE
PEDALS
RELAY
CONTROL
MODULE-
FRONT
CONTROL
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
81497d1d

B1D51-ADJUSTABLE PEDAL INHIBIT CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Front Control Module fails the Adjustable Pedal Inhibit Relay circuit.

Possible Causes
TERMINAL/CONNECTOR DAMAGE
ADJUSTABLE PEDALS RELAY
ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE, GROUND, OR OPEN
FRONT CONTROL MODULE
INTEGRATED POWER MODULE

Diagnostic Test

1. CHECK FOR A DTC B1D51-ADJUSTABLE PEDAL INHIBIT CIRCUIT OPEN

NOTE: This DTC must be active for the results of this test to be valid.

Turn the ignition on.

With the scan tool, read and record DTC's.

With the scan tool, read and record Freeze Fame information.

With the scan tool, erase DTC's.

Cycle the ignition switch from off to on.

With the scan tool, read and record DTC's

Does the scan tool display:B1D51-ADJUSTABLE PEDAL INHIBIT CIRCUIT OPEN?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.
Perform APS VERIFICATION TEST - VER 1.

---

2. CHECK THE TERMINALS/CONNECTORS FOR DAMAGE

NOTE: Check all related wiring for bruised, chafed, pierced, or partially broken wires.

NOTE: Check all related connectors for broken, bent, pushed out, or corroded terminals.

Turn the ignition off.

Visually inspect the wiring for damage.

Were any problems found?

Yes >> Repair as necessary.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 3

B1D51-ADJUSTABLE PEDAL INHIBIT CIRCUIT OPEN (CONTINUED)

3. SWAP OUT THE ADJUSTABLE PEDALS RELAY

Turn the ignition off.
Install a substitute relay in place of the Adjustable Pedals Relay.
Turn the ignition on.
With the scan tool, erase DTC's.
Cycle the ignition switch from off to on.
With the scan tool, read and record DTC's

Does the scan tool display: B1D4F-ADJUSTABLE PEDAL INHIBIT CIRCUIT LOW?

Yes >> Go To 4

No >> Replace the Adjustable Pedals Relay in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

---

4. CHECK THE VOLTAGE ON THE FUSED B(+) CIRCUIT FOR THE ADJUSTABLE PEDALS RELAY

Turn the ignition off.
Remove the Adjustable Pedals Relay from the IPM.
Measure the voltage of the internal Fused B(+) circuit at the IPM.

Is the voltage above 10 volts?

Yes >> Go To 5

No >> Replace the IPM in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

---

5. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.
Disconnect the Front Control Module harness connector.
Remove the Adjustable Pedals Relay from the IPM.
Using a 12-volt test light connected to 12-volts, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Relay Control circuit for a short to ground.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.
Disconnect the Front Control Module harness connector.
Remove the Adjustable Pedals Relay from the IPM.
Turn the ignition on.
Using a 12-volt test light connected to ground, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly?

Yes >> Repair the Adjustable Pedals Relay Control circuit for a short to voltage.
Perform APS VERIFICATION TEST - VER 1.

No >> Go To 7

B1D51-ADJUSTABLE PEDAL INHIBIT CIRCUIT OPEN (CONTINUED)

7. CHECK THE ADJUSTABLE PEDALS RELAY CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Front Control Module harness connector.

Remove the Adjustable Pedals Relay from the IPM.

Connect a jumper wire between the Adjustable Pedals Relay Control circuit and ground.

Using a 12-volt test light connected to 12-volts, check the Adjustable Pedals Relay Control circuit.

Does the test light illuminate brightly

Yes >> Replace the Front Control Module in accordance with the Service Information.
Perform APS VERIFICATION TEST - VER 1.

No >> Repair the (P201) Adjustable Pedals Relay Control circuit for an open.
Perform APS VERIFICATION TEST - VER 1.

COOLING

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COOLING

DESCRIPTION

3.7L/4.7L ENGINE

The cooling system consists of the following items:

- Electric cooling fan - Standard - 3.7L engine.
- Electric cooling fan and mechanical thermal viscous fan with low disengaged -4.7L engine only
- Radiator
- Radiator pressure cap
- Thermostat
- Coolant pressure bottle/overflow system
- Transmission oil cooler (if equipped with an automatic transmission)
- Power Steering Oil Cooler
- Coolant
- Water pump
- Hoses and hose clamps

5.7L ENGINE

The cooling system consists of the following items:

- Hydraulic cooling fan
- Radiator
- Power steering oil cooler
- Radiator pressure cap
- Thermostat
- Coolant reserve/overflow system
- Transmission oil cooler (if equipped with an automatic transmission)
- Coolant

- Water pump
- Hoses and hose clamps

3.0L DIESEL ENGINE

The cooling system regulates engine operating temperature. It allows the engine to reach normal operating temperature as quickly as possible, maintains normal operating temperature and prevents overheating.

The cooling system also provides a means of heating the passenger compartment. The cooling system is pressurized and uses a centrifugal water pump to circulate coolant throughout the system. A separate and remotely mounted, pressurized coolant tank using a pressure/vent cap is used.

COOLING SYSTEM COMPONENTS

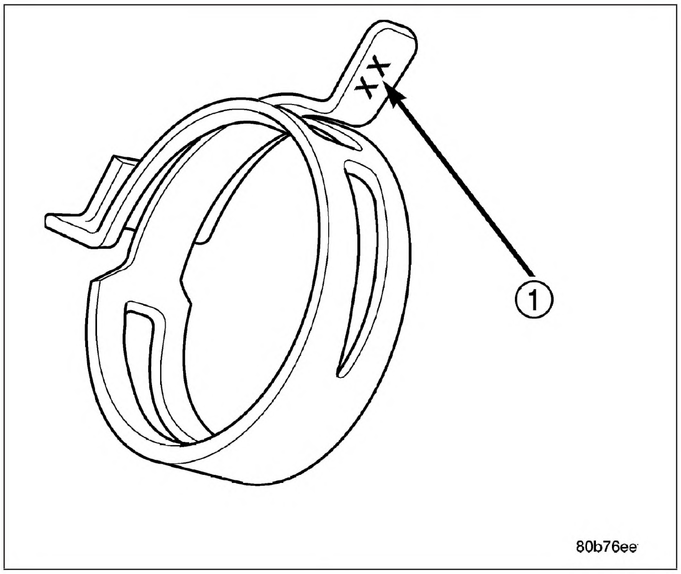
The cooling system consists of:

- Charge Air Cooler
- Hydraulic Cooling Fans
- A aluminum-core radiator with plastic side tanks
- A separate pressurized coolant bottle
- A pressure/vent cap on the coolant bottle
- Thermostat
- Coolant
- Coolant temperature gauge
- Water pump
- Hoses and hose clamps

DESCRIPTION - HOSE CLAMPS

The cooling system utilizes spring type hose clamps. If a spring type clamp replacement is necessary, replace with the original Mopar® equipment spring type clamp.

CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only a original equipment clamp with matching number or letter .



OPERATION

OPERATION - COOLING SYSTEM

The cooling system regulates engine operating temperature. It allows the engine to reach normal operating temperature as quickly as possible. It also maintains normal operating temperature and prevents overheating.

The cooling system also provides a means of heating the passenger compartment and cooling the automatic transmission fluid (if equipped). The cooling system is pressurized and uses a centrifugal water pump to circulate coolant throughout the system.

OPERATION - HOSE CLAMPS

The spring type hose clamp applies constant tension on a hose connection. To remove a spring type hose clamp, only use constant tension clamp pliers designed to compress the hose clamp.

DIAGNOSIS AND TESTING

ON-BOARD DIAGNOSTICS (OBD)

COOLING SYSTEM RELATED DIAGNOSTICS

The powertrain control module (PCM) has been programmed to monitor certain cooling system components:

- If the engine has remained cool for too long a period, such as with a stuck open thermostat, a Diagnostic Trouble Code (DTC) can be set.
- If an open or shorted condition has developed in the relay circuit controlling the electric radiator fan or fan control solenoid circuit controlling the hydraulic fan, a Diagnostic Trouble Code (DTC) can be set.

If the problem is sensed in a monitored circuit often enough to indicated an actual problem, a DTC is stored. The DTC will be stored in the PCM memory for eventual display to the service technician. (Refer to 25 - EMISSIONS CONTROL - DESCRIPTION).

ACCESSING DIAGNOSTIC TROUBLE CODES

To read DTC’s and to obtain cooling system data, (Refer to 25 - EMISSIONS CONTROL - DESCRIPTION).

ERASING TROUBLE CODES

After the problem has been repaired, use the scan tool to erase a DTC. Refer to the appropriate Powertrain Diagnostic Procedures service information for operation of the scan tool.

PRELIMINARY CHECKS

ENGINE COOLING SYSTEM OVERHEATING

Establish what driving conditions caused the complaint. Abnormal loads on the cooling system such as the following may be the cause:

- Prolonged idle
- Very high ambient temperature
- Slight tail wind at idle
- Slow traffic
- Traffic jams
- High speed
- Trailer towing
- Steep grades
- Any accessory addition that fully or partially blocks the grill opening

Driving techniques that avoid overheating are:

- Idle with A/C off when temperature gauge is at end of normal range.
- Increase engine speed for more air flow is recommended.

1. TRAILER TOWING:

Consult Trailer Towing section of owners manual. Do not exceed limits.

2. AIR CONDITIONING; ADD-ON OR AFTER MARKET:

A maximum cooling package should have been ordered with vehicle if add-on or after market A/C is installed. If not, maximum cooling system components should be installed for model involved per manufacturer’s specifications.

3. RECENT SERVICE OR ACCIDENT REPAIR:

Determine if any recent service has been performed on vehicle that may effect cooling system. This may be:

- Engine adjustments (incorrect timing)
- Slipping engine accessory drive belt(s)

- Brakes (possibly dragging)
- Changed parts. Incorrect water pump, or pump rotating in wrong direction due to belt not correctly routed
- Reconditioned radiator or cooling system refilling (possibly under filled or air trapped in system).

NOTE: If investigation reveals none of the previous items as a cause for an engine overheating complaint, refer to following Cooling System Diagnosis charts.

These charts are to be used as a quick-reference only. Refer to the group text for information.

COOLING SYSTEM DIAGNOSIS CHART

COOLING SYSTEM DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERATURE GAUGE READS LOW	1. Has a Diagnostic Trouble Code (DTC) been set indicating a stuck open thermostat?	1. Refer to (Refer to 25 - EMISSIONS CONTROL - DESCRIPTION) for On-Board Diagnostics and DTC information. Replace thermostat if necessary.
	2. Is the temperature sending unit connected?	2. Check the temperature sensor connector. (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT TEMP SENSOR - DESCRIPTION). Repair connector if necessary.
	3. Is the temperature gauge operating OK?	3. Check gauge operation. Repair as necessary.
	4. Coolant level low in cold ambient temperatures accompanied with poor heater performance.	4. Check coolant level in the coolant reserve/overflow tank and the radiator. Inspect system for leaks. Repair leaks as necessary.
	5. Improper operation of internal heater doors or heater controls.	5. Inspect heater and repair as necessary. (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING)

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERATURE GAUGE READS HIGH OR THE COOLANT LAMP ILLUMINATES. COOLANT MAY OR MAY NOT BE LOST OR LEAKING FROM THE COOLING SYSTEM	1. Trailer is being towed, a steep hill is being climbed, vehicle is operated in slow moving traffic, or engine is being idled with very high ambient (outside) temperatures and the air conditioning is on. Higher altitudes could aggravate these conditions.	1. This may be a temporary condition and repair is not necessary. Turn off the air conditioning and attempt to drive the vehicle without any of the previous conditions. Observe the temperature gauge. The gauge should return to the normal range. If the gauge does not return to the normal range, determine the cause for overheating and repair.
	2. Is the temperature gauge reading correctly?	2. Check gauge. (Refer to Group 8J - INSTRUMENT CLUSTER). Repair as necessary.
	3. Is the temperature warning illuminating unnecessarily?	3. Check warning lamp operation. (Refer to Group 8J - INSTRUMENT CLUSTER). Repair as necessary.
	4. Coolant low in coolant reserve/ overflow tank and radiator?	4. Check for coolant leaks and repair as necessary. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING).
	5. Pressure cap not installed tightly. If cap is loose, boiling point of coolant will be lowered. Also refer to the following Step 6.	5. Tighten cap
	6. Poor seals at the radiator cap.	6. (a) Check condition of cap and cap seals. (Refer to 7 - COOLING/ ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING). (b) Check condition of radiator filler neck. If neck is bent or damaged, replace radiator.
	7. Coolant level low in radiator but not in coolant reserve/overflow tank. This means the radiator is not drawing coolant from the coolant reserve/overflow tank as the engine cools	7. (a) Check condition of radiator cap and cap seals. (Refer to 7 - COOLING/ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING). (b) Check condition of radiator filler neck. If neck is bent or damaged, replace radiator. (c) Check condition of the hose from the radiator to the coolant tank. It should fit tight at both ends without any kinks or tears. Replace hose if necessary. (d) Check coolant reserve/overflow tank and tanks hoses for blockage. Repair as necessary.
	8. Incorrect coolant concentration	8. Check coolant. (Refer to 7 - COOLING/ENGINE/COOLANT - DESCRIPTION) for correct coolant/water mixture ratio.

CONDITION	POSSIBLE CAUSES	CORRECTION
	9. Coolant not flowing through system	9. Check for coolant flow at radiator filler neck with some coolant removed, engine warm and thermostat open. Coolant should be observed flowing through radiator. If flow is not observed, determine area of obstruction and repair as necessary.
	10. Radiator or A/C condenser fins are dirty or clogged.	10. Remove insects and debris. (Refer to 7 - COOLING/ENGINE/RADIATOR - CLEANING).
	11. Radiator core is corroded or plugged.	11. Have radiator re-cored or replaced.
	12. Aftermarket A/C installed without proper radiator.	12. Install proper radiator.
	13. Fuel or ignition system problems.	13. Refer to FUEL and /or IGNITION CONTROL for diagnosis.
	14. Dragging brakes.	14. Check and correct as necessary. (Refer to 5 - BRAKES - DIAGNOSIS AND TESTING) for correct procedures.
	15. Bug screen or cardboard is being used, reducing airflow.	15. Remove bug screen or cardboard.
	16. Thermostat partially or completely shut.	16. Check thermostat operation and replaces necessary. (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - DIAGNOSIS AND TESTING).
	17. Viscous fan drive not operating properly.	17. Check fan drive operation and replace as necessary. (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - DIAGNOSIS AND TESTING).
	18. Cylinder head gasket leaking.	18. Check for cylinder head gasket leaks. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING). For repair, (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).
	19. Heater core leaking.	19. Check heater core for leaks. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER CORE - REMOVAL). Repair as necessary.
	20. Hydraulic fan speed too low or inoperative.	20. Check for DTC code. Check fan operation speeds. Refer to fan speed operation table. Low power steering pump output. Refer to power steering pump diagnosis - 4.7L engine.

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERATURE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC)	1. During cold weather operation, with the heater blower in the high position, the gauge reading may drop slightly.	1. A normal condition. No correction is necessary.
	2. Temperature gauge or engine mounted gauge sensor defective or shorted. Also, corroded or loose wiring in this circuit.	2. Check operation of gauge and repair if necessary. Refer to Group 8J, Instrument cluster.
	3. Gauge reading rises when vehicle is brought to a stop after heavy use (engine still running)	3. A normal condition. No correction is necessary. Gauge should return to normal range after vehicle is driven.
	4. Gauge reading high after re-starting a warmed up (hot) engine.	4. A normal condition. No correction is necessary. The gauge should return to normal range after a few minutes of engine operation.
	5. Coolant level low in radiator (air will build up in the cooling system causing the thermostat to open late).	5. Check and correct coolant leaks. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING).
	6. Cylinder head gasket leaking allowing exhaust gas to enter cooling system causing a thermostat to open late.	6. (a) Check for cylinder head gasket leaks. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING). (b) Check for coolant in the engine oil. Inspect for white steam emitting from the exhaust system. Repair as necessary.
	7. Water pump impeller loose on shaft.	7. Check water pump and replace as necessary. (Refer to 7 - COOLING/ENGINE/WATER PUMP - DIAGNOSIS AND TESTING).
	8. Loose accessory drive belt. (water pump slipping)	8. (Refer to 7 - COOLING/ ACCESSORY DRIVE/DRIVE BELTS - DIAGNOSIS AND TESTING). Check and correct as necessary.
	9. Air leak on the suction side of the water pump allows air to build up in cooling system causing thermostat to open late.	9. Locate leak and repair as necessary.
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT TO COOLANT TANK. TEMPERATURE GAUGE READING MAY BE ABOVE NORMAL BUT NOT HIGH. COOLANT LEVEL MAY BE HIGH IN COOLANT RESERVE/ OVERFLOW TANK	1. Pressure relief valve in radiator cap is defective.	1. Check condition of radiator cap and cap seals. (Refer to 7 - COOLING/ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING). Replace cap as necessary.
COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE READING HIGH OR HOT	1. Coolant leaks in radiator, cooling system hoses, water pump or engine.	1. Pressure test and repair as necessary. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING).

CONDITION	POSSIBLE CAUSES	CORRECTION
DETONATION OR PRE-IGNITION (NOT CAUSED BY IGNITION SYSTEM). GAUGE MAY OR MAY NOT BE READING HIGH	1. Engine overheating.	1. Check reason for overheating and repair as necessary.
	2. Freeze point of coolant not correct. Mixture is too rich or too lean.	2. Check coolant concentration. (Refer to 7 - COOLING/ENGINE/ COOLANT - DESCRIPTION) and adjust ratio as required.
HOSE OR HOSES COLLAPSE WHILE ENGINE IS RUNNING	1. Vacuum created in cooling system on engine cool-down is not being relieved through coolant reserve/overflow system.	1. (a) Radiator cap relief valve stuck. (Refer to 7 - COOLING/ ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING). Replace if necessary (b) Hose between coolant reserve/overflow tank and radiator is kinked. Repair as necessary. (c) Vent at coolant reserve/overflow tank is plugged. Clean vent and repair as necessary. (d) Reserve/overflow tank is internally blocked or plugged. Check for blockage and repair as necessary.
NOISY VISCOUS FAN/DRIVE	1. Fan blades loose - 4.7L.	1. Replace fan blade assembly. (Refer to 7 - COOLING/ENGINE/ RADIATOR FAN - REMOVAL)
	2. Fan blades striking a surrounding object.	2. Locate point of fan blade contact and repair as necessary.
	3. Air obstructions at radiator or air conditioning condenser.	3. Remove obstructions and/or clean debris or insects from radiator or A/C condenser.
	4. Thermal viscous fan drive has defective bearing - 4.7L	4. Replace fan drive. Bearing is not serviceable. (Refer to 7 - COOLING/ ENGINE/RADIATOR FAN - REMOVAL).

CONDITION	POSSIBLE CAUSES	CORRECTION
INADEQUATE HEATER PERFORMANCE.	1.Thermostat failed in open position	1. Check thermostat operation and replaces necessary (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - DIAGNOSIS AND TESTING)
	2. Has a Diagnostic trouble Code (DTC) been set?	2. (Refer to 25 - EMISSIONS CONTROL - DESCRIPTION) for correct procedures and replace thermostat if necessary
	3. Coolant level low	3. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING).
	4. Obstructions in heater hose/ fittings	4. Remove heater hoses at both ends and check for obstructions
	5. Heater hose kinked	5. Locate kinked area and repair as necessary
	6. Water pump is not pumping water to/through the heater core. When the engine is fully warmed up, both heater hoses should be hot to the touch. If only one of the hoses is hot, the water pump may not be operating correctly or the heater core may be plugged. Accessory drive belt may be slipping causing poor water pump operation.	6. (Refer to 7 - COOLING/ENGINE/ WATER PUMP - DIAGNOSIS AND TESTING). If a slipping belt is detected, (Refer to 7 - COOLING/ ACCESSORY DRIVE/DRIVE BELTS - REMOVAL). If heater core obstruction is detected, (Refer to 7 - COOLING - STANDARD PROCEDURE) for cooling system reverse flushing.
STEAM IS COMING FROM THE FRONT OF VEHICLE NEAR THE GRILL AREA WHEN WEATHER IS WET, ENGINE IS WARMED UP AND RUNNING, AND VEHICLE IS STATIONARY. TEMPERATURE GAUGE IS IN NORMAL RANGE	1. During wet weather, moisture (snow, ice or rain condensation) on the radiator will evaporate when the thermostat opens. This opening allows heated water into the radiator. When the moisture contacts the hot radiator, steam may be emitted. This usually occurs in cold weather with no fan or airflow to blow it away.	1. Occasional steam emitting from this area is normal. No repair is necessary.
COOLANT COLOR	1. Coolant color is not necessarily an indication of adequate corrosion or temperature protection. Do not rely on coolant color for determining condition of coolant.	1. (Refer to 7 - COOLING/ENGINE/ COOLANT - DESCRIPTION) for coolant concentration information. Adjust coolant mixture as necessary.
COOLANT LEVEL CHANGES IN COOLANT RESERVE/OVERFLOW TANK. TEMPERATURE GAUGE IS IN NORMAL RANGE	1. Level changes are to be expected as coolant volume fluctuates with engine temperature. If the level in the tank was between the FULL and ADD marks at normal operating temperature, the level should return to within that range after operation at elevated temperatures.	1. A normal condition. No repair is necessary.

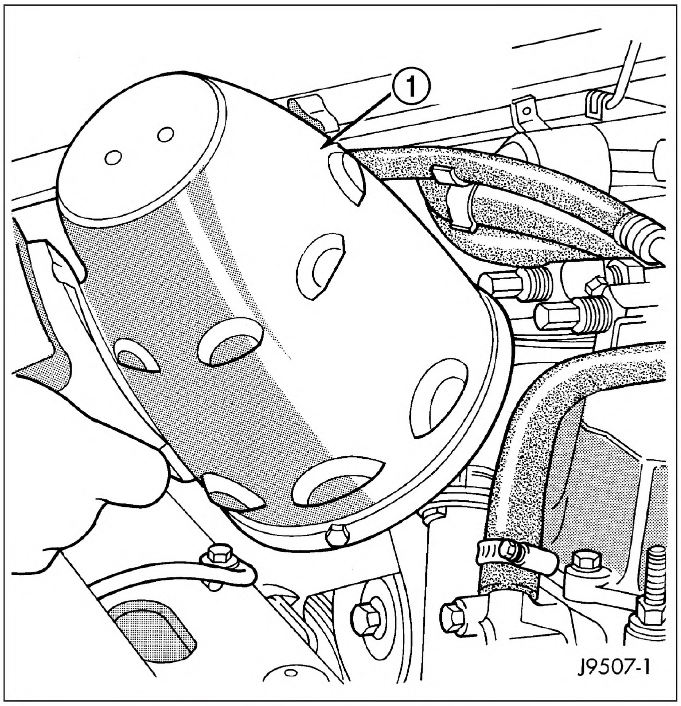
CONDITION	POSSIBLE CAUSES	CORRECTION
FAN RUNS ALL THE TIME	1. Fan control sensors inoperative.	1. Check for DTC's. Verify sensor readings.
	2. Fan control solenoid stuck ″on″.	2. Check fan operation speeds. Refer to fan speed operation table.
	3. Fan control solenoid harness damaged.	3. Check for DTC 1499. Repair as required.
	4. Transmission temperature too high.	4. Check for transmission over temp. DTC.
	5. Engine coolant temperature too high.	5. (a) Check coolant level. Correct level as required. (b) Thermostat stuck. Replace thermostat. (c) Water pump failed. Replace water pump. (d) Coolant flow restricted. Clean radiator. (e) Air flow over radiator obstructed. Remove obstruction.

COOLING SYSTEM LEAKS

ULTRAVIOLET LIGHT METHOD

A leak detection additive is available through the parts department that can be added to cooling system. The additive is highly visible under ultraviolet light (black light). Pour one ounce of additive into cooling system. Place heater control unit in HEAT position. Start and operate engine until radiator upper hose is warm to touch. Aim the commercially available black light tool at components to be checked. If leaks are present, black light will cause additive to glow a bright green color.

The black light can be used in conjunction with a pressure tester to determine if any external leaks exist.



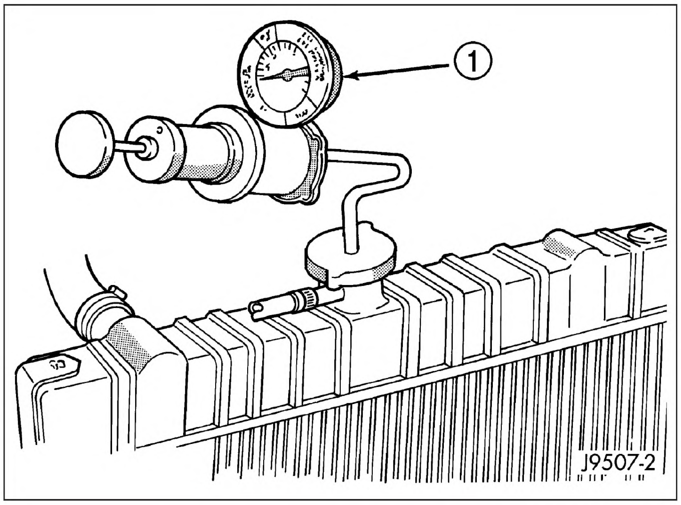
PRESSURE TESTER METHOD

The engine should be at normal operating temperature. Recheck the system cold if cause of coolant loss is not located during the warm engine examination.

WARNING: HOT, PRESSURIZED COOLANT CAN CAUSE INJURY BY SCALDING.

Carefully remove radiator pressure cap from filler neck and check coolant level. Push down on cap to disengage it from stop tabs. Wipe inside of filler neck and examine lower inside sealing seat for nicks, cracks, paint, dirt and solder residue. Inspect radiator-to-reserve/overflow tank hose for internal obstructions. Insert a wire through the hose to be sure it is not obstructed.

Inspect cams on outside of filler neck. If cams are damaged, seating of pressure cap valve and tester seal will be affected.



Attach pressure tester (7700 or an equivalent) to radiator filler neck.

Operate tester pump to apply 103.4 kPa (15 psi) pressure to system. If hoses enlarge excessively or bulges while testing, replace as necessary. Observe gauge pointer and determine condition of cooling system according to following criteria:

Holds Steady: If pointer remains steady for two minutes, serious coolant leaks are not present in system. However, there could be an internal leak that does not appear with normal system test pressure. If it is certain that coolant is being lost and leaks cannot be detected, inspect for interior leakage or perform Internal Leakage Test.

Drops Slowly: Indicates a small leak or seepage is occurring. Examine all connections for seepage or slight leakage with a flashlight. Inspect radiator, hoses, gasket edges and heater. Seal small leak holes with a Sealer Lubricant (or equivalent). Repair leak holes and inspect system again with pressure applied.

Drops Quickly: Indicates that serious leakage is occurring. Examine system for external leakage. If leaks are not visible, inspect for internal leakage. Large radiator leak holes should be repaired by a reputable radiator repair shop.

INTERNAL LEAKAGE INSPECTION

Remove engine oil pan drain plug and drain a small amount of engine oil. If coolant is present in the pan, it will drain first because it is heavier than oil. An alternative method is to operate engine for a short period to churn the oil. After this is done, remove engine dipstick and inspect for water globules. Also inspect transmission dipstick for water globules and transmission fluid cooler for leakage.

WARNING: WITH RADIATOR PRESSURE TESTER TOOL INSTALLED ON RADIATOR, DO NOT ALLOW PRESSURE TO EXCEED 110 KPA (20 PSI). PRESSURE WILL BUILD UP QUICKLY IF A COMBUSTION LEAK IS PRESENT. TO RELEASE PRESSURE, ROCK TESTER FROM SIDE TO SIDE. WHEN REMOVING TESTER, DO NOT TURN TESTER MORE THAN 1/2 TURN IF SYSTEM IS UNDER PRESSURE.

Operate engine without pressure cap on radiator until thermostat opens. Attach a Pressure Tester to filler neck. If pressure builds up quickly it indicates a combustion leak exists. This is usually the result of a cylinder head gasket leak or crack in engine. Repair as necessary.

If there is not an immediate pressure increase, pump the Pressure Tester. Do this until indicated pressure is within system range of 110 kPa (16 psi). Fluctuation of gauge pointer indicates compression or combustion leakage into cooling system.

Because the vehicle is equipped with a catalytic converter, **do not** remove spark plug cables or short out cylinders to isolate compression leak.

If the needle on dial of pressure tester does not fluctuate, race engine a few times to check for an abnormal amount of coolant or steam. This would be emitting from exhaust pipe. Coolant or steam from exhaust pipe may indicate a faulty cylinder head gasket, cracked engine cylinder block or cylinder head.

A convenient check for exhaust gas leakage into cooling system is provided by a commercially available Block Leak Check tool. Follow manufacturers instructions when using this product.

COMBUSTION LEAKAGE TEST - WITHOUT PRESSURE TESTER

DO NOT WASTE reusable coolant. If solution is clean, drain coolant into a clean container for reuse.

WARNING: DO NOT REMOVE CYLINDER BLOCK DRAIN PLUGS OR LOOSEN RADIATOR DRAINCOCK WITH SYSTEM HOT AND UNDER PRESSURE. SERIOUS BURNS FROM COOLANT CAN OCCUR.

Drain sufficient coolant to allow thermostat removal. (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - REMOVAL). Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

Add coolant to radiator to bring level to within 6.3 mm (1/4 in) of top of thermostat housing.

CAUTION: Avoid overheating. Do not operate engine for an excessive period of time. Open draincock immediately after test to eliminate boil over.

Start engine and accelerate rapidly three times, to approximately 3000 rpm while observing coolant. If internal engine combustion gases are leaking into cooling system, bubbles will appear in coolant. If bubbles do not appear, internal combustion gas leakage is not present.

COOLING SYSTEM DEAERATION

As the engine operates, any air trapped in cooling system gathers under the radiator cap. The next time the engine is operated, thermal expansion of coolant will push any trapped air past radiator cap into the coolant reserve/overflow tank. Here it escapes to the atmosphere into the tank. When the engine cools down the coolant, it will be drawn from the reserve/overflow tank into the radiator to replace any removed air.

STANDARD PROCEDURE

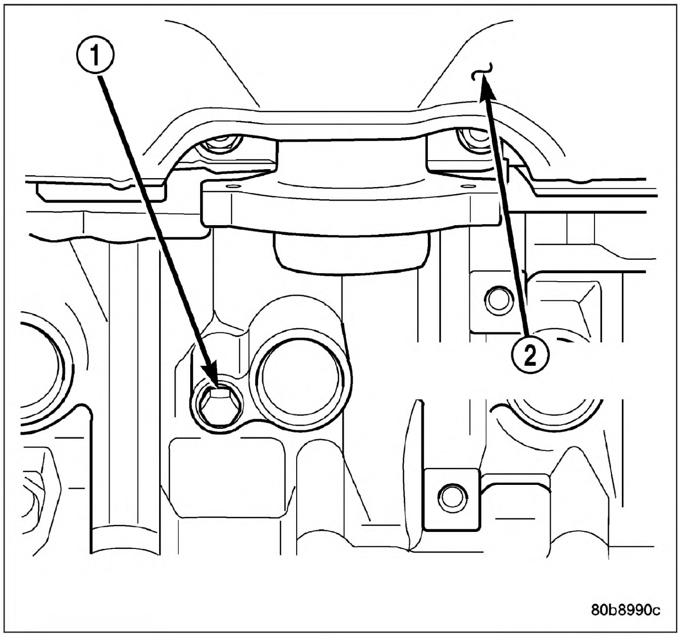
DRAINING COOLING SYSTEM

WARNING: DO NOT REMOVE THE CYLINDER BLOCK DRAIN PLUGS OR LOOSEN THE RADIATOR DRAINCOCK WITH SYSTEM HOT AND UNDER PRESSURE. SERIOUS BURNS FROM COOLANT CAN OCCUR.

1. DO NOT remove radiator cap first. With engine cold, raise vehicle on a hoist and locate radiator draincock.

NOTE: Radiator draincock is located on the right/ lower side of radiator facing to rear of vehicle.

2. Attach one end of a hose to the draincock. Put the other end into a clean container. Open draincock and drain coolant from radiator. This will empty the coolant reserve/overflow tank. The coolant does not have to be removed from the tank unless the system is being refilled with a fresh mixture. When tank is empty, remove radiator cap and continue draining cooling system.

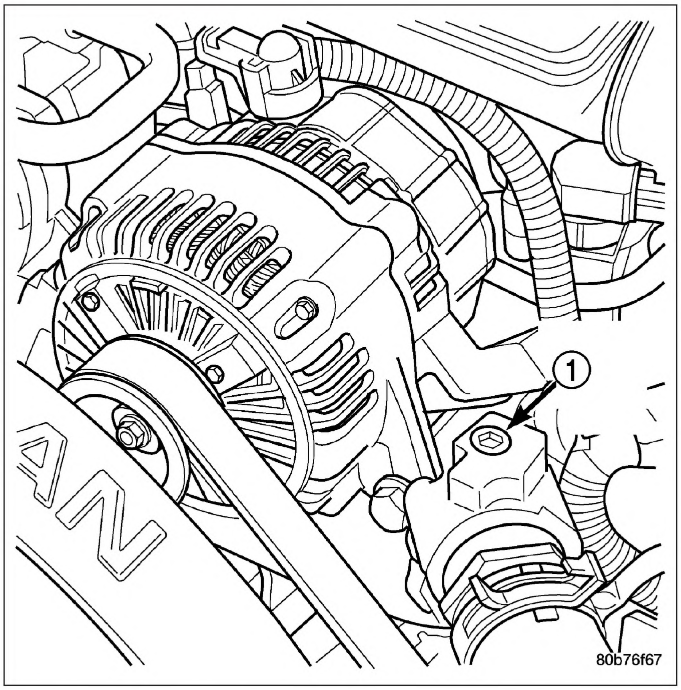


REFILLING COOLING SYSTEM - 4.7L ENGINE

1. Tighten the radiator draincock and the cylinder block drain plug(s) (if removed).

CAUTION: Failure to purge air from the cooling system can result in an overheating condition and severe engine damage.

2. Remove the cooling system bleed plug from the radiator upper hose inlet housing. Fill cooling system with the antifreeze mixture (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION), until coolant begins coming out of the cooling system bleed hole. Install the cooling system bleed plug. Fill radiator to top and install radiator cap. Add sufficient coolant to the reserve/overflow tank to raise level to FULL mark.
3. With heater control unit in the HEAT position, operate engine with radiator cap in place.
4. After engine has reached normal operating temperature, shut engine off and allow it to cool. When engine is cooling down, coolant will be drawn into the radiator from the reserve/overflow tank.



5. Add coolant to reserve/overflow tank as necessary. **Only add coolant to the reserve/overflow tank when the engine is cold. Coolant level in a warm engine will be higher due to thermal expansion.** To purge the cooling system of all air, this heat up/cool down cycle (adding coolant to cold engine) must be performed three times. Add necessary coolant to raise tank level to the FULL mark after each cool down period.

ADDING ADDITIONAL COOLANT

The use of aluminum cylinder blocks, cylinder heads and water pumps requires special corrosion protection. Only Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (glycol base coolant with corrosion inhibitors called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% distilled water to obtain to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

CAUTION: Do not use coolant additives that are claimed to improve engine cooling.

COOLING SYSTEM - REVERSE FLUSHING

CAUTION: The cooling system normally operates at 97-124 kPa (14-18 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

Reverse flushing of the cooling system is the forcing of water through the cooling system. This is done using air pressure in the opposite direction of normal coolant flow. It is usually only necessary with very dirty systems with evidence of partial plugging.

CHEMICAL CLEANING

If visual inspection indicates the formation of sludge or scaly deposits, use a radiator cleaner (Mopar Radiator Kleen or equivalent) before flushing. This will soften scale and other deposits and aid the flushing operation.

CAUTION: Be sure instructions on the container are followed.

REVERSE FLUSHING RADIATOR

Disconnect the radiator hoses from the radiator fittings. Attach a section of radiator hose to the radiator bottom outlet fitting and insert the flushing gun. Connect a water supply hose and air supply hose to the flushing gun.

CAUTION: The cooling system normally operates at 97-124 kPa (14-18 psi) pressure. Exceeding this pressure may damage the radiator or hoses.

Allow the radiator to fill with water. When radiator is filled, apply air in short blasts allowing radiator to refill between blasts. Continue this reverse flushing until clean water flows out through rear of radiator cooling tube passages. For more information, refer to operating instructions supplied with flushing equipment. Have radiator cleaned more extensively by a radiator repair shop.

REVERSE FLUSHING ENGINE

Drain the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE). Remove the thermostat housing and thermostat. Install the thermostat housing. Disconnect the radiator upper hose from the radiator and attach the flushing gun to the hose. Disconnect the radiator lower hose from the water pump. Attach a lead away hose to the water pump inlet fitting.

CAUTION: Be sure that the heater control valve is closed (heat off). This is done to prevent coolant flow with scale and other deposits from entering the heater core.

Connect the water supply hose and air supply hose to the flushing gun. Allow the engine to fill with water. When the engine is filled, apply air in short blasts, allowing the system to fill between air blasts. Continue until clean water flows through the lead away hose. For more information, refer to operating instructions supplied with flushing equipment.

Remove the lead away hose, flushing gun, water supply hose and air supply hose. Remove the thermostat housing (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - REMOVAL). Install the thermostat and housing with a replacement gasket (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - INSTALLATION). Connect the radiator hoses. Refill the cooling system with the correct antifreeze/water mixture (Refer to 7 - COOLING - STANDARD PROCEDURE).

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Automatic Belt Tensioner to Mounting Bracket Bolt 3.7L 4.7L 5.7L 3.0L DIESEL	41	30	-
Automatic Belt Tensioner Pulley Bolt 3.7L 4.7L 5.7L 3.0L DIESEL	61	45	-
Block Heater Bolt 3.7L 4.7L 5.7L 2.7L DIESEL	2	-	17
Fan Blade Assembly to Viscous Drive Bolts 4.7L	23	—	200
Generator Mounting Bolts 4.7L	57	42	—
Radiator Upper Isolator to Crossmember Nuts	3	—	20
Radiator Upper Isolator to Radiator Nuts	4	—	36
Radiator Brace Bolts	10	—	90
Thermostat Housing Bolts			
3.7L	22	16	—
4.7L	13	—	115
5.7L			
3.0L DIESEL			
Upper Radiator Crossmember to Body Bolts	10	—	90
Water Pump Bolts			
3.7L	23	17	—
4.7L	58	43	—
5.7L			
3.0L DIESEL			

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Water Pump Pulley to Water Pump Bolts 3.7L 4.7L 5.7L 3.0L DIESEL	28	—	250
High Pressure Inlet Hose to Hydraulic Fan Drive (1/2 inch Fitting)	49	36	—
High Pressure Outlet Hose to Steering Gear (3/8 inch Fitting)	29	21.5	—
Fan Shroud to Radiator Mounting Bolts	6	—	50

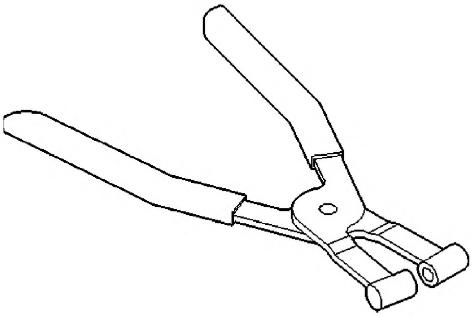
FILL VOLUMES

SPECIFICATIONS

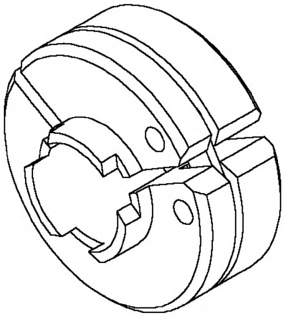
DESCRIPTION	SPECIFICATION	
	Metric	Standard
3.7L	9 L	10.0 qts.
4.7L	13.7 L	14.5 qts.
5.7L	13.7 L	14.5 qts.
3.0L DIESEL		

SPECIAL TOOLS

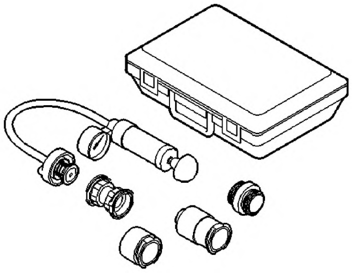
COOLING



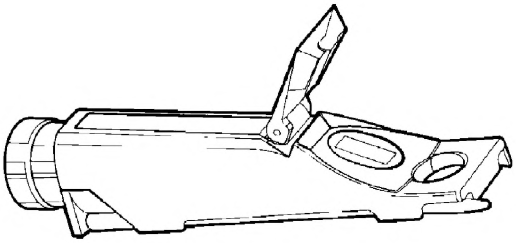
Pliers 6094



RELEASE TOOL 8875A



PRESSURE TESTER 7700;A



Coolant Refractometer 8286

ACCESSORY DRIVE

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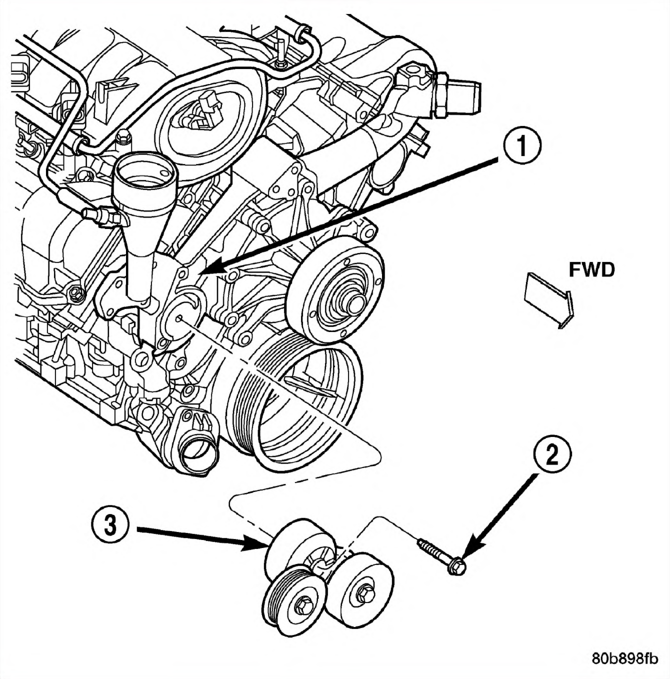
TENSIONERS-BELT

REMOVAL

3.7L ENGINE

1. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
2. Remove tensioner assembly from engine front cover.

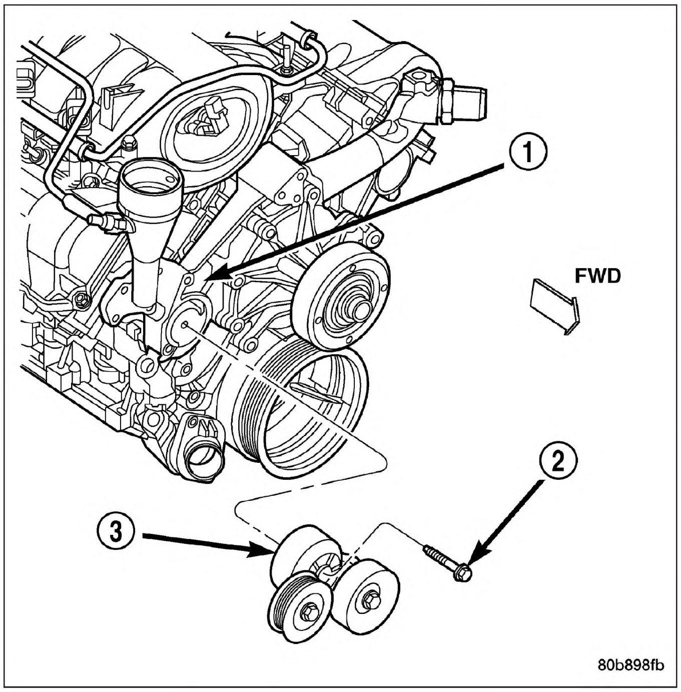
WARNING: BECAUSE OF HIGH SPRING TENSION, DO NOT ATTEMPT TO DISASSEMBLE AUTOMATIC TENSIONER. UNIT IS SERVICED AS AN ASSEMBLY (EXCEPT FOR PULLEY ON TENSIONER).



4.7L ENGINE

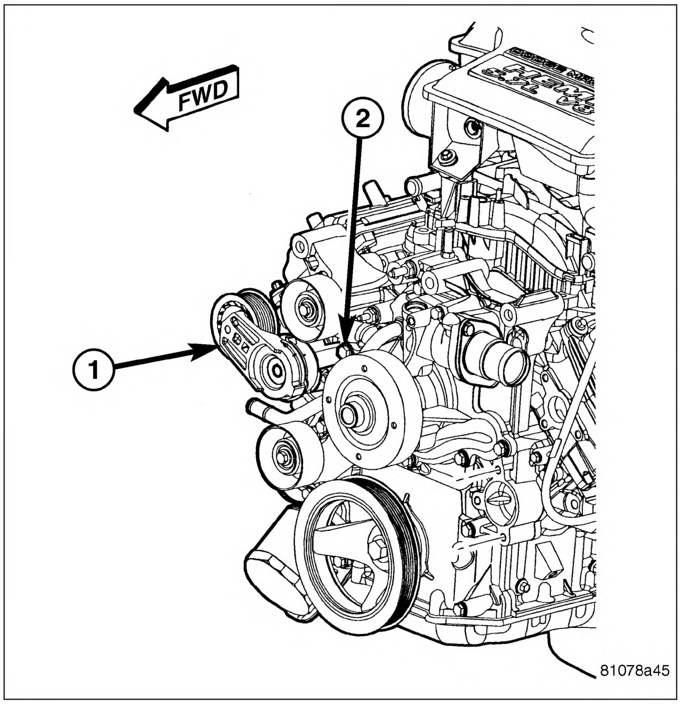
1. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
2. Remove tensioner assembly from engine front cover.

WARNING: BECAUSE OF HIGH SPRING TENSION, DO NOT ATTEMPT TO DISASSEMBLE AUTOMATIC TENSIONER. UNIT IS SERVICED AS AN ASSEMBLY (EXCEPT FOR PULLEY ON TENSIONER).



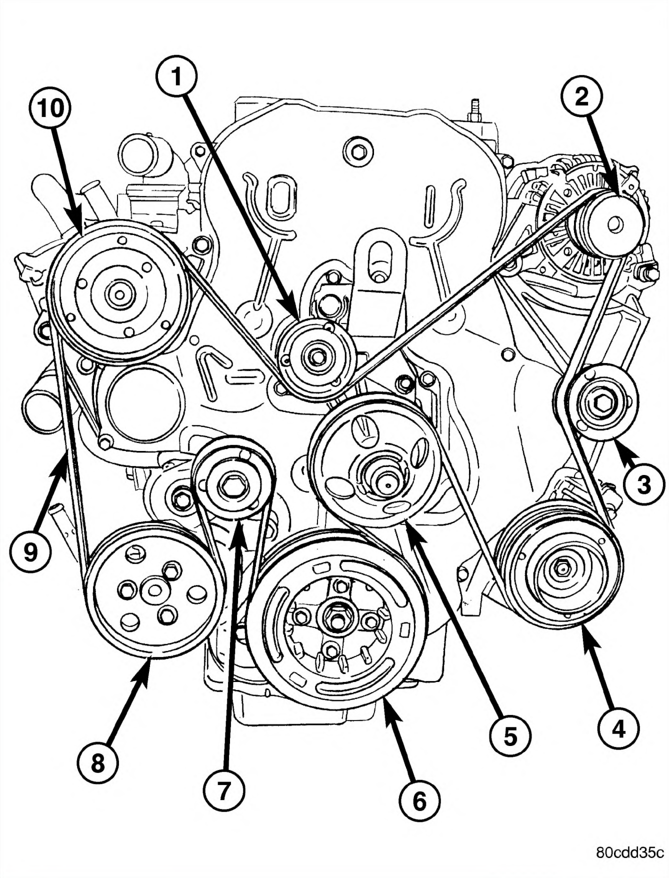
5.7L ENGINE

1. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
2. Remove bolt and tensioner assembly.



3.0L DIESEL

1. Disconnect negative battery cable.
2. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).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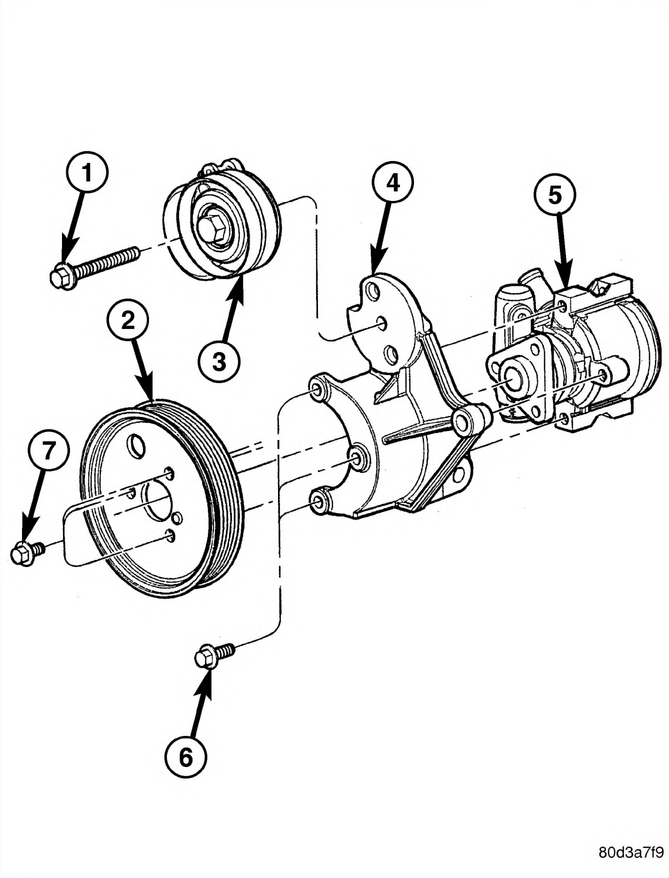
3. Remove belt tensioner retaining bolt and remove tensioner from bracket.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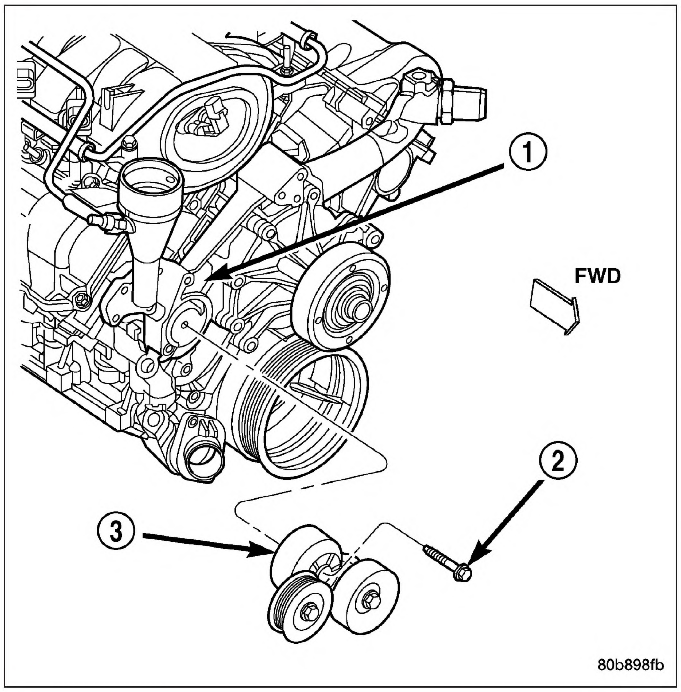
INSTALLATION

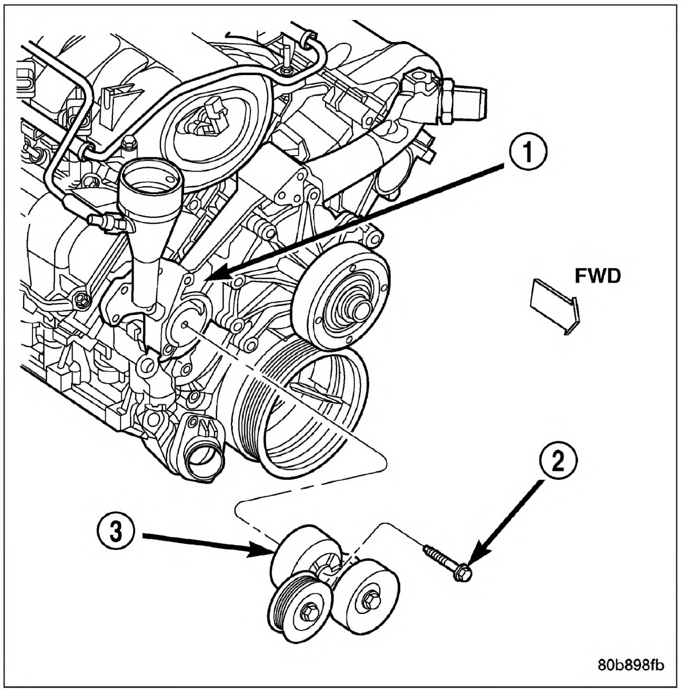
3.7L ENGINE

1. An indexing slot is located on back of tensioner. Align this slot to the head of the bolt on the front cover. Install the mounting bolt. Tighten bolt to 41 N·m (30 ft. lbs.).
2. Install drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
3. Check belt indexing marks (Refer to 7 - COOLING/ ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).



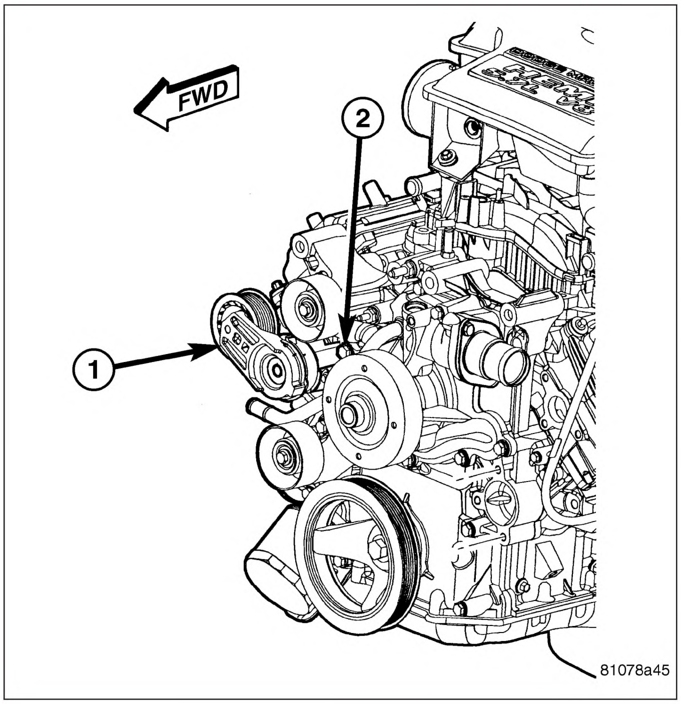
4.7L ENGINE

1. An indexing slot is located on back of tensioner. Align this slot to the head of the bolt on the front cover. Install the mounting bolt. Tighten bolt to 41 N·m (30 ft. lbs.).
2. Install drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
3. Check belt indexing marks (Refer to 7 - COOLING/ ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).



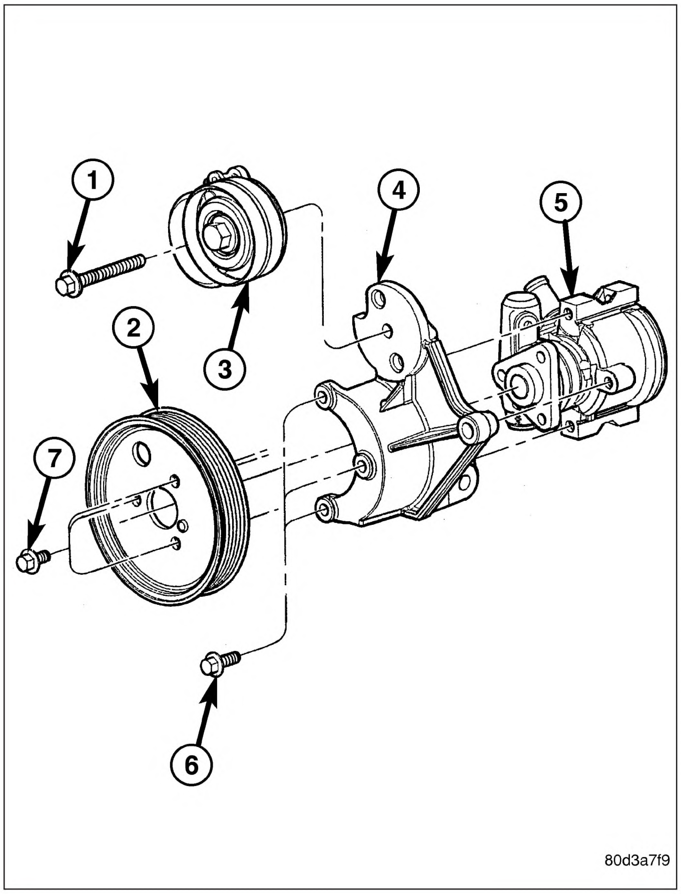
5.7L ENGINE

1. Align locator tang on tensioner with slot in front cover.
2. Install tensioner and mounting bolt to front cover.. Tighten bolt to 41 N·m (30 ft. lbs.).
3. Install accessory drive belt (Refer to 7 - COOLING/ ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

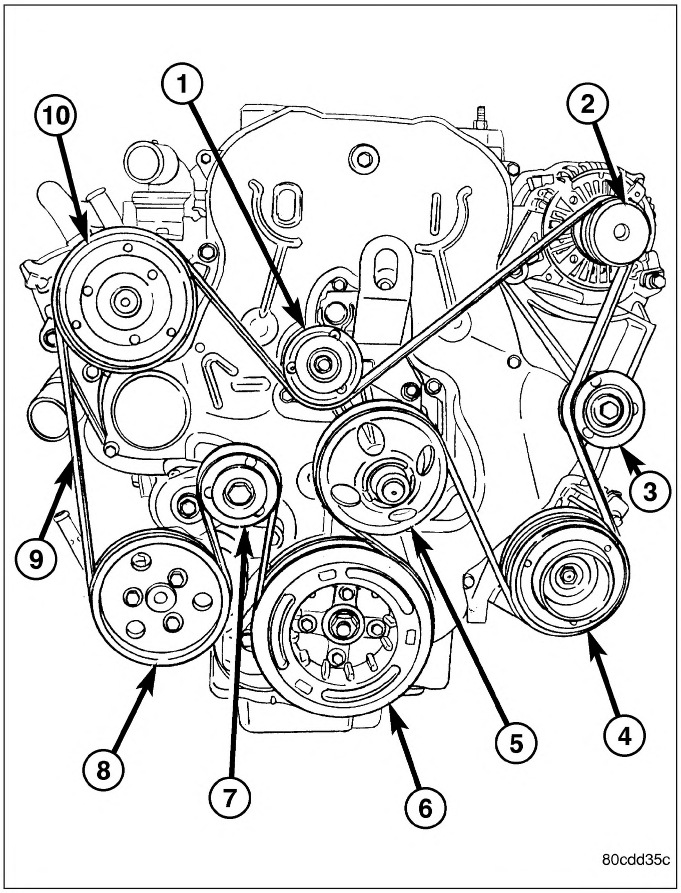


3.0L DIESEL

1. Install belt tensioner on bracket. Torque retaining bolt to 47.1N·m.



2. Install accessory drive belt (Refer to 7 - COOLING/ ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
3. Connect negative battery cable.



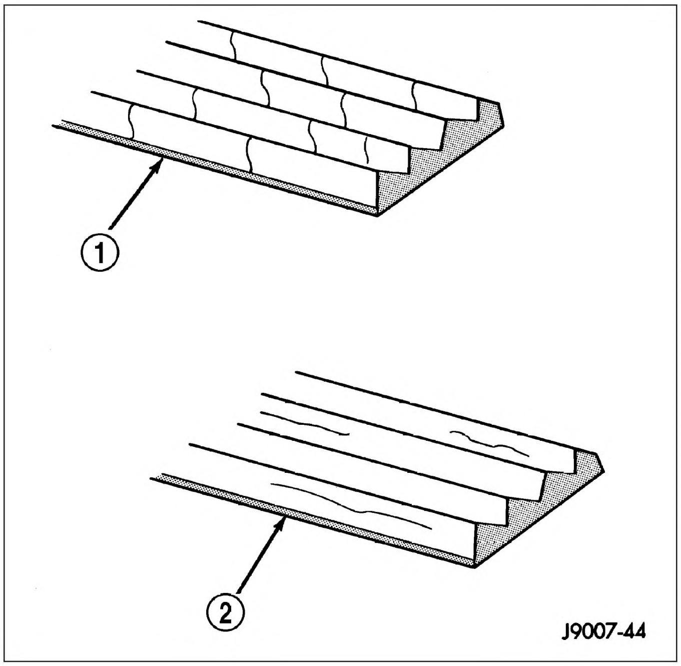
BELTS-DRIVE

DIAGNOSIS AND TESTING

SERPENTINE DRIVE BELT

When diagnosing serpentine drive belts, small cracks that run across ribbed surface of belt from rib to rib , are considered normal. These are not a reason to replace belt. However, cracks running along a rib (not across) are **not** normal. Any belt with cracks running along a rib must be replaced. Also replace belt if it has excessive wear, frayed cords or severe glazing.

Refer to SERPENTINE DRIVE BELT DIAGNOSIS CHART for further belt diagnosis.



SERPENTINE DRIVE BELT DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
RIB CHUNKING (ONE OR MORE RIBS HAS SEPARATED FROM BELT BODY)	1. Foreign objects imbedded in pulley grooves. 2. Installation damage.	1. Remove foreign objects from pulley grooves. Replace belt. 2. Replace belt.
RIB OR BELT WEAR	1. Pulley(s) misaligned. 2. Abrasive environment. 3. Rusted pulley(s). 4. Sharp or jagged pulley groove tips. 5. Rubber deteriorated.	1. Align pulley(s). 2. Clean pulley(s). Replace belt if necessary. 3. Clean rust from pulley(s). 4. Replace pulley. 5. Replace belt.
LONGITUDINAL BELT CRACKING (CRACKS BETWEEN TWO RIBS)	1. Belt has mistracked from pulley groove. 2. Pulley groove tip has worn away rubber to tensile member.	1. Replace belt. 2. Replace belt.
BELT SLIPS	1. Belt slipping because of insufficient tension. 2. Belt routed incorrectly 3. Incorrect belt. 4. Belt or pulley subjected to substance (belt dressing, oil ethylene glycol) that has reduced friction. 5. Driven component bearing failure. 6. Belt glazed and hardened from heat and excessive slippage.	1. Replace automatic belt tensioner. 2. Verify belt routing. 3. Replace belt. 4. Replace belt and clean pulleys. 5. Replace faulty component bearing. 6. Replace belt.

CONDITION	POSSIBLE CAUSES	CORRECTION
"GROOVE JUMPING" (BELT DOES NOT MAINTAIN CORRECT POSITION ON PULLEY)	1. Belt tension either too high or too low. 2. Belt routed incorrectly. 3. Incorrect belt. 4. Pulley(s) not within design tolerance. 5. Foreign object(s) in grooves. 6. Pulley misalignment. 7. Belt cord line is broken.	1. Replace automatic belt tensioner. 2. Verify belt routing. 3. Replace belt. 4. Replace pulley(s). 5. Remove foreign objects from grooves. 6. Check and replace. 7. Replace belt.
BELT BROKEN (NOTE: IDENTIFY AND CORRECT PROBLEM BEFORE NEW BELT IS INSTALLED)	1. Excessive tension. 2. Incorrect belt. 3. Tensile member damaged during belt installation. 4. Severe misalignment. 5. Bracket, pulley, or bearing failure.	1. Replace belt and automatic belt tensioner. 2. Replace belt. 3. Replace belt. 4. Check and replace. 5. Replace defective component and belt.
NOISE (OBJECTIONABLE SQUEAL, SQUEAK, OR RUMBLE IS HEARD OR FELT WHILE DRIVE BELT IS IN OPERATION)	1. Belt slippage. 2. Bearing noise. 3. Belt misalignment. 4. Belt-to-pulley mismatch.	1. Replace belt or automatic belt tensioner. 2. Locate and repair. 3. Replace belt. 4. Install correct belt.

REMOVAL

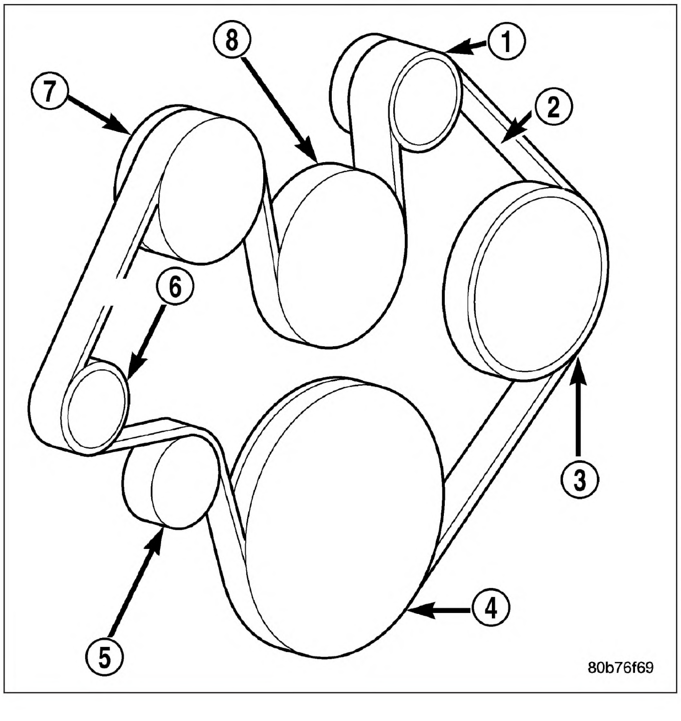
3.7L ENGINE

NOTE: The belt routing schematics are published from the latest information available at the time of publication. If anything differs between these schematics and the Belt Routing Label, use the schematics on Belt Routing Label. This label is located in the engine compartment.

CAUTION: DO NOT LET TENSIONER ARM SNAP BACK TO THE FREEARM POSITION, SEVERE DAMAGE MAY OCCUR TO THE TENSIONER.

Belt tension is not adjustable. Belt adjustment is maintained by an automatic (spring load) belt tensioner.

1. Disconnect negative battery cable from battery.
2. Rotate belt tensioner until it contacts its stop. Remove belt, then slowly rotate the tensioner into the freearm position..



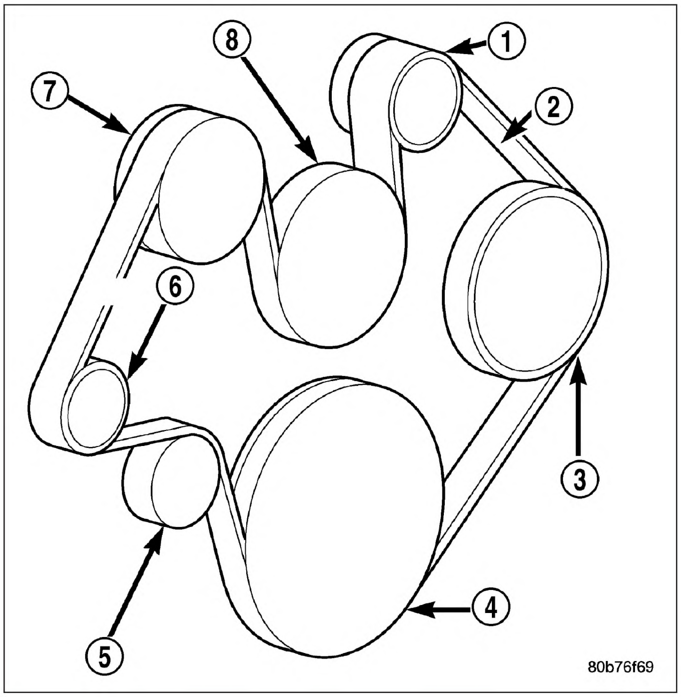
REMOVAL - 4.7L ENGINE

NOTE: The belt routing schematics are published from the latest information available at the time of publication. If anything differs between these schematics and the Belt Routing Label, use the schematics on Belt Routing Label. This label is located in the engine compartment.

CAUTION: DO NOT LET TENSIONER ARM SNAP BACK TO THE FREEARM POSITION, SEVERE DAMAGE MAY OCCUR TO THE TENSIONER.

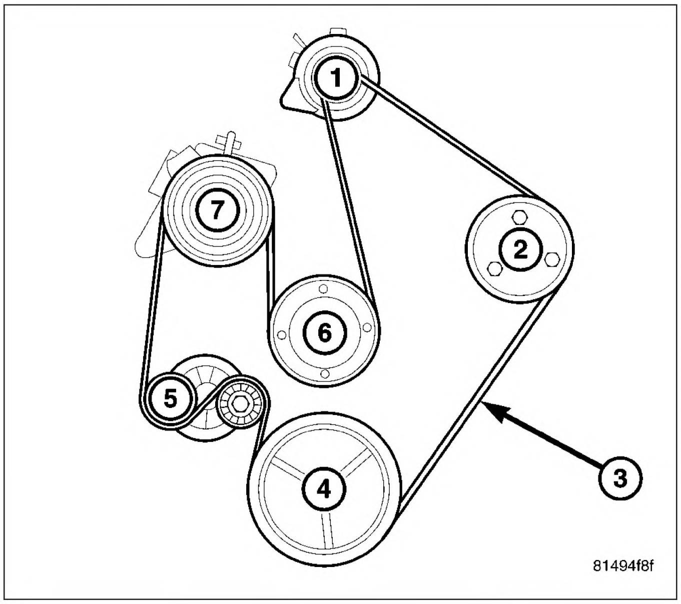
Belt tension is not adjustable. Belt adjustment is maintained by an automatic (spring load) belt tensioner.

1. Disconnect negative battery cable from battery.
2. Rotate belt tensioner until it contacts its stop. Remove belt, then slowly rotate the tensioner into the freearm position..

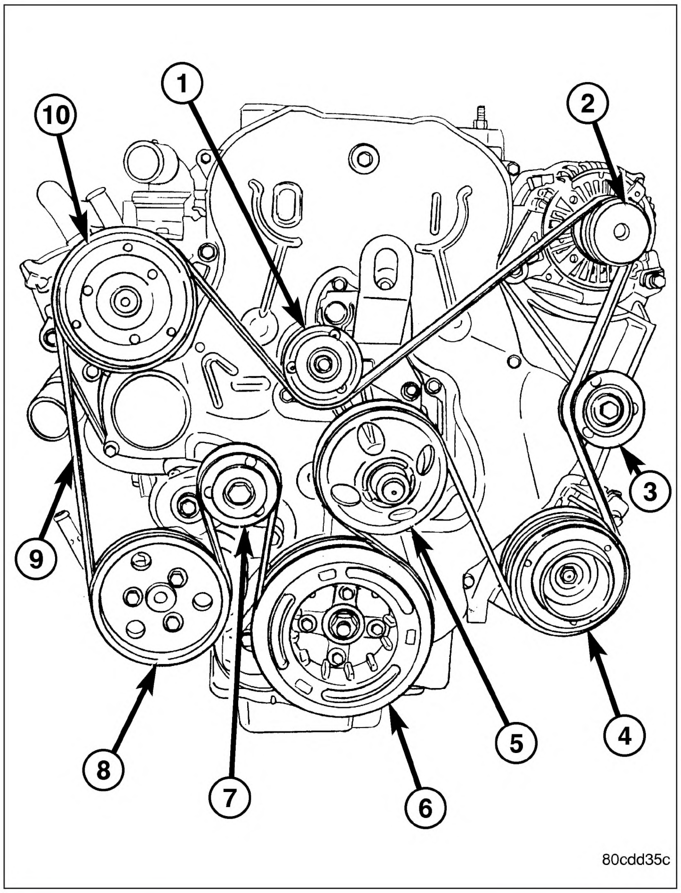


5.7L ENGINE

1. Remove the air intake tube between intake manifold and air filter assembly..
2. Release the belt tension by rotating the tensioner **counterclockwise** with a 15 mm wrench on the tensioner pulley bolt. Rotate belt tensioner until belt can be removed from pulleys.
3. Remove belt.
4. Gently release tensioner.



3.0L DIESEL



NOTE: The belt routing schematics are published from the latest information available at the time of publication. If anything differs between these schematics and the Belt Routing Label, use the schematics on Belt Routing Label. This label is located in the engine compartment.

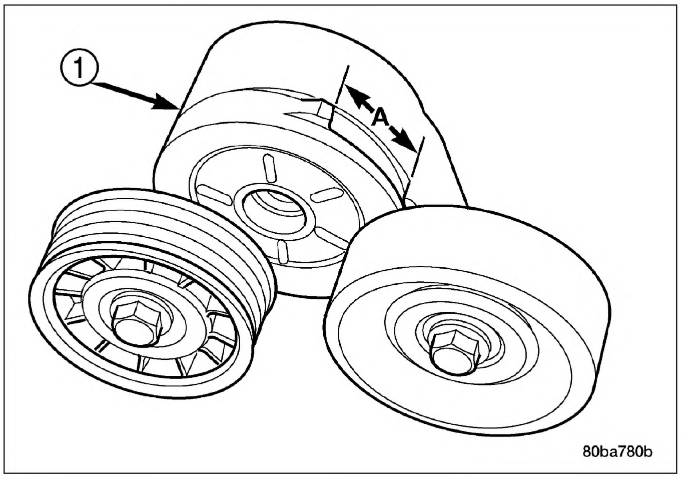
CAUTION: DO NOT LET TENSIONER ARM SNAP BACK TO THE FREEARM POSITION, SEVERE DAMAGE MAY OCCUR TO THE TENSIONER.

Belt tension is not adjustable. Belt adjustment is maintained by an automatic (spring loaded) belt tensioner.

1. Disconnect negative battery cable.
2. Rotate belt tensioner until it contacts its stop. Remove belt, then slowly rotate the tensioner into the freearm position.

INSTALLATION

3.7L ENGINE



NOTE: The belt routing schematics are published from the latest information available at the time of publication. If anything differs between these schematics and the Belt Routing Label, use the schematics on Belt Routing Label. This label is located in the engine compartment.

Belt tension is not adjustable. Belt adjustment is maintained by an automatic (spring load) belt tensioner.

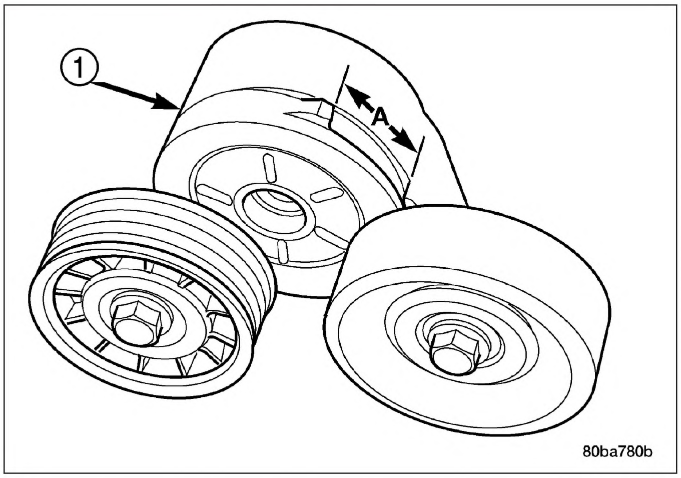
1. Check condition of all pulleys.

CAUTION: When installing the serpentine accessory drive belt, the belt MUST be routed correctly. If not, the engine may overheat due to the water pump rotating in the wrong direction.

2. Install new belt. Route the belt around all pulleys except the idler pulley. Rotate the tensioner arm until it contacts its stop position. Route the belt around the idler and slowly let the tensioner rotate into the belt. Make sure the belt is seated onto all pulleys.
3. With the drive belt installed, inspect the belt wear indicator. On 3.7L Engines the gap between the tang and the housing stop (measurement A) must not exceed 24 mm (.94 inches).

INSTALLATION - 4.7L ENGINE

NOTE: The belt routing schematics are published from the latest information available at the time of publication. If anything differs between these schematics and the Belt Routing Label, use the schematics on Belt Routing Label. This label is located in the engine compartment.

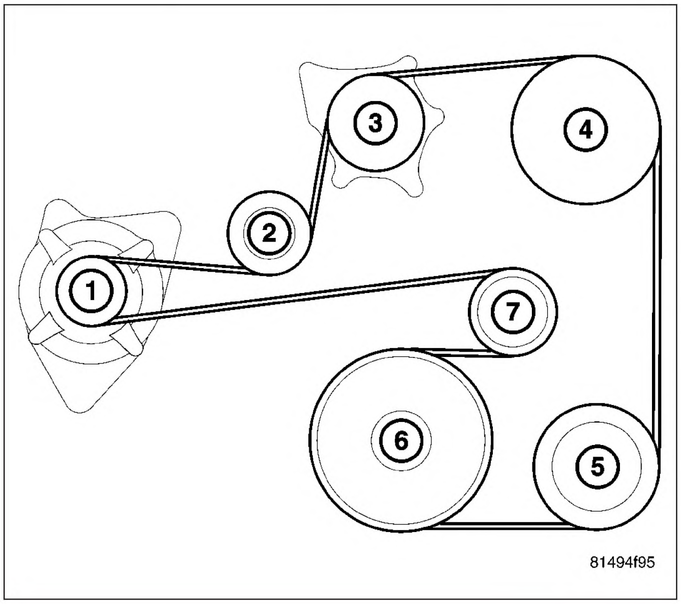


Belt tension is not adjustable. Belt adjustment is maintained by an automatic (spring load) belt tensioner.

1. Check condition of all pulleys.
2. Install new belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION). Route the belt around all pulleys except the idler pulley. Rotate the tensioner arm until it contacts its stop position. Route the belt around the idler and slowly let the tensioner rotate into the belt. Make sure the belt is seated onto all pulleys.
3. With the drive belt installed, inspect the belt wear indicator. On 4.7L Engines the gap between the tang and the housing stop (measurement A) must not exceed 24 mm (.94 inches).

5.7L ENGINE

NOTE: When installing accessory drive belt onto pulleys, make sure that belt is properly routed and all V-grooves make proper contact with pulleys.



1. Position the drive belt over all pulleys except for the water pump pulley.
2. Rotate tensioner **counterclockwise** and slip the belt over the water pump pulley.
3. Gently release tensioner.
4. Install the air intake tube between intake manifold and air filter assembly.

3.0L DIESEL

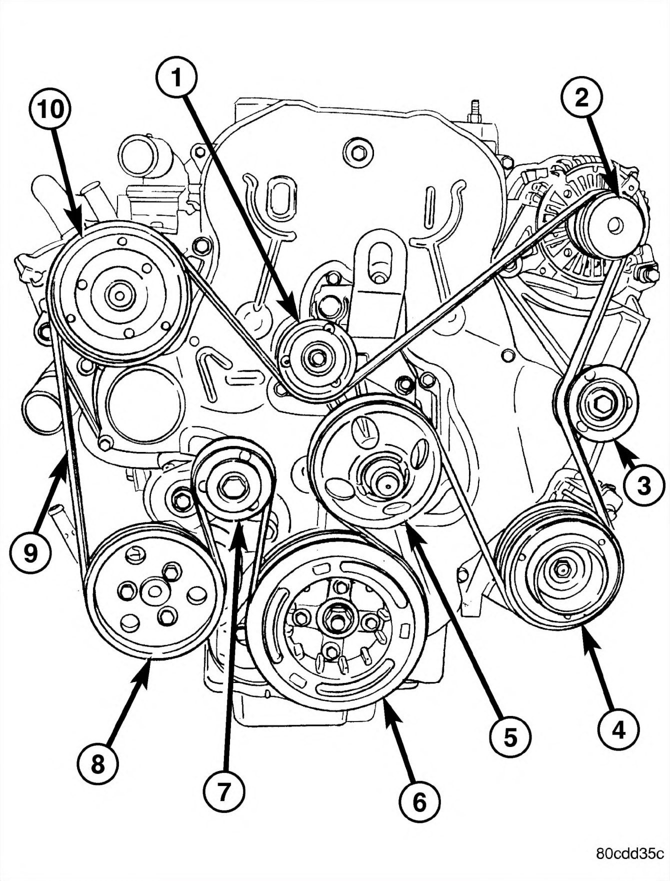
NOTE: The belt routing schematics are published from the latest information available at the time of publication. If anything differs between these schematics and the Belt Routing Label, use the schematics on Belt Routing Label. This label is located in the engine compartment.

Belt tension is not adjustable. Belt adjustment is maintained by an automatic (spring load) belt tensioner.

1. Check condition of all pulleys.

CAUTION: When installing the serpentine accessory drive belt, the belt MUST be routed correctly. If not, the engine may overheat due to the water pump rotating in the wrong direction.

2. Install new belt. Route the belt around all pulleys except the idler pulley. Rotate the tensioner arm until it contacts its stop position. Route the belt around the idler and slowly let the tensioner rotate into the belt. Make sure the belt is seated onto all pulleys.



ENGINE

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COOLANT

DESCRIPTION - ENGINE COOLANT

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

CAUTION: Use of Propylene Glycol based coolants is not recommended, as they provide less freeze protection and less boiling protection.

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and engine block. Then coolant carries the heat to the radiator where the tube/fin radiator can transfer the heat to the air.

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769), or the equivalent ethylene glycol base coolant with hybrid organic corrosion inhibitors (called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% Ethylene Glycol and 50% distilled water to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

The green coolant **MUST NOT BE MIXED** with the orange or magenta coolants. When replacing coolant the complete system flush must be performed before using the replacement coolant.

CAUTION: Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769) may not be mixed with any other type of antifreeze. Doing so will reduce the corrosion protection and may result in premature water pump seal failure. If non-HOAT coolant is introduced into the cooling system in an emergency, it should be replaced with the specified coolant as soon as possible.

OPERATION

Coolant flows through the engine block absorbing the heat from the engine, then flows to the radiator where the cooling fins in the radiator transfers the heat from the coolant to the atmosphere. During cold weather the ethylene-glycol or propylene-glycol coolant prevents water present in the cooling system from freezing within temperatures indicated by mixture ratio of coolant to water.

DIAGNOSIS AND TESTING - COOLANT CONCENTRATION TESTING

Coolant concentration should be checked when any additional coolant was added to system or after a coolant drain, flush and refill. The coolant mixture offers optimum engine cooling and protection against corrosion when mixed to a freeze point of -37°C (-34°F) to -46°C (-50°F). The use of a hydrometer or a refractometer can be used to test coolant concentration.

A hydrometer will test the amount of glycol in a mixture by measuring the specific gravity of the mixture. The higher the concentration of ethylene glycol, the larger the number of balls that will float, and higher the freeze protection (up to a maximum of 60% by volume glycol).

A refractometer (Special Tool 8286) (Refer to 7 - COOLING - SPECIAL TOOLS) will test the amount of glycol in a coolant mixture by measuring the amount a beam of light bends as it passes through the fluid.

Some coolant manufactures use other types of glycols into their coolant formulations. Propylene glycol is the most common new coolant. However, propylene glycol based coolants do not provide the same freezing protection and corrosion protection and is not recommended.

CAUTION: Do not mix types of coolant—corrosion protection will be severely reduced.

STANDARD PROCEDURE - COOLANT SERVICE

For engine coolant recommended service schedule, (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION).

CONTAINER-COOLANT RECOVERY

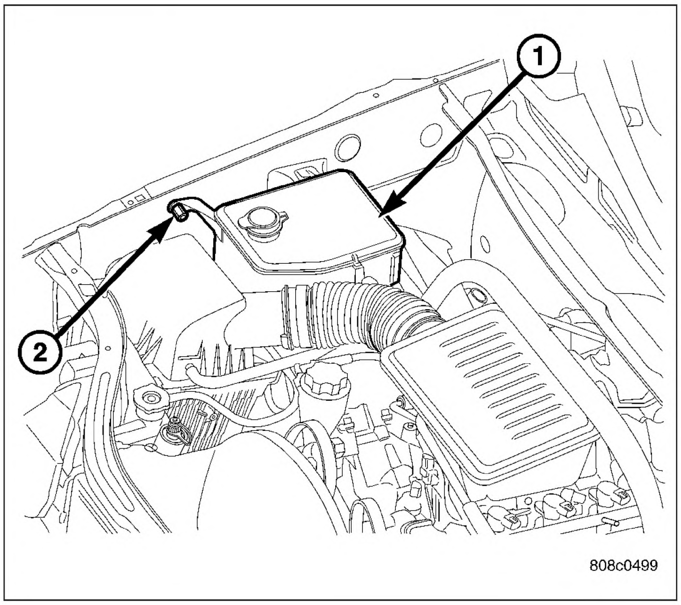
DESCRIPTION

This system works along with the radiator pressure cap. This is done by using thermal expansion and contraction of the coolant to keep the coolant free of trapped air. It provides:

- A volume for coolant expansion and contraction.
- A convenient and safe method for checking/adjusting coolant level at atmospheric pressure. This is done without removing the radiator pressure cap.
- Some reserve coolant to the radiator to cover minor leaks and evaporation or boiling losses.

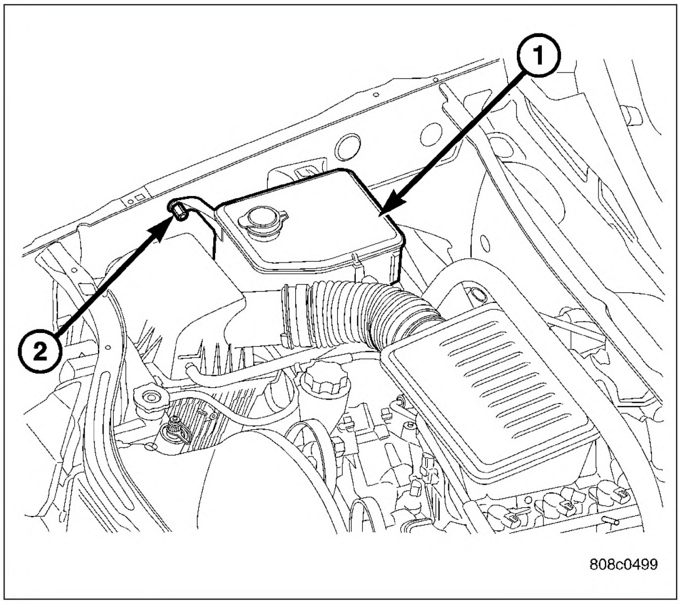
As the engine cools, a vacuum is formed in the cooling system of both the radiator and engine. Coolant will then be drawn from the coolant tank and returned to a proper level in the radiator.

The coolant reservoir/overflow system has a radiator mounted pressurized cap, an overflow tube and a plastic coolant reservoir/overflow tank mounted to the right inner fender.



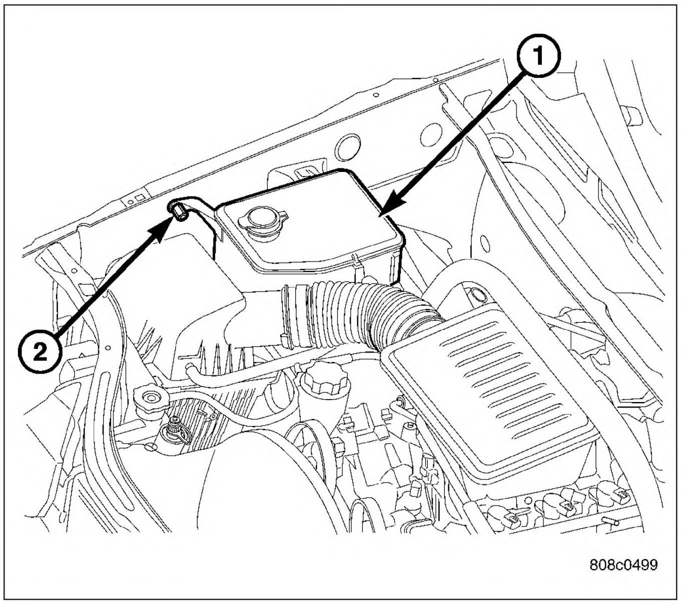
REMOVAL

1. Disconnect the coolant overflow hose (2).
2. Remove two mounting bolts (3).
3. Remove the coolant reservoir/overflow tank (1).



INSTALLATION

1. Position the coolant reservoir/overflow tank (1) in the vehicle.
2. Intstall two mounting bolts (3).
3. Install the coolant overflow hose (2).

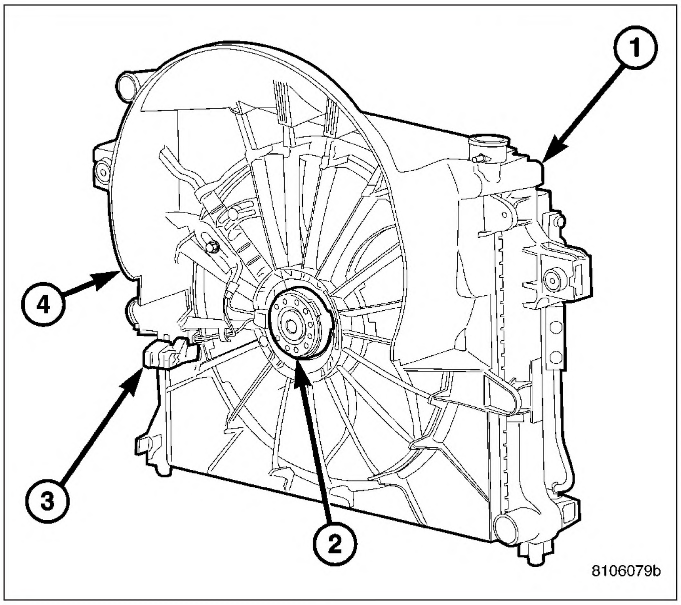


FAN-RADIATOR

DESCRIPTION

3.7L ENGINE The radiator cooling fan used on the 3.7L engine is an electrical fan and is integral to the fan shroud.

4.7L ENGINE The radiator cooling fan used on the 4.7L engine is a hybrid design. The hybrid fan system consist of a low speed viscous driven mechanical fan and a electrical fan.



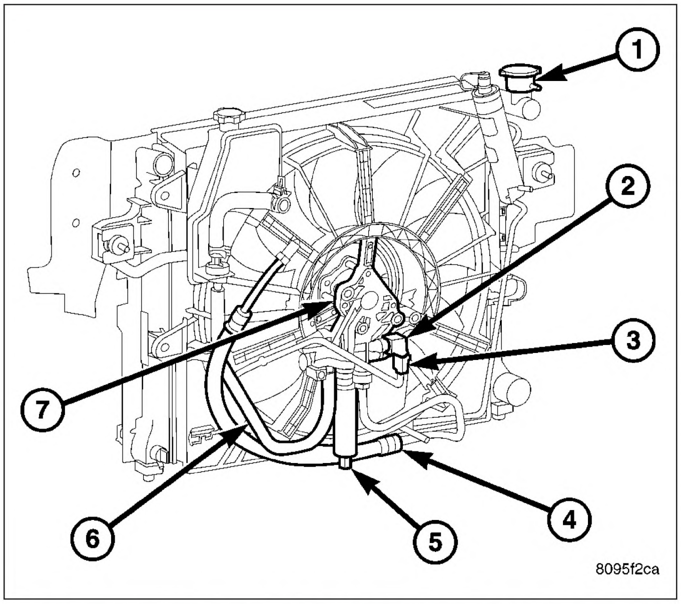
5.7L ENGINE The 5.7L hydraulic cooling fan is integral to the fan shroud and is located between the radiator and the engine.

The power steering pump supplies the hydraulic fluid and pressure to rotate the cooling fan blade, while the electrical part of the fan is controlled by the FCM.

The hydraulic fan drive (motor) consists of the three major following components:

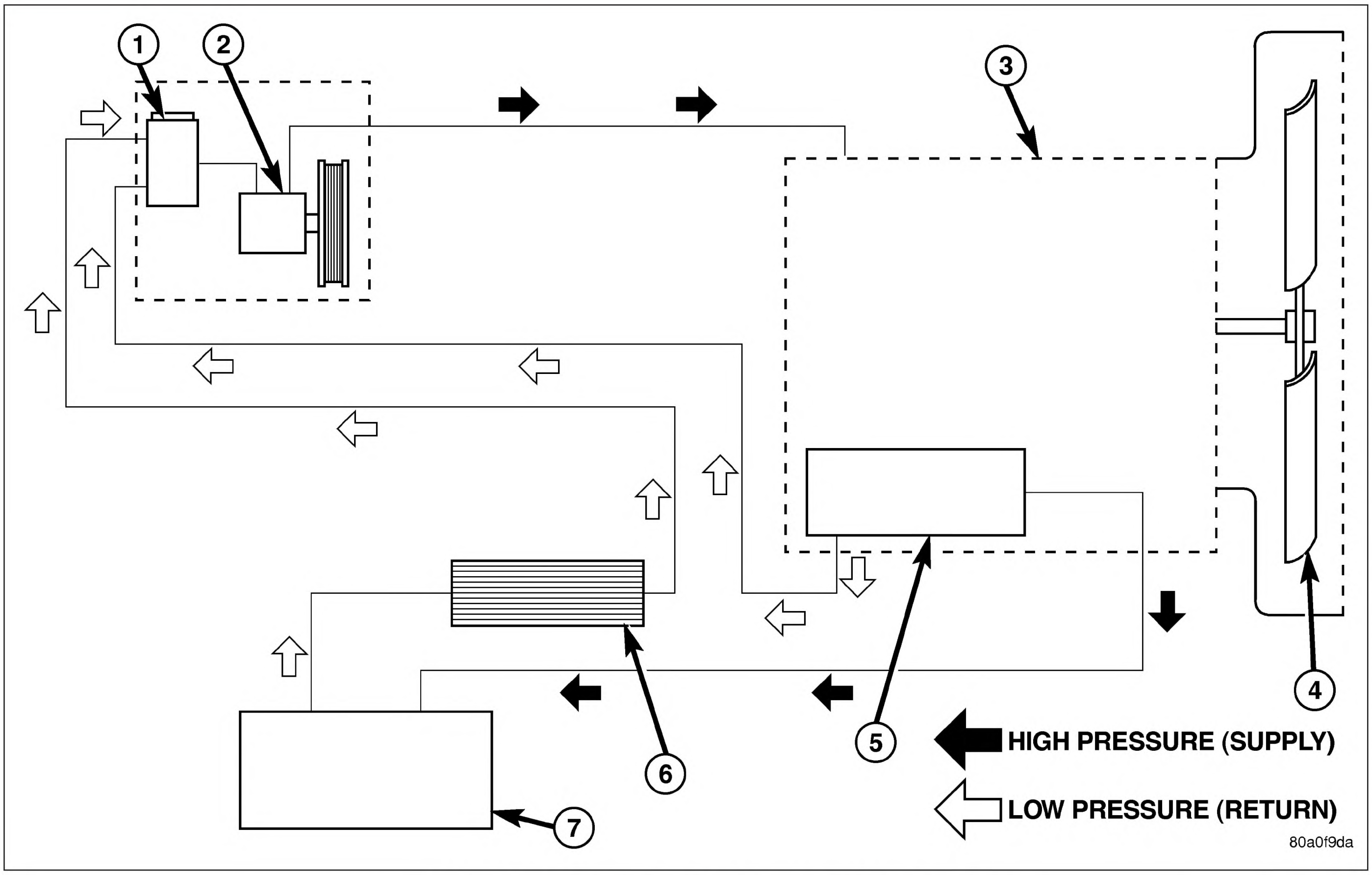
- Steering flow control valve
- Fan control valve
- Two stage G-rotor hydraulic drive

The hydraulic fan and drive is not serviceable. Therefore any failure of the fan blade, hydraulic fan drive or fan shroud requires replacement of the fan module because the fan blade and hydraulic fan drive are matched and balanced as a system and servicing either separately would disrupt this balance.



HYDRAULIC RADIATOR COOLING FAN AND FAN DRIVE - 5.7L

1 - RADIATOR
2 - HYDRAULIC FAN MOTOR SOLNOID
3 - ELECTRICAL CONNECTOR
4 - HIGH PRESSURE LINE FROM HYDRAULIC FAN MOTOR TO STEERING GEAR
5 - HIGH PRESSURE LINE
6 - RETURN LINE
7 - FAN MOTOR



HYDRAULIC FAN FLUID FLOW CIRCUIT

1 - POWER STEERING RESERVOIR
2 - POWER STEERING PUMP
3 - HYDRAULIC FAN DRIVE ASSEMBLY
4 - FAN BLADE
5 - HYDRAULIC FAN CONTROL SOLENOID
6 - POWER STEERING OIL COOLER
7 - STEERING GEAR

For hydraulic fluid routing information refer to flow chart..

CAUTION: Do not attempt to service the hydraulic cooling fan or fan drive separately, they are serviced as an assembly. Failure to do so may cause severe damage to the hydraulic cooling fan assembly.

OPERATION

The hydraulic radiator cooling fan used on the 5.7L and 3.0L Diesel engines replaces both the electric fan and the engine driven mechanical fan. This provides 5.7L and 3.0L Diesel equipped vehicles with heavy trailer towing capability while at the same time reducing unnecessary power drain on both the engine and the vehicles electrical system.

HYDRAULIC FAN STRATEGY

The hydraulic radiator cooling fan is controlled by the FCM. A PWM (Pulse With Modulated) signal from the JTEC controls the fan speed. There are four inputs to the FCM that determine what speed percentage of fan is required by the vehicle. These inputs are:

- Engine Coolant Temperature
- Transmission Oil Temperature
- A/C System Pressure

By monitoring these three parameters, the FCM can determine if cooling airflow is required. If airflow is required, the FCM will slowly ramp up (speed up) the fan speed until the parameter(s) are under control. Once the temperature or pressure is reduced to within operating parameters the fan will ramp up, ramp down, or hold its speed to maintain the temperature / pressure requirements.

NOTE: Even if the FCM is not requesting fan on operation the fan blade will usually spin between 100 and 500 RPM when the vehicle is at idle. This is due to a controlled minimum oil flow requirement through the fan drive motor.

ACTIVATING THE HYDRAULIC FAN WITH THE SCAN TOOL

Under the Engine Systems test heading, there is a subheading. “Hydraulic fan solenoid test”, that has the selections, on/off. Activating the fan with the scan tool will run the fan at 100% duty cycle, which will help troubleshoot any system problems, and also help with the deaeration procedure.

NOTE: Engine must be running to activate the fan with the scan tool.

RADIATOR COOLING FAN HYDRAULIC FLUID PATH

Hydraulic fluid is pumped through the power steering pump, from the pump the fluid travels though a high pressure delivery line to the fan drive motor. As fluid is diverted through the G-rotors, rotational motion is created as fluid moves from the high-pressure (inlet) side of the motor to the low-pressure (outlet) side. Fluid exiting the drive motor is divided into two paths. Path one continues through a high pressure delivery line to the vehicles steering gear to provide steering assist. and path two sends fluid back to the power steering pump through a low pressure line. Fluid exits the steering gear under low pressure and travels through a low pressure line to the power steering fluid cooler to be cooled before being returned back the power steering fluid reservoir.

NOTE: There is a steering flow control valve located in the fan drive motor. This valve operates like the flow control valve found in the typical power steering pump. Because of the design of the valve steering assist can not be effected by the radiator cooling fan even during fan drive failure.

REMOVAL

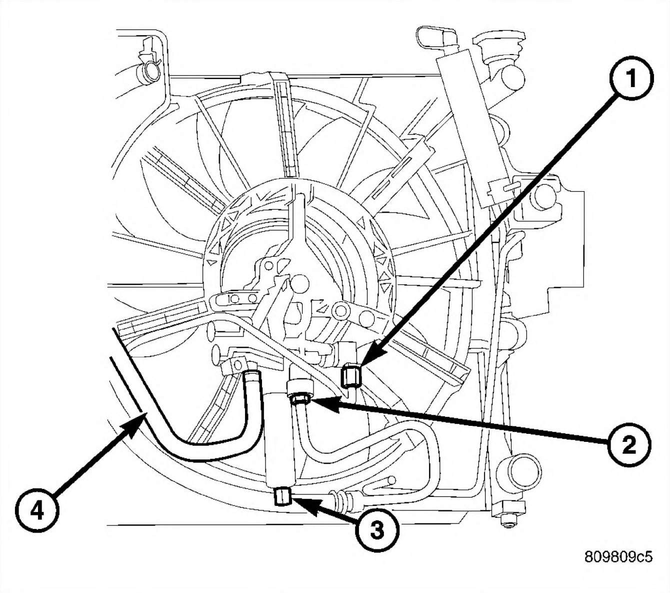
5.7L/3.0L DIESEL ENGINES

1. Raise vehicle on hoist.
2. Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

NOTE: The hydraulic fan drive is driven by the power steering pump. When removing lines or hoses from fan drive assembly use a drain pan to catch any power steering fluid that may exit the fan drive or the lines and hoses.

NOTE: When ever the high pressure line fittings are removed from the hydraulic fan drive the O-rings must be replaced.

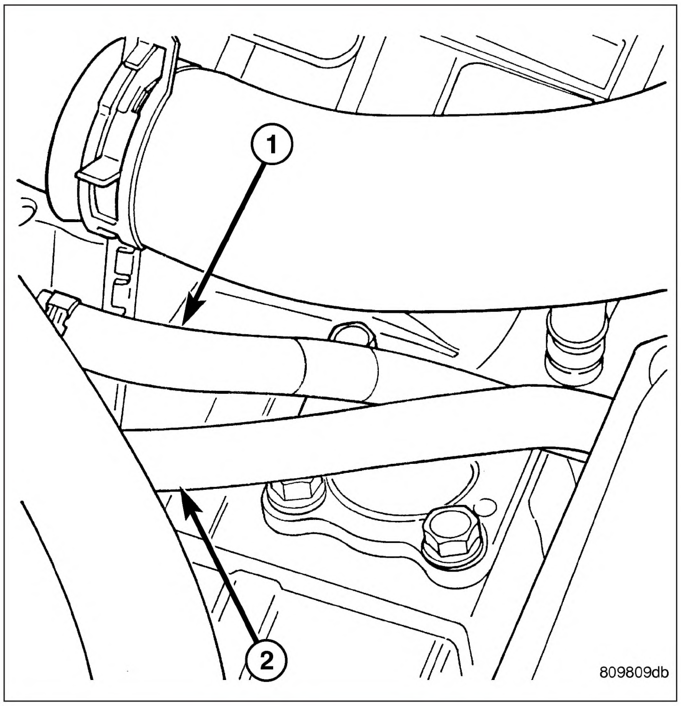
3. Disconnect two high pressure lines at hydraulic fan drive. Remove and discard o-rings from line fittings.
4. Disconnect low pressure return hose at hydraulic fan drive.



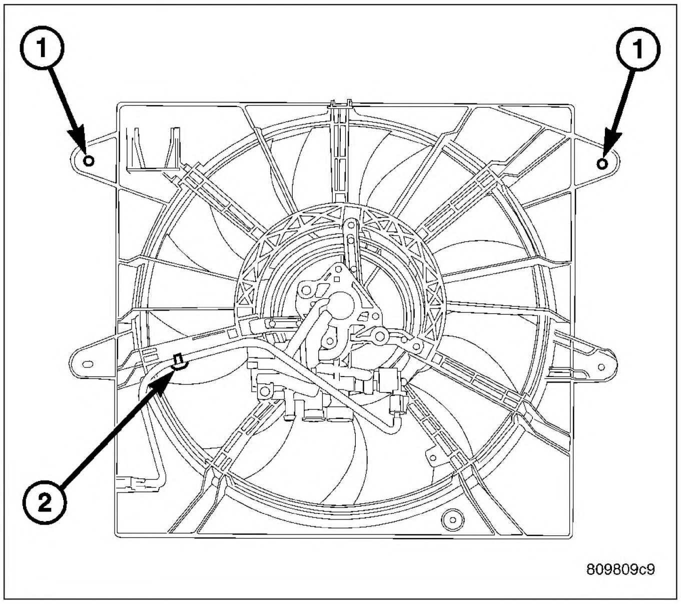
NOTE: The lower mounting bolts can only be accessed from under vehicle.

5. Remove two lower mounting bolts from the shroud.
6. Lower vehicle.
7. Disconnect the electrical connector for the fan control solenoid.
8. Disconnect the radiator upper hose at the radiator and position out of the way.

9. Disconnect the power steering gear outlet hose and fluid return hose at the cooler.



10. Remove two upper mounting bolts from the shroud.
11. Remove the shroud and fan drive from vehicle.



REMOVAL - ELECTRIC FAN

1. Disconnect electric fan connector.
2. Remove shroud mounting bolts bolts.
3. Remove hroud and fan assembly from vehicle.
4. Remove fan assembly mounting bolts and remove fan from shroud.

CLEANING

Clean the fan blades using a mild soap and water. Do not use an abrasive to clean the blades.

INSPECTION

WARNING: DO NOT ATTEMPT TO BEND OR STRAIGHTEN FAN BLADES IF FAN IS NOT WITHIN SPECIFICATIONS.

CAUTION: If fan blade assembly is replaced because of mechanical damage, water pump and viscous fan drive should also be inspected. These components could have been damaged due to excessive vibration.

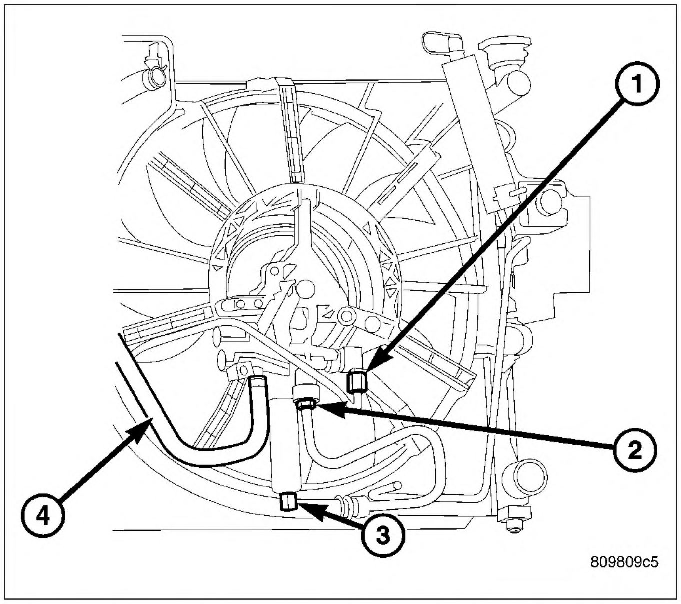
1. Remove fan blade assembly from viscous fan drive unit (four bolts).
2. Lay fan on a flat surface with leading edge facing down. With tip of blade touching flat surface, replace fan if clearance between opposite blade and surface is greater than 2.0 mm (.090 inch). Rocking motion of opposite blades should not exceed 2.0 mm (.090 inch). Test all blades in this manner.
3. Inspect fan assembly for cracks, bends, loose rivets or broken welds. Replace fan if any damage is found.

INSTALLATION

5.7L/3.0L DIESEL

CAUTION: There is an external ground wire connected to the hydraulic fan drive located at the electrical connector on the fan assembly. This ground MUST remain connected at all times. Failure to ensure ground wire is connected when engine is operating can cause severe damage to the JTEC module.

1. Position fan drive and shroud in vehicle.
2. Install fan shroud upper mounting bolts. Do not tighten at this time.
3. Install radiator upper hose onto radiator.
4. Connect power steering cooler hoses.
5. Raise vehicle on hoist.
6. Install fan shroud lower mounting bolts. Tighten to 6 N·m (50 in. lbs.).



NOTE: When ever the high pressure line fittings are removed from the hydraulic fan drive the o-rings located on the fittings must be replaced.

7. Lubricate the o-rings on the fittings with power steering fluid then connect inlet and outlet high pressure lines to fan drive. Tighten inlet line to 49 N·m (36 ft. lbs.) tighten outlet line to 29 N·m (21.5 ft. lbs.).
8. Connect low pressure return hose to fan drive.
9. Lower vehicle.
10. Install radiator upper hose.
11. Connect electrical connector for hydraulic fan control solenoid.
12. Tighten fan shroud upper mounting bolts to 6 N·m (50 in. lbs.).
13. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

CAUTION: Do not run engine with power steering fluid below the full mark in the reservoir. Sever damage to the hydraulic cooling fan or the engine can occur.

14. Refill power steering fluid reservoir and bleed air from steering system (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).
15. Run engine and check for leaks.

INSTALLATION - ELECTRIC FAN

1. Position fan assembly on shroud.
2. Install fan to fan shroud mounting nuts. Tighten to 5.5 N·m (50 in. lbs.).
3. Position fan and shroud assembly in vehicle.
4. Install shroud mounting bolts. Tighten to 5.5 N·m (50 in. lbs.)

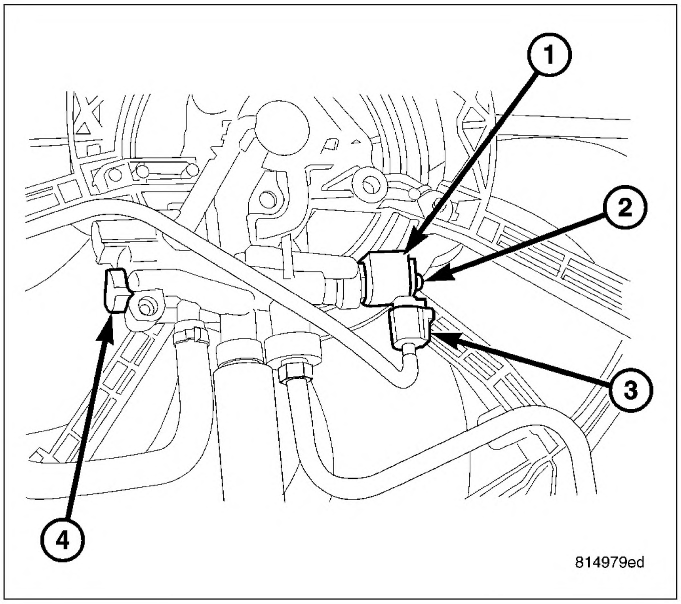
5. Connect electric fan elictrical connector.
6. Start engine and check fan operation.

SOLENOID-RADIATOR FAN

REMOVAL

NOTE: If the solenoid removal and replacement steps are performed quickly, then only a small amount of steering fluid will drip from the radiator fan solenoid opening. The small amount of leakage should not require prior fluid removal from the power steering reservoir.

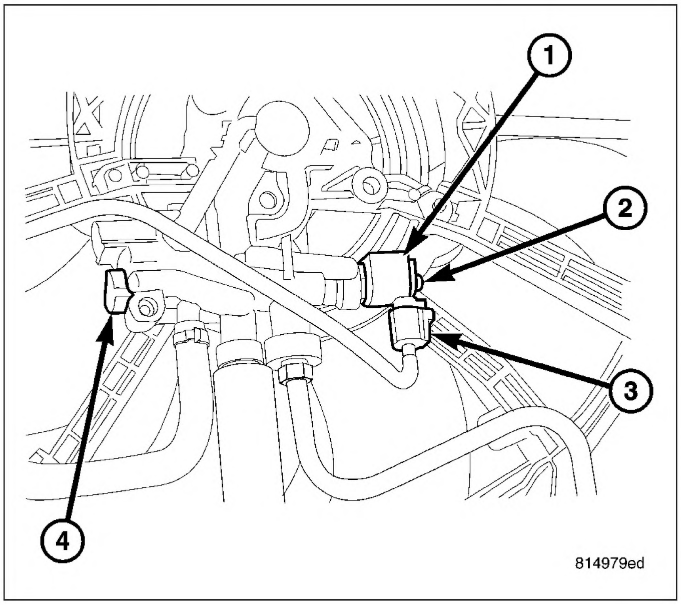
1. Disconnect the battery negative cable.
2. Raise and support the vehicle.
3. Disconnect the radiator fan solenoid connector (3).
4. Clean the area around the radiator fan solenoid (1) of any debris.
5. While holding the solenoid body, use Torx® T40 to remove the radiator fan solenoid.



INSTALLATION

CAUTION: If for any reason the hydraulic fan module ground wire is removed from the hydraulic fan module, reconnect the ground wire and tighten-mounting nut to 10 N·m (89 in. lbs.). Failure to ensure the ground wire is properly connected could result in an electrostatic discahrge that could damage the PCM.

1. Make sure that the two o-rings are in place. Notice that the armature of the solenoid can rotate within the body of the solenoid.
2. Install the radiator fan solenoid (1) into the hydraulic fan module (4).
3. While holding the solenoid body, using a Torx® T40 tighten the radiator fan solenoid screw (2) to 16.2 N·m (143 in. lbs.).
4. Connect the radiator fan solenoid connector (3).
5. Lower the vehicle
6. Connect the negative battery cable.
7. Check the power steering fluid level, fill as necessary.

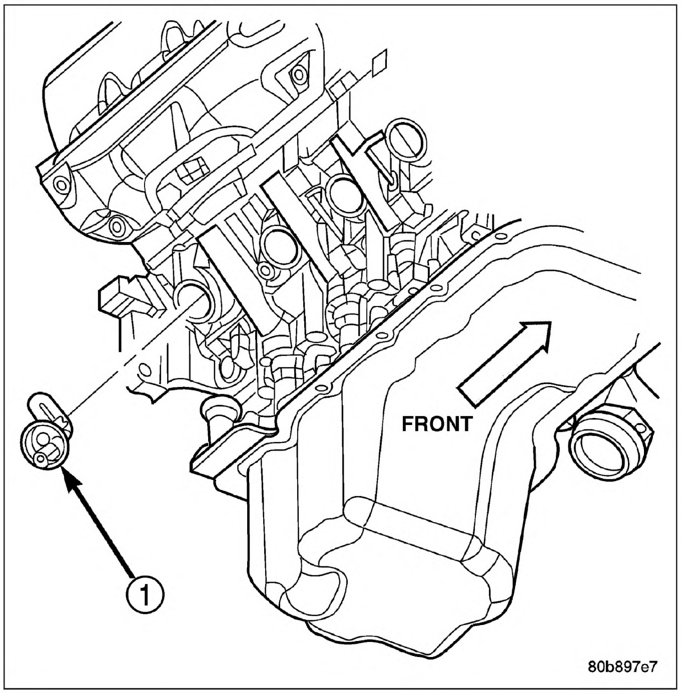


HEATER-ENGINE BLOCK

DESCRIPTION

WARNING: DO NOT OPERATE ENGINE UNLESS BLOCK HEATER CORD HAS BEEN DISCONNECTED FROM POWER SOURCE AND SECURED IN PLACE. THE POWER CORD MUST BE SECURED IN ITS RETAINING CLIPS AND ROUTED AWAY FROM EXHAUST MANIFOLDS AND MOVING PARTS.

An optional engine block heater is available with all models. The heater is equipped with a power cord. The cord is attached to an engine compartment component with tie-straps. The heater warms the engine providing easier engine starting and faster warm-up in low temperatures. The heater is mounted in a core hole of the engine cylinder block in place of a freeze plug with the heating element immersed in engine coolant.

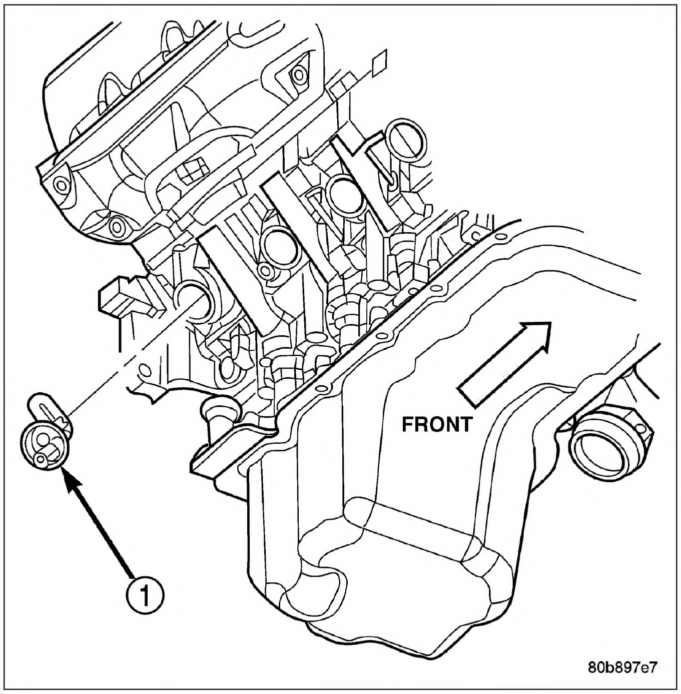


OPERATION

Connecting the power cord to a grounded 110-120 volt AC electrical outlet with a grounded, three wire extension cord activates the heating element warming the engine coolant.

DIAGNOSIS AND TESTING - ENGINE BLOCK HEATER

If the unit does not operate, possible causes can be either the power cord or the heater element. Test the power cord for continuity with a 110-volt voltmeter or 110-volt test light. Test heater element continuity with an ohmmeter or a 12-volt test light.

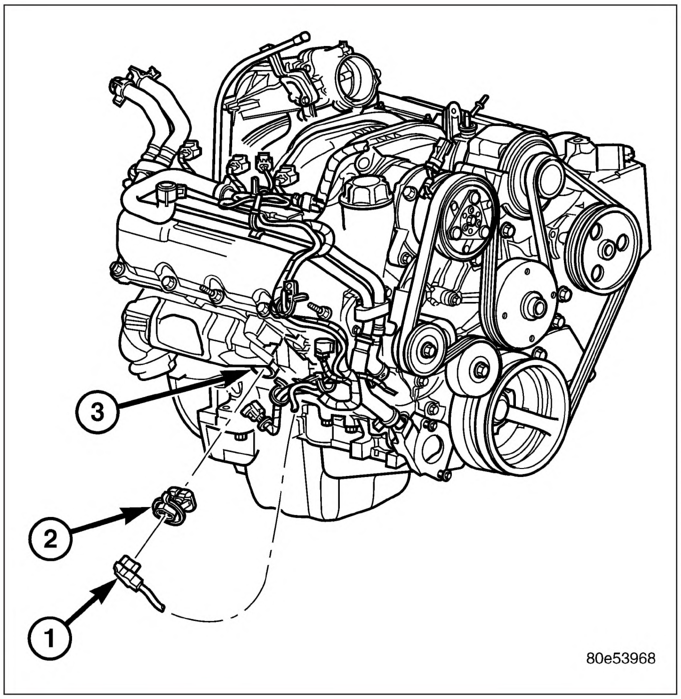


CAUTION: To prevent damage, the power cord must be secured in it's retainer clips and away from any components that may cause abrasion or damage, such as linkages, exhaust components, etc.

REMOVAL

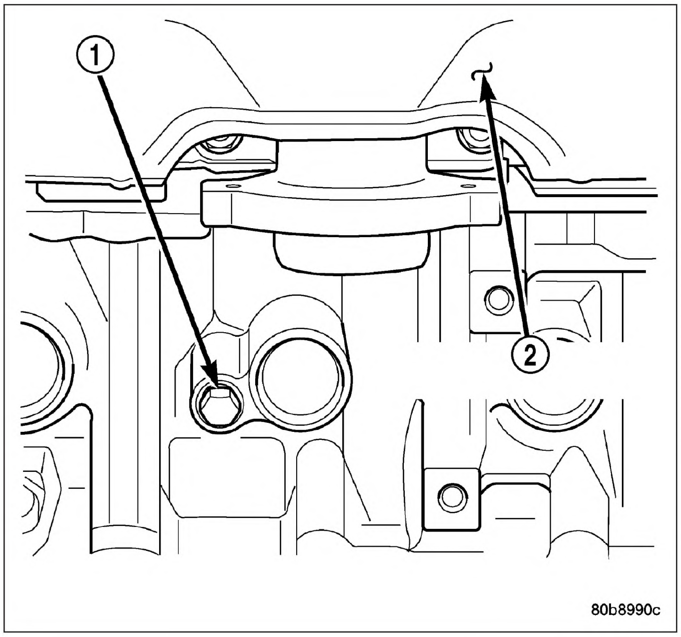
3.7L ENGINE

1. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
2. Raise vehicle on hoist.
3. Detach power cord plug from heater.
4. Loosen screw in center of heater. Remove heater assembly.

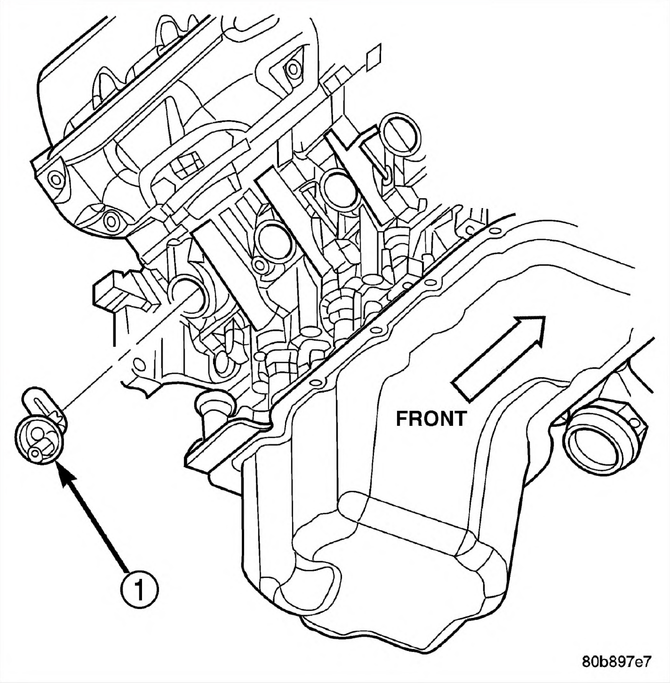


4.7L ENGINE

1. Disconnect negative battery cable from battery.
2. Drain coolant from radiator (Refer to 7 - COOLING - STANDARD PROCEDURE).
3. Raise vehicle.
4. Remove engine cylinder block drain plug(s) located on the sides of cylinder block above the oil pan rail.



5. Remove power cord from block heater.
6. Loosen screw at center of block heater. Remove heater assembly.



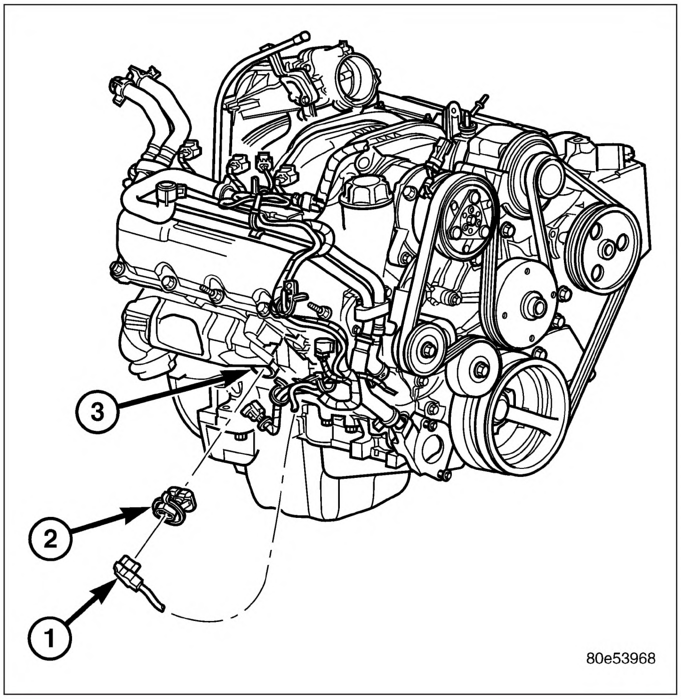
INSTALLATION

3.7L ENGINE

1. Thoroughly clean core hole and heater seat.
2. Insert heater assembly with element loop positioned **upward** .
3. With heater seated, tighten center screw securely to assure a positive seal.

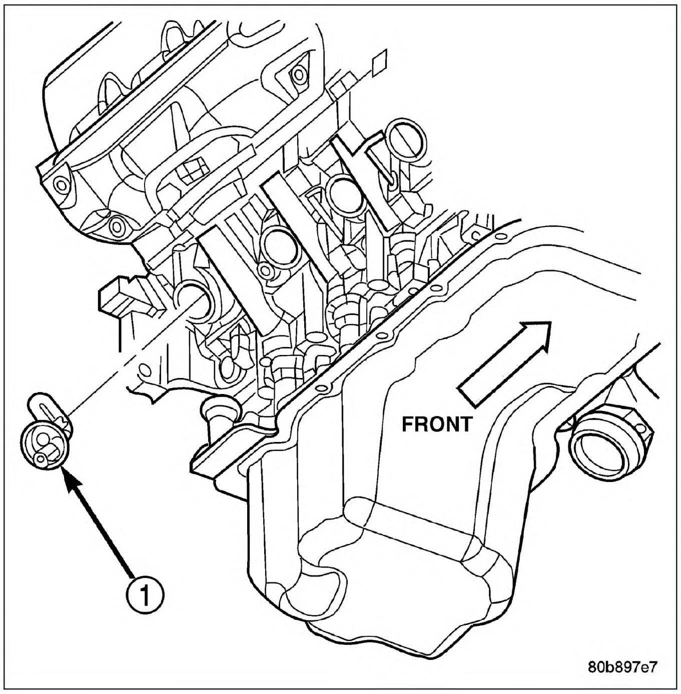
CAUTION: To prevent damage, the power cord must be secured in it's retaining clips, and not positioned so it could contact linkages or exhaust manifold.

4. Connect power cord to heater.
5. Lower vehicle.
6. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).



4.7L ENGINE

1. Thoroughly clean cylinder block core hole and block heater seat.
2. Insert block heater assembly with element loop pointing at twelve o'clock.
3. With block heater fully seated, tighten center screw to 2 N·m (17 in. lbs.) torque.
4. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Start and warm the engine. Check for leaks.



SENSOR-ENGINE COOLANT TEMPERATURE

DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to sense engine coolant temperature. The sensor protrudes into an engine water jacket.

The ECT sensor is a two-wire Negative Thermal Coefficient (NTC) sensor. Meaning, as engine coolant temperature increases, resistance (voltage) in the sensor decreases. As temperature decreases, resistance (voltage) in the sensor increases.

OPERATION

At key-on, the Powertrain Control Module (PCM) sends out a regulated 5 volt signal to the ECT sensor. The PCM then monitors the signal as it passes through the ECT sensor to the sensor ground (sensor return).

When the engine is cold, the PCM will operate in Open Loop cycle. It will demand slightly richer air-fuel mixtures and higher idle speeds. This is done until normal operating temperatures are reached.

The PCM uses inputs from the ECT sensor for the following calculations:

- for engine coolant temperature gauge operation through CCD or PCI (J1850) communications
- Injector pulse-width
- Spark-advance curves
- ASD relay shut-down times
- Idle Air Control (IAC) motor key-on steps
- Pulse-width prime-shot during cranking
- O2 sensor closed loop times
- Purge solenoid on/off times
- EGR solenoid on/off times (if equipped)
- Leak Detection Pump operation (if equipped)
- Radiator fan relay on/off times (if equipped)
- Target idle speed

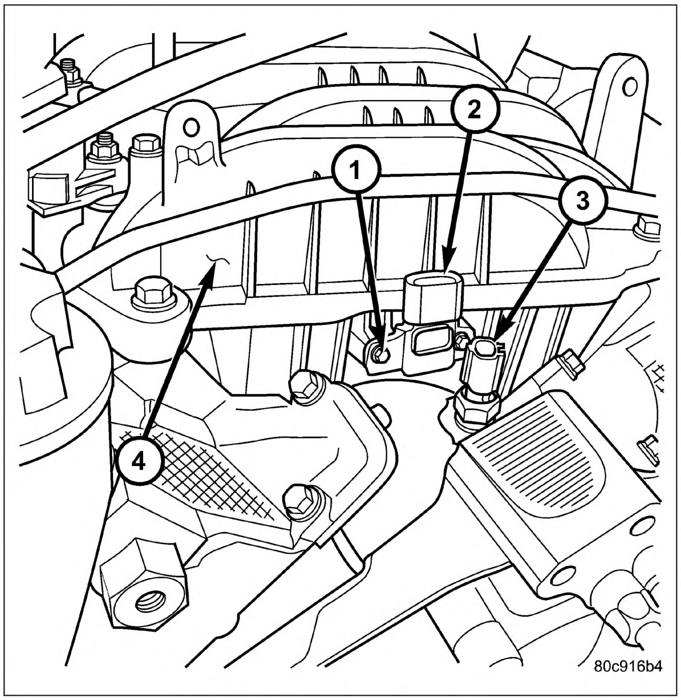
REMOVAL

3.7L V-6

The Engine Coolant Temperature (ECT) sensor on the 3.7L engine is installed into a water jacket at front of intake manifold near rear of generator.

WARNING: HOT, PRESSURIZED COOLANT CAN CAUSE INJURY BY SCALDING. COOLING SYSTEM MUST BE PARTIALLY DRAINED BEFORE REMOVING THE COOLANT TEMPERATURE SENSOR.

1. Partially drain the cooling system.
2. Disconnect the electrical connector from the sensor.
3. Remove the sensor from the intake manifold.

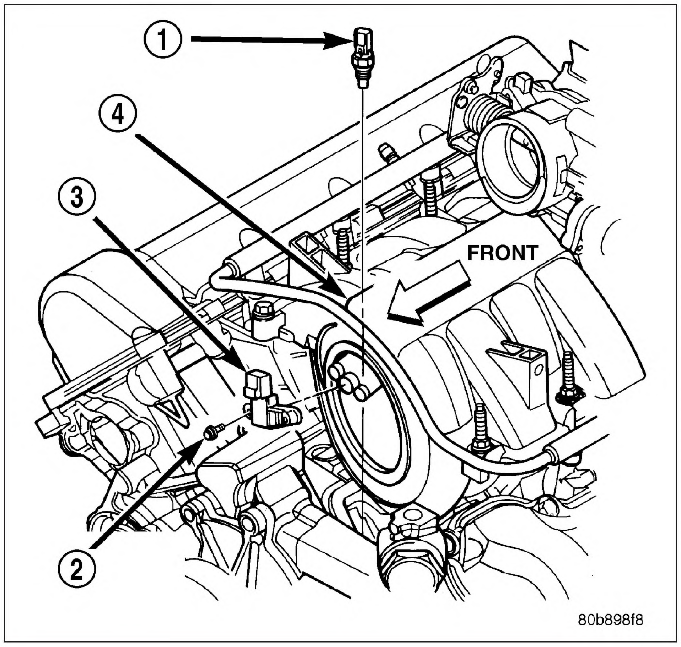


4.7L ENGINE

WARNING: HOT, PRESSURIZED COOLANT CAN CAUSE INJURY BY SCALDING. COOLING SYSTEM MUST BE PARTIALLY DRAINED BEFORE REMOVING THE ENGINE COOLANT TEMPERATURE (ECT) SENSOR. REFER TO GROUP 7, COOLING.

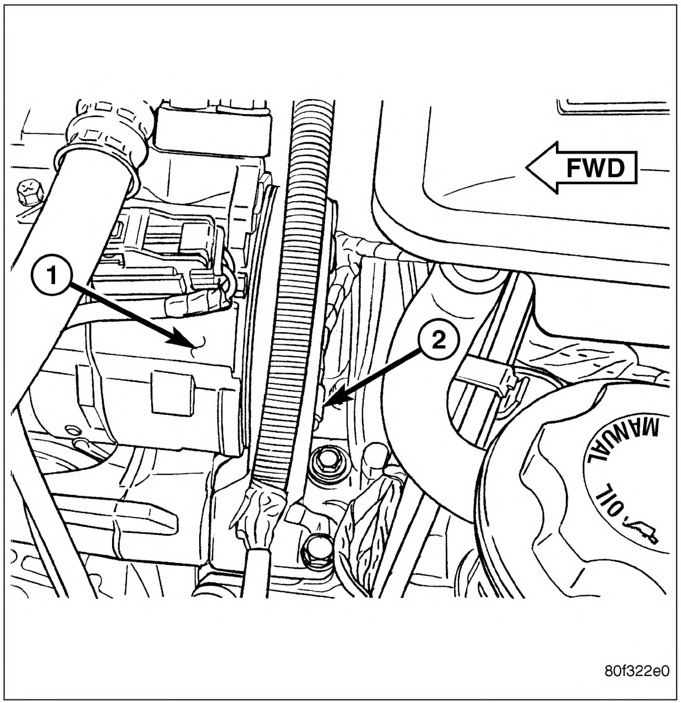
The ECT sensor is located near the front of the intake manifold.

1. Partially drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE).
2. Disconnect electrical connector from ECT sensor.
3. Remove sensor from intake manifold.



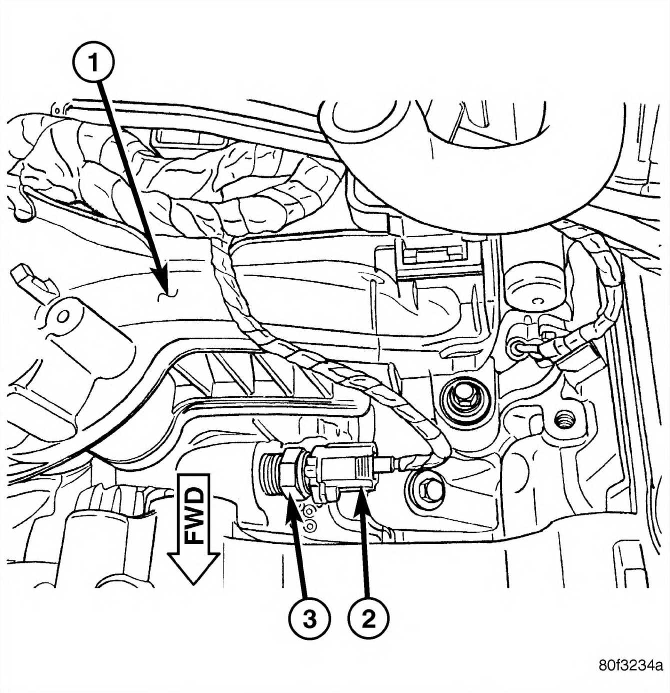
5.7L ENGINE

The Engine Coolant Temperature (ECT) sensor on the 5.7L engine is located under the air conditioning compressor. It is installed into a water jacket at the front of the cylinder block.



WARNING: HOT, PRESSURIZED COOLANT CAN CAUSE INJURY BY SCALDING. COOLING SYSTEM MUST BE PARTIALLY DRAINED BEFORE REMOVING THE COOLANT TEMPERATURE SENSOR.

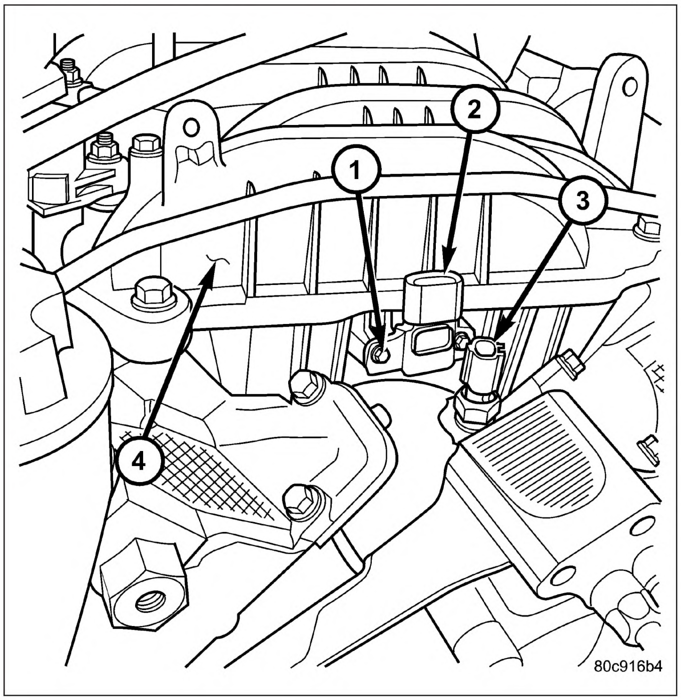
1. Partially drain the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
2. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
3. Carefully unbolt air conditioning compressor from front of engine. Do not disconnect any A/C hoses from compressor. Temporarily support compressor to gain access to ECT sensor. Refer to Heating and Air Conditioning section for information.
4. Disconnect electrical connector from sensor.
5. Remove sensor from cylinder block.



INSTALLATION

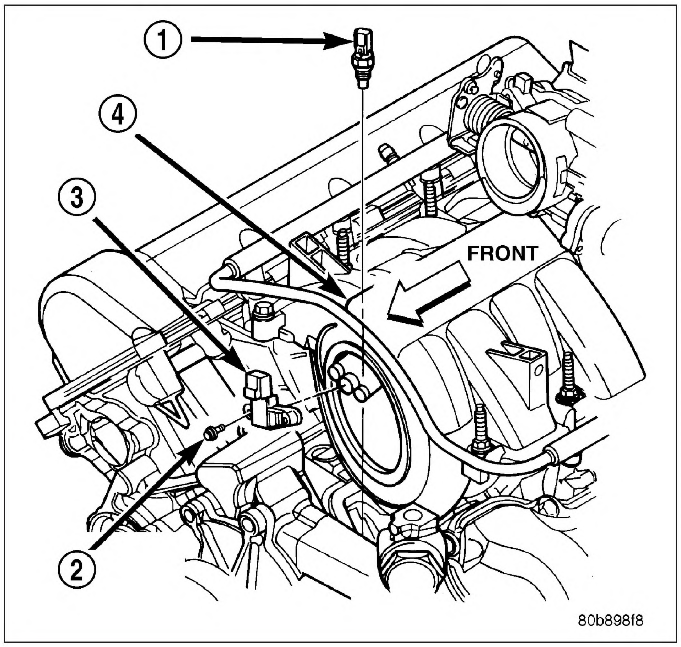
3.7L V-6

1. Apply thread sealant to sensor threads.
2. Install sensor to engine.
3. Tighten sensor to 11 N·m (8 ft. lbs.) torque.
4. Connect electrical connector to sensor.
5. Replace any lost engine coolant. (Refer to 7 - COOLING - STANDARD PROCEDURE).



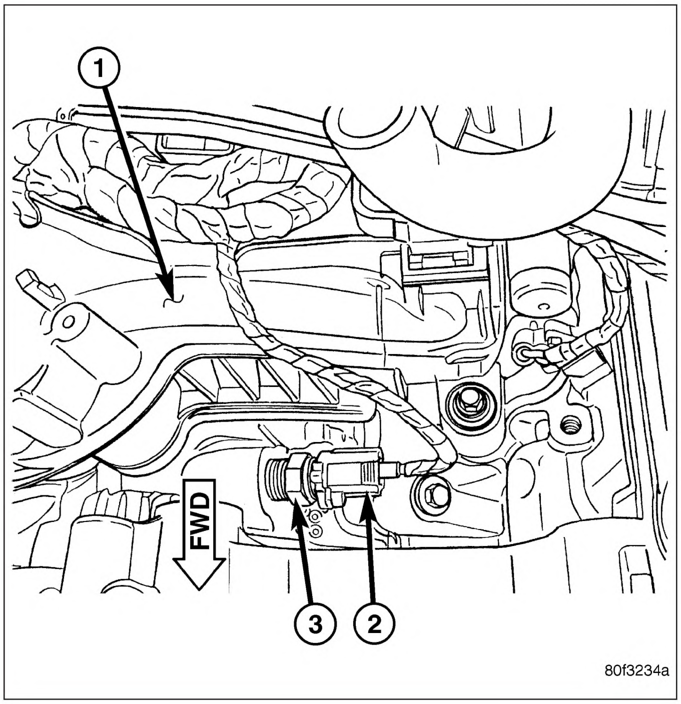
4.7L ENGINE

1. Install sensor.
2. Tighten to 11 N·m (8 ft. lbs.) torque.
3. Connect electrical connector to sensor.
4. Replace any lost engine coolant. (Refer to 7 - COOLING - STANDARD PROCEDURE).



5.7L ENGINE

1. Apply thread sealant to sensor threads.
2. Install sensor into engine.
3. Tighten sensor to 11 N·m (8 ft. lbs.) torque.
4. Connect electrical connector to sensor.
5. Carefully bolt air conditioning compressoronto the front of engine. Refer to Heating and Air Conditioning section for information.
6. Install accessory drive belt (Refer to 7 - COOLING/ ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
7. Replace any lost engine coolant. (Refer to 7 - COOLING - STANDARD PROCEDURE).



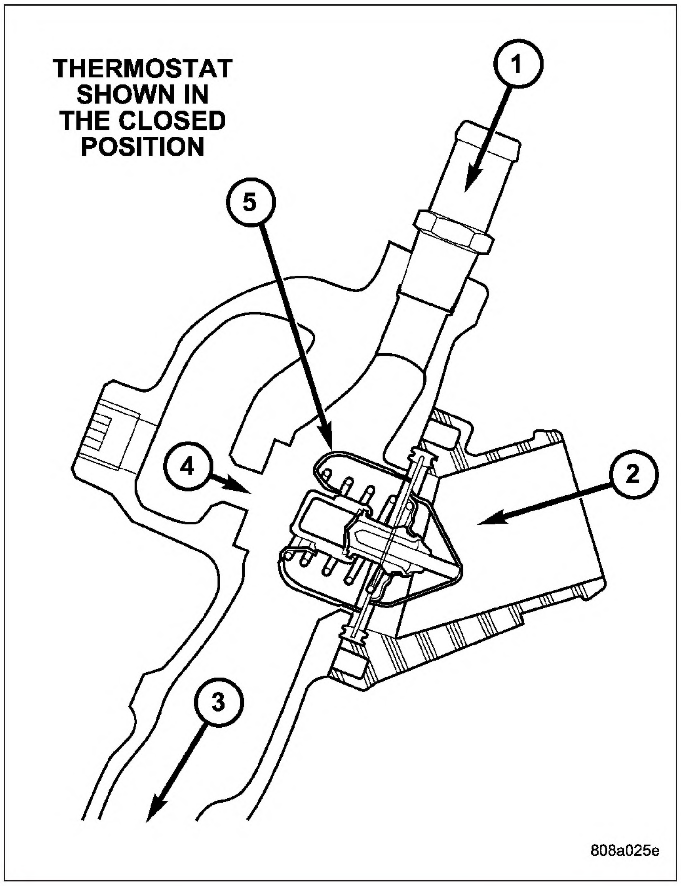
THERMOSTAT-ENGINE COOLANT

DESCRIPTION

CAUTION: Do not operate an engine without a thermostat, except for servicing or testing.

A pellet-type thermostat controls the operating temperature of the engine by controlling the amount of coolant flow to the radiator. On all engines the thermostat is closed below 195°F (90°C). Above this temperature, coolant is allowed to flow to the radiator. This provides quick engine warm up and overall temperature control.

The same thermostat is used for winter and summer seasons. An engine should not be operated without a thermostat, except for servicing or testing. Operating without a thermostat causes other problems. These are: longer engine warmup time, unreliable warmup performance, increased exhaust emissions and crankcase condensation. This condensation can result in sludge formation.



OPERATION

The wax pellet is located in a sealed container at the spring end of the thermostat. When heated, the pellet expands, overcoming closing spring tension and water pump pressure to force the valve to open.

DIAGNOSIS AND TESTING - THERMOSTAT

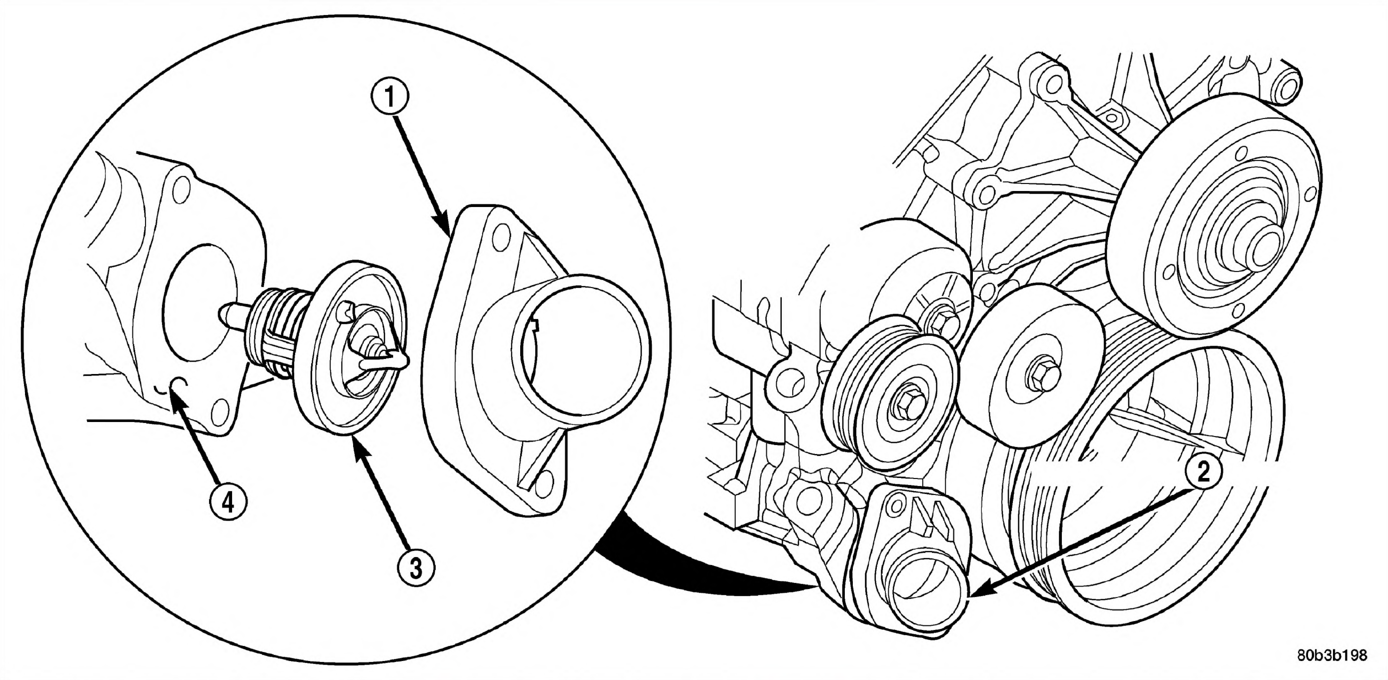
ON-BOARD DIAGNOSTICS

All models are equipped with On-Board Diagnostics for certain cooling system components.If the powertrain control module (PCM) detects low engine coolant temperature, it will record a Diagnostic Trouble Code (DTC). For other DTC numbers, (Refer to 25 - EMISSIONS CONTROL - DESCRIPTION).

The DTC can also be accessed through the DRB scan tool.

REMOVAL

3.7L/4.7L ENGINE



WARNING: DO NOT LOOSEN RADIATOR DRAINCOCK WITH SYSTEM HOT AND PRESSURIZED. SERIOUS BURNS FROM COOLANT CAN OCCUR.

Do not waste reusable coolant. If solution is clean, drain coolant into a clean container for reuse.

If thermostat is being replaced, be sure that replacement is specified thermostat for vehicle model and engine type.

1. Disconnect negative battery cable at battery.
2. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
3. Raise vehicle on hoist.
4. Remove splash shield.
5. Remove lower radiator hose clamp and lower radiator hose at thermostat housing.
6. Remove thermostat housing mounting bolts, thermostat housing and thermostat.

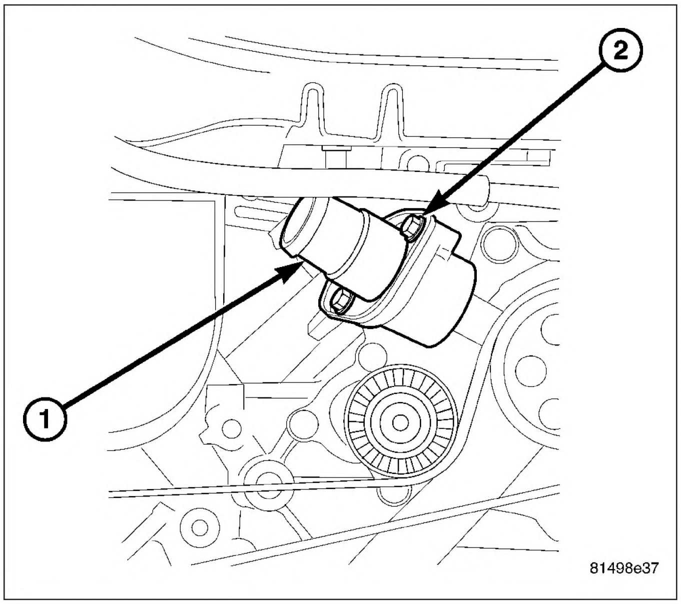
5.7L ENGINE

WARNING: DO NOT LOOSEN THE RADIATOR DRAINCOCK WITH THE COOLING SYSTEM HOT AND PRESSURIZED. SERIOUS BURNS FROM THE COOLANT CAN OCCUR.

Do not waste reusable coolant. If the solution is clean, drain the coolant into a clean container for reuse.

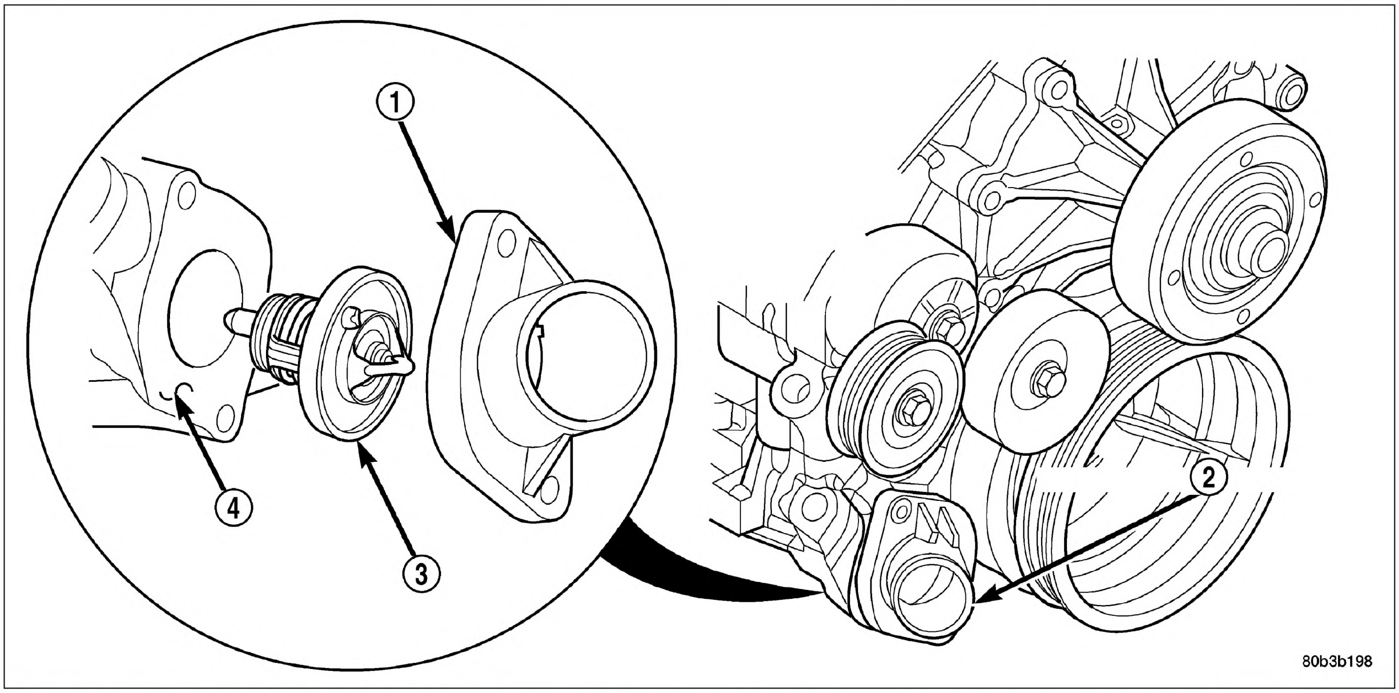
If the thermostat is being replaced, be sure that the replacement is the specified thermostat for the vehicle model and engine type.

1. Disconnect the negative battery cable.
2. Drain the cooling system
3. Remove the radiator hose clamp and radiator hose at the thermostat housing (1).
4. Remove the thermostat housing mounting bolts (2), thermostat housing (1) and thermostat.



INSTALLATION

3.7L/4.7L ENGINE



1. Clean mating areas of timing chain cover and thermostat housing.
2. Install thermostat (spring side down) into recessed machined groove on timing chain cover.
3. Position thermostat housing on timing chain cover.
4. Install two housing-to-timing chain cover bolts. Tighten bolts to 13 N·m (115 in. lbs.) torque.

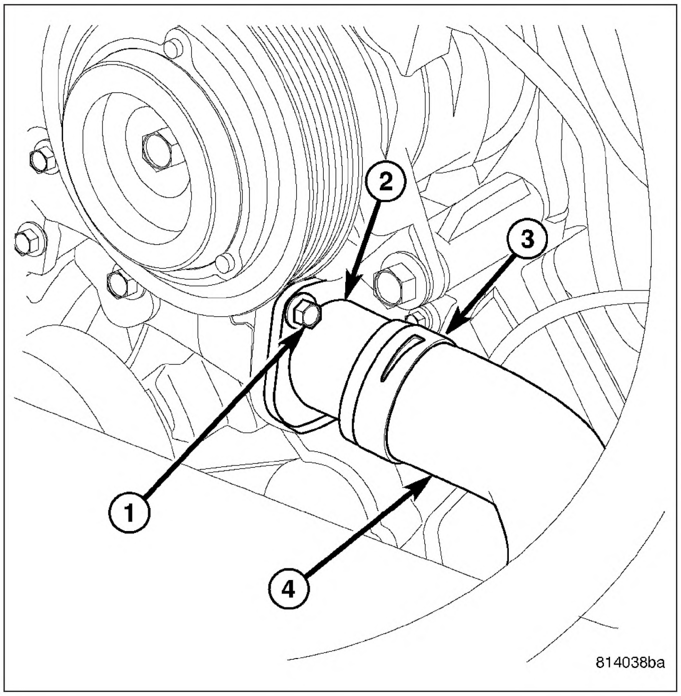
CAUTION: Housing must be tightened evenly and thermostat must be centered into recessed groove in timing chain cover. If not, it may result in a cracked housing, damaged timing chain cover threads or coolant leaks.

5. Install lower radiator hose on thermostat housing.

6. Install splash shield.
7. Lower vehicle.
8. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
9. Connect negative battery cable to battery.
10. Start and warm the engine. Check for leaks.

5.7L ENGINE

1. Position the thermostat and housing (1) on the front cover.
2. Install thermostat housing bolts (2). Tighten the bolts (2) to 13 N·m (112 in. lbs.).
3. Install the radiator hose onto the thermostat housing (1).
4. Fill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Connect negative battery cable.
6. Start and warm the engine. Check for leaks.



VISCOUS CLUTCH-FAN DRIVE

DESCRIPTION

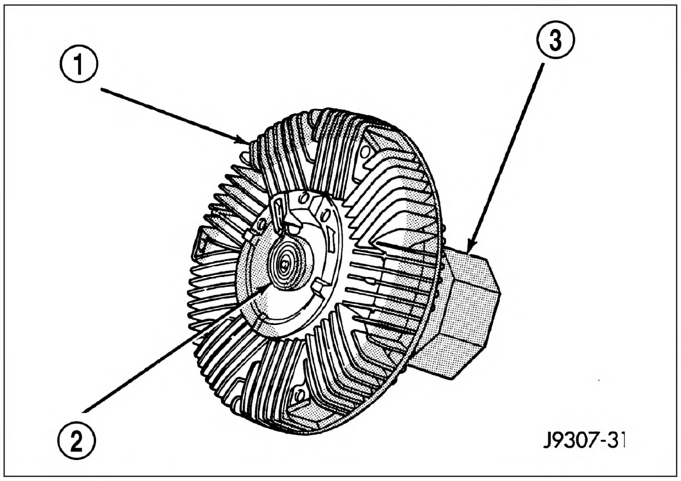
CAUTION: Engines equipped with serpentine drive belts have reverse rotating fans and viscous fan drives. They are marked with the word REVERSE to designate their usage. Installation of the wrong fan or viscous fan drive can result in engine overheating.

CAUTION: If the viscous fan drive is replaced because of mechanical damage, the cooling fan blades should also be inspected. Inspect for fatigue cracks, loose blades, or loose rivets that could have resulted from excessive vibration. Replace fan blade assembly if any of these conditions are found. Also inspect water pump bearing and shaft assembly for any related damage due to a viscous fan drive malfunction.

The thermal viscous fan drive is a silicone-fluid-filled coupling used to connect the fan blades to the water pump shaft. The coupling allows the fan to be driven in a normal manner. This is done at low engine speeds while limiting the top speed of the fan to a predetermined maximum level at higher engine speeds.

An electrical cooling fan located in the fan shroud aids in low speed cooling, It is designed to augment the viscous fan, However, it does not replace the viscous fan.

OPERATION



A thermostatic bimetallic spring coil is located on the front face of the viscous fan drive unit . This spring coil reacts to the temperature of the radiator discharge air. It engages the viscous fan drive for higher fan speed if the air temperature from the radiator rises above a certain point. Until additional engine cooling is necessary, **the fan will remain at a reduced rpm regardless of engine speed. Normally less than three hundred (300) rpm.**

Only when sufficient heat is present, will the viscous fan drive engage. This is when the air flowing through the radiator core causes a reaction to the bimetallic coil. It then increases fan speed to provide the necessary additional engine cooling.

Once the engine has cooled, the radiator discharge temperature will drop. The bimetallic coil again reacts and the fan speed is reduced to the previous disengaged speed.

DIAGNOSIS AND TESTING - VISCOUS FAN DRIVE

If the fan assembly free-wheels without drag (the fan blades will revolve more than five turns when spun by hand), replace the fan drive. This spin test must be performed when the engine is cool.

For the following test, the cooling system must be in good condition. It also will ensure against excessively high coolant temperature.

WARNING: BE SURE THAT THERE IS ADEQUATE FAN BLADE CLEARANCE BEFORE DRILLING.

1. Drill a 3.18-mm (1/8-in) diameter hole in the top center of the fan shroud.
2. Obtain a dial thermometer with an 8 inch stem (or equivalent). It should have a range of -18° - 105°C (0° - 220° F). Insert thermometer through the hole in the shroud. Be sure that there is adequate clearance from the fan blades.
3. Connect a tachometer and an engine ignition timing light (timing light is to be used as a strobe light).
4. Block the air flow through the radiator. Secure a sheet of plastic in front of the radiator (or air conditioner condenser). Use tape at the top to secure the plastic and be sure that the air flow is blocked.
5. Be sure that the air conditioner (if equipped) is turned off.

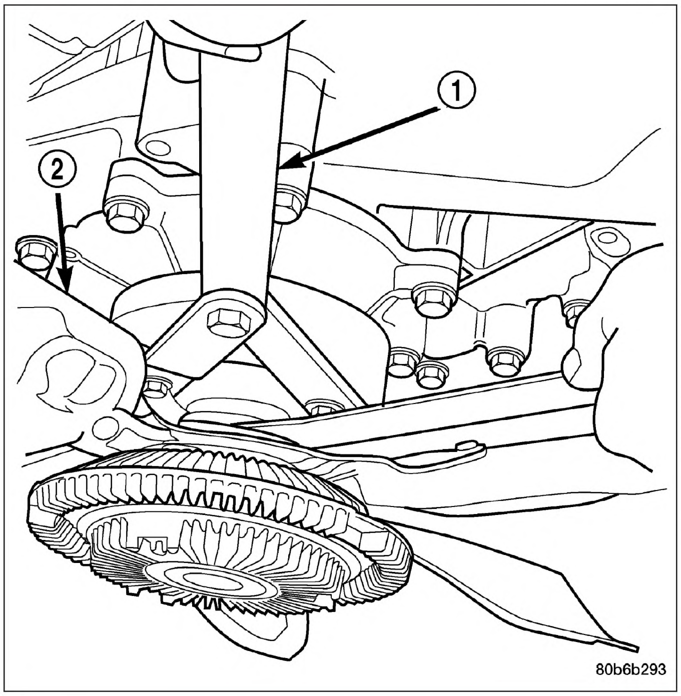
WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.

6. Start the engine and operate at 2400 rpm. Within ten minutes the air temperature (indicated on the dial thermometer) should be up to 93° C (200° F). Fan drive **engagement** should have started to occur at between 91° - 96° C (195° - 205° F). Engagement is distinguishable by a definite **increase** in fan flow noise (roaring). The timing light also will indicate an increase in the speed of the fan.
7. When the air temperature reaches 93° C (200° F), remove the plastic sheet. Fan drive **disengagement** should have started to occur at between 62° - 85° C (145° - 185° F). A definite **decrease** of fan flow noise (roaring) should be noticed. If not, replace the defective viscous fan drive unit.

REMOVAL

4.7L ENGINE

NOTE: The thermal viscous fan drive/fan blade assembly is attached (threaded) to water pump hub shaft.



1. Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
2. Remove fan blade/viscous fan drive assembly from water pump using special tool 6958 spanner wrench and 8346 adapters, by turning mounting nut counterclockwise as viewed from front. Threads on viscous fan drive are **RIGHT HAND.**
3. Do not attempt to remove fan/viscous fan drive assembly from vehicle at this time.
4. Do not unbolt fan blade assembly from viscous fan drive at this time.
5. Remove fan shroud to radiator bolts.
6. Remove fan shroud and fan blade/viscous fan drive assembly as a complete unit from vehicle.
7. After removing fan blade/viscous fan drive assembly, **do not** place viscous fan drive in horizontal position. If stored horizontally, silicone fluid in the viscous fan drive could drain into its bearing assembly and contaminate lubricant.

CAUTION: Do not remove water pump pulley-to-water pump bolts. This pulley is under belt tension.

8. Remove four bolts securing fan blade assembly to viscous fan drive.

INSTALLATION

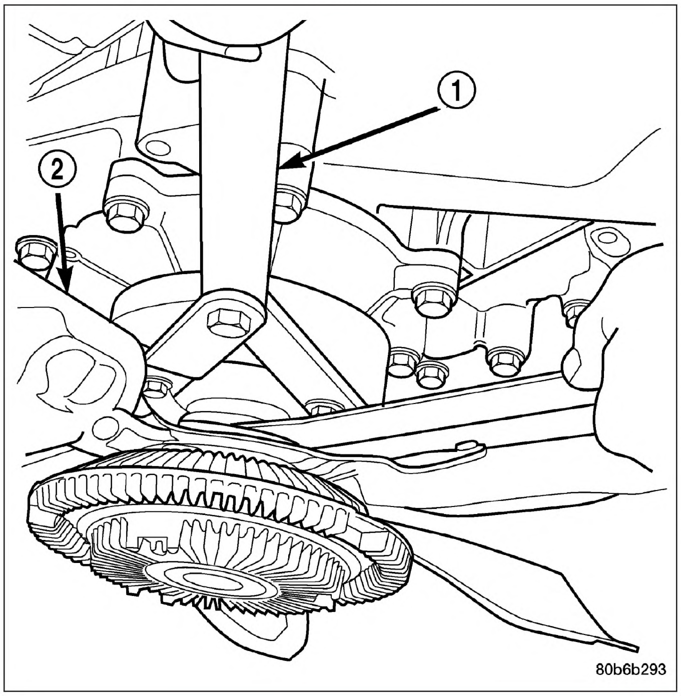
4.7L ENGINE

1. Assemble fan blade to viscous fan drive. Tighten mounting bolts to 27 N·m (20 ft. lbs.) torque.

NOTE: The viscous fan and fan shroud must be installed as an assembly.

2. Gently lay viscous fan into fan shroud.
3. Install the fan shroud to radiator mounting bolts, torque bolts to (5.5N·M or 50 in·lbs).
4. Thread the fan and fan drive onto the water pump pulley, and tighten nut using special tool 6958 spanner wrench and 8346 adapters.
5. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

CAUTION: When installing a serpentine accessory drive belt, the belt MUST be routed correctly. If not, the engine may overheat due to the water pump rotating in the wrong direction. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL) for correct belt routing.

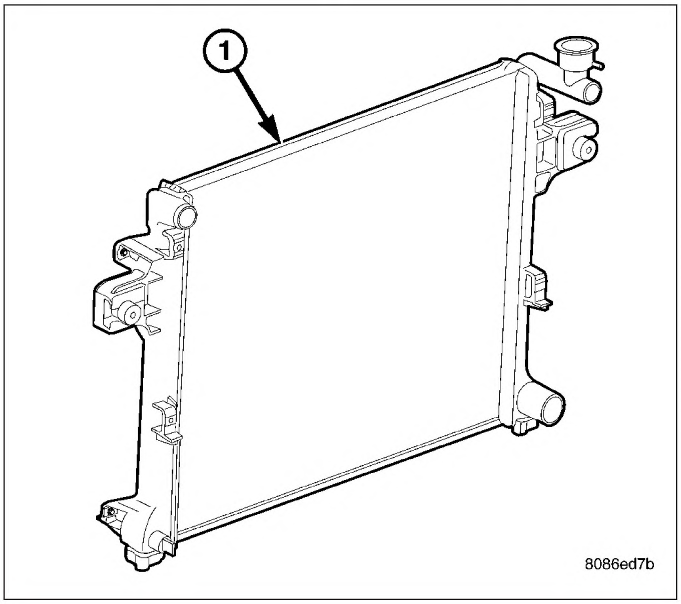


RADIATOR

DESCRIPTION

All vehicles are equipped with a cross flow type radiator with plastic side tanks.

Plastic tanks, while stronger than brass, are subject to damage by impact, such as from tools or wrenches. Handle radiator with care.



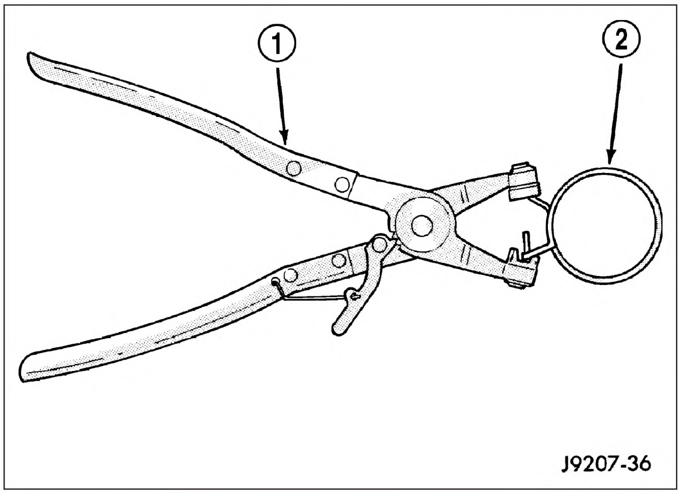
REMOVAL

GAS ENGINES

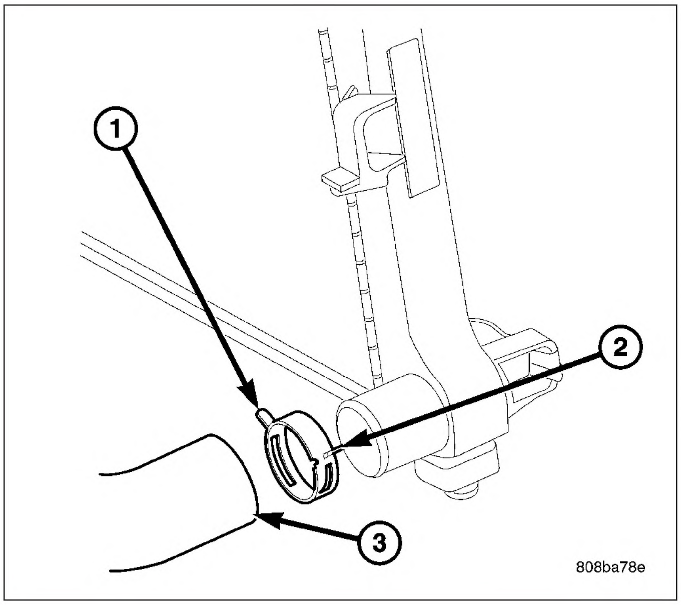
WARNING: DO NOT REMOVE THE CYLINDER BLOCK DRAIN PLUGS OR LOOSEN THE RADIATOR DRAINCOCK WITH THE SYSTEM HOT AND UNDER PRESSURE. SERIOUS BURNS FROM COOLANT CAN OCCUR. REFER TO COOLING SYSTEM DRAINING.

Do not waste reusable coolant. If the solution is clean, drain the coolant into a clean container for reuse.

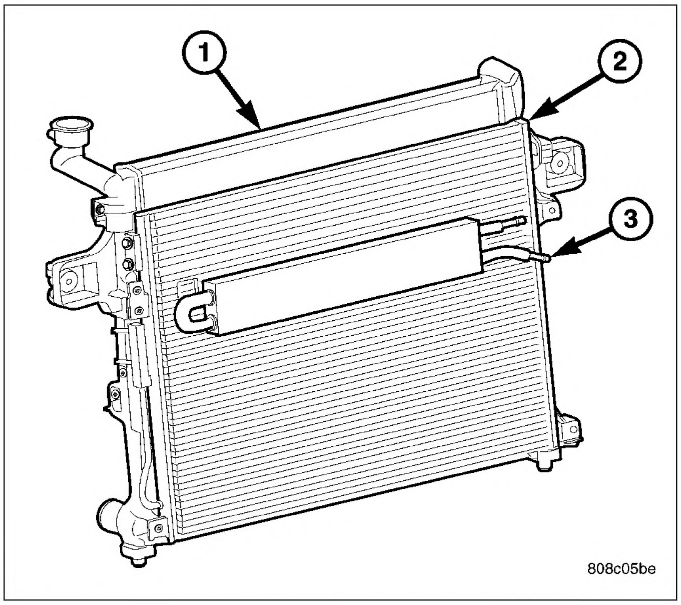
WARNING: CONSTANT TENSION HOSE CLAMPS ARE USED ON MOST COOLING SYSTEM HOSES. WHEN REMOVING OR INSTALLING, USE ONLY TOOLS DESIGNED FOR SERVICING THIS TYPE OF CLAMP, SUCH AS SPECIAL TOOL 6094. ALWAYS WEAR SAFETY GLASSES WHEN SERVICING CONSTANT TENSION CLAMPS.



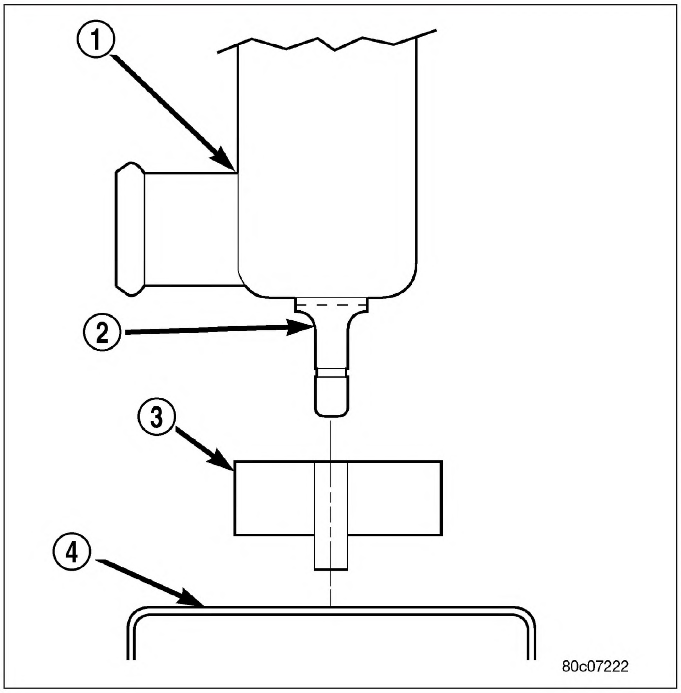
CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only an original equipment clamp with matching number or letter.



CAUTION: When removing the radiator or A/C condenser for any reason, note the location of all radiator-to-body and radiator-to-A/C condenser rubber air seals. These are used at the top, bottom and sides of the radiator and A/C condenser. To prevent overheating, these seals must be installed to their original positions.



1. Disconnect the negative battery cable at battery.
2. Drain coolant from radiator (Refer to 7 - COOLING - STANDARD PROCEDURE).
3. Remove the front grill (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).
4. Remove two radiator mounting bolts.
5. Disconnect both transmission cooler lines from radiator.
6. Disconnect electrical connector for the fan control solenoid.
7. Disconnect the power steering cooler line from cooler and filter.
8. Disconnect the radiator upper and lower hoses.
9. Disconnect the overflow hose from radiator.
10. Remove the air inlet duct at the grill.
11. The lower part of radiator is equipped with two alignment dowel pins. They are located on the bottom of radiator tank and fit into rubber grommets. These rubber grommets are pressed into the radiator lower crossmember.



WARNING: THE AIR CONDITIONING SYSTEM (IF EQUIPPED) IS UNDER A CONSTANT PRESSURE EVEN WITH THE ENGINE OFF. REFER TO REFRIGERANT WARNINGS IN, HEATING AND AIR CONDITIONING BEFORE HANDLING ANY AIR CONDITIONING COMPONENT.

NOTE: The radiator and radiator cooling fan can be removed as an assembly. It is not necessary to remove the cooling fan before removing or installing the radiator.

12. Disconnect the two high pressure fluid lines at the hydraulic fan drive.
13. Disconnect the low pressure return hose at the hydraulic fan drive.
14. Gently lift up and remove radiator from vehicle. Be careful not to scrape the radiator fins against any other component. Also be careful not to disturb the air conditioning condenser (if equipped).

CLEANING

Clean radiator fins With the engine cold, apply cold water and compressed air to the back (engine side) of the radiator to flush the radiator and/or A/C condenser of debris.

INSPECTION

The radiator cooling fins should be checked for damage or deterioration. Inspect cooling fins to make sure they are not bent or crushed, these areas result in reduced heat exchange causing the cooling system to operate at higher temperatures. Inspect the plastic end tanks for cracks, damage or leaks.

Inspect the radiator neck for damage or distortion.

INSTALLATION

GAS ENGINES

CAUTION: Before installing the radiator or A/C condenser, be sure the radiator-to-body and radiator-to-A/C condenser rubber air seals are properly fastened to their original positions. These are used at the top, bottom and sides of the radiator and A/C condenser. To prevent overheating, these seals must be installed to their original positions.

1. Equipped with air conditioning: Gently lower the radiator and fan shroud into the vehicle. Guide the two radiator alignment dowels through the holes in the rubber air seals first and then through the A/C support brackets. Continue to guide the alignment dowels into the rubber grommets located in lower radiator crossmember. The holes in the L-shaped brackets (located on bottom of A/C condenser) must be positioned between bottom of rubber air seals and top of rubber grommets.
2. Connect the radiator upper and lower hoses and hose clamps to radiator.

CAUTION: The tangs on the hose clamps must be positioned straight down.

3. Install coolant reserve/overflow tank hose at radiator.
4. Connect both transmission cooler lines at the radiator.
5. Install both radiator mounting bolts.
6. Install air inlet duct at grill.
7. Attach electric connector for hydraulic fan control solenoid.
8. Install the grill (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
9. Connect the two high pressure lines to the hydraulic fan drive. Tighten ½ in. pressure line fitting to 49 N·m (36 ft. lbs.). and the 3/8 in. pressure line fitting to 29 N·m (21.5 ft. lbs.).
10. Connect the low pressure hose to the hydraulic fan drive. Position the spring clamp.
11. Connect the power steering filter hoses to the filter. Install new hose clamps.
12. Rotate the fan blades (by hand) and check for interference at fan shroud.
13. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
14. Refill the power steering reservoir and bleed air from system (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).
15. Connect battery cable at battery.
16. Start and warm engine. Check for leaks.

MOTOR-RADIATOR FAN

DIAGNOSIS AND TESTING—ELECTRIC COOLING FAN

The powertrain control module (PCM) will enter a diagnostic trouble code (DTC) in memory if it detects a problem in the auxiliary cooling fan relay or circuit. (Refer to 25 - EMISSIONS CONTROL - DESCRIPTION).

If the electric cooling fan is inoperative, check the 15A fuse in the junction block and the 40A fuse in the Power Distribution Center (PDC) with a 12 volt test lamp or DVOM. Refer to the inside of the PDC cover for the exact location of the fuse. If fuses are okay, refer to ELECTRICAL SCHEMATICS for the cooling fan and relay circuit schematic.

PUMP-WATER

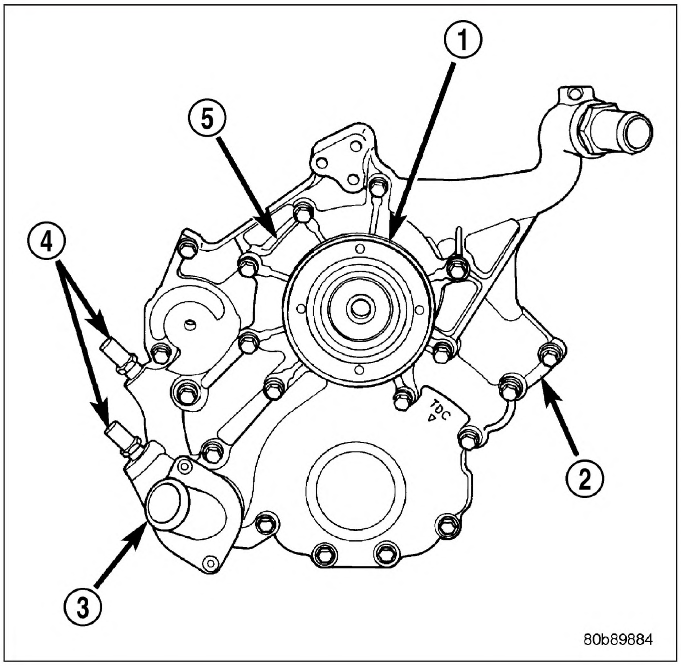
DESCRIPTION

DESCRIPTION - WATER PUMP - 4.7L

A centrifugal water pump circulates coolant through the water jackets, passages, intake manifold, radiator core, cooling system hoses and heater core. The pump is driven from the engine crankshaft by a single serpentine drive belt.

The water pump impeller is pressed onto the rear of a shaft that rotates in bearings pressed into the housing. The housing has two small holes to allow seepage to escape. The water pump seals are lubricated by the antifreeze in the coolant mixture. No additional lubrication is necessary.

Both heater hoses are connected to fittings on the timing chain front cover. The water pump is also mounted directly to the timing chain cover and is equipped with a non serviceable integral pulley.



DESCRIPTION - WATER PUMP BYPASS

The 4.7L engine uses an internal water/coolant bypass system. The design uses galleries in the timing chain cover to circulate coolant during engine warm-up preventing the coolant from flowing through the radiator. The thermostat uses a stub shaft located at the rear of the thermostat to control flow through the bypass gallery.

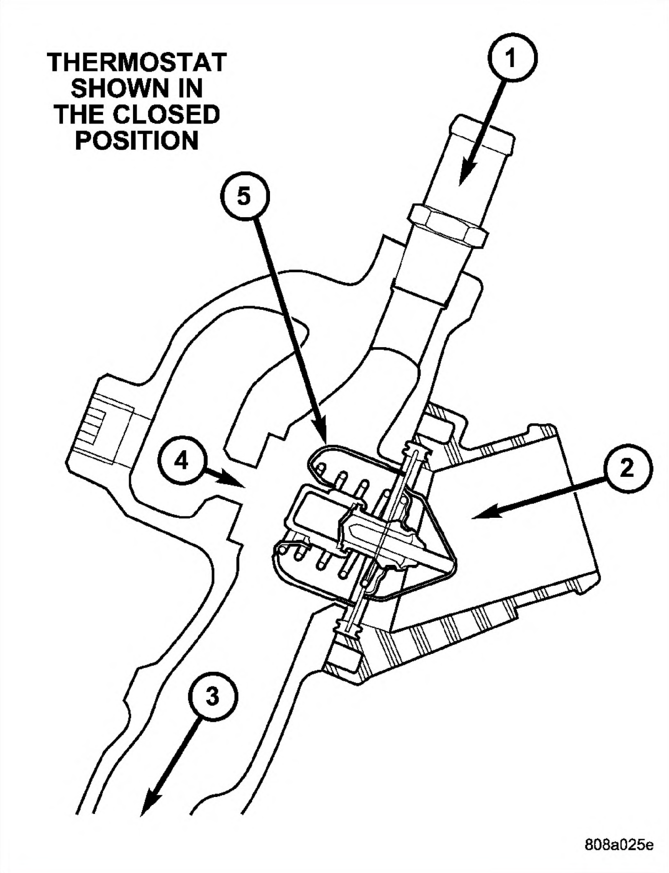
OPERATION

OPERATION - WATER PUMP

A centrifugal water pump circulates coolant through the water jackets, passages, intake manifold, radiator core, cooling system hoses and heater core, this coolant absorbs the heat generated when the engine is running. The pump is driven by the engine crankshaft via a drive belt.

WATER PUMP BYPASS – 3.7L/4.7L ENGINE

When the thermostat is in the closed position the bypass gallery is not obstructed allowing 100% flow. When the thermostat is in the open position the pill partially covers the bypass hole, reducing the amount of bypass flow. This design allows the coolant to reach operating temperature quickly when cold, while adding extra cooling during normal temperature operation.



DIAGNOSIS AND TESTING - WATER PUMP

LOOSE IMPELLER - 3.7L/4.7L/5.7L ENGINES

NOTE: Due to the design of the 3.7/4.7L/5.7L engine water pumps, testing the pump for a loose impeller must be done by verifying coolant flow in the radiator. To accomplish this refer to the following procedure.

DO NOT WASTE reusable coolant. If solution is clean, drain coolant into a clean container for reuse.

1. Drain coolant until the first row of cores is visible in the radiator (Refer to 7 - COOLING - STANDARD PROCEDURE) 4.7L Engine or (Refer to 7 - COOLING - STANDARD PROCEDURE) 4.0L Engine.
2. Leaving the radiator cap off, start the engine. Run engine until thermostat opens.
3. While looking into the radiator through the radiator fill neck, raise engine rpm to 2000 RPM. Observe the flow of coolant from the first row of cores.
4. If there is no flow or very little flow visable, replace the water pump.

INSPECTING FOR INLET RESTRICTIONS

Inadequate heater performance may be caused by a metal casting restriction in the heater hose inlet.

DO NOT WASTE reusable coolant. If solution is clean, drain the coolant into a clean container for reuse.

WARNING: DO NOT LOOSEN THE RADIATOR DRAINCOCK WITH THE SYSTEM HOT AND UNDER PRESSURE. SERIOUS BURNS FROM THE COOLANT CAN OCCUR.

1. Drain sufficient coolant from the radiator to decrease the level below the heater hose inlet. On 4.7L engines this requires complete draining.
2. Remove the heater hose.
3. Inspect the inlet for metal casting flash or other restrictions.

REMOVAL

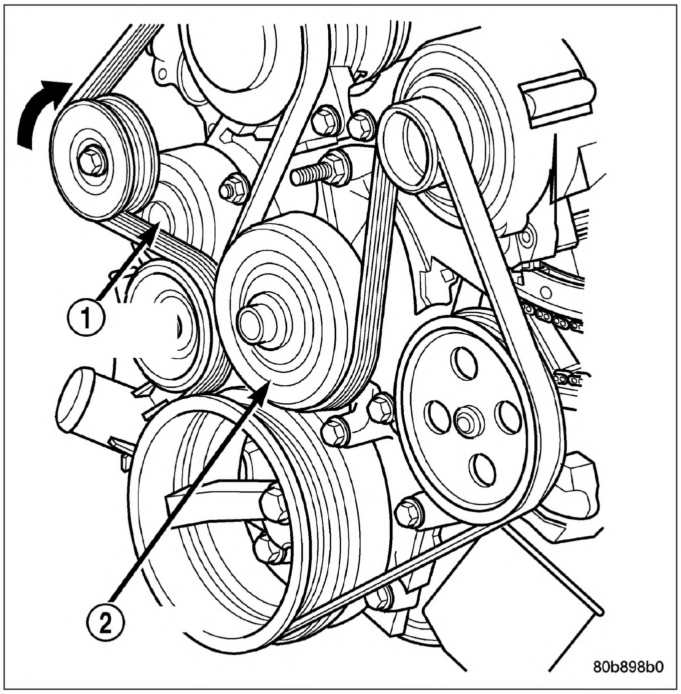
3.7L

The water pump on 3.7L engines is bolted directly to the engine timing chain case cover.

1. Disconnect negative battery cable from battery.
2. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

WARNING: CONSTANT TENSION HOSE CLAMPS ARE USED ON MOST COOLING SYSTEM HOSES. WHEN REMOVING OR INSTALLING, USE ONLY TOOLS DESIGNED FOR SERVICING THIS TYPE OF CLAMP, SUCH AS SPECIAL CLAMP TOOL (NUMBER 6094). SNAP-ON CLAMP TOOL (NUMBER HPC-20) MAY BE USED FOR LARGER CLAMPS. ALWAYS WEAR SAFETY GLASSES WHEN SERVICING CONSTANT TENSION CLAMPS.

CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only an original equipment clamp with matching number or letter.



3. Remove two fan shroud-to-radiator screws, Disconnect the coolant overflow hose.
4. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
5. Remove lower radiator hose clamp and remove lower hose at water pump.
6. Remove seven water pump mounting bolts and one stud bolt.

CAUTION: Do not pry water pump at timing chain case/cover. The machined surfaces may be damaged resulting in leaks.

7. Remove water pump and gasket. Discard gasket.

4.7L

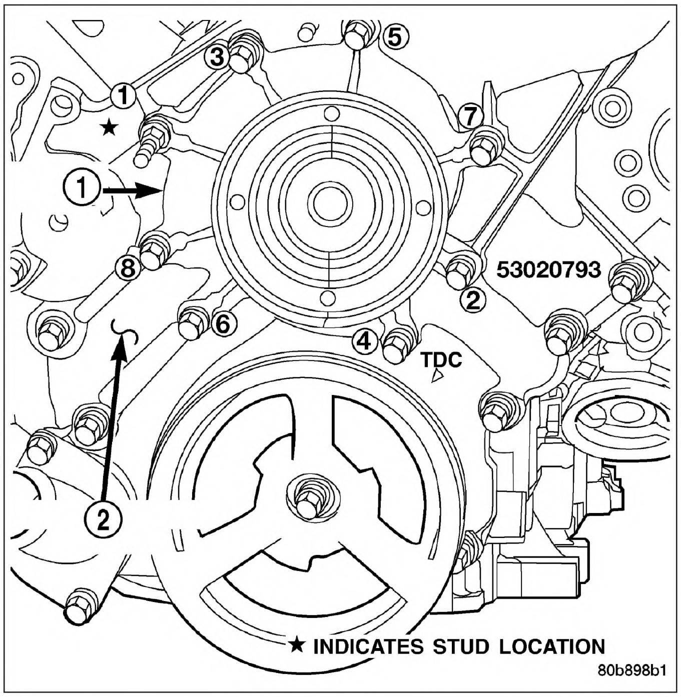
The water pump on 4.7L engines is bolted directly to the engine timing chain case/cover.

A gasket is used as a seal between the water pump and timing chain case/cover.

The water pump can be removed without discharging the air conditioning system (if equipped).

1. Disconnect negative battery cable from battery.
2. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE). Do not waste reusable coolant. If solution is clean, drain coolant into a clean container for reuse.

WARNING: CONSTANT TENSION HOSE CLAMPS ARE USED ON MOST COOLING SYSTEM HOSES. WHEN REMOVING OR INSTALLING, USE ONLY TOOLS DESIGNED FOR SERVICING THIS TYPE OF CLAMP, SUCH AS TOOL 6094. ALWAYS WEAR SAFETY GLASSES WHEN SERVICING CONSTANT TENSION CLAMPS.



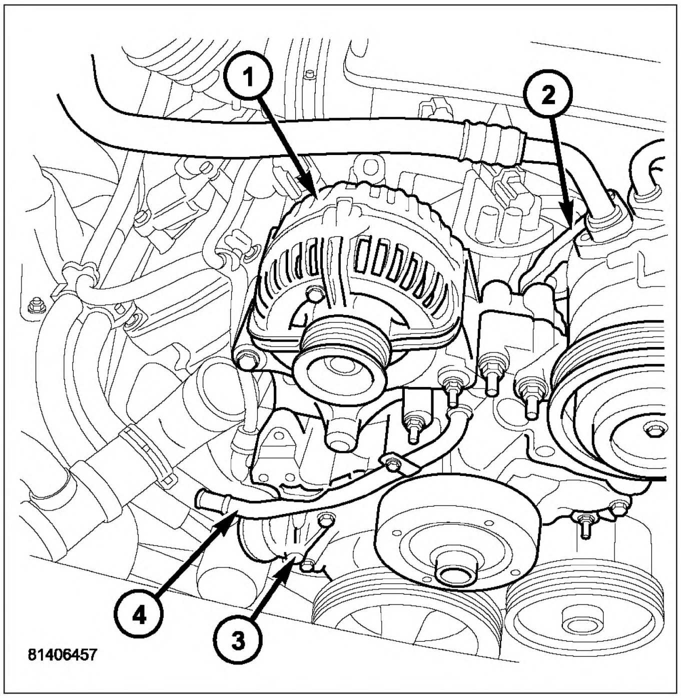
CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only an original equipment clamp with matching number or letter.

3. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
4. Remove lower radiator hose clamp and remove lower hose at water pump.
5. Remove seven water pump mounting bolts and one stud bolt.

CAUTION: Do not pry water pump at timing chain case/cover. The machined surfaces may be damaged resulting in leaks.

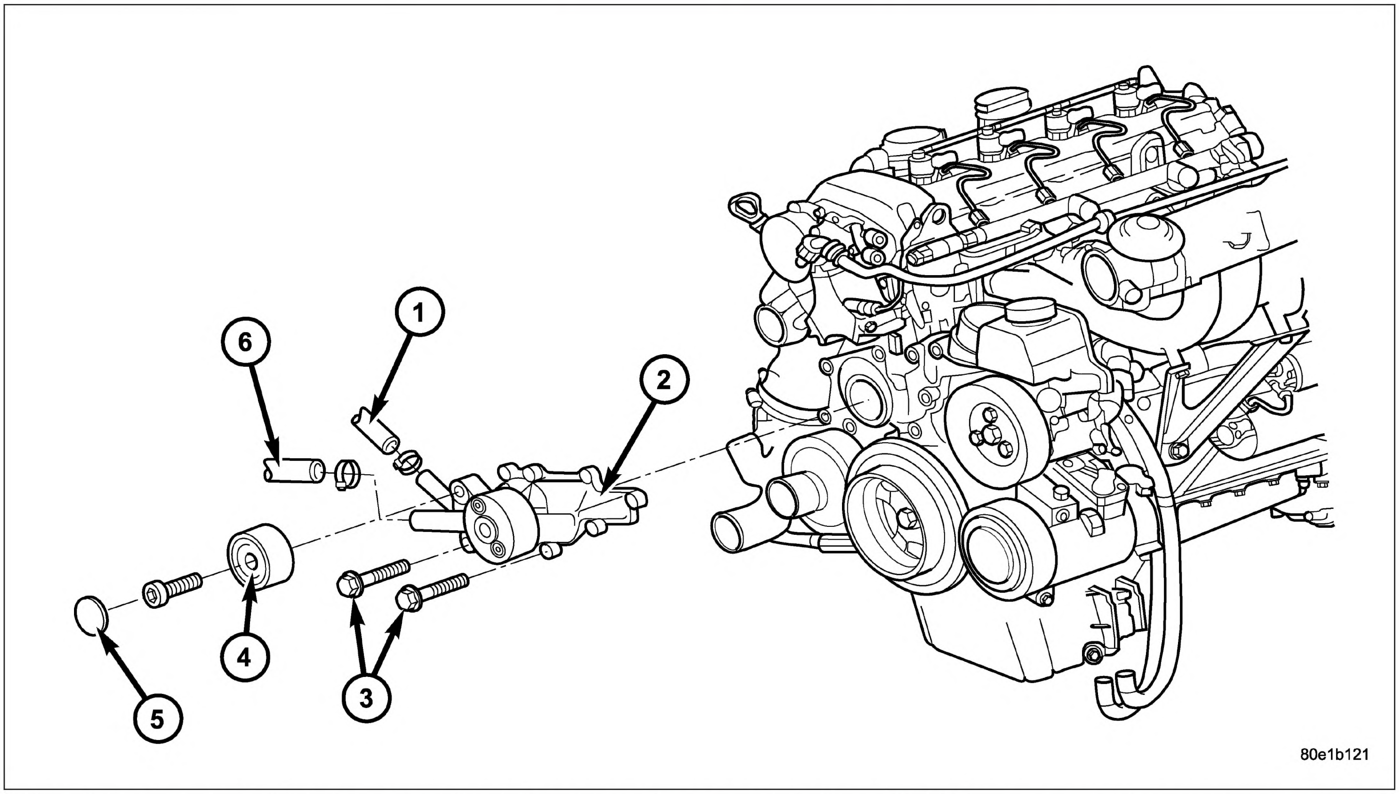
6. Remove water pump and gasket. Discard gasket.

5.7L



1. Disconnect negative battery cable.
2. Drain coolant.
3. Remove serpentine belt.
4. Remove fan clutch assembly.
5. Remove coolant fill bottle.
6. Disconnect washer bottle wiring and hose.
7. Remove fan shroud assembly.
8. Remove A/C compressor and generator brace.
9. Remove idler pulleys.
10. Remove belt tensioner assembly.
11. Remove upper and lower radiator hoses.
12. Remove heater hoses.
13. Remove water pump mounting bolts and remove pump.

3.0L DIESEL



WARNING: RISK OF INJURY TO SKIN AND EYES FROM SCALDING WITH HOT COOLANT. RISK OF POISONING FROM SWALLOWING COOLANT. DO NOT OPEN COOLING SYSTEM UNLESS COOLANT TEMPERATURE IS BELOW 90°C (194°F). OPEN CAP SLOWLY TO RELEASE PRESSURE. STORE COOLANT IN SUITABLE AND APPROPRIATELY MARKED CONTAINER. WEAR PROTECTIVE GLOVES, CLOTHES AND EYE WEAR.

1. Disconnect negative battery cable.

2. Remove engine cover (Refer to 9 - ENGINE - REMOVAL).
3. Drain engine coolant (Refer to 7 - COOLING/ENGINE/COOLANT - STANDARD PROCEDURE).
4. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
5. Disconnect coolant hoses at water pump.
6. Remove idler pulley.
7. Remove water pump and clean sealing surfaces.

CLEANING

Clean the gasket mating surface. Use caution not to damage the gasket sealing surface.

INSPECTION

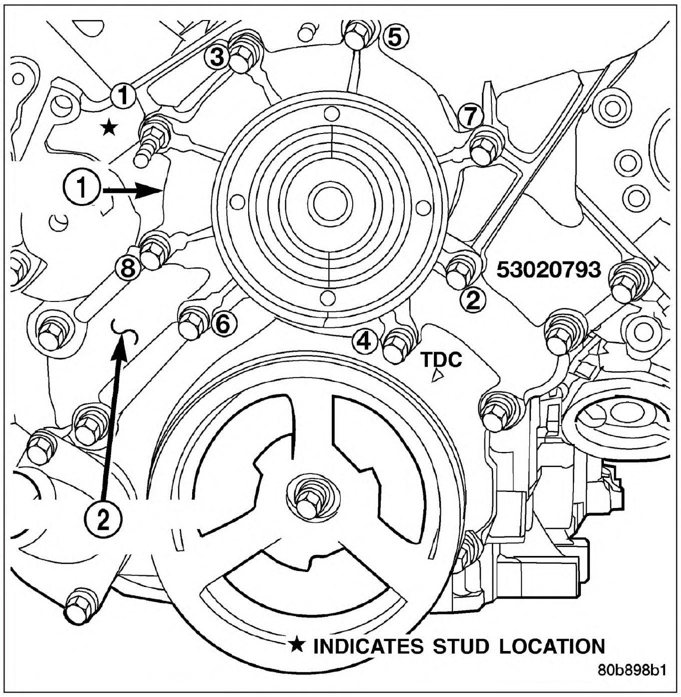
Inspect the water pump assembly for cracks in the housing, Water leaks from shaft seal, Loose or rough turning bearing or Impeller rubbing either the pump body or timing chain case/cover.

INSTALLATION

3.7L ENGINE

The water pump on 3.7L engines is bolted directly to the engine timing chain case cover.

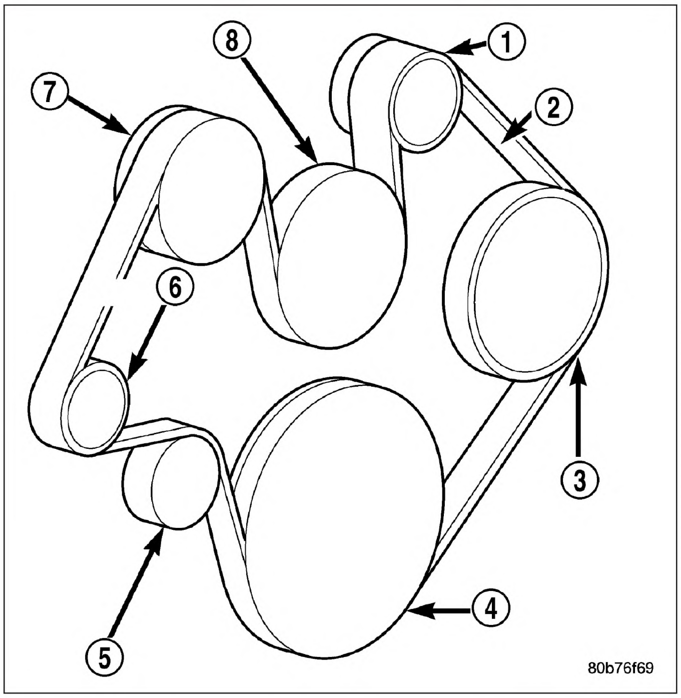
1. Clean gasket mating surfaces.
2. Using a new gasket, position water pump and install mounting bolts. Tighten water pump mounting bolts to 54 N·m (40 ft. lbs.) torque.
3. Spin water pump to be sure that pump impeller does not rub against timing chain case/cover.



4. Connect radiator lower hose to water pump.
5. Relax tension from belt tensioner. Install drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

CAUTION: When installing the serpentine accessory drive belt, belt must be routed correctly. If not, engine may overheat due to water pump rotating in wrong direction. Refer to for correct belt routing. Or, refer to the Belt Routing Label located in the engine compartment. The correct belt with correct length must be used.

6. Be sure the upper and lower portions of the fan shroud are firmly connected. All air must flow through the radiator.
7. Install two fan shroud-to-radiator screws.
8. Be sure of at least 25 mm (1.0 inches) between tips of fan blades and fan shroud.
9. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
10. Connect negative battery cable.
11. Start and warm the engine. Check for leaks.

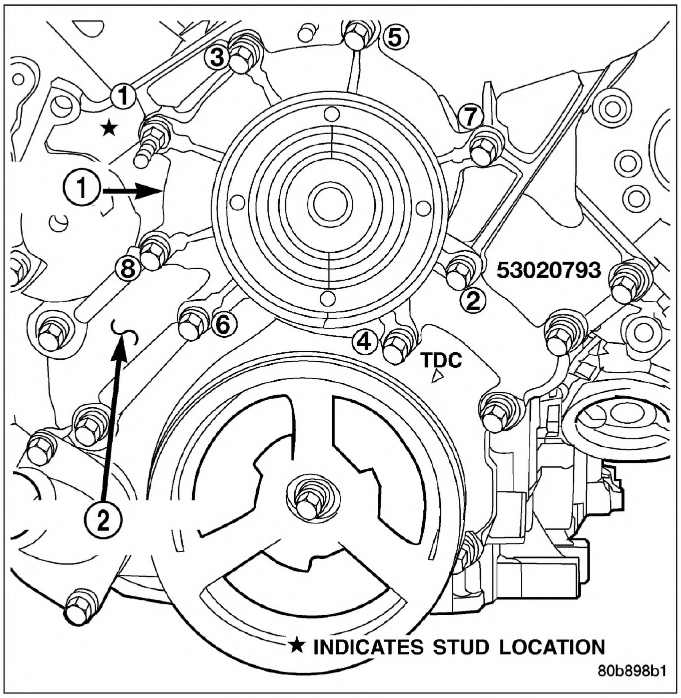


4.7L

1. Clean gasket mating surfaces.
2. Using a new gasket, position water pump and install mounting bolts as shown.. Tighten water pump mounting bolts to 58 N·m (43 ft. lbs.) torque.
3. Spin water pump to be sure that pump impeller does not rub against timing chain case/cover.
4. Connect radiator lower hose to water pump.
5. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

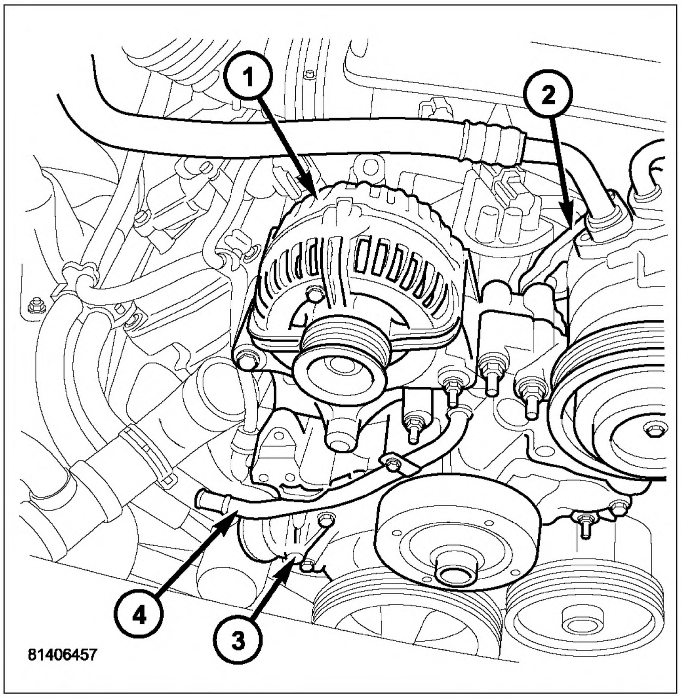
CAUTION: When installing the serpentine accessory drive belt, belt must be routed correctly. If not, engine may overheat due to water pump rotating in wrong direction.

6. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
7. Connect negative battery cable.
8. Start and warm the engine. Check for leaks.

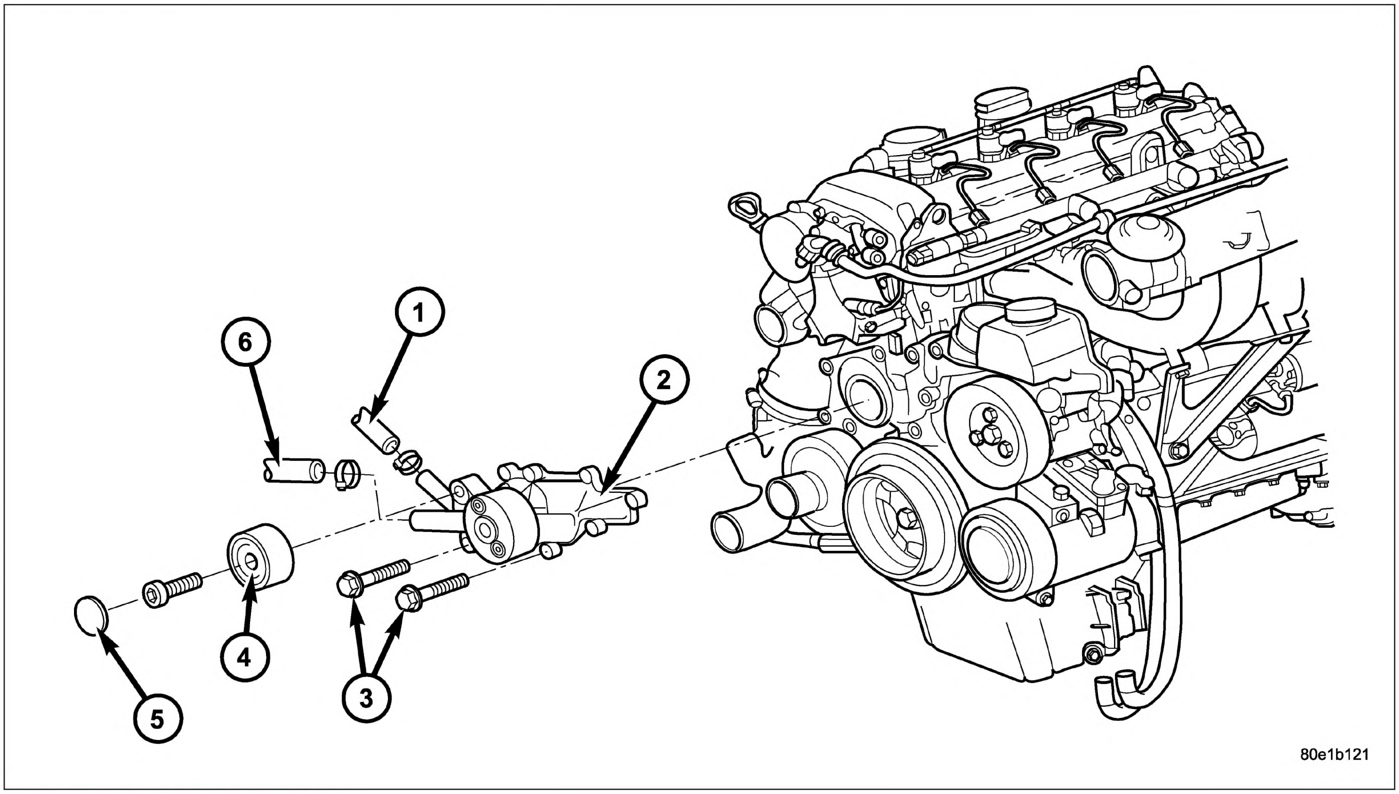


5.7L

1. Install water pump and mounting bolts. Tighten moubting bolts to 24 N·m (18 ft. lbs.).
2. Install heater hoses.
3. Install upper and lower radiator hoses.
4. Install belt tensioner assembly.
5. Install idler pulleys.
6. Install A/C compressor and alternator brace. Tighten bolt and nuts to 28 N·m (21 ft. lbs.).
7. Install fan shroud assembly.
8. Connect washer bottle wiring and hose.
9. Install coolant fill bottle.
10. Install fan clutch assembly.
11. Install serpentine belt.
12. Connect negative battery cable.
13. Fill coolant.
14. Pressure test coolant system



3.0L DIESEL



1. Clean all sealing surfaces.
2. Position and install waterpump. Tighten M6 bolts to 14N·m (124 lbs. in.) and M8 bolts to 20N·m (177 lbs. in.).
3. Install idler pulley. Tighten bolt to 35N·m (26 lbs. ft.).
4. Install coolant hoses.
5. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

6. Close coolant drain.
7. Install engine cover (Refer to 9 - ENGINE - INSTALLATION).
8. Connect negative battery cable.
9. Fill coolant system to proper level with the appropriate coolant mixture (Refer to 7 - COOLING/ENGINE/COOLANT - STANDARD PROCEDURE).

WARNING: USE EXTREME CAUTION WHEN ENGINE IS OPERATING. DO NOT PUT YOUR HANDS NEAR PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHES.

10. Start engine and inspect for leaks.

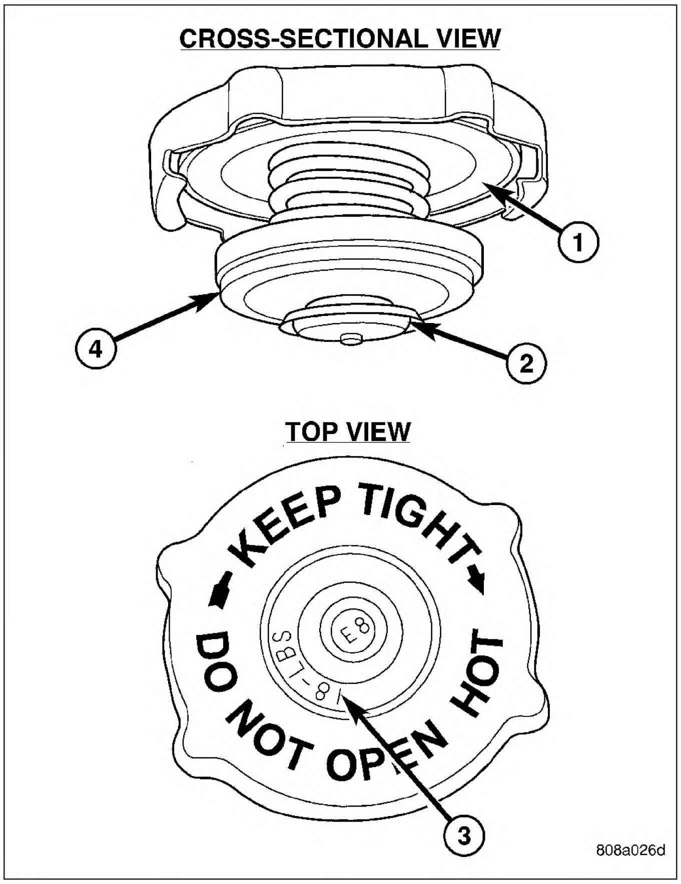
CAP-RADIATOR PRESSURE

DESCRIPTION

All radiators are equipped with a pressure cap. This cap releases pressure at some point within a range of 110 - 138 kPa (16 - 20 psi). The pressure relief point (in pounds) is engraved on top of the cap

The cooling system will operate at pressures slightly above atmospheric pressure. This results in a higher coolant boiling point allowing increased radiator cooling capacity. The cap contains a spring-loaded pressure relief valve. This valve opens when system pressure reaches the release range of 110 - 138 kPa (16 - 20 psi).

A rubber gasket seals the radiator filler neck. This is done to maintain vacuum during coolant cool-down and to prevent leakage when system is under pressure.



OPERATION

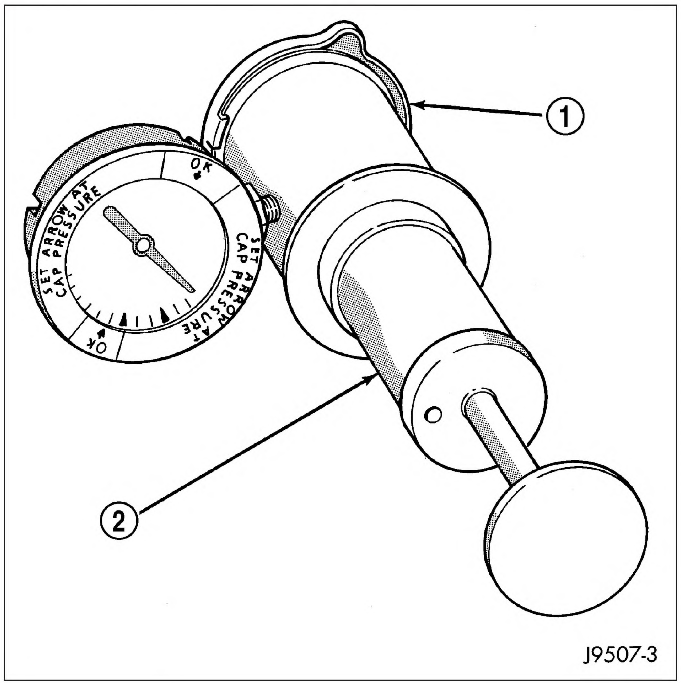
A vent valve in the center of the cap will remain shut as long as the cooling system is pressurized. As the coolant cools, it contracts and creates a vacuum in cooling system. This causes the vacuum valve to open and coolant in reserve/overflow tank to be drawn through connecting hose into radiator. If the vacuum valve is stuck shut, or overflow hose is kinked, radiator hoses will collapse on cool-down.

DIAGNOSIS AND TESTING - RADIATOR PRESSURE CAP

Remove cap from radiator. Be sure that sealing surfaces are clean. Moisten rubber gasket with water and install the cap on pressure tester (tool 7700 or an equivalent).

Operate the tester pump and observe the gauge pointer at its highest point. The cap release pressure should be 110 to 138 kPa (16 - 20 psi). The cap is satisfactory when the pressure holds steady. It is also good if it holds pressure within the 110 - 138 kPa (16 - 20 psi) range for 30 seconds or more. If the pointer drops quickly, replace the cap.

CAUTION: Radiator pressure testing tools are very sensitive to small air leaks, which will not cause cooling system problems. A pressure cap that does not have a history of coolant loss should not be replaced just because it leaks slowly when tested with this tool. Add water to tool. Turn tool upside down and recheck pressure cap to confirm that cap needs replacement.



CLEANING

Clean the radiator pressure cap using a mild soap and water only.

INSPECTION

Visually inspect the pressure valve gasket on the cap. Replace cap if the gasket is swollen, torn or worn. Inspect the area around radiator filler neck for white deposits that indicate a leaking cap.

TRANSMISSION

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COOLER-TRANSMISSION

DESCRIPTION

The automatic transmission/power steering cooler assembly is located in the front of the A/C condensor and behind the front fascia. The transmission cooler is a heat exchanger that allows heat in the transmission flud to be transferred to the air passing over the cooler fins.

The transmission oil/power steering cooler assemblly is equipped with quick connect fitting for the transmission oil and power steering lines.

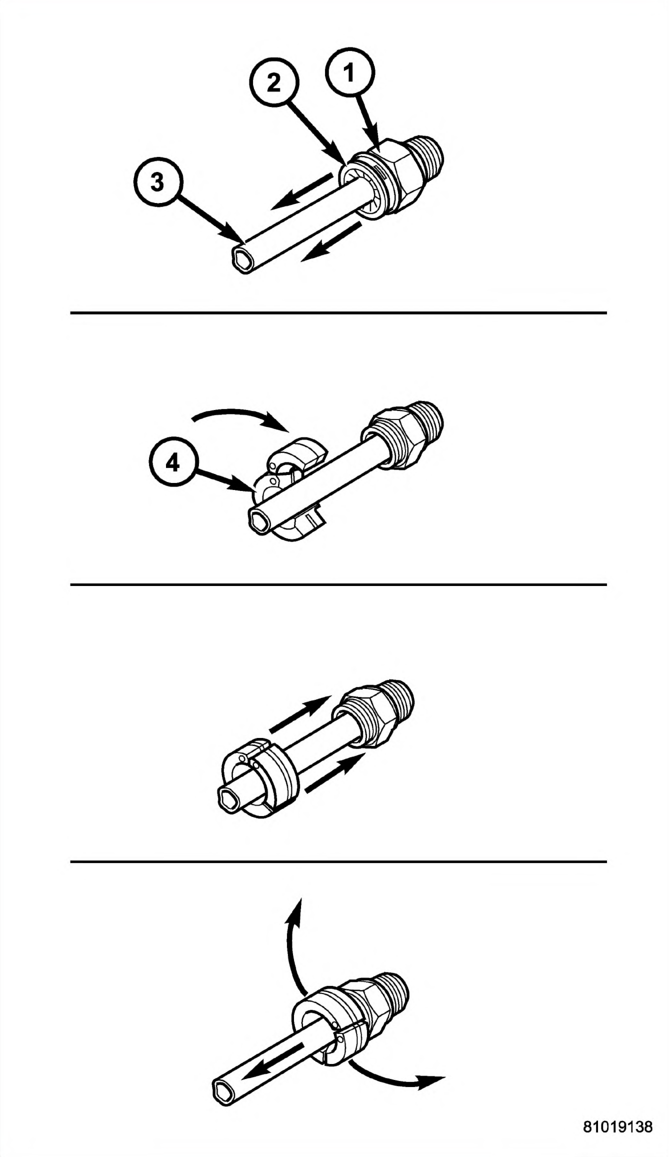
The transmission oil/power steering cooler is serviced as an assembly.

STANDARD PROCEDURE

TRANSMISSION COOLER LINE QUICK CONNECT FITTING DISASSEMBLY/ ASSEMBLY

DISCONNECT

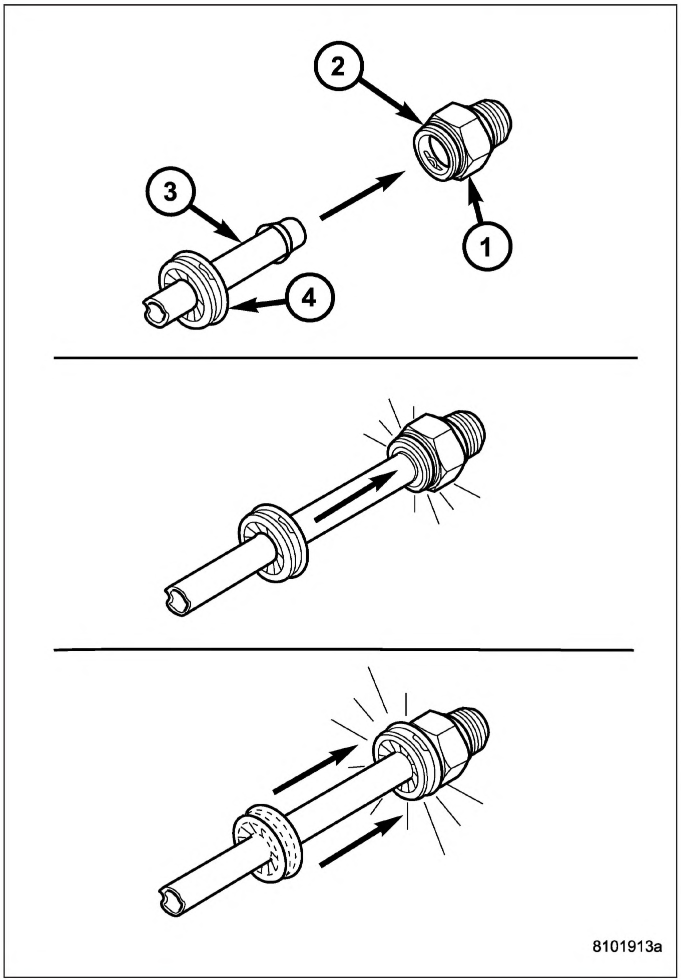
1. Remove dust cap by pulling it straight back off of quick connect fitting.
2. Place disconnect tool Special Tool 8875A onto transmission cooler line with the fingers of the tool facing the quick connect fitting.
3. Slide disconnect tool down the transmission line and engage the fingers of the tool into the retaining clip. When properly engaged in the clip, the tool will fit flush against the quick connect fitting.
4. Rotate the disconnect tool 60° to expand the retaining clip.
5. While holding the disconnect tool against the quick connect fitting, pull back on the transmission cooler line to remove.



CONNECT

1. Align transmission cooler line with quick connect fitting while pushing straight into the fitting.
2. Push in on transmission cooler line until a “click” is heard or felt.
3. Slide dust cap down the transmission cooler line and snap it over the quick connect fitting until it is fully seated and rotates freely. Dust cap will only snap over quick connect fitting when the transmission cooler line is properly installed.

NOTE: If dust cap will not snap into place, repeat assembly step 2.



REMOVAL

1. Remove grill (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).
2. Using Tool 8875A, disconnect transmission cooler tubes and power steering lines from the transmission oil/power steering cooler (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE).
3. Remove the transmission cooler mounting bolts.
4. Remove transmission cooler from vehicle.

INSTALLATION

1. Position transmission oil/power steering cooler in vehicle.
2. Install transmission mounting bolts. Tighten to 14 N·m (123 in. lbs.)
3. Install transmission and power steering lines into cooler (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE).
4. Install grill (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).

AUDIO/VIDEO

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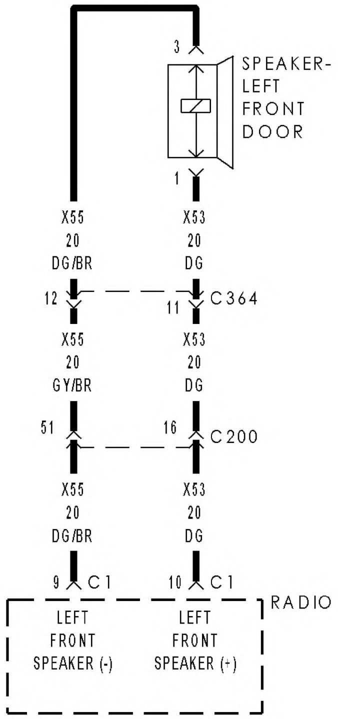
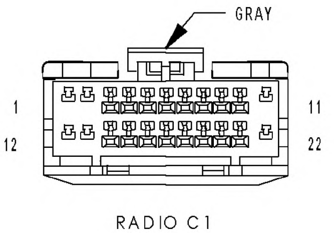
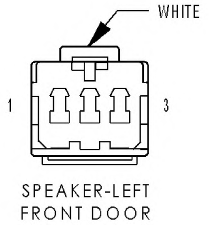
AUDIO/VIDEO SYSTEMS - ELECTRICAL DIAGNOSIS

DIAGNOSIS AND TESTING

B1401-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW


3
SPEAKER-LEFT FRONT DOOR
1
X55
20
DG/BR
X53
20
DG
12
11
C364
X55
20
GY/BR
X53
20
DG
51
16
C200
X55
20
DG/BR
X53
20
DG
9 C1
10 C1
RADIO
LEFT FRONT SPEAKER (-)
LEFT FRONT SPEAKER (+)


GRAY
1
12
11
22
RADIO C1


WHITE
1
3
SPEAKER-LEFT FRONT DOOR
812ce839

B1401-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is LOW for more than 3 seconds.

Possible Causes
SPEAKER
(X55) (X53) LEFT FRONT SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

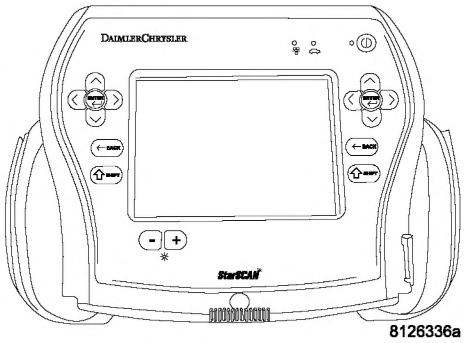
1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all Audio DTC's.

Turn the Radio on.

With the Scan Tool, read the DTC information.



Does the Scan Tool read: B1401-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST VER 1.

---

2. (X53) (X55) SPEAKER OUTPUT CIRCUITS.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Front Left Audio Speaker connector.

Measure the resistance between ground and each speaker (X53)(+) and (X55)(-) circuit.

Is the resistance below 1000.0 ohms for each circuit?

Yes >> Repair the applicable Speaker (+) or (-) Output circuit for a short to ground condition.

No >> Go To 3

B1401-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. SPEAKER

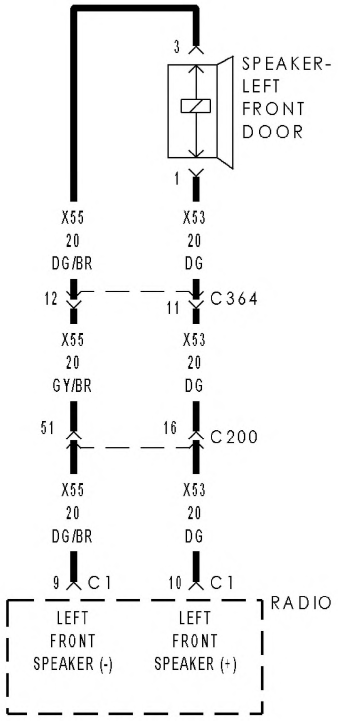
Turn the ignition off.
Disconnect the Front Left Audio Speaker.
Turn the ignition on.
Turn the Radio on.
With the Scan Tool, clear all Audio DTC's.
With the Scan Tool, read the DTC information.

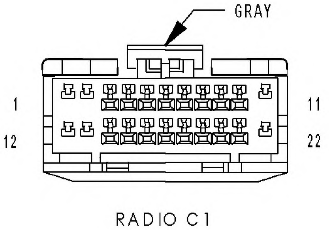
Does the Scan Tool read: B1401-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

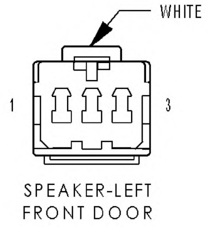
Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

No >> Test Complete.

B1402-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH


3
SPEAKER-LEFT FRONT DOOR
1
X55
20
DG/BR
X53
20
DG
12
11
C364
X55
20
GY/BR
X53
20
DG
51
16
C200
X55
20
DG/BR
X53
20
DG
9 C1
10 C1
RADIO
LEFT FRONT SPEAKER (-)
LEFT FRONT SPEAKER (+)


GRAY
1
12
11
22
RADIO C1


WHITE
1
3
SPEAKER-LEFT FRONT DOOR

812ce839

B1402-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- **Set Condition:**

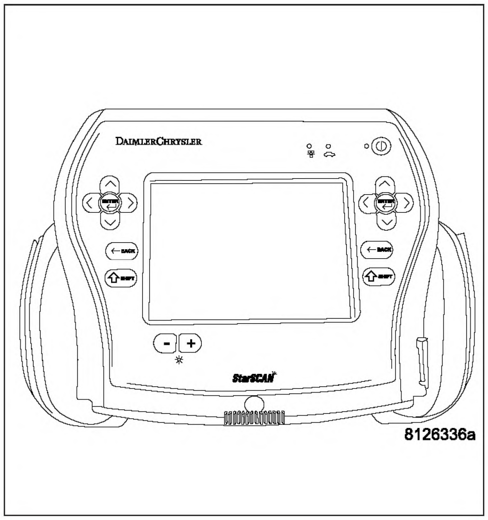
Possible Causes
SPEAKER
(X53) SPEAKER OUTPUT CIRCUIT (+)
(X55) SPEAKER OUTPUT CIRCUIT (-)

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.
With the scan tool, read Radio DTCs.



Does the scan tool display active: B1402-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

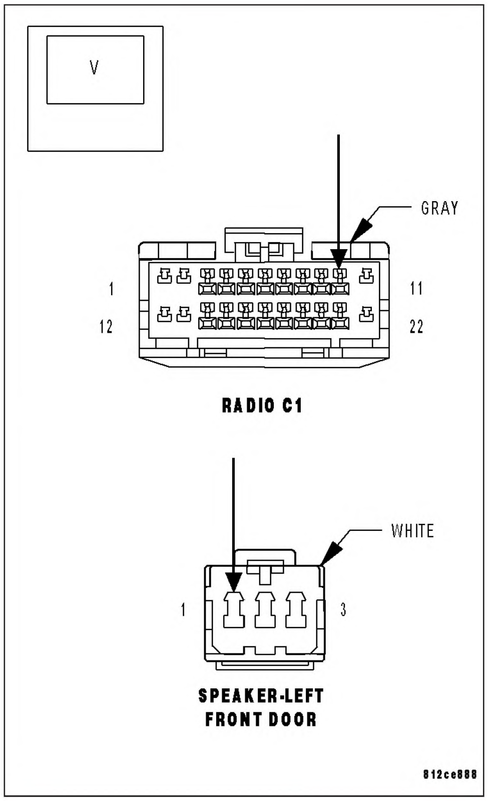
Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

B1402-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

2. CHECK FOR VOLTAGE ON THE (X53) SPEAKER (+) CIRCUIT

Turn the ignition off.
Disconnect the Radio C1 harness connector.
Disconnect the Left Front Speaker harness connector.
Measure for voltage on the (X53) Speaker (+) circuit.


V
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-LEFT
FRONT DOOR
812ce888

Is the voltage above 10.0 volts?

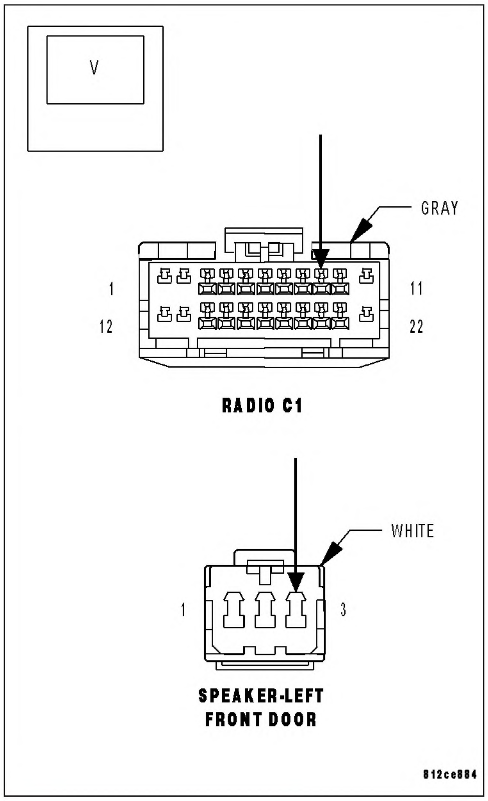
Yes >> Repair the (X53) Speaker (+) circuit for a short to voltage. Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B1402-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X55) SPEAKER (-) CIRCUIT

Measure for voltage on the (X55) Speaker (-) circuit.

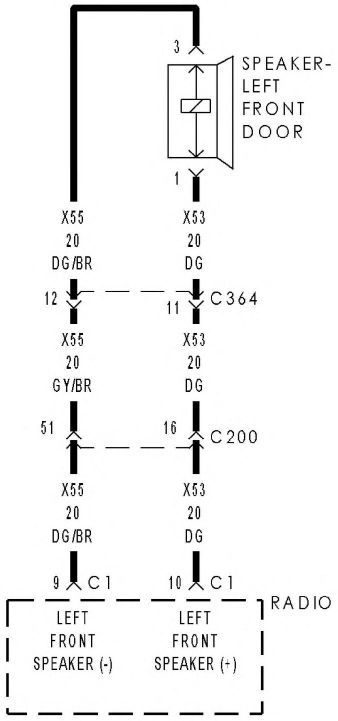

V
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-LEFT FRONT DOOR
812ce884

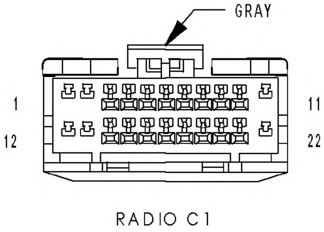
Is the voltage above 10.0 volts?

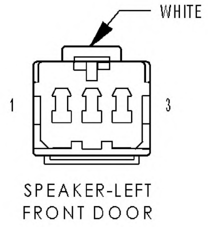
Yes >> Repair the (X55) Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Radio in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1403-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN


3
SPEAKER-LEFT FRONT DOOR
1
X55 20 DG/BR
X53 20 DG
12
11
C364
X55 20 GY/BR
X53 20 DG
51
16
C200
X55 20 DG/BR
X53 20 DG
9 C1
10 C1
RADIO
LEFT FRONT SPEAKER (-)
LEFT FRONT SPEAKER (+)


GRAY
1
11
12
22
RADIO C1


WHITE
1
3
SPEAKER-LEFT FRONT DOOR

812ce839

B1403-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is open for more than 3 seconds. The Radio will not set the fault if the radio confirms an amplifier is on the BUS.

Possible Causes
SPEAKER
(X55) (X53) LEFT FRONT SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

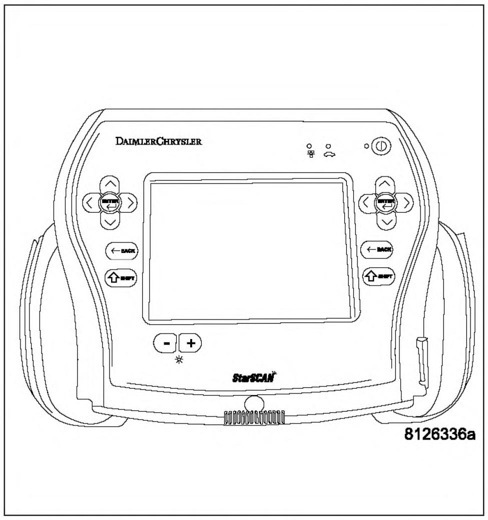
1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all Audio DTC's.

Turn the Radio on.

With the Scan Tool, read the DTC information.



Does the Scan Tool read: B1403-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST VER 1.

---

2. (X55) (X53) SPEAKER OUTPUT CIRCUITS.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Front Left Audio Speaker connector.

Measure the resistance of each speaker (X53)(+) and (X55)(-) circuit between the Radio and the Speaker.

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 3

No >> Repair the applicable Output Speaker circuit for an open condition.

Perform the BODY VERIFICATION TEST VER 1.

B1403-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. SPEAKER

Turn the ignition off.

Disconnect the Front Left Audio Speaker.

Turn the ignition on.

Turn the Radio on.

With the Scan Tool, clear all Audio DTC's.

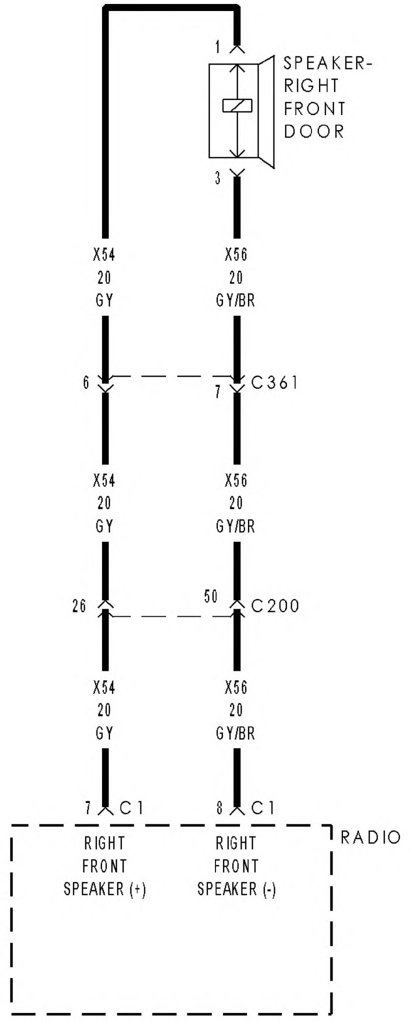
With the Scan Tool, read the DTC information.

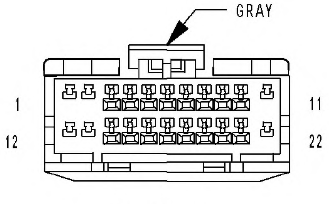
Does the Scan Tool read: B1403-FRONT LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

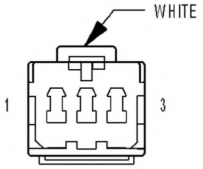
No >> Test Complete.

B1405-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW


1
SPEAKER-RIGHT FRONT DOOR
3
X54
20
GY
X56
20
GY/BR
6
7
C361
X54
20
GY
X56
20
GY/BR
26
50
C200
X54
20
GY
X56
20
GY/BR
7
C1
8
C1
RADIO
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)


GRAY
1
11
12
22

RADIO C1



SPEAKER-RIGHT FRONT DOOR

812cd9b2

B1405-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is LOW for more than 3 seconds.

Possible Causes
SPEAKER
(X56) (X54) RIGHT FRONT SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all Audio DTC's.

Turn the Radio on.

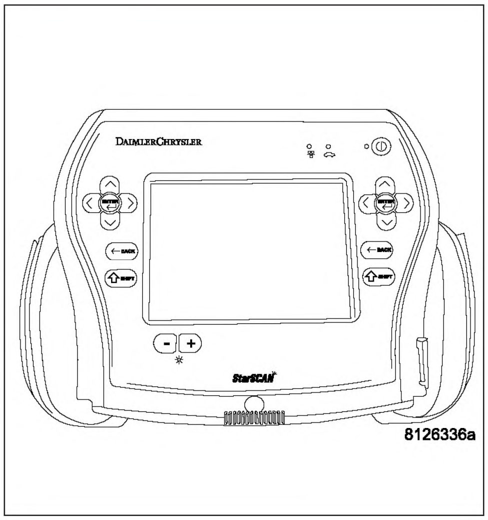
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B1405-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST VER 1.



---

2. (X54) (X56) SPEAKER OUTPUT CIRCUITS.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Front Right Audio Speaker connector.

Measure the resistance between ground and each speaker (X54)(+) and (X56)(-) circuit.

Is the resistance below 1000.0 ohms for each circuit?

Yes >> Repair the applicable Speaker (+) or (-) Output circuit for a short to ground condition.

No >> Go To 3

B1405-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. SPEAKER

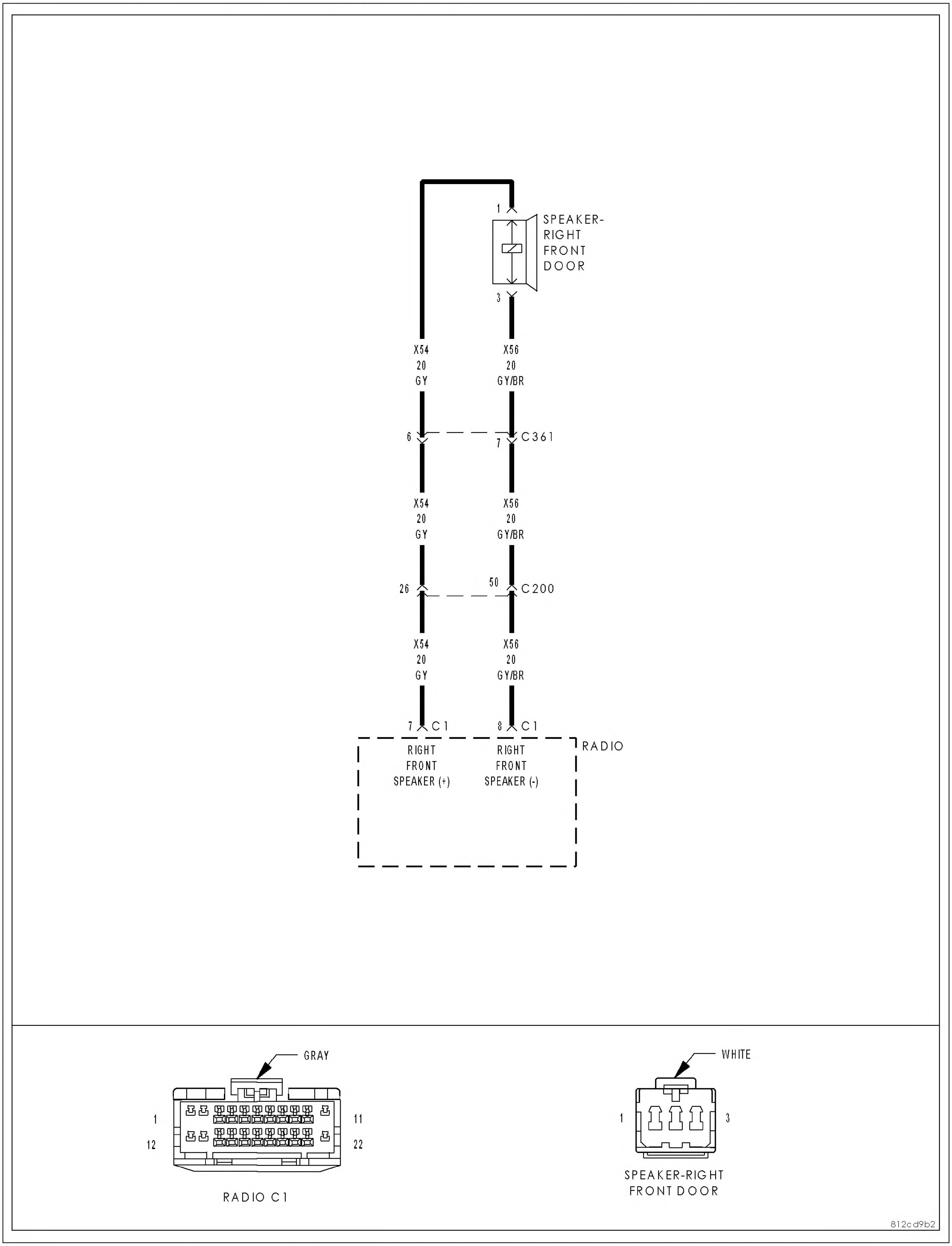
Turn the ignition off.
Disconnect the Front Right Audio Speaker.
Turn the ignition on.
Turn the Radio on.
With the Scan Tool, clear all Audio DTC's.
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B1405-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

No >> Test Complete.

B1406-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH


1
SPEAKER-RIGHT FRONT DOOR
3
X54 20 GY
X56 20 GY/BR
6
7
C361
X54 20 GY
X56 20 GY/BR
26
50
C200
X54 20 GY
X56 20 GY/BR
7 C1
8 C1
RADIO
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
812cd9b2

B1406-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- **Set Condition:**

Possible Causes
SPEAKER
(X54) SPEAKER OUTPUT CIRCUIT (+)
(X56) SPEAKER OUTPUT CIRCUIT (-)

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

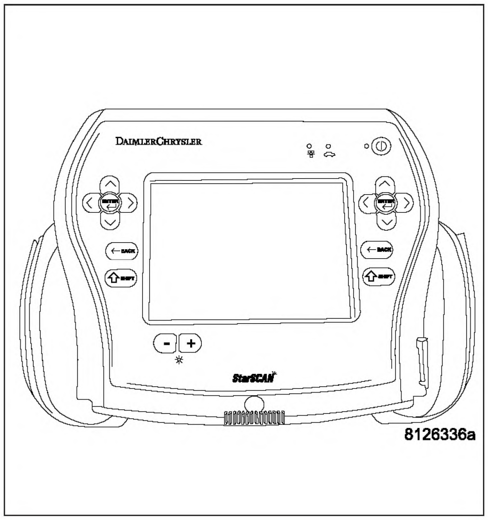
1. INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.
With the scan tool, read Radio DTCs.

Does the scan tool display active: B1406-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



B1406-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

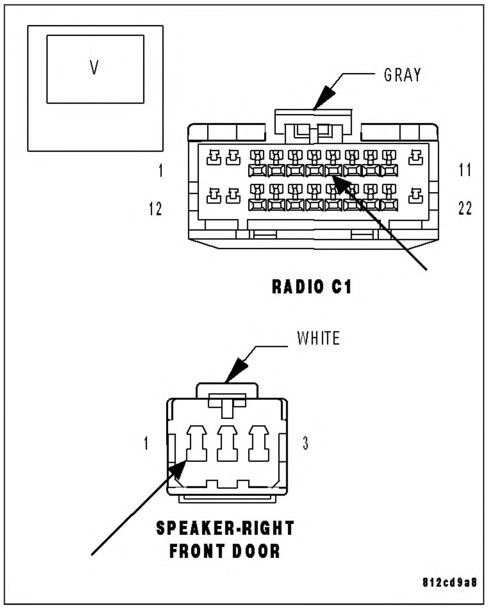
2. CHECK FOR VOLTAGE ON THE (X54) SPEAKER (+) CIRCUIT

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Right Rear Speaker harness connector.

Measure for voltage on the (X52) Speaker (+) circuit.


V
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
812cd9a8

Is the voltage above 10.0 volts?

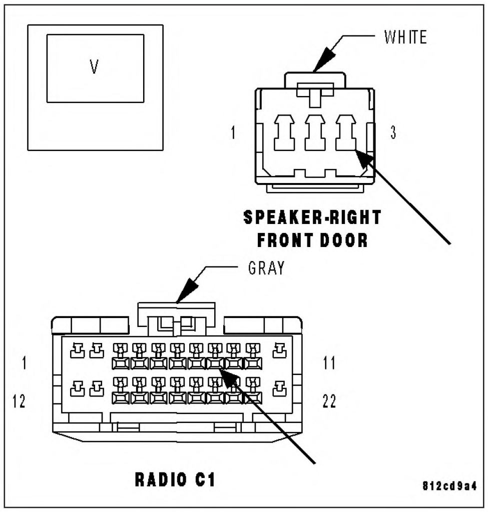
Yes >> Repair the (X52) Speaker (+) circuit for a short to voltage. Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

---

3. CHECK FOR VOLTAGE ON THE (X56) SPEAKER (-) CIRCUIT

Measure for voltage on the (X58) Speaker (-) circuit.

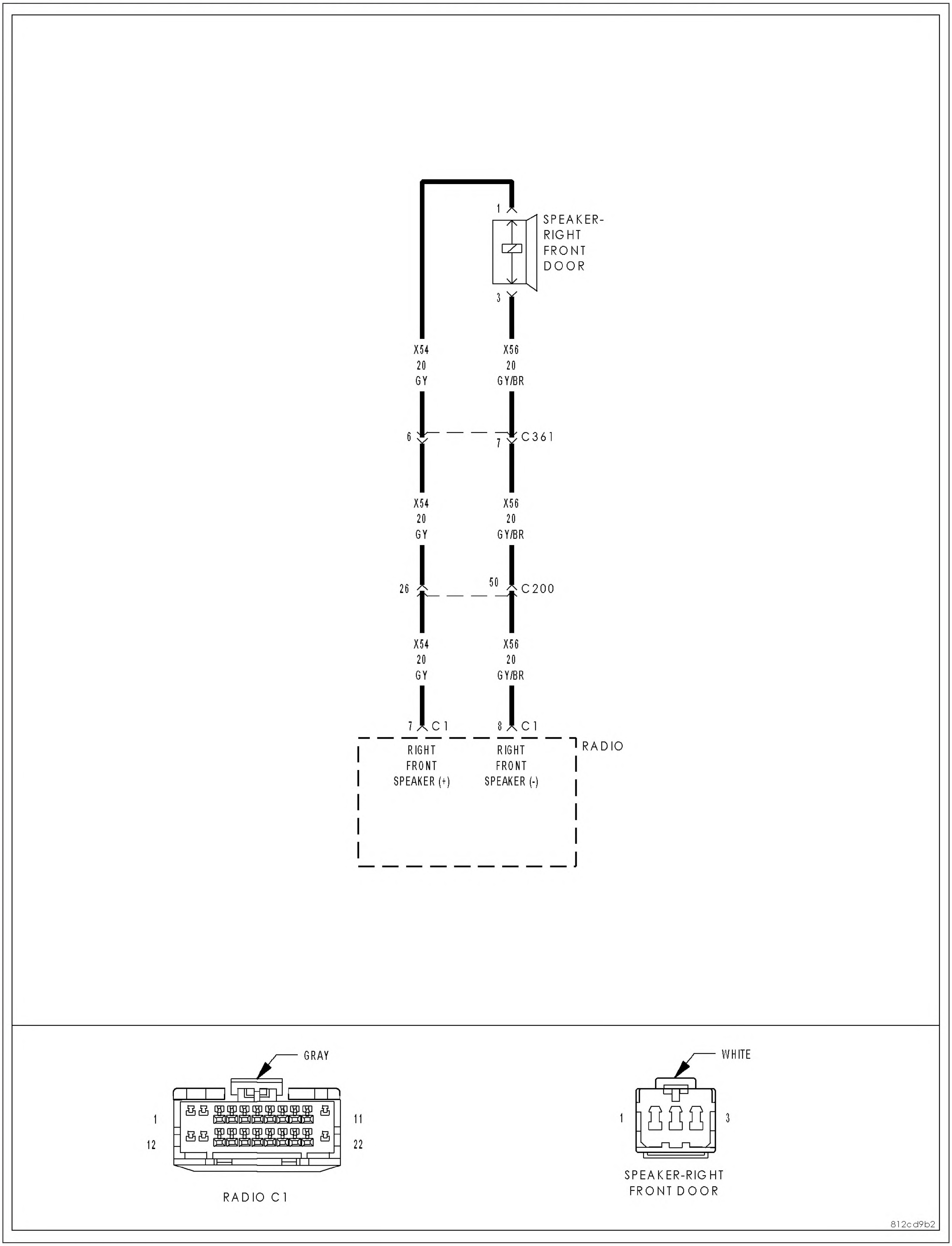

V
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
GRAY
1
11
12
22
RADIO C1
812cd9a4

Is the voltage above 10.0 volts?

Yes >> Repair the (X58) Speaker (-) circuit for a short to voltage. Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Radio in accordance with the service information. Perform BODY VERIFICATION TEST VER-1.

B1407-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN


1
SPEAKER-RIGHT FRONT DOOR
3
X54 20 GY
X56 20 GY/BR
6
7
C361
X54 20 GY
X56 20 GY/BR
26
50
C200
X54 20 GY
X56 20 GY/BR
7 C1
8 C1
RADIO
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
812cd9b2

B1407-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is open for more than 3 seconds. The Radio will not set the fault if the radio confirms an amplifier is on the BUS.

Possible Causes
SPEAKER
(X56) (X54) RIGHT FRONT SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

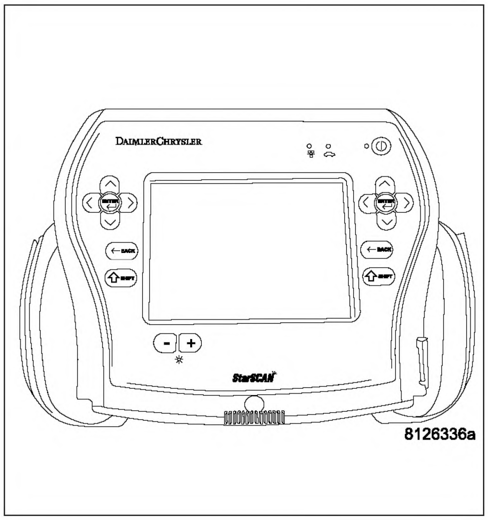
1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all Audio DTC's.

Turn the Radio on.

With the Scan Tool, read the DTC information.



Does the Scan Tool read: B1407-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST VER 1.

---

2. (X56) (X54) Speaker Output circuits.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Front Right Audio Speaker connector.

Measure the resistance of each speaker (X54)(+) and (X56)(-) circuit between the Radio and the Speaker.

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 3

No >> Repair the applicable Output Speaker circuit for an open condition.

Perform the BODY VERIFICATION TEST VER 1.

B1407-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. Speaker

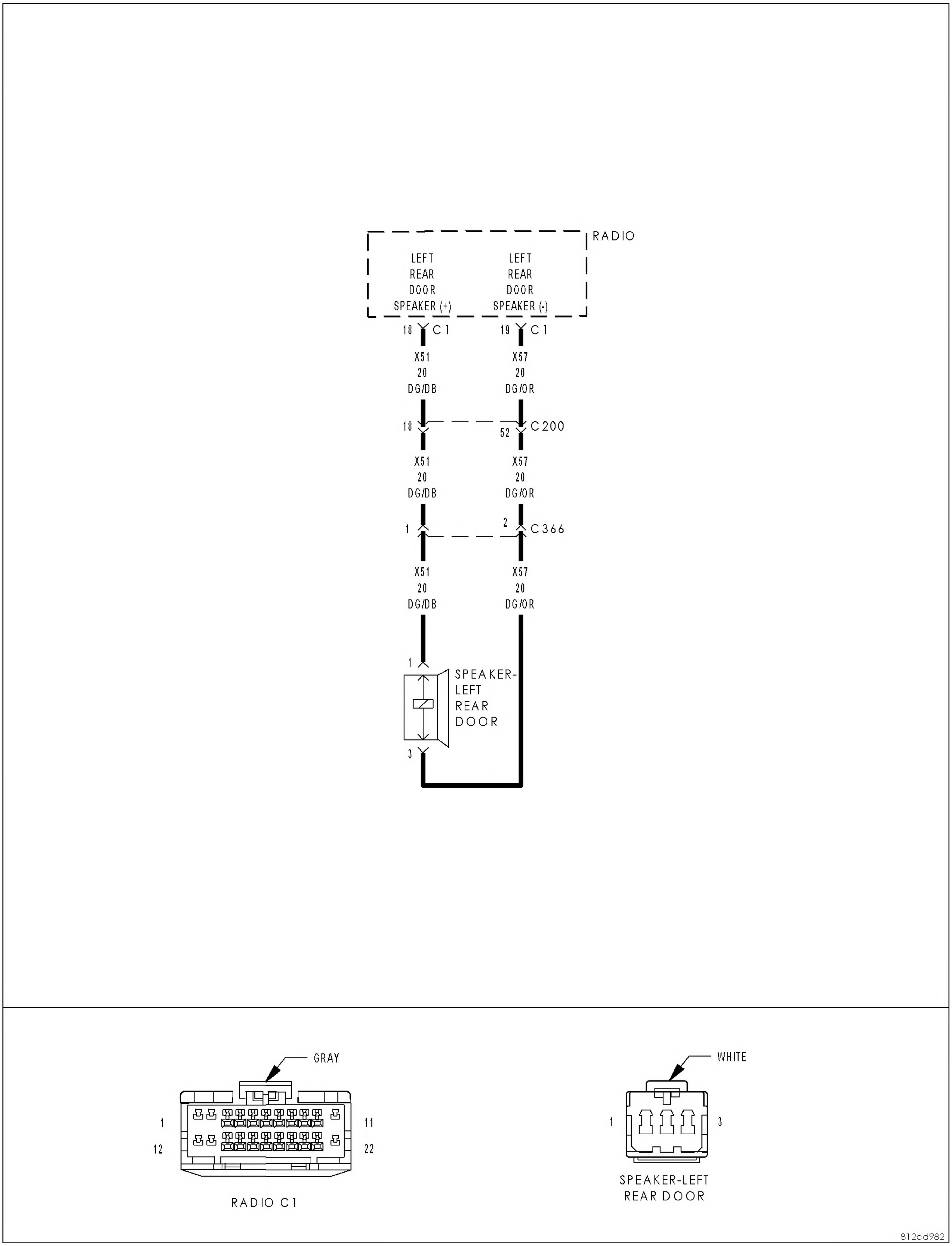
Turn the ignition off.
Disconnect the Front Right Audio Speaker.
Turn the ignition on.
Turn the Radio on.
With the Scan Tool, clear all Audio DTC's.
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B1407-FRONT RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

No >> Test Complete.

B1409-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW


RADIO
LEFT REAR DOOR SPEAKER (+)
LEFT REAR DOOR SPEAKER (-)
18 C1
19 C1
X51 20 DG/DB
X57 20 DG/OR
18
52
C200
X51 20 DG/DB
X57 20 DG/OR
1
2
C366
X51 20 DG/DB
X57 20 DG/OR
1
SPEAKER-LEFT REAR DOOR
3
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-LEFT REAR DOOR
812cd982

B1409-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is LOW for more than 3 seconds.

Possible Causes
SPEAKER
(X57) (X51) LEFT REAR SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all Audio DTC's.

Turn the Radio on.

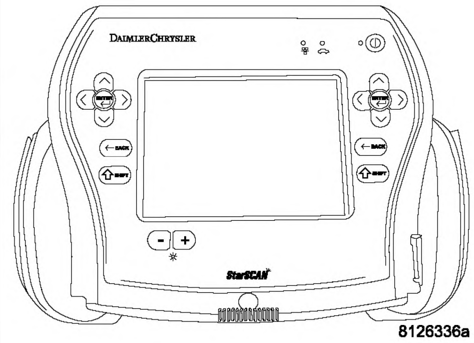
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B1409-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST VER 1.



---

2. (X51) (X57) SPEAKER OUTPUT CIRCUITS.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Rear Left Audio Speaker connector.

Measure the resistance between ground and each speaker (X51)(+) and (X57)(-) circuit.

Is the resistance below 1000.0 ohms for each circuit?

Yes >> Repair the applicable Speaker (+) or (-) Output circuit for a short to ground condition.

No >> Go To 3

B1409-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. SPEAKER

Turn the ignition off.

Disconnect the Rear Left Audio Speaker.

Turn the ignition on.

Turn the Radio on.

With the Scan Tool, clear all Audio DTC's.

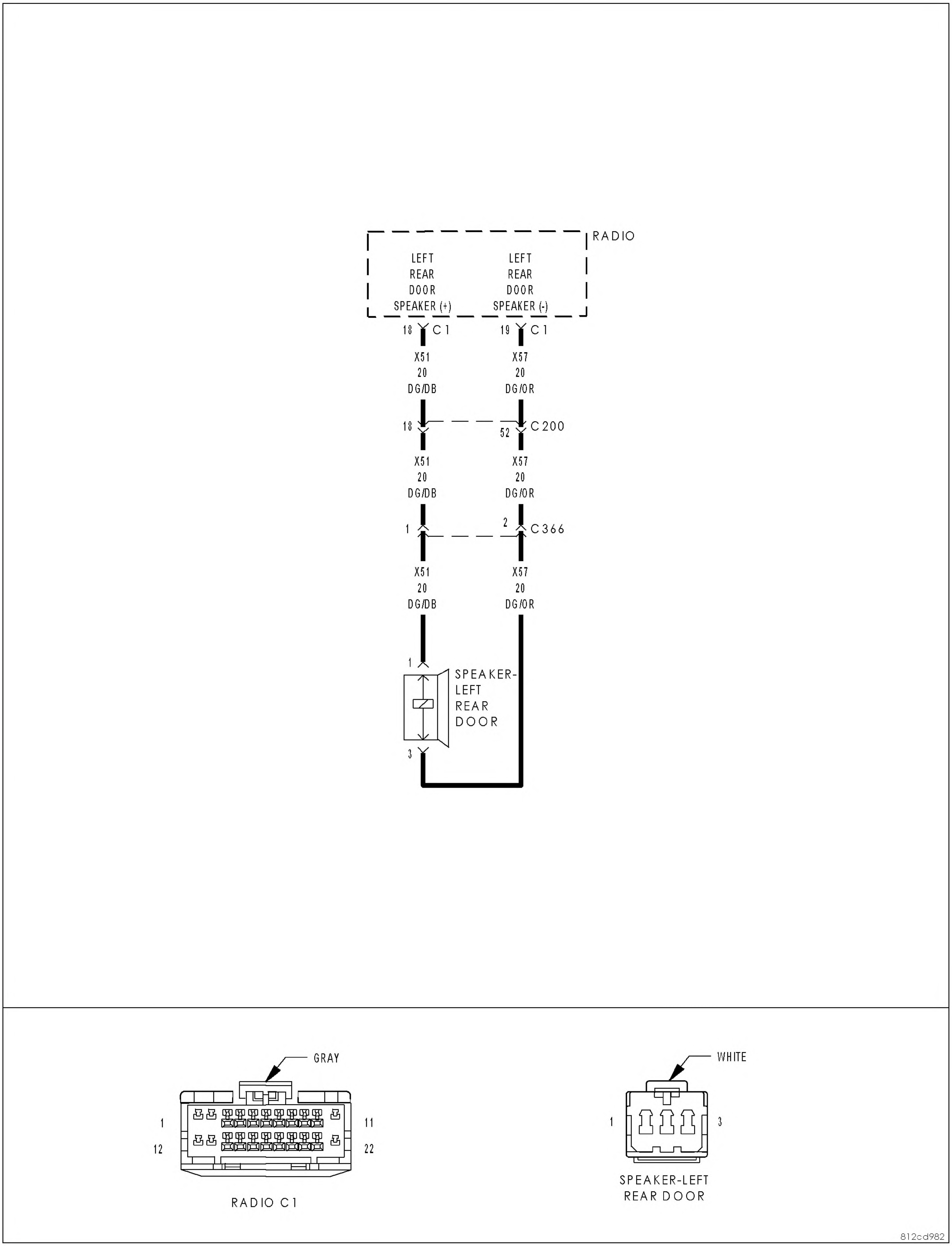
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B1409-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

No >> Test Complete.

B140A-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH


RADIO
LEFT REAR DOOR SPEAKER (+)
LEFT REAR DOOR SPEAKER (-)
18 C1
19 C1
X51 20 DG/DB
X57 20 DG/OR
18
52 C200
X51 20 DG/DB
X57 20 DG/OR
1
2 C366
X51 20 DG/DB
X57 20 DG/OR
1
SPEAKER-LEFT REAR DOOR
3
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-LEFT REAR DOOR
812cd982

B140A-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- **Set Condition:**

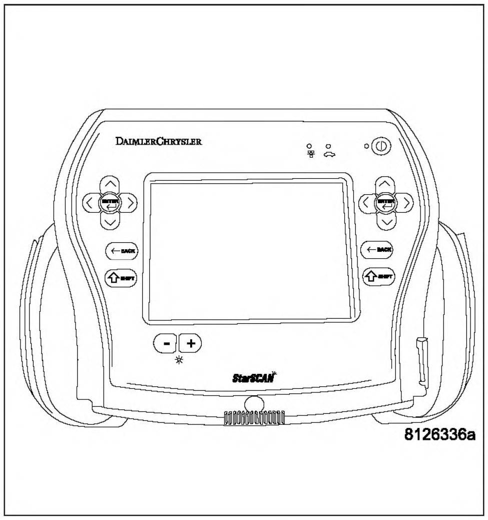
Possible Causes
SPEAKER
(X51) SPEAKER OUTPUT CIRCUIT (+)
(X57) SPEAKER OUTPUT CIRCUIT (-)

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.
With the scan tool, read Radio DTCs.



Does the scan tool display active: B140A-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

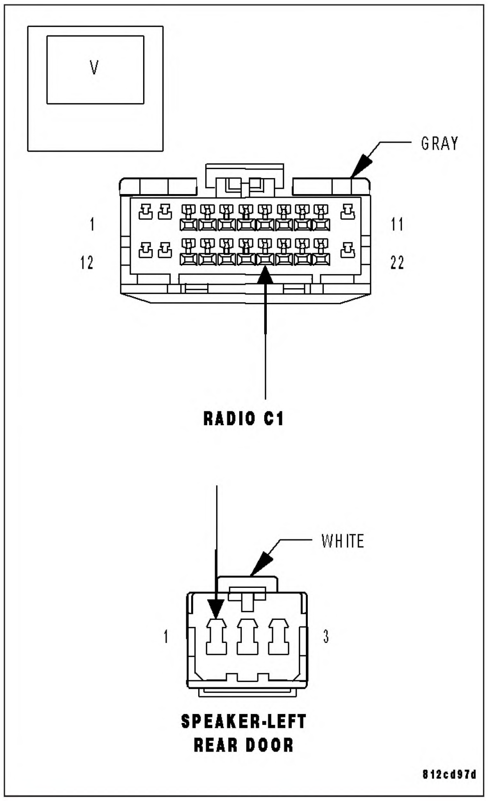
Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

B140A-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

2. CHECK FOR VOLTAGE ON THE (X51) SPEAKER (+) CIRCUIT

Turn the ignition off.
Disconnect the Radio C1 harness connector.
Disconnect the Left Rear Speaker harness connector.
Measure for voltage on the (X51) Speaker (+) circuit.


V
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-LEFT
REAR DOOR
812cd97d

Is the voltage above 10.0 volts?

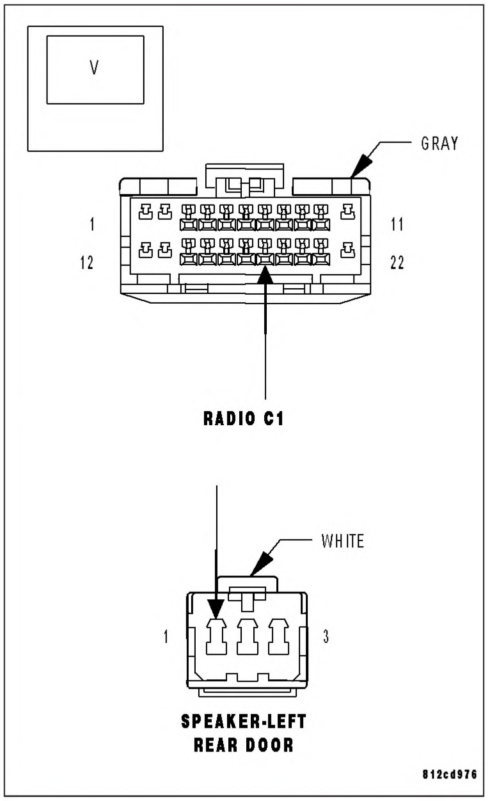
Yes >> Repair the (X51) Speaker (+) circuit for a short to voltage. Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B140A-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X57) SPEAKER (-) CIRCUIT

Measure for voltage on the (X57) Speaker (-) circuit.

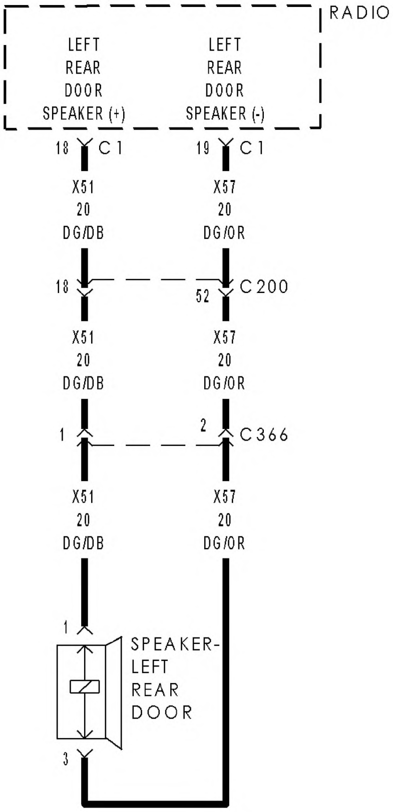

V
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-LEFT
REAR DOOR
812cd976

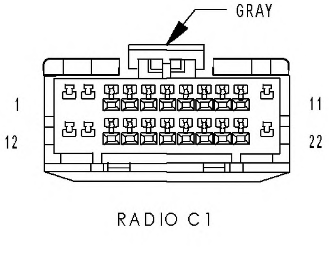
Is the voltage above 10.0 volts?

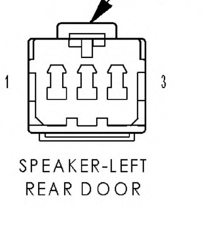
Yes >> Repair the (X57) Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Radio in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B140B-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN


RADIO
LEFT REAR DOOR SPEAKER (+)
LEFT REAR DOOR SPEAKER (-)
18 C1
19 C1
X51 20 DG/DB
X57 20 DG/OR
18
52 C200
X51 20 DG/DB
X57 20 DG/OR
1
2 C366
X51 20 DG/DB
X57 20 DG/OR
1
SPEAKER-LEFT REAR DOOR
3


GRAY
1
11
12
22
RADIO C1


WHITE
1
3
SPEAKER-LEFT REAR DOOR

812cd982

B140B-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is open for more than 3 seconds. The Radio will not set the fault if the radio confirms an amplifier is on the BUS.

Possible Causes
SPEAKER
(X57) (X51) LEFT REAR SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. Intermittent Condition

Turn the ignition on.

With the Scan Tool, clear all Audio DTC’s.

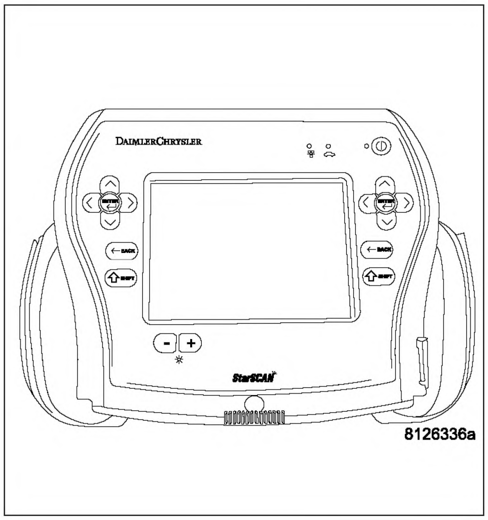
Turn the Radio on.

With the Scan Tool, read the DTC information.

Does the Scan Tool read: B140B-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.
Perform the BODY VERIFICATION TEST VER 1.



---

2. (X57) (X51) Speaker Output circuits.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Rear Left Audio Speaker connector.

Measure the resistance of each speaker (X51)(+) and (X57)(-) circuit between the Radio and the Speaker.

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 3

No >> Repair the applicable Output Speaker circuit for an open condition.
Perform the BODY VERIFICATION TEST VER 1.

B140B-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. Speaker

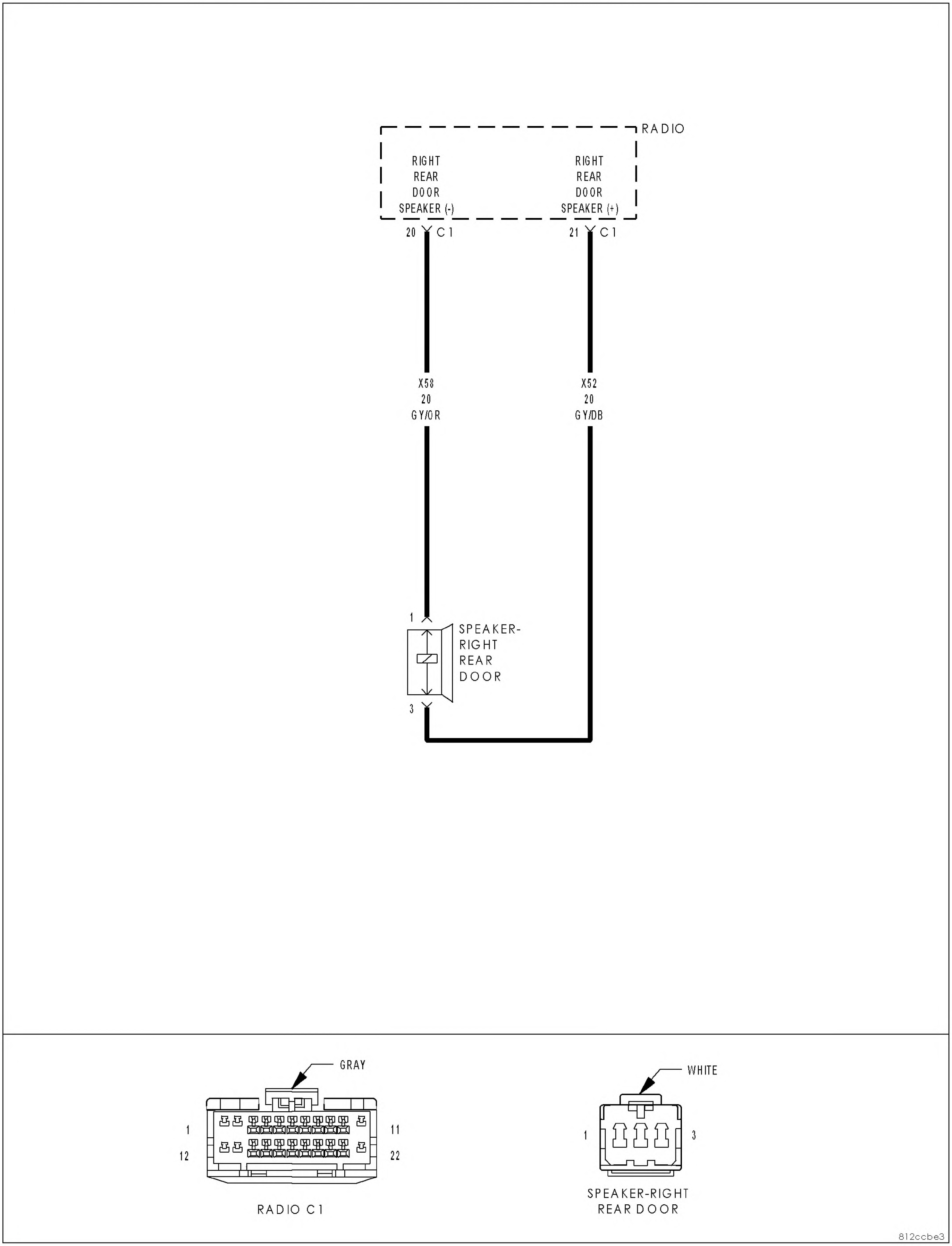
Turn the ignition off.
Disconnect the Rear Left Audio Speaker.
Turn the ignition on.
Turn the Radio on.
With the Scan Tool, clear all Audio DTC's.
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B140B-REAR LEFT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

No >> Test Complete.

B140D-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW


RADIO
RIGHT REAR DOOR SPEAKER (-)
RIGHT REAR DOOR SPEAKER (+)
20 C1
21 C1
X58 20 GY/OR
X52 20 GY/DB
1
3
SPEAKER-RIGHT REAR DOOR
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812ccbe3

B140D-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is LOW for more than 3 seconds.

Possible Causes
SPEAKER
(X58) (X52) RIGHT REAR SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. Intermittent Condition

Turn the ignition on.

With the Scan Tool, clear all Audio DTC's.

Turn the Radio on.

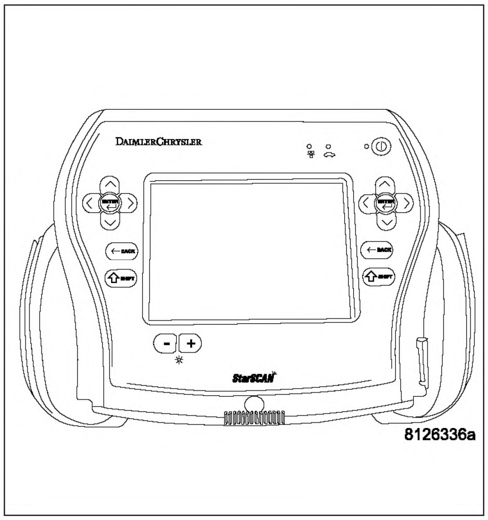
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B140D-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST VER 1.



---

2. (X58) (X52) Speaker Output circuits.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Rear Right Audio Speaker connector.

Measure the resistance between ground and each speaker (X58)(+) and (X52)(-) circuit.

Is the resistance below 1000.0 ohms for each circuit?

Yes >> Repair the applicable Speaker (+) or (-) Output circuit for a short to ground condition.

No >> Go To 3

B140D-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. Speaker

Turn the ignition off.

Disconnect the Rear Right Audio Speaker.

Turn the ignition on.

Turn the Radio on.

With the Scan Tool, clear all Audio DTC's.

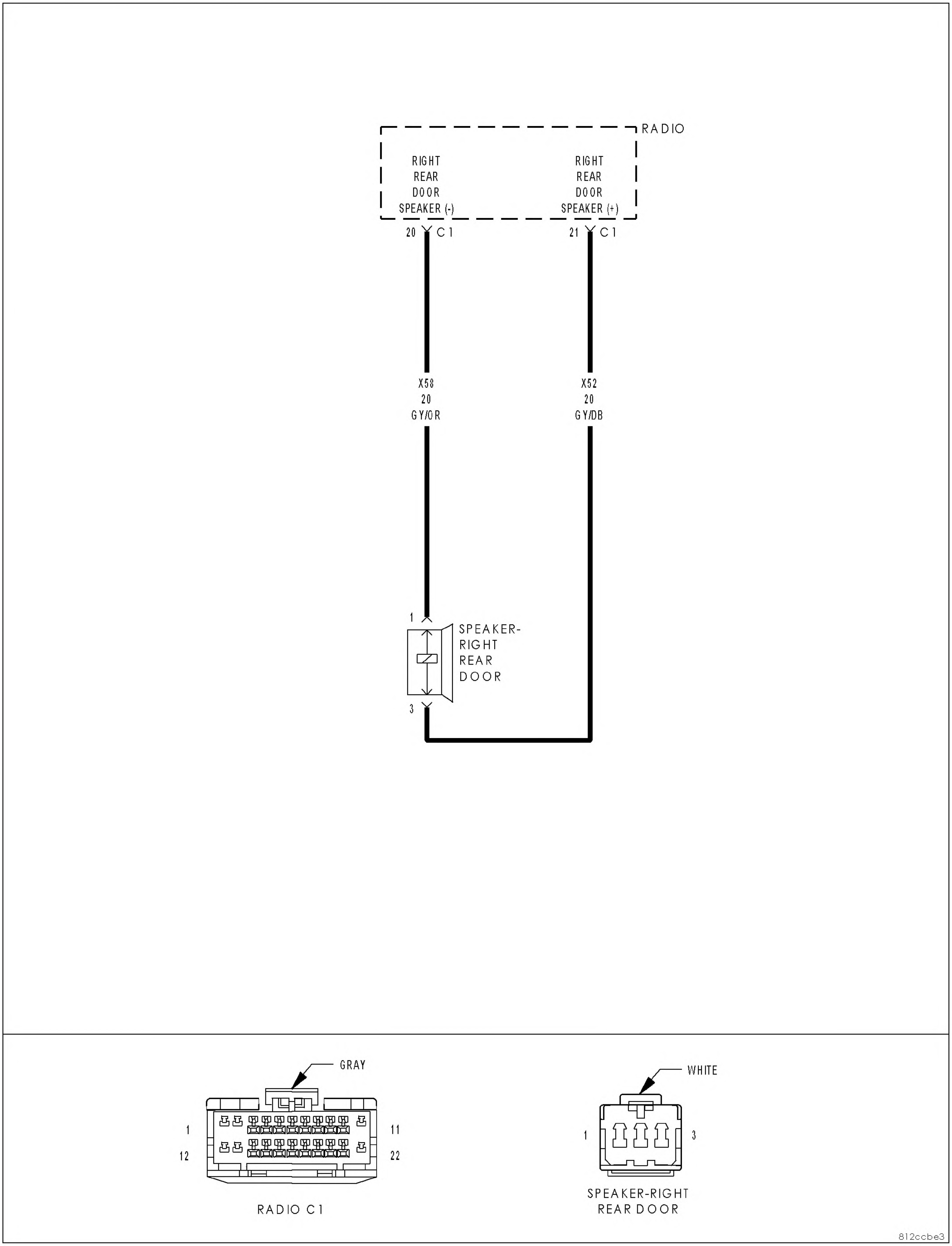
With the Scan Tool, read the DTC information.

Does the Scan Tool read: B140D-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

No >> Test Complete.

B140E-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH


RADIO
RIGHT REAR DOOR SPEAKER (-)
RIGHT REAR DOOR SPEAKER (+)
20 C1
21 C1
X58 20 GY/OR
X52 20 GY/DB
1
3
SPEAKER-RIGHT REAR DOOR
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812ccbe3

B140E-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- **Set Condition:**

Possible Causes
SPEAKER
(X52) SPEAKER OUTPUT CIRCUIT (+)
(X58) SPEAKER OUTPUT CIRCUIT (-)

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. INTERMITTENT CONDITION

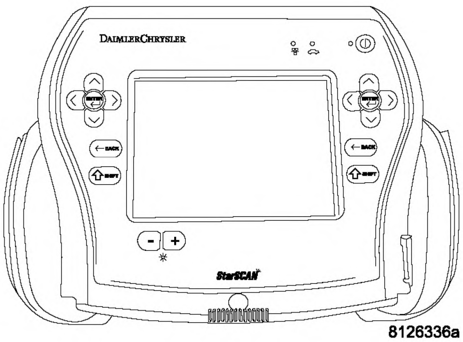
Turn the ignition on, then off, and then on again.
With the scan tool, read Radio DTCs.

Does the scan tool display active: B140E-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST VER-1.



8126336a

B140E-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

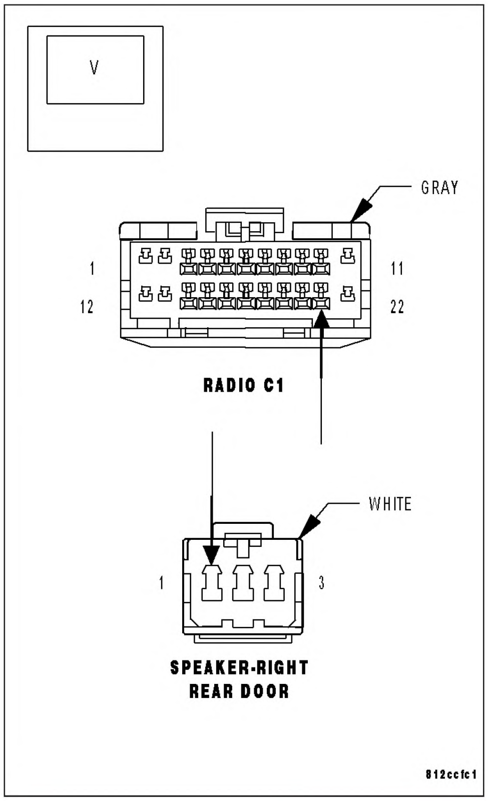
2. CHECK FOR VOLTAGE ON THE (X52) SPEAKER (+) CIRCUIT

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Right Rear Speaker harness connector.

Measure for voltage on the (X52) Speaker (+) circuit.


V
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812ccfc1

Is the voltage above 10.0 volts?

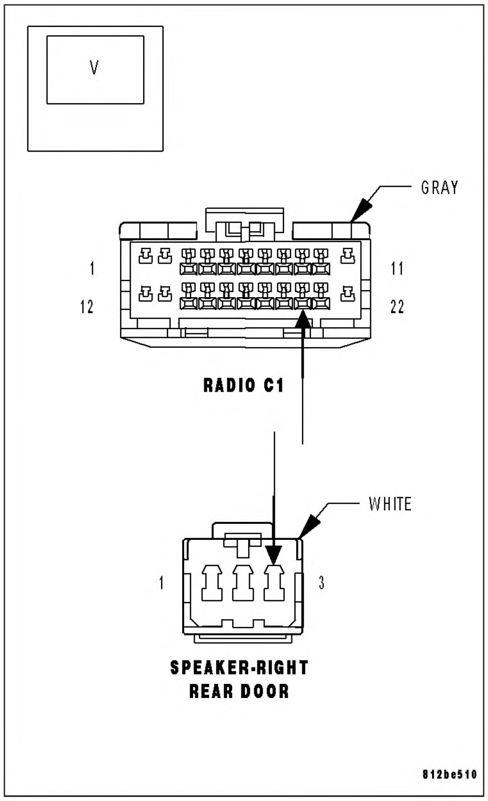
Yes >> Repair the (X52) Speaker (+) circuit for a short to voltage. Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B140E-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X58) SPEAKER (-) CIRCUIT

Measure for voltage on the (X58) Speaker (-) circuit.

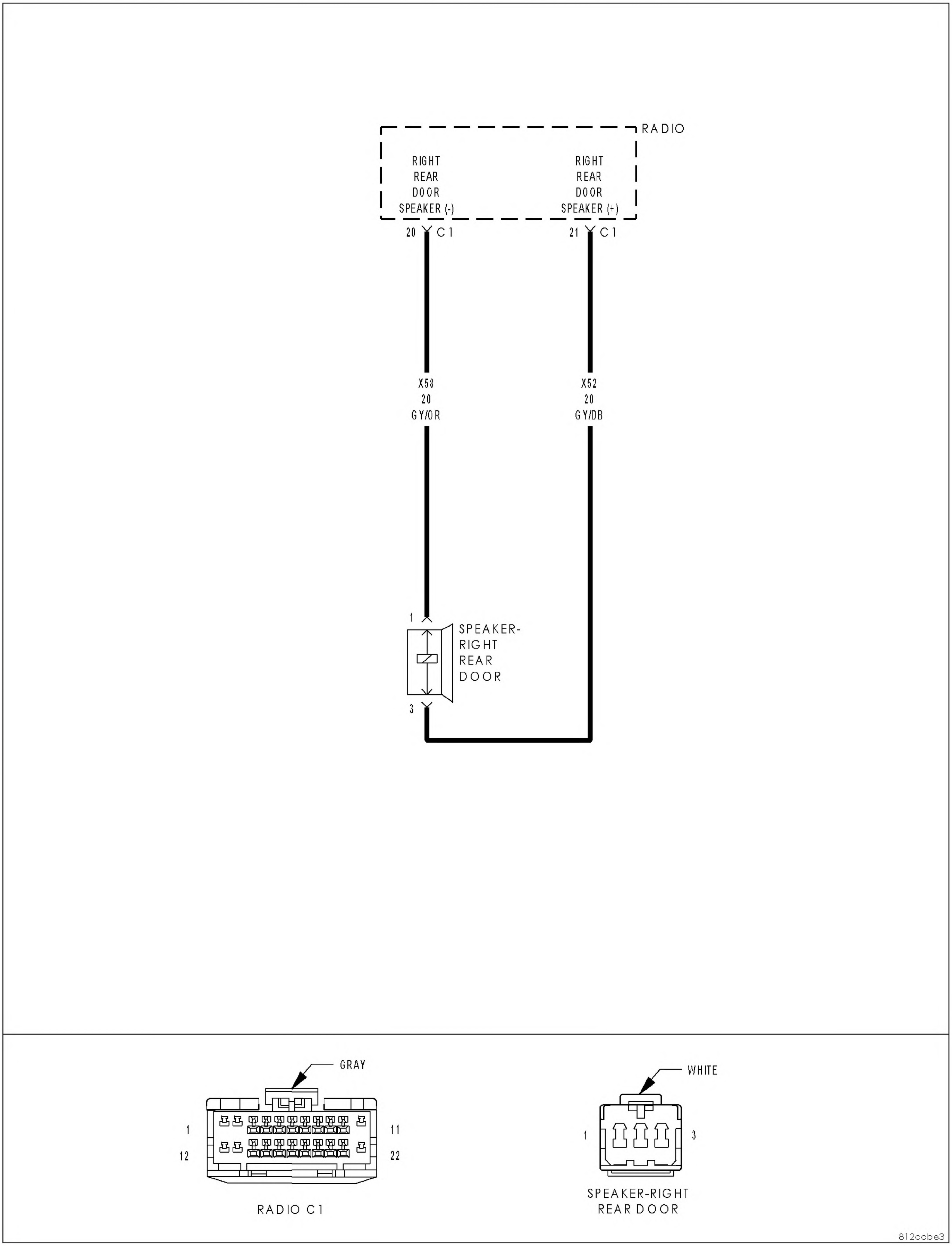

V
GRAY
1
11
12
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT
REAR DOOR
812be510

Is the voltage above 10.0 volts?

Yes >> Repair the (X58) Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Radio in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B140F-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN


RADIO
RIGHT REAR DOOR SPEAKER (-)
RIGHT REAR DOOR SPEAKER (+)
20 C1
21 C1
X58
20
GY/OR
X52
20
GY/DB
1
3
SPEAKER-RIGHT REAR DOOR
GRAY
1
12
11
22
RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812ccbe3

B140F-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Audio system circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Radio on.
- **Set Condition:**
- When the Output circuit is open for more than 3 seconds. The Radio will not set the fault if the radio confirms an amplifier is on the BUS.

Possible Causes
SPEAKER
(X58) (X52) RIGHT REAR SPEAKER OUTPUT CIRCUIT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. Intermittent Condition

Turn the ignition on.

With the Scan Tool, clear all Audio DTC's.

Turn the Radio on.

With the Scan Tool, read the DTC information.

DAIMLERCHRYSLER
StarSCAN
8126336a

Does the Scan Tool read: B140F-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST VER 1.

---

2. (X58) (X52) Speaker Output circuits.

Turn the ignition off.

Disconnect the Radio C1 harness connector.

Disconnect the Rear Right Audio Speaker connector.

Measure the resistance of each speaker (X58)(+) and (X52)(-) circuit between the Radio and the Speaker.

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 3

No >> Repair the applicable Output Speaker circuit for an open condition.

Perform the BODY VERIFICATION TEST VER 1.

B140F-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. Speaker

Turn the ignition off.

Disconnect the Rear Right Audio Speaker.

Turn the ignition on.

Turn the Radio on.

With the Scan Tool, clear all Audio DTC's.

With the Scan Tool, read the DTC information.

Does the Scan Tool read: B140F-REAR RIGHT AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Replace the Speaker in accordance with the service information.
Perform the BODY VERIFICATION TEST VER 1.

No >> Test Complete.

B142A-RADIO UNIT HIGH TEMPERATURE

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- When Monitored:
- Continuously with the ignition and Radio on.
- Set Condition:
- The code will set if the temperature inside the radio is above +65°C (+145°F)

Possible Causes
HIGH TEMPERATURE FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. VERIFY THAT DTC B142A—RADIO UNIT HIGH TEMPERATURE IS ACTIVE.

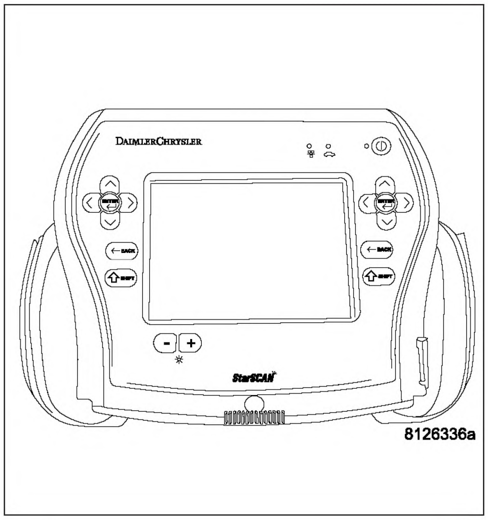
With the Scan Tool, erase the Audio DTC’s.

Start the engine and allow the engine to reach normal operating temperature.

If the vehicle has been in the hot sunlight or extreme cold, move the vehicle indoors and open the doors to allow the inside temperature to stabilize.

The Radio should operate between —23°C and 65°C (—10°F and +145°F).

With the Scan Tool, read the DTC’s.



Does the Scan Tool display, B142A— Radio Unit High Temperature?

Yes >> Replace the Radio in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1.

No >> Test Complete.

B142D-AUDIO ANTENNA NOT CONNECTED

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on and the radio in seek mode.
- **Set Condition:**
- With the radio in seek mode for two loops around the band. The radio does not detect an antenna connection or does not receive a radio station signal.

Possible Causes
BAD ANTENNA CONNECTION
RADIO

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

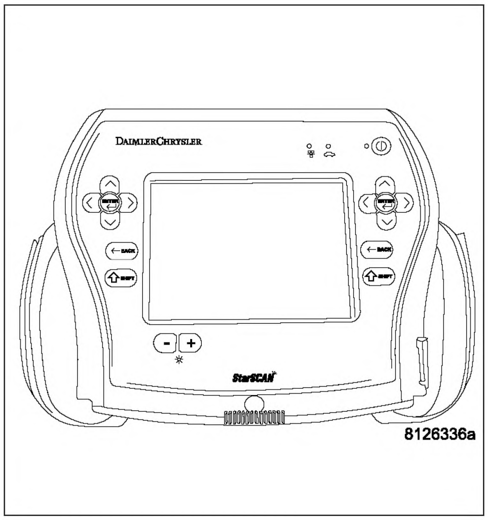
Diagnostic Test

1. Test Antenna

Turn the ignition off.

Disconnect the Radio Antenna connector.

Inspect the Radio Antenna connection.



Was the Antenna connection clean and secure?

Yes >> Go To 2

No >> Repair the Antenna connection as needed.
Perform the BODY VERIFICATION TEST — VER1.

---

2. ANTENNA

Refer to the Audio System in the service information and test the antenna in accordance with the service procedure.

Is the Antenna ok?

Yes >> Go To 3

No >> Repair or replace the Antenna assembly as necessary.
Perform the BODY VERIFICATION TEST — VER1.

B142D-AUDIO ANTENNA NOT CONNECTED (CONTINUED)

3. RADIO

NOTE: Reconnect all previously disconnected components.

NOTE: Move vehicle outside approximately 30ft from any structure.

Turn the ignition and radio on.

With the Scan Tool, erase the audio DTC's, put the radio in seek up and down mode for 2 loops around the band cycle before proceeding.

With the Scan Tool, read the audio DTC's.

Did this DTC reset?

Yes >> Replace the radio in accordance with the service information.
Perform the BODY VERIFICATION TEST-VER1.

No >> Test Complete.

B142F-SATELLITE RADIO ANTENNA NOT CONNECTED

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on and the Satellite Radio in seek mode.
- **Set Condition:**
- With the radio in seek mode for two loops around the band. The radio does not detect an antenna connection or does not receive a radio satellite signal.

Possible Causes
BAD ANTENNA CONNECTION
SATELLITE RADIO RECEIVER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

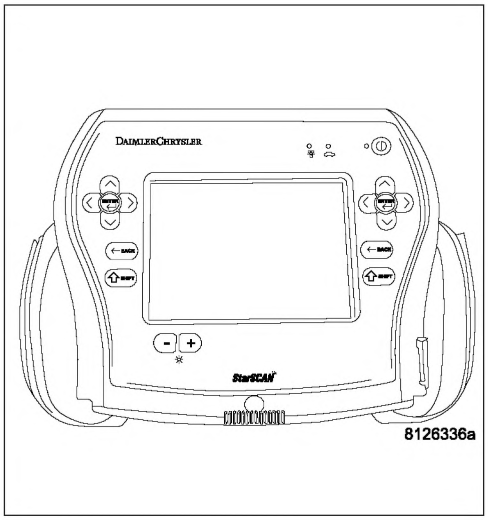
Diagnostic Test

1. Test Antenna

Turn the ignition off.

Disconnect the Satellite Radio Antenna connector.

Inspect the Satellite Radio Antenna connection.



Was the Antenna connection clean and secure?

Yes >> Go To 2

No >> Repair the Antenna connection as needed.
Perform the BODY VERIFICATION TEST — VER1.

---

2. SATELLITE RADIO ANTENNA

Refer to the Audio System in the service information and test the antenna in accordance with the service procedure.

Is the Antenna ok?

Yes >> Go To 3

No >> Repair or replace the Antenna assembly as necessary.
Perform the BODY VERIFICATION TEST — VER1.

B142F-SATELLITE RADIO ANTENNA NOT CONNECTED (CONTINUED)

3. SATELLITE RADIO RECEIVER

NOTE: Reconnect all previously disconnected components.

NOTE: Move vehicle outside approximately 30ft from any structure.

Turn the ignition and radio on.

With the Scan Tool, erase the audio DTC's, put the satellite radio in seek up and down mode for 2 loops around the band cycle before proceeding.

With the Scan Tool, read the audio DTC's.

Did this DTC reset?

Yes >> Replace the Satellite Radio Receiver in accordance with the service information.
Perform the BODY VERIFICATION TEST-VER1.

No >> Test Complete.

B221E-RADIO INTERNAL

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- When Monitored:
- Continuously with the ignition on and radio turned on.
- Set Condition:
- The code will set if the radio detects a radio internal failure.

Possible Causes
RADIO INTERNAL FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

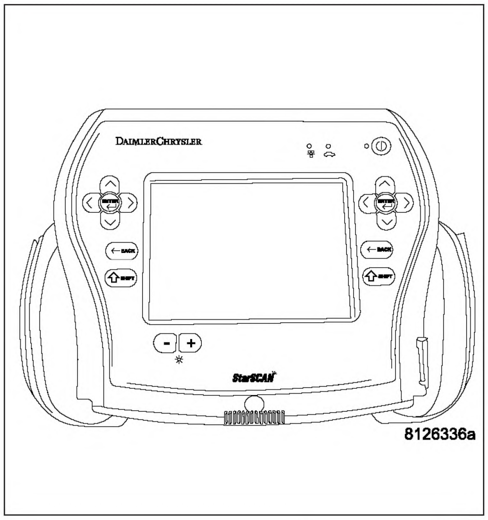
Diagnostic Test

1. Verify DTC B221E-RADIO INTERNAL IS ACTIVE

NOTE: If a DTC is set, erase the DTC and attempt to reset the DTC. If the DTC resets, follow test.

This is an internal radio failure

View repair



Does the DTC reset and read B221E-Radio Internal?

Repair

Replace the Radio in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1.

B2222-SATELLITE RADIO RECEIVER INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Satellite Radio Receiver detects a software checksum test failure.

Possible Causes
SATELLITE RADIO RECEIVER

Diagnostic Test

1. REPLACE THE SATELLITE RADIO RECEIVER

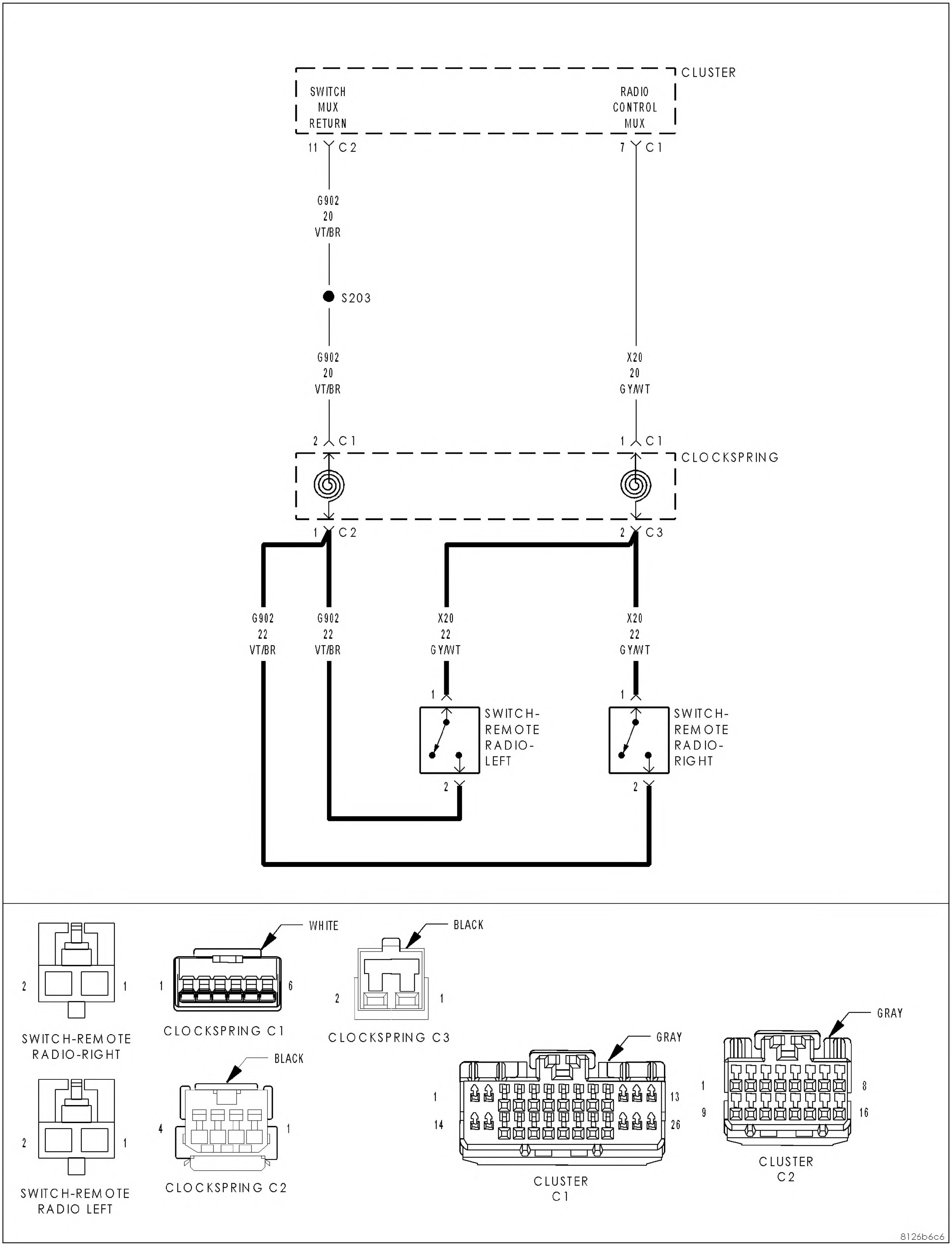
When this code is set, the Satellite Radio must be replaced.

Repair

Replace the Satellite Radio Receiver in accordance with the Service Information.

Perform the BODY VERIFICATION TEST-VER 1.

B1428-REMOTE RADIO SWITCH INPUT CIRCUIT STUCK


CLUSTER
SWITCH MUX RETURN
RADIO CONTROL MUX
11 C2
7 C1
G902 20 VT/BR
S203
G902 20 VT/BR
X20 20 GY/WT
2 C1
1 C1
CLOCKSPRING
1 C2
2 C3
G902 22 VT/BR
G902 22 VT/BR
X20 22 GY/WT
X20 22 GY/WT
1
SWITCH-REMOTE RADIO-LEFT
2
1
SWITCH-REMOTE RADIO-RIGHT
2
WHITE
BLACK
2 1
SWITCH-REMOTE RADIO-RIGHT
1 6
CLOCKSPRING C1
2 1
CLOCKSPRING C3
GRAY
GRAY
BLACK
2 1
SWITCH-REMOTE RADIO LEFT
4 1
CLOCKSPRING C2
1 13 14 26
CLUSTER C1
1 8 9 16
CLUSTER C2
8126b6c6

B1428-REMOTE RADIO SWITCH INPUT CIRCUIT STUCK (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition in any position except off.
- **Set Condition:**
  The Instrument Cluster detects a stuck switch state on the (X20) Radio Control MUX circuit for more than 30 seconds.

Possible Causes
(X20) REMOTE CONTROL MUX CIRCUIT SHORT TO GROUND
(X20) REMOTE CONTROL MUX CIRCUIT SHORT TO (G902) SWITCH MUX RETURN CIRCUIT
LEFT REMOTE RADIO SWITCH
RIGHT REMOTE RADIO SWITCH
CLOCKSPRING
INSTRUMENT CLUSTER (CCN)

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. LEFT REMOTE RADIO SWITCH

Turn the ignition off.

Disconnect the Left Remote Radio Switch harness connector.

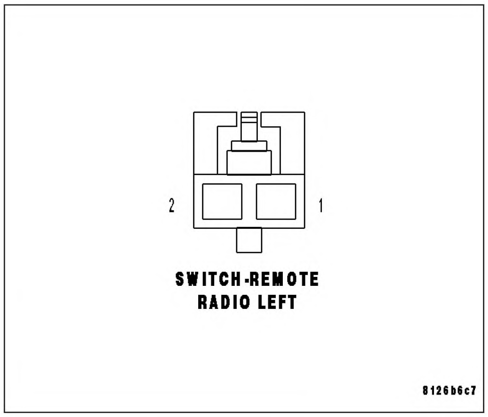
Turn the ignition on.

With the scan tool monitor the Remote Radio Control Switch voltage.

Is the voltage approximately 5.0 volts?

Yes >> Replace the Left Remote Radio Switch in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 3



B1428-REMOTE RADIO SWITCH INPUT CIRCUIT STUCK (CONTINUED)

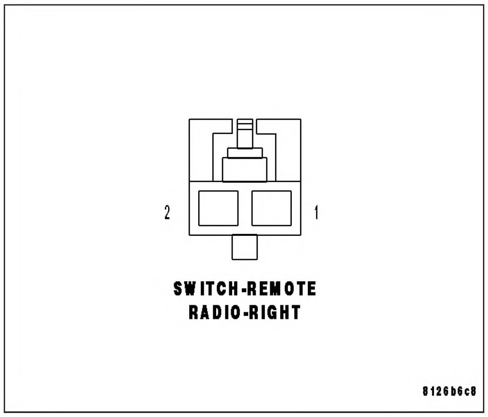
3. RIGHT REMOTE RADIO SWITCH

Turn the ignition off.

Disconnect the Right Remote Radio Switch harness connector.

Turn the ignition on.

With the scan tool monitor the Remote Radio Control Switch voltage.



Is the voltage approximately 5.0 volts?

Yes >> Replace the Right Remote Radio Switch in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 4

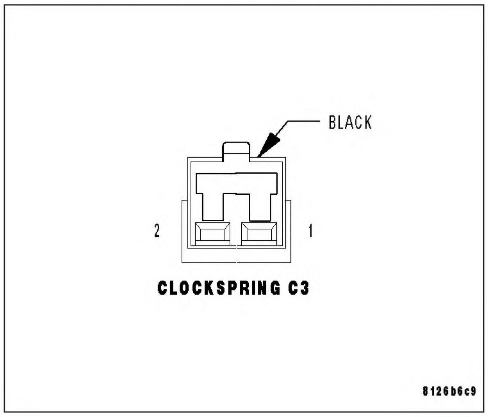
4. CLOCKSPRING

Turn the ignition off.

Disconnect the Clockspring C1 harness connector.

Turn the ignition on.

With the scan tool monitor the Remote Radio Control Switch voltage.



Is the voltage approximately 5.0 volts?

Yes >> Check the (X20) Radio Control MUX circuit for a short between the clockspring and the remote radio switches. If ok, replace the Clockspring in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 5

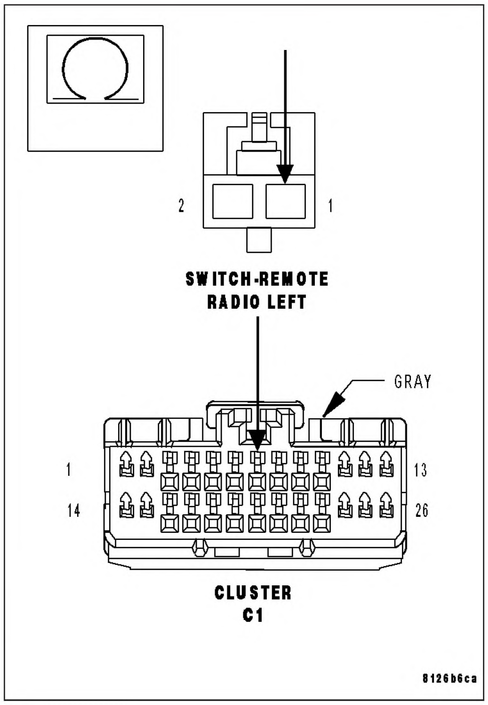
B1428-REMOTE RADIO SWITCH INPUT CIRCUIT STUCK (CONTINUED)

5. (X20) RADIO CONTROL MUX CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C1 harness connector.

Measure the resistance between ground and the (X20) Radio Control MUX circuit.



2
1
SWITCH-REMOTE RADIO LEFT
GRAY
1
13
14
26
CLUSTER C1
8126b6ca

Is the resistance below 100.0 ohms?

Yes >> Repair the (X20) Radio Control MUX circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1.

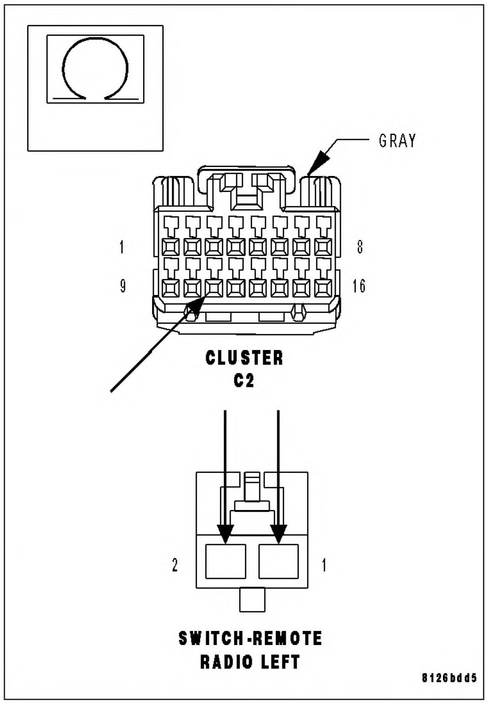
No >> Go To 6

---

6. (X20) RADIO CONTROL MUX CIRCUIT SHORT TO (G902) SWITCH MUX RETURN CIRCUIT

Disconnect the Instrument Cluster C2 harness connector.

Measure the resistance between the (X20) Radio Control MUX circuit and the (G902) Switch MUX Return circuit.



GRAY
1
8
9
16
CLUSTER C2
2
1
SWITCH-REMOTE RADIO LEFT
8126bdd5

Is the resistance below 100.0 ohms?

Yes >> Repair the (X20) Radio Control MUX circuit for a short to the (G902) Switch MUX Return circuit.
Perform BODY VERIFICATION TEST – VER 1.

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Instrument Cluster (CCN) in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

B1429-RADIO DISPLAY HIGH TEMPERATURE

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- When Monitored:
- Continuously with the ignition and Navigation Radio on.
- Set Condition:
- The code will set if the temperature inside the display exceeds 158°F

Possible Causes
HIGH TEMPERATURE FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. VERIFY THAT DTC B1429—RADIO DISPLAY HIGH TEMPERATURE IS ACTIVE.

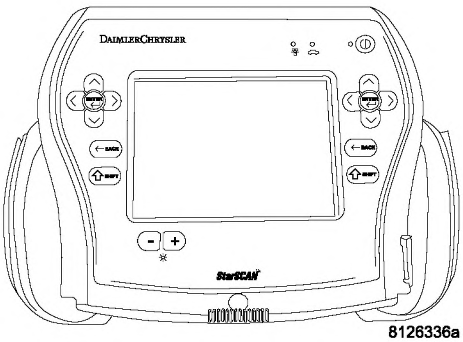
With the Scan Tool, erase the Audio DTC's.

Start the engine and allow the engine to reach normal operating temperature.

If the vehicle has been in the hot sunlight or extreme cold, move the vehicle indoors and open the doors to allow the inside temperature to stabilize.

The radio display should operate to 158°F.

With the Scan Tool, read the DTC's.



Does the Scan Tool display, B1429— Radio Display High Temperature?

Yes >> Replace the Radio in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1.

No >> Test Complete.

B142E-GPS ANTENNA NOT CONNECTED

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on and the radio in navigation mode.
- **Set Condition:**
- With the radio does not detect GPS antenna connection.

Possible Causes
BAD ANTENNA CONNECTION
RADIO

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

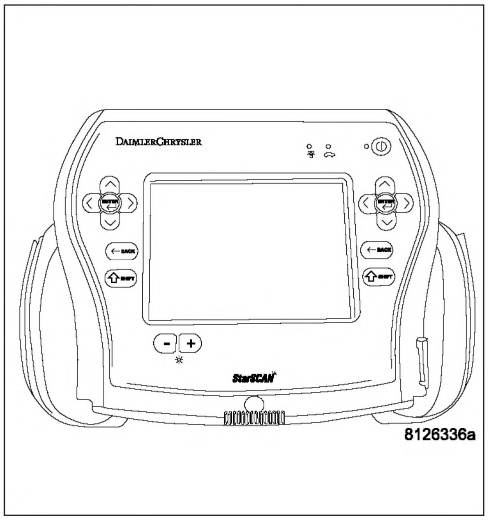
Diagnostic Test

1. TEST ANTENNA

Turn the ignition off.

Disconnect the GPS Antenna connector.

Inspect the GPS Antenna connection.



Was the Antenna connection clean and secure?

Yes >> Go To 2

No >> Repair the Antenna connection as needed.
Perform the BODY VERIFICATION TEST — VER1.

---

2. ANTENNA

Refer to the Audio System in the service information and test the antenna in accordance with the service procedure.

Is the Antenna ok?

Yes >> Go To 3

No >> Repair or replace the Antenna assembly as necessary.
Perform the BODY VERIFICATION TEST — VER1.

B142E-GPS ANTENNA NOT CONNECTED (CONTINUED)

3. RADIO

NOTE: Reconnect all previously disconnected components.

NOTE: Move vehicle outside approximately 30ft from any structure.

Turn the ignition and radio on.

With the Scan Tool, erase the audio DTC's and operate the navigation system.

With the Scan Tool, read the audio DTC's.

Did this DTC reset?

Yes >> Replace the radio in accordance with the service information.
Perform the BODY VERIFICATION TEST-VER1.

No >> Test Complete.

B1421-AUDIO CD READ ERROR/INOPERABLE DISC

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- Continuously with the ignition on and the radio CD player turned on.
- **Set Condition:**
- The code will set if a CD that is not formatted as a music CD is installed in the radio CD player.

Possible Causes
CD READ FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. RADIO

Replace the problem CD with a good, clean,unscratched, music CD.

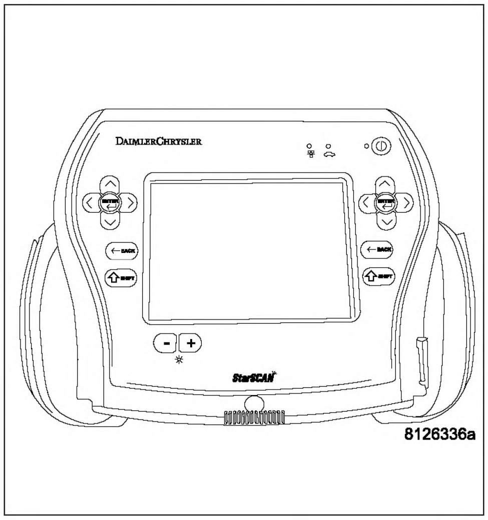
Turn the radio CD player on.

With the Scan Tool, read DTC's.

Does the Scan Tool display: B1421 Audio CD Read Error/Inoperable Disc?

Yes >> Eject the inoperative CD and replace the CD in accordance with the service information.
Perform the BODY VERIFICATION TEST — VER 1.

No >> Test Complete.



B1422-AUDIO DVD READ ERROR/INOPERABLE DISC

For the Audio System circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- Continuously with the ignition on and the DVD player turned on.
- **Set Condition:**
- The code will set if a DVD that is not formatted as a DVD is installed in the DVD player.

Possible Causes
DVD READ FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

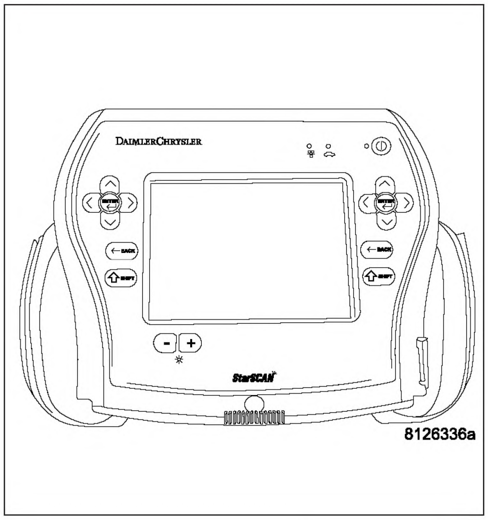
Diagnostic Test

1. DVD PLAYER

Replace the problem DVD with a good, clean,unscratched DVD.

Turn the DVD player on.

With the Scan Tool, read DTC's.



Does the Scan Tool display: B1422 Audio DVD Read Error/Inoperable Disc?

Yes >> Eject the inoperative DVD and replace the DVD in accordance with the service information.
Perform the BODY VERIFICATION TEST — VER 1.

No >> Test Complete.

B221F-AMPLIFIER INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a software checksum test failure.

Possible Causes
AMPLIFIER

Diagnostic Test

1. REPLACE THE AMPLIFIER

When this code is set, the Amplifier must be replaced.

Repair

Replace the Amplifier in accordance with the Service Information.
Perform the BODY VERIFICATION TEST-VER 1.

B210D-BATTERY VOLTAGE LOW

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the module detects that the battery voltage is less than 9.0 volts for 1 second.

Possible Causes
VEHICLE CHARGING SYSTEM
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

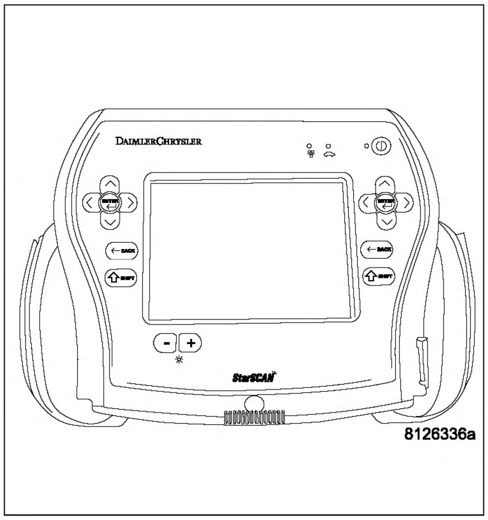
Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B210D-BATTERY VOLTAGE LOW?

Yes >> Go To

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



2. CHECK THE BATTERY VOLTAGE TO THE AMPLIFIER

With the scan tool in Data Display, read Amplifier battery voltage.

Is the battery voltage less than 9.0 volts?

Yes >> Go To 3

No >> Replace the Amplifier in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1.

3. CHECK FOR CHARGING SYSTEM RELATED DTCs IN THE POWERTRAIN CONTROL MODULE (PCM)

With the scan tool in ECU View, select PCM and check for any Charging System related DTCs.

Does the scan tool display any Charging System related DTCs?

Yes >> Diagnose and repair the DTCs. Refer to (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

No >> Replace the Amplifier in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1.

B210E-BATTERY VOLTAGE HIGH

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the module detects that the battery voltage is greater 16.5 volts for 1 second.

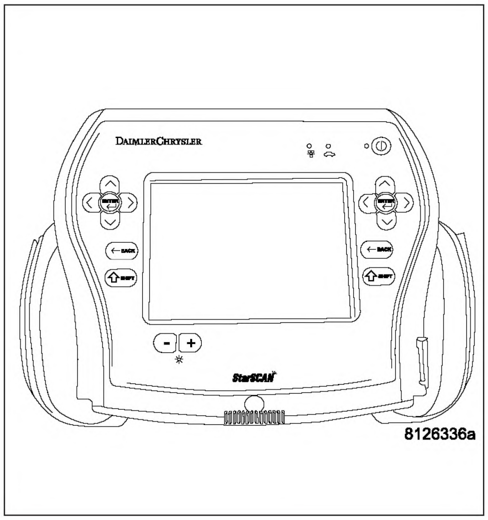
Possible Causes
VEHICLE CHARGING SYSTEM
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B210E-BATTERY VOLTAGE HIGH?

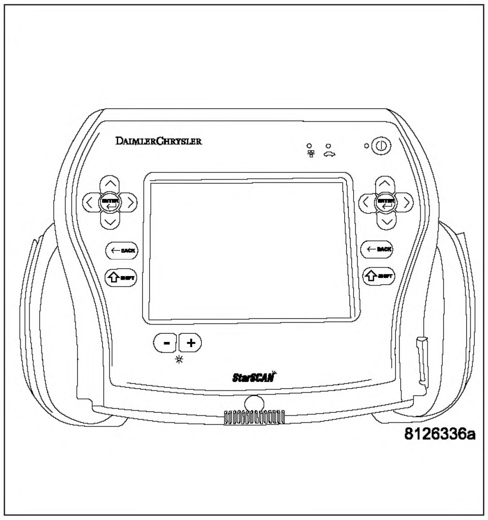
Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK THE BATTERY VOLTAGE TO THE AMPLIFIER

With the scan tool in Data Display, read Amplifier battery voltage.



Is the battery voltage greater than 16.5 volts?

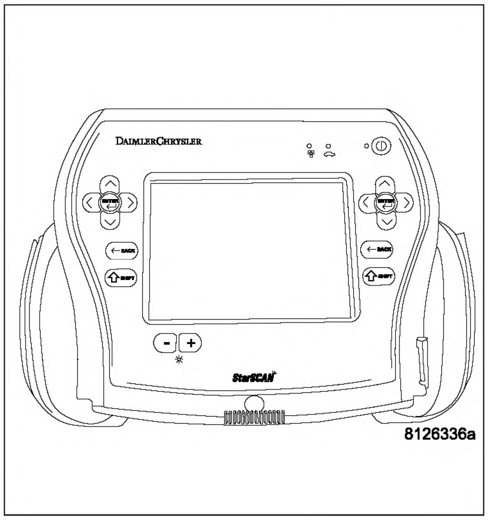
Yes >> Go To 3

No >> Replace the Amplifier in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1.

B210E-BATTERY VOLTAGE HIGH (CONTINUED)

3. CHECK FOR CHARGING SYSTEM RELATED DTCs IN THE POWERTRAIN CONTROL MODULE (PCM)

With the scan tool in ECU View, select PCM and check for any Charging System related DTCs.



Does the scan tool display any Charging System related DTCs?

Yes >> Diagnose and repair the DTCs. Refer to (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

No >> Replace the Amplifier in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1.

B1488–CABIN EQ MISMATCH PERFORMANCE

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the cabin EQ message is incompatible with the EQ's stored in the amplifier for 10 consecutive cycles, then the amplifier will set this DTC.

POSSIBLE CAUSES
NO COMMUNICATION WITH FRONT CONTROL MODULE
ACTIVE FCM DTCs
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on.

Turn the radio on.

With the scan tool, erase Amplifier DTCs.

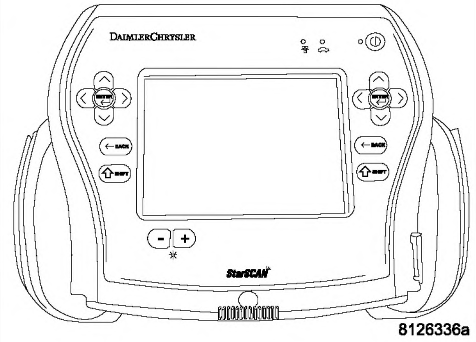
With the scan tool, reset the amplifier.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B1488–CABIN EQ MISMATCH PERFORMANCE?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



---

2. CHECK AMPLIFIER BUSSED INPUTS/OUTPUTS

With the scan tool in Amplifier Data Display, read the Cabin EQ# settings in the Bussed Inputs and Bussed Outputs Sections.

NOTE: The Cabin EQ# settings in the Inputs/Outputs section should match one another. The Cabin EQ# in the Inputs section is the information that is received form the FCM. The Cabin EQ# in the Outputs section is the information that is Stored in the Amplifier's memory.

The Cabin EQ# settings are as follows:

- •$51: HB Premium 1 (w/o Subwoofer)
- •$52: HB Premium 2 (with Subwoofer)

Do the Cabin EQ# settings match one another?

Yes >> Replace the Amplifier in accordance to the service information.
Perform the BODY VERIFICATION TEST-VER 1.

No >> Go To 3

B1488–CABIN EQ MISMATCH PERFORMANCE (CONTINUED)

3. VERIFY COMMUNICATION WITH FRONT CONTROL MODULE

With the scan tool in ECU VIEW, read active modules on the bus.

Does the scan tool show the Front Control Module active on the bus?

Yes >> Go To 4

No >> Refer to the Communication category for the related symptoms.
Perform the BODY VERIFICATION TEST VER 1.

---

4. CHECK FRONT CONTROL MODULE FOR ACTIVE DTCs

With the scan tool, erase FCM DTCs.

Turn the ignition off. Wait approximately 10 seconds.

Turn the ignition on.

With the scan tool, read FCM DTCs.

Are any active DTCs present?

Yes >> Refer to symptom list for problems related to the Front Control Module.
Perform the BODY VERIFICATION TEST VER 1.

No >> Replace the Front Control Module in accordance with the Service Information.
Perform the BODY VERIFICATION TEST-VER.1

B1460-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if a DC offset occurs on the output channel, the amplifier shall set a DTC after a maturity rate of 5 ±1 sec.

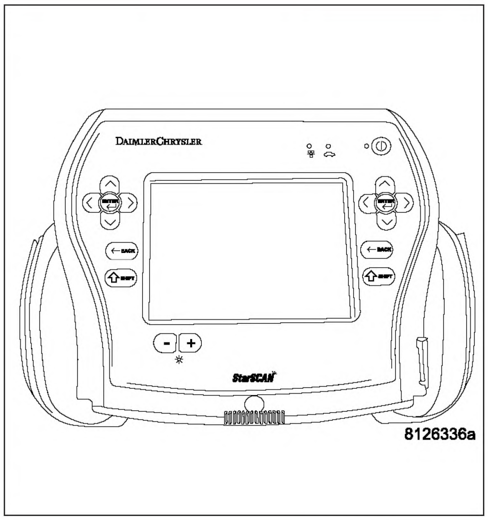
Possible Causes
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

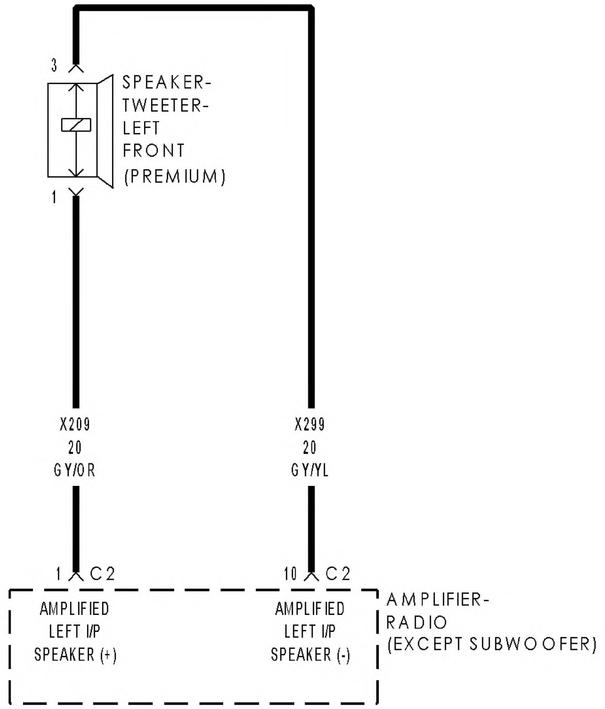


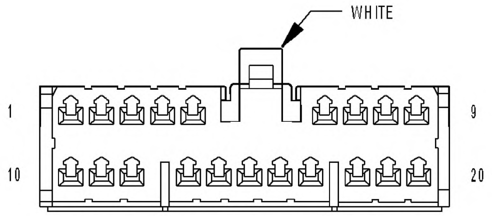
Does the scan tool display active: B1460-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

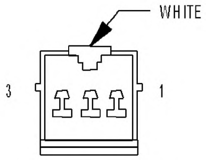
No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

B1461-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT LOW


3
SPEAKER-
TWEETER-
LEFT
FRONT
(PREMIUM)
1
X209
20
GY/OR
X299
20
GY/YL
1 C2
10 C2
AMPLIFIED
LEFT I/P
SPEAKER (+)
AMPLIFIED
LEFT I/P
SPEAKER (-)
AMPLIFIER-
RADIO
(EXCEPT SUBWOOFER)


WHITE
1
9
10
20

AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)



SPEAKER-TWEETER
LEFT FRONT
(PREMIUM)

812ceff7

B1461-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a shorted to ground condition on the speaker output circuit.

Possible Causes
(X209) AMPLIFIED LEFT FRONT I/P SPEAKER (+) CIRCUIT SHORTED TO GROUND
(X299) AMPLIFIED LEFT FRONT I/P SPEAKER (-) CIRCUIT SHORTED TO GROUND
LEFT FRONT I/P SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

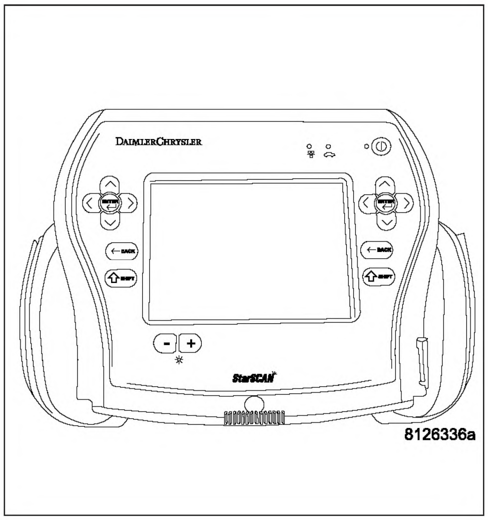
Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B1461-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



2. CHECK THE (X209) AMPLIFIED LEFT FRONT I/P SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND

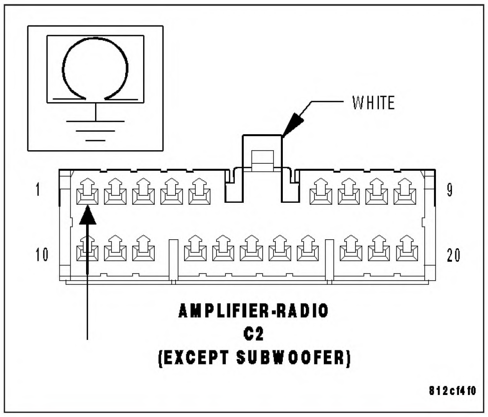
Disconnect the Amplifier C2 harness connector.

Measure the resistance between ground and the (X209) Amplified Left Front I/P Speaker (+) circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (X209) Amplified Left Front I/P Speaker (+) circuit for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

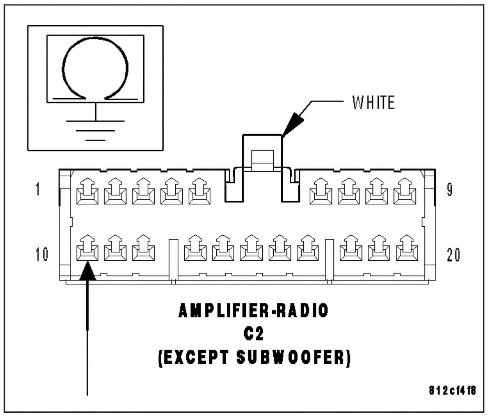
No >> Go To 3



B1461-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. CHECK THE (X299) AMPLIFIED LEFT FRONT I/P SPEAKER (-) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X299) Amplified Left Front I/P Speaker (-) circuit.


WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812c1418

Is the resistance below 10K ohms?

Yes >> Repair the (X299) Amplified Left Front I/P Speaker (-) for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 4

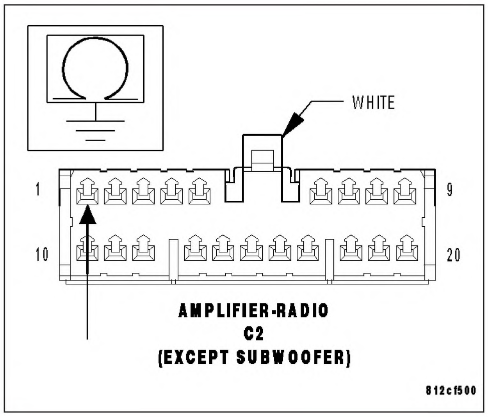
---

4. CHECK OPERATION OF THE AMPLIFIED LEFT FRONT I/P SPEAKER

Turn the ignition off.

Reconnect and reinstall the Left Front I/P Speaker.

Measure the resistance of the speaker circuit between the Amplifier C2 harness connector and ground.

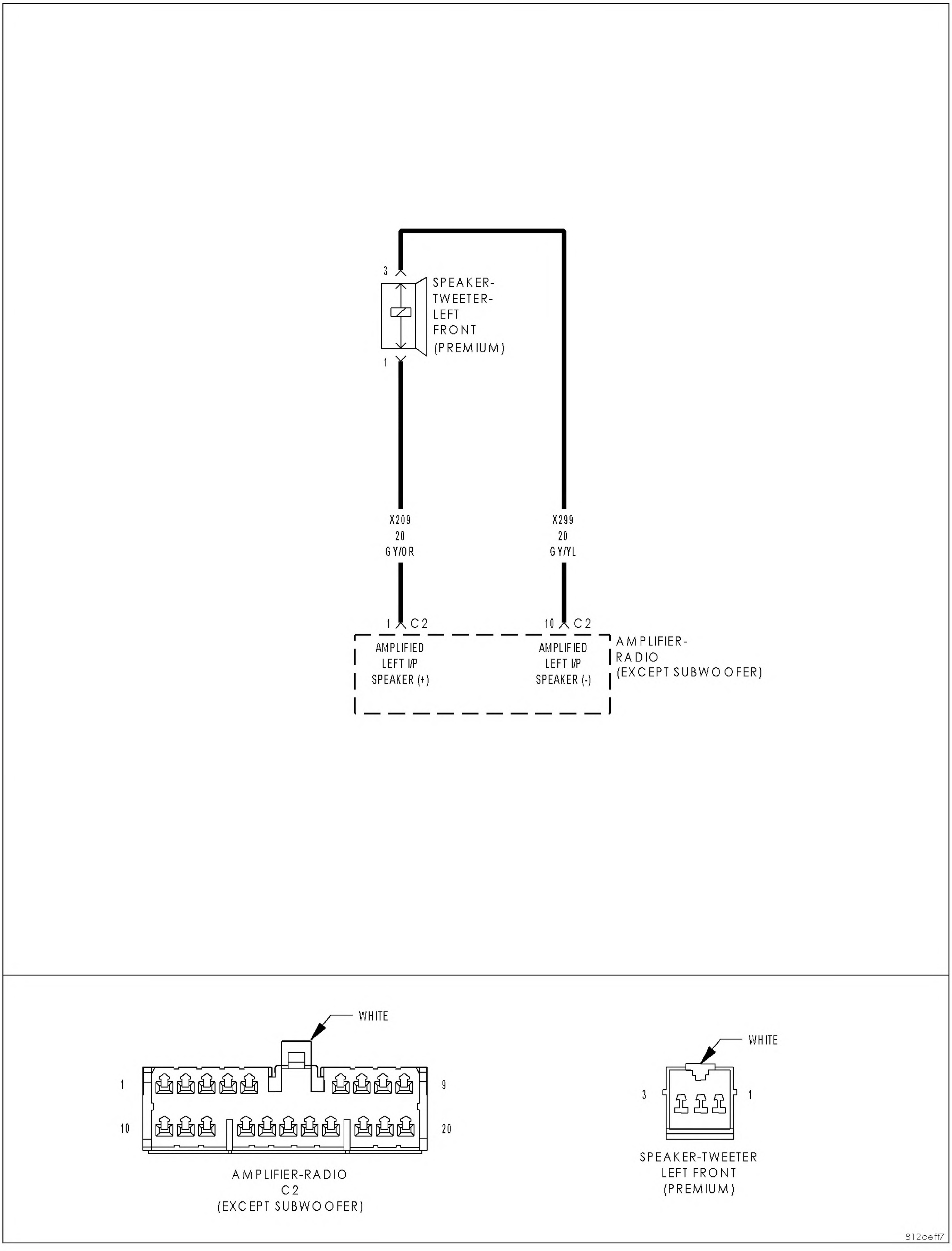

WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812c1500

Is the resistance below 10K ohms?

Yes >> Replace the Left Front I/P Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1462-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT HIGH


3
SPEAKER-TWEETER-LEFT FRONT (PREMIUM)
1
X209
20
GY/OR
X299
20
GY/YL
1 C2
10 C2
AMPLIFIED LEFT I/P SPEAKER (+)
AMPLIFIED LEFT I/P SPEAKER (-)
AMPLIFIER-RADIO (EXCEPT SUBWOOFER)
WHITE
1
9
10
20
AMPLIFIER-RADIO C2 (EXCEPT SUBWOOFER)
WHITE
3
1
SPEAKER-TWEETER LEFT FRONT (PREMIUM)
812ceff7

B1462-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a short to battery condition on the output circuit.

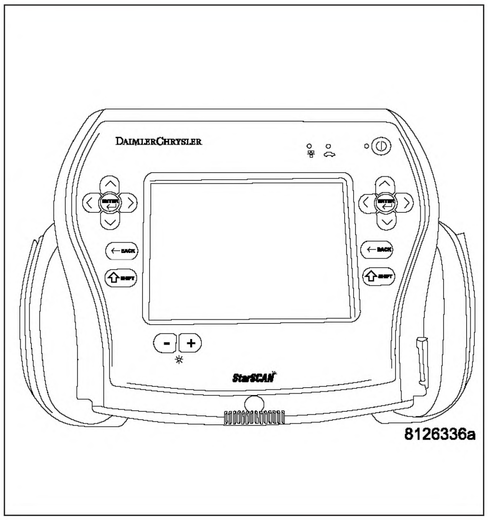
Possible Causes
(X209) AMPLIFIED LEFT I/P SPEAKER (+) CIRCUIT SHORT TO VOLTAGE
(X299) AMPLIFIED LEFT I/P SPEAKER (-) CIRCUIT SHORT TO VOLTAGE
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1462-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK FOR VOLTAGE ON THE (X209) AMPLIFIED LEFT I/P SPEAKER (+) CIRCUIT

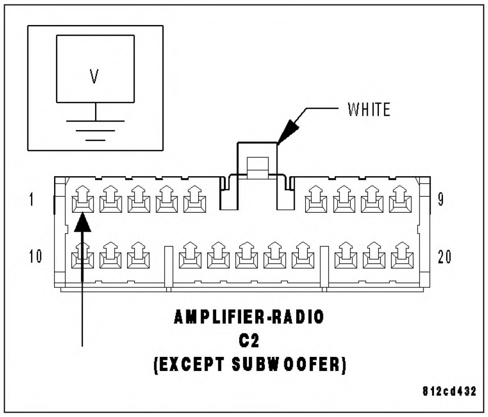
Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Disconnect the Amplified Left I/P Speaker harness connector.

Turn the ignition on.

Measure for voltage on the (X209) Amplified Left I/P Speaker (+) circuit.



Is the voltage above 10.0 volts?

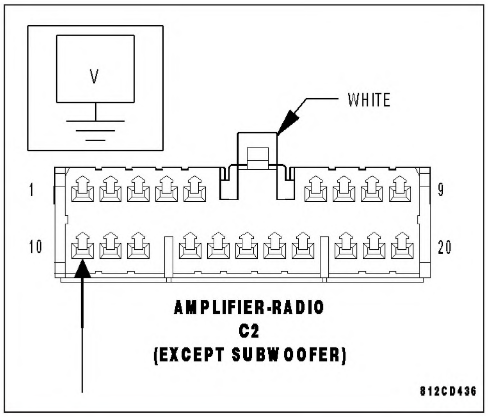
Yes >> Repair the (X209) Amplified Left I/P Speaker (+) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B1462-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X299) AMPLIFIED LEFT I/P SPEAKER (-) CIRCUIT

Measure for voltage on the (X299) Amplified Left I/P Speaker (-) circuit.

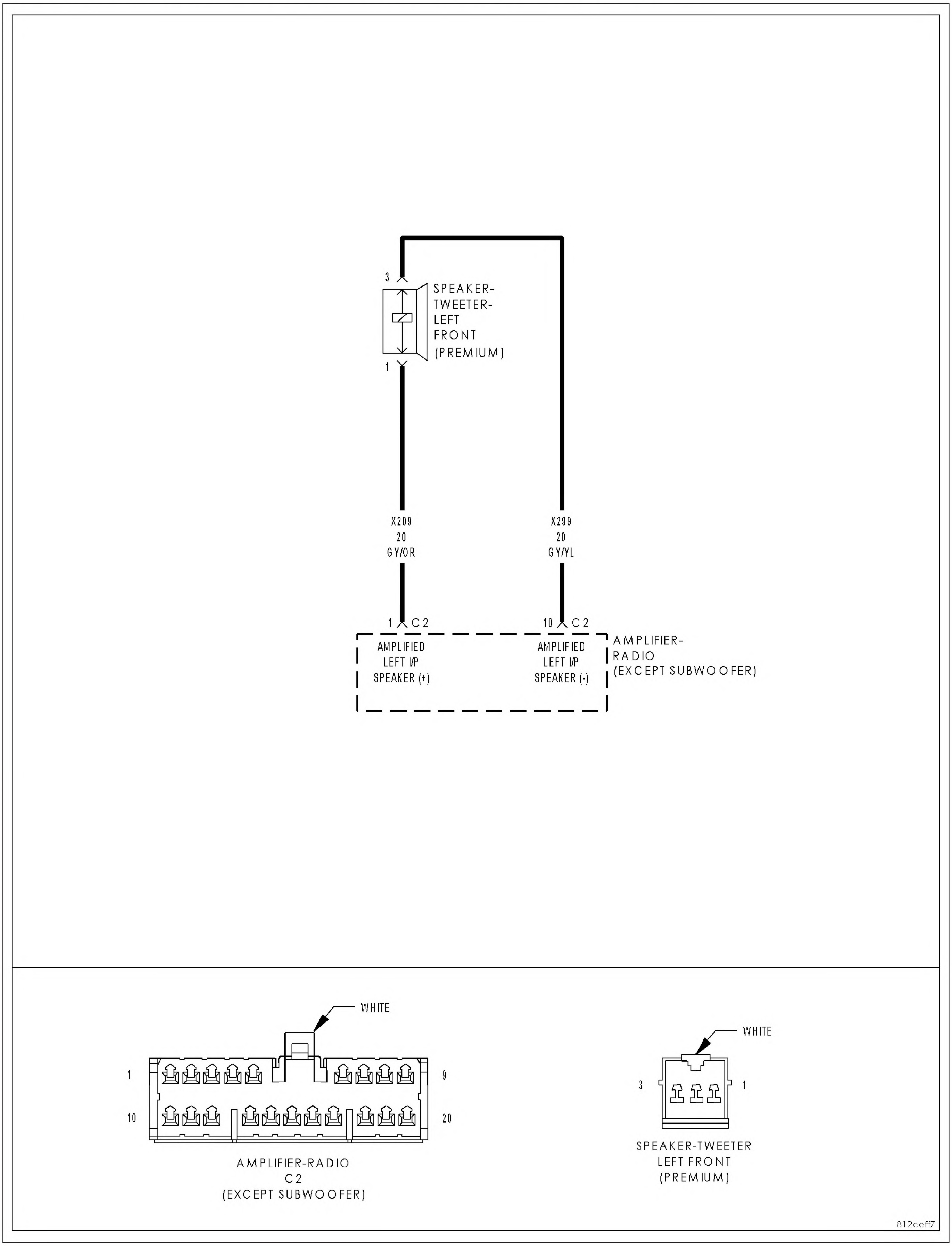

V
WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812CD436

Is the voltage above 10.0 volts?

Yes >> Repair the (X299) Amplified Left I/P Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1463-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT OPEN


3
SPEAKER-TWEETER-LEFT FRONT (PREMIUM)
1
X209 20 GY/OR
X299 20 GY/YL
1 C2
10 C2
AMPLIFIED LEFT I/P SPEAKER (+)
AMPLIFIED LEFT I/P SPEAKER (-)
AMPLIFIER-RADIO (EXCEPT SUBWOOFER)
WHITE
1
9
10
20
AMPLIFIER-RADIO C2 (EXCEPT SUBWOOFER)
WHITE
3
1
SPEAKER-TWEETER LEFT FRONT (PREMIUM)
812ceff7

B1463-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Amplifier Bus wake-up. Amplifier reset with scan tool.
- **Set Condition:**
  The Amplifier detects an open condition on the speaker output circuit.

Possible Causes
(X209) AMPLIFIED LEFT I/P SPEAKER (+) CIRCUIT OPEN
(X299) AMPLIFIED LEFT I/P SPEAKER (-) CIRCUIT OPEN
LEFT FRONT I/P SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

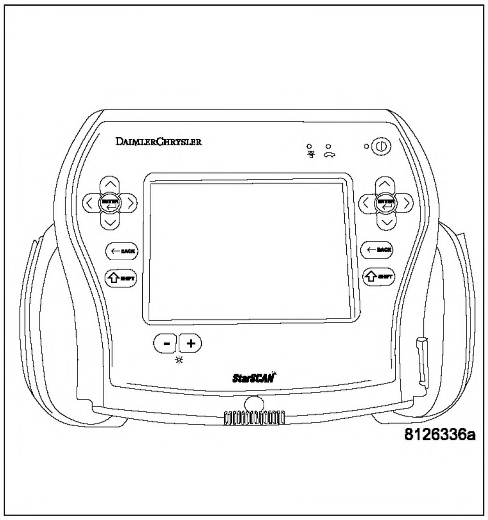
Turn the ignition on.

Turn the radio on.

With the scan tool, erase Amplifier DTCs.

With the scan tool, reset the amplifier.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1463-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

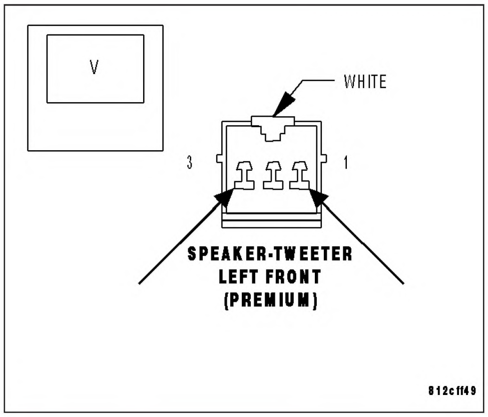
---

2. CHECK THE OPERATION OF THE LEFT FRONT I/P SPEAKER

Disconnect the Left I/P Speaker harness connector.

Turn the radio on and turn the volume to mid level.

With a voltmeter set to read in A/C voltage, measure the voltage of the Amplified Left I/P Speaker circuits in the Amplified Left I/P Speaker harness connector.



Is the voltage present greater than 1 volt?

Yes >> Replace the Amplified Left I/P Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

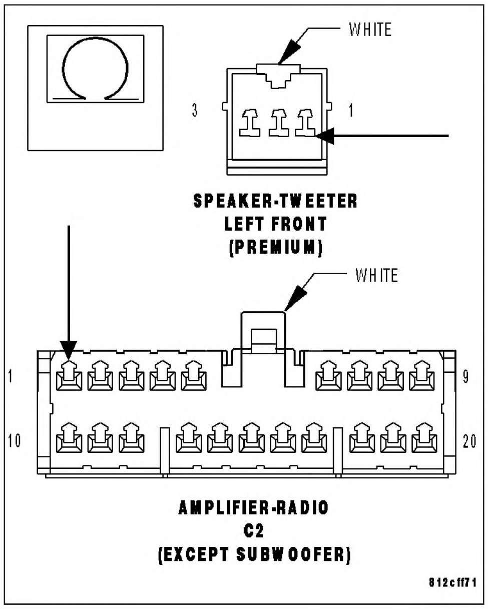
B1463-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. CHECK THE (X209) AMPLIFIED LEFT I/P SPEAKER (+) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Measure the resistance of the (X209) Amplified Left I/P Speaker (+) circuit between the Amplifier C2 harness connector and the Amplified Left I/P Speaker harness connector.


WHITE
3
1
SPEAKER-TWEETER
LEFT FRONT
(PREMIUM)
WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812cff71

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (X209) Amplified Left I/P Speaker (+) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

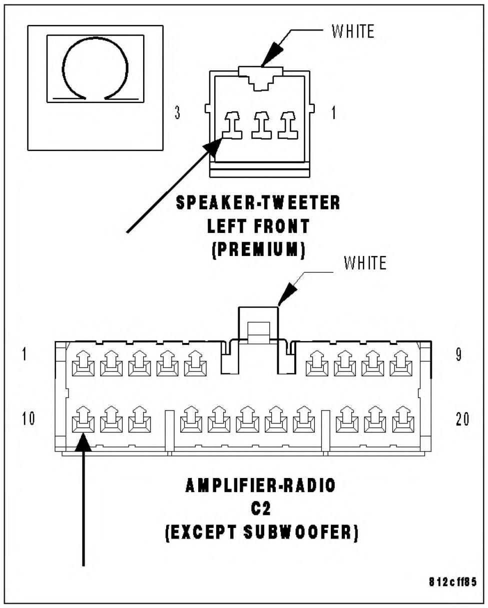
---

4. CHECK THE (X299) AMPLIFIED LEFT I/P SPEAKER (-) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Measure the resistance of the (X299) Amplified Left I/P Speaker (-) circuit between the Amplifier C2 harness connector and the Amplified Left I/P Speaker harness connector.

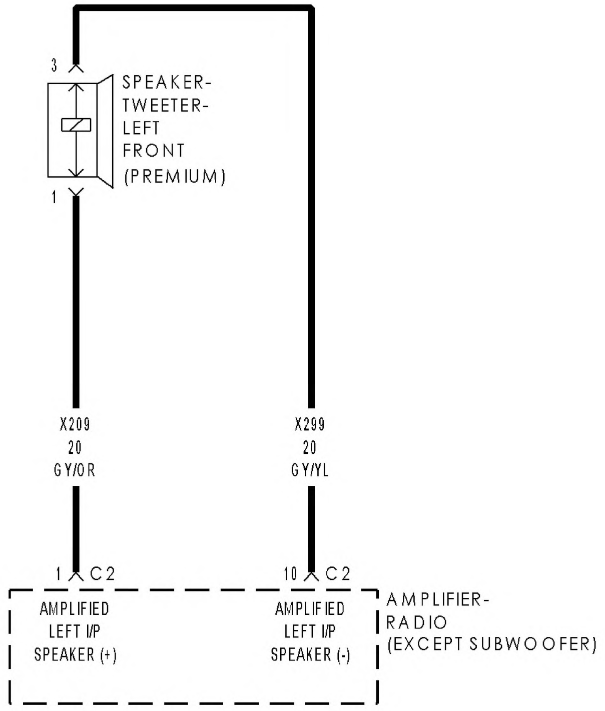

WHITE
3
1
SPEAKER-TWEETER
LEFT FRONT
(PREMIUM)
WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812cff85

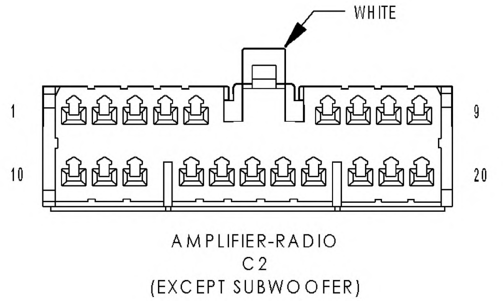
Is the resistance below 5.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

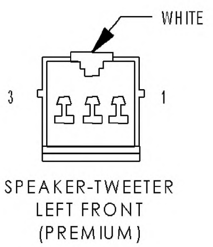
No >> Repair the (X299) Amplified Left I/P Speaker (-) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

B1464-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER


3
SPEAKER-
TWEETER-
LEFT
FRONT
(PREMIUM)
1
X209
20
GY/OR
X299
20
GY/YL
1 C2
10 C2
AMPLIFIED
LEFT I/P
SPEAKER (+)
AMPLIFIED
LEFT I/P
SPEAKER (-)
AMPLIFIER-
RADIO
(EXCEPT SUBWOOFER)


WHITE
1
9
10
20

AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)



SPEAKER-TWEETER
LEFT FRONT
(PREMIUM)

812ceff7

B1464-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Radio volume at 25 or higher.
- **Set Condition:**
  The amplifier detects that the output circuits are shorted together.

Possible Causes
(X209) AMPLIFIED LEFT I/P SPEAKER (+) CIRCUIT SHORTED TO THE (X299) AMPLIFIED LEFT I/P SPEAKER (-) CIRCUIT
AMPLIFIED LEFT I/P SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

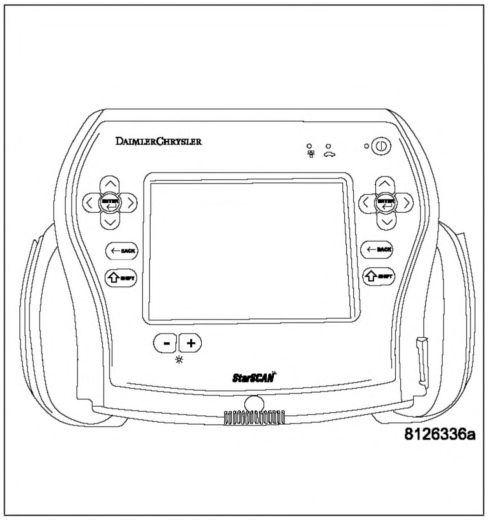
Turn the ignition on, then off, and then on again.

With the scan tool, erase Amplifier DTCs.

Turn the radio on.

Turn the volume level to 25.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1464-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK THE OPERATION OF THE AMPLIFIED LEFT I/P SPEAKER

Disconnect the Amplified Left I/P Speaker.

Measure the resistance of the speaker between the two terminals.

Is the resistance of the speaker less than 1 ohm?

Yes >> Replace the Amplified Left I/P Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

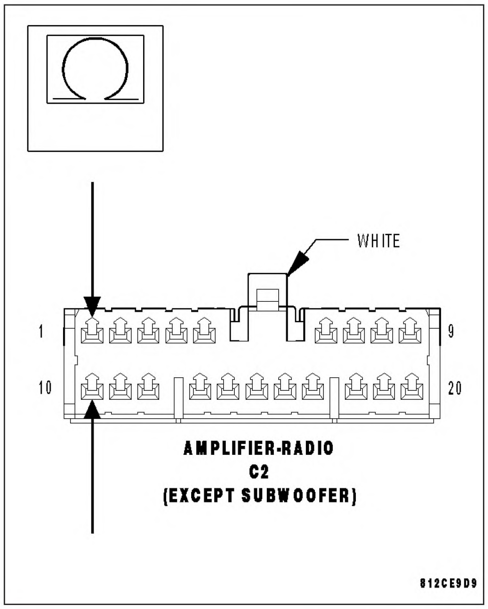
B1464-CHANNEL 1 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK THE (X209) AMPLIFIED LEFT I/P SPEAKER (+) CIRCUIT, AND THE (X299) AMPLIFIED LEFT I/P SPEAKER (-) CIRCUITS FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Measure the resistance between the (X209) Amplified Left I/P Speaker (+) circuit, and the (X299) Amplified Left I/P Speaker (-) circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X209) Amplified Left I/P Speaker (+) circuit, and the (X299) Amplified Left I/P Speaker (-) circuit for a short together.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1465-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if a DC offset occurs on the output channel, the amplifier shall set a DTC after a maturity rate of 5 ±1 sec.

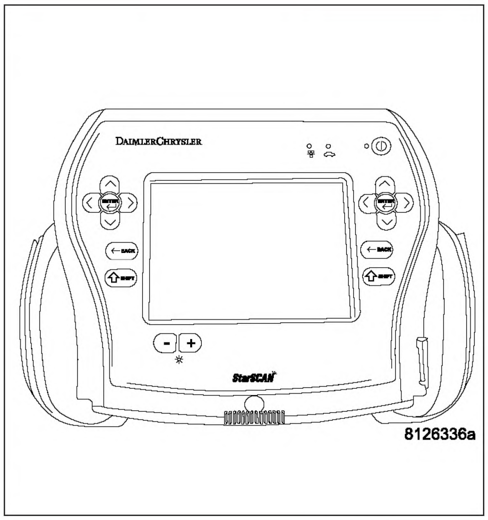
Possible Causes
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

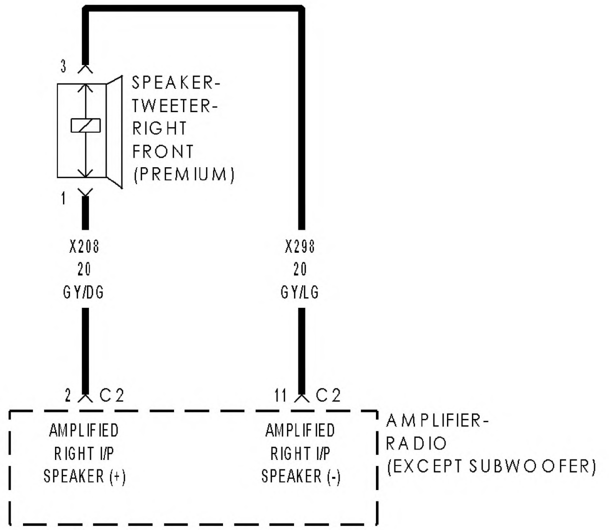


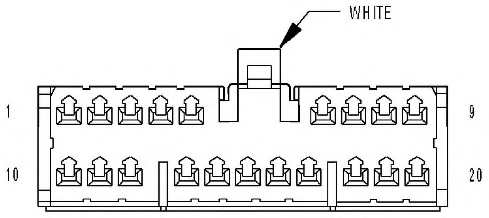
Does the scan tool display active: B1465-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

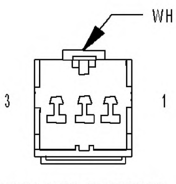
No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

B1466-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT LOW


3
SPEAKER-
TWEETER-
RIGHT
FRONT
(PREMIUM)
1
X208
20
GY/DG
X298
20
GY/LG
2 C2
11 C2
AMPLIFIED
RIGHT I/P
SPEAKER (+)
AMPLIFIED
RIGHT I/P
SPEAKER (-)
AMPLIFIER-
RADIO
(EXCEPT SUBWOOFER)


WHITE
1
9
10
20

AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)



SPEAKER-TWEETER-
RIGHT FRONT
(PREMIUM)

812ceffb

B1466-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a shorted to ground condition on the speaker output circuit.

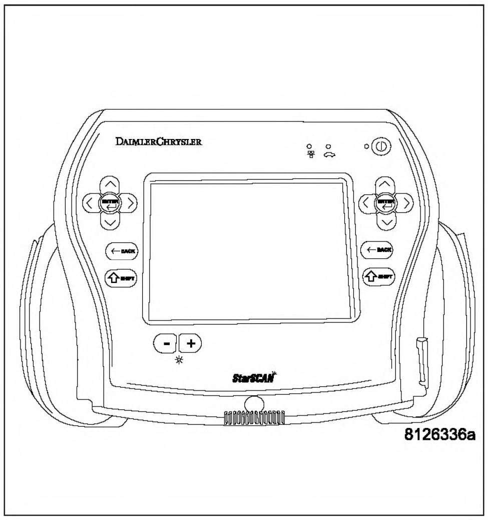
Possible Causes
(X208) AMPLIFIED RIGHT FRONT I/P SPEAKER (+) CIRCUIT SHORTED TO GROUND
(X298) AMPLIFIED RIGHT FRONT I/P SPEAKER (-) CIRCUIT SHORTED TO GROUND
RIGHT FRONT I/P SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1466-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT LOW?

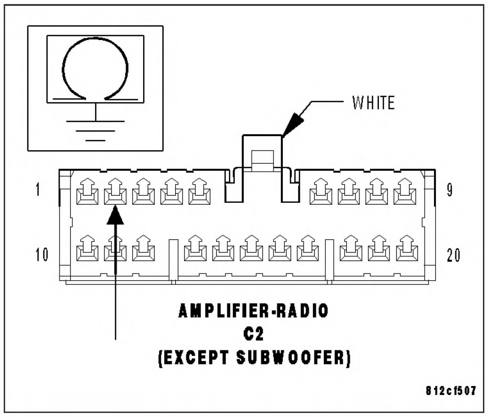
Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

2. CHECK THE (X208) AMPLIFIED RIGHT FRONT I/P SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND

Disconnect the Amplifier C2 harness connector.

Measure the resistance between ground and the (X208) Amplified Right Front I/P Speaker (+) circuit.



Is the resistance below 10K ohms?

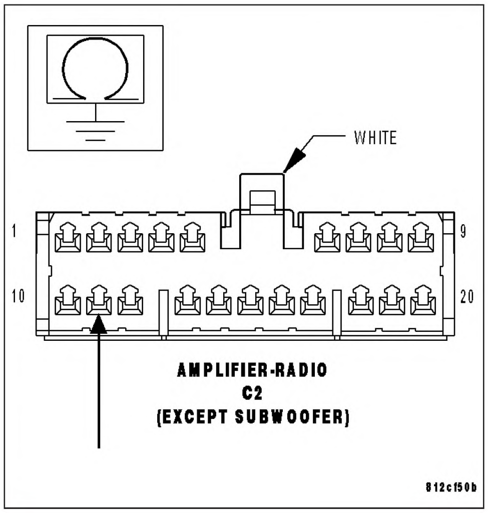
Yes >> Repair the (X208) Amplified Right Front I/P Speaker (+) circuit for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B1466-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. CHECK THE (X298) AMPLIFIED RIGHT FRONT I/P SPEAKER (-) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X298) Amplified Right Front I/P Speaker (-) circuit.


WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812c150b

Is the resistance below 10K ohms?

Yes >> Repair the (X298) Amplified Right Front I/P Speaker (-) for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 4

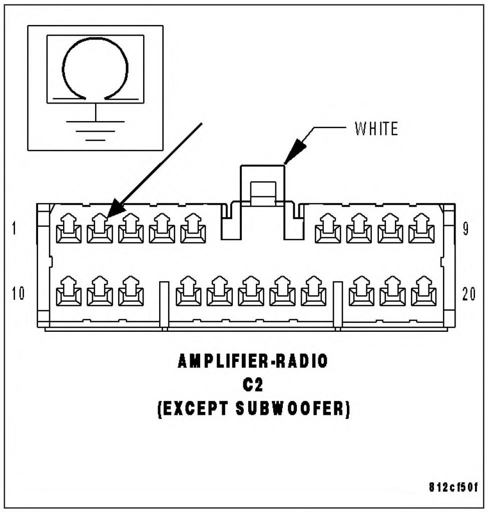
---

4. CHECK OPERATION OF THE AMPLIFIED RIGHT FRONT I/P SPEAKER

Turn the ignition off.

Reconnect and reinstall the Right Front I/P Speaker.

Measure the resistance of the speaker circuit between the Amplifier C2 harness connector and ground..

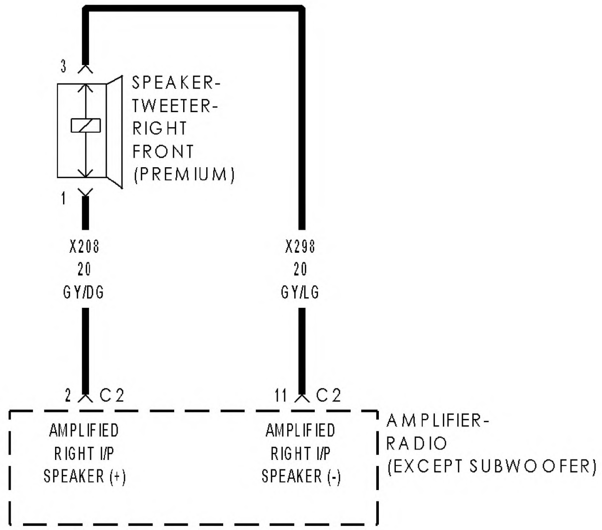

WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812c150f

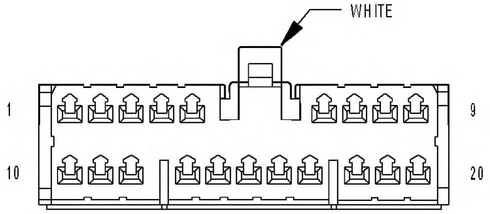
Is the resistance below 10K ohms?

Yes >> Replace the Right Front I/P Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

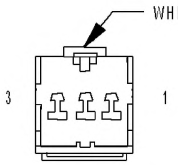
No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1467-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT HIGH


3
1
SPEAKER-
TWEETER-
RIGHT
FRONT
(PREMIUM)
X208
20
GY/DG
X298
20
GY/LG
2 C2
11 C2
AMPLIFIED
RIGHT I/P
SPEAKER (+)
AMPLIFIED
RIGHT I/P
SPEAKER (-)
AMPLIFIER-
RADIO
(EXCEPT SUBWOOFER)


WHITE
1
9
10
20

AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)



SPEAKER-TWEETER-
RIGHT FRONT
(PREMIUM)

812ceffb

B1467-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a short to battery condition on the output circuit.

Possible Causes
(X208) AMPLIFIED RIGHT I/P SPEAKER (+) CIRCUIT SHORT TO VOLTAGE
(X298) AMPLIFIED RIGHT I/P SPEAKER (-) CIRCUIT SHORT TO VOLTAGE
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

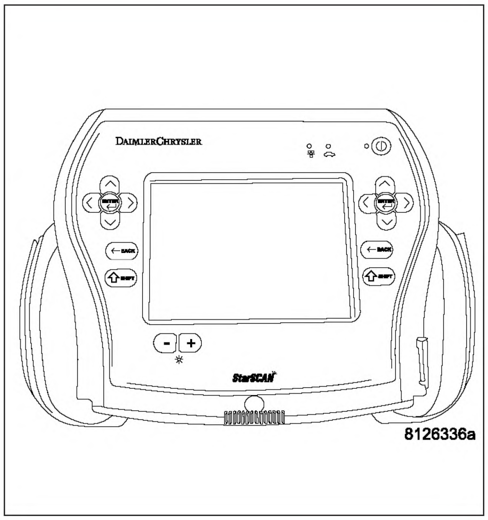
Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B1467-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



---

2. CHECK FOR VOLTAGE ON THE (X208) AMPLIFIED RIGHT I/P SPEAKER (+) CIRCUIT

Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Disconnect the Amplified Right I/P Speaker harness connector.

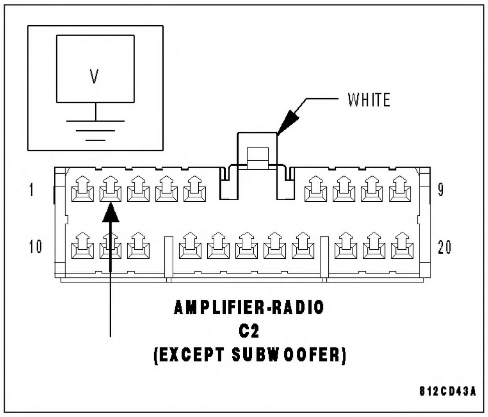
Turn the ignition on.

Measure for voltage on the (X208) Amplified Right I/P Speaker (+) circuit.

Is the voltage above 10.0 volts?

Yes >> Repair the (X208) Amplified Right I/P Speaker (+) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

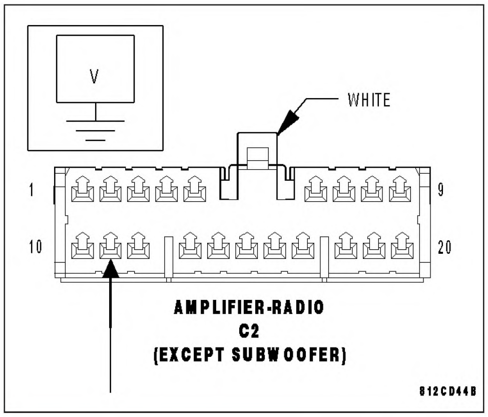
No >> Go To 3



B1467-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X298) AMPLIFIED RIGHT I/P SPEAKER (-) CIRCUIT

Measure for voltage on the (X298) Amplified Right I/P Speaker (-) circuit.

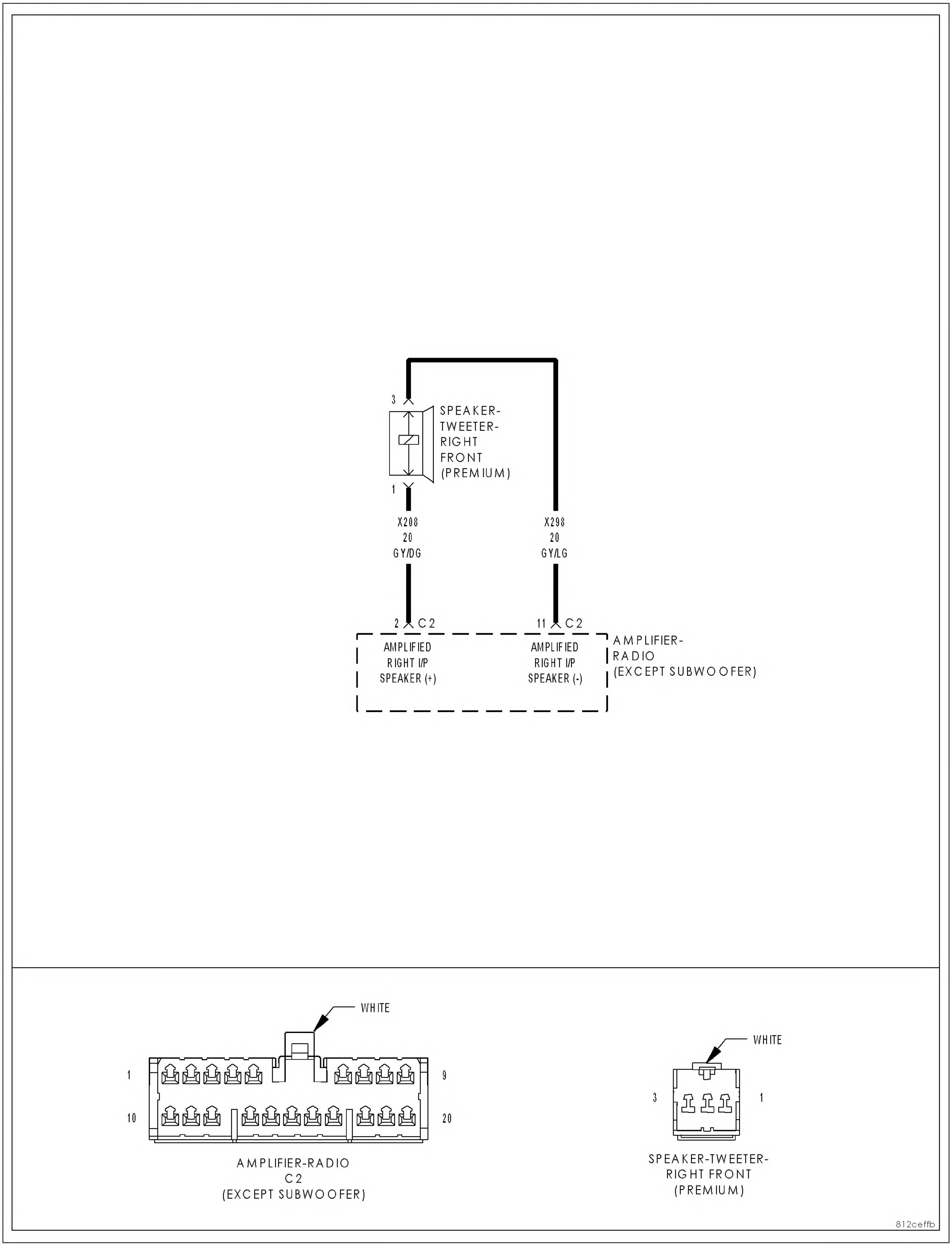

V
WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812CD44B

Is the voltage above 10.0 volts?

Yes >> Repair the (X298) Amplified Right I/P Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1468-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT OPEN


3
SPEAKER-TWEETER-RIGHT FRONT (PREMIUM)
1
X208
20
GY/DG
X298
20
GY/LG
2 C2
11 C2
AMPLIFIED RIGHT I/P SPEAKER (+)
AMPLIFIED RIGHT I/P SPEAKER (-)
AMPLIFIER-RADIO (EXCEPT SUBWOOFER)
WHITE
1
9
10
20
AMPLIFIER-RADIO C2 (EXCEPT SUBWOOFER)
WHITE
3
1
SPEAKER-TWEETER-RIGHT FRONT (PREMIUM)
812ceffb

B1468-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Amplifier Bus wake-up. Amplifier reset with scan tool.
- **Set Condition:**
  The Amplifier detects an open condition on the speaker output circuit.

Possible Causes
(X208) AMPLIFIED RIGHT I/P SPEAKER (+) CIRCUIT OPEN
(X298) AMPLIFIED RIGHT I/P SPEAKER (-) CIRCUIT OPEN
RIGHT I/P SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

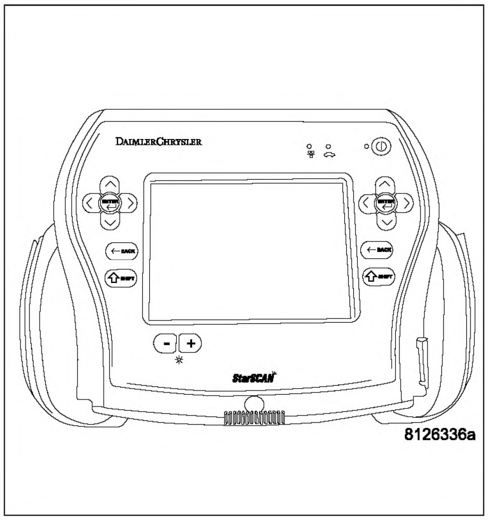
Turn the ignition on.

Turn the radio on.

With the scan tool, erase Amplifier DTCs.

With the scan tool, reset the amplifier.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1468-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

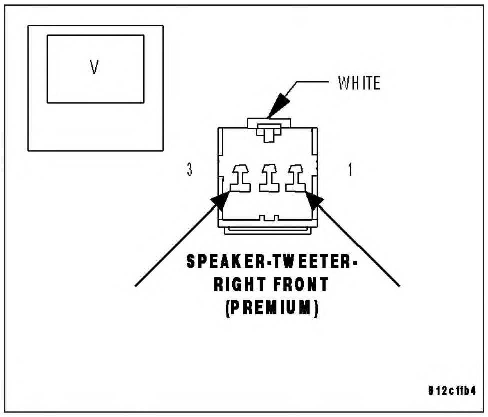
---

2. CHECK THE OPERATION OF THE RIGHT FRONT I/P SPEAKER

Disconnect the Right I/P Speaker harness connector.

Turn the radio on and turn the volume to mid level.

With a voltmeter set to read in A/C voltage, measure the voltage of the Amplified Right I/P Speaker circuits in the Amplified Right I/P Speaker harness connector.



Is the voltage present greater than 1 volt?

Yes >> Replace the Amplified Right I/P Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

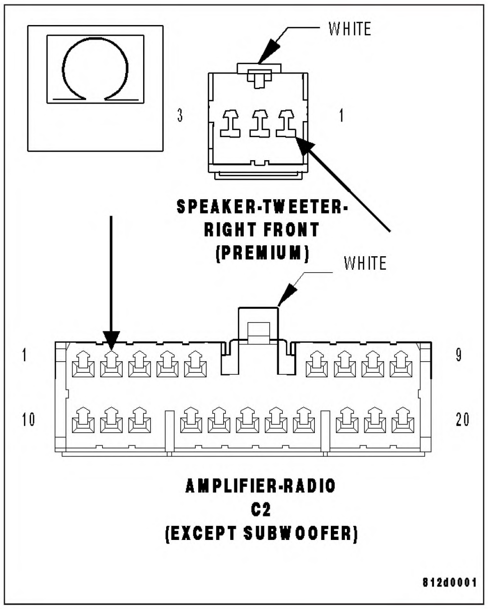
B1468-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. CHECK THE (X208) AMPLIFIED RIGHT I/P SPEAKER (+) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Measure the resistance of the (X208) Amplified Right I/P Speaker (+) circuit between the Amplifier C2 harness connector and the Amplified Right I/P Speaker harness connector.


WHITE
3
1
SPEAKER-TWEETER-
RIGHT FRONT
(PREMIUM)
WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812d0001

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (X208) Amplified Right I/P Speaker (+) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

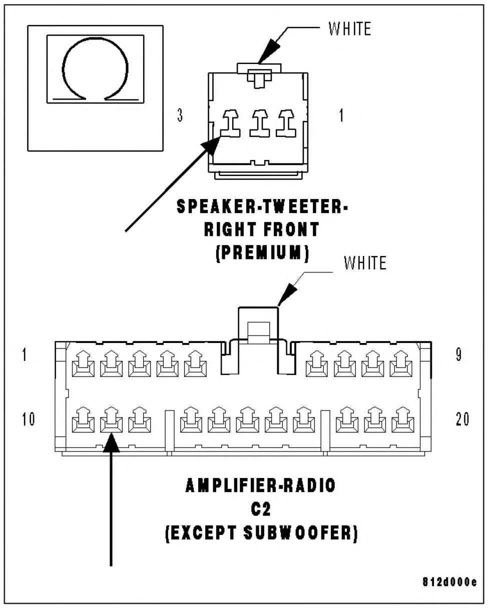
---

4. CHECK THE (X298) AMPLIFIED RIGHT I/P SPEAKER (-) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Measure the resistance of the (X298) Amplified Right I/P Speaker (-) circuit between the Amplifier C2 harness connector and the Amplified Right I/P Speaker harness connector.

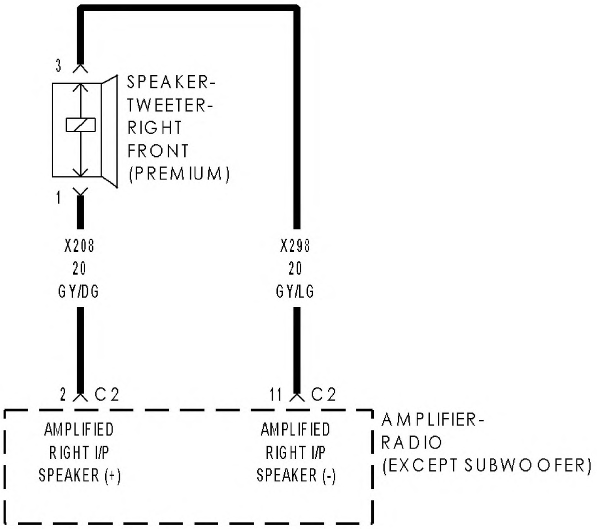

WHITE
3
1
SPEAKER-TWEETER-
RIGHT FRONT
(PREMIUM)
WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
812d000e

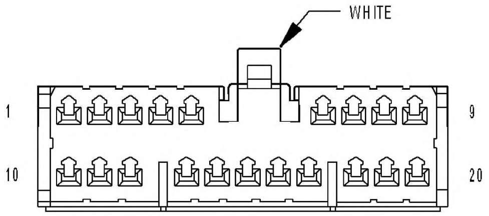
Is the resistance below 5.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

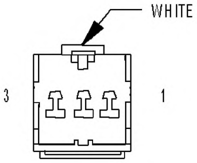
No >> Repair the (X298) Amplified Right I/P Speaker (-) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

B1469-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER


3
SPEAKER-
TWEETER-
RIGHT
FRONT
(PREMIUM)
1
X208
20
GY/DG
X298
20
GY/LG
2 C2
11 C2
AMPLIFIED
RIGHT I/P
SPEAKER (+)
AMPLIFIED
RIGHT I/P
SPEAKER (-)
AMPLIFIER-
RADIO
(EXCEPT SUBWOOFER)


WHITE
1
9
10
20

AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)



SPEAKER-TWEETER-
RIGHT FRONT
(PREMIUM)

812ceffb

B1469-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Radio volume at 25 or higher.
- **Set Condition:**
  The amplifier detects that the output circuits are shorted together.

Possible Causes
(X208) AMPLIFIED RIGHT I/P SPEAKER (+) CIRCUIT SHORTED TO THE (X298) AMPLIFIED RIGHT I/P SPEAKER (-) CIRCUIT
AMPLIFIED RIGHT I/P SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

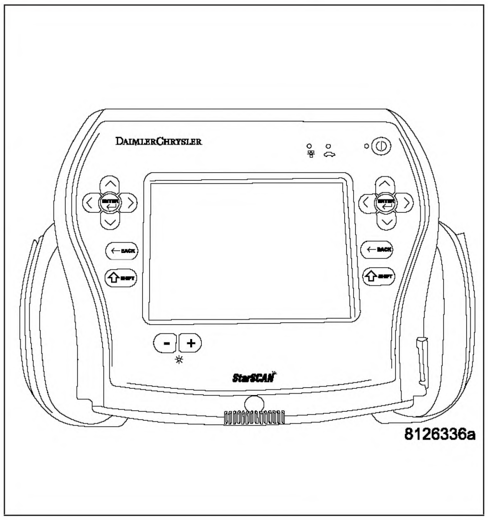
Turn the ignition on, then off, and then on again.

With the scan tool, erase Amplifier DTCs.

Turn the radio on.

Turn the volume level to 25.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1469-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK THE OPERATION OF THE AMPLIFIED RIGHT I/P SPEAKER

Disconnect the Amplified Right I/P Speaker.

Measure the resistance of the speaker between the two terminals.

Is the resistance of the speaker less than 1 ohm?

Yes >> Replace the Amplified Right I/P Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

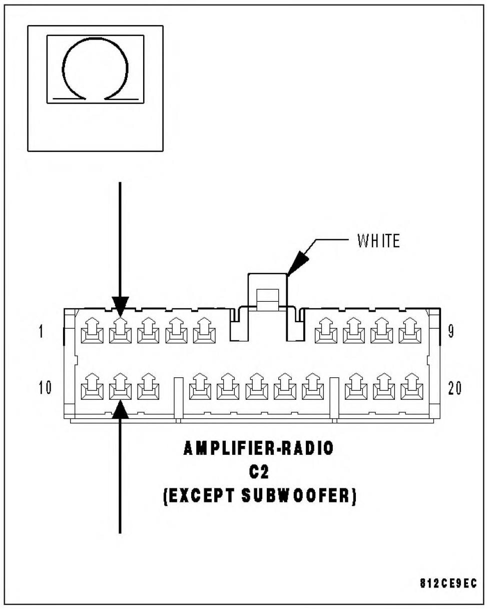
B1469-CHANNEL 2 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK THE (X208) AMPLIFIED RIGHT I/P SPEAKER (+) CIRCUIT, AND THE (X298) AMPLIFIED RIGHT I/P SPEAKER (-) CIRCUITS FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Amplifier C2 harness connector.

Measure the resistance between the (X208) Amplified Right I/P Speaker (+) circuit, and the (X298) Amplified Right I/P Speaker (-) circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X208) Amplified Right I/P Speaker (+) circuit, and the (X298) Amplified Right I/P Speaker (-) circuit for a short together.

Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.

Perform BODY VERIFICATION TEST VER-1.

B146A-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if a DC offset occurs on the output channel, the amplifier shall set a DTC after a maturity rate of 5 ±1 sec.

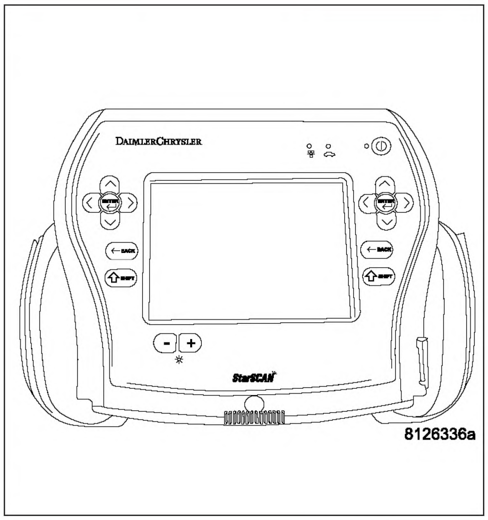
Possible Causes
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

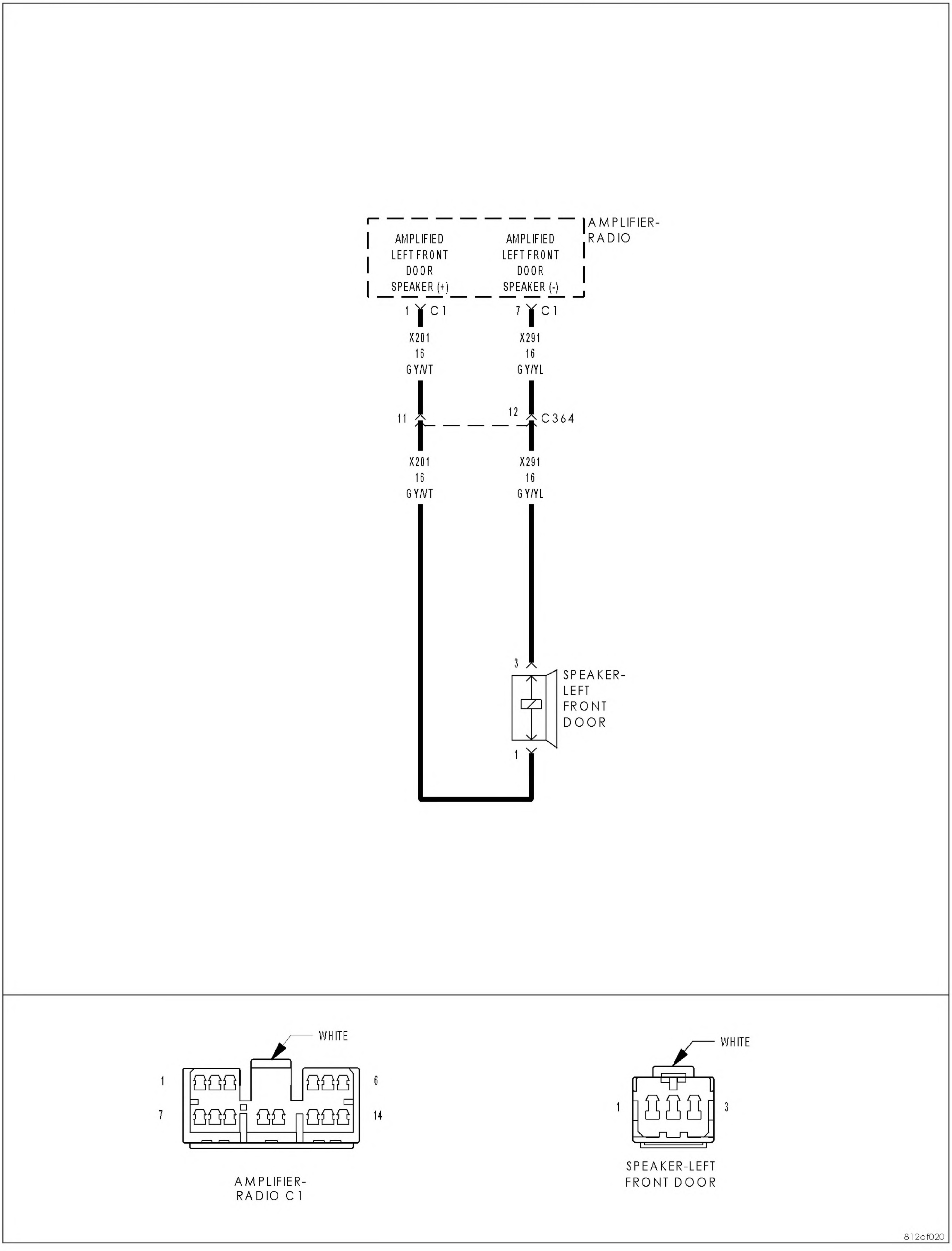


Does the scan tool display active: B146A-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

B146B-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT LOW


AMPLIFIER-RADIO
AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
1 C1
7 C1
X201 16 GY/VT
X291 16 GY/YL
11
12
C364
X201 16 GY/VT
X291 16 GY/YL
3
1
SPEAKER-LEFT FRONT DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-LEFT FRONT DOOR
812cf020

B146B-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a shorted to ground condition on the speaker output circuit.

Possible Causes
(X201) AMPLIFIED LEFT FRONT DOOR SPEAKER (+) CIRCUIT SHORTED TO GROUND
(X291) AMPLIFIED LEFT FRONT DOOR SPEAKER (-) CIRCUIT SHORTED TO GROUND
LEFT FRONT DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

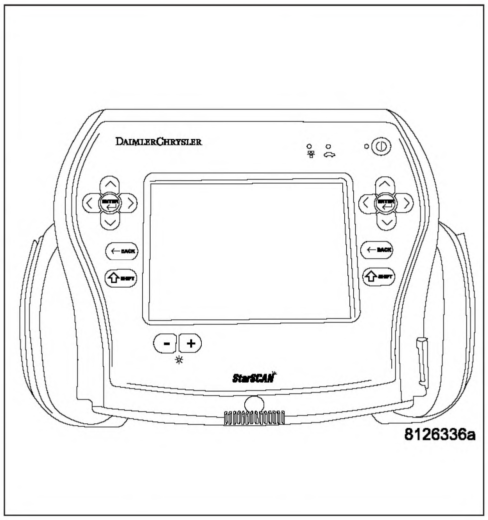
Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B146B-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



---

2. CHECK THE (X201) AMPLIFIED LEFT FRONT DOOR SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND

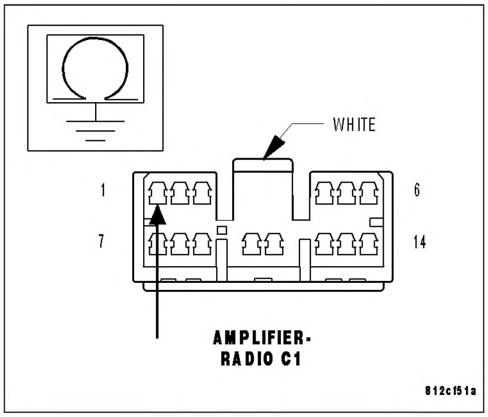
Disconnect the Amplifier C1 harness connector.

Measure the resistance between ground and the (X201) Amplified Left Front Door Speaker (+) circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (X201) Amplified Left Front Door Speaker (+) circuit for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3



B146B-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

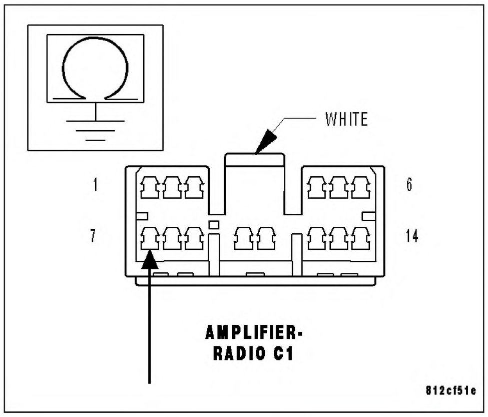
3. CHECK THE (X291) AMPLIFIED LEFT FRONT DOOR SPEAKER (-) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X291) Amplified Left Front Door Speaker (-) circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (X291) Amplified Left Front Door Speaker (-) for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 4



---

4. CHECK OPERATION OF THE AMPLIFIED LEFT FRONT DOOR SPEAKER

Turn the ignition off.

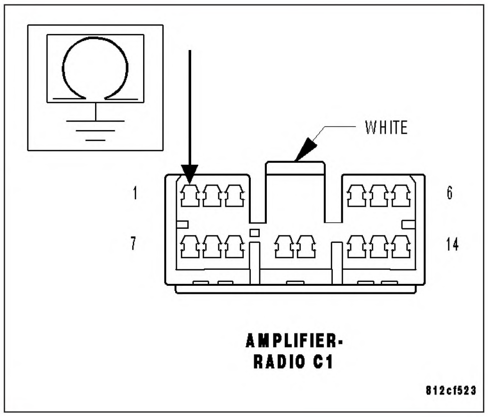
Reconnect and reinstall the Left Front Door Speaker.

Measure the resistance of the speaker circuit between the Amplifier C1 harness connector and ground..

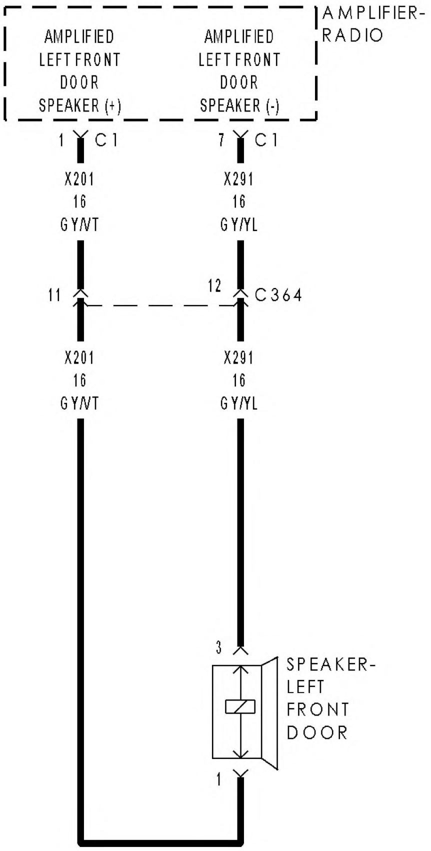
Is the resistance below 10K ohms?

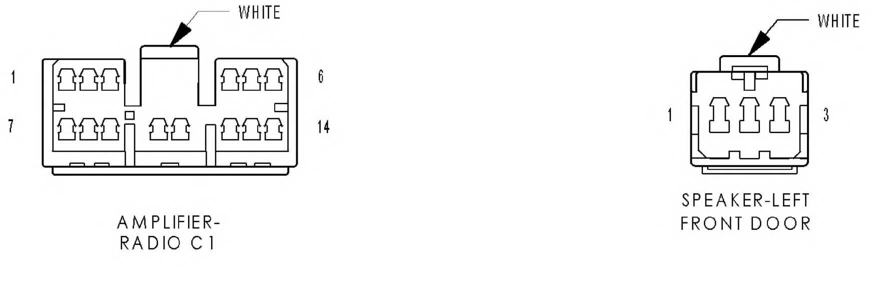
Yes >> Replace the Left Front Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.



B146C-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT HIGH


AMPLIFIER-RADIO
AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
1 C1
7 C1
X201 16 GY/VT
X291 16 GY/YL
11
12
C364
X201 16 GY/VT
X291 16 GY/YL
3
1
SPEAKER-LEFT FRONT DOOR


WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-LEFT FRONT DOOR
812cf020

B146C-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a short to battery condition on the output circuit.

Possible Causes
(X201) AMPLIFIED LEFT FRONT DOOR SPEAKER (+) CIRCUIT SHORT TO VOLTAGE
(X291) AMPLIFIED LEFT FRONT DOOR SPEAKER (-) CIRCUIT SHORT TO VOLTAGE
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

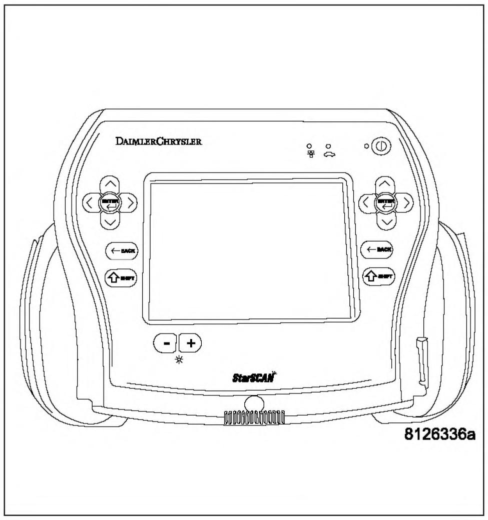
Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B146C-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



2. CHECK FOR VOLTAGE ON THE (X201) AMPLIFIED LEFT FRONT DOOR SPEAKER (+) CIRCUIT

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Disconnect the Amplified Left Front Door Speaker harness connector.

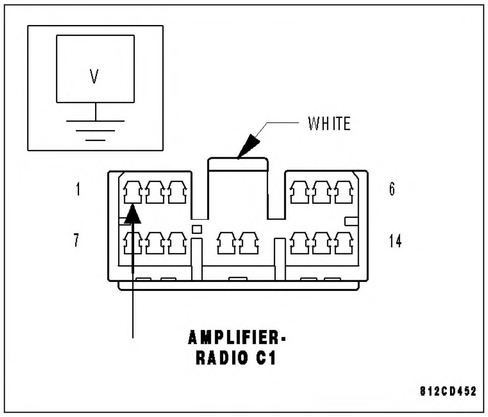
Turn the ignition on.

Measure for voltage on the (X201) Amplified Left Front Door Speaker (+) circuit.

Is the voltage above 10.0 volts?

Yes >> Repair the (X201) Amplified Left Front Door Speaker (+) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

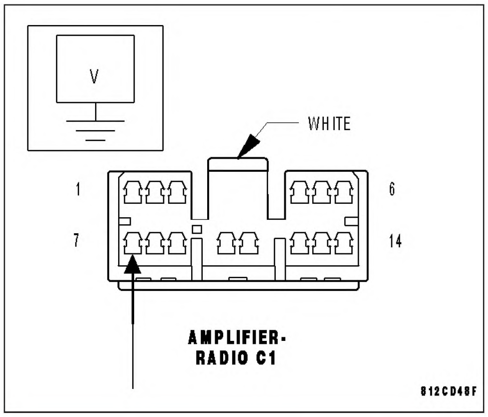
No >> Go To 3



B146C-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X291) AMPLIFIED LEFT FRONT DOOR SPEAKER (-) CIRCUIT

Measure for voltage on the (X291) Amplified Left Front Door Speaker (-) circuit.

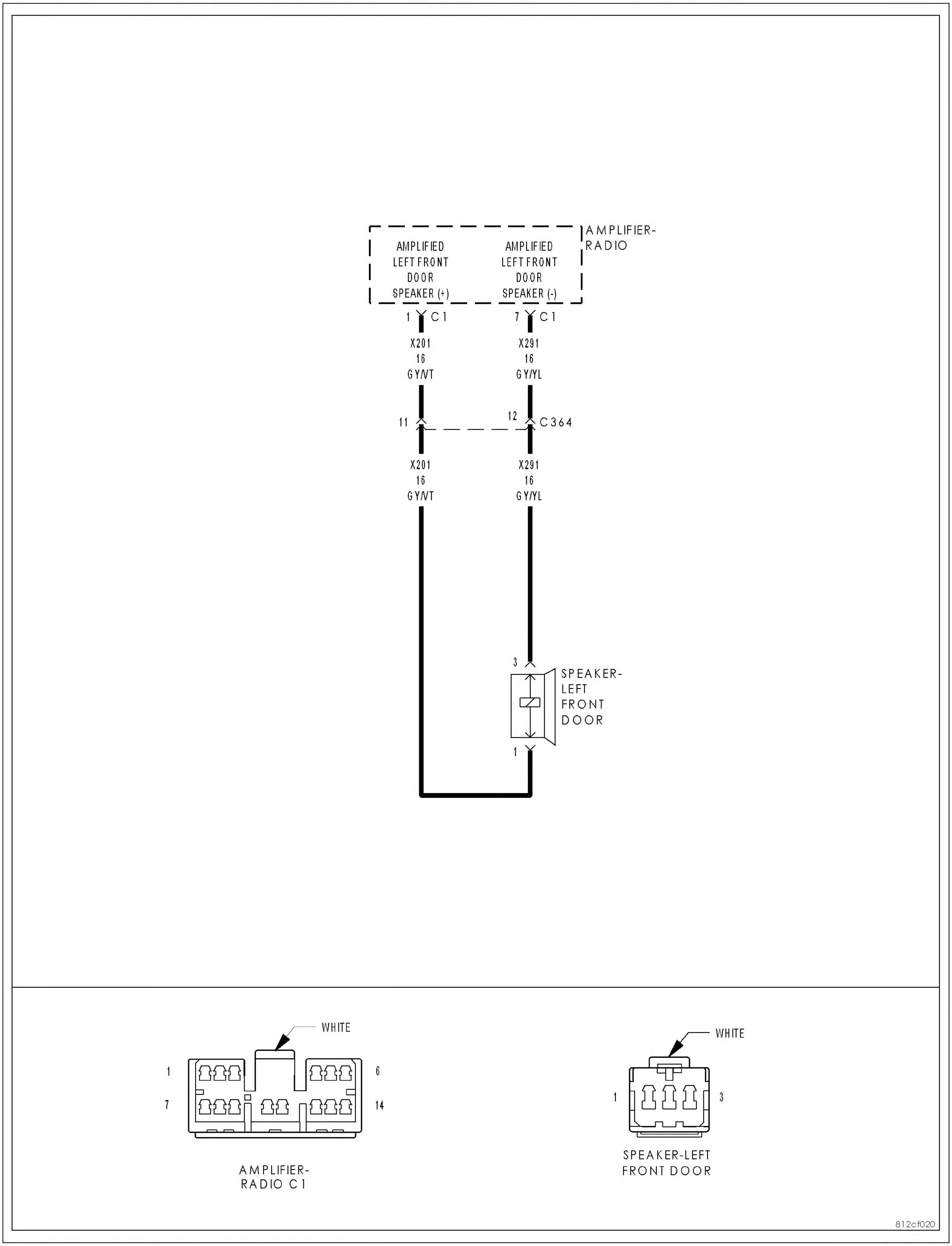


Is the voltage above 10.0 volts?

Yes >> Repair the (X291) Amplified Left Front Door Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B146D-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT OPEN


AMPLIFIER-
RADIO
AMPLIFIED
LEFT FRONT
DOOR
SPEAKER (+)
AMPLIFIED
LEFT FRONT
DOOR
SPEAKER (-)
1 C1
7 C1
X201
16
GY/VT
X291
16
GY/YL
11
12
C364
X201
16
GY/VT
X291
16
GY/YL
3
1
SPEAKER-
LEFT
FRONT
DOOR
WHITE
1
6
7
14
AMPLIFIER-
RADIO C1
WHITE
1
3
SPEAKER-LEFT
FRONT DOOR
812cf020

B146D-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Amplifier Bus wake-up. Amplifier reset with scan tool.
- **Set Condition:**
  The Amplifier detects an open condition on the speaker output circuit.

Possible Causes
(X201) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT OPEN
(X291) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT OPEN
LEFT REAR DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

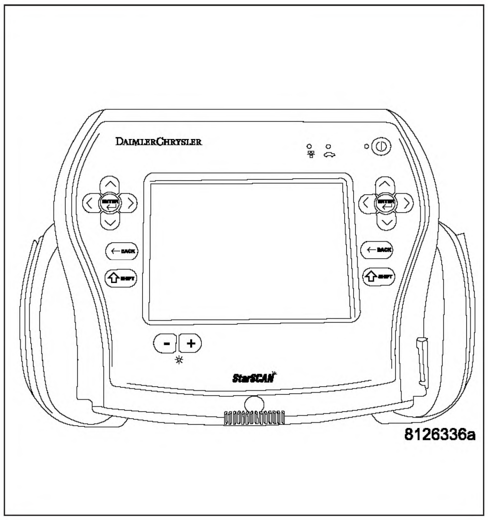
Turn the ignition on.

Turn the radio on.

With the scan tool, erase Amplifier DTCs.

With the scan tool, reset the amplifier.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B146D-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

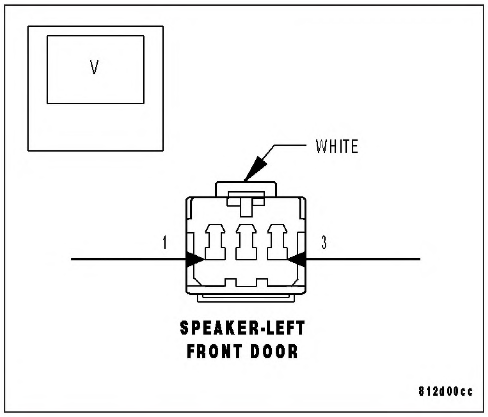
---

2. CHECK THE OPERATION OF THE LEFT REAR DOOR SPEAKER

Disconnect the Left Rear Door Speaker harness connector.

Turn the radio on and turn the volume to mid level.

With a voltmeter set to read in A/C voltage, measure the voltage of the Amplified Left Rear Door Speaker circuits in the Amplified Left Rear Door Speaker harness connector.



Is the voltage present greater than 1 volt?

Yes >> Replace the Amplified Left Rear Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

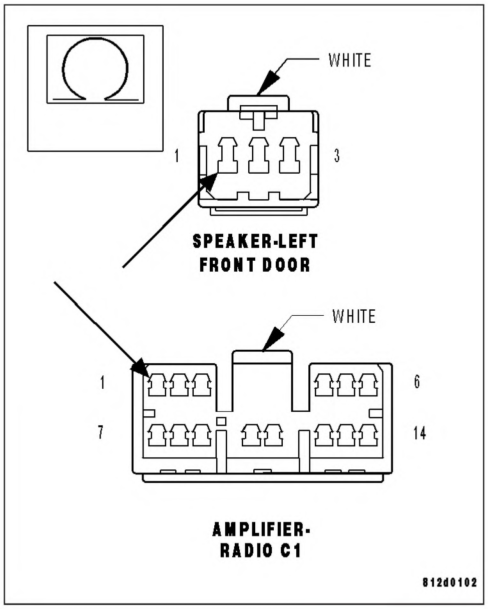
B146D-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. CHECK THE (X201) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X201) Amplified Left Rear Door Speaker (+) circuit between the Amplifier C1 harness connector and the Amplified Left Rear Door Speaker harness connector.


WHITE
1
3
SPEAKER-LEFT FRONT DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
812d0102

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (X201) Amplified Left Rear Door Speaker (+) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

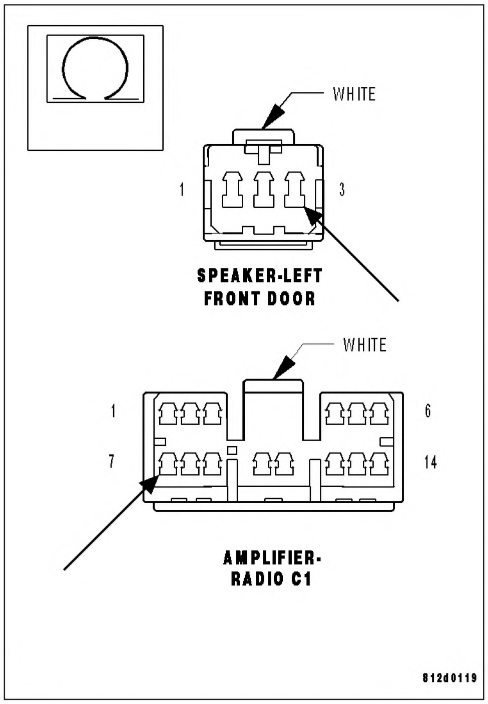
---

4. CHECK THE (X291) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X291) Amplified Left Rear Door Speaker (-) circuit between the Amplifier C1 harness connector and the Amplified Left Rear Door Speaker harness connector.

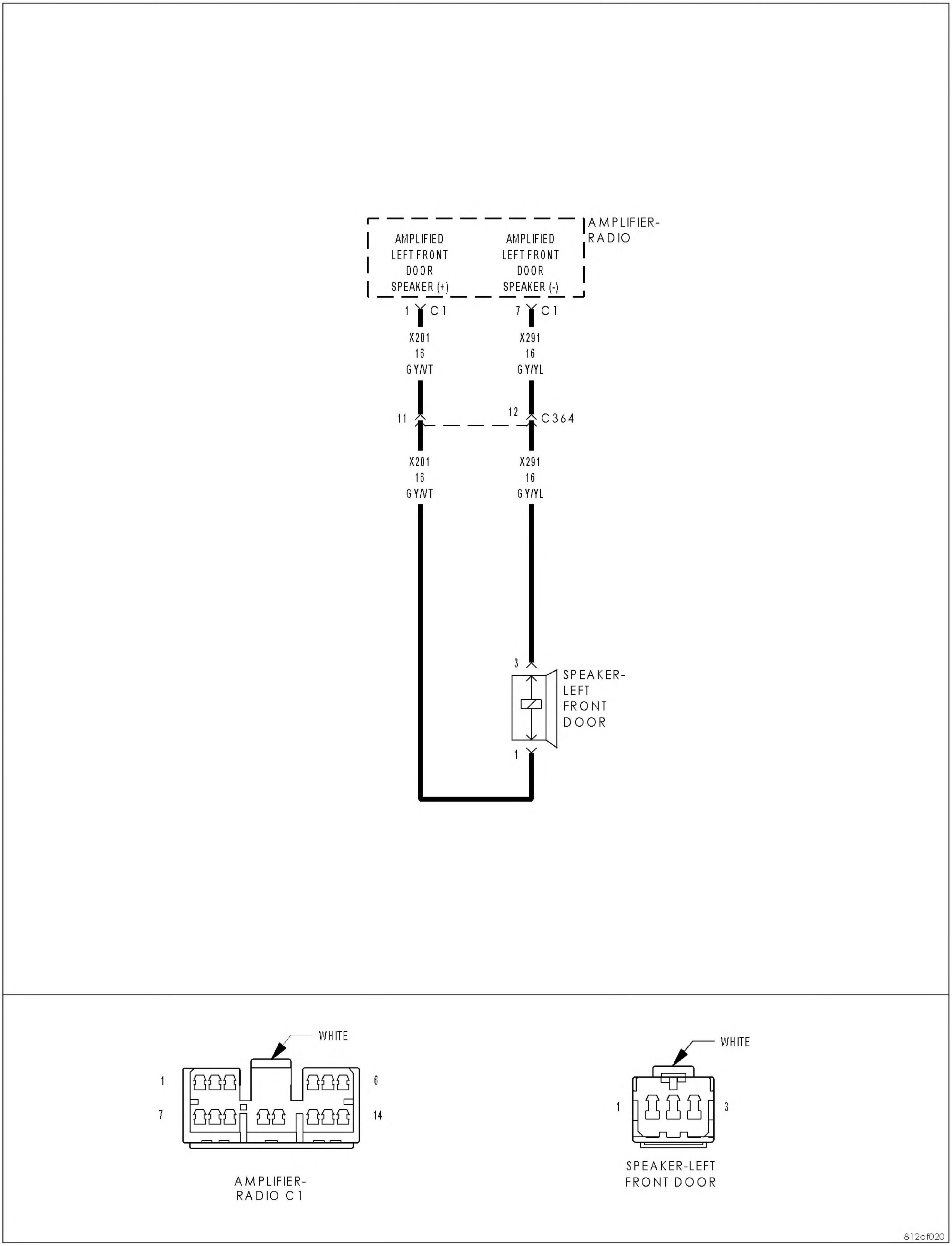

WHITE
1
3
SPEAKER-LEFT FRONT DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
812d0119

Is the resistance below 5.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Repair the (X291) Amplified Left Rear Door Speaker (-) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

B146E-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER


AMPLIFIER-RADIO
AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
1 C1
7 C1
X201 16 GY/VT
X291 16 GY/YL
11
12
C364
X201 16 GY/VT
X291 16 GY/YL
3
SPEAKER-LEFT FRONT DOOR
1
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-LEFT FRONT DOOR
812cf020

B146E-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Radio volume at 25 or higher.
- **Set Condition:**
  The amplifier detects that the output circuits are shorted together.

Possible Causes
(X201) AMPLIFIED LEFT FRONT DOOR SPEAKER (+) CIRCUIT SHORTED TO THE (X291) AMPLIFIED LEFT FRONT DOOR SPEAKER (-) CIRCUIT
AMPLIFIED LEFT FRONT DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

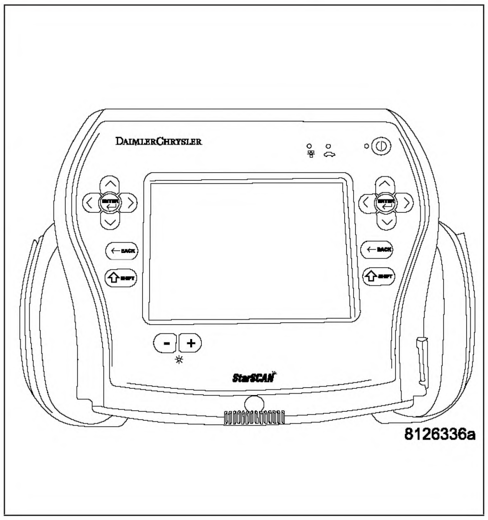
Turn the ignition on, then off, and then on again.

With the scan tool, erase Amplifier DTCs.

Turn the radio on.

Turn the volume level to 25.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B146E-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK THE OPERATION OF THE AMPLIFIED LEFT FRONT DOOR SPEAKER

Disconnect the Amplified Left Front Door Speaker.

Measure the resistance of the speaker between the two terminals.

Is the resistance of the speaker less than 1 ohm?

Yes >> Replace the Amplified Left Front Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

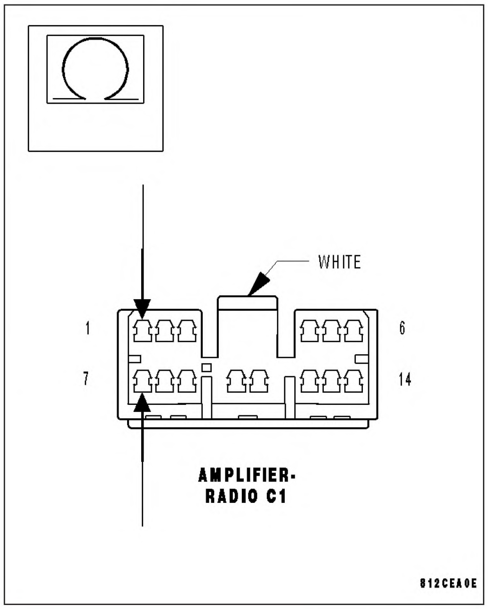
B146E-CHANNEL 3 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK THE (X201) AMPLIFIED LEFT FRONT DOOR SPEAKER (+) CIRCUIT, AND THE (X291) AMPLIFIED LEFT FRONT DOOR SPEAKER (-) CIRCUITS FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance between the (X201) Amplified Left Front Door Speaker (+) circuit, and the (X291) Amplified Left Front Door Speaker (-) circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X201) Amplified Left Front Door Speaker (+) circuit, and the (X291) Amplified Left Front Door Speaker (-) circuit for a short together.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B146F-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if a DC offset occurs on the output channel, the amplifier shall set a DTC after a maturity rate of 5 ±1 sec.

Possible Causes
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

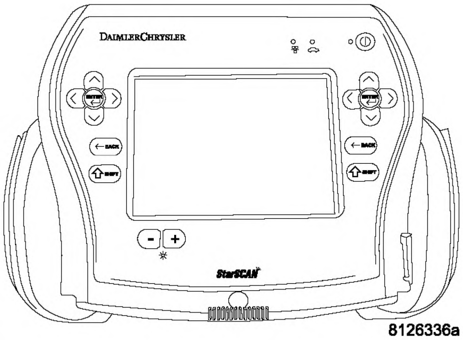
Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

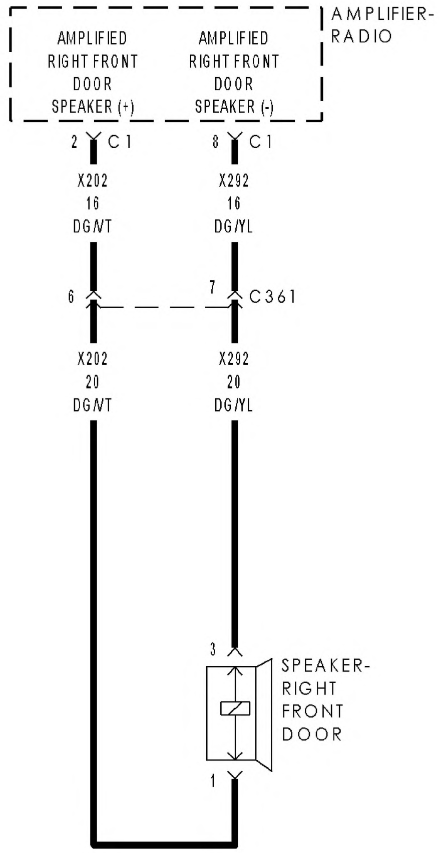
Does the scan tool display active: B146F-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE?

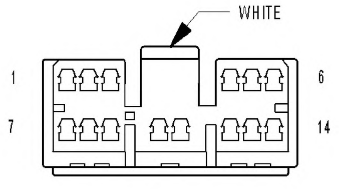
Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

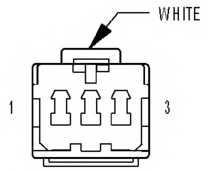


B1470-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT LOW


AMPLIFIER-
RADIO
AMPLIFIED
RIGHT FRONT
DOOR
SPEAKER (+)
AMPLIFIED
RIGHT FRONT
DOOR
SPEAKER (-)
2
C1
8
C1
X202
16
DG/VT
X292
16
DG/YL
6
7
C361
X202
20
DG/VT
X292
20
DG/YL
3
SPEAKER-
RIGHT
FRONT
DOOR
1


WHITE
1
6
7
14

AMPLIFIER-
RADIO C1


WHITE
1
3

SPEAKER-RIGHT
FRONT DOOR

812cf024

B1470-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a shorted to ground condition on the speaker output circuit.

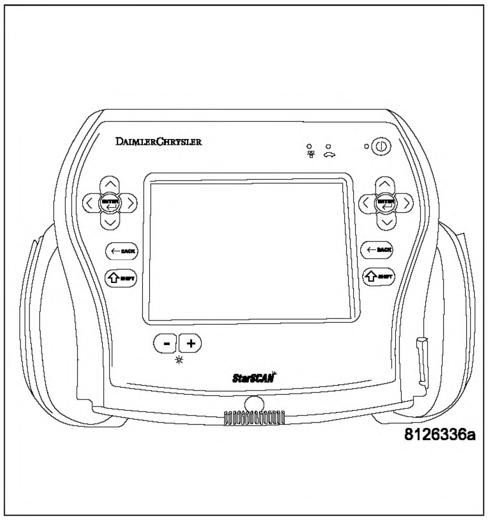
Possible Causes
(X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT SHORTED TO GROUND
(X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUIT SHORTED TO GROUND
RIGHT FRONT DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1470-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

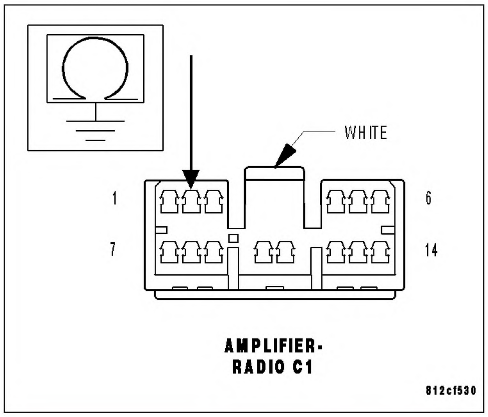
Perform BODY VERIFICATION TEST VER-1.

B1470-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

2. CHECK THE (X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND

Disconnect the Amplifier C1 harness connector.

Measure the resistance between ground and the (X202) Amplified Right Front Door Speaker (+) circuit.



Is the resistance below 10K ohms?

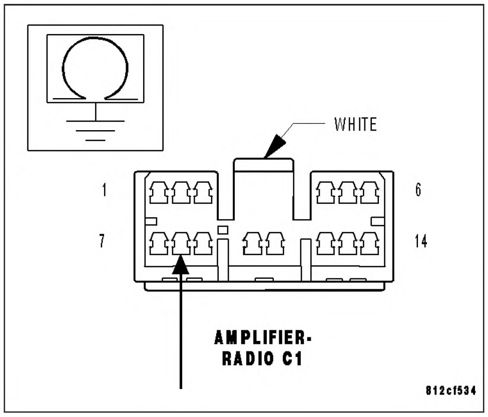
Yes >> Repair the (X202) Amplified Left Front Door Speaker (+) circuit for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

---

3. CHECK THE (X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X292) Amplified Right Front Door Speaker (-) circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X292) Amplified Right Front Door Speaker (-) for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 4

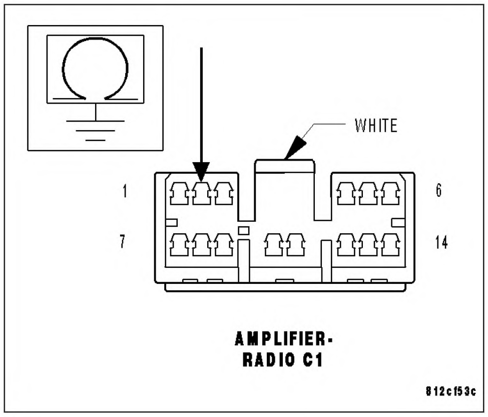
---

4. CHECK OPERATION OF THE AMPLIFIED RIGHT FRONT DOOR SPEAKER

Turn the ignition off.

Reconnect and reinstall the Right Front Door Speaker.

Measure the resistance of the speaker circuit between the Amplifier C1 harness connector and ground..

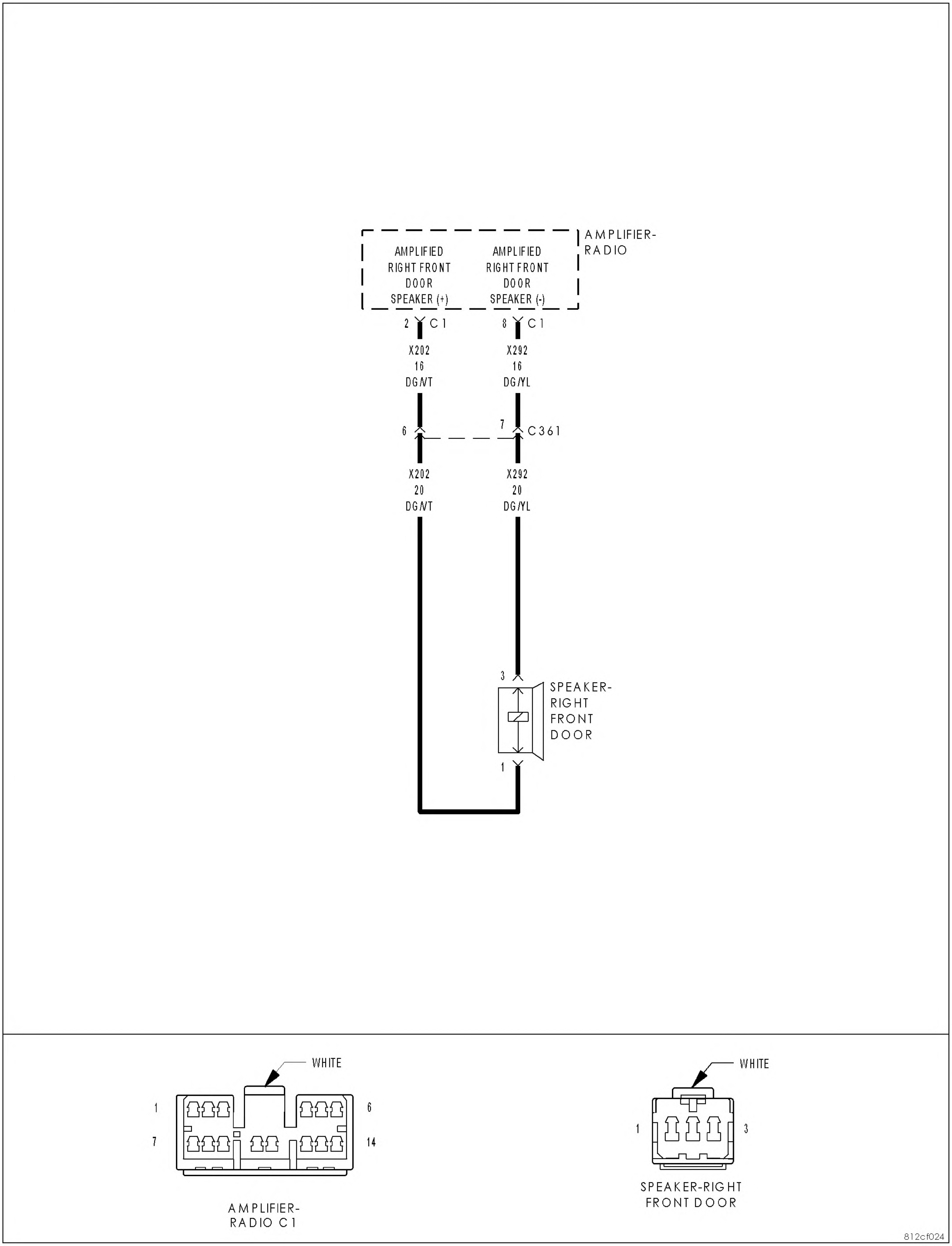


Is the resistance below 10K ohms?

Yes >> Replace the Right Front Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1471-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT HIGH


AMPLIFIER-
RADIO
AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
2 C1
8 C1
X202
16
DG/VT
X292
16
DG/YL
6
7
C361
X202
20
DG/VT
X292
20
DG/YL
3
1
SPEAKER-
RIGHT
FRONT
DOOR
WHITE
1
6
7
14
AMPLIFIER-
RADIO C1
WHITE
1
3
SPEAKER-RIGHT
FRONT DOOR
812cf024

B1471-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a short to battery condition on the output circuit.

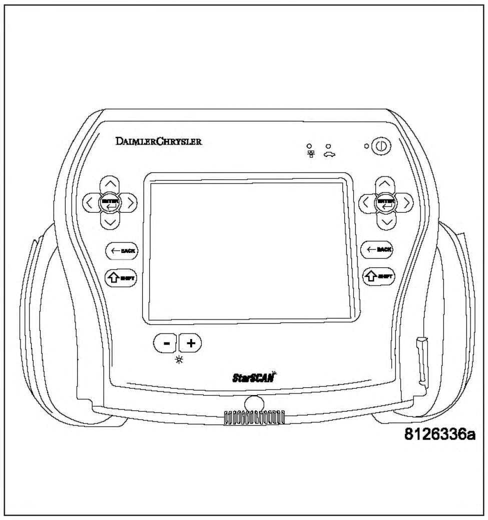
Possible Causes
(X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT SHORT TO VOLTAGE
(X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUIT SHORT TO VOLTAGE
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1471-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK FOR VOLTAGE ON THE (X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT

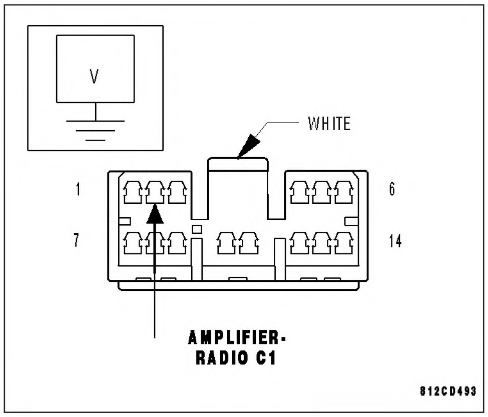
Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Disconnect the Amplified Right Front Door Speaker harness connector.

Turn the ignition on.

Measure for voltage on the (X202) Amplified Right Front Door Speaker (+) circuit.



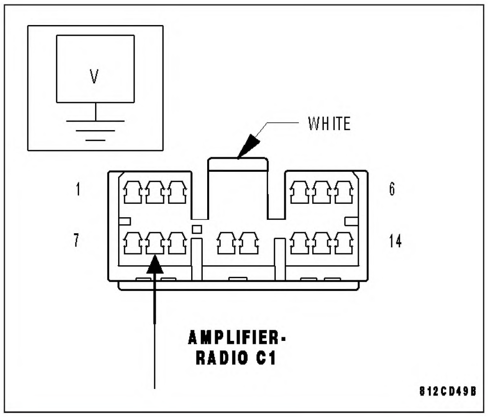
Is the voltage above 10.0 volts?

Yes >> Repair the (X202) Amplified Right Front Door Speaker (+) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B1471-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUIT



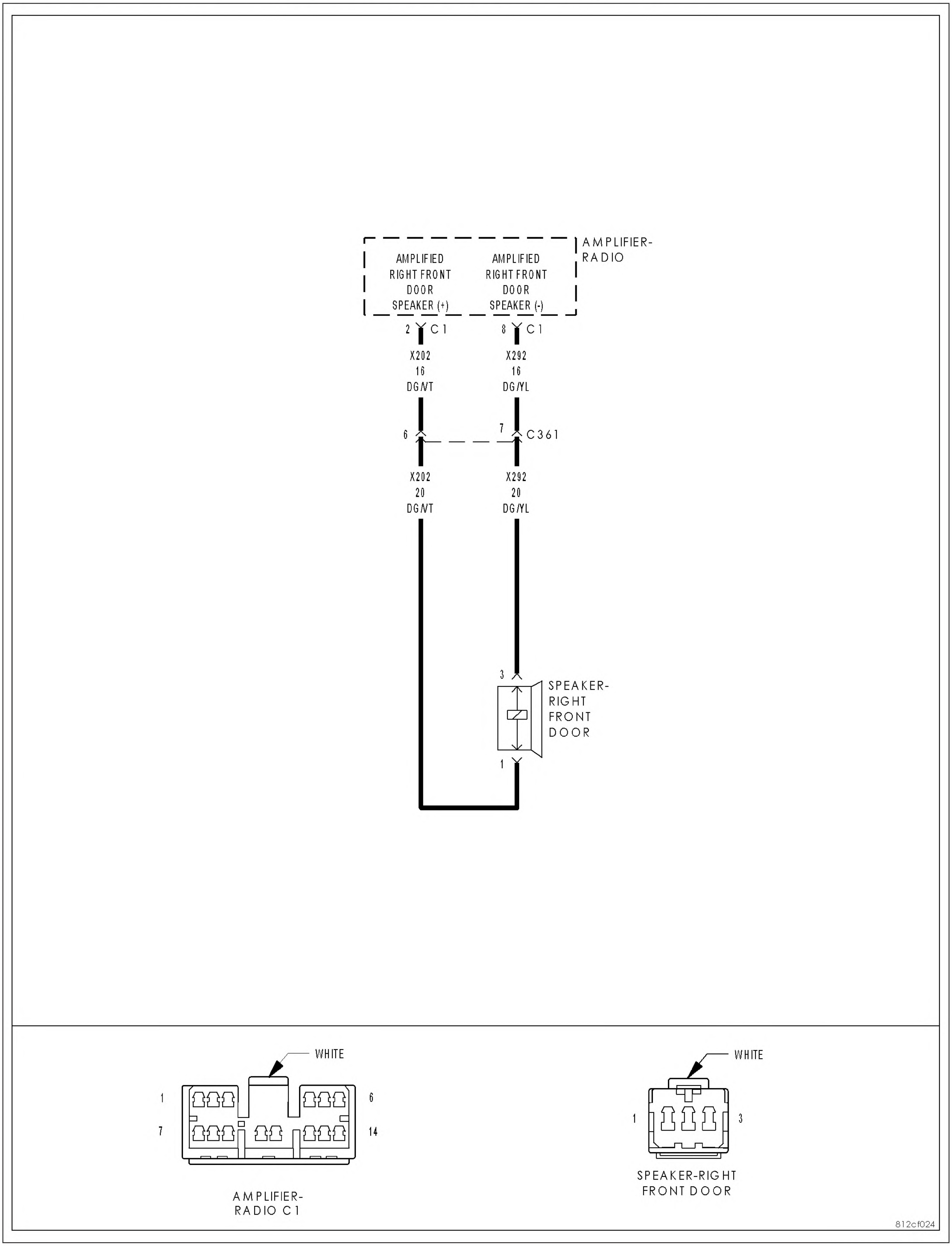
Measure for voltage on the (X292) Amplified Right Front Door Speaker (-) circuit.

Is the voltage above 10.0 volts?

Yes >> Repair the (X292) Amplified Right Front Door Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1472-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT OPEN


AMPLIFIER-RADIO
AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
2 C1
8 C1
X202 16 DG/VT
X292 16 DG/YL
6
7
C361
X202 20 DG/VT
X292 20 DG/YL
3
1
SPEAKER-RIGHT FRONT DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
812cf024

B1472-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Amplifier Bus wake-up. Amplifier reset with scan tool.
- **Set Condition:**
  The Amplifier detects an open condition on the speaker output circuit.

Possible Causes
(X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT OPEN
(X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUIT OPEN
RIGHT FRONT DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

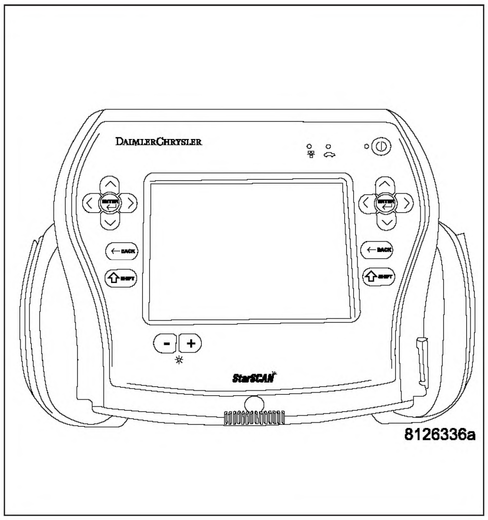
Turn the ignition on.

Turn the radio on.

With the scan tool, erase Amplifier DTCs.

With the scan tool, reset the amplifier.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1472-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

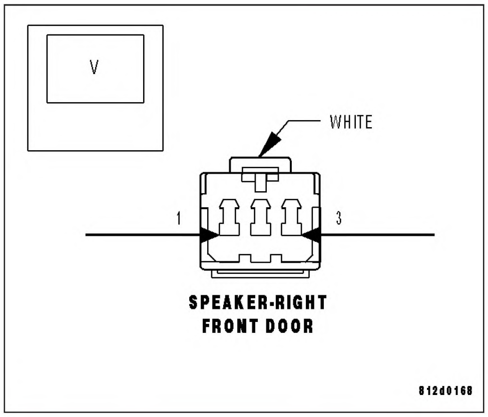
---

2. CHECK THE OPERATION OF THE RIGHT FRONT DOOR SPEAKER

Disconnect the Right Front Door Speaker harness connector.

Turn the radio on and turn the volume to mid level.

With a voltmeter set to read in A/C voltage, measure the voltage of the Amplified Right Front Door Speaker circuits in the Amplified Right Front Door Speaker harness connector.



Is the voltage present greater than 1 volt?

Yes >> Replace the Amplified Right Front Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

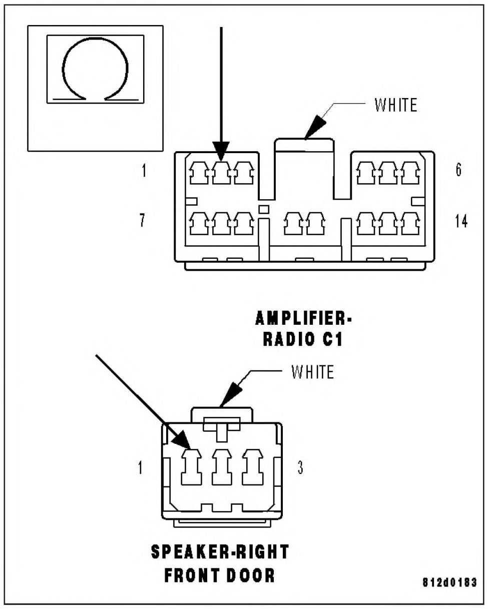
B1472-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. CHECK THE (X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X202) Amplified Right Front Door Speaker (+) circuit between the Amplifier C1 harness connector and the Amplified Right Front Door Speaker harness connector.


WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
812d0183

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (X202) Amplified Right Front Door Speaker (+) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

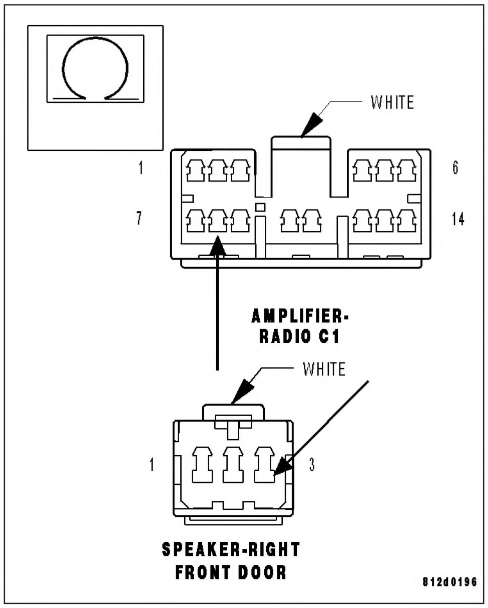
---

4. CHECK THE (X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X292) Amplified Right Front Door Speaker (-) circuit between the Amplifier C1 harness connector and the Amplified Right Front Door Speaker harness connector.

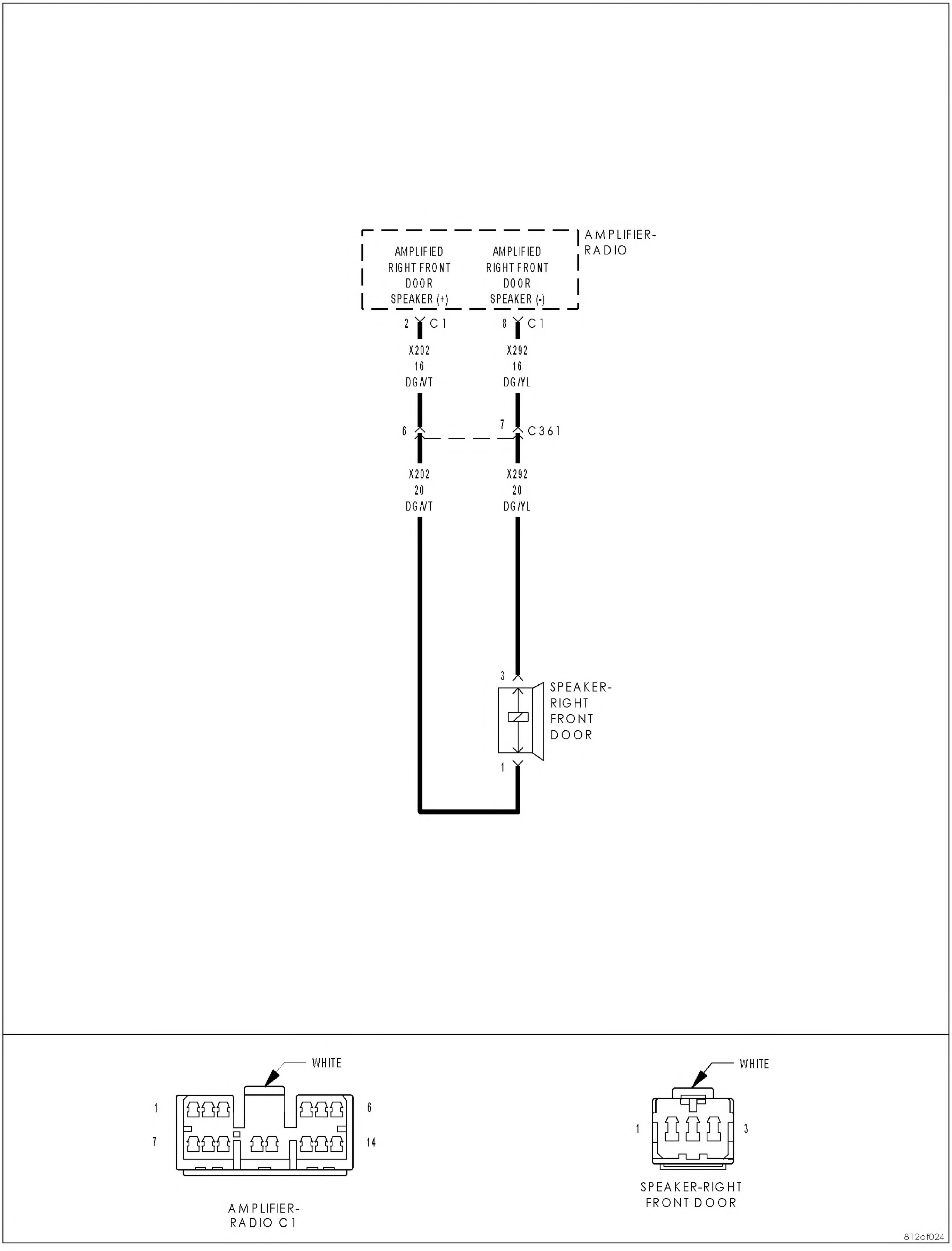

WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
812d0196

Is the resistance below 5.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Repair the (X292) Amplified Right Front Door Speaker (-) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

B1473-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER


AMPLIFIER-RADIO
AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
2 C1
8 C1
X202 16 DG/VT
X292 16 DG/YL
6
7 C361
X202 20 DG/VT
X292 20 DG/YL
3
1
SPEAKER-RIGHT FRONT DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT FRONT DOOR
812cf024

B1473-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Radio volume at 25 or higher.
- **Set Condition:**
  The amplifier detects that the output circuits are shorted together.

Possible Causes
(X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT SHORTED TO THE (X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUIT
AMPLIFIED RIGHT FRONT DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

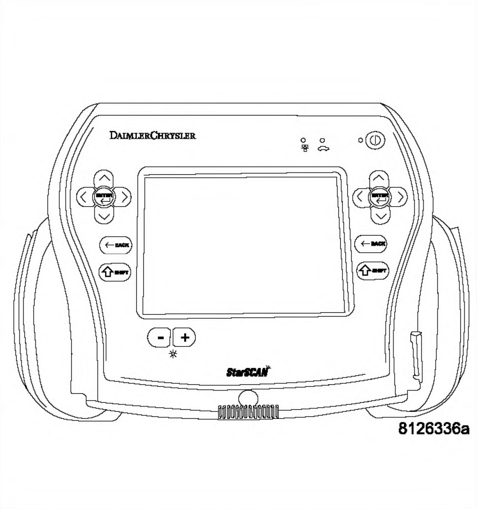
Turn the ignition on, then off, and then on again.

With the scan tool, erase Amplifier DTCs.

Turn the radio on.

Turn the volume level to 25.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1473-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK THE OPERATION OF THE AMPLIFIED RIGHT FRONT DOOR SPEAKER

Disconnect the Amplified Right Front Door Speaker.

Measure the resistance of the speaker between the two terminals.

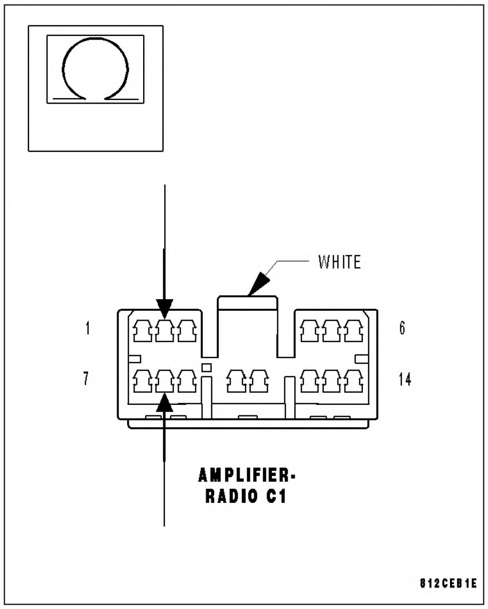
Is the resistance of the speaker less than 1 ohm?

Yes >> Replace the Amplified Right Front Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B1473-CHANNEL 4 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK THE (X202) AMPLIFIED RIGHT FRONT DOOR SPEAKER (+) CIRCUIT, AND THE (X292) AMPLIFIED RIGHT FRONT DOOR SPEAKER (-) CIRCUITS FOR A SHORT TOGETHER



Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance between the (X202) Amplified Right Front Door Speaker (+) circuit, and the (X292) Amplified Right Front Door Speaker (-) circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (X202) Amplified Right Front Door Speaker (+) circuit, and the (X292) Amplified Right Front Door Speaker (-) circuit for a short together.

Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.

Perform BODY VERIFICATION TEST VER-1.

B1474-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if a DC offset occurs on the output channel, the amplifier shall set a DTC after a maturity rate of 5 ±1 sec.

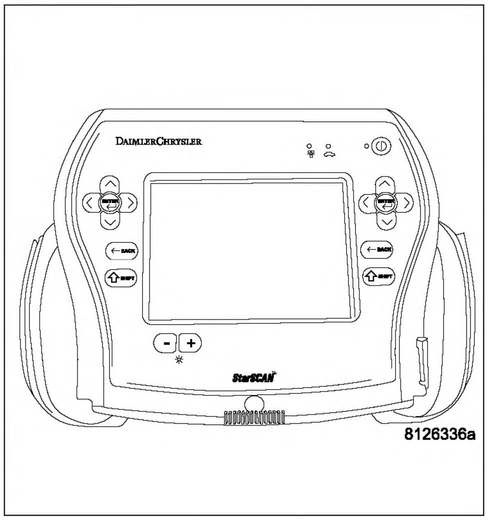
Possible Causes
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

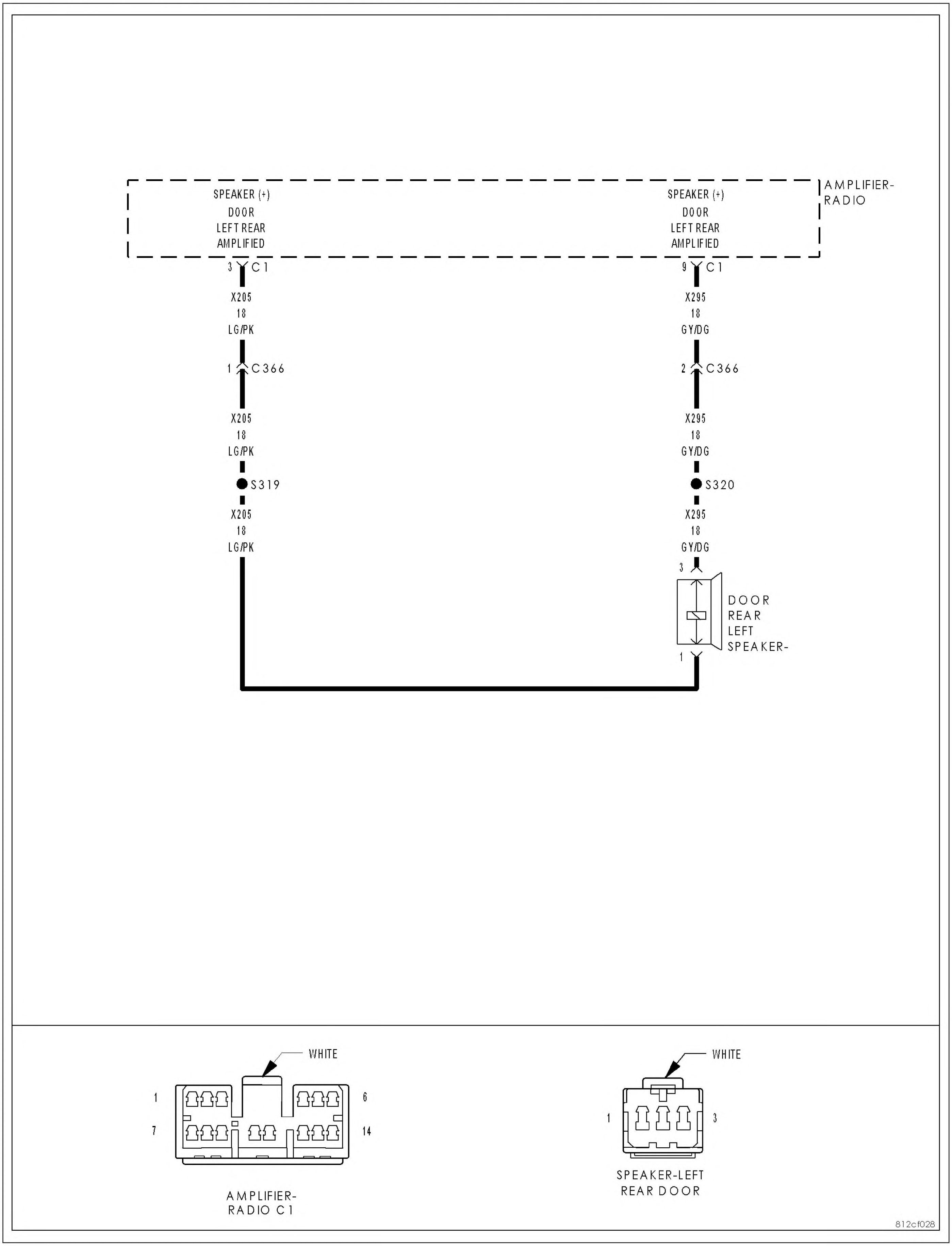


Does the scan tool display active: B1474-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

B1475-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT LOW


AMPLIFIER-
RADIO
SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
3 C1
9 C1
X205
18
LG/PK
X295
18
GY/DG
1 C366
2 C366
X205
18
LG/PK
X295
18
GY/DG
S319
S320
X205
18
LG/PK
X295
18
GY/DG
3
DOOR
REAR
LEFT
SPEAKER-
1
WHITE
1
6
7
14
AMPLIFIER-
RADIO C1
WHITE
1
3
SPEAKER-LEFT
REAR DOOR
812cf028

B1475-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a shorted to ground condition on the speaker output circuit.

Possible Causes
(X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT SHORTED TO GROUND
(X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT SHORTED TO GROUND
LEFT REAR DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

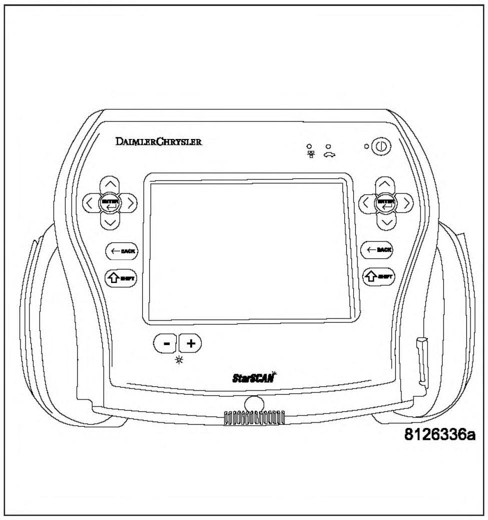
Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B1475-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



2. CHECK THE (X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND

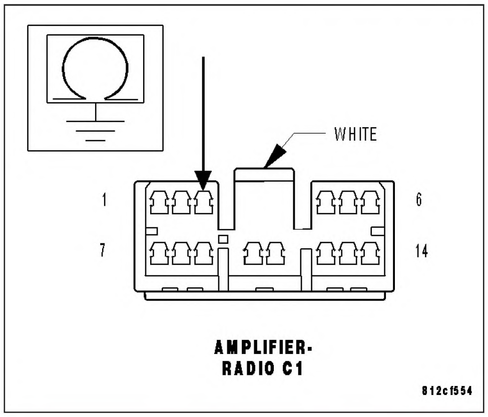
Disconnect the Amplifier C1 harness connector.

Measure the resistance between ground and the (X205) Amplified Left Rear Door Speaker (+) circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (X205) Amplified Left Rear Door Speaker (+) circuit for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

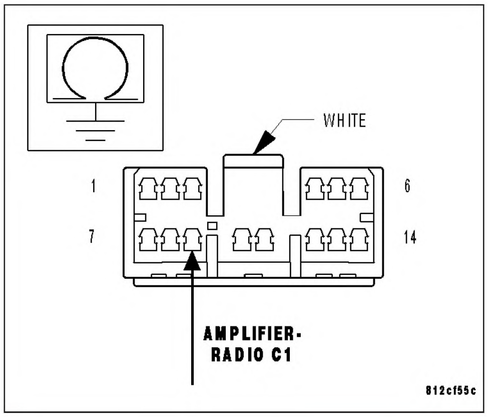
No >> Go To 3



B1475-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. CHECK THE (X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X295) Amplified Left Rear Door Speaker (-) circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X295) Amplified Left Rear Door Speaker (-) for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 4

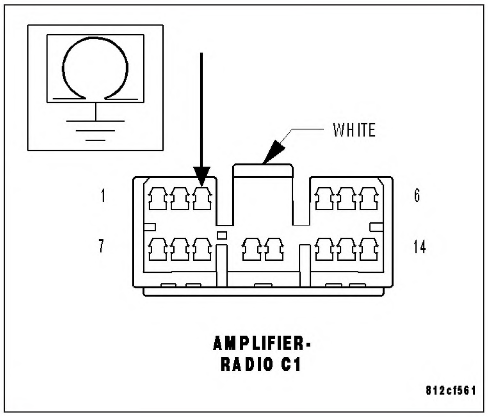
---

4. CHECK OPERATION OF THE AMPLIFIED LEFT REAR DOOR SPEAKER

Turn the ignition off.

Reconnect and reinstall the Left Rear Door Speaker.

Measure the resistance of the speaker circuit between the Amplifier C1 harness connector and ground..

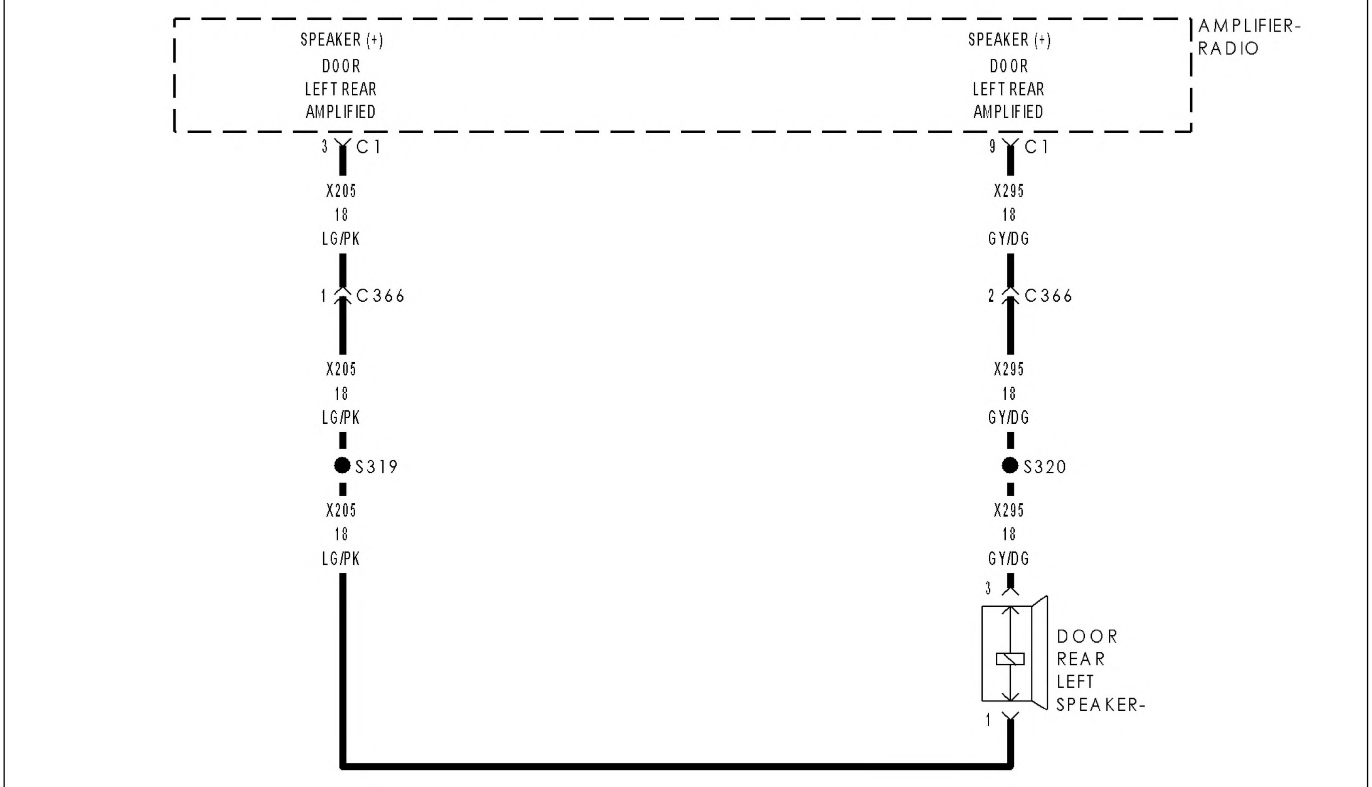


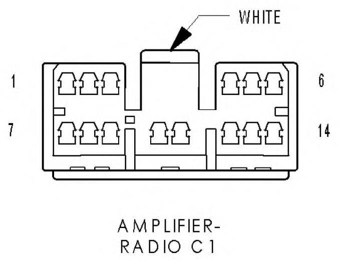
Is the resistance below 10K ohms?

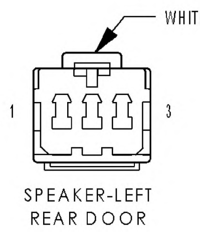
Yes >> Replace the Left Rear Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1476-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT HIGH


SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
AMPLIFIER-
RADIO
3 C1
9 C1
X205
18
LG/PK
X295
18
GY/DG
1 C366
2 C366
X205
18
LG/PK
X295
18
GY/DG
S319
S320
X205
18
LG/PK
X295
18
GY/DG
3
DOOR
REAR
LEFT
SPEAKER-
1


WHITE
1
6
7
14
AMPLIFIER-
RADIO C1


WHITE
1
3
SPEAKER-LEFT
REAR DOOR

812cf028

B1476-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a short to battery condition on the output circuit.

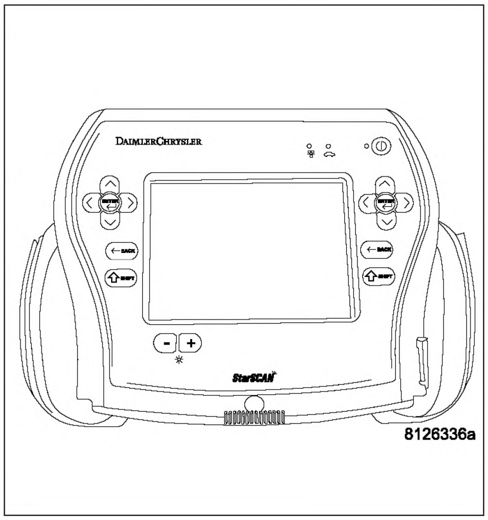
Possible Causes
(X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT SHORT TO VOLTAGE
(X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT SHORT TO VOLTAGE
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1476-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK FOR VOLTAGE ON THE (X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT

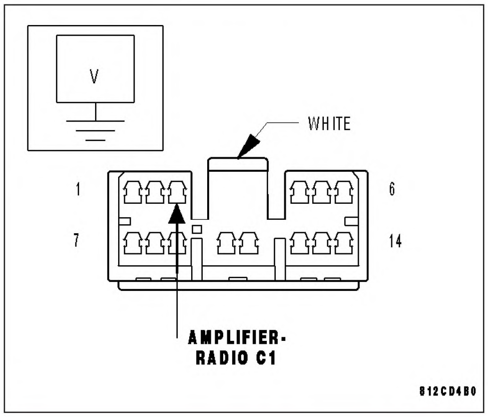
Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Disconnect the Amplified Left Rear Door Speaker harness connector.

Turn the ignition on.

Measure for voltage on the (X205) Amplified Left Rear Door Speaker (+) circuit.



Is the voltage above 10.0 volts?

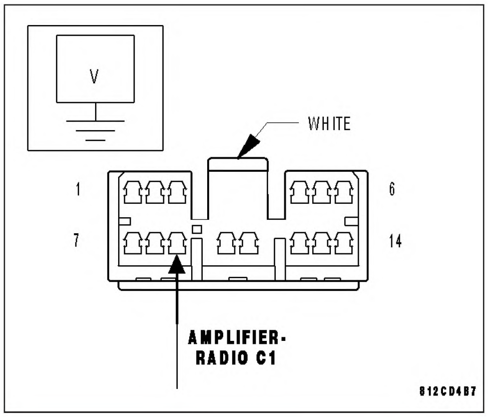
Yes >> Repair the (X205) Amplified Left Rear Door Speaker (+) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B1476-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT

Measure for voltage on the (X295) Amplified Left Rear Door Speaker (-) circuit.

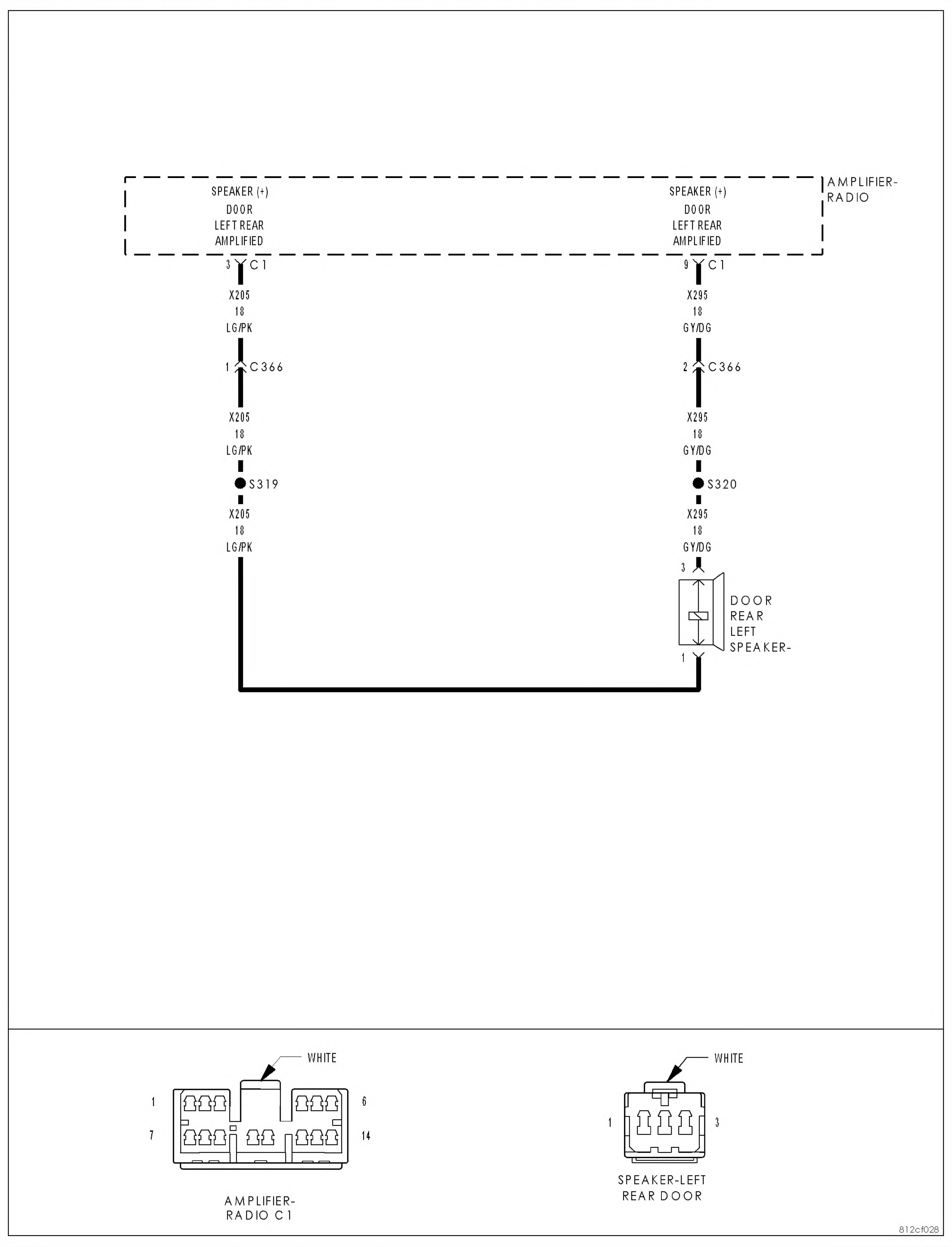


Is the voltage above 10.0 volts?

Yes >> Repair the (X295) Amplified Left Rear Door Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B1477-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT OPEN


AMPLIFIER-
RADIO
SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
3 C1
9 C1
X205
18
LG/PK
X295
18
GY/DG
1 C366
2 C366
X205
18
LG/PK
X295
18
GY/DG
S319
S320
X205
18
LG/PK
X295
18
GY/DG
3
1
DOOR
REAR
LEFT
SPEAKER-
WHITE
1
6
7
14
AMPLIFIER-
RADIO C1
WHITE
1
3
SPEAKER-LEFT
REAR DOOR
812cf028

B1477-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Amplifier Bus wake-up. Amplifier reset with scan tool.
- **Set Condition:**
  The Amplifier detects an open condition on the speaker output circuit.

Possible Causes
(X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT OPEN
(X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT OPEN
LEFT REAR DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

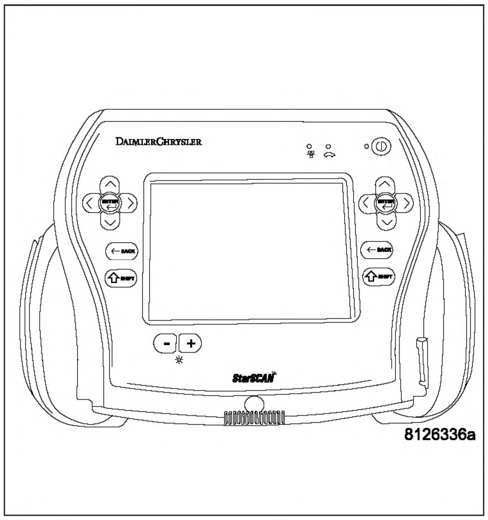
Turn the ignition on.

Turn the radio on.

With the scan tool, erase Amplifier DTCs.

With the scan tool, reset the amplifier.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B1477-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

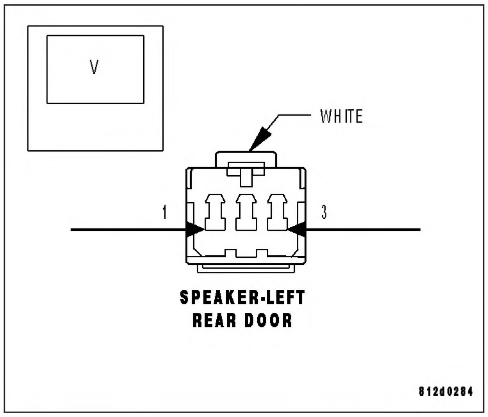
No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

2. CHECK THE OPERATION OF THE LEFT REAR DOOR SPEAKER

Disconnect the Left Rear Door Speaker harness connector.

Turn the radio on and turn the volume to mid level.

With a voltmeter set to read in A/C voltage, measure the voltage of the Amplified Left Rear Door Speaker circuits in the Amplified Left Rear Door Speaker harness connector.



Is the voltage present greater than 1 volt?

Yes >> Replace the Amplified Left I/P Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

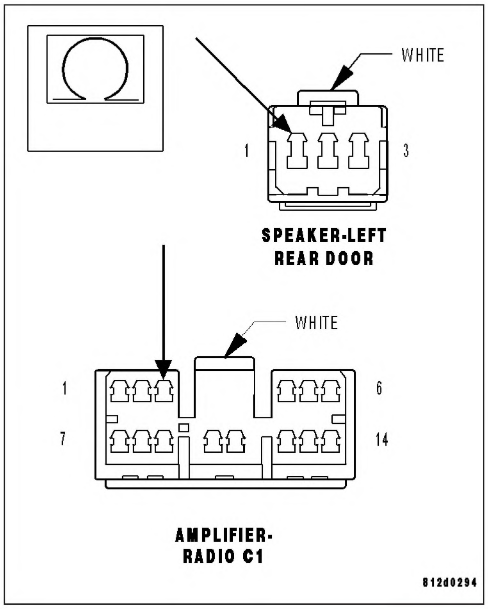
B1477-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. CHECK THE (X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X205) Amplified Left Rear Door Speaker (+) circuit between the Amplifier C1 harness connector and the Amplified Left Rear Door Speaker harness connector.


WHITE
1
3
SPEAKER-LEFT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
812d0294

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (X205) Amplified Left Rear Door Speaker (+) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

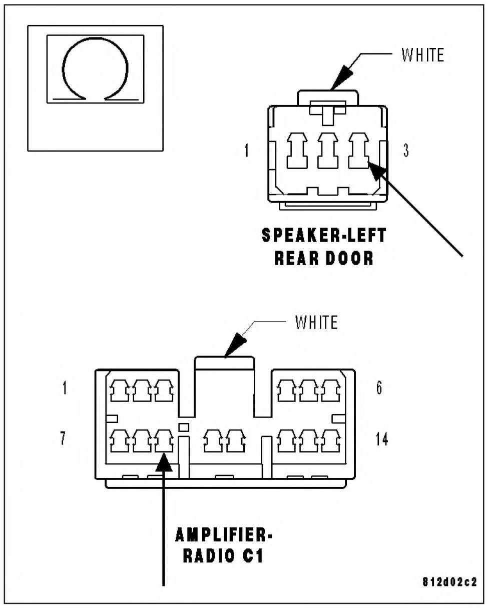
---

4. CHECK THE (X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X295) Amplified Left Rear Door Speaker (-) circuit between the Amplifier C1 harness connector and the Amplified Left Rear Door Speaker harness connector.

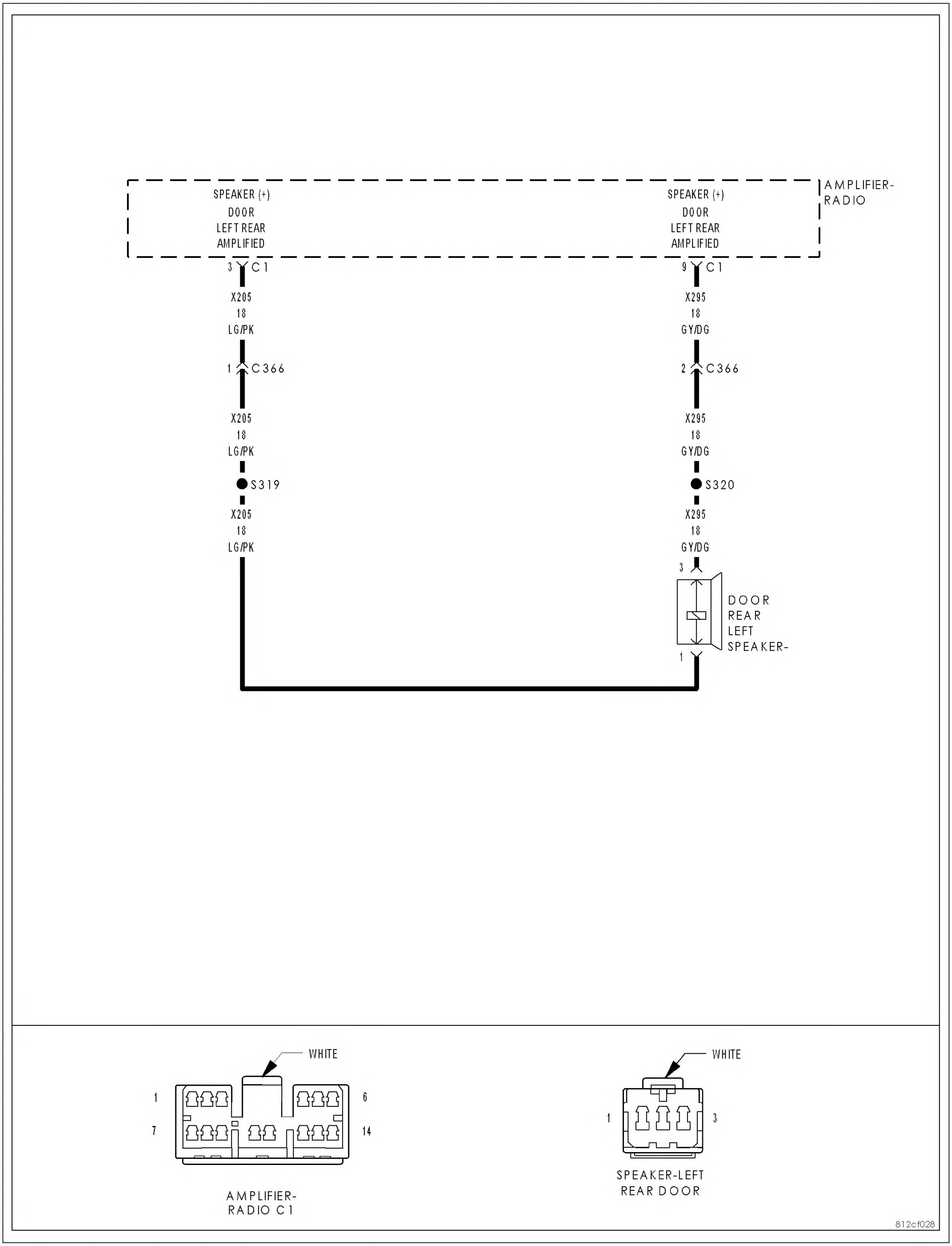

WHITE
1
3
SPEAKER-LEFT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
812d02c2

Is the resistance below 5.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Repair the (X295) Amplified Left Rear Door Speaker (-) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

B1478-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER


AMPLIFIER-
RADIO
SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
SPEAKER (+)
DOOR
LEFT REAR
AMPLIFIED
3 C1
9 C1
X205
18
LG/PK
X295
18
GY/DG
1 C366
2 C366
X205
18
LG/PK
X295
18
GY/DG
S319
S320
X205
18
LG/PK
X295
18
GY/DG
3
1
DOOR
REAR
LEFT
SPEAKER-
WHITE
1
6
7
14
AMPLIFIER-
RADIO C1
WHITE
1
3
SPEAKER-LEFT
REAR DOOR
812cf028

B1478-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Radio volume at 25 or higher.
- **Set Condition:**
  The amplifier detects that the output circuits are shorted together.

Possible Causes
(X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT SHORTED TO THE (X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUIT
AMPLIFIED LEFT REAR DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, erase Amplifier DTCs.

Turn the radio on.

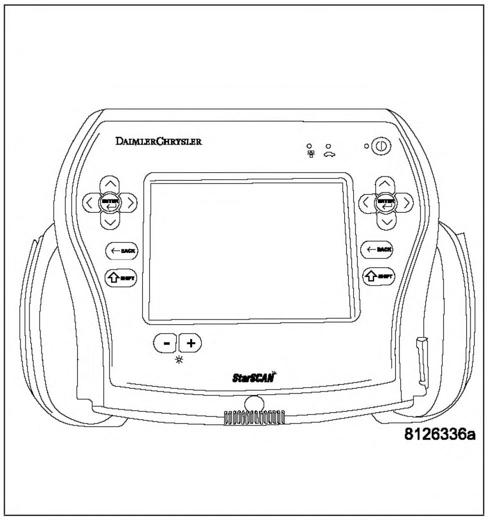
Turn the volume level to 25.

With the scan tool, read Amplifier DTCs.

Does the scan tool display active: B1478-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.



2. CHECK THE OPERATION OF THE AMPLIFIED LEFT REAR DOOR SPEAKER

Disconnect the Amplified Left Rear Door Speaker.

Measure the resistance of the speaker between the two terminals.

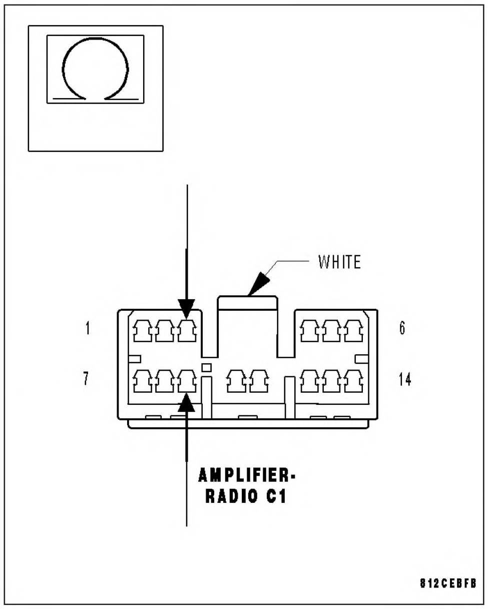
Is the resistance of the speaker less than 1 ohm?

Yes >> Replace the Amplified Left Rear Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B1478-CHANNEL 5 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK THE (X205) AMPLIFIED LEFT REAR DOOR SPEAKER (+) CIRCUIT, AND THE (X295) AMPLIFIED LEFT REAR DOOR SPEAKER (-) CIRCUITS FOR A SHORT TOGETHER



Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance between the (X205) Amplified Left Rear Door Speaker (+) circuit, and the (X295) Amplified Left Rear Door Speaker (-) circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (X205) Amplified Left Rear Door Speaker (+) circuit, and the (X295) Amplified Left Rear Door Speaker (-) circuit for a short together.

Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.

Perform BODY VERIFICATION TEST VER-1.

B1479-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if a DC offset occurs on the output channel, the amplifier shall set a DTC after a maturity rate of 5 ±1 sec.

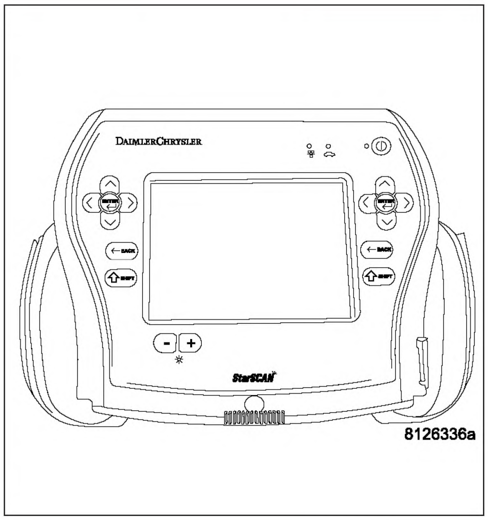
Possible Causes
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.

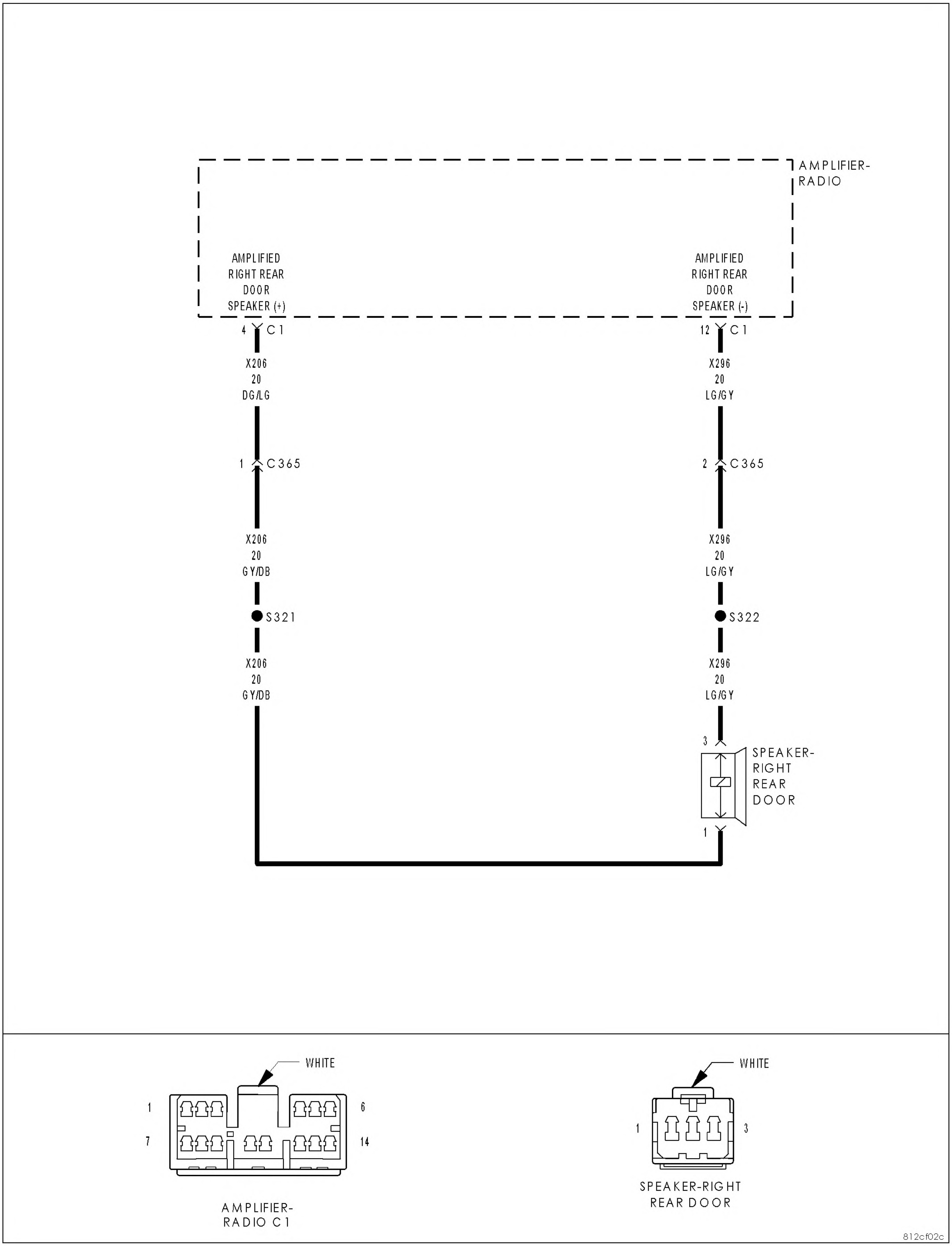


Does the scan tool display active: B1479-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT PERFORMANCE?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

B147A-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT LOW


AMPLIFIER-RADIO
AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
4 C1
12 C1
X206 20 DG/LG
X296 20 LG/GY
1 C365
2 C365
X206 20 GY/DB
X296 20 LG/GY
S321
S322
X206 20 GY/DB
X296 20 LG/GY
3
1
SPEAKER-RIGHT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812cf02c

B147A-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a shorted to ground condition on the speaker output circuit.

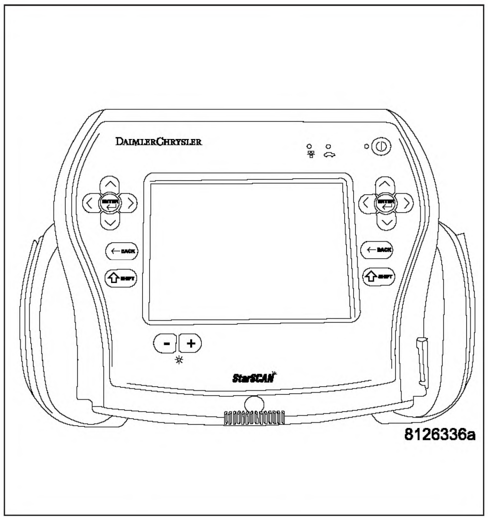
Possible Causes
(X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT SHORTED TO GROUND
(X296) AMPLIFIED RIGHT REAR DOOR SPEAKER (-) CIRCUIT SHORTED TO GROUND
RIGHT REAR DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B147A-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT LOW?

Yes >> Go To 2

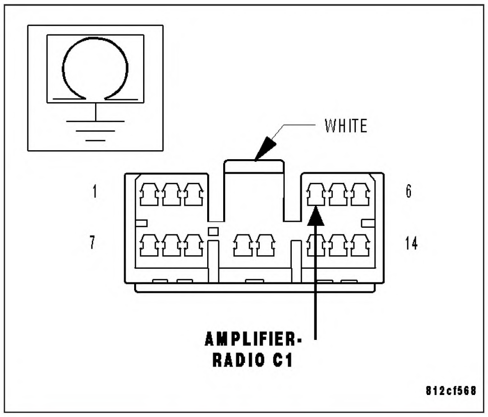
No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK THE (X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT FOR A SHORT TO GROUND

Disconnect the Amplifier C1 harness connector.

Measure the resistance between ground and the (X206) Amplified Right Rear Door Speaker (+) circuit.



Is the resistance below 10K ohms?

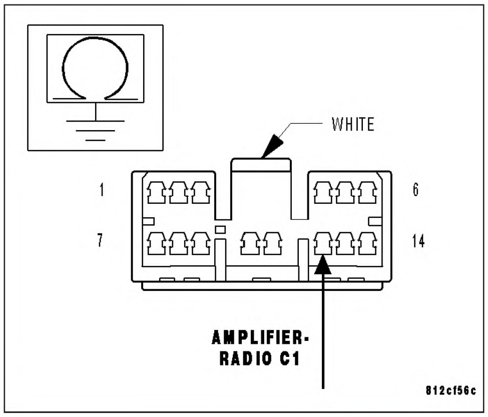
Yes >> Repair the (X206) Amplified Right Rear Door Speaker (+) circuit for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B147A-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT LOW (CONTINUED)

3. CHECK THE (X296) AMPLIFIED RIGHT REAR DOOR SPEAKER (-) CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X296) Amplified Right Rear Door Speaker (-) circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X296) Amplified Right Rear Door Speaker (-) for a short to ground.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 4

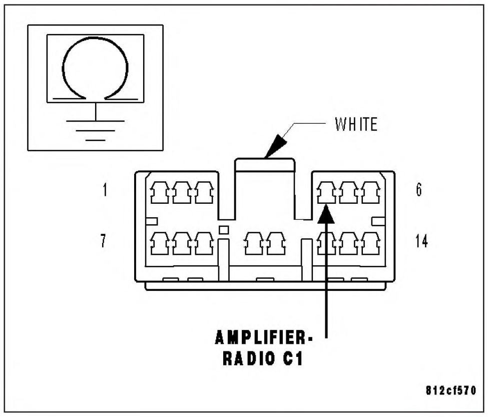
---

4. CHECK OPERATION OF THE AMPLIFIED RIGHT REAR DOOR SPEAKER

Turn the ignition off.

Reconnect and reinstall the Right Rear Door Speaker.

Measure the resistance of the speaker circuit between the Amplifier C1 harness connector and ground..

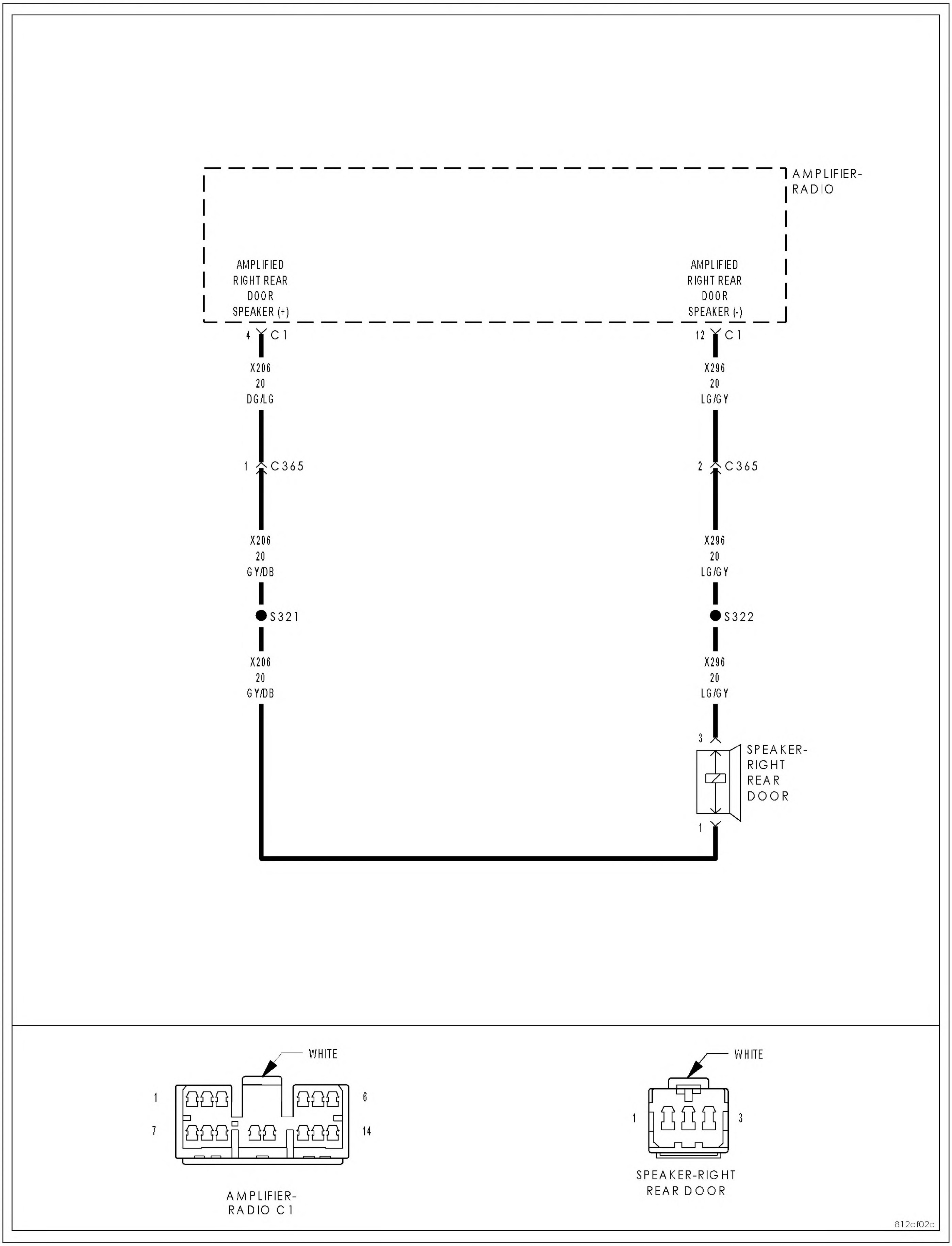


Is the resistance below 10K ohms?

Yes >> Replace the Right Rear Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B147B-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT HIGH


AMPLIFIER-RADIO
AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
4 C1
12 C1
X206 20 DG/LG
X296 20 LG/GY
1 C365
2 C365
X206 20 GY/DB
X296 20 LG/GY
S321
S322
X206 20 GY/DB
X296 20 LG/GY
3
1
SPEAKER-RIGHT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812cf02c

B147B-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Amplifier detects a short to battery condition on the output circuit.

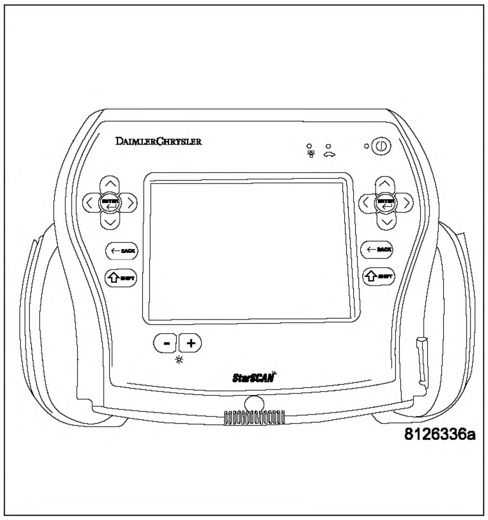
Possible Causes
(X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT SHORT TO VOLTAGE
(X296) AMPLIFIED RIGHT REAR DOOR SPEAKER (-) CIRCUIT SHORT TO VOLTAGE
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

Turn the ignition on, then off, and then on again.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B147B-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

---

2. CHECK FOR VOLTAGE ON THE (X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT

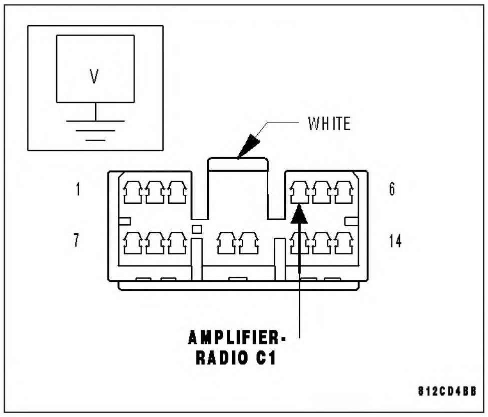
Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Disconnect the Amplified Right Rear Door Speaker harness connector.

Turn the ignition on.

Measure for voltage on the (X206) Amplified Right Rear Door Speaker (+) circuit.



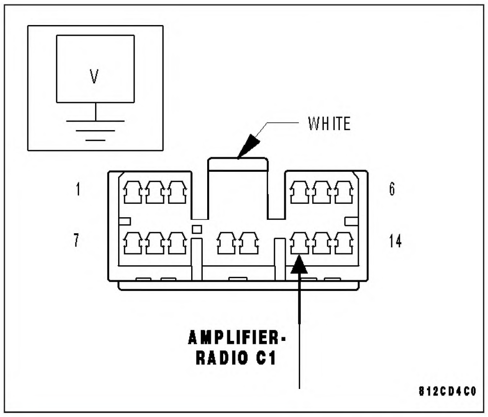
Is the voltage above 10.0 volts?

Yes >> Repair the (X206) Amplified Right Rear Door Speaker (+) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

B147B-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT HIGH (CONTINUED)

3. CHECK FOR VOLTAGE ON THE (X296) AMPLIFIED RIGHT REAR SPEAKER SPEAKER (-) CIRCUIT



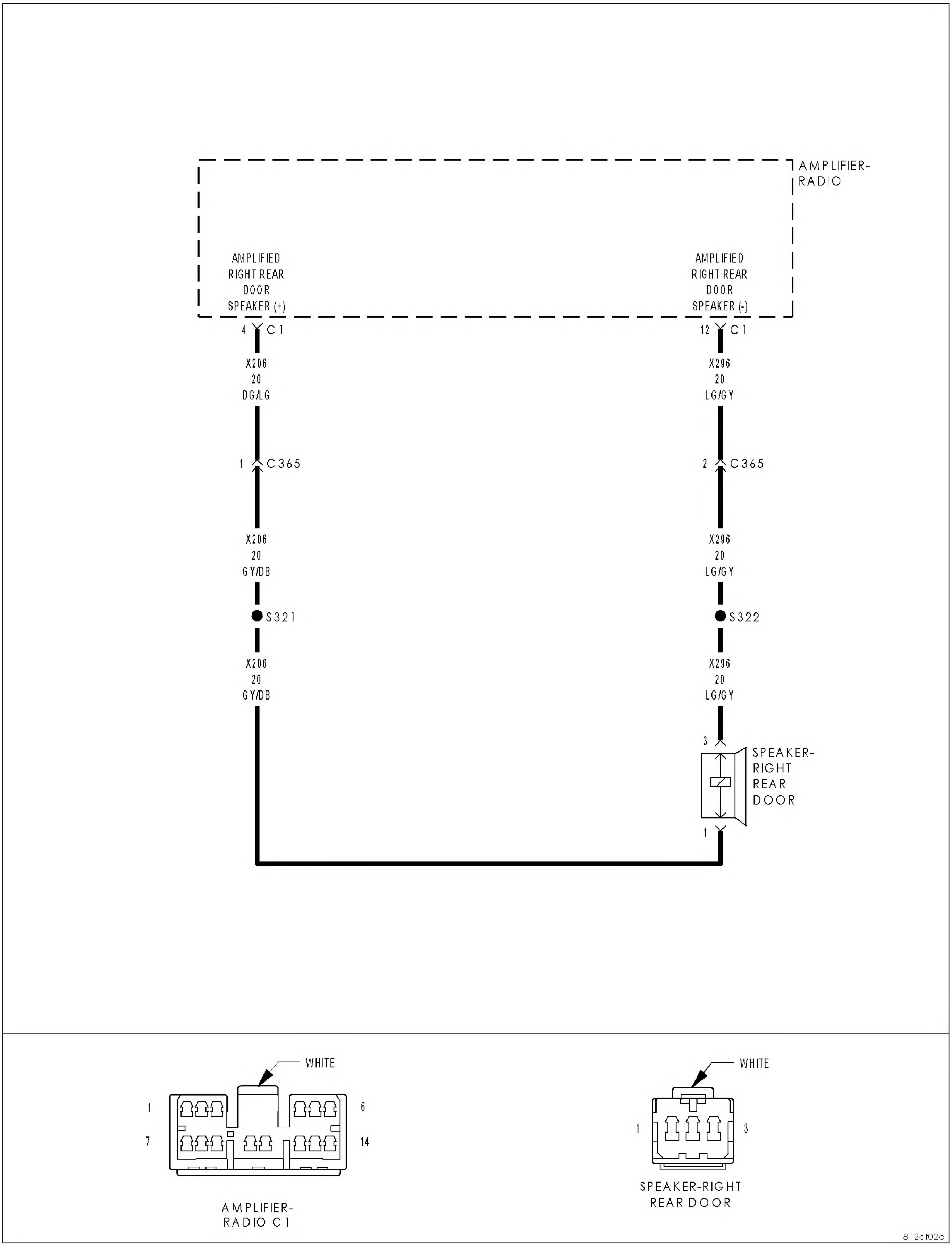
Measure for voltage on the (X296) Amplified Right Rear Door Speaker (-) circuit.

Is the voltage above 10.0 volts?

Yes >> Repair the (X296) Amplified Right Rear Door Speaker (-) circuit for a short to voltage.
Perform BODY VERIFICATION TEST VER-1.

No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

B147C-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT OPEN


AMPLIFIER-RADIO
AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
4 C1
12 C1
X206 20 DG/LG
X296 20 LG/GY
1 C365
2 C365
X206 20 GY/DB
X296 20 LG/GY
S321
S322
X206 20 GY/DB
X296 20 LG/GY
3
1
SPEAKER-RIGHT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812cf02c

B147C-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Amplifier Bus wake-up. Amplifier reset with scan tool.
- **Set Condition:**
  The Amplifier detects an open condition on the speaker output circuit.

Possible Causes
(X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT OPEN
(X296) AMPLIFIED RIGHT REAR DOOR SPEAKER (-) CIRCUIT OPEN
RIGHT REAR DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

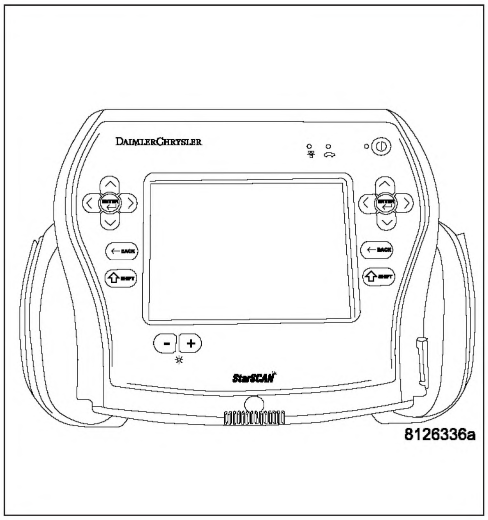
Turn the ignition on.

Turn the radio on.

With the scan tool, erase Amplifier DTCs.

With the scan tool, reset the amplifier.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B147C-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

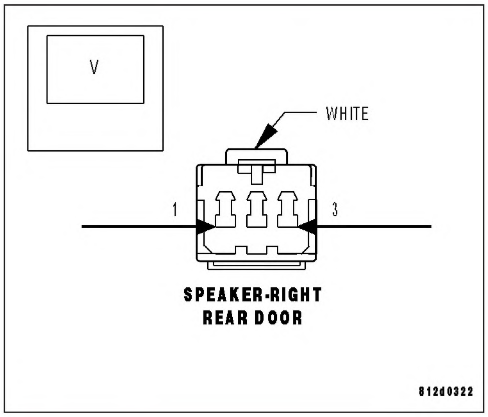
---

2. CHECK THE OPERATION OF THE RIGHT REAR DOOR SPEAKER

Disconnect the Right Rear Door Speaker harness connector.

Turn the radio on and turn the volume to mid level.

With a voltmeter set to read in A/C voltage, measure the voltage of the Amplified Right Rear Door Speaker circuits in the Amplified Right Rear Door Speaker harness connector.



Is the voltage present greater than 1 volt?

Yes >> Replace the Amplified Right Rear Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

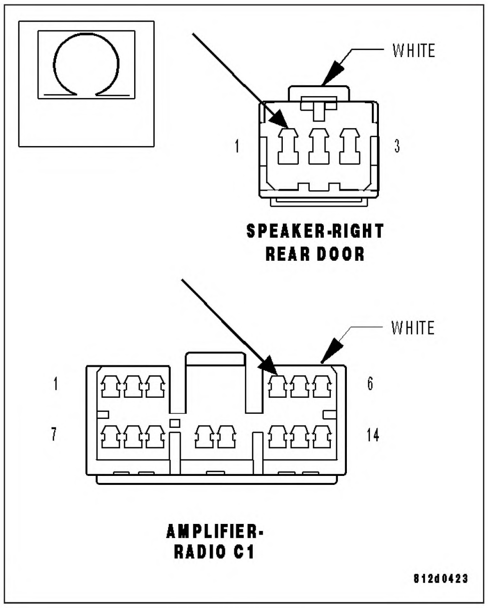
B147C-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT OPEN (CONTINUED)

3. CHECK THE (X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X206) Amplified Right Rear Door Speaker (+) circuit between the Amplifier C1 harness connector and the Amplified Right Rear Door Speaker harness connector.


WHITE
1
3
SPEAKER-RIGHT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
812d0423

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (X206) Amplified Right Rear Door Speaker (+) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

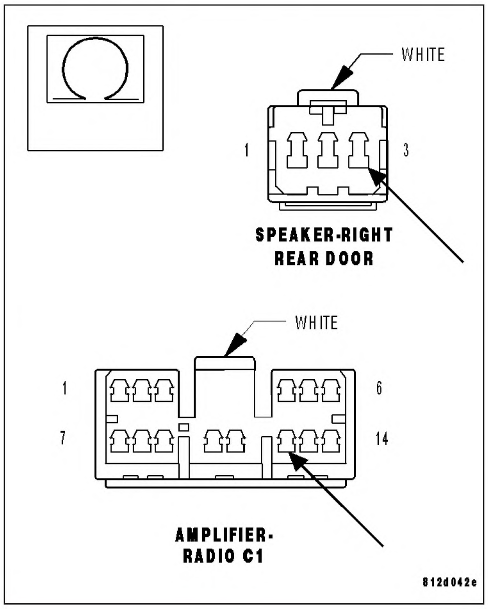
---

4. CHECK THE (X296) AMPLIFIED RIGHT REAR DOOR SPEAKER (-) CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance of the (X296) Amplified Right Rear Door Speaker (-) circuit between the Amplifier C1 harness connector and the Amplified Right Rear Door Speaker harness connector.

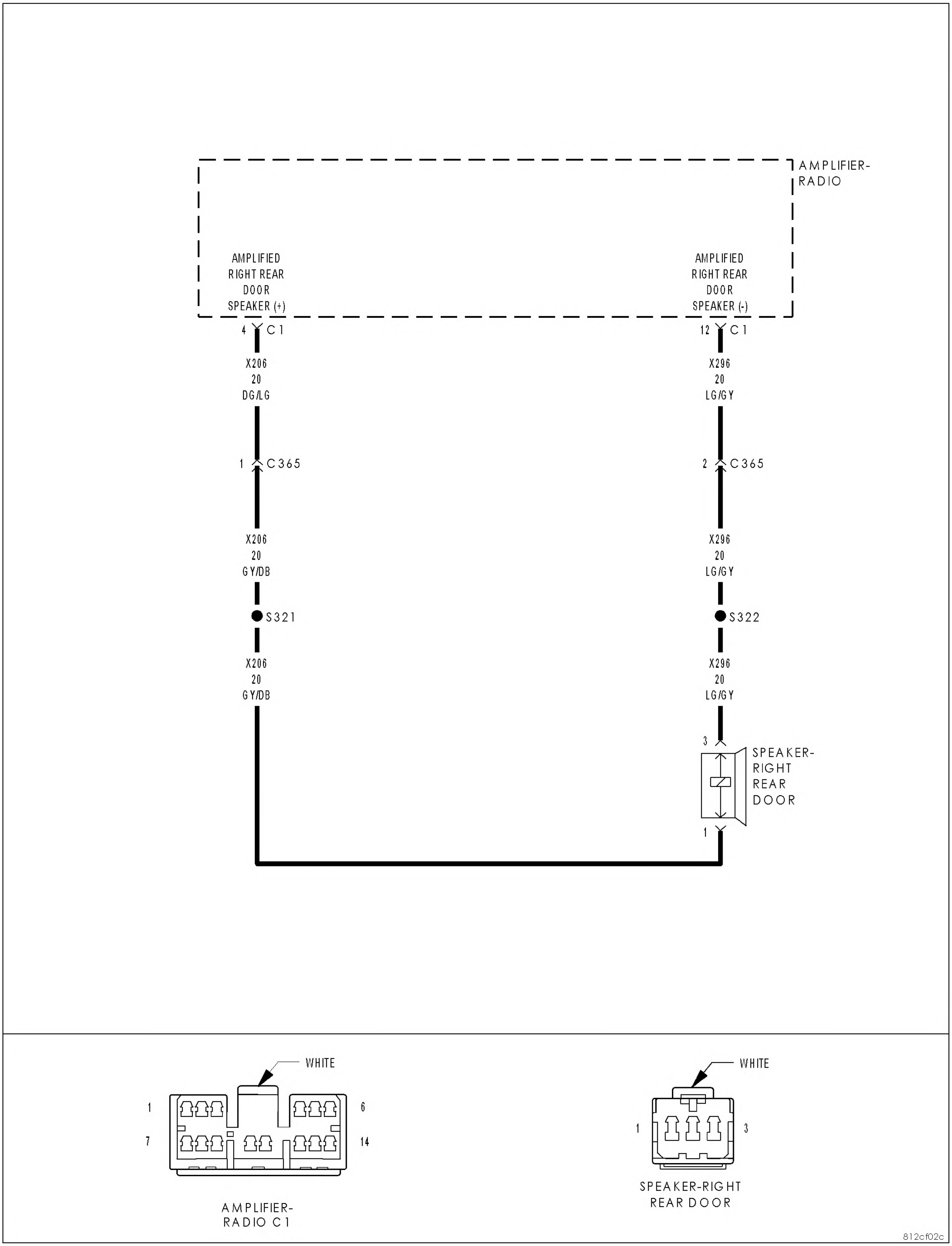

WHITE
1
3
SPEAKER-RIGHT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
812d042e

Is the resistance below 5.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Repair the (X296) Amplified Right Rear Door Speaker (-) circuit for an open.
Perform BODY VERIFICATION TEST VER-1.

B147D-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER


AMPLIFIER-RADIO
AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
4 C1
12 C1
X206 20 DG/LG
X296 20 LG/GY
1 C365
2 C365
X206 20 GY/DB
X296 20 LG/GY
S321
S322
X206 20 GY/DB
X296 20 LG/GY
3
1
SPEAKER-RIGHT REAR DOOR
WHITE
1
6
7
14
AMPLIFIER-RADIO C1
WHITE
1
3
SPEAKER-RIGHT REAR DOOR
812cf02c

B147D-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Radio volume at 25 or higher.
- **Set Condition:**
  The amplifier detects that the output circuits are shorted together.

Possible Causes
(X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT SHORTED TO THE (X296) AMPLIFIED RIGHT REAR DOOR SPEAKER (-) CIRCUIT
AMPLIFIED RIGHT REAR DOOR SPEAKER
AMPLIFIER

Diagnostic Test

1. CHECK FOR AN INTERMITTENT CONDITION

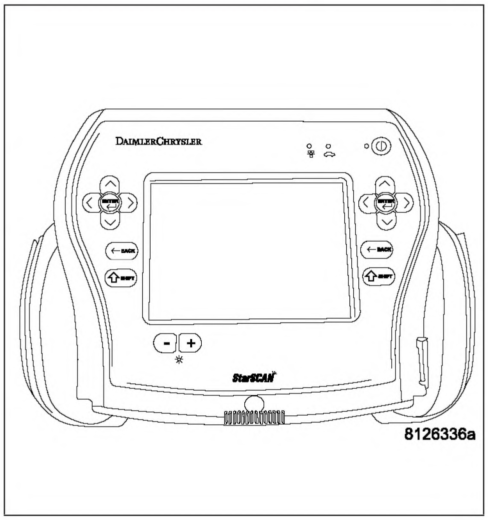
Turn the ignition on, then off, and then on again.

With the scan tool, erase Amplifier DTCs.

Turn the radio on.

Turn the volume level to 25.

With the scan tool, read Amplifier DTCs.



Does the scan tool display active: B147D-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST VER-1.

2. CHECK THE OPERATION OF THE AMPLIFIED RIGHT REAR DOOR SPEAKER

Disconnect the Amplified Right Rear Door Speaker.

Measure the resistance of the speaker between the two terminals.

Is the resistance of the speaker less than 1 ohm?

Yes >> Replace the Amplified Right Rear Door Speaker in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

No >> Go To 3

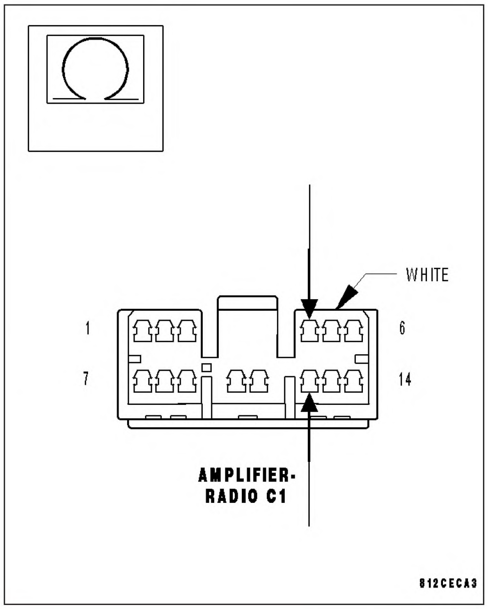
B147D-CHANNEL 6 AUDIO SPEAKER OUTPUT CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK THE (X206) AMPLIFIED RIGHT REAR DOOR SPEAKER (+) CIRCUIT, AND THE (X296) AMPLIFIED RIGHT REAR DOOR SPEAKER (-) CIRCUITS FOR A SHORT TOGETHER

Turn the ignition off.

Disconnect the Amplifier C1 harness connector.

Measure the resistance between the (X206) Amplified Right Rear Door Speaker (+) circuit, and the (X296) Amplified Right Rear Door Speaker (-) circuit.

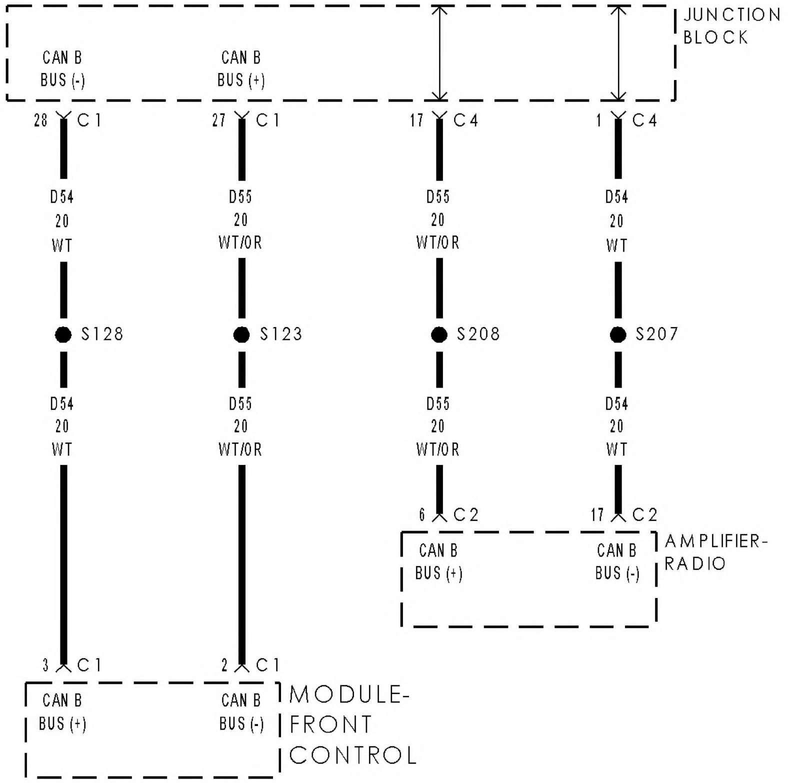


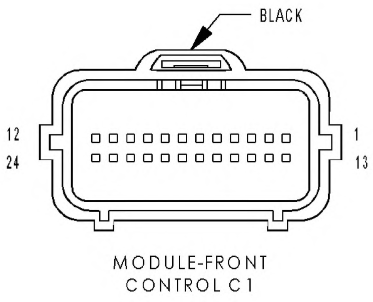
Is the resistance below 10K ohms?

Yes >> Repair the (X206) Amplified Right Rear Door Speaker (+) circuit, and the (X296) Amplified Right Rear Door Speaker (-) circuit for a short together.
Perform BODY VERIFICATION TEST VER-1.

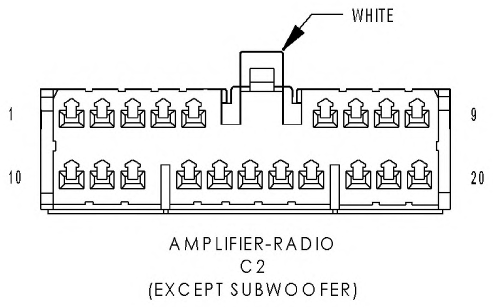
No >> Replace the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST VER-1.

U0019–CAN B BUS


JUNCTION BLOCK
CAN B BUS (-)
CAN B BUS (+)
28 C1
27 C1
17 C4
1 C4
D54 20 WT
D55 20 WT/OR
D55 20 WT/OR
D54 20 WT
S128
S123
S208
S207
D54 20 WT
D55 20 WT/OR
D55 20 WT/OR
D54 20 WT
6 C2
17 C2
CAN B BUS (+)
CAN B BUS (-)
AMPLIFIER-RADIO
3 C1
2 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL


BLACK
12
24
1
13

MODULE-FRONT CONTROL C1


WHITE
1
9
10
20

AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)

812c45ad

U0019–CAN B BUS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  Whenever the Can B Bus (+) or B Bus (–) circuit is open, shorted to voltage or shorted to ground, this code will set.

Possible Causes
CAN B BUS DTCs IN FRONT CONTROL MODULE
(D54) CAN B BUS (–) CIRCUIT OPEN
(D55) CAN B BUS (+) CIRCUIT OPEN
AMPLIFIER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs

Cycle the ignition from on to off 3 times.

Turn the ignition on.

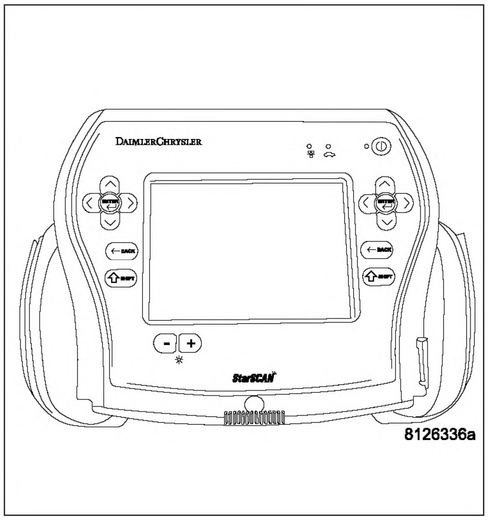
With the scan tool, read DTCs.

Does the scan tool display U0019–CAN B BUS CIRCUIT?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1.



2. CHECK FRONT CONTROL MODULE DTCs

With the scan tool, read Front Control Module DTCs

Does the scan tool display any CAN B BUS DTCs – ACTIVE?

Yes >> Refer to the symptom list for problems related to Communication in the ELECTRICAL.– ELECTRONIC CONTROL MODULES – ELECTRICAL DIAGNOSES section.

No >> Go to 3

U0019–CAN B BUS (CONTINUED)

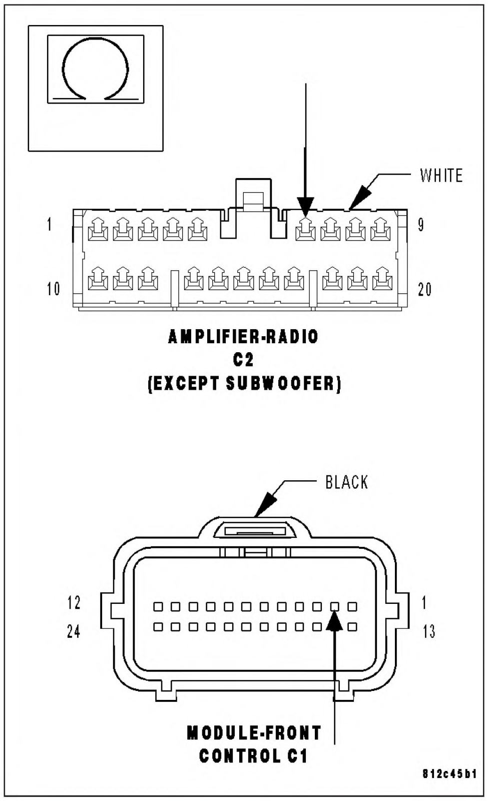
3. CAN B BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Amplifier harness connector.

Disconnect the Front Control Module C1 harness connector.

Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 harness connector and the Amplifier harness connector.


WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
BLACK
12
24
1
13
MODULE-FRONT
CONTROL C1
812c45b1

Is the resistance below 2.0 ohms?

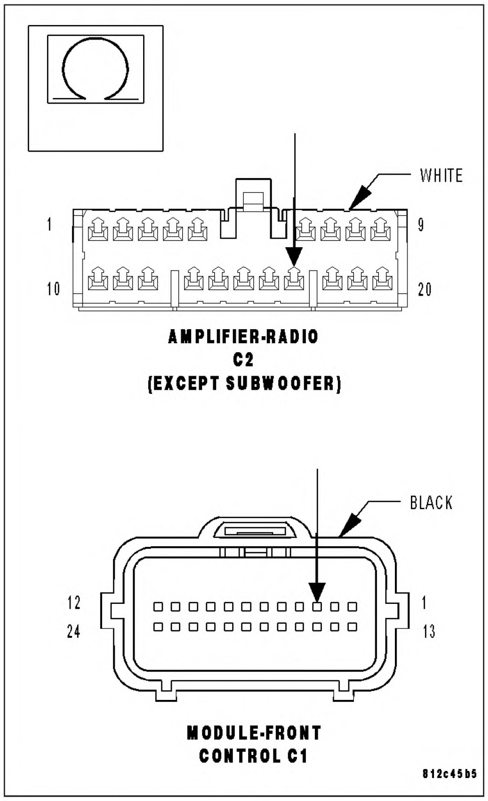
Yes >> Go To 4
Perform BODY VERIFICATION TEST - VER 1.

No >> Repair the Can B Bus (+) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

U0019–CAN B BUS (CONTINUED)

4. CAN B BUS (–) CIRCUIT OPEN

Measure the resistance of the (D54) Can B Bus (–) circuit between the Front Control Module C1 harness connector and the Amplifier harness connector.


Ω
WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
BLACK
12
24
1
13
MODULE-FRONT
CONTROL C1
812c45b5

Is the resistance below 2.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information..
Perform BODY VERIFICATION TEST - VER 1.

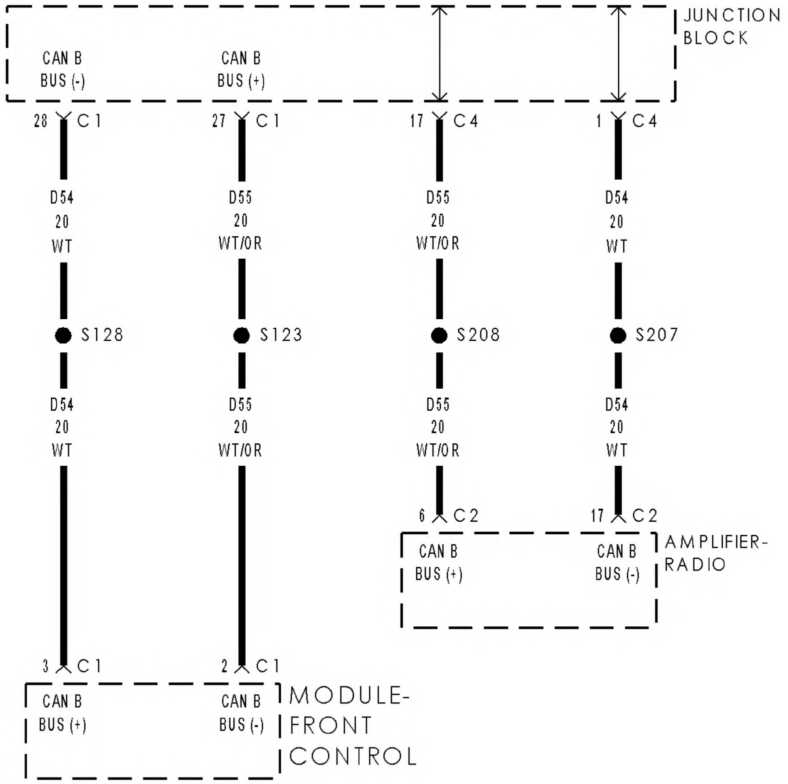
No >> Repair the Can B Bus (–) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

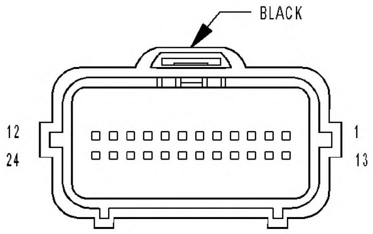
U0020-CAN B BUS OFF PERFORMANCE

For the Amplifier circuit diagram (Refer to 8 - ELECTRICAL/AUDIO - SCHEMATICS AND DIAGRAMS).

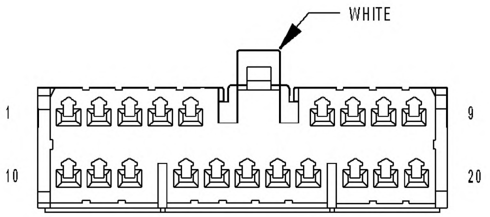
For a complete wiring diagram **Refer to Section 8W**.

U0020-CAN B BUS OFF PERFORMANCE (CONTINUED)


JUNCTION BLOCK
CAN B BUS (-)
CAN B BUS (+)
28 C1
27 C1
17 C4
1 C4
D54 20 WT
D55 20 WT/OR
D55 20 WT/OR
D54 20 WT
S128
S123
S208
S207
D54 20 WT
D55 20 WT/OR
D55 20 WT/OR
D54 20 WT
6 C2
17 C2
CAN B BUS (+)
CAN B BUS (-)
AMPLIFIER-RADIO
3 C1
2 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL


BLACK
12
24
1
13

MODULE-FRONT CONTROL C1


WHITE
1
9
10
20

AMPLIFIER-RADIO C2 (EXCEPT SUBWOOFER)

812c45ad

U0020-CAN B BUS OFF PERFORMANCE (CONTINUED)

- **When Monitored:**
  Continuously.
- **Set Condition:**
  Whenever the Can B Bus (+) or B Bus (–) circuit is open, shorted to voltage or shorted to ground, this code will set.

Possible Causes
CAN B BUS DTCs IN FRONT CONTROL MODULE
(D54) CAN B BUS (–) CIRCUIT OPEN
(D55) CAN B BUS (+) CIRCUIT OPEN
AMPLIFIER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

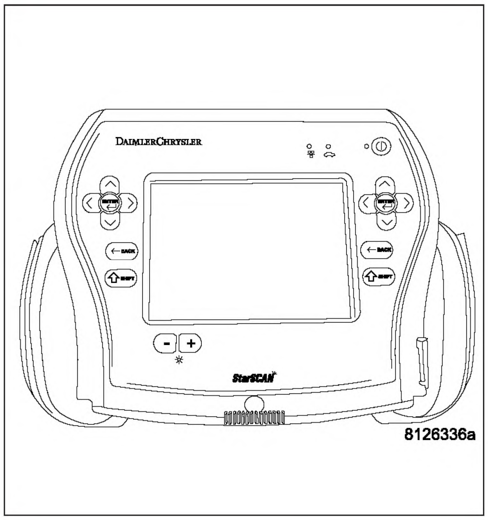
Turn the ignition on.

With the scan tool, record and erase DTCs

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.



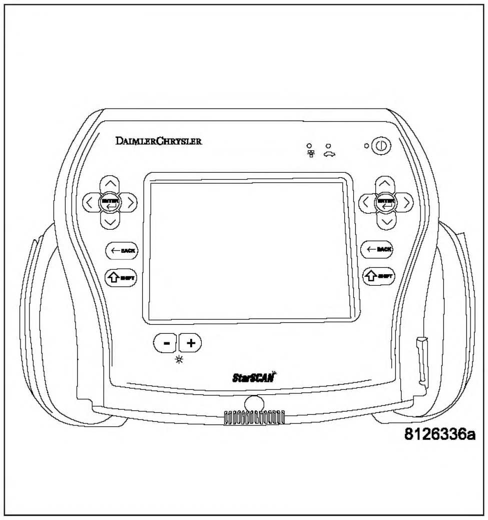
Does the scan tool display U0020-CAN B BUS OFF PERFORMANCE?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST - VER 1.

2. CHECK FRONT CONTROL MODULE DTCs

With the scan tool, read Front Control Module DTCs



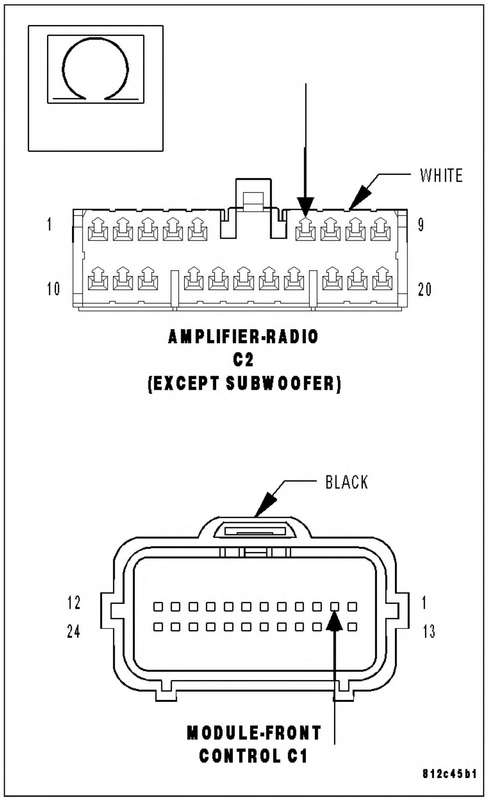
Does the scan tool display any CAN B BUS DTCs – ACTIVE?

Yes >> Refer to the symptom list for problems related to Communication in the ELECTRICAL.– ELECTRONIC CONTROL MODULES – ELECTRICAL DIAGNOSES section.

No >> Go to 3

U0020-CAN B BUS OFF PERFORMANCE (CONTINUED)

3. CAN B BUS (+) CIRCUIT OPEN


WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
BLACK
12
24
1
13
MODULE-FRONT
CONTROL C1
812c45b1

Turn the ignition off.

Disconnect the Amplifier harness connector.

Disconnect the Front Control Module C1 harness connector.

Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 harness connector and the Amplifier harness connector.

Is the resistance below 2.0 ohms?

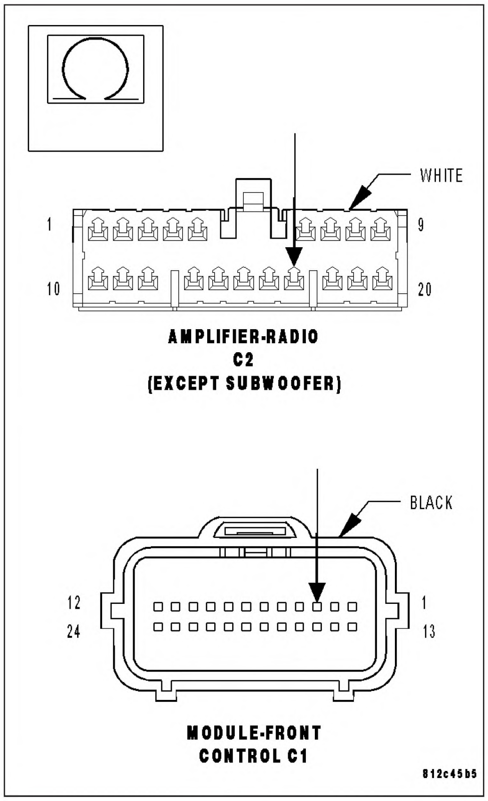
Yes >> Go To 4
Perform BODY VERIFICATION TEST - VER 1.

No >> Repair the Can B Bus (+) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

U0020-CAN B BUS OFF PERFORMANCE (CONTINUED)

4. CAN B BUS (–) CIRCUIT OPEN

Measure the resistance of the (D54) Can B Bus (–) circuit between the Front Control Module C1 harness connector and the Amplifier harness connector.


WHITE
1
9
10
20
AMPLIFIER-RADIO
C2
(EXCEPT SUBWOOFER)
BLACK
12
24
1
13
MODULE-FRONT
CONTROL C1
812c45b5

Is the resistance below 2.0 ohms?

Yes >> Replace the Amplifier in accordance with the service information..
Perform BODY VERIFICATION TEST - VER 1.

No >> Repair the Can B Bus (–) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER (ORC)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156-LOST COMMUNICATION WITH EOM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

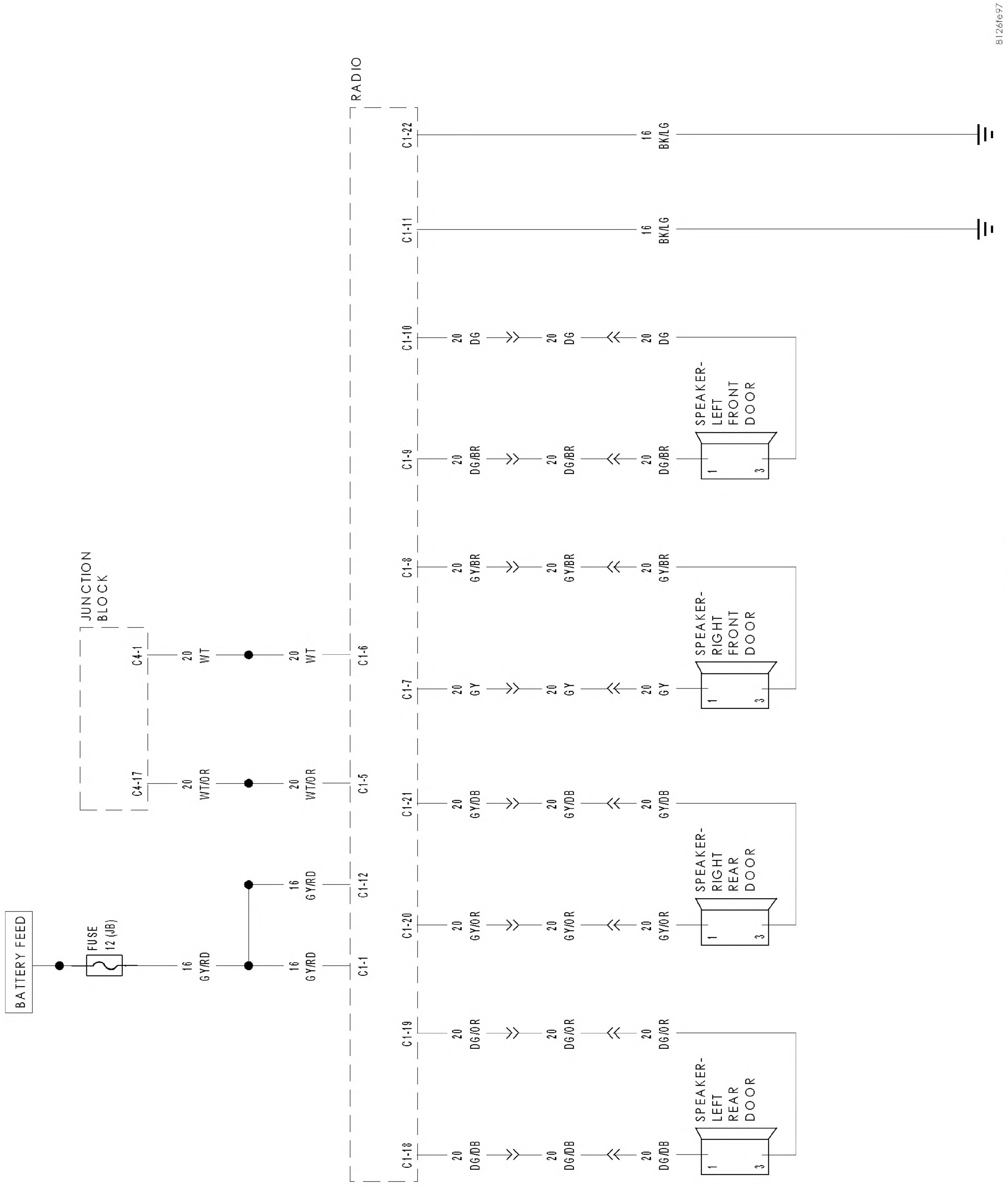
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

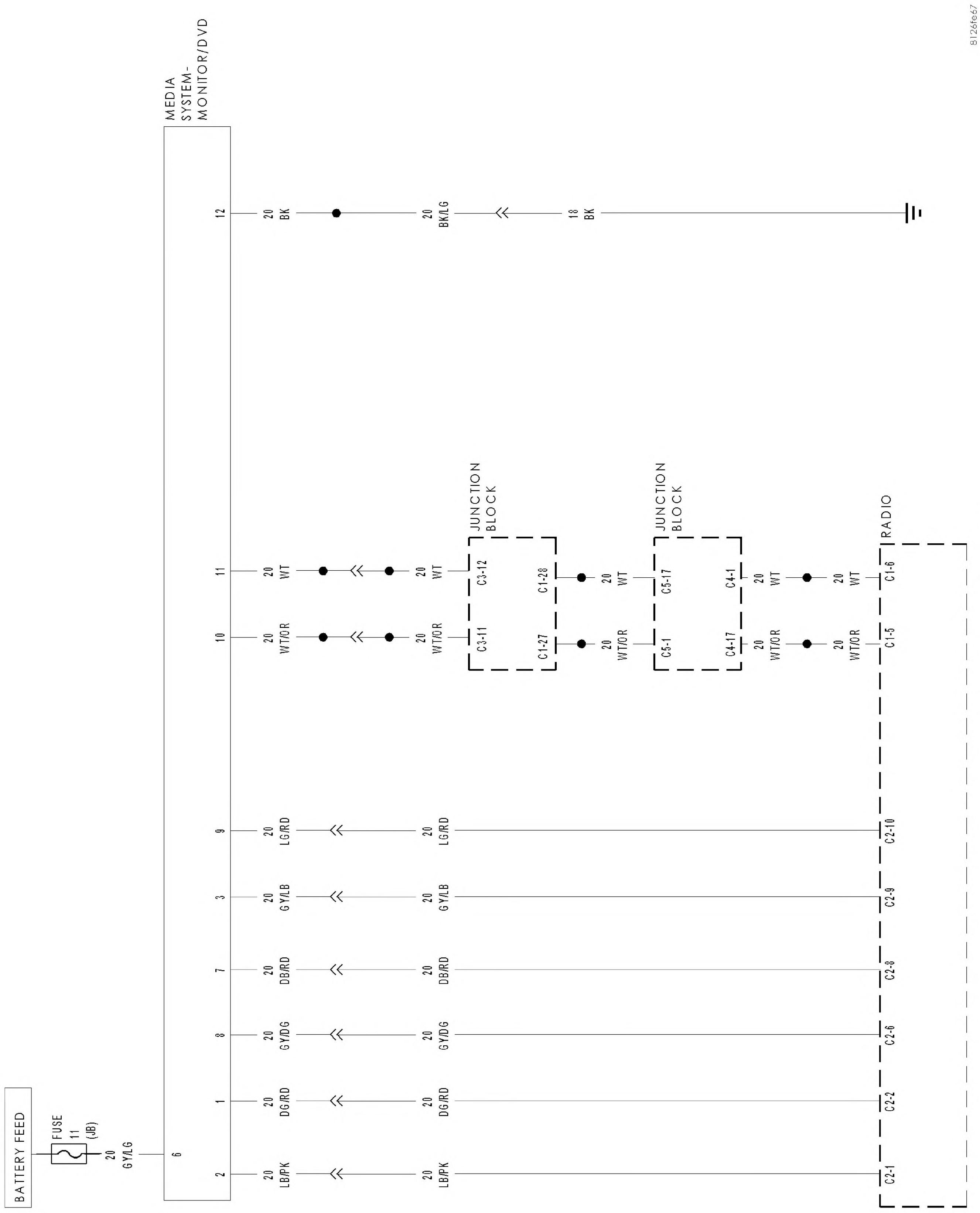
For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

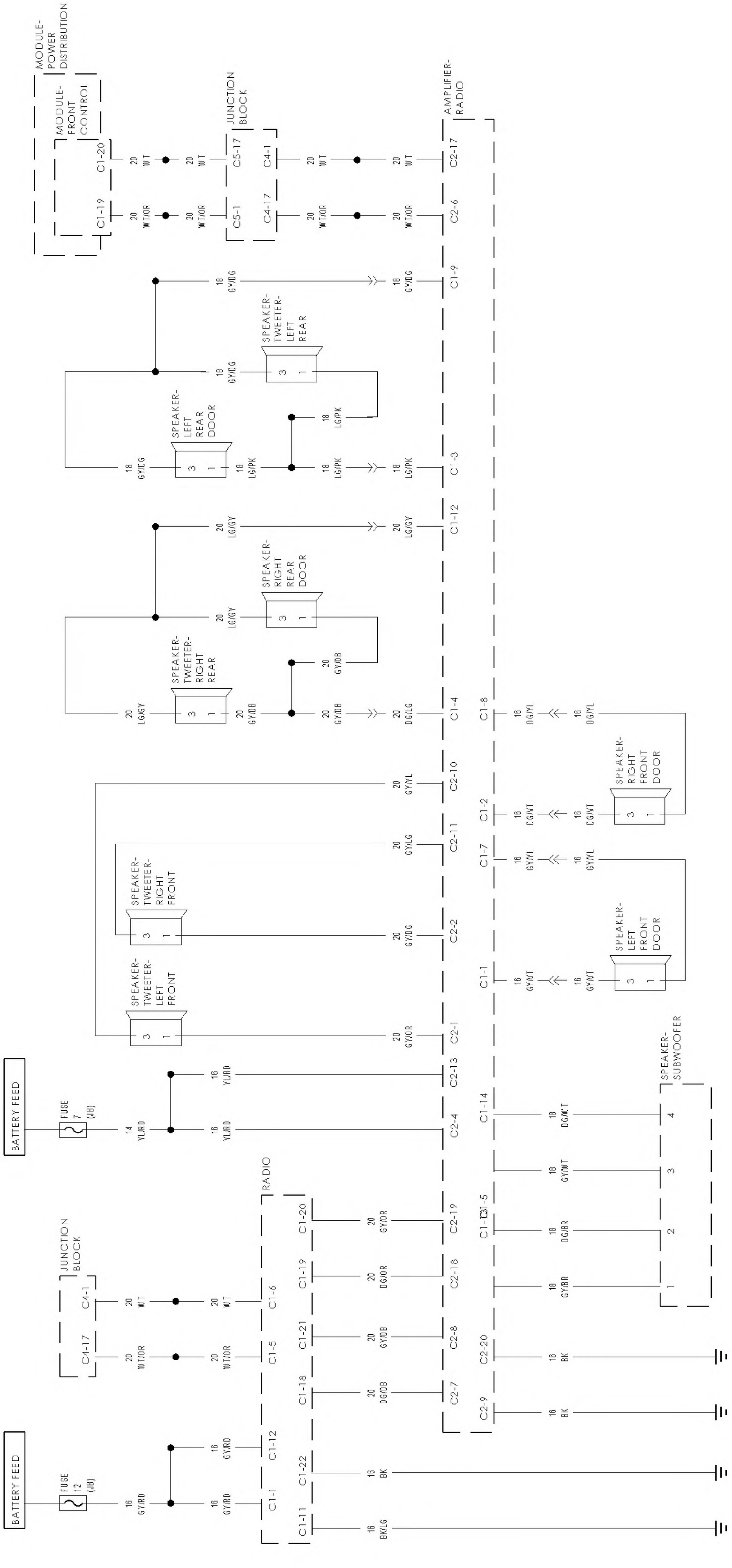
SCHEMATICS AND DIAGRAMS


8126fe97
RADIO
C1-22
16 BK/LG
C1-11
16 BK/LG
C1-10
20 DG
20 DG
20 DG
SPEAKER- LEFT FRONT DOOR
C1-9
20 DG/BR
20 DG/BR
20 DG/BR
1
3
C1-8
20 GY/BR
20 GY/BR
20 GY/BR
SPEAKER- RIGHT FRONT DOOR
C1-7
20 GY
20 GY
20 GY
1
3
JUNCTION BLOCK
C4-1
20 WT
20 WT
C1-6
C4-17
20 WT/OR
20 WT/OR
C1-5
C1-21
20 GY/DB
20 GY/DB
20 GY/DB
SPEAKER- RIGHT REAR DOOR
C1-20
20 GY/OR
20 GY/OR
20 GY/OR
1
3
16 GY/RD
C1-12
BATTERY FEED
FUSE 12 (JB)
16 GY/RD
16 GY/RD
C1-1
C1-19
20 DG/OR
20 DG/OR
20 DG/OR
SPEAKER- LEFT REAR DOOR
C1-18
20 DG/DB
20 DG/DB
20 DG/DB
1
3

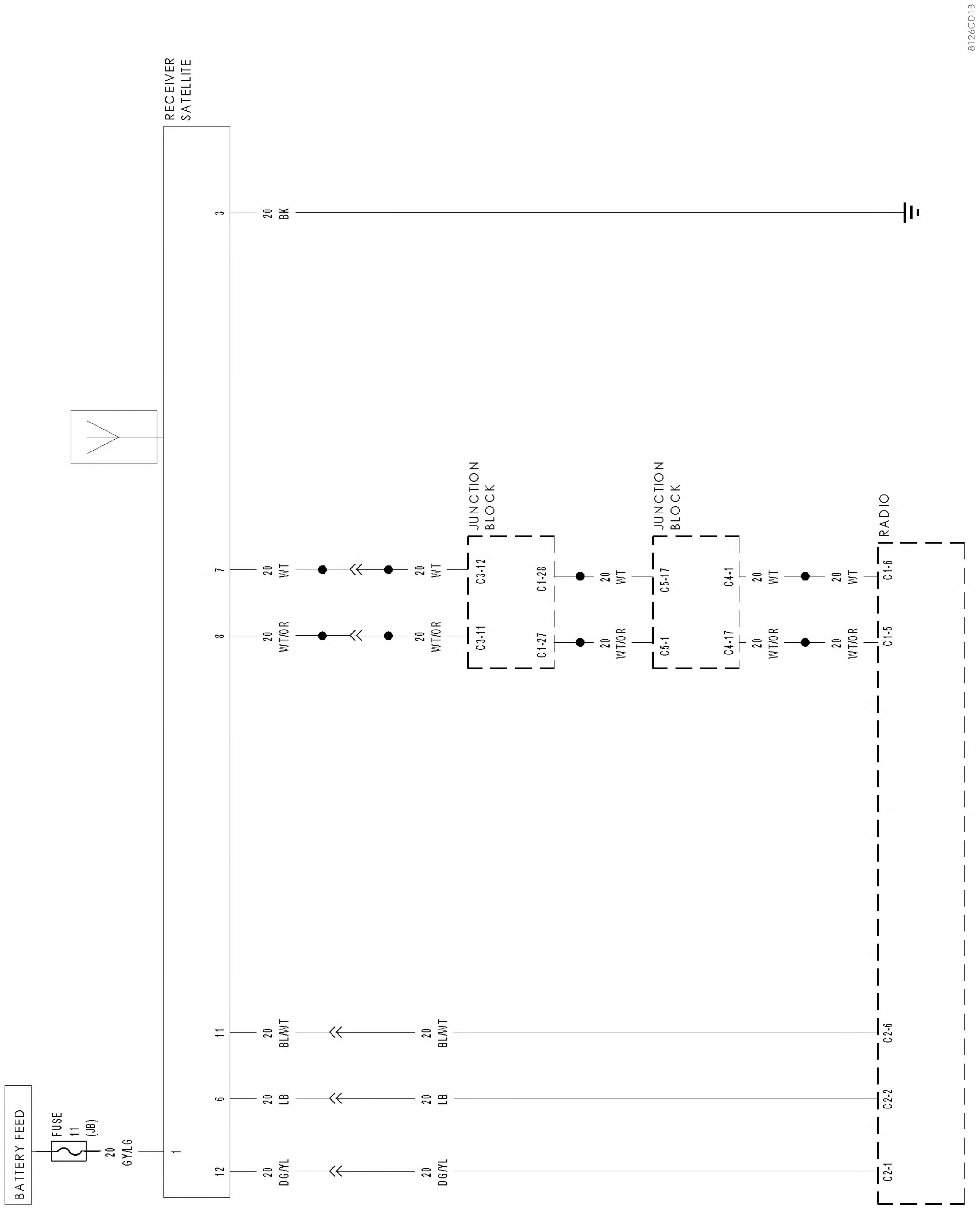
BASE RADIO SYSTEM


BATTERY FEED
FUSE 11 (JB)
20 GY/LG
MEDIA SYSTEM-MONITOR/DVD
6
12
11
10
9
3
7
8
1
2
20 BK
20 BK/LG
18 BK
20 WT
20 WT/OR
20 LG/RD
20 GY/LB
20 DB/RD
20 GY/DG
20 DG/RD
20 LB/PK
JUNCTION BLOCK
C3-12
C3-11
C1-28
C1-27
JUNCTION BLOCK
C5-17
C5-1
C4-1
C4-17
RADIO
C1-6
C1-5
C2-10
C2-9
C2-8
C2-6
C2-2
C2-1
8126fe67

DVD SYSTEM


MODULE-POWER DISTRIBUTION
MODULE-FRONT CONTROL
JUNCTION BLOCK
AMPLIFIER-RADIO
RADIO
BATTERY FEED
FUSE 7 (JB)
FUSE 12 (JB)
SPEAKER-TWEETER-LEFT REAR
SPEAKER-LEFT REAR DOOR
SPEAKER-RIGHT REAR DOOR
SPEAKER-TWEETER-RIGHT REAR
SPEAKER-TWEETER-RIGHT FRONT
SPEAKER-TWEETER-LEFT FRONT
SPEAKER-RIGHT FRONT DOOR
SPEAKER-LEFT FRONT DOOR
SPEAKER-SUBWOOFER
C1-19
C1-20
C5-1
C5-17
C4-17
C4-1
C2-6
C2-17
C1-9
C1-3
C1-12
C1-4
C1-8
C2-10
C1-2
C2-11
C1-7
C2-2
C1-1
C2-1
C2-13
C2-4
C1-14
C2-19
C1-5
C2-18
C2-8
C2-20
C2-7
C2-9
C1-6
C1-21
C1-18
C1-22
C1-11
20 WT
20 WT/OR
18 GY/DG
18 LG/PK
20 LG/GY
20 GY/DB
20 DG/LG
16 DG/YL
16 DG/WT
16 GY/YL
16 GY/WT
20 GY/YL
20 GY/LG
20 GY/DG
20 GY/OR
16 YL/RD
14 YL/RD
18 DG/WT
18 GY/WT
18 DG/BR
18 GY/BR
20 DG/OR
20 DG/DB
16 BK
16 GY/RD
16 BK/LG
3
1
4
2
8126feba

PREMIUM RADIO SYSTEM


8126CD1B
RECEIVER SATELLITE
BATTERY FEED
FUSE 11 (JB)
20 GY/LG
1
3
20 BK
7
20 WT
8
20 WT/OR
11
20 BL/WT
6
20 LB
12
20 DG/YL
JUNCTION BLOCK
C3-12
C3-11
C1-28
C1-27
JUNCTION BLOCK
C5-17
C5-1
C4-1
C4-17
RADIO
C1-6
C1-5
C2-6
C2-2
C2-1

SATELLITE RADIO

AUDIO/VIDEO - SERVICE INFORMATION

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- INSTALLATION 165

ANTENNA BODY & CABLE
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- REMOVAL 184
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- REMOVAL 186
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RADIO
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AUDIO/VIDEO - SERVICE INFORMATION

DESCRIPTION

Several combinations of radio receivers and speaker systems are offered on this vehicle. A rear seat video system is also available. The audio system receives fused battery current from a fuse in the Integrated Power Module (IPM) at all times.

A navigation radio is available on this vehicle. With this system, the operator has the option of choosing a street address, point of interest, trip itinerary and other features outlined in the operator's manual. The audio/video system includes the following components:

- Amplifier
- Antenna (Radio, Navigation, Satellite)
- Clockspring (with remote radio switches only)
- DVD Player
- Radio noise suppression components
- Radio receiver
- Remote radio switches (if equipped)
- Speakers
- Video Monitor

DIAGNOSIS AND TESTING

AUDIO SYSTEM

Any diagnosis of the Audio system should begin with the use of a scan tool and the appropriate Diagnostic Service information.

Refer to the appropriate wiring information.

NOTE:

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

AUDIO SYSTEM DIAGNOSIS TABLE

CONDITION	POSSIBLE CAUSES	CORRECTION
NO AUDIO	1. Fuse inoperative.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in the Integrated Power Module (IPM). Replace fuses, if required.
	2. Radio/amplifier (if equipped) connector damaged.	2. Check for loose or corroded radio/amplifier connector. Repair, if required.
	3. Wiring damaged.	3. Check for shorted or open wires. Repair wiring, if required.
	4. Radio/amplifier (if equipped) ground damaged.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio/amplifier (if equipped) inoperative.	5. Refer to appropriate Diagnostic Service Information.
	6. Speakers inoperative.	6. Refer to speaker diagnosis.
NO RADIO DISPLAY	1. Fuse inoperative.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Integrated Power Module (IPM). Replace fuses, if required.
	2. Radio connector damaged.	2. Check for loose or corroded radio connector. Repair, if required.

CONDITION	POSSIBLE CAUSES	CORRECTION
	3. Wiring damaged.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground damaged.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio inoperative.	5. Refer to appropriate Diagnostic Service Information.
CLOCK WILL NOT KEEP SET TIME	1. Fuse inoperative.	1. Check Ignition-Off Draw (IOD) fuse in the Integrated Power Module (IPM). Replace fuse, if required.
	2. Radio connector damaged.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring damaged.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio inoperative.	5. Refer to appropriate Diagnostic Service Information.
POOR RADIO RECEPTION	1. Antenna inoperative.	1. (Refer to 8 - ELECTRICAL/AUDIO/ANTENNA BODY & CABLE - DIAGNOSIS AND TESTING).
	2. Radio ground damaged.	2. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	3. Radio noise suppression damaged.	3. Repair or replace ground strap as necessary.
	4. Radio inoperative.	4. Refer to appropriate Diagnostic Service Information.
SOUND DISTORTION (VIBRATION FROM SPEAKER AREA, BUZZING - HUMMING)	1. Door trim panel loose or missing fasteners.	1. Inspect door trim panel and correct as necessary. Replace any misssing fasteners.
	2. Water shield loose or misaligned.	2. Inspect water shield and adjust as required.
	3. Items placed in door trim panel map pockets vibrating or moving from side to side.	Remove items from door trim panel. Ensure that vibration is no longer present.
NO COMPACT DISC OPERATION		AVOID USING CD'S OR DVD'S WITH HOME-MADE TYPE ADHESIVE LABELS AS THEY MAY CAUSE DISC TO BECOME JAMMED IN PLAYER
	1. CD faulty.	1. Insert known good CD and test operation.
	2. Foreign material on CD.	2. Clean CD and test operation.
	3. Condensation on CD or optics.	3. Allow temperature of vehicle interior to stabilize and test operation.
	4. Radio inoperative.	4. Refer to appropriate Diagnostic Service Information.

VIDEO SYSTEM DIAGNOSIS

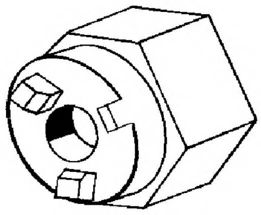
CONDITION	POSSIBLE CAUSES	CORRECTION
NO VIDEO (DVD PLAYER WILL NOT LOAD OR EJECT)	1. FUSE INOPERATIVE.	1. CHECK FUSES. REPLACE FUSES IF REQUIRED.
	2. LOOSE OR DAMAGED DVD PLAYER CONNECTOR	2. CHECK FOR LOOSE OR CORRODED DVD PLAYER CONNECTOR (16 PIN). REPAIR OR REPLACE AS REQUIRED.
	3. LOOSE OR DAMAGED WIRING/DVD PLAYER INOPERATIVE	3. CHECK PIN 1 (B+) AND PIN 9 (GROUND) OF THE 16 PIN CONNECTOR, THEN CHECK PIN 1 (B+) AND PIN 7 (GROUND) OF THE 12 PIN CONNECTOR. IF THE 16 PIN CONNECTOT DOES NOT SHOW VOLTAGE, THE 12 PIN CONNECTOR WILL NOT SHOW VOLTAGE (THE 12 PIN IS FED FROM THE 16 PIN). IF VOLTAGE IS OK ON THE 16 PIN, BUT NOT PRESENT ON THE 12 PIN, UNPLUG THE 12 PIN HARNESS FROM THE PLAYER AND CHECK THE CONNECTOR PINSON THE BACK OF THE PLAYER. IF VOLTAGE IS PRESENT ON THE 12 PIN CONNECTOR, THE SCREEN OR THE 12 PIN HARNESS SHOULD BE REPLACED. IF THERE IS STILL NO VOLTAGE ON THE 12 PIN CONNECTOR, THE DVD PLAYER SHOULD BE REPLACED.
	4. GROUND CONNECTION DAMAGED	4. CHECK FOR CONTINUITY BETWEEN DVD PLAYER AND A KNOWN GOOD GROUND. THERE SHOULD BE CONTINUITY. REPAIR GROUND IF REQUIRED.
	5. DVD PLAYER DAMAGED	5. EXCHANGE OR REPLACE DVD PLAYER IF REQUIRED.
	6. DVD DAMAGED. AVOID USING CD'S OR DVD'S THAT HAVE ADHESIVE TYPE LABELS, AS THEY MAY CAUSE THE DISC TO BECOME JAMMED.	6. INSERT KNOWN GOOD DVD AND TEST OPERATION.
NO DISPLAY. AUDIO HEARD THROUGH SPEAKERS	1. LOOSE OR DAMAGED CONNECTORS	1. CHECK FOR LOOSE OR CORRODED DVD PLAYER CONNECTOR (12 PIN). CHECK FOR LOOSE OR CORRODED VIDEO SCREEN CONNECTOR. REPAIR IF REQUIRED. CHECK FOR LOOSE OR DAMAGED IN-LINE CONNECTOR.

CONDITION	POSSIBLE CAUSES	CORRECTION
	2. WIRING DAMAGED	2. WITH HARNESS CONNECTED, CHECK FOR VIDEO SIGNAL VOLTAGE AT DVD PLAYER AND AT VIDEO SCREEN HARNESS. PLACE KNOWN GOOD DVD INTO DVD PLAYER. PLACE POSITIVE LEAD OF VOLTMETER ON PIN 5 (VIDEO SIGNAL) OF THE 12 PIN CONNECTOR. PLACE NEGATIVE LEAD ON PIN 6 (VIDEO GROUND). READINGS SHOULD BE BETWEEN 0.1V TO 2V DC.
	3. VIDEO SCREEN DAMAGED	3. EXCHANGE OR REPLACE VIDEO SCREEN IF REQUIRED.
WHITE DISPLAY	1. LOW VOLTAGE	1. CHECK FOR BATTERY VOLTAGE (9V-16V) AT DVD PLAYER 12 PIN CONNECTOR (PIN 1-BATTERY, PIN 7-GROUND). DISPLAY WILL BE WHITE IF VOLTAGE DROPS BELOW 6V.
	2. VIDEO SCREEN DAMAGED	2. EXCHANGE OR REPLACE VIDEO SCREEN IF REQUIRED.
DARK OR BRIGHT SPOTS ON SCREEN	1. BRIGHTNESS SETTING REQUIRES ADJUSTMENT.	1. ADJUST BRIGHTNESS SETTING OF VIDEO SCREEN BY PRESSING BUTTONS ON SIDE OF VIDEO SCREEN UNTIL DESIRED LEVEL IS REACHED. START WITH A BLACK SCREEN, THEN PRESS BUTTON UP 16-20 TIMES. THERE ARE 64 TOTAL STEPS OF BRIGHTNESS.
BRIGHT OR DARK DISPLAY	1. VIDEO SCREEN DISPLAY PIXEL DEFECT.	1. THE ACCEPTABLE LEVEL OF DOTS ON THE SCREEN IS (GREEN-1, RED-2) OR A TOTAL (GREEN+RED+BLUE+WHITE+BLACK) = 8. REPLACE OR EXCHANGE VIDEO SCREEN IF NECESSARY.
VIDEO SELECTIONS DO NOT APPEAR FULL SCREEN WIDTH	1. ASPECT RATIO IS SET INCORRECTLY.	1. USING MODE BUTTON, ADJUST UNTIL VIDEO APPEARS CORRECTLY.
	2. SOME DVD'S ARE TWO SIDED. ONE SIDE IS WIDE SCREEN FORMAT AND THE OTHER IS FULL SCREEN OR THERE MAY BE A WIDE SCREEN OR STANDARD SCREEN FORMAT ON THE DISC.	2. ENSURE THAT DVD IS INSERTED CORRECTLY.

CONDITION	POSSIBLE CAUSES	CORRECTION
BUTTONS ON VIDEO SCREEN INOPERATIVE	1. VIDEO SCREEN DAMAGED.	1. PLACE KNOWN GOOD DVD INTO DVD PLAYER. ONCE IMAGE APPEARS ON VIDEO SCREEN, PRESS TOP BUTTON ON SIDE OF VIDEO SCREEN TO ADJUST WIDTH OF DISPLAY. PRESS BOTTOM BUTTONS TO ADJUST BRIGHTNESS. ONCE DVD MENU APPEARS ON VIDEO SCREEN, PRESS MIDDLE BUTTON ON VIDEO SCREEN. HIGHLIGHTED SELECTION WILL BEGIN TO PLAY. IF ANY OF THE BUTTONS DO NOT FUNCTION, REPLACE OR EXCHANGE VIDEO SCREEN.

SPECIAL TOOLS

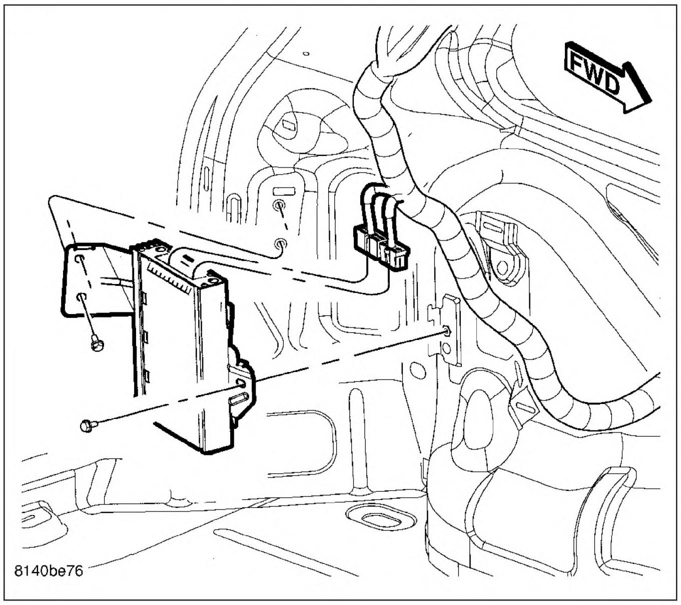
AUDIO SYSTEMS



AMPLIFIER

DESCRIPTION

Vehicles equipped with the Boston Acoustics speaker package have a separate amplifier unit. The amplifier (2) is rated at 288 watts. The amplifier is mounted to the left rear quarter panel behind the quarter trim panel.



OPERATION

The amplifier receives fused battery current from a fuse in the Integrated Power Module (IPM) at all times. The internal circuitry of the amplifier switches the amplifier on based upon a CAN bus message that is received from the radio receiver whenever the radio is turned on. The amplifier receives the sound signal inputs from the left and right rear outputs of the radio, then sends the amplified speaker outputs for each of those channels to the speakers.

DIAGNOSIS AND TESTING

AMPLIFIER

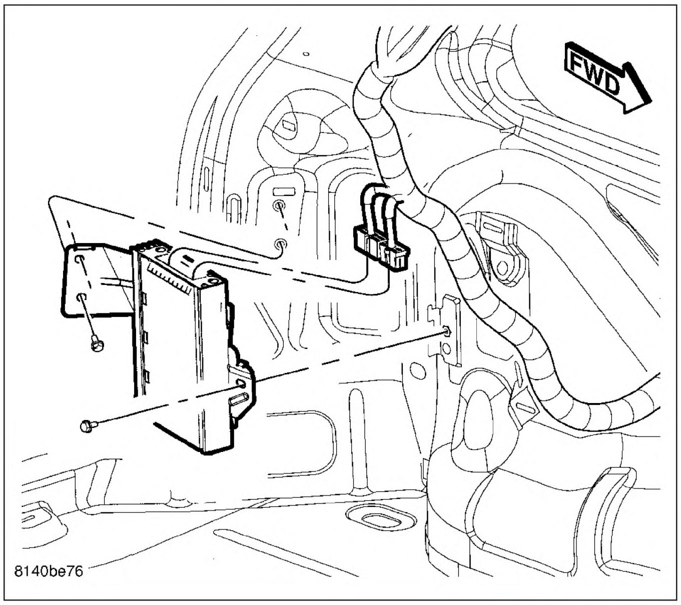
Any diagnosis of the Audio system should begin with the use of a scan tool and the appropriate Diagnostic Service information.

For complete circuit diagrams, refer to the appropriate wiring information.

The amplifier unit should be checked if there is no sound output noted from the speakers. For diagnosis of the power amplifier, (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - DIAGNOSIS AND TESTING).

REMOVAL

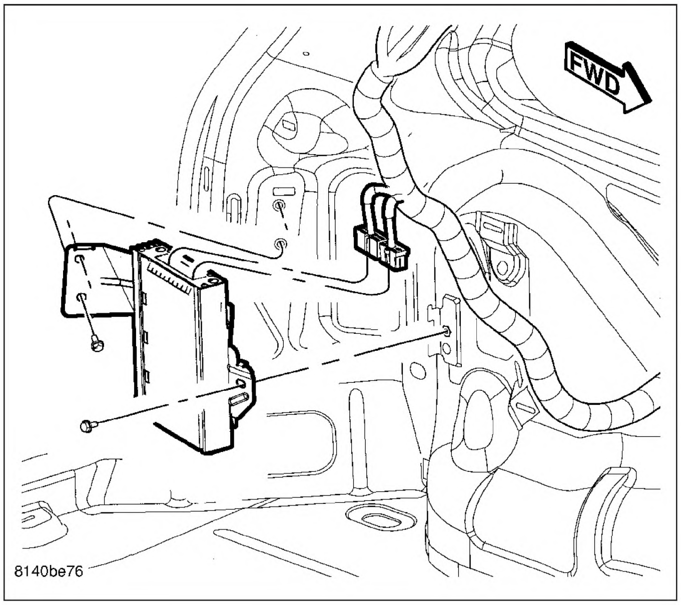
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, SIDE CURTAIN AIRBAG, FRONT IMPACT SENSOR, SIDE IMPACT SENSOR, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



1. Disconnect and isolate the battery negative cable.
2. Remove the left quarter trim panel.
3. Disconnect the two wire harness connectors from the amplifier.
4. Remove the mounting fasteners.
5. Remove the amplifier.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, DRIVER AIRBAG, PASSENGER AIRBAG, SEAT BELT TENSIONER, SIDE CURTAIN AIRBAG, FRONT IMPACT SENSOR, SIDE IMPACT SENSOR, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



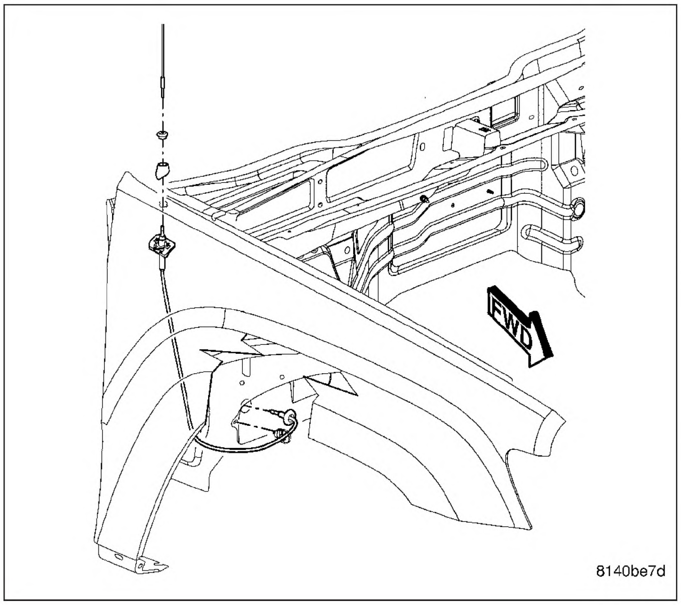
1. Position the amplifier into place.
2. Install and tighten the mounting fasteners.
3. Connect the two wire harness connectors.
4. Install the left quarter trim panel.
5. Connect the battery negative cable.

ANTENNA BODY & CABLE

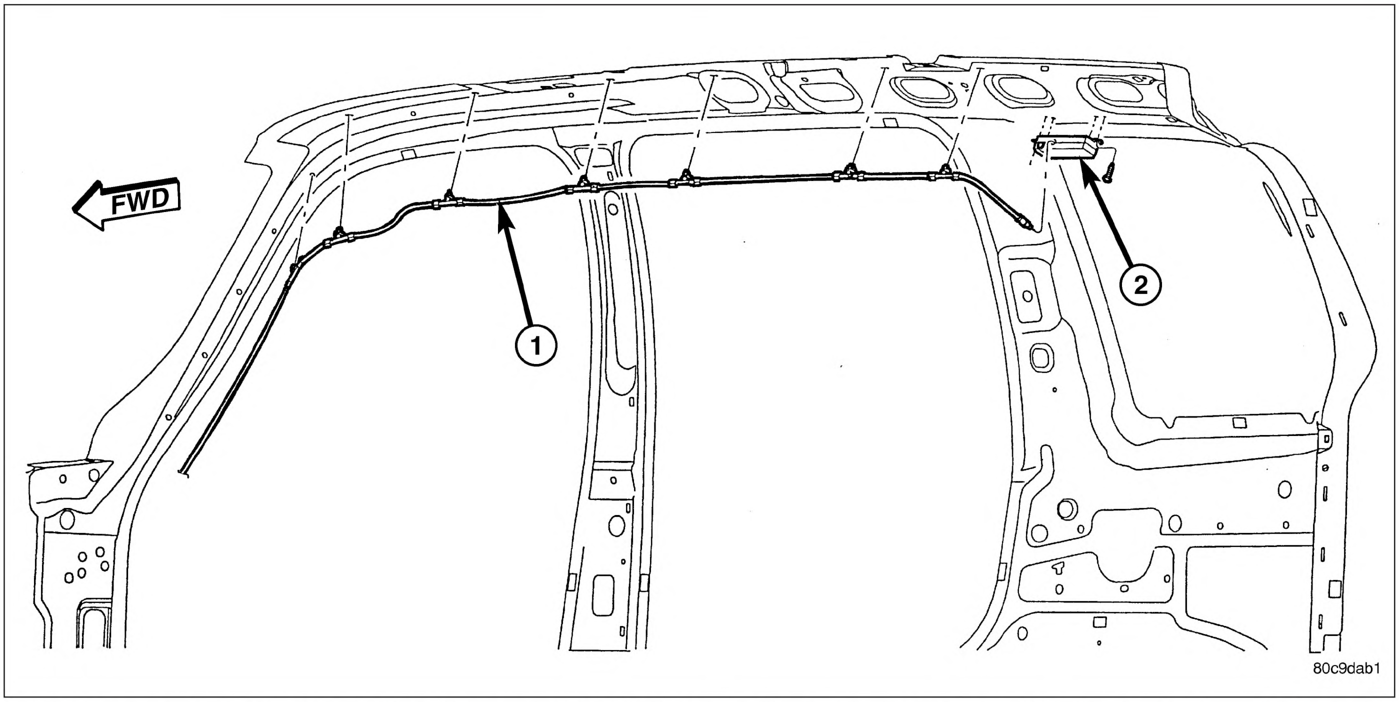
DESCRIPTION

DOMESTIC

The antenna body and cable is secured below the fender panel by the antenna cap nut through a mounting hole in the side of the right front fender. The primary coaxial antenna cable is then routed beneath the fender sheet metal and through a entry hole in the right cowl side panel into the interior of the vehicle. Inside the vehicle, the primary coaxial cable is connected to a secondary instrument panel antenna coaxial cable with an in-line connector that is located behind the right kick panel. The instrument panel antenna cable is then routed behind the instrument panel to the back of the radio.



EXPORT



The primary coaxial antenna cable (1) is routed behind the A-pillar trim, up the right side of the roof panel above the headliner. The cable is connected to a secondary instrument panel antenna coaxial cable with an in-line connector that is located behind the A-pillar trim. At the other end, the cable is connected to the antenna module (2). The instrument panel antenna cable is then routed behind the instrument panel to the back of the radio.

OPERATION

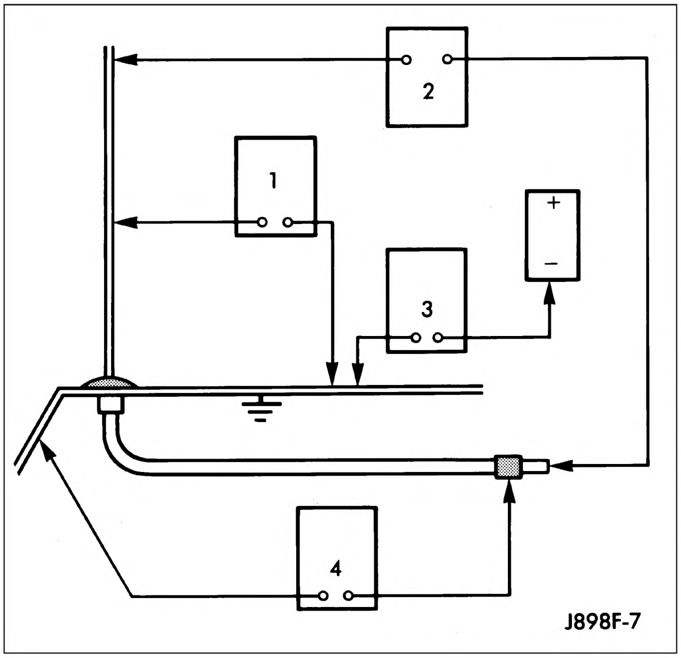
The antenna body and cable connects the antenna mast to the radio. The radio antenna is an electromagnetic circuit component used to capture radio frequency signals that are broadcast by local commercial radio stations in both the Amplitude Modulating (AM) and Frequency Modulating (FM) frequency ranges. These electromagnetic radio frequency signals induce small electrical modulations into the antenna as they move past the mast. The antenna body transfers the weak electromagnetic radio waves induced into the rigid antenna mast into the center conductor of the flexible primary antenna coaxial cable. The braided outer shield of the antenna coaxial cable is grounded through both the antenna body and the radio chassis, effectively shielding the radio waves as they are conducted to the radio. The radio then tunes and amplifies the weak radio signals into stronger electrical signals in order to operate the audio system speakers.

DIAGNOSIS AND TESTING

ANTENNA BODY AND CABLE

The following four tests are used to diagnose the antenna with an ohmmeter:

- **Test 1** - Mast to ground test
- **Test 2** - Tip-of-mast to tip-of-conductor test
- **Test 3** - Body ground to battery ground test
- **Test 4** - Body ground to antenna coaxial cable shield test.



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The ohmmeter test lead connections for each test are shown in the illustration.

NOTE: This model has a two-piece antenna coaxial cable. Tests 2 and 4 must be conducted in two steps to isolate an antenna cable problem. First, test the primary antenna cable (integral to the antenna body and cable) from the coaxial cable connector under the right end of the instrument panel near the right cowl side inner panel to the antenna body. Then, test the secondary antenna cable (instrument panel antenna cable) from the coaxial cable connector under the right end of the instrument panel near the right cowl side inner panel to the coaxial cable connector at the radio.

NOTE: Use extreme caution when checking continuity of center conductor to avoid damage.

TEST 1

Test 1 determines if the antenna mast is insulated from ground. Proceed as follows:

1. Disconnect and isolate the antenna coaxial cable connector under the right end of the instrument panel near the right cowl side inner panel.

2. Touch one ohmmeter test lead to the tip of the antenna mast. Touch the other test lead to the antenna cap nut. Check the ohmmeter reading for continuity.
3. There should be no continuity. If OK, go to Test 2. If not OK, replace the faulty antenna body and cable.

TEST 2

Test 2 checks the antenna conductor components for an open circuit. This test should be performed first on the entire antenna circuit, from the antenna mast to the center conductor of the coaxial cable connector at the radio. If an open circuit is detected, each of the three antenna conductor components (antenna mast, antenna body and primary cable unit, instrument panel antenna secondary cable) should be isolated and tested individually to locate the exact component that is the source of the open circuit. To begin this test, proceed as follows:

1. Disconnect the instrument panel (secondary) antenna cable coaxial connector from the back of the radio.
2. Touch one ohmmeter test lead to the tip of the antenna mast. Touch the other test lead to the center conductor pin of the instrument panel antenna cable coaxial connector for the radio. Check the ohmmeter reading for continuity.
3. There should be continuity. The ohmmeter should register only a fraction of an ohm resistance. High or infinite resistance indicates a damaged or open antenna conductor. If OK, go to Test 3. If not OK, isolate and test each of the individual antenna conductor components. Replace only the faulty antenna conductor component.

TEST 3

Test 3 checks the condition of the vehicle body ground connection. To begin this test, proceed as follows:

1. This test must be performed with the battery positive cable disconnected from the battery. Disconnect and isolate both battery cables, negative cable first.
2. Reconnect the battery negative cable.
3. Touch one ohmmeter test lead to a good clean ground point on the vehicle fender. Touch the other test lead to the battery negative terminal post. Check the ohmmeter reading for continuity.
4. There should be continuity. The ohmmeter should register less than one ohm resistance. High or infinite resistance indicates a loose, corroded, or damaged connection between the battery negative terminal and the vehicle body. If OK, go to Test 4. If not OK, check the battery negative cable connection to the vehicle body and the radio noise suppression ground strap connections to the engine and the vehicle body for being loose or corroded. Clean or tighten these connections as required.

TEST 4

Test 4 checks the condition of the connection between the antenna coaxial cable shield and the vehicle body ground as follows:

1. Disconnect and isolate the antenna coaxial cable connector under the right end of the instrument panel near the right cowl side inner panel.
2. Touch one ohmmeter test lead to a good clean ground point on the vehicle fender. Touch the other test lead to the outer crimp on the antenna coaxial cable connector under the right end of the instrument panel near the right cowl side inner panel. Check the ohmmeter reading for continuity.
3. There should be continuity. The ohmmeter should register less than one ohm resistance. High or infinite resistance indicates a loose, corroded, or damaged connection between the antenna body and the vehicle body or between the antenna body and the antenna coaxial cable shield. If not OK, clean the antenna body to fender mating surfaces and tighten the antenna cap nut to specifications.
4. Check the resistance again with an ohmmeter. If the resistance is still more then one ohm, replace the faulty antenna body and cable.

REMOVAL

DOMESTIC

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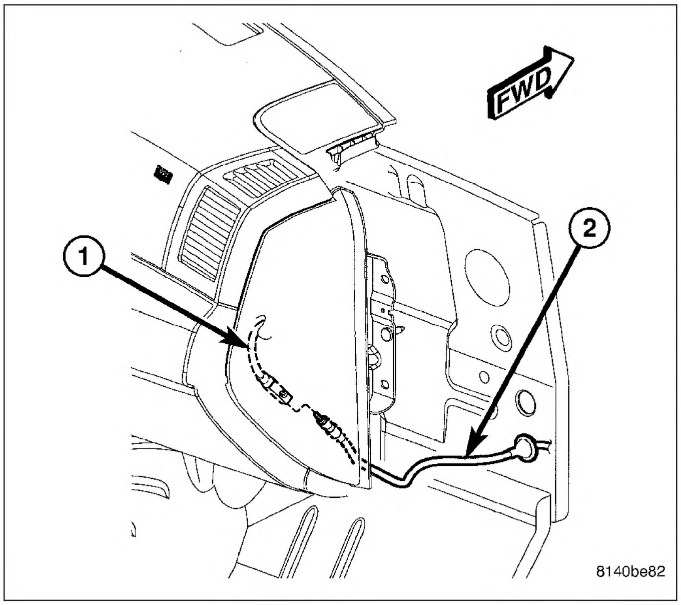
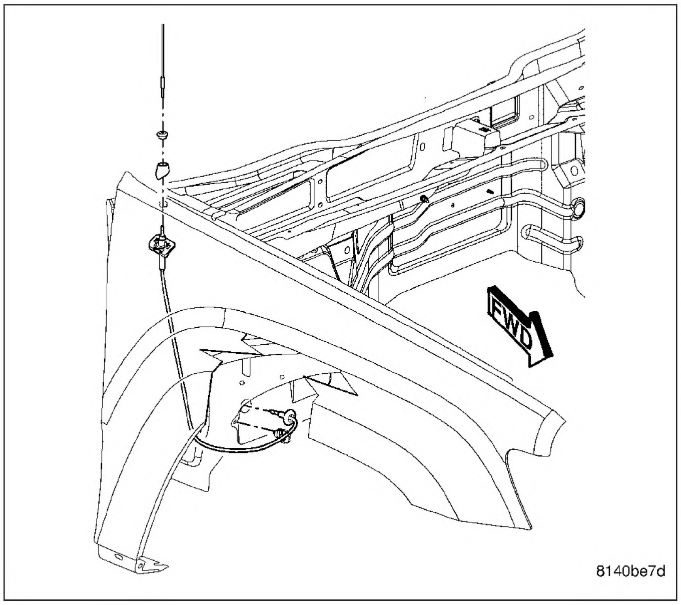
1. Disconnect and isolate the battery negative cable.
2. Remove the right side cowl trim cover.
3. Remove the glove box.
4. Reach under the instrument panel outboard of the glove box to access and disconnect the antenna coaxial cable connector (2). Disconnect the connector by pulling it apart while twisting the metal connector halves. Do not pull on the cable.
5. Disengage the antenna coaxial cable retainer at the right cowl side inner panel.



6. Remove the right side wheelhouse splash shield.
7. Unscrew the antenna mast from the antenna body.
8. Remove the antenna cap nut using an antenna nut wrench (Special Tool C-4816)
9. Remove the antenna adapter from the top of the fender.
10. Lower the antenna body through the mounting hole in the top of the fender.
11. Disengage the antenna coaxial cable grommet from the hole in the right cowl side outer panel.
12. Pull the antenna body and cable out through the opening between the right cowl side outer panel and the fender.



EXPORT

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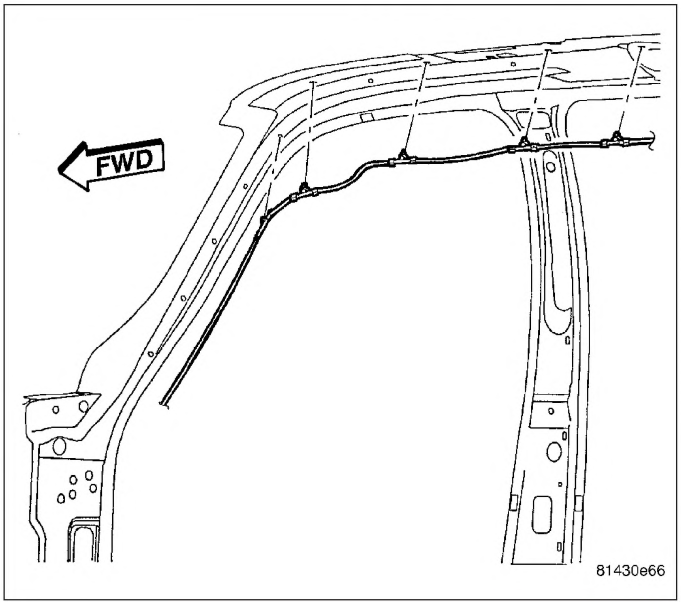
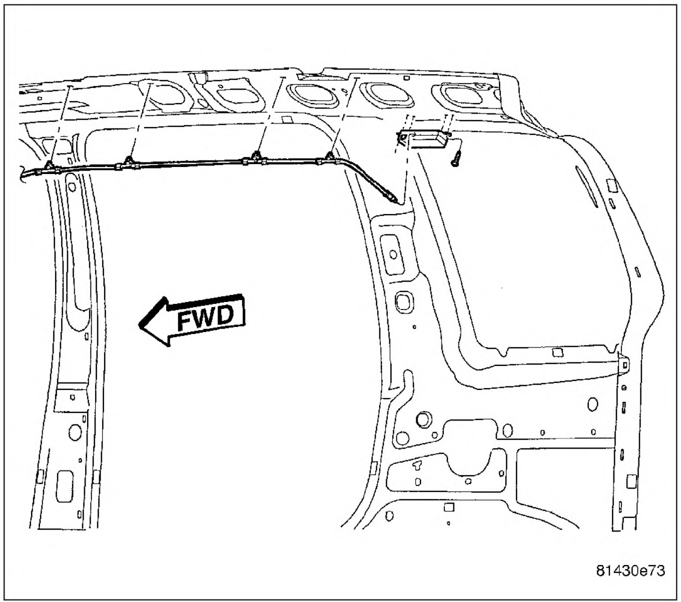
1. Disconnect and isolate the battery negative cable.
2. Remove the assist handles on the right side of the headliner.
3. Remove the right side visor.
4. Remove the A-pillar trim.
5. Disconnect antenna cable from instrument panel antenna cable.



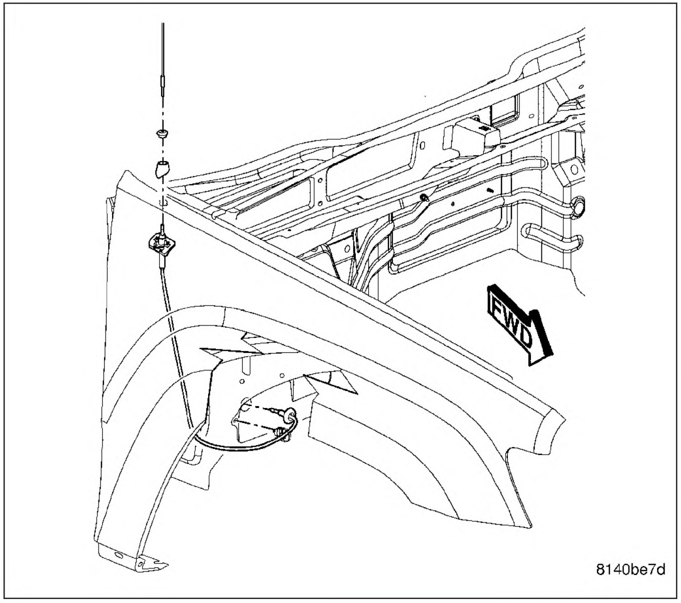
6. Lower headliner as necessary to access antenna cable.
7. Disconnect antenna cable from antenna module.
8. Remove antenna cable from roof panel by pulling on retaining clips.



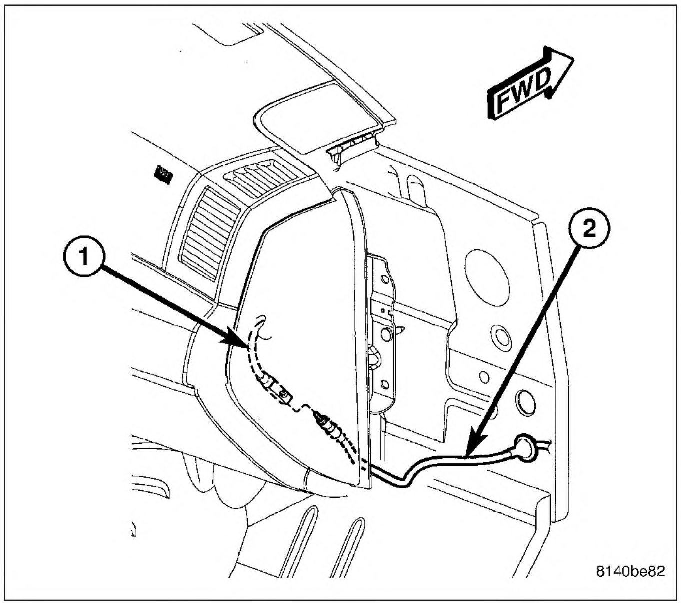
INSTALLATION

DOMESTIC

1. Position the antenna body and cable in the opening between the right cowl side outer panel and the fender.
2. Push the antenna coaxial cable into the passenger compartment through the hole in the right cowl side outer panel.
3. Engage the antenna coaxial cable grommet in the hole in the right cowl side outer panel.
4. Position the antenna body through the mounting hole in the top of the fender.
5. Install the adapter over the antenna body from the top of the fender.
6. Install and tighten the antenna cap nut using an antenna nut wrench (Special Tool C-4816).
7. Install and tighten the antenna mast onto the antenna body. **Ensure that the antenna mast is fully seated on antenna base and that there is no gap between the mast and base.**

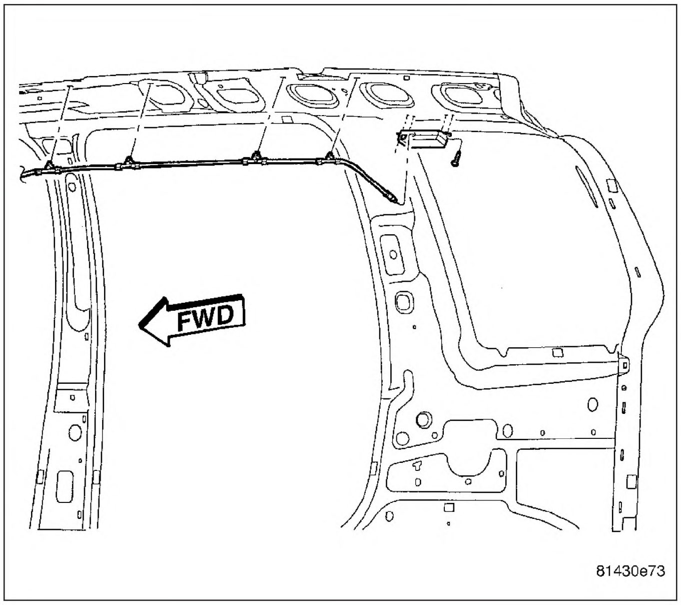


8. Engage the antenna coaxial cable retainers at the right cowl side inner panel and inside the right front fender.
9. Engage the antenna coaxial cable in the retainer clips on the lower instrument panel support behind the glovebox.
10. Reach under the instrument panel outboard of the glove box to connect the antenna cable (2) to the instrument panel antenna cable (1).
11. Install the glove box.
12. Install the cowl trim cover.
13. Install the wheelhouse splash shield.
14. Connect the battery negative cable.

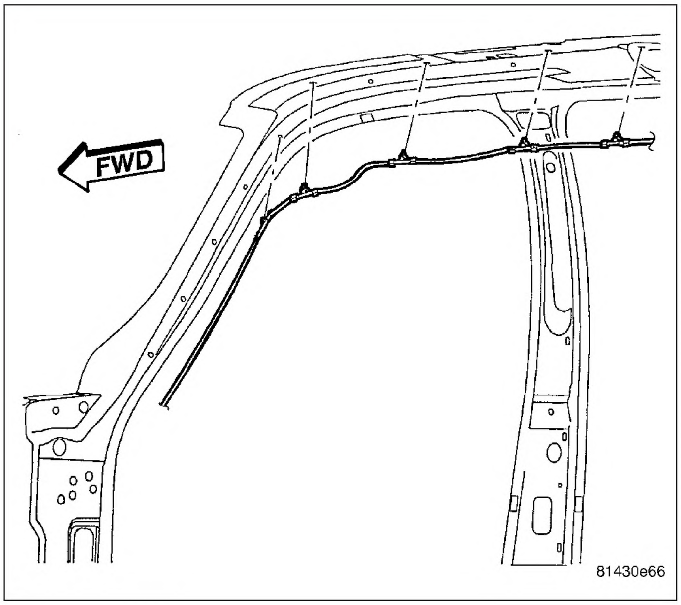


EXPORT

1. Install antenna cable to the roof panel by pressing retaining clips into position.
2. Connect antenna cable to the antenna module.



3. Connect antenna cable to the instrument panel antenna cable.
4. Raise headliner into position.
5. Install A-pillar trim.
6. Install the right side sunvisor.
7. Install the assist handles.
8. Connect the battery negative cable.



ANTENNA CABLE - INSTRUMENT PANEL

REMOVAL

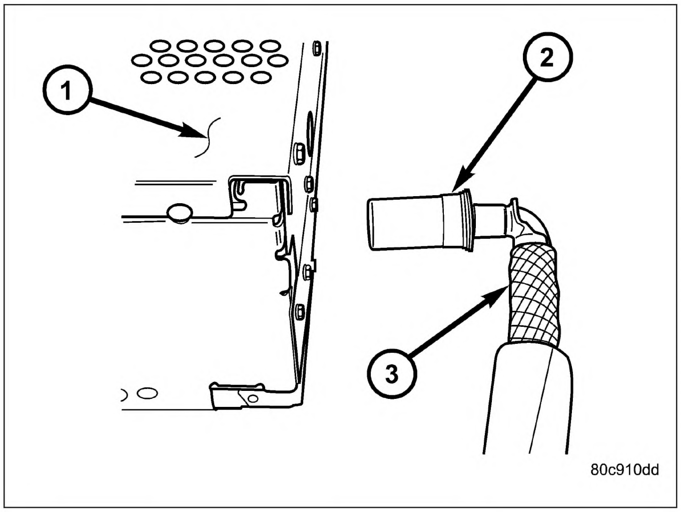
WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

DOMESTIC

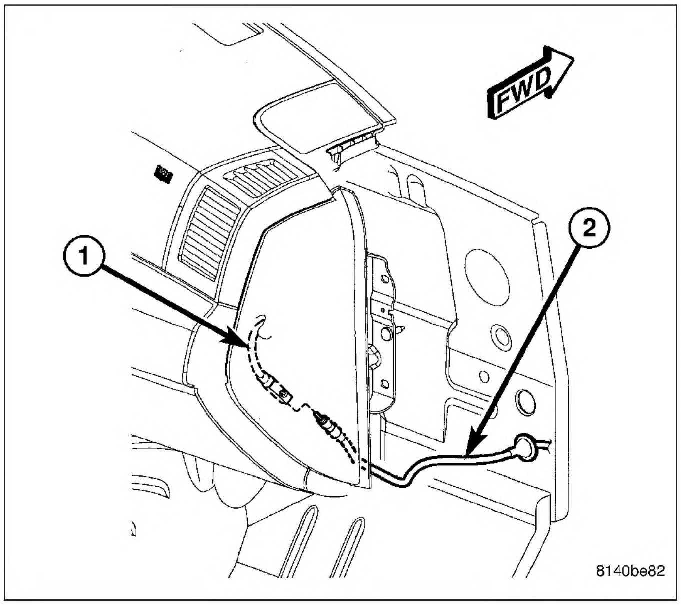
1. Disconnect and isolate the battery negative cable.
2. Remove radio (Refer to 8 - ELECTRICAL/AUDIO/RADIO - REMOVAL).

CAUTION: Pulling the antenna cable straight out of the radio without pulling on the locking antenna connector could damage the cable or radio.

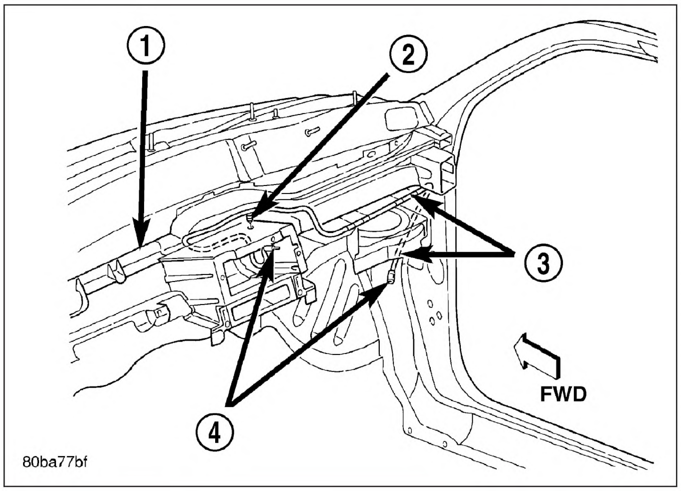
3. Disconnect the antenna cable by pulling the locking antenna connector (2) away from the radio (1).



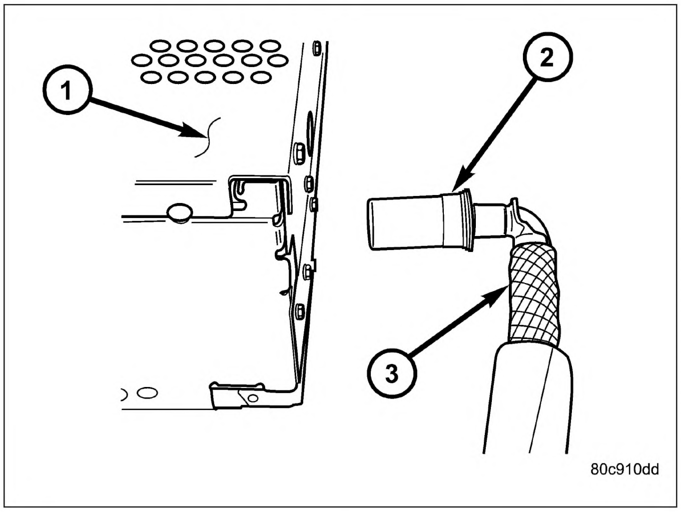
4. Remove the glove box.
5. Remove instrument panel side panel.
6. Disconnect instrument panel cable (1) from antenna body and cable (2).



7. Remove the antenna retaining straps and remove antenna cable (4).



EXPORT



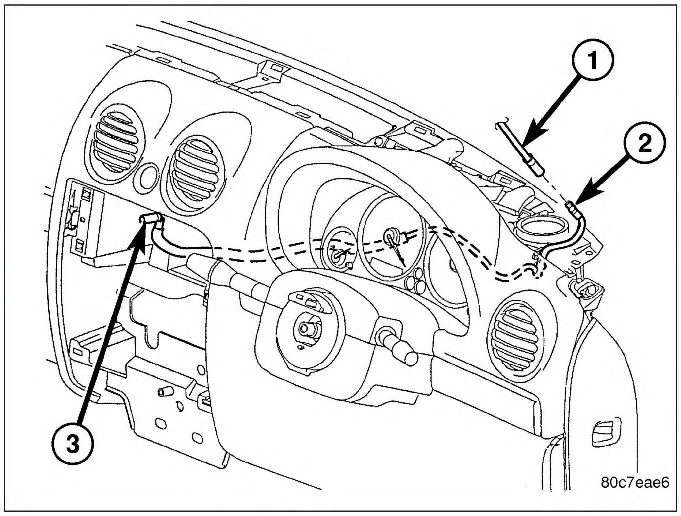
WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Disconnect and isolate the battery negative cable.
2. Remove the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

CAUTION: Pulling the antenna cable straight out of the radio without pulling on the locking antenna connector could damage the cable or radio.

3. Disconnect the antenna cable by pulling the locking antenna connector (2) away from the radio (1).

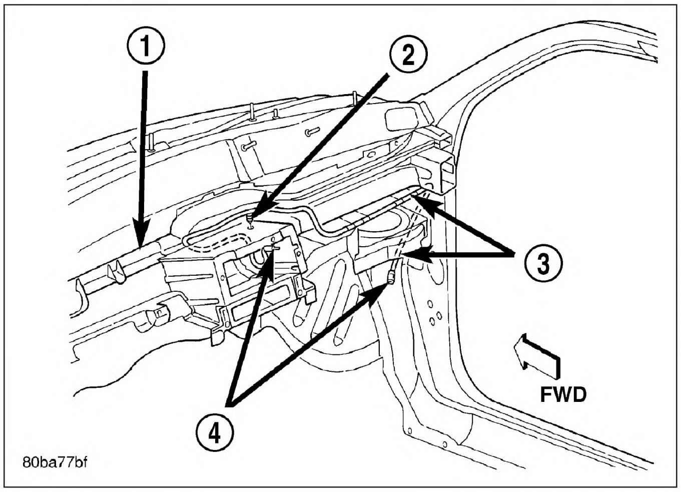
4. Disengage each of the retainers that secure the cable (2) to the instrument panel and remove cable.



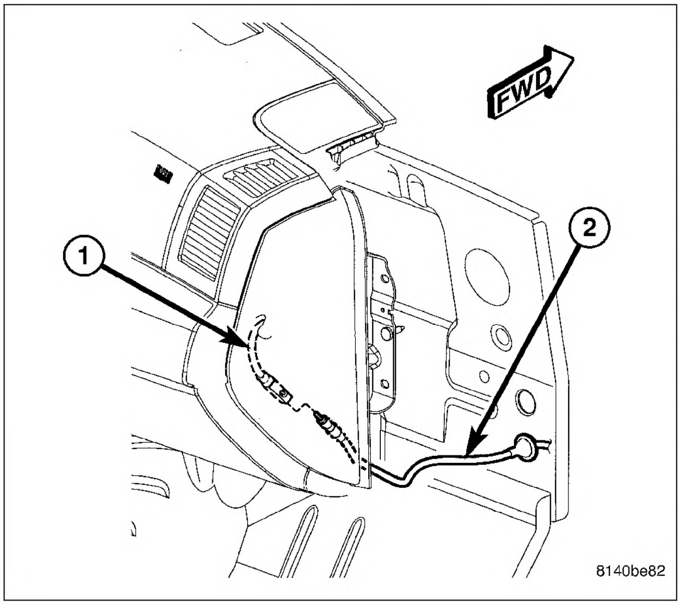
INSTALLATION

DOMESTIC

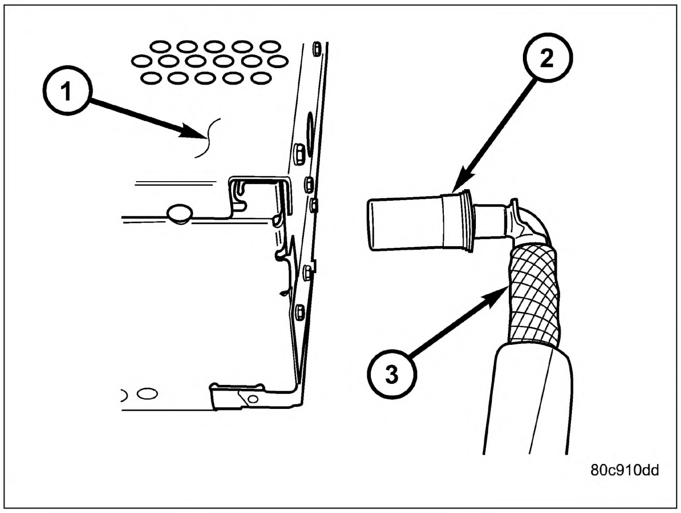
1. Install cable (3) to instrument panel and secure into place.


①
②
③
④
FWD
80ba77bf

2. Connect instrument panel cable (1) to antenna body and cable (2).
3. Install instrument panel side panel.
4. Install glove box.

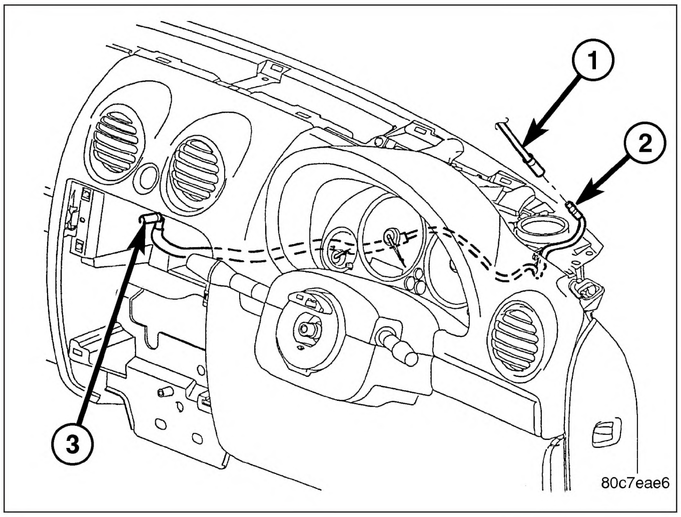

FWD
1
2
8140be82

5. Connect instrument panel cable (3) to radio (1).
6. Install radio (Refer to 8 - ELECTRICAL/AUDIO/RADIO - INSTALLATION).
7. Connect battery negative cable.

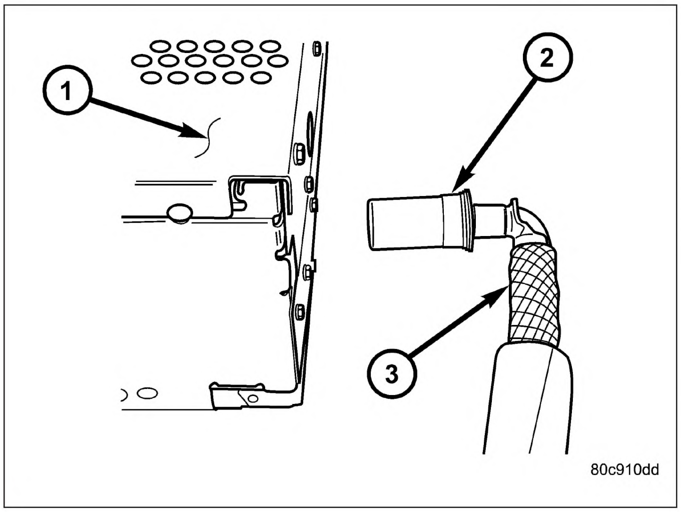


EXPORT

1. Install instrument panel cable (2) to instrument panel and secure into place.



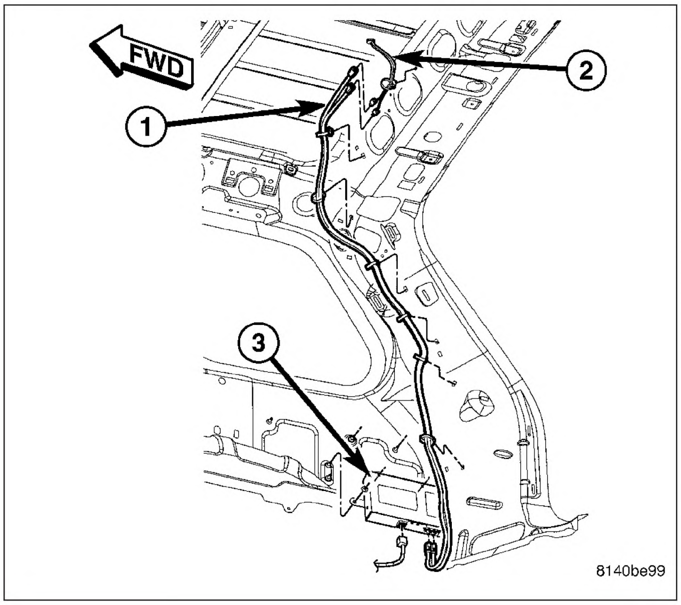
2. Connect instrument panel cable (3) to radio.
3. Install the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).
4. Connect the battery negative cable.



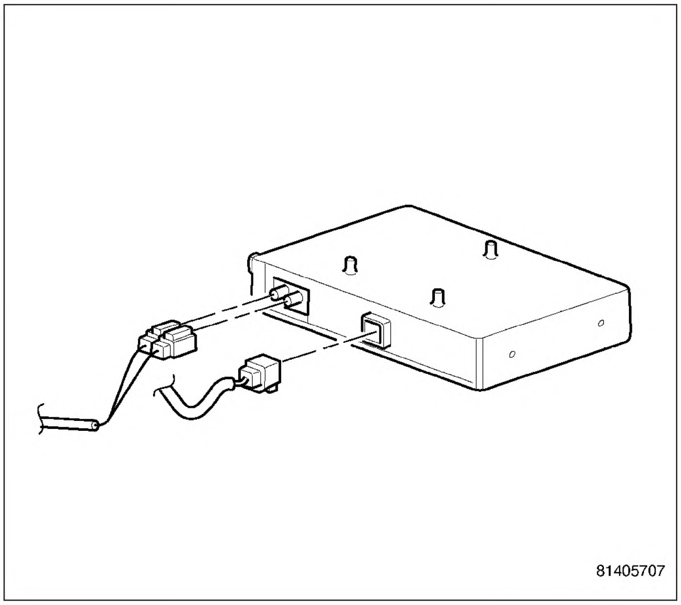
ANTENNA CABLE - SATELLITE RADIO

REMOVAL

1. Disconnect and isolate the battery cable.
2. Remove D-pillar trim.
3. Remove headliner (Refer to 23 - BODY/INTERIOR/ HEADLINER - REMOVAL).
4. Disconnect antenna cable (1) from antenna (2).
5. Remove antenna cable retainers from D-pillar and roof panel.

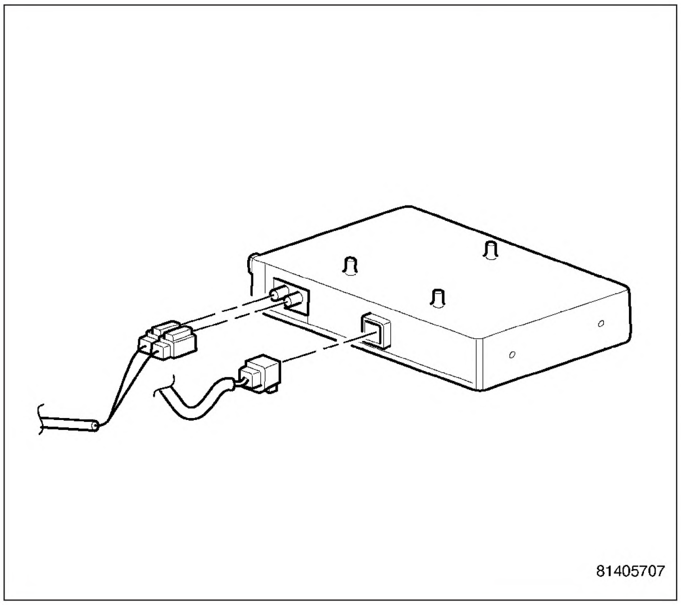


6. Disconnect antenna cable from satellite receiver.

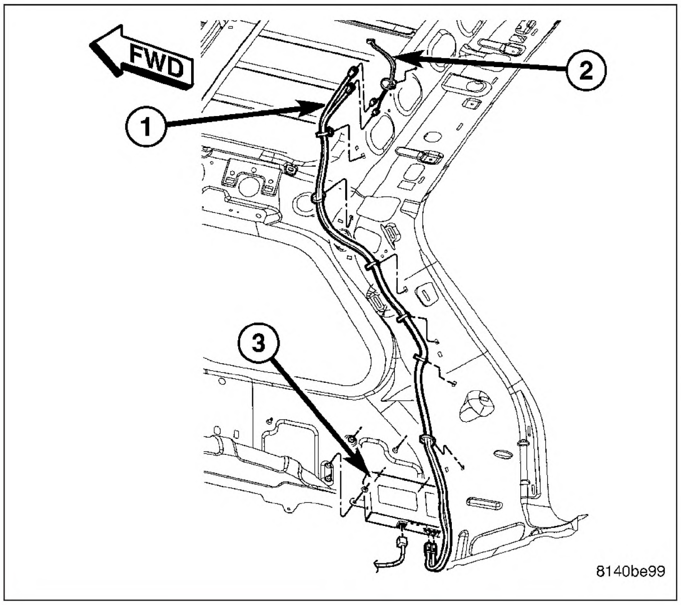


INSTALLATION

1. Connect antenna cable to satellite receiver.



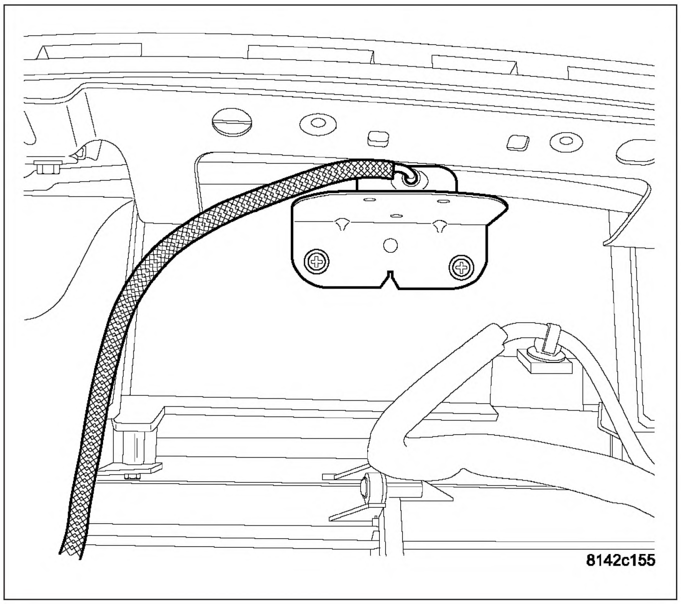
2. Install antenna cable retainers to D-pillar and roof panel.
3. Connect antenna cable (1) to satellite antenna (2).
4. Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
5. Install D-pillar trim.
6. Connect battery negative cable.



ANTENNA - NAVIGATION RADIO

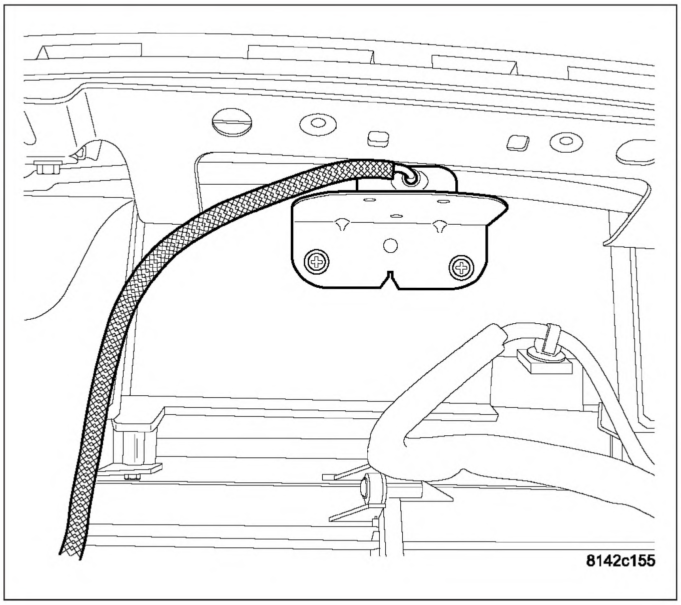
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the radio (Refer to 8 - ELECTRICAL/AUDIO/RADIO - REMOVAL).
3. Remove the mounting fasteners.
4. Remove the navigation radio antenna.



INSTALLATION

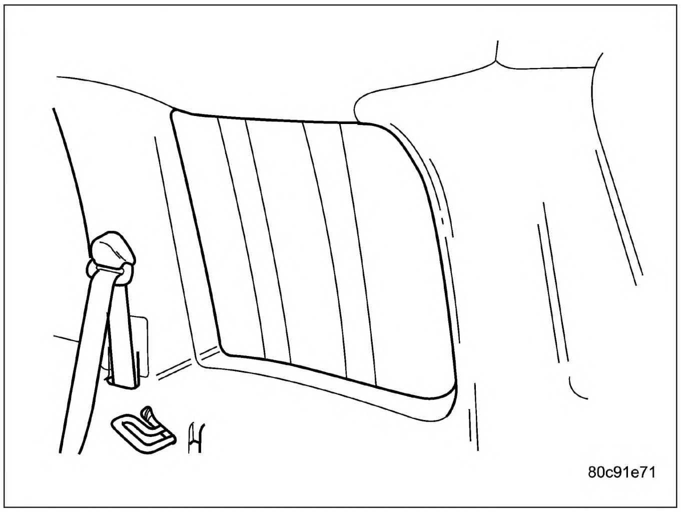
1. Position antenna to instrument panel.
2. Install and tighten mounting fasteners.
3. Install radio (Refer to 8 - ELECTRICAL/AUDIO/RADIO - INSTALLATION).
4. Connect battery negative cable.



ANTENNA - QUARTER GLASS

DESCRIPTION

The integral radio antenna element is bonded to the right rear quarter glass and is replaced with the glass assembly only.



OPERATION

The integral antenna receives RF (Radio Frequencies) and sends them to the antenna module for amplification.

DIAGNOSIS AND TESTING

QUARTER GLASS ANTENNA

For complete circuit diagrams, refer to the appropriate wiring information.

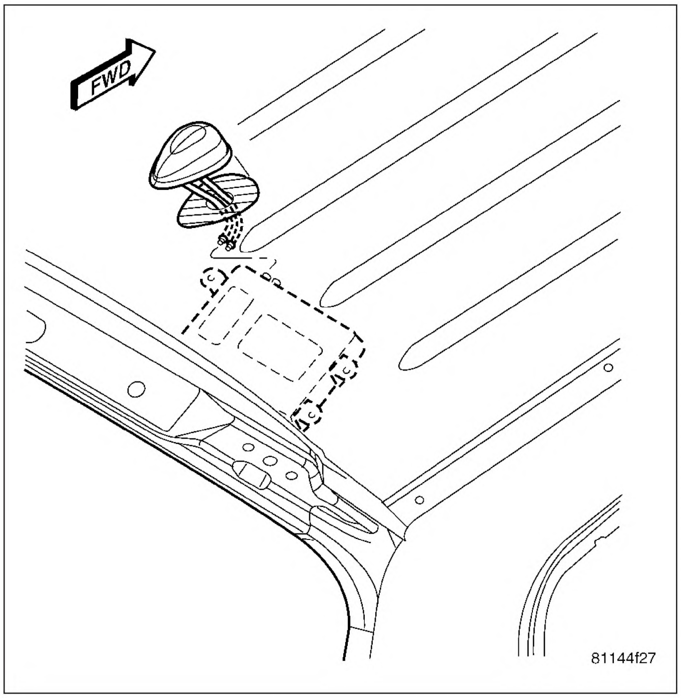
To detect breaks in the integral antenna elements, perform the following procedure:

1. Disconnect the antenna module connector from the antenna.
2. Using an Ohmmeter, place one test lead on the left hand terminal. Place the other test lead on the end of the conductor. Trace down the path to the end of the conductors. There should be continuity to each end of this conductive trace.
3. Place one test lead on the right hand terminal. Place the other test lead on the end of the conductor. Trace down the path to the end of the conductors. There should be continuity to each end of this conductive trace.
4. While keeping the Ohmmeter lead on the left hand terminal, place the other lead on the right hand terminal. There should be an open circuit with no continuity between the terminals.
5. A break in the antenna grid can be repaired using a Mopar Rear Window Defogger Repair Kit or equivalent.

ANTENNA-SATELLITE

DESCRIPTION

The satellite radio antenna is secured by a threaded fastener and two retainers which protrude through a hole in the roof panel. Two wires from the antenna are connected to the satellite receiver module.

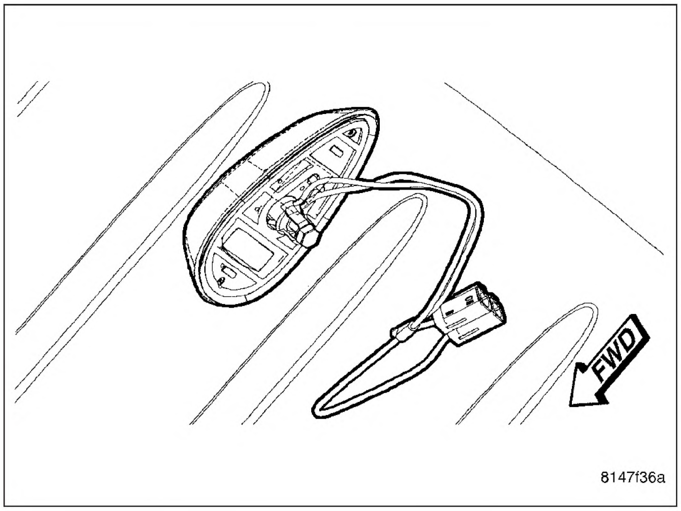


OPERATION

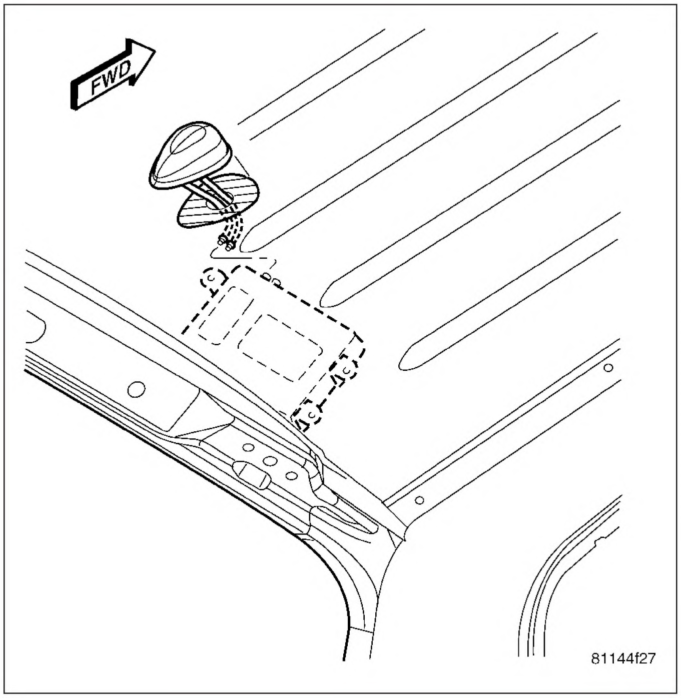
The satellite radio antenna receives signals from orbiting satellites and sends these signals to the satellite receiver module. The satellite radio antenna must have open space in which to operate. Items carried on the roof, parking inside etc. can have an effect on the antenna's ability to receive signals.

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Lower the rear portion of the headliner as necessary to access underside of antenna (1) (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
3. Disconnect the wire harness connectors from the antenna.
4. Remove fastener and retainer.

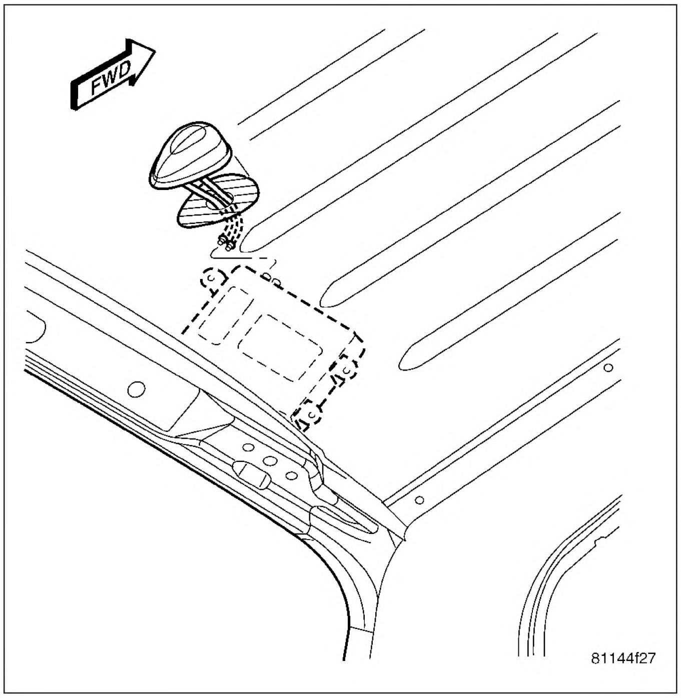


5. From inside the vehicle, and using a flat bladed tool, depress one of the retaining tabs on the antenna. Push up the one side of the antenna connector through the roof panel. Depress the other side of the connector and remove the antenna.

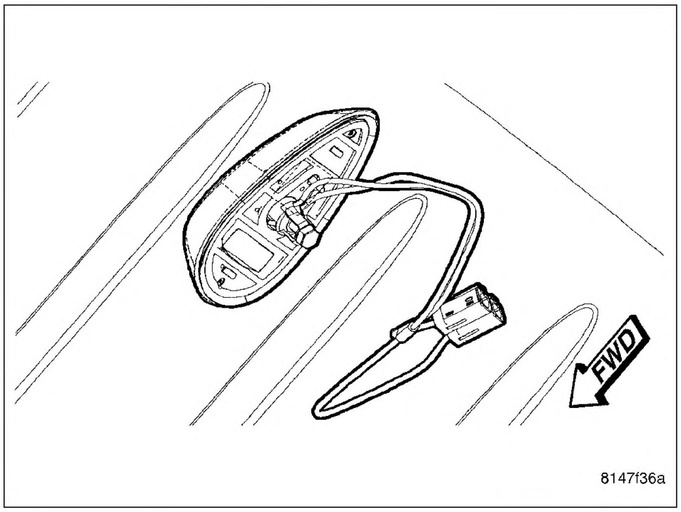


INSTALLATION

1. Insert wire harness through hole in roof panel. Press antenna into position until both retainers snap into place.



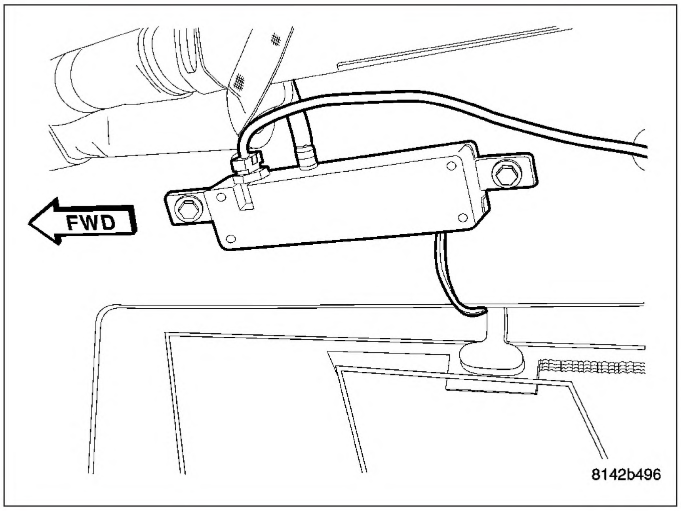
2. Connect wire harness connectors to antenna.
3. Install and tighten retaining fastener.
4. Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
5. Connect battery negative cable.



MODULE - ANTENNA

DESCRIPTION

The antenna module is an electromagnetic circuit component designed to capture and enhance RF (Radio Frequency) signals in both the AM and FM broadcast bands. The antenna module is mounted to the right rear roof rail under the headliner. The mounting brackets also serve as the ground circuit. The antenna module has a two wire electrical connector that connects to the integral radio antenna, located on the right rear quarter glass. A connector for the radio coax cable and battery voltage are on the top of the antenna module.



OPERATION

The antenna module receives both AM and FM radio signals supplied by the side window integral radio antenna system and selectively amplifies them while at the same time avoiding unusable or unwanted signals. The amplified signal is then sent through the body length coax cable to the radio input.

DIAGNOSIS AND TESTING

MODULE - ANTENNA

ANTENNA MODULE DIAGNOSIS TABLE

CONDITION	POSSIBLE CAUSES	CORRECTION
NO AM RECEPTION, WEAK FM RECEPTION	1. Antenna module to antenna connector open or disconnected. 2. Coax open or disconnected. 3. No battery power at antenna module.	1. Repair open, reconnect antenna module connector to glass mounted antenna. 2. Repair open, reconnect coax. 3. Check fuse. if okay, repair open in battery voltage circuit.
NO AM OR FM RECEPTION	1. Coax disconnected at radio. 2. Coax shorted to ground.	1. Reconnect coax. 2. Repair or Replace coax
WEAK OR NO AM/FM RECEPTION	1. Antenna Module inoperative.	1. Substitute a known good module to see If reception improves. Replace antenna module as necessary.

REMOVAL

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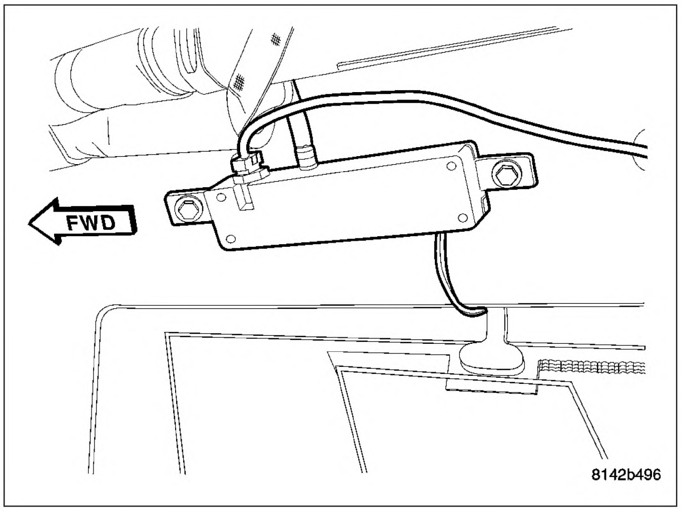
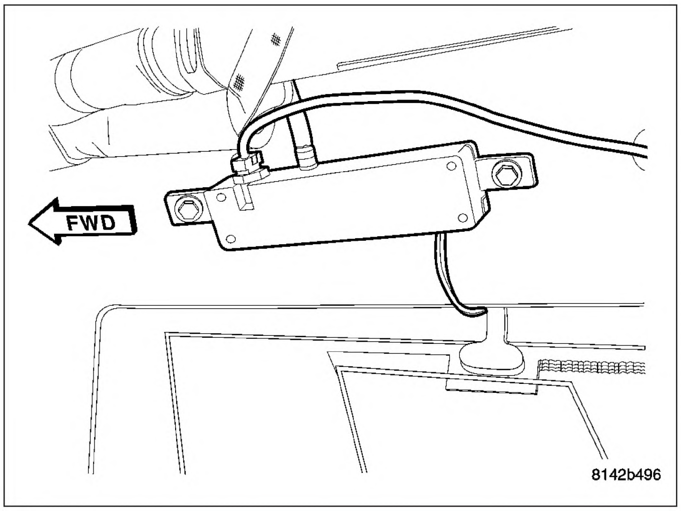


1. Disconnect and isolate the battery negative cable.
2. Lower the right side of the headliner.
3. Disconnect the antenna module connector from the integral antenna.
4. Remove the mounting fasteners and the antenna module.
5. Disconnect the battery power lead connector from the antenna module.
6. Disconnect the coax lead from the antenna module.

INSTALLATION

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Connect antenna cable to antenna module.
2. Connect battery power supply lead to antenna module.
3. Position antenna module onto right side upper roof rail. Install and tighten mounting fasteners.
4. Connect antenna module lead to the integral antenna.
5. Install headliner.



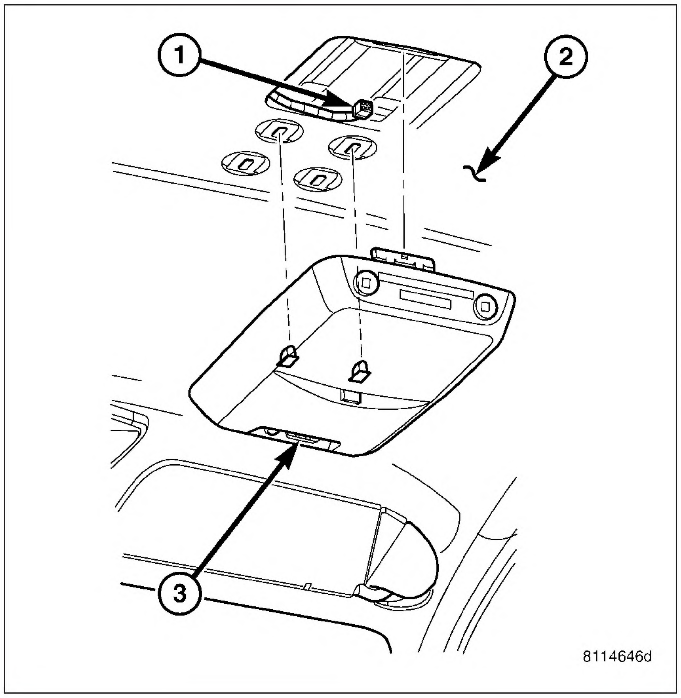
MONITOR-MEDIA SYSTEM

DESCRIPTION

The video entertainment system, consist of:

- Battery powered remote control
- DVD player located at the end of the center floor console
- Two headsets
- Video monitor (3) located on the headliner (2)

In addition to video DVDs, the system will play audio DVDs, audio CDs, MP3 audio disc, and video CDs. There are plug-in jacks on the DVD player to show video directly from a video camera, connect video games for display on the screen, and play music directly from a MP3 player.



OPERATION

A seven inch (diagonal measurement) liquid crystal display (LCD) screen supports both 3 X 4 and 6 X 9 video formats. The hinged screen latches in the closed position and swings down for viewing.

REMOVAL

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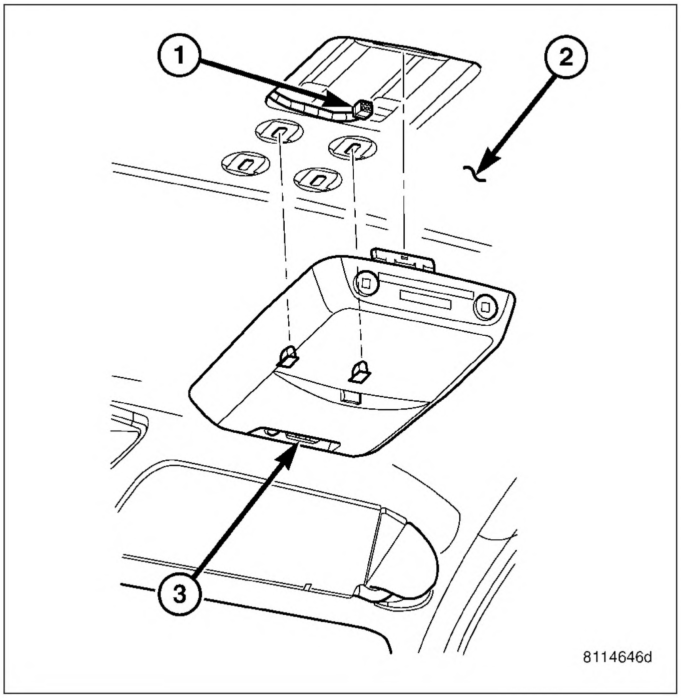
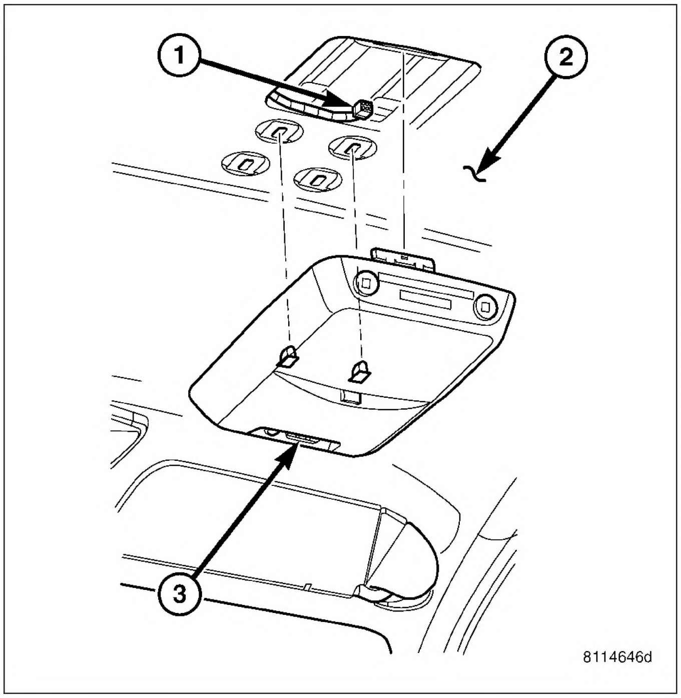
1. Disconnect and isolate the battery negative cable.
2. Remove the two mounting fasteners.
3. Using a trim stick, press the retaining clip at the rear of the monitor (3). Move the monitor from side to side to release from headliner (2).
4. Disconnect electrical harness connector (1) and remove monitor.



INSTALLATION

1. Connect electrical harness connector (1) to monitor (3).
2. Position monitor and press into place.
3. Install and tighten mounting fasteners.
4. Connect battery negative cable.



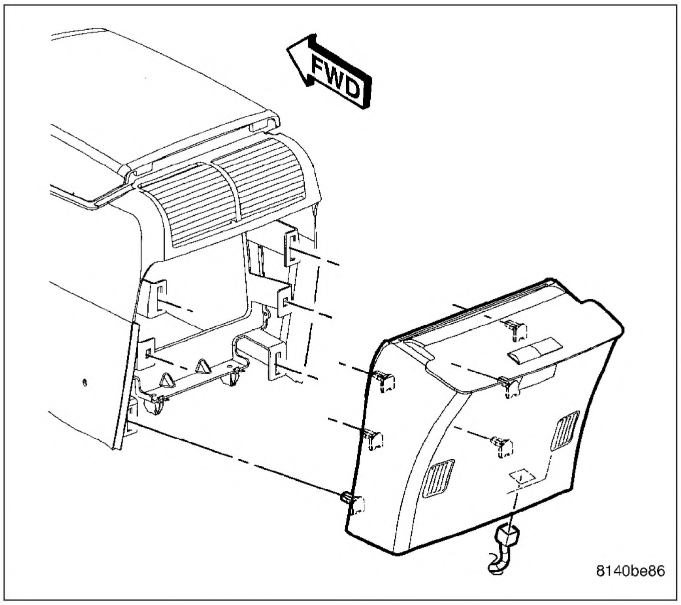
PLAYER - DVD

DESCRIPTION

The video entertainment system, consist of:

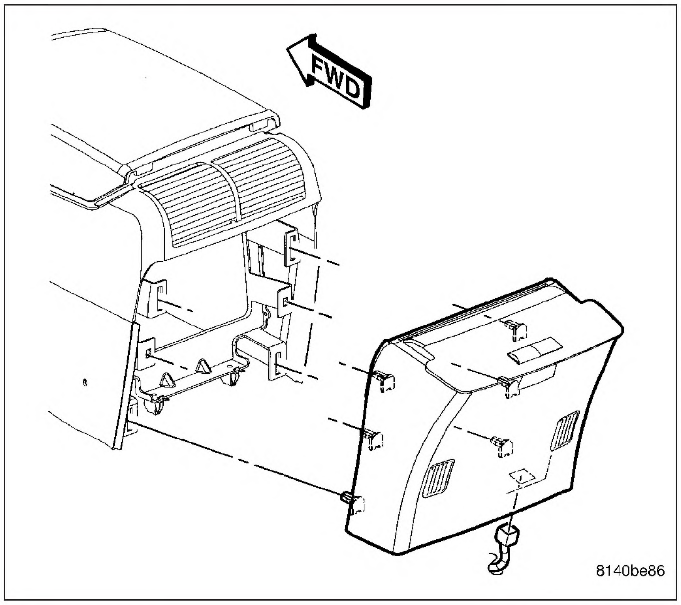
- Battery powered remote control
- DVD player located at the end of the center floor console
- Two headsets
- Video monitor located on the headliner

In addition to video DVDs, the system will play audio DVDs, audio CDs, MP3 audio disc, and video CDs. There are plug-in jacks on the DVD player to show video directly from a video camera, connect video games for display on the screen, and play music directly from a MP3 player.



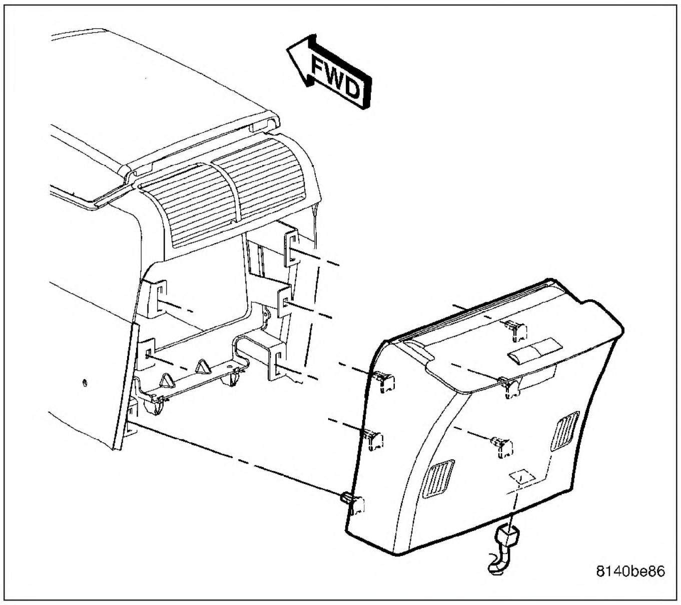
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Using a trim stick, gently pry on the sides of the DVD player and separate from console.
3. Disconnect electrical harness connector from DVD player.



INSTALLATION

1. Connect electrical harness connector to DVD player.
2. Position player to console and press into place.
3. Connect battery negative cable.

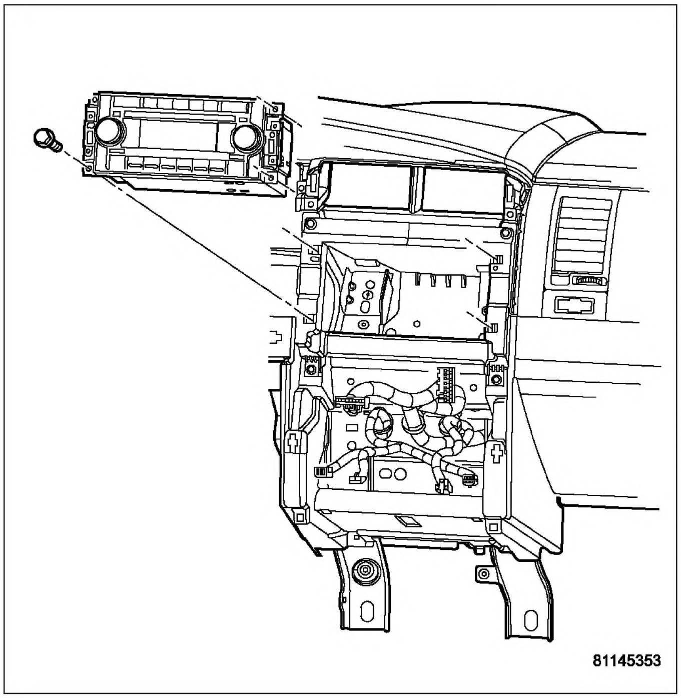


RADIO

DESCRIPTION

Available radios include:

- AM/FM/CD (REF sales code)
- AM/FM/6 disc CD/MP3 (RAQ sales code)
- AM/FM/cassette/CD/RDS/MP3 (RAK sales code)
- AM/FM/6CD/RDS/MP3/Navigation with integrated display (REC sales code)
- AM/FM/CD/RDS/MP3 (RAR sales code) - export only
- AM/FM/CD (REG sales code) - export only
- AM/FM/6CD/RDS/MP3/Navigation with integrated display (REJ sales code) - export only



REMOVAL

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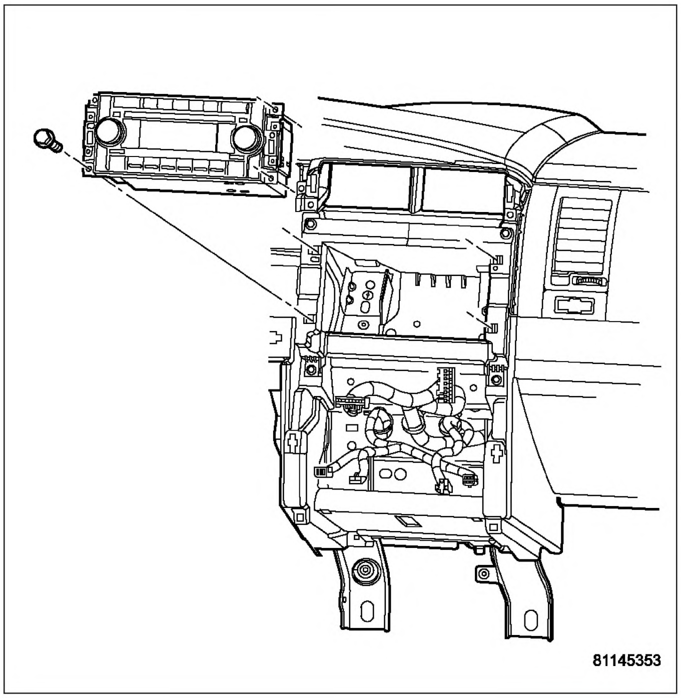
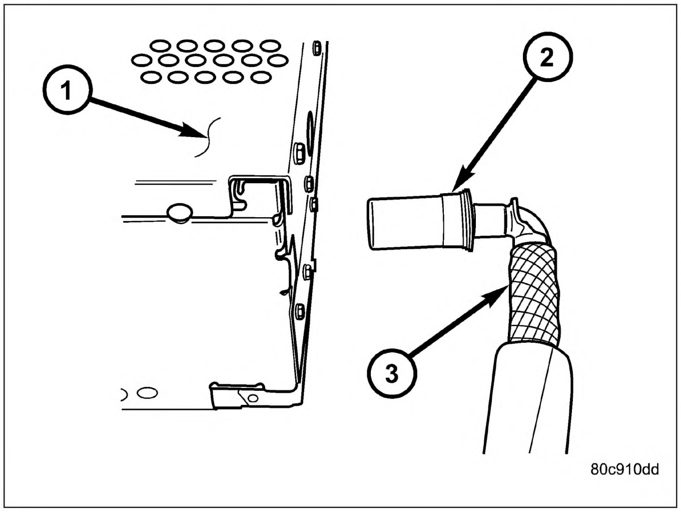
1. Disconnect and isolate the battery negative cable.
2. Remove the instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
3. Remove the radio mounting fasteners.

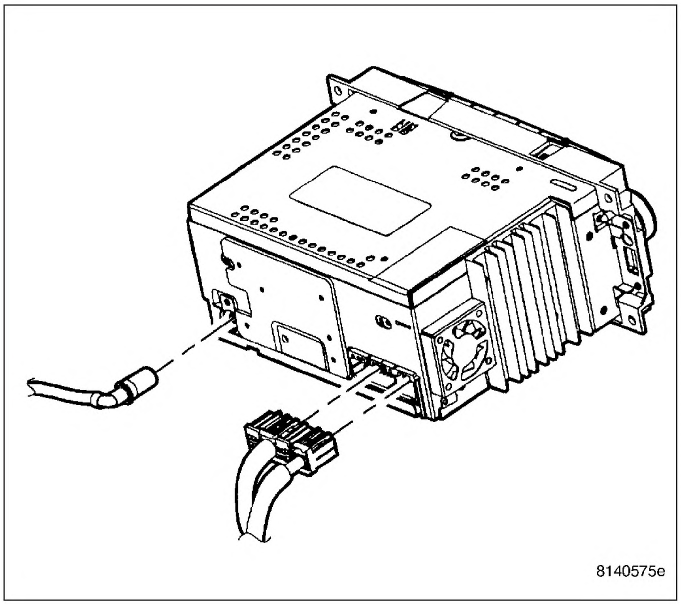


CAUTION: Pulling the antenna cable straight out of the radio without pulling on the locking antenna connector could damage the cable or radio.

4. Disconnect the antenna cable (3) by pulling the locking antenna connector (2) away from the radio (1).

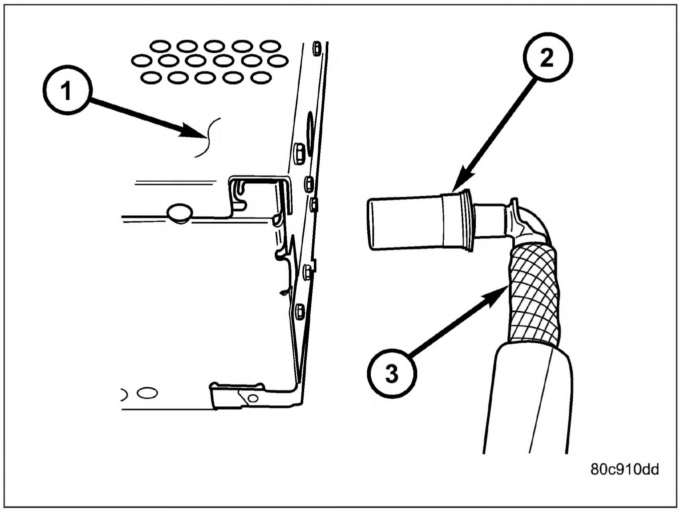


5. Disconnect the electrical harness connector and remove radio.

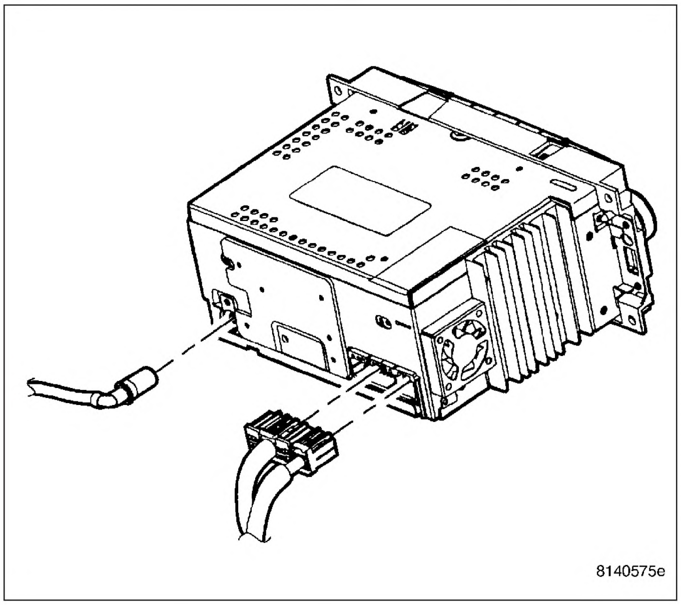


INSTALLATION

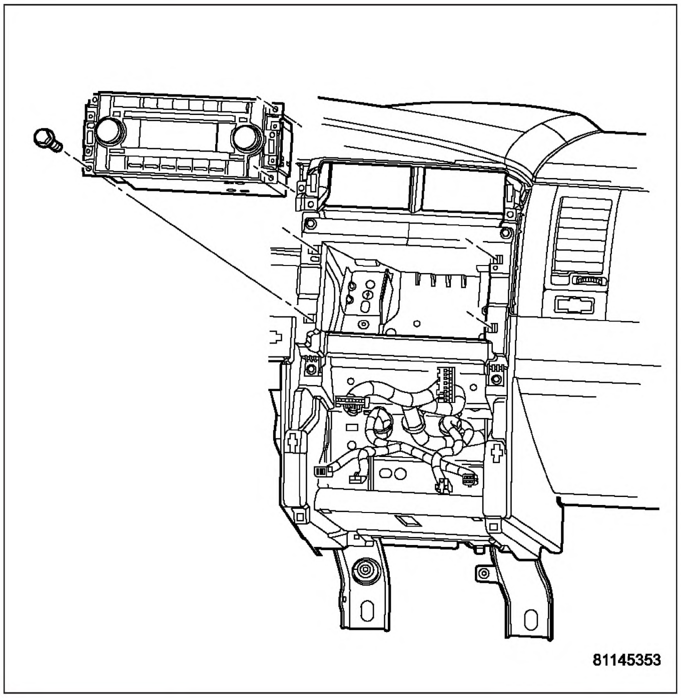
1. Connect antenna cable (3) to radio (1).


1
2
3
80c910dd

2. Connect the electrical harness connector to radio.



3. Position radio to instrument panel. Install and tighten mounting fasteners.
4. Install instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).



RADIO NOISE SUPPRESSION COMPONENTS

DESCRIPTION

Radio noise suppression devices are installed on this vehicle. Radio Frequency Interference (RFI) and ElectroMagnetic Interference (EMI) can be produced by any on-board or external source of electromagnetic energy. These electromagnetic energy sources can radiate electromagnetic signals through the air, or conduct them through the vehicle electrical system.

When the audio system converts RFI or EMI to an audible acoustic wave form, it is referred to as radio noise. This undesirable radio noise is generally manifested in the form of “buzzing,” “hissing,” “popping,” “clicking,” “crackling,” and/or “whirring” sounds. In most cases, RFI and EMI radio noise can be suppressed using a combination of vehicle and component grounding, filtering and shielding techniques. This vehicle is equipped with radio noise suppression devices that were designed to minimize exposure to typical sources of RFI and EMI; thereby, minimizing radio noise complaints.

Radio noise suppression is accomplished primarily through circuitry or devices that are integral to the radios, audio power amplifiers and other on-board electrical components such as generators, wiper motors, blower motors, and fuel pumps that have been found to be potential sources of RFI or EMI. External radio noise suppression devices that are used on this vehicle to control RFI or EMI, and can be serviced, include the following:

- **Engine-to-bulkhead ground strap** - This length of braided ground strap has an eyelet terminal connector crimped to each end. One end is secured to the engine cylinder heads. The other is secured to the bulkhead.
- **Resistor-type spark plugs** - This type of spark plug has an internal resistor connected in series between the spark plug terminal and the center electrode to help reduce the production of electromagnetic radiation that can result in radio noise.
- **Exhaust-to-frame ground strap** - This length of braided ground strap has an eyelet terminal connector crimped to each end. One end is secured to the exhaust pipe. The other is secured to the frame.

OPERATION

There are two common strategies that can be used to suppress Radio Frequency Interference (RFI) and Electro-Magnetic Interference (EMI) radio noise. The first suppression strategy involves preventing the production of RFI and EMI electromagnetic signals at their sources. The second suppression strategy involves preventing the reception of RFI and EMI electromagnetic signals by the audio system components.

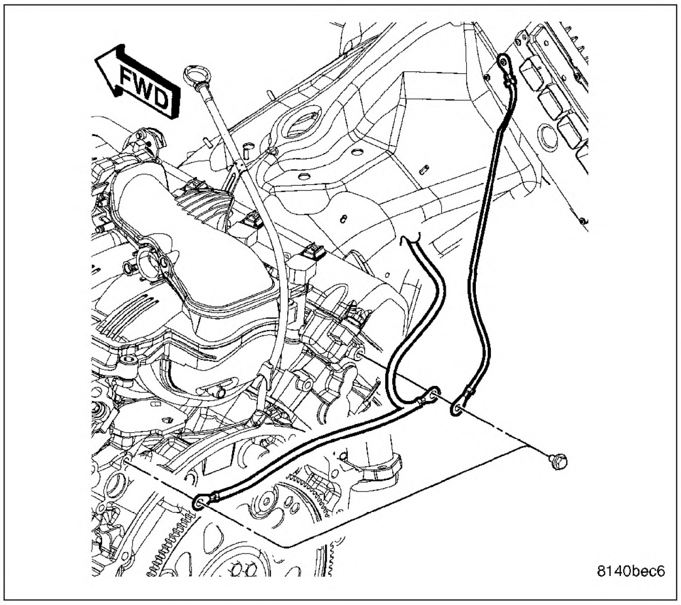
The use of braided ground straps in key locations is part of the RFI and EMI prevention strategy. These ground straps ensure adequate ground paths, particularly for high current components such as many of those found in the starting, charging, ignition, engine control and transmission control systems. An insufficient ground path for any of these high current components may result in radio noise caused by induced voltages created as the high current seeks alternative ground paths through components or circuits intended for use by, or in close proximity to the audio system components or circuits.

Preventing the reception of RFI and EMI is accomplished by ensuring that the audio system components are correctly installed in the vehicle. Loose, corroded or improperly soldered wire harness connections, improperly routed wiring and inadequate audio system component grounding can all contribute to the reception of RFI and EMI. A properly grounded antenna body and radio chassis, as well as a shielded antenna coaxial cable with clean and tight connections will each help reduce the potential for reception of RFI and EMI.

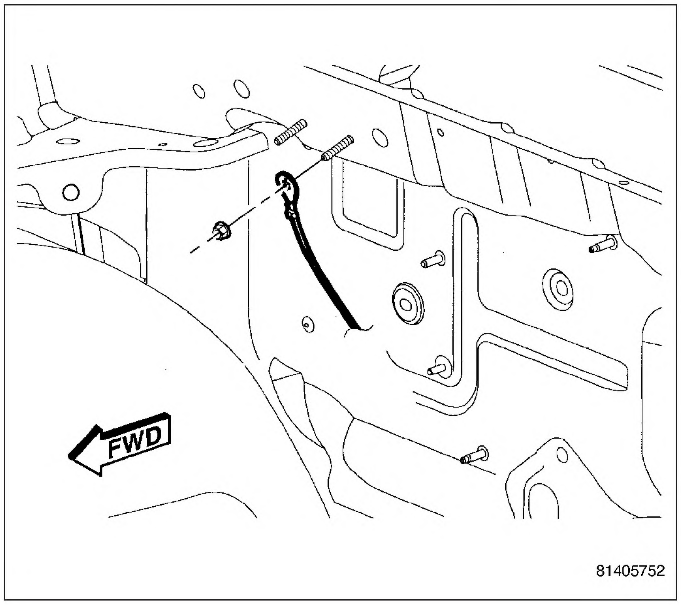
REMOVAL

ENGINE TO BULKHEAD - 4.7L

1. Disconnect and isolate the battery negative cable.
2. Remove mounting fasteners from engine cylinder heads.

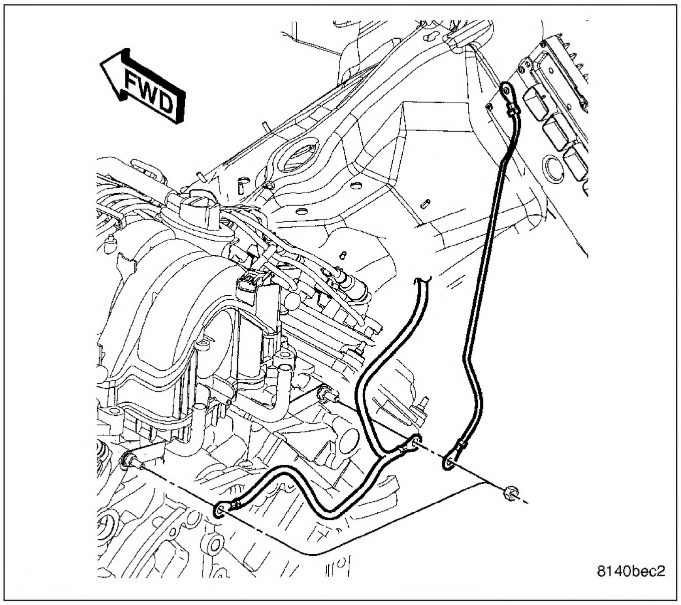


3. Remove mounting fastener from bulkhead and remove cable.


FWD
81405752

ENGINE TO BULKHEAD - 5.7L

1. Disconnect and isolate the battery negative cable.
2. Remove mounting fasteners from engine cylinder heads.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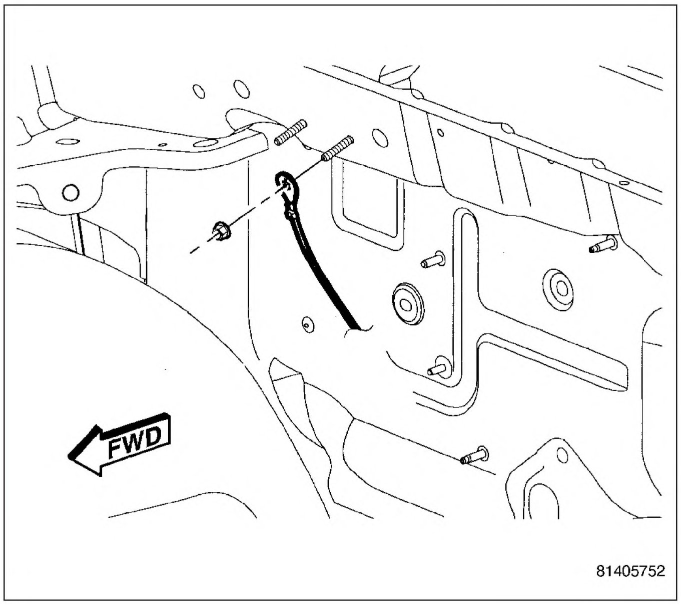
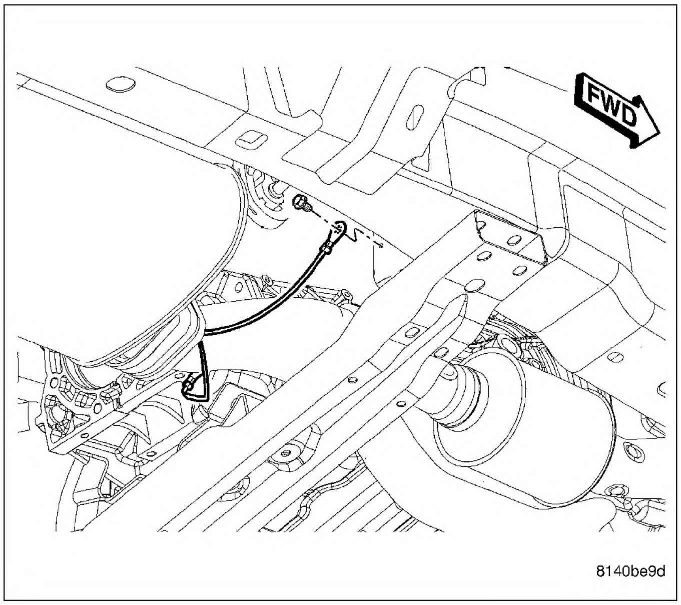
3. Remove mounting fastener from bulkhead and remove cable.



EXHAUST TO FRAME

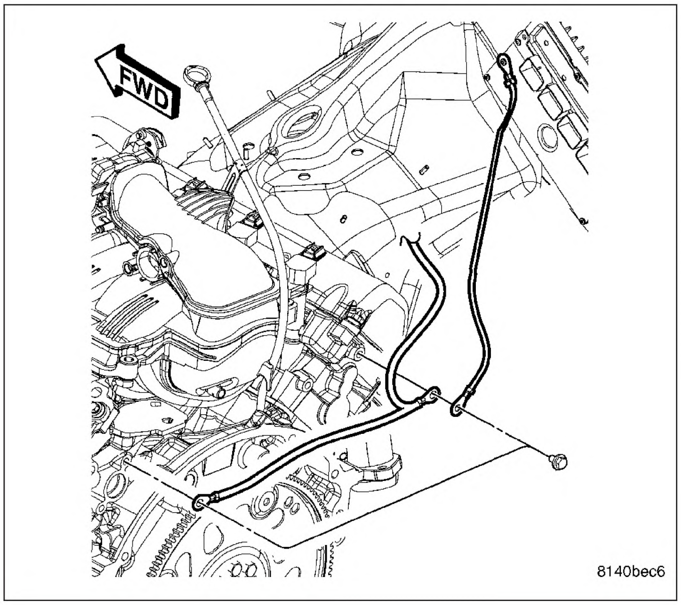
1. Disconnect and isolate the battery negative cable.
2. Remove mounting fastener from exhaust pipe.
3. Remove mounting fastener from frame and remove cable.



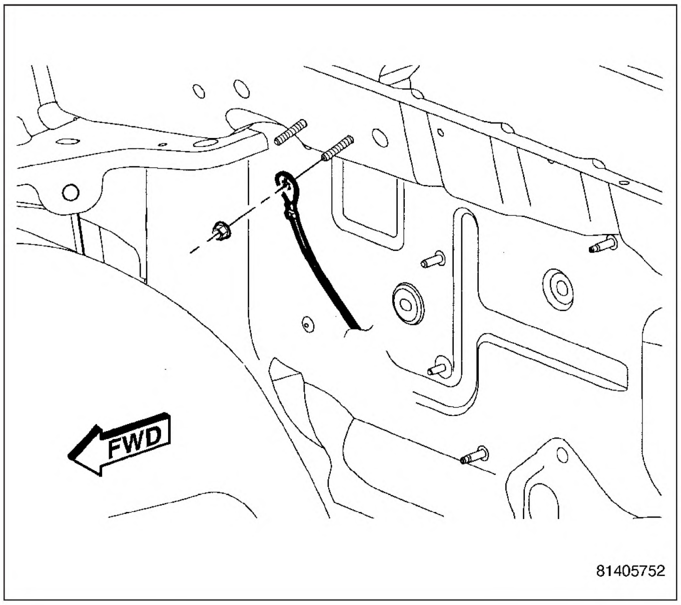
INSTALLATION

ENGINE TO BULKHEAD - 4.7L

1. Position cable to cylinder heads.
2. Install and tighten mounting fasteners.

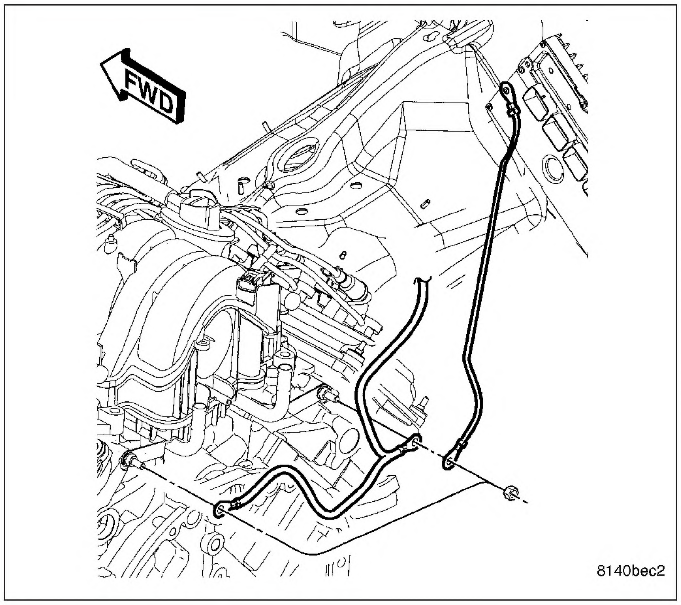


3. Position cable to bulkhead.
4. Install and tighten mounting fastener.
5. Connect battery negative cable.

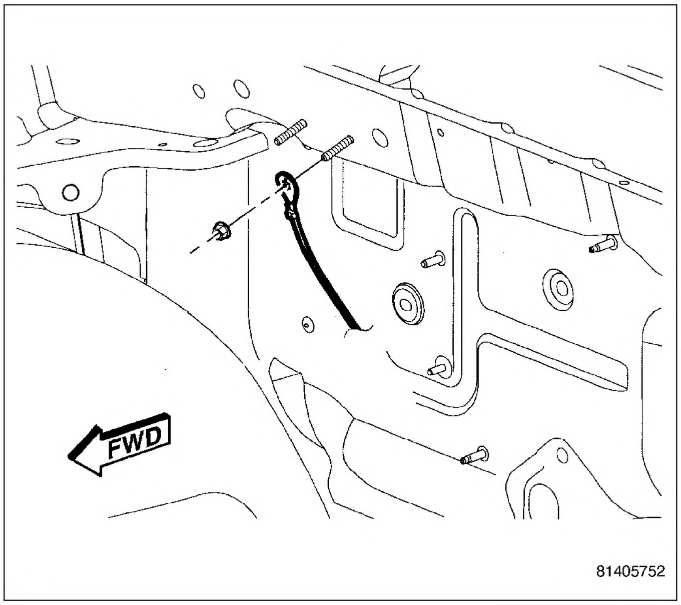


ENGINE TO BULKHEAD - 5.7L

1. Position cable to cylinder heads.
2. Install and tighten mounting fasteners.

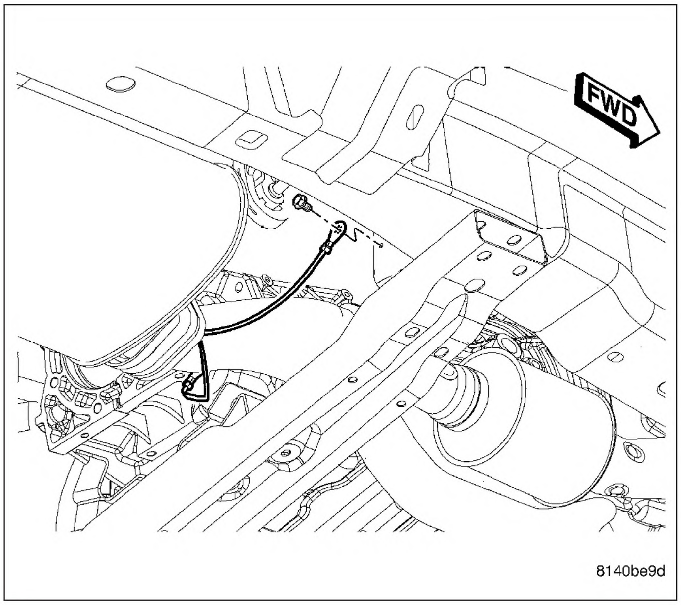


3. Position cable to bulkhead.
4. Install and tighten mounting fastener.
5. Connect battery negative cable.



EXHAUST TO FRAME

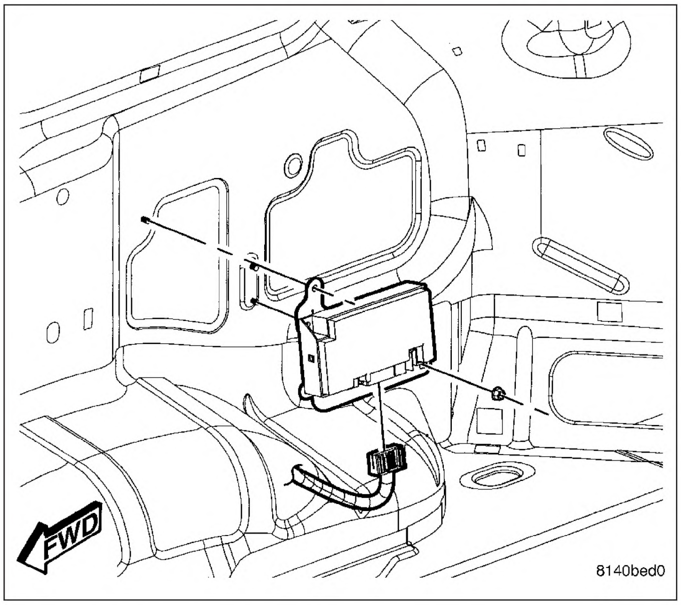
1. Position cable to exhaust pipe
2. Install and tighten mounting fastener to exhaust pipe.
3. Position cable to frame.
4. Install and tighten mounting fastener.
5. Connect battery negative cable.



RECEIVER-SATELLITE

DESCRIPTION

The satellite receiver is located in the right rear quarter area behind the trim panel. It is secured with three mounting fasteners.



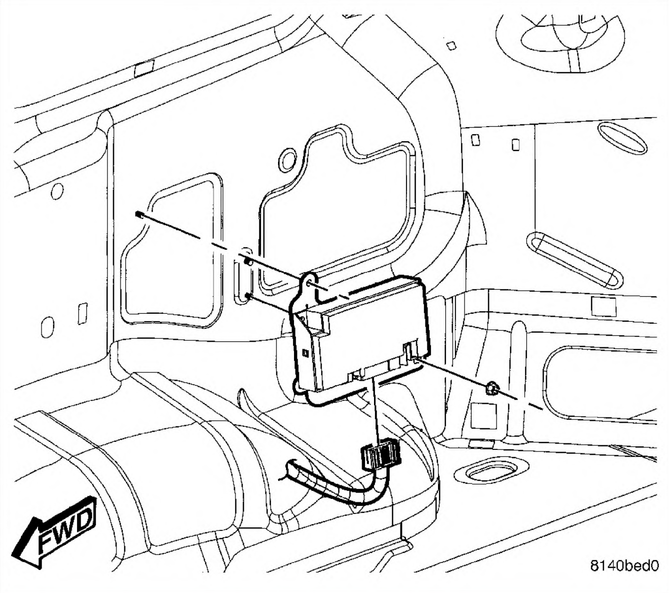
OPERATION

The satellite receiver module receives signals from the roof mounted antenna and processes this information before it is sent to the radio. The module operates on both battery feed circuits and CAN bus messages. It will operate with the ignition key in the run or accessory position only.

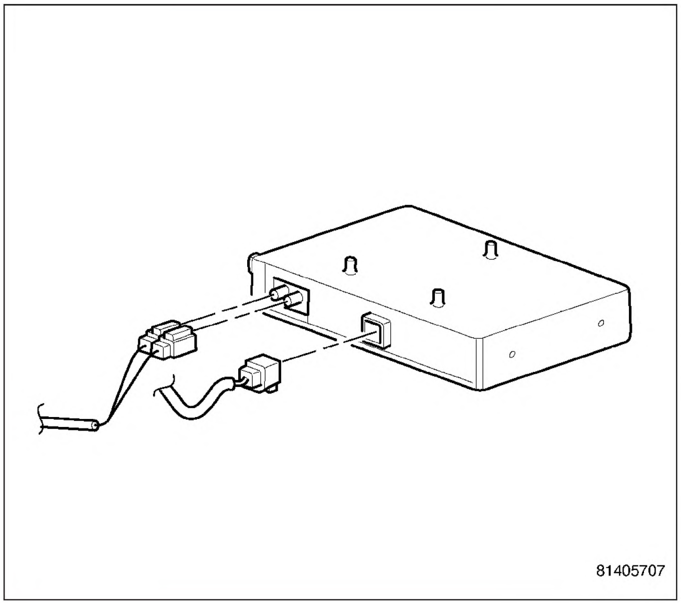
REMOVAL

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Disconnect and isolate the battery negative cable.
2. Remove the right quarter trim.
3. Remove the mounting fasteners.

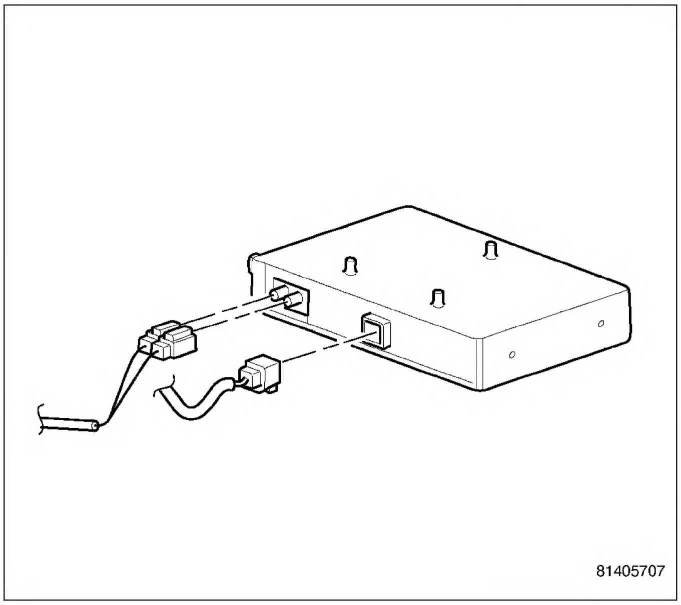


4. Disconnect the antenna and electrical harness connectors.
5. Remove the module.

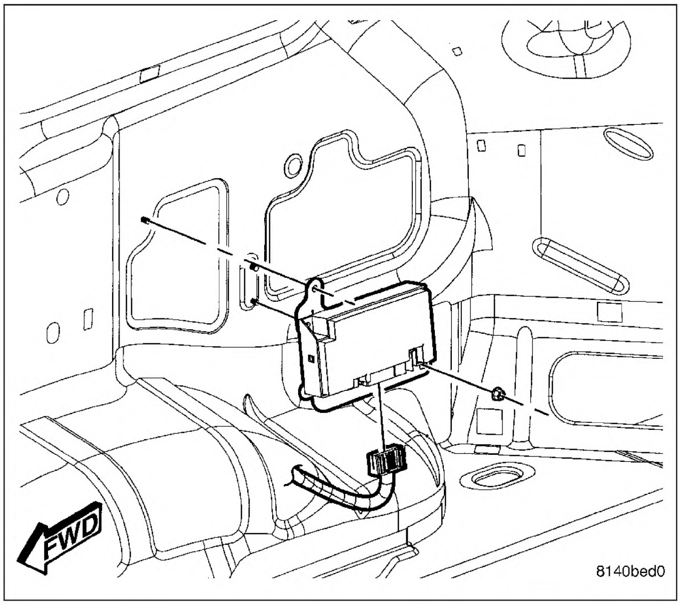


INSTALLATION

1. Connect antenna and electrical harness connector to module.



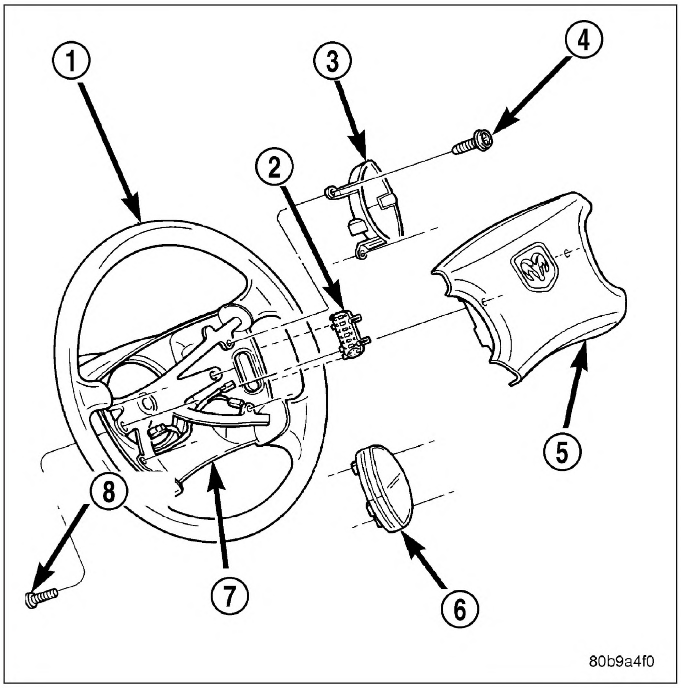
2. Position module to quarter panel.
3. Install and tighten mounting fasteners.
4. Install quarter trim panel.
5. Connect battery negative cable.



SWITCH - REMOTE RADIO

DESCRIPTION

Two rocker-type switches (2) are mounted in the sides of the rear (instrument panel side) steering wheel trim cover. The switch on the left spoke is the seek switch and has seek up, seek down, and preset station advance functions. The switch on the right spoke is the volume control switch and has volume up, and volume down functions. The switch on the right spoke also includes a “mode” control that allows the driver to sequentially select AM radio, FM radio, cassette player or CD player.



OPERATION

The six switches in the two remote radio switch units are normally open, resistor multiplexed momentary switches that are hard wired to the Instrument cluster through the clockspring. The instrument cluster sends a five volt reference signal to both switch units on one circuit, and senses the status of all of the switches by reading the voltage drop on a second circuit.

When the instrument cluster senses an input (voltage drop) from any one of the remote radio switches, it sends the proper switch status messages on the Controller Area Network (CAN) data bus to the radio. The electronic circuitry within the radio is programmed to respond to these remote radio switch status messages by adjusting the radio settings as requested.

DIAGNOSIS AND TESTING

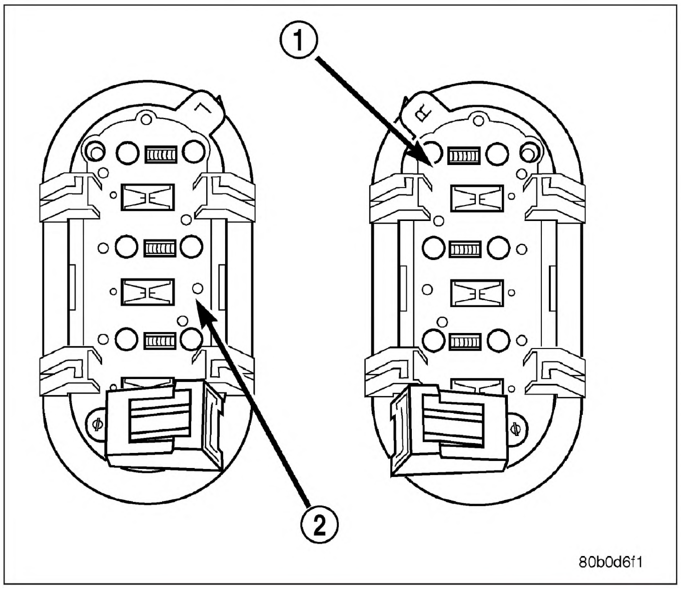
REMOTE SWITCHES

Any diagnosis of the Audio system should begin with the use of a scan tool and the appropriate Diagnostic Service information.

Refer to the appropriate wiring information.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Remove the remote radio switch(es) (1) and (2) from the steering wheel (Refer to 8 - ELECTRICAL/ AUDIO/REMOTE SWITCHES - REMOVAL).
2. Use an ohmmeter to check the switch resistances as shown in the Remote Radio Switch test table. If the remote radio switch resistances are not as indicated, replace the inoperative switch.

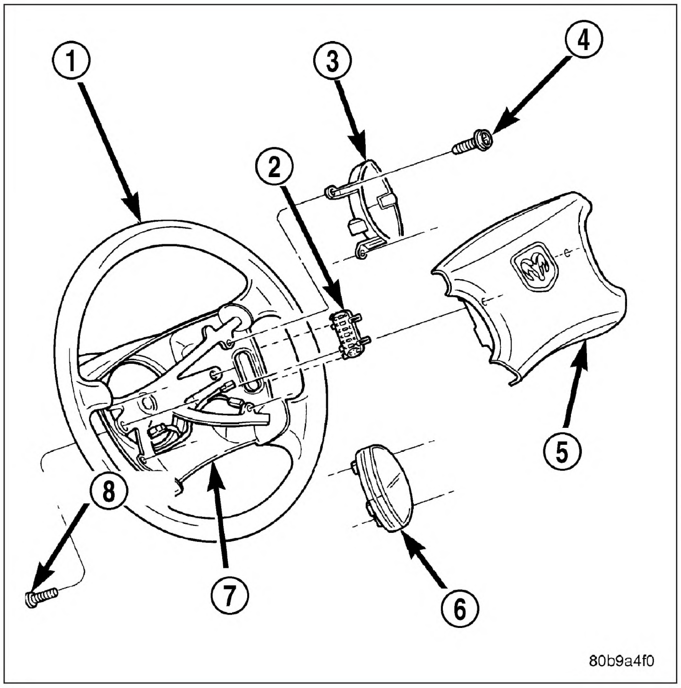


REMOTE RADIO SWITCH TEST

SWITCH	SWITCH POSITION	RESISTANCE
Right or Left	Neutral	24K Ohms ± 5%
Right (White)	Volume Up	6.8K Ohms ± 5%
Right (White)	Volume Down	15.6K Ohms ± 1%
Right (White)	Mode	0 Ohms
Left (Black)	Seek Up	1.2K Ohms ± 5%
Left (Black)	Seek Down	3.3K Ohms ± 5%
Left (Black)	Pre-Set Station Advance	.47K Ohms ± 5%

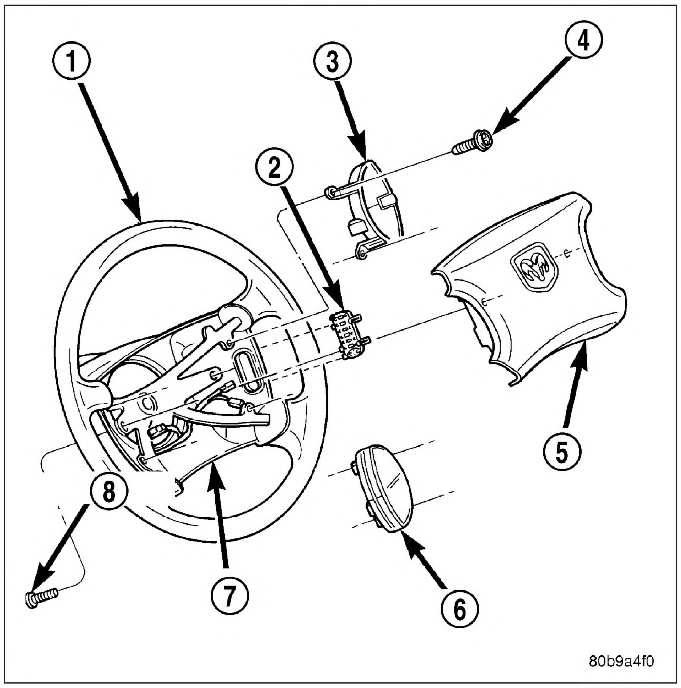
REMOVAL

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



1. Disconnect and isolate the battery negative cable.
2. Remove the driver side airbag (5) from the steering wheel (1). (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).
3. Remove the speed control switch (3) or (6) located on the same side of the steering wheel as the remote radio switch that is being serviced. (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - REMOVAL).
4. Disconnect the steering wheel wire harness connector from the connector receptacle of the remote radio switch.
5. Disengage the four remote radio switch latches that secure the switch to the inside of the mounting hole in the steering wheel rear trim cover.
6. From the outside of the steering wheel rear trim cover, remove the remote radio switch (2) from the trim cover.

INSTALLATION



1. Position the remote radio switch (2) to the mounting hole on the outside of the steering wheel rear trim cover. Be certain that the connector receptacle is oriented toward the bottom of the switch and pointed toward the center of the steering wheel.
2. Press firmly and evenly on the remote radio switch until each of the switch latches is fully engaged in the mounting hole of the steering wheel rear trim cover.
3. Reconnect the steering wheel wire harness connector to the connector receptacle of the remote radio switch.
4. Install the speed control switch (3) (6) onto the steering wheel. (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - INSTALLATION).
5. Install the driver side airbag (5) to the steering wheel (1). (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).
6. Connect the battery negative cable.

SPEAKER

DESCRIPTION

STANDARD

The standard equipment speaker system includes speakers in six locations. One 6.4 centimeter (2.50 inch) diameter tweeter is installed on each end of the instrument panel. One 15.2 by 22.9 centimeter (6 by 9 inch) full-range speaker is located in each front door. There is also one full-range 16.5 centimeter (6.5 inch) diameter full-range speaker located in each rear door.

BOSTON ACOUSTICS

The Boston Acoustics speaker system includes speakers in six locations. Each of the standard speakers is replaced with Boston Acoustics speakers. One 6.4 centimeter (3.50 inch) diameter speaker is installed on each end of the instrument panel. One 15.2 by 22.9 centimeter (6 by 9 inch) speaker is located in each front door. One 16.5 centimeter (6.5 inch) diameter speaker is located in each rear door. The Boston Acoustics speaker system also includes an amplifier. The total available power of the premium speaker system is approximately 288 watts.

DIAGNOSIS AND TESTING

SPEAKER

Any diagnosis of the Audio system should begin with the use of a scan tool and the appropriate Diagnostic Service information.

Refer to the appropriate wiring information.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

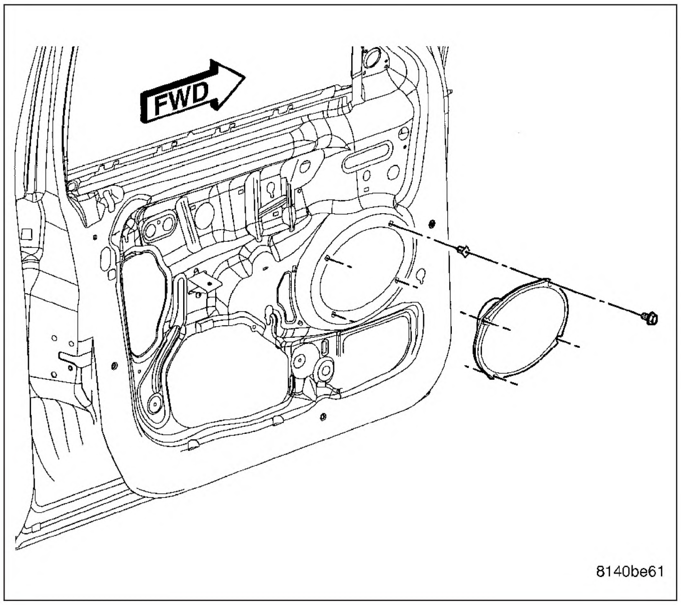
CAUTION: The speaker output of the radio is a “floating ground” system. Do not allow any speaker lead to short to ground, as damage to the radio may result.

1. If all speakers are inoperative, check the radio fuses in the junction block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.
2. Check the amplifier fuse (if equipped) in the junction block. If OK, go to Step 3. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.
3. Turn the ignition switch to the ON position. Turn the radio receiver ON. Adjust the balance and fader control controls to check the performance of each individual speaker. Note the speaker locations that are not performing correctly. Go to Step 4.
4. Turn the radio OFF. Turn the ignition OFF. Disconnect and isolate the battery negative cable. If vehicle is **not** equipped with a amplifier, remove the radio receiver. If the vehicle is equipped with an amplifier, disconnect the wire harness connectors. There are two connectors. The one on the body harness has body speakers only. The other on the instrument panel harness has the instrument panel speakers, battery, ground, and CAN. Go to Step 5.
5. Check both the speaker feed (+) circuit and return (-) circuit cavities for the inoperative speaker at the wire harness connector for continuity to ground. There should be no continuity. If OK, go to Step 6. If not OK, repair the shorted speaker feed (+) and/or return (-) circuits(s) to the speaker as required.
6. Disconnect wire harness connector at the inoperative speaker. Check for continuity between the speaker feed (+) circuit cavities of the radio receiver wire harness connector or if equipped, the amplifier wire harness connector and the speaker wire harness connector. Repeat the check between the speaker return (-) circuit cavities of the radio receiver wire harness connector and the speaker wire harness connector. In each case, there should be continuity. If OK, replace the faulty speaker. If not OK, repair the open speaker feed (+) and/or return (-) circuits(s) as required.

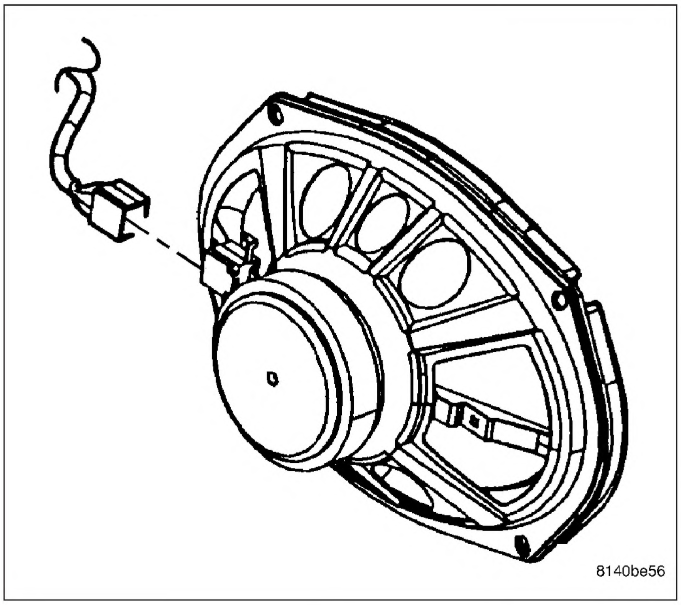
REMOVAL

FRONT DOOR

1. Disconnect and isolate the battery negative cable.
2. Remove front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
3. Remove mounting fasteners.



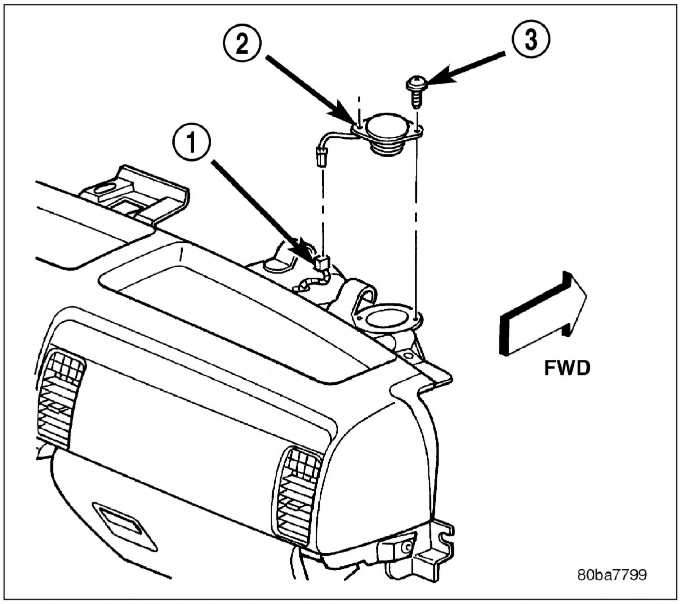
4. Remove speaker from door.
5. Disconnect wire harness connector from speaker.



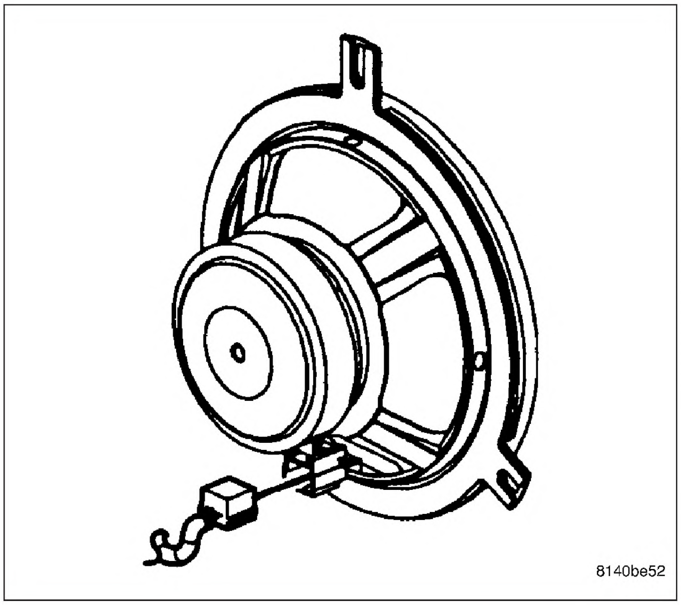
INSTRUMENT PANEL

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Disconnect and isolate the battery negative cable.
2. Remove speaker grille from instrument panel.

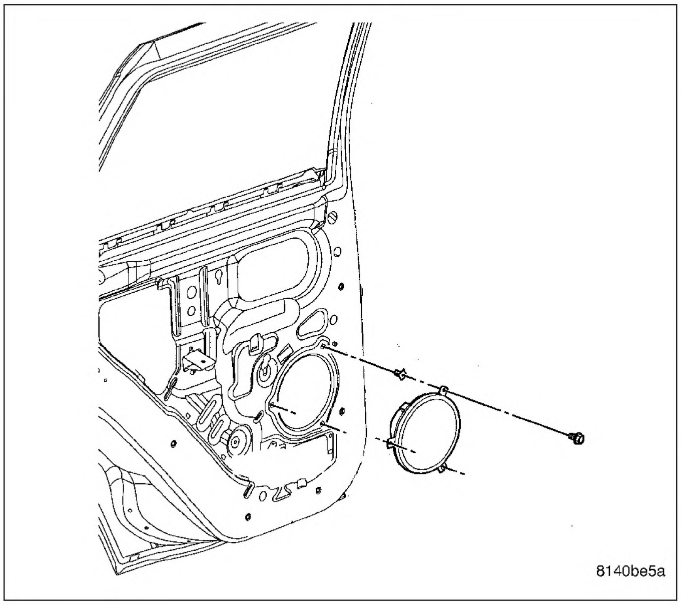


3. Remove speaker from instrument panel.
4. Disconnect wire harness connector from speaker.

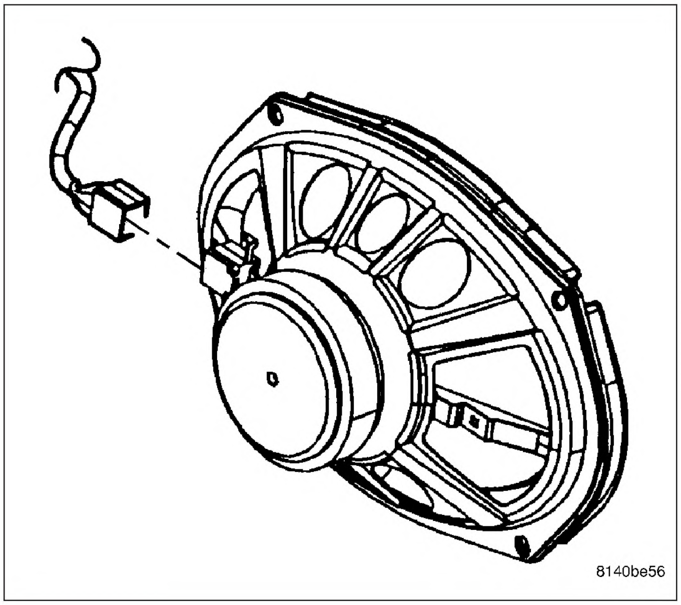


REAR DOOR

1. Disconnect and isolate the battery negative cable.
2. Remove rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
3. Remove mounting fasteners.



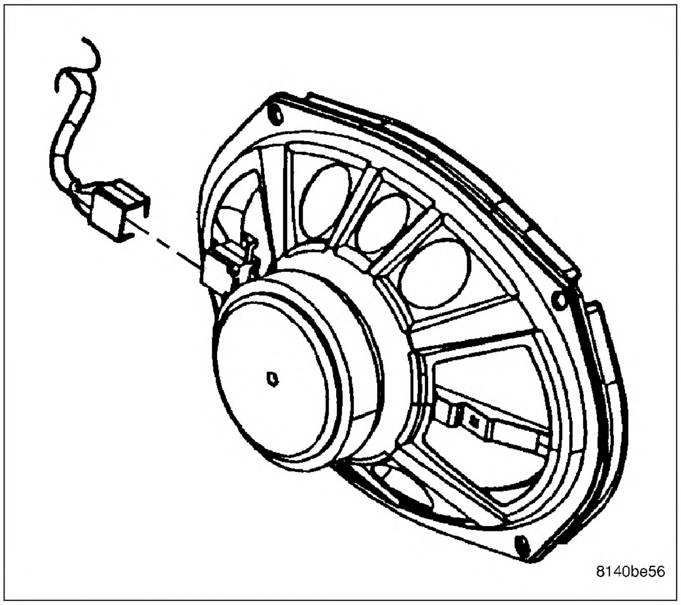
4. Remove speaker from door.
5. Disconnect wire harness connector from speaker.



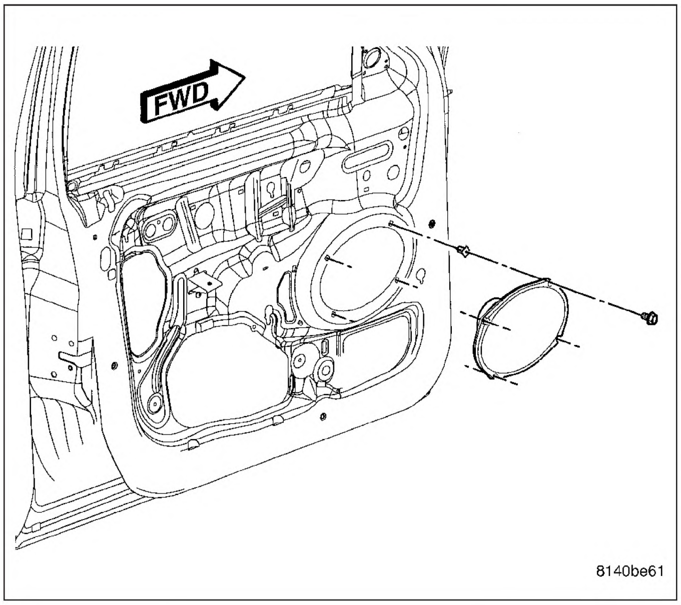
INSTALLATION

FRONT DOOR

1. Connect wire harness connector to speaker.
2. Position speaker to door.

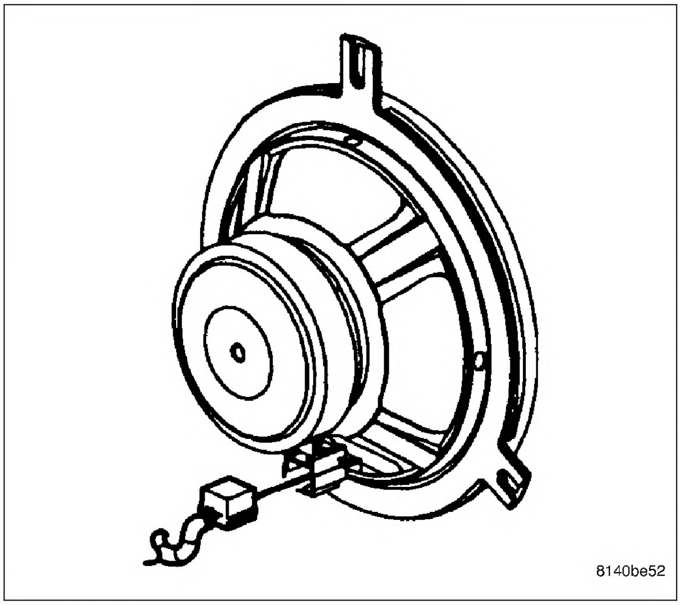


3. Install and tighten mounting fasteners.
4. Install front door trim panel.
5. Connect battery negative cable.

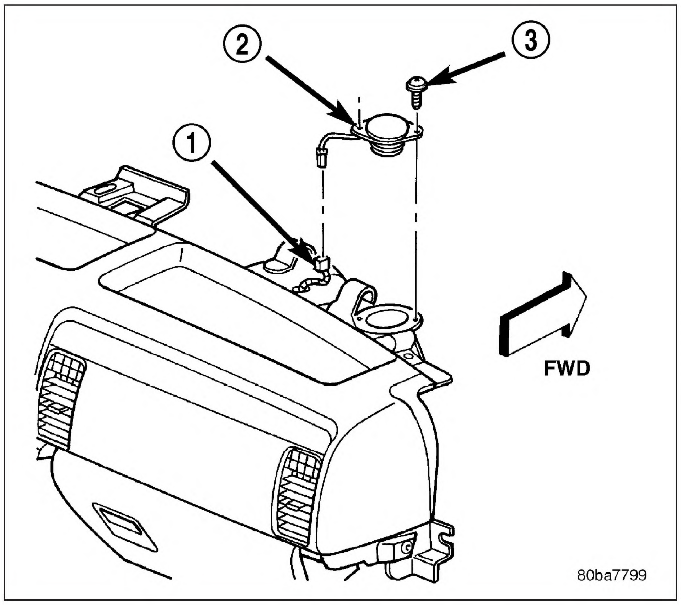


INSTRUMENT PANEL

1. Connect wire harness connector to speaker.
2. Position speaker to instrument panel.

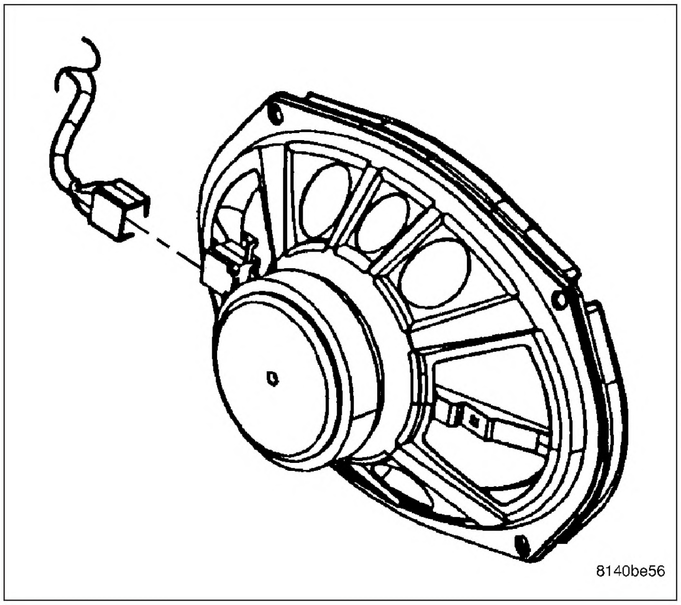


3. Install and tighten mounting fasteners.
4. Install speaker grille.
5. Connect battery negative cable.

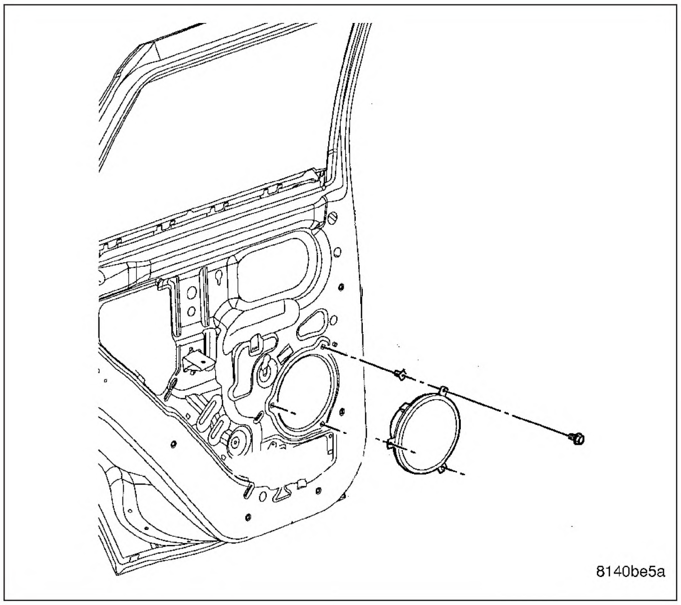


REAR DOOR

1. Connect wire harness connector to speaker.
2. Position speaker to door.



3. Install and tighten mounting fasteners.
4. Install rear door trim panel.
5. Connect battery negative cable.



CHIME/BUZZER

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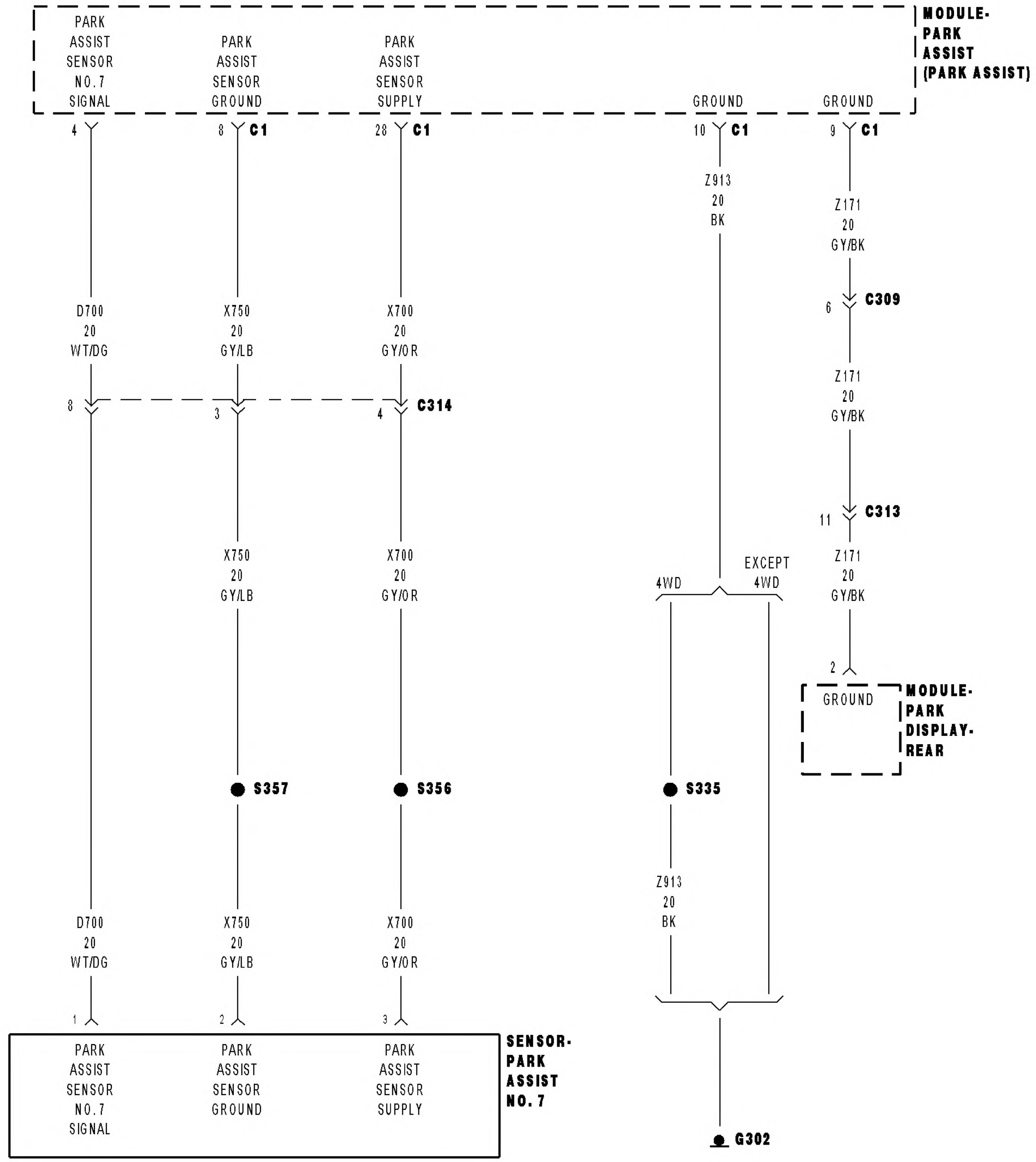
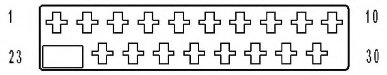
SCHEMATICS AND DIAGRAMS 62

CHIME/BUZZER - ELECTRICAL DIAGNOSTICS

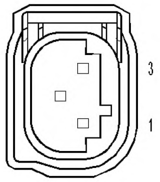
DIAGNOSIS AND TESTING

B122C-PTS SENSOR 7 CIRCUIT LOW


MODULE-
PARK
ASSIST
(PARK ASSIST)
PARK ASSIST SENSOR NO.7 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
GROUND
GROUND
4
8 C1
28 C1
10 C1
9 C1
Z913 20 BK
Z171 20 GY/BK
6 C309
Z171 20 GY/BK
11 C313
Z171 20 GY/BK
D700 20 WT/DG
X750 20 GY/LB
X700 20 GY/OR
8
3
4 C314
X750 20 GY/LB
X700 20 GY/OR
4WD
EXCEPT 4WD
2
GROUND
MODULE-
PARK
DISPLAY-
REAR
S357
S356
S335
Z913 20 BK
D700 20 WT/DG
X750 20 GY/LB
X700 20 GY/OR
1
2
3
PARK ASSIST SENSOR NO.7 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
SENSOR-
PARK
ASSIST
NO. 7
G302



MODULE-
PARK ASSIST C1
(PARK ASSIST)



SENSOR-
PARK ASSIST NO. 7
(REAR PARK
ASSIST)

814833c6

B122C-PTS SENSOR 7 CIRCUIT LOW (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATIC - ELECTRICAL).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time is too short (700 µsecs).

Possible Causes
(D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT SHORTED TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT
(D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT SHORTED TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT
(D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT SHORTED TO (Z914) PARK ASSIST MODULE GROUND CIRCUIT
(D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT SHORTED TO GROUND
PARK ASSIST SENSOR NO. 7
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B122C-PTS SENSOR 7 CIRCUIT LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B122C-PTS SENSOR 7 CIRCUIT LOW active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B122C-PTS SENSOR 7 CIRCUIT LOW (CONTINUED)

2. CHECK PARK ASSIST SENSOR NO. 7 FOR A SHORT TO GROUND

Shift the transmission into park.

With the scan tool, erase DTCs.

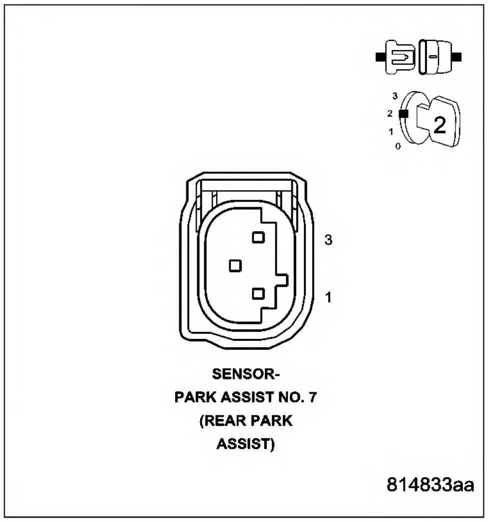
Turn the ignition off.

Disconnect Park Assist Sensor No. 7.

Turn the ignition on.

Shift the transmission into reverse.

With the scan tool, read Park Assist Module DTCs.


3
2
1
0
2
3
1
SENSOR-
PARK ASSIST NO. 7
(REAR PARK
ASSIST)
814833aa

Does the scan tool display: B122C-PTS SENSOR 7 CIRCUIT LOW?

Yes >> Go To 3

No >> Replace Park Assist Sensor No. 7 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

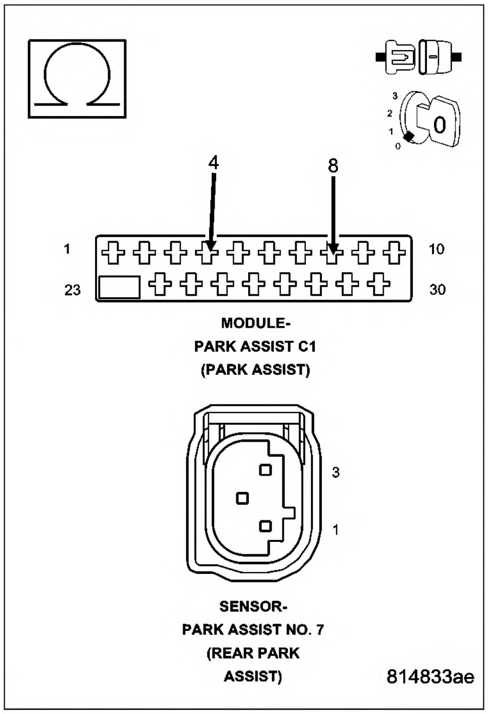
---

3. CHECK THE (D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT FOR A SHORT TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Measure the resistance between the (D700) Park Assist Sensor No. 7 Signal circuit and the (X750) Park Assist Sensor Ground circuit.


Ω
3
2
1
0
0
4
8
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 7
(REAR PARK
ASSIST)
814833ae

Is the resistance below 10K ohms?

Yes >> Repair the (D700) Park Assist Sensor No. 7 Signal circuit for a short to the (X750) Park Assist Sensor Ground circuit.

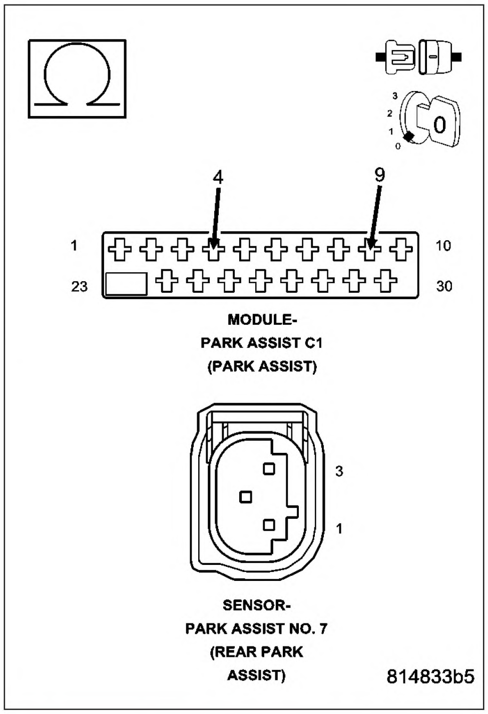
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

B122C-PTS SENSOR 7 CIRCUIT LOW (CONTINUED)

4. CHECK THE (D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT FOR A SHORT TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT

Measure the resistance between the (D700) Park Assist Sensor No. 7 Signal circuit and the (Z171) Park Assist Display Ground circuit.


4
9
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 7
(REAR PARK
ASSIST)
814833b5

Is the resistance below 10K ohms?

Yes >> Repair the (D700) Park Assist Sensor No. 7 Signal circuit for a short to the (Z171) Park Assist Display Ground circuit.

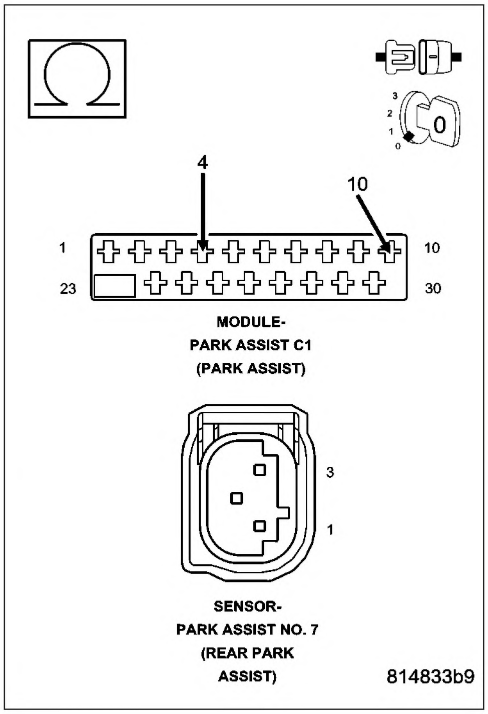
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 5

---

5. CHECK THE (D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT FOR A SHORT TO (Z914) PARK ASSIST MODULE GROUND CIRCUIT

Measure the resistance between the (D700) Park Assist Sensor No. 7 Signal circuit and the (Z914) Park Assist Module Ground circuit.


4
10
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 7
(REAR PARK
ASSIST)
814833b9

Is the resistance below 10K ohms?

Yes >> Repair the (D700) Park Assist Sensor No. 7 Signal circuit for a short to the (Z914) Park Assist Module Ground circuit.

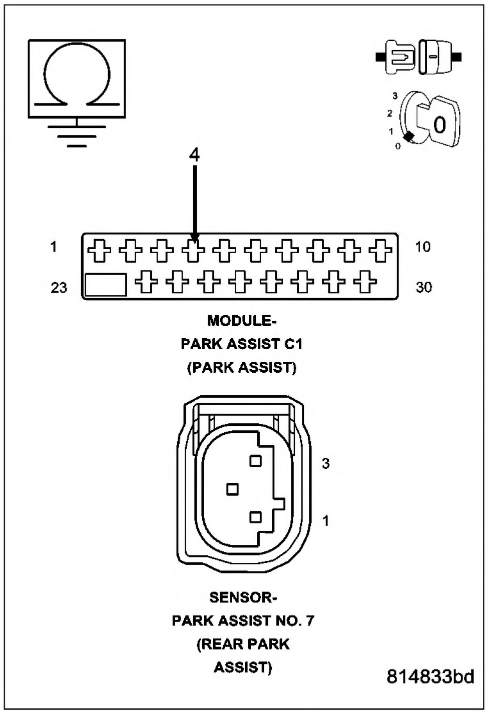
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 6

B122C-PTS SENSOR 7 CIRCUIT LOW (CONTINUED)

6. CHECK THE (D700) PARK ASSIST SENSOR NO. 7 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (D700) Park Assist Sensor No. 7 Signal circuit.



3
2
1
0
O
4
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 7
(REAR PARK
ASSIST)
814833bd

Is the resistance below 10K ohms?

Yes >> Repair the (D700) Park Assist Sensor No. 7 Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B122E-PTS SENSOR 7 RING TIME TOO SHORT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time exceeds limit (greater than 1450 µsecs).

Possible Causes
PARK ASSIST SENSOR NO. 7

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B122E-PTS SENSOR 7 RING TIME TOO SHORT

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B122E-PTS SENSOR 7 RING TIME TOO SHORT active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. REPLACE PARK ASSIST SENSOR NO. 7

View Repair

Repair

Replace Park Assist Sensor No. 7 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B122F-PTS SENSOR 7 RING TIME TOO LONG

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Data line stuck at 0.

Possible Causes
PARK ASSIST SENSOR NO. 7

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B122F-PTS SENSOR 7 RING TIME TOO LONG

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B122F-PTS SENSOR 7 RING TIME TOO LONG active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. REPLACE PARK ASSIST SENSOR NO 7.

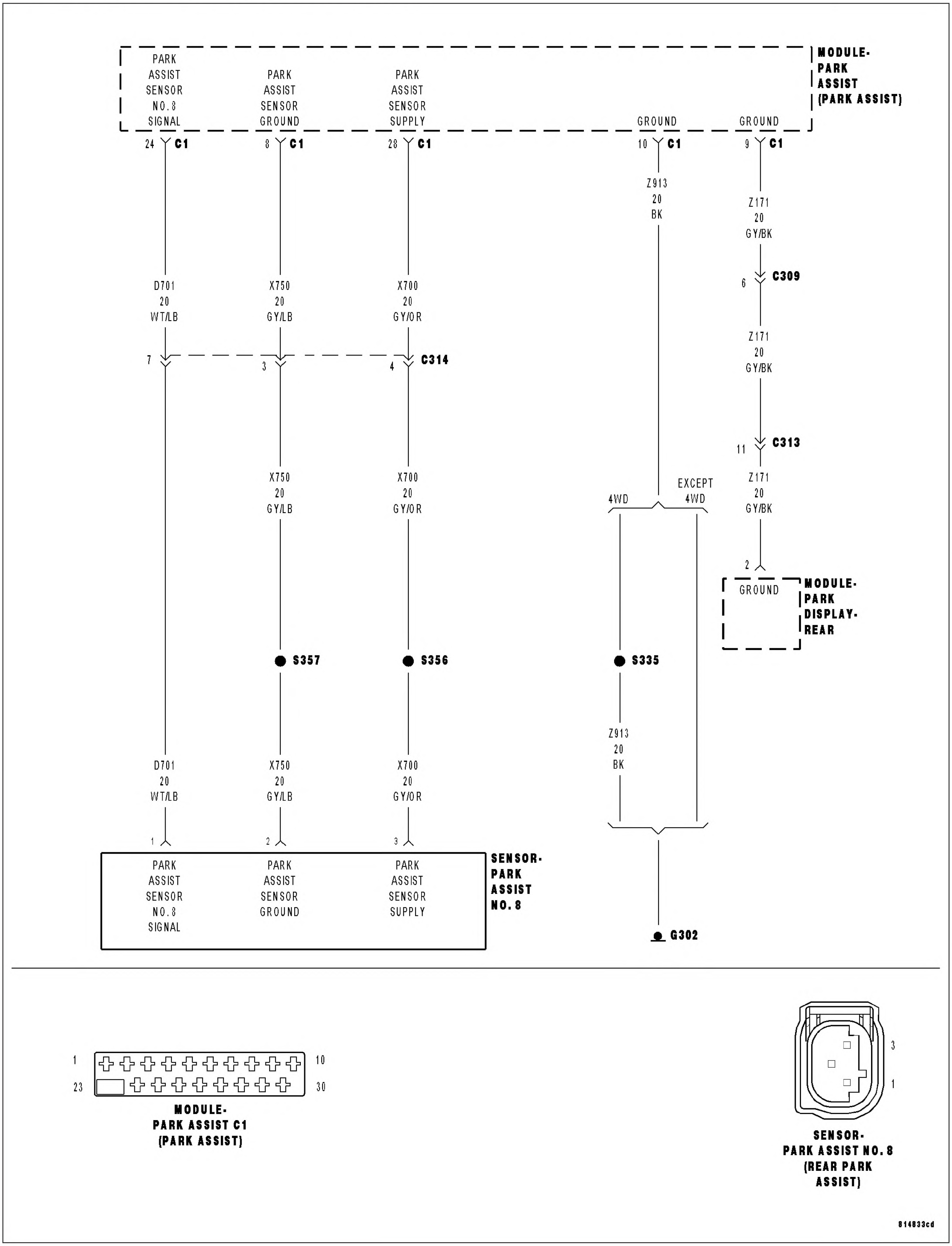
View Repair

Repair

Replace Park Assist Sensor No. 7 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1231-PTS SENSOR 8 CIRCUIT LOW


MODULE-
PARK
ASSIST
(PARK ASSIST)
PARK ASSIST SENSOR NO.8 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
GROUND
GROUND
24 C1
8 C1
28 C1
10 C1
9 C1
Z913
20
BK
Z171
20
GY/BK
6 C309
Z171
20
GY/BK
D701
20
WT/LB
X750
20
GY/LB
X700
20
GY/OR
7
3
4 C314
11 C313
Z171
20
GY/BK
X750
20
GY/LB
X700
20
GY/OR
4WD
EXCEPT 4WD
2
GROUND
MODULE-
PARK
DISPLAY-
REAR
S357
S356
S335
Z913
20
BK
D701
20
WT/LB
X750
20
GY/LB
X700
20
GY/OR
1
2
3
PARK ASSIST SENSOR NO.8 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
SENSOR-
PARK
ASSIST
NO. 8
G302
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 8
(REAR PARK
ASSIST)
814833cd

B1231-PTS SENSOR 8 CIRCUIT LOW (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATIC - ELECTRICAL).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time is too short (700 µsecs).

Possible Causes
(D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT SHORTED TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT
(D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT SHORTED TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT
(D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT SHORTED TO (Z914) PARK ASSIST MODULE GROUND CIRCUIT
(D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT SHORTED TO GROUND
PARK ASSIST SENSOR NO. 8
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B1231-PTS SENSOR 8 CIRCUIT LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B1231-PTS SENSOR 8 CIRCUIT LOW active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1231-PTS SENSOR 8 CIRCUIT LOW (CONTINUED)

2. CHECK PARK ASSIST SENSOR NO. 8 FOR A SHORT TO GROUND

Shift the transmission into park.

With the scan tool, erase DTCs.

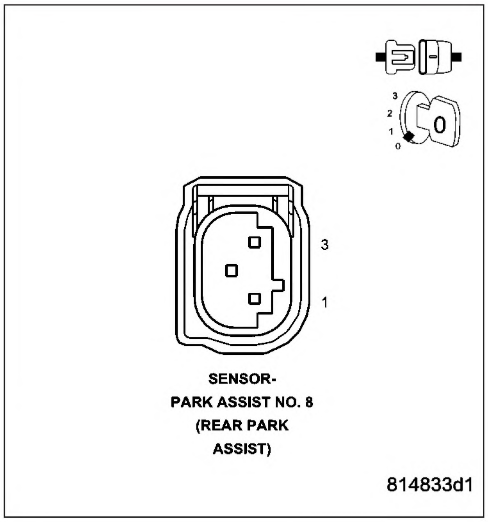
Turn the ignition off.

Disconnect Park Assist Sensor No. 8.

Turn the ignition on.

Shift the transmission into reverse.

With the scan tool, read Park Assist Module DTCs.


3
2
1
0
0
3
1
SENSOR-
PARK ASSIST NO. 8
(REAR PARK
ASSIST)
814833d1

Does the scan tool display: B1231-PTS SENSOR 8 CIRCUIT LOW?

Yes >> Go To 3

No >> Replace Park Assist Sensor No. 8 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

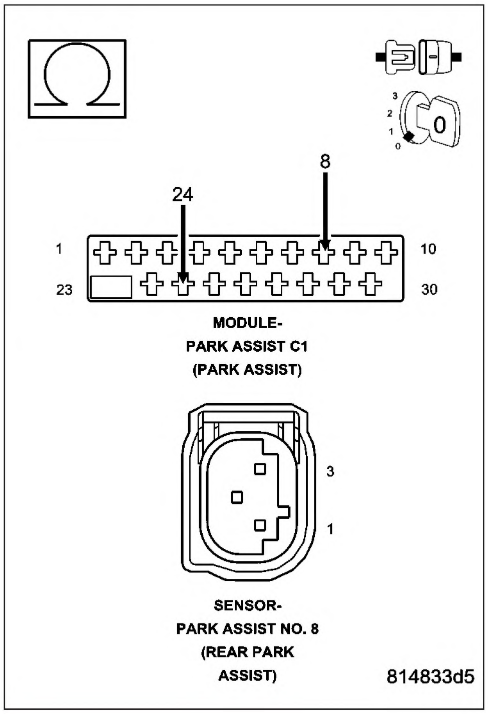
---

3. CHECK THE (D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT FOR A SHORT TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Measure the resistance between the (D701) Park Assist Sensor No. 8 Signal circuit and the (X750) Park Assist Sensor Ground circuit.


Ω
3
2
1
0
0
8
24
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 8
(REAR PARK
ASSIST)
814833d5

Is the resistance below 10K ohms?

Yes >> Repair the (D701) Park Assist Sensor No. 8 Signal circuit for a short to the (X750) Park Assist Sensor Ground circuit.

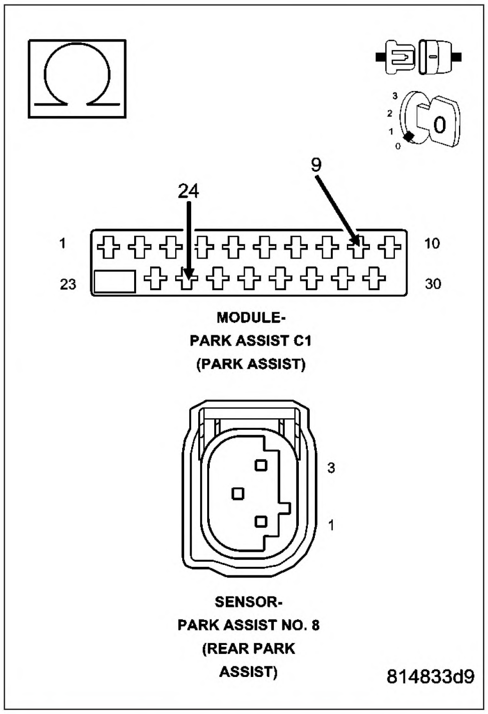
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

B1231-PTS SENSOR 8 CIRCUIT LOW (CONTINUED)

4. CHECK THE (D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT FOR A SHORT TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT

Measure the resistance between the (D701) Park Assist Sensor No. 8 Signal circuit and the (Z171) Park Assist Display Ground circuit.


24
9
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 8
(REAR PARK
ASSIST)
814833d9

Is the resistance below 10K ohms?

Yes >> Repair the (D701) Park Assist Sensor No. 8 Signal circuit for a short to the (Z171) Park Assist Display Ground circuit.

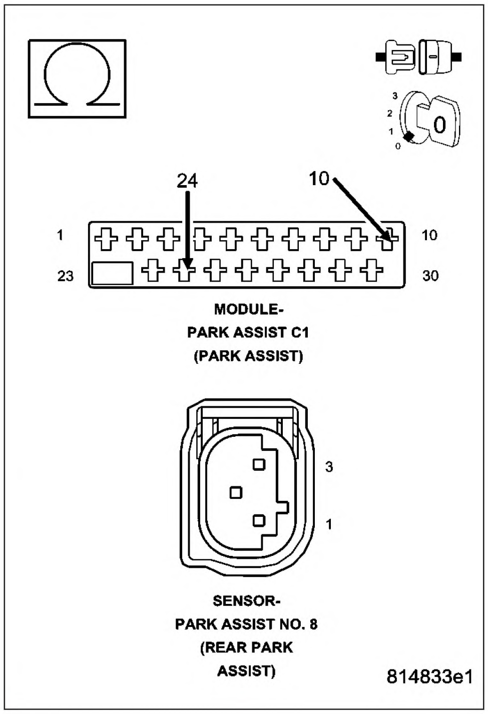
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 5

---

5. CHECK THE (D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT FOR A SHORT TO (Z914) PARK ASSIST MODULE GROUND CIRCUIT

Measure the resistance between the (D701) Park Assist Sensor No. 8 Signal circuit and the (Z914) Park Assist Module Ground circuit.


24
10
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 8
(REAR PARK
ASSIST)
814833e1

Is the resistance below 10K ohms?

Yes >> Repair the (D701) Park Assist Sensor No. 8 Signal circuit for a short to the (Z914) Park Assist Module Ground circuit.

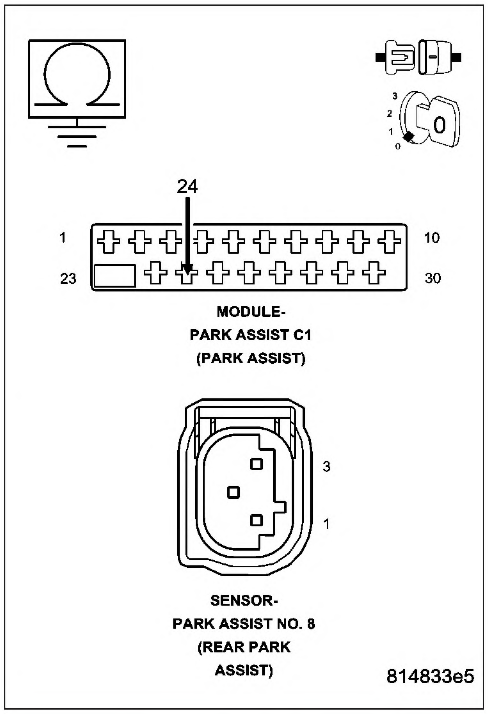
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 6

B1231-PTS SENSOR 8 CIRCUIT LOW (CONTINUED)

6. CHECK THE (D701) PARK ASSIST SENSOR NO. 8 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (D701) Park Assist Sensor No. 8 Signal circuit.



24
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 8
(REAR PARK
ASSIST)
3
2
1
0
814833e5

Is the resistance below 10K ohms?

Yes >> Repair the (D701) Park Assist Sensor No. 8 Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1233-PTS SENSOR 8 RING TIME TOO SHORT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time exceeds limit (greater than 1450 µsecs).

Possible Causes
PARK ASSIST SENSOR NO. 8

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B1233-PTS SENSOR 8 RING TIME TOO SHORT

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B1233-PTS SENSOR 8 RING TIME TOO SHORT active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. REPLACE PARK ASSIST SENSOR NO. 8

View Repair

Repair

Replace Park Assist Sensor No. 8 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1234-PTS SENSOR 8 RING TIME TOO LONG

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Data line stuck at 0.

Possible Causes
PARK ASSIST SENSOR NO. 8

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B1234-PTS SENSOR 8 RING TIME TOO LONG

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B1234-PTS SENSOR 8 RING TIME TOO LONG active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. REPLACE PARK ASSIST SENSOR NO. 8

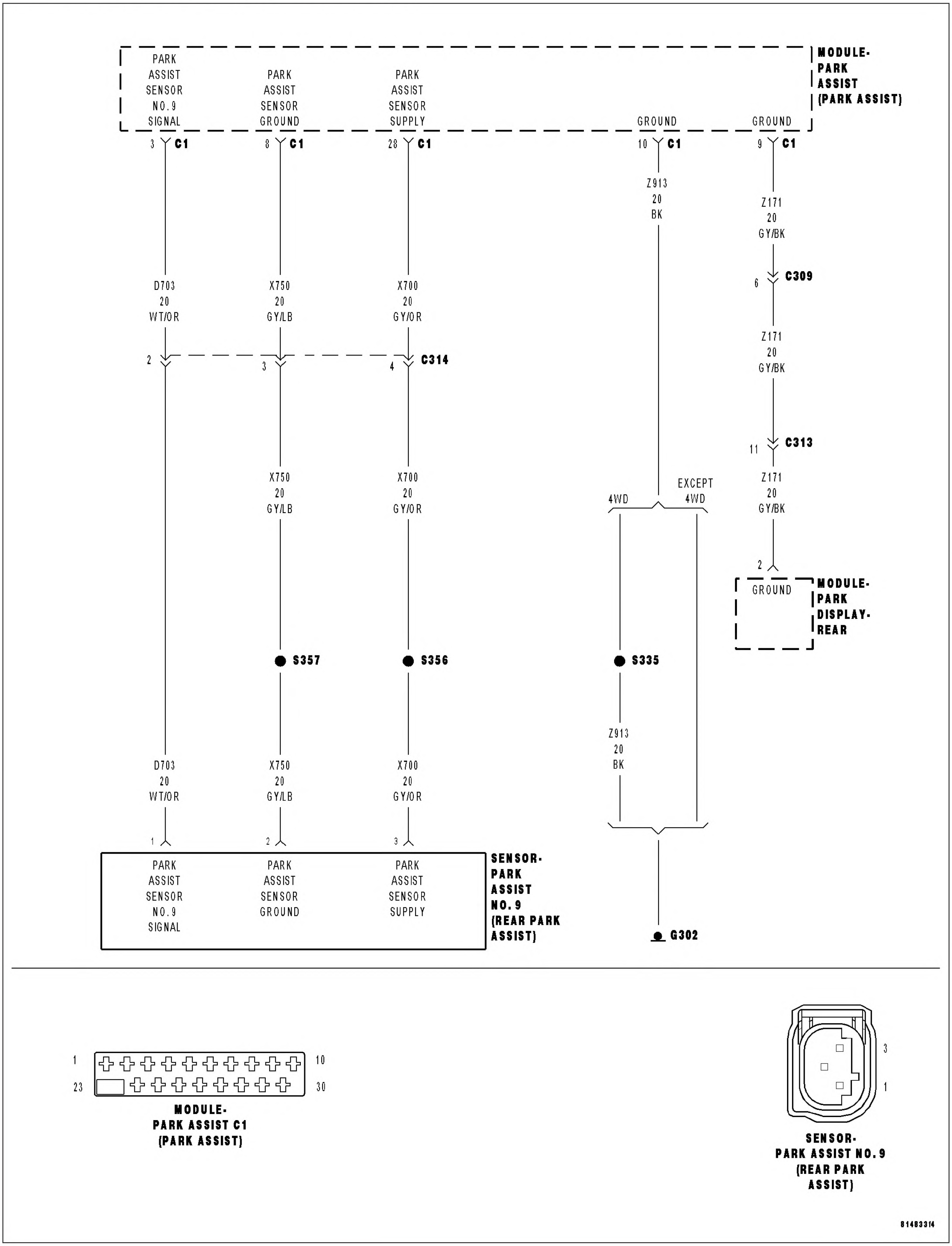
View Repair

Repair

Replace Park Assist Sensor No. 8 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1236-PTS SENSOR 9 CIRCUIT LOW


MODULE-PARK ASSIST (PARK ASSIST)
PARK ASSIST SENSOR NO. 9 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
GROUND
GROUND
3 C1
8 C1
28 C1
10 C1
9 C1
Z913 20 BK
Z171 20 GY/BK
6 C309
Z171 20 GY/BK
11 C313
Z171 20 GY/BK
2
GROUND
MODULE-PARK DISPLAY-REAR
D703 20 WT/OR
X750 20 GY/LB
X700 20 GY/OR
2
3
4 C314
X750 20 GY/LB
X700 20 GY/OR
4WD
EXCEPT 4WD
S357
S356
S335
Z913 20 BK
D703 20 WT/OR
X750 20 GY/LB
X700 20 GY/OR
1
2
3
PARK ASSIST SENSOR NO. 9 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
SENSOR-PARK ASSIST NO. 9 (REAR PARK ASSIST)
G302
1
10
23
30
MODULE-PARK ASSIST C1 (PARK ASSIST)
3
1
SENSOR-PARK ASSIST NO. 9 (REAR PARK ASSIST)
81483314

B1236-PTS SENSOR 9 CIRCUIT LOW (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATIC - ELECTRICAL).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time is too short (700 µsecs).

Possible Causes
(D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT SHORTED TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT
(D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT SHORTED TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT
(D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT SHORTED TO (Z914) PARK ASSIST MODULE GROUND CIRCUIT
(D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT SHORTED TO GROUND
PARK ASSIST SENSOR NO. 9
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B1236-PTS SENSOR 9 CIRCUIT LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B1236-PTS SENSOR 9 CIRCUIT LOW active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1236-PTS SENSOR 9 CIRCUIT LOW (CONTINUED)

2. CHECK PARK ASSIST SENSOR NO. 9 FOR A SHORT TO GROUND

Shift the transmission into park.

With the scan tool, erase DTCs.

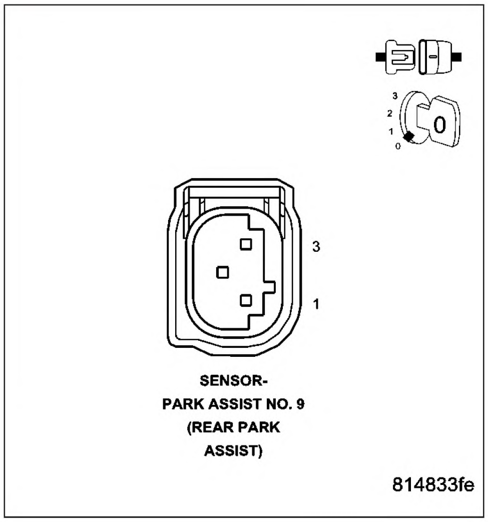
Turn the ignition off.

Disconnect Park Assist Sensor No. 9.

Turn the ignition on.

Shift the transmission into reverse.

With the scan tool, read Park Assist Module DTCs.


3
2
1
0
0
3
1
SENSOR-
PARK ASSIST NO. 9
(REAR PARK
ASSIST)
814833fe

Does the scan tool display: B1236-PTS SENSOR 9 CIRCUIT LOW?

Yes >> Go To 3

No >> Replace Park Assist Sensor No. 9 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

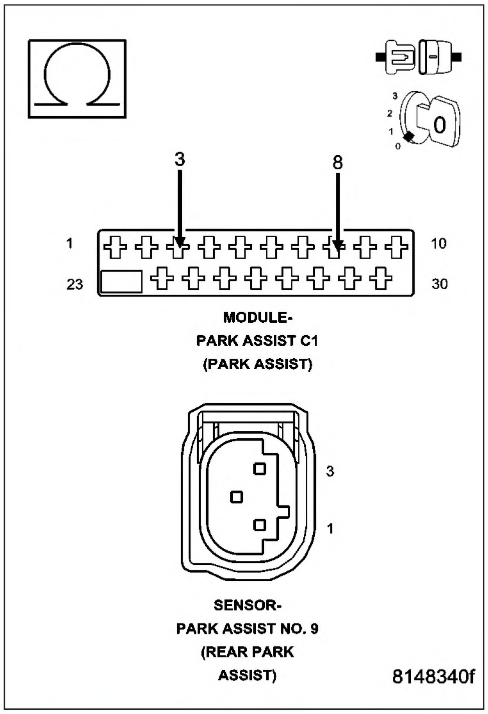
---

3. CHECK THE (D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT FOR A SHORT TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Measure the resistance between the (D703) Park Assist Sensor No. 9 Signal circuit and the (X750) Park Assist Sensor Ground circuit.


Ω
3
2
1
0
0
3
8
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 9
(REAR PARK
ASSIST)
8148340f

Is the resistance below 10K ohms?

Yes >> Repair the (D703) Park Assist Sensor No. 9 Signal circuit for a short to the (X750) Park Assist Sensor Ground circuit.

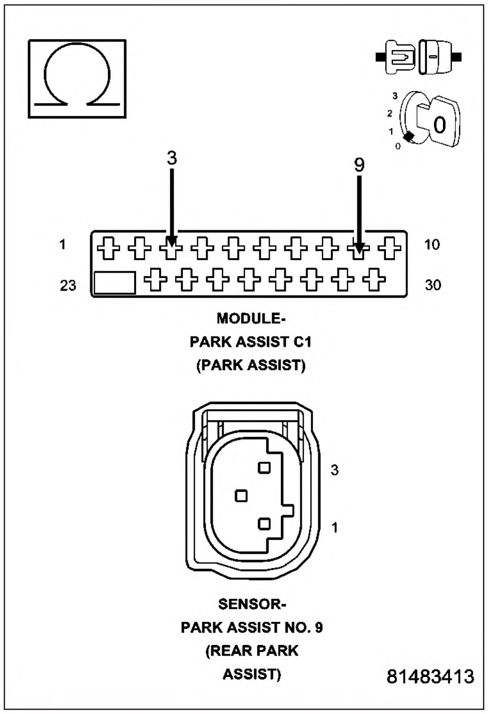
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

B1236-PTS SENSOR 9 CIRCUIT LOW (CONTINUED)

4. CHECK THE (D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT FOR A SHORT TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT

Measure the resistance between the (D703) Park Assist Sensor No. 9 Signal circuit and the (Z171) Park Assist Display Ground circuit.


3
9
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 9
(REAR PARK
ASSIST)
81483413

Is the resistance below 10K ohms?

Yes >> Repair the (D703) Park Assist Sensor No. 9 Signal circuit for a short to the (Z171) Park Assist Display Ground circuit.

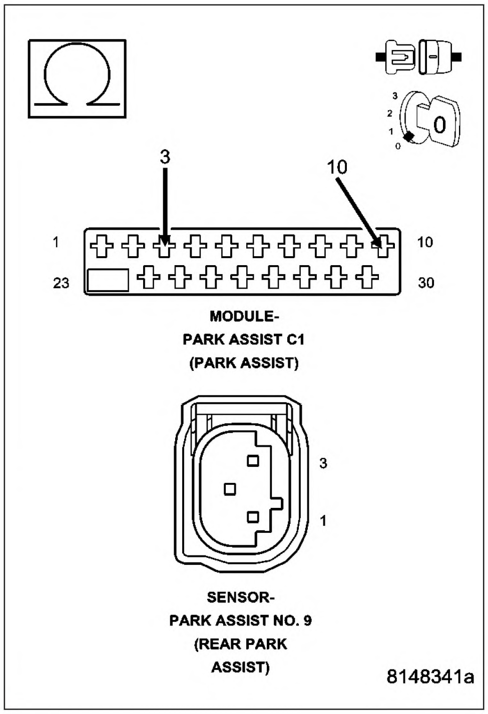
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 5

---

5. CHECK THE (D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT FOR A SHORT TO (Z914) PARK ASSIST MODULE GROUND CIRCUIT

Measure the resistance between the (D703) Park Assist Sensor No. 9 Signal circuit and the (Z914) Park Assist Module Ground circuit.


3
10
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 9
(REAR PARK
ASSIST)
8148341a

Is the resistance below 10K ohms?

Yes >> Repair the (D703) Park Assist Sensor No. 9 Signal circuit for a short to the (Z914) Park Assist Module Ground circuit.

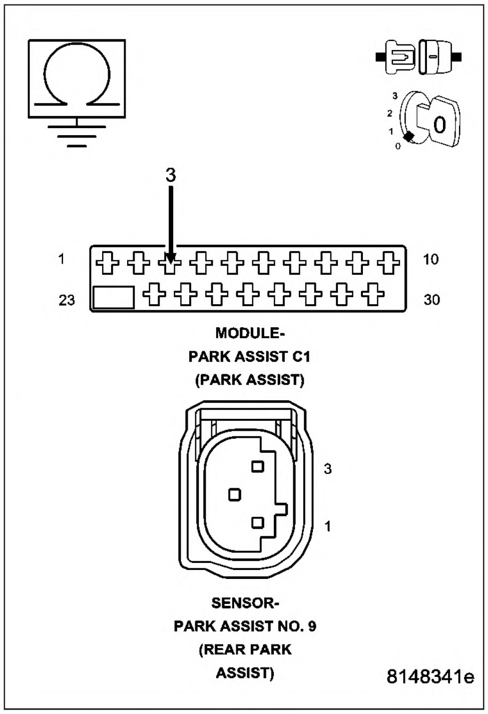
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 6

B1236-PTS SENSOR 9 CIRCUIT LOW (CONTINUED)

6. CHECK THE (D703) PARK ASSIST SENSOR NO. 9 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (D703) Park Assist Sensor No. 9 Signal circuit.


3
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 9
(REAR PARK
ASSIST)
8148341e

Is the resistance below 10K ohms?

Yes >> Repair the (D703) Park Assist Sensor No. 9 Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1238-PTS SENSOR 9 RING TIME TOO SHORT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time exceeds limit (greater than 1450 µsecs).

Possible Causes
PARK ASSIST SENSOR NO. 9

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B1238-PTS SENSOR 9 RING TIME TOO SHORT

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B1238-PTS SENSOR 9 RING TIME TOO SHORT active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. REPLACE PARK ASSIST SENSOR NO. 9

View Repair

Repair

Replace Park Assist Sensor No. 9 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1239-PTS SENSOR 9 RING TIME TOO LONG

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Data line stuck at 0.

Possible Causes
PARK ASSIST SENSOR N0. 9

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B1239-PTS SENSOR 9 RING TIME TOO LONG

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B1239-PTS SENSOR 9 RING TIME TOO LONG active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. REPLACE PARK ASSIST SENSOR NO. 9

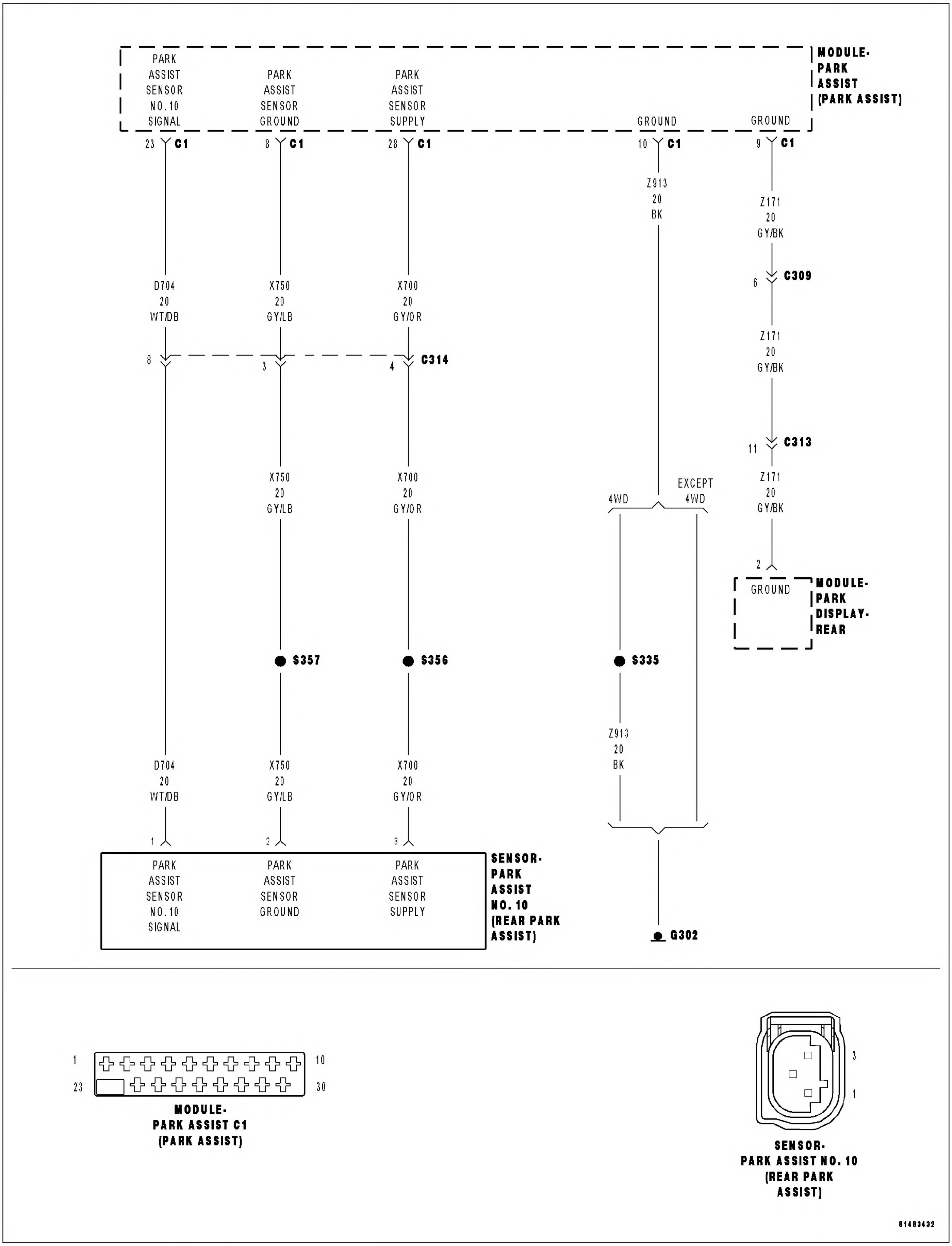
View Repair

Repair

Replace Park Assist Sensor No. 9 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B123B-PTS SENSOR 10 CIRCUIT LOW


MODULE-PARK ASSIST (PARK ASSIST)
PARK ASSIST SENSOR NO. 10 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
GROUND
GROUND
23 C1
8 C1
28 C1
10 C1
9 C1
Z913 20 BK
Z171 20 GY/BK
6 C309
Z171 20 GY/BK
11 C313
Z171 20 GY/BK
2
MODULE-PARK DISPLAY-REAR
GROUND
D704 20 WT/DB
X750 20 GY/LB
X700 20 GY/OR
8
3
4 C314
X750 20 GY/LB
X700 20 GY/OR
4WD
EXCEPT 4WD
S357
S356
S335
Z913 20 BK
D704 20 WT/DB
X750 20 GY/LB
X700 20 GY/OR
1
2
3
PARK ASSIST SENSOR NO. 10 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
SENSOR-PARK ASSIST NO. 10 (REAR PARK ASSIST)
G302
1
10
23
30
MODULE-PARK ASSIST C1 (PARK ASSIST)
3
1
SENSOR-PARK ASSIST NO. 10 (REAR PARK ASSIST)
81483432

B123B-PTS SENSOR 10 CIRCUIT LOW (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATIC - ELECTRICAL).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time is too short (700 µsecs).

Possible Causes
(D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT SHORTED TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT
(D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT SHORTED TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT
(D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT SHORTED TO (Z913) PARK ASSIST MODULE GROUND CIRCUIT
(D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT SHORTED TO GROUND
PARK ASSIST SENSOR NO. 10
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B123B-PTS SENSOR 10 CIRCUIT LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B123B-PTS SENSOR 10 CIRCUIT LOW active?

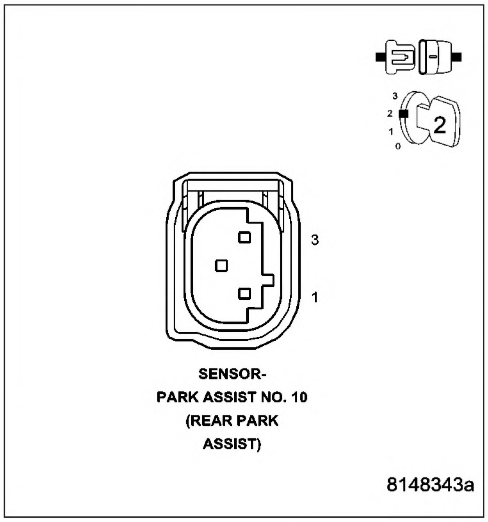
Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B123B-PTS SENSOR 10 CIRCUIT LOW (CONTINUED)

2. CHECK PARK ASSIST SENSOR NO. 10 FOR A SHORT TO GROUND


3
2
1
0
2
3
1
SENSOR-
PARK ASSIST NO. 10
(REAR PARK
ASSIST)
8148343a

Shift the transmission into park.

With the scan tool, erase DTCs.

Turn the ignition off.

Disconnect Park Assist Sensor No. 10.

Turn the ignition on.

Shift the transmission into reverse.

With the scan tool, read Park Assist Module DTCs.

Does the scan tool display: B123B-PTS SENSOR 10 CIRCUIT LOW?

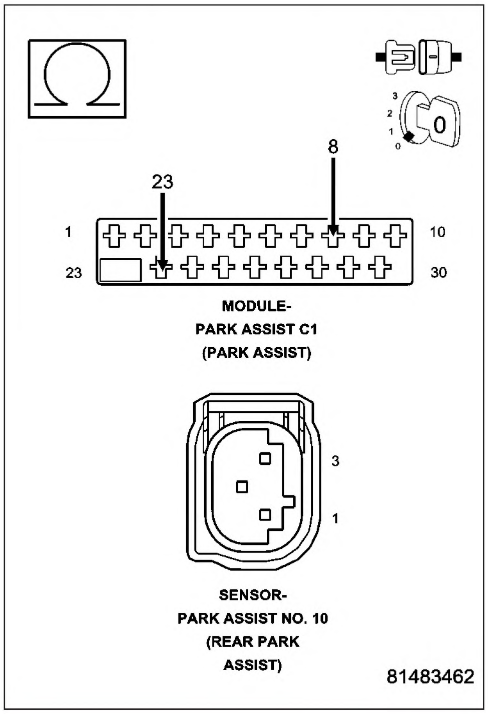
Yes >> Go To 3

No >> Replace Park Assist Sensor No. 10 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. CHECK THE (D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT FOR A SHORT TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT


3
2
1
0
0
8
23
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 10
(REAR PARK
ASSIST)
81483462

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Measure the resistance between the (D704) Park Assist Sensor No. 10 Signal circuit and the (X750) Park Assist Sensor Ground circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (D704) Park Assist Sensor No. 10 Signal circuit for a short to the (X750) Park Assist Sensor Ground circuit.

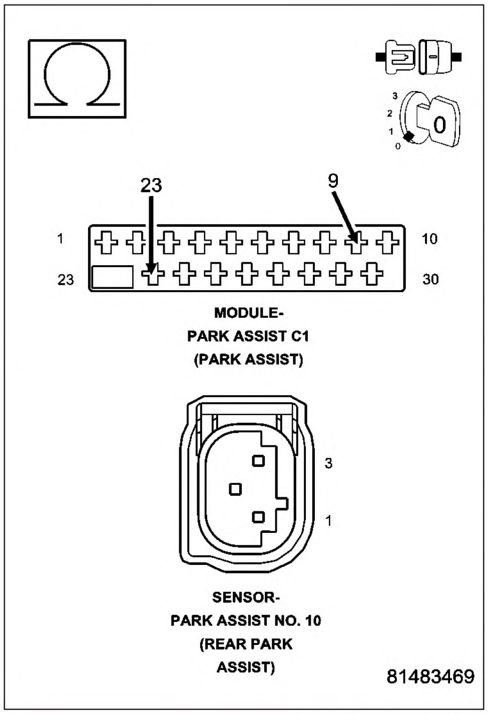
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

B123B-PTS SENSOR 10 CIRCUIT LOW (CONTINUED)

4. CHECK THE (D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT FOR A SHORT TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT

Measure the resistance between the (D704) Park Assist Sensor No. 10 Signal circuit and the (Z171) Park Assist Display Ground circuit.


23
9
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 10
(REAR PARK
ASSIST)
81483469

Is the resistance below 10K ohms?

Yes >> Repair the (D704) Park Assist Sensor No. 10 Signal circuit for a short to the (Z171) Park Assist Display Ground circuit.

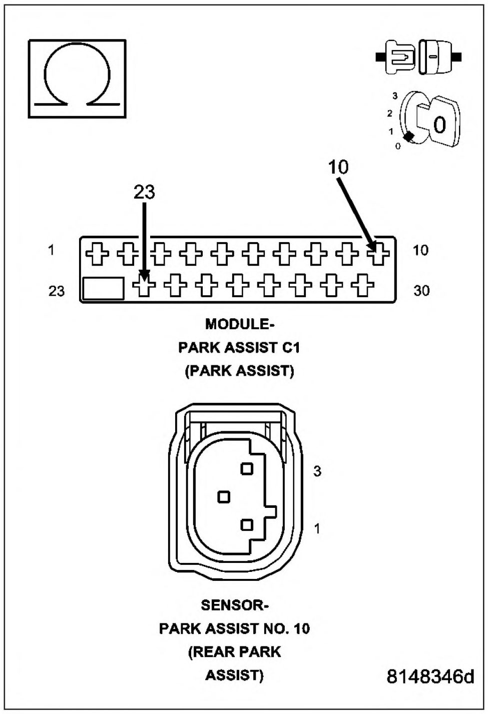
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 5

---

5. CHECK THE (D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT FOR A SHORT TO (Z913) PARK ASSIST MODULE GROUND CIRCUIT

Measure the resistance between the (D704) Park Assist Sensor No. 10 Signal circuit and the (Z913) Park Assist Module Ground circuit.


23
10
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 10
(REAR PARK
ASSIST)
8148346d

Is the resistance below 10K ohms?

Yes >> Repair the (D704) Park Assist Sensor No. 10 Signal circuit for a short to the (Z913) Park Assist Module Ground circuit.

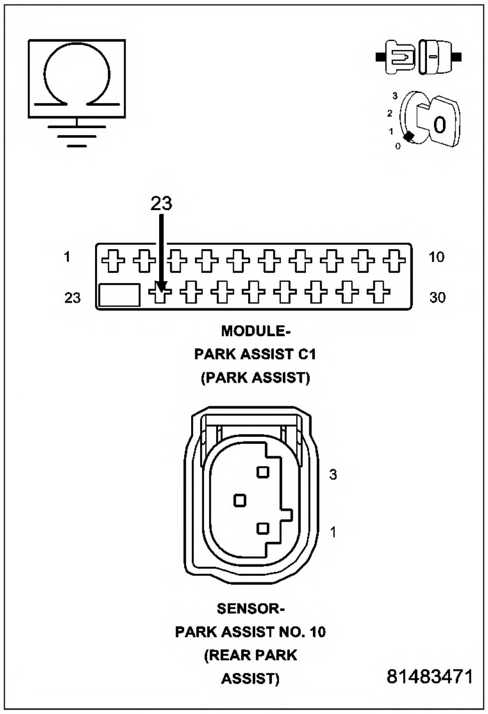
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 6

B123B-PTS SENSOR 10 CIRCUIT LOW (CONTINUED)

6. CHECK THE (D704) PARK ASSIST SENSOR NO. 10 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (D704) Park Assist Sensor No. 10 Signal circuit and ground.


3
2
1
0
23
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
SENSOR-
PARK ASSIST NO. 10
(REAR PARK
ASSIST)
81483471

Is the resistance below 10K ohms?

Yes >> Repair the (D704) Park Assist Sensor No. 10 Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B123D-PTS SENSOR 10 RING TIME TOO SHORT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Sensor ring down time exceeds limit (greater than 1450 µsecs).

Possible Causes
PARK ASSIST SENSOR NO. 10

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B123D-PTS SENSOR 10 RING TIME TOO SHORT

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B123D-PTS SENSOR 10 RING TIME TOO SHORT active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. REPLACE THE PARK ASSIST SENSOR N0. 10

View Repair

Repair

Replace Park Assist Sensor No. 10 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B123E-PTS SENSOR 10 RING TIME TOO LONG

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Data line stuck at 0.

Possible Causes
PARK ASSIST SENSORNO. 10

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B123E-PTS SENSOR 10 RING TIME TOO LONG

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC B123E-PTS SENSOR 10 RING TIME TOO LONG active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. REPLACE PARK ASSIST SENSOR NO. 10

View Repair

Repair

Replace Park Assist Sensor No. 10 in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B210D-BATTERY VOLTAGE LOW

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Park Assist Module supply voltage less than 9.0 volts.

Possible Causes
VEHICLE CHARGING SYSTEM
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B210D-BATTERY VOLTAGE LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B210D-BATTERY VOLTAGE LOW active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. VERIFY OPERATION OF THE VEHICLE CHARGING SYSTEM

NOTE: Troubleshoot any PCM charging/cranking DTCs before proceeding.

NOTE: Ensure the battery is fully charged.

Are any charging system DTCs present?

Yes >> (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B210E-BATTERY VOLTAGE HIGH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Park Assist Module supply voltage greater than 16.0 volts.

Possible Causes
VEHICLE CHARGING SYSTEM
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B210E-BATTERY VOLTAGE HIGH

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B210E-BATTERY VOLTAGE HIGH active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. VERIFY OPERATION OF THE VEHICLE CHARGING SYSTEM

NOTE: Troubleshoot any PCM charging/cranking DTCs before proceeding.

NOTE: Ensure the battery is fully charged.

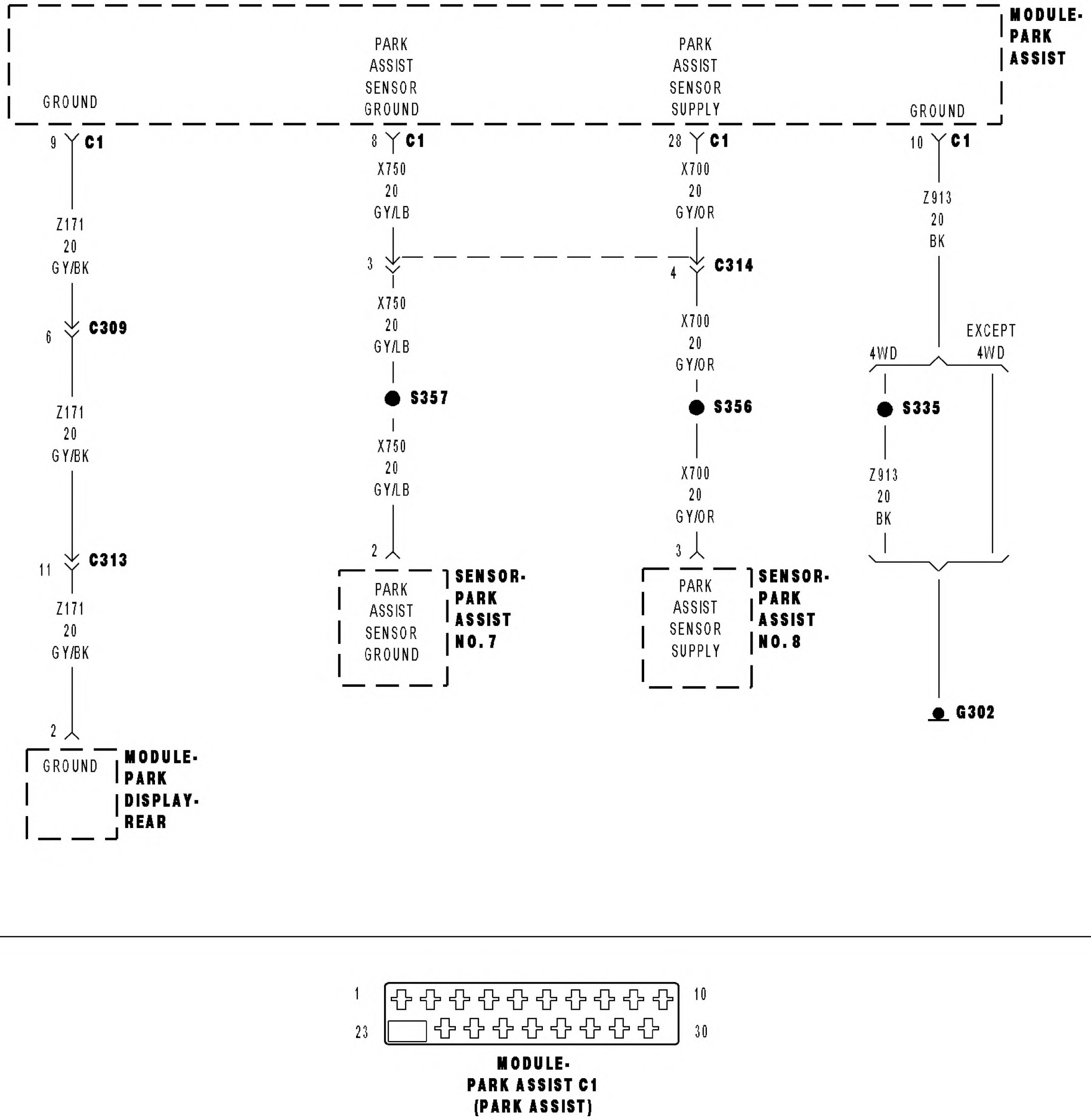
Are any charging system DTCs present?

Yes >> (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2126-SENSOR SUPPLY VOLTAGE LOW


MODULE-PARK ASSIST
GROUND
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
GROUND
9 C1
8 C1
28 C1
10 C1
Z171 20 GY/BK
6 C309
Z171 20 GY/BK
11 C313
Z171 20 GY/BK
2
GROUND
MODULE-PARK DISPLAY-REAR
X750 20 GY/LB
3
C314
4
X750 20 GY/LB
S357
X750 20 GY/LB
2
PARK ASSIST SENSOR GROUND
SENSOR-PARK ASSIST NO. 7
X700 20 GY/OR
X700 20 GY/OR
S356
X700 20 GY/OR
3
PARK ASSIST SENSOR SUPPLY
SENSOR-PARK ASSIST NO. 8
Z913 20 BK
4WD
EXCEPT 4WD
S335
Z913 20 BK
G302
1
10
23
30
MODULE-PARK ASSIST C1 (PARK ASSIST)

814a855c

B2126-SENSOR SUPPLY VOLTAGE LOW (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATIC - ELECTRICAL).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Park Assist Sensor supply voltage less than 7.2 volts.

Possible Causes
(X700) PARK ASSIST SENSOR SUPPLY CIRCUIT SHORTED TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT
(X700) PARK ASSIST SENSOR SUPPLY CIRCUIT SHORTED TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT
(X700) PARK ASSIST SENSOR SUPPLY CIRCUIT SHORTED TO (Z913) PARK ASSIST MODULE GROUND CIRCUIT
(X700) PARK ASSIST SENSOR SUPPLY CIRCUIT SHORTED TO GROUND
PARK ASSIST SENSOR
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

Turn the ignition on.

Apply the park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase DTCs.

Wait 30 seconds.

With the scan tool, read DTCs.

Is the DTC active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2126-SENSOR SUPPLY VOLTAGE LOW (CONTINUED)

2. CHECK EACH PARK ASSIST SENSOR FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect one Park Assist Sensor.

Turn the ignition on.

With the scan tool, read Park Assist Module DTCs. If DTC B2126 is still active, repeat this procedure by disconnecting another park assist sensor. However, if DTC B2126 changes from active to stored, or if all four sensors have been disconnected, proceed as follows:

Is B2126-SENSOR SUPPLY VOLTAGE LOW still active?

Yes >> Go To 3

No >> Replace the Park Assist Sensor that caused DTC B2126 to change from active to stored after disconnecting it in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. CHECK THE (X700) PARK ASSIST SENSOR SUPPLY CIRCUIT FOR A SHORT TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT

NOTE: Perform this test with all Park Assist Sensors disconnected.

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

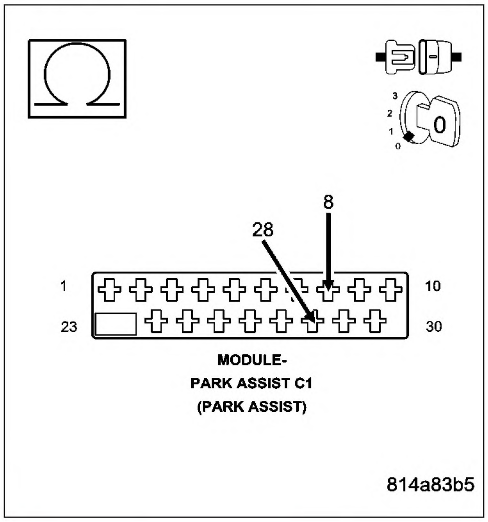
Measure the resistance between the (X700) Park Assist Sensor Supply circuit and the (X750) Park Assist Sensor Ground circuit.

Is the resistance below 10K ohms?

Yes >> Repair the (X700) Park Assist Sensor Supply circuit for a short to the (X750) Park Assist Sensor Ground circuit.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

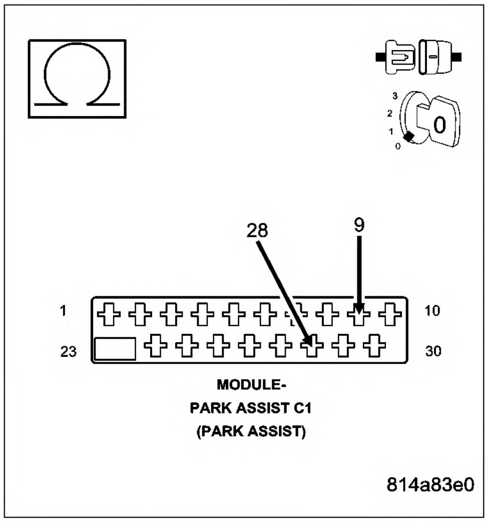


B2126-SENSOR SUPPLY VOLTAGE LOW (CONTINUED)

4. CHECK THE (X700) PARK ASSIST SENSOR SUPPLY CIRCUIT FOR A SHORT TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT

NOTE: Perform this test with all Park Assist Sensors disconnected.

Measure the resistance between the (X700) Park Assist Sensor Supply circuit and the (Z171) Park Assist Display Ground circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X700) Park Assist Sensor Supply circuit for a short to the (Z171) Park Assist Display Ground circuit.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

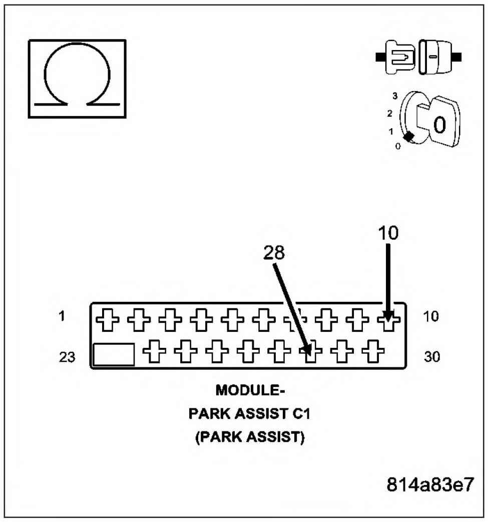
No >> Go To 5

---

5. CHECK THE (X700) PARK ASSIST SENSOR SUPPLY CIRCUIT FOR A SHORT TO (Z913) PARK ASSIST MODULE GROUND CIRCUIT

NOTE: Perform this test with all Park Assist Sensors disconnected.

Measure the resistance between the (X700) Park Assist Sensor Supply circuit and the (Z913) Park Assist Module Ground circuit.



Is the resistance below 10K ohms?

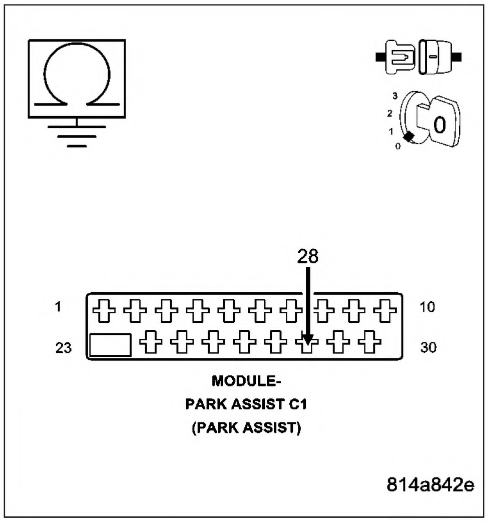
Yes >> Repair the (X700) Park Assist Sensor Supply circuit for a short to the (Z913) Park Assist Module Ground circuit.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 6

B2126-SENSOR SUPPLY VOLTAGE LOW (CONTINUED)

6. CHECK THE (X700) PARK ASSIST SENSOR SUPPLY CIRCUIT FOR A SHORT TO GROUND



NOTE: Perform this test with all Park Assist Sensors disconnected.

Measure the resistance between ground and the (X700) Park Assist Sensor Supply circuit.

Is the resistance below 10K ohms?

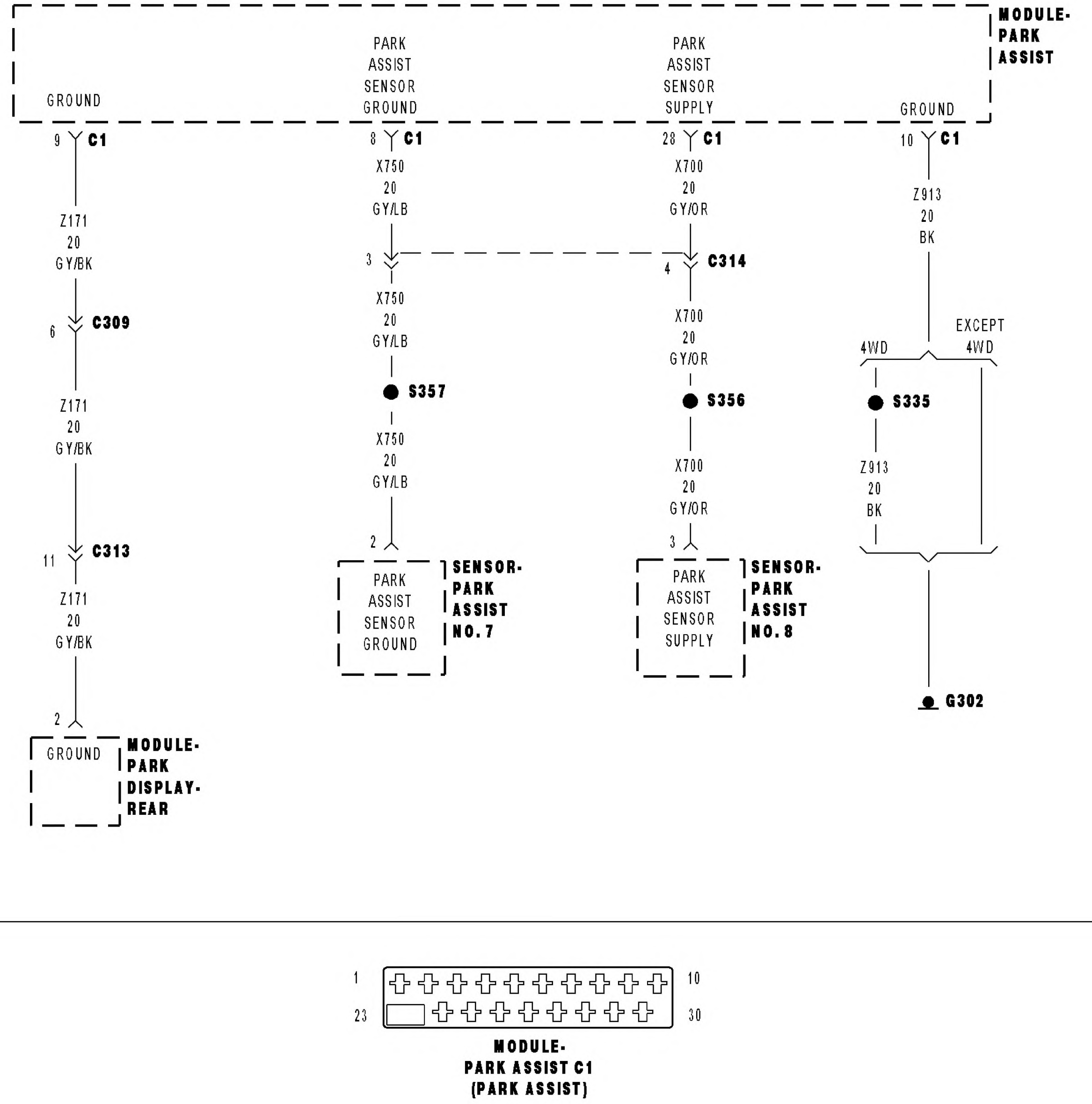
Yes >> Repair the (X700) Park Assist Sensor Supply circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2127-SENSOR SUPPLY VOLTAGE HIGH


MODULE-PARK ASSIST
GROUND
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
GROUND
9 C1
8 C1
28 C1
10 C1
Z171 20 GY/BK
X750 20 GY/LB
X700 20 GY/OR
Z913 20 BK
3
4 C314
6 C309
X750 20 GY/LB
X700 20 GY/OR
4WD
EXCEPT 4WD
S357
S356
S335
Z171 20 GY/BK
X750 20 GY/LB
X700 20 GY/OR
Z913 20 BK
11 C313
2
3
Z171 20 GY/BK
PARK ASSIST SENSOR GROUND
SENSOR-PARK ASSIST NO. 7
PARK ASSIST SENSOR SUPPLY
SENSOR-PARK ASSIST NO. 8
G302
2
GROUND
MODULE-PARK DISPLAY-REAR
1
10
23
30
MODULE-PARK ASSIST C1 (PARK ASSIST)

814a855c

B2127-SENSOR SUPPLY VOLTAGE HIGH (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Park Assist Sensor supply voltage greater than 9.2 volts.

Possible Causes
(X700) PARK ASSIST SENSOR SUPPLY CIRCUIT SHORT TO VOLTAGE
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B2127-SENSOR SUPPLY VOLTAGE HIGH

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B2127-SENSOR SUPPLY VOLTAGE HIGH active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

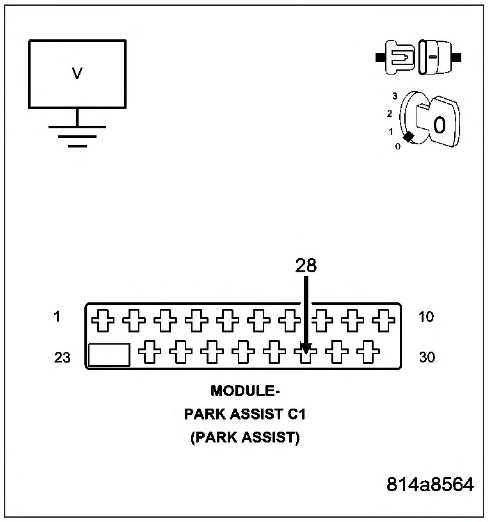
2. CHECK THE (X700) PARK ASSIST SENSOR SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Turn the ignition on.

Measure the voltage on the (X700) Park Assist Sensor Supply circuit.



Is the voltage above 9.2 volts?

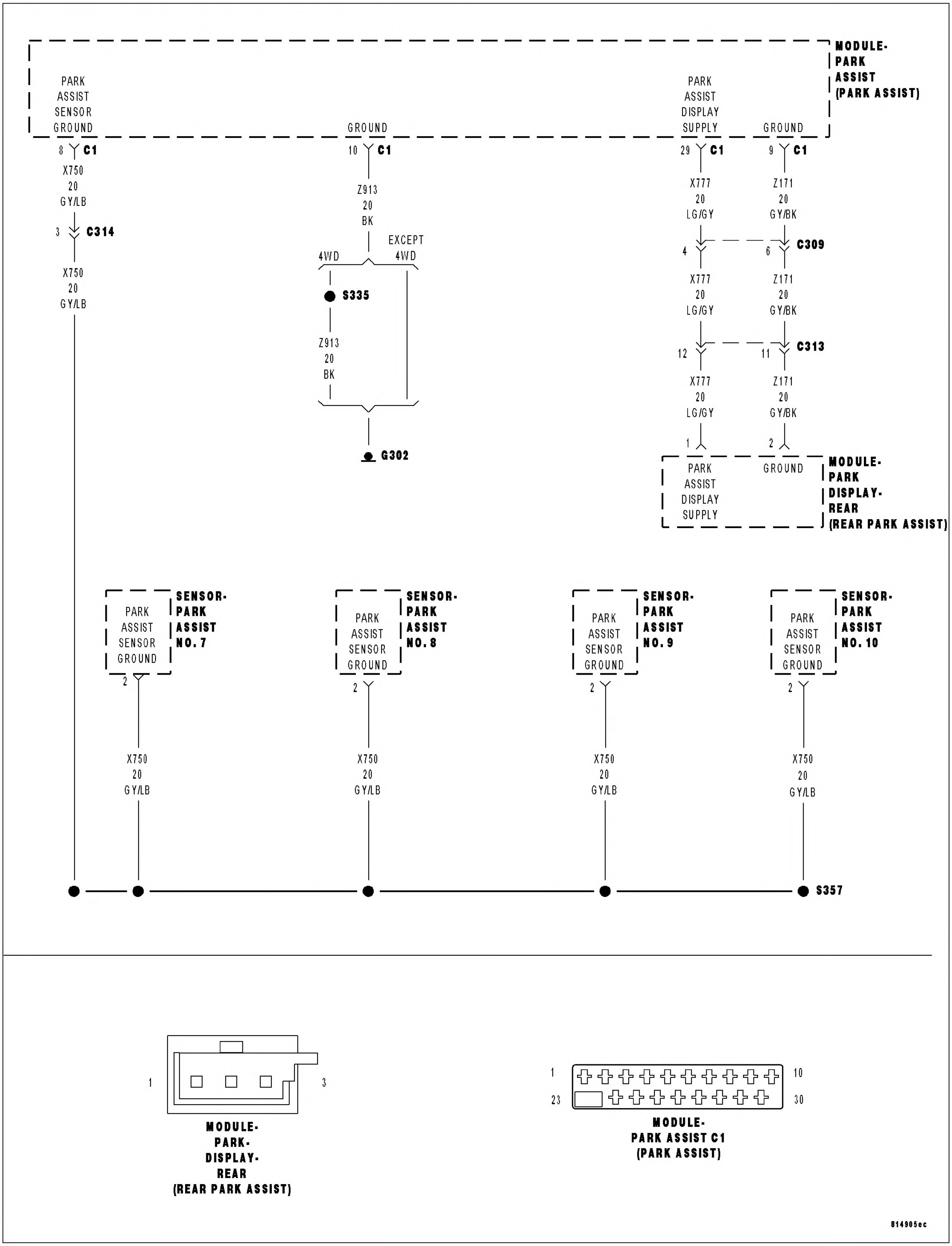
Yes >> Repair the (X700) Park Assist Sensor Supply circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B212A-PTS DISPLAY SUPPLY VOLTAGE LOW


MODULE-PARK ASSIST (PARK ASSIST)
PARK ASSIST SENSOR GROUND
GROUND
PARK ASSIST DISPLAY SUPPLY
GROUND
8 C1
10 C1
29 C1
9 C1
X750 20 GY/LB
3 C314
X750 20 GY/LB
Z913 20 BK
4WD
EXCEPT 4WD
S335
Z913 20 BK
G302
X777 20 LG/GY
Z171 20 GY/BK
4
6
C309
X777 20 LG/GY
Z171 20 GY/BK
12
11
C313
X777 20 LG/GY
Z171 20 GY/BK
1
2
PARK ASSIST DISPLAY SUPPLY
GROUND
MODULE-PARK DISPLAY-REAR (REAR PARK ASSIST)
PARK ASSIST SENSOR GROUND
SENSOR-PARK ASSIST NO. 7
SENSOR-PARK ASSIST NO. 8
SENSOR-PARK ASSIST NO. 9
SENSOR-PARK ASSIST NO. 10
2
X750 20 GY/LB
S357
1
3
MODULE-PARK-DISPLAY-REAR (REAR PARK ASSIST)
1
10
23
30
MODULE-PARK ASSIST C1 (PARK ASSIST)
814905ec

B212A-PTS DISPLAY SUPPLY VOLTAGE LOW (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Park Assist Sensor Display voltage less than 8.0 volts.

Possible Causes
(X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT SHORT TO GROUND
(X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT SHORT TO (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT
(X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT SHORT TO (Z913) PARK ASSIST MODULE GROUND CIRCUIT
(X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT SHORT TO (X750) PARK ASSIST SENSOR GROUND CIRCUIT
PARK ASSIST DISPLAY
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B212A-PTS DISPLAY SUPPLY VOLTAGE LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: B212A-PTS DISPLAY SUPPLY VOLTAGE LOW active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

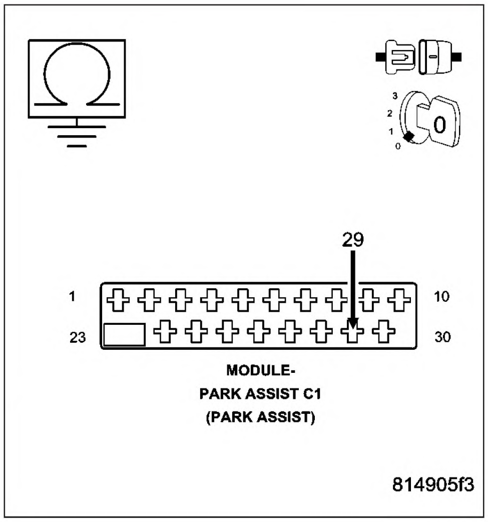
B212A-PTS DISPLAY SUPPLY VOLTAGE LOW (CONTINUED)

2. CHECK PARK ASSIST MODULE FOR AN INTERNAL SHORT TO GROUND

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Measure the resistance between ground and the (X777) Park Assist Display Supply circuit.



Is the resistance below 10K ohms?

Yes >> Go To 3

No >> Replace the Park Assist Module in accordance with the service information.

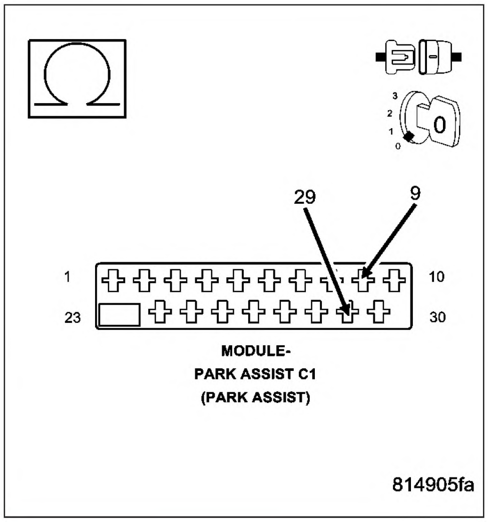
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. CHECK THE (X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT FOR A SHORT TO THE (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT

Disconnect the Park Assist Display harness connector.

Measure the resistance between the (X777) Park Assist Display Supply circuit and the (Z171) Park Assist Display Ground circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X777) Park Assist Display Supply circuit for a short to the (Z171) Park Assist Display Ground circuit.

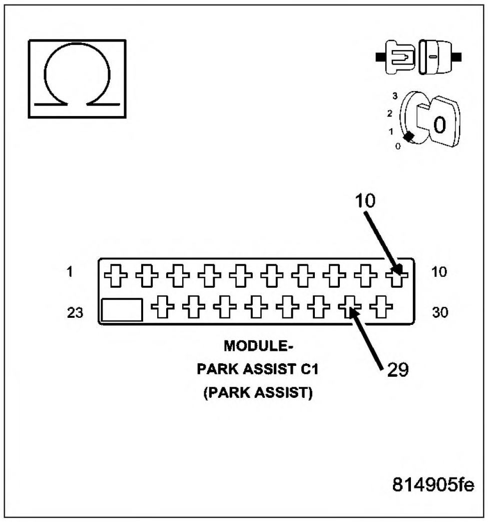
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

B212A-PTS DISPLAY SUPPLY VOLTAGE LOW (CONTINUED)

4. CHECK THE (X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT FOR A SHORT TO THE (Z913) PARK ASSIST MODULE GROUND CIRCUIT

Measure the resistance between the (X777) Park Assist Display Supply circuit and the (Z913) Park Assist Module Ground circuit.


10
1
10
23
30
29
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
2
1
0
814905fe

Is the resistance below 10K ohms?

Yes >> Repair the (X777) Park Assist Display Supply circuit for a short to the (Z913) Park Assist Module Ground circuit.

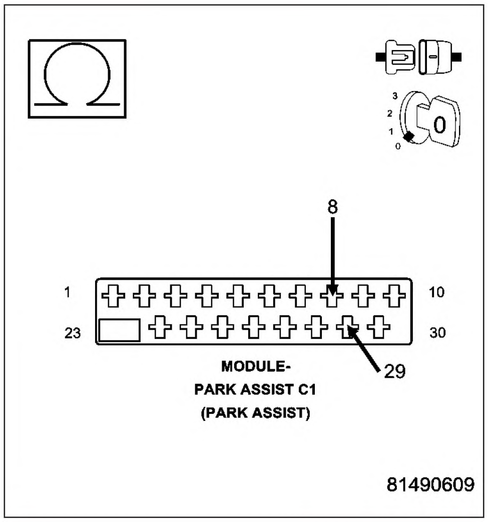
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 5

---

5. CHECK THE (X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT FOR A SHORT TO THE (X750) PARK ASSIST SENSOR GROUND CIRCUIT

Measure the resistance between the (X777) Park Assist Display Supply circuit and the (X750) Park Assist Sensor Ground circuit.


8
1
10
23
30
29
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
2
1
0
81490609

Is the resistance below 10K ohms?

Yes >> Repair the (X777) Park Assist Display Supply circuit for a short to the (X750) Park Assist Sensor Ground circuit.

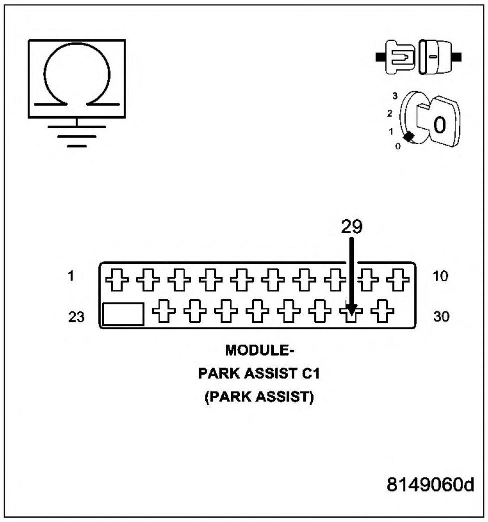
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 6

B212A-PTS DISPLAY SUPPLY VOLTAGE LOW (CONTINUED)

6. CHECK THE (X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X777) Park Assist Display Supply circuit.



Is the resistance below 10K ohms?

Yes >> Repair the (X777) Park Assist Display Supply circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Display in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B222A-VEHICLE LINE MISMATCH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Vehicle Line data transmitted on the CAN B bus doesn't correspond with the data stored in the Park Assist Module.

Possible Causes
PARK ASSIST MODULE

Diagnostic Test

1. CHECK VEHICLE LINE IN THE PCM

With the scan tool, compare the vehicle line that is programmed in to the PCM to the vehicle line of the vehicle.

Does the vehicle line programmed into the PCM match the vehicle?

Yes >> Replace the Park Assist Module in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform (NGC) POWERTRAIN VERIFICATION TEST (Refer to 9 - ENGINE - STANDARD PROCEDURE)

B2232-(PTS) PARKTRONICS INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Park Assist Module detects an internal failure.

Possible Causes
PARK ASSIST MODULE

Diagnostic Test

1. REPLACE THE PARK ASSIST MODULE

View Repair

Repair

Replace the Park Assist Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2234-(PTS) PARKTRONICS REAR DISPLAY INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  The Park Assist Module detects an internal Park Assist Display failure.

Possible Causes
PARK ASSIST DISPLAY

Diagnostic Test

1. REPLACE THE PARK ASSIST DISPLAY

View Repair

Repair

Replace the Park Assist Display in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U0423-IMPLAUSIBLE DATA RECEIVED FROM CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Park Assist Module supply voltage between 9–16 volts. Ignition in Run/Start.
- **Set Condition:**
  Ignition status = 7h

Possible Causes
NO COMMUNICATION WITH INSTRUMENT CLUSTER
DTCS STORED OR ACTIVE IN THE INSTRUMENT CLUSTER
ACTIVE DTCS IN THE FCM
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: U0423-IMPLAUSIBLE DATA RECEIVED FROM CLUSTER/CCN

Turn the ignition on.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: U0423-IMPLAUSIBLE DATA RECEIVED FROM CLUSTER/CCN active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. INSTRUMENT CLUSTER IS ACTIVE ON THE CAN B BUS

With the scan tool, select ECU View.

Verify that the Instrument Cluster is active on the bus.

Is the Instrument Cluster active on the bus?

Yes >> Go To 3

No >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for No Response diagnostic procedures.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U0423-IMPLAUSIBLE DATA RECEIVED FROM CLUSTER/CCN (CONTINUED)

3. DTCS STORED OR ACTIVE IN THE INSTRUMENT CLUSTER

Check for Ignition Switch DTCs in the Instrument Cluster.

Are any DTCs active or stored in the Instrument Cluster?

Yes >> Refer to the appropriate section and perform the diagnostics for the DTCs.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go to 4

4. ACTIVE DTCS IN THE FCM

With the scan tool, select ECU View and select FCM.

With the scan tool, read active DTCs.

Are any Communication DTCs active in the FCM Park Assist System?

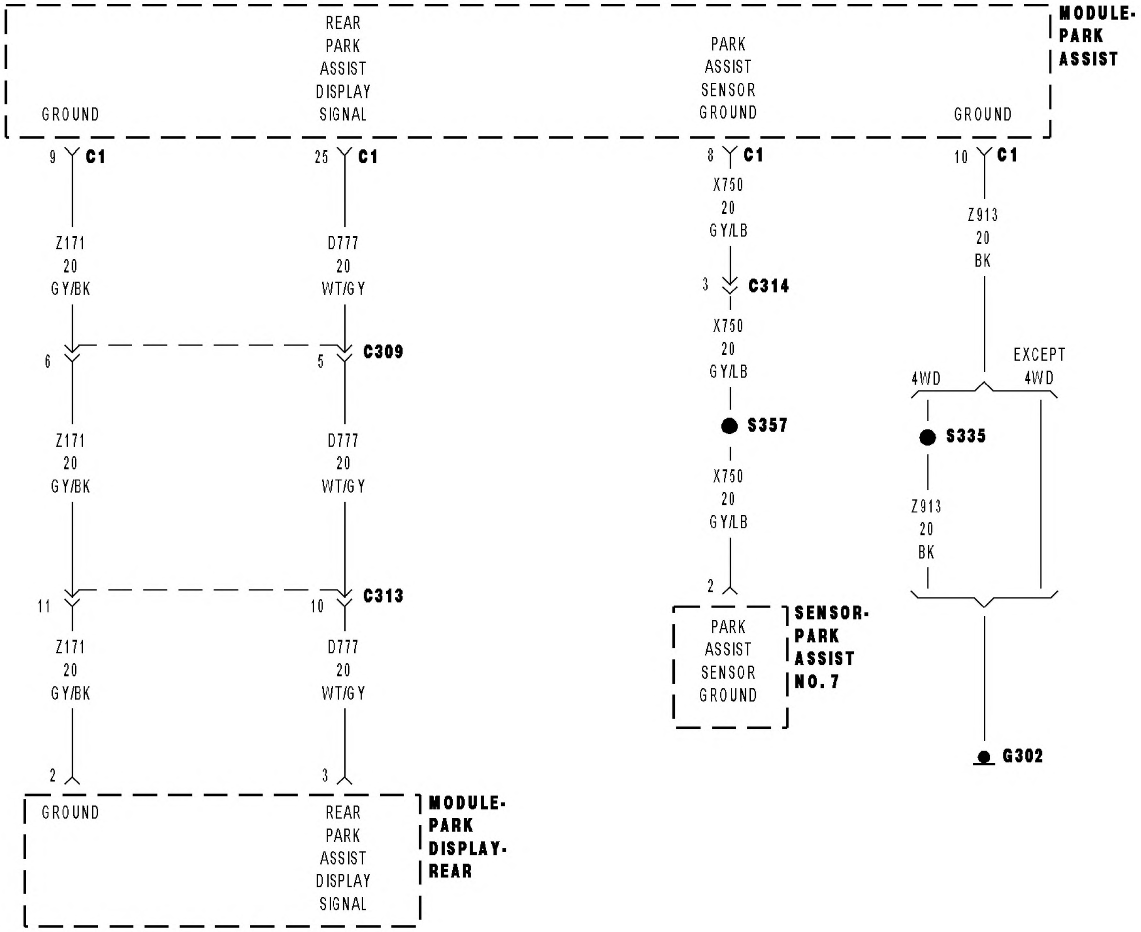
Yes >> Refer to the appropriate section and perform the diagnostics for the DTCs.

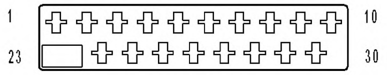
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace and program the Park Assist Module in accordance with the Service Information.

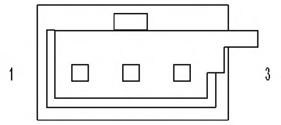
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U1002-PTS DISPLAY COMMUNICATION CIRCUIT LOW


MODULE-PARK ASSIST
GROUND
REAR PARK ASSIST DISPLAY SIGNAL
PARK ASSIST SENSOR GROUND
GROUND
9 C1
25 C1
8 C1
10 C1
Z171 20 GY/BK
D777 20 WT/GY
X750 20 GY/LB
3 C314
X750 20 GY/LB
S357
X750 20 GY/LB
Z913 20 BK
EXCEPT 4WD
4WD
S335
Z913 20 BK
6
5 C309
Z171 20 GY/BK
D777 20 WT/GY
11
10 C313
Z171 20 GY/BK
D777 20 WT/GY
2
SENSOR-PARK ASSIST NO. 7
PARK ASSIST SENSOR GROUND
G302
2
3
MODULE-PARK DISPLAY-REAR
GROUND
REAR PARK ASSIST DISPLAY SIGNAL



MODULE-
PARK ASSIST C1
(PARK ASSIST)



MODULE-
PARK-
DISPLAY-
REAR
(REAR PARK ASSIST)

814b8b01

U1002-PTS DISPLAY COMMUNICATION CIRCUIT LOW (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Display data line low.

Possible Causes
(D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT SHORT TO THE (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT
(D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT SHORT TO THE (X750) PARK ASSIST SENSOR GROUND CIRCUIT
(D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT SHORT TO THE (Z913) PARK ASSIST MODULE GROUND CIRCUIT
(D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT SHORT TO GROUND
PARK ASSIST DISPLAY
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: U1002-PTS DISPLAY COMMUNICATION CIRCUIT LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: U1002-PTS DISPLAY COMMUNICATION CIRCUIT LOW active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

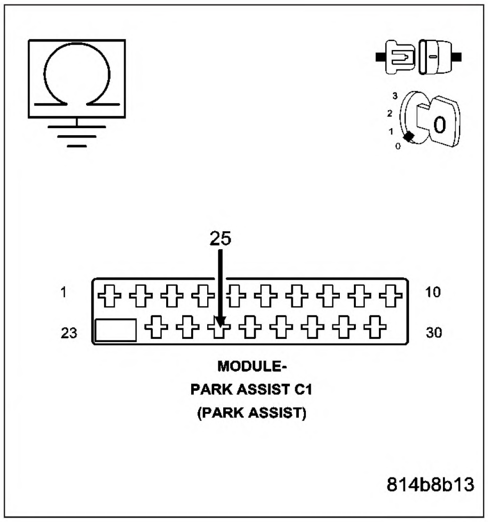
U1002-PTS DISPLAY COMMUNICATION CIRCUIT LOW (CONTINUED)

2. CHECK PARK ASSIST MODULE FOR AN INTERNAL SHORT TO GROUND

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Measure the resistance between ground and the (D777) Park Assist Display Signal circuit.


3
2
1
0
25
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
814b8b13

Is the resistance below 10K ohms?

Yes >> Go To 3

No >> Replace the Park Assist Module in accordance with the service information.

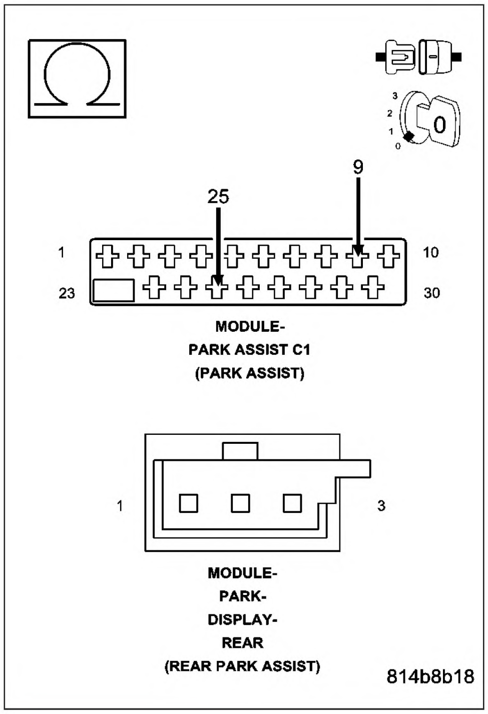
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. CHECK THE (D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT FOR A SHORT TO THE (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT

Disconnect the Park Assist Display harness connector.

Measure the resistance between the (D777) Park Assist Display Signal circuit and the (Z171) Park Assist Display Ground circuit.


3
2
1
0
9
25
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
1
3
MODULE-
PARK-
DISPLAY-
REAR
(REAR PARK ASSIST)
814b8b18

Is the resistance below 10K ohms?

Yes >> Repair the (D777) Park Assist Display Signal circuit for a short to the (Z171) Park Assist Display Ground circuit.

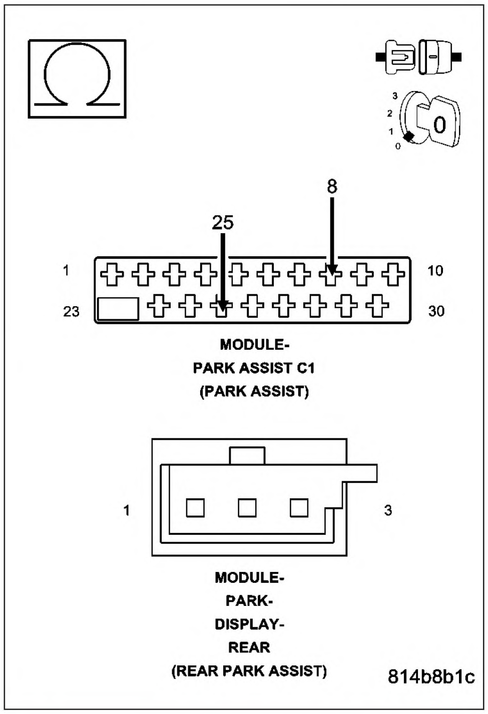
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

U1002-PTS DISPLAY COMMUNICATION CIRCUIT LOW (CONTINUED)

4. CHECK THE (D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT FOR A SHORT TO THE (X750) PARK ASSIST SENSOR GROUND CIRCUIT

Measure the resistance between the (D777) Park Assist Display Signal circuit and the (X750) Park Assist Sensor Ground circuit.



8
25
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
1
3
MODULE-
PARK-
DISPLAY-
REAR
(REAR PARK ASSIST)
814b8b1c

Is the resistance below 10K ohms?

Yes >> Repair the (D777) Park Assist Display Signal circuit for a short to the (X750) Park Assist Sensor Ground circuit.

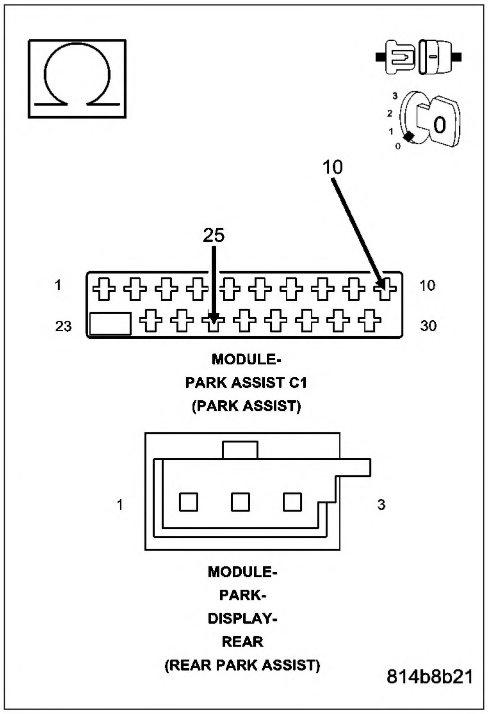
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 5

---

5. CHECK THE (D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT FOR A SHORT TO THE (Z913) PARK ASSIST MODULE GROUND CIRCUIT

Measure the resistance between the (D777) Park Assist Display Signal circuit and the (Z913) Park Assist Module Ground circuit.



10
25
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
1
3
MODULE-
PARK-
DISPLAY-
REAR
(REAR PARK ASSIST)
814b8b21

Is the resistance below 10K ohms?

Yes >> Repair the (D777) Park Assist Display Signal circuit for a short to the(Z913) Park Assist Module Ground circuit.

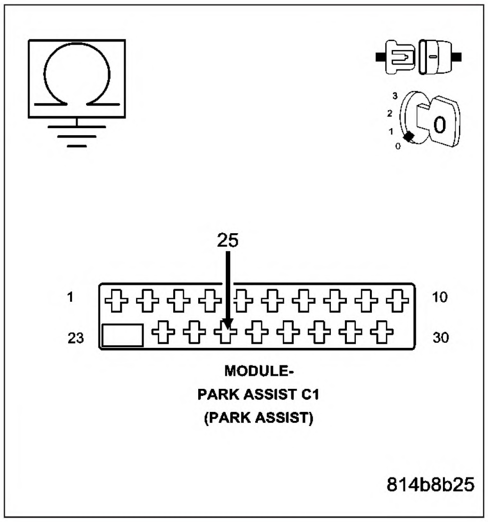
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 6

U1002-PTS DISPLAY COMMUNICATION CIRCUIT LOW (CONTINUED)

6. CHECK THE (D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (D777) Park Assist Display Signal circuit.



Is the resistance below 10K ohms?

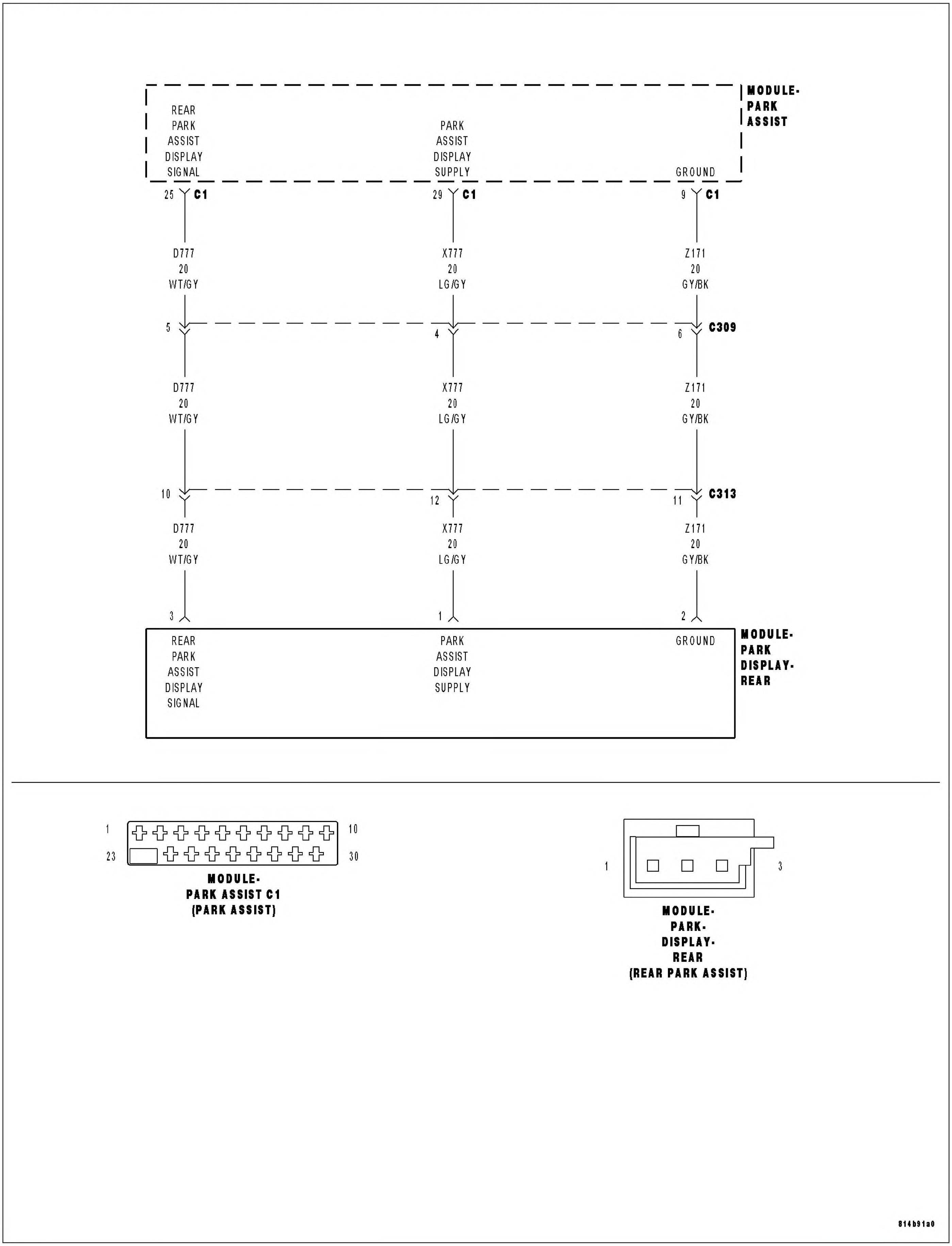
Yes >> Repair the (D777) Park Assist Display Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Park Assist Display in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U1101-LOST COMMUNICATION WITH PTS DISPLAY


MODULE-PARK ASSIST
REAR PARK ASSIST DISPLAY SIGNAL
PARK ASSIST DISPLAY SUPPLY
GROUND
25 C1
29 C1
9 C1
D777 20 WT/GY
X777 20 LG/GY
Z171 20 GY/BK
5
4
6
C309
10
12
11
C313
3
1
2
MODULE-PARK DISPLAY-REAR
1
10
23
30
MODULE-PARK ASSIST C1 (PARK ASSIST)
1
3
MODULE-PARK-DISPLAY-REAR (REAR PARK ASSIST)
814b91a0

U1101-LOST COMMUNICATION WITH PTS DISPLAY (CONTINUED)

For the Park Assist circuit diagram (Refer to 8 - ELECTRICAL/CHIME/BUZZER - SCHEMATIC - ELECTRICAL).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the vehicle is in reverse for speeds less than 16km/h.
- **Set Condition:**
  Data display line open.

Possible Causes
(D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT OPEN
(X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT OPEN
(Z171) PARK ASSIST DISPLAY GROUND CIRCUIT OPEN
PARK ASSIST DISPLAY
PARK ASSIST MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC: U1101-LOST COMMUNICATION WITH PTS DISPLAY

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into Reverse.

With the scan tool, record and erase Park Assist Module DTCs.

Wait 30 seconds.

With the scan tool, read Park Assist Module DTCs.

Is DTC: U1101-LOST COMMUNICATION WITH PTS DISPLAY active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

U1101-LOST COMMUNICATION WITH PTS DISPLAY (CONTINUED)

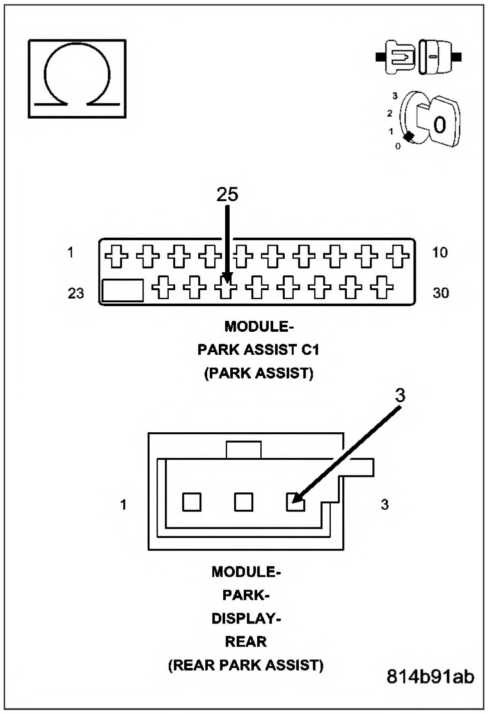
2. CHECK THE (D777) PARK ASSIST DISPLAY SIGNAL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Park Assist Module harness connector.

Disconnect the Park Assist Display Module harness connector.

Measure the resistance of the (D777) Park Assist Display Signal circuit between the Park Assist Module harness connector and the Park Assist Display harness connector.


25
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
3
1
3
MODULE-
PARK-
DISPLAY-
REAR
(REAR PARK ASSIST)
814b91ab

Is the resistance below 5.0 ohms?

Yes >> Go To 3

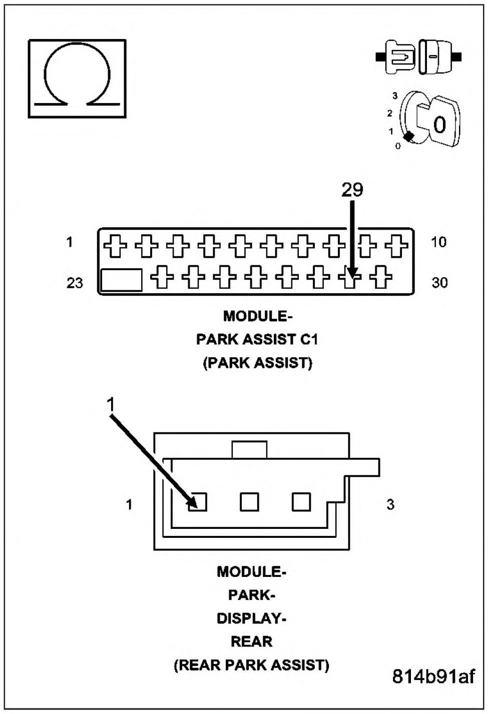
No >> Repair the (D777) Park Assist Display Signal circuit for an open.

Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

---

3. CHECK THE (X777) PARK ASSIST DISPLAY SUPPLY CIRCUIT FOR AN OPEN

Measure the resistance of the (X777) Park Assist Display Supply circuit between the Park Assist Module harness connector and the Park Assist Display harness connector.


29
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
1
1
3
MODULE-
PARK-
DISPLAY-
REAR
(REAR PARK ASSIST)
814b91af

Is the resistance below 5.0 ohms?

Yes >> Go To 4

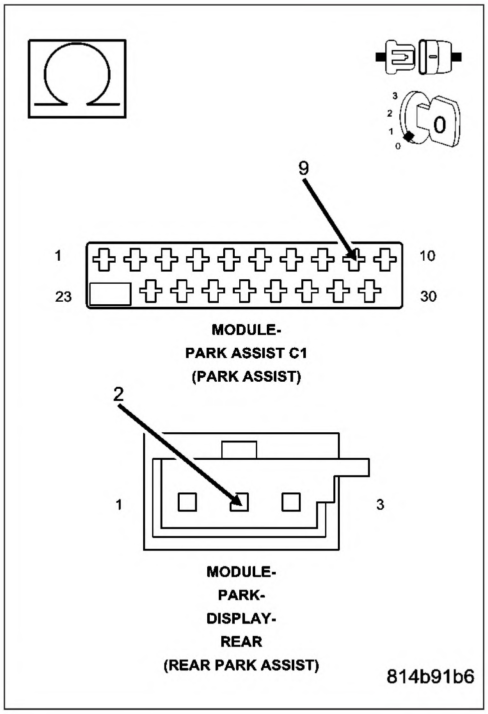
No >> Repair the (X777) Park Assist Display Supply circuit for an open.

Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

U1101-LOST COMMUNICATION WITH PTS DISPLAY (CONTINUED)

4. CHECK THE (Z171) PARK ASSIST DISPLAY GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (Z171) Park Assist Display Ground circuit between the Park Assist Module harness connector and the Park Assist Display harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the (Z171) Park Assist Display Ground circuit for an open.
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

---

5. CHECK THE OPERATION OF THE PARK ASSIST DISPLAY

Replace the Park Assist Display in accordance with the service information.

Reconnect the Park Assist Module harness connector.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display U1101-LOST COMMUNICATION WITH PTS DISPLAY?

Yes >> Replace the Park Assist Module in accordance with the service information.
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

No >> Test Complete.
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212-LOST COMMUNICATION WITH SCCM-CAN-B

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

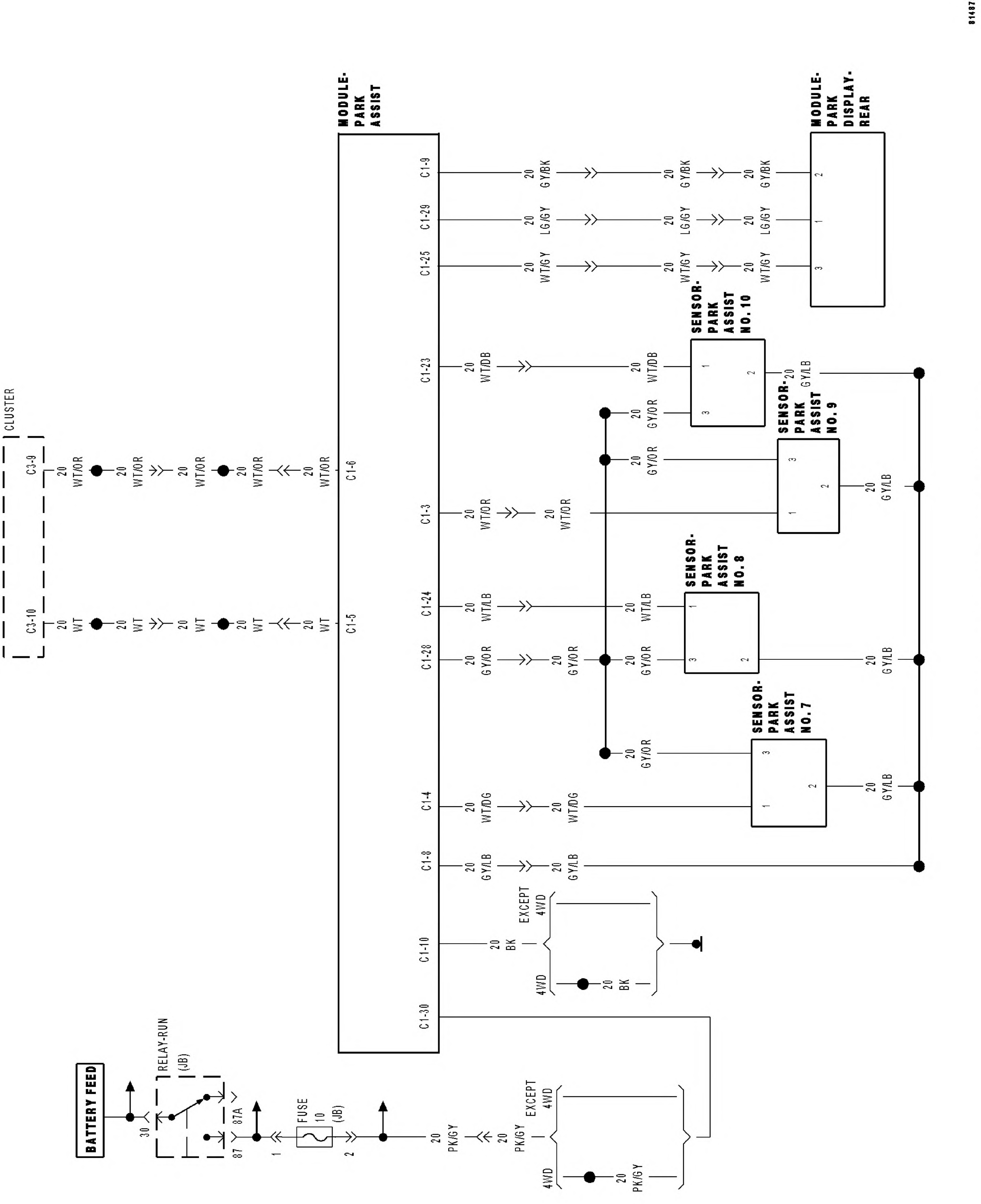
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

SCHEMATICS AND DIAGRAMS


814879ec
MODULE-PARK ASSIST
MODULE-PARK DISPLAY-REAR
CLUSTER
C3-9
C3-10
C1-9
C1-29
C1-25
C1-23
C1-6
C1-3
C1-5
C1-24
C1-28
C1-4
C1-8
C1-10
C1-30
20 GY/BK
20 LG/GY
20 WT/GY
20 WT/DB
20 GY/LB
20 GY/OR
20 WT/OR
20 WT
20 WT/LB
20 WT/DG
20 BK
20 PK/GY
SENSOR-PARK ASSIST NO.10
SENSOR-PARK ASSIST NO.9
SENSOR-PARK ASSIST NO.8
SENSOR-PARK ASSIST NO.7
1
2
3
EXCEPT 4WD
4WD
BATTERY FEED
RELAY-RUN (JB)
30
87A
87
FUSE 10 (JB)
1
2

WK PARK ASSIST SYSTEM SCHEMATIC

CHIME/BUZZER - SERVICE INFORMATION

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PARK ASSIST SENSOR
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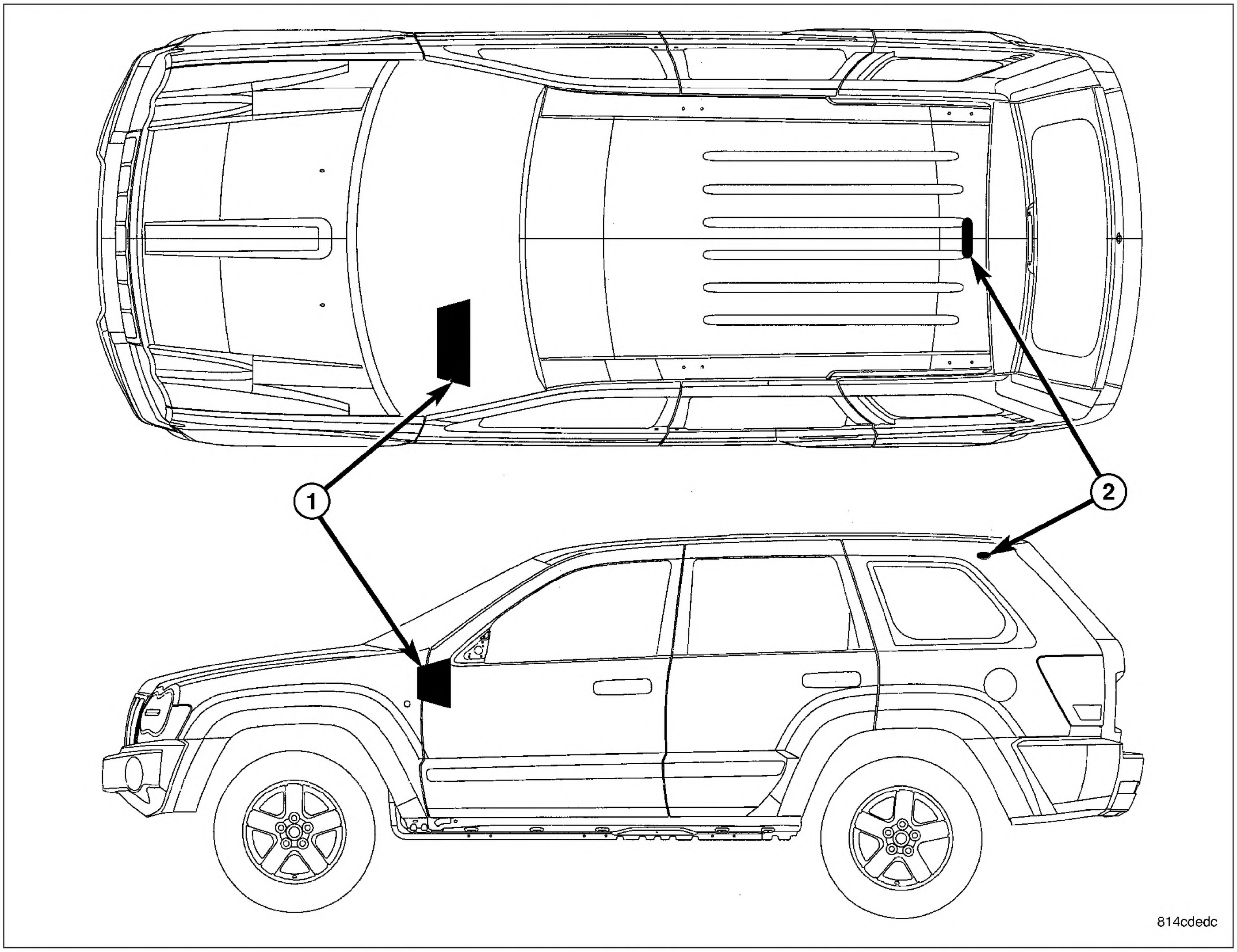
CHIME/BUZZER - SERVICE INFORMATION

DESCRIPTION

CHIME WARNING SYSTEM



A chime warning system is standard factory-installed equipment. The chime warning system uses an electromechanical transducer and an electromechanical relay that are soldered onto the electronic circuit board inside of the ElectroMechanical Instrument Cluster (EMIC) (1) to provide audible indications of various vehicle conditions that may require the attention of the vehicle operator or occupants. The EMIC also includes the hardware and software necessary to serve as the electronic body control module and is sometimes referred to as the Cab Compartment Node or CCN.

The Park Assist Display (2) will give out an audible signal when objects are detected starting at 40 cm (16 in.).

The electromechanical transducer generates beep tones and chime tones, while the electromechanical relay generates click tones to emulate the sounds associated with conventional turn signal and hazard warning flasher operation. The microprocessor-based EMIC utilizes electronic chime request messages received from other modules in the vehicle over the Controller Area Network (CAN) data bus along with hard wired inputs to monitor many sensors and switches throughout the vehicle. In response to those inputs, the circuitry and programming of the EMIC allow it to control the audible outputs that are produced through its on-board transducer and relay.

The EMIC is capable of producing the following audible outputs:

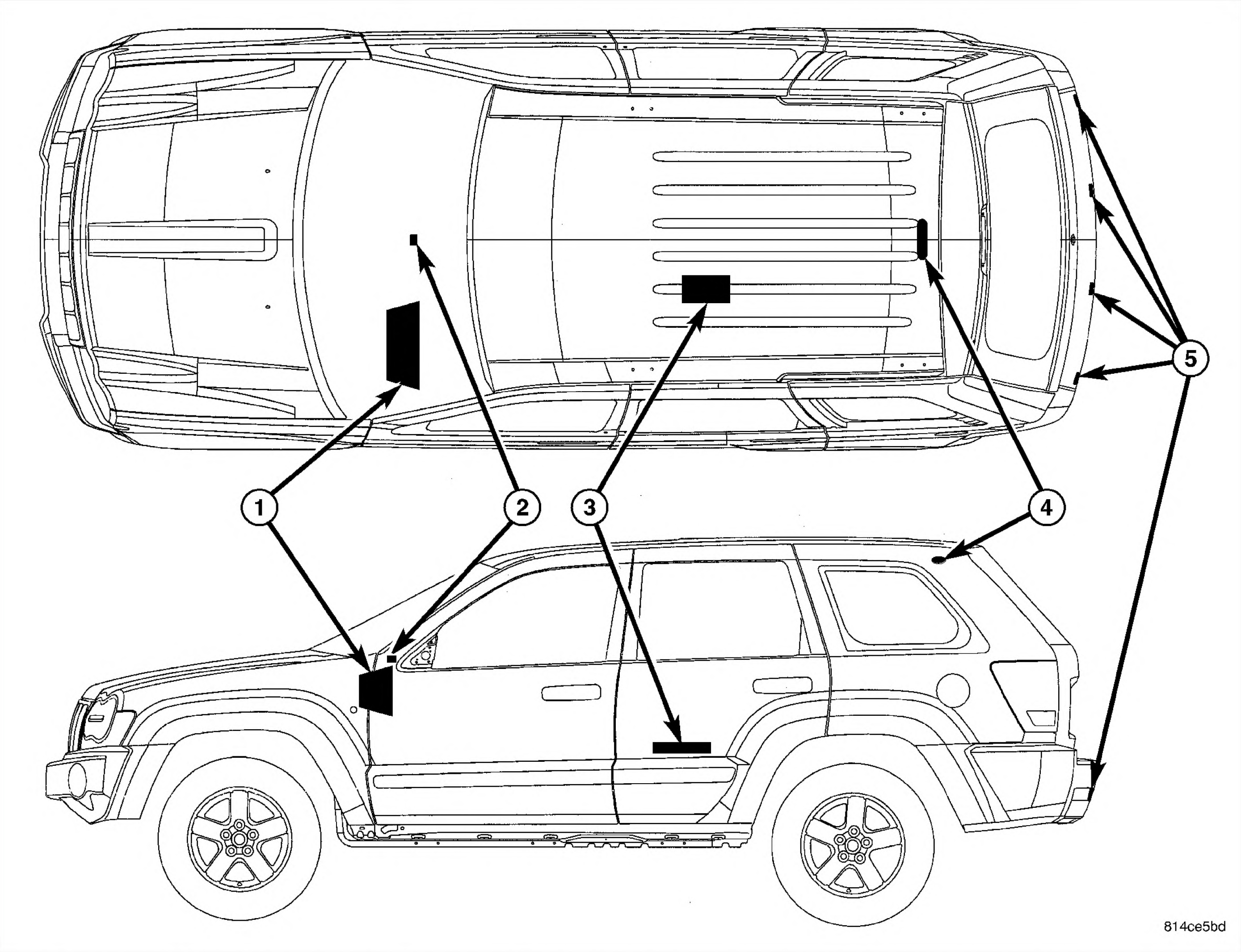
- **Slow Rate Repetitive Click** - Repeated "click" tones that are issued at a slow rate of about 50 clicks per minute.

- **Fast Rate Repetitive Click** - Repeated “click” tones that are issued at a fast rate of more than about 100 clicks per minute.
- **Fixed Duration Beep** - A short, sharp, single tactile “beep” tone.
- **Single Chime Tone** - A single “chime” tone.
- **Slow Rate Repetitive Chime** - Repeated “chime” tones that are issued at a slow rate of about 50 chimes per minute.
- **Fast Rate Repetitive Chime** - Repeated “chime” tones that are issued at a fast rate of about 180 chimes per minute.

Hard wired circuitry connects the EMIC and the various chime warning system switch and sensor inputs to their modules and to each other through the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the EMIC through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

The EMIC chime warning system circuits and components cannot be adjusted or repaired. If the EMIC circuitry, the on-board transducer or the relay are damaged or faulty, the EMIC unit must be replaced.

PARK ASSIST SYSTEM



The Park Assist System is an electronic parking aid that alerts the driver to obstacles which are located immediately behind the vehicle. Objects are sensed using ultrasonic sound waves. When an object is detected, the system will give the driver visual and audible warnings. The system can be turned OFF and ON with a disable switch located in the upper instrument panel switch pod, in the the instrument panel center stack, just above the radio. The system is enabled from the factory as a default.

The major components of the park assist system are:

- **Park Assist Module (3)** - supplies voltage to the object detection sensors and park assist display. It triggers the sensors, analyzes the echo delay times and calculates obstacle distances. It sends display information to the park assist display, performs system diagnostics, and communicates via the Controller Area Network (CAN) date bus network.
- **Park Assist Sensors (5)** - there are four sensors located in the rear bumper that generate ultrasonic pulses when triggered by the park assist module. The sensors signal the park assist module when reflected ultrasonic pulses are received.
- **Park Assist Display (4)** - there are sixteen Light Emitting Diode (LED) indicators which provide indication of relative distance to obstacles. When the system is engaged and no obstacles are detected, the two outermost yellow LED’s are lit at reduced brightness to show the system is working. As the distance to a detected obstacle decreases, more yellow LED’s towards the center of the display illuminate.
- **Park Assist OFF Switch (2)** - this is so the park assist system can be disabled/enabled if the system is not desired (I.E. during off road use where large objects are common). When the system is disabled, the EVIC display in the EMIC (1) will display “Park Assist Disabled”.

For diagnosis and testing of the park assist system, use a scan tool and the appropriate body diagnostic information.

OPERATION

CHIME WARNING SYSTEM

The chime warning system operates on battery voltage received through a fuse in the Junction Block (JB) on a non-switched fused B(+) circuit so that the system may operate regardless of the ignition switch position. The chime warning system also monitors the ignition switch position so that some chime features are functional only with the ignition switch in the ON position, while others are functional regardless of the ignition switch position.

The chime warning system provides an audible indication to the vehicle operator or occupants under the following conditions:

- **Airbag Indicator Warning** - The ElectroMechanical Instrument Cluster (EMIC) transducer will generate one short chime when the ignition switch is in the On position, and an electronic message is received over the Controller Area Network (CAN) data bus from the Occupant Restraint Controller (ORC) requesting “Airbag” indicator illumination. This warning will only occur following completion of the “Airbag” indicator bulb test, and will only occur once during any ignition cycle.
- **Compass Mini-Trip Computer Global Reset** - The EMIC transducer will generate one short chime when the ignition switch is in the On position, and an electronic message is received over the CAN data bus from the EVIC requesting that the average fuel economy, trip odometer and distance to empty data be reset. The EVIC monitors hard wired inputs from the U.S./Metric and Reset button switches to determine the proper reset messages to send to the EMIC.
- **Door Ajar Indicator Warning** - The EMIC transducer will generate one short chime when the ignition switch is in the On position, a hard wired input is received indicating that the status of any door ajar switch has changed, and an electronic message is received over the CAN data bus indicating that the vehicle is moving.
- **Fasten Seat Belt Indicator Warning** - The EMIC transducer will generate repetitive chimes at a slow rate to announce that a hard wired input from the seat belt switch indicates that the driver side front seat belt is not fastened with the ignition switch in the On position. The chime warning system also supports the enhanced seat belt reminder (beltminder) when this feature is enabled. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/SEAT BELT INDICATOR - OPERATION).
- **Gate Ajar Indicator Warning** - The EMIC transducer will generate one short chime when the ignition switch is in the On position, a hard wired input is received indicating that the status of the liftgate ajar switch has changed, and an electronic message is received over the CAN data bus indicating that the vehicle is moving.
- **Head/Park Lamps-On Warning** - The EMIC transducer will generate repetitive chimes at a fast rate to indicate that hard wired inputs from the driver door ajar switch, the headlamp switch, and the ignition switch indicate that the exterior lamps are turned On with the driver side front door opened and the ignition switch in the Off position. The chimes will continue to sound until the exterior lamps are turned Off, the driver side front door is closed, or the ignition switch is turned to the On position, whichever occurs first.

- **Key-In-Ignition Warning** - The EMIC transducer will generate repetitive chimes at a fast rate to indicate that hard wired inputs from the driver door ajar switch, the ignition switch, and the key-in ignition switch circuitry of the ignition switch indicate that the key is in the ignition lock cylinder with the driver side front door open and the ignition switch in the Off position. The chimes will continue to sound until the key is removed from the ignition lock cylinder, the driver side front door is closed, or the ignition switch is turned to the On position, whichever occurs first.
- **Low Fuel Indicator Warning** - The EMIC transducer will generate one short chime when the low fuel indicator is illuminated by the instrument cluster circuitry. This chime will only occur once during any ignition cycle.
- **Low Wash Indicator Warning** - The EMIC transducer will generate one short chime when the low washer fluid indicator is illuminated by the instrument cluster circuitry. This chime will only occur once during any ignition cycle.
- **Overspeed Warning** - The EMIC transducer will generate repetitive chimes at a slow rate to indicate that the vehicle speed is over a pre-programmed speed value. The EMIC monitors electronic vehicle speed messages received over the CAN data bus. This feature is only enabled on an EMIC that has been programmed with a Middle East Gulf Coast Country (GCC) country code.
- **Park Assist System Warning** - The Park Assist System Display will generate a chime as an object is detected by the sensors. This chime will be intermittent when the object is approximately 40 cm (16 in.) away and then become faster as the object approaches 30 cm (12 in.), when it will be a constant chime. If the radio is on when an object is detected, the radio will mute when the distance is that of which a chime is needed (Refer to 8 - ELECTRICAL/CHIME/BUZZER/PARK ASSIST DISPLAY - OPERATION).
- **Park Brake Reminder** - The EMIC transducer will generate one short chime to announce that the hard wired input from the park brake switch and a vehicle speed message input received over the CAN data bus indicate that the park brake is applied and the vehicle is moving. This chime will repeat each time the input conditions are met.
- **Sentry Key “Customer Learn” Mode Announcement** - The EMIC transducer will generate one short chime to confirm that an electronic “Customer Learn” mode message has been received over the CAN data bus to indicate that the Sentry Key Remote Entry Module (SKREEM) is prepared for programming additional sentry key transponders. This chime feature is only active on vehicles equipped with the optional Sentry Key system, and sold in a market where “Customer Learn” programming is an allowed feature.
- **Trans Overtemp Indicator Warning** - The EMIC transducer will generate repetitive chimes at a slow rate when the transmission overtemp indicator is illuminated by the instrument cluster for a high or critical transmission fluid temperature condition. This chime will repeat each time the trans overtemp indicator is cycled from Off to On.
- **Turn Signal/Hazard Warning Flasher Emulation** - The EMIC relay will generate repetitive clicks at a slow rate to emulate an electromechanical flasher when the turn signal or hazard warning system are operating. The EMIC relay will generate repetitive clicks at a fast rate to indicate that the right or left turn signal are operating with one or more bulbs inoperative. In either case, the clicks will continue until the turn signal and hazard warning systems are turned off.
- **Turn Signal On Warning** - The EMIC transducer will generate repetitive chimes at a slow rate to indicate that a turn signal has been active continuously for 1.6 kilometers (1 mile) with the vehicle speed greater than 22 kilometers-per-hour (15 miles-per hour). Vehicles built for markets other than the United States and Canada have a revised distance threshold of 4 kilometers for this feature. The chime will continue until the turn signal input becomes inactive or until the vehicle speed message indicates that the speed is less than 22 kilometers-per-hour (15 miles-per-hour), whichever occurs first. The hazard warning flashers will not activate this chime feature.
- **Warning Indicator Announcement** - The EMIC transducer will generate one short chime each time the check gauges indicator is illuminated by the instrument cluster circuitry. The check gauges indicator may be illuminated when any critical engine or transmission systems are operating outside of their normal parameters. The instrument cluster monitors electronic messages received over the CAN data bus to determine when to illuminate the check gauges indicator.

The EMIC provides chime service for all available features in the chime warning system. The EMIC relies upon its internal programming, numerous hard wired inputs, and electronic message inputs received from other modules over the CAN data bus network to provide the chime warning system features. The internal programming of the EMIC determines the priority of each chime request input that is received, as well as the rate and duration of each chime that is to be generated.

The hard wired chime warning system inputs to the EMIC may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the EMIC, the CAN data bus, or the electronic messages received by the EMIC from other modules. The most reliable, efficient and accurate means to diagnose the EMIC, the CAN data bus, or the electronic message inputs used for the chime warning system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

PARK ASSIST SYSTEM

The Park Assist System display activates an audible tone that changes from intermittent to continuous as the final two Light Emitting Diodes (LED's) are illuminated on one side or both sides of the display.

The system detection length from the rear of the vehicle is 0.3 meters to 1.5 meters. This area extends around the rear side of the vehicle. The system detection height from the ground is 0.2 meters to about 1.5 meters. The radio mutes when the system activates its audible tone.

When the driver selects Reverse, the system scans for objects behind the vehicle using four sensors located in the rear bumper. A warning display above the rear window provides both visible and audible warnings indicating the range of the object. If the radio is on, the system will mute the radio when the audible warning comes on.

The system is active only when the transmission gear selector is in reverse for vehicle speeds less than 16 Km/h (10 mph). If the vehicle's Parking/Emergency Brake is applied, the system is deactivated. There is an OFF/ON switch on the instrument panel located in the upper instrument panel switch pod, above the radio. If the driver does not want the system active, then a simple momentary press of the park assist system OFF button will disable the system until pressed again or the ignition key is cycled. The reason for the switch is mainly for use while pulling a trailer and off road use. With a trailer attached to the vehicle, anytime it is put into reverse, the audible and visual message would be present due to the close proximity of the trailer to the rear of the vehicle. When operating the vehicle off road, there are extreme angles that may set off the system alert and this helps eliminate the audible and visual message.

The display contains two sets of yellow and red Light Emitting Diode's (LED's) that the driver can see as they look over their shoulder while backing up. Each side of the vehicle has its own warning LED's. The system provides a visual warning by illuminating one or more yellow LED's as the vehicle gets closer to the object. As the vehicle continues to approach the object, one red LED is illuminated and the system emits a series of short beeps. The tone will remain constant and both red LED's are illuminated once the vehicle is within 12 inches (30.5 cm) of the object.

The system can be turned OFF and back ON through the switch on the upper instrument panel switch pod. If the park assist system is turned OFF, a single chime will sound and the EVIC display in the EMIC will display the following message “PARK ASSIST DISABLED”, when the vehicle is in reverse.

- Ensure that the rear bumper is free of dirt and debris to keep the system operating properly.
- Jackhammers, large trucks, and other vibrations could affect the performance of the system.
- Ensure that the parking brake is not applied.

If “Service Park Assist System” appears in the EVIC display after making sure the rear bumper is clean, proceed to diagnose the system using a scan tool and the appropriate diagnostic information.

DIAGNOSIS AND TESTING

CHIME WARNING SYSTEM

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

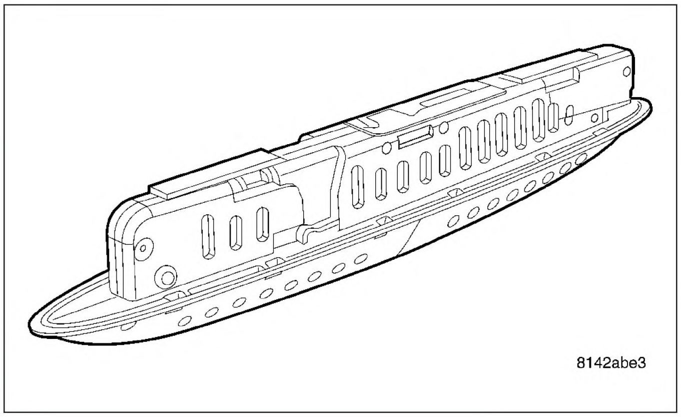
The hard wired chime warning system inputs to the ElectroMechanical Instrument Cluster (EMIC), as well as other hard wired circuits for this system may be diagnosed and tested using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

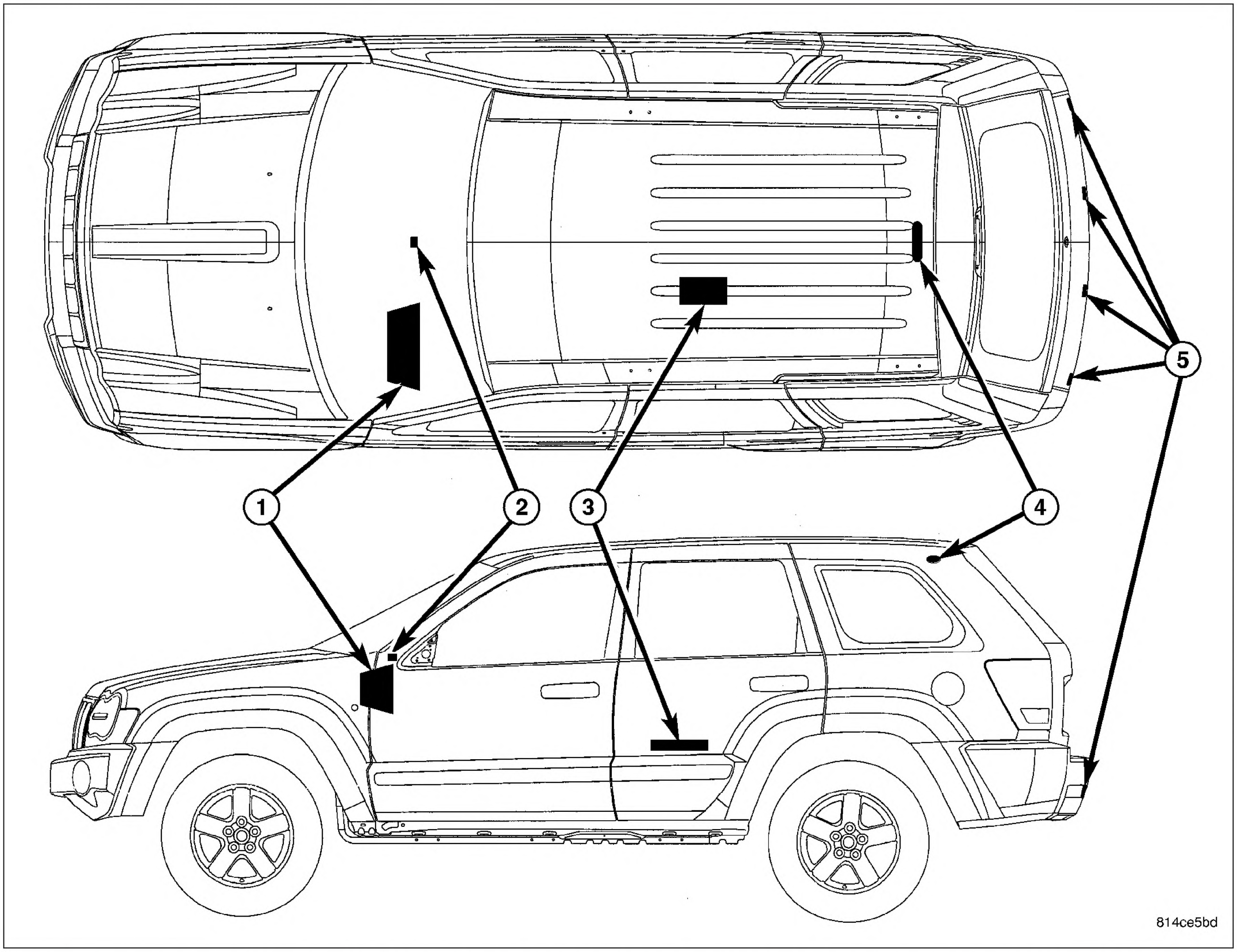
However, conventional diagnostic methods may not prove conclusive in the diagnosis of the EMIC, the Controller Area Network (CAN) data bus, or the electronic message inputs used by the EMIC to provide chime warning system service. The most reliable, efficient, and accurate means to diagnose the EMIC, the CAN data bus, and the electronic message inputs for the chime warning system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

PARK ASSIST DISPLAY

DESCRIPTION

The Park Assist Display is a molded plastic unit, housing Light Emitting Diodes (LED's) and a chime module.

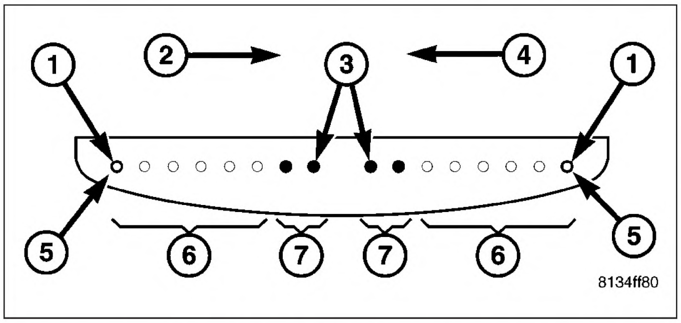




The Park Assist Display (4) is located in the rear of vehicle, over the rear window in the headliner. Located in the rear of the vehicle for easy visual reference when the driver is backing up.

The display is used to alert the driver of any obstacles detected in the rear of the vehicle. The chime or audible signal also comes from the display unit.

OPERATION



When the ignition is put in the RUN position, all the Light Emitting Diodes (LED's) will illuminate for approximately one second. This will be interrupted if the system senses an obstacle.

The ready status will be sensed by the outermost two yellow LED's (1) being illuminated. As the obstacle is sensed, the yellow LED's will start illuminating inward (6) until the object in approximately 40 cm (16 in.) away and then the inner red LED will light (3).

The display is sensitive to which side of the rear of the vehicle that the object is detected. If on the left rear, the left segments will light and the same for the right side of the vehicle.

CORRELATION OF LED SEGMENTS TO DISTANCE

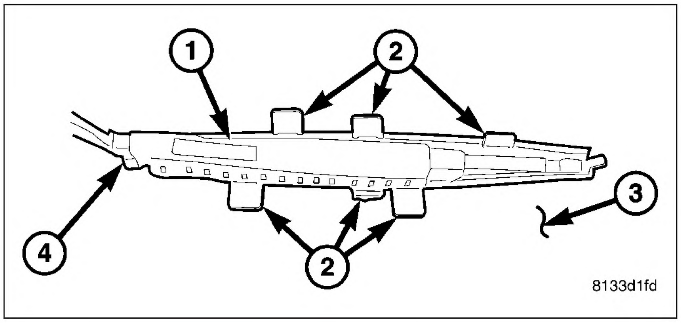
DISPLAY LED	DISTANCE		LED COLOR	AUDIBLE SIGNAL
	REAR CORNERS	REAR CENTER		
1st LED		150 cm (59 in.)	Yellow	None
2nd LED		120 cm (47 in.)	Yellow	None
3rd LED		100 cm (39 in.)	Yellow	None
4th LED	80 cm (31.5 in.)	80 cm (31.5 in.)	Yellow	None
5th LED	65 cm (25.5 in.)	65 cm (25.5 in.)	Yellow	None
6th LED	50 cm (20 in.)	50 cm (20 in.)	Yellow	None
7th LED	40 cm (16 in.)	40 cm (16 in.)	Red	30 cm (12 in.) Intermittant
8th LED	15 cm (6 in.)	30 cm (12 in.)	Red	20 cm (8 in.) Continuous

There will be an audible tone when the object gets within 40 cm (16 in.) from the rear of the vehicle.

To diagnose and test the Park Assist System, use a scan tool and the appropriate diagnostic information.

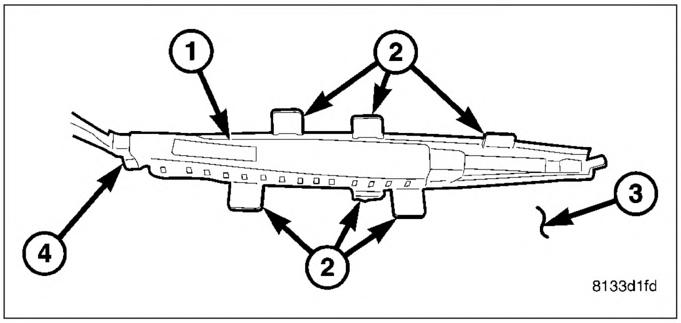
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Lower the headliner (3) in the rear of the vehicle in the liftgate opening. Follow the headliner removal procedure for the rear of the headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
3. Bend the retaining tabs (2) upwards to allow the park assist display (1) to drop out of the headliner (3) opening.
4. Disconnect the display electrical connector (4) and remove display (1) from vehicle.



INSTALLATION

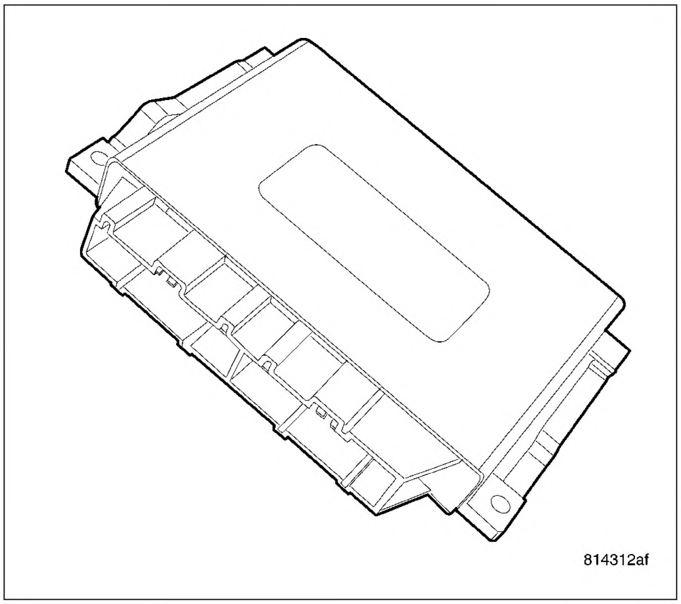
1. Position the Park Assist Display (1) in headliner (3) opening and connect the display electrical connector (4).
2. Bend the retaining tabs (2) down behind the headliner (3).
3. Raise the headliner in the rear of the vehicle in the liftgate opening (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
4. Connect the battery negative cable.



PARK ASSIST MODULE

DESCRIPTION

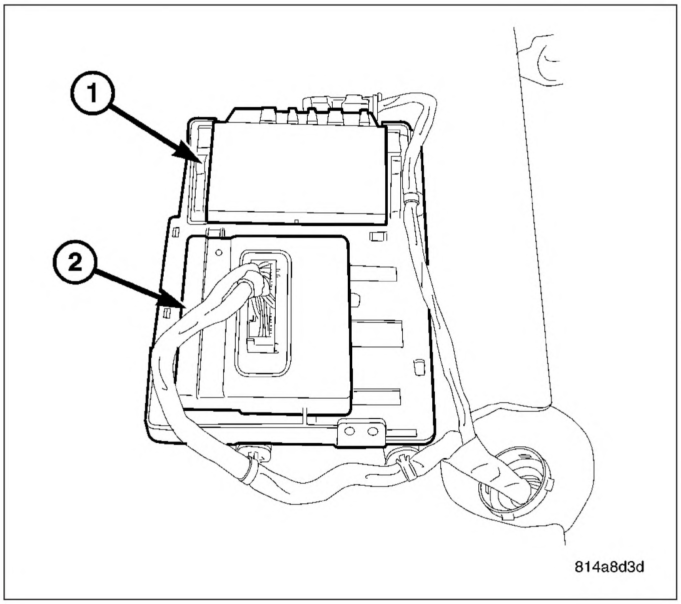
The Park Assist Module has a molded plastic housing which housing internal circuitry and two electrical connectors. There are four mounting tabs that affix the module to the mounting bracket with four clips.



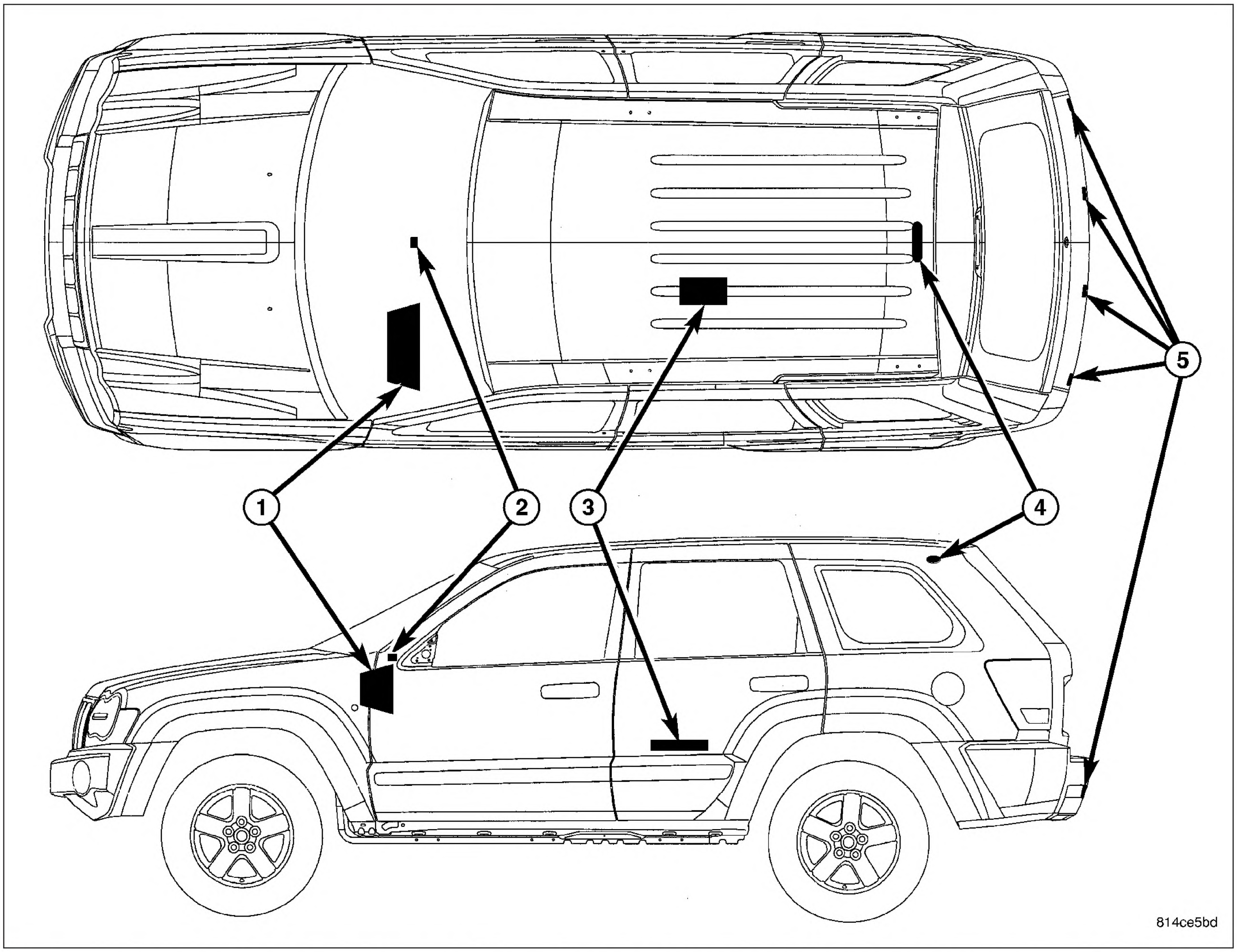
The Park Assist Module (1) is located on the left side of the vehicle, under the rear seat cushion, next to the final drive control module.

The park assist module (1) has a number of functions:

- Supply voltage to the sensors and display.
- Disconnection of the display with bus idle and over voltage Vmax.
- Triggering the sensors.
- Analyze echo delay times and calculate obstacle distances.
- Bi-directional data communication to the display for diagnosis.
- System diagnostics - diagnosis and error handling (sensors, display, module).
- Data exchange over the Controller Area Network (CAN) data bus.



OPERATION



The system detection length from the rear of the vehicle is 0.3 meters to 1.5 meters. This area extends around the rear side of the vehicle. The system detection height from the ground is 0.2 meters to about 1.5 meters. The radio mutes when the system activates its audible tone.

When the driver selects Reverse, the system scans for objects behind the vehicle using four sensors (5) located in the rear bumper. Objects can be detected from up to 1.5 meters. A warning display (4) above the rear window provides both visible and audible warnings indicating the range of the object.

The system in active only when the vehicle is in reverse for vehicle speeds less than 16 Km/h (10 mph). If the vehicles Parking/Emergency Brake is applied, the system is deactivated.

The park assist system has a disable switch (2) located on the instrument panel center stack within the upper instrument panel switch pod. The default for the system is ON, but it may be turned OFF by a press of the switch. This is a momentary switch and the system will stay OFF until pressed again or the ignition key is cycled. If the park assist system is turned OFF, a single chime will sound and the EVIC will display the following message “PARK ASSIST DISABLED”, when the vehicle is in reverse.

The display contains two sets of yellow and red Light Emitting Diode’s (LED’s) that the driver can see as they look over their shoulder while backing up. Each side of the vehicle has its own warning LED’s. The system provides a visual warning by illuminating one or more yellow LED’s as the vehicle gets closer to the object. As the vehicle continues to approaches the object, one red LED is illuminated and the system emits a series of short beeps. The tone will remain constant and both red LED’s are illuminated once the vehicle is within 12 inches (30.5 cm) of the object.

- Ensure that the rear bumper is free of dirt and debris to keep the system operating properly.
- Jackhammers, large trucks, and other vibrations could affect the performance of the system.

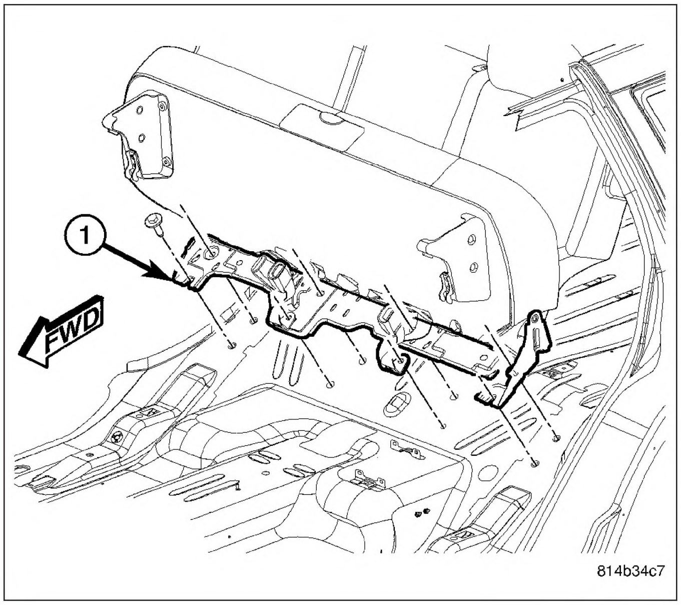
- Ensure that the parking brake is not applied.

If "Service Park Assist System" appears in the EVIC after making sure the rear bumper is clean, proceed to diagnose the system using a scan tool and the appropriate diagnostic information.

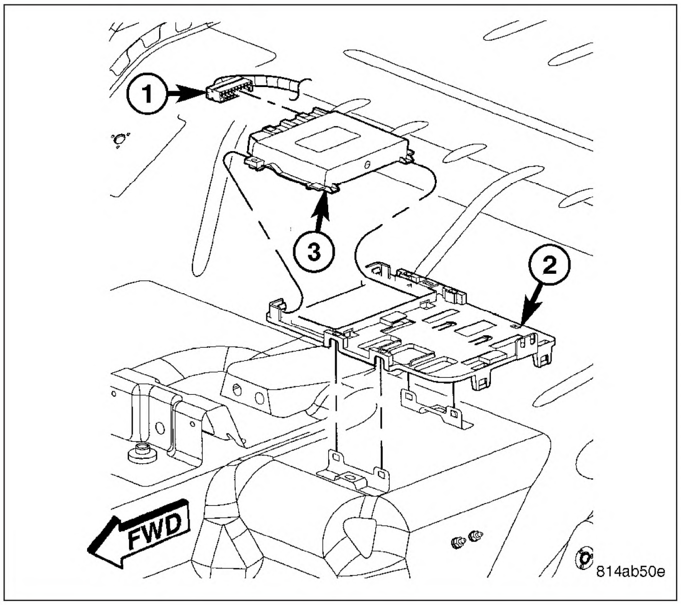
To diagnose the Park Assist Module, use a scan tool and the appropriate body diagnostic information.

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Lift up rear seat to expose the park assist module and final drive control module.

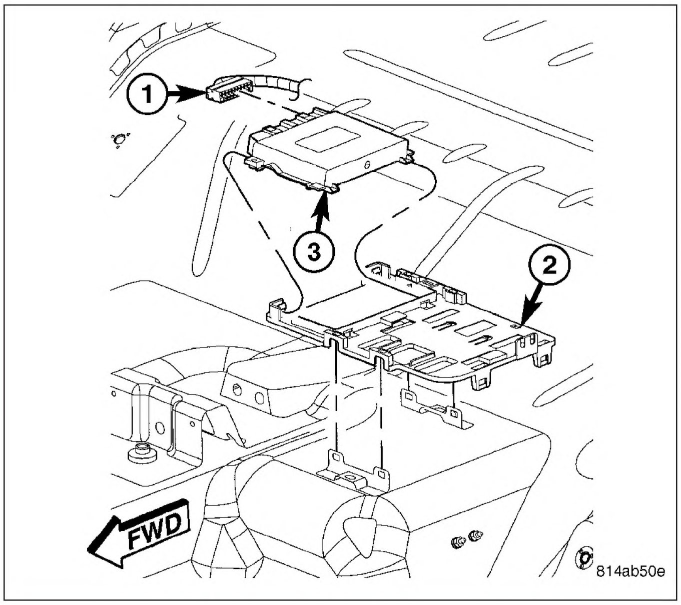


3. Disconnect the module electrical connector (1).
4. Using a trim stick (special tool #C-4755) or equivalent, gently pry back on the retaining tabs on the mounting plate (2) and remove module.



INSTALLATION

1. Place the park assist module (3) in its location on the mounting plate (2) and firmly snap into place.
2. Connect the electrical connector (1).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3
2
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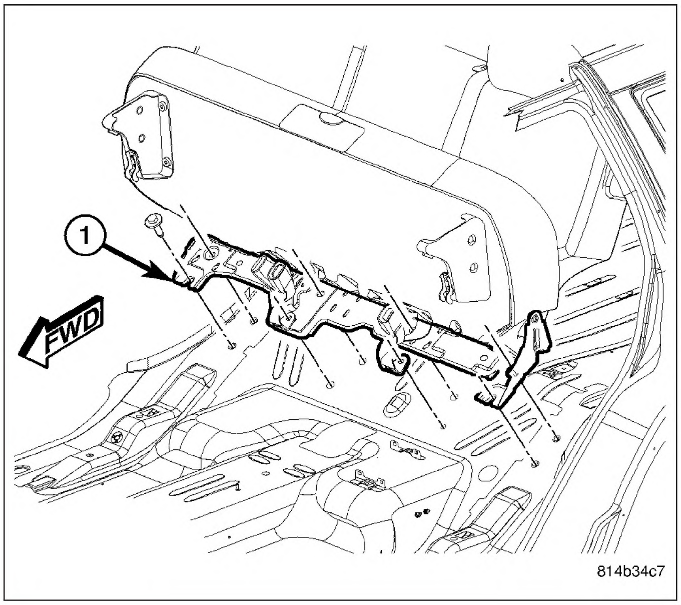
3. Lower the rear seat back down into position.
4. Connect the battery negative cable.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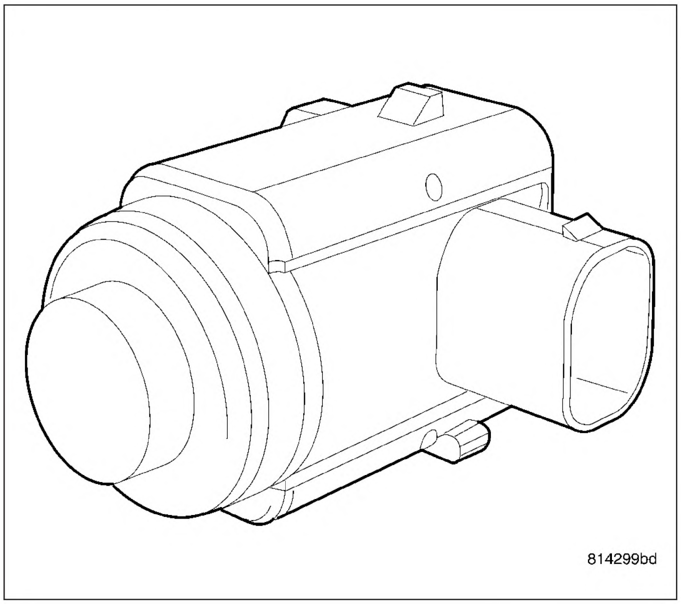
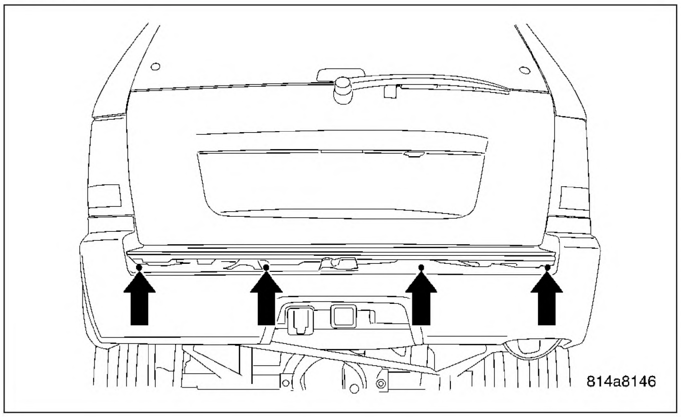
PARK ASSIST SENSOR

DESCRIPTION

The Park Assist Sensors generate ultrasonic pulses when triggered by the park assist module when an obstacle is detected. The sensors then signal the module when reflected ultrasonic pulses are received.



The Park Assist Sensors are located in the rear bumper fascia mounted equally apart. The sensors detect objects with an ultrasonic pulse that reflects off the object and then is sent to the module to determine the distance of the object.



OPERATION

The Park Assist Sensors:

- Generate ultrasonic pulses when triggered by the Park Assist Module.
- Reception/filtering of ultrasonic energy received.
- Signalling the module of received ultrasonic pulses that meet threshold criteria.

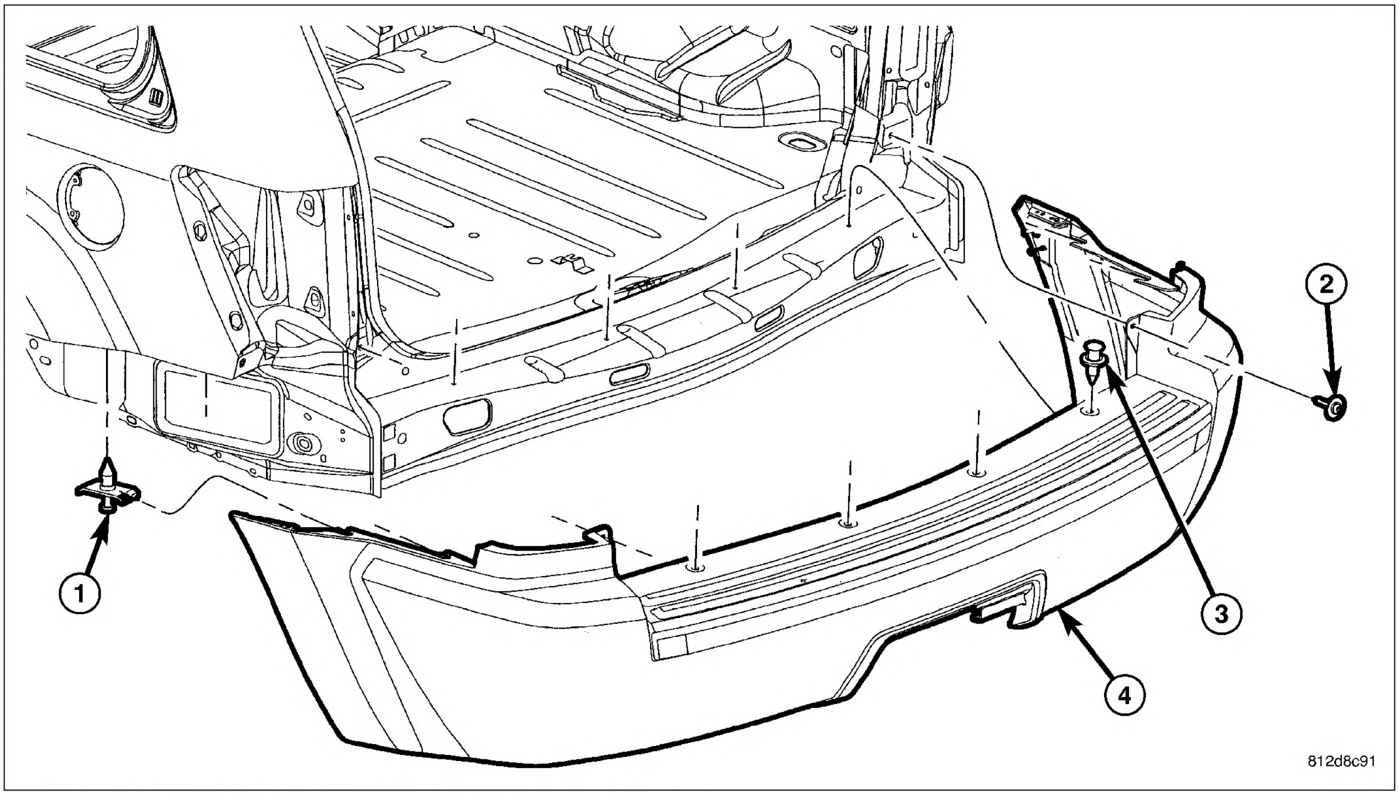
The sensors are supplied power by the module. The sensor supply is enabled when the sensor function is necessary.

The sensors detection length from the rear of the vehicle is 0.3 meters to 1.5 meters. This area extends around the rear side of the vehicle. The sensor detection height from the ground is 0.2 meters to about 1.5 meters.

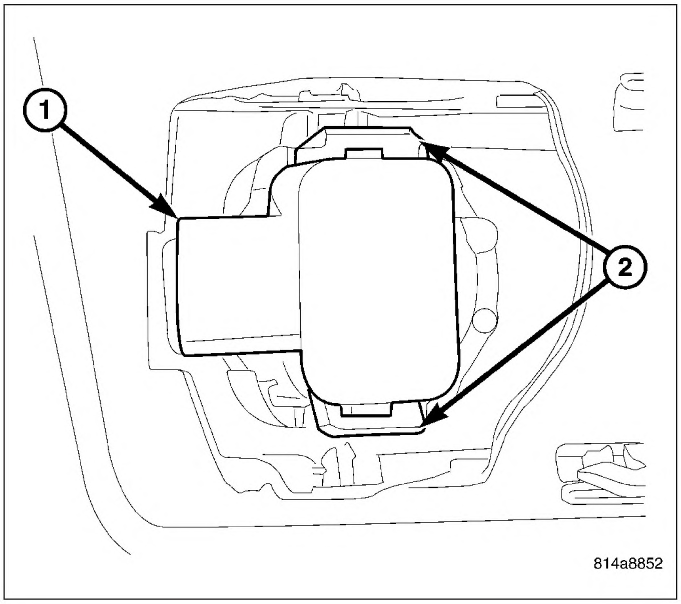
- Ensure that the rear bumper (sensors) is free of dirt and debris to keep the system operating properly.
- Jackhammers, large trucks, and other vibrations could affect the performance of the system.
- Ensure that the parking brake is not applied.

If “Service Park Assist System” appears in the EVIC after making sure the rear bumper is clean, proceed to diagnose the system using a scan tool and the appropriate diagnostic information.

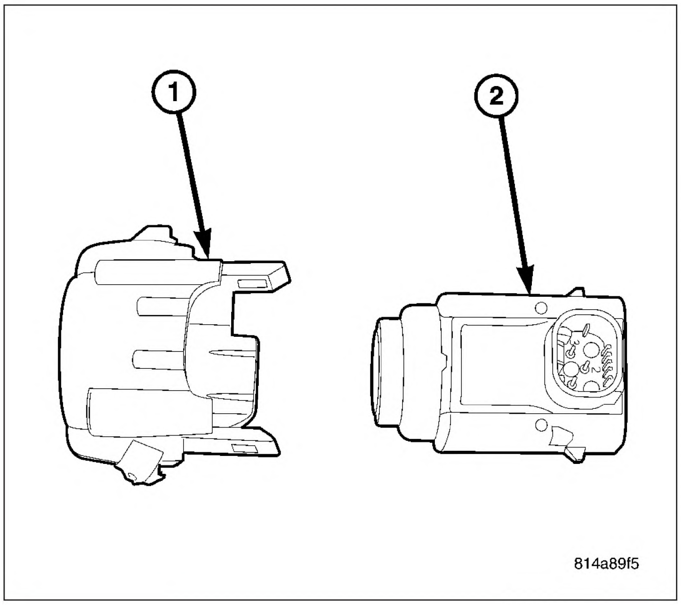
REMOVAL



1. Disconnect and isolate the battery negative cable.
2. Remove rear fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL).
3. Unsnap Park Assist Sensor (1) from the retaining housing (2) and remove from fascia.

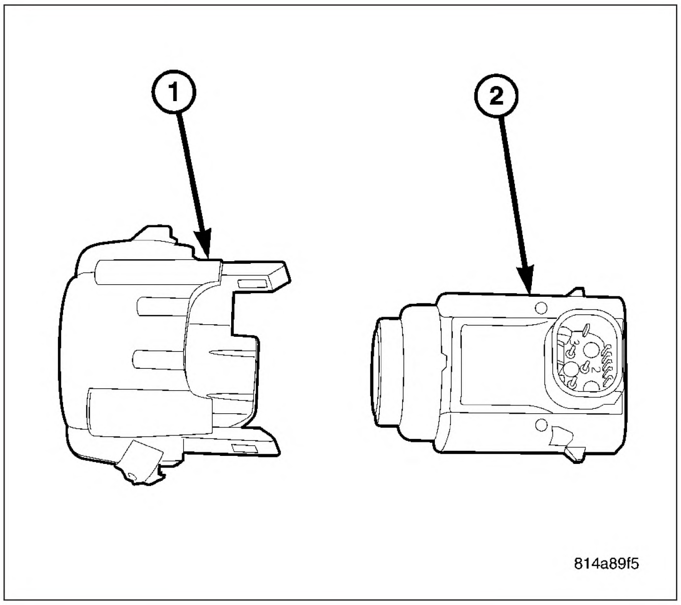


4. If the bracket (1) holding the sensor (2) is damaged, unclip it from the rear fascia with the sensor and then separate them.

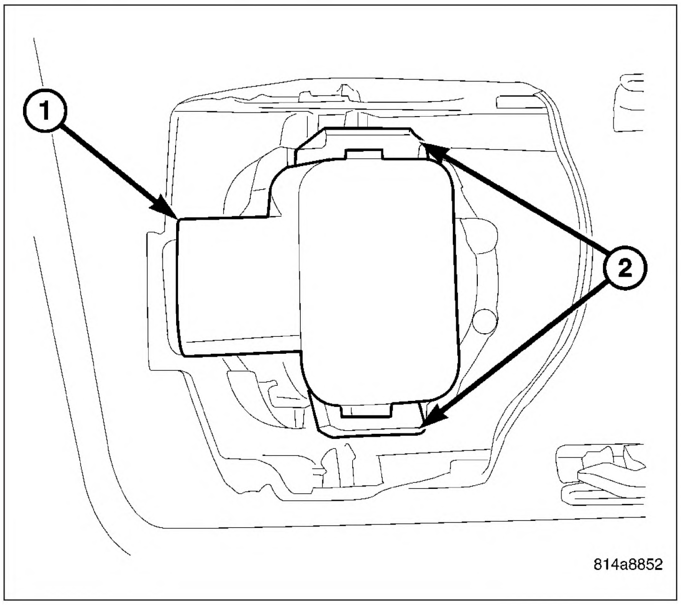


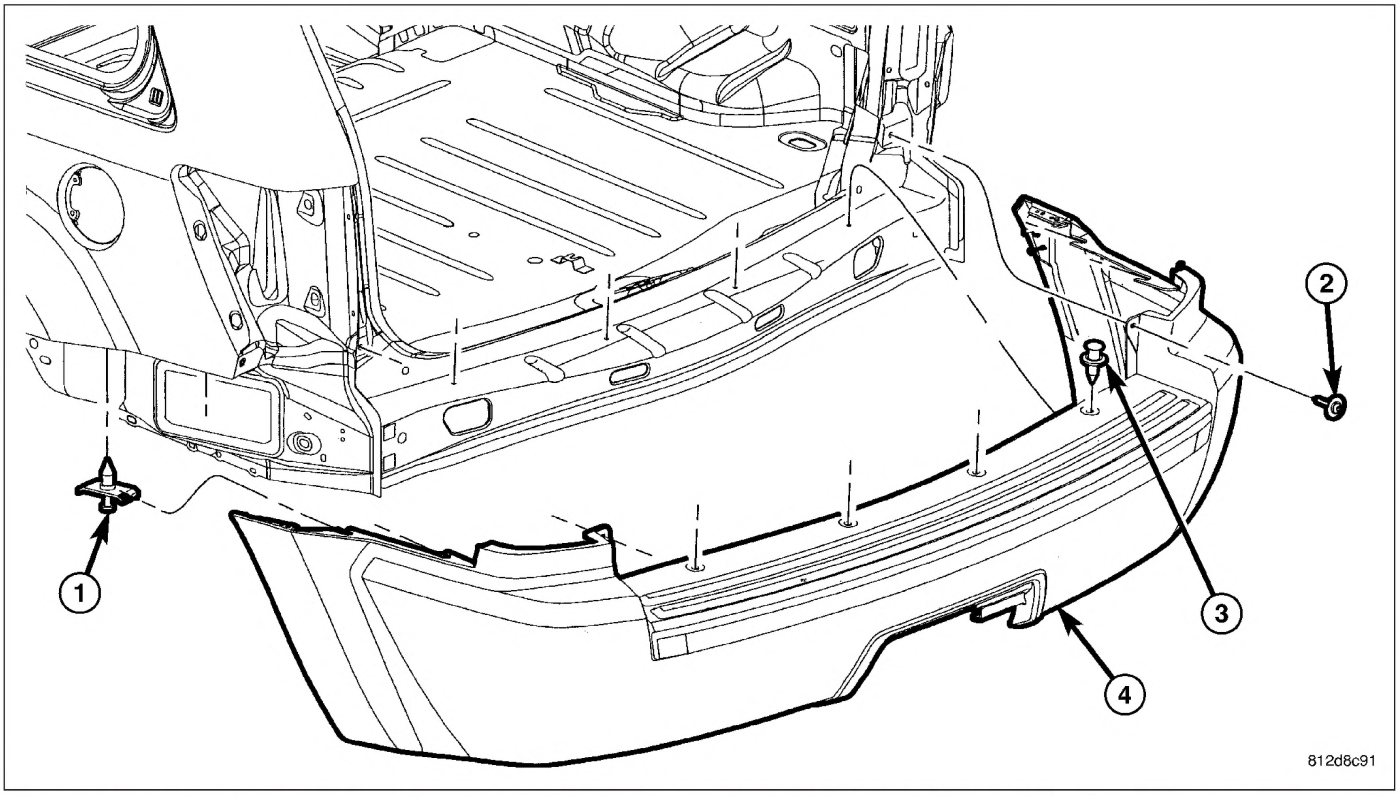
INSTALLATION

1. If replacing the sensor retaining bracket (1), snap the sensor (2) into the bracket until it seats fully.



2. Position the Park Assist Sensor (1) over the retaining bracket (2) and firmly snap into housing in rear fascia.





3. Install the rear fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - INSTALLATION).
4. Connect the battery negative cable.

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ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B210D-BATTERY VOLTAGE LOW

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  Battery voltage less than 9 volts for more than 15 seconds.

Possible Causes
RESISTANCE IN THE (A1) BATTERY POSITIVE CIRCUIT
RESISTANCE IN THE GENERATOR CASE GROUND
GENERATOR OPERATION
GENERATOR FIELD CONTROL CIRCUIT OPEN
GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
GROUND CIRCUIT OPEN
PCM

Diagnostic Test

1. **CHECK FOR ANY POWERTRAIN CONTROL MODULES DTCS**

NOTE: Make sure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.

NOTE: Inspect the vehicle for after market accessories that may exceed the Generator System output.

NOTE: Make sure the generator drive belt is in good operating condition.

NOTE: Inspect the fuses in the IPM. If an open fuse is found, use the wire diagram/schematic as a guide, inspect the wiring and connectors for damage.

Turn the ignition on.

With the scan tool, read active PCM DTC's.

Does the scan tool display any active PCM DTC's?

Yes >> (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

No >> Check the above conditions that can cause a low voltage condition. Repair as necessary.

B210E-BATTERY VOLTAGE HIGH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  Battery voltage greater than 16 volts for more than 15 seconds.

Possible Causes
GENERATOR FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
GENERATOR
PCM

Diagnostic Test

1. CHECK FOR ANY POWERTRAIN CONTROL MODULES DTCS

NOTE: Make sure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.

NOTE: Inspect the vehicle for after market accessories that may exceed the Generator System output.

NOTE: Make sure the generator drive belt is in good operating condition.

NOTE: Inspect the fuses in the IPM. If an open fuse is found, use the wire diagram/schematic as a guide, inspect the wiring and connectors for damage.

Turn the ignition on.

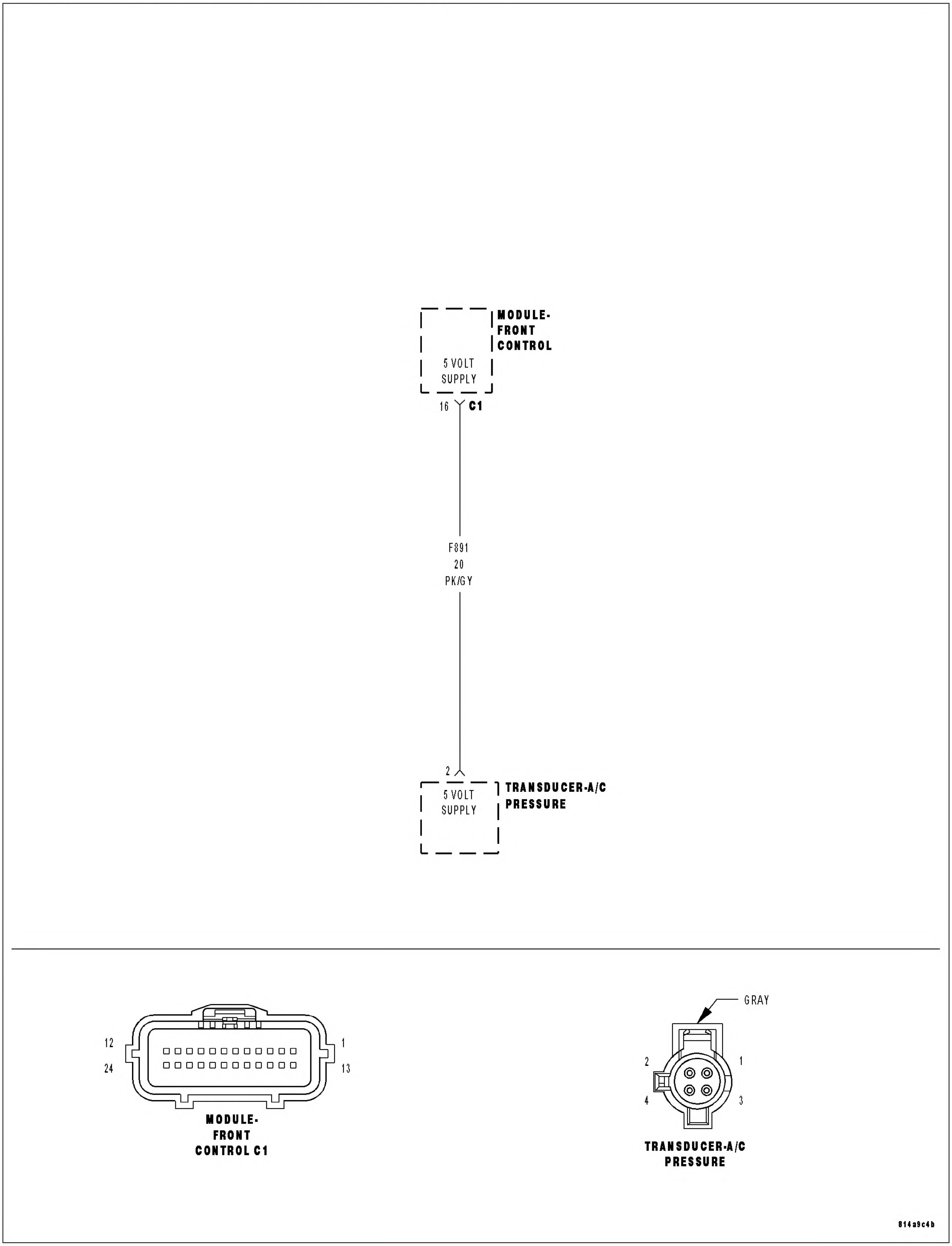
With the scan tool, read active PCM DTC's.

Does the scan tool display any active PCM DTC's?

Yes >> (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

No >> Check the above conditions that can cause a high voltage condition. Repair as necessary.

B2112-5 VOLT SUPPLY CIRCUIT LOW (FCM)


MODULE-
FRONT
CONTROL
5 VOLT
SUPPLY
16
C1
F891
20
PK/GY
2
5 VOLT
SUPPLY
TRANSDUCER-A/C
PRESSURE
12
24
1
13
MODULE-
FRONT
CONTROL C1
GRAY
2
1
4
3
TRANSDUCER-A/C
PRESSURE
814a9c4b

B2112-5 VOLT SUPPLY CIRCUIT LOW (FCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module detects the (F891) 5 volt supply circuit voltage below 0.3 volts.

Possible Causes
(F891) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
A/C PRESSURE TRANSDUCER
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. A/C PRESSURE TRANSDUCER

Turn the ignition off.

Disconnect the A/C Pressure Transducer harness connector.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 3

No >> Replace the A/C Pressure Transducer in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

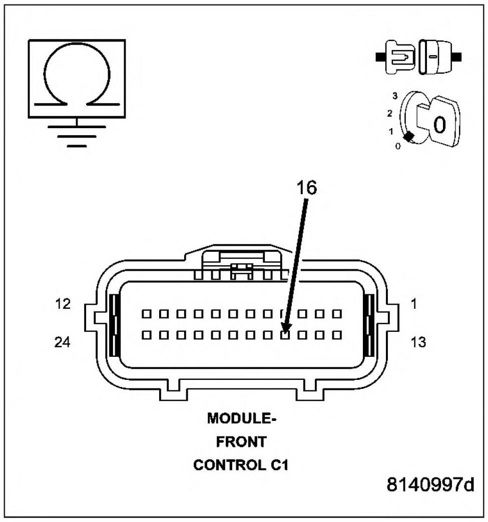
B2112-5 VOLT SUPPLY CIRCUIT LOW (FCM) (CONTINUED)

3. (F891) 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the FCM C1 harness connector.

Measure the resistance between ground and the (F891) 5 Volt Supply circuit.



Is the resistance below 1000.0 ohms?

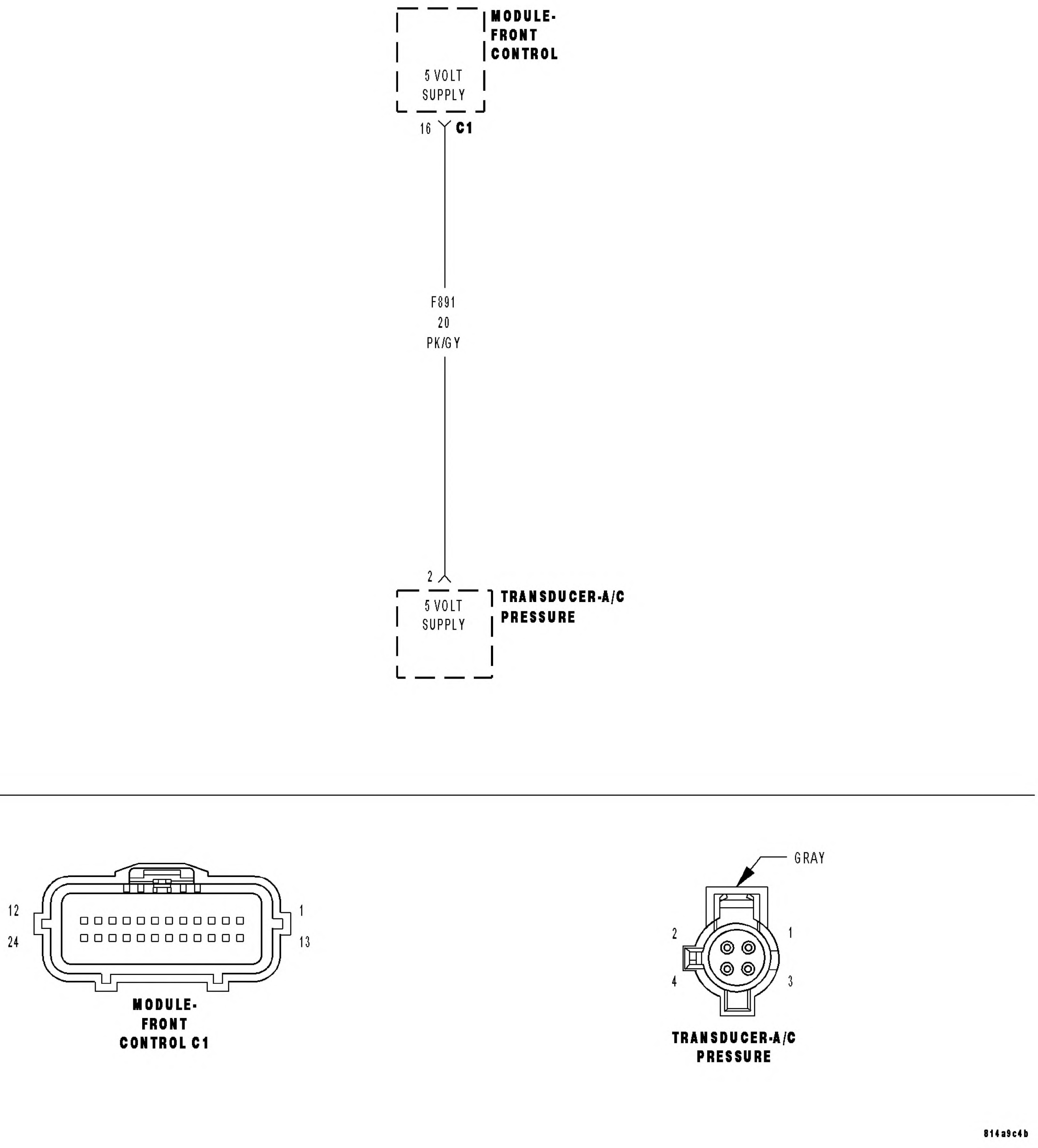
Yes >> Repair the (F891) 5 Volt Supply circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2113-5 VOLT SUPPLY CIRCUIT HIGH (FCM)


MODULE-
FRONT
CONTROL
5 VOLT
SUPPLY
16
C1
F891
20
PK/GY
2
5 VOLT
SUPPLY
TRANSDUCER-A/C
PRESSURE
12
1
24
13
MODULE-
FRONT
CONTROL C1
GRAY
2
1
4
3
TRANSDUCER-A/C
PRESSURE
814a9c4b

B2113-5 VOLT SUPPLY CIRCUIT HIGH (FCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module detects the (F891) 5 volt supply circuit voltage above 5.0 volts.

Possible Causes
(F891) 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
A/C PRESSURE TRANSDUCER
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. A/C PRESSURE TRANSDUCER

Turn the ignition off.

Disconnect the A/C Pressure Transducer harness connector.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 3

No >> Replace the A/C Pressure Transducer in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2113-5 VOLT SUPPLY CIRCUIT HIGH (FCM) (CONTINUED)

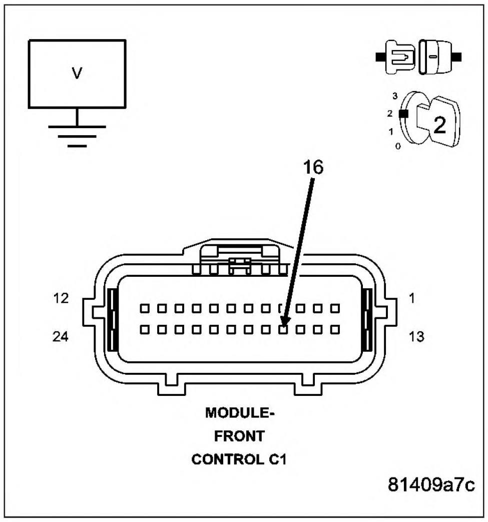
3. (F891) 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the FCM C1 harness connector.

Turn the ignition on.

Measure the voltage of the (F891) 5 Volt Supply circuit.



Is the voltage above 5.5 volts?

Yes >> Repair the (F891) 5 Volt Supply circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2206-CURRENT VIN MISSING/MISMATCH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module will receive and monitor the VIN message from the PCM and record the VIN if different from the last VIN.

Possible Causes
INCORRECT VIN PROGRAMMED IN PCM
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK VIN IN PCM

With the scan tool compare the VIN that is programmed into the PCM to the VIN on the vehicle.

Does the VIN programmed into the PCM match the vehicles VIN?

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Program the correct VIN in the PCM and retest.

B2215-FRONT CONTROL MODULE INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Front Control Module detects an internal fault.

Possible Causes
FRONT CONTROL MODULE

Diagnostic Test

1. REPLACE THE FRONT CONTROL MODULE IF DTC IS ACTIVE

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B222C-VEHICLE CONFIGURATION NOT PROGRAMMED

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module is not configured correctly to the vehicle.

Possible Causes
FRONT CONTROL MODULE NOT CONFIGURED CORRECTLY
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

2. CONFIGURE THE FCM TO THE VEHICLE

With the scan tool enter program network configuration and program the FCM to the vehicle configuration.

With the scan tool, erase FCM DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

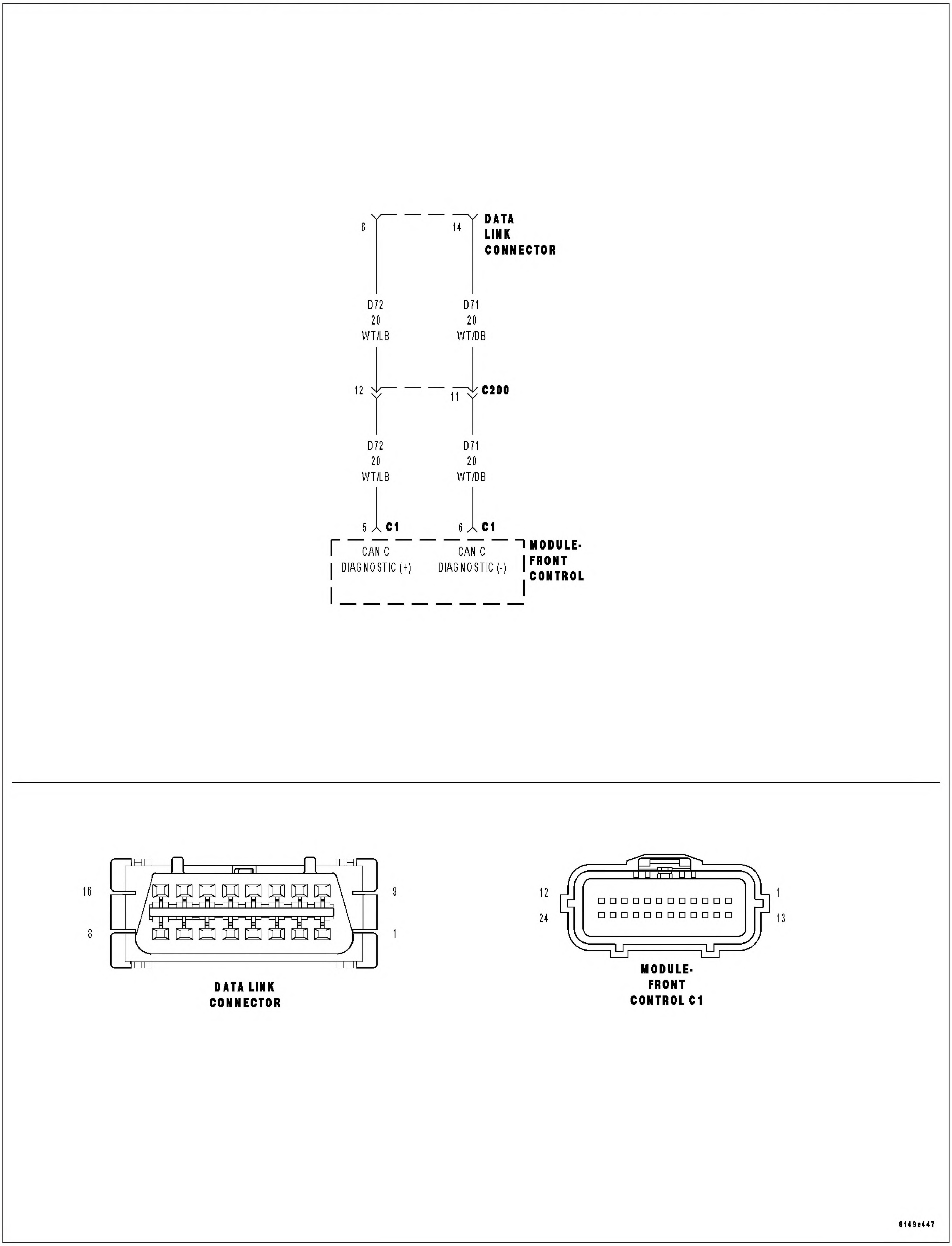
Does the scan tool display this DTC as active?

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair is complete.

*CAN C DIAGNOSTIC (+) AND/OR CAN C DIAGNOSTIC (-) CIRCUITS HIGH


6
14
DATA LINK CONNECTOR
D72
20
WT/LB
D71
20
WT/DB
12
11
C200
D72
20
WT/LB
D71
20
WT/DB
5 C1
6 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
16
9
8
1
DATA LINK CONNECTOR
12
1
24
13
MODULE-FRONT CONTROL C1
8149e447

*CAN C DIAGNOSTIC (+) AND/OR CAN C DIAGNOSTIC (-) CIRCUITS HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the scan tool queries the FCM.
- **Set Condition:**
  The scan tool has detected a shorted high condition on either or both CAN C Diagnostic circuits.

Possible Causes
(D72) CAN C DIAGNOSTIC (+) CIRCUIT SHORTED TO VOLTAGE
(D71) CAN C DIAGNOSTIC (-) CIRCUIT SHORTED TO VOLTAGE
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK THE STATUS OF THE ERROR MESSAGE

NOTE: Ensure the vehicle being tested is a CAN BUS VEHICLE. If not, false error messages may be displayed.

NOTE: Ensure the scan tool is updated to the latest software.

With the scan tool, record the error message.

Disconnect the scan tool from the DLC.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

Does the scan tool display this same error message?

Yes >> Go To 2

No >> The conditions that caused this error message to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. CAN C DIAGNOSTIC CIRCUITS SHORTED TO VOLTAGE

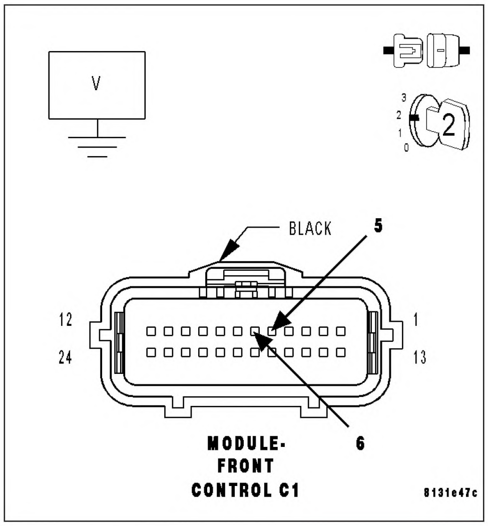
Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Disconnect the scan tool from the DLC.

Turn the ignition on.

Measure the voltage of the CAN C Diagnostic circuits.



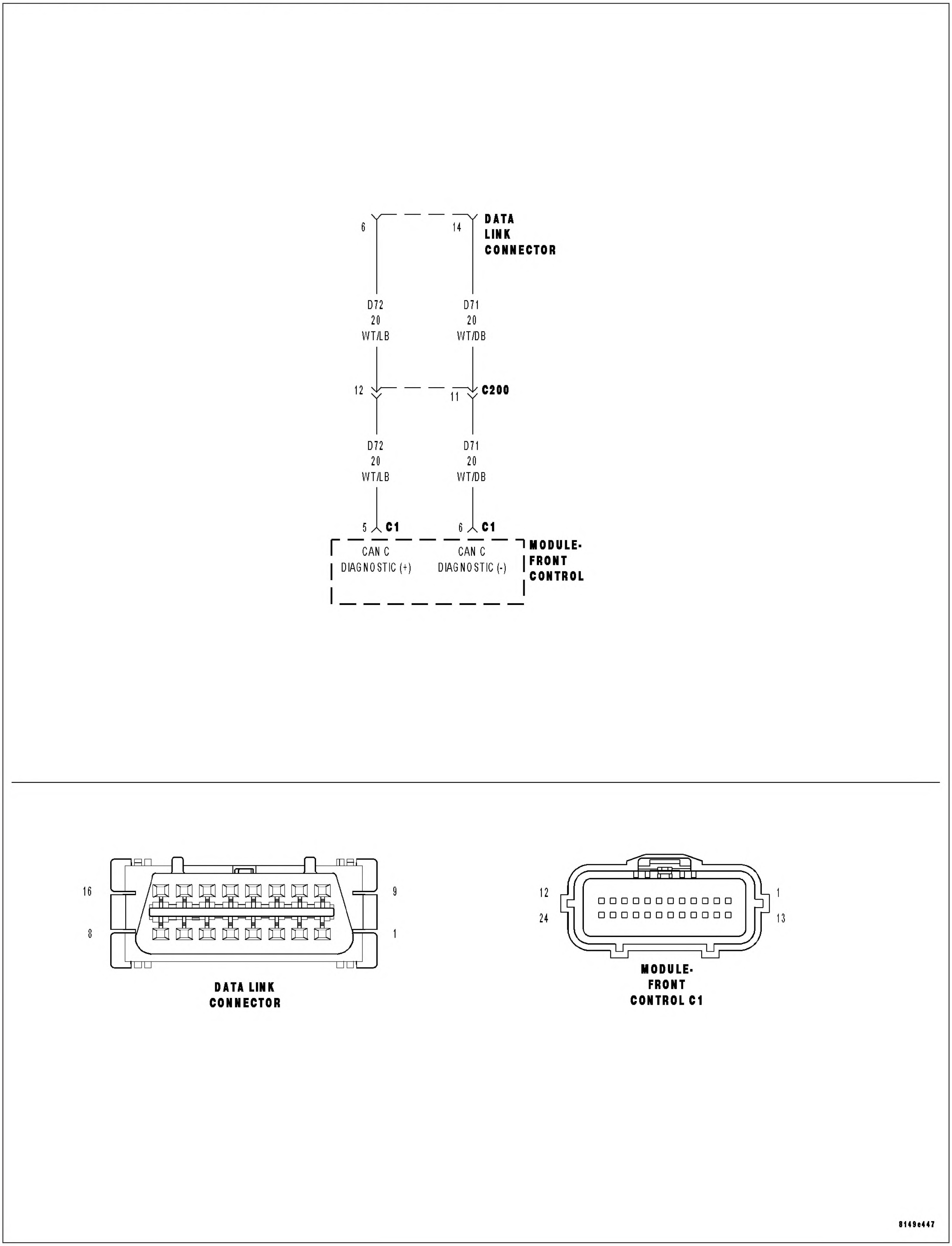
Is the voltage above 6.0 volts for either circuit?

Yes >> Repair the CAN C Diagnostic circuits for a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

*CAN C DIAGNOSTIC (+) CIRCUIT LOW


6
14
DATA LINK CONNECTOR
D72
20
WT/LB
D71
20
WT/DB
12
11
C200
D72
20
WT/LB
D71
20
WT/DB
5
C1
6
C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
16
9
8
1
DATA LINK CONNECTOR
12
1
24
13
MODULE-FRONT CONTROL C1
8149e447

*CAN C DIAGNOSTIC (+) CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the scan tool queries the FCM.
- **Set Condition:**
  The scan tool has detected a shorted low condition on the (D72) CAN C Diagnostic (+) circuit.

Possible Causes
(D72) CAN C DIAGNOSTIC (+) CIRCUIT SHORTED TO GROUND
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK THE STATUS OF THE ERROR MESSAGE

NOTE: Ensure the vehicle being tested is a CAN BUS VEHICLE. If not, false error messages may be displayed.

NOTE: Ensure the scan tool is updated to the latest software.

With the scan tool, record the error message.

Disconnect the scan tool from the DLC.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

Does the scan tool display this same error message?

Yes >> Go To 2

No >> The conditions that caused this error message to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

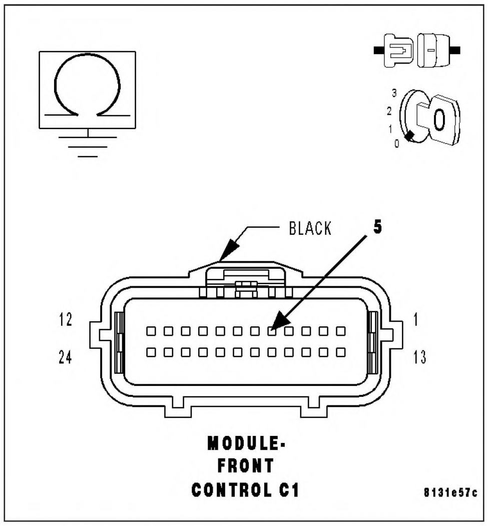
2. (D72) CAN C DIAGNOSTIC (+) CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Disconnect the scan tool from the DLC.

Measure the resistance between ground and the (D72) CAN C Diagnostic (+) circuit.



Is the resistance below 100.0 ohms?

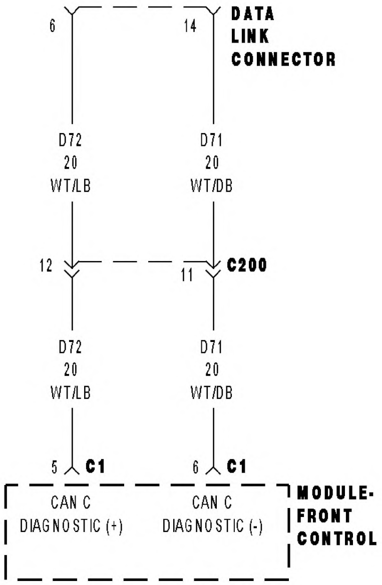
Yes >> Repair the (D72) CAN C Diagnostic (+) circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

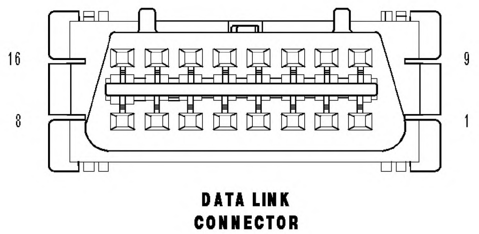
No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

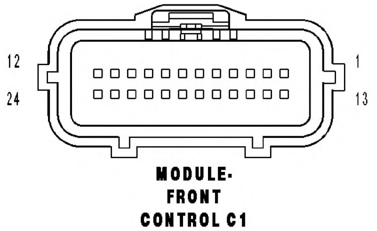
*CAN C DIAGNOSTIC (-) CIRCUIT LOW



6
14
DATA LINK CONNECTOR
D72
20
WT/LB
D71
20
WT/DB
12
11
C200
D72
20
WT/LB
D71
20
WT/DB
5
C1
6
C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL



16
9
8
1
DATA LINK CONNECTOR



12
1
24
13
MODULE-FRONT CONTROL C1

8149e447

*CAN C DIAGNOSTIC (-) CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the scan tool queries the FCM.
- **Set Condition:**
  The scan tool has detected a shorted low condition on the (D71) CAN C Diagnostic (-) circuit.

Possible Causes
(D71) CAN C DIAGNOSTIC (-) CIRCUIT SHORTED TO GROUND
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK THE STATUS OF THE ERROR MESSAGE

NOTE: Ensure the vehicle being tested is a CAN BUS VEHICLE. If not, false error messages may be displayed.

NOTE: Ensure the scan tool is updated to the latest software.

With the scan tool, record the error message.

Disconnect the scan tool from the DLC.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

Does the scan tool display this same error message?

Yes >> Go To 2

No >> The conditions that caused this error message to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. (D71) CAN C DIAGNOSTIC (-) CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Disconnect the scan tool from the DLC.

Measure the resistance between ground and the (D71) CAN C Diagnostic (-) circuit.

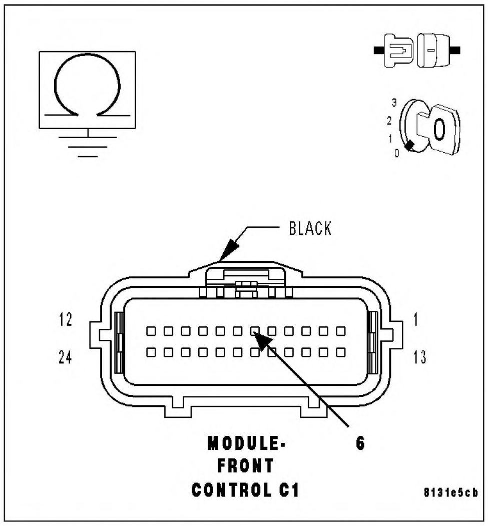
Is the resistance below 100.0 ohms?

Yes >> Repair the (D71) CAN C Diagnostic (-) circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



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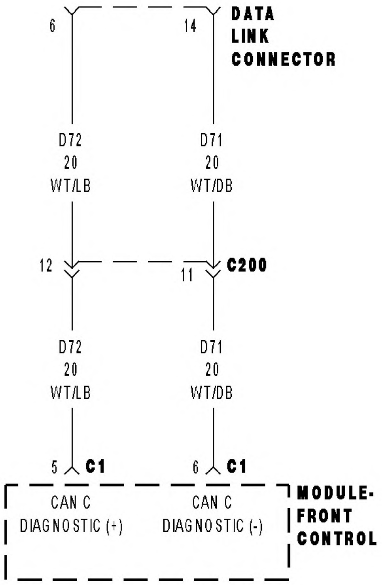
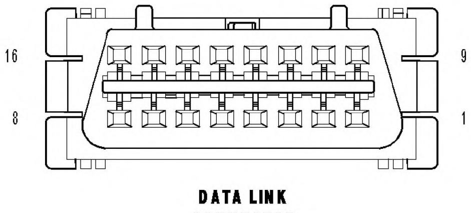
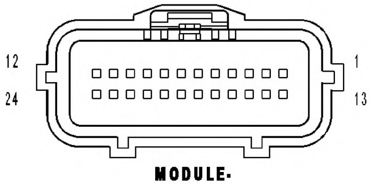
*CAN C DIAGNOSTIC (+) SHORTED TO CAN C DIAGNOSTIC (-)


6
14
DATA LINK CONNECTOR
D72
20
WT/LB
D71
20
WT/DB
12
C200
11
D72
20
WT/LB
D71
20
WT/DB
5
C1
6
C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL



DATA LINK CONNECTOR


12
1
24
13

MODULE-FRONT CONTROL C1

8149e447

*CAN C DIAGNOSTIC (+) SHORTED TO CAN C DIAGNOSTIC (-) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the scan tool queries the FCM.
- **Set Condition:**
  The scan tool has detected a shorted together condition on the CAN C Diagnostic circuits.

Possible Causes
(D72) CAN C DIAGNOSTIC (+) CIRCUIT SHORTED TO (D71) CAN C DIAGNOSTIC (-) CIRCUIT
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK THE STATUS OF THE ERROR MESSAGE

NOTE: Ensure the vehicle being tested is a CAN BUS VEHICLE. If not, false error messages may be displayed.

NOTE: Ensure the scan tool is updated to the latest software.

With the scan tool, record the error message.

Disconnect the scan tool from the DLC.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

Does the scan tool display this same error message?

Yes >> Go To 2

No >> The conditions that caused this error message to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

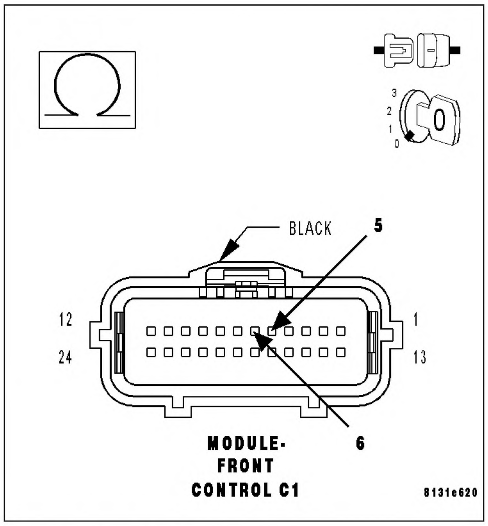
2. (D72) CAN C DIAGNOSTIC (+) CIRCUIT SHORTED TO (D71) CAN C DIAGNOSTIC (-) CIRCUIT

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Disconnect the scan tool from the DLC.

Measure the resistance between the (D72) CAN C Diagnostic (+) circuit and the (D71) CAN C Diagnostic (-) circuit.

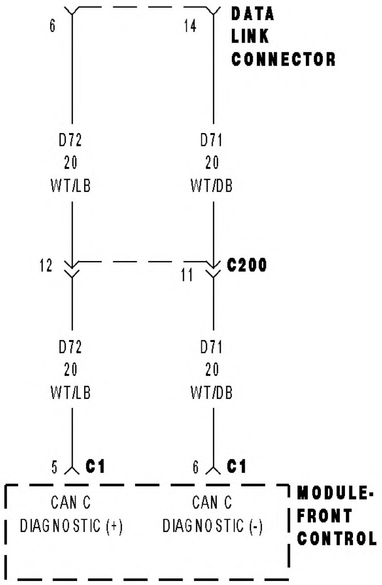


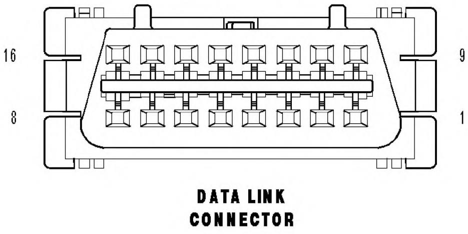
Is the resistance below 100.0 ohms?

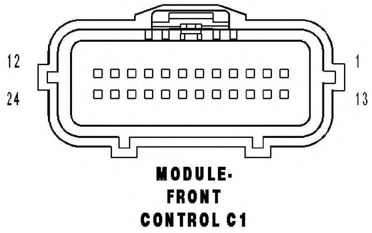
Yes >> Repair the (D72) CAN C Diagnostic (+) circuit for a short to the (D71) CAN C Diagnostic (-) circuit.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*CAN C DIAGNOSTIC (-) CIRCUIT OPEN


6
14
DATA LINK CONNECTOR
D72
20
WT/LB
D71
20
WT/DB
12
11
C200
D72
20
WT/LB
D71
20
WT/DB
5
C1
6
C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL


16
9
8
1
DATA LINK CONNECTOR


12
1
24
13
MODULE-FRONT CONTROL C1

8149e447

*CAN C DIAGNOSTIC (-) CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the scan tool queries the FCM.
- **Set Condition:**
  The scan tool has detected an open condition on the (D71) CAN C Diagnostic (-) circuit.

Possible Causes
(D71) CAN C DIAGNOSTIC (-) CIRCUIT OPEN
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK THE STATUS OF THE ERROR MESSAGE

NOTE: Ensure the vehicle being tested is a CAN BUS VEHICLE. If not, false error messages may be displayed.

NOTE: Ensure the scan tool is updated to the latest software.

With the scan tool, record the error message.

Disconnect the scan tool from the DLC.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

Does the scan tool display this same error message?

Yes >> Go To 2

No >> The conditions that caused this error message to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

*CAN C DIAGNOSTIC (-) CIRCUIT OPEN (CONTINUED)

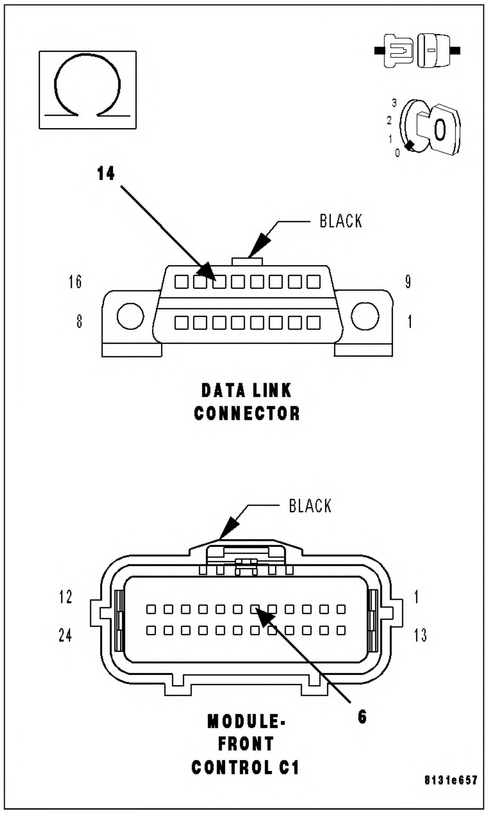
2. (D71) CAN C DIAGNOSTIC (-) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Disconnect the scan tool from the DLC.

Measure the resistance of the (D71) CAN C Diagnostic (-) circuit between the FCM connector and the DLC.



Is the resistance below 5.0 ohms?

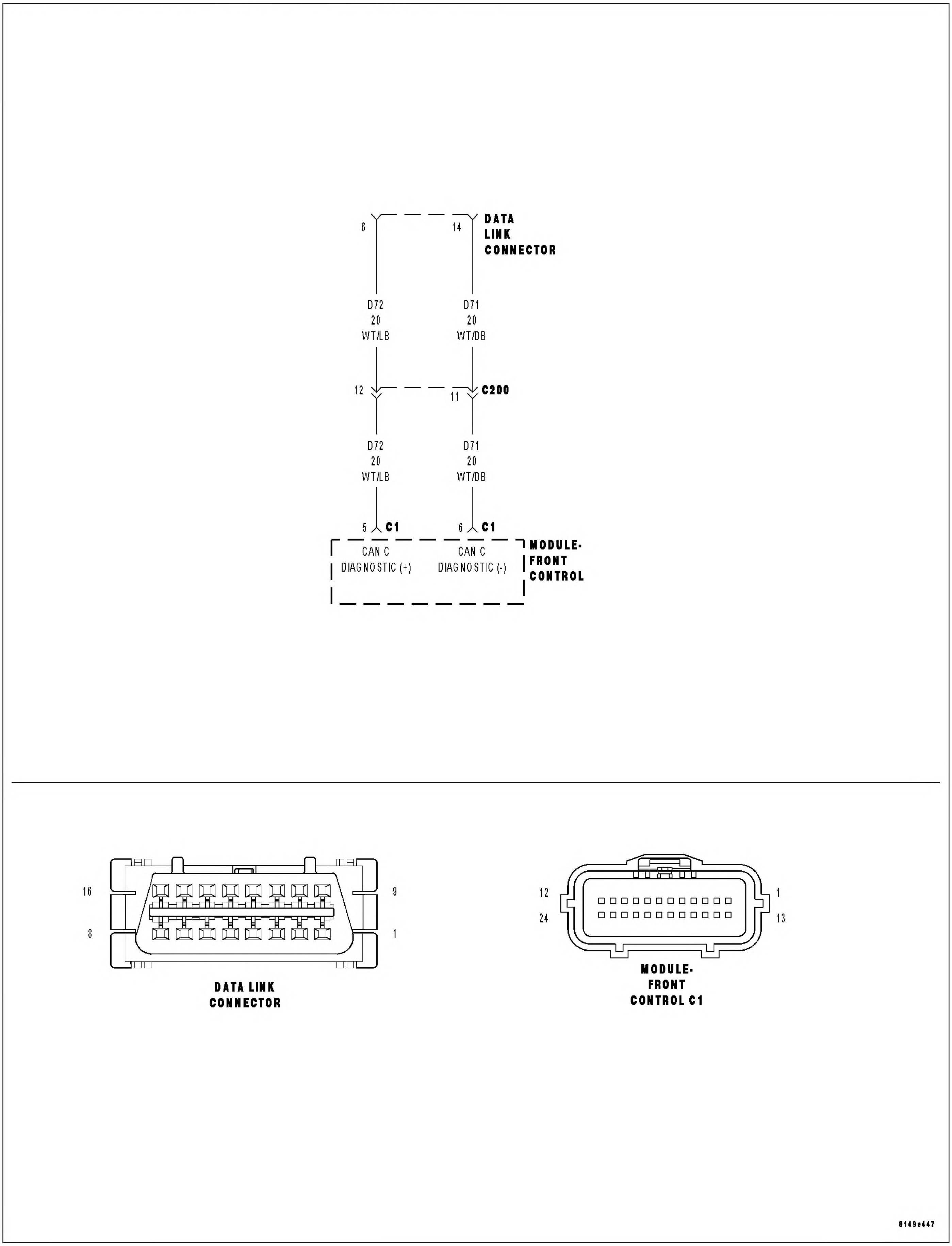
Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D71) CAN C Diagnostic (-) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*CAN C DIAGNOSTIC (+) CIRCUIT OPEN


6
14
DATA LINK CONNECTOR
D72
20
WT/LB
D71
20
WT/DB
12
11
C200
D72
20
WT/LB
D71
20
WT/DB
5 C1
6 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
16
9
8
1
DATA LINK CONNECTOR
12
1
24
13
MODULE-FRONT CONTROL C1
8149e447

*CAN C DIAGNOSTIC (+) CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the scan tool queries the FCM.
- **Set Condition:**
  The scan tool has detected an open condition on the (D72) CAN C Diagnostic (+) circuit.

Possible Causes
(D72) CAN C DIAGNOSTIC (+) CIRCUIT OPEN
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK THE STATUS OF THE ERROR MESSAGE

NOTE: Ensure the vehicle being tested is a CAN BUS VEHICLE. If not, false error messages may be displayed.

NOTE: Ensure the scan tool is updated to the latest software.

With the scan tool, record the error message.

Disconnect the scan tool from the DLC.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

Does the scan tool display this same error message?

Yes >> Go To 2

No >> The conditions that caused this error message to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

*CAN C DIAGNOSTIC (+) CIRCUIT OPEN (CONTINUED)

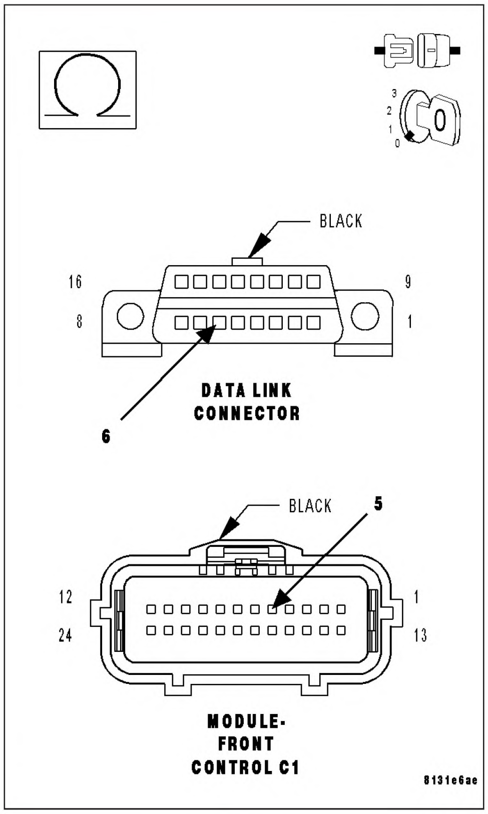
2. (D72) CAN C DIAGNOSTIC (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Disconnect the scan tool from the DLC.

Measure the resistance of the (D72) CAN C Diagnostic (+) circuit between the FCM connector and the DLC.



Is the resistance below 5.0 ohms?

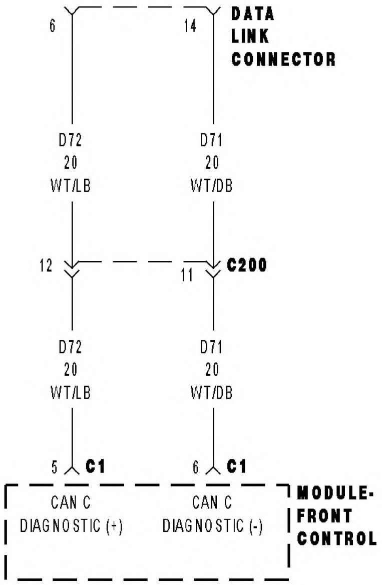
Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

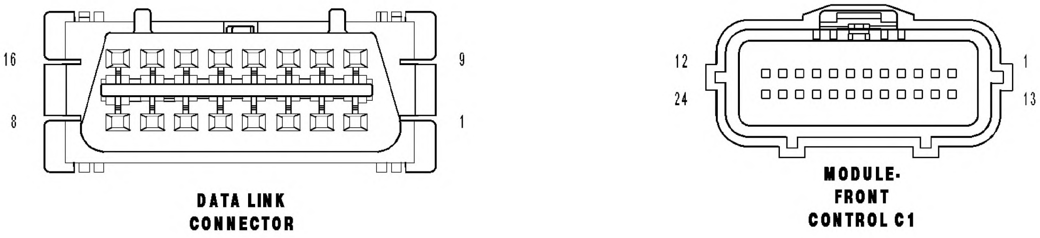
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D72) CAN C Diagnostic (+) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*BOTH CAN C DIAGNOSTIC (+) AND CAN C DIAGNOSTIC (-) CIRCUITS OPEN


6
14
DATA LINK CONNECTOR
D72
20
WT/LB
D71
20
WT/DB
12
11
C200
D72
20
WT/LB
D71
20
WT/DB
5 C1
6 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL


16
8
9
1
DATA LINK CONNECTOR
12
24
1
13
MODULE-FRONT CONTROL C1
8149e447

*BOTH CAN C DIAGNOSTIC (+) AND CAN C DIAGNOSTIC (-) CIRCUITS OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the scan tool queries the FCM.
- **Set Condition:**
  The scan tool has detected an open condition on both CAN C Diagnostic circuits.

Possible Causes
(D72) CAN C DIAGNOSTIC (+) CIRCUIT OPEN
(D71) CAN C DIAGNOSTIC (-) CIRCUIT OPEN
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK THE STATUS OF THE ERROR MESSAGE

NOTE: Ensure the vehicle being tested is a CAN BUS VEHICLE. If not, false error messages may be displayed.

NOTE: Ensure the scan tool is updated to the latest software.

With the scan tool, record the error message.

Disconnect the scan tool from the DLC.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

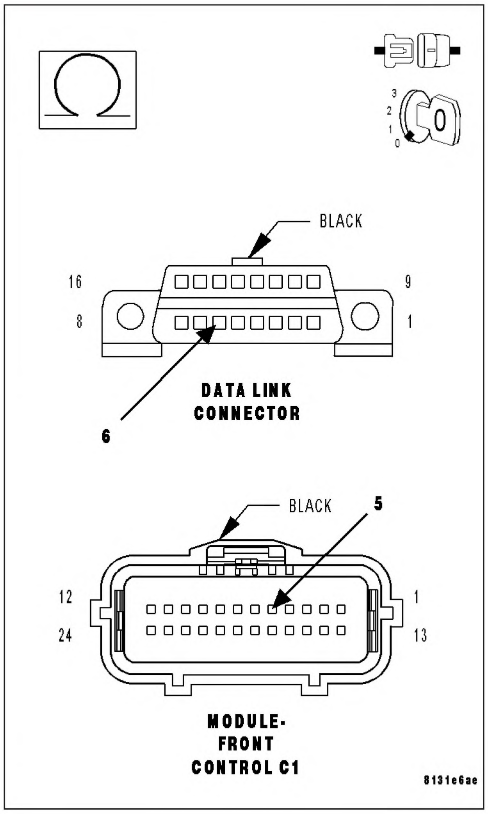
Does the scan tool display this same error message?

Yes >> Go To 2

No >> The conditions that caused this error message to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

*BOTH CAN C DIAGNOSTIC (+) AND CAN C DIAGNOSTIC (-) CIRCUITS OPEN (CONTINUED)

2. (D72) CAN C DIAGNOSTIC (+) CIRCUIT OPEN


BLACK
16
9
8
1
DATA LINK CONNECTOR
6
BLACK
5
12
1
24
13
MODULE- FRONT CONTROL C1
8131e6ae
3
2
1
0

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Disconnect the scan tool from the DLC.

NOTE: Check the connectors at both the DLC and the FCM.

Measure the resistance of the (D72) CAN C Diagnostic (+) circuit between the FCM connector and the DLC.

Is the resistance below 5.0 ohms?

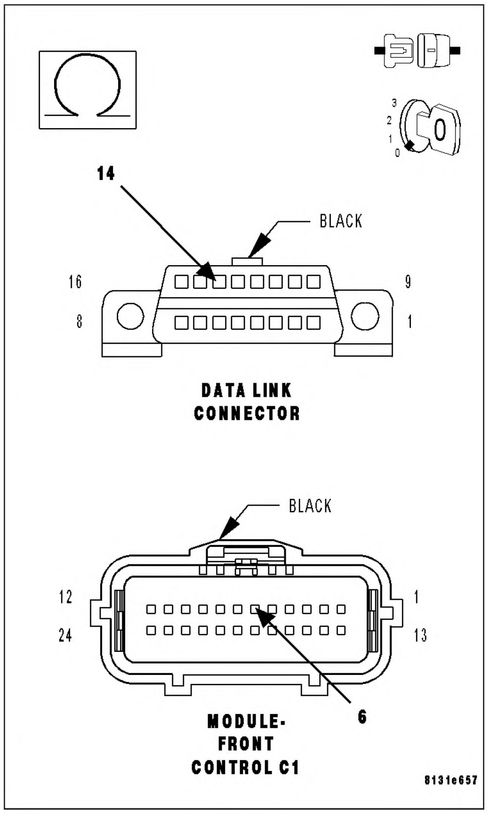
Yes >> Go To 3

No >> Repair the (D72) CAN C Diagnostic (+) circuit for an open. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*BOTH CAN C DIAGNOSTIC (+) AND CAN C DIAGNOSTIC (-) CIRCUITS OPEN (CONTINUED)

3. (D71) CAN C DIAGNOSTIC (-) CIRCUIT OPEN

Measure the resistance of the (D71) CAN C Diagnostic (-) circuit between the FCM connector and the DLC.


14
BLACK
16
9
8
1
DATA LINK CONNECTOR
BLACK
12
1
24
13
6
MODULE-FRONT CONTROL C1
8131e657

Is the resistance below 5.0 ohms?

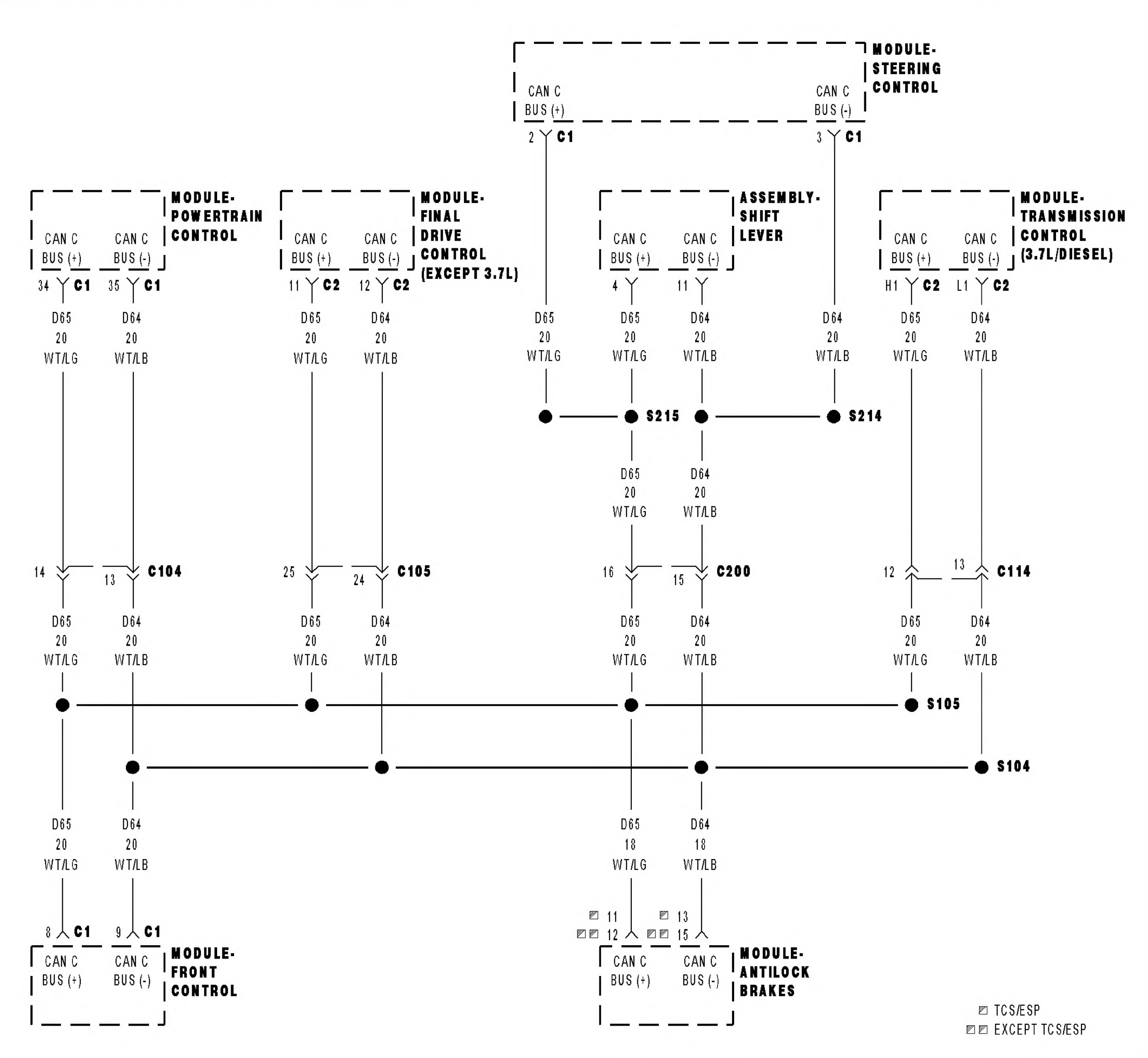
Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

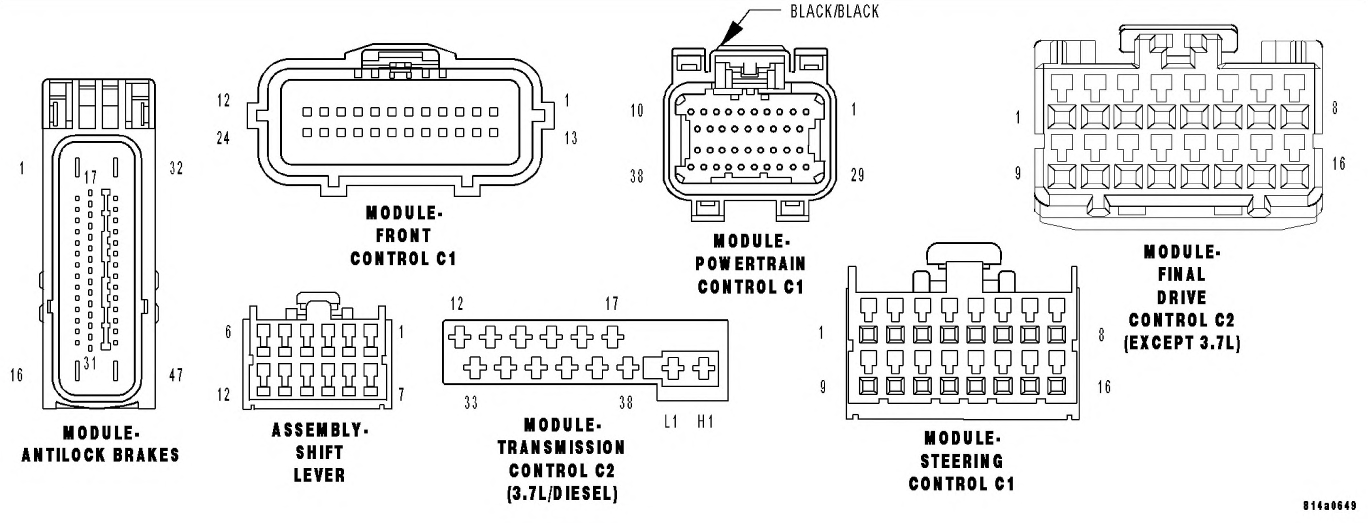
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D71) CAN C Diagnostic (-) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0001-CAN C BUS CIRCUIT


MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
MODULE-POWERTRAIN CONTROL
34 C1
35 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
11 C2
12 C2
ASSEMBLY-SHIFT LEVER
4
11
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
S215
S214
C104
14
13
C105
25
24
C200
16
15
C114
12
13
S105
S104
D65 18 WT/LG
D64 18 WT/LB
8 C1
9 C1
MODULE-FRONT CONTROL
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-ANTILOCK BRAKES
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


BLACK/BLACK
1
32
17
16
31
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
10
38
1
29
MODULE-POWERTRAIN CONTROL C1
1
9
8
16
MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)
6
12
1
7
ASSEMBLY-SHIFT LEVER
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
9
8
16
MODULE-STEERING CONTROL C1
814a0649

U0001-CAN C BUS CIRCUIT (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The FCM detects a short in either CAN C Bus circuit.

Possible Causes
(D65) CAN C BUS (+) CIRCUIT SHORTED TO GROUND
(D64) CAN C BUS (-) CIRCUIT SHORTED TO GROUND
(D65) CAN C BUS (+) CIRCUIT SHORTED TO VOLTAGE
(D64) CAN C BUS (-) CIRCUIT SHORTED TO VOLTAGE
(D65) CAN C BUS (+) CIRCUIT SHORTED TO (D64) CAN C BUS (-) CIRCUIT
ANTILOCK BRAKE MODULE
POWERTRAIN CONTROL MODULE
SHIFT LEVER ASSEMBLY
STEERING CONTROL MODULE
FINAL DRIVE CONTROL MODULE
ENGINE CONTROL MODULE (DIESEL ONLY)
TRANSMISSION CONTROL MODULE (3.7L/DIESEL ONLY)
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC’s.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC’s.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

U0001-CAN C BUS CIRCUIT (CONTINUED)

2. ANTILOCK BRAKE MODULE — INTERNAL SHORT

Turn the ignition off.
Disconnect the Antilock Brake Module harness connector.
Turn the ignition on.
With the scan tool, record and erase FCM DTC's.
Cycle the ignition from on to off 3 times.
Turn the ignition on.
With the scan tool, read active FCM DTC's.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 3

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Antilock Brake Module in accordance with the service information.
Perform ABS VERIFICATION TEST — VER 1.

---

3. POWERTRAIN CONTROL MODULE — INTERNAL SHORT

Turn the ignition off.
Disconnect the Powertrain Control Module C1 harness connector.
Turn the ignition on.
With the scan tool, record and erase FCM DTC's.
Cycle the ignition from on to off 3 times.
Turn the ignition on.
With the scan tool, read active FCM DTC's.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 4

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Powertrain Control Module in accordance with the service information.
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

---

4. SHIFT LEVER ASSEMBLY (IF EQUIPPED) — INTERNAL SHORT

Turn the ignition off.
Disconnect the Shift Lever Assembly harness connector.
Turn the ignition on.
With the scan tool, record and erase FCM DTC's.
Cycle the ignition from on to off 3 times.
Turn the ignition on.
With the scan tool, read active FCM DTC's.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 5

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Shift Lever Assembly in accordance with the service information.
Perform VERIFICATION TEST VER 1.

U0001-CAN C BUS CIRCUIT (CONTINUED)

5. STEERING CONTROL MODULE — INTERNAL SHORT

Turn the ignition off.
Disconnect the Steering Control Module C1 harness connector.
Turn the ignition on.
With the scan tool, record and erase FCM DTC's.
Cycle the ignition from on to off 3 times.
Turn the ignition on.
With the scan tool, read active FCM DTC's.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 6

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Steering Control Module in accordance with the service information.
Perform VERIFICATION TEST VER - 1.

---

6. FINAL DRIVE CONTROL MODULE (IF EQUIPPED)— INTERNAL SHORT

Turn the ignition off.
Disconnect the Final Drive Control Module C2 harness connector.
Turn the ignition on.
With the scan tool, record and erase FCM DTC's.
Cycle the ignition from on to off 3 times.
Turn the ignition on.
With the scan tool, read active FCM DTC's.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 7

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Final Drive Control Module in accordance with the service information.
Perform FDCM VERIFICATION TEST VER - 1.

---

7. ENGINE CONTROL MODULE (3.7L/DIESEL ONLY) — INTERNAL SHORT

Turn the ignition off.
Disconnect the Engine Control Module harness connectors.
Turn the ignition on.
With the scan tool, record and erase FCM DTC's.
Cycle the ignition from on to off 3 times.
Turn the ignition on.
With the scan tool, read active FCM DTC's.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 8

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Engine Control Module in accordance with the service information.
Perform POWERTRAIN VERIFICATION TEST VER - 1.

U0001-CAN C BUS CIRCUIT (CONTINUED)

8. TRANSMISSION CONTROL MODULE (DIESEL ONLY) — INTERNAL SHORT

Turn the ignition off.

Disconnect the Transmission Control Module C2 harness connector.

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display U0001–CAN C BUS CIRCUIT as active?

Yes >> Go To 9

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Transmission Control Module in accordance with the service information.

Perform TRANSMISSION VERIFICATION TEST VER.

---

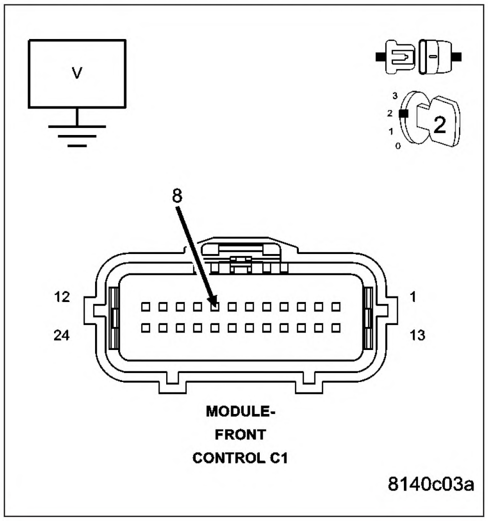
9. (D65) CAN C BUS (+) CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Turn the ignition on.

Measure the voltage between the (D65) CAN C Bus (+) circuit and ground.



Is there any voltage present?

Yes >> Repair the (D65) CAN C Bus (+) circuit for a short to voltage.

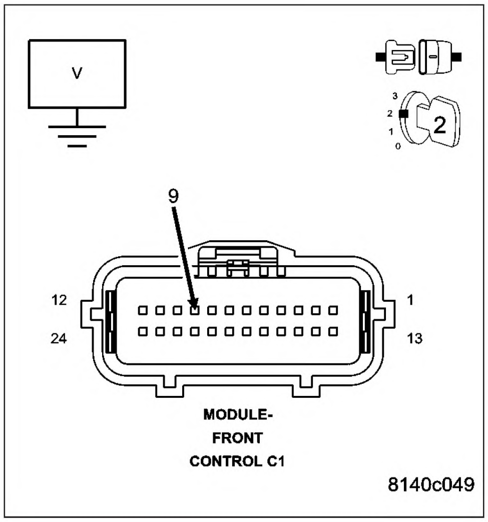
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 10

U0001-CAN C BUS CIRCUIT (CONTINUED)

10. (D64) CAN C BUS (-) CIRCUIT SHORTED TO VOLTAGE

Measure the voltage between the (D64) CAN C Bus (-) circuit and ground.


V
3
2
1
0
2
9
12
24
1
13
MODULE-
FRONT
CONTROL C1
8140c049

Is there any voltage present?

Yes >> Repair the (D64) CAN C Bus (-) circuit for a short to voltage.

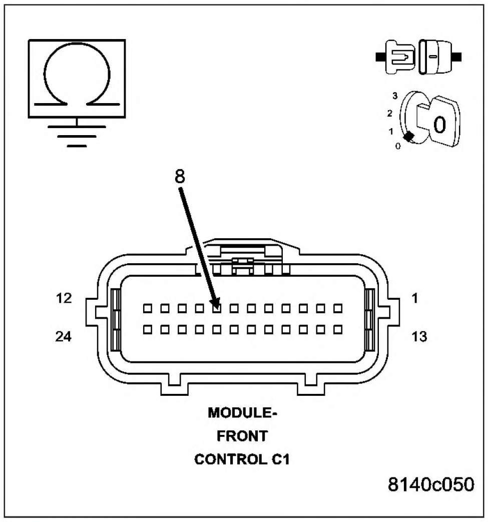
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 11

11. (D65) CAN C BUS (+) CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D65) CAN C Bus (+) circuit.


Ω
3
2
1
0
0
8
12
24
1
13
MODULE-
FRONT
CONTROL C1
8140c050

Is any resistance present?

Yes >> Repair the (D65) CAN C Bus (+) circuit for a short to ground.

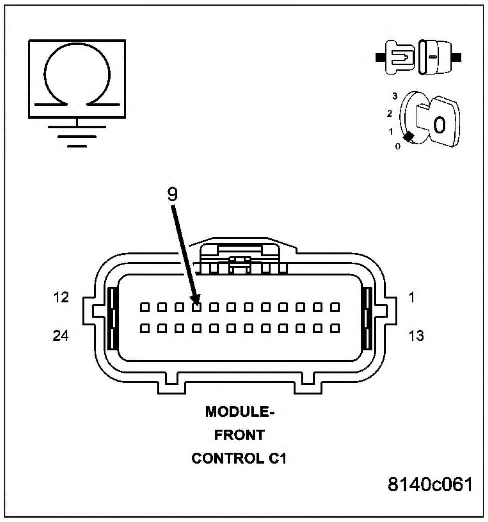
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 12

U0001-CAN C BUS CIRCUIT (CONTINUED)

12. (D64) CAN C BUS (-) CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (D64) CAN C Bus (-) circuit.



Is any resistance present?

Yes >> Repair the (D64) CAN C Bus (-) circuit for a short to ground.

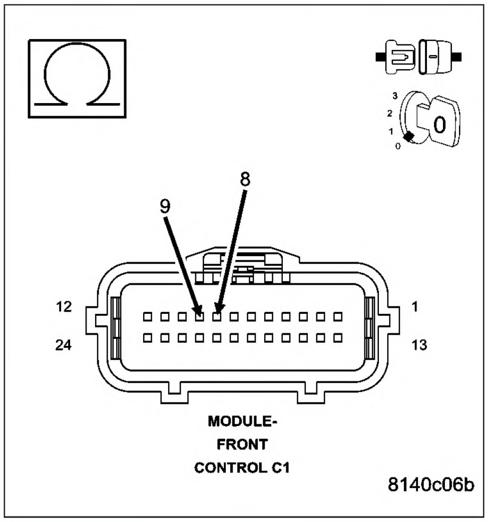
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 13

---

13. (D65) CAN C BUS (+) CIRCUIT SHORTED TO (D64) CAN C BUS (-) CIRCUIT

Measure the resistance between the (D65) CAN C Bus (+) circuit and the (D64) CAN C Bus (-) circuit.



Is any resistance present?

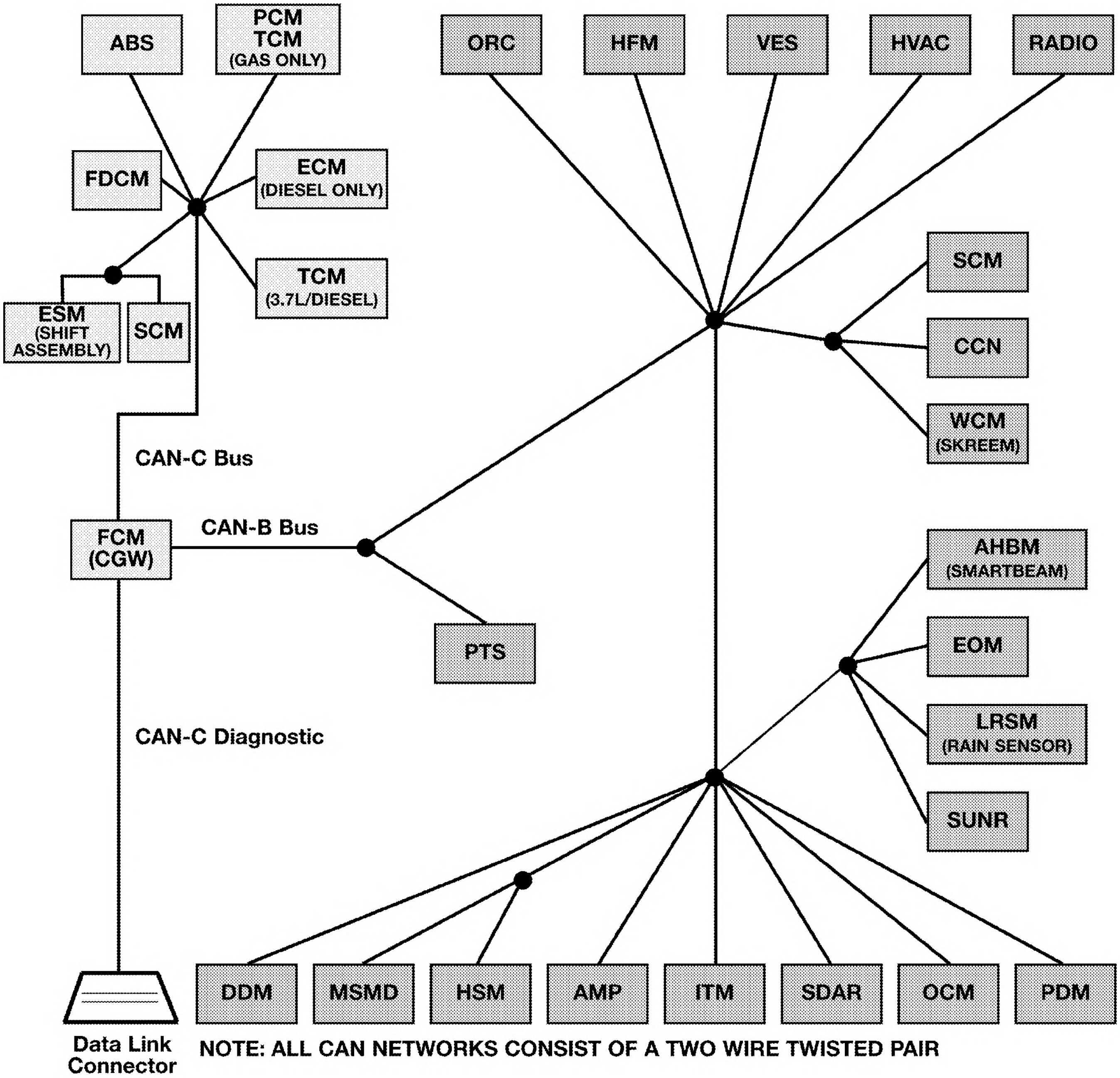
Yes >> Repair the (D65) CAN C Bus (+) circuit for a short to the (D64) CAN C Bus (-) circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0021-CAN B BUS (+) CIRCUIT OPEN


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

814a12dd

U0021-CAN B BUS (+) CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and battery voltage between 10 and 16 volts.
- **Set Condition:**
  The FCM detects the (D55) CAN B Bus (+) circuit is open.

Possible Causes
CAN B BUS TERMINAL PUSH OUT
SPREAD CAN B BUS TERMINAL
(D55) CAN B BUS (+) CIRCUIT OPEN
INTERNAL OPEN IN A CAN B BUS MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.
With the scan tool, record and erase FCM DTC's
Cycle the ignition from on to off 3 times.
Turn the ignition on.
With the scan tool, read active FCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

U0021-CAN B BUS (+) CIRCUIT OPEN (CONTINUED)

2. ATTEMPT TO ISOLATE THE OPEN CONDITION

Turn the ignition on.

Verify that all CAN B Bus modules are communicating with the scan tool.

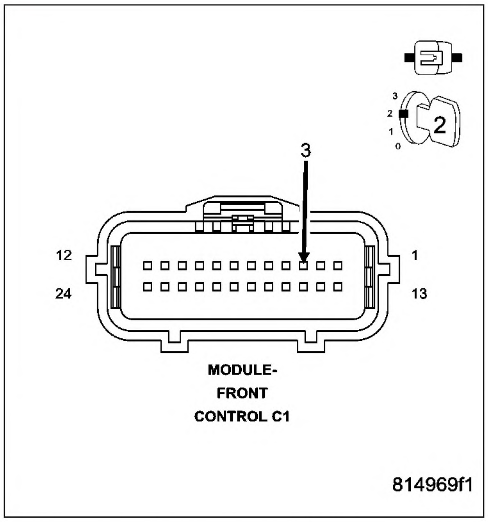
NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: If any module is not communicating, perform the appropriate no response test procedure before proceeding.

Turn the ignition off.

Gain access to the Front Control Module C1 harness connector, but do not disconnect.

Using a fused jumper wire, connect one end to ground and with the other end backprobe the CAN B Bus (-) circuit at the FCM C1 harness connector.



Turn the ignition on.

With the scan tool monitor the network status screen and document all modules that display a red X.

Are there any red X's displayed next to the modules?

Yes >> Go To 3

No >> Check backprobe connection to ground, make sure it is proper. The CAN B Bus open DTC may no longer be active, it may be stored. Check all module connections

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. ATTEMPT TO ISOLATE THE OPEN CONDITION — MULTIPLE RED X'S

With the scan tool continue monitoring the network status screen.

Are there multiple red X's displayed next to the modules?

Yes >> The most likely cause of this condition is an open CAN B Bus (+) circuit between a common CAN B Bus splice and the modules that display the red X next to them. Use the wiring diagrams will help you determine where open condition exists.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

U0021-CAN B BUS (+) CIRCUIT OPEN (CONTINUED)

4. (D55) CAN B BUS (+) CIRCUIT OPEN — SINGLE RED X

Turn the ignition off.

Disconnect the module that has the red X displayed next to it.

Turn the ignition on.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

Is there any voltage present?

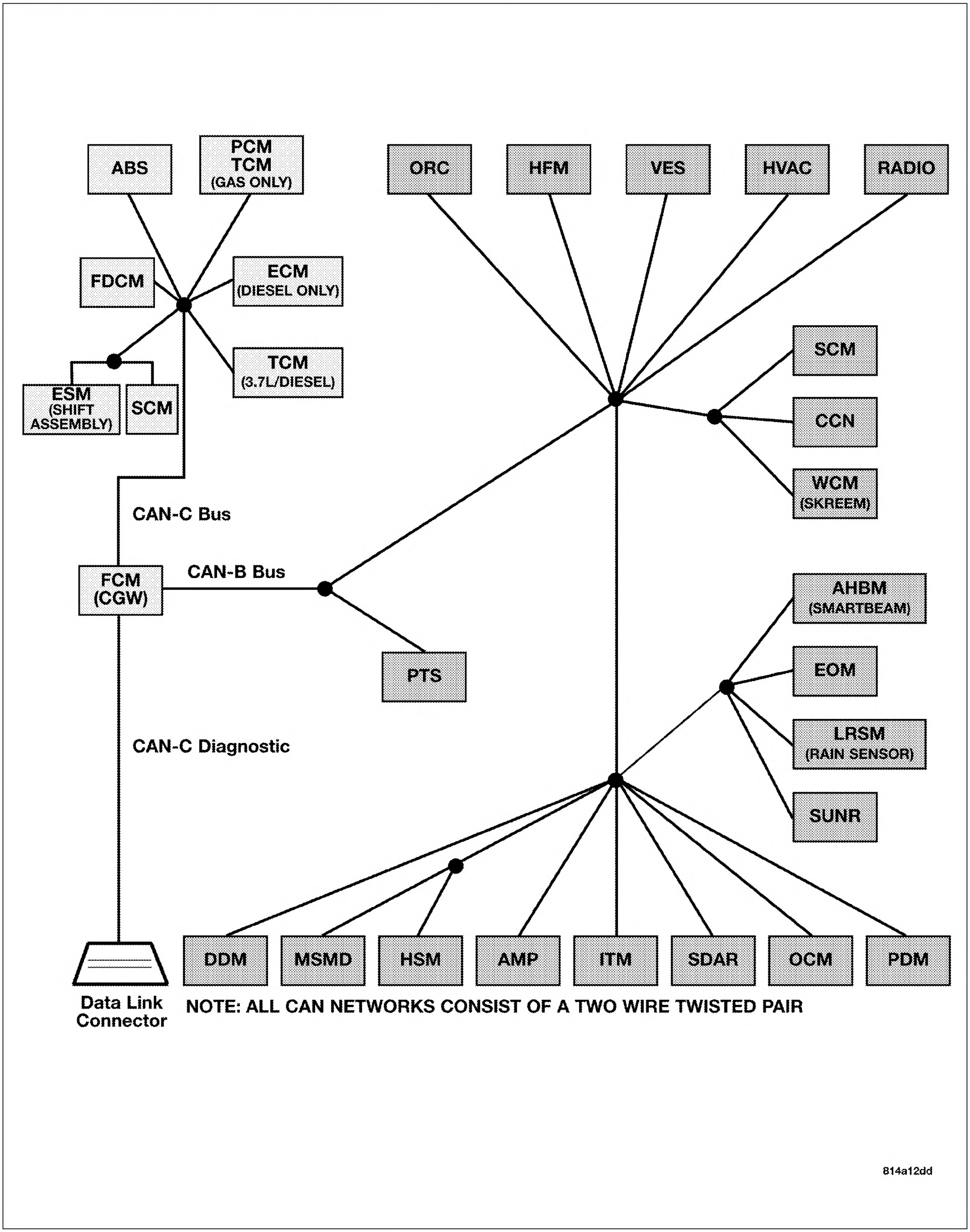
Yes >> Inspect the connector and terminal for damage, inspect for spread terminals, or push out terminals. If ok, replace the module that displayed the red X next to it in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) CAN B Bus (+) circuit for an open between the next common splice and the module that has the red X displayed next to it. Use the wiring diagrams will help you determine where open condition exists.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0022-CAN B BUS (+) CIRCUIT LOW


ABS
PCM TCM (GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM (DIESEL ONLY)
TCM (3.7L/DIESEL)
ESM (SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM (SKREEM)
CAN-C Bus
FCM (CGW)
CAN-B Bus
AHBM (SMARTBEAM)
PTS
EOM
CAN-C Diagnostic
LRSM (RAIN SENSOR)
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0022-CAN B BUS (+) CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The FCM detects the (D55) CAN B Bus (+) circuit is shorted to ground.

Possible Causes
(D55) CAN B BUS (+) CIRCUIT SHORTED TO GROUND
ANY CAN B BUS MODULE
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. CHECK THE (D55) CAN B BUS (+) CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

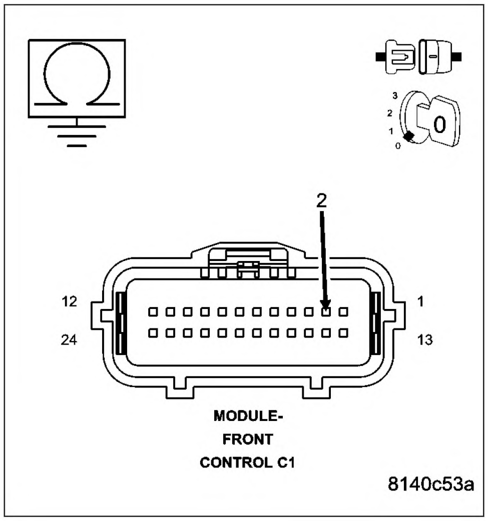
Measure the resistance between ground and the (D55) CAN B Bus (+) circuit.

Is resistance below 1000.0 ohms?

Yes >> Go To 3

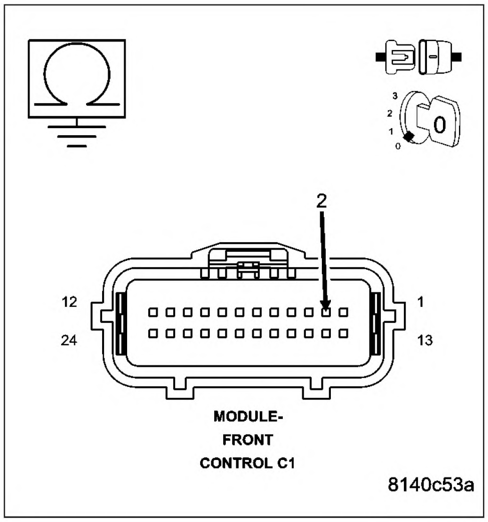
No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



U0022-CAN B BUS (+) CIRCUIT LOW (CONTINUED)

3. (D55) CAN B BUS (+) CIRCUIT SHORTED TO GROUND



Measure the resistance between ground and the (D55) CAN B Bus (+) circuit.

While monitoring the ohmmeter, disconnect each CAN B Bus module one at a time.

NOTE: This is to determine if the short to ground is internal within a module or if the circuit is shorted.

NOTE: Disconnecting an in-line connector can eliminate a module or group of modules from the list of possible causes for this fault. Refer to the wring diagrams to assist in diagnosis.

Is resistance below 1000.0 ohms with all the CAN B Bus modules disconnected?

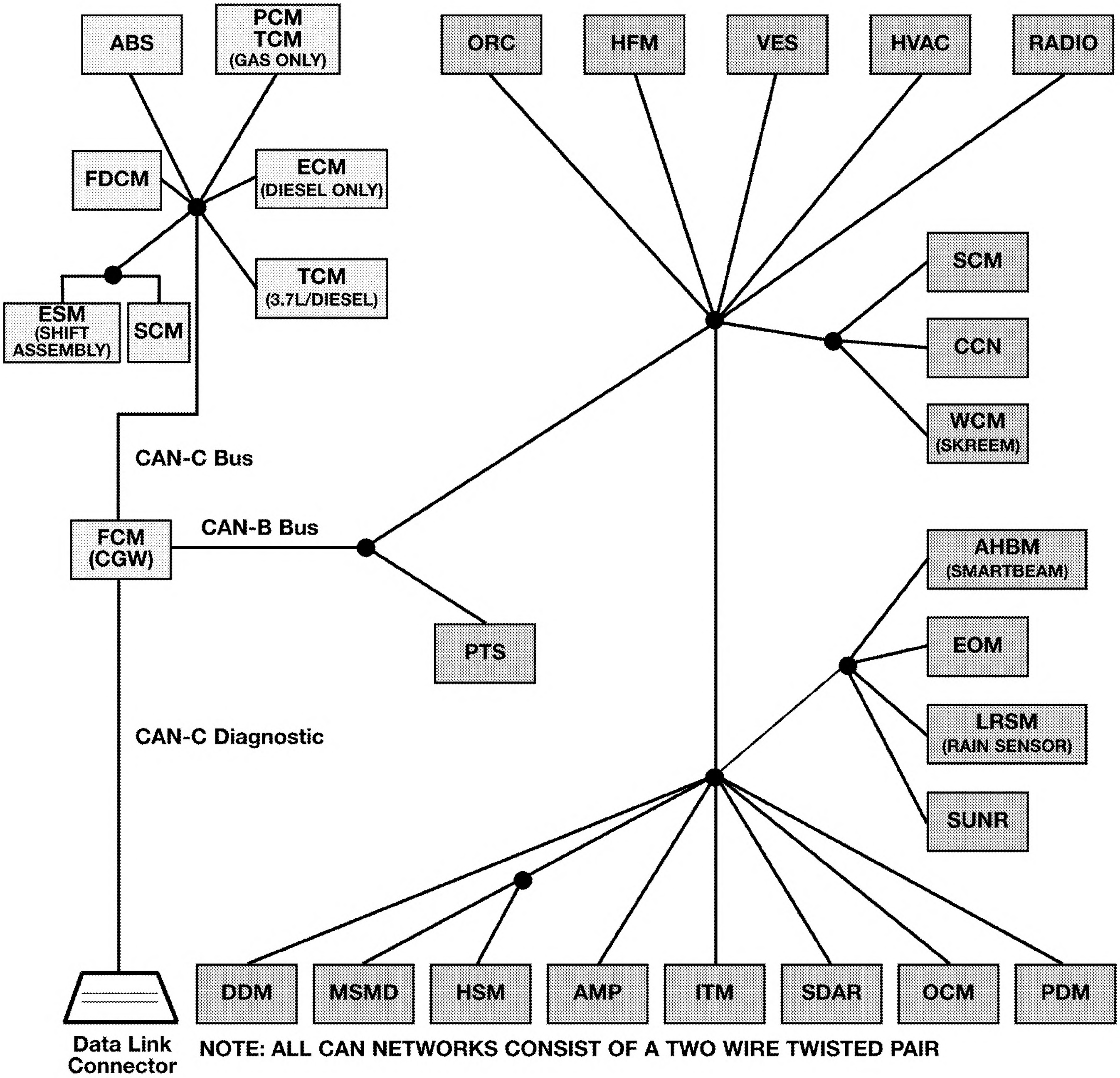
Yes >> Repair the (D55) CAN B Bus (+) circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the module that when disconnected the short to ground was eliminated, in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0023-CAN B BUS (+) CIRCUIT HIGH


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0023-CAN B BUS (+) CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The FCM detects the (D55) CAN B Bus (+) circuit is shorted to voltage.

Possible Causes
(D55) CAN B BUS (+) CIRCUIT SHORTED TO VOLTAGE
ANY CAN B BUS MODULE
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

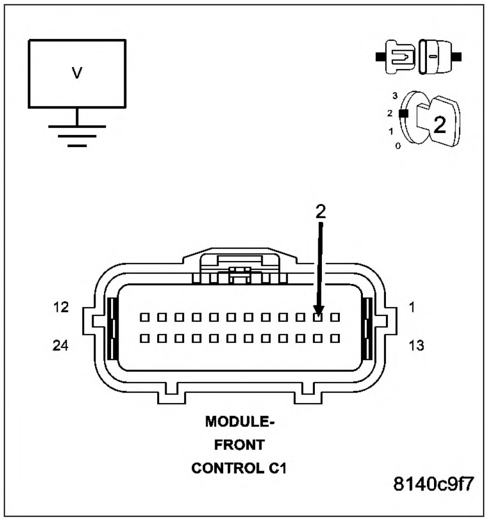
2. CHECK THE (D55) CAN B BUS (+) CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Turn the ignition on.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is voltage above 10.0 volts?

Yes >> Go To 3

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0023-CAN B BUS (+) CIRCUIT HIGH (CONTINUED)

3. (D55) CAN B BUS (+) CIRCUIT SHORTED TO VOLTAGE

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

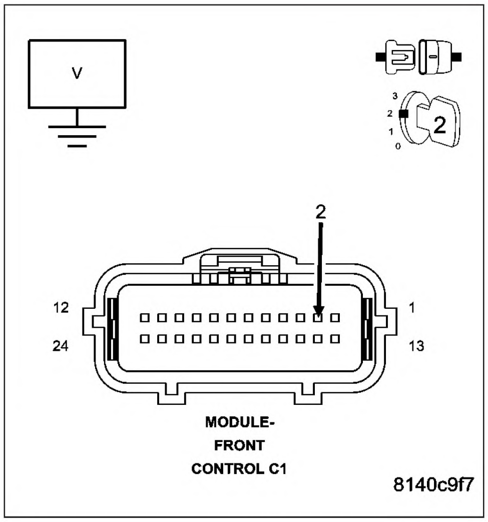
While monitoring the voltmeter, disconnect each CAN B Bus module one at a time.

NOTE: When performing the above step, turn the ignition off (wait one minute) before disconnecting any module. When the module is disconnected turn the ignition on to check for a short to voltage.

NOTE: This is to determine if the short to voltage is internal within a module or if the circuit is shorted.

NOTE: Disconnecting an in-line connector can eliminate a module or group of modules from the list of possible causes for this fault. Refer to the wring diagrams to assist in diagnosis.

Is the voltage above 10.0 volts with all the CAN B Bus modules disconnected?



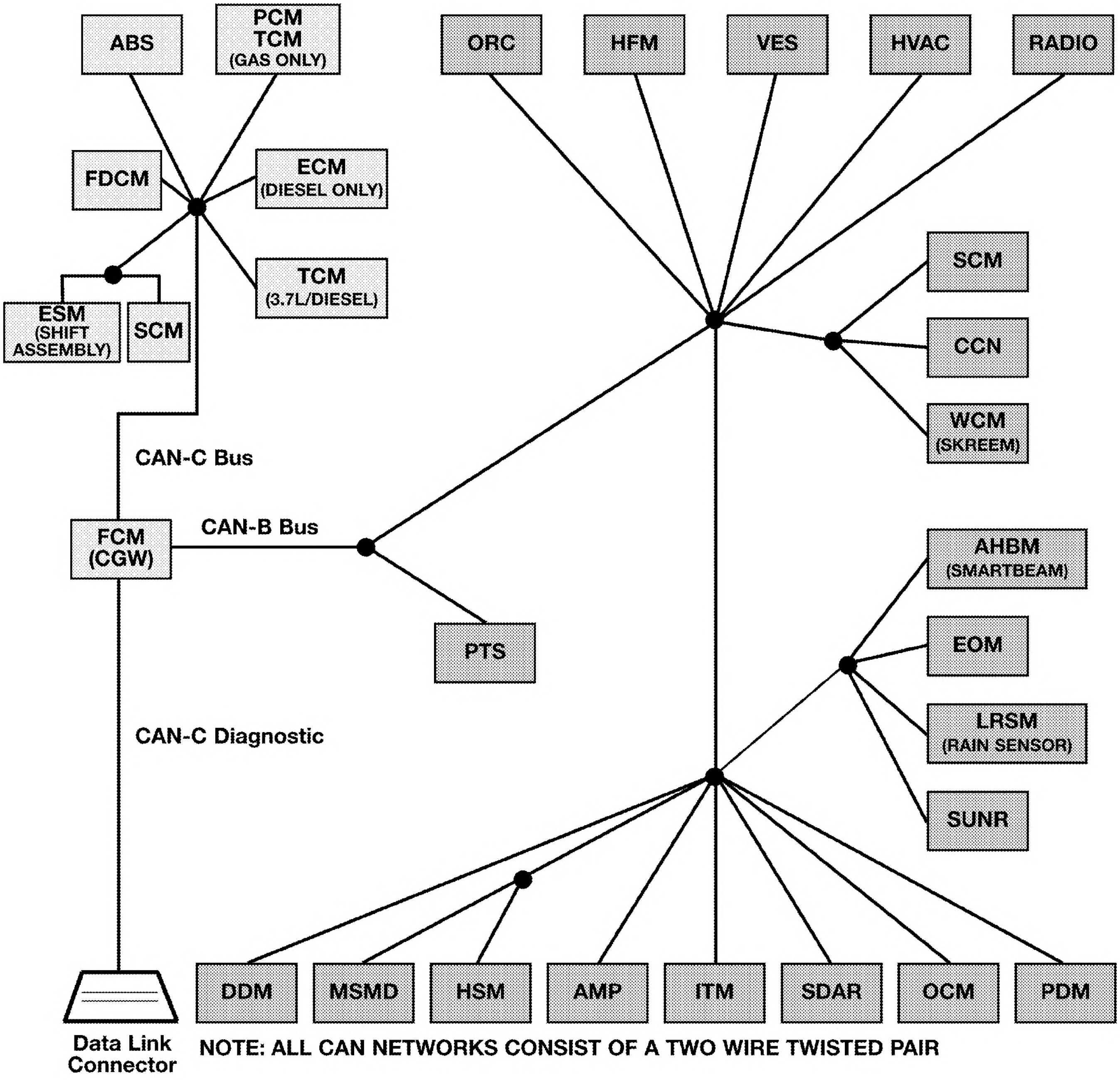
Yes >> Repair the (D55) CAN B Bus (+) circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the module that when disconnected the short to voltage was eliminated, in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0024-CAN B BUS (-) CIRCUIT OPEN


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0024-CAN B BUS (-) CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and battery voltage between 10 and 16 volts.
- **Set Condition:**
  The FCM detects the (D54) CAN B Bus (-) circuit is open.

Possible Causes
CAN B BUS TERMINAL PUSH OUT
SPREAD CAN B BUS TERMINAL
(D54) CAN B BUS (-) CIRCUIT OPEN
INTERNAL OPEN IN A CAN B BUS MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC's

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

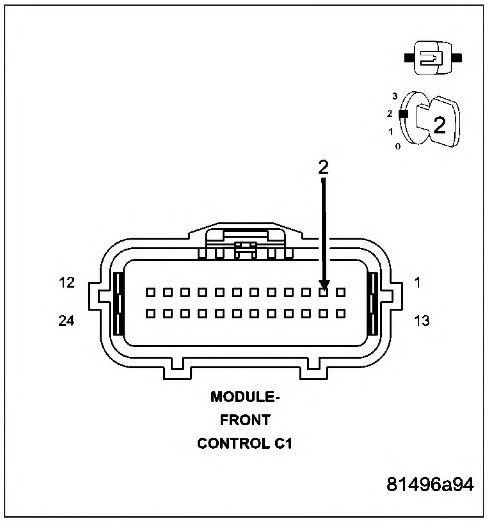
Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

U0024-CAN B BUS (-) CIRCUIT OPEN (CONTINUED)

2. ATTEMPT TO ISOLATE THE OPEN CONDITION



Turn the ignition on.

Verify that all CAN B Bus modules are communicating with the scan tool.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: If any module is not communicating, perform the appropriate no response test procedure before proceeding.

Turn the ignition off.

Gain access to the Front Control Module C1 harness connector, but do not disconnect.

Using a fused jumper wire, connect one end to ground and with the other end backprobe the CAN B Bus (+) circuit at the FCM C1 harness connector.

Turn the ignition on.

With the scan tool monitor the network status screen and document all modules that display a red X.

Are there any red X's displayed next to the modules?

Yes >> Go To 3

No >> Check backprobe connection to ground, make sure it is proper. The CAN B Bus open DTC may no longer be active, it may be stored. Check all module connections

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. ATTEMPT TO ISOLATE THE OPEN CONDITION — MULTIPLE RED X'S

With the scan tool continue monitoring the network status screen.

Are there multiple red X's displayed next to the modules?

Yes >> The most likely cause of this condition is an open CAN B Bus (-) circuit between a common CAN B Bus splice and the modules that display the red X next to them. Use the wiring diagrams will help you determine where open condition exists.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

U0024-CAN B BUS (-) CIRCUIT OPEN (CONTINUED)

4. (D54) CAN B BUS (-) CIRCUIT OPEN — SINGLE RED X

Turn the ignition off.

Disconnect the module that has the red X displayed next to it.

Turn the ignition on.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Is there any voltage present?

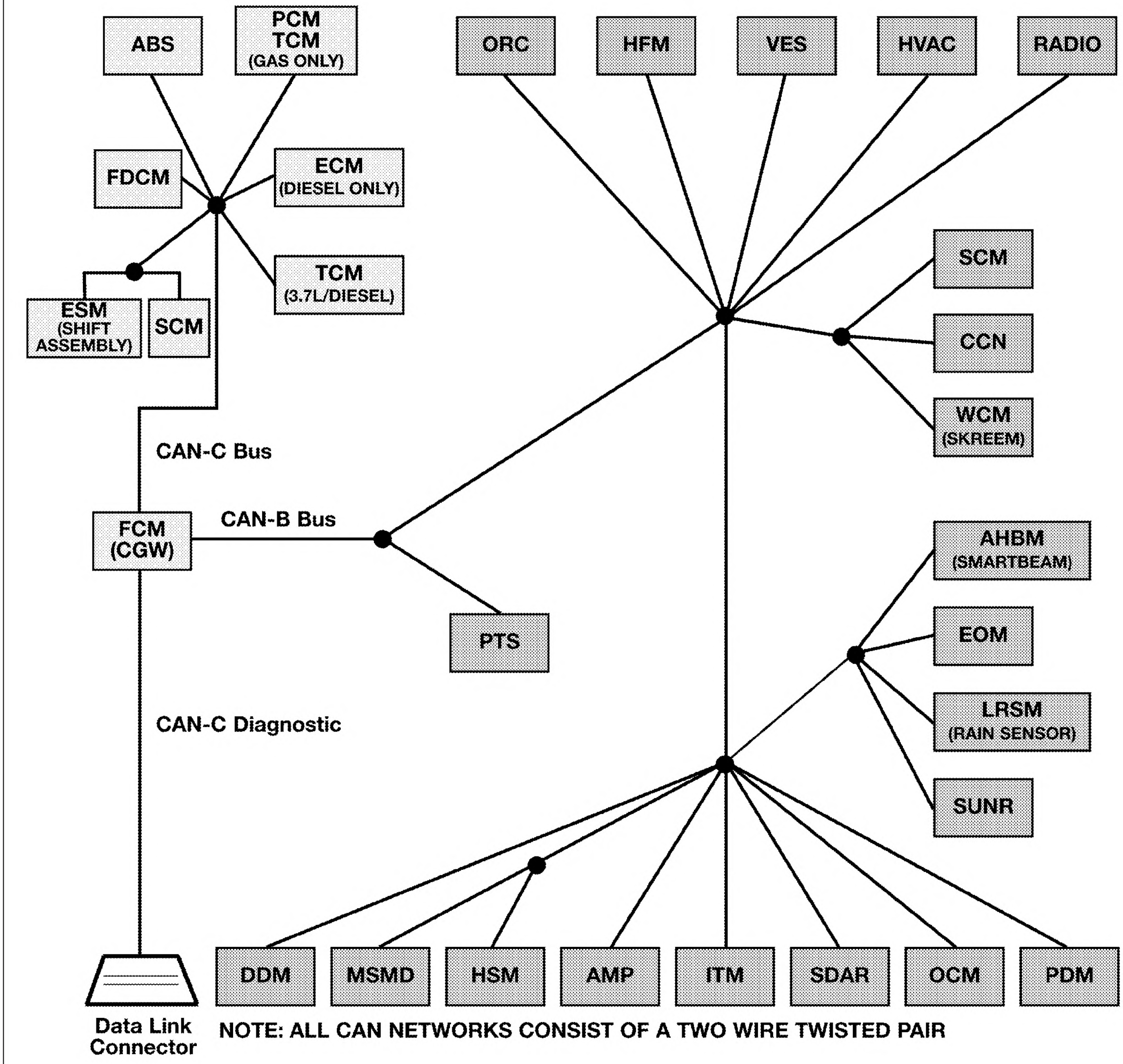
Yes >> Inspect the connector and terminal for damage, inspect for spread terminals, or push out terminals. If ok, replace the module that displayed the red X next to it in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D54) CAN B Bus (-) circuit for an open between the next common splice and the module that has the red X displayed next to it. Use the wiring diagrams will help you determine where open condition exists.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0025-CAN B BUS (-) CIRCUIT LOW


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0025-CAN B BUS (-) CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The FCM detects the (D54) CAN B Bus (-) circuit is shorted to ground.

Possible Causes
(D54) CAN B BUS (-) CIRCUIT SHORTED TO GROUND OR TO (D54) CAN B BUS (-) CIRCUIT
ANY CAN B BUS MODULE
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. CHECK THE (D54) CAN B BUS (-) CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

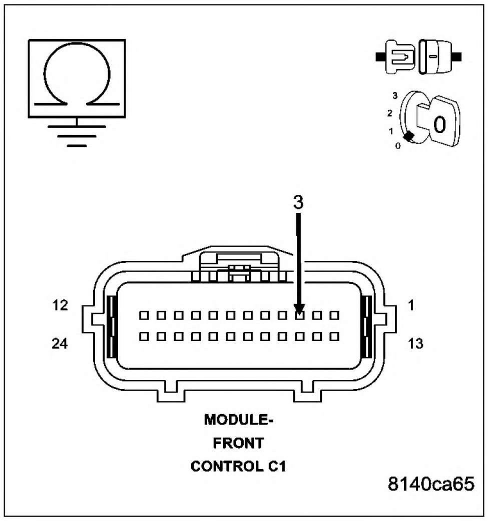
Disconnect the Front Control Module C1 harness connector.

Measure the resistance between ground and the (D54) CAN B Bus (-) circuit.

Is resistance below 1000.0 ohms?

Yes >> Go To 3

No >> Go To 4



U0025-CAN B BUS (-) CIRCUIT LOW (CONTINUED)

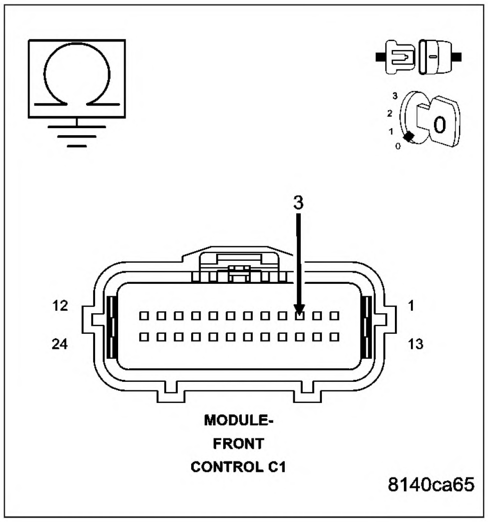
3. (D54) CAN B BUS (-) CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (D54) CAN B Bus (-) circuit.

While monitoring the ohmmeter, disconnect each CAN B Bus module one at a time.

NOTE: This is to determine if the short to ground is internal within a module or if the circuit is shorted.

NOTE: Disconnecting an in-line connector can eliminate a module or group of modules from the list of possible causes for this fault. Refer to the wring diagrams to assist in diagnosis.



Is resistance below 1000.0 ohms with all the CAN B Bus modules disconnected?

Yes >> Repair the (D54) CAN B Bus (-) circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

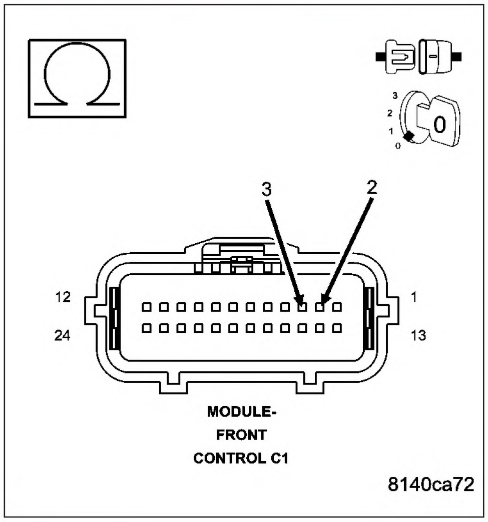
No >> Replace the module that when disconnected the short to ground was eliminated, in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (D55) CAN B BUS (+) CIRCUIT FOR A SHORT TO THE (D54) CAN B BUS (-) CIRCUIT

Measure the resistance between the (D55) CAN B Bus (+) circuit and (D54) CAN B Bus (-) circuit.



Is resistance below 1000.0 ohms?

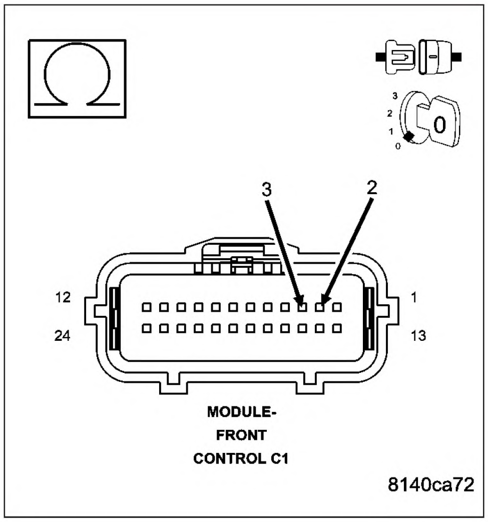
Yes >> Go To 5

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0025-CAN B BUS (-) CIRCUIT LOW (CONTINUED)

5. (D55) CAN B BUS (+) CIRCUIT SHORTED TO THE (D54) CAN B BUS (-) CIRCUIT



Measure the resistance between the (D55) CAN B Bus (+) circuit and (D54) CAN B Bus (-) circuit.

While monitoring the ohmmeter, disconnect each CAN B Bus module one at a time.

NOTE: This is to determine if the short together is internal within a module or if the circuits are shorted together.

NOTE: Disconnecting an in-line connector can eliminate a module or group of modules from the list of possible causes for this fault. Refer to the wring diagrams to assist in diagnosis.

Is resistance below 1000.0 ohms with all the CAN B Bus modules disconnected?

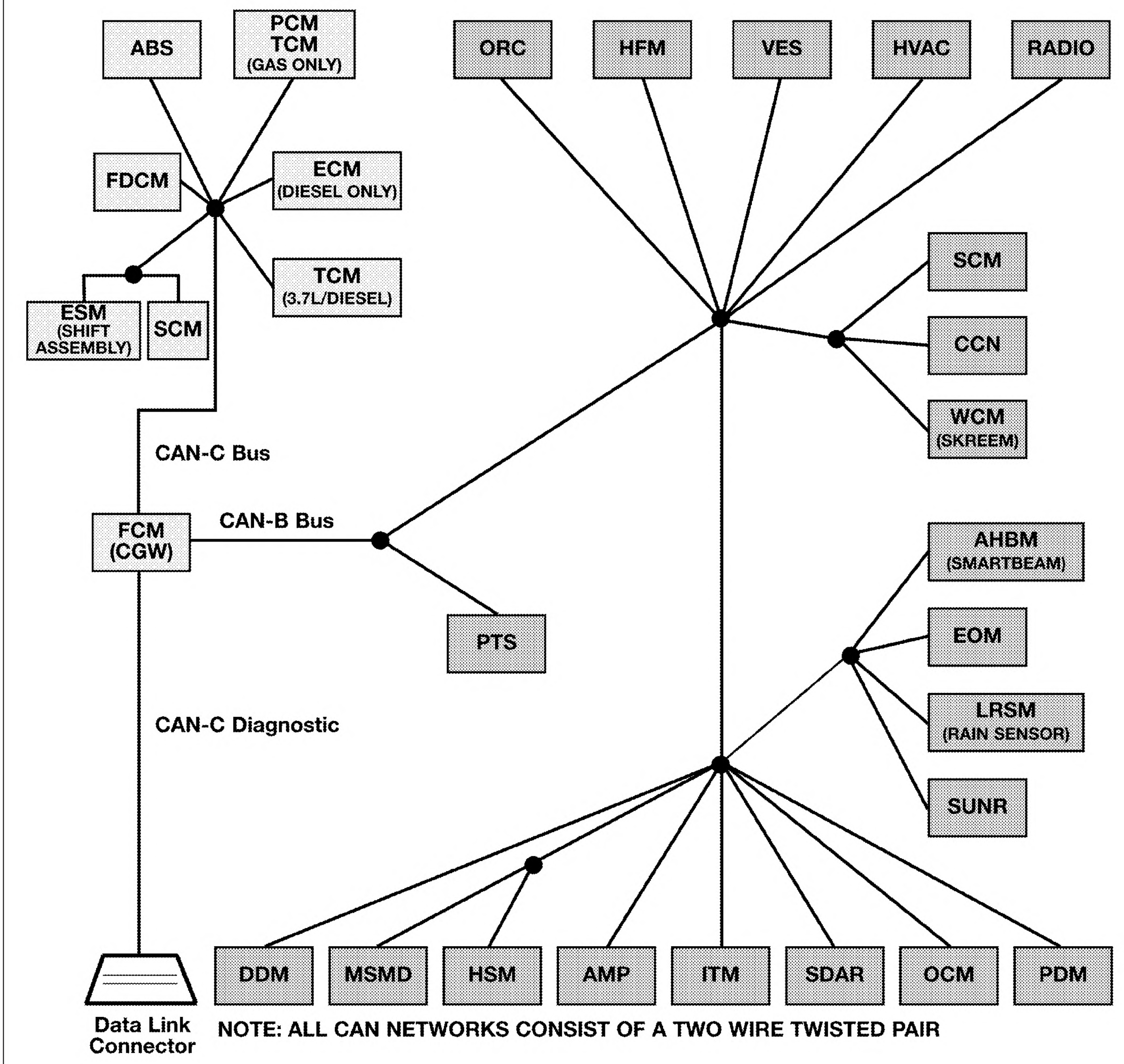
Yes >> Repair the (D55) CAN B Bus (+) circuit for a short to the (D54) CAN B Bus (-) circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the module that when disconnected the short to ground was eliminated, in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0026-CAN B BUS (-) CIRCUIT HIGH


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0026-CAN B BUS (-) CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The FCM detects the (D54) CAN B Bus (-) circuit is shorted to voltage.

Possible Causes
(D54) CAN B BUS (-) CIRCUIT SHORTED TO VOLTAGE
ANY CAN B BUS MODULE
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC's.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. CHECK THE (D54) CAN B BUS (-) CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

Turn the ignition on.

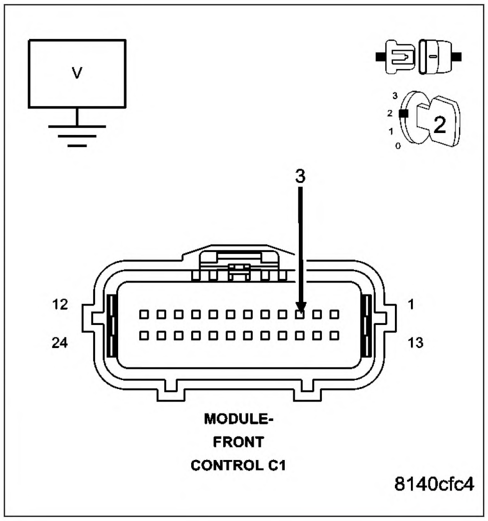
Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Is voltage above 10.0 volts?

Yes >> Go To 3

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



U0026-CAN B BUS (-) CIRCUIT HIGH (CONTINUED)

3. (D54) CAN B BUS (-) CIRCUIT SHORTED TO VOLTAGE

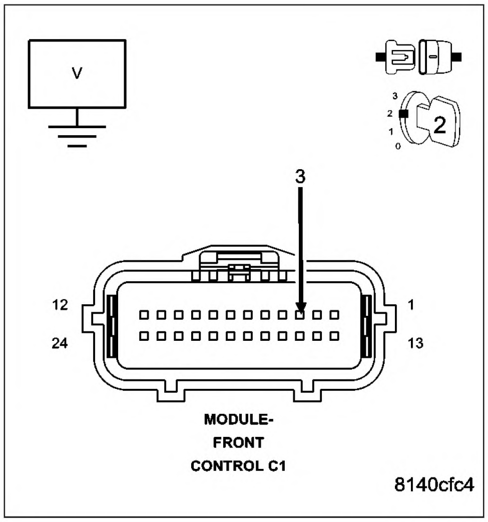
Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

While monitoring the voltmeter, disconnect each CAN B Bus module one at a time.

NOTE: When performing the above step, turn the ignition off (wait one minute) before disconnecting any module. When the module is disconnected turn the ignition on to check for a short to voltage.

NOTE: This is to determine if the short to voltage is internal within a module or if the circuit is shorted.

NOTE: Disconnecting an in-line connector can eliminate a module or group of modules from the list of possible causes for this fault. Refer to the wring diagrams to assist in diagnosis.



Is the voltage above 10.0 volts with all the CAN B Bus modules disconnected?

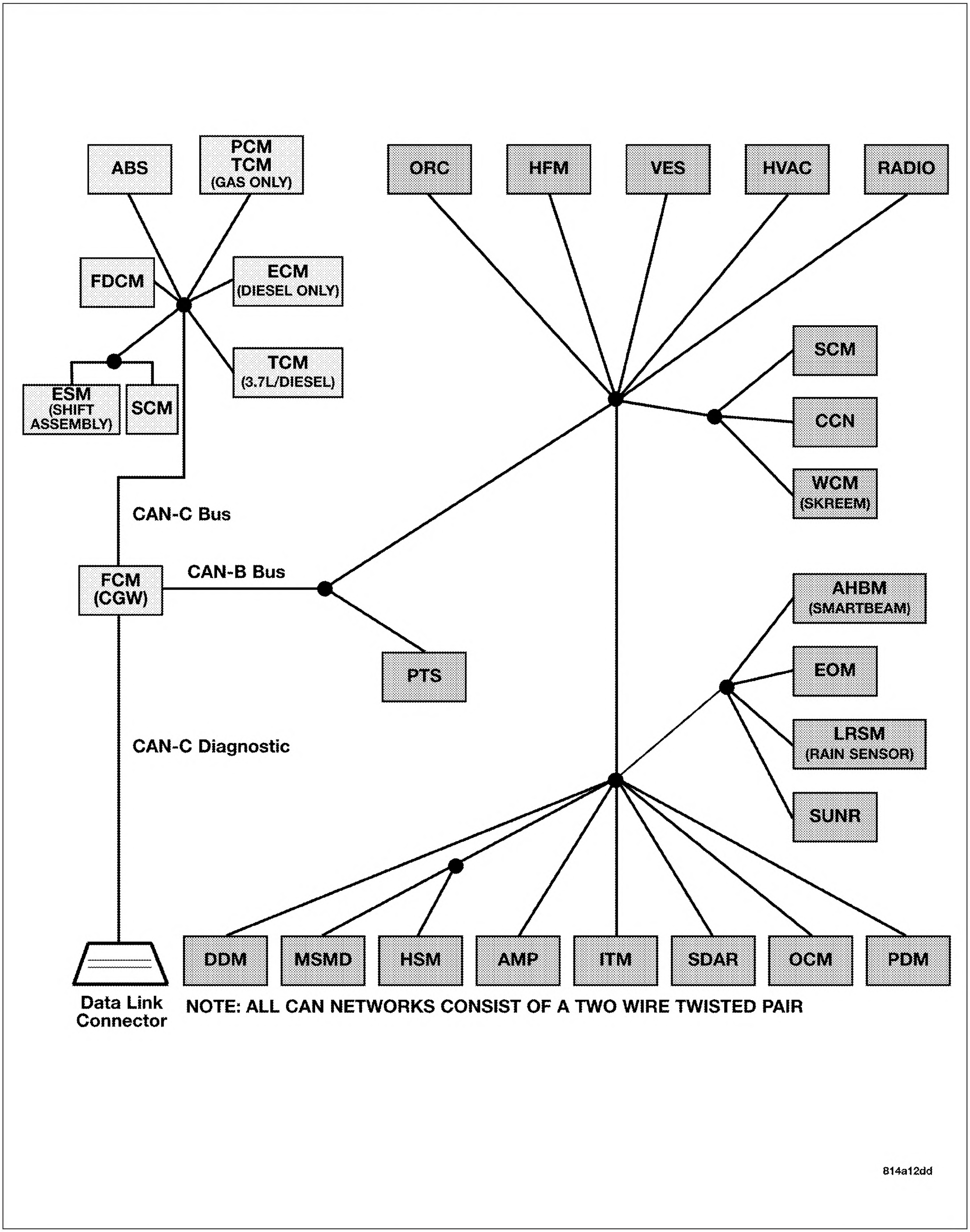
Yes >> Repair the (D54) CAN B Bus (-) circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the module that when disconnected the short to voltage was eliminated, in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0027-CAN B BUS (-) SHORTED TO BUS (+)


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0027-CAN B BUS (-) SHORTED TO BUS (+) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The FCM detects the (D55) CAN B Bus (+) circuit is shorted to the (D54) CAN B Bus (-) circuit.

Possible Causes
(D55) CAN B BUS (+) CIRCUIT SHORTED TO THE (D54) CAN B BUS (-) CIRCUIT
ANY CAN B BUS MODULE
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase FCM DTC’s.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active FCM DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. CHECK THE (D55) CAN B BUS (+) CIRCUIT FOR A SHORT TO THE (D54) CAN B BUS (-) CIRCUIT

Turn the ignition off.

Disconnect the Front Control Module C1 harness connector.

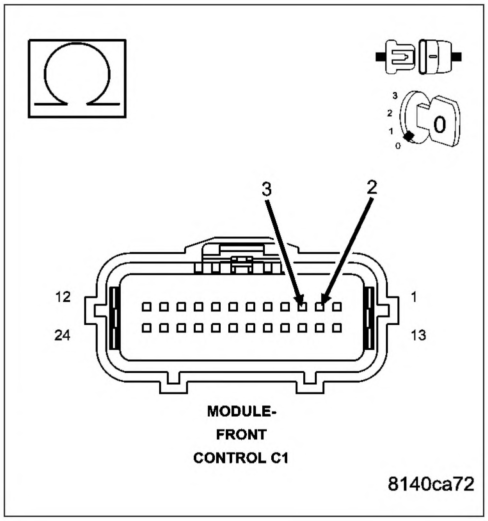
Measure the resistance between the (D55) CAN B Bus (+) circuit and (D54) CAN B Bus (-) circuit.

Is resistance below 1000.0 ohms?

Yes >> Go To 3

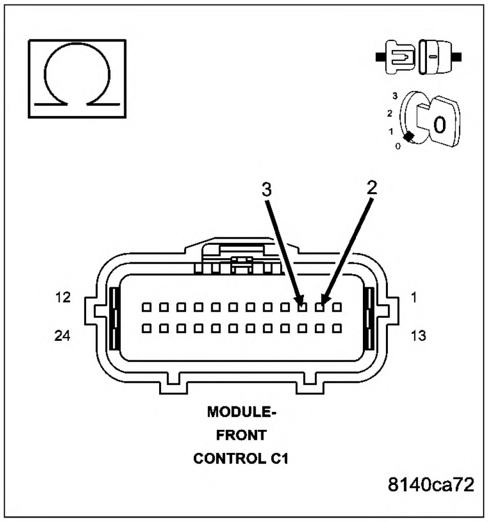
No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



U0027-CAN B BUS (-) SHORTED TO BUS (+) (CONTINUED)

3. (D55) CAN B BUS (+) CIRCUIT SHORTED TO THE (D54) CAN B BUS (-) CIRCUIT



Measure the resistance between the (D55) CAN B Bus (+) circuit and (D54) CAN B Bus (-) circuit.

While monitoring the ohmmeter, disconnect each CAN B Bus module one at a time.

NOTE: This is to determine if the short together is internal within a module or if the circuits are shorted together.

NOTE: Disconnecting an in-line connector can eliminate a module or group of modules from the list of possible causes for this fault. Refer to the wring diagrams to assist in diagnosis.

Is resistance below 1000.0 ohms with all the CAN B Bus modules disconnected?

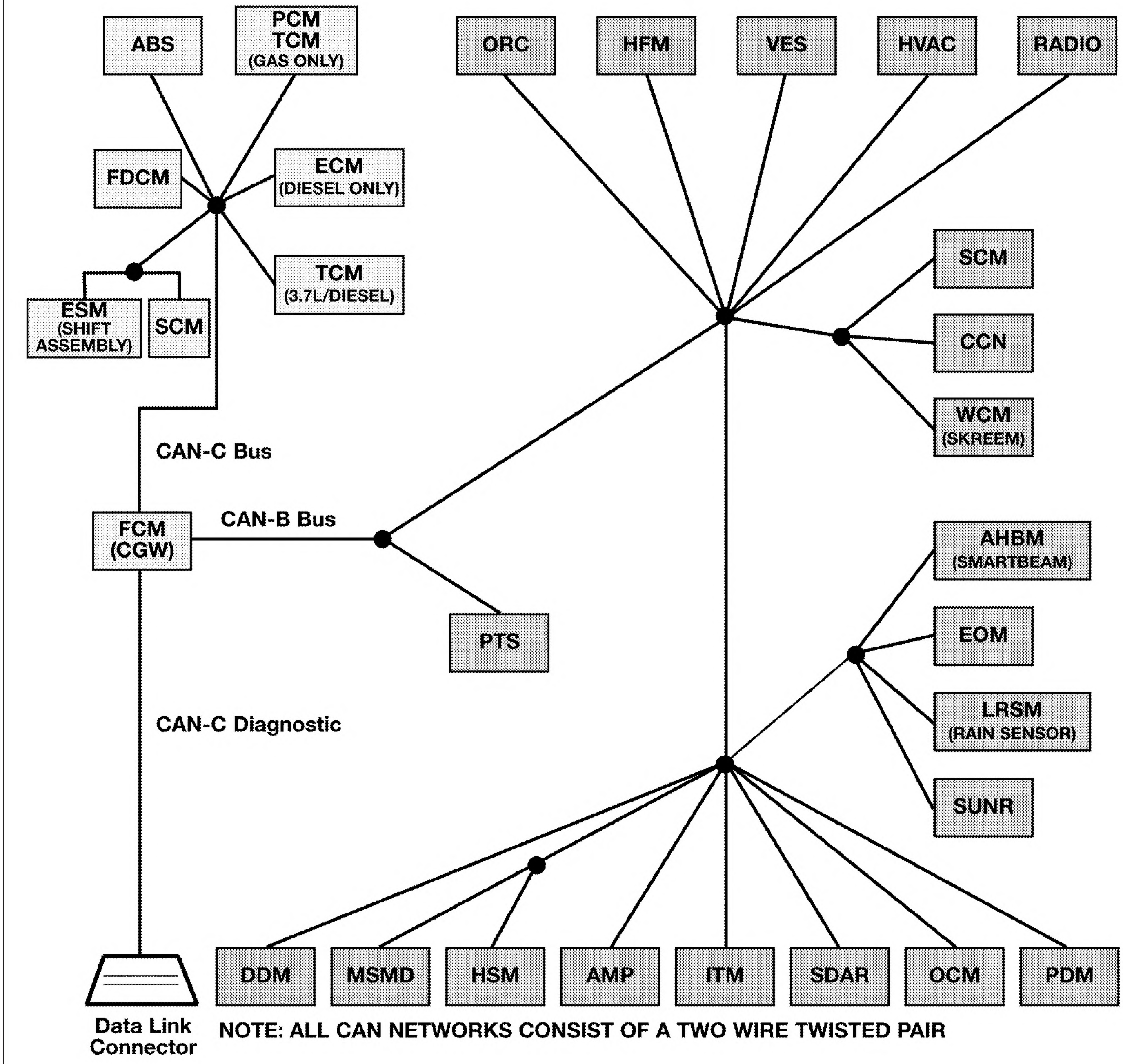
Yes >> Repair the (D55) CAN B Bus (+) circuit for a short to the (D54) CAN B Bus (-) circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the module that when disconnected the short together was eliminated, in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0100-LOST COMMUNICATION WITH ECM/PCM


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

814a12dd

U0100-LOST COMMUNICATION WITH ECM/PCM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the ECM/PCM for approximately 2 to 5 seconds.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
ECM/PCM POWER AND GROUND
ECM/PCM
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE ECM/PCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the ECM/PCM is active on the bus.

Is the ECM/PCM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0100-LOST COMMUNICATION WITH ECM/PCM (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

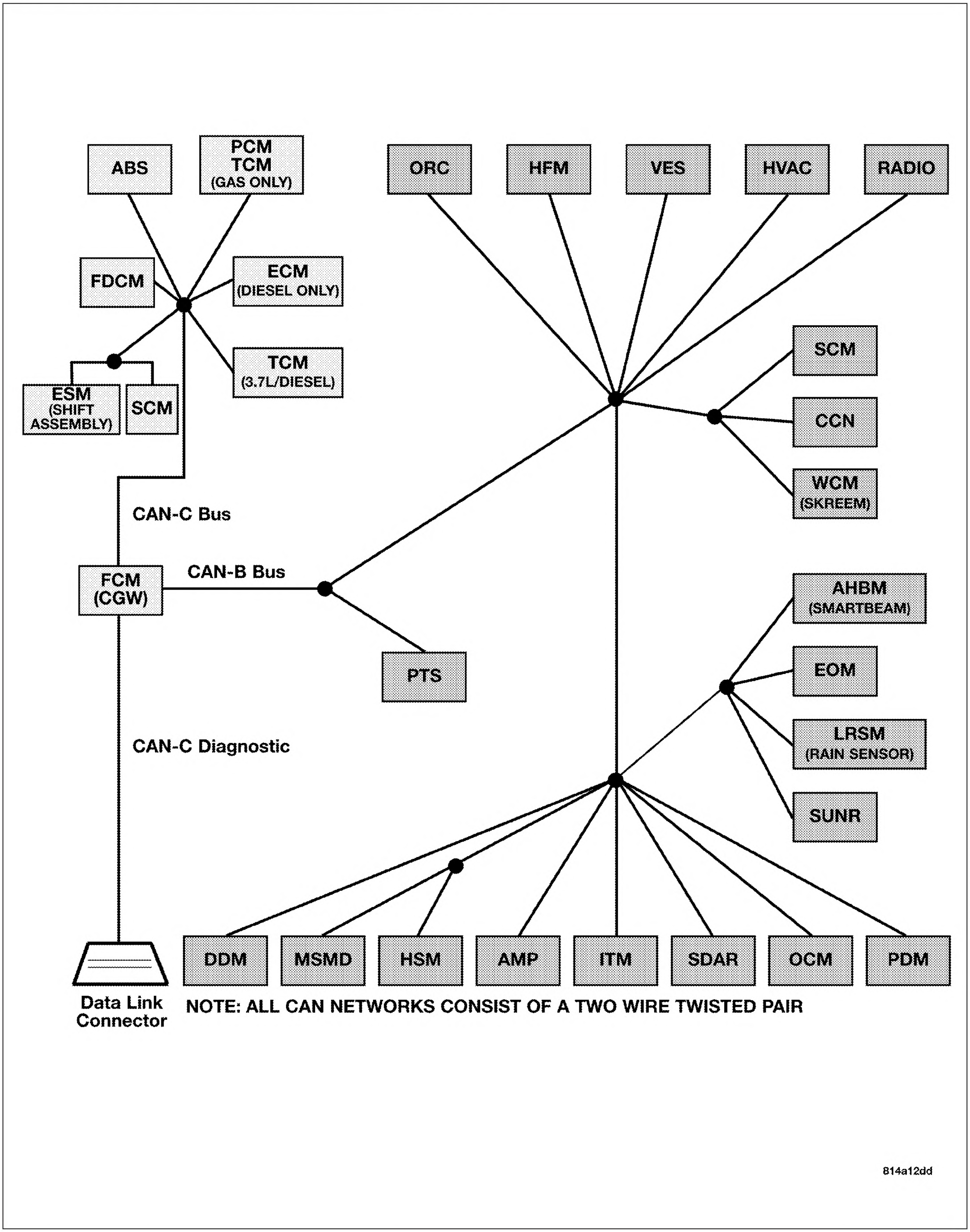
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the ECM/PCM?

Yes >> Replace/update the ECM/PCM in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0101-LOST COMMUNICATION WITH TCM


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0101-LOST COMMUNICATION WITH TCM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the TCM for approximately 2 to 5 seconds.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
TCM POWER AND GROUND
TCM (PCM - GAS ONLY)
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE TCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the TCM is active on the bus.

Is the TCM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0101-LOST COMMUNICATION WITH TCM (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

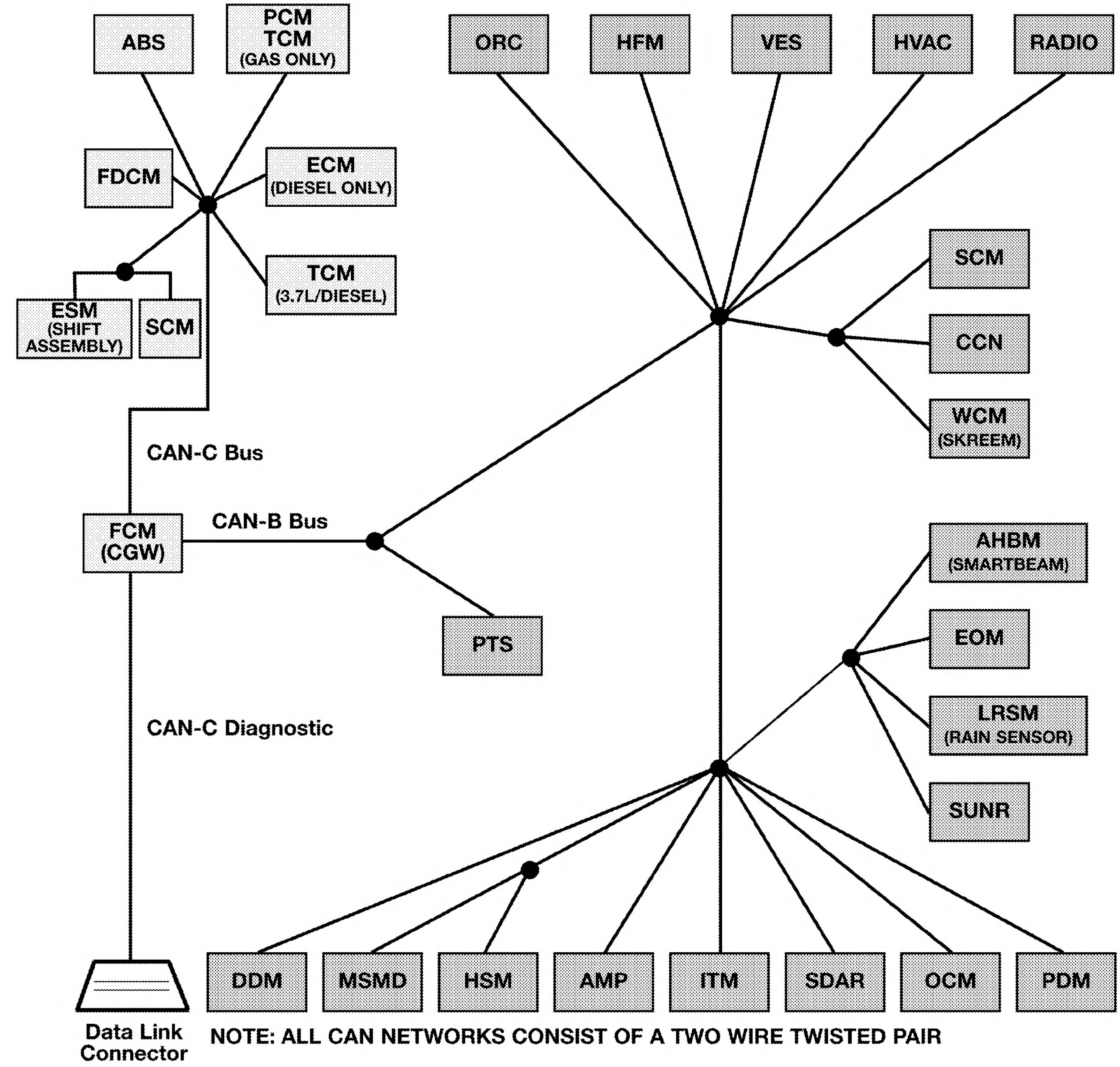
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the TCM?

Yes >> Replace/update the TCM (PCM — Gas only) in accordance with the service information. Perform the appropriate VERIFICATION TEST.

No >> Replace/update the module that set this DTC in accordance with the service information. Perform the appropriate VERIFICATION TEST.

U0103-LOST COMMUNICATION WITH ELECTRIC GEAR SHIFT MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
CAN-C Diagnostic
LRSM
(RAIN SENSOR)
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0103-LOST COMMUNICATION WITH ELECTRIC GEAR SHIFT MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Electric Gear Shift Module (shift lever assembly) for approximately 500ms.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
SHIFT LEVER ASSEMBLY
SHIFT LEVER ASSEMBLY POWER AND GROUND
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE SHIFT LEVER ASSEMBLY IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the Shift Lever Assembly is active on the bus.

Is the Shift Lever Assembly active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0103-LOST COMMUNICATION WITH ELECTRIC GEAR SHIFT MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

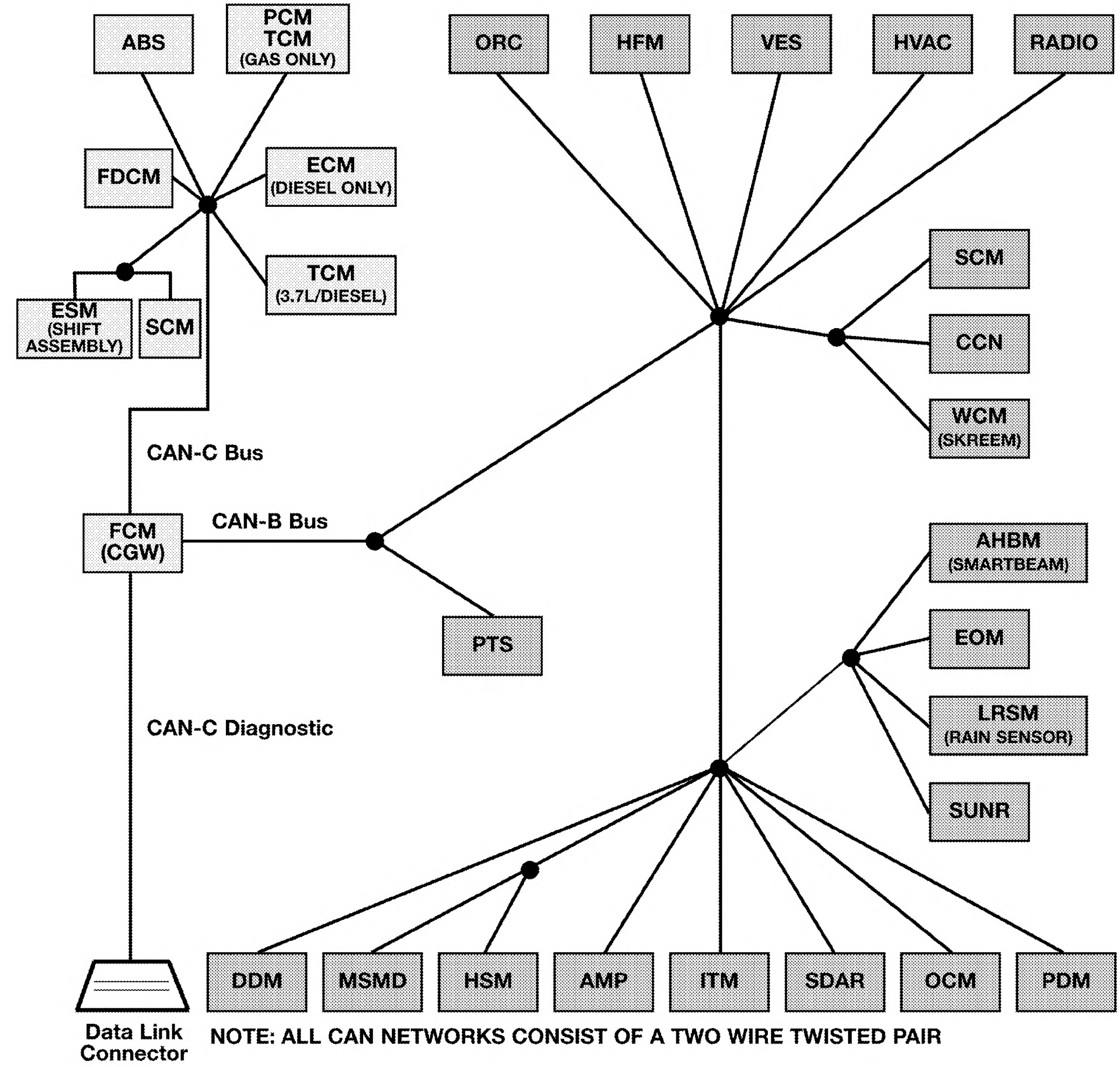
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the Shift Lever Assembly?

Yes >> Replace/update the Shifter Lever Assembly in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Final Drive Control Module (FDCM) for approximately 2 to 5 seconds.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
FINAL DRIVE CONTROL MODULE POWER AND GROUND
FINAL DRIVE CONTROL MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE FDCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the FDCM is active on the bus.

Is the FDCM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

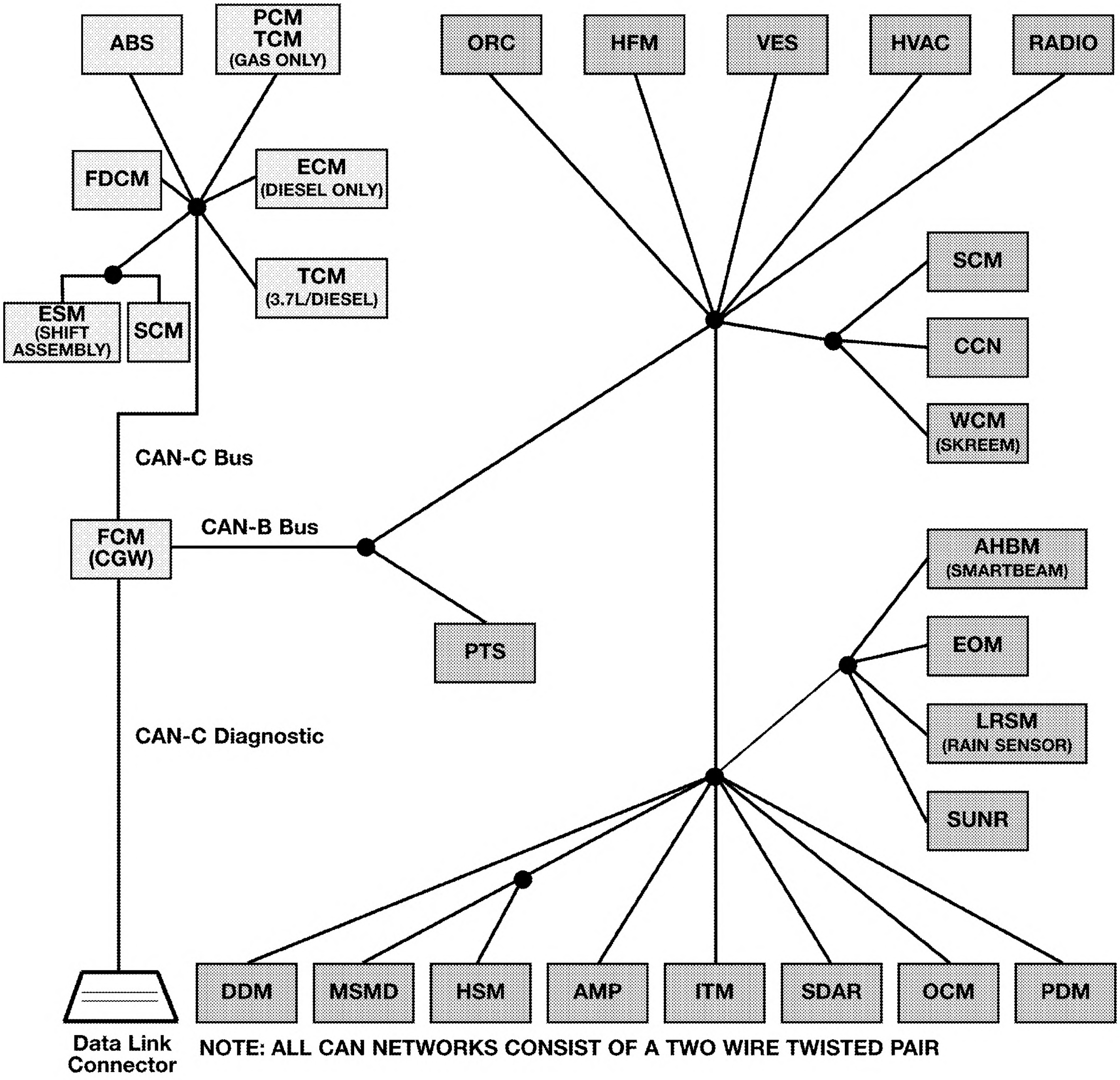
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the FDCM?

Yes >> Replace/update the Final Drive Control Module in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Antilock Brake Module for approximately 2 to 5 seconds.

Possible Causes
CAN B OR CAN C BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
ANTILOCK BRAKE MODULE POWER AND GROUND
ANTILOCK BRAKE MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

3. VERIFY THAT THE ABS IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the ABS is active on the bus.

Is the ABS active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

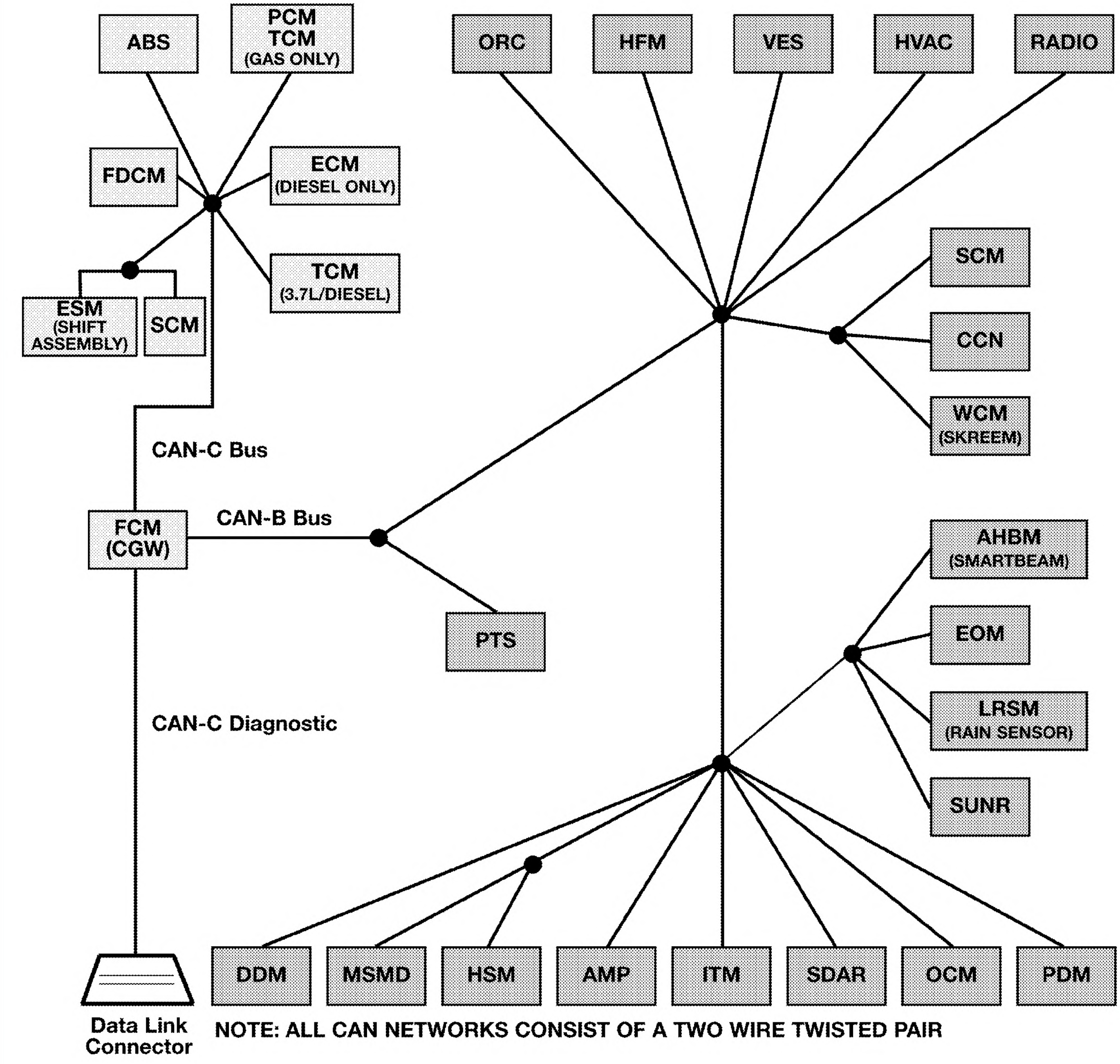
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the ABS?

Yes >> Replace/update the Antilock Brake Module in accordance with the service information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
SCM
ESM
(SHIFT
ASSEMBLY)
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Front Control Module for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
FRONT CONTROL MODULE POWER AND GROUND
FRONT CONTROL MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.

With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

3. VERIFY THAT THE FCM IS ACTIVE ON THE BUS

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Verify that the FCM is active on the bus.

Is the FCM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

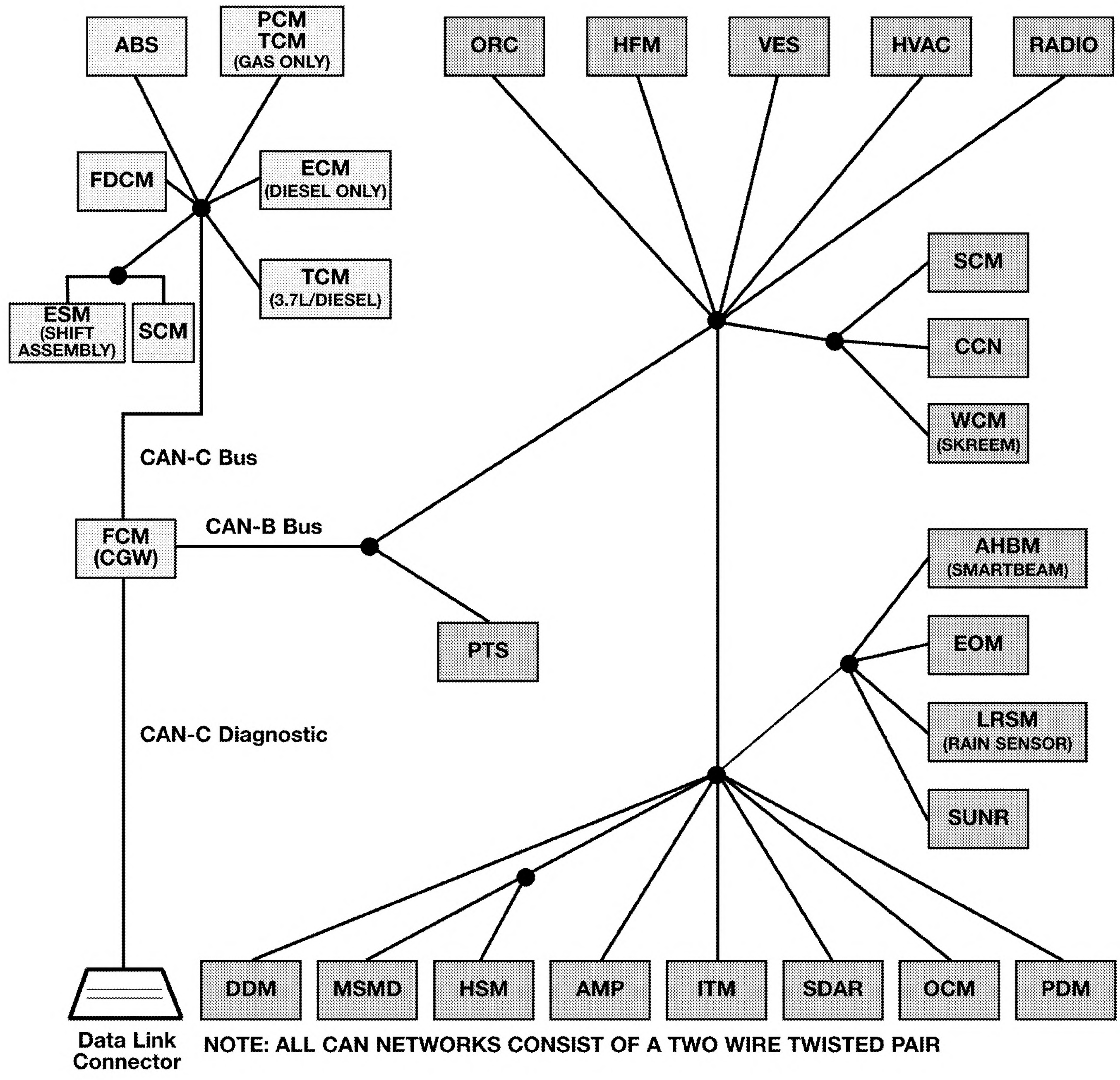
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the FCM?

Yes >> Replace/update the Front Control Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0151–LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER (ORC)


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
PTS
AHBM
(SMARTBEAM)
EOM
LRSM
(RAIN SENSOR)
SUNR
CAN-C Diagnostic
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0151–LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER (ORC) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Occupant Restraint Controller for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
OCCUPANT RESTRAINT CONTROLLER POWER AND GROUND
OCCUPANT RESTRAINT CONTROLLER
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE ORC IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the ORC is active on the bus.

Is the ORC active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0151–LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER (ORC) (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

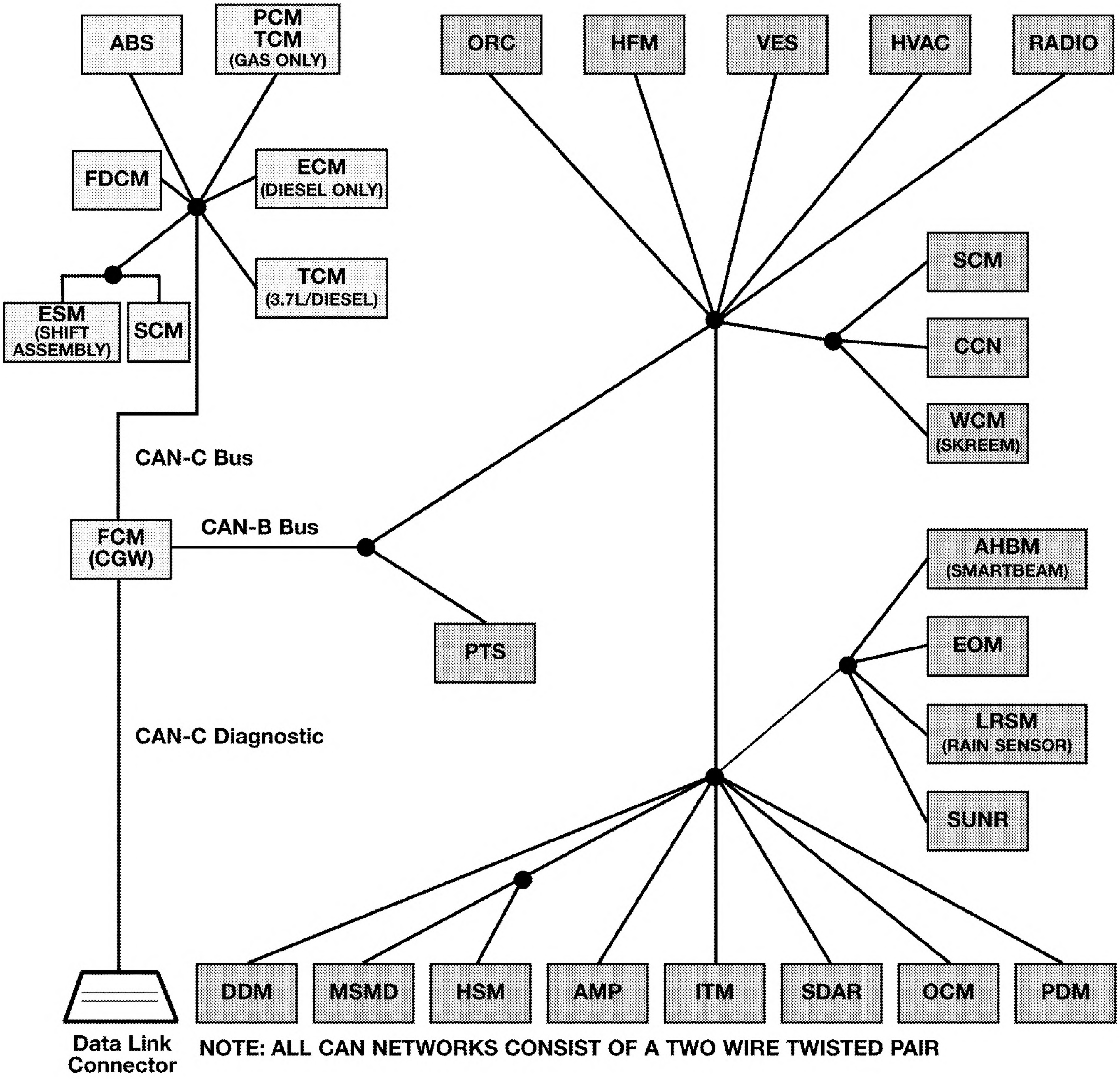
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the ORC?

Yes >> Replace/update the Occupant Restraint Controller in accordance with the service information.
Perform AIRBAG VERIFICATION TEST – VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0154–LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
CAN-C Diagnostic
LRSM
(RAIN SENSOR)
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0154–LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Occupant Classification Module for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
OCCUPANT CLASSIFICATION MODULE POWER AND GROUND
OCCUPANT CLASSIFICATION MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

3. VERIFY THAT THE OCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the OCM is active on the bus.

Is the OCM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0154–LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

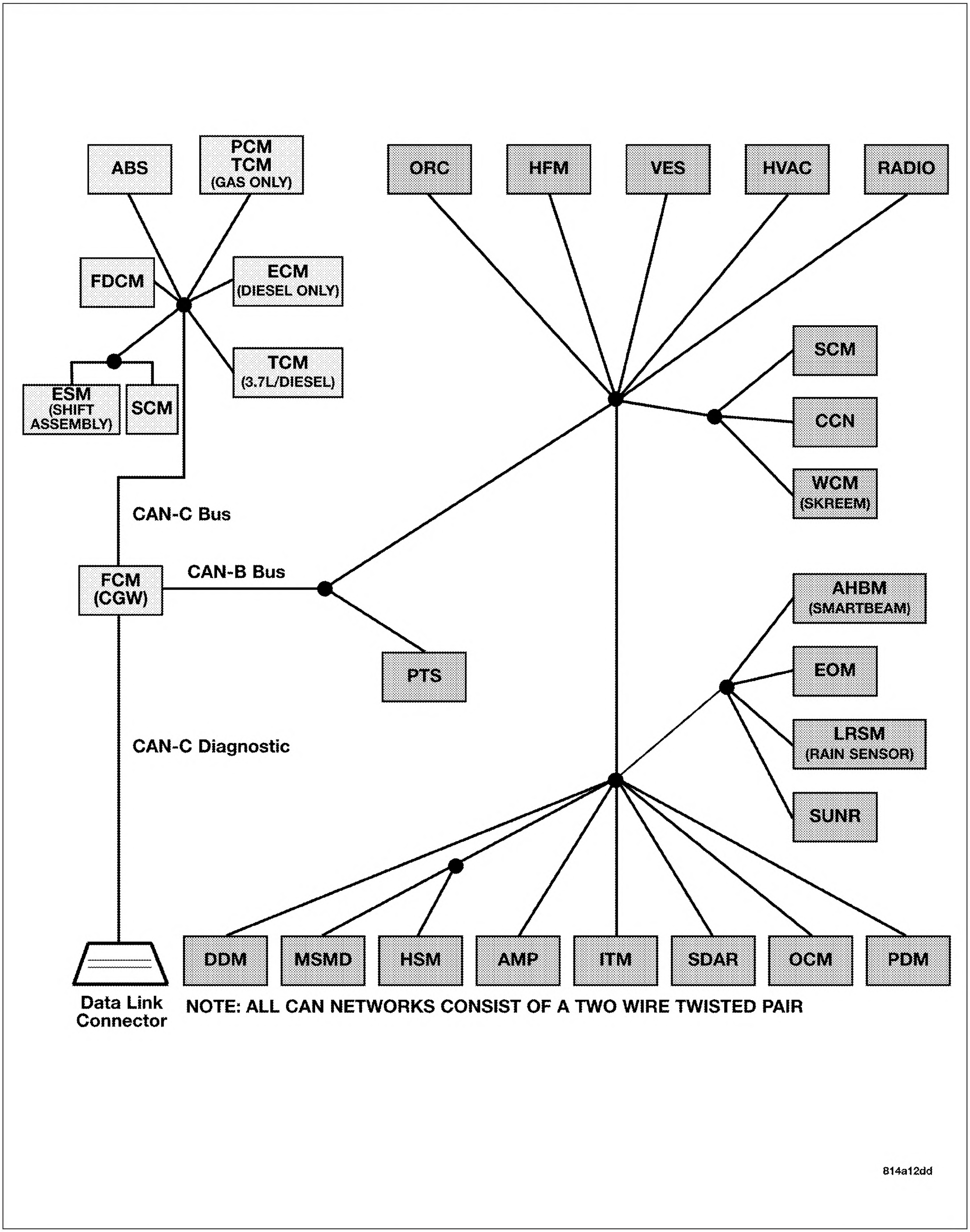
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the OCM?

Yes >> Replace/update the Occupant Classification Module in accordance with the service information.
Perform AIRBAG VERIFICATION TEST – VER 1.

No >> Replace/update the module that set this DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0155-LOST COMMUNICATION WITH CLUSTER/CCN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Cluster/CCN for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
CLUSTER/CCN POWER AND GROUND
CLUSTER/CCN
MODULE THAT SET THE DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE CCN IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the CCN is active on the bus.

Is the CCN active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

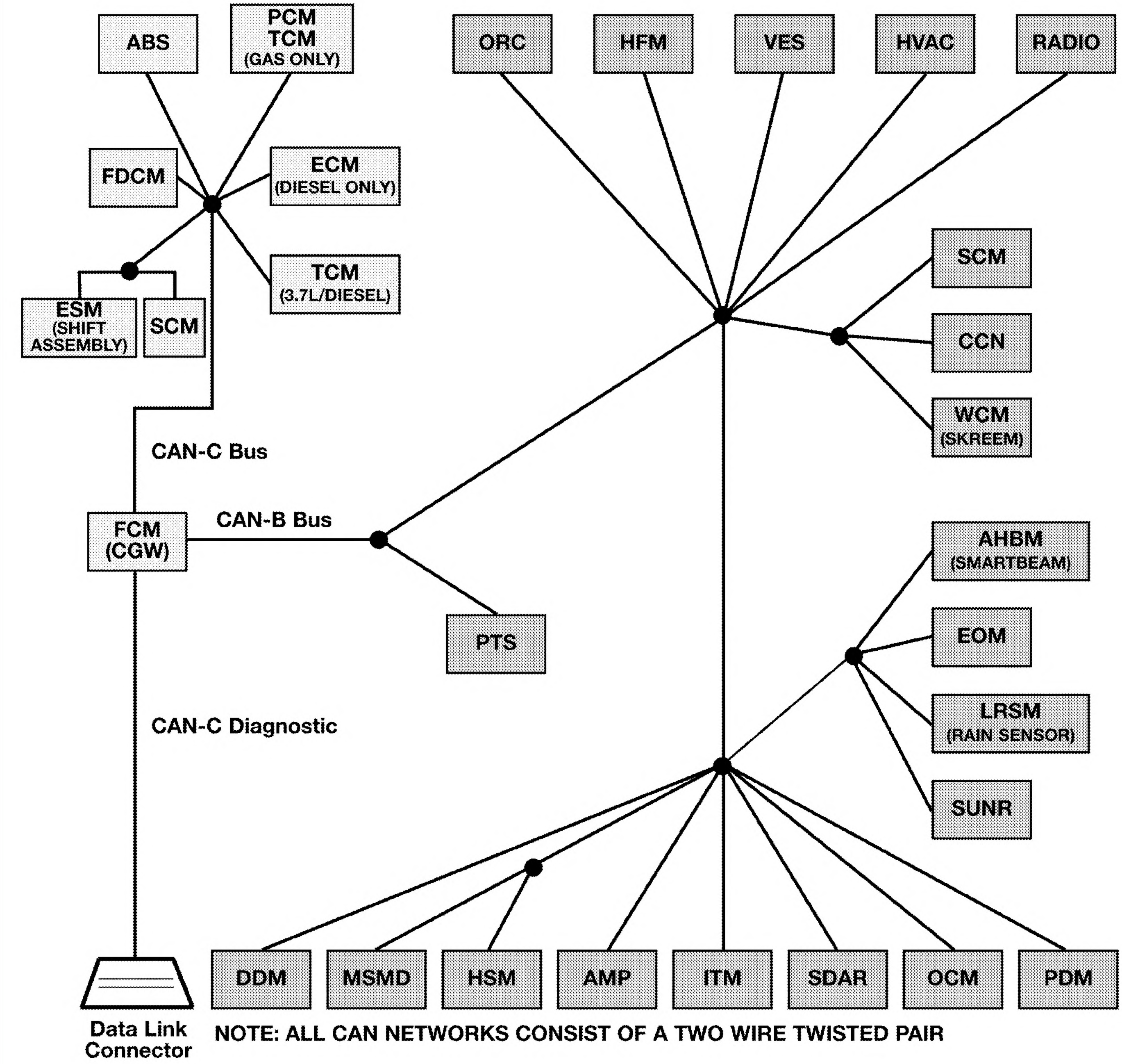
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the CCN?

Yes >> Replace/update the Cluster (CCN) in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0156–LOST COMMUNICATION WITH EOM


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0156–LOST COMMUNICATION WITH EOM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Electronic Overhead Module (EOM) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
ELECTRONIC OVERHEAD MODULE POWER OR GROUND
ELECTRONIC OVERHEAD MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE EOM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the EOM is active on the bus.

Is the EOM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0156–LOST COMMUNICATION WITH EOM (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the EOM?

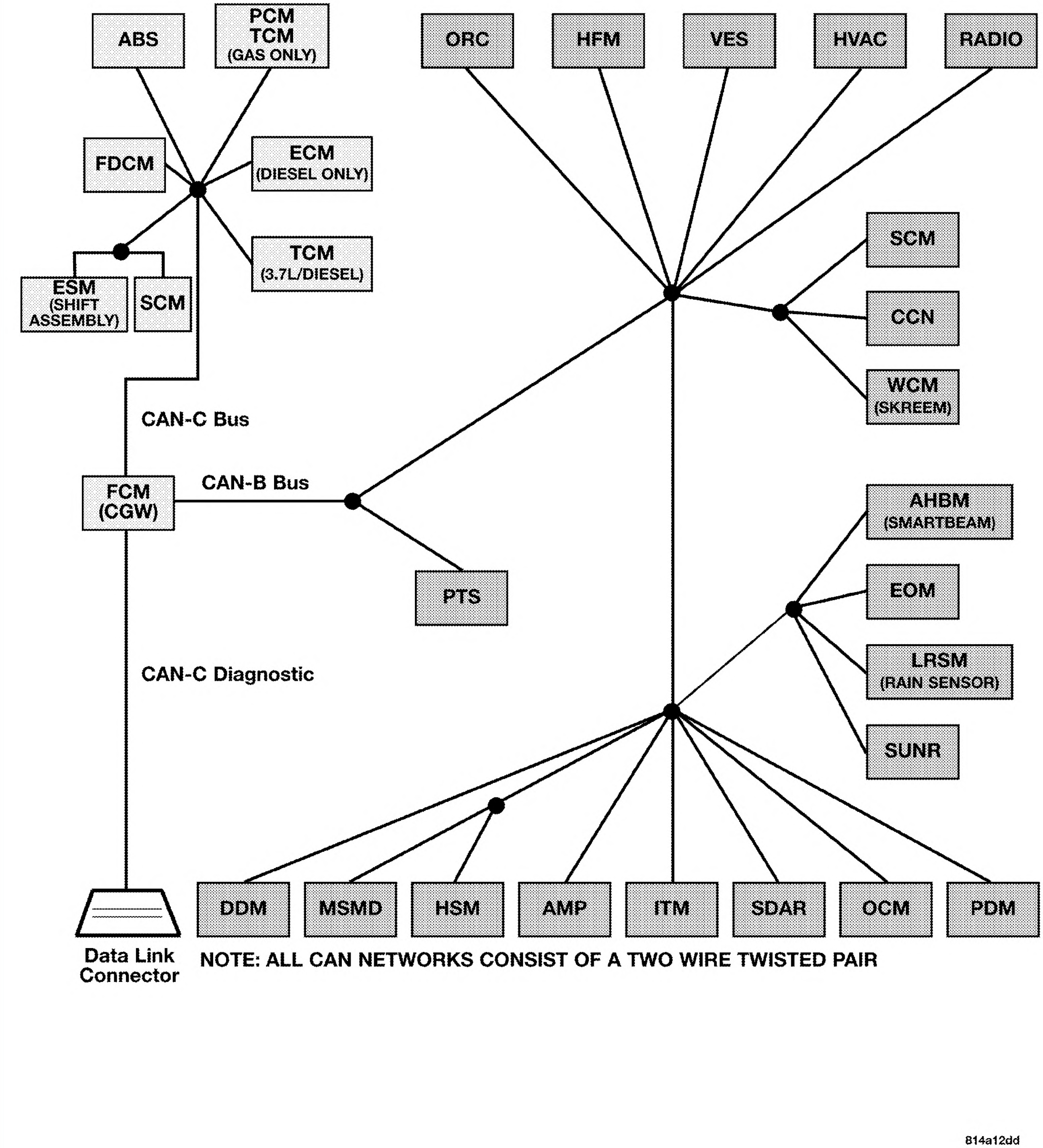
Yes >> Replace/update the Electronic Overhead Module (EOM) in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information

Perform the appropriate VERIFICATION TEST.

U0159-LOST COMMUNICATION WITH PARK ASSIST CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
CAN-C Bus
FCM
(CGW)
CAN-B Bus
PTS
CAN-C Diagnostic
ORC
HFM
VES
HVAC
RADIO
SCM
CCN
WCM
(SKREEM)
AHBM
(SMARTBEAM)
EOM
LRSM
(RAIN SENSOR)
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
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U0159-LOST COMMUNICATION WITH PARK ASSIST CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Park Assist Module (PTS) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
PARK ASSIST MODULE
PARK ASSIST MODULE POWER OR GROUND
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read all active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE PTS IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the PTS is active on the bus.

Is the PTS active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0159-LOST COMMUNICATION WITH PARK ASSIST CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

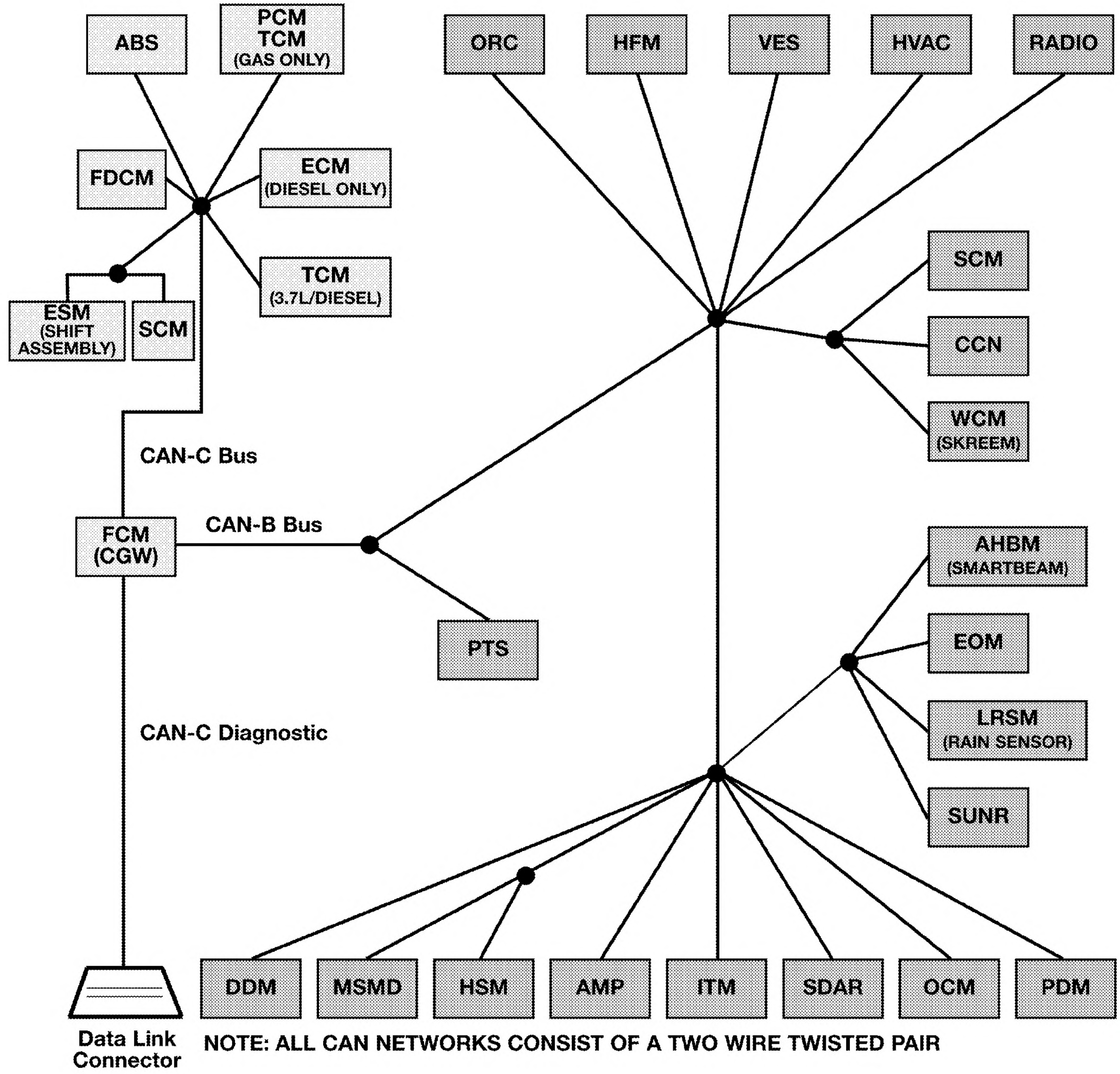
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the PTS?

Yes >> Replace/update the Park Assist Module (PTS) in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
PTS
AHBM
(SMARTBEAM)
EOM
LRSM
(RAIN SENSOR)
SUNR
CAN-C Diagnostic
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the A/C Heater Control (HVAC) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
A/C HEATER CONTROL POWER AND GROUND
A/C HEATER CONTROL
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE HVAC IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the HVAC is active on the bus.

Is the HVAC active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

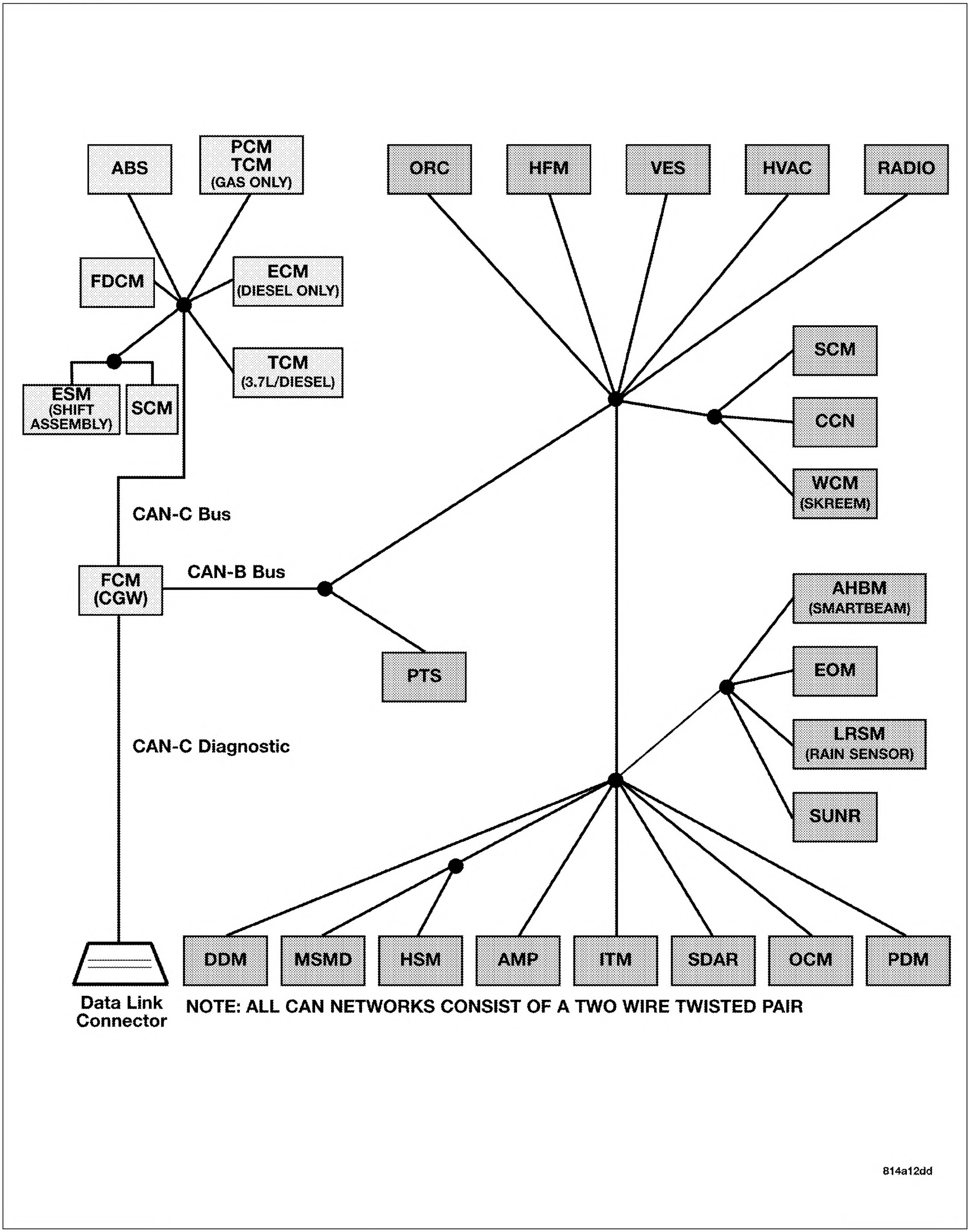
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the HVAC?

Yes >> Replace/update the A/C Heater Control in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set the DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE


ABS
PCM TCM (GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM (DIESEL ONLY)
TCM (3.7L/DIESEL)
ESM (SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM (SKREEM)
CAN-C Bus
FCM (CGW)
CAN-B Bus
PTS
AHBM (SMARTBEAM)
EOM
LRSM (RAIN SENSOR)
SUNR
CAN-C Diagnostic
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Intrusion Transceiver Control Module (ITM) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
INTRUSION TRANSCEIVER CONTROL MODULE POWER AND GROUND
INTRUSION TRANSCEIVER CONTROL MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

3. VERIFY THAT THE ITM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the ITM is active on the bus.

Is the ITM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

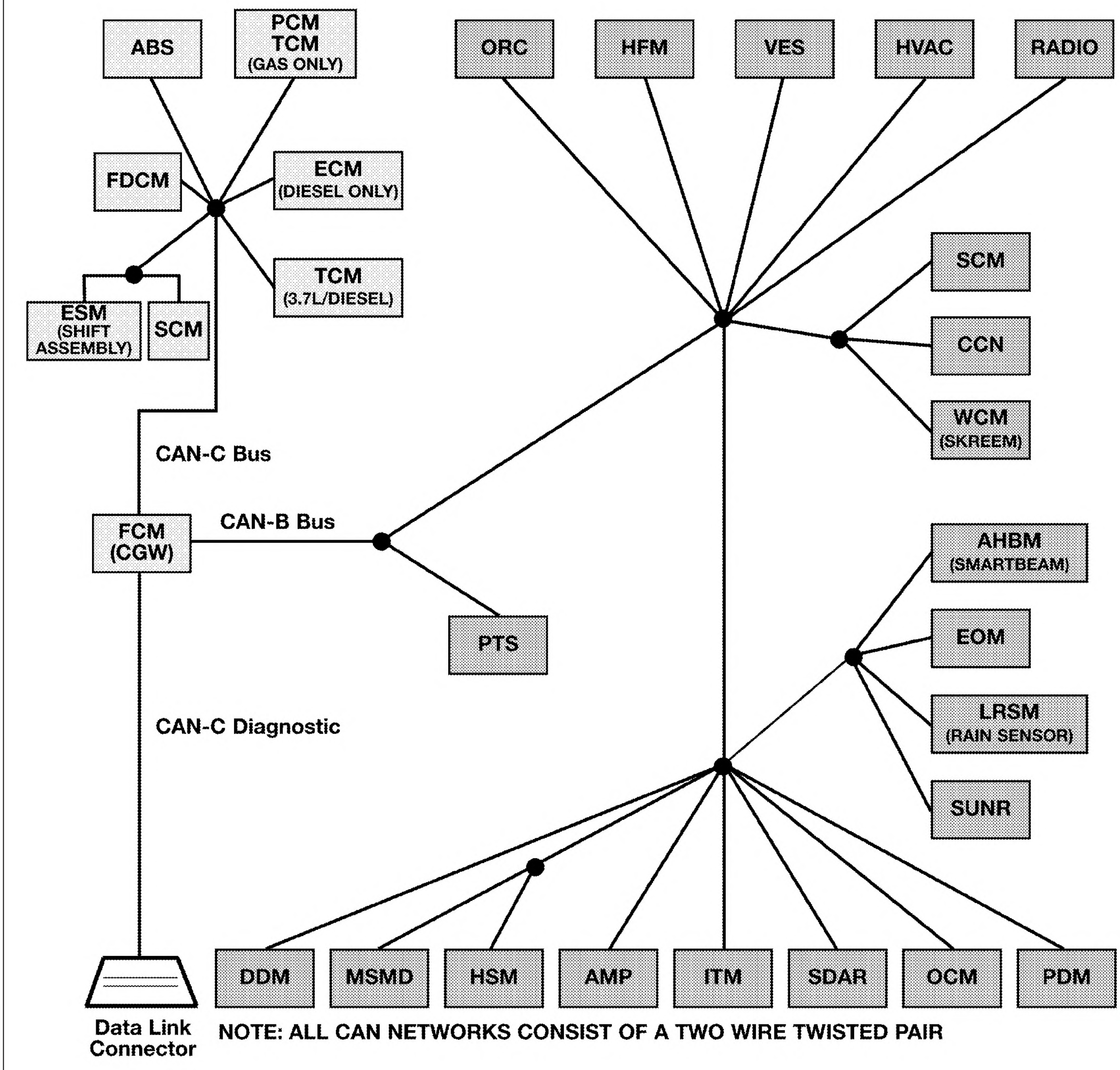
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the ITM?

Yes >> Replace/update the Intrusion Transceiver Control Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set the DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
PTS
AHBM
(SMARTBEAM)
EOM
LRSM
(RAIN SENSOR)
SUNR
CAN-C Diagnostic
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

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U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Sentry Key Remote Entry Module (WCM) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
SENTRY KEY REMOTE ENTRY MODULE POWER AND GROUND
SENTRY KEY REMOTE ENTRY MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE WCM IS ACTIVE ON THE BUS

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Verify that the WCM is active on the bus.

Is the WCM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM) (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

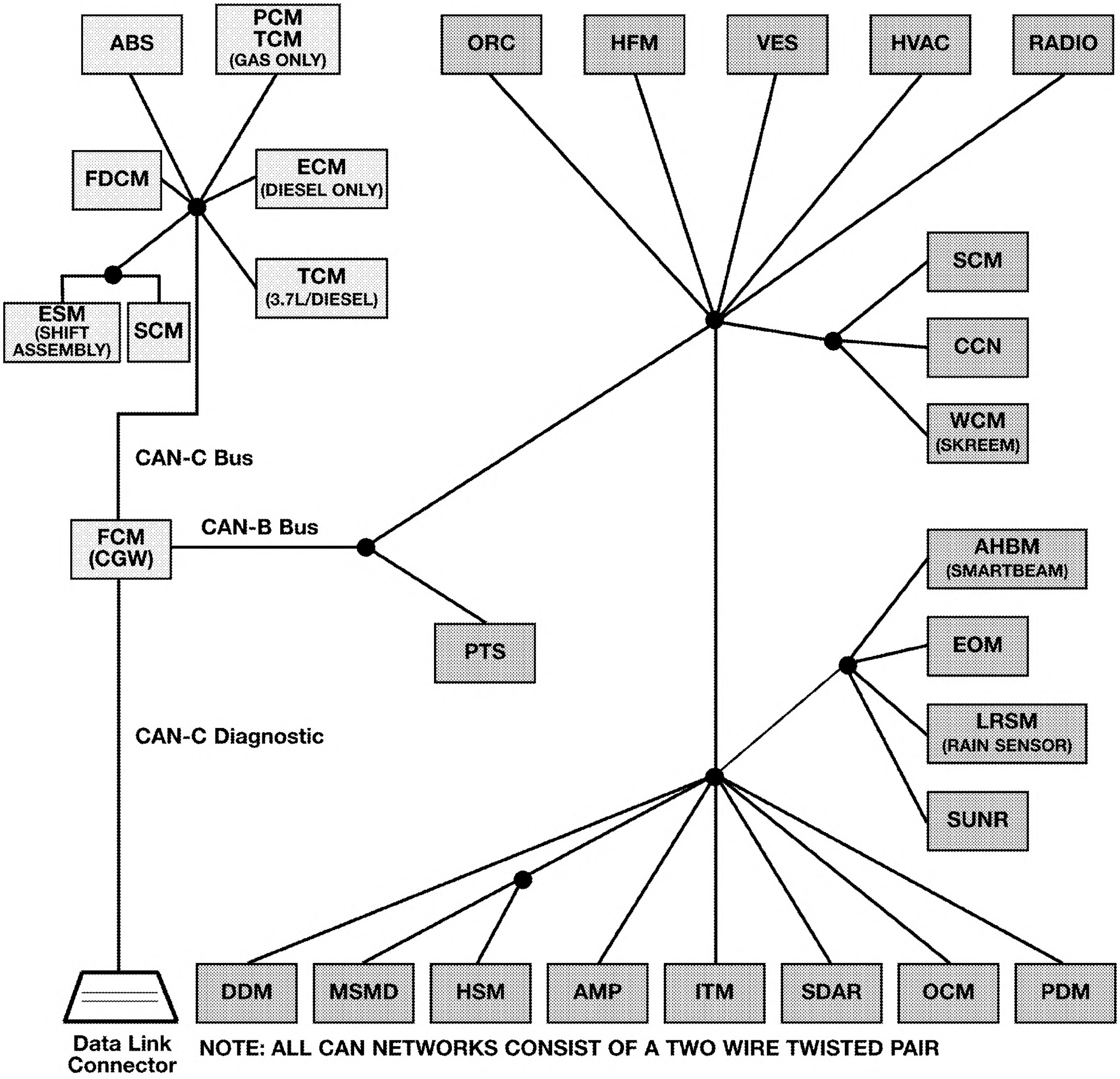
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the WCM?

Yes >> Replace/update the Sentry Key Remote Entry Module in accordance with the service information.
Perform SKREEM VERIFICATION TEST

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Sunroof Motor/Module (SUNR) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
SUNROOF MOTOR/MODULE POWER AND GROUND
SUNROOF MOTOR/MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

3. VERIFY THAT THE SUNR IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the SUNR is active on the bus.

Is the SUNR active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

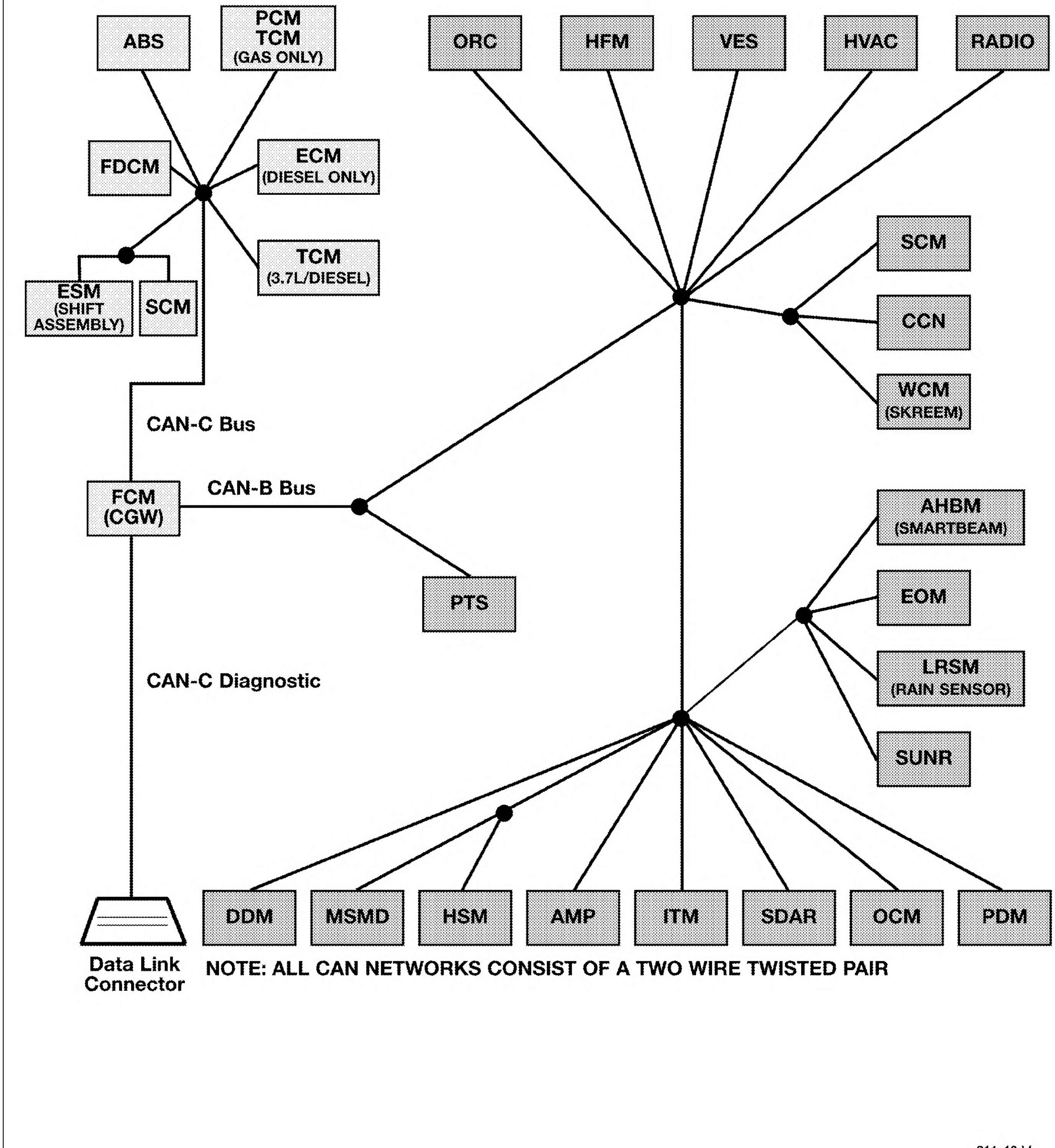
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the SUNR?

Yes >> Replace/update the Sunroof Motor/Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0184-LOST COMMUNICATION WITH RADIO


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
CAN-C Diagnostic
LRSM
(RAIN SENSOR)
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0184-LOST COMMUNICATION WITH RADIO (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Radio for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
RADIO POWER AND GROUND
RADIO
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE RADIO IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the Radio is active on the bus.

Is the Radio active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0184-LOST COMMUNICATION WITH RADIO (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the Radio?

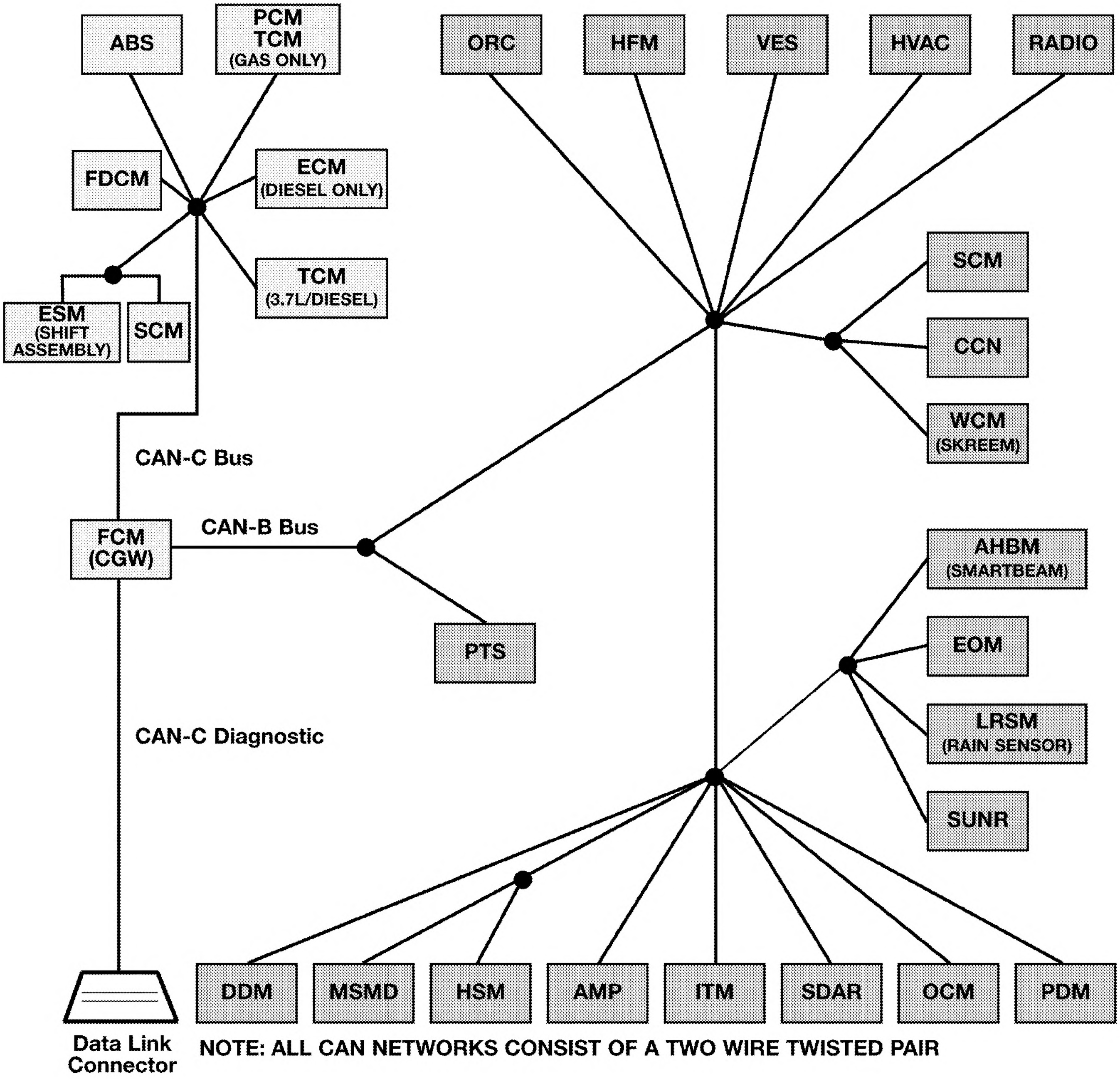
Yes >> Replace/update the Radio in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.

Perform the appropriate VERIFICATION TEST.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
PTS
EOM
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

814a12dd

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Amplifier for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
AMPLIFIER POWER AND GROUND
AMPLIFIER
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

3. VERIFY THAT THE AMPLIFIER IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the Amplifier is active on the bus.

Is the Amplifier active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

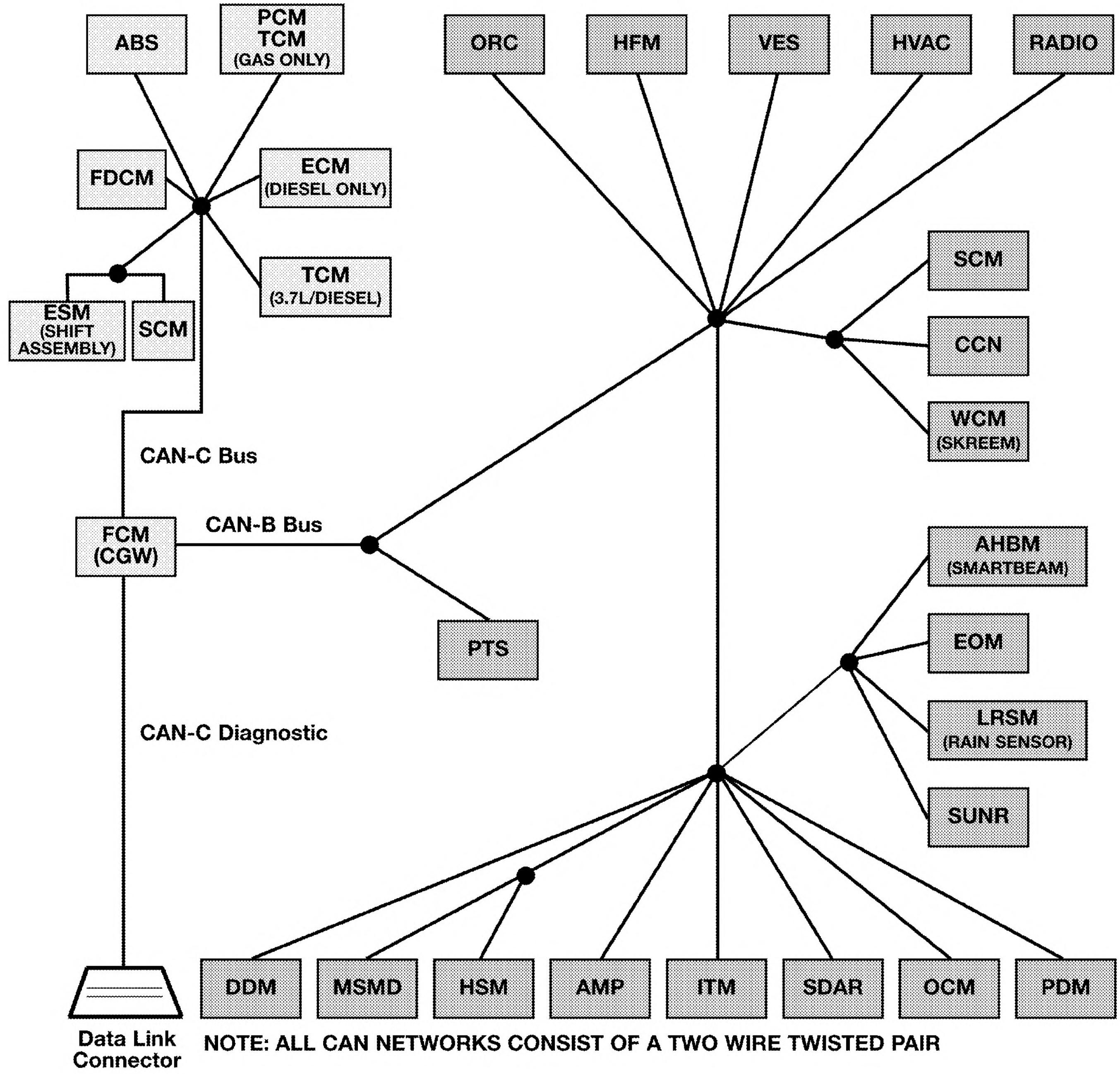
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the Amplifier?

Yes >> Replace/update the Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0195-LOST COMMUNICATION WITH SDARS


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
PTS
AHBM
(SMARTBEAM)
EOM
LRSM
(RAIN SENSOR)
SUNR
CAN-C Diagnostic
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0195-LOST COMMUNICATION WITH SDARS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the Satellite Receiver (SDAR) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
SATELLITE RECEIVER POWER AND GROUND
SATELLITE RECEIVER
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE SATELLITE RECEIVER IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the SDARS is active on the bus.

Is the SDARS active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0195-LOST COMMUNICATION WITH SDARS (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

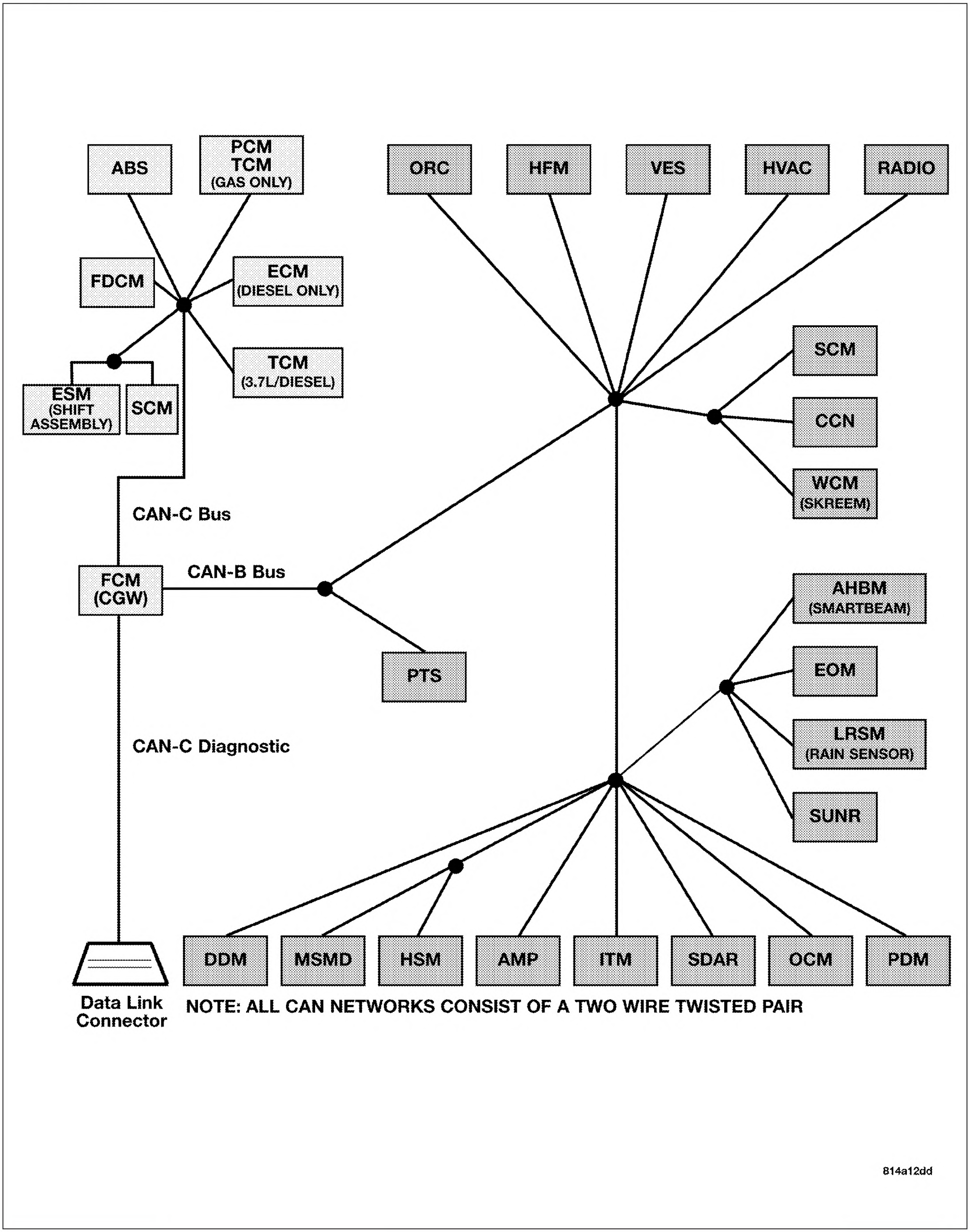
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the SDARS?

Yes >> Replace/update the Satellite Receiver in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set the DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
PTS
AHBM
(SMARTBEAM)
EOM
CAN-C Diagnostic
LRSM
(RAIN SENSOR)
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the vehicle entertainment system (DVD player) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
MONITOR/DVD MEDIA SYSTEM (DVD PLAYER)
MONITOR/DVD MEDIA SYSTEM (DVD PLAYER) POWER AND GROUND
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE VES IS ACTIVE ON THE BUS

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Verify that the VES is active on the bus.

Is the VES active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the VES?

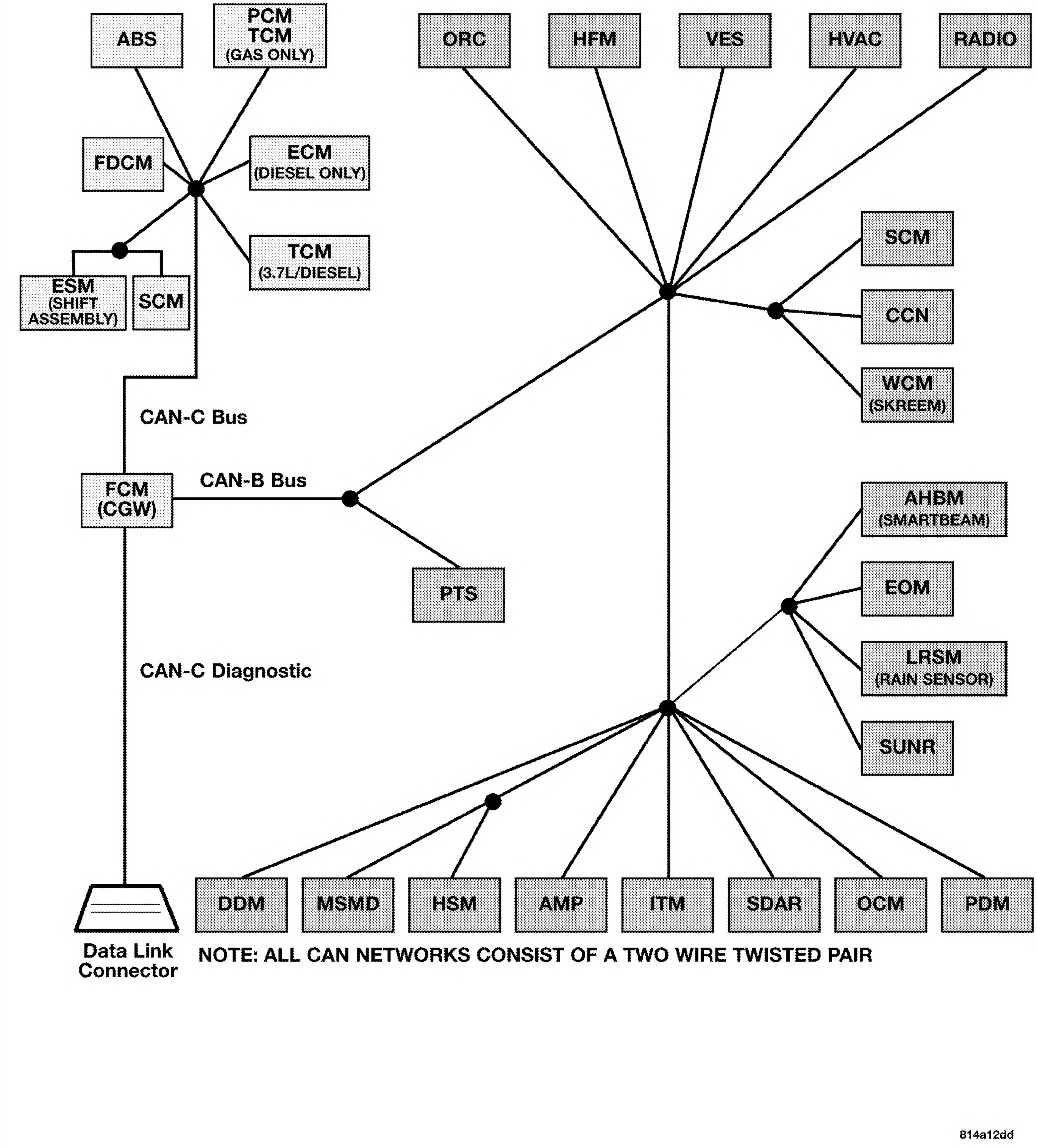
Yes >> Replace/update the Monitor/DVD Media System (DVD Player) in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.

Perform the appropriate VERIFICATION TEST.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the HFM for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
HANDS FREE MODULE POWER AND GROUND
HANDS FREE MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE HFM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the HFM is active on the bus.

Is the HFM active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the HFM?

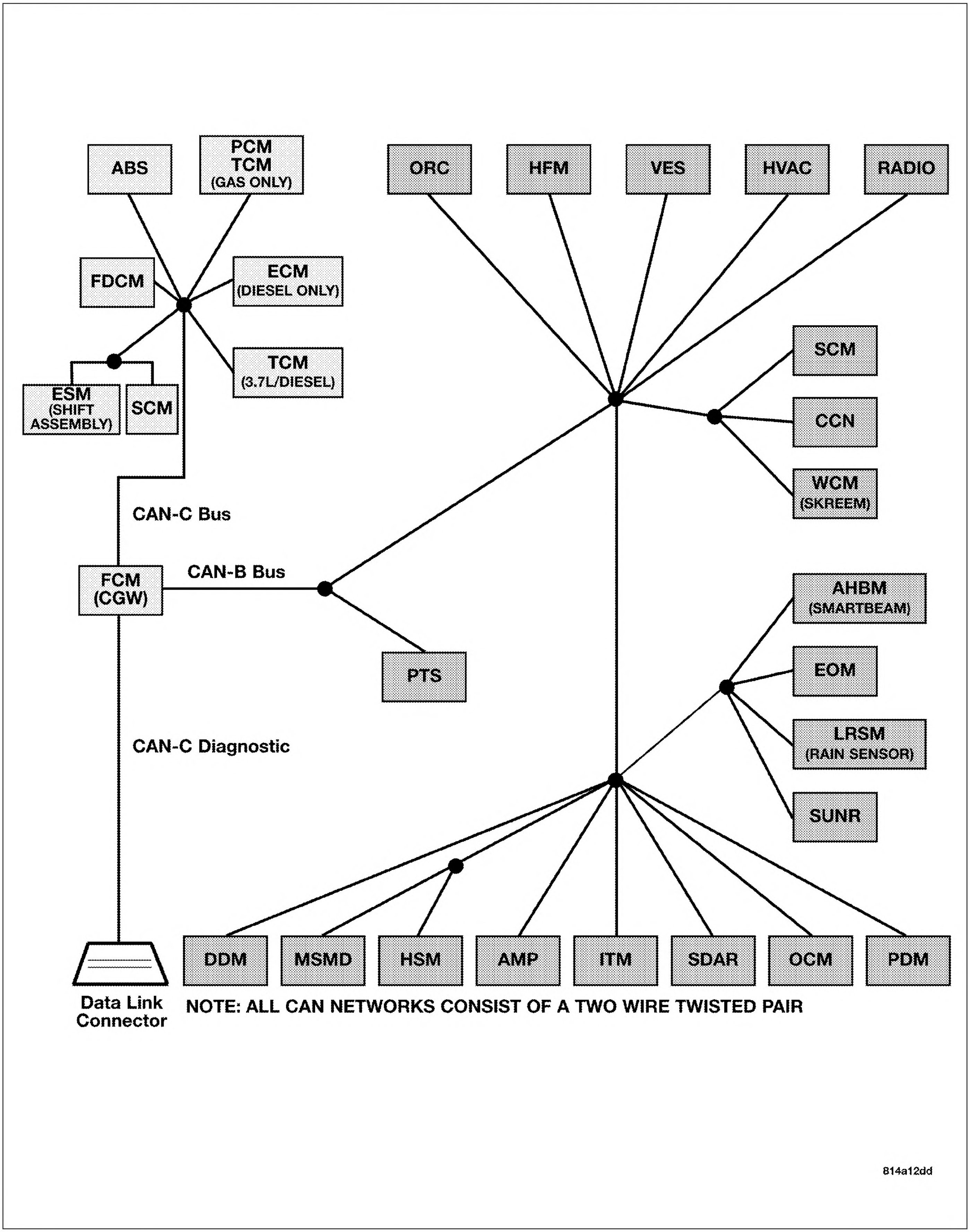
Yes >> Replace/update the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.

Perform the appropriate VERIFICATION TEST.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the DDM for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
DRIVER MEMORY MIRROR MODULE POWER AND GROUND
DRIVER MEMORY MIRROR MODULE
MODULE THAT SET THE DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE DDM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the DDM is active on the bus.

Is the DDM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

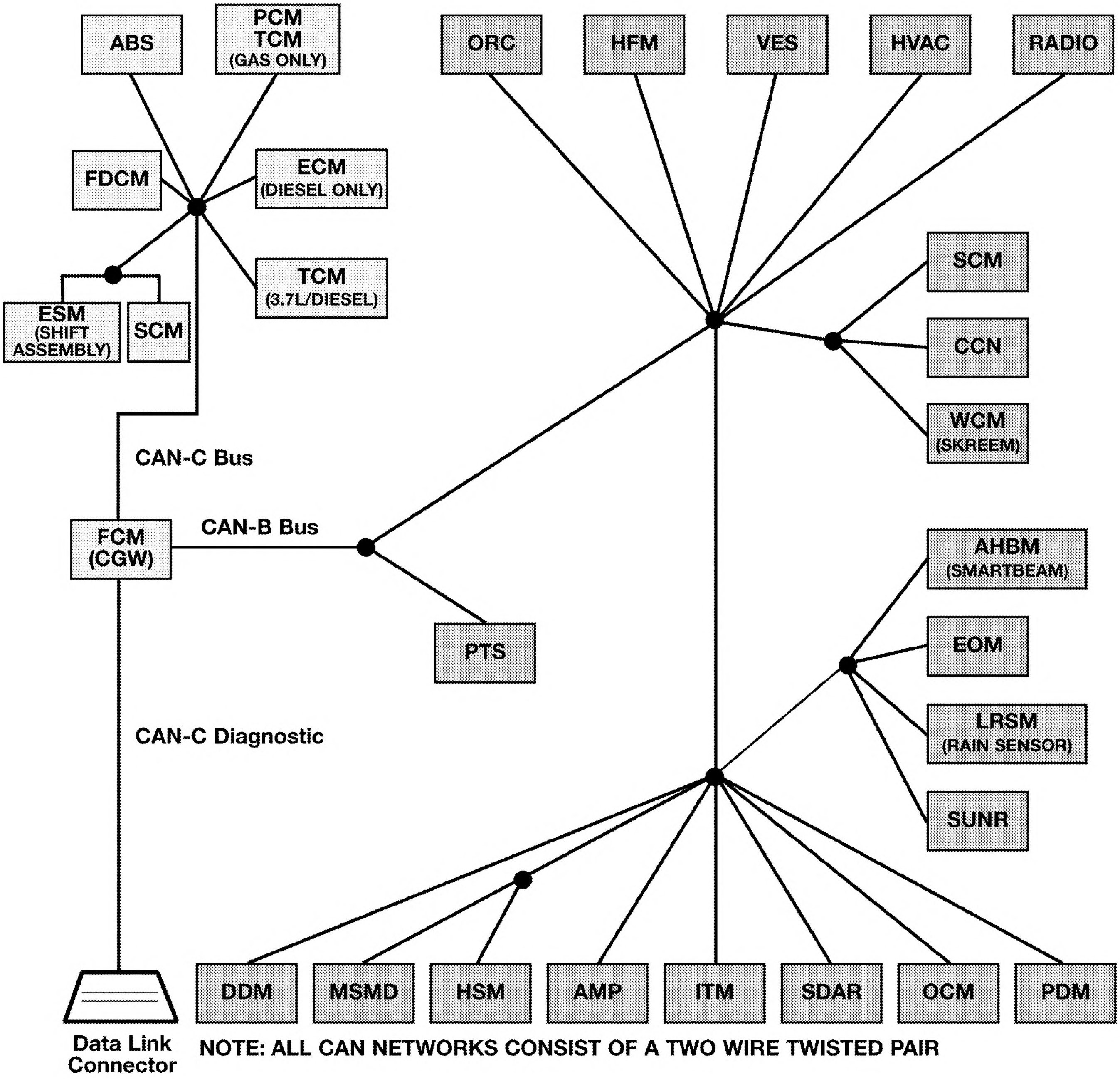
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the DDM?

Yes >> Replace/update the Driver Memory Mirror Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the PDM for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
PASSENGER MEMORY MIRROR MODULE POWER AND GROUND
PASSENGER MEMORY MIRROR MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

3. VERIFY THAT THE PDM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the PDM is active on the bus.

Is the PDM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

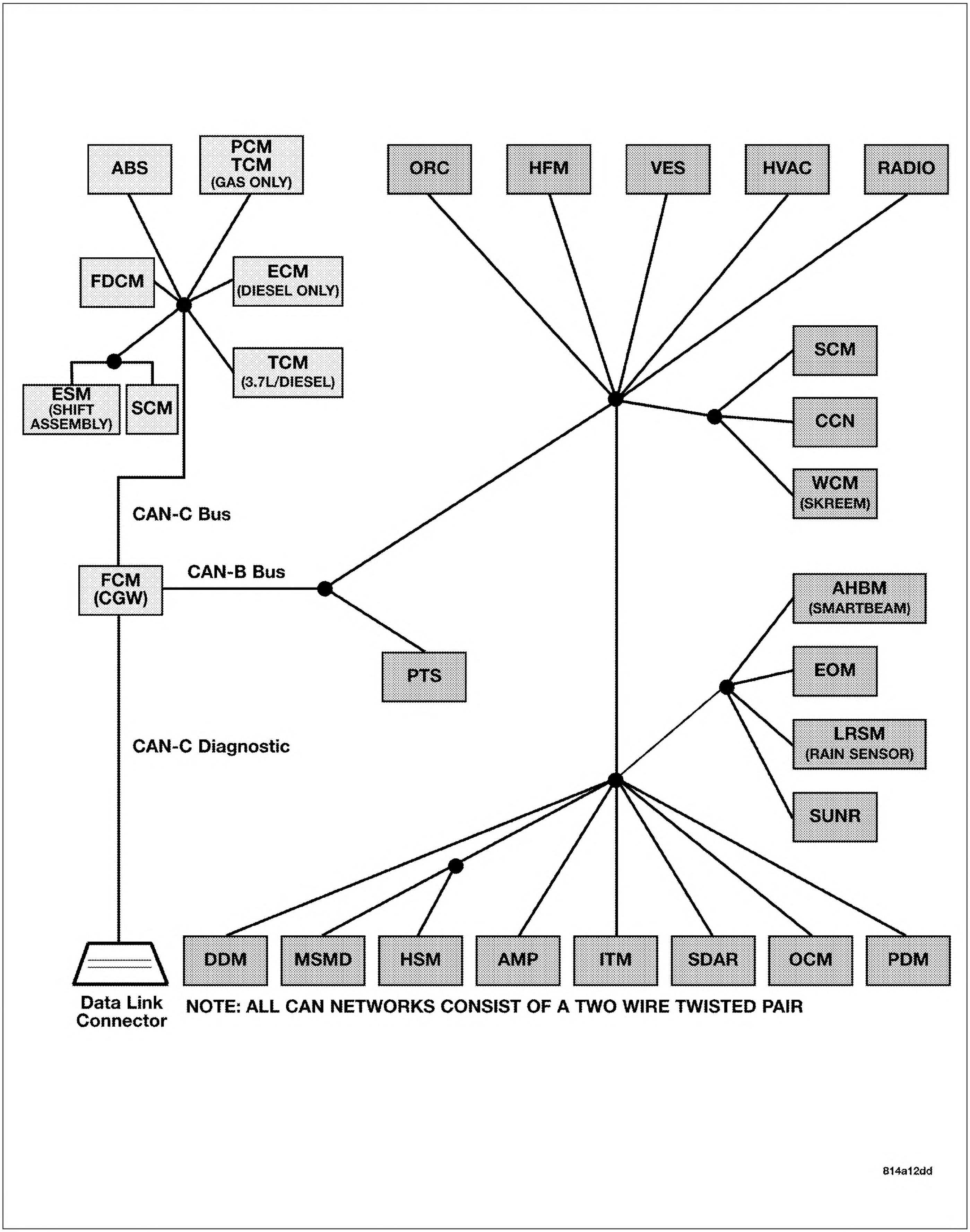
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the PDM?

Yes >> Replace/update the Passenger Memory Mirror Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information
Perform the appropriate VERIFICATION TEST.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the HSM for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
HEATED SEAT MODULE POWER AND GROUND
HEATED SEAT MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE HSM IS ACTIVE ON THE BUS

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Verify that the HSM is active on the bus.

Is the HSM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

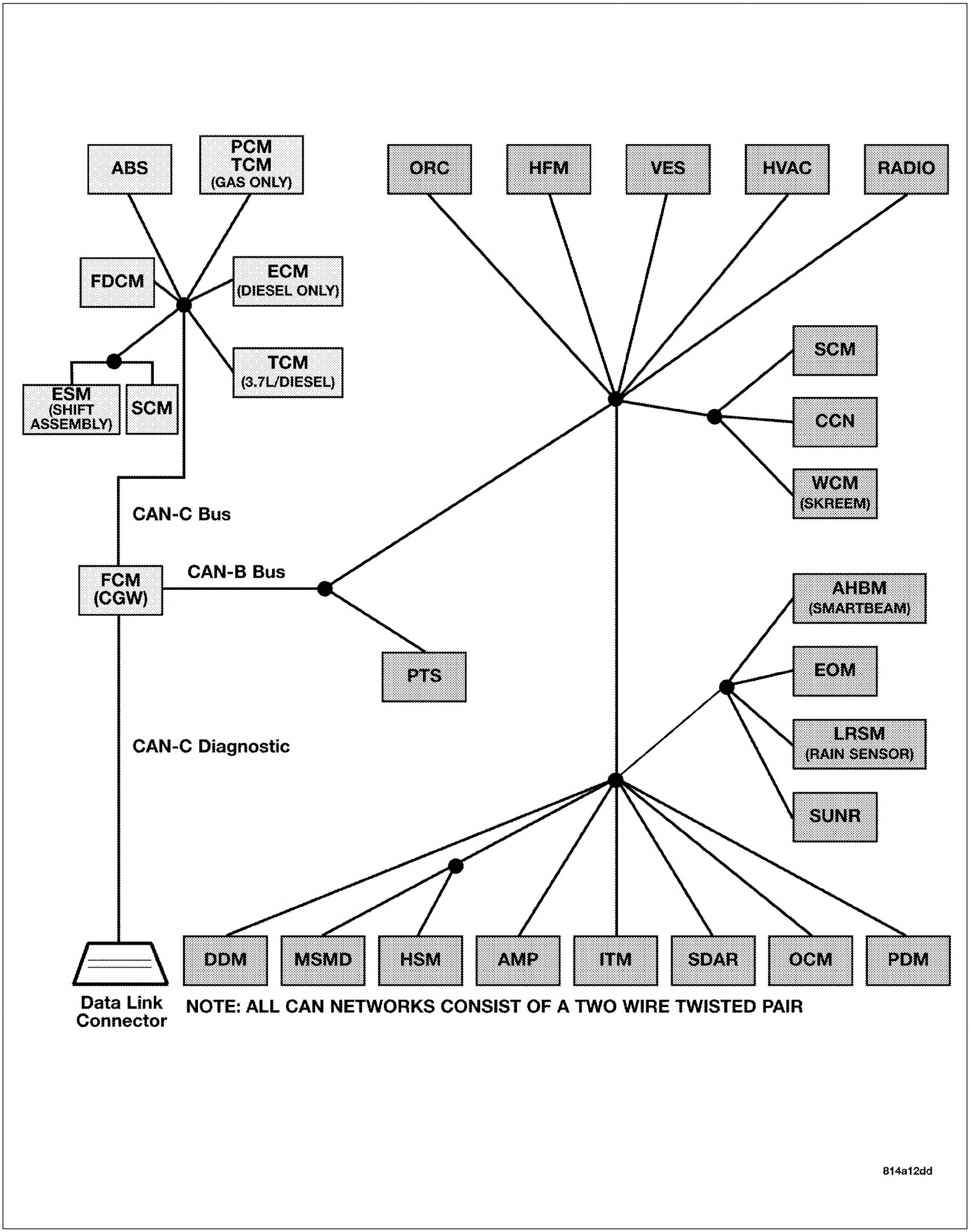
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the HSM?

Yes >> Replace/update the Heated Seat Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the MSMD for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
MEMORY SEAT MODULE POWER AND GROUND
MEMORY SEAT MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE MSMD IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the MSMD is active on the bus.

Is the MSMD active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

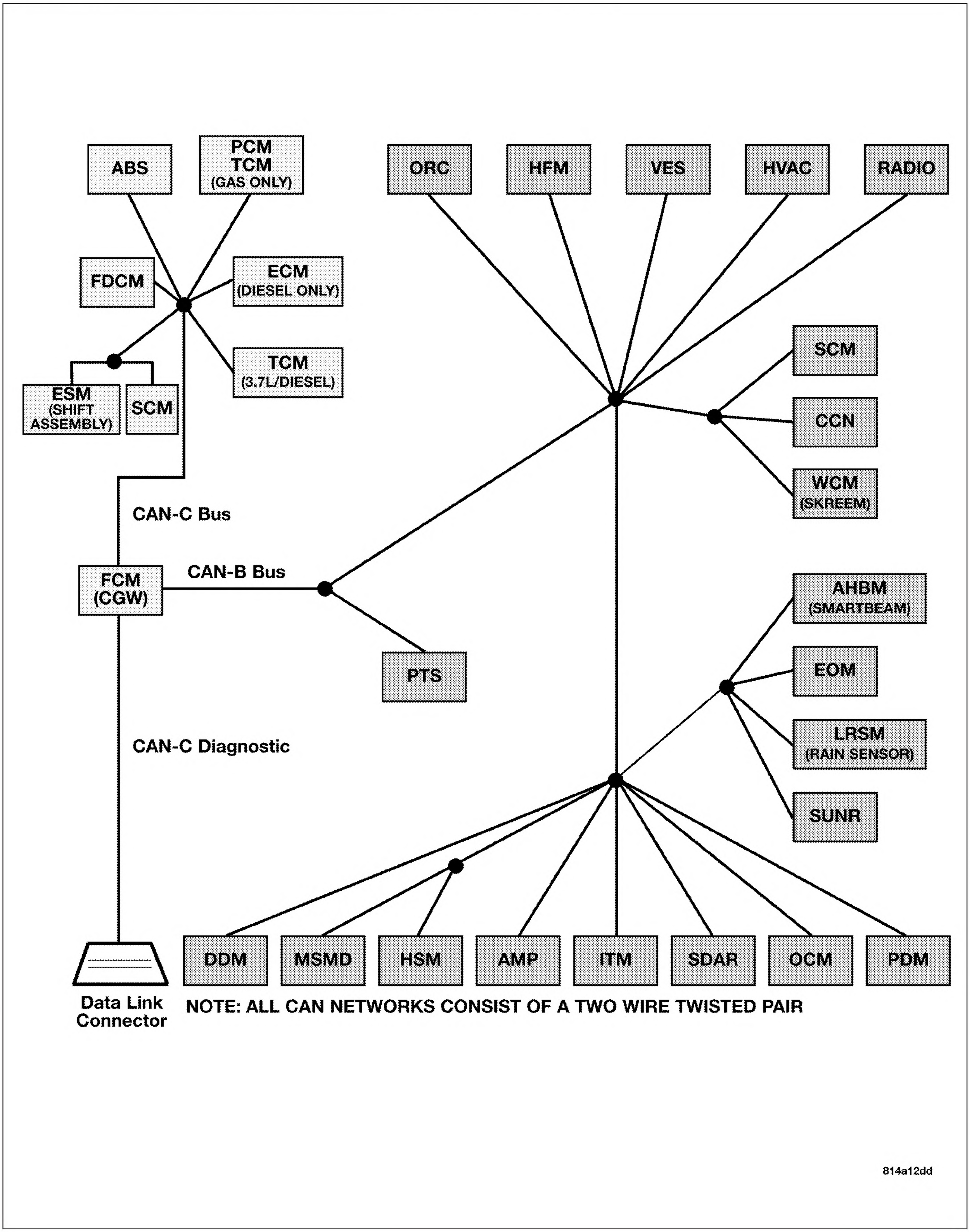
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the MSMD?

Yes >> Replace/update the Memory Seat Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0212-LOST COMMUNICATION WITH SCCM - CAN B


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0212-LOST COMMUNICATION WITH SCCM - CAN B (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the SCM (CAN B) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
STEERING CONTROL MODULE POWER AND GROUND
STEERING CONTROL MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE SCM IS ACTIVE ON THE BUS

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Verify that the SCM is active on the bus.

Is the SCM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0212-LOST COMMUNICATION WITH SCCM - CAN B (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

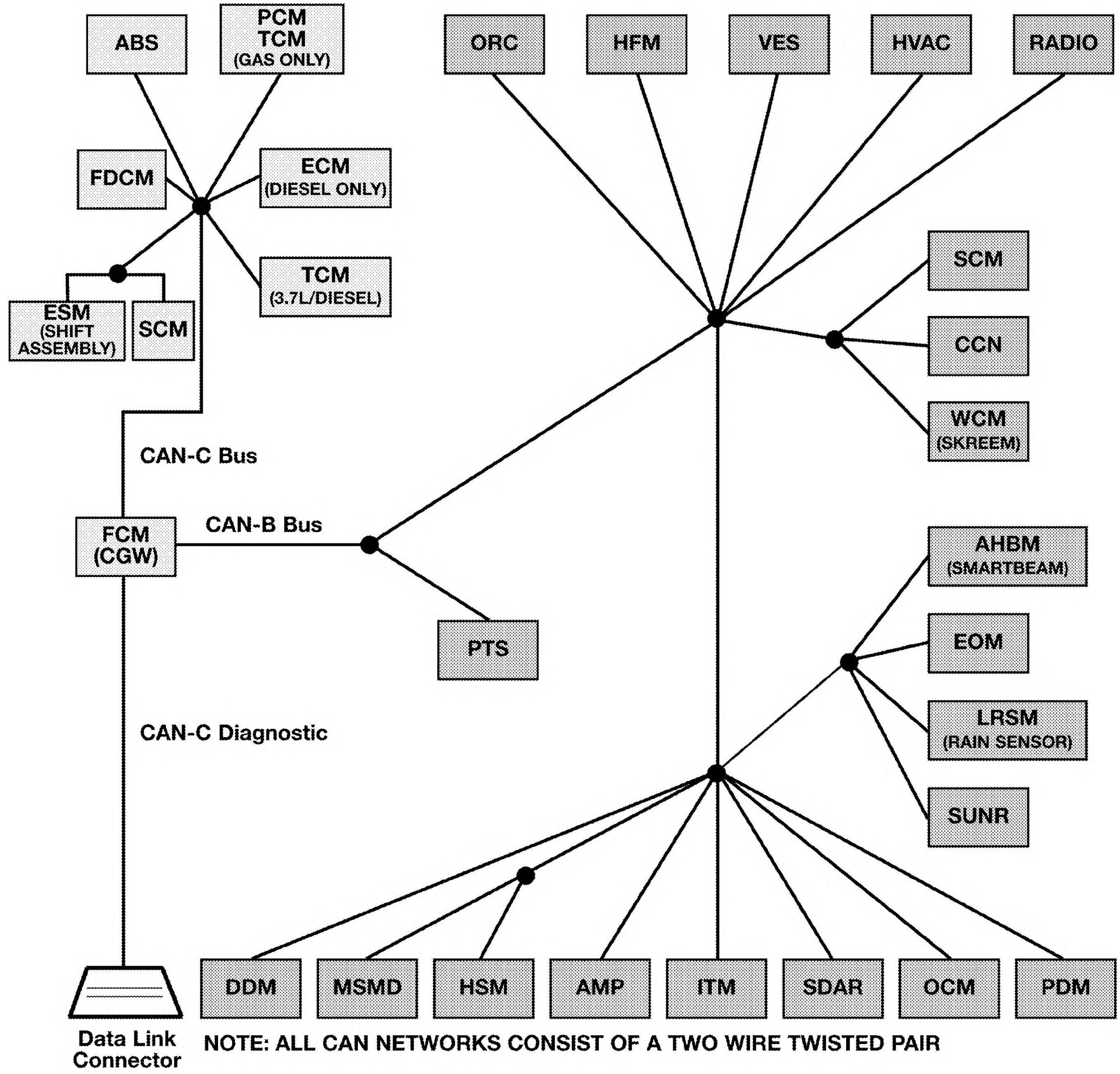
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs "Logged Against" the SCM?

Yes >> Replace/update the Steering Control Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE


ABS
PCM TCM (GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM (DIESEL ONLY)
TCM (3.7L/DIESEL)
ESM (SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM (SKREEM)
CAN-C Bus
FCM (CGW)
CAN-B Bus
PTS
AHBM (SMARTBEAM)
EOM
LRSM (RAIN SENSOR)
SUNR
CAN-C Diagnostic
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the rain sensor (LRSM) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
RAIN SENSOR POWER AND GROUND
RAIN SENSOR
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding. With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE LRSM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the LRSM is active on the bus.

Is the LRSM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

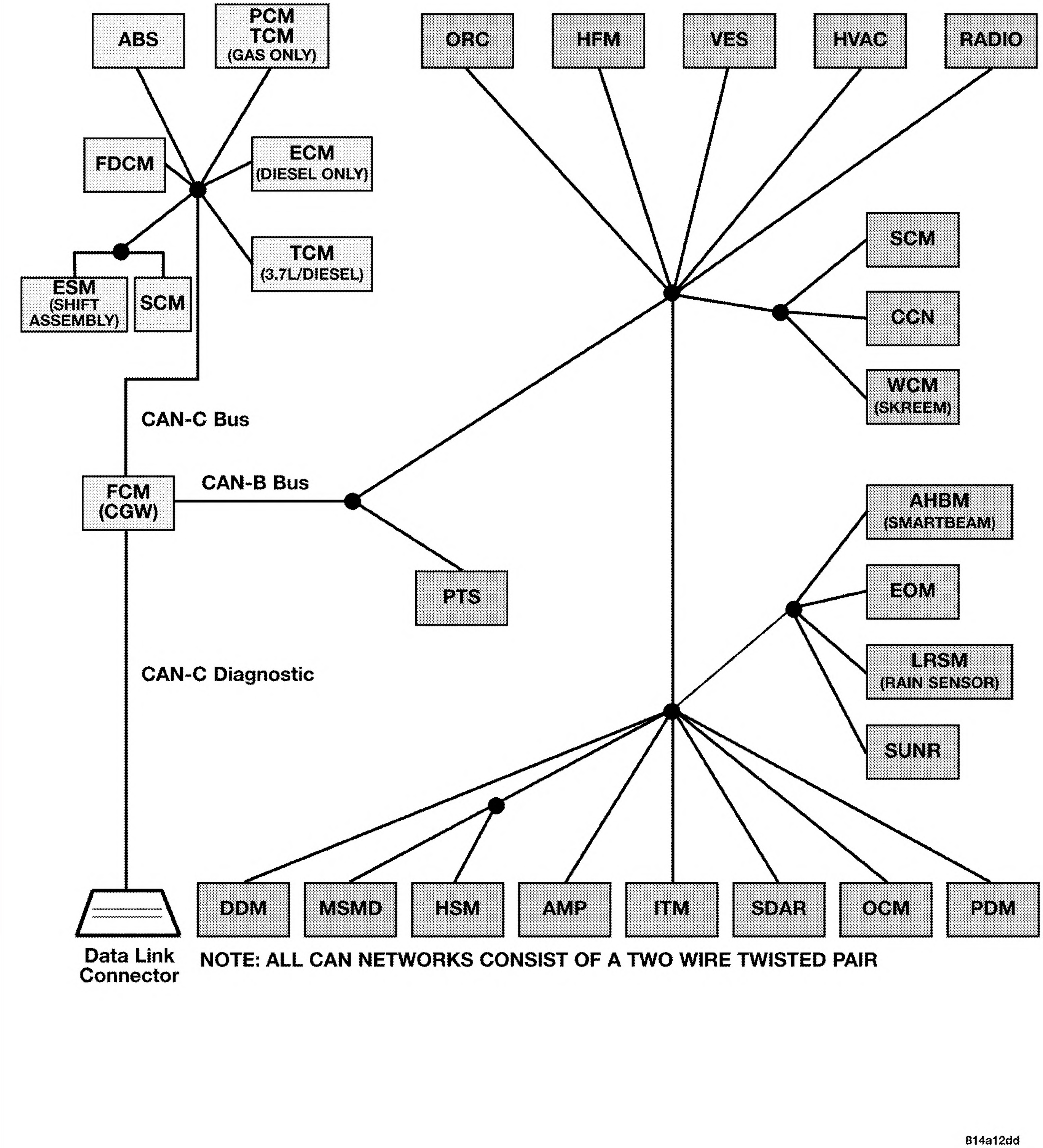
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the LRSM?

Yes >> Replace/update the Rain Sensor in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE


ABS
PCM
TCM
(GAS ONLY)
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
ORC
HFM
VES
HVAC
RADIO
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
PTS
AHBM
(SMARTBEAM)
EOM
LRSM
(RAIN SENSOR)
SUNR
CAN-C Diagnostic
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the inside rearview mirror (smartbeam) for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
INSIDE REARVIEW MIRROR (SMARTBEAM) POWER AND GROUND
INSIDE REARVIEW MIRROR (SMARTBEAM)
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Index for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE AHBM (SMARTBEAM) IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the AHBM (SMARTBEAM) is active on the bus.

Is the AHBM (SMARTBEAM) active on the bus?

Yes >> Go To 4

No >> Refer to the No Response test procedure. Refer to the table of contents in this section.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

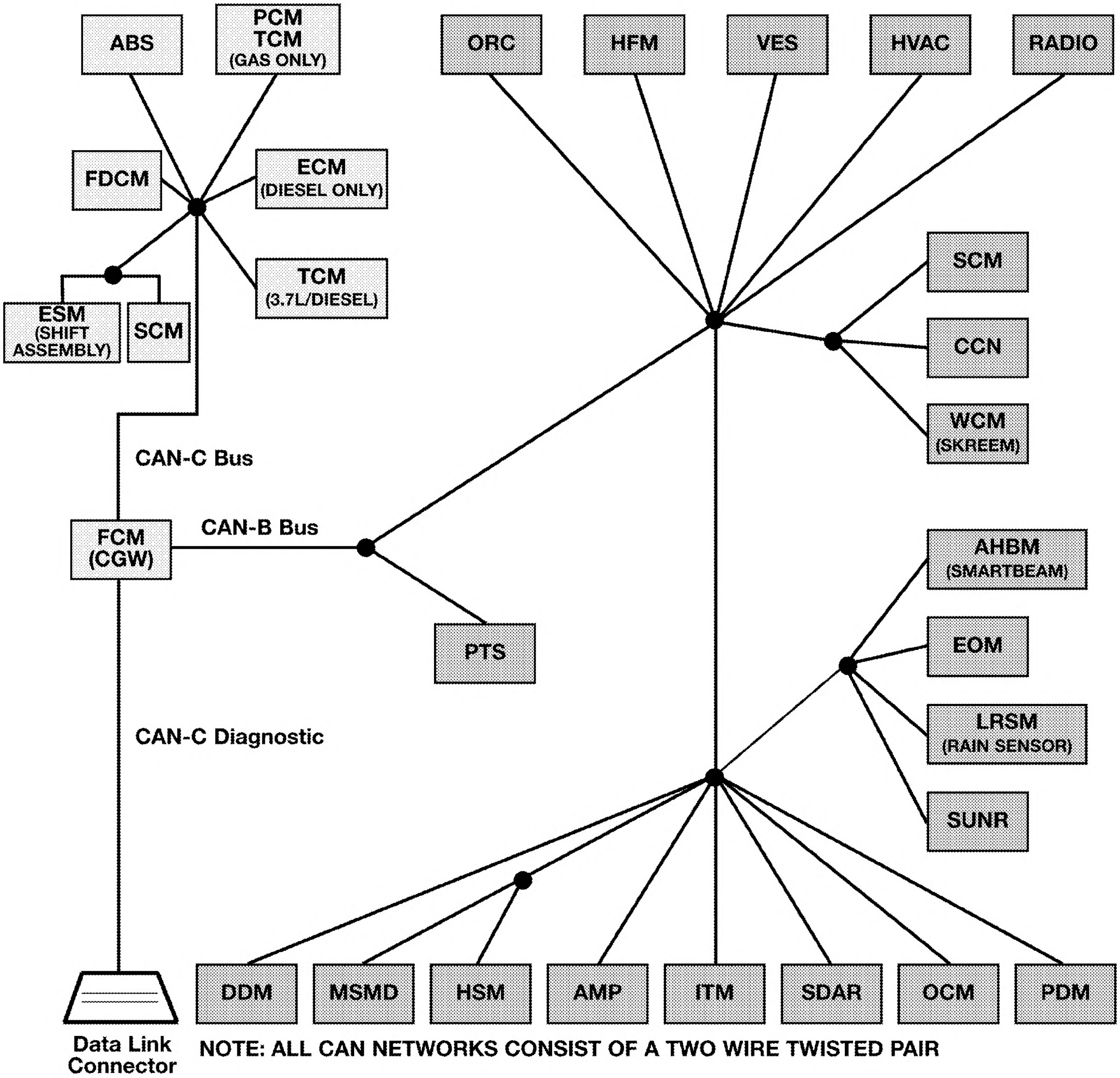
With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the AHBM (SMARTBEAM)?

Yes >> Replace/update the Inside Rearview Mirror (SMARTBEAM) in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

U1108-ADDITIONAL CAN B ECU DETECTED


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

814a12dd

U1108-ADDITIONAL CAN B ECU DETECTED (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Front Control Module detects an additional CAN B module and requires a reconfiguration.

Possible Causes
ADDITIONAL MODULE ADDED/REMOVED FROM THE CAN B BUS NETWORK

Diagnostic Test

1. RECONFIGURE THE FRONT CONTROL MODULE

Turn the ignition on.

With the scan tool, select network view and press the gateway button. This will list the CAN modules on the vehicle. Read and record the listed modules.

With the scan tool, select FCM, miscellaneous functions then add/remove ECUs.

With the scan tool, add or remove the module that was not configured in the FCM.

With the scan tool, erase DTC’s.

Cycle the ignition from on to off 3 times and read the active FCM DTC’s.

Does the scan tool display this DTC as active?

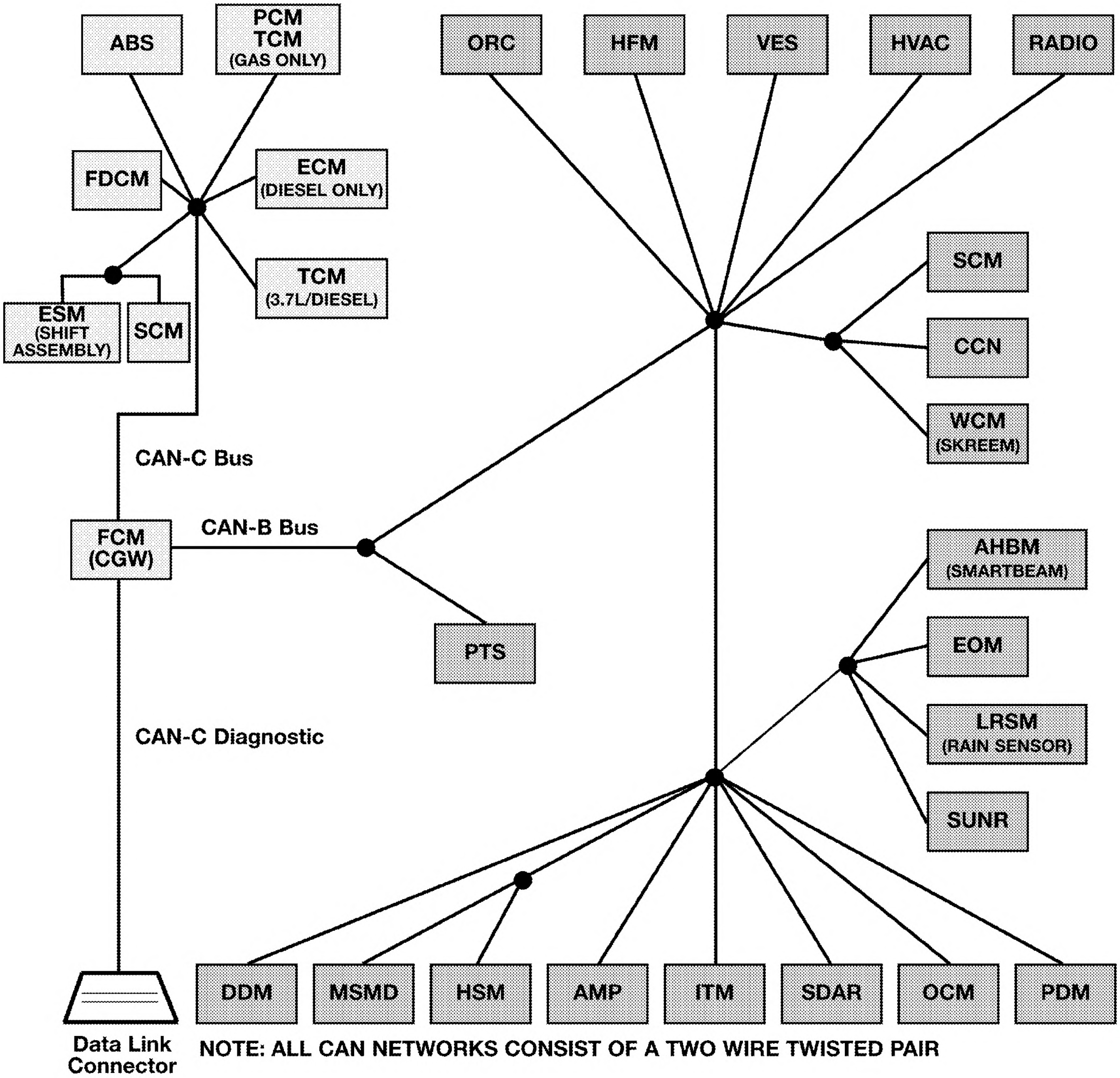
Yes >> Retest system and attempt to reconfigure the FCM.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U110A-LOST COMMUNICATION WITH SCCM - CAN C


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

U110A-LOST COMMUNICATION WITH SCCM - CAN C (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
    - With the ignition on
    - Battery voltage between 10 and 16 volts
    - IOD fuse installed
    - FCM is configured correctly
- **Set Condition:**
  Bus messages not received from the SCM (CAN C) for approximately 200ms.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
STEERING CONTROL MODULE POWER AND GROUND
STEERING CONTROL MODULE
MODULE THAT SET THIS DTC

Diagnostic Test

1. VERIFY DTC IS ACTIVE

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read active DTCs.

Is this DTC active?

Yes >> Go To 2

No >> Refer to the Stored Lost Communication test procedure. Refer to the table of contents in this section.

---

2. CHECK FOR ANY OF THE FOLLOWING ACTIVE DTCS

With the scan tool, read active DTCs from all modules.

NOTE: Check for FCM configuration, CAN B or C hardware electrical, VIN Missing/Mismatch, battery or ignition related DTCs.

Does the scan tool display any active DTCs to the conditions listed above?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents for a complete list of the symptoms.

No >> Go To 3

---

3. VERIFY THAT THE SCM IS ACTIVE ON THE BUS

Turn the ignition on.
With the scan tool, select Network Diagnostics.
Verify that the SCM is active on the bus.

Is the SCM active on the bus?

Yes >> Go To 4

No >> Refer to the Table of Contents located in this section for a no response test procedure.

U110A-LOST COMMUNICATION WITH SCCM - CAN C (CONTINUED)

4. CHECK FOR ADDITIONAL COMMUNICATION RELATED DTCS

With the scan tool, select Network Diagnostics.

Is there more than one module with active DTCs “Logged Against” the SCM?

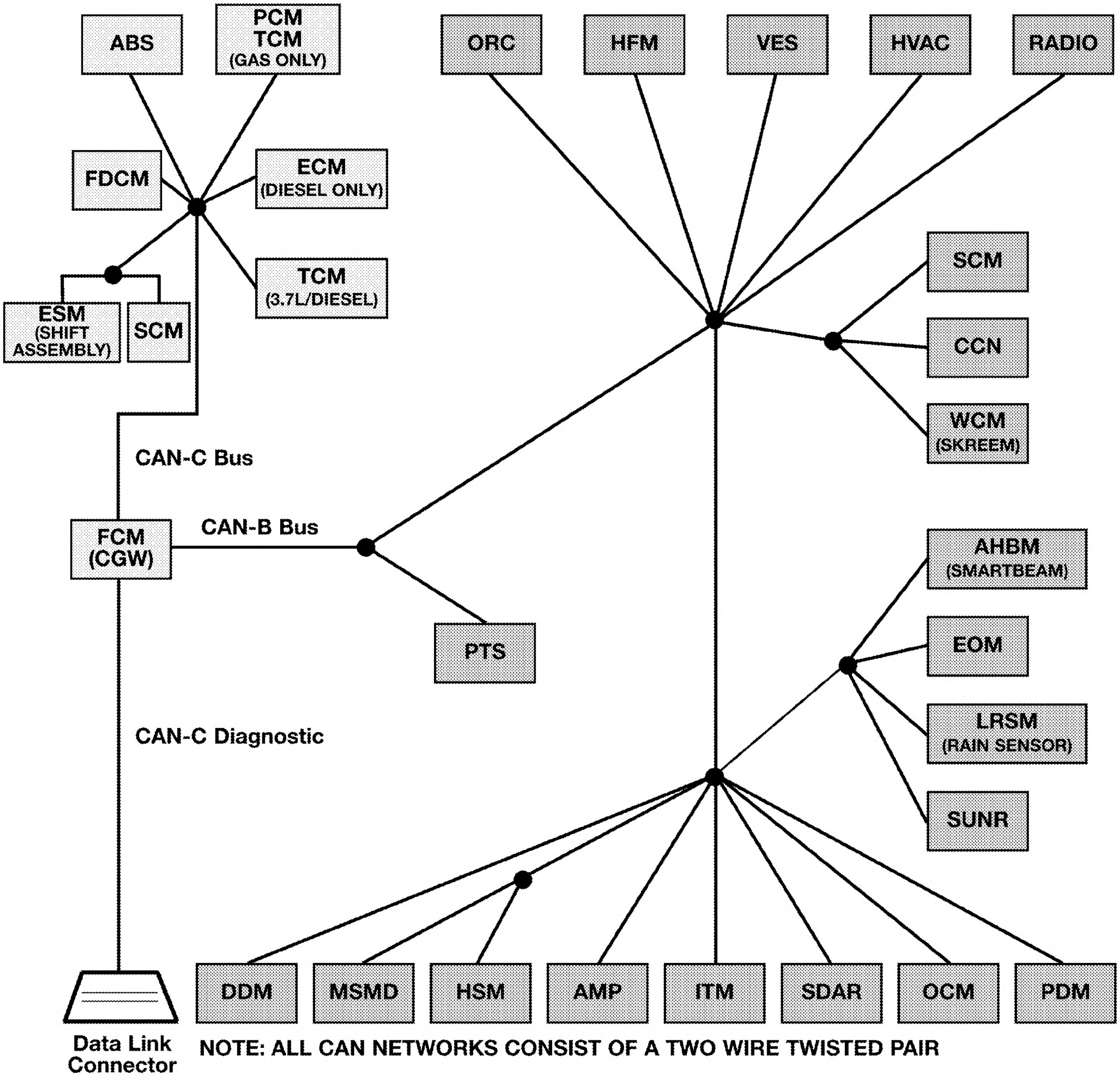
Yes >> Replace/update the Steering Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace/update the module that set this DTC in accordance with the service information.

Perform the appropriate VERIFICATION TEST.

*STORED LOST COMMUNICATION DTCS


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

814a12dd

*STORED LOST COMMUNICATION DTCS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  - With the ignition on
  - Battery voltage between 10 and 16 volts
  - IOD fuse installed
  - FCM is configured correctly
- **Set Condition:**
  Bus messages not received for approximately 2 to 5 seconds.

Possible Causes
CAN B BUS CIRCUITS OPEN OR SHORTED
DTCS RELATED TO BATTERY VOLTAGE, IGNITION, OR VIN MESSAGES
FCM NOT CONFIGURED CORRECTLY
POWER OR GROUND FROM THE REPORTING MODULE
MODULE THAT SET THIS DTC
PREVIOUS SERVICE PERFORMED WITHIN THE LAST 100 KEY CYCLES (FUSE/RELAYS REMOVED, WIRING SERVICE, BATTERY DISCONNECT)
LOW BATTERY/JUMP START CONDITION
IOD FUSE WAS REMOVED DURING SHIPPING
CHECK FOR RELATED TSBS

Diagnostic Test

1. VERIFY DTC IS STORED

NOTE: Stored faults may indicate a customer perceived intermittent condition.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10 and 16 volts before proceeding.
With the scan tool, read stored DTCs.

Is this DTC stored?

Yes >> Go To 2

No >> Diagnose the active DTC. Refer to the Index for a list of the symptoms.

---

2. CHECK THE ENVIRONMENTAL DATA

With the scan tool, read the loss of communication environmental data.

Does the loss of communication environmental odometer data match up to any of the previous service procedures listed in the possible causes or are their any stored CAN B or C hardware electrical, battery, ignition voltage, VIN missing/mismatch, FCM configuration DTCs present with matching environmental data?

Yes >> These DTCs may have been the result of other service procedures performed. Clear DTCs.

No >> Go To 3

---

*STORED LOST COMMUNICATION DTCS (CONTINUED)

3. VERIFY INTERMITTENT LOST COMMUNICATION DTC – WIRING CONCERNS

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Is there more than one ECU with stored DTCs "Logged Against" the module and one or more lost communication DTCs stored in the offending module?

Yes >> Verify if the vehicle was recently in for this type of service. Otherwise, visually inspect the related wiring harness for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent, pushed out, and corroded terminals. Repair as necessary.

No >> Go To 4

4. VERIFY INTERMITTENT LOST COMMUNICATION DTC – OFFENDING MODULE

Turn the ignition on.

With the scan tool, select Network Diagnostics.

Is there more than one ECU with stored DTCs "Logged Against" the module and NO lost communication DTCs stored in the offending module?

Yes >> Check for TSB related to this offending module.

No >> Go To 5

5. VERIFY INTERMITTENT LOST COMMUNICATION DTC – REPORTING MODULE

Turn the ignition on.

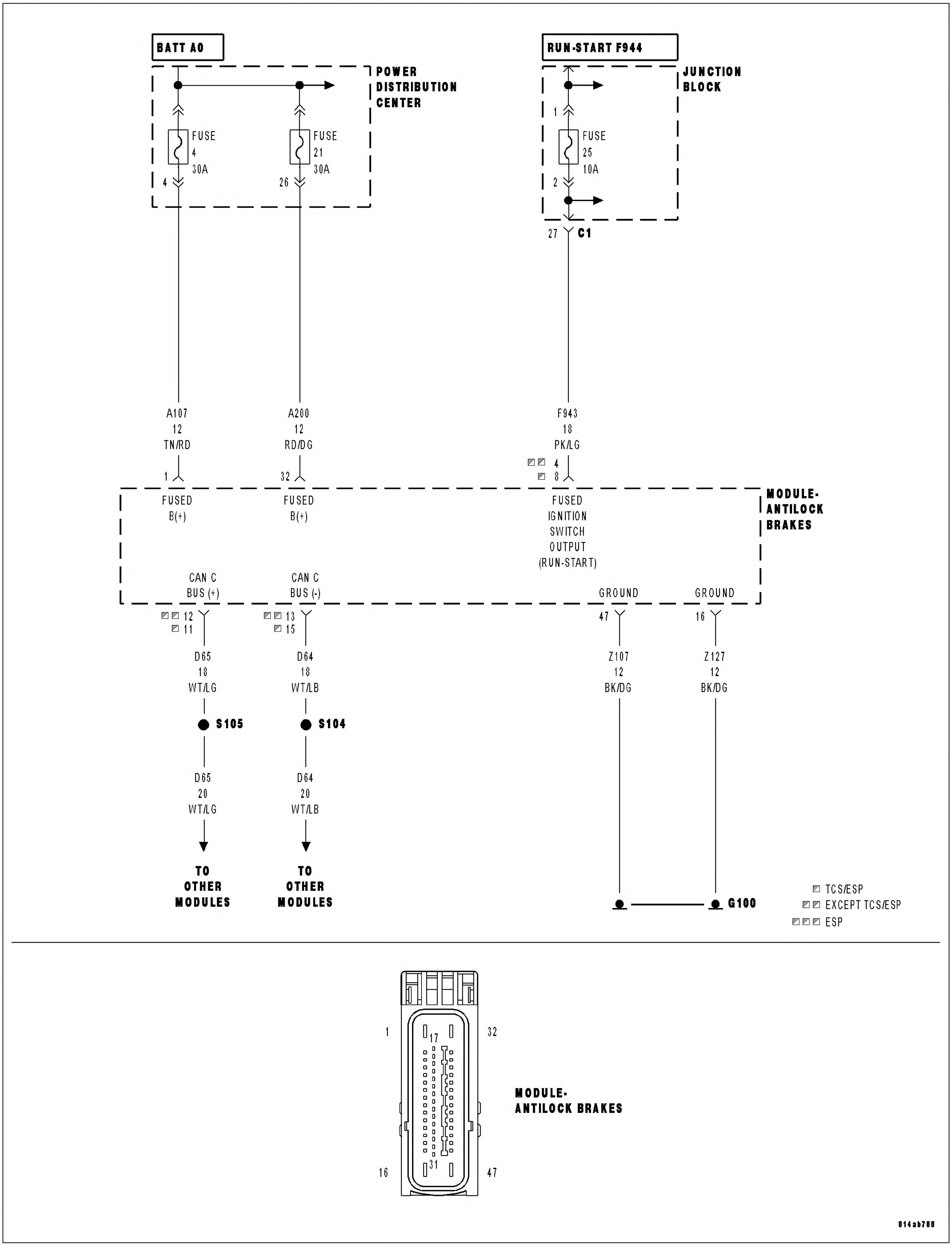
With the scan tool, select Network Diagnostics.

Is there ONLY ONE ECU with stored DTCs "Logged Against" the module?

Yes >> Check for TSB related to the module that set this DTC.

No >> Verify if the vehicle was recently in for this type of service. Otherwise, visually inspect the related wiring harness for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent, pushed out, and corroded terminals. Repair as necessary.

*NO RESPONSE FROM ABS (ANTILOCK BRAKE MODULE)


BATT A0
POWER DISTRIBUTION CENTER
FUSE 4 30A
4
FUSE 21 30A
26
RUN-START F944
JUNCTION BLOCK
1
FUSE 25 10A
2
27
C1
A107
12
TN/RD
A200
12
RD/DG
F943
18
PK/LG
1
32
▨▨ 4
▨ 8
MODULE-ANTILOCK BRAKES
FUSED B(+)
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
▨▨ 12
▨ 11
▨▨ 13
▨ 15
47
16
D65
18
WT/LG
D64
18
WT/LB
Z107
12
BK/DG
Z127
12
BK/DG
S105
S104
D65
20
WT/LG
D64
20
WT/LB
TO OTHER MODULES
TO OTHER MODULES
G100
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
▨▨▨ ESP
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
814ab788

*NO RESPONSE FROM ABS (ANTILOCK BRAKE MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A107) (A200) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z107) (Z127) GROUND CIRCUIT OPEN
(F943) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED
(D65) CAN C BUS (+) CIRCUIT OPEN
(D64) CAN C BUS (-) CIRCUIT OPEN
ANTILOCK BRAKE MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: Check the FCM for any active CAN C hardware DTCs, perform DTC before proceeding.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A107) (A200) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

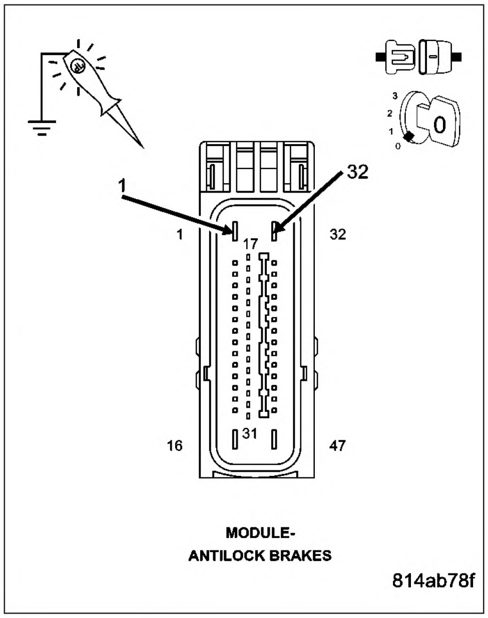
Disconnect the Antilock Brake Module harness connector.

Using a 12-volt test light connected to ground, check each (A107) and (A200) Fused B(+) circuit.

Does the test light illuminate brightly for each circuit?

Yes >> Go To 3

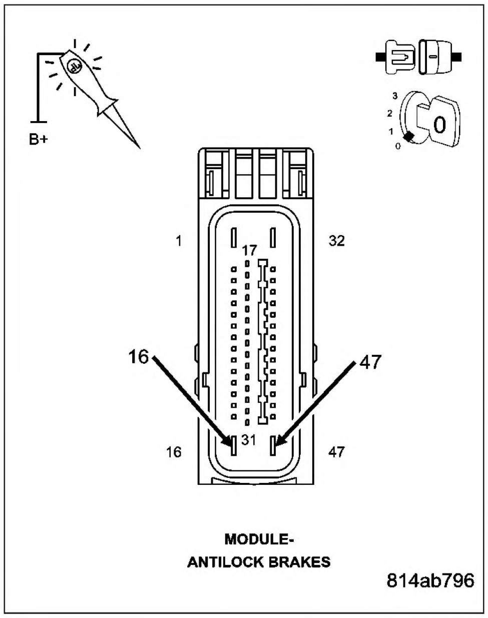
No >> Repair the Fused B(+) circuit for an open or short.
Perform ABS VERIFICATION TEST - VER 1.



*NO RESPONSE FROM ABS (ANTILOCK BRAKE MODULE) (CONTINUED)

3. (Z107) (Z127) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check each (Z107) and (Z127) ground circuit.


B+
1
17
32
16
47
31
16
47
3
2
1
0
0
MODULE-
ANTILOCK BRAKES
814ab796

Does the test light illuminate brightly for each circuit?

Yes >> Go To 4

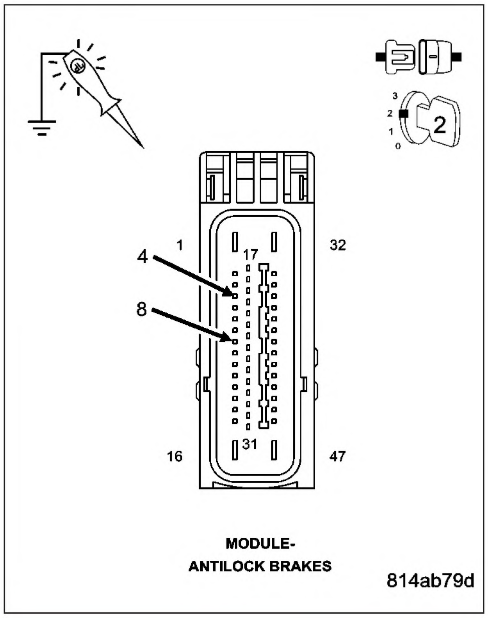
No >> Repair the ground circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

---

4. (F943) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F943) Fused Ignition Switch Output circuit.


1
17
32
4
8
16
31
47
3
2
1
0
2
MODULE-
ANTILOCK BRAKES
814ab79d

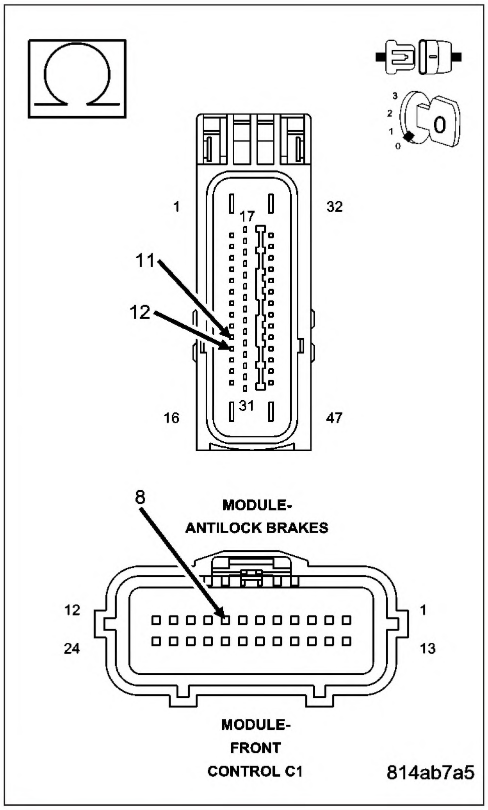
Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (F943) Fused Ignition Switch Output circuit for an open or short.
Perform ABS VERIFICATION TEST - VER 1.

*NO RESPONSE FROM ABS (ANTILOCK BRAKE MODULE) (CONTINUED)

5. (D65) CAN C BUS (+) CIRCUIT OPEN


1
17
32
11
12
31
16
47
8
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
814ab7a5

Turn the ignition off.

Disconnect the FCM C1 harness connector.

Measure the resistance of the (D65) CAN C Bus (+) circuit between the FCM connector and the Antilock Brake Module connector.

Is resistance below 5.0 ohms?

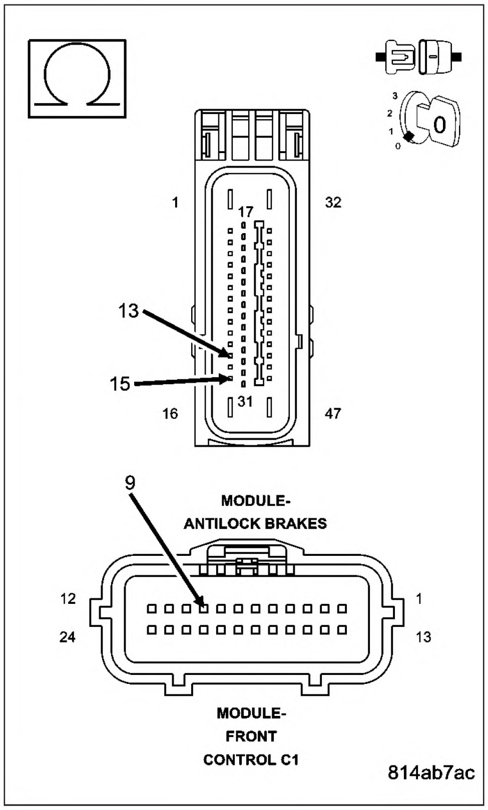
Yes >> Go To 6

No >> Repair the (D65) CAN C Bus (+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.

*NO RESPONSE FROM ABS (ANTILOCK BRAKE MODULE) (CONTINUED)

6. (D64) CAN C BUS (-) CIRCUIT OPEN

Measure the resistance of the (D64) CAN C Bus (-) circuit between the FCM connector and the Antilock Brake Module connector.

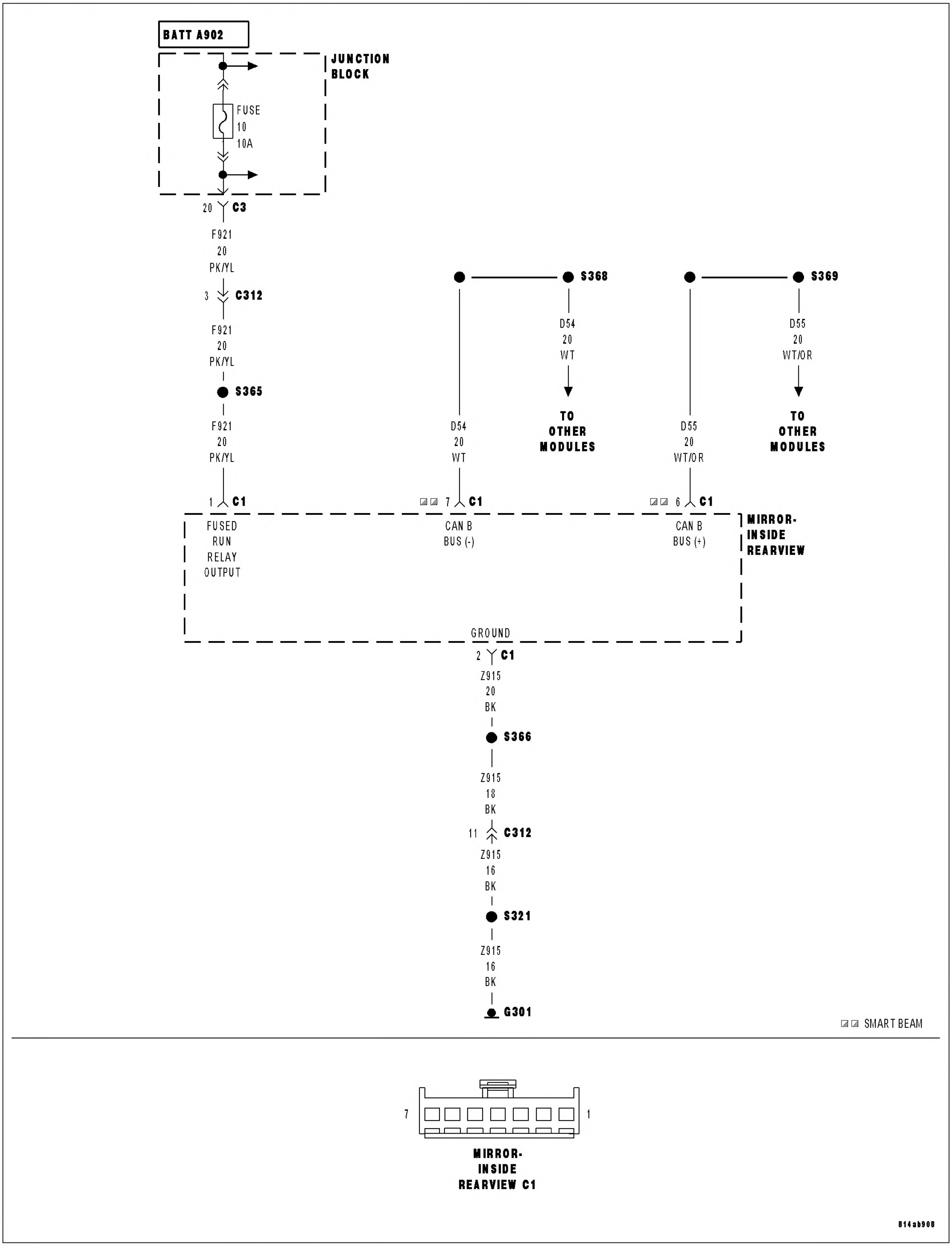

1
17
32
13
15
31
16
47
9
MODULE-
ANTILOCK BRAKES
12
24
1
13
MODULE-
FRONT
CONTROL C1
814ab7ac

Is resistance below 5.0 ohms?

Yes >> Replace the Antilock Brake Module in accordance with the service information.
Perform ABS VERIFICATION TEST - VER 1.

No >> Repair the (D64) CAN C Bus (-) circuit for an open.
Perform ABS VERIFICATION TEST - VER 1.

*NO RESPONSE FROM AHBM (SMARTBEAM)


BATT A902
JUNCTION BLOCK
FUSE 10 10A
20 C3
F921 20 PK/YL
3 C312
F921 20 PK/YL
S365
F921 20 PK/YL
1 C1
S368
D54 20 WT
TO OTHER MODULES
D54 20 WT
▨▨ 7 C1
S369
D55 20 WT/OR
TO OTHER MODULES
D55 20 WT/OR
▨▨ 6 C1
FUSED RUN RELAY OUTPUT
CAN B BUS (-)
CAN B BUS (+)
MIRROR-INSIDE REARVIEW
GROUND
2 C1
Z915 20 BK
S366
Z915 18 BK
11 C312
Z915 16 BK
S321
Z915 16 BK
G301
▨▨ SMART BEAM
7
1
MIRROR-INSIDE REARVIEW C1
814ab908

*NO RESPONSE FROM AHBM (SMARTBEAM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED
(Z915) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
INSIDE REARVIEW MIRROR (CONTROLS SMARTBEAM FUNCTIONS)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED

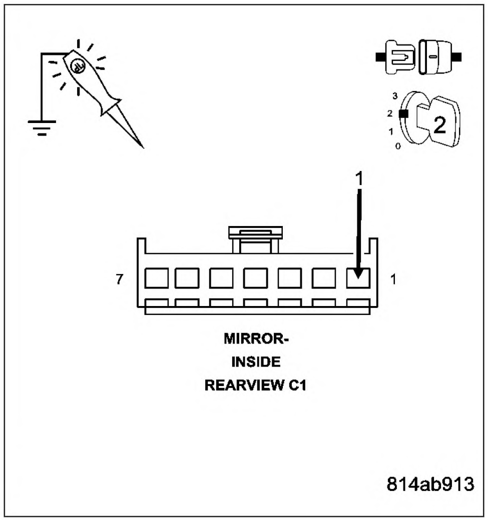
Turn the ignition off.

NOTE: Check the FCM and the Cluster for any ignition related DTCs. If set, perform the appropriate DTC before proceeding.

Disconnect the Inside Rearview Mirror C1 harness connector.

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F921) Fused Run Relay Output circuit.



Does the test light illuminate brightly?

Yes >> Go To 3

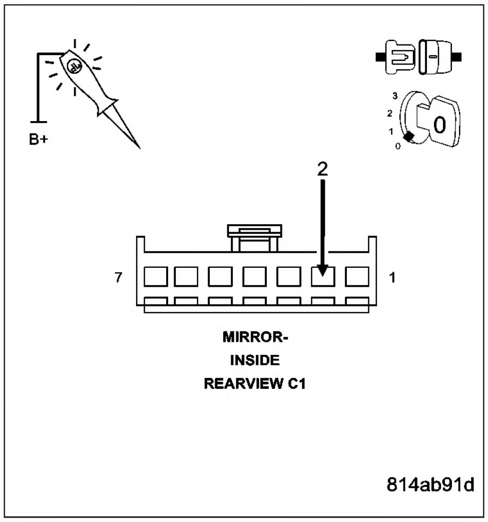
No >> Repair the (F921) Fused Run Relay Output circuit for an open or short.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM AHBM (SMARTBEAM) (CONTINUED)

3. (Z915) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z915) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z915) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

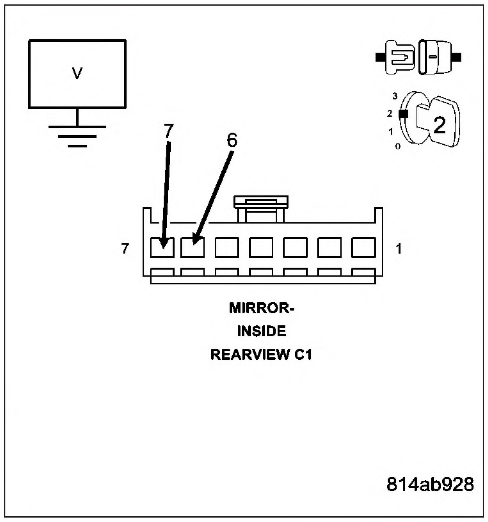
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

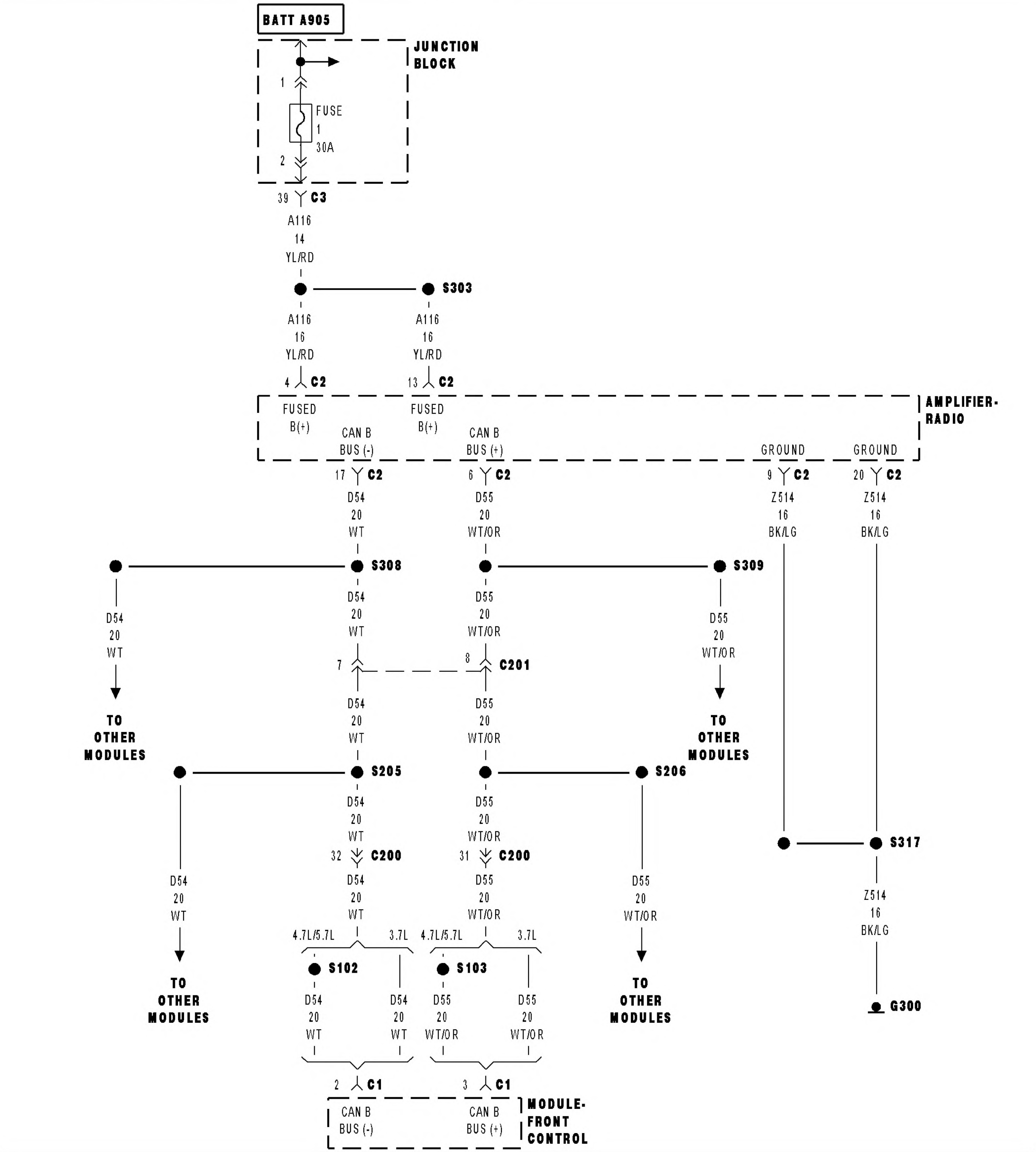


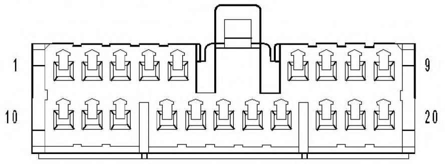
Is there any voltage present on either circuit?

Yes >> Replace and program/calibrate the Inside Rearview Mirror (for smartbeam functions) in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM AMP (AMPLIFIER)


BATT A905
JUNCTION BLOCK
1
FUSE
1
30A
2
39 C3
A116
14
YL/RD
S303
A116
16
YL/RD
A116
16
YL/RD
4 C2
13 C2
AMPLIFIER-RADIO
FUSED B(+)
FUSED B(+)
CAN B BUS (-)
CAN B BUS (+)
GROUND
GROUND
17 C2
6 C2
9 C2
20 C2
D54
20
WT
D55
20
WT/OR
Z514
16
BK/LG
Z514
16
BK/LG
S308
S309
D54
20
WT
D55
20
WT/OR
7
8
C201
TO OTHER MODULES
TO OTHER MODULES
S205
S206
32 C200
31 C200
S317
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
S102
S103
G300
2 C1
3 C1
MODULE-FRONT CONTROL
CAN B BUS (-)
CAN B BUS (+)


1
9
10
20
814aafa5

AMPLIFIER RADIO C2 (PREMIUM AUDIO)

*NO RESPONSE FROM AMP (AMPLIFIER) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A116) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z514) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
AMPLIFIER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

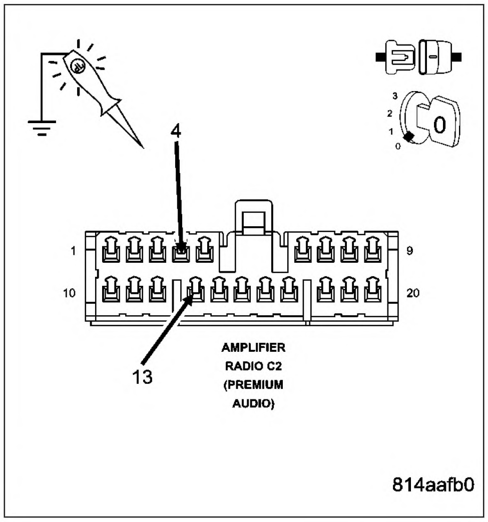
---

2. (A116) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

Disconnect the Radio Amplifier C2 harness connector.

Using a 12-volt test light connected to ground, check each (A116) Fused B(+) circuit.



Does the test light illuminate brightly for each circuit?

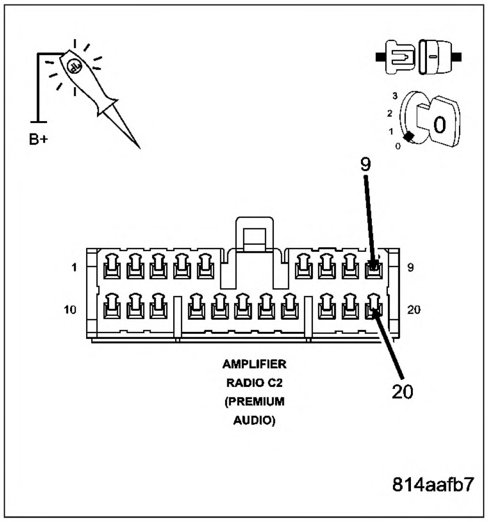
Yes >> Go To 3

No >> Repair the (A116) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM AMP (AMPLIFIER) (CONTINUED)

3. (Z514) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check each (Z514) ground circuit.


B+
3
2
1
0
0
9
1
9
10
20
AMPLIFIER
RADIO C2
(PREMIUM
AUDIO)
20
814aafb7

Does the test light illuminate brightly for each circuit?

Yes >> Go To 4

No >> Repair the (Z514) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

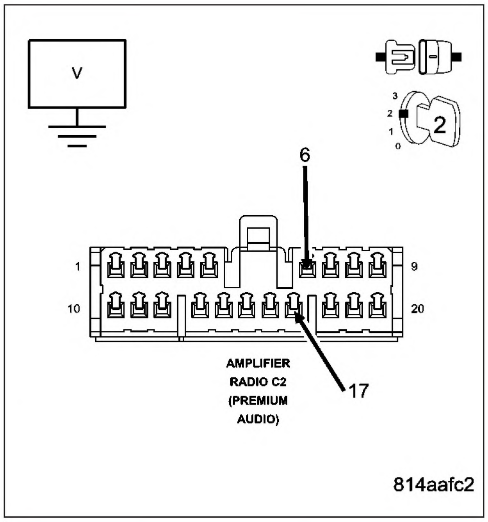
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

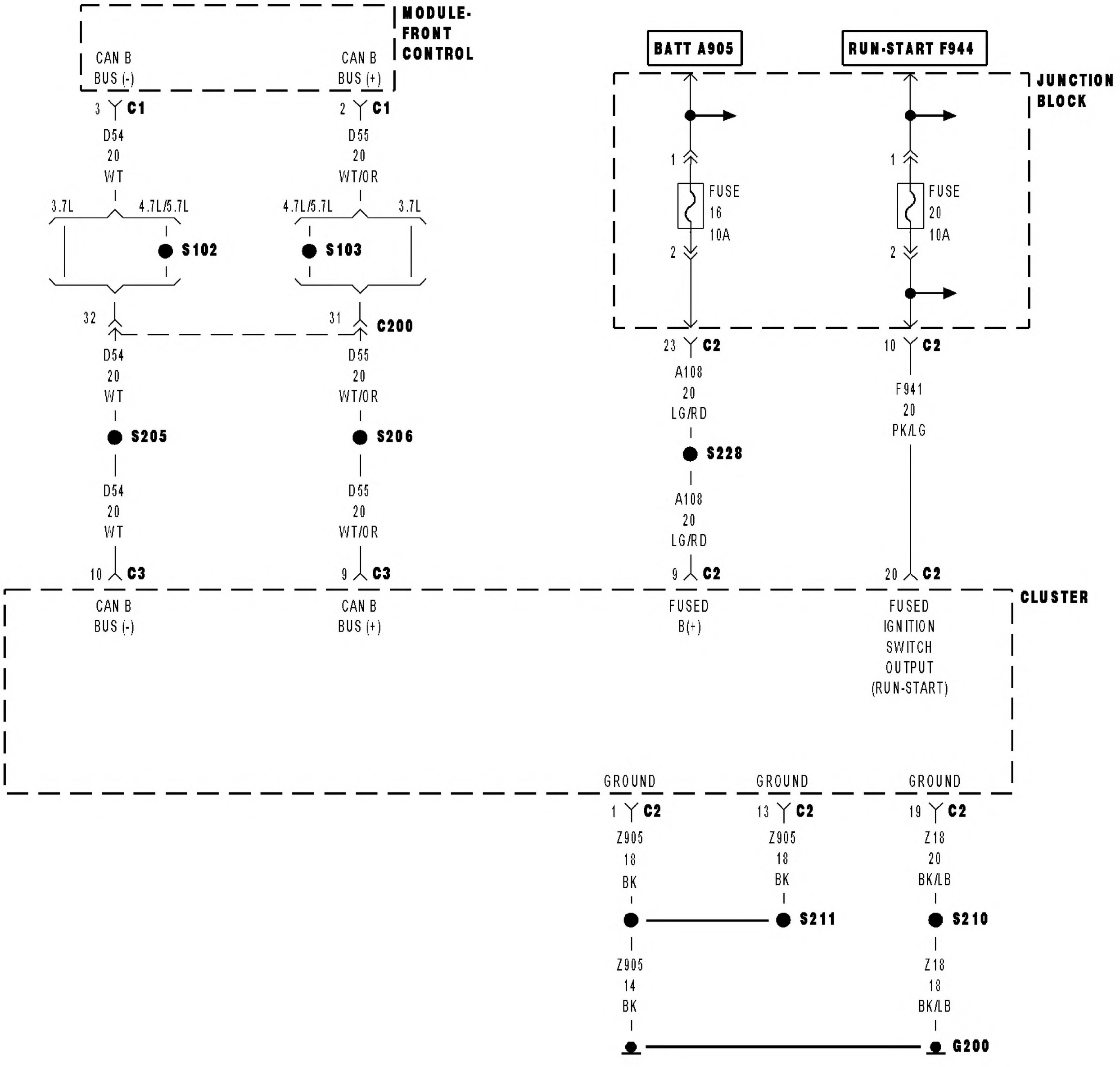

V
3
2
1
0
2
6
1
9
10
20
AMPLIFIER
RADIO C2
(PREMIUM
AUDIO)
17
814aafc2

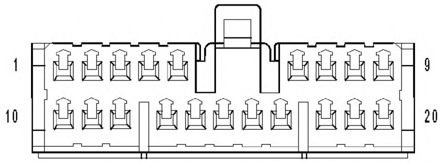
Is there any voltage present on either circuit?

Yes >> Replace the Radio Amplifier in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

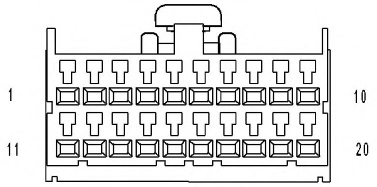
No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM CCN (CLUSTER)


MODULE-
FRONT
CONTROL
CAN B
BUS (-)
CAN B
BUS (+)
3 C1
2 C1
D54
20
WT
D55
20
WT/OR
3.7L
4.7L/5.7L
4.7L/5.7L
3.7L
S102
S103
32
31
C200
D54
20
WT
D55
20
WT/OR
S205
S206
D54
20
WT
D55
20
WT/OR
10 C3
9 C3
BATT A905
RUN-START F944
JUNCTION
BLOCK
1
FUSE
16
10A
2
1
FUSE
20
10A
2
23 C2
10 C2
A108
20
LG/RD
S228
A108
20
LG/RD
F941
20
PK/LG
9 C2
20 C2
CLUSTER
CAN B
BUS (-)
CAN B
BUS (+)
FUSED
B(+)
FUSED
IGNITION
SWITCH
OUTPUT
(RUN-START)
GROUND
GROUND
GROUND
1 C2
13 C2
19 C2
Z905
18
BK
Z905
18
BK
Z18
20
BK/LB
S211
S210
Z905
14
BK
Z18
18
BK/LB
G200



CLUSTER C2



CLUSTER C3

814ac46f

*NO RESPONSE FROM CCN (CLUSTER) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A108) FUSED B(+) CIRCUITS OPEN OR SHORTED
(Z905) (Z18) GROUND CIRCUITS OPEN
(F941) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
CLUSTER (CCN)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A108) FUSED B(+) CIRCUITS OPEN OR SHORTED

Turn the ignition off.

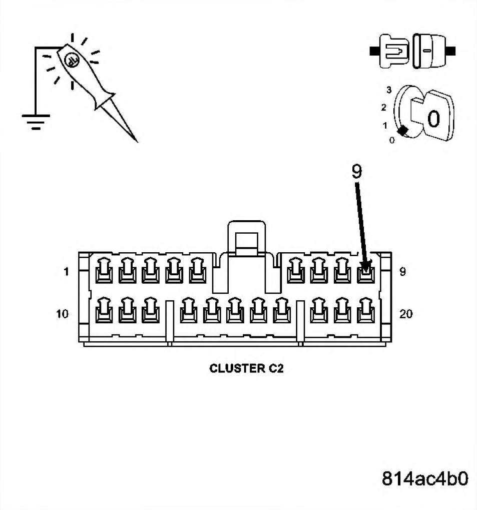
Disconnect the Cluster C2 harness connector.

Using a 12-volt test light connected to ground, check the (A108) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

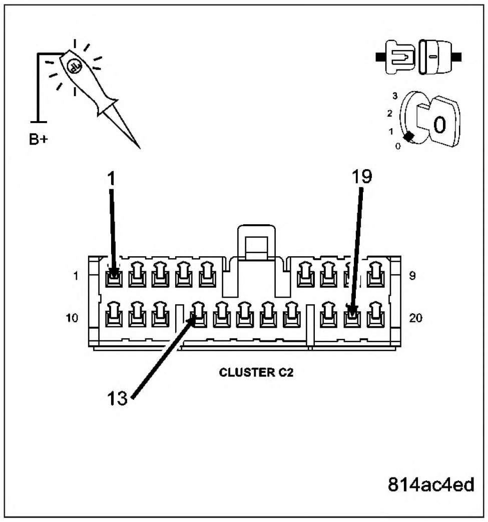
No >> Repair the (A108) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM CCN (CLUSTER) (CONTINUED)

3. (Z905) (Z18) GROUND CIRCUITS OPEN

Using a 12-volt test light connected to 12-volts, check each (Z905) (Z18) ground circuit.



Does the test light illuminate brightly for each circuit?

Yes >> Go To 4

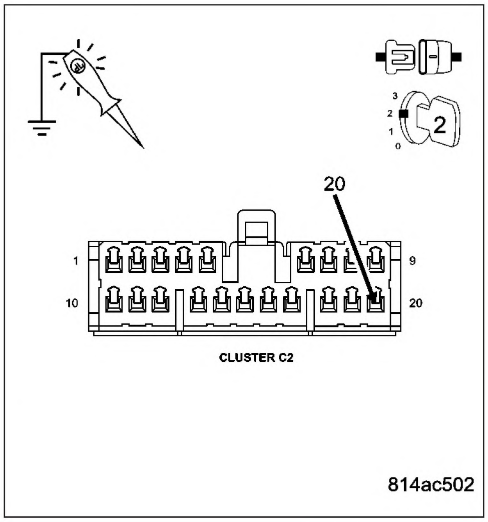
No >> Repair the (Z905) (Z18) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. (F941) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F941) Fused Ignition Switch Output circuit.



Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (F941) Fused Ignition Switch Output circuit for an open or short.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

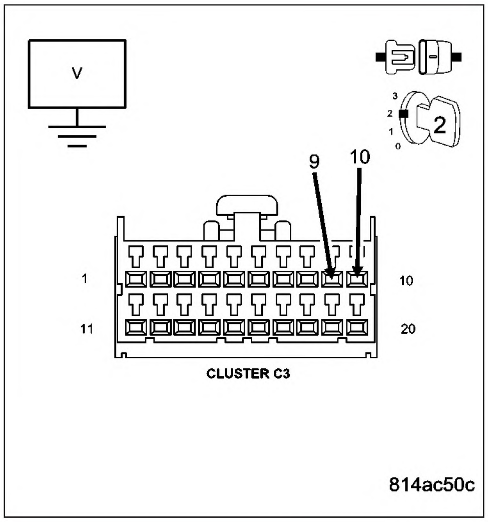
*NO RESPONSE FROM CCN (CLUSTER) (CONTINUED)

5. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is there any voltage present on either circuit?

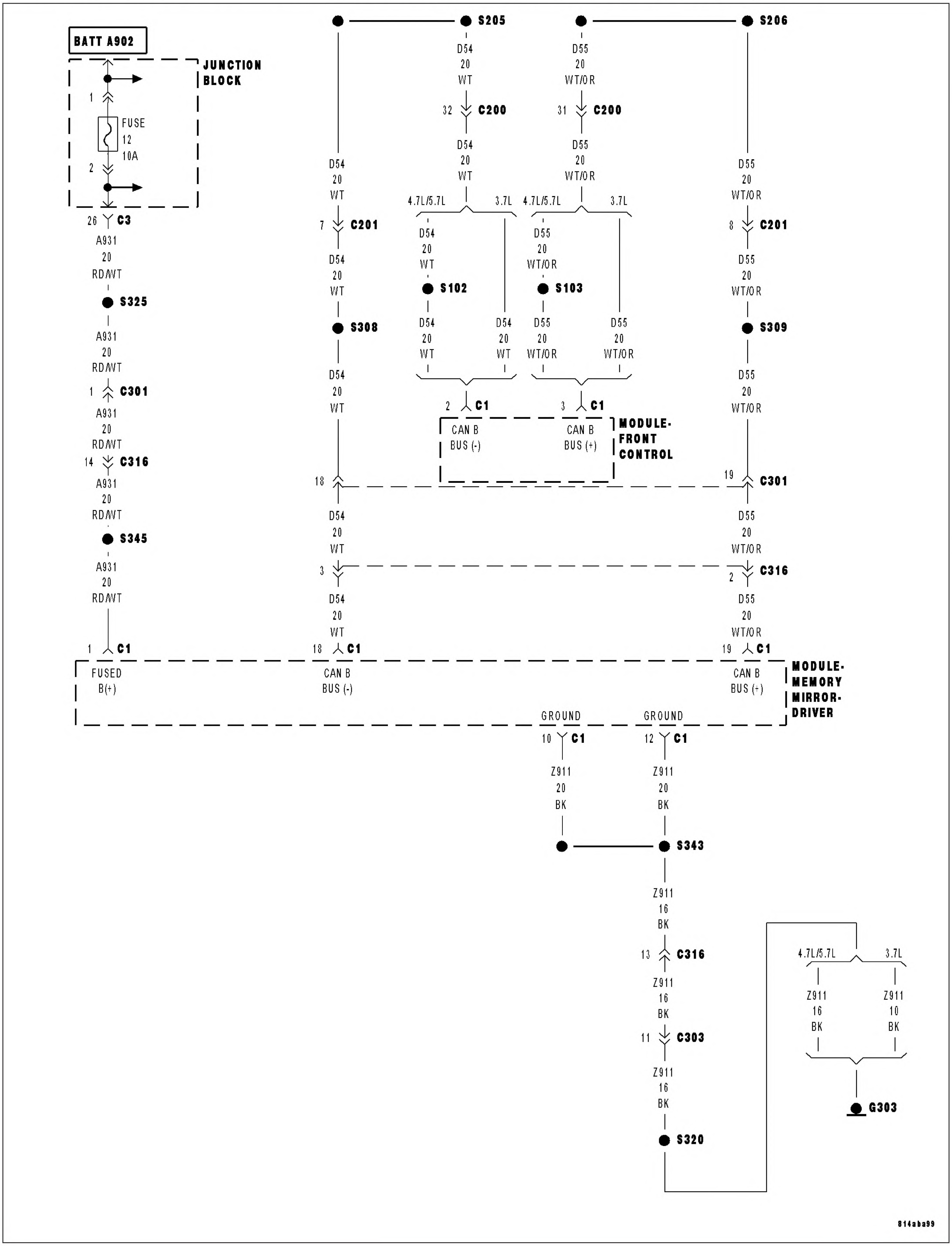
Yes >> Replace the Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM DDM (DRIVER MEMORY MIRROR MODULE)


BATT A902
JUNCTION BLOCK
1
FUSE 12 10A
2
26 C3
A931 20 RD/WT
S325
A931 20 RD/WT
1 C301
A931 20 RD/WT
14 C316
A931 20 RD/WT
S345
A931 20 RD/WT
1 C1
S205
D54 20 WT
32 C200
D54 20 WT
4.7L/5.7L
3.7L
D54 20 WT
S102
D54 20 WT
D54 20 WT
2 C1
S206
D55 20 WT/OR
31 C200
D55 20 WT/OR
4.7L/5.7L
3.7L
D55 20 WT/OR
S103
D55 20 WT/OR
D55 20 WT/OR
3 C1
CAN B BUS (-)
CAN B BUS (+)
MODULE-FRONT CONTROL
D54 20 WT
7 C201
D54 20 WT
S308
D54 20 WT
18
D54 20 WT
3
D54 20 WT
18 C1
D55 20 WT/OR
8 C201
D55 20 WT/OR
S309
D55 20 WT/OR
19 C301
D55 20 WT/OR
2 C316
D55 20 WT/OR
19 C1
FUSED B(+)
CAN B BUS (-)
CAN B BUS (+)
MODULE-MEMORY MIRROR-DRIVER
GROUND
GROUND
10 C1
12 C1
Z911 20 BK
Z911 20 BK
S343
Z911 16 BK
13 C316
Z911 16 BK
11 C303
Z911 16 BK
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
814aba99

*NO RESPONSE FROM DDM (DRIVER MEMORY MIRROR MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A931) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z911) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
DRIVER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A931) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

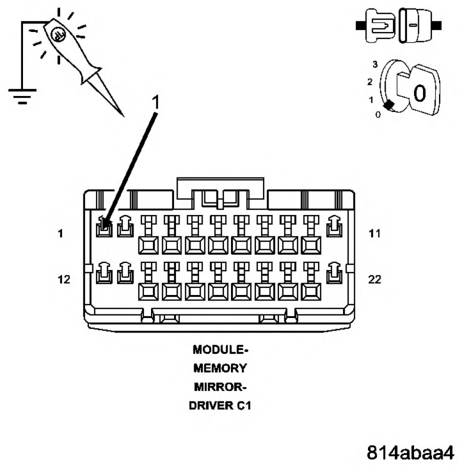
Disconnect the Driver Memory Mirror Module C1 harness connector.

Using a 12-volt test light connected to ground, check the (A931) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

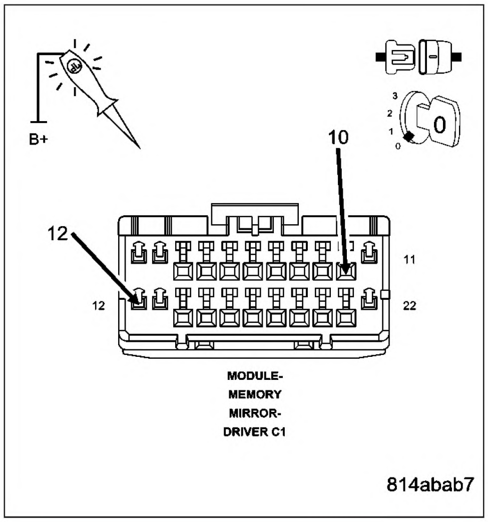
No >> Repair the (A931) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM DDM (DRIVER MEMORY MIRROR MODULE) (CONTINUED)

3. (Z911) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check each (Z911) ground circuit.



Does the test light illuminate brightly for each circuit?

Yes >> Go To 4

No >> Repair the (Z911) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

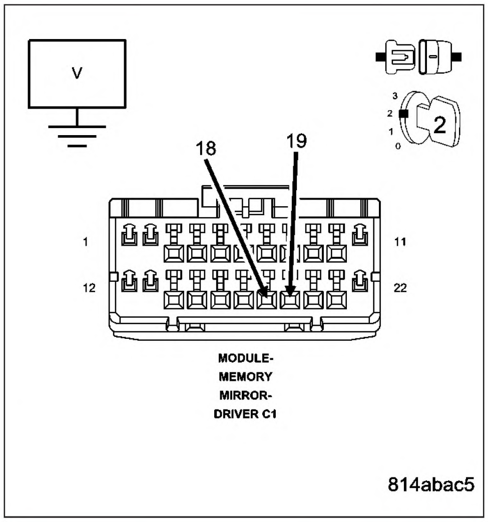
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

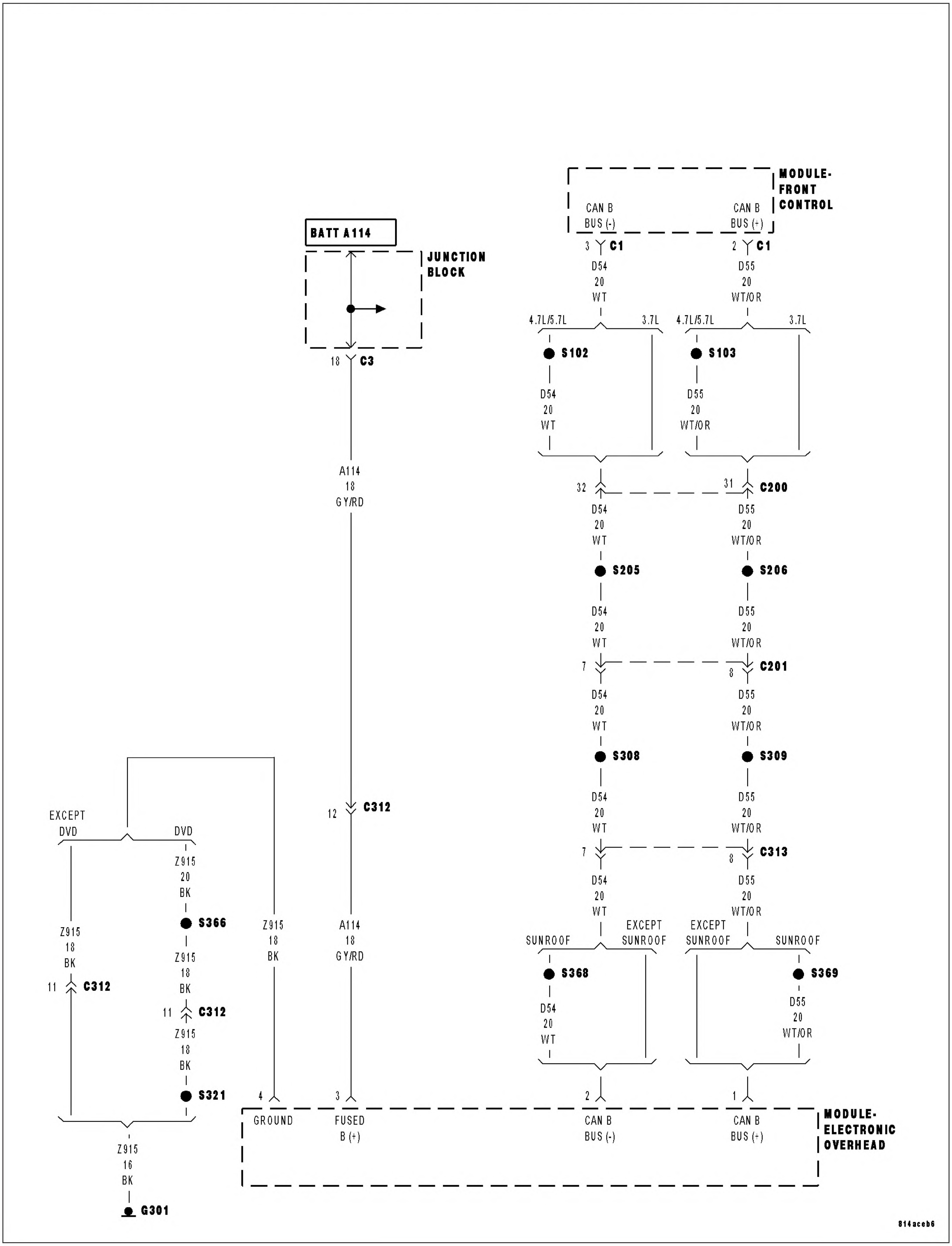


Is there any voltage present on either circuit?

Yes >> Replace the Driver Memory Mirror Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM EOM (ELECTRONIC OVERHEAD MODULE)


MODULE-FRONT CONTROL
CAN B BUS (-)
CAN B BUS (+)
3 C1
2 C1
D54 20 WT
D55 20 WT/OR
4.7L/5.7L
3.7L
S102
S103
BATT A114
JUNCTION BLOCK
18 C3
A114 18 GY/RD
32
31 C200
S205
S206
7
8 C201
S308
S309
12 C312
7
8 C313
SUNROOF
EXCEPT SUNROOF
S368
S369
EXCEPT DVD
DVD
Z915 20 BK
S366
Z915 18 BK
11 C312
S321
Z915 16 BK
G301
4
3
2
1
GROUND
FUSED B (+)
MODULE-ELECTRONIC OVERHEAD
814aceb6

*NO RESPONSE FROM EOM (ELECTRONIC OVERHEAD MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A114) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z915) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
ELECTRONIC OVERHEAD MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

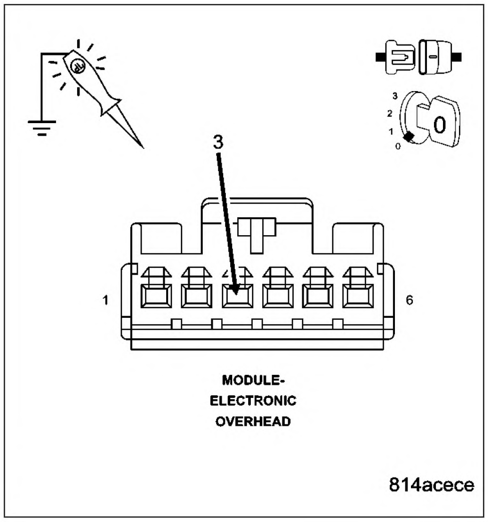
---

2. (A114) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

Disconnect the Electronic Overhead Module harness connector.

Using a 12-volt test light connected to ground, check the (A114) Fused B(+) circuit.



Does the test light illuminate brightly?

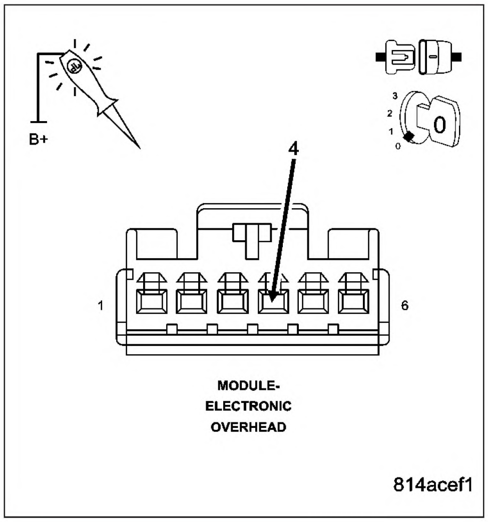
Yes >> Go To 3

No >> Repair the (A114) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM EOM (ELECTRONIC OVERHEAD MODULE) (CONTINUED)

3. (Z915) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z915) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z915) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

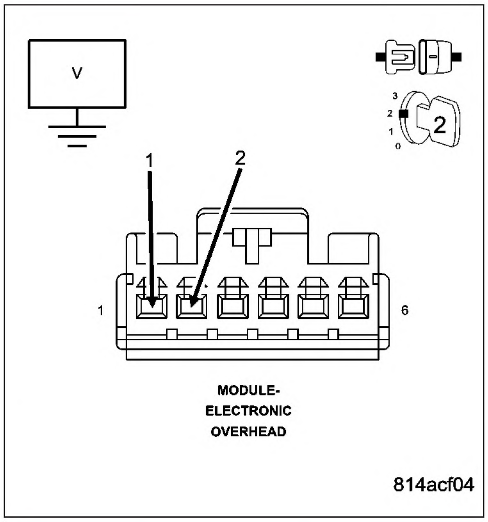
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is there any voltage present on either circuit?

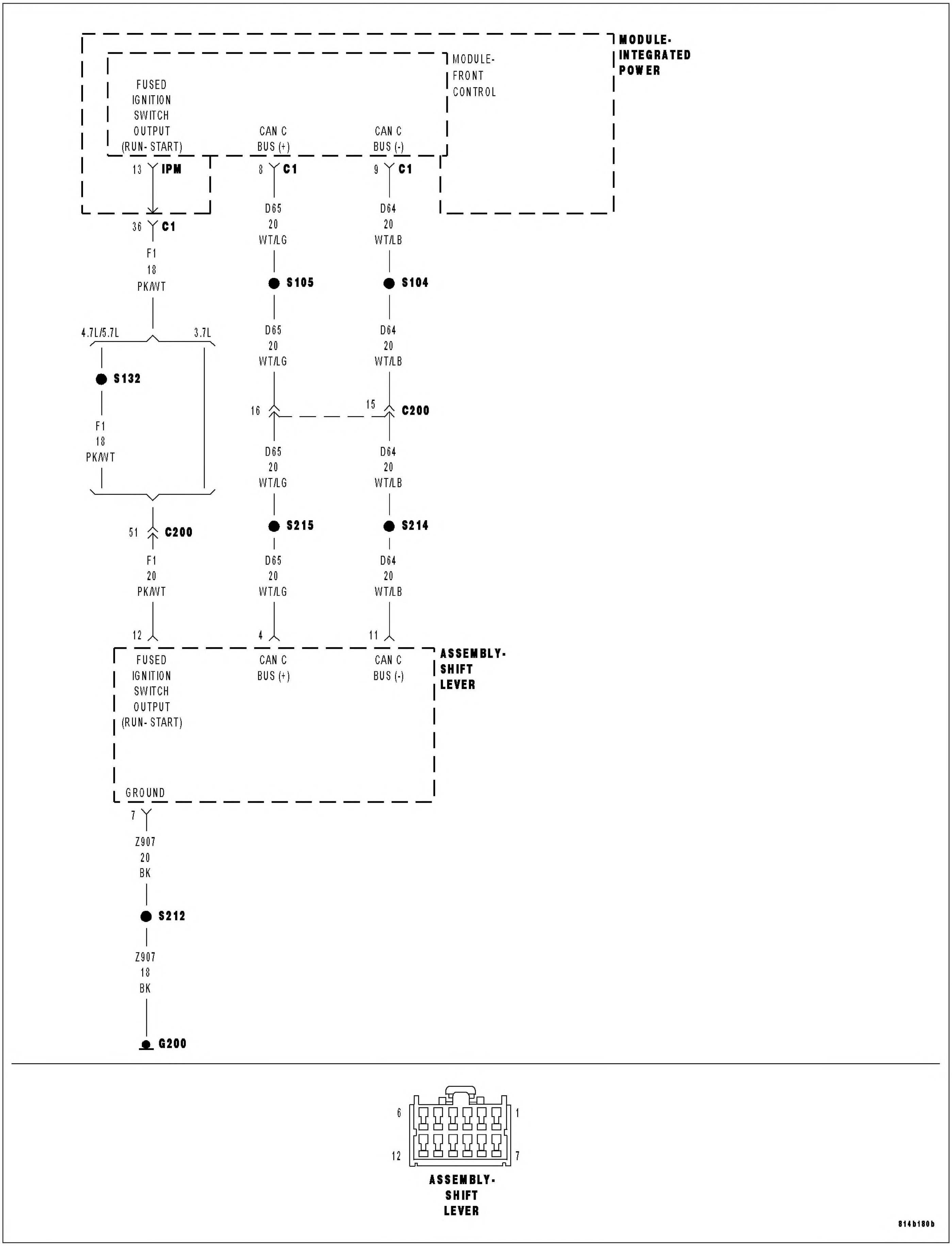
Yes >> Replace the Electronic Overhead Module (EOM) in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM ESM (SHIFT LEVER ASSEMBLY) - NAG1/DIESEL


MODULE-
INTEGRATED
POWER
MODULE-
FRONT
CONTROL
FUSED
IGNITION
SWITCH
OUTPUT
(RUN- START)
CAN C
BUS (+)
CAN C
BUS (-)
13 IPM
8 C1
9 C1
36 C1
F1
18
PK/WT
D65
20
WT/LG
D64
20
WT/LB
S105
S104
4.7L/5.7L
3.7L
S132
F1
18
PK/WT
16
15
C200
S215
S214
51 C200
F1
20
PK/WT
12
4
11
ASSEMBLY-
SHIFT
LEVER
GROUND
7
Z907
20
BK
S212
Z907
18
BK
G200
6
1
12
7
ASSEMBLY-
SHIFT
LEVER
814b180b

*NO RESPONSE FROM ESM (SHIFT LEVER ASSEMBLY) - NAG1/DIESEL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(Z907) GROUND CIRCUIT OPEN
(F1) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED
(D65) CAN C BUS (+) CIRCUIT OPEN
(D64) CAN C BUS (-) CIRCUIT OPEN
SHIFT LEVER ASSEMBLY

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: Check the FCM for any active CAN C hardware and any ignition related DTCs, perform DTCs before proceeding.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

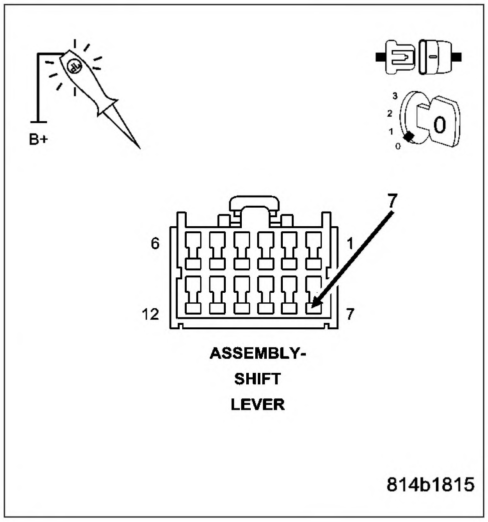
---

2. (Z907) GROUND CIRCUIT OPEN

Turn the ignition off.

Disconnect the Shift Lever Assembly harness connector.

Using a 12-volt test light connected to 12-volts, check the (Z907) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 3

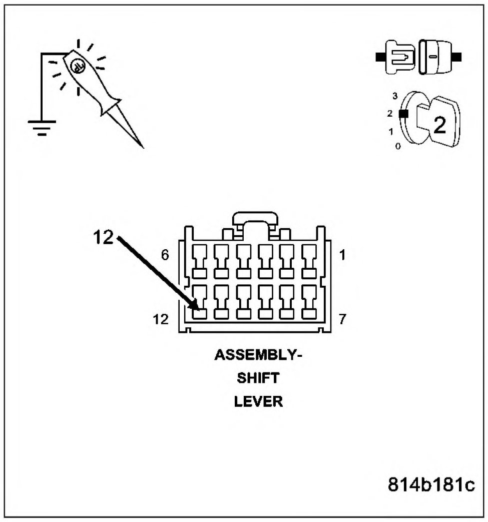
No >> Repair the (Z907) ground circuit for an open.
Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.

*NO RESPONSE FROM ESM (SHIFT LEVER ASSEMBLY) - NAG1/DIESEL (CONTINUED)

3. (F1) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F1) Fused Ignition Switch Output circuit.


2
12
6
1
12
7
ASSEMBLY-
SHIFT
LEVER
814b181c

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (F1) Fused Ignition Switch Output circuit for an open or short.
Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.

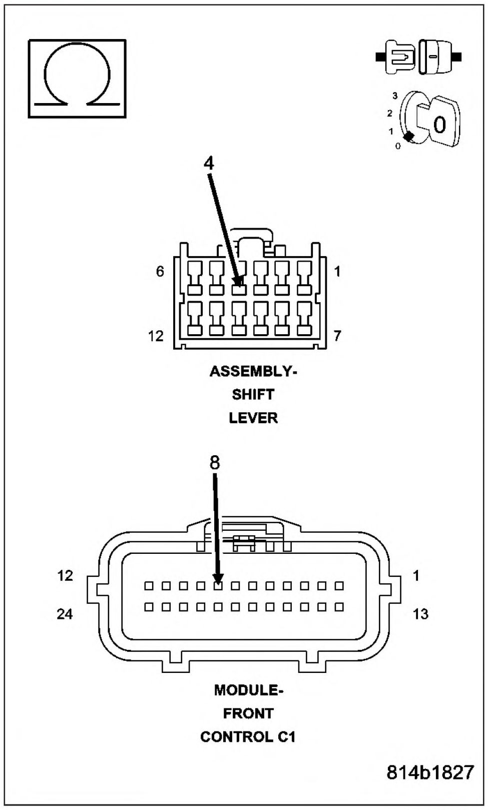
---

4. (D65) CAN C BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the FCM C1 harness connector.

Measure the resistance of the (D65) CAN C Bus (+) circuit between the FCM connector and the Shift Lever Assembly connector.


Ω
0
4
6
1
12
7
ASSEMBLY-
SHIFT
LEVER
8
12
1
24
13
MODULE-
FRONT
CONTROL C1
814b1827

Is resistance below 5.0 ohms?

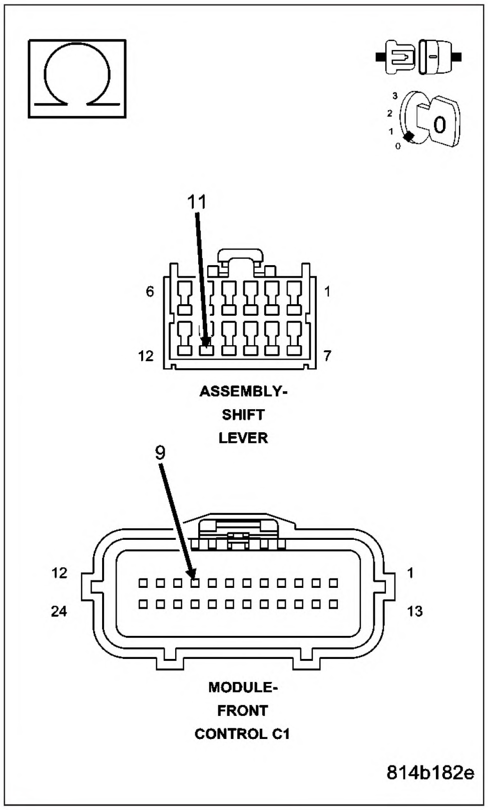
Yes >> Go To 5

No >> Repair the (D65) CAN C Bus (+) circuit for an open.
Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.

*NO RESPONSE FROM ESM (SHIFT LEVER ASSEMBLY) - NAG1/DIESEL (CONTINUED)

5. (D64) CAN C BUS (-) CIRCUIT OPEN

Measure the resistance of the (D64) CAN C Bus (-) circuit between the FCM connector and the Shift Lever Assembly connector.


Ω
3
2
1
0
11
6
1
12
7
ASSEMBLY-
SHIFT
LEVER
9
12
24
1
13
MODULE-
FRONT
CONTROL C1
814b182e

Is resistance below 5.0 ohms?

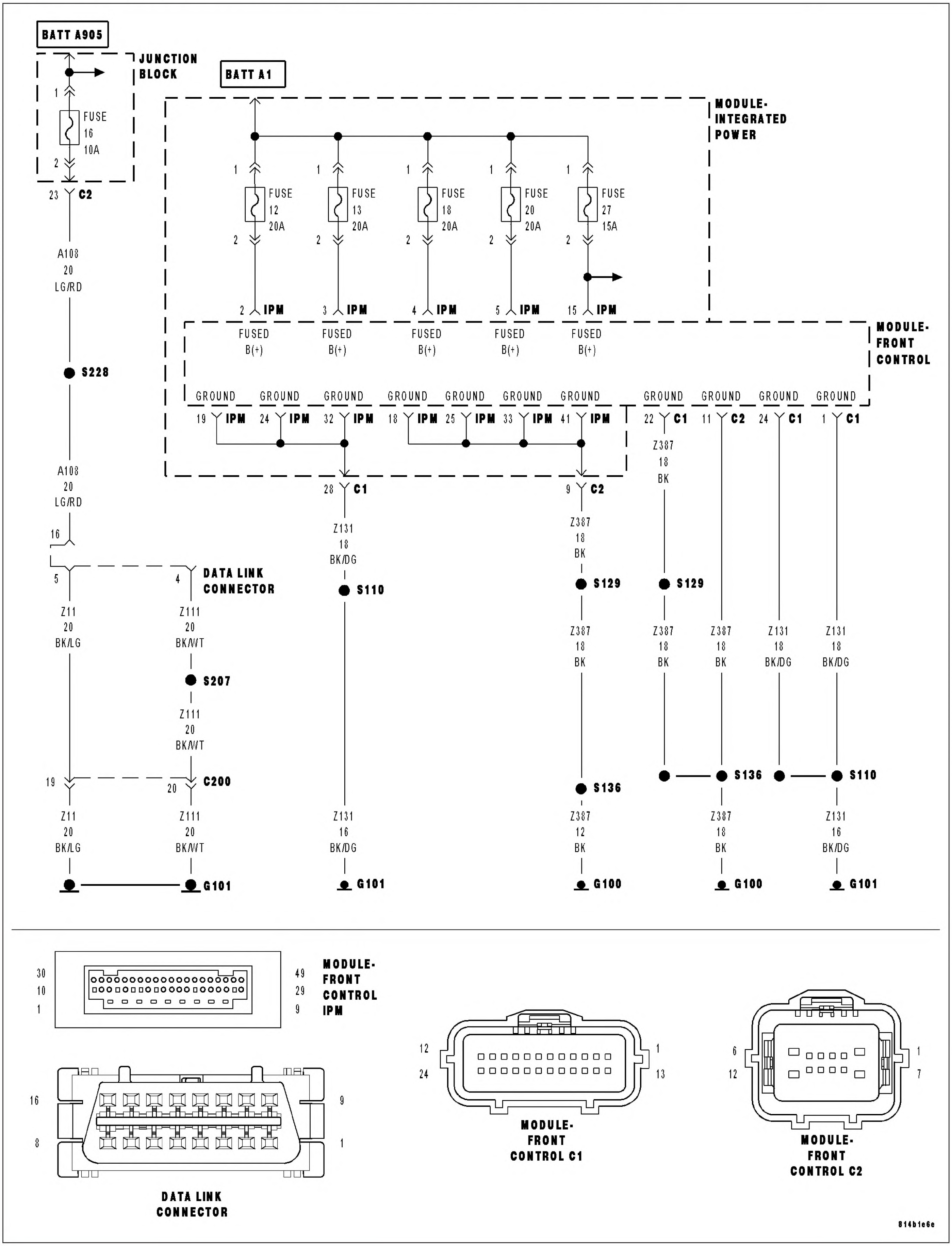
Yes >> Replace the Shift Lever Assembly in accordance with the service information.

Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair the (D64) CAN C Bus (-) circuit for an open.

Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.

*NO RESPONSE FROM FCM (FRONT CONTROL MODULE)


BATT A905
JUNCTION BLOCK
FUSE 16 10A
1
2
23 C2
A108 20 LG/RD
S228
A108 20 LG/RD
16
5
4
DATA LINK CONNECTOR
Z11 20 BK/LG
Z111 20 BK/WT
S207
Z111 20 BK/WT
19
20 C200
Z11 20 BK/LG
Z111 20 BK/WT
G101
BATT A1
MODULE-INTEGRATED POWER
FUSE 12 20A
FUSE 13 20A
FUSE 18 20A
FUSE 20 20A
FUSE 27 15A
2 IPM
3 IPM
4 IPM
5 IPM
15 IPM
FUSED B(+)
MODULE-FRONT CONTROL
GROUND
19 IPM
24 IPM
32 IPM
18 IPM
25 IPM
33 IPM
41 IPM
22 C1
11 C2
24 C1
1 C1
28 C1
9 C2
Z131 18 BK/DG
S110
Z387 18 BK
S129
Z387 18 BK
S136
Z131 18 BK/DG
S136
S110
Z131 16 BK/DG
G101
Z387 12 BK
G100
Z387 18 BK
G100
Z131 16 BK/DG
G101
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
12
24
1
13
MODULE-FRONT CONTROL C1
6
12
1
7
MODULE-FRONT CONTROL C2
16
8
9
1
DATA LINK CONNECTOR
814b1e6e

*NO RESPONSE FROM FCM (FRONT CONTROL MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A108) FUSED B (+) CIRCUIT OPEN AT DLC
(Z11) (Z111) GROUND CIRCUIT OPEN AT DLC
GROUND CIRCUITS OPEN AT FCM
FUSED B+ CIRCUITS OPEN AT FCM
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

NOTE: Ensure the scan tool is updated to the latest software.

NOTE: If the scan tool displays any error messages involving the CAN C Diagnostic circuits, diagnose and repair the error message before proceeding. Refer to the Table of Contents.

NOTE: A loss of communication with the FCM can cause the ECU View button on the scan tool to be inoperative (not highlighted).

With the scan tool, attempt to select ECU view.

Can the scan tool communicate with the FCM?

Yes >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

No >> Go To 2

---

2. (A108) FUSED B(+) CIRCUIT OPEN AT DLC

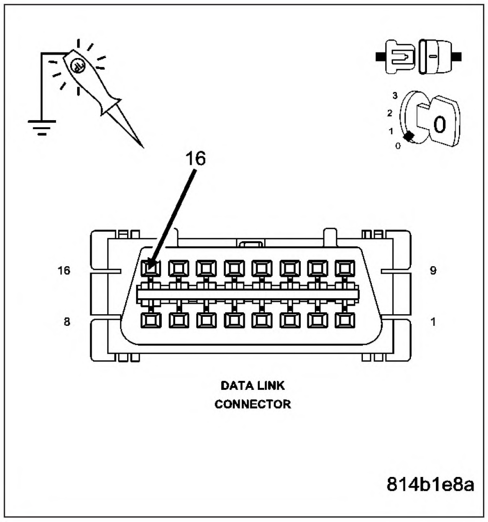
Disconnect the scan tool from the DLC.

Using a 12-volt test light connected to ground, check the (A108) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

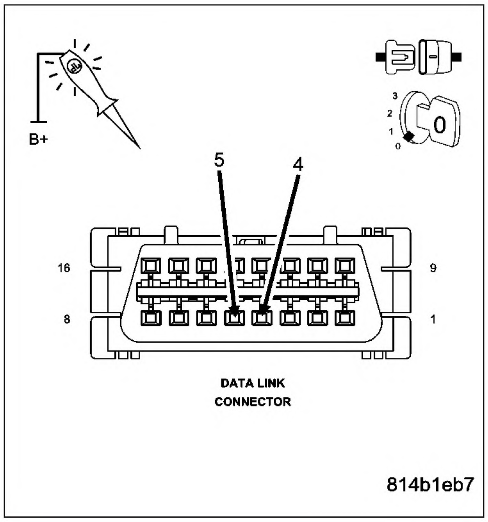
No >> Repair the (A108) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM FCM (FRONT CONTROL MODULE) (CONTINUED)

3. (Z11) (Z111) GROUND CIRCUIT OPEN AT DLC

Using a 12-volt test light connected to 12-volts, check the (Z11) and (Z111) ground circuits.


B+
5
4
16
9
8
1
DATA LINK CONNECTOR
3
2
1
0
814b1eb7

Does the test light illuminate brightly for each circuit?

Yes >> Go To 4

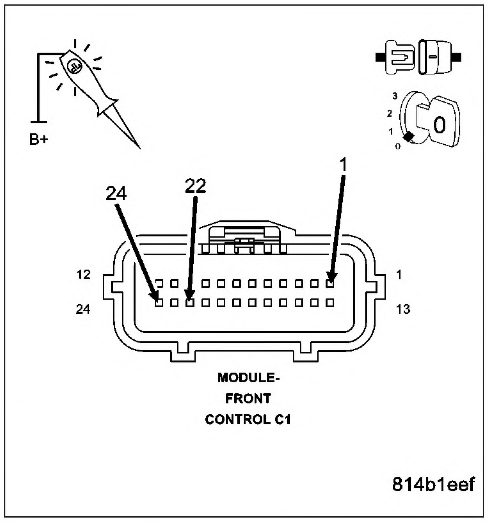
No >> Repair the ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. GROUND CIRCUITS OPEN AT FCM C1 CONNECTOR

Disconnect the FCM C1 harness connector.

Using a 12-volt test light connected to 12-volts, check each ground circuit.


B+
24
22
1
12
1
24
13
MODULE-
FRONT
CONTROL C1
3
2
1
0
814b1eef

Does the test light illuminate brightly for each circuit?

Yes >> Go To 5

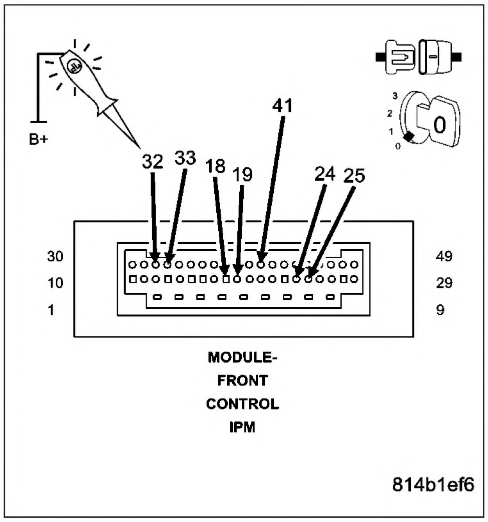
No >> Repair the ground circuit for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM FCM (FRONT CONTROL MODULE) (CONTINUED)

5. GROUND CIRCUITS OPEN AT FCM IPM CONNECTOR

Remove the FCM from the IPM.

Using a 12-volt test light connected to 12-volts, check each ground circuit.


B+
41
32
33
18
19
24
25
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
814b1ef6

Does the test light illuminate brightly for each circuit?

Yes >> Go To 6

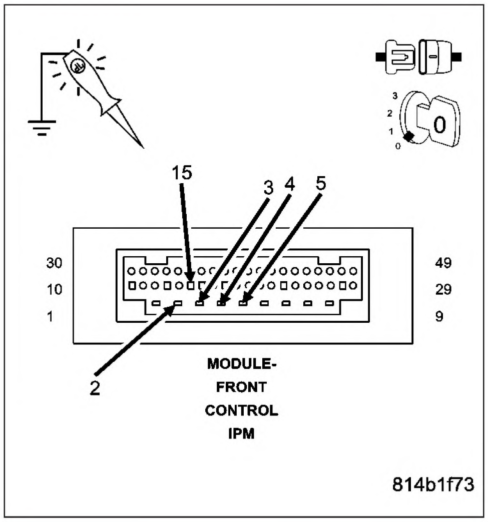
No >> Repair the ground circuit for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

6. FUSED B(+) CIRCUITS OPEN AT FCM IPM CONNECTOR

Using a 12-volt test light connected to ground, check each Fused B(+) circuit.


15
3
4
5
30
10
1
49
29
9
2
MODULE-
FRONT
CONTROL
IPM
814b1f73

Does the test light illuminate brightly for each circuit?

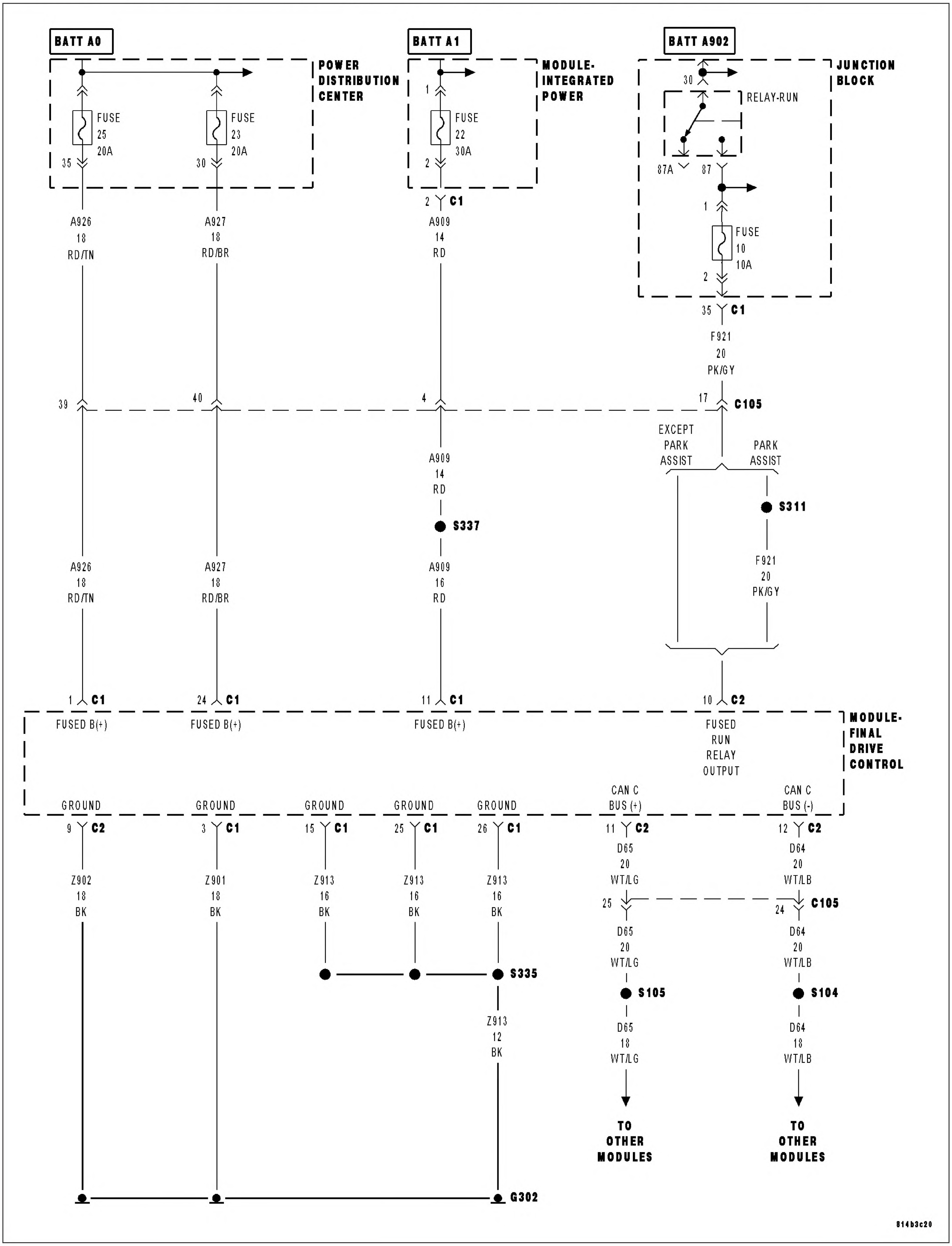
Yes >> Replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the Fused B(+) circuit for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM FDCM (FINAL DRIVE CONTROL MODULE)



BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
A926 18 RD/TN
A927 18 RD/BR
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A909 14 RD
BATT A902
JUNCTION BLOCK
30
RELAY-RUN
87A
87
1
FUSE 10 10A
2
35 C1
F921 20 PK/GY
39
40
4
17
C105
EXCEPT PARK ASSIST
PARK ASSIST
A909 14 RD
S337
A909 16 RD
S311
F921 20 PK/GY
A926 18 RD/TN
A927 18 RD/BR
1 C1
24 C1
11 C1
10 C2
MODULE-FINAL DRIVE CONTROL
FUSED B(+)
FUSED B(+)
FUSED B(+)
FUSED RUN RELAY OUTPUT
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
9 C2
3 C1
15 C1
25 C1
26 C1
11 C2
12 C2
Z902 18 BK
Z901 18 BK
Z913 16 BK
Z913 16 BK
Z913 16 BK
D65 20 WT/LG
D64 20 WT/LB
25
24
C105
D65 20 WT/LG
D64 20 WT/LB
S335
S105
S104
Z913 12 BK
D65 18 WT/LG
D64 18 WT/LB
TO OTHER MODULES
TO OTHER MODULES
G302
814b3c20

*NO RESPONSE FROM FDCM (FINAL DRIVE CONTROL MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A926) (A909) (A927) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z901) (Z902) (Z913) GROUND CIRCUIT OPEN
(F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED
(D65) CAN C BUS (+) CIRCUIT OPEN
(D64) CAN C BUS (-) CIRCUIT OPEN
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: Check the FCM for any active CAN C hardware DTCs, perform DTC before proceeding.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

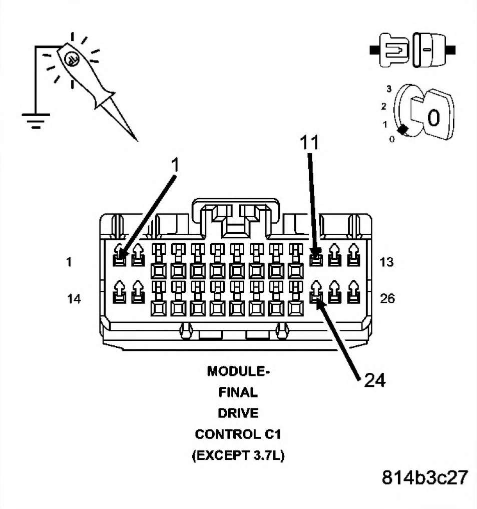
---

2. FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

Disconnect the Final Drive Control Module harness connectors.

Using a 12-volt test light connected to ground, check each Fused B(+) circuit.



Does the test light illuminate brightly for each circuit?

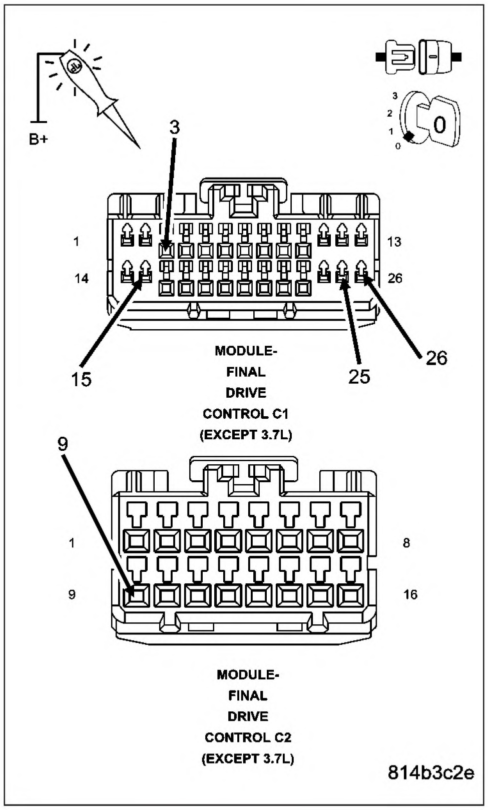
Yes >> Go To 3

No >> Repair the Fused B(+) circuit for an open or short.
Perform the FDCM VERIFICATION TEST.

*NO RESPONSE FROM FDCM (FINAL DRIVE CONTROL MODULE) (CONTINUED)

3. GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check each Ground circuit.


B+
3
1
13
14
26
15
25
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
9
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
814b3c2e

Does the test light illuminate brightly for each circuit?

Yes >> Go To 4

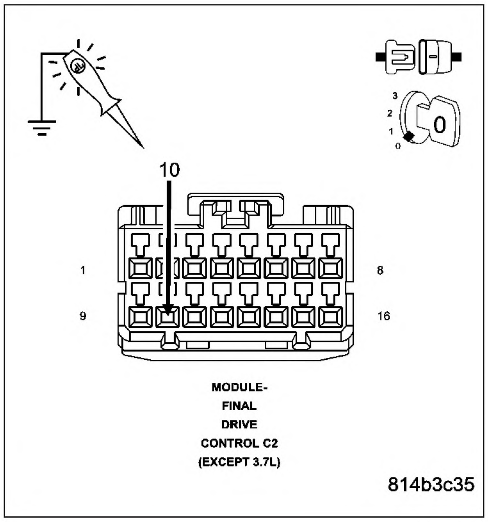
No >> Repair the ground circuit for an open.
Perform the FDCM VERIFICATION TEST.

---

4. (F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F921) Fused Run Relay Output circuit.


10
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
814b3c35

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (F921) Fused Run Relay Output circuit for an open or short.
Perform the FDCM VERIFICATION TEST.

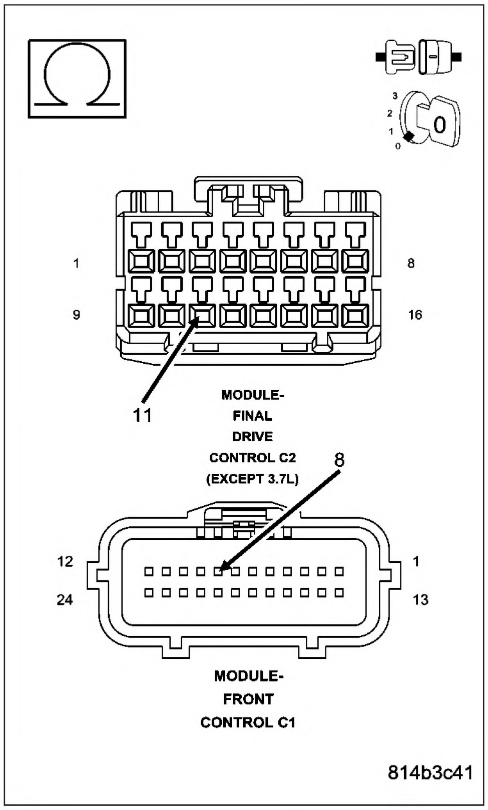
*NO RESPONSE FROM FDCM (FINAL DRIVE CONTROL MODULE) (CONTINUED)

5. (D65) CAN C BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the FCM C1 harness connector.

Measure the resistance of the (D65) CAN C Bus (+) circuit between the FCM connector and the FDCM connector.


3
2
1
0
1
8
9
16
11
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
8
12
1
24
13
MODULE-
FRONT
CONTROL C1
814b3c41

Is resistance below 5.0 ohms?

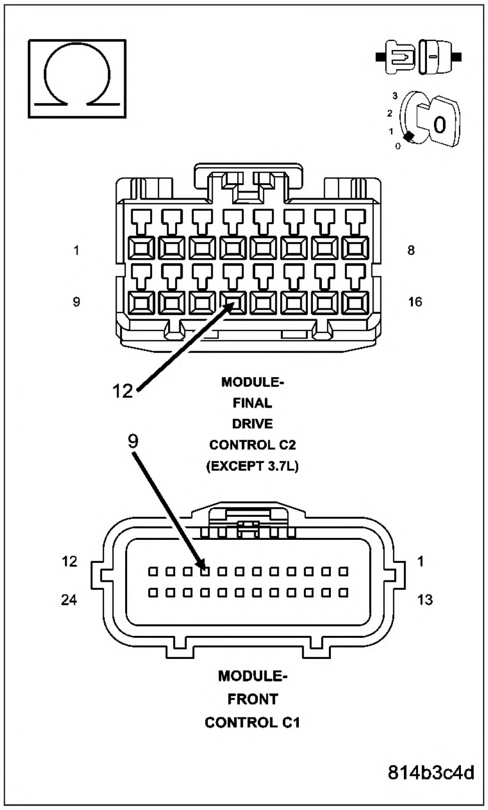
Yes >> Go To 6

No >> Repair the (D65) CAN C Bus (+) circuit for an open. Perform the FDCM VERIFICATION TEST.

*NO RESPONSE FROM FDCM (FINAL DRIVE CONTROL MODULE) (CONTINUED)

6. (D64) CAN C BUS (-) CIRCUIT OPEN

Measure the resistance of the (D64) CAN C Bus (-) circuit between the FCM connector and the FDCM connector.

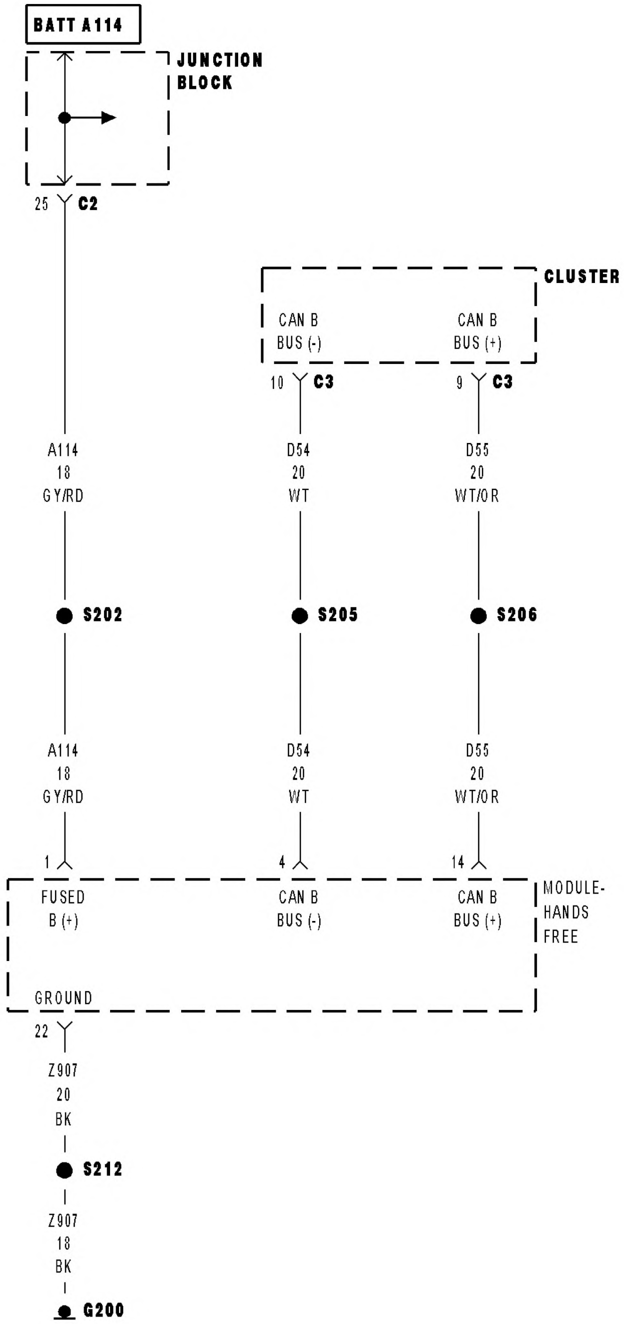

3
2
1
0
0
1
8
9
16
12
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
9
12
1
24
13
MODULE-
FRONT
CONTROL C1
814b3c4d

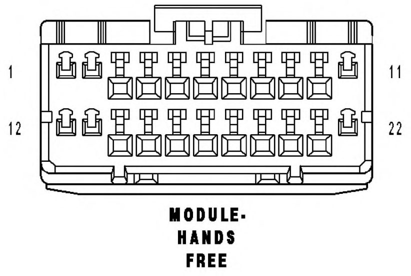
Is resistance below 5.0 ohms?

Yes >> Replace the Final Drive Control Module in accordance with the service information.
Perform the FDCM VERIFICATION TEST.

No >> Repair the (D64) CAN C Bus (-) circuit for an open.
Perform the FDCM VERIFICATION TEST.

*NO RESPONSE FROM HFM (HANDS FREE MODULE)


BATT A114
JUNCTION BLOCK
25 C2
CLUSTER
CAN B BUS (-)
CAN B BUS (+)
10 C3
9 C3
A114 18 GY/RD
D54 20 WT
D55 20 WT/OR
S202
S205
S206
A114 18 GY/RD
D54 20 WT
D55 20 WT/OR
1
4
14
FUSED B (+)
CAN B BUS (-)
CAN B BUS (+)
MODULE-HANDS FREE
GROUND
22
Z907 20 BK
S212
Z907 18 BK
G200


1
11
12
22
MODULE-HANDS FREE

814adba7

*NO RESPONSE FROM HFM (HANDS FREE MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A114) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z907) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
HANDS FREE MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A114) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

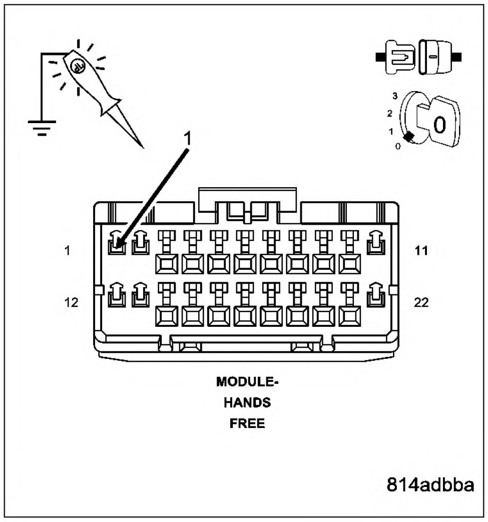
Disconnect the Hands Free Module harness connector.

Using a 12-volt test light connected to ground, check the (A114) Fused B(+) circuit.

Does the test light illuminate brightly?

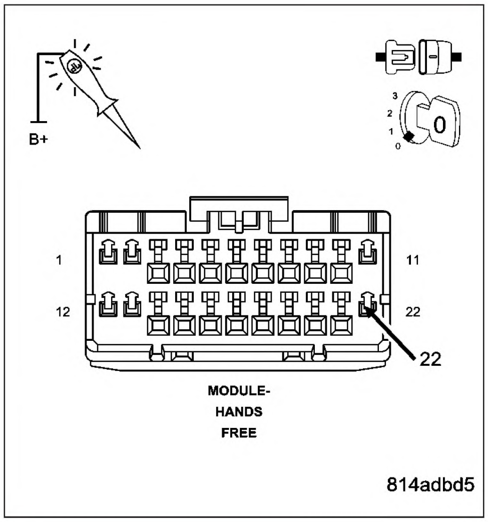
Yes >> Go To 3

No >> Repair the (A114) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM HFM (HANDS FREE MODULE) (CONTINUED)

3. (Z907) GROUND CIRCUIT OPEN



Using a 12-volt test light connected to 12-volts, check the (Z907) ground circuit.

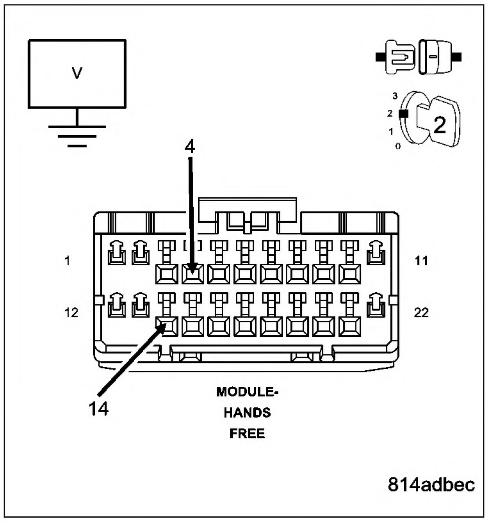
Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z907) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN



NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

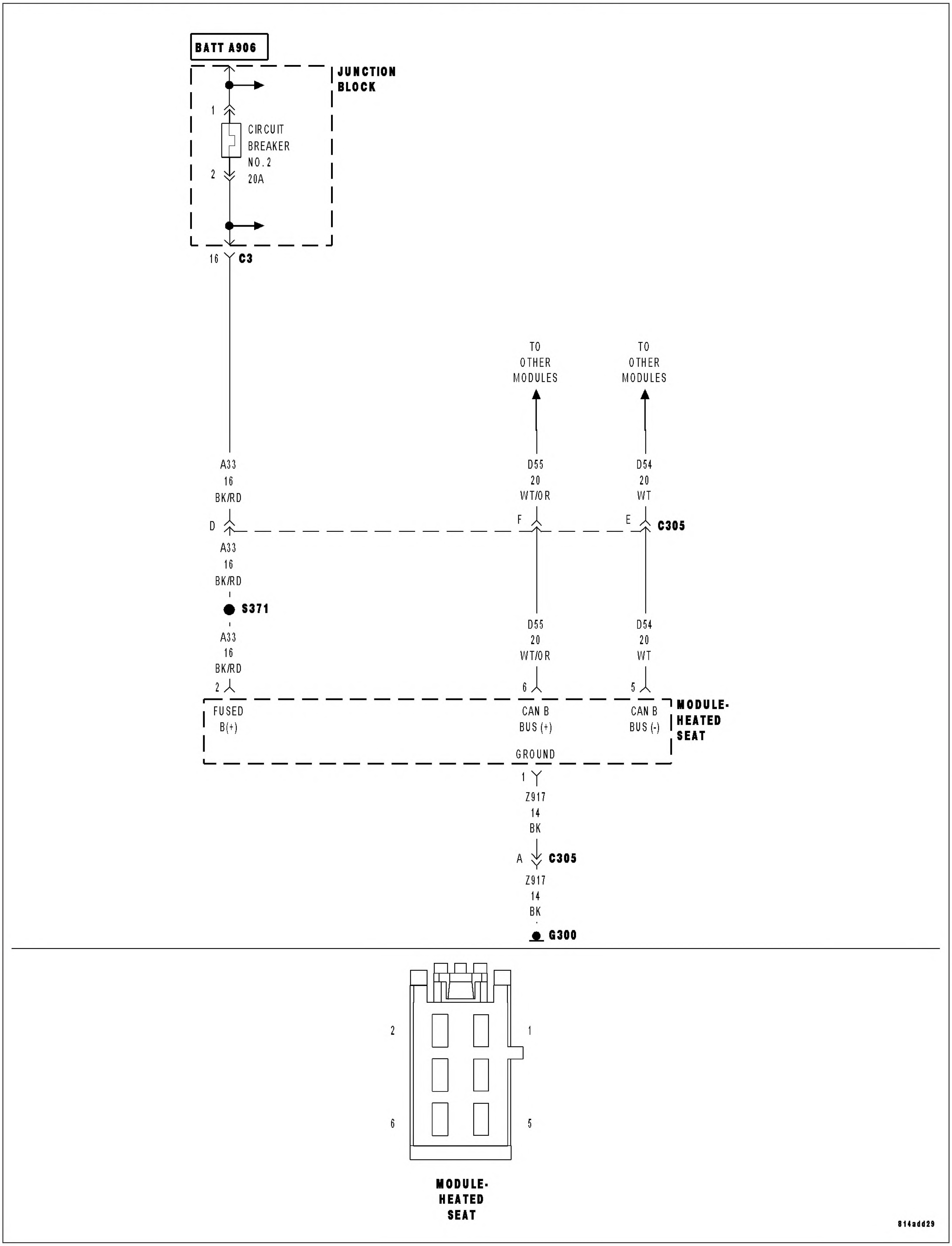
Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

Is there any voltage present on either circuit?

Yes >> Replace the Hands Free Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM HSM (HEATED SEAT MODULE)


BATT A906
JUNCTION BLOCK
1
CIRCUIT BREAKER NO.2 20A
2
16 C3
TO OTHER MODULES
TO OTHER MODULES
A33 16 BK/RD
D55 20 WT/OR
D54 20 WT
D
F
E
C305
A33 16 BK/RD
S371
A33 16 BK/RD
D55 20 WT/OR
D54 20 WT
2
6
5
FUSED B(+)
CAN B BUS (+)
CAN B BUS (-)
MODULE-HEATED SEAT
GROUND
1
Z917 14 BK
A
C305
Z917 14 BK
G300
2
1
6
5
MODULE-HEATED SEAT
814add29

*NO RESPONSE FROM HSM (HEATED SEAT MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A33) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z917) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
HEATED SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A33) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

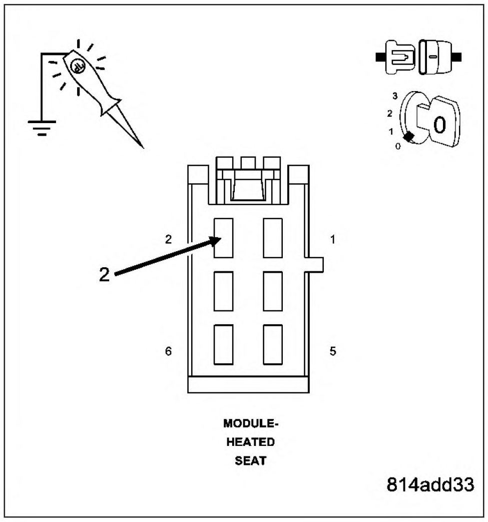
Disconnect the Heated Seat Module harness connector.

Using a 12-volt test light connected to ground, check the (A33) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

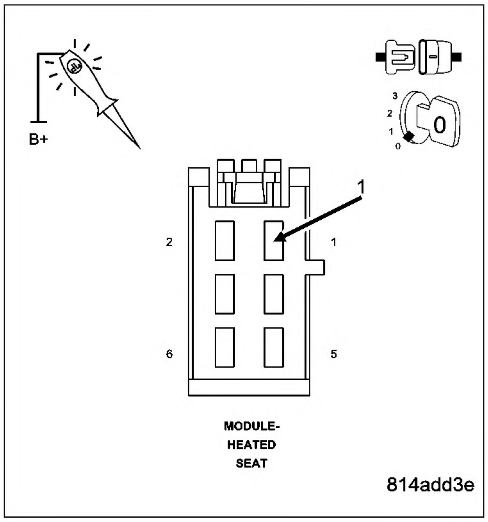
No >> Repair the (A33) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM HSM (HEATED SEAT MODULE) (CONTINUED)

3. (Z917) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z917) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z917) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

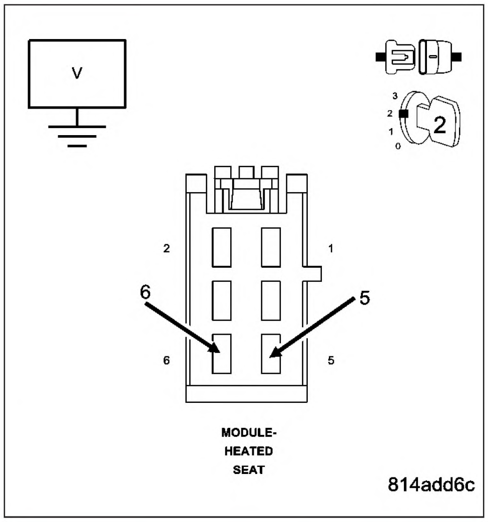
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

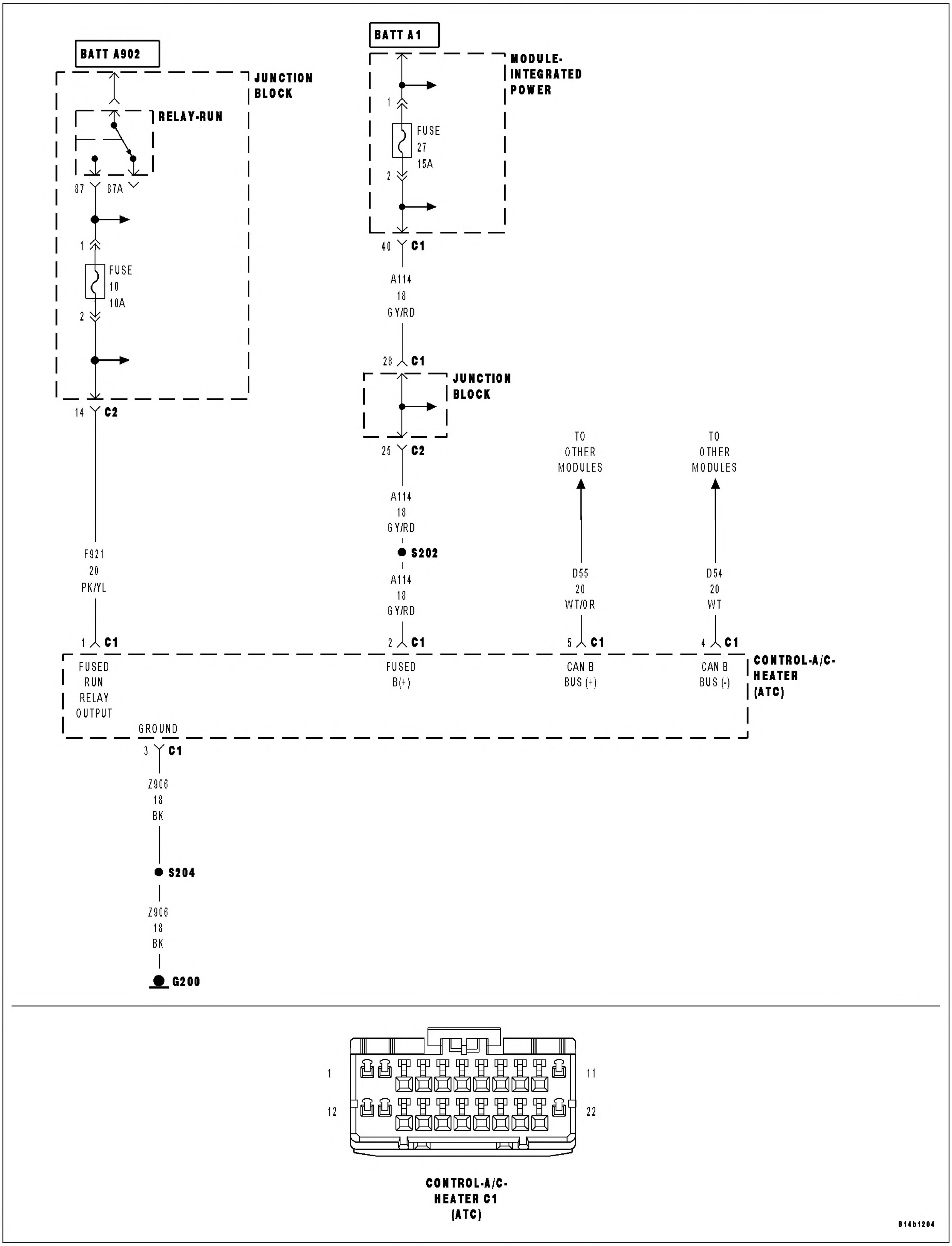


Is there any voltage present on either circuit?

Yes >> Replace the Heated Seat Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM HVAC (A/C HEATER CONTROL - ATC ONLY)


BATT A902
JUNCTION BLOCK
RELAY-RUN
87
87A
1
FUSE 10 10A
2
14 C2
F921 20 PK/YL
1 C1
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 27 15A
2
40 C1
A114 18 GY/RD
28 C1
JUNCTION BLOCK
25 C2
A114 18 GY/RD
S202
A114 18 GY/RD
2 C1
TO OTHER MODULES
D55 20 WT/OR
5 C1
TO OTHER MODULES
D54 20 WT
4 C1
FUSED RUN RELAY OUTPUT
FUSED B(+)
CAN B BUS (+)
CAN B BUS (-)
CONTROL-A/C-HEATER (ATC)
GROUND
3 C1
Z906 18 BK
S204
Z906 18 BK
G200
1
11
12
22
CONTROL-A/C-HEATER C1 (ATC)
814b1204

*NO RESPONSE FROM HVAC (A/C HEATER CONTROL - ATC ONLY) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A114) FUSED B (+) CIRCUIT OPEN OR SHORTED
(F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED
(Z906) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
A/C HEATER CONTROL

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

2. (A114) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

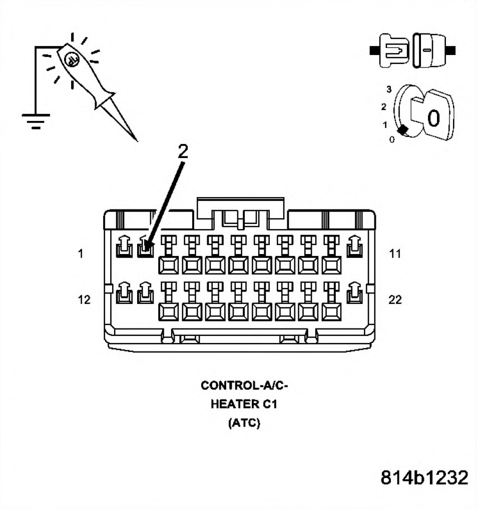
Disconnect the A/C Heater Control C1 harness connector.

Using a 12-volt test light connected to ground, check the (A114) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the (A114) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

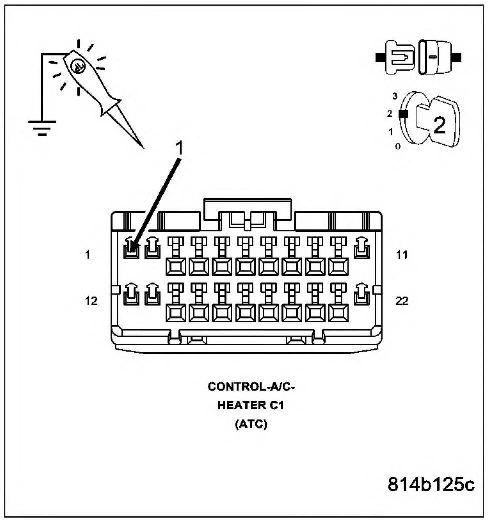


*NO RESPONSE FROM HVAC (A/C HEATER CONTROL - ATC ONLY) (CONTINUED)

3. (F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F921) Fused Run Relay Output circuit.


1
3
2
1
0
2
1
11
12
22
CONTROL-A/C-
HEATER C1
(ATC)
814b125c

Does the test light illuminate brightly?

Yes >> Go To 4

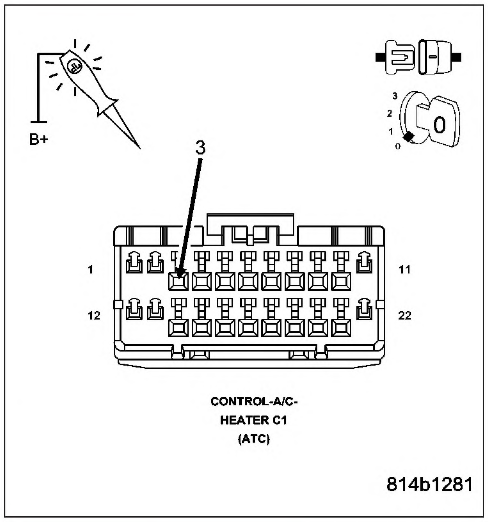
No >> Repair the (F921) Fused Run Relay Output for an open or short.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. (Z906) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z906) ground circuit.


B+
3
2
1
0
0
3
1
11
12
22
CONTROL-A/C-
HEATER C1
(ATC)
814b1281

Does the test light illuminate brightly?

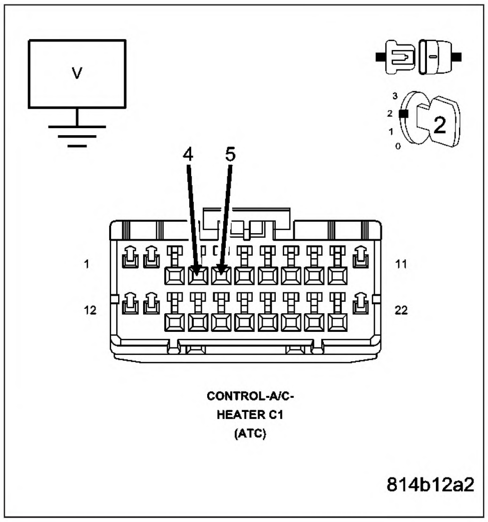
Yes >> Go To 5

No >> Repair the (Z906) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM HVAC (A/C HEATER CONTROL - ATC ONLY) (CONTINUED)

5. (D55) AND (D54) CAN B BUS CIRCUITS OPEN



NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

Is there any voltage present on either circuit?

Yes >> Replace the A/C Heater Control in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM ITM (INTRUSION TRANSCEIVER MODULE)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A114) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z915) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
INTRUSION TRANSCEIVER MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A114) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

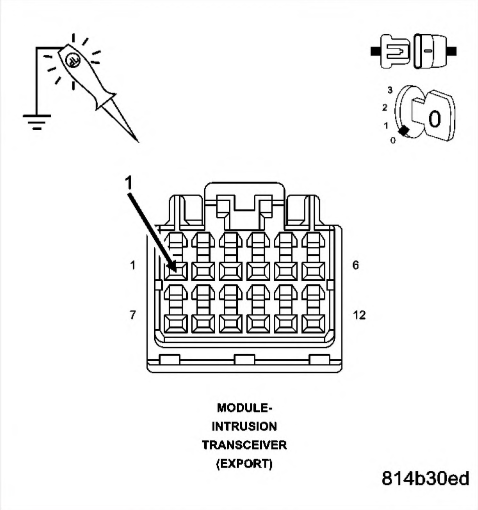
Disconnect the Intrusion Transceiver Module harness connector.

Using a 12-volt test light connected to ground, check the (A114) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

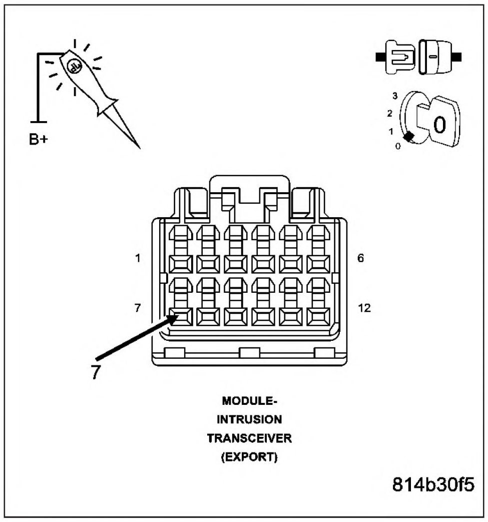
No >> Repair the (A114) Fused B(+) circuit for an open or short.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM ITM (INTRUSION TRANSCEIVER MODULE) (CONTINUED)

3. (Z915) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z915) ground circuit.


B+
1
6
7
12
7
3
2
1
0
0
MODULE-
INTRUSION
TRANSCEIVER
(EXPORT)
814b30f5

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z915) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

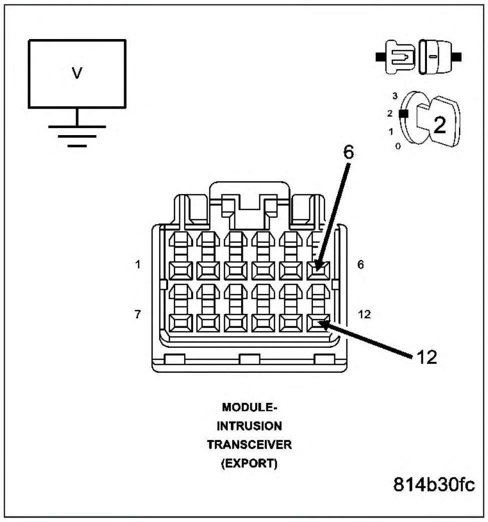
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.


V
3
2
1
0
2
6
1
6
7
12
12
MODULE-
INTRUSION
TRANSCEIVER
(EXPORT)
814b30fc

Is there any voltage present on either circuit?

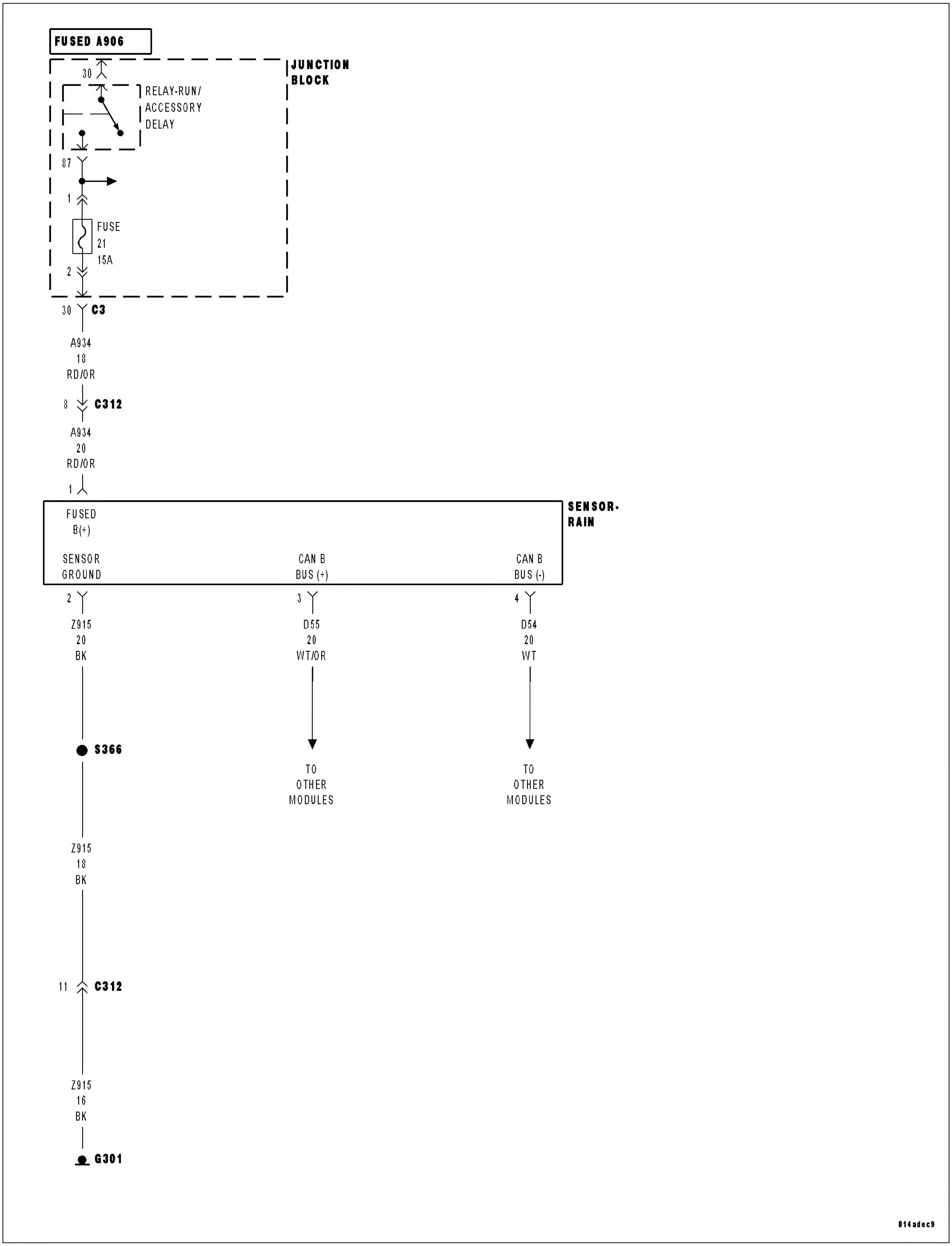
Yes >> Replace the Intrusion Transceiver Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM LRSM (RAIN SENSOR)


FUSED A906
JUNCTION BLOCK
30
RELAY-RUN/ ACCESSORY DELAY
87
1
FUSE 21 15A
2
30 C3
A934 18 RD/OR
8 C312
A934 20 RD/OR
1
SENSOR-RAIN
FUSED B(+)
SENSOR GROUND
CAN B BUS (+)
CAN B BUS (-)
2
3
4
Z915 20 BK
D55 20 WT/OR
D54 20 WT
S366
TO OTHER MODULES
TO OTHER MODULES
Z915 18 BK
11 C312
Z915 16 BK
G301
814adec9

*NO RESPONSE FROM LRSM (RAIN SENSOR) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A934) FUSED RUN/ACCESSORY RELAY OUTPUT CIRCUIT OPEN OR SHORTED
(Z915) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
RAIN SENSOR

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.
With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

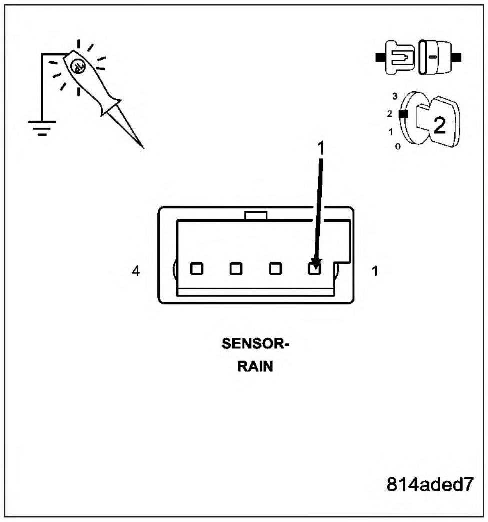
2. (A934) FUSED RUN/ACCESSORY RELAY OUTPUT CIRCUIT OPEN OR SHORTED

NOTE: Check the FCM for any ignition related DTCs before proceeding. If set (Refer to 8 - ELECTRICAL/IGNITION CONTROL - DIAGNOSIS AND TESTING).
Turn the ignition off.

Disconnect the Rain Sensor harness connector.

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (A934) Fused Run/Accessory Relay Output circuit.



Does the test light illuminate brightly?

Yes >> Go To 3

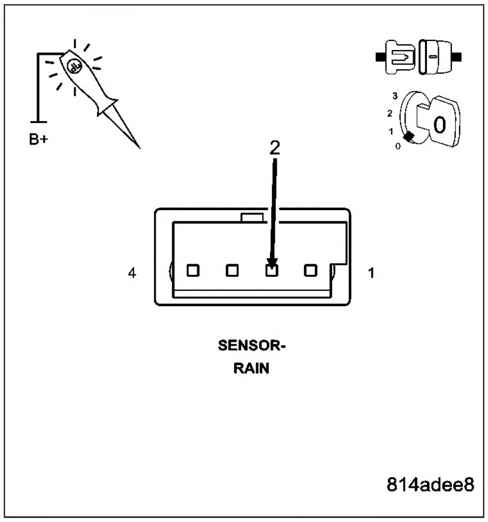
No >> Repair the (A934) Fused Run/Accessory Relay Output circuit for an open or short.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM LRSM (RAIN SENSOR) (CONTINUED)

3. (Z915) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to 12-volts, check the (Z915) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z915) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

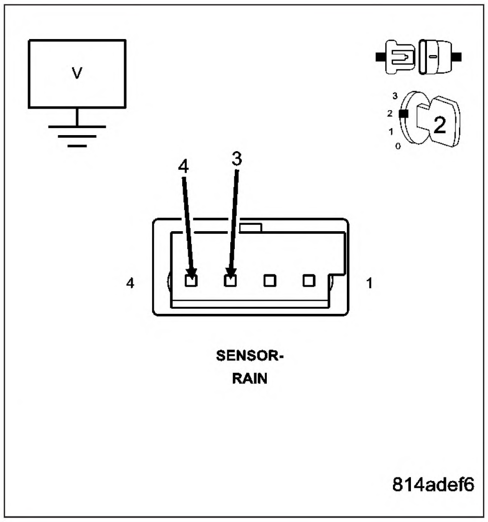
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is there any voltage present on either circuit?

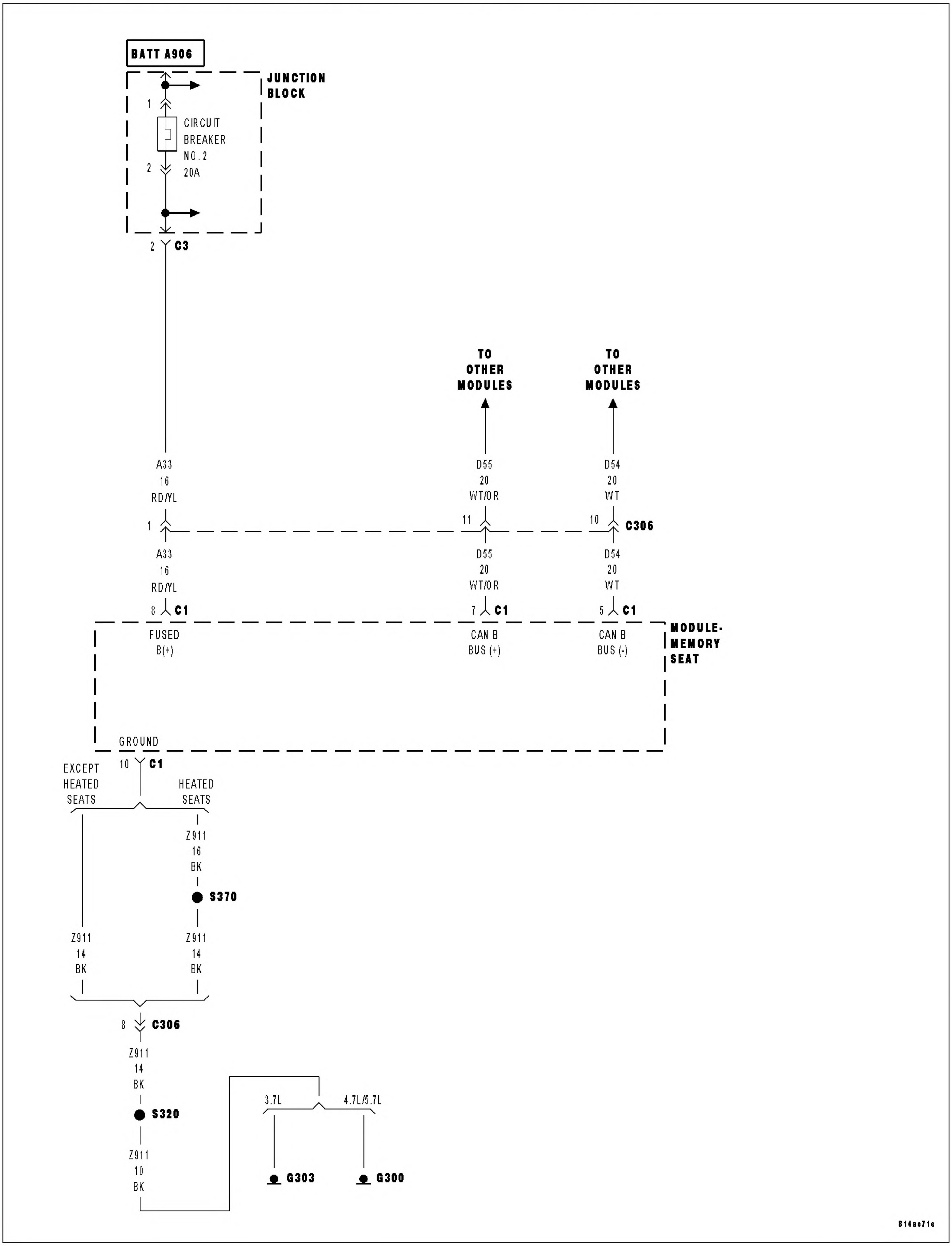
Yes >> Replace the Rain Sensor in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM MSMD (MEMORY SEAT MODULE)


BATT A906
JUNCTION BLOCK
1
CIRCUIT BREAKER NO.2 20A
2
2 C3
TO OTHER MODULES
TO OTHER MODULES
A33 16 RD/YL
D55 20 WT/OR
D54 20 WT
1
11
10 C306
A33 16 RD/YL
D55 20 WT/OR
D54 20 WT
8 C1
7 C1
5 C1
FUSED B(+)
CAN B BUS (+)
CAN B BUS (-)
MODULE-MEMORY SEAT
GROUND
10 C1
EXCEPT HEATED SEATS
HEATED SEATS
Z911 16 BK
S370
Z911 14 BK
Z911 14 BK
8 C306
Z911 14 BK
S320
Z911 10 BK
3.7L
4.7L/5.7L
G303
G300
814ae71e

*NO RESPONSE FROM MSMD (MEMORY SEAT MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A33) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z911) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A33) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

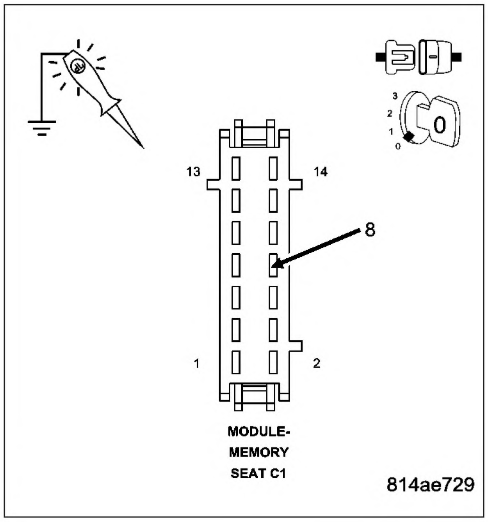
Disconnect the Memory Seat Module C1 harness connector.

Using a 12-volt test light connected to ground, check the (A33) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

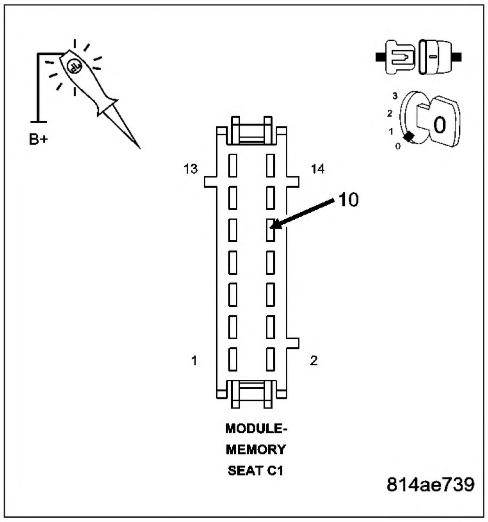
No >> Repair the (A33) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM MSMD (MEMORY SEAT MODULE) (CONTINUED)

3. (Z911) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z911) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z911) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

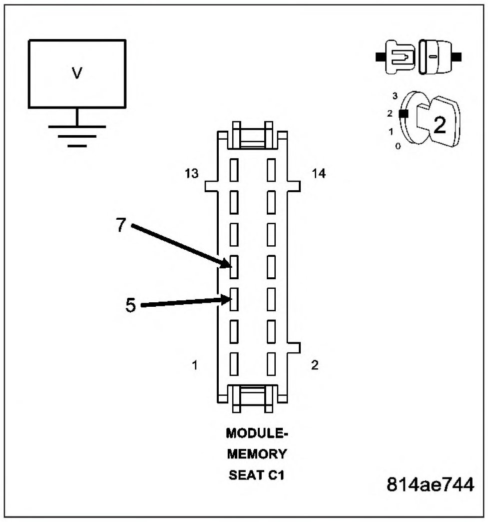
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

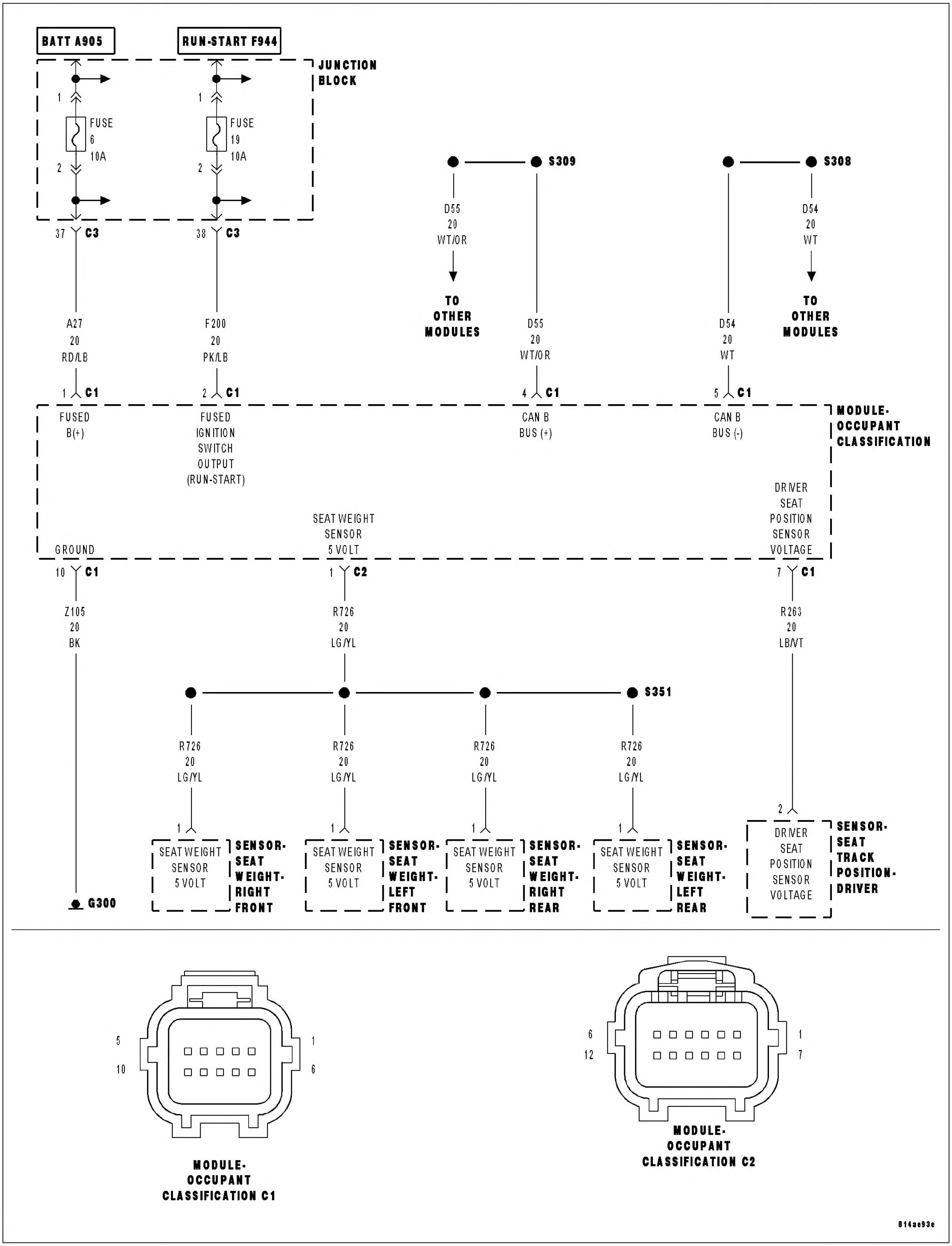


Is there any voltage present on either circuit?

Yes >> Replace the Memory Seat Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM OCM (OCCUPANT CLASSIFICATION MODULE)


BATT A905
RUN-START F944
JUNCTION BLOCK
1
FUSE 6 10A
2
1
FUSE 19 10A
2
37 C3
38 C3
S309
S308
D55 20 WT/OR
TO OTHER MODULES
D54 20 WT
TO OTHER MODULES
A27 20 RD/LB
F200 20 PK/LB
D55 20 WT/OR
D54 20 WT
1 C1
2 C1
4 C1
5 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
DRIVER SEAT POSITION SENSOR VOLTAGE
SEAT WEIGHT SENSOR 5 VOLT
GROUND
10 C1
1 C2
7 C1
Z105 20 BK
R726 20 LG/YL
R263 20 LB/VT
S351
R726 20 LG/YL
R726 20 LG/YL
R726 20 LG/YL
R726 20 LG/YL
1
1
1
1
2
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT FRONT
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-LEFT FRONT
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT REAR
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-LEFT REAR
DRIVER SEAT POSITION SENSOR VOLTAGE
SENSOR-SEAT TRACK POSITION-DRIVER
G300
5
10
1
6
MODULE-OCCUPANT CLASSIFICATION C1
6
12
1
7
MODULE-OCCUPANT CLASSIFICATION C2
814ae93e

*NO RESPONSE FROM OCM (OCCUPANT CLASSIFICATION MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A27) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z105) GROUND CIRCUIT OPEN
(F200) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
(R263) DRIVER SEAT POSITION SENSOR VOLTAGE CIRCUIT FOR A SHORT TO GROUND
(R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT FOR A SHORT TO GROUND
OCCUPANT CLASSIFICATION MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A27) FUSED B(+) CIRCUIT OPEN OR SHORTED

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Occupant Classification Module C1 harness connector.

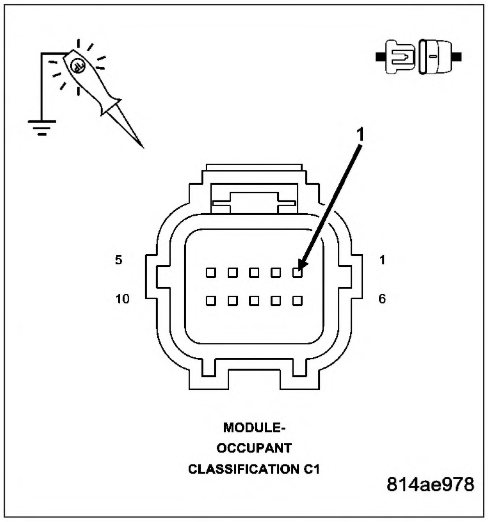
WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Using a 12-volt test light connected to ground, check the (A27) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the (A27) Fused B(+) circuit for an open or short. Perform the OCS VERIFICATION TEST-VER 1.

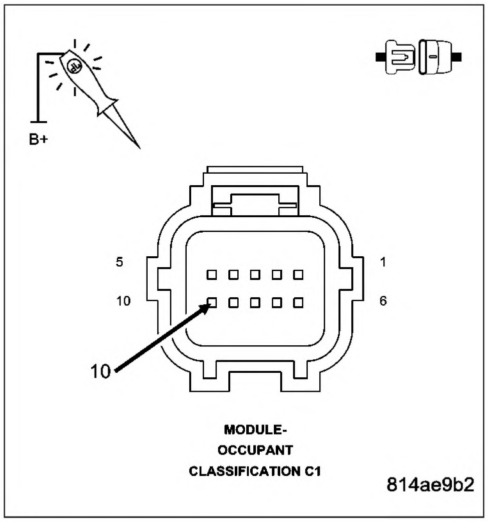


*NO RESPONSE FROM OCM (OCCUPANT CLASSIFICATION MODULE) (CONTINUED)

3. (Z105) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to 12-volts, check the (Z105) ground circuit.


B+
5
1
10
6
10
MODULE-
OCCUPANT
CLASSIFICATION C1
814ae9b2

Does the test light illuminate brightly?

Yes >> Go To 4

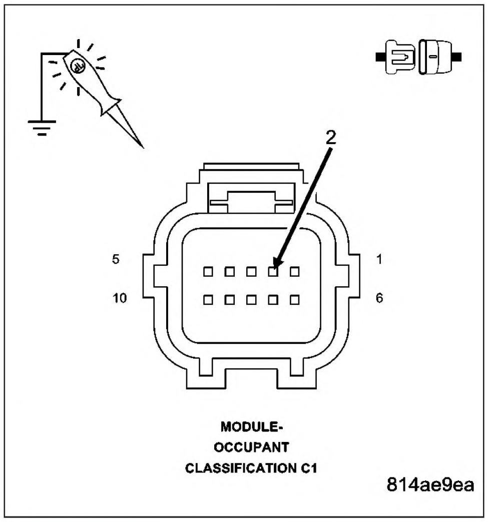
No >> Repair the (Z105) ground circuit for an open.
Perform the OCS VERIFICATION TEST-VER 1.

---

4. (F200) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F200) Fused Ignition Switch Output circuit.


2
5
1
10
6
MODULE-
OCCUPANT
CLASSIFICATION C1
814ae9ea

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (F200) Fused Ignition Switch Output circuit for an open or short.
Perform the OCS VERIFICATION TEST-VER 1.

*NO RESPONSE FROM OCM (OCCUPANT CLASSIFICATION MODULE) (CONTINUED)

5. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

WARNING: If the Occupant Classification Module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

NOTE: One open circuit will not cause this condition.

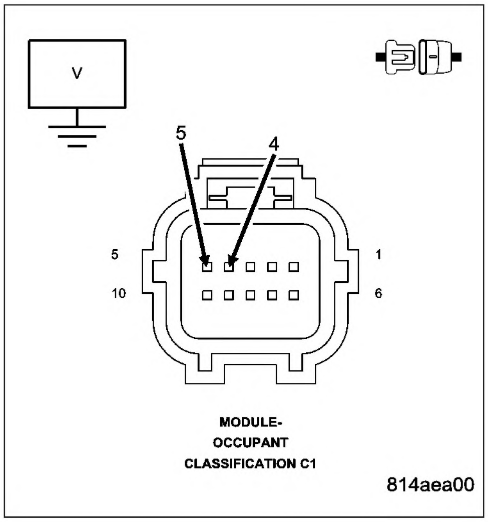
Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

Is there any voltage present on either circuit?

Yes >> Go To 6

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform the OCS VERIFICATION TEST-VER 1.



---

6. CHECK (R263) DRIVER SEAT POSITION SENSOR VOLTAGE CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (R263) Driver Seat Position Sensor Voltage-Driver circuit.

Is the resistance below 10k ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the OCM and Driver Seat Position Sensor Harness in accordance with the service information.
Perform the OCS VERIFICATION TEST-VER 1.

No >> Go To 7

---

7. CHECK (R726) STRAIN GAUGE 5 VOLT IN CIRCUIT FOR A SHORT TO GROUND

Disconnect the Occupant Classification Module C2 harness connector.

Measure the resistance between ground and the (R726) Seat Weight Sensor 5 volt circuit.

Is the resistance below 10k ohms?

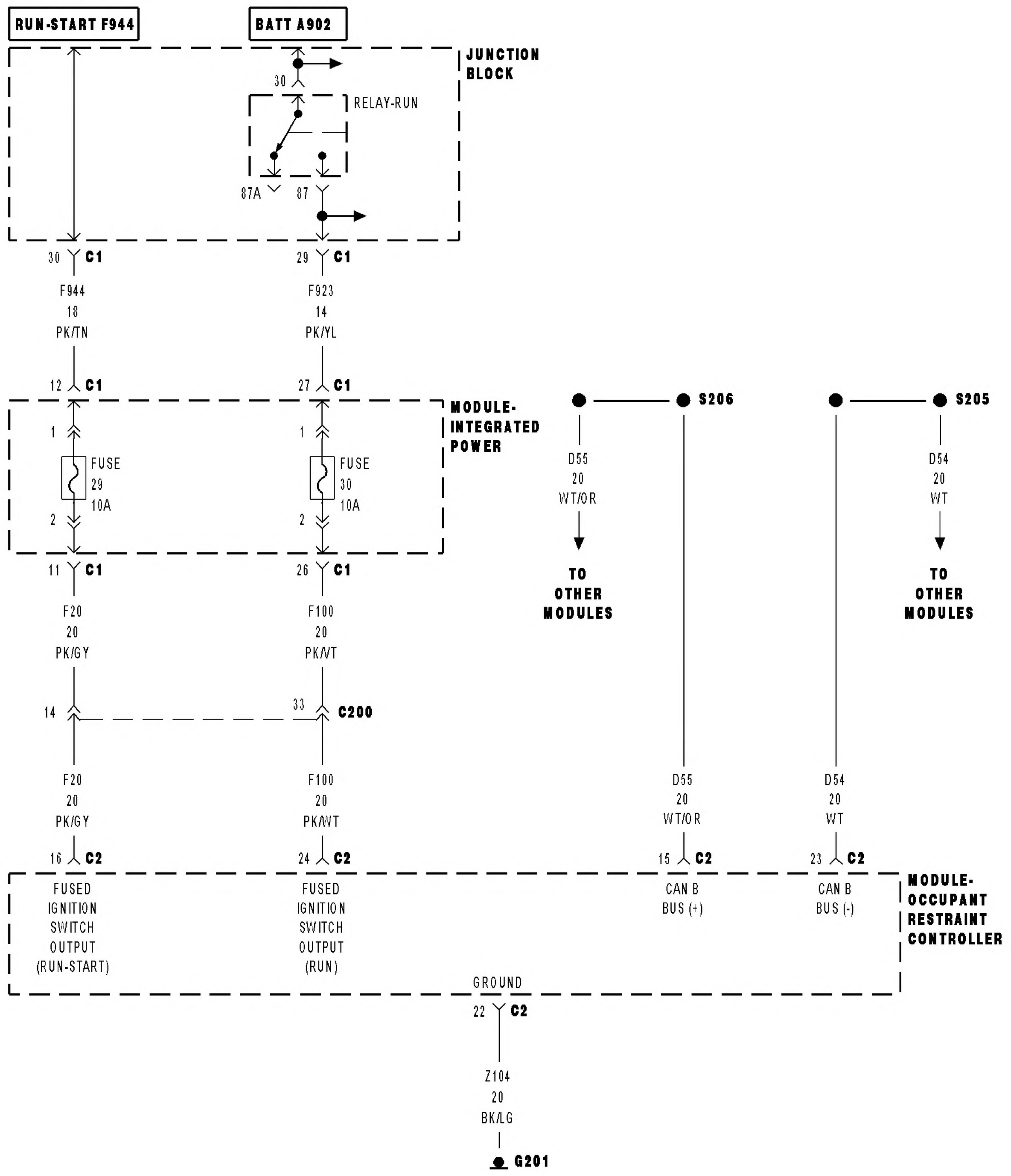
Yes >>

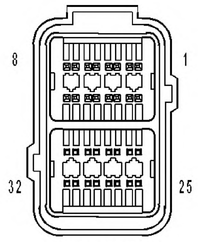
NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the OCM and Driver Seat Position Sensor Harness in accordance with the service information.
Perform the OCS VERIFICATION TEST-VER 1.

No >> Replace the Occupant Classification Module in accordance with the service information.
Perform the OCS VERIFICATION TEST-VER 1.

*NO RESPONSE FROM ORC (OCCUPANT RESTRAINT CONTROLLER)


RUN-START F944
BATT A902
JUNCTION BLOCK
30
RELAY-RUN
87A
87
30 C1
29 C1
F944
18
PK/TN
F923
14
PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
1
FUSE
29
10A
2
1
FUSE
30
10A
2
11 C1
26 C1
F20
20
PK/GY
F100
20
PK/WT
S206
S205
D55
20
WT/OR
TO OTHER MODULES
D54
20
WT
TO OTHER MODULES
14
33
C200
F20
20
PK/GY
F100
20
PK/WT
D55
20
WT/OR
D54
20
WT
16 C2
24 C2
15 C2
23 C2
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED IGNITION SWITCH OUTPUT (RUN)
CAN B BUS (+)
CAN B BUS (-)
MODULE-OCCUPANT RESTRAINT CONTROLLER
GROUND
22 C2
Z104
20
BK/LG
G201



MODULE-OCCUPANT RESTRAINT CONTROLLER C2

814af2cc

*NO RESPONSE FROM ORC (OCCUPANT RESTRAINT CONTROLLER) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(Z104) GROUND CIRCUIT OPEN
(F100) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED
(F20) FUSED IGNITION SWITCH OUTPUT (RUN/START) CIRCUIT OPEN OR SHORTED
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
OCCUPANT RESTRAINT CONTROLLER MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (Z104) GROUND CIRCUIT OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Occupant Restraint Controller Module harness connectors.

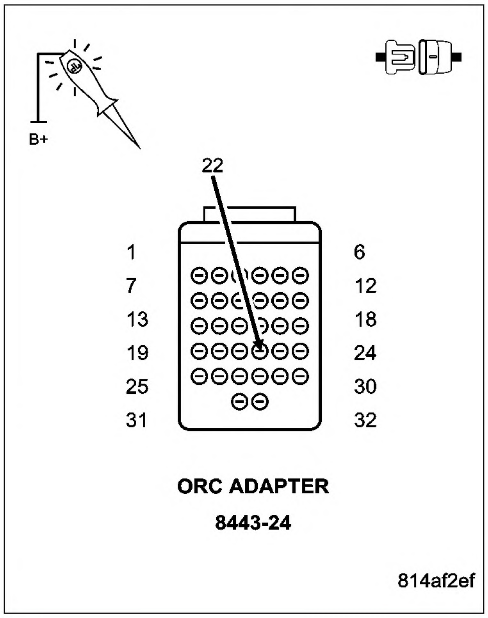
Connect the appropriate Load Tool ACM Adaptor to the ORC connector.

Using a 12-volt test light connected to 12-volts, check the (Z104) ground circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the (Z104) ground circuit for an open.
Perform AIRBAG VERIFICATION TEST - VER 1.



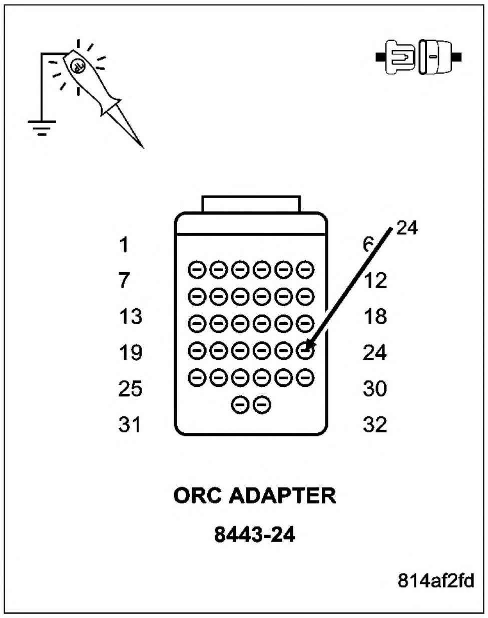
*NO RESPONSE FROM ORC (OCCUPANT RESTRAINT CONTROLLER) (CONTINUED)

3. (F100) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED

NOTE: Check the FCM for any ignition related DTCs before proceeding. If set (Refer to 8 - ELECTRICAL/IGNITION CONTROL - DIAGNOSIS AND TESTING).

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Using a 12-volt test light connected to ground, check the (F100) Fused Run Relay Output circuit.



24
1
6
7
12
13
18
19
24
25
30
31
32
ORC ADAPTER
8443-24
814af2fd

Does the test light illuminate brightly?

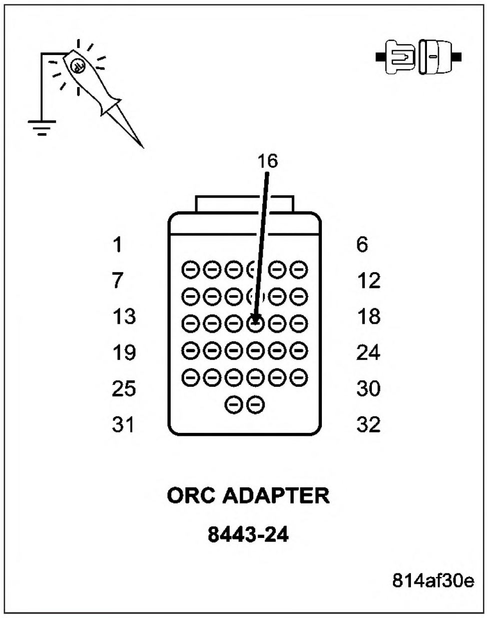
Yes >> Go To 4

No >> Repair the (F100) Fused Run Relay Output circuit for an open or short.
Perform AIRBAG VERIFICATION TEST - VER 1.

---

4. (F20) FUSED IGNITION SWITCH OUTPUT (RUN/START) CIRCUIT OPEN OR SHORTED

Using a 12-volt test light connected to ground, check the (F20) Fused Ignition Switch Output (RUN/START) circuit.



16
1
6
7
12
13
18
19
24
25
30
31
32
ORC ADAPTER
8443-24
814af30e

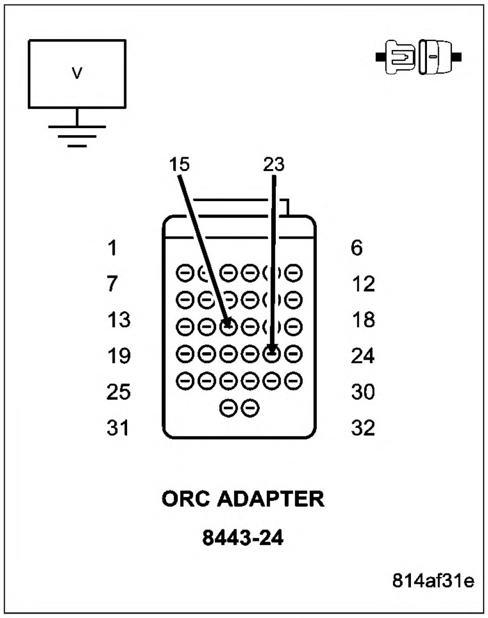
Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (F20) Fused Ignition Switch Output (RUN/START) circuit for an open or short.
Perform AIRBAG VERIFICATION TEST - VER 1.

*NO RESPONSE FROM ORC (OCCUPANT RESTRAINT CONTROLLER) (CONTINUED)

5. (D55) AND (D54) CAN B BUS CIRCUITS OPEN



WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

Is there any voltage present on either circuit?

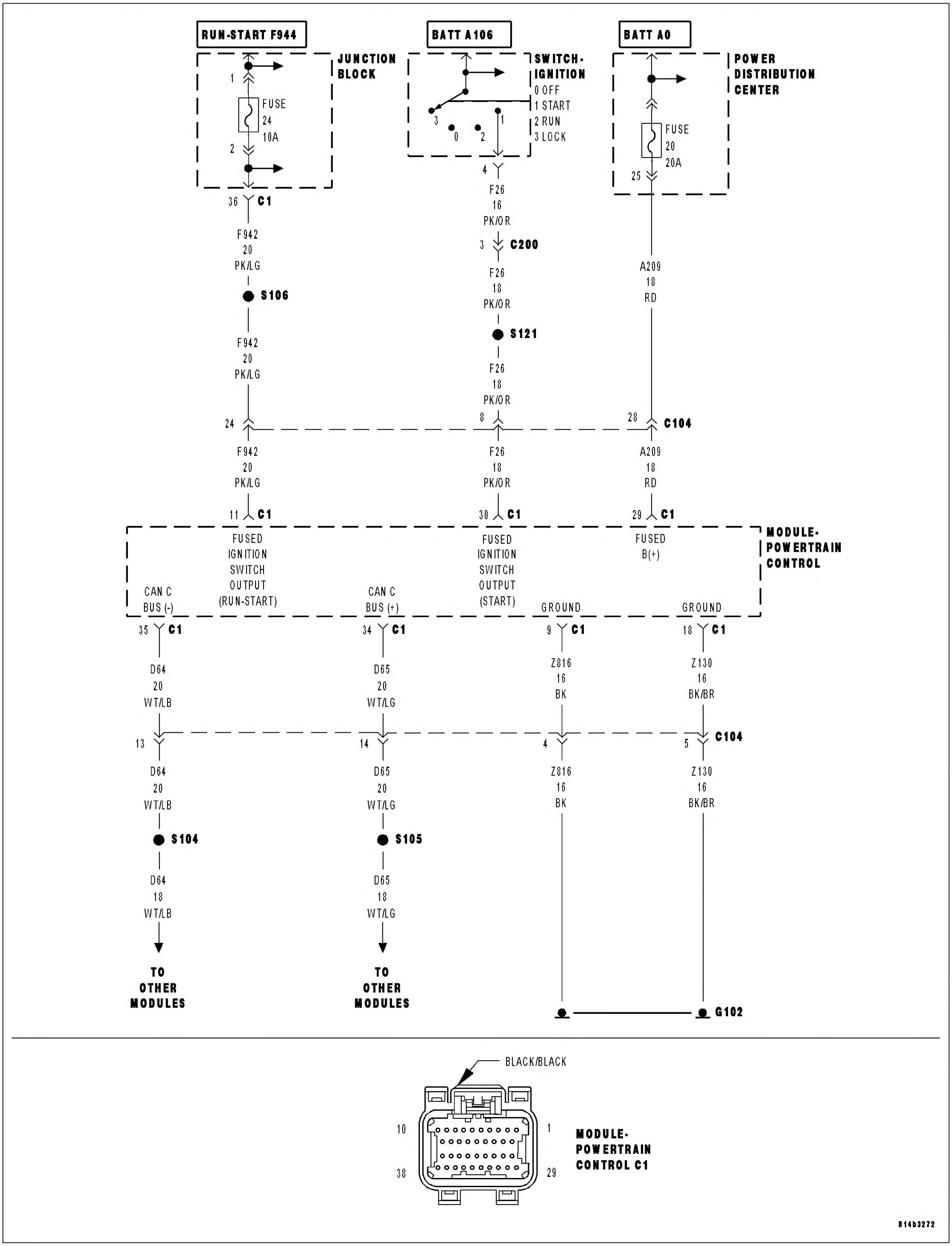
Yes >> Replace the Occupant Restraint Controller Module in accordance with the service information.

Perform AIRBAG VERIFICATION TEST - VER 1.

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform AIRBAG VERIFICATION TEST - VER 1.

*NO RESPONSE FROM PCM (POWERTRAIN CONTROL MODULE)


RUN-START F944
JUNCTION BLOCK
1
FUSE
24
10A
2
36 C1
F942
20
PK/LG
S106
F942
20
PK/LG
BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 LOCK
3
0
2
1
4
F26
16
PK/OR
3 C200
F26
18
PK/OR
S121
F26
18
PK/OR
BATT A0
POWER DISTRIBUTION CENTER
FUSE
20
20A
25
A209
18
RD
24
8
28
C104
F942
20
PK/LG
F26
18
PK/OR
A209
18
RD
11 C1
30 C1
29 C1
MODULE-POWERTRAIN CONTROL
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED IGNITION SWITCH OUTPUT (START)
FUSED B(+)
CAN C BUS (-)
CAN C BUS (+)
GROUND
GROUND
35 C1
34 C1
9 C1
18 C1
D64
20
WT/LB
D65
20
WT/LG
Z816
16
BK
Z130
16
BK/BR
13
14
4
5
C104
D64
20
WT/LB
D65
20
WT/LG
Z816
16
BK
Z130
16
BK/BR
S104
S105
D64
18
WT/LB
D65
18
WT/LG
TO OTHER MODULES
TO OTHER MODULES
G102
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
814b3272

*NO RESPONSE FROM PCM (POWERTRAIN CONTROL MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A209) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z130) (Z816) GROUND CIRCUIT OPEN
(F26) (F942) FUSED IGNITION SW OUTPUT CIRCUIT OPEN OR SHORTED
(D65) CAN C BUS (+) CIRCUIT OPEN
(D64) CAN C BUS (-) CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: Check the FCM for any active CAN C hardware DTCs, perform DTC before proceeding.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A209) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

Disconnect the PCM C1 harness connector.

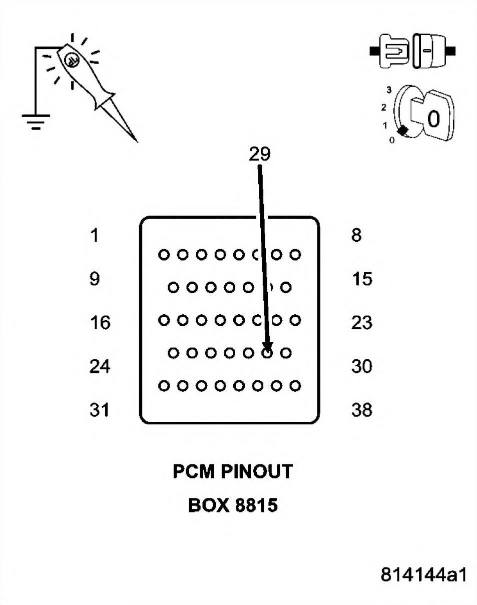
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Using a 12-volt test light connected to ground, check the (A209) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

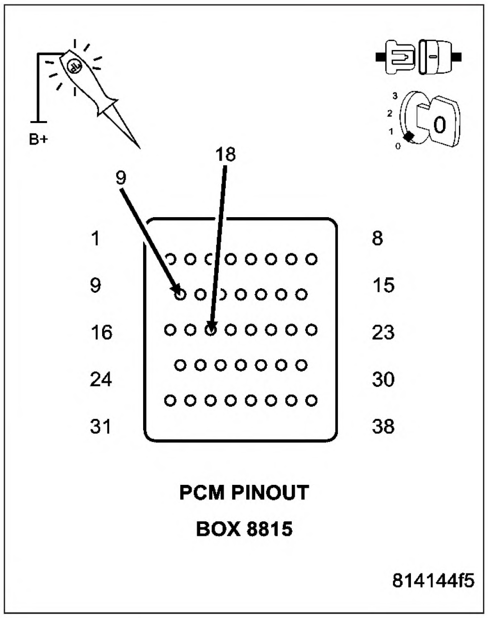
No >> Repair the (A209) Fused B(+) circuit for an open or short. Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.



*NO RESPONSE FROM PCM (POWERTRAIN CONTROL MODULE) (CONTINUED)

3. (Z816) (Z130) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check each (Z816) and (Z130) ground circuit.


B+
9
18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
814144f5

Does the test light illuminate brightly for each circuit?

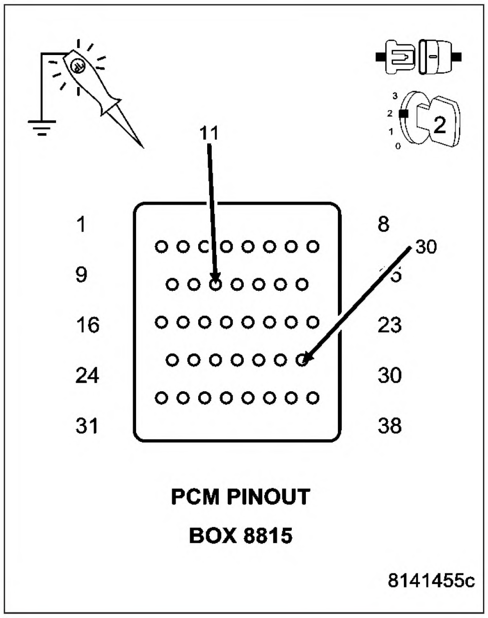
Yes >> Go To 4

No >> Repair the ground circuit for an open.
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

4. (F26) (F942) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check each (F26) and (F942) Fused Ignition Switch Output circuit.


11
1
8
30
9
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8141455c

Does the test light illuminate brightly for each circuit?

Yes >> Go To 5

No >> Repair the Fused Ignition Switch Output circuit for an open or short.
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

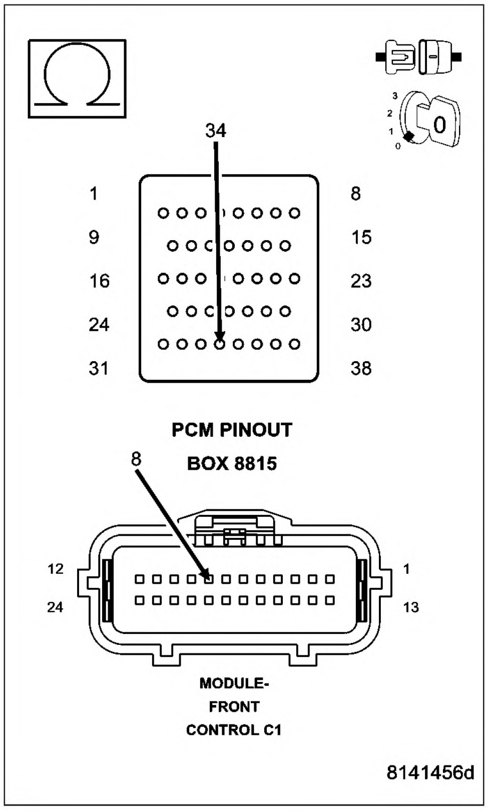
*NO RESPONSE FROM PCM (POWERTRAIN CONTROL MODULE) (CONTINUED)

5. (D65) CAN C BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the FCM C1 harness connector.

Measure the resistance of the (D65) CAN C Bus (+) circuit between the FCM connector and the appropriate terminal of the special tool #8815.



34
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8
12
24
1
13
MODULE-
FRONT
CONTROL C1
8141456d

Is the resistance below 5.0 ohms?

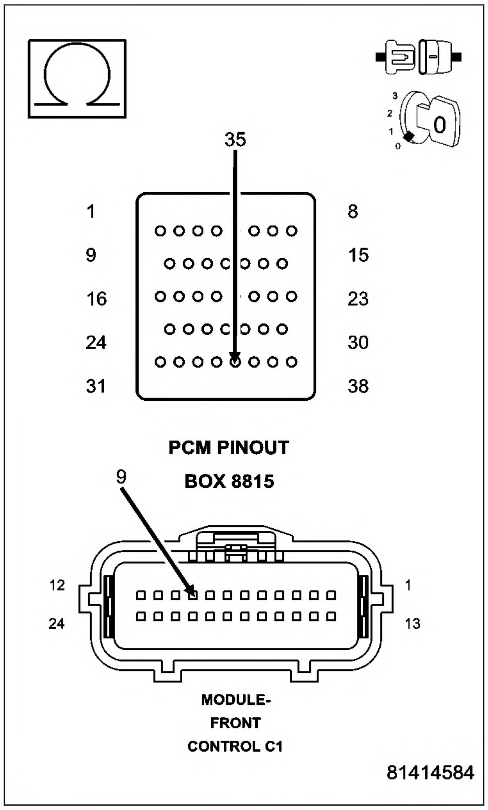
Yes >> Go To 6

No >> Repair the (D65) CAN C Bus (+) circuit for an open. Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

*NO RESPONSE FROM PCM (POWERTRAIN CONTROL MODULE) (CONTINUED)

6. (D64) CAN C BUS (-) CIRCUIT OPEN

Measure the resistance of the (D64) CAN C Bus (-) circuit between the FCM connector and the appropriate terminal of the special tool #8815.


35
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
9
12
1
24
13
MODULE-
FRONT
CONTROL C1
81414584

Is the resistance below 5.0 ohms?

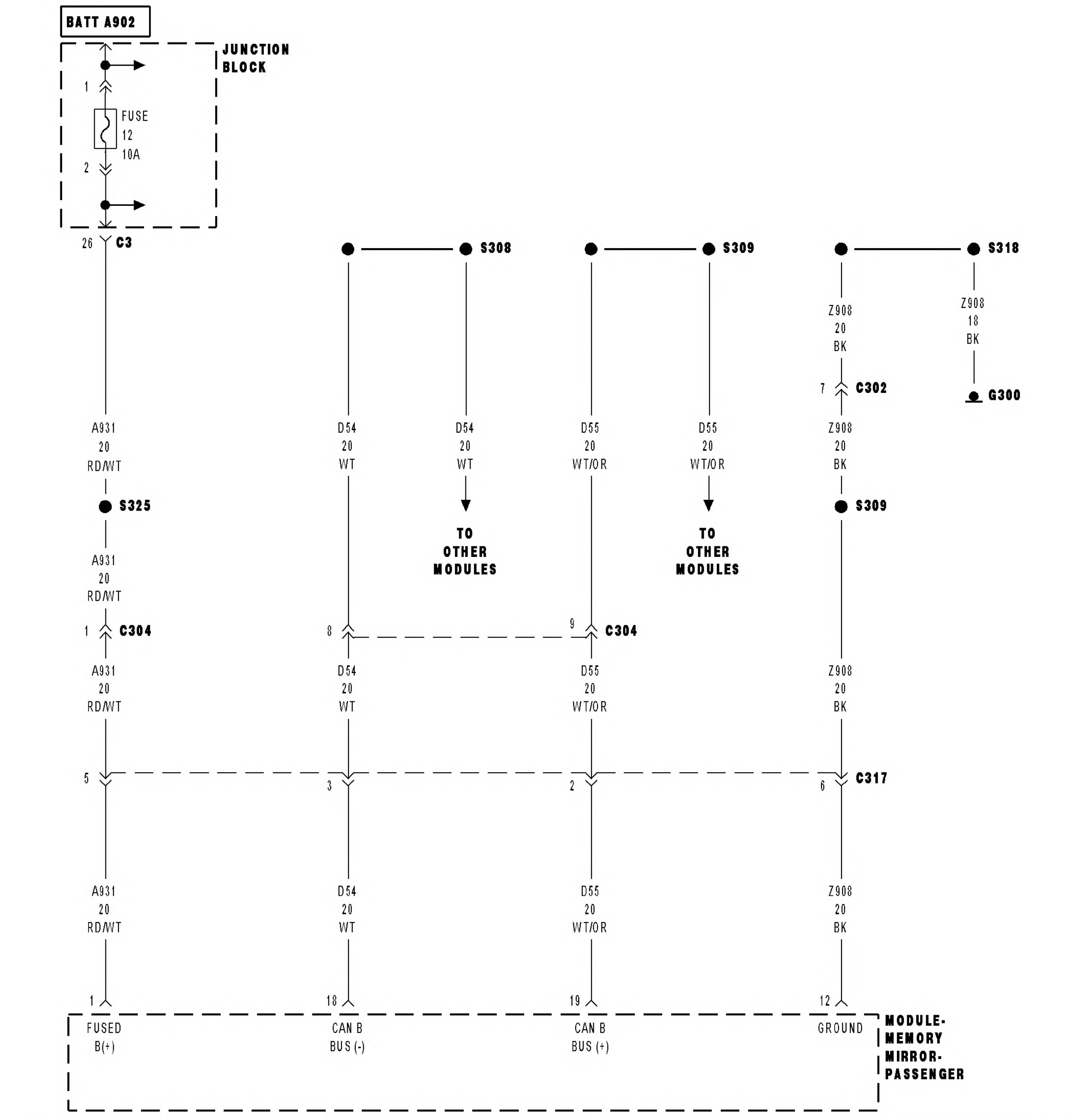
Yes >> Replace and program the Powertrain Control Module in accordance with the service information.

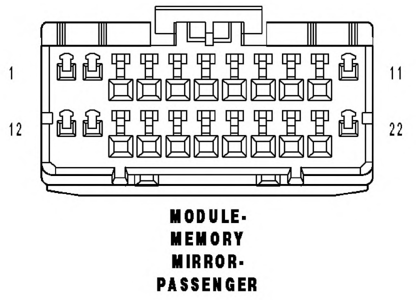
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

No >> Repair the (D64) CAN C Bus (-) circuit for an open.

Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

*NO RESPONSE FROM PDM (PASSENGER MEMORY MIRROR MODULE)


BATT A902
JUNCTION BLOCK
1
FUSE 12 10A
2
26 C3
S308
S309
S318
Z908 20 BK
Z908 18 BK
7 C302
G300
A931 20 RD/WT
D54 20 WT
D54 20 WT
D55 20 WT/OR
D55 20 WT/OR
Z908 20 BK
S325
TO OTHER MODULES
TO OTHER MODULES
S309
1 C304
8
9 C304
5
3
2
6 C317
1 FUSED B(+)
18 CAN B BUS (-)
19 CAN B BUS (+)
12 GROUND
MODULE-MEMORY MIRROR-PASSENGER


1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
814abf65

*NO RESPONSE FROM PDM (PASSENGER MEMORY MIRROR MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A931) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z908) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
PASSENGER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A931) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

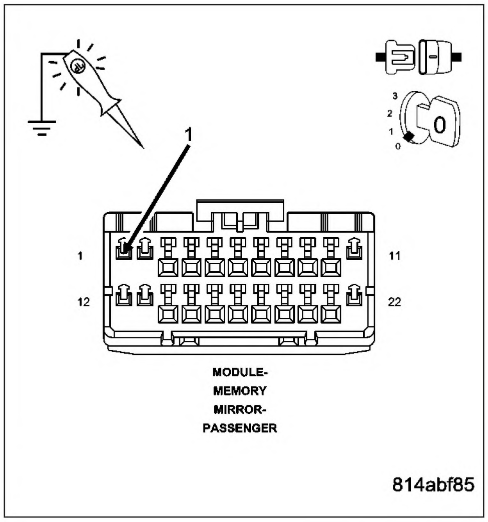
Disconnect the Passenger Memory Mirror Module harness connector.

Using a 12-volt test light connected to ground, check the (A931) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

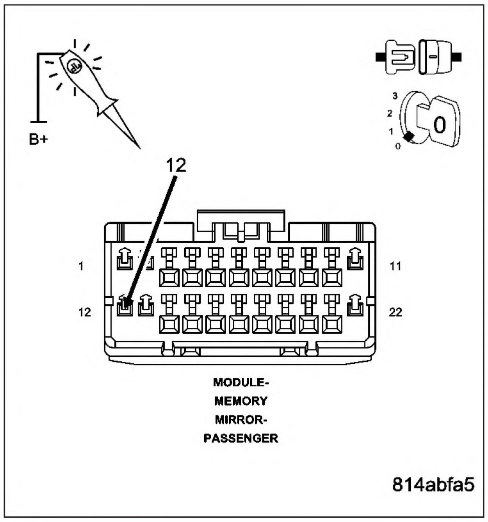
No >> Repair the (A931) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM PDM (PASSENGER MEMORY MIRROR MODULE) (CONTINUED)

3. (Z908) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z908) ground circuit.


B+
12
1
11
12
22
0
1
2
3
0
MODULE-
MEMORY
MIRROR-
PASSENGER
814abfa5

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z908) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

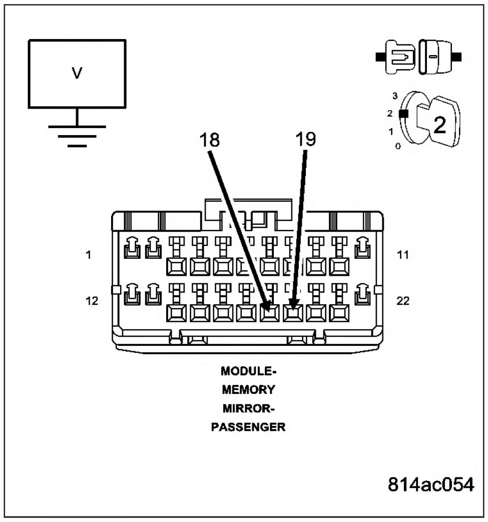
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

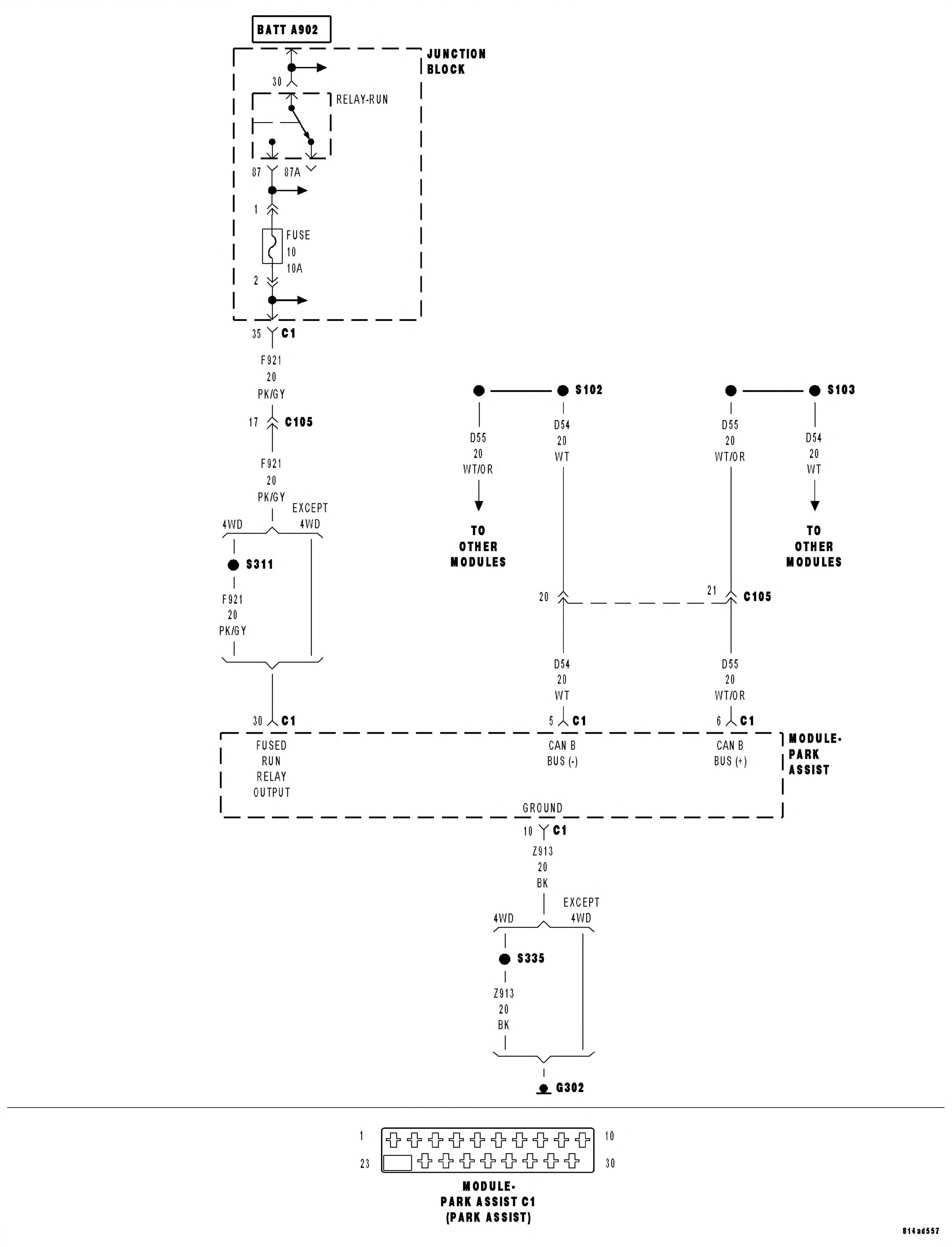

V
18
19
2
3
2
1
0
1
11
12
22
MODULE-
MEMORY
MIRROR-
PASSENGER
814ac054

Is there any voltage present on either circuit?

Yes >> Replace the Passenger Memory Mirror Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM PTS (PARK ASSIST MODULE)


BATT A902
JUNCTION BLOCK
30
RELAY-RUN
87
87A
1
FUSE
10
10A
2
35 C1
F921
20
PK/GY
17 C105
F921
20
PK/GY
4WD
EXCEPT 4WD
S311
F921
20
PK/GY
30 C1
S102
D55
20
WT/OR
TO OTHER MODULES
D54
20
WT
S103
D55
20
WT/OR
D54
20
WT
TO OTHER MODULES
20
21 C105
D54
20
WT
D55
20
WT/OR
5 C1
6 C1
FUSED RUN RELAY OUTPUT
CAN B BUS (-)
CAN B BUS (+)
MODULE-PARK ASSIST
GROUND
10 C1
Z913
20
BK
4WD
EXCEPT 4WD
S335
Z913
20
BK
G302
1
10
23
30
MODULE-PARK ASSIST C1 (PARK ASSIST)
814ad557

*NO RESPONSE FROM PTS (PARK ASSIST MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED
(Z913) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
PARK ASSIST MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (F921) FUSED RUN RELAY OUTPUT CIRCUIT OPEN OR SHORTED

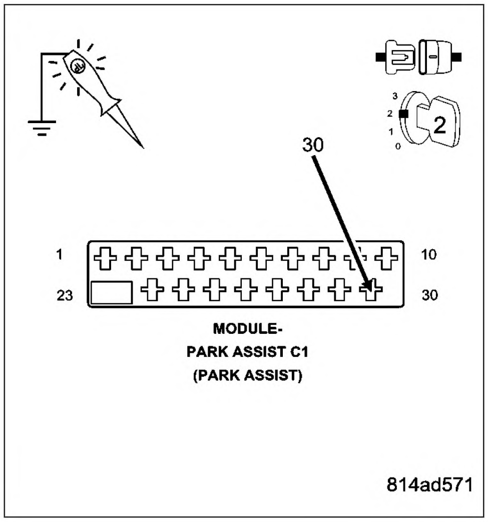
NOTE: Check the FCM for any ignition related DTCs before proceeding. If set (Refer to 8 - ELECTRICAL/IGNITION CONTROL - DIAGNOSIS AND TESTING).

Turn the ignition off.

Disconnect the Park Assist Module C1 harness connector.

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F921) Fused Run Relay Output circuit.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the (F921) Fused Run Relay Output circuit for an open or short.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM PTS (PARK ASSIST MODULE) (CONTINUED)

3. (Z913) GROUND CIRCUIT OPEN

Turn the ignition off.

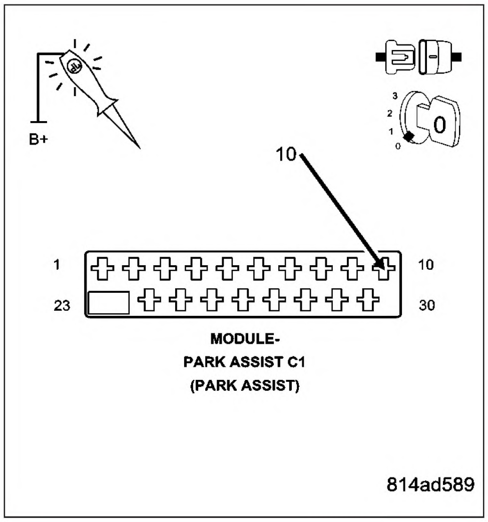
Using a 12-volt test light connected to 12-volts, check the (Z913) ground circuit.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z913) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).


B+
3
2
1
0
0
10
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
814ad589

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

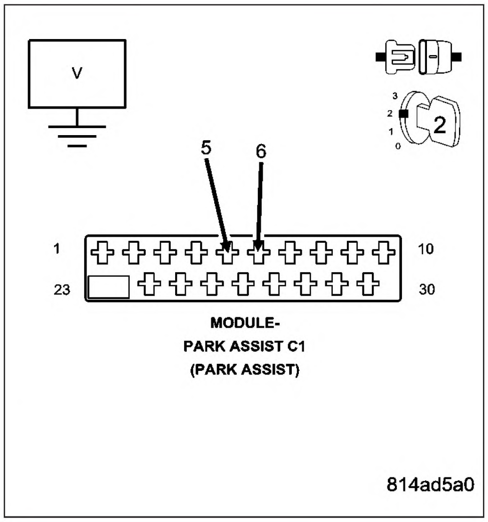
Is there any voltage present on either circuit?

Yes >> Replace the Park Assist Module in accordance with the service information.

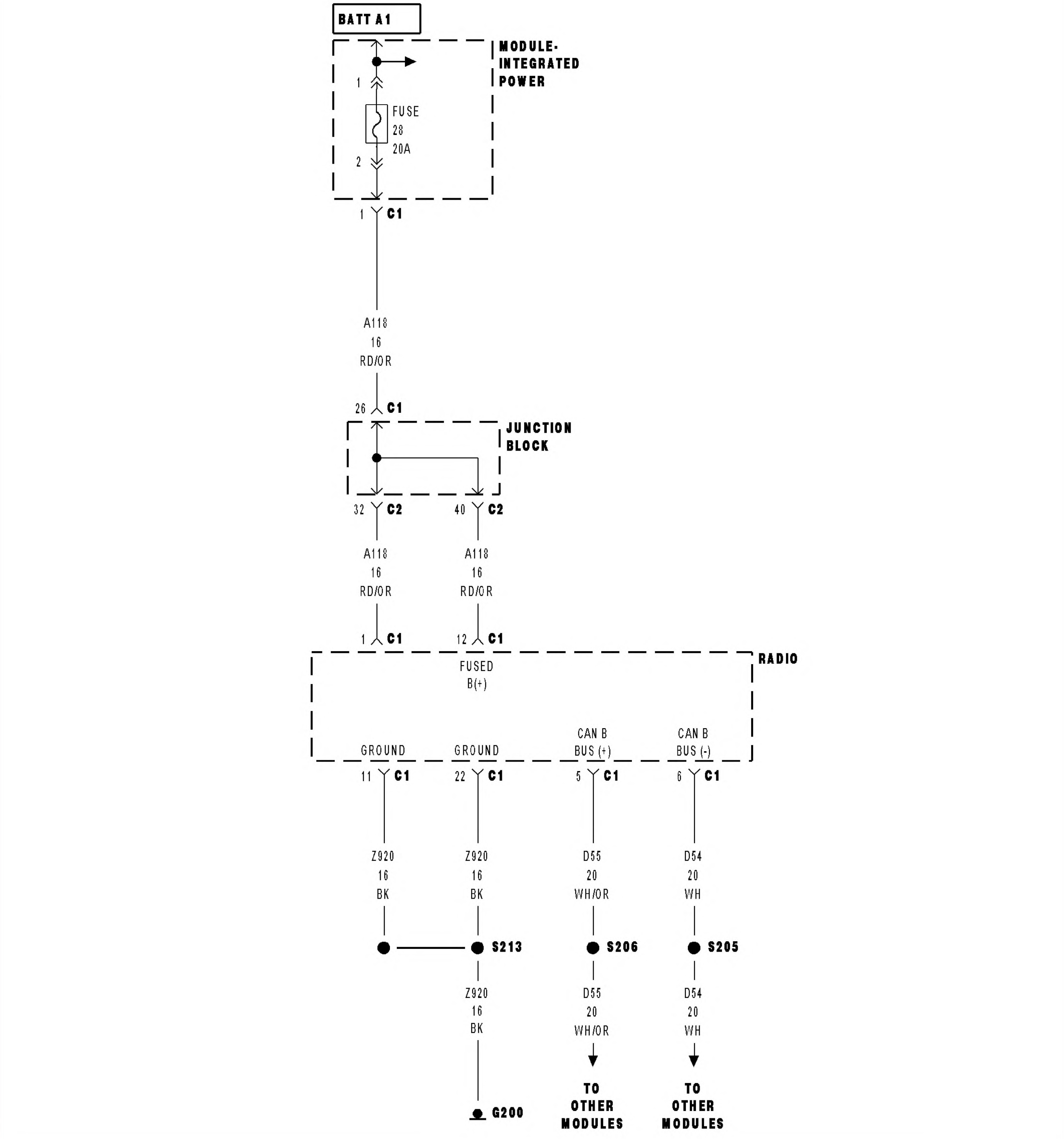
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

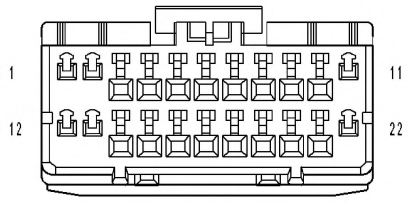
No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).


V
3
2
1
0
2
5
6
1
10
23
30
MODULE-
PARK ASSIST C1
(PARK ASSIST)
814ad5a0

*NO RESPONSE FROM RADIO


BATT A1
MODULE-INTEGRATED POWER
1
FUSE
28
20A
2
1 C1
A118
16
RD/OR
26 C1
JUNCTION BLOCK
32 C2
40 C2
A118
16
RD/OR
A118
16
RD/OR
1 C1
12 C1
RADIO
FUSED B(+)
GROUND
GROUND
CAN B BUS (+)
CAN B BUS (-)
11 C1
22 C1
5 C1
6 C1
Z920
16
BK
Z920
16
BK
D55
20
WH/OR
D54
20
WH
S213
S206
S205
Z920
16
BK
D55
20
WH/OR
D54
20
WH
G200
TO OTHER MODULES
TO OTHER MODULES



RADIO C1

814af598

*NO RESPONSE FROM RADIO (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A118) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z920) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
RADIO

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A118) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

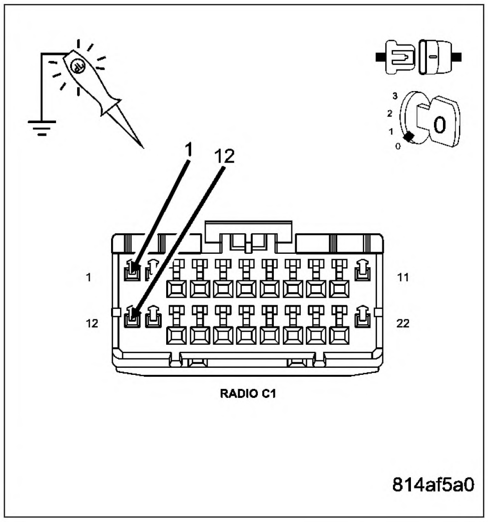
Disconnect the Radio C1 harness connector.

Using a 12-volt test light connected to ground, check each (A118) Fused B(+) circuit.

Does the test light illuminate brightly for each circuit?

Yes >> Go To 3

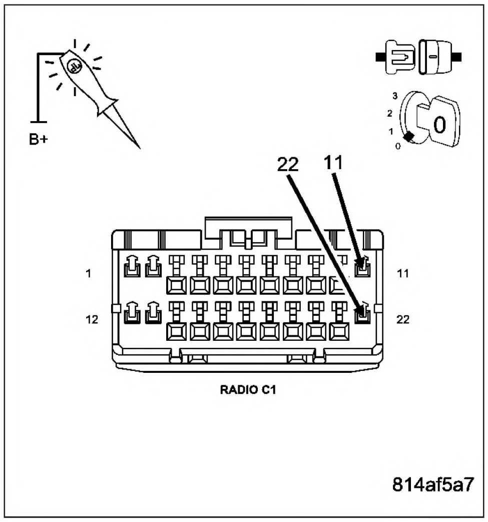
No >> Repair the (A118) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM RADIO (CONTINUED)

3. (Z920) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check each (Z920) ground circuit.



Does the test light illuminate brightly for each circuit?

Yes >> Go To 4

No >> Repair the (Z920) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

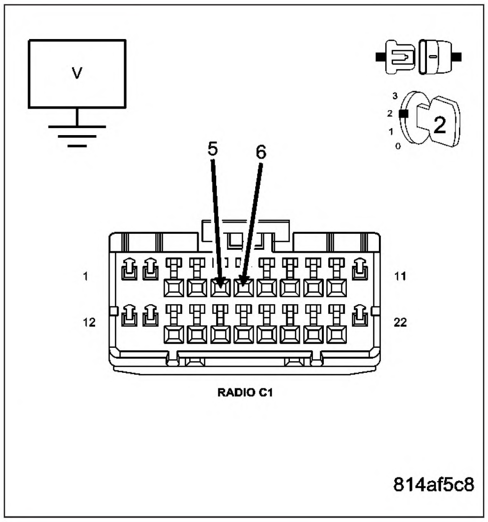
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is there any voltage present on either circuit?

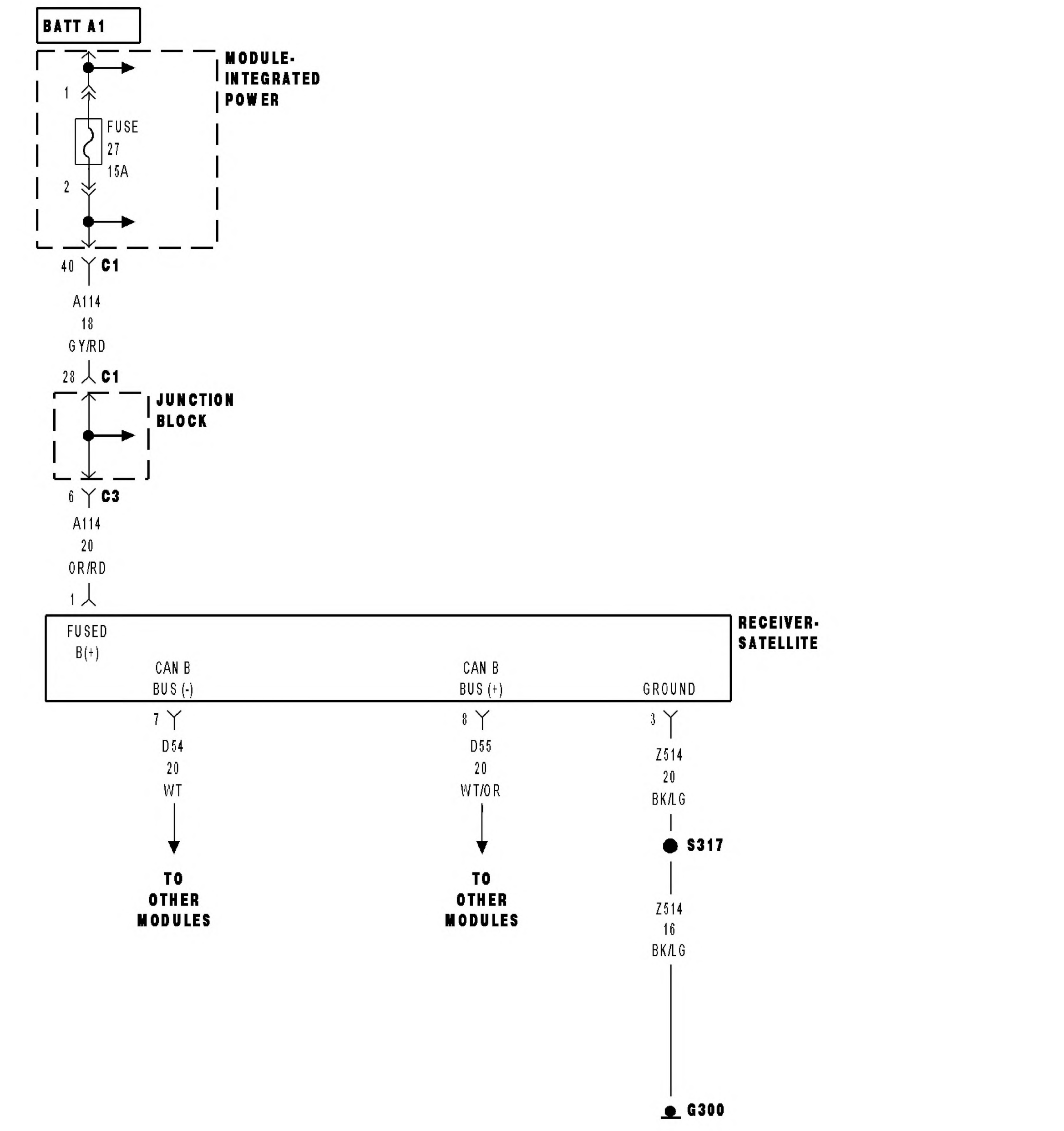
Yes >> Replace the Radio in accordance with the service information.

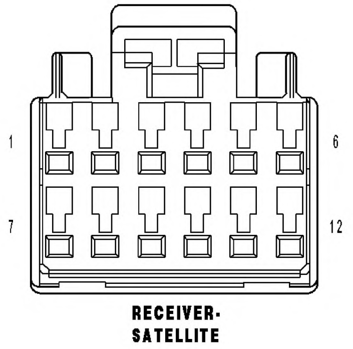
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM SDAR (SATELLITE RECEIVER)


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 27 15A
2
40 C1
A114 18 GY/RD
28 C1
JUNCTION BLOCK
6 C3
A114 20 OR/RD
1
FUSED B(+)
CAN B BUS (-)
CAN B BUS (+)
GROUND
RECEIVER-SATELLITE
7
D54 20 WT
8
D55 20 WT/OR
3
Z514 20 BK/LG
S317
Z514 16 BK/LG
G300
TO OTHER MODULES
TO OTHER MODULES


1
6
7
12
RECEIVER-SATELLITE
814af6da

*NO RESPONSE FROM SDAR (SATELLITE RECEIVER) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A114) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z514) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
SATELLITE RECEIVER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A114) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

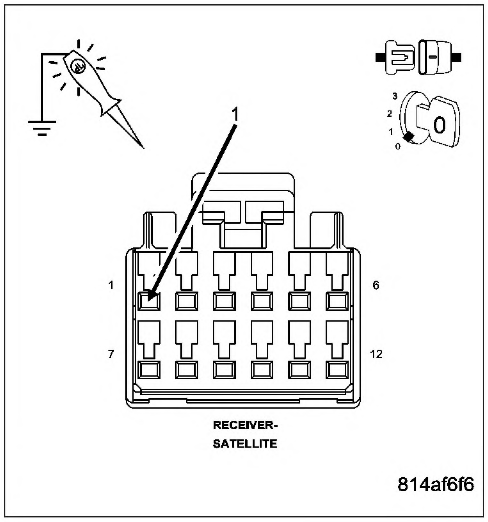
Disconnect the Satellite Receiver harness connector.

Using a 12-volt test light connected to ground, check the (A114) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

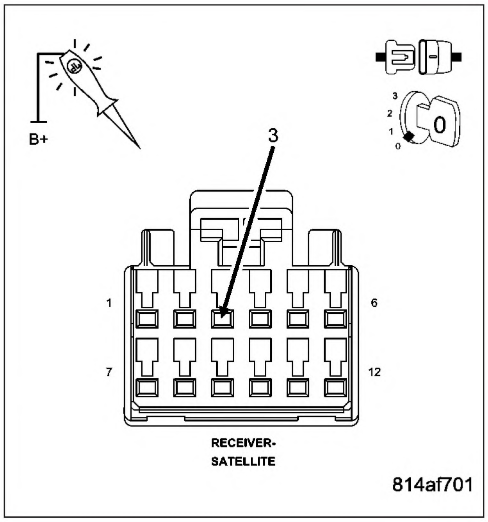
No >> Repair the (A114) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM SDAR (SATELLITE RECEIVER) (CONTINUED)

3. (Z514) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z514) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z514) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

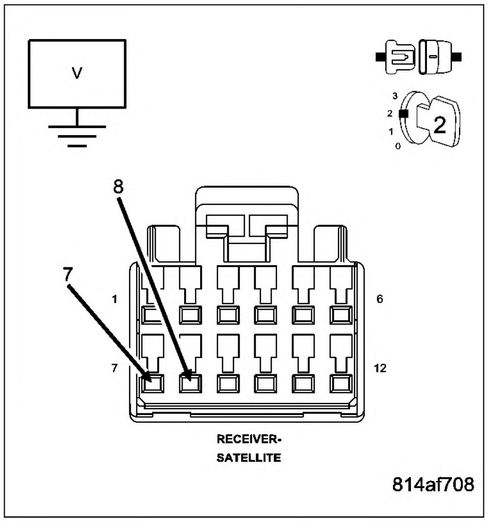
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

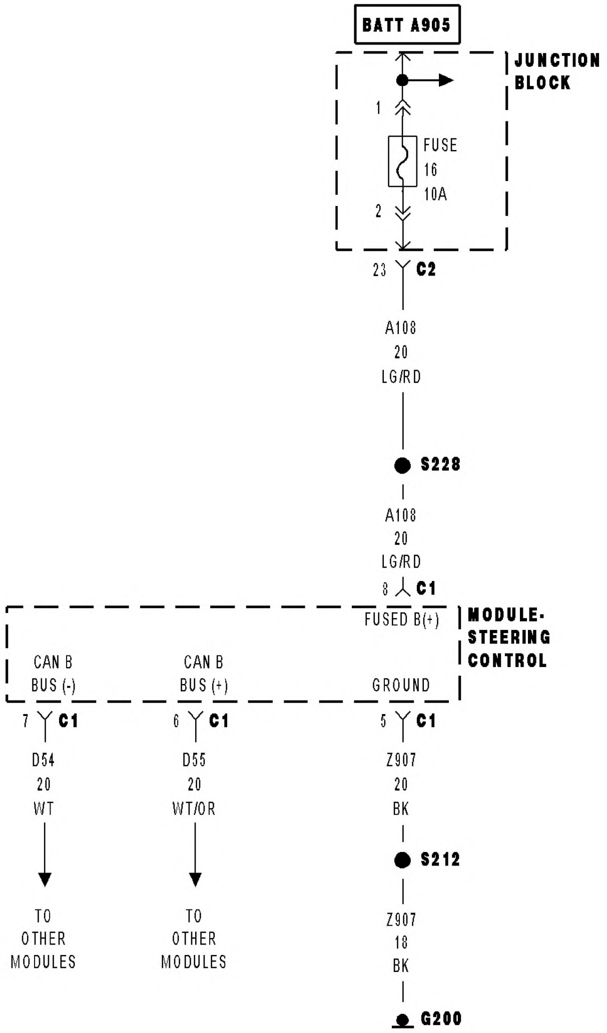


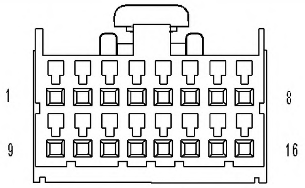
Is there any voltage present on either circuit?

Yes >> Replace the Satellite Receiver in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM SCM (STEERING COLUMN MODULE)


BATT A905
JUNCTION BLOCK
1
FUSE 16 10A
2
23 C2
A108 20 LG/RD
S228
A108 20 LG/RD
8 C1
FUSED B(+)
MODULE-STEERING CONTROL
CAN B BUS (-)
CAN B BUS (+)
GROUND
7 C1
6 C1
5 C1
D54 20 WT
D55 20 WT/OR
Z907 20 BK
S212
Z907 18 BK
G200
TO OTHER MODULES
TO OTHER MODULES



MODULE-STEERING CONTROL C1

814af7e8

*NO RESPONSE FROM SCM (STEERING COLUMN MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A108) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z907) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
STEERING CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

2. (A108) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

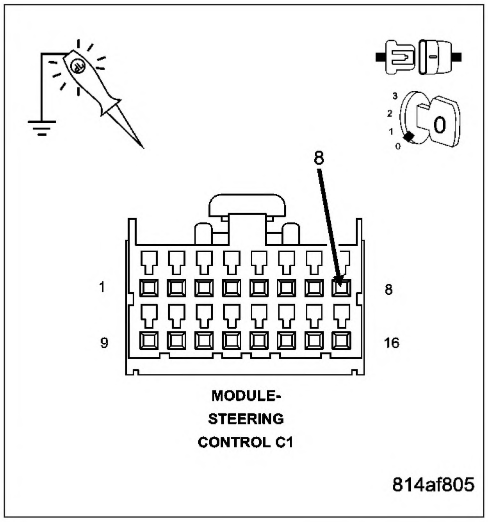
Disconnect the Steering Control Module C1 harness connector.

Using a 12-volt test light connected to ground, check the (A108) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

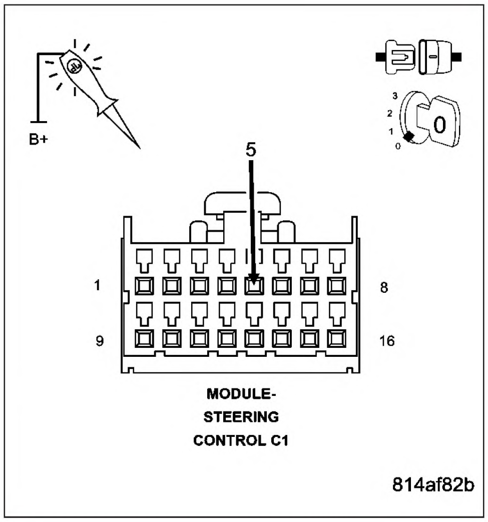
No >> Repair the (A108) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM SCM (STEERING COLUMN MODULE) (CONTINUED)

3. (Z907) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z907) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z907) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

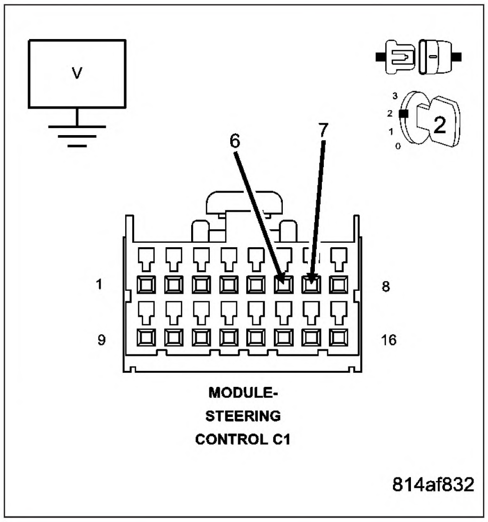
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is there any voltage present on either circuit?

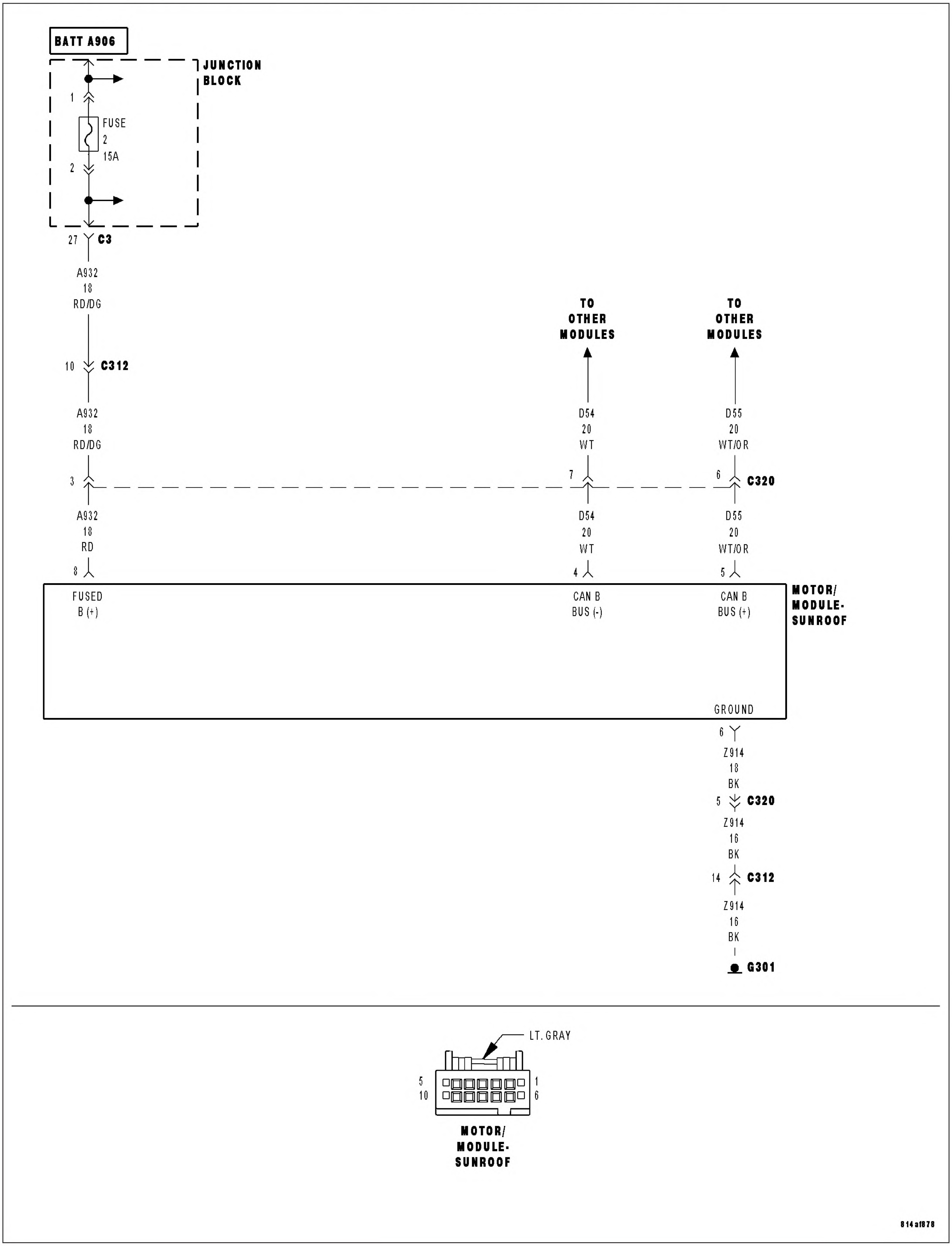
Yes >> Replace the Steering Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM SUNR (SUNROOF MOTOR/MODULE)


BATT A906
JUNCTION BLOCK
1
FUSE
2
15A
2
27 C3
A932
18
RD/DG
10 C312
A932
18
RD/DG
TO OTHER MODULES
TO OTHER MODULES
D54
20
WT
D55
20
WT/OR
3
7
6 C320
A932
18
RD
D54
20
WT
D55
20
WT/OR
8
4
5
FUSED B (+)
CAN B BUS (-)
CAN B BUS (+)
MOTOR/ MODULE- SUNROOF
GROUND
6
Z914
18
BK
5 C320
Z914
16
BK
14 C312
Z914
16
BK
G301
LT. GRAY
5
10
1
6
MOTOR/ MODULE- SUNROOF
814af878

*NO RESPONSE FROM SUNR (SUNROOF MOTOR/MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A932) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z914) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
SUNROOF MOTOR/MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A932) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

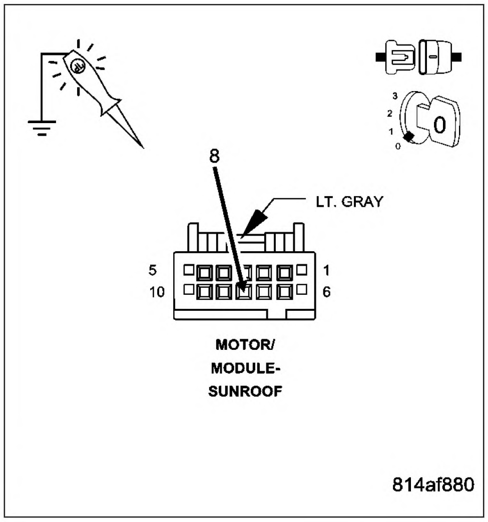
Disconnect the Sunroof Motor/Module harness connector.

Using a 12-volt test light connected to ground, check the (A932) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

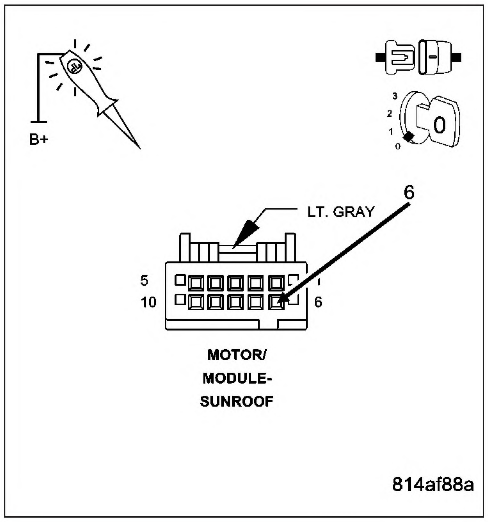
No >> Repair the (A932) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



*NO RESPONSE FROM SUNR (SUNROOF MOTOR/MODULE) (CONTINUED)

3. (Z914) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z914) ground circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z914) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

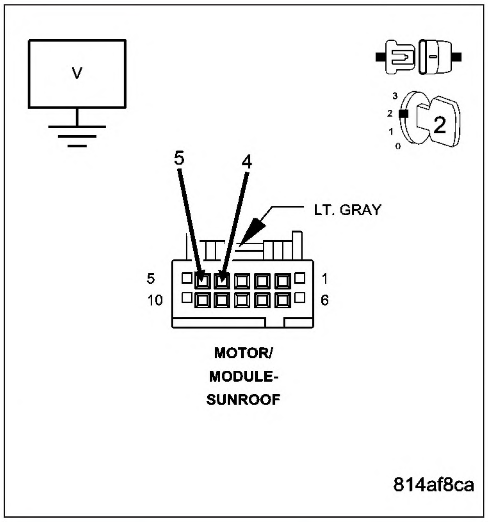
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

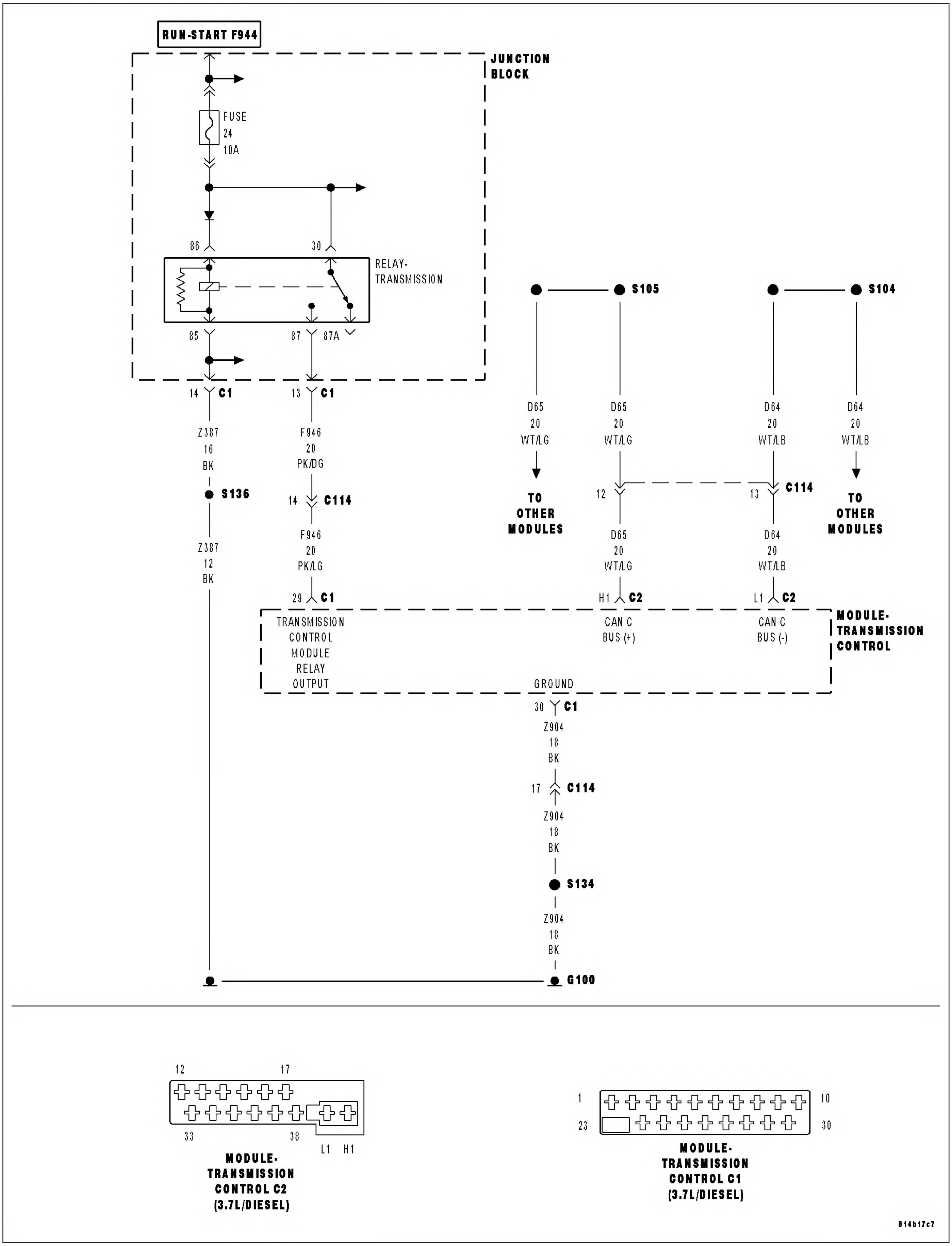


Is there any voltage present on either circuit?

Yes >> Replace the Sunroof Motor/Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM TCM - NAG1/DIESEL


RUN-START F944
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/DG
S136
14 C114
Z387 12 BK
F946 20 PK/LG
S105
S104
D65 20 WT/LG
D65 20 WT/LG
D64 20 WT/LB
D64 20 WT/LB
TO OTHER MODULES
12
13
C114
TO OTHER MODULES
D65 20 WT/LG
D64 20 WT/LB
29 C1
H1 C2
L1 C2
TRANSMISSION CONTROL MODULE RELAY OUTPUT
CAN C BUS (+)
CAN C BUS (-)
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
814b17c7

*NO RESPONSE FROM TCM - NAG1/DIESEL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(Z904) GROUND CIRCUIT OPEN
(F946) TRANSMISSION RELAY OUTPUT CIRCUIT OPEN OR SHORT
(D65) CAN C BUS (+) CIRCUIT OPEN
(D64) CAN C BUS (-) CIRCUIT OPEN
TRANSMISSION CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: Check the FCM for any active CAN C hardware and any ignition related DTCs, perform DTCs before proceeding.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (Z904) GROUND CIRCUIT OPEN

Turn the ignition off.

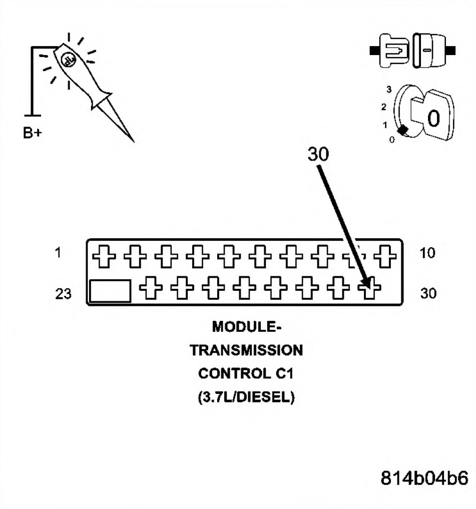
Disconnect the Transmission Control Module C1 harness connector.

Using a 12-volt test light connected to 12-volts, check the (Z904) ground circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the (Z904) ground circuit for an open.
Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.



*NO RESPONSE FROM TCM - NAG1/DIESEL (CONTINUED)

3. (F946) TRANSMISSION RELAY OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

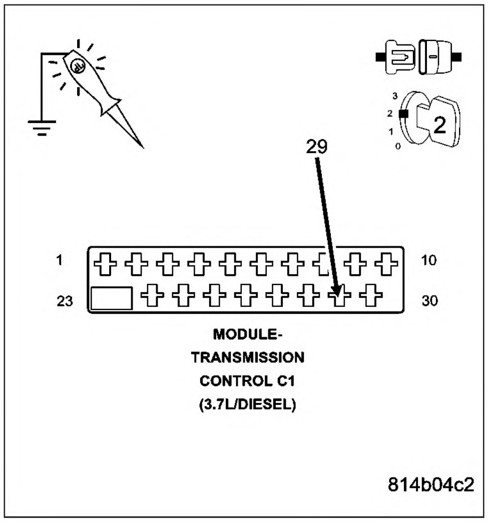
Using a 12-volt test light connected to ground, check the (F946) Transmission Relay Output circuit.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (F946) Transmission Relay Output circuit for an open or short.

Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.


29
1
10
23
30
2
MODULE-
TRANSMISSION
CONTROL C1
(3.7L/DIESEL)
814b04c2

---

4. (D65) CAN C BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the FCM C1 harness connector.

Disconnect the TCM C2 harness connector.

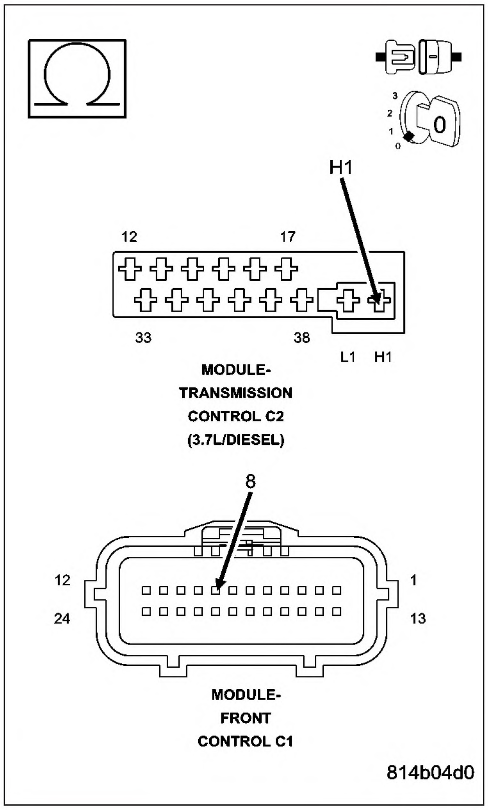
Measure the resistance of the (D65) CAN C Bus (+) circuit between the FCM connector and the TCM connector.

Is resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the (D65) CAN C Bus (+) circuit for an open.

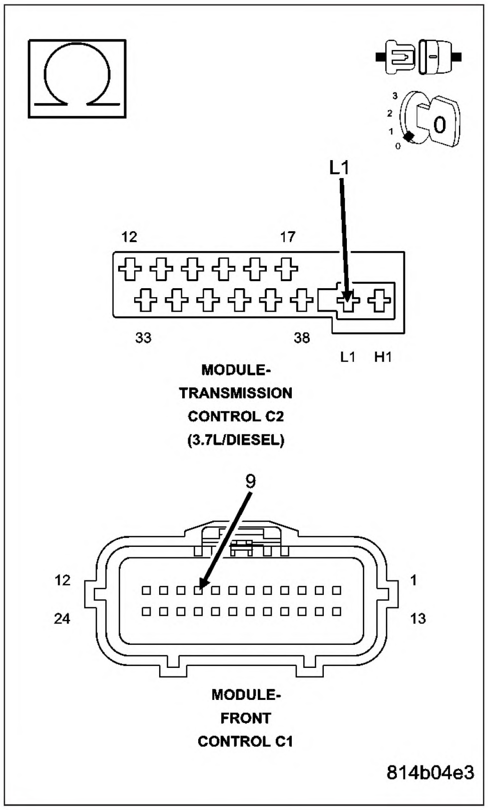
Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.


0
H1
12
17
33
38
L1
H1
MODULE-
TRANSMISSION
CONTROL C2
(3.7L/DIESEL)
8
12
1
24
13
MODULE-
FRONT
CONTROL C1
814b04d0

*NO RESPONSE FROM TCM - NAG1/DIESEL (CONTINUED)

5. (D64) CAN C BUS (-) CIRCUIT OPEN

Measure the resistance of the (D64) CAN C Bus (-) circuit between the FCM connector and the TCM connector.


L1
12
17
33
38
L1 H1
MODULE-
TRANSMISSION
CONTROL C2
(3.7L/DIESEL)
9
12
24
1
13
MODULE-
FRONT
CONTROL C1
814b04e3

Is resistance below 5.0 ohms?

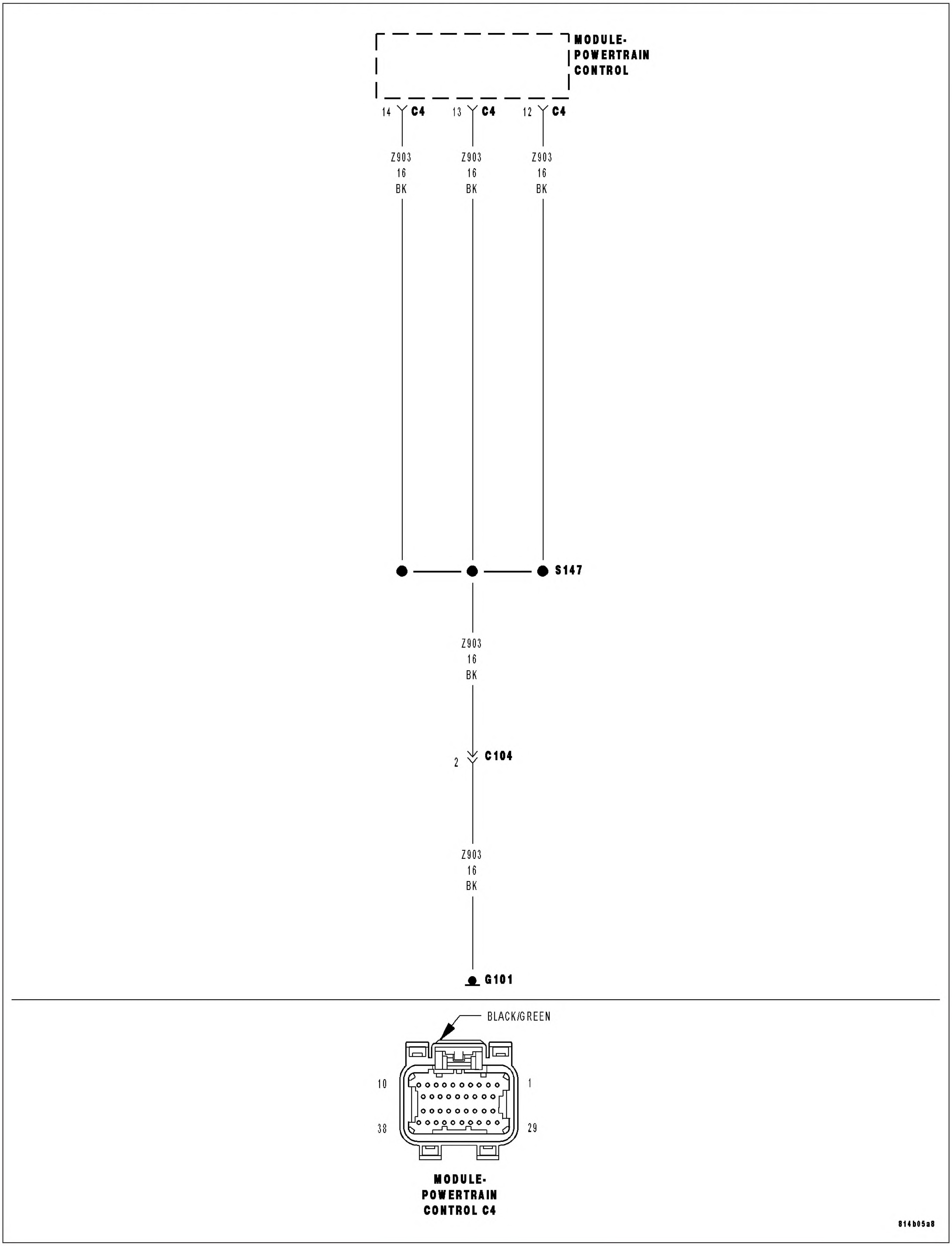
Yes >> Replace the Transmission Control Module in accordance with the service information.

Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair the (D64) CAN C Bus (-) circuit for an open.

Perform NAG1/Diesel TRANSMISSION VERIFICATION TEST - VER 1.

*NO RESPONSE FROM TCM (POWERTRAIN CONTROL MODULE) - NGC


MODULE-
POWERTRAIN
CONTROL
14 C4
13 C4
12 C4
Z903
16
BK
S147
C104
2
G101
BLACK/GREEN
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C4
814b05a8

*NO RESPONSE FROM TCM (POWERTRAIN CONTROL MODULE) - NGC (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A209) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z903) GROUND CIRCUIT OPEN
(F942) (F26) FUSED IGNITION SW OUTPUT CIRCUIT OPEN OR SHORTED
(D65) CAN C BUS (+) CIRCUIT OPEN
(D64) CAN C BUS (-) CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

NOTE: Check the FCM for any active CAN C hardware DTCs, perform DTC before proceeding.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. ATTEMPT TO COMMUNICATE WITH THE PCM

With the scan tool in ECU view, observe the status of the PCM.

Does the scan tool display a red X next to the PCM?

Yes >> Refer to the No Response From PCM test procedure. Refer to the table of contents in this section.

No >> Go To 3

*NO RESPONSE FROM TCM (POWERTRAIN CONTROL MODULE) - NGC (CONTINUED)

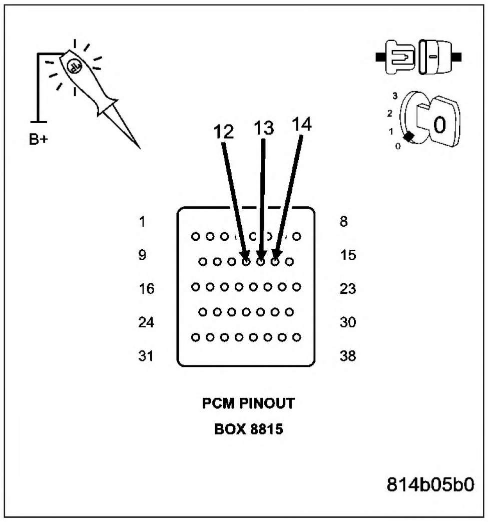
3. (Z903) GROUND CIRCUIT OPEN

Turn the ignition off.

Disconnect the PCM C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Using a 12-volt test light connected to 12-volts, check each (Z903) ground circuit.

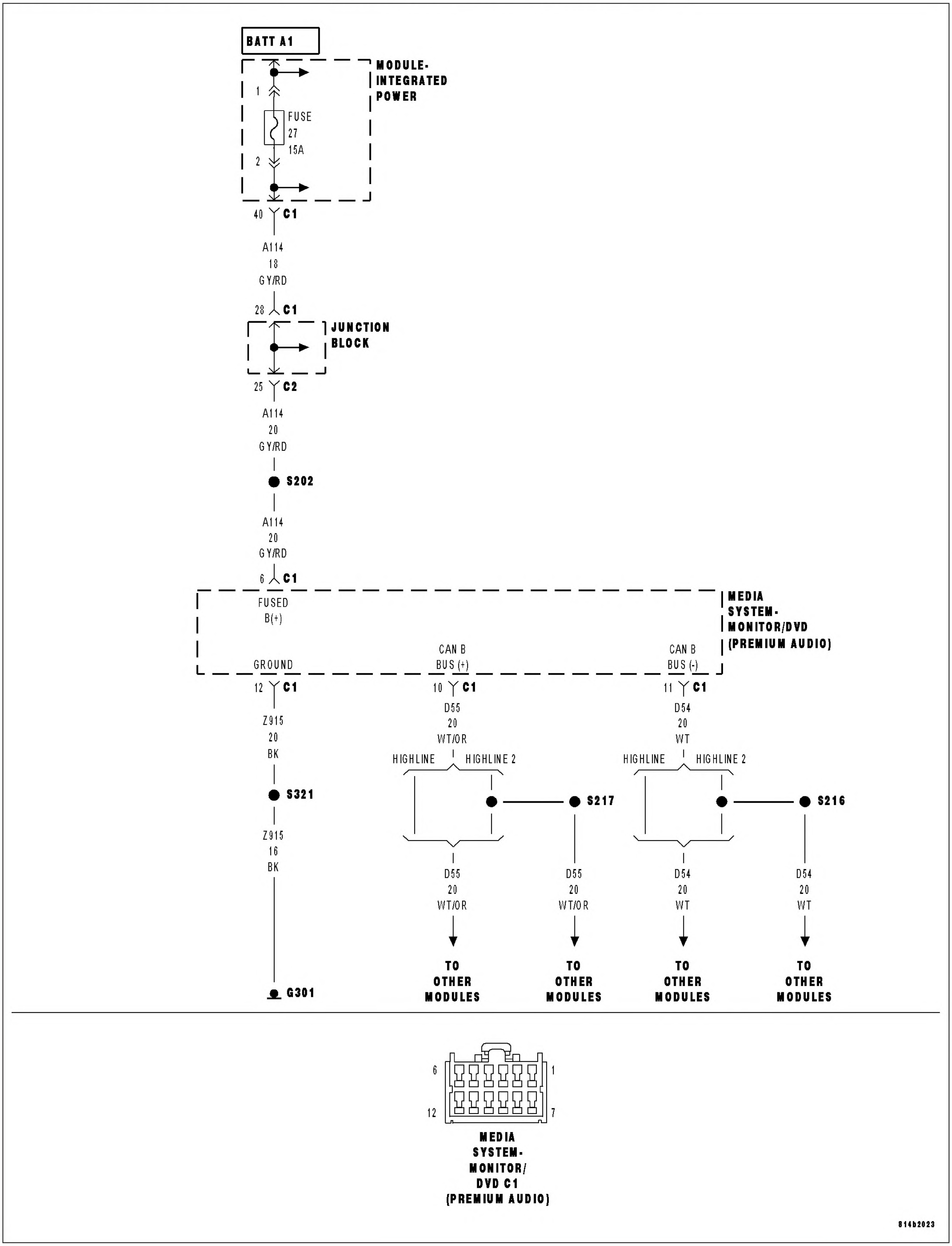


Does the test light illuminate brightly for each circuit?

Yes >> Replace and program the Powertrain Control Module in accordance with the service information.
Perform the appropriate VERIFICATION TEST.

No >> Repair the (Z903) ground circuit for an open.
Perform the appropriate VERIFICATION TEST.

*NO RESPONSE FROM VES (MONITOR/DVD MEDIA SYSTEM)


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 27 15A
2
40 C1
A114 18 GY/RD
28 C1
JUNCTION BLOCK
25 C2
A114 20 GY/RD
S202
A114 20 GY/RD
6 C1
FUSED B(+)
MEDIA SYSTEM-MONITOR/DVD (PREMIUM AUDIO)
GROUND
CAN B BUS (+)
CAN B BUS (-)
12 C1
10 C1
11 C1
Z915 20 BK
D55 20 WT/OR
D54 20 WT
HIGHLINE
HIGHLINE 2
HIGHLINE
HIGHLINE 2
S321
S217
S216
Z915 16 BK
D55 20 WT/OR
D55 20 WT/OR
D54 20 WT
D54 20 WT
TO OTHER MODULES
TO OTHER MODULES
TO OTHER MODULES
TO OTHER MODULES
G301
6
1
12
7
MEDIA SYSTEM-MONITOR/DVD C1 (PREMIUM AUDIO)
814b2023

*NO RESPONSE FROM VES (MONITOR/DVD MEDIA SYSTEM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A114) FUSED B (+) CIRCUIT OPEN OR SHORTED
(Z915) GROUND CIRCUIT OPEN
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
MONITOR/DVD MEDIA SYSTEM (DVD PLAYER)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

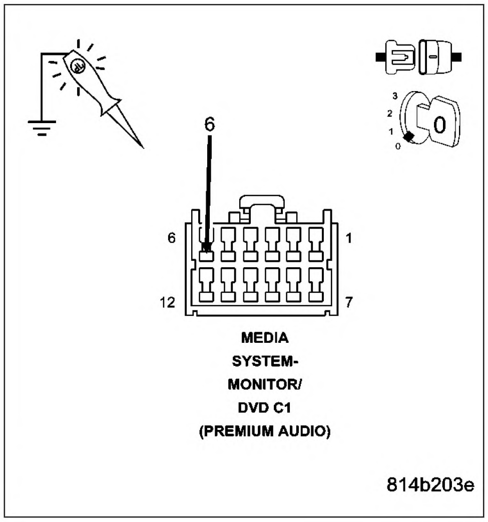
No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

2. (A114) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

Disconnect the Monitor/DVD Media System C1 (DVD Player) harness connector.

Using a 12-volt test light connected to ground, check the (A114) Fused B(+) circuit.



Does the test light illuminate brightly?

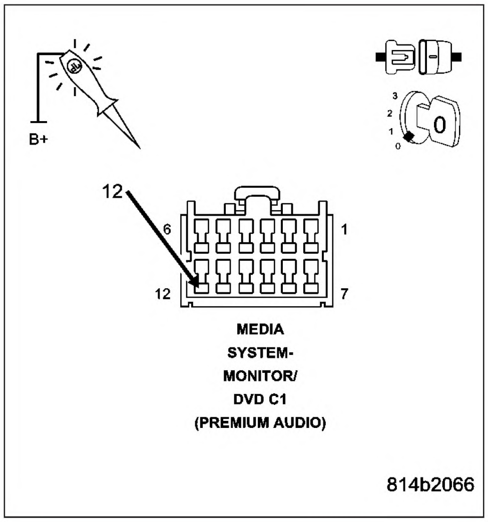
Yes >> Go To 3

No >> Repair the (A114) Fused B(+) circuit for an open or short. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM VES (MONITOR/DVD MEDIA SYSTEM) (CONTINUED)

3. (Z915) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z915) ground circuit.


B+
12
6
1
12
7
3
2
1
0
0
MEDIA
SYSTEM-
MONITOR/
DVD C1
(PREMIUM AUDIO)
814b2066

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z915) ground circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

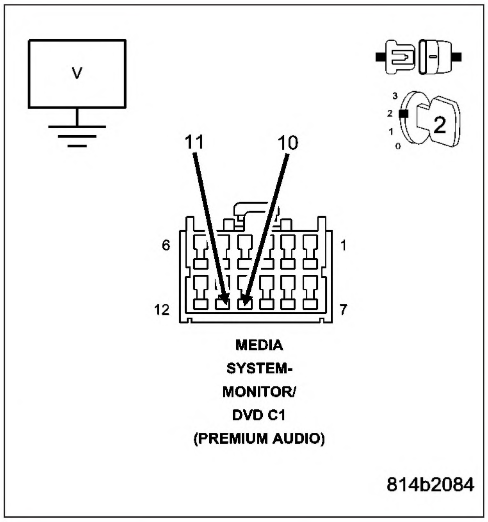
---

4. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

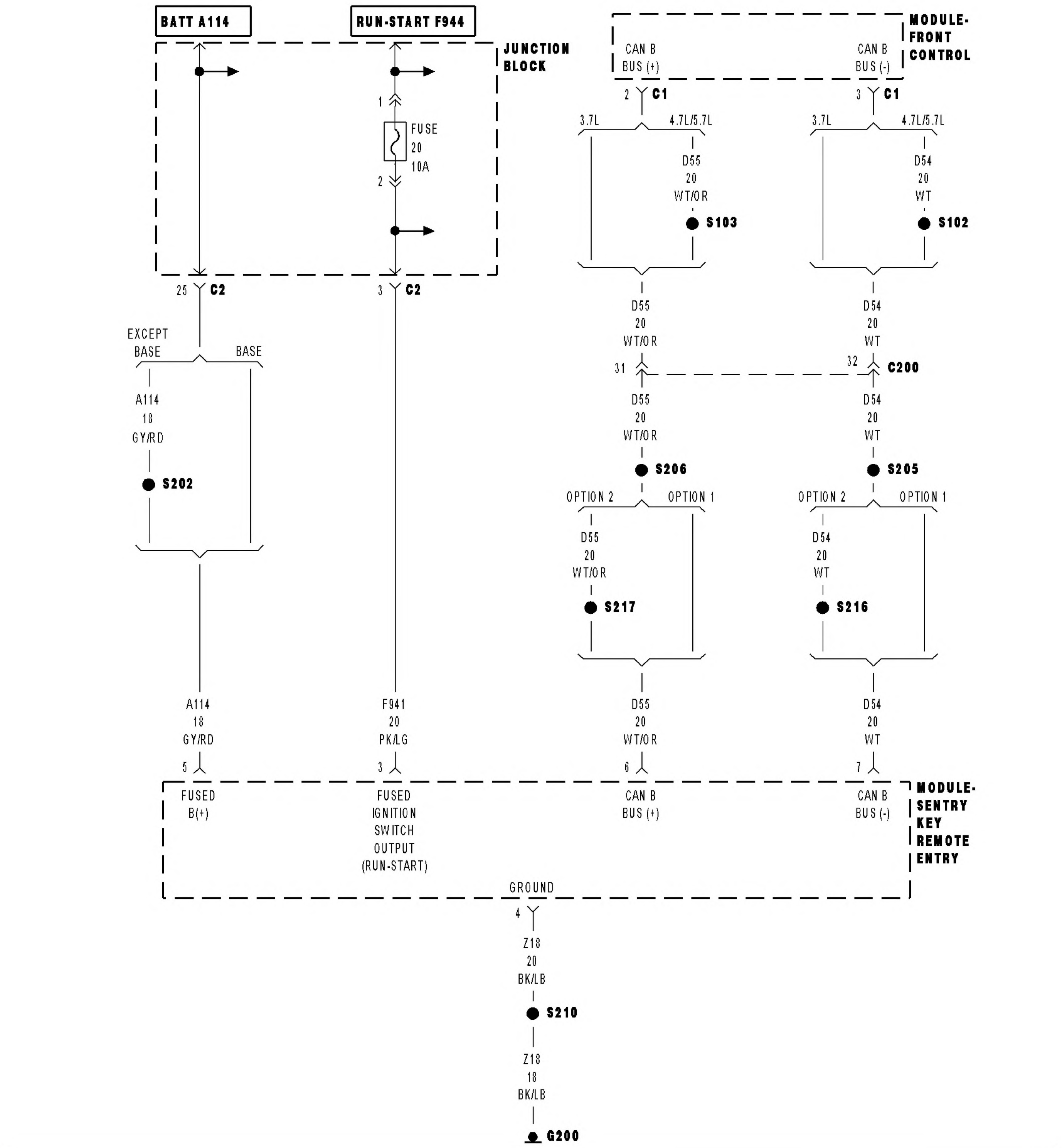

V
11
10
6
1
12
7
3
2
1
0
2
MEDIA
SYSTEM-
MONITOR/
DVD C1
(PREMIUM AUDIO)
814b2084

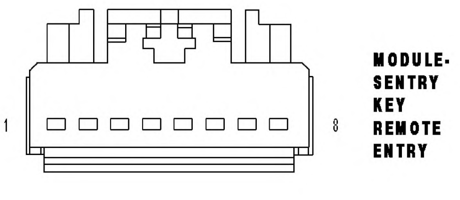
Is there any voltage present on either circuit?

Yes >> Replace the Monitor/DVD Media System (DVD Player) in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*NO RESPONSE FROM WCM (SENTRY KEY REMOTE ENTRY MODULE)


BATT A114
RUN-START F944
JUNCTION BLOCK
1
FUSE 20 10A
2
25 C2
3 C2
EXCEPT BASE
BASE
A114 18 GY/RD
S202
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
D54 20 WT
S102
31
32
C200
S206
S205
OPTION 2
OPTION 1
S217
S216
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
5
3
6
7
MODULE-SENTRY KEY REMOTE ENTRY
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200


1
8
MODULE-SENTRY KEY REMOTE ENTRY
814b0642

*NO RESPONSE FROM WCM (SENTRY KEY REMOTE ENTRY MODULE) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A114) FUSED B(+) CIRCUIT OPEN OR SHORTED
(Z18) GROUND CIRCUIT OPEN
(F941) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED
(D55) AND (D54) CAN B BUS CIRCUITS OPEN
SENTRY KEY REMOTE ENTRY MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

NOTE: Ensure the IOD fuse is installed and battery voltage is between 10.0 and 16.0 volts.

With the scan tool, select ECU view.

NOTE: A red X will be next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the module?

Yes >> Go To 2

No >> The no response condition is not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent , pushed out, and corroded terminals.

---

2. (A114) FUSED B(+) CIRCUIT OPEN OR SHORTED

Turn the ignition off.

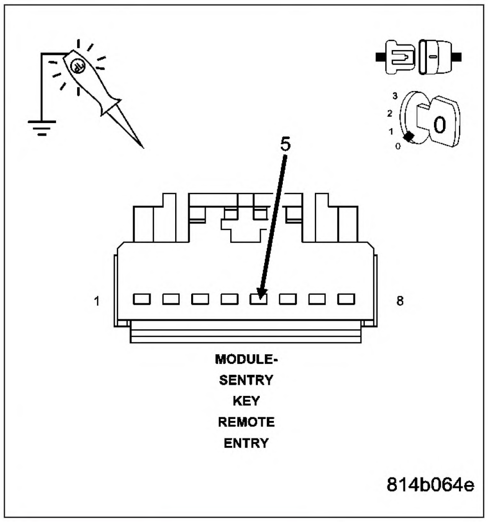
Disconnect the Sentry Key Remote Entry Module harness connector.

Using a 12-volt test light connected to ground, check the (A114) Fused B(+) circuit.

Does the test light illuminate brightly?

Yes >> Go To 3

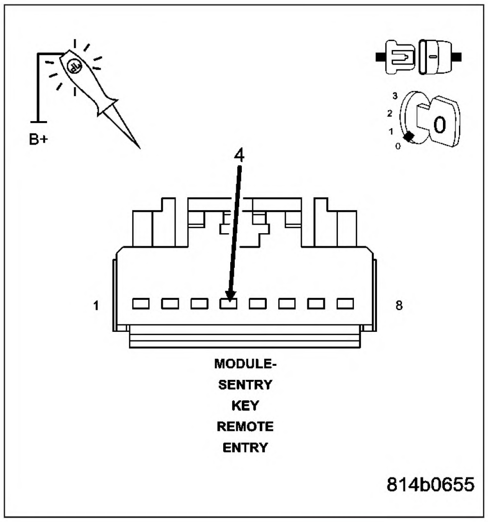
No >> Repair the (A114) Fused B(+) circuit for an open or short. Perform SKREEM VERIFICATION TEST.



*NO RESPONSE FROM WCM (SENTRY KEY REMOTE ENTRY MODULE) (CONTINUED)

3. (Z18) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, check the (Z18) ground circuit.


B+
3
2
1
0
0
4
1
8
MODULE-
SENTRY
KEY
REMOTE
ENTRY
814b0655

Does the test light illuminate brightly?

Yes >> Go To 4

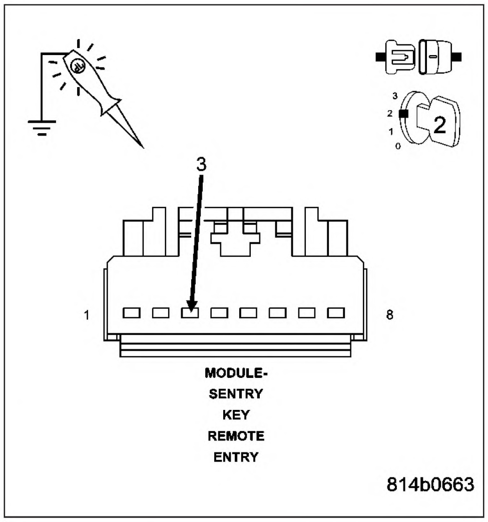
No >> Repair the (Z18) ground circuit for an open.
Perform SKREEM VERIFICATION TEST.

---

4. (F941) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN OR SHORTED

Turn the ignition on.

Using a 12-volt test light connected to ground, check the (F941) Fused Ignition Switch Output circuit.


3
2
1
0
2
3
1
8
MODULE-
SENTRY
KEY
REMOTE
ENTRY
814b0663

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (F941) Fused Ignition Switch Output circuit for an open or short.
Perform SKREEM VERIFICATION TEST.

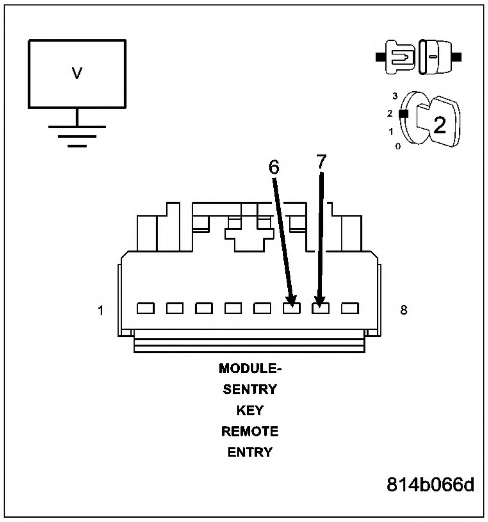
*NO RESPONSE FROM WCM (SENTRY KEY REMOTE ENTRY MODULE) (CONTINUED)

5. (D55) AND (D54) CAN B BUS CIRCUITS OPEN

NOTE: One open circuit will not cause this condition.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is there any voltage present on either circuit?

Yes >> Replace the Sentry Key Remote Entry Module in accordance with the service information.

Perform SKREEM VERIFICATION TEST.

No >> Repair the (D55) and (D54) CAN B Bus circuits for an open. Inspect the connector for damage.

Perform SKREEM VERIFICATION TEST.

STANDARD PROCEDURE

BODY VERIFICATION TEST – VER 1

Diagnostic Test

1. Perform Body Verification Test

1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors.
2. Ensure that all accessories are turned off.
3. Ensure that the battery is fully charged.
4. Turn the ignition on.
5. With the scan tool, record and erase DTCs from all modules.
6. If an electronic control module was replaced, select the applicable module from the scan tool menu and press “Misc. Functions”. If the module has programable features, program as necessary.
7. Perform this step only if diagnosing faults related to the HVAC system.
    - The Manual Temperature Control (MTC) is not on the Bus and not addressable with a scan tool. Perform the following to clear DTCs from the MTC: 1. Turn the blower control on. 2. Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch. 3. When the A/C status indicator begins flashing DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches.
    - For vehicles equipped with Automatic Temperature Control (ATC), if repairs were made to any of the HVAC doors, linkage, door actuators, or door actuator circuits, run the actuator calibration function by selecting the following from the scan tool menu: select HVAC, More Options, System Tests, Actuator Calibration Test, and Start. Follow the directions displayed by the scan tool. Allow the test to run to completion before proceeding.
    - For vehicles equipped with MTC, if repairs were made to any of the HVAC doors, linkage, door actuators, or door actuator circuits, run the door calibration function by performing the following: 1. Turn the ignition on. 2. Turn the blower control to off. 3. Press the EBL mode switch down, turn the blower control on, wait 5 seconds and then release the mode switch. Wait approximately 90 seconds for the calibration process to run to completion before proceeding.
8. Turn the ignition off, wait 10 seconds, and then turn the ignition on.
9. Operate all functions of the system that caused the original concern.
10. With the scan tool, select ECU View.
11. With the scan tool, select ECU View and check for DTCs in the modules.
12. Perform this step only if diagnosing faults related to the MTC HVAC system.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

- Perform the following to read DTCs from the MTC: 1. Turn the blower control on. 2. Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch. 3. Read the DTCs from the flashing A/C status indicator.

Are DTCs present in any of the modules or is the original condition still present?

Yes >> The repair is not complete. Refer to the related category for the DTC or symptom that is still present.

No >> The repair is complete.

ELECTRONIC CONTROL MODULES - SERVICE INFORMATION

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    - 4.7L/5.7L VEHICLES 294

ELECTRONIC CONTROL MODULES - SERVICE INFORMATION

STANDARD PROCEDURE

PCM/SKREEM PROGRAMMING

NOTE: Before replacing the PCM, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM failures are caused by internal component failures (i.e. relays and solenoids) and shorted circuits (i.e. pull-ups, drivers, and switched circuits). These failures are difficult to detect when a double fault has occurred and only one Diagnostic Trouble Code (DTC) has been set.

When a PCM and the SKREEM are replaced at the same time, perform the following steps in order:

1. Program the new PCM.
2. Program the new SKREEM.
3. Replace all ignition keys and program them to the new SKREEM.

PROGRAMMING THE PCM

The SKIS Secret Key is an ID code that is unique to each SKREEM. This code is programmed and stored in the SKREEM, the PCM, and the ignition key transponder chip(s). When replacing the PCM, it is necessary to program the secret key into the new PCM using the scan tool. Perform the following steps to program the secret key into the PCM.

1. Turn the ignition switch to the On position (transmission in Park/Neutral).
2. Use the scan tool and select THEFT ALARM, SKREEM, then MISCELLANEOUS.
3. Select PCM REPLACED (GAS ENGINE).
4. Enter secured access mode by entering the vehicle four-digit PIN.
5. Select ENTER to update PCM VIN.

NOTE: If three attempts are made to enter secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition switch to the ON position for one hour, then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

6. Press ENTER to transfer the secret key (the SKREEM will send the secret key to the PCM).
7. Press Page Back to get to the Select System menu and select ENGINE, MISCELLANEOUS, and SRI MEMORY CHECK.
8. The scan tool will ask, “Is odometer reading between XX and XX?” Select the YES or NO button on the scan tool. If NO is selected, the scan tool will read, “Enter Odometer Reading (From I.P. odometer)”. Enter the odometer reading from the instrument cluster and press ENTER.

PROGRAMMING THE SKREEM

1. Turn the ignition switch to the On position (transmission in Park/Neutral).
2. Use the scan tool and select THEFT ALARM, SKREEM, then MISCELLANEOUS.
3. Select PCM REPLACED (GAS ENGINE).
4. Program the vehicle four-digit PIN into SKREEM.
5. Select COUNTRY CODE and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKREEM, it cannot be changed and the SKREEM must be replaced.

6. Select YES to update VIN (the SKREEM will learn the VIN from the PCM).
7. Press ENTER to transfer the secret key (the PCM will send the secret key to the SKREEM).
8. Program ignition keys to the SKREEM.

NOTE: If the PCM and the SKREEM are replaced at the same time, all vehicle ignition keys will need to be replaced and programmed to the new SKREEM.

PROGRAMMING IGNITION KEYS TO THE SKREEM

1. Turn the ignition switch to the On position (transmission in Park/Neutral).
2. Use the scan tool and select THEFT ALARM, SKREEM, then MISCELLANEOUS.
3. Select PROGRAM IGNITION KEY'S.
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A maximum of eight keys can be learned to each SKREEM. Once a key is learned to a SKREEM it (the key) cannot be transferred to another vehicle.

5. Obtain ignition keys to be programmed from the customer (8 keys maximum).
6. Using the scan tool, erase all ignition keys by selecting MISCELLANEOUS, and ERASE ALL CURRENT IGN. KEYS.
7. Program all of the ignition keys.

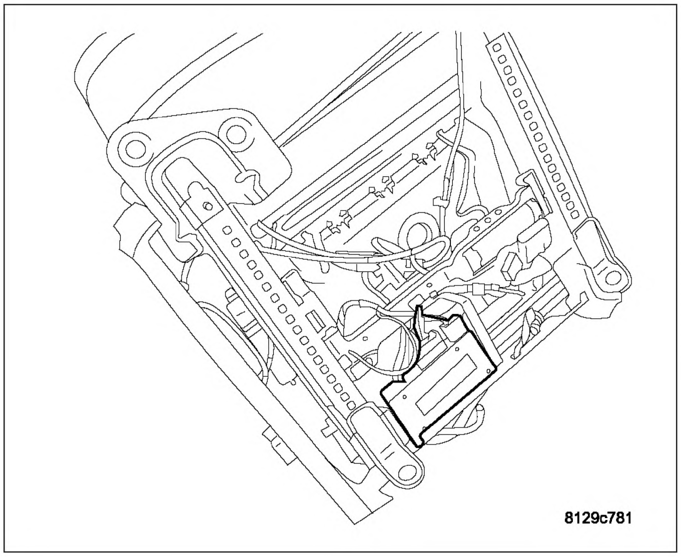
If ignition key programming is unsuccessful, the scan tool will display one of the following messages:

- **Programming Not Attempted** - The scan tool attempts to read the programmed key status and there are no keys programmed into SKREEM memory.
- **Programming Key Failed (Possible Used Key From Wrong Vehicle)** - SKREEM is unable to program an ignition key transponder due to one of the following:
  - The ignition key transponder is faulty.
  - The ignition key transponder is or has been already programmed to another vehicle.
- **8 Keys Already Learned, Programming Not Done** - The SKREEM transponder ID memory is full.
- **Learned Key In Ignition** - The ID for the ignition key transponder currently in the ignition lock cylinder is already programmed in SKREEM memory.

MODULE-ADJUSTABLE PEDALS

DESCRIPTION

The Adjustable pedals module (APM) is located underneath the driver seat, towards the front and on the outboard side. It is used in conjunction with the other modules in the memory system.



DIAGNOSIS AND TESTING

ADJUSTABLE PEDALS MODULE (APM)

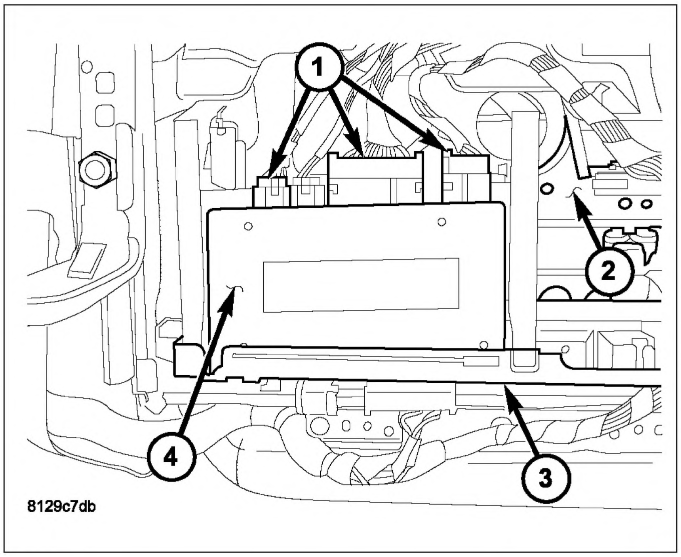
In order to obtain conclusive testing of the adjustable pedals system, the Controller Area Network (CAN) data bus, and all of the electronic modules that provide inputs to, or receive outputs from the adjustable pedals system components must be checked. **Any diagnosis of the adjustable pedals module should begin with, the use of a scan tool and the appropriate diagnostic service information.**

Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

Before any testing of the adjustable pedals system is attempted, the battery should be fully-charged.

REMOVAL

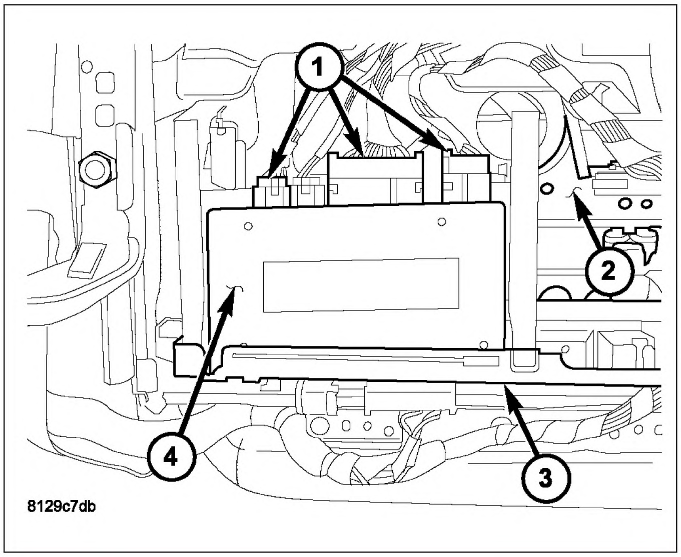
1. Disconnect and isolate the battery negative cable.
2. Remove the driver seat cushion/cover (2) (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - REMOVAL).
3. Pivot the module upward and disconnect the electrical connectors (1).
4. Unsnap the adjustable pedals module (4) from the side brackets.
5. Pull the module rearward to remove it from the front of the seat frame (3).



INSTALLATION

CAUTION: The Adjustable Pedals Module mounting tabs can be damaged during module installation. Use care to properly align tabs to prevent binding that could result in tab breakage.

1. Place the module (4) into position making sure the mounting tabs are properly aligned with the front bracket.
2. Push down on the rear of the module (4) snapping the retaining clips into place in the side brackets.
3. Connect the adjustable pedals module rear harness connectors (1).
4. Connect the adjustable pedals module front harness connectors.
5. Install the driver seat cushion/cover (2) (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - INSTALLATION).
6. Connect the battery negative cable.
7. Verify system and vehicle operation.

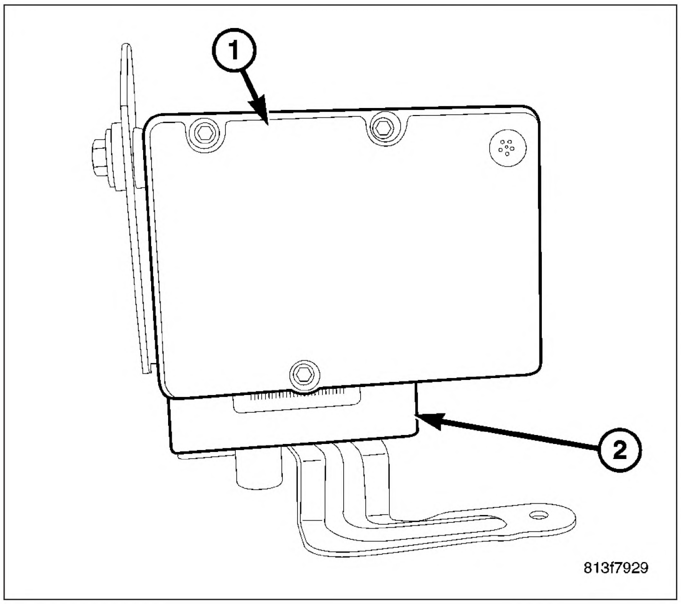


MODULE-ANTILOCK BRAKES

DESCRIPTION

NOTE: If the ABM module is replaced it must be initialized using the scan tool.

The Antilock Brake Module (ABM) (1) is mounted to the Hydraulic Control Unit (HCU) (2) and operates the ABS system.



OPERATION

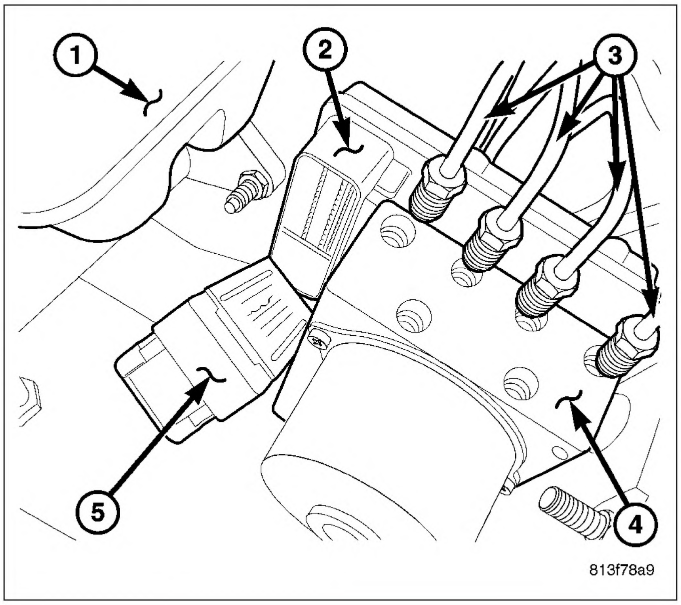
NOTE: If the ABM nodule is replaced it must be initialized using the scan tool.

The ABM voltage is supplied by the ignition switch in the RUN position. The ABM contains dual microprocessors. A logic block in each microprocessor receives identical sensor signals. These signals are processed and compared simultaneously. The ABM contains a self check program that illuminates the ABS warning light when a system fault is detected. Faults are stored in a diagnostic program memory and are accessible with the scan tool. ABS faults remain in memory until cleared, or until after the vehicle is started approximately 50 times. Stored faults are **not** erased if the battery is disconnected.

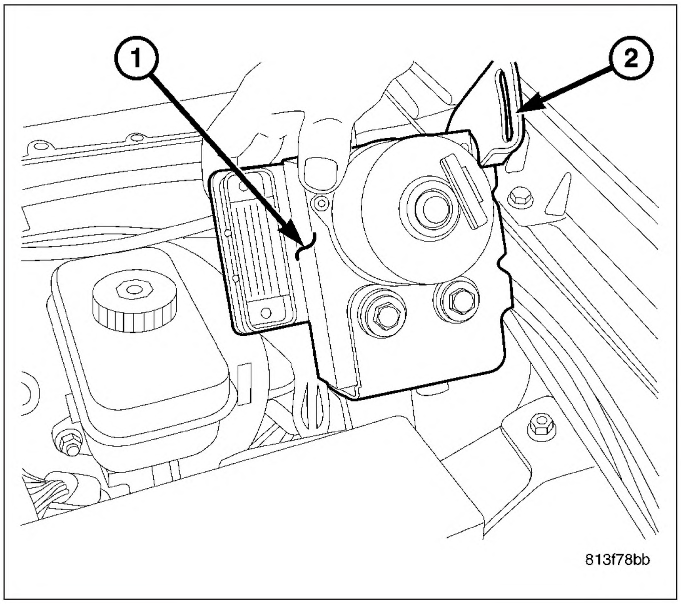
REMOVAL

1. Remove the negative battery cable from the battery.
2. Install a brake pedal prop rod.
3. Siphon the master cylinder.

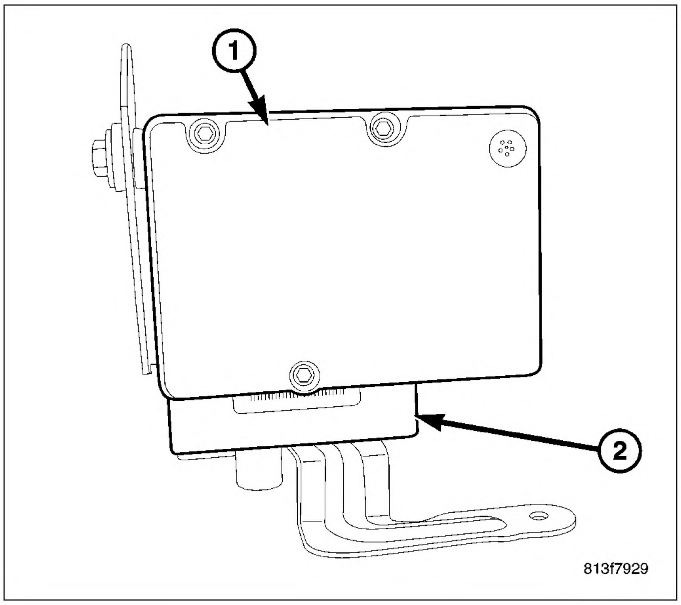
4. Disconnect the HCU electrical connectors (5).
5. Remove the primary brake line at the master cylinder.
6. Remove the primary brake line from the HCU (4).
7. Remove the secondary brake line at the master cylinder.
8. Remove the secondary brake line at the HCU (4)
9. Remove the 4 chassis lines (3) at the HCU (4).



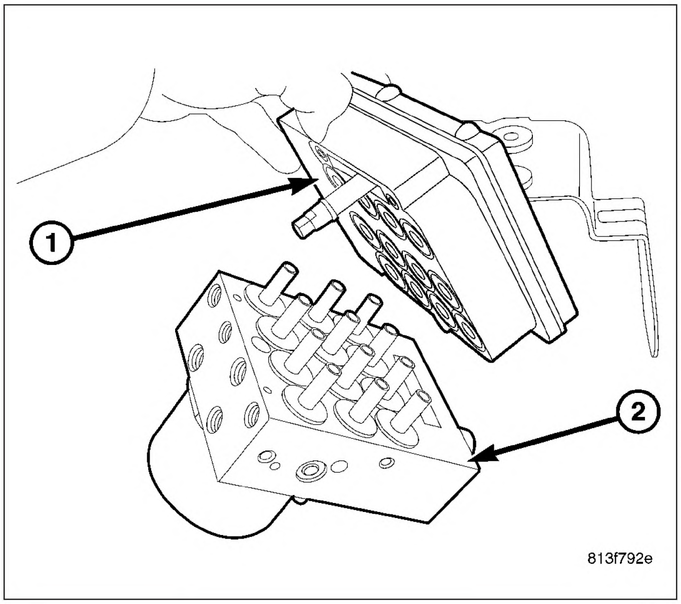
10. Remove the 3 mounting nuts at the HCU bracket (2).
11. Remove the HCU (1) with the bracket (2) from the vehicle.



12. Remove the 3 ABM bolts securing the ABM (1) to the HCU (2).


1
2
813f7929

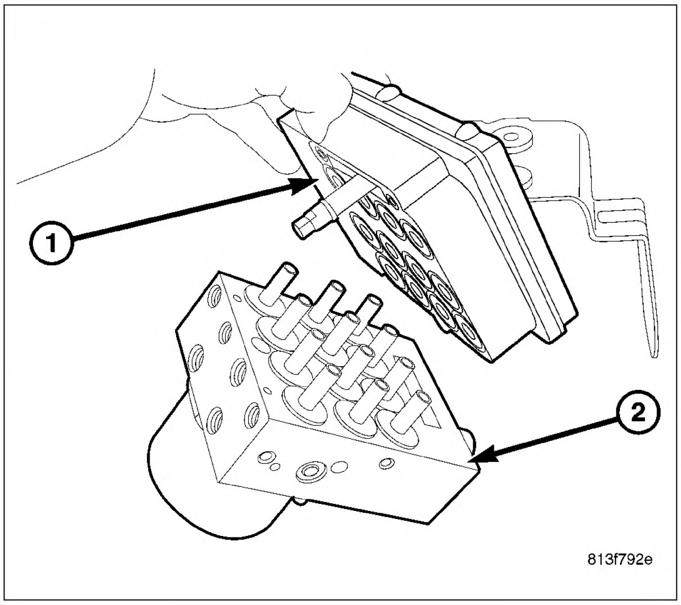
13. Separate the ABM (1) from the HCU (2).


1
2
813f792e

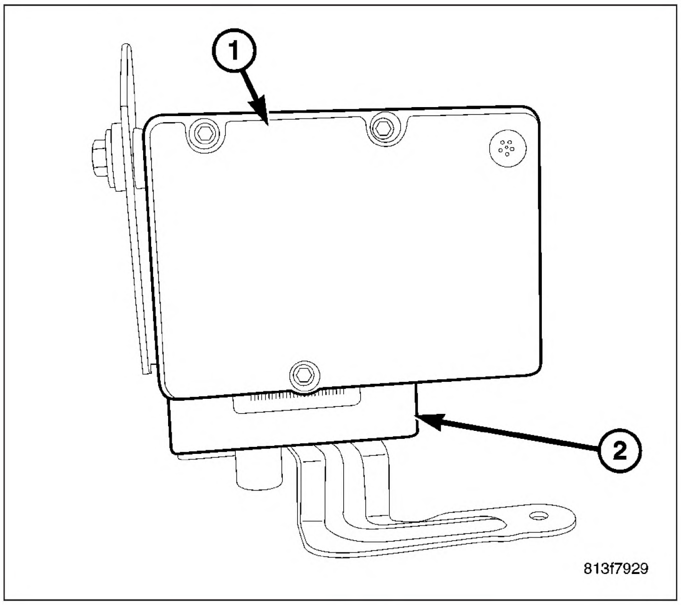
INSTALLATION

NOTE: If the ABM is being replaced with a new ABM is must be reprogrammed with the use of a scan tool.

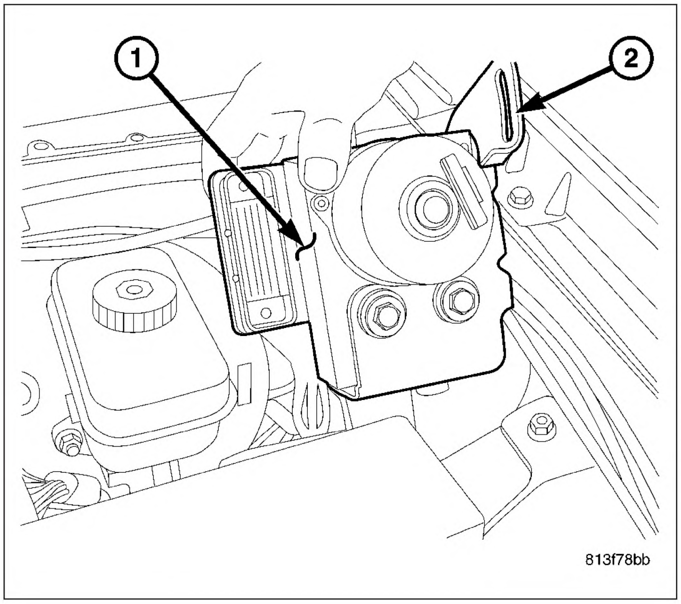
1. Install the ABM (1) to the HCU (2).



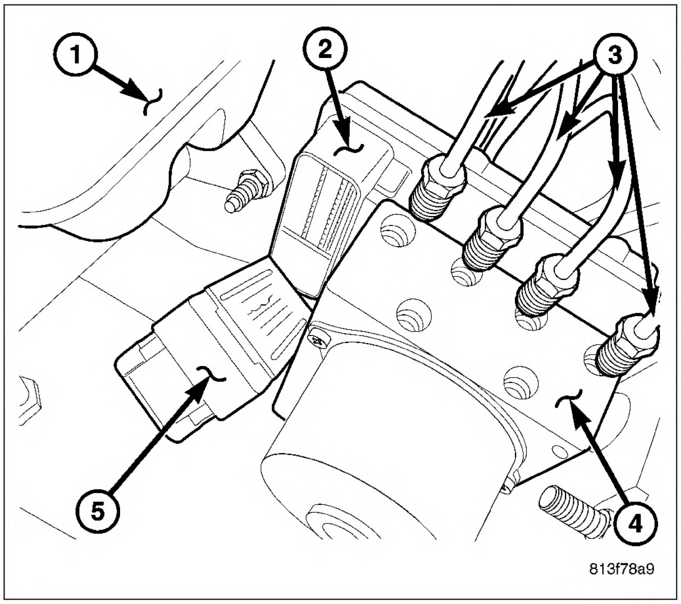
2. Install the 3 ABM (1) mounting bolts to the HCU (2) if removed tighten mounting bolts to 12 N·m (9 ft. lbs.).



3. Install the HCU (1) with bracket (2) to the vehicle and tighten the 2 mounting nuts.



4. Reconnect the HCU electrical connector (5).
5. Install the 4 chassis lines (3) at the HCU (4).
6. Install the secondary brake tube at the HCU (4).
7. Install the secondary brake tube at the master cylinder.
8. Install the primary brake tube at the HCU (4).
9. Install the primary brake tube at the master cylinder.



10. Install negative battery cable to the battery.
11. Remove the brake pedal prop rod.
12. Bleed base and ABS brake systems, (Refer to 5 - BRAKES - STANDARD PROCEDURE).
13. Initialize the ABS module using the scan tool.

COMMUNICATION

DESCRIPTION

The Controller Area Network (CAN) is a serial data bus communication network used for interconnecting numerous electronic control modules throughout the vehicle in a two-wire multiplexed system. Within this context the term serial refers to electronic data that is transferred bit by bit, while bus refers to the shared wires through which that data is transferred. Multiplexing is any system that enables the transmission of multiple messages over a single channel or circuit. The communication protocol being used is a non-proprietary, open standard adopted from the Bosch CAN Specification 2.0b and uses an 11-bit message identifier.

There are actually three separate CAN bus systems used in the vehicle. They are designated: the CAN-B, the CAN-C and the Diagnostic CAN-C. The CAN-B and CAN-C systems provide on-board communication between all nodes in the vehicle. The CAN-C is the faster of the two systems providing near real-time communication (500 Kbps), but is less fault tolerant than the CAN-B system. The CAN-C is used exclusively for communications between critical powertrain and chassis nodes. The slower (83.3 Kbps), but more fault tolerant CAN-B system is used for communications between body and interior nodes. The CAN-B fault tolerance comes from its ability to revert to a single wire communication mode if there is a fault in the bus wiring.

The Diagnostic CAN-C bus is also capable of 500 Kbps communication, and is sometimes informally referred to as the CAN-D system to differentiate it from the other high speed CAN-C bus. A central gateway or hub integral to the Front Control Module (FCM) physically and electrically isolates the three CAN buses from each other and coordinates the bi-directional transfer of messages between the three buses. The FCM is located on the Integrated Power Module (IPM), which is located in the engine compartment near the battery. The Diagnostic CAN-C is used exclusively for the transmission of diagnostic information between the FCM/gateway and a diagnostic scan tool connected to the industry-standard 16-way Data Link Connector (DLC) located beneath the instrument panel on the driver side of the vehicle.

Each node is connected in parallel to its CAN-B or CAN-C bus using a two-wire twisted pair. These wires are wrapped around each other to provide shielding from unwanted electromagnetic induction interfering with the relatively low voltage signals being carried through them. The twisted pairs have between 33 and 50 twists per meter. While the CAN bus is operating, one of the bus wires will carry a higher voltage and is referred to as the CAN High or CAN bus (+) wire, while the other bus wire will carry a lower voltage and is referred to as the CAN Low or CAN bus (–) wire. Each twisted pair terminates at the FCM/gateway.

The added speed of the CAN data bus is many times faster than previous data bus systems. This added speed facilitates the addition of more electronic control modules or nodes and the incorporation of many new electrical and electronic features in the vehicle. Like prior data bus systems, the CAN data bus minimizes redundant wiring connections; and, at the same time, reduces wire harness complexity, sensor current loads and controller hardware by allowing each sensing device to be connected to only one node. Each node reads, then broadcasts its sensor data over the bus for use by all other nodes requiring that data.

OPERATION

The Controller Area Network (CAN) data bus allows all electronic modules or nodes connected to the bus to share information with each other. Each node can both send and receive serial data simultaneously. The CAN bus signal lines have termination through a termination resistor within each node, either dominant or recessive. The serial data is made up of high and low voltage pulses strung together. Each string of voltage pulses forms a message.

Regardless of whether a message originates from a node on the medium speed CAN-B bus or on the high speed CAN-C bus, the message structure and layout is the same, which allows the Front Control Module (FCM)/Central GateWay (sometimes referred to as the FCMCGW) to process and transfer messages between the buses. The priority of each message is based upon the 11-bit message identifier. Each node uses arbitration to sort the message priority if two competing messages are attempting to be broadcast at the same time.

The FCM used in the CAN system has more control than a non-CAN FCM. Available options are configured into the FCM at the assembly plant, but additional options can be added in the field using the diagnostic scan tool. The configuration settings are stored in non-volatile memory. The FCM also has two 64-bit registers, which register each of the “as-built” and “currently responding” nodes on the CAN-B and CAN-C buses. The FCM stores a Diagnostic Trouble Code (DTC) in one of two caches for any detected active or stored faults in the order in which they occur. One cache stores powertrain (P-Code), chassis (C-Code) and body (B-Code) DTCs, while the second cache is dedicated to storing network (U-Code) DTCs.

If there are intermittent or active faults in the CAN network, a diagnostic scan tool connected to the Diagnostic CAN-C bus through the 16-way Data Link Connector (DLC) may only be able to communicate with the FCM. To aid in CAN network diagnosis, the FCM will provide CAN-B and CAN-C network status information to the scan tool using certain diagnostic signals. In addition, the transceiver in each node on the CAN-C bus will identify a “bus off hardware failure,” while the transceiver in each node on the CAN-B bus will identify a “general bus hardware failure.” The transceivers for some CAN-B nodes will also identify “bus shorted high,” “bus shorted low,” “bus open” or “bus shorted together” failures for both CAN-B bus signal wires.

In order to minimize the potential effects of Ignition-Off Draw (IOD), the CAN-B network employs a sleep strategy. However, a network sleep strategy should not be confused with the sleep strategy of the individual nodes on that network, as they may differ. For example: The CAN-C bus network is awake only when the ignition switch is in the On or Start positions; however, the FCM or the Transmission Control Module (TCM), which are on the CAN-C bus, may still be awake with the ignition switch in the Accessory or Unlock positions. The integrated circuitry of an individual node may be capable of processing certain sensor inputs and outputs without the need to utilize network resources.

The CAN-B bus network remains active until all nodes on that network are ready for sleep. This is determined by the network using tokens in a manner similar to polling. When the last node that is active on the network is ready for sleep, and it has already received a token indicating that all other nodes on the bus are ready for sleep, it broadcasts a “bus sleep acknowledgment” message that causes the network to sleep. Once the CAN-B bus network is asleep, any node on the bus can awaken it by transmitting a message on the network. The FCM will keep either the CAN-B or the CAN-C bus awake for a timed interval after it receives a diagnostic message for that bus over the Diagnostic CAN-C bus.

CONNECTOR-DATA LINK

DESCRIPTION

The Data Link Connector (DLC) is a 16-way molded plastic connector insulator on a dedicated take out of the instrument panel wire harness. This connector is located at the lower edge of the instrument panel, outboard of the steering column. The connector insulator is retained by integral snap features within a rectangular cutout in the lower instrument panel reinforcement.

OPERATION

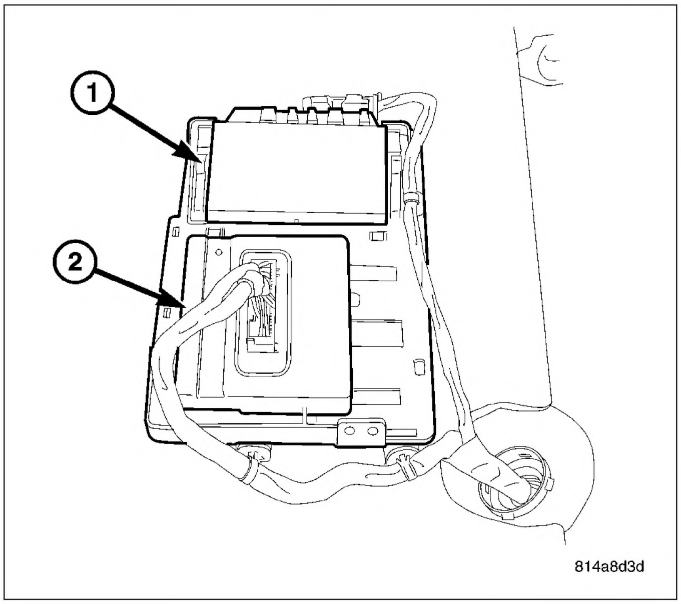
The Data Link Connector (DLC) is an industry-standard 16-way connector that permits the connection of a diagnostic scan tool to the Controller Area Network (CAN) for interfacing with, configuring, and retrieving Diagnostic Trouble Code (DTC) data from the electronic modules that reside on the data bus network of the vehicle.

MODULE-FINAL DRIVE CONTROL

DESCRIPTION

The Final Drive Control Module (FDCM) (2) is a microprocessor-based assembly, controlling a 4X4 Transfer Case and Front and Rear Electronic Limited Slip Differentials (ELSD’s). Communication is via the CAN serial bus. Inputs include user selectable 4X4 modes that include 4WD Full Time (4HI), 4LO, Neutral. The logic and driver circuitry is contained in aluminum housing base and a stamped steel housing cover with an embedded heat sink

The FDCM is installed inside the passenger compartment underneath the driver side of the rear seat.



OPERATION

POWER UP/DOWN

The Final Drive Control Module (FDCM) will power up with an OFF/ON transition of the hardwired ignition switch input, or with the presence of active CAN C communications.

The FDCM will power down when the vehicle ignition switch transitions from ON to OFF, or there are no CAN C messages, or there are no system requirements that dictate the controller to remain active

START-UP DIAGNOSTICS

When the FDCM is activated, the internal circuitry will undergo a diagnostic procedure. The controller will examine all inputs and outputs for short circuits to ground, short circuits to battery and open circuits and will also verify proper CPU and memory operation. If a fault is detected, a message will be sent out over the CAN C bus to the Cluster based Electronic Vehicle Information Center EVIC indicating that service is recommended.

After passing all diagnostic tests, the controller will receive and process inputs and produce the appropriate outputs. Proper monitoring of the controller inputs and outputs performance will continue.

INPUTS/OUTPUTS

The following are inputs to the FDCM:

- Lateral Accelerometer
- Transfer Case Range Select Switch
- Transfer Case Mode Sensor Signal
- Front DIfferential Temperature Sensor
- Rear Differential Temperature Sensor
- 3 Directr Battery Feeds
- Ignition RUN Sense
- Sensor Grounds
- Module Grounds
- CAN C Bus

The following are outputs of the FDCM:

- 5V Sensor Supply
- Transfer Case NEUTRAL Lamp
- Front Electronic Limited Slip Differential Pressure Solenoid
- Rear Electronic Limited Slip Differential Pressure Solenoid
- Transfer Case Bi-directional Motor Control (A & B)
- Switched B+ Solenoid Supply
- Transfer Case Motor Brake Control

TRANSFER CASE RANGE SELECT SWITCH INPUT (NEUTRAL & 4HI/4LO SELECT SWITCH)

The FDCM will support circuitry which interfaces to the system's Transfer Case Range Select Switch, including a Transfer Case Range Select Switch voltage supply and a Transfer Case Range Select Switch input. The purpose of this circuitry is to determine the mode currently being requested by the operator via the resistance ladder network in the shifter assembly, where the Transfer Case Range Select Switch is packaged.

The NEUTRAL Select Switch Input will provide the operator with the ability to place the Transfer Case in Neutral. The 4HI/ 4LO Select Switch Input will provide the operator with the ability to place the transfer case in 4HI or 4LO. The NEUTRAL Select Switch is a momentary contact switch and the 4HI/4LO Select Switch is a 2-position toggle or a momentary contact switch and both these switches are provided through a resistor network for diagnostic purposes. The input will have an internal 1.0K +/- 1% pull-down resistor to ground.

As the selected position in the 4HI/4LO Switch varies and/or the NEUTRAL Switch is depressed or not, the resistance between the module's Transfer Case Range Select Switches voltage supply and Transfer Case Range Select Switches input will vary. Hardware, software, and calibrations within the FDCM will be provided that interpret the external resistance between the module's Transfer Case Range Select Switches voltage supply and Transfer Case Range Select Switches inputs as given in the table below:

STEP	RESISTANCE RANGE	REQUIRED INTERPRETATION
A	63<111<140.4	Fault Condition (short)
B	309.7<337<364.39	NEUTRAL from 4LO(1)
C	380.93< 414<448.20	NEUTRAL from 4HI(1)
D	910.87< 990< 1071.72	4LO
E	2024.17< 2200< 2381.61	4HI
F	Greater Than 8661.5<9000<9343	Fault condition (open)

NOTE: There is no requirement for the FDCM to distinguish between a neutral request from the 4LO or the 4HI position. Resistances in these ranges will be represented as a Neutral Switch Activation.

TRANSFER CASE MODE SENSOR SIGNAL

The Transfer Case Mode Sensor Signal Input will provide the FDCM feedback about the position of the transfer case. The mode sensor will be a linear analog position sensor with a 1.4K +/- 20% potentiometer and a 1 K +/- 20% wiper resistor that converts the motor shaft position into a multiplexed voltage.

FRONT AND REAR DIFFERENTIAL TEMPERATURE SENSORS

The Front and Rear Differential Temperature Sensors will provide a Temperature signal to the FDCM. The temperature sensor will be of a resistive nature and supplied by the Drivetrain Sensor Supply.

TEMPERATURE		RESISTANCE kΩ	
Degrees C	Degrees F	Minimum	Maximum
-60	-76	1353.41	1838.59
-40	-40	291.49	381.71
-30	-22	155.2	199.6
-20	-4	85.85	108.39
-10	14	49.25	61.43
0	32	29.33	35.99
10	50	17.99	21.81
20	68	11.37	13.61
25	77	9.12	10.88
30	86	7.37	8.75
40	104	4.9	5.75
50	122	3.33	3.88
60	140	2.31	2.67
70	158	1.63	1.87
80	176	1.17	1.34
90	194	0.86	0.97
100	212	0.64	0.72
110	230	0.48	0.54
120	248	0.37	0.41
130	266	0.28	0.32
140	284	0.21	0.25
150	302	0.17	0.20

NEUTRAL LAMP

There will be a LED indicator in the Shifter bezel to indicate to the driver that the Transfer Case is in the Neutral gear. FDCM will be capable of driving the LED continuously at 25 mA.

FRONT AND REAR ELECTRONIC LIMITED SLIP DIFFERENTIAL PRESSURE SOLENOID

These outputs will control a Solenoid that regulates the oil pressure inside the Front and Rear Electrical Differential. The oil pressure controls a clutch pack in the front differential that varies the torque transfer across the front or rear axle.. The solenoid will be PWM controlled at a 1Khz frequency and with a 0 to 100% duty cycle capability.

TRANSFER CASE BI-DIRECTIONAL MOTOR CONTROL (A & B)

This output will control a Bi-directional DC motor that controls a clutch pack in the Transfer Case that varies the torque transfer between the front and rear axles.

MODES OF OPERATION

Normal Operation

This mode is achieved by the ignition being switched in the RUN position, which powers up the 5V regulator and generates the appropriate RESET for the microprocessor. This mode also includes any required power-up system checks.

Shut Down Mode

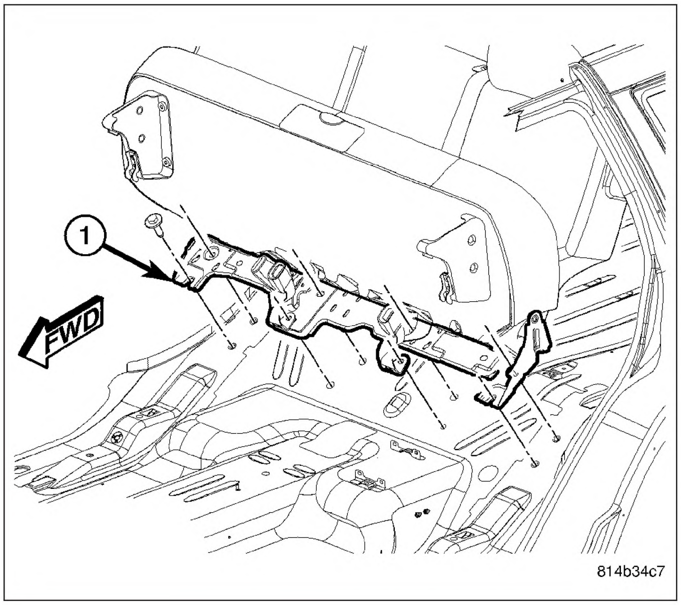
This mode is activated when the ignition switch turned to the off position. The FDCM will perform any required Shut Down tasks prior to turning off the 5V regulator.

Limp-In Mode

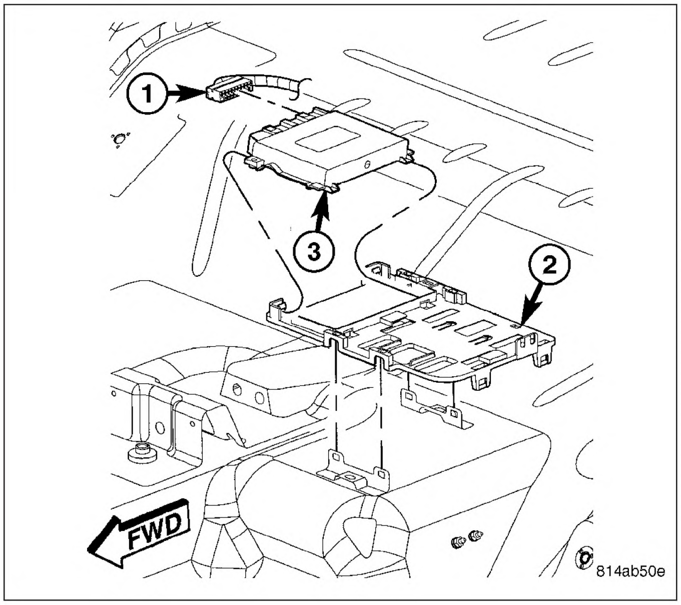
This mode is entered when the FDCM has detected an error condition that prevents the system from performing its' required task. The FDCM operation will vary depending from modified operation to total system shut down based on the failure that has occurred.

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Lift up rear seat to expose the park assist module and final drive control module.

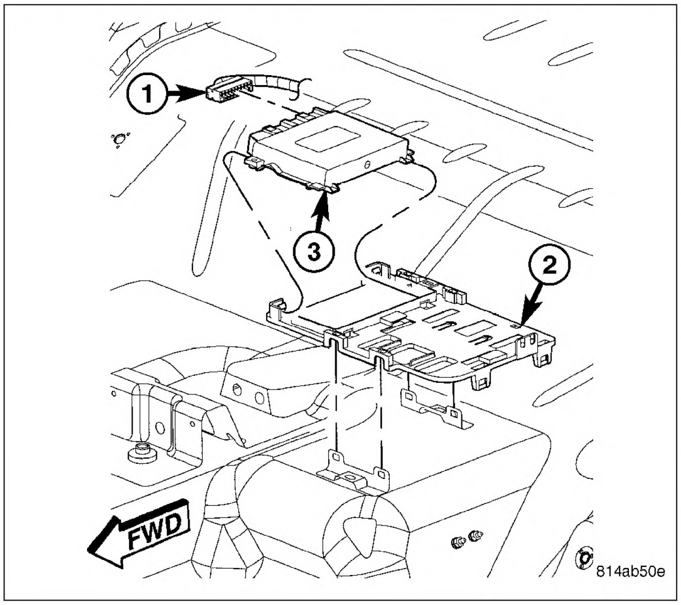


3. Disconnect the module electrical connector (1).
4. Using a trim stick (special tool #C-4755) or equivalent, gently pry back on the retaining tabs on the mounting plate (2) and remove module.

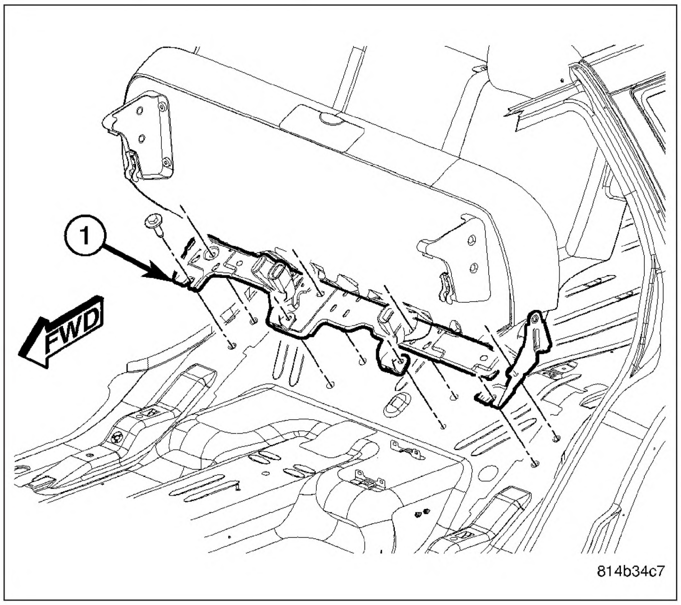


INSTALLATION

1. Place the park assist module (3) in its location on the mounting plate (2) and firmly snap into place.
2. Connect the electrical connector (1).



3. Lower the rear seat back down into position.
4. Connect the battery negative cable.

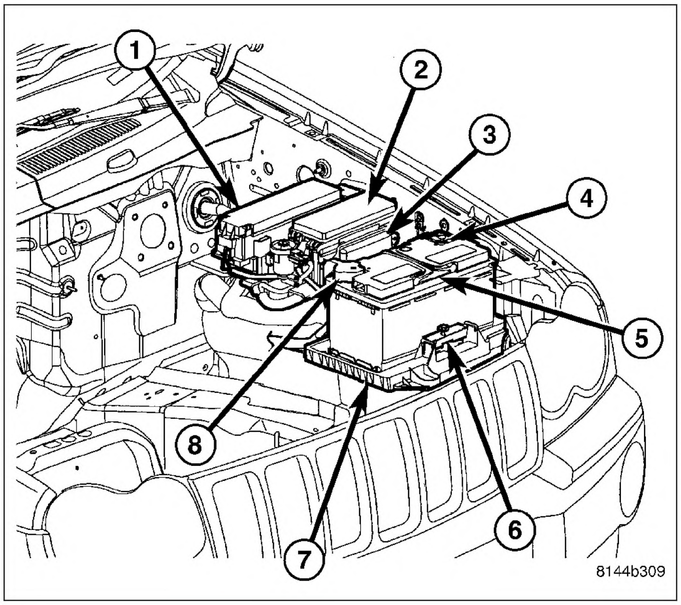


MODULE-FRONT CONTROL

DESCRIPTION

CAUTION: Do not exchange the Front Control Module with the module from another vehicle. Multiple vehicle module configurations may be altered. Use only approved service parts when replacing the module or exchanging the module for diagnostic purposes.

The Front Control Module (FCM) (3) is a micro controller based module located in the left front corner of the engine compartment. The FCM mates directly to the Integrated Power Module (IPM)(2). The IPM connects directly to the battery and provides the primary means of circuit protection and power distribution for many of the vehicle electrical systems. The FCM controls power to some of these vehicle systems electrical and electromechanical loads based on inputs received from hard wired switch inputs and data received on the Controller Area Network (CAN) data bus circuit.



OPERATION

As messages are sent over the Controller Area Network (CAN) bus circuit, the Front Control Module (FCM) reads these messages and controls power to some of the vehicles electrical systems by completing the circuit to ground (low side driver) or completing the circuit to 12 volt power (high side driver). The following functions are controlled by the FCM:

- Front turn signals
- Turn signal and tail lamps
- Front and rear hazard warning lamps
- Headlamps
- Fog Lamps
- Daytime running lamps - if equipped
- Horn

- Windshield wiper and washer systems
- Trailer tow wiring output
- Power Accessory Delay
- Smart Power Accessory Delay
- Manual adjustable pedals
- Hydraulic cooling fan
- Sensor monitoring (ambient, battery voltage, brake pedal position, and hood ajar - if equipped)

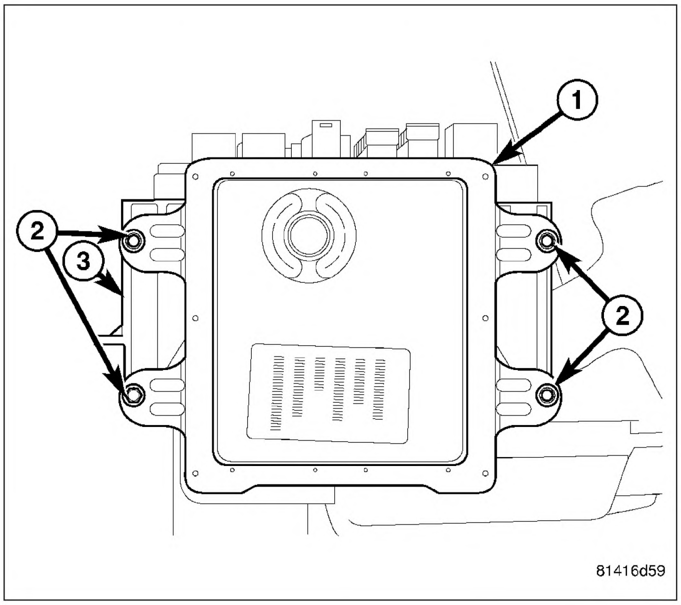
The FCM provides the following features for the above function:

- It flashes lamps in response to turn signal, Remote Keyless Entry and Vehicle Theft Security Alarm inputs, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - OPERATION) for additional information on customer programmable features.
- It sounds the horn in response to Remote Keyless Entry and Vehicle Theft Security Alarm inputs, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - OPERATION) for additional information on customer programmable features.
- It turns off the horn in the event of excessively long operation that could otherwise damage the horn.
- It minimized voltage variations to the headlamps to extend bulb life.
- If the headlamps are left on, it automatically turns them off after eight minutes to protect the battery from discharge.
- It operates the high-beam headlamps at reduced intensity by pulse-width modulation of the power supply to provide the daytime running lamps.
- It provides the variable delay intermittent windshield wiper feature and the vehicle speed sensitive windshield wiper delay variation.
- It acts as a gateway between the CAN-C network for critical powertrain and anti-lock brake systems and the CAN-B network for body and interior modules as well as the CAN-D network. For example it collects ambient temperature data and relays it to the PCM.

REMOVAL

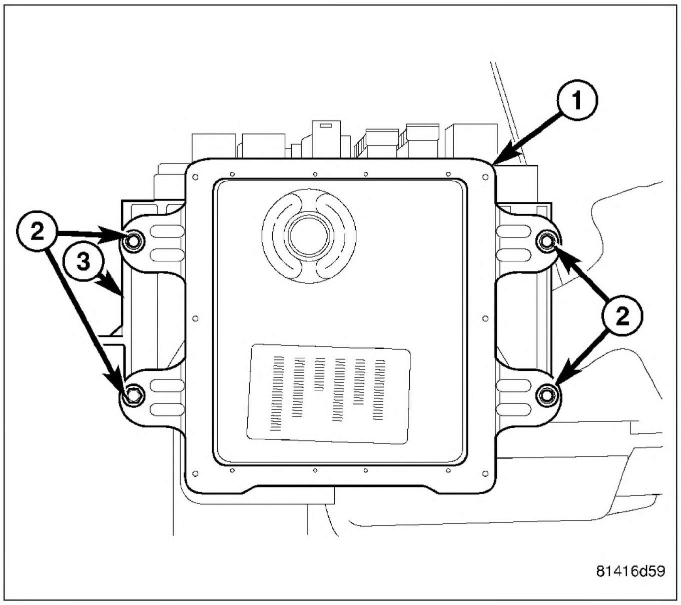
CAUTION: Front Control Module (FCM) damage may occur if the module case comes in contact with the battery while still connected. Always disconnect the battery negative cable prior to removal of the FCM.

1. Disconnect and isolate the battery negative cable.
2. Remove the Integrated Power Module (IPM) from the engine compartment, (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/INTEGRATED POWER MODULE - REMOVAL).
3. Remove the four fasteners (2) securing the Front Control Module (FCM) (1) to the IPM (3).
4. Separate the FCM from the IPM by pulling the two straight away from each other to disengage the electrical connector.



INSTALLATION

NOTE: If installing a new service part, remove the plastic cover from the original module and install it on the one.



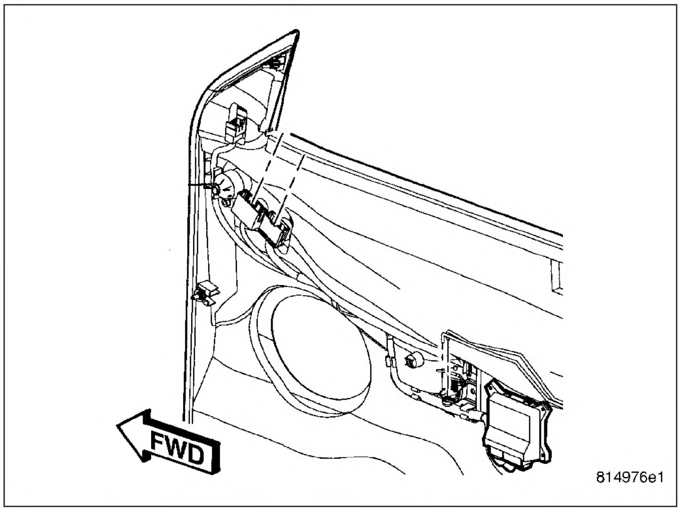
1. Connect the Integrated Power Module (IPM) (3) to the Front Control Module (FCM) (1) by lining up the electrical connector and pushing the two together.
2. Install the four fasteners (2) securing the FCM (1) to the IPM (3).
3. Install the IPM, (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/INTEGRATED POWER MODULE - INSTALLATION).
4. Connect the battery negative cable.

MODULE-MEMORY MIRROR

DESCRIPTION

There are two Memory Mirror Modules (these are sometimes referred to as Driver Door Modules (DDM) and Passenger Door Modules (PDM) within the memory system. One located in the driver door and one in the passenger door, just behind the door trim panel. The modules send a bus message to the power mirrors to adjust them to a preset position when a memory recall request has been made.

The memory mirror modules also act as an interface in each door for electrical functions (door lock switches and door ajar switches).



The **Memory System** makes available for immediate recall personalized preferences of the following:

- Automatic temperature control settings.
- Outside mirror positions.
- Power adjustable brake and accelerator pedal position.
- Power seat horizontal, vertical, recliner, and easy entry positions.
- Radio push button station selections.

The major components of the **Memory System** are:

- **Memory Selector Switch** - located in the driver door trim panel.
- **Driver Memory Mirror Module (DMMM)** - located in the driver door, behind the trim panel.
- **Passenger Memory Mirror Module (PMMM)** - located in the passenger door, behind the trim panel.
- **Sentry Key Remote Entry Module (SKREEM)** - located at ignition key cylinder.

- **Remote Keyless Entry (RKE) Transmitter** - located with ignition key.
- **Memory Seat Module (MSM)** - located underneath the driver seat and also controls the Adjustable Pedals.
- **Radio** - located in the instrument panel center stack.
- **Automatic Temperature Control (ATC)** - located in the instrument panel center stack.

The memory recall is available at the press of a button on the drivers door trim panel or, by using the Remote Keyless Entry (RKE) transmitter if it is programmed to trigger the recall.

Radio settings include up to 20 push button presets (10 AM and 10 FM), and the last station selection, even if it is not one of the 20 preset selections.

OPERATION

The memory mirror module receives input from the door lock switches and sends that message to the cluster for door lock operation (vehicles equipped with memory system only). It also controls the mirror adjustment by receiving input from the mirror switch on the door trim panel. Sensors in the mirrors act as inputs to the memory mirror module in order to position the mirrors to presets by the driver(s). The power supply to the mirrors is supplied by the mirror memory modules. On vehicles equipped with a memory system, the front door ajar switches are inputs to the memory mirror module. The modules use this information for door lock inhibit etc.

A memory setting is saved by pressing the “set” button, then pressing either the memory “1” or “2” button within 5 seconds of pressing the “set” button.

A memory setting is recalled by pressing either the memory “1” or “2” button, or by pressing the unlock button on a “linked” Remote Keyless Entry (RKE) transmitter.

For driver safety, memorized settings can not be recalled if the transmission is in a position other than Park or the seat belt is latched.

Both driver and passenger modules provide active and stored Diagnostic Trouble Codes (DTC’s) to aid in diagnosis.

Both modules are identical in appearance with the exception of an extra ground wire on the driver side memory mirror module.

DIAGNOSIS AND TESTING

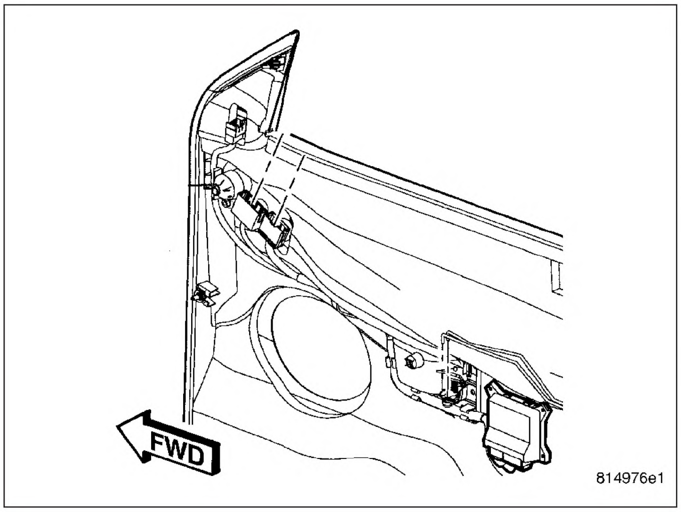
MEMORY MIRROR MODULE

Any diagnosis of the memory mirror module should begin with the use of a scan tool and the appropriate Diagnostic information.

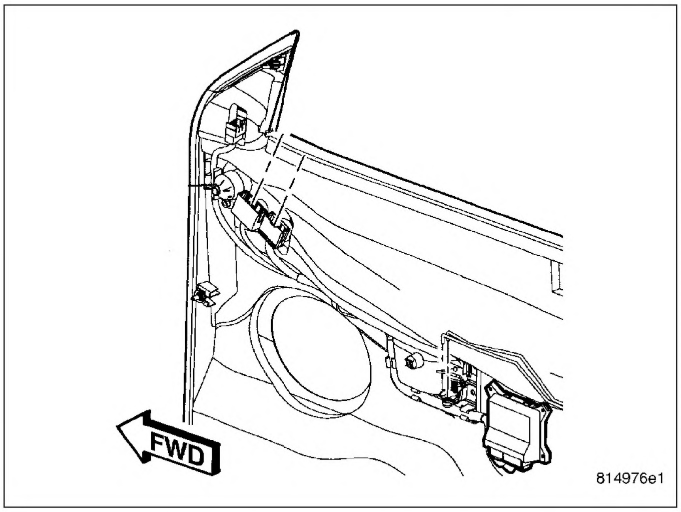
Refer to the appropriate wiring information.

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the door trim panel (Refer to 23 - BODY/ DOOR - FRONT/TRIM PANEL - REMOVAL).
3. Disconnect the electrical connector from module.
4. Remove fasteners and module from vehicle.



INSTALLATION

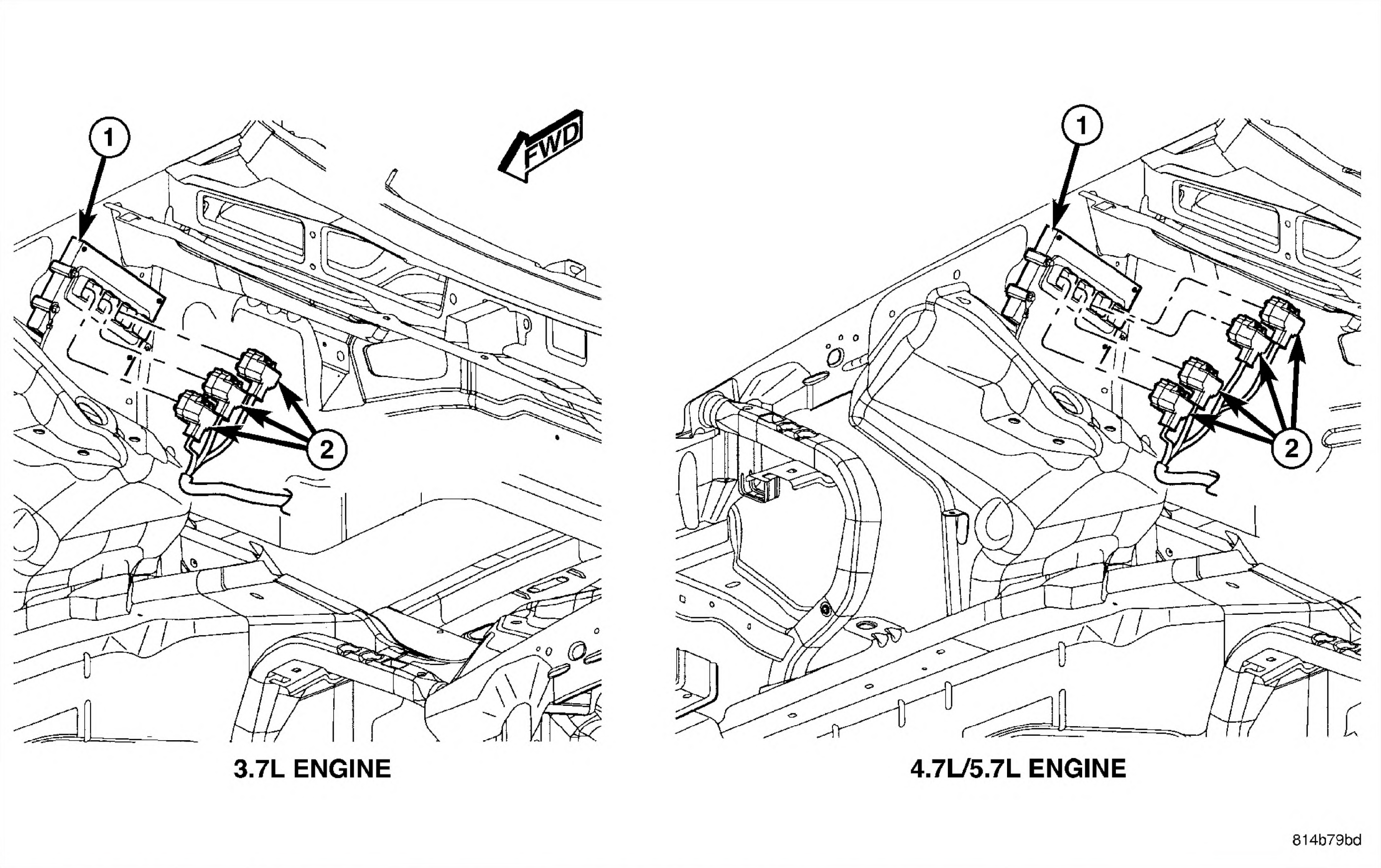

FWD
814976e1

1. Position module on door trim panel and install fasteners (2).
2. Connect the electrical connector to module.
3. Install the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
4. Connect the battery negative cable.

MODULE-POWERTRAIN CONTROL

DESCRIPTION

POWERTRAIN CONTROL MODULE (PCM)


1
2
FWD
3.7L ENGINE
1
2
4.7L/5.7L ENGINE
814b79bd

The PCM (1) is attached to the right-front inner fender located in the engine compartment.

MODES OF OPERATION

As input signals to the Powertrain Control Module (PCM) change, the PCM adjusts its response to the output devices.

The PCM will operate in two different modes: **Open Loop and Closed Loop**.

During Open Loop modes, the PCM receives input signals and responds only according to preset PCM programming. Input from the oxygen (O2S) sensors is not monitored during Open Loop modes.

During Closed Loop modes, the PCM will monitor the oxygen (O2S) sensors input. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio. This ratio is 14.7 parts air-to-1 part fuel. By monitoring the exhaust oxygen content through the O2S sensor, the PCM can fine tune the injector pulse width. This is done to achieve optimum fuel economy combined with low emission engine performance.

The fuel injection system has the following modes of operation:

- Ignition switch ON
- Engine start-up (crank)
- Engine warm-up
- Idle
- Cruise
- Acceleration
- Deceleration
- Wide open throttle (WOT)
- Ignition switch OFF

The ignition switch On, engine start-up (crank), engine warm-up, acceleration, deceleration and wide open throttle modes are Open Loop modes. The idle and cruise modes, (with the engine at operating temperature) are Closed Loop modes.

IGNITION SWITCH (KEY-ON) MODE

This is an Open Loop mode. When the fuel system is activated by the ignition switch, the following actions occur:

- The PCM pre-positions the idle air control (IAC) motor.
- The PCM determines atmospheric air pressure from the MAP sensor input to determine basic fuel strategy.
- The PCM monitors the engine coolant temperature sensor input. The PCM modifies fuel strategy based on this input.
- Intake manifold air temperature sensor input is monitored.
- Throttle position sensor (TPS) is monitored.
- The auto shutdown (ASD) relay is energized by the PCM for approximately three seconds.
- The fuel pump is energized through the fuel pump relay by the PCM. The fuel pump will operate for approximately three seconds unless the engine is operating or the starter motor is engaged.
- The O2S sensor heater element is energized via the ASD relay. The O2S sensor input is not used by the PCM to calibrate air-fuel ratio during this mode of operation.

ENGINE START-UP MODE

This is an Open Loop mode. The following actions occur when the starter motor is engaged.

The PCM receives inputs from:

- Battery voltage
- Engine coolant temperature sensor
- Crankshaft position sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Starter motor relay
- Camshaft position sensor signal

The PCM monitors the crankshaft position sensor. If the PCM does not receive a crankshaft position sensor signal within 3 seconds of cranking the engine, it will shut down the fuel injection system.

The fuel pump is activated by the PCM through the fuel pump relay.

Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control the injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off.

The PCM determines the proper ignition timing according to input received from the crankshaft position sensor.

ENGINE WARM-UP MODE

This is an Open Loop mode. During engine warm-up, the PCM receives inputs from:

- Battery voltage
- Crankshaft position sensor
- Engine coolant temperature sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Park/neutral switch (gear indicator signal—auto. trans. only)
- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)

Based on these inputs the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control the injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off.
- The PCM adjusts engine idle speed through the idle air control (IAC) motor and adjusts ignition timing.
- The PCM operates the A/C compressor clutch through the clutch relay. This is done if A/C has been selected by the vehicle operator and requested by the A/C thermostat.
- When engine has reached operating temperature, the PCM will begin monitoring O2S sensor input. The system will then leave the warm-up mode and go into closed loop operation.

IDLE MODE

When the engine is at operating temperature, this is a Closed Loop mode. At idle speed, the PCM receives inputs from:

- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)
- Battery voltage
- Crankshaft position sensor
- Engine coolant temperature sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Battery voltage
- Park/neutral switch (gear indicator signal—auto. trans. only)
- Oxygen sensors

Based on these inputs, the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off.
- The PCM monitors the O2S sensor input and adjusts air-fuel ratio by varying injector pulse width. It also adjusts engine idle speed through the idle air control (IAC) motor.
- The PCM adjusts ignition timing by increasing and decreasing spark advance.
- The PCM operates the A/C compressor clutch through the clutch relay. This happens if A/C has been selected by the vehicle operator and requested by the A/C thermostat.

CRUISE MODE

When the engine is at operating temperature, this is a Closed Loop mode. At cruising speed, the PCM receives inputs from:

- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)
- Battery voltage
- Engine coolant temperature sensor
- Crankshaft position sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Park/neutral switch (gear indicator signal—auto. trans. only)
- Oxygen (O2S) sensors

Based on these inputs, the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then adjust the injector pulse width by turning the ground circuit to each individual injector on and off.
- The PCM monitors the O2S sensor input and adjusts air-fuel ratio. It also adjusts engine idle speed through the idle air control (IAC) motor.
- The PCM adjusts ignition timing by turning the ground path to the coil on and off.
- The PCM operates the A/C compressor clutch through the clutch relay. This happens if A/C has been selected by the vehicle operator and requested by the A/C thermostat.

ACCELERATION MODE

This is an Open Loop mode. The PCM recognizes an abrupt increase in throttle position or MAP pressure as a demand for increased engine output and vehicle acceleration. The PCM increases injector pulse width in response to increased throttle opening.

DECELERATION MODE

When the engine is at operating temperature, this is an Open Loop mode. During hard deceleration, the PCM receives the following inputs.

- Air conditioning select signal (if equipped)
- Air conditioning request signal (if equipped)
- Battery voltage
- Engine coolant temperature sensor
- Crankshaft position sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal
- Park/neutral switch (gear indicator signal—auto. trans. only)
- Vehicle speed sensor

If the vehicle is under hard deceleration with the proper rpm and closed throttle conditions, the PCM will ignore the oxygen sensor input signal. The PCM will enter a fuel cut-off strategy in which it will not supply a ground to the injectors. If a hard deceleration does not exist, the PCM will determine the proper injector pulse width and continue injection.

Based on the above inputs, the PCM will adjust engine idle speed through the idle air control (IAC) motor.

The PCM adjusts ignition timing by turning the ground path to the coil on and off.

WIDE OPEN THROTTLE MODE

This is an Open Loop mode. During wide open throttle operation, the PCM receives the following inputs.

- Battery voltage
- Crankshaft position sensor
- Engine coolant temperature sensor
- Intake manifold air temperature sensor
- Manifold absolute pressure (MAP) sensor
- Throttle position sensor (TPS)
- Camshaft position sensor signal

During wide open throttle conditions, the following occurs:

- Voltage is applied to the fuel injectors with the ASD relay via the PCM. The PCM will then control the injection sequence and injector pulse width by turning the ground circuit to each individual injector on and off. The PCM ignores the oxygen sensor input signal and provides a predetermined amount of additional fuel. This is done by adjusting injector pulse width.
- The PCM adjusts ignition timing by turning the ground path to the coil on and off.

IGNITION SWITCH OFF MODE

When ignition switch is turned to OFF position, the PCM stops operating the injectors, ignition coil, ASD relay and fuel pump relay.

5 VOLT SUPPLIES

Two different Powertrain Control Module (PCM) five volt supply circuits are used; primary and secondary.

IGNITION CIRCUIT SENSE

This circuit ties the ignition switch to the Powertrain Control Module (PCM). Battery voltage is supplied to the PCM through the ignition switch when the ignition is in the Run or Start position. This is referred to as the “ignition sense” circuit and is used to “wake up” the PCM.

POWER GROUNDS

The Powertrain Control Module (PCM) has 2 main grounds. Both of these grounds are referred to as power grounds. All of the high-current, noisy, electrical devices are connected to these grounds as well as all of the sensor returns. The sensor return comes into the sensor return circuit, passes through noise suppression, and is then connected to the power ground.

The power ground is used to control ground circuits for the following PCM loads:

- Generator field winding
- Fuel injectors
- Ignition coil(s)
- Certain relays/solenoids
- Certain sensors

SENSOR RETURN

The Sensor Return circuits are internal to the Powertrain Control Module (PCM).

Sensor Return provides a low–noise ground reference for all engine control system sensors. Refer to Power Grounds for more information.

SIGNAL GROUND

Signal ground provides a low noise ground to the data link connector.

OPERATION

POWERTRAIN CONTROL MODULE (PCM)

The PCM is a pre-programmed, microprocessor digital computer. It regulates ignition timing, air-fuel ratio, emission control devices, charging system, certain transmission features, speed control, air conditioning compressor clutch engagement and idle speed. The PCM can adapt its programming to meet changing operating conditions.

The PCM receives input signals from various switches and sensors. Based on these inputs, the PCM regulates various engine and vehicle operations through different system components. These components are referred to as Powertrain Control Module (PCM) Outputs. The sensors and switches that provide inputs to the PCM are considered Powertrain Control Module (PCM) Inputs.

The PCM adjusts ignition timing based upon inputs it receives from sensors that react to: engine rpm, manifold absolute pressure, engine coolant temperature, throttle position, transmission gear selection (automatic transmission), vehicle speed and the brake switch.

The PCM adjusts idle speed based on inputs it receives from sensors that react to: throttle position, vehicle speed, transmission gear selection, engine coolant temperature and from inputs it receives from the air conditioning clutch switch and brake switch.

Based on inputs that it receives, the PCM adjusts ignition coil dwell. The PCM also adjusts the generator charge rate through control of the generator field and provides speed control operation.

NOTE: PCM Inputs:

- Accelerator pedal position sensor (if equipped)
- A/C request (if equipped with factory A/C)
- A/C select (if equipped with factory A/C)
- Auto shutdown (ASD) sense
- Battery temperature
- Battery voltage
- Brake switch
- CAN bus (+) circuits
- CAN bus (-) circuits
- Camshaft position sensor signal
- Clutch Interlock Switch (if equipped)
- Crankshaft position sensor
- Data link connection for diagnostic scan tool
- EGR position sensor (if equipped)
- Engine coolant temperature sensor
- Fuel level
- Generator (battery voltage) output
- Ignition circuit sense (ignition switch in on/off/crank/run position)
- Intake manifold air temperature sensor
- Knock sensor(s) (if equipped)
- Leak detection pump (switch) sense (if equipped)
- Manifold absolute pressure (MAP) sensor
- Oil pressure sensor
- Output shaft speed sensor
- Overdrive/override switch
- Oxygen sensors
- Park/neutral switch (auto. trans. only)
- Power ground
- Power steering pressure switch (if equipped)
- Sensor return
- Signal ground

- Speed control multiplexed single wire input
- Throttle position sensor
- Transmission governor pressure sensor
- Transmission output speed sensor
- Transmission temperature sensor
- Vehicle speed inputs from ABS or RWAL system

NOTE: PCM Outputs:

- A/C clutch relay
- Auto shutdown (ASD) relay
- CAN bus (+/-) circuits for: speedometer, voltmeter, fuel gauge, oil pressure gauge/lamp, engine temp. gauge and speed control warn. lamp
- Data link connection for diagnostic scan tool
- Double start override (if equipped)
- EGR valve control solenoid (if equipped)
- Electronic throttle control
- EVAP canister purge solenoid
- Five volt sensor supply (primary)
- Five volt sensor supply (secondary)
- Fuel injectors
- Fuel pump relay
- Generator field driver (-)
- Generator field driver (+)
- Generator lamp (if equipped)
- Idle air control (IAC) motor
- Ignition coil(s)
- CAN bus circuits
- Leak detection pump (if equipped)
- Malfunction indicator lamp (Check engine lamp). Driven through CAN bus circuits.
- Overdrive indicator lamp (if equipped)
- Radiator cooling fan (if equipped)
- Speed control vacuum solenoid
- Speed control vent solenoid
- Starter relay
- Tachometer (if equipped). Driven through CAN bus circuits.
- Transmission convertor clutch circuit
- Transmission 3-4 shift solenoid
- Transmission relay
- Transmission temperature lamp (if equipped)
- Transmission variable force solenoid

5 VOLT SUPPLIES

Primary 5–volt supply:

- supplies the required 5 volt power source to the Crankshaft Position (CKP) sensor.
- supplies the required 5 volt power source to the Camshaft Position (CMP) sensor.
- supplies a reference voltage for the Manifold Absolute Pressure (MAP) sensor.
- supplies a reference voltage for the Throttle Position Sensor (TPS) sensor.

Secondary 5–volt supply:

- supplies the required 5 volt power source to the oil pressure sensor.
- supplies the required 5 volt power source for the Vehicle Speed Sensor (VSS) (if equipped).

- supplies the 5 volt power source to the transmission pressure sensor (if equipped with an RE automatic transmission).

IGNITION CIRCUIT SENSE

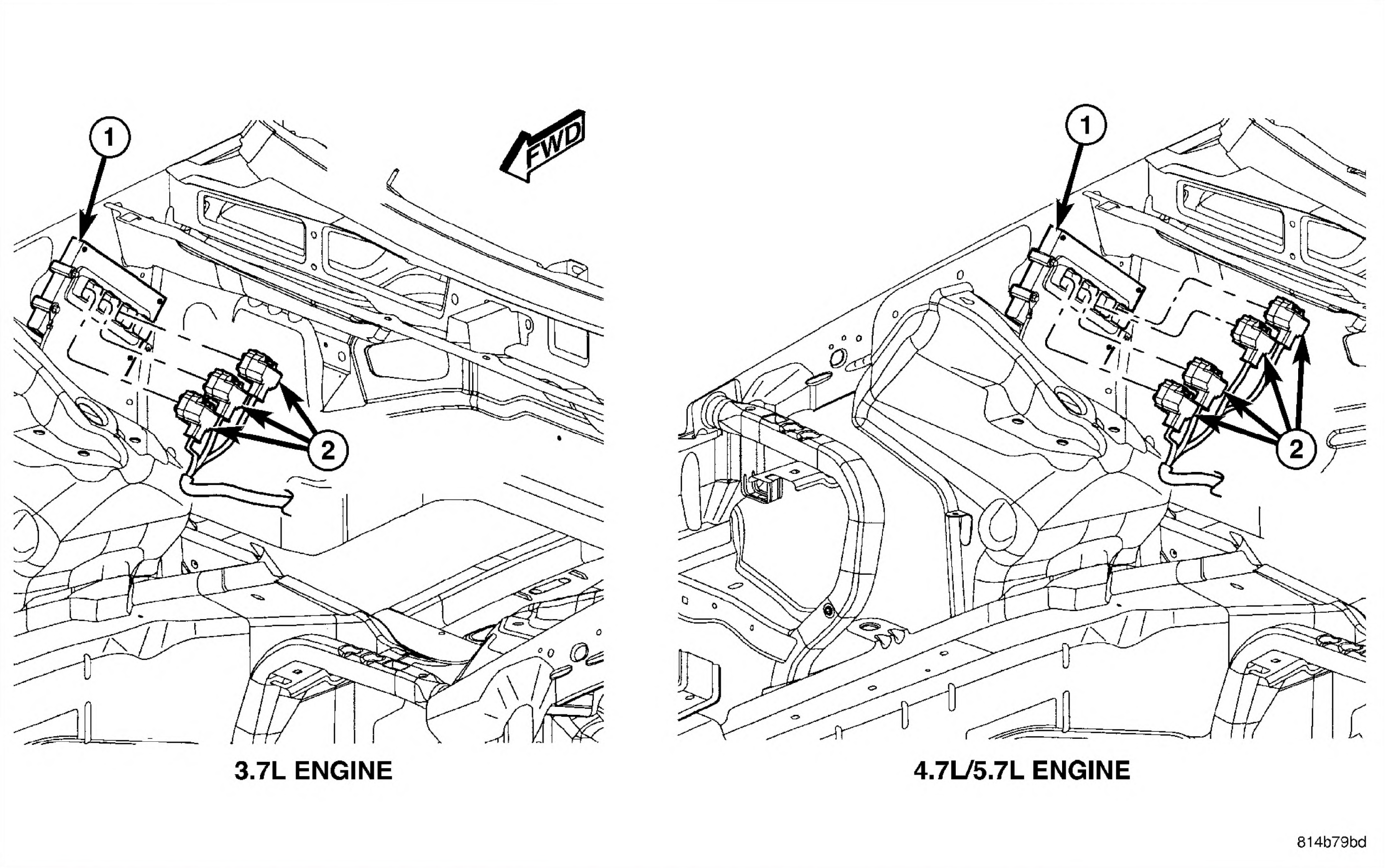
The ignition circuit sense input tells the PCM the ignition switch has energized the ignition circuit.

Battery voltage is also supplied to the PCM through the ignition switch when the ignition is in the RUN or START position. This is referred to as the ″ignition sense″ circuit and is used to ″wake up″ the PCM. Voltage on the ignition input can be as low as 6 volts and the PCM will still function. Voltage is supplied to this circuit to power the PCM's 8-volt regulator and to allow the PCM to perform fuel, ignition and emissions control functions.

REMOVAL

CAUTION: Certain ABS systems rely on having the Powertrain Control Module (PCM) broadcast the Vehicle Identification Number (VIN) over the bus network. To prevent problems of DTCs and other items related to the VIN broadcast, it is recommend that you disconnect the ABS CAB (controller) temporarily when replacing the PCM. Once the PCM is replaced, write the VIN to the PCM using a diagnostic scan tool. This is done from the engine main menu. Arrow over to the second page to "1. Miscellaneous". Select "Check VIN" from the choices. Make sure it has the correct VIN entered before continuing. When the VIN is complete, turn off the ignition key and reconnect the ABS module connector. This will prevent the setting of DTCs and other items associated with the lack of a VIN detected when you turn the key ON after replacing the PCM.

CAUTION: Use a diagnostic scan tool to reprogram the new PCM with the vehicles original identification number (VIN) and the vehicles original mileage. If this step is not done, a Diagnostic Trouble Code (DTC) may be set.

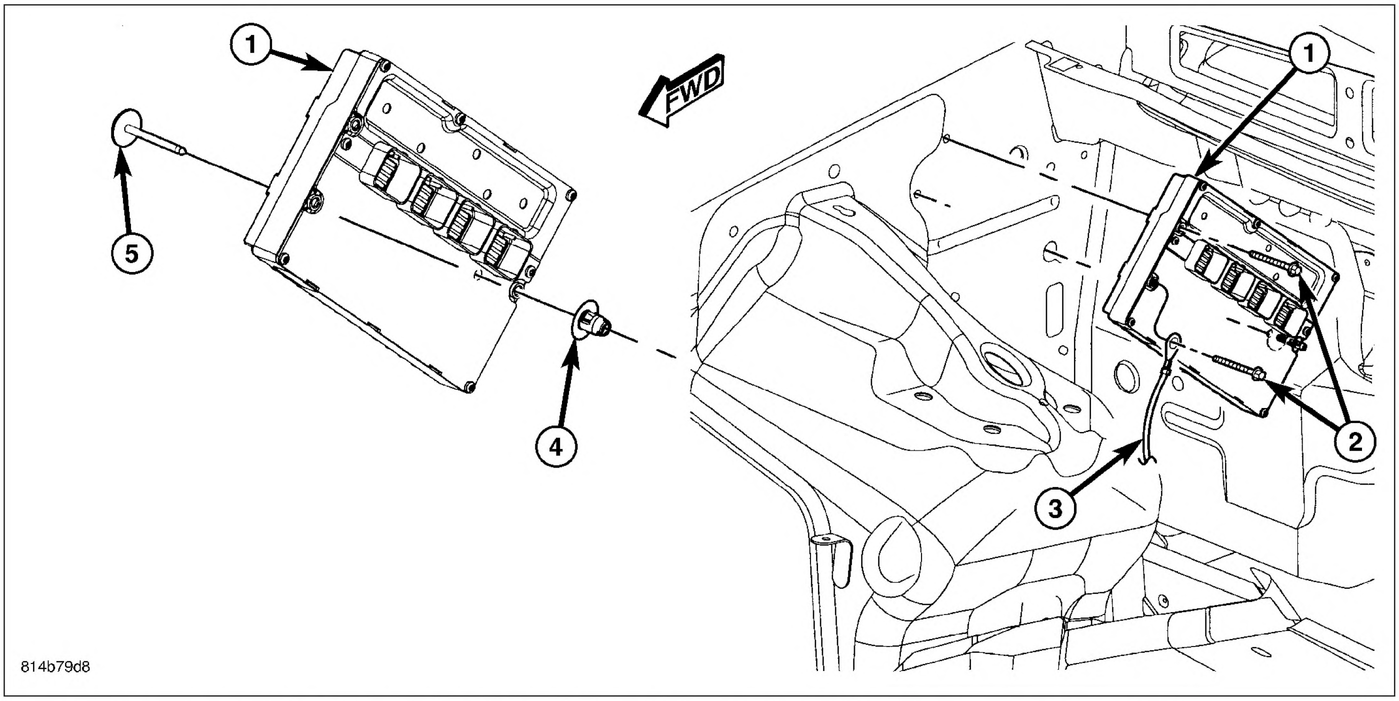


The PCM (1) is attached to the right-front inner fender located in the engine compartment.

To avoid possible voltage spike damage to the PCM, ignition key must be off, and negative battery cable must be disconnected before unplugging PCM connectors.

1. Disconnect and isolate negative battery cable.

2. Carefully unplug the 38-way connectors (2) from PCM.

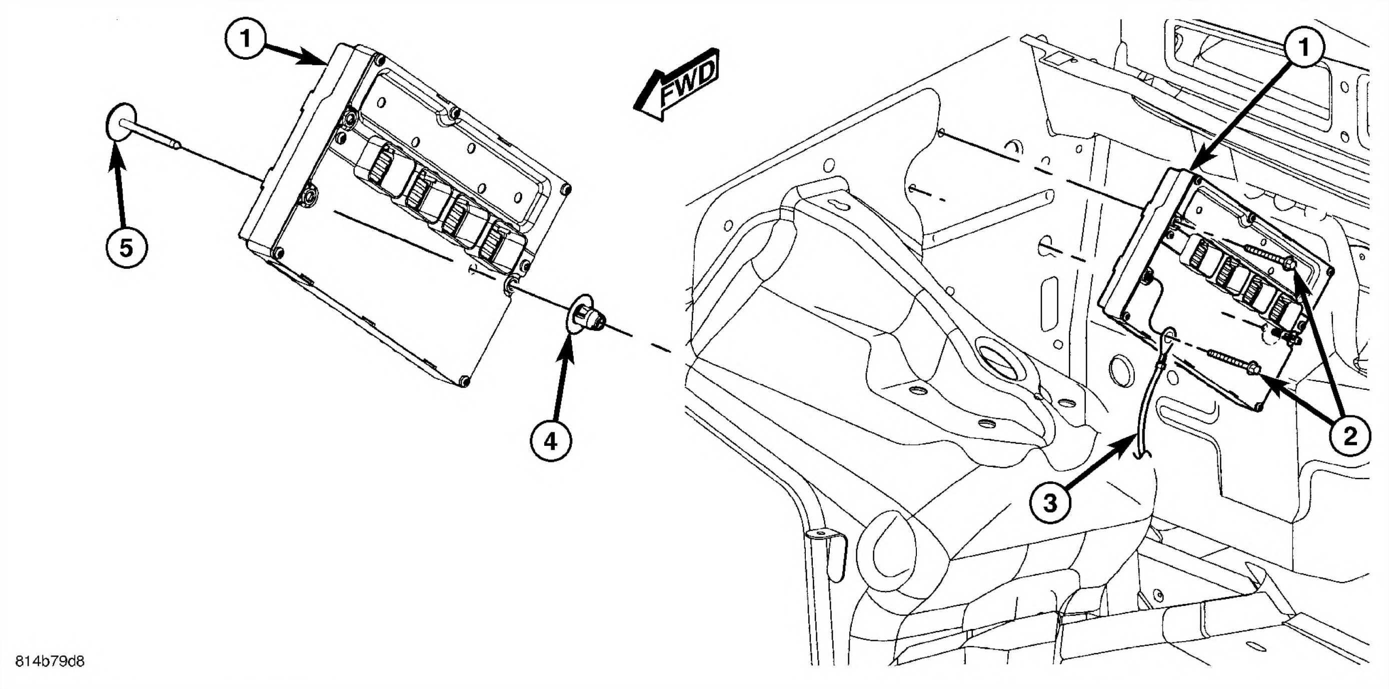


3. A locating pin (5) is used in place of one of the PCM mounting bolts. Pry clip (4) from pin (5).
4. Remove two PCM mounting bolts (2), and remove PCM from vehicle.
5. Position ground strap (3) to the side.

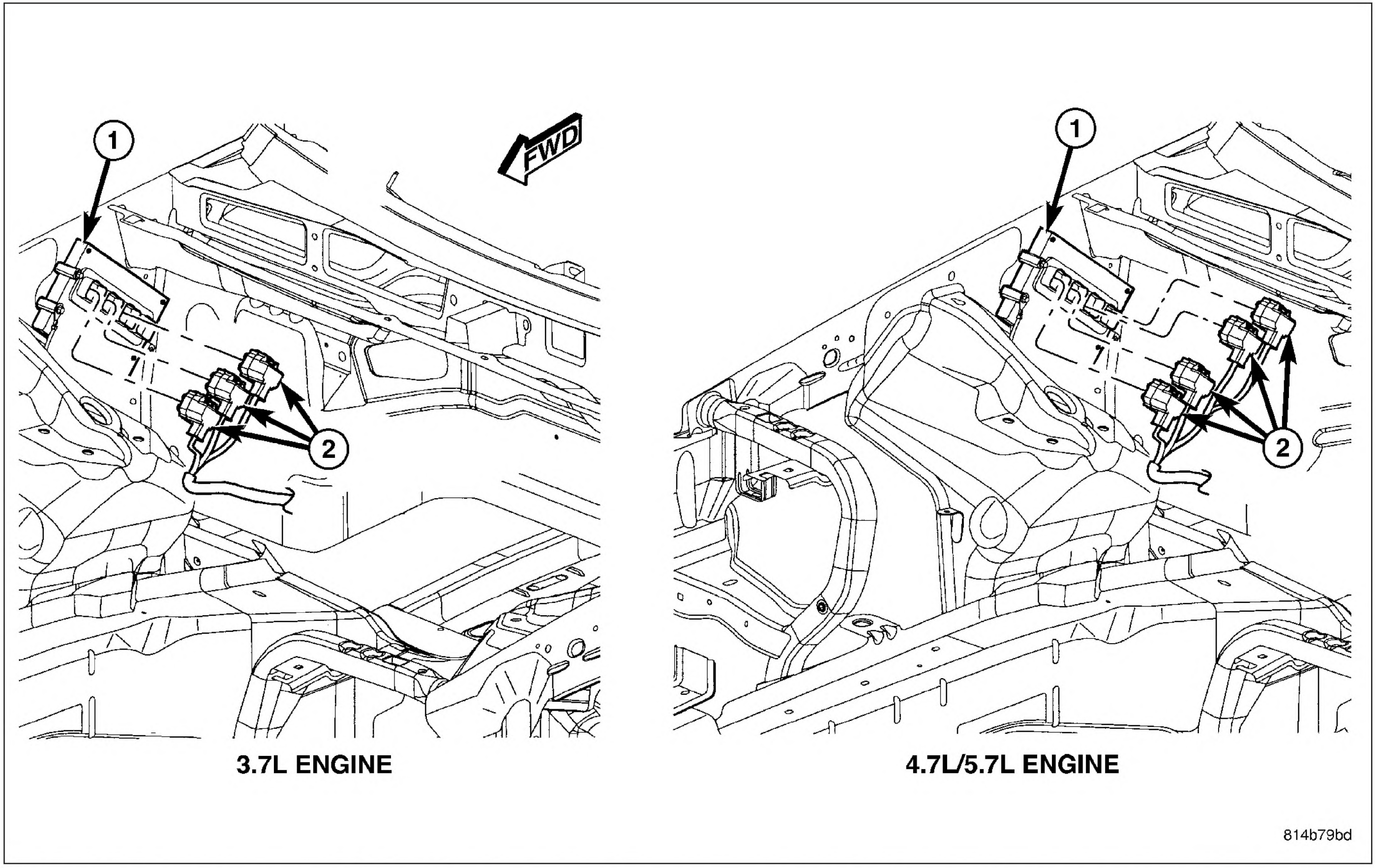
INSTALLATION

CAUTION: Certain ABS systems rely on having the Powertrain Control Module (PCM) broadcast the Vehicle Identification Number (VIN) over the bus network. To prevent problems of DTCs and other items related to the VIN broadcast, it is recommend that you disconnect the ABS CAB (controller) temporarily when replacing the PCM. Once the PCM is replaced, write the VIN to the PCM using a diagnostic scan tool. This is done from the engine main menu. Arrow over to the second page to “1. Miscellaneous”. Select “Check VIN” from the choices. Make sure it has the correct VIN entered before continuing. When the VIN is complete, turn off the ignition key and reconnect the ABS module connector. This will prevent the setting of DTCs and other items associated with the lack of a VIN detected when you turn the key ON after replacing the PCM.

CAUTION: Use a diagnostic scan tool to reprogram the new PCM with the vehicles original identification number (VIN) and the vehicles original mileage. If this step is not done, a Diagnostic Trouble Code (DTC) may be set.


1
FWD
1
5
4
3
2
814b79d8

1. Install clip (4) to pin (5).
2. Position PCM (1) to body and install two bolts (2). Be sure to position ground strap (3) before installing bolt.
3. Tighten two bolts (2) to 3–5 N·m (30–40 in. lbs.).

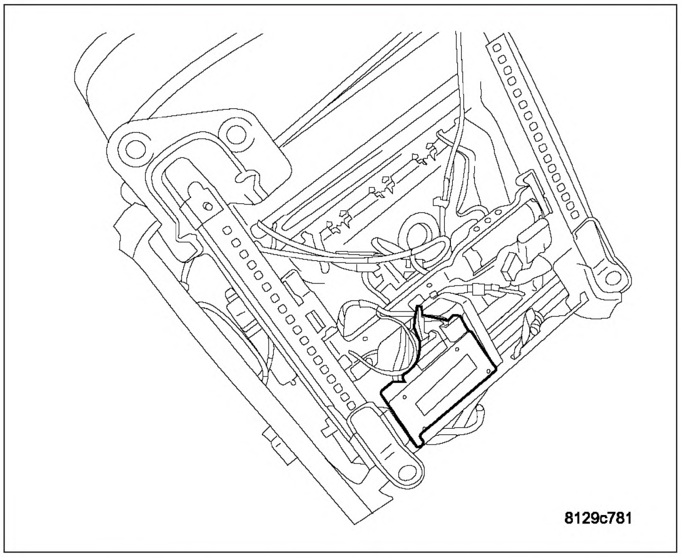

1
FWD
2
3.7L ENGINE
1
2
4.7L/5.7L ENGINE
814b79bd

4. Check pin connectors in PCM. Also check the 38–way connectors (2) for corrosion or damage. Repair as necessary.
5. Carefully plug the 38-way connectors (2) into PCM (1).

6. Connect negative battery cable.
7. **Use a diagnostic scan tool to reprogram new PCM with vehicles original Identification Number (VIN) and original vehicle mileage. If this step is not done, a Diagnostic Trouble Code (DTC) may be set.**

MODULE-MEMORY SEAT

DESCRIPTION



The Memory Seat Module (MSM) is located underneath the driver seat, towards the front and on the outboard side. It is used in conjunction with the other modules in the memory system to recall the driver seat to one of two preset seat positions (horizontal, vertical, and recliner). The switch for the memory seat programming and selection mounts on the driver door trim panel. The memory system is able to store and recall all driver side power seat positions, outside mirror positions and power adjustable pedal position. The system can be set for two different drivers. On vehicles with a factory installed radio connected to the Controller Area Network (CAN) data bus network, the memory system is also able to store and recall up to twelve radio station presets (six AM and six FM), also for two drivers. The memory system will also store and recall the last station listened to for each driver, even if it is not one of the twelve preset stations.

The memory system will automatically recall all of these settings when a button of the memory switch is depressed, or when the doors are unlocked using the Remote Keyless Entry (RKE) transmitter (if the “RKE Linked to Memory” feature is enabled). If the vehicle has more than two drivers the RKE transmitter recall of memory features can be disabled. This is a customer programmable feature of the Electronic Vehicle Information Center (EVIC).

OPERATION

The Memory Seat Module (MSM) receives battery current through a 25 amp circuit breaker in the Power Distribution Center (PDC) so that the memory system remains operational, regardless of the ignition switch position. When the driver memory switch button is pushed, a resistance signal is sent to the MSM via the Controller Area Network (CAN) bus circuit. The MSM is responsible for the 12v battery feed and ground path to the power seat adjuster motor and other memory system components.

The MSM receives memory set/position switch input through the CAN bus circuit. The MSM also receives hard wired input from the hall effect sensors, mounted on each of the driver power seat adjuster motors and the driver side view mirror motor. The programmed software in the module allows it to know where the seat and adjustable pedals are located in its designed travel by a pulse count generated from the hall effect sensors. This way, when the memory switch is depressed the module will power these components until the correct preset location is achieved. The module will prevent the seat memory recall function from being initiated, if the transmission gear selector lever is not in the Park position, or if the vehicle is moving. These inputs are monitored over the Controller Area Network (CAN) bus circuit by the MSM.

A memory setting is saved by pressing the “set” button, then pressing either the memory “1” or “2” button within 5 seconds of pressing the “set” button.

A memory setting is recalled by pressing either the memory “1” or “2” button, or by pressing the unlock button on a “linked” Remote Keyless Entry (RKE) transmitter.

For driver safety, memorized settings can not be recalled if the transmission is in a position other than Park or the seat belt is latched.

The MSM performs the following functions:

- Positions the driver power seat (vertical, horizontal, and recliner positions).

- Positions the power adjustable pedals.
- Sends the memory save or recall (#1 or #2) command over the CAN data bus circuit to the other memory system components, radio station pre-sets and power mirror positions.
- Provides for "linking" the key FOBs to memory.
- Provides for the easy entry/exit feature.

When a memory button is pressed (#1 or #2) on the memory switch, the Driver Door Module (DDM) sends a recall message to the MSM. The MSM will then position the memory system components to the preprogrammed location/setting. When the Remote Keyless Entry (RKE) Transmitter button is pressed, depending on which transmitter (#1 or #2), the SKREEM (RKE Receiver) sends the recall request and FOB number (#1 or #2) data message. This RKE transmitter function depends on if the MSM is programmed to trigger the recall (linked FOBs).

A key FOB is "linked" to a memory setting by pressing the "set" button and then pressing either the memory "1" or "2" button within 5 seconds of pressing the set button, then by pressing the "lock" button on the selected key FOB.

The memory system "Easy Entry and /Exit" feature provides the driver with more room to enter or exit the vehicle. When the seat is in a memorized position, it will move rearward 55 millimeters or to the end of its travel, whichever occurs first, when the key is removed from the ignition switch lock cylinder. This is a customer programmable feature of the overhead console. The seat will return to the memory position when the driver turns the vehicle's ignition switch out of the LOCK position.

The memory system "learns" the seat and adjustable pedal motor maximum end positions when the motor reaches the limit of travel in any direction and stalls. Subsequently, movement will stop just short of that position to avoid extra stress on the motors and mechanisms. If the system learned a maximum position as a result of an obstruction, as for instance if a large object was placed on the floor behind the seat, the system can relearn the "true" maximum position through manually operating the power seat after the obstruction is removed.

NOTE: It is normal for the power accessories contained in the memory system to stop at the maximum "learned" position and then continue to the "true" maximum position when the control switch is released and then applied in the same direction a second time.

Certain functions and features of the memory system rely upon resources shared with other electronic modules in the vehicle over the Controller Area Network (CAN) bus. The CAN bus allows the sharing of sensor information. This helps to reduce wire harness complexity, internal controller hardware, and component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities. For diagnosis of these electronic modules or of the CAN bus, the use of a scan tool and the proper diagnostic information are needed.

DIAGNOSIS AND TESTING

MEMORY SEAT MODULE

In order to obtain conclusive testing of the memory system, the Controller Area Network (CAN) data bus, and all of the electronic modules that provide inputs to, or receive outputs from the memory system components must be checked. **Any diagnosis of the memory system/module should begin with, the use of a scan tool and the appropriate diagnostic service information.**

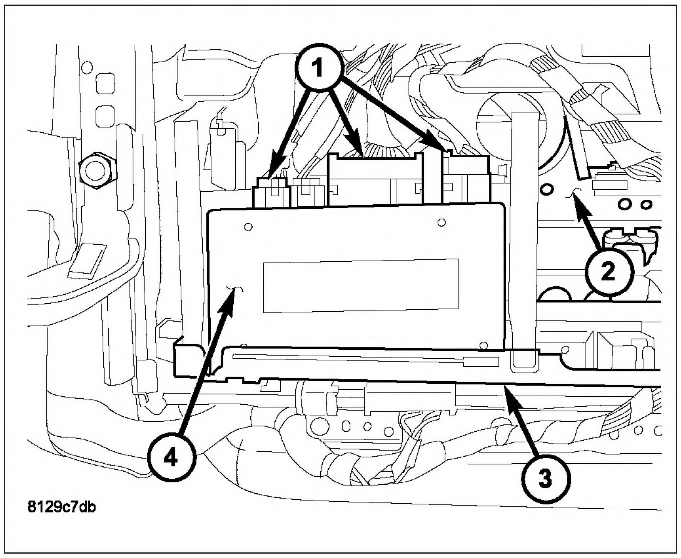
Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

NOTE: Vehicles equipped with the memory/heated seat option utilize a low voltage cut-off feature. This feature turns off the 12v power to the power seat system anytime vehicle voltage is below 11.7v. Be certain to check the vehicle electrical system for proper voltage anytime the power seat system appears inoperative.

Before any testing of the power seat system is attempted, the battery should be fully-charged.

REMOVAL

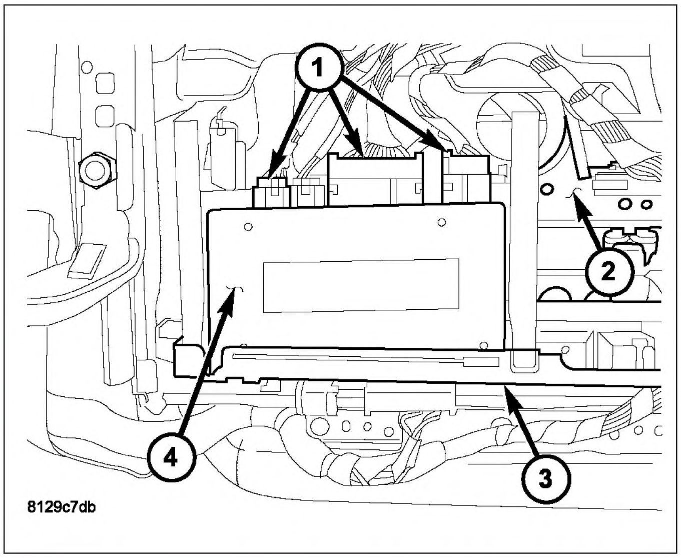
1. Disconnect and isolate the battery negative cable.
2. Remove the driver seat cushion/cover (2) (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - REMOVAL).
3. Pivot the module upward and disconnect the electrical connectors (1).
4. Unsnap the memory seat module (4) from the side brackets.
5. Pull the module rearward to remove it from the front of the seat frame (3).



INSTALLATION

CAUTION: The Memory Seat Module (MSM) mounting tabs can be damaged during module installation. Use care to properly align tabs to prevent binding that could result in tab breakage.

1. Place the module (4) into position making sure the mounting tabs are properly aligned with the front bracket.
2. Push down on the rear of the module (4) snapping the retaining clips into place in the side brackets.
3. Connect the MSM rear harness connectors (1).
4. Connect the MSM front harness connectors.
5. Install the driver seat cushion/cover (2) (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - INSTALLATION).
6. Connect the battery negative cable.
7. Verify system and vehicle operation.

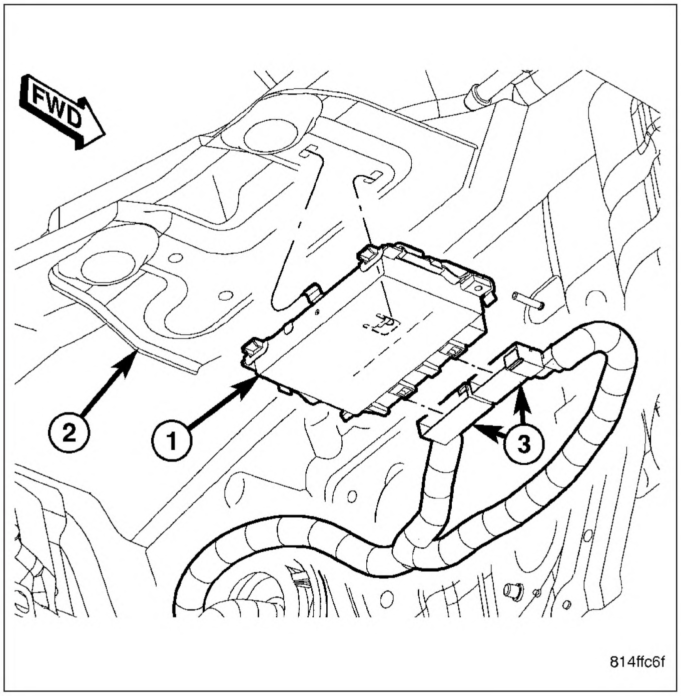


MODULE-TRANSMISSION CONTROL

DESCRIPTION

3.7L VEHICLES

The transmission control module (TCM) (1) is mounted to the dash panel (2), under the dash panel silencer pad, just to the right of the steering column.



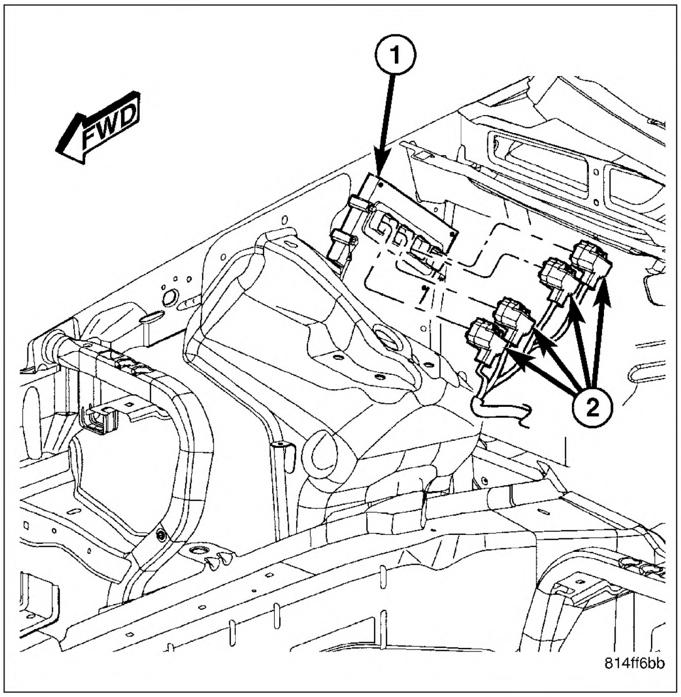
The electronic control system consists of various components providing inputs to the TCM. The TCM monitors transmission sensors, shifter assembly, and bus messages to determine transmission shift strategy. After shift strategies are determined, the TCM controls the actuation of transmission solenoids, which controls the routing of hydraulic fluid within the transmission, by moving a sequence of four valves to make a shift occur.

The system performs its functions based on continuous real-time sensor feedback information. In addition the TCM receives information from the rest of the vehicle over the CAN C bus. The CAN C bus is a high-speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 milliseconds. This means critical information can be shared between the transmission, engine, and ABS controllers. The CAN C bus is a two wire bus with a CAN C Bus (+) circuit and a CAN C Bus (-) circuit. These circuits are twisted pairs in the harness to reduce the potential of radio and noise interference.

The transmission control system automatically adapts to changes in engine performance, vehicle speed, and transmission temperature variations to provide consistent shift quality. The control system ensures that clutch operation during up-shifting and downshifting is more responsive without increased harshness. The TCM activates the solenoid valves and moves valves in the valve body to achieve the necessary gear changes. The required pressure level is calculated from the load condition, engine speed. Vehicle speed (from ABS module) and transmission oil temperature, matched to the torque to be transmitted. Power for the transmission system is supplied through the shifter mechanism (no transmission control relay).

4.7L/5.7L VEHICLES

The Transmission Control Module (TCM) is a sub-module within the Powertrain Control Module (PCM) (1). The PCM is located on the right inner fender.



OPERATION

3.7L VEHICLES

The transmission control module (TCM) determines the current operating conditions of the vehicle and controls the shifting process for shift comfort and driving situations. It receives this operating data from sensors and broadcast messages from other modules.

The TCM uses inputs from several sensors that are directly hardwired to the controller and it uses several indirect inputs that are used to control shifts. This information is used to actuate the proper solenoids in the valve body to achieve the desired gear.

The shift lever sensor assembly (SLSA) has sensors that are monitored by the TCM to calculate shift lever position. The reverse light switch, an integral part of the SLSA, controls the reverse light relay control circuit. The Brake/Transmission Shift Interlock (BTSI) solenoid and the park lockout solenoid (also part of the SLSA) are controlled by the TCM.

The ECM and ABS broadcast messages over the controller area network (CAN C) bus for use by the TCM. The TCM uses this information, with other inputs, to determine the transmission operating conditions.

The TCM:

- determines the momentary operating conditions of the vehicle.
- controls all shift processes.
- considers shift comfort and the driving situation.

The TCM controls the solenoid valves for modulating shift pressures and gear changes. Relative to the torque being transmitted, the required pressures are calculated from load conditions, engine rpm, vehicle speed, and ATF temperature.

The following functions are contained in the TCM:

- Shift Program
- Downshift Safety
- Torque Converter Lock-Up Clutch.
- Adaptation.

This transmission does not have a TCM relay. Power is supplied to the SLSA and the TCM directly from the ignition.

The TCM continuously checks for electrical problems, mechanical problems, and some hydraulic problems. When a problem is sensed, the TCM stores a diagnostic trouble code (DTC). Some of these codes cause the transmission to go into ″Limp-In″ or ″default″ mode. Some DTCs cause permanent Limp-In and others cause temporary Limp-In. The W5J400 defaults in the current gear position if a DTC is detected, then after a key cycle the transmission will go into Limp-in, which is mechanical 2nd gear. Some DTCs may allow the transmission to resume normal operation (recover) if the detected problem goes away. A permanent Limp-In DTC will recover when the key is cycled, but if the same DTC is detected for three key cycles the system will not recover and the DTC must be cleared from the TCM with the DRBIII® scan tool.

TCM SIGNALS

The TCM registers one part of the input signals by direct inputs, the other part by CAN C bus. In addition to the direct control of the actuators, the TCM sends various output signals by CAN C bus to other control modules.

Selector Lever Position

A series of 12 Hall-effect switches in the SLSA inform the TCM of the position of the selector lever.

The TCM monitors the SLSA for all shift lever positions through five position circuits. The SLSA provides a low-current 12-volt signal to the TCM. The TCM compares the on/off signals to programmed combinations to determine the exact position of the shift lever.

ATF Temperature Sensor

The ATF temperature sensor is a positive temperature co-efficient (PTC) thermistor. It measures the temperature of the transmission fluid and is a direct input signal for the TCM. The temperature of the ATF has an influence on the shifttime and resulting shift quality. As the temperature rises, resistance rises, and therefore, the probing voltage is decreasing. Because of its registration, the shifting process can be optimized in all temperature ranges.

The ATF temperature sensor is wired in series with the park/neutral contact. The temperature signal is transmitted to the TCM only when the reed contact of the park/neutral contact is closed because the TCM only reads ATF temperature while in any forward gear, or REVERSE. When the transmission is in PARK or NEUTRAL, the TCM will substitute the engine temperature for the ATF temperature.

Starter Interlock

The TCM monitors a contact switch wired in series with the transmission temperature sensor to determine PARK and NEUTRAL positions. The contact switch is open in PARK and NEUTRAL. The TCM senses transmission temperature as high (switch supply voltage), confirming switch status as open. The TCM then broadcasts a message over CAN bus to confirm switch status. The PCM receives this information and allows operation of the starter circuit.

N2 and N3 Speed Sensors

The N2 and N3 Input Speed Sensors are two Hall-effect speed sensors that are mounted internally in the transmission and are used by the TCM to calculate the transmission's input speed. Since the input speed cannot be measured directly, two of the drive elements are measured. Two input speed sensors were required because both drive elements are not active in all gears.

CAN C Bus Indirect Input Signals

A 2.5-volt bias (operating voltage) is present on the CAN C bus any time the ignition switch is in the RUN position. Both the TCM and the ABS apply this bias. On this vehicle, the CAN C bus is used for module data exchange only. The indirect inputs used on the W5J400 electronic control system are:

- Wheel Speed Sensors.
- Transfer Case Switch Status.
- Brake Switch.
- Engine RPM.
- Engine Temperature.
- Cruise Control Status.
- Gear Limit Request.
- Throttle Position - 0% at idle, 100% at WOT. If open, TCM assumes idle (0% throttle opening).
- Odometer Mileage

- Maximum Effective Torque.
- Engine in Limp-In Mode/Mileage Where DTC Was Set.

SHIFT SCHEDULES

The basic shift schedule includes up and downshifts for all five gears. The TCM adapts the shift program according to driving style, accelerator pedal position and deviation of vehicle speed. Influencing factors are:

- Road Conditions.
- Incline, Decline and Altitude.
- Trailer Operation, Loading.
- Engine Coolant Temperature.
- Cruise Control Operation.
- Sporty Driving Style.
- Low and High ATF Temperature.

Upshift To:	**1-2**	**2-3**	**3-4**	**4-5**
Activated By Solenoid:	1-2/4-5	2-3	3-4	1-2/4-5
Shift Point (at 35.2% of throttle)	17.8 km/h (11.6 mph)	32.1 km/h (19.95 mph)	67.5 km/h (41.94 mph)	73.8 km/h (45.86 mph)

Downshift From:	**5-4**	**4-3**	**3-2**	**2-1**
Activated By Solenoid:	1-2/4-5	3-4	2-3	1-2/4-5
Shift Point	55.7 km/h (34.61 mph)	40.5 km/h (25.17 mph)	24.4 km/h (15.16 mph)	15.1 km/h (9.38 mph)

DOWNSHIFT SAFETY

Selector lever downshifts are not performed if inadmissible high engine rpm is sensed.

ADAPTATION

To equalize tolerances and wear, an automatic adaptation takes place for:

- Shift Time.
- Clutch Filling Time.
- Clutch Filling Pressure.
- Torque Converter Lock-Up Control.

Adaptation data may be stored permanently and to some extent, can be diagnosed.

Driving Style Adaptation

The shift point is modified in steps based on the information from the inputs. The control module looks at inputs such as:

- vehicle acceleration and deceleration (calculated by the TCM).
- rate of change as well as the position of the throttle pedal (fuel injection information from the ECM).
- lateral acceleration (calculated by the TCM).
- gear change frequency (how often the shift occurs).

Based on how aggressive the driver is, the TCM moves up the shift so that the present gear is held a little longer before the next upshift. If the driving style is still aggressive, the shift point is modified up to ten steps. If the driving returns to normal, then the shift point modification also returns to the base position.

This adaptation has no memory. The adaptation to driving style is nothing more than a shift point modification meant to assist an aggressive driver. The shift points are adjusted for the moment and return to base position as soon as the inputs are controlled in a more rational manner.

Shift Time Adaptation (Shift Overlap Adaptation, Working Pressure)

Shift time adaptation is the ability of the TCM to electronically alter the time it takes to go from one gear to another. Shift time is defined as the time it takes to disengage one shift member while another is being applied. Shift time adaptation is divided into four categories:

1. Accelerating upshift, which is an upshift under a load. For shift time adaptation for the 1-2 upshift to take place, the transmission must shift from 1st to 2nd in six different engine load ranges vs. transmission output speed ranges.
2. Decelerating upshift, which is an upshift under no load. This shift is a rolling upshift and is accomplished by letting the vehicle roll into the next gear.
3. Accelerating downshift, which is a downshift under load. This shift can be initiated by the throttle, with or without kickdown. The shift selector can also be used.
4. Decelerating downshift, which is accomplished by coasting down. As the speed of the vehicle decreases, the transmission downshifts.

Fill Pressure Adaptation (Apply Pressure Adaptation, Modulating Pressure)

Fill pressure adaptation is the ability of the TCM to modify the pressure used to engage a shift member. The value of this pressure determines how firm the shift will be.

- If too much pressure is used, the shift will be hard.
- If too little pressure is used, the transmission may slip.

The pressure adjustment is needed to compensate for the tolerances of the shift pressure solenoid valve. The amount the solenoid valve opens as well as how quickly the valve can move, has an effect on the pressure. The return spring for the shift member provides a resistance that must be overcome by the pressure in order for shift member to apply. These return springs have slightly different values. This also affects the application pressure and is compensated for by fill pressure adaptation.

Fill Time Adaptation (Engagement Time Adaptation)

Fill time is the time it takes to fill the piston cavity and take up any clearances for a friction element (clutch or brake). Fill time adaptation is the ability of the TCM to modify the time it takes to fill the shift member by applying a preload pressure.

CONTROLLER MODES OF OPERATION

Permanent Limp-In Mode

When the TCM determines there is a non-recoverable condition present that does not allow proper transmission operation, it places the transmission in permanent Limp-In Mode. When the condition occurs the TCM turns off all solenoids as well as the solenoid supply output circuit. If this occurs while the vehicle is moving, the transmission remains in the current gear position until the ignition is turned off or the shifter is placed in the ″P″ position. When the shifter has been placed in ″P,″ the transmission only allows 2nd gear operation. If this occurs while the vehicle is not moving, the transmission only allows operation in 2nd gear.

Temporary Limp-In Mode

This mode is the same as the permanent Limp-In Mode except if the condition is no longer present, the system resumes normal operation.

Under Voltage Limp-In Mode

When the TCM detects that system voltage has dropped below 8.5 volts, it disables voltage-dependant diagnostics and places the transmission in the temporary Limp-In Mode. When the TCM senses that the voltage has risen above 9.0 volts, normal transmission operation is resumed.

Hardware Error Mode

When the TCM detects a major internal error, the transmission is placed in the permanent Limp-In Mode and ceases all communication over the CAN bus. When the TCM has entered this mode normal transmission operation does not resume until all DTCs are cleared from the TCM.

Loss of Drive

If the TCM detects a situation that has resulted or may result in a catastrophic engine or transmission problem, the transmission is placed in the neutral position. Improper Ratio, Input Sensor Overspeed or Engine Overspeed DTCs cause the loss of drive.

Controlled Limp-in Mode

When a failure does not require the TCM to shut down the solenoid supply, but the failure is severe enough that the TCM places the transmission into a predefined gear, there are several shift performance concerns. For instance, if the transmission is slipping, the controller tries to place the transmission into 3rd gear and maintain 3rd gear for all forward drive conditions.

4.7L/5.7L VEHICLES

The Transmission Control Module (TCM) controls all electronic operations of the transmission. The TCM receives information regarding vehicle operation from both direct and indirect inputs, and selects the operational mode of the transmission. Direct inputs are hardwired to, and used specifically by the TCM. Indirect inputs originate from other components/modules, and are shared with the TCM via the vehicle communication bus.

Some examples of **direct inputs** to the TCM are:

- Battery (B+) voltage
- Ignition “ON” voltage
- Transmission Control Relay (Switched B+)
- Throttle Position Sensor
- Crankshaft Position Sensor
- Transmission Range Sensor
- Pressure Switches
- Transmission Temperature Sensor
- Input Shaft Speed Sensor
- Output Shaft Speed Sensor
- Line Pressure Sensor

Some examples of **indirect inputs** to the TCM are:

- Engine/Body Identification
- Manifold Pressure
- Target Idle
- Torque Reduction Confirmation
- Engine Coolant Temperature
- Ambient/Battery Temperature
- Scan Tool Communication

Based on the information received from these various inputs, the TCM determines the appropriate shift schedule and shift points, depending on the present operating conditions and driver demand. This is possible through the control of various direct and indirect outputs.

Some examples of TCM **direct outputs** are:

- Transmission Control Relay
- Solenoids
- Torque Reduction Request

Some examples of TCM **indirect outputs** are:

- Transmission Temperature (to PCM)
- PRNDL Position (to BCM)

In addition to monitoring inputs and controlling outputs, the TCM has other important responsibilities and functions:

- Storing and maintaining Clutch Volume Indexes (CVI)
- Storing and selecting appropriate Shift Schedules
- System self-diagnostics
- Diagnostic capabilities (with scan tool)

NOTE: If the TCM has been replaced, the "Quick Learn Procedure" must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

BATTERY FEED

A fused, direct battery feed to the TCM is used for continuous power. This battery voltage is necessary to retain adaptive learn values in the TCM's RAM (Random Access Memory). When the battery (B+) is disconnected, this memory is lost. When the battery (B+) is restored, this memory loss is detected by the TCM and a Diagnostic Trouble Code (DTC) is set.

CLUTCH VOLUME INDEXES (CVI)

An important function of the TCM is to monitor Clutch Volume Indexes (CVI). CVIs represent the volume of fluid needed to compress a clutch pack.

The TCM monitors gear ratio changes by monitoring the Input and Output Speed Sensors. The Input, or Turbine Speed Sensor sends an electrical signal to the TCM that represents input shaft rpm. The Output Speed Sensor provides the TCM with output shaft speed information.

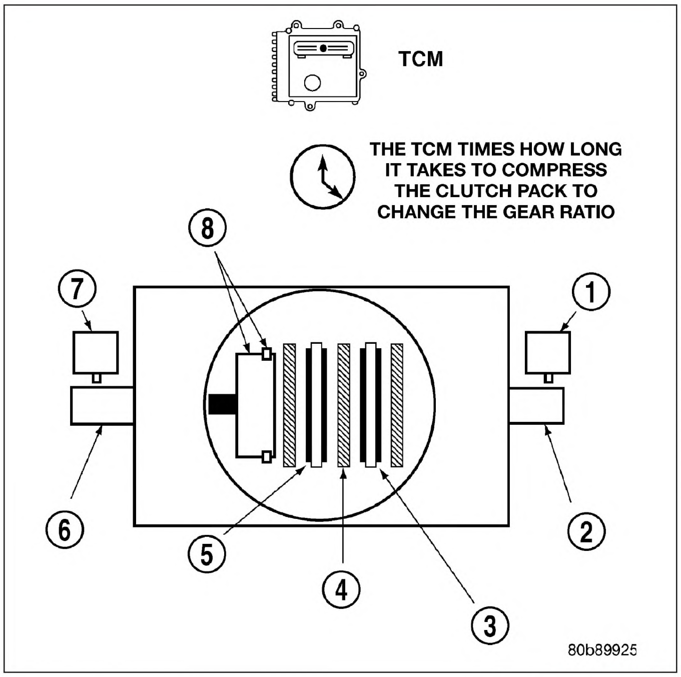
By comparing the two inputs, the TCM can determine transmission gear position. This is important to the CVI calculation because the TCM determines CVIs by monitoring how long it takes for a gear change to occur.

Gear ratios can be determined by using the DRBIII® Scan Tool and reading the Input/Output Speed Sensor values in the "Monitors" display. Gear ratio can be obtained by dividing the Input Speed Sensor value by the Output Speed Sensor value.

The gear ratio changes as clutches are applied and released. By monitoring the length of time it takes for the gear ratio to change following a shift request, the TCM can determine the volume of fluid used to apply or release a friction element.

The volume of transmission fluid needed to apply the friction elements are continuously updated for adaptive controls. As friction material wears, the volume of fluid need to apply the element increases.

Certain mechanical failures within the input clutch assembly can cause inadequate or out-of-range element volumes. Also, defective Input/Output Speed Sensors and wiring can cause these conditions. The following chart identifies the appropriate clutch volumes and when they are monitored/updated:


TCM
THE TCM TIMES HOW LONG IT TAKES TO COMPRESS THE CLUTCH PACK TO CHANGE THE GEAR RATIO
8
7
1
6
5
4
3
2
80b89925

CLUTCH VOLUMES		
Clutch	**When Updated**	**Proper Clutch Volume**
L/R	2-1 or 3-1 downshift	45 to 134
2C	3-2 kickdown shift	25 to 85
OD	2-3 upshift	30 to 100
4C	3-4 upshift	30 to 85
UD	4-3 kickdown shift	25 to 100

SHIFT SCHEDULES

As mentioned earlier, the TCM has programming that allows it to select a variety of shift schedules. Shift schedule selection is dependent on the following:

- Shift lever position
- Throttle position

- Engine load
- Fluid temperature
- Software level

As driving conditions change, the TCM appropriately adjusts the shift schedule. Refer to the following chart to determine the appropriate operation expected, depending on driving conditions.

Schedule	Condition	Expected Operation
Extreme Cold	Oil temperature below -16° F	-Park, Reverse, Neutral and 1st and 3rd gear only in D position, 2nd gear only in Manual 2 or L -No EMCC
Super Cold	Oil temperature between -12° F and 10° F	- Delayed 2-3 upshift - Delayed 3-4 upshift - Early 4-3 coastdown shift - High speed 4-2, 3-2, 2-1 kickdown shifts are prevented -Shifts at high throttle openings willl be early. - No EMCC
Cold	Oil temperature between 10° F and 36° F	-Shift schedule is the same as Super Cold except that the 2-3 upshifts are not delayed.
Warm	Oil temperature between 40° F and 80° F	- Normal operation (upshift, kickdowns, and coastdowns) - No EMCC
Hot	Oil temperature between 80° F and 240° F	- Normal operation (upshift, kickdowns, and coastdowns) - Normal EMCC operation
Overheat	Oil temperature above 240° F or engine coolant temperature above 244° F	- Delayed 2-3 upshift - Delayed 3-4 upshift - 3rd gear FEMCC from 30-48 mph - 3rd gear PEMCC above 35 mph - Above 25 mph the torque converter will not unlock unless the throttle is closed or if a wide open throttle 2nd PEMCC to 1 kickdown is made

STANDARD PROCEDURE

ADAPTATION - 3.7L VEHICLES

The adaptation procedure requires the use of the appropriate scan tool. This program allows the electronic transmission system to re-calibrate itself. This will provide the proper baseline transmission operation. The adaptation procedure should be performed if any of the following procedures are performed:

- Transmission Assembly Replacement
- Transmission Control Module Replacement
- Clutch Plate and/or Seal Replacement
- Electrohydraulic Unit Replacement or Recondition

1. With the scan tool, reset the Transmission adaptives. Resetting the adaptives will set the adaptives to factory settings.

NOTE: Perform the Coast Down Adaptations first. The Transmission Temperature must be greater than 60°C (140°F) and less than 70°C (158°F). Failure to stay within these temperature ranges will void the procedure.

2. Drive the vehicle until the transmission temperature is in the specified range.
3. Perform 4 to 5 coast downs from 5th to 4th gear and then 4th to 3rd gear.

NOTE: For Upshift adaptation, the Transmission temperature must be greater than 60°C (140°F) and less than 100°C (212°F). Failure to stay within these temperature ranges will void this procedure.

4. From a stop, moderately accelerate the vehicle and obtain all forward gear ranges while keeping the Engine RPM below 1800 RPM. Repeat this procedure 4 to 5 times.
5. Obtaining 5th gear may be difficult at 1800 RPM. Allow the transmission to shift into 5th gear at a higher RPM then lower the RPM to 1800 and perform manual shifts between 4th and 5th gears using the shift lever.
6. The TCM will store the adaptives every 10 minutes. After completion of the adaptation procedure make sure the vehicle stays running for at least 10 minutes.
7. It is possible to manually store the adaptives under the 10 minute time frame using the scan tool Store Adaptives procedure.

QUICK LEARN - 4.7L/5.7L VEHICLES

The quick learn procedure requires the use of the scan tool.

This program allows the electronic transmission system to recalibrate itself. This will provide the proper transmission operation. The quick learn procedure should be performed if any of the following procedures are performed:

- Transmission Assembly Replacement
- Transmission Control Module Replacement
- Solenoid Pack Replacement
- Clutch Plate and/or Seal Replacement
- Valve Body Replacement or Recondition

To perform the Quick Learn Procedure, the following conditions must be met:

- The brakes must be applied
- The engine speed must be above 500 rpm
- The throttle angle (TPS) must be less than 3 degrees
- The shift lever position must stay in PARK until prompted to shift to overdrive
- The shift lever position must stay in overdrive after the Shift to Overdrive prompt until the scan tool indicates the procedure is complete
- The calculated oil temperature must be above 60° and below 200°

DRIVE LEARN - 4.7L/5.7L VEHICLES

When a transmission is repaired and a Quick Learn procedure has been performed on the Transmission Control Module (TCM), the following Drive Learn procedure can be performed to fine tune any shifts which are particularly objectionable.

NOTE: It is not necessary to perform the complete Drive Learn procedure every time the TCM is Quick Learned. Perform only the portions which target the objectionable shift.

LEARN A SMOOTH 1ST NEUTRAL TO DRIVE SHIFT

Perform this procedure only if the complaint is for a delayed or harsh shift the first time the transmission is put into gear after the vehicle is allowed to set with the engine not running for at least 10 minutes. Use the following steps to have the TCM learn the 1st N-D UD CVI.

NOTE: The transmission oil temperature must be between 80 - 110°F (27 - 43°C).

1. Start the engine only when the engine and ignition have been off for at least ten (10) minutes.

2. With the vehicle at a stop and the service brake applied, record the 1st N-D UD CVI while performing a Neutral to Drive shift. The 1st N-D UD CVI accounts for air entrapment in the UD clutch that may occur after the engine has been off for a period of time.
3. Repeat Step 1 and Step 2 until the recorded 1st N-D UD CVI value stabilizes.

NOTE: It is important that this procedure be performed when the transmission temperature is between 80 - 110°F (27 - 43°C). If this procedure takes too long to complete fully for the allowed transmission oil temperature, the vehicle may be returned to the customer with an explanation that the shift will improve daily during normal vehicle usage. The TCM also learns at higher oil temperatures, but these values (line pressure correction values) are not available for viewing on the scan tool.

LEARN A SMOOTH NEUTRAL TO DRIVE GARAGE SHIFT

Perform this procedure if the complaint is for a delayed or harsh shift when the transmission is put into gear after the vehicle has had its first shift. Use the following steps to have the TCM learn the Norm N-D UD CVI.

NOTE: The transmission oil temperature must be between 80 - 110°F (27 - 43°C) to learn the UD CVI. Additional learning occurs at temperatures as low as 0°F and as high as 200°F. This procedure may be performed at any temperature that experiences poor shift quality. Although the UD CVI may not change, shift quality should improve.

1. Start the vehicle engine and shift to drive.
2. Move the vehicle forward to a speed of at least 16 km/h (10 MPH) and come to a stop. This ensures no air is present in the UD hydraulic circuit.
3. Perform repeated N-D shifts at a stop while pausing in Neutral for at least 2-3 seconds and monitor Norm N-D UD CVI volume until the value stabilizes. The value will change during the N-D shift. This is normal since the UD value is different for the N-D shift then the normal value shown which is used for 4-3 coastdown and kickdowns. Perform repeated shifts in this temperature range until the Norm N-D UD CVI value stabilizes and the N-D shifts become smooth.

LEARN THE 1ST 2-3 SHIFT AFTER A RESTART OR SHIFT TO REVERSE

Use the following steps to have the TCM learn the 1st 2-3 shift OD CVI.

NOTE: The transmission oil temperature must be above 80°F (27°C).

1. With the vehicle engine running, select reverse gear for over 2 seconds.
2. Shift the transmission to Drive and accelerate the vehicle from a stop at a steady 15 degree throttle opening and perform a 2-3 shift while noting the 1st 2-3 OD CVI.
3. Repeat Step 1 and Step 2 until the 1st 2-3 upshift becomes smooth and the 1st 2-3 OD CVI stabilizes.

LEARN A SMOOTH 2-3 AND 3-4 UPSHIFT

NOTE: The transmission oil temperature must be above 110°F (43°C).

Use the following steps to have the TCM learn the OD and 4C CVI's.

1. Accelerate the vehicle from a stop at a steady 15 degree throttle opening and perform multiple 1-2, 2-3, and 3-4 upshifts. The 2nd 2-3 shift following a restart or shift to reverse will be shown during the shift as a value between the 1st 2-3 OD CVI and the normal OD CVI. Updates to the normal OD CVI will occur after the 2nd shift into 3rd gear, following a restart or shift to reverse.
2. Repeat Step 1 until the 2-3 and 3-4 shifts become smooth and the OD and 4C CVI become stable.

LEARN A SMOOTH 4-3 COASTDOWN AND PART THROTTLE 4-3 KICKDOWN

NOTE: The transmission oil temperature must be above 110°F (43°C).

Use the following steps to have the TCM learn the UD shift volume.

1. At a vehicle speed between 64-97 km/h (40-60 MPH), perform repeated 4-3 kickdown shifts.

2. Repeat Step 1 until the UD volume becomes somewhat stable and the shift becomes smooth.

LEARN A SMOOTH 1-2 UPSHIFT AND 3-2 KICKDOWN

Use the following steps to have the TCM learn the 2C shift volume.

NOTE: The transmission oil temperature must be above 110°F (43°C).

1. With a vehicle speed below 48 km/h (30 MPH) and the transmission in 3rd gear, perform multiple 3-2 kickdowns.
2. Repeat Step 1 until the 3-2 kickdowns become smooth and the 2C CVI becomes stable.

LEARN A SMOOTH MANUAL 2-1 PULLDOWN SHIFT AS WELL AS A NEUTRAL TO REVERSE SHIFT

NOTE: The transmission oil temperature must be above 110°F (43°C).

Use the following steps to have the TCM learn the LR volume.

1. With the vehicle speed around 40-48 km/h (25-30 MPH) in Manual 2nd, perform manual pulldowns to Low or 1st gear at closed throttle.
2. Repeat Step 1 until the LR CVI becomes stable and the manual 2-1 becomes smooth.

LEARN A SMOOTH NEUTRAL TO REVERSE SHIFT

NOTE: The transmission oil temperature must be above 110°F (43°C).

1. With the vehicle at a stop, perform Neutral to Reverse shifts until the shift is smooth. An unlearned Neutral to Reverse shift may be harsh or exhibit a double bump.
2. If any of the shifts are still not smooth after the clutch volume stabilizes, an internal transmission problem may be present.

LEARN A SMOOTH 4-5 UPSHIFT

NOTE: The transmission oil temperature must be above 110°F (43°C).

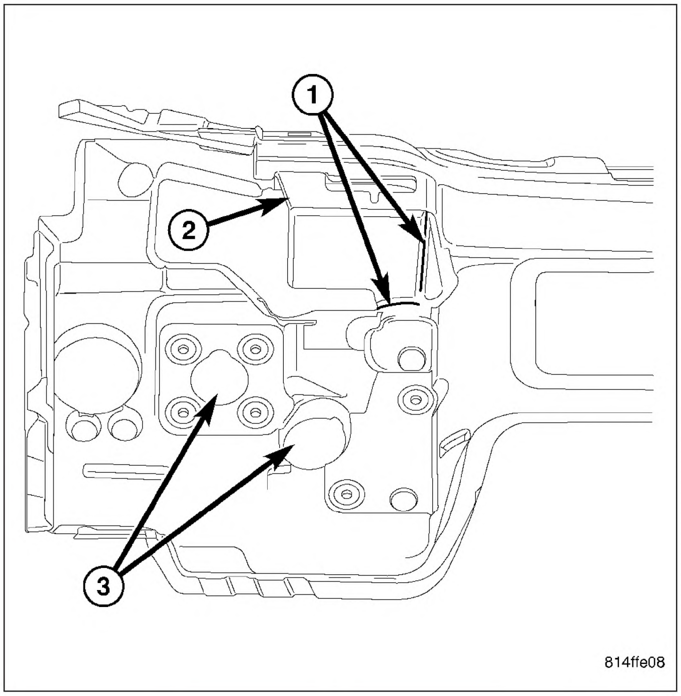
Use the following steps to have the TCM learn the Alt 2C CVI.

1. Accelerate the vehicle through 88 km/h (55mph) at a steady 10-15 degree throttle opening and perform multiple 4-5 upshifts.
2. Repeat Step 1 until the 4-5 shift become smooth and theAlt 2C CVI become stable. There is a separate 2C volume used and learned for 4-5 shifts, 2CA. It is independent of the 2C CVI learned on 3-2 kickdowns.

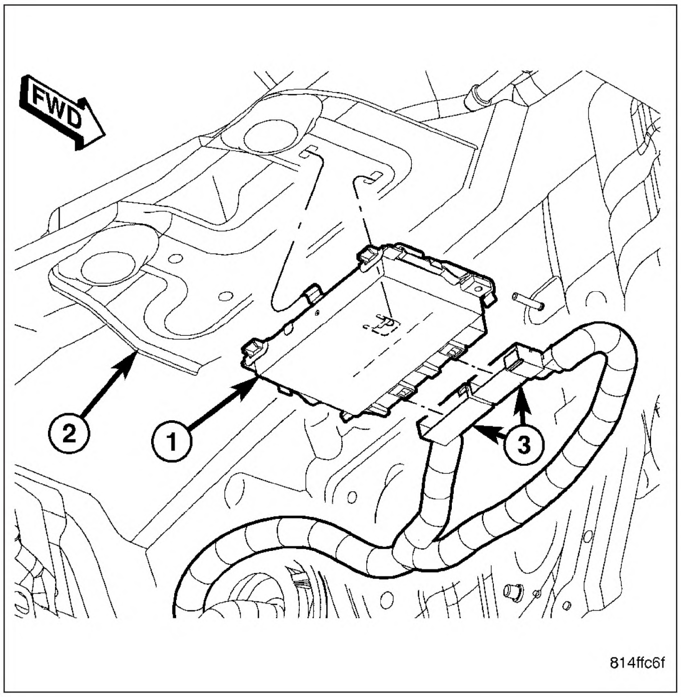
REMOVAL

3.7L VEHICLES

1. Locate the transmission control module on the dash panel, under the dash panel silencer pad (2), just to the right of the steering column.
2. Locate the cut lines (1) marked on the silencer pad. Cut the pad along these lines.



3. Remove the transmission control module from the dash panel or bracket.
4. Disconnect the wiring harness connectors (3) from the module.
5. Remove the module from the vehicle.



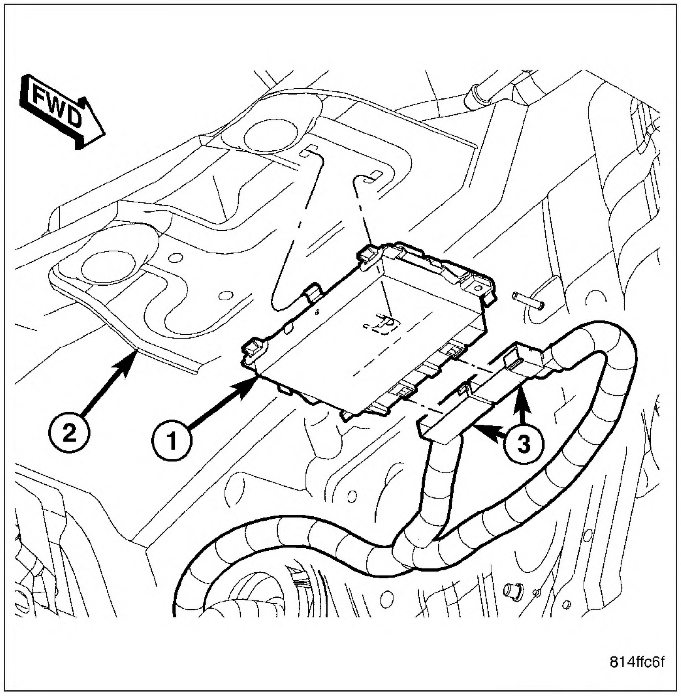
4.7L/5.7L VEHICLES

The transmission control module is part of the powertrain control module. For the removal procedure, Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - REMOVAL.

INSTALLATION

3.7L VEHICLES

1. Connect the wiring connectors (3) to the transmission control module (1).
2. Install the module to the dash panel (2) or the mounting bracket.
3. Fold the dash panel silencer pad back over the module and retain the pad in place with suitable adhesive tape.



4.7L/5.7L VEHICLES

The transmission control module is part of the powertrain control module. For the installation procedure, Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - INSTALLATION.

ENGINE SYSTEMS

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BATTERY SYSTEM - SERVICE INFORMATION

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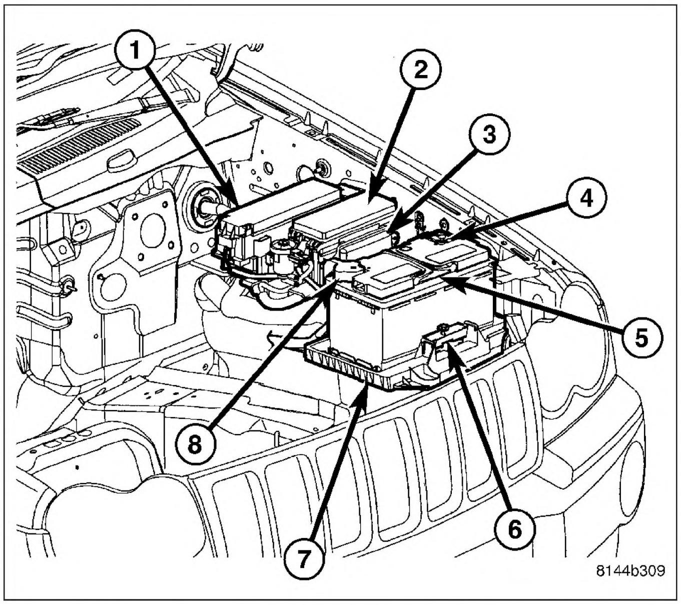
BATTERY SYSTEM - SERVICE INFORMATION

DESCRIPTION

This vehicle is equipped with a single 12-volt battery. All of the components of the battery system are located within the engine compartment. The battery system for this vehicle covers the following related components:

- **Battery (5)** - The storage battery provides a reliable means of storing a renewable source of electrical energy within the vehicle.
- **Positive Battery cable (8)** - The positive battery cable connects the battery positive terminal post to the vehicle electrical system, starter and alternator.
- **Negative Battery Cable (4)** - The negative battery cable connects the battery negative terminal post to the vehicle electrical system through body, chassis and engine grounding points.
- **Battery Holddown (6)** - The battery holddown hardware secures the battery in the battery tray in the engine compartment.
- **Battery Tray (7)** - The battery tray provides a secure mounting location in the vehicle for the battery and an anchor point for the battery holddown hardware.



For battery system maintenance schedules (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION). (Refer to LUBRICATION & MAINTENANCE/JUMP STARTING - STANDARD PROCEDURE) for the proper jump starting procedure. The battery must be fully-charged before any battery system diagnosis or testing procedures can be performed.

OPERATION

The battery system is designed to provide a safe, efficient, reliable and mobile means of delivering and storing electrical energy. This electrical energy is required to operate the engine starting system, as well as many of the other vehicle accessory systems for limited durations while the engine and/or the charging system are not operating. The battery system is also designed to provide a reserve of electrical energy to supplement the charging system for short durations while the engine is running and the electrical current demands of the vehicle exceed the output of the charging system. In addition to delivering, and storing electrical energy for the vehicle, the battery system serves as a capacitor and voltage stabilizer for the vehicle electrical system. It absorbs most abnormal or transient voltages caused by the switching of any of the electrical components or circuits in the vehicle.

DIAGNOSIS AND TESTING - BATTERY SYSTEM

The battery, starting, and charging systems in the vehicle operate with one another and must be tested as a complete system. In order for the engine to start and the battery to maintain its charge properly, all of the components that are used in these systems must perform within specifications. It is important that the battery, starting, and charging systems be thoroughly tested and inspected any time a battery needs to be charged or replaced. The cause of abnormal battery discharge, overcharging or early battery failure must be diagnosed and corrected before a battery is replaced and before a vehicle is returned to service. The service information for these systems has been separated within this service manual to make it easier to locate the specific information you are seeking. However, when attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used for the battery, starting, and charging systems include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, a volt/ohmmeter, a battery charger, a carbon pile rheostat (load tester) and a 12-volt test lamp may be required. All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for any failure it detects. (Refer to 8 - ELECTRICAL/CHARGING - DIAGNOSIS AND TESTING) for the proper charging system on-board diagnostic test procedures.

MICRO 420 ELECTRICAL SYSTEM TESTER

The Micro 420 automotive battery system tester is designed to help diagnose the cause of a defective battery. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER) for directions on using the Micro 420 battery tester.

BATTERY SYSTEM DIAGNOSIS

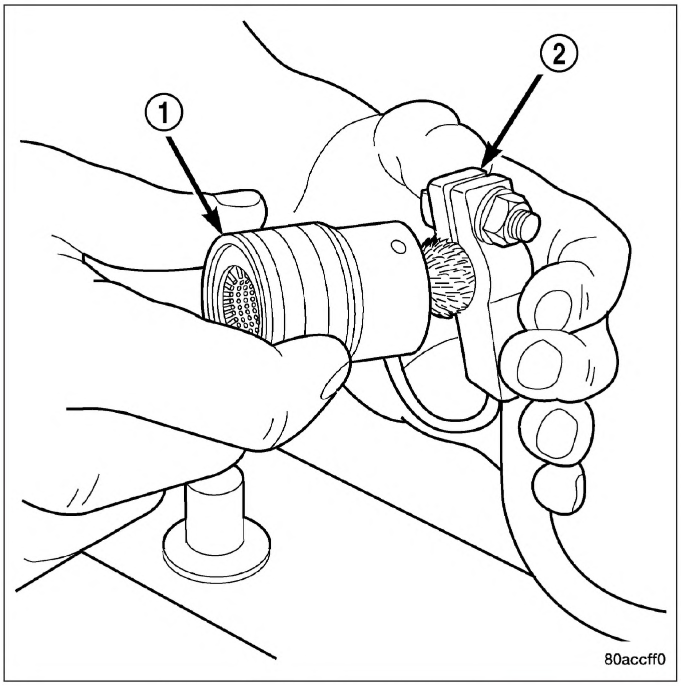
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY SEEMS WEAK OR DEAD WHEN ATTEMPTING TO START THE ENGINE.	1. The electrical system ignition-off draw is excessive.	1. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - IGNITION-OFF DRAW TEST) for the proper test procedures. Repair the excessive ignition-off draw, as required.
	2. The charging system is inoperative.	2. Determine if the charging system is performing to specifications, (Refer to 8 - ELECTRICAL/ CHARGING - DIAGNOSIS AND TESTING). Repair the inoperative charging system, as required.
	3. The battery is discharged.	3. Determine the battery state-of-charge using the Micro 420 battery tester, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER). Charge the battery as required.
	4. The battery terminal connections are loose or corroded.	4. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - DIAGNOSIS AND TESTING). Clean and tighten the battery terminal connections, as required.
	5. The battery has an incorrect size or rating for this vehicle.	5. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - SPECIFICATIONS) for the proper size and rating. Replace an incorrect battery, as required.
	6. The battery is inoperative.	6. Determine the battery cranking capacity using the Micro 420 battery tester, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER). Replace the inoperative battery, as required.
	7. The starting system is inoperative.	7. Determine if the starting system is performing to specifications, (Refer to 8 - ELECTRICAL/ STARTING - DIAGNOSIS AND TESTING). Repair the inoperative starting system, as required.
	8. The battery is physically damaged.	8. Inspect the battery for loose terminal posts or a cracked and leaking case. Replace the damaged battery, as required.

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY STATE OF CHARGE CANNOT BE MAINTAINED.	1. The battery has an incorrect size or rating for this vehicle.	1. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - SPECIFICATIONS) for the proper size and rating. Replace an incorrect battery, as required.
	2. The battery terminal connections are loose or corroded.	2. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - DIAGNOSIS AND TESTING). Clean and tighten the battery terminal connections, as required.
	3. The electrical system ignition-off draw is excessive.	3. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - IGNITION-OFF DRAW TEST) for the proper test procedures. Repair the inoperative electrical system, as required.
	4. The battery is inoperative.	4. Test the battery using the Micro 420 battery tester, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER). Replace the inoperative battery, as required.
	5. The starting system is inoperative.	5. Determine if the starting system is performing to specifications, (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING). Repair the inoperative starting system, as required.
	6. The charging system is inoperative.	6. Determine if the charging system is performing to specifications, (Refer to 8 - ELECTRICAL/CHARGING - DIAGNOSIS AND TESTING). Repair the inoperative charging system, as required.
	7. Electrical loads exceed the output of the charging system.	7. Inspect the vehicle for aftermarket electrical equipment which might cause excessive electrical loads.
	8. Slow driving or prolonged idling with high-amperage draw systems in use.	8. Advise the vehicle operator, as required.
THE BATTERY WILL NOT ACCEPT A CHARGE.	1. The battery is inoperative.	1. Test the battery using the Micro 420 battery tester, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER). Replace the inoperative battery, as required.

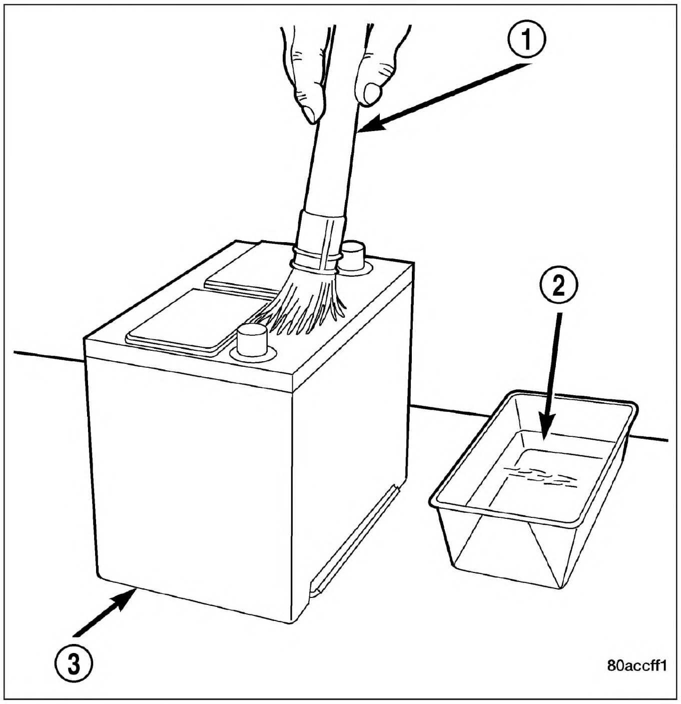
CLEANING

The following information details the recommended cleaning procedures for the battery and related components. In addition to the maintenance schedules found in this service manual, (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION) it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

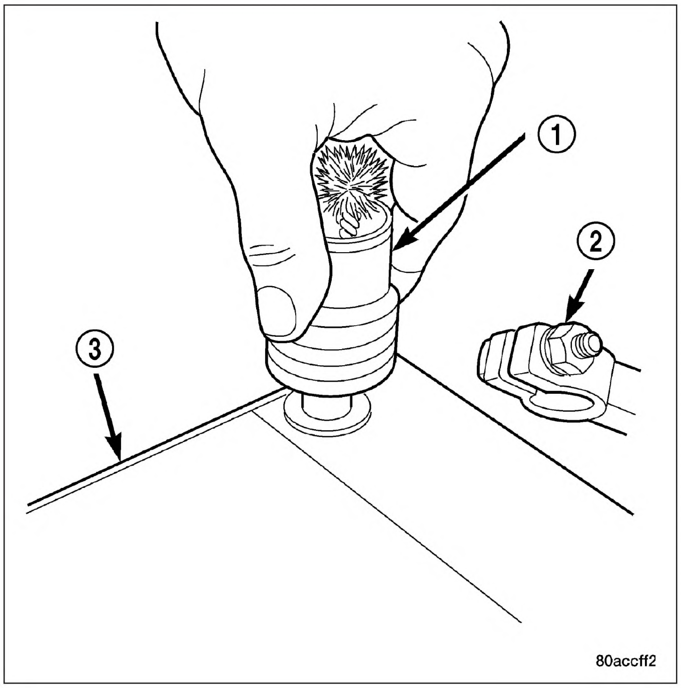
1. Clean the battery cable terminal clamps (2) of all corrosion. Remove any corrosion using a wire brush or a post and terminal cleaning tool (1), and a sodium bicarbonate (baking soda) and warm water cleaning solution.



2. Clean the battery tray and battery hold down hardware of all corrosion. Remove any corrosion using a wire brush and a sodium bicarbonate (baking soda) and warm water cleaning solution (2). Paint any exposed bare metal.
3. If the removed battery is to be reinstalled, clean the outside of the battery case (3) and the top cover with a sodium bicarbonate (baking soda) and warm water cleaning solution (2) using a stiff bristle parts cleaning brush (1) to remove any acid film. Rinse the battery with clean water. Ensure that the cleaning solution does not enter the battery cells through the vent holes. If the battery is being replaced, confirm that the replacement battery is the correct size and has the correct ratings for the vehicle.
4. Clean the battery thermal guard with a sodium bicarbonate (baking soda) and warm water cleaning solution (2) using a stiff bristle parts cleaning brush (1) to remove any acid film.



5. Clean any corrosion from the battery terminal posts with a wire brush or a post and terminal cleaner (1) and a sodium bicarbonate (baking soda) and warm water cleaning solution.



INSPECTION

The following information details the recommended inspection procedures for the battery and related components. In addition to the maintenance schedules, (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION), it is recommended that these procedures be performed any time the battery or related components are removed for vehicle service.

1. Inspect the battery cable terminal clamps for damage. Replace any battery cable that has a damaged or deformed terminal clamp.
2. Inspect the battery tray and battery hold down hardware for damage. Replace any damaged parts.
3. Slide the thermal guard off of the battery case, if equipped. Inspect the battery case for cracks or other damage that could result in electrolyte leaks. Also, check the battery terminal posts for looseness. Batteries with damaged cases or loose terminal posts must be replaced.
4. Inspect the battery thermal guard for tears, cracks, deformation or other damage. Replace any battery thermal guard that has been damaged.
5. Inspect the battery built-in test indicator sight glass (if equipped) for an indication of the battery condition. If the battery is discharged, charge as required, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - BATTERY CHARGING).

SPECIFICATIONS

The battery Group Size number, the Cold Cranking Amperage (CCA) rating, and the Reserve Capacity (RC) rating or Ampere-Hours (AH) rating can be found on the original equipment battery label. Be certain that a replacement battery has the correct Group Size number, as well as CCA, and RC or AH ratings that equal or exceed the original equipment specification for the vehicle being serviced. Battery sizes and ratings are discussed in more detail below.

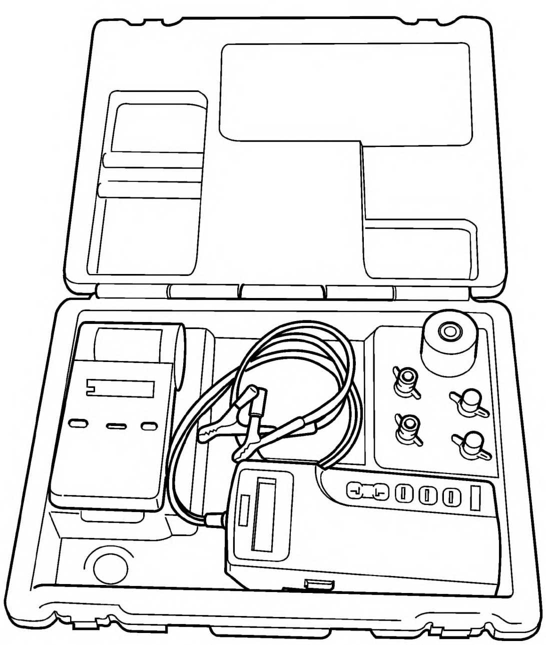
- **Group Size** - The outside dimensions and terminal placement of the battery conform to standards established by the Battery Council International (BCI). Each battery is assigned a BCI Group Size number to help identify a correctly-sized replacement.
- **Cold Cranking Amperage** - The Cold Cranking Amperage (CCA) rating specifies how much current (in amperes) the battery can deliver for thirty seconds at -18° C (0° F). Terminal voltage must not fall below 7.2 volts during or after the thirty second discharge period. The CCA required is generally higher as engine displacement increases, depending also upon the starter current draw requirements.
- **Reserve Capacity** - The Reserve Capacity (RC) rating specifies the time (in minutes) it takes for battery terminal voltage to fall below 10.5 volts, at a discharge rate of 25 amperes. RC is determined with the battery fully-charged at 26.7° C (80° F). This rating estimates how long the battery might last after a charging system failure, under minimum electrical load.

- **Ampere-Hours** - The Ampere-Hours (AH) rating specifies the current (in amperes) that a battery can deliver steadily for twenty hours, with the voltage in the battery not falling below 10.5 volts. This rating is also sometimes identified as the twenty-hour discharge rating.

BATTERY CLASSIFICATIONS & RATINGS					
Part Number	BCI Group Size Classification	Cold Cranking Amperage	Reserve Capacity	Ampere - Hours	Load Test Amperage
04608719AC	H7	730	140 Minutes	72	250

SPECIAL TOOLS

BATTERY SYSTEM SPECIAL TOOLS

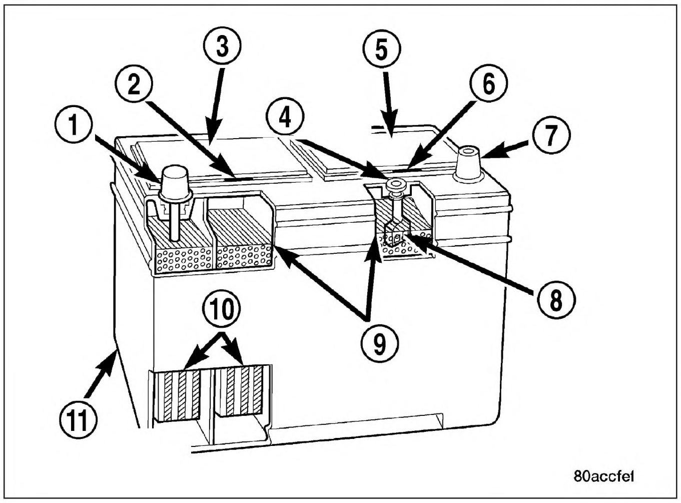


BATTERY

DESCRIPTION

This vehicle is equipped with a single, 12-volt, maintenance-free battery located in the engine compartment. The battery is comprised of the following components:

- Positive Post (1)
- Vent (2)
- Cell Cap (3)
- Vent (4)
- Cell Cap (5)
- Vent (6)
- Negative Post (7)
- Indicator Eye (8) if equipped
- Electrolyte Level (9)
- Plate Groups (10)
- Maintenance Free Battery assembly (11)



This battery is designed to provide a safe, efficient and reliable means of storing electrical energy in a chemical form. This means of energy storage allows the battery to produce the electrical energy required to operate the engine starting system, as well as to operate many of the other vehicle accessory systems for limited durations while the engine and/or the charging system are not operating. The battery is made up of six individual cells that are connected in series. Each cell contains positively charged plate groups that are connected with lead straps to the positive terminal post, and negatively charged plate groups that are connected with lead straps to the negative terminal post. Each plate consists of a stiff mesh framework or grid coated with lead dioxide (positive plate) or sponge lead (negative plate). Insulators or plate separators made of a non-conductive material are inserted between the positive and negative plates to prevent them from contacting or shorting against one another. These dissimilar metal plates are submerged in a sulfuric acid and water solution called an electrolyte.

The battery Group Size number, the Cold Cranking Amperage (CCA) rating, and the Reserve Capacity (RC) rating or Ampere-Hours (AH) rating can be found on the original equipment battery label. Be certain that a replacement battery has the correct Group Size number, as well as CCA, and RC or AH ratings that equal or exceed the original equipment specification for the vehicle being serviced. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - SPECIFICATIONS) for the proper factory-installed battery specifications.

OPERATION

The battery is designed to store electrical energy in a chemical form. When an electrical load is applied to the terminals of the battery, an electrochemical reaction occurs. This reaction causes the battery to discharge electrical current from its terminals. As the battery discharges, a gradual chemical change takes place within each cell. The sulfuric acid in the electrolyte combines with the plate materials, causing both plates to slowly change to lead sulfate. At the same time, oxygen from the positive plate material combines with hydrogen from the sulfuric acid, causing the electrolyte to become mainly water. The chemical changes within the battery are caused by the movement of excess or free electrons between the positive and negative plate groups. This movement of electrons produces a flow of electrical current through the load device attached to the battery terminals.

As the plate materials become more similar chemically, and the electrolyte becomes less acid, the voltage potential of each cell is reduced. However, by charging the battery with a voltage higher than that of the battery itself, the battery discharging process is reversed. Charging the battery gradually changes the sulfated lead plates back into sponge lead and lead dioxide, and the water back into sulfuric acid. This action restores the difference in the electron charges deposited on the plates, and the voltage potential of the battery cells. For a battery to remain useful, it must be able to produce high-amperage current over an extended period. A battery must also be able to accept a charge, so that its voltage potential may be restored.

The battery is vented to release excess hydrogen gas that is created when the battery is being charged or discharged. However, even with these vents, hydrogen gas can collect in or around the battery. If hydrogen gas is exposed to flame or sparks, it may ignite. If the electrolyte level is low, the battery may arc internally and explode. If the battery cell caps cannot be removed, the battery must be replaced if the electrolyte level becomes low.

DIAGNOSIS AND TESTING

BATTERY

The battery must be completely charged and the terminals should be properly cleaned and inspected before diagnostic procedures are performed. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING) and (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - INSPECTION) for the proper battery cleaning and inspection procedures. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - BATTERY CHARGING) for the proper battery charging procedures.

MICRO 420 BATTERY TESTER

The Micro 420 automotive battery tester is designed to help diagnose the cause of an inoperative battery. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER) for instructions on the use of the Micro 420 battery tester.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING OR LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

A battery that will not accept a charge is inoperative, and must be replaced. Further testing is not required. A fully-charged battery must be load tested to determine its cranking capacity. A battery that is fully-charged, but does not pass the load test, is inoperative and must be replaced.

NOTE: Completely discharged batteries may take several hours to accept a charge. Refer to Standard Procedures for the proper battery charging procedures.

STANDARD PROCEDURE

BATTERY CHARGING

Battery charging is the means by which the battery can be restored to its full voltage potential. A battery is fully-charged when:

- Micro 420 electrical system tester indicates battery is OK.
- All of the battery cells are gassing freely during battery charging.
- Open-circuit voltage of the battery is 12.65 volts or above.

WARNING: NEVER EXCEED TWENTY AMPERES WHEN CHARGING A COLD (-1° C [30° F] OR LOWER) BATTERY. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING, LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

WARNING: IF THE BATTERY IS EQUIPPED WITH REMOVABLE CELL CAPS, BE CERTAIN THAT EACH OF THE CELL CAPS IS IN PLACE AND TIGHT BEFORE THE BATTERY IS RETURNED TO SERVICE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT FROM LOOSE OR MISSING CELL CAPS.

CAUTION: Always disconnect and isolate the battery negative cable before charging a battery. Do not exceed sixteen volts while charging a battery. Damage to the vehicle electrical system components may result.

CAUTION: Battery electrolyte will bubble inside the battery case during normal battery charging. Electrolyte boiling or being discharged from the battery vents indicates a battery overcharging condition. Immediately reduce the charging rate or turn off the charger to evaluate the battery condition. Damage to the battery may result from overcharging.

CAUTION: The battery should not be hot to the touch. If the battery feels hot to the touch, turn off the charger and let the battery cool before continuing the charging operation. Damage to the battery may result.

After the battery has been charged to 12.65 volts or greater, perform a load test to determine the battery cranking capacity, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER) for the proper battery load test procedures. If the battery will endure a load test, return the battery to service. If the battery will not endure a load test, it is inoperative and must be replaced.

Clean and inspect the battery hold downs, tray, terminals, posts, and top before completing battery service. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING) and (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - INSPECTION) for the proper battery system cleaning and inspection procedures.

CHARGING A COMPLETELY DISCHARGED BATTERY

The following procedure should be used to recharge a completely discharged battery. Unless this procedure is properly followed, a good battery may be needlessly replaced.

1. Measure the voltage at the battery posts with a voltmeter, accurate to 1/10 (0.10) volt. If the reading is below ten volts, the battery charging current will be low. It could take some time before the battery accepts a current greater than a few milliamperes. Such low current may not be detectable on the ammeters built into many battery chargers.
2. Disconnect and isolate the battery negative cable. Connect the battery charger leads. Some battery chargers are equipped with polarity-sensing circuitry. This circuitry protects the battery charger and the battery from being damaged if they are improperly connected. If the battery state-of-charge is too low for the polarity-sensing circuitry to detect, the battery charger will not operate. This makes it appear that the battery will not accept charging current. See the instructions provided by the manufacturer of the battery charger for details on how to bypass the polarity-sensing circuitry.
3. Battery chargers vary in the amount of voltage and current they provide. The amount of time required for a battery to accept measurable charging current at various voltages is shown in the Charge Rate Table. If the charging current is still not measurable at the end of the charging time, the battery is inoperative and must be replaced. If the charging current is measurable during the charging time, the battery may be good and the charging should be completed in the normal manner.

CHARGE RATE TABLE

Voltage	Hours
16.0 volts maximum	up to 4 hours
14.0 to 15.9 volts	up to 8 hours
13.9 volts or less	up to 16 hours

CHARGING TIME REQUIRED

The time required to charge a battery will vary, depending upon the following factors:

- **Battery Capacity** - A completely discharged heavy-duty battery requires twice the charging time of a small capacity battery.
- **Temperature** - A longer time will be needed to charge a battery at -18° C (0° F) than at 27° C (80° F). When a fast battery charger is connected to a cold battery, the current accepted by the battery will be very low at first. As the battery warms, it will accept a higher charging current rate (amperage).
- **Charger Capacity** - A battery charger that supplies only five amperes will require a longer charging time. A battery charger that supplies twenty amperes or more will require a shorter charging time.
- **State-Of-Charge** - A completely discharged battery requires more charging time than a partially discharged battery. Electrolyte is nearly pure water in a completely discharged battery. At first, the charging current (amperage) will be low. As the battery charges, the specific gravity of the electrolyte will gradually rise.

The Battery Charging Time Table gives an indication of the time required to charge a typical battery at room temperature based upon the battery state-of-charge and the charger capacity.

BATTERY CHARGING TIME TABLE

Charging Amperage	5 Amps	10 Amps	20 Amps
Open Circuit Voltage	Hours Charging @ 21° C (70° F)		
12.25 to 12.49	6 hours	3 hours	1.5 hours
12.00 to 12.24	10 hours	5 hours	2.5 hours
10.00 to 11.99	14 hours	7 hours	3.5 hours
Below 10.00	18 hours	9 hours	4.5 hours

IGNITION-OFF DRAW TEST

The term Ignition-Off Draw (IOD) identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. A normal vehicle electrical system will draw from five to thirty-five milliamperes (0.005 to 0.035 ampere) with the ignition switch in the Off position, and all non-ignition controlled circuits in proper working order. Up to thirty-five milliamperes are needed to enable the memory functions for the Powertrain Control Module (PCM), digital clock, electronically tuned radio, and other modules which may vary with the vehicle equipment.

A vehicle that has not been operated for approximately twenty days, may discharge the battery to an inadequate level. When a vehicle will not be used for twenty days or more (stored), remove the IOD fuse from the Junction Block (JB). This will reduce battery discharging.

Excessive IOD can be caused by:

- Electrical items left on.
- Inoperative or improperly adjusted switches.
- Inoperative or shorted electronic modules and components.
- An internally shorted generator.
- Intermittent shorts in the wiring.

If the IOD is over thirty-five milliamperes, the problem must be found and corrected before replacing a battery. In most cases, the battery can be charged and returned to service after the excessive IOD condition has been corrected.

1. Verify that all electrical accessories are off. Turn off all lamps, remove the ignition key, and close all doors. If the vehicle is equipped with an illuminated entry system or an electronically tuned radio, allow the electronic timer function of these systems to automatically shut off (time out). This may take up to three minutes. See the Electronic Module Ignition-Off Draw Table for more information.

ELECTRONIC MODULE IGNITION-OFF DRAW (IOD) TABLE			
Module	Time Out? (If Yes, Interval And Wake-Up Input)	IOD	IOD After Time Out
Radio	No	1 to 3 milliamperes	N/A
Audio Power Amplifier	No	up to 1 milliampere	N/A
Central Timer Module (CTM)	No	4.75 milliamperes (max.)	N/A
Powertrain Control Module (PCM)	No	0.95 milliampere	N/A
ElectroMechanical Instrument Cluster (EMIC)	No	0.44 milliampere	N/A
Combination Flasher	No	0.08 milliampere	N/A

2. Determine that the underhood lamp is operating properly, then disconnect the lamp wire harness connector or remove the lamp bulb.
3. Disconnect the battery negative cable.
4. Set an electronic digital multi-meter to its highest amperage scale. Connect the multi-meter between the disconnected battery negative cable terminal clamp and the battery negative terminal post. Make sure that the doors remain closed so that the illuminated entry system is not activated. The multi-meter amperage reading may remain high for up to three minutes, or may not give any reading at all while set in the highest amperage scale, depending upon the electrical equipment in the vehicle. The multi-meter leads must be securely clamped to the battery negative cable terminal clamp and the battery negative terminal post. If continuity between the battery negative terminal post and the negative cable terminal clamp is lost during any part of the IOD test, the electronic timer function will be activated and all of the tests will have to be repeated.
5. After about three minutes, the high-amperage IOD reading on the multi-meter should become very low or nonexistent, depending upon the electrical equipment in the vehicle. If the amperage reading remains high, remove and replace each fuse or circuit breaker in the Power Distribution Center (PDC) and then in the Junction Block (JB), one at a time until the amperage reading becomes very low, or nonexistent. Refer to the appropriate wiring information for complete PDC and JB fuse, circuit breaker, and circuit identification. This will isolate each circuit and identify the circuit that is the source of the high-amperage IOD. If the amperage reading remains high after removing and replacing each fuse and circuit breaker, disconnect the wire harness from the generator. If the amperage reading now becomes very low or nonexistent, diagnose and repair the Charging System as necessary. After the high-amperage IOD has been corrected, switch the multi-meter to progressively lower amperage scales and, if necessary, repeat the fuse and circuit breaker remove-and-replace process to identify and correct all sources of excessive IOD. It is now safe to select the lowest milliampere scale of the multi-meter to check the low-amperage IOD.

CAUTION: Do not open any doors, or turn on any electrical accessories with the lowest milliampere scale selected, or the multi-meter may be damaged.

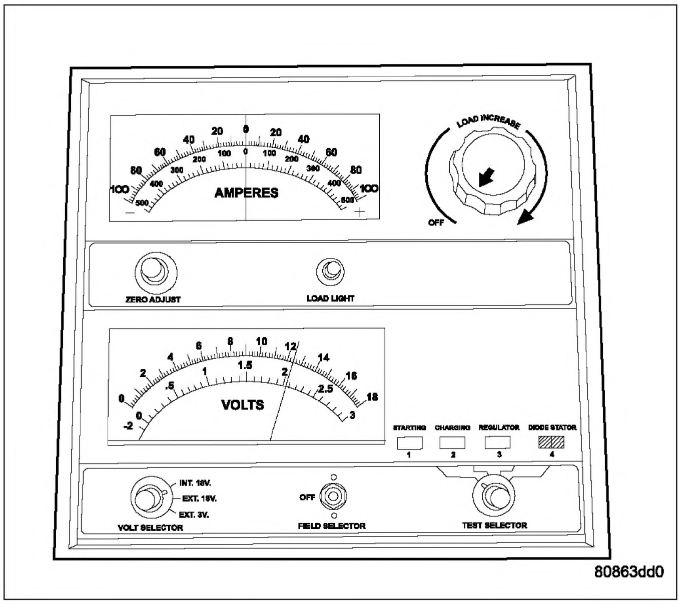
6. Observe the multi-meter reading. The low-amperage IOD should not exceed thirty-five milliamperes (0.035 ampere). If the current draw exceeds thirty-five milliamperes, isolate each circuit using the fuse and circuit breaker remove-and-replace process in Step 5. The multi-meter reading will drop to within the acceptable limit when the source of the excessive current draw is disconnected. Repair this circuit as required; whether a wiring short, incorrect switch adjustment, or an inoperative component is the cause.

OPEN-CIRCUIT VOLTAGE TEST

A battery open-circuit voltage (no load) test will show the approximate state-of-charge of a battery. This test can be used in place of the hydrometer test when a hydrometer is not available, or for maintenance-free batteries with non-removable cell caps.

Before proceeding with this test, completely charge the battery (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - BATTERY CHARGING).

1. Before measuring the open-circuit voltage, the surface charge must be removed from the battery. Turn on the headlamps for fifteen seconds, then allow up to five minutes for the battery voltage to stabilize.
2. Disconnect and isolate both battery cables, negative cable first.
3. Using a voltmeter connected to the battery posts (see the instructions provided by the manufacturer of the voltmeter), measure the open-circuit voltage.

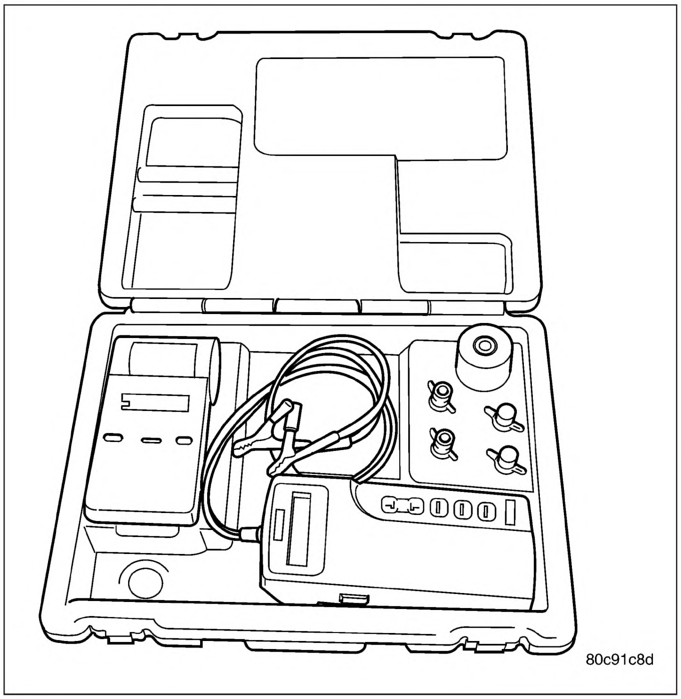

LOAD INCREASE
OFF
AMPERES
ZERO ADJUST
LOAD LIGHT
VOLTS
STARTING
CHARGING
REGULATOR
DIODE STATOR
INT. 18V.
EXT. 18V.
EXT. 3V.
VOLT SELECTOR
OFF
FIELD SELECTOR
TEST SELECTOR
80863dd0

See the Open-Circuit Voltage Table. This voltage reading will indicate the battery state-of-charge, but will not reveal its cranking capacity. If a battery has an open-circuit voltage reading of 12.4 volts or greater, it may be load tested to reveal its cranking capacity (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER).

OPEN CIRCUIT VOLTAGE TABLE	
Open Circuit Voltage	Charge Percentage
11.7 volts or less	0%
12.0 volts	25%
12.3 volts	50%
12.6 volts	75%
12.8 volts or more	100%

MICRO 420 BATTERY TESTER

Always use the Micro 420 Instruction Manual that was supplied with the tester as a reference. If the Instruction Manual is not available the following procedure can be used:



WARNING: ALWAYS WEAR APPROPRIATE EYE PROTECTION AND USE EXTREME CAUTION WHEN WORKING WITH BATTERIES.

BATTERY TESTING

1. If testing the battery OUT-OF-VEHICLE, clean the battery terminals with a wire brush before testing, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING). If the battery is equipped with side post terminals, install and tighten the supplied lead terminal stud adapters. Do not use steel bolts. Failure to properly install the stud adapters, or using stud adapters that are dirty or worn-out may result in false test readings.
2. If testing the battery IN-THE-VEHICLE, make certain all of the vehicle accessory loads are OFF, including the ignition. **The preferred test position is at the battery terminal**. If the battery is not accessible, you may test using both the positive and negative jumper posts. Select TESTING AT JUMPER POST when connecting to that location.
3. Connect the tester to the battery or jumper posts, the red clamp to positive (+) and the black clamp to negative (–).

NOTE: Multiple batteries connected in parallel must have the ground cable disconnected to perform a battery test. Failure to disconnect may result in false battery test readings.

4. Using the ARROW key select **in** or **out** of vehicle testing and press ENTER to make a selection.
5. If not selected, choose the Cold Cranking Amp (CCA) battery rating. Or select the appropriate battery rating for your area (see menu). The tester will then run its self programmed test of the battery and display the results. Refer to the test result table noted below.

CAUTION: If REPLACE BATTERY is the result of the test, this may mean a poor connection between the vehicle's cables and battery exists. After disconnecting the vehicle's battery cables from the battery, retest the battery using the OUT-OF-VEHICLE test before replacing.

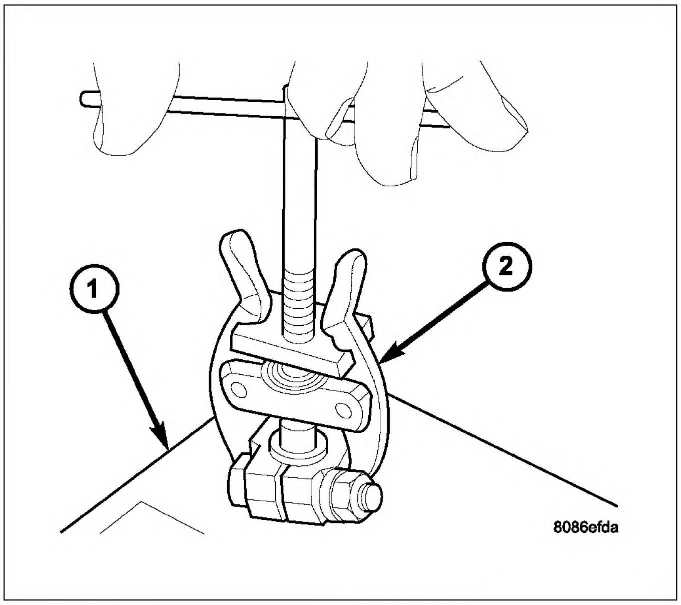
6. While viewing the battery test result, press the CODE button and the tester will prompt you for the last 4 digits of the VIN. Use the UP/DOWN arrow buttons to scroll to the correct character; then press ENTER to select and move to the next digit. Then press the ENTER button to view the SERVICE CODE. Pressing the CODE button a second time will return you to the test results.

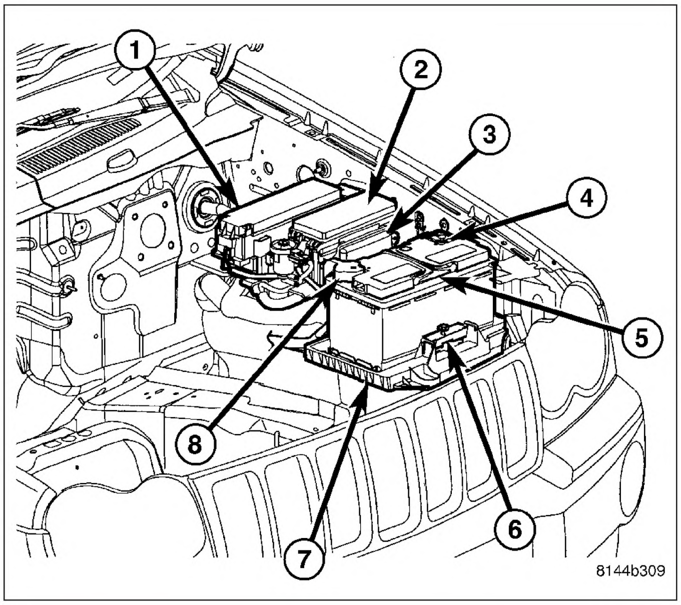
BATTERY TEST RESULTS	
GOOD BATTERY	Return to service
GOOD - RECHARGE	Fully charge battery and return to service
CHARGE & RETEST	Fully charge battery and retest battery
REPLACE BATTERY	Replace the battery and retest complete system
BAD-CELL REPLACE	Replace the battery and retest complete system

NOTE: The SERVICE CODE is required on every warranty claim submitted for battery replacement.

REMOVAL

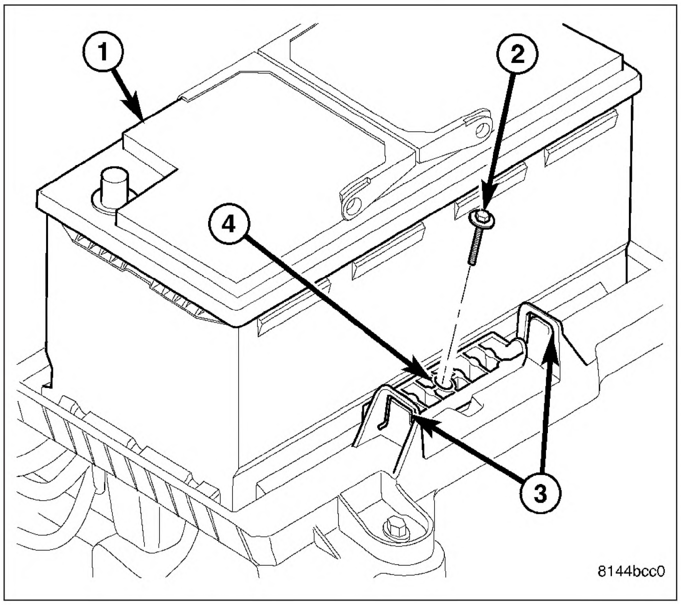
NOTE: It may be necessary to use a battery terminal puller (2) if the battery cable terminal clamps are seized on to the battery posts.





1. Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.
2. Loosen the battery negative cable terminal clamp pinch-bolt hex nut (4).
3. Disconnect the battery negative cable terminal clamp from the battery negative terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post.
4. Loosen the battery positive cable terminal clamp pinch-bolt hex nut (8).
5. Disconnect the battery positive cable terminal clamp from the battery positive terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post.

6. Remove the battery hold down bolt (2) and slide the hold down (4) up and forward in the battery tray slots (3).

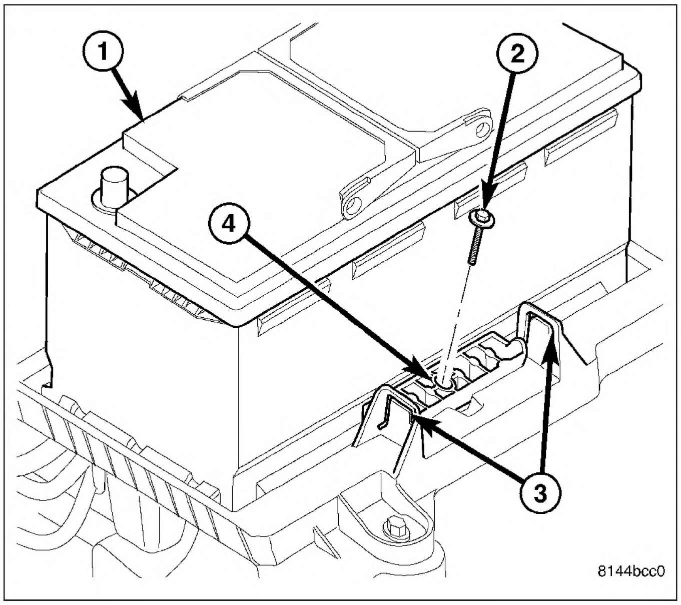


WARNING: WEAR A SUITABLE PAIR OF RUBBER GLOVES WHEN REMOVING A BATTERY BY HAND. SAFETY GLASSES SHOULD ALSO BE WORN. IF THE BATTERY IS CRACKED OR LEAKING, THE ELECTROLYTE CAN BURN THE SKIN AND EYES.

7. Remove the battery (1) from the vehicle.

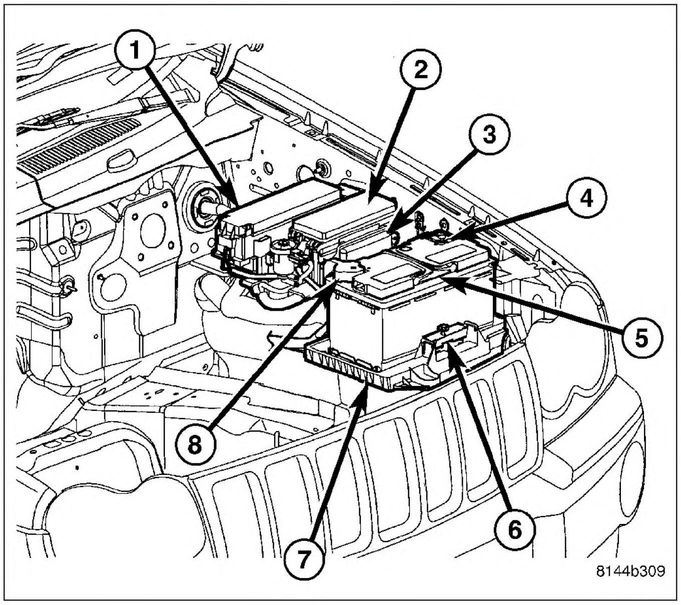
INSTALLATION

1. Clean and inspect the battery case, terminal posts and battery cable clamps, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING).
2. Position the battery (1) into the vehicle. Ensure that the battery positive and negative terminal posts are correctly positioned. The battery cable terminal clamps must reach the correct battery terminal post without stretching the cables.
3. Install the battery hold down (4) by sliding it back and downward in the battery tray slots (3). Install the battery hold down bolt (2).



CAUTION: Be certain that the battery cable terminal clamps are connected to the correct battery terminal posts. Reverse battery polarity may damage electrical components of the vehicle.

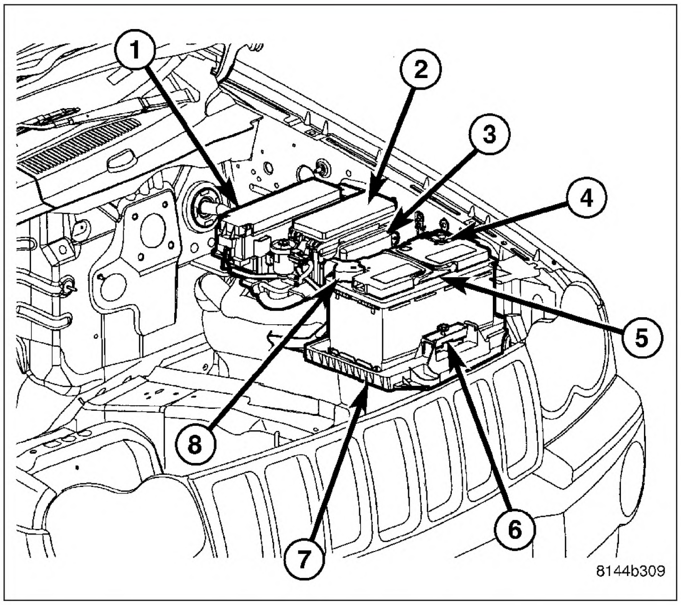
4. Connect the battery positive cable terminal clamp (8) to the battery positive terminal post. Tighten the terminal clamp pinch-bolt hex nut to 5.6 N·m (50 in. lbs.).
5. Connect the battery negative cable terminal clamp (4) to the battery negative terminal post. Tighten the terminal clamp pinch-bolt hex nut to 5.6 N·m (50 in. lbs.).
6. Apply a thin coating of petroleum jelly or chassis grease to the exposed surfaces of the battery cable terminal clamps and the battery terminal posts.



BATTERY CABLES

DESCRIPTION

The battery cables (4) and (8) are large gauge, stranded copper wires sheathed within a heavy plastic or synthetic rubber insulating jacket. The wire used in the battery cables combines excellent flexibility and reliability with high electrical current carrying capacity. The battery cables feature a stamped brass clamping type female battery terminal crimped onto one end of the battery cable wire and then solder-dipped. A square headed pinch-bolt and hex nut are installed at the open end of the female battery terminal clamp. Large eyelet type terminals are crimped onto the opposite end of the battery cable wire and then solder-dipped. The battery positive cable wires (8) have a red insulating jacket to provide visual identification and feature a larger female battery terminal clamp to allow connection to the larger battery positive terminal post. The battery negative cable wires (4) have a black insulating jacket and a smaller female battery terminal clamp.



The battery cables cannot be repaired and, if damaged or faulty they must be replaced. Both the battery positive and negative cables are available for service replacement only as a unit with the battery wire harness, which may include portions of the wiring circuits for the generator and other components on some models. Refer to the appropriate wiring information for the location of the proper battery cable wire harness diagrams. The wiring information also includes proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

The battery cables connect the battery terminal posts to the vehicle electrical system. These cables also provide a return path for electrical current generated by the charging system for restoring the voltage potential of the battery. The female battery terminal clamps on the ends of the battery cable wires provide a strong and reliable connection of the battery cable to the battery terminal posts. The terminal pinch bolts allow the female terminal clamps to be tightened around the male terminal posts on the top of the battery. The eyelet terminals secured to the ends of the battery cable wires opposite the female battery terminal clamps provide secure and reliable connection of the battery to the vehicle electrical system.

DIAGNOSIS AND TESTING

BATTERY CABLES

A voltage drop test will determine if there is excessive resistance in the battery cable terminal connections or the battery cables. If excessive resistance is found in the battery cable connections, the connection point should be disassembled, cleaned of all corrosion or foreign material, then reassembled. Following reassembly, check the voltage drop for the battery cable connection and the battery cable again to confirm repair.

When performing the voltage drop test, it is important to remember that the voltage drop is giving an indication of the resistance between the two points at which the voltmeter probes are attached. **EXAMPLE:** When testing the resistance of the battery positive cable, touch the voltmeter leads to the battery positive cable terminal clamp and to the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud. If you probe the battery positive terminal post and the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud, you are reading the combined voltage drop in the battery positive cable terminal clamp-to-terminal post connection and the battery positive cable.

TESTING

VOLTAGE DROP TEST

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING, LOOSE POSTS, OR LOW ELECTROLYTE LEVEL, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

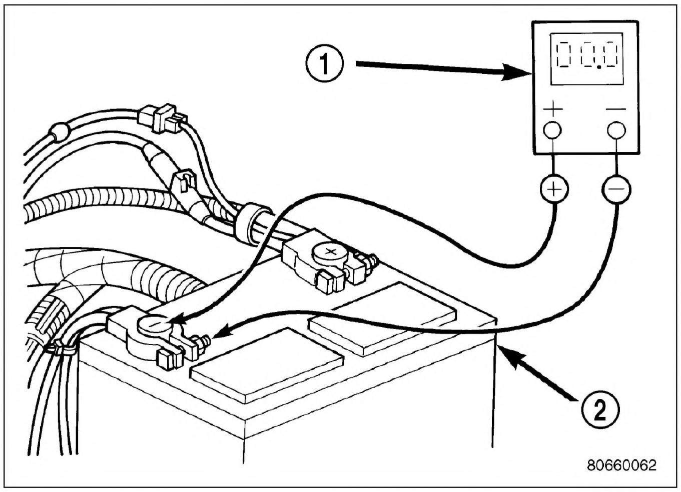
WARNING: IF THE BATTERY IS EQUIPPED WITH REMOVABLE CELL CAPS, BE CERTAIN THAT EACH OF THE CELL CAPS IS IN PLACE AND TIGHT BEFORE THE BATTERY IS RETURNED TO SERVICE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT FROM LOOSE OR MISSING CELL CAPS.

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing this test, be certain that the following procedures are accomplished:

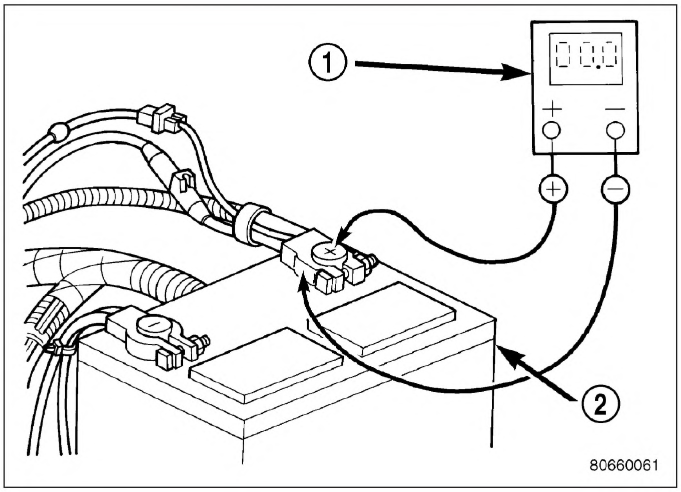
- The battery is fully-charged and tested, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE - USING MICRO 420 BATTERY TESTER).
- Fully engage the parking brake.
- If the vehicle is equipped with an automatic transmission, place the gearshift selector lever in the Park position. If the vehicle is equipped with a manual transmission, place the gearshift selector lever in the Neutral position and block the clutch pedal in the fully depressed position.
- Verify that all lamps and accessories are turned off.

- To prevent a gasoline engine from starting, remove the Automatic ShutDown (ASD) relay. The ASD relay is located in the Integrated Power Module (IPM), in the engine compartment. See the fuse and relay layout label on the underside of the IPM cover for ASD relay identification and location.

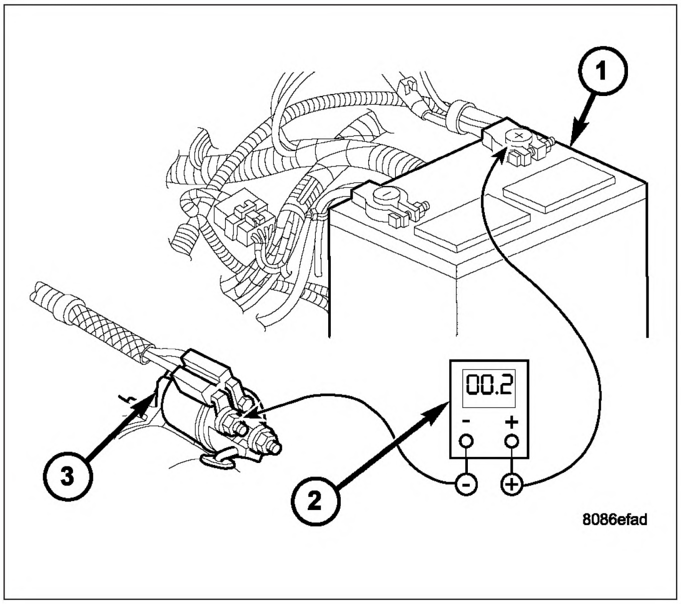
1. Connect the positive lead of the voltmeter (1) to the battery negative terminal post. Connect the negative lead of the voltmeter (1) to the battery negative cable terminal clamp. Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery negative cable terminal clamp and the battery negative terminal post.



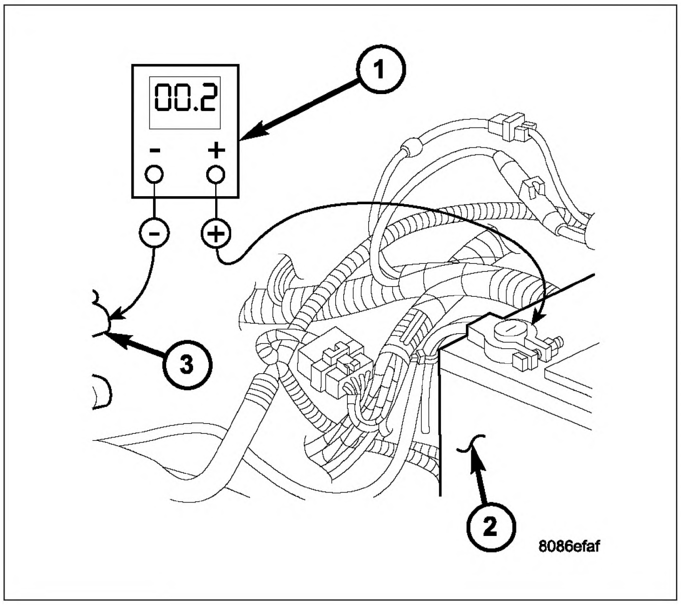
2. Connect the positive lead of the voltmeter (1) to the battery positive terminal post. Connect the negative lead of the voltmeter to the battery positive cable terminal clamp. Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery positive cable terminal clamp and the battery positive terminal post.



3. Connect the voltmeter (2) to measure between the battery positive cable terminal clamp (1) and the starter solenoid (3) B(+) terminal stud. Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery positive cable eyelet terminal connection at the starter solenoid B(+) terminal stud. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery positive cable.

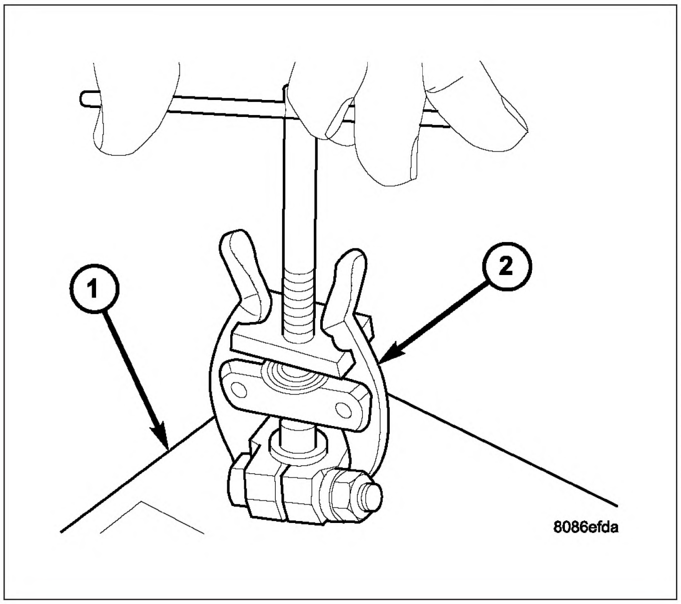


4. Connect the voltmeter (1) to measure between the battery (2) negative cable terminal clamp and a good clean ground (3) on the engine block. Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery negative cable eyelet terminal connection to the engine block. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery negative cable.



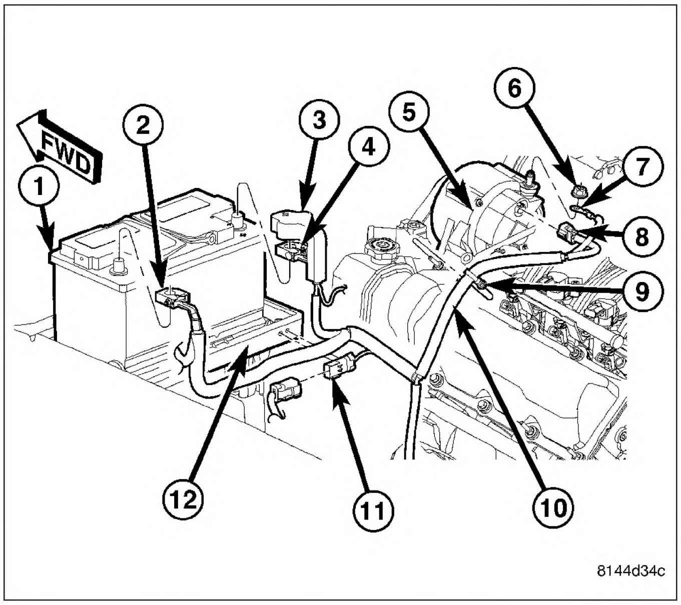
REMOVAL

NOTE: It may be necessary to use a battery terminal puller (2) if the battery cable terminal clamps are seized on to the battery posts.



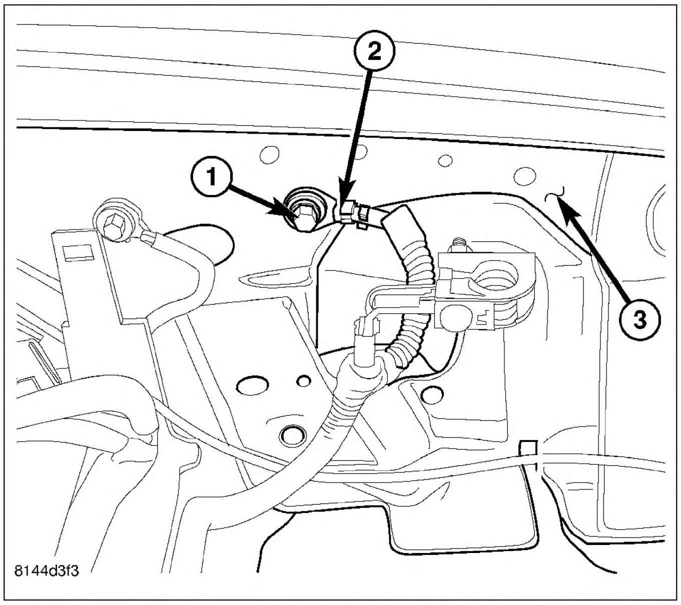
Both the battery negative cable (2) and the battery positive cable (4) are serviced in the battery wire harness (10). If either battery cable is damaged or faulty, the battery wire harness assembly must be replaced.

1. Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.
2. Disconnect the battery negative cable terminal clamp (2) from the battery negative terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post.
3. Lift the battery positive cable terminal clamp cover (3) to gain access to the pinch-bolt hex nut.

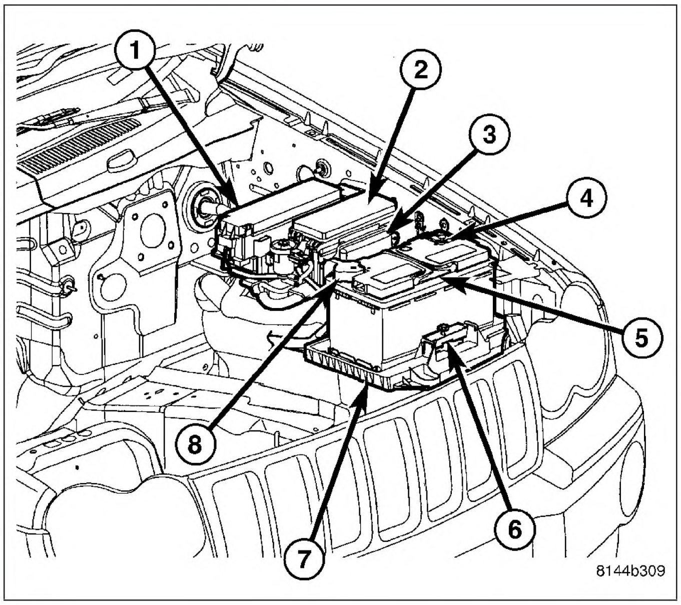


4. Disconnect the battery positive cable terminal clamp (4) from the battery positive terminal post. If necessary, use a battery terminal puller to remove the terminal clamp from the battery post.

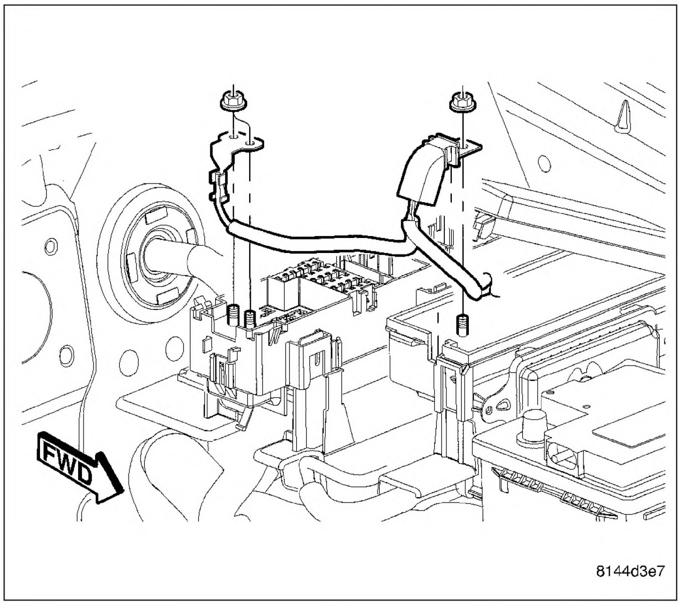
5. Remove the screw (1) that secures the battery negative cable eyelet terminal (2) to the inner fender (3).



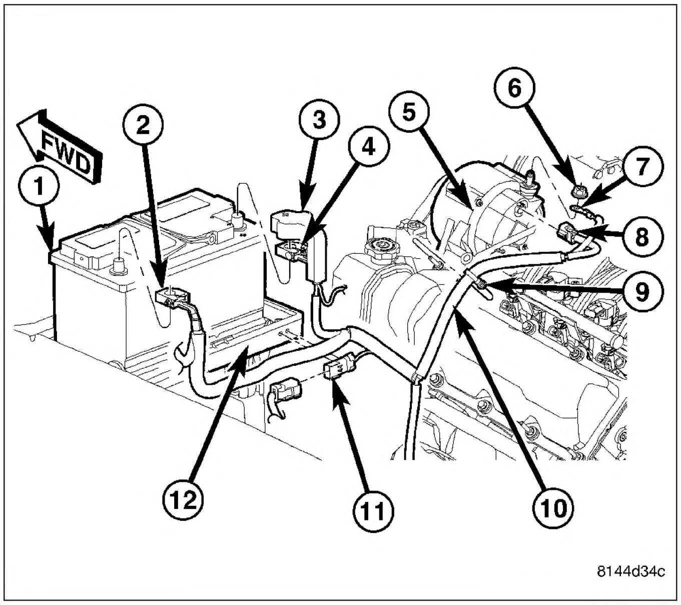
6. Unlatch and open the cover on the Power Distribution Center (PDC)(1) and Integrated Power Module (IPM)(2).



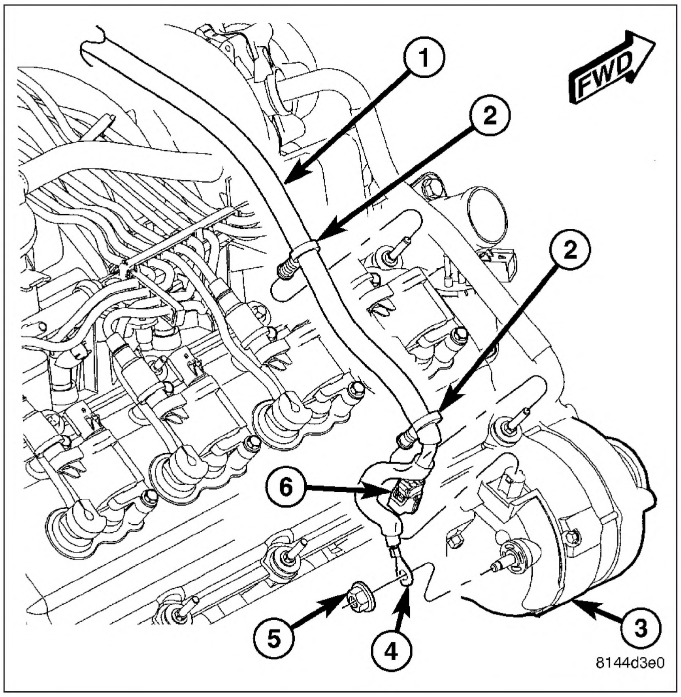
7. Remove the two nuts that secure the battery positive cable eyelet terminal to the B(+) terminal studs in the PDC.
8. Remove the nut that secures the battery positive cable eyelet terminal to the B(+) terminal stud in the IPM.
9. Remove both battery positive cable eyelet terminals from the B(+) terminal studs in the PDC and IPM.



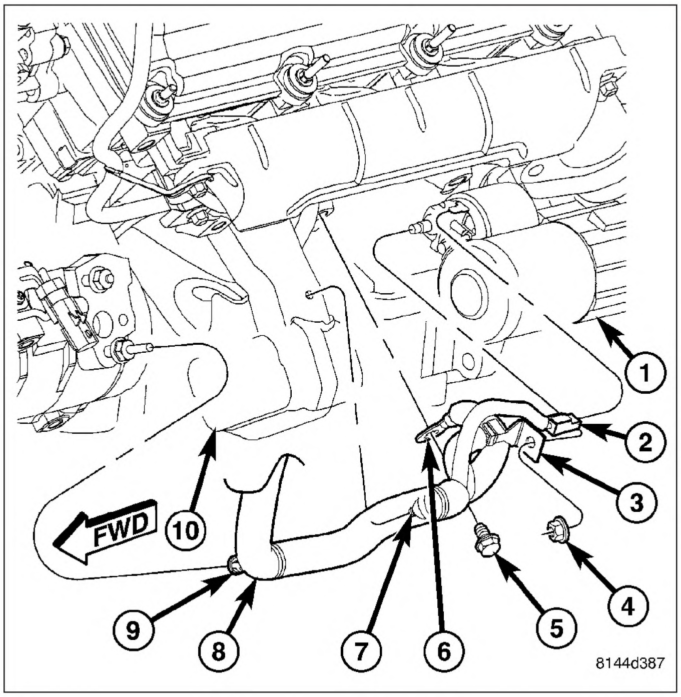
10. Disconnect the battery wire harness three pin connector (11).
11. Remove the battery wire harness three pin connector (11) from the battery tray (12).
12. On 3.7L and 4.7L engines remove the nut (6) that secures the generator output cable eyelet terminal (7) to the generator output terminal stud.
13. Remove the generator output cable eyelet terminal from the generator output terminal stud.
14. Disconnect the battery wire harness connector (8) from the generator field terminal connector receptacle on the back of the generator.
15. Remove the battery wire harness retaining clip (9) from the valve cover stud.



16. On 5.7L engines remove the nut (5) that secures the generator output cable eyelet terminal (4) to the generator output terminal stud.
17. Remove the generator output cable eyelet terminal from the generator output terminal stud.
18. Disconnect the battery wire harness connector (6) from the generator field terminal connector receptacle on the back of the generator (3).
19. Remove the battery wire harness retaining clips (2) from the valve cover studs.



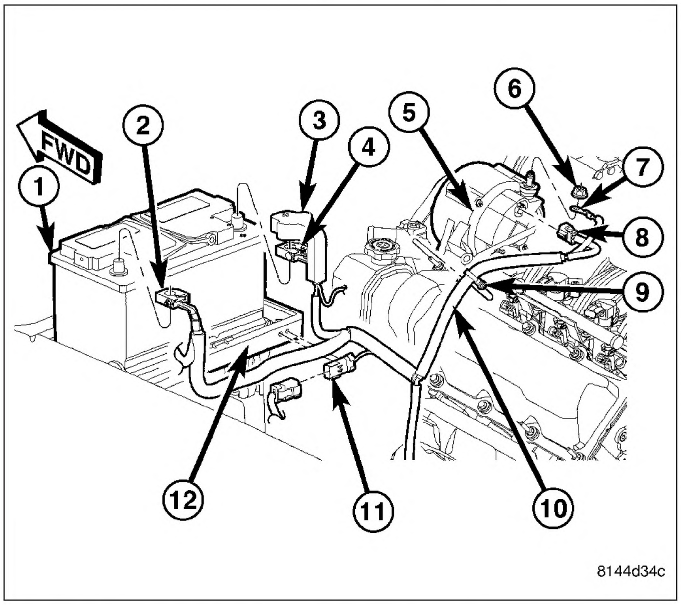
20. Raise the vehicle on a hoist, (Refer to LUBRICATION & MAINTENANCE/LIFT POINTS - STANDARD PROCEDURE).
21. Remove the bolt (5) that secures the battery negative cable ground eyelet terminal (6) to the engine block (10).
22. Remove the nut (4) that secures the battery positive cable eyelet terminal (3) to the B(+) terminal stud on the starter solenoid.
23. Remove the battery positive cable eyelet terminal from the B(+) terminal stud on the starter solenoid.
24. Disconnect the battery wire harness connector (2) from the connector receptacle on the starter solenoid.
25. Remove the battery wire harness retaining clips (7) & (9) from the engine.
26. Remove the battery wire harness from the engine compartment.



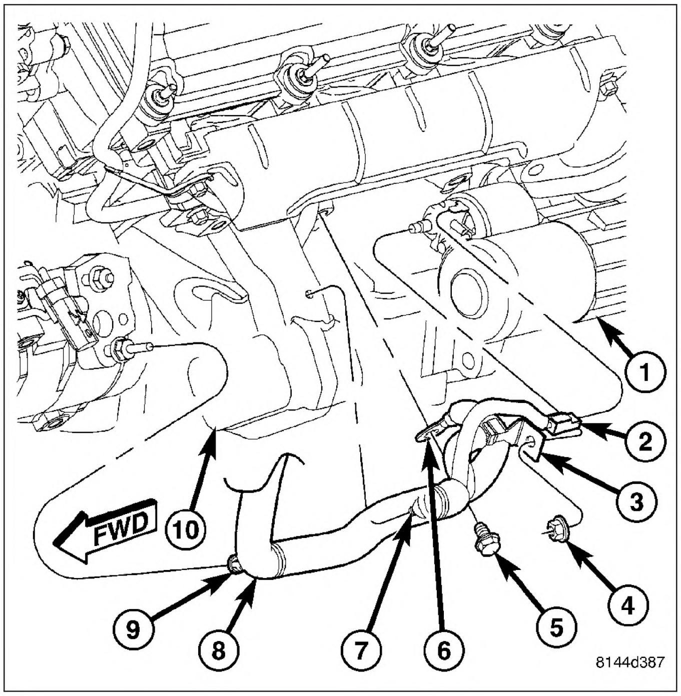
INSTALLATION

NOTE: Both the battery negative cable and the battery positive cable are serviced in the battery wire harness. If either battery cable is damaged or inoperative, the battery wire harness assembly must be replaced.

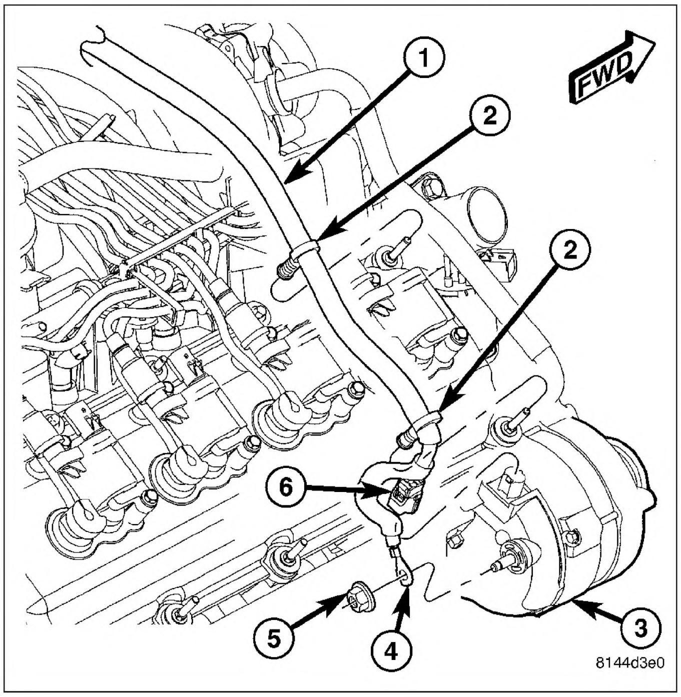
1. Clean and inspect the battery cable terminal clamps and the battery terminal posts, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING).
2. Position the battery wire harness assembly (10) into the vehicle.



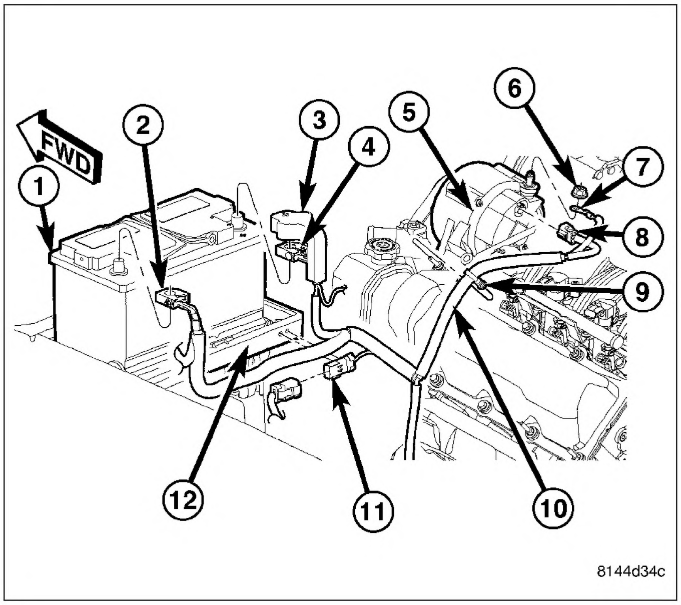
3. Raise the vehicle on a hoist, (Refer to LUBRICATION & MAINTENANCE/LIFT POINTS - STANDARD PROCEDURE).
4. Install the battery wire harness retaining clips (7) & (9) to the engine.
5. Reconnect the battery wire harness connector (2) to the connector receptacle on the starter solenoid.
6. Install the battery positive cable eyelet terminal (3) onto the B(+) terminal stud on the starter solenoid.
7. Install and tighten the nut (4) that secures the battery positive cable eyelet terminal (3) to the B(+) terminal stud on the starter solenoid. Tighten the nut to 10.75 N·m (95 in. lbs.).
8. Install and tighten the bolt (5) that secures the battery negative cable ground eyelet terminal (6) to the engine block (10). Tighten the bot to 10.75 N·m (95 in. lbs.).
9. Lower the vehicle.



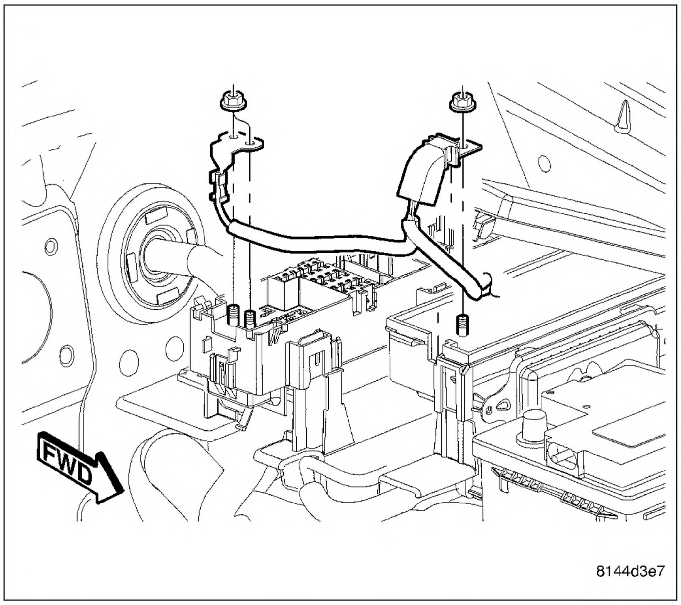
10. Install the battery wire harness retaining clips (2) to the valve cover studs.
11. On 5.7L engines, reconnect the battery wire harness connector (6) to the generator field terminal connector receptacle on the back of the generator.
12. Install the generator output cable eyelet terminal (4) onto the generator output terminal stud.
13. Install and tighten the nut (5) that secures the generator output cable eyelet terminal (4) to the generator output terminal stud. Tighten the nut to 14 N·m (125 in. lbs.).



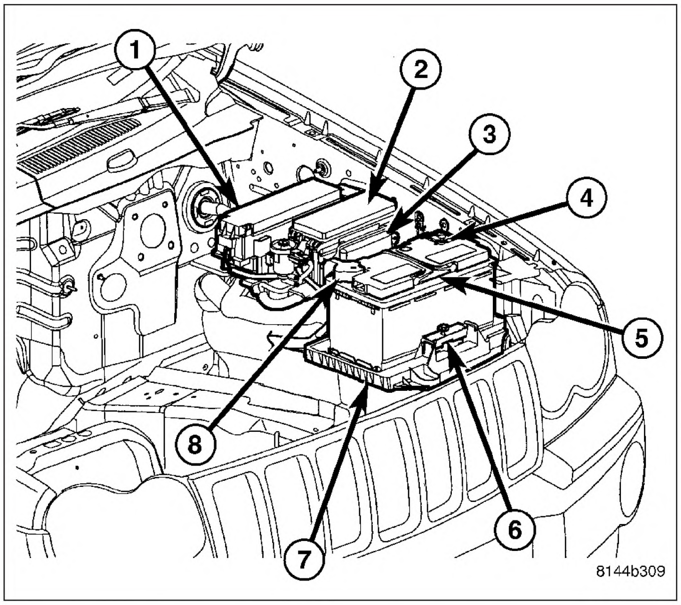
14. On 3.7L and 4.7L engines, reconnect the battery wire harness connector (8) to the generator field terminal connector receptacle on the back of the generator.
15. Install the generator output cable eyelet terminal (7) onto the generator output terminal stud.
16. Install and tighten the nut (6) that secures the generator output cable eyelet terminal (7) to the generator output terminal stud. Tighten the nut to 14 N·m (125 in. lbs.).
17. Install the battery wire harness retaining clip (9) onto the valve cover stud.
18. Install the battery wire harness three pin connector (11) onto the battery tray (12).
19. Connect the battery wire harness three pin connector (11).



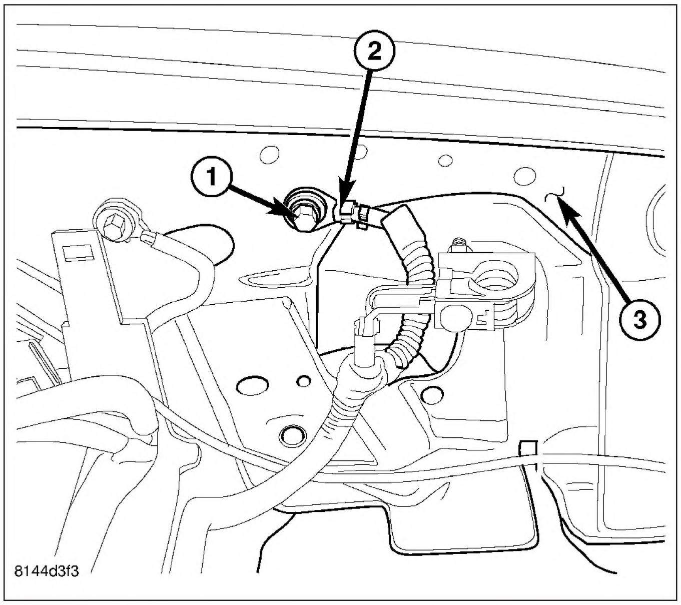
20. Install both battery positive cable eyelet terminals onto the B(+) terminal studs in the Power Distribution Center (PDC) and Integrated Power Module (IPM).
21. Install and tighten the nuts that secure the battery positive cable eyelet terminals onto the B(+) terminal studs in the PDC and IPM. Tighten the nut to 11.5 N·m (105 in. lbs.).



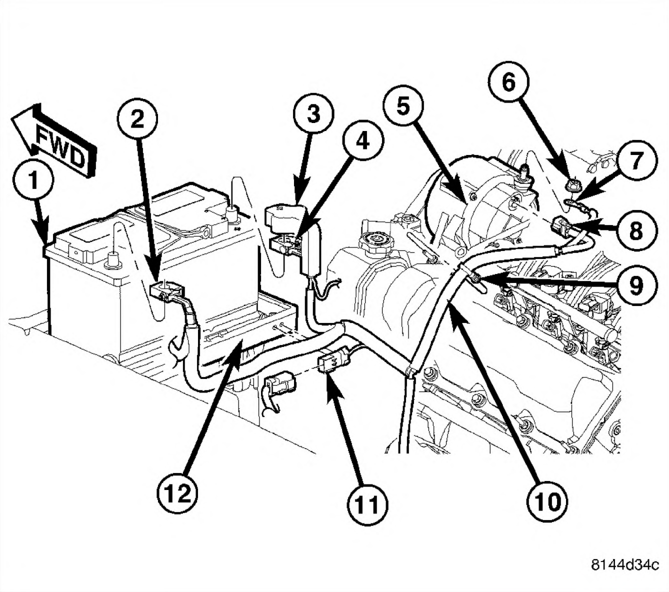
22. Close and latch the covers on the PDC (1) and IPM (2).



23. Install and tighten the screw (1) that secures the battery negative cable eyelet terminal (2) to the inner fender (3). Tighten the screw to 28.2 N·m (250 in. lbs.).



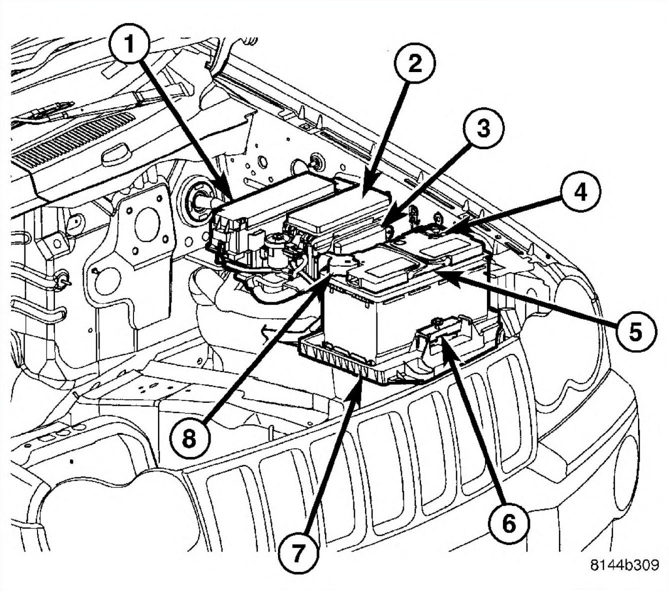
24. Reconnect the battery positive cable terminal clamp (4) to the battery positive terminal post. Tighten the terminal clamp pinch-bolt hex nut to 5.6 N·m (50 in. lbs.).
25. Secure the battery positive cable terminal clamp cover (3) over the battery positive cable terminal clamp (4).
26. Reconnect the battery negative cable terminal clamp (2) to the battery negative terminal post. Tighten the terminal clamp pinch-bolt hex nut to 5.6 N·m (50 in. lbs.).
27. Apply a thin coating of petroleum jelly or chassis grease to the exposed surfaces of the battery cable terminal clamps and the battery terminal posts.



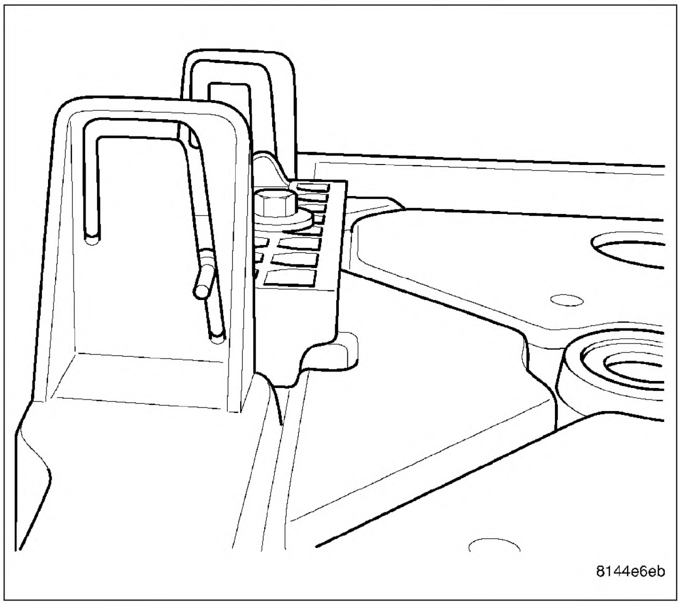
BATTERY TRAY

DESCRIPTION

The battery (5) is mounted in a molded plastic battery tray and support unit (7) located in the left front corner of the engine compartment. The battery tray and support unit is secured at the rear with a nut to a stud on the front frame rail, at the outboard side with two screws fastened to the left side inner fender panel, and at the front with a screw on a bracket off the radiator support.

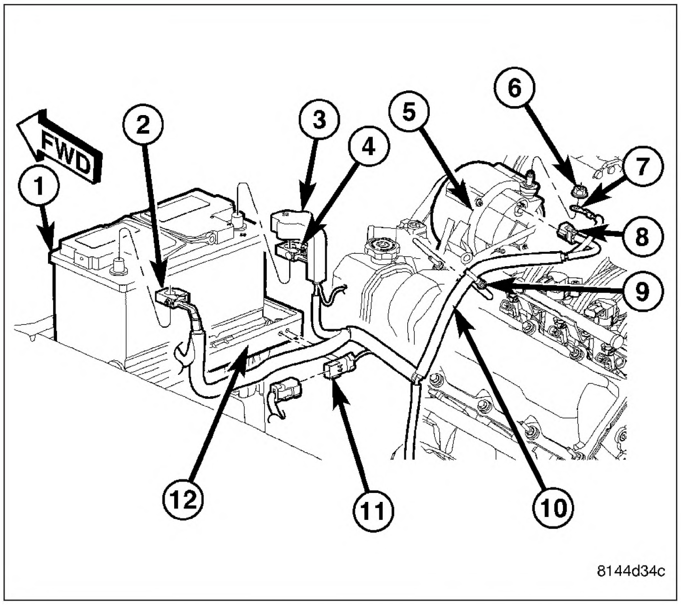


The battery tray for this vehicle is unique in that it has a built-in hold down bracket molded into the tray assembly. This bracket retains the hold down after the bolt is removed. With the bolt removed the hold down can slide up and forward in the bracket slots freeing the battery from the tray.

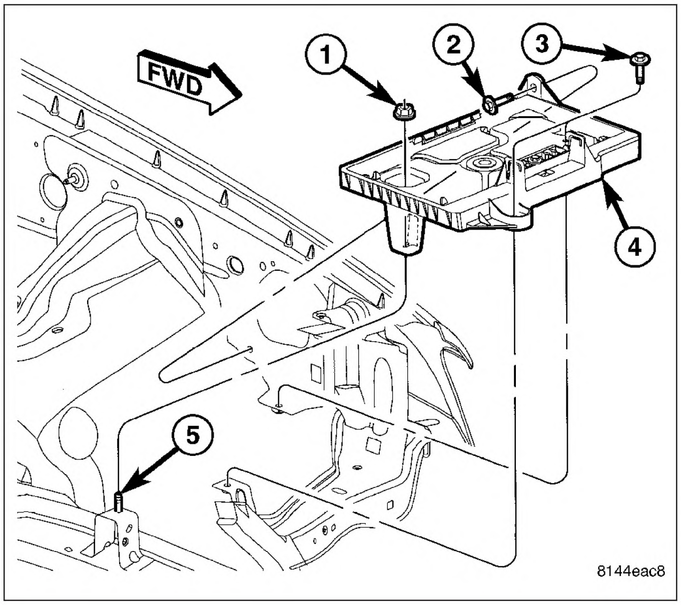


REMOVAL - GAS ENGINE

1. Remove the battery from the battery tray (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - REMOVAL).
2. Remove the battery wire harness three pin connector (11) from the battery tray (12).

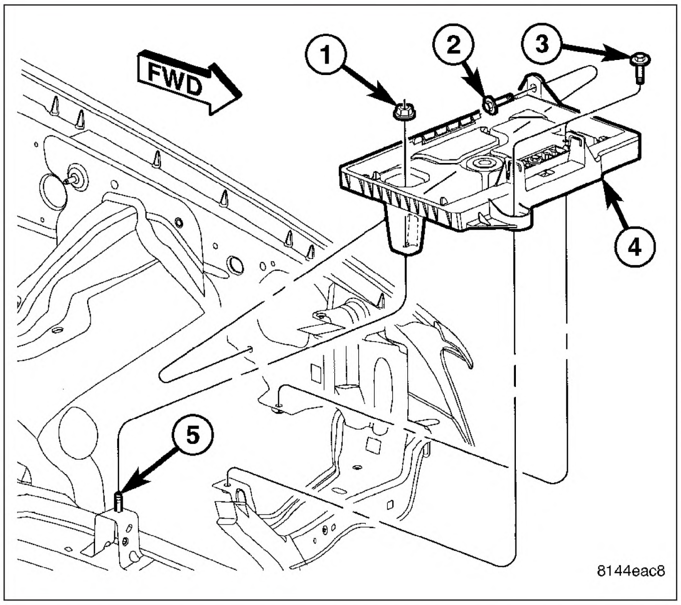


3. Remove the two screws (3) that secures the battery tray (4) to the inner fender and the bracket on the radiator support.
4. Remove the one screw (2) that secures the outboard side of the battery tray (4) to the left inner fender.
5. Remove the one nut (1) that secures the rear of the battery tray to the stud (5) on the front frame rail.
6. Remove the battery tray from the left front corner of the engine compartment.

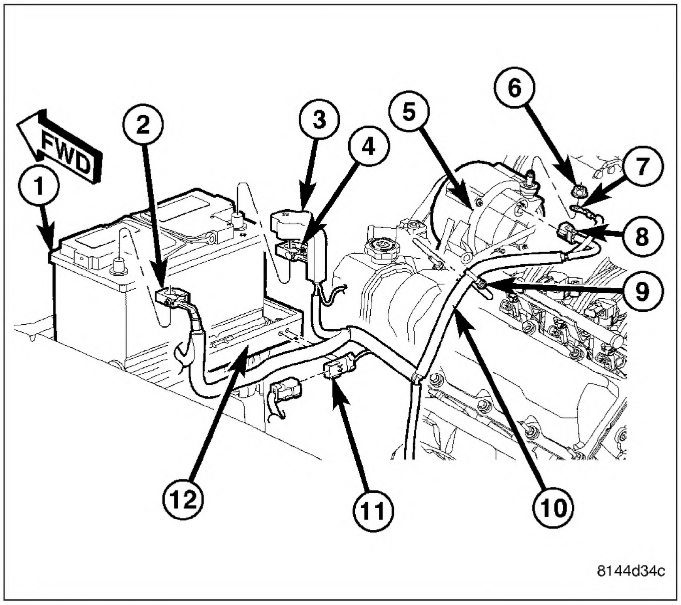


INSTALLATION - GAS ENGINE

1. Clean and inspect the battery tray, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - CLEANING) and (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - INSPECTION).
2. Position the battery tray and support unit into the right front corner of the engine compartment. Be certain that no hoses or wire harnesses are trapped or pinched by the installation of the tray.
3. Install and tighten the one nut (1) that secures the rear of the battery tray to the stud (5) on the front frame rail. Tighten the nut to 7.3 N·m (65 in. lbs.).
4. Install and tighten the one screw (2) that secures the outboard side of the battery tray (4) to the left inner fender. Tighten the screw to 7.3 N·m (65 in. lbs.).
5. Install and tighten the two screws (3) that secures the battery tray (4) to the inner fender and the bracket on the radiator support. Tighten the screw to 7.3 N·m (65 in. lbs.).



6. Install the battery wire harness three pin connector (11) onto the battery tray (12).
7. Install the battery onto the battery tray (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - INSTALLATION).



CHARGING - SERVICE INFORMATION

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CHARGING - SERVICE INFORMATION

DESCRIPTION

The charging system consists of:

- Generator
- Generator decoupler pulley (if equipped)
- Electronic Voltage Regulator (EVR) circuitry within the Powertrain Control Module (PCM)
- Ignition switch
- Battery (refer to Battery for information)
- Generator lamp (if equipped)
- Check gauges lamp (if equipped)
- Voltmeter (refer to Instrument Cluster for information)
- Wiring harness and connections (refer to Wiring for information)

OPERATION

The charging system is turned on and off with the ignition switch. The system is on when the engine is running and the ASD relay is energized. When the ASD relay is on, voltage is supplied to the ASD relay sense circuit at the PCM. This voltage is connected through the PCM and supplied to one of the generator field terminals (Gen. Source +) at the back of the generator.

The amount of DC current produced by the generator is controlled by the EVR (field control) circuitry contained within the PCM. This circuitry is connected in series with the second rotor field terminal and ground.

A battery temperature sensor, located in the battery tray housing, is used to sense battery temperature. This temperature data, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to control the strength of the rotor magnetic field. The PCM then compensates and regulates generator current output accordingly.

All vehicles are equipped with On-Board Diagnostics (OBD). All OBD-sensed systems, including EVR (field control) circuitry, are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for certain failures it detects.

The Check Gauges Lamp (if equipped) monitors: **charging system voltage,** engine coolant temperature and engine oil pressure. If an extreme condition is indicated, the lamp will be illuminated. This is done as a reminder to check the three gauges. The signal to activate the lamp is sent via the CAN bus circuits. The lamp is located on the instrument panel. Refer to Instrument Cluster for additional information.

DIAGNOSIS AND TESTING - CHARGING SYSTEM

The following procedures may be used to diagnose the charging system if:

- the check gauges lamp (if equipped) is illuminated with the engine running
- the voltmeter (if equipped) does not register properly

- an undercharged or overcharged battery condition occurs.

Remember that an undercharged battery is often caused by:

- accessories being left on with the engine not running
- a faulty or improperly adjusted switch that allows a lamp to stay on. Refer to Ignition-Off Draw Test in the Battery section for more information.

INSPECTION

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the On-Board Diagnostic (OBD) system. Some charging system circuits are checked continuously, and some are checked only under certain conditions.

Refer to Diagnostic Trouble Codes in; Powertrain Control Module; Electronic Control Modules for more DTC information. This will include a complete list of DTC's including DTC's for the charging system.

To perform a complete test of the charging system, refer to the appropriate Diagnostic Test Procedures and use a diagnostic scan tool. Perform the following inspections before attaching the scan tool.

1. Inspect the battery condition. Refer to Battery for procedures.
2. Inspect condition of battery cable terminals, battery posts, connections at engine block, starter solenoid and relay. They should be clean and tight. Repair as required.
3. Inspect all fuses in both the fuseblock and Power Distribution Center (PDC) for tightness in receptacles. They should be properly installed and tight. Repair or replace as required.
4. Inspect generator mounting bolts for tightness. Replace or tighten bolts if required. Refer to the Generator Removal/Installation section of this group for torque specifications.
5. Inspect generator drive belt condition and tension. Tighten or replace belt as required. Refer to Belt Tension Specifications in Cooling System.
6. Inspect automatic belt tensioner (if equipped). Refer to Cooling System for information.
7. Inspect generator electrical connections at generator field, battery output, and ground terminal (if equipped). Also check generator ground wire connection at engine (if equipped). They should all be clean and tight. Repair as required.

SPECIFICATIONS

GENERATOR RATINGS

TYPE	PART NUMBER	RATED SAE AMPS	ENGINES
DENSO	56029914AA	160	3.7L / 4.7L
DENSO	56044380AC	160	5.7L

TORQUE - CHARGING SYSTEM

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Generator Mounting Bolts - 5.7L	41	30	-
Generator Support Bracket Bolt/Nuts - 5.7L	41	30	-
Generator Vertical Mounting Bolt - 3.7L / 4.7L Engines	55	40	-
Generator (long) Horizontal Mounting Bolt - 3.7L / 4.7L Engines	55	40	-

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Generator (short) Horizontal Mounting Bolt - 3.7L / 4.7L Engines	74	55	-
Generator B+ Output Cable Terminal Nut	12	-	108

GENERATOR

DESCRIPTION

The generator is belt-driven by the engine using a serpentine type drive belt. It is serviced only as a complete assembly. If the generator fails for any reason, the entire assembly must be replaced.

OPERATION

As the energized rotor begins to rotate within the generator, the spinning magnetic field induces a current into the windings of the stator coil. Once the generator begins producing sufficient current, it also provides the current needed to energize the rotor.

The stator winding connections deliver the induced alternating current to 6 positive and 6 negative diodes for rectification. From the diodes, rectified direct current is delivered to the vehicle electrical system through the generator battery terminal.

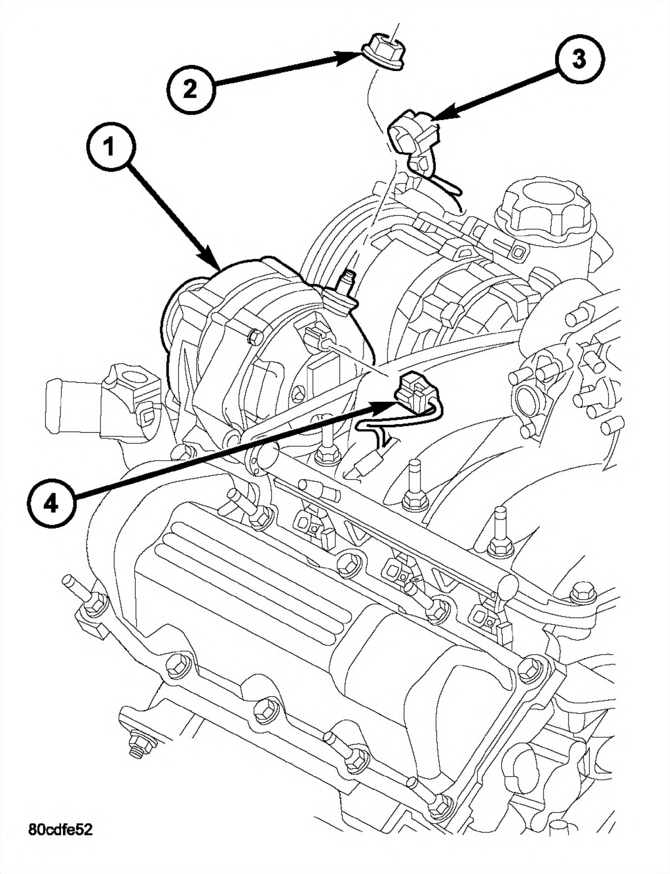
Noise emitting from the generator may be caused by: worn, loose or defective bearings; a loose or defective drive pulley; incorrect, worn, damaged or misadjusted fan drive belt; loose mounting bolts; a misaligned drive pulley or a defective stator or diode.

REMOVAL

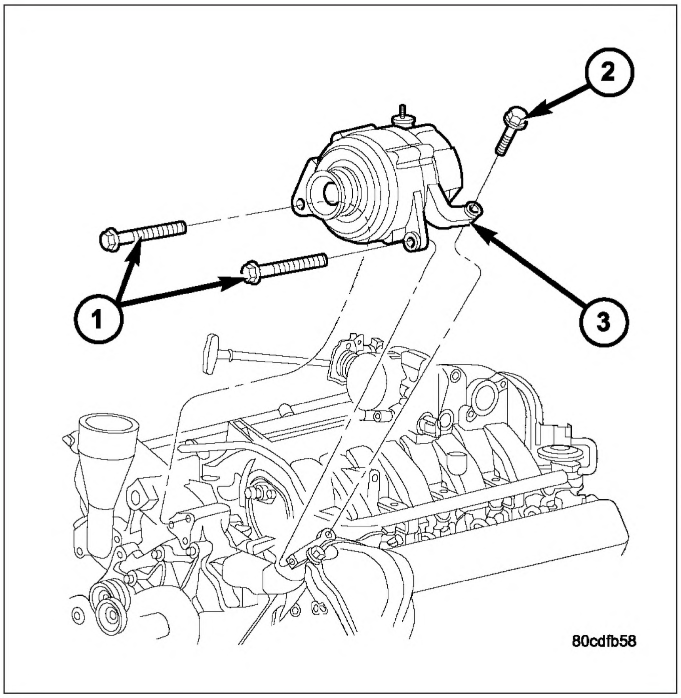
3.7L / 4.7L

WARNING: DISCONNECT NEGATIVE CABLE FROM BATTERY BEFORE REMOVING BATTERY OUTPUT WIRE (B+ WIRE) FROM GENERATOR. FAILURE TO DO SO CAN RESULT IN INJURY OR DAMAGE TO ELECTRICAL SYSTEM.

1. Disconnect negative battery cable at battery.
2. Remove generator drive belt. Refer to 7, Cooling System for procedure.
3. Unsnap plastic insulator cap (3) from B+ output terminal.
4. Remove B+ terminal mounting nut (2) at rear of generator. Disconnect terminal from generator.
5. Disconnect field wire connector (4) at rear of generator by pushing on connector tab.



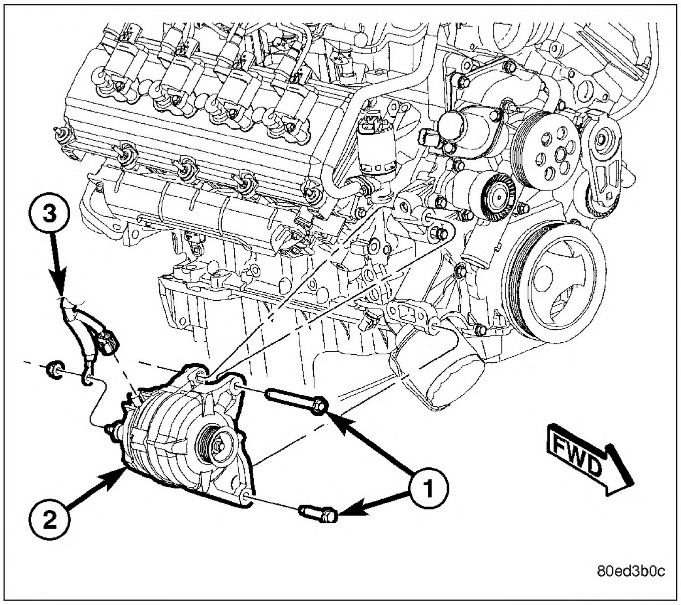
6. Remove 1 rear vertical generator mounting bolt (2).
7. Remove 2 front horizontal generator mounting bolts (1).
8. Remove generator from vehicle.



5.7L

WARNING: DISCONNECT NEGATIVE CABLE FROM BATTERY BEFORE REMOVING BATTERY OUTPUT WIRE (B+ WIRE) FROM GENERATOR. FAILURE TO DO SO CAN RESULT IN INJURY OR DAMAGE TO ELECTRICAL SYSTEM.

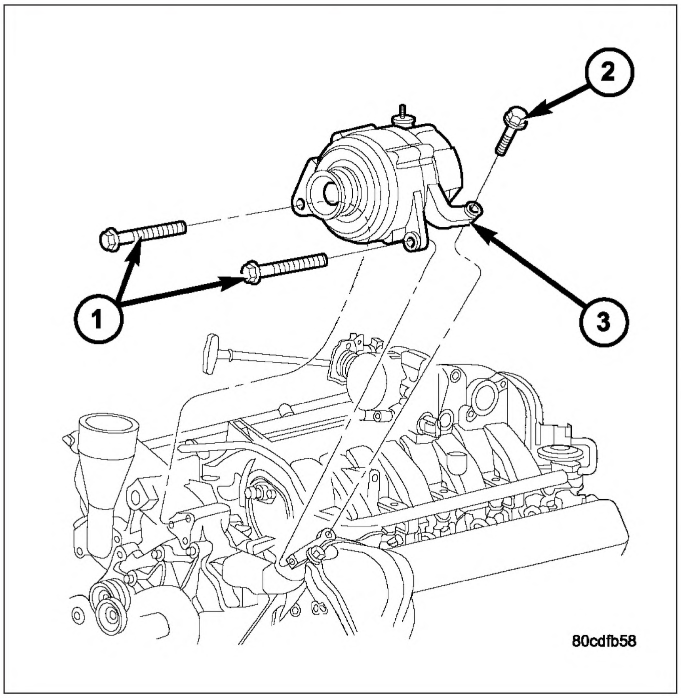
1. Disconnect negative battery cable at battery.
2. Remove generator drive belt. Refer to 7, Cooling System for procedure.
3. Unsnap plastic insulator cap from B+ output terminal.
4. Remove B+ terminal mounting nut (3) at rear of generator. Disconnect terminal from generator.
5. Disconnect field wire connector (3) at rear of generator by pushing on connector tab.
6. Remove 2 generator mounting bolts (1).
7. Remove generator (2) from vehicle.



INSTALLATION

3.7L / 4.7L

1. Position generator (3) to engine and install 2 horizontal bolts (1) and 1 vertical bolt (2).
2. Tighten all 3 bolts. Refer to Torque Specifications.

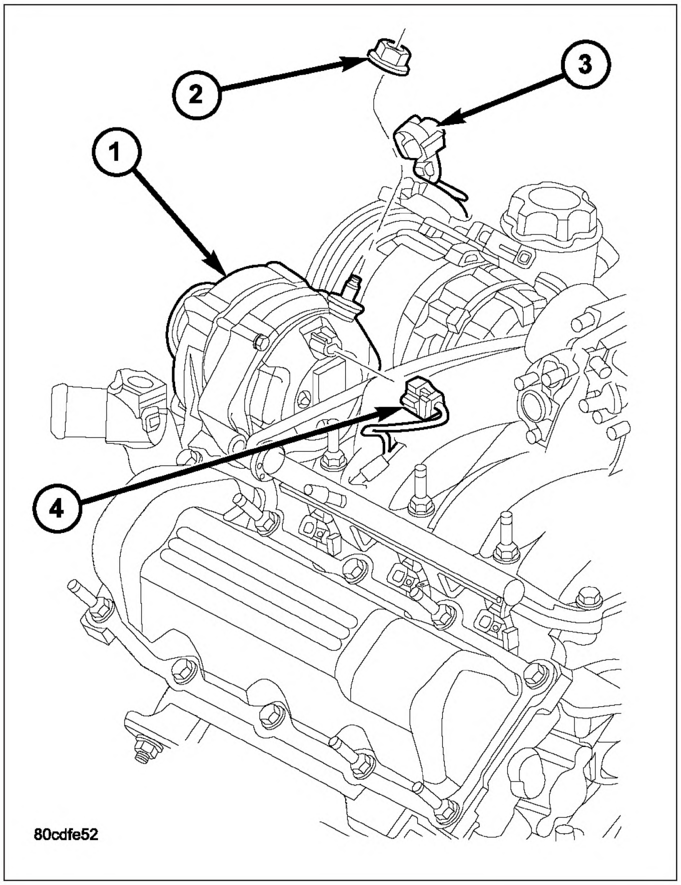


3. Snap field wire connector (4) into rear of generator.
4. Install B+ terminal eyelet to generator output stud. Tighten mounting nut (2). Refer to Torque Specifications.

CAUTION: Never force a belt over a pulley rim using a screwdriver. The synthetic fiber of the belt can be damaged.

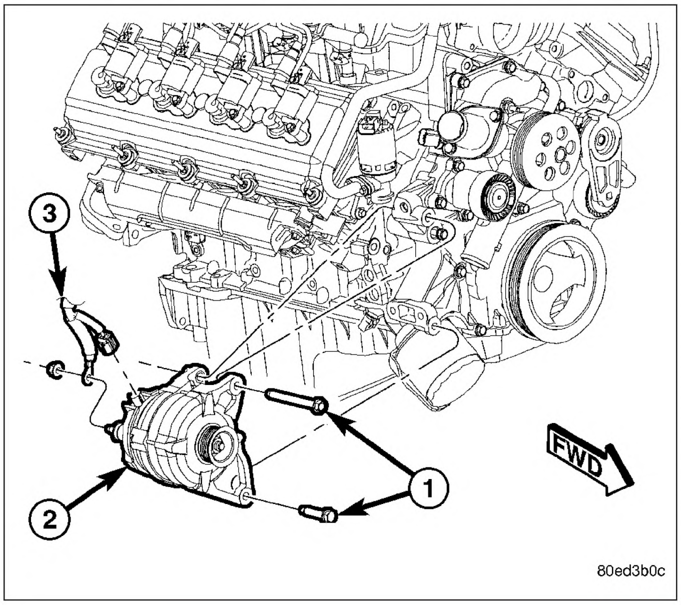
CAUTION: When installing a serpentine accessory drive belt, the belt MUST be routed correctly. The water pump may be rotating in the wrong direction if the belt is installed incorrectly, causing the engine to overheat. Refer to belt routing label in engine compartment, or refer to Belt Schematics in 7, Cooling System.

5. Install generator drive belt. Refer to 7, Cooling System for procedure.
6. Install negative battery cable to battery.



5.7L

1. Position generator (2) to engine and install 2 mounting bolts (1).
2. Tighten bolts. Refer to Torque Specifications.
3. Snap field wire connector (3) into rear of generator.
4. Install B+ terminal eyelet (3) to generator output stud. Tighten mounting nut. Refer to Torque Specifications.



CAUTION: Never force a belt over a pulley rim using a screwdriver. The synthetic fiber of the belt can be damaged.

CAUTION: When installing a serpentine accessory drive belt, the belt MUST be routed correctly. The water pump may be rotating in the wrong direction if the belt is installed incorrectly, causing the engine to overheat. Refer to belt routing label in engine compartment, or refer to Belt Schematics in 7, Cooling System.

5. Install generator drive belt. Refer to 7, Cooling System for procedure.
6. Install negative battery cable to battery.

REGULATOR, VOLTAGE

DESCRIPTION

The Electronic Voltage Regulator (EVR) is not a separate component. It is actually a voltage regulating circuit located within the Powertrain Control Module (PCM). The EVR is not serviced separately. If replacement is necessary, the PCM must be replaced.

OPERATION

The amount of DC current produced by the generator is controlled by EVR circuitry contained within the PCM. This circuitry is connected in series with the generators second rotor field terminal and its ground.

Voltage is regulated by cycling the battery voltage to control the strength of the rotor magnetic field. The EVR circuitry monitors system line voltage (B+) and battery temperature (refer to Battery Temperature Sensor for more information). It then determines a target charging voltage. If sensed battery voltage is 0.5 volts or lower than the target voltage, the PCM energizes the field winding until sensed battery voltage is 0.5 volts above target voltage. A circuit in the PCM cycles the battery side of the generator field up to 100 times per second (100Hz), but has the capability to full field to achieve the target voltage. If the charging rate cannot be monitored (limp-in), a duty cycle of 25% is used by the PCM in order to have some generator output.

STARTING

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STARTING

DESCRIPTION

The starting system consists of:

- Starter relay
- Starter motor (including an integral starter solenoid)

Other components to be considered as part of starting system are:

- Battery
- Battery cables
- Ignition switch and key lock cylinder
- Clutch pedal position switch (manual transmission)
- Park/neutral position switch (automatic transmission)
- Wire harnesses and connections.

The Battery, Starting, and Charging systems operate in conjunction with one another, and must be tested as a complete system. For correct operation of starting/charging systems, all components used in these 3 systems must perform within specifications. When attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used in each of these groups include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, volt/ohmmeter, battery charger, carbon pile rheostat (load tester), and 12-volt test lamp may be required.

Certain starting system components are monitored by the PCM and may produce a Diagnostic Trouble Code (DTC).

OPERATION

The starting system components form two separate circuits. A high-amperage feed circuit that feeds the starter motor between 150 and 350 amperes, and a low-amperage control circuit that operates on less than 20 amperes. The high-amperage feed circuit components include the battery, the battery cables, the contact disc portion of the starter solenoid, and the starter motor. The low-amperage control circuit components include the ignition switch, the park/neutral position switch, the starter relay, the electromagnetic windings of the starter solenoid, and the connecting wire harness components.

Battery voltage is supplied through the low-amperage control circuit to the coil battery terminal of the starter relay when the ignition switch is turned to the Start position. The park/neutral position switch is installed in series between the starter relay coil ground terminal and ground. This normally open switch prevents the starter relay from being energized and the starter motor from operating unless the automatic transmission gear selector is in the Neutral or Park positions.

When the starter relay coil is energized, the normally open relay contacts close. The relay contacts connect the relay common feed terminal to the relay normally open terminal. The closed relay contacts energize the starter solenoid coil windings.

The energized solenoid pull-in coil pulls in the solenoid plunger. The solenoid plunger pulls the shift lever in the starter motor. This engages the starter overrunning clutch and pinion gear with the starter ring gear.

As the solenoid plunger reaches the end of its travel, the solenoid contact disc completes the high-amperage starter feed circuit and energizes the solenoid plunger hold-in coil. Current now flows between the solenoid battery terminal and the starter motor, energizing the starter.

Once the engine starts, the overrunning clutch protects the starter motor from damage by allowing the starter pinion gear to spin faster than the pinion shaft. When the ignition switch is released to the On position, the starter relay coil is de-energized. This causes the relay contacts to open. When the relay contacts open, the starter solenoid plunger hold-in coil is de-energized.

When the solenoid plunger hold-in coil is de-energized, the solenoid plunger return spring returns the plunger to its relaxed position. This causes the contact disc to open the starter feed circuit, and the shift lever to disengage the overrunning clutch and pinion gear from the starter ring gear.

DIAGNOSIS AND TESTING - STARTING SYSTEM

The battery, starting, and charging systems operate in conjunction with one another, and must be tested as a complete system. For correct starting/charging system operation, all of the components involved in these 3 systems must perform within specifications.

Starting System Diagnosis

CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER FAILS TO OPERATE.	1. Battery discharged or faulty.	1. Refer to Battery. Charge or replace battery, if required.
	2. Starting circuit wiring faulty.	2. Refer to 8, Wiring Diagrams. Test and repair starter feed and/or control circuits, if required.
	3. Starter relay faulty.	3. Refer to Starter Relay in Diagnosis and Testing. Replace starter relay if required.
	4. Ignition switch faulty.	4. Refer to Ignition Switch and Key Lock Cylinder. Replace ignition switch if required.
	5. Park/Neutral position switch faulty or misadjusted.	6. Refer to Park/Neutral Position Switch. Replace park/neutral position switch if required.
	6. Starter motor faulty.	8. If all other starting system components and circuits test OK, replace starter motor.
STARTER ENGAGES, FAILS TO TURN ENGINE.	1. Battery discharged or faulty.	1. Refer to Battery. Charge or replace battery if required.
	2. Starting circuit wiring faulty.	2. Refer to 8, Wiring Diagrams. Test and repair starter feed and/or control circuits if required.
	3. Starter motor faulty.	3. If all other starting system components and circuits test OK, replace starter motor assembly.
	4. Engine seized.	4. Refer to Engine Diagnosis in the Diagnosis and Testing section of 9, Engine.
STARTER ENGAGES, SPINS OUT BEFORE ENGINE STARTS.	1. Starter ring gear faulty.	1. Refer to Starter Motor Removal and Installation. Remove starter motor to inspect starter ring gear. Replace starter ring gear if required.
	2. Starter motor faulty.	2. If all other starting system components and circuits test OK, replace starter motor assembly.

Starting System Diagnosis		
CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER DOES NOT DISENGAGE.	1. Starter motor improperly installed.	1. Refer to Starter Motor Removal and Installation. Tighten starter mounting hardware to correct torque specifications.
	2. Starter relay faulty.	2. Refer to Starter Relay Diagnosis and Testing. Replace starter relay if required.
	3. Ignition switch faulty.	3. Refer to Ignition Switch and Key Lock Cylinder. Replace ignition switch if required.
	4. Starter motor faulty.	4. If all other starting system components and circuits test OK, replace starter motor.

INSPECTION

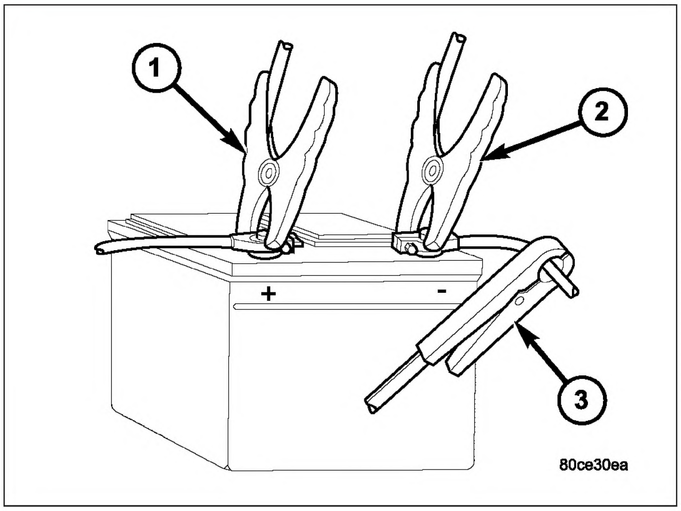
For complete starter wiring circuit diagrams, refer to 8, Wiring Diagrams. Before removing any unit from starting system for repair or diagnosis, perform the following inspections:

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO 8, PASSIVE RESTRAINT SYSTEMS, BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- **Battery** - Visually inspect battery for indications of physical damage and loose or corroded cable connections. Determine state-of-charge and cranking capacity of battery. Charge or replace battery if required. Refer to **Battery** in 8, Battery. **Note: If equipped with diesel engine, a dual battery system may be used, and both batteries must be inspected.**
- **Ignition Switch** - Visually inspect ignition switch for indications of physical damage and loose or corroded wire harness connections. Refer to **Ignition Switch and Key Lock Cylinder.**
- **Park/Neutral Position Switch** - Visually inspect park/neutral position switch for indications of physical damage and loose or corroded wire harness connections. Refer to **Park/Neutral Position Switch** in 21, Transmission.
- **Starter Relay** - Visually inspect starter relay for indications of physical damage and loose or corroded wire harness connections.
- **Starter Motor** - Visually inspect starter motor for indications of physical damage and loose or corroded wire harness connections.
- **Starter Solenoid** - Visually inspect starter solenoid for indications of physical damage and loose or corroded wire harness connections.
- **Wiring** - Visually inspect wire harnesses for damage. Repair or replace any faulty wiring, as required. Refer to 8, Wiring Diagrams.

TESTING

COLD CRANKING TEST



For complete starter wiring circuit diagrams, refer to 8, Wiring Diagrams. The battery must be fully-charged and load-tested before proceeding. Refer to **Battery** in Battery.

1. Connect volt-ampere tester to battery terminals (1), (2) and (3). See instructions provided by manufacturer of volt-ampere tester being used.
2. Fully engage parking brake.
3. Place gearshift selector lever in Park position.
4. Verify that all lamps and accessories are turned off.
5. To prevent a gasoline engine from starting, remove Automatic ShutDown (ASD) relay. To prevent a diesel engine from starting, remove Fuel Pump Relay. These relays are located in Power Distribution Center (PDC). Refer to label on PDC cover for relay location.
6. Rotate and hold ignition switch in Start position. Note cranking voltage and current (amperage) draw readings shown on volt-ampere tester.
    a. If voltage reads below 9.6 volts, refer to **Starter Motor** in Diagnosis and Testing. If starter motor is OK, refer to **Engine Diagnosis** in 9, Engine for further testing of engine. If starter motor is not OK, replace faulty starter motor.
    b. If voltage reads above 9.6 volts and current (amperage) draw reads below specifications, refer to **Feed Circuit Test** in this section.
    c. If voltage reads 12.5 volts or greater and starter motor does not turn, refer to **Control Circuit Testing** in this section.
    d. If voltage reads 12.5 volts or greater and starter motor turns very slowly, refer to **Feed Circuit Test** in this section.

NOTE: A cold engine will increase starter current (amperage) draw reading, and reduce battery voltage reading.

FEED CIRCUIT TEST

The starter feed circuit test (voltage drop method) will determine if there is excessive resistance in high-amperage feed circuit. For complete starter wiring circuit diagrams, refer 8, Wiring Diagrams.

When performing these tests, it is important to remember that voltage drop is giving an indication of resistance between two points at which voltmeter probes are attached.

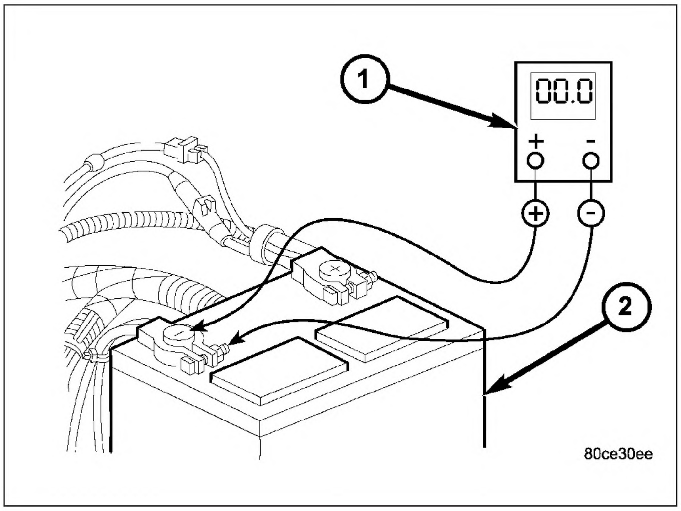
Example: When testing resistance of positive battery cable, touch voltmeter leads to positive battery cable clamp and cable connector at starter solenoid. If you probe positive battery terminal post and cable connector at starter solenoid, you are reading combined voltage drop in positive battery cable clamp-to-terminal post connection and positive battery cable.

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing tests, be certain that following procedures are accomplished:

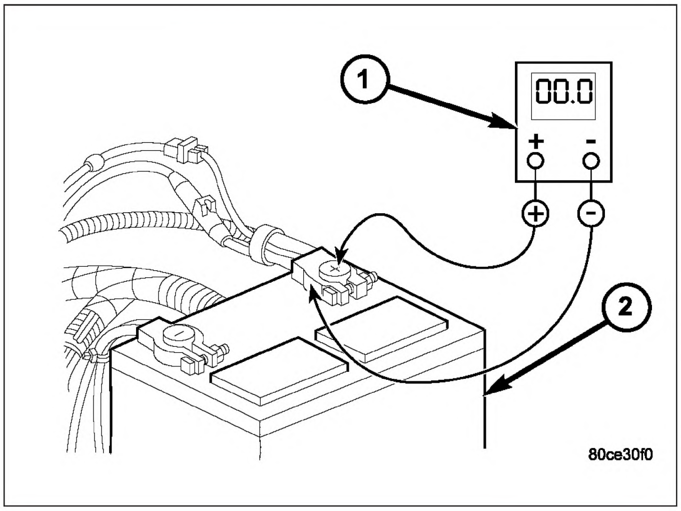
- Battery is fully-charged and load-tested. Refer to **Battery** in 8, Battery.
- Fully engage parking brake.
- Place gearshift selector lever in Park position.
- Verify that all lamps and accessories are turned off.

- To prevent a gasoline engine from starting, remove Automatic ShutDown (ASD) relay. To prevent a diesel engine from starting, remove Fuel Pump Relay. These relays are located in Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

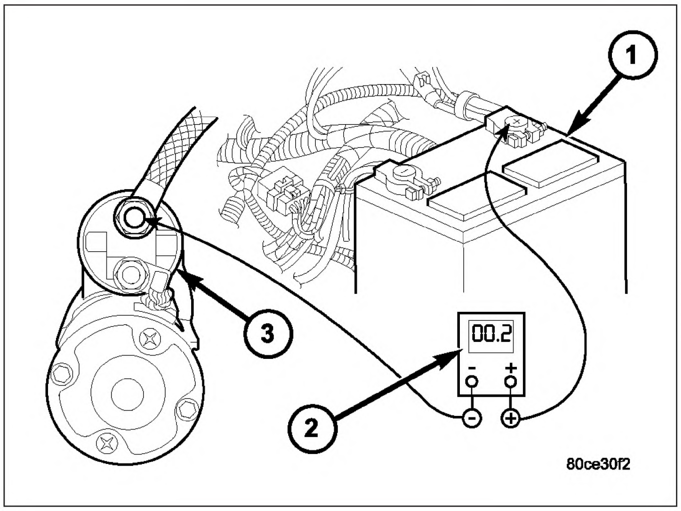
1. Connect positive lead of voltmeter (1) to negative battery cable terminal post. Connect negative lead of voltmeter to negative battery cable clamp. Rotate and hold ignition switch in Start position. Observe voltmeter (1). If voltage is detected, correct poor contact between cable clamp and terminal post.



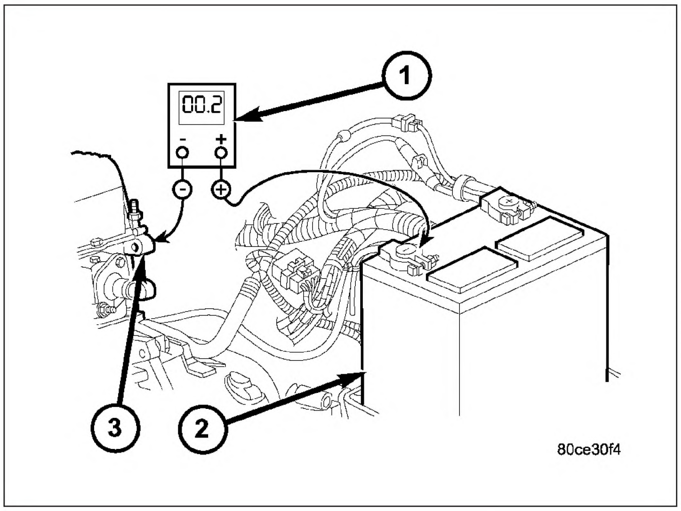
2. Connect positive lead of voltmeter (1) to positive battery terminal post. Connect negative lead of voltmeter to battery positive cable clamp. Rotate and hold ignition switch in Start position. Observe voltmeter (1). If voltage is detected, correct poor contact between cable clamp and terminal post.

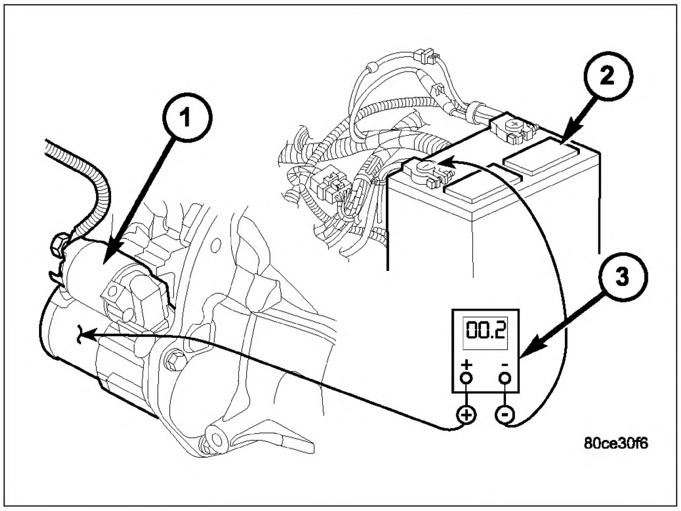


3. Connect voltmeter (2) to measure between battery positive terminal post and starter solenoid battery terminal stud (3). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten battery cable connection at solenoid. Repeat test. If reading is still above 0.2 volt, replace faulty positive battery cable.



4. Connect voltmeter (1) to measure between negative battery terminal post and a good clean ground on engine block (3). Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten negative battery cable attachment on engine block. Repeat test. If reading is still above 0.2 volt, replace faulty negative battery cable.





5. Connect positive lead of voltmeter (3) to starter housing (1). Connect negative lead of voltmeter to negative battery terminal post. Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, correct poor starter to engine block ground contact.
6. If equipped with dual battery system (certain diesel equipped models), connect positive lead of voltmeter to positive battery cable clamp on battery located on left side of vehicle. Connect negative lead of voltmeter to positive battery terminal post on battery located on right side of vehicle. Rotate and hold ignition switch in Start position. Observe voltmeter. If reading is above 0.2 volt, clean and tighten battery cables at both batteries. Repeat test. If reading is still above 0.2 volt, replace faulty positive battery cable.

If resistance tests detect no feed circuit problems, refer to **Starter Motor** in the Diagnosis and Testing.

CONTROL CIRCUIT TESTING

The starter control circuit components should be tested in the order in which they are listed, as follows:

- **Starter Relay** - Refer to **Starter Relay** Diagnosis and Testing.
- **Starter Solenoid** - Refer to **Starter Motor** Diagnosis and Testing.
- **Ignition Switch** - Refer to **Ignition Switch and Key Lock Cylinder**
- **Park/Neutral Position Switch** - Refer to **Park/Neutral Position Switch** in 21, Transmission.
- **Wire harnesses and connections** - Refer to 8, Wiring Diagrams.

SPECIFICATIONS

STARTING SYSTEM

Starter Motor and Solenoid			
Engine Application	3.7L	4.7L	5.7L
Manufacturer	Denso		
Part Number	56044734AA	56044735AB	56044736AB
Power Rating	1.2 Kilowatt / 1.6 Horsepower	1.2 Kilowatt / 1.6 Horsepower	1.4 Kilowatt / 1.9 Horsepower
Voltage	12 Volts		
Number of Brushes	4		
Drive Type	Gear Reduction		
Free Running Test Voltage	11 Volts		
Free Running Test Amperage Draw	73 Amperes		
Free Running Test Minimum Speed	3601 rpm		
Solenoid Closing Maximum Voltage Required	7.5 Volts		
* Cranking Amperage Draw Test	125 - 250 Amperes		
* Test at operating temperature. Cold engine, tight (new) engine, or heavy oil will increase starter amperage draw.			

SPECIFICATIONS - TORQUE - STARTING SYSTEM

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Battery Cable Eyelet Nut at Solenoid (large nut)	25	19	221
Starter Mounting Bolts	68	50	-

STARTER

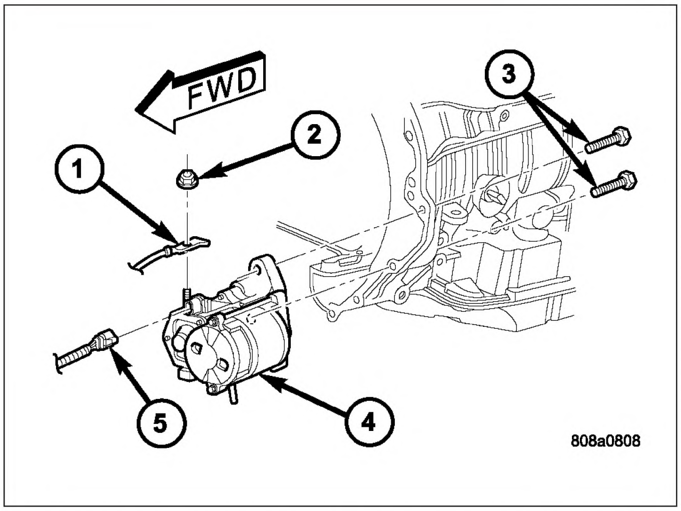
DIAGNOSIS AND TESTING - STARTER MOTOR

Correct starter motor operation can be confirmed by performing the following free running bench test. This test can only be performed with starter motor removed from vehicle. Refer to Specifications for starter motor specifications.

1. Remove starter motor from vehicle. Refer to Starter Motor Removal and Installation.
2. Mount starter motor securely in a soft-jawed bench vise. The vise jaws should be clamped on the mounting flange of starter motor. Never clamp on starter motor by field frame.
3. Connect a suitable volt-ampere tester and a 12-volt battery to starter motor in series, and set ammeter to 100 ampere scale. See instructions provided by manufacturer of volt-ampere tester being used.
4. Install jumper wire from solenoid terminal to solenoid battery terminal. The starter motor should operate. If starter motor fails to operate, replace faulty starter motor assembly.
5. Adjust carbon pile load of tester to obtain free running test voltage. Refer to Specifications for starter motor free running test voltage specifications.
6. Note reading on ammeter and compare reading to free running test maximum amperage draw. Refer to Specifications for starter motor free running test maximum amperage draw specifications.
7. If ammeter reading exceeds maximum amperage draw specification, replace faulty starter motor assembly.

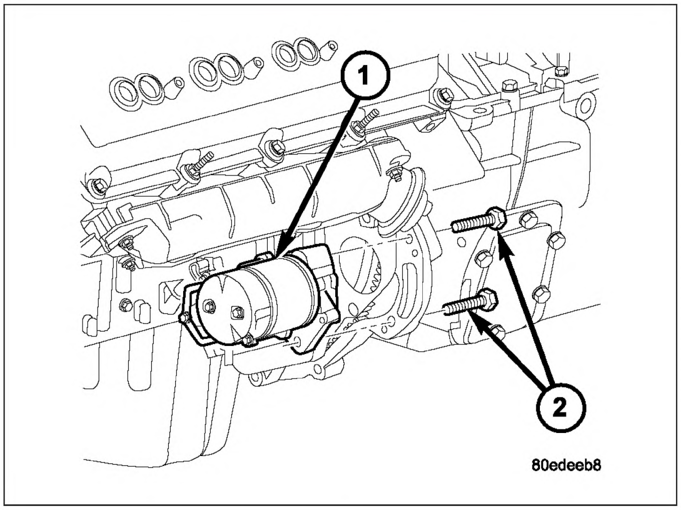
REMOVAL

3.7L / 4.7L



1. Disconnect and isolate negative battery cable.
2. Raise and support vehicle.
3. Note: If equipped with 4WD and certain transmissions, a support bracket is used between front axle and side of transmission. Remove 2 support bracket bolts at transmission. Pry support bracket slightly to gain access to lower starter mounting bolt.
4. Remove two bolts (3) if equipped with an automatic transmission.
5. Move starter motor (4) towards front of vehicle far enough for nose of starter pinion housing to clear housing. Always support starter motor during this process, do not let starter motor hang from wire harness.
6. Tilt nose downwards and lower starter motor far enough to access and remove nut (2) that secures battery positive cable wire harness connector eyelet (1) to solenoid battery terminal stud. Do not let starter motor hang from wire harness.
7. Remove battery positive cable wire harness connector eyelet (5) from solenoid battery terminal stud.
8. Disconnect battery positive cable wire harness connector from solenoid terminal connector receptacle.
9. Remove starter motor.

5.7L V-8

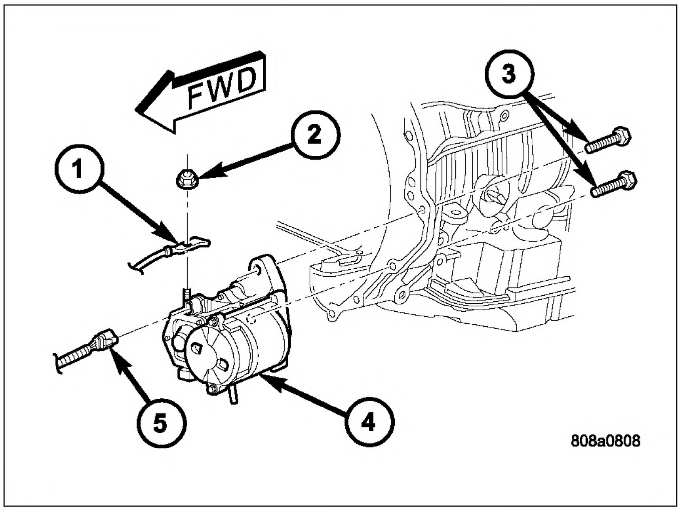


1. Disconnect and isolate negative battery cable.
2. Raise and support vehicle.
3. Note: If equipped with 4WD and certain transmissions, a support bracket is used between front axle and side of transmission. Remove 2 support bracket bolts at transmission. Pry support bracket slightly to gain access to lower starter mounting bolt.
4. Remove two mounting bolts (2).
5. Move starter motor towards front of vehicle far enough for nose of starter pinion housing to clear housing. Always support starter motor (1) during this process, do not let starter motor hang from wire harness.
6. Tilt nose downwards and lower starter motor far enough to access and remove nut that secures battery positive cable wire harness connector eyelet to solenoid battery terminal stud. Do not let starter motor hang from wire harness.
7. Remove battery positive cable wire harness connector eyelet from solenoid battery terminal stud.
8. Disconnect battery positive cable wire harness connector from solenoid terminal connector receptacle.
9. Remove starter motor.

INSTALLATION

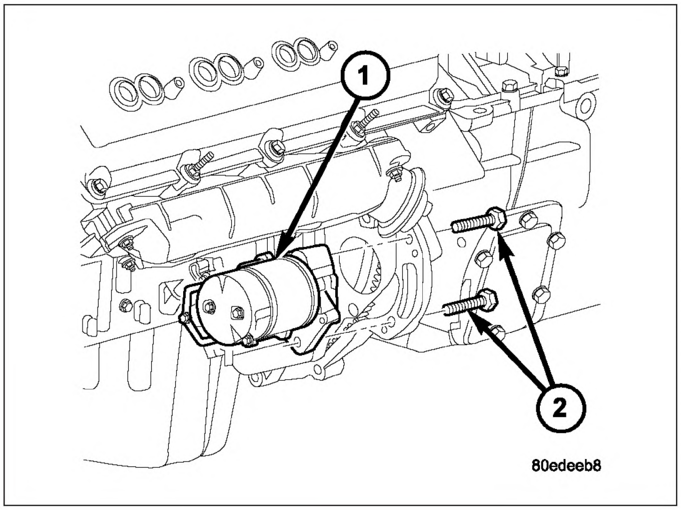
3.7L / 4.7L

1. Connect solenoid wire to starter motor (snaps on).
2. Position battery cable (1) to solenoid stud. Install and tighten battery cable eyelet nut (2). Refer to Torque Specifications. Do not allow starter motor to hang from wire harness.
3. Position starter motor (4) to transmission.
4. If equipped with automatic transmission, slide cooler tube bracket into position.
5. Install and tighten both bolts (3). Refer to Torque Specifications.
6. Lower vehicle.
7. Connect negative battery cable.



5.7L V-8

1. Connect solenoid wire to starter motor (snaps on).
2. Position battery cable to solenoid stud. Install and tighten battery cable eyelet nut. Refer to Torque Specifications. Do not allow starter motor to hang from wire harness.
3. Position starter motor (1) to engine.
4. If equipped with automatic transmission, slide cooler tube bracket into position.
5. Install and tighten both mounting bolts (2). Refer to Torque Specifications.
6. Lower vehicle.
7. Connect negative battery cable.



RELAY-STARTER MOTOR

DESCRIPTION

The starter relay is an electromechanical device that switches battery current to the pull-in coil of the starter solenoid when the ignition switch is turned to the Start position. The starter relay is located in the Power Distribution Center (PDC) in the engine compartment. See the PDC cover for relay identification and location.

The starter relay is a International Standards Organization (ISO) relay. Relays conforming to ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions.

The starter relay cannot be repaired or adjusted. If faulty or damaged, it must be replaced.

OPERATION

The ISO relay consists of an electromagnetic coil, a resistor or diode, and three (two fixed and one movable) electrical contacts. The movable (common feed) relay contact is held against one of the fixed contacts (normally closed) by spring pressure. When electromagnetic coil is energized, it draws the movable contact away from normally closed fixed contact, and holds it against the other (normally open) fixed contact.

When electromagnetic coil is de-energized, spring pressure returns movable contact to normally closed position. The resistor or diode is connected in parallel with electromagnetic coil within relay, and helps to dissipate voltage spikes produced when coil is de-energized.

REMOVAL

The starter relay is located in the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

1. Disconnect and isolate negative battery cable.
2. Remove cover from Power Distribution Center (PDC) for relay identification and location.
3. Remove starter relay from PDC.
4. Check condition of relay terminals and PDC connector terminals for damage or corrosion. Repair if necessary before installing relay.
5. Check for pin height (pin height should be the same for all terminals within the PDC connector). Repair if necessary before installing relay.

INSTALLATION

1. Push down firmly on starter relay until terminals are fully seated into PDC receptacle.
2. Install PDC cover.
3. Connect battery cable.

HEATED SYSTEMS

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HEATED GLASS - SERVICE INFORMATION

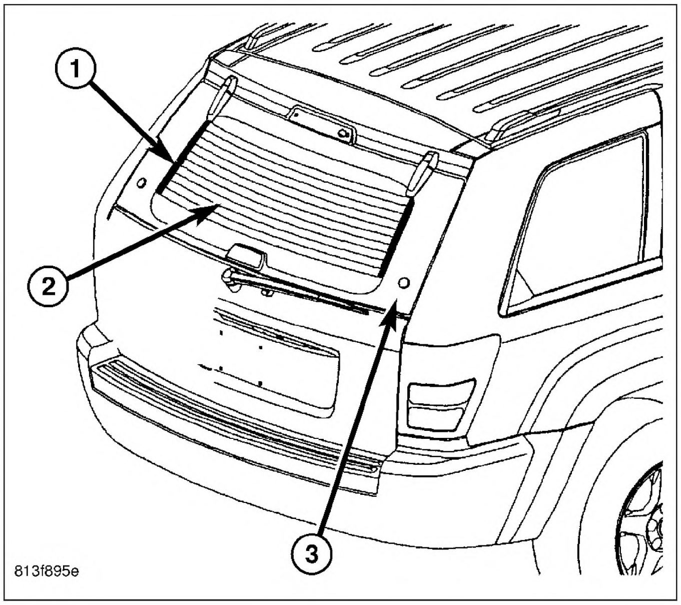
DESCRIPTION

CAUTION: Grid lines can be damaged or scraped off with sharp instruments. Care should be taken in cleaning glass or removing foreign materials, decals or stickers. Normal glass cleaning solvents or hot water used with rags or toweling is recommended.

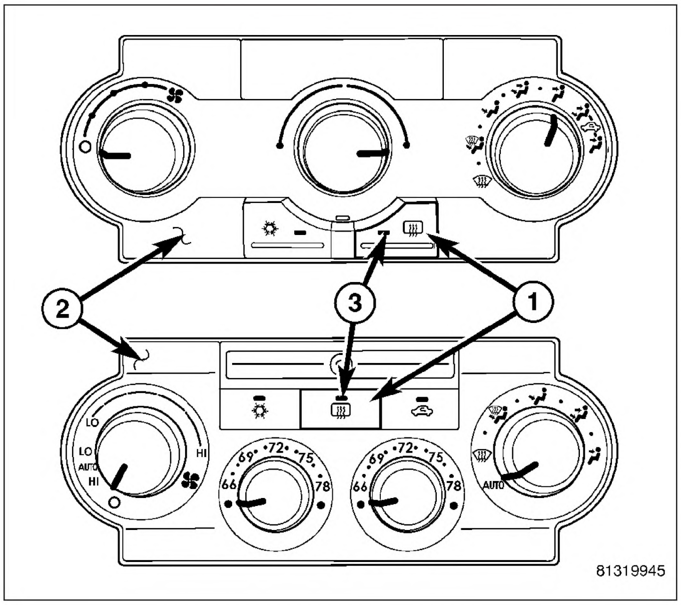
The rear window defogger system, also known as electric backlight (EBL), consists of two vertical bus bars (1) linked by a series of grid lines (2) fired onto the inside surface of the rear window (3).

The EBL system is turned On or Off by a switch and timing circuit integral to the A/C-heater control located at the center of the instrument panel.

Circuit protection is provided by two cartridge fuses located in the junction block (JB) inside of the vehicle. One fuse is for the heated rear window grid control circuit and the other fuse is for the heated outside mirror grid circuit, when equipped.



OPERATION



The electric backlight (EBL) system is controlled by a momentary switch (1) located in the A/C-heater control (2) on the instrument panel. When the rear window defogger switch is pressed to the On position, the A/C-heater control energizes the rear window defogger (EBL) relay and battery current is then directed through the relay and to the rear window defogger grid lines and the heated outside rear view mirrors, when equipped. The grid lines heat the glass to help clear the rear window and outside mirror surfaces of fog or frost.

An amber indicator (3) in the rear window defogger switch will illuminate to indicate when the EBL system is turned on. The A/C-heater control contains the EBL system control circuitry including the timer logic.

NOTE: The EBL system turns off automatically after ten minutes of initial operation. Each following activation cycle of the EBL system will last five minutes.

The EBL system will be automatically turned off after an initial programmed time interval of about ten minutes. After the initial time interval has expired, if the rear window defogger switch is turned on again during the same ignition cycle, the EBL system will automatically turn off after about five minutes. The EBL system will automatically shut off if the ignition switch is turned to the Off position, or it can be turned off manually by pressing the rear window defogger switch a second time.

Repair of the rear window defogger grid lines, bus bars, terminals or pigtail wires can be accomplished using the Mopar Rear Window Defogger Repair Kit (Part Number 04549275) or equivalent (Refer to 8 - ELECTRICAL/ HEATED GLASS/REAR WINDOW DEFOGGER GRID - STANDARD PROCEDURE - GRID LINE AND TERMINAL REPAIR).

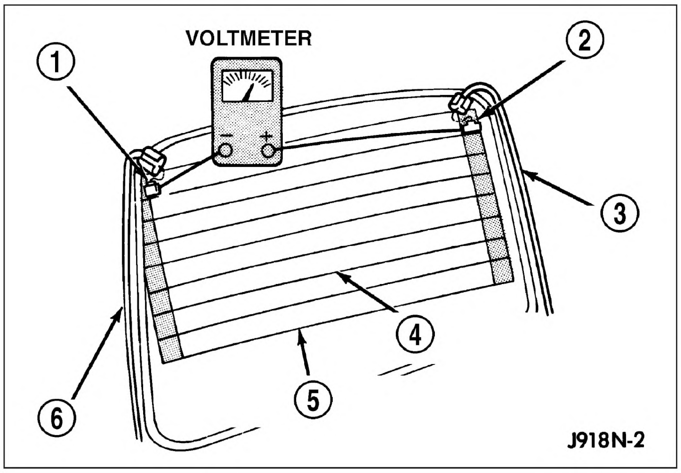
DIAGNOSIS AND TESTING

ELECTRIC BACKLIGHT (EBL) SYSTEM

NOTE: Illumination of the defogger switch indicator lamp does not necessary mean that electrical current is reaching the rear glass heating grid lines.

NOTE: For circuit descriptions and diagrams of the rear window defogger system, refer to 8W - WIRING DIAGRAM INFORMATION.

Operation of the electric backlight (EBL) system can be confirmed by the following:



1. If equipped with the automatic temperature control (ATC) heating-A/C system, use a scan tool and check for diagnostic trouble codes (DTCs) related to the A/C-heater control. If equipped with the manual temperature control (MTC) heating-A/C system, use the A/C-heater control to check for diagnostic trouble codes (DTCs) related to the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HVAC SELF DIAGNOSTICS). If no DTCs are found, go to Step 2. If any DTCs are found, repair as required, then proceed to Step 2
2. Turn the ignition switch to the On position. Set the rear window defogger switch in the On position. The rear window defogger operation can be checked by feeling the rear window or outside rear view mirror glass surfaces. A distinct difference in temperature between the grid lines (4 and 5) and the adjacent clear glass or the mirror glass should be detected within three to four minutes of operation.
3. If a temperature difference is not detected, use a 12-volt DC voltmeter and contact the rear glass heating grid terminal A (1) with the negative lead, and terminal B (2) with the positive lead. The voltmeter should read battery voltage. If the voltmeter does not read battery voltage, check the following:
   - Confirm that the ignition switch is in the On position.
   - Make sure that the rear glass heating grid feed wire (3) and ground wire (6) are connected to the terminals. Confirm that the ground wire has continuity to ground.
   - Check the EBL relay and the fuses located in the junction block (JB) inside of the vehicle. The relay and fuses must be tight in their receptacles and all electrical connections must be secure.

When the above steps have been completed and the rear glass heating grid is still inoperative, one or more of the following is faulty:

- Rear window defogger switch in the A/C-heater control.
- Rear window defogger grid lines (all grid lines would have to be broken, or the power feed or the ground wire disconnected, for the entire heating grid to be inoperative).

4. If the EBL system operation has been verified but the rear window defogger LED indicator does not illuminate, replace the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/CONTROL-A/C HEATER - REMOVAL).

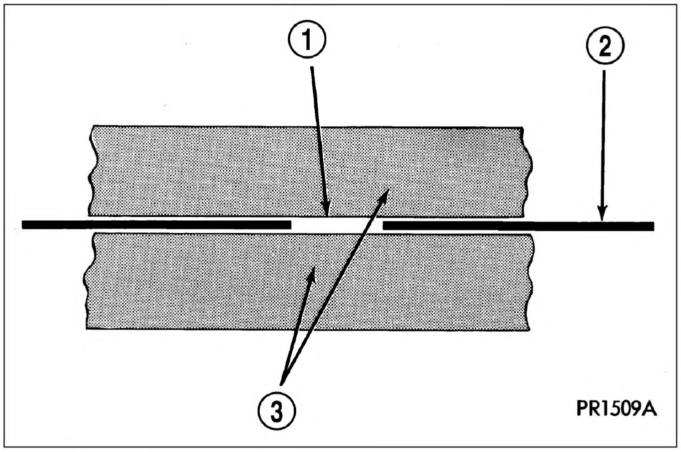
GRID-REAR WINDOW DEFOGGER

STANDARD PROCEDURE

GRID LINE AND TERMINAL REPAIR

WARNING: Materials contained in the Repair Kit (Part Number 04549275) may cause skin or eye irritation. The kit contains epoxy resin and amine type hardener, which are harmful if swallowed. Avoid contact with the skin and eyes. For skin contact, wash the affected areas with soap and water. For contact with the eyes, flush with plenty of water. Do not take internally. If taken internally, induce vomiting and call a physician immediately. Use with adequate ventilation. Do not use near fire or flame. Contains flammable solvents. Keep out of the reach of children. Failure to follow the warnings could result in possible personal injury or death.

Repair of the rear glass heating grid lines, bus bars, terminals or pigtail wires can be accomplished using the Mopar Rear Window Defogger Repair Kit (Part Number 04549275) or equivalent.



1. Mask the repair area with masking tape (3) so that the conductive epoxy can be applied neatly. Extend the epoxy application onto the grid line (2) or the bus bar on each side of the break (1).
2. Follow the instructions in the repair kit for preparing the damaged area.
3. Remove the package separator clamp and mix the two conductive epoxy components thoroughly within the packaging. Fold the package in half and cut the center corner to dispense the epoxy.
4. For grid line repairs, mask the area to be repaired with masking tape or use a template.
5. Apply the epoxy through the slit in the masking tape or template. Overlap both ends of the break by at least 19 millimeters (0.75 inch).
6. For a terminal or pigtail wire replacement, mask the adjacent areas so the epoxy can be extended onto the adjacent grid line as well as the bus bar. Apply a thin layer of epoxy to the area where the terminal or pigtail wire was fastened and onto the adjacent grid line.
7. Apply a thin layer of conductive epoxy to the terminal or bare wire end of the pigtail and place it in the proper location on the bus bar. To prevent the terminal or pigtail wire from moving while the epoxy is curing, it must be wedged or clamped.
8. Carefully remove the masking tape or template.

CAUTION: Do not allow the glass surface to exceed 204° C (400° F) when using a heat gun, or the glass may fracture.

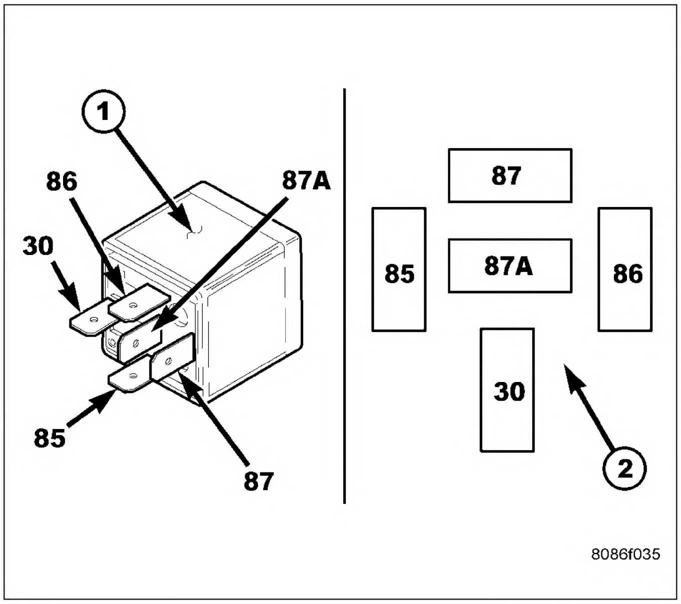
9. Allow the epoxy to cure 24 hours at room temperature, or carefully use a heat gun for fifteen minutes. When using a heat gun, hold it approximately 25.4 centimeters (10 inches) from the repair and do not allow the glass surface to exceed 204° C (400° F).
10. After the conductive epoxy is properly cured, remove the wedge or clamp from the terminal or pigtail wire.
11. Connect the wire harness leads to the grid terminals or pigtail wires and verify EBL operation.

RELAY-REAR WINDOW DEFOGGER

DESCRIPTION

The rear window defogger (EBL) relay (1) is a International Standards Organization (ISO)-type relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns (2). The EBL relay is a electromechanical device that switches fused battery current to the rear window defogger grid and when equipped, switches fused battery current through a fuse in the junction block (JB) to the outside rear view mirror heating grids. The EBL relay is energized when the relay coil is provided a ground path by the control circuitry within the A/C-heater control.

The EBL relay is located in the JB in the engine compartment.



OPERATION

The ISO-standard rear window defogger (EBL relay is an electromechanical switch that uses a low current input controlled by the A/C-heater control to control the high current output to the rear window defogger grid lines. The movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to the rear window defogger grid lines.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

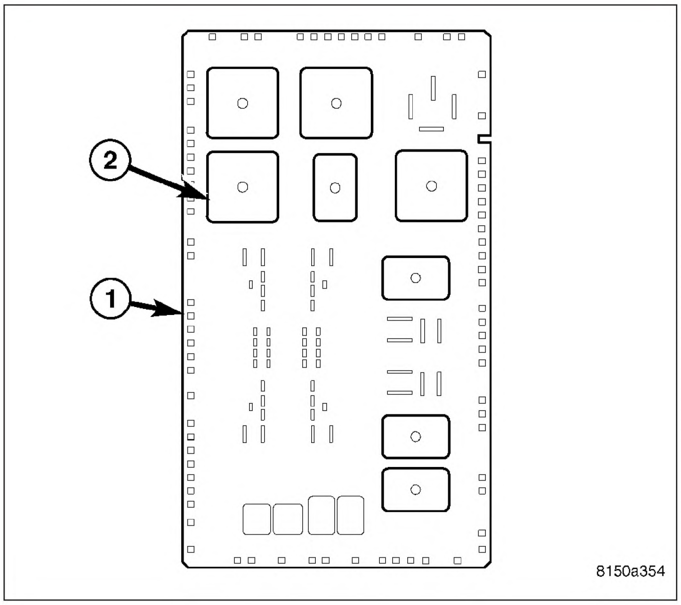
The EBL relay terminals are connected to the vehicle electrical system through a receptacle in the junction block (JB). The inputs and outputs of the EBL relay include:

- Terminal (30) receives battery current from a fused B(+) circuit at all times.
- Terminal (85) receives a ground through the EBL relay control circuit only when the A/C-heater control electronically pulls the circuit to ground.
- Terminal (86) receives fused battery current through the run relay only when the run relay coil is energized.
- Terminal (87) provides battery current to the rear window defogger grid through the EBL relay output circuit only when the EBL relay coil is energized.
- Terminal (87A) is not connected to any circuit in this application, but provides a battery current output only when the EBL relay coil is de-energized.

The EBL relay cannot be repaired and, if faulty or damaged, it must be replaced. Refer to the appropriate wiring information for diagnosis and testing of the ISO-standard relay and for complete rear window defogger (EBL) wiring diagrams.

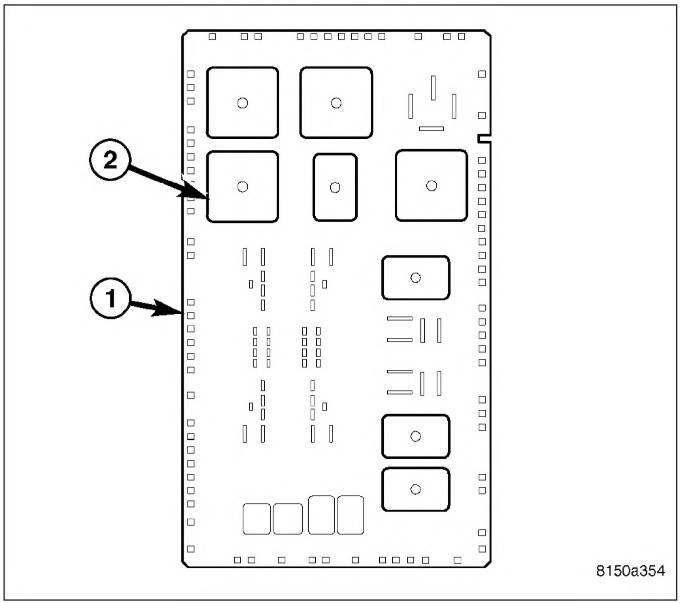
REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Remove the junction block (JB) (1) from underneath the instrument panel (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - REMOVAL).
3. Remove the EBL relay (2) from the top side of the JB.



INSTALLATION

1. Position the EBL relay (2) into the proper receptacle of the junction block (1) located in the passenger compartment.
2. Align the EBL relay terminals with the terminal cavities in the JB receptacle and push down firmly on the relay until the terminals are fully seated.
3. Install the junction block (JB) (1) (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - INSTALLATION).
4. Reconnect the negative battery cable.

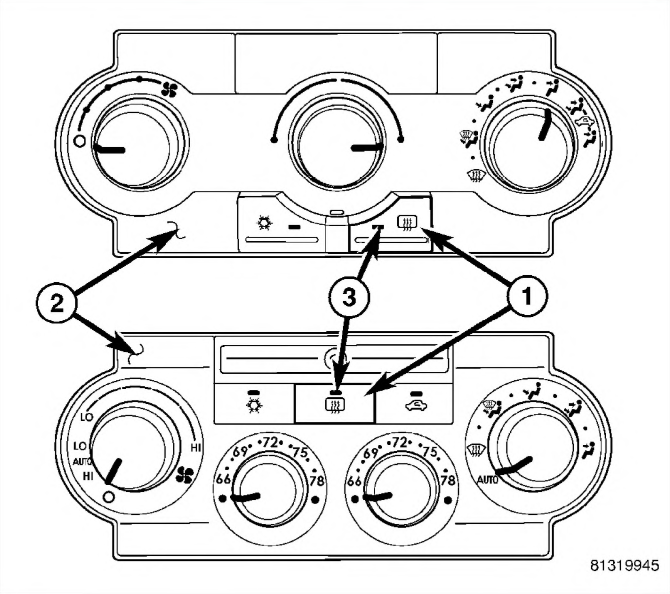


SWITCH-REAR WINDOW DEFOGGER

DESCRIPTION

The switch for the rear window defogger (EBL) system (1) is integrated into the A/C-heater control (2), which is located in the center of the instrument panel. When the rear window defogger switch is activated, the timing circuit integral to the A/C-heater control operates the rear window defogger (EBL) relay. An amber indicator (3) in the rear window defogger switch will illuminate to indicate when the EBL system is turned on.

When the EBL relay is activated, current is directed to the rear window defogger grid lines and when equipped, to the heated outside rear view mirrors. The grid lines heat the window and mirror glass to help clear the surfaces of fog or frost.



OPERATION

An LED indicator will illuminate when the rear window defogger switch is activated. When the switch is activated, the A/C-heater control operates the rear window defogger (EBL) relay. The EBL relay controls the current flow to the heating grid of the rear window and when equipped, the heated outside rear view mirrors.

NOTE: The EBL system turns off automatically after ten minutes of initial operation. Each following activation cycle of the EBL system will last five minutes.

The EBL system will initially be on for approximately ten minutes or until the rear window defogger switch or the ignition switch is turned off. After the initial time interval has expired, if the defogger switch is turned On again during the same ignition cycle, the EBL system will automatically turn off after about five minutes.

The rear window defogger switch and the rear window defogger LED indicator cannot be repaired and, if faulty or damaged, the A/C-heater control must be replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/CONTROL-A/C HEATER - REMOVAL).

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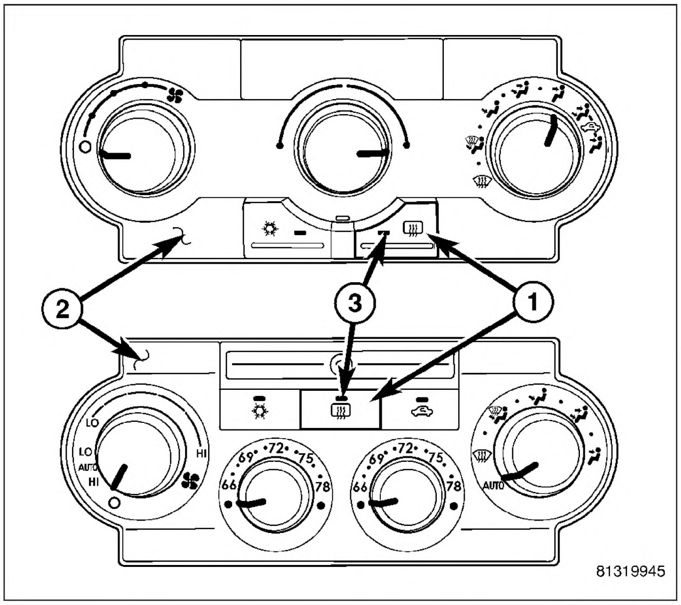
HEATED MIRRORS - SERVICE INFORMATION

DESCRIPTION

The optional heated mirror system is controlled by the momentary rear window defogger switch (1) which is integral to the A/C-heater control (2). An amber indicator lamp in the switch (3) will illuminate to indicate when the rear window defogger (EBL) system is turned on.



The heated mirror system only operates in concert with the EBL system, and will be automatically shut off after a programmed time interval of about ten minutes. After the initial time interval has expired, if the defogger switch is turned on again during the same ignition cycle, the heated mirror system will automatically shut off after about five minutes.

The heated mirror system will automatically shut off if the ignition switch is turned to the Off position, or it can be shut off manually by pressing the rear window defogger switch a second time.

Circuit protection is provided by a cartridge fuse located in the junction block (JB).

OPERATION

When the rear window defogger switch is pressed, the rear window defogger (EBL) system becomes activated and an electric heater grid located behind the glass of each of the outside rear view mirrors is energized. When energized, each of these heater grids produce heat to help clear the outside rear view mirrors of ice, snow, or fog.

If the outside mirror heating grids are both inoperative, refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING in this group. If only one of the outside mirror heating grids is inoperative, refer to 8 - ELECTRICAL/ POWER MIRRORS - DIAGNOSIS AND TESTING.

The heating grid behind each outside mirror glass cannot be repaired and, if faulty or damaged, the mirror glass must be replaced (Refer to 23 - BODY/EXTERIOR/MIRROR-SIDE VIEW - GLASS - REMOVAL).

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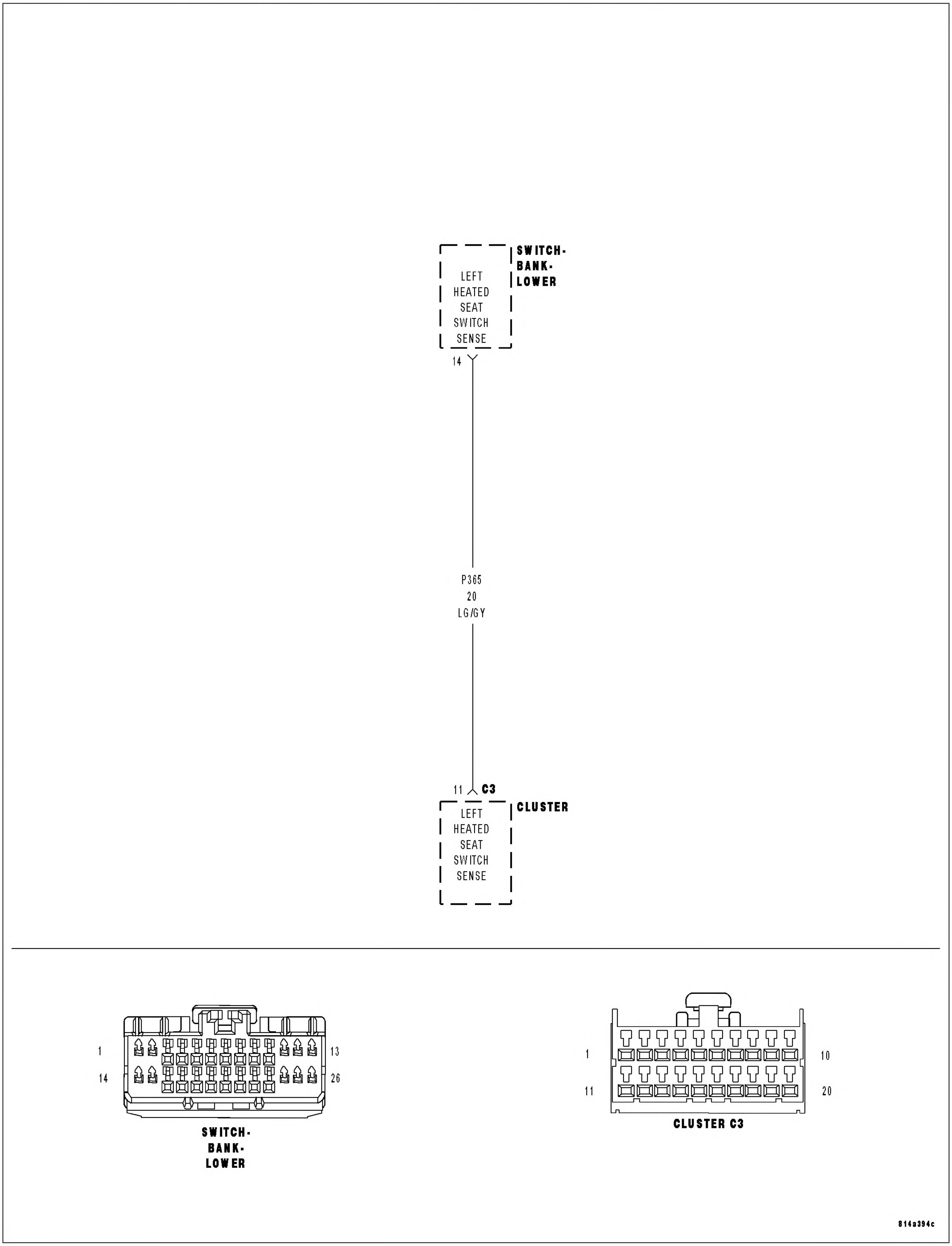
HEATED SEATS - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1085-LEFT HEATED SEAT SWITCH INPUT CIRCUIT LOW


SWITCH-
BANK-
LOWER
LEFT
HEATED
SEAT
SWITCH
SENSE
14
P365
20
LG/GY
11
C3
CLUSTER
LEFT
HEATED
SEAT
SWITCH
SENSE
1
13
14
26
SWITCH-
BANK-
LOWER
1
10
11
20
CLUSTER C3
814a394c

B1085-LEFT HEATED SEAT SWITCH INPUT CIRCUIT LOW (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on.
- **Set Condition:**This code is set when the Cluster detects the heated seat switch sense circuit is shorted low.

Possible Causes
(P365) LEFT HEATED SEAT SWITCH SENSE SHORTED TO GROUND
LOWER SWITCH BANK
CLUSTER

Diagnostic Test

1. VERIFY THAT DTC B1085-LEFT HEATED SEAT SWITCH INPUT CIRCUIT LOW IS ACTIVE

With the scan tool, record and erase DTC's

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

Does the DTC B1085 LEFT HEATED SEAT SWITCH INPUT CIRCUIT LOW reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

---

2. HEATED SEAT SWITCH

With the scan tool, record and erase DTC's

Disconnect the lower switch bank connector.

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

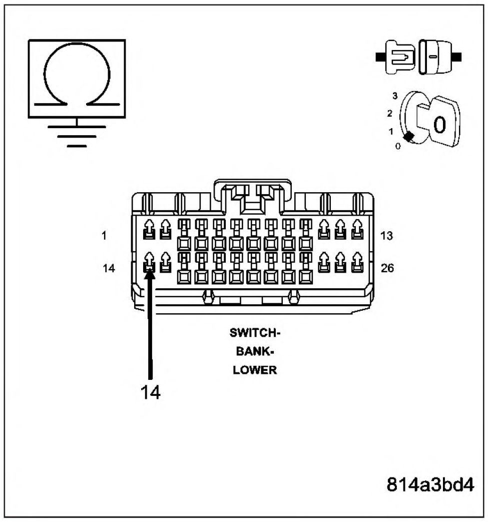
Does the DTC B1085 LEFT HEATED SEAT SWITCH INPUT CIRCUIT LOW reset?

Yes >> Go To 3

No >> Replace the lower switch bank.
Perform BODY VERIFICATION TEST – VER 1.

B1085-LEFT HEATED SEAT SWITCH INPUT CIRCUIT LOW (CONTINUED)

3. CHECK THE (P365) LEFT HEATED SEAT SWITCH SENSE CIRCUIT FOR A SHORT TO GROUND



Disconnect the Cluster C3 connector.

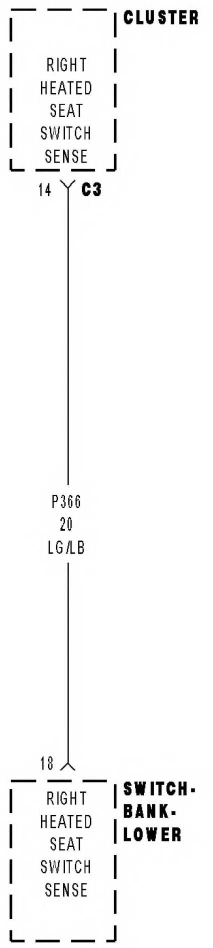
Measure the resistance between ground and the (P365) Left Heated Seat Switch Sense circuit.

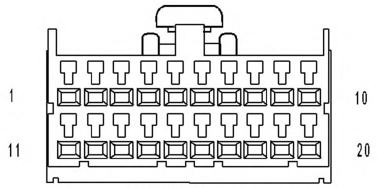
Was the resistance below 5.0 ohms?

Yes >> Repair the (P365) Left Heated Seat Switch Sense circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1.

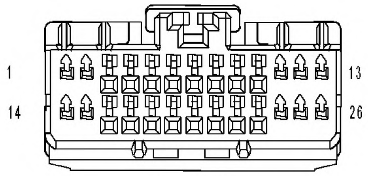
No >> Replace the Cluster.
Perform BODY VERIFICATION TEST – VER 1.

B1088-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT LOW


CLUSTER
RIGHT HEATED SEAT SWITCH SENSE
14
C3
P366
20
LG/LB
18
RIGHT HEATED SEAT SWITCH SENSE
SWITCH-BANK-LOWER



CLUSTER C3



SWITCH-BANK-LOWER

814a3f11

B1088-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT LOW (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on.
- **Set Condition:**This code is set whenever the Cluster detects the heated seat switch sense circuit is shorted low.

Possible Causes
(P366) RIGHT HEATED SEAT SWITCH SENSE SHORTED TO GROUND
LOWER SWITCH BANK
CLUSTER

Diagnostic Test

1. VERIFY THAT DTC B1088-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT LOW IS ACTIVE

With the scan tool, record and erase DTC's

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

Does the DTC B1088 RIGHT HEATED SEAT SWITCH INPUT CIRCUIT LOW reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

---

2. HEATED SEAT SWITCH

With the scan tool, record and erase DTC's

Disconnect the lower switch bank connector.

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

Does the DTC B1088 RIGHT HEATED SEAT SWITCH INPUT CIRCUIT LOW reset?

Yes >> Go To 3

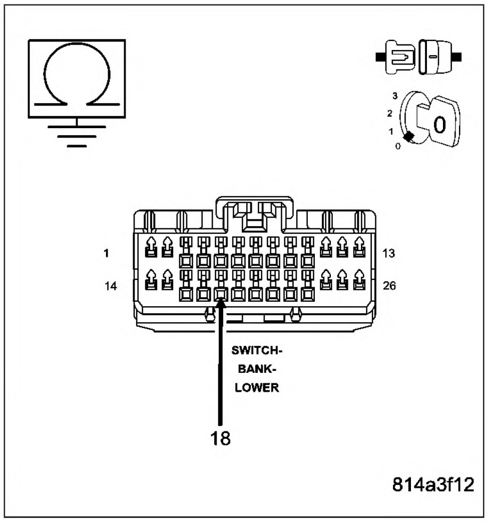
No >> Replace the lower switch bank.
Perform BODY VERIFICATION TEST – VER 1.

B1088-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT LOW (CONTINUED)

3. CHECK THE (P366) RIGHT HEATED SEAT SWITCH SENSE CIRCUIT FOR A SHORT TO GROUND

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the (P366) Right Heated Seat Switch Sense circuit.

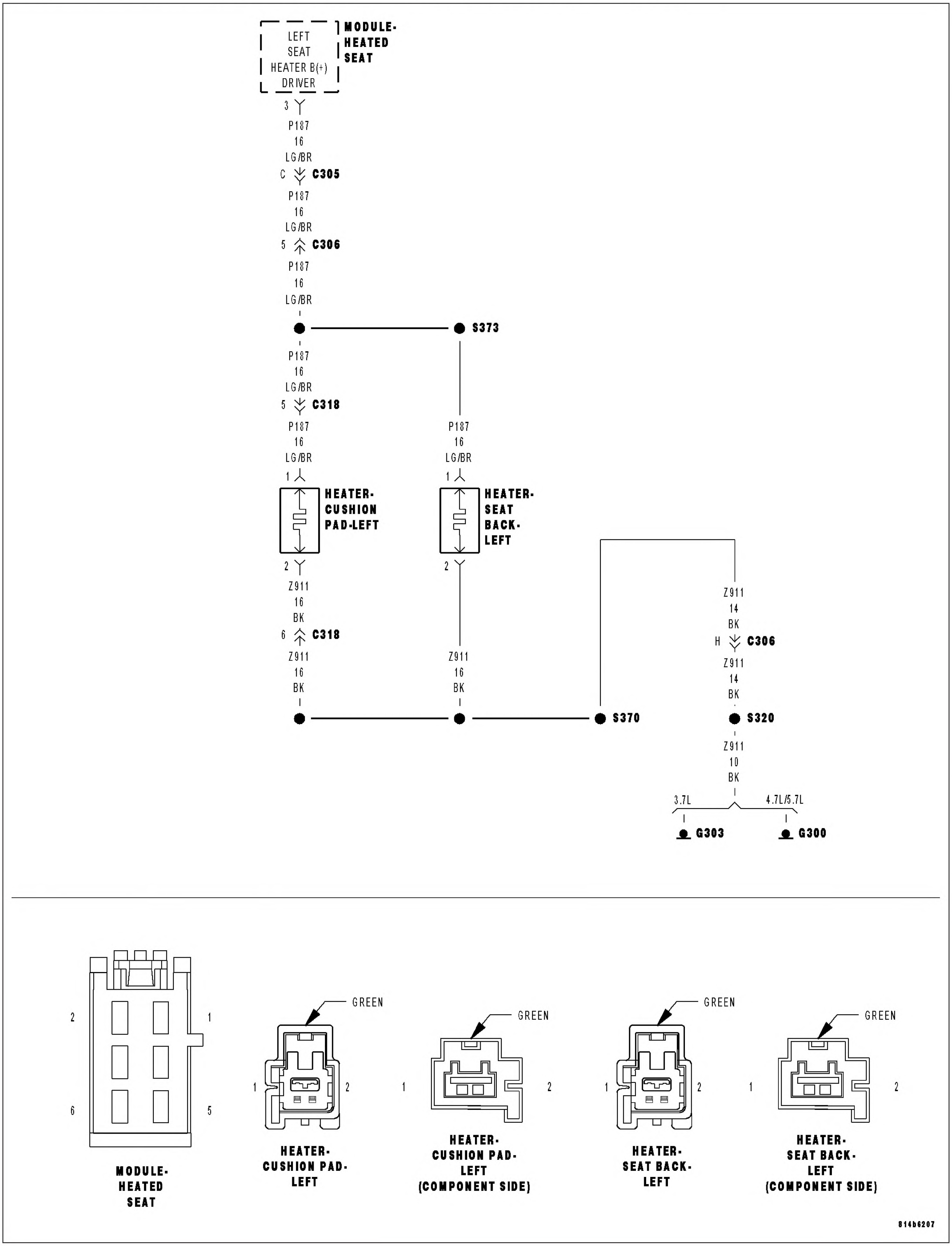


Was the resistance below 5.0 ohms?

Yes >> Repair the (P366) Right Heated Seat Switch Sense circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace the Cluster.
Perform BODY VERIFICATION TEST – VER 1.

B1092-FRONT LEFT SEAT HEATER CONTROL CIRCUIT LOW


MODULE-HEATED SEAT
LEFT SEAT HEATER B(+) DRIVER
3
P187 16 LG/BR
C C305
P187 16 LG/BR
5 C306
P187 16 LG/BR
S373
P187 16 LG/BR
5 C318
P187 16 LG/BR
P187 16 LG/BR
1
1
HEATER-CUSHION PAD-LEFT
HEATER-SEAT BACK-LEFT
2
2
Z911 16 BK
6 C318
Z911 16 BK
Z911 16 BK
Z911 14 BK
H C306
Z911 14 BK
S370
S320
Z911 10 BK
3.7L
4.7L/5.7L
G303
G300
2 1 6 5
MODULE-HEATED SEAT
GREEN
1 2
HEATER-CUSHION PAD-LEFT
GREEN
1 2
HEATER-CUSHION PAD-LEFT (COMPONENT SIDE)
GREEN
1 2
HEATER-SEAT BACK-LEFT
GREEN
1 2
HEATER-SEAT BACK-LEFT (COMPONENT SIDE)
814b6207

B1092-FRONT LEFT SEAT HEATER CONTROL CIRCUIT LOW (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on, during the heated seat operation.
- **Set Condition:**This code is set immediately after the Heated Seat Module detects the control circuit shorted to ground.

Possible Causes
(P187) LEFT SEAT HEATER B(+) DRIVER SHORTED TO GROUND
SEAT HEATER ELEMENT PIGTAIL HARNESS SHORTED
SEAT CUSHION HEATER ELEMENT SHORTED
SEAT BACK HEATER ELEMENT SHORTED
HEATED SEAT MODULE

Diagnostic Test

1. VERIFY THAT DTC B1092-FRONT LEFT SEAT HEATER CONTROL CIRCUIT LOW IS ACTIVE

With the scan tool, record and erase DTC's

Operate the Heated Seat Switch in both positions several times.

With the scan tool, read DTC's.

Does the DTC B1092 FRONT LEFT SEAT HEATER CONTROL CIRCUIT LOW reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

---

2. DISCONNECT LEFT SEAT INLINE CONNECTOR AND READ DTC'S

Disconnect the left seat C306 inline connector.

NOTE: Check connectors - Clean and repair as necessary.

With the scan tool, erase HSM DTC's

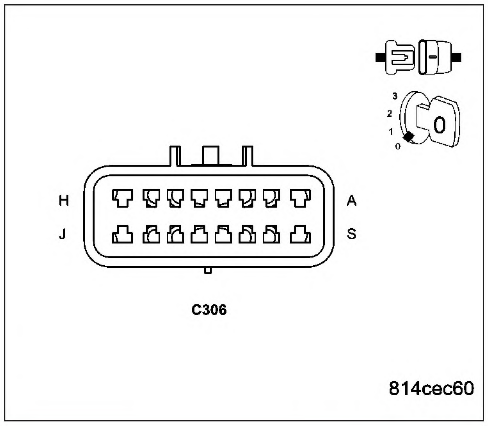
Operate the Heated Seat Switch in both positions several times.

With the scan tool, read DTC's.

Does the scan tool display the same DTC?

Yes >> Go To 6

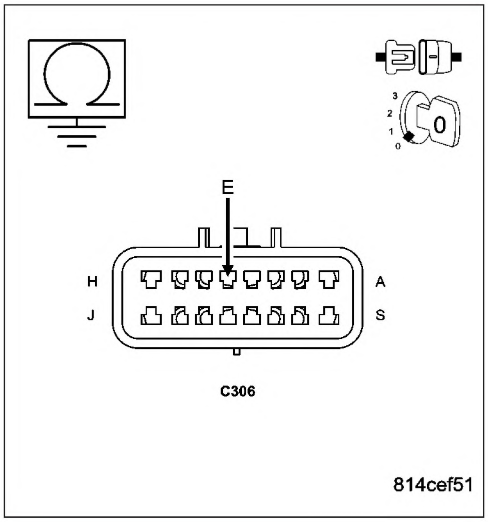
No >> Go To 3



B1092-FRONT LEFT SEAT HEATER CONTROL CIRCUIT LOW (CONTINUED)

3. CHECK THE (P187) LEFT SEAT HEATER B(+) DRIVER FOR A SHORT TO GROUND

Measure between the (P187) Left Seat Heater B(+) Driver circuit at the seat inline connector (seat side) and the seat frame for a short to ground.



Is the resistance below 1000 ohms?

Yes >> Repair/replace the pigtail/heating element as necessary for a short to ground condition.
Perform BODY VERIFICATION TEST – VER 1.

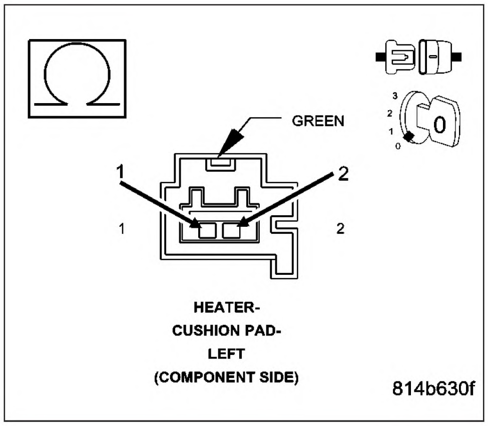
No >> Go To 4

---

4. CHECK THE LEFT CUSHION PAD HEATER RESISTANCE

Disconnect the Left Cushion Pad Heater 2 – way connector.

Check the resistance of the cushion heater element by measuring between the Left Seat Heater B(+) Driver and the Ground circuit at the left cushion pad connector (component side).



Was the resistance below 3.5 ohms?

Yes >> Replace the heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 5

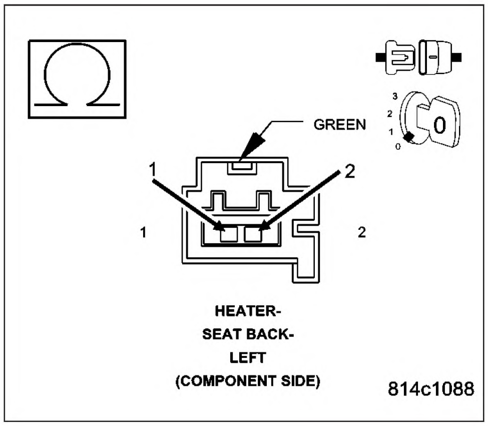
---

5. CHECK THE LEFT SEAT BACK HEATER RESISTANCE

Disconnect the Left Seat Back Heater 2 – way connector.

NOTE: Check connectors - Clean and repair as necessary.

Check the resistance of the seat back heater element by measuring between the Left Seat Heater B(+) Driver and the Ground circuit at the left seat back connector (component side).



Is the resistance below 4.0 ohms?

Yes >> Replace the seat back heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1

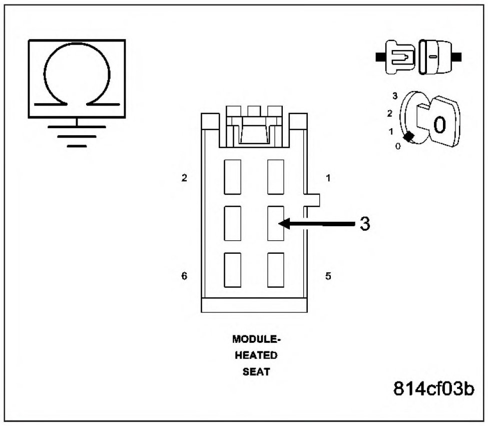
No >> Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for an intermittent short to ground.
Perform BODY VERIFICATION TEST – VER 1

B1092-FRONT LEFT SEAT HEATER CONTROL CIRCUIT LOW (CONTINUED)

6. Check the Left Seat Heater B(+) Driver circuit for a short to ground

Disconnect the Heated Seat Module connector.

NOTE: Check connectors - Clean and repair as necessary.
Measure the Left Seat Heater B(+) Driver circuit to ground at the HSM connector.

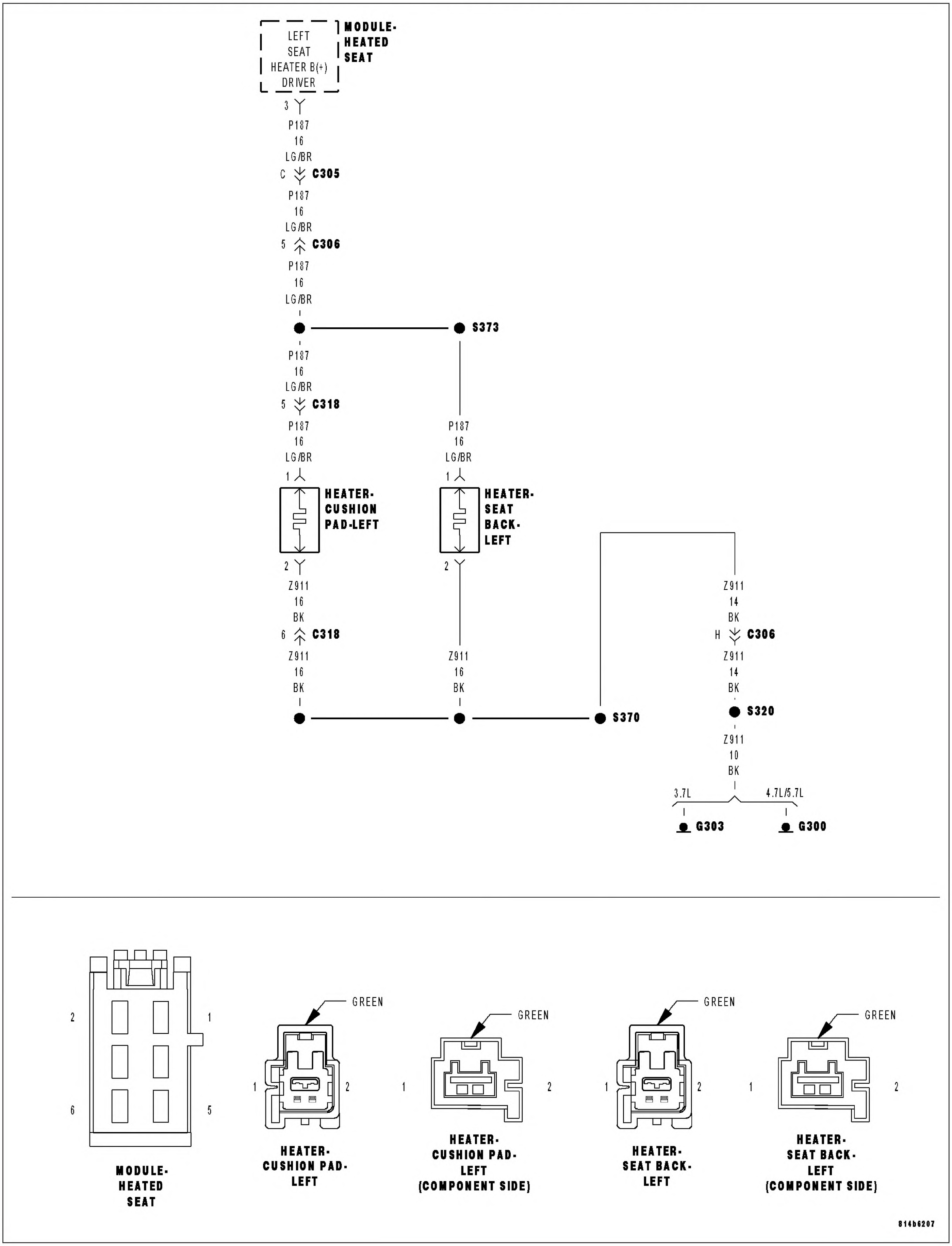


Is the resistance below 5.0 ohms?

Yes >> Repair the Left Seat Heater B(+) Driver circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace the Heated Seat Module.
Perform BODY VERIFICATION TEST – VER 1.

B1094-FRONT LEFT SEAT HEATER CONTROL CIRCUIT OPEN


LEFT SEAT HEATER B(+) DRIVER
MODULE-HEATED SEAT
3
P187 16 LG/BR
C C305
5 C306
S373
5 C318
1
HEATER-CUSHION PAD-LEFT
HEATER-SEAT BACK-LEFT
2
Z911 16 BK
6 C318
Z911 14 BK
H C306
S370
S320
Z911 10 BK
3.7L
4.7L/5.7L
G303
G300
2
1
6
5
MODULE-HEATED SEAT
GREEN
HEATER-CUSHION PAD-LEFT
HEATER-CUSHION PAD-LEFT (COMPONENT SIDE)
HEATER-SEAT BACK-LEFT
HEATER-SEAT BACK-LEFT (COMPONENT SIDE)
814b6207

B1094-FRONT LEFT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on, during the heated seat operation.
- **Set Condition:**This code is set immediately after the Heated Seat Module detects an open in the seat heater B(+) driver circuit.

Possible Causes
LEFT SEAT HEATER B(+) DRIVER WIRE OPEN
GROUND WIRE OPEN
SEAT CUSHION HEATER ELEMENT OPEN
SEAT BACK HEATER ELEMENT OPEN
HEATED SEAT MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. VERIFY THAT DTC B1094-FRONT LEFT SEAT HEATER CONTROL CIRCUIT OPEN IS ACTIVE

With the scan tool, record and erase DTC's

Operate the Heated Seat Switch in both positions several times.

With the scan tool, read DTC's.

Does the DTC B1094 FRONT LEFT SEAT HEATER CONTROL CIRCUIT OPEN reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

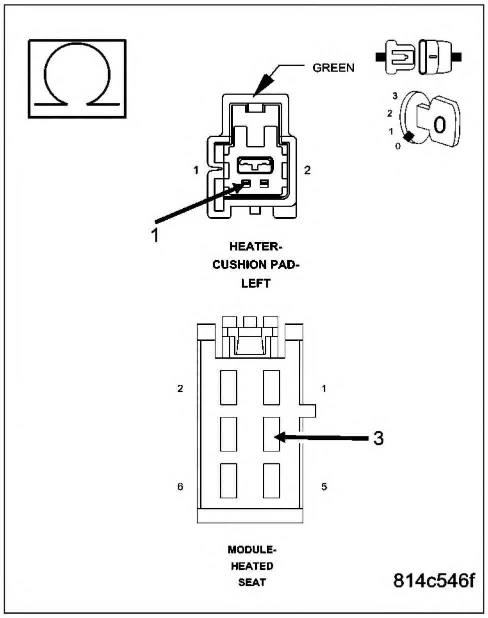
B1094-FRONT LEFT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

2. CHECK FOR AN OPEN SEAT HEATER B(+) DRIVER FROM HSM TO SEAT CUSHION

Disconnect the Left Cushion Pad Heater 2 – way connector.

Disconnect the Heated Seat Module 6 – way connector.

NOTE: Check connectors - Clean and repair as necessary.
Measure the resistance of the Left Seat Heater B(+) Driver circuit from the HSM 6 – way to the Cushion Pad Heater 2 – way connector.


GREEN
3
2
1
0
0
1
2
1
HEATER-
CUSHION PAD-
LEFT
2
1
3
6
5
MODULE-
HEATED
SEAT
814c546f

Is the resistance below 2 ohms?

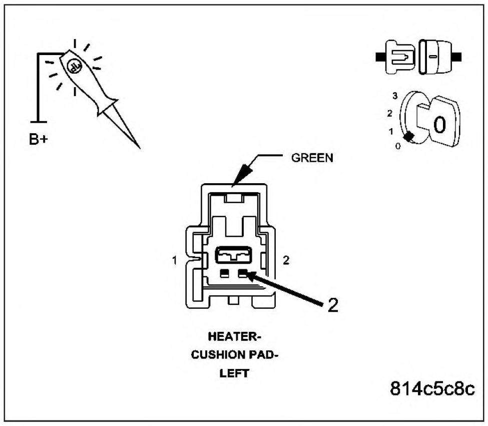
Yes >> Go To 3

No >> Repair the open Seat Heater B(+) Driver circuit.
Perform BODY VERIFICATION TEST – VER 1.

---

3. CHECK THE LEFT SEAT HEATER CUSHION GROUND CIRCUIT

Using a 12-volt test light connected to 12-volts, check the ground circuit at the Heater Cushion Pad 2 – way connector.


B+
3
2
1
0
0
GREEN
1
2
2
HEATER-
CUSHION PAD-
LEFT
814c5c8c

Does the test light illuminate brightly?

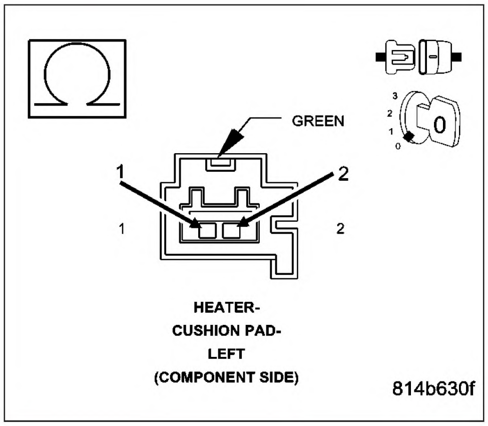
Yes >> Go To 4

No >> Repair the open ground circuit.
Perform BODY VERIFICATION TEST – VER 1.

B1094-FRONT LEFT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

4. CHECK THE LEFT CUSHION PAD HEATER RESISTANCE

Check the resistance of the Cushion Pad Heater element by measuring between the Left Seat Heater B(+) Driver and the Ground circuit at the 2 – way connector (component side).


GREEN
1
2
1
2
3
2
1
0
0
HEATER-
CUSHION PAD-
LEFT
(COMPONENT SIDE)
814b630f

Is the resistance above 4.9 ohms?

Yes >> Replace the seat cushion pad heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1.

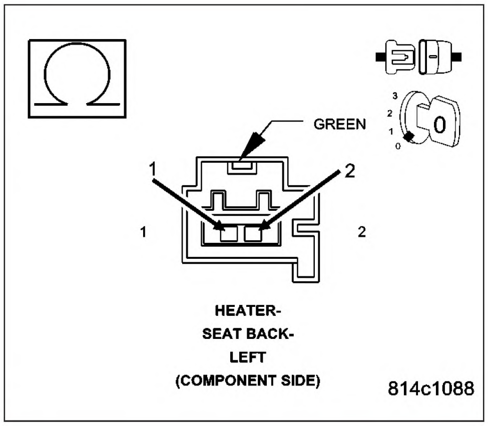
No >> 5
Perform BODY VERIFICATION TEST – VER 1.

---

5. CHECK THE LEFT SEAT BACK HEATER RESISTANCE

Disconnect the Left Seat Back Heater 2 – way connector.

NOTE: Check connectors - Clean and repair as necessary.
Check the resistance of the seat back heater element by measuring between the Left Seat Heater B(+) Driver and the Ground circuit at the connector 2 – way (component side).


GREEN
1
2
1
2
3
2
1
0
0
HEATER-
SEAT BACK-
LEFT
(COMPONENT SIDE)
814c1088

Is the resistance above 5.5 ohms?

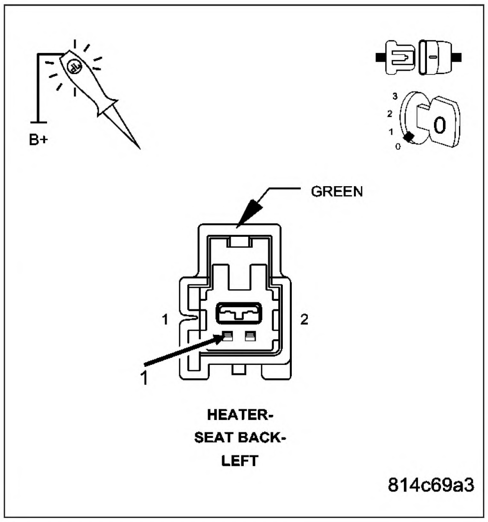
Yes >> Replace the seat back heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1.

No >> 6
Perform BODY VERIFICATION TEST – VER 1.

---

6. CHECK THE LEFT SEAT BACK HEATER GROUND CIRCUIT

Using a 12-volt test light connected to 12-volts, check the ground circuit at the Seat Back Heater 2 – way connector.


B+
3
2
1
0
0
GREEN
1
2
1
HEATER-
SEAT BACK-
LEFT
814c69a3

Does the test light illuminate brightly?

Yes >> Go To 7

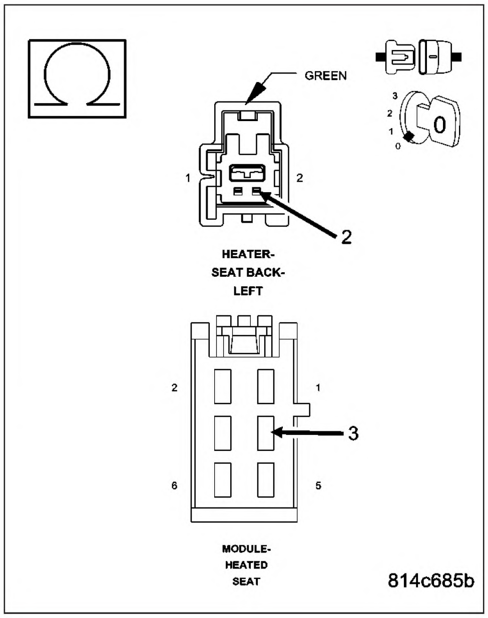
No >> Repair the open ground circuit.
Perform BODY VERIFICATION TEST – VER 1.

B1094-FRONT LEFT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

7. CHECK FOR AN OPEN SEAT HEATER B(+) DRIVER FROM HSM TO SEAT BACK

NOTE: Check connectors - Clean and repair as necessary.

Measure the Left Seat Heater B(+) Driver circuit from the Seat Back connector to the HSM connector.

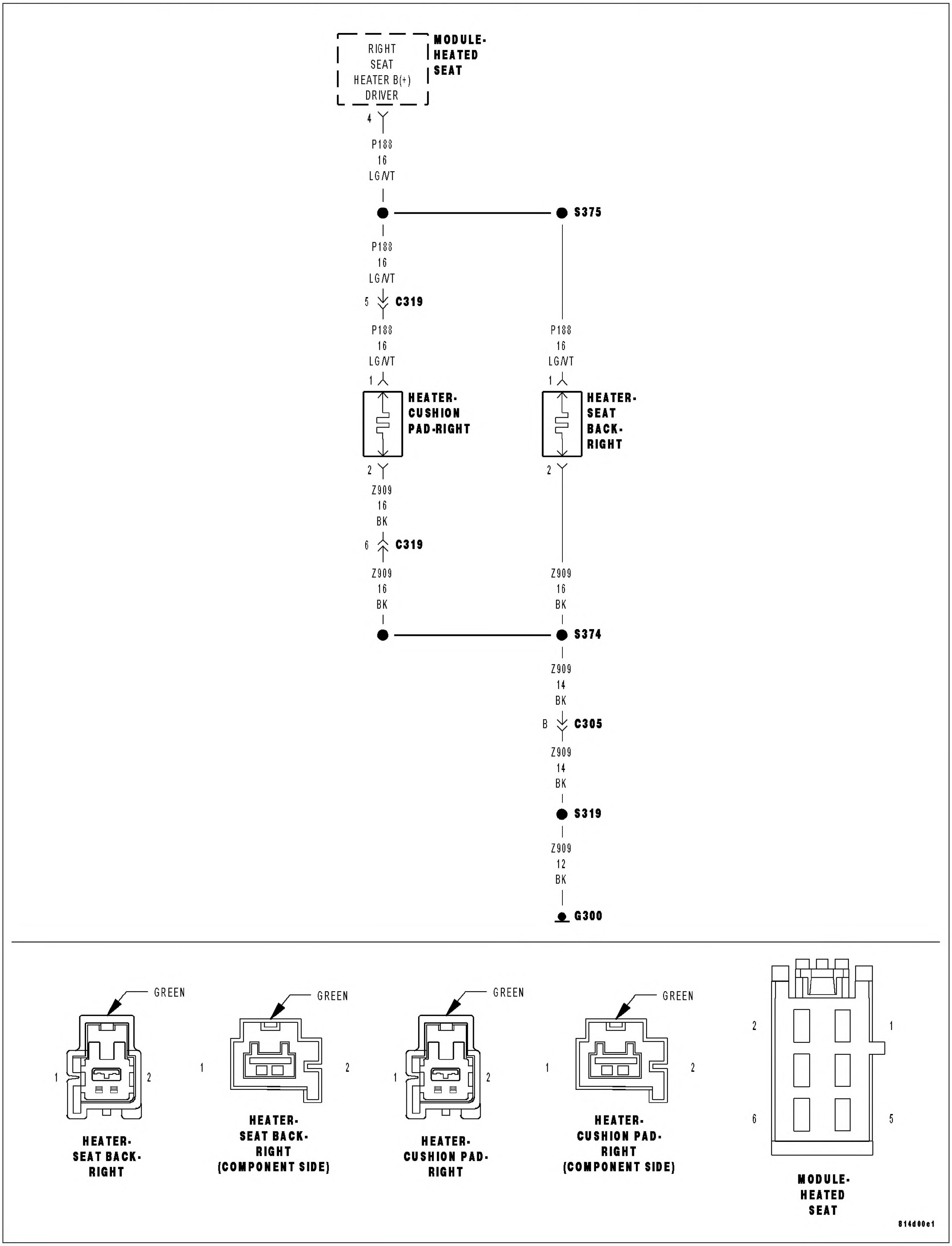

GREEN
3
2
1
0
0
1
2
2
HEATER-
SEAT BACK-
LEFT
2
1
3
6
5
MODULE-
HEATED
SEAT
814c685b

Is the resistance below 2.0 ohms?

Yes >> Replace the Heated Seat Module.
Perform BODY VERIFICATION TEST – VER 1.

No >> Repair the Left Seat Heater B(+) Driver circuit for an open back to the splice.
Perform BODY VERIFICATION TEST – VER 1.

B1096-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT LOW


RIGHT SEAT HEATER B(+) DRIVER
MODULE-HEATED SEAT
4
P188 16 LG/VT
S375
P188 16 LG/VT
5
C319
P188 16 LG/VT
P188 16 LG/VT
1
1
HEATER-CUSHION PAD-RIGHT
HEATER-SEAT BACK-RIGHT
2
2
Z909 16 BK
6
C319
Z909 16 BK
Z909 16 BK
S374
Z909 14 BK
B
C305
Z909 14 BK
S319
Z909 12 BK
G300
GREEN
1
2
HEATER-SEAT BACK-RIGHT
GREEN
1
2
HEATER-SEAT BACK-RIGHT (COMPONENT SIDE)
GREEN
1
2
HEATER-CUSHION PAD-RIGHT
GREEN
1
2
HEATER-CUSHION PAD-RIGHT (COMPONENT SIDE)
2
1
6
5
MODULE-HEATED SEAT
814d00e1

B1096-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT LOW (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on, during the heated seat operation.
- **Set Condition:**This code is set immediately after the Heated Seat Module detects the control circuit shorted to ground.

Possible Causes
(P188) LEFT SEAT HEATER B(+) DRIVER SHORTED TO GROUND
SEAT HEATER ELEMENT PIGTAIL HARNESS SHORTED
SEAT CUSHION HEATER ELEMENT SHORTED
SEAT BACK HEATER ELEMENT SHORTED
HEATED SEAT MODULE

Diagnostic Test

1. VERIFY THAT DTC B1096-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT LOW IS ACTIVE

With the scan tool, record and erase DTC's

Operate the Heated Seat Switch in both positions several times.

With the scan tool, read DTC's.

Does the DTC B1096 FRONT RIGHT SEAT HEATER CONTROL CIRCUIT LOW reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

---

2. DISCONNECT RIGHT SEAT INLINE CONNECTOR AND READ DTC'S

Disconnect the right seat C305 inline connector.

NOTE: Check connectors - Clean and repair as necessary.

With the scan tool, erase HSM DTC's

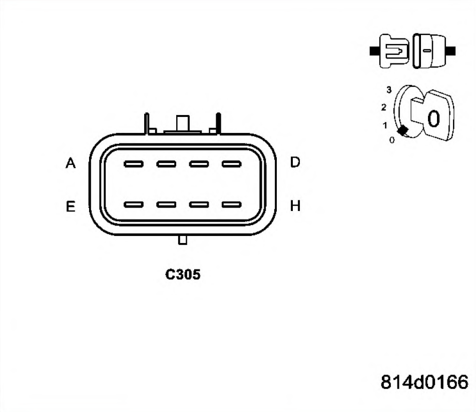
Operate the Heated Seat Switch in both positions several times.

With the scan tool, read DTC's.

Does the scan tool display the same DTC?

Yes >> Go To 6

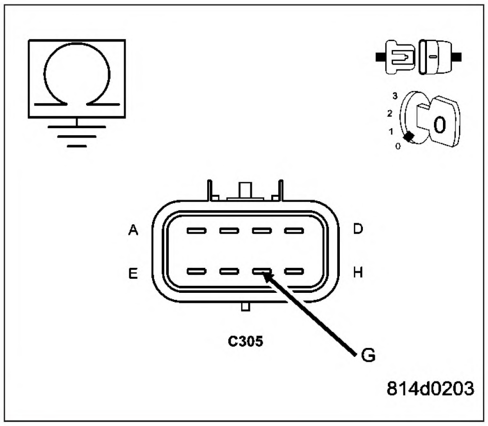
No >> Go To 3



B1096-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT LOW (CONTINUED)

3. CHECK THE (P188) RIGHT SEAT HEATER B(+) DRIVER FOR A SHORT TO GROUND

Measure between the (P188) Right Seat Heater B(+) Driver circuit at the seat inline connector (seat side) and the seat frame for a short to ground.



Is the resistance below 1000 ohms?

Yes >> Repair/replace the pigtail/heating element as necessary for a short to ground condition.
Perform BODY VERIFICATION TEST – VER 1.

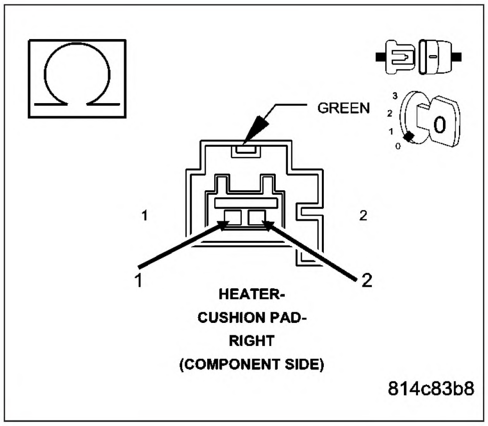
No >> Go To 4

---

4. CHECK THE RIGHT CUSHION PAD HEATER RESISTANCE

Disconnect the Right Cushion Pad Heater 2 – way connector.

Check the resistance of the cushion heater element by measuring between the Right Seat Heater B(+) Driver and the Ground circuit at the right cushion pad connector (component side).



Was the resistance below 3.5 ohms?

Yes >> Replace the heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1.

No >> Go To 5

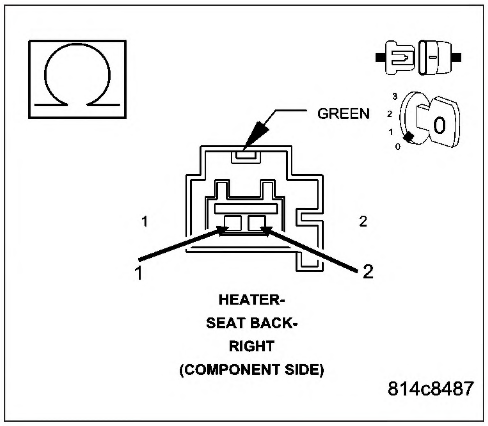
---

5. CHECK THE RIGHT SEAT BACK HEATER RESISTANCE

Disconnect the RIght Seat Back Heater 2 – way connector.

NOTE: Check connectors - Clean and repair as necessary.

Check the resistance of the seat back heater element by measuring between the Right Seat Heater B(+) Driver and the Ground circuit at the right seat back connector (component side).



Is the resistance below 4.0 ohms?

Yes >> Replace the seat back heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1

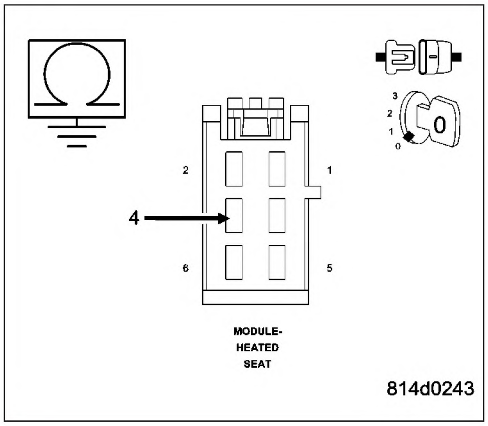
No >> Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for an intermittent short to ground.
Perform BODY VERIFICATION TEST – VER 1

B1096-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT LOW (CONTINUED)

6. Check the Right Seat Heater B(+) Driver circuit for a short to ground

Disconnect the Heated Seat Module connector.

NOTE: Check connectors - Clean and repair as necessary.
Measure the Right Seat Heater B(+) Driver circuit to ground at the HSM connector.

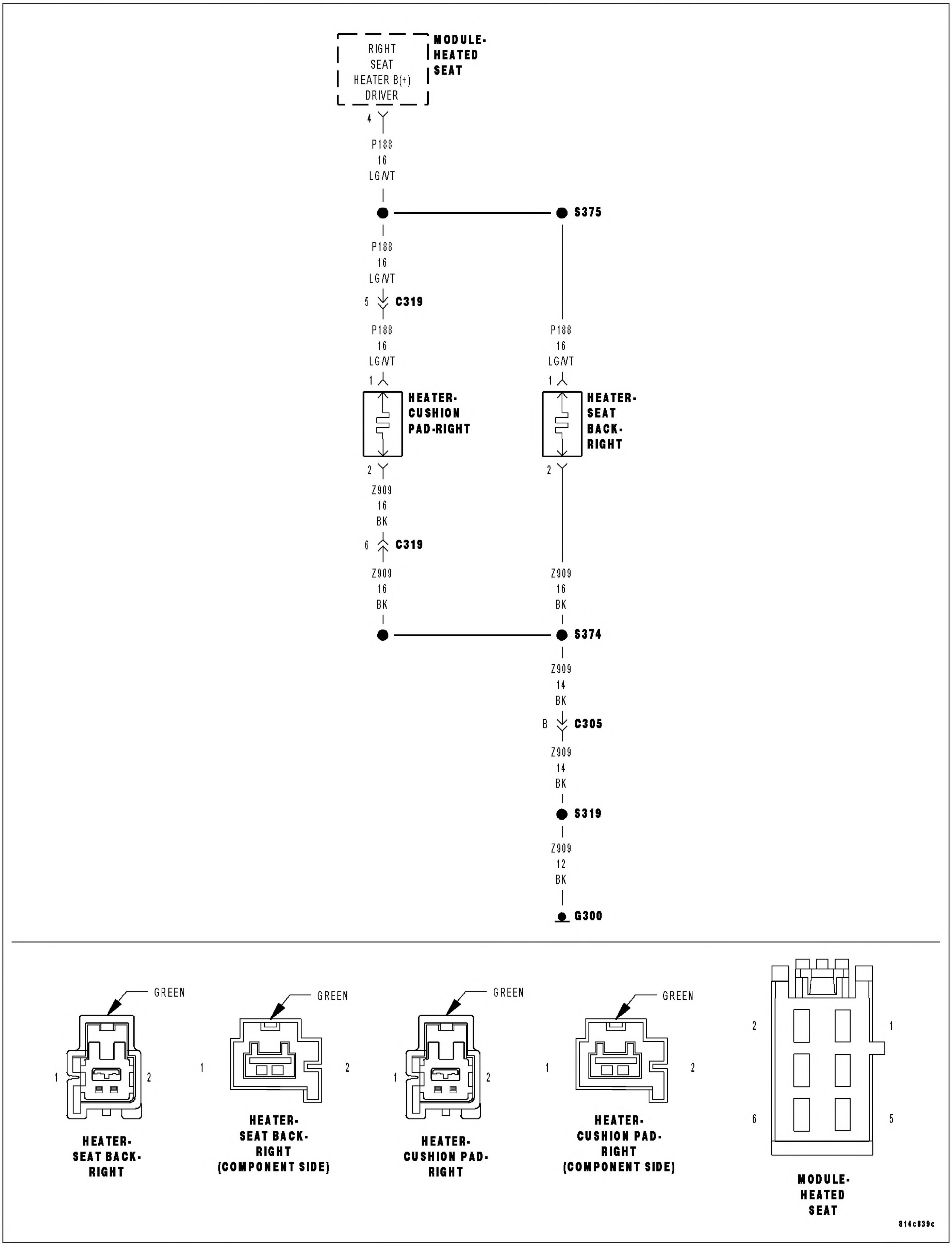


Is the resistance below 5.0 ohms?

Yes >> Repair the Right Seat Heater B(+) Driver circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace the Heated Seat Module.
Perform BODY VERIFICATION TEST – VER 1.

B1098-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT OPEN


RIGHT SEAT HEATER B(+) DRIVER
MODULE-HEATED SEAT
4
P188 16 LG/VT
S375
P188 16 LG/VT
5 C319
P188 16 LG/VT
P188 16 LG/VT
1
1
HEATER-CUSHION PAD-RIGHT
HEATER-SEAT BACK-RIGHT
2
2
Z909 16 BK
6 C319
Z909 16 BK
Z909 16 BK
S374
Z909 14 BK
B C305
Z909 14 BK
S319
Z909 12 BK
G300
GREEN
1
2
HEATER-SEAT BACK-RIGHT
GREEN
1
2
HEATER-SEAT BACK-RIGHT (COMPONENT SIDE)
GREEN
1
2
HEATER-CUSHION PAD-RIGHT
GREEN
1
2
HEATER-CUSHION PAD-RIGHT (COMPONENT SIDE)
2
1
6
5
MODULE-HEATED SEAT
814c839c

B1098-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on, during the heated seat operation.
- **Set Condition:**This code is set immediately after the Heated Seat Module detects an open in the seat heater B(+) driver circuit.

Possible Causes
RIGHT SEAT HEATER B(+) DRIVER WIRE OPEN
GROUND WIRE OPEN
SEAT CUSHION HEATER ELEMENT OPEN
SEAT BACK HEATER ELEMENT OPEN
HEATED SEAT MODULE

Diagnostic Test

1. VERIFY THAT DTC B1098-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT OPEN IS ACTIVE

With the scan tool, record and erase DTC’s

Operate the Heated Seat Switch in both positions several times.

With the scan tool, read DTC’s.

Does the DTC B1098 FRONT RIGHT SEAT HEATER CONTROL CIRCUIT OPEN reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

B1098-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

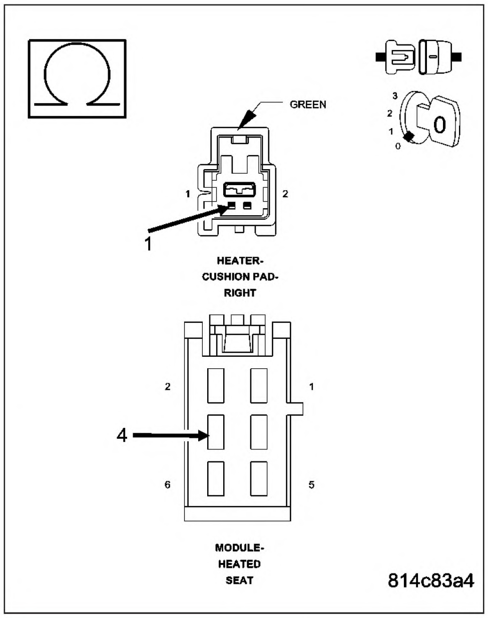
2. CHECK FOR AN OPEN SEAT HEATER B(+) DRIVER FROM HSM TO SEAT CUSHION

Disconnect the Right Cushion Pad Heater 2 – way connector.

Disconnect the Heated Seat Module 6 – way connector.

NOTE: Check connectors - Clean and repair as necessary.

Measure the resistance of the Right Seat Heater B(+) Driver circuit from the HSM 6 – way to the Cushion Pad Heater 2 – way connector.


GREEN
3
2
1
0
1
2
1
HEATER-
CUSHION PAD-
RIGHT
2
1
4
6
5
MODULE-
HEATED
SEAT
814c83a4

Is the resistance below 2 ohms?

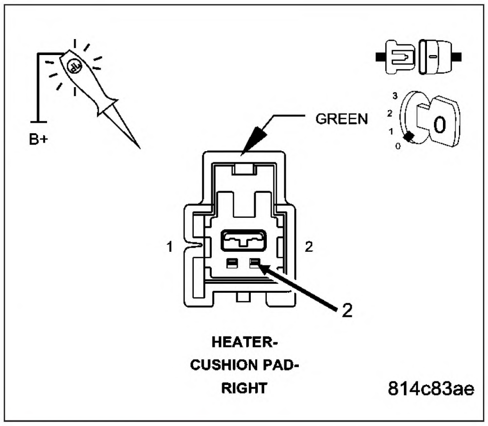
Yes >> Go To 3

No >> Repair the open Seat Heater B(+) Driver circuit.
Perform BODY VERIFICATION TEST – VER 1.

---

3. CHECK THE RIGHT SEAT HEATER CUSHION GROUND CIRCUIT

Using a 12-volt test light connected to 12-volts, check the ground circuit at the Heater Cushion Pad 2 – way connector.


B+
GREEN
3
2
1
0
1
2
2
HEATER-
CUSHION PAD-
RIGHT
814c83ae

Does the test light illuminate brightly?

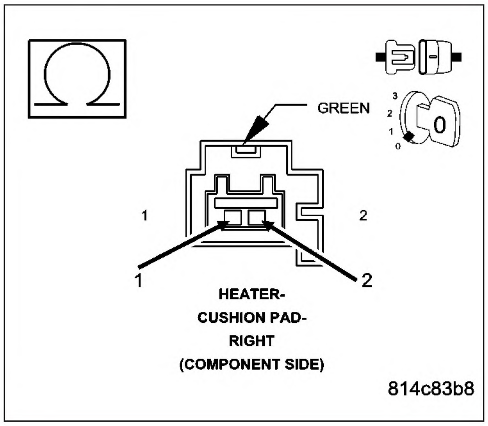
Yes >> Go To 4

No >> Repair the open ground circuit.
Perform BODY VERIFICATION TEST – VER 1.

B1098-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

4. CHECK THE RIGHT CUSHION PAD HEATER RESISTANCE

Check the resistance of the Cushion Pad Heater element by measuring between the Right Seat Heater B(+) Driver and the Ground circuit at the 2 – way connector (component side).


GREEN
3
2
1
0
1
2
1
2
HEATER-
CUSHION PAD-
RIGHT
(COMPONENT SIDE)
814c83b8

Is the resistance above 4.9 ohms?

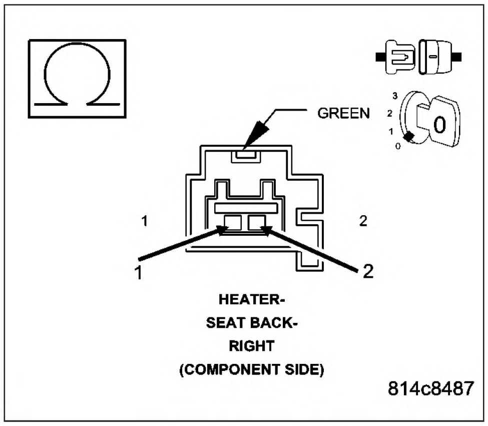
Yes >> Replace the seat cushion pad heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1.

No >> 5
Perform BODY VERIFICATION TEST – VER 1.

5. CHECK THE RIGHT SEAT BACK HEATER RESISTANCE

Disconnect the Right Seat Back Heater 2 – way connector.

NOTE: Check connectors - Clean and repair as necessary.
Check the resistance of the seat back heater element by measuring between the Right Seat Heater B(+) Driver and the Ground circuit at the connector 2 – way (component side).


GREEN
3
2
1
0
1
2
1
2
HEATER-
SEAT BACK-
RIGHT
(COMPONENT SIDE)
814c8487

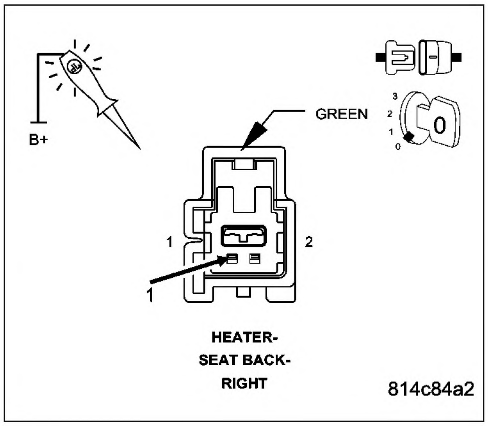
Is the resistance above 5.5 ohms?

Yes >> Replace the seat back heater element as necessary.
Perform BODY VERIFICATION TEST – VER 1.

No >> 6
Perform BODY VERIFICATION TEST – VER 1.

6. CHECK THE RIGHT SEAT BACK HEATER GROUND CIRCUIT

Using a 12-volt test light connected to 12-volts, check the ground circuit at the Seat Back Heater 2 – way connector.


B+
GREEN
3
2
1
0
1
2
1
HEATER-
SEAT BACK-
RIGHT
814c84a2

Does the test light illuminate brightly?

Yes >> Go To 7

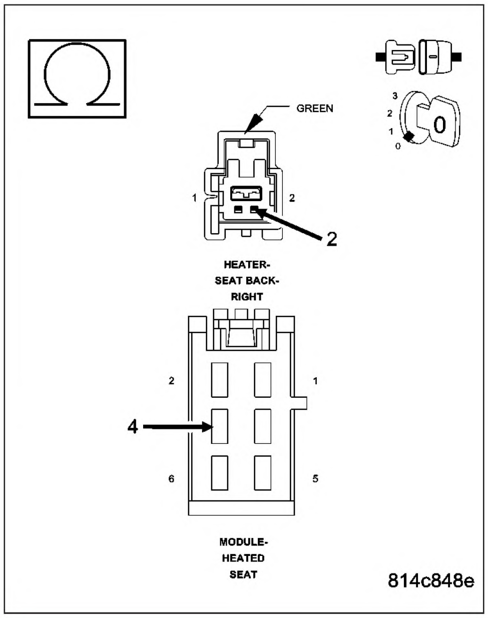
No >> Repair the open ground circuit.
Perform BODY VERIFICATION TEST – VER 1.

B1098-FRONT RIGHT SEAT HEATER CONTROL CIRCUIT OPEN (CONTINUED)

7. CHECK FOR AN OPEN SEAT HEATER B(+) DRIVER FROM HSM TO SEAT BACK

NOTE: Check connectors - Clean and repair as necessary.

Measure the Right Seat Heater B(+) Driver circuit from the Seat Back connector to the HSM connector.

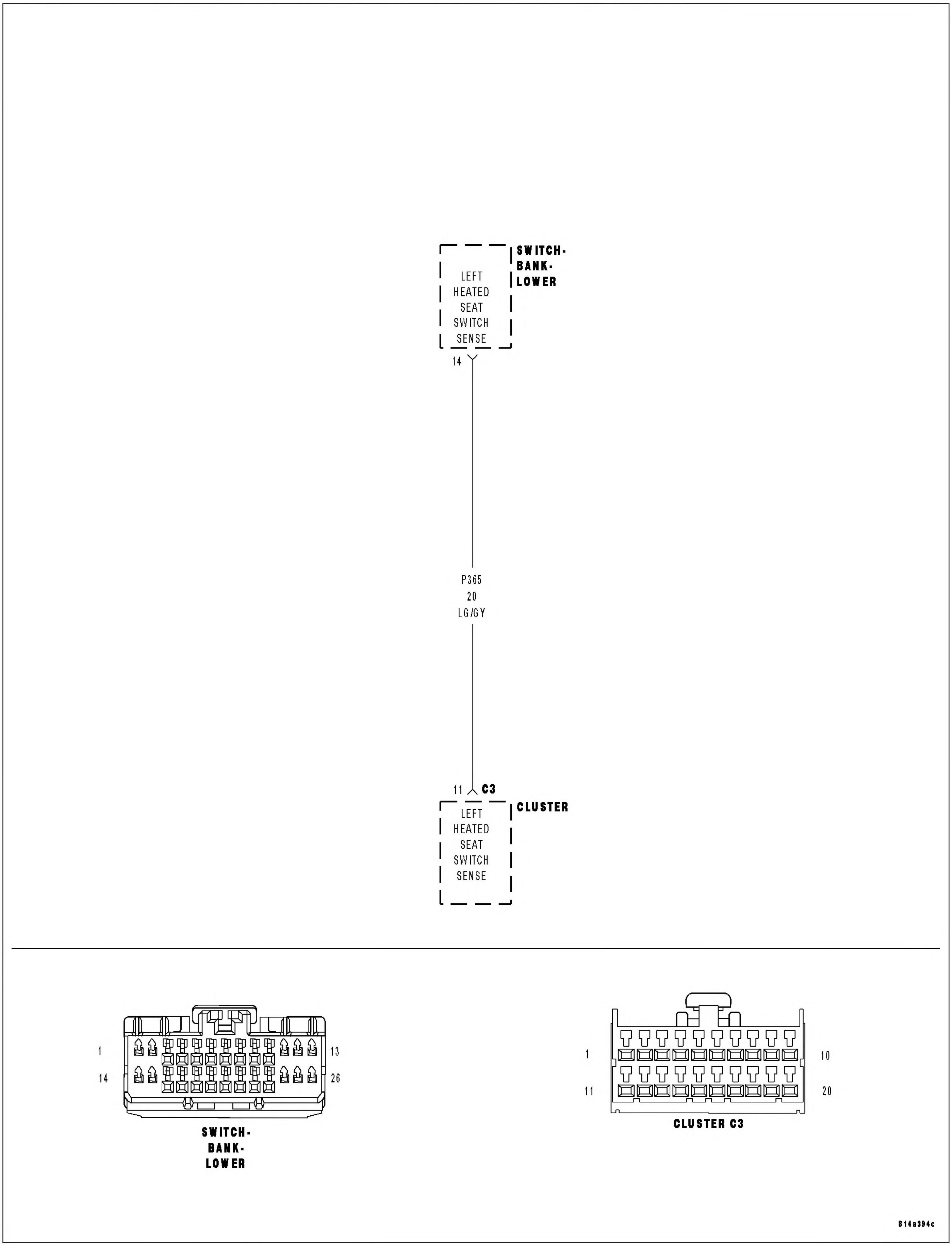

GREEN
1
2
2
HEATER-
SEAT BACK-
RIGHT
2
1
4
6
5
MODULE-
HEATED
SEAT
3
2
1
0
814c848e

Is the resistance below 2.0 ohms?

Yes >> Replace the Heated Seat Module.
Perform BODY VERIFICATION TEST – VER 1.

No >> Repair the Right Seat Heater B(+) Driver circuit for an open back to the splice.
Perform BODY VERIFICATION TEST – VER 1.

B10BB-LEFT HEATED SEAT SWITCH INPUT CIRCUIT STUCK


SWITCH-
BANK-
LOWER
LEFT
HEATED
SEAT
SWITCH
SENSE
14
P365
20
LG/GY
11
C3
CLUSTER
LEFT
HEATED
SEAT
SWITCH
SENSE
1
13
14
26
SWITCH-
BANK-
LOWER
1
10
11
20
CLUSTER C3
814a394c

B10BB-LEFT HEATED SEAT SWITCH INPUT CIRCUIT STUCK (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on.
- **Set Condition:**This code is set when the Cluster detects a stuck heated seat switch.

Possible Causes
(P365) LEFT HEATED SEAT SWITCH SENSE PARTIALLY SHORTED TO GROUND
LOWER SWITCH BANK
CLUSTER

Diagnostic Test

1. VERIFY THAT DTC B10BB-LEFT HEATED SEAT SWITCH INPUT CIRCUIT STUCK IS ACTIVE

With the scan tool, record and erase DTC's

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

Does the DTC B10BB LEFT HEATED SEAT SWITCH INPUT CIRCUIT STUCK reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

---

2. HEATED SEAT SWITCH

With the scan tool, record and erase DTC's

Disconnect the lower switch bank.

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

Does the DTC B10BB LEFT HEATED SEAT SWITCH INPUT CIRCUIT STUCK reset?

Yes >> Go To 3

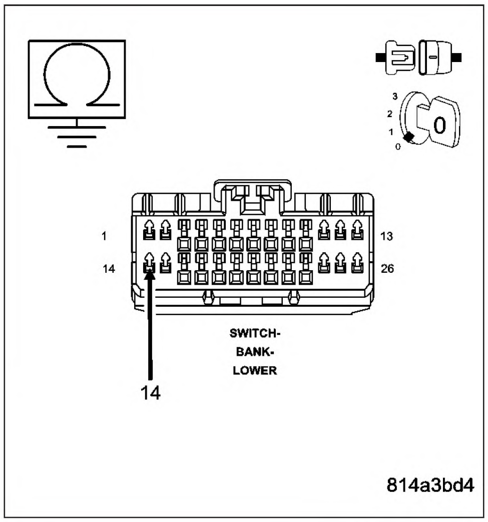
No >> Replace the lower switch bank.
Perform BODY VERIFICATION TEST – VER 1.

B10BB-LEFT HEATED SEAT SWITCH INPUT CIRCUIT STUCK (CONTINUED)

3. CHECK THE (P365) LEFT HEATED SEAT SWITCH SENSE CIRCUIT FOR A PARTIAL SHORT TO GROUND

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the (P365) Left Heated Seat Switch Sense circuit.



Was the resistance below 10k ohms?

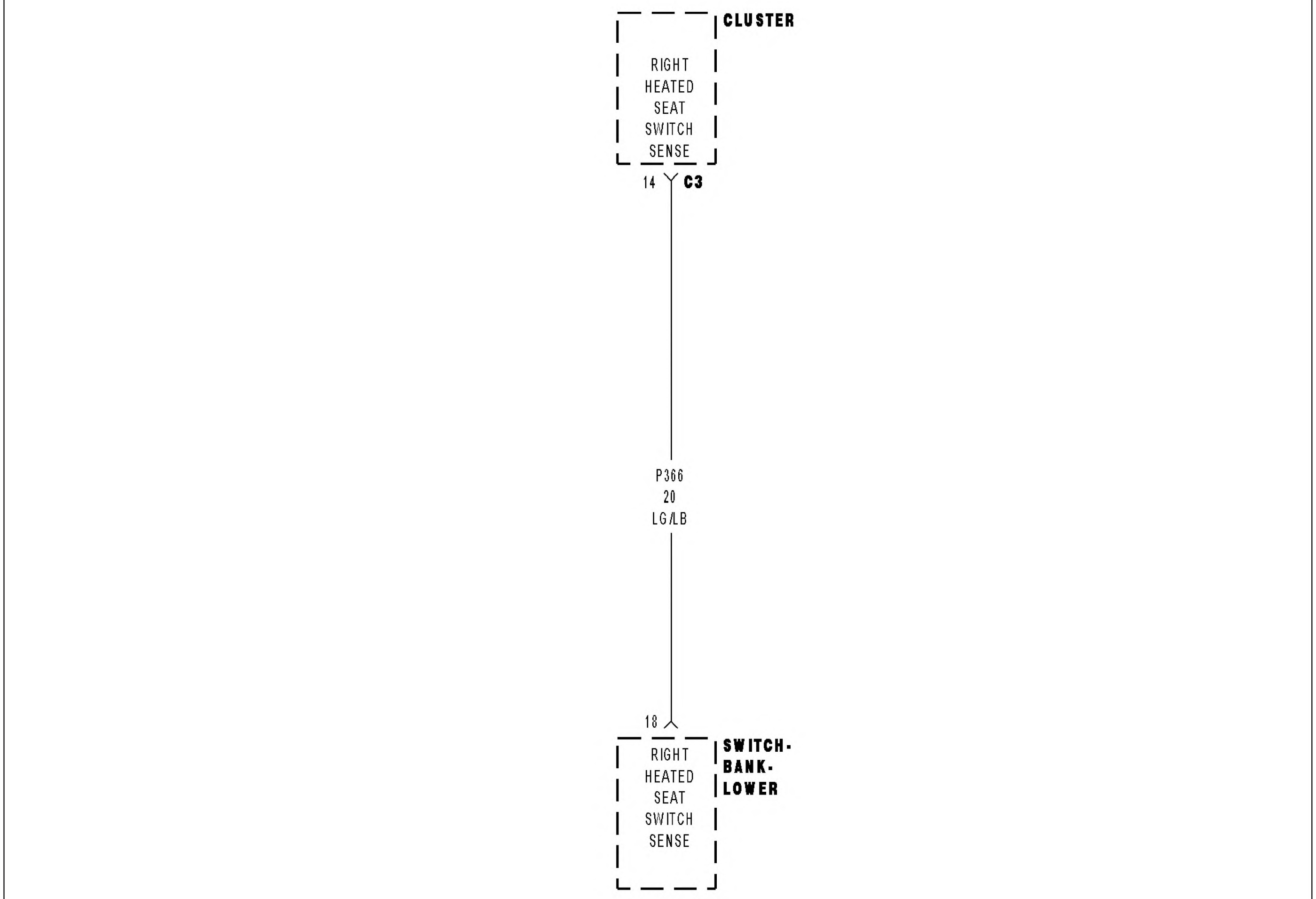
Yes >> Repair the (P365) Left Heated Seat Switch Sense circuit for a short to ground.

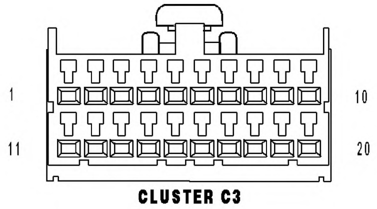
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace the Cluster.

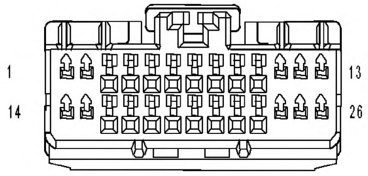
Perform BODY VERIFICATION TEST – VER 1.

B10BC-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT STUCK


CLUSTER
RIGHT HEATED SEAT SWITCH SENSE
14
C3
P366
20
LG/LB
18
SWITCH-BANK-LOWER
RIGHT HEATED SEAT SWITCH SENSE



CLUSTER C3



SWITCH-BANK-LOWER

814a3f11

B10BC-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT STUCK (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on.
- **Set Condition:**This code is set whenever the Cluster detects a stuck heated seat switch.

Possible Causes
(P366) RIGHT HEATED SEAT SWITCH SENSE PARTIALLY SHORTED TO GROUND
LOWER SWITCH BANK
CLUSTER

Diagnostic Test

1. VERIFY THAT DTC B10BC-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT STUCK IS ACTIVE

With the scan tool, record and erase DTC's

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

Does the DTC B10BC RIGHT HEATED SEAT SWITCH INPUT CIRCUIT STUCK reset?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

---

2. HEATED SEAT SWITCH

With the scan tool, record and erase DTC's

Disconnect the lower switch bank.

Cycle the ignition switch off then back on.

With the scan tool, read DTC's.

Does the DTC B10BC RIGHT HEATED SEAT SWITCH INPUT CIRCUIT STUCK reset?

Yes >> Go To 3

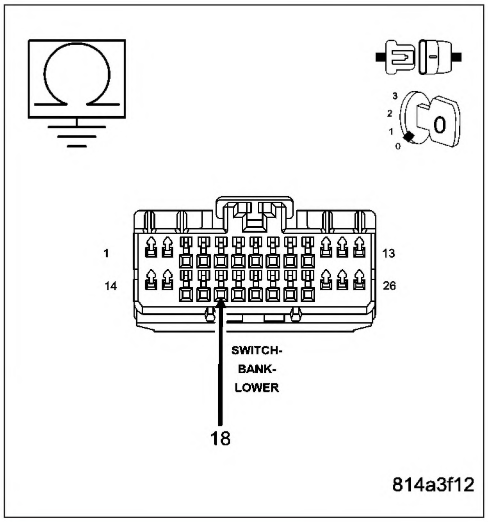
No >> Replace the lower switch bank.
Perform BODY VERIFICATION TEST – VER 1.

B10BC-RIGHT HEATED SEAT SWITCH INPUT CIRCUIT STUCK (CONTINUED)

3. CHECK THE (P366) RIGHT HEATED SEAT SWITCH SENSE CIRCUIT FOR A PARTIAL SHORT TO GROUND

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the (P366) Right Heated Seat Switch Sense circuit.

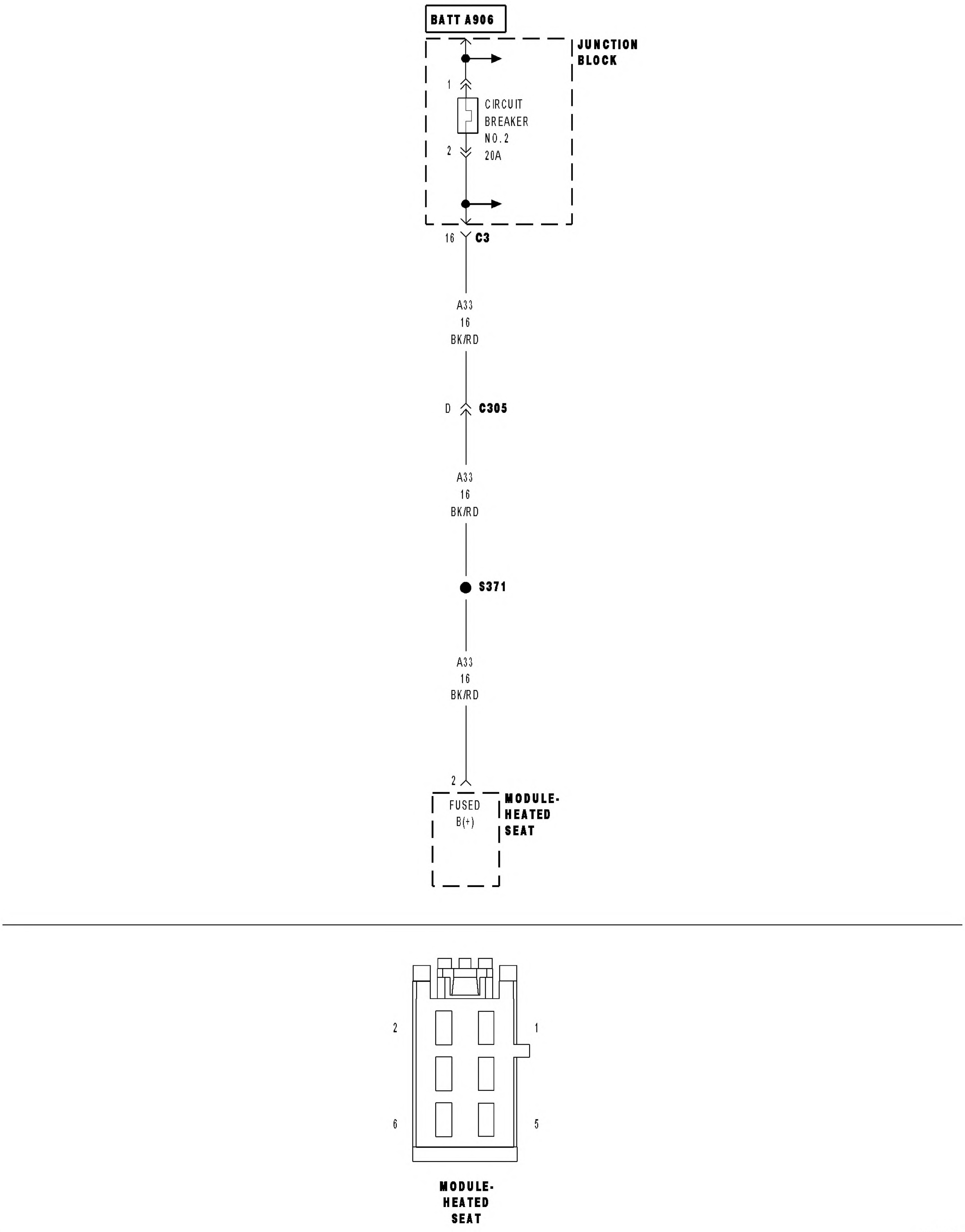


Was the resistance below 10K ohms?

Yes >> Repair the (P366) Right Heated Seat Switch Sense circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace the Cluster.
Perform BODY VERIFICATION TEST – VER 1.

B210D-BATTERY VOLTAGE LOW


BATT A906
JUNCTION BLOCK
1
CIRCUIT BREAKER NO.2 20A
2
16
C3
A33
16
BK/RD
D
C305
A33
16
BK/RD
S371
A33
16
BK/RD
2
FUSED B(+)
MODULE-HEATED SEAT
2
1
6
5
MODULE-HEATED SEAT
814a719d

B210D-BATTERY VOLTAGE LOW (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Engine running, during heated seat operation.
- **Set Condition:**This code is set immediately after the Heated Seat Module receives a low charging system voltage message over the CAN B Bus or detects voltage under 11.3 volts on the (A33) Fused B(+) circuit.

Possible Causes
CHARGING SYSTEM VOLAGE LOW
(A33) FUSED B(+) CIRCUIT
HEATED SEAT MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. CHECK PCM FOR CHARGING SYSTEM DTC

With the scan tool, read Powertrain Control Module DTC’s.

Are there any Charging System DTC’s set in the Powertrain Control Module?

Yes >> (Refer to 8 - ELECTRICAL/CHARGING - DIAGNOSIS AND TESTING) for Charging System diagnostic procedures.

No >> Go To 2
Perform BODY VERIFICATION TEST – VER 1.

---

2. VERIFY THAT DTC B210D-BATTERY VOLTAGE LOW IS ACTIVE

With the scan tool, record and erase DTC’s

Turn the ignition switch to the Off position then start the engine and let run for one minute.

With the scan tool, read DTC’s.

Does the DTC B210D-BATTERY VOLTAGE LOW reset?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

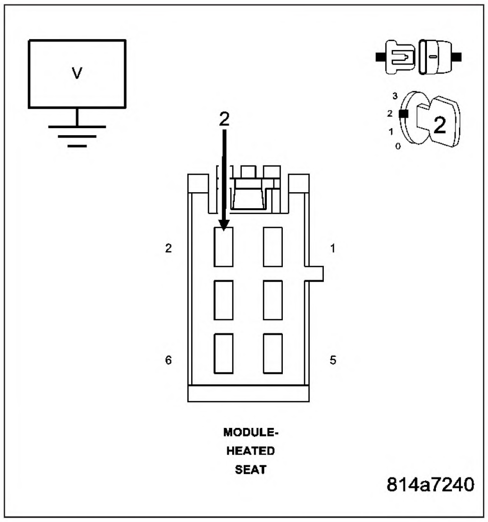
B210D-BATTERY VOLTAGE LOW (CONTINUED)

3. CHECK THE VOLTAGE ON THE (A33) FUSED B(+) CIRCUIT

Disconnect the Heated Seat Module connector.

NOTE: Check connectors - Clean and repair as necessary.
Start the engine and let idle.

Measure the voltage on the (A33) Fused B(+) circuit at the HSM connector and compare to voltage at the vehicle battery.



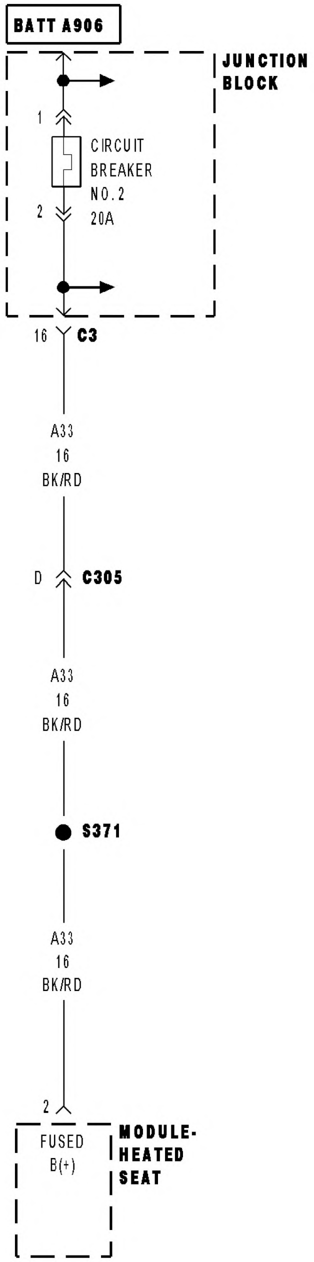
814a7240

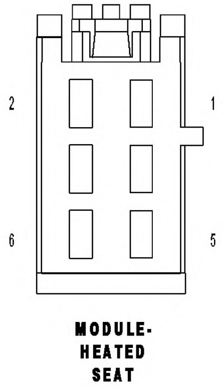
Is the voltage at the HSM connector the same as measured at the battery?

Yes >> Replace the Heated Seat Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Repair the (A33) Fused B(+) circuit as necessary.
Perform BODY VERIFICATION TEST – VER 1.

B210E-BATTERY VOLTAGE HIGH


BATT A906
JUNCTION BLOCK
1
CIRCUIT BREAKER NO.2 20A
2
16
C3
A33
16
BK/RD
D
C305
A33
16
BK/RD
S371
A33
16
BK/RD
2
FUSED B(+)
MODULE-HEATED SEAT


2
1
6
5
MODULE-HEATED SEAT

814a719d

B210E-BATTERY VOLTAGE HIGH (CONTINUED)

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Engine running, during heated seat operation.
- **Set Condition:**This code is set immediately after the Heated Seat Module receives a high charging system voltage message over the CAN B Bus or detects voltage over 15 volts on the (A33) Fused B(+) circuit.

Possible Causes
CHARGING SYSTEM VOLAGE HIGH
(A33) FUSED B(+) CIRCUIT
HEATED SEAT MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. CHECK PCM FOR CHARGING SYSTEM DTC

With the scan tool, read Powertrain Control Module DTC's.

Are there any Charging System DTC's set in the Powertrain Control Module?

Yes >> (Refer to 8 - ELECTRICAL/CHARGING - DIAGNOSIS AND TESTING) for Charging System diagnostic procedures.

No >> Go To 2

---

2. VERIFY THAT DTC B210E-BATTERY VOLTAGE HIGH IS ACTIVE

With the scan tool, record and erase DTC's

Turn the ignition switch to the Off position then start the engine and let run for one minute.

Attempt to operate the heated seats.

With the scan tool, read DTC's.

Does the DTC B210E-BATTERY VOLTAGE HIGH reset?

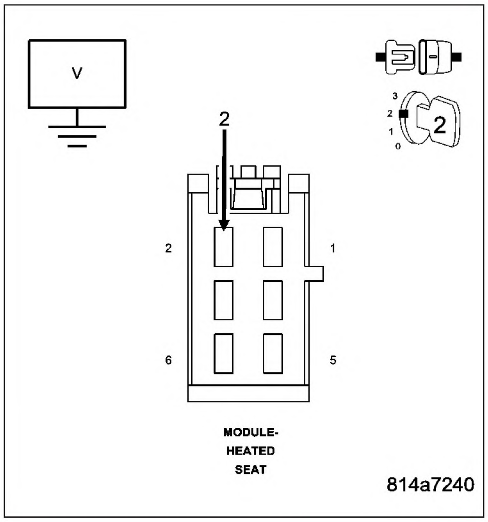
Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1.

B210E-BATTERY VOLTAGE HIGH (CONTINUED)

3. CHECK THE VOLTAGE ON THE (A33) FUSED B(+) CIRCUIT



Disconnect the Heated Seat Module connector.

NOTE: Check connectors - Clean and repair as necessary.
Start the engine and let idle.

Measure the voltage on the (A33) Fused B(+) circuit at the HSM connector and compare to voltage at the vehicles battery.

Is the voltage at the HSM connector the same as measured at the battery?

Yes >> Replace the Heated Seat Module in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1.

No >> Repair the (A33) Fused B(+) circuit as necessary.
Perform BODY VERIFICATION TEST – VER 1.

B221A-HEATED SEAT MODULE INTERNAL

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on.
- **Set Condition:**This code is set immediately if the Heated Seat Module internal self test fails.

Possible Causes
HEATED SEAT MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. VERIFY THAT DTC B221A-HEATED SEAT MODULE INTERNAL IS ACTIVE

With the scan tool, record and erase DTC's

Cycle the ignition switch off then back on.

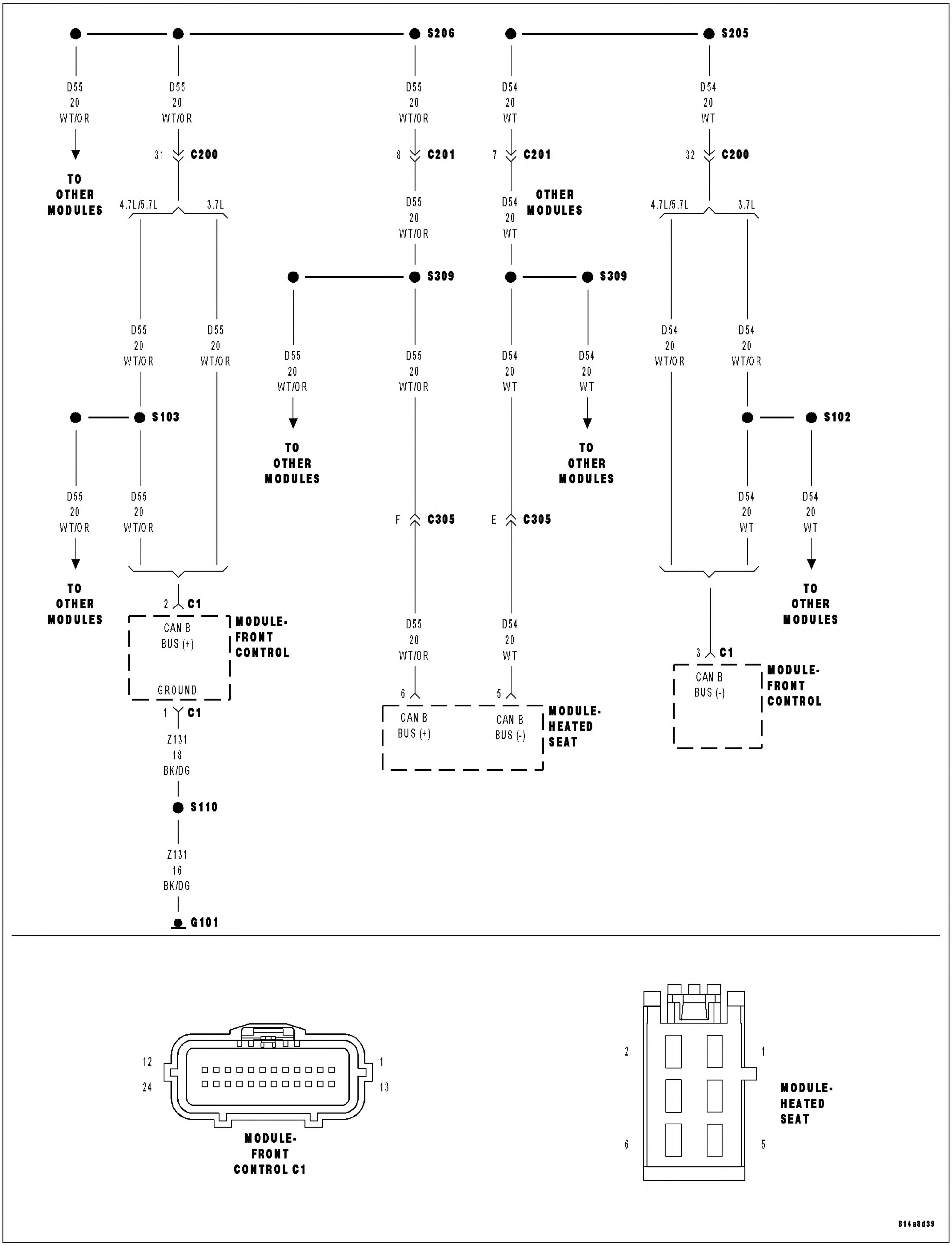
With the scan tool, read DTC's.

Does the DTC B221A-HEATED SEAT MODULE INTERNAL reset?

Yes >> Replace the Heated Seat Module.
Perform BODY VERIFICATION TEST – VER 1.

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST – VER 1.

U0019–CAN B BUS – HSM


S206
S205
D55 20 WT/OR
TO OTHER MODULES
D55 20 WT/OR
31 C200
4.7L/5.7L
3.7L
D55 20 WT/OR
8 C201
D55 20 WT/OR
S309
D54 20 WT
7 C201
D54 20 WT
OTHER MODULES
S309
D54 20 WT
32 C200
4.7L/5.7L
3.7L
D55 20 WT/OR
D55 20 WT/OR
D55 20 WT/OR
TO OTHER MODULES
D55 20 WT/OR
D54 20 WT
D54 20 WT
TO OTHER MODULES
D54 20 WT/OR
D54 20 WT/OR
S103
S102
D55 20 WT/OR
TO OTHER MODULES
D55 20 WT/OR
F C305
E C305
D54 20 WT
D54 20 WT
TO OTHER MODULES
2 C1
CAN B BUS (+)
GROUND
MODULE-FRONT CONTROL
1 C1
Z131 18 BK/DG
S110
Z131 16 BK/DG
G101
D55 20 WT/OR
D54 20 WT
6
5
CAN B BUS (+)
CAN B BUS (-)
MODULE-HEATED SEAT
3 C1
CAN B BUS (-)
MODULE-FRONT CONTROL
12
24
1
13
MODULE-FRONT CONTROL C1
2
1
6
5
MODULE-HEATED SEAT
814a8d39

U0019–CAN B BUS – HSM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the Can B Bus (+) or B Bus (–) circuit is open, shorted to voltage or shorted to ground, this code will set.

Possible Causes
CAN B BUS DTC's IN FRONT CONTROL MODULE
(D54) CAN B BUS (–) CIRCUIT OPEN
(D55) CAN B BUS (+) CIRCUIT OPEN
HEATED SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display U0019 CAN B BUS CIRCUIT?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. CHECK FRONT CONTROL MODULE DTC's

With the scan tool, read Front Control Module DTC's

Does the scan tool display any CAN B BUS DTC's – ACTIVE?

Yes >> Refer to the symptom list for problems related to Communication in the ELECTRICAL.– ELECTRONIC CONTROL MODULES – ELECTRICAL DIAGNOSES section.

No >> Go to 3

U0019–CAN B BUS – HSM (CONTINUED)

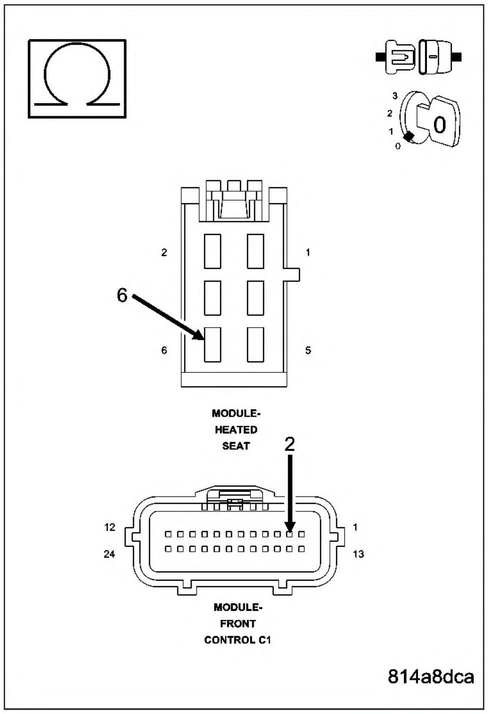
3. CAN B BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Heated Seat Module connector.

Disconnect the Front Control Module C1 connector.

Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 connector and the Heated Seat Module connector.



3
2
1
0
0
2
1
6
6
5
MODULE-
HEATED
SEAT
2
12
1
24
13
MODULE-
FRONT
CONTROL C1
814a8dca

Is the resistance below 2.0 ohms?

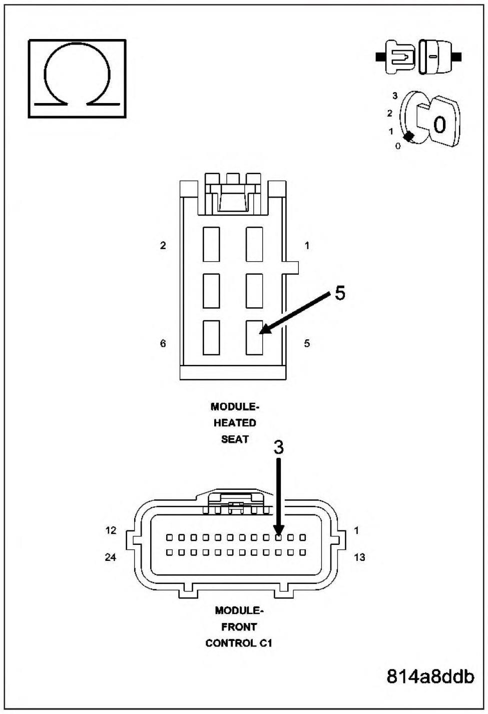
Yes >> Go To 4

No >> Repair the Can B Bus (+) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

---

4. CAN B BUS (–) CIRCUIT OPEN

Measure the resistance of the (D54) Can B Bus (–) circuit between the Front Control Module C1 connector and the Heated Seat Module connector.



3
2
1
0
0
2
1
5
6
5
MODULE-
HEATED
SEAT
3
12
1
24
13
MODULE-
FRONT
CONTROL C1
814a8ddb

Is the resistance below 2.0 ohms?

Yes >> Replace the Heated Seat Module.
Perform BODY VERIFICATION TEST - VER 1.

No >> Repair the Can B Bus (–) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156-LOST COMMUNICATION WITH EOM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212–LOST COMMUNICATION WITH SCCM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

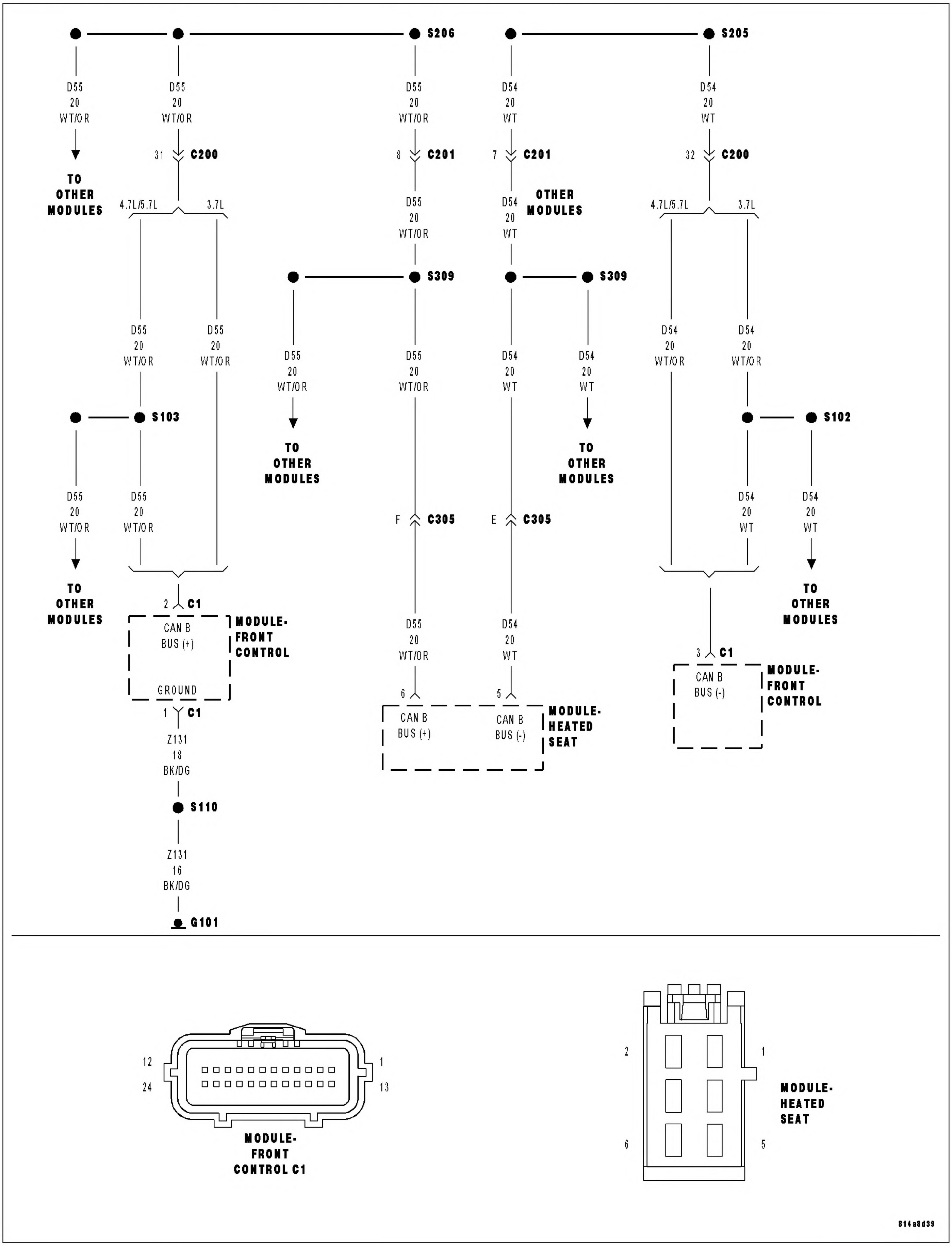
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U1107–ECU IN SINGLE–WIRE MODE – HSM


S206
S205
D55
20
WT/OR
D54
20
WT
TO OTHER MODULES
31 C200
8 C201
7 C201
32 C200
OTHER MODULES
4.7L/5.7L
3.7L
S309
S103
S102
F C305
E C305
2 C1
1 C1
3 C1
6
5
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-FRONT CONTROL
MODULE-HEATED SEAT
Z131
18
BK/DG
S110
Z131
16
BK/DG
G101
12
24
1
13
MODULE-FRONT CONTROL C1
2
1
6
5
MODULE-HEATED SEAT
814a8d39

U1107–ECU IN SINGLE–WIRE MODE – HSM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  This code will set if either the Can B Bus (+) or (-) circuits are open.

Possible Causes
CAN B BUS DTC's IN FRONT CONTROL MODULE
(D54) CAN B BUS (–) CIRCUIT OPEN
(D55) CAN B BUS (+) CIRCUIT OPEN
HEATED SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display U1107 ECU IN SINGLE-WIRE MODE?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. CHECK FRONT CONTROL MODULE DTC's

With the scan tool, read Front Control Module DTC's

Does the scan tool display any CAN B BUS DTC's – ACTIVE?

Yes >> Refer to the symptom list for problems related to Communication in the ELECTRICAL.– ELECTRONIC CONTROL MODULES – ELECTRICAL DIAGNOSES section.

No >> Go to 3

U1107–ECU IN SINGLE–WIRE MODE – HSM (CONTINUED)

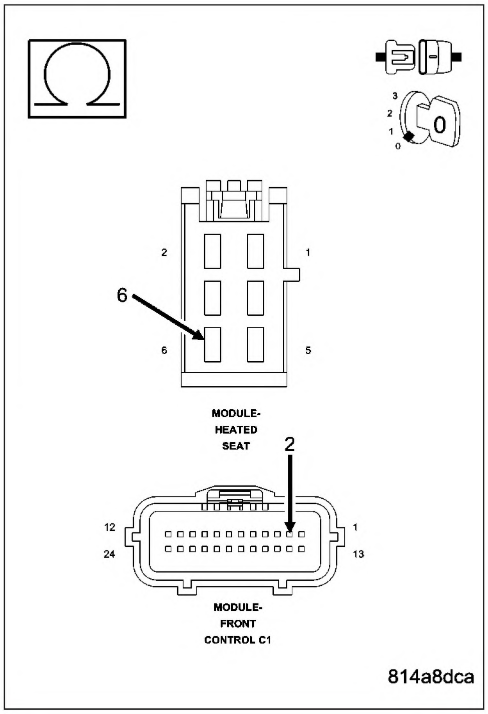
3. CAN B BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Heated Seat Module connector.

Disconnect the Front Control Module C1 connector.

Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 connector and the Heated Seat Module connector.


2
1
6
6
5
MODULE-
HEATED
SEAT
2
12
1
24
13
MODULE-
FRONT
CONTROL C1
3
2
1
0
0
814a8dca

Is the resistance below 2.0 ohms?

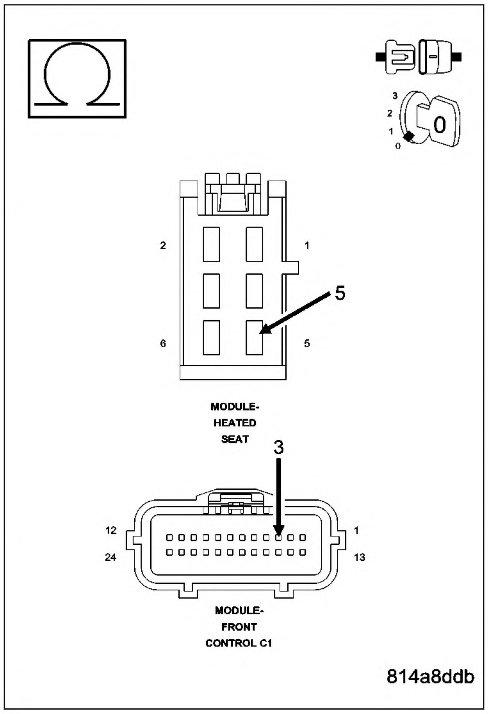
Yes >> Go To 4

No >> Repair the Can B Bus (+) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

---

4. CAN B BUS (–) CIRCUIT OPEN

Measure the resistance of the (D54) Can B Bus (–) circuit between the Front Control Module C1 connector and the Heated Seat Module connector.


2
1
5
6
5
MODULE-
HEATED
SEAT
3
12
1
24
13
MODULE-
FRONT
CONTROL C1
3
2
1
0
0
814a8ddb

Is the resistance below 2.0 ohms?

Yes >> Replace the Heated Seat Module.
Perform BODY VERIFICATION TEST - VER 1.

No >> Repair the Can B Bus (–) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

BODY VERIFICATION TEST – VER 1

Diagnostic Test

1. Perform Body Verification Test

Disconnect all jumper wires and reconnect all previously disconnected components and connectors.

Ensure that all accessories are turned off.

Ensure that the battery is fully charged.

Turn the ignition on.

With the scan tool, record and erase DTCs from all modules.

If an electronic control module was replaced, select the applicable module from the scan tool menu and press “Misc. Functions”. If the module has programable features, program as necessary.

If repairs were made to any of the HVAC door actuator circuits, with the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. The test must pass before proceeding to the next step.

If repairs were made to any of the HVAC doors, linkage, door actuators, or door actuator circuits, with the scan tool in HVAC, select System Tests and then select Actuator Calibration Test. The test must pass before proceeding to the next step.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

Operate all functions of the system that caused the original concern.

With the scan tool, select ECU View.

Check for DTCs in the modules.

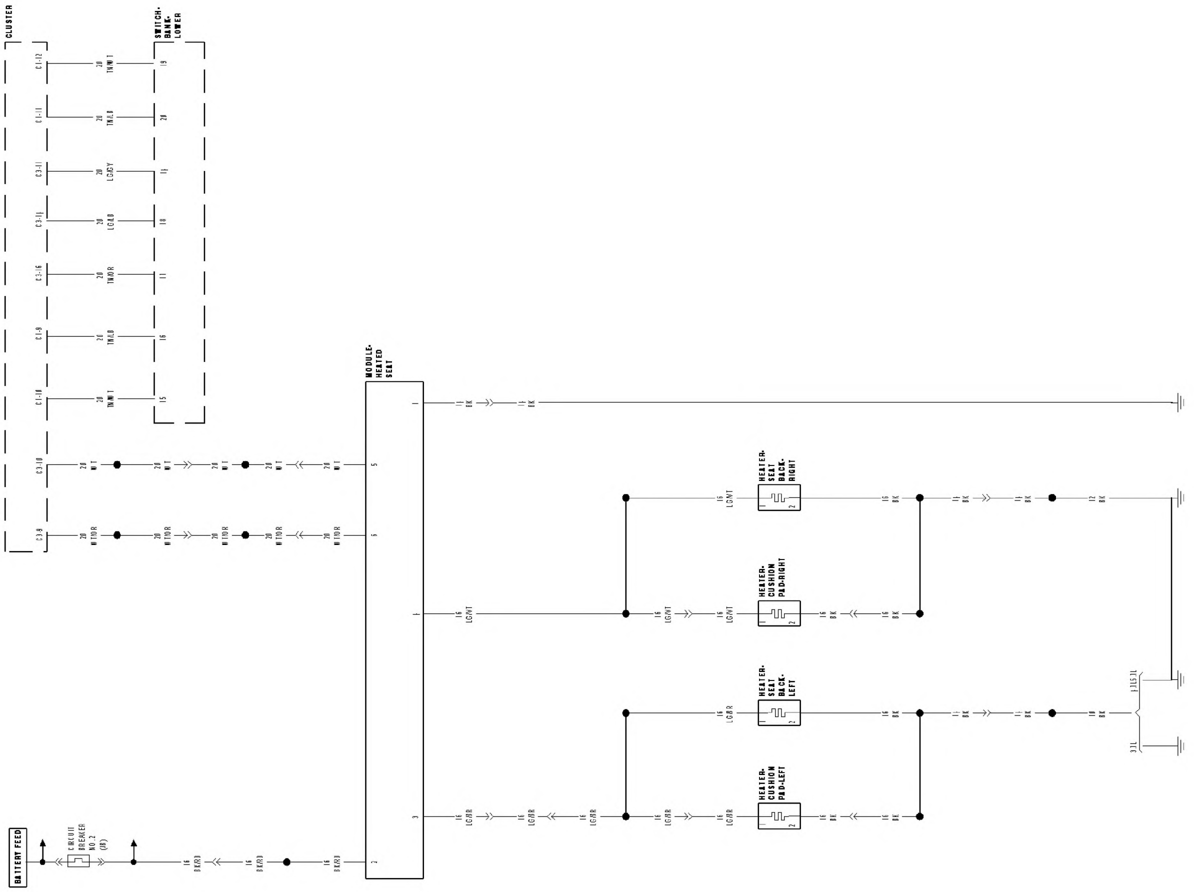
Are DTCs present in any of the modules or is the original condition still present?

Yes >> The repair is not complete. Refer to the related category for the DTC or symptom that is still present.

No >> The repair is complete.

SCHEMATICS AND DIAGRAMS

814b64a4


CLUSTER
SWITCH-BANK-LOWER
MODULE-HEATED SEAT
C1-12
C1-11
C3-11
C3-14
C3-16
C1-9
C1-10
C3-10
C3-9
20 TN/WT
20 TN/LB
20 LG/GY
20 LG/LB
20 TN/OR
20 WT
20 WT/OR
19
20
14
18
11
16
15
5
6
1
4
3
2
14 BK
16 LG/VT
16 LG/BR
16 BK/RD
16 BK
12 BK
18 BK
BATTERY FEED
CIRCUIT BREAKER NO. 2 (JB)
HEATER-SEAT BACK-RIGHT
HEATER-CUSHION PAD-RIGHT
HEATER-SEAT BACK-LEFT
HEATER-CUSHION PAD-LEFT
1
2
4.7L 5.7L
3.7L

HEATED SEAT SYSTEM

HEATED SEATS - SERVICE INFORMATION

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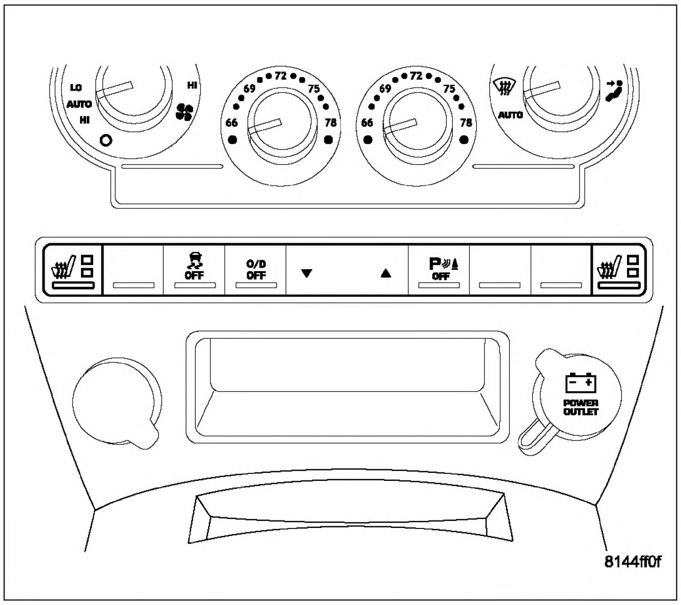
HEATED SEATS - SERVICE INFORMATION

DESCRIPTION

WARNING: The front passenger seat assembly contains critical components that affect the front passenger airbag deployment. Correctly functioning front passenger seat components are critical for the Occupant Classification System (OCS) to properly classify the front passenger and calculate the proper airbag deployment. Unapproved modifications or service procedures to the front passenger seat assembly, its related components, or trim cover may inadvertently change the airbag deployment in case of a frontal crash. This could result in death or serious injury to the front seat passenger if the vehicle is involved in an accident. The following requirements must be strictly adhered to:

- **Do not modify the front passenger seat assembly or components in any way.**
- **Do not modify the front seat center console or center position seat in any way.**
- **Do not use prior or future model year seat trim covers not designated for the specific model being repaired. Always use the correct seat trim cover specified for the vehicle.**
- **Do not replace the seat trim cover with an aftermarket trim cover.**
- **Do not add a secondary trim cover other than those approved by DaimlerChrysler/Mopar.**
- **At no time should any Supplemental Restraint System (SRS) component or SRS related component or fastener be modified or replaced with any part except those which are approved by DaimlerChrysler/Mopar.**



Vehicles with the heated seat option can be visually identified by the two heated seat switches located in the center stack of the instrument panel. The heated seat system allows the driver and front seat passenger to select from two different levels of electrical seat heating (HI/LO). The heated seat system for this vehicle includes the following major components, which are described in further detail later in this section:

- **Heated Seat Elements** - Four heated seat elements are used per vehicle. Two heated seat elements are integral to each seat, one in the seat back and the other in the seat cushion.
- **Heated Seat Module** - One heated seat module is used per vehicle. The Heated Seat Module is mounted under the right front seat. This module contains the control logic and software for the front heated seat system. The module communicates on the Controller Area Network (CAN) data bus.
- **Heated Seat Switches** - Two heated seat switches are used per vehicle, one for each heated seat. Both switches are mounted in the instrument panel center stack.
- **Instrument Cluster (CCN)** - A Cab Compartment Node (CCN) is part of the instrument cluster on this vehicle. The CCN utilizes integrated software and information carried on the CAN data bus. The CCN serves as the link between the heated seat switches and the heated seat module.

OPERATION

The heated seat system operates on battery current received through a fuse in the Integrated Power Module (IPM). Fused ignition switch output (run) circuits are used, so that the heated seat system will only operate when the ignition switch is in the On position. The heated seat system will turn Off automatically whenever the ignition switch is turned to any position except On.

A Heated Seat Module is used to control the heated seat system. The module responds to heated seat switch messages and ignition switch status inputs by controlling the 12v output to the front seat heating elements through integral solid-state relays.

When either of the heated seat switches are depressed a resistance signal is sent to the Cab Compartment Node (CCN) or instrument cluster. The CCN then sends a message via the Controller Area Network (CAN) data bus to the heated seat module, signaling the module to energize the heating element for the selected seat. Amber Light Emitting Diodes LEDS) in the top portion of each switch indicate the level of heat in use: Two LEDs are illuminated for high, one for low, and none for off. Pressing the switch once will select high-level heating. Pressing the switch a second time will select low-level heating. Pressing the switch a third time will shut the heating elements off.

The heated seat module energizes an integral solid-state relay, which supplies battery current to the heating elements. When high-temperature heating is selected, the heaters provide a boosted heat level during the first four minutes of operation after heating is activated. The heat output then drops to the normal high-temperature level. If high-level heating is selected, the control system will automatically switch to the low level after two hours of continuous operation. At that time, the number of illuminated LEDs changes from two to one, indicating the change. Operation on the low setting also turns off automatically after two hours.

The module will automatically turn off the heating elements if it detects an OPEN or LOW short in the heating element circuit.

DIAGNOSIS AND TESTING

HEATED SEAT SYSTEM

In order to obtain conclusive testing, the heated seat system and the Controller Area Network (CAN) data bus circuit must be checked. **Any diagnosis of the heated seat system should begin with, the use of a scan tool and the appropriate diagnostic service information.**

Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

NOTE: Vehicles equipped with the heated seat option utilize a low voltage cut-off feature. This feature turns off power to the heated seat system anytime vehicle voltage is below 11.7v or above 15.5v. Be certain to check the vehicle electrical system for proper voltage anytime the power seat system appears inoperative.

Before any testing of the heated seat system is attempted, the battery should be fully-charged.

HEATER-CUSHION PAD

DESCRIPTION

Vehicles equipped with the optional heated seat system have two, carbon fiber heated seat elements, located in each front seat. One heating element is used for each seat cushion and another for each seat back.

Each of the heated seat element consists of multiple heating circuits operating in parallel throughout the carbon fiber element. The heated seat elements are captured between the leather trim cover and the seat cushion assembly. If a malfunction occurs in one or more of the individual carbon fiber circuits, the others will continue to provide heat.

The heated seat elements cannot be repaired. If found to be damaged or inoperative, a new heating element assembly must be installed.

OPERATION

One end of the heated seat element is connected to ground at all times through a splice under the seat. Battery current is directed to the other end of the heated seat element by the heated seat module. The heated seat module will energize the heated seat element when the heated seat switch is depressed in the Low or High position.

As electrical current passes through the heated seat element, the resistance of the wire used in the element disperses some of the electrical current in the form of heat. The heat produced by the heated seat element then radiates through the underside of the seat cushion and seat back trim covers, warming the seat cover and its occupant.

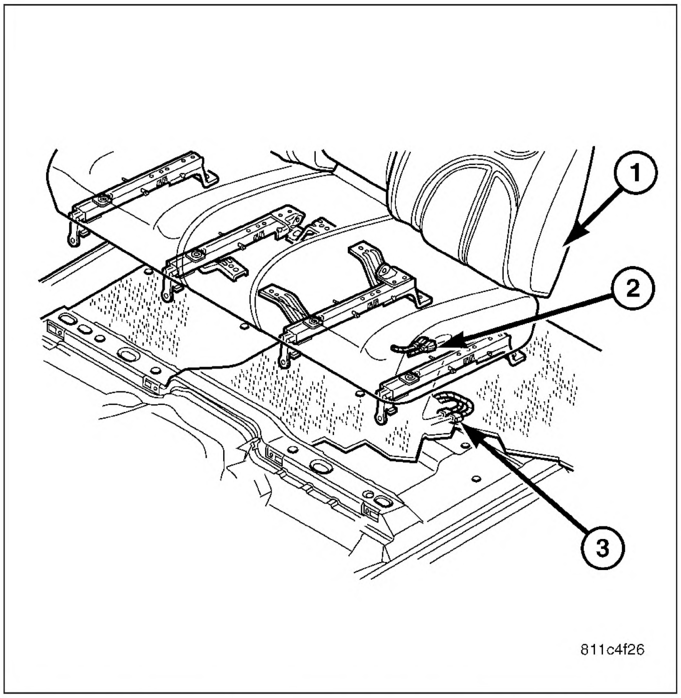
DIAGNOSIS AND TESTING

HEATED SEAT ELEMENT

Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

The wire harness connectors (2&3) for the heating elements are located under the seat (1).

NOTE: When checking heated seat elements for continuity, be certain to move the heating element being checked. Moving the element, such as sitting in the seat will eliminate the possibility of an intermittent open in the element which would only be evident if the element was in a certain position. Failure to check the element in various positions could result in an incomplete test.

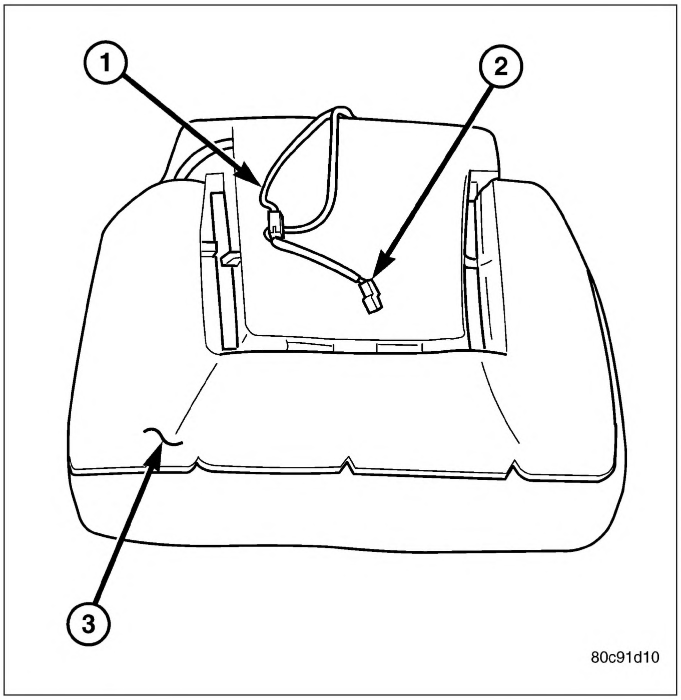


1. Locate and disconnect the seat electrical connector.
2. Check the resistance between the circuit leading in and out of the suspect heated seat element. The resistance should be between 3.8 - 4.8 ohms for a seat cushion element and 4.3 - 5.4 ohms for a seat back element. If OK, (Refer to 8 - ELECTRICAL/HEATED SEATS - DIAGNOSIS AND TESTING). If not OK, replace the inoperative heated seat element.

REMOVAL

NOTE: Do not remove the factory installed heating elements (3) from the seat or seat back cushions. The original element is permanently attached and cannot be removed without permanent damage. The replacement heating element is designed to be applied directly on top of the inoperative factory installed heating element.

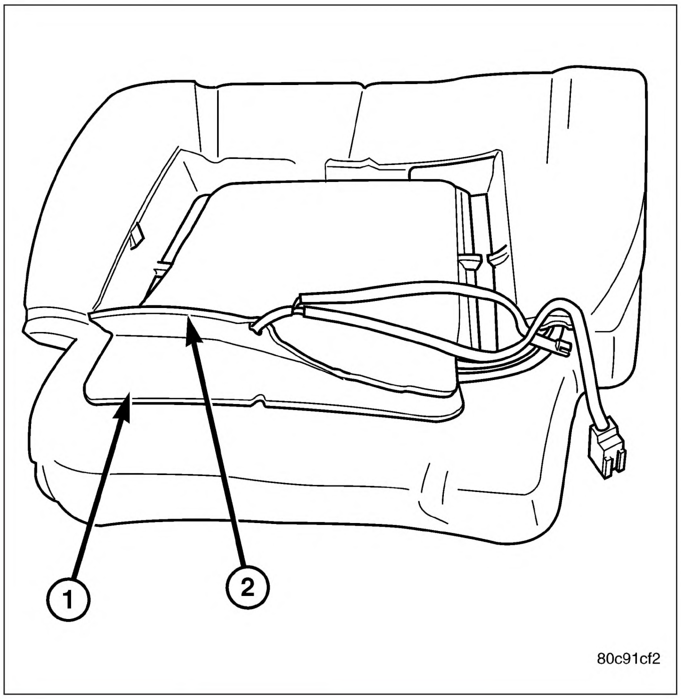
1. Disconnect and isolate the battery negative cable.
2. Remove the appropriate seat cushion, (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - REMOVAL) or seat back trim cover, (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION / COVER - REMOVAL).
3. Disconnect the inoperative heated seat cushion or seat back element electrical connectors (2).
4. Locate the wires leading from the inoperative heating element and cut them off flush with the edge of the original heating element.



INSTALLATION

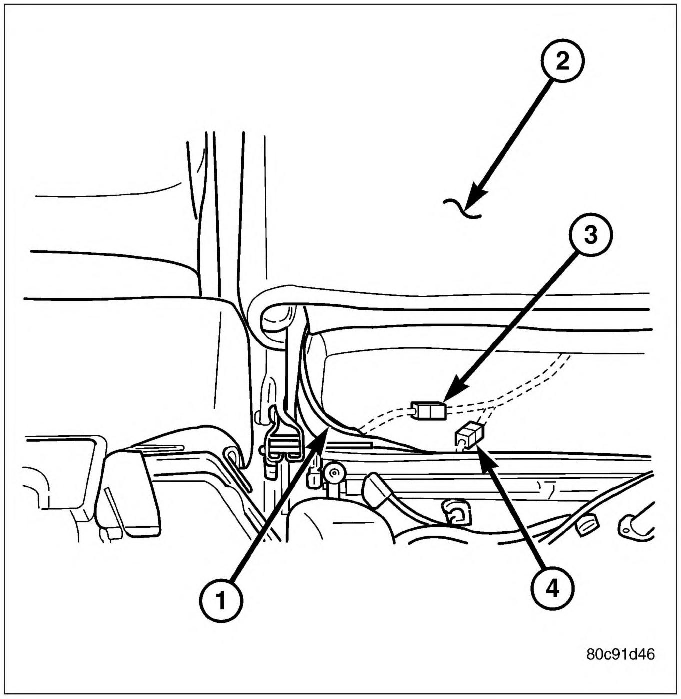
1. Peel off the adhesive backing on the back of the replacement heating element (2) and stick directly on top of the factory installed heating element (1).

CAUTION: During the installation of the replacement heating element, be careful not to fold or crease the element assembly. Folds or creases will cause premature failure.



2. Connect the new heating element electrical connectors (3&4).
3. Connect the battery negative cable.
4. Verify heated seat system operation.
5. Install the appropriate seat cushion, (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - INSTALLATION) or seat back trim cover, (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION / COVER - INSTALLATION).

NOTE: Make certain the seat wire harness is correctly routed through the seat and seat back. The excess wire between the cushion and back elements should be securely tucked between the rear of the cushion foam and the rear carpet flap of the trim cover.

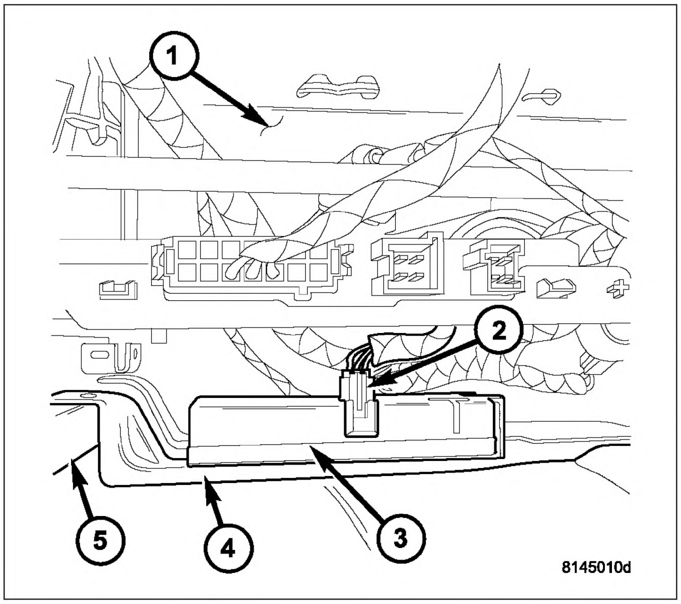


MODULE-HEATED SEATS

DESCRIPTION

The heated seat module (3) is located under the right front seat (1). It has a single electrical connector (2) and four locking tabs that secure it to the mounting bracket (4). The module can be accessed from under the front right seat with the seat in the full back position. The mounting bracket (4) is bolted to the seat frame assembly (5)

The heated seat module is a microprocessor designed to use Controller Area Network (CAN) data bus messages from the instrument cluster also known as the Cabin Compartment Node (CCN). The CCN receives inputs from the heated seat switches and in turn signals the heated seat module to operate the heated seat elements for both front seats.



OPERATION

The heated seat module operates on fused battery current received from the ignition switch. The module is grounded to the body at all times through the electrical connector. Inputs to the module include Controller Area Network (CAN) data bus messages and standard hardwired 12volt power and ground. In response to the CAN inputs the heated seat module will control the battery current to the appropriate heated seat elements.

When a heated seat switch CAN data bus signal is received by the heated seat module, the module energizes the selected heated seat element. The Low heat set point is about 38C (100.4°F), and the High heat set point is about 42C (107.6°F).

If the heated seat module detects a heated seat element OPEN or SHORT circuit, it will record and store the appropriate diagnostic trouble code (DTC).

DIAGNOSIS AND TESTING

HEATED SEAT MODULE

In order to obtain conclusive testing, the heated seat system and the Controller Area Network (CAN) data bus circuit must be checked. **Any diagnosis of the heated seat system should begin with, the use of a scan tool and the appropriate diagnostic service information.**

Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

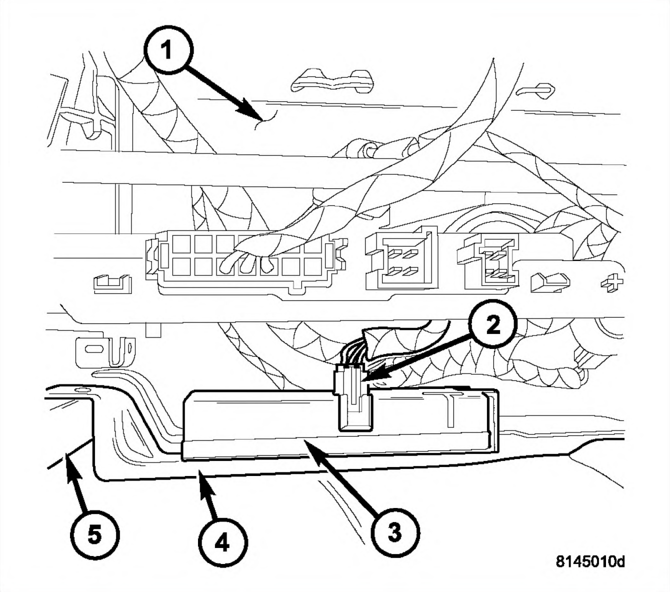
NOTE: Vehicles equipped with the heated seat option utilize a low voltage cut-off feature. This feature turns off power to the heated seat system anytime vehicle voltage is below 11.7v or above 15.5v. Be certain to check the vehicle electrical system for proper voltage anytime the power seat system appears inoperative.

Before any testing of the heated seat system is attempted, the battery should be fully-charged.

REMOVAL

CAUTION: The Heated Seat Module mounting tabs can be damaged during module removal and installation. Use care to properly align tabs to prevent binding that could result in tab breakage.

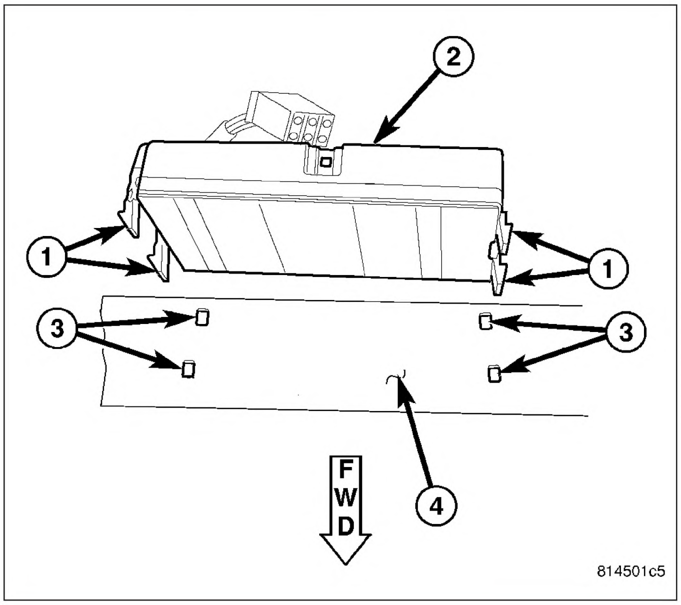
1. Position the right front seat to the full rearward position.
2. Disconnect and isolate the battery negative cable.
3. Disconnect the wire harness connector (2) from the heated seat module (3).
4. Unsnap the heated seat module retaining clips from the mounting bracket (4).
5. Remove the heated seat module (3) from the vehicle.



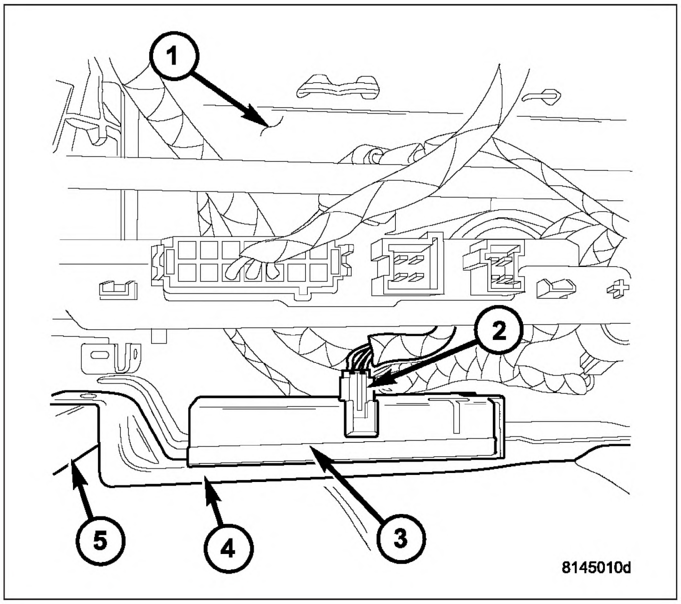
INSTALLATION

CAUTION: The Heated Seat Module mounting tabs can be damaged during module removal and installation. Use care to properly align tabs to prevent binding that could result in tab breakage.

1. Install the heated seat module (2) into the vehicle.
2. Position the retaining clips (1) with the retaining holes (3) in the mounting bracket (4). Firmly apply even pressure to the module (2) until all four retaining clips (1) snap into place.



3. Connect the wire harness connector (2) to the heated seat module (3).
4. Connect the battery negative cable.
5. Check for proper heated seat system operation.

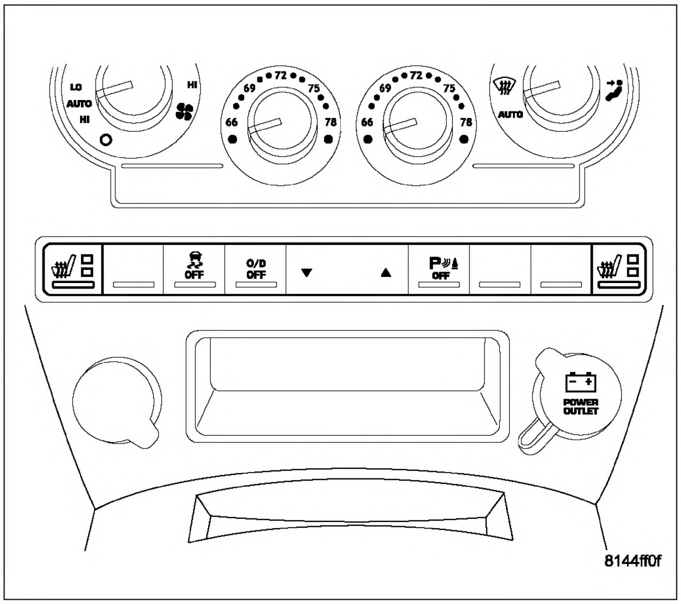


SWITCH-HEATED SEAT

DESCRIPTION

The heated seat switches are both mounted in the instrument panel. The two switches are part of the lower instrument panel switch pod assembly. If either of the switches is damaged or inoperative the complete switch pod assembly must be replaced.

Each heated seat switch provides a resistor-multiplexed signal to the Cab Compartment Node (CCN). Amber Light Emitting Diodes (LEDS) in the top portion of each switch indicate the level of heat in use: Two LEDs are illuminated for high, one for low, and none for off. Pressing the switch once will select high-level heating. Pressing the switch a second time will select low-level heating. Pressing the switch a third time will shut the heating elements off.



The LED indicator lamps in each heated seat switch cannot be repaired. If the LED lamps are inoperative or damaged, or the switch is inoperative or damaged the complete switch pod assembly must be replaced.

OPERATION

The heated seat switches receive battery current through a fused ignition switch output (run) circuit when the ignition switch is in the On position. Depressing the heated seat switch provides a hard-wired resistor multiplexed signal to the Cabin Compartment Node (CCN). The CCN is responsible for supplying the Controller Area Network (CAN) data bus message to the heated seat module, signaling the module to power the heated seat element of the selected seat and maintain the temperature setting.

If the heated seat switch is depressed to a different position (Low or High) than the currently selected state, the CCN will go through the process again to change the temperature setting. If a heated seat switch is depressed a second time to the same position as the currently selected state, the CCN and heated seat module interprets the second input as a request to turn the seat heater OFF. The CCN will then signal the heated seat module to turn the heated seat elements for that seat off.

DIAGNOSIS AND TESTING

HEATED SEAT SWITCH

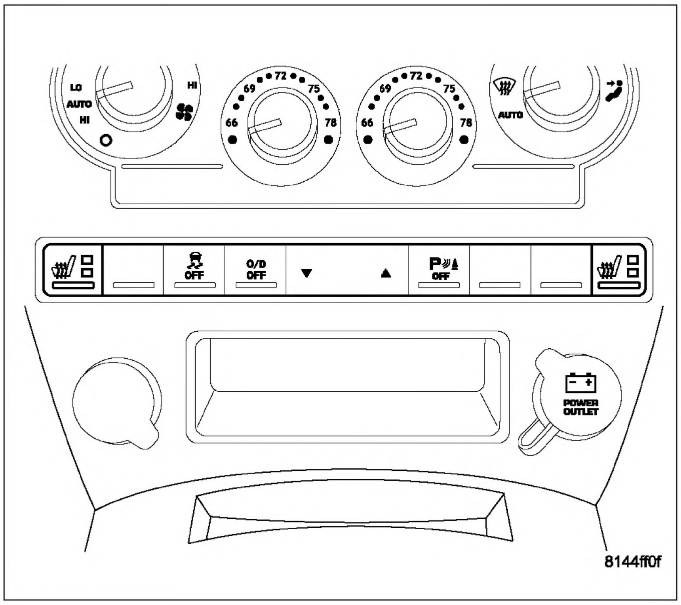
In order to obtain conclusive testing, the heated seat system and the Controller Area Network (CAN) data bus circuit must be checked. **Any diagnosis of the heated seat system should begin with, the use of a scan tool and the appropriate diagnostic service information.**

Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

NOTE: Vehicles equipped with the heated seat option utilize a low voltage cut-off feature. This feature turns off power to the heated seat system anytime vehicle voltage is below 11.0v or above 15.5v. Be certain to check the vehicle electrical system for proper voltage anytime the power seat system appears inoperative.

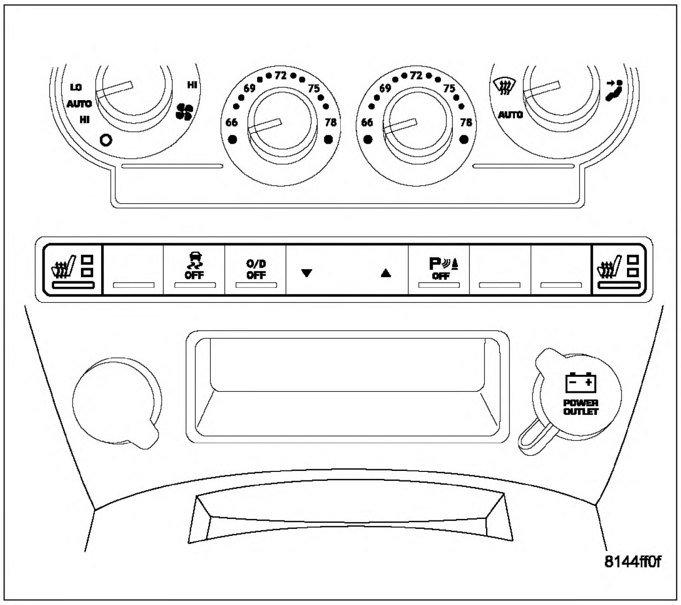
Before any testing of the heated seat system is attempted, the battery should be fully-charged.

REMOVAL


LO
AUTO
HI
HI
69
72
75
66
78
69
72
75
66
78
AUTO
OFF
O/D
OFF
P
OFF
POWER
OUTLET
8144ff0f

1. Disconnect and isolate the battery negative cable.
2. Remove the instrument panel center bezel, (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
3. Remove the lower instrument panel switch pod fasteners.
4. Remove the lower instrument panel switch pod from the vehicle.

INSTALLATION


LO
AUTO
HI
HI
69
72
75
66
78
69
72
75
66
78
AUTO
OFF
O/D
OFF
P
OFF
POWER
OUTLET
8144ff0f

NOTE: There are different instrument panel switch pods available based on the option content of the vehicle. Ensure the switch pod being installed matches the vehicle options.

1. Position the lower instrument panel switch pod into the instrument panel center bezel.
2. Install the lower instrument panel switch pod fasteners.
3. Install the instrument panel center bezel, (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).
4. Connect the battery negative cable.
5. Verify heated seat system operation.

HORN

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HORN - ELECTRICAL DIAGNOSTICS

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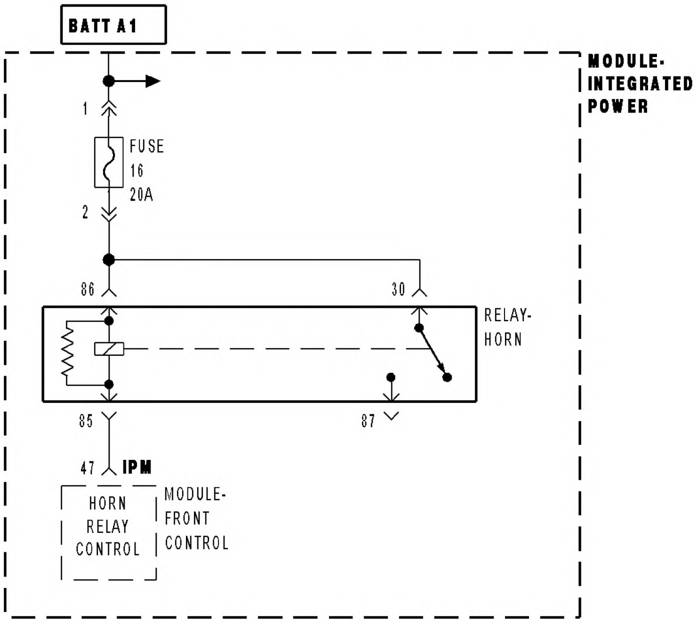
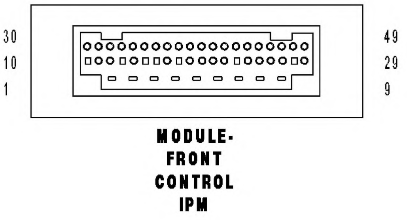
HORN - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B2336–HORN CONTROL CIRCUIT LOW – FCM


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
16
20A
2
86
30
RELAY-
HORN
85
87
47
IPM
HORN
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814d2536

B2336–HORN CONTROL CIRCUIT LOW – FCM (CONTINUED)

For the Horn System circuit diagram (Refer to 8 - ELECTRICAL/HORN - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Front Control Module (FCM) senses either excessively low or no voltage on the (X4) Horn Relay Control circuit.

Possible Causes
(A43) FUSED B(+) CIRCUIT SHORTED TO GROUND
(X4) HORN RELAY CONTROL CIRCUIT SHORTED TO GROUND
(A1) / (A913) CIRCUIT OPEN TO HORN FUSE
(A43) FUSED B(+) CIRCUIT OPEN
(X4) HORN RELAY CONTROL CIRCUIT OPEN
HORN FUSE
HORN RELAY
INTEGRATED POWER MODULE (IPM)
FRONT CONTROL MODULE (FCM)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Horn Switch several times.

Cycle the ignition from on to off 3 times and leave on.

With the scan tool, read DTCs.

Does the scan tool display: B2336 HORN CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

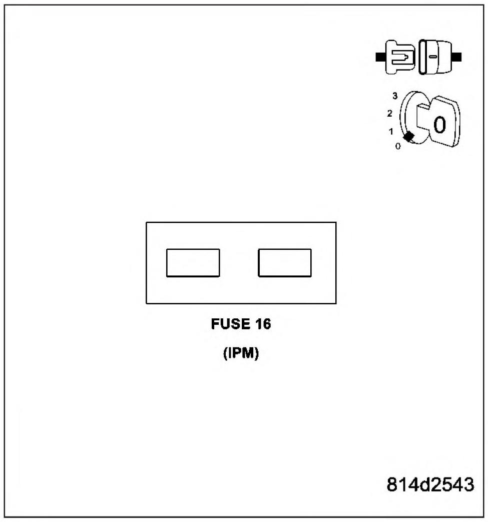
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2336–HORN CONTROL CIRCUIT LOW – FCM (CONTINUED)

2. CHECK THE HORN FUSE

Turn the ignition off.

Remove and inspect the Horn fuse.



Is the Horn Fuse open?

Yes >> Go To 3

No >> Reinstall the Horn Fuse. Then, Go To 7.

---

3. CHECK FOR A SHORTED HORN RELAY

Install a known good relay in place of the Horn Relay.

Replace the Horn fuse.

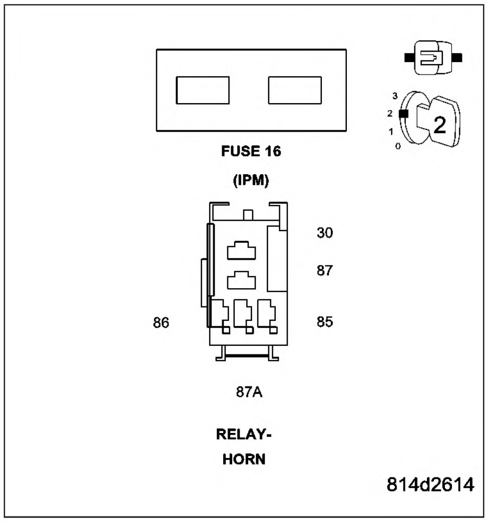
Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Horn Switch several times.

Cycle the ignition from on to off 3 times and leave on.

With the scan tool, read DTCs.



Does the scan tool display: B2336 HORN CONTROL CIRCUIT LOW?

Yes >> Go To 4

No >> Replace the original Horn Relay.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2336–HORN CONTROL CIRCUIT LOW – FCM (CONTINUED)

4. CHECK THE (A43) FUSED B(+) CIRCUIT FOR A SHORT TO GROUND

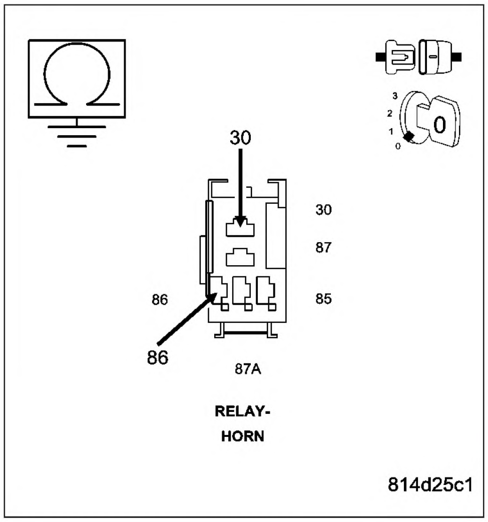
Turn the ignition off.

Remove the Horn Relay.

Remove the Horn Fuse.

Measure the resistance of the (A43) Fused B(+) circuit between ground and Cavity 86 of the Horn Relay connector in the Integrated Power Module (IPM).

Measure the resistance of the (A43) Fused B(+) circuit between ground and Cavity 30 of the Horn Relay connector in the Integrated Power Module (IPM).



Is the resistance below 10000.0 ohms?

Yes >> Replace the Integrated Power Module (IPM) in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

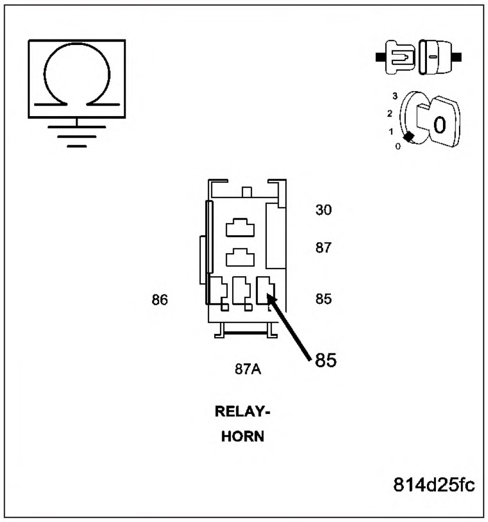
No >> Go To 5

---

5. CHECK THE (X4) HORN RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Remove the Front Control Module (FCM) in accordance with the Service Information.

Measure the resistance of the (X4) Horn Relay Control circuit between ground and Cavity 85 of the Horn Relay connector in the Integrated Power Module (IPM).



Is the resistance below 10000.0 ohms?

Yes >> Replace the Integrated Power Module (IPM) in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Control Module (FCM) in accordance with the Service Information. Then, Go To 6.

B2336–HORN CONTROL CIRCUIT LOW – FCM (CONTINUED)

6. CHECK FOR A SHORTED INTEGRATED POWER MODULE (IPM)

Install the original Horn Relay.

Replace the Horn fuse.

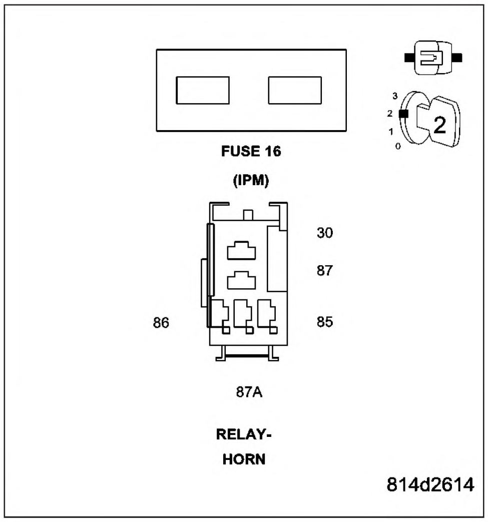
Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Horn Switch several times.

Cycle the ignition from on to off 3 times and leave on.

With the scan tool, read DTCs.



Does the scan tool display: B2336 HORN CONTROL CIRCUIT LOW?

Yes >> Replace the Integrated Power Module (IPM) in accordance with the Service Information.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

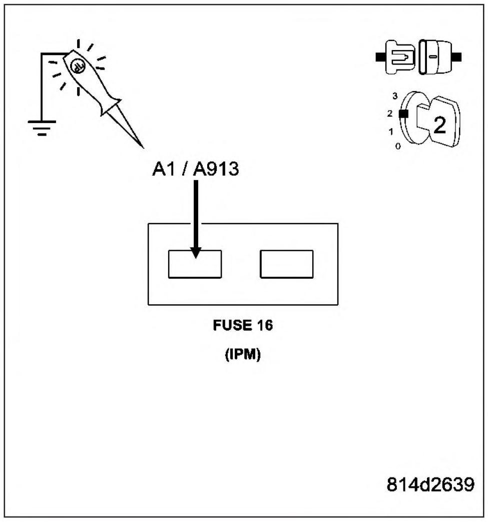
No >> Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

7. CHECK FOR POWER TO THE HORN FUSE

Turn the ignition on.

Using a 12-volt test light connected to ground, check for power to the Horn Fuse.



Does the test light illuminate brightly?

Yes >> Go To 8

No >> Repair the (A1) / (A913) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2336–HORN CONTROL CIRCUIT LOW – FCM (CONTINUED)

8. CHECK FOR AN OPEN HORN RELAY

Turn the ignition off.

Install a known good relay in place of the Horn Relay.

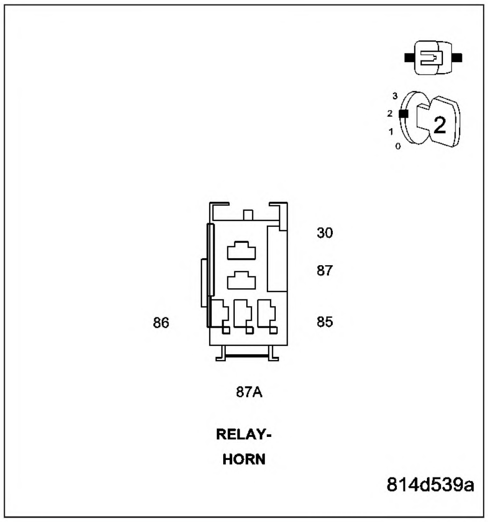
Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Horn Switch several times.

Cycle the ignition from on to off 3 times and leave on.

With the scan tool, read DTCs.



Does the scan tool display: B2336 HORN CONTROL CIRCUIT LOW?

Yes >> Go To 9

No >> Replace the original Horn Relay.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

9. CHECK THE (A43) FUSED B(+) CIRCUIT FOR AN OPEN

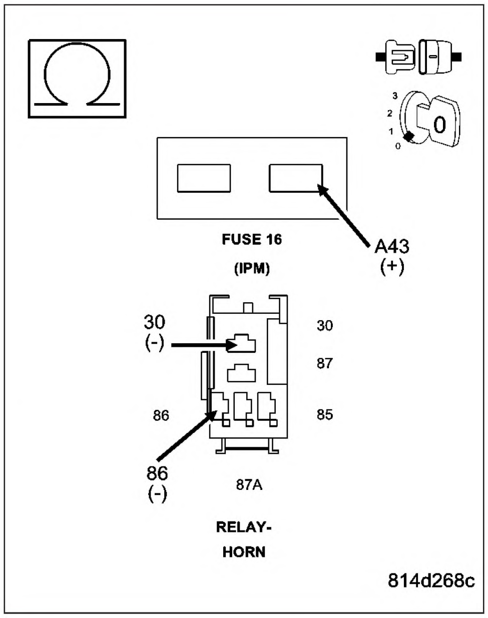
Turn the ignition off.

Remove the Horn Relay.

Remove the Horn Fuse.

Measure the resistance of the (A43) Fused B(+) circuit between the Horn Fuse (output cavity) and Cavity 86 of the Horn Relay connector in the Integrated Power Module (IPM).

Measure the resistance of the (A43) Fused B(+) circuit between the Horn Fuse (output cavity) and Cavity 30 of the Horn Relay connector in the Integrated Power Module (IPM).



Is the resistance below 5.0 ohms?

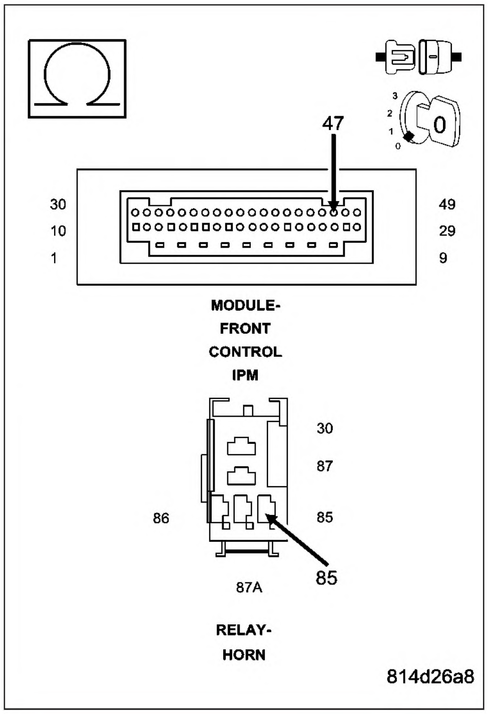
Yes >> Go To 10

No >> Replace the Integrated Power Module (IPM) in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2336–HORN CONTROL CIRCUIT LOW – FCM (CONTINUED)

10. CHECK THE (X4) HORN RELAY CONTROL CIRCUIT FOR AN OPEN



Remove the Front Control Module (FCM) in accordance with the Service Information.

Measure the resistance of the (X4) Horn Relay Control circuit between Cavity 85 of the Horn Relay connector in the Integrated Power Module (IPM) and Cavity 47 of the FCM 49-Way connector.

Is the resistance below 5.0 ohms?

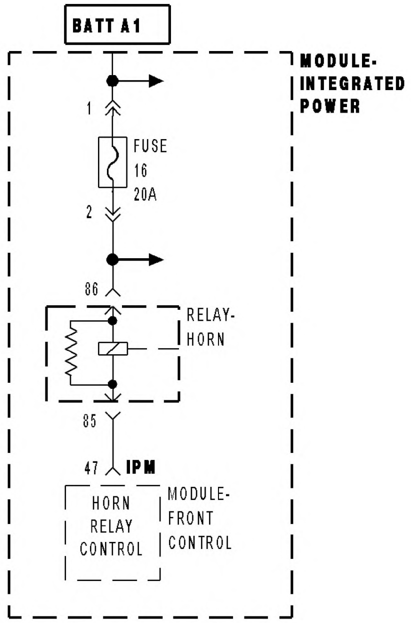
Yes >> Replace the Front Control Module (FCM) in accordance with the Service Information.

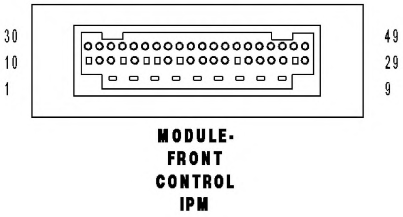
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Integrated Power Module (IPM) in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2337–HORN CONTROL CIRCUIT HIGH – FCM


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
16
20A
2
86
RELAY-
HORN
85
47
IPM
HORN
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814d5393

B2337–HORN CONTROL CIRCUIT HIGH – FCM (CONTINUED)

For the Horn System circuit diagram (Refer to 8 - ELECTRICAL/HORN - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Front Control Module (FCM) senses excessive voltage on the (X4) Horn Relay Control circuit.

Possible Causes
(X4) HORN RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
HORN RELAY
INTEGRATED POWER MODULE (IPM)
FRONT CONTROL MODULE (FCM)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Horn Switch several times.

Cycle the ignition from on to off 3 times and leave on.

With the scan tool, read DTCs.

Does the scan tool display: B2337 HORN CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

2. CHECK FOR A SHORTED HORN RELAY

Turn the ignition off.

Install a known good relay in place of the Horn Relay.

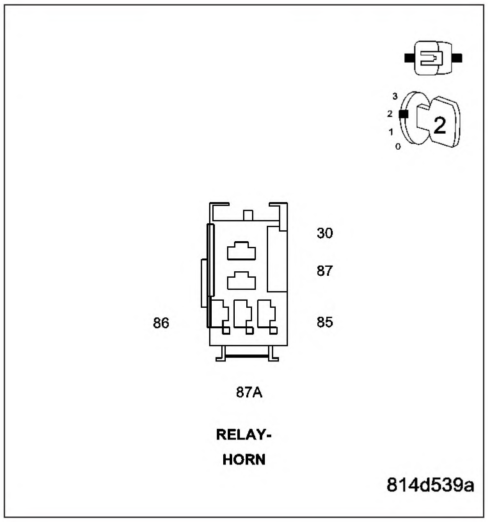
Turn the ignition on.

With the scan tool erase DTCs.

Operate the Horn Switch several times.

Cycle the ignition from on to off 3 times and leave on.

With the scan tool, read DTCs.



Does the scan tool display: B2337 HORN CONTROL CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the original Horn Relay.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2337–HORN CONTROL CIRCUIT HIGH – FCM (CONTINUED)

3. CHECK THE (X4) HORN RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

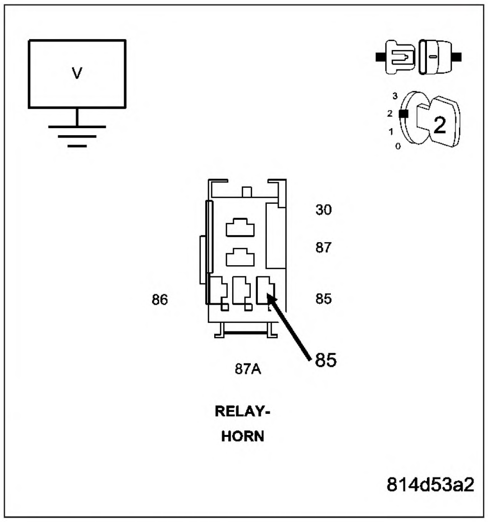
Turn the ignition off.

Remove the Horn Relay.

Remove the Front Control Module (FCM) in accordance with the Service Information.

Turn the ignition on.

Measure the voltage of the (X4) Horn Relay Control circuit.



Is the voltage above 0.2 volts?

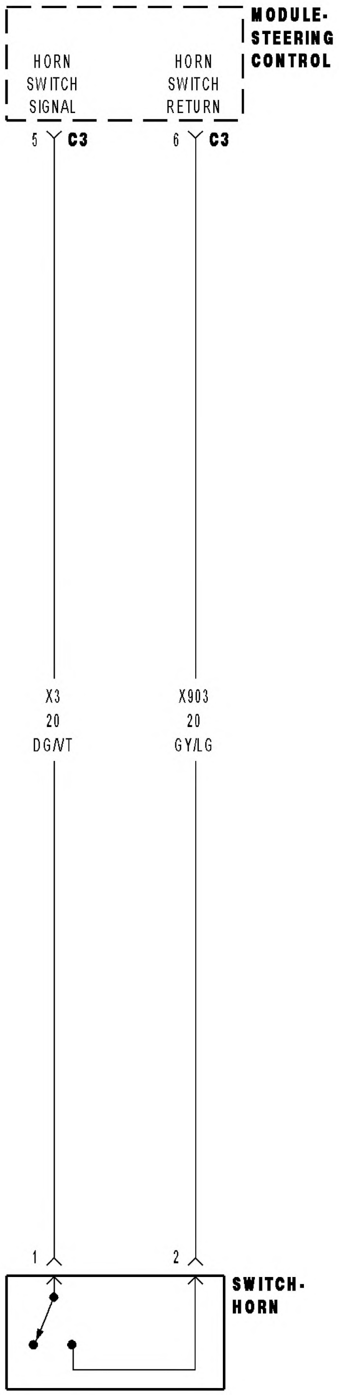
Yes >> Replace the Integrated Power Module (IPM) in accordance with the Service Information.

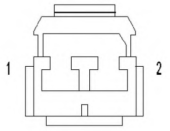
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Control Module (FCM) in accordance with the Service Information.

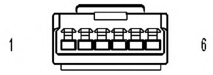
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2339–HORN SWITCH STUCK — SCCM


MODULE-
STEERING
CONTROL
HORN
SWITCH
SIGNAL
HORN
SWITCH
RETURN
5 C3
6 C3
X3
20
DG/VT
X903
20
GY/LG
1
2
SWITCH-
HORN



**SWITCH-
HORN**


1
6

**MODULE-
STEERING CONTROL C3**

814d6d11

B2339–HORN SWITCH STUCK — SCCM (CONTINUED)

For the Horn System circuit diagram (Refer to 8 - ELECTRICAL/HORN - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The Horn Switch connects to the Steering Column Control Module (SCCM) via a serial sub-bus called the LIN bus. The SCCM monitors the Horn Switch status. When the switch status changes (switch is pressed or released), the SCCM processes the request and broadcasts it on the CAN B Bus where it is read and processed by the Front Control Module (FCM).

- **When Monitored:**
  Continuously.
- **Set Condition:**
  If the Steering Column Control Module (SCCM) senses that the Horn Switch is in the Set position for more than 50 seconds.

Possible Causes
(X3) HORN SWITCH SIGNAL CIRCUIT SHORTED TO (X903) HORN SWITCH RETURN CIRCUIT
(X3) HORN SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
HORN SWITCH
STEERING COLUMN CONTROL MODULE (SCCM)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

NOTE: If DTC P0562 BATTERY VOLTAGE LOW or DTC P0563 BATTERY VOLTAGE HIGH is active along with this DTC, diagnose and repair the battery voltage related DTC first.

Turn the ignition on.

With the Scan Tool, select View DTCs in the Steering Column Control Module (SCCM).

Does the scan tool display DTC B2339 HORN SWITCH STUCK active?

Yes >> Go To 2

No >> The conditions necessary to set this DTC are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. In addition, wiggle test the wiring and connectors while monitoring the scan tool data relative to this circuit. Look for the data to change or for the DTC to set as active during the wiggle test. Repair as necessary.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2339–HORN SWITCH STUCK — SCCM (CONTINUED)

2. TEST THE HORN SWITCH

Turn the ignition off.

Remove the Driver Airbag in accordance with the Service information.

Disconnect the Horn Switch connector.

Measure the resistance between the (X3) Horn Switch Signal circuit and the (X903) Horn Switch Return circuit in the Horn Switch while pressing and releasing the switch several times.

Does the ohmmeter reading indicate continuity when the switch is pressed and no continuity when the switch is released?

Yes >> Go To 3

No >> Replace the Horn Switch in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. CHECK THE (X3) HORN SWITCH SIGNAL CIRCUIT FOR A SHORT TO THE (X903) HORN SWITCH RETURN CIRCUIT

Disconnect the Steering Control Module C3 connector.

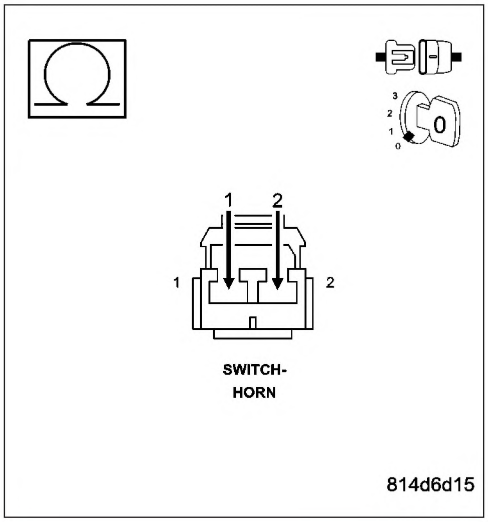
Measure the resistance between the (X3) Horn Switch Signal circuit and the (X903) Horn Switch Return circuit in the Horn Switch Connector.

Is the resistance below 10000.0 ohms?

Yes >> Repair the (X3) Horn Switch Signal circuit for a short to the (X903) Horn Switch Return circuit.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

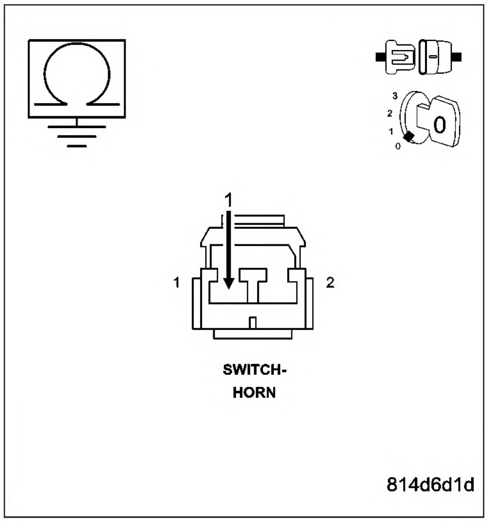
No >> Go To 4



B2339–HORN SWITCH STUCK — SCCM (CONTINUED)

4. CHECK THE (X3) HORN SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (X3) Horn Switch Signal circuit in the Horn Switch Connector.



Is the resistance below 10000.0 ohms?

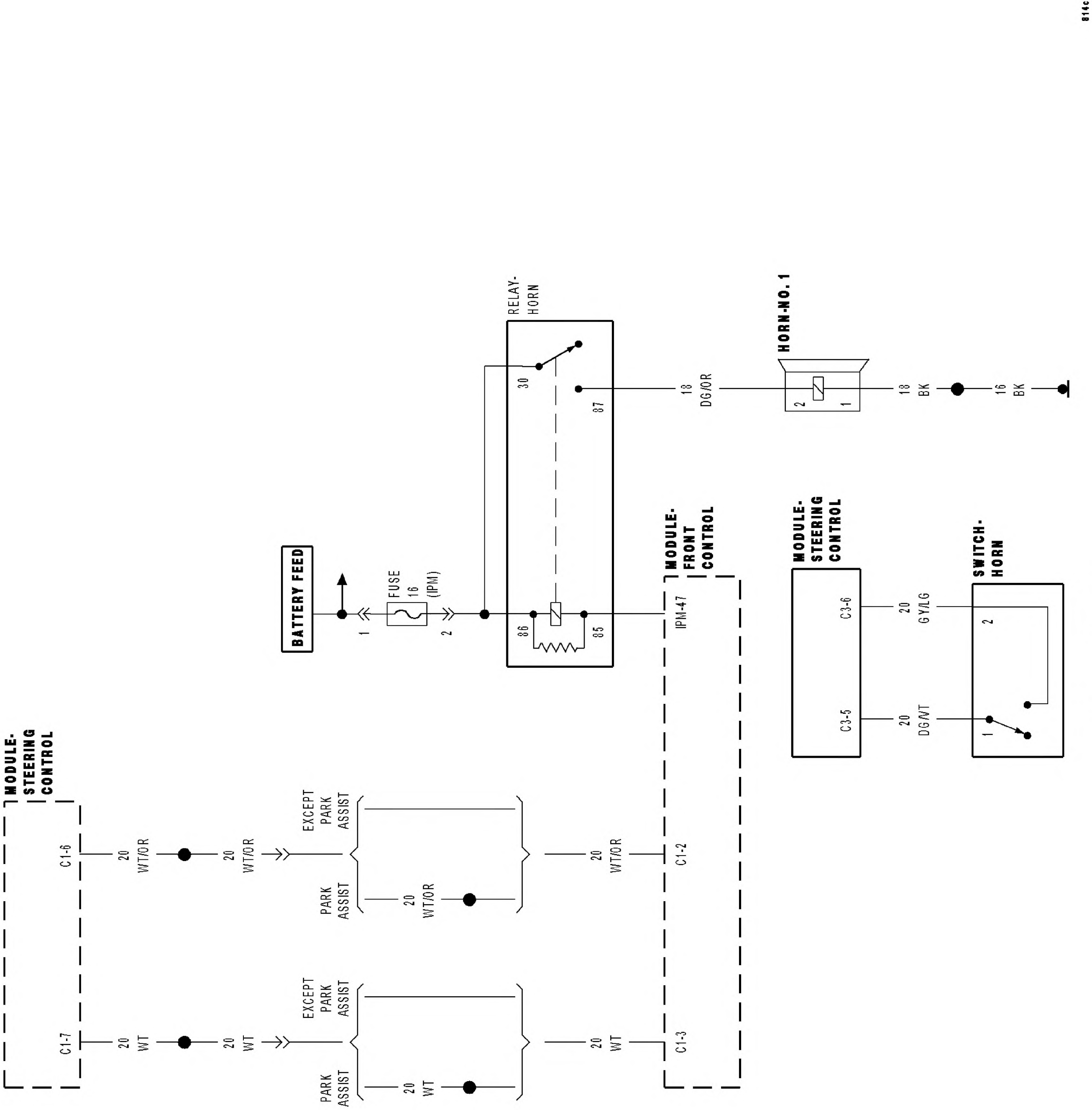
Yes >> Repair the (X3) Horn Switch Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Steering Column Control Module (SCCM) in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

SCHEMATICS AND DIAGRAMS


814c1737
BATTERY FEED
1
FUSE
16
(IPM)
2
RELAY-
HORN
30
87
86
85
18
DG/OR
HORN-NO.1
2
1
18
BK
16
BK
MODULE-
FRONT
CONTROL
IPM-47
C1-2
C1-3
MODULE-
STEERING
CONTROL
C3-6
C3-5
20
GY/LG
20
DG/VT
SWITCH-
HORN
2
1
MODULE-
STEERING
CONTROL
C1-6
C1-7
20
WT/OR
20
WT
EXCEPT
PARK
ASSIST
PARK
ASSIST

HORN SYSTEM

HORN SYSTEM - SERVICE INFORMATION

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DIAGNOSIS AND TESTING
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SWITCH-HORN
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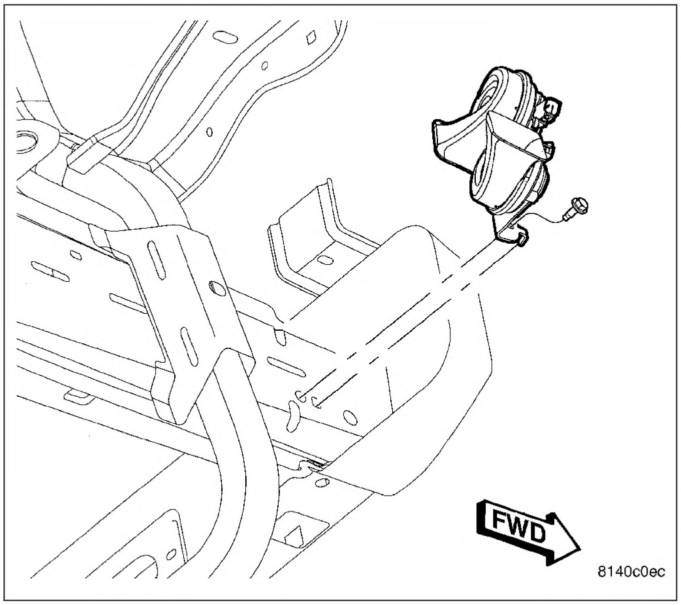
HORN SYSTEM - SERVICE INFORMATION

DESCRIPTION

The dual-note horn system features dual electromagnetic horn units. The horn system includes the following major components:

- **Horn** - The two horns are located on the right side of the vehicle behind the fascia.
- **Horn Switch** - The horn switch is located in the driver airbag trim cover.



OPERATION

The horn system operates on battery current received through a fuse in the Integrated Power Module (IPM). The horn system circuit is designed so that the system will remain operational, regardless of the ignition switch position.

DIAGNOSIS AND TESTING - HORN SYSTEM

The most reliable, efficient, and accurate means to diagnose the horn system requires the use of a scan tool and the proper Diagnostic Procedures information.

Refer to the appropriate wiring information.

In most cases, any problem involving continually sounding horns can be quickly alleviated by removing the horn fuse from the Integrated Power Module (IPM).

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

HORN

DIAGNOSIS AND TESTING

HORN

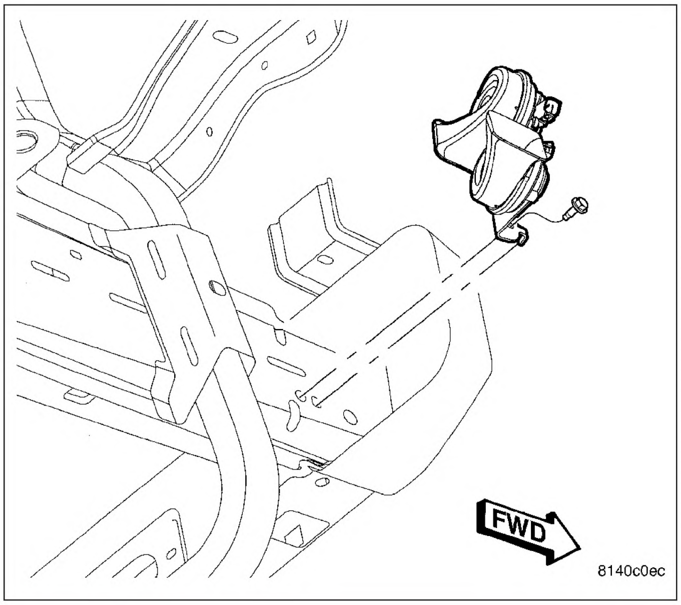
The most reliable, efficient, and accurate means to diagnose the horn system requires the use of a scan tool and the proper Diagnostic Procedures information.

Refer to the appropriate wiring information.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

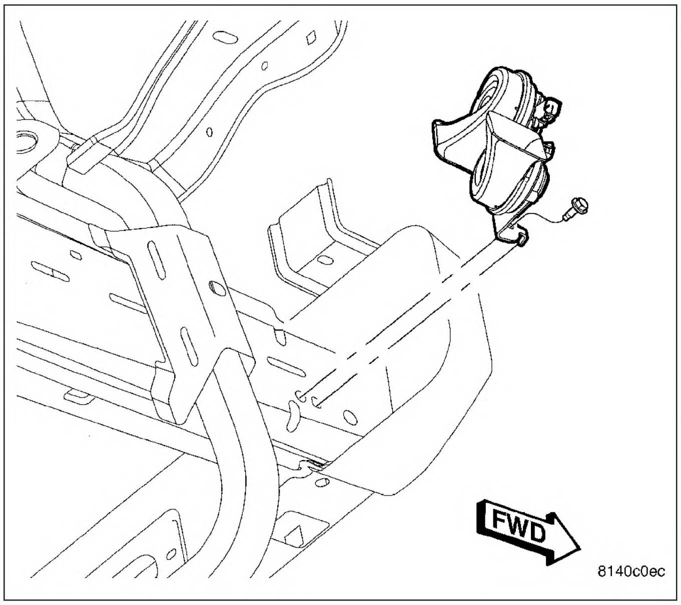
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Raise and support the vehicle.
3. Remove the lower front half of the inner liner from the right front fender wheel house.
4. Disconnect the electrical harness connectors.
5. Remove the mounting fastener.
6. Remove both horns and the mounting bracket as a unit.



INSTALLATION

1. Position both horns and the mounting bracket.
2. Install and tighten the mounting fastener.
3. Connect the electrical harness connectors.
4. Install the lower front half of the inner liner to the right front fender wheel house.
5. Lower the vehicle.
6. Connect the battery negative cable.



SWITCH-HORN

DESCRIPTION

A center-blow, normally open, resistive membrane-type horn switch is secured in a plastic tray that is inserted in a pocket sewn on the front of the driver side airbag retainer strap. The horn switch is concealed behind the driver side airbag module trim cover.

The steering wheel and steering column must be properly grounded in order for the horn switch to function properly. The horn switch and plastic tray are serviced as a unit. If the horn switch is damaged or inoperative, or if the driver side airbag is deployed, the horn switch and tray must be replaced as a unit.

DIAGNOSIS AND TESTING

HORN SWITCH

The most reliable, efficient, and accurate means to diagnose the horn system requires the use of a scan tool and the proper Diagnostic Procedures information.

For complete circuit diagrams, refer to the appropriate wiring information.

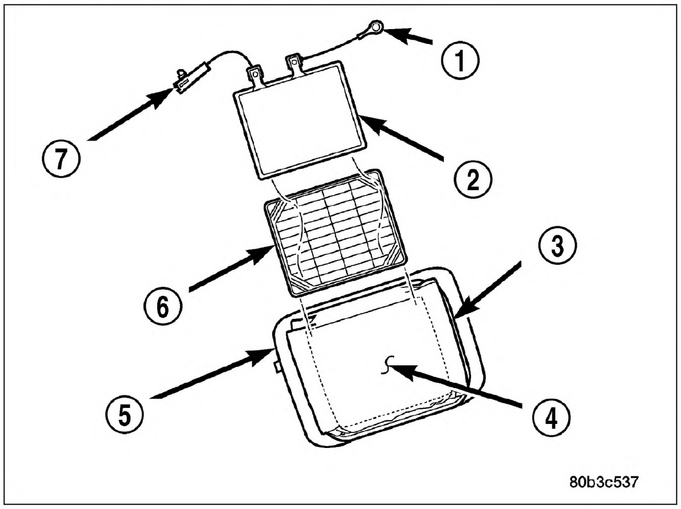
WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Disconnect and isolate the battery negative cable.
2. Remove the trim cover from the driver side airbag. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).
3. Remove the horn switch (2) and tray (6) as a unit from the pouch on the retaining strap of the driver side airbag (5)

.

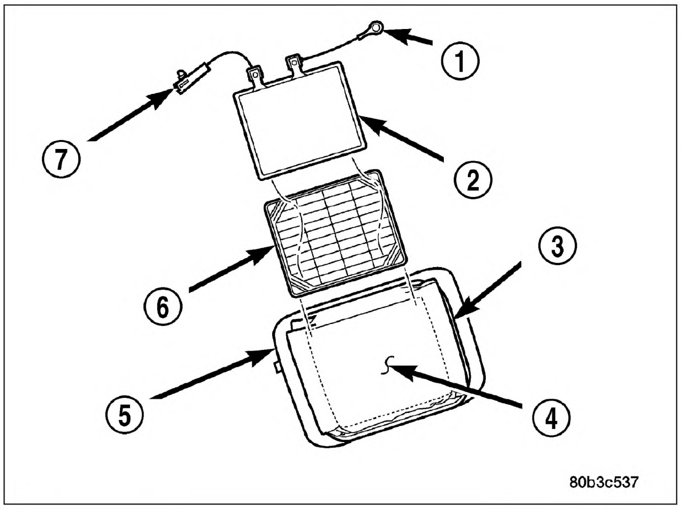


INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Install the horn switch (2) and tray as a unit into the pouch on the retaining strap of the driver side airbag (5).

NOTE: Be certain that the tray is facing the airbag module, that the horn switch is facing the trim cover, that the horn switch feed wire is on the left, and that the horn switch ground wire is on the right.



2. Install the trim cover onto the driver side airbag. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION) for the procedure.
3. Connect the battery negative cable.

IGNITION CONTROL

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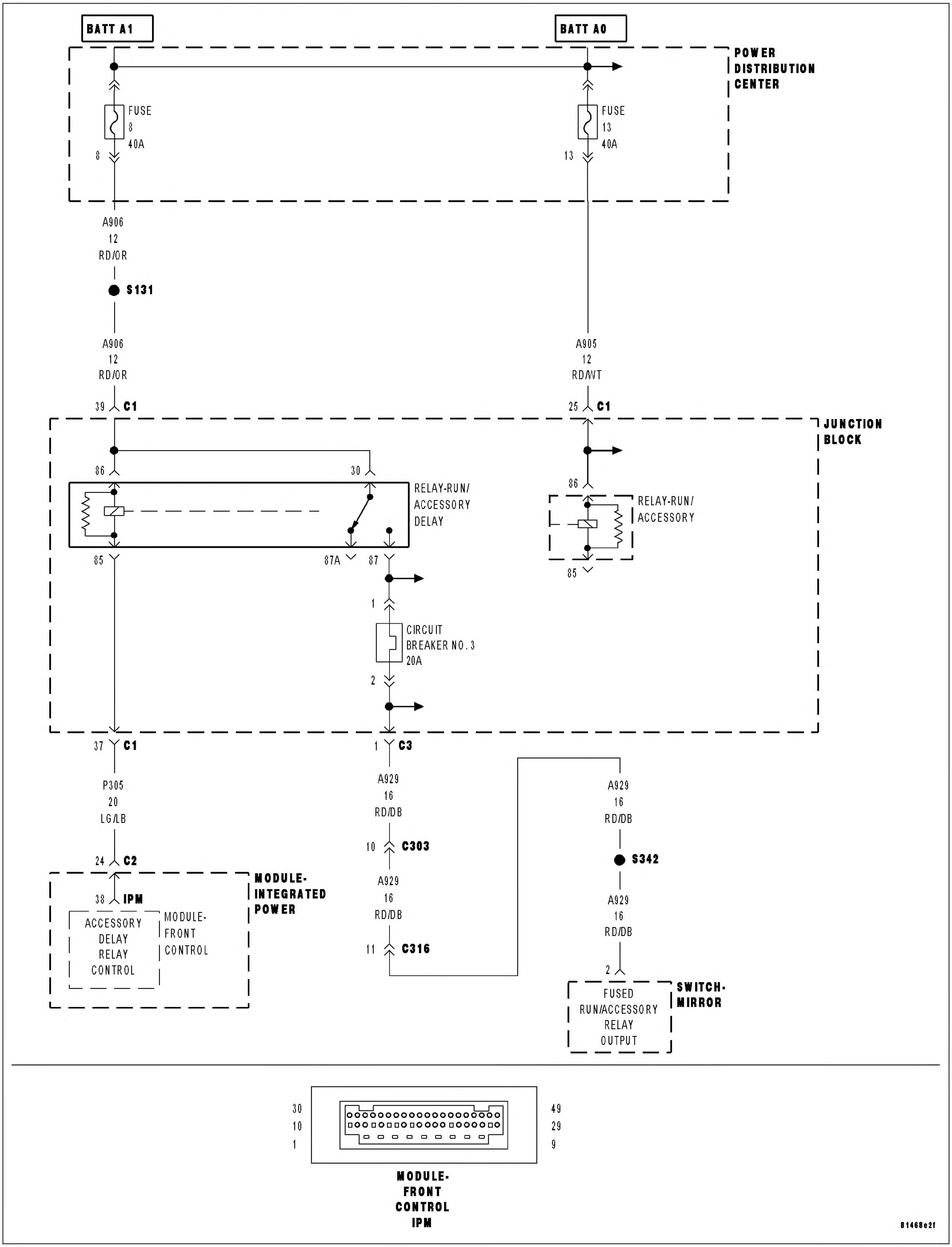
IGNITION SYSTEMS - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B211E–IGNITION RUN/ACC/PAD CONTROL CIRCUIT LOW


BATT A1
BATT A0
POWER DISTRIBUTION CENTER
FUSE 8 40A
8
FUSE 13 40A
13
A906 12 RD/OR
S131
A906 12 RD/OR
A905 12 RD/WT
39 C1
25 C1
JUNCTION BLOCK
86
30
RELAY-RUN/ ACCESSORY DELAY
85
87A
87
86
RELAY-RUN/ ACCESSORY
85
1
CIRCUIT BREAKER NO. 3 20A
2
37 C1
1 C3
P305 20 LG/LB
A929 16 RD/DB
10 C303
A929 16 RD/DB
11 C316
A929 16 RD/DB
S342
A929 16 RD/DB
24 C2
38 IPM
MODULE-INTEGRATED POWER
ACCESSORY DELAY RELAY CONTROL
MODULE-FRONT CONTROL
2
FUSED RUN/ACCESSORY RELAY OUTPUT
SWITCH-MIRROR
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
81468e21

B211E–IGNITION RUN/ACC/PAD CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module will set this DTC within 500ms if the (P305) Accessory Delay Relay Control circuit is open or shorted to ground.

Possible Causes
(P305) ACCESSORY DELAY RELAY CONTROL CIRCUIT OPEN
(P305) ACCESSORY DELAY RELAY CONTROL CIRCUIT SHORTED TO GROUND
ACCESSORY DELAY RELAY
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. ACCESSORY DELAY RELAY

Turn the ignition off.

Install a substitute relay in place of the original Accessory Delay Relay.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active FCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 3

No >> Replace the original Accessory Delay Relay.
Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

B211E–IGNITION RUN/ACC/PAD CONTROL CIRCUIT LOW (CONTINUED)

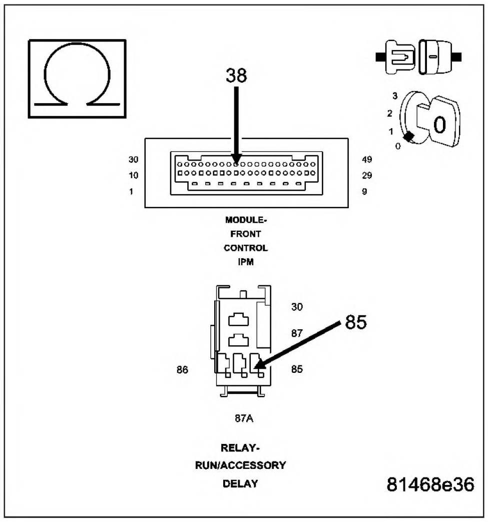
3. (P305) ACCESSORY DELAY RELAY CONTROL CIRCUIT OPEN

Turn the ignition off.

Remove the FCM from the Integrated Power Module.

Remove the Accessory Delay Relay from the Rear Junction Block.

Measure the resistance of the (P305) Accessory Delay Relay Control circuit from the Front Control Module IPM connector to the Relay connector.


38
30
10
1
49
29
9
3
2
1
0
MODULE-
FRONT
CONTROL
IPM
30
87
85
86
85
87A
RELAY-
RUN/ACCESSORY
DELAY
81468e36

Is the resistance below 10.0 ohms?

Yes >> Go To 4

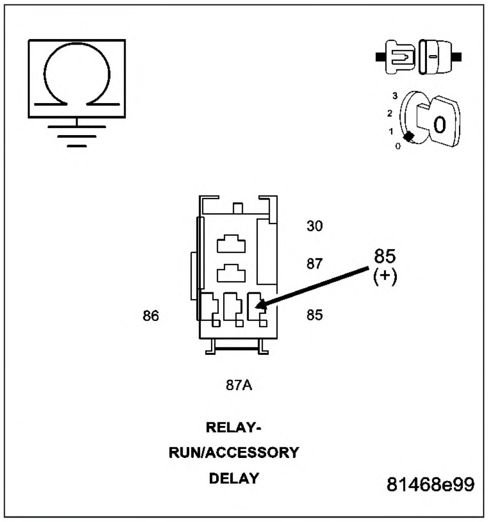
No >> Repair the (P305) Accessory Delay Relay Control circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

---

4. (P307) ACCESSORY DELAY RELAY CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (P305) Accessory Delay Relay Control circuit at the relay cavity (85).


3
2
1
0
30
87
85
(+)
86
85
87A
RELAY-
RUN/ACCESSORY
DELAY
81468e99

Is the resistance below 100.0 ohms?

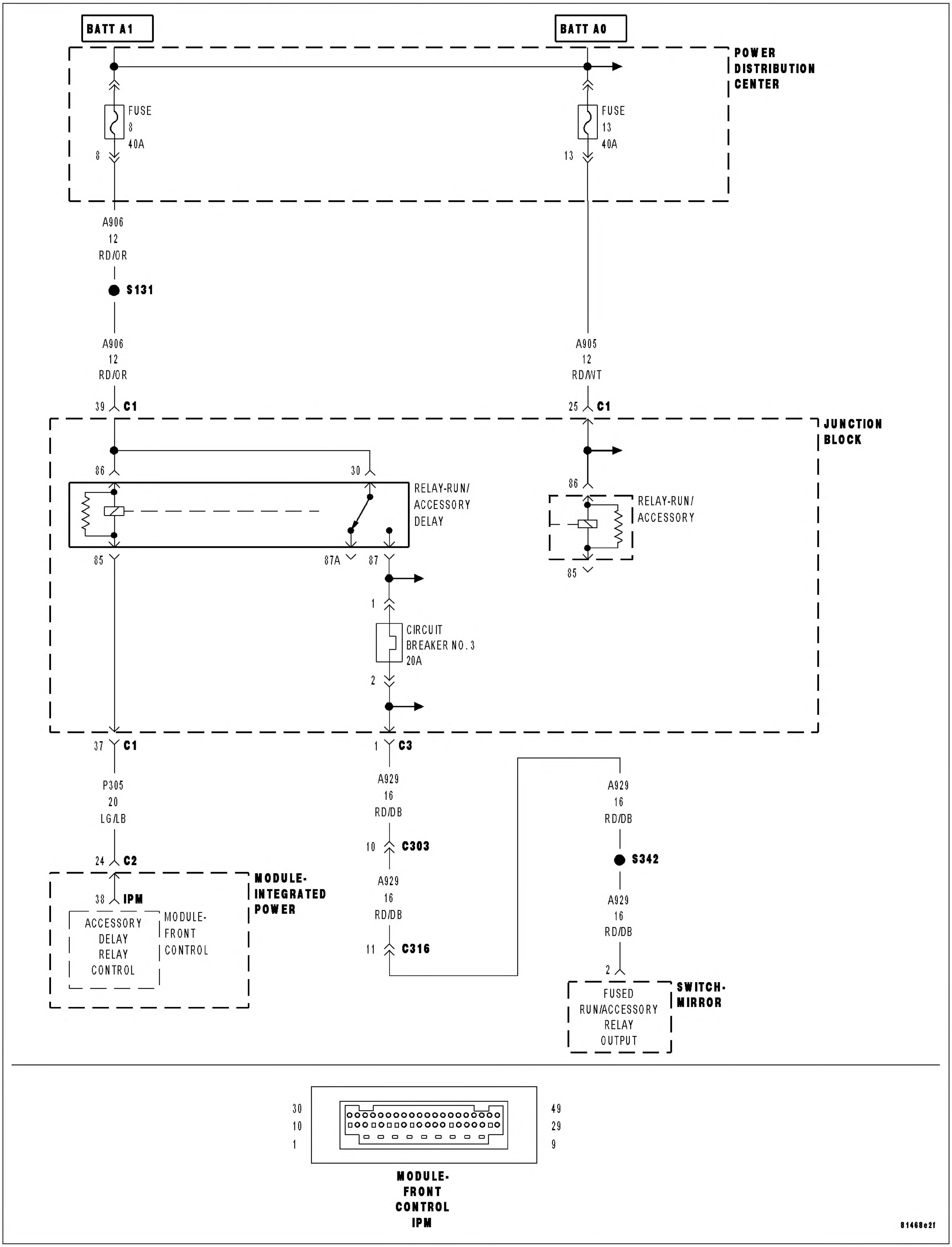
Yes >> Repair the (P305) Accessory Delay Relay Control circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

B211F–IGNITION RUN/ACC/PAD CONTROL CIRCUIT HIGH


BATT A1
BATT A0
POWER DISTRIBUTION CENTER
FUSE 8 40A
8
FUSE 13 40A
13
A906 12 RD/OR
S131
A906 12 RD/OR
A905 12 RD/WT
39 C1
25 C1
JUNCTION BLOCK
86
30
RELAY-RUN/ ACCESSORY DELAY
86
RELAY-RUN/ ACCESSORY
85
87A
87
85
1
CIRCUIT BREAKER NO. 3 20A
2
37 C1
1 C3
P305 20 LG/LB
A929 16 RD/DB
A929 16 RD/DB
24 C2
10 C303
S342
38 IPM
MODULE-INTEGRATED POWER
ACCESSORY DELAY RELAY CONTROL
MODULE-FRONT CONTROL
A929 16 RD/DB
A929 16 RD/DB
11 C316
2
SWITCH-MIRROR
FUSED RUN/ACCESSORY RELAY OUTPUT
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
81468e21

B211F–IGNITION RUN/ACC/PAD CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module will set this DTC within 500ms if the (P305) Ignition Run/Acc/Pad Relay Control circuit is shorted to voltage.

Possible Causes
(P305) ACCESSORY DELAY RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
ACCESSORY DELAY RELAY
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. ACCESSORY DELAY RELAY

Turn the ignition off.

Install a substitute relay in place of the original Accessory Delay Relay.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active FCM DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 3

No >> Replace the original relay.
Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

B211F–IGNITION RUN/ACC/PAD CONTROL CIRCUIT HIGH (CONTINUED)

3. (P305) ACCESSORY DELAY RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE

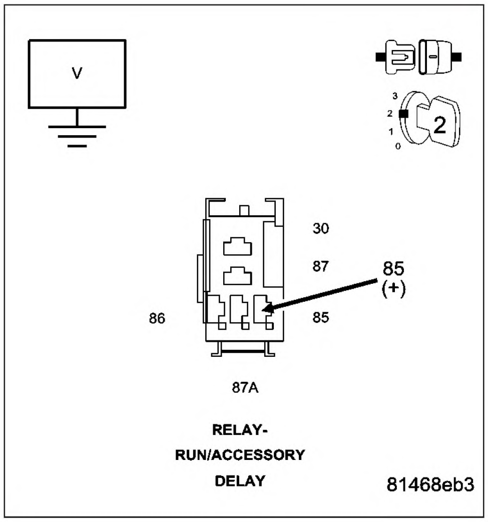
Turn the ignition off.

Remove the FCM from the Integrated Power Module.

Remove the Accessory Delay Relay from the Rear Junction Block.

Turn the ignition on.

Measure the voltage of the (P305) Accessory Delay Relay Control circuit at the relay connector (cavity 85).



Is there any voltage present?

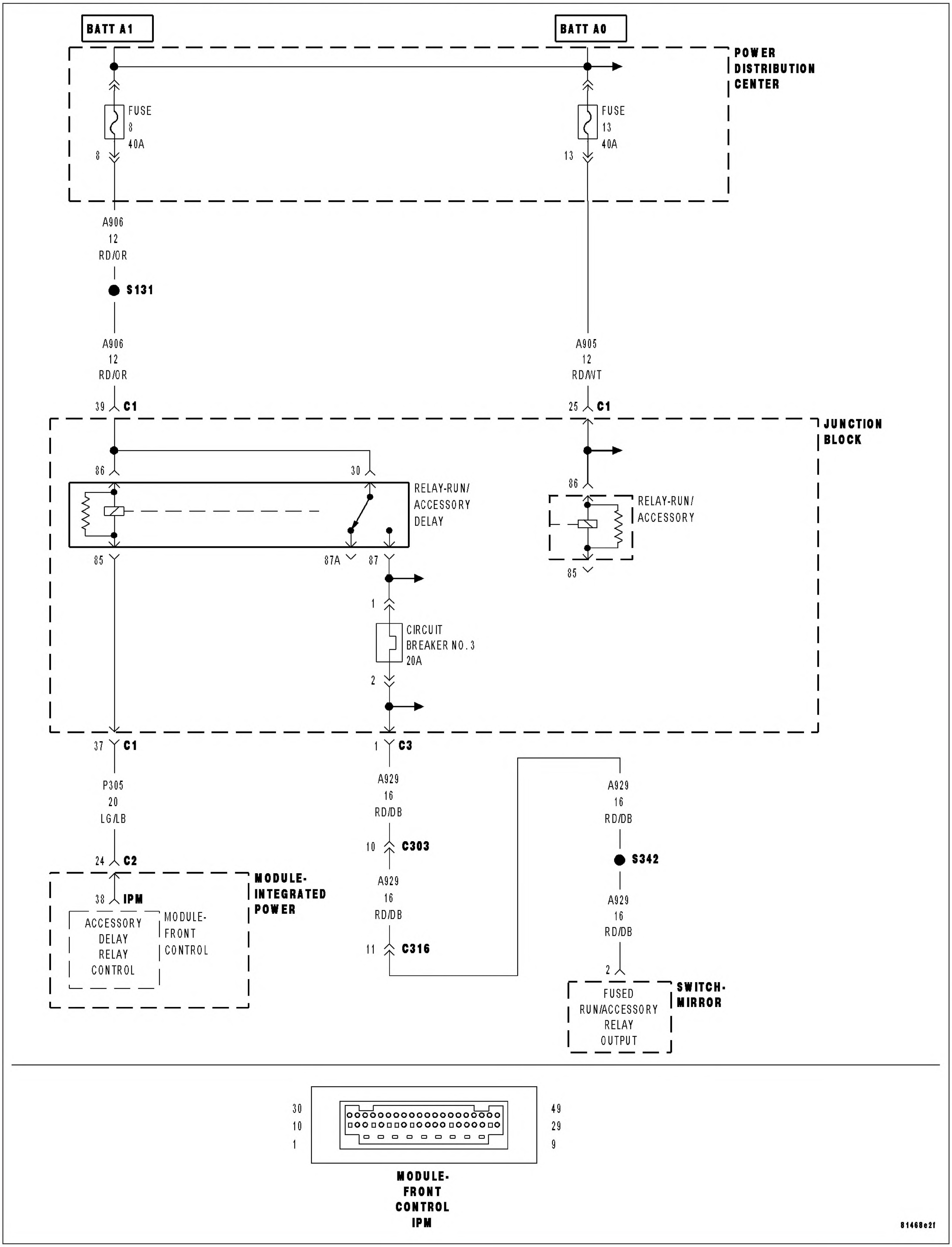
Yes >> Repair the (P305) Accessory Delay Relay Control circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

No >> Inspect the wiring and connectors for damage or shorted circuits. If OK, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

B2120–IGNITION RUN/ACC/PAD CONTROL CIRCUIT OPEN


BATT A1
BATT A0
POWER DISTRIBUTION CENTER
FUSE 8 40A
8
FUSE 13 40A
13
A906 12 RD/OR
S131
A906 12 RD/OR
A905 12 RD/WT
39 C1
25 C1
JUNCTION BLOCK
86
30
RELAY-RUN/ ACCESSORY DELAY
85
87A
87
86
RELAY-RUN/ ACCESSORY
85
1
CIRCUIT BREAKER NO. 3 20A
2
37 C1
1 C3
P305 20 LG/LB
A929 16 RD/DB
10 C303
A929 16 RD/DB
11 C316
A929 16 RD/DB
S342
A929 16 RD/DB
24 C2
38 IPM
ACCESSORY DELAY RELAY CONTROL
MODULE- FRONT CONTROL
MODULE- INTEGRATED POWER
2
FUSED RUN/ACCESSORY RELAY OUTPUT
SWITCH- MIRROR
30
10
1
49
29
9
MODULE- FRONT CONTROL IPM
81468e21

B2120–IGNITION RUN/ACC/PAD CONTROL CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module will set this DTC within 500ms if the (P305) Ignition Accessory Delay Relay Control circuit is open.

Possible Causes
(P305) ACCESSORY DELAY RELAY CONTROL CIRCUIT OPEN
ACCESSORY DELAY RELAY
FRONT CONTROL MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. ACCESSORY DELAY RELAY

Turn the ignition off.

Install a substitute relay in place of the original Accessory Delay Relay.

Cycle the ignition switch from off to on, leaving the ignition on for a minimum of 90 seconds.

With the scan tool, read the active FCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 3

No >> Replace the original Accessory Delay Relay.
Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

B2120–IGNITION RUN/ACC/PAD CONTROL CIRCUIT OPEN (CONTINUED)

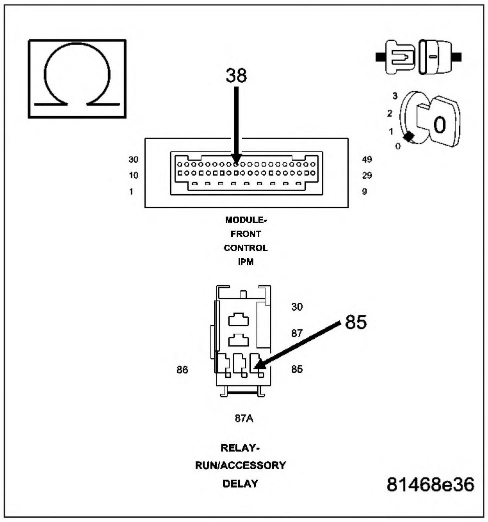
3. (P305) ACCESSORY DELAY RELAY CONTROL CIRCUIT OPEN

Turn the ignition off.

Remove the FCM from the Integrated Power Module.

Remove the Accessory delay Relay from the Rear Junction Block.

Measure the resistance of the (P305) Accessory Delay Relay Control circuit from the FCM-IPM connector to the relay connector.


38
30
10
1
49
29
9
3
2
1
0
0
MODULE-
FRONT
CONTROL
IPM
30
87
85
86
85
87A
RELAY-
RUN/ACCESSORY
DELAY
81468e36

Is the resistance below 10.0 ohms?

No >> Repair the (P305) Accessory Delay Relay Control circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If OK, replace and program the Front Control Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to BODY VERIFICATION TEST – VER 1).

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SENSOR-KNOCK
DESCRIPTION 27
OPERATION 27
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REMOVAL 30
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CYLINDER - IGNITION KEY/LOCK
REMOVAL 34
INSTALLATION 35
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REMOVAL 36
INSTALLATION 43

IGNITION SYSTEM - SERVICE INFORMATION

DESCRIPTION

The ignition system is controlled by the Powertrain Control Module (PCM) on all engines.

3.7L V-6 ENGINE

The 3.7L V-6 engine uses a separate ignition coil for each cylinder. The one-piece coil bolts directly to the cylinder head. Rubber boots seal the secondary terminal ends of the coils to the top of all 6 spark plugs. A separate electrical connector is used for each coil.

Because of coil design, spark plug cables (secondary cables) are not used. A distributor is not used with the 3.7L engine.

Two knock sensors (one for each cylinder bank) are used to help control spark knock.

The Auto Shutdown (ASD) relay provides battery voltage to each ignition coil.

The ignition system consists of:

- 6 Spark Plugs
- 6 Separate Ignition Coils
- 2 Knock Sensors
- Powertrain Control Module (PCM)
- Also to be considered part of the ignition system are certain inputs from the Crankshaft Position, Camshaft Position, Throttle Position, 2 knock and MAP Sensors

4.7L V-8 ENGINE

The 4.7L V-8 engine uses a separate ignition coil for each cylinder. The one-piece coil bolts directly to the cylinder head. Rubber boots seal the secondary terminal ends of the coils to the top of all 8 spark plugs. A separate electrical connector is used for each coil.

Because of coil design, spark plug cables (secondary cables) are not used. A distributor is not used with the 4.7L engine.

Two knock sensors (one for each cylinder bank) are used to help control spark knock.

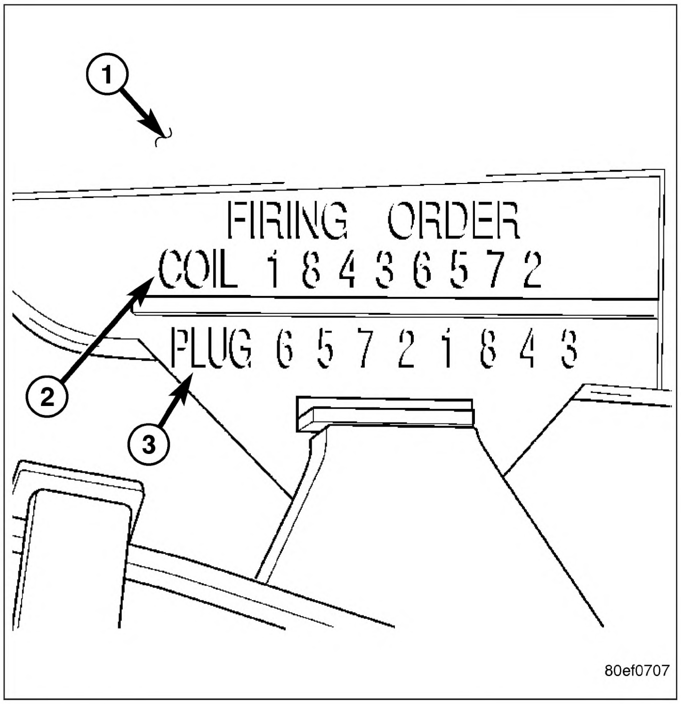
The Auto Shutdown (ASD) relay provides battery voltage to each ignition coil.

The ignition system consists of:

- 8 Spark Plugs
- 8 Separate Ignition Coils
- 2 Knock Sensors
- Powertrain Control Module (PCM)
- Also to be considered part of the ignition system are certain inputs from the Crankshaft Position, Camshaft Position, Throttle Position, 2 knock and MAP Sensors

5.7L V-8 ENGINE

For additional information, also refer to Ignition Coil Description and Operation.



The 5.7L V-8 engine is equipped with 16 spark plugs. Two plugs are used for each cylinder. The 5.7L is also equipped with 8 separate and independent ignition coils. The one-piece coil bolts directly to the cylinder head cover and attaches the coils secondary output terminal directly to a spark plug using a rubber boot seal. Each coil is also equipped with a second output terminal. This second terminal connects a conventional spark plug cable directly to a spark plug on the opposite cylinder bank. A separate primary electrical connector is used for each coil.

Eight conventional spark plug cables are used with the 5.7L. These cables connect a coil on one cylinder bank, directly to a spark plug on the opposite cylinder bank. The cables are placed and routed in a special plastic loom to keep them separated. This loom is clipped to the intake manifold. To prevent a miss-match of cables, a corresponding spark plug / coil number is displayed on each plug cable: 1/6, 2/3, 4/7 and 5/8. These numbers (2) and (3) can also be found on the top of the intake manifold (1) to the right of the throttle body.

Two knock sensors (one for each cylinder bank) are used to help control spark knock.

The 5.7L engine will not use a conventional distributor.

The ignition system consists of:

- 16 Spark Plugs (2 per cylinder)
- 8 Separate, Dual-Secondary Output, Ignition Coils
- 2 Knock Sensors
- 8 Secondary Ignition Cables
- Powertrain Control Module (PCM)
- Also to be considered part of the ignition system are certain inputs from the Crankshaft Position, Camshaft Position, Throttle Position, 2 knock and MAP Sensors

SPECIFICATIONS

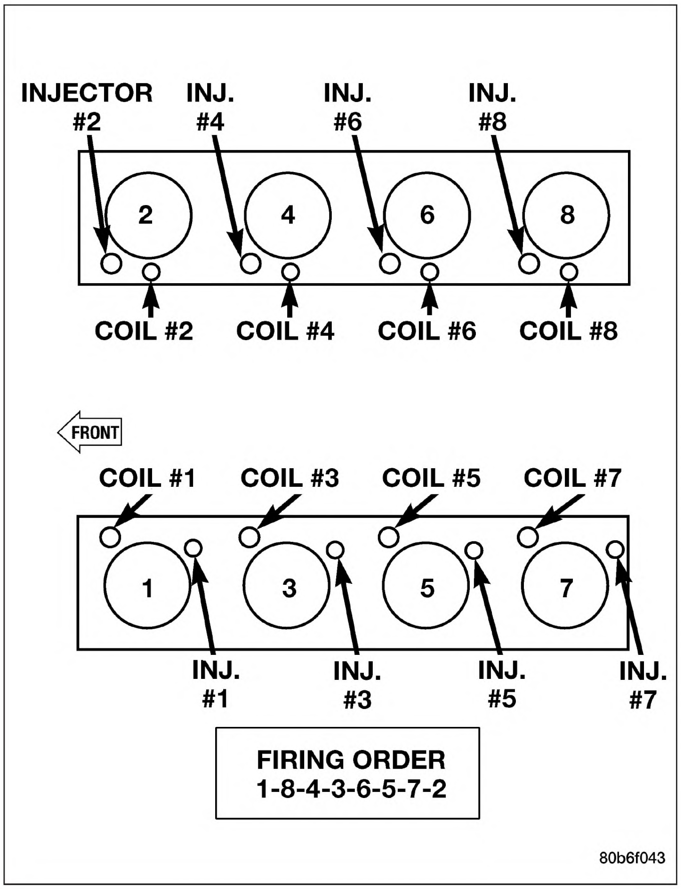
TORQUE - IGNITION

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Camshaft Position Sensor - 3.7L V-6 Engine	12	-	106
Camshaft Position Sensor - 4.7L V-8 Engine	12	-	106
Camshaft Position Sensor - 5.7L V-8 Engine	12	9	105
Crankshaft Position Sensor - 3.7L V-6 Engine	28	21	205
Crankshaft Position Sensor - 4.7L V-8 Engine	28	21	205
Crankshaft Position Sensor - 5.7L V-8 Engine	12	9	105
Ignition Coil Mounting - 3.7L V-6 Engine	8	-	70
Ignition Coil Mounting - 4.7L V-8 Engine	8	-	70
Ignition Coil Mounting - 5.7L V-8 Engine	12	9	105 (± 20)
* Knock Sensor - 3.7L V-6 Engine	20	15	176
* Knock Sensor - 4.7L V-8 Engine	20	15	176
* Knock Sensor - 5.7L V-8 Engine	20	15	176
Spark Plugs - 3.7L V-6 Engine	27	20	-
Spark Plugs - 4.7L V-8 Engine	27	20	-
** Spark Plugs - 5.7L V-8 Engine	18 (± 3)	13 (± 2)	-
* Do not apply any sealant, thread-locker or adhesive to bolts. Poor sensor performance may result.			
** Torque critical tapered design. Do not exceed 15 ft. lbs.			

ENGINE FIRING ORDER - 3.7L V-6

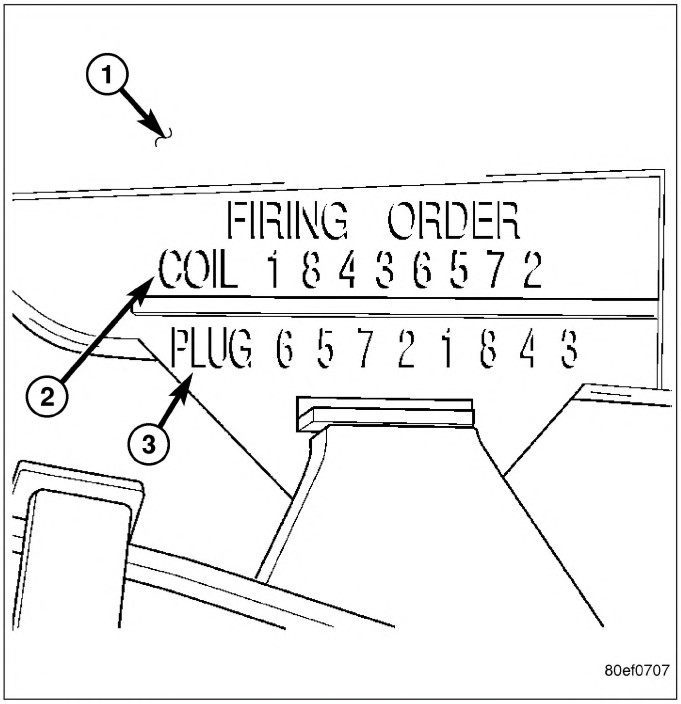
1 - 6 - 5 - 4 - 3 - 2

ENGINE FIRING ORDER – 4.7L V-8


INJECTOR #2
INJ. #4
INJ. #6
INJ. #8
2
4
6
8
COIL #2
COIL #4
COIL #6
COIL #8
FRONT
COIL #1
COIL #3
COIL #5
COIL #7
1
3
5
7
INJ. #1
INJ. #3
INJ. #5
INJ. #7
FIRING ORDER
1-8-4-3-6-5-7-2
80b6f043

FIRING ORDER / CABLE ROUTING – 5.7L V-8 ENGINE

Eight conventional spark plug cables are used with the 5.7L. These cables connect a coil on one cylinder bank, directly to a spark plug on the opposite cylinder bank. The cables are placed and routed in a special plastic loom to keep them separated. This loom is clipped to the intake manifold. To prevent a miss-match of cables, a corresponding spark plug / coil number is displayed on each plug cable: 1/6, 2/3, 4/7 and 5/8. These numbers (2) and (3) can also be found on the top of the intake manifold (1) to the right of the throttle body.


1
FIRING ORDER
COIL 1 8 4 3 6 5 7 2
PLUG 6 5 7 2 1 8 4 3
2
3
80ef0707

SPARK PLUG CABLE RESISTANCE

MINIMUM	MAXIMUM
250 Ohms Per Inch	1000 Ohms Per Inch
3000 Ohms Per Foot	12,000 Ohms Per Foot

SPARK PLUGS

ENGINE	PLUG TYPE	ELECTRODE GAP
3.7L V-6	ZFR6F - 11G (NGK)	1.1 (0.042 in.)
4.7L V-8	RC12MCC4	1.01 mm (.040 in.)
5.7L V-8	Champion - RE14MCC4	1.14 mm (.045 in.)

IGNITION COIL RESISTANCE - 3.7L V-6

PRIMARY RESISTANCE 21-27°C (70-80°F)	SECONDARY RESISTANCE 21-27°C (70-80°F)
0.6 - 0.9 Ohms	6,000 - 9,000 Ohms

IGNITION COIL RESISTANCE - 4.7L V-8

PRIMARY RESISTANCE 21-27°C (70-80°F)	SECONDARY RESISTANCE 21-27°C (70-80°F)
0.6 - 0.9 Ohms	6,000 - 9,000 Ohms

IGNITION COIL RESISTANCE - 5.7L V-8

PRIMARY RESISTANCE @ 21-27°C (70-80°F)
0.558 - 0.682 Ohms (Plus or Minus 10% @ 70-80° F)

IGNITION TIMING

Ignition timing is not adjustable on any engine.

RELAY-AUTO SHUT DOWN

DESCRIPTION - PCM OUTPUT

The 5–pin, 12–volt, Automatic Shutdown (ASD) relay is located in the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

OPERATION

PCM OUTPUT

The ASD relay supplies battery voltage (12+ volts) to the fuel injectors and ignition coil(s). With certain emissions packages it also supplies 12–volts to the oxygen sensor heating elements.

The ground circuit for the coil within the ASD relay is controlled by the Powertrain Control Module (PCM). The PCM operates the ASD relay by switching its ground circuit on and off.

The ASD relay will be shut–down, meaning the 12–volt power supply to the ASD relay will be de-activated by the PCM if:

- the ignition key is left in the ON position. This is if the engine has not been running for approximately 1.8 seconds.
- there is a crankshaft position sensor signal to the PCM that is lower than pre-determined values.

ASD SENSE - PCM INPUT

A 12 volt signal at this input indicates to the PCM that the ASD has been activated. The relay is used to connect the oxygen sensor heater element, ignition coil and fuel injectors to 12 volt + power supply.

This input is used only to sense that the ASD relay is energized. If the Powertrain Control Module (PCM) does not see 12 volts at this input when the ASD should be activated, it will set a Diagnostic Trouble Code (DTC).

REMOVAL

The ASD relay is located in the engine compartment within the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

1. Remove PDC cover.
2. Remove relay from PDC.
3. Check condition of relay terminals and PDC connector terminals for damage or corrosion. Repair if necessary before installing relay.
4. Check for pin height (pin height should be the same for all terminals within the PDC connector). Repair if necessary before installing relay.

INSTALLATION

The ASD relay is located in the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

1. Install relay to PDC.
2. Install cover to PDC.

SENSOR-CAMSHAFT POSITION

DESCRIPTION

3.7L V-6

The Camshaft Position Sensor (CMP) on the 3.7L 6-cylinder engine is bolted to the right-front side of the right cylinder head.

4.7L V-8

The Camshaft Position Sensor (CMP) on the 4.7L V-8 engine is bolted to the right-front side of the right cylinder head.

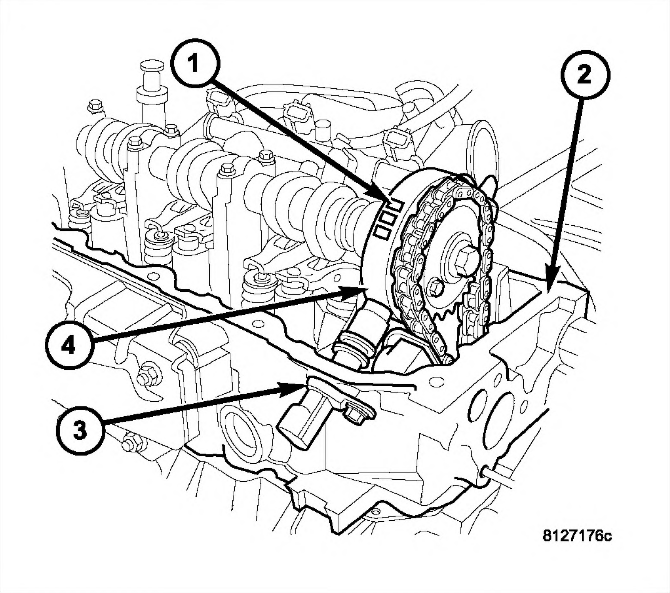
5.7L V-8

The Camshaft Position Sensor (CMP) on the 5.7L V-8 engine is located below the generator on the timing chain / case cover on the right/front side of engine.

OPERATION

3.7L V-6

The Camshaft Position Sensor (CMP) sensor on the 3.7L V-6 engine (3) contains a hall effect device referred to as a sync signal generator. A rotating target wheel (tonewheel) for the CMP is located (4) at the front of the camshaft for the right cylinder head (2). This sync signal generator detects notches (1) located on a tonewheel. As the tonewheel rotates, the notches pass through the sync signal generator. The signal from the CMP sensor is used in conjunction with the Crankshaft Position Sensor (CKP) to differentiate between fuel injection and spark events. It is also used to synchronize the fuel injectors with their respective cylinders.

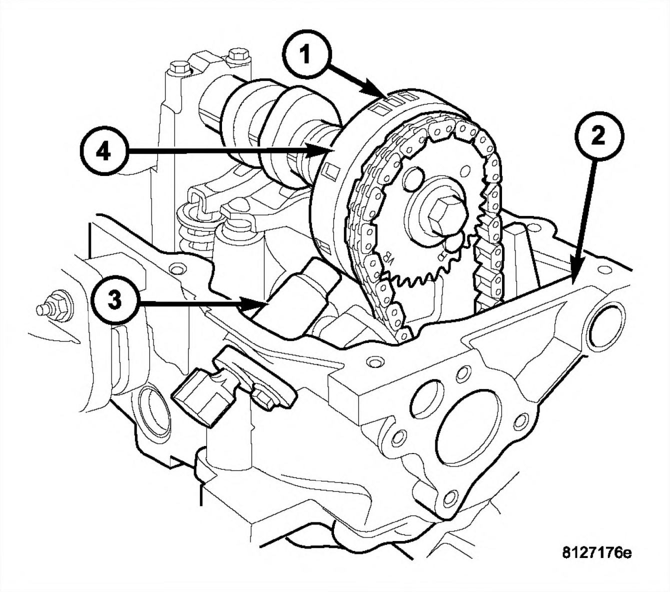


When the leading edge of the tonewheel notch enters the tip of the CMP, the interruption of magnetic field causes the voltage to switch high, resulting in a sync signal of approximately 5 volts.

When the trailing edge of the tonewheel notch leaves then tip of the CMP, the change of the magnetic field causes the sync signal voltage to switch low to 0 volts.

4.7L V-8

The CMP sensor on the 4.7L engine contains a hall effect device called a sync signal generator to generate a fuel sync signal. This sync signal generator detects notches located on a tonewheel. The tonewheel (4) is located at the front of the camshaft for the right cylinder head (2). As the tonewheel rotates, the notches (1) pass through the sync signal generator. The pattern of the notches (viewed counter-clockwise from front of engine) is: 1 notch, 2 notches, 3 notches, 3 notches, 2 notches 1 notch, 3 notches and 1 notch. The signal from the CMP sensor is used in conjunction with the crankshaft position sensor to differentiate between fuel injection and spark events. It is also used to synchronize the fuel injectors with their respective cylinders.

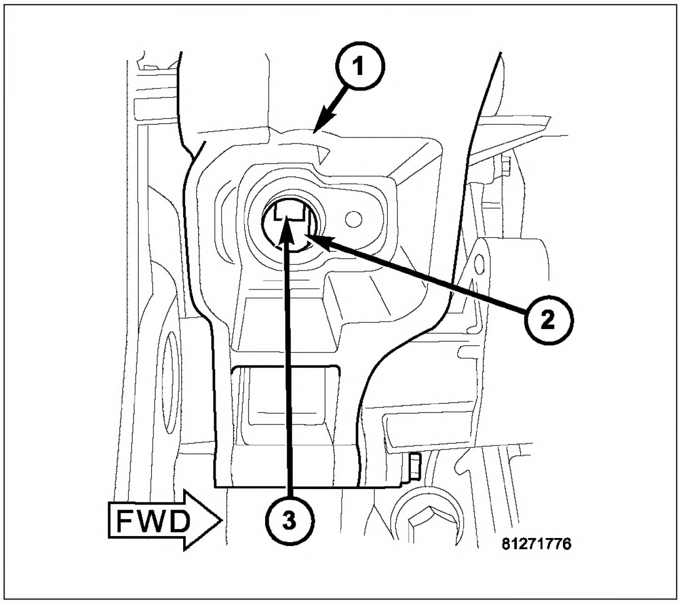


5.7L V-8

The CMP sensor is used in conjunction with the crankshaft position sensor to differentiate between fuel injection and spark events. It is also used to synchronize the fuel injectors with their respective cylinders. The sensor generates electrical pulses. These pulses (signals) are sent to the Powertrain Control Module (PCM). The PCM will then determine crankshaft position from both the camshaft position sensor and crankshaft position sensor.

The tonewheel is located at the front of the camshaft (2). As the tonewheel rotates, notches (3) pass through the sync signal generator.

When the cam gear is rotating, the sensor will detect the notches. Input voltage from the sensor to the PCM will then switch from a low (approximately 0.3 volts) to a high (approximately 5 volts). When the sensor detects a notch has passed, the input voltage switches back low to approximately 0.3 volts.

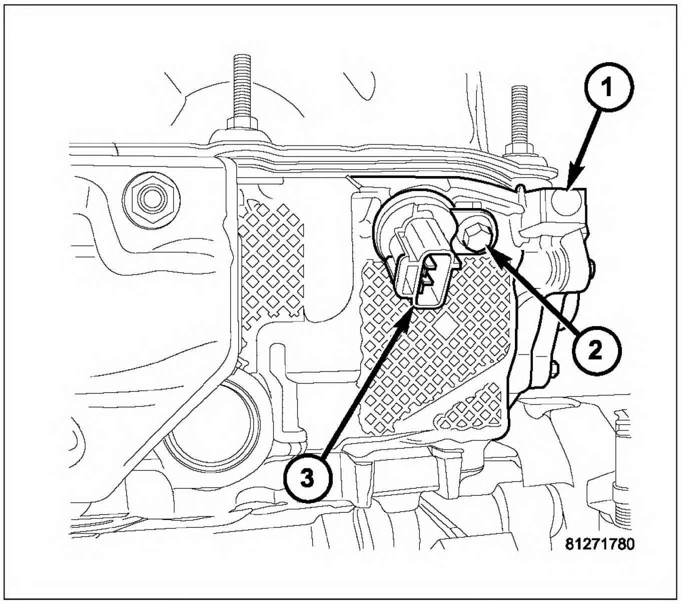


REMOVAL

3.7L V-6

The Camshaft Position Sensor (CMP) on the 3.7L V-6 engine (3) is bolted to the front/top of the right cylinder head (1).

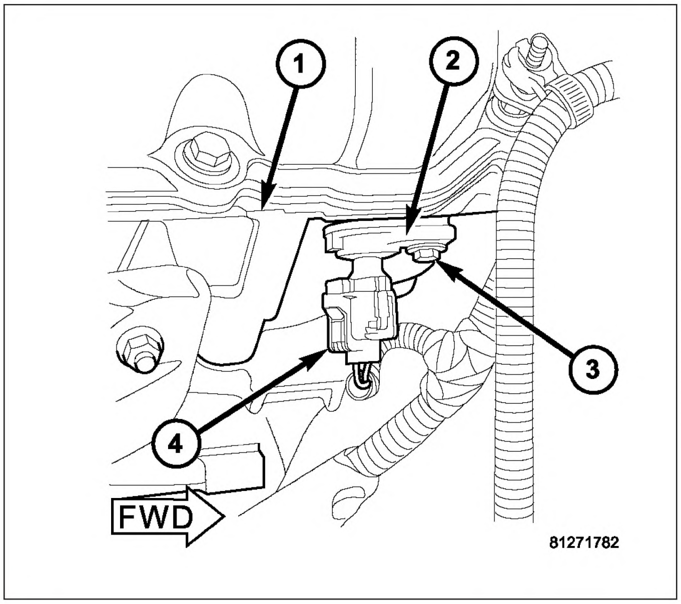
1. Disconnect electrical connector at CMP sensor.
2. Remove sensor mounting bolt (2).
3. Carefully twist sensor from cylinder head.
4. Check condition of sensor o-ring.



4.7L V-8

The Camshaft Position Sensor (CMP) on the 4.7L V–8 engine (2) is bolted to the front/top of the right cylinder head (1).

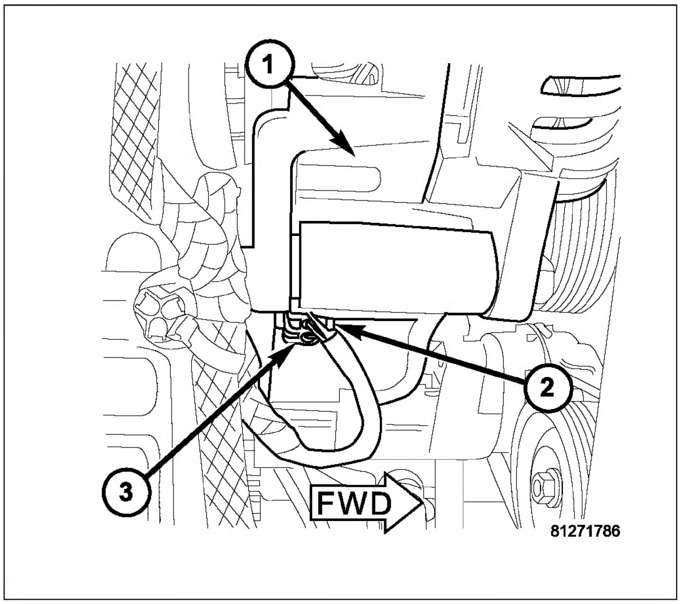
1. Raise and support vehicle.
2. Disconnect electrical connector (4) at CMP sensor.
3. Remove sensor mounting bolt (3).
4. Carefully twist sensor from cylinder head.
5. Check condition of sensor o-ring.



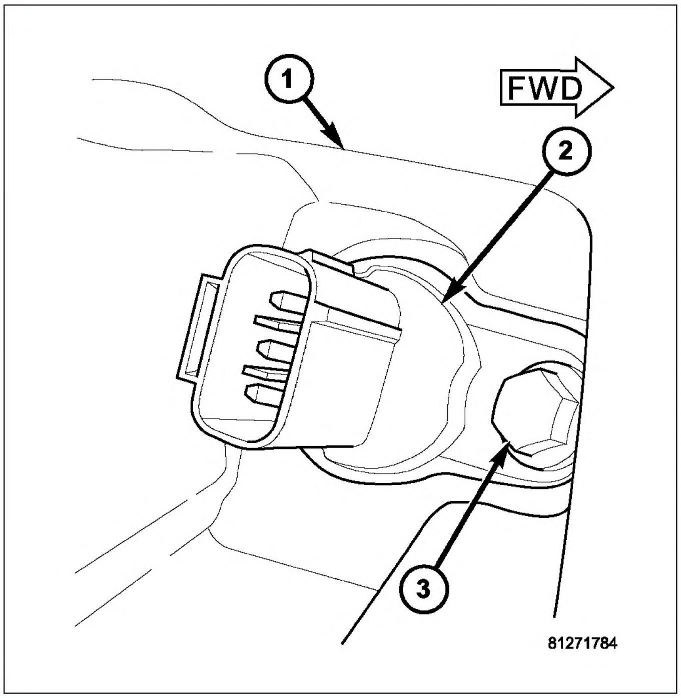
5.7L V-8

The Camshaft Position Sensor (CMP) on the 5.7L V-8 engine is located on right side of timing chain cover below generator (1).

1. Disconnect electrical connector (3) at CMP sensor.



2. Remove sensor mounting bolt (3).
3. Carefully twist sensor (2) from cylinder head.
4. Check condition of sensor o-ring.



INSTALLATION

3.7L V-6

1. Clean out machined hole in cylinder head.
2. Apply a small amount of engine oil to sensor o-ring.
3. Install sensor into cylinder head with a slight rocking and twisting action.

CAUTION: Before tightening sensor mounting bolt, be sure sensor is completely flush to cylinder head. If sensor is not flush, damage to sensor mounting tang may result.

4. Install mounting bolt and tighten. Refer to torque specifications.
5. Connect electrical connector to sensor.

4.7L V-8

1. Clean out machined hole in cylinder head.
2. Apply a small amount of engine oil to sensor o-ring.
3. Install sensor into cylinder head with a slight rocking action. Do not twist sensor into position as damage to o-ring may result.

CAUTION: Before tightening sensor mounting bolt, be sure sensor is completely flush to cylinder head. If sensor is not flush, damage to sensor mounting tang may result.

4. Install mounting bolt and tighten. Refer to Torque Specifications.
5. Connect electrical connector to sensor.

5.7L V-8

1. Clean out machined hole in cylinder head.
2. Apply a small amount of engine oil to sensor o-ring.
3. Install sensor into cylinder head with a slight rocking action. Do not twist sensor into position as damage to o-ring may result.

CAUTION: Before tightening sensor mounting bolt, be sure sensor is completely flush to timing chain cover. If sensor is not flush, damage to sensor mounting tang may result.

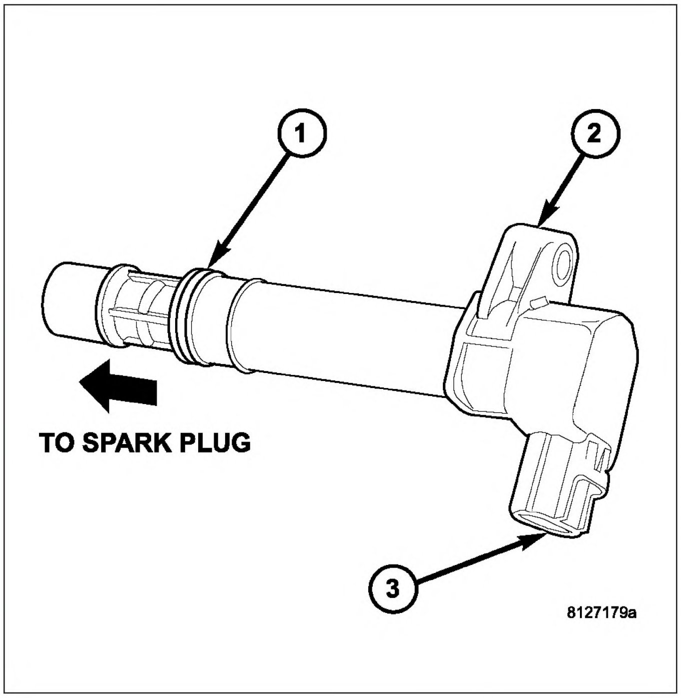
4. Install mounting bolt and tighten. Refer to Torque Specifications.
5. Connect electrical connector to sensor.

COIL-IGNITION

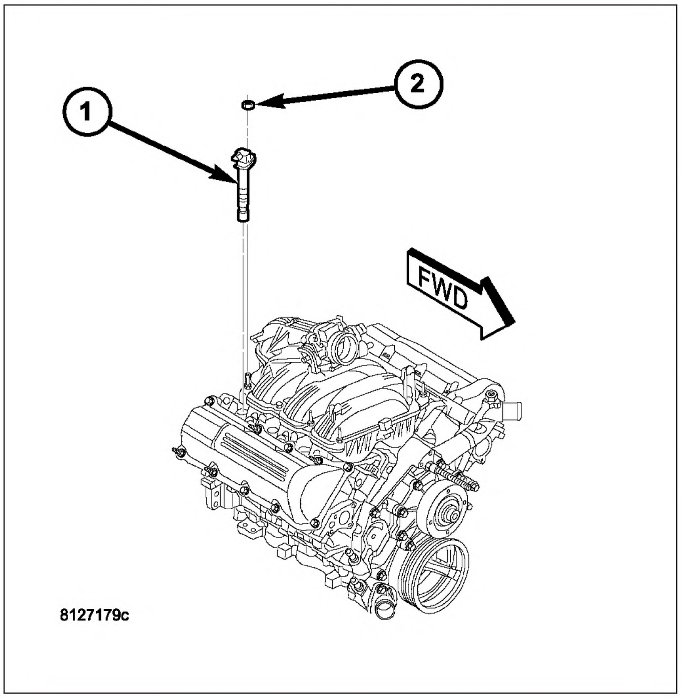
DESCRIPTION

3.7L V-6

The 3.7L V-6 engine uses 6 dedicated, and individually fired coil for each spark plug (2).

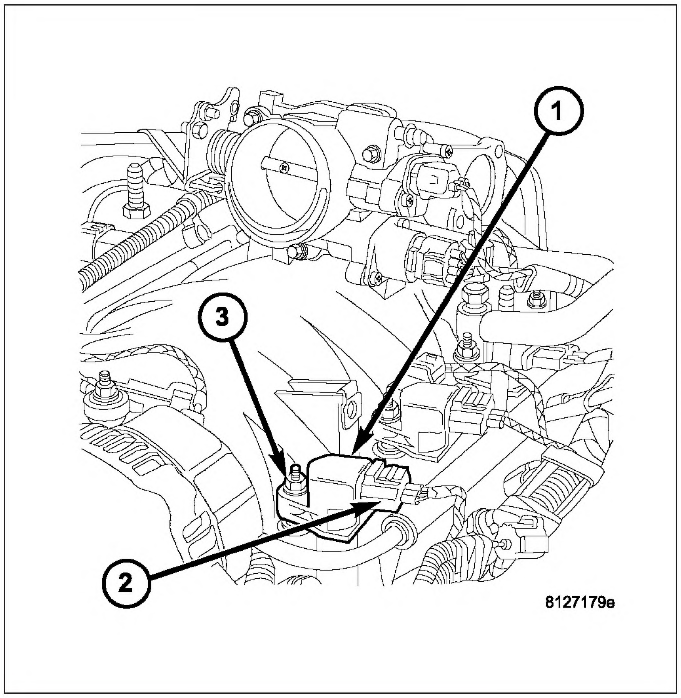

1
2
TO SPARK PLUG
3
8127179a

Each coil (1) is mounted directly into the cylinder head and onto the top of each spark plug.


2
1
FWD
8127179c

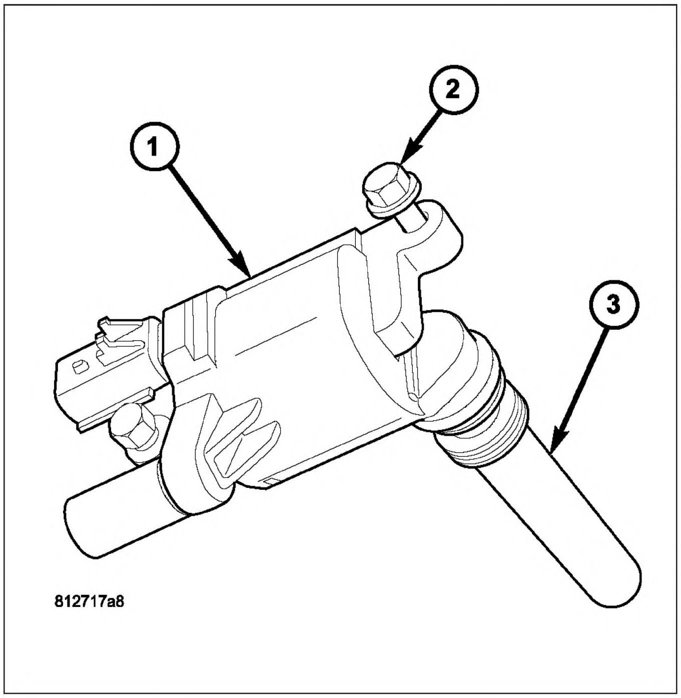
4.7L V-8

The 4.7L V–8 engine uses 8 dedicated, and individually fired coil (1) for each spark plug. Each coil is mounted directly to the top of each spark plug.

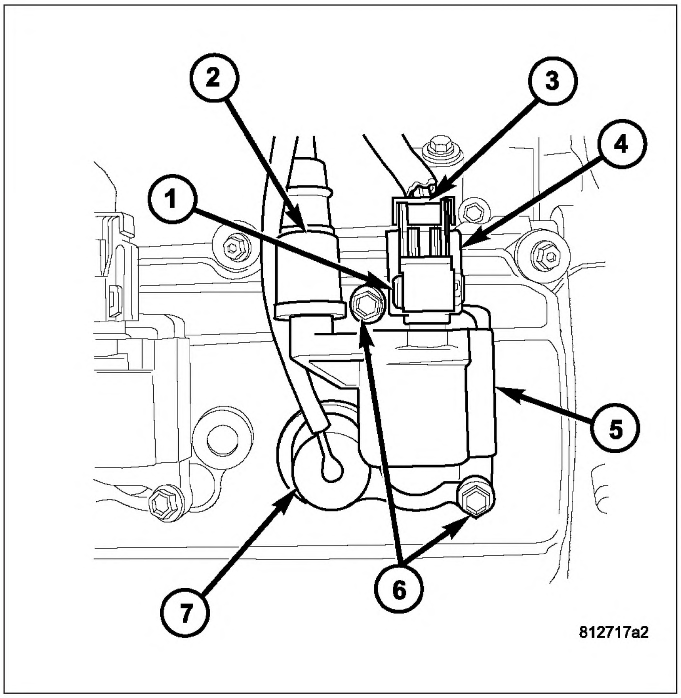


5.7L V-8

The 5.7L V–8 engine uses 8 dedicated, and individually fired coil (1) for each pair of spark plugs.



Each coil (5) is mounted directly to the top of each spark plug. Each coil is bolted (6) to the valve cover.



OPERATION

3.7L V-6

Battery voltage is supplied to the 6 individual ignition coils from the ASD relay. The Powertrain Control Module (PCM) opens and closes each ignition coil ground circuit at a determined time for ignition coil operation.

Base ignition timing is not adjustable. By controlling the coil ground circuit, the PCM is able to set the base timing and adjust the ignition timing advance. This is done to meet changing engine operating conditions.

The ignition coil is not oil filled. The windings are embedded in an epoxy compound. This provides heat and vibration resistance that allows the ignition coil to be mounted on the engine.

Because of coil design, spark plug cables (secondary cables) are not used with the 3.7L V-6 engine.

4.7L V-8

Battery voltage is supplied to the 8 individual ignition coils from the ASD relay. The Powertrain Control Module (PCM) opens and closes each ignition coil ground circuit at a determined time for ignition coil operation.

Base ignition timing is not adjustable. By controlling the coil ground circuit, the PCM is able to set the base timing and adjust the ignition timing advance. This is done to meet changing engine operating conditions.

The ignition coil is not oil filled. The windings are embedded in an epoxy compound. This provides heat and vibration resistance that allows the ignition coil to be mounted on the engine.

Because of coil design, spark plug cables (secondary cables) are not used with the 4.7L V-8 engine.

5.7L V-8

The ignition system is controlled by the Powertrain Control Module (PCM) on all engines.

A “wasted spark” system is used on the 5.7L engine combining paired, or dual-firing coils, and 2 spark plugs per cylinder. The coils and spark plugs are connected with paired, secondary high-voltage cables.

Each cylinder is equipped with 1 dual-output coil. Meaning one coil mounts directly over one of the dual spark plugs for 1 high-voltage output. A second high-voltage output is supplied directly from the same coil (using a plug cable) to one of the dual spark plugs on a corresponding (paired) cylinder on the opposite cylinder bank.

Each coil fires 2 spark plugs simultaneously on each of the cylinder banks (one cylinder on compression stroke and one cylinder on exhaust stroke). **EXAMPLE :** When the #1 cylinder is on compression stroke and ready for spark, the #1 coil will fire one of the dual spark plugs on the #1 cylinder (directly below the coil). The other dual spark plug on the #1 cylinder will be fired by the #6 coil. At the same time, the #1 coil will fire a “wasted spark” to one of the dual spark plugs at the #6 cylinder as coil #6 also fires a “wasted spark” to one of the dual spark plugs at the #6 cylinder.

The firing order is paired at cylinders 1/6, 2/3, 4/7, 5/8. Basic cylinder firing order is 1–8–4–3–6–5–7–2.

Battery voltage is supplied to all of the ignition coils positive terminals from the ASD relay. If the PCM does not see a signal from the crankshaft and camshaft sensors (indicating the ignition key is ON but the engine is not running), it will shut down the ASD circuit.

Base ignition timing is not adjustable on the 5.7L V-8 engine. By controlling the coil ground circuits, the PCM is able to set the base timing and adjust the ignition timing advance. This is done to meet changing engine operating conditions.

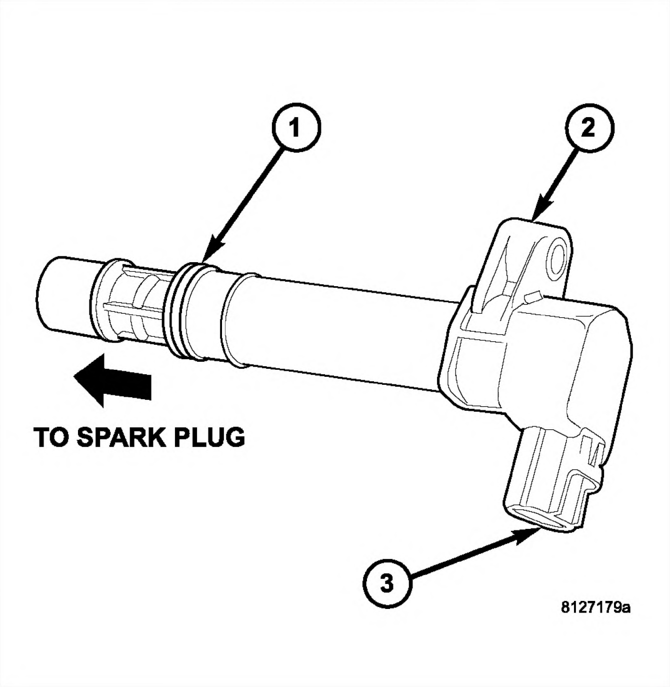
The PCM adjusts ignition timing based on inputs it receives from:

- The engine coolant temperature sensor
- The crankshaft position sensor (engine speed)
- The camshaft position sensor (crankshaft position)
- The manifold absolute pressure (MAP) sensor
- The throttle position sensor
- Transmission gear selection

REMOVAL

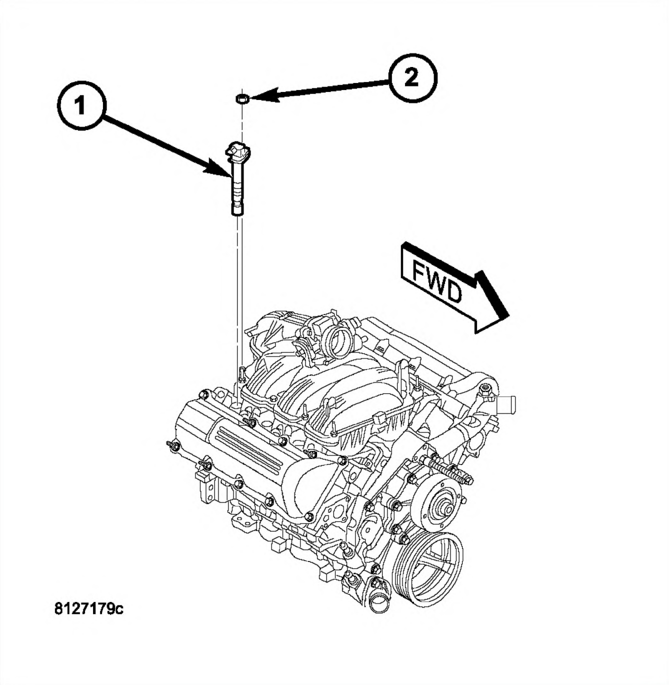
3.7L V-6

An individual ignition coil is used for each spark plug (2). The coil fits into machined holes in the cylinder head. A mounting stud/nut secures each coil to the top of the intake manifold. The bottom of the coil is equipped with a rubber boot to seal the spark plug to the coil. Inside each rubber boot is a spring. The spring is used for a mechanical contact between the coil and the top of the spark plug. These rubber boots and springs are a permanent part of the coil and are not serviced separately. An o-ring (1) is used to seal the coil at the opening into the cylinder head.



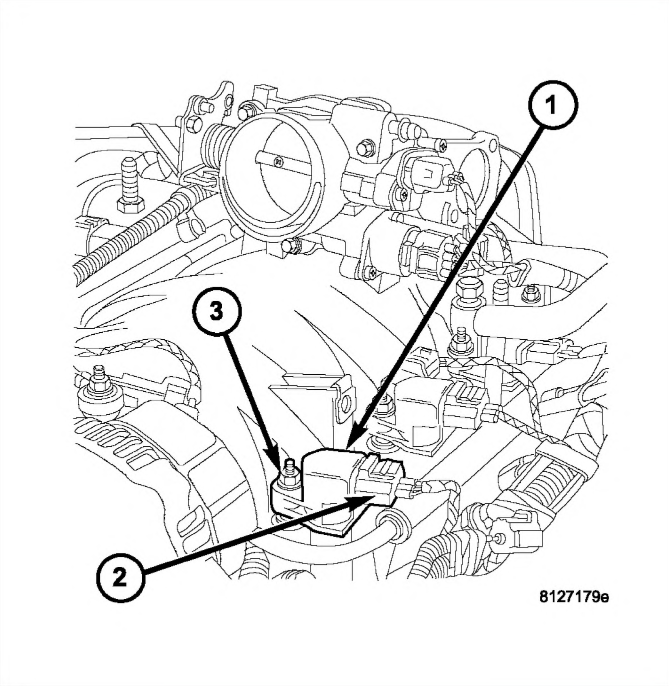
1. Depending on which coil is being removed, the throttle body air intake tube or intake box may need to be removed to gain access to coil.
2. Disconnect electrical connector from coil by pushing downward on release lock on top of connector and pull connector from coil.
3. Clean area at base of coil with compressed air before removal.

4. Remove coil mounting nut (2) from mounting stud.
5. Carefully pull up coil from cylinder head opening with a slight twisting action.
6. Remove coil from vehicle.



4.7L V-8

An individual ignition coil (1) is used for each spark plug. The coil fits into machined holes in the cylinder head. A mounting stud/nut (3) secures each coil to the top of the intake manifold . The bottom of the coil is equipped with a rubber boot to seal the spark plug to the coil. Inside each rubber boot is a spring. The spring is used for a mechanical contact between the coil and the top of the spark plug. These rubber boots and springs are a permanent part of the coil and are not serviced separately. An o-ring is used to seal the coil at the opening into the cylinder head.

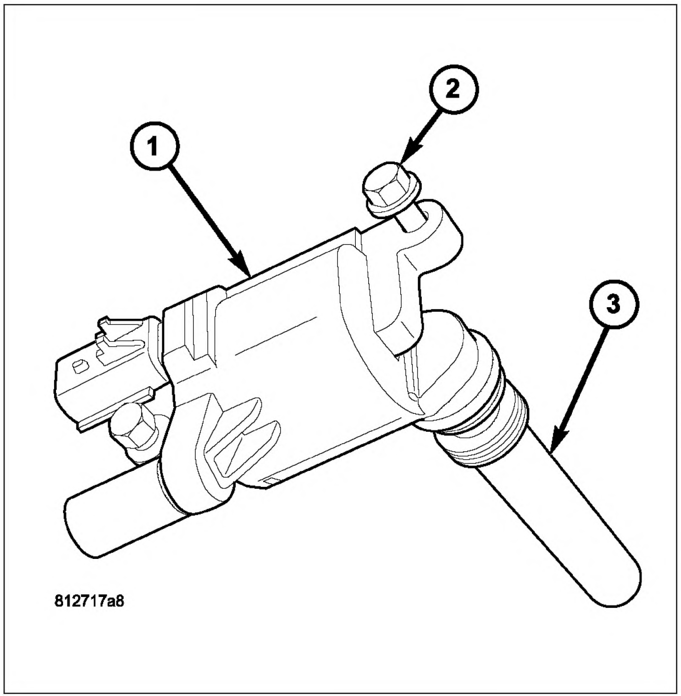


1. Depending on which coil is being removed, the throttle body air intake tube or intake box may need to be removed to gain access to coil.
2. Disconnect electrical connector (2) from coil by pushing downward on release lock on top of connector and pull connector from coil.
3. Clean area at base of coil with compressed air before removal.
4. Remove coil mounting nut (3) from mounting stud.
5. Carefully pull up coil from cylinder head opening with a slight twisting action.
6. Remove coil from vehicle.

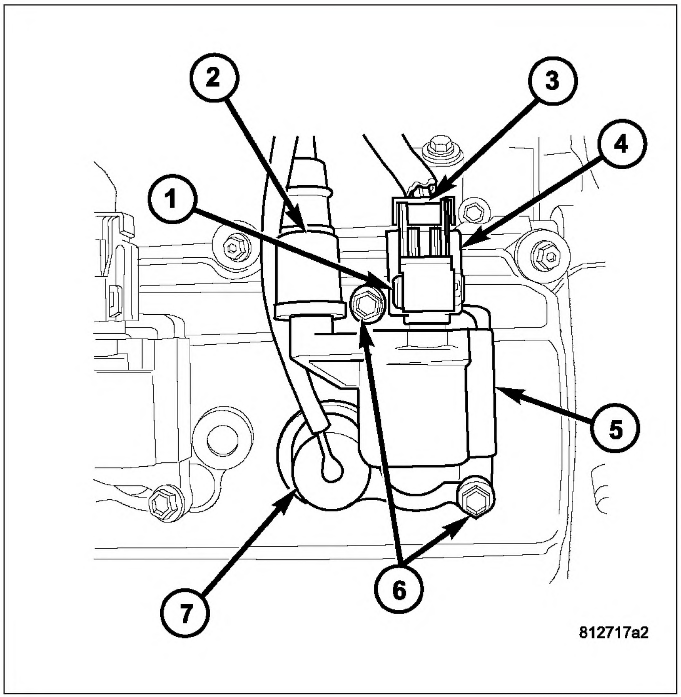
5.7L V-8

Before removing or disconnecting any spark plug cables, note their original position. Remove cables one-at-a-time. To prevent ignition crossfire, spark plug cables **MUST** be placed in cable tray (routing loom) into their original position.

An individual ignition coil (1) is used at each cylinder. The coil mounts to the top of the valve cover with two bolts (2). The bottom of the coil is equipped with a rubber boot (3) to seal the spark plug to the coil. Inside each rubber boot is a spring. The spring is used for a mechanical contact between the coil and the top of the spark plug.



1. Depending on which coil is being removed, the throttle body air intake tube or intake box may need to be removed to gain access to coil.
2. Unlock electrical connector (4) by moving slide lock (1) first. Press on release lock (3) while pulling electrical connector from coil.
3. Disconnect secondary high-voltage cable (2) from coil with a twisting action.
4. Clean area at base of coil with compressed air before removal.
5. Remove two mounting bolts (6) (note that mounting bolts are retained to coil).
6. Carefully pull up coil from cylinder head opening with a slight twisting action.
7. Remove coil from vehicle.
8. Before installing spark plug cables to either the spark plugs or coils, or before installing a coil to a spark plug, apply dielectric grease to inside of boots.



INSTALLATION

3.7L V-6

1. Using compressed air, blow out any dirt or contaminants from around top of spark plug.
2. Check condition of coil o-ring and replace as necessary. To aid in coil installation, apply silicone to coil o-ring.
3. Position ignition coil into cylinder head opening and push onto spark plug. Do this while guiding coil base over mounting stud.
4. Install coil mounting stud nut. Refer to torque specifications.

5. Connect electrical connector to coil by snapping into position.
6. If necessary, install throttle body air tube.

4.7L V-8

1. Using compressed air, blow out any dirt or contaminants from around top of spark plug.
2. Check condition of coil o-ring and replace as necessary. To aid in coil installation, apply silicone to coil o-ring.
3. Position ignition coil into cylinder head opening and push onto spark plug. Do this while guiding coil base over mounting stud.
4. Install coil mounting stud nut. Refer to torque specifications.
5. Connect electrical connector to coil by snapping into position.
6. If necessary, install throttle body air tube.

5.7L V-8

1. Using compressed air, blow out any dirt or contaminants from around top of spark plug.
2. Before installing spark plug cables to either the spark plugs or coils, or before installing a coil to a spark plug, apply dielectric grease to inside of boots.
3. Position ignition coil into cylinder head opening and push onto spark plug. Twist coil into position.
4. Install 2 coil mounting bolts. Refer to torque specifications.
5. Connect electrical connector to coil by snapping into position.
6. Install cable to coil. To prevent ignition crossfire, spark plug cables **MUST** be placed in cable tray (routing loom) into their original position. Refer to Spark Plug Cable Removal for a graphic.
7. If necessary, install throttle body air tube.

SENSOR-KNOCK

DESCRIPTION

The sensors are used only with 3.7L V-6, 4.7L V-8 and 5.7L V-8 engines. On 3.7L V-6 and 4.7L V-8 engines, the 2 knock sensors are bolted into the cylinder block under the intake manifold.

On 5.7L V-8 engines, 2 knock sensors are also used. These are bolted into each side of the cylinder block (outside) under the exhaust manifold.

OPERATION

3.7L V-6 / 4.7L V-8 / 5.7L V-8 Engines Only

Two knock sensors are used; one for each cylinder bank. When the knock sensor detects a knock in one of the cylinders on the corresponding bank, it sends an input signal to the Powertrain Control Module (PCM). In response, the PCM retards ignition timing for all cylinders by a scheduled amount.

Knock sensors contain a piezoelectric material which constantly vibrates and sends an input voltage (signal) to the PCM while the engine operates. As the intensity of the crystal's vibration increases, the knock sensor output voltage also increases.

The voltage signal produced by the knock sensor increases with the amplitude of vibration. The PCM receives the knock sensor voltage signal as an input. If the signal rises above a predetermined level, the PCM will store that value in memory and retard ignition timing to reduce engine knock. If the knock sensor voltage exceeds a preset value, the PCM retards ignition timing for all cylinders. It is not a selective cylinder retard.

The PCM ignores knock sensor input during engine idle conditions. Once the engine speed exceeds a specified value, knock retard is allowed.

Knock retard uses its own short term and long term memory program.

Long term memory stores previous detonation information in its battery-backed RAM. The maximum authority that long term memory has over timing retard can be calibrated.

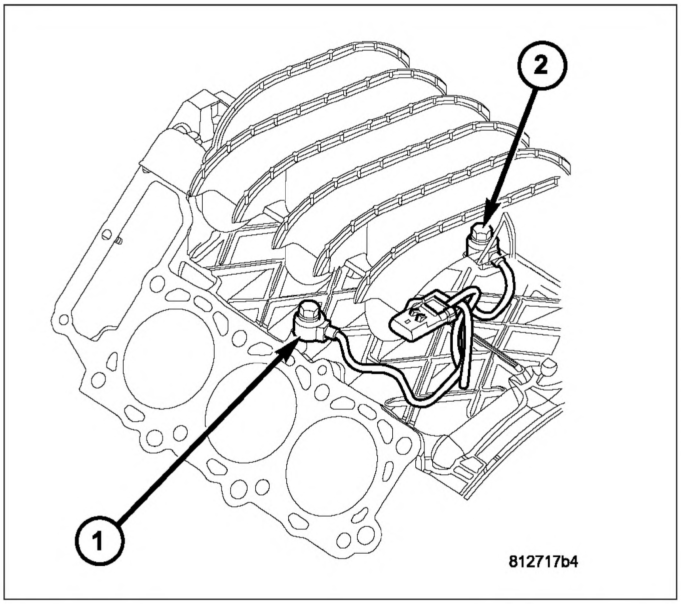
Short term memory is allowed to retard timing up to a preset amount under all operating conditions (as long as rpm is above the minimum rpm) except at Wide Open Throttle (WOT). The PCM, using short term memory, can respond quickly to retard timing when engine knock is detected. Short term memory is lost any time the ignition key is turned off.

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors.

REMOVAL

3.7L V-6

The 2 knock sensors are bolted into the cylinder block under the intake manifold (1) and (2).

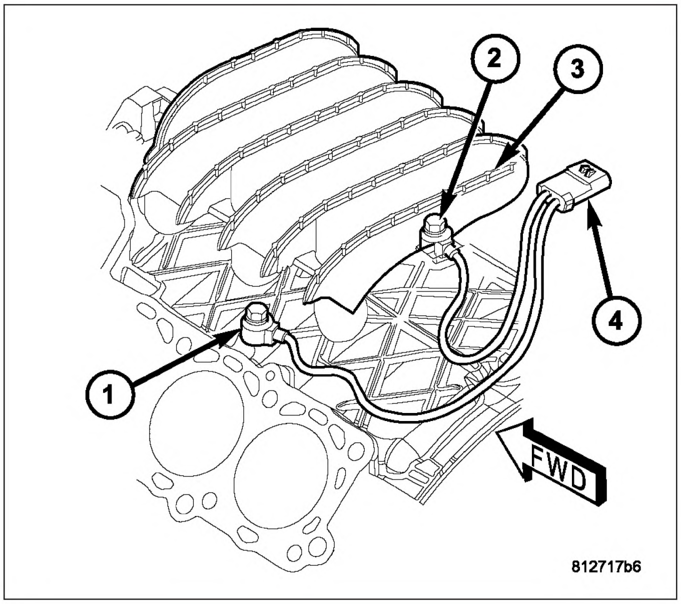


NOTE: The left sensor is identified by an identification tag (LEFT). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

1. Disconnect knock sensor dual pigtail harness from engine wiring harness. This connection is made near rear of engine.
2. Remove intake manifold. Refer to Engine section.
3. Remove sensor mounting bolts (2). Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.
4. Remove sensors from engine.

4.7L V-8

The two knock sensors (1) are bolted into the cylinder block under the intake manifold (3).



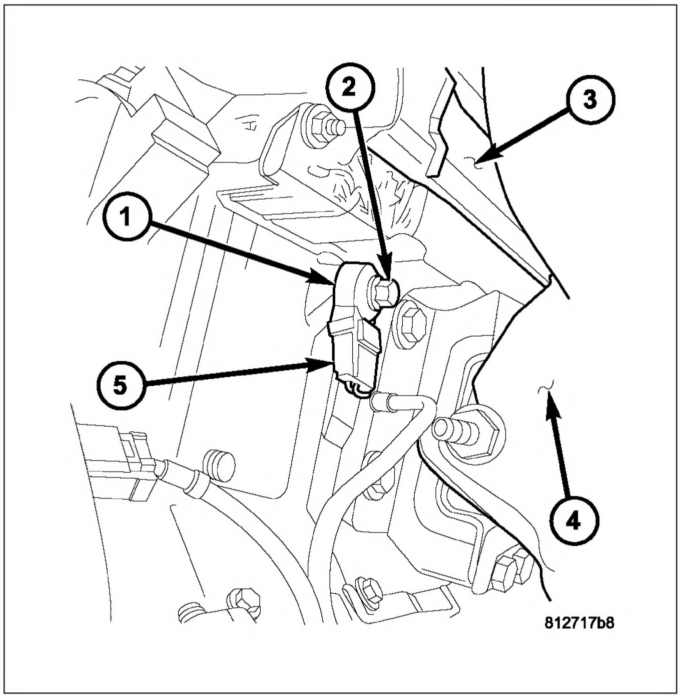
NOTE: The left sensor is identified by an identification tag (LEFT). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

1. Disconnect knock sensor dual pigtail harness from engine wiring harness. This connection is made near rear of engine.
2. Remove intake manifold. Refer to Engine section.
3. Remove sensor mounting bolts (2). Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.
4. Remove sensors from engine.

5.7L V8

Two sensors (1) are used. Each sensor is bolted into the outside of cylinder block below the exhaust manifold (3).

1. Raise vehicle.
2. Disconnect knock sensor electrical connector (5).
3. Remove sensor mounting bolt (2). Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.
4. Remove sensor from engine.



INSTALLATION

3.7L V-6 / 4.7L V-8

NOTE: The left sensor is identified by an identification tag (LEFT). It is also identified by a larger bolt head. The Powertrain Control Module (PCM) must have and know the correct sensor left/right positions. Do not mix the sensor locations.

1. Thoroughly clean knock sensor mounting holes.
2. Install sensors into cylinder block.

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors. The torque for the knock senor bolt is relatively light for an 8mm bolt.

NOTE: Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

3. Install and tighten mounting bolts. Refer to torque specification.
4. Install intake manifold. Refer to Engine section.
5. Connect knock sensor wiring harness to engine harness at rear of intake manifold.

5.7L V-8

1. Thoroughly clean knock sensor mounting hole.
2. Install sensor into cylinder block.

NOTE: Over or under tightening the sensor mounting bolts will affect knock sensor performance, possibly causing improper spark control. Always use the specified torque when installing the knock sensors. The torque for the knock senor bolt is relatively light for an 8mm bolt.

NOTE: Note foam strip on bolt threads. This foam is used only to retain the bolts to sensors for plant assembly. It is not used as a sealant. Do not apply any adhesive, sealant or thread locking compound to these bolts.

3. Install and tighten mounting bolt. Refer to torque specification.
4. Install electrical connector to sensor.

SPARK PLUG

DESCRIPTION

Resistor type spark plugs are used on all engines.

Sixteen spark plugs (2 per cylinder) are used with 5.7L V-8 engines.

REMOVAL

3.7L V-6

Each individual spark plug is located under each ignition coil. Each individual ignition coil must be removed to gain access to each spark plug. Refer to Ignition Coil Removal/Installation.

1. Remove necessary air filter tubing at throttle body.
2. Prior to removing ignition coil, spray compressed air around coil base at cylinder head.
3. Prior to removing spark plug, spray compressed air into cylinder head opening. This will help prevent foreign material from entering combustion chamber.
4. Remove spark plug from cylinder head using a quality socket with a rubber or foam insert. Also check condition of ignition coil o-ring and replace as necessary.
5. Inspect spark plug condition.

4.7L V-8

Each individual spark plug is located under each ignition coil. Each individual ignition coil must be removed to gain access to each spark plug. Refer to Ignition Coil Removal/Installation.

1. Remove necessary air filter tubing at throttle body.
2. Prior to removing ignition coil, spray compressed air around coil base at cylinder head.
3. Prior to removing spark plug, spray compressed air into cylinder head opening. This will help prevent foreign material from entering combustion chamber.
4. Remove spark plug from cylinder head using a quality socket with a rubber or foam insert. Also check condition of ignition coil o-ring and replace as necessary.
5. Inspect spark plug condition..

5.7L V-8

Eight of the 16 spark plugs are located under an ignition coil; the other 8 are not. If spark plug being removed is under coil, coil must be removed to gain access to spark plug. Refer to Ignition Coil Removal/Installation and observe all CAUTIONS and WARNINGS.

Before removing or disconnecting any spark plug cables, note their original position. Remove cables one-at-a-time. To prevent ignition crossfire, spark plug cables **MUST** be placed in cable tray (routing loom) into their original position. Refer to Spark Plug Cable Removal for a graphic.

Before installing spark plug cables to either the spark plugs or coils, apply dielectric grease to inside of boots.

1. Remove necessary air filter tubing at throttle body.
2. Prior to removing ignition coil (if coil removal is necessary), spray compressed air around coil base at cylinder head cover.
3. Prior to removing spark plug, spray compressed air into cylinder head opening. This will help prevent foreign material from entering combustion chamber.
4. Remove spark plug from cylinder head using a quality socket with a rubber or foam insert.
5. Inspect spark plug condition.

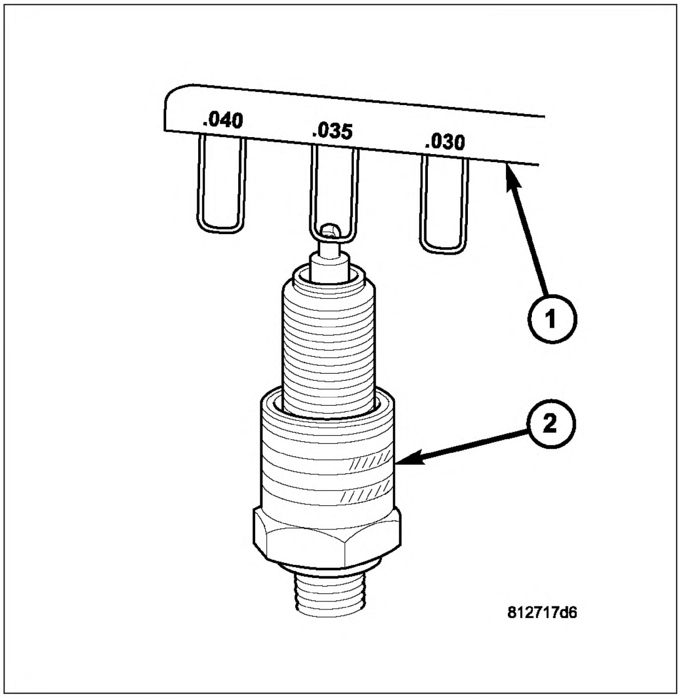
CLEANING

CLEANING AND ADJUSTMENT

The plugs may be cleaned using commercially available spark plug cleaning equipment. After cleaning, file center electrode flat with a small point file or jewelers file before adjusting gap.

CAUTION: Never use a motorized wire wheel brush to clean spark plugs. Metallic deposits will remain on spark plug insulator and will cause plug misfire.

Adjust spark plug gap with a gap gauging tool (1).



INSTALLATION

3.7L V-6

Special care should be taken when installing spark plugs into the cylinder head spark plug wells. Be sure the plugs do not drop into the plug wells as electrodes can be damaged.

Always tighten spark plugs to the specified torque. Over tightening can cause distortion resulting in a change in the spark plug gap or a cracked porcelain insulator.

1. Start the spark plug into the cylinder head by hand to avoid cross threading.
2. Tighten spark plugs. Refer to torque specifications.
3. Before installing ignition coil(s), check condition of coil o-ring and replace as necessary. To aid in coil installation, apply silicone to coil o-ring.
4. Install ignition coil(s). Refer to Ignition Coil Removal/Installation.

4.7L V-8

CAUTION: The 4.7L V–8 engine is equipped with copper core ground electrode spark plugs. They must be replaced with the same type/number spark plug as the original. If another spark plug is substituted, pre-ignition will result.

Special care should be taken when installing spark plugs into the cylinder head spark plug wells. Be sure the plugs do not drop into the plug wells as electrodes can be damaged.

Always tighten spark plugs to the specified torque. Over tightening can cause distortion resulting in a change in the spark plug gap or a cracked porcelain insulator.

1. Start the spark plug into the cylinder head by hand to avoid cross threading.
2. Tighten spark plugs. Refer to torque specifications.
3. Before installing ignition coil(s), check condition of coil o-ring and replace as necessary. To aid in coil installation, apply silicone to coil o-ring.
4. Install ignition coil(s). Refer to Ignition Coil Removal/Installation.

5.7L V-8

1. Special care should be taken when installing spark plugs into the cylinder head spark plug wells. Be sure the plugs do not drop into the plug wells as electrodes can be damaged.
2. Start the spark plug into cylinder head by hand to avoid cross threading aluminum threads. To aid in installation, attach a piece of rubber hose, or an old spark plug boot to spark plug.
3. The 5.7L V-8 is equipped with torque critical design spark plugs. Do not exceed 15 ft. lbs. torque. Tighten spark plugs. Refer to torque specifications.
4. Before installing spark plug cables to either the spark plugs or coils, apply dielectric grease to inside of boots.
5. To prevent ignition crossfire, spark plug cables **MUST** be placed in cable tray (routing loom) into their original position. Refer to Spark Plug Cable Removal for a graphic.
6. Install ignition coil(s) to necessary spark plugs. Refer to Ignition Coil Installation.
7. Install spark plug cables to remaining spark plugs. Remember to apply dielectric grease to inside of boots.

CABLE-SPARK PLUG

DESCRIPTION

Spark plug cables are sometimes referred to as secondary ignition wires, or secondary ignition cables.

Plug cables are used only on the 5.7L V-8 engine.

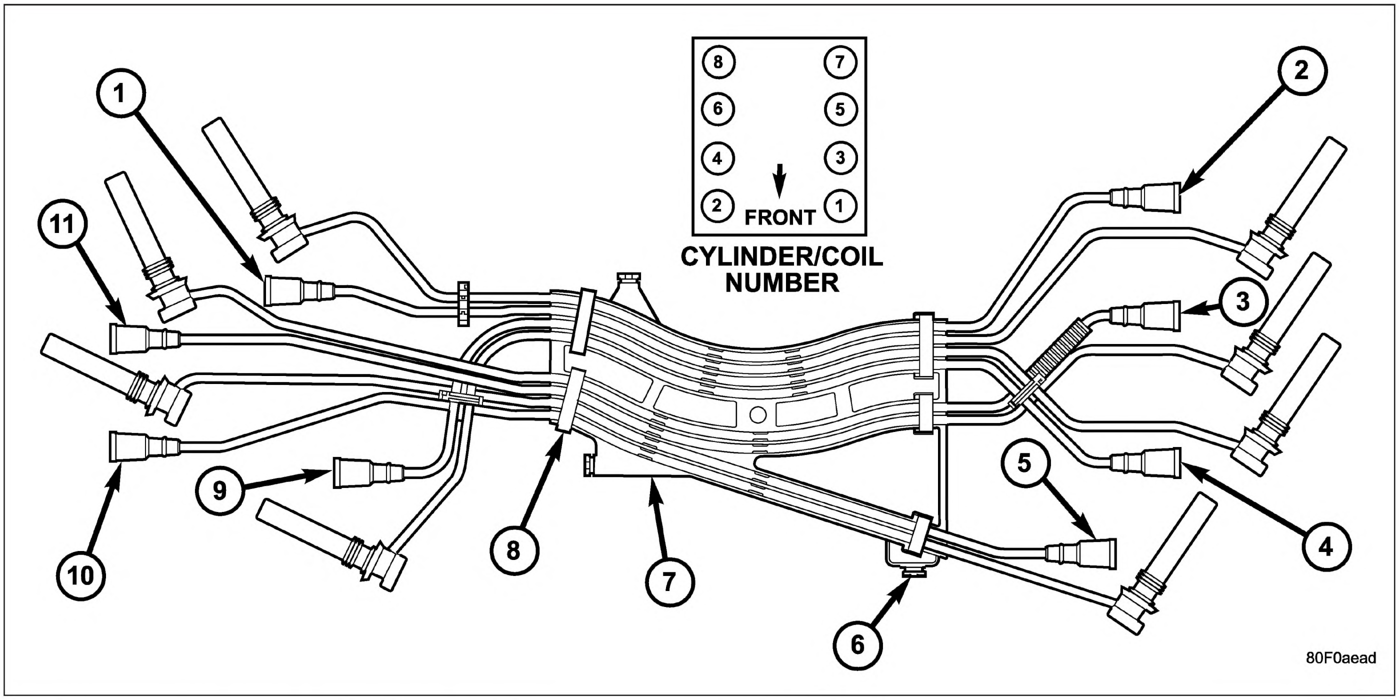
OPERATION

The spark plug cables transfer electrical current from the ignition coil(s) and/or distributor, to individual spark plugs at each cylinder. The resistive spark plug cables are of nonmetallic construction. The cables provide suppression of radio frequency emissions from the ignition system.

Plug cables are used only on the 5.7L V-8 engine.

REMOVAL

5.7L V-8



1 - #8 COIL-TO- #5 SPARK PLUG (MARKED 5/8)
2 - #5 COIL-TO- #8 SPARK PLUG (MARKED 5/8)
3 - #7 COIL-TO- #4 SPARK PLUG (MARKED 4/7)
4 - #3 COIL-TO- #2 SPARK PLUG (MARKED 2/3)
5 - #1 COIL-TO- #6 SPARK PLUG (MARKED 1/6)
6 - CLIPS (TRAY-TO-MANIFOLD RETENTION)
7 - CABLE TRAY
8 - CLIPS (SPARK PLUG CABLE-TO-TRAY- RETENTION)
9 - #2 COIL-TO- #3 SPARK PLUG (MARKED 2/3)
10 - #6 COIL-TO- #1 SPARK PLUG (MARKED 1/6)
11 - #4 COIL-TO- #7 SPARK PLUG (MARKED 4/7)

Spark plug cables on the 5.7L engine are paired on cylinders 1/6, 2/3, 4/7 and 5/8. Before removing or disconnecting any spark plug cables, note their original position. Remove cables one-at-a-time. To prevent ignition crossfire, spark plug cables **MUST** be placed in cable tray (routing loom) into their original position. The cable retention clips (6) and (8) must also be securly locked.

Before installing spark plug cables to either the spark plugs or coils, apply dielectric grease to inside of boots.

If cable tray removal is necessary, release the 4 tray-to-manifold retention clips.

INSTALLATION

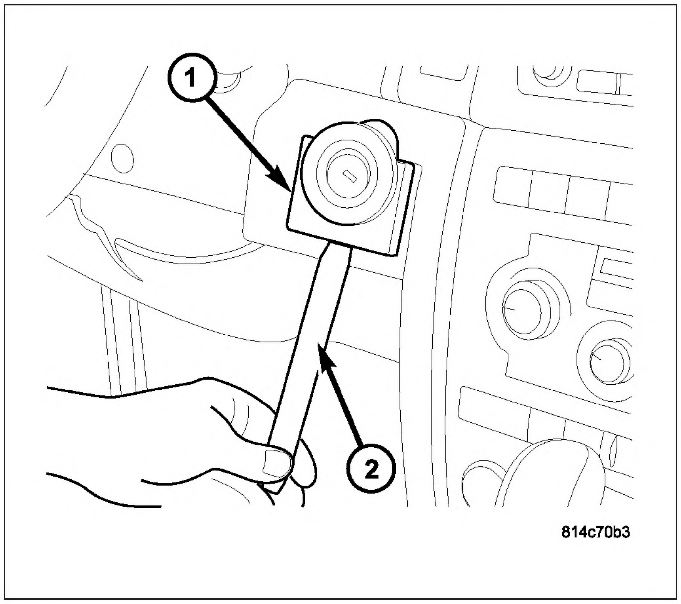
1. Install cables into the proper engine cylinder firing order sequence.
2. When replacing the spark plug and coil cables, route the cables correctly and secure them in the proper retainers. Failure to route the cables properly may cause the radio to reproduce ignition noise. It could also cause cross-ignition of the plugs, or, may short-circuit the cables to ground.
3. When installing new cables, make sure a positive connection is made. A snap should be felt when a good connection is made.
4. Refer to Spark Plug Cable Removal for additional information.

CYLINDER - IGNITION KEY/LOCK

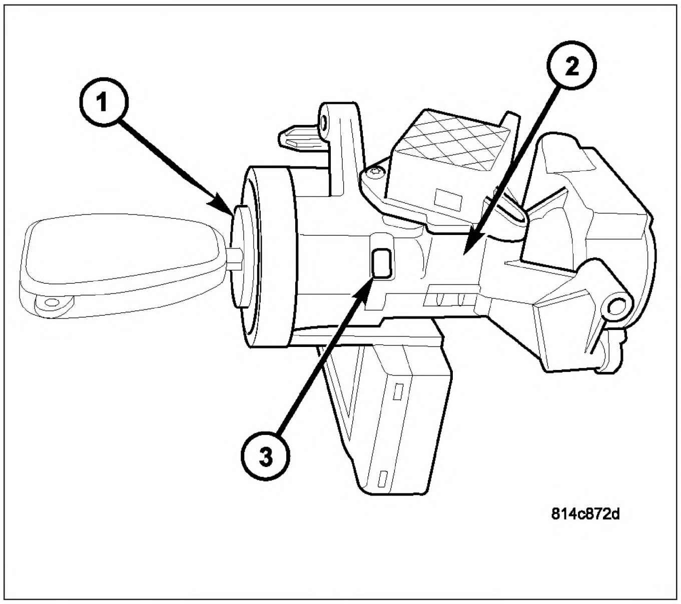
REMOVAL

The key lock cylinder may be removed without removing the switch assembly, although the original ignition key must be used.

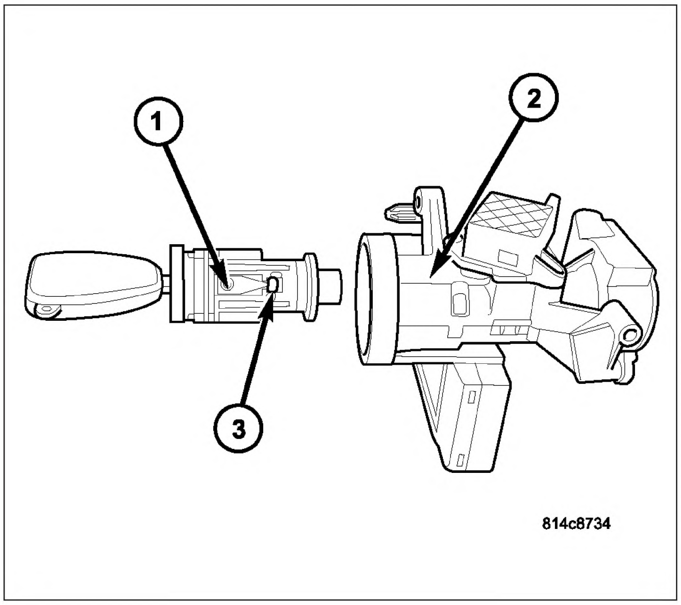
1. Disconnect negative cable from battery.
2. Use a plastic trim removal stick (2) to remove switch bezel (1). Bezel snaps on.



3. To remove key lock cylinder (1) from housing (2), rotate key to ON position while pressing on release tab (3). This tab (3) is located on the right side of the switch assembly.

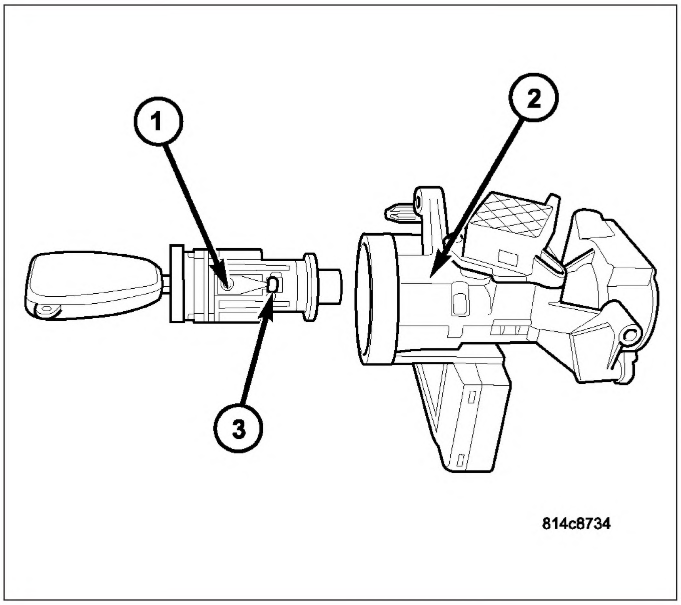


4. Pull key lock cylinder (1) from housing (2) for removal.

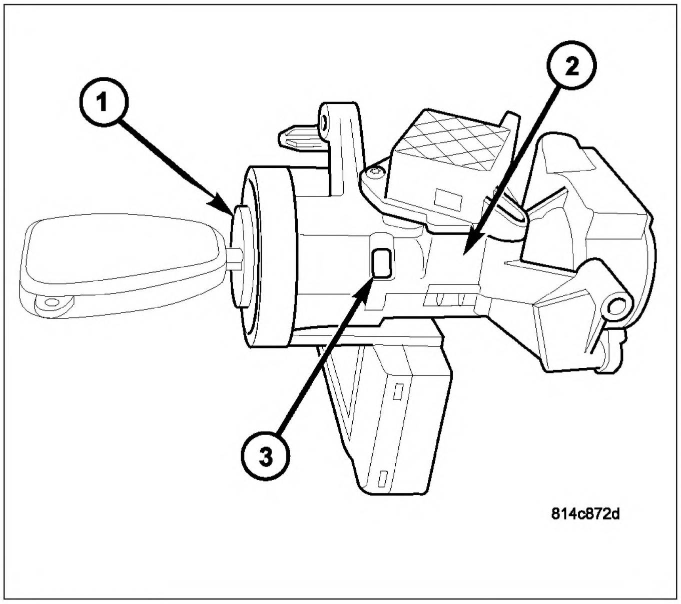


INSTALLATION

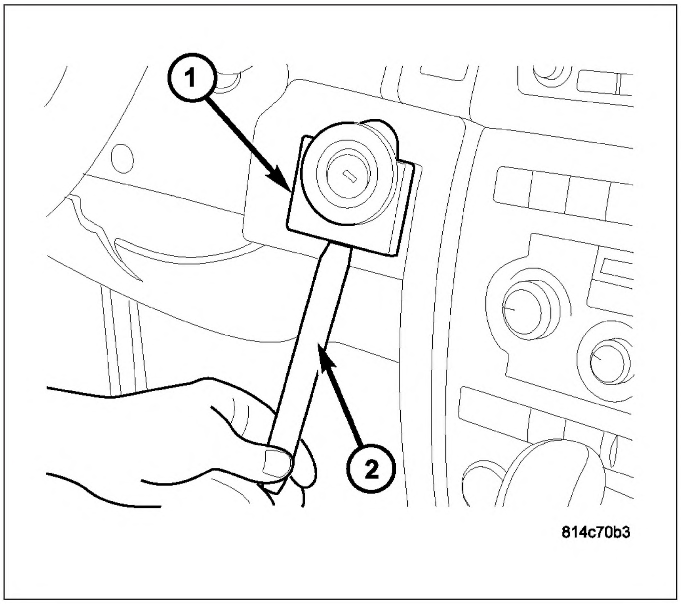
1. Install ignition key into lock cylinder (1). Rotate key to “ON” position (retaining tab on side of lock cylinder (3) can now be depressed).
2. The shaft at end of key lock cylinder aligns with socket within end of housing. To align socket with lock cylinder, ensure socket is in “ON” position.
3. Position and align key lock cylinder with grooves in housing.



4. Slide lock cylinder into housing until release tab (3) sticks through opening at side of housing.



5. Install bezel (1). Snaps on.
6. Connect negative battery cable.

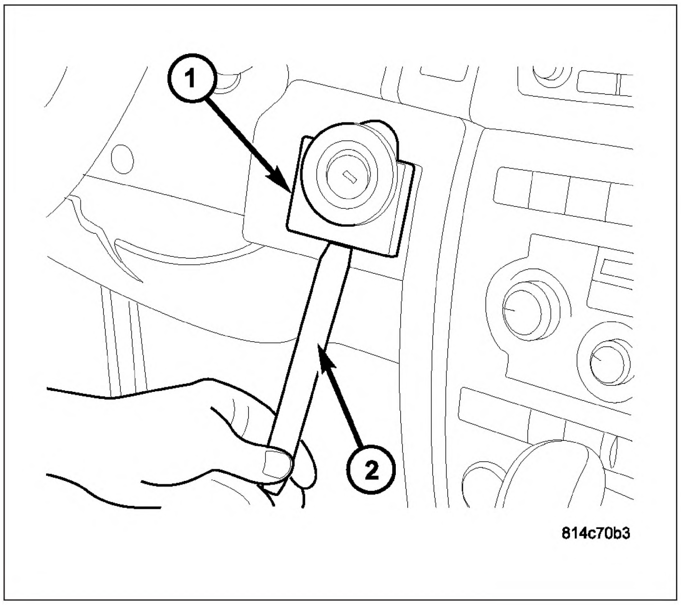


SWITCH-IGNITION

REMOVAL

The electrical ignition switch attaches to the rear of the key lock cylinder housing. The SKREEM unit also attaches to the key lock cylinder housing. For ignition switch terminal and circuit identification, refer to the Wiring Diagrams section.

1. Disconnect negative cable from battery.
2. Use a plastic trim removal stick (2) to remove switch bezel (1). Bezel snaps on.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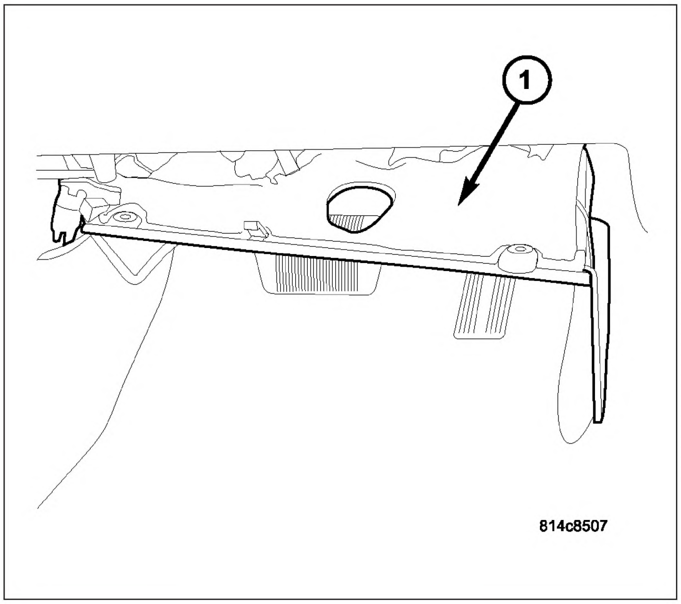
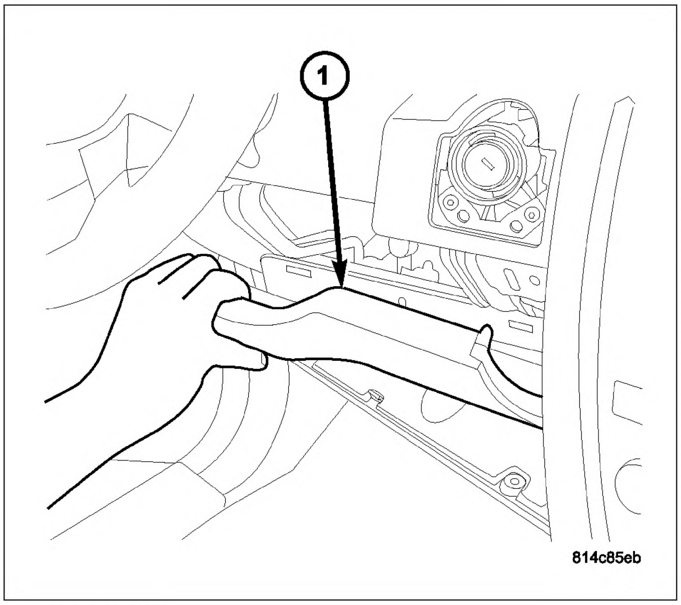
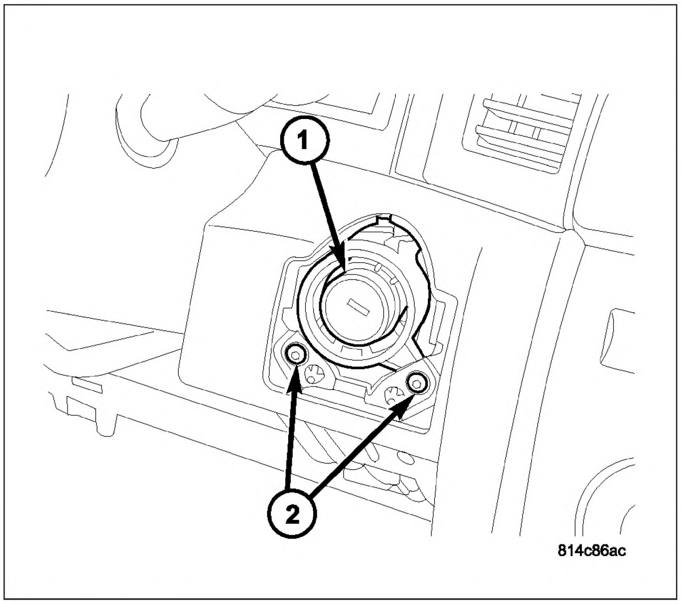
3. Remove silencer pad (1) (two screws).



4. Remove knee blocker (1).



5. Remove two key cylinder housing torx screws (2).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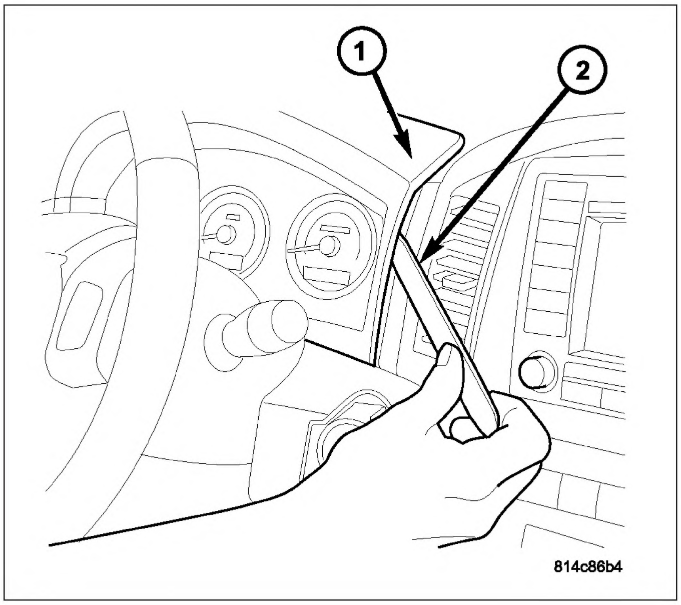
6. Use a plastic trim removal stick (2) to remove I.P. cluster bezel (1). Bezel snaps on.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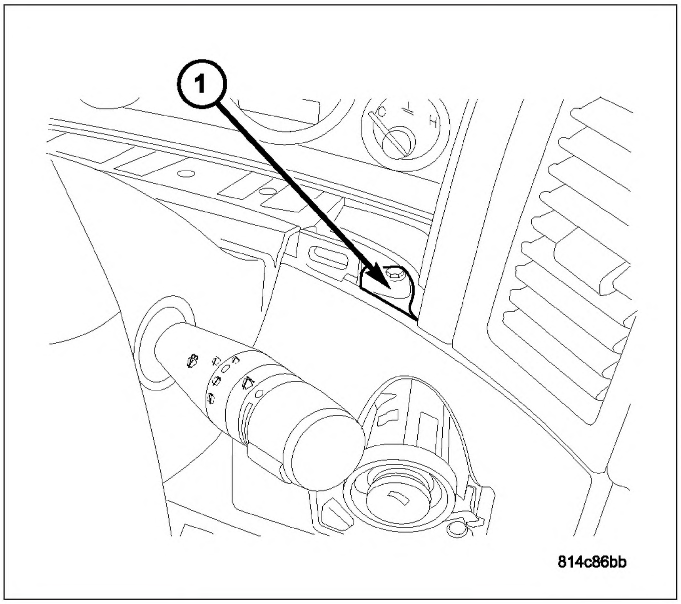
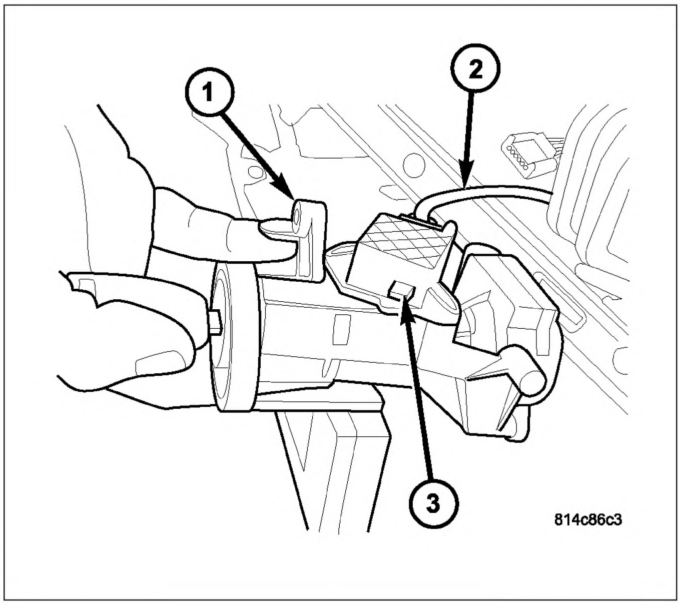
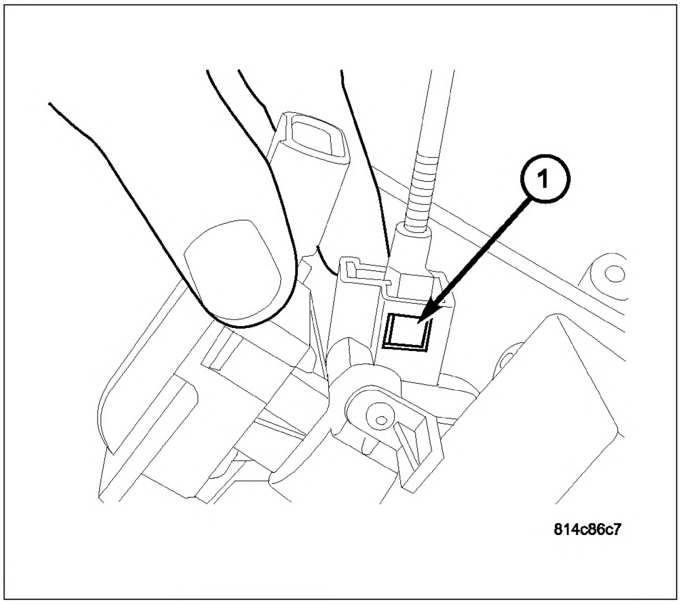
7. Remove one key cylinder housing torx screw (1).



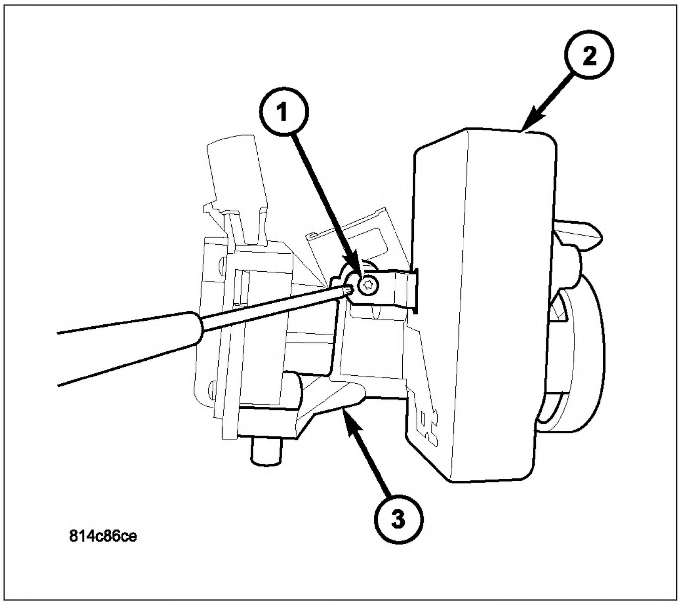
8. To prevent binding or kinking cable (2), carefully lower the key/cylinder/switch/cable/SKREEM assembly (1). Disconnect two electrical connectors (one at ignition switch and one at SKREEM). To release cable (2) from switch, simultaneously press on tab (3) while.......



9. ....pressing on tab (1).



10. Remove SKREEM unit (2) from switch housing (3) by removing screw (1).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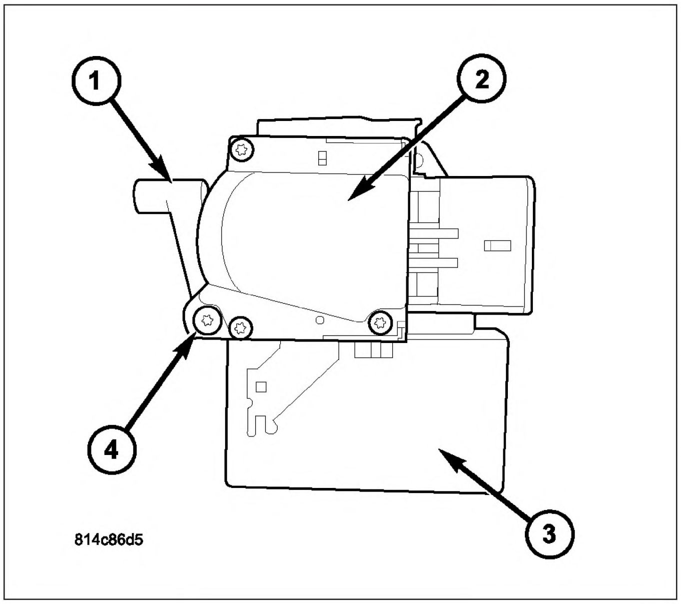
11. Remove ignition switch (2) from switch housing (1) by removing screw (4) and then proceeding to the next step.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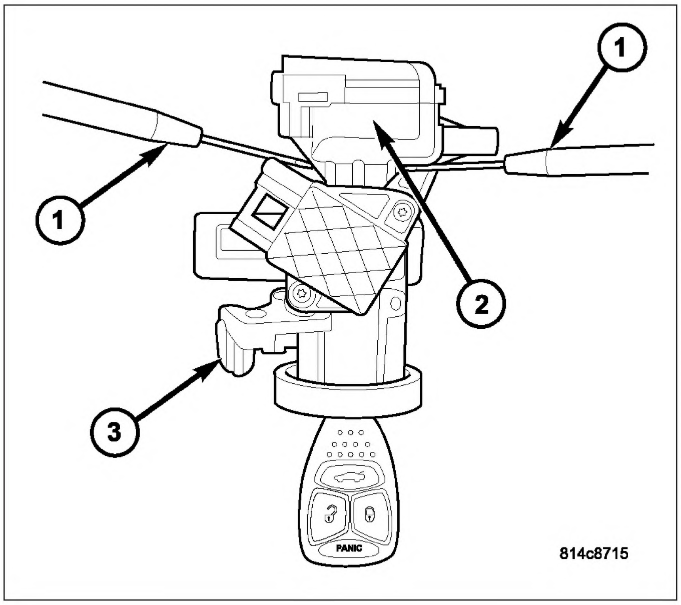
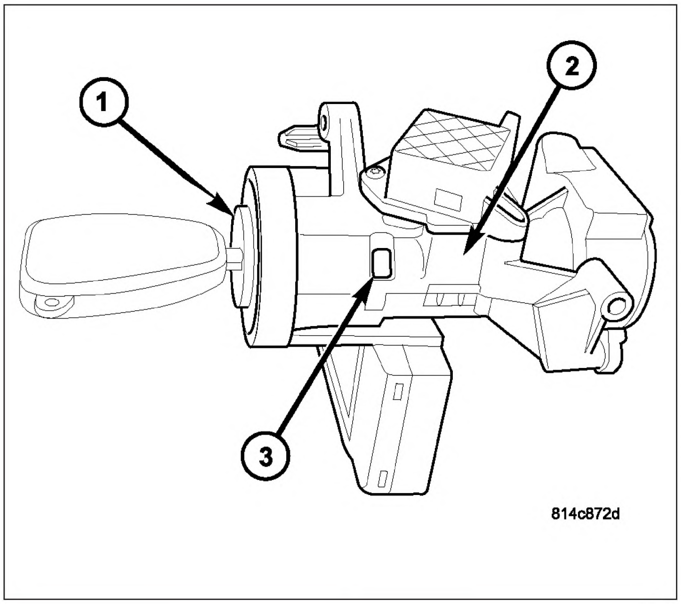
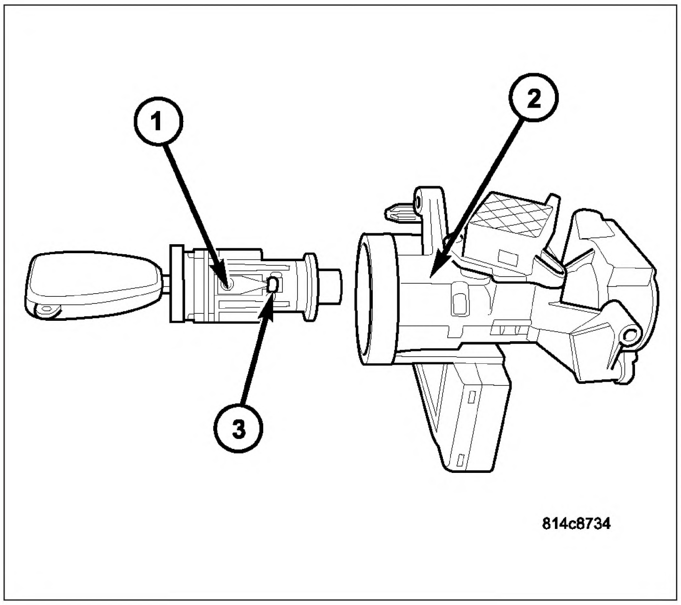
12. Continue to remove ignition switch (2) by simultaneously pressing on two release tabs using two small screwdrivers (1), while pulling ignition switch (2) from housing (3).



13. To remove key lock cylinder (1) from housing (2), rotate key to ON position while pressing on release tab (3).

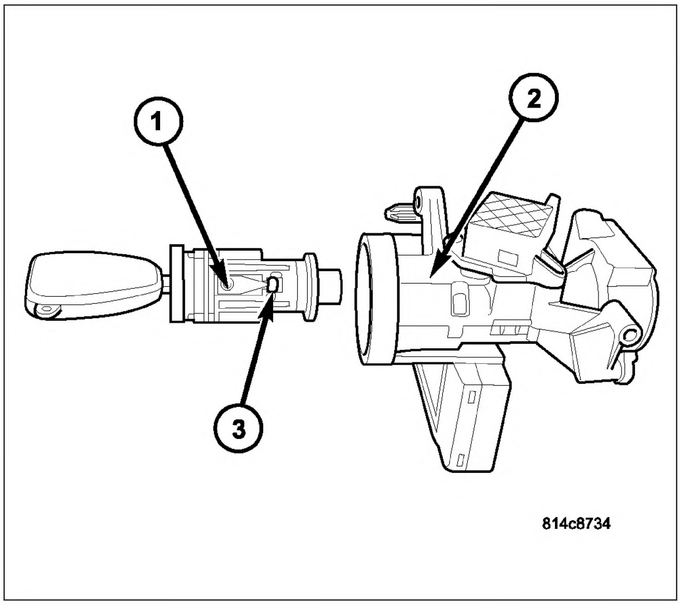


14. Remove key lock cylinder (1) from housing (2).

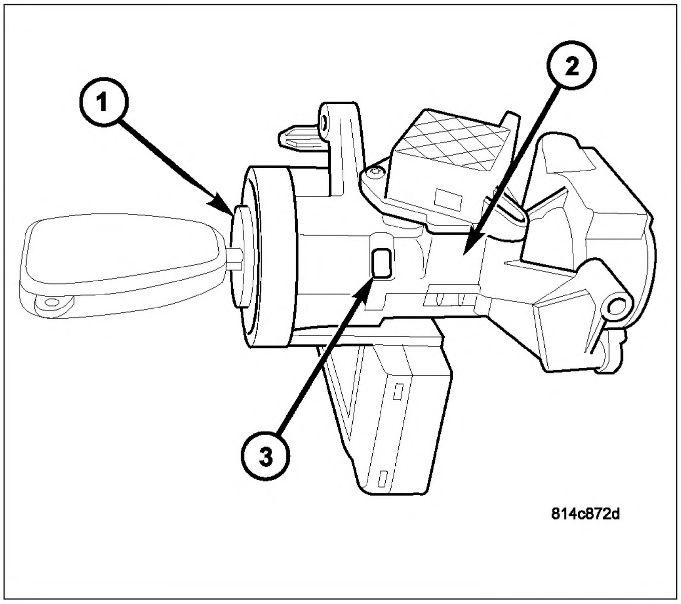


INSTALLATION

1. Install ignition key into lock cylinder (1). Rotate key to “ON” position (retaining tab on side of lock cylinder (3) can now be depressed).
2. The shaft at end of key lock cylinder aligns with socket within end of housing. To align socket with lock cylinder, ensure socket is in “ON” position.
3. Position and align key lock cylinder with grooves in housing.



4. Slide lock cylinder into housing until release tab (3) sticks through opening at side of housing.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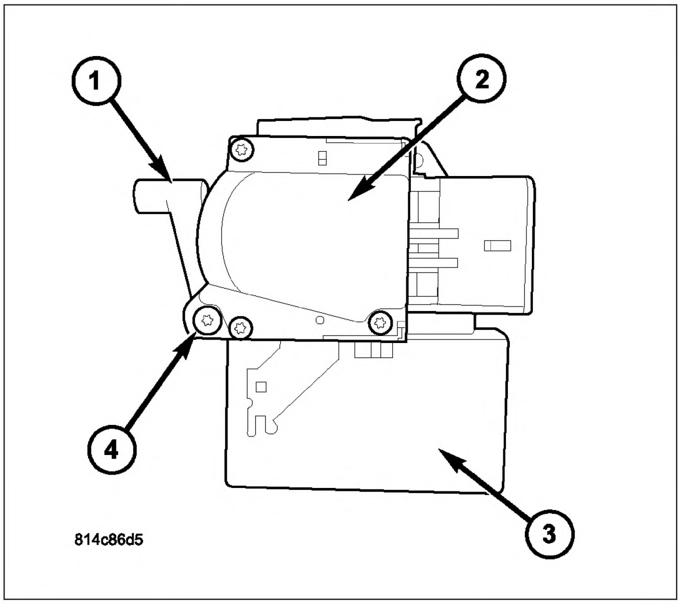
5. Install ignition switch (2) to switch housing (1) until it snaps into the two tabs. Install and tighten screw (4).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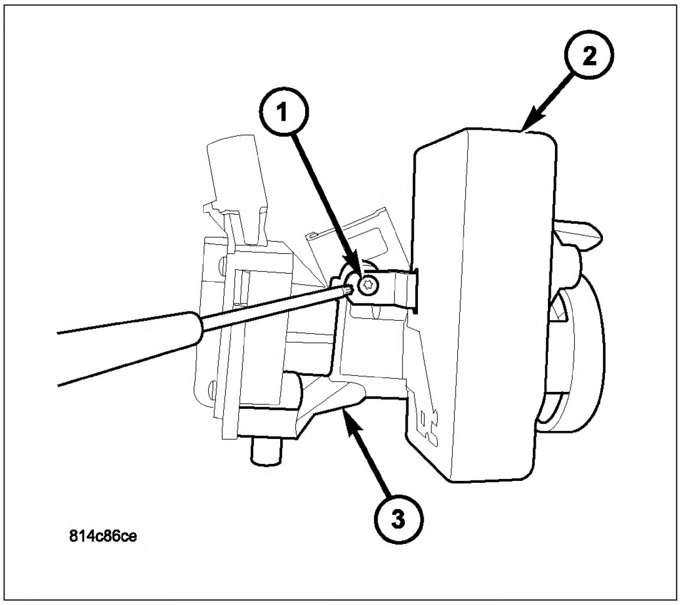
6. Install SKREEM unit (2) to switch housing (3) and install screw (1).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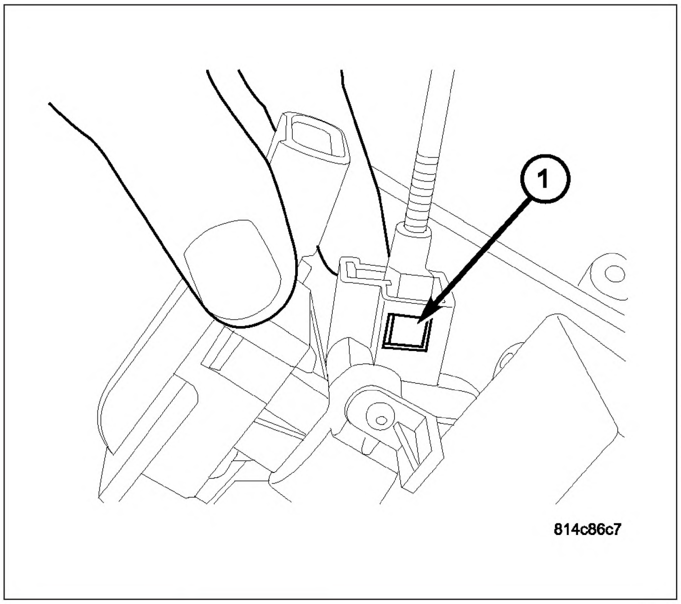
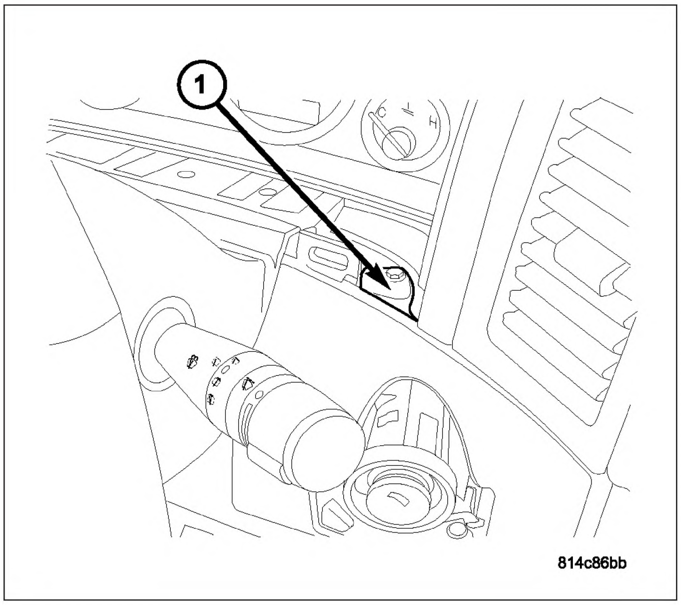
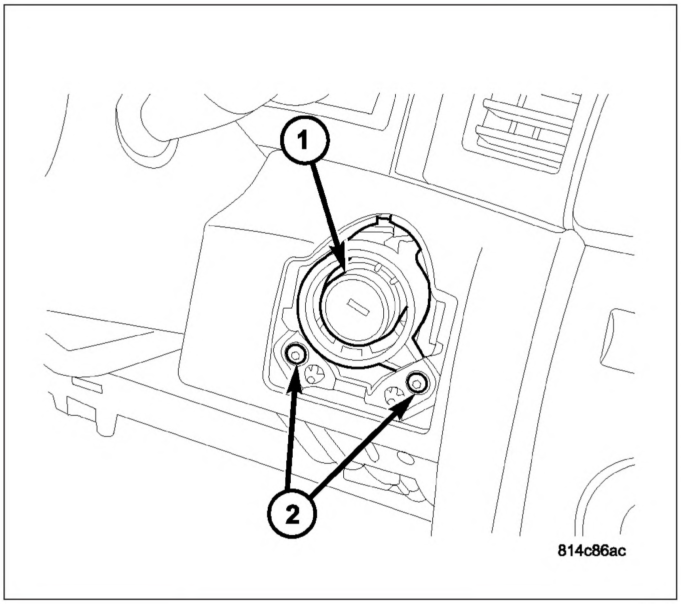
7. Position cable into assembly until tab (1) engages.



8. Install one key cylinder housing torx screw (1). Do not tighten (finger tight only).



9. Install two key cylinder housing torx screws (2). Now tighten all three housing mounting screws.
10. Install knee blocker.
11. Install silencer pad.
12. Install both bezel. Snaps on.
13. Connect negative battery cable.



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INSTRUMENT CLUSTER - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1200-AIRBAG WARNING INDICATOR CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and when requested to turn on by the Occupant Restraint Controller (ORC).
- **Set Condition:**
  The Instrument Cluster software detects the voltage across the Airbag Lamp is below 0.5 volts when ON.

Possible Causes
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR ACTIVE DTC

NOTE: The Instrument Cluster performs internal tests on the Airbag Lamp during each ignition cycle.

With the scan tool, erase DTCs.

Turn the ignition off, wait 10 seconds, then turn the ignition on.

Wait for the Instrument Cluster to perform the bulb check.

With the scan tool, read DTCs.

Is the DTC active?

Yes >> Replace and program the Instrument Cluster in accordance with the Service Information.
Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

B1201-AIRBAG WARNING INDICATOR CIRCUIT OPEN

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and when requested to turn on by the Occupant Restraint Controller (ORC).
- **Set Condition:**
  The Instrument Cluster software detects the voltage across the Airbag Lamp is above 4.0 volts when ON.

Possible Causes
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

NOTE: The Instrument Cluster performs internal tests on the Airbag Lamp during each ignition cycle.

With the scan tool, erase DTCs.

Turn the ignition off, wait 10 seconds, then turn the ignition on.

Wait for the Instrument Cluster to perform the bulb check.

With the scan tool, read DTCs.

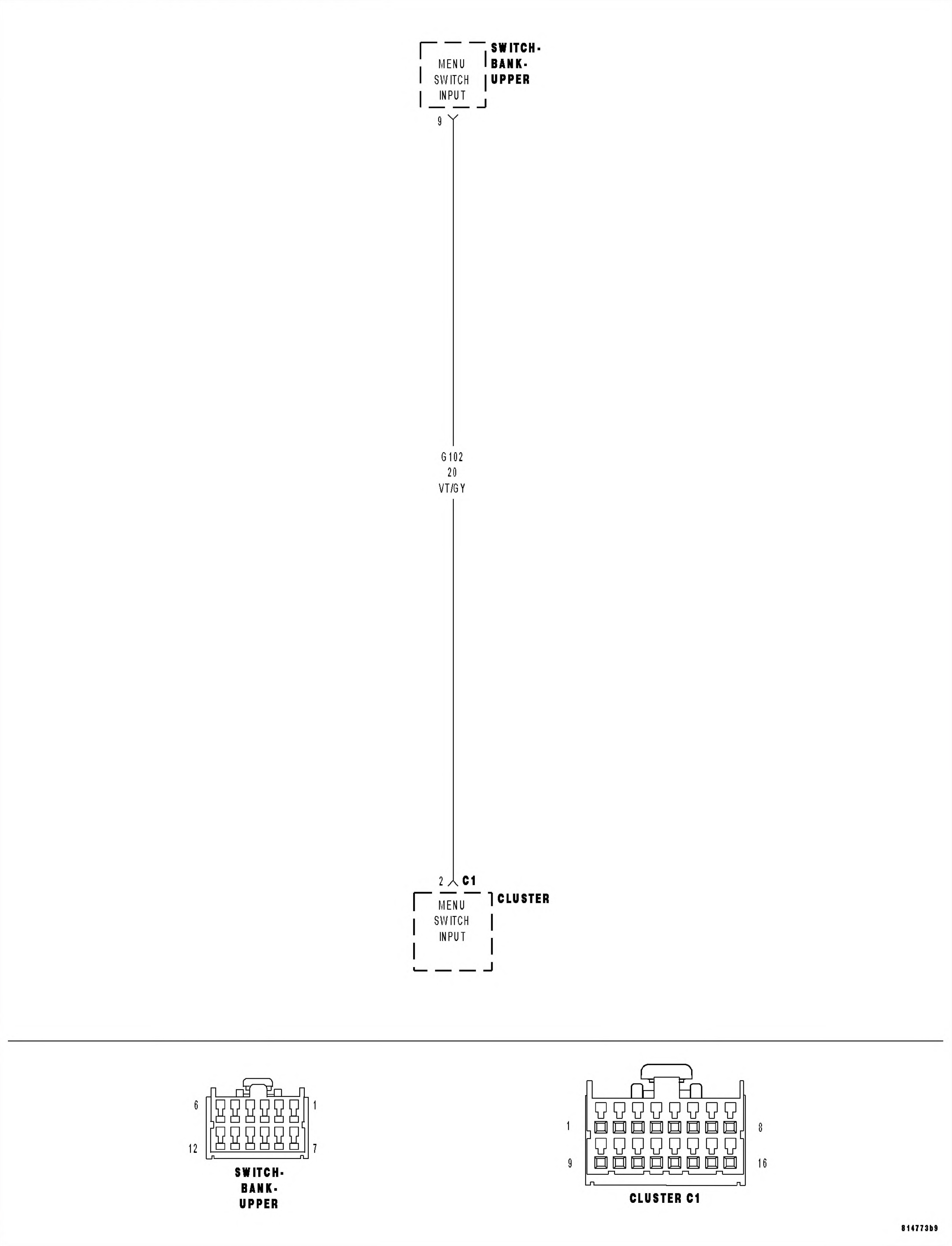
Is the DTC active?

Yes >> Replace and program the Instrument Cluster in accordance with the Service Information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

B123F-MENU SWITCH STUCK


SWITCH-
BANK-
UPPER
MENU
SWITCH
INPUT
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G102
20
VT/GY
2
C1
CLUSTER
MENU
SWITCH
INPUT
6
1
12
7
SWITCH-
BANK-
UPPER
1
8
9
16
CLUSTER C1
814773b9

B123F-MENU SWITCH STUCK (CONTINUED)

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Instrument Cluster detects the Menu Switch active for greater than 20 seconds.

Possible Causes
(G102) MENU SWITCH INPUT CIRCUIT SHORT TO GROUND
UPPER SWITCH BANK
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR ACTIVE DTC

Press and release the switch three times.
Turn the ignition on.
With the scan tool, record and erase Instrument Cluster DTCs.
Turn the ignition off.
Turn the ignition on.
Wait 30 seconds.
With the scan tool, read Instrument Cluster DTCs.

Is DTC: B123F-MENU SWITCH STUCK active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B123F-MENU SWITCH STUCK (CONTINUED)

2. CHECK OPERATION OF THE UPPER SWITCH BANK

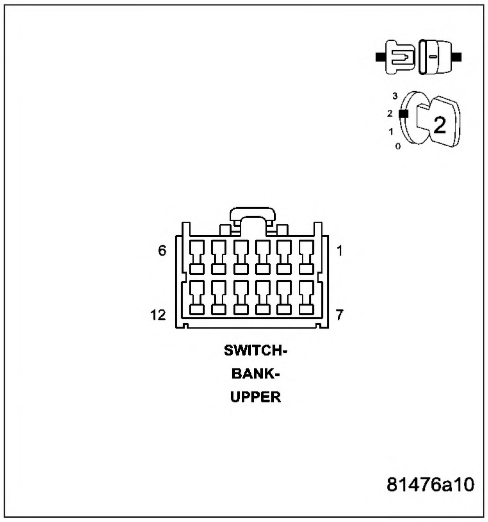
Turn the ignition off.

Disconnect the Upper Switch Bank Harness Connector.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.



81476a10

Does the scan tool display DTC: B123F-MENU SWITCH STUCK?

Yes >> Go To 3

No >> Replace the Upper Switch Bank in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

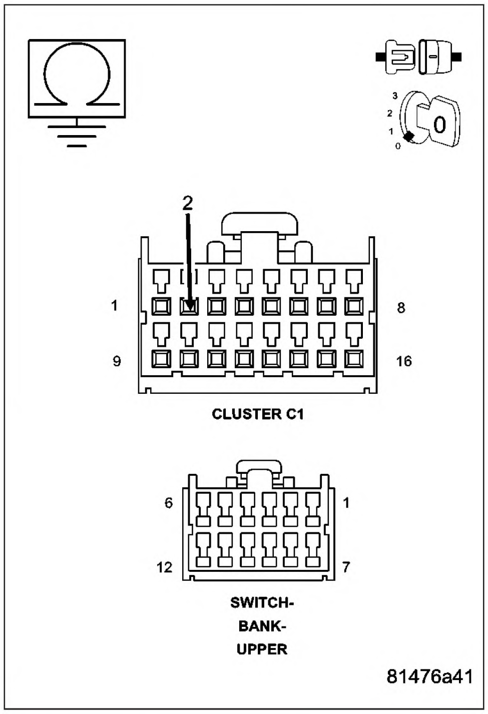
---

3. CHECK THE (G102) MENU SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C1 harness connector.

Measure the resistance of the (G102) Menu Switch Input circuit for a short to ground.



81476a41

Is the resistance below 10K ohms?

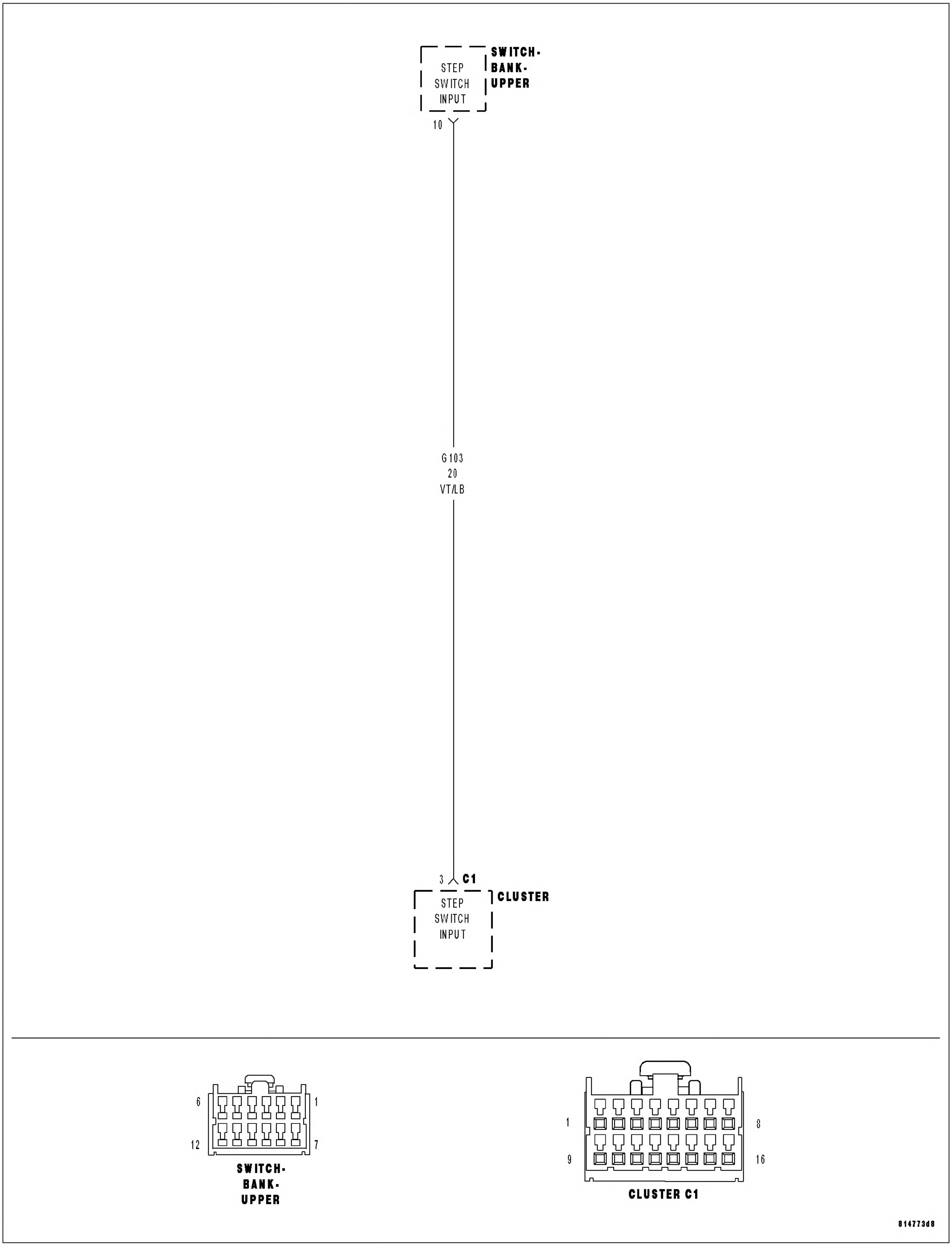
Yes >> Repair the (G102) Menu Switch Input circuit for a short to ground.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1240-STEP SWITCH STUCK


STEP
SWITCH
INPUT
SWITCH-
BANK-
UPPER
10
G103
20
VT/LB
3
C1
STEP
SWITCH
INPUT
CLUSTER
6
1
12
7
SWITCH-
BANK-
UPPER
1
8
9
16
CLUSTER C1
814773d8

B1240-STEP SWITCH STUCK (CONTINUED)

For the Instrument Cluater circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Instrument Cluster detects the Step Switch active for greater than 20 seconds.

Possible Causes
(G103) STEP SWITCH INPUT CIRCUIT SHORT TO GROUND
UPPER SWITCH BANK
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR ACTIVE DTC

Press and release the switch three times.

Turn the ignition on.

With the scan tool, record and erase Instrument Cluster DTCs.

Turn the ignition off.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.

Is DTC: B123F-MENU SWITCH STUCK active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1240-STEP SWITCH STUCK (CONTINUED)

2. CHECK OPERATION OF THE UPPER SWITCH BANK

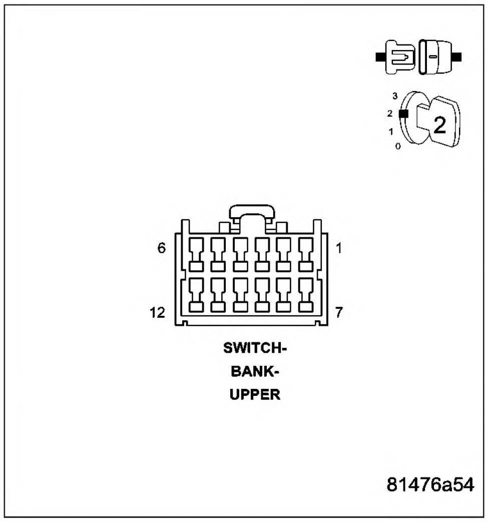
Turn the ignition off.

Disconnect the Upper Switch Bank Harness Connector.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.



81476a54

Does the scan tool display DTC: B1240-STEP SWITCH STUCK?

Yes >> Go To 3

No >> Replace the Upper Switch Bank in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

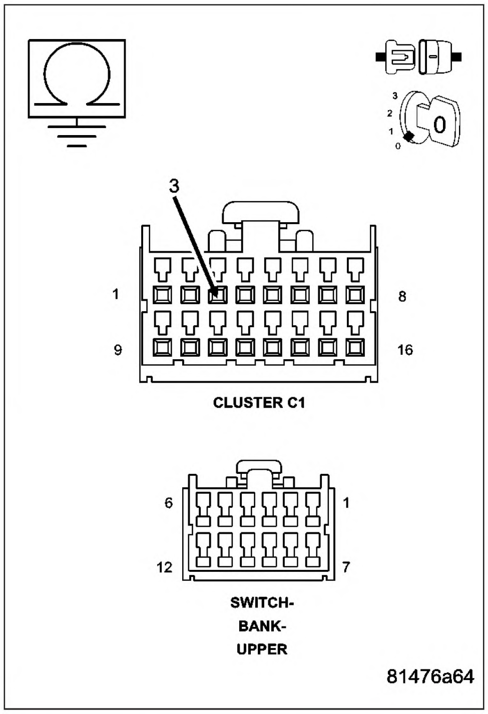
---

3. CHECK THE (G103) STEP SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C1 harness connector.

Measure the resistance of the (G103) Step Switch Input circuit for a short to ground.



81476a64

Is the resistance below 10K ohms?

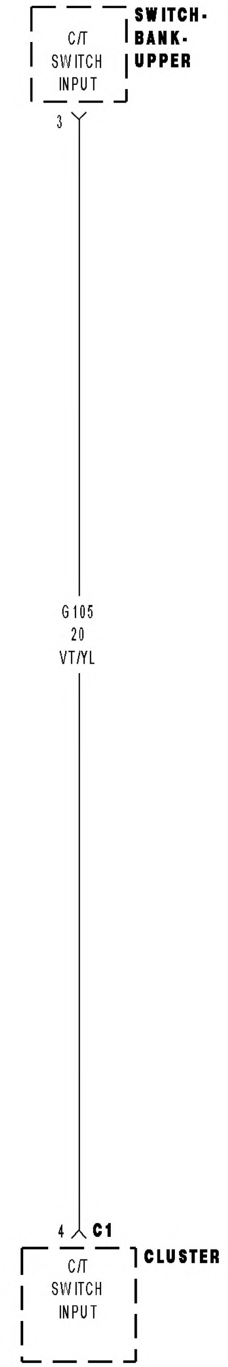
Yes >> Repair the (G103) Step Switch Input circuit for a short to ground.

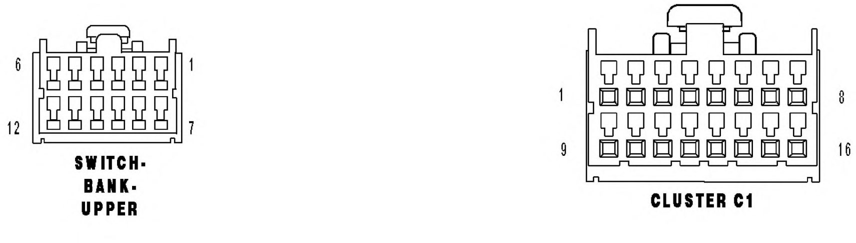
Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1241-C/T SWITCH STUCK


C/T
SWITCH
INPUT
SWITCH-
BANK-
UPPER
3
G105
20
VT/YL
4
C1
CLUSTER
C/T
SWITCH
INPUT


6
1
12
7
SWITCH-
BANK-
UPPER
1
8
9
16
CLUSTER C1
814773fc

B1241-C/T SWITCH STUCK (CONTINUED)

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Instrument Cluster detects the C/T Switch active for greater than 20 seconds.

Possible Causes
(G105) C/T SWITCH INPUT CIRCUIT SHORT TO GROUND
UPPER SWITCH BANK
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR ACTIVE DTC

Press and release the switch three times.

Turn the ignition on.

With the scan tool, record and erase Instrument Cluster DTCs.

Turn the ignition off.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.

Is DTC: B1241-C/T SWITCH STUCK active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1241-C/T SWITCH STUCK (CONTINUED)

2. CHECK OPERATION OF THE UPPER SWITCH BANK

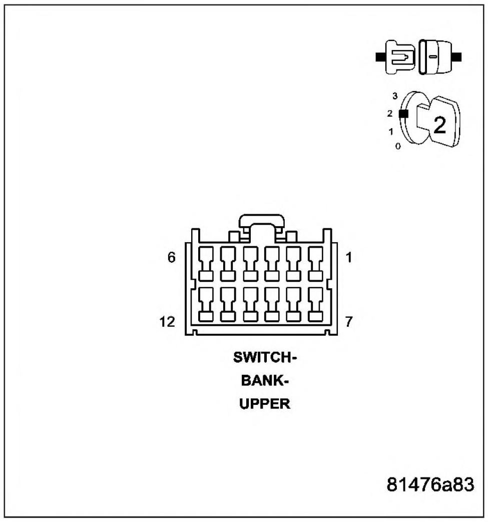
Turn the ignition off.

Disconnect the Upper Switch Bank Harness Connector.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.



Does the scan tool display B1241-C/T SWITCH STUCK?

Yes >> Go To 3

No >> Replace the Upper Switch Bank in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

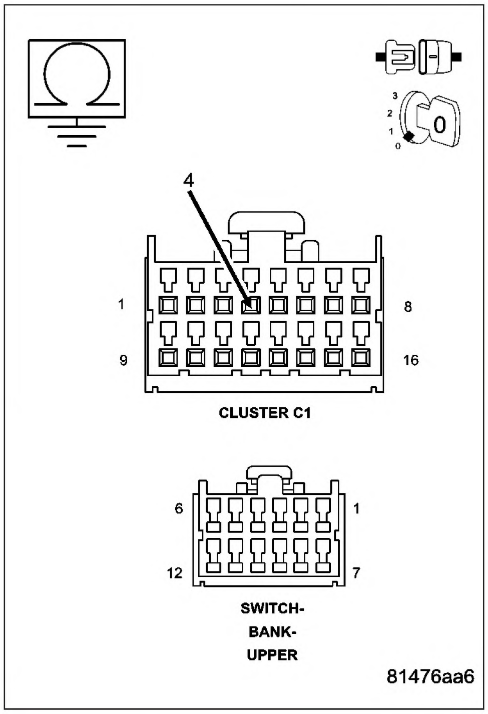
---

3. CHECK THE (G105) C/T SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C1 harness connector.

Measure the resistance of the (G105) C/T Switch Input circuit for a short to ground.



Is the resistance below 10K ohms?

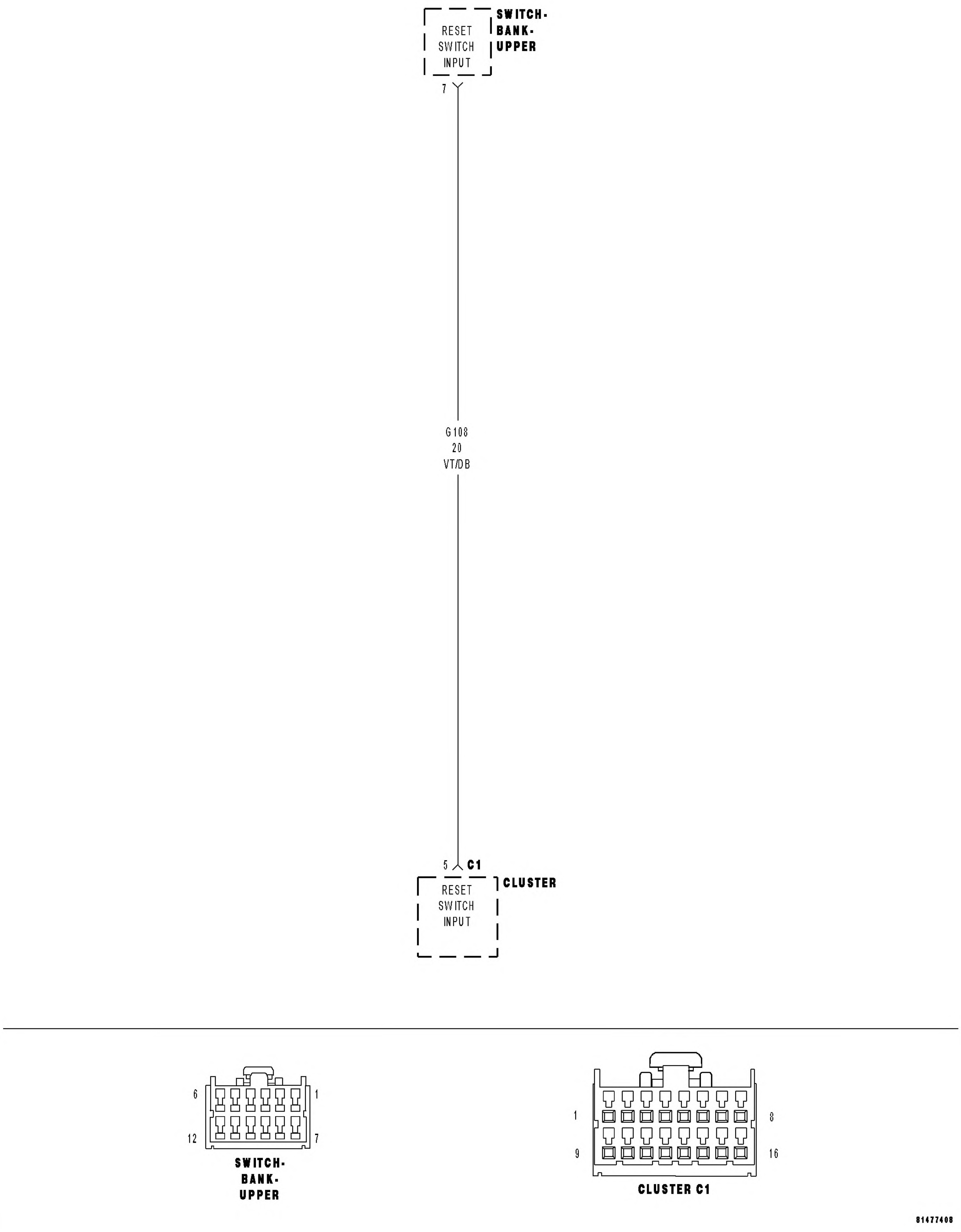
Yes >> Repair the (G105) C/T Switch Input circuit for a short to ground.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1242-RESET SWITCH STUCK


RESET SWITCH INPUT
SWITCH-BANK-UPPER
7
G108
20
VT/DB
5
C1
RESET SWITCH INPUT
CLUSTER
6
1
12
7
SWITCH-BANK-UPPER
1
8
9
16
CLUSTER C1
81477408

B1242-RESET SWITCH STUCK (CONTINUED)

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Instrument Cluster detects the Reset Switch active for greater than 20 seconds.

Possible Causes
(G108) RESET SWITCH INPUT CIRCUIT SHORT TO GROUND
UPPER SWITCH BANK
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR ACTIVE DTC

Press and release the switch three times.

Turn the ignition on.

With the scan tool, record and erase Instrument Cluster DTCs.

Turn the ignition off.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.

Is DTC: B1242-RESET SWITCH STUCK active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1242-RESET SWITCH STUCK (CONTINUED)

2. CHECK OPERATION OF THE UPPER SWITCH BANK

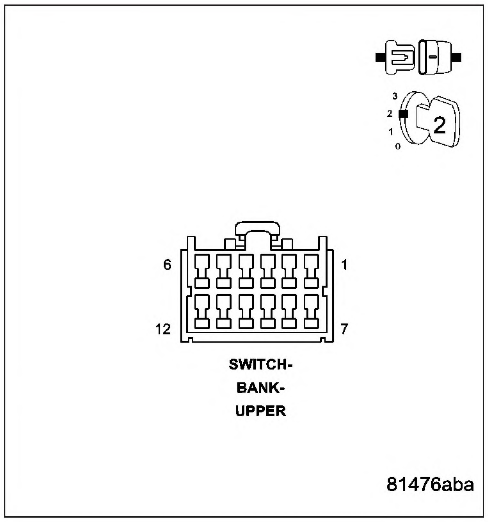
Turn the ignition off.

Disconnect the Upper Switch Bank Harness Connector.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.



Does the scan tool display DTC: B1242-RESET SWITCH STUCK?

Yes >> Go To 3

No >> Replace the Upper Switch Bank in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

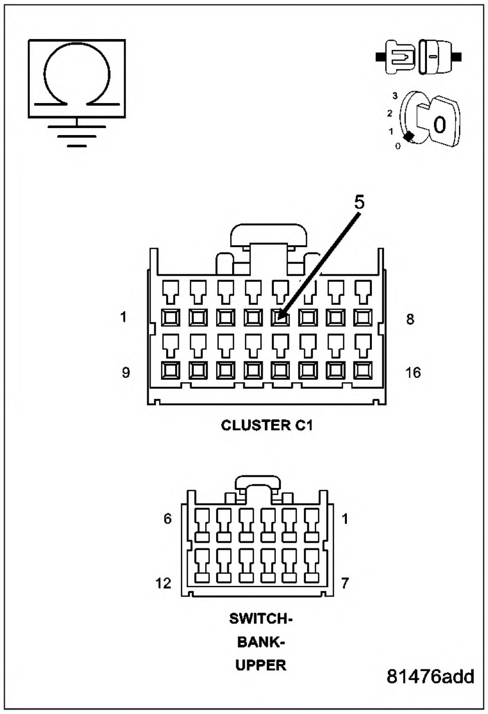
---

3. CHECK THE (G108) RESET SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C1 harness connector.

Measure the resistance of the (G108) Reset Switch Input circuit for a short to ground.



Is the resistance below 10K ohms?

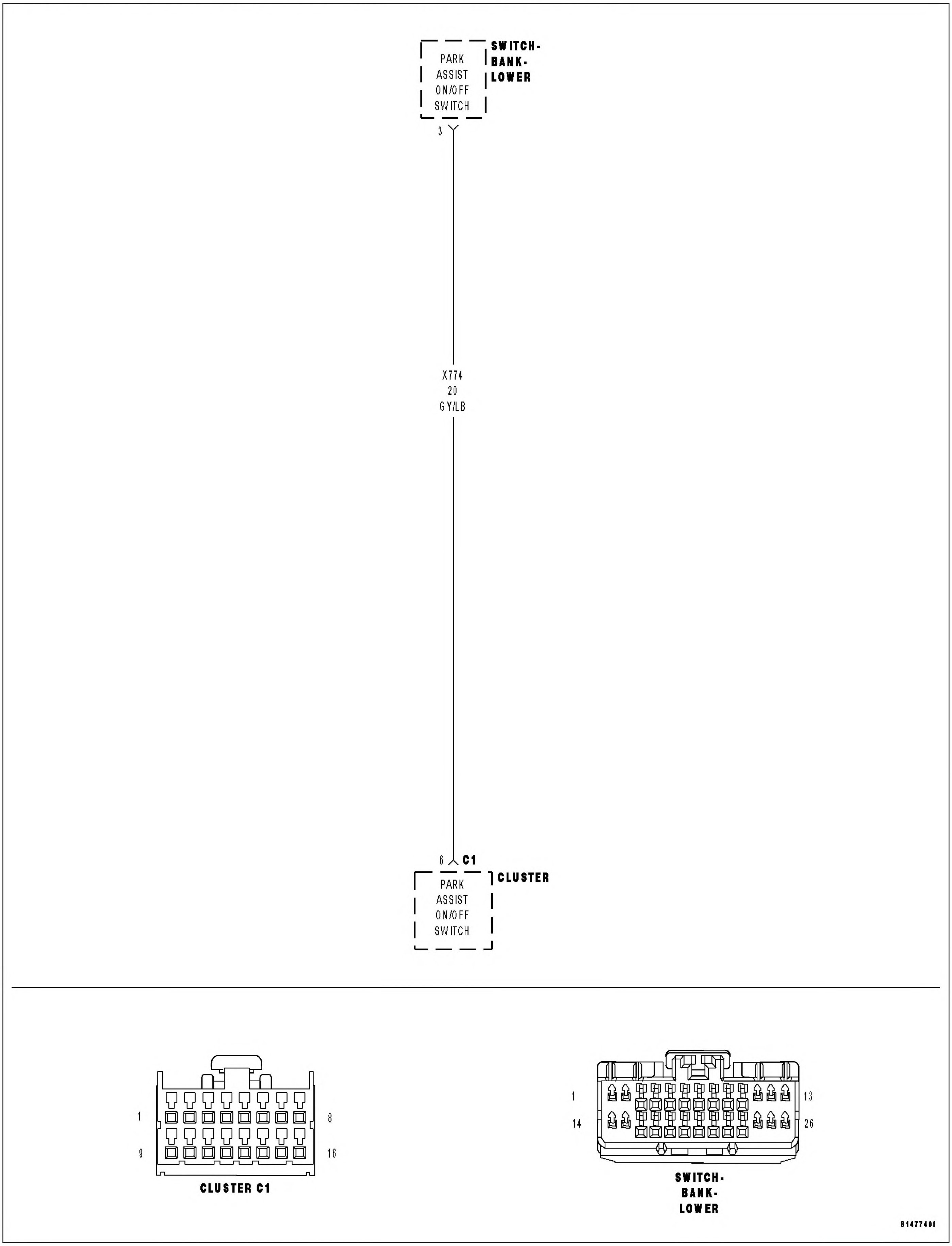
Yes >> Repair the (G108) Reset Switch Input circuit for a short to ground.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1243-REAR PARK ASSIST DISABLE SWITCH STUCK


PARK ASSIST ON/OFF SWITCH
SWITCH-BANK-LOWER
3
X774
20
GY/LB
6
C1
PARK ASSIST ON/OFF SWITCH
CLUSTER
1
8
9
16
CLUSTER C1
1
13
14
26
SWITCH-BANK-LOWER
81477401

B1243-REAR PARK ASSIST DISABLE SWITCH STUCK (CONTINUED)

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Instrument Cluster detects the Rear Park Assist Disable Switch active for greater than 20 seconds.

Possible Causes
(X774) PARK ASSIST ON/OFF SWITCH CIRCUIT SHORT TO GROUND
LOWER SWITCH BANK
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR ACTIVE DTC

Press and release the switch three times.

Turn the ignition on.

With the scan tool, record and erase Instrument Cluster DTCs.

Turn the ignition off.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.

Is DTC: B1243-REAR PARK ASSIST DISABLE SWITCH STUCK active?

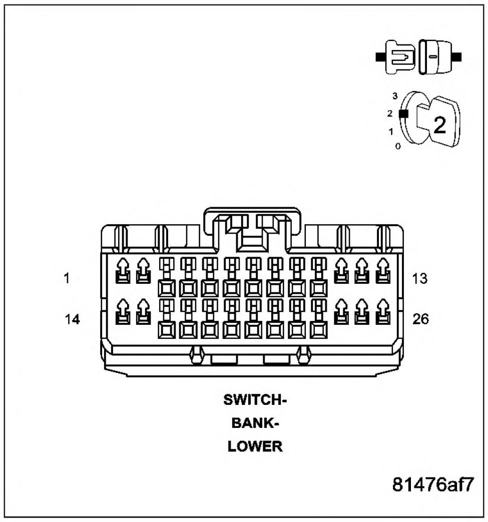
Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1243-REAR PARK ASSIST DISABLE SWITCH STUCK (CONTINUED)

2. CHECK OPERATION OF THE LOWER SWITCH BANK



Turn the ignition off.

Disconnect the Lower Switch Bank Harness Connector.

Turn the ignition on.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.

Does the scan tool display DTC: B1243-REAR PARK ASSIST DISABLE SWITCH STUCK?

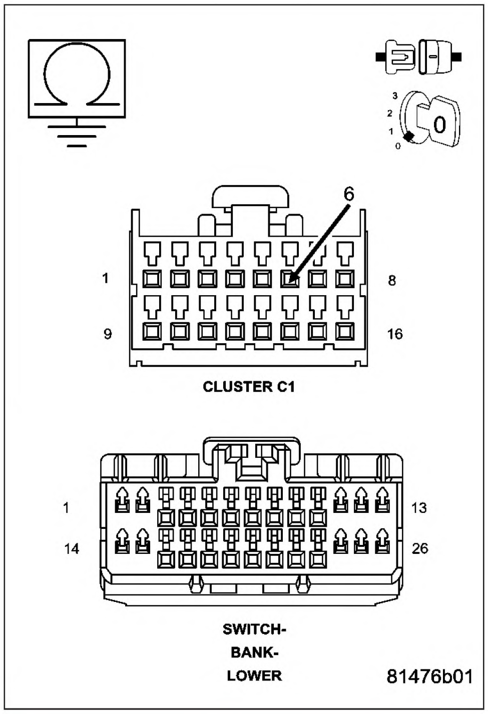
Yes >> Go To 3

No >> Replace the Lower Switch Bank in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. CHECK THE (X774) PARK ASSIST ON/OFF SWITCH CIRCUIT FOR A SHORT TO GROUND



Turn the ignition off.

Disconnect the Instrument Cluster C1 harness connector.

Measure the resistance of the (X774) Park Assist ON/OFF Switch circuit for a short to ground.

Is the resistance below 10K ohms?

Yes >> Repair the (X774) Park Assist ON/OFF Switch circuit for a short to ground.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B160A-PANEL DIMMER INPUT CIRCUIT LOW (SCM)

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the SCM awake.
- **Set Condition:**
  Panel Dimmer Input less than 0.5 volts.

Possible Causes
LIGHTING MULTI-FUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all SCM DTC's.

Turn the Panel Illumination ON then OFF.

With the Scan Tool, read the SCM DTC's.

Does the Scan Tool read: B160A-PANEL DIMMER INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Lighting Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 10 and 11. Move the switch position from DOME DEFEAT to DOME LAMPS while measuring.

DOME DEFEAT = 0 ohms
DIM 1 = 118 ohms
DIM 2 = 224 ohms
DIM 3 = 450 ohms
DIM 4 = 1099 ohms
DIM 5 = 1099 ohms
DIM 6 = 1099 ohms
PARADE = 1099 ohms
DOME LAMPS = 1099 ohms

Is the resistance in each position correct?

Yes >> Go To 3

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B160A-PANEL DIMMER INPUT CIRCUIT LOW (SCM) (CONTINUED)

3. MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Lighting Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 9 and 11. Move the switch position from DOME DEFEAT to DOME LAMPS while measuring.

DOME DEFEAT = 1099 ohms

DIM 1 = 1099 ohms

DIM 2 = 1099 ohms

DIM 3 = 1099 ohms

DIM 4 = 1099 ohms

DIM 5 = 450 ohms

DIM 6 = 224 ohms

PARADE = 118 ohms

DOME LAMPS = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B160B-PANEL DIMMER INPUT CIRCUIT HIGH (SCM)

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the Instrument Cluster awake.
- **Set Condition:**
  Panel Dimmer Input greater than 4.8 volts.

Possible Causes
LIGHTING MULTI-FUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all SCM DTC's.

Turn the Panel Illumination ON then OFF.

With the Scan Tool, read the SCM DTC's.

Does the Scan Tool read: B160B-PANEL DIMMER INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Lighting Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 10 and 11. Move the switch position from DOME DEFEAT to DOME LAMPS while measuring.

DOME DEFEAT = 0 ohms

DIM 1 = 118 ohms

DIM 2 = 224 ohms

DIM 3 = 450 ohms

DIM 4 = 1099 ohms

DIM 5 = 1099 ohms

DIM 6 = 1099 ohms

PARADE = 1099 ohms

DOME LAMPS = 1099 ohms

Is the resistance in each position correct?

Yes >> Go To 3

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B160B-PANEL DIMMER INPUT CIRCUIT HIGH (SCM) (CONTINUED)

3. MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Lighting Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 9 and 11. Move the switch position from DOME DEFEAT to DOME LAMPS while measuring.

DOME DEFEAT = 1099 ohms

DIM 1 = 1099 ohms

DIM 2 = 1099 ohms

DIM 3 = 1099 ohms

DIM 4 = 1099 ohms

DIM 5 = 450 ohms

DIM 6 = 224 ohms

PARADE = 118 ohms

DOME LAMPS = 0 ohms

Is the resistance in each position correct?

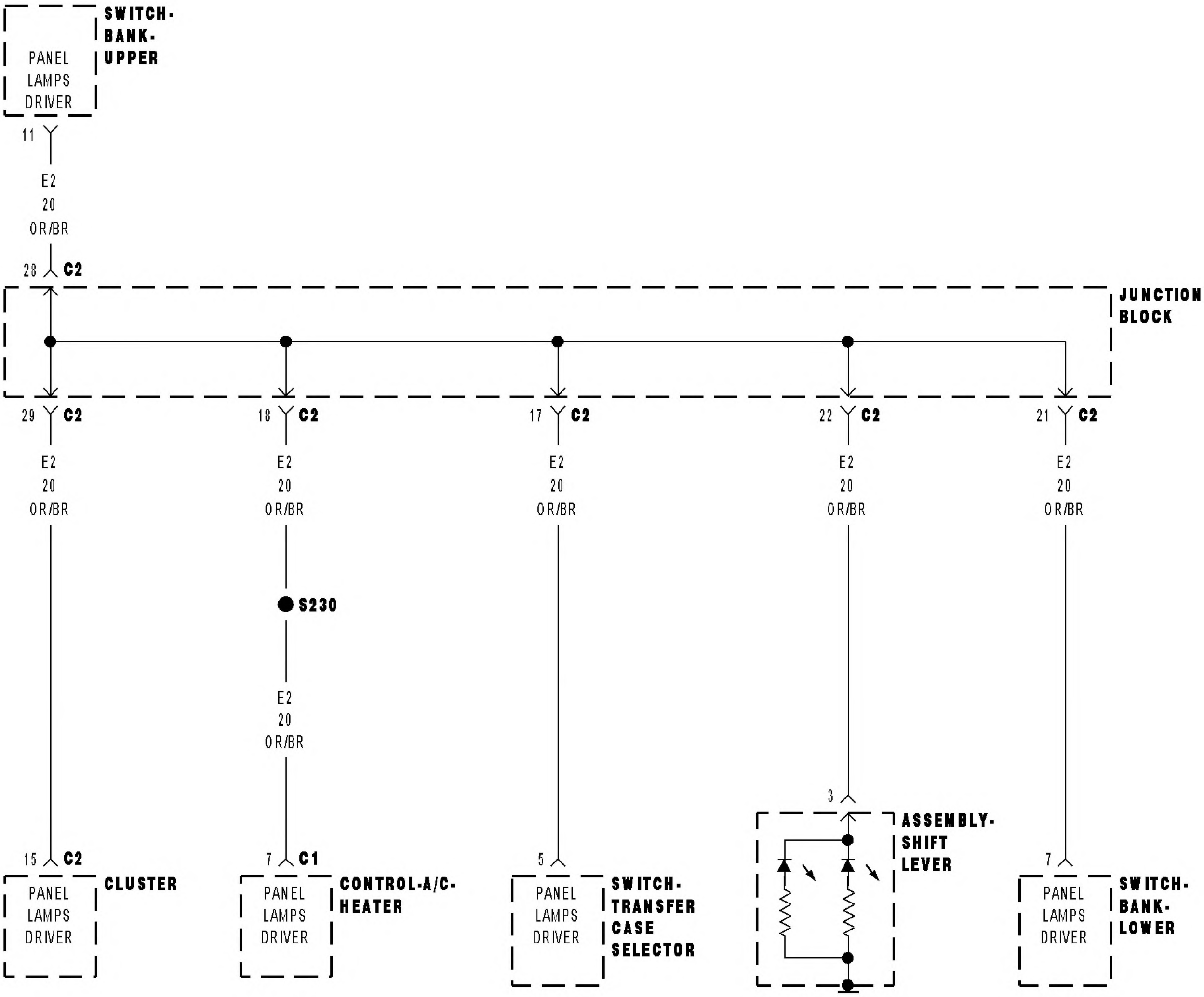
Yes >> Replace the Steering Control Module in accordance with the service information.

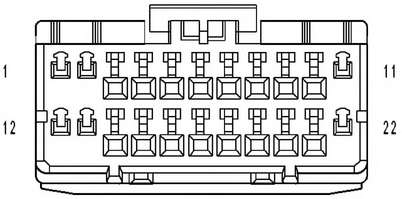
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

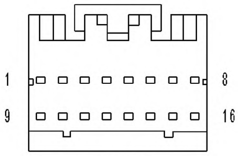
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1612-PANEL ILLUMINATION CONTROL CIRCUIT

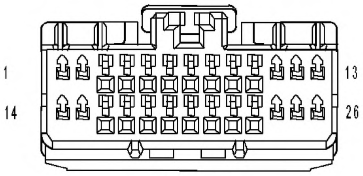

SWITCH-
BANK-
UPPER
PANEL
LAMPS
DRIVER
11
E2
20
OR/BR
28 C2
JUNCTION
BLOCK
29 C2
18 C2
17 C2
22 C2
21 C2
E2
20
OR/BR
S230
3
ASSEMBLY-
SHIFT
LEVER
15 C2
CLUSTER
7 C1
CONTROL-A/C-
HEATER
5
SWITCH-
TRANSFER
CASE
SELECTOR
7
SWITCH-
BANK-
LOWER



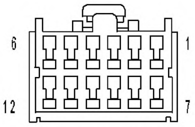
CONTROL-A/C-
HEATER C1
(ATC)



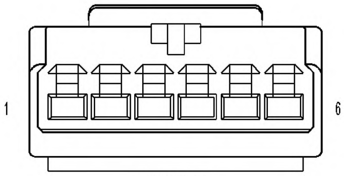
CONTROL-
A/C-HEATER C1
(MTC)



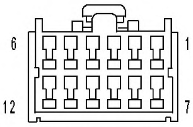
SWITCH-
BANK-
LOWER



SWITCH-
BANK-
UPPER



SWITCH-
TRANSFER
CASE
SELECTOR



ASSEMBLY-
SHIFT
LEVER

814c156e

B1612-PANEL ILLUMINATION CONTROL CIRCUIT (CONTINUED)

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the Ignition on, and the Panel Illumination active.
- **Set Condition:**
  Panel Illumination Status HIGH.

Possible Causes
(E2) PANEL LAMPS DRIVER CIRCUIT SHORTED TO GROUND
(E2) PANEL LAMPS DRIVER CIRCUIT SHORTED TO VOLTAGE
UPPER SWITCH BANK SHORTED TO GROUND
LOWER SWITCH BANK SHORTED TO GROUND
A/C HEATER CONTROL SHORTED TO GROUND
TRANSFER CASE SWITCH SHORTED TO GROUND
SHIFTER ASSEMBLY SHORTED TO GROUND
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

Turn the ignition on.

With the scan tool, record and erase DTCs.

Activate the Panel Illumination.

Wait 30 seconds.

With the scan tool, read DTCs.

Is the DTC active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

B1612-PANEL ILLUMINATION CONTROL CIRCUIT (CONTINUED)

2. CHECK THE UPPER SWITCH BANK FOR A SHORT TO GROUND

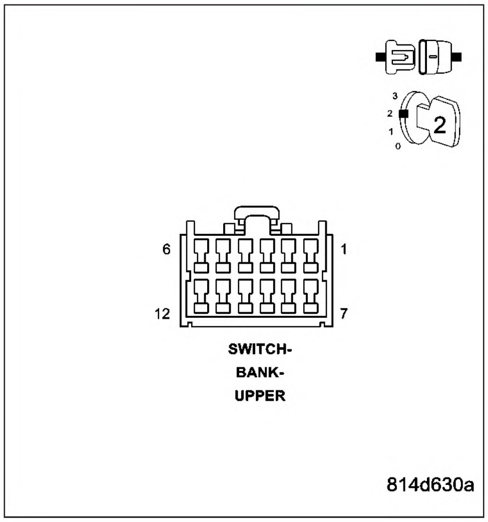
Turn the ignition off.

Disconnect the Upper Switch Bank harness connector.

Turn the ignition on.

Activate the Panel Illumination.

With the scan tool, read DTCs.



Does the scan tool display- B1612-PANEL ILLUMINATION CONTROL CIRCUIT?

Yes >> Go To 3

No >> Replace the Upper Switch Bank in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

3. CHECK THE LOWER SWITCH BANK FOR A SHORT TO GROUND

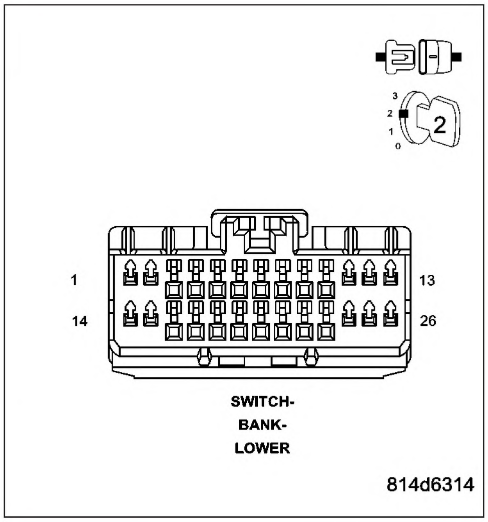
Turn the ignition off.

Disconnect the Lower Switch Bank harness connector.

Turn the ignition on.

Activate the Panel Illumination.

With the scan tool, read DTCs.



Does the scan tool display- B1612-PANEL ILLUMINATION CONTROL CIRCUIT?

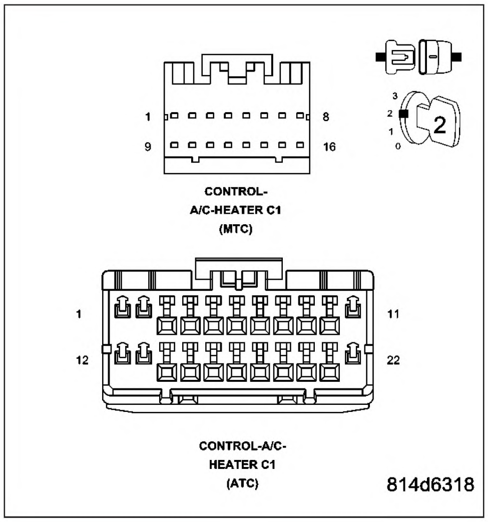
Yes >> Go To 4

No >> Replace the Upper Switch Bank in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1612-PANEL ILLUMINATION CONTROL CIRCUIT (CONTINUED)

4. CHECK THE A/C HEATER CONTROL FOR A SHORT TO GROUND


1
8
9
16
CONTROL-
A/C-HEATER C1
(MTC)
1
11
12
22
CONTROL-A/C-
HEATER C1
(ATC)
3
2
1
0
2
814d6318

Turn the ignition off.

Disconnect the A/C Heater Control harness connector.

Turn the ignition on.

Activate the Panel Illumination.

With the scan tool, read DTCs.

Does the scan tool display- B1612-PANEL ILLUMINATION CONTROL CIRCUIT?

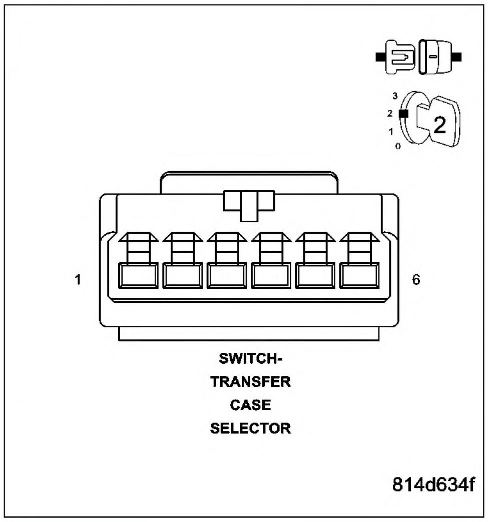
Yes >> Go To 5

No >> Replace the A/C Control in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

5. CHECK THE TRANSFER CASE SWITCH FOR A SHORT TO GROUND


3
2
1
0
2
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
814d634f

Turn the ignition off.

Disconnect theTransfer Case Switch harness connector.

Turn the ignition on.

Activate the Panel Illumination.

With the scan tool, read DTCs.

Does the scan tool display- B1612-PANEL ILLUMINATION CONTROL CIRCUIT?

Yes >> Go To 6

No >> Replace the Transfer Case Switch in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1612-PANEL ILLUMINATION CONTROL CIRCUIT (CONTINUED)

6. CHECK THE SHIFTER ASSEMBLY FOR A SHORT TO GROUND

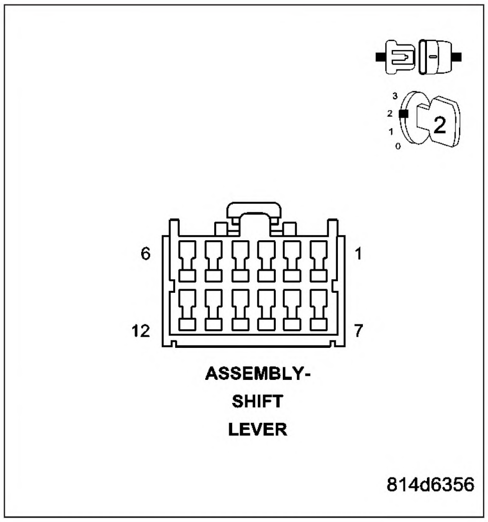
Turn the ignition off.

Disconnect the Shifter Assembly harness connector.

Turn the ignition on.

Activate the Panel Illumination.

With the scan tool, read DTCs.



Does the scan tool display- B1612-PANEL ILLUMINATION CONTROL CIRCUIT?

Yes >> Go To 7

No >> Replace the Shifter Assembly in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

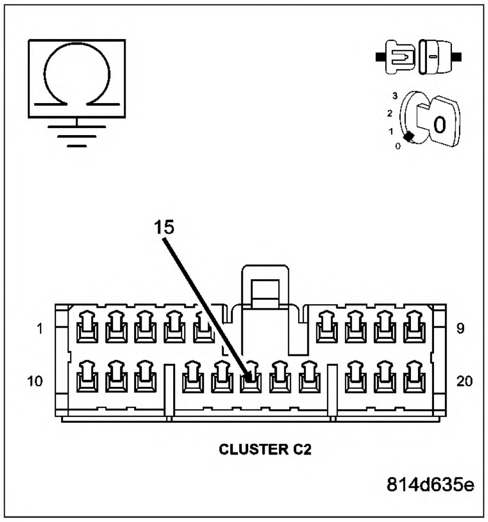
---

7. CHECK THE (E2) PANEL LAMPS DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C2 harness connector.

With all the above components disconnected, measure the resistance to ground of the (E2) Panel Lamps Driver Circuit from the Instrument Cluster C2 harness connector.



Is the resistance less than 10K ohms?

Yes >> Repair the (E2) Panel Lamps Driver circuit for a short to ground.

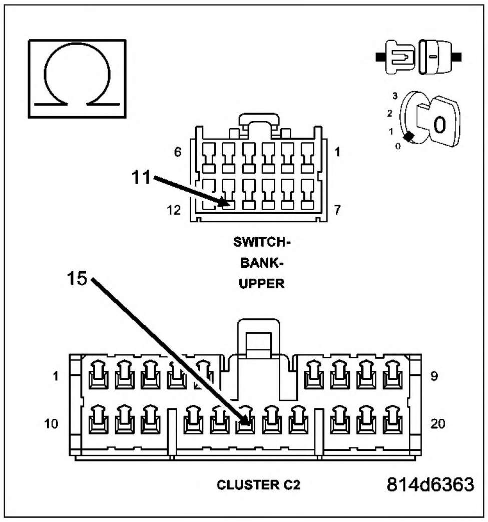
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

No >> Go To 8

B1612-PANEL ILLUMINATION CONTROL CIRCUIT (CONTINUED)

8. CHECK THE (E2) PANEL LAMPS DRIVER CIRCUIT FOR AN OPEN

With all the above components disconnected, measure the resistance of the (E2) Panel Lamps Driver Circuit between the Instrument Cluster C2 harness connector and the Upper Switch Bank harness connector.



Is the resistance greater than 10K ohms?

Yes >> Repair the (E2) Panel Lamps Driver circuit for an open.
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

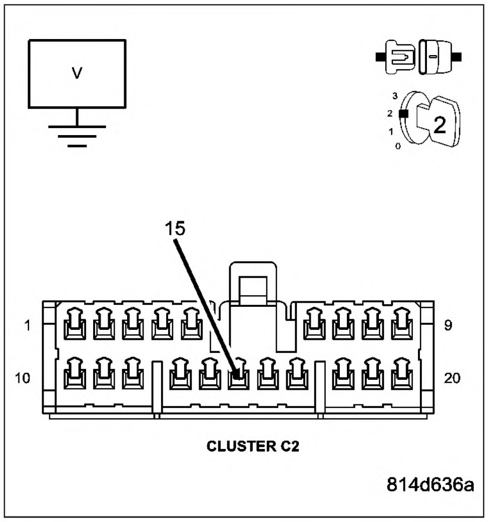
No >> Go To 9

---

9. CHECK THE (E2) PANEL LAMPS DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

With all the above components disconnected, measure the voltage of the (E2) Panel Lamps Driver Circuit from the Instrument Cluster C2 harness connector.



Is the voltage above 5.0 volts?

Yes >> Repair the (E2) Panel Lamps Driver circuit for a short to voltage.
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

No >> Replace the Instrument Cluster in accordance with the service information.
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST - VER 1).

B210D-BATTERY VOLTAGE LOW

For the Instrument Cluster circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Instrument Cluster detects the a battery voltage of 9.0 volts for 5 seconds.

Possible Causes
VEHICLE CHARGING SYSTEM
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR ACTIVE DTC: B210D-BATTERY VOLTAGE LOW

Turn the ignition on.

Apply the vehicle park brake.

Shift the transmission into reverse.

With the scan tool, record and erase Instrument Cluster DTCs.

Wait 30 seconds.

With the scan tool, read Instrument Cluster DTCs.

Is DTC: B210D-BATTERY VOLTAGE LOW active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. VERIFY OPERATION OF THE VEHICLE CHARGING SYSTEM

NOTE: Troubleshoot any PCM charging/cranking DTCs before proceeding.

NOTE: Ensure the battery is fully charged.

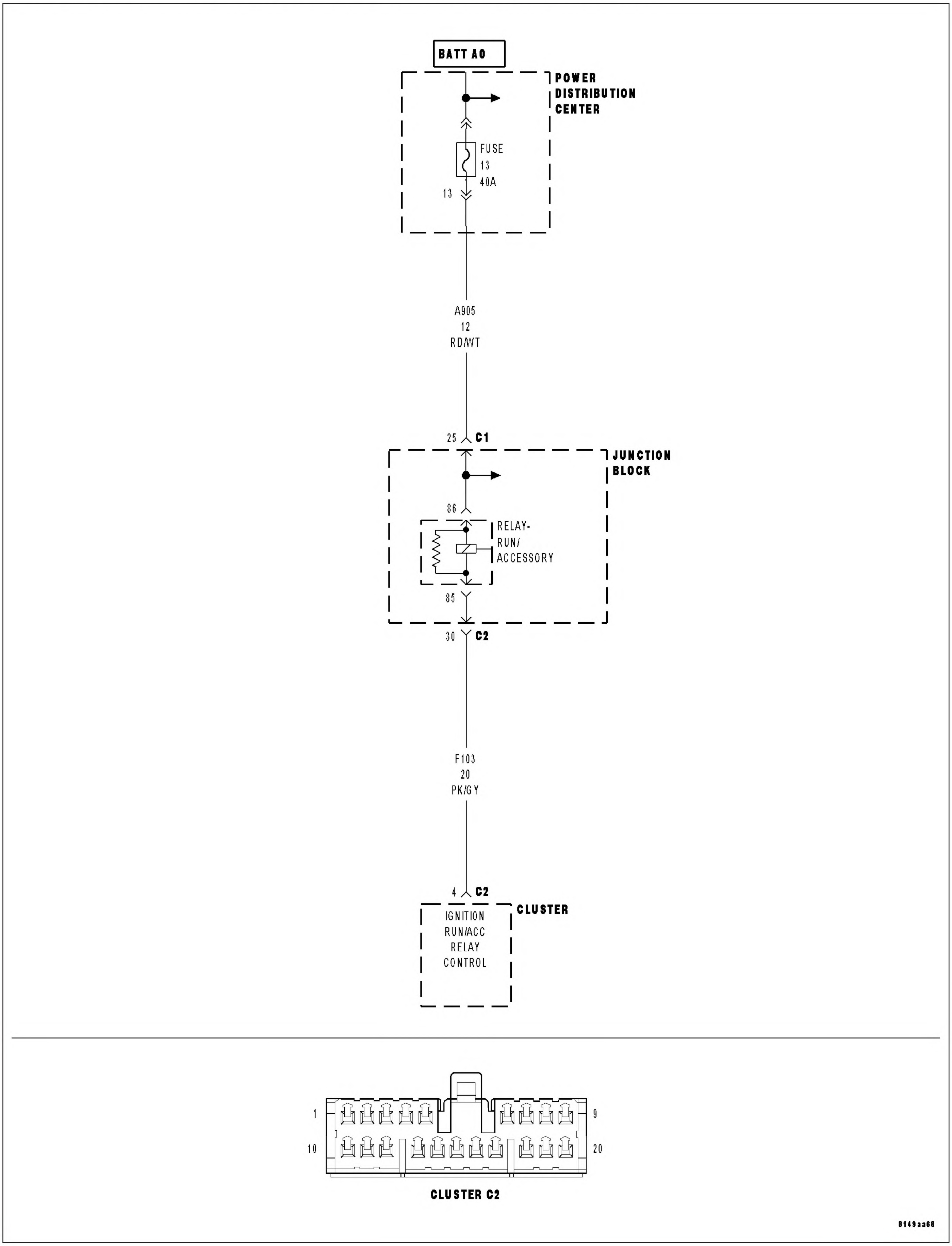
Are any charging system DTCs present?

Yes >> (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)

No >> Replace the Instrument Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B211A-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25
C1
JUNCTION BLOCK
86
RELAY-RUN/ACCESSORY
85
30
C2
F103
20
PK/GY
4
C2
CLUSTER
IGNITION RUN/ACC RELAY CONTROL
1
9
10
20
CLUSTER C2
8149aa68

B211A-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT LOW (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a low condition on the (F103) Ignition Run/Acc Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(F103) IGNITION RUN/ACC/SPAD RELAY CONTROL CIRCUIT LOW
JUNCTION BLOCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display B211A-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT LOW?

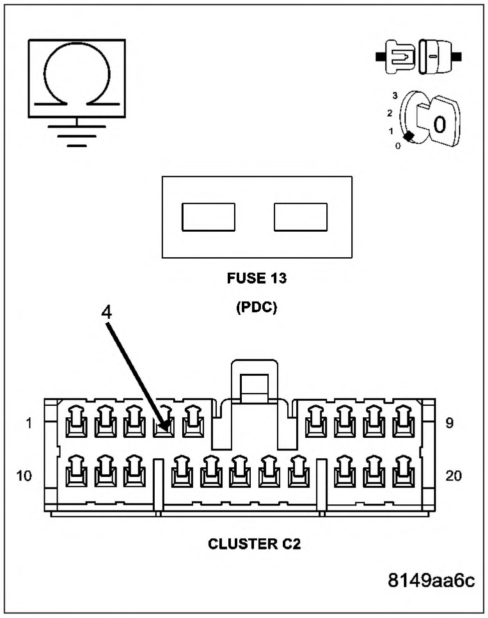
Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. IGNITION RUN/ACC/SPAD RELAY SHORTED



Turn the ignition off.

Disconnect the Cluster C2 connector.

Remove the PDC fuse #13.

Measure the resistance between ground and the (F103) Ignition Run/ACC/SPAD Relay Control circuit in the Cluster C2 connector

Is the resistance below 1000.0 ohms?

No >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

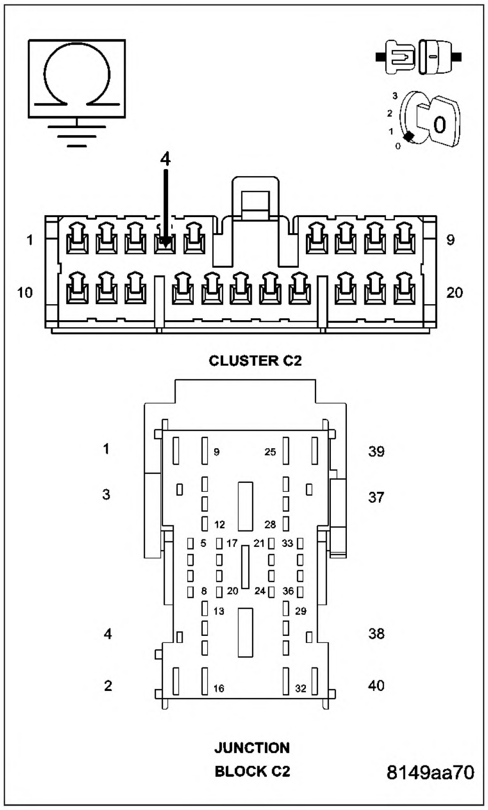
Yes >> Go To 3

B211A-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT LOW (CONTINUED)

3. (F103) IGNITION RUN/ACC/SPAD RELAY CONTROL CIRCUIT SHORT TO GROUND

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the resistance between ground and the (F103) Ignition Run/ACC/SPAD Relay Control circuit in the Cluster C2 connector.


3
2
1
0
4
1
9
10
20
CLUSTER C2
1
3
4
2
9
25
12
28
5
17
21
33
8
20
24
36
13
29
16
32
39
37
38
40
JUNCTION
BLOCK C2
8149aa70

Is the resistance below 1000.0 ohms?

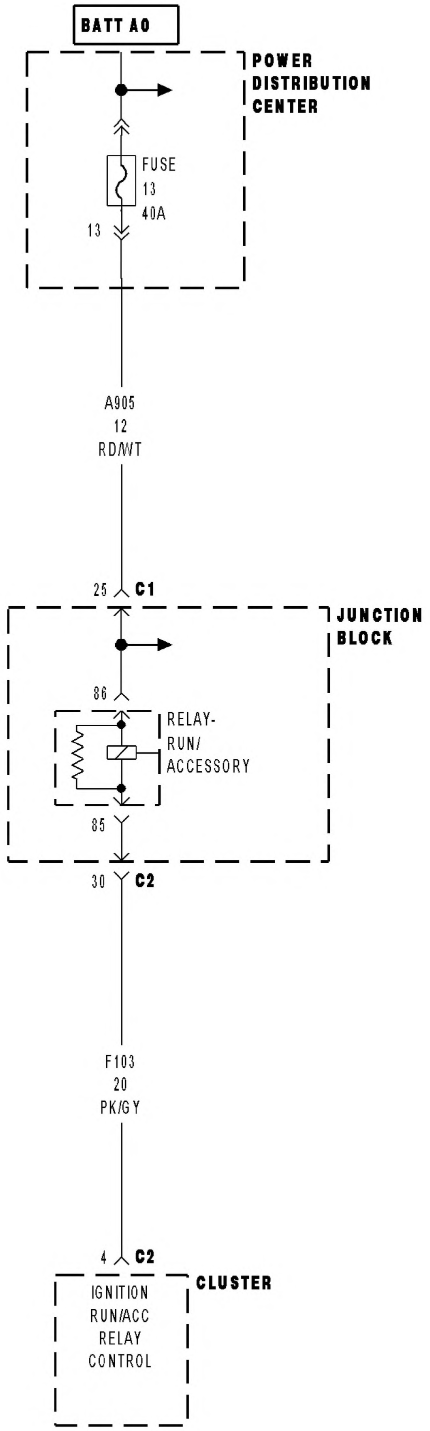
Yes >> Repair the (F103) Ignition Run/ACC/SPAD Relay Control circuit for a short to ground.

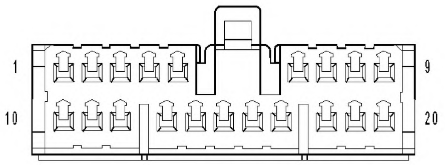
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B211B-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25 C1
JUNCTION BLOCK
86
RELAY-RUN/ACCESSORY
85
30 C2
F103
20
PK/GY
4 C2
CLUSTER
IGNITION RUN/ACC RELAY CONTROL



CLUSTER C2

8149aa68

B211B-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT HIGH (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a high condition on the (F103) Ignition Run/Acc Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(F103) IGNITION RUN/ACC/SPAD RELAY CONTROL CIRCUIT SHORT TO BATTERY
JUNCTION BLOCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display B211B-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

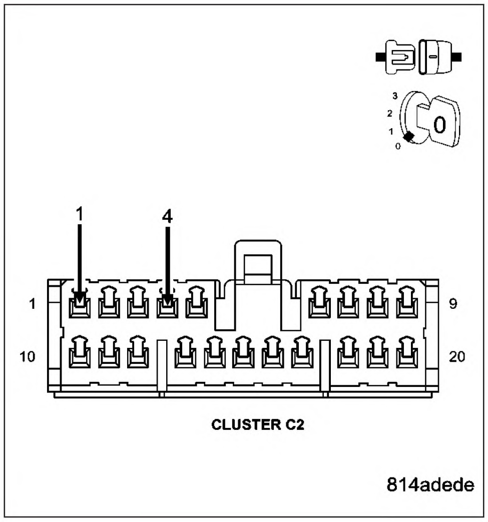
---

2. IGNITION RUN RELAY SHORTED TO BATTERY

Turn the ignition off.

Disconnect the Cluster C2 connector.

Momentarily connect a jumper wire between the (F103) Ignition Run Relay Control circuit and the (Z905) Ground circuit in the Cluster C2 connector.



Did the relay actuate?

Yes >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3

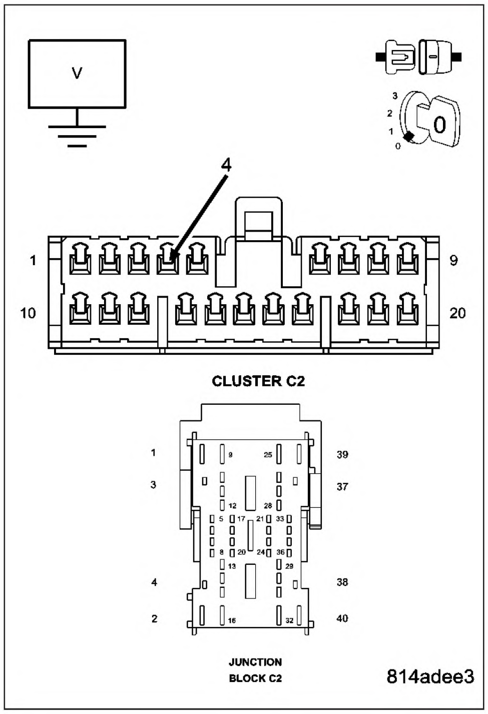
B211B-IGNITION RUN/ACC/SPAD CONTROL CIRCUIT HIGH (CONTINUED)

3. (F103) IGNITION RUN/ACC/SPAD RELAY CONTROL CIRCUIT SHORTED TO BATTERY

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the voltage between ground and the (F103) Ignition Run/Acc/SPAD Relay Control circuit in the Cluster C2 connector.

Turn the ignition on.


V
3
2
1
0
4
1
9
10
20
CLUSTER C2
1
3
4
2
39
37
38
40
9
25
12
28
5
17
21
33
8
20
24
36
13
29
16
32
JUNCTION BLOCK C2
814adee3

Is there any voltage present?

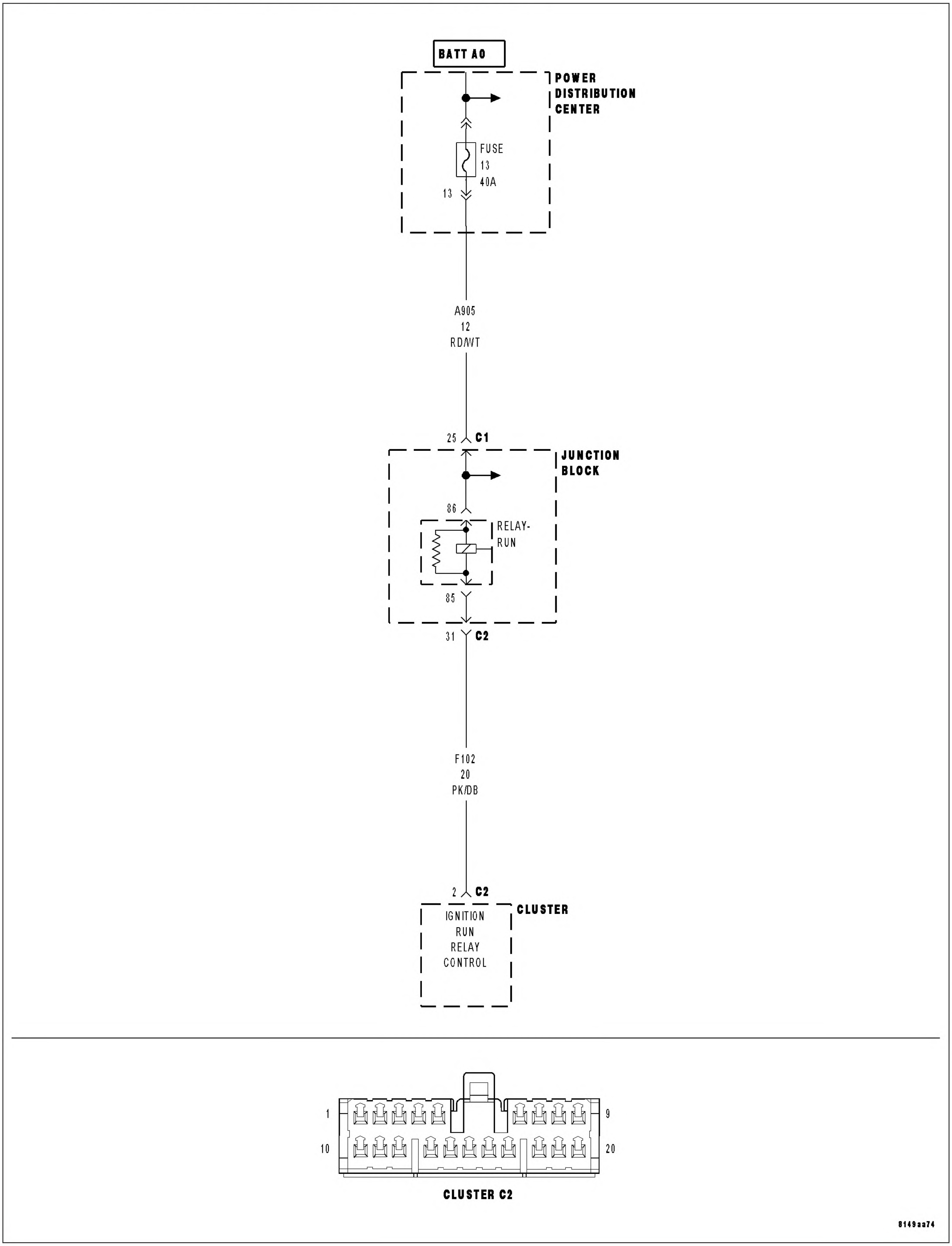
Yes >> Repair the (F103) Ignition Run/Acc/SPAD Relay Control circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2122-IGNITION RUN CONTROL CIRCUIT LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25
C1
JUNCTION BLOCK
86
RELAY-RUN
85
31
C2
F102
20
PK/DB
2
C2
CLUSTER
IGNITION RUN RELAY CONTROL
1
9
10
20
CLUSTER C2
8149aa74

B2122-IGNITION RUN CONTROL CIRCUIT LOW (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a low condition on the (F102) Ignition Run Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(F102) IGNITION RUN RELAY CONTROL CIRCUIT LOW
JUNCTION BLOCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display B2122-IGNITION RUN CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. IGNITION RUN RELAY SHORTED

Turn the ignition off.

Disconnect the Cluster C2 connector.

Remove the PDC fuse #13.

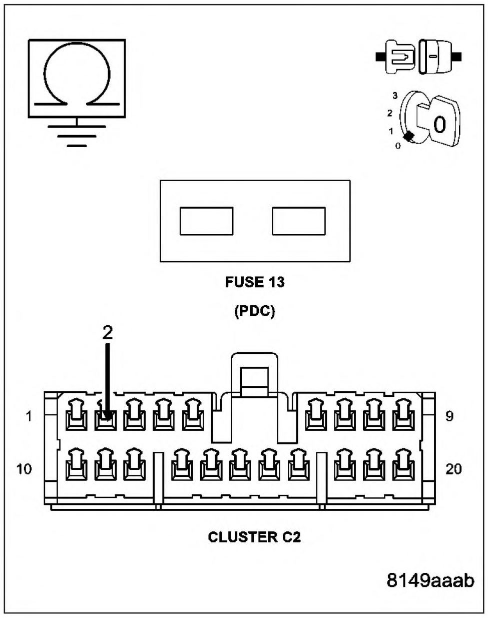
Measure the resistance between ground and the (F102) Ignition Run Relay Control circuit in the Cluster C2 connector

Is the resistance below 1000.0 ohms?

No >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3

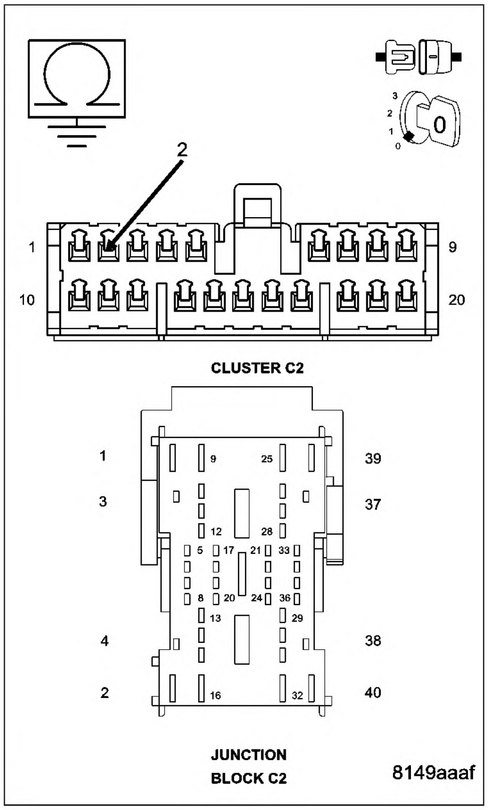


B2122-IGNITION RUN CONTROL CIRCUIT LOW (CONTINUED)

3. (F102) IGNITION RUN RELAY CONTROL CIRCUIT SHORT TO GROUND

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the resistance between ground and the (F102) Ignition Run Relay Control circuit in the Cluster C2 connector.


2
1
9
10
20
CLUSTER C2
1
3
4
2
9
25
12
28
5
17
21
33
8
20
24
36
13
29
16
32
39
37
38
40
JUNCTION
BLOCK C2
8149aaaf

Is the resistance below 1000.0 ohms?

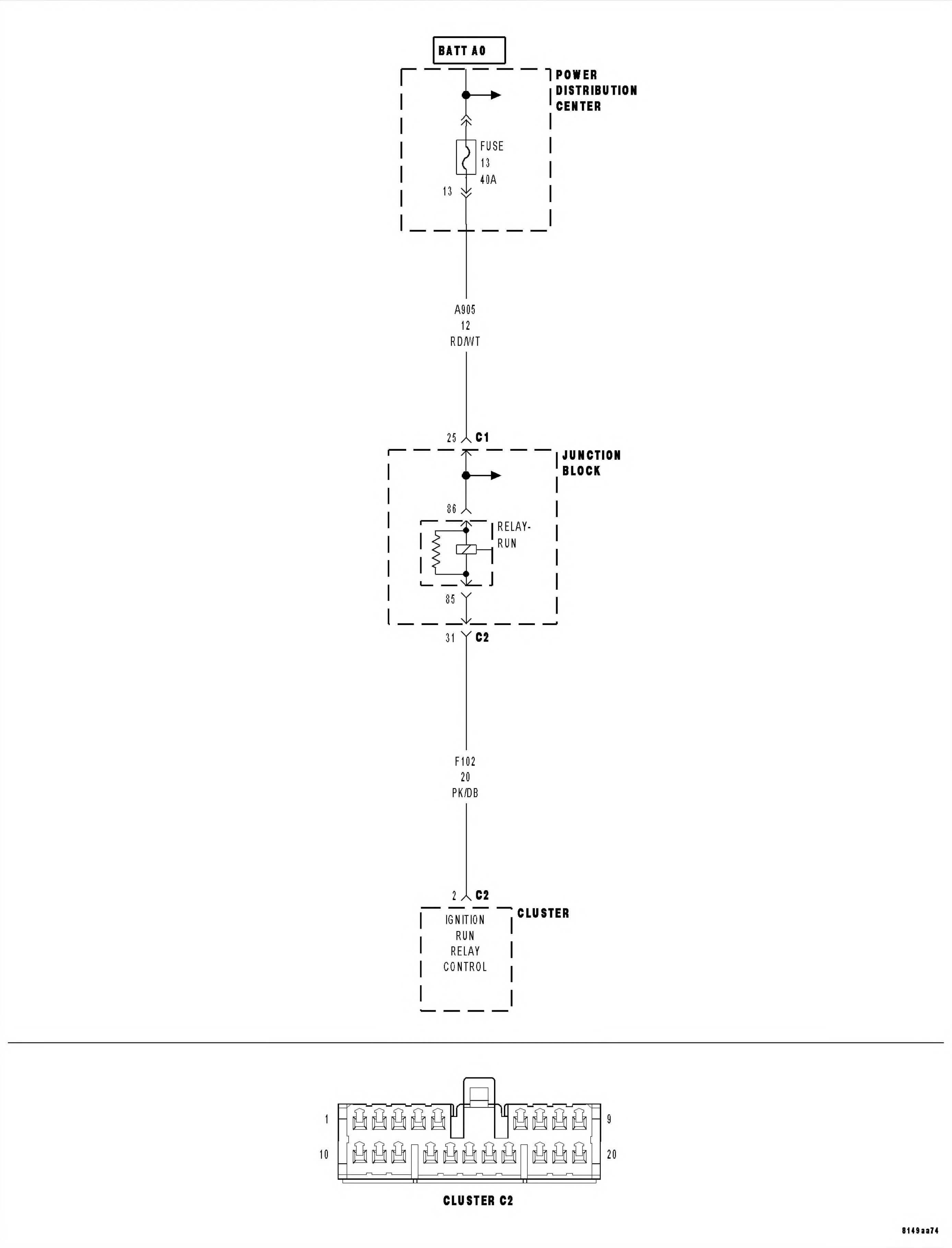
Yes >> Repair the (F102) Ignition Run Relay Control circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2123-IGNITION RUN CONTROL CIRCUIT HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25 C1
JUNCTION BLOCK
86
RELAY-RUN
85
31 C2
F102
20
PK/DB
2 C2
CLUSTER
IGNITION RUN RELAY CONTROL
1
9
10
20
CLUSTER C2
8149aa74

B2123-IGNITION RUN CONTROL CIRCUIT HIGH (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a high condition on the (F102) Ignition Run Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(F102) IGNITION RUN RELAY CONTROL CIRCUIT SHORT TO BATTERY
JUNCTION BLOCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display B2123-IGNITION RUN CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. IGNITION RUN RELAY SHORTED TO BATTERY

Turn the ignition off.

Disconnect the Cluster C2 connector.

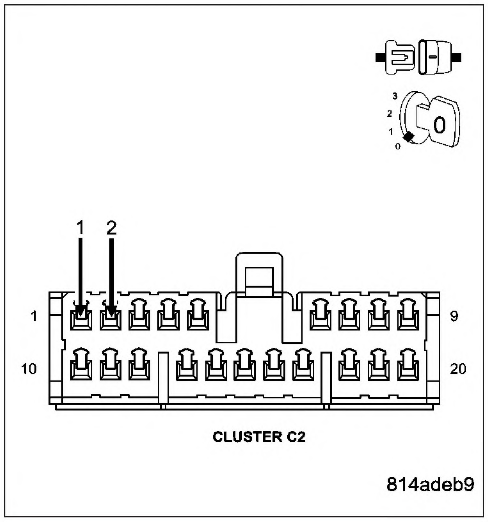
Momentarily connect a jumper wire between the (F102) Ignition Run Relay Control circuit and the (Z905) Ground circuit in the Cluster C2 connector.

Did the relay actuate?

Yes >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3



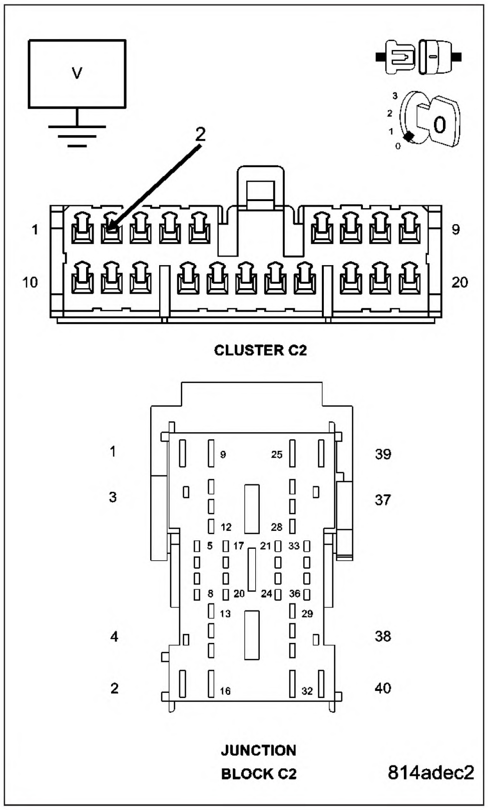
B2123-IGNITION RUN CONTROL CIRCUIT HIGH (CONTINUED)

3. (F102) IGNITION RUN RELAY CONTROL CIRCUIT SHORTED TO BATTERY

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the voltage between ground and the (F102) Ignition Run Relay Control circuit in the Cluster C2 connector.

Turn the ignition on.


V
2
3
2
1
0
1
9
10
20
CLUSTER C2
1
3
4
2
9
25
12
28
5
17
21
33
8
20
24
36
13
29
16
32
39
37
38
40
JUNCTION
BLOCK C2
814adec2

Is there any voltage present?

Yes >> Repair the (F102) Ignition Run Relay Control circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2213–CCN INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the Instrument Cluster awake.
- **Set Condition:**
  The Instrument Cluster detects an internal failure.

Possible Causes
INSTRUMENT CLUSTER

Diagnostic Test

1. REPLACE THE INSTRUMENT CLUSTER

When this code is set, the Instrument Cluster must be replaced.

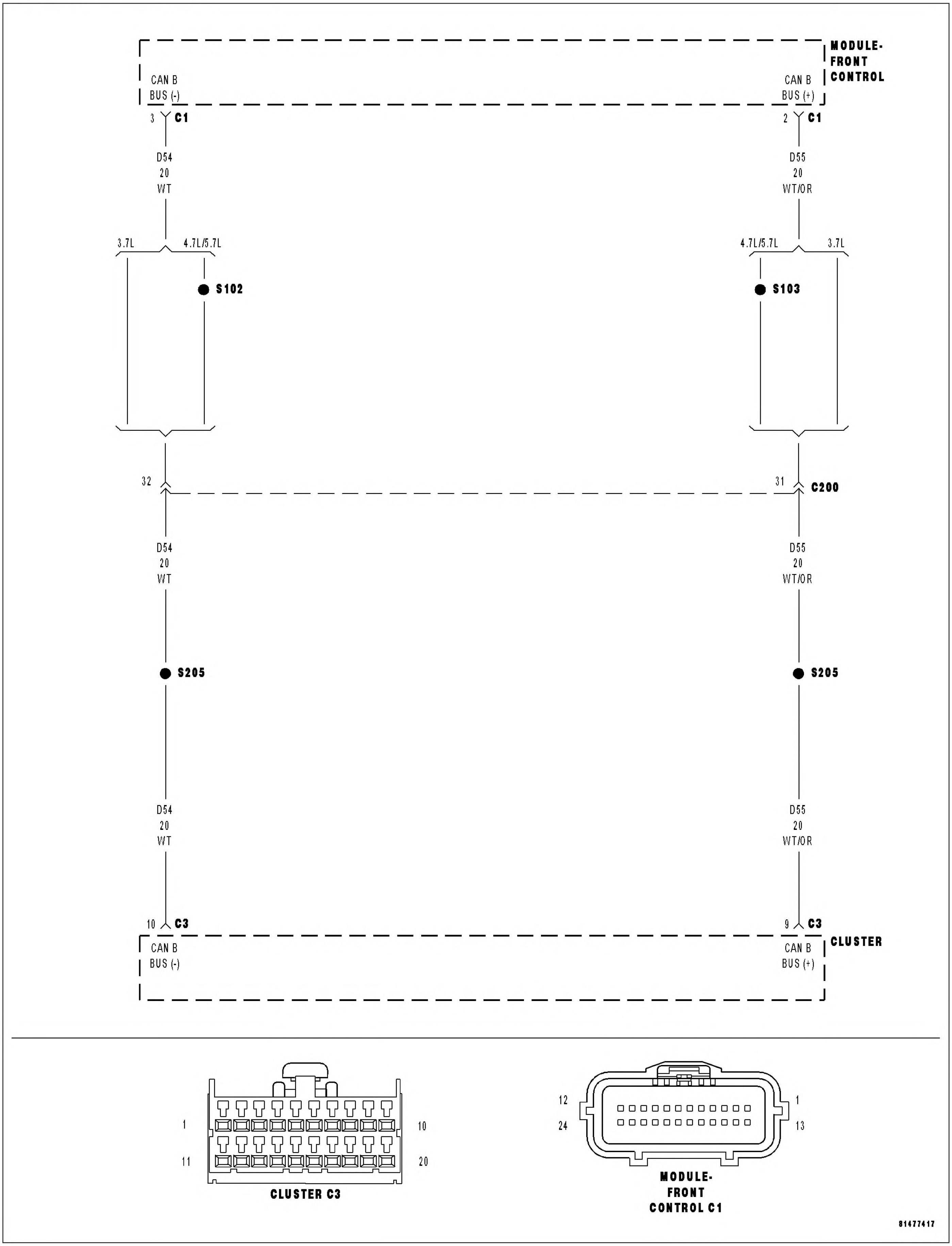
View Repair

Repair

Replace the Instrument Cluster in accordance with the Service Information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U0019–CAN B BUS


MODULE-
FRONT
CONTROL
CAN B
BUS (-)
CAN B
BUS (+)
3 C1
2 C1
D54
20
WT
D55
20
WT/OR
3.7L
4.7L/5.7L
S102
S103
32
31
C200
S205
10 C3
9 C3
CLUSTER
1
10
11
20
CLUSTER C3
12
24
13
MODULE-
FRONT
CONTROL C1
81477417

U0019–CAN B BUS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the Instrument Cluster awake.
- **Set Condition:**
  Whenever the Can B Bus (+) or B Bus (–) circuit is open, shorted to voltage or shorted to ground, this code will set.

Possible Causes
CAN B BUS DTCs IN FRONT CONTROL MODULE
(D54) CAN B BUS (–) CIRCUIT OPEN
(D55) CAN B BUS (+) CIRCUIT OPEN
INSTRUMENT CLUSTER

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

Turn the ignition on.

With the scan tool, record and erase DTCs.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Is the DTC active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. CHECK FRONT CONTROL MODULE DTCs

With the scan tool, read Front Control Module DTCs.

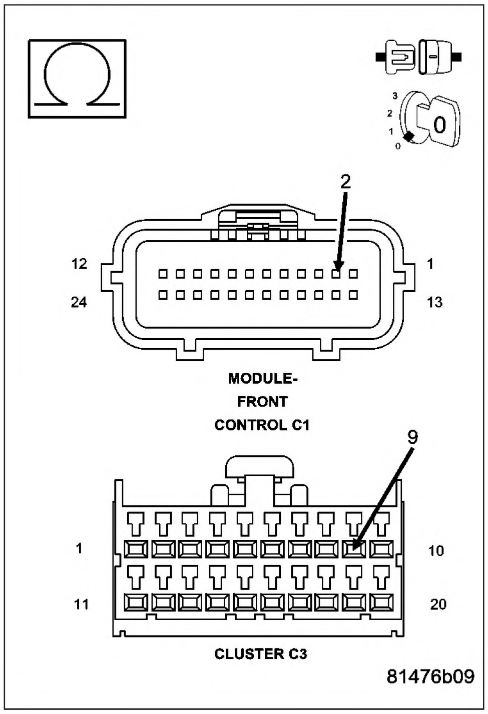
Does the scan tool display the U0019–CAN B BUS DTC?

Yes >> Refer to the symptom list for problems related to Communication in the ELECTRICAL.– ELECTRONIC CONTROL MODULES – ELECTRICAL DIAGNOSES section.

No >> Go to 3

U0019–CAN B BUS (CONTINUED)

3. (D55) CAN B BUS (+) CIRCUIT OPEN



Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the Instrument Cluster C3 harness connector.

Disconnect the Front Control Module C1 harness connector.

Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 harness connector and the Instrument Cluster C3 harness connector.

Is the resistance below 2.0 ohms?

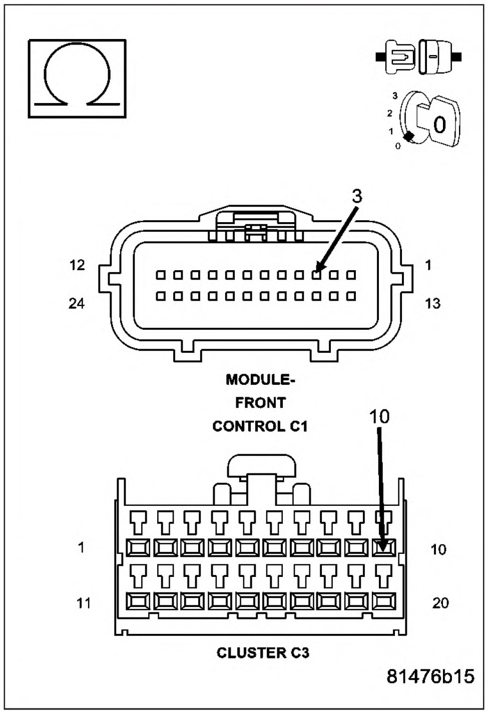
Yes >> Go To 4

No >> Repair the Can B Bus (+) circuit for an open.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

4. (D54) CAN B BUS (–) CIRCUIT OPEN



Measure the resistance of the (D54) Can B Bus (–) circuit between the Front Control Module C1 harness connector and the Instrument Cluster C3 harness connector.

Is the resistance below 2.0 ohms?

Yes >> Replace the Instrument Cluster in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Repair the Can B Bus (–) circuit for an open.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212-LOST COMMUNICATION WITH SCCM-CAN-B

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

INSTRUMENT CLUSTER - SERVICE INFORMATION

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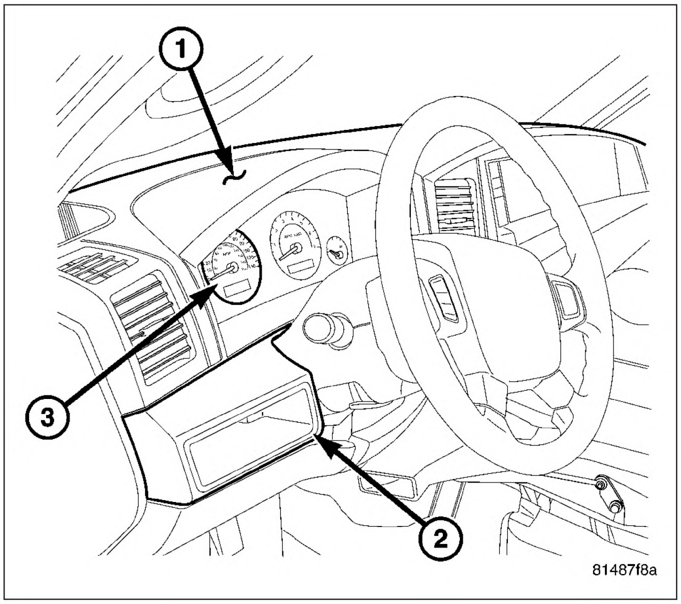
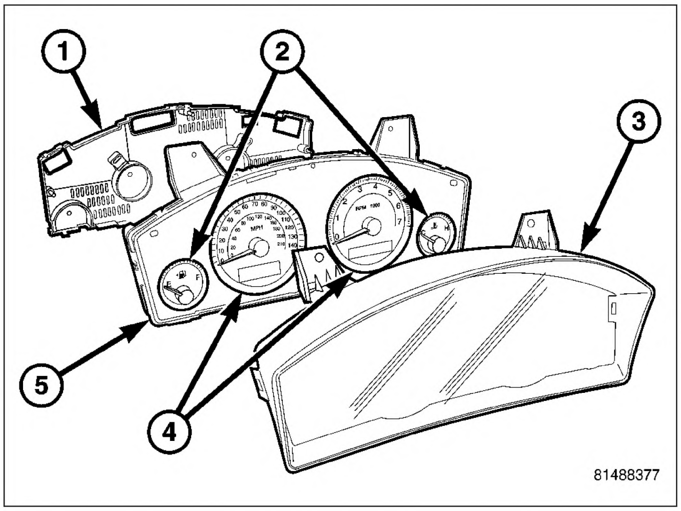
INSTRUMENT CLUSTER - SERVICE INFORMATION

DESCRIPTION

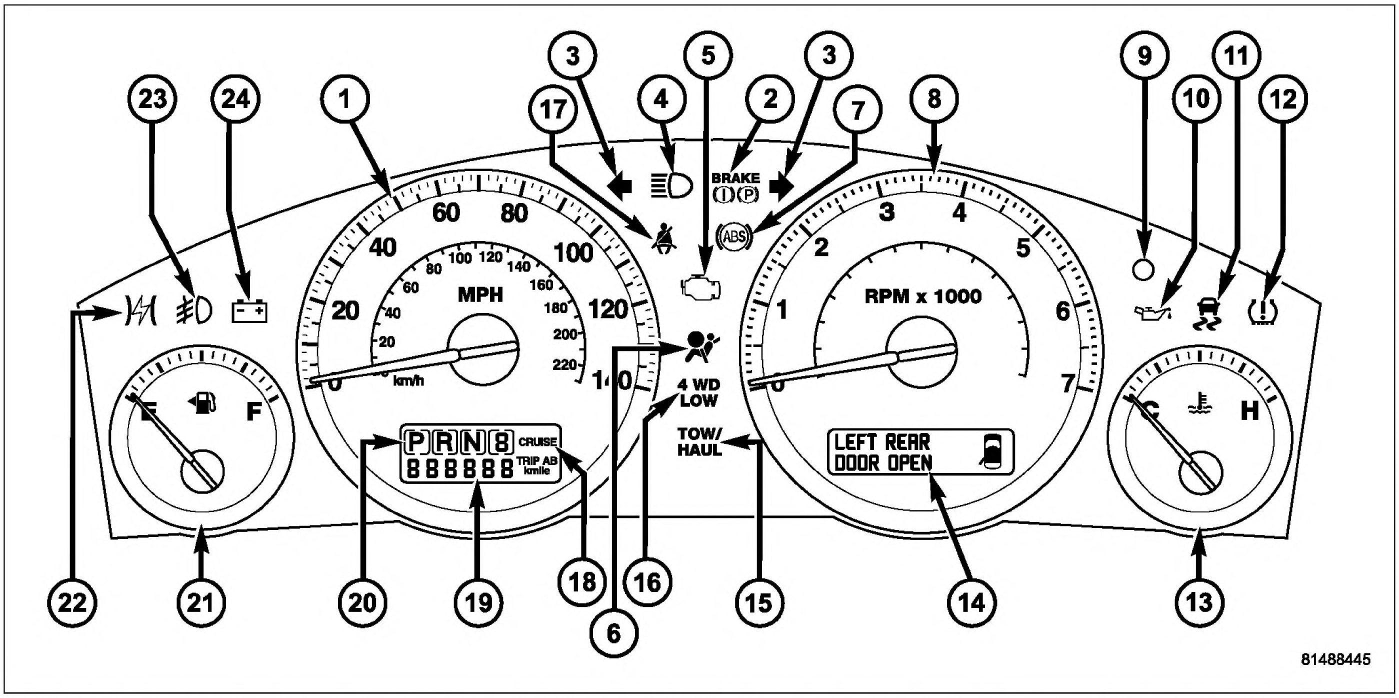
The instrument cluster (3) for this model is an Electro-Mechanical Instrument Cluster (EMIC) that is located in the instrument panel above the steering column opening, directly in front of the driver. The remainder of the EMIC, including the mounts and the electrical connections, are concealed within the instrument panel behind the cluster bezel (2). Besides analog gauges and indicators, the EMIC module incorporates two blue-green digital Vacuum Fluorescent Display (VFD) units. One is for displaying odometer/trip odometer information, engine hours, automatic transmission gear selector position (PRNDL), several warning or reminder indications and certain diagnostic information. The second is the Electronic Vehicle Information Center (EVIC) display that will display things such as compass/temperature, miles per gallon, average fuel economy, distance till empty, etc. The instrument cluster for this model also includes the hardware and software necessary to serve as the electronic body control module and is sometimes referred to as the Cab Compartment Node or CCN.





The EMIC gauges and indicators (5) are visible through a dedicated opening in the cluster bezel on the instrument panel and are protected by a clear plastic cluster lens (3), and the integral hood. The cluster hood serves as a visor and shields the face of the cluster from ambient light and reflections to reduce glare. The molded plastic EMIC lens, hood and mask unit has two integral mounting tabs on the upper edges of the unit. These mounting tabs are used to secure the EMIC to the molded plastic instrument panel cluster carrier with four screws.

The rear of the cluster housing and the EMIC electronic circuitry are protected by a molded plastic rear cover (1), which is secured to the cluster housing. The rear cover includes clearance holes for the cluster connector receptacles. The connector receptacles on the back of the cluster electronic circuit board connect the EMIC to the vehicle electrical system through three take outs with connectors from the instrument panel wire harness.



The EMIC houses four analog gauges and has provisions for up to twenty-five indicators. Some of the EMIC indicators are automatically configured when the EMIC is connected to the vehicle electrical system for compatibility with certain optional equipment or equipment required for regulatory purposes in certain markets. While each EMIC may have provisions for indicators to support every available option, the configurable indicators will not be functional in a vehicle that does not have the equipment that an indicator supports.

The EMIC includes the following analog gauges:

- **Engine Temperature Gauge (13)**
- **Fuel Gauge (21)**
- **Speedometer (1)**
- **Tachometer (8)**

The EMIC includes the following VFD units:

- **Gear Selector/Odometer/Trip A B/engine hours (20)**
- **Electronic Vehicle Information Center (EVIC) Display (14)** - This displays the customer programmable features and status of them, the “Check Gauges” warning message, and the door ajar indication.

The EMIC includes provisions for the following indicators:

- **Airbag Indicator (6)**
- **Antilock Brake System (ABS) Indicator (7)**
- **Brake Indicator (2)**
- **Charging Indicator (24)**
- **Cruise Indicator (18)**
- **Door Ajar Indicator (14 - within the EVIC VFD)**
- **Electronic Throttle Control (ETC) Indicator (22)**
- **Engine Temperature Indicator (13 - within temperature gauge)**
- **Four-Wheel Drive Low Indicator (16)**
- **Front Fog Lamp Indicator (23)**
- **Gate Ajar Indicator (14 - within EVIC VFD)**
- **High Beam Indicator (4)**
- **Low Fuel Indicator (21 - within fuel gauge)**
- **Low Oil Pressure Indicator (10)**
- **Malfunction Indicator Lamp (MIL) (5)**
- **Seat Belt Indicator (17)**
- **Security Indicator (9)**
- **Tow/Haul Indicator (15)**
- **Traction Control Indicator (11)**
- **Turn Signal (Right and Left) Indicators (3)**
- **Washer Fluid Indicator (14 - within EVIC VFD)**

Each indicator in the EMIC, except those located within a VFD unit, is illuminated by a dedicated LED that is soldered onto the EMIC electronic circuit board. Cluster illumination is accomplished by a dimmable electro-luminescent lamp, which illuminates each of the gauge dial faces for visibility when the exterior lighting is turned on. The LED units and the electro-luminescent lamp unit are not available for service replacement and, if damaged or faulty, the entire EMIC must be replaced.

Hard wired circuitry connects the EMIC to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the EMIC through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

The EMIC module for this model is serviced only as a complete unit. The EMIC module cannot be adjusted or repaired. If a gauge, an LED indicator, a VFD unit, the electronic circuit board, the circuit board hardware, the cluster overlay, or the EMIC housing are damaged or faulty, the entire EMIC module must be replaced. The cluster lens, hood and mask unit is available for separate service replacement.

OPERATION

The ElectroMechanical Instrument Cluster (EMIC) in this model also includes the hardware and software necessary to serve as the electronic body control module and is sometimes referred to as the Cab Compartment Node or CCN. The following information deals primarily with the instrument cluster functions of this unit. Additional details of the electronic body control functions of this unit may be found within the service information for the system or component that the EMIC controls. For example: Additional details of the audible warning functions of the EMIC are found within the Chime/Buzzer service information.

The EMIC is designed to allow the vehicle operator to monitor the conditions of many of the vehicle components and operating systems. The gauges and indicators in the EMIC provide valuable information about the various standard and optional powertrains, fuel and emissions systems, cooling systems, lighting systems, safety systems and many other convenience items. The EMIC is installed in the instrument panel so that all of these monitors can be easily viewed by the vehicle operator when driving, while still allowing relative ease of access for service.

The microprocessor-based EMIC hardware and software uses various inputs to control the gauges and indicators visible on the face of the cluster. Some of these inputs are hard wired, but most are in the form of electronic messages that are transmitted by other electronic modules over the Controller Area Network (CAN) data bus. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - OPERATION).

The EMIC microprocessor smooths the input data using algorithms to provide gauge readings that are accurate, stable and responsive to operating conditions. These algorithms are designed to provide gauge readings during normal operation that are consistent with customer expectations. However, when abnormal conditions exist such as high coolant temperature, the algorithm can drive the gauge pointer to an extreme position and the microprocessor can sound a chime through the on-board audible tone transducer to provide distinct visual and audible indications of a problem to the vehicle operator. The EMIC may also produce audible warnings for other electronic modules in the vehicle based upon electronic tone request messages received over the CAN data bus. Each audible warning is intended to provide the vehicle operator with an audible alert to supplement a visual indication.

The EMIC circuitry operates on battery current received through a fused B(+) fuse on a non-switched fused B(+) circuit, and on battery current received through a fused ignition switch output (run-start) fuse on a fused ignition switch output (run-start) circuit. This arrangement allows the EMIC to provide some features regardless of the ignition switch position, while other features will operate only with the ignition switch in the On or Start positions. The EMIC circuitry is grounded through a ground circuit and take out of the instrument panel wire harness with an eyelet terminal connector that is secured by a ground screw to a ground location near the center of the instrument panel structural support.

GAUGES

All gauges receive battery current through the EMIC circuitry only when the ignition switch is in the On or Start positions. With the ignition switch in the Off position battery current is not supplied to any gauges, and the EMIC circuitry is programmed to move all of the gauge needles back to the low end of their respective scales. Therefore, the gauges do not accurately indicate any vehicle condition unless the ignition switch is in the On or Start positions.

All of the EMIC gauges are air core magnetic units. Two fixed electromagnetic coils are located within each gauge. These coils are wrapped at right angles to each other around a movable permanent magnet. The movable magnet is suspended within the coils on one end of a pivot shaft, while the gauge needle is attached to the other end of the shaft. One of the coils has a fixed current flowing through it to maintain a constant magnetic field strength. Current flow through the second coil changes, which causes changes in its magnetic field strength. The current flowing through the second coil is changed by the EMIC circuitry in response to messages received over the CAN data bus. The gauge needle moves as the movable permanent magnet aligns itself to the changing magnetic fields created around it by the electromagnets.

Proper testing of the CAN data bus and the electronic data bus message inputs to the EMIC that control each gauge require the use of a diagnostic scan tool. Refer to the appropriate diagnostic information. Specific operation details for each gauge may be found elsewhere in this service information.

VACUUM-FLUORESCENT DISPLAYS

The Vacuum-Fluorescent Display (VFD) units are soldered to the EMIC electronic circuit board. With the ignition switch in the Off or Accessory positions, the odometer and EVIC VFD's are activated when the driver door is opened (Rental Car mode) and is deactivated when the driver door is closed. Otherwise, the display units are active when the ignition switch is in the On or Start positions, and inactive when the ignition switch is in the Off or Accessory positions.

The illumination intensity of the VFD units are controlled by the EMIC circuitry based upon an input from the headlamp switch and a dimming level input received from the panel dimmer switch. The EMIC synchronizes the illumination intensity of other VFD units with that of the units in the EMIC by sending electronic dimming level messages to other electronic modules in the vehicle over the CAN data bus.

Proper testing of the CAN data bus and the electronic data bus message inputs to the EMIC that control some of the VFD functions requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information. Specific operation details for the odometer, the trip odometer, the gear selector indicator and the various warning and reminder indicator functions of the VFD unit may be found elsewhere in this service information. The scan tool will cycle through all the VFD segments during the "CCN Actuator Test."

INDICATORS

Indicators are located in various positions within the EMIC and are all connected to the EMIC electronic circuit board. The door ajar indicator, gate ajar indicator, high beam indicator, and turn signal indicators operate based upon hard wired inputs to the EMIC. The brake indicator is controlled by CAN data bus messages from the Controller Antilock Brake (CAB) as well as by hard wired park brake switch inputs to the EMIC. The seat belt indicator is controlled by the EMIC programming, CAN data bus messages from the Occupant Restraint Controller (ORC), and a hard wired seat belt switch input to the EMIC. The Malfunction Indicator Lamp (MIL) is normally controlled by CAN data bus messages from the Powertrain Control Module (PCM); however, if the EMIC loses CAN data bus communication, the EMIC circuitry will automatically turn the MIL on until CAN data bus communication is restored. The EMIC uses CAN data bus messages from the Front Control Module (FCM), the PCM, the ORC, the CAB, and the Sentry Key REmote Entry Module (SKREEM) to control all of the remaining indicators.

The various EMIC indicators are controlled by different strategies; some receive fused ignition switch output from the EMIC circuitry and have a switched ground, while others are grounded through the EMIC circuitry and have a switched battery feed. However, all indicators are completely controlled by the EMIC microprocessor based upon various hard wired and electronic message inputs. The cruise, four low, four lock and tow/haul indicators and those located within the VFD unit are dimmable. All other indicators are illuminated at a fixed intensity, which is not affected by the selected illumination intensity of the electro-luminescent EMIC general illumination lamp. The illumination intensity of the dimmable indicators is synchronized with that of the EMIC general illumination lamp.

In addition, certain indicators in this instrument cluster are automatically configured or self-configured. This feature allows the configurable indicators to be enabled by the EMIC circuitry for compatibility with certain optional equipment. The EMIC defaults for the ABS indicator and airbag indicator are enabled, and these configuration settings must be programmatically disabled in the EMIC using a diagnostic scan tool for vehicles that do not have this equipment. The automatically configured or self-configured indicators remain latent in each EMIC at all times and will be active only when the EMIC receives the appropriate CAN message inputs for that optional system or equipment.

The hard wired indicator inputs may be diagnosed using conventional diagnostic methods. Proper testing of the CAN data bus and the electronic message inputs to the EMIC that control an indicator requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information. Specific details of the operation for each indicator may be found elsewhere in this service information. Each indicator may be individually checked using the scan tool to check its operation within the EMIC.

CLUSTER ILLUMINATION

The EMIC has a single electro-luminescent lamp that provides cluster back lighting whenever the exterior lighting is turned On. The illumination intensity of this lamp is adjusted when the interior lighting thumbwheel on the headlamp switch is rotated (down to dim, up to brighten) to one of six available minor detent positions. The EMIC monitors a resistor multiplexed input from the headlamp switch on a dimmer input circuit. In response to that input, the EMIC electronic circuitry converts a fused 12-volt input it receives on a hard wired panel lamps dimmer switch signal circuit into a 12-volt Pulse Width Modulated (PWM) output.

The EMIC uses this PWM output to control the illumination intensity of the electro-luminescent cluster illumination lamp and the VFD unit on the EMIC circuit board, then provides a synchronized PWM output on various hard wired fused panel lamps dimmer switch signal circuits to control and synchronize the illumination intensity of other incandescent illumination lamps in the vehicle. The EMIC also transmits electronic dimming level messages over the CAN data bus to other electronic modules in the vehicle to control and synchronize the illumination intensity of their VFD units to that of the EMIC VFD unit.

The hard wired headlamp switch and panel lamps dimmer inputs to and outputs from the EMIC may be diagnosed using conventional diagnostic methods. However, proper testing of the PWM processing of the EMIC and the electronic dimming level messages sent by the EMIC over the CAN data bus requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING

INSTRUMENT CLUSTER

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

If all of the instrument cluster gauges and indicators are inoperative, be certain to check the instrument cluster fused B(+) fuse and the instrument cluster fused B(+) and ground circuits for shorts or opens. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

CAUTION: Instrument clusters used in this model automatically configure themselves for compatibility with the features and optional equipment in the vehicle in which they are initially installed. The instrument cluster is programmed to do this by embedding the Vehicle Identification Number (VIN) and other information critical to proper cluster operation into electronic memory. This embedded information is learned through electronic messages received from other electronic modules in the vehicle over the Controller Area Network (CAN) data bus, and through certain hard wired inputs received when the cluster is connected to the vehicle electrically. Once configured, the instrument cluster memory may be irreparably damaged and certain irreversible configuration errors may occur if the cluster is connected electrically to another vehicle; or, if an electronic module from another vehicle is connected that provides data to the instrument cluster (including odometer values) that conflicts with that which was previously learned and stored. Therefore, the practice of exchanging (swapping) instrument clusters and other electronic modules in this vehicle with those removed from another vehicle must always be avoided. Failure to observe this caution may result in instrument cluster damage, which is not reimbursable under the terms of the product warranty. Service replacement instrument clusters are provided with the correct VIN, and the certified odometer and engine hours values embedded into cluster memory, but will otherwise be automatically configured for compatibility with the features and optional equipment in the vehicle in which they are initially installed.

NOTE: Certain indicators in this instrument cluster are automatically configured. This feature allows those indicators to be activated or deactivated for compatibility with certain optional equipment. If the problem being diagnosed involves improper illumination of the cruise indicator, the electronic throttle control indicator, the tow/haul indicator, the service four-wheel drive indicator, the four-wheel drive low indicator, the four-wheel drive lock indicator, the transmission overtemp indicator, the security indicator or the gear selector indicator, disconnect and isolate the battery negative cable. After about five minutes, reconnect the battery negative cable and turn the ignition switch to the On position. The instrument cluster should automatically relearn the equipment in the vehicle and properly configure the configurable indicators accordingly.

DIAGNOSTIC TROUBLE CODE (DTC) SELF TEST

To check the EMIC/CCN for DTC's, cycle the key in the ingnition three times (I.E. ON/OFF, ON/OFF, ON/OFF, ON). IF there are any active codes they will be displayed in the EVIC VFD at this time. If there are no active codes, the EVIC VFD will display "NO DTC's." The DTC's may be checked using the scan tool if preferred.

TELLTALE / INDICATOR / VACUUM FLUORESCENT DISPLAY (VFD) SEGMENT TEST

Using a scan tool, the instrument cluster can check all the telltales/indicators and vacuum fluorescent display (VFD) segments. While in this mode, the EMIC will illuminate all the telltales/indicators and all the VFD segments. The telltales can be checked individually as well.

GAUGE TEST

Using a scan tool, the instrument cluster can check all the gauges. While in this mode, the EMIC will sweep the gauge pointer from low to high, stopping at predetermined points. Each gauge must be checked individually by selecting the specific gauge from the scan tool menu.

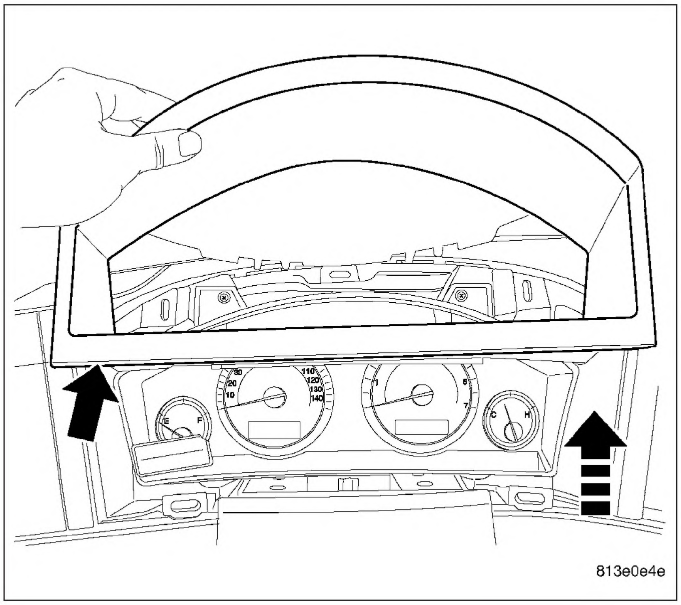
Successful completion of the cluster tests will confirm that the instrument cluster is operational. However, there may still be a problem with the CAN data bus, the Powertrain Control Module (PCM), the Front Control Module (FCM), the Transmission Control Module (TCM), the Occupant Restraint Controller (ORC), the Controller Anti-lock Brake (CAB), or the hard wired inputs to one of these electronic control modules. Use a diagnostic scan tool to diagnose these components. Refer to the appropriate diagnostic information.

REMOVAL

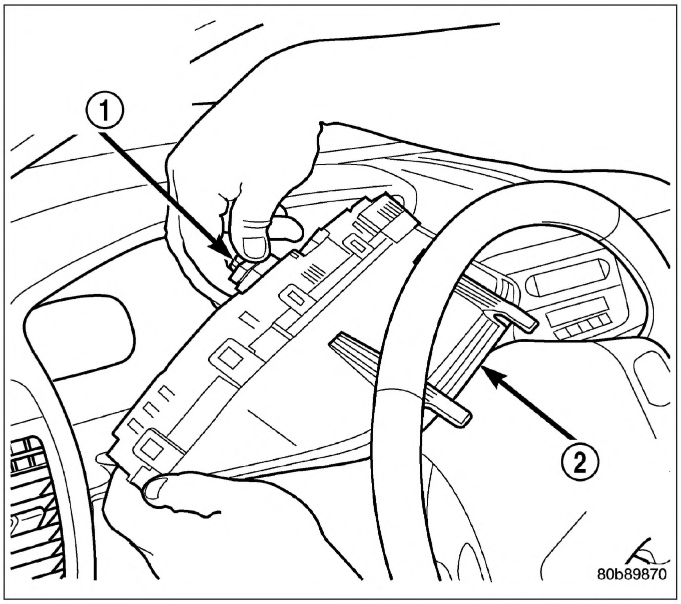
WARNING: On vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, driver airbag, passenger airbag, seat belt tensioner, side curtain airbag, front impact sensor, side impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

WARNING: On vehicles equipped with the premium instrument cluster, the cluster circuitry provides an alternating current to supply power to the electro-luminescent illumination lamp through a pigtail wire and connector that is accessible at the back of the cluster housing. Use proper precautions when handling this unit during diagnosis or service to avoid electrical shock and possible personal injury.

1. Disconnect and isolate the battery negative cable.
2. Remove the cluster bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/ CLUSTER BEZEL - REMOVAL).



3. Remove the two screws that secure the upper mounting tabs of the instrument cluster.
4. Pull the instrument cluster rearward far enough to access the instrument panel wire harness connector for the instrument cluster.



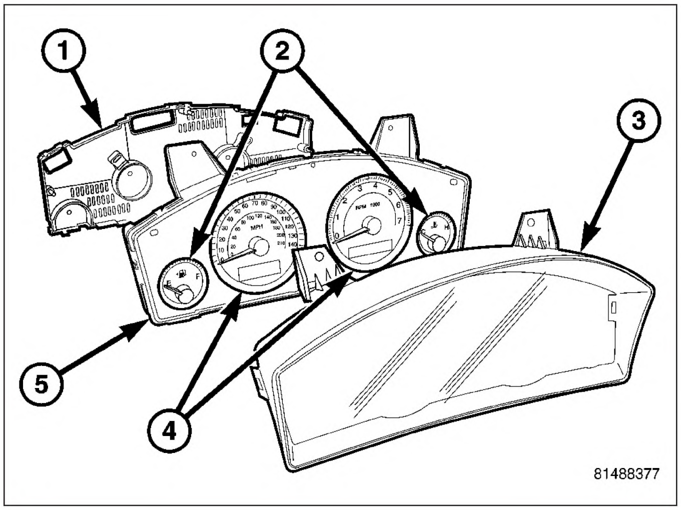
DISASSEMBLY

WARNING: On vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, driver airbag, passenger airbag, seat belt tensioner, side curtain airbag, front impact sensor, side impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

WARNING: On vehicles equipped with the premium instrument cluster, the cluster circuitry provides an alternating current to supply power to the electro-luminescent illumination lamp through a pigtail wire and connector that is accessible at the back of the cluster housing. Use proper precautions when handling this unit during diagnosis or service to avoid electrical shock and possible personal injury.

CLUSTER LENS, HOUSING, AND REAR COVER

1. Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).
2. Work around the perimeter of the cluster housing to disengage each of the latches that secure the cluster lens (3) to the cluster housing (5).
3. Work around the perimeter of the cluster housing to disengage each of the latches that secure the rear cover (1) to the cluster housing (5).



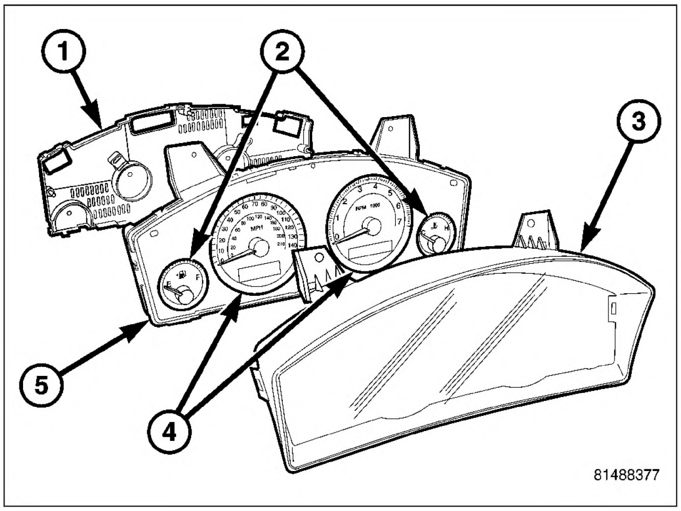
ASSEMBLY

WARNING: On vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, driver airbag, passenger airbag, seat belt tensioner, side curtain airbag, front impact sensor, side impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

WARNING: On vehicles equipped with the premium instrument cluster, the cluster circuitry provides an alternating current to supply power to the electro-luminescent illumination lamp through a pigtail wire and connector that is accessible at the back of the cluster housing. Use proper precautions when handling this unit during diagnosis or service to avoid electrical shock and possible personal injury.

CLUSTER LENS, HOUSING, AND REAR COVER

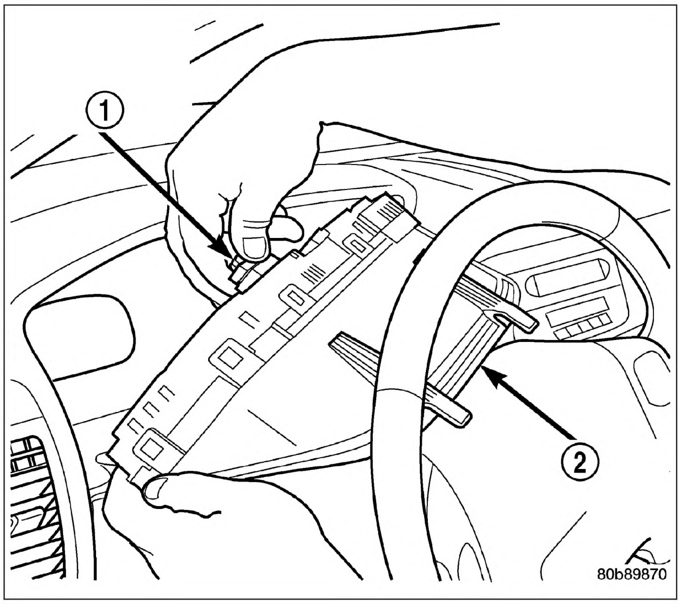
1. Position the cluster lens over the face of the instrument cluster.
2. Press firmly and evenly on the cluster lens to install it onto the cluster housing.
3. Position the cluster rear cover over the rear of the instrument cluster.
4. Press firmly and evenly on the cluster back cover to install it onto the cluster housing.
5. Reinstall the instrument cluster into the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).
6. Reconnect the battery negative cable.



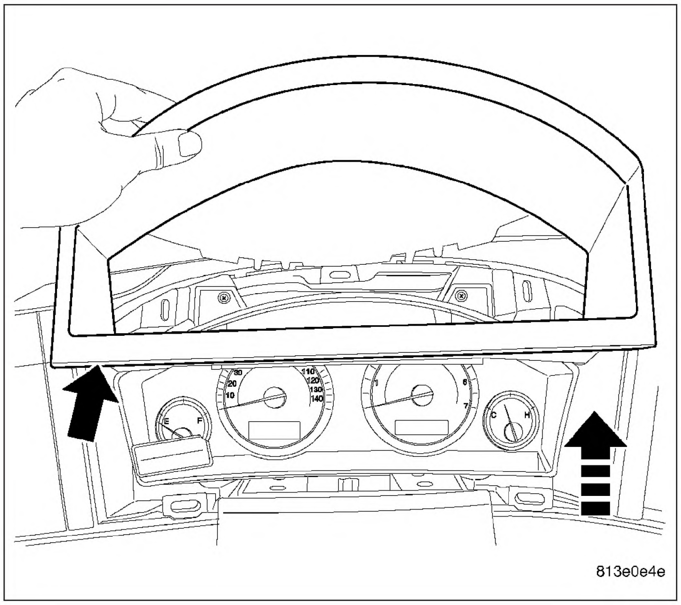
INSTALLATION

WARNING: On vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, driver airbag, passenger airbag, seat belt tensioner, side curtain airbag, front impact sensor, side impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

WARNING: On vehicles equipped with the premium instrument cluster, the cluster circuitry provides an alternating current to supply power to the electro-luminescent illumination lamp through a pigtail wire and connector that is accessible at the back of the cluster housing. Use proper precautions when handling this unit during diagnosis or service to avoid electrical shock and possible personal injury.



1. Position the instrument cluster to the instrument panel.
2. Reconnect the instrument panel wire harness connector for the instrument cluster to the connector receptacle on the back of the instrument cluster housing.
3. Position the instrument cluster in the instrument panel opening, then tilt the top of the instrument cluster forward until the upper mounting tabs are positioned to the mounting holes.
4. Install and tighten the two screws that secure the upper mounting tabs of the instrument cluster. Tighten the screws to 2.2 N·m (20 in. lbs.).



5. Reinstall the cluster bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/ CLUSTER BEZEL - INSTALLATION).
6. Reconnect the battery negative cable.

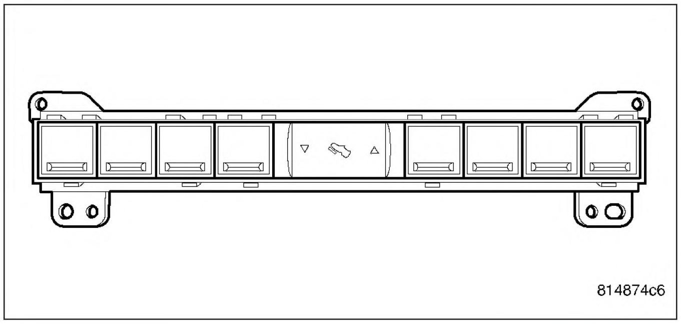
SWITCH-BANK-LOWER

DESCRIPTION

The Lower Instrument Panel Switch Pod on this model is available in six different configurations. They vary from a single switch configuration to a six switch configuration. The lower switch pod is located just below the HVAC control unit in the instrument panel center stack, Refer to each individual area of the service/diagnostic information for Description, Operation, Diagnosis, and Testing of the effected switch (I.E. Adjustable Pedals Switch - Brakes).

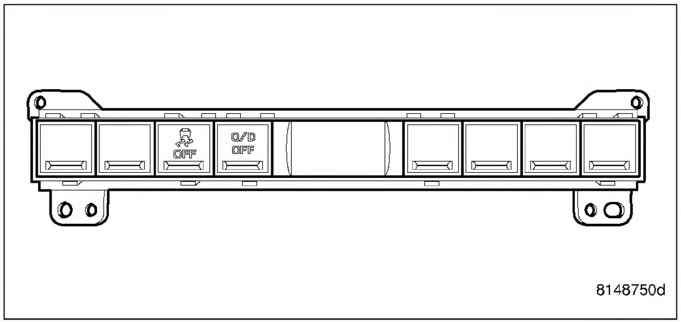
The one button switch configuration will include:

- **Adjustable Pedals Switch** - (Refer to 5 - BRAKES/ELECTRICAL/ADJUSTABLE PEDAL SWITCH - DESCRIPTION).



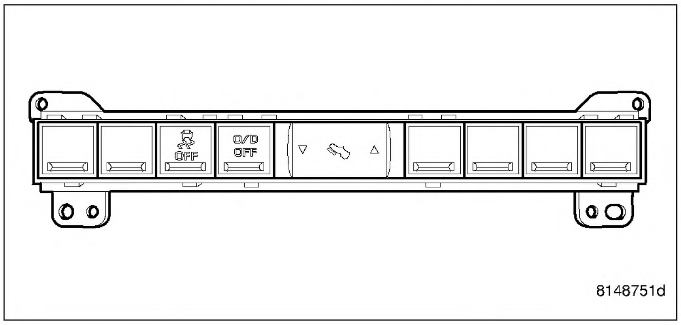
The two button switch configuration will include:

- **Adjustable Pedals Switch** - (Refer to 5 - BRAKES/ELECTRICAL/ADJUSTABLE PEDAL SWITCH - DESCRIPTION).
- **Traction Control OFF Switch**



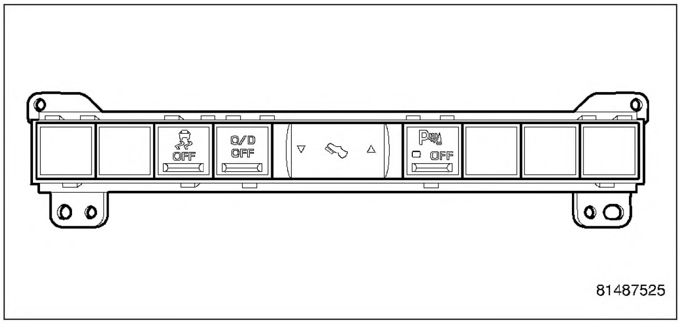
The three button switch configuration will include:

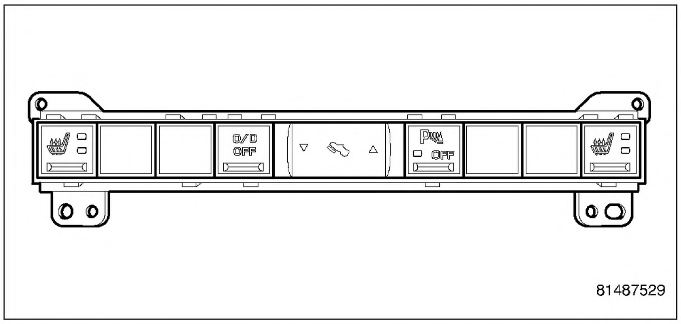
- **Adjustable Pedals Switch** - (Refer to 5 - BRAKES/ELECTRICAL/ADJUSTABLE PEDAL SWITCH - DESCRIPTION).
- **Traction Control OFF Switch**
- **Tow/Haul - Overdrive OFF Switch** - (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE/OVERDRIVE SWITCH - DESCRIPTION).



The four button switch configuration will include:

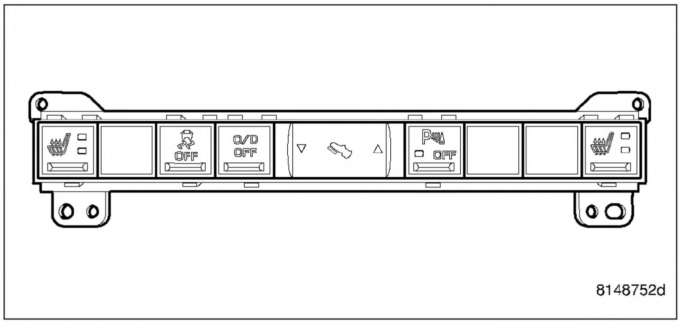
- **Adjustable Pedals Switch** - (Refer to 5 - BRAKES/ELECTRICAL/ADJUSTABLE PEDAL SWITCH - DESCRIPTION).
- **Traction Control OFF Switch**
- **Tow/Haul - Overdrive OFF Switch** - (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE/OVERDRIVE SWITCH - DESCRIPTION).
- **Park Assist OFF Switch** - (Refer to 8 - ELECTRICAL/CHIME/BUZZER - DESCRIPTION).





The four button switch configuration will include:

- **Adjustable Pedals Switch** - (Refer to 5 - BRAKES/ELECTRICAL/ADJUSTABLE PEDAL SWITCH - DESCRIPTION).
- **Tow/Haul - Overdrive OFF Switch** - (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE/OVERDRIVE SWITCH - DESCRIPTION).
- **Park Assist OFF Switch** - (Refer to 8 - ELECTRICAL/CHIME/BUZZER - DESCRIPTION).
- **Heated Seat ON/OFF Switches** - (Refer to 8 - ELECTRICAL/HEATED SEATS/SEAT SWITCH - DESCRIPTION).

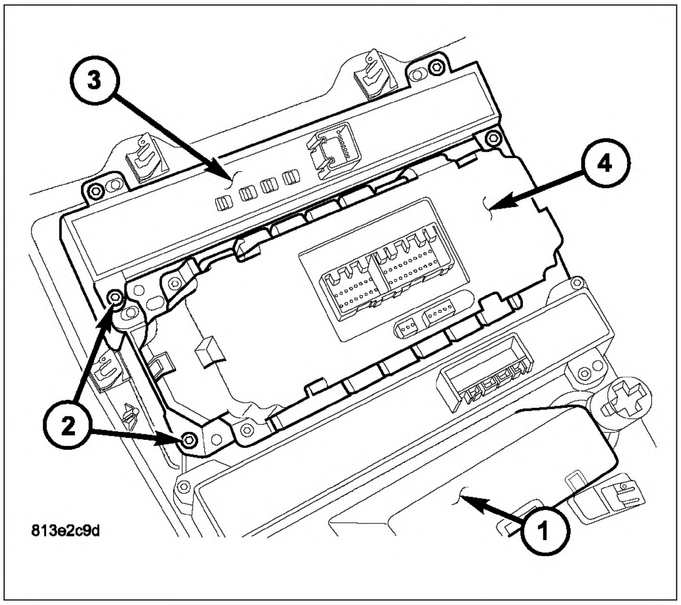


The four button switch configuration will include:

- **Adjustable Pedals Switch** - (Refer to 5 - BRAKES/ELECTRICAL/ADJUSTABLE PEDAL SWITCH - DESCRIPTION).
- **Traction Control OFF Switch**
- **Tow/Haul - Overdrive OFF Switch** - (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE/OVERDRIVE SWITCH - DESCRIPTION).
- **Park Assist OFF Switch** - (Refer to 8 - ELECTRICAL/CHIME/BUZZER - DESCRIPTION).
- **Heated Seat ON/OFF Switches (2)** - (Refer to 8 - ELECTRICAL/HEATED SEATS/SEAT SWITCH - DESCRIPTION).

REMOVAL

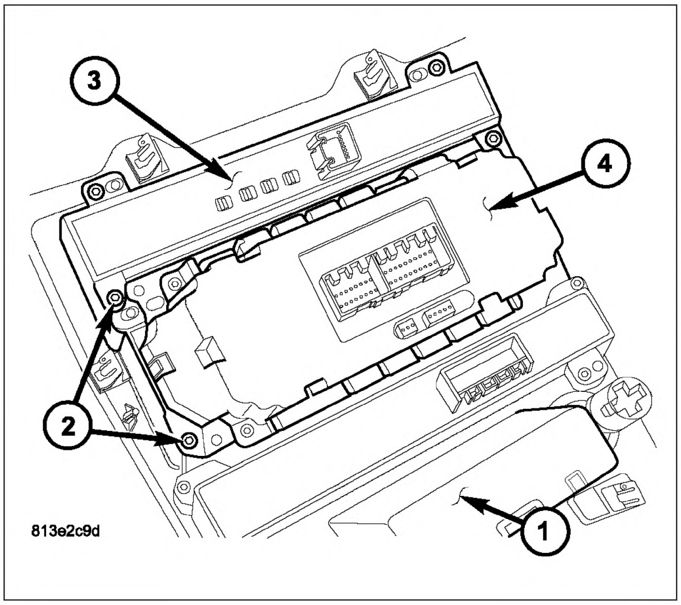
1. Disconnect and isolate the battery negative cable.
2. Remove the instrument panel center bezel (1) (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
3. Remove the four lower instrument panel switch pod fasteners front the center bezel (1).



INSTALLATION

NOTE: There are different instrument panel switch pods available based on the option content of the vehicle. Ensure the switch pod being installed matches the vehicle options.

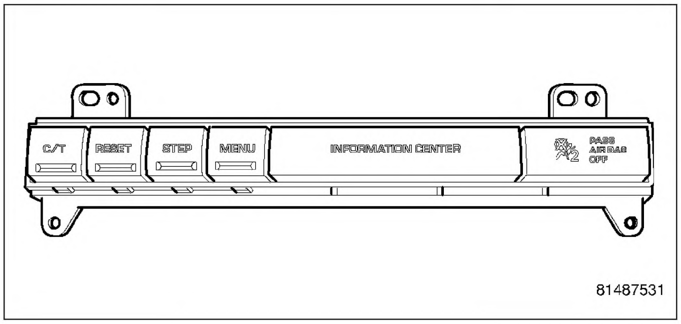
1. Position the lower instrument panel switch pod into the instrument panel center bezel (1).
2. Install the lower instrument panel switch pod fasteners.
3. Install the instrument panel center bezel (1) (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).
4. Connect the battery negative cable.



SWITCH-BANK-UPPER

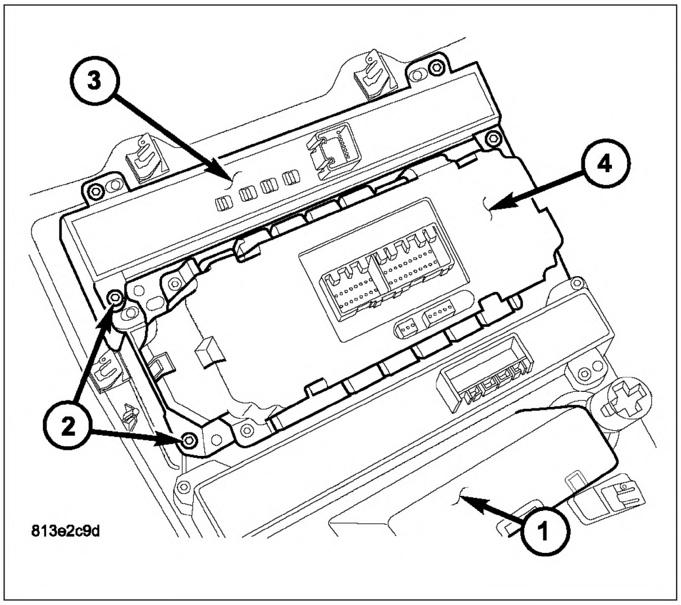
DESCRIPTION

The Upper Instrument Panel Switch Pod is located just above the HVAC control unit, in the instrument panel center stack. The upper switch pod contains the controls for the Electronic Vehicle Information Center (EVIC) (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - OPERATION), and the Passenger Airbag ON/OFF indicator (Refer to 8 - ELECTRICAL/RESTRAINTS/PASS AIRBAG ON/OFF INDICATOR - DESCRIPTION).



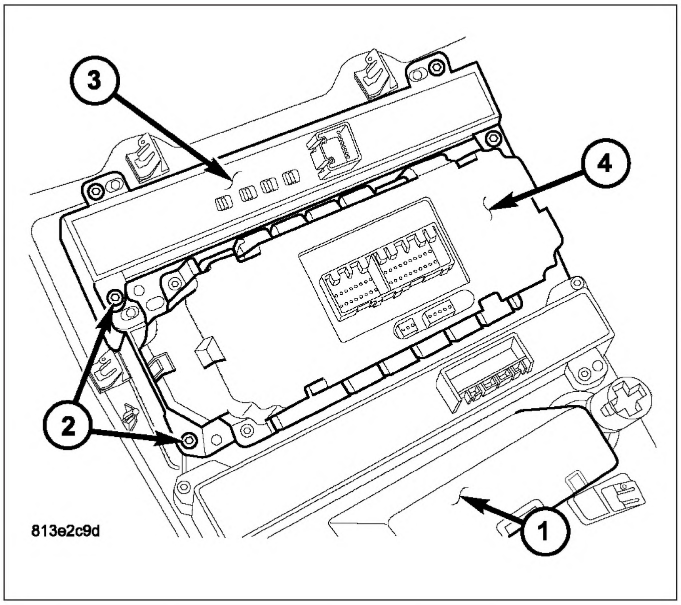
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the instrument panel center bezel (1) (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
3. Remove the four upper instrument panel switch pod (3) fasteners front the center bezel (1).



INSTALLATION

1. Position the upper instrument panel switch pod (3) into the instrument panel center bezel (1).
2. Install the four upper instrument panel switch pod (3) fasteners.
3. Install the instrument panel center bezel (1) (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).
4. Connect the battery negative cable.



LAMPS

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LAMPS/LIGHTING - EXTERIOR - ELECTRICAL DIAGNOSTICS

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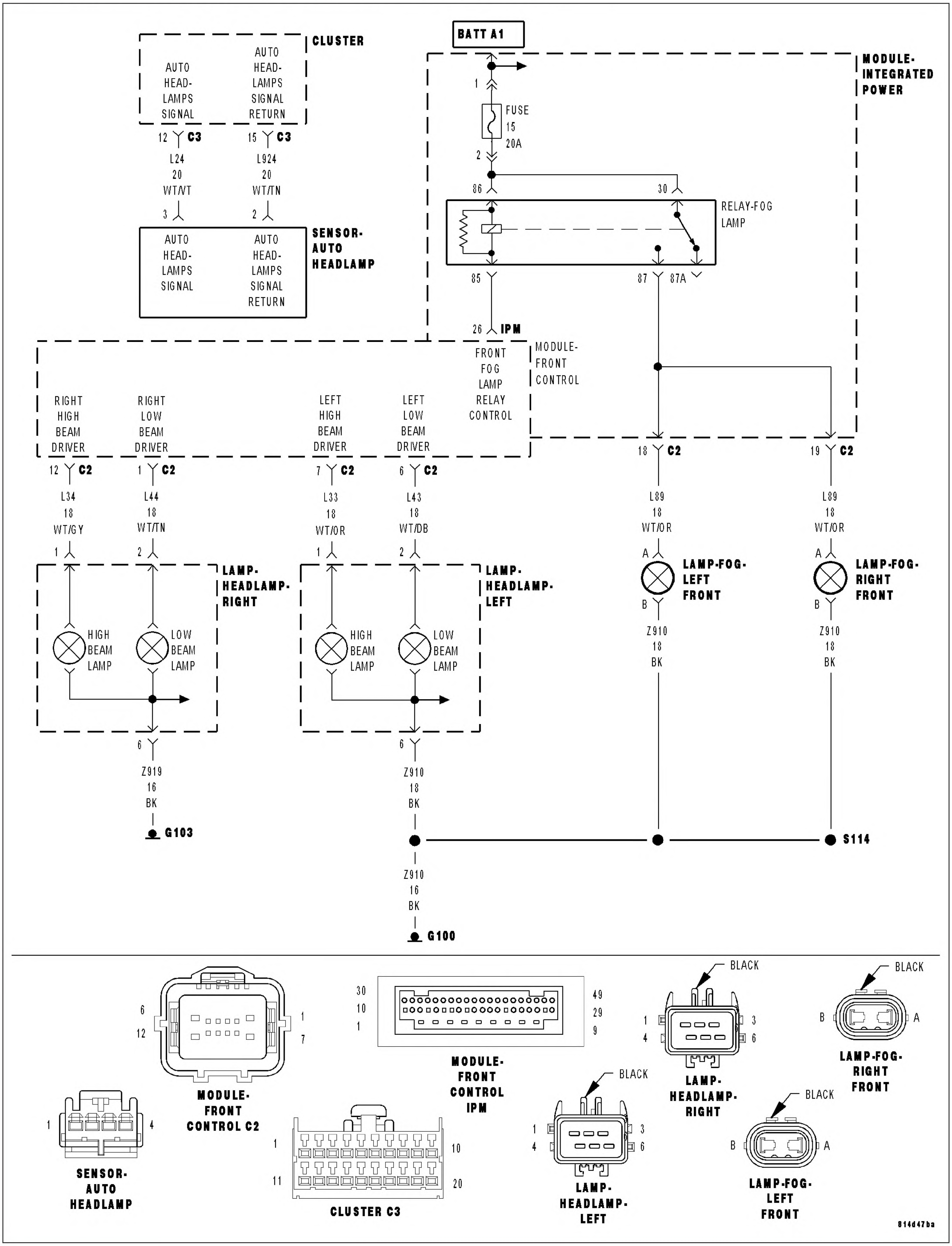
LAMPS/LIGHTING - EXTERIOR - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B162B-LEFT LOW BEAM CONTROL CIRCUIT LOW


CLUSTER
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
12 C3
15 C3
L24 20 WT/VT
L924 20 WT/TN
3
2
SENSOR-AUTO HEADLAMP
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 15 20A
2
86
30
RELAY-FOG LAMP
85
87
87A
26 IPM
MODULE-FRONT CONTROL
FRONT FOG LAMP RELAY CONTROL
RIGHT HIGH BEAM DRIVER
RIGHT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
LEFT LOW BEAM DRIVER
12 C2
1 C2
7 C2
6 C2
18 C2
19 C2
L34 18 WT/GY
L44 18 WT/TN
L33 18 WT/OR
L43 18 WT/DB
L89 18 WT/OR
L89 18 WT/OR
1
2
1
2
A
A
LAMP-HEADLAMP-RIGHT
LAMP-HEADLAMP-LEFT
HIGH BEAM LAMP
LOW BEAM LAMP
HIGH BEAM LAMP
LOW BEAM LAMP
LAMP-FOG-LEFT FRONT
LAMP-FOG-RIGHT FRONT
B
B
Z910 18 BK
Z910 18 BK
6
6
Z919 16 BK
Z910 18 BK
G103
S114
Z910 16 BK
G100
6
12
1
7
MODULE-FRONT CONTROL C2
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
BLACK
B
A
LAMP-FOG-RIGHT FRONT
1
4
SENSOR-AUTO HEADLAMP
1
11
10
20
CLUSTER C3
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
B
A
LAMP-FOG-LEFT FRONT
814d47ba

B162B-LEFT LOW BEAM CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Headlamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L43) LEFT LOW BEAM CONTROL CIRCUIT SHORT TO GROUND
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Headlamps on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B162B-LEFT LOW BEAM CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. (L43) LEFT LOW BEAM CONTROL CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Disconnect the Left Headlamp harness connector.

Measure the resistance between ground and the (L43) Left Low Beam Control circuit.

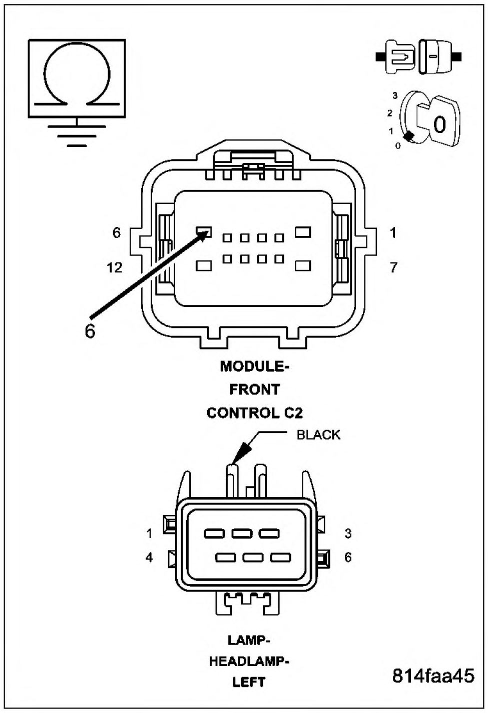
Is the resistance below 5.0 ohms?

Yes >> Repair the (L43) Left Low Beam Control circuit for a short to ground condition.

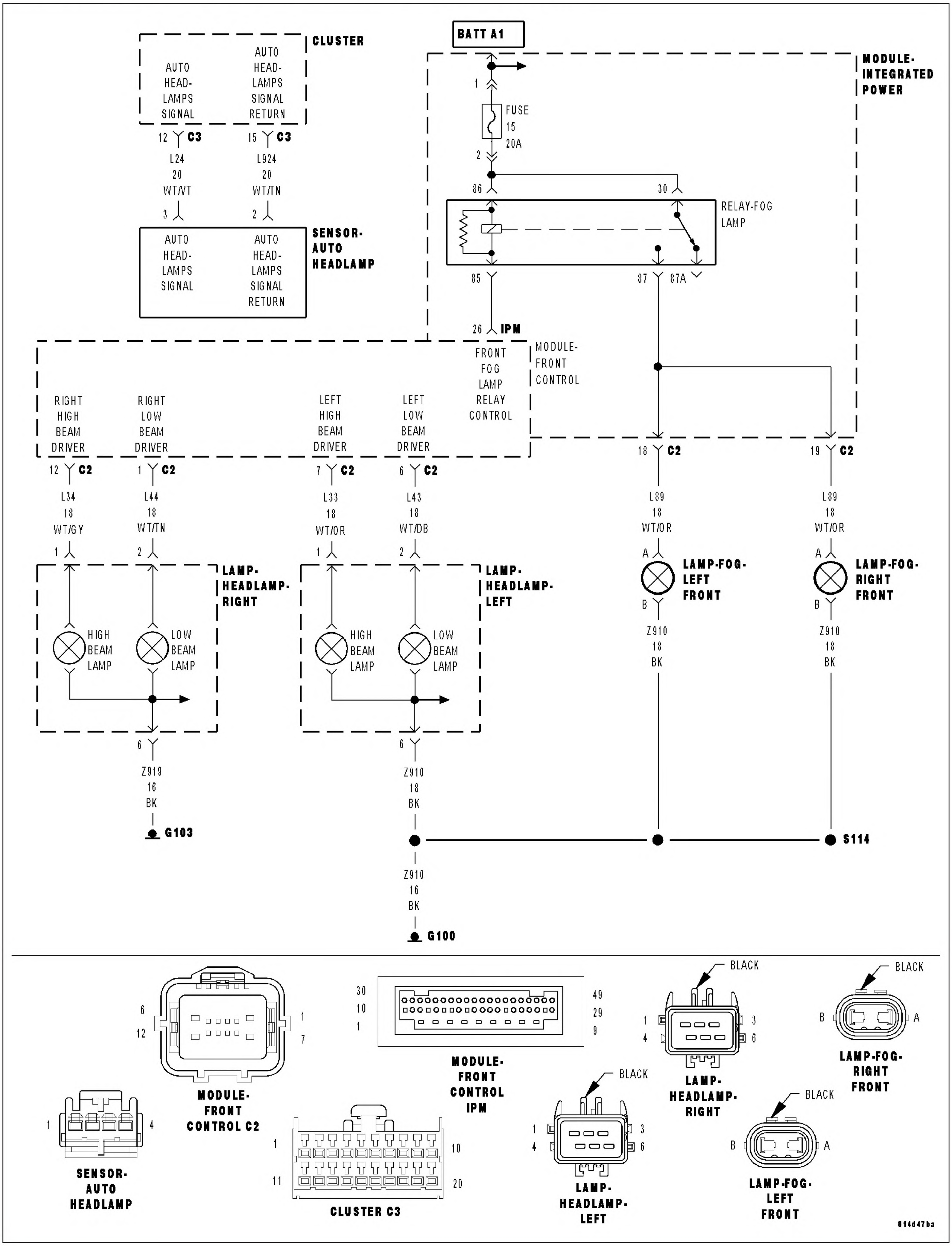
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module (FCM) in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B162F-RIGHT LOW BEAM CONTROL CIRCUIT LOW


CLUSTER
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
12 C3
15 C3
L24 20 WT/VT
L924 20 WT/TN
3
2
SENSOR-AUTO HEADLAMP
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 15 20A
2
86
30
RELAY-FOG LAMP
85
87
87A
26 IPM
MODULE-FRONT CONTROL
FRONT FOG LAMP RELAY CONTROL
RIGHT HIGH BEAM DRIVER
RIGHT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
LEFT LOW BEAM DRIVER
12 C2
1 C2
7 C2
6 C2
18 C2
19 C2
L34 18 WT/GY
L44 18 WT/TN
L33 18 WT/OR
L43 18 WT/DB
L89 18 WT/OR
L89 18 WT/OR
1
2
1
2
A
A
LAMP-HEADLAMP-RIGHT
LAMP-HEADLAMP-LEFT
LAMP-FOG-LEFT FRONT
LAMP-FOG-RIGHT FRONT
HIGH BEAM LAMP
LOW BEAM LAMP
HIGH BEAM LAMP
LOW BEAM LAMP
B
B
Z910 18 BK
Z910 18 BK
6
6
Z919 16 BK
Z910 18 BK
G103
S114
Z910 16 BK
G100
6
12
1
7
MODULE-FRONT CONTROL C2
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
BLACK
B
A
LAMP-FOG-RIGHT FRONT
1
4
SENSOR-AUTO HEADLAMP
1
11
10
20
CLUSTER C3
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
B
A
LAMP-FOG-LEFT FRONT
814d47ba

B162F-RIGHT LOW BEAM CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Headlamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L44) RIGHT LOW BEAM CONTROL CIRCUIT
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Headlamps on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B162F-RIGHT LOW BEAM CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. (L44) RIGHT LOW BEAM CONTROL CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Disconnect the Right Headlamp harness connector.

Measure the resistance between ground and the (L44) Right Low Beam Control circuit.

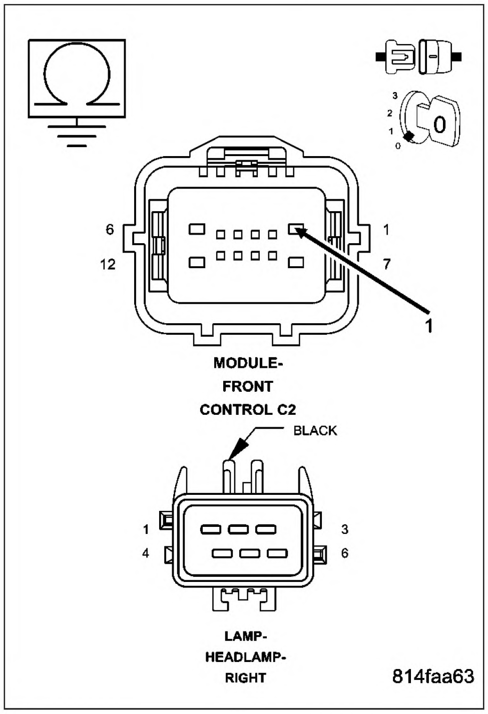
Is the resistance below 5.0 ohms?

Yes >> Repair the (L44) Right Low Beam Control circuit for a short to ground condition.

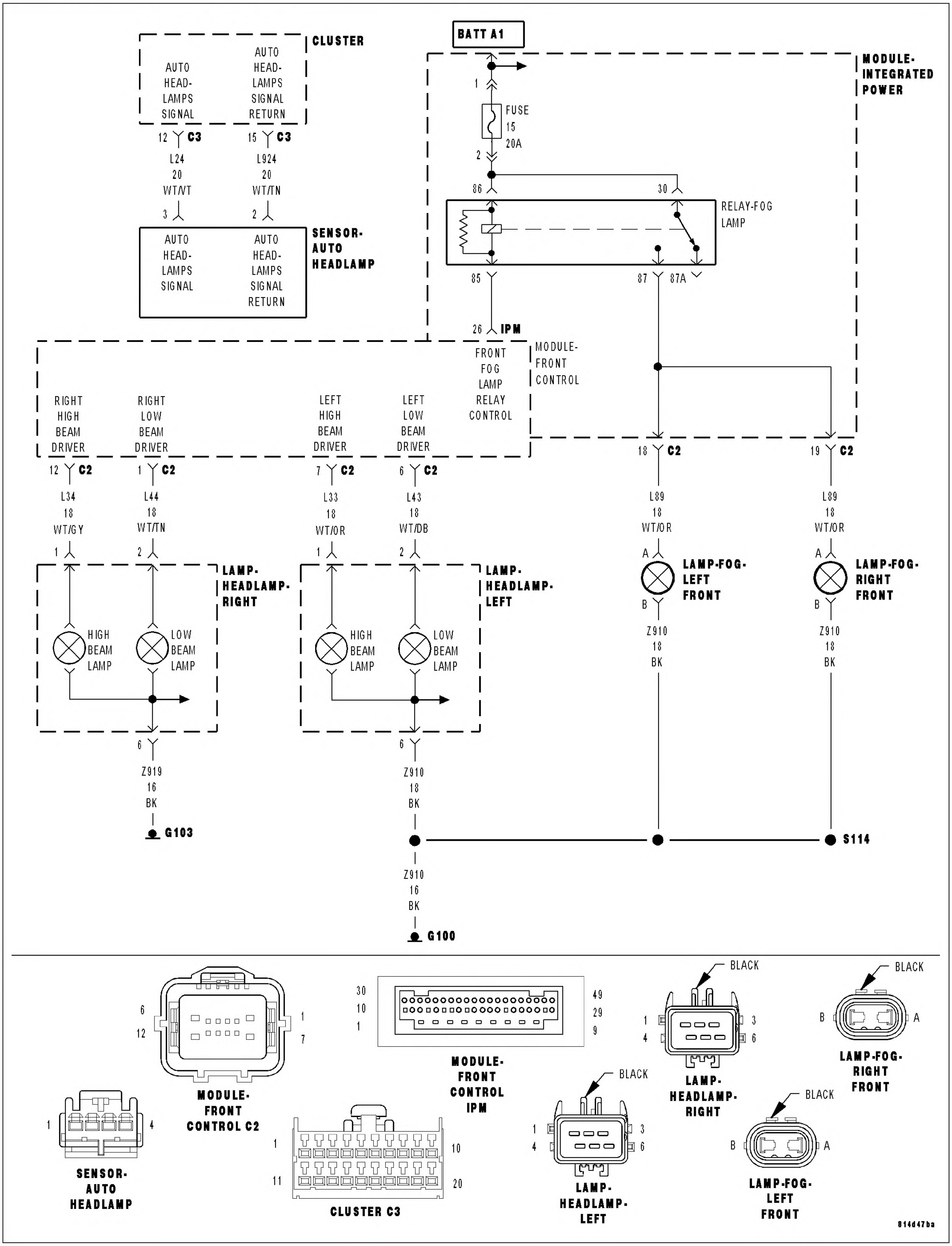
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module (FCM) in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B1630-RIGHT LOW BEAM CONTROL CIRCUIT HIGH


CLUSTER
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
12 C3
15 C3
L24 20 WT/VT
L924 20 WT/TN
3
2
SENSOR-AUTO HEADLAMP
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 15 20A
2
86
30
RELAY-FOG LAMP
85
87
87A
26 IPM
MODULE-FRONT CONTROL
FRONT FOG LAMP RELAY CONTROL
RIGHT HIGH BEAM DRIVER
RIGHT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
LEFT LOW BEAM DRIVER
12 C2
1 C2
7 C2
6 C2
18 C2
19 C2
L34 18 WT/GY
L44 18 WT/TN
L33 18 WT/OR
L43 18 WT/DB
L89 18 WT/OR
L89 18 WT/OR
1
2
1
2
A
A
LAMP-HEADLAMP-RIGHT
LAMP-HEADLAMP-LEFT
LAMP-FOG-LEFT FRONT
LAMP-FOG-RIGHT FRONT
HIGH BEAM LAMP
LOW BEAM LAMP
HIGH BEAM LAMP
LOW BEAM LAMP
B
B
Z910 18 BK
Z910 18 BK
6
6
Z919 16 BK
G103
Z910 18 BK
S114
Z910 16 BK
G100
6
12
1
7
MODULE-FRONT CONTROL C2
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
BLACK
B
A
LAMP-FOG-RIGHT FRONT
1
4
SENSOR-AUTO HEADLAMP
1
11
10
20
CLUSTER C3
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
B
A
LAMP-FOG-LEFT FRONT
814d47ba

B1630-RIGHT LOW BEAM CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Headlamps activated.
- **Set Condition:**
- When the FCM detects a HIGH condition.

Possible Causes
(L44) RIGHT LOW BEAM CONTROL CIRCUIT SHORTED TO GROUND
RIGHT LOW BEAM BULB
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Headlamps on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B1630-RIGHT LOW BEAM CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. RIGHT LOW BEAM BULB

Turn the ignition off.

Inspect the Right Low Beam Bulb Assembly.

Is the inoperative bulb OK?

Yes >> Go To 3

No >> Replace the Inoperative bulb in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

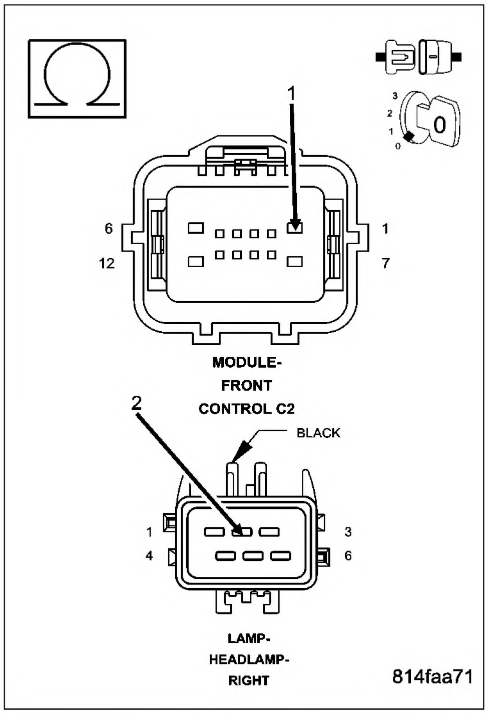
B1630-RIGHT LOW BEAM CONTROL CIRCUIT HIGH (CONTINUED)

3. (L44) RIGHT LOW BEAM CONTROL CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Measure the resistance of the (L44) Right Low Beam Control circuit.


Ω
1
3
2
1
0
0
6
12
1
7
MODULE-
FRONT
CONTROL C2
2
BLACK
1
4
3
6
LAMP-
HEADLAMP-
RIGHT
814faa71

Is the resistance above 5.0 ohms?

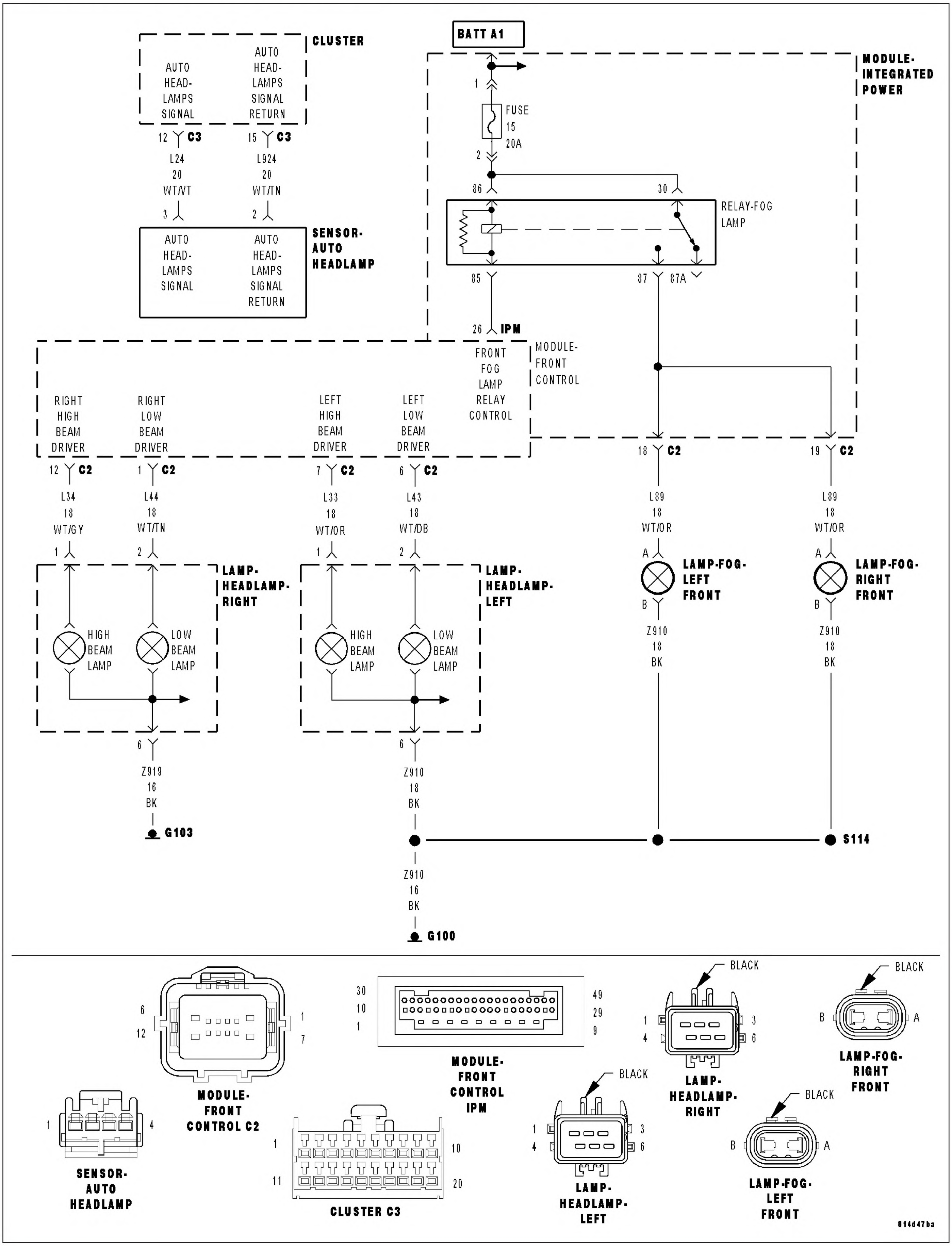
Yes >> Repair the (L44) Right Low Beam Control circuit for an open condition.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module (FCM) in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1633-LEFT HI BEAM CONTROL CIRCUIT LOW


CLUSTER
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
12 C3
15 C3
L24 20 WT/VT
L924 20 WT/TN
3
2
SENSOR-AUTO HEADLAMP
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 15 20A
2
86
30
RELAY-FOG LAMP
85
87
87A
26 IPM
MODULE-FRONT CONTROL
FRONT FOG LAMP RELAY CONTROL
RIGHT HIGH BEAM DRIVER
RIGHT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
LEFT LOW BEAM DRIVER
12 C2
1 C2
7 C2
6 C2
18 C2
19 C2
L34 18 WT/GY
L44 18 WT/TN
L33 18 WT/OR
L43 18 WT/DB
L89 18 WT/OR
L89 18 WT/OR
1
2
1
2
A
A
LAMP-HEADLAMP-RIGHT
LAMP-HEADLAMP-LEFT
HIGH BEAM LAMP
LOW BEAM LAMP
HIGH BEAM LAMP
LOW BEAM LAMP
LAMP-FOG-LEFT FRONT
LAMP-FOG-RIGHT FRONT
B
B
Z910 18 BK
Z910 18 BK
6
6
Z919 16 BK
G103
Z910 18 BK
S114
Z910 16 BK
G100
6
12
1
7
MODULE-FRONT CONTROL C2
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
BLACK
B
A
LAMP-FOG-RIGHT FRONT
1
4
SENSOR-AUTO HEADLAMP
1
11
10
20
CLUSTER C3
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
B
A
LAMP-FOG-LEFT FRONT
814d47ba

B1633-LEFT HI BEAM CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Headlamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L33) LEFT HIGHBEAM OUTPUT CIRCUIT
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Highbeam Headlamps on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B1633-LEFT HI BEAM CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. (L33) LEFT HIGHBEAM OUTPUT CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Disconnect the Left Headlamp harness connector.

Measure the resistance between ground and the Left Highbeam Output circuit.

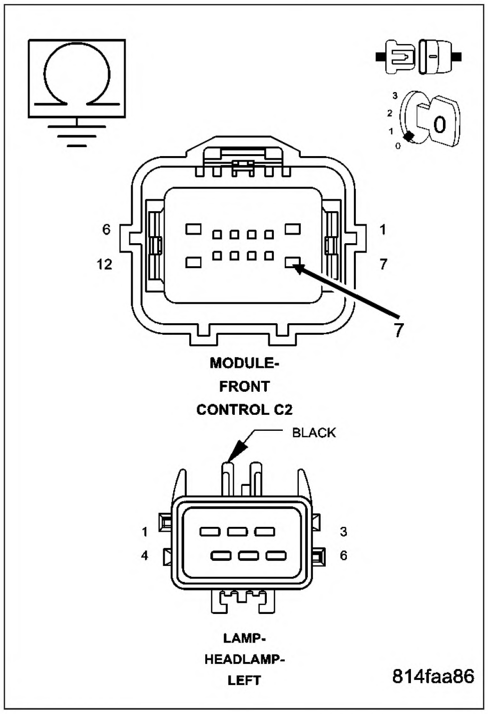
Is the resistance below 5.0 ohms?

Yes >> Repair the (L33) Left Highbeam Output circuit for a short to ground condition.

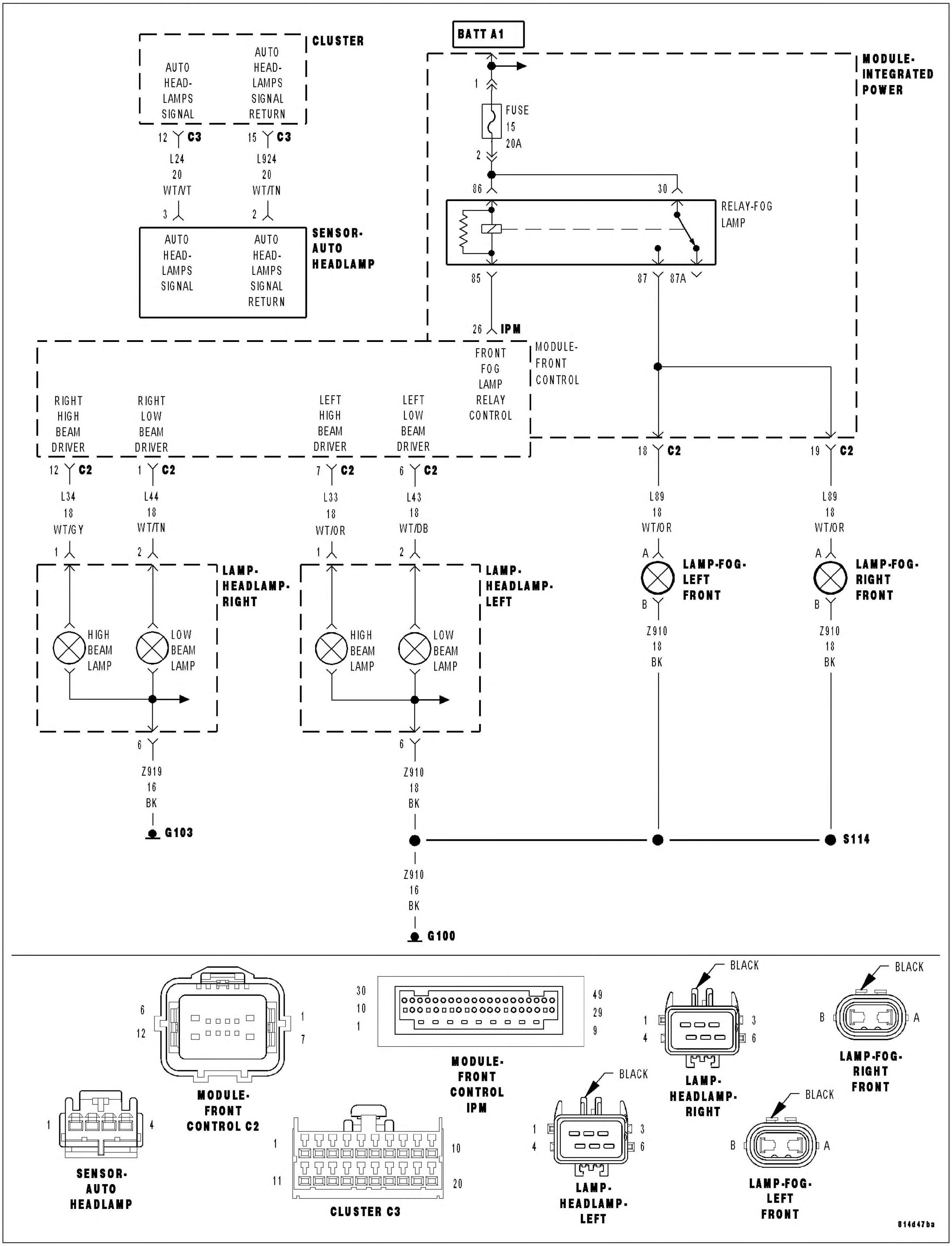
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module (FCM) in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B1634-LEFT HI BEAM CONTROL CIRCUIT HIGH


CLUSTER
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
12 C3
15 C3
L24 20 WT/VT
L924 20 WT/TN
3
2
SENSOR-AUTO HEADLAMP
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 15 20A
2
86
30
RELAY-FOG LAMP
85
87
87A
26 IPM
MODULE-FRONT CONTROL
FRONT FOG LAMP RELAY CONTROL
RIGHT HIGH BEAM DRIVER
RIGHT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
LEFT LOW BEAM DRIVER
12 C2
1 C2
7 C2
6 C2
18 C2
19 C2
L34 18 WT/GY
L44 18 WT/TN
L33 18 WT/OR
L43 18 WT/DB
L89 18 WT/OR
L89 18 WT/OR
1
2
1
2
A
A
LAMP-HEADLAMP-RIGHT
LAMP-HEADLAMP-LEFT
LAMP-FOG-LEFT FRONT
LAMP-FOG-RIGHT FRONT
HIGH BEAM LAMP
LOW BEAM LAMP
HIGH BEAM LAMP
LOW BEAM LAMP
B
B
Z910 18 BK
Z910 18 BK
6
6
Z919 16 BK
Z910 18 BK
G103
S114
Z910 16 BK
G100
6
12
1
7
MODULE-FRONT CONTROL C2
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
BLACK
B
A
LAMP-FOG-RIGHT FRONT
1
4
SENSOR-AUTO HEADLAMP
1
11
10
20
CLUSTER C3
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
B
A
LAMP-FOG-LEFT FRONT
814d47ba

B1634-LEFT HI BEAM CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Headlamps activated.
- **Set Condition:**
- When the FCM detects a HIGH condition.

Possible Causes
(L33) HIGH BEAM CONTROL CIRCUIT
LEFT HIGH BEAM BULB
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.
With the Scan Tool, clear all FCM DTC's.
Turn the Headlamps on.
With the Scan Tool read the DTC information.

Does the Scan Tool read: B1634-LEFT HI BEAM CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.
Perform the BODY VERIFICATION TEST - VER 1.

---

2. LEFT HIGH BEAM BULB

Turn the ignition off.
Inspect the Left High Beam Bulb Assembly.

Is the inoperative bulb OK?

Yes >> Go To 3

No >> Replace the Inoperative bulb in accordance with the service information.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

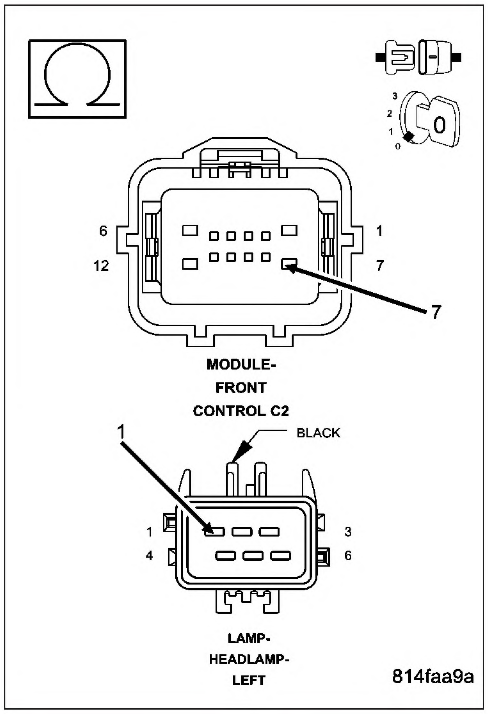
B1634-LEFT HI BEAM CONTROL CIRCUIT HIGH (CONTINUED)

3. (L33) HIGH BEAM CONTROL CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Measure the resistance of the (L33) High Beam Control circuit.


3
2
1
0
6
12
1
7
7
MODULE-
FRONT
CONTROL C2
1
BLACK
1
4
3
6
LAMP-
HEADLAMP-
LEFT
814faa9a

Is the resistance above 5.0 ohms?

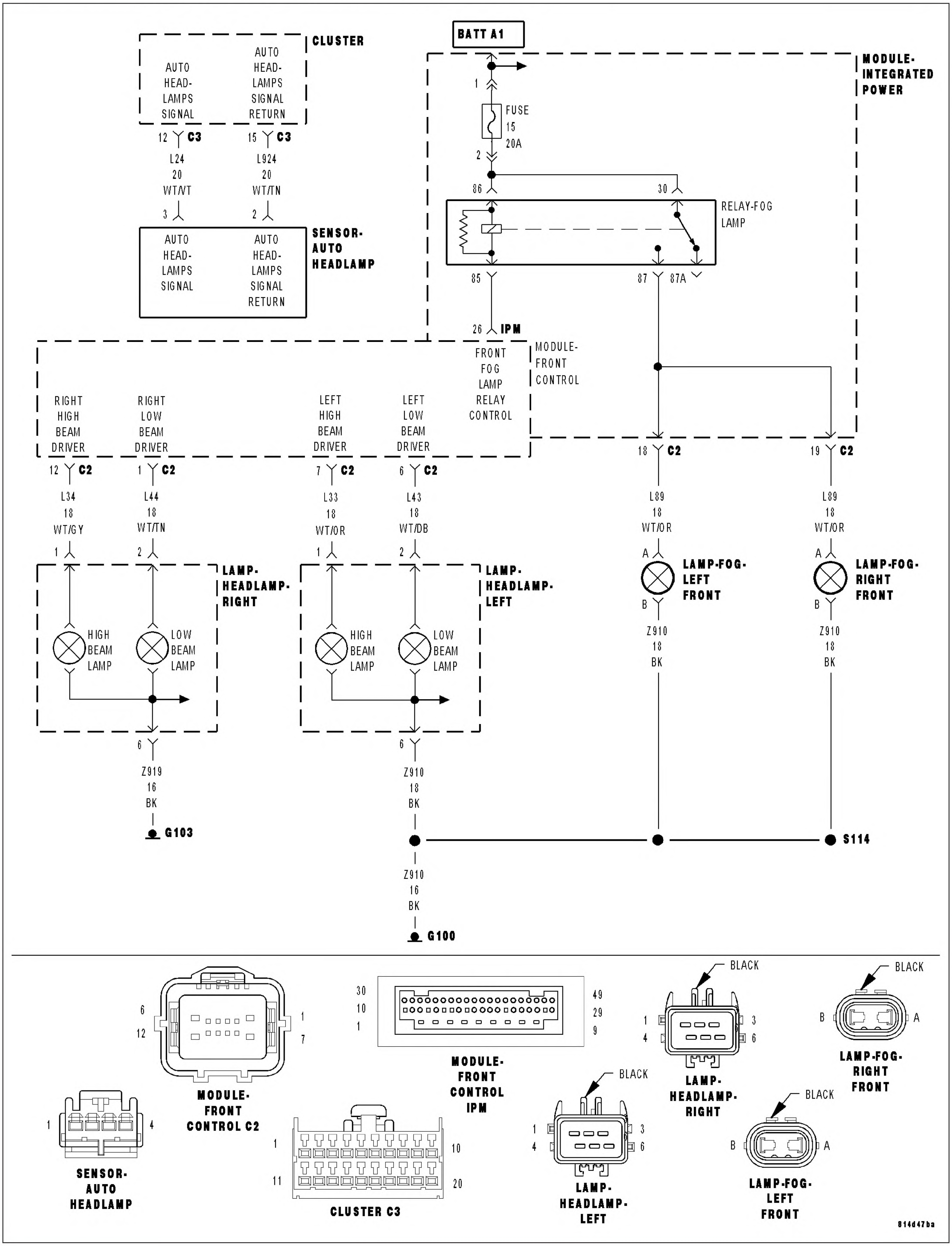
Yes >> Repair the (L33) High Beam Control circuit for an open condition.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module (FCM) in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1637-RIGHT HI BEAM CONTROL CIRCUIT LOW


CLUSTER
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
12 C3
15 C3
L24 20 WT/VT
L924 20 WT/TN
3
2
SENSOR-AUTO HEADLAMP
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 15 20A
2
86
30
RELAY-FOG LAMP
85
87
87A
26 IPM
MODULE-FRONT CONTROL
FRONT FOG LAMP RELAY CONTROL
RIGHT HIGH BEAM DRIVER
RIGHT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
LEFT LOW BEAM DRIVER
12 C2
1 C2
7 C2
6 C2
18 C2
19 C2
L34 18 WT/GY
L44 18 WT/TN
L33 18 WT/OR
L43 18 WT/DB
L89 18 WT/OR
L89 18 WT/OR
1
2
1
2
A
A
LAMP-HEADLAMP-RIGHT
LAMP-HEADLAMP-LEFT
HIGH BEAM LAMP
LOW BEAM LAMP
HIGH BEAM LAMP
LOW BEAM LAMP
LAMP-FOG-LEFT FRONT
LAMP-FOG-RIGHT FRONT
B
B
Z910 18 BK
Z910 18 BK
6
6
Z919 16 BK
Z910 18 BK
G103
S114
Z910 16 BK
G100
6
12
1
7
MODULE-FRONT CONTROL C2
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
BLACK
B
A
LAMP-FOG-RIGHT FRONT
1
4
SENSOR-AUTO HEADLAMP
1
11
10
20
CLUSTER C3
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
B
A
LAMP-FOG-LEFT FRONT
814d47ba

B1637-RIGHT HI BEAM CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Highbeam Headlamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L34) RIGHT HIGHBEAM OUTPUT CIRCUIT
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Highbeam Headlamps on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B1637-RIGHT HI BEAM CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. (L34) RIGHT HIGHBEAM OUTPUT CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Disconnect the Right Headlamp harness connector.

Measure the resistance between ground and the Right Highbeam Output circuit.

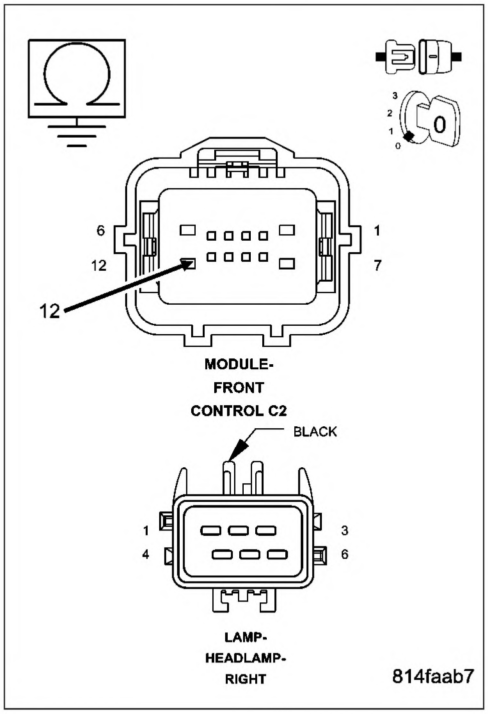
Is the resistance below 5.0 ohms?

Yes >> Repair the (L34) Right Highbeam Output circuit for a short to ground condition.

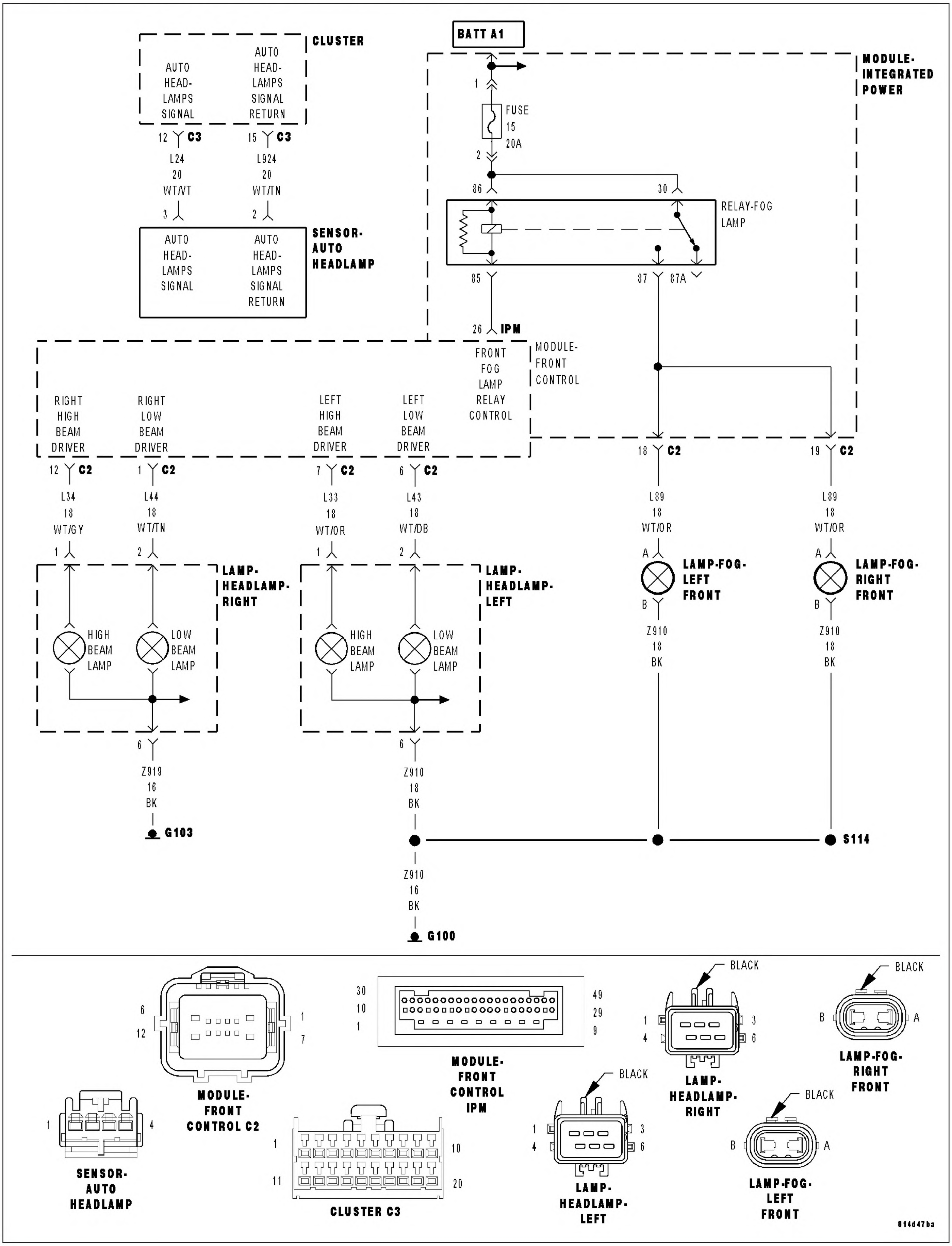
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module (FCM) in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B1638-RIGHT HI BEAM CONTROL CIRCUIT HIGH


CLUSTER
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
12 C3
15 C3
L24 20 WT/VT
L924 20 WT/TN
3
2
SENSOR-AUTO HEADLAMP
AUTO HEAD-LAMPS SIGNAL
AUTO HEAD-LAMPS SIGNAL RETURN
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 15 20A
2
86
30
RELAY-FOG LAMP
85
87
87A
26 IPM
MODULE-FRONT CONTROL
FRONT FOG LAMP RELAY CONTROL
RIGHT HIGH BEAM DRIVER
RIGHT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
LEFT LOW BEAM DRIVER
12 C2
1 C2
7 C2
6 C2
18 C2
19 C2
L34 18 WT/GY
L44 18 WT/TN
L33 18 WT/OR
L43 18 WT/DB
L89 18 WT/OR
L89 18 WT/OR
1
2
1
2
A
A
LAMP-HEADLAMP-RIGHT
LAMP-HEADLAMP-LEFT
LAMP-FOG-LEFT FRONT
LAMP-FOG-RIGHT FRONT
HIGH BEAM LAMP
LOW BEAM LAMP
HIGH BEAM LAMP
LOW BEAM LAMP
B
B
Z910 18 BK
Z910 18 BK
6
6
Z919 16 BK
Z910 18 BK
G103
S114
Z910 16 BK
G100
6
12
1
7
MODULE-FRONT CONTROL C2
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
BLACK
B
A
LAMP-FOG-RIGHT FRONT
1
4
SENSOR-AUTO HEADLAMP
1
11
10
20
CLUSTER C3
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
B
A
LAMP-FOG-LEFT FRONT
814d47ba

B1638-RIGHT HI BEAM CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Headlamps activated.
- **Set Condition:**
- When the FCM detects a HIGH condition.

Possible Causes
(L34) HIGH BEAM CONTROL CIRCUIT
RIGHT HIGH BEAM BULB
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Headlamps on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B1638-RIGHT HI BEAM CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. RIGHT LOW BEAM BULB

Turn the ignition off.

Inspect the Right High Beam Bulb Assembly.

Is the inoperative bulb OK?

Yes >> Go To 3

No >> Replace the Inoperative bulb in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

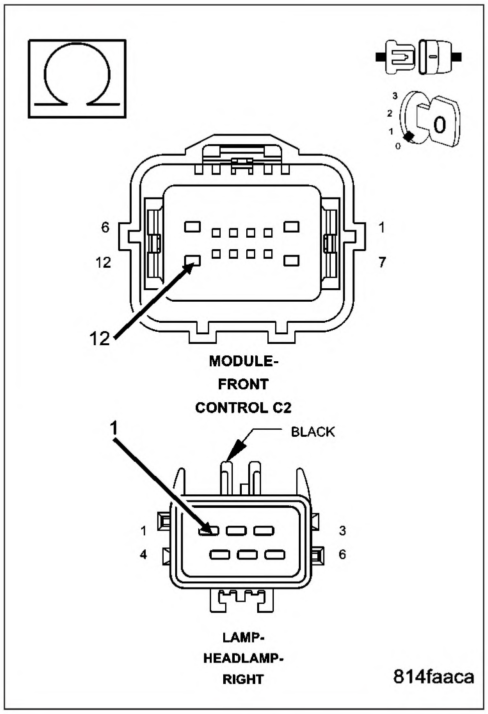
B1638-RIGHT HI BEAM CONTROL CIRCUIT HIGH (CONTINUED)

3. (L34) HIGH BEAM CONTROL CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Measure the resistance of the (L34) High Beam Control circuit.


3
2
1
0
0
6
12
1
7
12
MODULE-
FRONT
CONTROL C2
1
BLACK
1
4
3
6
LAMP-
HEADLAMP-
RIGHT
814faaca

Is the resistance above 5.0 ohms?

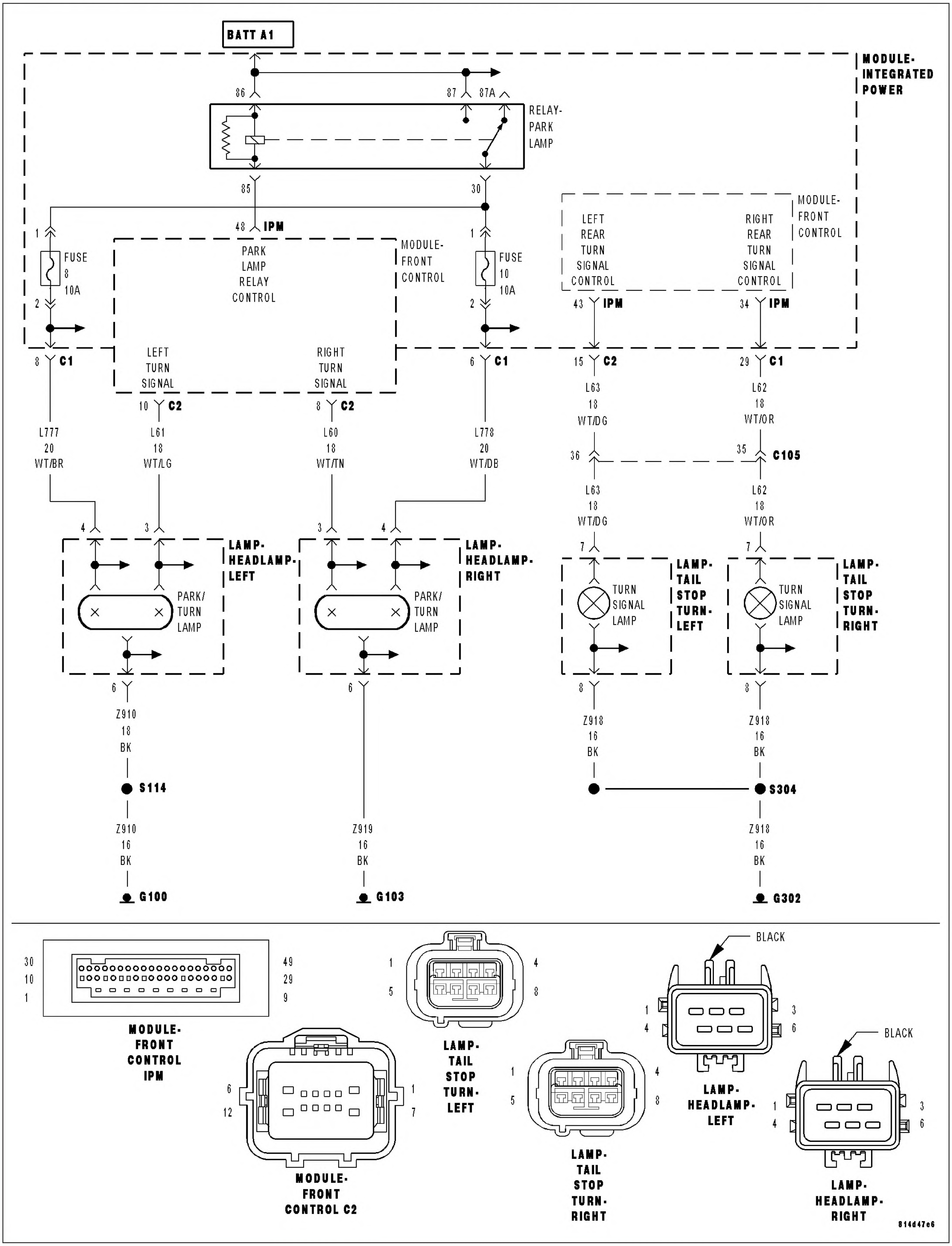
Yes >> Repair the (L34) High Beam Control circuit for a short to battery condition.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module (FCM) in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B163B-FRONT LEFT TURN CONTROL CIRCUIT LOW


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
PARK LAMP RELAY CONTROL
MODULE-FRONT CONTROL
1
FUSE 8 10A
2
FUSE 10 10A
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
MODULE-FRONT CONTROL
43 IPM
34 IPM
8 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
6 C1
15 C2
29 C1
10 C2
8 C2
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
L63 18 WT/DG
L62 18 WT/OR
36
35
C105
4
3
7
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/ TURN LAMP
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
6
8
Z910 18 BK
S114
Z910 16 BK
G100
Z919 16 BK
G103
Z918 16 BK
S304
Z918 16 BK
G302
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
6
12
1
7
MODULE-FRONT CONTROL C2
1
5
4
8
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
LAMP-HEADLAMP-RIGHT
814d47e6

B163B-FRONT LEFT TURN CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Headlamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L61) FRONT LEFT TURN SIGNAL CONTROL CIRCUIT
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Left Turn Signals on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B163B-FRONT LEFT TURN CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

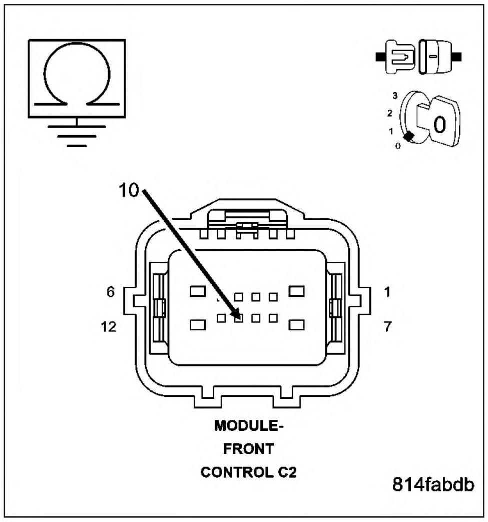
---

2. L61 FRONT LEFT TURN SIGNAL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 connector.

Measure the resistance between ground and the (L61) Front Left Turn Signal Control circuit.



Is the resistance below 5.0 ohms?

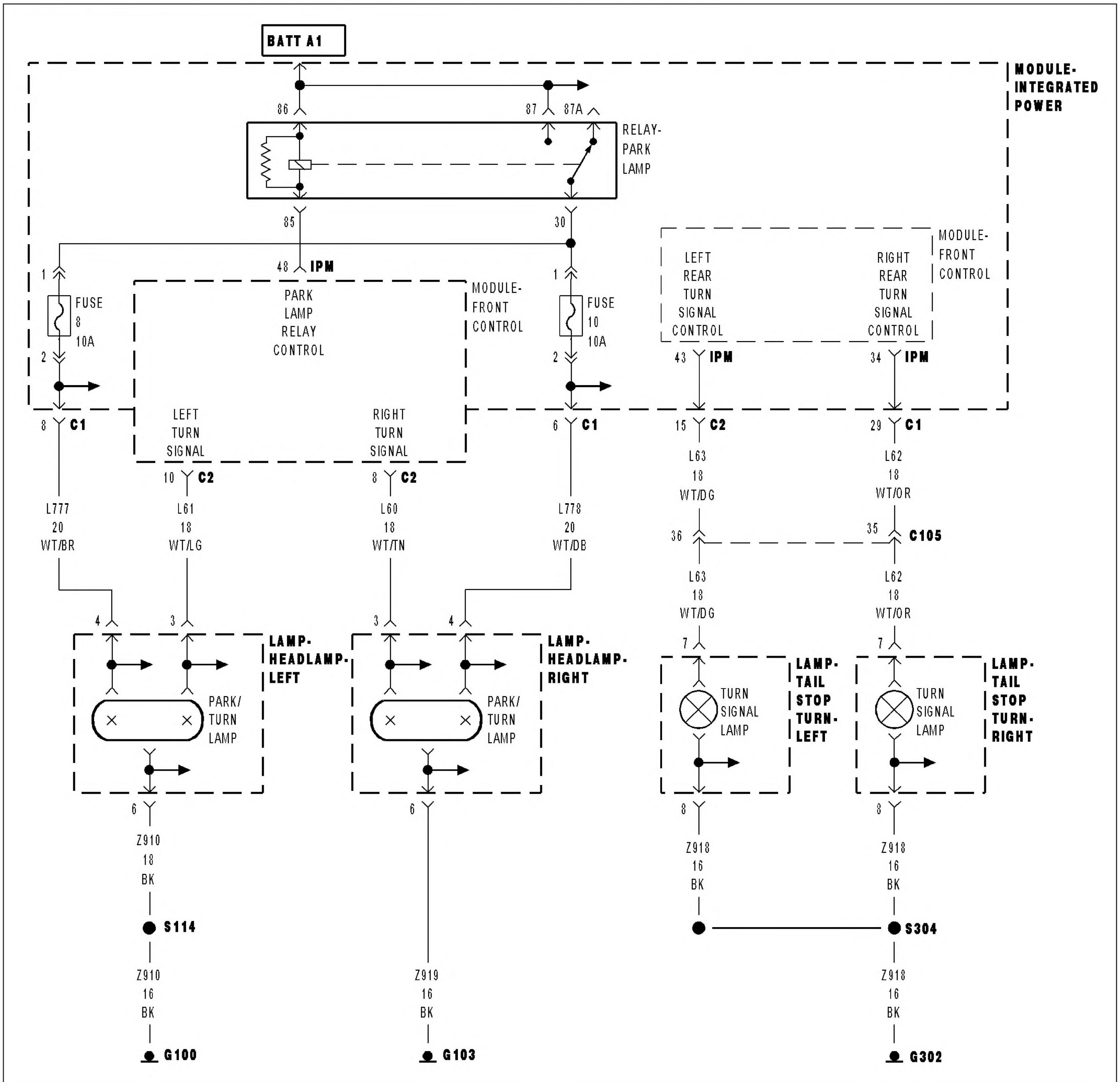
Yes >> Repair the (L61) Front Left Turn Signal Control circuit for a short to ground.

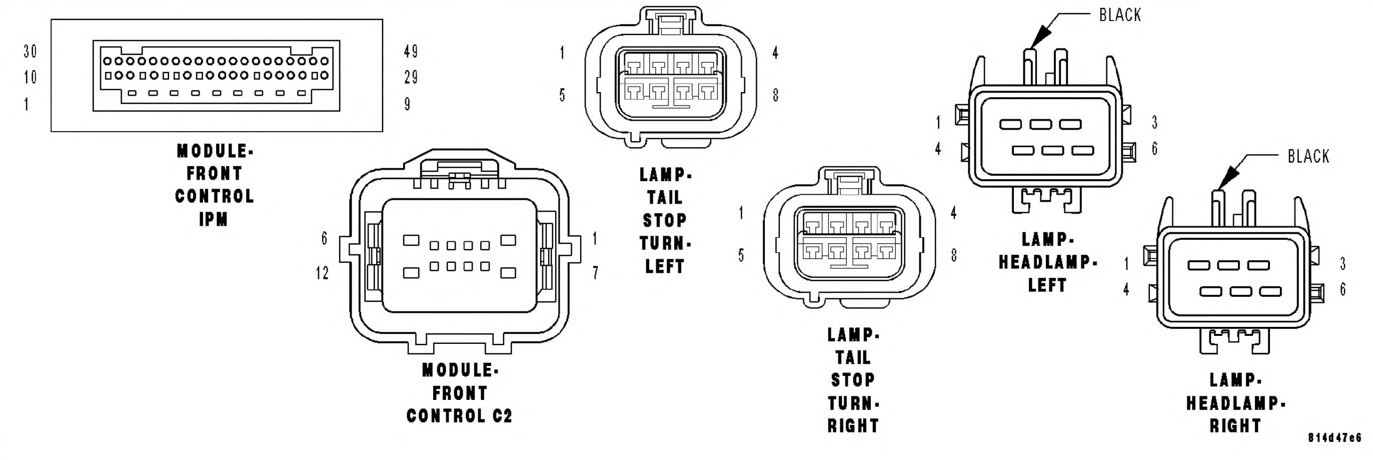
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B163C-FRONT LEFT TURN CONTROL CIRCUIT HIGH


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
PARK LAMP RELAY CONTROL
MODULE-FRONT CONTROL
1
FUSE 8 10A
2
1
FUSE 10 10A
2
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
MODULE-FRONT CONTROL
43 IPM
34 IPM
8 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
6 C1
15 C2
29 C1
10 C2
8 C2
L63 18 WT/DG
L62 18 WT/OR
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
36
35
C105
L63 18 WT/DG
L62 18 WT/OR
4
3
3
4
7
7
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/ TURN LAMP
PARK/ TURN LAMP
TURN SIGNAL LAMP
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
6
6
8
8
Z910 18 BK
Z918 16 BK
Z918 16 BK
S114
S304
Z910 16 BK
Z919 16 BK
Z918 16 BK
G100
G103
G302


30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
1
5
4
8
LAMP-TAIL STOP TURN-LEFT
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
6
12
1
7
MODULE-FRONT CONTROL C2
1
5
4
8
LAMP-TAIL STOP TURN-RIGHT
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
814d47e6

B163C-FRONT LEFT TURN CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Front Control Module detects a short to battery on the Control circuit.

Possible Causes
(L61) TURN SIGNAL CONTROL CIRCUIT
FRONT LEFT TURN SIGNAL BULB
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

Clear all FCM DTC's

Turn the Left Turn Signal on.

With the scan tool, read DTC's.

Does the scan tool read: B163C-FRONT LEFT TURN CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. FRONT LEFT TURN SIGNAL BULB

Turn the ignition off.

Inspect the Front Left Turn Signal Bulb Assembly.

Is the inoperative bulb OK?

Yes >> Go To 3

No >> Replace the Inoperative bulb in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

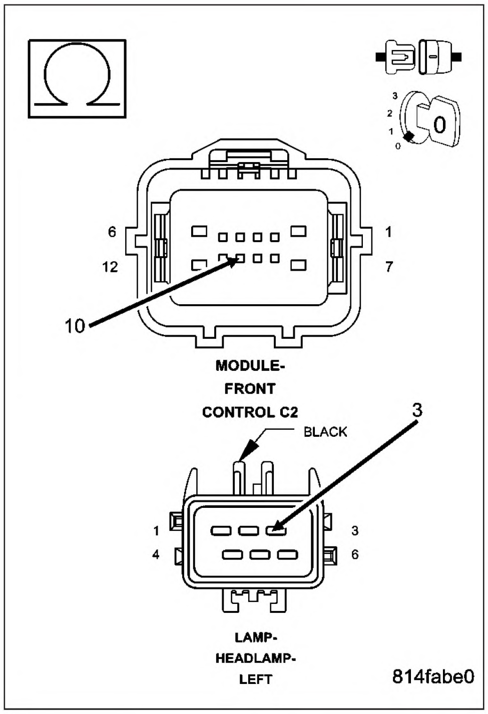
B163C-FRONT LEFT TURN CONTROL CIRCUIT HIGH (CONTINUED)

3. L61 LEFT TURN SIGNAL CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the FCM C2 connector.

Measure the resistance of the (L61) Front Left Turn Signal Control circuit.



Is the resistance above 5.0 ohms?

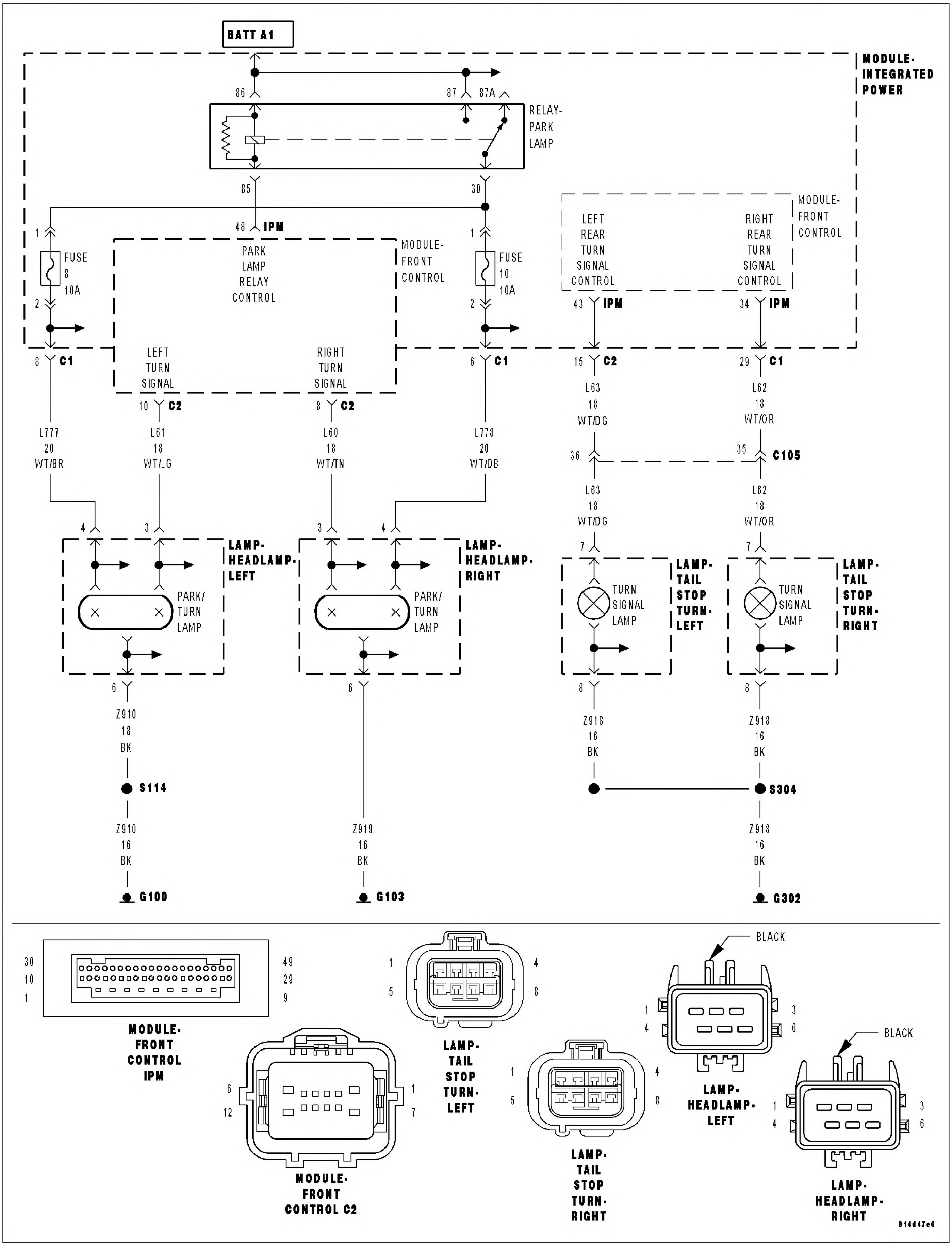
No >> Repair the (L61) Turn Signal Control circuit for an open.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B163F-FRONT RIGHT TURN CONTROL CIRCUIT LOW


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
PARK LAMP RELAY CONTROL
MODULE-FRONT CONTROL
1
FUSE 8 10A
2
FUSE 10 10A
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
MODULE-FRONT CONTROL
43 IPM
34 IPM
8 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
6 C1
15 C2
29 C1
10 C2
8 C2
L63 18 WT/DG
L62 18 WT/OR
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
36
35 C105
L63 18 WT/DG
L62 18 WT/OR
4
3
3
4
7
7
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/TURN LAMP
PARK/TURN LAMP
TURN SIGNAL LAMP
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
6
6
8
8
Z910 18 BK
Z918 16 BK
Z918 16 BK
S114
S304
Z910 16 BK
Z919 16 BK
Z918 16 BK
G100
G103
G302
30 10 1
49 29 9
MODULE-FRONT CONTROL IPM
1 5
4 8
LAMP-TAIL STOP TURN-LEFT
6 12
1 7
MODULE-FRONT CONTROL C2
1 5
4 8
LAMP-TAIL STOP TURN-RIGHT
BLACK
1 4
3 6
LAMP-HEADLAMP-LEFT
BLACK
1 4
3 6
LAMP-HEADLAMP-RIGHT
814d47e6

B163F-FRONT RIGHT TURN CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Turn Signal activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L60) FRONT RIGHT TURN SIGNAL CONTROL CIRCUIT
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC’s.

Turn the Right Turn Signals on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B163F-FRONT RIGHT TURN CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. L60 FRONT RIGHT TURN SIGNAL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 harness connector.

Disconnect the Right Front Headlamp harness connector.

Measure the resistance between ground and the (L60) Front Turn Signal Control circuit.

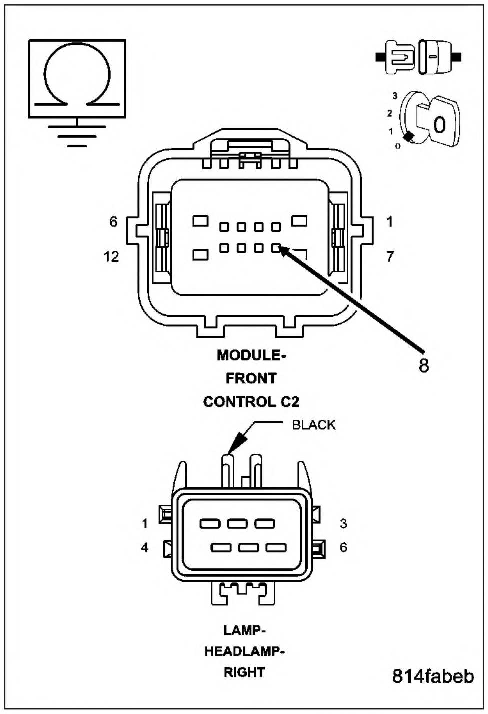
Is the resistance below 5.0 ohms?

Yes >> Repair the (L60) Front Right Turn Signal Control circuit for a short to ground.

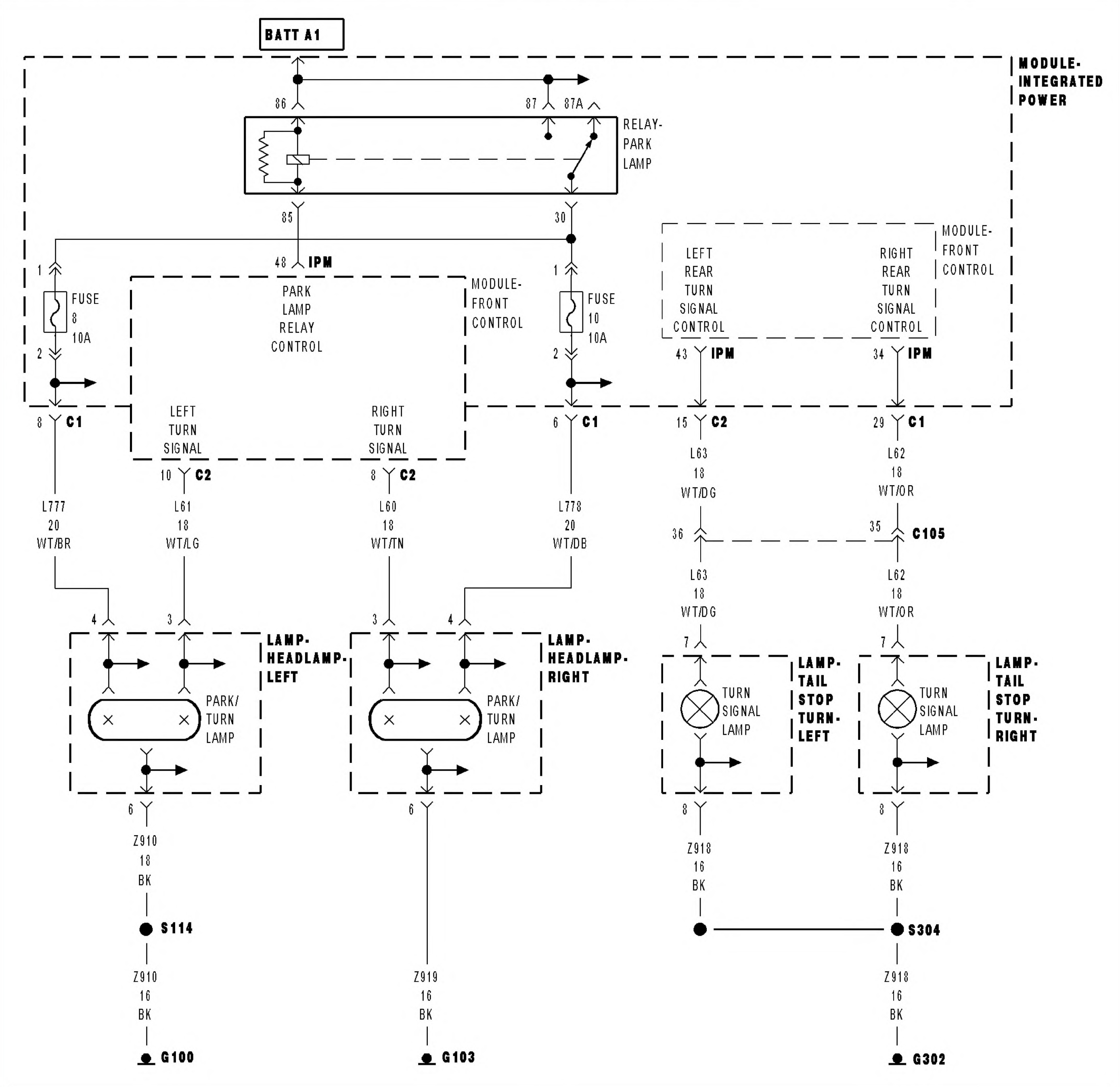
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

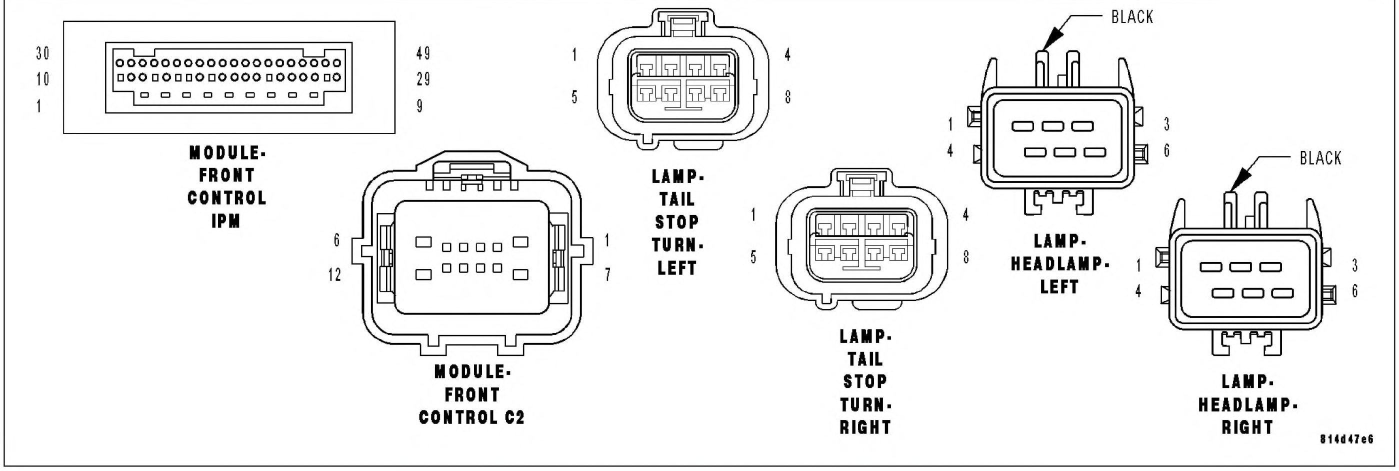
No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B1640-FRONT RIGHT TURN CONTROL CIRCUIT HIGH


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
PARK LAMP RELAY CONTROL
MODULE-FRONT CONTROL
1
FUSE 8 10A
2
1
FUSE 10 10A
2
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
MODULE-FRONT CONTROL
43 IPM
34 IPM
8 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
6 C1
15 C2
29 C1
10 C2
8 C2
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
L63 18 WT/DG
L62 18 WT/OR
36
35 C105
L63 18 WT/DG
L62 18 WT/OR
4
3
3
4
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/TURN LAMP
PARK/TURN LAMP
7
7
TURN SIGNAL LAMP
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
6
6
8
8
Z910 18 BK
S114
Z910 16 BK
G100
Z919 16 BK
G103
Z918 16 BK
Z918 16 BK
S304
Z918 16 BK
G302


30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
6
12
1
7
MODULE-FRONT CONTROL C2
1
5
4
8
LAMP-TAIL STOP TURN-LEFT
1
5
4
8
LAMP-TAIL STOP TURN-RIGHT
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
814d47e6

B1640-FRONT RIGHT TURN CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Front Control Module detects a short to battery on the Control circuit.

Possible Causes
(L60) TURN SIGNAL CONTROL CIRCUIT
FRONT RIGHT TURN SIGNAL BULB
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

Clear all FCM DTC's

Turn the Right Turn Signal on.

With the scan tool, read DTC's.

Does the scan tool read: B1640-FRONT RIGHT TURN CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. FRONT RIGHT TURN SIGNAL BULB

Turn the ignition off.

Inspect the Front Right Turn Signal Bulb Assembly.

Is the inoperative bulb OK?

Yes >> Go To 3

No >> Replace the Inoperative bulb in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

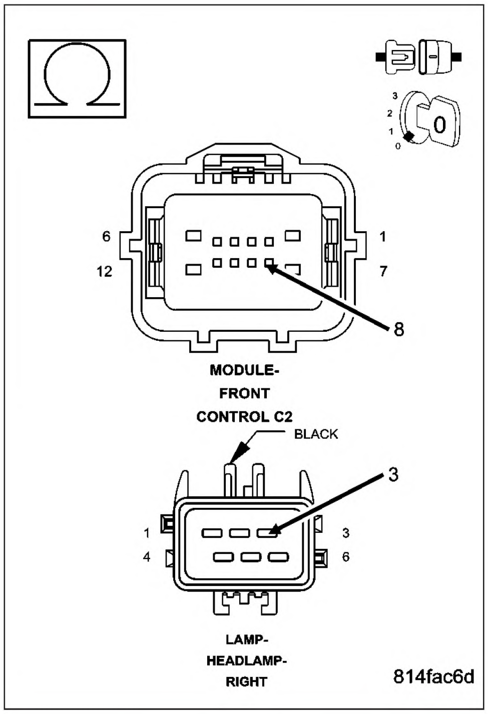
B1640-FRONT RIGHT TURN CONTROL CIRCUIT HIGH (CONTINUED)

3. L60 RIGHT TURN SIGNAL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the FCM C2 connector.

Measure the resistance of the (L60) Front Right Turn Signal Control circuit.

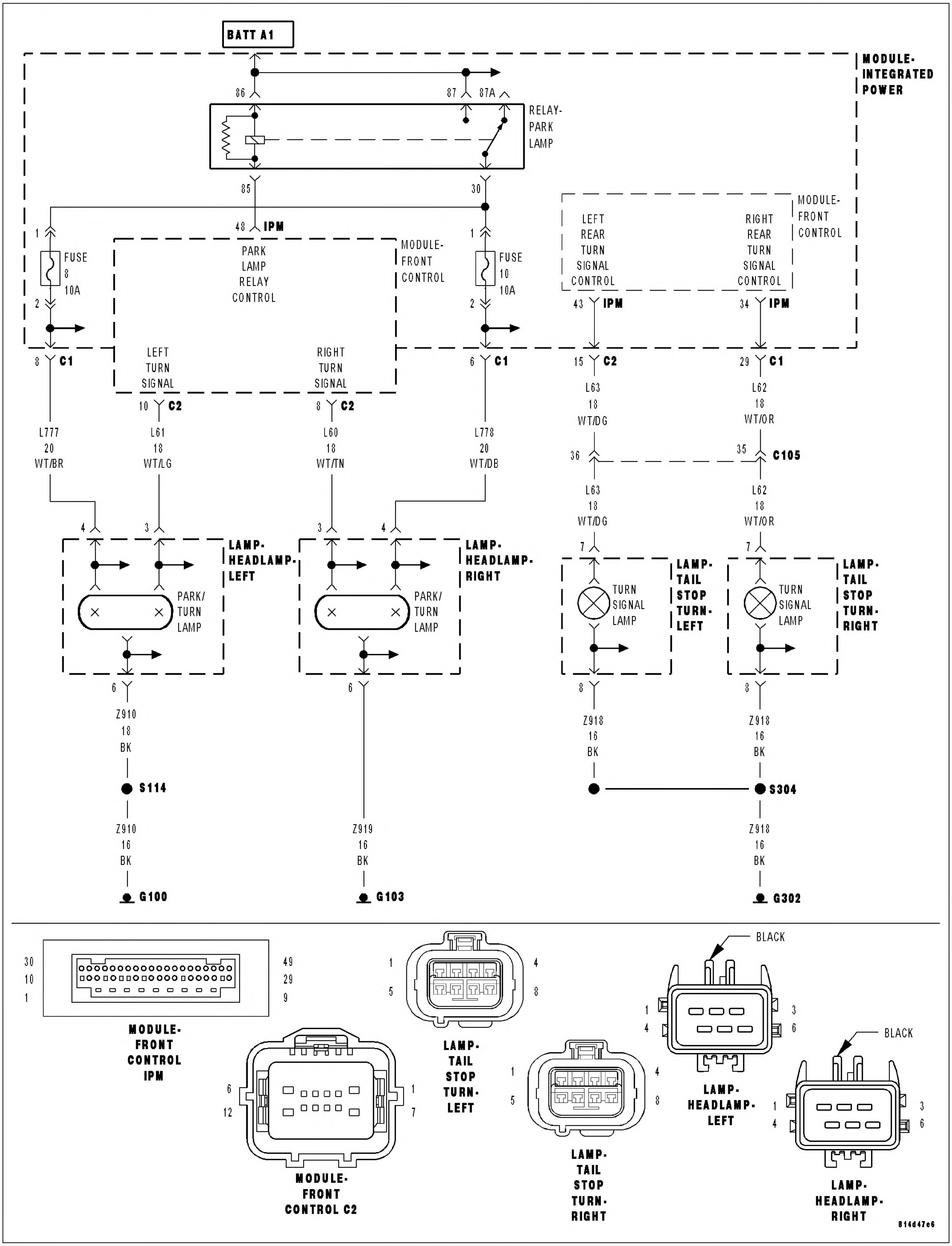

Ω
3
2
1
0
0
6
12
1
7
8
MODULE-
FRONT
CONTROL C2
BLACK
3
1
4
3
6
LAMP-
HEADLAMP-
RIGHT
814fac6d

Is the resistance above 5.0 ohms?

No >> Repair the (L60) Turn Signal Control circuit for an open.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Replace the Front Control Module.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1643-REAR LEFT TURN CONTROL CIRCUIT LOW


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
PARK LAMP RELAY CONTROL
MODULE-FRONT CONTROL
1
FUSE 8 10A
2
1
FUSE 10 10A
2
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
MODULE-FRONT CONTROL
43 IPM
34 IPM
8 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
6 C1
15 C2
29 C1
10 C2
8 C2
L63 18 WT/DG
L62 18 WT/OR
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
36
35
C105
L63 18 WT/DG
L62 18 WT/OR
4
3
3
4
7
7
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/TURN LAMP
PARK/TURN LAMP
TURN SIGNAL LAMP
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
6
6
8
8
Z910 18 BK
Z918 16 BK
Z918 16 BK
S114
S304
Z910 16 BK
Z919 16 BK
Z918 16 BK
G100
G103
G302
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
1
5
4
8
LAMP-TAIL STOP TURN-LEFT
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
BLACK
1
4
3
6
LAMP-HEADLAMP-RIGHT
6
12
1
7
MODULE-FRONT CONTROL C2
1
5
4
8
LAMP-TAIL STOP TURN-RIGHT
814d47c6

B1643-REAR LEFT TURN CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Turn Signal activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L63) REAR LEFT TURN SIGNAL CONTROL CIRCUIT
POWER DISTRIBUTION CENTER
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Left Turn Signals on.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B1643-REAR LEFT TURN CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. L63 LEFT TURN SIGNAL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the IPM C2 connector.

Disconnect the Left Rear Tail Lamp connector.

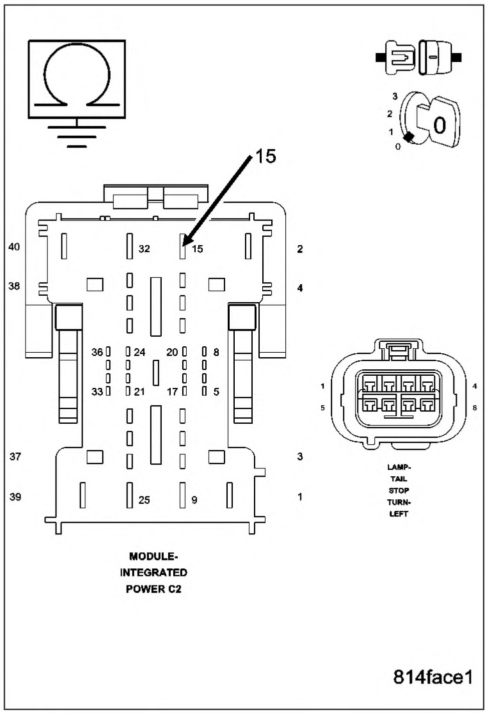
Measure the resistance between ground and the (L63) Rear Left Turn Signal Control circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (L63) Rear Left Turn Signal Control circuit for a short to ground.

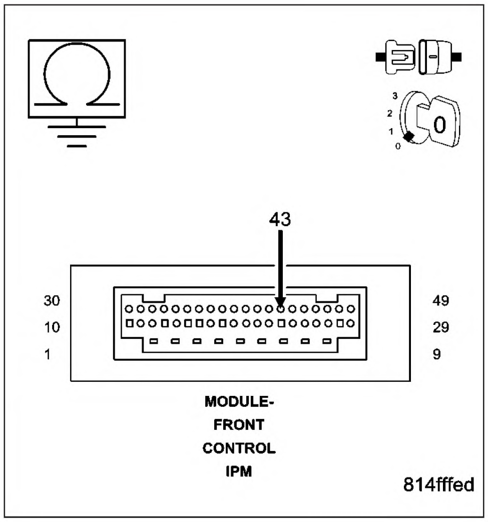
Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3



B1643-REAR LEFT TURN CONTROL CIRCUIT LOW (CONTINUED)

3. FRONT CONTROL MODULE



Turn the ignition off.

Disconnect the Front Control Module from the IPM 49–way connector..

Measure the resistance between ground and the (L63) Left Turn Signal Control circuit in the PDC.

Is the resistance below 5.0 ohms?

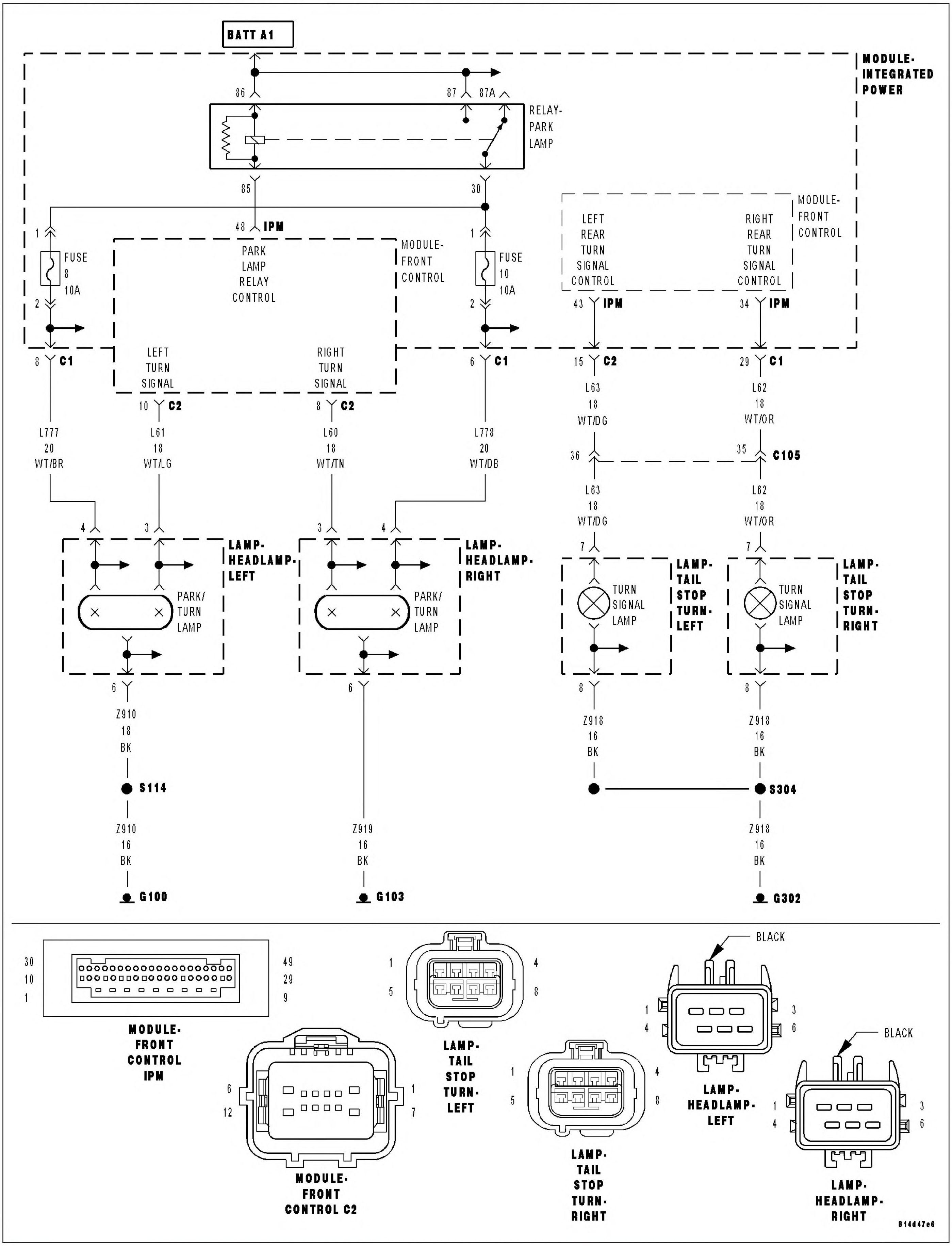
Yes >> Replace the Power Distribution Center in accordance with the service information.

Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1644-REAR LEFT TURN CONTROL CIRCUIT HIGH


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
MODULE-FRONT CONTROL
PARK LAMP RELAY CONTROL
1
FUSE 8 10A
2
FUSE 10 10A
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
43 IPM
34 IPM
8 C1
6 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
10 C2
8 C2
15 C2
29 C1
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
L63 18 WT/DG
L62 18 WT/OR
36
35
C105
4
3
7
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/TURN LAMP
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
TURN SIGNAL LAMP
6
8
Z910 18 BK
S114
Z910 16 BK
G100
Z919 16 BK
G103
Z918 16 BK
S304
G302
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
6
12
1
7
MODULE-FRONT CONTROL C2
1
5
4
8
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
BLACK
1
4
3
6
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
814d47e6

B1644-REAR LEFT TURN CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Front Control Module detects a short to battery on the Control circuit.

Possible Causes
(L63) TURN SIGNAL CONTROL CIRCUIT
POWER DISTRIBUTION CENTER
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

Clear all FCM DTC's

Turn the Left Turn Signal on.

With the scan tool, read DTC's.

Does the scan tool read: B1644-REAR LEFT TURN CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. LEFT REAR TURN SIGNAL BULB

Turn the ignition off.

Inspect the Left Rear Turn Signal Bulb Assembly.

Is the inoperative bulb OK?

Yes >> Go To 3

No >> Replace the Inoperative bulb in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1644-REAR LEFT TURN CONTROL CIRCUIT HIGH (CONTINUED)

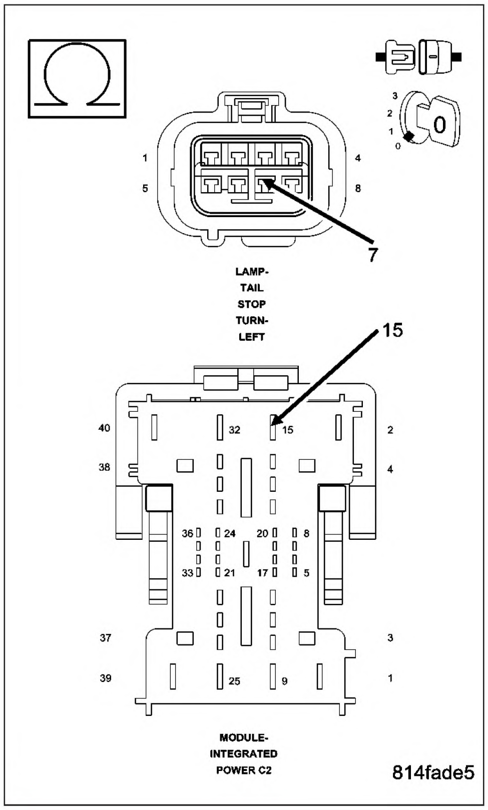
3. L63 LEFT TURN SIGNAL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the IPM C2 connector.

Disconnect the Left Rear Tail Lamp assembly.

Measure the resistance of the (L63) Left Rear Turn Signal Control circuit.


Ω
3
2
1
0
0
1
4
5
8
7
LAMP-
TAIL
STOP
TURN-
LEFT
15
40
32
15
2
38
4
36
24
20
8
33
21
17
5
37
3
39
25
9
1
MODULE-
INTEGRATED
POWER C2
814fade5

Is the resistance above 5.0 ohms?

Yes >> Repair the (L63) Turn Signal Control circuit for an open.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

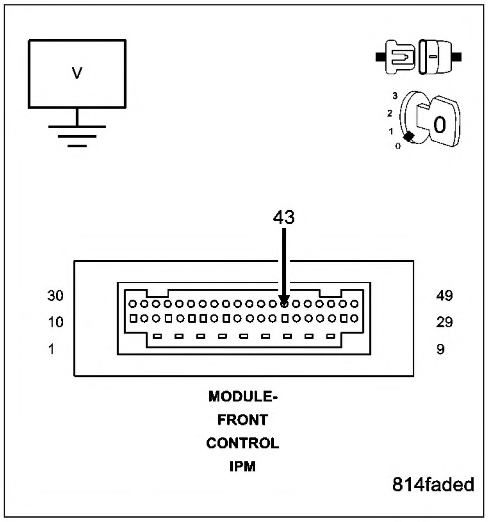
No >> Go To 4

4. FRONT CONTROL MODULE

Turn the ignition off.

Disconnect the Front Control Module from the PDC 49–way connector.

Measure the voltage between (L63) Left Rear Turn Signal Control circuit and ground in the PDC.

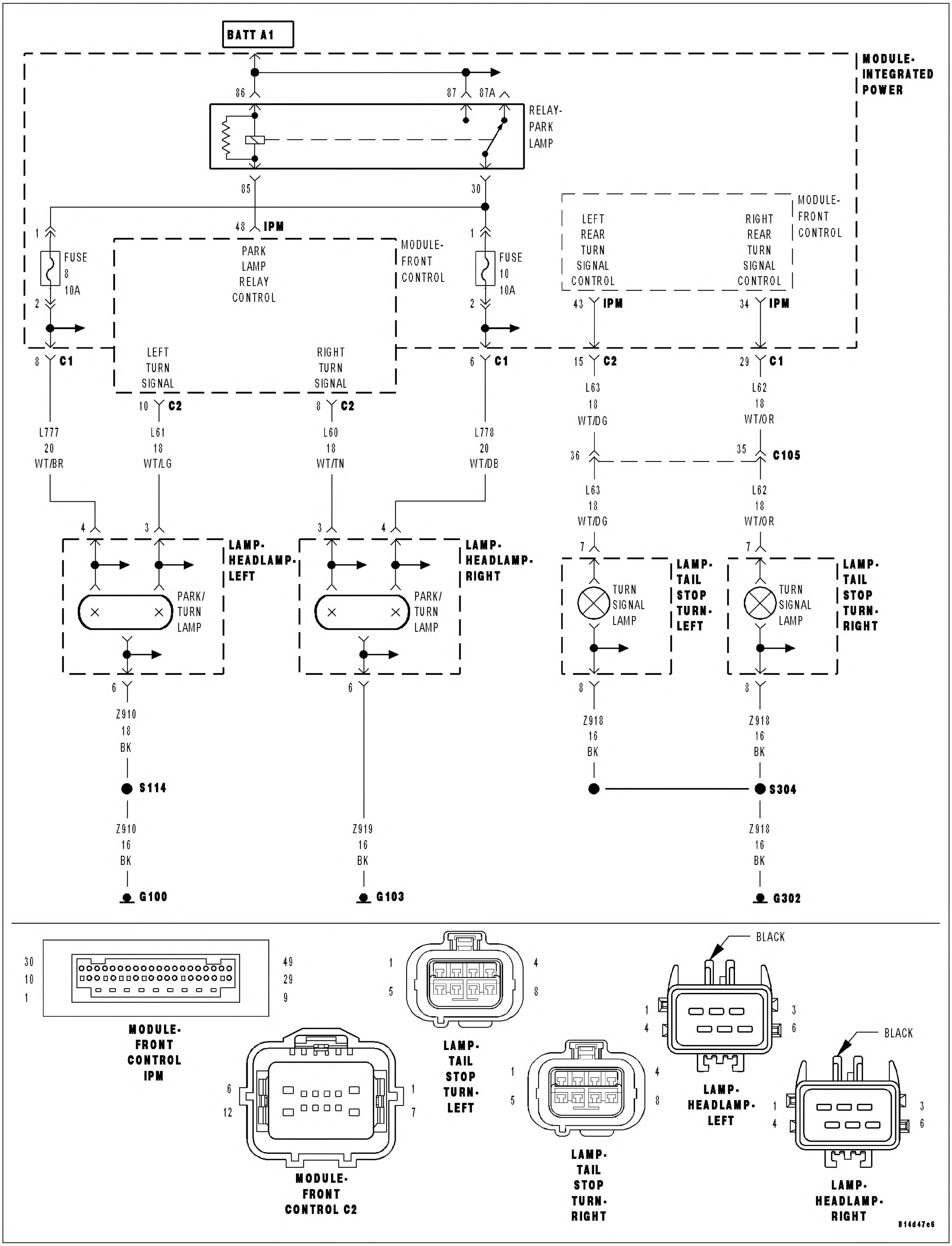

V
3
2
1
0
0
43
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
814faded

Is there any voltage present?

Yes >> Replace the Power Distribution Center.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1647-REAR RIGHT TURN CONTROL CIRCUIT LOW


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
PARK LAMP RELAY CONTROL
MODULE-FRONT CONTROL
1
FUSE 8 10A
2
FUSE 10 10A
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
43 IPM
34 IPM
8 C1
6 C1
15 C2
29 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
10 C2
8 C2
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
L63 18 WT/DG
L62 18 WT/OR
36
35
C105
4
3
7
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/ TURN LAMP
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-LEFT
LAMP-TAIL STOP TURN-RIGHT
6
8
Z910 18 BK
Z918 16 BK
S114
S304
Z910 16 BK
Z919 16 BK
G100
G103
G302
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
1
4
5
8
LAMP-TAIL STOP TURN-LEFT
BLACK
1
3
4
6
LAMP-HEADLAMP-LEFT
6
12
1
7
MODULE-FRONT CONTROL C2
LAMP-TAIL STOP TURN-RIGHT
LAMP-HEADLAMP-RIGHT
814d47e6

B1647-REAR RIGHT TURN CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Turn Signal activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
(L62) REAR RIGHT TURN SIGNAL CONTROL CIRCUIT
POWER DISTRIBUTION CENTER
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.
With the Scan Tool, clear all FCM DTC's.
Turn the Right Turn Signals on.
With the Scan Tool read the DTC information.

Does the Scan Tool read: B1647-REAR RIGHT TURN CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1647-REAR RIGHT TURN CONTROL CIRCUIT LOW (CONTINUED)

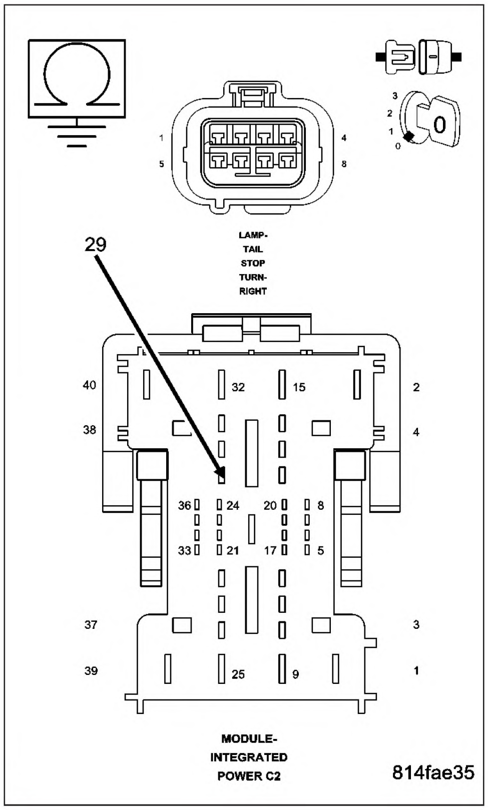
2. L62 RIGHT TURN SIGNAL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the IPM C2 connector.

Disconnect the Right Rear Tail Lamp connector.

Measure the resistance between ground and the (L62) Rear Turn Signal Control circuit.


1
4
5
8
3
2
1
0
0
29
LAMP-
TAIL
STOP
TURN-
RIGHT
40
32
15
2
38
4
36
24
20
8
33
21
17
5
37
3
39
25
9
1
MODULE-
INTEGRATED
POWER C2
814fae35

Is the resistance below 5.0 ohms?

Yes >> Repair the (L62) Rear Right Turn Signal Control circuit for a short to ground.

Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3

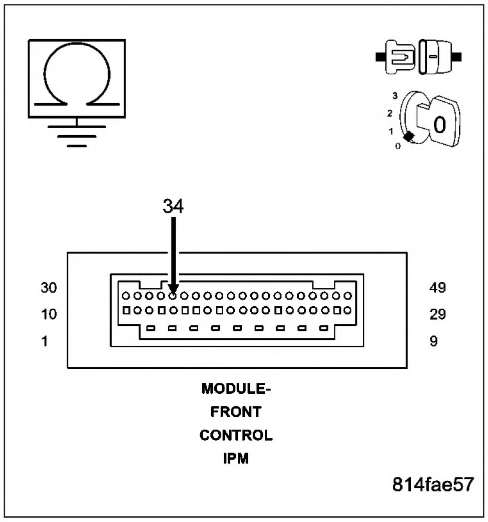
---

3. FRONT CONTROL MODULE

Turn the ignition off.

Disconnect the Front Control Module from the IPM 49–way connector.

Measure the resistance between ground and the (L62) Right Turn Signal Control circuit in the PDC.


3
2
1
0
0
34
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
814fae57

Is the resistance below 5.0 ohms?

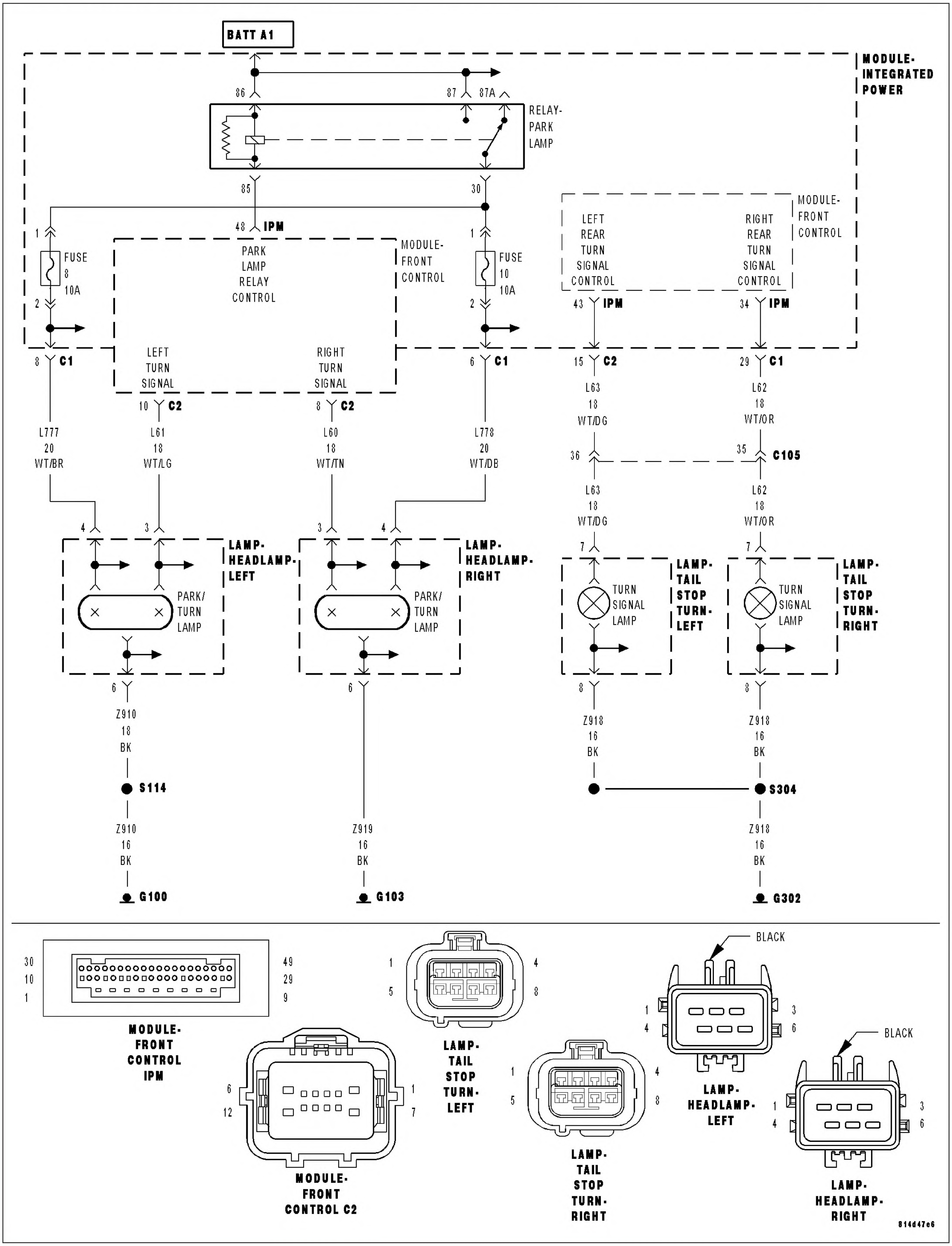
Yes >> Replace the Power Distribution Center in accordance with the service information.

Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST-VER1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1648-REAR RIGHT TURN CONTROL CIRCUIT HIGH


BATT A1
MODULE-INTEGRATED POWER
86
87
87A
RELAY-PARK LAMP
85
30
48 IPM
PARK LAMP RELAY CONTROL
MODULE-FRONT CONTROL
1
FUSE 8 10A
2
1
FUSE 10 10A
2
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
MODULE-FRONT CONTROL
43 IPM
34 IPM
8 C1
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
6 C1
15 C2
29 C1
10 C2
8 C2
L63 18 WT/DG
L62 18 WT/OR
L777 20 WT/BR
L61 18 WT/LG
L60 18 WT/TN
L778 20 WT/DB
36
35 C105
L63 18 WT/DG
L62 18 WT/OR
4
3
3
4
7
7
LAMP-HEADLAMP-LEFT
LAMP-HEADLAMP-RIGHT
PARK/TURN LAMP
PARK/TURN LAMP
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-LEFT
TURN SIGNAL LAMP
LAMP-TAIL STOP TURN-RIGHT
6
6
8
8
Z910 18 BK
Z918 16 BK
Z918 16 BK
S114
S304
Z910 16 BK
Z919 16 BK
Z918 16 BK
G100
G103
G302
30 10 1
49 29 9
MODULE-FRONT CONTROL IPM
1 5 4 8
LAMP-TAIL STOP TURN-LEFT
BLACK
1 4 3 6
LAMP-HEADLAMP-LEFT
6 12 1 7
MODULE-FRONT CONTROL C2
1 5 4 8
LAMP-TAIL STOP TURN-RIGHT
BLACK
1 4 3 6
LAMP-HEADLAMP-RIGHT
814d47e6

B1648-REAR RIGHT TURN CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Front Control Module detects a short to battery on the Control circuit.

Possible Causes
(L62) TURN SIGNAL CONTROL CIRCUIT
POWER DISTRIBUTION CENTER
FRONT CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

Clear all FCM DTC's

Turn the Right Turn Signal on.

With the scan tool, read DTC's.

Does the scan tool read: B1648-REAR RIGHT TURN CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. RIGHT REAR TURN SIGNAL BULB

Turn the ignition off.

Inspect the Right Rear Turn Signal Bulb Assembly.

Is the inoperative bulb OK?

Yes >> Go To 3

No >> Replace the Inoperative bulb in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1648-REAR RIGHT TURN CONTROL CIRCUIT HIGH (CONTINUED)

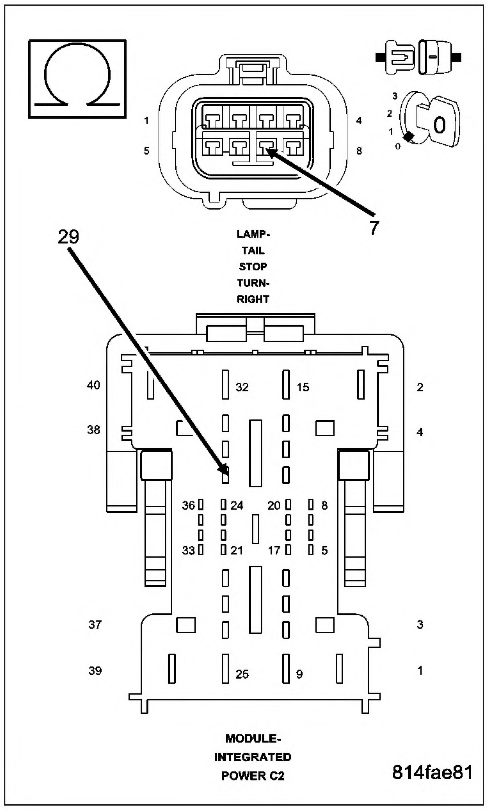
3. (L62) RIGHT REAR TURN SIGNAL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the IPM C2 connector.

Disconnect the Right Rear Tail Lamp assembly.

Measure the resistance of the (L62) Right Rear Turn Signal Control circuit.


1
4
5
8
7
29
LAMP-TAIL STOP TURN-RIGHT
40
38
37
39
2
4
3
1
32
15
36
24
20
8
33
21
17
5
25
9
MODULE-INTEGRATED POWER C2
814fae81

Is the resistance above 5.0 ohms?

Yes >> Repair the (L62) Right Rear Turn Signal Control circuit for an open.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

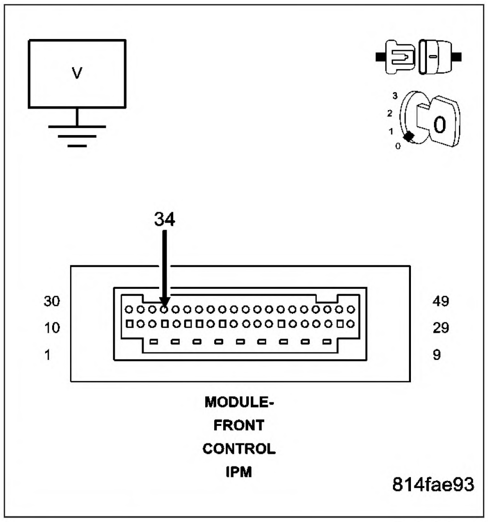
---

4. FRONT CONTROL MODULE

Turn the ignition off.

Disconnect the Front Control Module from the IPM 49–way connector.

Measure the voltage between (L62) Right Rear Turn Signal Control circuit and ground in the PDC.

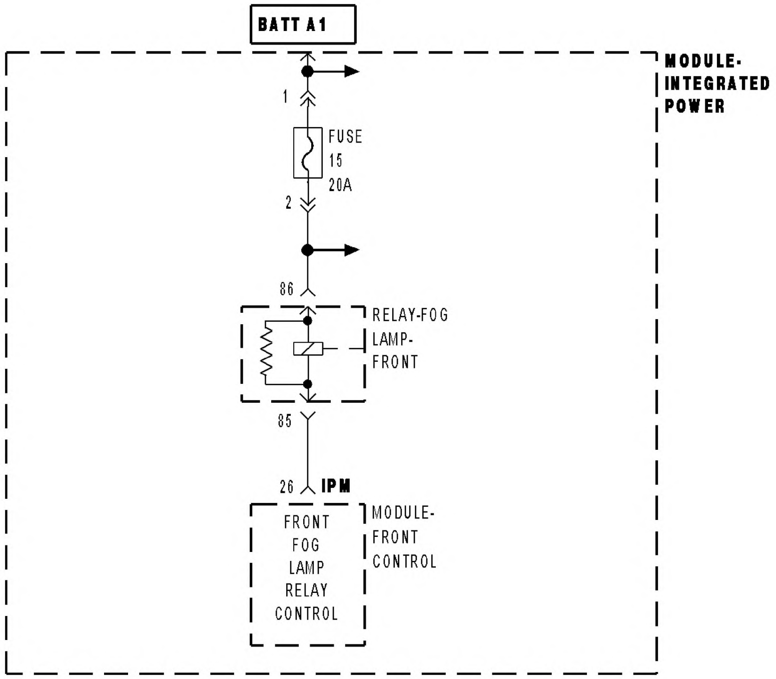

V
34
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
814fae93

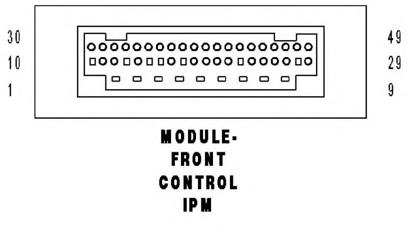
Is there any voltage present?

Yes >> Replace the Power Distribution Center.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module.
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1659-FRONT FOG LAMP CONTROL CIRCUIT LOW


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
15
20A
2
86
RELAY-FOG
LAMP-
FRONT
85
26
IPM
FRONT
FOG
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814e5714

B1659-FRONT FOG LAMP CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Fog Lamps activated.
- **Set Condition:**
- When the IPM detects a LOW condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Fog Lamp relay with and known good relay.

With the Scan Tool, clear all IPM DTC’s.

Turn the Fog Lights ON then OFF.

With the Scan Tool, read the Wiper DTC’s.

Does the Scan Tool read: B1659-FRONT FOG LAMP CONTROL CIRCUIT LOW?

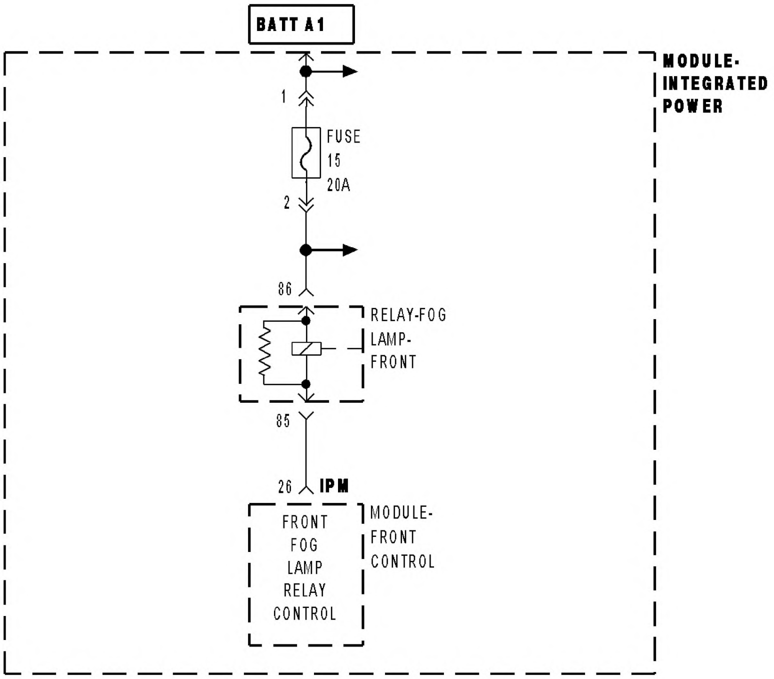
Yes >> Replace the Integrated Power Module in accordance with the service information.

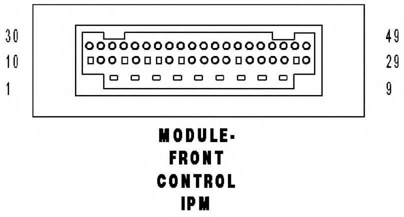
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1660-FRONT FOG LAMP CONTROL CIRCUIT HIGH


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
15
20A
2
86
RELAY-FOG
LAMP-
FRONT
85
26
IPM
FRONT
FOG
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814e5714

B1660-FRONT FOG LAMP CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Front Fog Lamps activated.
- **Set Condition:**
- When the IPM detects a HIGH condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Fog Lamp relay with and known good relay.

With the Scan Tool, clear all IPM DTC’s.

Turn the Fog Lamps ON then OFF.

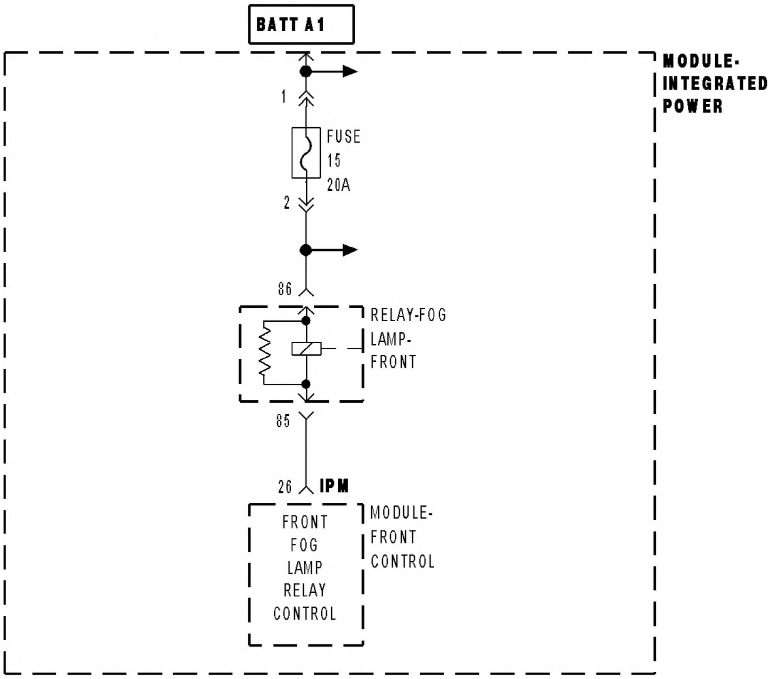
With the Scan Tool, read the Wiper DTC’s.

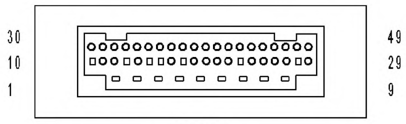
Does the Scan Tool read: B1660-FRONT FOG LAMP CONTROL CIRCUIT HIGH?

Yes >> Replace the Integrated Power Module in accordance with the service information.
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1661-FRONT FOG LAMP CONTROL CIRCUIT OPEN


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
15
20A
2
86
RELAY-FOG
LAMP-
FRONT
85
26
IPM
FRONT
FOG
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9

MODULE-
FRONT
CONTROL
IPM

814e5714

B1661-FRONT FOG LAMP CONTROL CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Fog Lamps activated.
- **Set Condition:**
- When the IPM detects an OPEN condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Fog Lamp relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Turn the Fog Lamps ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B1661-FRONT FOG LAMP CONTROL CIRCUIT OPEN?

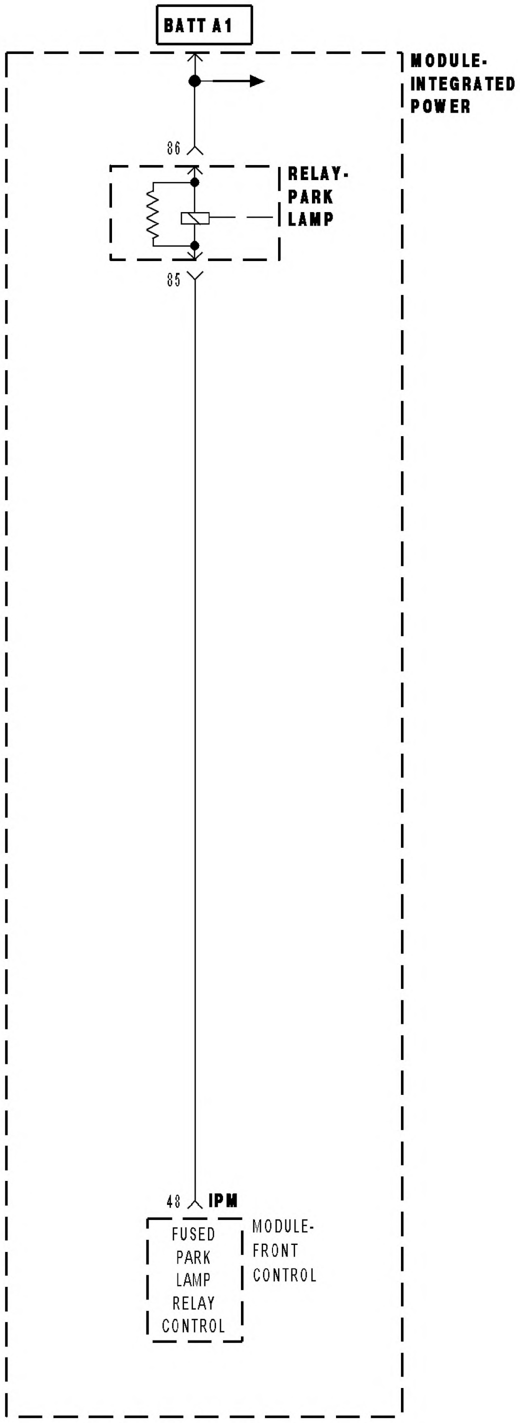
Yes >> Replace the Integrated Power Module in accordance with the service information.

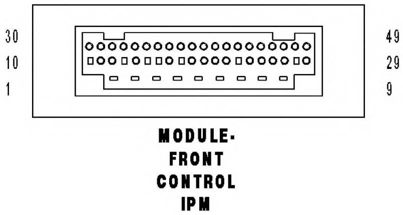
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B165C-PARK LAMP CONTROL CIRCUIT LOW


BATT A1
MODULE-
INTEGRATED
POWER
86
RELAY-
PARK
LAMP
85
48 IPM
FUSED
PARK
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814d4c30

B165C-PARK LAMP CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Park Lamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
FRONT CONTROL MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Park Lamp relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Turn the Park Lamps ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B165C-PARK LAMP CONTROL CIRCUIT LOW?

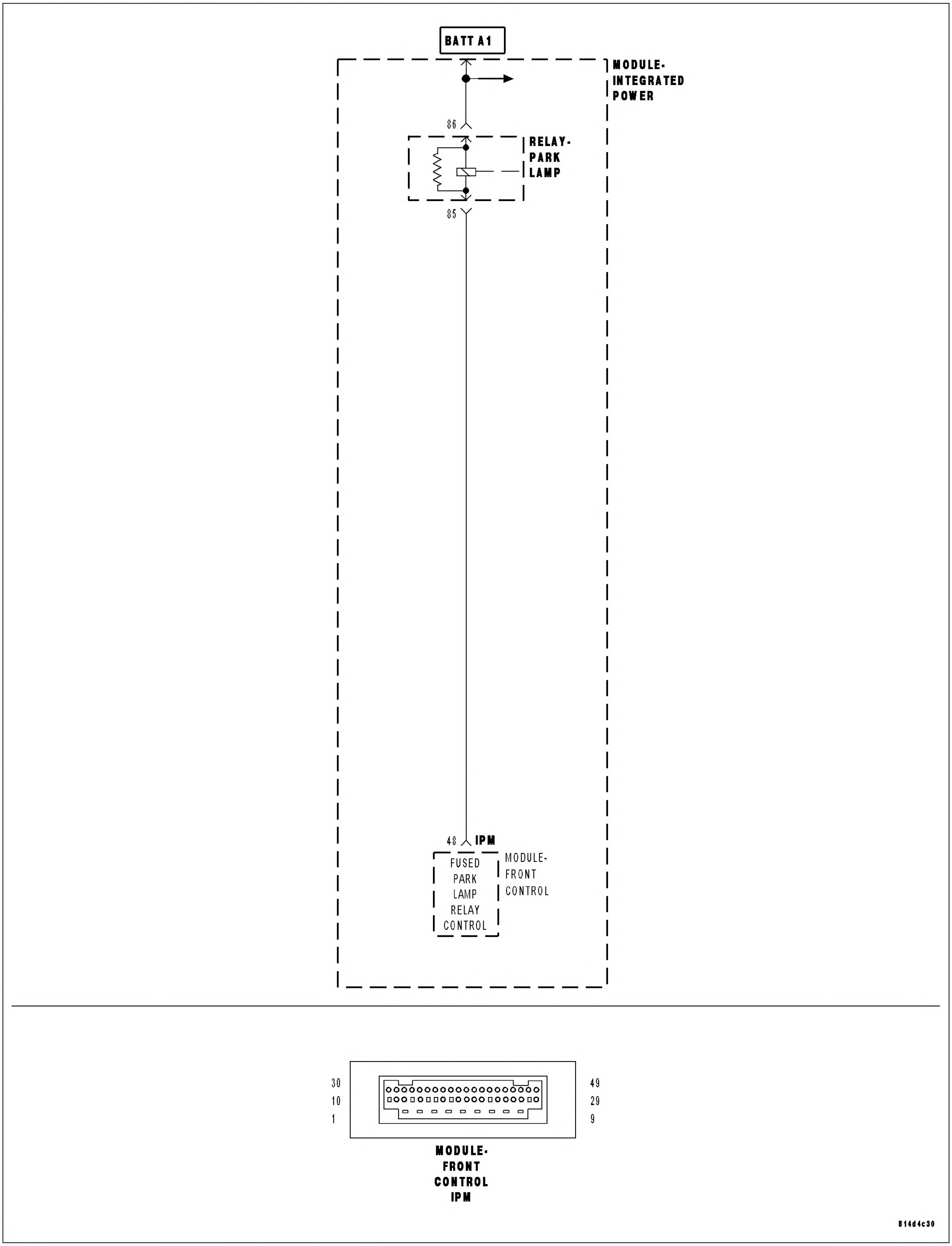
Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B165D-PARK LAMP CONTROL CIRCUIT HIGH


BATT A1
MODULE-
INTEGRATED
POWER
86
RELAY-
PARK
LAMP
85
48 IPM
FUSED
PARK
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
814d4c30

B165D-PARK LAMP CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Park Lamps activated.
- **Set Condition:**
- When the FCM detects a HIGH condition.

Possible Causes
FRONT CONTROL MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Park Lamp relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Turn the Park Lamps ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B165D-PARK LAMP CONTROL CIRCUIT HIGH?

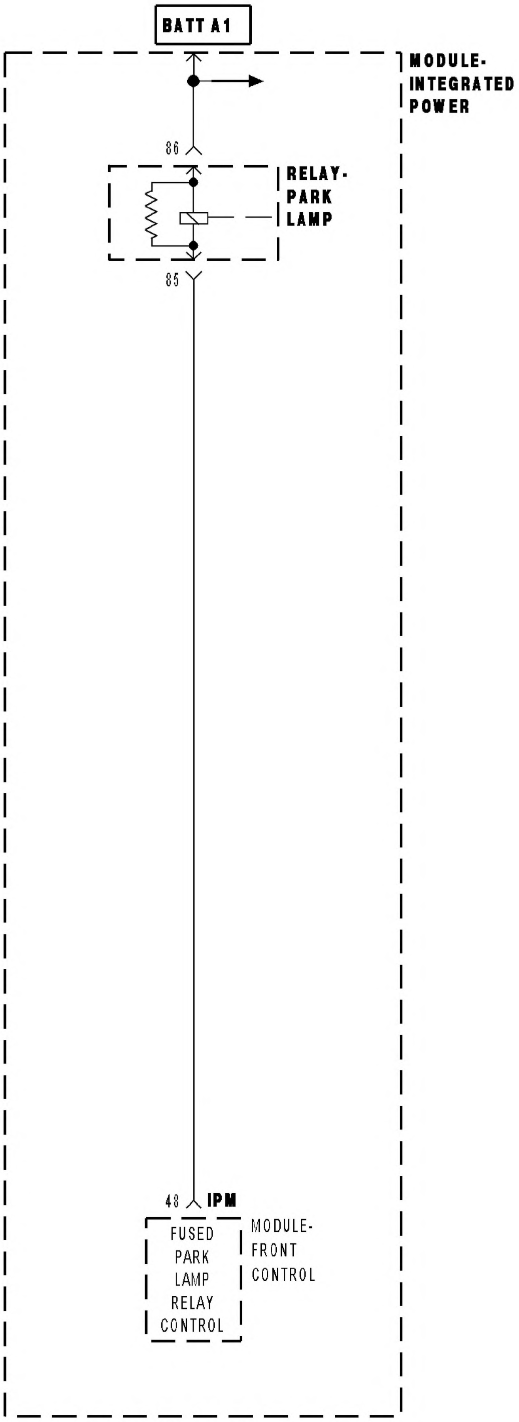
Yes >> Replace the Integrated Power Module in accordance with the service information.

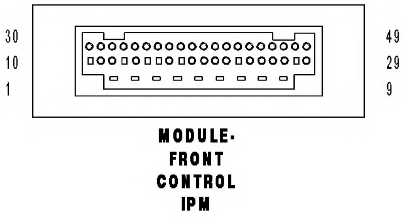
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B165E-PARK LAMP CONTROL CIRCUIT OPEN


BATT A1
MODULE-
INTEGRATED
POWER
86
RELAY-
PARK
LAMP
85
48
IPM
FUSED
PARK
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814d4c30

B165E-PARK LAMP CONTROL CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Park Lamps activated.
- **Set Condition:**
- When the FCM detects a OPEN condition.

Possible Causes
FRONT CONTROL MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Park Lamp relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Turn the Park Lamps ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B165E-PARK LAMP CONTROL CIRCUIT OPEN?

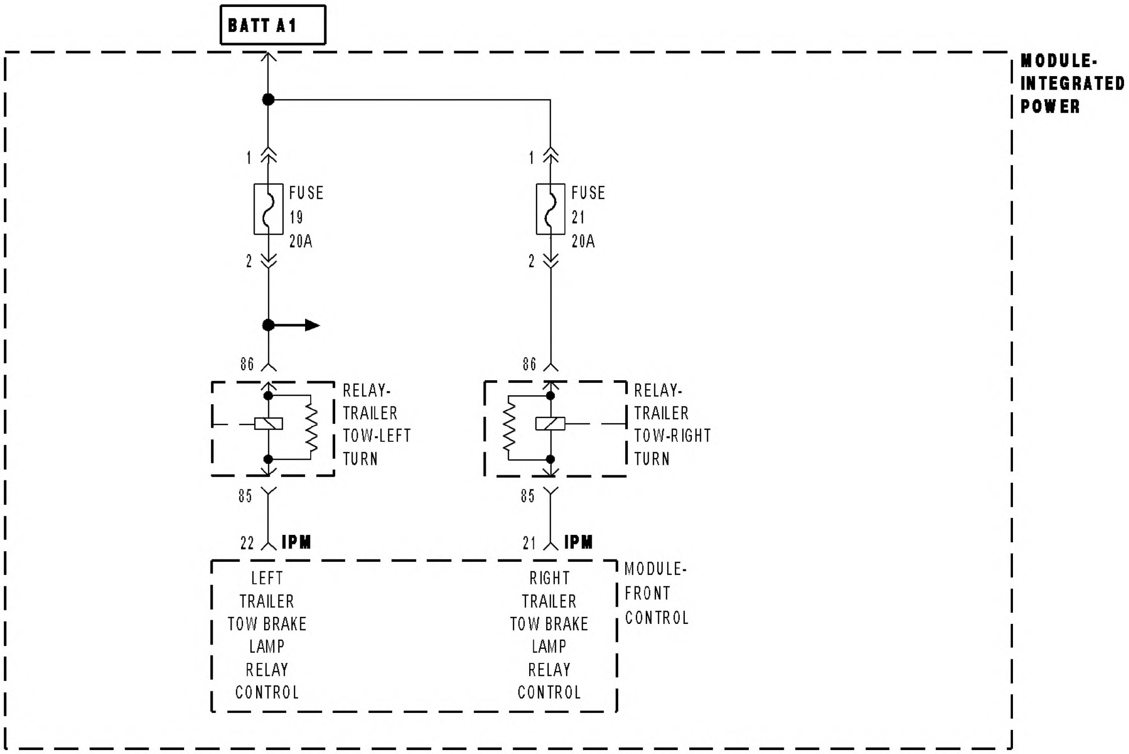
Yes >> Replace the Integrated Power Module in accordance with the service information.

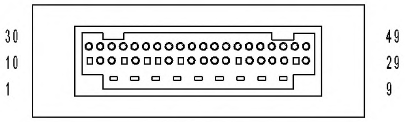
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B166B-LEFT TRAILER TOW LAMP CONTROL CIRCUIT LOW


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
19
20A
2
1
FUSE
21
20A
2
86
RELAY-
TRAILER
TOW-LEFT
TURN
85
22
IPM
86
RELAY-
TRAILER
TOW-RIGHT
TURN
85
21
IPM
LEFT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
RIGHT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9

**MODULE-
FRONT
CONTROL
IPM**

814e5725

B166B-LEFT TRAILER TOW LAMP CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Trailer Tow Lamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Trailer Tow Left Turn relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Activate the Left Turn Signal.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B166B-LEFT TRAILER TOW LAMP CONTROL CIRCUIT LOW?

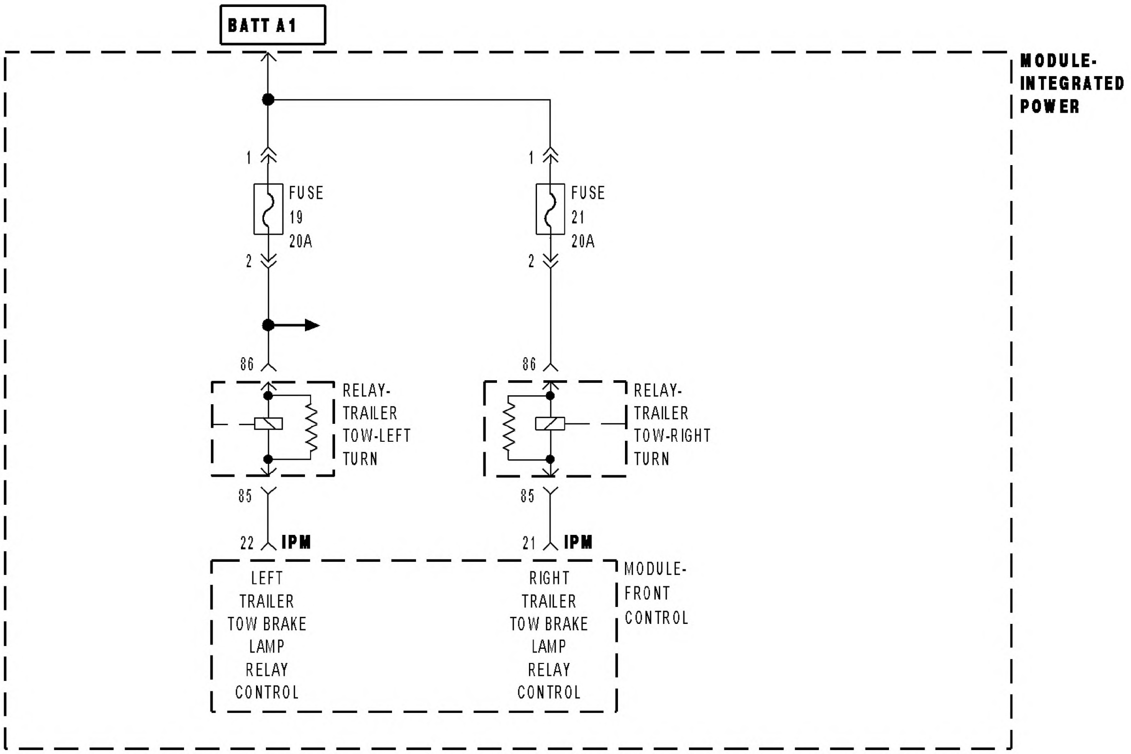
Yes >> Replace the Integrated Power Module in accordance with the service information.

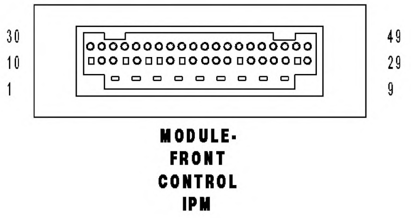
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B166C-LEFT TRAILER TOW LAMP CONTROL CIRCUIT HIGH


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
19
20A
2
1
FUSE
21
20A
2
86
RELAY-
TRAILER
TOW-LEFT
TURN
86
RELAY-
TRAILER
TOW-RIGHT
TURN
85
85
22 IPM
21 IPM
LEFT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
RIGHT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814e5725

B166C-LEFT TRAILER TOW LAMP CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Trailer Tow Lamps activated.
- **Set Condition:**
- When the FCM detects a HIGH condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Trailer Tow Left Turn relay with and known good relay.

With the Scan Tool, clear all IPM DTC’s.

Activate the Left Turn Signal.

With the Scan Tool, read the Wiper DTC’s.

Does the Scan Tool read: B166C-LEFT TRAILER TOW LAMP CONTROL CIRCUIT HIGH?

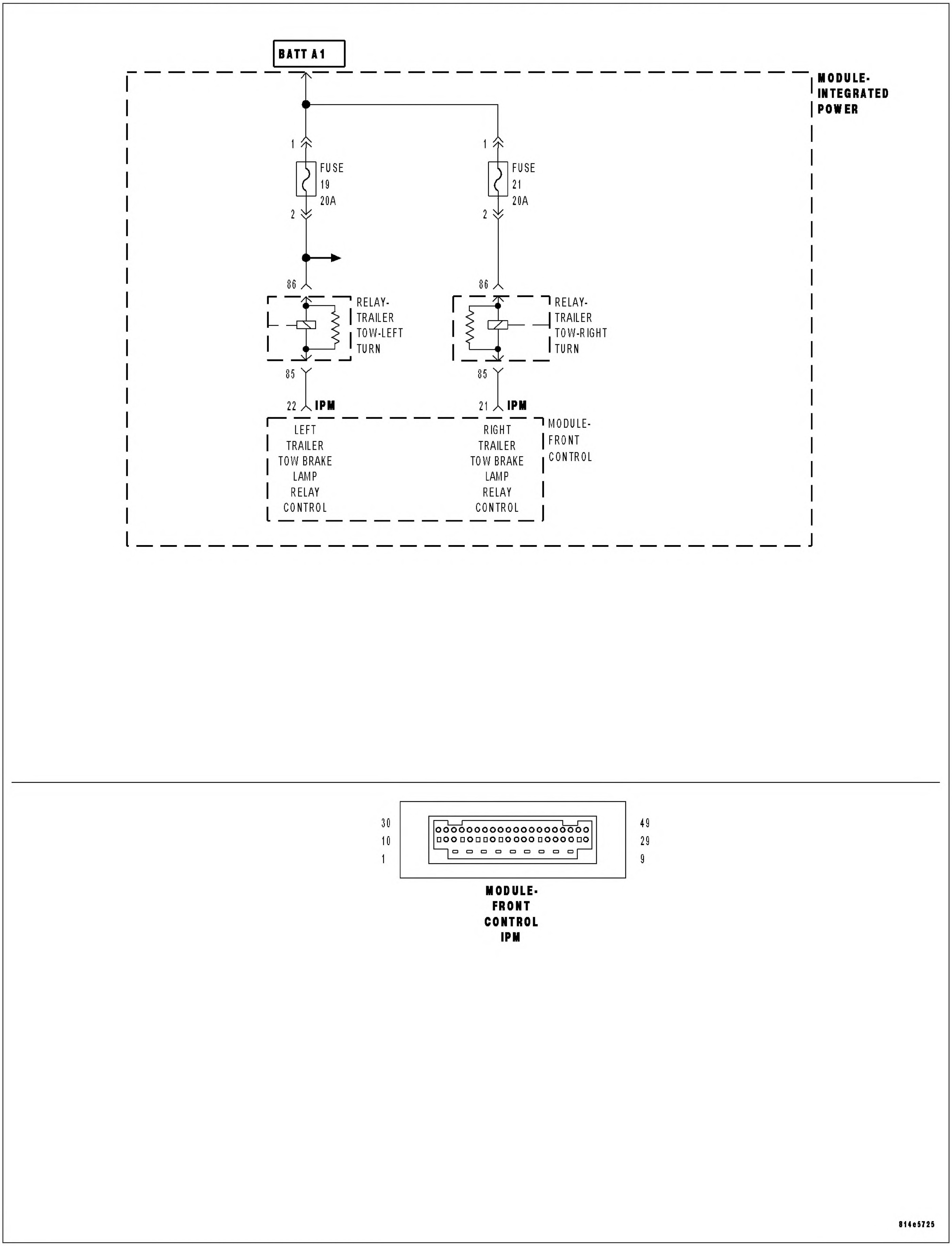
Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B166D-LEFT TRAILER TOW LAMP CONTROL CIRCUIT OPEN


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
19
20A
2
1
FUSE
21
20A
2
86
RELAY-
TRAILER
TOW-LEFT
TURN
86
RELAY-
TRAILER
TOW-RIGHT
TURN
85
85
22 IPM
21 IPM
LEFT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
RIGHT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
814e5725

B166D-LEFT TRAILER TOW LAMP CONTROL CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Trailer Tow Lamps activated.
- **Set Condition:**
- When the FCM detects a OPEN condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Trailer Tow Left Turn relay with and known good relay.

With the Scan Tool, clear all IPM DTC’s.

Activate the Left Turn Signal.

With the Scan Tool, read the Wiper DTC’s.

Does the Scan Tool read: B166D-LEFT TRAILER TOW LAMP CONTROL CIRCUIT OPEN?

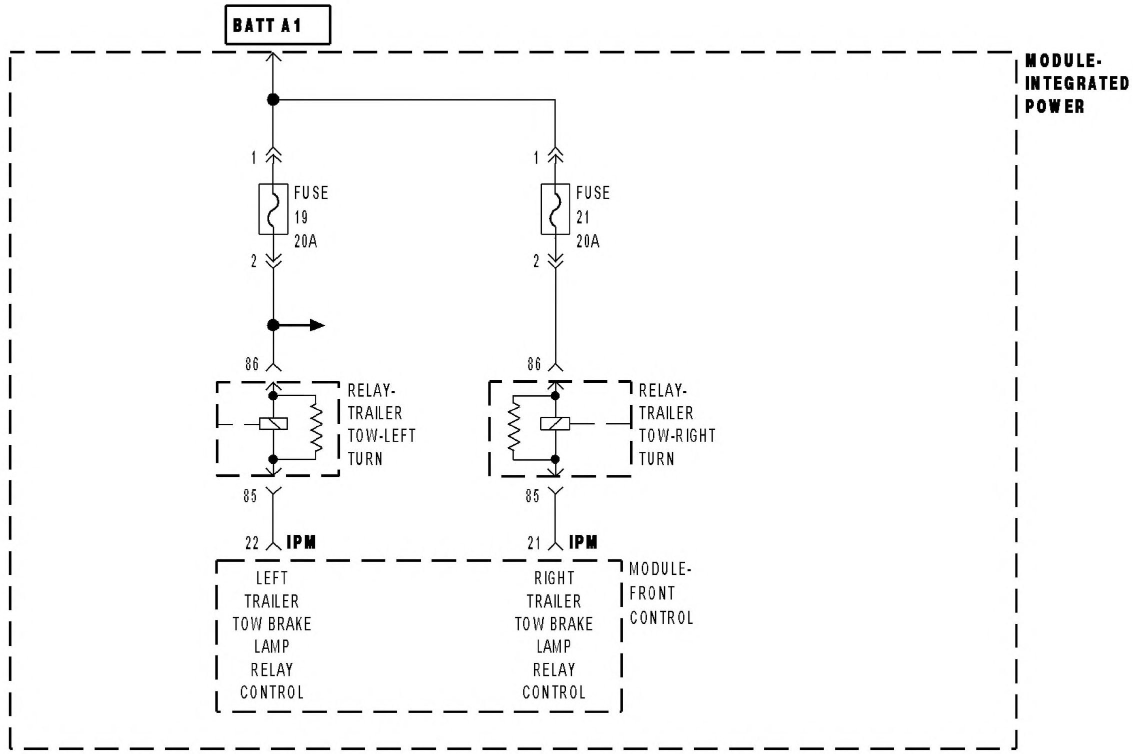
Yes >> Replace the Integrated Power Module in accordance with the service information.

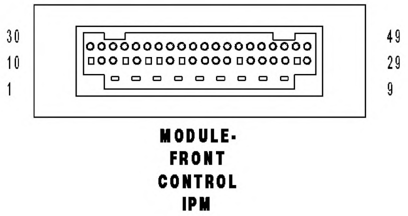
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B166F-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT LOW


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
19
20A
2
1
FUSE
21
20A
2
86
RELAY-
TRAILER
TOW-LEFT
TURN
85
86
RELAY-
TRAILER
TOW-RIGHT
TURN
85
22 IPM
21 IPM
LEFT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
RIGHT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL


30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM

814e5725

B166F-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Trailer Tow Lamps activated.
- **Set Condition:**
- When the FCM detects a LOW condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Trailer Tow Right Turn relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Activate the Right Turn Signal.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B166F-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT LOW?

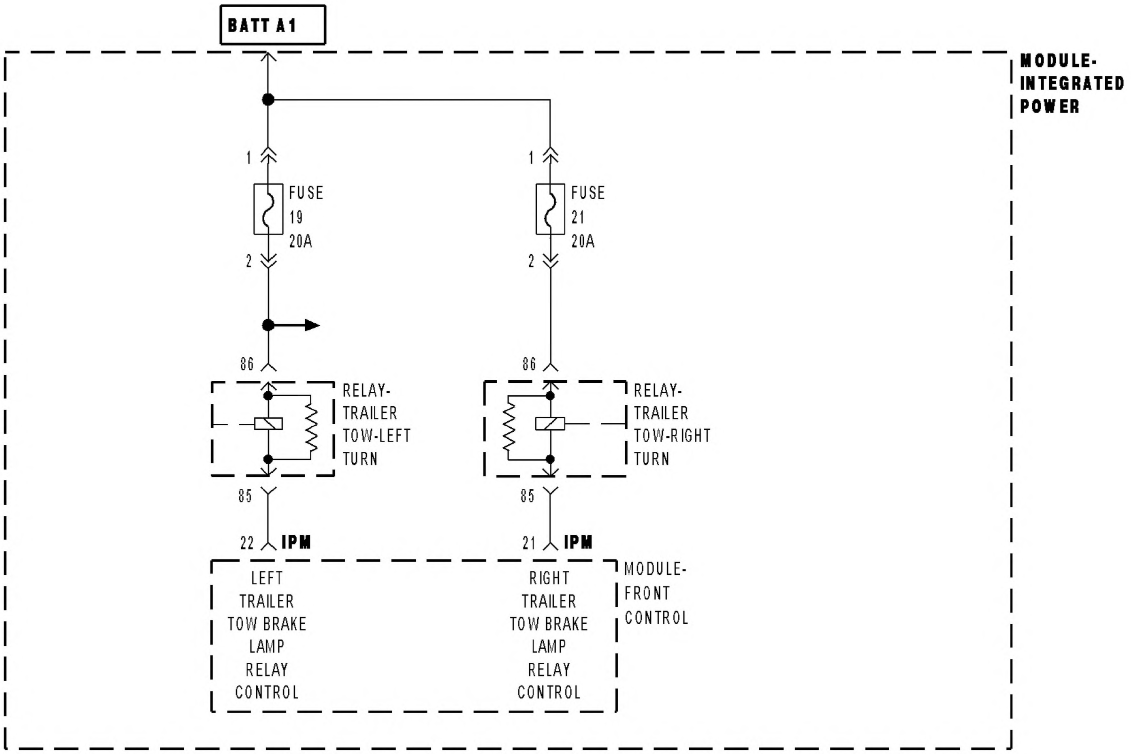
Yes >> Replace the Integrated Power Module in accordance with the service information.

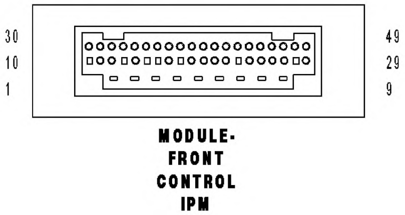
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1670-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT HIGH


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 19 20A
2
1
FUSE 21 20A
2
86
RELAY-TRAILER TOW-LEFT TURN
85
86
RELAY-TRAILER TOW-RIGHT TURN
85
22 IPM
21 IPM
LEFT TRAILER TOW BRAKE LAMP RELAY CONTROL
RIGHT TRAILER TOW BRAKE LAMP RELAY CONTROL
MODULE-FRONT CONTROL


30
10
1
49
29
9
MODULE-FRONT CONTROL IPM

814e5725

B1670-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Trailer Tow Lamps activated.
- **Set Condition:**
- When the FCM detects a HIGH condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Trailer Tow Right Turn relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Activate the Right Turn Signal.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B1670-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT HIGH?

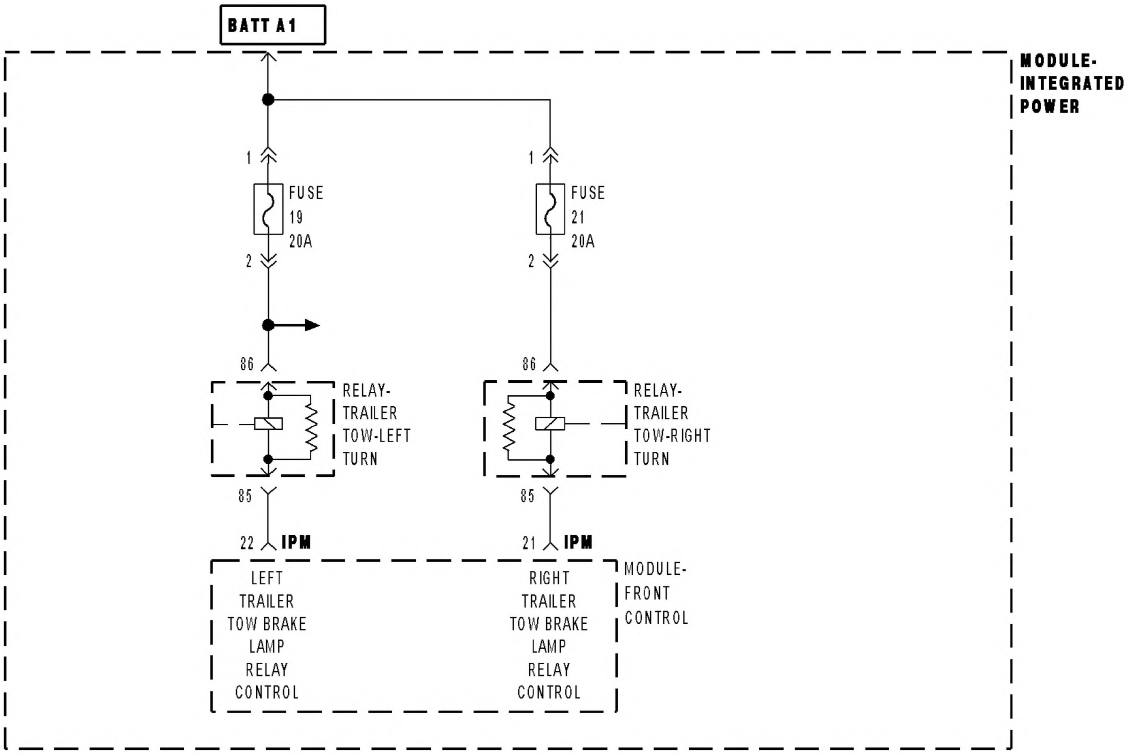
Yes >> Replace the Integrated Power Module in accordance with the service information.

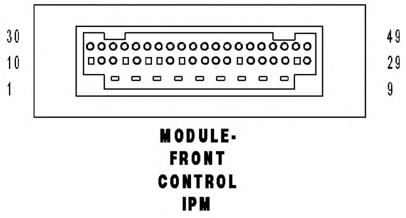
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1671-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT OPEN


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 19 20A
2
1
FUSE 21 20A
2
86
RELAY-TRAILER TOW-LEFT TURN
86
RELAY-TRAILER TOW-RIGHT TURN
85
85
22 IPM
21 IPM
LEFT TRAILER TOW BRAKE LAMP RELAY CONTROL
RIGHT TRAILER TOW BRAKE LAMP RELAY CONTROL
MODULE-FRONT CONTROL


30
10
1
49
29
9
MODULE-FRONT CONTROL IPM

814e5725

B1671-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the Trailer Tow Lamps activated.
- **Set Condition:**
- When the FCM detects a OPEN condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Trailer Tow Right Turn relay with and known good relay.

With the Scan Tool, clear all IPM DTC's.

Activate the Right Turn Signal.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B1671-RIGHT TRAILER TOW LAMP CONTROL CIRCUIT OPEN?

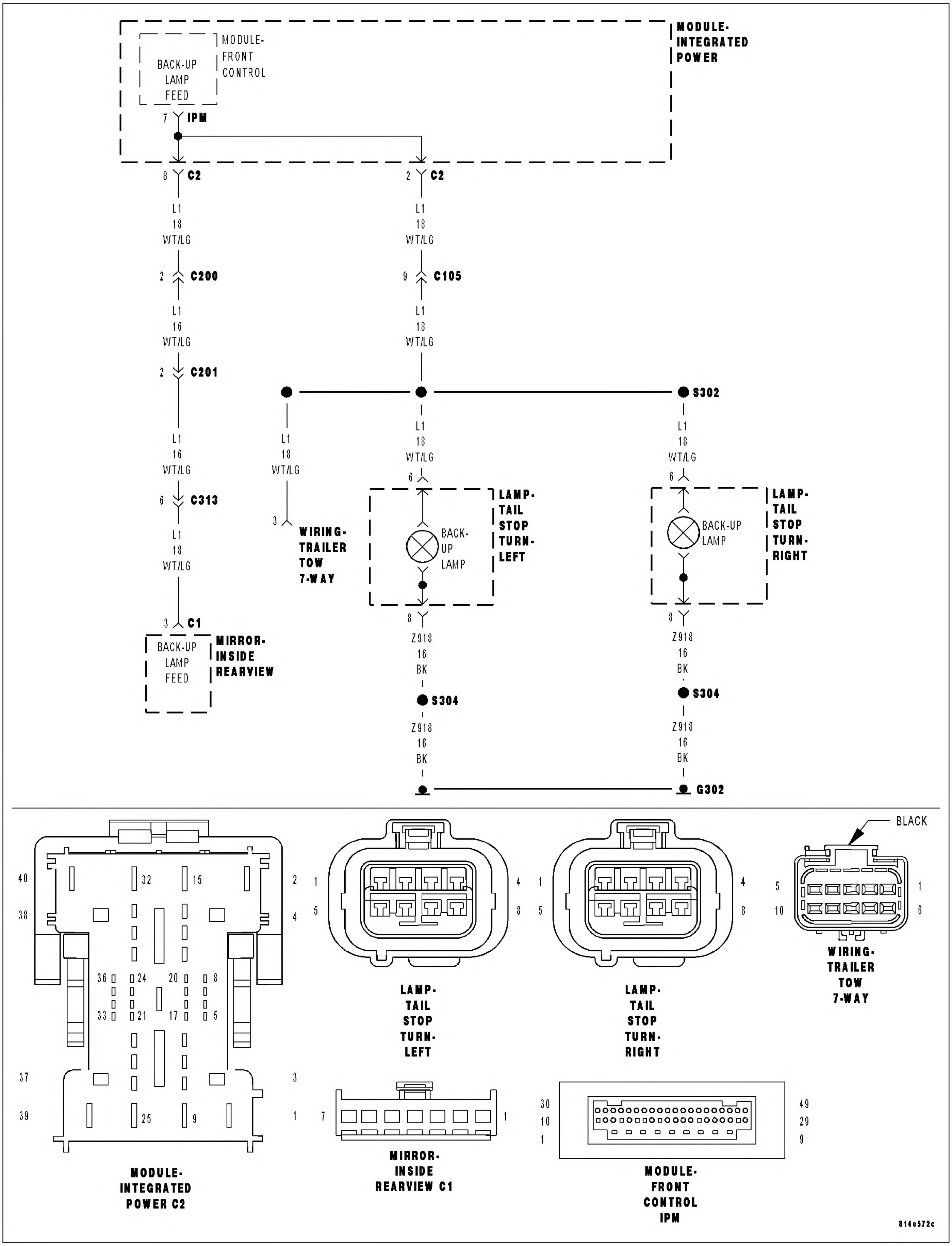
Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1667-REVERSE LAMP CONTROL CIRCUIT LOW


MODULE-
INTEGRATED
POWER
BACK-UP
LAMP
FEED
MODULE-
FRONT
CONTROL
7 IPM
8 C2
2 C2
L1
18
WT/LG
2 C200
9 C105
L1
16
WT/LG
2 C201
S302
6 C313
3 C1
WIRING-
TRAILER
TOW
7-WAY
LAMP-
TAIL
STOP
TURN-
LEFT
BACK-UP LAMP
LAMP-
TAIL
STOP
TURN-
RIGHT
MIRROR-
INSIDE
REARVIEW
Z918
16
BK
S304
G302
BLACK
40
38
37
39
32
15
36
24
20
8
33
21
17
5
25
9
2
4
3
1
5
10
6
7
30
49
29
MODULE-
INTEGRATED
POWER C2
MIRROR-
INSIDE
REARVIEW C1
MODULE-
FRONT
CONTROL
IPM
814e572c

B1667-REVERSE LAMP CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The FCM Detects a Short to ground condition.

Possible Causes
(L1) BACK-UP LAMP FEED CIRCUIT SHORT TO GROUND
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Shift the transmission into reverse.

With the Scan Tool read the DTC information.

Does the Scan Tool read: B1667-REVERSE LAMP CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

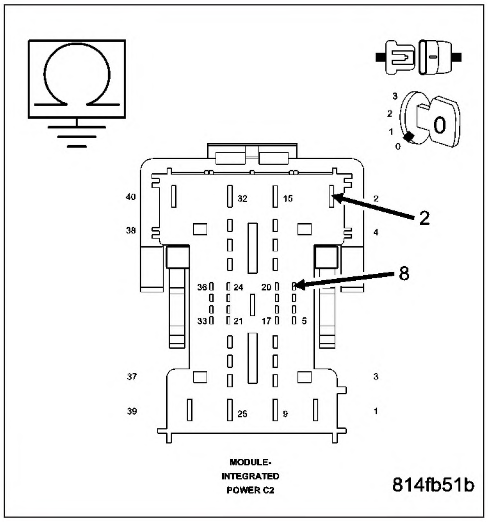
---

2. (L1) BACK-UP LAMP FEED CIRCUIT

Turn the ignition off.

Disconnect the IPM C2 connector.

Measure the resistance between ground and the (L1) Back-up Lamp circuit.



Is the resistance below 5.0 ohms?

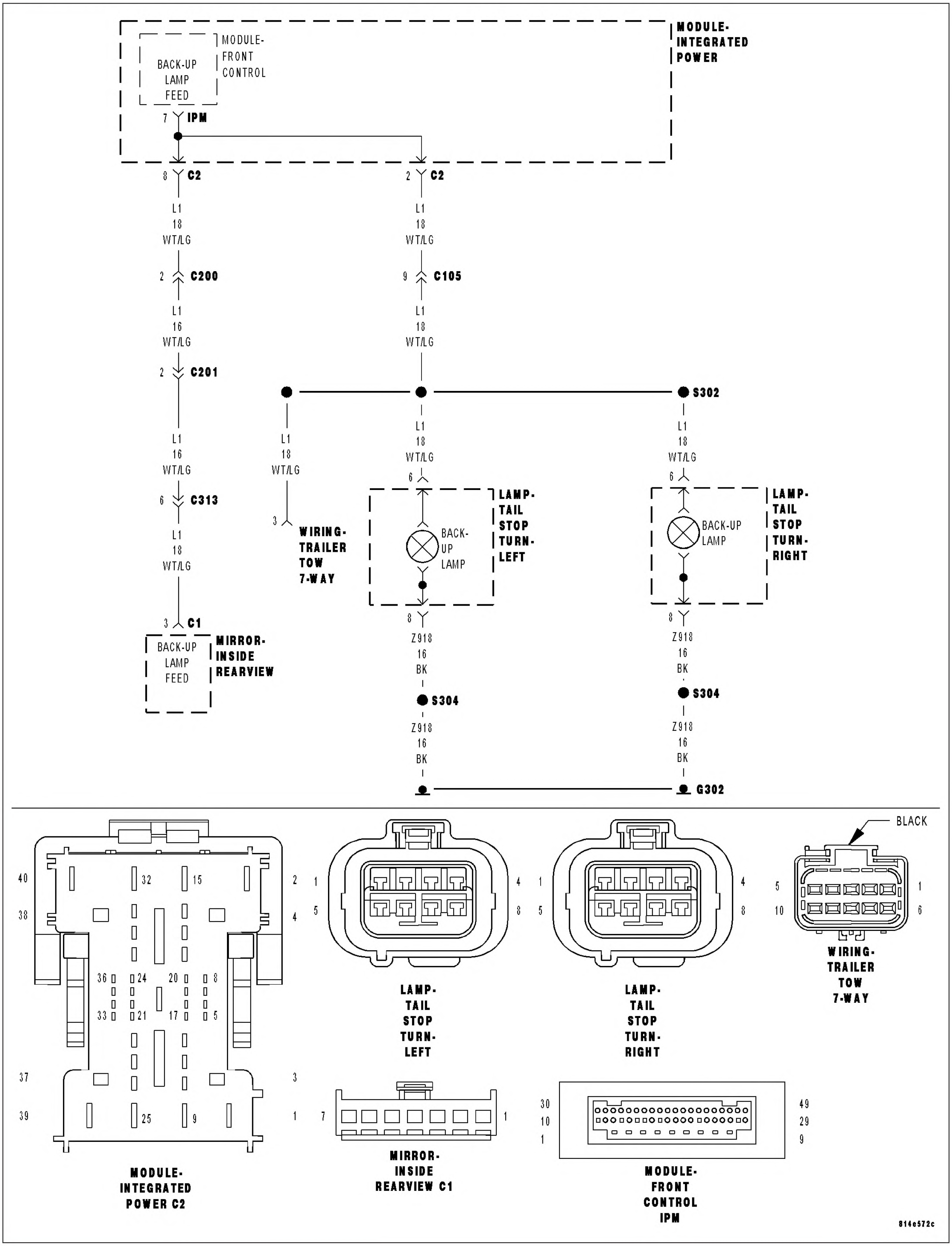
Yes >> Repair the (L1) Back-up Lamp circuit for a short to ground.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1668-REVERSE LAMP CONTROL CIRCUIT HIGH


MODULE-INTEGRATED POWER
MODULE-FRONT CONTROL
BACK-UP LAMP FEED
7 IPM
8 C2
2 C2
L1 18 WT/LG
2 C200
9 C105
L1 16 WT/LG
L1 18 WT/LG
2 C201
S302
L1 16 WT/LG
6 C313
L1 18 WT/LG
3 C1
MIRROR-INSIDE REARVIEW
BACK-UP LAMP FEED
3
WIRING-TRAILER TOW 7-WAY
6
LAMP-TAIL STOP TURN-LEFT
BACK-UP LAMP
LAMP-TAIL STOP TURN-RIGHT
8
Z918 16 BK
S304
G302
MODULE-INTEGRATED POWER C2
40 38 37 39 32 15 36 24 20 8 33 21 17 5 25 9 2 4 3 1
LAMP-TAIL STOP TURN-LEFT
1 5 4 8
LAMP-TAIL STOP TURN-RIGHT
BLACK
5 10 1 6
WIRING-TRAILER TOW 7-WAY
7 1
MIRROR-INSIDE REARVIEW C1
30 10 1 49 29 9
MODULE-FRONT CONTROL IPM
814e572c

B1668-REVERSE LAMP CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The FCM detects an open condition.

Possible Causes
(L1) BACK-UP LAMP FEED CIRCUIT SHORT TO VOLTAGE
IPM

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

Clear all FCM DTC's

Shift the transmission into reverse.

With the scan tool, read DTC's.

Does the scan tool read: B1668-REVERSE LAMP CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. (L1) BACK-UP LAMP FEED CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the IPM C2 harness connector.

Turn the ignition on.

Measure the voltage on the (L1) Back-up Lamp Feed circuit.

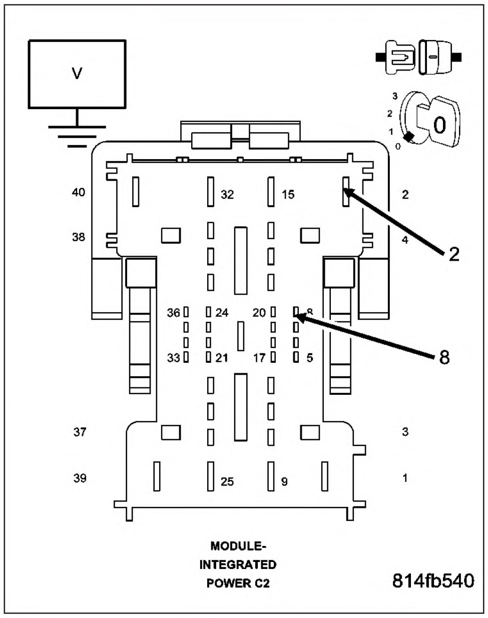
Is the voltage greater than 10.0 volts?

Yes >> Repair the (L1) Back-up Lamp Feed circuit for a short to voltage.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the IPM in accordance with the service information.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B168F-FRONT FOG LAMP SWITCH STUCK (SCM)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the Fog Lamps on.
- **Set Condition:**
  When the CCN detects a Fog Lamp Switch Stuck message on the BUS.

Possible Causes
LIGHTING MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Fog Lamp Switch several times.

Turn the ignition on and wait 30 seconds.

With the scan tool, read DTC's.

Does the scan tool display: B168F-FRONT FOG LAMP SWITCH STUCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST - VER 1. (Refer to BODY VERIFICATION TEST – VER 1.

---

2. LIGHTING MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Lighting Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 4 and 5. Move the switch position from OFF to AUTO WITH FOG while measuring.

OFF = OPEN

OFF WITH FOG = 1047 ohms

PARK WITH FOG = 383 ohms

HEAD WITH FOG = 173 ohms

AUTO WITH FOG = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1607-HEADLAMP SWITCH INPUT CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- The SCM detects a low condition.

Possible Causes
LIGHTING MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Headlamps on.

With the Scan Tool, read the DTC information.

Does the Scan Tool read: B1607-HEADLAMP SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. LIGHTING MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Lighting Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 4 and 7. Move the switch position from OFF to AUTO while measuring.

OFF = 1047 ohms

PARK LAMP = 383 ohms

HEADLAMP = 195 ohms

AUTO = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1608-HEADLAMP SWITCH INPUT CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- The SCM detects a high condition.

Possible Causes
LIGHTING MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Headlamps on.

With the Scan Tool, read the DTC information.

Does the Scan Tool read: B1608-HEADLAMP SWITCH INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. LIGHTING MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Lighting Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 4 and 7. Move the switch position from OFF to AUTO while measuring.

OFF = 1047 ohms

PARK LAMP = 383 ohms

HEADLAMP = 195 ohms

AUTO = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B16A7-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- LEFT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The DTC will be set if the target light source is not within the correctable limits of the mirror.

Possible Causes
SMART BEAM CALIBRATION

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Does the scan tool display: B16A7-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- LEFT?

Yes >> Perform Smart Beam Calibration. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/SMART-BEAM - STANDARD PROCEDURE)

No >> Test complete.

B16A8-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- RIGHT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The DTC will be set if the target light source is not within the correctable limits of the mirror.

Possible Causes
SMART BEAM CALIBRATION

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Does the scan tool display: B16A8-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- RIGHT?

Yes >> Perform Smart Beam Calibration. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/SMART-BEAM - STANDARD PROCEDURE)

No >> Test complete.

B16A9-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- TOP

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The DTC will be set if the target light source is not within the correctable limits of the mirror.

Possible Causes
SMART BEAM CALIBRATION

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Does the scan tool display: B16A9-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- TOP?

Yes >> Perform Smart Beam Calibration. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/SMART-BEAM - STANDARD PROCEDURE)

No >> Test complete.

B16AA-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- BOTTOM

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The DTC will be set if the target light source is not within the correctable limits of the mirror.

Possible Causes
SMART BEAM CALIBRATION

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Does the scan tool display: B16AA-HIGH BEAM CAMERA ALIGNMENT PERFORMANCE- BOTTOM?

Yes >> Perform Smart Beam Calibration. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/SMART-BEAM - STANDARD PROCEDURE)

No >> Test complete.

LAMPS/LIGHTING - EXTERIOR - SERVICE INFORMATION

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LAMPS/LIGHTING - EXTERIOR - SERVICE INFORMATION

DESCRIPTION

EXTERIOR LAMPS

The exterior lighting system consist of the following components:

- Automatic Headlamp Light Sensor
- Electro-Mechanical Instrument Cluster (EMIC) / Cab Compartment Node (CCN)
- Fog Lamp Relay
- Headlamp High Beam Relay
- Headlamp Low Beam Relay
- Left Multi-function Switch
- Park Lamp Relay
- Headlamp Leveling Switch and Motors (if equipped)

Vehicles have incandescent lighting on the exterior for illuminating and indicating purposes. Lighting circuits are protected by fuses. Lighting circuits require an overload protected power source, on/off device, lamps and body ground to operate.

TURN SIGNAL AND HAZARD WARNING SYSTEM

The turn signal and hazard warning system includes the following major components, which are described in further detail elsewhere in this service information:

- Front Side Marker Lamps
- Hazard Warning Switch
- Left Multi-Function Switch
- Turn Signal Cancel Cam
- Turn Signal Indicators
- Turn Signal Lamps

The turn signal and hazard warning systems also provide the following features:

- **Flash Lights with Lock** - This customer programmable feature flashes the hazard warning lamps to provide optical verification that the Remote Keyless Entry (RKE) System has received a valid Lock or Unlock request from an RKE transmitter. (Refer to 8 - ELECTRICAL/POWER LOCKS - DESCRIPTION - REMOTE KEYLESS ENTRY SYSTEM).
- **Panic Mode Optical Alert** - This feature flashes the hazard warning lamps to provide an optical alert when the Remote Keyless Entry (RKE) System panic mode is activated by depressing the Panic button on an RKE transmitter. (Refer to 8 - ELECTRICAL/POWER LOCKS - DESCRIPTION - REMOTE KEYLESS ENTRY SYSTEM).
- **Turn Signal On Warning** - This feature provides the vehicle operator with both visual and audible reminders when a turn signal has been left turned on for an extended period. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - DESCRIPTION).
- **Vehicle Theft Security System (VTSS) Optical Alarm** - This feature flashes the hazard warning lamps to provide an optical alarm when the VTSS is armed and activated by an unauthorized entry into the vehicle. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - DESCRIPTION - VEHICLE THEFT SECURITY SYSTEM).

OPERATION

EXTERIOR LAMPS

The headlamps operate through the headlamp switch which provides a ground signal to the headlamp beam selector in the multi-function switch. The multi-function switch sends a low or high beam signal input to the Body Control Module (BCM), which energizes the low or high beam relay. Once the low or high beam relay is energized, voltage is provided to the headlamps.

For park lamps operation, the headlamp switch provides a ground signal to the BCM, which energizes the park lamp relay. Once the park lamp relay is energized, voltage is provided to the park lamps.

For fog lamps operation, the headlamp switch provides a ground signal to the BCM, which energizes the fog lamp relay. Once the fog lamp relay is energized, voltage is provided to the fog lamps.

Day Time Running Lights (Headlamps) System, installed on vehicles manufactured for sale in Canada only, illuminate the headlamps when the ignition switch is turned to the on position. The headlamps are illuminated at less than 50% of normal intensity.

TURN SIGNAL AND HAZARD WARNING SYSTEM

The turn signal system operates on battery current received on a fused ignition switch output (run) circuit so that the turn signals will only operate with the ignition switch in the On position. The hazard warning system operates on non-switched battery current received on a fused B(+) circuit so that the hazard warning remains operational regardless of the ignition switch position. When the turn signal system is activated, the circuitry of the left multi-function switch and the FCM will cause the selected (right or left) turn signal indicator, front park/turn signal lamp, front side marker lamp and rear tail/stop/turn signal lamp to flash on and off. When the hazard warning system is activated, the circuitry of the hazard warning switch and the FCM will cause both the right side and the left side turn signal indicators, front park/turn signal lamps, front side marker lamps and rear tail/stop/turn signal lamps to flash on and off. The Front Control Module (FCM) can also activate the hazard warning system lamps.

This Vehicle uses the Electronic Vehicle Information Center (EVIC) to display turn signal status messages received from the Electro-Mechanical Instrument Cluster (EMIC) and distance messages received from the Powertrain Control Module (PCM) over the Controller Area Network (CAN) data bus to determine when the Turn Signal On warning should be activated. The EMIC receives hard wired inputs from the Front Control Module (FCM) to operate the turn signal indicators, then sends the proper turn signal status message to the EVIC. If a turn signal is left on for more than about 1.6 kilometers (1 mile) of driving distance, the EVIC will display a visual “Turn Signal On” message and will send a request to the FCM over the PCI data bus to notify the vehicle operator.

During both the turn signal and the hazard warning operation, if the exterior lamps are turned Off, the front park/turn signal lamps and the front side marker lamps will flash in unison. If the exterior lamps are turned On, the front park/turn signal lamps and the front side marker lamps will flash alternately.

SMARTBEAM SYSTEM

The lighting control switch, located on the left stalk, must be in the Auto position labeled ″A″ on the stalk. The system can return to manual control by pulling the stalk towards rearward. A partial pull will momentarily power the high beams (flash-to-pass). A complete pull will override SmartBeam. A message will temporarily appear in the reconfigurable display to confirm. Also, the high beams will change from on to off, or off to on, with a complete pull.

SmartBeam will only activate the high-beams when traveling at speeds in excess of 20 mph. If the high-beams are on while decelerating and approaching a full stop, the system will turn them off at approximately 15 mph.

SmartBeam senses lighting conditions directly ahead of the vehicle. In certain situations, such as hills or winding roads, it may be more comfortable manually overriding the system because the vehicles in front may not be in SmartBeam’s field of view. However, it is not likely to be causing discomforting glare to other drivers.

SmartBeam’s light sensor is located on the inside of the vehicle in front of the interior rearview mirror. Because it looks through the windshield, the system may not function properly if this area is covered with ice, dirt, haze or any other obstruction. SmartBeam may not function properly if its field of view is obscured. The SmartBeam is not serviceable seperately from the inside rear view mirror. If the light sensor is damaged or faulty, the entire inside rear view mirror must be replaced (Refer to 23 - BODY/INTERIOR/REAR VIEW MIRROR - REMOVAL).

For optimal system performance, The light-sensor window must be cleaned periodically, as it may haze over due to the air quality in the vehicle passenger compartment. Spray a small amount of glass cleaner onto a soft cloth and gently clean the sensor window. Do not spray the glass cleaner directly on the sensor window.

For optimal system performance, the Smartbeam camera should be re-aimed by the dealer to insure that the camera is properly centered on the road ahead. If the camera is not aimed relative to the new vehicle environment (replaced windshield or button) the system performance may be diminished or altered.

DIAGNOSIS AND TESTING

LAMPS/LIGHTING - EXTERIOR

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

NOTE: When diagnosing the exterior lighting circuits, remember that high generator output can burn out bulbs rapidly and repeatedly; and, that dim or flickering bulbs can be caused by low generator output or poor battery condition. If one of these symptoms is a problem on the vehicle, be certain to diagnose the battery and charging system, then repair as necessary.

NOTE: A good ground is necessary for proper lighting operation. If a lighting problem is being diagnosed that involves multiple symptoms, systems, or components, the problem can often be traced to a loose, corroded, or open ground.

The hard wired exterior lamp and lighting circuits may be diagnosed and tested using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods may not prove conclusive in the diagnosis of the ElectroMechanical Instrument Cluster (EMIC), the Front Control Module (FCM), the Integrated Power Module (IPM), the Power Distribution Center (PDC), the Powertrain Control Module (PCM), the Controller Area Network (CAN) data bus, or the electronic message inputs used to provide exterior lamp and lighting service or many of the electronic features of the exterior lamp and lighting systems. The most reliable, efficient, and accurate means to diagnose the EMIC, the FCM, the IPM, the PDC, the PCM, the CAN data bus, and the electronic message inputs for the exterior lamps and lighting system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

BACKUP LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
BACKUP LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse.	1. Test and replace backup lamp fuse as required.
	2. Faulty or missing bulb.	2. Test and replace backup lamp bulb as required.
	3. Faulty ground circuit.	3. Test and repair backup lamp ground circuit as required.
	4. Faulty supply circuit.	4. Test and repair open back-up lamp supply circuit as required.
	5. Faulty switch.	5. Test and replace transmission range sensor as required.
	6. Faulty FCM inputs or outputs.	6. Use a diagnostic scan tool to test the FCM inputs and outputs. Refer to the appropriate diagnostic information.
BACKUP LAMP DOES NOT EXTINGUISH	1. Faulty supply circuit.	1. Test and repair shorted back-up lamp supply circuit as required.
	2. Faulty switch.	2. Test and replace transmission range sensor as required.
	3. Faulty FCM inputs or outputs.	3. Use a diagnostic scan tool to test the FCM inputs and outputs. Refer to the appropriate diagnostic information.

STOP LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
STOP LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse.	1. Test and replace stop lamp fuse as required.
	2. Faulty or missing bulb.	2. Test and replace stop lamp bulb as required.
	3. Faulty ground circuit.	3. Test and repair stop lamp ground circuit as required.
	4. Faulty supply circuit.	4. Test and repair open stop lamp switch output circuit as required.
	5. Faulty switch.	5. Test and replace stop lamp switch as required.
STOP LAMP DOES NOT EXTINGUISH	1. Faulty supply circuit.	1. Test and repair shorted stop lamp switch output circuit as required.
	2. Faulty switch.	2. Test and replace stop lamp switch as required.

DAYTIME RUNNING LAMPS

NOTE: Before performing the following tests, determine whether the headlamp low and high beams operate. If the headlamp low and high beams are also inoperative, diagnose and repair that problem before attempting to repair the Daytime Running Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
DAYTIME RUNNING LAMPS WILL NOT ILLUMINATE	1. Incorrect FCM programming.	1. Use a diagnostic scan tool to check and correct the FCM programming as required. Refer to the appropriate diagnostic information.
	2. Faulty FCM inputs or outputs.	2. Use a diagnostic scan tool to test the FCM inputs and outputs. Refer to the appropriate diagnostic information.

FRONT FOG LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
FRONT FOG LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse.	1. Test and replace front fog lamp fuse as required.
	2. Faulty or missing bulb.	2. Test and replace front fog lamp bulb as required.
	3. Faulty ground circuit.	3. Test and repair front fog lamp ground circuit as required.
	4. Faulty supply circuit.	4. Test and repair open front fog lamp relay output circuit as required.
	5. Faulty or missing relay.	5. Test and replace front fog lamp relay as required.
	6. Faulty switch.	6. Test and replace left multi-function switch as required.
FRONT FOG LAMP DOES NOT EXTINGUISH	1. Faulty supply circuit.	1. Test and repair shorted front fog lamp relay output circuit as required.
	2. Faulty relay.	2. Test and replace front fog lamp relay as required.
	3. Faulty switch.	3. Test and replace left multi-function switch as required.

HAZARD WARNING LAMPS

NOTE: Before performing the following tests, confirm whether the left and right turn signals operate satisfactorily. If the turn signals are inoperative or operate improperly, diagnose and repair that problem before attempting to repair the Hazard Warning Lamps.

CONDITION	POSSIBLE CAUSES	CORRECTION
HAZARD WARNING LAMPS DO NOT FLASH	1. Faulty switch.	1. Test and replace hazard switch as required.
HAZARD WARNING LAMPS DO NOT STOP FLASHING	1. Faulty switch.	1. Test and replace hazard switch as required.

HEADLAMPS

NOTE: As part of the exterior lighting failsafe feature, upon ignition On the park lamps and the headlamp low beams will illuminate regardless of the headlamp switch position if the instrument cluster cannot detect an input from the headlamp switch, or if there is a loss of data bus communication.

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMP DOES NOT ILLUMINATE	1. Faulty or missing bulb.	1. Test and replace headlamp bulb as required.
	2. Faulty ground circuit.	2. Test and repair open headlamp ground circuit as required.
	3. Faulty supply circuit.	3. Test and repair open headlamp low beam or high beam circuit as required.
	4. Faulty switch.	4. Test and replace left multi-function switch as required.
HEADLAMP DOES NOT EXTINGUISH	1. Faulty supply circuit.	1. Test and repair shorted headlamp low beam or high beam circuit as required.
	2. Faulty switch.	2. Test and replace left multi-function switch as required.
HEADLAMPS ILLUMINATE WITH IGNITION ON AND HEADLAMP SWITCH OFF (FAIL-SAFE OPERATION)	1. Faulty circuits between headlamp switch and instrument cluster.	1. Test and repair left multi-function switch mux and return circuits as required.
	2. Loss of data bus communication.	2. Use a diagnostic scan tool to test the data bus. Refer to the appropriate diagnostic information.
	3. Faulty switch.	3. Test and replace left multi-function switch as required.
HEADLAMPS WILL NOT SWITCH FROM HIGH TO LOW BEAMS, OR FROM LOW TO HIGH BEAMS	1. Faulty circuits between multi-function switch and instrument cluster.	1. Test and repair wash/beam select mux and multi-function switch return circuits as required.
	2. Faulty switch.	2. Test and replace multi-function switch as required.
AUTO HEADLAMPS INOPERATIVE	1. Faulty circuits between sun load sensor and instrument cluster.	1. Test and repair sun sensor and sun sensor return circuits as required.
	2. Faulty sun load sensor.	2. Test and replace sun load sensor as required.

PARK LAMPS

NOTE: As part of the exterior lighting failsafe feature, upon ignition On the exterior park lamps and the headlamp low beams will illuminate regardless of the headlamp switch position if the instrument cluster cannot detect an input from the headlamp switch, or if there is a loss of data bus communication.

CONDITION	POSSIBLE CAUSES	CORRECTION
PARK LAMP DOES NOT ILLUMINATE	1. Faulty or missing fuse.	1. Test and replace park lamp fuse as required.
	2. Faulty or missing bulb.	2. Test and replace park lamp bulb as required.
	3. Faulty or missing relay.	3. Test and replace park lamp relay as required.
	4. Faulty ground circuit.	4. Test and repair open park lamp ground circuit as required.
	5. Faulty supply circuit.	5. Test and repair open park lamp relay output circuit as required.
	6. Faulty switch.	6. Test and replace left mult-function switch as required.
PARK LAMP DOES NOT EXTINGUISH	1. Faulty supply circuit.	1. Test and repair shorted park lamp relay output circuit as required.
	2. Faulty relay.	2. Test and replace park lamp relay as required.
	3. Faulty switch.	3. Test and replace left multi-function switch as required.

SMARTBEAM

CONDITION	POSSIBLE CAUSES	CORRECTION
SMARTBEAM INOPERATIVE & GREEN LED ON INSIDE REAR VIEW MIRROR NOT FLASHING	1. Automatic high beams are not enabled.	1. Enable automatic high beams using customer programmable features function.
	2. Automatic headlamps are not turned On.	2. Turn automatic headlamps On using the control knob on the left multi-function switch control stalk.
	3. Vehicle speed is below 32 kilometers-per-hour (20 miles-per-hour).	3. Increase vehicle speed. SmartBeam is not designed to operate at speeds below 32 kilometers-per-hour (20 miles-per-hour).
	4. SmartBeam imager lens dirty or obstructed.	4. Initiate the Imager Optics Test from the Demonstration Mode to confirm the function of the SmartBeam optics. Clean imager lens and windshield or remove obstructions from the windshield glass as required.
	5. Faulty ground circuit.	5. Test and repair open ground circuit to inside rear view mirror as required.
	6. Faulty supply circuit.	6. Test and repair open fused run relay output circuit to inside rear view mirror as required.
	7. Loss of data bus communication.	7. Use a diagnostic scan tool to test the data bus. Refer to the appropriate diagnostic information.
	8. Faulty inside rear view mirror.	8. Use a diagnostic scan tool to test the inside rear view mirror. Refer to the appropriate diagnostic information.
SMARTBEAM INOPERATIVE & GREEN LED ON INSIDE REAR VIEW MIRROR FLASHING CONTINUALLY	1. SmartBeam calibration required (slow flash - once-per-second).	1. Perform the SmartBeam Calibration procedure.
	2. SmartBeam failed calibration procedure due to improper set up (fast flash - twice-per-second).	2. Perform the SmartBeam Calibration procedure properly.
	3. SmartBeam failed calibration procedure due to a mechanical misalignment (fast flash - twice-per-second).	3. Use a diagnostic scan tool to retrieve the Diagnostic Trouble Code (DTC). Refer to the appropriate diagnostic information. Perform the appropriate SmartBeam Imager Shim Adjustment procedure.
SMARTBEAM INOPERATIVE & GREEN LED ON INSIDE REAR VIEW MIRROR FLASHES ONLY AFTER IGNITION IS CYCLED ON	1. Three or four flashes after cycling ignition On.	1. Internal mirror fault - electrochromic system failure. Replace the faulty mirror as required.
	2. Five flashes after cycling ignition On.	2. Internal mirror fault - active light sensor system failure. Replace the faulty mirror as required.
	3. Six flashes after cycling ignition On.	3. Internal mirror fault - SmartBeam camera (imager) failure. Replace the faulty mirror as required.

TURN SIGNAL LAMPS

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE TURN SIGNAL LAMP DOES NOT ILLUMINATE	1. Faulty or missing bulb. 2. Faulty ground circuit. 3. Faulty supply circuit.	1. Test and replace turn signal bulb as required. 2. Test and repair open ground circuit as required. 3. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE AND/OR ALL LEFT SIDE TURN SIGNAL LAMPS DO NOT FLASH	1. Faulty switch. 2. Faulty signal circuit.	1. Test and replace left multi-function switch as required. 2. Test and repair open right or left turn signal circuit as required.
ALL RIGHT SIDE OR ALL LEFT SIDE TURN SIGNALS FLASH TOO RAPIDLY (MORE THAN 100 FLASHES PER MINUTE)	1. Faulty or missing bulb. 2. Faulty ground circuit. 3. Faulty signal circuit.	1. Test and replace faulty bulb as required. 2. Test and repair open ground circuit as required. 3. Test and repair open right or left turn signal circuit as required.

SPECIFICATIONS

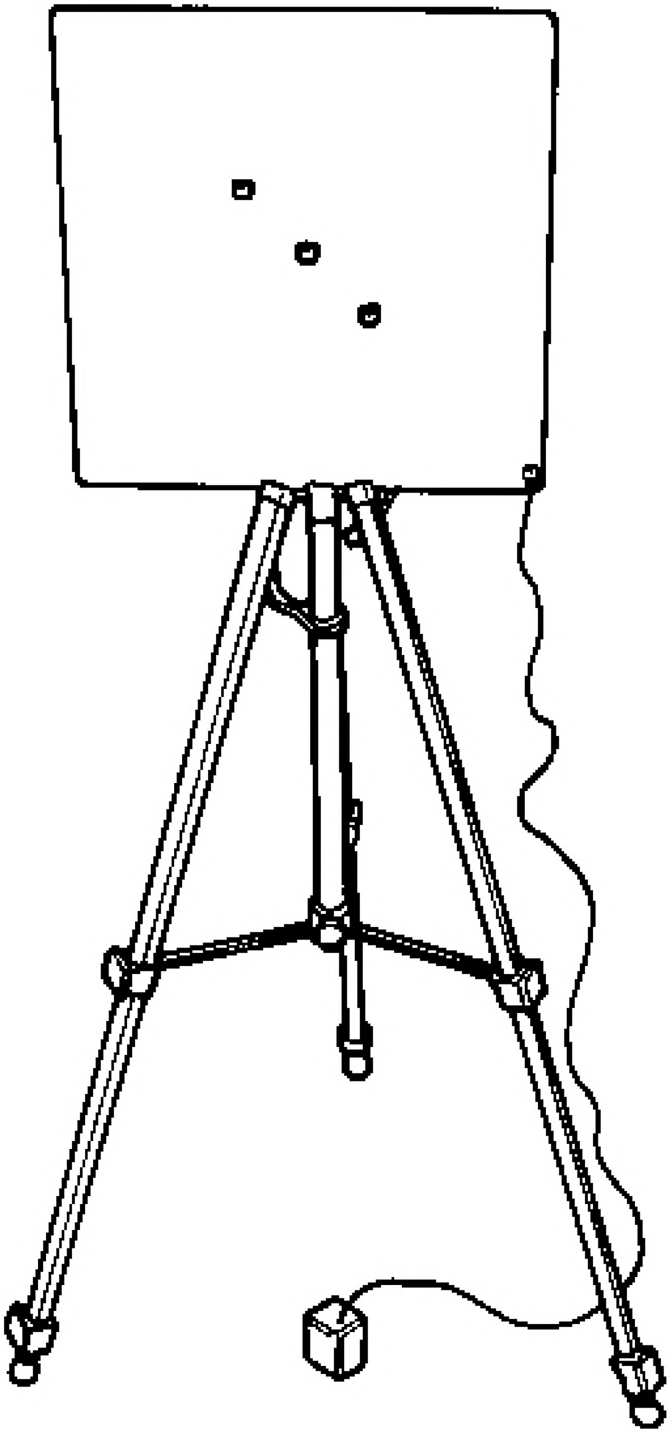
EXTERIOR LAMPS

CAUTION: Do not use bulbs other than the bulbs listed in the Bulb Application Table. Damage to lamp can result. Do not touch halogen bulbs with fingers or other oily surfaces. Bulb life will be reduced.

LAMP	BULB TYPE
BACK-UP	3157A
FOG LAMP	9145
FRONT PARK LAMP	194NA
FRONT SIDE MARKER	194NA
FRONT TURN SIGNAL	3157A
HIGH BEAM	9005
LICENSE PLATE	168
LOW BEAM	9006
TAIL/STOP	3157A
REAR TURN SIGNAL	3157A

SPECIAL TOOLS

LAMPS/LIGHTING - EXTERIOR



SmartBeam Aim Board C-3649

AUTO HEADLAMP SENSOR

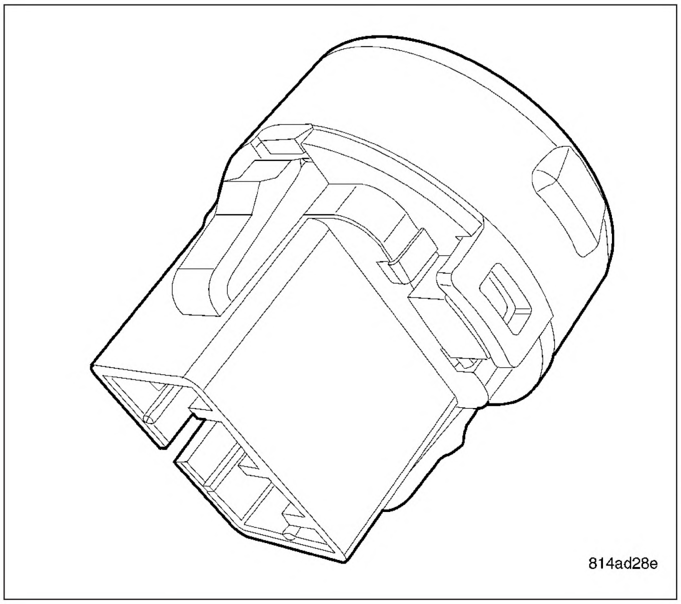
DIAGNOSIS AND TESTING

AUTO HEADLAMP SENSOR

The auto headlamp sensor needs real sunlight to properly register the light level. When auto headlamps are enabled indoors, the headlamps may be turned on. The sensor is located in the instrument panel near the base of the windshield, between the left and right defroster grill. There are no faults set in the EMIC or FCM for a inoperative or missing auto headlamp sensor. Symptoms of a missing sensor or unconnected sensor would be that the headlamps and park lamps turn on when the vehicle is started and there is a high level of ambient light present (I.E. daytime). Auto headlamps should not function in the presence of daylight.

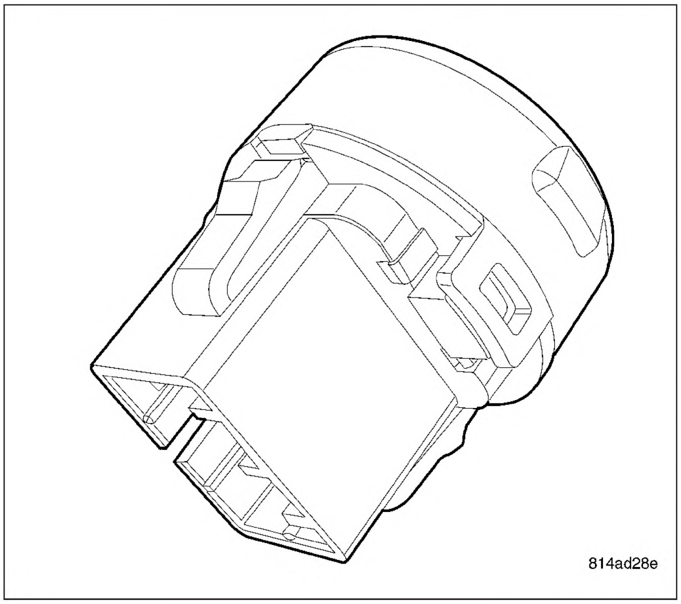
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Using a trim stick (special tool #C-4755) or equivalent, gently pry up on the auto headlamp sensor and lift it out of the instrument panel top pad.
3. Disconnect the harness connector from the auto headlamp sensor.
4. Separate the auto headlamp sensor from instrument panel.



INSTALLATION

1. Connect the harness connector to auto headlamp sensor.
2. Position the auto headlamp sensor on instrument panel and firmly snap onto place.
3. Connect the battery negative cable.

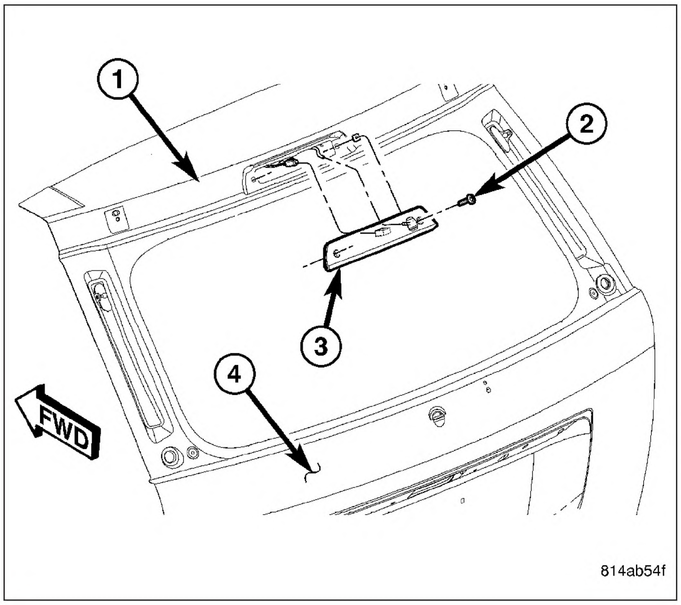


CENTER HIGH MOUNTED STOP LAMP

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the screws (2) attaching CHMSL to the liftgate (3)

.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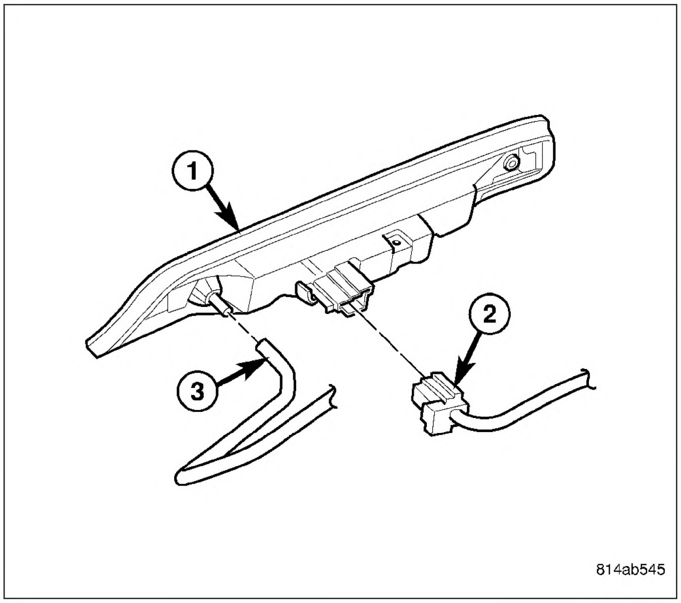
3. Disconnect the wire harness connector (2).
4. Separate the CHMSL (1) from the vehicle.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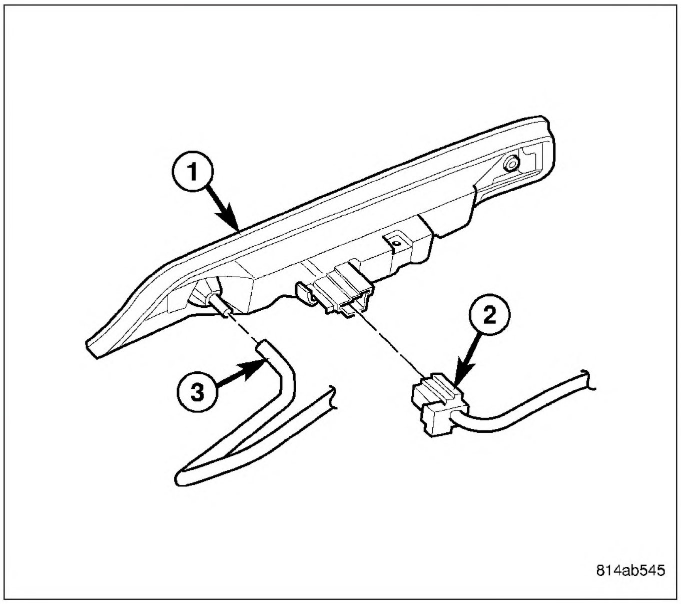
INSTALLATION

1. Connect the wire harness connector (2).
2. Position the CHMSL (1) on liftgate.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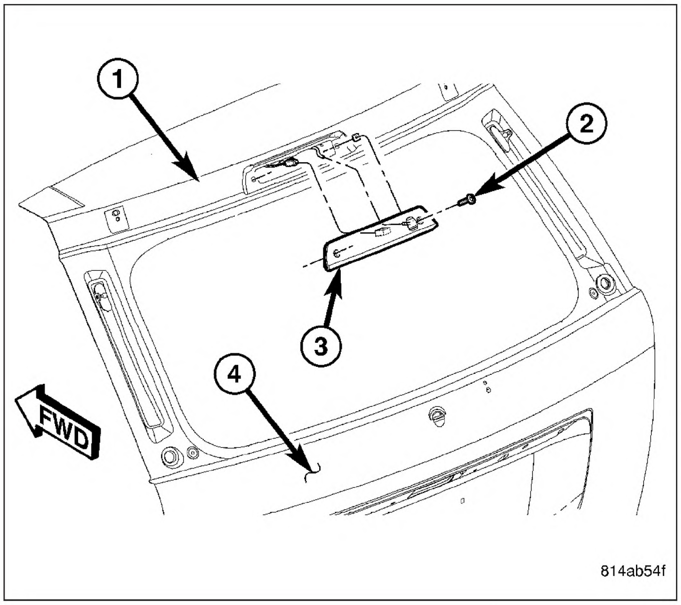
3. Install the screws attaching the CHMSL (2) to the liftgate (1).
4. Connect battery negative cable.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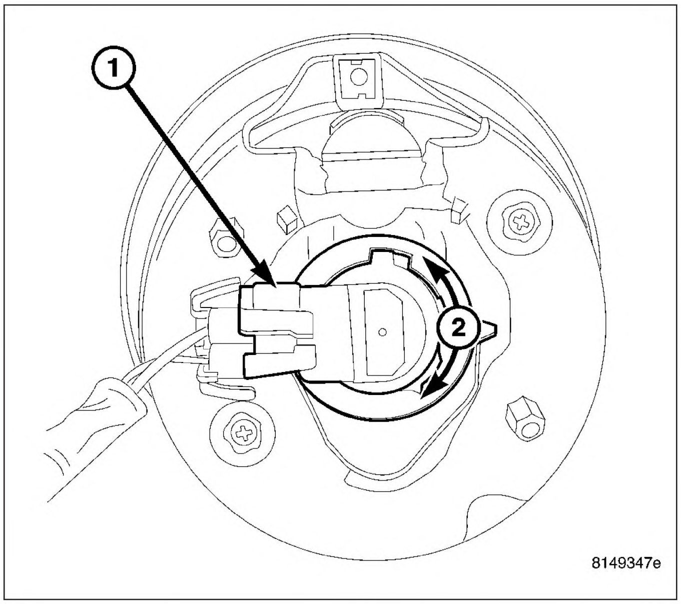
FOG LAMP

REMOVAL

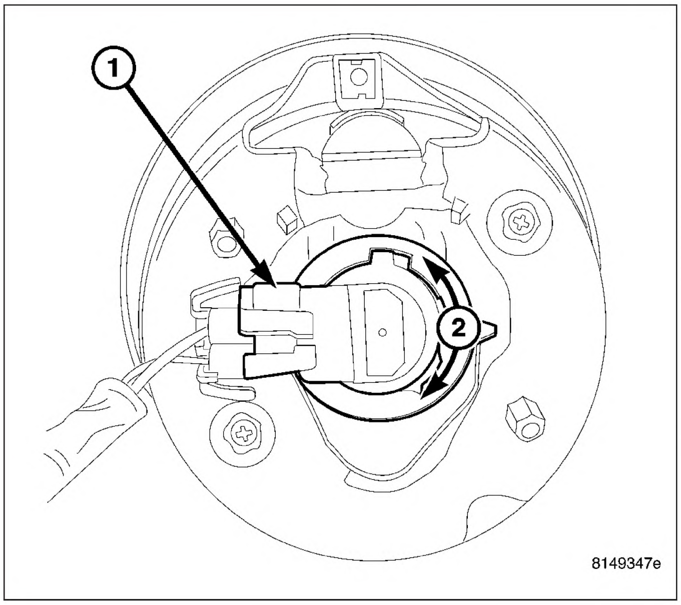
1. Access the rear of the fog lamp assembly by removing the inner fender well to lower front fasica push pins.
2. Disconnect the fog lamp harness connector from the fog lamp (1).
3. Rotate the fog lamp (1) 1/4 turn counterclockwise.
4. Remove the fog lamp from lamp unit.



INSTALLATION

CAUTION: Do not touch the bulb glass with fingers or other oily surfaces. Reduced bulb life will result.

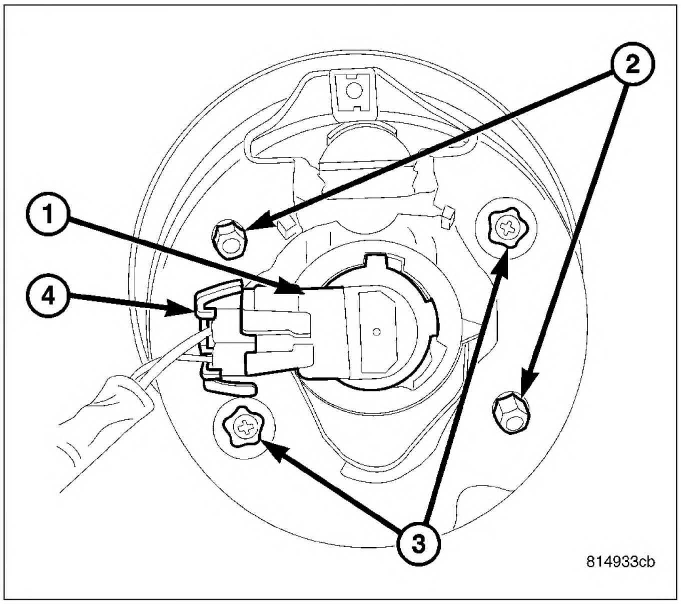
1. Position the fog lamp (1) in fog lamp unit.
2. Rotate the fog lamp 1/4 turn clockwise.
3. Connect the fog lamp harness connector.
4. Align the inner fender well with the lower front fascia and install the push pins.



FOG LAMP UNIT

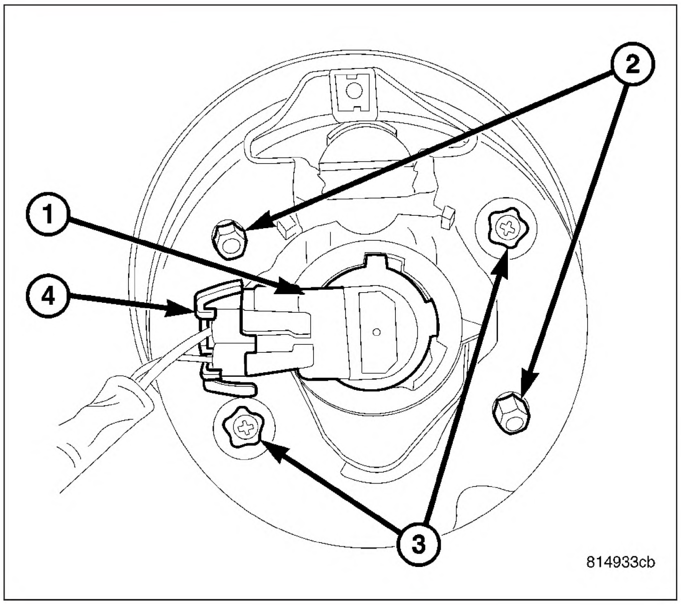
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Access the rear of the fog lamp assembly by removing the inner fender well to lower front fascia push pins.
3. Disengage the fog lamp electrical connector (4).
4. Grasp the fog lamp (1) and rotate the quarter turn counterclockwise to release the lamp (1) from the housing.
5. Remove the two fog lamp unit screws (3) and remove the fog lamp through the front of the lower fascia.



INSTALLATION

1. Position the fog lamp unit in the lower fascia. There are two alignment dowels (2) to assist in this step.
2. Install the two screws (3) attaching fog lamp unit to fascia.
3. Install the fog lamp (1) and turn it one quarter turn clockwise.
4. Connect the fog lamp electrical connector (4).
5. Align the fog lamp, if necessary (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ FOG LAMP UNIT - ADJUSTMENTS).
6. Align the inner wheel well with the lower front fascia and install push pins.
7. Connect the battery negative cable.



ADJUSTMENTS

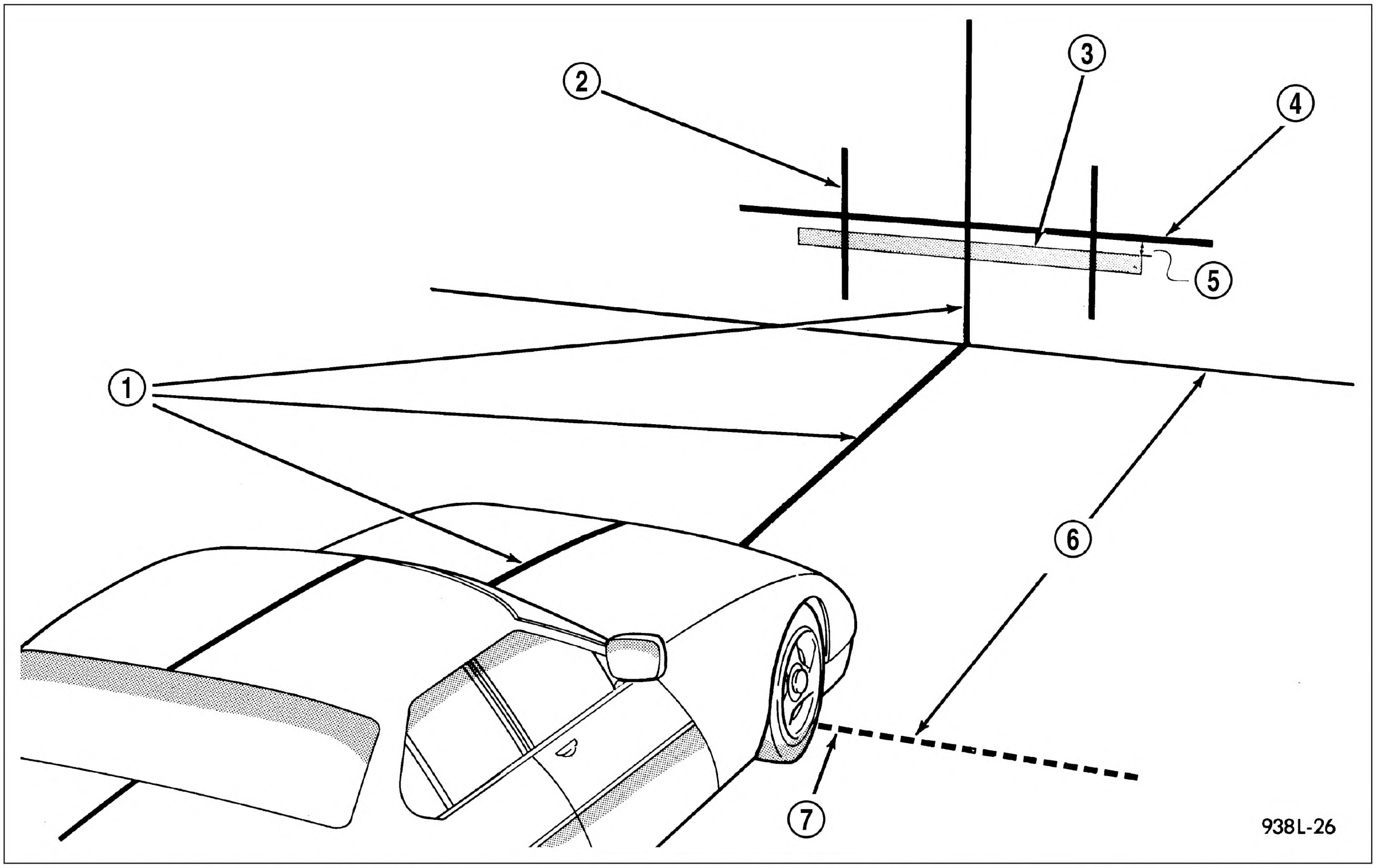
FOG LAMP ALIGNMENT

VEHICLE PREPARATION FOR LAMP ALIGNMENT

1. Verify headlamp dimmer switch and high beam indicator operation.
2. Correct defective components that could hinder proper lamp alignment.
3. Verify proper tire inflation.
4. Clean lamp lenses.
5. Verify that luggage area is not heavily loaded.

6. Fuel tank should be FULL. Add 2.94 kg (6.5 lbs.) of weight over the fuel tank for each estimated gallon of missing fuel.

LAMP ALIGNMENT SCREEN PREPARATION

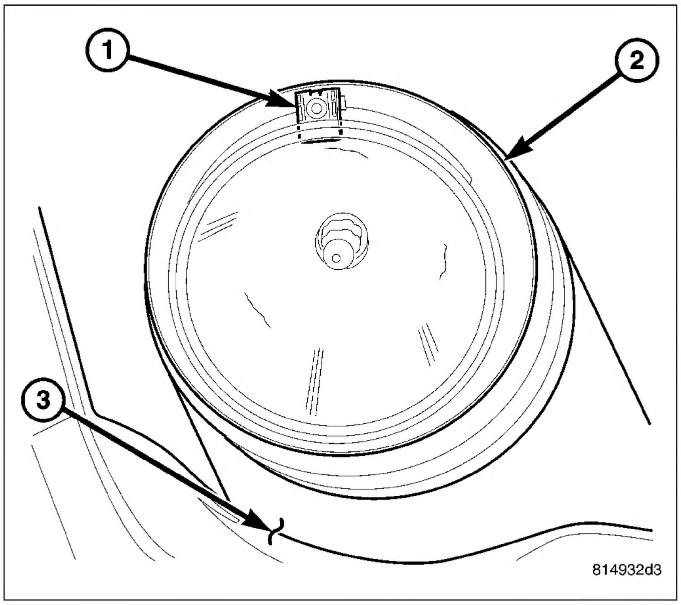


1. Position vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 ft) away (6) from front of headlamp lens.
2. If necessary, tape a line on the floor (7) 7.62 meters (25 ft) away from and parallel to the wall.
3. Measure from the floor up 1.27 meters (5 ft) and tape a line on the wall at the centerline of the vehicle. Sight along the centerline of the vehicle (from rear of vehicle forward) to verify accuracy of the line placement (1).
4. Rock vehicle side-to-side three times to allow suspension to stabilize.
5. Jounce front suspension three times by pushing downward on front bumper and releasing.
6. Measure the distance from the center of fog lamp lens to the floor. Transfer measurement to the alignment screen (4). Use this line for up/down adjustment reference.
7. Measure distance from the centerline of the vehicle to the center of each fog lamp being aligned. Transfer measurements to screen (with tape) to each side of vehicle centerline. Use these lines for left/right adjustment reference.

FOG LAMP ADJUSTMENT

A properly aligned fog lamp will project a pattern on the alignment screen 100 mm (4 in.) below the fog lamp centerline and straight ahead.

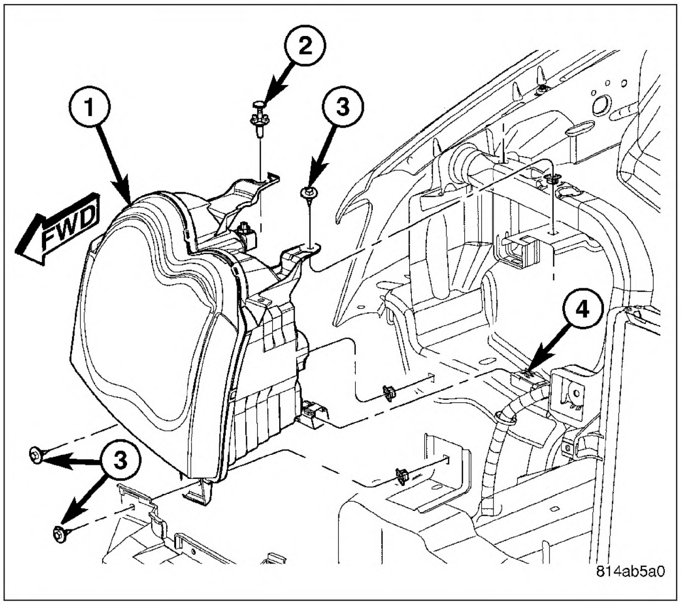
Rotate the adjustment screw (1) to adjust beam height (2).



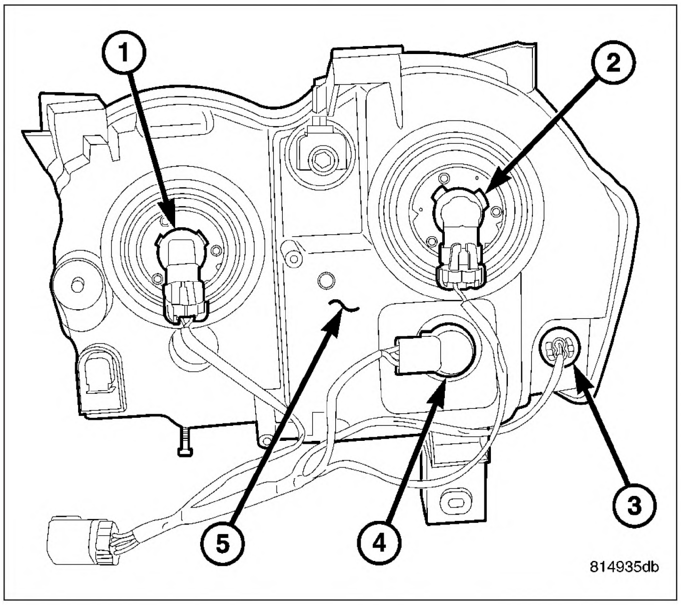
HEADLAMP

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).



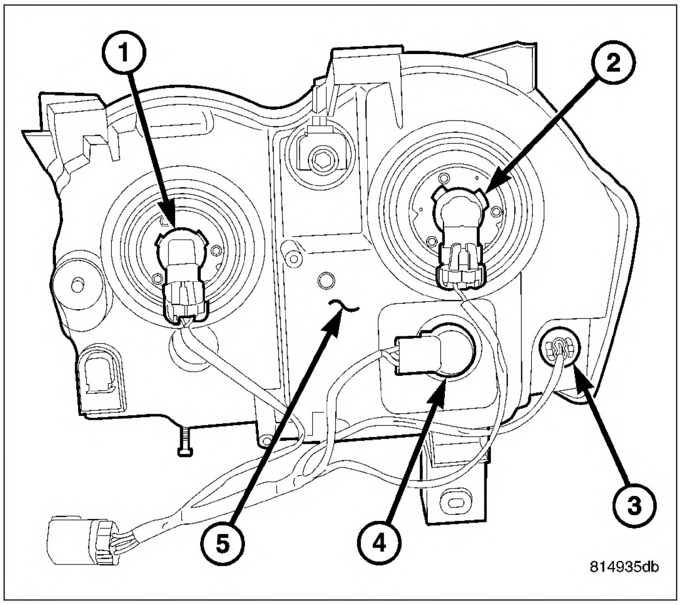
3. Turn the high or low beam lamp (1 or 2) one quarter turn counter clockwise.
4. Disconnect the electrical connector from lamp.



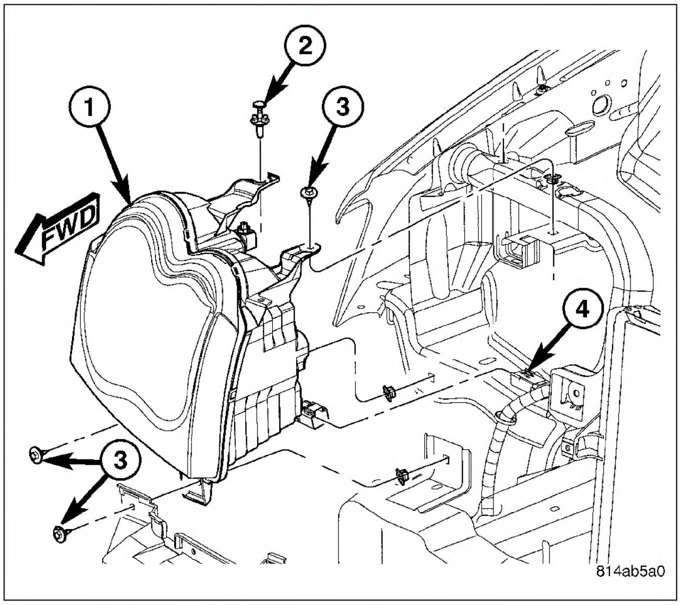
INSTALLATION

CAUTION: Do not touch the bulb glass with fingers or other oily surfaces. Reduced bulb life will result.

1. Position the high or low beam lamp (1 or 2) into the head lamp unit (5).
2. Position the lamp (1 or 2) in headlamp unit (5) and turn the lamp one quarter turn clockwise.
3. Connect the lamp (1 or 2) electrical connector.



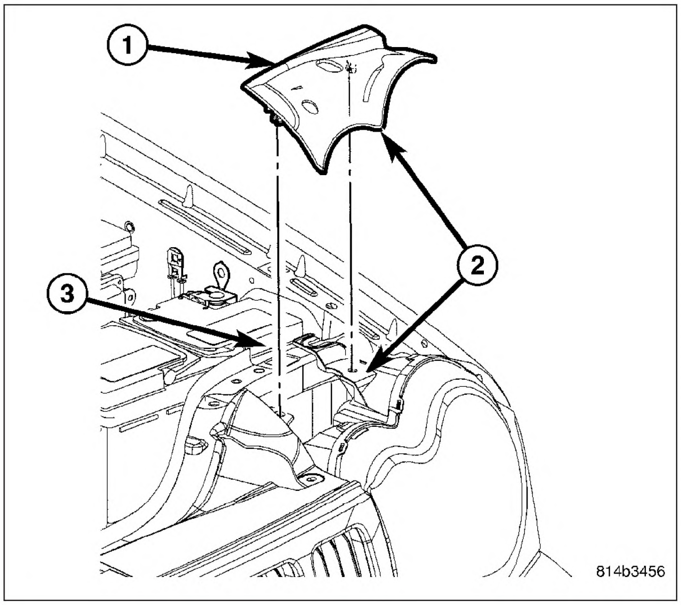
4. Install the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).


1
2
3
FWD
4
3
814ab5a0

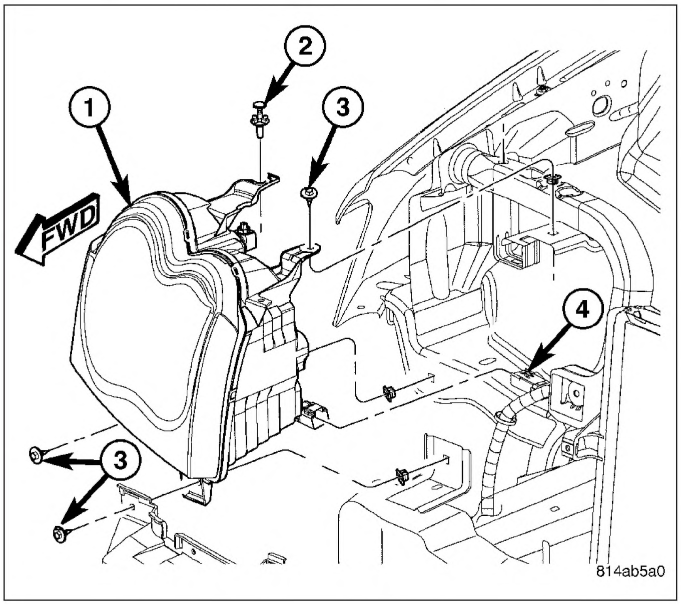
HEADLAMP UNIT

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the headlamp cover (1).


1
2
3
814b3456

3. Remove the mounting fasteners.
4. Disconnect the headlamp unit electrical connector (4).
5. Separate the headlamp from vehicle.

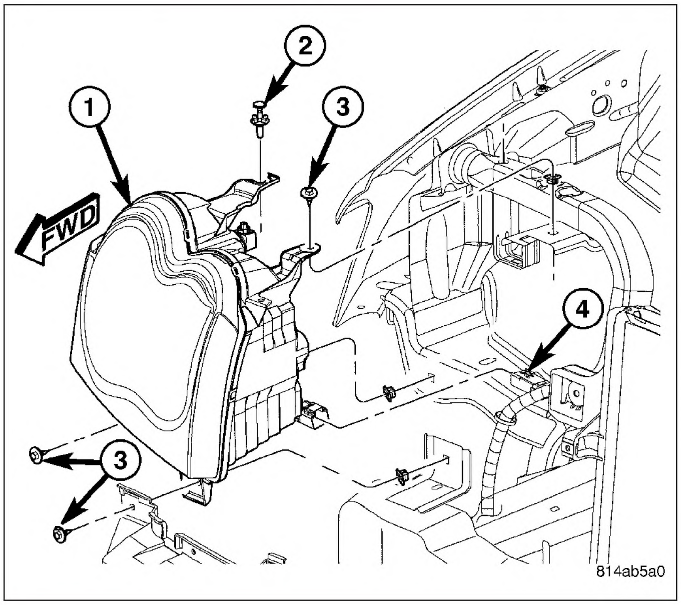


INSTALLATION

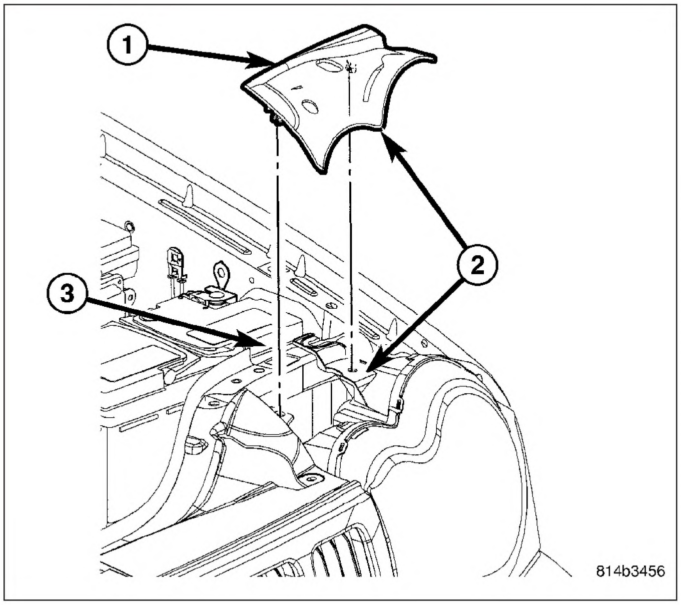
CAUTION: Do not touch the bulb glass with fingers or other oily surfaces. Reduced bulb life will result.

NOTE: If installing a new headlamp unit, transfer all the wiring, bulbs, and sockets to the new unit.

1. Install all of the bulb sockets in headlamp (1).
2. Position the headlamp on the vehicle.
3. Connect the electrical connector (4).
4. Push the headlamp inward to secure into position.
5. Install mounting fasteners (2 & 3).



6. Install cover (1) over headlamp.
7. Connect battery negative cable.



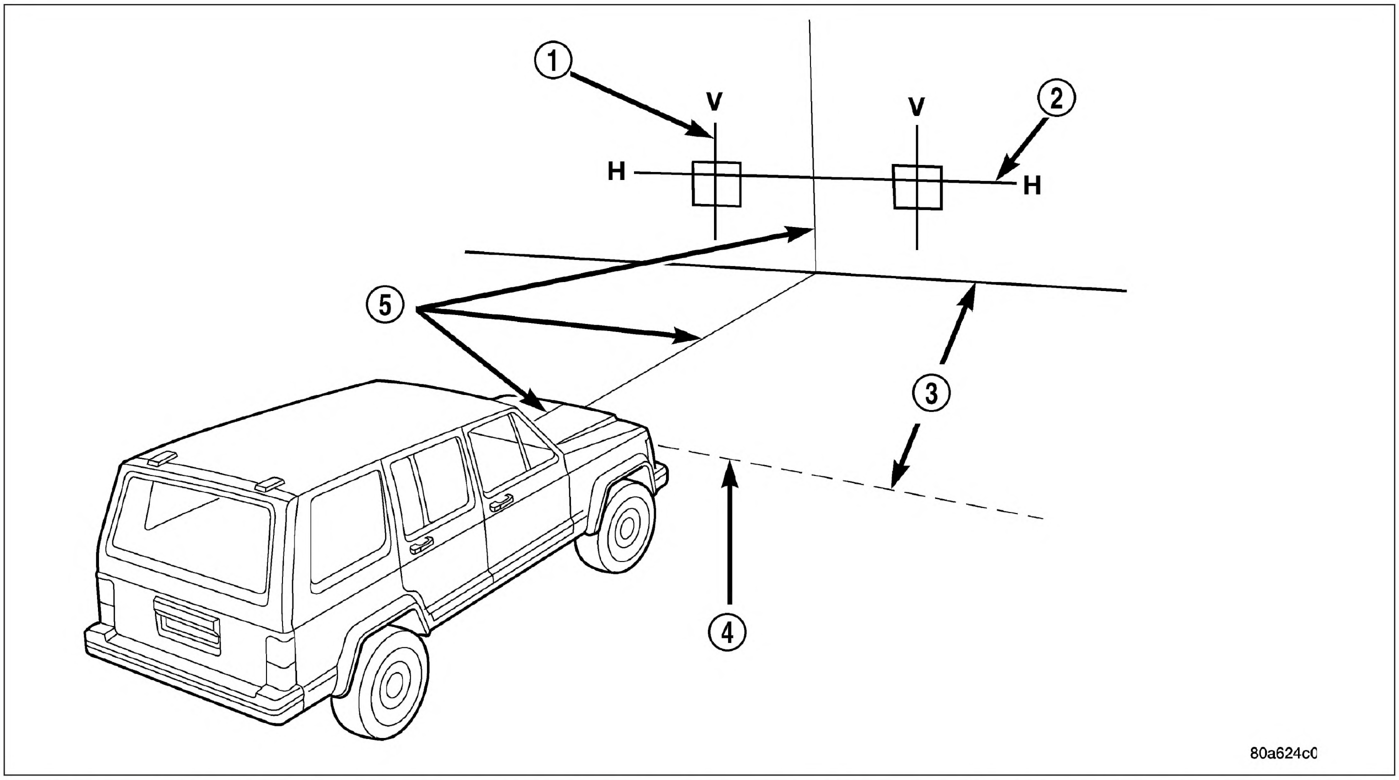
ADJUSTMENTS

HEADLAMP UNIT ALIGNMENT

VEHICLE PREPARATION FOR LAMP ALIGNMENT

1. Verify headlamp dimmer switch and high beam indicator operation.
2. Correct defective components that could hinder proper lamp alignment.
3. Verify proper tire inflation.
4. Clean lamp lenses.
5. Verify that luggage area is not heavily loaded.
6. Fuel tank should be FULL. Add 2.94 kg (6.5 lbs.) of weight over the fuel tank for each estimated gallon of missing fuel.

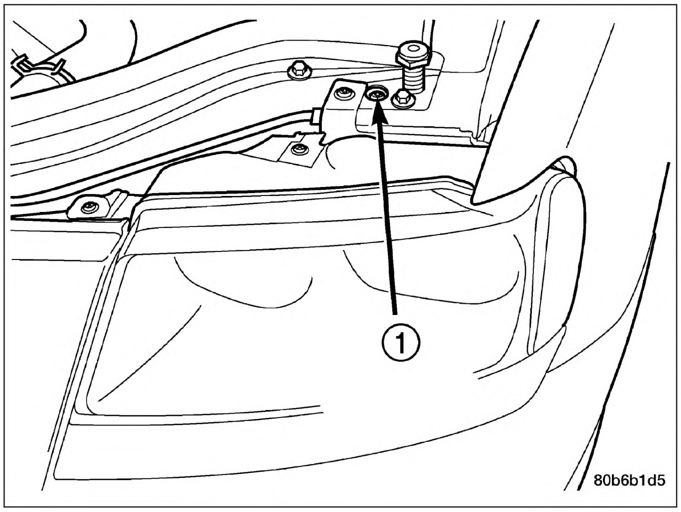
LAMP ALIGNMENT SCREEN PREPARATION



1. Position vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 ft) away from front of headlamp lens.
2. If necessary, tape a line on the floor 7.62 meters (25 ft) away from and parallel to the wall.
3. Measure from the floor up 1.27 meters (5 ft) and tape a line on the wall at the centerline of the vehicle. Sight along the centerline of the vehicle (from rear of vehicle forward) to verify accuracy of the line placement.
4. Rock vehicle side-to-side three times to allow suspension to stabilize.
5. Jounce front suspension three times by pushing downward on front bumper and releasing.
6. Measure the distance from the center of headlamp lens to the floor. Transfer measurement to the alignment screen (with tape). Use this line for up/down adjustment reference.
7. Measure distance from the centerline of the vehicle to the center of each headlamp being aligned. Transfer measurements to screen (with tape) to each side of vehicle centerline. Use these lines for left/right adjustment reference.

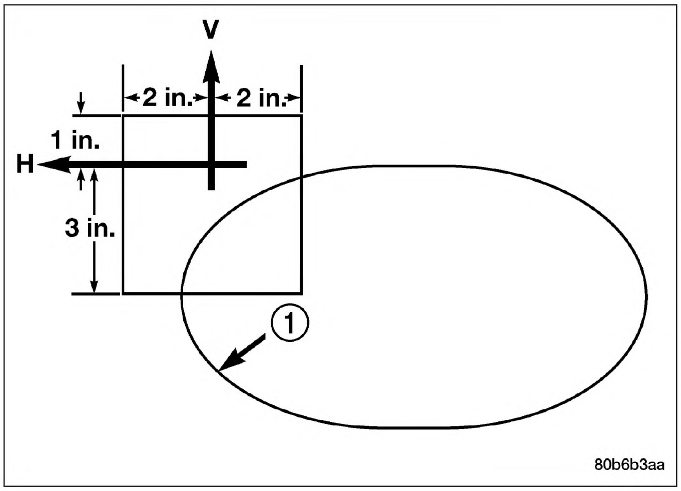
HEADLAMP ADJUSTMENT

1. Clean front of the headlamps.
2. Place headlamps on LOW beam.
3. Cover front of the headlamp that is not being adjusted.



A properly aimed low beam will project the top edge of the beam intensity pattern on the screen from 25 mm (1 in.) above to 75 mm (3 in.) below headlamp centerline. The side-to-side left edge of the beam intensity pattern should be from 50 mm (2 in.) left to 50 mm (2 in.) right of headlamp centerline.

4. Turn adjustment screw until the top edge of the beam intensity pattern is positioned within 25 mm (1 in.) above or 75 mm (3 in.) below the headlamp horizontal centerline.
5. Cover front of the headlamp and adjust the other headlamp beam as instructed below.
6. Rotate the adjustment screw until the top edge of the beam intensity pattern is positioned within 25 mm (1 in.) above or 75 mm (3 in.) below the headlamp horizontal centerline.



LEFT MULTI-FUNCTION SWITCH

DESCRIPTION

The left multi-function switch, its mounting provisions, and its electrical connections are all concealed beneath the steering column shrouds, just below the steering wheel.

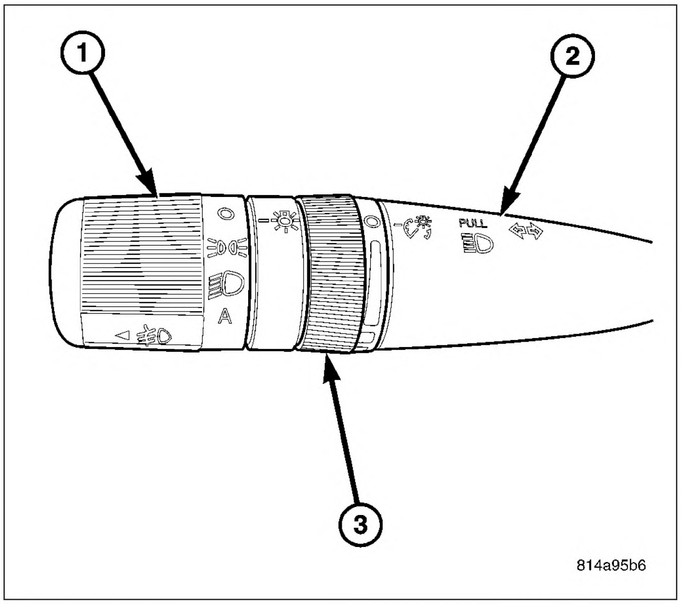
A single connector with eleven terminal pins is integral to the switch housing and connects the switch to the Steering Control Module (SCM).

The left multi-function switch supports the following exterior lighting functions:

- Auto Headlamps
- Front Fog Lamps
- Headlamps
- Headlamp Beam Selection
- Headlamp Optical Horn
- Park Lamps
- Turn Signal Control

The left multi-function switch also supports the following interior lighting functions:

- Interior Lamps Defeat
- Panel Lamps Dimming
- Parade Mode
- Interior Lamps On



The left multi-function switch cannot be adjusted or repaired. If any function of the switch is faulty, or if the switch is damaged, the entire switch unit must be replaced.

OPERATION

The left multi-function switch uses a combination of resistor multiplexed switched outputs to control the many functions and features it provides using a minimal number of hard wired circuits. Following are descriptions of how the left multi-function switch operates to control the many exterior lighting functions and features it provides:

- **Auto Headlamps** - The automatic headlamps feature is provided by the Front Control Module (FCM), which monitors an input from a photodiode sensor located on the top of the instrument panel to detect ambient light levels whenever the ignition switch is in the On position. Based upon the multiplexed input from the left multi-function switch and the input of the photodiode sensor, the FCM controls outputs to the park lamp and headlamp relays to illuminate or extinguish all exterior lighting.
- **Front Fog Lamps** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, controls an output to the front fog lamp relay to illuminate or extinguish the front fog lamps.
- **Headlamps** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, controls an output to the headlamp low or high beam relays to illuminate or extinguish the headlamps.
- **Headlamp Beam Selection** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, controls an output to the headlamp low or high beam relays to activate the selected headlamp beam.
- **Headlamp Optical Horn** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, controls an output to the headlamp high beam relay to activate the headlamp high beams.
- **Park Lamps** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, controls an output to the park lamp relay to illuminate or extinguish the parking lamps.
- **Turn Signal Control** - The left multi-function switch control stalk actuates the turn signal switch. The FCM monitors the left multi-function switch then, based upon that multiplexed input, provides a variable voltage output to control the lighting of the turn signals.

Following are descriptions of the how the left multi-function switch operates to control the many interior lighting functions and features it provides:

- **Panel Lamps Dimming** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, provides a variable voltage output through several panel lamps driver circuits to control the lighting of many incandescent panel lamps. The FCM also sends panel lamps dimming messages over the Controller Area Network (CAN) data bus to other modules to control display lighting levels in those modules.
- **Interior Lamps Defeat** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, internally disables the function the FCM normally provides to control the illumination of the interior lamps.
- **Parade Mode** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, provides a voltage output through several panel lamps driver circuits to control the lighting of many incandescent panel lamps. The FCM also sends panel lamps dimming messages over the CAN data bus to other modules on the bus to control lighting levels in those modules.
- **Interior Lamps On** - The FCM monitors the left multi-function switch then, based upon that multiplexed input, provides a control output to activate all of the interior lamp circuits.

DIAGNOSIS AND TESTING

LEFT MULTI-FUNCTION SWITCH

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

The left multi-function switch can be diagnosed using conventional diagnostic tools and methods. However, proper testing of the multiplexed inputs to the Steering Control Module (SCM) requires the use of a diagnostic scan tool. (Refer to 19 - STEERING/COLUMN/STEERING CONTROL MODULE - DIAGNOSIS AND TESTING) for the appropriate diagnostic information.

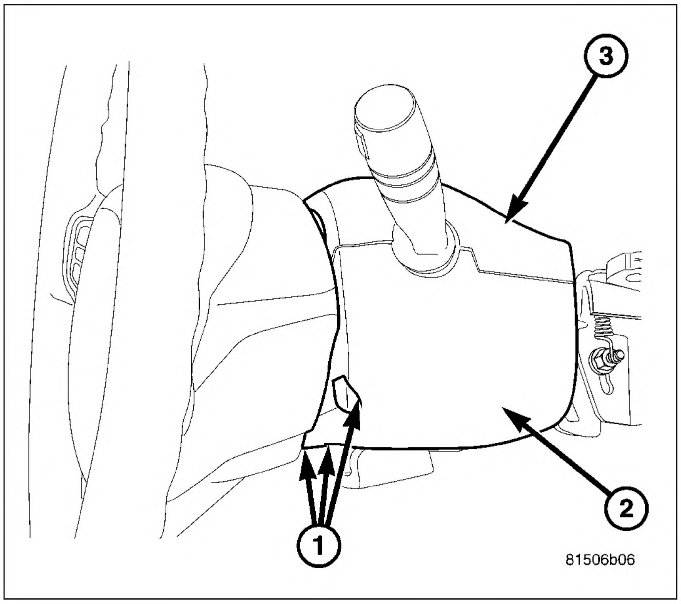
REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

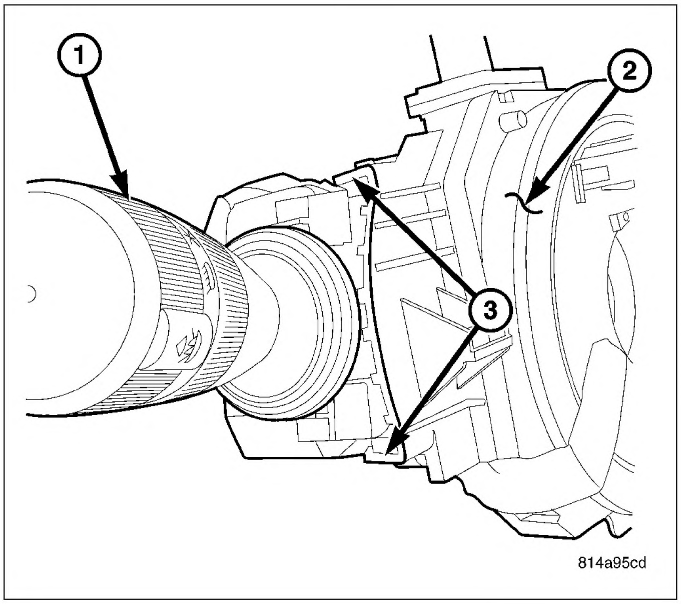
1. Disconnect and isolate the battery negative cable.

WARNING: Wait two minutes for the airbag system reserve capacitor to discharge before performing further diagnosis or service.

2. From below the steering column, remove the three screws (1) that secure the lower steering column shroud (2) to the multi-function switch mounting housing.
3. Using hand pressure, push gently inward on both sides of the upper shroud (3) near the parting line between the upper and lower shrouds to release the snap features that secure the two shroud halves together.



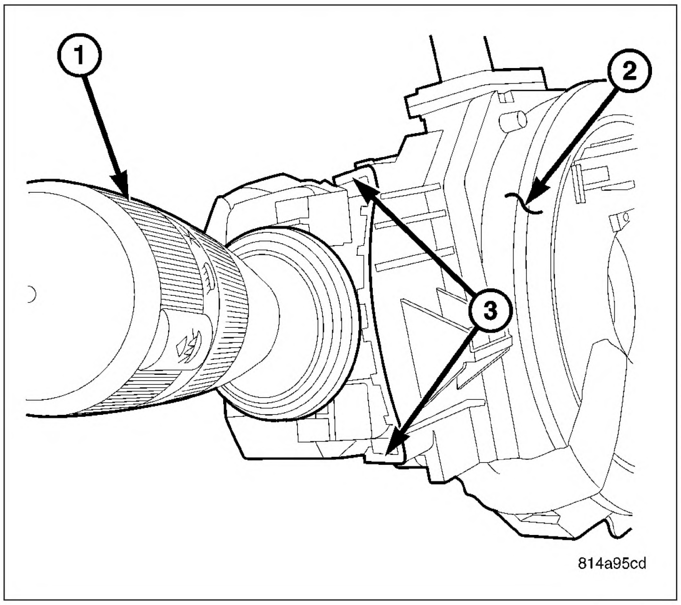
4. Remove both the upper and lower shrouds from the steering column.
5. Remove the Steering Control Module (SCM) from the steering column (Refer to 19 - STEERING/ COLUMN/STEERING COLUMN CONTROL MODULE - REMOVAL).
6. Remove the two screws that secure the left multi-function switch (1) to the SCM (2).
7. Disengage the two retaining tabs (3), next to the screw mounts that secure the left multi-function switch to the SCM.
8. Disconnect the left multi-function switch from the SCM.



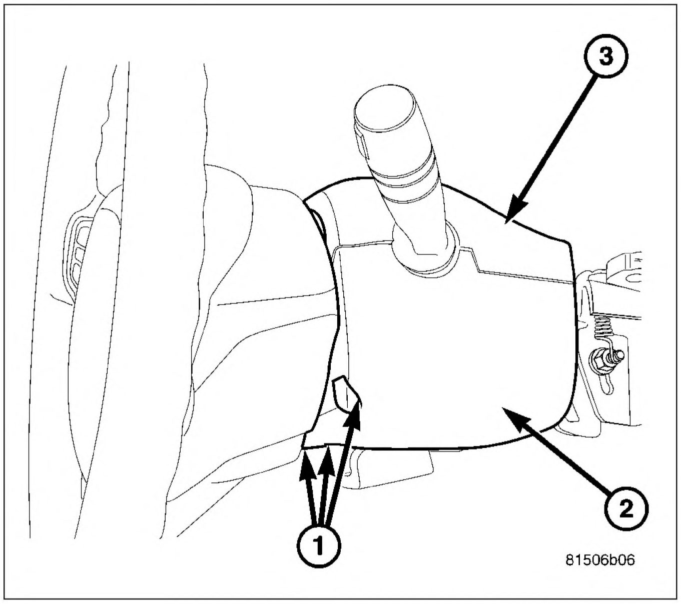
INSTALLATION

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury.

1. Position the left multi-function switch (1) onto position on the Steering Control Module (SCM) (2).
2. Engage the two retaining tabs, next to the screw mounts that secure the left multi-function switch and firmly snap into place.
3. Install the two screws (3) that secure the left multi-function switch to the SCM. Tighten the screws to 2.5 N·m (22 in. lbs.).



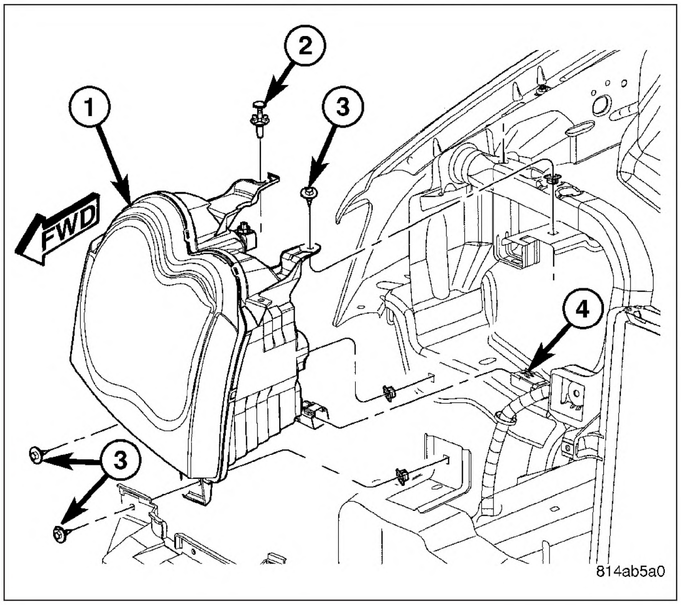
4. Position the lower steering column shroud (2) to the underside of the steering column.
5. Install the three screws (1) that secure the lower steering column shroud to the multi-function switch mounting housing. Tighten the screws to 2 N·m (17 in. lbs.).
6. Position the upper column shroud (3) over the steering column with the hazard warning switch button inserted through the hole in the upper shroud.
7. Align the snap features on the upper and lower shrouds and apply hand pressure to snap them together.
8. Reconnect the battery negative cable.



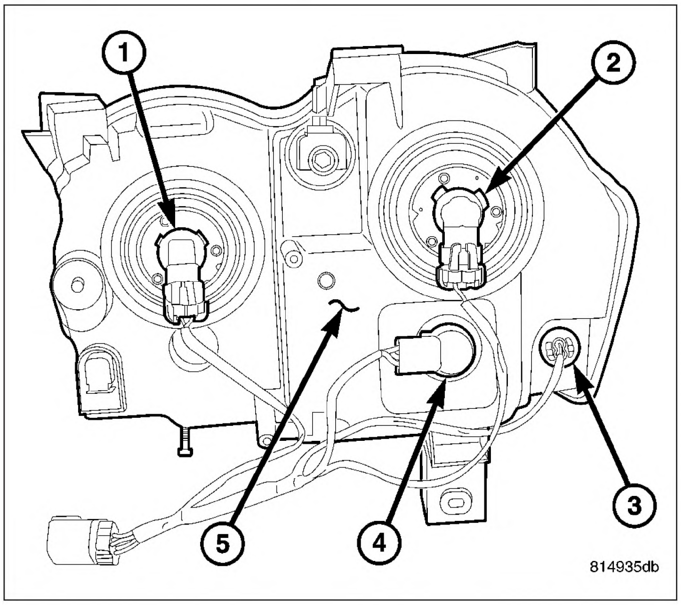
PARK/TURN SIGNAL LAMP

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

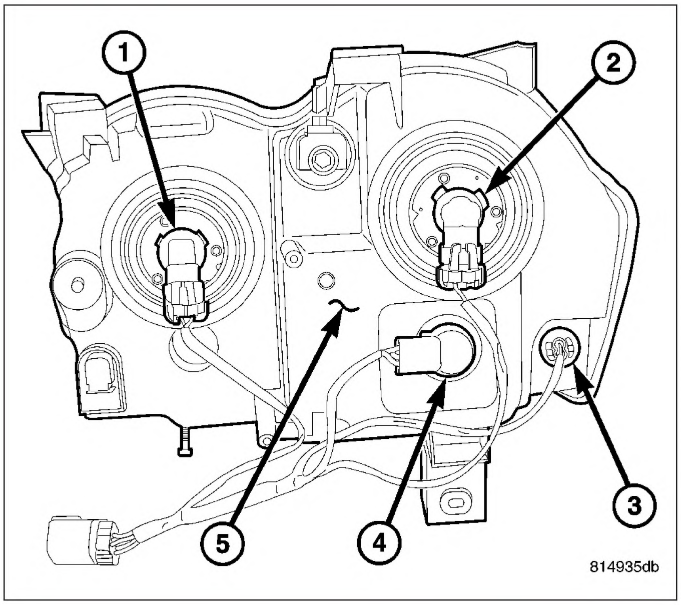


3. Rotate the turn signal bulb socket (4) 1/4 turn counter clockwise.
4. Remove the bulb socket (4) from the headlamps unit (5).
5. Remove the bulb from socket.

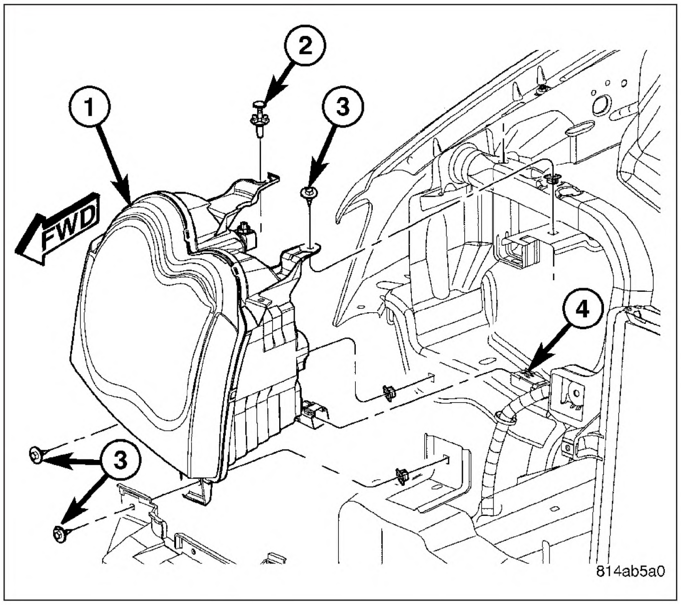


INSTALLATION

1. Press the bulb into socket.
2. Position the bulb socket (5) into headlamp unit (5).
3. Rotate the turn signal bulb socket (4) 1/4 turn clockwise.

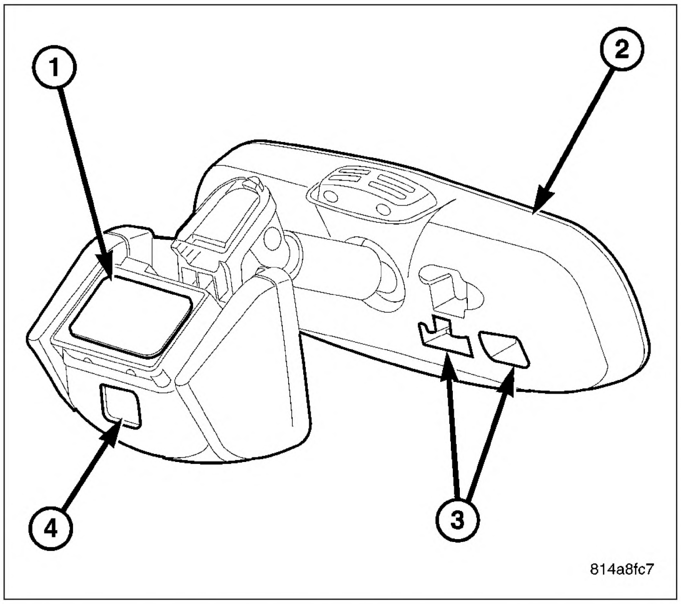


4. Install the headlamp unit (1) (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).
5. Connect the battery negative cable.



SMARTBEAM

DESCRIPTION



SmartBeam (4) is integrated into the interior rearview mirror (2). It uses digital light-sensing technology to monitor the lighting and traffic conditions in front of the vehicle. SmartBeam enhances the vehicle’s headlamp system by assisting the driver with the task of turning the vehicle’s high-beams ON and OFF according to surrounding traffic conditions. It helps improve forward visibility during nighttime driving by initiating high-beam usage as ambient lighting and traffic conditions allow.

When the SmartBeam system is enabled, it is dark enough to justify use of high beams, the vehicle is moving over 20 mph, and no other traffic is present, the high beams will gradually turn on. When the system detects an approaching vehicle’s headlamps or a preceding vehicle’s tail lamps, the high-beams will turn off.

Depending on the driving scenario, SmartBeam may fade the high-beams on and off, or control them off instantly. The high-beam indicator on the instrument panel will illuminate as soon as the high-beams start to come on, and will remain on until the high-beams have faded off completely. All SmartBeam-equipped vehicles, however, will quickly turn off the high-beams if the system detects the sudden presence of vehicle lights ahead. SmartBeam does not prevent the driver from using the high-beams manually. Flash-to-pass is still functional with SmartBeam.

OPERATION

The lighting control switch, located on the left stalk, must be in the Auto position labeled ″A″ on the stalk. The system can return to manual control by pulling the stalk towards rearward. A partial pull will momentarily power the high beams (flash-to-pass). A complete pull will override SmartBeam. A message will temporarily appear in the reconfigurable display to confirm. Also, the high beams will change from on to off, or off to on, with a complete pull.

SmartBeam will only activate the high-beams when traveling at speeds in excess of 20 mph. If the high-beams are on while decelerating and approaching a full stop, the system will turn them off at approximately 15 mph.

SmartBeam senses lighting conditions directly ahead of the vehicle. In certain situations, such as hills or winding roads, it may be more comfortable manually overriding the system because the vehicles in front may not be in SmartBeam's field of view. However, it is not likely to be causing discomforting glare to other drivers.

SmartBeam's light sensor is located on the inside of the vehicle in front of the interior rearview mirror. Because it looks through the windshield, the system may not function properly if this area is covered with ice, dirt, haze or any other obstruction. SmartBeam may not function properly if its field of view is obscured. The SmartBeam is not serviceable seperately from the inside rear view mirror. If the light sensor is damaged or faulty, the entire inside rear view mirror must be replaced (Refer to 23 - BODY/INTERIOR/REAR VIEW MIRROR - REMOVAL).

For optimal system performance, The light-sensor window must be cleaned periodically, as it may haze over due to the air quality in the vehicle passenger compartment. Spray a small amount of glass cleaner onto a soft cloth and gently clean the sensor window. Do not spray the glass cleaner directly on the sensor window.

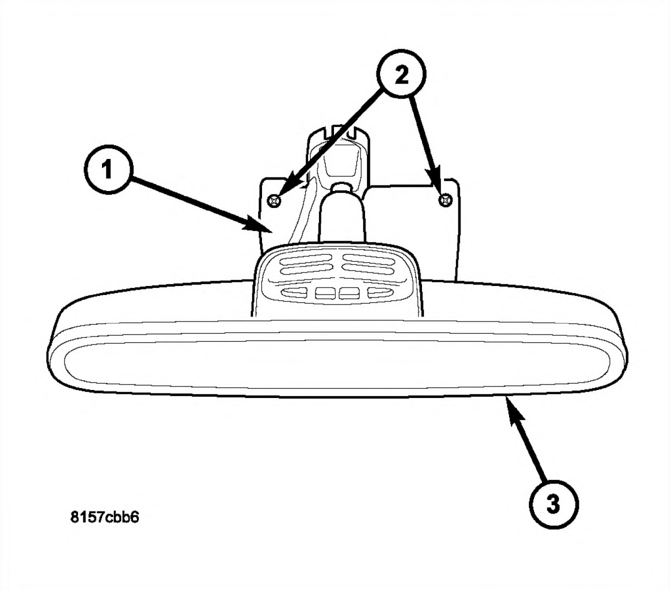
For optimal system performance, the Smartbeam camera should be re-aimed by the dealer to insure that the camera is properly centered on the road ahead. If the camera is not aimed relative to the new vehicle environment (replaced windshield or button) the system performance may be diminished or altered.

STANDARD PROCEDURE

IMAGER SHIM ADJUSTMENT

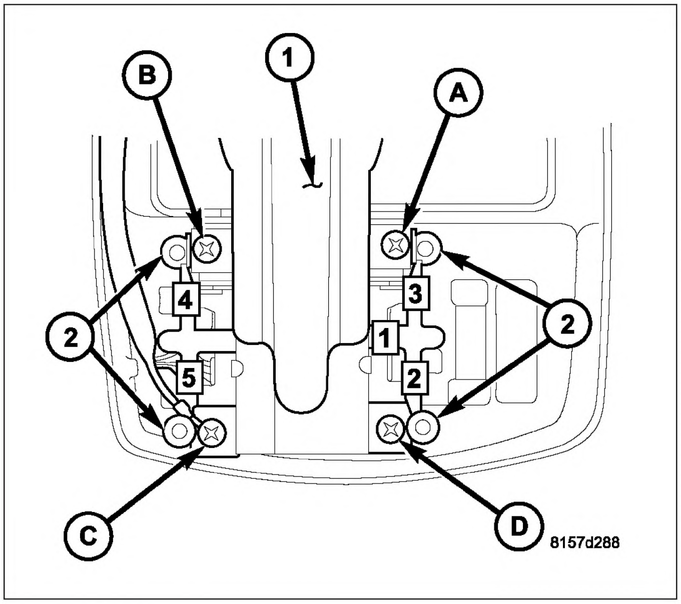
NOTE: The following adjustment procedure is used to adjust the SmartBeam imager (camera) ONLY after the SmartBeam Calibration Procedure has resulted in a "High Beam Camera Alignment Performance Fault - Left, Right, Top or Bottom" Diagnostic Trouble Code (DTC) or a combination of any two of these faults being set. The imager is assembled to a mounting bracket on the inside rear view mirror with four screws. Four stepped plastic shims along with an integral plastic tree that joins them are factory assembled between the mounting bracket and the imager at the time of manufacture, a single shim at each screw location. The following procedure details the proper procedure for repositioning the appropriate shims to correct each fault or combination of faults. However, retrieval and erasure of the DTC to complete and verify the procedure will require the use of a diagnostic scan tool. Refer to the appropriate diagnostic procedures.

1. Using a diagnostic scan tool, read and record the SmartBeam (also referred to as the Automatic High Beam Module/AHBM) Diagnostic Trouble Code (DTC) data. Refer to the appropriate diagnostic procedures.
2. Adjust the inside rear view mirror head (3) downward far enough to access and remove the two screws (2) that secure the rear cover (1) to the imager housing.
3. Adjust the mirror head up toward the headliner to its uppermost position.
4. Unsnap and pull the upper edge of the rear cover away from the imager housing far enough to disengage the tabs at the lower edge of the cover, then remove the cover from the housing.



NOTE: If more than one High Beam Camera Alignment Performance Fault DTC was retrieved, then the appropriate screws should be loosened and their shims relocated for both of the two faults as outlined in the following steps. One screw and one shim will be common to both of the faults. In this case, the total amount of available correction will be slightly diminished from that available for a single fault but, in most cases, this action should result in a sufficient amount of correction to remedy both fault conditions.

5. Carefully cut the plastic tree for the shims (2) at the appropriate location or locations for the fault or fault combination as shown in the preceding graphic and listed in the Imager Adjustment Table that follows.



IMAGER ADJUSTMENT TABLE		
High Beam Camera Alignment Performance Fault	**Shim Tree Cut Location(s) - (Boxed Numbers In Graphic)**	**Shim Screw Locations - (Circled Letters In Graphic)**
Right	(1)	(A) & (D)
Left	(1)	(B) & (C)
Top	(3) & (4)	(A) & (B)
Bottom	(2) & (5)	(C) & (D)

6. Locate those screws on the rear view mirror bracket (1) at the appropriate locations for the fault or fault combination as shown in the preceding graphic and listed in the preceding Imager Adjustment Table, then loosen each of those screws one-half turn (counterclockwise).
7. Slide the shim beneath each of the loosened screws to its most outboard position.
8. Tighten each of the loosened screws to secure the imager and shims to the mirror bracket. Tighten the screws to 0.8 N·m (7 in. lbs.).
9. Engage the tabs at the lower edge of the rear cover to the bottom of the imager housing. Be certain that the imager wiring is held against the mirror bracket, then snap the upper edge of the cover into place on the housing.
10. Install and tighten the two screws that secure the rear cover to the imager housing. Tighten the screws to 0.7 N·m (6 in. lbs.).
11. Use the diagnostic scan tool to erase any SmartBeam DTC data. Refer to the appropriate diagnostic information.
12. The SmartBeam calibration procedure should be performed following any imager shim adjustment procedure. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/SMARTBEAM - STANDARD PROCEDURE - SMARTBEAM CALIBRATION).

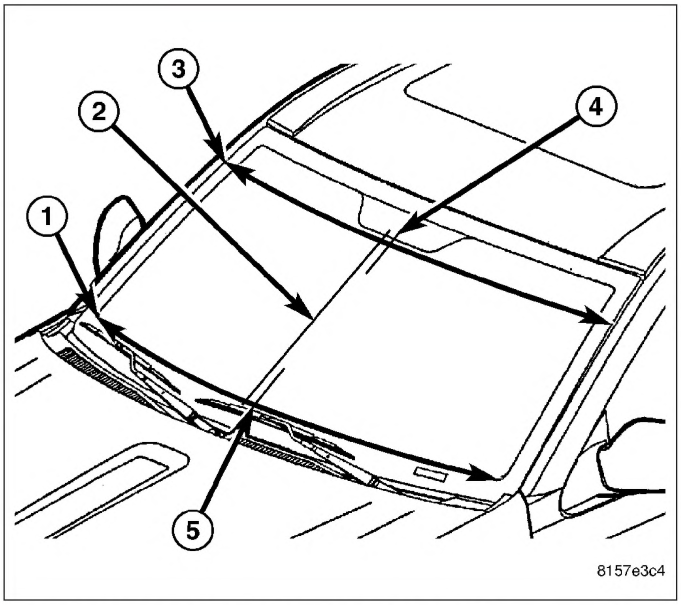
SMARTBEAM CALIBRATION

SmartBeam calibration must be performed after the inside rear view mirror is replaced with a new unit, and may also be required following any rear view mirror mounting button or windshield replacement procedure. The calibration procedure ensures that the field of vision for the SmartBeam imager is aimed at the proper path directly ahead of the vehicle. New and unused replacement SmartBeam units are shipped in calibration mode, which will be indicated by a continuously flashing electrochromic mirror Light Emitting Diode (LED) while the ignition switch is in the On position. Complaints of poor or improper system performance following mirror mounting button or windshield replacement indicate the need for SmartBeam calibration.

VEHICLE PREPARATION FOR SMARTBEAM CALIBRATION

1. Be certain that the imager lens and the windshield glass in front of the imager lens are clean and free from obstructions.
2. Be certain that the inside rear view mirror mounting set screw is tightened to 1.7 N·m (15 in. lbs.).
3. Repair or replace any faulty, worn or damaged suspension components that could hinder proper SmartBeam calibration.
4. Verify proper tire inflation pressures.
5. Remove any accumulations of mud, snow or ice from the vehicle underbody.
6. Verify that there is no load in the vehicle (cargo or passengers), except for the driver.
7. The fuel tank should be Full. Add 2.94 kilograms (6.5 pounds) of weight over the fuel tank for each estimated gallon of missing fuel.
8. Verify correct vehicle suspension height.

MARK IMAGER CENTERLINE ON WINDSHIELD

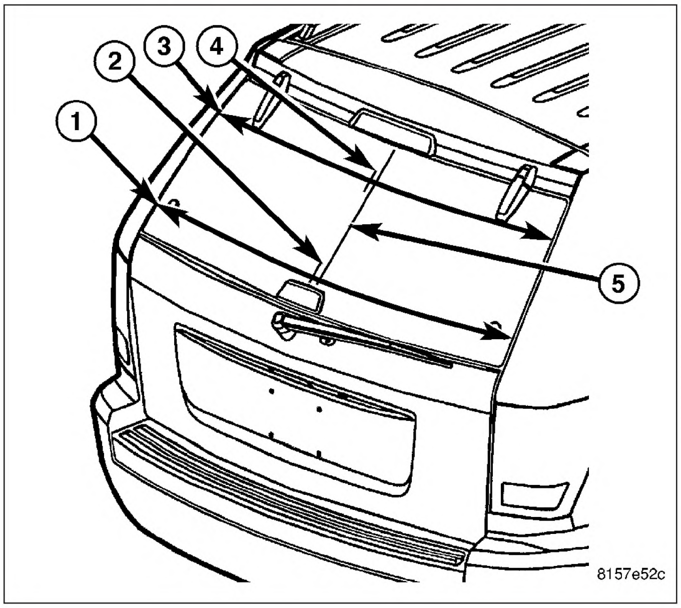


1. Take a measurement (3) across the lower edge of the tint band at the top of the windshield using the shaft of the tint band arrow within the “AS1” marking on each side of the glass as the reference points.
2. Divide the upper measurement in half and mark that dimension near the lower edge of the tint band on the glass (4) using a grease pencil. This is the upper centerline of the glass.
3. Take a measurement (1) across the upper edge of the blackout area at the base of the windshield using the inside corner where each side blackout area intersects the lower blackout area as the reference points.
4. Divide the lower measurement in half and mark that dimension near the upper edge of the lower blackout area on the glass (5) using a grease pencil. This is the lower centerline of the glass.
5. Measure and mark 21 millimeters (0.827 inches) toward the passenger side of the windshield from the upper and lower glass centerline marks and draw a line (2) between these marks. This is the centerline of the imager.

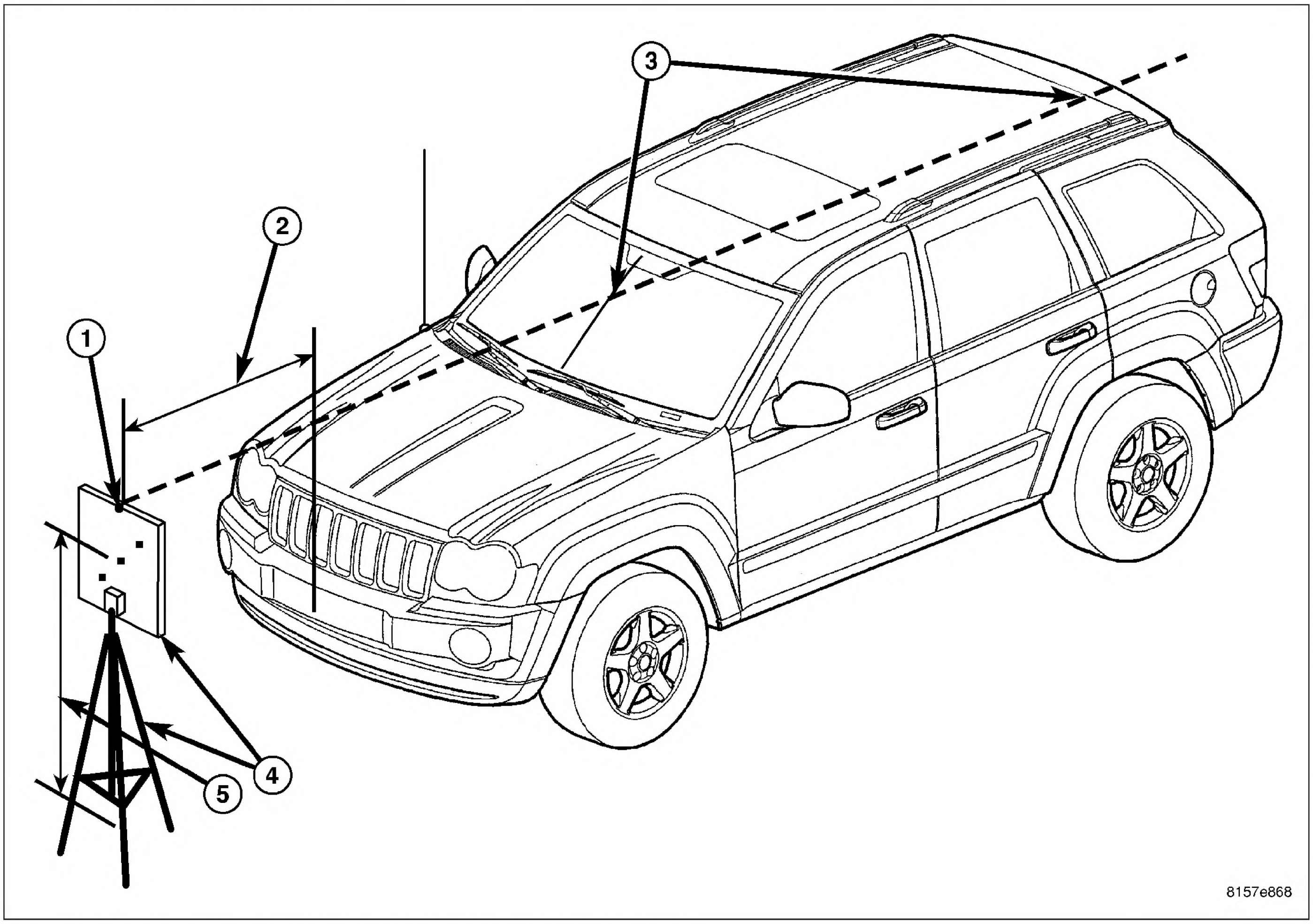
NOTE: Be certain to clean the centerline marks from the area of the glass in front of the imager lens before attempting to calibrate the SmartBeam unit.

MARK IMAGER CENTERLINE ON LIFTGATE GLASS

1. Take a measurement (3) across the lower edge of the liftgate glass hinges using the vertical edges of the body liftgate opening as the reference points.
2. Divide the upper measurement in half and mark that dimension on the glass (4) using a grease pencil. This is the upper centerline of the glass.
3. Take a measurement (1) across the lower edge of the liftgate glass strut mounts using the vertical edges of the body liftgate opening as the reference points.
4. Divide the lower measurement in half and mark that dimension on the glass (2) using a grease pencil. This is the lower centerline of the glass.
5. Measure and mark 21 millimeters (0.827 inches) toward the passenger side of the liftgate glass from the upper and lower glass centerline marks and draw a line (5) between these marks. This is the centerline of the imager.



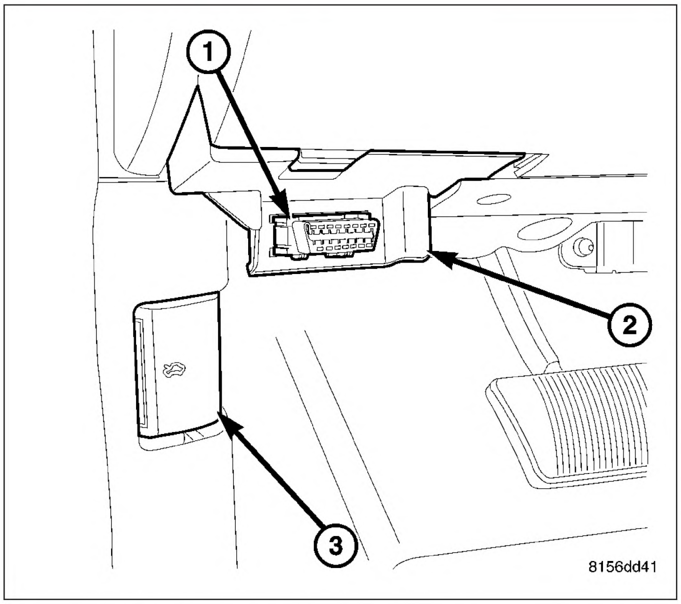
SET UP AIM BOARD AND TRIPOD



1. Position the vehicle on a level surface in a dimly lit area.
2. Place the aim board and tripod (4) (Special Tool #9649) 127 centimeters (50 inches) ahead of the foremost center of the front fascia (2).

3. Sight through the V-notch (1) in the upper edge of the aim board to align and center the board to the imager centerline marks on both the windshield and the liftgate glass (3).
4. Adjust the tripod so that the center Light Emitting Diode (LED) on the aim board is 145 centimeters (57 inches) from the level floor (5).

CALIBRATION PROCEDURE



1. For re-calibration of a previously calibrated mirror, connect a diagnostic scan tool to the Data Link Connector (DLC) (1) below the driver side end of the instrument panel (2).
2. Turn the ignition switch to the On position.
3. A new mirror will begin flashing the electrochromic LED at a rate of once-per-second to indicate that it is in calibration mode and calibration is required. For re-calibration of a previously calibrated mirror, use the diagnostic scan tool to enter the SmartBeam unit into calibration mode. Look in the diagnostic scan tool under the “SmartBeam” or “Automatic High Beam Module/AHBM” menu item as appropriate. When a previously calibrated SmartBeam unit has entered calibration mode, it will also be indicated by flashing the electrochromic LED at a rate of once-per-second.
4. Connect the aim board transformer to illuminate the aim board LED units. The electrochromic LED will continue to flash for five to ten seconds, then will stop flashing to indicate that it has completed calibration. If the LED begins to flash at a faster rate (twice-per-second), it indicates that a Diagnostic Trouble Code (DTC) has been recorded. Use the diagnostic scan tool to retrieve the DTC, then refer to the appropriate diagnostic information.

SMARTBEAM DEMONSTRATION MODE

The SmartBeam automatic high beam system has a demonstration mode. This mode allows the function of the automatic high beams accompanied with that of the high beam indicator in the instrument cluster to be demonstrated while the vehicle is stationary and under any ambient lighting conditions. Besides demonstrating the automatic high beam system, this mode will confirm that the system electronics and circuitry are functional. This mode also incorporates a feature that allows a functional test of the imager optics to be performed.

NOTE: The SmartBeam Demonstration Mode will NOT be functional when a diagnostic scan tool is connected to the 16-way Data Link Connector (DLC) beneath the instrument panel on the driver side. Once the demonstration sequence has begun, a detected vehicle speed input of over 8 kilometers-per-hour (5 miles-per-hour) will cause the sequence to be aborted and the automatic high beam system to return to normal operation.

1. With the ignition switch in the Off position, depress and hold depressed the “Auto” button on the electrochromic inside rear view mirror.
2. With the “Auto” button still depressed, turn the ignition switch to the On position.
3. Continue to hold the “Auto” button depressed until the Demonstration Mode begins (headlamp high beams and high beam indicator illuminate), at which time the button may be released.
4. The automatic high beam system will complete three cycles of ramping up the headlamp high beams to full brightness, then ramping them down until fully extinguished accompanied by the appropriate indications from the high beam indicator. At the conclusion of this sequence (about 40 seconds), the automatic high beam system will return to normal operation.

IMAGER OPTICS TEST

If the green Light Emitting Diode (LED) located on the electrochromic inside rear view mirror just to the left of the “Auto” button does not flash on and off several times when the ignition switch is turned to the On position, but the automatic high beam system is not operating as it should, the SmartBeam imager optics may be dirty or obstructed. The optics of the imager may be tested while the automatic high beam system is in the Demonstration Mode. This test will confirm that the imager can “see” ambient light through the imager lens and the windshield. If the LED does flash when the ignition switch is turned to the On position, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR - DIAGNOSIS AND TESTING - SMARTBEAM).

1. Begin by initiating the automatic high beam Demonstration Mode.
2. Observe the green LED located on the electrochromic inside rear view mirror just to the left of the “Auto” button.
3. Obstruct the view of the imager by placing a hand or another suitable obstruction between the imager lens and the windshield, or over the windshield glass in front of the imager. The LED should extinguish each time the optics are obstructed, then illuminate again each time the obstruction is removed.
4. Failure of the LED to respond to these inputs indicates that the imager optics are obstructed.

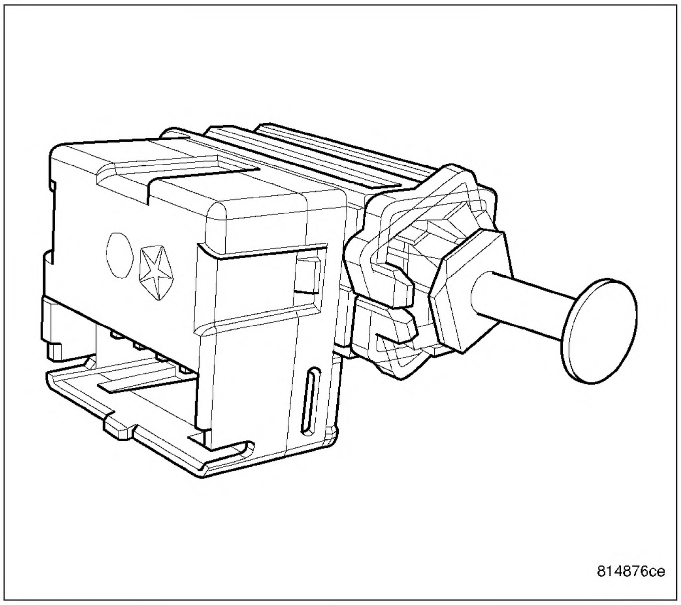
CAUTION: Do not spray glass cleaners directly onto the imager lens. Damage to the imager optics and electronics may result.

5. Clean the imager lens and the windshield glass and/or remove any obstructions from the windshield in front of the imager. To clean the imager lens, spray a small amount of glass cleaner onto a soft cloth and gently wipe the lens clean.
6. Repeat the test to confirm proper automatic high beam imager operation.

SWITCH-STOP LAMP

DESCRIPTION

The brake lamp switch is mounted on a bracket attached to the brake pedal support. The switch is adjustable.

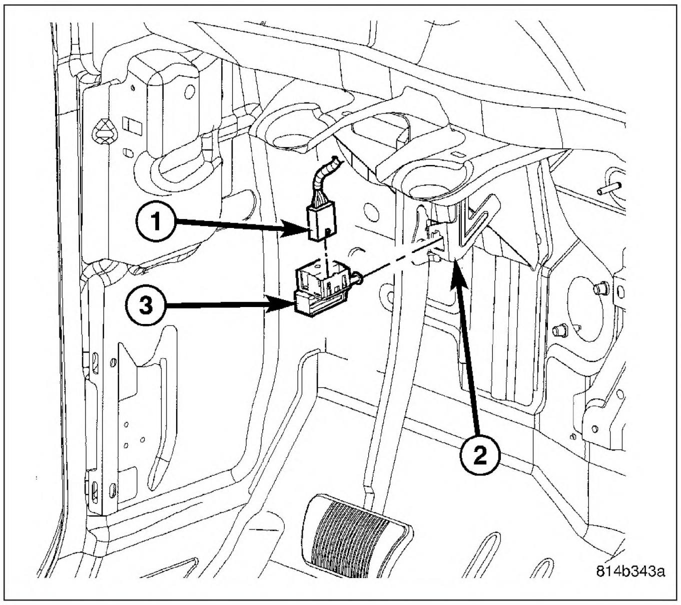


OPERATION

The brake lamp switch is used for the brake lamp, speed control and brake sensor circuits.

REMOVAL

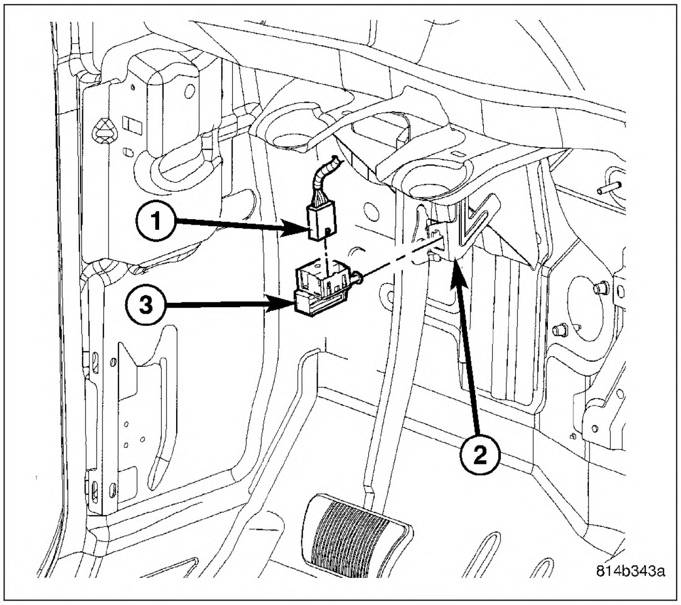
1. Disconnect and isolate the battery negative cable.
2. Remove the steering column cover and lower trim panel.
3. Press the brake pedal downward to fully applied position.
4. Rotate the switch approximately 30° in counter-clockwise direction to unlock the switch retainer. Pull switch rearward and out of bracket.
5. Disconnect switch harness and remove switch from vehicle.



INSTALLATION

1. Pull the switch plunger all the way out to fully extended position.
2. Connect the harness wires (1) to switch.
3. Press and hold brake pedal in applied position.
4. Install the switch (3) as follows: Align the tab on the switch with the notch in the switch bracket. Insert the switch in the bracket and turn it clockwise about 30° to lock it in place.
5. Release the brake pedal. Then pull the pedal lightly rearward. The pedal will set the plunger to the correct position as the pedal pushes the plunger into switch body. The switch will make ratcheting sound as it self adjusts.

CAUTION: Booster damage may occur if the pedal pull exceeds 20 lbs.



ADJUSTMENTS

SWITCH-STOP LAMP

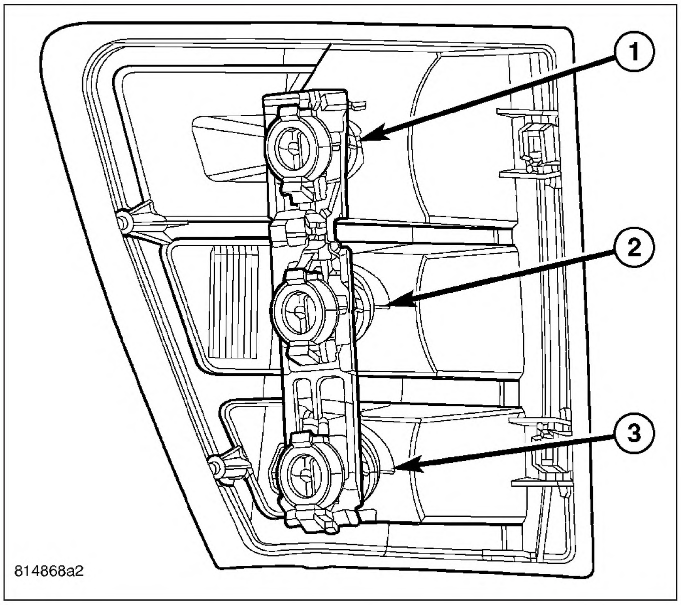
1. Press and hold brake pedal in applied position.
2. Pull switch plunger all the way out to fully extended position.
3. Release brake pedal. Then pull pedal lightly rearward. Pedal will set plunger to correct position as pedal pushes plunger into switch body. Switch will make ratcheting sound as it self adjusts.

CAUTION: Booster damage may occur if the pedal pull exceeds 20 lbs.

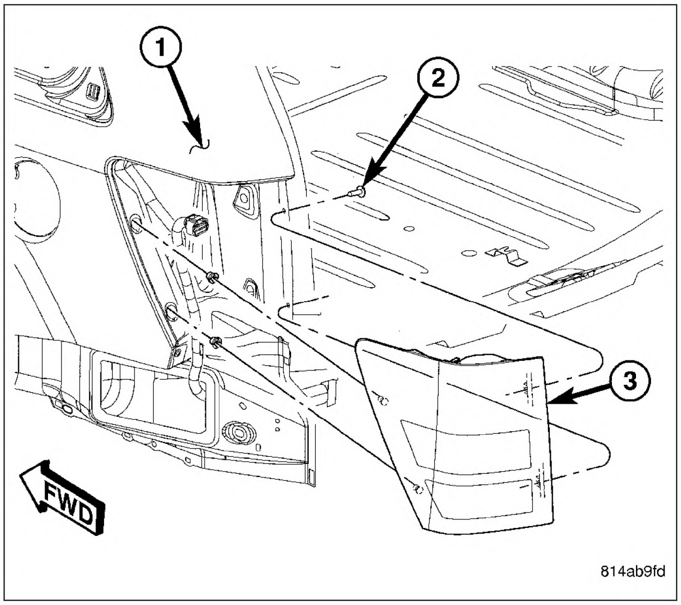
TAIL LAMPS

REMOVAL

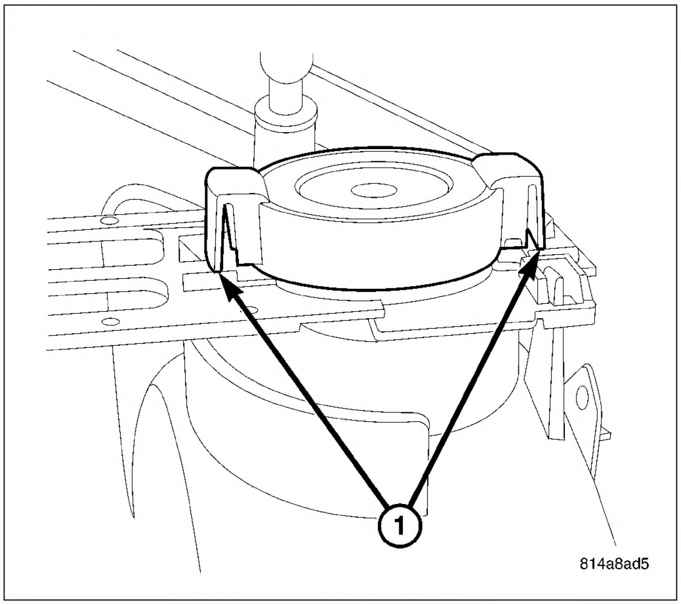
The stop (1), turn signal (2), and back-up (3) bulbs are incorporated into the tail lamp unit.



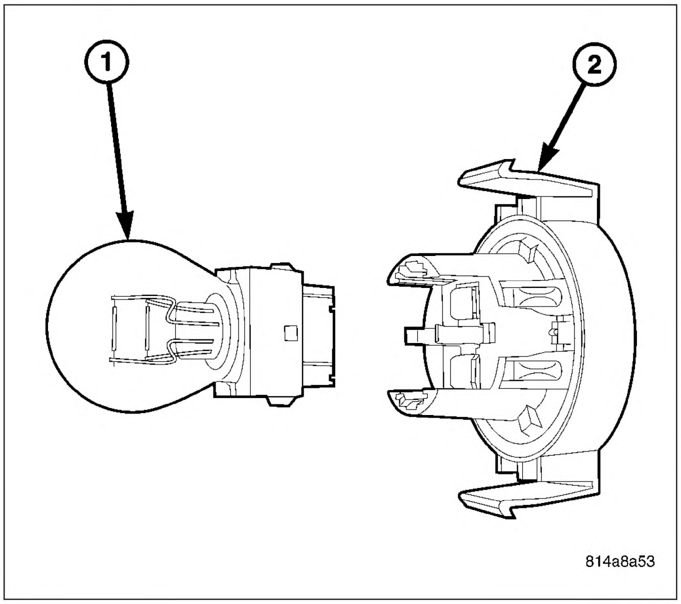
1. Remove the tail lamp unit (3) (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP - REMOVAL).



2. Compress both retaining tabs (1) on the bulb socket and pull straight out.



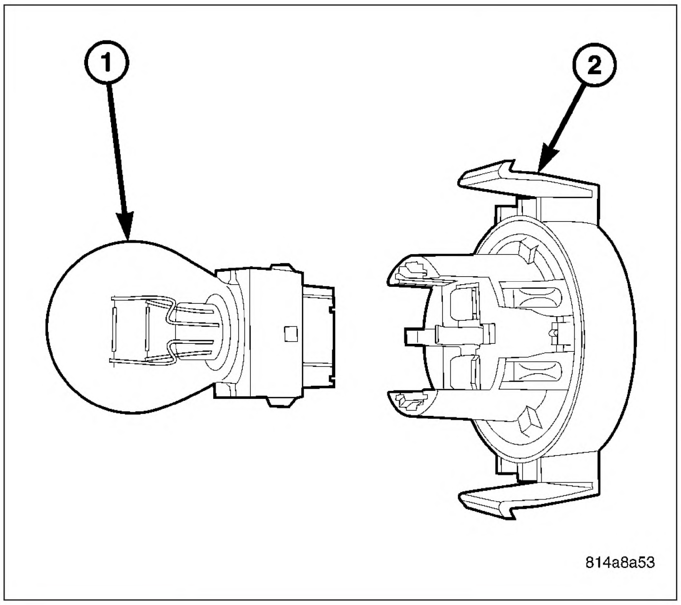
3. Remove the bulb (1) from the socket (2).


1
2
814a8a53

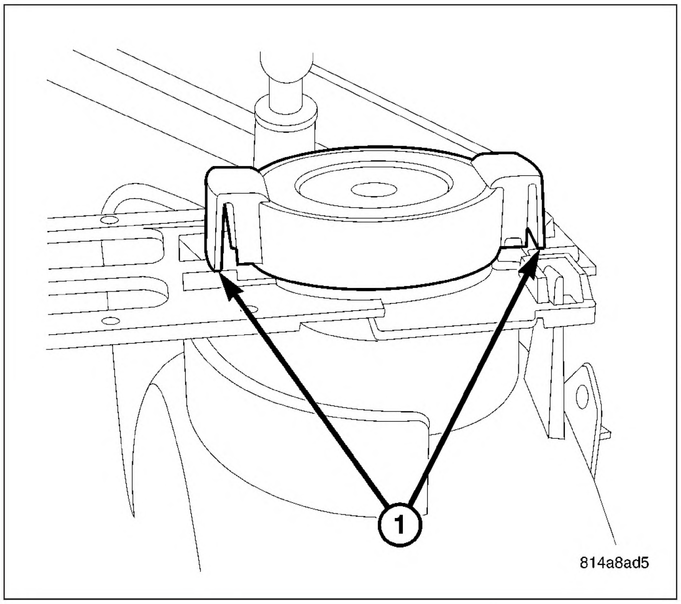
INSTALLATION

CAUTION: Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the lamp, the socket and/or the lamp wiring. Do not touch the bulb glass with fingers or other oily surfaces. Reduced bulb life will result.

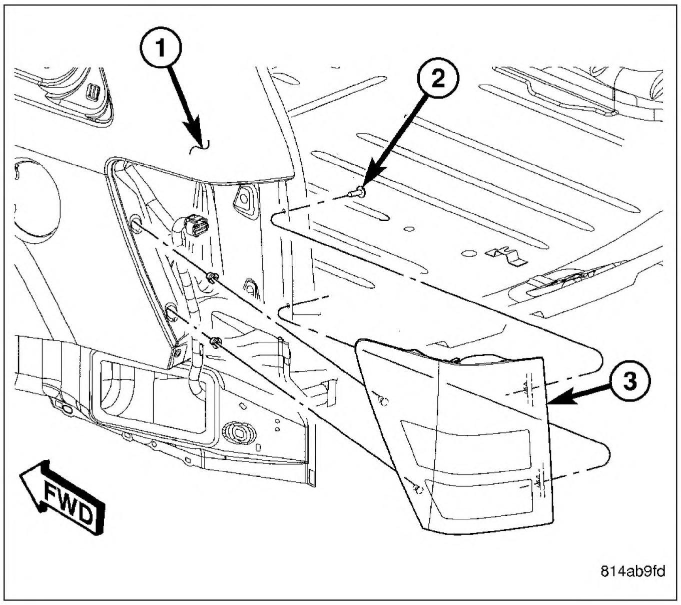
1. Position the bulb (1) in the socket (2) and push into place.



2. Position the bulb socket in the tail lamp unit and push firmly into place until the retaining tabs (1) are fully engaged.



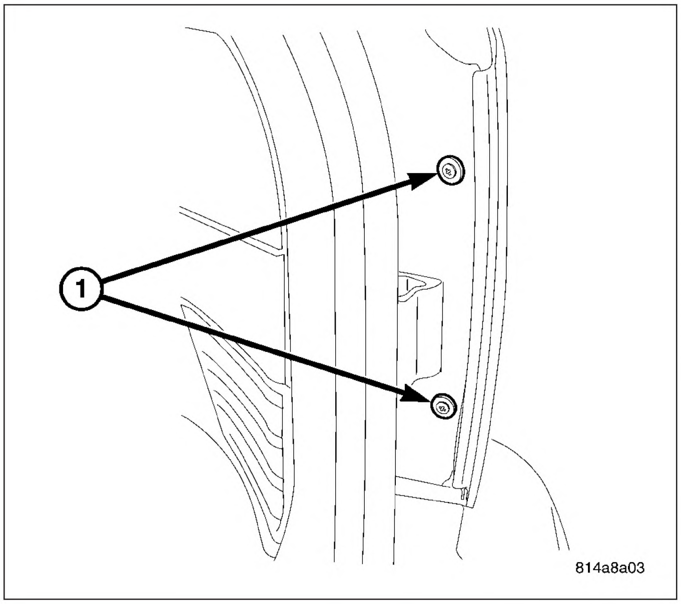
3. Install the tail lamp assembly (3) (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ TAIL LAMP - INSTALLATION).



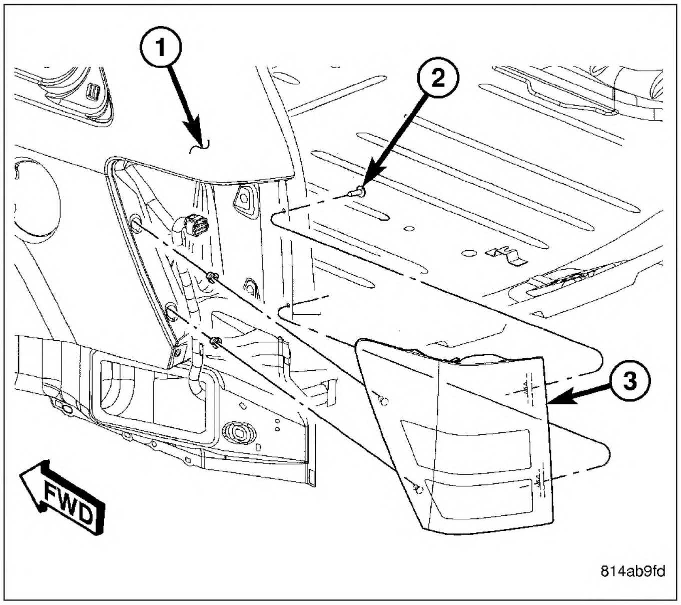
TAIL LAMP UNIT

REMOVAL

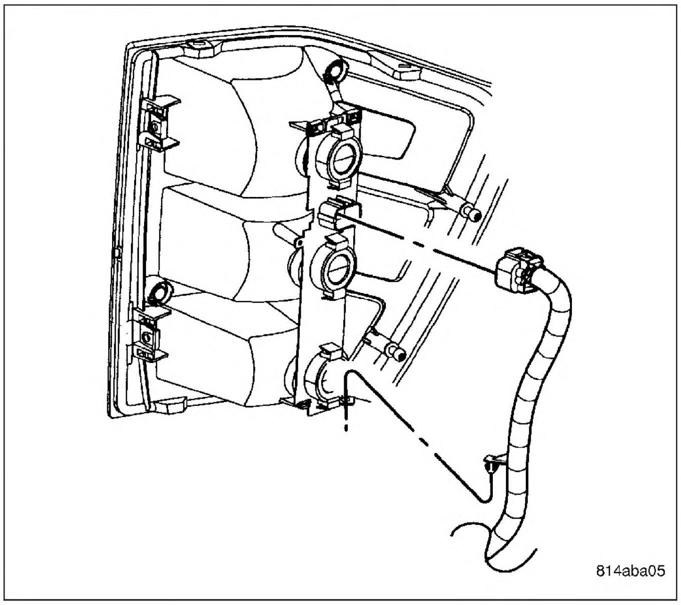
1. Disconnect and isolate the battery negative cable.
2. Open liftgate and remove the two screws (1) attaching the lamp to the body.



3. Pull tail lamp unit (3) rearward to disengage the lamp alignment pins from the body (1).

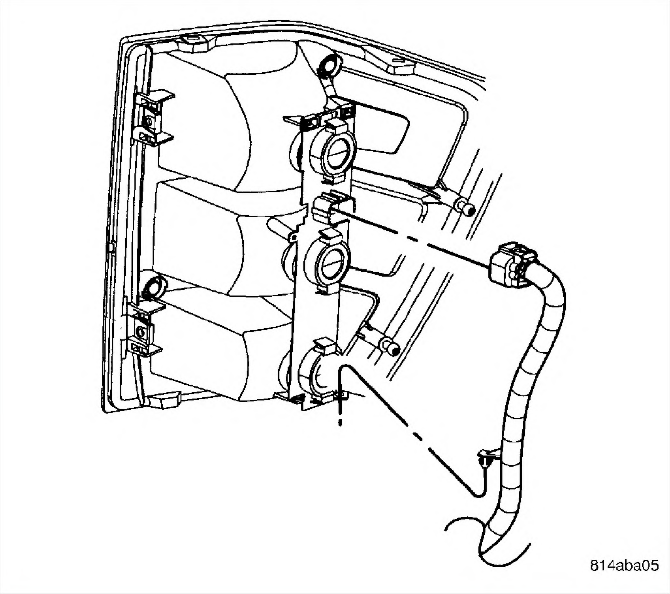

1
2
3
FWD
814ab9fd

4. Disconnect lamp unit wire harness connector.
5. Remove the lamp unit from vehicle.

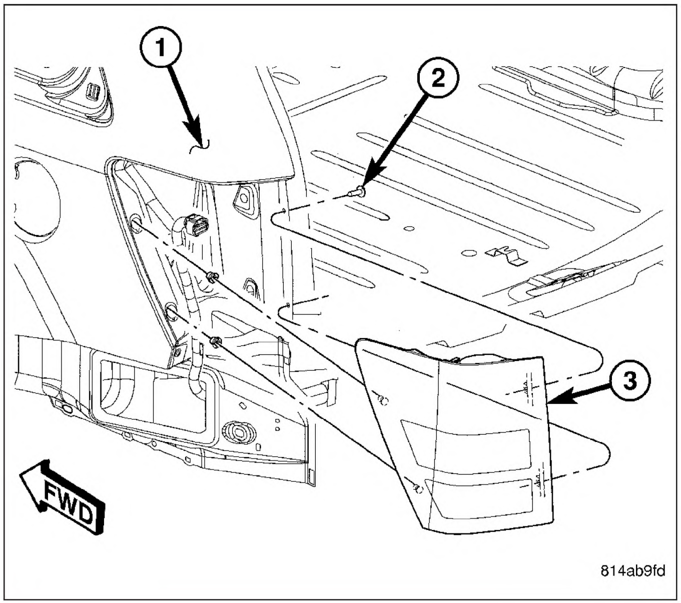


INSTALLATION

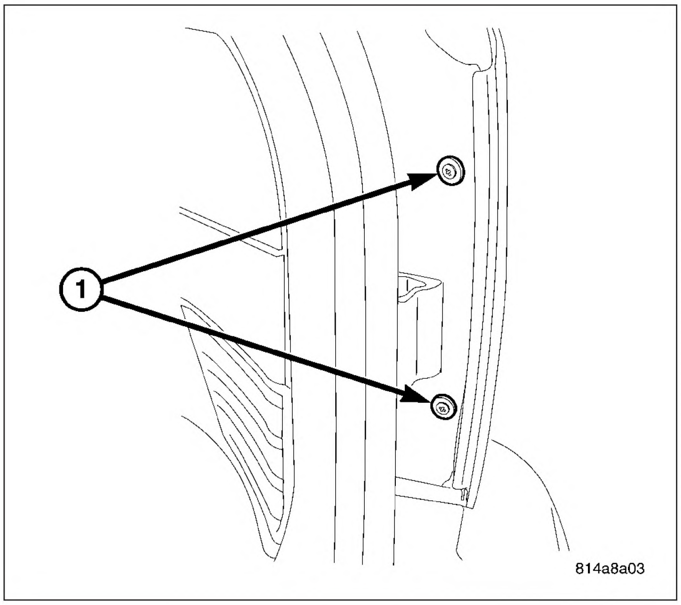
1. Connect the tail lamp unit wire harness connector.



2. Align the pins with the retainers in the vehicle body (1) and press the lamp (3) forward to engage.


1
2
3
FWD
814ab9fd

3. Install the two screws (1) attaching the tail lamp unit to body.
4. Connect the battery negative cable.



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OVERHEAD CONSOLE - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1A32-UNIVERSAL GARAGE DOOR SWITCH 1 STUCK

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Electronic Overhead Module detects the UGDO switch in the closed position for more than 2 minutes.

Possible Causes
ELECTRONIC OVERHEAD MODULE

Diagnostic Test

1. **REPLACE THE ELECTRONIC OVERHEAD MODULE**

When this code is set, the Electronic Overhead Module must be replaced.

Repair

Replace the Electronic Overhead Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1A33-UNIVERSAL GARAGE DOOR SWITCH 2 STUCK

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Electronic Overhead Module detects the UGDO switch in the closed position for more than 2 minutes.

Possible Causes
ELECTRONIC OVERHEAD MODULE

Diagnostic Test

1. REPLACE THE ELECTRONIC OVERHEAD MODULE

When this code is set, the Electronic Overhead Module must be replaced.

Repair

Replace the Electronic Overhead Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1A34-UNIVERSAL GARAGE DOOR SWITCH 3 STUCK

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Electronic Overhead Module detects the UGDO switch in the closed position for more than 2 minutes.

Possible Causes
ELECTRONIC OVERHEAD MODULE

Diagnostic Test

1. REPLACE THE ELECTRONIC OVERHEAD MODULE

When this code is set, the Electronic Overhead Module must be replaced.

Repair

Replace the Electronic Overhead Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2217 - EVIC/EOM/CMTC INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, internal self test routine running.
- **Set Condition:**
  The Electronic Overhead Module fails one of seven internal tests.

Possible Causes
ELECTRONIC OVERHEAD MODULE

Diagnostic Test

1. VERIFY OPERATION OF THE ELECTRONIC OVERHEAD MODULE

Turn the ignition on.

With the scan tool, erase Electronic Overhead Module DTCs.

With the scan tool, activate the Electronic Overhead Module self test.

Wait for self test to complete.

With the scan tool, read Electronic Overhead Module DTCs.

Does the scan tool display: B2217–EVIC/EOM/CMTC INTERNAL?

YES >> Replace the Electronic Overhead Module in accordance with the service information.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

NO >> Test complete.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2331–VEHICLE NEEDS DEGAUSSED

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Vehicle speed greater than 10 mph.
- **Set Condition:**
  The magnetic feild around the vehicle is greater than 2.4 guass.

Diagnostic Test

1. PERFORM THE VEHICLE DEMAGNITIZING PROCEDURE

NOTE: A blank compass display indicates that vehicle degaussing is required.

NOTE: After demagnitizing, the vehicle will enter Auto Fast-Cal when the ignition is turned on.

NOTE: Ensure that the correct compass variance is stored in the compass memory. See “Setting Compass Variance” in the Service Information.

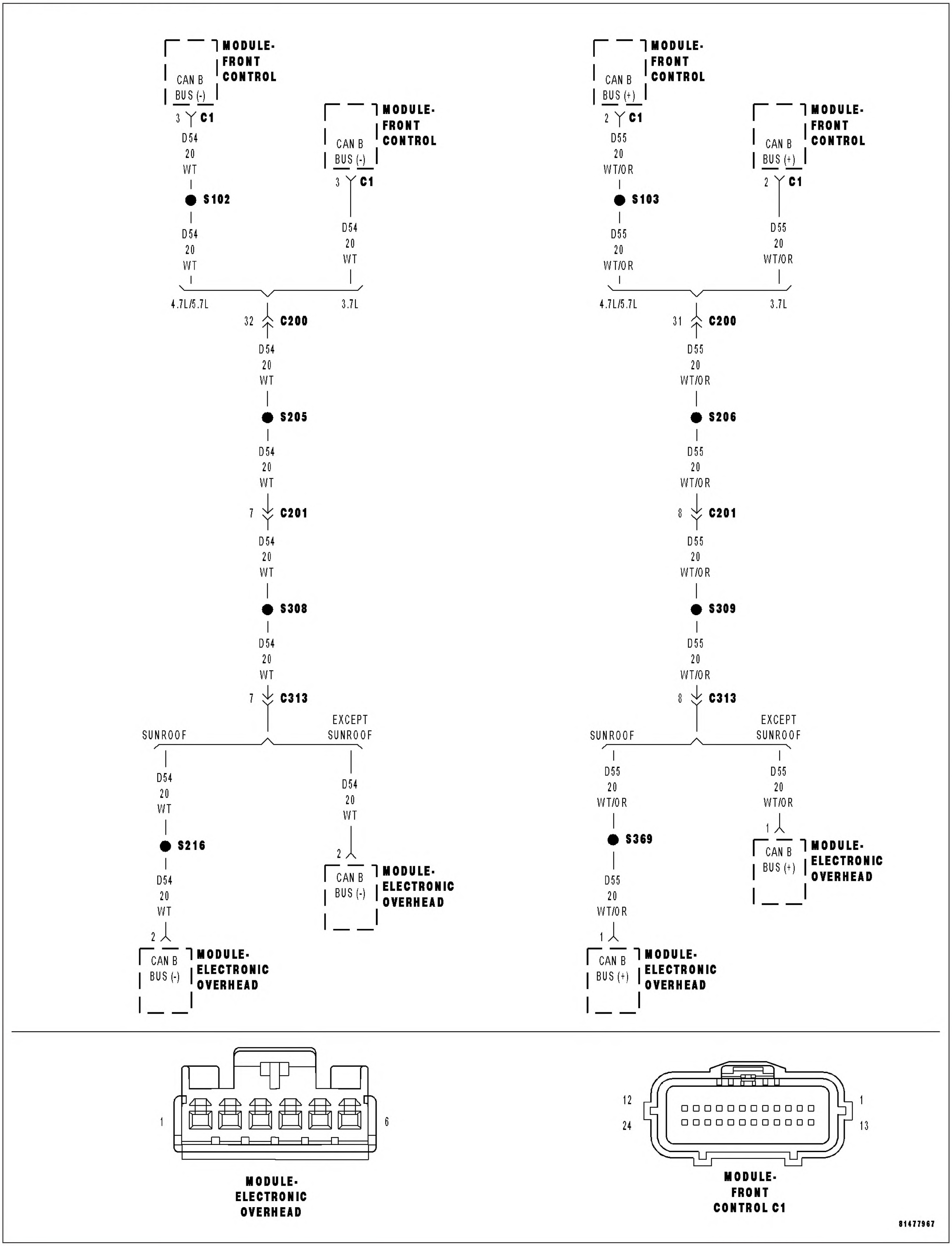
View repair.

Repair

Refer to the Service Information and perform the Compass Demagnitizing Standard Procedure.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U0019–CAN B BUS


MODULE-FRONT CONTROL
CAN B BUS (-)
3 C1
D54 20 WT
S102
D54 20 WT
MODULE-FRONT CONTROL
CAN B BUS (-)
3 C1
D54 20 WT
4.7L/5.7L
3.7L
32 C200
D54 20 WT
S205
D54 20 WT
7 C201
D54 20 WT
S308
D54 20 WT
7 C313
SUNROOF
EXCEPT SUNROOF
D54 20 WT
S216
D54 20 WT
2
MODULE-ELECTRONIC OVERHEAD
CAN B BUS (-)
D54 20 WT
2
MODULE-ELECTRONIC OVERHEAD
CAN B BUS (-)
MODULE-FRONT CONTROL
CAN B BUS (+)
2 C1
D55 20 WT/OR
S103
D55 20 WT/OR
MODULE-FRONT CONTROL
CAN B BUS (+)
2 C1
D55 20 WT/OR
4.7L/5.7L
3.7L
31 C200
D55 20 WT/OR
S206
D55 20 WT/OR
8 C201
D55 20 WT/OR
S309
D55 20 WT/OR
8 C313
SUNROOF
EXCEPT SUNROOF
D55 20 WT/OR
S369
D55 20 WT/OR
1
MODULE-ELECTRONIC OVERHEAD
CAN B BUS (+)
D55 20 WT/OR
1
MODULE-ELECTRONIC OVERHEAD
CAN B BUS (+)
1
6
MODULE-ELECTRONIC OVERHEAD
12
24
1
13
MODULE-FRONT CONTROL C1
81477967

U0019–CAN B BUS (CONTINUED)

For the Electronic Overhead Module circuit diagram (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  If the Can B Bus (+) or B Bus (–) circuit is open, shorted to voltage, or shorted to ground.

Possible Causes
CAN B BUS DTCs IN FRONT CONTROL MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (–) CIRCUIT OPEN
ELECTRONIC OVERHEAD MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC U0019–CAN B BUS

Turn the ignition on.

With the scan tool, record and erase any Electronic Overhead Module DTCs.

Turn the ignition off, wait 30 seconds then turn the ignition on.

With the scan tool, read DTCs.

Is DTC U0019–CAN B BUS active?

Yes >> Go To 2

No >> The condition that caused this code to set is not present at this time. Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE

With the scan tool, read Front Control Module DTCs

Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go to 3

U0019–CAN B BUS (CONTINUED)

3. CHECK (D55) CAN B BUS (+) CIRCUIT FOR AN OPEN

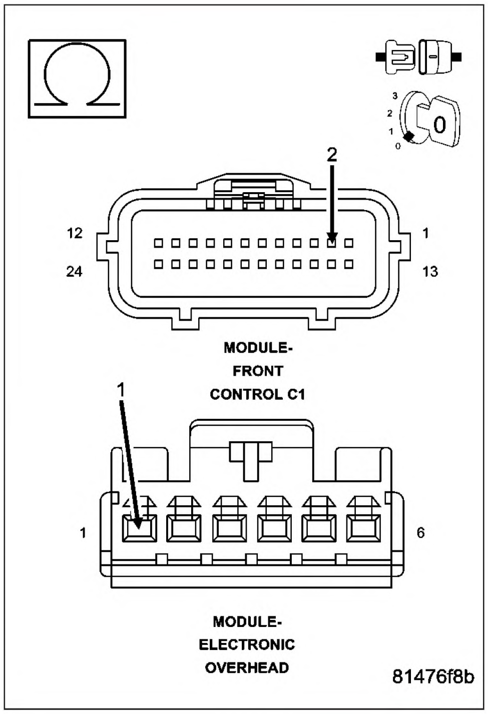
Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the Electronic Overhead Module harness connector.

Disconnect the Front Control Module C1 harness connector.

Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 harness connector and the Electronic Overhead Module harness connector.


Ω
0
3
2
1
0
2
12
24
1
13
MODULE-
FRONT
CONTROL C1
1
1
6
MODULE-
ELECTRONIC
OVERHEAD
81476f8b

Is the resistance below 5.0 ohms?

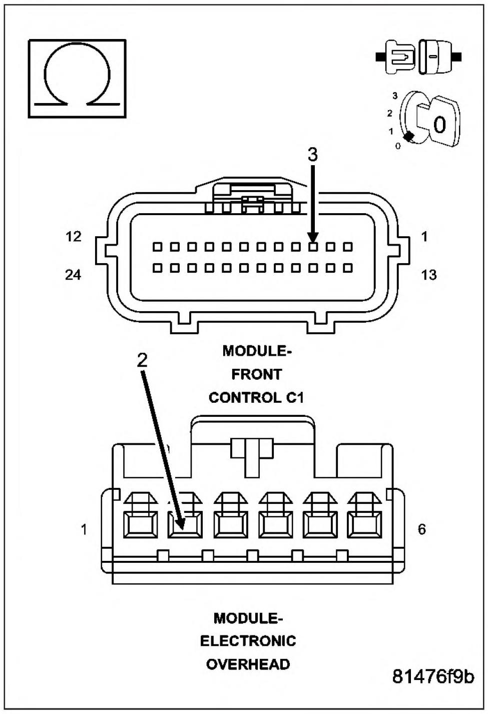
Yes >> Go To 4

No >> Repair the Can B Bus (+) circuit for an open.
Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

4. CHECK THE (D54) CAN B BUS (–) CIRCUIT FOR AN OPEN

Measure the resistance of the (D54) Can B Bus (–) circuit between the Front Control Module C1 harness connector and the Electronic Overhead Module harness connector.


Ω
0
3
2
1
0
3
12
24
1
13
MODULE-
FRONT
CONTROL C1
2
1
6
MODULE-
ELECTRONIC
OVERHEAD
81476f9b

Is the resistance below 5.0 ohms?

Yes >> Replace the Electronic Overhead Module in accordance with the service information.
Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Repair the Can B Bus (–) circuit for an open.
Perform BODY VERIFICATION TEST VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212-LOST COMMUNICATION WITH SCCM-CAN-B

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

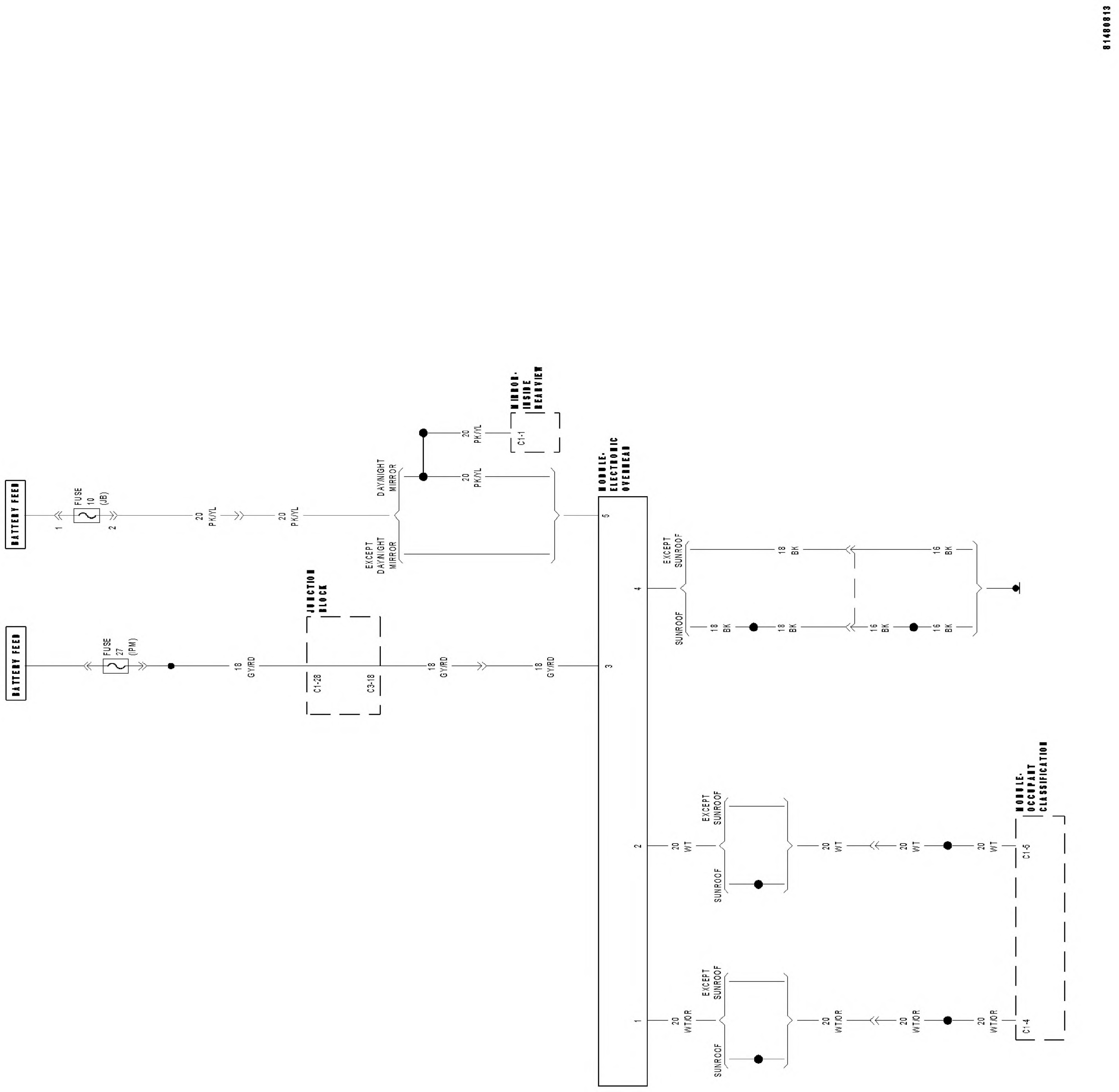
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

SCHEMATICS AND DIAGRAMS


81480813
BATTERY FEED
FUSE 10 (JB)
1
2
20 PK/YL
20 PK/YL
DAY/NIGHT MIRROR
EXCEPT DAY/NIGHT MIRROR
20 PK/YL
20 PK/YL
C1-1
MIRROR-INSIDE REARVIEW
MODULE-ELECTRONIC OVERHEAD
5
4
3
2
1
BATTERY FEED
FUSE 27 (PM)
18 GY/RD
JUNCTION BLOCK
C1-28
C3-18
18 GY/RD
18 GY/RD
EXCEPT SUNROOF
SUNROOF
18 BK
18 BK
18 BK
16 BK
16 BK
16 BK
20 WT
EXCEPT SUNROOF
SUNROOF
20 WT
20 WT
20 WT
C1-5
MODULE-OCCUPANT CLASSIFICATION
20 WT/OR
EXCEPT SUNROOF
SUNROOF
20 WT/OR
20 WT/OR
20 WT/OR
C1-4

WK-EOM SYSTEM SCHEMATIC

OVERHEAD CONSOLE - SERVICE INFORMATION

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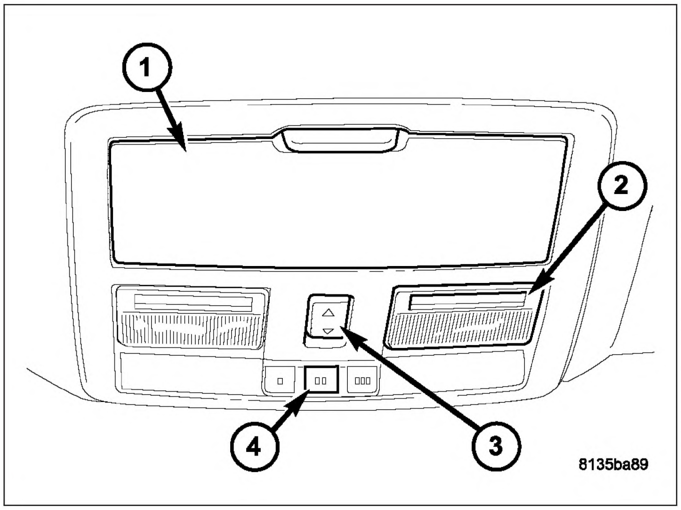
OVERHEAD CONSOLE - SERVICE INFORMATION

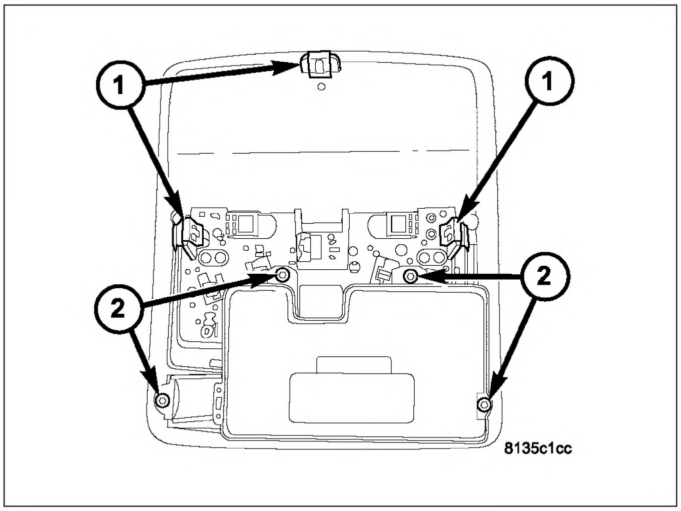
DESCRIPTION

An overhead console is standard on this vehicle and includes the following components:

- Overhead storage compartment (1)
- Front map/reading lamps (2)
- Power sunroof switch (3) - if equipped
- Universal transmitter (4) - if equipped
- Electronic Overhead Module - if equipped

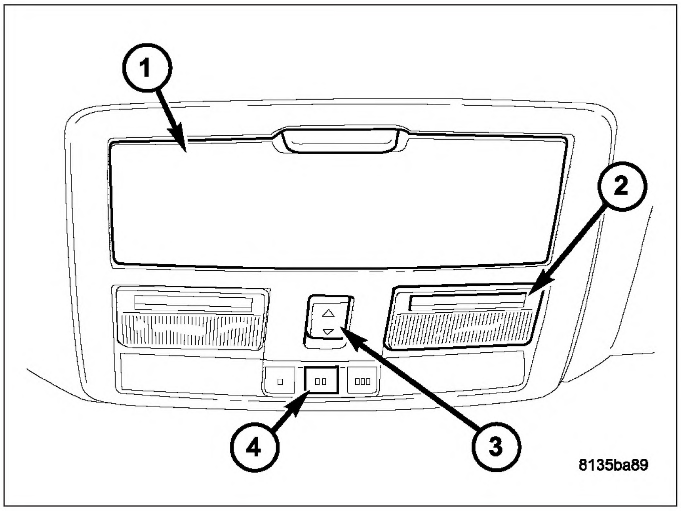


The overhead console assembly is mounted by three snap clips (1) securing it to a molded plastic retainer bracket located above the headliner. The Electronic Overhead Module is secured to the overhead console with screws (2).

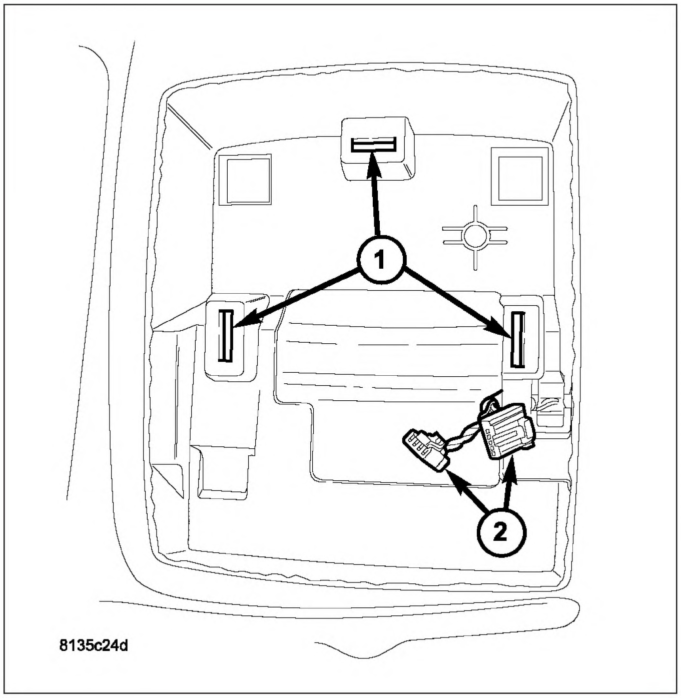


REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Pull downward on the sides of the overhead console housing firmly and evenly to disengage the snap clips from the overhead console bracket.

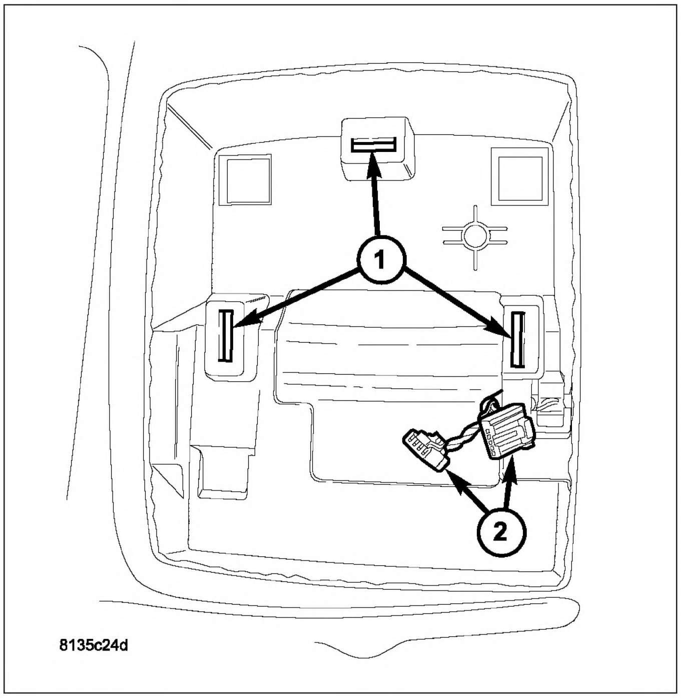


3. Lower the overhead console from the headliner far enough to access the wire harness connectors (2).
4. Disconnect the roof wire harness connectors (2) from the overhead console wire harness connector.
5. Remove the overhead console from the headliner.



INSTALLATION

1. Position the overhead console near the mounting location on the headliner.
2. Reconnect the roof wire harness connectors (2) to the overhead console.
3. Align the snap clips on the overhead console housing with their receptacles (1) in the overhead console bracket.
4. Push upward firmly and evenly on the sides of the overhead console housing over the snap clip locations until the snap clip is fully engaged with its receptacle in the overhead console bracket.
5. Reconnect the battery negative cable.

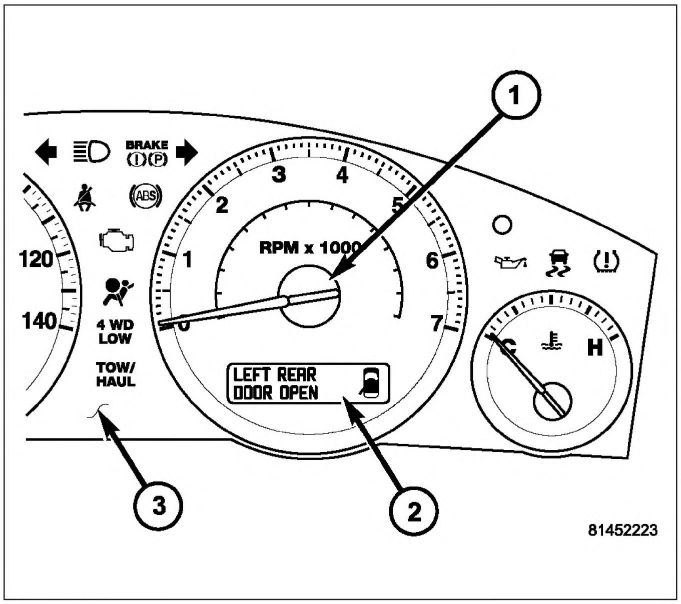


ELECTRONIC VEHICLE INFORMATION CENTER

DESCRIPTION

The Electronic Vehicle Information Center (EVIC) features a driver-interactive display (2). The display is located in the lower part of the tachometer (1) on the right side of the instrument cluster (3). This system conveniently allows the driver to select a variety of useful information by pressing the switches mounted on the center stack of the instrument panel. The EVIC displays information related to the following:

- System Status
- Vehicle information warning message displays
- Tire Pressure Monitor System — If Equipped
- Personal Settings (customer programmable features)
- Compass display
- Outside temperature display
- Trip computer functions



The EVIC system is comprised of several different components. Those components are:

- Instrument Cluster
- Upper instrument panel switch pod
- Ambient Temperature Sensor
- Electronic Overhead Module
- Controller Area Network (CAN) Data Bus

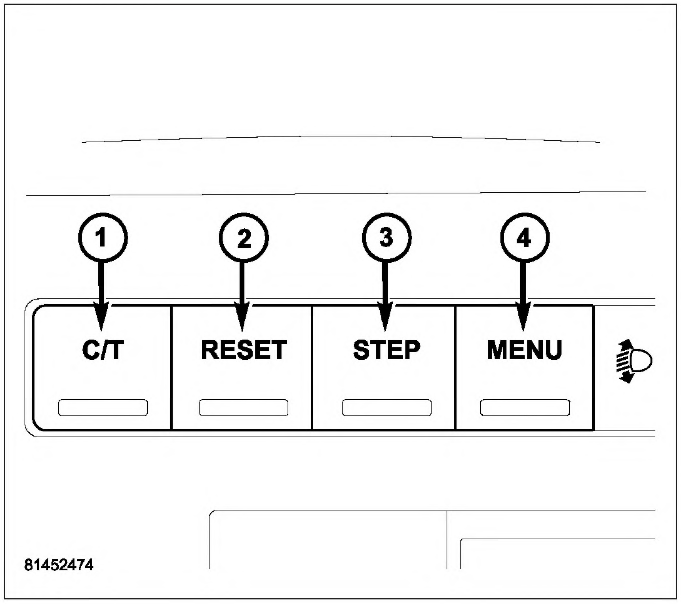
The EVIC display is part of the Instrument Cluster assembly and is not serviced as a separate component. If the display is inoperative the complete Instrument Cluster assembly must be replaced, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL). If the EVIC switches in the upper instrument panel switch pod are inoperative and require replacement, Refer to ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD - REMOVAL for the appropriate procedure. If the compass position sensor (Electronic Overhead Module) is inoperative and requires replacement, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/UNIVERSAL TRANSMITTER - REMOVAL) for the appropriate procedure.

OPERATION

The Electronic Vehicle Information Center (EVIC) uses both non-switched and ignition switched sources of battery current so that some of its features remain operational at any time, while others may only operate with the ignition switch in the On position. When the ignition switch is turned to the On position, the EVIC display will return to the last function being displayed before the ignition was turned to the Off position.

The EVIC system is comprised of several different components that communicate over the Controller Area Network (CAN) Data Bus. If the system is inoperative a scan tool and the appropriate diagnostic information must be used to diagnose the system.

The EVIC control switches are used to operate the different functions of the EVIC system. Pressing and releasing the MENU button (4) will change the mode displayed to one of the Personal Settings. The STEP button (3) is used to make a selection from the Personal Setting displayed at that time. Pressing and releasing the C/T (compass/thermometer) button (1) will cause the EVIC to return to the compass/thermometer/trip computer display mode from any other mode. From the compass/thermometer/trip computer display mode the STEP button (3) is used to scroll through and make selections in the Trip Functions. Pressing and releasing the RESET button (2) resets the trip computer screen displayed at that time.



EVIC DISPLAY MODES

SYSTEM STATUS MODE

Displays warnings and user interaction messages. Initial warnings will be displayed accompanied by a series of audible beeps. Critical text warnings will be displayed until the failure is corrected. Non-critical text warnings will be displayed for 60 seconds. The driver can scroll to view multiple messages by using the STEP button.

When the appropriate conditions exist, the EVIC displays the following messages:

- TURN SIGNAL ON
- PERFORM SERVICE
- KEY NOT PROGRAMMED - DAMAGED KEY
- KEY NOT PROGRAMMED - INVALID KEY
- KEY NOT PROGRAMMED - EXCEEDED KEY PROGRAM LIMIT
- PROGRAMMING ACTIVE - NEW KEY PROGRAMMED
- SERVICE SECURITY KEY
- INVALID KEY - TRY ALTERNATE KEY
- DRIVER/PASSENGER DOOR OPEN (with graphic)
- LEFT/RIGHT REAR DOOR OPEN (with graphic)
- X DOORS OPEN (with graphic)
- LIFTGATE OPEN (with graphic)
- LIFTGATE/DOOR OPEN (with graphic)
- LIFTGATE/DOORS OPEN (with graphic)
- LIFTGLASS OPEN (with graphic)
- HOOD OPEN (with graphic)
- HOOD/DOOR OPEN (with graphic)
- HOOD/DOORS OPEN (with graphic)
- LIFTGATE/HOOD OPEN (with graphic)
- HOOD/GLASS/DOOR OPEN (with graphic)
- HOOD/GLASS/DOORS OPEN (with graphic)
- HOOD/GATE/DOOR OPEN (with graphic)
- HOOD/GATE/DOORS OPEN (with graphic)
- LIFTGLASS/DOOR OPEN (with graphic)
- LIFTGLASS/DOORS OPEN (with graphic)
- LIFTGLASS/HOOD OPEN (with graphic)

- WASHER FLUID LOW (with graphic)
- FUEL LOW (with graphic)
- CHECK GAUGES
- AUTO HIGHBEAM ON
- AUTO HIGHBEAM OFF
- PARK ASSIST DISABLED
- SERVICE PARK ASSIST SYSTEM
- TRANSMISSION OVER TEMP
- CHECK SHIFT PROCEDURE
- SERVICE 4WD SYSTEM
- 4WD SYSTEM IN NEUTRAL
- LOW BRAKE FLUID LEVEL
- WARNING! LIMIT SPEED
- CHECK GAS CAP
- SERVICE SUSPENSION
- ESP SYSTEM DISABLED
- SERVICE ELEC BRAKE SYSTEM
- TRACTION SYS DISABLED
- MEMORY #1 POSITIONS SET
- MEMORY #2 POSITIONS SET
- MEMORY SYSTEM DISABLED - SEATBELT FASTENED (with graphic)
- MEMORY SYSTEM DISABLED - VEHICLE NOT IN PARK
- DRIVER 1 MEMORY
- DRIVER 2 MEMORY
- PEDAL ADJUST DISABLED - CRUISE CONTROL SET
- PEDAL ADJUST DISABLED - SHIFTER IN REVERSE
- SERVICE TIRE PRESS SYSTEM
- LEFT FRONT LOW PRESSURE (Premium Tire Pressure Monitoring (TPM) System Only)
- RIGHT FRONT LOW PRESSURE (Premium TPM System Only)
- LEFT REAR LOW PRESSURE (Premium TPM System Only)
- RIGHT REAR LOW PRESSURE (Premium TPM System Only)
- SPARE LOW PRESSURE (Premium TPM System Only)

PERSONAL SETTINGS MODE (CUSTOMER PROGRAMMABLE FEATURES)

Allows the driver to set and recall features when the transmission is in Park by pressing and releasing the MENU button until Personal Settings is displayed in the EVIC. The following personal settings can be set and recalled by pressing the STEP button:

- Language: English, Spanish, German, Italian or French
- Display units in English or Metric
- Lock doors automatically at 15 mph (24 Kph), On or Off
- Unlock door automatically on exit, On or Off
- Remote Keyless Entry unlock driver door on first press or unlock all doors on first press
- Recall Memory with Remote Keyless Entry Unlock, On or Off
- Sound horn with Remote Keyless Entry Lock, On or Off
- Flash lights with Remote Keyless Entry Lock, On or Off
- Delay turning headlamps off for 0, 30, 60 or 90 seconds
- Illuminated approach on for 0, 30, 60 or 90 seconds
- Auto headlamp low/high beam, low beam or low/high beam
- Headlamps on with wipers, On or Off
- Rain Sensing Intermittent Wipers, On or Off

- Service interval (Gasoline engines), 3200,...9600 KM, in increments of 800 KM/2000,...6000 miles in increments of 500 miles
- Service interval (Diesel engines), 4000,...20000 KM, in increments of 1000 KM/2500,...12500 miles in increments of 625 miles
- Automatically move seat back on exit, On or Off

Compass/Temperature/Trip Computer Mode

This display provides the outside temperature, one of the eight compass headings to indicate the direction the vehicle is facing, and vehicle trip information. The compass and temperature display is the normal display. When the C/T button is pressed the compass/temperature display returns.

The trip computer function will be displayed if the STEP button is pressed from the Compass/Temperature display mode. The trip computer displays the following information:

- Average fuel economy
- Distance to empty
- Trip A
- Trip B
- Elapsed time
- Miles to service
- Tire pressure display (if equipped)

Universal Garage Door Transceiver

The Electronic Vehicle Information Center (EVIC) features a driver-interactive display which includes HomeLink system messages. For additional information on the universal transceiver (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/UNIVERSAL TRANSMITTER - DESCRIPTION).

DIAGNOSIS AND TESTING

ELECTRONIC VEHICLE INFORMATION CENTER

The Electronic Vehicle Information Center (EVIC) data is obtained from several components on the Controller Area Network (CAN) Data Bus circuit. The EVIC will not function properly if the bus messages from any of these components is not receive. If no EVIC data is displayed, check the CAN Data Bus circuit communications, the Instrument Cluster functions and the Front Control Module (FCM). **Any diagnosis of the EVIC system should begin with, the use of a scan tool and the appropriate diagnostic service information.**

The use of a scan tool and the proper diagnostic procedures information are recommended for further testing of the EVIC and the CAN Data Bus circuit.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

STANDARD PROCEDURE

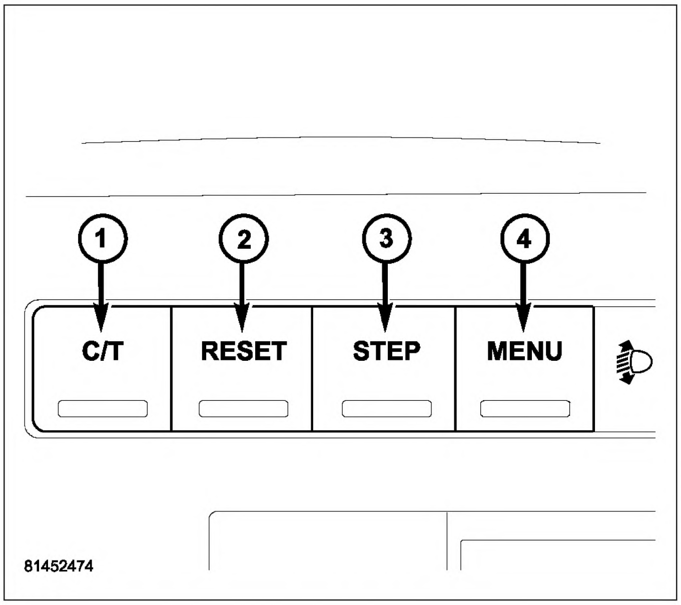
COMPASS CALIBRATION

CAUTION: Do not place any external magnets, such as magnetic roof mount antennas, in the vicinity of the compass. Do not use magnetic tools when servicing the overhead console.

The electronic compass unit features a self-calibrating design, which simplifies the calibration procedure. This feature automatically updates the compass calibration while the vehicle is being driven. This allows the compass unit to compensate for small changes in the residual magnetism that the vehicle may acquire during normal use. If the compass readings appear to be erratic or the Electronic Vehicle Information Center (EVIC) displays “CAL”, perform the following calibration procedure. Also, any time EVIC service replacement components are installed, they must be calibrated using this procedure. Do not attempt to calibrate the compass near large metal objects such as other vehicles, large buildings, or bridges; or, near overhead or underground power lines.

Calibrate the compass manually as follows:

1. Turn the ignition switch to the On position.
2. Press and release the C/T button (1) so that the EVIC display is in the Compass/Temperature mode.
3. Depress and hold the C/T push button (1) for approximately ten seconds. The message "CAL" will appear in the EVIC display.
4. Drive the vehicle on a level surface, away from large metal objects and power lines, through one or two**complete** circles in not less than 16 seconds. The "CAL" message will disappear from the display to indicate that the compass is now calibrated.



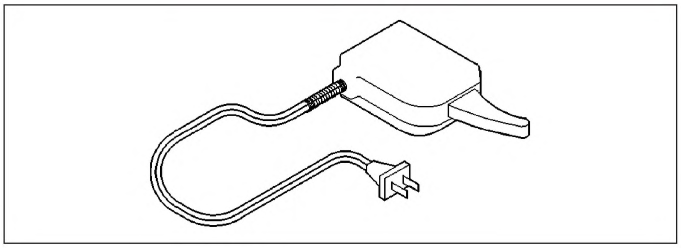
NOTE: A blank compass display indicates that vehicle degaussing (demagnetizing) is necessary.

NOTE: If the "CAL" message remains in the display, either there is excessive magnetism near the compass, or the unit is inoperative. Repeat the calibration procedure at least one more time.

NOTE: If the wrong direction is still indicated in the compass display, the area selected for calibration may be too close to a strong magnetic field. Repeat the calibration procedure in another location.

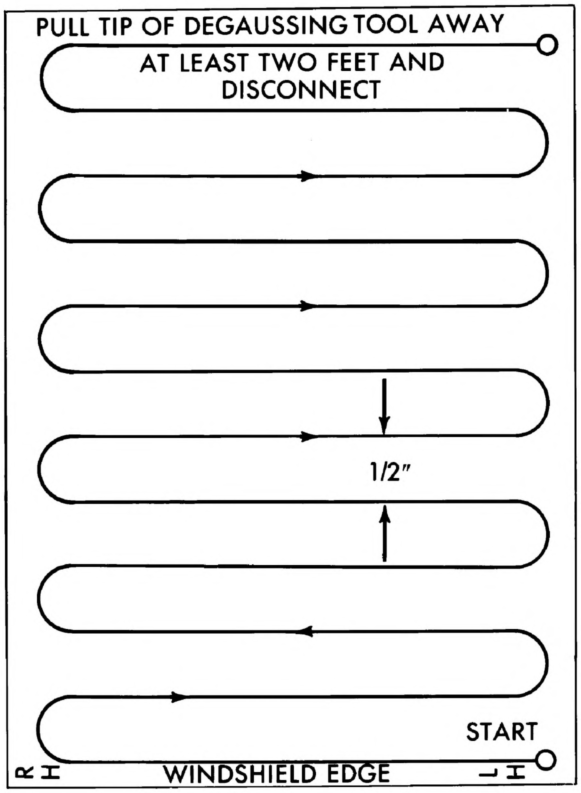
COMPASS DEMAGNETIZING

A degaussing tool (Special Tool 6029) is used to demagnetize, or degauss, the roof panel above the overhead console. Equivalent units must be rated as continuous duty for 110/115 volts and 60 Hz. They must also have a field strength of over 350 gauss at 7 millimeters (0.25 inch) beyond the tip of the probe.



To demagnetize the roof panel proceed as follows:

1. Be certain that the ignition switch is in the Off position, before you begin the demagnetizing procedure.
2. Place a piece of paper approximately 22 by 28 centimeters (8.5 by 11 inches), oriented on the vehicle lengthwise from front to rear, on the center line of the roof at the windshield header. The purpose of the paper is to protect the roof panel from scratches, and to define the area to be demagnetized.
3. Connect the degaussing tool to an electrical outlet, while keeping the tool at least 61 centimeters (2 feet) away from the compass unit.
4. Slowly approach the center line of the roof panel at the windshield header, with the degaussing tool connected.
5. Contact the roof panel with the plastic coated tip of the degaussing tool. Be sure that the template is in place to avoid scratching the roof panel. Using a slow, back-and-forth sweeping motion, and allowing 13 millimeters (0.50 inch) between passes, move the tool at least 11 centimeters (4 inches) to each side of the roof center line, and 28 centimeters (11 inches) back from the windshield header.
6. With the degaussing tool still energized, slowly back it away from the roof panel. When the tip of the tool is at least 61 centimeters (2 feet) from the roof panel, disconnect the tool.
7. Calibrate the compass, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - STANDARD PROCEDURE - COMPASS CALIBRATION) and adjust the compass variance, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - STANDARD PROCEDURE - COMPASS VARIATION ADJUSTMENT).



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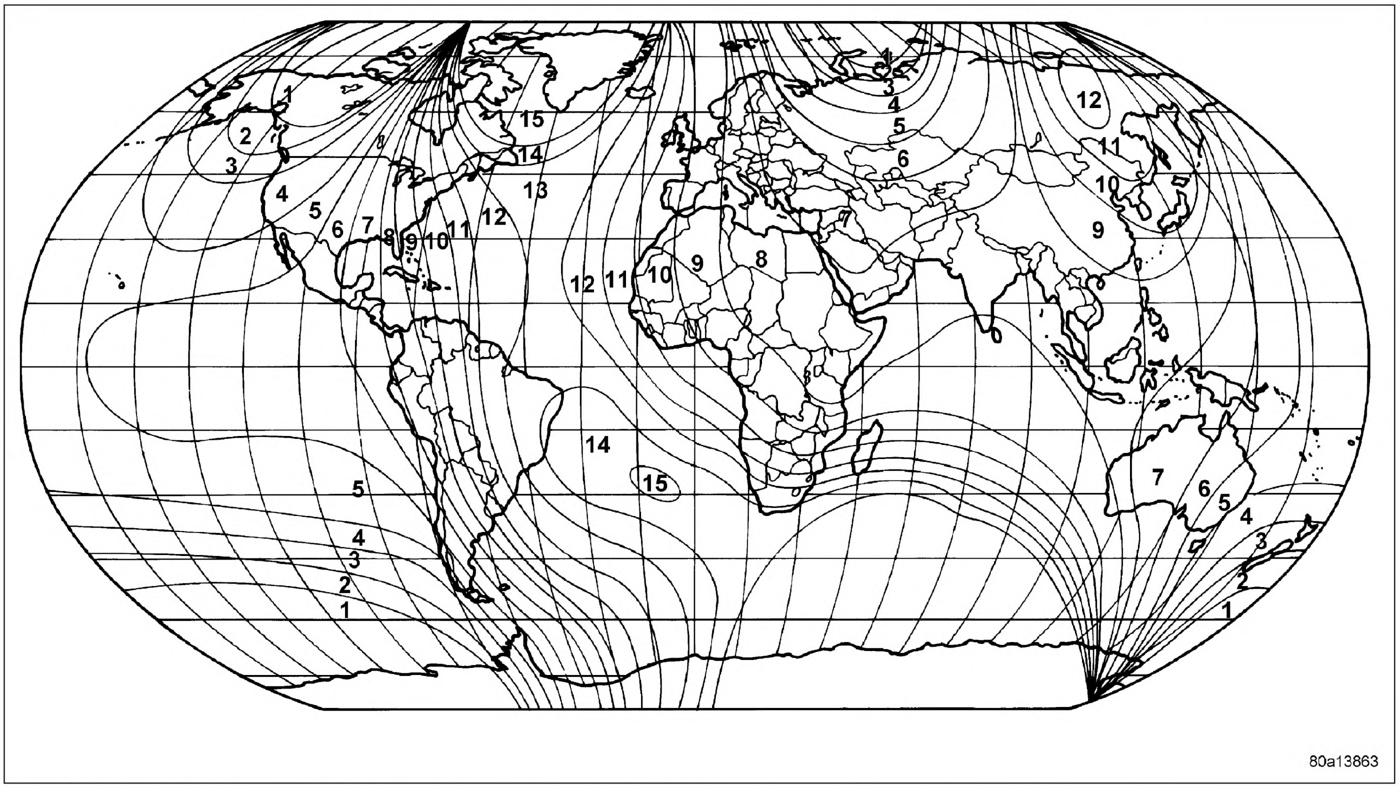
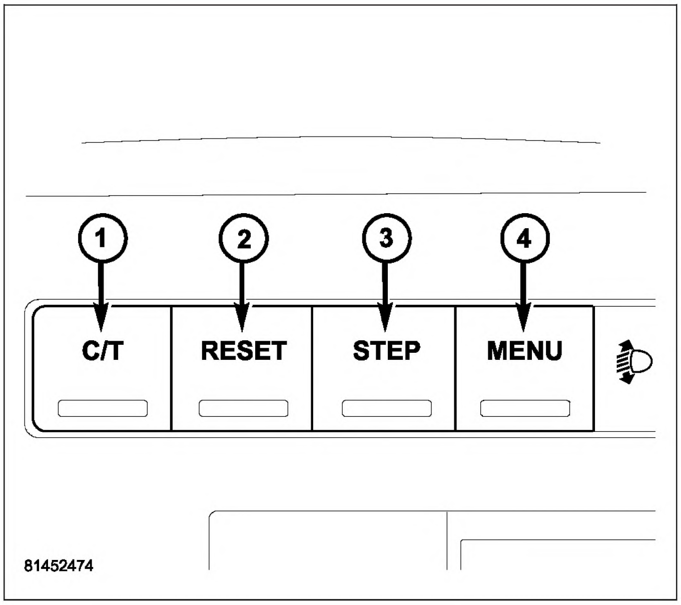
COMPASS VARIATION ADJUSTMENT

Compass variance, also known as magnetic declination, is the difference in angle between magnetic north and true geographic north. In some geographic locations, the difference between magnetic and geographic north is great enough to cause the compass to give false readings. If this problem occurs, the compass variance setting may need to be changed.

To set the compass variance:



1. Using the Variance Settings map, find your geographic location and note the zone number.
2. Turn the ignition switch to the On position.
3. Press and release the C/T button (1) so that the EVIC display is in the Compass/Temperature mode.
4. Depress and hold the C/T push button (1) for approximately five to ten seconds. The last variance zone number will appear in the EVIC display.
5. Press and release the STEP button (3) until the zone number for your geographic location appears in the display.
6. Depress and release the RESET push button (2) to exit.
7. Confirm that the correct directions are now indicated by the compass.

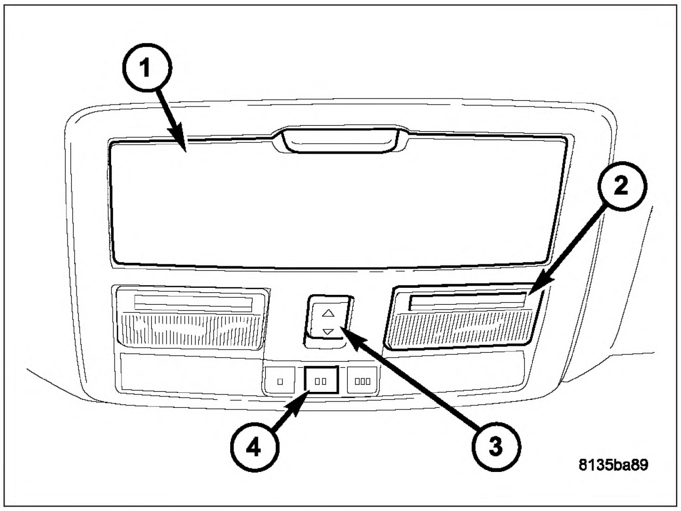


UNIVERSAL TRANSMITTER

DESCRIPTION

The universal transmitter transceiver is integral to the overhead console. The only visible component of the universal transmitter are the three transmitter push buttons (4) at the front of the overhead console. The buttons are marked with one, two or three illuminated dots, respectively, for identification of each channel.

Each of the three universal transmitter push buttons controls an independent radio transmitter channel. Each of these three channels can be trained to transmit a different radio frequency signal for the remote operation of garage door openers, motorized gate openers, home or office lighting, security systems or just about any other device that can be equipped with a radio receiver in the 286 to 399 MegaHertz (MHz) frequency range for remote operation. The universal transmitter is capable of operating systems using either rolling code or non-rolling code technology. The system will not transmit operating signals if the Vehicle Theft Security System is armed.



The universal transmitter cannot be repaired, and is available for service only as part of the Electronic Overhead Module (EOM). The EOM includes the push button switches and the plastic module body.

DIAGNOSIS AND TESTING

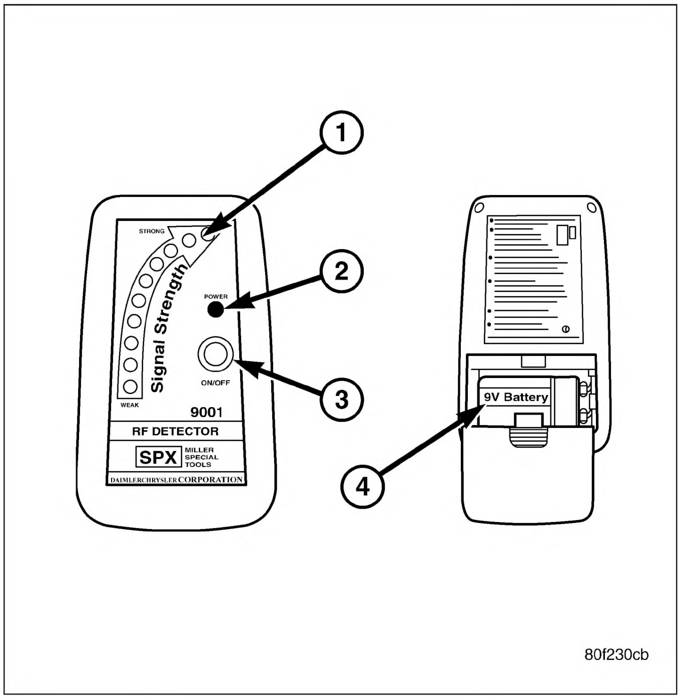
UNIVERSAL TRANSMITTER

If the Universal Transmitter is inoperative, but the Electronic Vehicle Information Center (EVIC) is operating normally, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/UNIVERSAL TRANSMITTER - STANDARD PROCEDURE) for instructions on training the Transmitter. Retrain the Transmitter with a known good transmitter as instructed and test the Transmitter operation again.

If the unit is still inoperative, test the universal transmitter with Radio Frequency Detector special tool. as described below:

1. Turn the Radio Frequency (RF) Detector ON. A “chirp” will sound and the green power LED will light. If the green LED does not light, replace the battery.
2. Hold the RF detector within one inch of the TRAINED universal transmitter and press any of the transmitters buttons.
3. The red signal detection LEDs will light and the tool will beep if a radio signal is detected. Repeat this test for each button. If any button is inoperative, replace the universal transmitter assembly, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/UNIVERSAL TRANSMITTER - REMOVAL).

If both the Transmitter and the EVIC module are inoperative, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - DIAGNOSIS AND TESTING) for further diagnosis. Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

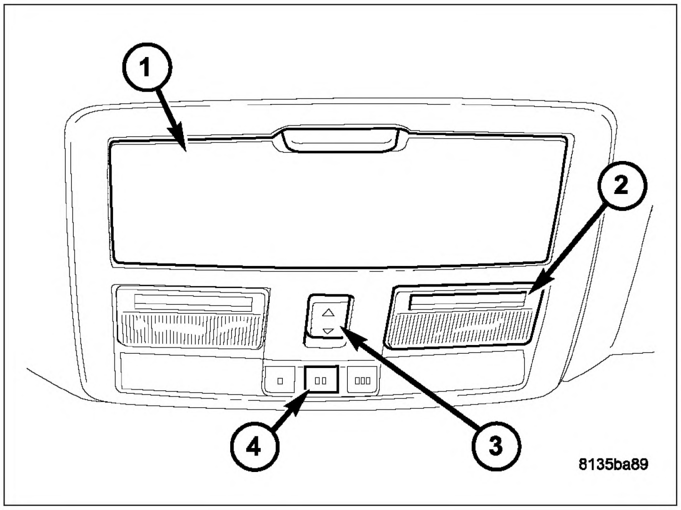


STANDARD PROCEDURE

PROGRAMMING TRANSMITER CODES

CAUTION: Vehicle exhaust contains carbon monoxide, a dangerous gas. Do not run the vehicle's exhaust while training the transceiver. Exhaust gas can cause serious injury or death.

CAUTION: Your motorized door or gate will open and close while you are training the Universal Transceiver. Do not train the transceiver if people or pets are in the path of the door or gate. A moving door or gate can cause serious injury or death to people and pets or damage to objects.



The Electronic Vehicle Information Center (EVIC) features a driver-interactive display which includes HomeLink system messages. The EVIC is located in the upper part of the cluster between the speedometer and tachometer.

1. Press and hold the two outer HomeLink buttons (4), and release only when the EVIC display shows “Channels Cleared” (after 20 seconds). **Do not** hold the buttons for longer than 30 seconds and **do not** repeat step one to program a second and/or third hand-held transmitter to the remaining two HomeLink buttons.
2. Position the end of your hand-held transmitter 1-3 inches (3-8 cm) away from the HomeLink buttons.
3. Simultaneously press and hold both the HomeLink button that you want to train and the hand-held transmitter buttons. **Do not release the buttons until step 4 has been completed.**
4. The EVIC display will show “Channel X Training” (where X is Channel 1, 2, or 3). Release both buttons after the EVIC display shows “Channel X Trained”.

NOTE: If the EVIC display shows “Did Not Train” repeat steps 2–4.

5. Press and hold the just trained HomeLink button and observe the EVIC display. If the EVIC display shows “Channel X Transmit” (where X is Channel 1, 2, or 3), programming is complete and your device should activate when the HomeLink button is pressed and released.

NOTE: To program the remaining two HomeLink buttons, begin with ″Programming″ step two. Do not repeat step one.

NOTE: If your hand-held transmitter appears to program the universal transceiver, but your garage door does not operate using the transmitter and your garage door opener was manufactured after 1995, your garage door opener may have a multiple security code system (rolling code system). Please proceed to steps 6–8 to complete the programming of a rolling code equipped device (most common garage door openers require this step.

6. At the garage door opener receiver (motor-head unit) in the garage, locate the ″learn″ or ″smart″ button. This can usually be found where the hanging antenna wire is attached to the motor-head unit.
7. Firmly press and release the ″learn″ or ″smart″ button. (The name and color of the button may vary by manufacturer.)

NOTE: There are 30 seconds in which to initiate step eight.

8. Return to the vehicle and firmly **press, hold for two seconds and release** the programmed HomeLink button. Repeat the ″**press/hold/release**″ sequence a second time, and, depending on the brand of the garage door opener (or other rolling code equipped device), repeat this sequence a third time to complete the programming.
9. HomeLink should now activate your rolling code equipped device.
10. To program the remaining two HomeLink buttons, begin with ″Programming″ **step two. Do not repeat step one.**

ERASING TRANSMITTER CODES

NOTE: Individual channels cannot be erased. Erasing the transmitter codes will erase ALL programmed codes.

To erase programming from the three buttons (individual buttons cannot be erased but can be ″reprogrammed″ - note below), follow the step noted:

- Press and hold the two outer HomeLink buttons and release only when the Electronic Vehicle Information Center (EVIC) display shows “Channels Cleared” (after 20 seconds). Release both buttons. Do not hold for longer that 30 seconds. HomeLink is now in the train (or learning) mode and can be programmed at any time, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/UNIVERSAL TRANSMITTER - STANDARD PROCEDURE).

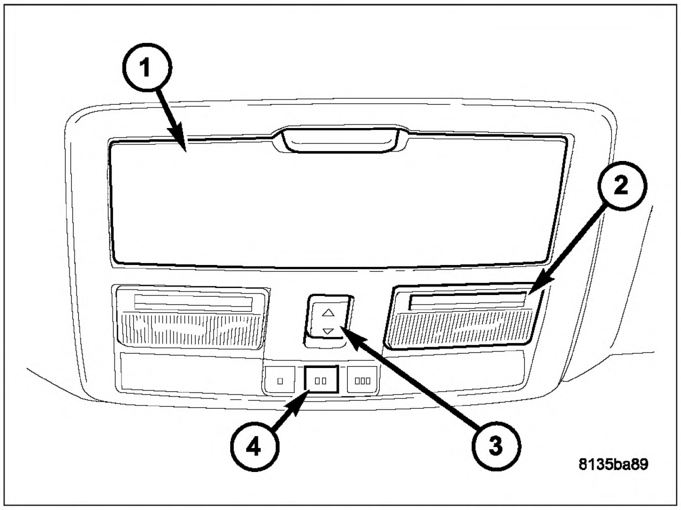
REPROGAMMING TRANSMITTER CODES

CAUTION: Vehicle exhaust contains carbon monoxide, a dangerous gas. Do not run the vehicle’s exhaust while training the transceiver. Exhaust gas can cause serious injury or death.

CAUTION: Your motorized door or gate will open and close while you are training the Universal Transceiver. Do not train the transceiver if people or pets are in the path of the door or gate. A moving door or gate can cause serious injury or death to people and pets or damage to objects.

To program a device to HomeLink using a HomeLink button previously trained, follow these steps:

1. Press and hold the desired HomeLink button (4). **Do NOT** release the button.
2. The EVIC display will show “Channel X Transmit” (where X is Channel 1, 2, or 3) for 20 seconds and then change to “Channel X Training”. Without releasing the HomeLink button, proceed to step 3.
3. Position the end of your hand-held transmitter 1-3 inches (3-8 cm) away from the HomeLink buttons.
4. Simultaneously press and hold both the HomeLink button that you want to train and the hand-held transmitter buttons. **Do not release the buttons until step 5 has been completed.**
5. Press and hold the just trained HomeLink button and observe the EVIC display. If the EVIC display shows “Channel X Transmit” (where X is Channel 1, 2, or 3), programming is complete and your device should activate when the HomeLink button is pressed and released.



NOTE: To program the remaining two HomeLink buttons, begin with ″Programming″ step two. Do not repeat step one.

NOTE: If your hand-held transmitter appears to program the universal transceiver, but your garage door does not operate using the transmitter and your garage door opener was manufactured after 1995, your garage door opener may have a multiple security code system (rolling code system). Please proceed to steps 6–8 to complete the programming of a rolling code equipped device (most common garage door openers require this step.

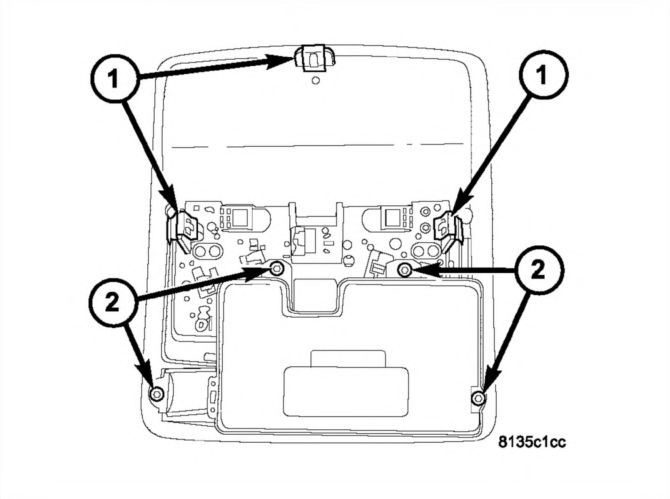
6. At the garage door opener receiver (motor-head unit) in the garage, locate the ″learn″ or ″smart″ button. This can usually be found where the hanging antenna wire is attached to the motor-head unit.
7. Firmly press and release the ″learn″ or ″smart″ button. (The name and color of the button may vary by manufacturer.)

NOTE: There are 30 seconds in which to initiate step eight.

8. Return to the vehicle and firmly **press, hold for two seconds and release** the programmed HomeLink button. Repeat the ″**press/hold/release**″ sequence a second time, and, depending on the brand of the garage door opener (or other rolling code equipped device), repeat this sequence a third time to complete the programming.
9. HomeLink should now activate your rolling code equipped device.

REMOVAL

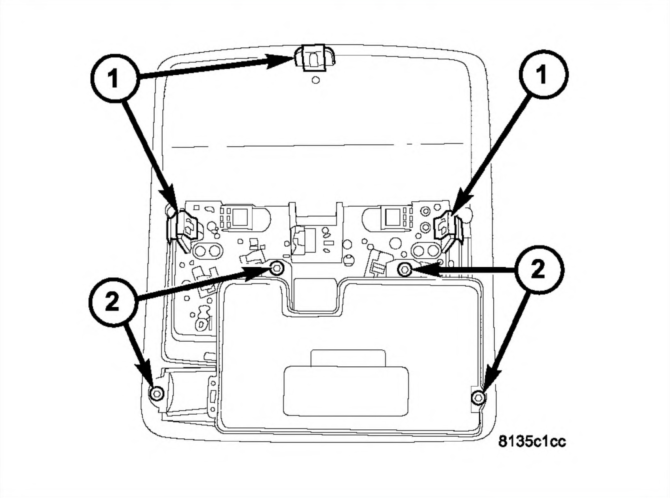
1. Disconnect and isolate the battery negative cable.
2. Remove the overhead console assembly, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).
3. Remove the Electronic Overhead Module (EOM) retaining screws (2) and separate the EOM from the overhead console.



INSTALLATION

NOTE: In addition to the Universal Transmitter operation the Electronic Overhead Module (EOM) is responsible for some of the compass functions. Anytime the EOM is replaced the compass variance value must be set, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - STANDARD PROCEDURE - COMPASS VARIATION ADJUSTMENT).

1. Position the EOM onto the overhead console assembly and install the retaining screws (2).
2. Install the overhead console assembly, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).
3. Connect the battery negative cable.



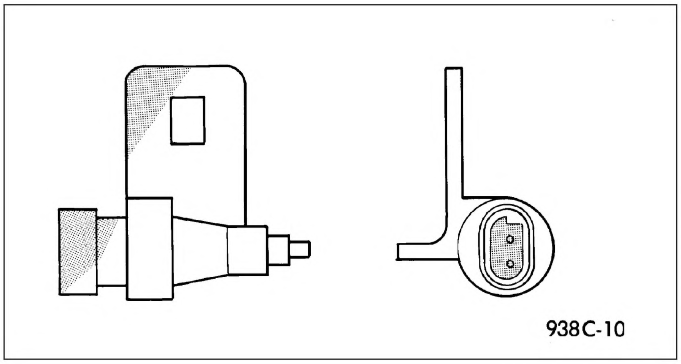
4. Program the universal transmitter codes, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/UNIVERSAL TRANSMITTER - STANDARD PROCEDURE).

SENSOR-AMBIENT AIR TEMPERATURE

DESCRIPTION

The ambient temperature sensor is a variable resistor type sensor. it is mounted to the lower front fascia behind the radiator grille and in front of the engine compartment.

The ambient temperature sensor cannot be adjusted or repaired and, if inoperative or damaged, it must be replaced.



OPERATION

The ambient temperature sensor is a variable resistor that operates on a five-volt reference signal sent by the Front Control Module (FCM). The resistance in the sensor changes as temperature changes, changing the temperature sensor signal circuit voltage to the FCM. Based upon the resistance in the sensor, the FCM senses a specific voltage on the temperature sensor signal circuit. The FCM then translates the voltage into a temperature reading that it sent over the Controller Area Network (CAN) data bus to other modules utilizing temperature information.

DIAGNOSIS AND TESTING

AMBIENT TEMPERATURE SENSOR

The temperature function is supported by the ambient temperature sensor, a wiring circuit, and the Front Control Module (FCM). If any portion of the ambient temperature sensor circuit fails or if the Controller Area Network (CAN) data bus information is missing, a (– –) will appear in the Electronic Vehicle Information Center (EVIC) display in place of the temperature. When the sensor is exposed to temperatures above 55° C (130° F), or if the sensor circuit is shorted, 55° C (130° F) will appear in the EVIC display in place of the temperature. When the sensor is exposed to temperatures below - 40° C (- 40° F) or if the sensor circuit is open, - 40° C (- 40° F) will appear in the EVIC display.

The ambient temperature sensor circuit can also be diagnosed using the following Sensor Test, and Sensor Circuit Test. If the temperature sensor and circuit are confirmed to be OK, but the temperature display is inoperative or incorrect, test the EVIC operation, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - DIAGNOSIS AND TESTING).

SENSOR TEST

1. Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the ambient temperature sensor harness connector.
2. Measure the resistance of the ambient temperature sensor. At - 40° C (- 40° F), the sensor resistance is 336 kilohms. At 55° C (130° F), the sensor resistance is 2.488 kilohms. The sensor resistance should read between these two values. If OK, refer to Sensor Circuit Test in this group. If not OK, replace the inoperative ambient temperature sensor.

SENSOR CIRCUIT TEST

Refer to the appropriate wiring information for complete circuit schematic or connector pin-out information.

1. Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the wire harness connectors from the ambient temperature sensor and the FCM.

2. Connect a jumper wire between the two terminals in the body half of the ambient temperature sensor harness connector.
3. Check for continuity between the sensor return circuit and the ambient temperature sensor signal circuit cavities of the FCM harness connector. There should be continuity. If OK, go to Step 4. If not OK, repair the open sensor return circuit or ambient temperature sensor signal circuit to the ambient temperature sensor as required.
4. Check for continuity between the ambient temperature sensor signal circuit cavity of the FCM harness connector and a good ground. There should be no continuity. If OK, test the EVIC operation, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - DIAGNOSIS AND TESTING). If not OK, repair the shorted ambient temperature sensor signal circuit as required.

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the grille, (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).
3. Disconnect the wire harness connector from the ambient temperature sensor.
4. Release the ambient temperature sensor from the retaining bracket.
5. Remove the ambient temperature sensor from the vehicle.

INSTALLATION

1. Position the ambient temperature sensor in the vehicle.
2. Secure the ambient temperature sensor into the retaining bracket.
3. Connect the wire harness connector to the ambient temperature sensor.
4. Install the grille, (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
5. Connect the battery negative cable.

POWER SYSTEMS

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POWER LOCKS - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B210D-BATTERY VOLTAGE LOW – DOOR MODULE

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At all times.
- **Set Condition:**
  Anytime the module senses voltage input below 9.5 volts, this code will set.

POSSIBLE CAUSES
LOW VOLTAGE ENGINE DTC
DOOR MODULE

Diagnostic Test

1. CHECK ENGINE DTC's

With the scan tool, read ENGINE DTC's

Are there any ENGINE DTC's present?

No >> Go to 2

Yes >> Refer to symptom list for problems related to ENGINE.

---

2. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Start the engine and run for 2 minutes.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display BATTERY VOLTAGE LOW?

Yes >> Replace the appropriate Door Module.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B210E-BATTERY VOLTAGE HIGH – MEMORY MIRROR MODULE

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At all times.
- **Set Condition:**
  Anytime the module senses voltage input above 15.9 volts, this code will set.

POSSIBLE CAUSES
HIGH VOLTAGE ENGINE DTC
MEMORY MIRROR MODULE

Diagnostic Test

1. CHECK ENGINE DTC's

With the scan tool, read ENGINE DTC's

Are there any ENGINE DTC's present?

No >> Go to 2

Yes >> Refer to symptom list for problems related to ENGINE.

---

2. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Start the engine and run for 2 minutes.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display BATTERY VOLTAGE HIGH?

Yes >> Replace the Memory Mirror Module.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2218, B2219–DOOR MODULE INTERNAL – DOOR MODULE

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At all times
- **Set Condition:**
  Whenever the module detects an EEPROM failure

POSSIBLE CAUSES
DOOR MODULE

Diagnostic Test

1. Replace the Door Module

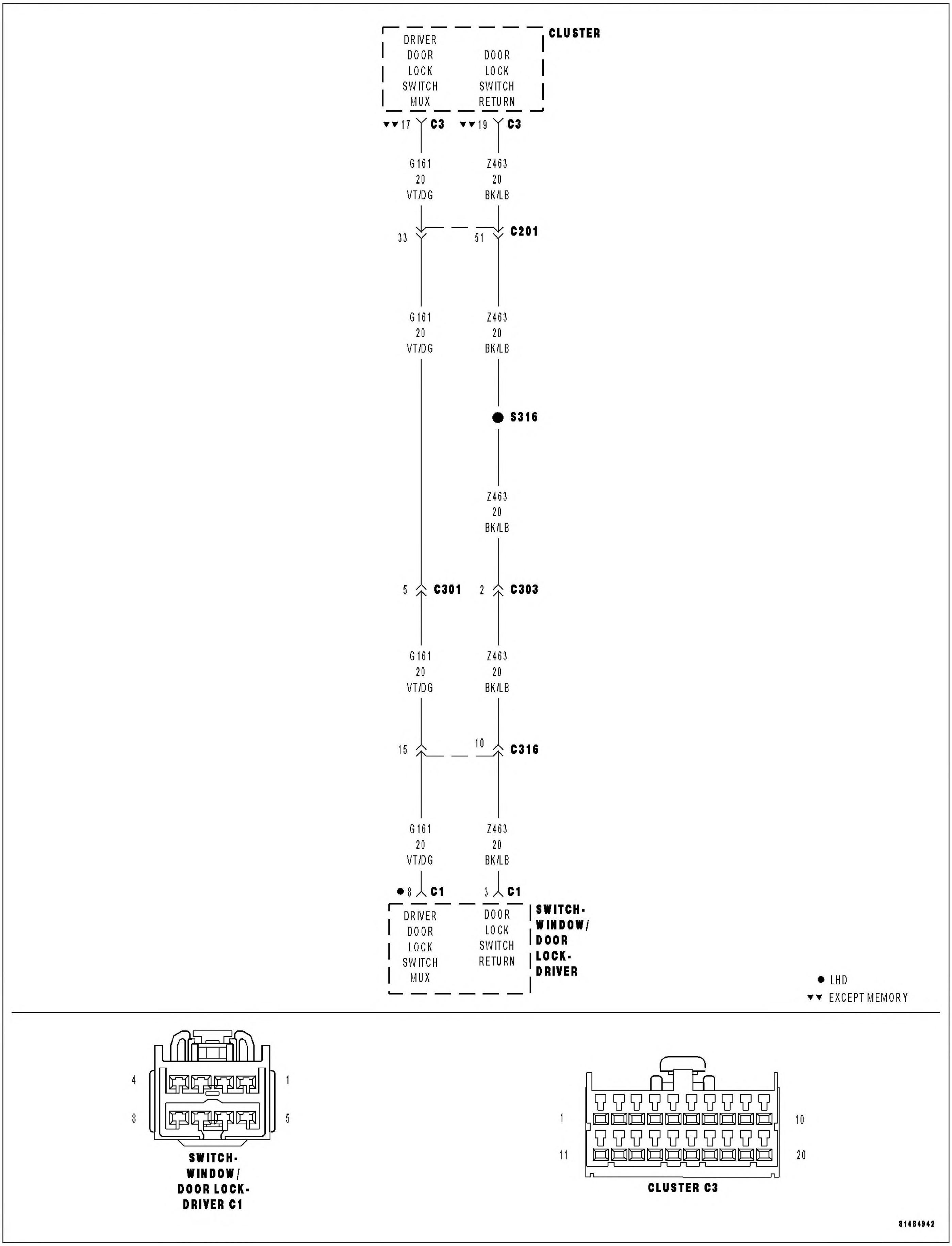
NOTE: Anytime this code is logged, the module must be replaced.

Repair

Replace the appropriate Door Module.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1801 DRIVER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW – CLUSTER


CLUSTER
DRIVER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
▼▼ 17 C3
▼▼ 19 C3
G161 20 VT/DG
Z463 20 BK/LB
33
51
C201
S316
5 C301
2 C303
15
10
C316
● 8 C1
3 C1
SWITCH-WINDOW/DOOR LOCK-DRIVER
● LHD
▼▼ EXCEPT MEMORY
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-DRIVER C1
1
10
11
20
CLUSTER C3
81484942

B1801 DRIVER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW – CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Driver Door Lock Switch Mux circuit is below 1.5 volts for over 10 seconds.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORT TO GROUND
DOOR LOCK SWITCH SHORT TO GROUND
INSTRUMENT CLUSTER

Theory of Operation

This code will only set in vehicles that do not have the Memory System.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Driver Door Lock Switch in all positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. DOOR LOCK SWITCH SHORTED

With the scan tool, erase DTC's.

Disconnect the Driver Window/Door Lock Switch connector.

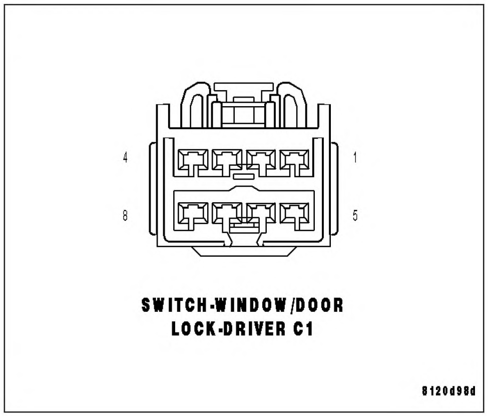
With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW?

No >> Replace the Driver Window/Door Lock Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3



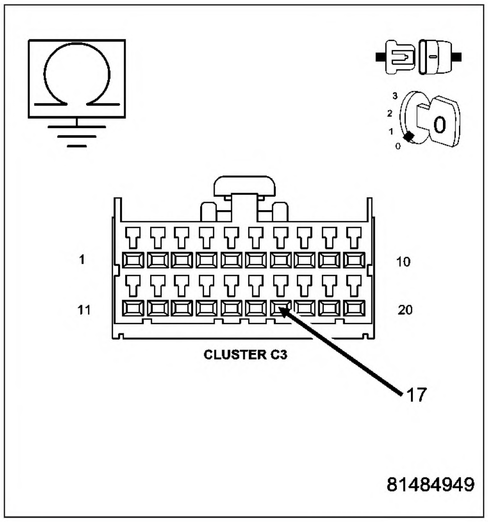
B1801 DRIVER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW – CLUSTER (CONTINUED)

3. DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the (G161) Driver Door Lock Switch Mux circuit.



Is the resistance below 10000.0 ohms?

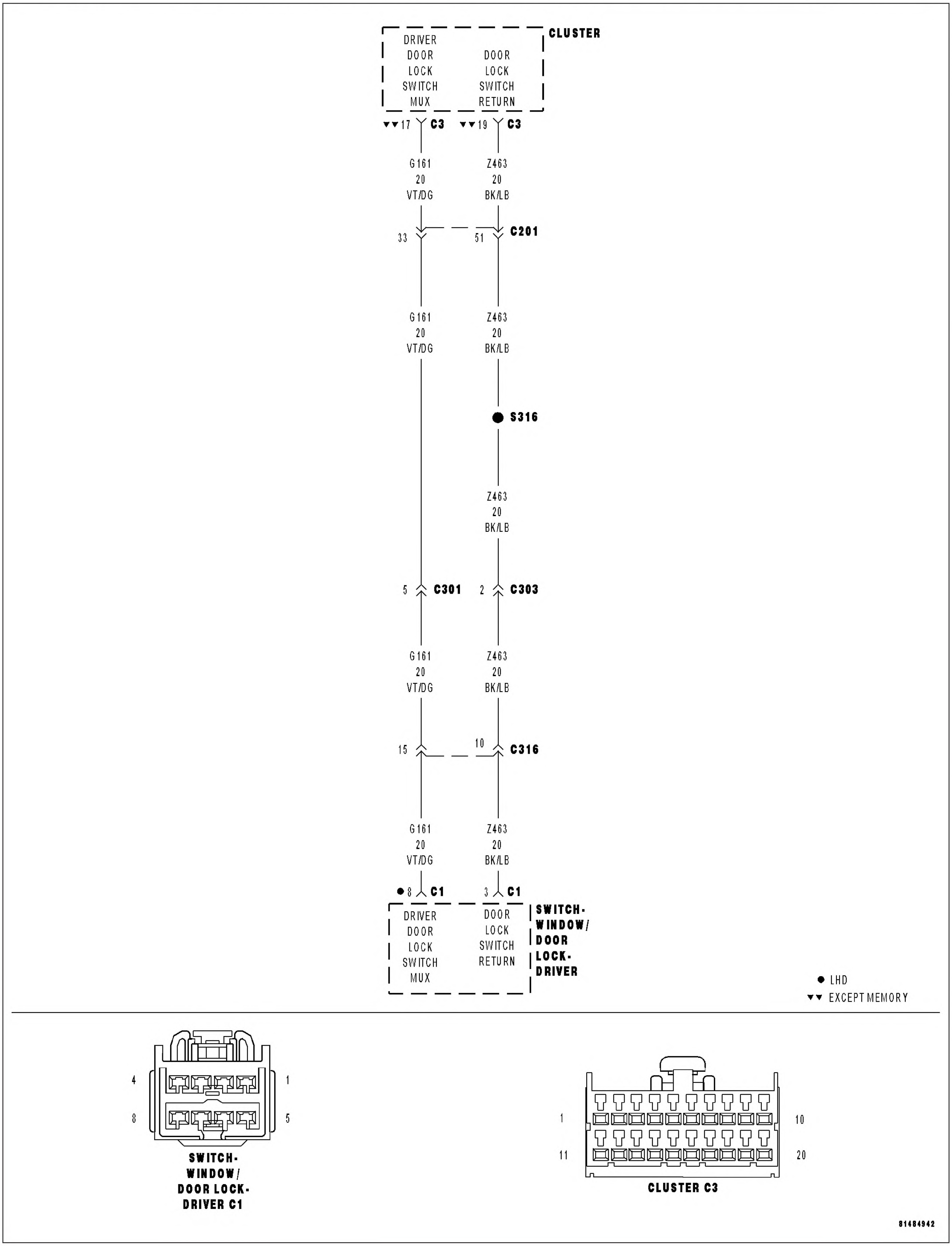
Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK– CLUSTER


CLUSTER
DRIVER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
▾▾ 17 C3
▾▾ 19 C3
G161 20 VT/DG
Z463 20 BK/LB
33
51
C201
G161 20 VT/DG
Z463 20 BK/LB
S316
Z463 20 BK/LB
5 C301
2 C303
G161 20 VT/DG
Z463 20 BK/LB
15
10
C316
G161 20 VT/DG
Z463 20 BK/LB
● 8 C1
3 C1
DRIVER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
SWITCH-WINDOW/DOOR LOCK-DRIVER
● LHD
▾▾ EXCEPT MEMORY
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-DRIVER C1
1
10
11
20
CLUSTER C3
81484942

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a Lock input on the Driver Door Lock Switch Mux circuit for over 30 seconds, this code will set.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND
DOOR LOCK SWITCH STUCK
INSTRUMENT CLUSTER

Theory of Operation

This code will only set in Cluster in vehicles that do not have the Memory System.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Driver Door Lock Switch in all positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

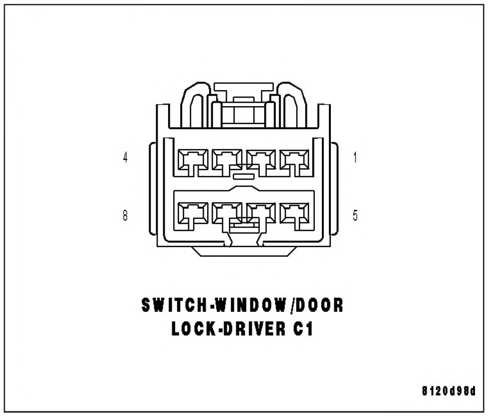
---

2. DOOR LOCK SWITCH SHORTED

With the scan tool, erase DTC's.

Disconnect the Driver Window/Door Lock Switch connector.

With the scan tool, read DTC's.



Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK?

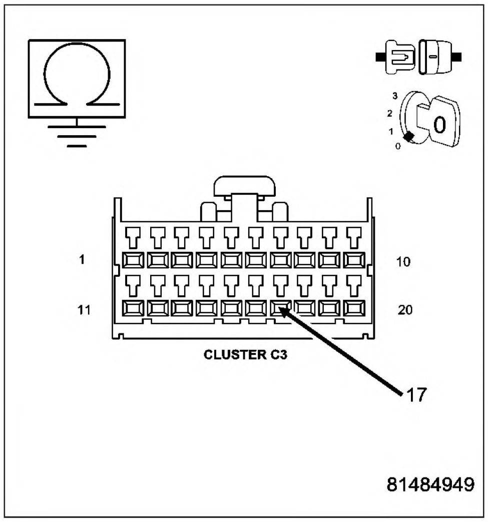
No >> Replace the Driver Window/Door Lock Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK– CLUSTER (CONTINUED)

3. DRIVER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND



Turn the ignition off.

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the Driver Door Lock Switch Mux circuit.

Is the resistance below 10000.0 ohms?

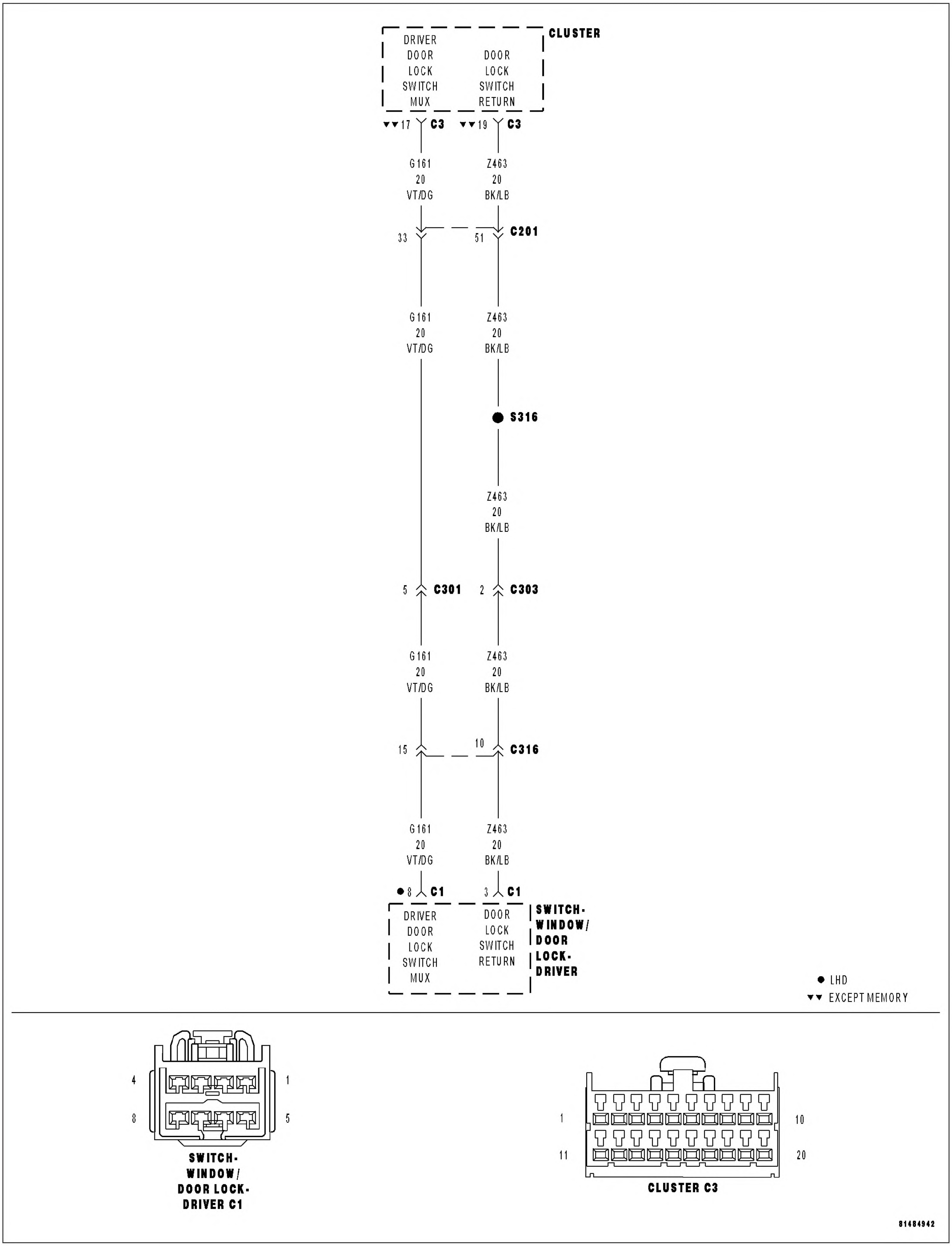
Yes >> Repair the Driver Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1804–DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK– CLUSTER


CLUSTER
DRIVER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
▾▾17 C3
▾▾19 C3
G161 20 VT/DG
Z463 20 BK/LB
33
51
C201
S316
5 C301
2 C303
15
10
C316
● 8 C1
3 C1
SWITCH-WINDOW/DOOR LOCK-DRIVER
● LHD
▾▾ EXCEPT MEMORY
4 1 8 5
SWITCH-WINDOW/DOOR LOCK-DRIVER C1
1 10 11 20
CLUSTER C3
81484942

B1804–DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses an Unlock input on the Driver Door Lock Switch Mux circuit for over 10 seconds, this code will set.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND
DRIVER DOOR LOCK SWITCH STUCK
INSTRUMENT CLUSTER

Theory of Operation

This code will only set in Cluster in vehicles that do not have the Memory System.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Driver Door Lock Switch in all positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST - VER 1.

---

2. DOOR LOCK SWITCH SHORTED

With the scan tool, erase DTC's.

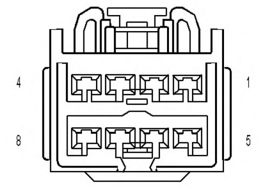
Disconnect the Driver Window/Door Lock Switch connector.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK?

No >> Replace the Driver Window/Door Lock Switch.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3



SWITCH-WINDOW/DOOR LOCK-DRIVER C1

8120d98d

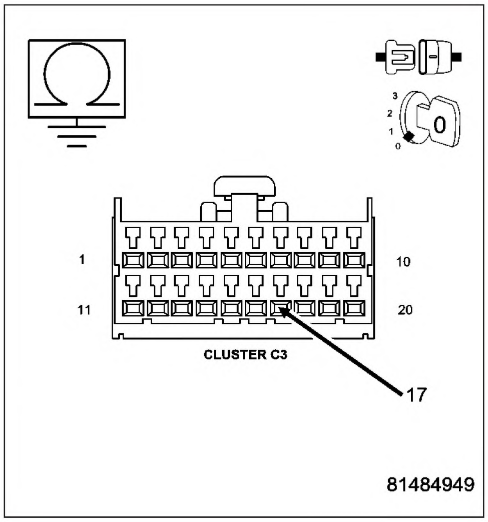
B1804–DRIVER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK– CLUSTER (CONTINUED)

3. (G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND

Turn the ignition off.

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the (G161) Driver Door Lock Switch Mux circuit.

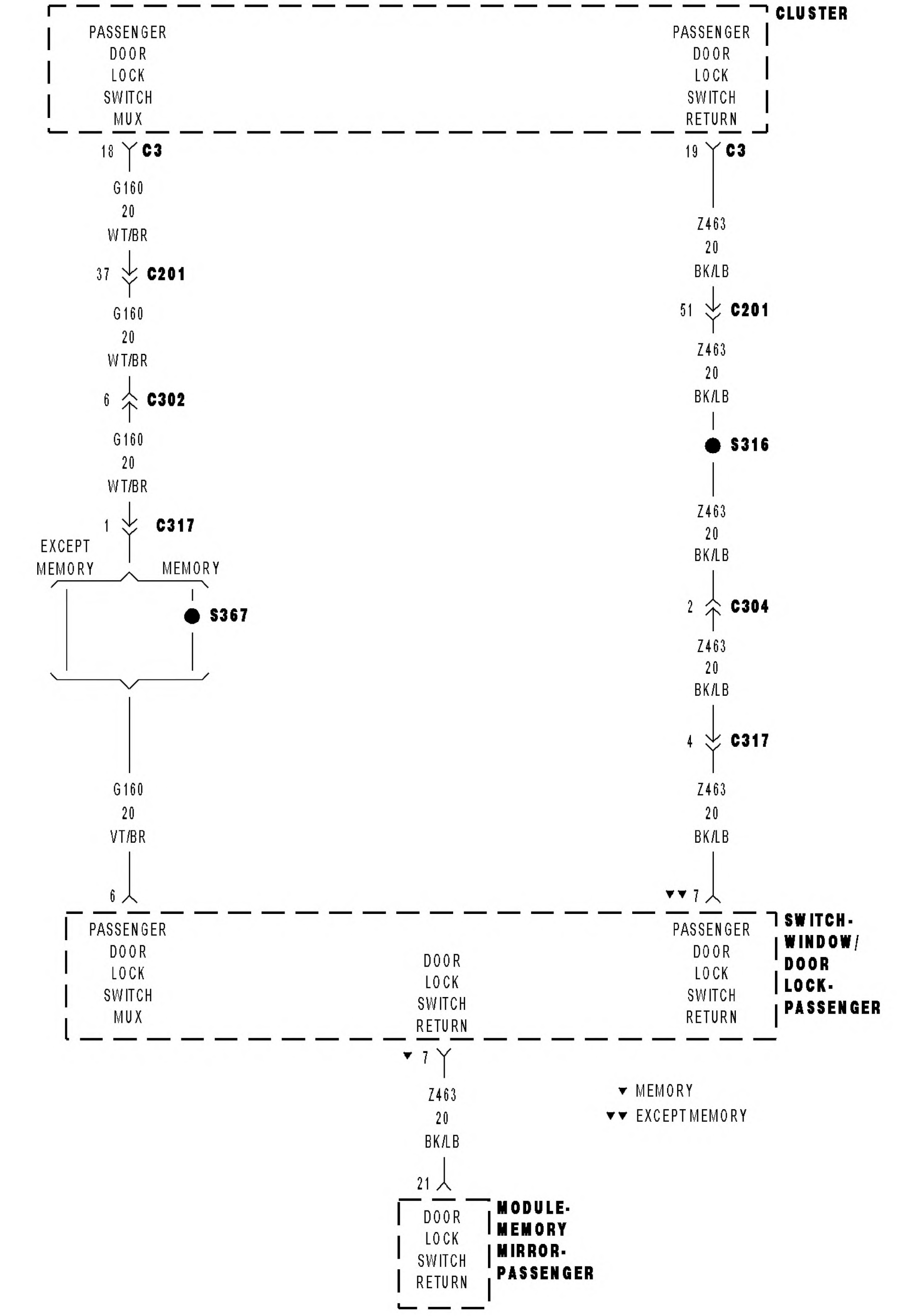


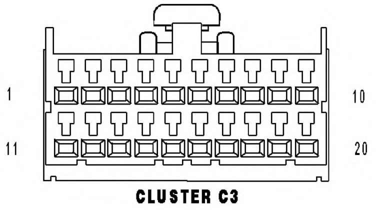
Is the resistance below 10000.0 ohms?

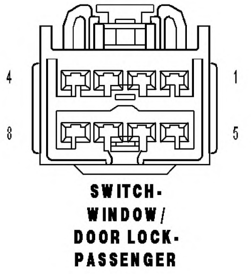
Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to ground.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1806–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW – CLUSTER


CLUSTER
PASSENGER DOOR LOCK SWITCH MUX
PASSENGER DOOR LOCK SWITCH RETURN
18 C3
19 C3
G160 20 WT/BR
37 C201
6 C302
1 C317
EXCEPT MEMORY
MEMORY
S367
G160 20 VT/BR
6
Z463 20 BK/LB
51 C201
S316
2 C304
4 C317
▾▾ 7
SWITCH-WINDOW/ DOOR LOCK-PASSENGER
DOOR LOCK SWITCH RETURN
▾ 7
21
MODULE-MEMORY MIRROR-PASSENGER
▾ MEMORY
▾▾ EXCEPT MEMORY


1
10
11
20
CLUSTER C3


4
1
8
5
SWITCH-WINDOW/ DOOR LOCK-PASSENGER

81484b26

B1806–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW – CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Driver Door Lock Switch Mux circuit is below 0.7 volts for over 10 seconds.

Possible Causes
DOOR LOCK SWITCH SHORT TO GROUND
(G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT SHORT TO GROUND
INSTRUMENT CLUSTER

Theory of Operation

This code will only set in vehicles that do not have the Memory System.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC’s

Operate the Passenger Door Lock Switch in all positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC’s.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

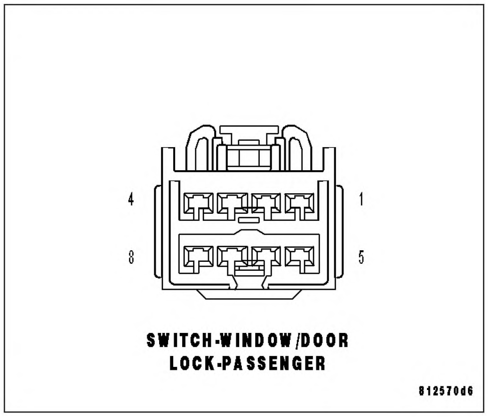
---

2. DOOR LOCK SWITCH SHORTED

With the scan tool, erase DTC’s.

Diconnect the Passenger Window/Door Lock Switch connector.

With the scan tool, read DTC’s.



Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW?

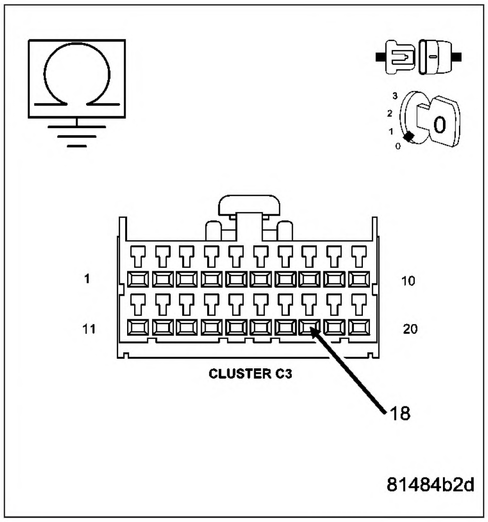
No >> Replace the Passenger Window/Door Lock Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3

B1806–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT CIRCUIT LOW – CLUSTER (CONTINUED)

3. DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORT TO GROUND



Turn the ignition off.

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the Passenger Door Lock Switch Mux circuit.

Is the resistance below 10000.0 ohms?

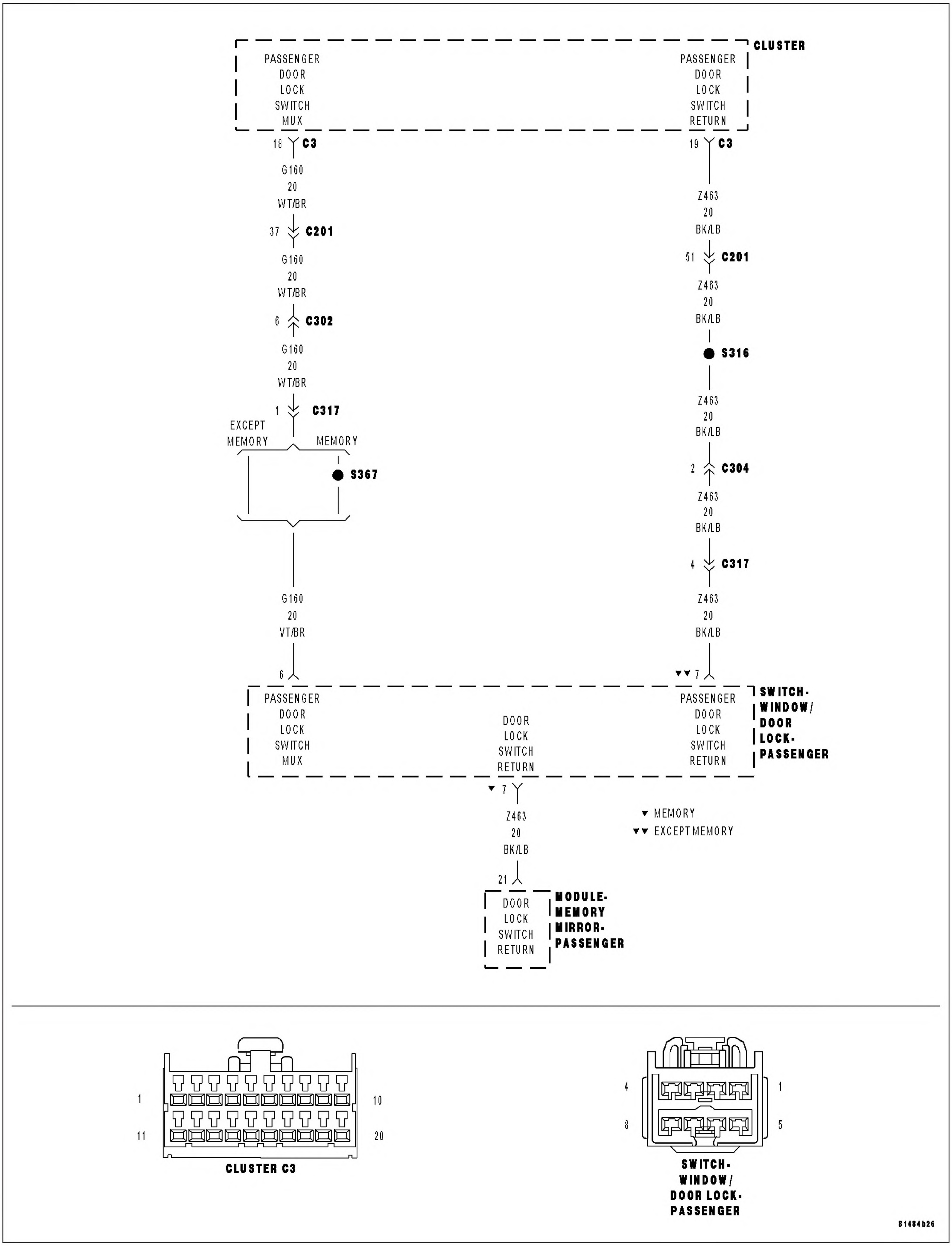
Yes >> Repair the Passenger Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1808–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK – CLUSTER


CLUSTER
PASSENGER DOOR LOCK SWITCH MUX
PASSENGER DOOR LOCK SWITCH RETURN
18 C3
19 C3
G160 20 WT/BR
37 C201
G160 20 WT/BR
6 C302
G160 20 WT/BR
1 C317
EXCEPT MEMORY
MEMORY
S367
G160 20 VT/BR
6
Z463 20 BK/LB
51 C201
Z463 20 BK/LB
S316
Z463 20 BK/LB
2 C304
Z463 20 BK/LB
4 C317
Z463 20 BK/LB
▾▾ 7
SWITCH-WINDOW/DOOR LOCK-PASSENGER
PASSENGER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH RETURN
▾ 7
Z463 20 BK/LB
▾ MEMORY
▾▾ EXCEPT MEMORY
21
DOOR LOCK SWITCH RETURN
MODULE-MEMORY MIRROR-PASSENGER
1
10
11
20
CLUSTER C3
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-PASSENGER
81484b26

B1808–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK – CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a Lock input on the Passenger Door Lock Switch Mux circuit for over 10 seconds, this code will set.

Possible Causes
DOOR LOCK SWITCH STUCK
(G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND
INSTRUMENT CLUSTER

Theory of Operation

This code will only set in Cluster in vehicles that do not have the Memory System.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC’s

Operate the Passenger Door Lock Switch in all positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC’s.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. DOOR LOCK SWITCH SHORTED

With the scan tool, erase DTC’s.

Disconnect the Passenger Window/Door Lock Switch connector.

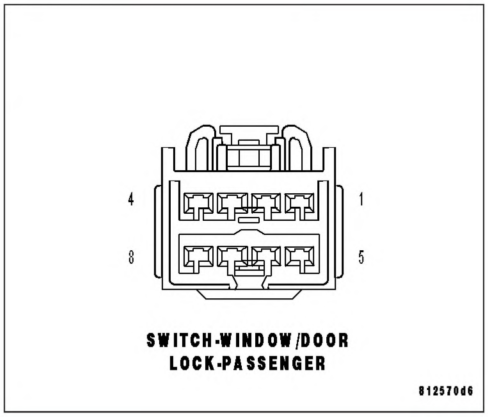
With the scan tool, read DTC’s.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK?

No >> Replace the Passenger Window/Door Lock Switch.

Perform BODY VERIFICATION TEST - VER 1.

Yes >> Go To 3



SWITCH-WINDOW/DOOR LOCK-PASSENGER

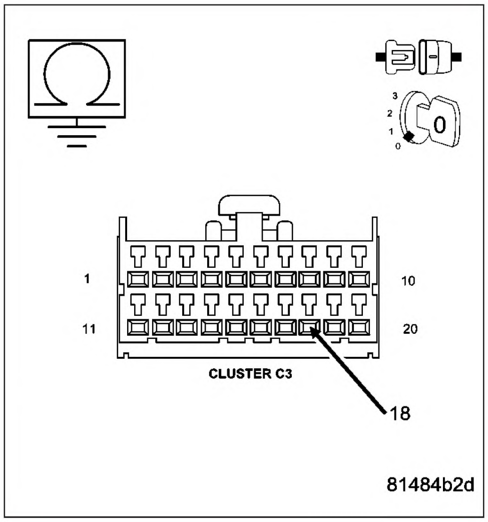
B1808–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK – CLUSTER (CONTINUED)

3. (G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND

Turn the ignition off.

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the (G160) Passenger Door Lock Switch Mux circuit.



Is the resistance below 10000.0 ohms?

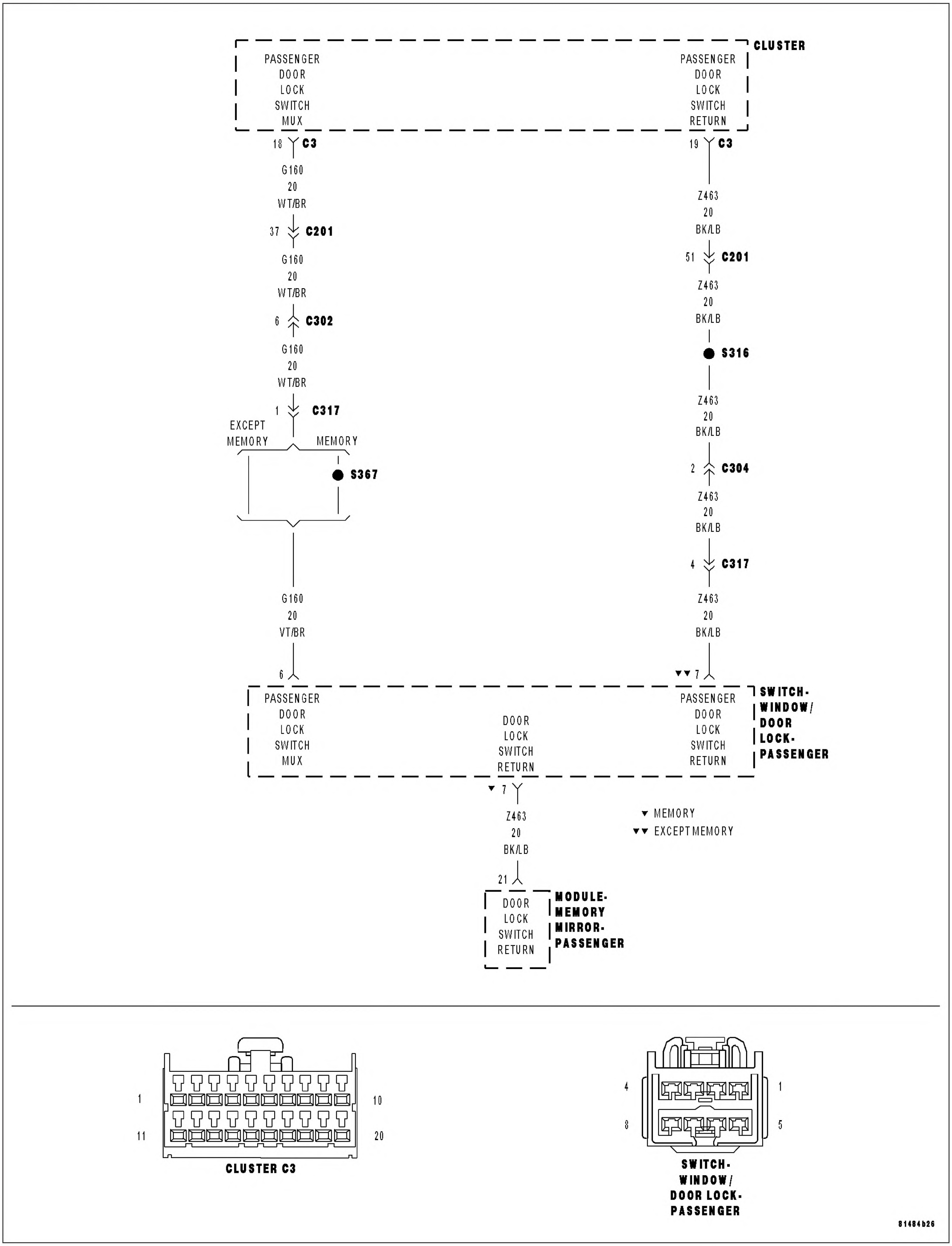
Yes >> Repair the (G160) Passenger Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1809–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK–CLUSTER


CLUSTER
PASSENGER DOOR LOCK SWITCH MUX
PASSENGER DOOR LOCK SWITCH RETURN
18 C3
19 C3
G160 20 WT/BR
37 C201
G160 20 WT/BR
6 C302
G160 20 WT/BR
1 C317
EXCEPT MEMORY
MEMORY
S367
G160 20 VT/BR
6
Z463 20 BK/LB
51 C201
Z463 20 BK/LB
S316
Z463 20 BK/LB
2 C304
Z463 20 BK/LB
4 C317
Z463 20 BK/LB
▾▾ 7
SWITCH-WINDOW/DOOR LOCK-PASSENGER
PASSENGER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH RETURN
▾ 7
Z463 20 BK/LB
▾ MEMORY
▾▾ EXCEPT MEMORY
21
DOOR LOCK SWITCH RETURN
MODULE-MEMORY MIRROR-PASSENGER
1
10
11
20
CLUSTER C3
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-PASSENGER
81484b26

B1809–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses an Unlock input on the Passeenger Door Lock Switch Mux circuit for over 10 seconds, this code will set.

Possible Causes
DOOR LOCK SWITCH STUCK
(G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND
INSTRUMENT CLUSTER

Theory of Operation

This code will only set in Cluster in vehicles that do not have the Memory System.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Passenger Door Lock Switch in all positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK LOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. DOOR LOCK SWITCH SHORTED

With the scan tool, erase DTC's.

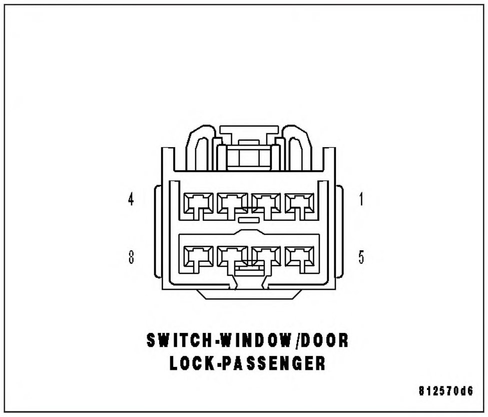
Disconnect the Passenger Window/Door Lock Switch connector.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK?

No >> Replace the Passenger Window/Door Lock Switch.
Perform BODY VERIFICATION TEST - VER 1.

Yes >> Go To 3



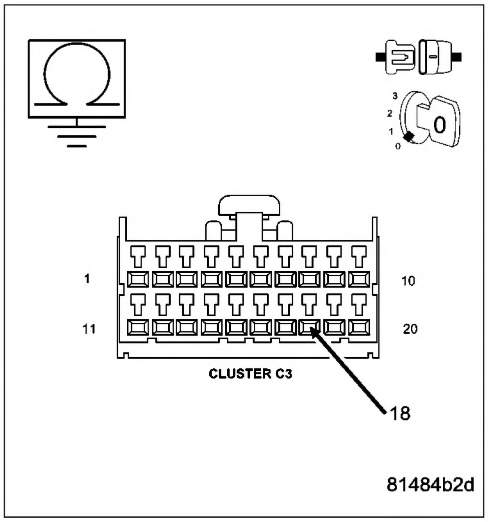
B1809–PASSENGER DOOR LOCK/UNLOCK SWITCH INPUT STUCK UNLOCK– CLUSTER (CONTINUED)

3. (G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT PARTIAL SHORT TO GROUND

Turn the ignition off.

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the (G160) Passenger Door Lock Switch Mux circuit.



Is the resistance below 10000.0 ohms?

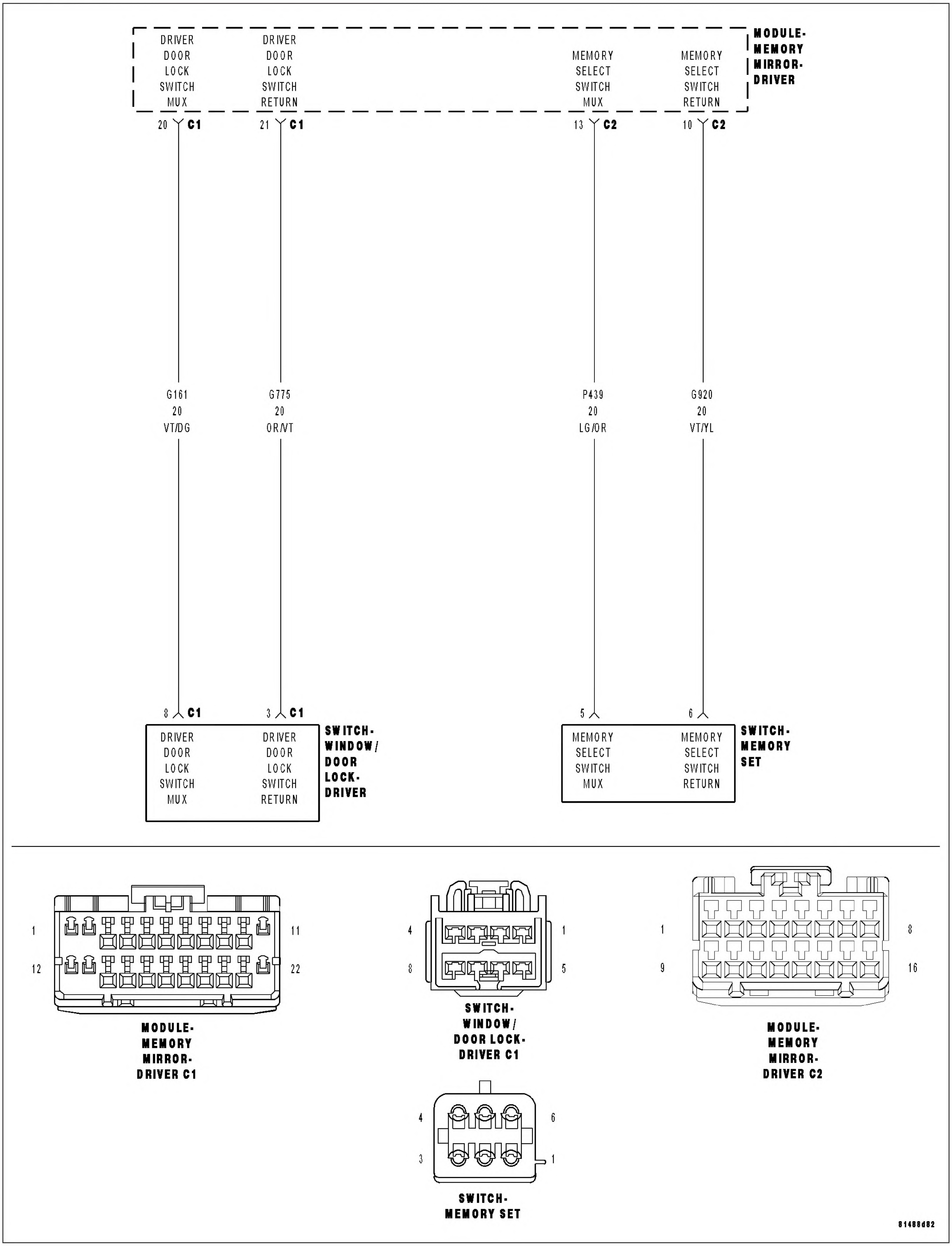
Yes >> Repair the (G160) Passenger Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1802–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH – DRIVER DOOR MODULE


MODULE-MEMORY MIRROR-DRIVER
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
20 C1
21 C1
13 C2
10 C2
G161 20 VT/DG
G775 20 OR/VT
P439 20 LG/OR
G920 20 VT/YL
8 C1
3 C1
5
6
SWITCH-WINDOW/DOOR LOCK-DRIVER
SWITCH-MEMORY SET
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-DRIVER C1
1
8
9
16
MODULE-MEMORY MIRROR-DRIVER C2
4
6
3
1
SWITCH-MEMORY SET
81488d82

B1802–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH – DRIVER DOOR MODULE (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Door Lock Switch Mux circuit is above 5.25 volts for over 30 msec.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX WIRE SHORT TO VOLTAGE
(P439) MEMORY SELECT SWITCH MUX WIRE SHORT TO VOLTAGE
DRIVER WINDOW/DOOR LOCK SWITCH
DRIVER MEMORY MIRROR MODULE

Theory of Operation

This code will only set in vehicles that have the Memory System. The supply circuit for the Memory Mirrors are supplied by the Memory Mirror Module, therefore both the Memory Select Switch Mux or the Door Lock Switch Mux circuits can cause this DTC.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Driver Door Lock Switch in both positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1802–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH – DRIVER DOOR MODULE (CONTINUED)

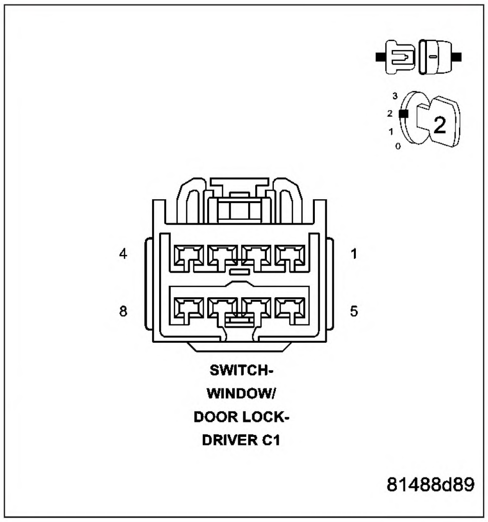
2. DRIVER DOOR LOCK SWITCH SHORTED TO VOLTAGE

With the scan tool, erase DTC's.

Disconnect the Driver Window/Door Lock Switch connector.

Turn the ignition on.

With the scan tool, read DTC's.


3
2
1
0
2
4
1
8
5
SWITCH-
WINDOW/
DOOR LOCK-
DRIVER C1
81488d89

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH?

No >> Replace the Driver Window/Door Lock Switch.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

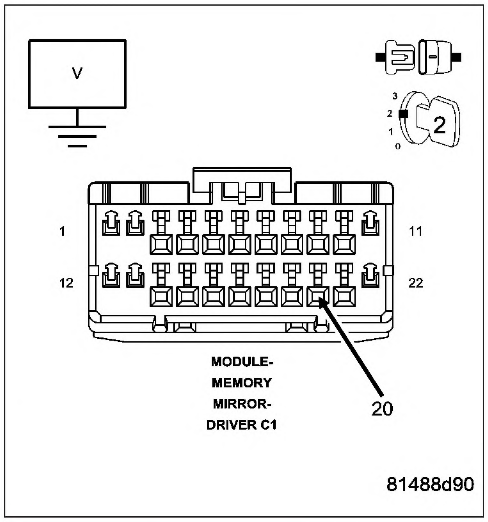
Yes >> Go to 3

---

3. (G161) DRIVER DOOR LOCK SWITCH MUX WIRE SHORT TO VOLTAGE

Disconnect the Driver Memory Mirror Module C1 connector.

Measure the voltage of the (G161) Driver Door Lock Switch Mux circuit in the Memory Mirror Module connector.


V
3
2
1
0
2
1
11
12
22
MODULE-
MEMORY
MIRROR-
DRIVER C1
20
81488d90

Is there any voltage present?

Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to voltage.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

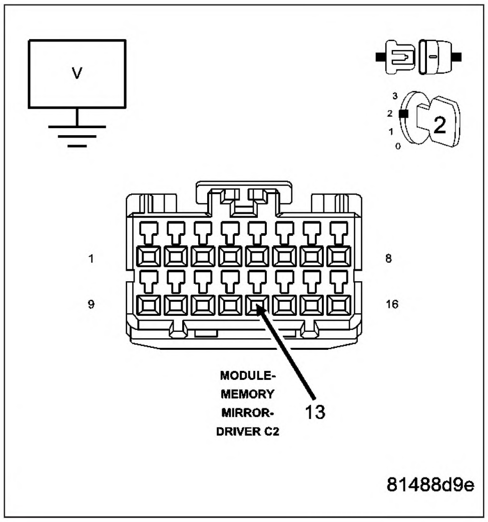
No >> Go to 4

B1802–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH – DRIVER DOOR MODULE (CONTINUED)

4. (P439) MEMORY SELECT MUX WIRE SHORT TO VOLTAGE

Disconnect the Driver Memory Mirror Module C2 connector.

Measure the voltage of the (P439) Memory Select Switch Mux circuit.



Is there any voltage present?

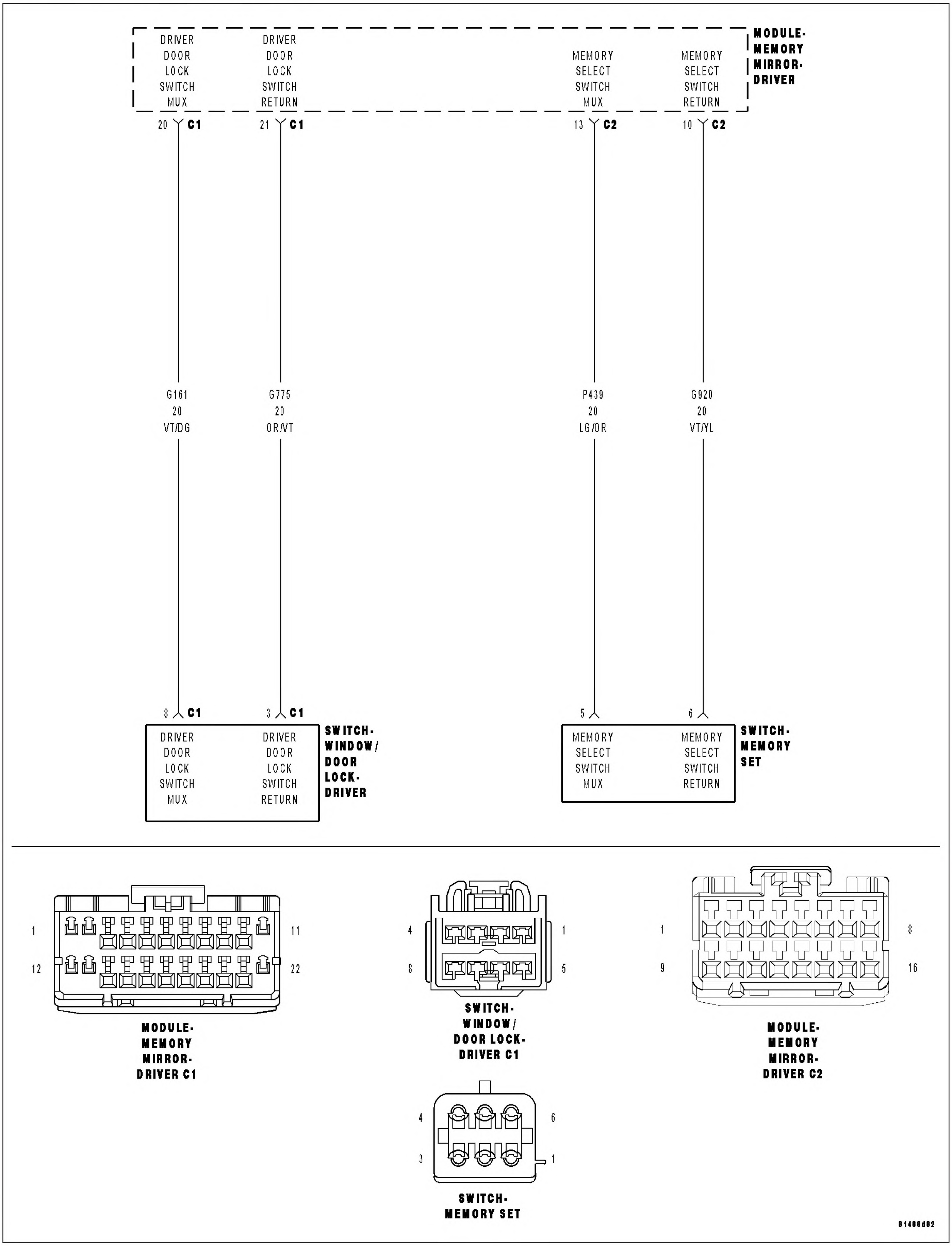
Yes >> Repair the (P439) Memory Select Switch Mux wire for a short to voltage.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Driver Memory Mirror Module.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – DRIVER MEMORY MIRROR MODULE


DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
MODULE-MEMORY MIRROR-DRIVER
20 C1
21 C1
13 C2
10 C2
G161 20 VT/DG
G775 20 OR/VT
P439 20 LG/OR
G920 20 VT/YL
8 C1
3 C1
5
6
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
SWITCH-WINDOW/DOOR LOCK-DRIVER
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
SWITCH-MEMORY SET
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-DRIVER C1
1
8
9
16
MODULE-MEMORY MIRROR-DRIVER C2
4
6
3
1
SWITCH-MEMORY SET
81488d82

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Driver Door Lock Switch Mux circuit is under 2.6 volts for over 30 seconds.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX WIRE PARTIAL SHORT TO GROUND
(P439) MEMORY SELECT SWITCH MUX WIRE PARTIAL SHORT TO GROUND
(P439) MEMORY SELECT SWITCH MUX CIRCUIT SHORTED TO THE (G920) MEMORY SELECT SWITCH RETURN CIRCUIT
MEMORY SELECTOR SWITCH
DRIVER WINDOW/DOOR LOCK SWITCH STUCK
DRIVER MEMORY MIRROR MODULE

Theory of Operation

This code will only set in vehicles that have the Memory System. The supply circuit for the Memory Mirrors are supplied by the Memory Mirror Module, therefore both the Memory Select Switch Mux or the Door Lock Switch Mux circuits can cause this DTC.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Driver Door Lock Switch in both positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

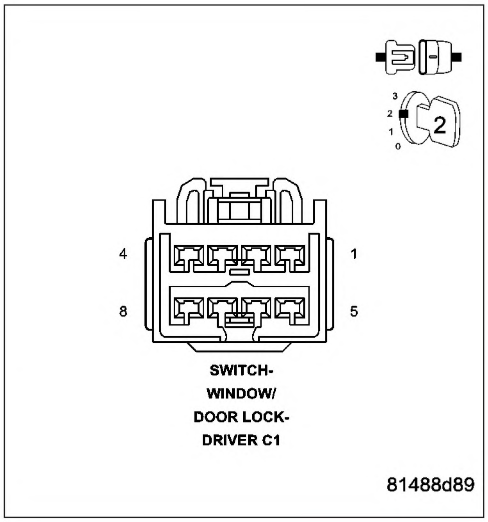
2. DRIVER DOOR LOCK SWITCH SHORTED TO GROUND

With the scan tool, erase DTC's.

Disconnect the Driver Window/Door Lock Switch connector.

Turn the ignition on.

With the scan tool, read DTC's.



81488d89

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK?

No >> Replace the Driver Window/Door Lock Switch.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go to 3

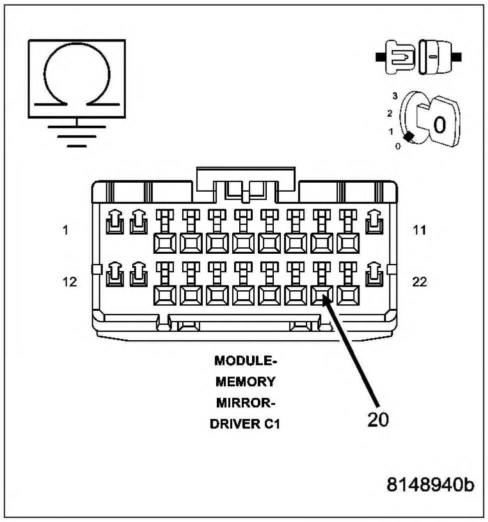
---

3. (G161) DRIVER DOOR LOCK SWITCH MUX WIRE SHORT TO GROUND

Turn the ignition off.

Disconnect the Driver Memory Mirror Module C1 connector.

Measure the resistance between ground and the (G161) Driver Door Lock Switch Mux circuit in the Memory Mirror Module connector.



8148940b

Is the resistance below 10000.0 ohms?

Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to ground.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

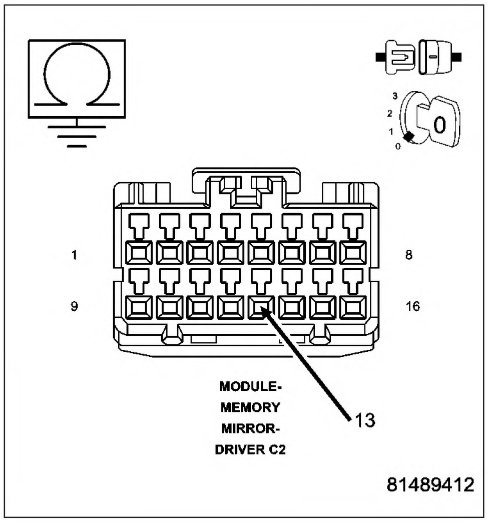
No >> Go to 4

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

4. (P439) MEMORY SELECT MUX WIRE SHORT TO GROUND

Disconnect the Driver Memory Mirror Module C2 connector.

Measure the resistance between ground and the (P439) Memory Select Switch Mux circuit.


3
2
1
0
0
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
13
81489412

Is the resistance below 10000.0 ohms?

Yes >> Repair the (P439) Memory Select Switch Mux wire for a short to ground.

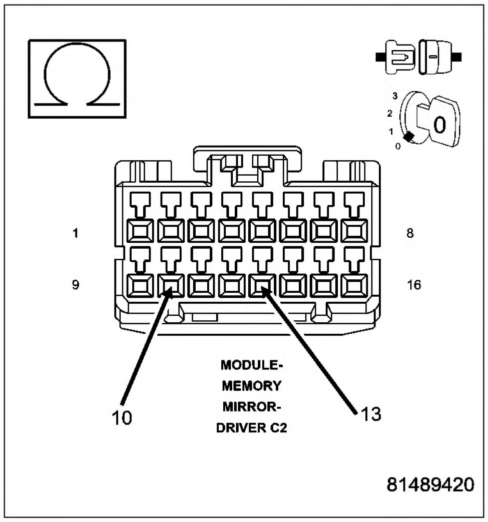
Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go to 5

---

5. MEMORY SELECT SWITCH MUX CIRCUIT SHORTED

Measure the resistance between the (P439) Memory Select Switch Mux circuit and the (G920) Memory Select Switch Return circuit in the Driver Memory Mirror Module C2 connector.


3
2
1
0
0
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
10
13
81489420

Is the resistance below 10000.0 ohms?

Yes >> Go to 6

No >> Replace the Driver Memory Mirror Module.

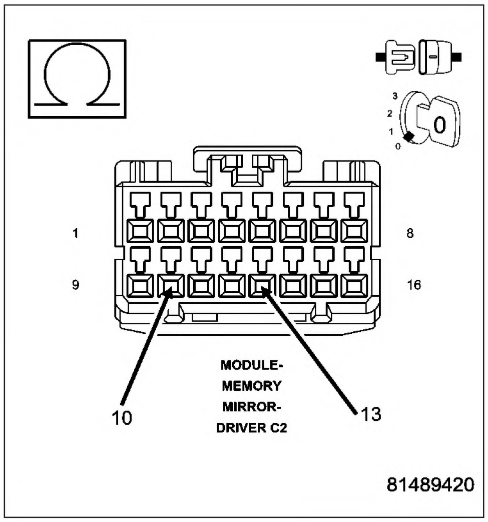
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1803–DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

6. MEMORY SELECTOR SWITCH SHORTED

Disconnect the Memory Selector Switch connector.

Measure the resistance between the (P439) Memory Select Switch Mux circuit and the (G920) Memory Select Switch Return circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms?

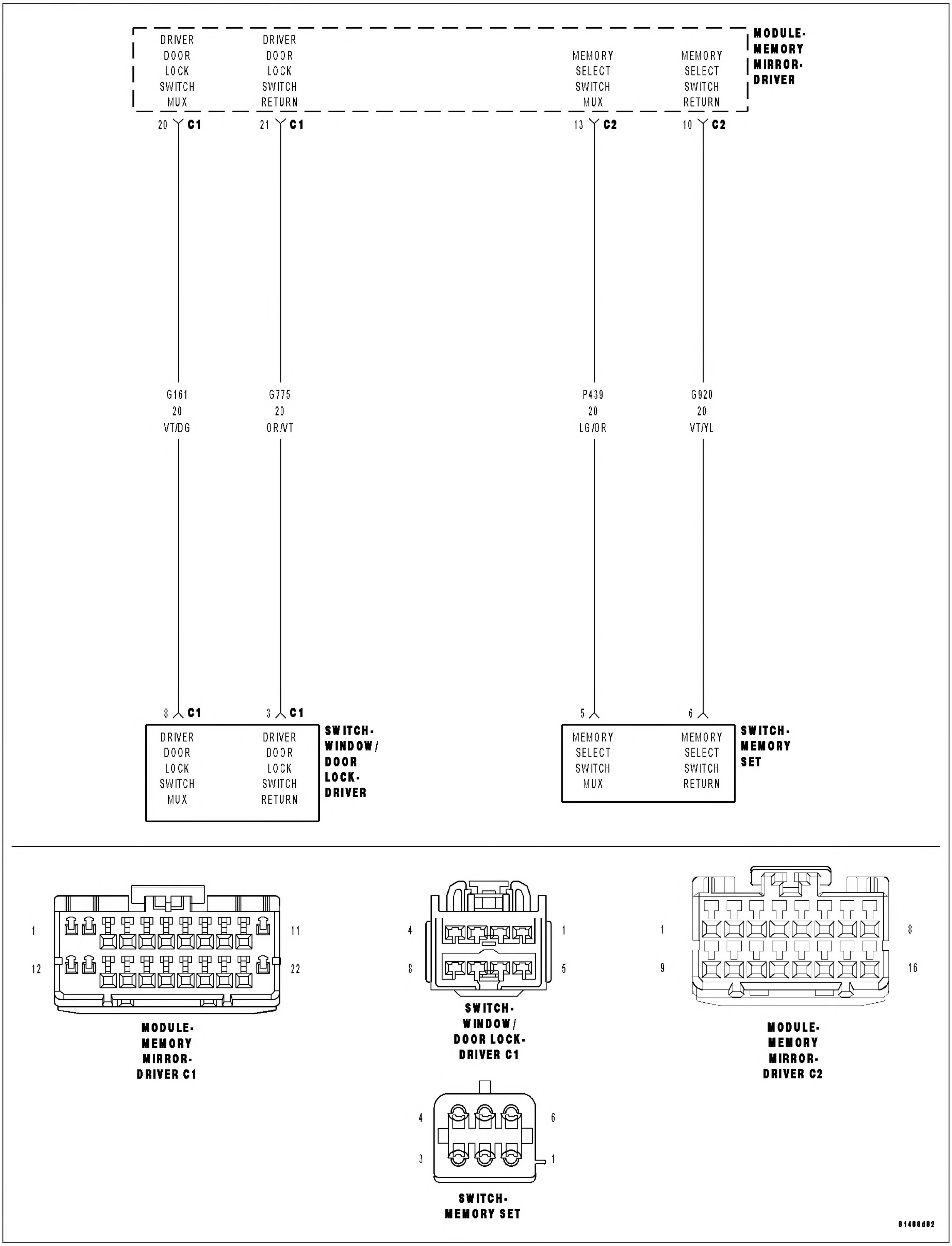
Yes >> Repair the (P439) Memory Select Switch Mux circuit for a short to the (G920) Memory Select Switch Return circuit.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Memory Selector Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1804 DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – DRIVER MEMORY MIRROR MODULE


MODULE-MEMORY MIRROR-DRIVER
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
20 C1
21 C1
13 C2
10 C2
G161 20 VT/DG
G775 20 OR/VT
P439 20 LG/OR
G920 20 VT/YL
8 C1
3 C1
5
6
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
SWITCH-WINDOW/DOOR LOCK-DRIVER
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
SWITCH-MEMORY SET
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-DRIVER C1
1
8
9
16
MODULE-MEMORY MIRROR-DRIVER C2
4
6
3
1
SWITCH-MEMORY SET
81488d82

B1804 DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Driver Door Lock Switch Mux circuit is under 1.5 volts for over 30 seconds.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX WIRE PARTIAL SHORT TO GROUND
(P439) MEMORY SELECT SWITCH MUX WIRE PARTIAL SHORT TO GROUND
(P439) MEMORY SELECT SWITCH MUX CIRCUIT SHORTED TO THE (G920) MEMORY SELECT SWITCH RETURN CIRCUIT
MEMORY SELECTOR SWITCH
DRIVER WINDOW/DOOR LOCK SWITCH STUCK
DRIVER MEMORY MIRROR MODULE

Theory of Operation

This code will only set in vehicles that have the Memory System. The supply circuit for the Memory Mirrors are supplied by the Memory Mirror Module, therefore both the Memory Select Switch Mux or the Door Lock Switch Mux circuits can cause this DTC.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Driver Door Lock Switch in both positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1804 DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

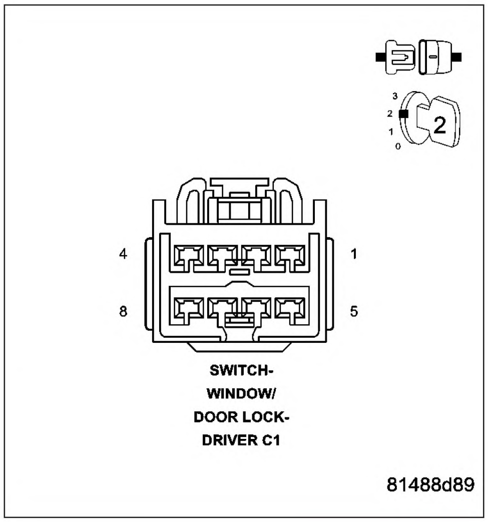
2. DRIVER DOOR LOCK SWITCH SHORTED TO GROUND

With the scan tool, erase DTC's.

Disconnect the Driver Window/Door Lock Switch connector.

Turn the ignition on.

With the scan tool, read DTC's.



Does the scan tool display DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK?

No >> Replace the Driver Window/Door Lock Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go to 3

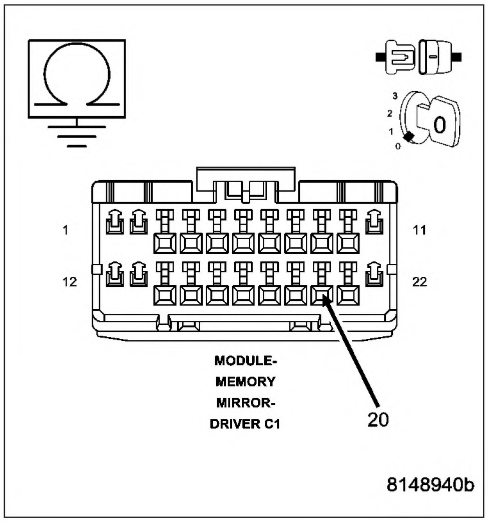
---

3. (G161) DRIVER DOOR LOCK SWITCH MUX WIRE SHORT TO GROUND

Turn the ignition off.

Disconnect the Driver Memory Mirror Module C1 connector.

Measure the resistance between ground and the (G161) Driver Door Lock Switch Mux circuit in the Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go to 4

B1804 DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

4. (P439) MEMORY SELECT MUX WIRE SHORT TO GROUND

Disconnect the Driver Memory Mirror Module C2 connector.

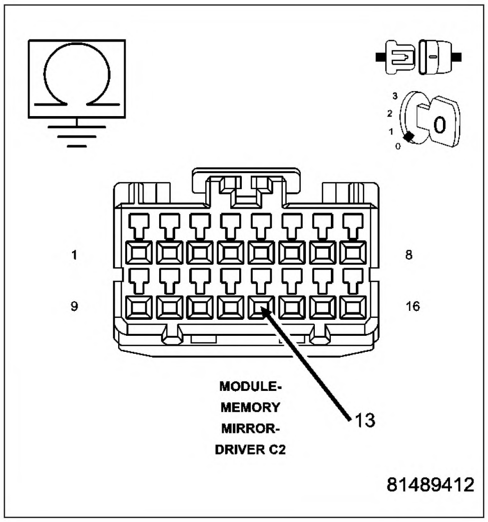
Measure the resistance between ground and the (P439) Memory Select Switch Mux circuit.

Is the resistance below 10000.0 ohms?

Yes >> Repair the (P439) Memory Select Switch Mux wire for a short to ground.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go to 5


3
2
1
0
0
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
13
81489412

---

5. (P439) MEMORY SELECT SWITCH MUX CIRCUIT SHORTED

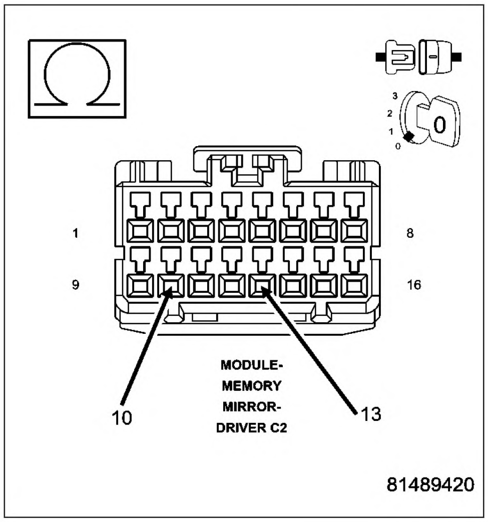
Measure the resistance between the (P439) Memory Select Switch Mux circuit and the (G920) Memory Select Switch Return circuit in the Driver Memory Mirror Module C2 connector.

Is the resistance below 10000.0 ohms?

Yes >> Go to 6

No >> Replace the Driver Memory Mirror Module.

Perform BODY VERIFICATION TEST - VER 1.

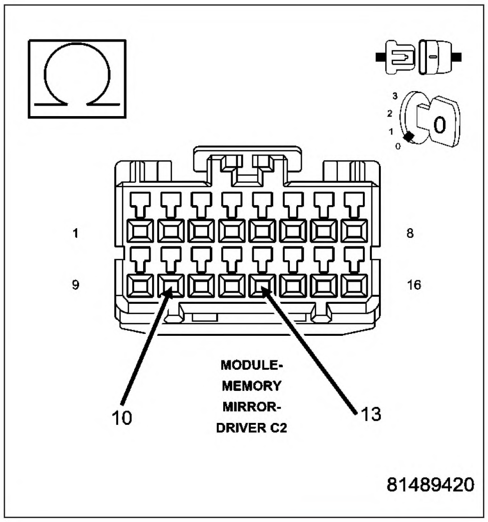

3
2
1
0
0
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
10
13
81489420

B1804 DRIVER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

6. MEMORY SELECTOR SWITCH SHORTED

Disconnect the Memory Selector Switch connector.

Measure the resistance between the (P439) Memory Select Switch Mux circuit and the (G920) Memory Select Switch Return circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms?

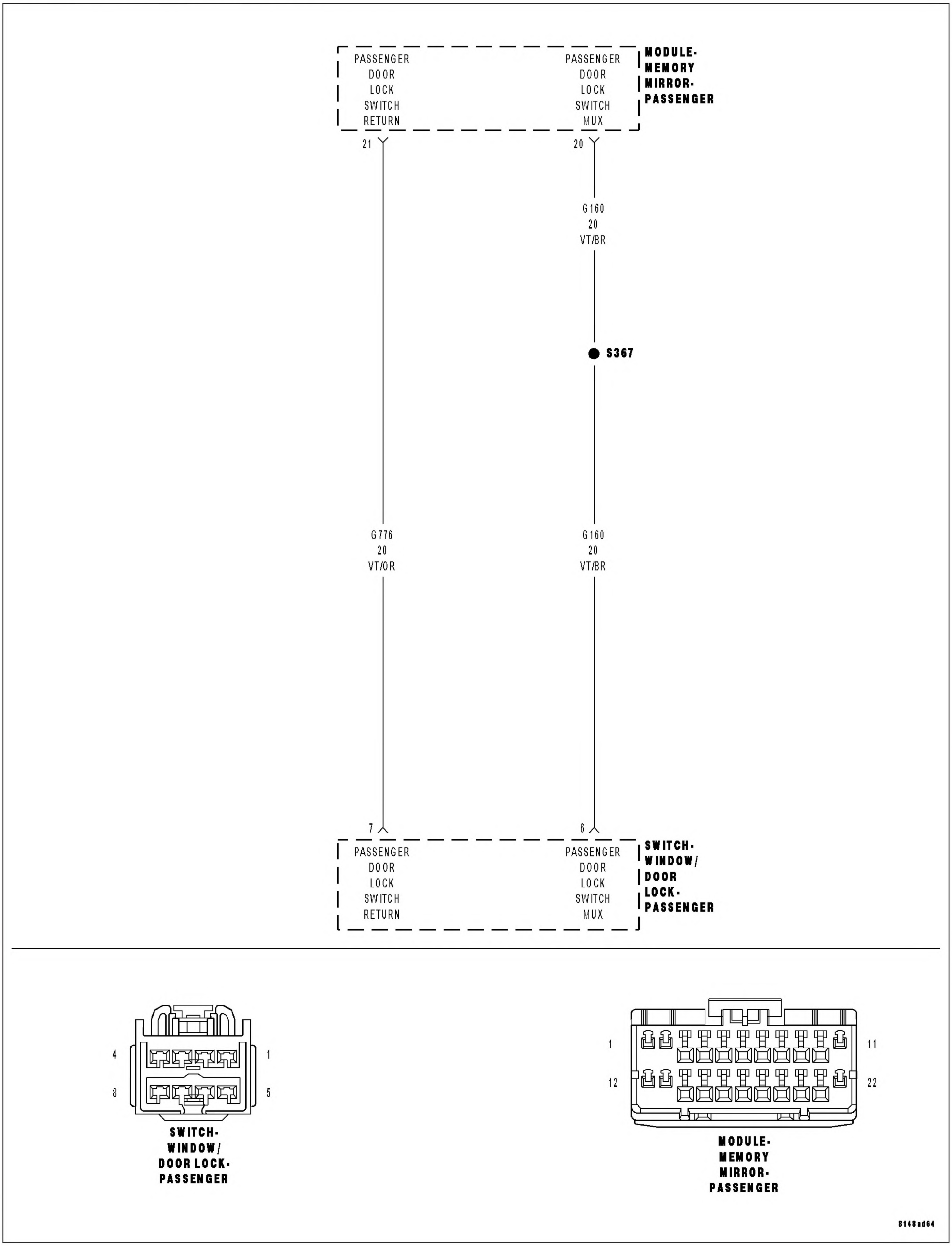
Yes >> Repair the (P439) Memory Select Switch Mux circuit for a short to the (G920) Memory Select Switch Return circuit.

Perform the BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Memory Selector Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1807 PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH – PASSENGER MEMORY MIRROR MODULE


PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH MUX
MODULE-MEMORY MIRROR-PASSENGER
21
20
G160 20 VT/BR
S367
G776 20 VT/OR
G160 20 VT/BR
7
6
PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH MUX
SWITCH-WINDOW/DOOR LOCK-PASSENGER
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
8148ad64

B1807 PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH – PASSENGER MEMORY MIRROR MODULE (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Door Lock Switch Mux circuit is above 5.25 volts for over 30 msec.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX WIRE PARTIAL SHORT TO VOLTAGE
PASSENGER WINDOW/DOOR LOCK SWITCH STUCK
PASSENGER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Passenger Door Lock Switch in both positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

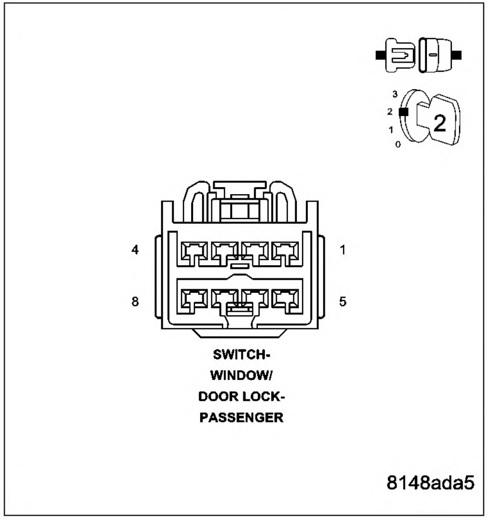
2. DOOR LOCK SWITCH SHORTED TO VOLTAGE

With the scan tool, erase DTC's.

Disconnect the Passenger Window/Door Lock Switch connector.

Turn the ignition on.

With the scan tool, read DTC's.



Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH?

No >> Replace the Window/Door Lock Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

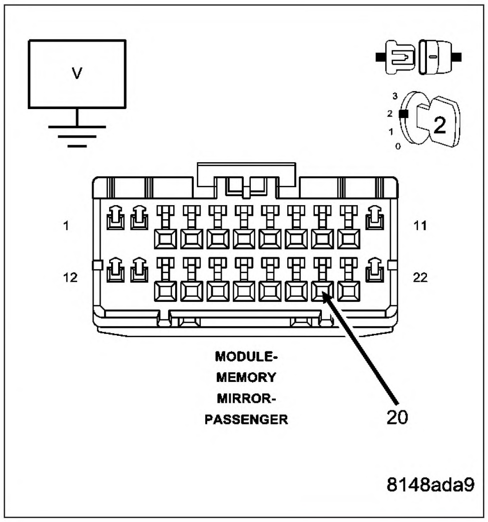
Yes >> Go to 3

B1807 PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT HIGH – PASSENGER MEMORY MIRROR MODULE (CONTINUED)

3. (G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT SHORT TO VOLTAGE

Disconnect the Passenger Memory Mirror Module connector.

Measure the voltage of the (G160) Passenger Door Lock Switch Mux circuit in the Passenger Memory Mirror Module connector.



Is there any voltage present?

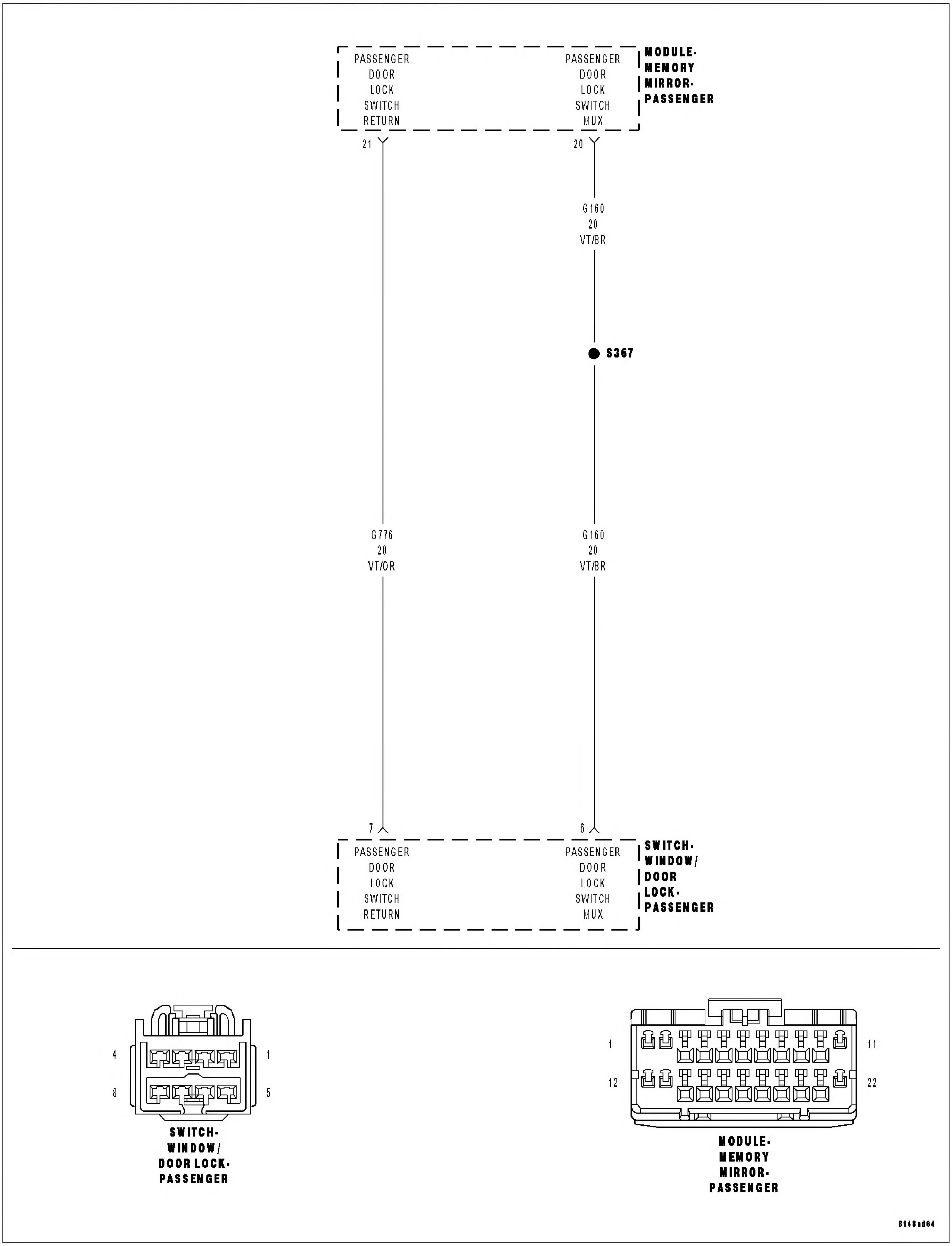
Yes >> Repair the (G160) Passenger Door Lock Switch Mux circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Passenger Memory Mirror Module.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1808 PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – PASSENGER MEMORY MIRROR MODULE


PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH MUX
MODULE-MEMORY MIRROR-PASSENGER
21
20
G160 20 VT/BR
S367
G776 20 VT/OR
G160 20 VT/BR
7
6
PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH MUX
SWITCH-WINDOW/DOOR LOCK-PASSENGER
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
8148ad64

B1808 PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – PASSENGER MEMORY MIRROR MODULE (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Passenger Door Lock Switch Mux circuit is under 2.6 volts for over 30 seconds.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX WIRE PARTIAL SHORT TO GROUND
PASSENGER WINDOW/DOOR LOCK SWITCH STUCK
PASSENGER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Door Lock Switch from the side this DTC was set in. Put the switch in both positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST - VER 1.

---

2. PASSENGER DOOR LOCK SWITCH SHORTED TO GROUND

With the scan tool, erase DTC's.

Disconnect the Passenger Window/Door Lock Switch connector.

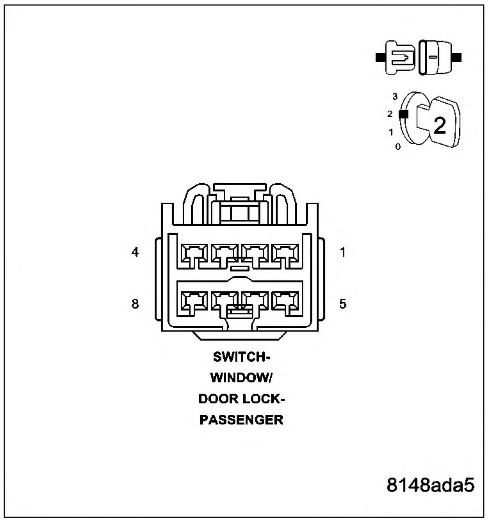
Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK?

No >> Replace the Passenger Window/Door Lock Switch.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go to 3



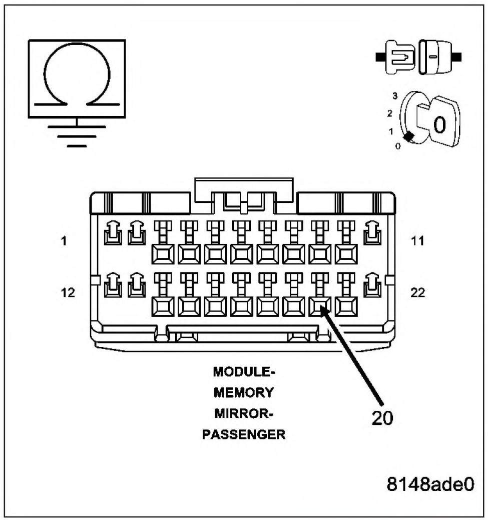
B1808 PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK LOCK – PASSENGER MEMORY MIRROR MODULE (CONTINUED)

3. (G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Passenger Memory Mirror Module connector.

Measure the resistance between ground and the (G160) Passenger Door Lock Switch Mux circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

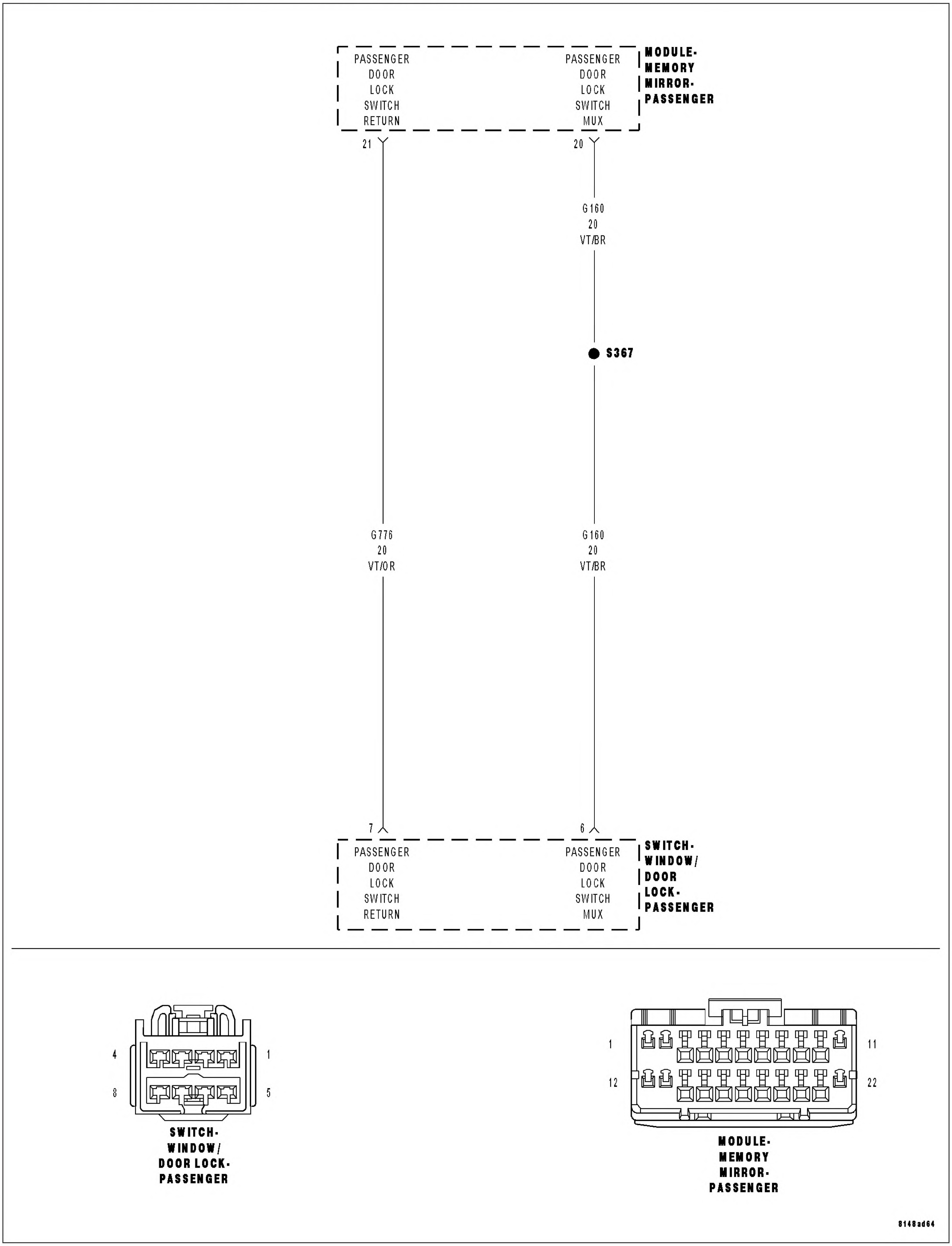
Yes >> Repair the (G160) Passenger Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Passenger Memory Mirror Module.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1809–PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – PASSENGER MEMORY MIRROR MODULE


PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH MUX
MODULE-MEMORY MIRROR-PASSENGER
21
20
G160 20 VT/BR
S367
G776 20 VT/OR
G160 20 VT/BR
7
6
PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH MUX
SWITCH-WINDOW/ DOOR LOCK-PASSENGER
4
1
8
5
SWITCH-WINDOW/ DOOR LOCK-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
8148ad64

B1809–PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – PASSENGER MEMORY MIRROR MODULE (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Passenger Door Lock Switch Mux circuit is under 1.5 volts for over 30 seconds.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX WIRE PARTIAL SHORT TO GROUND
PASSENGER WINDOW/DOOR LOCK SWITCH STUCK
PASSENGER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Passenger Door Lock Switch in both positions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. PASSENGER DOOR LOCK SWITCH SHORTED TO GROUND

With the scan tool, erase DTC's.

Disconnect the Passenger Window/Door Lock Switch connector.

Turn the ignition on.

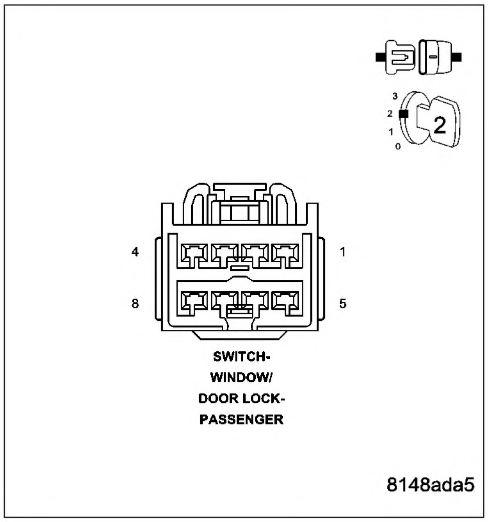
With the scan tool, read DTC's.

Does the scan tool display DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK?

No >> Replace the Passenger Window/Door Lock Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go to 3



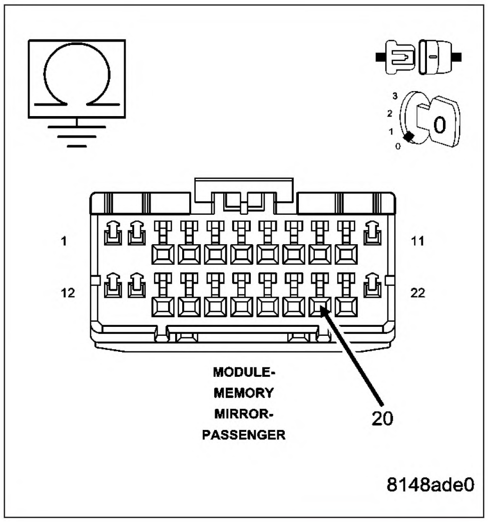
B1809–PASSENGER DOOR LOCK/UNLOCK SWITCH CIRCUIT STUCK UNLOCK – PASSENGER MEMORY MIRROR MODULE (CONTINUED)

3. (G160) PASSENGER DOOR LOCK SWITCH MUX CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Passenger Memory Mirror Module connector.

Measure the resistance between ground and the (G160) Passenger Door Lock Switch Mux circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

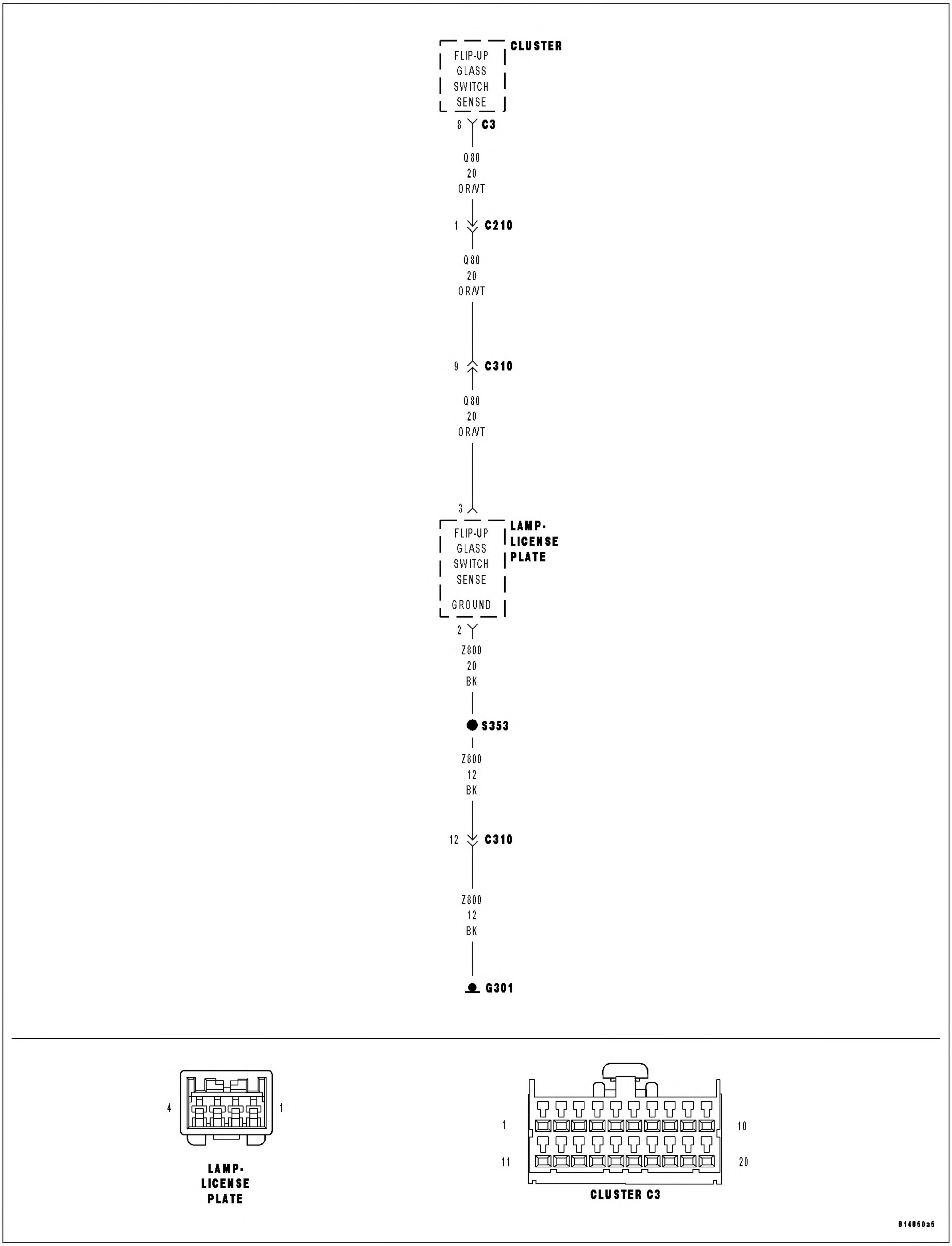
Yes >> Repair the (G160) Passenger Door Lock Switch Mux circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Passenger Memory Mirror Module.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1851–FLIPPER GLASS SWITCH STUCK– CLUSTER


CLUSTER
FLIP-UP GLASS SWITCH SENSE
8 C3
Q80 20 OR/VT
1 C210
Q80 20 OR/VT
9 C310
Q80 20 OR/VT
3
LAMP-LICENSE PLATE
FLIP-UP GLASS SWITCH SENSE
GROUND
2
Z800 20 BK
S353
Z800 12 BK
12 C310
Z800 12 BK
G301
4
1
LAMP-LICENSE PLATE
1
10
11
20
CLUSTER C3
814850a5

B1851–FLIPPER GLASS SWITCH STUCK– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a low condition on the Flip-UP (Flipper) Glass Switch Sense circuit for over 10 seconds, this code will set.

Possible Causes
(Q80) FLIP-UP GLASS SWITCH SENSE CIRCUIT SHORT TO GROUND
FLIP-UP GLASS SWITCH (LICENSE LAMP) STUCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Flip-Up Glass Switch several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display FLIPPER GLASS SWITCH STUCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. FLIP-UP GLASS SWITCH STUCK

With the scan tool, erase DTC's.

Disconnect the License Lamp connector.

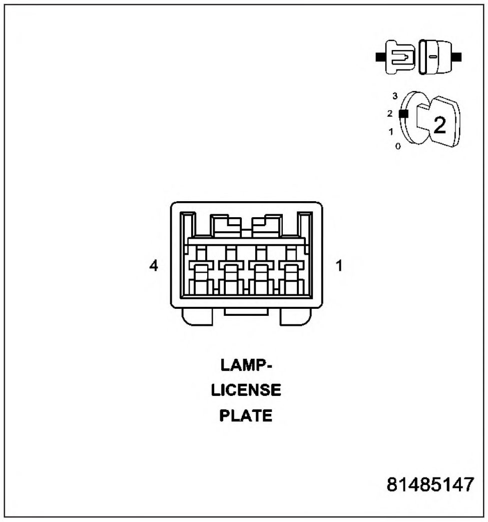
With the scan tool, read DTC's.

Does the scan tool display FLIPPER GLASS SWITCH STUCK?

No >> Replace the Flip-Up Glass Switch (License Lamp).

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3



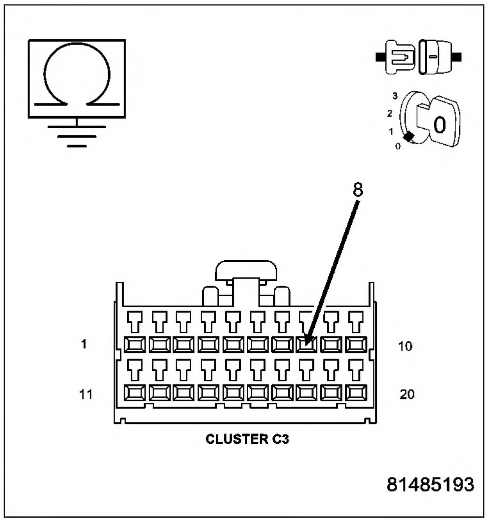
B1851–FLIPPER GLASS SWITCH STUCK– CLUSTER (CONTINUED)

3. FLIP-UP GLASS SWITCH SENSE CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Cluster C3 connector.

Measure the resistance between ground and the Flip-Up Glass Switch Sense circuit.



Is the resistance below 1000.0 ohms?

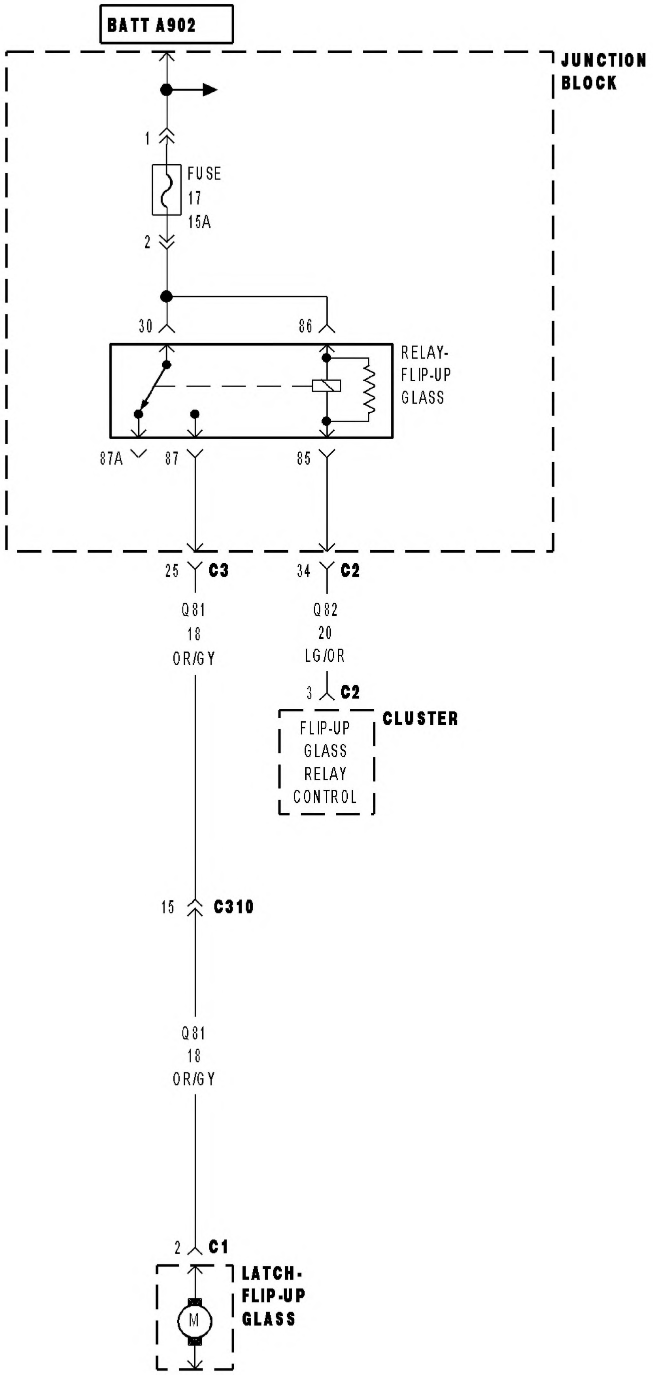
Yes >> Repair the Flip-Up Glass Switch Sense circuit for a short to ground.

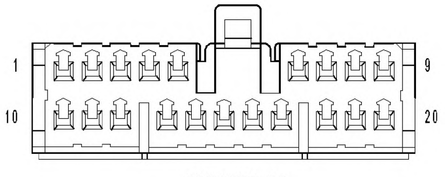
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B184E–FLIPPER GLASS CONTROL CIRCUIT LOW– CLUSTER


BATT A902
JUNCTION BLOCK
1
FUSE
17
15A
2
30
86
RELAY-FLIP-UP GLASS
87A
87
85
25 C3
34 C2
Q81
18
OR/GY
Q82
20
LG/OR
3 C2
CLUSTER
FLIP-UP GLASS RELAY CONTROL
15 C310
Q81
18
OR/GY
2 C1
LATCH-FLIP-UP GLASS
M



CLUSTER C2

81498548

B184E–FLIPPER GLASS CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a low condition on the Flip-UP (Flipper) Glass Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(Q82) FLIP-UP GLASS RELAY CONTROL CIRCUIT SHORT TO GROUND
FLIP-UP GLASS RELAY
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Flip-Up Glass Switch several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display FLIPPER GLASS RELAY CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. FLIP-UP GLASS RELAY SHORTED

With the scan tool, erase DTC's.

Install a substitute relay in place of the Flip-Up Glass relay (in Junction Block).

With the scan tool actuate the Flip-Up Glass.

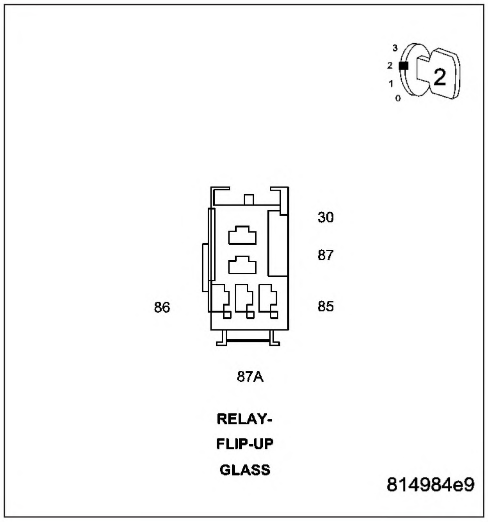
With the scan tool, read DTC's.

Does the scan tool display FLIPPER GLASS RELAY CONTROL CIRCUIT LOW?

No >> Replace the Flip-Up Glass relay.

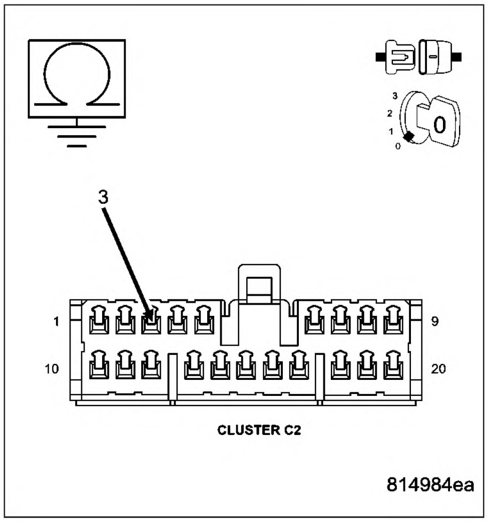
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3



B184E–FLIPPER GLASS CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

3. (Q82) FLIP-UP GLASS RELAY CONTROL CIRCUIT SHORT TO GROUND



Turn the ignition off.

Remove the Flip-Up Glass relay.

Disconnect the Cluster C2 connector.

Measure the resistance between ground and the (Q82) Flip-Up Glass Relay Control circuit.

Is the resistance below 10000.0 ohms?

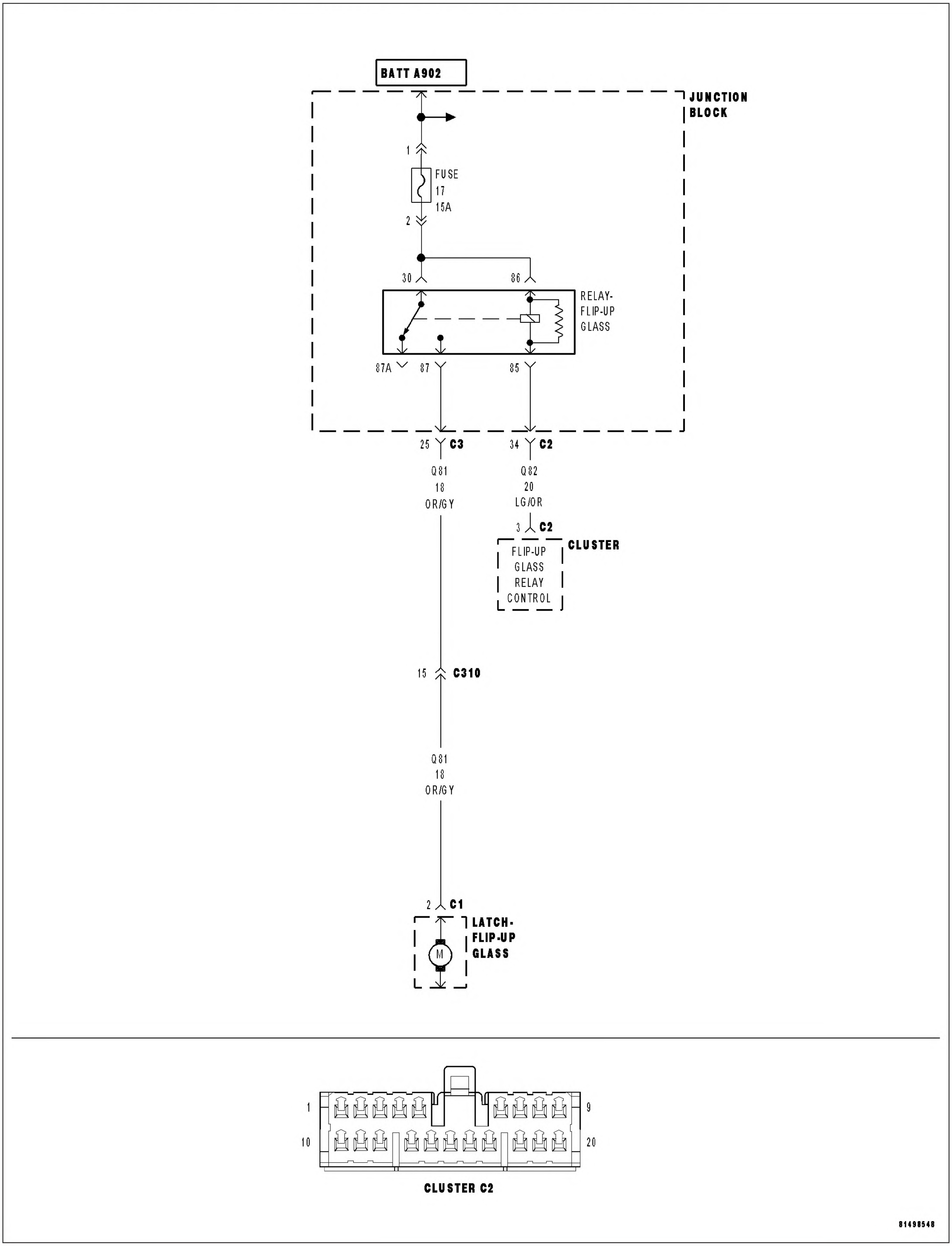
Yes >> Repair the (Q82) Flip-Up Glass Relay Control circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B184F–FLIPPER GLASS CONTROL CIRCUIT HIGH– CLUSTER


BATT A902
JUNCTION BLOCK
1
FUSE
17
15A
2
30
86
RELAY-FLIP-UP GLASS
87A
87
85
25 C3
34 C2
Q81
18
OR/GY
Q82
20
LG/OR
3 C2
CLUSTER
FLIP-UP GLASS RELAY CONTROL
15 C310
Q81
18
OR/GY
2 C1
M
LATCH-FLIP-UP GLASS
1
9
10
20
CLUSTER C2
81498548

B184F–FLIPPER GLASS CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a high condition on the Flip-UP (Flipper) Glass Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(Q82) FLIP-UP GLASS RELAY CONTROL CIRCUIT SHORT TO BATTERY
FLIP-UP GLASS RELAY
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the Flip-Up Glass Switch several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display FLIPPER GLASS RELAY CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

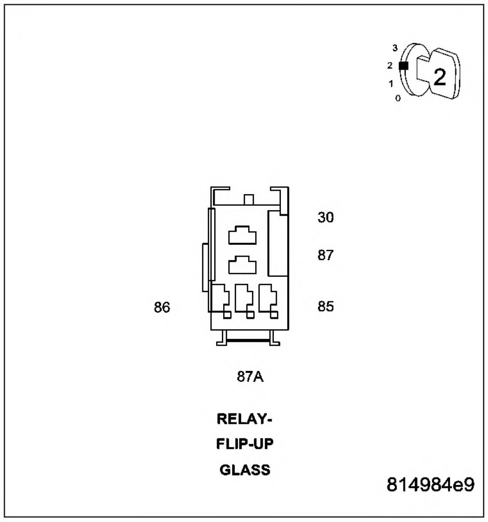
2. FLIP-UP GLASS RELAY SHORTED

With the scan tool, erase DTC's.

Install a substitute relay in place of the Flip-Up Glass relay (in Junction Block).

With the scan tool actuate the Flip-Up Glass.

With the scan tool, read DTC's.



Does the scan tool display FLIPPER GLASS RELAY CONTROL CIRCUIT HIGH?

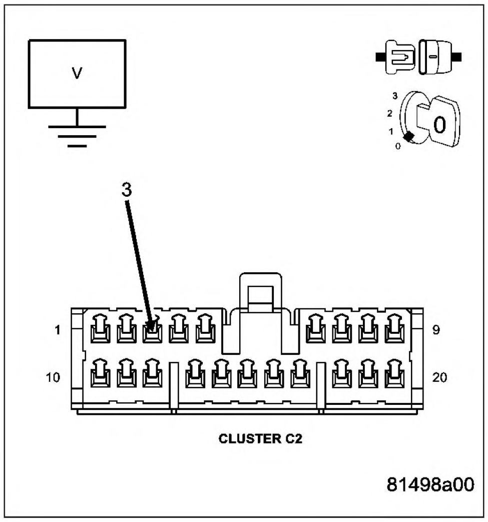
No >> Replace the Flip-Up Glass relay.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

Yes >> Go To 3

B184F–FLIPPER GLASS CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

3. (Q82) FLIP-UP GLASS RELAY CONTROL CIRCUIT SHORT TO BATTERY



Turn the ignition off.

Remove the Flip-Up Glass relay.

Disconnect the Cluster C2 connector.

Measure the voltage between ground and the (Q82) Flip-Up Glass Relay Control circuit in the Cluster C2 connector..

Is the voltage above 0.5 volts?

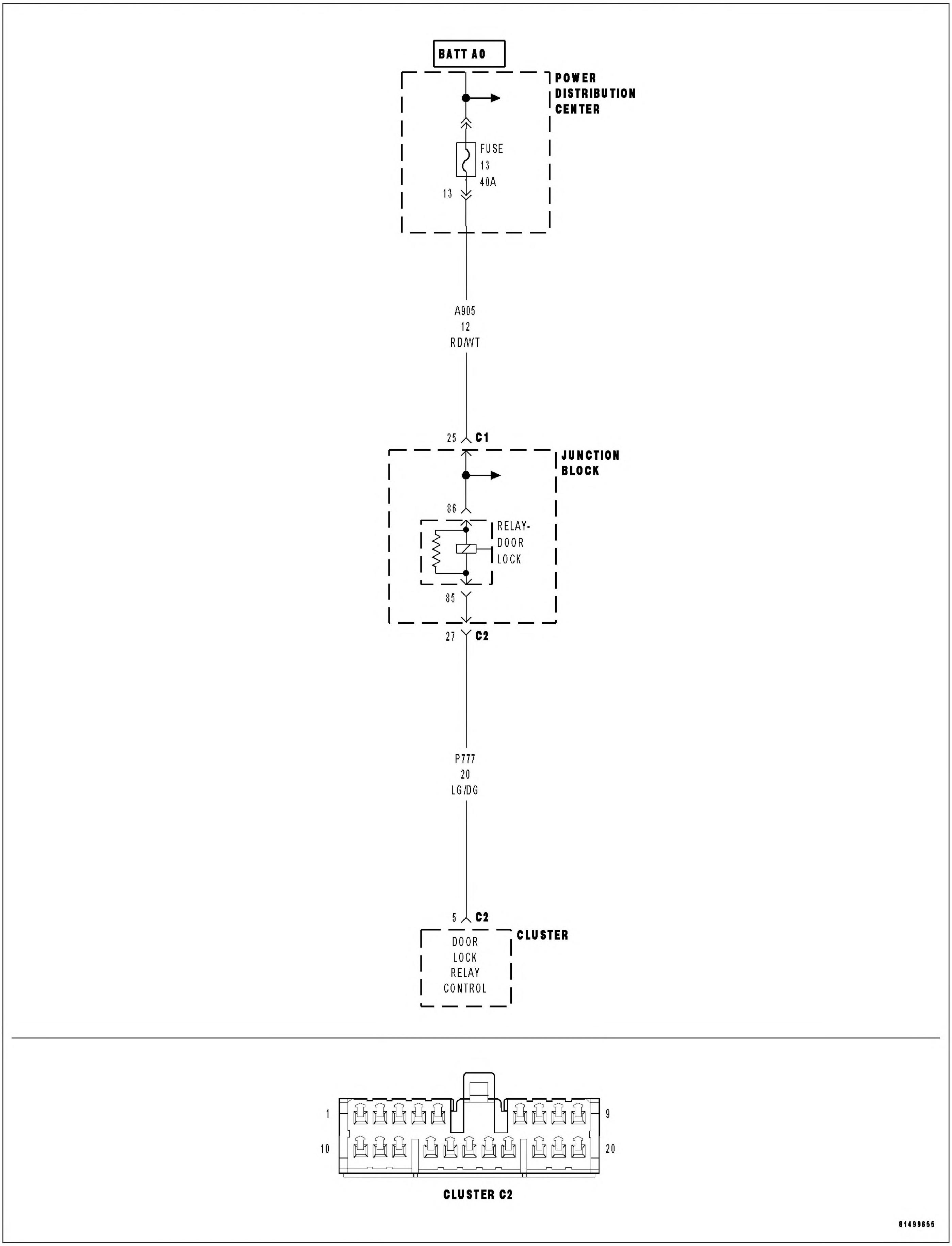
Yes >> Repair the (Q82) Flip-Up Glass Relay Control circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B182D–ALL DOOR LOCK CONTROL CIRCUIT LOW– CLUSTER


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25 C1
JUNCTION BLOCK
86
RELAY-DOOR LOCK
85
27 C2
P777
20
LG/DG
5 C2
CLUSTER
DOOR LOCK RELAY CONTROL
1
9
10
20
CLUSTER C2
81499655

B182D–ALL DOOR LOCK CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a low condition on the (P777) Door Lock Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(P777) DOOR LOCK RELAY CONTROL CIRCUIT SHORT TO GROUND
JUNCTION BLOCK
INSTRUMENT CLUSTER

Theory of Operation

If the (P777) Door Lock Relay Control circuit has been shorted to ground for any length of time, the door latch solenoids are probably damaged. Check all the door latches after the short is repaired..

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display ALL DOOR LOCK RELAY CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B182D–ALL DOOR LOCK CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

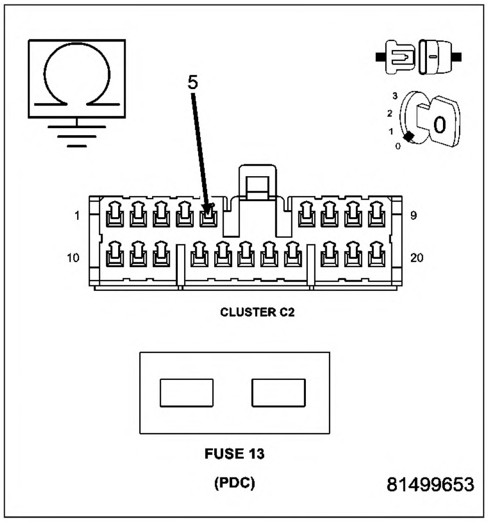
2. DOOR LOCK RELAY SHORTED

Turn the ignition off.

Disconnect the Cluster C2 connector.

Remove the PDC fuse #13.

Measure the resistance between ground and the (P777) Door Lock Relay Control circuit in the Cluster C2 connector


5
3
2
1
0
1
9
10
20
CLUSTER C2
FUSE 13
(PDC)
81499653

Is the resistance below 1000.0 ohms?

No >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

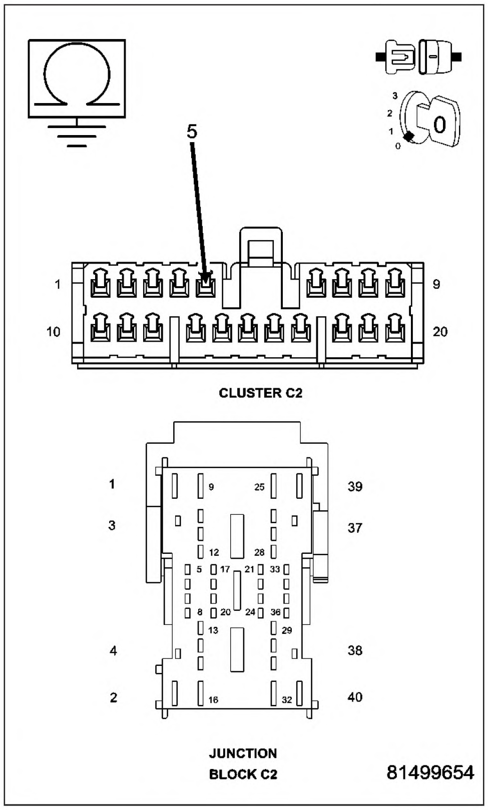
Yes >> Go To 3

---

3. (P777) DOOR LOCK RELAY CONTROL CIRCUIT SHORT TO GROUND

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the resistance between ground and the (P777) Door Lock Relay Control circuit in the Cluster C2 connector.


5
3
2
1
0
1
9
10
20
CLUSTER C2
1
3
4
2
39
37
38
40
9
25
12
28
5
17
21
33
8
20
24
36
13
29
16
32
JUNCTION
BLOCK C2
81499654

Is the resistance below 1000.0 ohms?

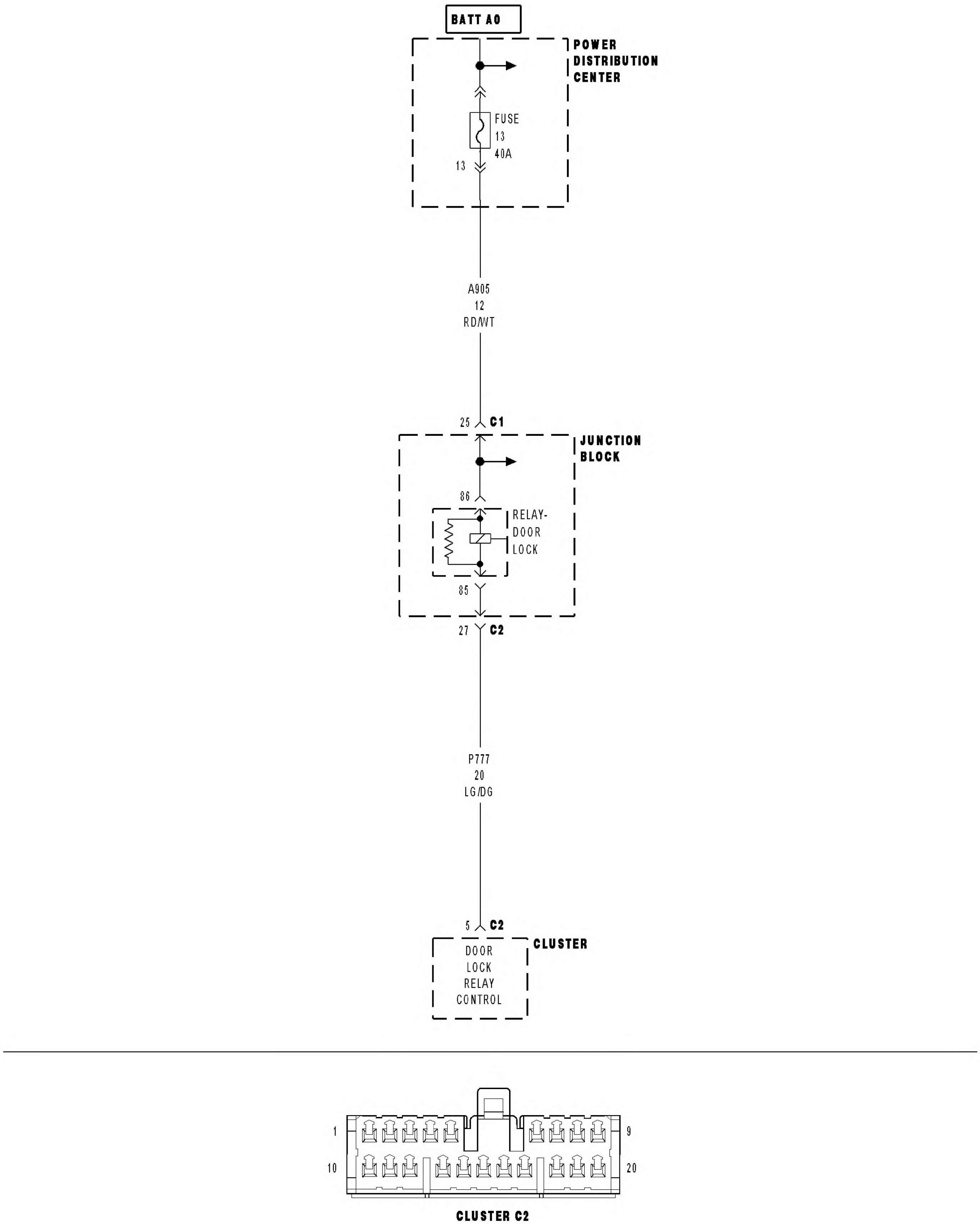
Yes >> Repair the (P777) Door Lock Relay Control circuit for a short to ground.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B182E–ALL DOOR LOCK CONTROL CIRCUIT HIGH– CLUSTER


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905 12 RD/WT
25 C1
JUNCTION BLOCK
86
RELAY- DOOR LOCK
85
27 C2
P777 20 LG/DG
5 C2
CLUSTER
DOOR LOCK RELAY CONTROL
1
9
10
20
CLUSTER C2
81499655

B182E–ALL DOOR LOCK CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a high condition on the (P777) Door Lock Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(P777) DOOR LOCK RELAY CONTROL CIRCUIT SHORT TO BATTERY
JUNCTION BLOCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display ALL DOOR LOCK RELAY CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

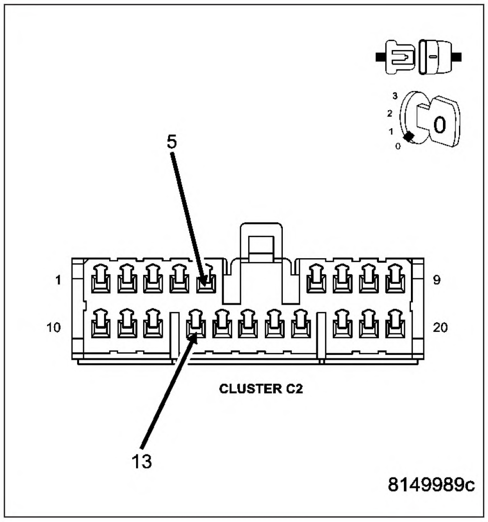
2. DOOR LOCK RELAY SHORTED TO BATTERY

NOTE: Ensure the doors are unlocked and the windows down before proceeding.

Turn the ignition off.

Disconnect the Cluster C2 connector.

Momentarily connect a jumper wire between the (P777) Door Lock Relay Control circuit and the (Z905) Ground circuit in the Cluster C2 connector.



Did the doors lock?

Yes >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3

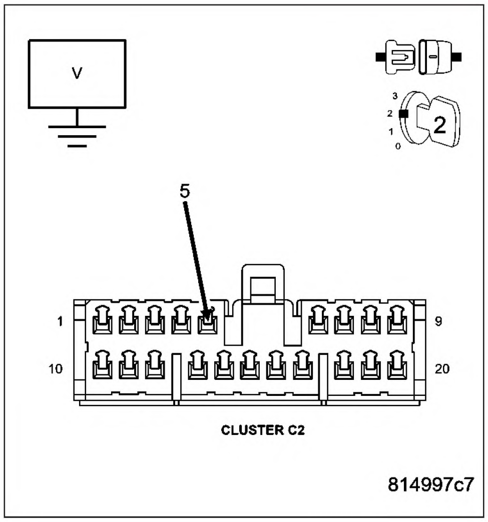
B182E–ALL DOOR LOCK CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

3. (P777) DOOR LOCK RELAY CONTROL CIRCUIT SHORTED TO BATTERY

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the voltage between ground and the (P777) Door Lock Relay Control circuit in the Cluster C2 connector.

Turn the ignition on.



Is there any voltage present?

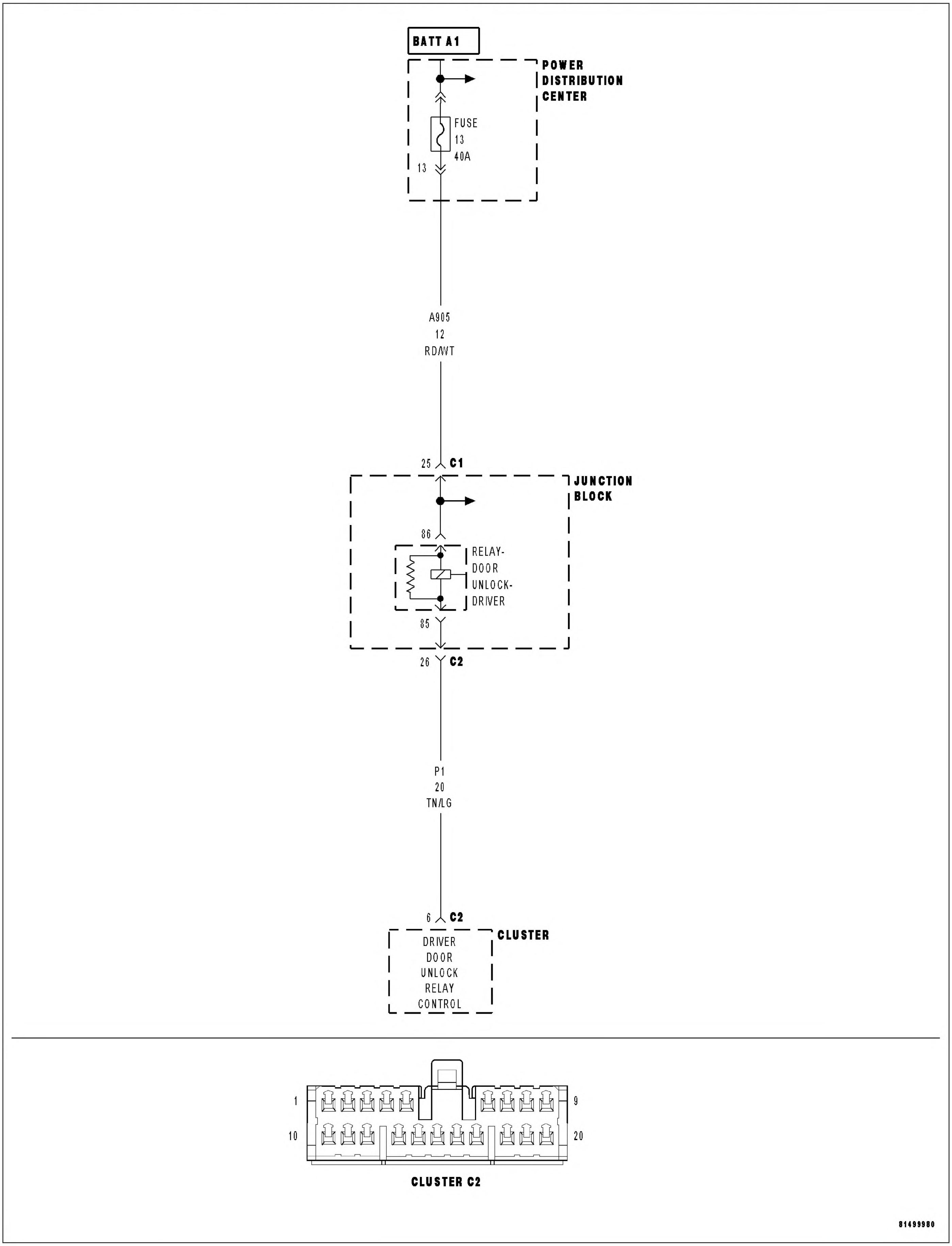
Yes >> Repair the (P777) Door Lock Relay Control circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1835–DRIVER DOOR UNLOCK CONTROL CIRCUIT LOW– CLUSTER


BATT A1
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25 C1
JUNCTION BLOCK
86
RELAY-DOOR UNLOCK-DRIVER
85
26 C2
P1
20
TN/LG
6 C2
CLUSTER
DRIVER DOOR UNLOCK RELAY CONTROL
1
9
10
20
CLUSTER C2
81499980

B1835–DRIVER DOOR UNLOCK CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a low condition on the (P1) Driver Door Unlock Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(P1) DRIVER DOOR UNLOCK RELAY CONTROL CIRCUIT SHORT TO GROUND
JUNCTION BLOCK
INSTRUMENT CLUSTER

Theory of Operation

If the (P1) Driver Door Unlock Relay Control circuit has been shorted to ground for any length of time, the driver door latch solenoid will probably be damaged. Check the driver door latch after the short is repaired..

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR UNLOCK CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1835–DRIVER DOOR UNLOCK CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

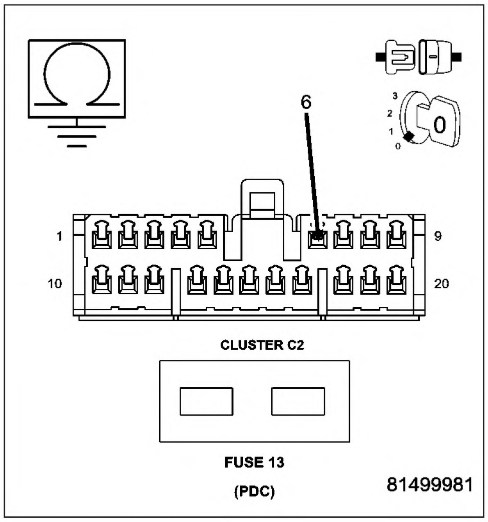
2. DRIVER DOOR UNLOCK RELAY SHORTED

Turn the ignition off.

Remove the PDC fuse #13.

Disconnect the Cluster C2 connector.

Measure the resistance between ground and the (P1) Driver Door Unlock Relay Control circuit in the Cluster C2 connector


6
3
2
1
0
0
1
9
10
20
CLUSTER C2
FUSE 13
(PDC)
81499981

Is the resistance below 1000.0 ohms?

No >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

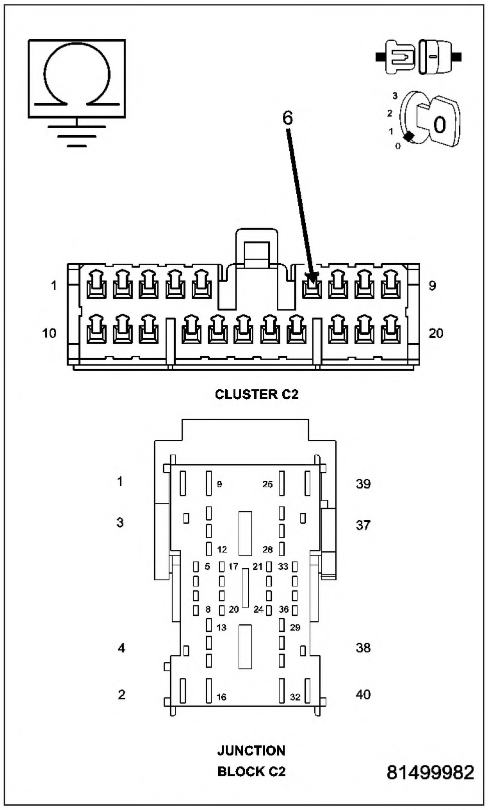
Yes >> Go To 3

---

3. (P1) DRIVER DOOR UNLOCK RELAY CONTROL CIRCUIT SHORT TO GROUND

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the resistance between ground and the (P1) Driver Door Unlock Relay Control circuit in the Cluster C2 connector.


6
3
2
1
0
0
1
9
10
20
CLUSTER C2
1
9
25
39
3
37
12
28
5
17
21
33
8
20
24
36
13
29
4
38
2
16
32
40
JUNCTION
BLOCK C2
81499982

Is the resistance below 1000.0 ohms?

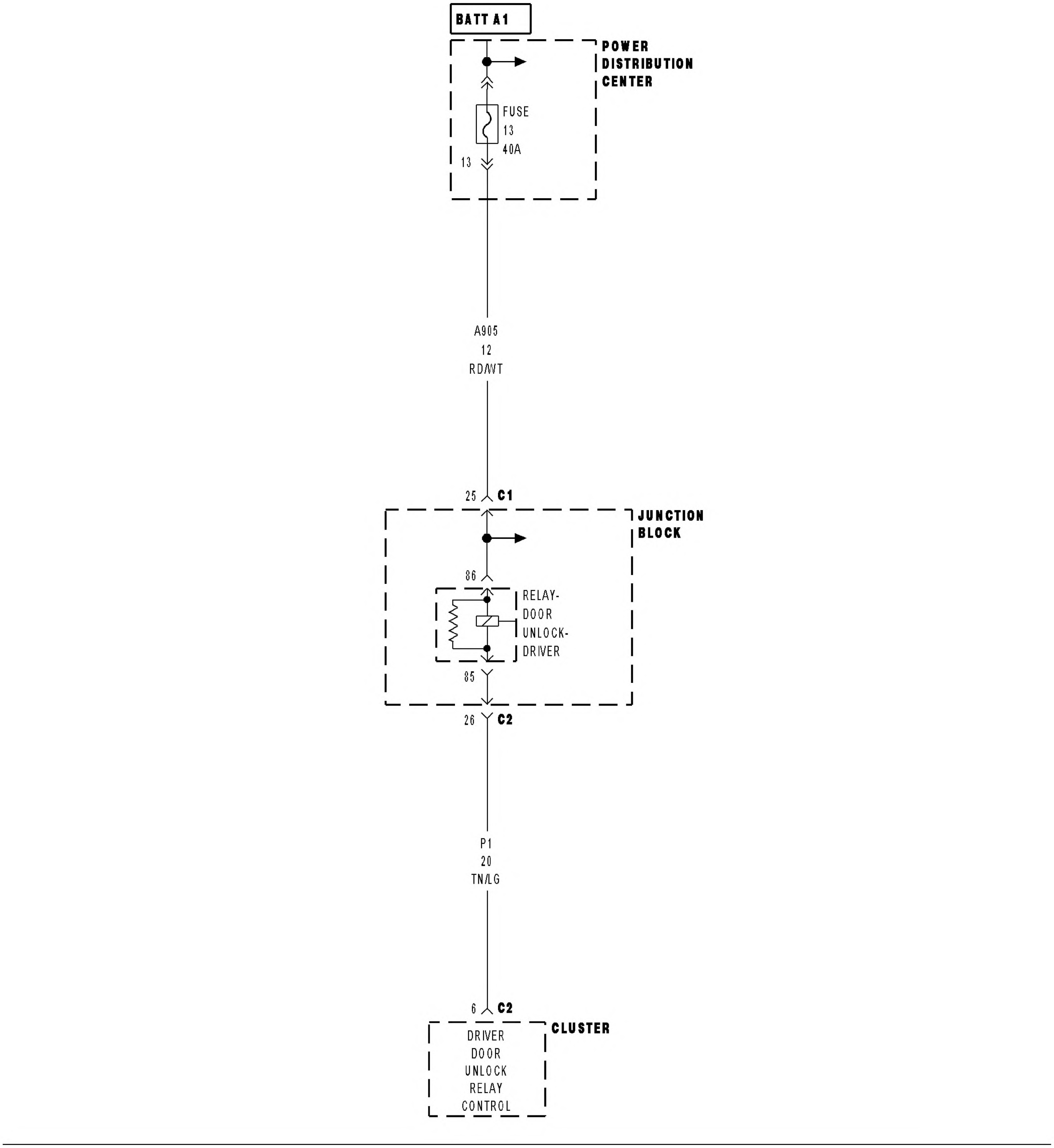
Yes >> Repair the (P1) Driver Door Unlock Relay Control circuit for a short to ground.

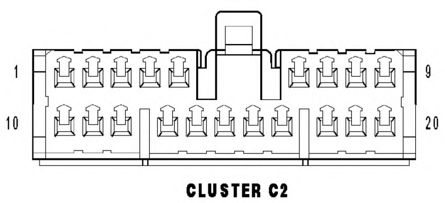
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1836–DRIVER DOOR UNLOCK CONTROL CIRCUIT HIGH– CLUSTER


BATT A1
POWER DISTRIBUTION CENTER
FUSE
13
40A
13
A905
12
RD/WT
25
C1
JUNCTION BLOCK
86
RELAY-DOOR UNLOCK-DRIVER
85
26
C2
P1
20
TN/LG
6
C2
CLUSTER
DRIVER DOOR UNLOCK RELAY CONTROL



CLUSTER C2

81499980

B1836–DRIVER DOOR UNLOCK CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a high condition on the (P1) Driver Door Unlock Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(P1) DRIVER DOOR UNLOCK RELAY CONTROL CIRCUIT SHORT TO BATTERY
JUNCTION BLOCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display DRIVER DOOR UNLOCK CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. DOOR LOCK RELAY SHORTED TO BATTERY

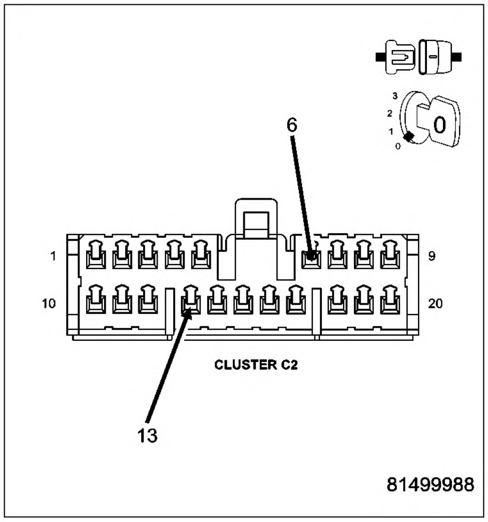
NOTE: Ensure the windows are down before proceeding.

Turn the ignition off.

Lock the driver door.

Disconnect the Cluster C2 connector.

Momentarily connect a jumper wire between the (P1) Driver Door Unlock Relay Control circuit and the (Z905) Ground circuit in the Cluster C2 connector.



Did the driver door unlock?

Yes >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3

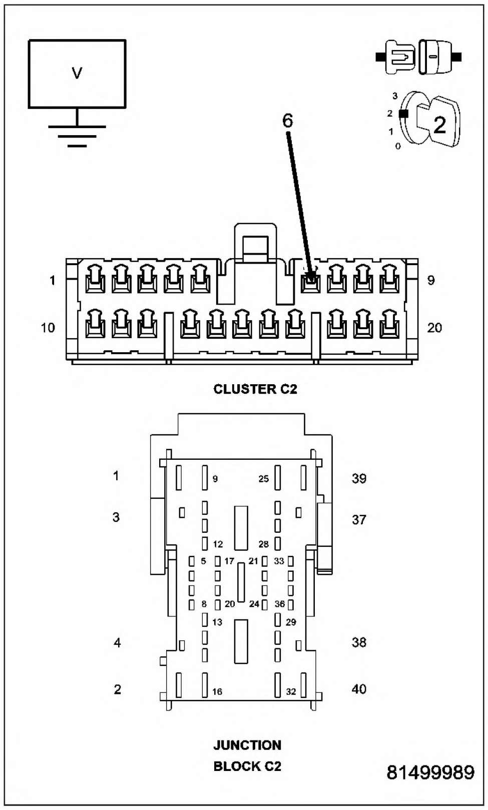
B1836–DRIVER DOOR UNLOCK CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

3. (P1) DRIVER DOOR UNLOCK RELAY CONTROL CIRCUIT SHORTED TO BATTERY

Disconnect the Junction Block C2 connector (on top of junction block).

Turn the ignition on.

Measure the voltage between ground and the (P1) Driver Door Unlock Relay Control circuit in the Cluster C2 connector.


V
6
3
2
1
0
2
1
9
10
20
CLUSTER C2
1
9
25
39
3
37
12
28
5
17
21
33
8
20
24
36
13
29
4
38
2
16
32
40
JUNCTION
BLOCK C2
81499989

Is there any voltage present?

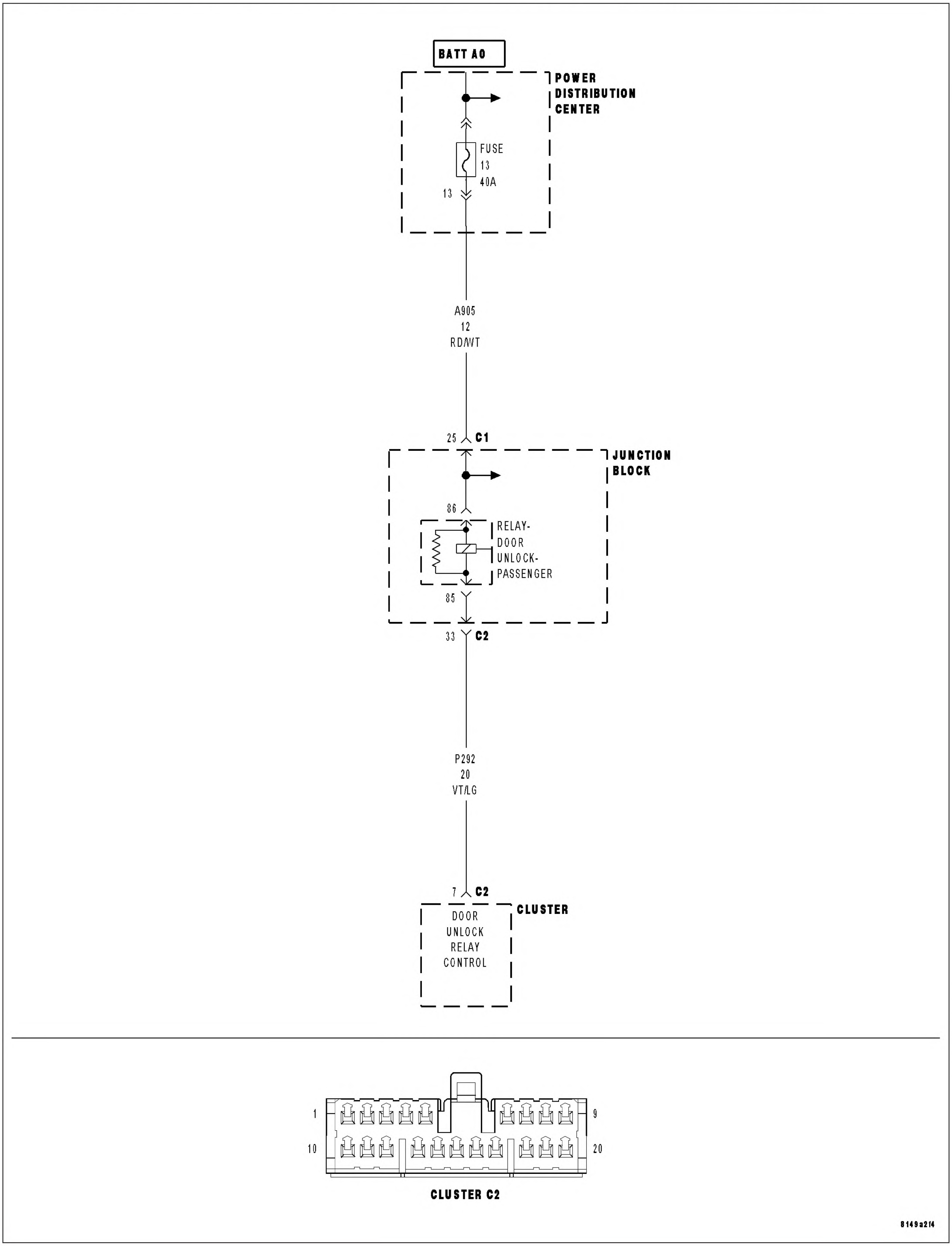
Yes >> Repair the (P1) Driver Door Unlock Relay Control circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1839–PASSENGER DOORS UNLOCK CONTROL CIRCUIT LOW– CLUSTER


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25
C1
JUNCTION BLOCK
86
RELAY-DOOR UNLOCK-PASSENGER
85
33
C2
P292
20
VT/LG
7
C2
CLUSTER
DOOR UNLOCK RELAY CONTROL
1
9
10
20
CLUSTER C2
8149a214

B1839–PASSENGER DOORS UNLOCK CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a low condition on the (P292) Passenger Doors Unlock Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(P292) PASSENGER DOORS UNLOCK RELAY CONTROL CIRCUIT SHORT TO GROUND
JUNCTION BLOCK
INSTRUMENT CLUSTER

Theory of Operation

If the (P292) Door Unlock Relay Control circuit has been shorted to ground for any length of time, the door latch solenoids will probably be damaged. Check the door latches after the short is repaired..

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOORS UNLOCK CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1839–PASSENGER DOORS UNLOCK CONTROL CIRCUIT LOW– CLUSTER (CONTINUED)

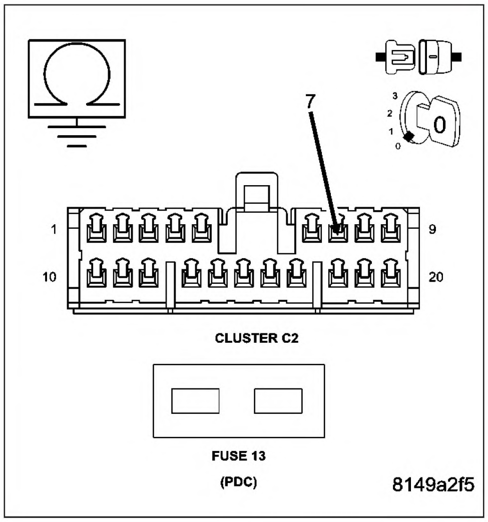
2. DOOR UNLOCK RELAY SHORTED

Turn the ignition off.

Remove the PDC fuse #13.

Disconnect the Cluster C2 connector.

Measure the resistance between ground and the (P292) Door Unlock Relay Control circuit in the Cluster C2 connector


7
3
2
1
0
1
9
10
20
CLUSTER C2
FUSE 13
(PDC)
8149a2f5

Is the resistance below 10000.0 ohms?

No >> Replace the Instrument Cluster in accordance with service information.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

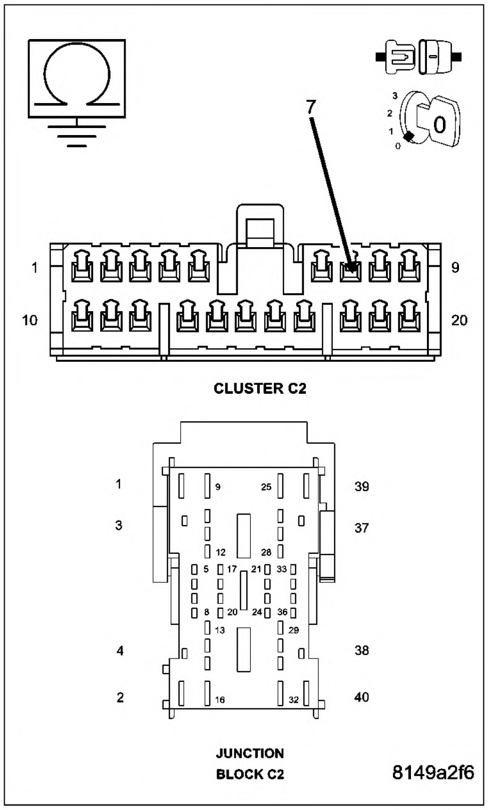
Yes >> Go To 3

---

3. (P292) DOOR UNLOCK RELAY CONTROL CIRCUIT SHORT TO GROUND

Disconnect the Junction Block C2 connector (on top of junction block).

Measure the resistance between ground and the (P292) Door Unlock Relay Control circuit in the Cluster C2 connector.

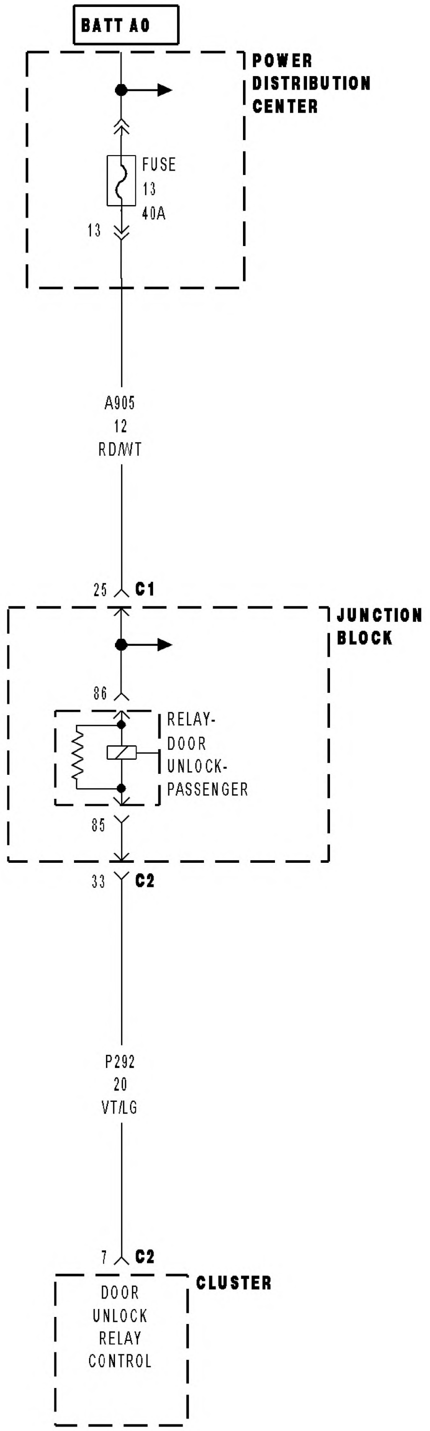

7
3
2
1
0
1
9
10
20
CLUSTER C2
1
3
4
2
39
37
38
40
9
25
12
28
5
17
21
33
8
20
24
36
13
29
16
32
JUNCTION
BLOCK C2
8149a2f6

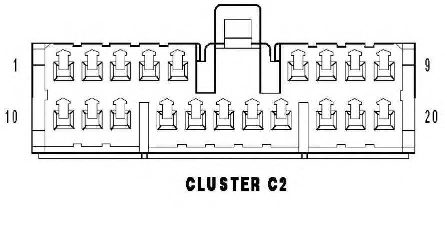
Is the resistance below 10000.0 ohms?

Yes >> Repair the (P292) Door Unlock Relay Control circuit for a short to ground.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Junction Block in accordance with service information.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B183A–PASSENGER DOORS UNLOCK CONTROL CIRCUIT HIGH– CLUSTER


BATT A0
POWER DISTRIBUTION CENTER
FUSE 13 40A
13
A905
12
RD/WT
25
C1
JUNCTION BLOCK
86
RELAY-DOOR UNLOCK-PASSENGER
85
33
C2
P292
20
VT/LG
7
C2
CLUSTER
DOOR UNLOCK RELAY CONTROL


1
9
10
20
CLUSTER C2

8149a2f4

B183A–PASSENGER DOORS UNLOCK CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

For the Power Door Lock circuit diagram (Refer to 8 - ELECTRICAL/POWER LOCKS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Cluster senses a high condition on the (P292) Door Unlock Relay Control circuit for over 10 seconds, this code will set.

Possible Causes
(P292) DOOR UNLOCK RELAY CONTROL CIRCUIT SHORT TO BATTERY
JUNCTION BLOCK
INSTRUMENT CLUSTER

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's.

Operate the door locks several times.

Cycle the ignition from on to off.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display PASSENGER DOORS UNLOCK CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. DOOR UNLOCK RELAY SHORTED TO BATTERY

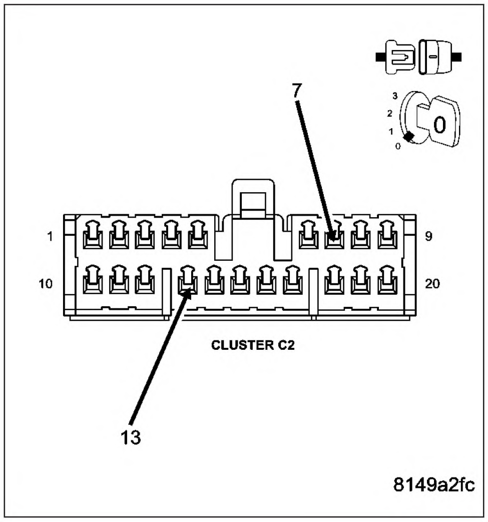
NOTE: Ensure the windows are down before proceeding.

Turn the ignition off.

Lock the all doors.

Disconnect the Cluster C2 connector.

Momentarily connect a jumper wire between the (P292) Door Unlock Relay Control circuit and the (Z905) Ground circuit in the Cluster C2 connector.



Did the doors unlock?

Yes >> Replace the Instrument Cluster in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3

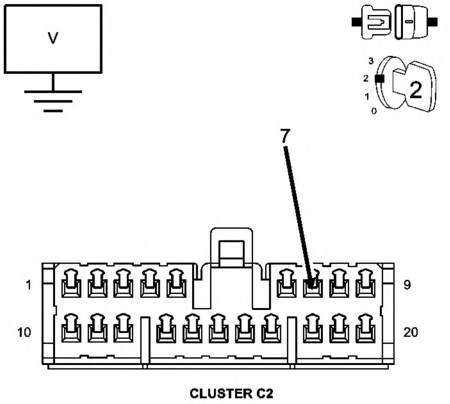
B183A–PASSENGER DOORS UNLOCK CONTROL CIRCUIT HIGH– CLUSTER (CONTINUED)

3. (P292) DOOR UNLOCK RELAY CONTROL CIRCUIT SHORTED TO BATTERY

Disconnect the Junction Block C2 connector (on top of junction block).

Turn the ignition on.

Measure the voltage between ground and the (P292) Door Unlock Relay Control circuit in the Cluster C2 connector.



8149a2fd

Is there any voltage present?

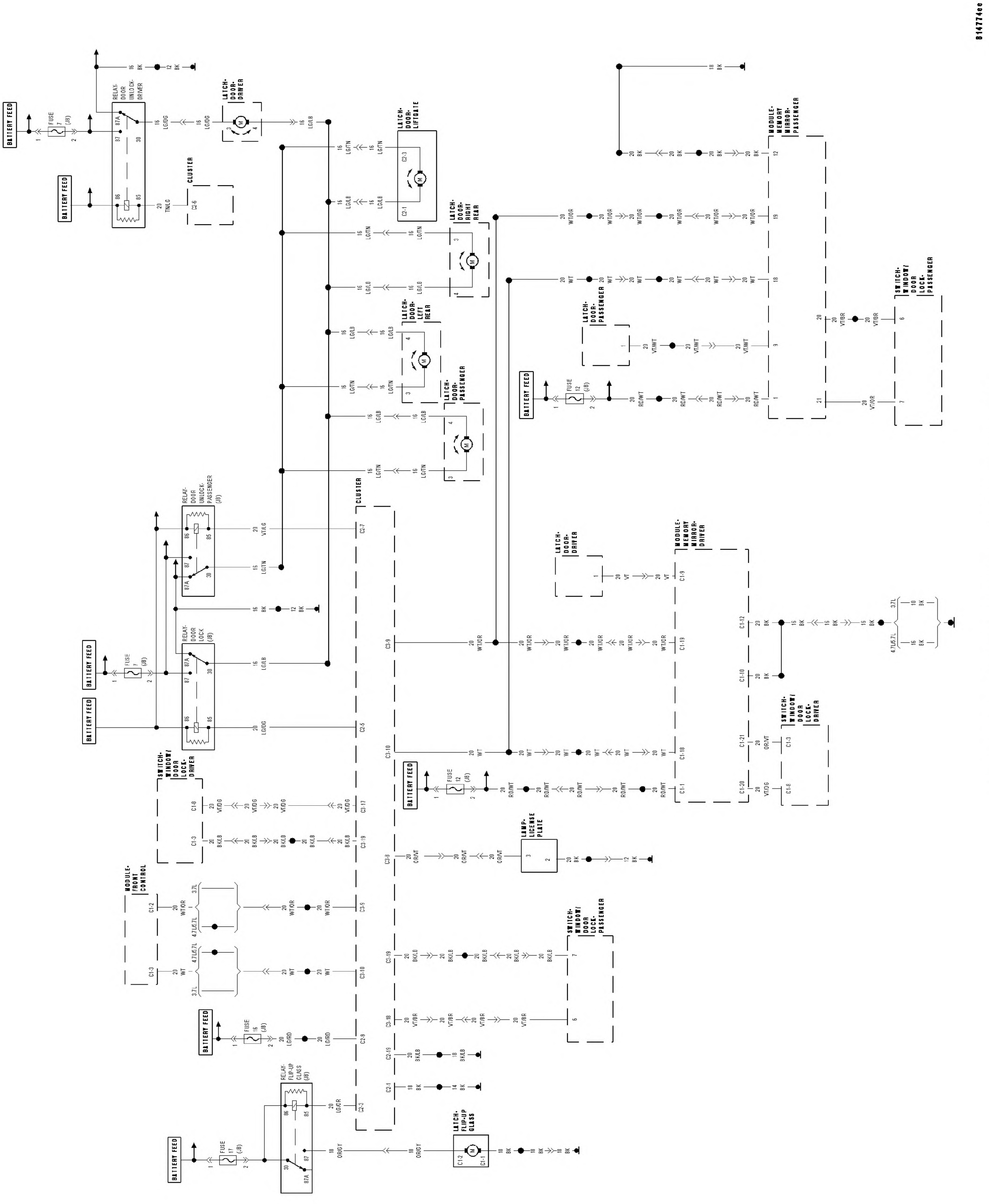
Yes >> Repair the (P292) Door Unlock Relay Control circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

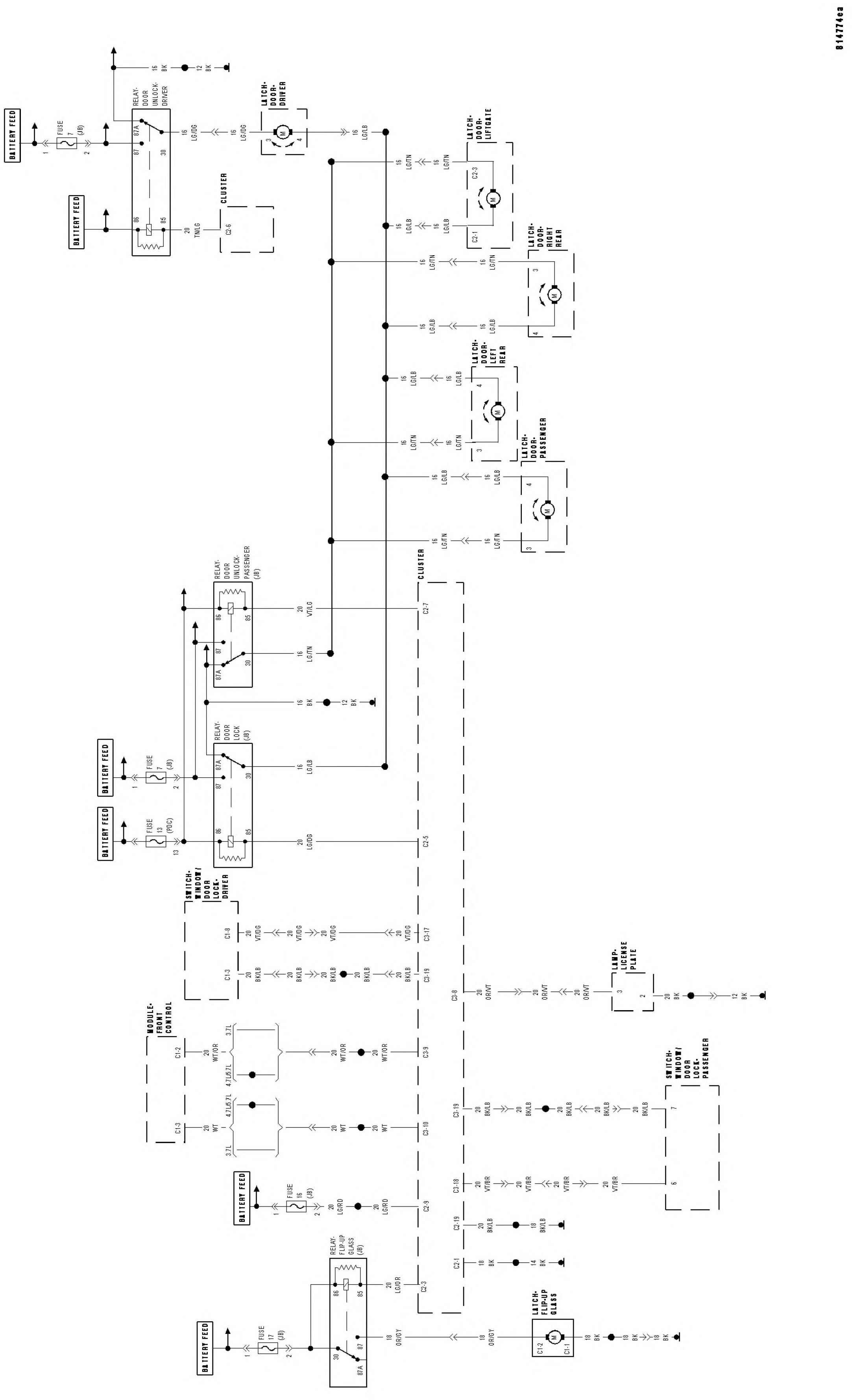
No >> Replace the Junction Block in accordance with service information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

SCHEMATICS AND DIAGRAMS


BATTERY FEED
FUSE
RELAY-DOOR UNLOCK-DRIVER
LATCH-DOOR-DRIVER
CLUSTER
LATCH-DOOR-LIFTGATE
LATCH-DOOR-RIGHT REAR
LATCH-DOOR-LEFT REAR
LATCH-DOOR-PASSENGER
MODULE-MEMORY MIRROR-PASSENGER
SWITCH-WINDOW/DOOR LOCK-PASSENGER
MODULE-MEMORY MIRROR-DRIVER
SWITCH-WINDOW/DOOR LOCK-DRIVER
RELAY-DOOR UNLOCK-PASSENGER (JB)
RELAY-DOOR LOCK (JB)
MODULE-FRONT CONTROL
LAMP-LICENSE PLATE
RELAY-FLIP-UP GLASS (JB)
LATCH-FLIP-UP GLASS
814774ee

WK DOOR LOCKS MEMORY CKT DIAGRAM


814774ea
BATTERY FEED
FUSE 7 (JB)
RELAY-DOOR UNLOCK-DRIVER
87A
87
30
86
85
16 BK
12 BK
16 LG/DG
20 TN/LG
CLUSTER
C2-6
LATCH-DOOR-DRIVER
M
16 LG/LB
16 LG/TN
LATCH-DOOR-LIFTGATE
C2-3
C2-1
LATCH-DOOR-RIGHT REAR
LATCH-DOOR-LEFT REAR
LATCH-DOOR-PASSENGER
RELAY-DOOR UNLOCK-PASSENGER (JB)
20 VT/LG
C2-7
RELAY-DOOR LOCK (JB)
FUSE 13 (PDC)
20 LG/DG
C2-5
SWITCH-WINDOW/DOOR LOCK-DRIVER
C1-8
C1-3
20 VT/DG
20 BK/LB
C3-17
C3-19
C3-8
20 OR/VT
LAMP-LICENSE PLATE
20 BK
12 BK
MODULE-FRONT CONTROL
C1-2
20 WT/OR
3.7L
4.7L/5.7L
20 WT
C3-9
C3-10
SWITCH-WINDOW/DOOR LOCK-PASSENGER
C3-18
20 VT/BR
FUSE 16 (JB)
20 LG/RD
C2-9
C2-19
20 BK/LB
18 BK/LB
C2-1
18 BK
14 BK
RELAY-FLIP-UP GLASS (JB)
20 LG/OR
C2-3
FUSE 17 (JB)
18 OR/GY
LATCH-FLIP-UP GLASS
C1-2
C1-1
18 BK

WK DOOR LOCKS BASE CKT DIAGRAM

POWER LOCKS - SERVICE INFORMATION

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POWER LOCKS - SERVICE INFORMATION

DESCRIPTION

POWER LOCKS

The power lock system allows all of the doors and liftgate to be locked or unlocked electrically by operating a switch on either front door trim panel. The power lock system receives non-switched battery current through a fuse in the Junction Block (JB), so that the power locks remain operational, regardless of the ignition switch position.

The instrument cluster locks the doors automatically when the vehicle is driven beyond the speed of 25.7 Km/h (15 mph), all doors are closed, and the accelerator pedal is depressed. The rolling door lock feature can be disabled if desired.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences.

The power lock system for this vehicle can also be operated remotely using the Remote Keyless Entry (RKE) transmitters.

DOOR LOCK MOTORS

The lock mechanisms are actuated by a reversible electric motor mounted within each door. The power lock motors are integral to the door latch units.

The power lock motors cannot be adjusted or repaired and, if faulty or damaged, the door latch unit must be replaced.

CENTRAL LOCKING/UNLOCKING

The central locking system controls powered operation of the door and liftgate locks and the illuminated entry system. Central locking included the following features:

- Automatic locking of the doors and liftgate when the vehicle speed exceeds 13 km/h (8 mph).
- Locking prevention with a door lock switch or the RKE transmitter if the key is in the ignition switch and the driver's door is open.
- Driver selectable unlocking mode: unlock only the driver's door or all doors and the liftgate with one press of the RKE transmitter unlock button.
- Automatic illumination of interior courtesy lamps when the vehicle is unlocked.

- Locking all doors and the liftgate by pressing the lock button on the RKE transmitter, or by pressing a lock switch on one of the front doors.

ENHANCED ACCIDENT RESPONSE

In the event of an impact that causes airbag deployment, the Enhanced Accident Response System switches on the interior lamps and unlocks the doors after the vehicle has stopped. This helps emergency personnel render appropriate assistance. The lamps remain on as long as the battery has power or until the ignition key is removed.

REMOTE KEYLESS ENTRY

Remote Keyless Entry (RKE) is standard on this vehicle. It locks and unlocks doors and liftgate, turns on interior lamps, and arms and disarms the Vehicle Theft Security System (if equipped). The RKE system operates on non-switched battery current through a fuse in the Integrated Power Module (IPM), so that the system remains operational, regardless of the ignition switch position.

The RKE transmitters are also equipped with a Panic button. If the Panic button on the RKE transmitter is depressed, the horn will sound and the exterior lights will flash on the vehicle for about three minutes, or until the Panic button is depressed a second time. A vehicle speed of about 25.7 kilometers-per-hour (15 miles-per-hour) will also cancel the panic event.

The RKE system can also perform other functions on this vehicle. If the vehicle is equipped with the optional Vehicle Theft Security System (VTSS), the RKE transmitter will arm the VTSS when the Lock button is depressed, and disarm the VTSS when the Unlock button is depressed.

The RKE system includes two transmitters when the vehicle is shipped from the factory, but the system can retain the vehicle access codes of up to a total of four transmitters. The transmitter codes are retained in the RKE module memory, even if the battery is disconnected. If an RKE transmitter is faulty or lost, new transmitter vehicle access codes can be programmed into the system using a scan tool.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences. Customer programmable feature options affecting the RKE system include:

- **Remote Unlock Sequence** - Allows the option of having only the driver side front door unlock when the RKE transmitter Unlock button is depressed the first time. The remaining doors unlock when the button is depressed a second time within 5 seconds of the first unlock press. Another option is having all doors and liftgate unlock upon the first depression of the RKE transmitter Unlock button.
- **Sound Horn on Lock** - Allows the option of having the horn sound a short chirp as an audible verification that the RKE system received a valid Lock request from the RKE transmitter, or having no audible verification (not available in all areas).
- **Flash Lights with Lock and Unlock** - Allows the option of having the park lamps flash as an optical verification that the RKE system received a valid Lock request or Unlock request from the RKE transmitter, or having no optical verification.
- **Programming Additional Transmitters** - Allows up to a total of four transmitter vehicle access codes to be stored in the receiver memory.

Certain functions and features of the RKE system rely upon resources shared with other electronic modules in the vehicle over the CAN data bus network. For diagnosis of these electronic modules or of the data bus network, the use of a scan tool and the appropriate diagnostic information are required.

OPERATION

POWER LOCKS

The instrument cluster locks or unlocks the doors when an actuation input signal from a door lock switch or Memory Mirror Module is received. The instrument cluster turns on the output drivers and provides a voltage level to the door lock motor for a specified time. All passenger doors can be locked or unlocked using a mechanical button mounted on the door trim panel. The drivers door can be locked or unlocked by using the key cylinder.

DOOR LOCK MOTORS

The door lock motors are controlled by the instrument cluster. A positive and negative battery connection to the two motor terminals will cause the motor to move in one direction. Reversing the current will cause the motor to move in the opposite direction.

REMOTE KEYLESS ENTRY

- **LOCK**: Pressing the LOCK button locks all doors, sounds horn (chirp) once if enabled, flashes the park lamps once if enabled, and arms the Vehicle Theft Security System (VTSS), if enabled. The chirp verifies that the instrument cluster has sent a message for door lock operation. If a door has not been closed before pressing the LOCK button, the vehicle may not be secured and the VTSS (if equipped) will not arm until the door is closed.
- **UNLOCK**: Pressing the UNLOCK button once will unlock the driver's door first if enabled, flashes the park lamps twice if enabled, activates the illuminated entry system, and disarms the Vehicle Theft Security System (VTSS), if equipped. Pressing the UNLOCK button twice within five seconds will unlock all doors, if driver's door first is enabled.
- **PANIC**: Pressing the PANIC button sounds the horns at half second intervals, flashes the exterior lamps, and turns ON the interior lamps. The panic alarm will remain on for three minutes, or until the PANIC button is actuated again or the vehicle speed exceeds 25.7 Km/h (15 mph) will cancel the panic event.

DIAGNOSIS AND TESTING

POWER LOCKS

The most reliable, efficient, and accurate means to diagnose the power lock system requires the use of a scan tool and the proper Diagnostic Procedures information.

Following are tests that will help to diagnose the hard wired components and circuits of the power lock system. However, these tests may not prove conclusive in the diagnosis of this system. In order to obtain conclusive testing of the power lock system, the CAN data bus network must be checked.

Refer to the appropriate wiring information.

PRELIMINARY DIAGNOSIS

As a preliminary diagnosis for the power lock system, note the system operation while you actuate both the Lock and Unlock functions with the power lock switches and with the Remote Keyless Entry (RKE) transmitter. Then, proceed as follows:

- If the entire power lock system fails to function with either the power lock switches or the RKE transmitter, check the fuse in the Junction Block (JB).
- If the power lock system functions with both power lock switches, but not with the RKE transmitter, proceed to diagnosis of the Remote Keyless Entry (RKE) system.
- If the power lock system functions with the RKE transmitter, but not with one or both power lock switches, proceed to diagnosis of the door lock switches.
- If the driver side power lock switch operates only the driver side front door power lock motor, but all other power lock motors operate with the passenger side power lock switch or the RKE transmitter, use a scan tool and the appropriate diagnostic information to diagnose the CAN data bus.
- If only one power lock motor fails to operate with both power lock switches and the RKE transmitter, use a scan tool and the appropriate diagnostic information to diagnose the CAN data bus.

POWER LOCK MOTOR

DESCRIPTION

The lock mechanisms are actuated by a reversible electric motor mounted within each door. The power lock motors are integral to the door latch units.

The power lock motors cannot be adjusted or repaired and, if faulty or damaged, the door latch unit must be replaced.

OPERATION

The door lock motors are controlled by the instrument cluster. A positive and negative battery connection to the two motor terminals will cause the motor to move in one direction. Reversing the current will cause the motor to move in the opposite direction.

DIAGNOSIS AND TESTING

POWER LOCK MOTOR

The most reliable, efficient, and accurate means to diagnose the power lock system requires the use of a scan tool and the proper Diagnostic Procedures information.

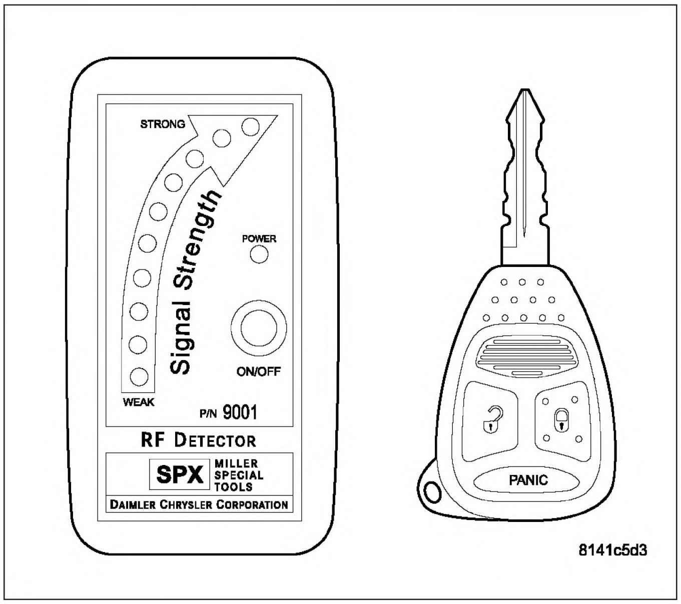
Refer to the appropriate wiring information.

REMOTE KEYLESS ENTRY TRANSMITTER

DIAGNOSIS AND TESTING

REMOTE KEYLESS ENTRY TRANSMITTER

Using special tool 9001, first test to ensure that the transmitter is functioning. Typical testing distance is 2.5 centimeters (1 inch) for Asian transmitters and 30.5 centimeters (12 inches) for all others. To test, position the transmitter as shown. Press any transmitter button, then test each button individually. The tool will beep if a radio signal strength that lights five or more LED's is detected. Repeat this test three times. If transmitter fails any of the test refer to the proper Diagnostic Procedures information.



STANDARD PROCEDURE

REMOTE KEYLESS ENTRY CUSTOMER PREFERENCES

HORN CHIRP DISABLING/ENABLING

The horn chirp can be toggled using a scan tool or by using the Remote Keyless Entry (RKE) transmitter.

To DISABLE (cancel) the horn chirp feature: With the ignition in the ON position, press and hold the transmitter LOCK button for four seconds. While pressing the LOCK button in, press the PANIC button within 6 seconds. Release both buttons when a single chime is heard.

To ENABLE the horn chirp feature, repeat the above procedure.

UNLOCK SEQUENCE

The unlock sequence can be toggled using a scan tool or by using the following procedure.

1. Place the key in the ignition.
2. Within 10 seconds, cycle the key from the OFF position to the ON position four times, ending in the ON position (Do not start the engine).
3. Within 30 seconds, press the driver's door lock switch in the UNLOCK direction. A single chime will be heard to indicate the feature has been disabled.

This will toggle between Driver door first and Unlock all doors function.

To ENABLE this feature, repeat the above procedure.

REMOTE KEYLESS ENTRY TRANSMITTER BATTERIES

The Remote Keyless Entry (RKE) transmitter case snaps open and shut for battery access. To replace the RKE transmitter batteries:

1. Using a trim stick or a thin coin, gently pry at the notch in the center seam of the RKE transmitter case halves located near the key ring until the two halves unsnap.
2. Lift the back half of the transmitter case off of the RKE transmitter.
3. Remove the two batteries from the RKE transmitter.
4. Replace the battery with a new CR2016. Be certain that the battery is installed with the polarity correctly oriented.
5. Align the two RKE transmitter case halves with each other, and squeeze them firmly and evenly together using hand pressure until they snap back into place.

REMOTE KEYLESS ENTRY TRANSMITTER PROGRAMMING

If vehicle is not equipped with Sentry Key Theft Deterrent, new Remote Keyless Entry (RKE) transmitters can be programed using a scan tool and the proper Diagnostic Procedures manual. If vehicle is equipped with Sentry Key Theft Deterrent, (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE).

SPECIFICATIONS

REMOTE KEYLESS ENTRY TRANSMITTER

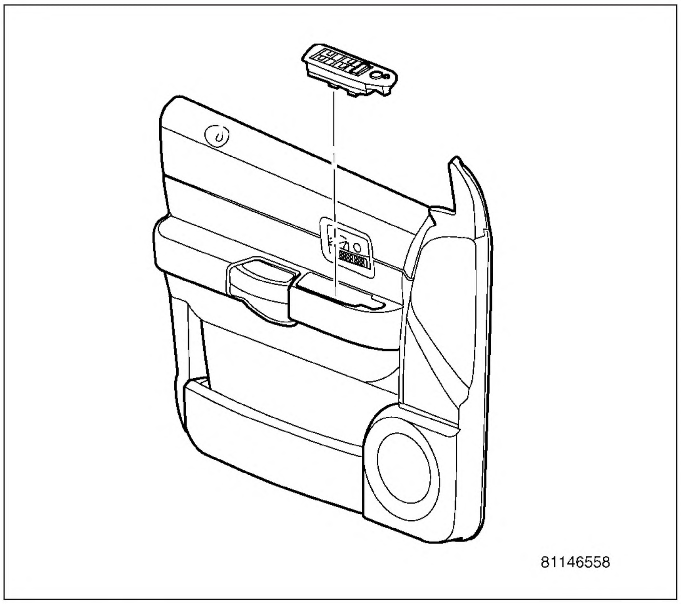
Normal operation range is up to 10 meters/32 feet (3 meters/10 feet in Japan) of the vehicle. Range may be better or worse depending on the environment around the vehicle.

SWITCH-WINDOW/DOOR LOCK

DESCRIPTION

A window/lock switch located in each front door trim panel. The driver's side window/lock switch includes the following:

- **Power Lock Switch** - A two-way, momentary, resistor multiplexed switch to control the power lock system.
- **Power Window Lockout Switch** - A two-way, latching, push-button switch allows the vehicle operator to lock out the power window switches on each passenger door so that the passenger door power windows may be operated only from the master switches.
- **Power Window Switches** - A two-way, momentary power window switch for the driver side front door also has a second detent in the Down direction and internal circuitry to provide an Auto-Down feature for the driver side front door power window. In addition to the power window switch for its own door, the window/lock switch houses individual master switches for each passenger door power window.



The passenger side window/lock switch includes the following:

- **Power Lock Switch** - A two-way, momentary, resistor multiplexed switch to control the power lock system.
- **Power Window Switch** - A two-way, momentary power window switch for the passenger side front door.

OPERATION

The driver side window/lock switch combines a power lock switch, a driver power window switch with an Auto-down feature, master switches for each passenger door power window, a power window lockout switch, a power mirror selector switch, and four power mirror adjustment switches in a single assembly. The switches in the window/lock switch can be diagnosed using conventional diagnostic tools and methods.

Power Lock Switch

The power lock switch circuitry is connected in series between ground and the driver door switch mux input of the instrument cluster (without memory). If equipped with the memory system, the circuitry is connected to the memory mirror module. Each power lock switch position (Lock, Unlock, and Neutral) provides a different resistance value to the instrument cluster or memory mirror input, which allows the instrument cluster or memory module to sense the switch position. Based upon the power lock switch input, the instrument cluster or memory module controls the battery and ground feed outputs to the individual power lock motors to lock or unlock the door latches. The Light-Emitting Diode (LED) in the power lock switch is connected to battery current through the power window circuit breaker in the Integrated Power Module (IPM) on a fused ignition switch output (run-acc) circuit so that the switch will be illuminated whenever the ignition switch is in the On or Accessory positions.

Power Window Switches

The power window switch circuitry is connected to battery current through a circuit breaker in the Integrated Power Module (IPM) on a fused ignition switch output (run-acc) circuit so that the power windows will operate whenever the ignition switch is in the On or Accessory positions. Each two-way, momentary master passenger power window switch in the window/lock switch provides battery current and ground to the individual power window switches on each passenger door so that the power window switch controls the battery current and ground feeds to its respective power window motor. The switch for the driver side front door power window includes an auto-down feature. When this switch is depressed to a second momentary detent position and released, the driver door power window is automatically operated through an internal circuit and relay to its fully lowered position. The Auto-down event is cancelled if the switch paddle is depressed a second time in either the Up or Down direction. When the two position window lockout switch in the window/lock switch is depressed and latched in the lockout position, the battery current feed to each of the individual passenger power window switches is interrupted so that the passenger door power windows can only be operated from the switches in the window/lock switch. The window lockout switch also controls the battery current feed for the LED in each passenger power window switch so that the switch will not be illuminated when it is locked out.

DIAGNOSIS AND TESTING

WINDOW/DOOR LOCK SWITCH

The Light-Emitting Diode (LED) illumination lamps for all of the window/lock switch power window and power lock switches receive battery current through the circuit breaker in the Integrated Power Module (IPM). If only one LED in the door module is inoperative, replace the faulty door module. If the driver side front door power window operates in a normal manner, but the Auto-Down feature is inoperative, replace the faulty window/lock switch. Refer to the appropriate wiring information.

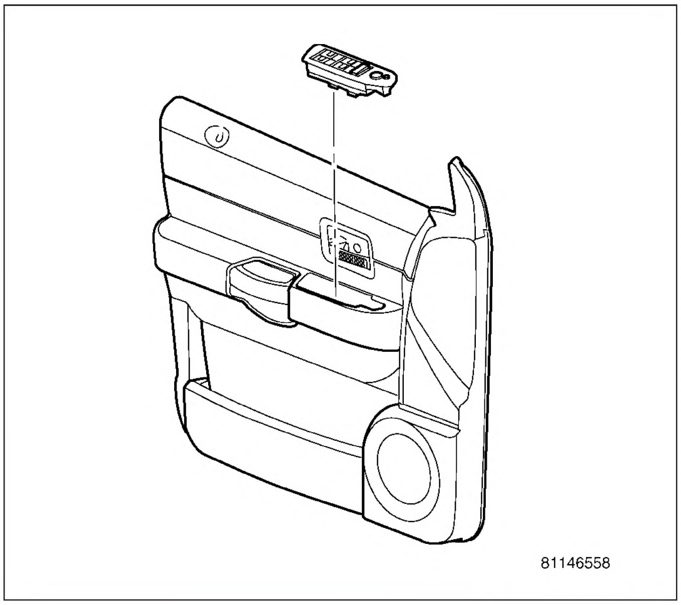
1. Disconnect and isolate the battery negative cable. Remove the window/lock switch from the door trim panel. Disconnect the door wire harness connectors from the switch.
2. Test the switch continuity. See the Switch Tests chart to determine if the continuity is correct for the suspect switches in each switch position. If not OK, replace the faulty window/lock switch as required.

WINDOW/DOOR LOCK SWITCH TEST

POWER LOCK SWITCH	
SWITCH POSITION	**RESISTANCE BETWEEN C-1 PINS 8 & 3**
LOCK	330 OHMS ± 5%
UNLOCK	100 OHMS ± 5%
POWER WINDOW SWITCHES - DRIVER DOOR	
SWITCH POSITION	**CONTINUITY BETWEEN PINS OF C-1**
NEUTRAL	PINS 4 (C1) & 6 (C2) PINS 4 (C1) & 5 (C2) PINS 4 (C1) & 1 (C2) PINS 4 (C1) & 4 (C2) PINS 4 (C1) & 2 (C2)
LEFT FRONT UP	PINS 2 & 7 (C1)
LEFT FRONT DOWN	PINS 2 & 6 (C1)
RIGHT FRONT UP	PINS 2 (C1) & 6 (C2)
RIGHT FRONT DOWN	PINS 2 (C1) & 5 (C2)
LEFT REAR UP	PINS 2 (C1) & 1 (C2)
LEFT REAR DOWN	PINS 2 (C1) & 4 (C2)
RIGHT REAR UP	PINS 2 (C1) & 2 (C2)
RIGHT REAR DOWN	PINS 2 (C1) & 3 (C2)
POWER WINDOW SWITCH - PASSENGER DOOR	
UP	PINS 4 & 3
DOWN	PINS 4 & 2
NEUTRAL	PINS 1 & 2 AND 3 & 8
POWER WINDOW LOCKOUT SWITCH	
SWITCH POSITION	**CONTINUITY BETWEEN**
OFF (SWITCH BUTTON RAISED - NOT DEPRESSED)	PINS 2 AND 5 OF C-1

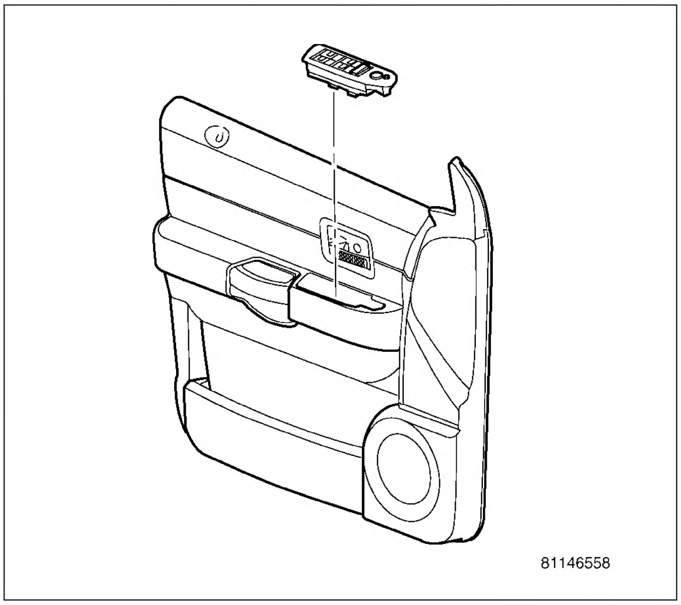
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Using a trim stick, start at the rear of the switch and pry up to remove from door trim panel.
3. Disconnect electrical harness connectors from switch.



INSTALLATION

1. Connect electrical harness connectors to switch.
2. Insert front end of switch into door trim panel opening. Press into place.
3. Connect battery negative cable.



POWER MIRRORS - ELECTRICAL DIAGNOSTICS

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POWER MIRRORS - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1DA7–SWITCH POWER SUPPLY CIRCUIT LOW — PASSENGER MEMORY MIRROR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Passenger Memory Mirror Module detects an internal module failure.

Possible Causes
PASSENGER MEMORY MIRROR MODULE

Diagnostic Test

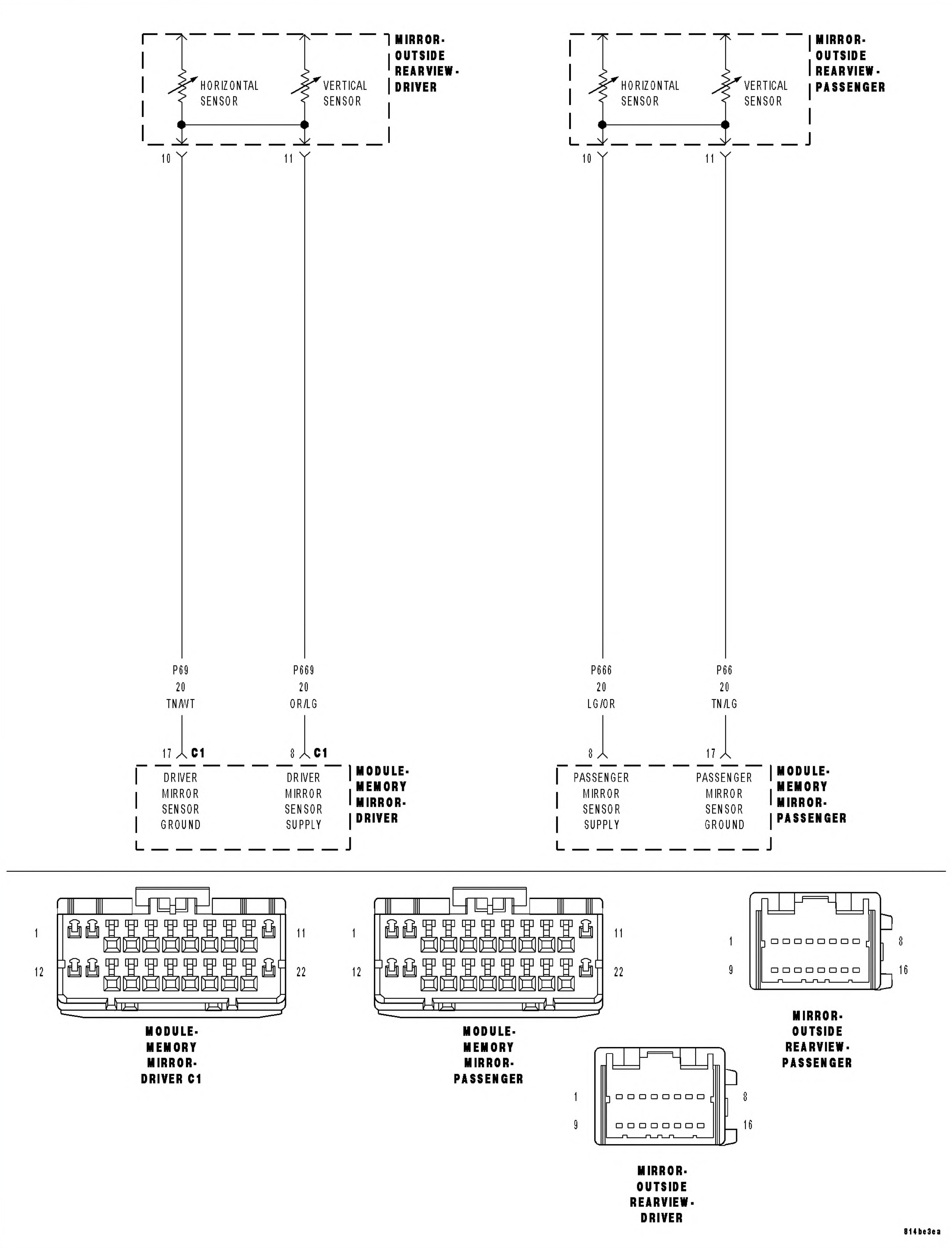
1. **REPLACE THE PASSENGER MEMORY MIRROR MODULE**

Repair

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0A, B1D13–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT HIGH – MEMORY MIRROR MODULE


MIRROR-OUTSIDE REARVIEW-DRIVER
HORIZONTAL SENSOR
VERTICAL SENSOR
10
11
MIRROR-OUTSIDE REARVIEW-PASSENGER
HORIZONTAL SENSOR
VERTICAL SENSOR
10
11
P69
20
TN/WT
P669
20
OR/LG
P666
20
LG/OR
P66
20
TN/LG
17 C1
8 C1
DRIVER MIRROR SENSOR GROUND
DRIVER MIRROR SENSOR SUPPLY
MODULE-MEMORY MIRROR-DRIVER
8
17
PASSENGER MIRROR SENSOR SUPPLY
PASSENGER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814be3ea

B1D0A, B1D13–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  DTC B1D0A – If the Driver Memory Mirror Module senses voltage is greater than 5.5 volts for more than 30 ms on the (P669) Driver Mirror Sensor Supply circuit.
  DTC B1D13 – If the Passenger Memory Mirror Module senses voltage is greater than 5.5 volts for more than 30 ms on the (P666) Passenger Mirror Sensor Supply circuit.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE
(P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT OPEN
(P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OPEN
DRIVER OUTSIDE REARVIEW MIRROR OPEN
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO VOLTAGE
(P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT OPEN
(P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT OPEN
PASSENGER OUTSIDE REARVIEW MIRROR OPEN
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D0A or B1D13 MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0A, B1D13–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

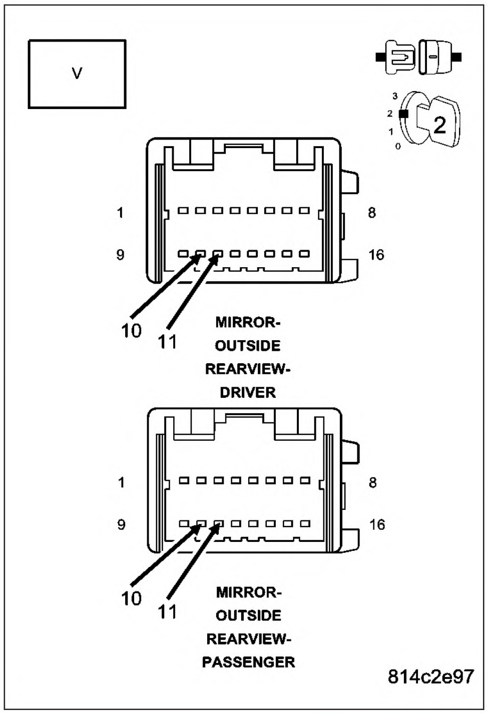
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- Measure the voltage between the (P669) Driver Mirror Sensor Supply circuit and the (P69) Driver Mirror Sensor Ground circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- Measure the voltage between the (P666) Passenger Mirror Sensor Supply circuit and the (P66) Passenger Mirror Sensor Ground circuit.


V
3
2
1
0
2
1
8
9
16
10
11
MIRROR-OUTSIDE REARVIEW-DRIVER
1
8
9
16
10
11
MIRROR-OUTSIDE REARVIEW-PASSENGER

814c2e97

What is the voltage?

4.8 Volts To 5.2 Volts

Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Below 4.8 Volts

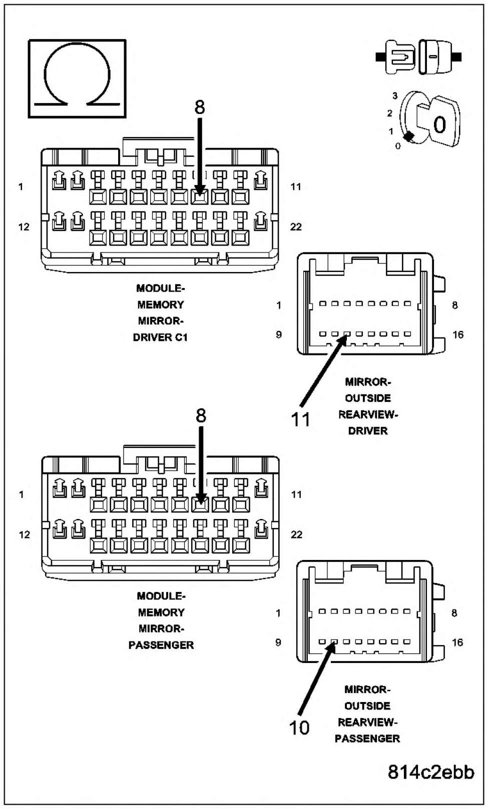
Go To 3

Above 5.2 Volts

Go To 5

B1D0A, B1D13–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

3. CHECK THE (P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT OR THE (P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT FOR AN OPEN


8
1
11
12
22
MODULE-
MEMORY
MIRROR-
DRIVER C1
1
8
9
16
11
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
8
1
11
12
22
MODULE-
MEMORY
MIRROR-
PASSENGER
1
8
9
16
10
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
3
2
1
0
O
814c2ebb

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance of the (P669) Driver Mirror Sensor Supply circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance of the (P666) Passenger Mirror Sensor Supply circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.

Is the resistance below 2.0 ohms?

Yes >> Go To 4

No, Driver MMM

Repair the (P669) Driver Mirror Sensor Supply circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Repair the (P666) Passenger Mirror Sensor Supply circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0A, B1D13–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

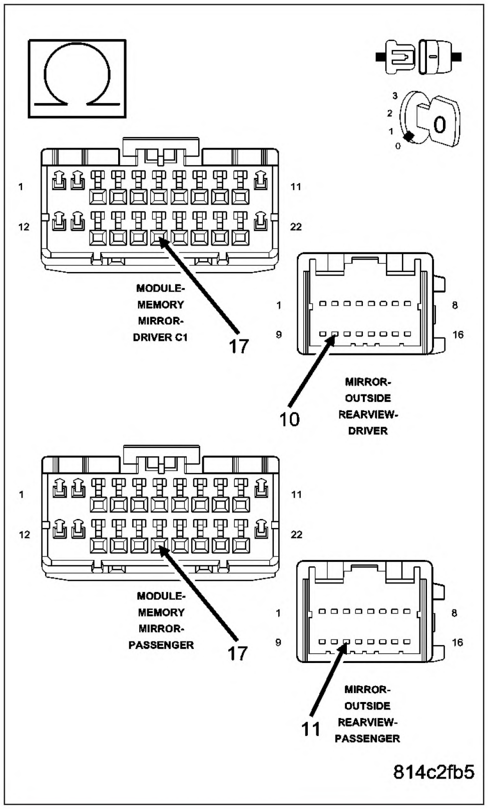
4. CHECK THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT FOR AN OPEN

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance of the (P69) Driver Mirror Sensor Ground circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance of the (P66) Passenger Mirror Sensor Ground circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.


3
2
1
0
1
11
12
22
MODULE-
MEMORY
MIRROR-
DRIVER C1
17
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
10
1
11
12
22
MODULE-
MEMORY
MIRROR-
PASSENGER
17
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
11
814c2fb5

Is the resistance below 2.0 ohms?

Yes, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Repair the (P69) Driver Mirror Sensor Ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Repair the (P66) Passenger Mirror Sensor Ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0A, B1D13–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

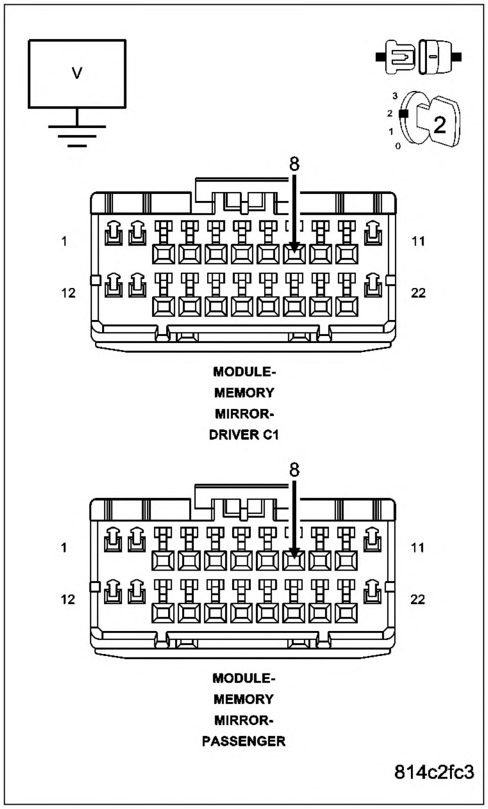
5. CHECK THE (P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT OR THE (P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Turn the ignition on.
- Measure the voltage of the (P669) Driver Mirror Sensor Supply circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Turn the ignition on.
- Measure the voltage of the (P666) Passenger Mirror Sensor Supply circuit.



Is the voltage above 0.2 volts?

Yes, Driver MMM

Repair the (P669) Driver Mirror Sensor Supply circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P666) Passenger Mirror Sensor Supply circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

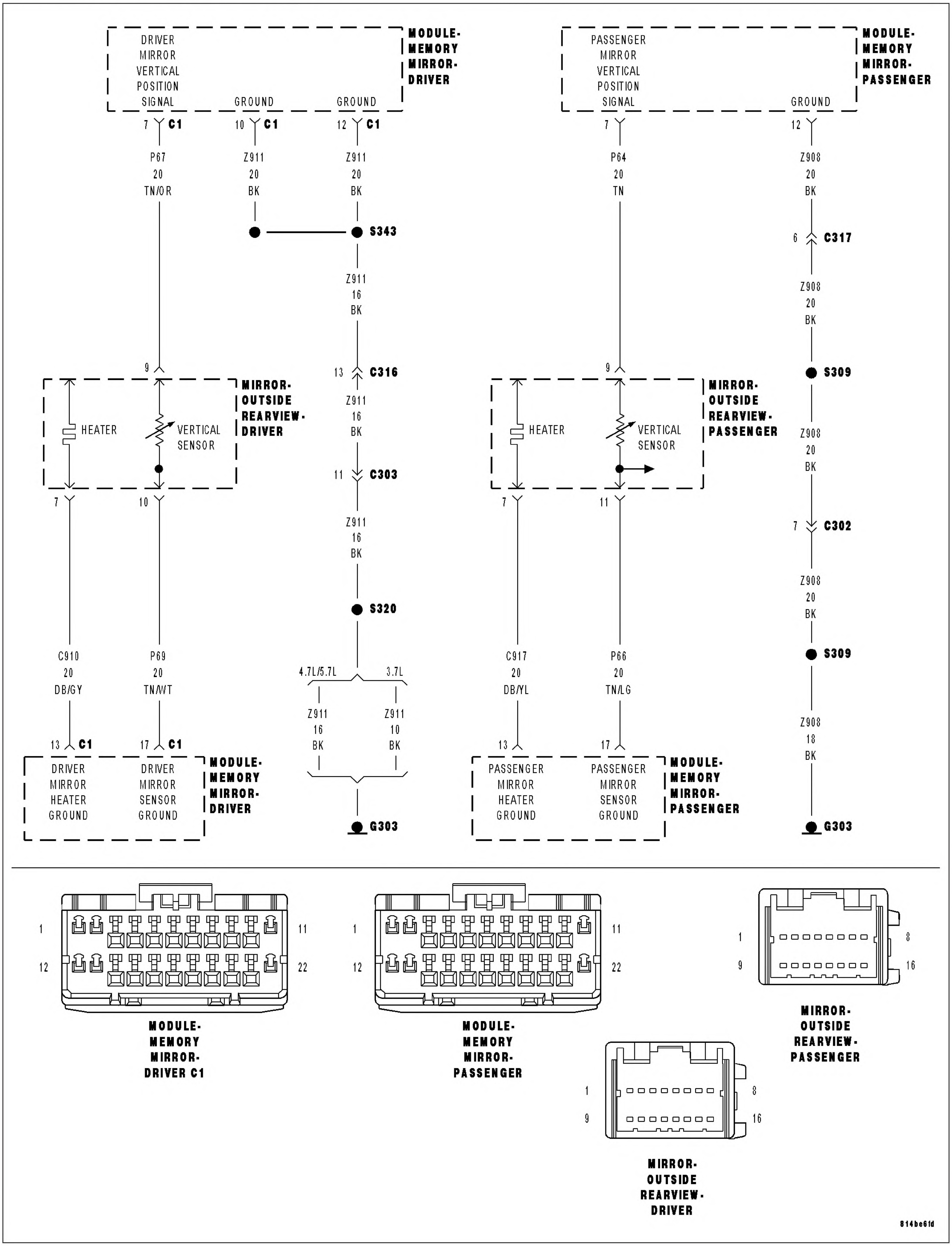
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0C, B1D15–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE


DRIVER MIRROR VERTICAL POSITION SIGNAL
GROUND
GROUND
MODULE-MEMORY MIRROR-DRIVER
7 C1
10 C1
12 C1
P67 20 TN/OR
Z911 20 BK
Z911 20 BK
S343
Z911 16 BK
13 C316
Z911 16 BK
11 C303
Z911 16 BK
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
9
HEATER
VERTICAL SENSOR
MIRROR-OUTSIDE REARVIEW-DRIVER
7
10
C910 20 DB/GY
P69 20 TN/WT
13 C1
17 C1
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-DRIVER
PASSENGER MIRROR VERTICAL POSITION SIGNAL
GROUND
MODULE-MEMORY MIRROR-PASSENGER
7
12
P64 20 TN
Z908 20 BK
6 C317
Z908 20 BK
S309
Z908 20 BK
7 C302
Z908 20 BK
S309
Z908 18 BK
G303
9
HEATER
VERTICAL SENSOR
MIRROR-OUTSIDE REARVIEW-PASSENGER
7
11
C917 20 DB/YL
P66 20 TN/LG
13
17
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814be6fd

B1D0C, B1D15–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The (P67) Driver Mirror Vertical Position Signal circuit supplies input to the Driver Memory Mirror Module. DTC B1D0C will set if the input value is less than the known good (stored) value for more than 60 ms.
  The (P64) Passenger Mirror Vertical Position Signal circuit supplies input to the Passenger Memory Mirror Module. DTC B1D15 will set if the input value is less than the known good (stored) value for more than 60 ms.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT
(P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO (C910) DRIVER MIRROR HEATER GROUND CIRCUIT
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO (Z908) GROUND CIRCUIT
(P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT
(P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

B1D0C, B1D15–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D0C or B1D15 MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

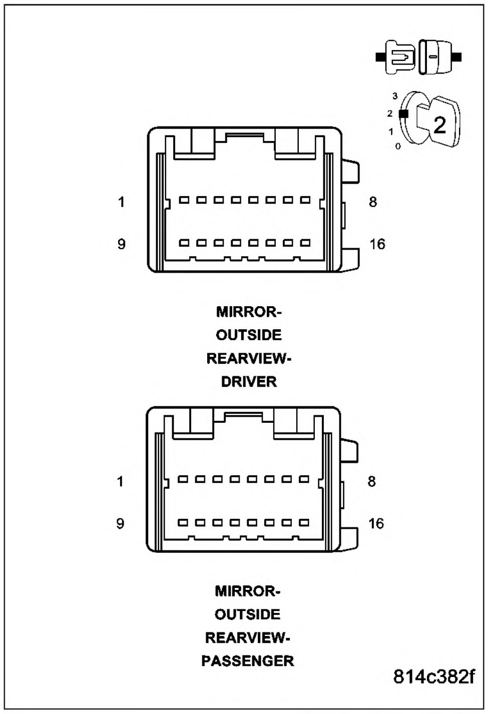
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D0C or B1D15 MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW?

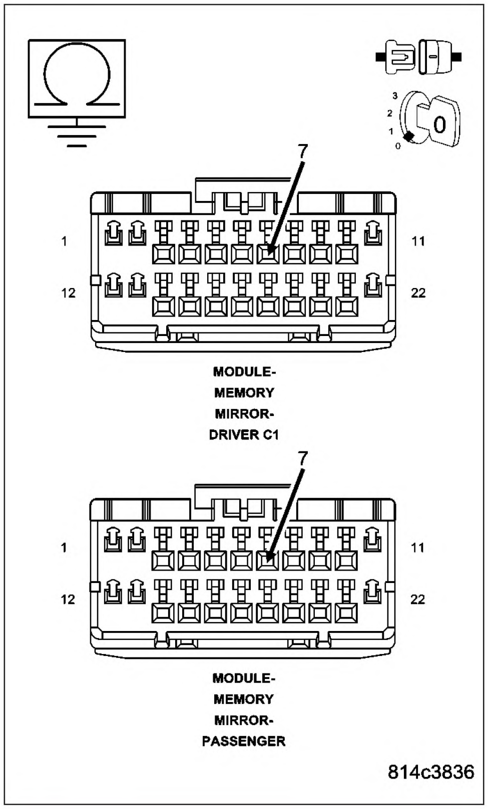
Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0C, B1D15–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

3. CHECK THE (P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT OR THE (P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO GROUND



For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance between ground and the (P67) Driver Mirror Vertical Position Signal circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance between ground and the (P64) Passenger Mirror Vertical Position Signal circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P67) Driver Mirror Vertical Position Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P64) Passenger Mirror Vertical Position Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D0C, B1D15–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

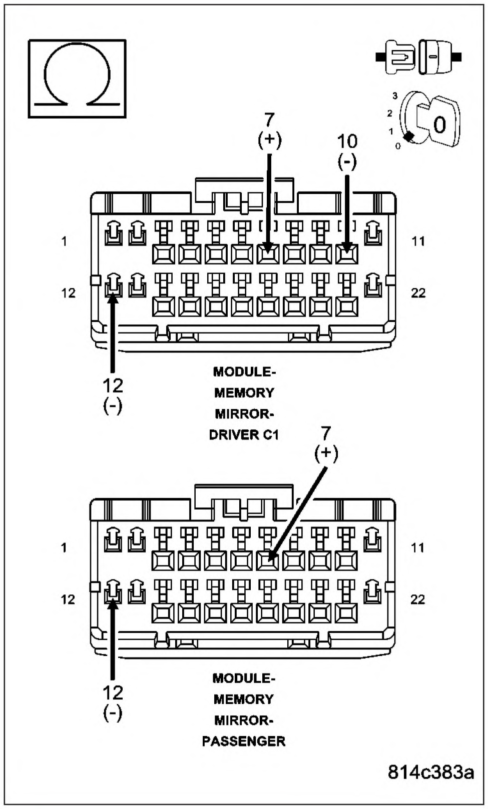
4. CHECK THE (P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT OR THE (P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (Z908) GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P67) Driver Mirror Vertical Position Signal circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P64) Passenger Mirror Vertical Position Signal circuit and the (Z908) Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P67) Driver Mirror Vertical Position Signal circuit for a short to the (Z911) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P64) Passenger Mirror Vertical Position Signal circuit for a short to the (Z908) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

B1D0C, B1D15–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

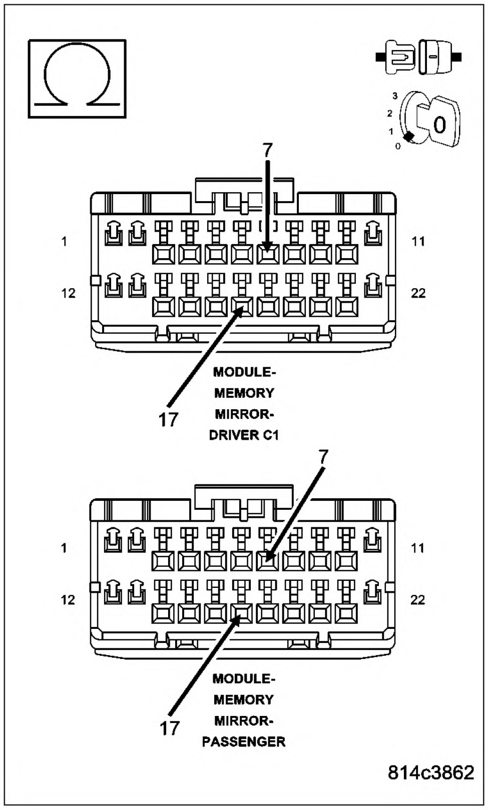
5. CHECK THE (P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR THE (P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P67) Driver Mirror Vertical Position Signal circuit and the (P69) Driver Mirror Sensor Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P64) Passenger Mirror Vertical Position Signal circuit and the (P66) Passenger Mirror Sensor Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P67) Driver Mirror Vertical Position Signal circuit for a short to the (P69) Driver Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P64) Passenger Mirror Vertical Position Signal circuit for a short to the (P66) Passenger Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1D0C, B1D15–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

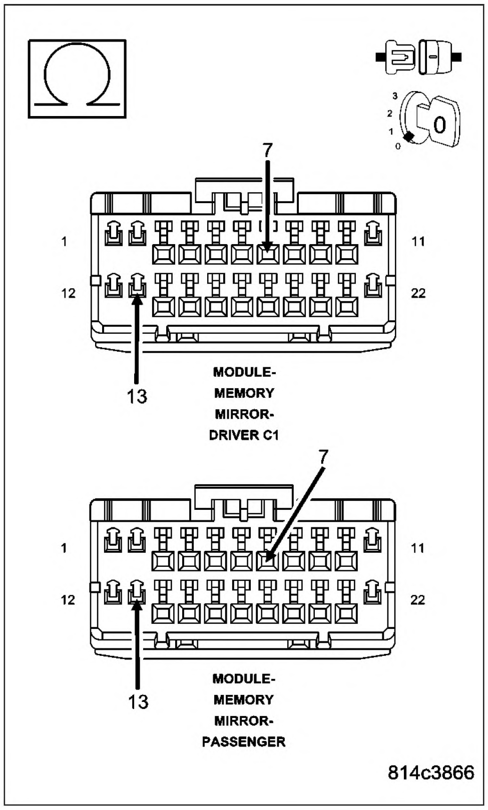
6. CHECK THE (P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P67) Driver Mirror Vertical Position Signal circuit and the (C910) Driver Mirror Heater Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P64) Passenger Mirror Vertical Position Signal circuit and the (C917) Passenger Mirror Heater Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P67) Driver Mirror Vertical Position Signal circuit for a short to the (C910) Driver Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P64) Passenger Mirror Vertical Position Signal circuit for a short to the (C917) Passenger Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

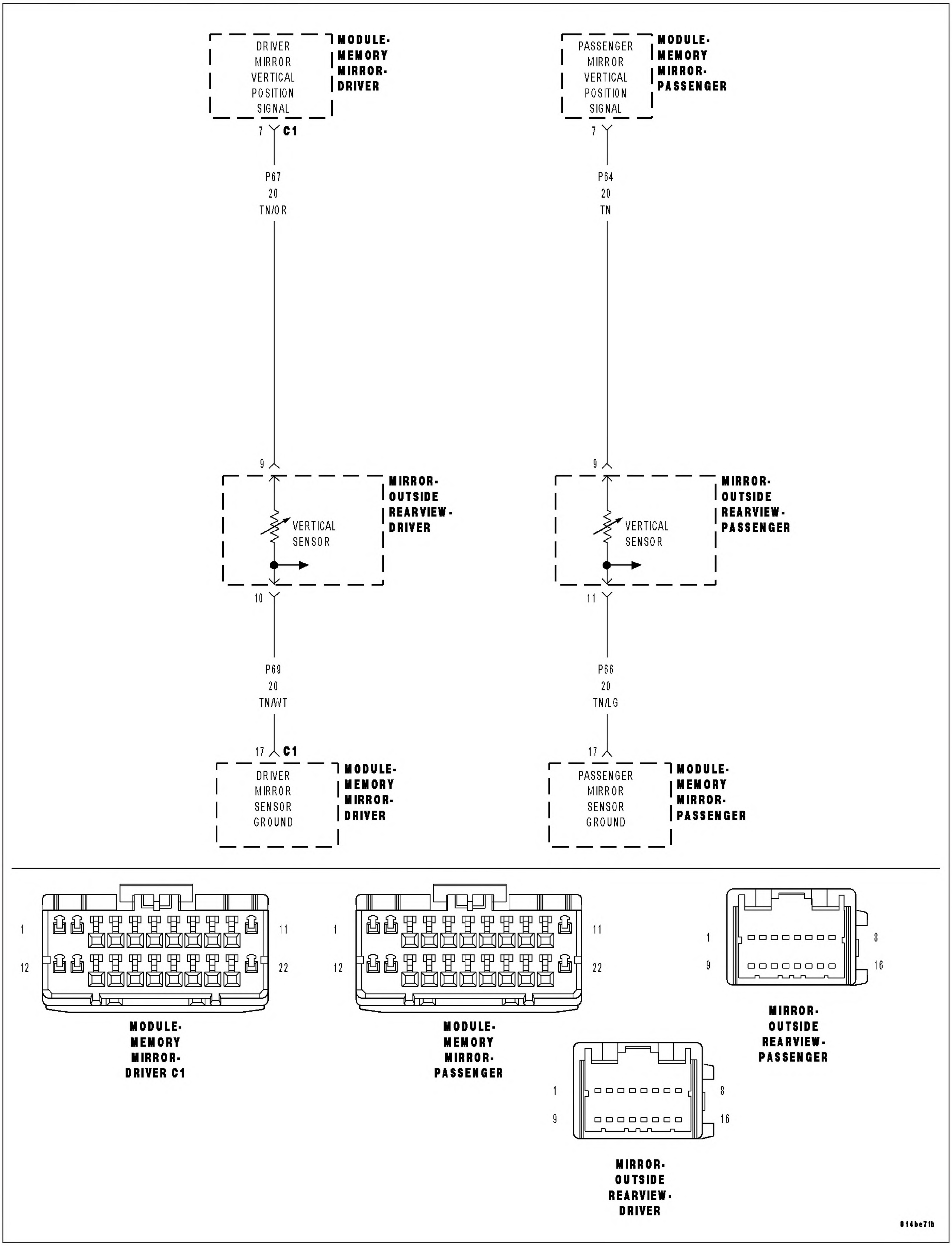
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0D, B1D16–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE


DRIVER MIRROR VERTICAL POSITION SIGNAL
MODULE-MEMORY MIRROR-DRIVER
7 C1
P67 20 TN/OR
PASSENGER MIRROR VERTICAL POSITION SIGNAL
MODULE-MEMORY MIRROR-PASSENGER
7
P64 20 TN
9
VERTICAL SENSOR
MIRROR-OUTSIDE REARVIEW-DRIVER
10
P69 20 TN/WT
9
VERTICAL SENSOR
MIRROR-OUTSIDE REARVIEW-PASSENGER
11
P66 20 TN/LG
17 C1
DRIVER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-DRIVER
17
PASSENGER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-PASSENGER
1 11 12 22
MODULE-MEMORY MIRROR-DRIVER C1
1 11 12 22
MODULE-MEMORY MIRROR-PASSENGER
1 8 9 16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1 8 9 16
MIRROR-OUTSIDE REARVIEW-DRIVER
814be71b

B1D0D, B1D16–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The (P67) Driver Mirror Vertical Position Signal circuit supplies input to the Driver Memory Mirror Module. DTC B1D0D will set if the input value is greater than the known good (stored) value for more than 60 ms.
  The (P64) Passenger Mirror Vertical Position Signal circuit supplies input to the Passenger Memory Mirror Module. DTC B1D16 will set if the input value is greater than the known good (stored) value for more than 60 ms.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO VOLTAGE
(P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT OPEN
(P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OPEN
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT SHORTED TO VOLTAGE
(P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT OPEN
(P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT OPEN
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D0D or B1D16 MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0D, B1D16–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

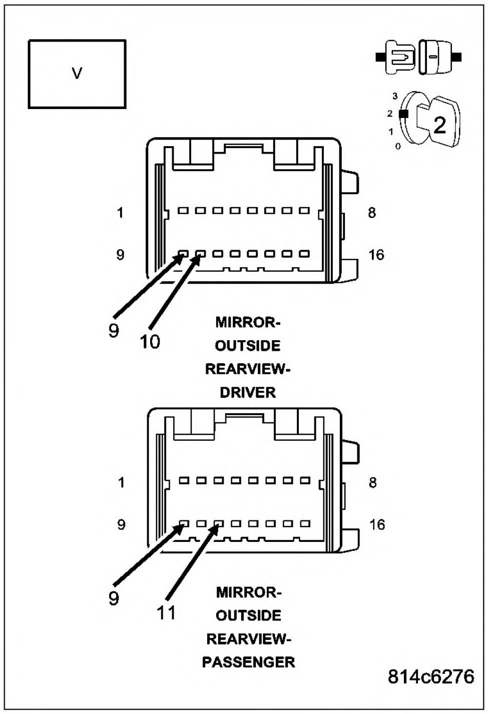
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Connect a voltmeter between the (P67) Driver Mirror Vertical Position Signal circuit and the (P69) Driver Mirror Sensor Ground circuit.
- Turn the ignition on.
- Move the mirror switch to any switch position while monitoring the voltmeter.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Connect a voltmeter between the (P64) Passenger Mirror Vertical Position Signal circuit and the (P66) Passenger Mirror Sensor Ground circuit
- Turn the ignition on.
- Move the mirror switch to any switch position while monitoring the voltmeter.



What is the voltage?

4.8 to 5.2 Volts

Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Above 5.2 Volts

Go To 3

Below 4.8 Volts

Go To 4

B1D0D, B1D16–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

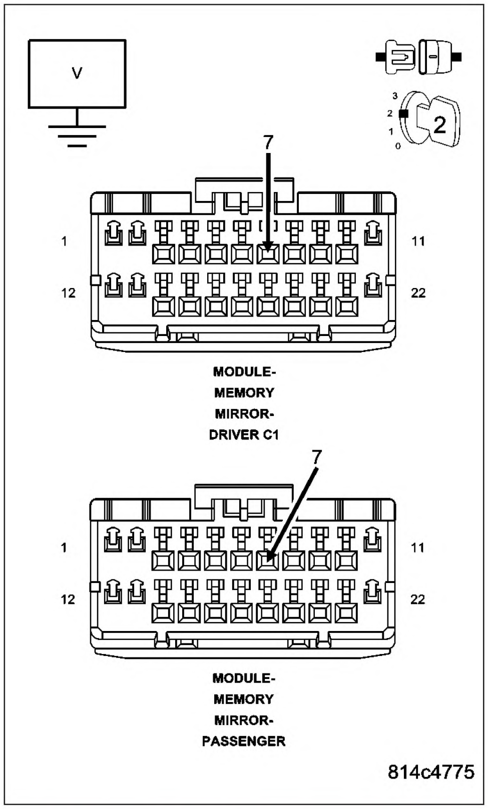
3. CHECK THE (P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT OR THE (P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Turn the ignition on.
- Measure the voltage of the (P67) Driver Mirror Vertical Position Signal circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Turn the ignition on.
- Measure the voltage of the (P64) Passenger Mirror Vertical Position Signal circuit.



Is the voltage above 0.2 volts?

Yes, Driver MMM

Repair the (P67) Driver Mirror Vertical Position Signal circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P64) Passenger Mirror Vertical Position Signal circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0D, B1D16–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

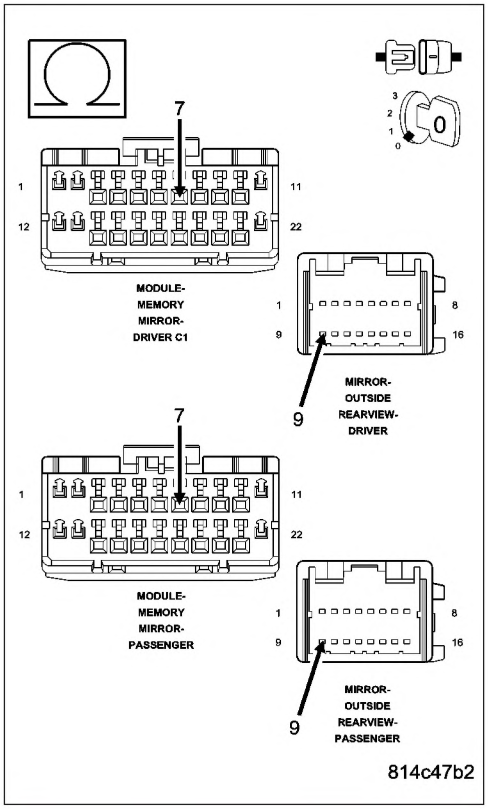
4. CHECK THE (P67) DRIVER MIRROR VERTICAL POSITION SIGNAL CIRCUIT OR THE (P64) PASSENGER MIRROR VERTICAL POSITION SIGNAL CIRCUIT FOR AN OPEN

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance of the (P67) Driver Mirror Vertical Position Signal circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance of the (P64) Passenger Mirror Vertical Position Signal circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.


3
2
1
0
7
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
8
9
16
9
MIRROR-OUTSIDE REARVIEW-DRIVER
7
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
9
MIRROR-OUTSIDE REARVIEW-PASSENGER

814c47b2

Is the resistance below 2.0 ohms?

Yes >> Go To 5

No, Driver MMM

Repair the (P67) Driver Mirror Vertical Position Signal circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

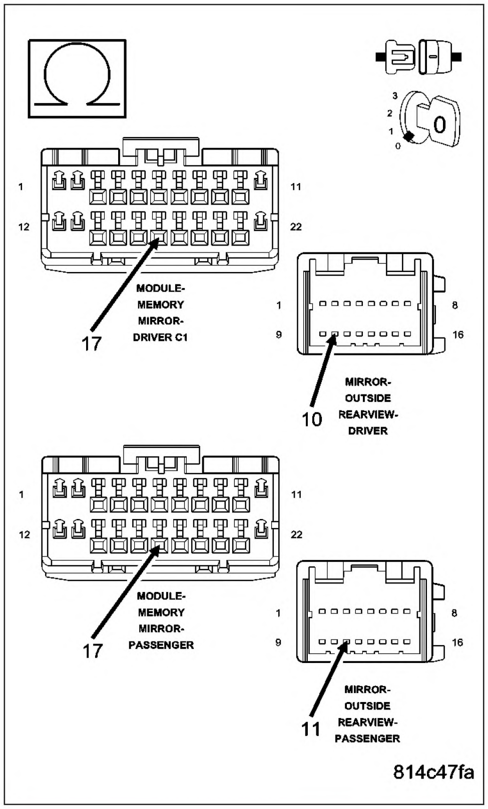
No, Passenger MMM

Repair the (P64) Passenger Mirror Vertical Position Signal circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0D, B1D16–MIRROR VERTICAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT FOR AN OPEN


3
2
1
0
1
11
12
22
MODULE-
MEMORY
MIRROR-
DRIVER C1
17
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
10
1
11
12
22
MODULE-
MEMORY
MIRROR-
PASSENGER
17
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
11
814c47fa

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance of the (P69) Driver Mirror Sensor Ground circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance of the (P66) Passenger Mirror Sensor Ground circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.

Is the resistance below 2.0 ohms?

Yes, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Repair the (P69) Driver Mirror Sensor Ground circuit for an open.

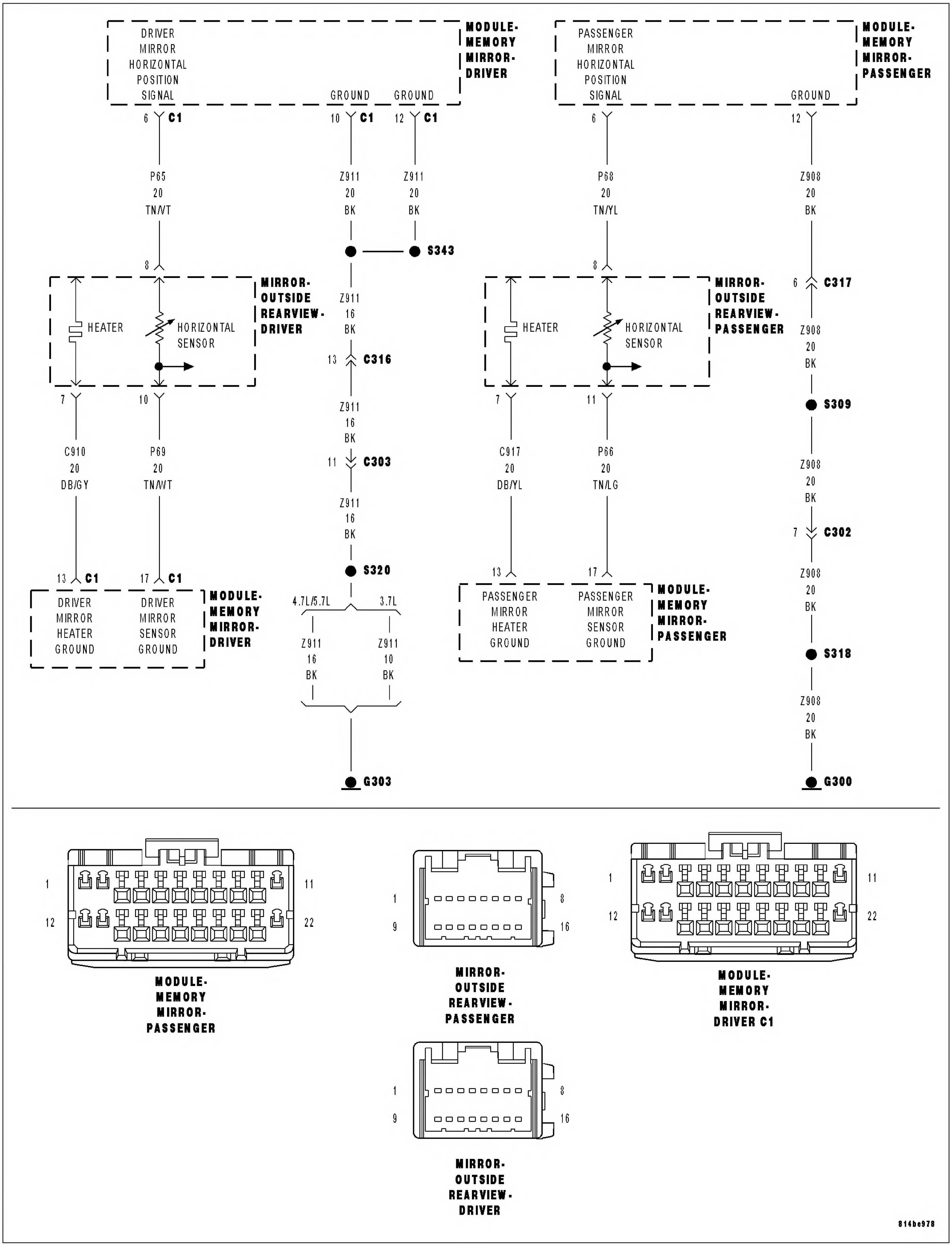
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Repair the (P66) Passenger Mirror Sensor Ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0F, B1D18–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE


DRIVER MIRROR HORIZONTAL POSITION SIGNAL
GROUND
GROUND
MODULE-MEMORY MIRROR-DRIVER
6 C1
10 C1
12 C1
P65 20 TN/VT
Z911 20 BK
Z911 20 BK
S343
PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
GROUND
MODULE-MEMORY MIRROR-PASSENGER
6
12
P68 20 TN/YL
Z908 20 BK
8
HEATER
HORIZONTAL SENSOR
MIRROR-OUTSIDE REARVIEW-DRIVER
Z911 16 BK
13 C316
7
10
Z911 16 BK
11 C303
C910 20 DB/GY
P69 20 TN/WT
Z911 16 BK
S320
13 C1
17 C1
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-DRIVER
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
8
HEATER
HORIZONTAL SENSOR
MIRROR-OUTSIDE REARVIEW-PASSENGER
6 C317
Z908 20 BK
S309
7
11
C917 20 DB/YL
P66 20 TN/LG
Z908 20 BK
7 C302
Z908 20 BK
13
17
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-PASSENGER
S318
Z908 20 BK
G300
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814be978

B1D0F, B1D18–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The (P65) Driver Mirror Horizontal Position Signal circuit supplies input to the Driver Memory Mirror Module. DTC B1D0F will set if the input value is less than the known good (stored) value for more than 60 ms.
  The (P68) Passenger Mirror Horizontal Position Signal circuit supplies input to the Passenger Memory Mirror Module. DTC B1D18 will set if the input value is less than the known good (stored) value for more than 60 ms.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT
(P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO (C910) DRIVER MIRROR HEATER GROUND CIRCUIT
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO (Z908) GROUND CIRCUIT
(P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT
(P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

B1D0F, B1D18–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D0F or B1D18 MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

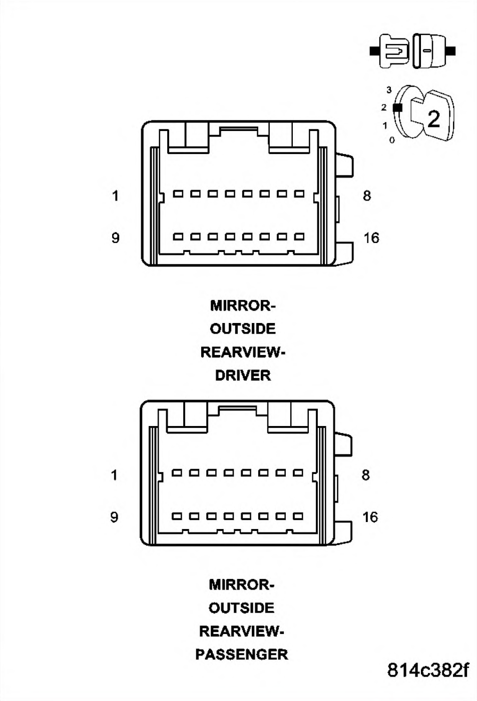
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D0F or B1D18 MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D0F, B1D18–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

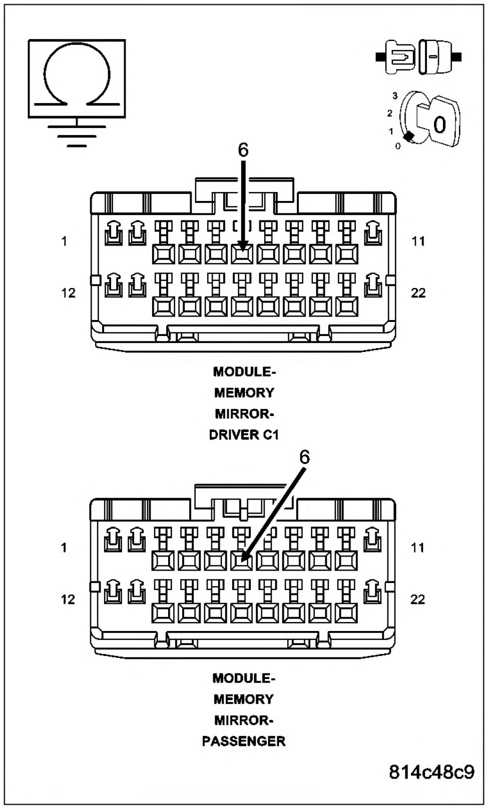
3. CHECK THE (P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT OR THE (P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO GROUND

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance between ground and the (P65) Driver Mirror Horizontal Position Signal circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance between ground and the (P68) Passenger Mirror Horizontal Position Signal circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P65) Driver Mirror Horizontal Position Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

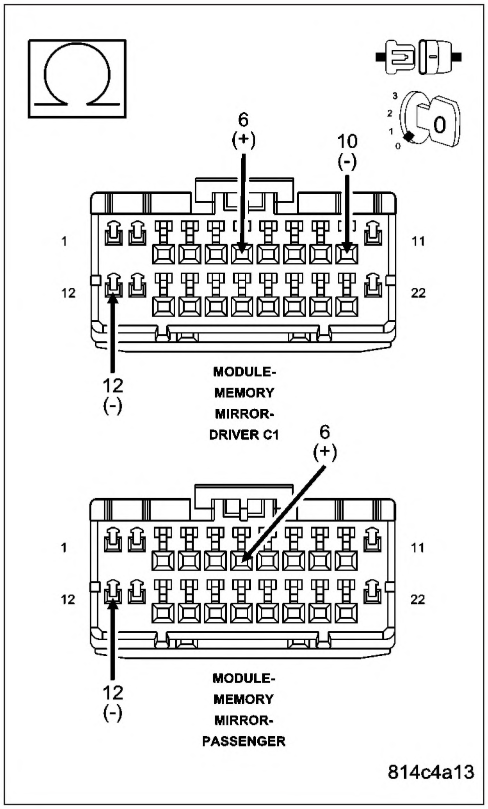
Repair the (P68) Passenger Mirror Horizontal Position Signal circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D0F, B1D18–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

4. CHECK THE (P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT OR THE (P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (Z908) GROUND CIRCUIT



For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P65) Driver Mirror Horizontal Position Signal circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P68) Passenger Mirror Horizontal Position Signal circuit and the (Z908) Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P65) Driver Mirror Horizontal Position Signal circuit for a short to the (Z911) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P68) Passenger Mirror Horizontal Position Signal circuit for a short to the (Z908) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

B1D0F, B1D18–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

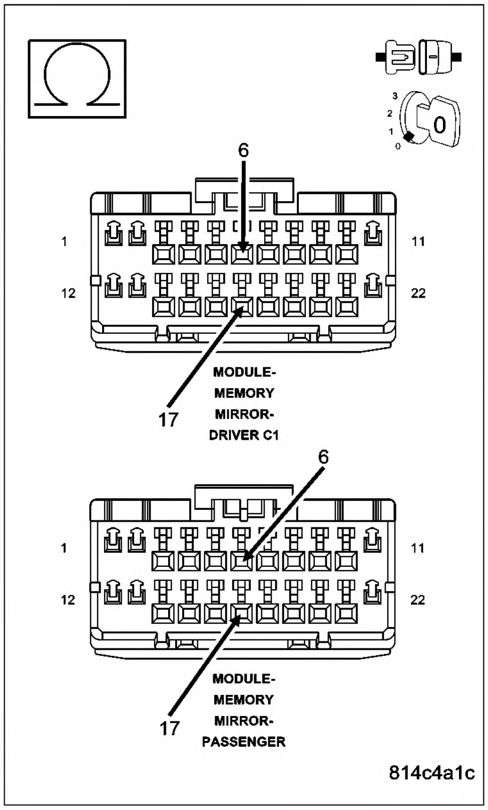
5. CHECK THE (P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR THE (P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P65) Driver Mirror Horizontal Position Signal circuit and the (P69) Driver Mirror Sensor Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P68) Passenger Mirror Horizontal Position Signal circuit and the (P66) Passenger Mirror Sensor Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P65) Driver Mirror Horizontal Position Signal circuit for a short to the (P69) Driver Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P68) Passenger Mirror Horizontal Position Signal circuit for a short to the (P66) Passenger Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1D0F, B1D18–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

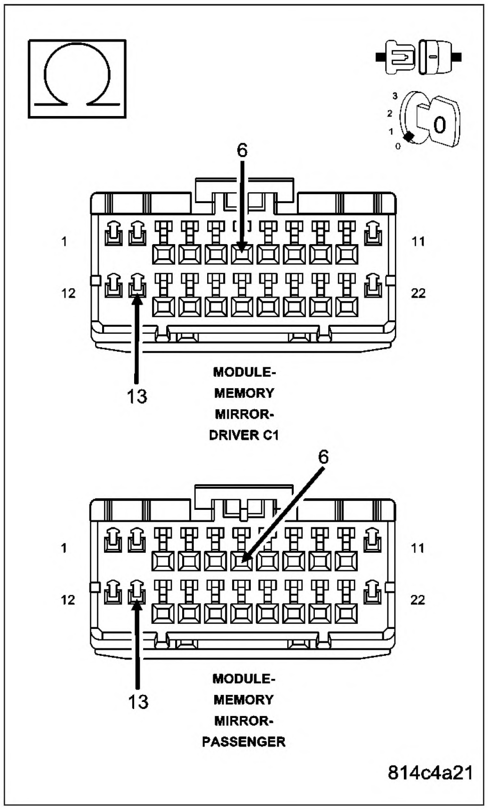
6. CHECK THE (P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P65) Driver Mirror Horizontal Position Signal circuit and the (C910) Driver Mirror Heater Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P68) Passenger Mirror Horizontal Position Signal circuit and the (C917) Passenger Mirror Heater Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P65) Driver Mirror Horizontal Position Signal circuit for a short to the (C910) Driver Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P68) Passenger Mirror Horizontal Position Signal circuit for a short to the (C917) Passenger Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

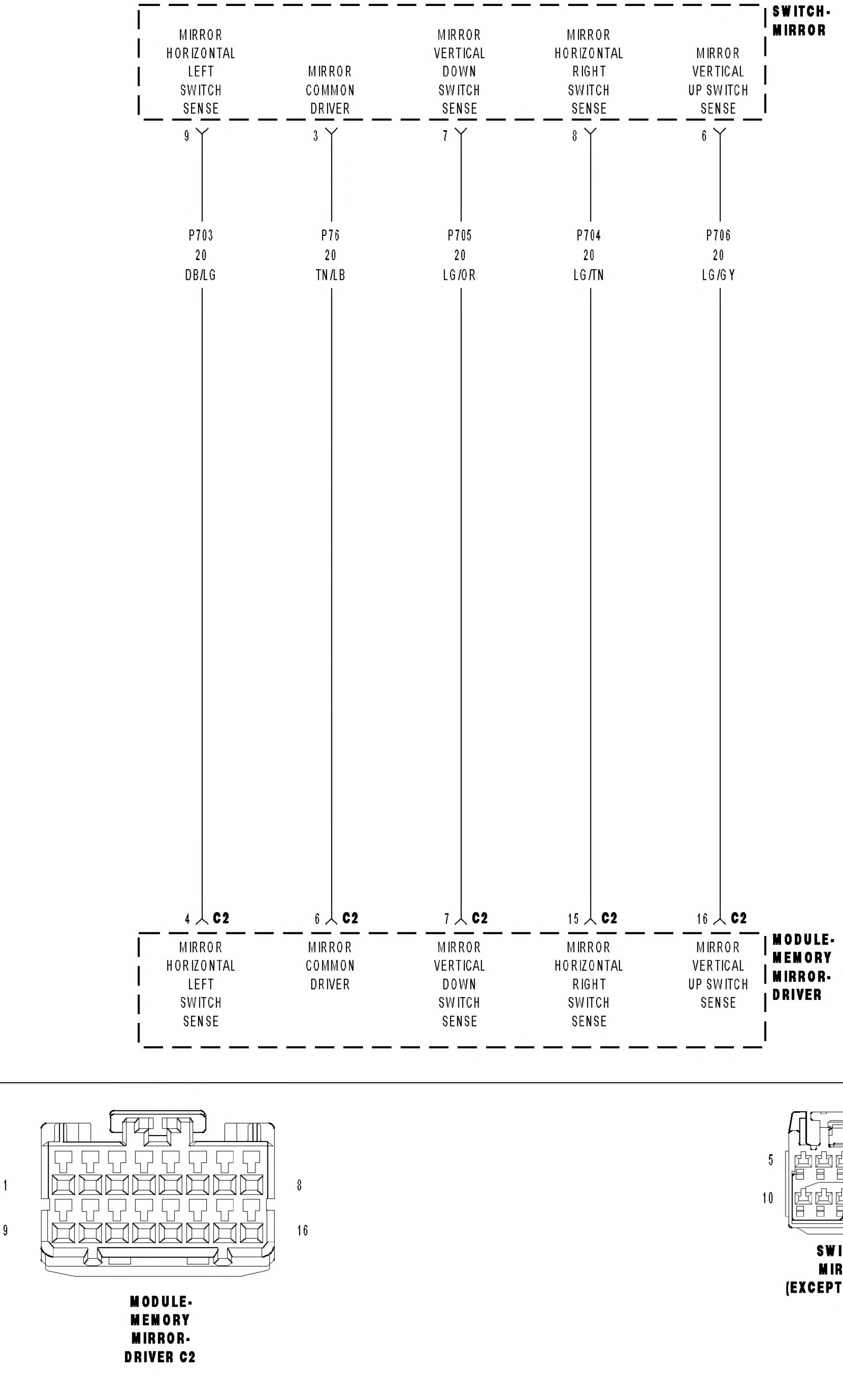
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE


SWITCH-MIRROR
MIRROR HORIZONTAL LEFT SWITCH SENSE
MIRROR COMMON DRIVER
MIRROR VERTICAL DOWN SWITCH SENSE
MIRROR HORIZONTAL RIGHT SWITCH SENSE
MIRROR VERTICAL UP SWITCH SENSE
9
3
7
8
6
P703 20 DB/LG
P76 20 TN/LB
P705 20 LG/OR
P704 20 LG/TN
P706 20 LG/GY
4 C2
6 C2
7 C2
15 C2
16 C2
MODULE-MEMORY MIRROR-DRIVER
MIRROR HORIZONTAL LEFT SWITCH SENSE
MIRROR COMMON DRIVER
MIRROR VERTICAL DOWN SWITCH SENSE
MIRROR HORIZONTAL RIGHT SWITCH SENSE
MIRROR VERTICAL UP SWITCH SENSE
1
8
9
16
MODULE-MEMORY MIRROR-DRIVER C2
5
1
10
6
SWITCH-MIRROR (EXCEPT EXPORT)
814bf410

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When mirror operation is requested.
- **Set Condition:**
  If he Driver Memory Mirror Module senses an open or a short to ground for more than 100 ms on the (P703) Mirror Horizontal Left Switch Sense circuit, the (P76) Mirror Common Driver circuit, the (P705) Mirror Vertical Down Switch Sense circuit, the (P704) Mirror Horizontal Right Switch Sense circuit, or the (P706) Mirror Vertical Up Switch Sense circuit after receiving a request for mirror movement from the switch.

Possible Causes
(P703) MIRROR HORIZONTAL LEFT SWITCH SENSE CIRCUIT OPEN
(P703) MIRROR HORIZONTAL LEFT SWITCH SENSE CIRCUIT SHORTED TO GROUND
(P703) MIRROR HORIZONTAL LEFT SWITCH SENSE CIRCUIT SHORTED TO ANOTHER MIRROR CIRCUIT
(P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT OPEN
(P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT SHORTED TO GROUND
(P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT SHORTED TO ANOTHER MIRROR CIRCUIT
(P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT OPEN
(P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT SHORTED TO GROUND
(P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT SHORTED TO ANOTHER MIRROR CIRCUIT
(P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT OPEN
(P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT SHORTED TO GROUND
(P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT SHORTED TO ANOTHER MIRROR CIRCUIT
(P76) MIRROR COMMON SWITCH SENSE CIRCUIT OPEN
(P76) MIRROR COMMON SWITCH SENSE CIRCUIT SHORTED TO GROUND
(P76) MIRROR COMMON SWITCH SENSE CIRCUIT SHORTED TO ANOTHER MIRROR CIRCUIT
MIRROR SWITCH
DRIVER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Press the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D04 MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. If the conditions returns, replace the switch.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

2. TEST THE MIRROR SWITCH

Turn the ignition off.

Remove the Mirror Switch in accordance with the Service Information.

Disconnect the Mirror Switch connector.

Test the Mirror Switch in all positions in accordance with the Service information. (Refer to 8 - ELECTRICAL/POWER MIRRORS/POWER MIRROR SWITCH - DIAGNOSIS AND TESTING).

Does the switch pass the test in all positions?

Yes >> Go To 3

No >> Replace the Mirror Switch in accordance with the Service information.

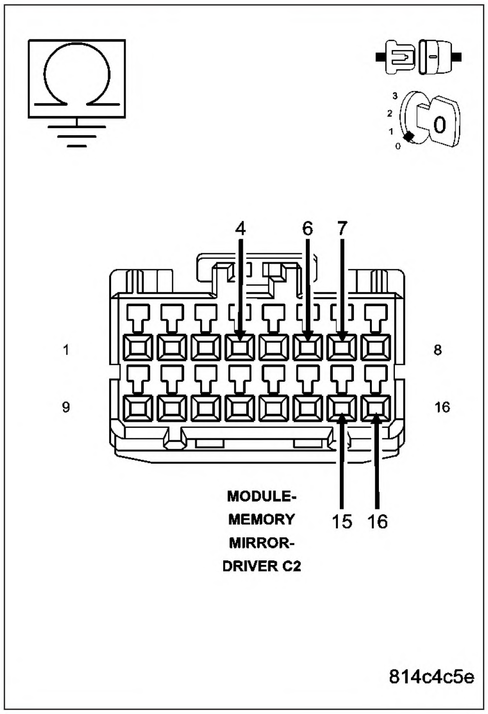
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. CHECK THE (P703) MIRROR HORIZONTAL LEFT SWITCH SENSE CIRCUIT, THE (P76) MIRROR COMMON DRIVER CIRCUIT, THE (P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT, THE (P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT, & THE (P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT FOR A SHORT TO GROUND

Disconnect the Driver Memory Mirror Module C2 connector.

Measure the resistance between ground and the (P703) Mirror Horizontal Left Switch Sense circuit, the (P76) Mirror Common Driver circuit, the (P705) Mirror Vertical Down Switch Sense circuit, the (P704) Mirror Horizontal Right Switch Sense circuit, and the (P706) Mirror Vertical Up Switch Sense circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10000.0 ohms for a short to ground.

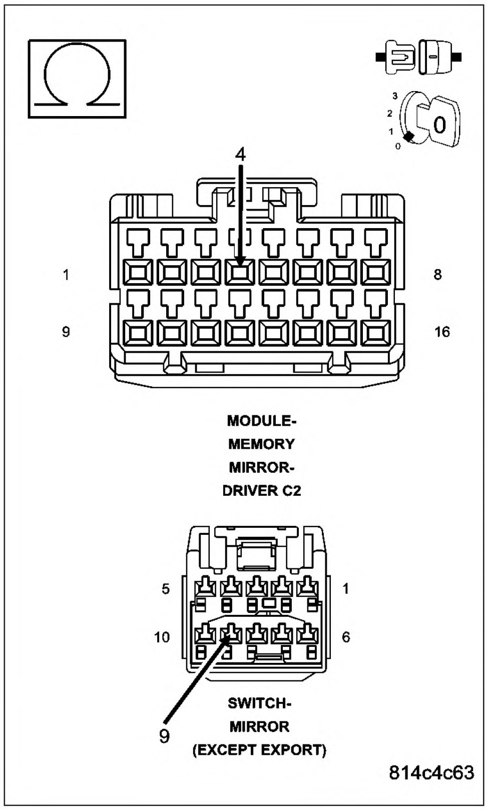
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

4. CHECK THE (P703) MIRROR HORIZONTAL LEFT SWITCH SENSE CIRCUIT FOR AN OPEN

Measure the resistance of the (P703) Mirror Horizontal Left Switch Sense circuit between the Driver Memory Mirror Module C2 connector and the Mirror Switch connector.


Ω
3
2
1
0
0
4
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
5
1
10
6
9
SWITCH-
MIRROR
(EXCEPT EXPORT)
814c4c63

Is the resistance below 2.0 ohms?

Yes >> Go To 5

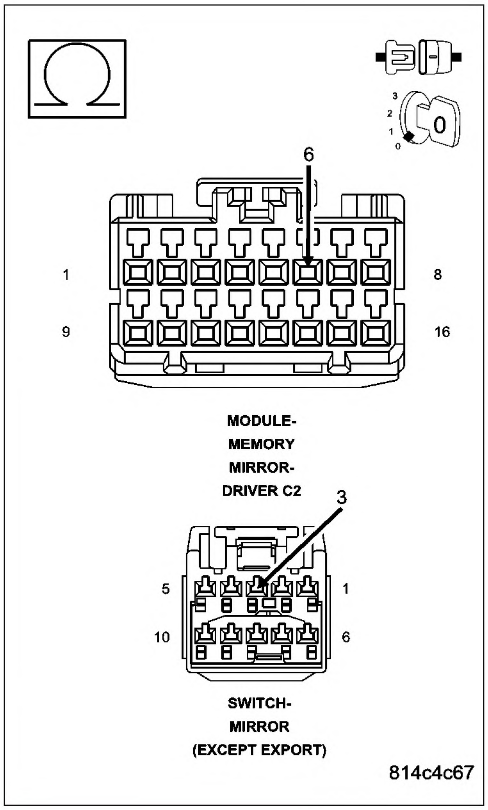
No >> Repair the (P703) Mirror Horizontal Left Switch Sense circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (P76) MIRROR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (P76) Mirror Common Driver circuit between the Driver Memory Mirror Module C2 connector and the Mirror Switch connector.


6
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
3
5
1
10
6
SWITCH-
MIRROR
(EXCEPT EXPORT)
814c4c67

Is the resistance below 2.0 ohms?

Yes >> Go To 6

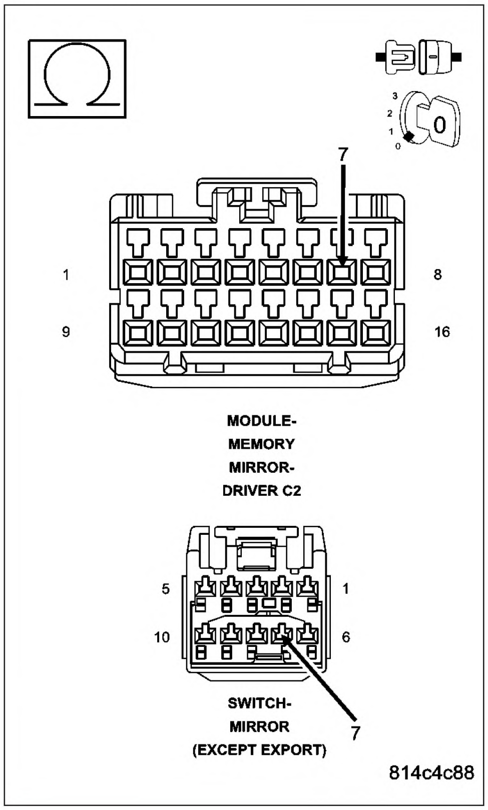
No >> Repair the (P76) Mirror Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

6. CHECK THE (P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT FOR AN OPEN

Measure the resistance of the (P705) Mirror Vertical Down Switch Sense circuit between the Driver Memory Mirror Module C2 connector and the Mirror Switch connector.


7
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
5
1
10
6
SWITCH-
MIRROR
(EXCEPT EXPORT)
7
814c4c88

Is the resistance below 2.0 ohms?

Yes >> Go To 7

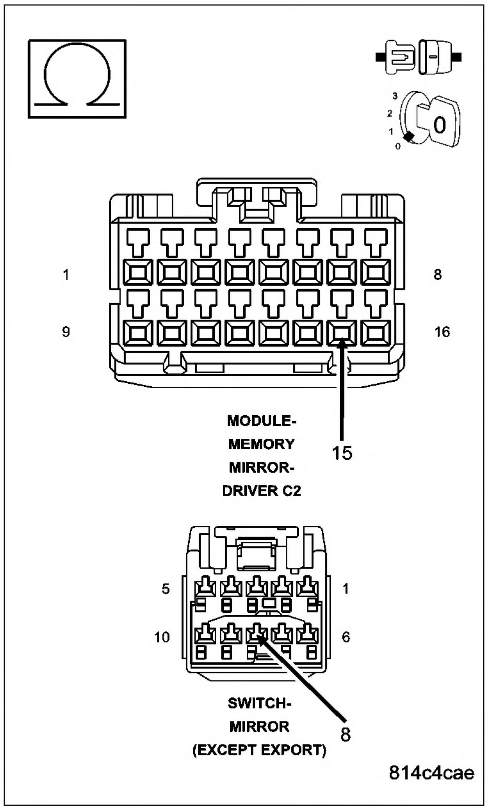
No >> Repair the (P705) Mirror Vertical Down Switch Sense circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

7. CHECK THE (P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT FOR AN OPEN

Measure the resistance of the (P704) Mirror Horizontal Right Switch Sense circuit between the Driver Memory Mirror Module C2 connector and the Mirror Switch connector.


3
2
1
0
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
15
5
1
10
6
SWITCH-
MIRROR
(EXCEPT EXPORT)
8
814c4cae

Is the resistance below 2.0 ohms?

Yes >> Go To 8

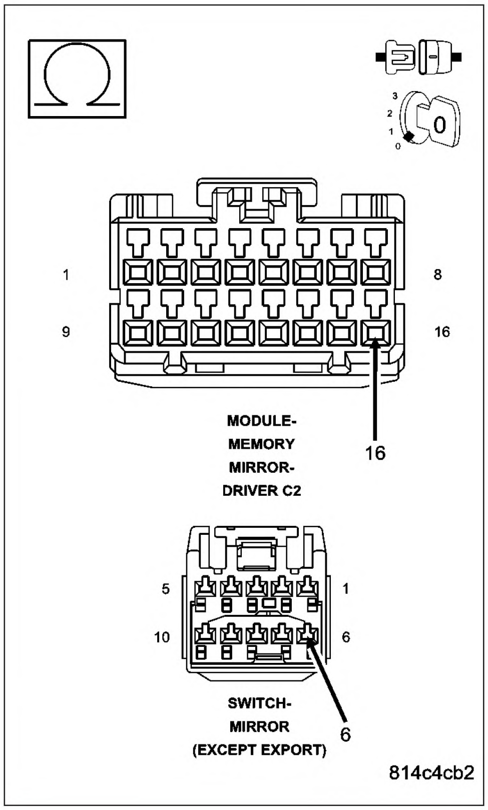
No >> Repair the (P704) Mirror Horizontal Right Switch Sense circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

8. CHECK THE (P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT FOR AN OPEN

Measure the resistance of the (P706) Mirror Vertical Up Switch Sense circuit between the Driver Memory Mirror Module C2 connector and the Mirror Switch connector.


3
2
1
0
0
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C2
16
5
1
10
6
SWITCH-
MIRROR
(EXCEPT EXPORT)
6
814c4cb2

Is the resistance below 2.0 ohms?

Yes >> Go To 9

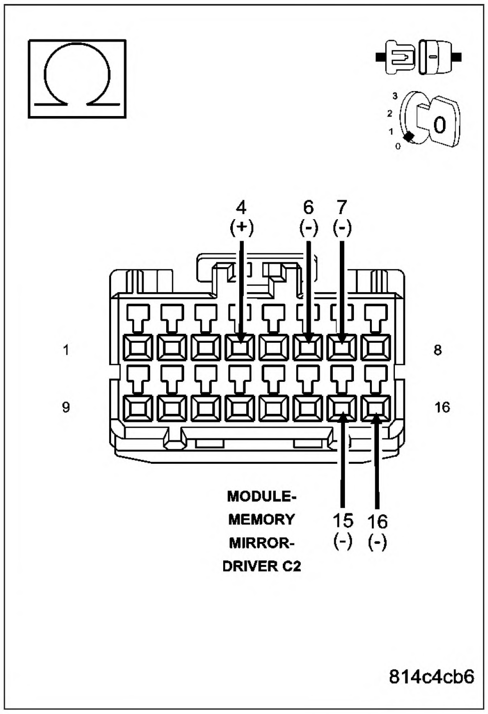
No >> Repair the (P706) Mirror Vertical Up Switch Sense circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

9. CHECK THE (P703) MIRROR HORIZONTAL LEFT SWITCH SENSE CIRCUIT FOR A SHORT TO THE (P76) MIRROR COMMON DRIVER CIRCUIT, THE (P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT, THE (P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT, & THE (P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT

Measure the resistance between the (P703) Mirror Horizontal Left Switch Sense circuit and the (P76) Mirror Common Driver circuit, the (P705) Mirror Vertical Down Switch Sense circuit, the (P704) Mirror Horizontal Right Switch Sense circuit, and the (P706) Mirror Vertical Up Switch Sense circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10000.0 ohms for a short to the (P703) Mirror Horizontal Left Switch Sense circuit.

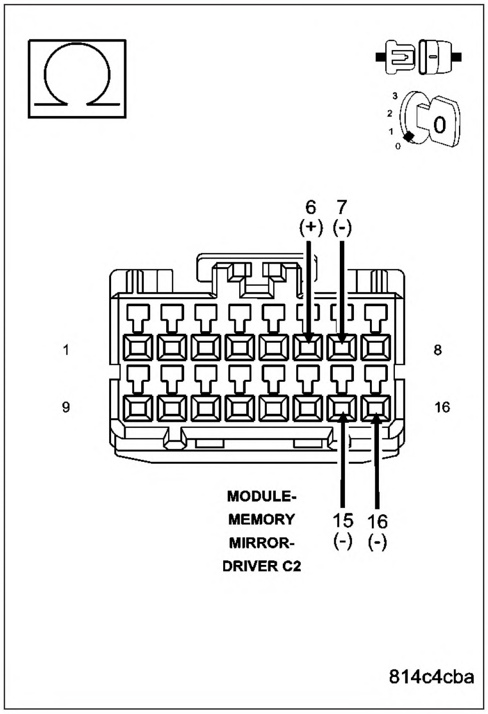
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 10

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

10. CHECK THE (P76) MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT, THE (P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT, & THE (P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT

Measure the resistance between the (P76) Mirror Common Driver circuit and the (P705) Mirror Vertical Down Switch Sense circuit, the (P704) Mirror Horizontal Right Switch Sense circuit, and the (P706) Mirror Vertical Up Switch Sense circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10000.0 ohms for a short to the (P76) Mirror Common Driver circuit.

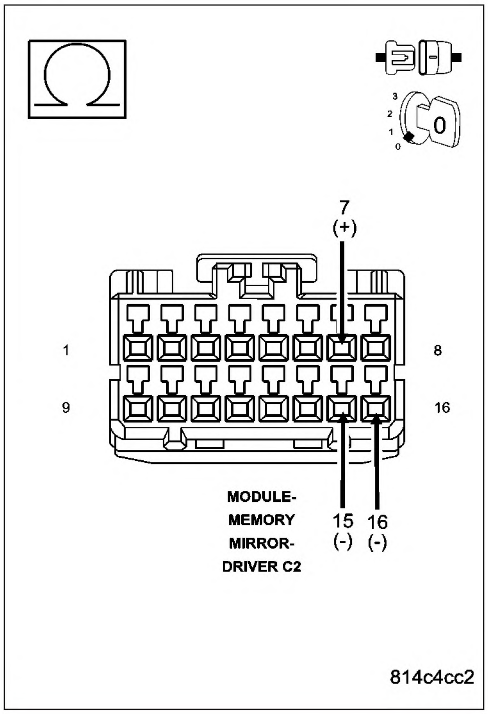
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 11

---

11. CHECK THE (P705) MIRROR VERTICAL DOWN SWITCH SENSE CIRCUIT FOR A SHORT TO THE (P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT, & THE (P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT

Measure the resistance between the (P705) Mirror Vertical Down Switch Sense circuit and the (P704) Mirror Horizontal Right Switch Sense circuit, and the (P706) Mirror Vertical Up Switch Sense circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10000.0 ohms for a short to the (P705) Mirror Vertical Down Switch Sense circuit.

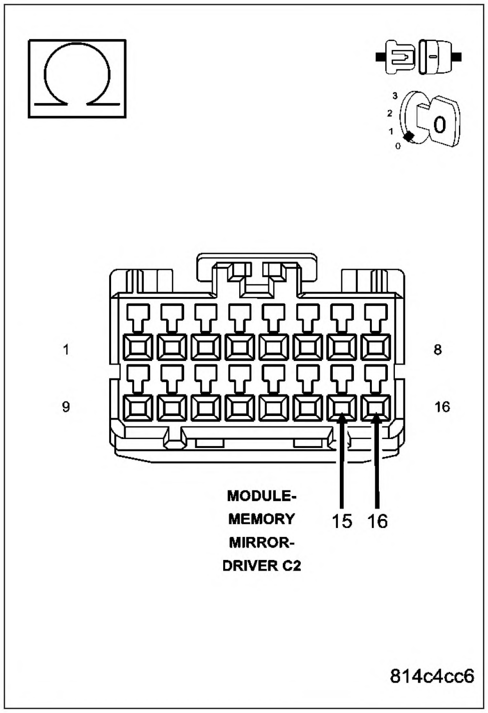
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 12

B1D04–MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE – DRIVER MEMORY MIRROR MODULE (CONTINUED)

12. CHECK THE (P704) MIRROR HORIZONTAL RIGHT SWITCH SENSE CIRCUIT FOR A SHORT TO THE (P706) MIRROR VERTICAL UP SWITCH SENSE CIRCUIT

Measure the resistance between the (P704) Mirror Horizontal Right Switch Sense circuit and the (P706) Mirror Vertical Up Switch Sense circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms?

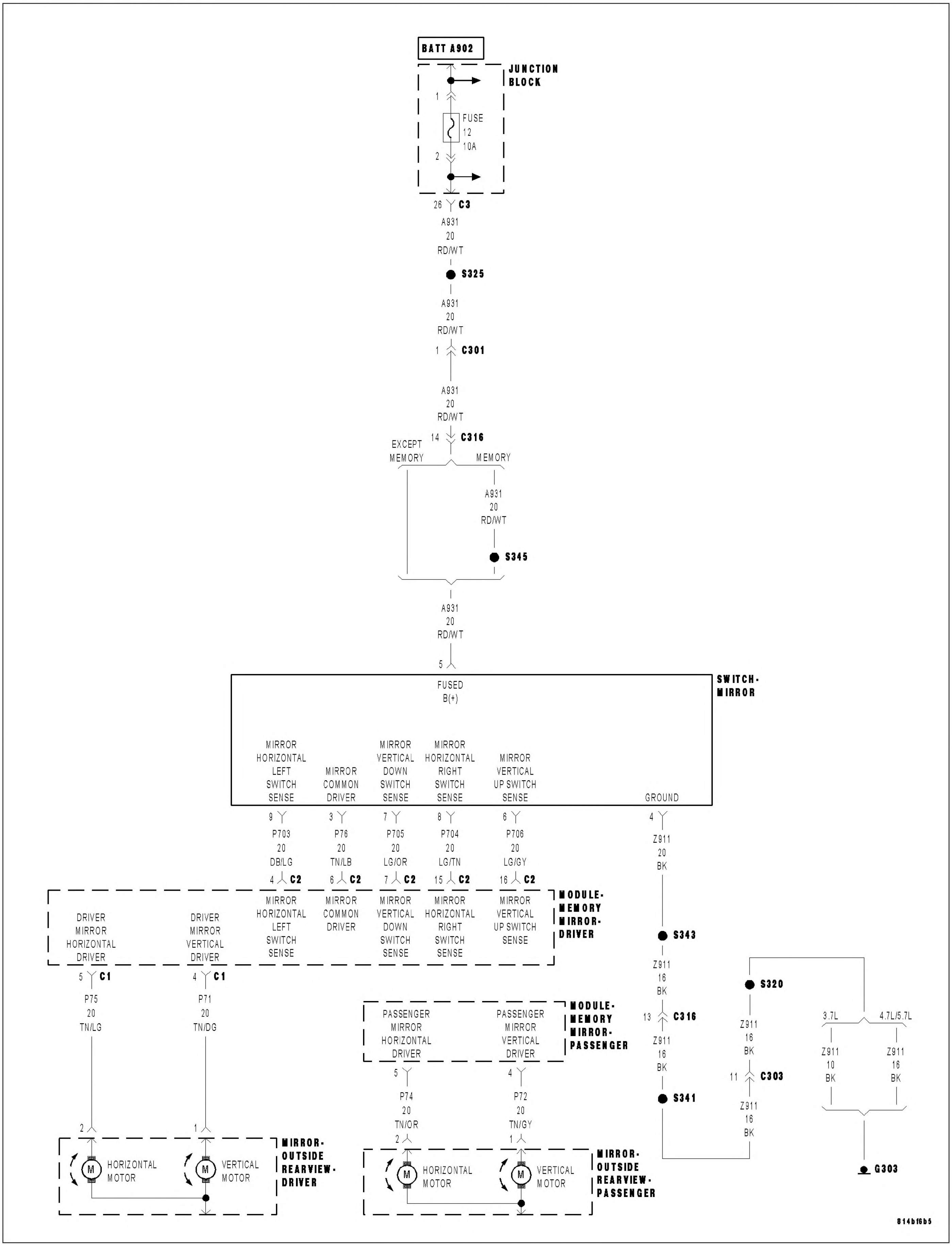
Yes >> Repair the (P704) Mirror Horizontal Right Switch Sense circuit for a short to the (P706) Mirror Vertical Up Switch Sense circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D07–MIRROR ADJUST SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE


BATT A902
JUNCTION BLOCK
1
FUSE 12 10A
2
26 C3
A931 20 RD/WT
S325
A931 20 RD/WT
1 C301
A931 20 RD/WT
14 C316
EXCEPT MEMORY
MEMORY
A931 20 RD/WT
S345
A931 20 RD/WT
5
FUSED B(+)
SWITCH-MIRROR
MIRROR HORIZONTAL LEFT SWITCH SENSE
MIRROR COMMON DRIVER
MIRROR VERTICAL DOWN SWITCH SENSE
MIRROR HORIZONTAL RIGHT SWITCH SENSE
MIRROR VERTICAL UP SWITCH SENSE
GROUND
9 P703 20 DB/LG 4 C2
3 P76 20 TN/LB 6 C2
7 P705 20 LG/OR 7 C2
8 P704 20 LG/TN 15 C2
6 P706 20 LG/GY 16 C2
4 Z911 20 BK
MODULE-MEMORY MIRROR-DRIVER
DRIVER MIRROR HORIZONTAL DRIVER
DRIVER MIRROR VERTICAL DRIVER
MIRROR HORIZONTAL LEFT SWITCH SENSE
MIRROR COMMON DRIVER
MIRROR VERTICAL DOWN SWITCH SENSE
MIRROR HORIZONTAL RIGHT SWITCH SENSE
MIRROR VERTICAL UP SWITCH SENSE
S343
Z911 16 BK
13 C316
Z911 16 BK
S341
S320
Z911 16 BK
11 C303
Z911 16 BK
3.7L
4.7L/5.7L
Z911 10 BK
Z911 16 BK
G303
5 C1 P75 20 TN/LG
4 C1 P71 20 TN/DG
MODULE-MEMORY MIRROR-PASSENGER
PASSENGER MIRROR HORIZONTAL DRIVER
PASSENGER MIRROR VERTICAL DRIVER
5 P74 20 TN/OR 2
4 P72 20 TN/GY 1
2
1
M HORIZONTAL MOTOR
M VERTICAL MOTOR
MIRROR-OUTSIDE REARVIEW-DRIVER
M HORIZONTAL MOTOR
M VERTICAL MOTOR
MIRROR-OUTSIDE REARVIEW-PASSENGER
814bf6b5

B1D07–MIRROR ADJUST SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When mirror operation is requested.
- **Set Condition:**
  If the Driver Memory Mirror Module detects that the Mirror Switch is stuck in the same position for more than 30 seconds.

Possible Causes
MIRROR SWITCH
DRIVER MEMORY MIRROR MODULE

Diagnostic Test

1. VERIFY IF DTC B1D04 MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE IS ACTIVE

Turn the ignition on.

With the scan tool, record and erase DTCs.

Press the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D04 MIRROR ADJUST SWITCH INPUT CIRCUIT/PERFORMANCE?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents in this section for a complete list of Power Mirror System DTCs.

No >> Go To 2

---

2. TEST THE MIRROR SWITCH

Turn the ignition off.

Remove the Mirror Switch in accordance with the Service Information.

Disconnect the Mirror Switch connector.

Test the Mirror Switch in all positions in accordance with the Service information. (Refer to 8 - ELECTRICAL/POWER MIRRORS/POWER MIRROR SWITCH - DIAGNOSIS AND TESTING).

Does the switch pass the test in all positions?

Yes >> Go To 3

No >> Replace the Mirror Switch in accordance with the Service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D07–MIRROR ADJUST SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

3. VERIFY THAT DTC B1D07 MIRROR ADJUST SWITCH INPUT CIRCUIT STUCK IS STILL ACTIVE

Turn the ignition off.

Reconnect the Mirror Switch connector.

Reinstall the Mirror Switch in accordance with the Service Information.

Turn the ignition on.

With the scan tool, erase DTCs.

Press the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D07 MIRROR ADJUST SWITCH INPUT CIRCUIT STUCK?

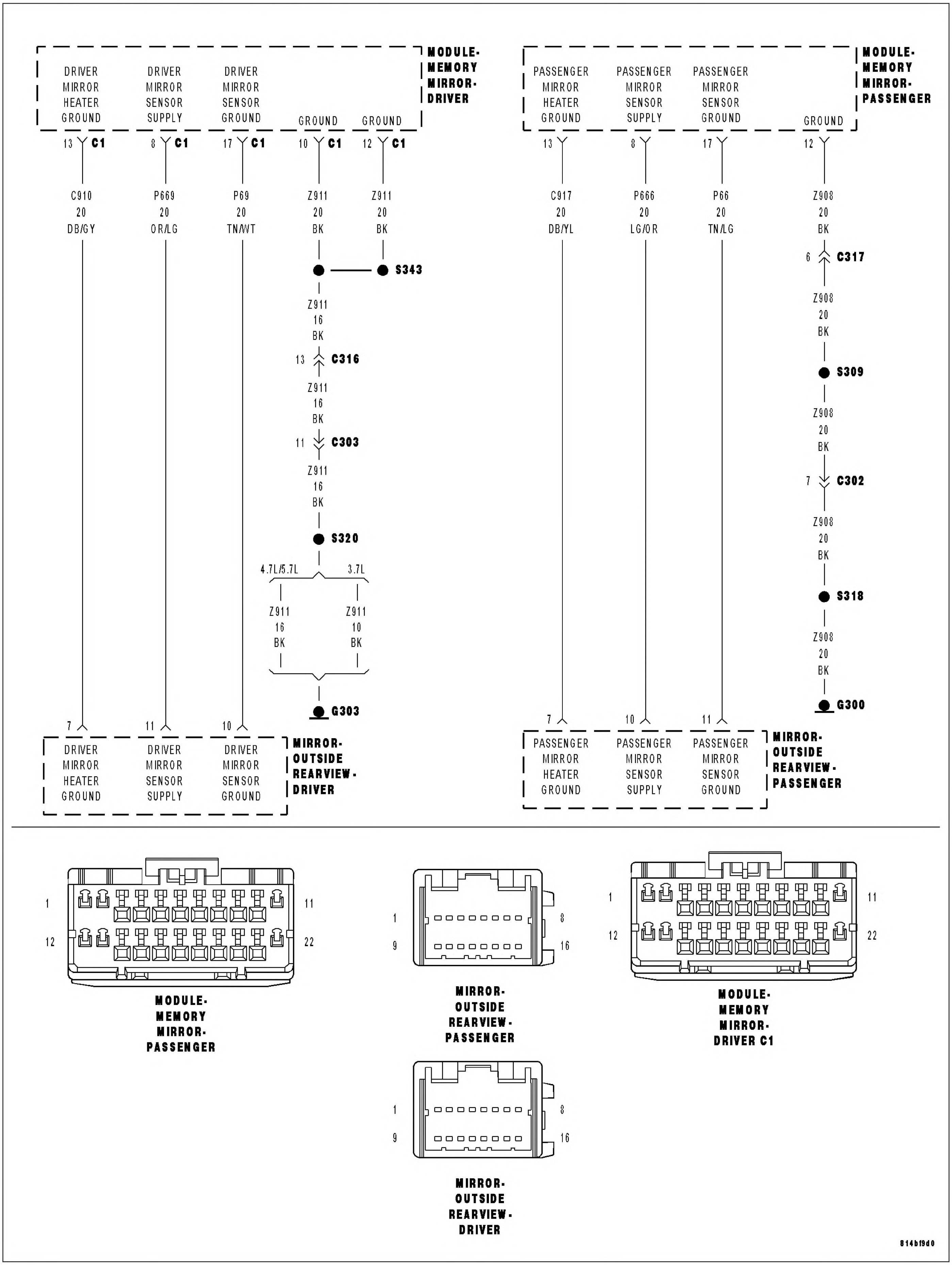
Yes >> Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. If the conditions returns, replace the switch.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D09, B1D12–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW – MEMORY MIRROR MODULE


MODULE-MEMORY MIRROR-DRIVER
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR SENSOR SUPPLY
DRIVER MIRROR SENSOR GROUND
GROUND
GROUND
13 C1
8 C1
17 C1
10 C1
12 C1
C910 20 DB/GY
P669 20 OR/LG
P69 20 TN/WT
Z911 20 BK
Z911 20 BK
S343
Z911 16 BK
13 C316
Z911 16 BK
11 C303
Z911 16 BK
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
7
11
10
MIRROR-OUTSIDE REARVIEW-DRIVER
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR SENSOR SUPPLY
DRIVER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-PASSENGER
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR SENSOR SUPPLY
PASSENGER MIRROR SENSOR GROUND
GROUND
13
8
17
12
C917 20 DB/YL
P666 20 LG/OR
P66 20 TN/LG
Z908 20 BK
6 C317
Z908 20 BK
S309
Z908 20 BK
7 C302
Z908 20 BK
S318
Z908 20 BK
G300
7
10
11
MIRROR-OUTSIDE REARVIEW-PASSENGER
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR SENSOR SUPPLY
PASSENGER MIRROR SENSOR GROUND
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814bf9d0

B1D09, B1D12–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  DTC B1D09 – If the Driver Memory Mirror Module senses voltage is less than 4.3 volts for more than 30 ms on the (P669) Driver Mirror Sensor Supply circuit.
  DTC B1D12 – If the Passenger Memory Mirror Module senses voltage is less than 4.3 volts for more than 30 ms on the (P666) Passenger Mirror Sensor Supply circuit.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO GROUND
(P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT
(P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO (C910) DRIVER MIRROR HEATER GROUND CIRCUIT
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO GROUND
(P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO THE (Z908) GROUND CIRCUIT
(P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT
(P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT SHORTED TO (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

B1D09, B1D12–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D09 or B1D12 MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

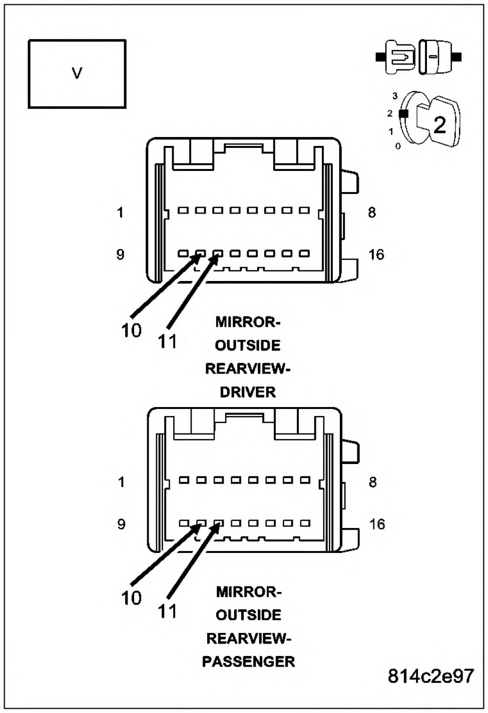
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- Measure the voltage between the (P669) Driver Mirror Sensor Supply circuit and the (P69) Driver Mirror Sensor Ground circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- Measure the voltage between the (P666) Passenger Mirror Sensor Supply circuit and the (P66) Passenger Mirror Sensor Ground circuit.



Is the voltage above 4.6 volts?

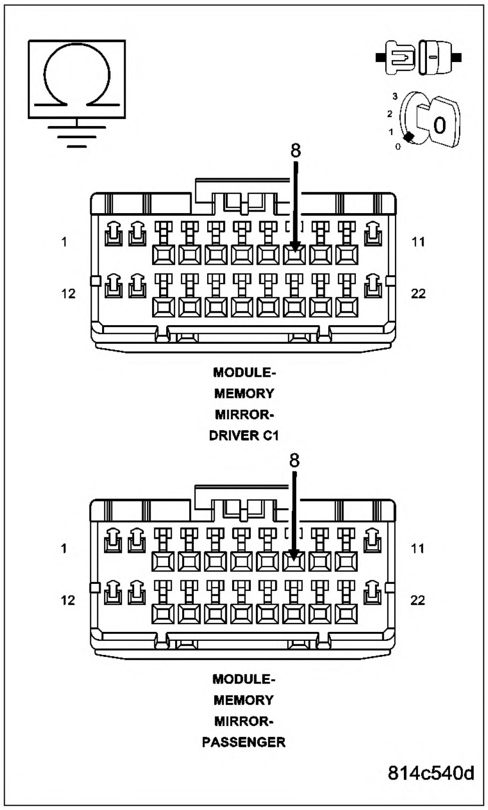
Yes >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

B1D09, B1D12–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

3. CHECK THE (P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT OR THE (P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO GROUND



For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance between ground and the (P669) Driver Mirror Sensor Supply circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance between ground and the (P666) Passenger Mirror Sensor Supply circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P669) Driver Mirror Sensor Supply circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P666) Passenger Mirror Sensor Supply circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D09, B1D12–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

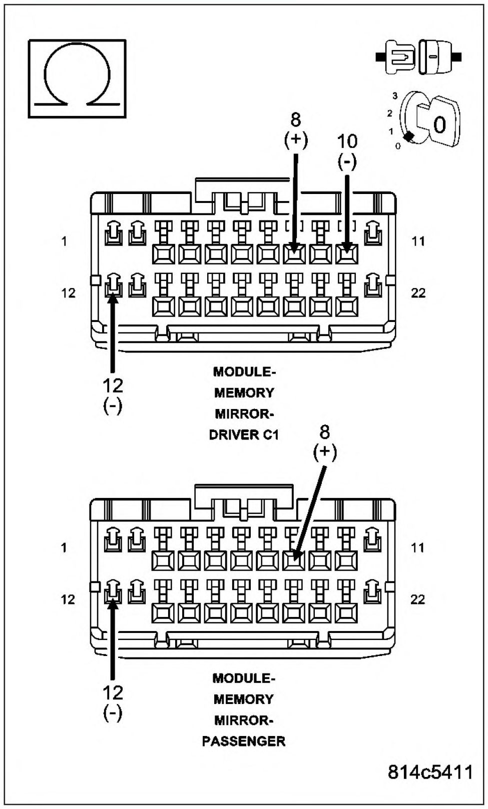
4. CHECK THE (P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT OR THE (P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO THE (Z908) GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P669) Driver Mirror Sensor Supply circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P666) Passenger Mirror Sensor Supply circuit and the (Z908) Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P669) Driver Mirror Sensor Supply circuit for a short to the (Z911) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

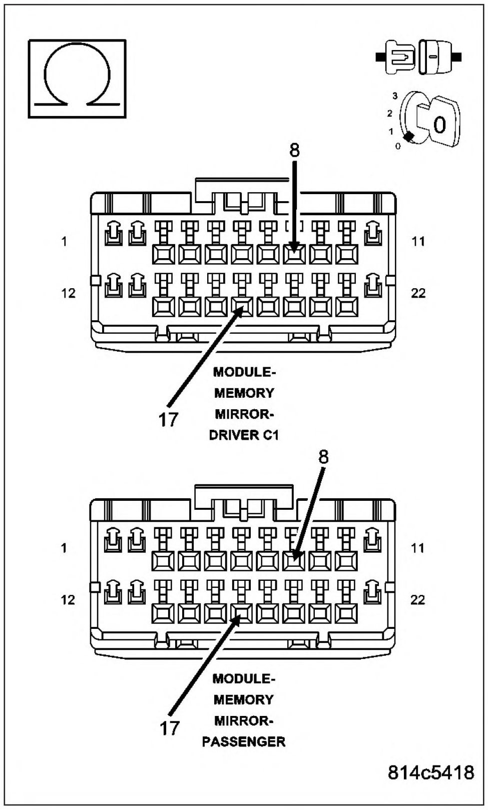
Repair the (P666) Passenger Mirror Sensor Supply circuit for a short to the (Z908) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

B1D09, B1D12–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR THE (P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO THE (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT



For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P669) Driver Mirror Sensor Supply circuit and the (P69) Driver Mirror Sensor Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P666) Passenger Mirror Sensor Supply circuit and the (P66) Passenger Mirror Sensor Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P669) Driver Mirror Sensor Supply circuit for a short to the (P69) Driver Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P666) Passenger Mirror Sensor Supply circuit for a short to the (P66) Passenger Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1D09, B1D12–MIRROR POSITION SENSOR POWER SUPPLY CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

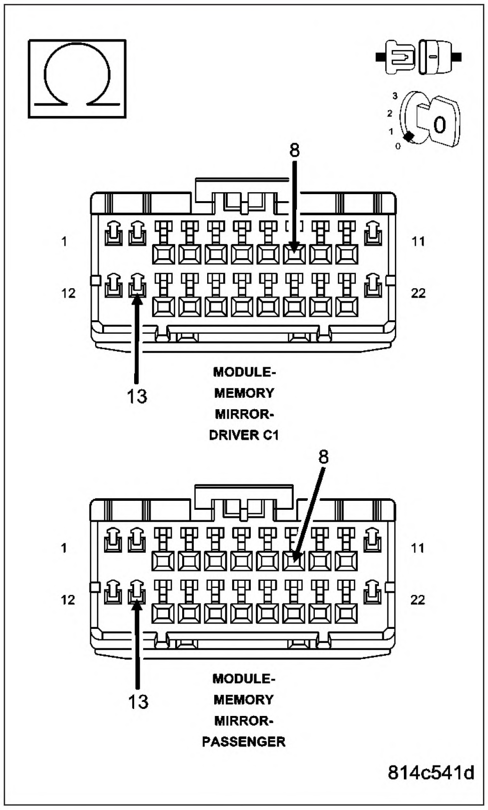
6. CHECK THE (P669) DRIVER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (P666) PASSENGER MIRROR SENSOR SUPPLY CIRCUIT FOR A SHORT TO THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P669) Driver Mirror Sensor Supply circuit and the (C910) Driver Mirror Heater Ground circuit in the Driver Memory Mirror Module connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P666) Passenger Mirror Sensor Supply circuit and the (C917) Passenger Mirror Heater Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P669) Driver Mirror Sensor Supply circuit for a short to the (C910) Driver Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P666) Passenger Mirror Sensor Supply circuit for a short to the (C917) Passenger Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

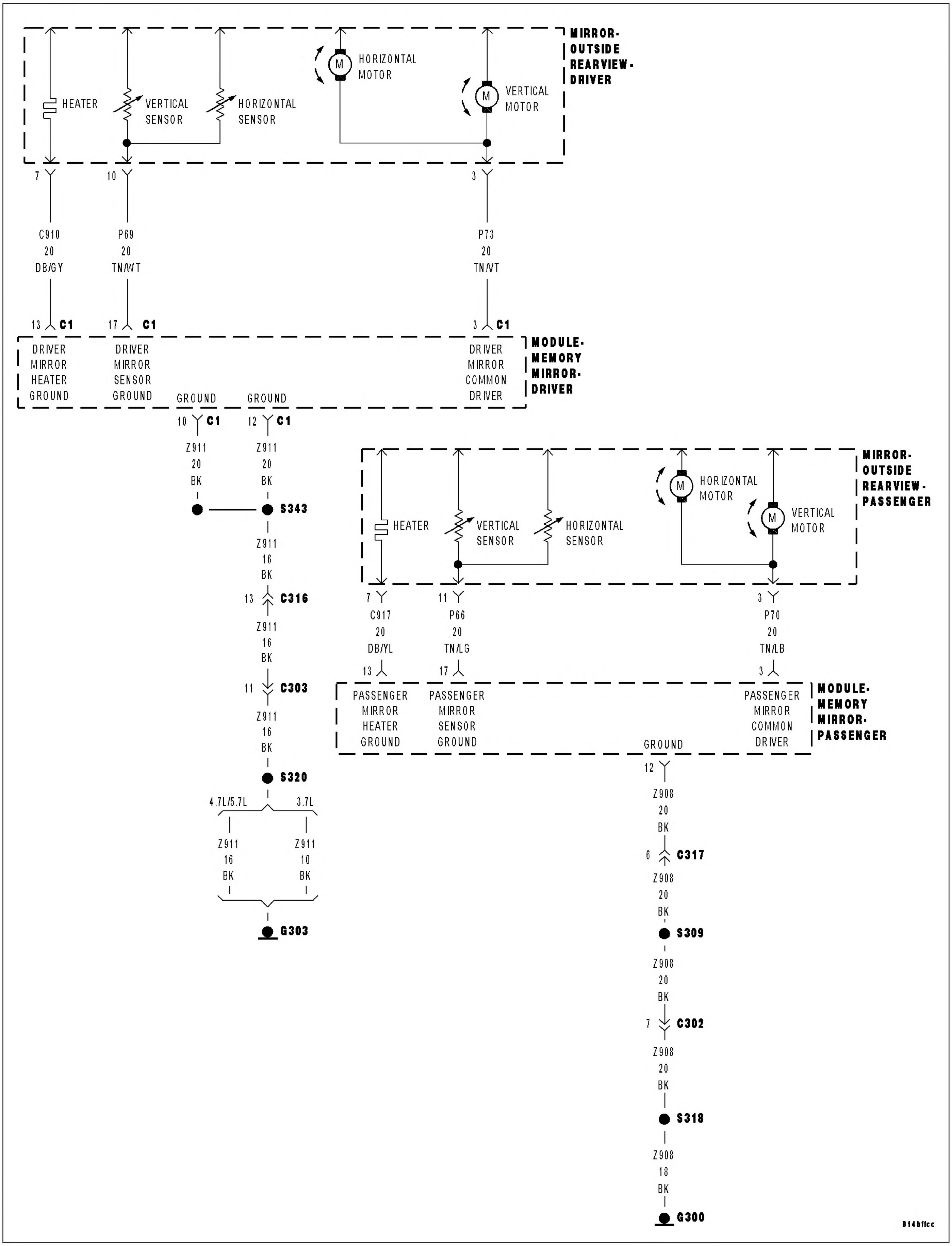
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D1B, B1D27–MIRROR MOTOR COMMON CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE


MIRROR-OUTSIDE REARVIEW-DRIVER
HEATER
VERTICAL SENSOR
HORIZONTAL SENSOR
HORIZONTAL MOTOR
VERTICAL MOTOR
M
7
10
3
C910 20 DB/GY
P69 20 TN/WT
P73 20 TN/VT
13 C1
17 C1
3 C1
MODULE-MEMORY MIRROR-DRIVER
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR SENSOR GROUND
GROUND
GROUND
DRIVER MIRROR COMMON DRIVER
10 C1
12 C1
Z911 20 BK
S343
Z911 16 BK
13 C316
11 C303
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
MIRROR-OUTSIDE REARVIEW-PASSENGER
7
11
3
C917 20 DB/YL
P66 20 TN/LG
P70 20 TN/LB
13
17
3
MODULE-MEMORY MIRROR-PASSENGER
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR SENSOR GROUND
GROUND
PASSENGER MIRROR COMMON DRIVER
12
Z908 20 BK
6 C317
S309
7 C302
S318
Z908 18 BK
G300
814bffcc

B1D1B, B1D27–MIRROR MOTOR COMMON CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Common Driver Output is turned on.
- **Set Condition:**
  DTC B1D1B – If the Driver Memory Mirror Module senses an excessive current draw on the (P73) Driver Mirror Common Driver circuit within 10 ms of turning on the Mirror Common Driver Output.
  DTC B1D27 – If the Passenger Memory Mirror Module senses an excessive current draw on the (P70) Passenger Mirror Common Driver circuit within 10 ms of turning on the Mirror Common Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P73) DRIVER MIRROR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(P73) DRIVER MIRROR COMMON DRIVER CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(P73) DRIVER MIRROR COMMON DRIVER CIRCUIT SHORTED TO (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT
(P73) DRIVER MIRROR COMMON DRIVER CIRCUIT SHORTED TO (C910) DRIVER MIRROR HEATER GROUND CIRCUIT
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT SHORTED TO (Z908) GROUND CIRCUIT
(P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT SHORTED TO (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT
(P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT SHORTED TO (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

B1D1B, B1D27–MIRROR MOTOR COMMON CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D1B or B1D27 MIRROR MOTOR COMMON CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

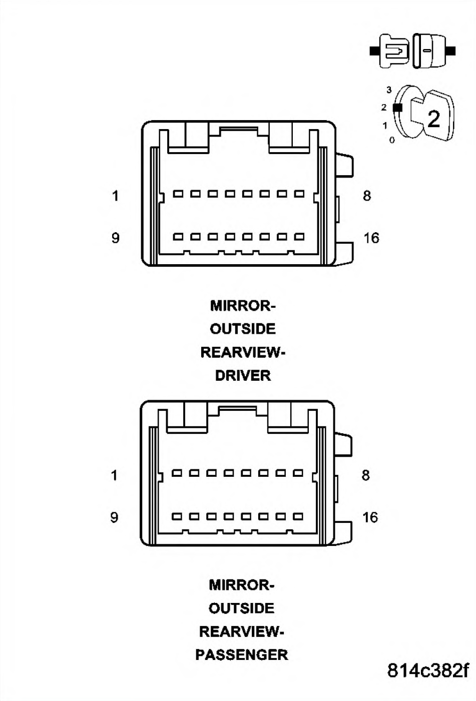
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D1B or B1D27 MIRROR MOTOR COMMON CONTROL CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D1B, B1D27–MIRROR MOTOR COMMON CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

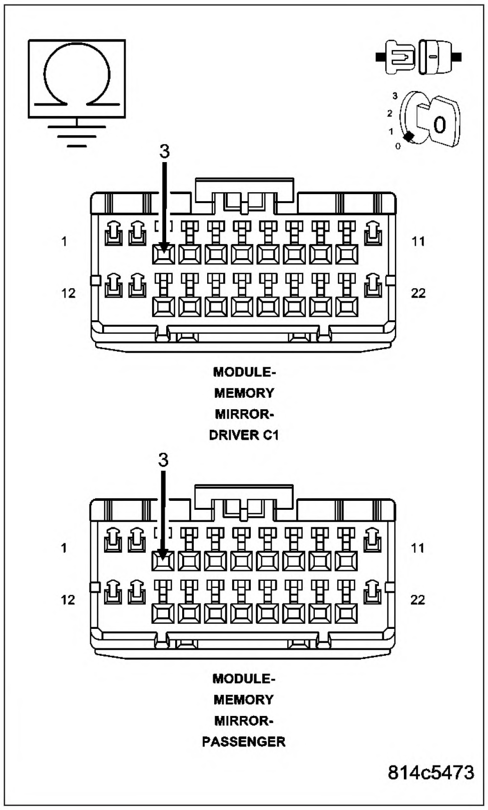
3. CHECK THE (P73) DRIVER MIRROR COMMON DRIVER CIRCUIT OR THE (P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance between ground and the (P73) Driver Mirror Common Driver circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance between ground and the (P70) Passenger Mirror Common Driver circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P73) Driver Mirror Common Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

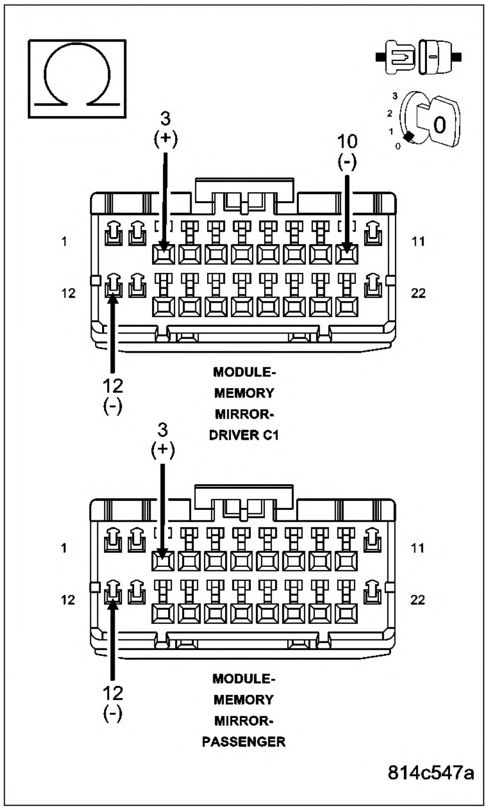
Repair the (P70) Passenger Mirror Common Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D1B, B1D27–MIRROR MOTOR COMMON CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

4. CHECK THE (P73) DRIVER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT OR THE (P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (Z908) GROUND CIRCUIT



For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P73) Driver Mirror Common Driver circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P70) Passenger Mirror Common Driver circuit and the (Z908) Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P73) Driver Mirror Common Driver circuit for a short to the (Z911) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P70) Passenger Mirror Common Driver circuit for a short to the (Z908) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

B1D1B, B1D27–MIRROR MOTOR COMMON CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (P73) DRIVER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR THE (P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT

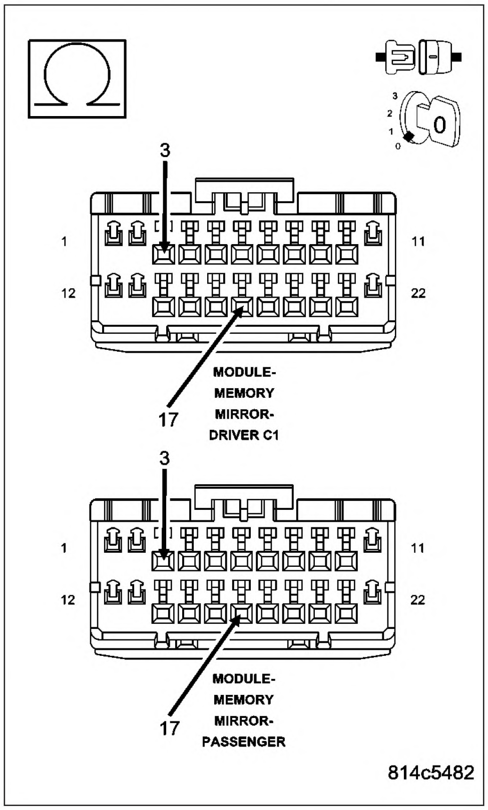
For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P73) Driver Mirror Common Driver circuit and the (P69) Driver Mirror Sensor Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P70) Passenger Mirror Common Driver circuit and the (P66) Passenger Mirror Sensor Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?



Yes, Driver MMM

Repair the (P73) Driver Mirror Common Driver circuit for a short to the (P69) Driver Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P70) Passenger Mirror Common Driver circuit for a short to the (P66) Passenger Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1D1B, B1D27–MIRROR MOTOR COMMON CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

6. CHECK THE (P73) DRIVER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT

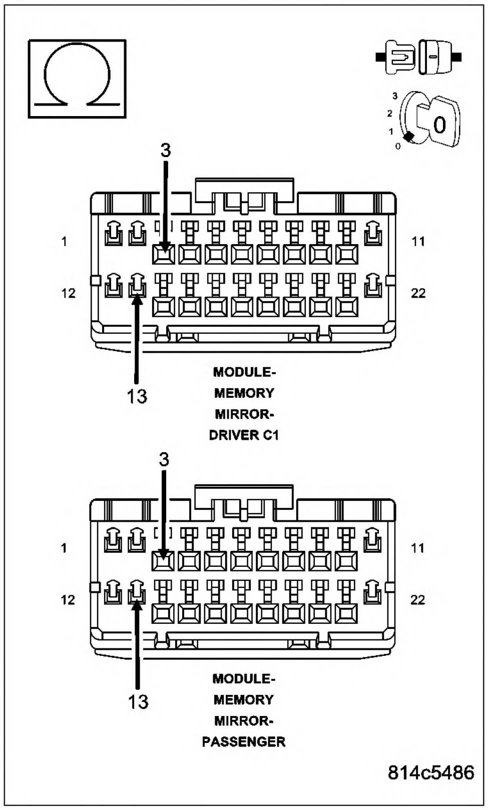
For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P73) Driver Mirror Common Driver circuit and the (C910) Driver Mirror Heater Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P70) Passenger Mirror Common Driver circuit and the (C917) Passenger Mirror Heater Ground circuit in the Passenger Driver Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?



Yes, Driver MMM

Repair the (P73) Driver Mirror Common Driver circuit for a short to the (C910) Driver Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P70) Passenger Mirror Common Driver circuit for a short to the (C917) Passenger Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

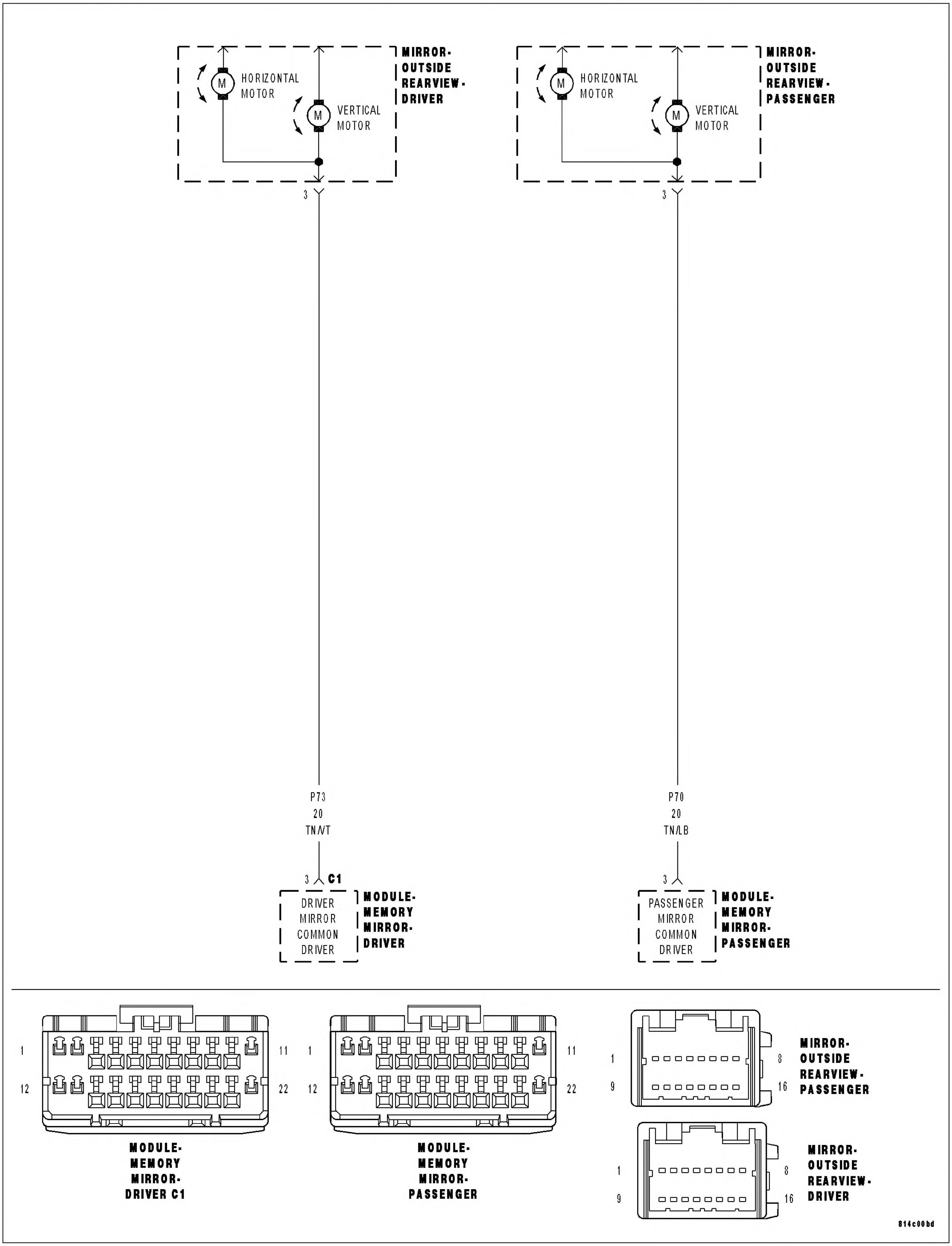
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D1C, B1D28–MIRROR MOTOR COMMON CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE


MIRROR-OUTSIDE REARVIEW-DRIVER
M
HORIZONTAL MOTOR
M
VERTICAL MOTOR
3
MIRROR-OUTSIDE REARVIEW-PASSENGER
M
HORIZONTAL MOTOR
M
VERTICAL MOTOR
3
P73
20
TN/VT
3
C1
DRIVER MIRROR COMMON DRIVER
MODULE-MEMORY MIRROR-DRIVER
P70
20
TN/LB
3
PASSENGER MIRROR COMMON DRIVER
MODULE-MEMORY MIRROR-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814c00bd

B1D1C, B1D28–MIRROR MOTOR COMMON CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Common Driver Output is turned on.
- **Set Condition:**
  DTC B1D1C – If the Driver Memory Mirror Module senses voltage on the (P73) Driver Mirror Common Driver circuit within 10 ms of turning on the Mirror Common Driver Output.
  DTC B1D28 – If the Passenger Memory Mirror Module senses voltage on the (P70) Passenger Mirror Common Driver circuit within 10 ms of turning on the Mirror Common Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P73) DRIVER MIRROR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D1C or B1D28 MIRROR MOTOR COMMON CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D1C, B1D28–MIRROR MOTOR COMMON CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

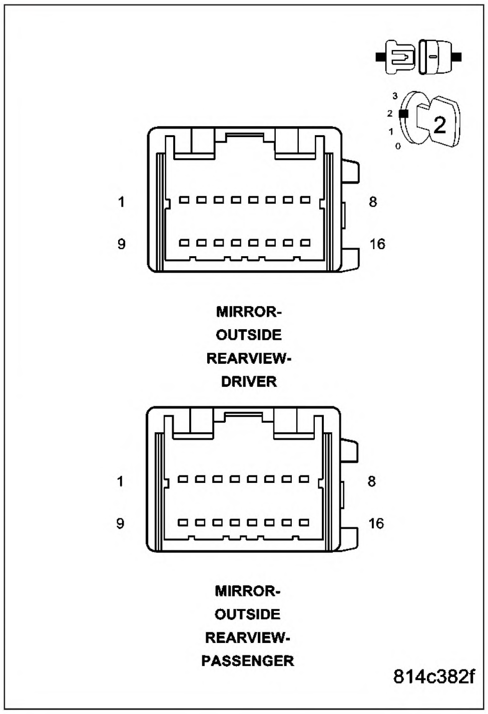
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D1C or B1D28 MIRROR MOTOR COMMON CONTROL CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D1C, B1D28–MIRROR MOTOR COMMON CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

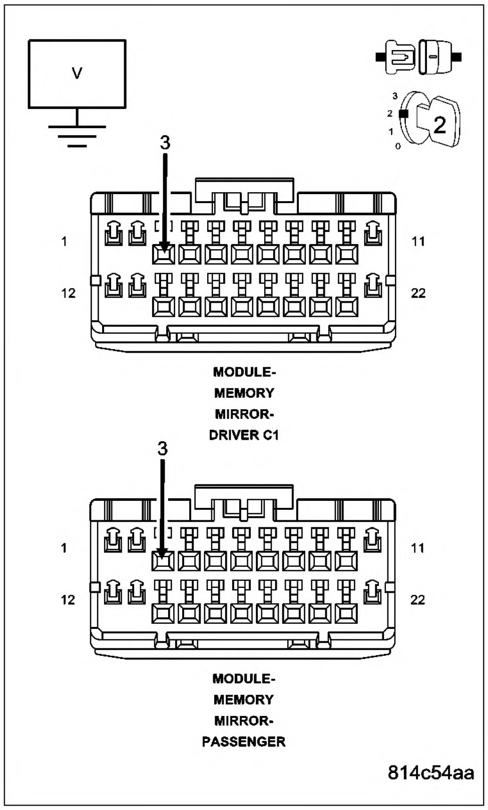
3. CHECK THE (P73) DRIVER MIRROR COMMON DRIVER CIRCUIT OR THE (P70) PASSENGER MIRROR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

For the Driver Memory Mirror System, proceed as follows:

- Measure the voltage of the (P73) Driver Mirror Common Driver circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the voltage of the (P70) Passenger Mirror Common Driver circuit.



Is the voltage above 0.2 volts?

Yes, Driver MMM

Repair the (P73) Driver Mirror Common Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P70) Passenger Mirror Common Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

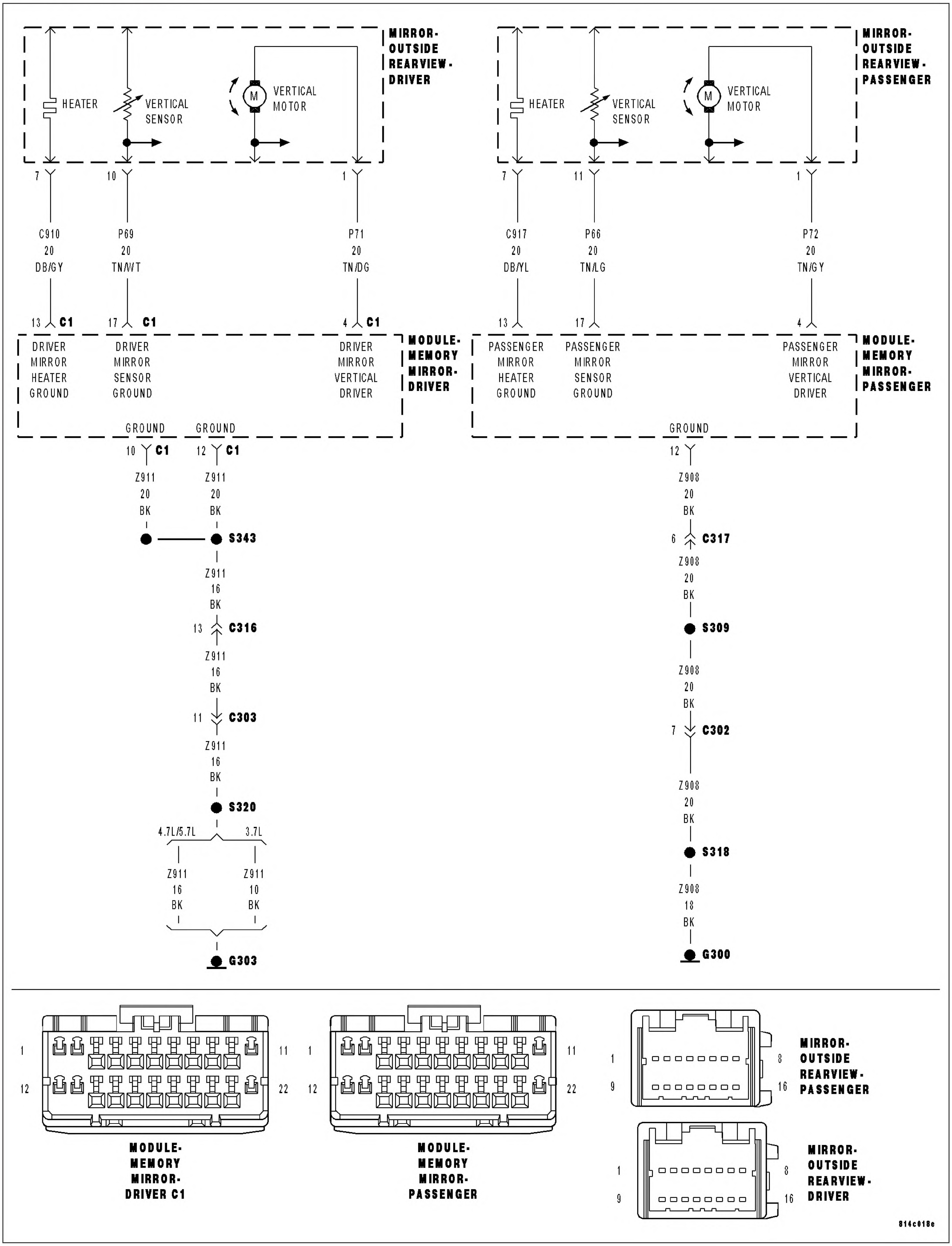
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D1F, B1D2B–MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE


MIRROR-OUTSIDE REARVIEW-DRIVER
HEATER
VERTICAL SENSOR
M
VERTICAL MOTOR
7
10
1
C910 20 DB/GY
P69 20 TN/WT
P71 20 TN/DG
13 C1
17 C1
4 C1
MODULE-MEMORY MIRROR-DRIVER
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR SENSOR GROUND
DRIVER MIRROR VERTICAL DRIVER
GROUND
GROUND
10 C1
12 C1
Z911 20 BK
Z911 20 BK
S343
Z911 16 BK
13 C316
Z911 16 BK
11 C303
Z911 16 BK
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
MIRROR-OUTSIDE REARVIEW-PASSENGER
HEATER
VERTICAL SENSOR
M
VERTICAL MOTOR
7
11
1
C917 20 DB/YL
P66 20 TN/LG
P72 20 TN/GY
13
17
4
MODULE-MEMORY MIRROR-PASSENGER
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR SENSOR GROUND
PASSENGER MIRROR VERTICAL DRIVER
GROUND
12
Z908 20 BK
6 C317
Z908 20 BK
S309
Z908 20 BK
7 C302
Z908 20 BK
S318
Z908 18 BK
G300
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814c018e

B1D1F, B1D2B–MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Vertical Driver Output is turned on.
- **Set Condition:**
  DTC B1D1F – If the Driver Memory Mirror Module senses an excessive current draw on the (P71) Driver Mirror Vertical Driver circuit within 10 ms of turning on the Mirror Vertical Driver Output.
  DTC B1D2B – If the Passenger Memory Mirror Module senses an excessive current draw on the (P72) Passenger Mirror Vertical Driver circuit within 10 ms of turning on the Mirror Vertical Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO GROUND
(P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT
(P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO (C910) DRIVER MIRROR HEATER GROUND CIRCUIT
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO GROUND
(P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO (Z908) GROUND CIRCUIT
(P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT
(P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

B1D1F, B1D2B–MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D1F or B1D2B MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

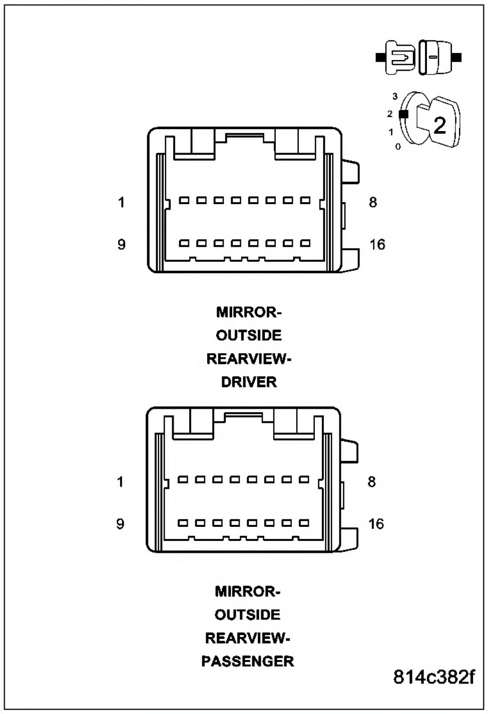
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D1F or B1D2B MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW?

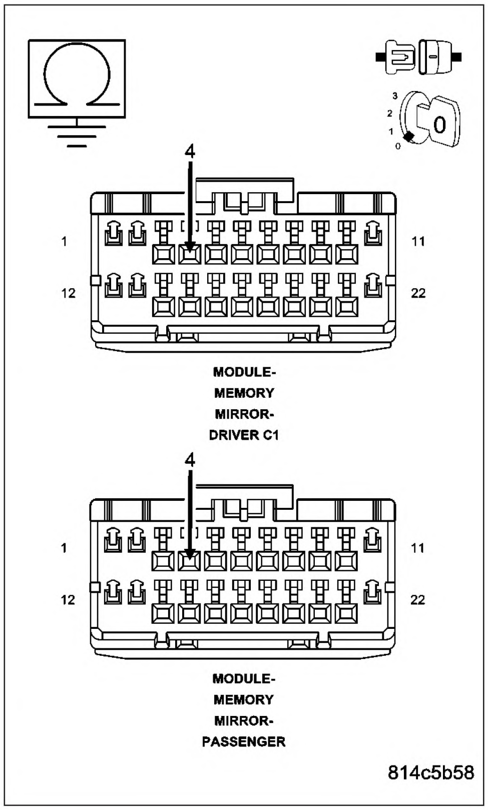
Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D1F, B1D2B–MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

3. CHECK THE (P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT OR THE (P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO GROUND



For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance between ground and the (P71) Driver Mirror Vertical Driver circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance between ground and the (P72) Passenger Mirror Vertical Driver circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P71) Driver Mirror Vertical Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P72) Passenger Mirror Vertical Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D1F, B1D2B–MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

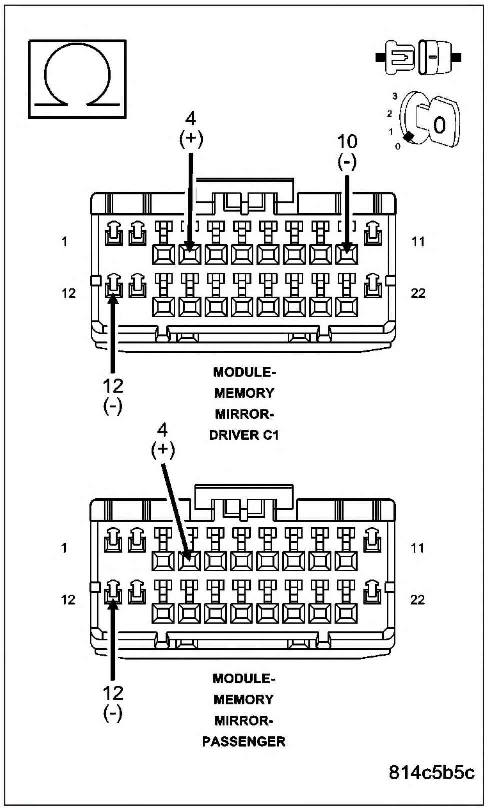
4. CHECK THE (P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT OR THE (P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO THE (Z908) GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P71) Driver Mirror Vertical Driver circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P72) Passenger Mirror Vertical Driver circuit and the (Z908) Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P71) Driver Mirror Vertical Driver circuit for a short to the (Z911) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P72) Passenger Mirror Vertical Driver circuit for a short to the (Z908) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

B1D1F, B1D2B–MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR THE (P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO THE (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT

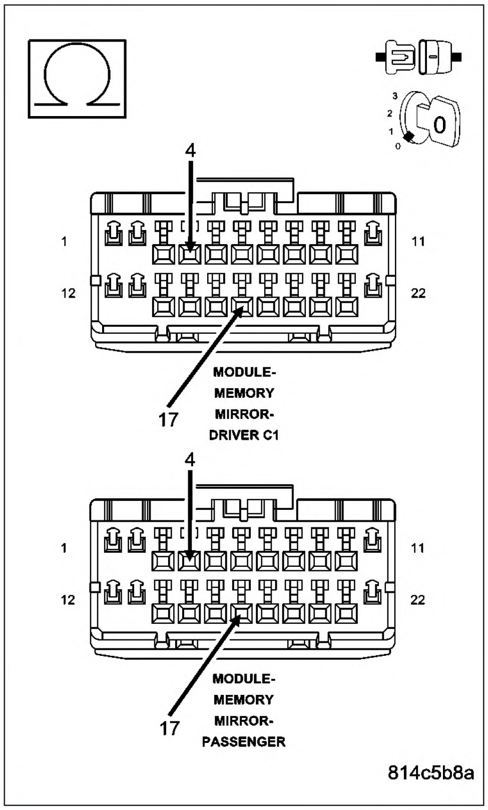
For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P71) Driver Mirror Vertical Driver circuit and the (P69) Driver Mirror Sensor Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P72) Passenger Mirror Vertical Driver circuit and the (P66) Passenger Mirror Sensor Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?



Yes, Driver MMM

Repair the (P71) Driver Mirror Vertical Driver circuit for a short to the (P69) Driver Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

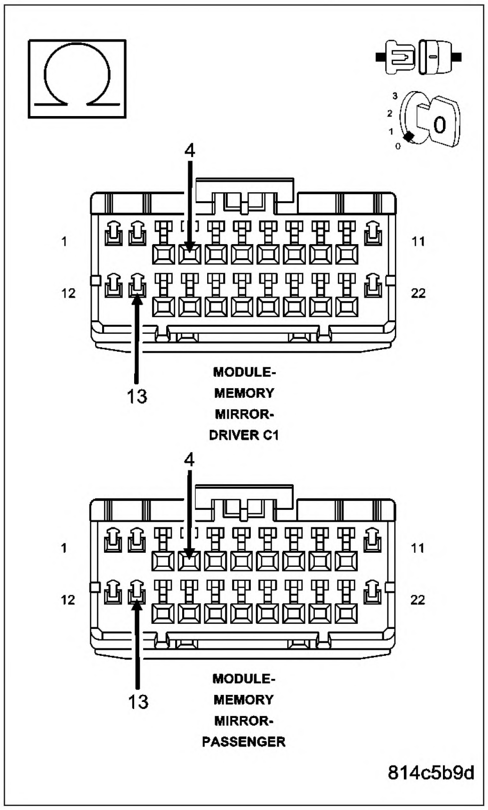
Repair the (P72) Passenger Mirror Vertical Driver circuit for a short to the (P66) Passenger Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1D1F, B1D2B–MIRROR VERTICAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

6. CHECK THE (P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT



For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P71) Driver Mirror Vertical Driver circuit and the (C910) Driver Mirror Heater Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P72) Passenger Mirror Vertical Driver circuit and the (C917) Passenger Mirror Heater Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P71) Driver Mirror Vertical Driver circuit for a short to the (C910) Driver Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P72) Passenger Mirror Vertical Driver circuit for a short to the (C917) Passenger Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

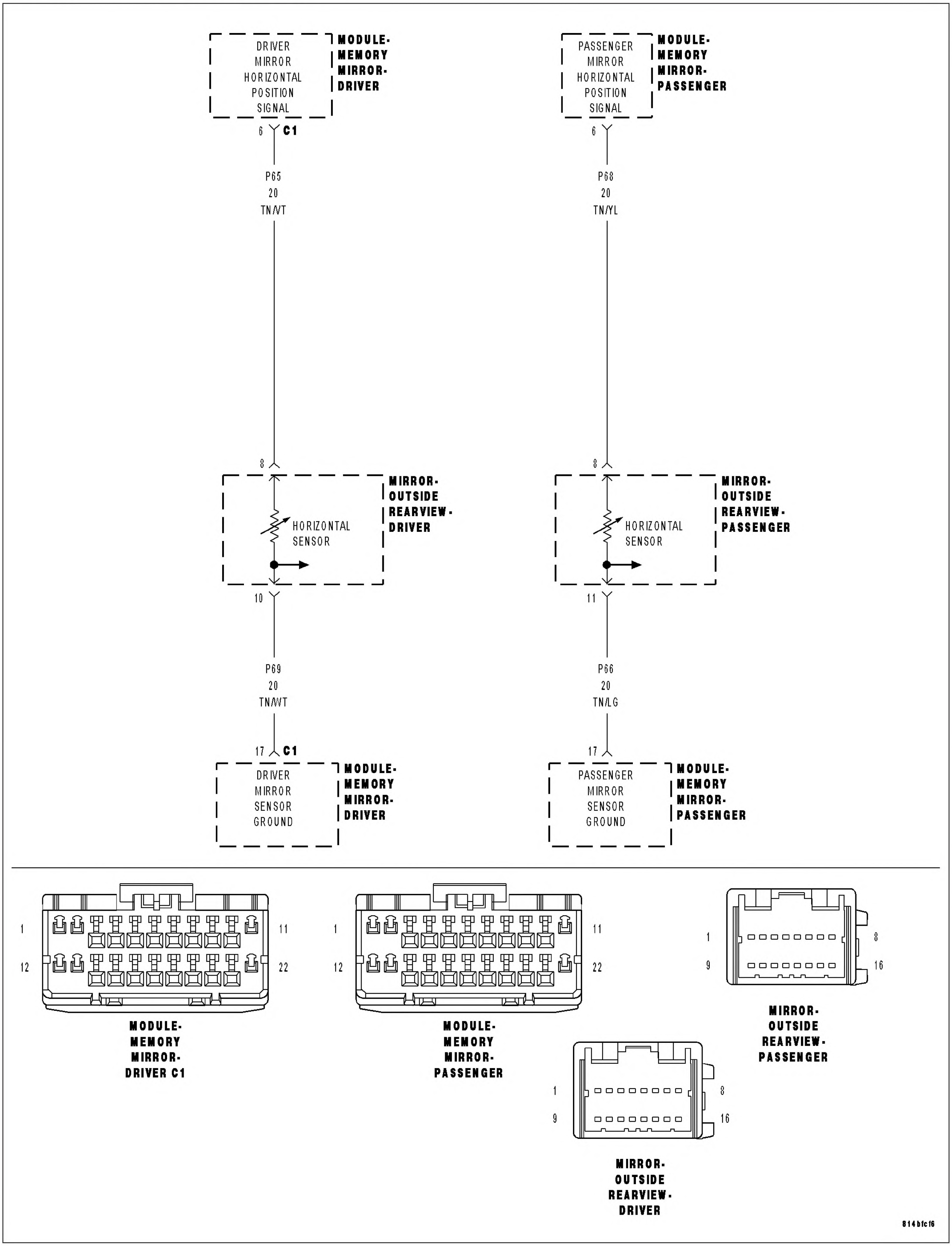
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D10, B1D19–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE


DRIVER MIRROR HORIZONTAL POSITION SIGNAL
MODULE-MEMORY MIRROR-DRIVER
6 C1
P65
20
TN/VT
PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
MODULE-MEMORY MIRROR-PASSENGER
6
P68
20
TN/YL
8
HORIZONTAL SENSOR
MIRROR-OUTSIDE REARVIEW-DRIVER
10
P69
20
TN/WT
17 C1
DRIVER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-DRIVER
8
HORIZONTAL SENSOR
MIRROR-OUTSIDE REARVIEW-PASSENGER
11
P66
20
TN/LG
17
PASSENGER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-PASSENGER
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814bfc16

B1D10, B1D19–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The (P65) Driver Mirror Horizontal Position Signal circuit supplies input to the Driver Memory Mirror Module. DTC B1D10 will set if the input value is greater than the known good (stored) value for more than 60 ms.
  The (P68) Passenger Mirror Horizontal Position Signal circuit supplies input to the Passenger Memory Mirror Module. DTC B1D19 will set if the input value is greater than the known good (stored) value for more than 60 ms.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO VOLTAGE
(P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT OPEN
(P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OPEN
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT SHORTED TO VOLTAGE
(P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT OPEN
(P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT OPEN
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D10 or B1D19 MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D10, B1D19–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

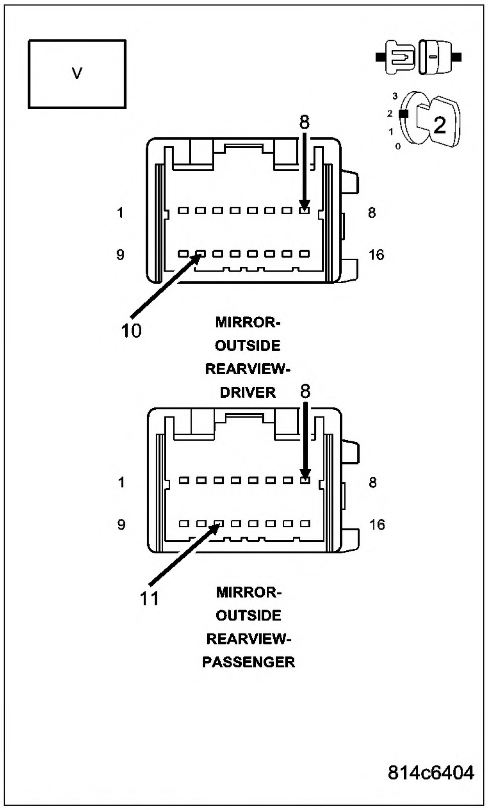
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Connect a voltmeter between the (P65) Driver Mirror Horizontal Position Signal circuit and the (P69) Driver Mirror Sensor Ground circuit.
- Turn the ignition on.
- Move the mirror switch to any switch position while monitoring the voltmeter.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Connect a voltmeter between the (P68) Passenger Mirror Horizontal Position Signal circuit and the (P66) Passenger Mirror Sensor Ground circuit
- Turn the ignition on.
- Move the mirror switch to any switch position while monitoring the voltmeter.


V
8
3
2
1
0
2
1
8
9
16
10
MIRROR-OUTSIDE REARVIEW-DRIVER
8
1
8
9
16
11
MIRROR-OUTSIDE REARVIEW-PASSENGER
814c6404

What is the voltage?

4.8 to 5.2 Volts

Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Above 5.2 Volts

Go To 3

Below 4.8 Volts

Go To 4

B1D10, B1D19–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

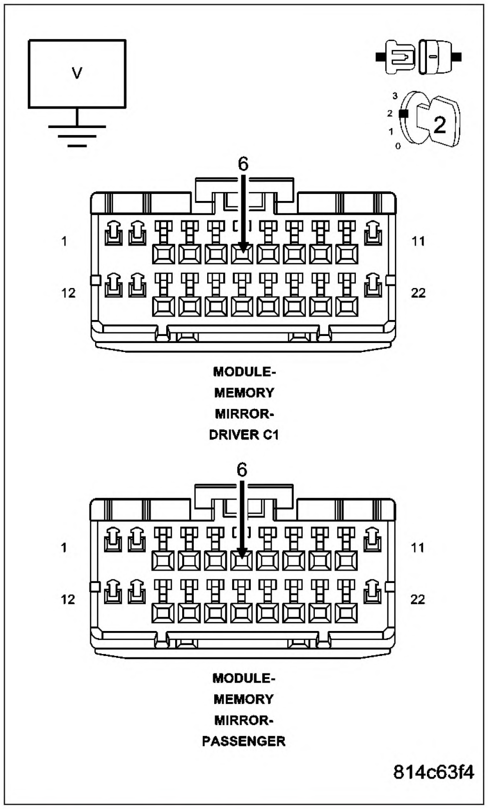
3. CHECK THE (P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT OR THE (P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Turn the ignition on.
- Measure the voltage of the (P65) Driver Mirror Horizontal Position Signal circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Turn the ignition on.
- Measure the voltage of the (P68) Passenger Mirror Horizontal Position Signal circuit.



Is the voltage above 0.2 volts?

Yes, Driver MMM

Repair the (P65) Driver Mirror Horizontal Position Signal circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P68) Passenger Mirror Horizontal Position Signal circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D10, B1D19–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

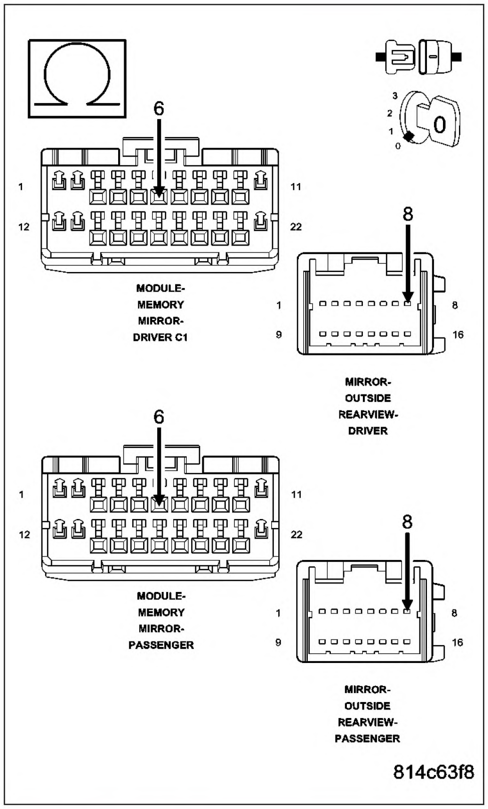
4. CHECK THE (P65) DRIVER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT OR THE (P68) PASSENGER MIRROR HORIZONTAL POSITION SIGNAL CIRCUIT FOR AN OPEN

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance of the (P65) Driver Mirror Horizontal Position Signal circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance of the (P68) Passenger Mirror Horizontal Position Signal circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.


6
1
11
12
22
MODULE-
MEMORY
MIRROR-
DRIVER C1
8
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
6
1
11
12
22
MODULE-
MEMORY
MIRROR-
PASSENGER
8
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
3
2
1
0
0
814c63f8

Is the resistance below 2.0 ohms?

Yes >> Go To 5

No, Driver MMM

Repair the (P65) Driver Mirror Horizontal Position Signal circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

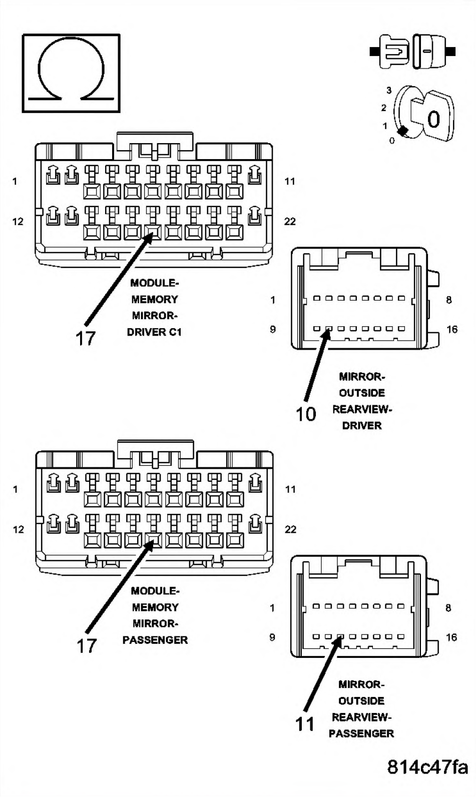
No, Passenger MMM

Repair the (P68) Passenger Mirror Horizontal Position Signal circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D10, B1D19–MIRROR HORIZONTAL POSITION SENSOR INPUT CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT FOR AN OPEN


1
11
12
22
17
MODULE-
MEMORY
MIRROR-
DRIVER C1
1
8
9
16
10
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
1
11
12
22
17
MODULE-
MEMORY
MIRROR-
PASSENGER
1
8
9
16
11
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
3
2
1
0
814c47fa

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance of the (P69) Driver Mirror Sensor Ground circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance of the (P66) Passenger Mirror Sensor Ground circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.

Is the resistance below 2.0 ohms?

Yes, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Repair the (P69) Driver Mirror Sensor Ground circuit for an open.

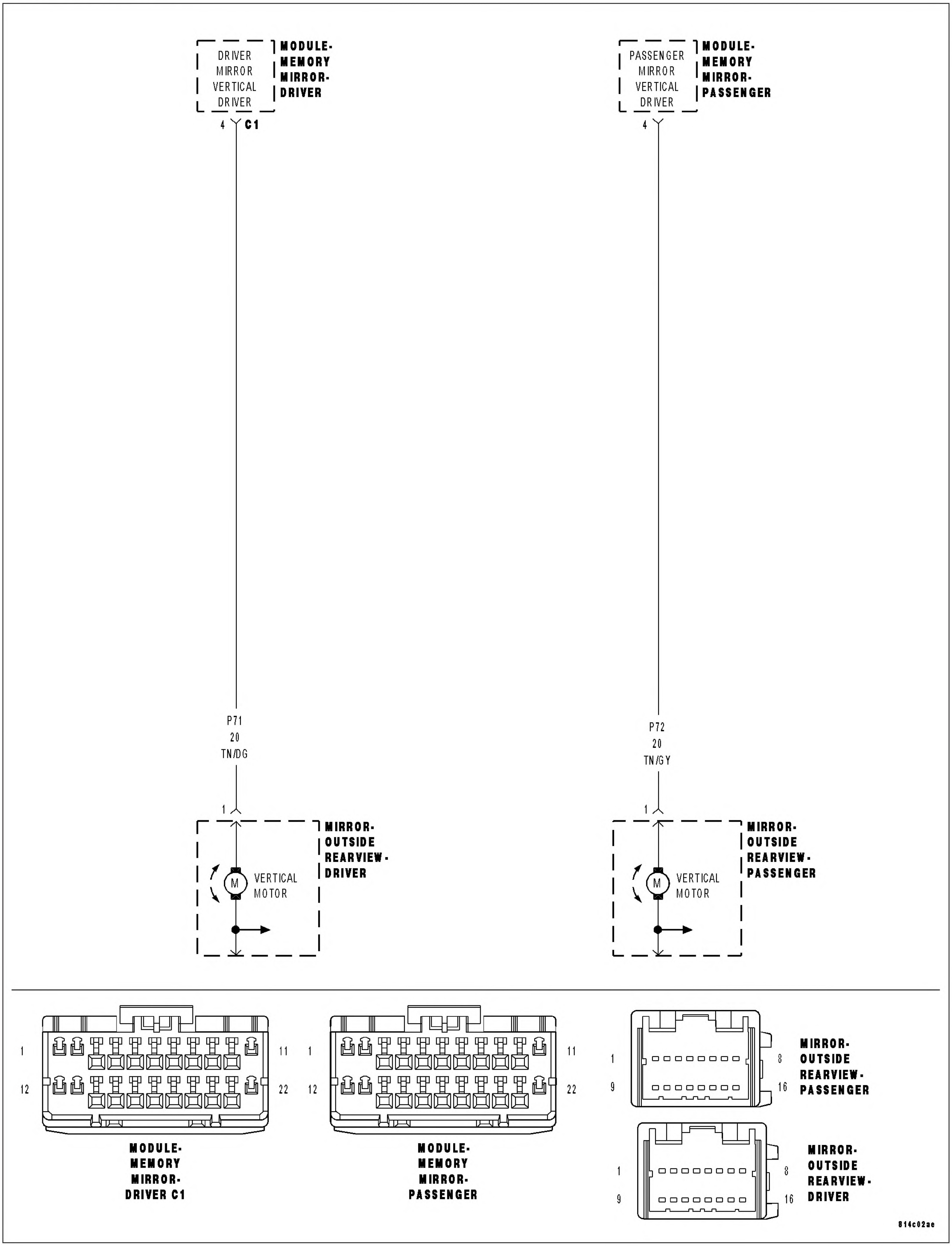
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Repair the (P66) Passenger Mirror Sensor Ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D20, B1D2C–MIRROR VERTICAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE


DRIVER MIRROR VERTICAL DRIVER
MODULE-MEMORY MIRROR-DRIVER
4 C1
PASSENGER MIRROR VERTICAL DRIVER
MODULE-MEMORY MIRROR-PASSENGER
4
P71
20
TN/DG
P72
20
TN/GY
1
MIRROR-OUTSIDE REARVIEW-DRIVER
VERTICAL MOTOR
M
1
MIRROR-OUTSIDE REARVIEW-PASSENGER
VERTICAL MOTOR
M
1 11 12 22
MODULE-MEMORY MIRROR-DRIVER C1
1 11 12 22
MODULE-MEMORY MIRROR-PASSENGER
1 8 9 16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1 8 9 16
MIRROR-OUTSIDE REARVIEW-DRIVER
814c02ae

B1D20, B1D2C–MIRROR VERTICAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Vertical Driver Output is turned on.
- **Set Condition:**
  DTC B1D20 – If the Driver Memory Mirror Module senses voltage on the (P71) Driver Mirror Vertical Driver circuit within 10 ms of turning on the Mirror Vertical Driver Output.
  DTC B1D2C – If the Passenger Memory Mirror Module senses voltage on the (P72) Passenger Mirror Vertical Driver circuit within 10 ms of turning on the Mirror Vertical Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO VOLTAGE
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT SHORTED TO VOLTAGE
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D20 or B1D2C MIRROR VERTICAL MOTOR CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D20, B1D2C–MIRROR VERTICAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

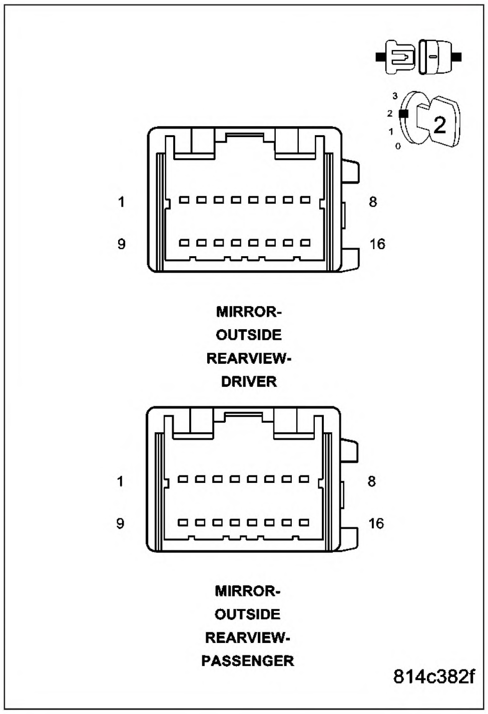
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D20 or B1D2C MIRROR VERTICAL MOTOR CONTROL CIRCUIT HIGH?

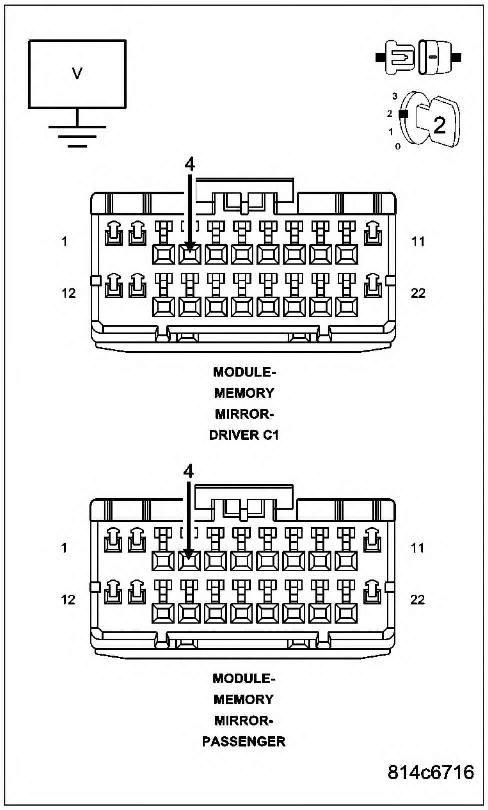
Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D20, B1D2C–MIRROR VERTICAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

3. CHECK THE (P71) DRIVER MIRROR VERTICAL DRIVER CIRCUIT OR THE (P72) PASSENGER MIRROR VERTICAL DRIVER CIRCUIT FOR A SHORT TO VOLTAGE



For the Driver Memory Mirror System, proceed as follows:

- Measure the voltage of the (P71) Driver Mirror Vertical Driver circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the voltage of the (P72) Passenger Mirror Vertical Driver circuit.

Is the voltage above 0.2 volts?

Yes, Driver MMM

Repair the (P71) Driver Mirror Vertical Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P72) Passenger Mirror Vertical Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

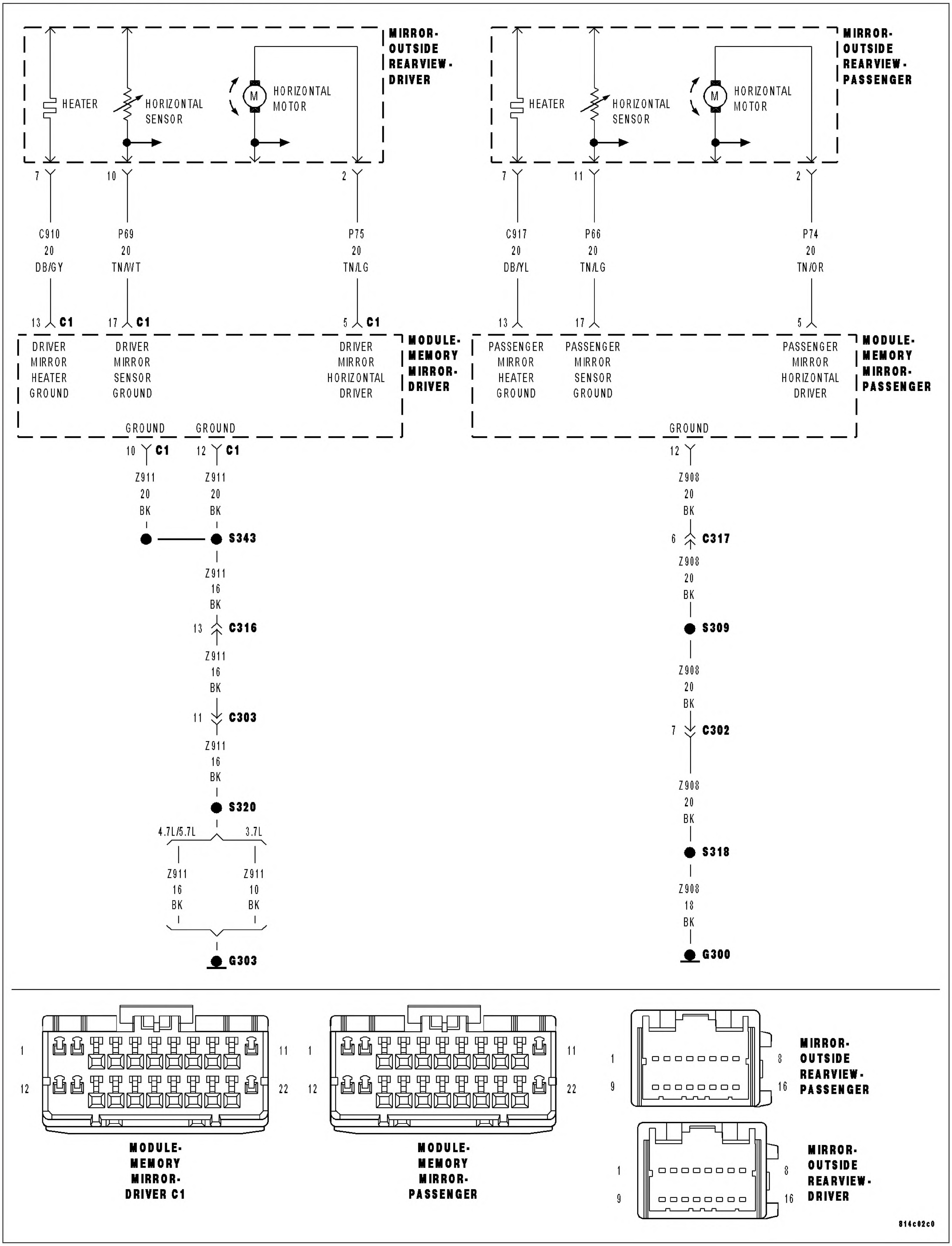
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D23, B1D2F–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE


MIRROR-OUTSIDE REARVIEW-DRIVER
HEATER
HORIZONTAL SENSOR
M
HORIZONTAL MOTOR
7
10
2
C910 20 DB/GY
P69 20 TN/WT
P75 20 TN/LG
13 C1
17 C1
5 C1
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR SENSOR GROUND
DRIVER MIRROR HORIZONTAL DRIVER
MODULE-MEMORY MIRROR-DRIVER
GROUND
GROUND
10 C1
12 C1
Z911 20 BK
Z911 20 BK
S343
Z911 16 BK
13 C316
Z911 16 BK
11 C303
Z911 16 BK
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
MIRROR-OUTSIDE REARVIEW-PASSENGER
HEATER
HORIZONTAL SENSOR
M
HORIZONTAL MOTOR
7
11
2
C917 20 DB/YL
P66 20 TN/LG
P74 20 TN/OR
13
17
5
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR SENSOR GROUND
PASSENGER MIRROR HORIZONTAL DRIVER
MODULE-MEMORY MIRROR-PASSENGER
GROUND
12
Z908 20 BK
6 C317
Z908 20 BK
S309
Z908 20 BK
7 C302
Z908 20 BK
S318
Z908 18 BK
G300
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814c02c0

B1D23, B1D2F–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Horizontal Driver Output is turned on.
- **Set Condition:**
  DTC B1D23 – If the Driver Memory Mirror Module senses an excessive current draw on the (P75) Driver Mirror Horizontal Driver circuit within 10 ms of turning on the Mirror Horizontal Driver Output.
  DTC B1D2F – If the Passenger Memory Mirror Module senses an excessive current draw on the (P74) Passenger Mirror Horizontal Driver circuit within 10 ms of turning on the Mirror Horizontal Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO GROUND
(P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT
(P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO (C910) DRIVER MIRROR HEATER GROUND CIRCUIT
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO GROUND
(P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO (Z908) GROUND CIRCUIT
(P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT
(P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

B1D23, B1D2F–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D23 or B1D2F MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

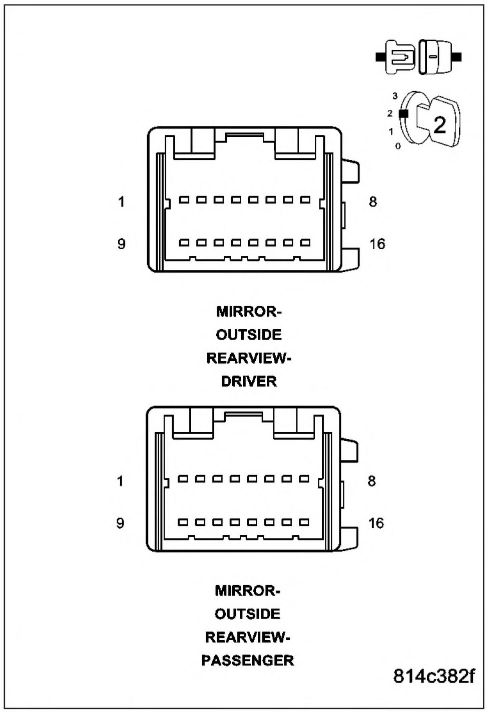
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D23 or B1D2F MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D23, B1D2F–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

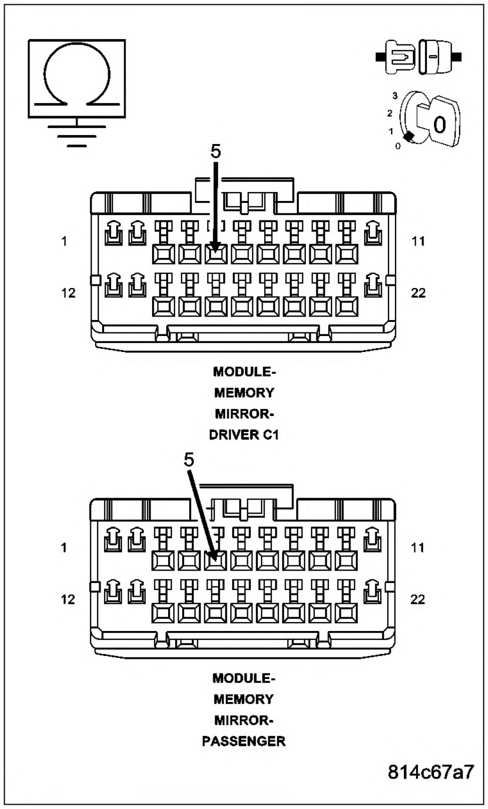
3. CHECK THE (P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT OR THE (P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO GROUND

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance between ground and the (P75) Driver Mirror Horizontal Driver circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance between ground and the (P74) Passenger Mirror Horizontal Driver circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P75) Driver Mirror Horizontal Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P74) Passenger Mirror Horizontal Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D23, B1D2F–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

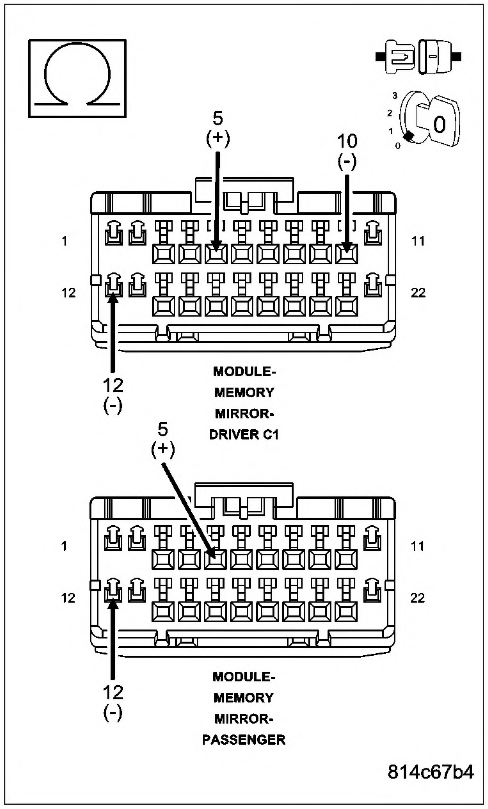
4. CHECK THE (P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT OR THE (P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO THE (Z908) GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P75) Driver Mirror Horizontal Driver circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P74) Passenger Mirror Horizontal Driver circuit and the (Z908) Ground circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P75) Driver Mirror Horizontal Driver circuit for a short to the (Z911) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P74) Passenger Mirror Horizontal Driver circuit for a short to the (Z908) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

B1D23, B1D2F–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR THE (P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO THE (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P75) Driver Mirror Horizontal Driver circuit and the (P69) Driver Mirror Sensor Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P74) Passenger Mirror Horizontal Driver circuit and the (P66) Passenger Mirror Sensor Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P75) Driver Mirror Horizontal Driver circuit for a short to the (P69) Driver Mirror Sensor Ground circuit.

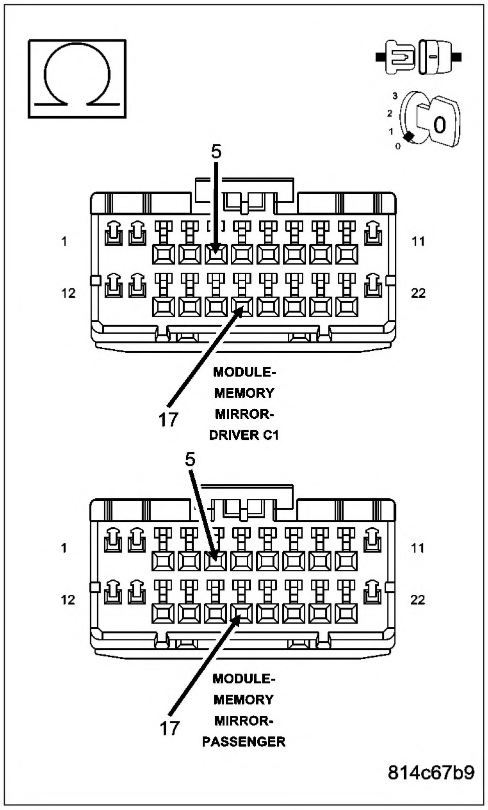
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P74) Passenger Mirror Horizontal Driver circuit for a short to the (P66) Passenger Mirror Sensor Ground circuit.

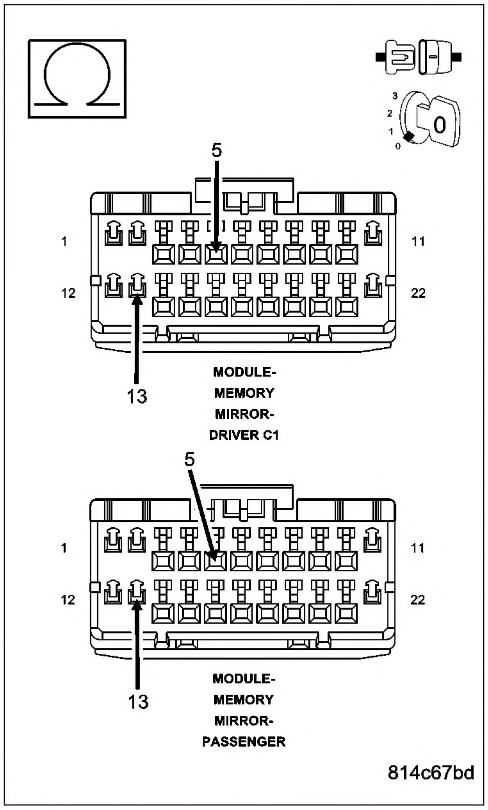
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6



B1D23, B1D2F–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

6. CHECK THE (P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT



For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (P75) Driver Mirror Horizontal Driver circuit and the (C910) Driver Mirror Heater Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (P74) Passenger Mirror Horizontal Driver circuit and the (C917) Passenger Mirror Heater Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (P75) Driver Mirror Horizontal Driver circuit for a short to the (C910) Driver Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P74) Passenger Mirror Horizontal Driver circuit for a short to the (C917) Passenger Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

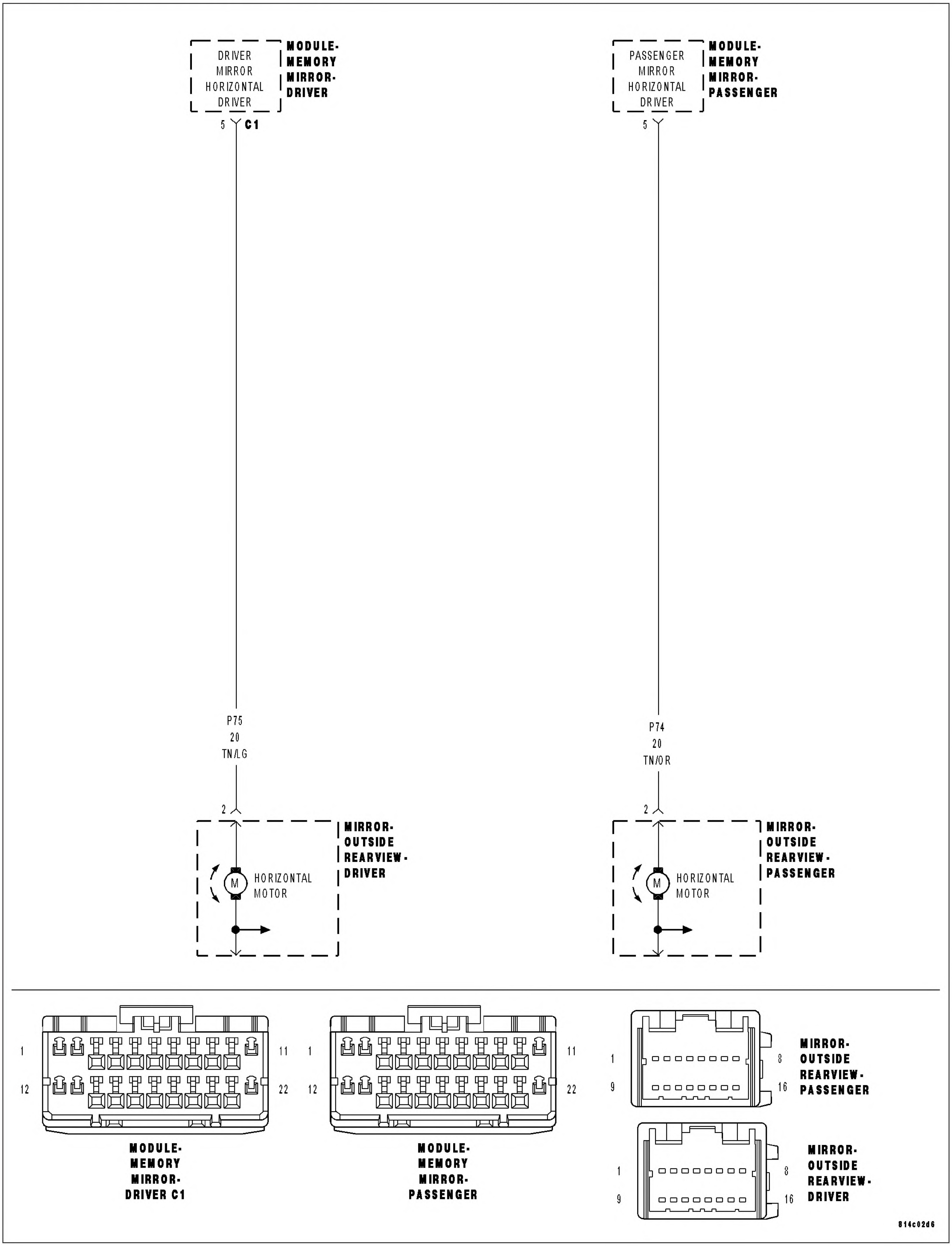
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D24, B1D30–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE


DRIVER MIRROR HORIZONTAL DRIVER
MODULE-MEMORY MIRROR-DRIVER
5 C1
PASSENGER MIRROR HORIZONTAL DRIVER
MODULE-MEMORY MIRROR-PASSENGER
5
P75
20
TN/LG
P74
20
TN/OR
2
2
MIRROR-OUTSIDE REARVIEW-DRIVER
HORIZONTAL MOTOR
M
MIRROR-OUTSIDE REARVIEW-PASSENGER
HORIZONTAL MOTOR
M
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814c02d6

B1D24, B1D30–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Horizontal Driver Output is turned on.
- **Set Condition:**
  DTC B1D24 – If the Driver Memory Mirror Module senses voltage on the (P75) Driver Mirror Horizontal Driver circuit within 10 ms of turning on the Mirror Horizontal Driver Output.
  DTC B1D30 – If the Passenger Memory Mirror Module senses voltage on the (P74) Passenger Mirror Horizontal Driver circuit within 10 ms of turning on the Mirror Horizontal Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO VOLTAGE
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT SHORTED TO VOLTAGE
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Operate the Mirror Switch in all directions several times.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D24 or B1D30 MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT HIGH?

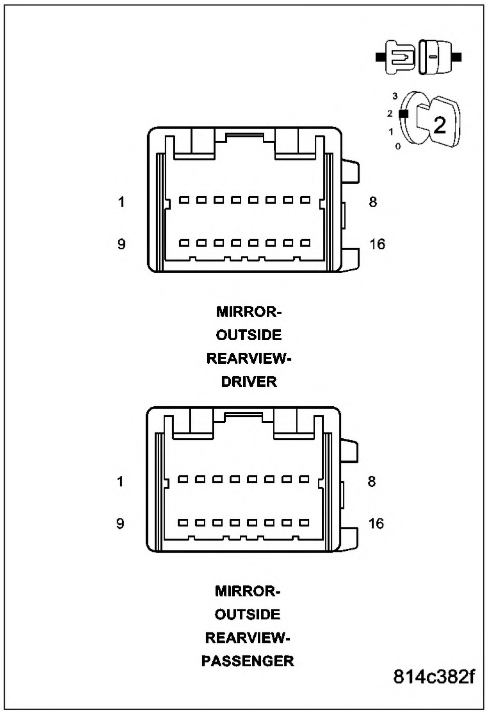
Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D24, B1D30–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR



For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Operate the Mirror Switch in all directions several times.
- Cycle the ignition from on to off 3 times.
- Turn the ignition on.
- With the scan tool, read DTCs.

Does the scan tool display: B1D24 or B1D30 MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D24, B1D30–MIRROR HORIZONTAL MOTOR CONTROL CIRCUIT HIGH – MEMORY MIRROR MODULE (CONTINUED)

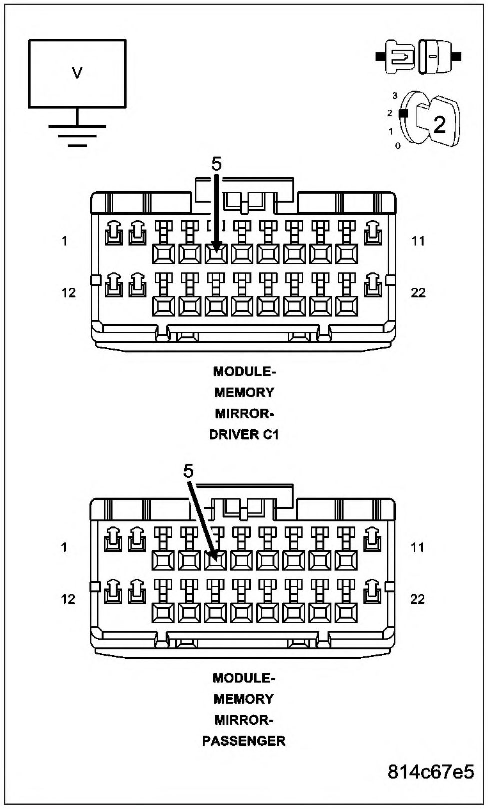
3. CHECK THE (P75) DRIVER MIRROR HORIZONTAL DRIVER CIRCUIT OR THE (P74) PASSENGER MIRROR HORIZONTAL DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

For the Driver Memory Mirror System, proceed as follows:

- Measure the voltage of the (P75) Driver Mirror Horizontal Driver circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the voltage of the (P74) Passenger Mirror Horizontal Driver circuit.



Is the voltage above 0.2 volts?

Yes, Driver MMM

Repair the (P75) Driver Mirror Horizontal Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (P74) Passenger Mirror Horizontal Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

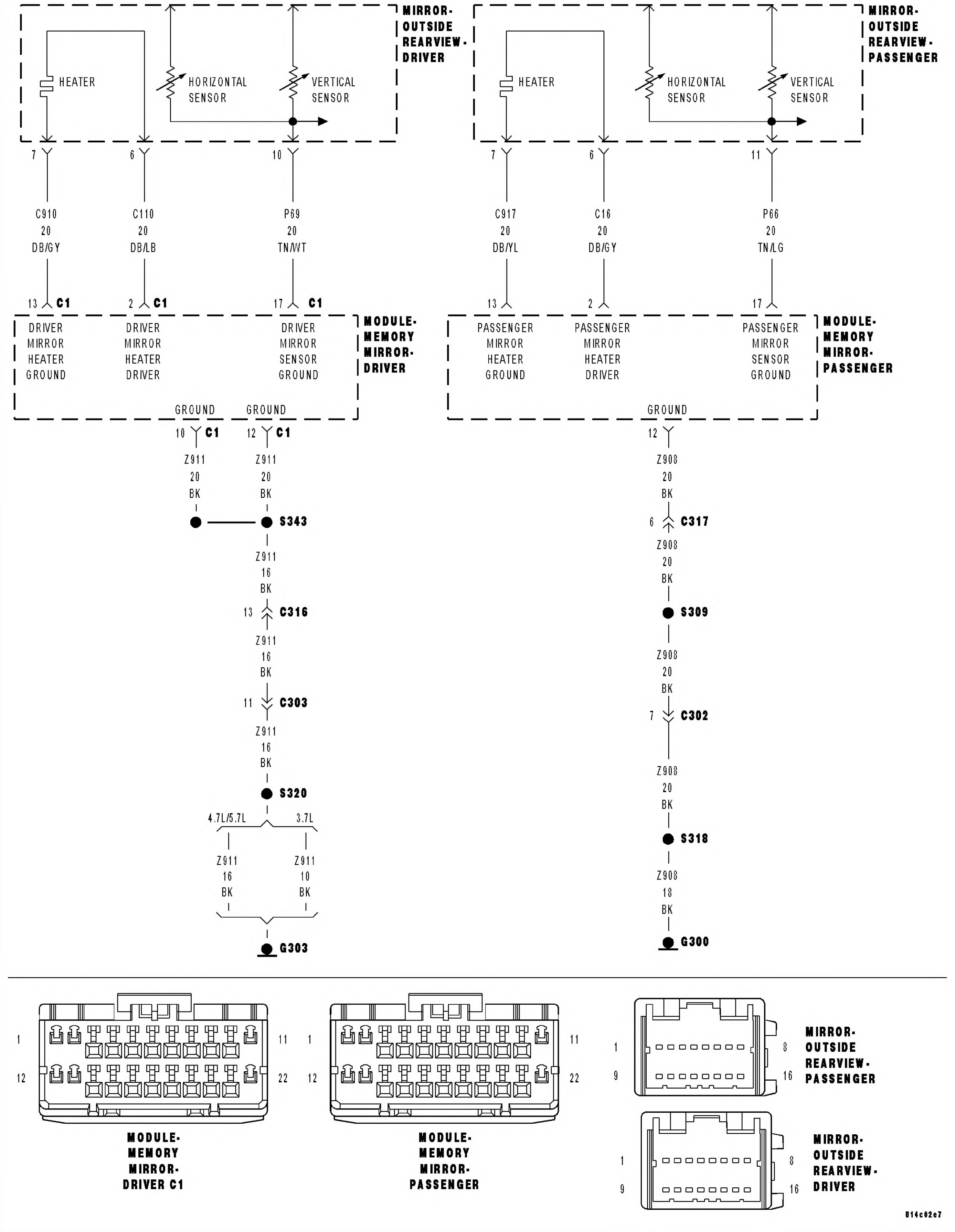
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D33, B1D37–MIRROR HEATER CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE


MIRROR-OUTSIDE REARVIEW-DRIVER
HEATER
HORIZONTAL SENSOR
VERTICAL SENSOR
7
6
10
C910 20 DB/GY
C110 20 DB/LB
P69 20 TN/WT
13 C1
2 C1
17 C1
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR HEATER DRIVER
DRIVER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-DRIVER
GROUND
GROUND
10 C1
12 C1
Z911 20 BK
Z911 20 BK
S343
Z911 16 BK
13 C316
Z911 16 BK
11 C303
Z911 16 BK
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
MIRROR-OUTSIDE REARVIEW-PASSENGER
HEATER
HORIZONTAL SENSOR
VERTICAL SENSOR
7
6
11
C917 20 DB/YL
C16 20 DB/GY
P66 20 TN/LG
13
2
17
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR HEATER DRIVER
PASSENGER MIRROR SENSOR GROUND
MODULE-MEMORY MIRROR-PASSENGER
GROUND
12
Z908 20 BK
6 C317
Z908 20 BK
S309
Z908 20 BK
7 C302
Z908 20 BK
S318
Z908 18 BK
G300
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
11
12
22
MODULE-MEMORY MIRROR-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
814c02e7

B1D33, B1D37–MIRROR HEATER CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Heater Driver Output is turned on.
- **Set Condition:**
  DTC B1D33 – If the Driver Memory Mirror Module senses an excessive current draw on the (C110) Driver Mirror Heater Driver circuit within 10 ms of turning on the Mirror Heater Driver Output.
  DTC B1D37 – If the Passenger Memory Mirror Module senses an excessive current draw on the (C16) Passenger Mirror Heater Driver circuit within 10 ms of turning on the Mirror Heater Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(C110) DRIVER MIRROR HEATER DRIVER CIRCUIT SHORTED TO GROUND
(C110) DRIVER MIRROR HEATER DRIVER CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(C110) DRIVER MIRROR HEATER DRIVER CIRCUIT SHORTED TO (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT
(C110) DRIVER MIRROR HEATER DRIVER CIRCUIT SHORTED TO (C910) DRIVER MIRROR HEATER GROUND CIRCUIT
DRIVER OUTSIDE REARVIEW MIRROR SHORTED
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT SHORTED TO GROUND
(C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT SHORTED TO (Z908) GROUND CIRCUIT
(C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT SHORTED TO (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT
(C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT SHORTED TO (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT
PASSENGER OUTSIDE REARVIEW MIRROR SHORTED
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

B1D33, B1D37–MIRROR HEATER CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

Verify that the Rear Window Defogger (EBL) mode switch is off (EBL status indicator not illuminated).

With the scan tool, record and erase DTCs.

Press the Rear Window Defogger (EBL) mode switch on.

With the scan tool, read DTCs.

Does the scan tool display: B1D33 or B1D37 MIRROR HEATER CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

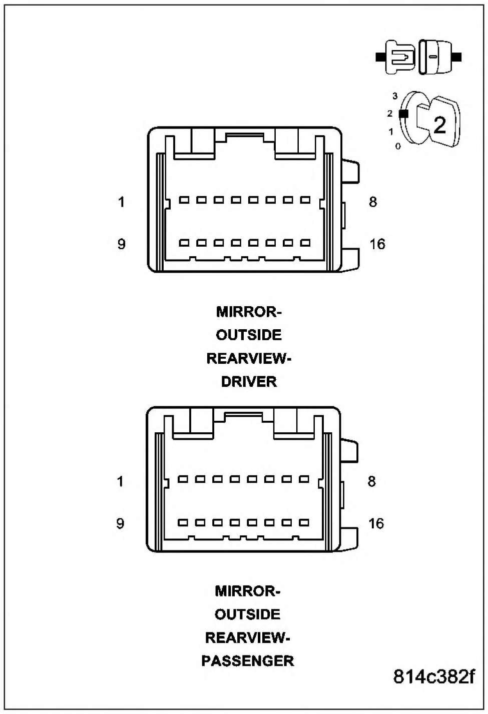
2. TEST FOR A SHORTED OUTSIDE REARVIEW MIRROR

For the Driver Memory Mirror System, proceed as follows:

- Press the Rear Window Defogger (EBL) mode switch off.
- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Press the Rear Window Defogger (EBL) mode switch on.
- With the scan tool, read DTCs.

For the Passenger Memory Mirror System, proceed as follows:

- Press the Rear Window Defogger (EBL) mode switch off.
- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Turn the ignition on.
- With the scan tool, erase DTCs.
- Press the Rear Window Defogger (EBL) mode switch on.
- With the scan tool, read DTCs.



Does the scan tool display: B1D33 or B1D37 MIRROR HEATER CONTROL CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D33, B1D37–MIRROR HEATER CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

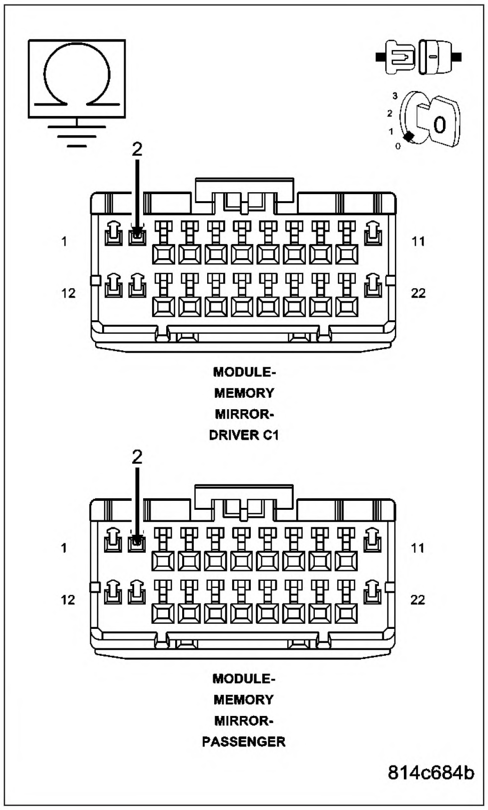
3. CHECK THE (C110) DRIVER MIRROR HEATER DRIVER CIRCUIT OR THE (C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT FOR A SHORT TO GROUND

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance between ground and the (C110) Driver Mirror Heater Driver circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance between ground and the (C16) Passenger Mirror Heater Driver circuit in the Passenger Memory Mirror Module connector.



Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (C110) Driver Mirror Heater Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (C16) Passenger Mirror Heater Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1D33, B1D37–MIRROR HEATER CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

4. CHECK THE (C110) DRIVER MIRROR HEATER DRIVER CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT OR THE (C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT FOR A SHORT TO THE (Z908) GROUND CIRCUIT

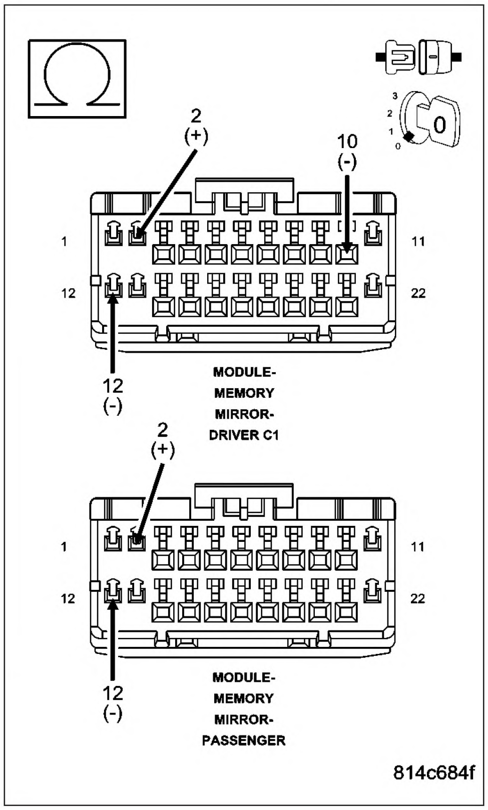
For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (C110) Driver Mirror Heater Driver circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (C16) Passenger Mirror Heater Driver circuit and the (Z908) Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?



Yes, Driver MMM

Repair the (C110) Driver Mirror Heater Driver circuit for a short to the (Z911) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (C16) Passenger Mirror Heater Driver circuit for a short to the (Z908) Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

B1D33, B1D37–MIRROR HEATER CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

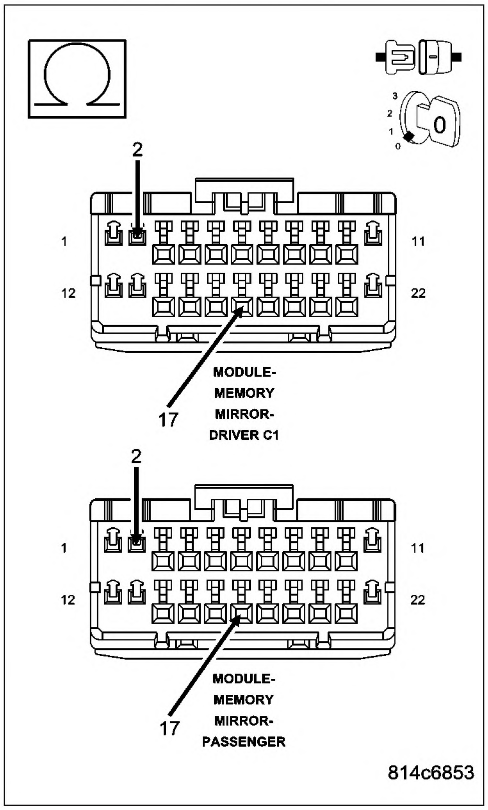
5. CHECK THE (C110) DRIVER MIRROR HEATER DRIVER CIRCUIT FOR A SHORT TO THE (P69) DRIVER MIRROR SENSOR GROUND CIRCUIT OR THE (C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT FOR A SHORT TO THE (P66) PASSENGER MIRROR SENSOR GROUND CIRCUIT

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (C110) Driver Mirror Heater Driver circuit and the (P69) Driver Mirror Sensor Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (C16) Passenger Mirror Heater Driver circuit and the (P66) Passenger Mirror Sensor Ground circuit in the Passenger Memory Mirror Module connector.



Ω
3
2
1
0
0
2
1
11
12
22
17
MODULE-MEMORY MIRROR-DRIVER C1
2
1
11
12
22
17
MODULE-MEMORY MIRROR-PASSENGER
814c6853

Is the resistance below 10000.0 ohms?

Yes, Driver MMM

Repair the (C110) Driver Mirror Heater Driver circuit for a short to the (P69) Driver Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (C16) Passenger Mirror Heater Driver circuit for a short to the (P66) Passenger Mirror Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1D33, B1D37–MIRROR HEATER CONTROL CIRCUIT LOW – MEMORY MIRROR MODULE (CONTINUED)

6. CHECK THE (C110) DRIVER MIRROR HEATER DRIVER CIRCUIT FOR A SHORT TO THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT FOR A SHORT TO THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT

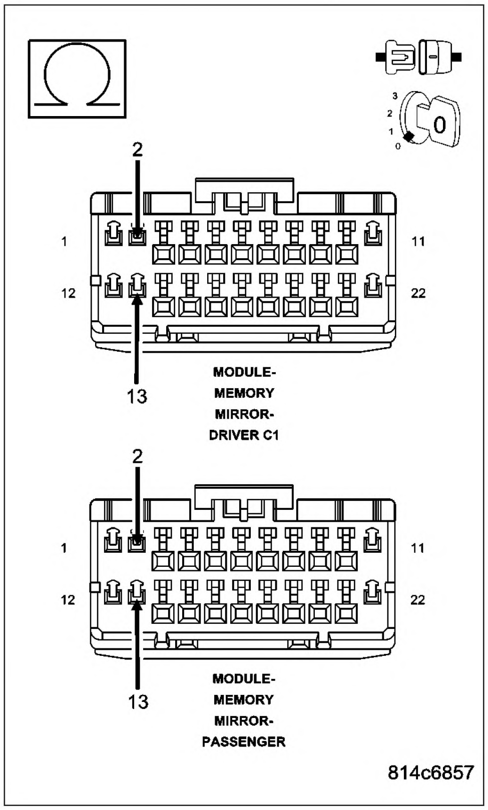
For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between the (C110) Driver Mirror Heater Driver circuit and the (C910) Driver Mirror Heater Ground circuit in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between the (C16) Passenger Mirror Heater Driver circuit and the (C917) Passenger Mirror Heater Ground circuit in the Passenger Memory Mirror Module connector.

Is the resistance below 10000.0 ohms?



Yes, Driver MMM

Repair the (C110) Driver Mirror Heater Driver circuit for a short to the (C910) Driver Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Repair the (C16) Passenger Mirror Heater Driver circuit for a short to the (C917) Passenger Mirror Heater Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

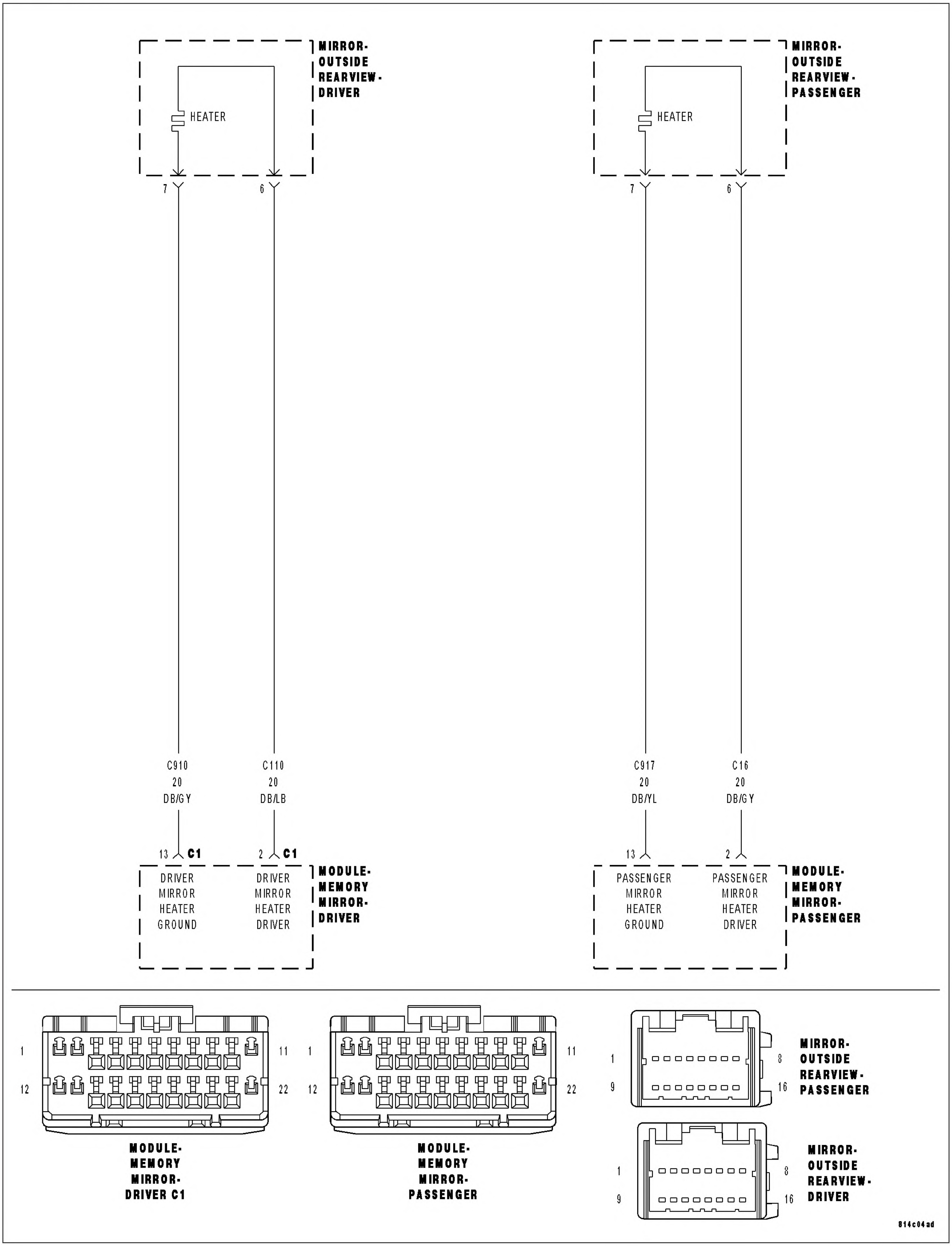
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D35, B1D39–MIRROR HEATER CONTROL CIRCUIT OPEN – MEMORY MIRROR MODULE


MIRROR-
OUTSIDE
REARVIEW-
DRIVER
HEATER
7
6
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
HEATER
7
6
C910
20
DB/GY
C110
20
DB/LB
C917
20
DB/YL
C16
20
DB/GY
13 C1
2 C1
13
2
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR HEATER DRIVER
MODULE-
MEMORY
MIRROR-
DRIVER
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR HEATER DRIVER
MODULE-
MEMORY
MIRROR-
PASSENGER
1
11
12
22
MODULE-
MEMORY
MIRROR-
DRIVER C1
1
11
12
22
MODULE-
MEMORY
MIRROR-
PASSENGER
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
814c04ad

B1D35, B1D39–MIRROR HEATER CONTROL CIRCUIT OPEN – MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Mirror Heater Driver Output is turned on.
- **Set Condition:**
  DTC B1D35 – If the Driver Memory Mirror Module senses voltage on the (C110) Driver Mirror Heater Driver circuit within 10 ms of turning on the Mirror Heater Driver Output.
  DTC B1D39 – If the Passenger Memory Mirror Module senses voltage on the (C16) Passenger Mirror Heater Driver circuit within 10 ms of turning on the Mirror Heater Driver Output.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
(C110) DRIVER MIRROR HEATER DRIVER CIRCUIT OPEN
(C910) DRIVER MIRROR HEATER GROUND CIRCUIT OPEN
DRIVER OUTSIDE REARVIEW MIRROR OPEN
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
(C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT OPEN
(C917) PASSENGER MIRROR HEATER GROUND CIRCUIT OPEN
PASSENGER OUTSIDE REARVIEW MIRROR OPEN
PASSENGER MEMORY MIRROR MODULE

NOTE: This procedure addresses the Driver Memory Mirror system's circuits and components and the Passenger Memory Mirror system's circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

Verify that the Rear Window Defogger (EBL) mode switch is off (EBL status indicator not illuminated).

With the scan tool, record and erase DTCs.

Turn the ignition off, wait 10 seconds, then turn the ignition on.

Press the Rear Window Defogger (EBL) mode switch on.

With the scan tool, read DTCs.

Does the scan tool display: B1D35 or B1D39 MIRROR HEATER CONTROL CIRCUIT OPEN?

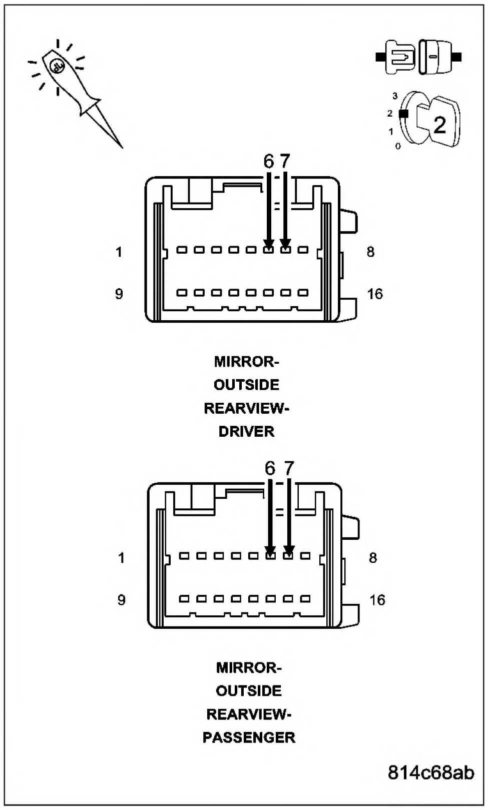
Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D35, B1D39–MIRROR HEATER CONTROL CIRCUIT OPEN – MEMORY MIRROR MODULE (CONTINUED)

2. TEST FOR AN OPEN OUTSIDE REARVIEW MIRROR


6 7
1
8
9
16
MIRROR-OUTSIDE REARVIEW-DRIVER
6 7
1
8
9
16
MIRROR-OUTSIDE REARVIEW-PASSENGER
814c68ab

For the Driver Memory Mirror System, proceed as follows:

- Press the Rear Window Defogger (EBL) mode switch off.
- Turn the ignition off.
- Disconnect the Driver Outside Rearview Mirror connector.
- Connect a 12-volt test light between the (C110) Driver Mirror Heater Driver circuit and the (C910) Driver Mirror Heater Ground circuit.
- Turn the ignition on.
- Press the Rear Window Defogger (EBL) mode switch on.

For the Passenger Memory Mirror System, proceed as follows:

- Press the Rear Window Defogger (EBL) mode switch off.
- Turn the ignition off.
- Disconnect the Passenger Outside Rearview Mirror connector.
- Connect a 12-volt test light between the (C16) Passenger Mirror Heater Driver circuit and the (C917) Passenger Mirror Heater Ground circuit.
- Turn the ignition on.
- Press the Rear Window Defogger (EBL) mode switch on.

Does the test light illuminate brightly?

Yes >> Replace the Outside Rearview Mirror in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

B1D35, B1D39–MIRROR HEATER CONTROL CIRCUIT OPEN – MEMORY MIRROR MODULE (CONTINUED)

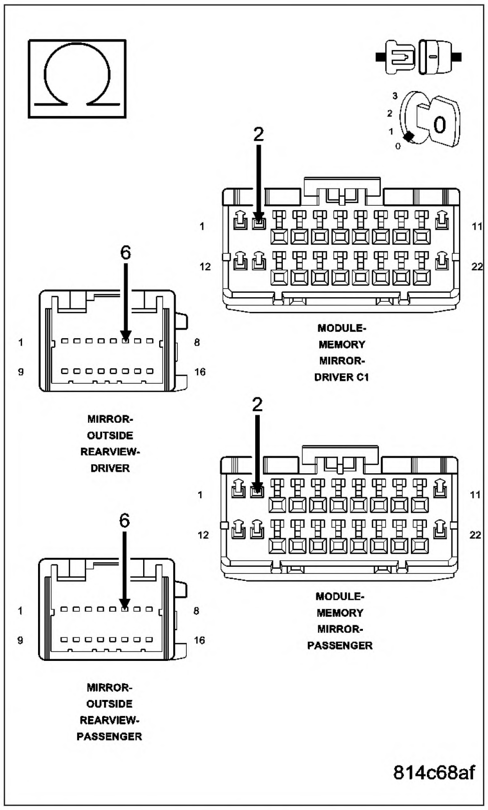
3. CHECK THE (C110) DRIVER MIRROR HEATER DRIVER CIRCUIT OR THE (C16) PASSENGER MIRROR HEATER DRIVER CIRCUIT FOR AN OPEN

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Measure the resistance of the (C110) Driver Mirror Heater Driver circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Measure the resistance of the (C16) Passenger Mirror Heater Driver circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.


Ω
3
2
1
0
O
2
1
11
12
22
6
1
8
9
16
MODULE-
MEMORY
MIRROR-
DRIVER C1
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
2
1
11
12
22
6
1
8
9
16
MODULE-
MEMORY
MIRROR-
PASSENGER
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
814c68af

Is the resistance below 2.0 ohms?

Yes >> Go To 4

No, Driver MMM

Repair the (C110) Driver Mirror Heater Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Repair the (C16) Passenger Mirror Heater Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D35, B1D39–MIRROR HEATER CONTROL CIRCUIT OPEN – MEMORY MIRROR MODULE (CONTINUED)

4. CHECK THE (C910) DRIVER MIRROR HEATER GROUND CIRCUIT OR THE (C917) PASSENGER MIRROR HEATER GROUND CIRCUIT FOR AN OPEN

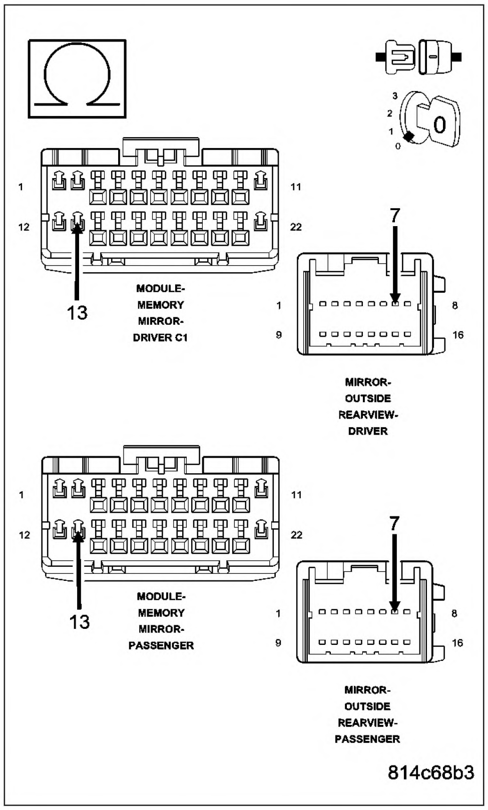
For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance of the (C910) Driver Mirror Heater Ground circuit between the Driver Outside Rearview Mirror connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance of the (C917) Passenger Mirror Heater Ground circuit between the Passenger Outside Rearview Mirror connector and the Passenger Memory Mirror Module connector.

Is the resistance below 2.0 ohms?


3
2
1
0
0
1
11
12
22
13
MODULE-
MEMORY
MIRROR-
DRIVER C1
7
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
DRIVER
1
11
12
22
13
MODULE-
MEMORY
MIRROR-
PASSENGER
7
1
8
9
16
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
814c68b3

Yes, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Repair the (C910) Driver Mirror Heater Ground circuit for an open.

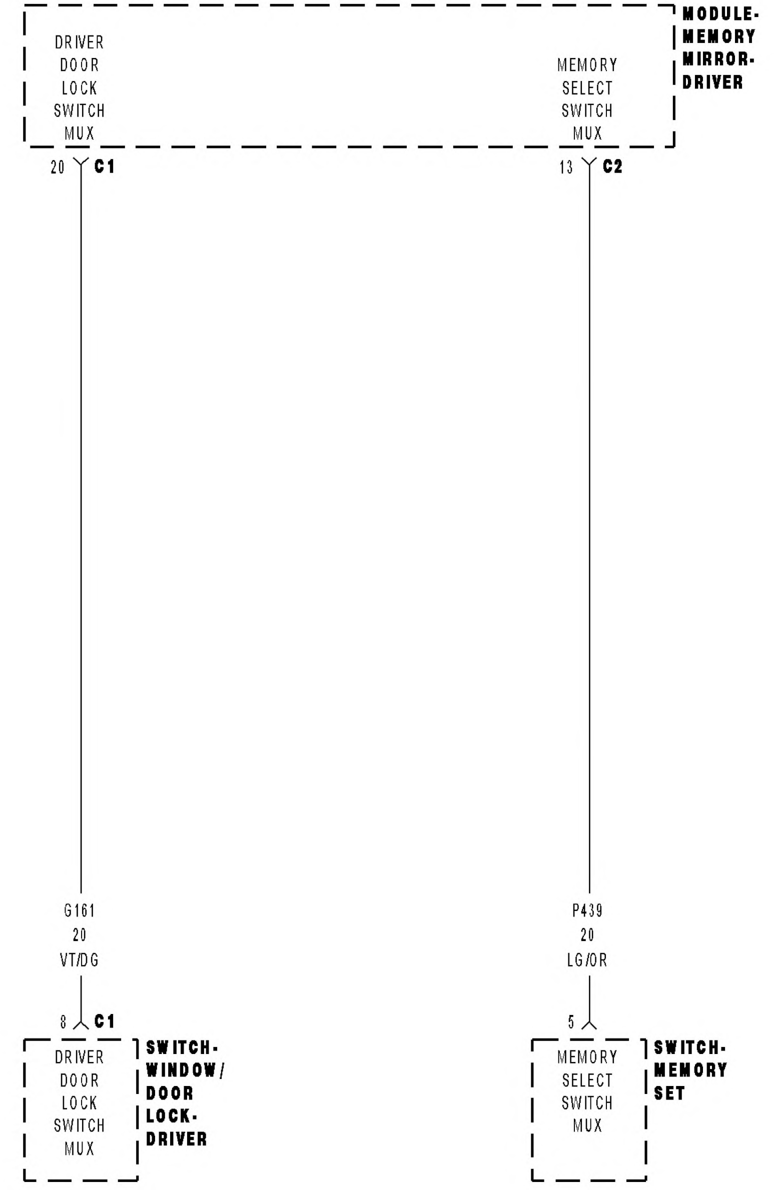
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

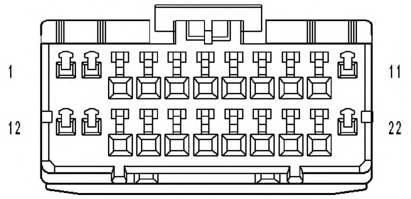
No, Passenger MMM

Repair the (C917) Passenger Mirror Heater Ground circuit for an open.

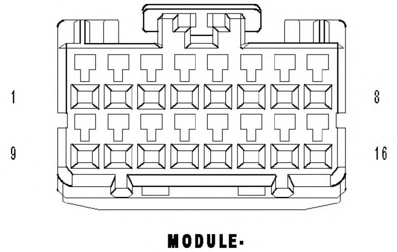
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D4C–MEMORY SWITCH INPUT CIRCUIT HIGH – DRIVER MEMORY MIRROR MODULE

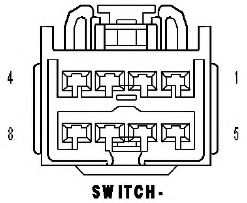

MODULE-
MEMORY
MIRROR-
DRIVER
DRIVER
DOOR
LOCK
SWITCH
MUX
MEMORY
SELECT
SWITCH
MUX
20 C1
13 C2
G161
20
VT/DG
P439
20
LG/OR
8 C1
5
DRIVER
DOOR
LOCK
SWITCH
MUX
SWITCH-
WINDOW/
DOOR
LOCK-
DRIVER
MEMORY
SELECT
SWITCH
MUX
SWITCH-
MEMORY
SET



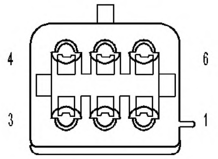
MODULE-
MEMORY
MIRROR-
DRIVER C1



MODULE-
MEMORY
MIRROR-
DRIVER C2



SWITCH-
WINDOW/
DOOR LOCK-
DRIVER C1



SWITCH-
MEMORY SET

814bede2

B1D4C–MEMORY SWITCH INPUT CIRCUIT HIGH – DRIVER MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Driver Memory Mirror Module senses voltage is greater than 5.25 volts for more than 60 ms on the (P439) Memory Select Switch Mux circuit or the (G161) Driver Door Lock Switch Mux circuit.

Possible Causes
(P439) MEMORY SELECT SWITCH MUX CIRCUIT SHORTED TO VOLTAGE
(G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORTED TO VOLTAGE
DRIVER WINDOW/DOOR LOCK SWITCH
DRIVER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Press the Memory Set Switch several time in all positions.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D4C MEMORY SWITCH INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

2. CHECK THE DRIVER WINDOW/DOOR LOCK SWITCH FOR A SHORT TO VOLTAGE

With the scan tool, erase DTCs.

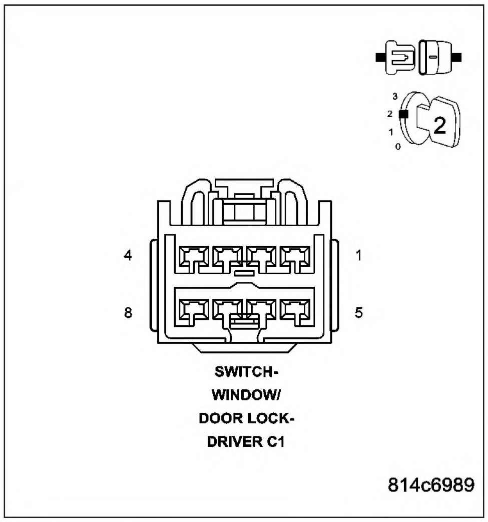
Turn the ignition off.

Disconnect the Driver Window/Door Lock Switch C1 connector.

Cycle the ignition 3 times.

Turn the ignition on.

With the scan tool, read DTCs.



Does the scan tool display: B1D4C MEMORY SWITCH INPUT CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Driver Window/Door Lock Switch in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D4C–MEMORY SWITCH INPUT CIRCUIT HIGH – DRIVER MEMORY MIRROR MODULE (CONTINUED)

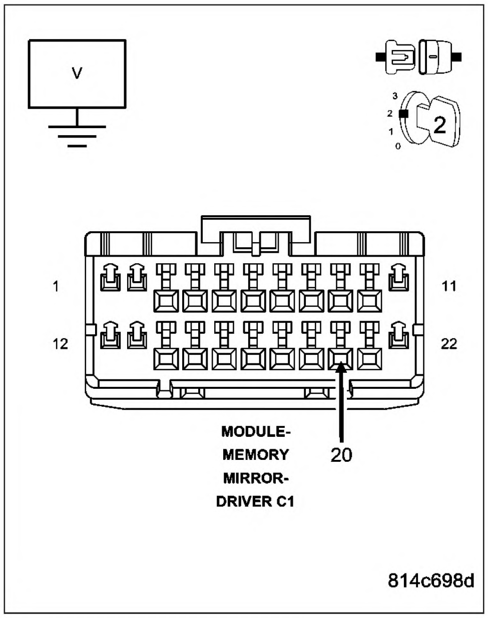
3. CHECK THE (G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Driver Memory Mirror Module C1 connector.

Turn the ignition on.

Measure the voltage of the (G161) Driver Door Lock Switch Mux circuit.



Is the voltage above 0.2 volts?

Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

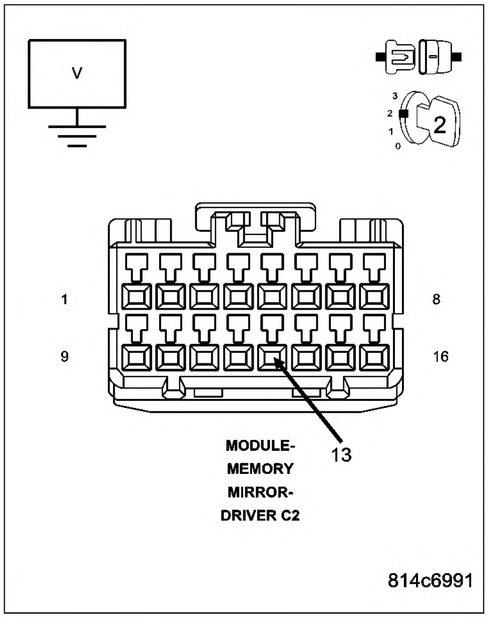
4. CHECK THE (P439) MEMORY SELECT SWITCH MUX CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Driver Memory Mirror Module C2 connector.

Turn the ignition on.

Measure the voltage of the (P439) Memory Select Switch Mux circuit.



Is the voltage above 0.2 volts?

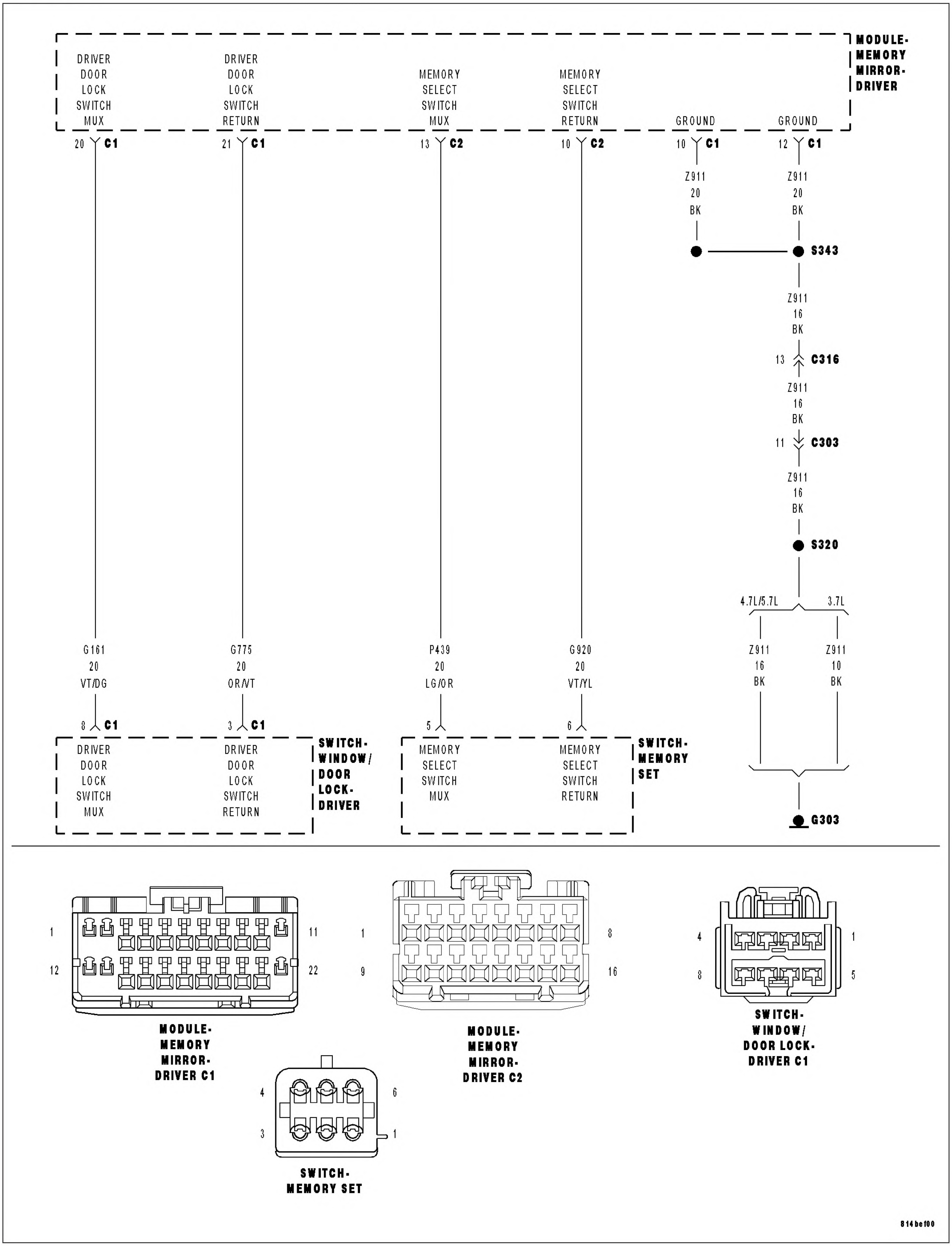
Yes >> Repair the (P439) Memory Select Switch Mux circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D4D–MEMORY SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE


MODULE-MEMORY MIRROR-DRIVER
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
GROUND
GROUND
20 C1
21 C1
13 C2
10 C2
10 C1
12 C1
Z911 20 BK
Z911 20 BK
S343
Z911 16 BK
13 C316
Z911 16 BK
11 C303
Z911 16 BK
S320
4.7L/5.7L
3.7L
Z911 16 BK
Z911 10 BK
G303
G161 20 VT/DG
G775 20 OR/VT
P439 20 LG/OR
G920 20 VT/YL
8 C1
3 C1
5
6
SWITCH-WINDOW/DOOR LOCK-DRIVER
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
SWITCH-MEMORY SET
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
1
11
12
22
MODULE-MEMORY MIRROR-DRIVER C1
1
8
9
16
MODULE-MEMORY MIRROR-DRIVER C2
4
1
8
5
SWITCH-WINDOW/DOOR LOCK-DRIVER C1
4
6
3
1
SWITCH-MEMORY SET
814bef00

B1D4D–MEMORY SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Driver Memory Mirror Module either receives a conflicting input from the (P439) Memory Select Switch Mux circuit or the (G161) Driver Door Lock Switch Mux circuit or the module senses voltage is less than 0.2 volts on the (P439) Memory Select Switch Mux circuit or the (G161) Driver Door Lock Switch Mux circuit.

Possible Causes
(G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORTED TO GROUND
(G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORTED TO (Z911) GROUND CIRCUIT
(G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORTED TO THE (G775) DRIVER DOOR LOCK SWITCH RETURN CIRCUIT
(P439) MEMORY SELECT SWITCH MUX CIRCUIT SHORTED TO GROUND
(P439) MEMORY SELECT SWITCH MUX CIRCUIT SHORTED TO THE (G920) MEMORY SELECT SWITCH RETURN CIRCUIT
DRIVER WINDOW/DOOR LOCK SWITCH
MEMORY SET SWITCH
DRIVER MEMORY MIRROR MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Press the Memory Set Switch several times in all positions.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B1D4D MEMORY SWITCH INPUT CIRCUIT STUCK?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D4D–MEMORY SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

2. CHECK THE DRIVER WINDOW/DOOR LOCK SWITCH FOR A SHORT TO GROUND

With the scan tool, erase DTCs.

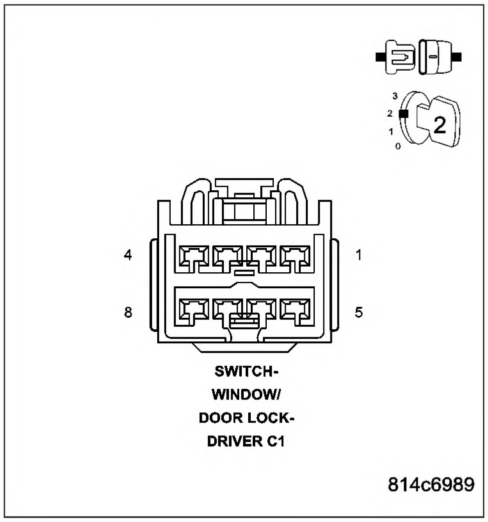
Turn the ignition off.

Disconnect the Driver Window/Door Lock Switch C1 connector.

Cycle the ignition 3 times.

Turn the ignition on.

With the scan tool, read DTCs.



Does the scan tool display: B1D4D MEMORY SWITCH INPUT CIRCUIT STUCK?

Yes >> Go To 3

No >> Replace the Driver Window/Door Lock Switch in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. CHECK THE MEMORY SET SWITCH FOR A SHORT TO GROUND

With the scan tool, erase DTCs.

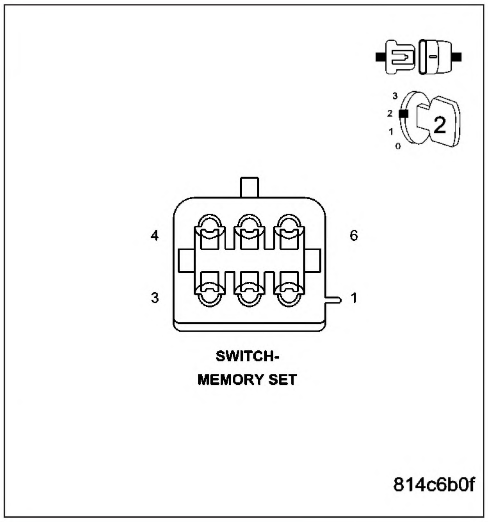
Turn the ignition off.

Disconnect the Memory Set Switch connector.

Cycle the ignition 3 times.

Turn the ignition on.

With the scan tool, read DTCs.



Does the scan tool display: B1D4D MEMORY SWITCH INPUT CIRCUIT STUCK?

Yes >> Go To 4

No >> Replace the Memory Set Switch in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

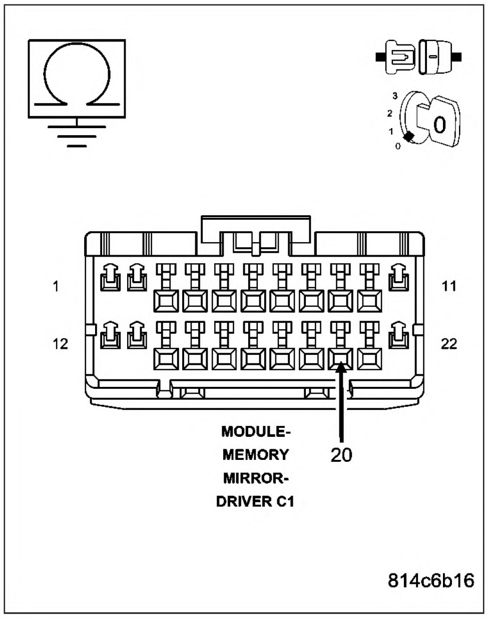
B1D4D–MEMORY SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

4. CHECK THE (G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Driver Memory Mirror Module C1 connector.

Measure the resistance between ground and the (G161) Driver Door Lock Switch Mux circuit in the Driver Memory Mirror Module C1 connector.



Is the resistance below 10000.0 ohms?

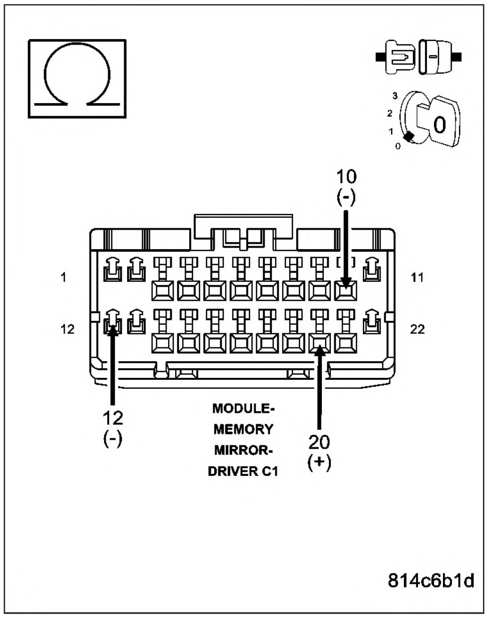
Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go to 5

---

5. CHECK THE (G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT FOR A SHORT TO THE (Z911) GROUND CIRCUIT

Measure the resistance between the (G161) Driver Door Lock Switch Mux circuit and the (Z911) Ground circuit in the Driver Memory Mirror Module C1 connector.



Is the resistance below 10000.0 ohms?

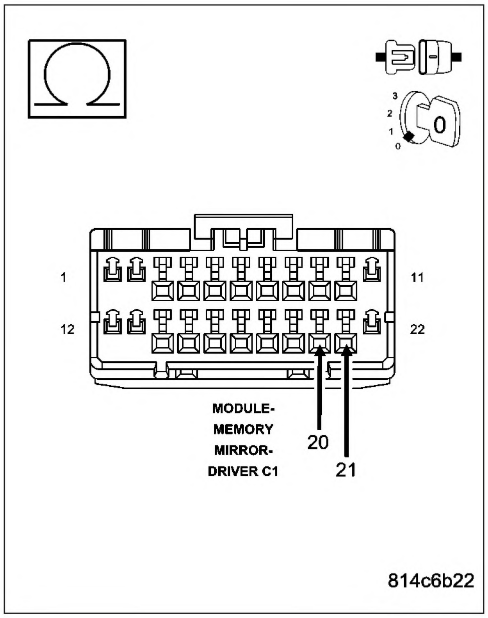
Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to the (Z911) Ground circuit.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1D4D–MEMORY SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

6. CHECK THE (G161) DRIVER DOOR LOCK SWITCH MUX CIRCUIT FOR A SHORT TO THE (G775) DRIVER DOOR LOCK SWITCH RETURN CIRCUIT

Measure the resistance between the (G161) Driver Door Lock Switch Mux circuit and the (G775) Driver Door Lock Switch Return circuit in the Driver Memory Mirror Module C1 connector.



Is the resistance below 10000.0 ohms?

Yes >> Repair the (G161) Driver Door Lock Switch Mux circuit for a short to the (G775) Driver Door Lock Switch Return circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

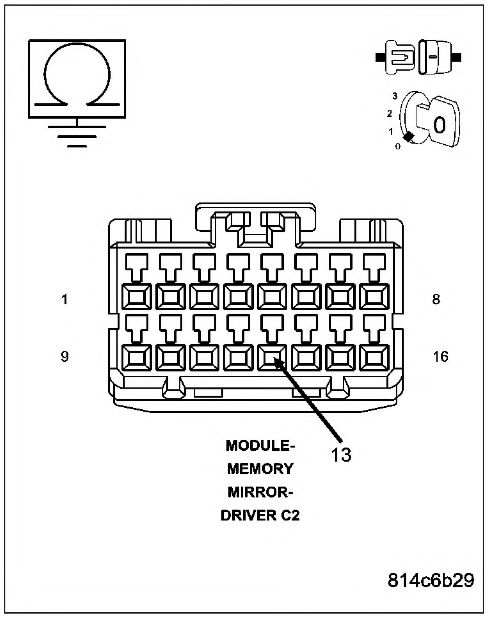
No >> Go To 7

---

7. CHECK THE (P439) MEMORY SELECT SWITCH MUX CIRCUIT FOR A SHORT TO GROUND

Disconnect the Driver Memory Mirror Module C2 connector.

Measure the resistance between ground and the (P439) Memory Select Switch Mux circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms?

Yes >> Repair the (P439) Memory Select Switch Mux circuit for a short to ground.

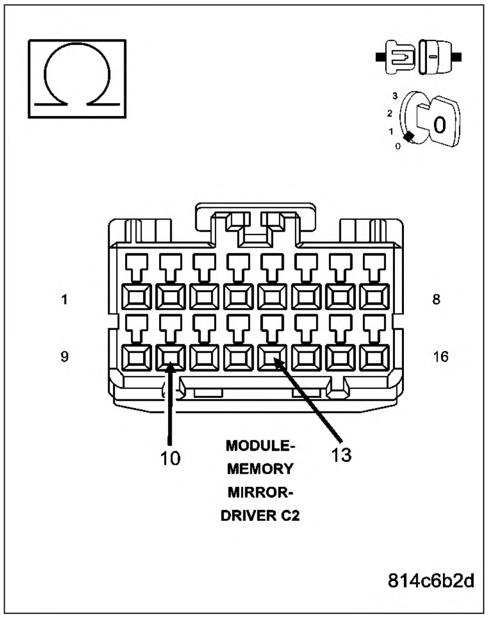
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 8

B1D4D–MEMORY SWITCH INPUT CIRCUIT STUCK – DRIVER MEMORY MIRROR MODULE (CONTINUED)

8. CHECK THE (P439) MEMORY SELECT SWITCH MUX CIRCUIT FOR A SHORT TO THE (G920) MEMORY SELECT SWITCH RETURN CIRCUIT

Measure the resistance between the (P439) Memory Select Switch Mux circuit and the (G920) Memory Select Switch Return circuit in the Driver Memory Mirror Module C2 connector.



Is the resistance below 10000.0 ohms?

Yes >> Repair the (P439) Memory Select Switch Mux circuit for a short to the (G920) Memory Select Switch return circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1D53–SWITCH POWER SUPPLY CIRCUIT LOW — DRIVER MEMORY MIRROR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Driver Memory Mirror Module detects an internal module failure.

Possible Causes
DRIVER MEMORY MIRROR MODULE

Diagnostic Test

1. REPLACE THE DRIVER MEMORY MIRROR MODULE

Repair

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B210D–BATTERY VOLTAGE LOW – MEMORY MIRROR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Driver / Passenger Memory Mirror Module senses voltage is less than 8.5 volts on the (A931) Fused B(+) circuit.

POSSIBLE CAUSES
FOR THE DRIVER MEMORY MIRROR SYSTEM:
BATTERY / CHARGING SYSTEM
(A931) FUSED B(+) CIRCUIT SHORTED
(A931) FUSED B(+) CIRCUIT OPEN
(Z911) GROUND CIRCUIT(S) OPEN
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
BATTERY / CHARGING SYSTEM
(A931) FUSED B(+) CIRCUIT SHORTED
(A931) FUSED B(+) CIRCUIT OPEN
(Z908) GROUND CIRCUIT OPEN
PASSENGER MEMORY MIRROR MODULE

NOTE: Since this DTC can set in the Driver Door Module (DDM) and in the Passenger Door Module (PDM) this procedure addresses both systems' circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. CHECK FOR ENGINE DTCs

Turn the ignition on.

With the scan tool, read engine DTCs.

Does the scan tool display any BATTERY VOLTAGE LOW related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) for the diagnostic test procedure(s).

No >> Go To 2

B210D–BATTERY VOLTAGE LOW – MEMORY MIRROR MODULE (CONTINUED)

2. VERIFY THAT THE DRIVER DOOR MODULE (DDM) OR PASSENGER DOOR MODULE (PDM) IS ACTIVE ON THE BUS

NOTE: Ensure that the IOD fuse is installed and that battery voltage is between 10.0 and 16.0 volts.
With the scan tool, select ECU view.

NOTE: A red X will display next to the module that is not communicating, indicating that the module is not active on the Bus network. A green check indicates that the module is active on the Bus network.

Does the scan tool display a red X next to the Driver or Passenger Door Module (DDM or PDM)?

Yes >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for No Response diagnostic test procedures.

No >> Go To 3

---

3. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTCs

Start the engine and run for 2 minutes.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: B210D BATTERY VOLTAGE LOW?

Yes >> Go To 4

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK FOR POWER ON THE (A931) FUSED B(+) CIRCUIT AT THE DRIVER OR PASSENGER MEMORY MIRROR MODULE

For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Turn the ignition on.
- Measure the voltage of the (A931) Fused B(+) circuit.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Turn the ignition on.
- Measure the voltage of the (A931) Fused B(+) circuit.

Is the voltage above 8.5 volts?

Yes >> Go To 5

No >> Repair the (A931) Fused B(+) circuit for an open or short.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B210D–BATTERY VOLTAGE LOW – MEMORY MIRROR MODULE (CONTINUED)

5. CHECK THE (Z911) OR THE (Z908) GROUND CIRCUITS FOR AN OPEN

For the Driver Memory Mirror System, proceed as follows:

- Measure the resistance between ground and both of the (Z911) ground circuits in the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Measure the resistance between ground and the (Z908) ground circuit in the Passenger Memory Mirror Module connector.

It the resistance below 2.0 ohms?

Yes, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Driver MMM

Repair the (Z911) ground circuit(s) for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Passenger MMM

Repair the (Z908) ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B210E–BATTERY VOLTAGE HIGH – MEMORY MIRROR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the Driver / Passenger Memory Mirror Module senses voltage is greater than 16.9 volts on the (A931) Fused B(+) circuit.

POSSIBLE CAUSES
BATTERY / CHARGING SYSTEM
DRIVER MEMORY MIRROR MODULE
PASSENGER MEMORY MIRROR MODULE

NOTE: Since this DTC can set in the Driver Door Module (DDM) and in the Passenger Door Module (PDM) this procedure addresses both systems' circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. CHECK FOR ENGINE DTCs

Turn the ignition on.

With the scan tool, read engine DTCs.

Does the scan tool display any BATTERY VOLTAGE HIGH related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) for the diagnostic test procedure(s).

No >> If DTC B210E BATTERY VOLTAGE HIGH set in the Driver Door Module (DDM), Go To 2. If DTC B210E BATTERY VOLTAGE HIGH set in the Passenger Door Module (PDM), Go To 3

---

2. TEST FOR INTERMITTENT CONDITION – DDM

With the scan tool, erase DTCs

Start the engine and run for 2 minutes.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read Driver Door Module (DDM) DTCs.

Does the scan tool display: B210E–BATTERY VOLTAGE HIGH?

Yes >> Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> The conditions that caused this code to set are not present at this time.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B210E–BATTERY VOLTAGE HIGH – MEMORY MIRROR MODULE (CONTINUED)

3. TEST FOR INTERMITTENT CONDITION – PDM

With the scan tool, erase DTCs

Start the engine and run for 2 minutes.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read Passenger Door Module (PDM) DTCs.

Does the scan tool display: B210E–BATTERY VOLTAGE HIGH?

Yes >> Replace the Passenger Memory Mirror Module in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> The conditions that caused this code to set are not present at this time.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2218–DOOR MODULE INTERNAL – DRIVER MEMORY MIRROR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At wake up or power up.
- **Set Condition:**
  If the Driver Memory Mirror Module detects a RAM, ROM, or Checksum failure.

Possible Causes
DRIVER MEMORY MIRROR MODULE

Diagnostic Test

1. REPLACE THE DRIVER MEMORY MIRROR MODULE

Repair

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2219–DOOR MODULE INTERNAL – PASSENGER MEMORY MIRROR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At wake up or power up.
- **Set Condition:**
  If the Passenger Memory Mirror Module detects a RAM, ROM, or Checksum failure.

Possible Causes
PASSENGER MEMORY MIRROR MODULE

Diagnostic Test

1. REPLACE THE PASSENGER MEMORY MIRROR MODULE

Repair

Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151–LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER (ORC)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154–LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155–LOST COMMUNICATION WITH CLUSTER/CCN

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156–LOST COMMUNICATION WITH EOM

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159–LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164–LOST COMMUNICATION WITH HVAC CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0167–LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168–LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169–LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184–LOST COMMUNICATION WITH RADIO

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186–LOST COMMUNICATION WITH AUDIO AMPLIFIER

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195–LOST COMMUNICATION WITH SDARS

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196–LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197–LOST COMMUNICATION WITH HANDS FREE PHONE MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199–LOST COMMUNICATION WITH DRIVER DOOR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200–LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208–LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209–LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212–LOST COMMUNICATION WITH SCCM - CAN-B

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231–LOST COMMUNICATION WITH RAIN SENSING MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

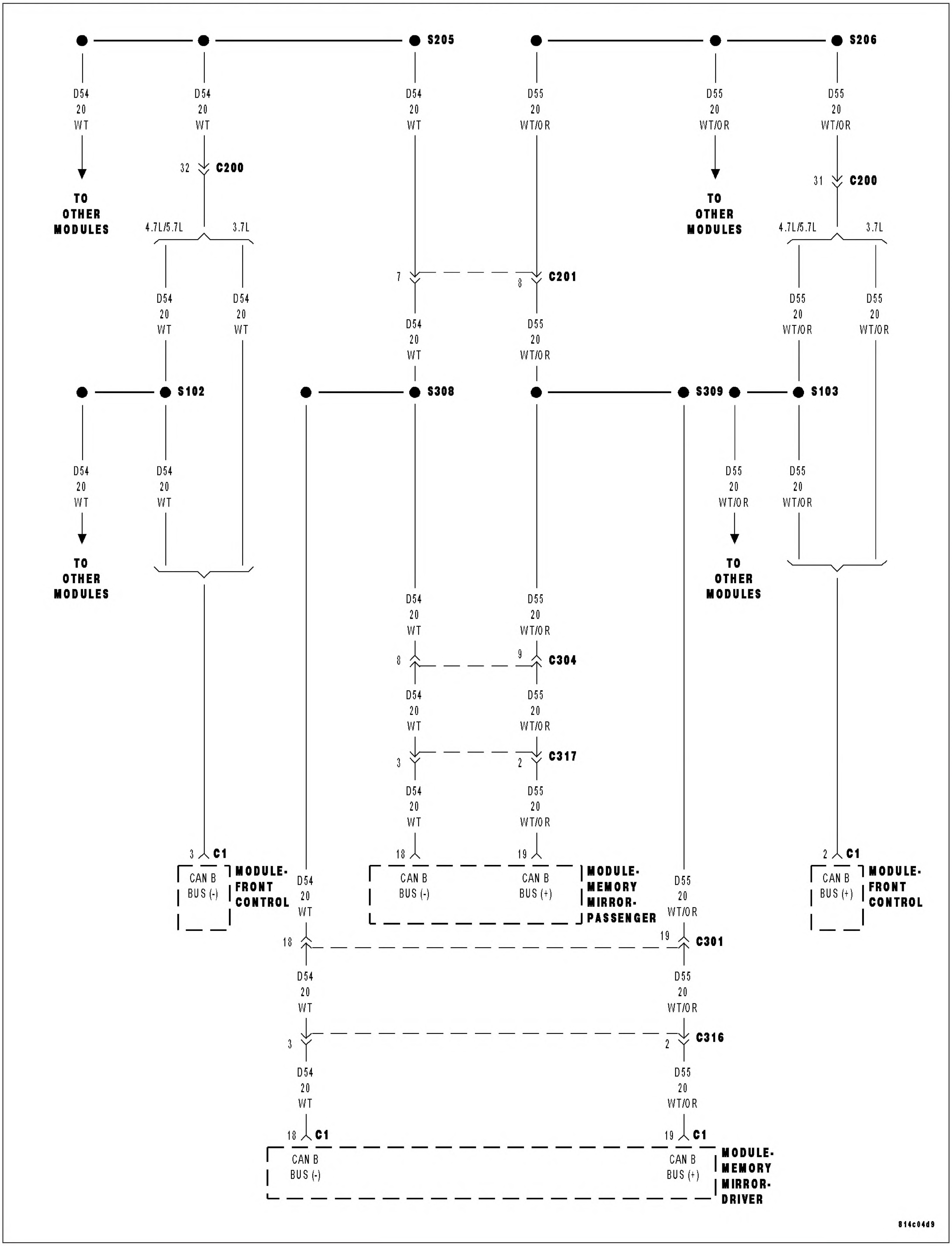
U0241–LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U1000–CAN B BUS (+) CIRCUIT– MEMORY MIRROR MODULE


S205
S206
D54 20 WT
D55 20 WT/OR
TO OTHER MODULES
32 C200
31 C200
4.7L/5.7L
3.7L
7 C201 8
S102
S308
S309
S103
8 C304 9
3 C317 2
3 C1
CAN B BUS (-)
MODULE-FRONT CONTROL
18 19
CAN B BUS (-)
CAN B BUS (+)
MODULE-MEMORY MIRROR-PASSENGER
2 C1
CAN B BUS (+)
MODULE-FRONT CONTROL
18 C301 19
3 C316 2
18 C1
19 C1
MODULE-MEMORY MIRROR-DRIVER
814c04d9

U1000–CAN B BUS (+) CIRCUIT– MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition in the run position.
- **Set Condition:**
  If the Driver / Passenger Memory Mirror Module senses that the (D55) Can B Bus (+) circuit is either open, or shorted to voltage, or shorted to ground.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
ACTIVE CAN B BUS DTCs IN FRONT CONTROL MODULE (FCM)
(D55) CAN B BUS (+) CIRCUIT OPEN TO DRIVER MEMORY MIRROR MODULE
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
ACTIVE CAN B BUS DTCs IN FRONT CONTROL MODULE (FCM)
(D55) CAN B BUS (+) CIRCUIT OPEN TO PASSENGER MEMORY MIRROR MODULE
PASSENGER MEMORY MIRROR MODULE

NOTE: Since this DTC can set in the Driver Door Module (DDM) and in the Passenger Door Module (PDM) this procedure addresses both systems' circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: U1000 CAN B BUS (+) CIRCUIT?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE (FCM)

With the scan tool, read Front Control Module (FCM) DTCs

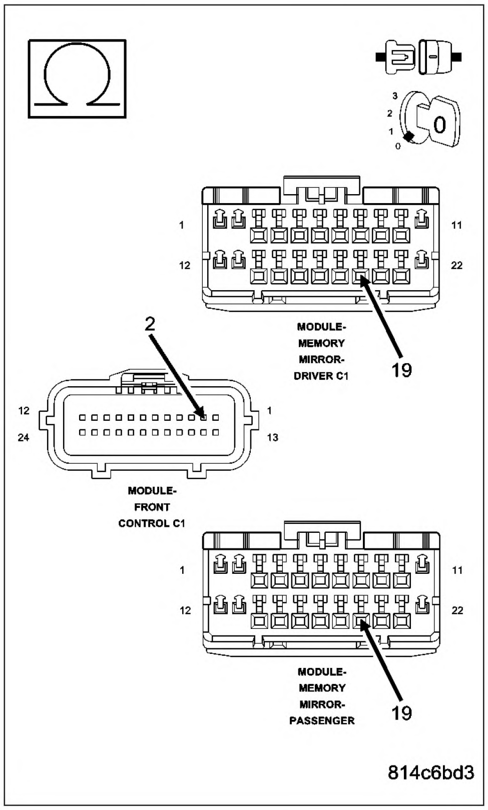
Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING).

No >> Go To 3

U1000–CAN B BUS (+) CIRCUIT– MEMORY MIRROR MODULE (CONTINUED)

3. CHECK THE (D55) CAN B BUS (+) CIRCUIT FOR AN OPEN BETWEEN THE FRONT CONTROL MODULE & THE DRIVER / PASSENGER MEMORY MIRROR MODULE



For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Disconnect the Front Control Module C1 connector.
- Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Disconnect the Front Control Module C1 connector.
- Measure the resistance of the (D55) Can B Bus (+) circuit between the Front Control Module C1 connector and the Passenger Memory Mirror Module connector.

Is the resistance below 2.0 ohms?

Yes, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

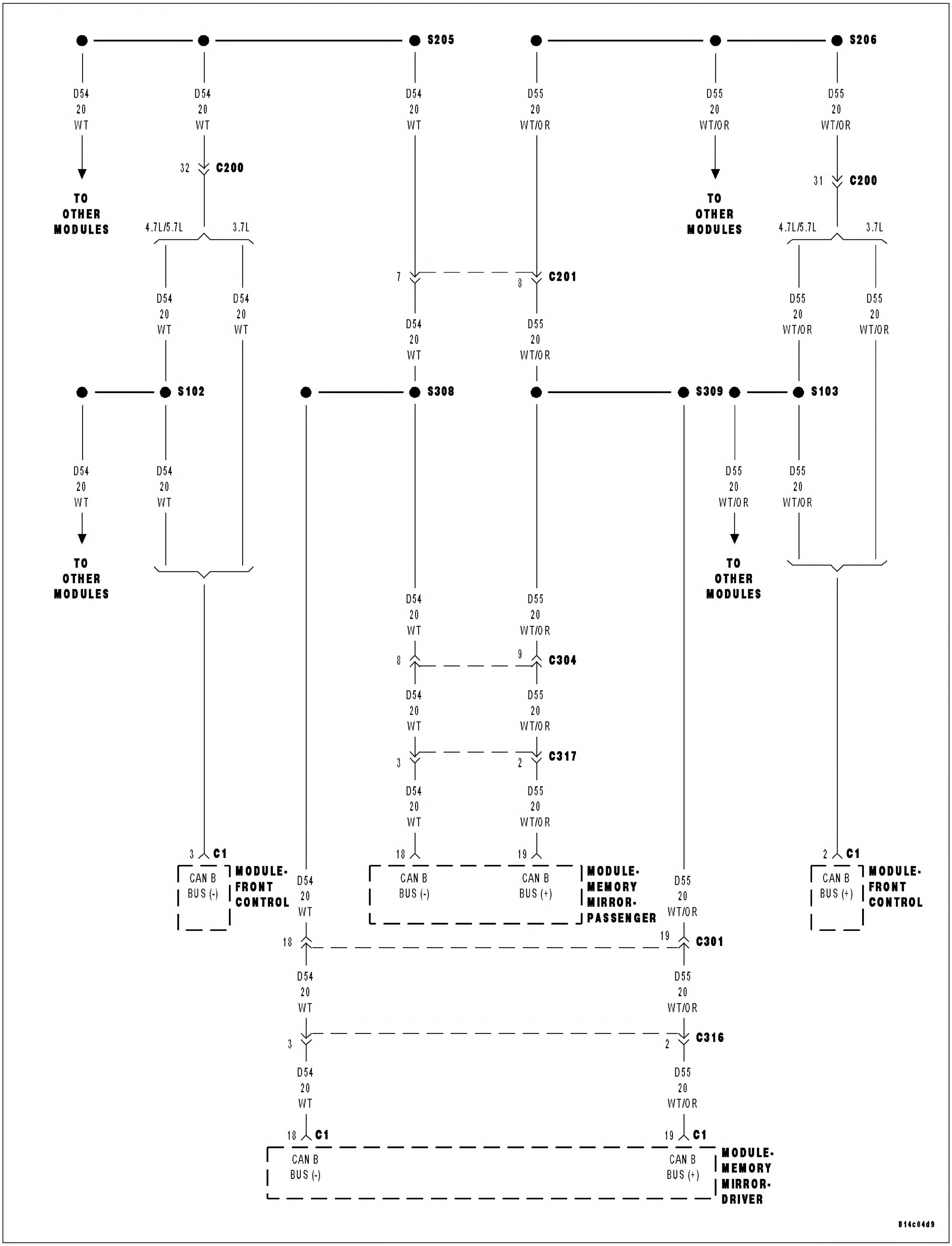
Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D55) Can B Bus (+) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U1001–CAN B BUS (-) CIRCUIT– MEMORY MIRROR MODULE


S205
S206
D54
20
WT
D55
20
WT/OR
32
31
C200
TO OTHER MODULES
4.7L/5.7L
3.7L
7
8
C201
S102
S308
S309
S103
9
C304
3
2
C317
18
19
C1
CAN B BUS (-)
CAN B BUS (+)
MODULE-FRONT CONTROL
MODULE-MEMORY MIRROR-PASSENGER
C301
C316
MODULE-MEMORY MIRROR-DRIVER
814c04d9

U1001–CAN B BUS (-) CIRCUIT– MEMORY MIRROR MODULE (CONTINUED)

For the Power Memory Mirror System circuit diagram (Refer to 8 - ELECTRICAL/POWER MIRRORS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition in the run position.
- **Set Condition:**
  If the Driver / Passenger Memory Mirror Module senses that the (D54) Can B Bus (-) circuit is either open, or shorted to voltage, or shorted to ground, or shorted together.

Possible Causes
FOR THE DRIVER MEMORY MIRROR SYSTEM:
ACTIVE CAN B BUS DTCs IN FRONT CONTROL MODULE (FCM)
(D54) CAN B BUS (-) CIRCUIT OPEN TO DRIVER MEMORY MIRROR MODULE
DRIVER MEMORY MIRROR MODULE
FOR THE PASSENGER MEMORY MIRROR SYSTEM:
ACTIVE CAN B BUS DTCs IN FRONT CONTROL MODULE (FCM)
(D54) CAN B BUS (-) CIRCUIT OPEN TO PASSENGER MEMORY MIRROR MODULE
PASSENGER MEMORY MIRROR MODULE

NOTE: Since this DTC can set in the Driver Door Module (DDM) and in the Passenger Door Module (PDM) this procedure addresses both systems' circuits and components. Select only that which applies to the system you are diagnosing.

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTCs.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTCs.

Does the scan tool display: U1001 CAN B BUS (-) CIRCUIT?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE (FCM)

With the scan tool, read Front Control Module (FCM) DTCs

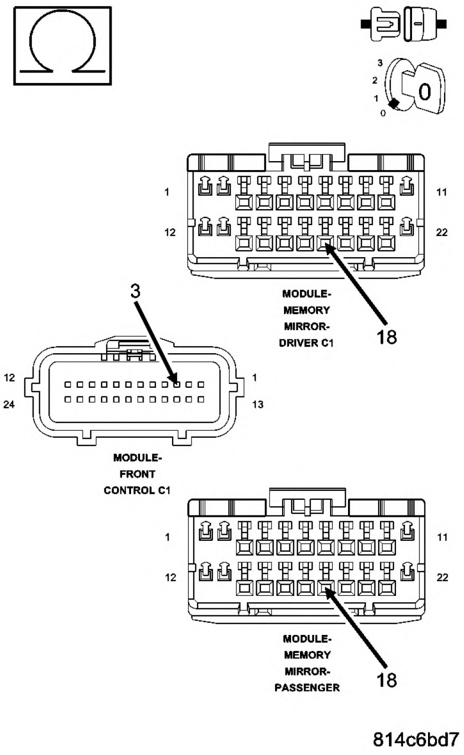
Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING).

No >> Go To 3

U1001–CAN B BUS (-) CIRCUIT– MEMORY MIRROR MODULE (CONTINUED)

3. CHECK THE (D54) CAN B BUS (-) CIRCUIT FOR AN OPEN BETWEEN THE FRONT CONTROL MODULE & THE DRIVER / PASSENGER MEMORY MIRROR MODULE



For the Driver Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Driver Memory Mirror Module C1 connector.
- Disconnect the Front Control Module C1 connector.
- Measure the resistance of the (D54) Can B Bus (-) circuit between the Front Control Module C1 connector and the Driver Memory Mirror Module C1 connector.

For the Passenger Memory Mirror System, proceed as follows:

- Turn the ignition off.
- Disconnect the Passenger Memory Mirror Module connector.
- Disconnect the Front Control Module C1 connector.
- Measure the resistance of the (D54) Can B Bus (-) circuit between the Front Control Module C1 connector and the Passenger Memory Mirror Module connector.

Is the resistance below 2.0 ohms?

Yes, Driver MMM

Replace the Driver Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes, Passenger MMM

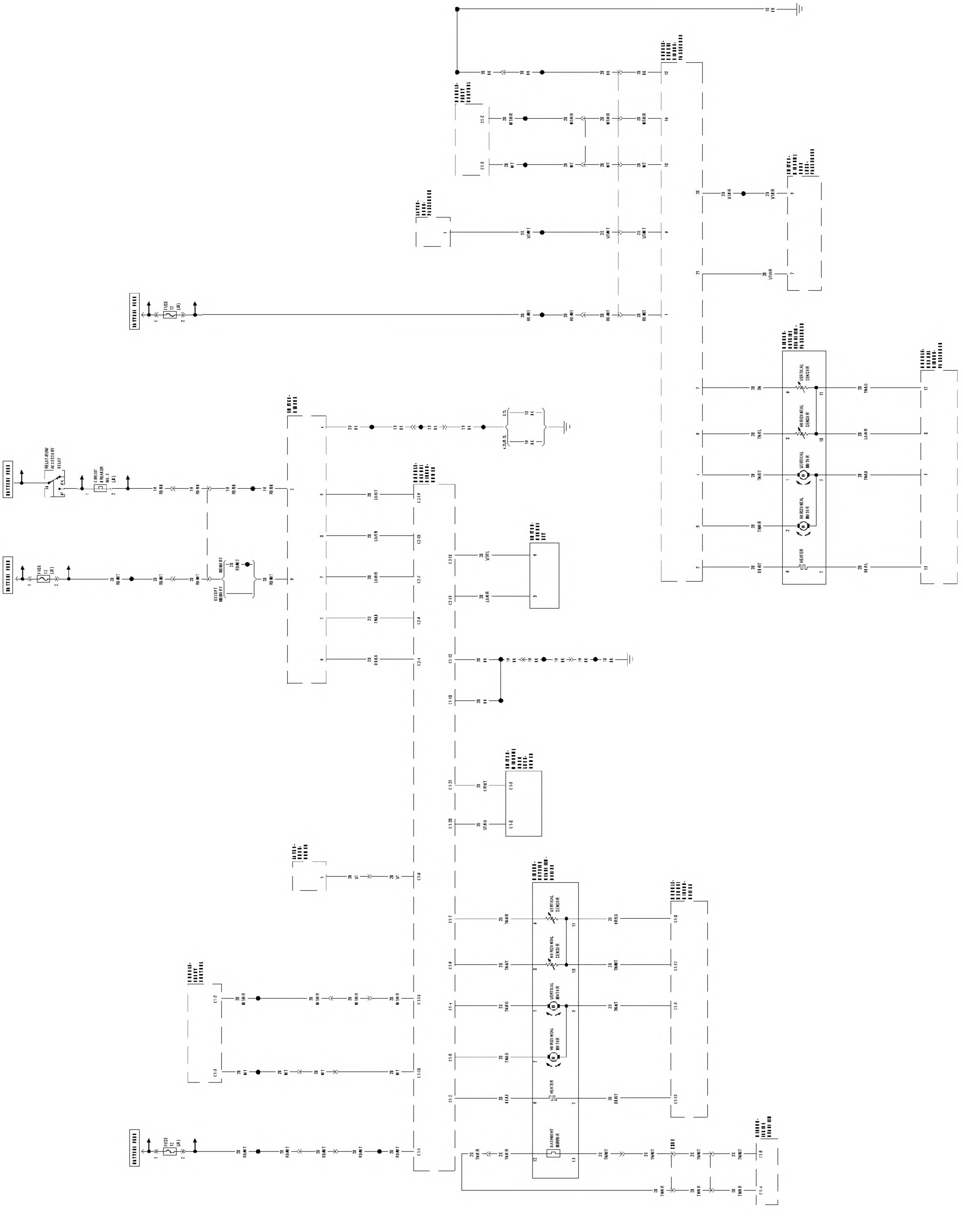
Replace the Passenger Memory Mirror Module in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D54) Can B Bus (-) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

SCHEMATICS AND DIAGRAMS



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POWER MEMORY MIRRORS SYSTEM

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POWER MIRRORS-SERVICE INFORMATION

DESCRIPTION

AUTOMATIC DAY/NIGHT MIRROR

The automatic day/night mirror system is able to automatically change the reflectance of the inside rear view mirror in order to reduce the glare of headlamps approaching the vehicle from the rear. The automatic day/night rear view mirror receives battery current through a fuse in the junction block only when the ignition switch is in the On position.

OUTSIDE REAR VIEW MIRROR

The power operated rear view mirrors allow the driver to adjust both outside mirrors electrically from the driver side front seat position by operating a switch on the driver side front door trim panel. The power mirrors receive a non-switched battery feed through a fuse in the junction block so that the system will remain operational, regardless of the ignition switch position.

OPERATION

AUTOMATIC DAY/NIGHT MIRROR

A switch located on the bottom of the automatic day/night mirror housing allows the vehicle operator to select whether the automatic dimming feature is operational. When the automatic day/night mirror is turned on, the mirror switch is lighted by an integral Light-Emitting Diode (LED). The mirror will automatically disable its self-dimming feature whenever the vehicle is being driven in reverse.

DIAGNOSIS AND TESTING

POWER MIRRORS

For complete circuit diagrams, refer to the appropriate wiring information.

1. Check the fuses in the Power Distribution Center (PDC) and the junction block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse(s).
2. Check for battery voltage at the fuse in the junction block. If OK, go to Step 3. If not OK, repair the open circuit to the PDC as required.
3. Disconnect and isolate the battery negative cable. Remove the driver side power window switch and bezel assembly and unplug the wire harness connector from the power mirror switch. Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity in the door wire harness half of the power mirror switch wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the junction block as required.

4. Disconnect and isolate the battery negative cable. Check for continuity between the ground circuit cavity in the door wire harness half of the power mirror switch wire harness connector and a good ground. There should be continuity. If OK, (Refer to 8 - ELECTRICAL/POWER MIRRORS/SIDEVIEW MIRROR - DIAGNOSIS AND TESTING). If not OK, repair open in the ground circuit.

MIRROR-INSIDE REARVIEW

DESCRIPTION

The automatic day/night mirror uses a thin layer of electrochromic material between two pieces of conductive glass to make up the face of the mirror. When the mirror switch is in the On position, two photocell sensors are used by the mirror circuitry to monitor external light levels and adjust the reflectance of the mirror.

OPERATION

The ambient photocell sensor is located on the forward-facing (windshield side) of the rear view mirror housing, and detects the ambient light levels outside of the vehicle. The headlamp photocell sensor is located inside the rear view mirror housing behind the mirror glass and faces rearward, to detect the level of the light being received at the rear window side of the mirror. When the circuitry of the automatic day/night mirror detects that the difference between the two light levels is too great (the light level received at the rear of the mirror is much higher than that at the front of the mirror), it begins to darken the mirror.

The automatic day/night mirror circuitry also monitors the transmission using an input from the backup lamp circuit. The mirror circuitry is programmed to automatically disable its self-dimming feature whenever it senses that the transmission backup lamp circuit is energized.

The automatic day/night mirror is a completely self-contained unit and cannot be repaired. If faulty or damaged, the entire mirror assembly must be replaced.

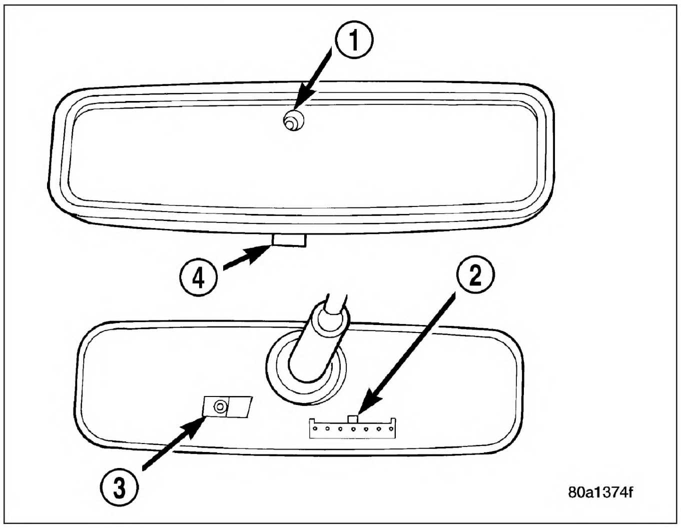
DIAGNOSIS AND TESTING

AUTOMATIC DAY/NIGHT MIRROR

For complete circuit diagrams, refer to the appropriate wiring information.

1. Check the fuse in the junction block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.
2. Turn the ignition switch to the On position. Check for battery voltage at the fuse in the junction block. If OK, go to Step 3. If not OK, repair the open circuit to the ignition switch as required.
3. Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Unplug the wire harness connector from the automatic day/night mirror. Connect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the automatic day/night mirror wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the junction block as required.

4. Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Check for continuity between the ground circuit cavity of the automatic day/night mirror wire harness connector and a good ground. There should be continuity. If OK, go to Step 5. If not OK, repair the circuit to ground as required.
5. Connect the battery negative cable. Turn the ignition switch to the On position. Apply the parking brake. Place the transmission gear selector lever in the Reverse position. Check for battery voltage at the backup lamp switch output circuit cavity of the automatic day/night mirror wire harness connector. If OK, go to Step 6. If not OK, repair the open circuit as required.



6. Turn the ignition switch to the Off position. Disconnect the battery negative cable. Plug in the automatic day/night mirror wire harness connector. Connect the battery negative cable. Turn the ignition switch to the On position. Place the transmission gear selector lever in the Neutral position. Place the mirror switch in the On (the LED in the mirror switch is lighted) position. Cover the forward facing ambient photocell sensor to keep out any ambient light.

NOTE: The ambient photocell sensor must be covered completely, so that no light reaches the sensor. Use a finger pressed tightly against the sensor, or cover the sensor completely with electrical tape.

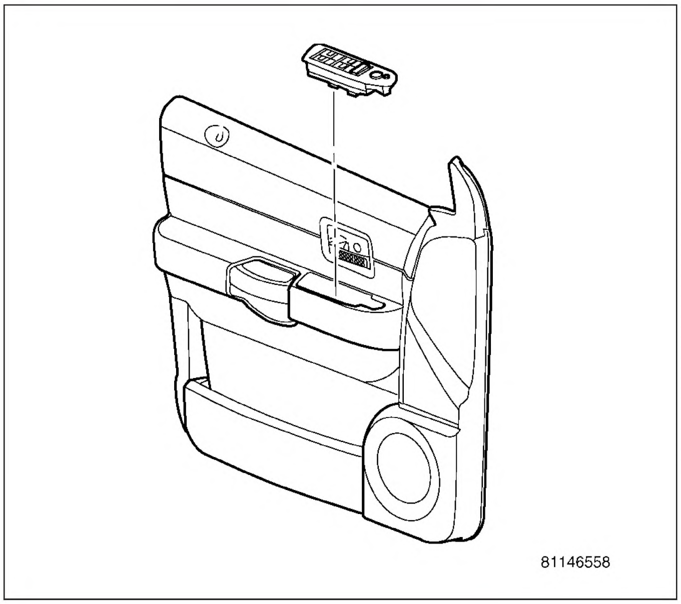
7. Shine a light into the rearward facing headlamp photocell sensor. The mirror glass should darken. If OK, go to Step 8. If not OK, replace the faulty automatic day/night mirror unit.
8. With the mirror glass darkened, place the transmission gear selector lever in the Reverse position. The mirror should return to its normal reflectance. If not OK, replace the faulty automatic day/night mirror.

SWITCH-MIRROR

DESCRIPTION

A power mirror switch is located on the driver's door trim panel, attached to the window/lock switch. The power mirror switch includes the following:

- **Power Mirror Selector Switch -** A three-position rotary joystick switch selects the right or left power mirror for adjustment, or turns the power mirror system Off in the center position.
- **Power Mirror Adjustment Switch -** A momentary joystick directional switch allows the driver to adjust the selected power mirror in the Up, Down, Right or Left directions.



OPERATION

The power mirror switch circuitry is connected to battery current through a fuse in the IPM on a fused B(+) circuit so that the power mirrors remain operational regardless of the ignition switch position. A rotary joystick selector switch has three positions, one to select the right mirror, one to select the left mirror, and a center Off position. After the right or left mirror is selected, the joystick is moved to move the selected mirror Up, Down, Right or Left. In vehicles without Memory Mirrors the power mirror switch circuitry controls the battery current and ground feeds to each of the four (two in each mirror head) power mirror motors. In vehicles with Memory Mirrors the mirror switch connects to the driver power mirror module. The driver memory mirror module uses the mirror switch inputs to control the battery current and ground feeds to driver mirror motor and sends a CAN Bus message to the passenger mirror module. The passenger mirror module controls the battery current and ground feeds to passenger mirror motors based on the CAN bus message from the driver memory module.

DIAGNOSIS AND TESTING

POWER MIRROR SWITCH

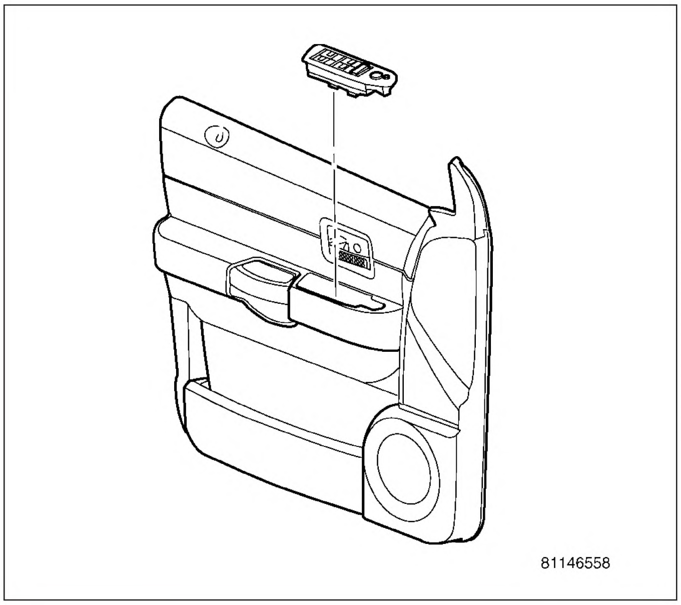
1. Disconnect and isolate the battery negative cable. Remove the power mirror switch. Disconnect the wire harness connector from the switch.
2. Test the switch continuity. See the Switch Tests chart to determine if the continuity is correct for the suspect switch in each switch position. If not OK, replace the inoperative switch as required.

POWER MIRROR SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN PINS OF MIRROR SWITCH
LEFT MIRROR SELECTED	
UP	PINS 5 & 7, PINS 4 & 3
DOWN	PINS 4 & 7, PINS 5 & 3
RIGHT	PINS 4 & 9, PINS 5 & 3
LEFT	PINS 4 & 3, PINS 5 & 9
RIGHT MIRROR SELECTED	
UP	PINS 4 & 3, PINS 5 & 6
DOWN	PINS 4 & 6, PINS 5 & 3
RIGHT	PINS 4 & 8, PINS 5 & 3
LEFT	PINS 4 & 3, PINS 5 & 8

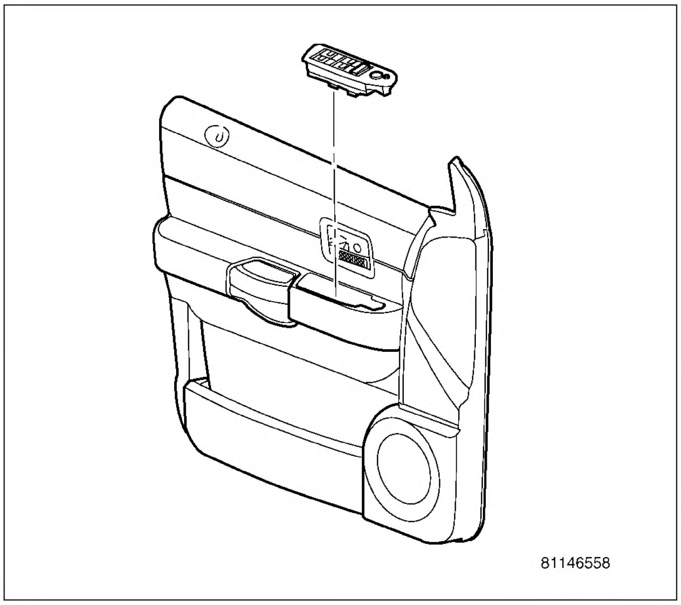
REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the door trim panel.
3. Remove the power mirror switch from the door trim panel by twisting switch.



INSTALLATION

1. Install power mirror switch to door trim panel.
2. Connect wire harness connectors to switches.
3. Install door trim panel.
4. Connect battery negative cable.



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POWER SEATS - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1D62–POWER SEAT SWITCH STUCK

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Memory Seat Module detects the switch engaged in an active position for over 50 seconds, this code will set.

Possible Causes
DRIVER SEAT SWITCH

Diagnostic Test

1. **TEST FOR INTERMITTENT CONDITION**

Turn the ignition on.

With the scan tool, record and erase DTC’s

Press the Seat Switch in all directions several times.

Wait one minute.

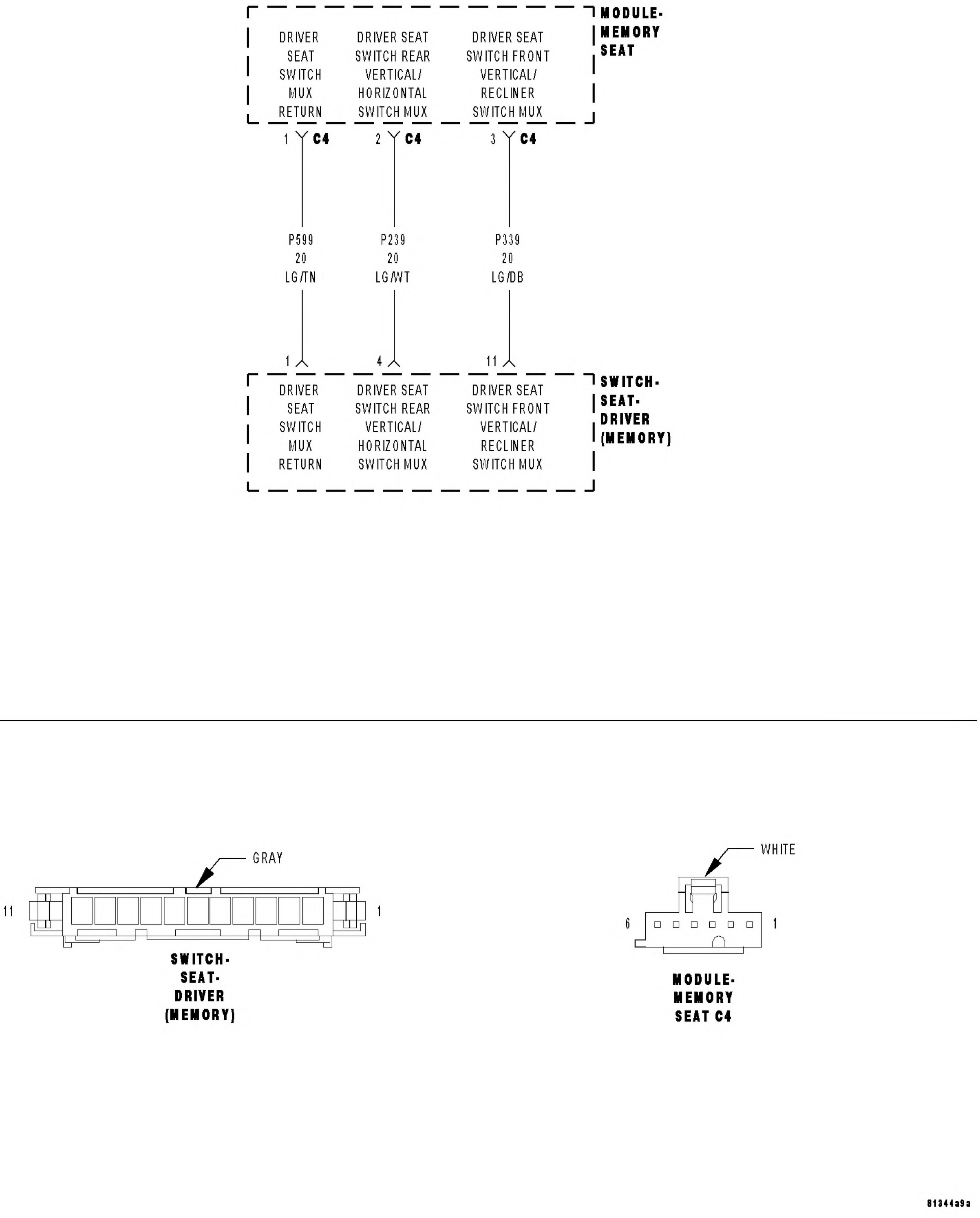
With the scan tool, read DTC’s.

Does the scan tool display B1D62–POWER SEAT SWITCH STUCK?

Yes >> Replace the Driver Seat Switch as necessary.
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D63–POWER SEAT SWITCH OPEN


MODULE-MEMORY SEAT
DRIVER SEAT SWITCH MUX RETURN
DRIVER SEAT SWITCH REAR VERTICAL/ HORIZONTAL SWITCH MUX
DRIVER SEAT SWITCH FRONT VERTICAL/ RECLINER SWITCH MUX
1 C4
2 C4
3 C4
P599 20 LG/TN
P239 20 LG/WT
P339 20 LG/DB
1
4
11
SWITCH-SEAT-DRIVER (MEMORY)
DRIVER SEAT SWITCH MUX RETURN
DRIVER SEAT SWITCH REAR VERTICAL/ HORIZONTAL SWITCH MUX
DRIVER SEAT SWITCH FRONT VERTICAL/ RECLINER SWITCH MUX
GRAY
11
1
SWITCH-SEAT-DRIVER (MEMORY)
WHITE
6
1
MODULE-MEMORY SEAT C4
81344a9a

B1D63–POWER SEAT SWITCH OPEN (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  When the Memory Seat Module detects an open driver seat switch MUX circuit this code will set.

Possible Causes
(P239) DRIVER SEAT REAR VERTICAL/HORIZONTAL SWITCH MUX OPEN
(P339) DRIVER SEAT FRONT VERTICAL/RECLINER SWITCH MUX OPEN
(P599) DRIVER SEAT SWITCH MUX RETURN OPEN
DRIVER SEAT SWITCH
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Press the Seat Switch in all directions several times.

Wait one minute.

With the scan tool, read DTC's.

Does the scan tool display B1D63–POWER SEAT SWITCH OPEN?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

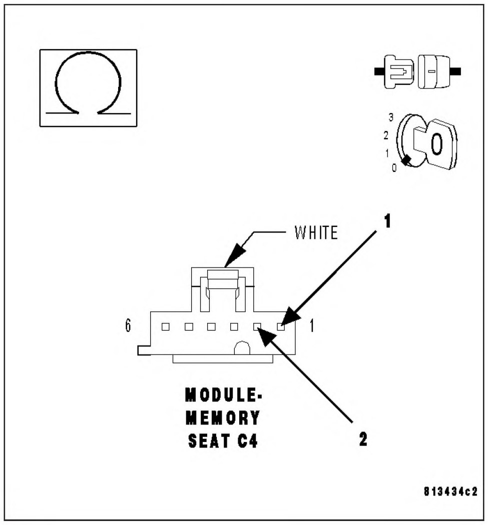
---

2. CHECK THE (P239) DRIVER SEAT REAR VERTICAL/HORIZONTAL SWITCH MUX CIRCUIT RESISTANCE

Disconnect the Memory Seat Module C4 connector.

NOTE: Check connectors - Clean and repair as necessary.

Measure the resistance between the (P239) Driver Seat Rear Vertical/Horizontal Switch MUX circuit and the (P599) Driver Seat Switch MUX Return circuit in the C4 connector.



Is the resistance 47.0 ohms + or – 1.0?

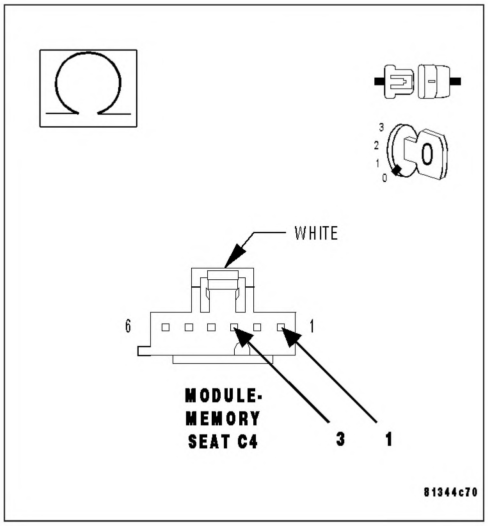
Yes >> Go To 3

No >> Go To 5

B1D63–POWER SEAT SWITCH OPEN (CONTINUED)

3. CHECK THE (P339) DRIVER SEAT FRONT VERTICAL/RECLINER SWITCH MUX CIRCUIT RESISTANCE

Measure the resistance between the (P339) Driver Seat Front Vertical/Recliner Switch MUX circuit and the (P599) Driver Seat Switch MUX Return circuit in the C4 connector.


Ω
3
2
1
0
0
WHITE
6
1
MODULE-MEMORY SEAT C4
3
1
81344c70

Is the resistance 47.0 ohms + or – 1.0?

Yes >> Replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 4

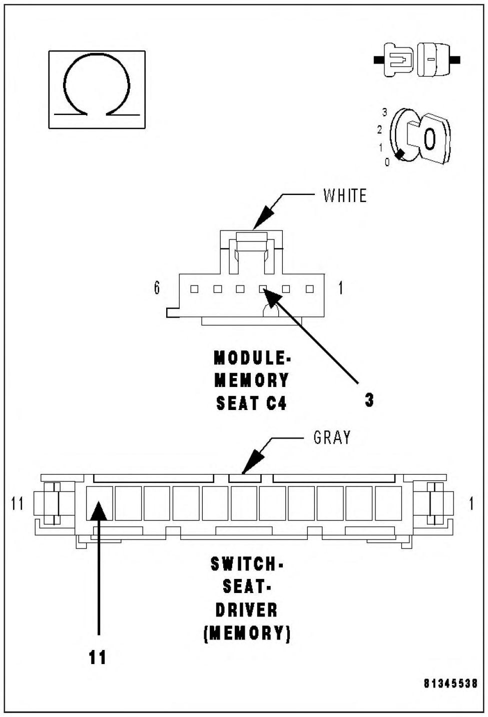
---

4. CHECK THE (P339) DRIVER SEAT FRONT VERTICAL/RECLINER SWITCH MUX WIRE RESISTANCE

Disconnect the Driver Seat Switch.

NOTE: Check connectors - Clean and repair as necessary.

Measure the resistance of the (P339) Driver Seat Front Vertical/Recliner Switch MUX circuit between the C4 connector and the Driver Seat Switch connector.


Ω
3
2
1
0
0
WHITE
6
1
MODULE-MEMORY SEAT C4
3
GRAY
11
1
SWITCH-SEAT-DRIVER (MEMORY)
11
81345538

Is the resistance below 1.0 ohm?

Yes >> Replace the Driver Seat Switch.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

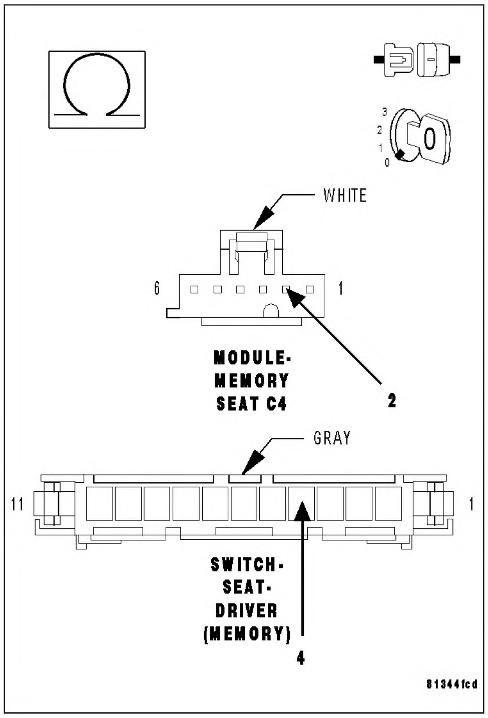
No >> Repair the (P339) Driver Seat Front Vertical/Recliner Switch MUX circuit for an open.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D63–POWER SEAT SWITCH OPEN (CONTINUED)

5. CHECK THE (P239) DRIVER SEAT REAR VERTICAL/HORIZONTAL SWITCH MUX WIRE RESISTANCE

Measure the resistance of the (P239) Driver Seat Rear Vertical/Horizontal Switch MUX circuit between the C4 connector and the Driver Seat Switch connector.


WHITE
6
1
MODULE-
MEMORY
SEAT C4
2
GRAY
11
1
SWITCH-
SEAT-
DRIVER
(MEMORY)
4
81344fcd

Is the resistance below 1.0 ohm?

Yes >> Go To 6

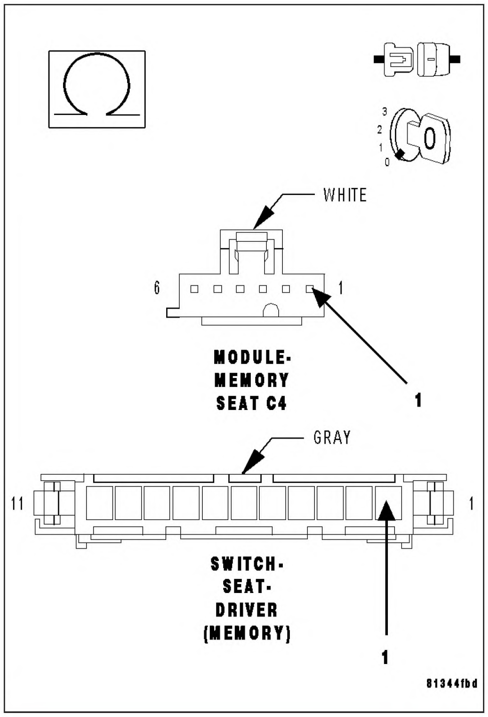
No >> Repair the (P239) Driver Seat Rear Vertical/Horizontal Switch MUX circuit for an open.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

---

6. CHECK THE (P599) DRIVER SEAT SWITCH MUX RETURN WIRE RESISTANCE

Measure the resistance of the (P599) Driver Seat Switch MUX Return circuit between the C4 connector and the Driver Seat Switch connector.


WHITE
6
1
MODULE-
MEMORY
SEAT C4
1
GRAY
11
1
SWITCH-
SEAT-
DRIVER
(MEMORY)
1
81344fbd

Is the resistance below 1.0 ohm?

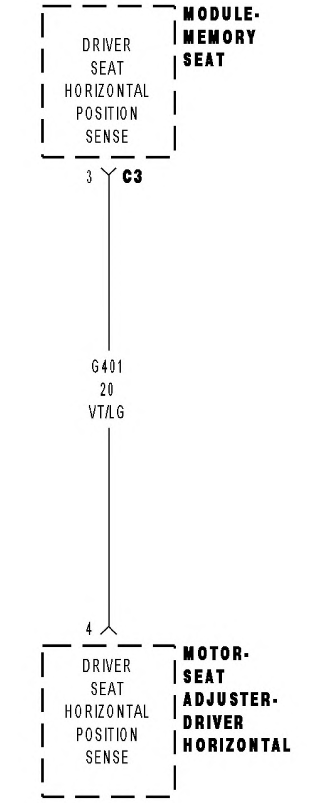
Yes >> Replace the Driver Seat Switch.

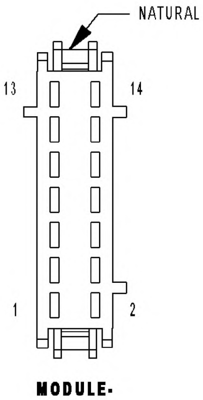
Perform BODY VERIFICATION TEST – VER 1 (Refer to BODY VERIFICATION TEST - VER 1).

No >> Repair the (P599) Driver Seat Switch MUX Return circuit for an open.

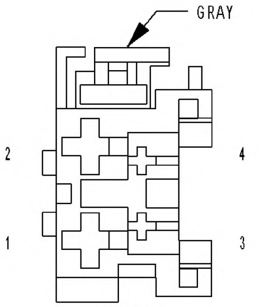
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D6D–SEAT HORIZONTAL POSITION SENSOR CIRCUIT LOW


DRIVER
SEAT
HORIZONTAL
POSITION
SENSE
MODULE-
MEMORY
SEAT
3
C3
G401
20
VT/LG
4
DRIVER
SEAT
HORIZONTAL
POSITION
SENSE
MOTOR-
SEAT
ADJUSTER-
DRIVER
HORIZONTAL


NATURAL
13
14
1
2

MODULE-
MEMORY
SEAT C3



MOTOR-
SEAT ADJUSTER-
DRIVER HORIZONTAL

813480aa

B1D6D–SEAT HORIZONTAL POSITION SENSOR CIRCUIT LOW (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If sensor voltage is not within a specified range this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G401) DRIVER SEAT HORIZONTAL POSITION SENSE CIRCUIT SHORTED TO GROUND
DRIVER HORIZONTAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC’s

Move the Seat Switch in the Horizontal position 3 times.

With the scan tool, read DTC’s.

Does the scan tool display B1D6D–SEAT HORIZONTAL POSITION SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

---

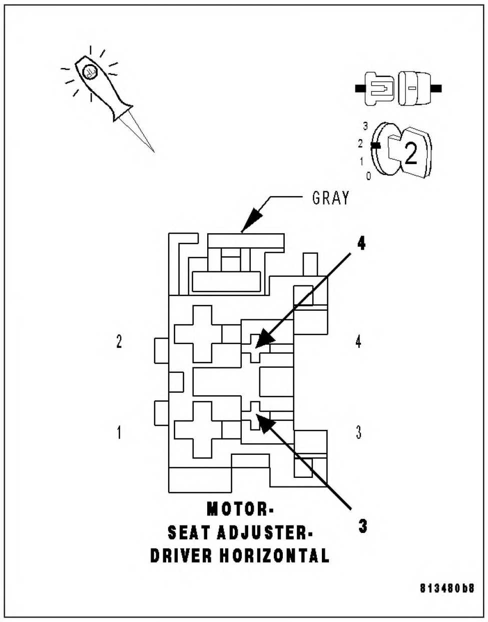
2. CHECK THE (G401) DRIVER SEAT HORIZONTAL POSITION SENSE VOLTAGE

Disconnect the Driver Horizontal Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

Move the Seat Switch in the Horizontal position during the next step.

Using a 12-volt test light connect one lead to the (G401) Driver Seat Horizontal Position Sense circuit and the other lead to Driver Seat Horizontal Sensor Ground at the Driver Horizontal Seat Adjuster Motor connector.



Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

Yes >> Replace the seat track horizontal motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 3

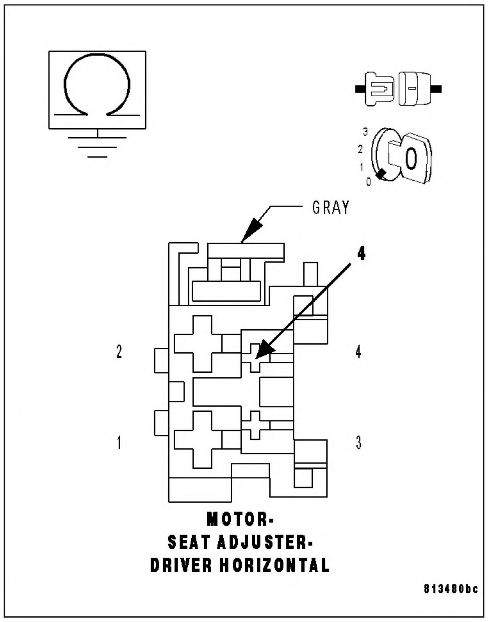
B1D6D–SEAT HORIZONTAL POSITION SENSOR CIRCUIT LOW (CONTINUED)

3. CHECK THE (G401) DRIVER SEAT HORIZONTAL POSITION SENSE WIRE FOR A SHORT TO GROUND

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (G401) Driver Seat Horizontal Position Sense wire at the Driver Horizontal Seat Adjuster Motor connector to ground.



Is the resistance below 1000.0 ohm?

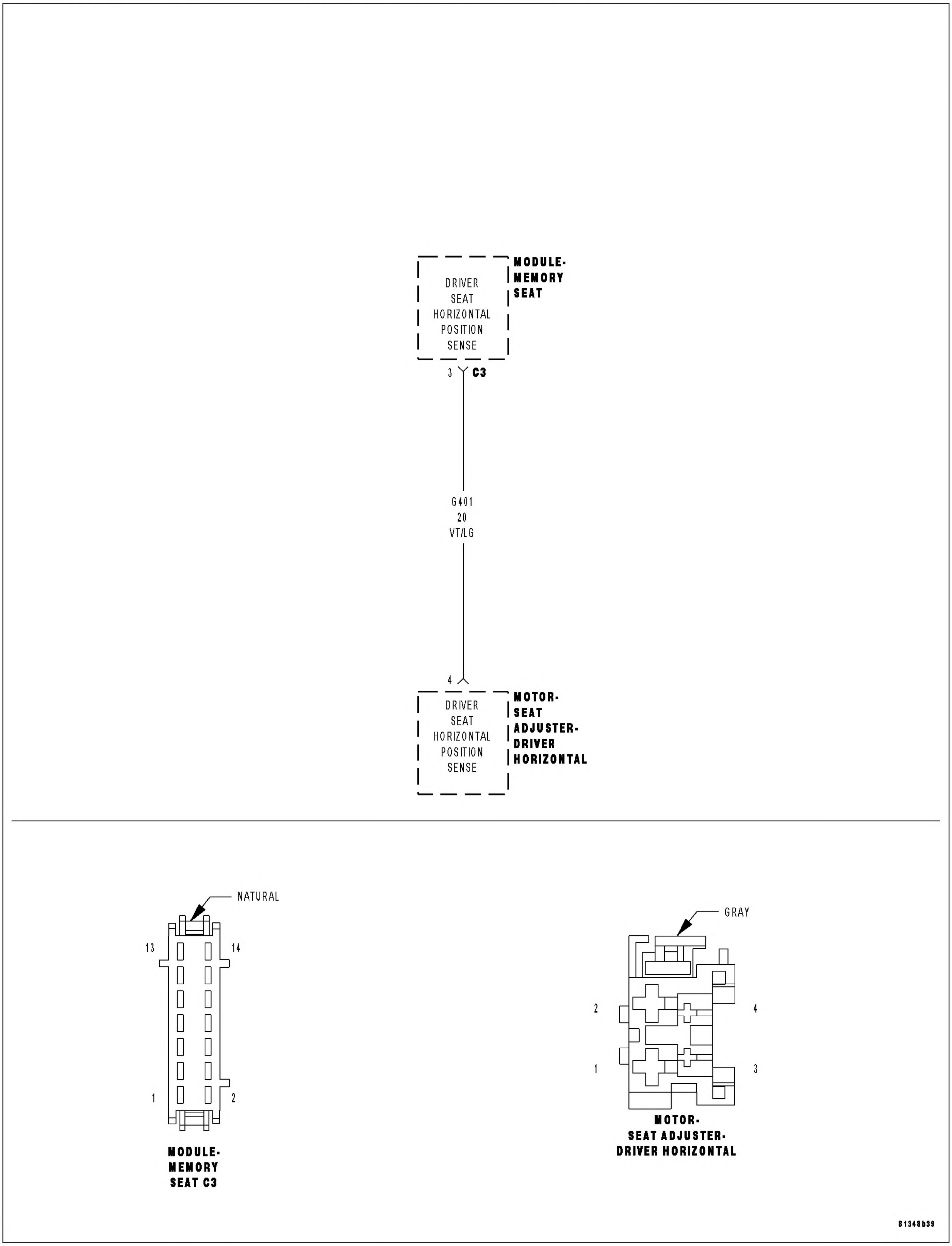
Yes >> Repair the (G401) Driver Seat Horizontal Position Sense circuit for a short to ground.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D6E–SEAT HORIZONTAL POSITION SENSOR CIRCUIT HIGH


MODULE-
MEMORY
SEAT
DRIVER
SEAT
HORIZONTAL
POSITION
SENSE
3
C3
G401
20
VT/LG
4
DRIVER
SEAT
HORIZONTAL
POSITION
SENSE
MOTOR-
SEAT
ADJUSTER-
DRIVER
HORIZONTAL
NATURAL
13
14
1
2
MODULE-
MEMORY
SEAT C3
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
DRIVER HORIZONTAL
81348b39

B1D6E–SEAT HORIZONTAL POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If during motor operation the sensor voltage is not within a specified range this code will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G401) DRIVER SEAT HORZONTAL POSITION SENSE CIRCUIT SHORTED TO VOLTAGE
DRIVER RECLINER SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC’s

Move the seat switch in the horizontal position 3 times.

With the scan tool, read DTC’s.

Does the scan tool display B1D6E–SEAT HORIZONTAL POSITION SENSOR CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

---

2. CHECK THE (G401) DRIVER SEAT HORIZONTAL POSITION SENSE VOLTAGE

Disconnect the Driver Horizontal Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

With the scan tool erase DTC’s

Move the seat switch in the horizontal positions 3 times.

With the scan tool, read DTC’s.

Does the same DTC reset?

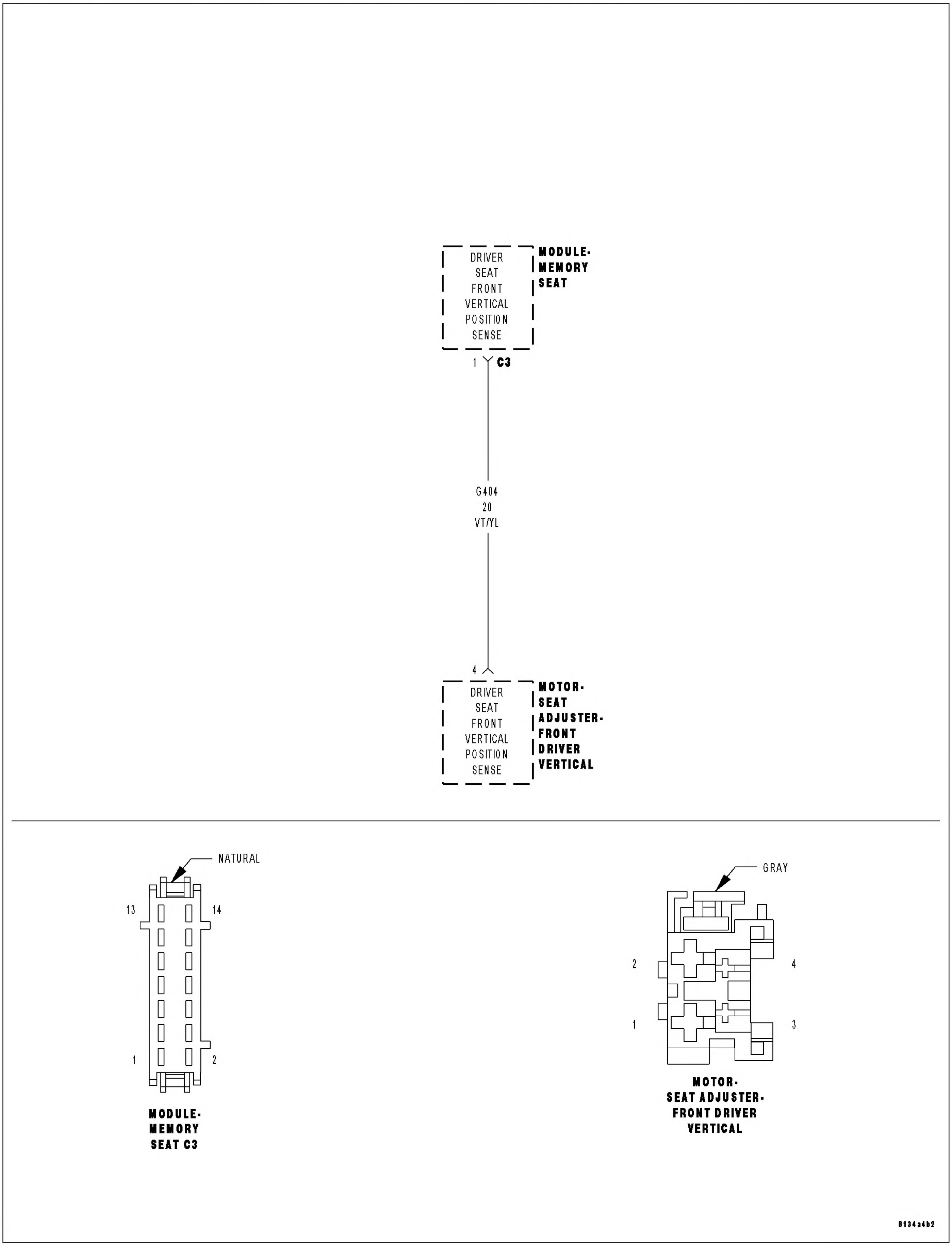
No >> Inspect the position sense wire for a possible intermittent short to voltage from another circuit, if OK replace the Driver Horizontal Seat Adjuster Motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

Yes >> Inspect the position sense wire for a possible short to voltage from another circuit, if OK replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D71–SEAT FRONT VERTICAL POSITION SENSOR CIRCUIT LOW


DRIVER SEAT FRONT VERTICAL POSITION SENSE
MODULE-MEMORY SEAT
1
C3
G404
20
VT/YL
4
DRIVER SEAT FRONT VERTICAL POSITION SENSE
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
NATURAL
13
14
1
2
MODULE-MEMORY SEAT C3
GRAY
2
4
1
3
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
8134a4b2

B1D71–SEAT FRONT VERTICAL POSITION SENSOR CIRCUIT LOW (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If sensor voltage is not within a specified range this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE CIRCUIT SHORTED TO GROUND
FRONT DRIVER VERTICAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the Seat Switch in the Front Vertical position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D71–SEAT FRONT VERTICAL POSITION SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D71–SEAT FRONT VERTICAL POSITION SENSOR CIRCUIT LOW (CONTINUED)

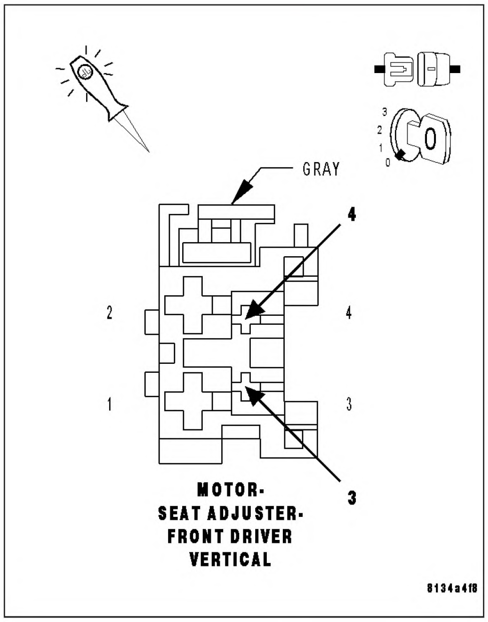
2. CHECK THE (G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE VOLTAGE

Disconnect the Front Driver Vertical Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

Move the seat switch in the front vertical position during the next step.

Using a 12-volt test light connect one lead to the (G404) Driver Seat Front Vertical Position Sense circuit and the other lead to the Driver Seat Front Vertical Sensor Ground at the Front Driver Seat Adjuster Motor connector.



Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

Yes >> Replace the Front Driver Seat Adjuster Motor assembly.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 3

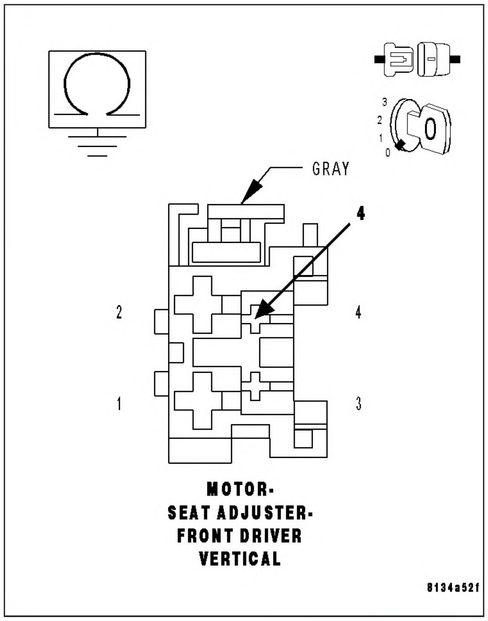
---

3. CHECK THE (G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE WIRE FOR A SHORT TO GROUND

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (G404) Driver Seat Front Vertical Position Sense wire at the Front Driver Vertical Seat Adjuster Motor connector to ground.

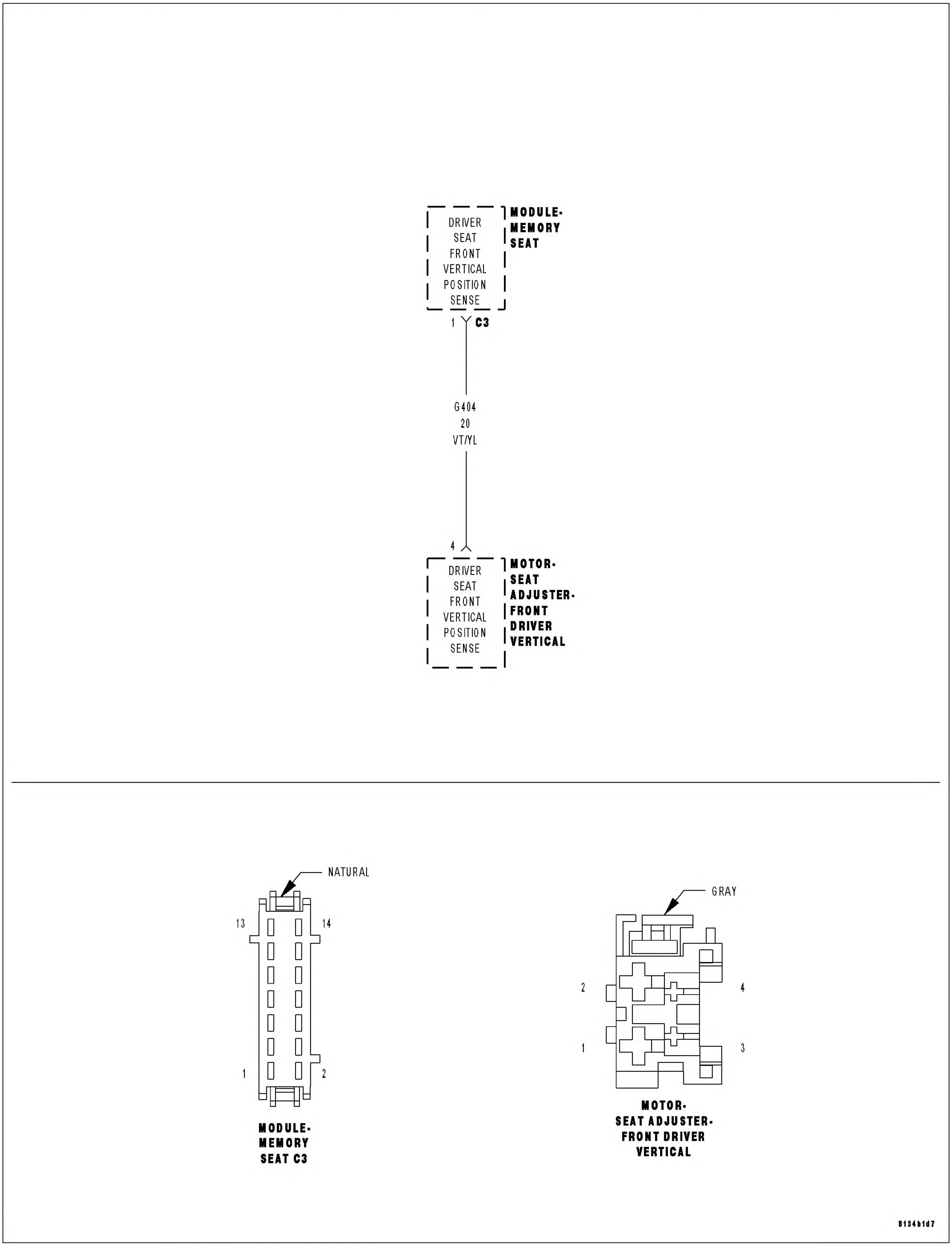


Is the resistance below 1000.0 ohm?

Yes >> Repair the (G404) Driver Seat Front Vertical Position Sense circuit for a short to ground.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Replace the Memory Seat Module.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D72–SEAT FRONT VERTICAL POSITION SENSOR CIRCUIT HIGH


DRIVER SEAT FRONT VERTICAL POSITION SENSE
MODULE-MEMORY SEAT
1
C3
G404
20
VT/YL
4
DRIVER SEAT FRONT VERTICAL POSITION SENSE
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
NATURAL
13
14
1
2
MODULE-MEMORY SEAT C3
GRAY
2
4
1
3
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
8134b1d7

B1D72–SEAT FRONT VERTICAL POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If during motor operation the sensor voltage is not within a specified range this code will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE CIRCUIT SHORTED TO VOLTAGE
REAR DRIVER VERTICAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the seat switch front vertical position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D72–SEAT FRONT VERTICAL POSITION SENSOR CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

---

2. CHECK THE (G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE VOLTAGE

Disconnect the Front Driver Vertical Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

With the scan tool erase DTC's

Move the seat switch in the both front vertical positions 3 times.

With the scan tool, read DTC's.

Does the same DTC reset?

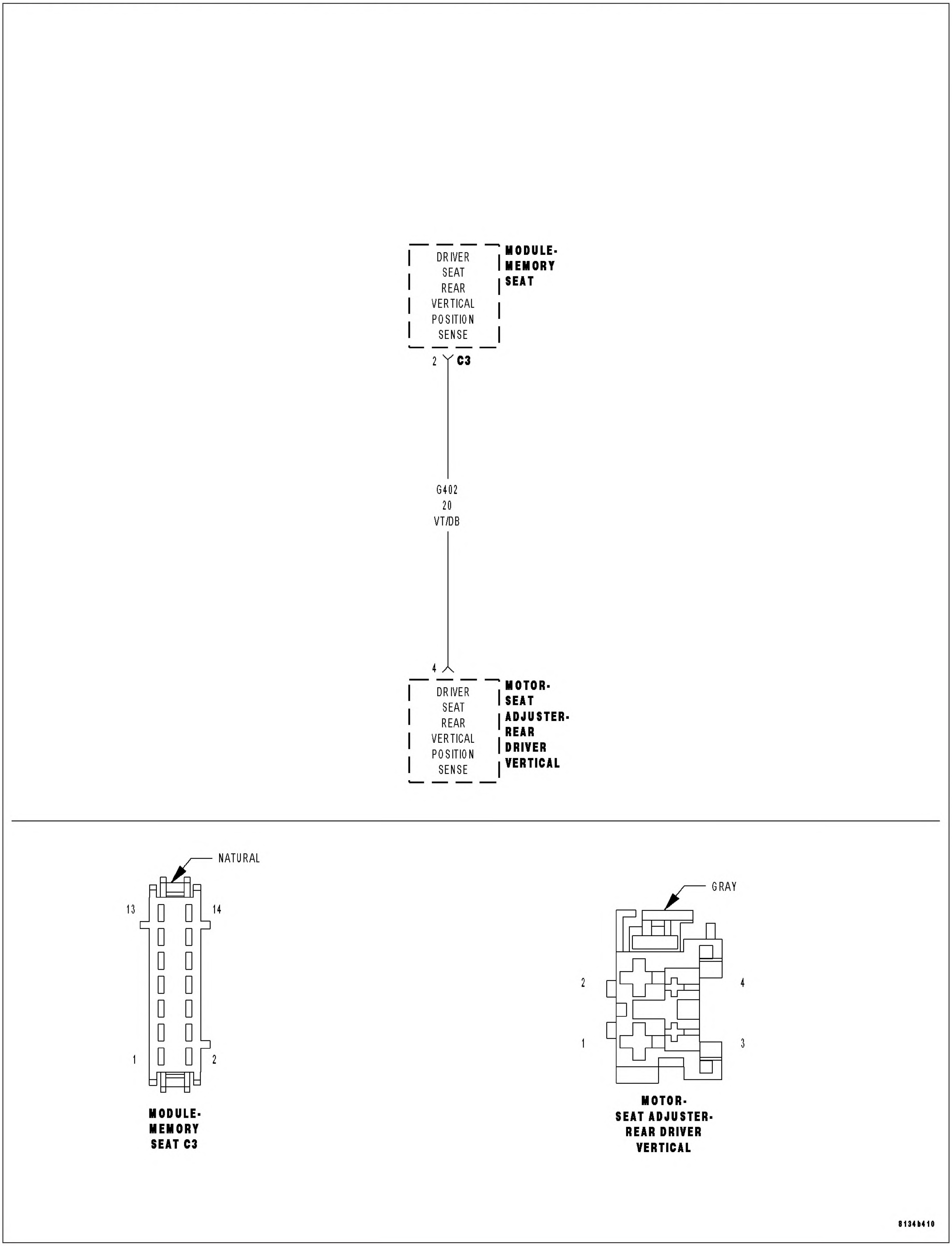
No >> Inspect the position sense wire for a possible intermittent short to another circuit, if OK replace the Front Driver Vertical Seat Adjuster Motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

Yes >> Inspect the position sense wire for a possible short to another circuit, if OK replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D75–SEAT REAR VERTICAL POSITION SENSOR CIRCUIT LOW


DRIVER SEAT REAR VERTICAL POSITION SENSE
MODULE-MEMORY SEAT
2
C3
G402
20
VT/DB
4
DRIVER SEAT REAR VERTICAL POSITION SENSE
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL
NATURAL
13
14
1
2
MODULE-MEMORY SEAT C3
GRAY
2
4
1
3
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL
8134b410

B1D75–SEAT REAR VERTICAL POSITION SENSOR CIRCUIT LOW (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If sensor voltage is not within a specified range this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G402) DRIVER SEAT REAR VERTICAL POSITION SENSE CIRCUIT SHORTED TO GROUND
REAR DRIVER VERTICAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the Seat Switch in the Rear Vertical position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D75–SEAT REAR VERTICAL POSITION SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D75–SEAT REAR VERTICAL POSITION SENSOR CIRCUIT LOW (CONTINUED)

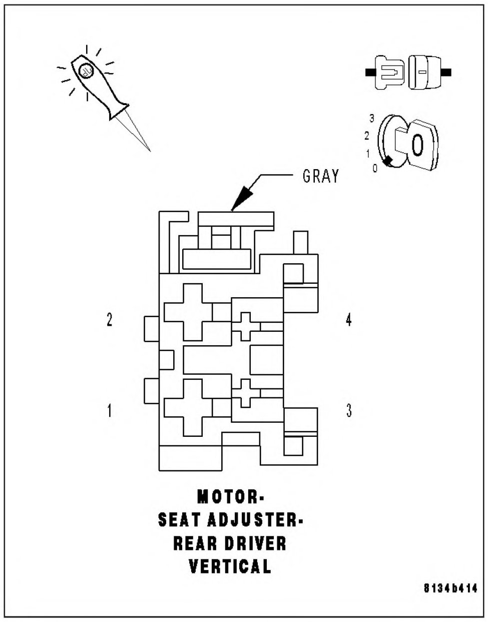
2. CHECK THE (G402) DRIVER SEAT REAR VERTICAL POSITION SENSE VOLTAGE

Disconnect the Rear Driver Vertical Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

Move the seat switch in the rear vertical position during the next step.

Using a 12-volt test light connect one lead to the (G402) Driver Seat Rear Vertical Position Sense circuit and the other lead to Driver Seat Rear Vertical Sensor Ground at the Rear Driver Seat Adjuster Motor connector.



Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

Yes >> Replace the Rear Driver Vertical Seat Adjuster Motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 3

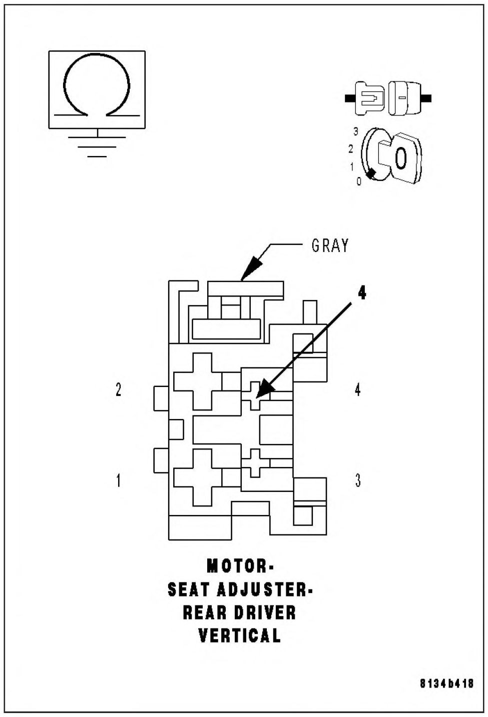
---

3. CHECK THE (G402) DRIVER SEAT REAR VERTICAL POSITION SENSE WIRE FOR A SHORT TO GROUND

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (G402) Driver Seat Rear Vertical Position Sense wire at the Rear Driver Vertical Seat Adjuster Motor connector to ground.



Is the resistance below 1000.0 ohm?

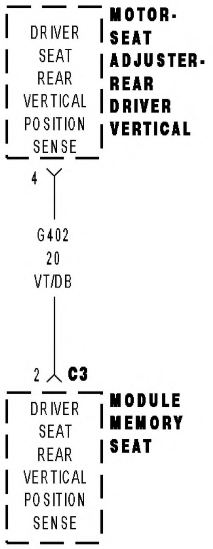
Yes >> Repair the (G402) Driver Seat Rear Vertical Position Sense circuit for a short to ground.

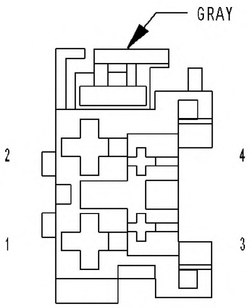
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Replace the Memory Seat Module.

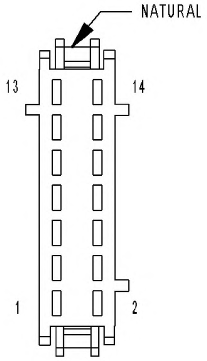
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D76–SEAT REAR VERTICAL POSITION SENSOR CIRCUIT HIGH


DRIVER SEAT REAR VERTICAL POSITION SENSE
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL
4
G402
20
VT/DB
2
C3
DRIVER SEAT REAR VERTICAL POSITION SENSE
MODULE MEMORY SEAT



**MOTOR-
SEAT ADJUSTER-
REAR DRIVER
VERTICAL**


NATURAL
13
14
1
2

**MODULE-
MEMORY
SEAT C3**

8134b8ed

B1D76–SEAT REAR VERTICAL POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If during motor operation the sensor voltage is not within a specified range this code will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G402) DRIVER SEAT REAR VERTICAL POSITION SENSE CIRCUIT SHORTED TO VOLTAGE
REAR DRIVER VERTICAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC’s

Move the seat switch rear vertical position 3 times.

With the scan tool, read DTC’s.

Does the scan tool display B1D76–SEAT REAR VERTICAL POSITION SENSOR CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

---

2. CHECK THE (G402) DRIVER SEAT REAR VERTICAL POSITION SENSE VOLTAGE

Disconnect the Rear Driver Vertical Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

With the scan tool erase DTC’s

Move the seat switch in the both rear vertical positions 3 times.

With the scan tool, read DTC’s.

Does the same DTC reset?

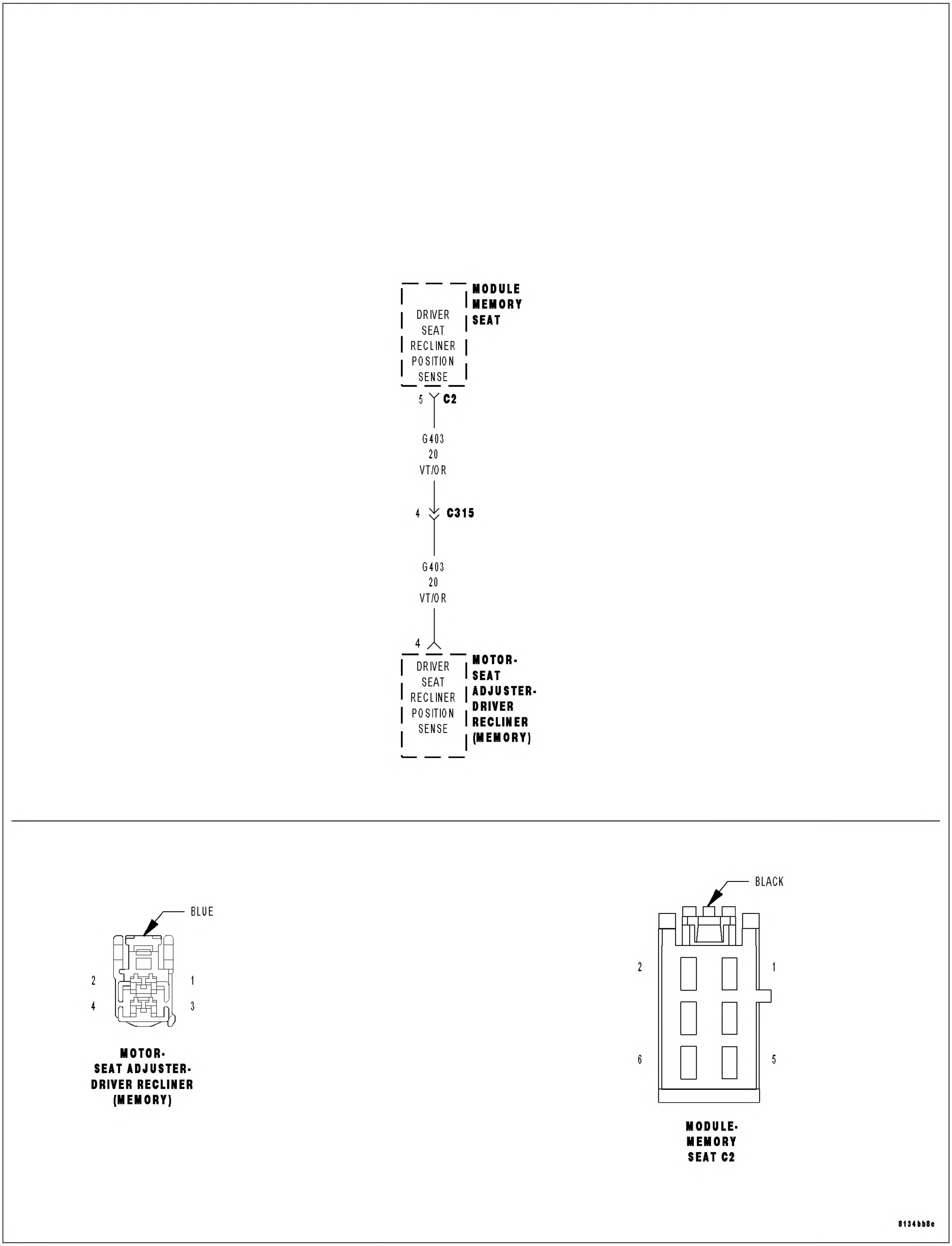
No >> Inspect the position sense wire for a possible intermittent short to voltage from another circuit, if OK replace the Rear Driver Vertical Seat Adjuster Motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

Yes >> Inspect the position sense wire for a possible short to voltage from another circuit, if OK replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D79–SEAT RECLINER POSITION SENSOR CIRCUIT LOW


MODULE MEMORY SEAT
DRIVER SEAT RECLINER POSITION SENSE
5
C2
G403
20
VT/OR
4
C315
G403
20
VT/OR
4
DRIVER SEAT RECLINER POSITION SENSE
MOTOR-SEAT ADJUSTER-DRIVER RECLINER (MEMORY)
BLUE
2
1
4
3
MOTOR-SEAT ADJUSTER-DRIVER RECLINER (MEMORY)
BLACK
2
1
6
5
MODULE-MEMORY SEAT C2
8134bb8e

B1D79–SEAT RECLINER POSITION SENSOR CIRCUIT LOW (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If sensor voltage is not within a specified range this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G403) DRIVER SEAT RECLINER POSITION SENSE CIRCUIT SHORTED TO GROUND
DRIVER RECLINER SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the Seat Switch recliner position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D79–SEAT RECLINER POSITION SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D79–SEAT RECLINER POSITION SENSOR CIRCUIT LOW (CONTINUED)

2. CHECK THE (G403) DRIVER SEAT RECLINER POSITION SENSE VOLTAGE

Disconnect the Driver Recliner Seat Adjuster Motor.

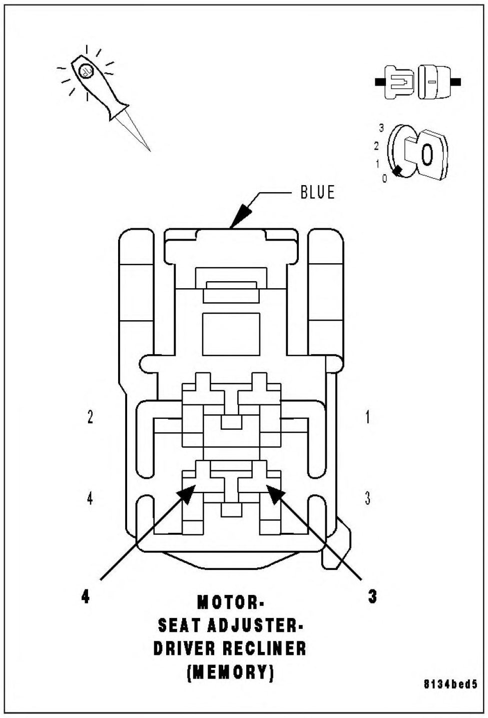
NOTE: Check connectors – Clean and repair as necessary.
Move the seat switch in the recliner position during the next step.

Using a 12-volt test light connect one lead to the (G403) Driver Seat Recliner Position Sense circuit and the other lead to Driver Seat Recliner Position Sensor Ground at the Driver Recliner Seat Adjuster Motor connector.

Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

Yes >> Replace the Driver Recliner Seat Adjuster Motor assembly.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 3



---

3. CHECK THE (G403) DRIVER SEAT RECLINER POSITION SENSE WIRE FOR A SHORT TO GROUND

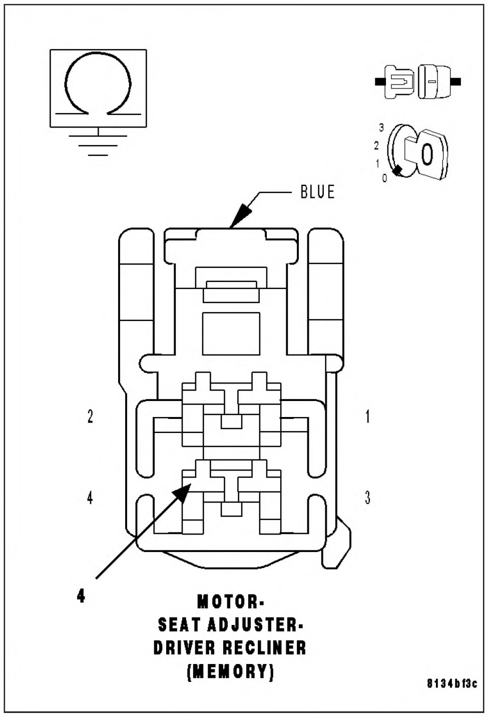
Disconnect the Memory Seat Module C2 connector.

NOTE: Check connectors – Clean and repair as necessary.
Measure the resistance of the (G403) Driver Seat Recliner Position Sense wire at the Driver Recliner Seat Adjuster Motor connector to ground.

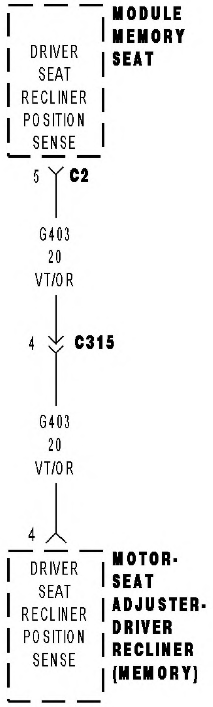
Is the resistance below 1000.0 ohm?

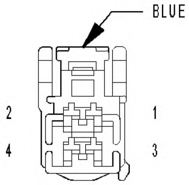
Yes >> Repair the (G403) Driver Seat Recliner Position Sense circuit for a short to ground.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Replace the Memory Seat Module.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

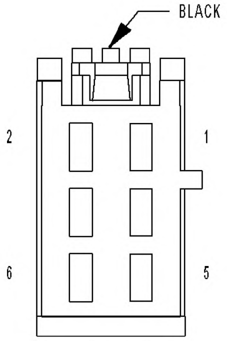


B1D7A–SEAT RECLINER POSITION SENSOR CIRCUIT HIGH


MODULE MEMORY SEAT
DRIVER SEAT RECLINER POSITION SENSE
5
C2
G403
20
VT/OR
4
C315
G403
20
VT/OR
4
DRIVER SEAT RECLINER POSITION SENSE
MOTOR-SEAT ADJUSTER-DRIVER RECLINER (MEMORY)



**MOTOR-
SEAT ADJUSTER-
DRIVER RECLINER
(MEMORY)**



**MODULE-
MEMORY
SEAT C2**

8134dda0

B1D7A–SEAT RECLINER POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the seat motor is activated (sensor supply voltage is switched on whenever motor is activated).
- **Set Condition:**
  If during motor operation the sensor voltage is not within a specified range this code will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
(G403) DRIVER SEAT RECLINER POSITION SENSE CIRCUIT SHORTED TO VOLTAGE
DRIVER RECLINER SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the seat switch recliner position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D7A–SEAT BACKREST POSITION SENSOR CIRCUIT HIGH?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

---

2. CHECK THE (G403) DRIVER SEAT RECLINER POSITION SENSE VOLTAGE

Disconnect the Driver Recliner Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

With the scan tool erase DTC's

Move the seat switch in the both recliner positions 3 times.

With the scan tool, read DTC's.

Does the same DTC reset?

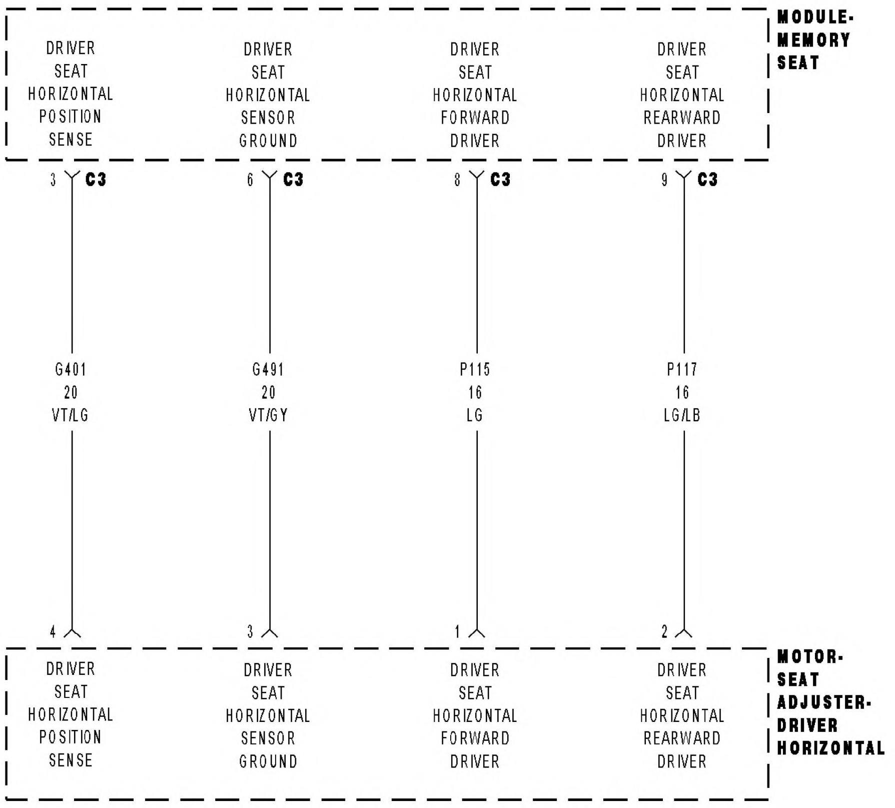
No >> Inspect the position sense wire for a possible intermittent short to voltage from another circuit, if OK replace the Driver Recliner Seat Adjuster Motor assembly.

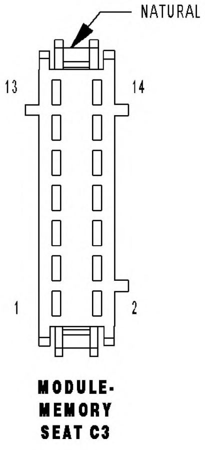
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

Yes >> Inspect the position sense wire for a possible short to voltage from another circuit, if OK replace the Memory Seat Module.

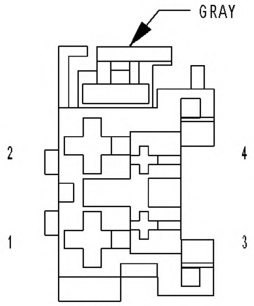
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D7B–SEAT HORIZONTAL MOTOR CONTROL CIRCUIT PERFORMANCE


MODULE-MEMORY SEAT
DRIVER SEAT HORIZONTAL POSITION SENSE
DRIVER SEAT HORIZONTAL SENSOR GROUND
DRIVER SEAT HORIZONTAL FORWARD DRIVER
DRIVER SEAT HORIZONTAL REARWARD DRIVER
3 C3
6 C3
8 C3
9 C3
G401 20 VT/LG
G491 20 VT/GY
P115 16 LG
P117 16 LG/LB
4
3
1
2
DRIVER SEAT HORIZONTAL POSITION SENSE
DRIVER SEAT HORIZONTAL SENSOR GROUND
DRIVER SEAT HORIZONTAL FORWARD DRIVER
DRIVER SEAT HORIZONTAL REARWARD DRIVER
MOTOR-SEAT ADJUSTER-DRIVER HORIZONTAL


NATURAL
13
14
1
2

MODULE-MEMORY SEAT C3


GRAY
2
4
1
3

MOTOR-SEAT ADJUSTER-DRIVER HORIZONTAL

8134e24e

B1D7B–SEAT HORIZONTAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the seat motor is activated.
- **Set Condition:**
  If the Memory Seat Module does not detect the rotation of the seat motor this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
SEAT POSITION SENSOR CIRCUIT DIAGNOSTIC TROUBLE CODES
(G401) DRIVER SEAT HORIZONTAL POSITION SENSE CIRCUIT OPEN
(G491) DRIVER SEAT HORIZONTAL SENSOR GROUND CIRCUIT OPEN
(P115) DRIVER SEAT HORIZONTAL FORWARD DRIVER
(P117) DRIVER SEAT HORIZONTAL REARWARD DRIVER
DRIVER HORIZONTAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. CHECK FOR RELATED DIAGNOSTIC TROUBLE CODES

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display any seat position sensor DTC's?

Yes >> Diagnose and repair the other DTC(s) first. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the Seat Switch in the Horizontal position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D7B–SEAT HORIZONTAL MOTOR CONTROL CIRCUIT PERFORMANCE?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D7B–SEAT HORIZONTAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

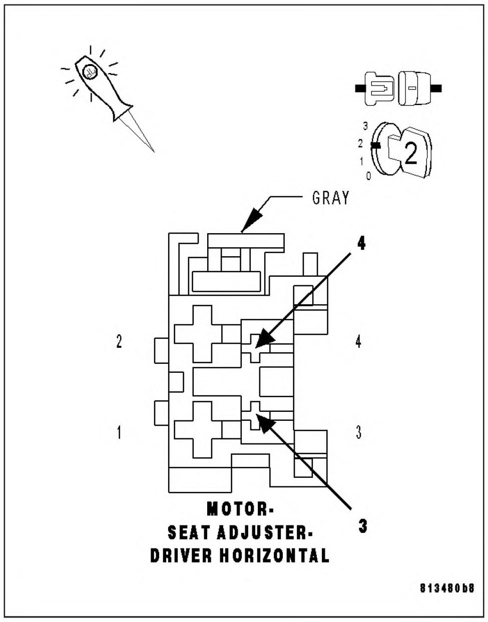
3. CHECK THE (G401) DRIVER SEAT HORIZONTAL POSITION SENSE VOLTAGE

Disconnect the Driver Horizontal Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

Move the Seat Switch in the Horizontal position during the next step.

Using a 12-volt test light connect one lead to the (G401) Driver Seat Horizontal Position Sense circuit and the other lead to Driver Seat Horizontal Sensor Ground at the Driver Horizontal Seat Adjuster Motor connector.



Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

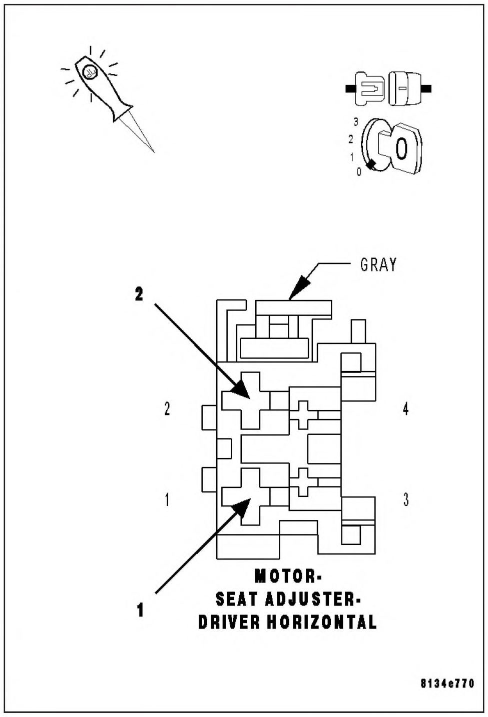
Yes >> Go To 4

No >> Go To 5

4. CHECK THE DRIVER SEAT HORIZONTAL FORWARD/REARWARD DRIVER VOLTAGE

Move the Seat Switch in the Horizontal position during the next step.

Using a 12-volt test light connect one lead to the (P115) Driver Seat Horizontal Forward Driver circuit and the other lead to (P117) Driver Seat Horizontal Rearward Driver circuit at the Driver Horizontal Seat Adjuster Motor connector.



Does the test light illuminate with the seat switch engaged?

Yes >> Replace the track/horizontal motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 7

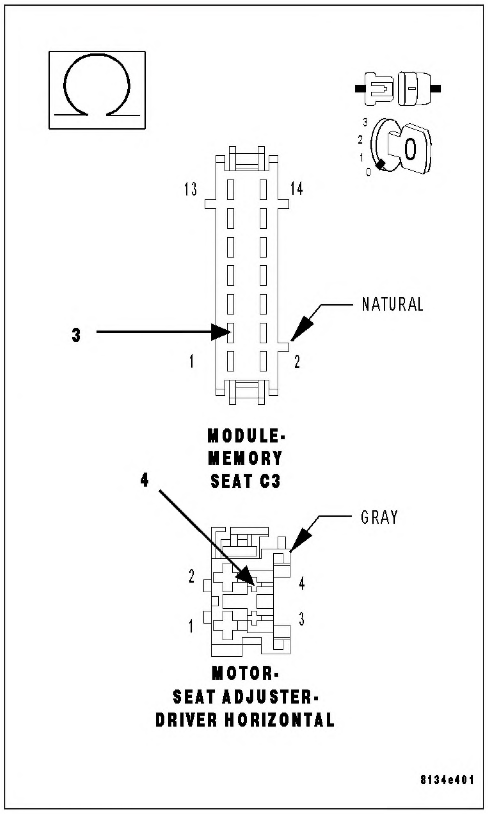
B1D7B–SEAT HORIZONTAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

5. CHECK THE (G401) DRIVER SEAT HORIZONTAL POSITION SENSE WIRE FOR AN OPEN

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (G401) Driver Seat Horizontal Position Sense circuit at the Driver Horizontal Seat Adjuster Motor connector to the C3 connector.


13
14
NATURAL
3
1
2
MODULE-
MEMORY
SEAT C3
4
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
DRIVER HORIZONTAL
8134e401

Is the resistance above 1.0 ohm?

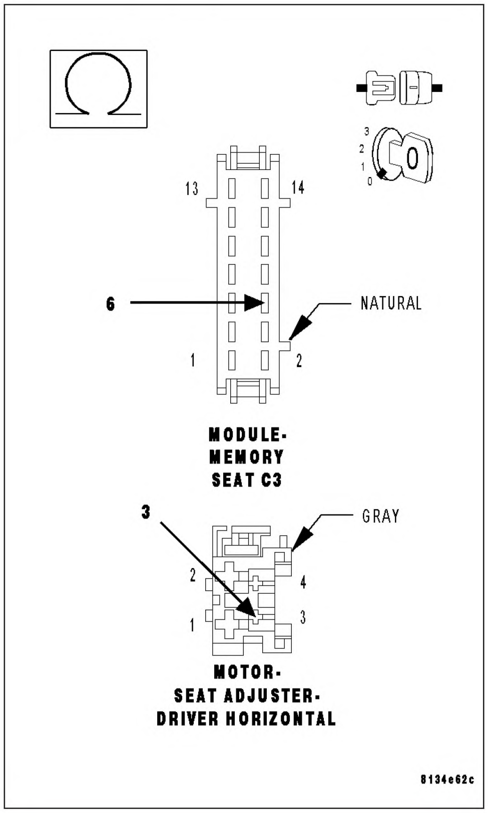
Yes >> Repair the (G401) Driver Seat Horizontal Position Sense circuit for an open.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 6

6. CHECK THE (G491) DRIVER SEAT HORIZONTAL SENSOR GROUND FOR AN OPEN

Measure the resistance of the (G491) Driver Seat Horizontal Sensor Ground circuit at the Driver Horizontal Seat Adjuster Motor connector to the C3 connector.


13
14
6
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
3
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
DRIVER HORIZONTAL
8134e62c

Is the resistance above 1.0 ohm?

Yes >> Repair the (G491) Driver Seat Horizontal Senor Ground circuit for an open.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

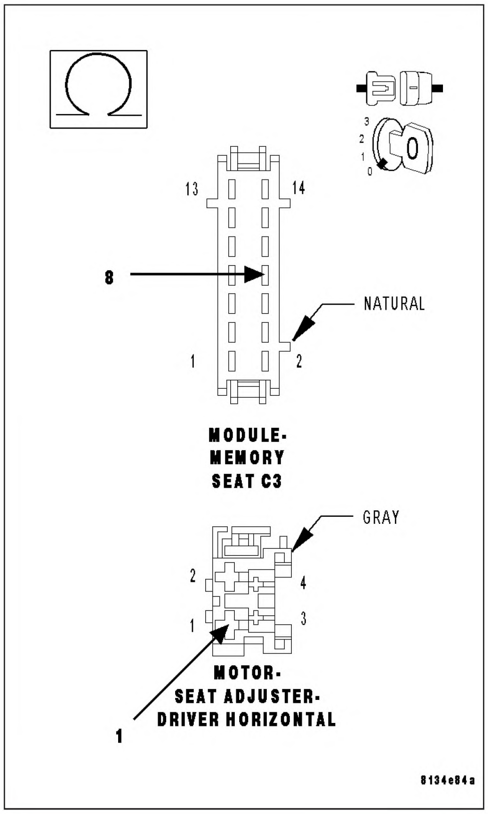
B1D7B–SEAT HORIZONTAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

7. CHECK THE (P115) DRIVER SEAT HORIZONTAL FORWARD DRIVER WIRE FOR AN OPEN

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (P115) Driver Seat Horizontal Forward Driver circuit at the Driver Horizontal Seat Adjuster Motor connector to the C3 connector.


Ω
3
2
1
0
13
14
8
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
DRIVER HORIZONTAL
1
8134e84a

Is the resistance above 1.0 ohm?

Yes >> Repair the (P115) Driver Seat Horizontal Forward Driver circuit for an open.

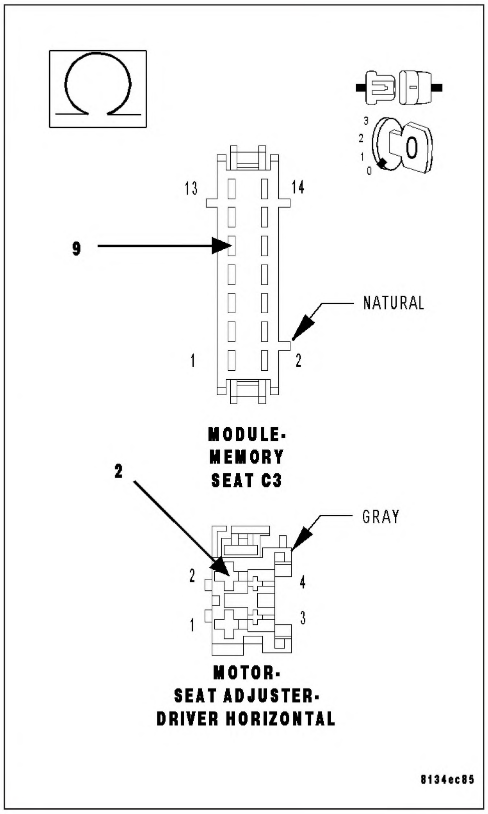
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1D7B–SEAT HORIZONTAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

8. CHECK THE (P117) DRIVER SEAT HORIZONTAL REARWARD DRIVER AN OPEN

Measure the resistance of the (P117) Driver Seat Horizontal Rearward Driver circuit at the Driver Horizontal Seat Adjuster Motor connector to the C3 connector.


13
14
9
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
2
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
DRIVER HORIZONTAL
8134ec85

Is the resistance above 1.0 ohm?

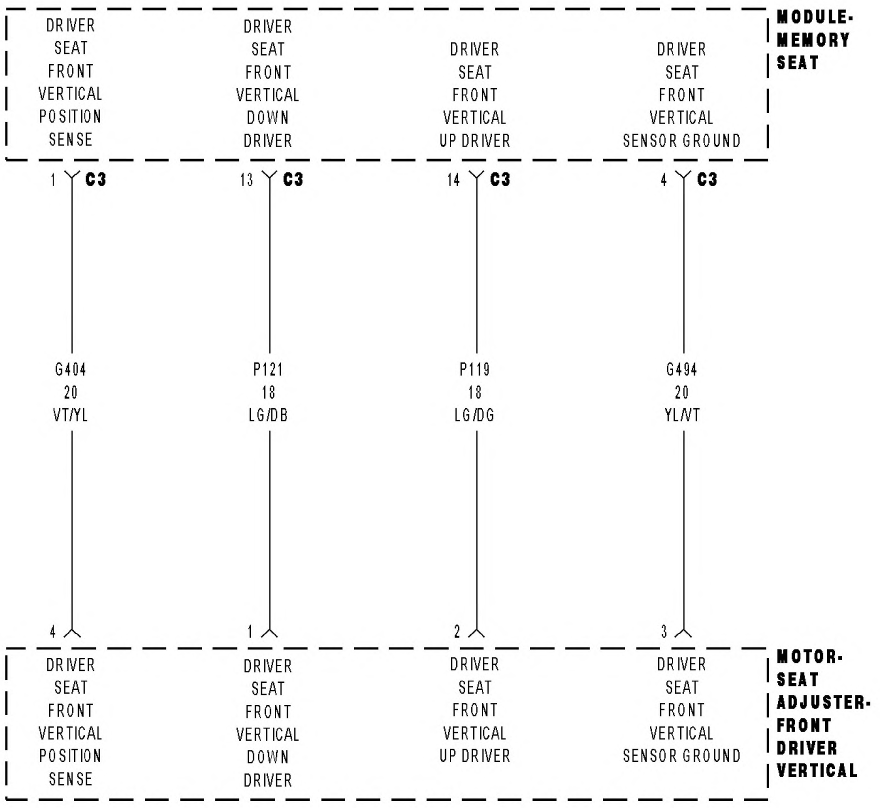
Yes >> Repair the (P117) Driver Seat Horizontal Rearward Driver circuit for an open.

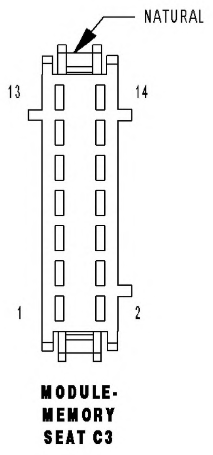
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

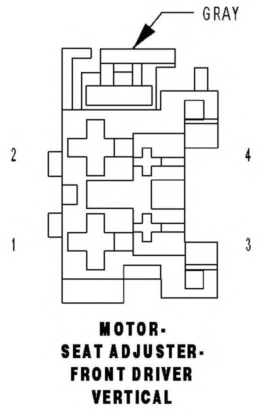
No >> Replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1 (Refer to 8 - ELECTRICAL/POWER SEATS - DIAGNOSIS AND TESTING)

B1D7F–SEAT FRONT VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE


MODULE-MEMORY SEAT
DRIVER SEAT FRONT VERTICAL POSITION SENSE
DRIVER SEAT FRONT VERTICAL DOWN DRIVER
DRIVER SEAT FRONT VERTICAL UP DRIVER
DRIVER SEAT FRONT VERTICAL SENSOR GROUND
1 C3
13 C3
14 C3
4 C3
G404 20 VT/YL
P121 18 LG/DB
P119 18 LG/DG
G494 20 YL/VT
4
1
2
3
DRIVER SEAT FRONT VERTICAL POSITION SENSE
DRIVER SEAT FRONT VERTICAL DOWN DRIVER
DRIVER SEAT FRONT VERTICAL UP DRIVER
DRIVER SEAT FRONT VERTICAL SENSOR GROUND
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL


NATURAL
13
14
1
2
MODULE-MEMORY SEAT C3


GRAY
2
4
1
3
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
81341148

B1D7F–SEAT FRONT VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the seat motor is activated.
- **Set Condition:**
  If the Memory Seat Module does not detect the rotation of the seat motor this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
SEAT POSITION SENSOR CIRCUIT DIAGNOSTIC TROUBLE CODES
(G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE CIRCUIT OPEN
(G494) DRIVER SEAT FRONT VERTICAL SENSOR GROUND CIRCUIT OPEN
(P119) DRIVER SEAT FRONT VERTICAL UP DRIVER
(P121) DRIVER SEAT FRONT VERTICAL DOWN DRIVER
FRONT DRIVER VERTICAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. CHECK FOR RELATED DIAGNOSTIC TROUBLE CODES

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display any seat position sensor DTC's?

Yes >> Diagnose and repair other DTC(s) first. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the Seat Switch in the Front Vertical position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D7F–SEAT FRONT VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

B1D7F–SEAT FRONT VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

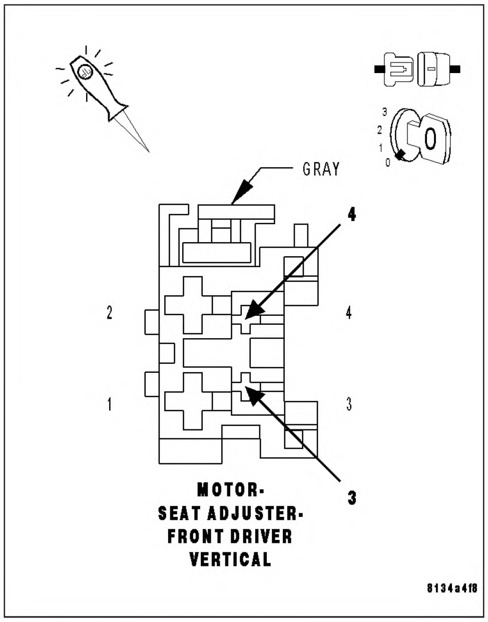
3. CHECK THE (G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE VOLTAGE

Disconnect the Front Driver Vertical Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

Move the Seat Switch in the front vertical position during the next step.

Using a 12-volt test light connect one lead to the (G404) Driver Seat Front Vertical Position Sense circuit and the other lead to Driver Seat Front Vertical Sensor Ground at the Driver Front Vertical Seat Adjuster Motor connector.



Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

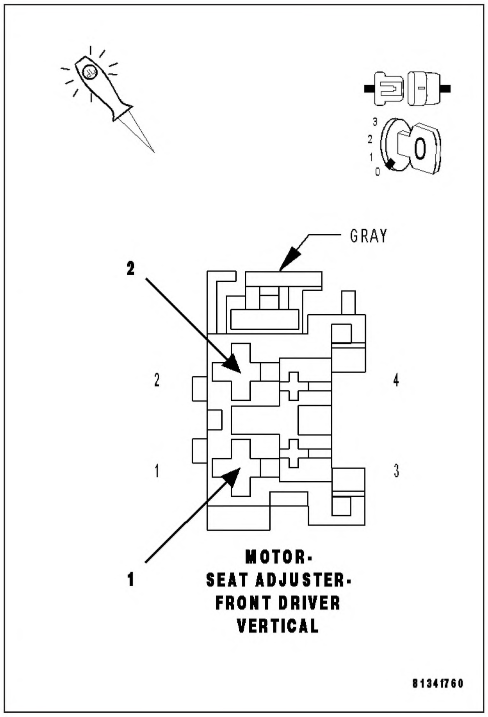
Yes >> Go To 4

No >> Go To 5

4. CHECK THE DRIVER SEAT FRONT VERTICAL UP/DOWN DRIVER VOLTAGE

Move the Seat Switch in the front vertical position during the next step.

Using a 12-volt test light connect one lead to the (G119) Driver Seat Front Vertical Up Driver circuit and the other lead to (P121) Driver Seat Front Vertical Down Driver circuit at the Front Driver Vertical Seat Adjuster Motor connector.



Does the test light illuminate with the seat switch engaged?

Yes >> Replace the Front Driver Vertical Seat Adjuster motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 7

B1D7F–SEAT FRONT VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

5. CHECK THE (G404) DRIVER SEAT FRONT VERTICAL POSITION SENSE WIRE FOR AN OPEN

Disconnect the Memory Seat Module C3 connector.

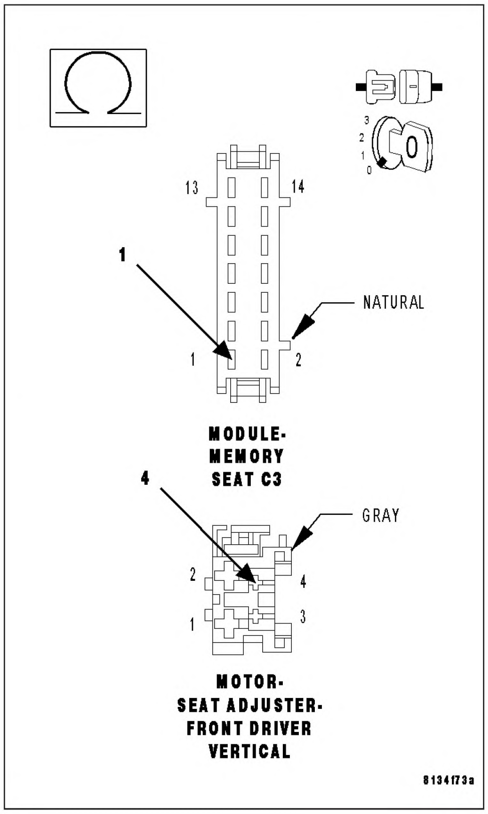
NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (G404) Driver Seat Front Vertical Position Sense circuit at the Front Driver Vertical Seat Adjuster Motor connector to the C3 connector.

Is the resistance above 1.0 ohm?

Yes >> Repair the (G404) Driver Seat Front Vertical Position Sense circuit for an open.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 6


3
2
1
0
13
14
1
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
4
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
FRONT DRIVER
VERTICAL
8134173a

---

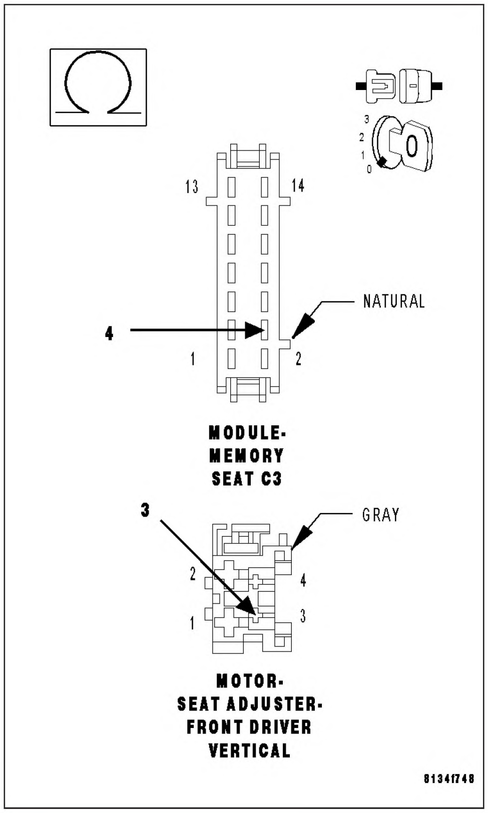
6. CHECK THE (G494) DRIVER SEAT FRONT VERTICAL SENSOR GROUND FOR AN OPEN

Measure the resistance of the (G494) Driver Seat Front Vertical Sensor Ground circuit at the Driver Front Vertical Seat Adjuster Motor connector to the C3 connector.

Is the resistance above 1.0 ohm?

Yes >> Repair the (G494) Driver Seat Front Vertical Senor Ground circuit for an open.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Replace the Memory Seat Module.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1


3
2
1
0
13
14
NATURAL
4
1
2
MODULE-
MEMORY
SEAT C3
3
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
FRONT DRIVER
VERTICAL
81341748

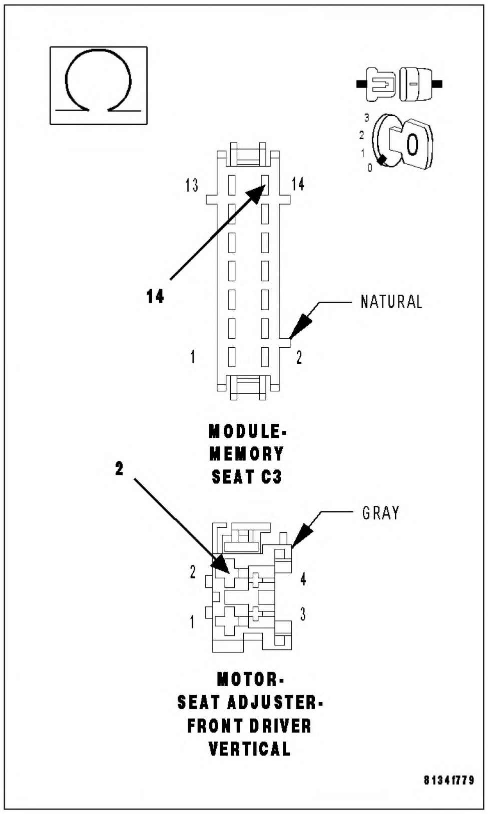
B1D7F–SEAT FRONT VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

7. CHECK THE (P119) DRIVER SEAT FRONT VERTICAL UP DRIVER WIRE FOR AN OPEN

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (P119) Driver Seat Front Vertical Up Driver circuit at the Driver Front Vertical Seat Adjuster Motor connector to the C3 connector.


Ω
3
2
1
0
13
14
14
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
2
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
FRONT DRIVER
VERTICAL
81341779

Is the resistance above 1.0 ohm?

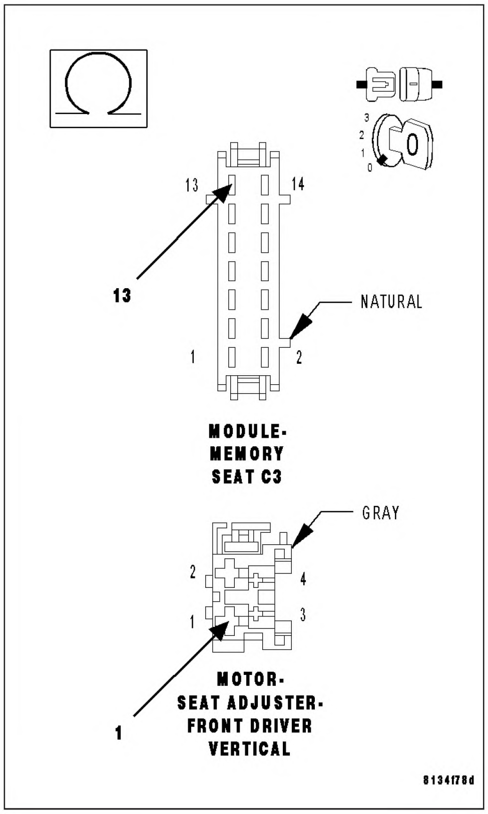
Yes >> Repair the (P119) Driver Seat Front Vertical Up Driver circuit for an open.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 8

B1D7F–SEAT FRONT VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

8. CHECK THE (P121) DRIVER SEAT FRONT VERTICAL DOWN DRIVER AN OPEN

Measure the resistance of the (P121) Driver Seat Front Vertical Down Driver circuit at the Driver Front Vertical Seat Adjuster Motor connector to the C3 connector.


13
14
13
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
GRAY
2
4
1
3
1
MOTOR-
SEAT ADJUSTER-
FRONT DRIVER
VERTICAL
8134178d

Is the resistance above 1.0 ohm?

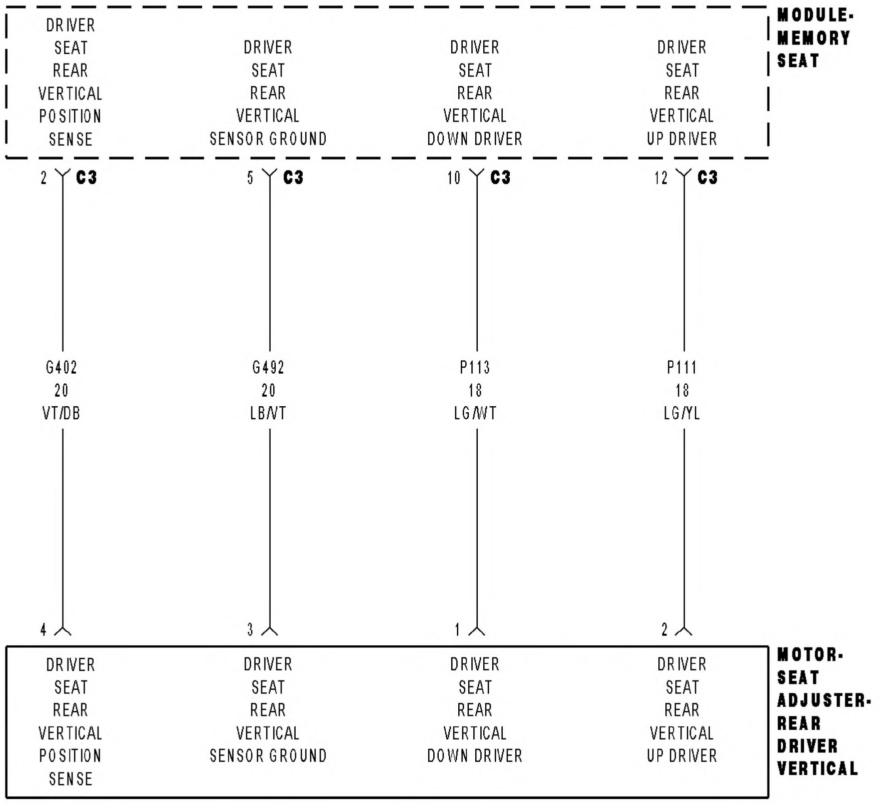
Yes >> Repair the (P121) Driver Seat Front Vertical Down Driver circuit for an open.

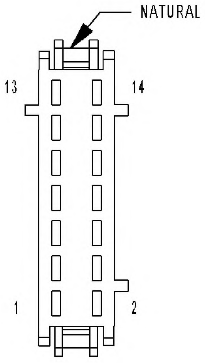
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Replace the Memory Seat Module.

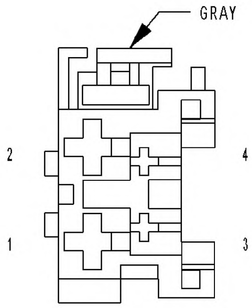
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

B1D83–SEAT REAR VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE


DRIVER SEAT REAR VERTICAL POSITION SENSE
DRIVER SEAT REAR VERTICAL SENSOR GROUND
DRIVER SEAT REAR VERTICAL DOWN DRIVER
DRIVER SEAT REAR VERTICAL UP DRIVER
MODULE-MEMORY SEAT
2 C3
5 C3
10 C3
12 C3
G402 20 VT/DB
G492 20 LB/WT
P113 18 LG/WT
P111 18 LG/YL
4
3
1
2
DRIVER SEAT REAR VERTICAL POSITION SENSE
DRIVER SEAT REAR VERTICAL SENSOR GROUND
DRIVER SEAT REAR VERTICAL DOWN DRIVER
DRIVER SEAT REAR VERTICAL UP DRIVER
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL


NATURAL
13
14
1
2

MODULE-MEMORY SEAT C3



MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL

813509ac

B1D83–SEAT REAR VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the seat motor is activated.
- **Set Condition:**
  If the Memory Seat Module does not detect the rotation of the seat motor this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
SEAT POSITION SENSOR CIRCUIT DIAGNOSTIC TROUBLE CODES
(G402) DRIVER SEAT REAR VERTICAL POSITION SENSE CIRCUIT OPEN
(G492) DRIVER SEAT REAR VERTICAL SENSOR GROUND CIRCUIT OPEN
(P111) DRIVER SEAT REAR VERTICAL UP DRIVER
(P113) DRIVER SEAT REAR VERTICAL DOWN DRIVER
REAR DRIVER VERTICAL SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. CHECK FOR RELATED DIAGNOSTIC TROUBLE CODES

Turn the ignition on.

With the scan tool, read DTC’s.

Does the scan tool display any seat position sensor DTC’s?

Yes >> Diagnose and repair other DTC(s) first. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC’s

Move the Seat Switch in the Rear Vertical position 3 times.

With the scan tool, read DTC’s.

Does the scan tool display B1D83–SEAT REAR VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

B1D83–SEAT REAR VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

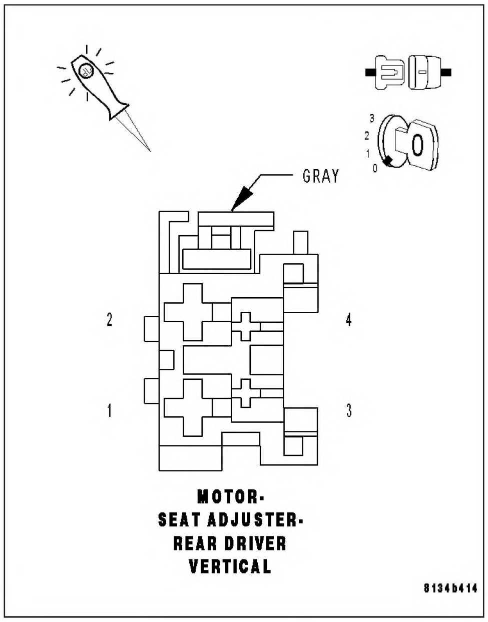
3. CHECK THE (G402) DRIVER SEAT REAR VERTICAL POSITION SENSE VOLTAGE

Disconnect the Rear Driver Vertical Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

Move the Seat Switch in the rear vertical position during the next step.

Using a 12-volt test light connect one lead to the (G402) Driver Seat Rear Vertical Position Sense circuit and the other lead to Driver Seat Rear Vertical Sensor Ground at the Driver Rear Vertical Seat Adjuster Motor connector.



Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

Yes >> Go To 4

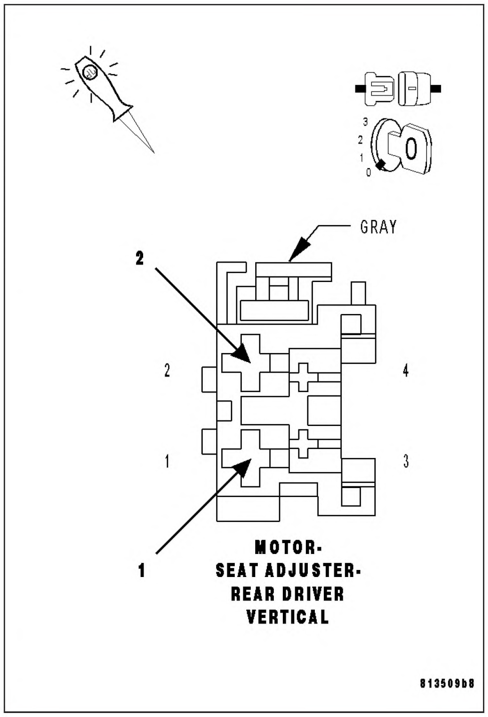
No >> Go To 5

---

4. CHECK THE DRIVER SEAT REAR VERTICAL UP/DOWN DRIVER VOLTAGE

Move the Seat Switch in the rear vertical position during the next step.

Using a 12-volt test light connect one lead to the (P111) Driver Seat Rear Vertical Up Driver circuit and the other lead to (P113) Driver Seat Rear Vertical Down Driver circuit at the Rear Driver Vertical Seat Adjuster Motor connector.



Does the test light illuminate with the seat switch engaged?

Yes >> Replace the Rear Driver Vertical Seat Adjuster motor assembly.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 7

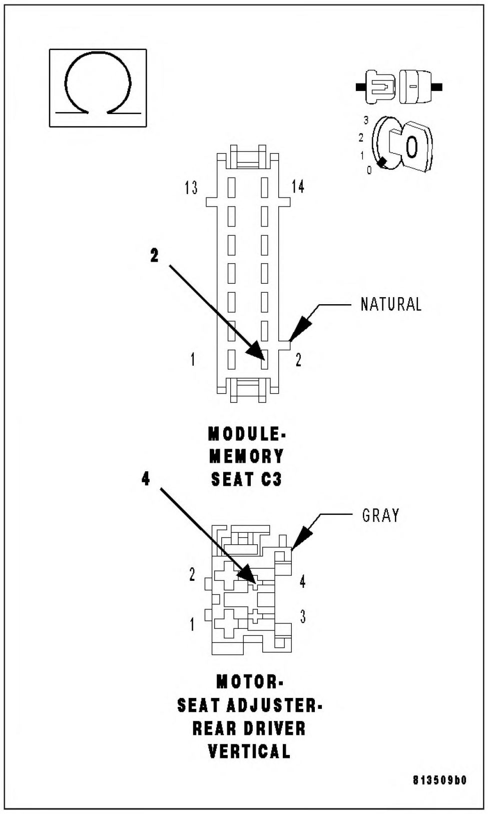
B1D83–SEAT REAR VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

5. CHECK THE (G402) DRIVER SEAT REAR VERTICAL POSITION SENSE WIRE FOR AN OPEN

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (G402) Driver Seat Rear Vertical Position Sense circuit at the Rear Driver Vertical Seat Adjuster Motor connector to the C3 connector.


13
14
2
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
4
GRAY
2
4
1
3
MOTOR-
SEAT ADJUSTER-
REAR DRIVER
VERTICAL
813509b0

Is the resistance above 1.0 ohm?

Yes >> Repair the (G402) Driver Seat Rear Vertical Position Sense circuit for an open.

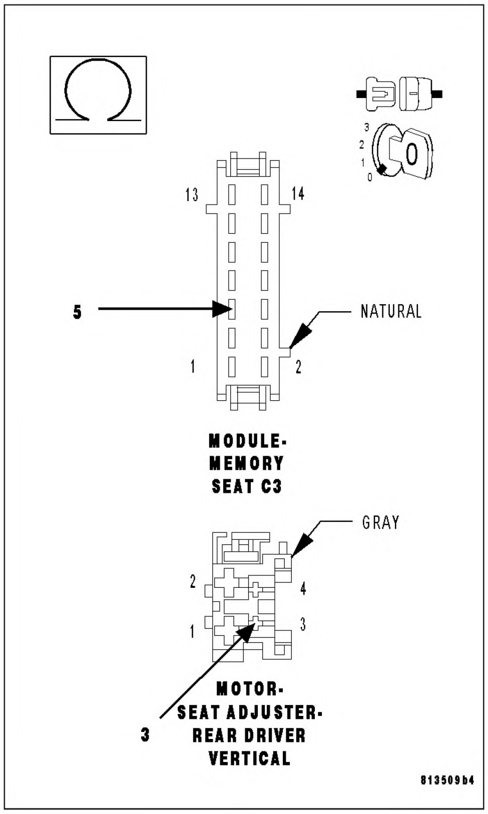
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 6

B1D83–SEAT REAR VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

6. CHECK THE (G492) DRIVER SEAT REAR VERTICAL SENSOR GROUND FOR AN OPEN

Measure the resistance of the (G492) Driver Seat Rear Vertical Sensor Ground circuit at the Driver Rear Vertical Seat Adjuster Motor connector to the C3 connector.


Ω
3
2
1
0
13
14
5
NATURAL
1
2
MODULE-
MEMORY
SEAT C3
GRAY
2
4
1
3
3
MOTOR-
SEAT ADJUSTER-
REAR DRIVER
VERTICAL
813509b4

Is the resistance above 1.0 ohm?

Yes >> Repair the (G492) Driver Seat Rear Vertical Senor Ground circuit for an open.

Perform MEMORY SYSTEM VERIFICATION TEST – VER 1

No >> Replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

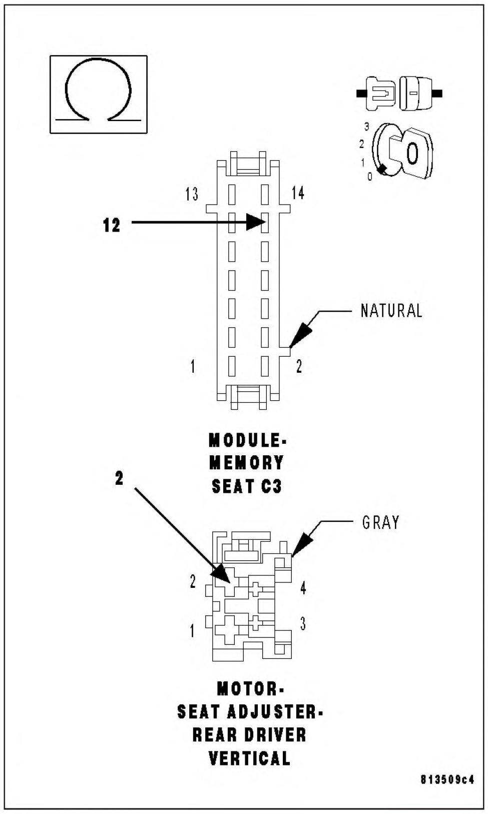
B1D83–SEAT REAR VERTICAL MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

7. CHECK THE (P111) DRIVER SEAT REAR VERTICAL UP DRIVER WIRE FOR AN OPEN

Disconnect the Memory Seat Module C3 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (P111) Driver Seat Rear Vertical Up Driver circuit at the Driver Rear Vertical Seat Adjuster Motor connector to the C3 connector.


12
13
14
1
2
NATURAL
MODULE-MEMORY SEAT C3
2
GRAY
2
4
1
3
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL
813509c4

Is the resistance above 1.0 ohm?

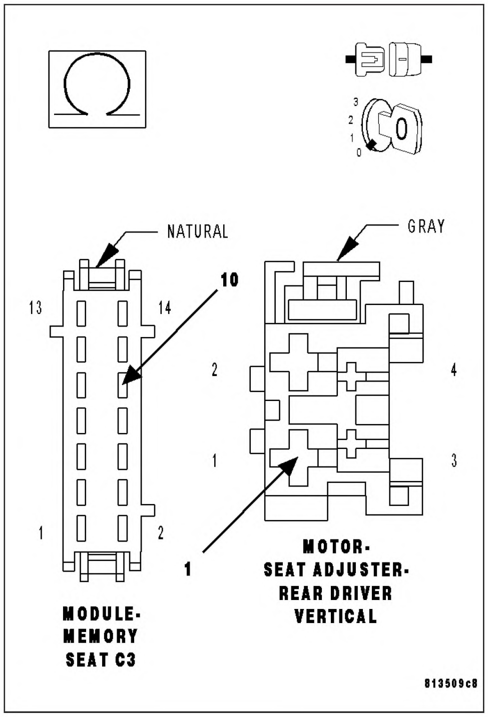
Yes >> Repair the (P111) Driver Seat Rear Vertical Up Driver circuit for an open.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 8

---

8. CHECK THE (P113) DRIVER SEAT REAR VERTICAL DOWN DRIVER AN OPEN

Measure the resistance of the (P113) Driver Seat Rear Vertical Down Driver circuit at the Driver Rear Vertical Seat Adjuster Motor connector to the C3 connector.

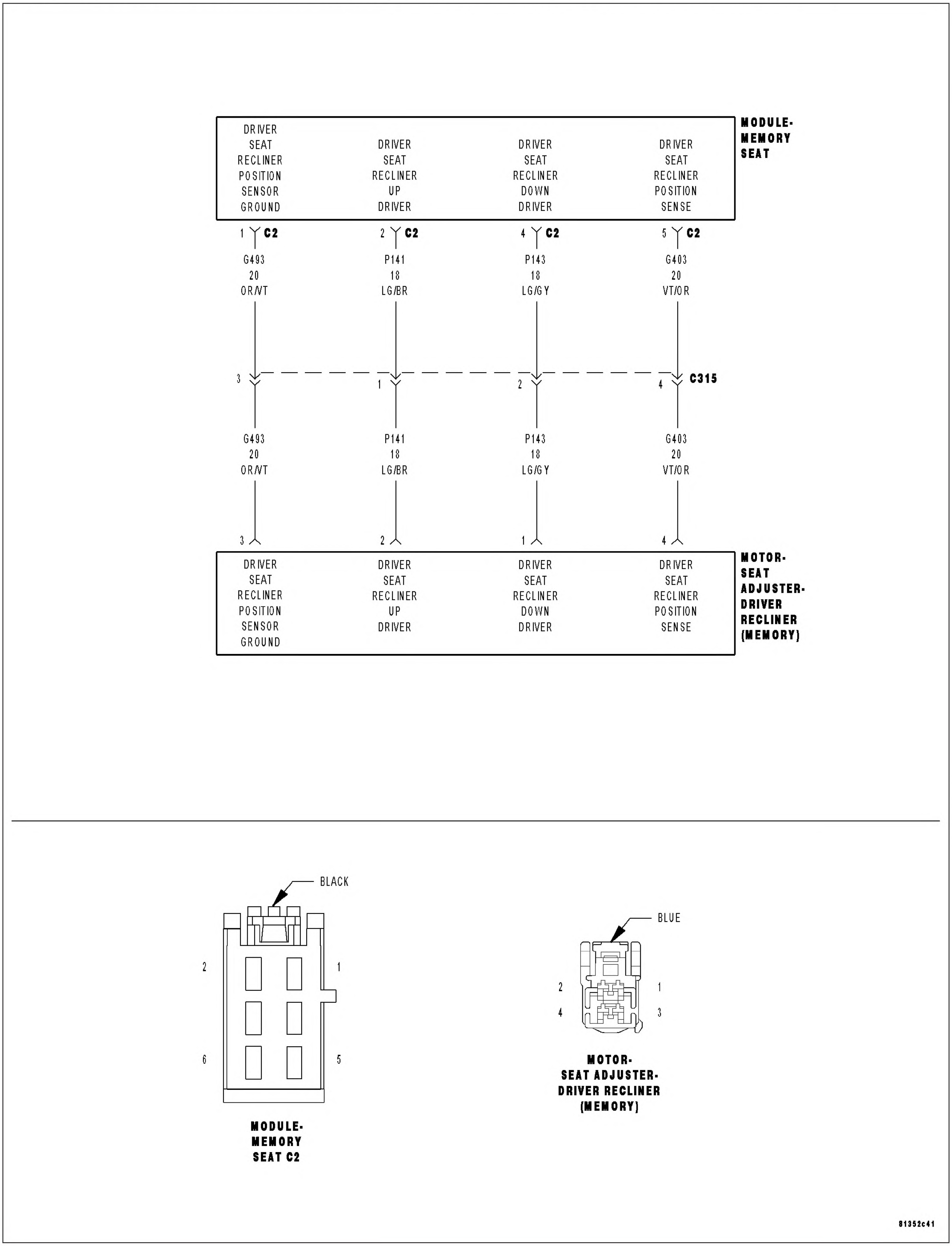

NATURAL
GRAY
10
13
14
2
4
1
3
1
2
1
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL
MODULE-MEMORY SEAT C3
813509c8

Is the resistance above 1.0 ohm?

Yes >> Repair the (P113) Driver Seat Rear Vertical Down Driver circuit for an open.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Replace the Memory Seat Module.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

B1D87–SEAT RECLINER MOTOR CONTROL CIRCUIT PERFORMANCE


MODULE-
MEMORY
SEAT
DRIVER SEAT RECLINER POSITION SENSOR GROUND
DRIVER SEAT RECLINER UP DRIVER
DRIVER SEAT RECLINER DOWN DRIVER
DRIVER SEAT RECLINER POSITION SENSE
1 C2
2 C2
4 C2
5 C2
G493 20 OR/VT
P141 18 LG/BR
P143 18 LG/GY
G403 20 VT/OR
3
1
2
4
C315
G493 20 OR/VT
P141 18 LG/BR
P143 18 LG/GY
G403 20 VT/OR
3
2
1
4
DRIVER SEAT RECLINER POSITION SENSOR GROUND
DRIVER SEAT RECLINER UP DRIVER
DRIVER SEAT RECLINER DOWN DRIVER
DRIVER SEAT RECLINER POSITION SENSE
MOTOR-
SEAT
ADJUSTER-
DRIVER
RECLINER
(MEMORY)
BLACK
2
1
6
5
MODULE-
MEMORY
SEAT C2
BLUE
2
1
4
3
MOTOR-
SEAT ADJUSTER-
DRIVER RECLINER
(MEMORY)
81352c41

B1D87–SEAT RECLINER MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the seat motor is activated.
- **Set Condition:**
  If the Memory Seat Module does not detect the rotation of the seat motor this DTC will set. This DTC will only set when the seat switch is moved in the same direction three consecutive times.

Possible Causes
SEAT POSITION SENSOR CIRCUIT DIAGNOSTIC TROUBLE CODES
(G403) DRIVER SEAT RECLINER POSITION SENSE CIRCUIT OPEN
(G493) DRIVER SEAT RECLINER POSITION SENSOR GROUND CIRCUIT OPEN
(P141) DRIVER SEAT RECLINER UP DRIVER
(P143) DRIVER SEAT RECLINER DOWN DRIVER
DRIVER RECLINER SEAT ADJUSTER MOTOR
MEMORY SEAT MODULE

Diagnostic Test

1. CHECK FOR RELATED DIAGNOSTIC TROUBLE CODES

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display any seat position sensor DTC's?

Yes >> Diagnose and repair the other DTC(s) first. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the Seat Switch in the Recliner position 3 times.

With the scan tool, read DTC's.

Does the scan tool display B1D7B–SEAT BACKREST MOTOR CONTROL CIRCUIT PERFORMANCE?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

B1D87–SEAT RECLINER MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

3. CHECK THE (G403) DRIVER SEAT RECLINER POSITION SENSE VOLTAGE

Disconnect the Driver Recliner Seat Adjuster Motor.

NOTE: Check connectors – Clean and repair as necessary.

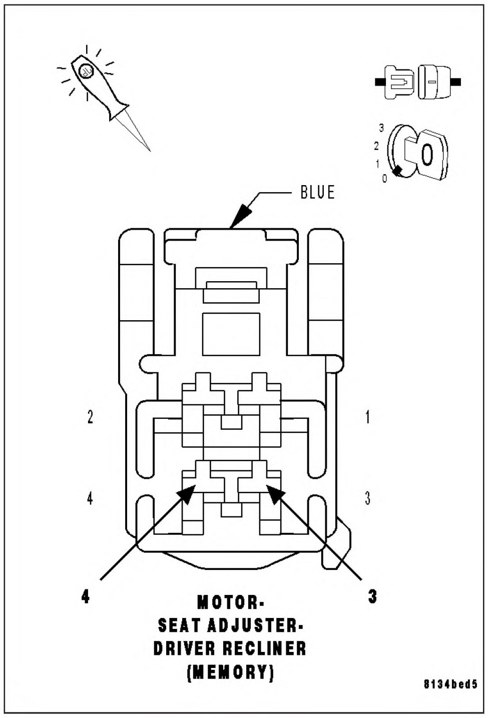
Move the Seat Switch in the Recliner position during the next step.

Using a 12-volt test light connect one lead to the (G403) Driver Seat Recliner Position Sense circuit and the other lead to Driver Seat Recliner Position Sensor Ground at the Driver Recliner Seat Adjuster Motor connector.

Does the test light illuminate for approximately 2 seconds then turn off with the seat switch engaged?

Yes >> Go To 4

No >> Go To 5


3
2
1
0
BLUE
2
1
4
3
4
3
MOTOR-
SEAT ADJUSTER-
DRIVER RECLINER
(MEMORY)
8134bed5

---

4. CHECK THE DRIVER SEAT RECLINER FORWARD/REARWARD DRIVER VOLTAGE

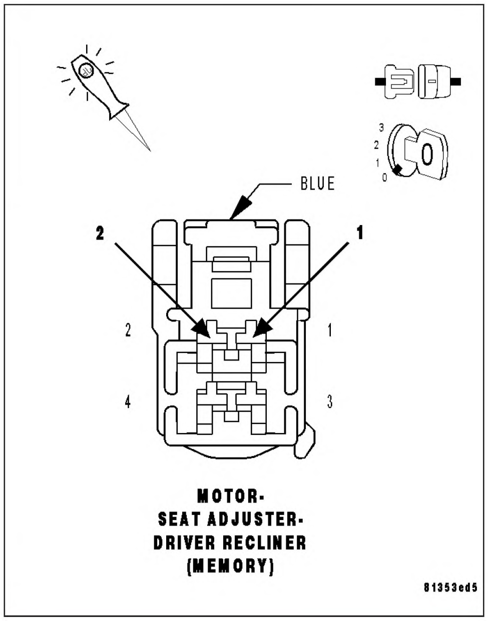
Move the Seat Switch in the Recliner position during the next step.

Using a 12-volt test light connect one lead to the (P141) Driver Seat Recliner Up Driver circuit and the other lead to (P143) Driver Seat Recliner Down Driver circuit at the Driver Recliner Seat Adjuster Motor connector.

Does the test light illuminate with the seat switch engaged?

Yes >> Replace the Recliner motor assembly.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 7


3
2
1
0
BLUE
2
1
2
1
4
3
MOTOR-
SEAT ADJUSTER-
DRIVER RECLINER
(MEMORY)
81353ed5

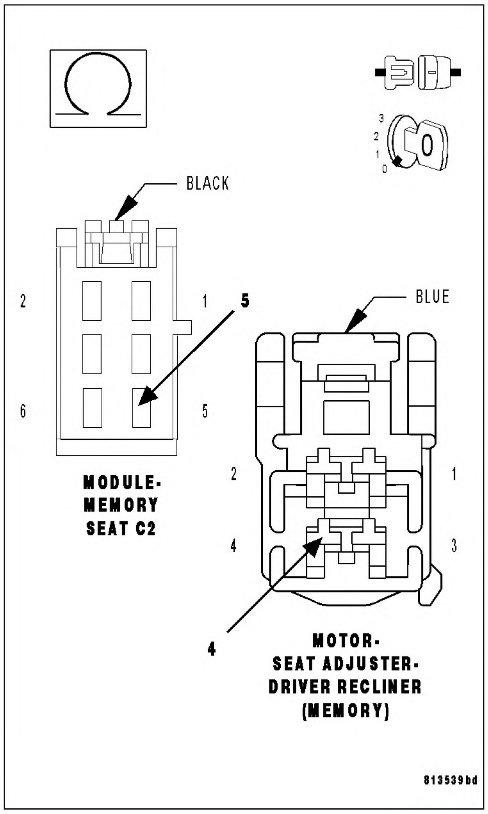
B1D87–SEAT RECLINER MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

5. CHECK THE (G403) DRIVER SEAT RECLINER POSITION SENSE WIRE FOR AN OPEN

Disconnect the Memory Seat Module C2 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (G403) Driver Seat Recliner Position Sense circuit at the Driver Recliner Seat Adjuster Motor connector to the C2 connector.



BLACK
2
1
5
6
5
BLUE
MODULE-
MEMORY
SEAT C2
2
1
4
3
4
MOTOR-
SEAT ADJUSTER-
DRIVER RECLINER
(MEMORY)
813539bd

Is the resistance above 1.0 ohm?

Yes >> Repair the (G403) Driver Seat Recliner Position Sense circuit for an open.

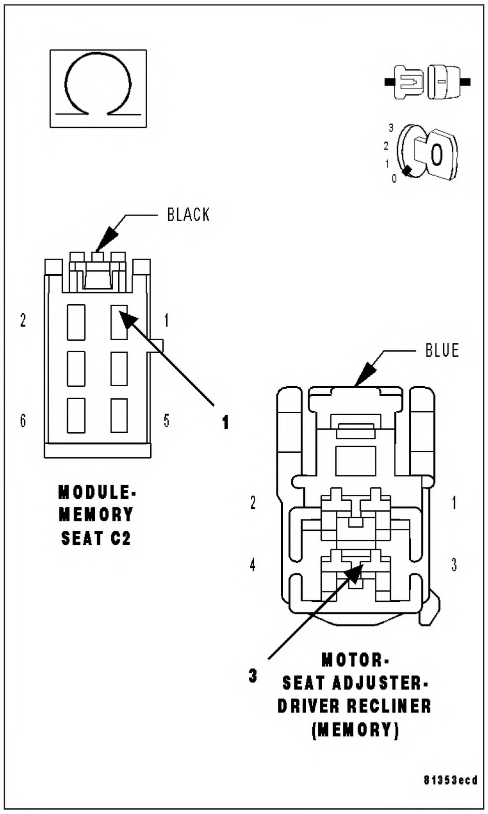
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 6

B1D87–SEAT RECLINER MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

6. CHECK THE (G493) DRIVER SEAT RECLINER POSTION SENSOR GROUND FOR AN OPEN

Measure the resistance of the (G493) Driver Seat Recliner Position Sensor Ground circuit at the Driver Recliner Seat Adjuster Motor connector to the C2 connector.


Ω
BLACK
2
1
6
5
1
BLUE
2
1
4
3
3
MODULE-
MEMORY
SEAT C2
MOTOR-
SEAT ADJUSTER-
DRIVER RECLINER
(MEMORY)
81353ecd

Is the resistance above 1.0 ohm?

Yes >> Repair the (G493) Driver Seat Recliner Position Senor Ground circuit for an open.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

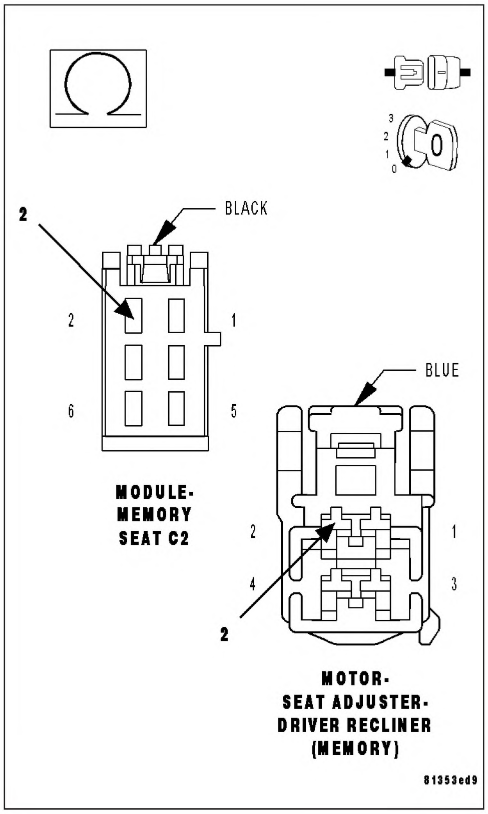
B1D87–SEAT RECLINER MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

7. CHECK THE (P141) DRIVER SEAT RECLINER UP DRIVER WIRE FOR AN OPEN

Disconnect the Memory Seat Module C2 connector.

NOTE: Check connectors – Clean and repair as necessary.

Measure the resistance of the (P141) Driver Seat Recliner Up Driver circuit at the Driver Recliner Seat Adjuster Motor connector to the C2 connector.



3
2
1
0
2
BLACK
2
1
6
5
MODULE-MEMORY SEAT C2
BLUE
2
1
4
3
2
MOTOR-SEAT ADJUSTER-DRIVER RECLINER (MEMORY)
81353ed9

Is the resistance above 1.0 ohm?

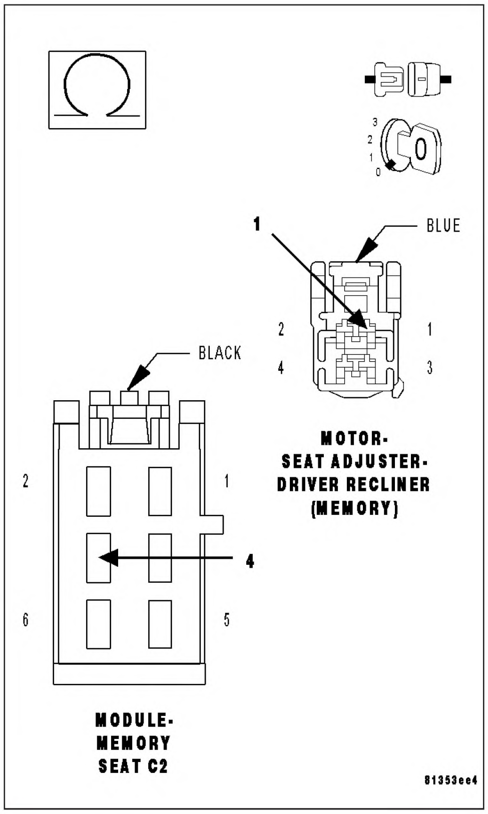
Yes >> Repair the (P141) Driver Seat Recliner Up Driver circuit for an open.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Go To 8

B1D87–SEAT RECLINER MOTOR CONTROL CIRCUIT PERFORMANCE (CONTINUED)

8. CHECK THE (P143) DRIVER SEAT RECLINER DOWN DRIVER AN OPEN

Measure the resistance of the (P143) Driver Seat Recliner Down Driver circuit at the Driver Recliner Seat Adjuster Motor connector to the C2 connector.


1
BLUE
2
1
4
3
BLACK
MOTOR-
SEAT ADJUSTER-
DRIVER RECLINER
(MEMORY)
2
1
4
6
5
MODULE-
MEMORY
SEAT C2
81353ee4

Is the resistance above 1.0 ohm?

Yes >> Repair the (P143) Driver Seat Recliner Down Driver circuit for an open.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

No >> Replace the Memory Seat Module.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1

B1D9B–SEAT HORIZONTAL FRONT STOP NOT LEARNED

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the seat motor is activated.
- **Set Condition:**
  Seat becomes de-standardized. If the seat is not standardized, an Easy Exit/Entry function can not be performed. If seat is standardized (learn seat cushion horizontal front hardstop) and then becomes de-standardized (conditions are: seat cushion motor is 5% past the expected hard stop position or seat cushion hall sensor failure is occured), a DTC is logged.

Possible Causes
OTHER DIAGNOSTIC TROUBLE CODES SET IN THE MEMORY SEAT MODULE
SEAT STANDERDIZATION ROUTINE NOT PERFORMED

Diagnostic Test

1. CHECK FOR RELATED DIAGNOSTIC TROUBLE CODES

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display any seat position sensor or circuit performance DTC's?

Yes >> Diagnose and repair the other DTC(s) first. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase DTC's

Move the seat in the full forward horizontal position.

With the scan tool, read DTC's.

Does the scan tool display B1D9B–SEAT HORIZONTAL FRONT STOP NOT LEARNED?

Yes >> With the scan tool, perform the MSM Standard Routine.
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

B210D-BATTERY VOLTAGE LOW

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Engine running, during seat motor operation.
- **Set Condition:**This code is set immediately after the Seat Memory Module receives a low charging system voltage message over the CAN B Bus or detects voltage under 9.5 volts on the (A110) Fused B(+) circuit.

Possible Causes
CHARGING SYSTEM VOLAGE LOW
(A110) FUSED B(+) CIRCUIT
SEAT MEMORY MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. CHECK PCM FOR CHARGING SYSTEM DTC

With the scan tool, read Powertrain Control Module DTC's.

Are there any Charging System DTC's set in the Powertrain Control Module?

Yes >> (Refer to 8 - ELECTRICAL/CHARGING - DIAGNOSIS AND TESTING) for Charging System diagnostic procedures.

No >> Go To 2
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

---

2. VERIFY THAT DTC B210D-BATTERY VOLTAGE LOW IS ACTIVE

With the scan tool, record and erase DTC's

Turn the ignition switch to the Off position then start the engine and operate the driver power seat.

With the scan tool, read DTC's.

Does the DTC B210D-BATTERY VOLTAGE LOW reset?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

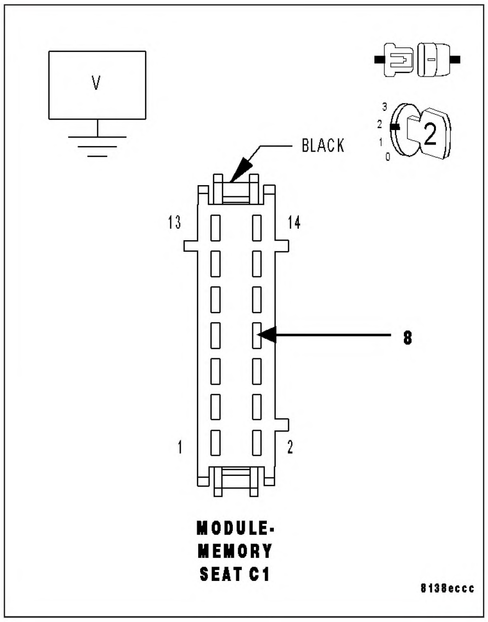
B210D-BATTERY VOLTAGE LOW (CONTINUED)

3. CHECK THE VOLTAGE ON THE (A110) FUSED B(+) CIRCUIT

Disconnect the Memory Seat Module connector.

NOTE: Check connectors - Clean and repair as necessary.
Start the engine and let idle.

Measure the voltage on the (A110) Fused B(+) circuit at the MSM connector and compare to voltage at the vehicle battery.



Is the voltage at the MSM connector the same as measured at the battery?

Yes >> Replace the Memory Seat Module in accordance with the service information.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

No >> Repair the (A110) Fused B(+) circuit as necessary.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

B210E-BATTERY VOLTAGE HIGH

For the Heated Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Engine running, during seat operation.
- **Set Condition:**This code is set immediately after the Memory Seat Module receives a high charging system voltage message over the CAN B Bus or detects voltage over 16.5 volts on the (A110) Fused B(+) circuit.

Possible Causes
CHARGING SYSTEM VOLAGE HIGH
(A110) FUSED B(+) CIRCUIT
MEMORY SEAT MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. CHECK PCM FOR CHARGING SYSTEM DTC

With the scan tool, read Powertrain Control Module DTC's.

Are there any Charging System DTC's set in the Powertrain Control Module?

Yes >> (Refer to 8 - ELECTRICAL/CHARGING - DIAGNOSIS AND TESTING) for Charging System diagnostic procedures.

No >> Go To 2

---

2. VERIFY THAT DTC B210E-BATTERY VOLTAGE HIGH IS ACTIVE

With the scan tool, record and erase DTC's

Turn the ignition switch to the Off position then start the engine and let run for one minute.

Attempt to operate the driver power seat.

With the scan tool, read DTC's.

Does the DTC B210E-BATTERY VOLTAGE HIGH reset?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

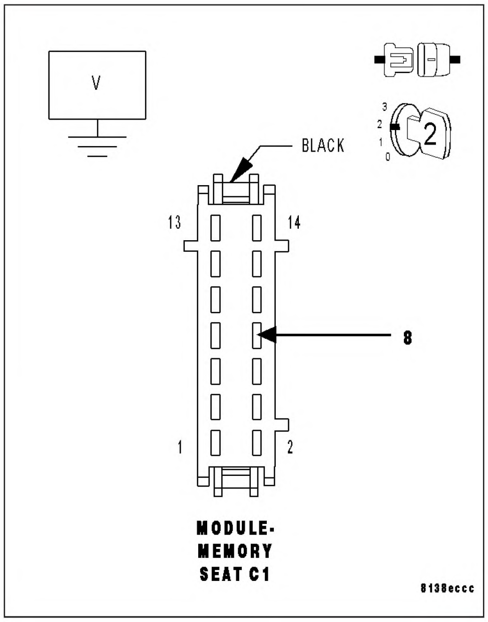
B210E-BATTERY VOLTAGE HIGH (CONTINUED)

3. CHECK THE VOLTAGE ON THE (A110) FUSED B(+) CIRCUIT

Disconnect the Seat Memory Module connector.

NOTE: Check connectors - Clean and repair as necessary.
Start the engine and let idle.

Measure the voltage on the (A110) Fused B(+) circuit at the MSM connector and compare to voltage at the vehicles battery.



Is the voltage at the MSM connector the same as measured at the battery?

Yes >> Replace the Memory Seat Module in accordance with the service information.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

No >> Repair the (A110) Fused B(+) circuit as necessary.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

B221C- MEMORY SEAT MODULE INTERNAL

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/HEATED SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**Ignition on.
- **Set Condition:**This code is set immediately if the Memory Seat Module internal self test fails.

Possible Causes
MEMORY SEAT MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding.

Diagnostic Test

1. VERIFY THAT DTC B221C- MEMORY SEAT MODULE INTERNAL IS ACTIVE

With the scan tool, record and erase DTC's

Cycle the ignition switch off then back on.

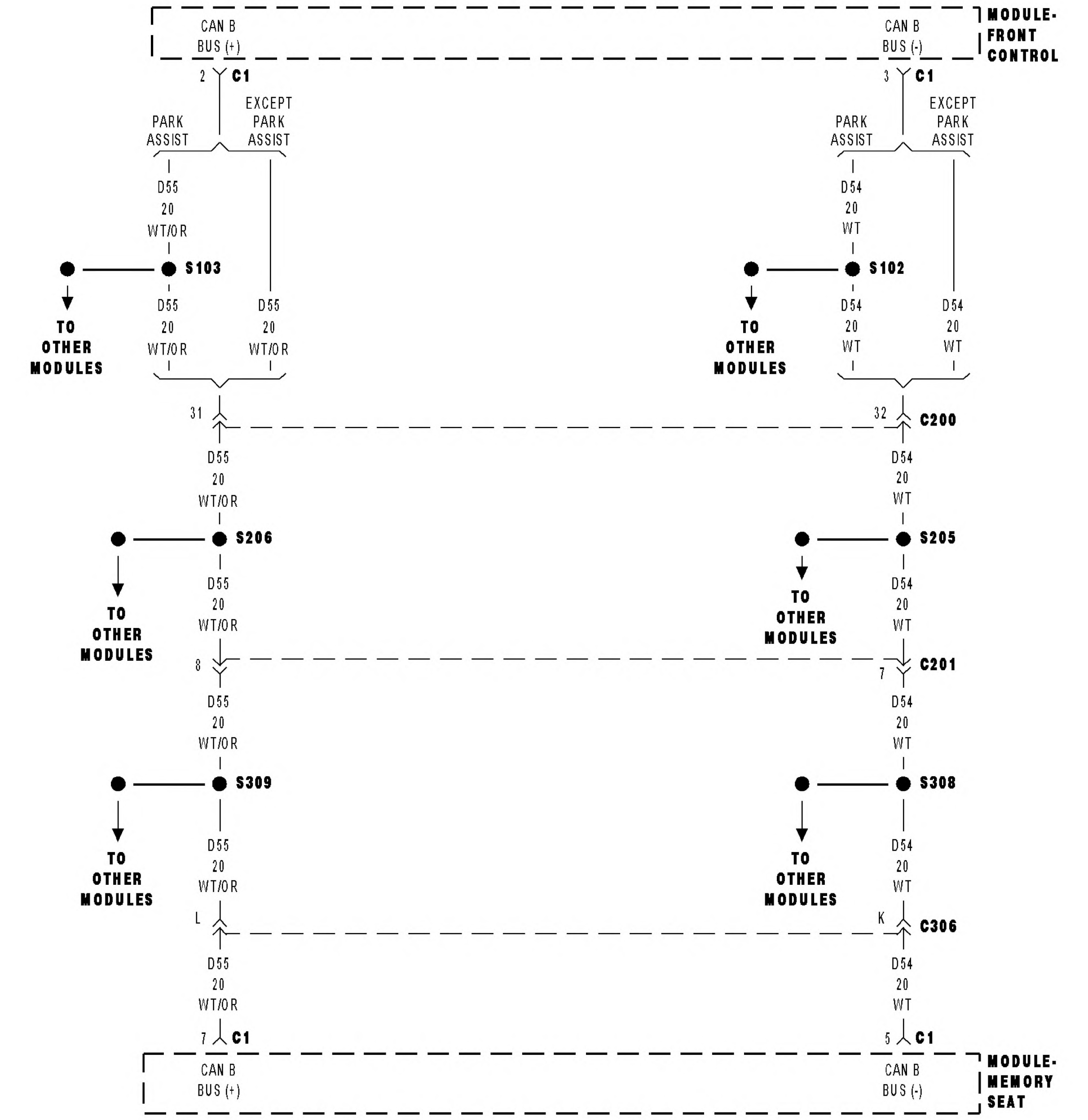
With the scan tool, read DTC's.

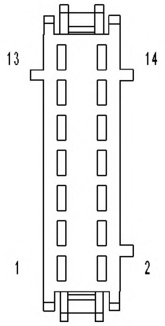
Does the DTC B221C-MEMORY SEAT MODULE INTERNAL reset?

Yes >> Replace the Memory Seat Module.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

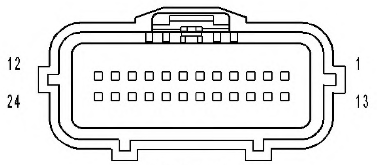
No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform POWER SEAT SYSTEM VERIFICATION TEST – VER 1.

U0020-CAN B BUS OFF PERFORMANCE


MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
PARK ASSIST
EXCEPT PARK ASSIST
D55 20 WT/OR
D54 20 WT
S103
S102
TO OTHER MODULES
31
32
C200
S206
S205
8
7
C201
S309
S308
L
K
C306
7 C1
5 C1
MODULE-MEMORY SEAT



MODULE-MEMORY SEAT C1



MODULE-FRONT CONTROL C1

814d771c

U0020-CAN B BUS OFF PERFORMANCE (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The Memory Seat Module detects the (D55) CAN B Bus (+) circuit or (D54) CAN B Bus (-) circuit open.

Possible Causes
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase MSM DTC’s

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active MSM DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

---

2. (D55) CAN B BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Memory Seat Module C1 harness connector.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.

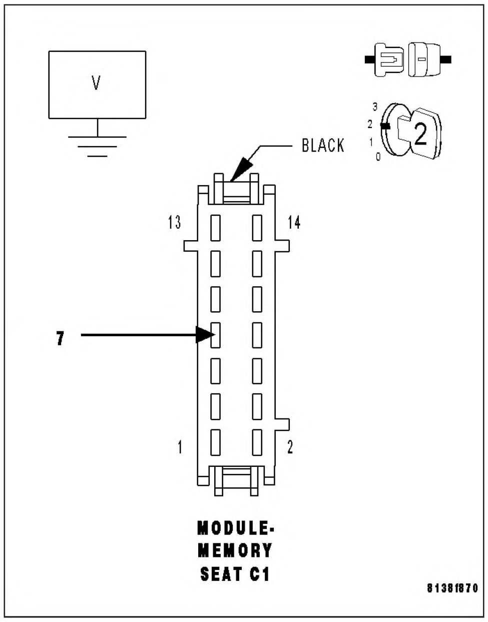
Is there any voltage present?

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Memory Seat Module in accordance with the service information.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

No >> Repair the (D55) CAN B Bus (+) circuit for an open.

Perform BODY VERIFICATION TEST - VER 1.



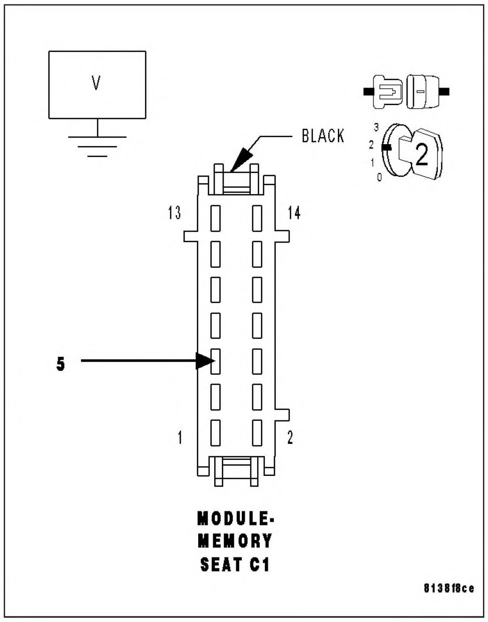
U0020-CAN B BUS OFF PERFORMANCE (CONTINUED)

3. (D54) CAN B BUS (-) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Memory Seat Module C1 harness connector.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.



Is there any voltage present?

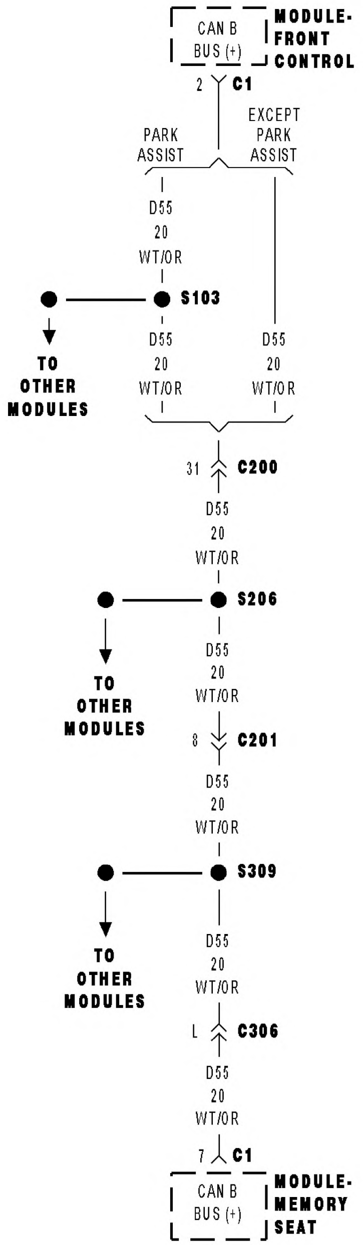
Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Memory Seat Module in accordance with the service information.

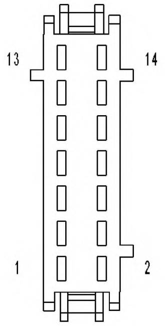
Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

No >> Repair the (D54) CAN B Bus (-) circuit for an open.

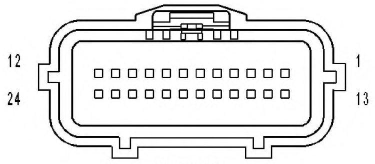
Perform BODY VERIFICATION TEST - VER 1.

U0021-CAN B BUS (+) CIRCUIT OPEN


CAN B BUS (+)
MODULE-FRONT CONTROL
2
C1
PARK ASSIST
EXCEPT PARK ASSIST
D55 20 WT/OR
S103
TO OTHER MODULES
D55 20 WT/OR
D55 20 WT/OR
31
C200
D55 20 WT/OR
S206
TO OTHER MODULES
D55 20 WT/OR
8
C201
D55 20 WT/OR
S309
TO OTHER MODULES
D55 20 WT/OR
L
C306
D55 20 WT/OR
7
C1
CAN B BUS (+)
MODULE-MEMORY SEAT



MODULE-MEMORY SEAT C1



MODULE-FRONT CONTROL C1

814d772d

U0021-CAN B BUS (+) CIRCUIT OPEN (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The Memory Seat Module detects the (D55) CAN B Bus (+) circuit is open.

Possible Causes
(D55) CAN B BUS (+) CIRCUIT OPEN
MEMORY SEAT MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase MSM DTC's

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active MSM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

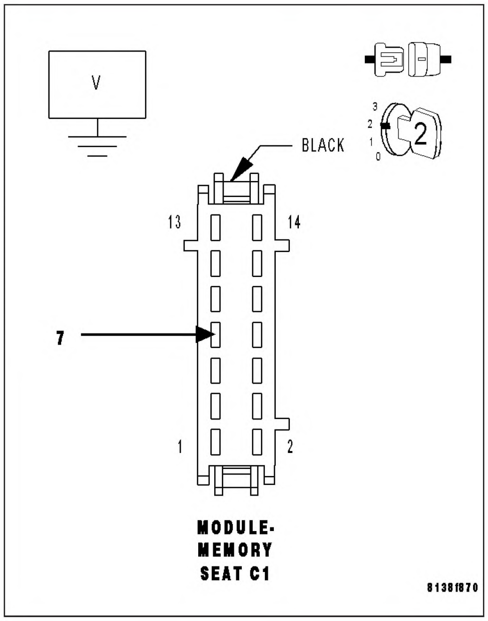
---

2. (D55) CAN B BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Memory Seat Module C1 harness connector.

Measure the voltage between the (D55) CAN B Bus (+) circuit and ground.



Is there any voltage present?

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Memory Seat Module in accordance with the service information.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

No >> Repair the (D55) CAN B Bus (+) circuit for an open.

Perform BODY VERIFICATION TEST - VER 1.

U0022-CAN B BUS (+) CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**.

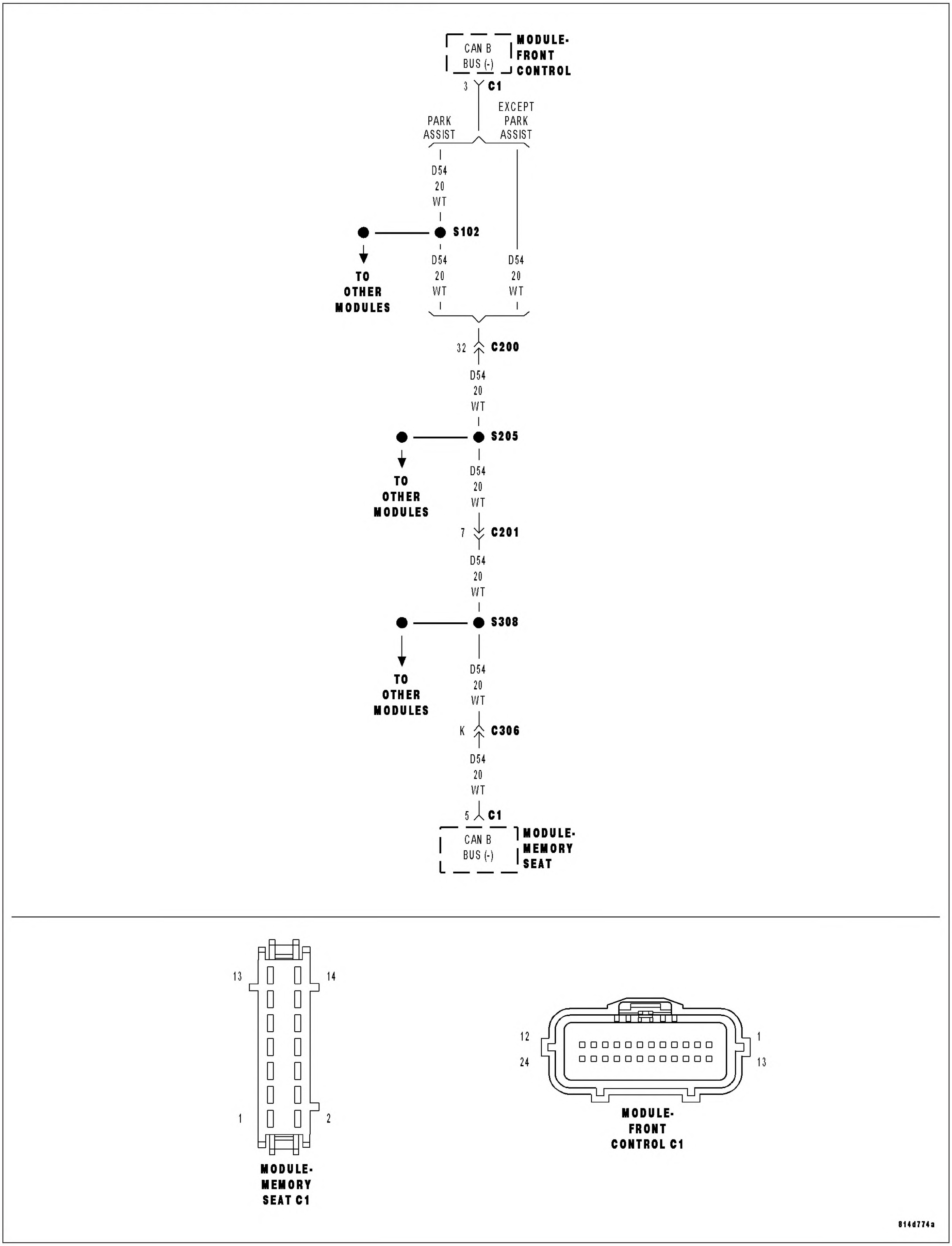
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0023-CAN B BUS (+) CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0024-CAN B BUS (-) CIRCUIT OPEN


CAN B BUS (-)
MODULE-FRONT CONTROL
3
C1
PARK ASSIST
EXCEPT PARK ASSIST
D54 20 WT
S102
TO OTHER MODULES
D54 20 WT
D54 20 WT
32
C200
D54 20 WT
S205
TO OTHER MODULES
D54 20 WT
7
C201
D54 20 WT
S308
TO OTHER MODULES
D54 20 WT
K
C306
D54 20 WT
5
C1
CAN B BUS (-)
MODULE-MEMORY SEAT
13
14
1
2
MODULE-MEMORY SEAT C1
12
24
1
13
MODULE-FRONT CONTROL C1
814d774a

U0024-CAN B BUS (-) CIRCUIT OPEN (CONTINUED)

For the Power Seat System circuit diagram (Refer to 8 - ELECTRICAL/POWER SEATS - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  The Memory Seat Module detects the (D54) CAN B Bus (-) circuit is open.

Possible Causes
(D54) CAN B BUS (-) CIRCUIT OPEN
MEMORY SEAT MODULE

Theory of Operation

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

Turn the ignition on.

With the scan tool, record and erase MSM DTC's

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read active MSM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

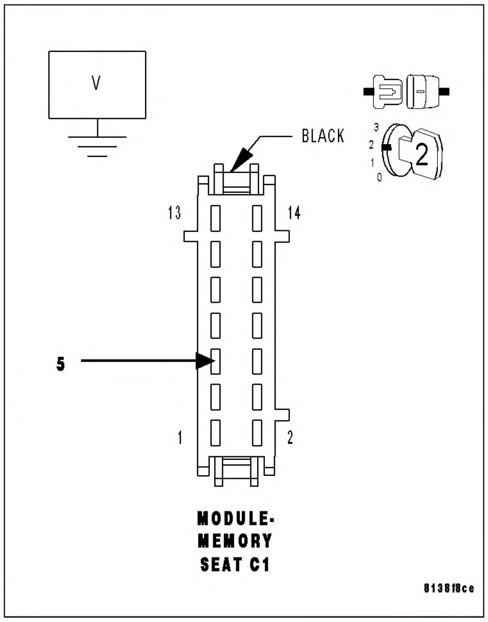
U0024-CAN B BUS (-) CIRCUIT OPEN (CONTINUED)

2. (D54) CAN B BUS (-) CIRCUIT OPEN

Turn the ignition off.

Disconnect the Memory Seat Module C1 harness connector.

Measure the voltage between the (D54) CAN B Bus (-) circuit and ground.



Is there any voltage present?

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace the Memory Seat Module in accordance with the service information.

Perform POWER SEAT SYSTEM VERIFICATION TEST - VER 1.

No >> Repair the (D54) CAN B Bus (-) circuit for an open.

Perform BODY VERIFICATION TEST - VER 1.

U0025-CAN B BUS (-) CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0026-CAN B BUS (-) CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156-LOST COMMUNICATION WITH EOM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0181–LOST COMMUNICATION WITH HEADLAMP LEVEL TRANSLATOR

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212–LOST COMMUNICATION WITH SCCM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

POWER SEAT SYSTEM VERIFICATION TEST – VER 1

Diagnostic Test

1. Perform Power Seat System Verification Test

Disconnect all jumper wires and reconnect all previously disconnected components and connectors.

Ensure that all accessories are turned off.

Ensure that the battery is fully charged.

Turn the ignition on.

If either the Memory Seat Module or the Driver Horizontal Seat Adjuster Motor/Seat Track was replaced, the MSM Standard Routine must be performed using the scan tool.

With the scan tool, record and erase DTCs from all modules.

Operate the driver seat in all positions.

With the Memory Switch on the Driver's Door, program the Driver's Seat #1 Button to a desired position and Driver #2 Button to a different position.

Verify that both Memory positions can be recalled from the RKE transmitter and the Memory Switch on the Driver's Door.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select ECU View.

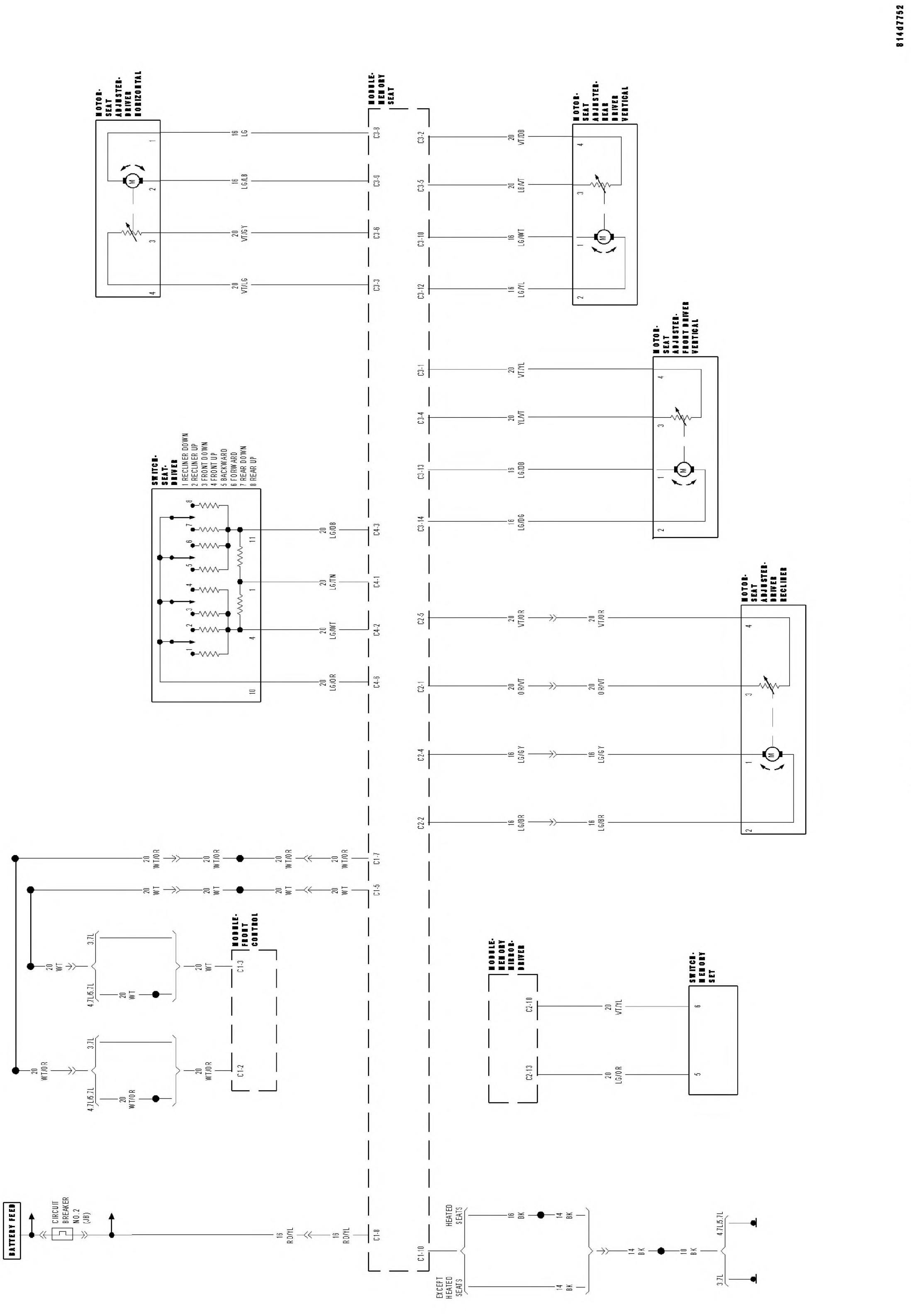
Check for DTCs in the modules.

Are DTCs present in any of the modules or is the original condition still present?

Yes >> The repair is not complete. Refer to the related category for the DTC or symptom that is still present.

No >> The repair is complete.

SCHEMATICS AND DIAGRAMS


814d7752
MOTOR-SEAT ADJUSTER-DRIVER HORIZONTAL
MODULE-MEMORY SEAT
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
SWITCH-SEAT-DRIVER
1 RECLINER DOWN
2 RECLINER UP
3 FRONT DOWN
4 FRONT UP
5 BACKWARD
6 FORWARD
7 REAR DOWN
8 REAR UP
MOTOR-SEAT ADJUSTER-DRIVER RECLINER
MODULE-FRONT CONTROL
MODULE-MEMORY MIRROR-DRIVER
SWITCH-MEMORY SET
BATTERY FEED
CIRCUIT BREAKER NO.2 (JB)
HEATED SEATS
EXCEPT HEATED SEATS
3.7L
4.7L,5.7L

POWER SEAT SYSTEM MSM

POWER SEATS - SERVICE INFORMATION

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POWER SEATS - SERVICE INFORMATION

DESCRIPTION

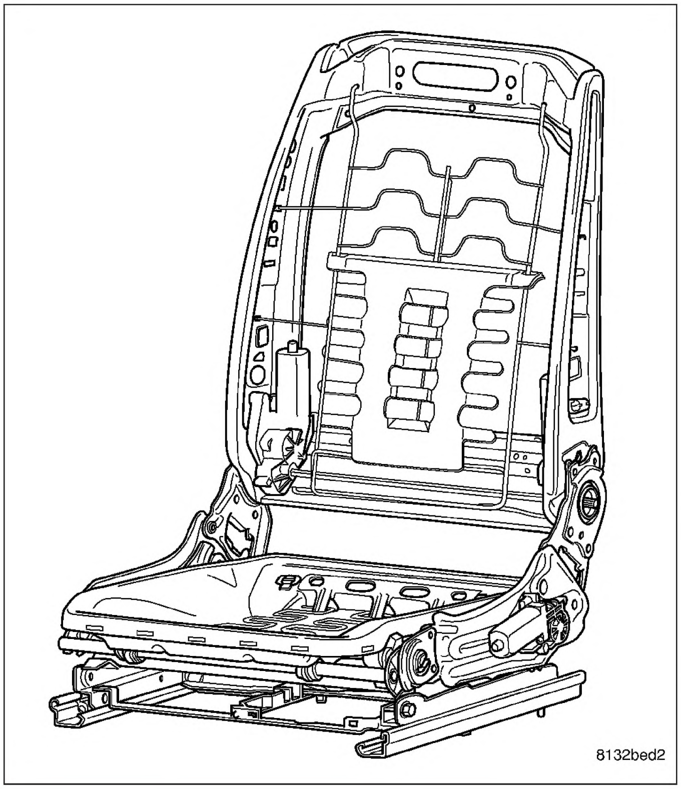
POWER SEAT SYSTEM

WARNING: The front passenger seat assembly contains critical components that affect the front passenger airbag deployment. Correctly functioning front passenger seat components are critical for the Occupant Classification System (OCS) to properly classify the front passenger and calculate the proper airbag deployment. Unapproved modifications or service procedures to the front passenger seat assembly, its related components, or trim cover may inadvertently change the airbag deployment in case of a frontal crash. This could result in death or serious injury to the front seat passenger if the vehicle is involved in an accident. The following requirements must be strictly adhered to:

- **Do not modify the front passenger seat assembly or components in any way.**
- **Do not modify the front seat center console or center position seat in any way.**
- **Do not use prior or future model year seat trim covers not designated for the specific model being repaired. Always use the correct seat trim cover specified for the vehicle.**
- **Do not replace the seat trim cover with an aftermarket trim cover.**
- **Do not add a secondary trim cover other than those approved by DaimlerChrysler/Mopar.**
- **At no time should any Supplemental Restraint System (SRS) component or SRS related component or fastener be modified or replaced with any part except those which are approved by DaimlerChrysler/Mopar.**

The power seat system allows the driver and front seat passenger to electrically adjust their seating positions using the power seat switches located on the outboard seat cushion side shield of each front seat.

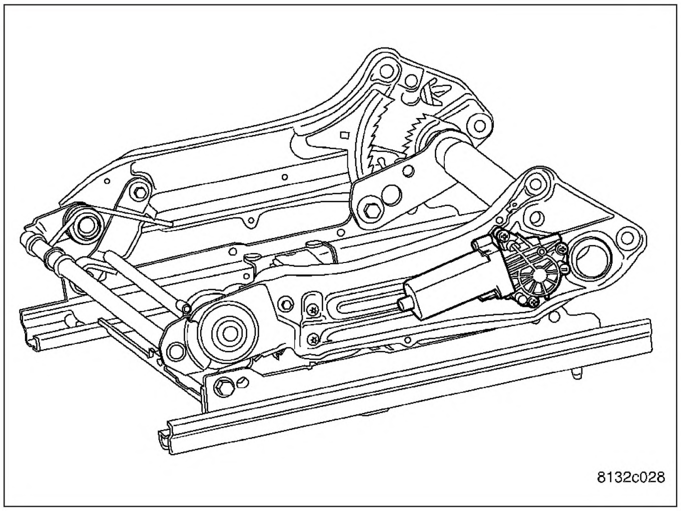
A driver side eight-way power seat includes a six-way adjustable seat cushion track and a two-way power seat back. The driver power seat can be adjusted up, down, front up, front down, forward, rearward, recliner forward, and recliner rearward. A passenger side four-way power seat includes a two-way adjustable seat cushion track and a two-way power seat back. The passenger power front seat can be adjusted forward, rearward, recliner forward and recliner rearward. The power seat system is also available with the heated seat option and memory seat option that automatically positions the power seat for two different drivers (Refer to 8 - ELECTRICAL/HEATED SEATS - DESCRIPTION) and MEMORY SEAT SYSTEM below.



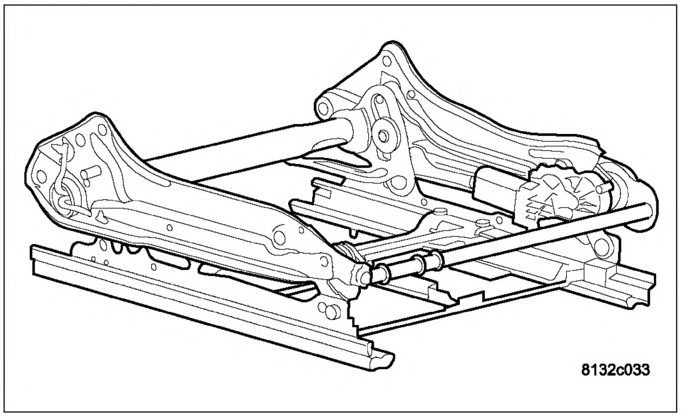
The power seat system for this vehicle includes the following major components:

- **Power Seat Adjuster** - The power seat adjuster is made up of the upper and lower power seat adjuster assemblies. The driver upper power seat adjuster contains two reversible motors that are connected to worm-drive gearboxes that move the seat adjuster through a combination of screw-type drive units. These motors are the height adjust motor and the front tilt motor. On vehicles equipped with non-memory power seats, each motor contains a self-resetting circuit breaker to protect it from overload. On vehicles equipped with memory power seats the motor overload protection is a function of the Memory Seat Module (MSM). Consecutive or frequent resetting of the circuit breakers may damaged the motors. There are no motors on the passenger upper power seat adjuster.

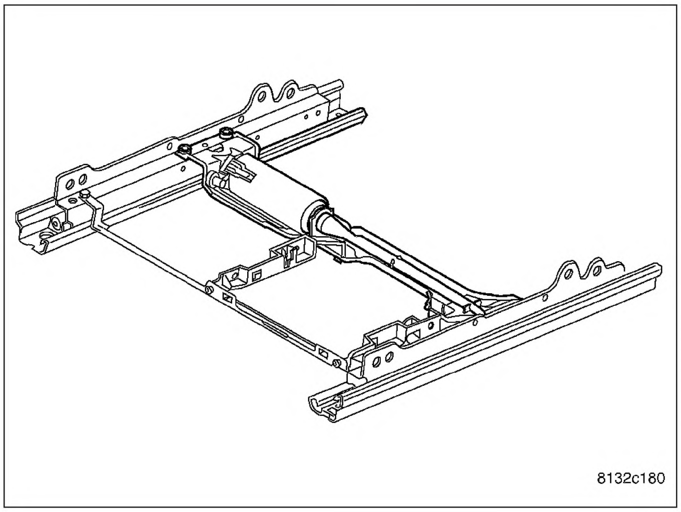
  The height adjust motor is located on the rear of the upper power seat adjuster assembly and controls the up and down movement of the entire seat. The height adjust motor can be serviced separately from the power seat adjuster assembly.



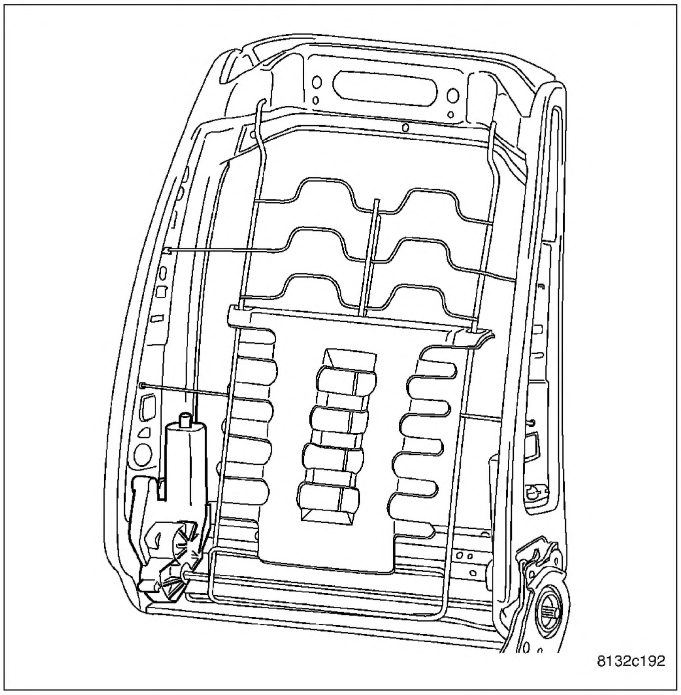
The front tilt motor is located on the front of the upper power seat adjuster assembly and controls the up and down movement of the seat front only. The front tilt motor can be serviced separately from the power seat adjuster assembly.



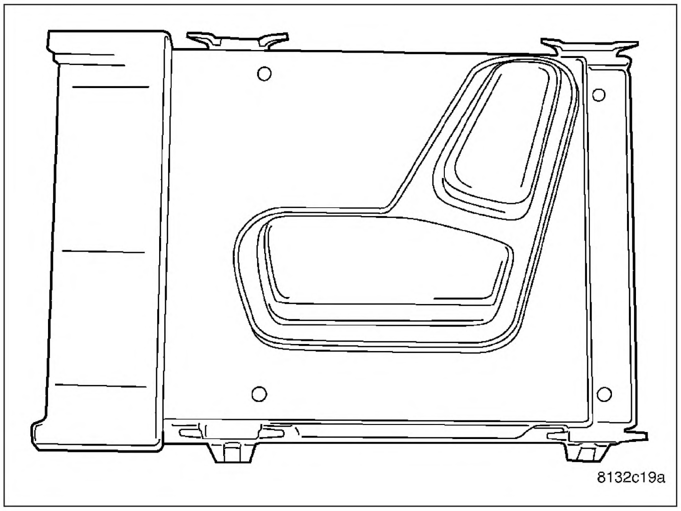
The driver and passenger lower power seat adjusters contain one reversible motor that is connected to a worm-drive gearbox that moves the seat adjuster through a screw-type drive unit. On vehicles equipped with non-memory power seats, the motor will contain a self-resetting circuit breaker to protect it from overload. On vehicles equipped with memory power seats the motor overload protection is a function of the Memory Seat Module (MSM). Consecutive or frequent resetting of the circuit breakers may damaged the motors. The motor is part of the lower power seat track unit and must be replaced as an assembly, (Refer to 23 - BODY/SEATS/SEAT ADJUSTERS - REMOVAL).



- **Power Seat Recliner** - The power seat recliner replaces the manual seat recliner. The power seat option includes an electrically operated power seat back recliner mechanism. The power seat recliner switch is integral to the power seat switch assembly, but is actuated with a separate switch knob.
  The power seat recliner motor assembly is mounted in the place of a seat hinge on the outboard side of the seat. The upper hinge plate of the power seat recliner mechanism is secured with two screws to the seat back frame and is concealed beneath the seat back trim cover and padding. The lower hinge plate and the motor and drive unit of the power seat recliner mechanism is secured with two screws to the seat cushion frame, and is concealed by the outboard seat cushion side shield.
  The power seat recliner motor cannot be repaired. If the unit is inoperative or damaged, the seat back frame must be replaced, (Refer to 8 - ELECTRICAL/POWER SEATS/POWER SEAT MOTOR - REMOVAL).



- **Power Seat Switches** - Vehicles may be equipped with driver only, or driver and passenger power seat switches. One seat switch is used for each front seat. The power seat switches are paddle-type levers mounted on the outboard seat side shields. Movement of the seat cushions and backs mimics the action of the switch paddles. (Refer to 8 - ELECTRICAL/POWER SEATS/ SEAT SWITCH - DESCRIPTION) for additional information.



MEMORY SEAT SYSTEM

An electronic memory seat system is available on certain models. The memory system is able to store and recall all driver side power seat positions, and the drivers side view mirror positions. The system can be set for two different drivers. On vehicles with a factory installed radio connected to the Controller Area Network (CAN) data bus network, the memory system is also able to store and recall up to twenty radio station presets (ten AM and ten FM), also for two drivers. The memory system also will store and recall the last station listened to for each driver, even if it is not one of the twenty preset stations.

The memory system will automatically recall all of these settings when a button of the memory switch is depressed, or when the doors are unlocked using the Remote Keyless Entry (RKE) transmitter (if enabled). If the vehicle has more than two drivers the RKE transmitter recall of memory features can be disabled. This is a customer programmable feature of the overhead console.

The memory system also has a easy exit feature that will move the driver seat rearward 55 millimeters or to the end of its travel, whichever occurs first, when the key is removed from the ignition switch lock cylinder. This is a customer programmable feature of the overhead console.

The memory system includes the following components:

- **Memory Selector Switch** - located in the driver door trim panel.
- **Driver Memory Mirror Module (DMMM)** - located in the driver door, behind the trim panel.
- **Passenger Memory Mirror Module (PMMM)** - located in the passenger door, behind the trim panel.
- **Hall Effect Sensors - Drivers Mirror** - The hall effect sensor is permanently installed on the drivers side view mirror motor. This hall effect sensor is used to provide a reference signal to the memory heated seat mirror module, letting the module know the exact position of the mirror.
- **Sentry Key Remote Entry Module (SKREEM)** - located at ignition key cylinder.
- **Remote Keyless Entry (RKE) Transmitter** - located with ignition key.
- **Memory Seat Module (MSM)** - located underneath the driver seat and also controls the Adjustable Pedals.
- **Hall Effect Sensors - Seat Track** - These hall effect sensors are permanently installed in each of the power seat track motors. They are used to provide a reference signal to the memory heated seat mirror module, letting the module know the exact position of the seat cushion and recliner.
- **Radio** - located in the instrument panel center stack.
- **Automatic Temperature Control (ATC)** - located in the instrument panel center stack.

Certain functions and features of the memory system rely upon resources shared with other electronic modules in the vehicle over the Controller Area Network (CAN) bus. The CAN bus allows the sharing of sensor information. This helps to reduce wire harness complexity, internal controller hardware, and component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities. For diagnosis of these electronic modules or of the CAN bus, the use of a scan tool and the proper diagnostic information are needed.

OPERATION

POWER SEAT SYSTEM

The power seat system receives battery current through a 50 amp fuse in the Power Distribution Center (PDC) so that the power seats remain operational, regardless of the ignition switch position.

When a power seat switch is actuated, a battery feed and a ground path are applied through the power seat switch contacts to the appropriate motor or motors. The motor and drive unit operate to move the seat in the selected direction until the switch is released, or until the travel limit of the power seat track is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor is reversed through the switch contacts. This causes the motor to run in the opposite direction.

MEMORY SEAT SYSTEM

The Memory Seat Module (MSM) receives battery current through a 50 amp fuse in the Power Distribution Center (PDC) so that the power seats remain operational, regardless of the ignition switch position. When the driver memory seat switch control knob is actuated, a resistance signal is sent to the MSM via the Controller Area Network (CAN) bus circuit. The MSM is responsible for the 12v battery feed and ground path to the power seat adjuster motor. The adjuster motor operates to move the power seat adjuster mechanism through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached.

The MSM receives memory set/position switch input through the CAN bus circuit. The MSM also receives hard wired input from the hall effect sensors, mounted on each of the driver power seat adjuster motors and the driver side view mirror motor. The programmed software in the module allows it to know where the seat/mirror is located in its designed travel by a pulse count generated from the hall effect sensors. This way, when the memory switch is depressed the module will power the seat adjuster/mirror motors until the correct preset location is achieved. The module will prevent the seat memory recall function from being initiated, if the transmission gear selector lever is not in the Park position, or if the vehicle is moving. These inputs are monitored over the Controller Area Network (CAN) bus circuit by the MSM.

A memory setting is saved by pressing the “set” button, then pressing either the memory “1” or “2” button within 5 seconds of pressing the “set” button.

A memory setting is recalled by pressing either the memory “1” or “2” button, or by pressing the unlock button on a “linked” Remote Keyless Entry (RKE) transmitter.

For driver safety, memorized settings can not be recalled if the transmission is in a position other than Park or the seat belt is latched.

DIAGNOSIS AND TESTING

MEMORY SEAT SYSTEM

In order to obtain conclusive testing of the power seats with and without the memory system option, the Controller Area Network (CAN) bus, and all of the electronic modules that provide inputs to, or receive outputs from the memory system components must be checked. Use a scan tool and the proper diagnostic information to accurately diagnose the power seat/memory seat systems.

NOTE: Vehicles equipped with the memory/heated seat option utilize a low voltage cut-off feature. This feature turns off the 12v power to the power seat system anytime vehicle voltage is below 11.0v. Be certain to check the vehicle electrical system for proper voltage anytime the power seat system appears inoperative.

Before any testing of the power seat system is attempted, the battery should be fully-charged.

POWER SEAT ADJUSTER

Operate the power seat switch and move the seat in all directions. The seat should move in each of the selected directions.

If the power seat adjuster fails to operate in more than one direction, proceed as follows:

1. Inspect the power seat adjuster motors to ensure the electrical connectors are fully seated to the motors. If OK, go to Step 2. If not OK, connect the electrical connector to the fully seated position.

2. Check the power seat fuse in the power distribution center. If OK, go to Step 3. If not OK, replace the inoperative fuse.
3. Remove the power seat switch from the seat cushion side panel. Check for battery voltage at the fused B(+) circuit cavity of the power seat switch wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the power distribution center as required.
4. Check for continuity between the ground circuit cavity of the power seat switch wire harness connector and a good ground. There should be continuity. If OK, go to Step 5. If not OK, repair the open circuit to ground as required.
5. (Refer to 8 - ELECTRICAL/POWER SEATS/SEAT SWITCH - DIAGNOSIS AND TESTING). If the switch tests OK, check the wire harness between the power seat switch and the motor. If the circuits check OK, replace the faulty power seat adjuster assembly. If the circuits are not OK, repair the wire harness as required.

STANDARD PROCEDURE

MEMORY SYSTEM PROGRAMMING

The Memory Seat Module (MSM) interfaces with the Remote Keyless Entry (RKE) system via the Controller Area Network (CAN) bus. The proper procedure of setting and recalling a memory position using the RKE is as follows:

1. Press and release memory switch 1 or 2 to recall memory position 1or 2.
2. Adjust the seat, recliner, adjustable pedal position, set radio station presets, set HVAC temperature preset, and the side view mirrors to the desired position.
3. Press momentarily and release memory switch S.
4. Within five seconds, press momentarily and release memory switch 1 or 2.
5. To link the RKE transmitter: within ten seconds, press and release the “LOCK” button on one of the RKE transmitters

To program the second driver’s position, repeat the above procedure using memory switch 2. The second RKE transmitter can be programmed in the same fashion as indicated in step 5 Step 5.

NOTE: The module will abort a recall if the transmission is moved out of park or if any seat movement is activated whether manually or by memory recall. The module will also abort a recall if any movement of the adjustable pedals is detected.

To recall either of the programmed positions momentarily press and release either memory selector switch 1 or 2. If using RKE, just press and release the “UNLOCK” button on the proper transmitter for either position 1 or 2.

A recall is possible any time the vehicle transmission is in PARK and the seatbelt is unbuckled. This condition is monitored by the MSM.

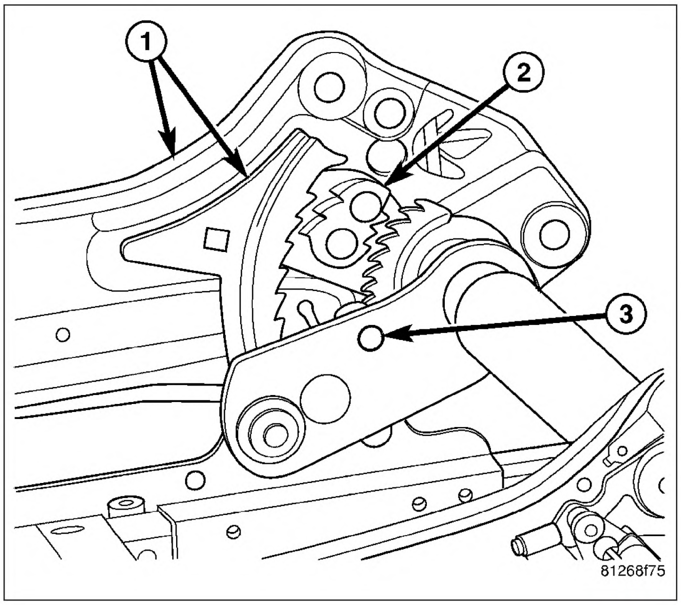
MOTOR-SEAT ADJUSTER

REMOVAL

WARNING: A seat structure that has seen significant load may have the locking mechanism activated and may exhibit the following symptoms:

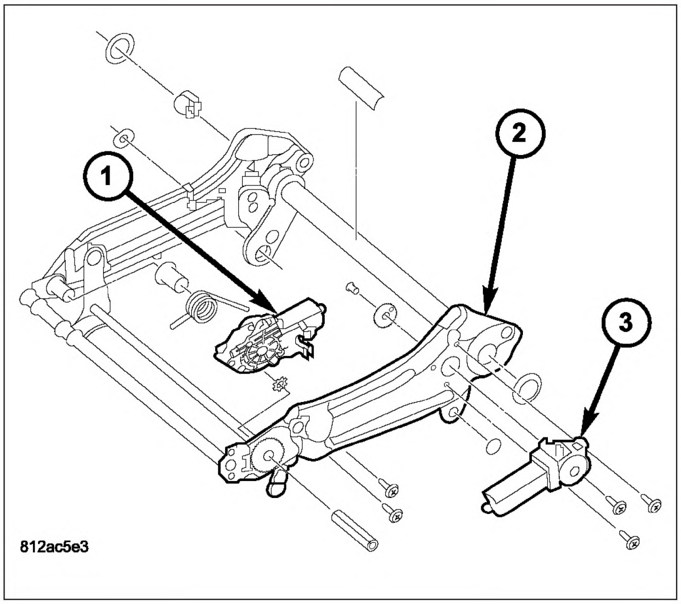
- **Locking pawl (2) loose**
- **Locking pawl (2) engaged into the seat frame sidemember (1)**
- **Height adjuster only works on outboard side**
- **Broken or missing shear pin (3)**

If any one or more of these symptoms exist replace the height adjuster assembly. Do not attempt any repairs. Failure to follow these instructions may result in personal injury or death.

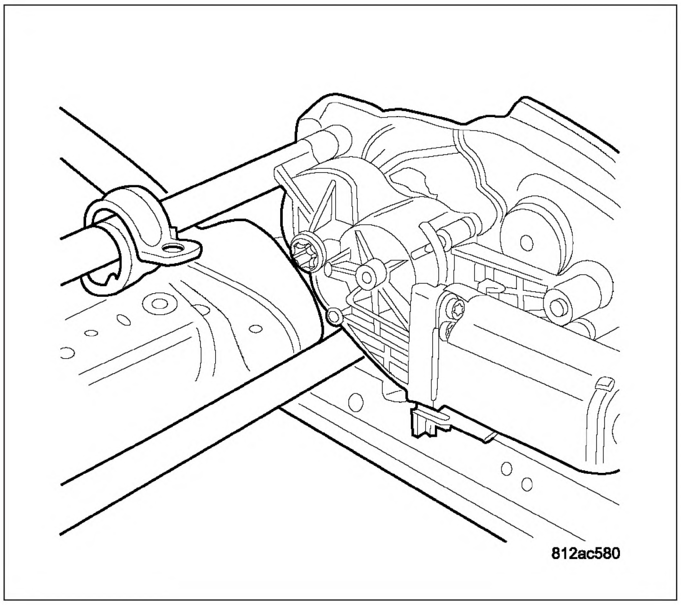


FRONT TILT MOTOR

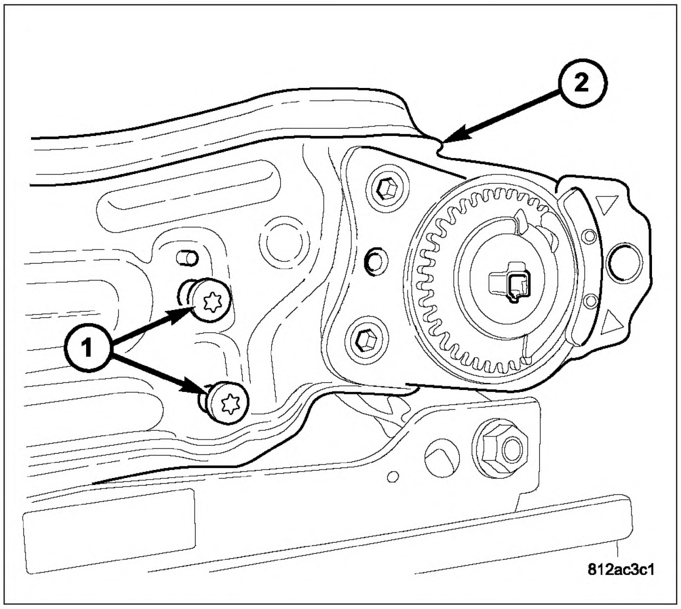
1. Disconnect and isolate the battery negative cable.
2. Remove the affected seat with the inoperative motor (1) (Refer to 23 - BODY/SEATS/SEAT - FRONT - REMOVAL).
3. Remove the seat cushion and pan (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - REMOVAL).



4. Disconnect the motor electrical connector.



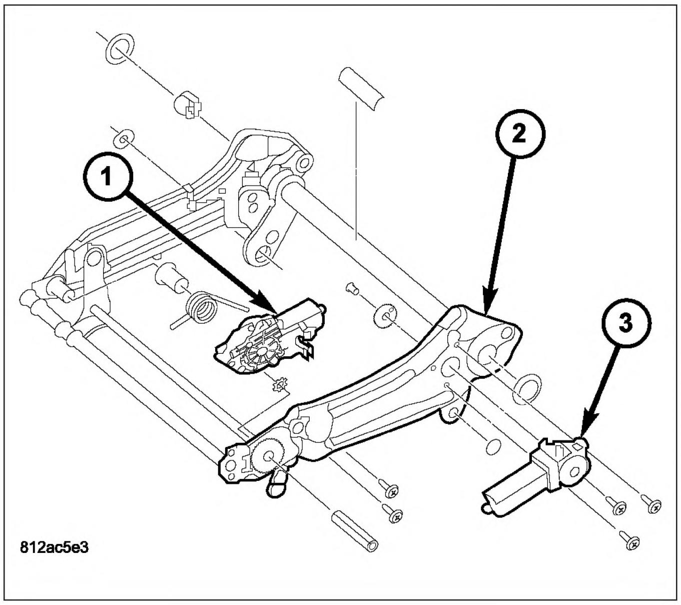
5. Remove the fasteners holding the motor to the seat adjuster (1).
6. Remove motor from seat adjuster (2).



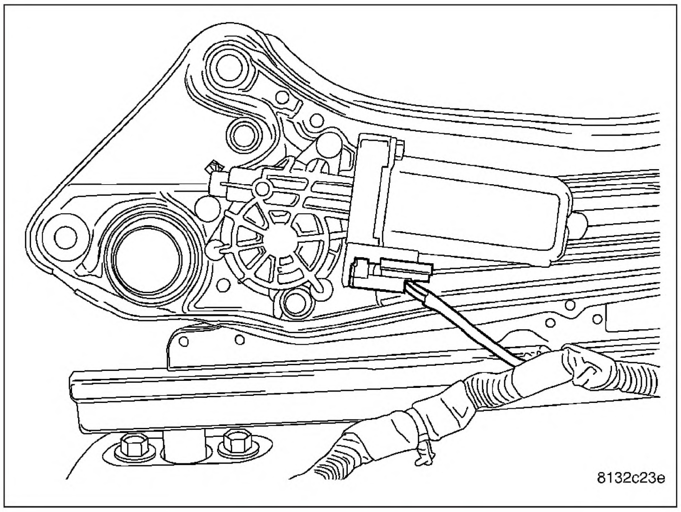
HEIGHT ADJUST MOTOR

WARNING: Use caution when removing the height adjust motor (3) if the motor is inoperative, and the power seat is not in the full up position. The seat adjuster assembly (2) is under load from the height adjust spring and may cause the motor to rotate under pressure when the fasteners are removed. The seat adjuster assembly also may spring upward when the motor is removed. If the height adjust motor is operative, move the power seat to the full up position prior to disconnecting the battery.

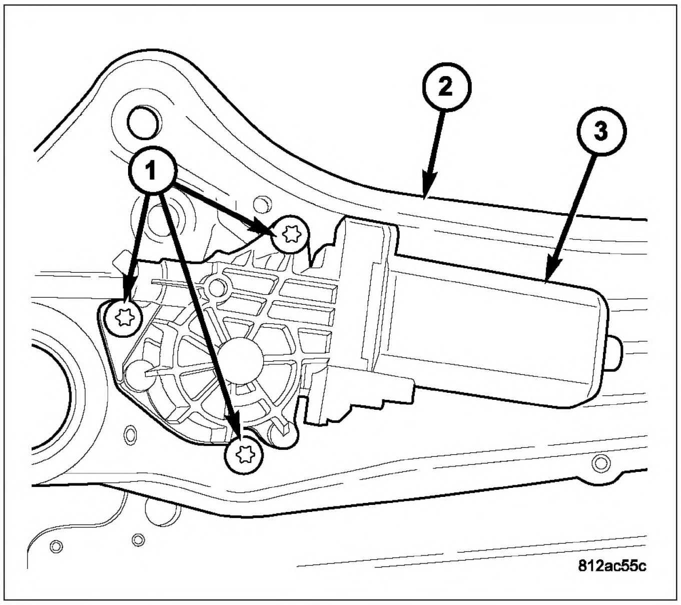
1. Disconnect and isolate the battery negative cable.
2. Remove the affected seat with the inoperative motor (3) (Refer to 23 - BODY/SEATS/SEAT - FRONT - REMOVAL).
3. Remove the seat cushion and pan (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - REMOVAL).



4. Disconnect the motor electrical connector.



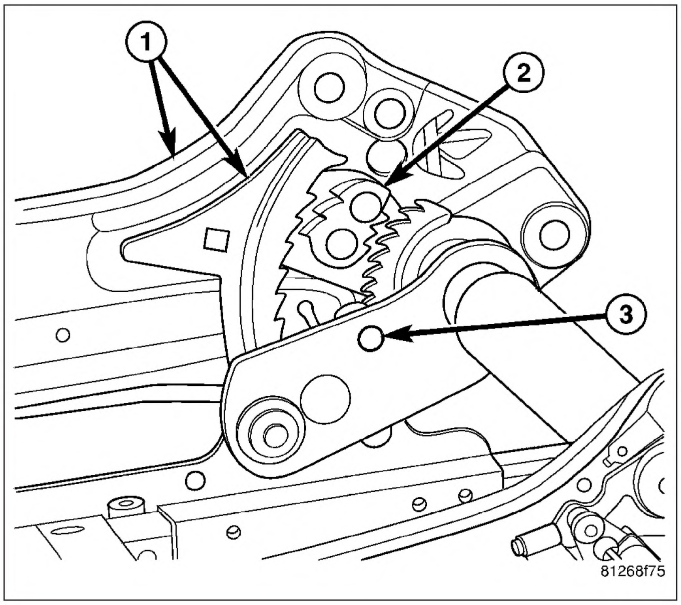
5. Remove the fasteners (1) holding the motor (3) to the seat adjuster (2).
6. Remove screw and washer from the motor shaft.
7. Remove motor (3) from seat adjuster (2).



INSTALLATION

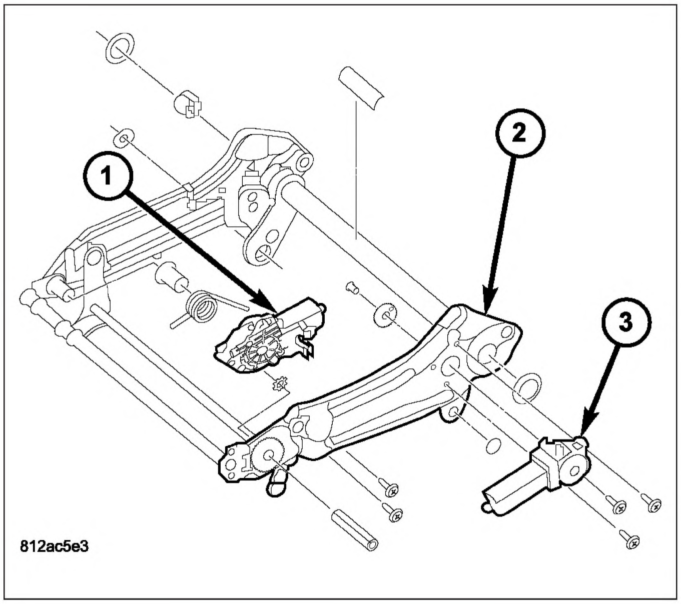
WARNING: A seat structure that has seen significant load may have the locking mechanism activated and may exhibit the following symptoms:
- **Locking pawl (2) loose**
- **Locking pawl (2) engaged into the seat frame sidemember (1)**
- **Height adjuster only works on outboard side**
- **Broken or missing shear pin (3)**

If any one or more of these symptoms exist replace the height adjuster assembly. Do not attempt any repairs. Failure to follow these instructions may result in personal injury or death.

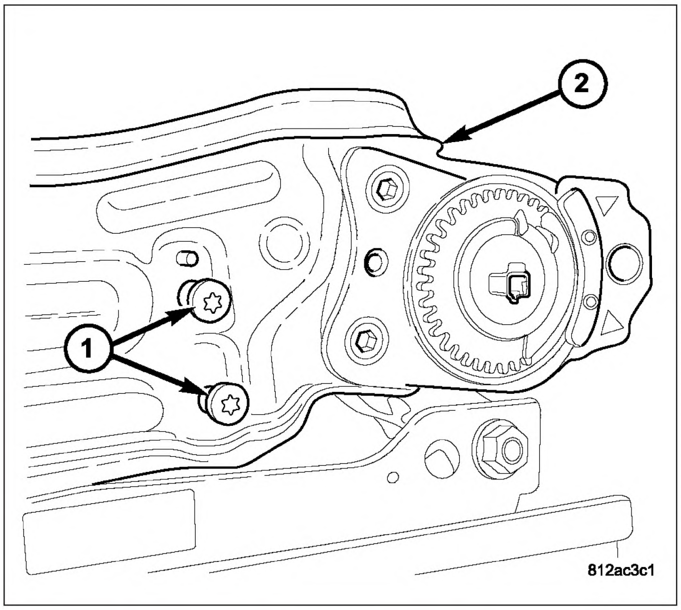


FRONT TILT MOTOR

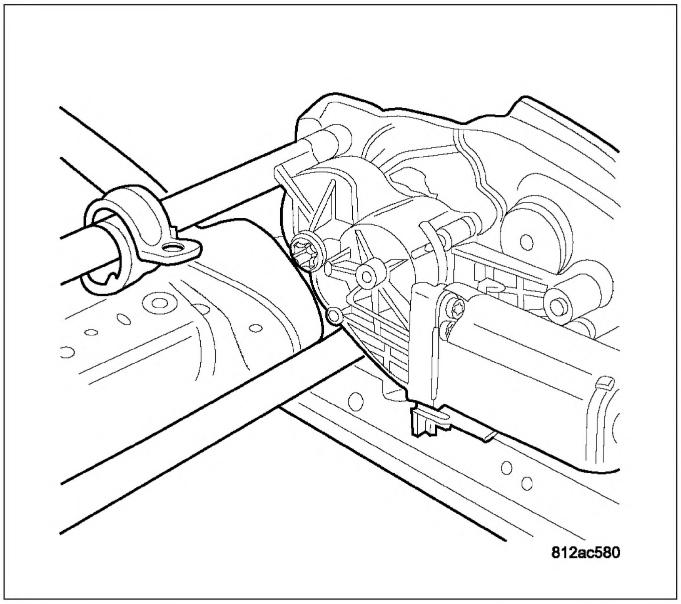
1. Position motor (1) on seat adjuster (2).



2. Install the fasteners (1) holding the motor to the seat adjuster (2). Tighten the screws to 5 N·m (44 in. lbs.).

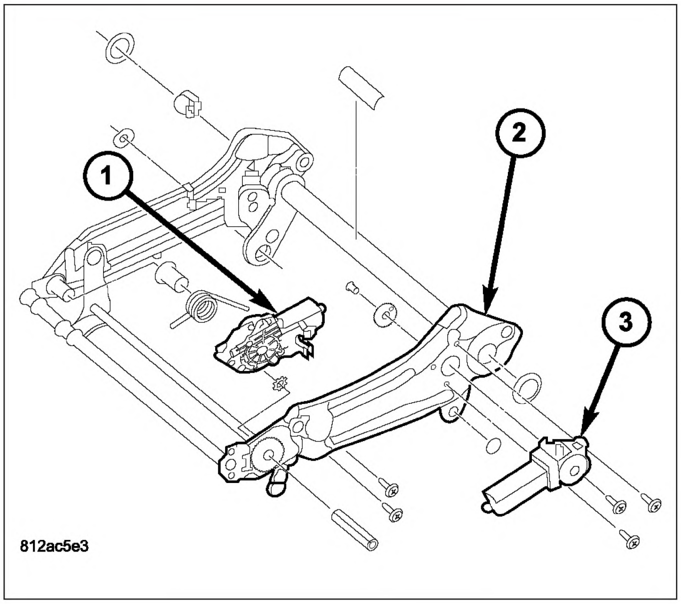


3. Connect the motor electrical connector.
4. Install the seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - INSTALLATION).
5. Clip the wire harness to cushion pan.
6. Install the seat assembly (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).
7. Connect the battery negative cable.
8. Verify normal operation of the power seat assembly.

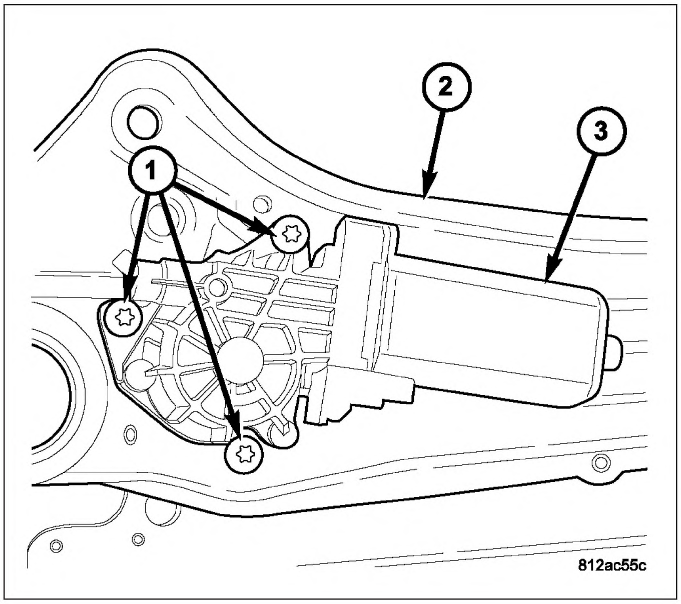


HEIGHT ADJUST MOTOR

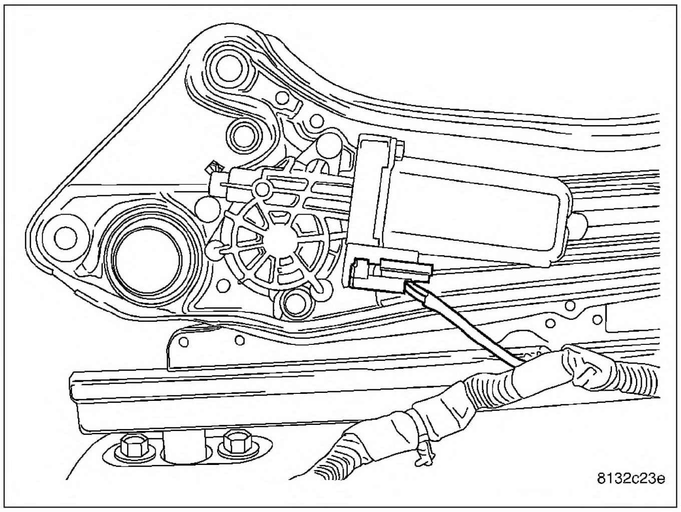
1. Ensure the seat adjuster (2) is in the full up position by pulling upward on the upper adjuster assembly.
2. Position motor (3) on seat adjuster (2).
3. Install the motor shaft screw and washer and tighten until snug. **Do not torque screw at this time.**



4. Install the screws (1) holding the motor (3) to the seat adjuster (2). **It may be necessary to twist the motor slightly to align the fastener holes.**
5. Starting with the bottom screw, tighten the motor screws (1) to 9 N·m (80 in. lbs.).
6. Tighten the motor shaft screw and washer to 6.5 N·m (57.5 in. lbs.).



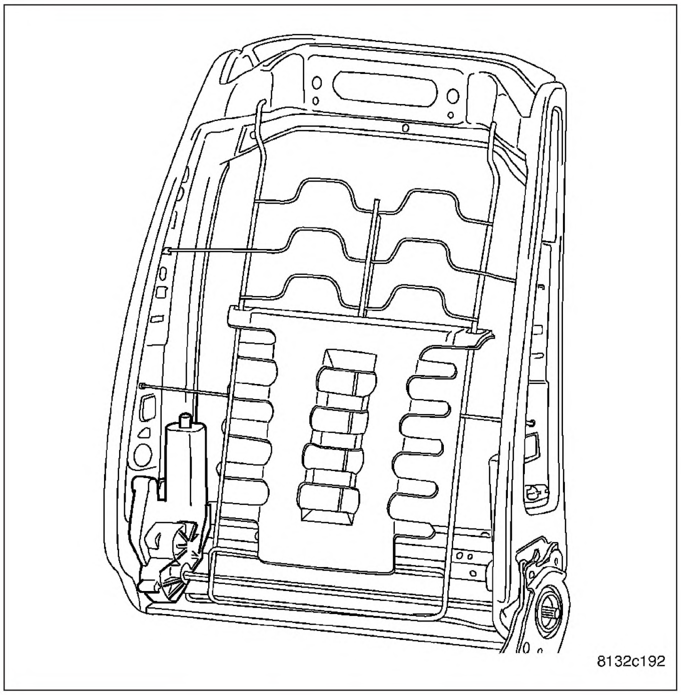
7. Connect the motor electrical connector.
8. Install the seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - INSTALLATION).
9. Clip the wire harness to cushion pan.
10. Install the seat assembly (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).
11. Connect the battery negative cable.
12. Verify normal operation of the power seat assembly.



POWER SEAT RECLINER

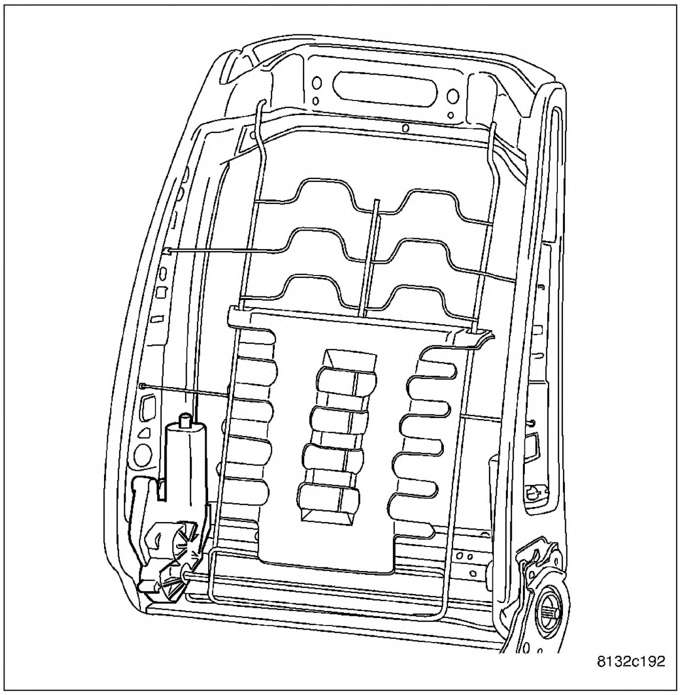
REMOVAL

1. Remove the seat back frame assembly (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION/COVER - REMOVAL).
2. Remove any parts that will need to be installed on new seat back frame assembly.



INSTALLATION

1. Install parts from old seat back assembly as necessary.
2. Install the seat back (1) (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION/COVER - INSTALLATION).



SWITCH-SEAT

DESCRIPTION

The driver power seat can be adjusted in eight different ways using the power seat switch. The passenger power seat can be adjusted in four different ways. The power seat switch is located on the lower outboard side of the seat cushion on the seat cushion side shield on all models.

The individual switches in the power seat switch assembly cannot be repaired. If one switch is damaged or faulty, the entire power seat switch must be replaced.

OPERATION

When a power seat switch is actuated, a battery feed and a ground path are applied through the switch contacts to the power seat adjuster or recliner adjuster motor. The selected adjuster motor operates to move the seat or recliner through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the adjuster motor to run in the opposite direction.

On vehicles equipped with memory system, a resistance signal is sent to the Memory Seat Module (MSM) via the Controller Area Network (CAN) bus circuit, when the driver memory seat switch control knob is actuated. The MSM is responsible for the 12v battery feed and ground path to the power seat adjuster motor. The adjuster motor operates to move the power seat adjuster mechanism through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached.

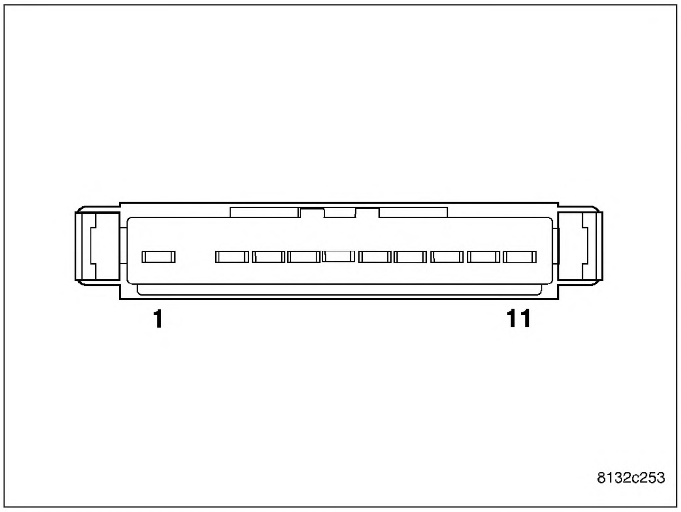
No power seat switch should be held applied in any direction after the adjuster has reached its travel limit. The power seat adjuster motors each contain a self-resetting circuit breaker to protect them from overload. However, consecutive or frequent resetting of the circuit breaker may result in motor damage.

DIAGNOSIS AND TESTING

POWER SEAT SWITCH

DRIVER WITHOUT MEMORY SEAT SYSTEM

1. Disconnect and isolate the battery negative cable.
2. Remove the power seat switch from the power seat (Refer to 8 - ELECTRICAL/POWER SEATS/SEAT SWITCH - REMOVAL).
3. Use an ohmmeter to test the continuity of the power seat switch. Refer to DRIVER POWER SEAT SWITCH WITHOUT MEMORY SEAT SYSTEM CONTINUITY table. If not OK, replace the faulty power seat switch. If switch tests OK (Refer to 8 - ELECTRICAL/POWER SEATS/POWER SEAT ADJUSTER - DIAGNOSIS AND TESTING).

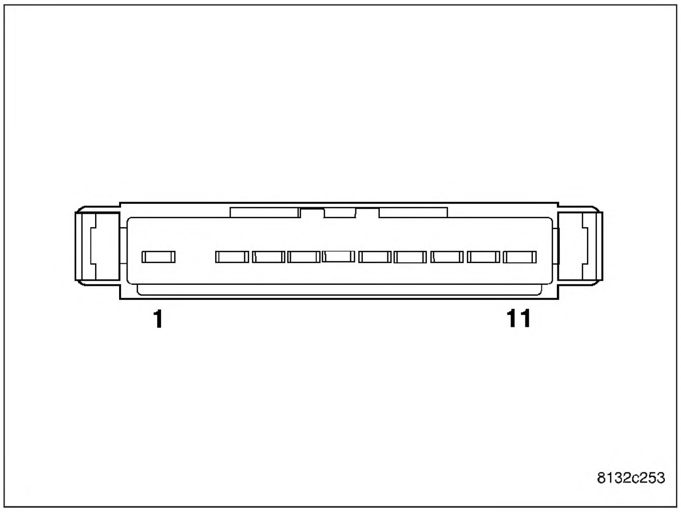


DRIVER POWER SEAT SWITCH WITHOUT MEMORY SEAT SYSTEM CONTINUITY

SWITCH POSITION	CONTINUITY BETWEEN
OFF	7-1, 7-2, 7-3, 7-4, 7-5, 7-8, 7-9, 7-10, 7-11
RECLINER UP	6-3, 7-1, 7-2, 7-4, 7-5, 7-8, 7-9, 7-10, 7-11
RECLINER DOWN	6-1, 7-2, 7-3, 7-4, 7-5, 7-8, 7-9, 7-10, 7-11
HORIZONTAL FORWARD	6-8, 7-1, 7-2, 7-3, 7-4, 7-5, 7-9, 7-10, 7-11
HORIZONTAL REARWARD	6-4, 7-1, 7-2, 7-3, 7-5, 7-8, 7-9, 7-10, 7-11
FRONT TILT DOWN	6-5, 7-1, 7-2, 7-3, 7-4, 7-8, 7-9, 7-10, 7-11
FRONT TILT UP	6-9, 7-1, 7-2, 7-3, 7-4, 7-5, 7-8, 7-10, 7-11
REAR TILT DOWN	6-10, 7-1, 7-2, 7-3, 7-4, 7-5, 7-8, 7-9, 7-11
REAR TILT UP	6-11, 7-1, 7-2, 7-3, 7-4, 7-5, 7-8, 7-9, 7-10

PASSENGER SEAT

1. Disconnect and isolate the battery negative cable.
2. Remove the power seat switch from the power seat (Refer to 8 - ELECTRICAL/POWER SEATS/SEAT SWITCH - REMOVAL).
3. Use an ohmmeter to test the continuity of the power seat switch. Refer to PASSENGER POWER SEAT SWITCH CONTINUITY table. If not OK, replace the faulty power seat switch. If switch tests OK (Refer to 8 - ELECTRICAL/POWER SEATS/POWER SEAT ADJUSTER - DIAGNOSIS AND TESTING).

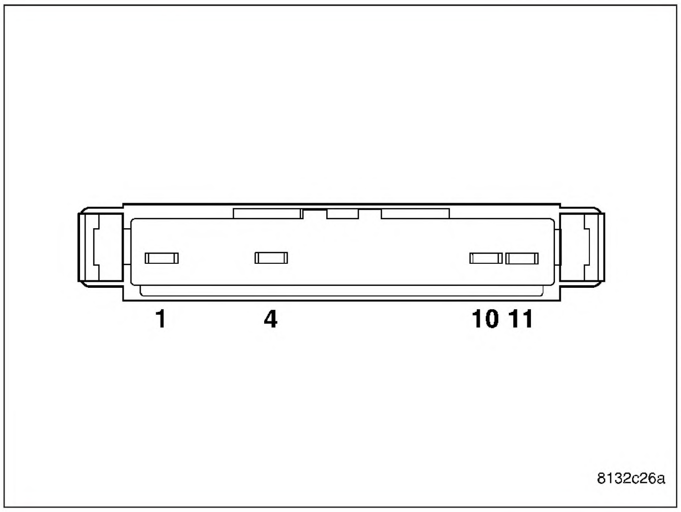


PASSENGER POWER SEAT SWITCH CONTINUITY

SWITCH POSITION	CONTINUITY BETWEEN
OFF	7-1, 7-3, 7-4, 7-8
RECLINER UP	6-3, 7-1, 7-4, 7-8
RECLINER DOWN	6-1, 7-3, 7-4, 7-8
HORIZONTAL FORWARD	6-8, 7-1, 7-3, 7-4
HORIZONTAL REARWARD	6-4, 7-1, 7-3, 7-8

DRIVER WITH MEMORY SEAT SYSTEM

1. Disconnect and isolate the battery negative cable.
2. Remove the power seat switch from the power seat (Refer to 8 - ELECTRICAL/POWER SEATS/SEAT SWITCH - REMOVAL).
3. Use an ohmmeter to test the resistance of the power seat switch. Refer to DRIVER POWER SEAT SWITCH WITH MEMORY SEAT SYSTEM CONTINUITY table. If not OK, replace the faulty power seat switch. If switch tests OK (Refer to 8 - ELECTRICAL/POWER SEATS/POWER SEAT ADJUSTER - DIAGNOSIS AND TESTING).



DRIVER POWER SEAT SWITCH WITH MEMORY SEAT SYSTEM CONTINUITY

SWITCH POSITION	CONTINUITY BETWEEN	RESISTANCE VALUE
OFF	10-4	OPEN
OFF	10-11	OPEN
OFF	1-4	47 OHMS
OFF	1-11	47 OHMS
REAR TILT UP	10-11	169 OHMS
REAR TILT DOWN	10-11	76 OHMS
HORIZONTAL FORWARD	10-11	43 OHMS
HORIZONTAL REARWARD	10-11	10 OHMS
RECLINER UP	10-4	43 OHMS
RECLINER DOWN	10-4	10 OHMS
FRONT TILT UP	10-4	169 OHMS
FRONT TILT DOWN	10-4	76 OHMS
ALL RESISTANCE VALUES ARE ± FIVE PERCENT		

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the seat cushion side panel from the seat and disconnect the electrical harness connector.
3. Using a small flat bladed tool, gently release the four mounting tabs that secure the power seat switch and separate switch from trim panel.

INSTALLATION

1. Position the power seat switch on the seat cushion side panel. Gently apply pressure to the switch until the four mounting tabs that secure the switch snap into place.
2. Connect the power seat switch electrical connector.
3. Install the seat cushion side panel on the seat.
4. Connect the battery negative cable.
5. Verify normal operation of the power seat assembly.

POWER TOP - ELECTRICAL DIAGNOSIS

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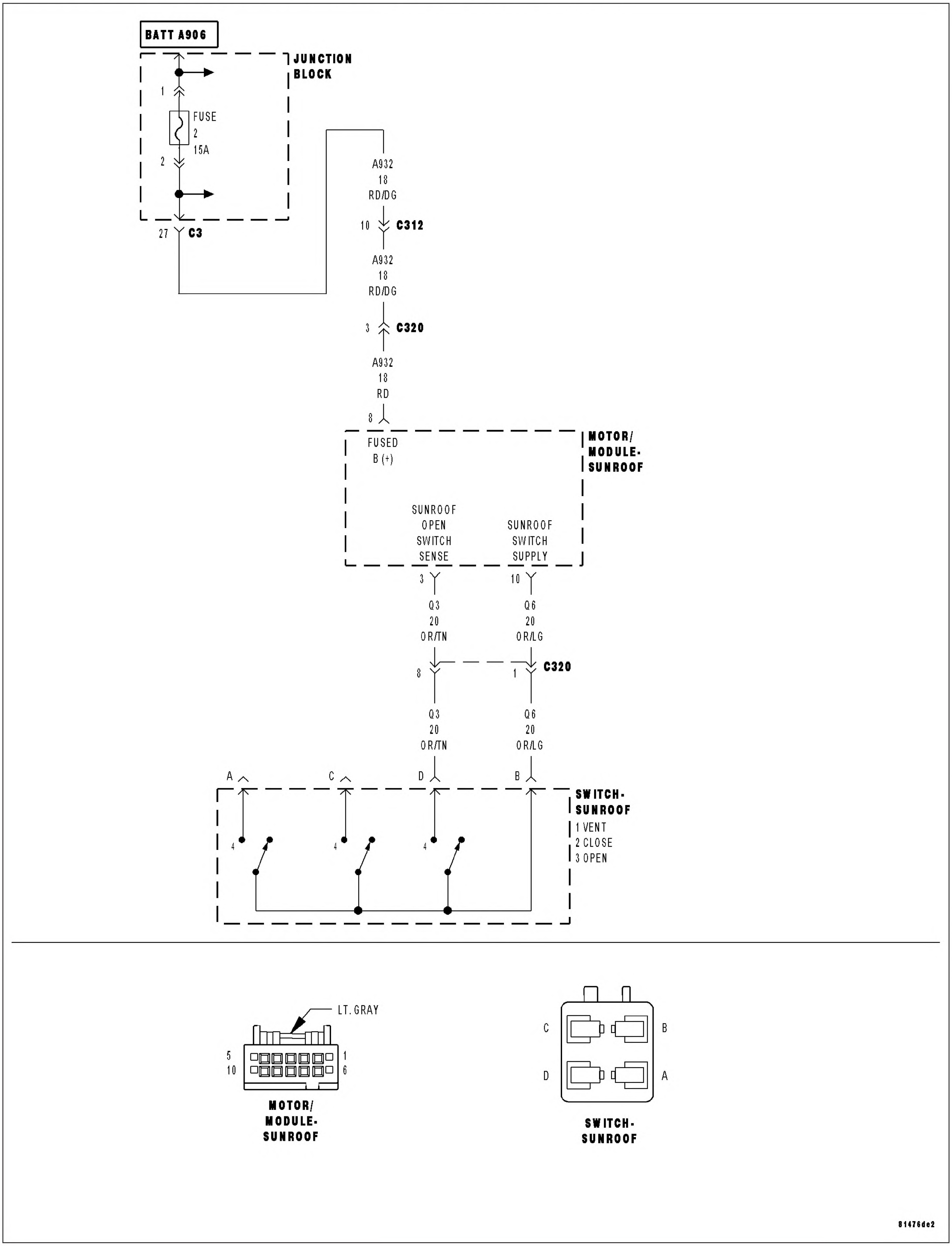
POWER TOP - ELECTRICAL DIAGNOSIS

DIAGNOSIS AND TESTING

B1841–SUNROOF OPEN SWITCH INPUT CIRCUIT HIGH


BATT A906
JUNCTION BLOCK
1
FUSE
2
15A
2
27
C3
A932
18
RD/DG
10
C312
A932
18
RD/DG
3
C320
A932
18
RD
8
FUSED
B (+)
MOTOR/ MODULE-SUNROOF
SUNROOF OPEN SWITCH SENSE
SUNROOF SWITCH SUPPLY
3
10
Q3
20
OR/TN
Q6
20
OR/LG
8
1
C320
Q3
20
OR/TN
Q6
20
OR/LG
A
C
D
B
4
4
4
SWITCH-SUNROOF
1 VENT
2 CLOSE
3 OPEN
LT. GRAY
5
10
1
6
MOTOR/ MODULE-SUNROOF
C
B
D
A
SWITCH-SUNROOF
81476de2

B1841–SUNROOF OPEN SWITCH INPUT CIRCUIT HIGH (CONTINUED)

For the Sunroof circuit diagram (Refer to 8 - ELECTRICAL/POWER TOP - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The Sunroof Motor/Module supplies a 12 volt supply circuit to the sunroof switch. When the switch is closed to any of the 3 sense circuits (open, close or vent), it sends that command back to the module.

- **When Monitored:**
  Whenever the Sunroof module is awake.
- **Set Condition:**
  Whenever the module has determined that the open switch has been applied for over 15 seconds or there is a short to voltage on the Sunroof Open Switch Sense circuit, this code will set.

Possible Causes
(Q3) SUNROOF OPEN SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
(Q3) SUNROOF OPEN SWITCH SENSE CIRCUIT SHORT TO (Q6) SUNROOF SWITCH SUPPLY CIRCUIT
SUNROOF SWITCH SHORTED
SUNROOF MOTOR/MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

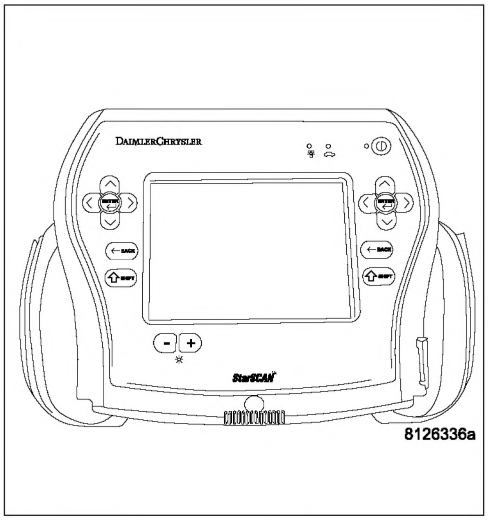
Turn the ignition on.

With the scan tool, record and erase DTC's

Press and release the Sunroof Switch in all positions several times.

Wait 30 seconds.

With the scan tool, read DTC's.



Does the scan tool display B1841–SUNROOF OPEN SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Check the switch for any binding conditions and using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

B1841–SUNROOF OPEN SWITCH INPUT CIRCUIT HIGH (CONTINUED)

2. SUNROOF SWITCH SHORTED

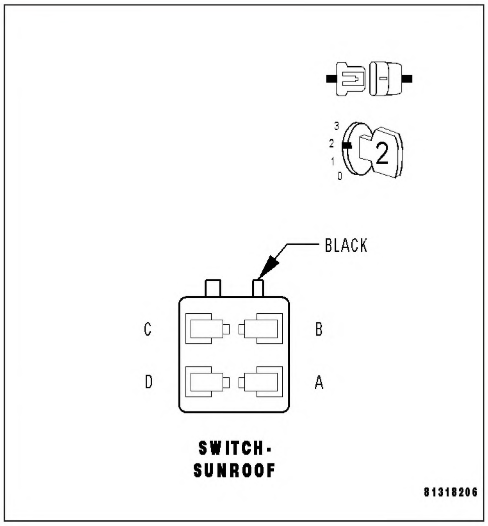
With the scan tool, erase DTC's.

Turn the ignition off.

Disconnect the Sunroof Switch connector.

Turn the ignition on and wait 30 seconds.

With the scan tool, read DTC's.



Does the scan tool display B1841–SUNROOF OPEN SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Sunroof Switch.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. (Q3) SUNROOF OPEN SWITCH SENSE CIRCUIT SHORT TO VOLTAGE

NOTE: To further diagnose the sunroof, it is necessary to lower or remove the headliner.

Turn the ignition off.

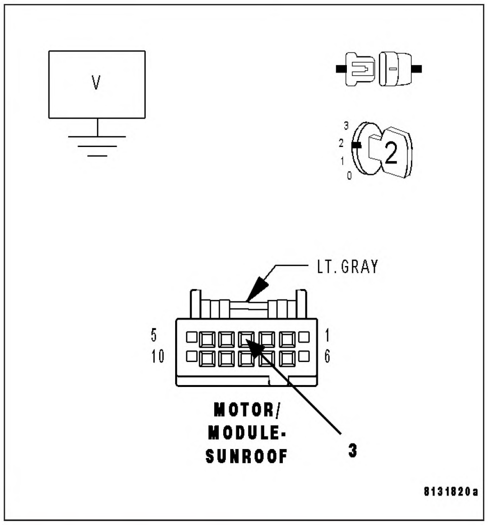
Lower the headliner to gain access to the Sunroof Motor/Module connector.

Disconnect the Sunroof Motor/Module connector.

NOTE: Ensure the A-Pillar connector is connected before proceeding.

Turn the ignition on.

Measure the voltage between the (Q3) Sunroof Open Switch Sense circuit and Ground.



Is the voltage above 0.4 volts?

Yes >> Repair the (Q3) Sunroof Open Switch Sense circuit for a short to voltage.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

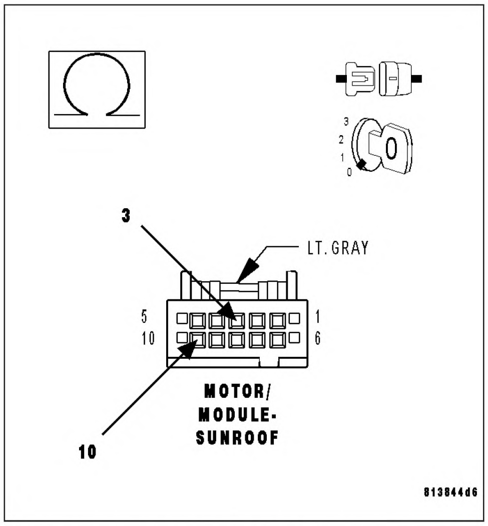
B1841–SUNROOF OPEN SWITCH INPUT CIRCUIT HIGH (CONTINUED)

4. (Q3) SUNROOF OPEN SWITCH SENSE CIRCUIT SHORT TO (Q6) SUNROOF SWITCH SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the A-Pillar connector.

Measure the resistance between the (Q3) Sunroof Open Switch Sense circuit and the (Q6) Sunroof Switch Supply circuit in the Sunroof Motor/Module connector.



Is the resistance below 1000.0 ohms?

Yes >> Repair the (Q3) Sunroof Open Switch Sense circuit for a short to the (Q6) Sunroof Switch Supply circuit.

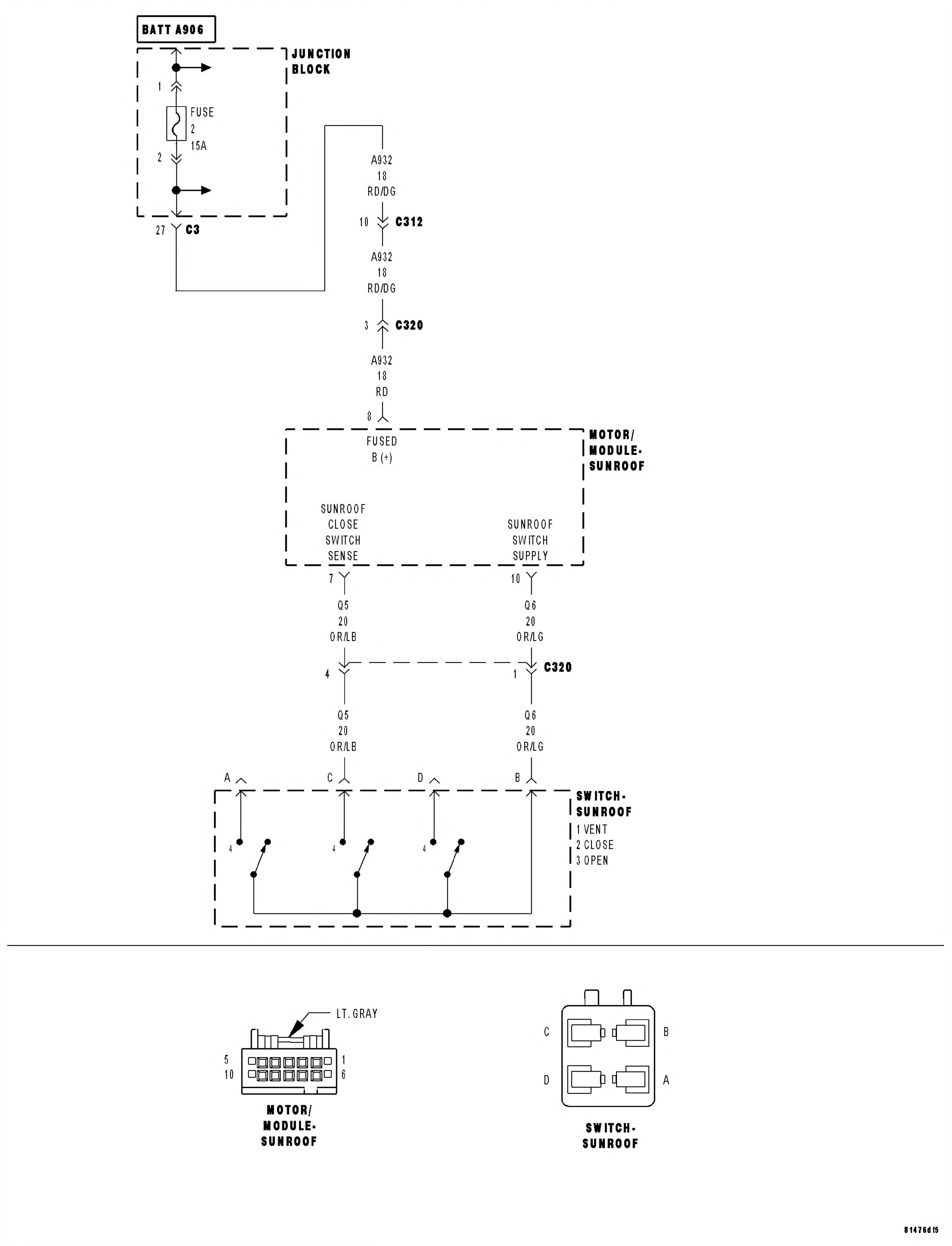
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Sunroof Motor/Module.

Perform the Sunroof Position Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION). Perform the Excessive Force Limitation Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION CALIBRATION).

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1844–SUNROOF CLOSE SWITCH INPUT CIRCUIT HIGH


BATT A906
JUNCTION BLOCK
1
FUSE
2
15A
2
27
C3
A932
18
RD/DG
10
C312
A932
18
RD/DG
3
C320
A932
18
RD
8
FUSED
B (+)
MOTOR/MODULE-SUNROOF
SUNROOF CLOSE SWITCH SENSE
SUNROOF SWITCH SUPPLY
7
10
Q5
20
OR/LB
Q6
20
OR/LG
4
1
C320
Q5
20
OR/LB
Q6
20
OR/LG
A
C
D
B
SWITCH-SUNROOF
1 VENT
2 CLOSE
3 OPEN
4
4
4
LT. GRAY
5
10
1
6
MOTOR/MODULE-SUNROOF
C
B
D
A
SWITCH-SUNROOF
81476d15

B1844–SUNROOF CLOSE SWITCH INPUT CIRCUIT HIGH (CONTINUED)

For the Sunroof circuit diagram (Refer to 8 - ELECTRICAL/POWER TOP - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The Sunroof Motor/Module supplies a 12 volt supply circuit to the sunroof switch. When the switch is closed to any of the 3 sense circuits (open, close or vent), it sends that command back to the module.

- **When Monitored:**
  Whenever the Sunroof module is awake.
- **Set Condition:**
  Whenever the module has determined that the close switch has been applied for over 15 seconds or there is a short to voltage on the Sunroof Close Switch Sense circuit, this code will set.

Possible Causes
(Q5) SUNROOF CLOSE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
(Q5) SUNROOF CLOSE SWITCH SENSE CIRCUIT SHORT TO (Q6) SUNROOF SWITCH SUPPLY CIRCUIT
SUNROOF SWITCH SHORTED
SUNROOF MOTOR/MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

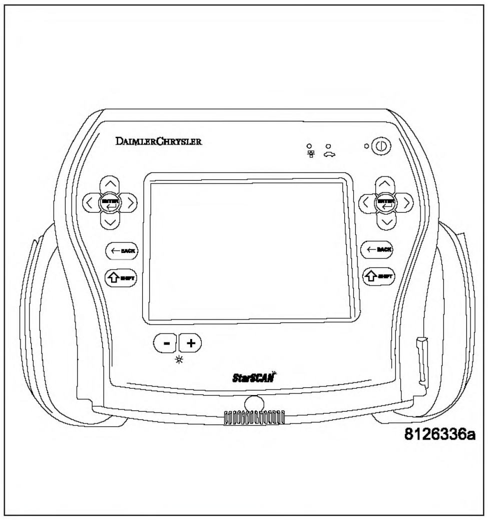
Turn the ignition on.

With the scan tool, record and erase DTC's

Press and release the Sunroof Switch in all positions several times.

Wait 30 seconds.

With the scan tool, read DTC's.



Does the scan tool display B1844–SUNROOF CLOSE SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Check the switch for any binding conditions and using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

B1844–SUNROOF CLOSE SWITCH INPUT CIRCUIT HIGH (CONTINUED)

2. SUNROOF SWITCH SHORTED

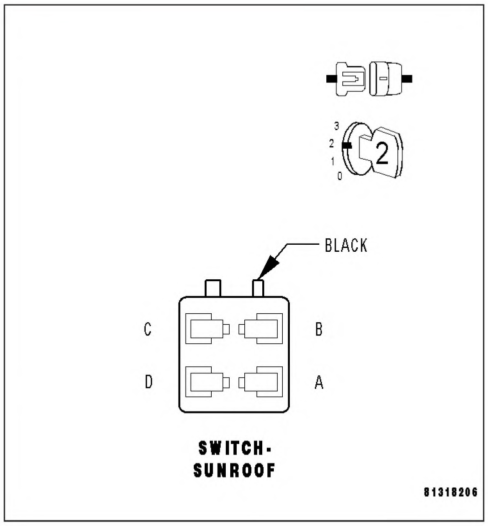
With the scan tool, erase DTC's.

Turn the ignition off.

Disconnect the Sunroof Switch connector.

Turn the ignition on and wait 30 seconds.

With the scan tool, read DTC's.



Does the scan tool display B1844–SUNROOF CLOSE SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Sunroof Switch.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. (Q5) SUNROOF CLOSE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE

NOTE: To further diagnose the sunroof, it is necessary to lower or remove the headliner.

Turn the ignition off.

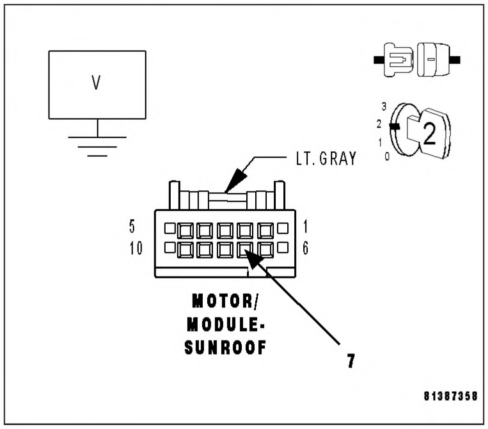
Lower the headliner to gain access to the Sunroof Motor/Module connector.

Disconnect the Sunroof Motor/Module connector.

NOTE: Ensure the A-Pillar connector is connected before proceeding.

Turn the ignition on.

Measure the voltage between the (Q5) Sunroof Close Switch Sense circuit and Ground.



Is the voltage above 0.4 volts?

Yes >> Repair the (Q5) Sunroof Close Switch Sense circuit for a short to voltage.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

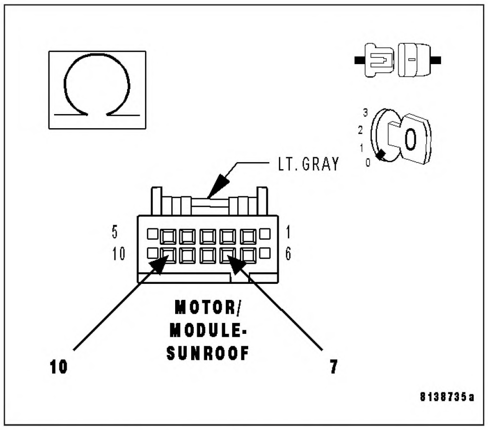
B1844–SUNROOF CLOSE SWITCH INPUT CIRCUIT HIGH (CONTINUED)

4. (Q5) SUNROOF CLOSE SWITCH SENSE CIRCUIT SHORT TO (Q6) SUNROOF SWITCH SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the A-Pillar connector.

Measure the resistance between the (Q5) Sunroof Close Switch Sense circuit and the (Q6) Sunroof Switch Supply circuit in the Sunroof Motor/Module connector.



Is the resistance below 1000.0 ohms?

Yes >> Repair the (Q5) Sunroof Close Switch Sense circuit for a short to the (Q6) Sunroof Switch Supply circuit.

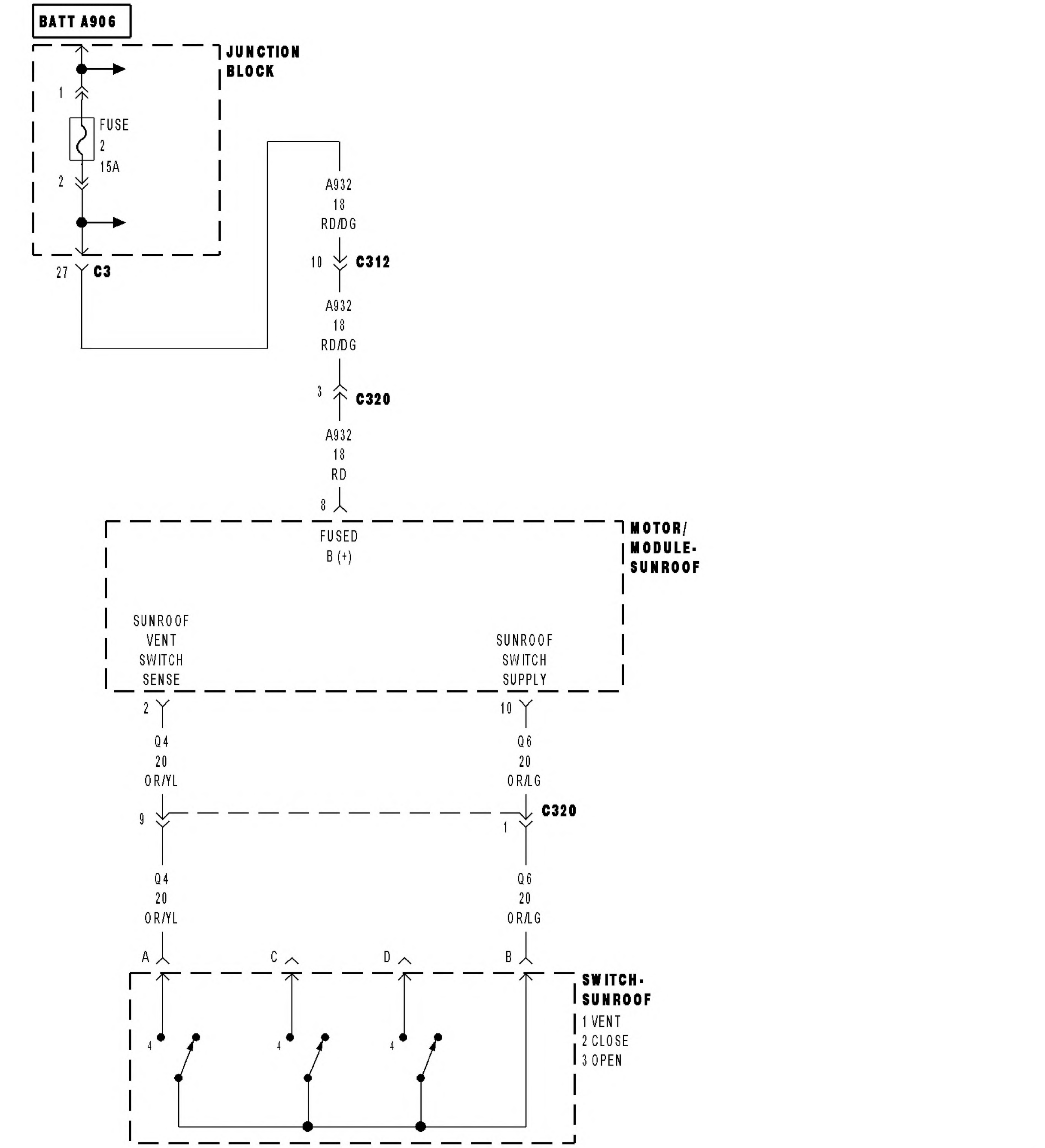
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

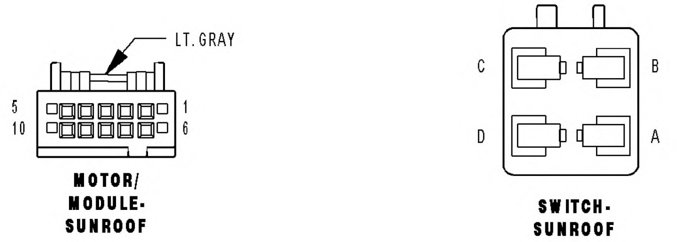
No >> Replace the Sunroof Motor/Module.

Perform the Sunroof Position Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION). Perform the Excessive Force Limitation Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION CALIBRATION).

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1847–SUNROOF VENT SWITCH INPUT CIRCUIT HIGH


BATT A906
JUNCTION BLOCK
1
FUSE
2
15A
2
27
C3
A932
18
RD/DG
10
C312
A932
18
RD/DG
3
C320
A932
18
RD
8
FUSED
B (+)
MOTOR/ MODULE-SUNROOF
SUNROOF VENT SWITCH SENSE
SUNROOF SWITCH SUPPLY
2
10
Q4
20
OR/YL
Q6
20
OR/LG
9
1
C320
Q4
20
OR/YL
Q6
20
OR/LG
A
C
D
B
SWITCH-SUNROOF
1 VENT
2 CLOSE
3 OPEN
4
4
4


LT. GRAY
5
10
1
6
MOTOR/ MODULE-SUNROOF
C
B
D
A
SWITCH-SUNROOF
81476dfc

B1847–SUNROOF VENT SWITCH INPUT CIRCUIT HIGH (CONTINUED)

For the Sunroof circuit diagram (Refer to 8 - ELECTRICAL/POWER TOP - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The Sunroof Motor/Module supplies a 12 volt supply circuit to the sunroof switch. When the switch is closed to any of the 3 sense circuits (open, close or vent), it sends that command back to the module.

- **When Monitored:**
  Whenever the Sunroof module is awake.
- **Set Condition:**
  Whenever the module has determined that the vent switch has been applied for over 15 seconds or there is a short to voltage on the Sunroof Vent Switch Sense circuit, this code will set.

Possible Causes
(Q4) SUNROOF VENT SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
(Q4) SUNROOF VENT SWITCH SENSE CIRCUIT SHORT TO (Q6) SUNROOF SWITCH SUPPLY CIRCUIT
SUNROOF SWITCH SHORTED
SUNROOF MOTOR/MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

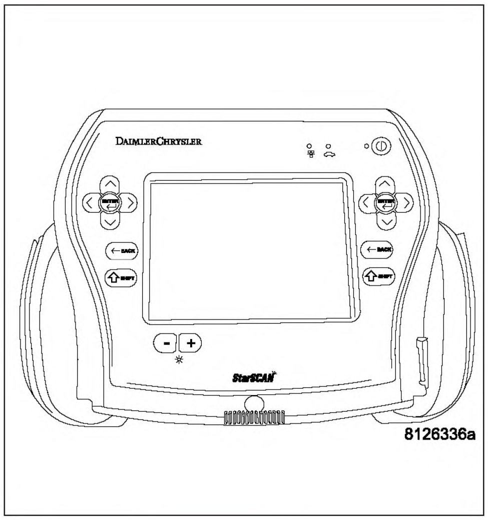
Turn the ignition on.

With the scan tool, record and erase DTC's

Press and release the Sunroof Switch in all positions several times.

Wait 30 seconds.

With the scan tool, read DTC's.



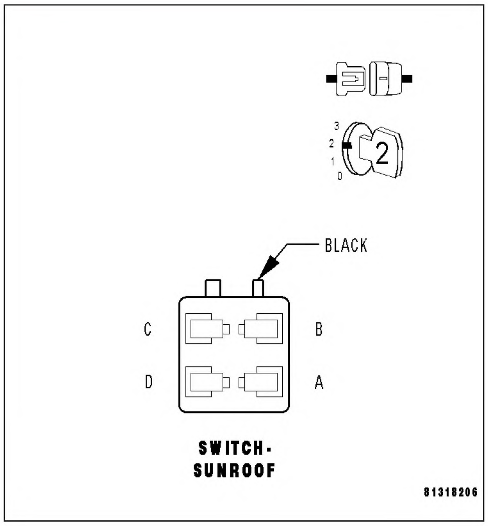
Does the scan tool display B1847–SUNROOF VENT SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Check the switch for any binding conditions and using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

B1847–SUNROOF VENT SWITCH INPUT CIRCUIT HIGH (CONTINUED)

2. SUNROOF SWITCH SHORTED



With the scan tool, erase DTC's.

Turn the ignition off.

Disconnect the Sunroof Switch connector.

Turn the ignition on and wait 30 seconds.

With the scan tool, read DTC's.

Does the scan tool display B1847–SUNROOF VENT SWITCH INPUT CIRCUIT LOW?

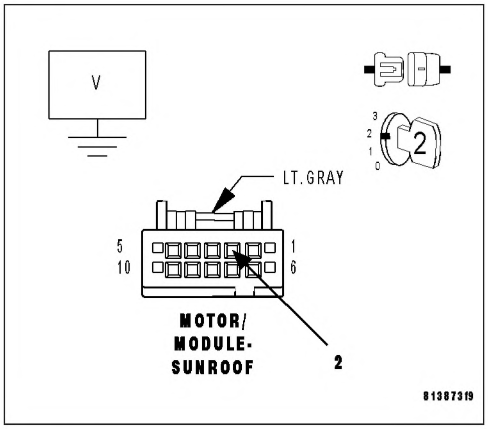
Yes >> Go To 3

No >> Replace the Sunroof Switch.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

3. (Q4) SUNROOF VENT SWITCH SENSE CIRCUIT SHORT TO VOLTAGE



NOTE: To further diagnose the sunroof, it is necessary to lower or remove the headliner.

Turn the ignition off.

Lower the headliner to gain access to the Sunroof Motor/Module connector.

Disconnect the Sunroof Motor/Module connector.

NOTE: Ensure the A-Pillar connector is connected before proceeding.

Turn the ignition on.

Measure the voltage between the (Q4) Sunroof Vent Switch Sense circuit and Ground.

Is the voltage above 0.4 volts?

Yes >> Repair the (Q4) Sunroof Vent Switch Sense circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

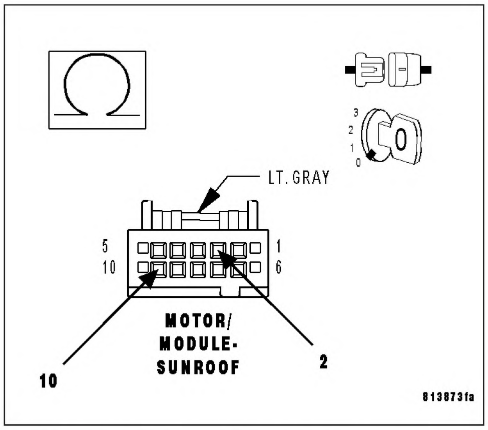
B1847–SUNROOF VENT SWITCH INPUT CIRCUIT HIGH (CONTINUED)

4. (Q4) SUNROOF VENT SWITCH SENSE CIRCUIT SHORT TO (Q6) SUNROOF SWITCH SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the A-Pillar connector.

Measure the resistance between the (Q4) Sunroof Vent Switch Sense circuit and the (Q6) Sunroof Switch Supply circuit in the Sunroof Motor/Module connector.



Is the resistance below 1000.0 ohms?

Yes >> Repair the (Q4) Sunroof Vent Switch Sense circuit for a short to the (Q6) Sunroof Switch Supply circuit.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Sunroof Motor/Module.

Perform the Sunroof Position Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION). Perform the Excessive Force Limitation Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION CALIBRATION).

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B1849–SUNROOF MOTOR CONTROL CIRCUIT/PERFORMANCE (STALLED)

For the Sunroof circuit diagram (Refer to 8 - ELECTRICAL/POWER TOP - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the Sunroof motor/module is in motion.
- **Set Condition:**
  Whenever the sunroof motor/module is attempting to move the sunroof in response to the input switches (or in response to an obstacle), and it doesn't appear to be responding correctly. This code is usually set when there is some type of binding in the sunroof mechanism.

Possible Causes
SUNROOF MOTOR/MODULE
MECHANICAL BINDING, STICKING OR CABLES OUT OF CALIBRATION

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

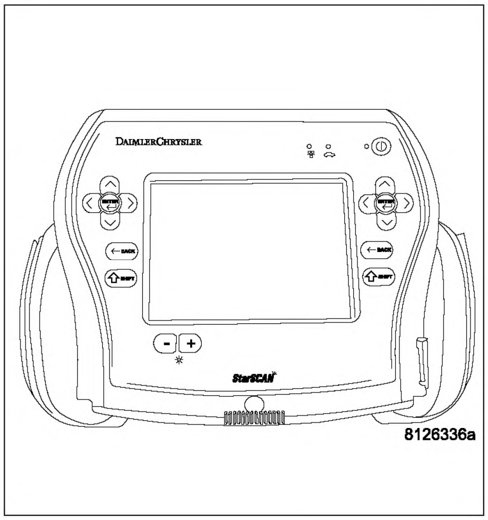
Turn the ignition on.

With the scan tool, record and erase DTC's

Operate the Sunroof Switch in all positions several times.

Wait 30 seconds.

With the scan tool, read DTC's.



Does the scan tool display B1849–SUNROOF MOTOR CONTROLCIRCUIT/PERFORMANCE (STALLED)?

Yes >> Go To 2

No >> The conditions that caused this code to set are not present at this time. Check for any binding or sticking conditions.

B1849–SUNROOF MOTOR CONTROL CIRCUIT/PERFORMANCE (STALLED) (CONTINUED)

2. SUNROOF MOTOR

NOTE: To further diagnose the sunroof, it is necessary to lower or remove the headliner.

NOTE: Any time the Sunroof Motor is removed, it is necessary to perform the Position Calibration when the motor is re-installed.

Turn the ignition off.

Lower the headliner to gain access to the Sunroof Motor/Module.

Remove the Sunroof Motor/Module from the sunroof.

NOTE: Ensure the A-Pillar connector is connected before proceeding.

Turn the ignition on.

While holding the motor firmly in your hand, have an assistant press the sunroof switch Open and after the motor stops press Close (NOT VENT) several times and observe the motor operation.

Did the motor operate smoothly and powerful?

Yes >> Repair or replace the sunroof mechanism as necessary in accordance with Service Information.Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Sunroof Motor Module.

Perform the Sunroof Position Calibration. (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE) Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2227–SUNROOF ECU INTERNAL

For the Sunroof circuit diagram (Refer to 8 - ELECTRICAL/POWER TOP - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the Sunroof module is awake.
- **Set Condition:**
  Whenever the module has determined that there is a motor or electronic malfunction, this code will set.

Possible Causes
SUNROOF MOTOR/MODULE

Diagnostic Test

1. TEST FOR INTERMITTENT CONDITION

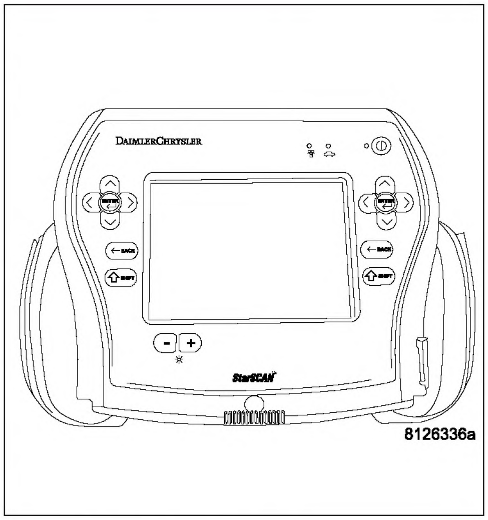
Turn the ignition on.

With the scan tool, record and erase DTC's

Operate the Sunroof Switch in all positions several times.

Wait 30 seconds.

With the scan tool, read DTC's.



Does the scan tool display B2227–SUNROOF ECU INTERNAL?

Yes >> Replace the Sunroof Motor/Module.

Perform the Sunroof Position Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION). Perform the Excessive Force Limitation Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION CALIBRATION).

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> The conditions that caused this code to set are not present at this time. Operate the Sunroof several times and recheck for DTC's. If the code reappears now or later, replace the Sunroof Motor/Module.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

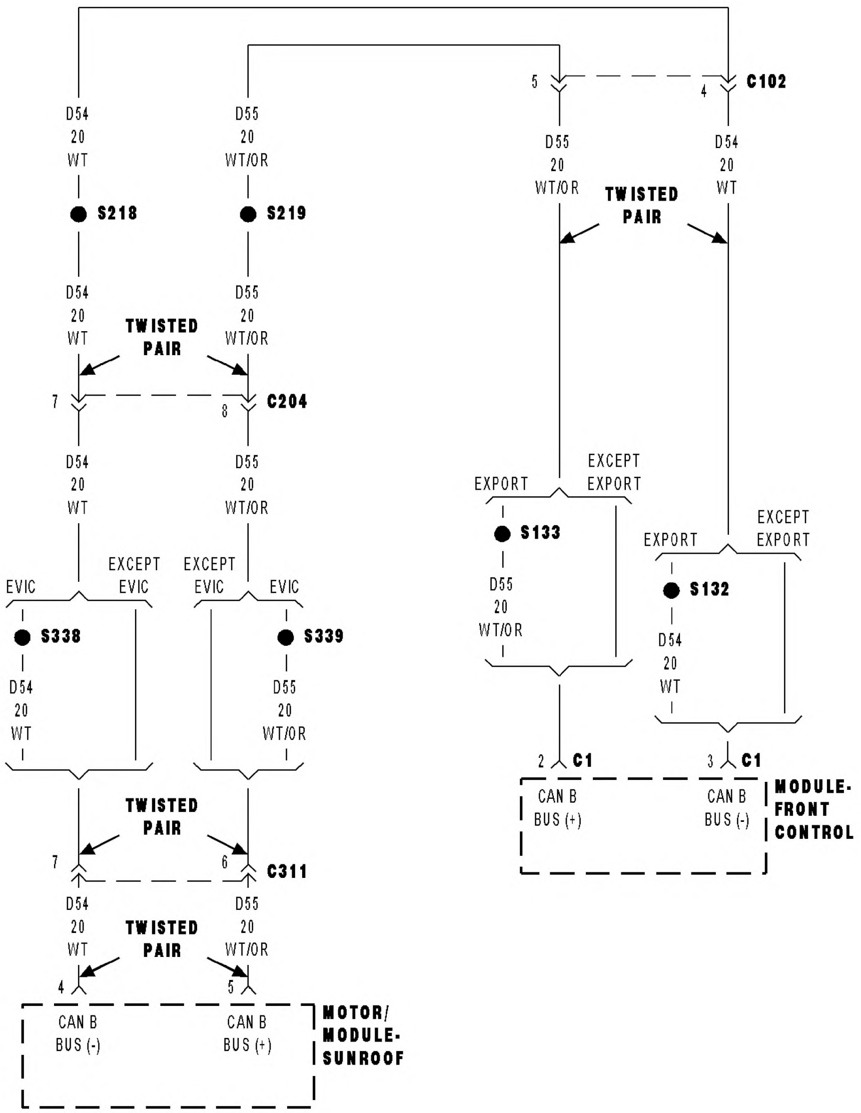
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

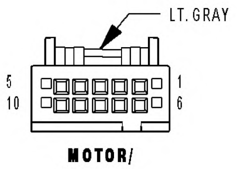
U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

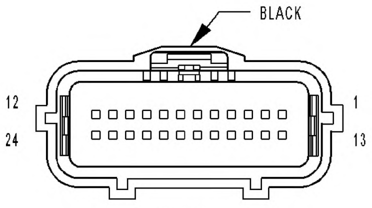
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0019–CAN B BUS


C102
5
4
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
D54
20
WT
S218
D55
20
WT/OR
S219
D54
20
WT
TWISTED PAIR
D55
20
WT/OR
7
8
C204
D54
20
WT
D55
20
WT/OR
EVIC
EXCEPT EVIC
EXCEPT EVIC
EVIC
S338
D54
20
WT
S339
D55
20
WT/OR
TWISTED PAIR
7
6
C311
D54
20
WT
TWISTED PAIR
D55
20
WT/OR
4
5
CAN B BUS (-)
CAN B BUS (+)
MOTOR/ MODULE- SUNROOF
EXPORT
EXCEPT EXPORT
S133
D55
20
WT/OR
EXPORT
EXCEPT EXPORT
S132
D54
20
WT
2
C1
3
C1
CAN B BUS (+)
CAN B BUS (-)
MODULE- FRONT CONTROL


LT. GRAY
5
10
1
6

MOTOR/ MODULE- SUNROOF


BLACK
12
24
1
13

MODULE- FRONT CONTROL C1

8138bdcd

U0019–CAN B BUS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage or shorted to ground.

Possible Causes
CAN B BUS DTC's IN FRONT CONTROL MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
SUNROOF MOTOR/MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTCS

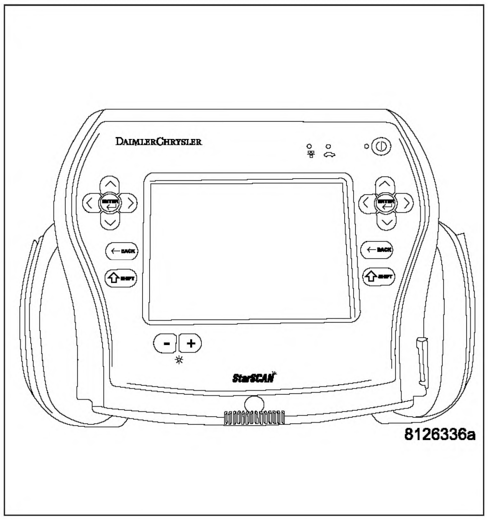
With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

Turn the ignition off and wait 30 seconds.

Turn the ignition on.

With the scan tool, read the active DTC's.



Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK FRONT CONTROL MODULE DTC's

With the scan tool, read Front Control Module active DTC's

Does the scan tool display any CAN B BUS DTC's – ACTIVE?

Yes >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING)

No >> Go To 3

U0019–CAN B BUS (CONTINUED)

3. (D55) CAN B BUS (+) CIRCUIT OPEN

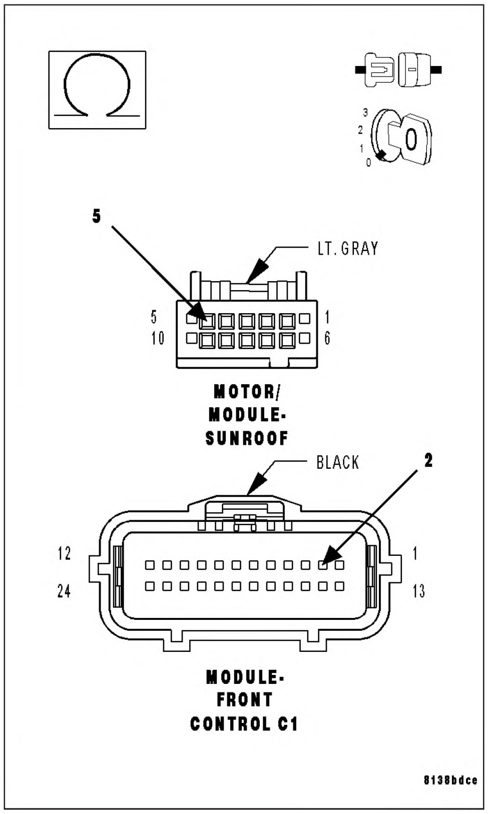
Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the Sunroof Motor/Module connector.

Disconnect the Front Control Module C1 connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 connector and the Sunroof Motor/Module connector.


3
2
1
0
5
LT. GRAY
5
10
1
6
MOTOR/
MODULE-
SUNROOF
BLACK
2
12
24
1
13
MODULE-
FRONT
CONTROL C1
8138bdce

Is the resistance below 2.0 ohms?

Yes >> Go To 4

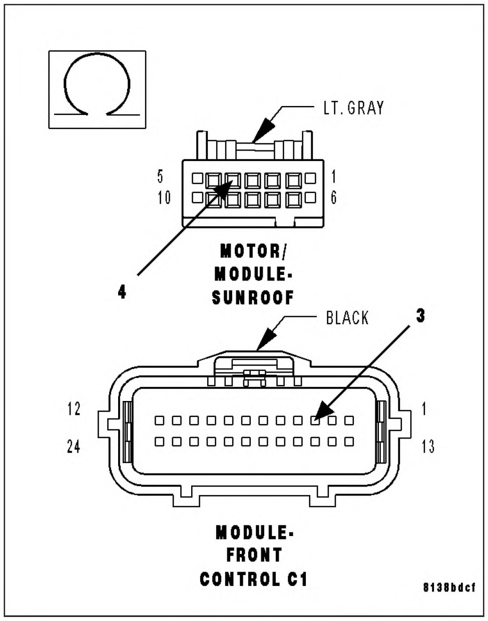
No >> Repair the (D55) CAN B Bus (+) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

4. (D54) CAN B BUS (–) CIRCUIT OPEN

Measure the resistance of the (D54) CAN B Bus (–) circuit between the Front Control Module C1 connector and the Sunroof Motor/Module connector.


LT. GRAY
5
10
1
6
4
MOTOR/
MODULE-
SUNROOF
BLACK
3
12
24
1
13
MODULE-
FRONT
CONTROL C1
8138bdcf

Is the resistance below 2.0 ohms?

Yes >> Replace the Sunroof Motor/Module in accordance with the service information.

Perform the Sunroof Position Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION). Perform the Excessive Force Limitation Calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION CALIBRATION).

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Repair the (D54) CAN B Bus (–) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B210D-BATTERY VOLTAGE LOW – SUNROOF

For the Power Top circuit diagram (Refer to 8 - ELECTRICAL/POWER TOP - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At all times.
- **Set Condition:**
  Anytime the module senses voltage input below 10 volts (motor operating or not). After this code is set, it becomes stored when the voltage exceeds 10.1 volts.

POSSIBLE CAUSES
LOW VOLTAGE ENGINE DTC
(A932) FUSED B(+) CIRCUIT RESISTED
SUNROOF MOTOR/MODULE

Diagnostic Test

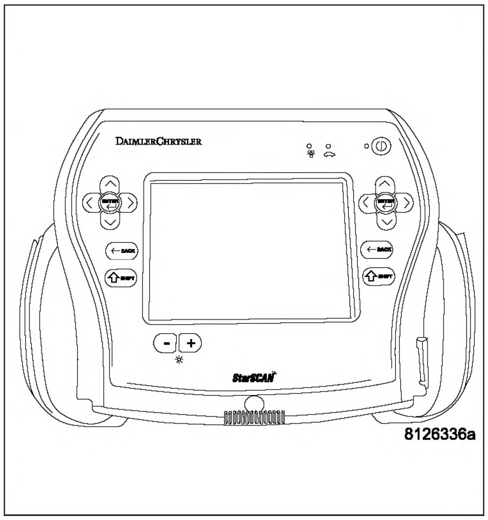
1. CHECK ENGINE DTC's

NOTE: Ensure the battery is fully charged before proceeding.
With the scan tool, read ENGINE DTC's

Are there any ENGINE BATTERY OR CHARGING SYSTEM DTC's present?

No >> Go to 2

Yes >> Refer to symptom list for problems related to ENGINE.



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2. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Start the engine and run for 2 minutes.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display BATTERY VOLTAGE LOW in the Sunroof module only?

Yes >> Go To 3

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

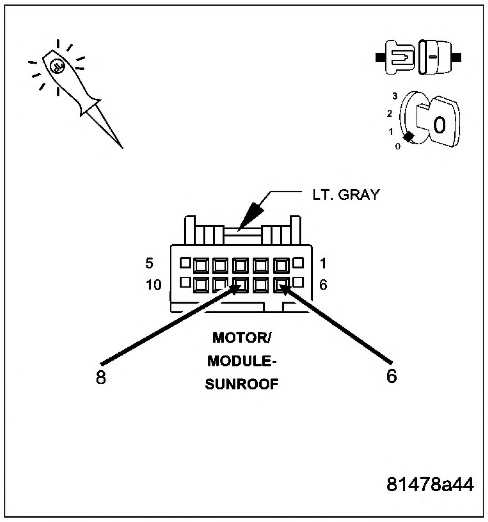
B210D-BATTERY VOLTAGE LOW – SUNROOF (CONTINUED)

3. (A932) FUSED B(+) CIRCUIT RESISTED

Turn the ignition off.

Lower the headliner and disconnect the Sunroof Motor/Module connector.

Test for a resisted (A932) Fused B(+) circuit by connecting a 12-volt test light between the (A932) Fused B(+) circuit and the (Z914) Ground circuit in the Sunroof Motor/Module connector. The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.



Does the test light illuminate brightly?

Yes >> Replace the Sunroof Motor/Module in accordance with Service Information. (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL)

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test the (A932) Fused B(+) and the (Z914) Ground circuits to determine which circuit is resisted. Repair the (A932) Fused B(+) circuit or the (Z914) Ground circuit for high resistance.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B210E-BATTERY VOLTAGE HIGH

For the Power Top circuit diagram (Refer to 8 - ELECTRICAL/POWER TOP - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At all times.
- **Set Condition:**
  Anytime the module senses voltage input above 16 volts. This code will become stored when the voltage drops below 15.9 volts.

POSSIBLE CAUSES
HIGH VOLTAGE ENGINE DTC
SUNROOF MOTOR/ MODULE

Diagnostic Test

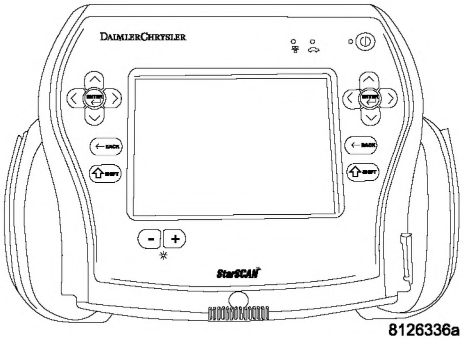
1. CHECK ENGINE DTC's

With the scan tool, read ENGINE DTC's

Are there any ENGINE DTC's present?

No >> Go to 2

Yes >> Refer to symptom list for problems related to ENGINE.



8126336a

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2. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase DTC's

Start the engine and run for 2 minutes.

Cycle the ignition from on to off 3 times.

Turn the ignition on.

With the scan tool, read DTC's.

Does the scan tool display BATTERY VOLTAGE HIGH in this module only?

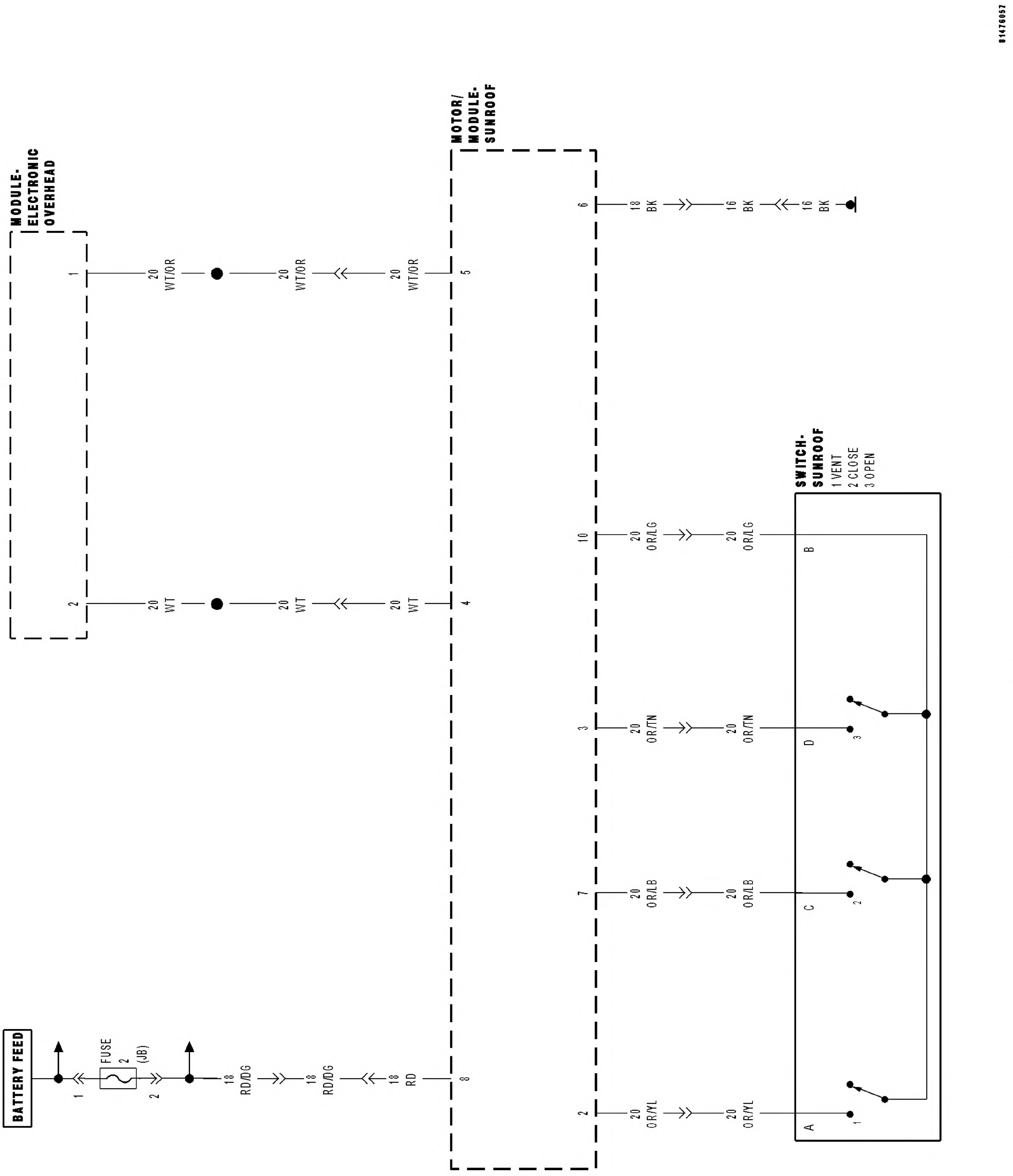
Yes >> Replace the Sunroof Motor/Module in accordance with service information. (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL)

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> The conditions that caused this code to set are not present at this time. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

SCHEMATICS AND DIAGRAMS


81476057
MODULE-ELECTRONIC OVERHEAD
MOTOR/MODULE-SUNROOF
SWITCH-SUNROOF
1 VENT
2 CLOSE
3 OPEN
BATTERY FEED
FUSE 2 (JB)
1
2
18 RD/DG
18 RD/DG
18 RD
8
20 WT/OR
20 WT/OR
20 WT/OR
5
20 WT
20 WT
20 WT
4
18 BK
16 BK
16 BK
6
20 OR/LG
20 OR/LG
10
B
20 OR/TN
20 OR/TN
3
D
20 OR/LB
20 OR/LB
7
C
20 OR/YL
20 OR/YL
2
A

WK SUNROOF CIRCUIT

POWER TOP - SUNROOF SERVICE INFO

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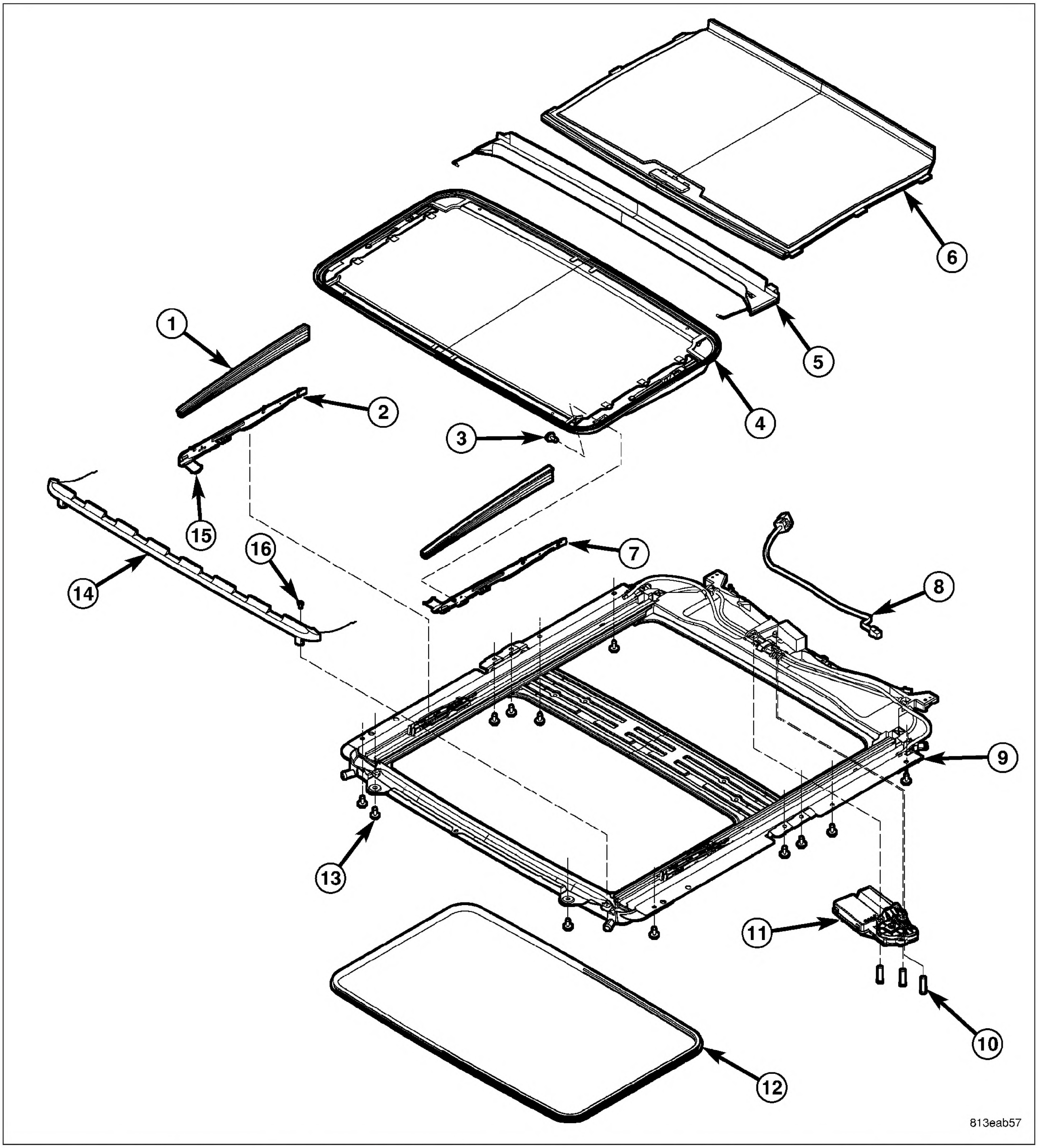
POWER TOP - SUNROOF SERVICE INFO

DESCRIPTION



The power sunroof system allows the sunroof to be opened, closed or placed in the vent position electrically by actuating a switch in the overhead console. The sunroof system receives battery feed through a fuse in the Power Distribution Center (PDC). The sunroof will operate normally with the key in any position while the Accessory Delay system is active.

The sunroof glass panel tilts upward at the rear for ventilation and slides rearward under the roof when open. The panel seals flush with the roof in the closed position to eliminate wind noise. The sunroof includes a manual-sliding sunshade to cover the deep-tinted glass panel.

In addition to the standard power sunroof operation, this vehicle offers several additional features. There is an express (one-touch) opening and closing feature as well as Excessive Force Limitation (EFL). The EFL function detects obstacles trapped between the glass and the vehicle roof during a closing motion. Upon sensing an obstacle the EFL function will reverse direction of the glass to allow removal of the obstacle.

The main components of the power sunroof system are:

- The motor/module assembly
- The power sunroof glass and frame assembly
- The power sunroof switch
- The manual-sliding sunshade

OPERATION

This vehicle has a vent, tilt and slide power sunroof system with express (one-touch) open and closing feature. The sunroof system receives constant battery feed through a fuse in the Power Distribution Center (PDC). The sunroof will operate normally with the key in any position while the Accessory Delay system is active. If the sunroof is moving when the key is turned to the START position (crank engine), all motions stop until the key is released, then the previously requested sunroof motion will resume. The sunroof will also complete a requested motion if the Accessory Delay system goes inactive while the motion is in progress.

A combination push-button and rocker switch module mounted in the overhead console controls sunroof operation. The sunroof switch is a rocker design with a push button in the center of the two halves of the rocker. Pressing the rocker towards the front of the car commands the sunroof closed. Pressing the rocker towards the rear of the car commands the sunroof open. Pressing the center push button commands the sunroof up into the vent position (Rear of sunroof glass raises above the vehicle roof with glass still covering the sunroof opening). All switch commands operate with the glass starting in any position. (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - OPERATION) for additional information.

An electronic control system, integral to the motor/module assembly, provides the express open and close functions. Pressing the ″open″ or ″close″ end of the rocker switch moves the sunroof glass panel to the full open or full closed position, respectively. During express closing, anytime an obstacle is detected in the way of the glass, the motor will stop and reverse travel to avoid pinching an occupant’s finger, ice in the track, etc. This function is called Excessive Force Limitation (EFL). There are two methods of overriding the EFL function.

1. When three EFL events occur without the glass being allowed to fully close, the next close attempt will only move while the close switch is continuously actuated. This allows the sunroof to be forced closed if multiple close attempts fail.
2. If the sunroof close switch is continuously actuated during an EFL event, through the reversal, and during a two second wait time, then continuing to hold the close switch will cause the roof to move towards close with the EFL protection disabled. This allows the sunroof to be forced closed if it is known that a reversal will occur.

While in EFL override, the closing motion will cease if the sunroof switch is released at any time.

The motor/module is programmed to learn the speed required to drive the panel based on position and recalibrates itself as needed. If the sunroof becomes uncalibrated, it will only respond to the vent switch. If the vent switch is pressed, the glass will move toward vent; if the switch is released, all motion stops. In the event that the sunroof system becomes uncalibrated perform the sunroof position calibration procedure, (Refer to 8 - ELECTRICAL/ POWER TOP/MOTOR - STANDARD PROCEDURE -SUNROOF POSITION CALIBRATION).

DIAGNOSIS AND TESTING

POWER TOP - SUNROOF

Any diagnosis of the power sunroof system should begin with the use of a scan tool and the proper Diagnostic Procedures Information. The scan tool can provide confirmation that the Controller Area Network (CAN) Data Bus is functional, that all of the electronic modules are sending and receiving the proper messages on the CAN Data Bus, and that the power sunroof motor is being sent the proper hard wired output by the sunroof switch.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

Refer to the appropriate diagnostic information.

MOTOR/MODULE-SUNROOF

DIAGNOSIS AND TESTING

MOTOR/MODULE - SUNROOF

Any diagnosis of the power sunroof system should begin with the use of a scan tool and the proper Diagnostic Procedures Information. The scan tool can provide confirmation that the Controller Area Network (CAN) Data Bus is functional, that all of the electronic modules are sending and receiving the proper messages on the CAN Data Bus, and that the power sunroof motor is being sent the proper hard wired output by the sunroof switch.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

Refer to the appropriate diagnostic information.

STANDARD PROCEDURE

SUNROOF POSITION CALIBRATION

Press the power sunroof switch (Open, Closed, and Vent). If no movement occurs when either the open switch or closed switch is pressed, but the system does move when the vent button is pressed and held, the system is not calibrated. Perform the following procedure to position calibrate the power sunroof system.

1. Turn the ignition to the RUN position.
2. Press the vent button on the power sunroof switch and hold until the sunroof glass panel has moved to the full vent position and the motor movement has stopped for at least 1 second.
3. Press the close switch on the power sunroof switch and hold for a moment (at least 100ms) and release. The sunroof glass panel should continue travel to the full close position. If the sunroof glass panel does not return to the full close position, refer to the appropriate diagnostic information for full system diagnosis.
4. Verify proper system operation.

EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION

NOTE: Verify the battery is in good condition prior to performing this procedure. Do not leave the vehicle on a battery charger while performing this procedure. If the voltage at the sunroof motor/module drops below 11 volts or exceeds 15 volts at anytime while this procedure is being performed, the Excessive Force Limitation (EFL) function will not be properly calibrated.

1. Turn the ignition to the RUN position.
2. Press the vent button on the power sunroof switch and hold until the sunroof glass panel has moved to the full vent position and the motor movement has stopped for at least 1 second.
3. Press the close position on the power sunroof switch and release. The sunroof glass panel should continue travel to the full closed position. **This will be considered the first sunroof closed position in a series of four sunroof closes.**
4. Press the vent button on the power sunroof switch and release. The sunroof glass panel should move to the full vent position. After the sunroof motor/module has stopped, press the close position on the power sunroof switch and release. The sunroof glass panel should continue travel to the full closed position. **This will be considered the second sunroof closed position in a series of four sunroof closes.**
5. Continue to move the sunroof glass to the “vent” then “closed” positions two more times so that the sunroof glass has moved to the closed position a total of four times starting with the first sunroof close in step 3.

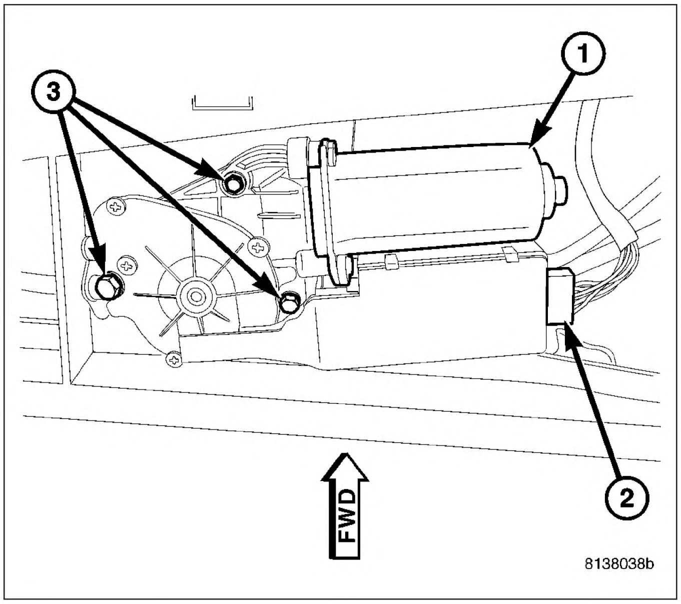
6. Press the open position on the power sunroof switch and release. The sunroof glass panel should continue travel to the full open position.
7. Press the close position on the power sunroof switch and release. The sunroof glass panel should continue travel to the full closed position. **This will be considered the first sunroof closed position in a series of five sunroof closes.**
8. Press the open position on the power sunroof switch and release. The sunroof glass panel should move to the full open position. After the sunroof motor/module has stopped, press the close position on the power sunroof switch and release. The sunroof glass panel should continue travel to the full closed position. **Continue to move the sunroof glass to the "open" then "closed" position four more times so that the sunroof glass has moved to the closed position a total of five times starting with the first sunroof close in step 7.**

Verify proper EFL calibration by placing a standard pencil at the front of the sunroof and then moving the sunroof to the full closed position. The sunroof should reverse direction upon contact without damage to the pencil.

REMOVAL

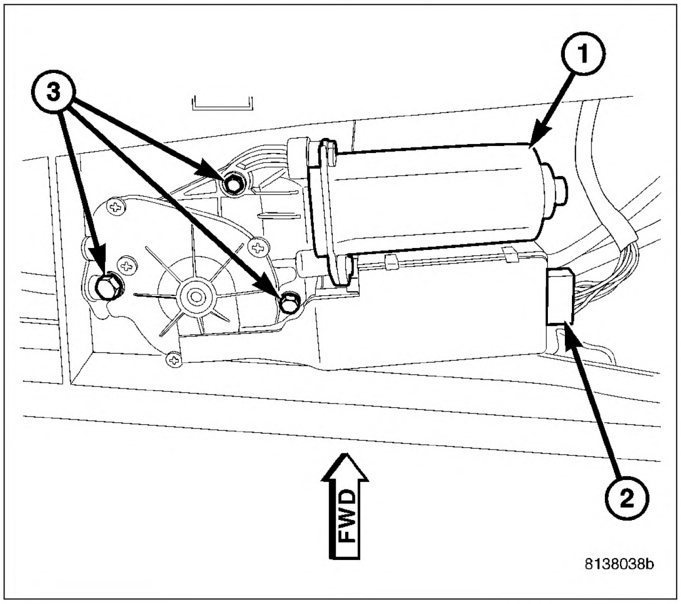
WARNING: The Excessive Force Limitation (EFL) feature must be calibrated any time a sunroof motor/module is replaced with a new component. Failure to perform this procedure could result in vehicle damage and/or personal injury. (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION) for the appropriate procedure.

1. Disconnect the battery negative cable.
2. Remove the vehicle headliner, (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
3. Remove the power sunroof motor/module electrical connector (2).
4. Remove the retaining screws (3) and remove the motor/module (1) from the vehicle.



INSTALLATION

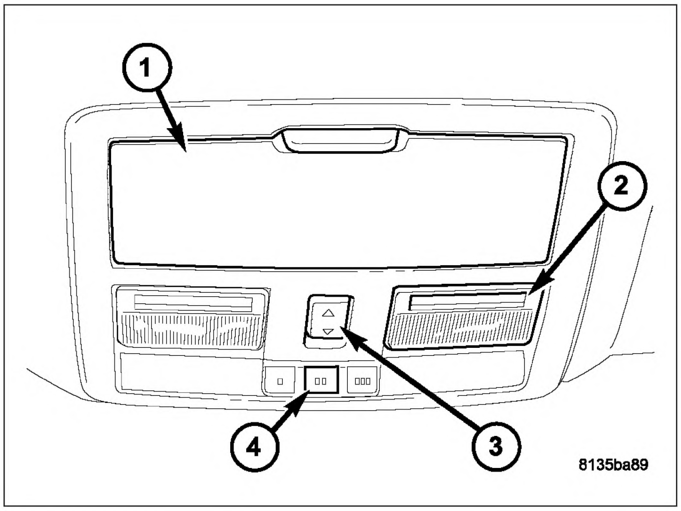
WARNING: The Excessive Force Limitation (EFL) feature must be calibrated any time a sunroof motor/module is replaced with a new component. Failure to perform this procedure could result in vehicle damage and/or personal injury. (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION) for the appropriate procedure.



1. Position the power sunroof motor/module (1) in the vehicle.
2. Install the motor/module retaining screws (3). Tighten the screws to 4 N·m (35 in. lbs.).
3. Connect the motor/module electrical connector (2).
4. Connect the battery negative cable and move the sunroof through one open and close cycle to confirm proper system operation.
5. Install the vehicle headliner, (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
6. Perform the sunroof position calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION).
7. Perform the Excessive Force Limitation (EFL) calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION).
8. Verify proper operation of the power sunroof system.

SWITCH - SUNROOF

DESCRIPTION



The power sunroof switch (3) is a combination push-button and rocker switch module mounted in the overhead console. The sunroof switch is a direct contact unit that is directly wired to the sunroof motor/module assembly. The sunroof switch performs the following functions:

- Power sunroof open (back of switch pushed)
- Power sunroof closed (front of switch pushed)
- Power sunroof vent (switch center button pushed)

The power sunroof switch is part of the overhead console assembly and cannot be replaced separately. If the switch is damaged or inoperative the overhead console must be replaced, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

OPERATION

The power sunroof switch is hard wired to the sunroof motor/module assembly. The switch receives battery current from the motor/module when the ignition switch is in the RUN and ACCESSORY positions or the vehicle Accessory Delay System is active. When one of the switch positions is pressed it sends battery current back to the motor/module, signaling it to move the power sunroof to the appropriate position. The motor/module will perform one of the following functions:

- Power sunroof open (back of switch pushed)
- Power sunroof closed (front of switch pushed)
- Power sunroof vent (switch center button pushed)

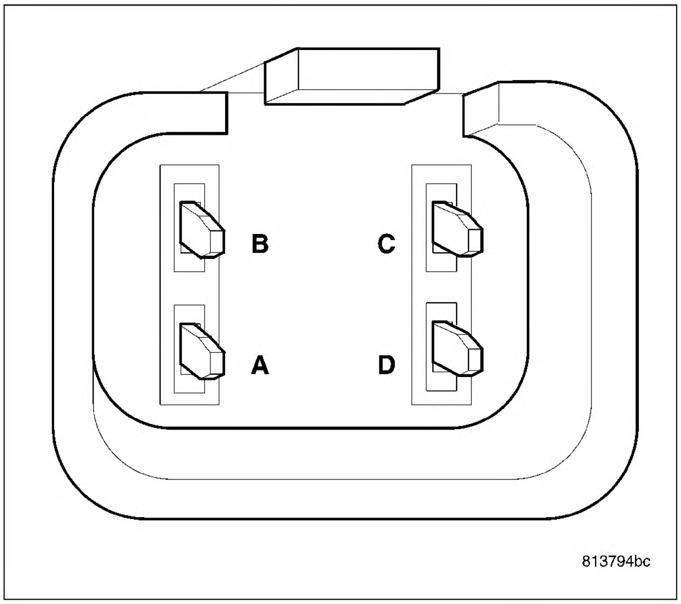
DIAGNOSIS AND TESTING

SWITCH - POWER SUNROOF

Any diagnosis of the power sunroof system should begin with the use of a scan tool and the proper Diagnostic Procedures Information. The scan tool can provide confirmation that the Controller Area Network (CAN) Data Bus circuit is functional, that all of the electronic modules are sending and receiving the proper messages on the CAN Data Bus, and that the power sunroof motor/module assembly is being sent the proper hard wired output by the sunroof switch.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds. If completing the appropriate diagnostic information results in the sunroof switch being inoperative, perform the following test prior to switch replacement.

1. Disconnect and isolate the battery negative cable.
2. Remove the overhead console, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).
3. Disconnect the power sunroof switch wire harness connector.
4. Using an ohmmeter, test the continuity of the power sunroof switch in each switch position. Refer to the POWER SUNROOF SWITCH CONTINUITY TABLE . If OK, inspect the wiring harness and connectors for damage. Use a scan tool and the proper Diagnostic Procedures Information to complete diagnosis of the power sunroof system. If not OK, replace the overhead console.



POWER SUNROOF SWITCH CONTINUITY TABLE

SWITCH POSITION	CONTINUITY BETWEEN PINS
OFF	NO CONTINUITY
SUNROOF OPEN	B & D
SUNROOF CLOSED	B & C
SUNROOF VENT	B & A

POWER WINDOWS - SERVICE INFORMATION

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POWER WINDOWS - SERVICE INFORMATION

DESCRIPTION

The power window system allows each of the door windows to be raised and lowered electrically by actuating a switch on the trim panel of each respective door. A master switch on the driver side front door trim panel allows the driver to raise or lower each of the passenger door windows and to lock out the individual switches on the passenger doors from operation. The power window system receives battery feed through a circuit breaker, only when the ignition switch is in the On position.

The power window system includes the power window switches on each door trim panel, the circuit breaker, and the power window motors inside each door.

The power window motor is integral to the power window regulator unit. If the power window motor is inoperative or damaged, the entire power window regulator unit must be replaced. (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - REMOVAL) or (Refer to 23 - BODY/DOORS - REAR/WINDOW REGULATOR - REMOVAL) for the window regulator service procedures.

OPERATION

POWER WINDOW SWITCH

The power windows are controlled by a window/lock switch on the trim panel of each front door. Switches in the driver door window/lock switch allows the driver to control the passenger windows.

The power window switch for the driver side front door window has a second detent position beyond the normal Down position that provides an automatic one-touch window down feature. This feature is controlled by the window/lock switch.

The power window switches control the battery and ground feeds to the power window motors. All of the passenger door power window switches receive their battery and ground feeds through the circuitry of the window/lock switch. When the power window lockout switch is in the Lock position, the battery feed for the individual passenger door power window switches is interrupted.

POWER WINDOW MOTOR

A permanent magnet reversible motor moves the window regulator through an integral gearbox mechanism. A positive and negative battery connection to the two motor terminals will cause the motor to rotate in one direction. Reversing the current through these same two connections will cause the motor to rotate in the opposite direction.

In addition, each power window motor is equipped with an integral self-resetting circuit breaker to protect the motor from overloads. The power window motor and gearbox assembly cannot be repaired and, if inoperative or damaged, the power window regulator must be replaced.

DIAGNOSIS AND TESTING

POWER WINDOWS

For complete circuit diagrams, refer to the appropriate wiring information.

ALL WINDOWS INOPERATIVE

1. Check the circuit breaker. If OK, go to Step 2. If not OK, replace the inoperative circuit breaker.
2. Disconnect and isolate the battery negative cable. Remove the window/lock switch from the driver side front door trim panel. Unplug the wire harness connector.
3. Check for continuity between the ground circuit cavity of the door module wire harness connector and a good ground. If OK, go to Step 4. If not OK, repair the circuit to ground as required.
4. Connect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run) circuit cavity of the window/lock switch wire harness connector. If OK, (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK SWITCH - DIAGNOSIS AND TESTING). If not OK, repair the circuit as required.

ONE WINDOW INOPERATIVE

The window glass must be free to slide up and down for the power window motor to function properly. If the glass is not free to move up and down, the motor will overload and trip the integral circuit breaker. To determine if the glass is free, disconnect the regulator from the glass. Then slide the window up and down by hand.

There is an alternate method to check if the glass is free. Position the glass between the up and down stops. Then, shake the glass in the door. Check that the glass can be moved slightly from side to side, front to rear, and up and down. Then check that the glass is not bound tight in the tracks. If the glass is free, proceed with the diagnosis that follows. If the glass is not free, determine the cause of the condition.

If the only inoperative window is in the driver or passenger side front door and the preceding checks have not identified a problem, (Refer to 8 - ELECTRICAL/POWER WINDOWS/WINDOW MOTOR - DIAGNOSIS AND TESTING). If the problem being diagnosed involves only the Auto-down feature for the driver side front door window, but all of the power windows are operational, replace the driver's side window/lock switch. For diagnosis of the window/lock switch, (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK SWITCH - DIAGNOSIS AND TESTING). For a rear power window problem proceed with the following:

1. Disconnect and isolate the battery negative cable. Unplug the wire harness connector from the power window switch unit on the door with the inoperative power window. Check for continuity between the ground circuit cavity of the power window switch wire harness connector and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open circuit to the power window and door lock master switch as required.
2. Connect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run) circuit cavity in the body half of the power window switch unit wire harness connector. If OK, go to Step 3. If not OK, repair the open circuit to the power window and door lock master switch as required.
3. Test the power window switch continuity (Refer to 8 - ELECTRICAL/POWER WINDOWS/POWER WINDOW SWITCH - DIAGNOSIS AND TESTING). If OK, go to Step 4. If not OK, replace the power window switch.
4. Check the continuity in each circuit between the inoperative power window switch wire harness connector cavities and the corresponding power window motor wire harness connector cavities. If OK, (Refer to 8 - ELECTRICAL/POWER WINDOWS/WINDOW MOTOR - DIAGNOSIS AND TESTING). If not OK, repair the open circuit(s) as required.

NOTE: All passenger door power window switches receive their battery and ground feed for operating the passenger door power window motors through the driver side power window and lock master switch and wire harness connector.

MOTOR-WINDOW

DIAGNOSIS AND TESTING

WINDOW MOTOR

For complete circuit diagrams, refer to the appropriate wiring information.

1. Disconnect and isolate the battery negative cable. Remove the trim panel from the door with the inoperative power window.
2. Unplug the power window motor wire harness connector. Apply 12 volts across the motor terminals to check its operation in one direction. Reverse the connections across the motor terminals to check the operation in the other direction. If the window is in the full up or full down position, the motor will not operate in that direction by design. If OK, repair the circuits from the power window motor to the power window switch as required. If not OK, replace the inoperative motor.
3. If the motor operates in both directions, check the operation of the window glass and lift mechanism through its complete up and down travel. There should be no binding or sticking of the window glass or lift mechanism through the entire travel range. If not OK, check the window glass, tracks, and regulator for sticking, binding, or improper adjustment.

REMOVAL

The power window motor is integral to the power window regulator unit. If the power window motor is inoperative or damaged, the entire power window regulator unit must be replaced. (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - REMOVAL) or (Refer to 23 - BODY/DOORS - REAR/WINDOW REGULATOR - REMOVAL) for the window regulator service procedures.

SWITCH-POWER WINDOW

DIAGNOSIS AND TESTING

POWER WINDOW SWITCH

The front door power window switches are included in the window/lock switch (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK SWITCH - DIAGNOSIS AND TESTING).

The Light-Emitting Diode (LED) illumination lamps for all of the power window switch knobs receive battery current through the power window circuit breaker in the junction block. If all of the LEDs are inoperative in the power window switch and the power windows are inoperative, (Refer to 8 - ELECTRICAL/POWER WINDOWS - DIAGNOSIS AND TESTING). If the power windows operate, but any or all of the LEDs are inoperative, the power window and lock switch units with the inoperative LED(s) must be replaced. For complete circuit diagrams, refer to the appropriate wiring information.

1. Check the fuse and the circuit breaker. If OK, go to Step 2. If not OK, replace the fuse or circuit breaker.
2. Turn the ignition switch to the On position. Check for battery voltage at the power window fuse. If OK, turn the ignition switch to the Off position and go to Step 3. If not OK, check circuit breaker and repair the circuit to the ignition switch as required.
3. Disconnect and isolate the battery negative cable. Remove the power window switch from the door trim panel. Unplug the wire harness connector from the switch.
4. Test the power window switch continuity. See the Power Window Switch Continuity chart to determine if the continuity is correct in the Neutral, Up and Down switch positions. If OK, (Refer to 8 - ELECTRICAL/POWER WINDOWS - DIAGNOSIS AND TESTING). If not OK, replace the inoperative switch.

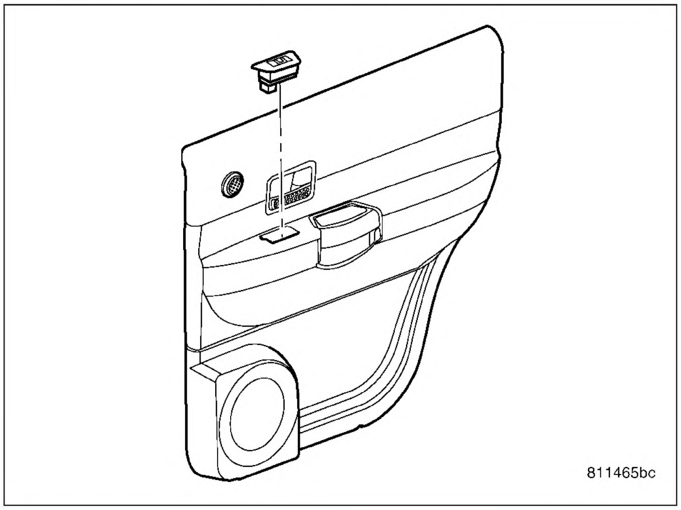
REAR POWER WINDOW SWITCH CONTINUITY CHART

SWITCH POSITION	CONTINUITY BETWEEN
NEUTRAL	PIN 3 & 4, PIN 1 & 2
UP	PIN 6 & 3, PIN 1 & 2
DOWN	PIN 6 & 2, PIN 3 & 4

REMOVAL

The driver and front passenger side power window switch is included in the window/lock switch. (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK SWITCH - REMOVAL) for the service procedures.

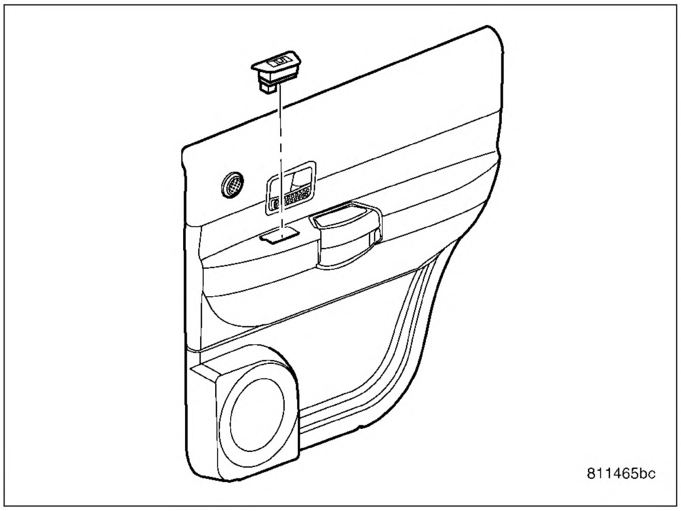
1. Disconnect and isolate the battery negative cable.
2. Remove the door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
3. Remove switch from door trim panel.



INSTALLATION

The driver and front passenger side power window switch is included in the window/lock switch. (Refer to 8 - ELECTRICAL/POWER LOCKS/POWER LOCK SWITCH - INSTALLATION).

1. Install the switch to the door trim panel.
2. Install the door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
3. Connect the battery negative cable.



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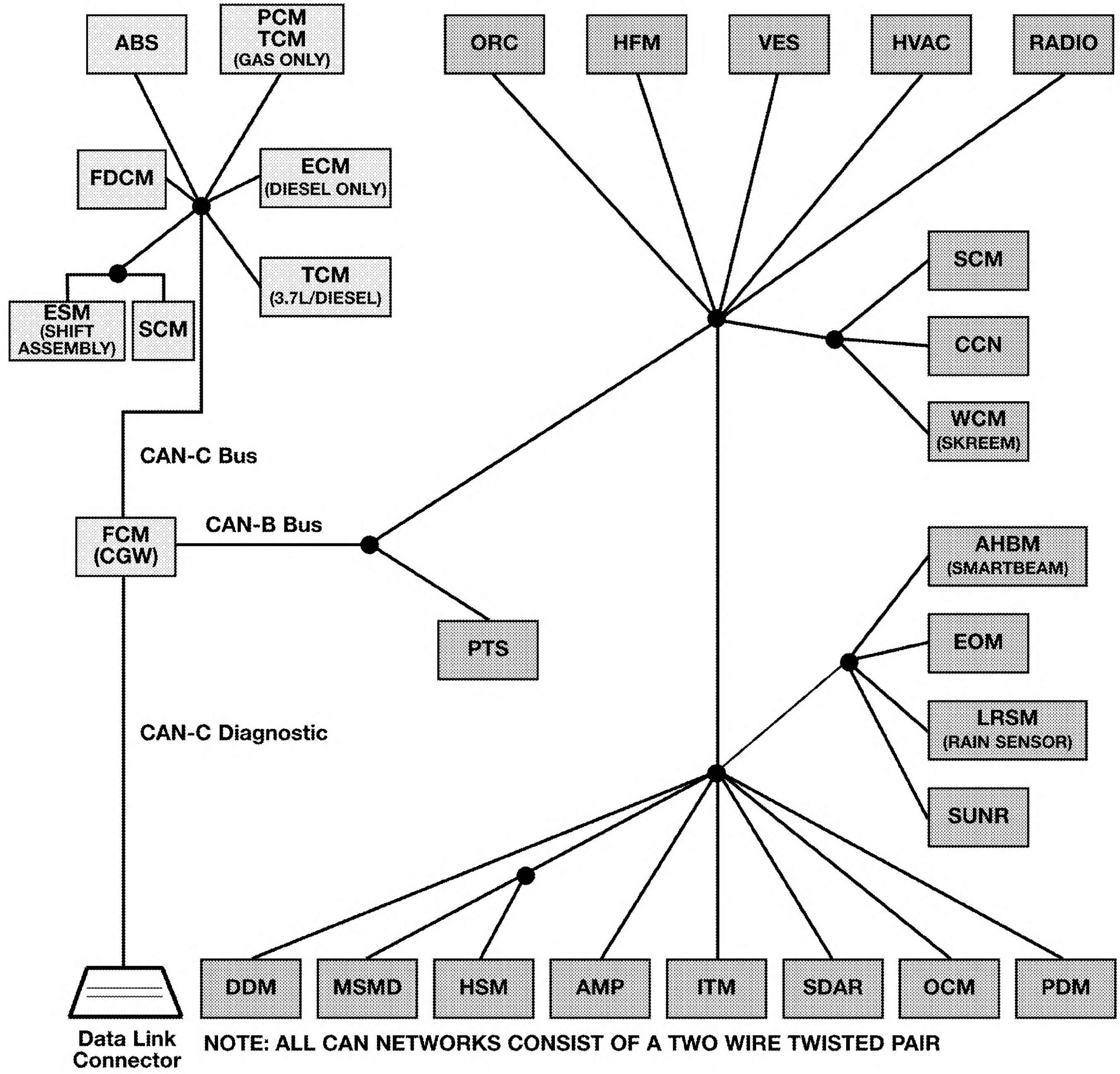
RESTRAINTS - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1203-SRS WARNING INDICATOR CIRCUIT/PERFORMANCE


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

B1203-SRS WARNING INDICATOR CIRCUIT/PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the CAN B bus for a message from the Instrument Cluster containing the airbag warning indicator status. The ORC requests the warning lamp status from the Instrument Cluster once every second.
- **Set Condition:**
  This DTC will set immediately if the indicator status is LOW or HIGH.

Possible Causes
INSTRUMENT CLUSTER ACTIVE DTCs
ORC

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.
With the scan tool, read ORC DTCs.

Select DTC type.

Active
Go To 2

Stored
Go To 4

---

2. CHECK FOR INSTRUMENT CLUSTER DTCs

With the scan tool, read Instrument Cluster DTCs.

Does the scan tool display any Instrument Cluster DTCs?

Yes >> Refer to the symptom list for problems related to the Instrument Cluster.
Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 3

---

3. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

Repair
Replace the ORC in accordance with the service information.
Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1203-SRS WARNING INDICATOR CIRCUIT/PERFORMANCE (CONTINUED)

4. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

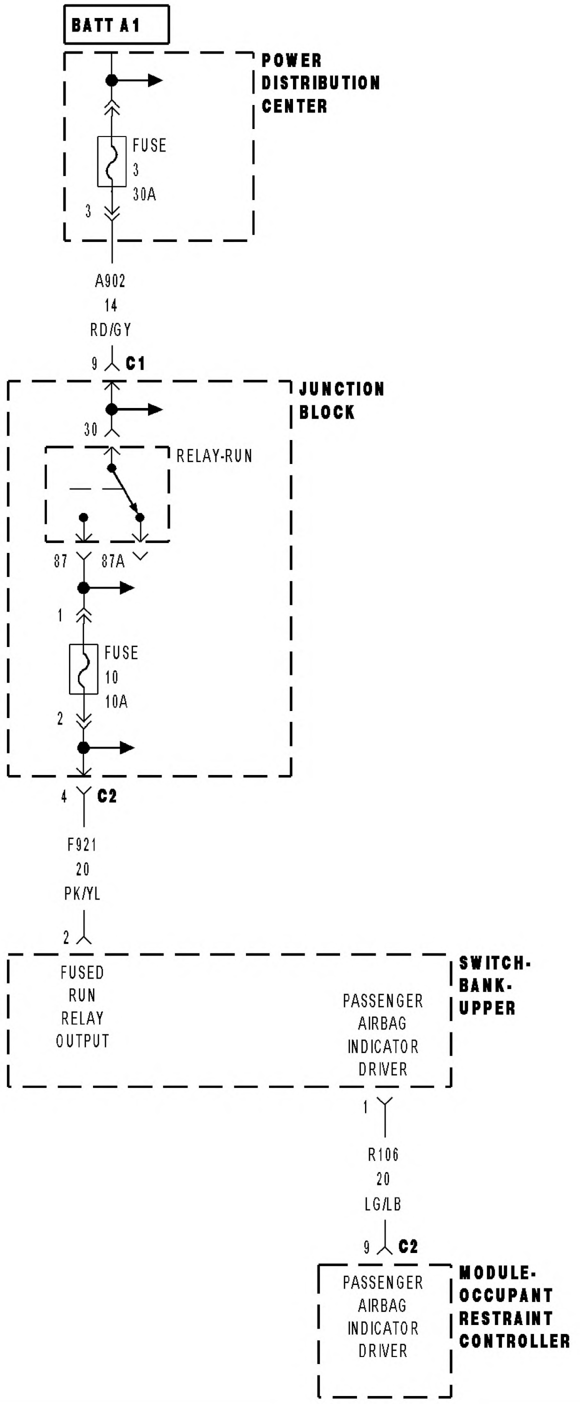
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

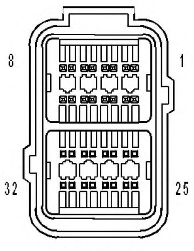
Does the scan tool display any ACTIVE DTCs?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

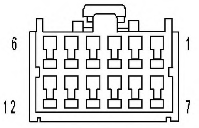
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1204-PASSENGER AIRBAG INDICATOR CIRCUIT LOW


BATT A1
POWER DISTRIBUTION CENTER
FUSE
3
30A
3
A902
14
RD/GY
9
C1
JUNCTION BLOCK
30
RELAY-RUN
87
87A
1
FUSE
10
10A
2
4
C2
F921
20
PK/YL
2
SWITCH-BANK-UPPER
FUSED RUN RELAY OUTPUT
PASSENGER AIRBAG INDICATOR DRIVER
1
R106
20
LG/LB
9
C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
PASSENGER AIRBAG INDICATOR DRIVER



MODULE-OCCUPANT RESTRAINT CONTROLLER C2



SWITCH-BANK-UPPER

814b9507

B1204-PASSENGER AIRBAG INDICATOR CIRCUIT LOW (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Occupant Restraint Controller (ORC) cannot detect voltage on the (G104) Passenger Airbag Indicator Driver circuit.

Possible Causes
(G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT SHORTED TO GROUND
PASSENGER AIRBAG ON/OFF INDICATOR LAMP
ORC

Diagnostic Test

1. VERIFY THAT DTC B1204 PASSENGER AIRBAG INDICATOR CIRCUIT LOW IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1204 PASSENGER AIRBAG INDICATOR CIRCUIT LOW?

Yes >> Go To 2

No >> Go To 5

---

2. CHECK FOR ACTIVE DTC B1204 PASSENGER AIRBAG INDICATOR CIRCUIT LOW WITH SWITCH BANK CONNECTOR DISCONNECTED

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Switch Bank connector.

NOTE: Check connectors - Clean and repair as necessary.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, erase ORC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1204 PASSENGER AIRBAG INDICATOR CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Passenger Airbag On/Off Indicator Lamp in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1204-PASSENGER AIRBAG INDICATOR CIRCUIT LOW (CONTINUED)

3. CHECK (G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT FOR A SHORT TO GROUND

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

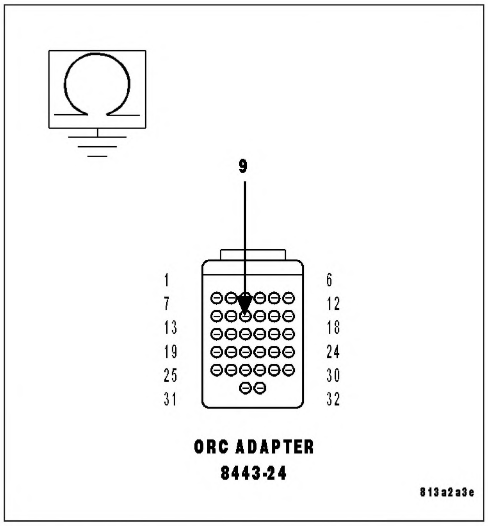
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the ORC C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the appropriate Load Tool ORC Adaptor to the ORC connector.

Measure the resistance of the (G104) Passenger Airbag Indicator Driver circuit between ground and the ORC Adaptor.



Is the resistance below 100.0 ohms?

Yes >> Repair the (G104) Passenger Airbag Indicator Driver circuit for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

View Repair

Repair

Replace the ORC in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1204-PASSENGER AIRBAG INDICATOR CIRCUIT LOW (CONTINUED)

5. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

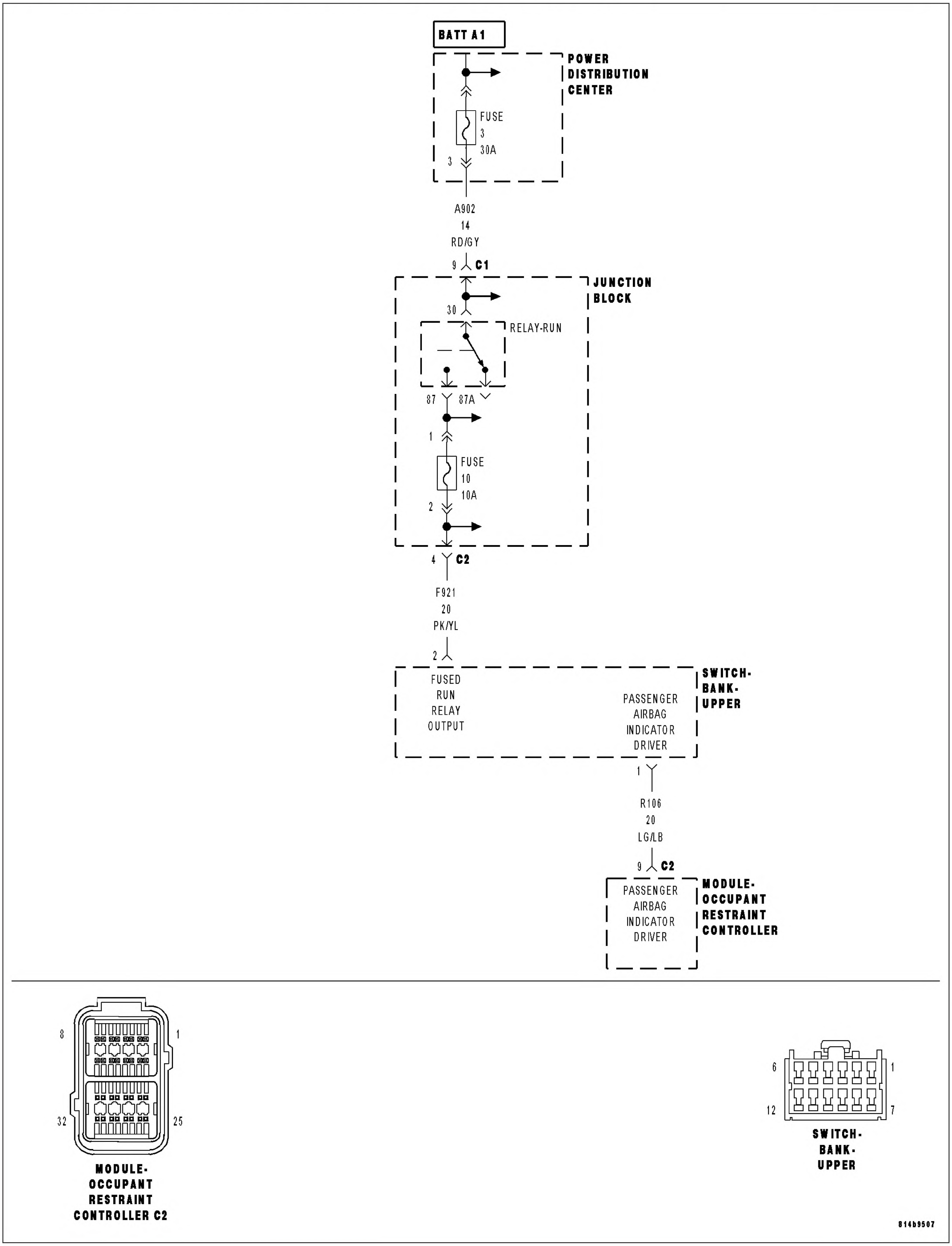
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1205-PASSENGER AIRBAG INDICATOR CIRCUIT HIGH


BATT A1
POWER DISTRIBUTION CENTER
FUSE 3 30A
3
A902
14
RD/GY
9 C1
JUNCTION BLOCK
30
RELAY-RUN
87
87A
1
FUSE 10 10A
2
4 C2
F921
20
PK/YL
2
SWITCH-BANK-UPPER
FUSED RUN RELAY OUTPUT
PASSENGER AIRBAG INDICATOR DRIVER
1
R106
20
LG/LB
9 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
PASSENGER AIRBAG INDICATOR DRIVER
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
6
1
12
7
SWITCH-BANK-UPPER
814b9507

B1205-PASSENGER AIRBAG INDICATOR CIRCUIT HIGH (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Occupant Restraint Controller (ORC) senses a low resistance to battery voltage on the (G104) Passenger Airbag Indicator Driver circuit.

Possible Causes
(G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT SHORTED TO (F23) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT
(G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT SHORTED TO VOLTAGE
PASSENGER AIRBAG ON/OFF INDICATOR LAMP
ORC

Diagnostic Test

1. VERIFY THAT DTC B1205 PASSENGER AIRBAG INDICATOR CIRCUIT HIGH IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1205 PASSENGER AIRBAG INDICATOR CIRCUIT HIGH?

Yes >> Go To 2

No >> Go To 6

B1205-PASSENGER AIRBAG INDICATOR CIRCUIT HIGH (CONTINUED)

2. CHECK (G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT FOR A SHORT TO (F23) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

WARNING: If the Occupant Classification Module (OCM) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Remove the Airbag Run-Start Fuse from the PDC.

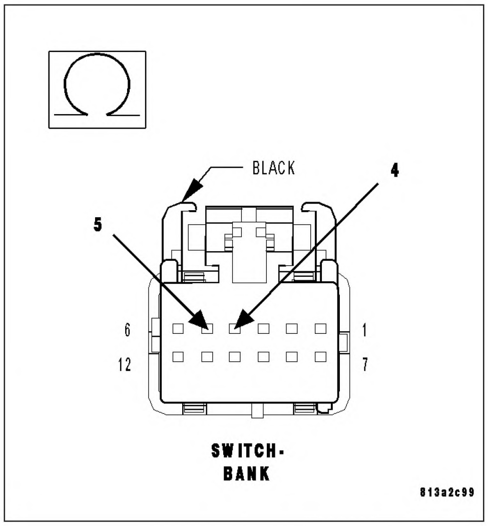
Disconnect the ORC C1 and C2 connectors.

Disconnect the OCM C1 connector.

Disconnect the Switch Bank connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the appropriate Load Tool ORC Adaptor to the ORC connectors.



Measure the resistance between the (G104) Passenger Airbag Indicator Driver circuit and the (F23) Fused Ignition Switch Output (Run-Start) circuit in the Switch Bank connector.

Is the resistance below 100.0 ohms?

Yes >> Repair the (G104) Passenger Airbag Indicator Driver circuit for a short to the (F23) Fused Ignition Switch Output (Run-Start) circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 3

---

3. CHECK (G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

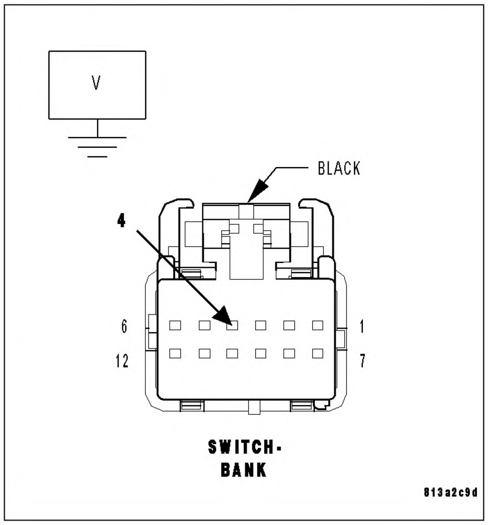
Measure the voltage of the (G104) Passenger Airbag Indicator Driver circuit.

Is there any voltage present?

Yes >> Repair the (G104) Passenger Airbag Indicator Driver circuit for a short to voltage.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4



B1205-PASSENGER AIRBAG INDICATOR CIRCUIT HIGH (CONTINUED)

4. CHECK FOR ACTIVE DTC B1205 PASSENGER AIRBAG INDICATOR CIRCUIT HIGH WITH SWITCH BANK CONNECTOR DISCONNECTED

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Remove the Load Tool ORC Adaptor from the ORC connectors.

Reconnect the ORC C1 and C2 connectors.

Reconnect the OCM C1 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, erase ORC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1205 PASSENGER AIRBAG INDICATOR CIRCUIT HIGH?

Yes >> Go To 5

No >> Replace the Passenger Airbag On/Off Indicator Lamp in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

Repair

Replace the ORC in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1205-PASSENGER AIRBAG INDICATOR CIRCUIT HIGH (CONTINUED)

6. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

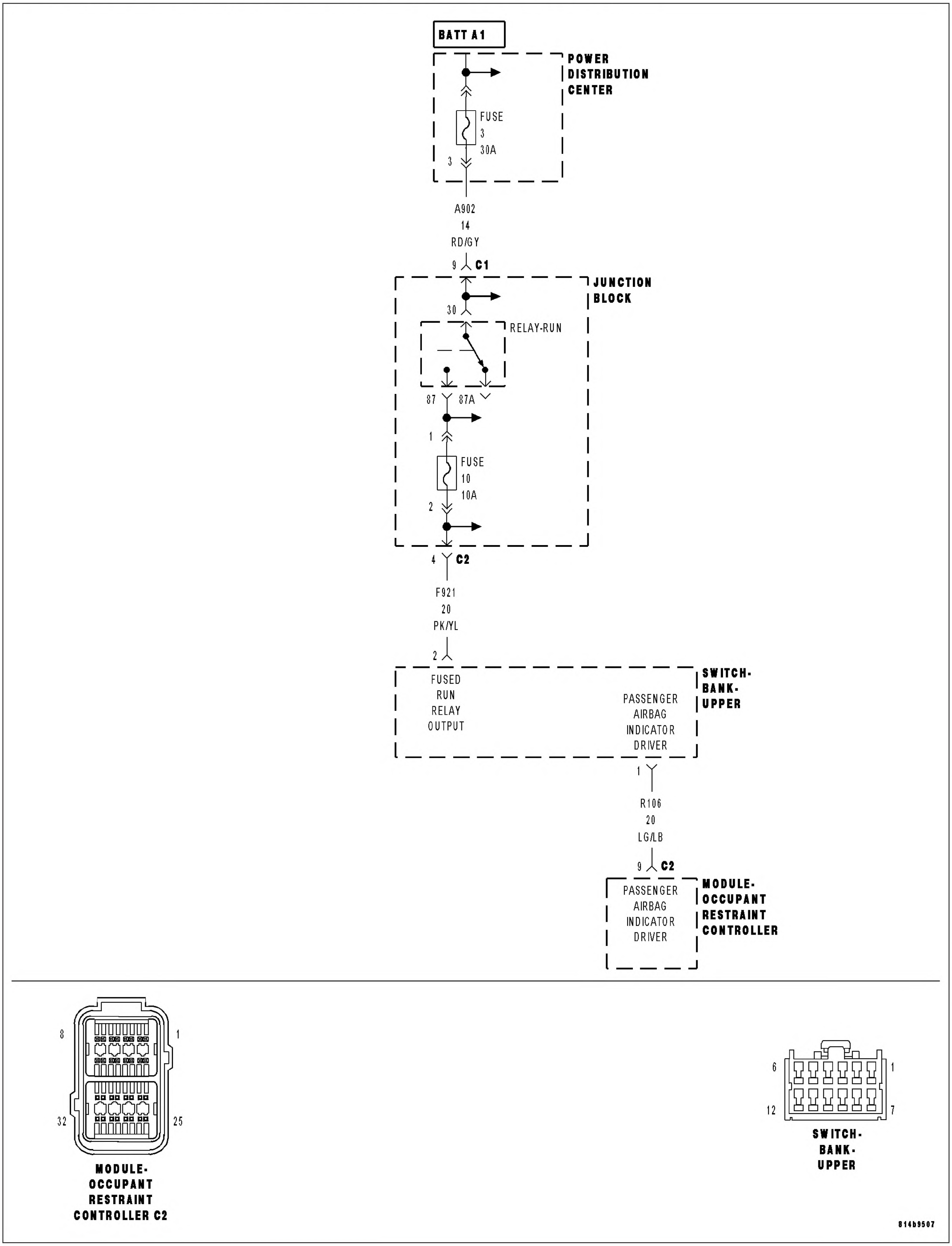
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1206-PASSENGER AIRBAG INDICATOR CIRCUIT OPEN


BATT A1
POWER DISTRIBUTION CENTER
FUSE
3
30A
3
A902
14
RD/GY
9
C1
JUNCTION BLOCK
30
RELAY-RUN
87
87A
1
FUSE
10
10A
2
4
C2
F921
20
PK/YL
2
SWITCH-BANK-UPPER
FUSED RUN RELAY OUTPUT
PASSENGER AIRBAG INDICATOR DRIVER
1
R106
20
LG/LB
9
C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
PASSENGER AIRBAG INDICATOR DRIVER
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
6
1
12
7
SWITCH-BANK-UPPER
814b9507

B1206-PASSENGER AIRBAG INDICATOR CIRCUIT OPEN (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Occupant Restraint Controller (ORC) cannot detect voltage on the (G104) Passenger Airbag Indicator Driver circuit.

Possible Causes
SWITCH BANK CONNECTOR DISCONNECTED
(G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT OPEN
PASSENGER AIRBAG ON/OFF INDICATOR LAMP
ORC

Diagnostic Test

1. VERIFY THAT DTC B1206 PASSENGER AIRBAG INDICATOR CIRCUIT OPEN IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1206 PASSENGER AIRBAG INDICATOR CIRCUIT OPEN?

Yes >> Go To 2

No >> Go To 6

2. VERIFY THAT SWITCH BANK CONNECTOR IS CONNECTED

Turn the ignition off.

Gain access to the Switch Bank connector.

Is the Switch Bank connected to the dash harness?

Yes >> Go To 3

No >> Connect the Switch Bank to the dash harness.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1206-PASSENGER AIRBAG INDICATOR CIRCUIT OPEN (CONTINUED)

3. CHECK (G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT OPERATION

Disconnect the Switch Bank connector.

Connect a Test Light between the (G104) Passenger Airbag Indicator Driver circuit and the (F23) Fused Ignition Switch Output (Run-Start) circuit in the Switch Bank connector.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1206 PASSENGER AIRBAG INDICATOR CIRCUIT OPEN?

Yes >> Go To 4

No >> Replace the Passenger Airbag On/Off Indicator Lamp in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. CHECK (G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT FOR AN OPEN

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

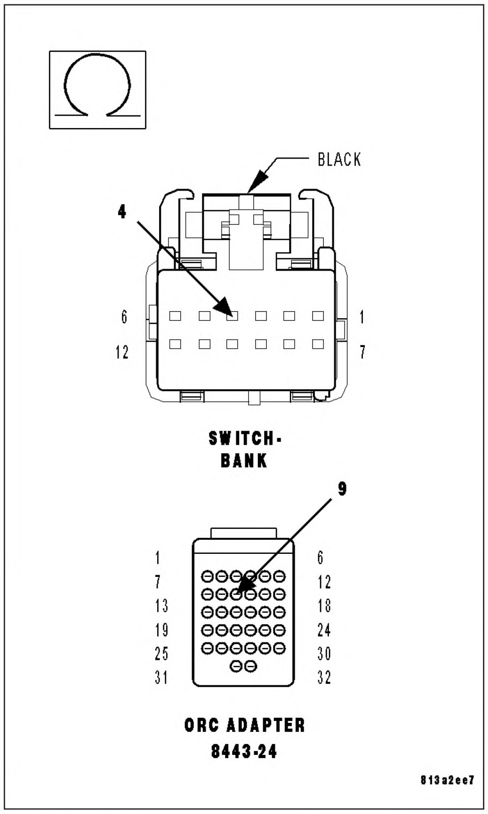
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the ORC C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the appropriate Load Tool ORC Adaptor to the ORC connector.

Measure the resistance of the (G104) Passenger Airbag Indicator Driver circuit between the ORC Adaptor and the Switch Bank connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the (G104) Passenger Airbag Indicator Driver circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1206-PASSENGER AIRBAG INDICATOR CIRCUIT OPEN (CONTINUED)

5. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

Repair

Replace the ORC in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

6. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

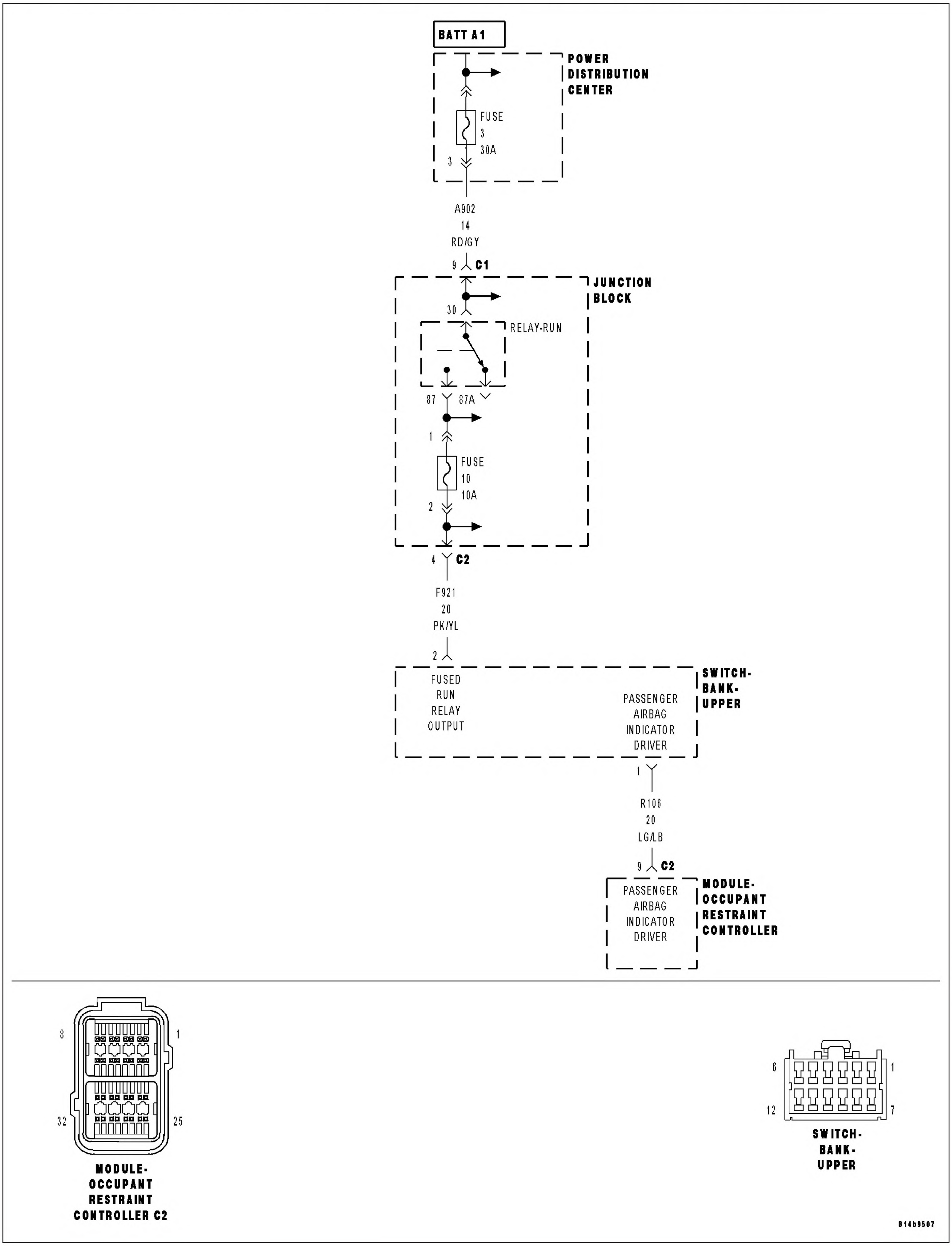
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1207-PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER


BATT A1
POWER DISTRIBUTION CENTER
FUSE
3
30A
3
A902
14
RD/GY
9
C1
JUNCTION BLOCK
30
RELAY-RUN
87
87A
1
FUSE
10
10A
2
4
C2
F921
20
PK/YL
2
SWITCH-BANK-UPPER
FUSED RUN RELAY OUTPUT
PASSENGER AIRBAG INDICATOR DRIVER
1
R106
20
LG/LB
9
C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
PASSENGER AIRBAG INDICATOR DRIVER
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
6
1
12
7
SWITCH-BANK-UPPER
814b9507

B1207-PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Occupant Restraint Controller (ORC) detects over current on the (G104) Passenger Airbag Indicator Driver circuit.

Possible Causes
(G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT SHORTED TO (F23) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT
(G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT SHORTED TO VOLTAGE
PASSENGER AIRBAG ON/OFF INDICATOR LAMP
ORC

Diagnostic Test

1. VERIFY THAT DTC B1207 PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

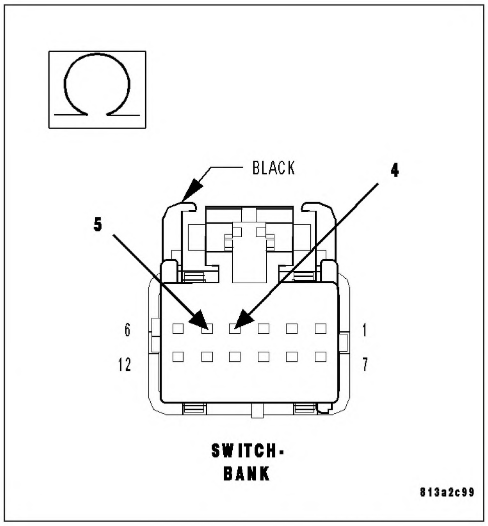
Does the scan tool display active: B1207 PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER?

Yes >> Go To 2

No >> Go To 6

B1207-PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER (CONTINUED)

2. CHECK (G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT FOR A SHORT TO (F23) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT



WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

WARNING: If the Occupant Classification Module (OCM) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Remove the Airbag Run-Start Fuse from the PDC.

Disconnect the ORC C1 and C2 connectors.

Disconnect the OCM C1 connector.

Disconnect the Switch Bank connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the appropriate Load Tool ORC Adaptor to the ORC connectors.

Measure the resistance between the (G104) Passenger Airbag Indicator Driver circuit and the (F23) Fused Ignition Switch Output (Run-Start) circuit in the Switch Bank connector.

Is the resistance below 100.0 ohms?

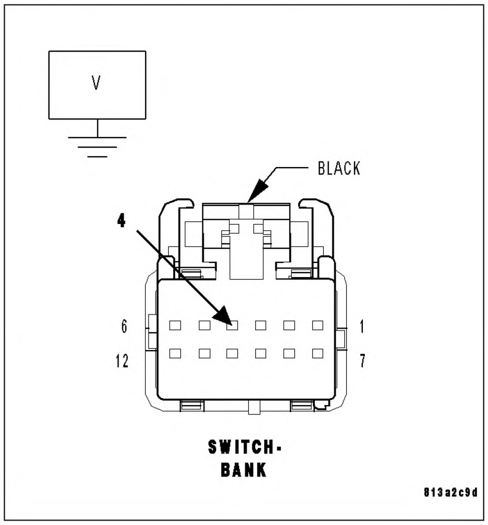
Yes >> Repair the (G104) Passenger Airbag Indicator Driver circuit for a short to the (F23 Fused Ignition Switch Output (Run-Start) circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 3

---

3. CHECK (G104) PASSENGER AIRBAG INDICATOR DRIVER CIRCUIT FOR A SHORT TO VOLTAGE



WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (G104) Passenger Airbag Indicator Driver circuit.

Is there any voltage present?

Yes >> Repair the (G104) Passenger Airbag Indicator Driver circuit for a short to voltage.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1207-PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER (CONTINUED)

4. CHECK FOR ACTIVE DTC B1207 PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER WITH SWITCH BANK CONNECTOR DISCONNECTED

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Remove the Load Tool ORC Adaptor from the ORC connectors.

Reconnect the ORC C1 and C2 connectors.

Reconnect the OCM C1 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, erase ORC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1207 PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER?

Yes >> Go To 5

No >> Replace the Passenger Airbag On/Off Indicator Lamp in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

Repair

Replace the ORC in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1207-PASSENGER AIRBAG INDICATOR CIRCUIT SHORTED TOGETHER (CONTINUED)

6. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

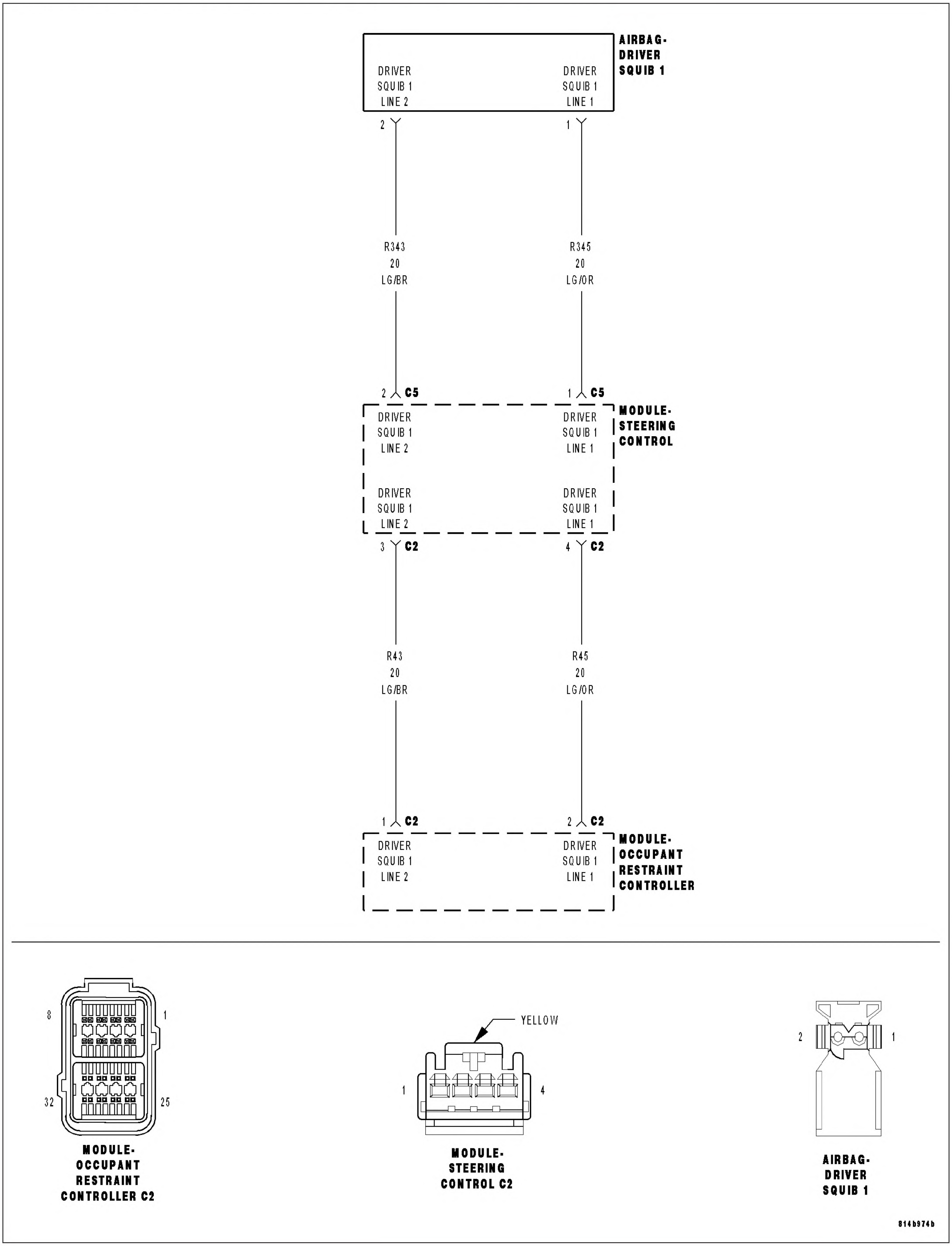
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B00-DRIVER AIRBAG SQUIB 1 CIRCUIT LOW


AIRBAG-DRIVER SQUIB 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
2
1
R343 20 LG/BR
R345 20 LG/OR
2 C5
1 C5
MODULE-STEERING CONTROL
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
3 C2
4 C2
R43 20 LG/BR
R45 20 LG/OR
1 C2
2 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
YELLOW
1
4
MODULE-STEERING CONTROL C2
2
1
AIRBAG-DRIVER SQUIB 1
814b974b

B1B00-DRIVER AIRBAG SQUIB 1 CIRCUIT LOW (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance on the Driver Squib 1 circuits.

Possible Causes
(R43) DRIVER SQUIB 1 LINE 2 CIRCUIT OR (R45) DRIVER SQUIB 1 LINE 1 CIRCUIT SHORTED TO GROUND
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B00-DRIVER AIRBAG SQUIB 1 CIRCUIT LOW (CONTINUED)

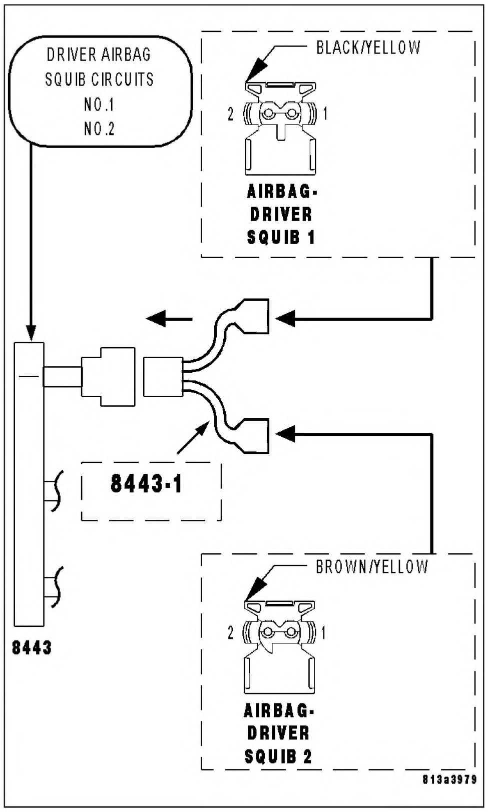
2. CHECK FOR SHORTED SQUIB CIRCUITS IN DRIVER AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.


DRIVER AIRBAG
SQUIB CIRCUITS
NO.1
NO.2
BLACK/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 1
8443-1
8443
BROWN/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 2
813a3979

Does the scan tool display: B1B00 DRIVER AIRBAG SQUIB 1 CIRCUIT LOW?

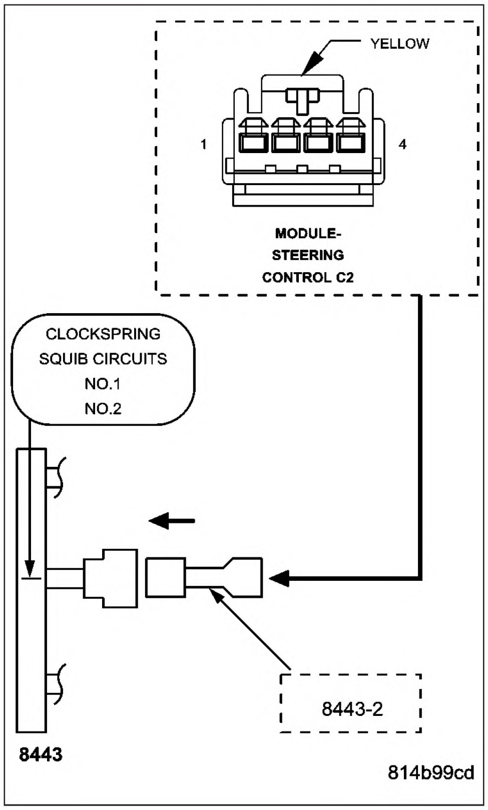
Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B00-DRIVER AIRBAG SQUIB 1 CIRCUIT LOW (CONTINUED)

3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool Jumper from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B00 DRIVER AIRBAG SQUIB 1 CIRCUIT LOW?

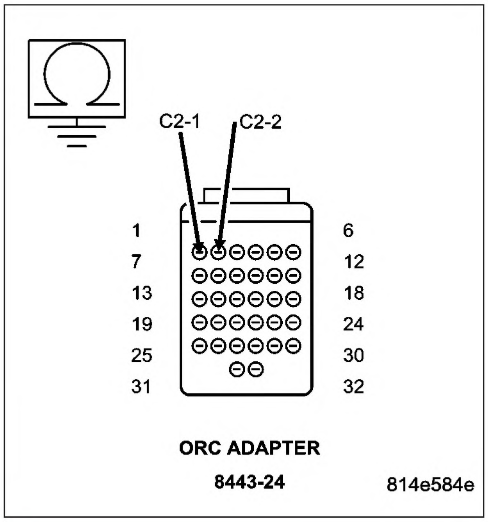
Yes >> Go To 4

No >> Replace the Steering Column Control Module in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. CHECK (R43) DRIVER SQUIB 1 LINE 2 CIRCUIT AND (R45) DRIVER SQUIB 1 LINE 1 CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Steering Control Module C2 connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443–24 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance of the (R43) Driver Squib 1 Line 2 circuit between ground and the adapter.

Measure the resistance of the (R45) Driver Squib 1 Line 1 circuit between ground and the adapter.

Is the resistance below 10K ohms for either measurement?

Yes >> Repair the Driver Squib 1 circuit(s) for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 5

B1B00-DRIVER AIRBAG SQUIB 1 CIRCUIT LOW (CONTINUED)

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

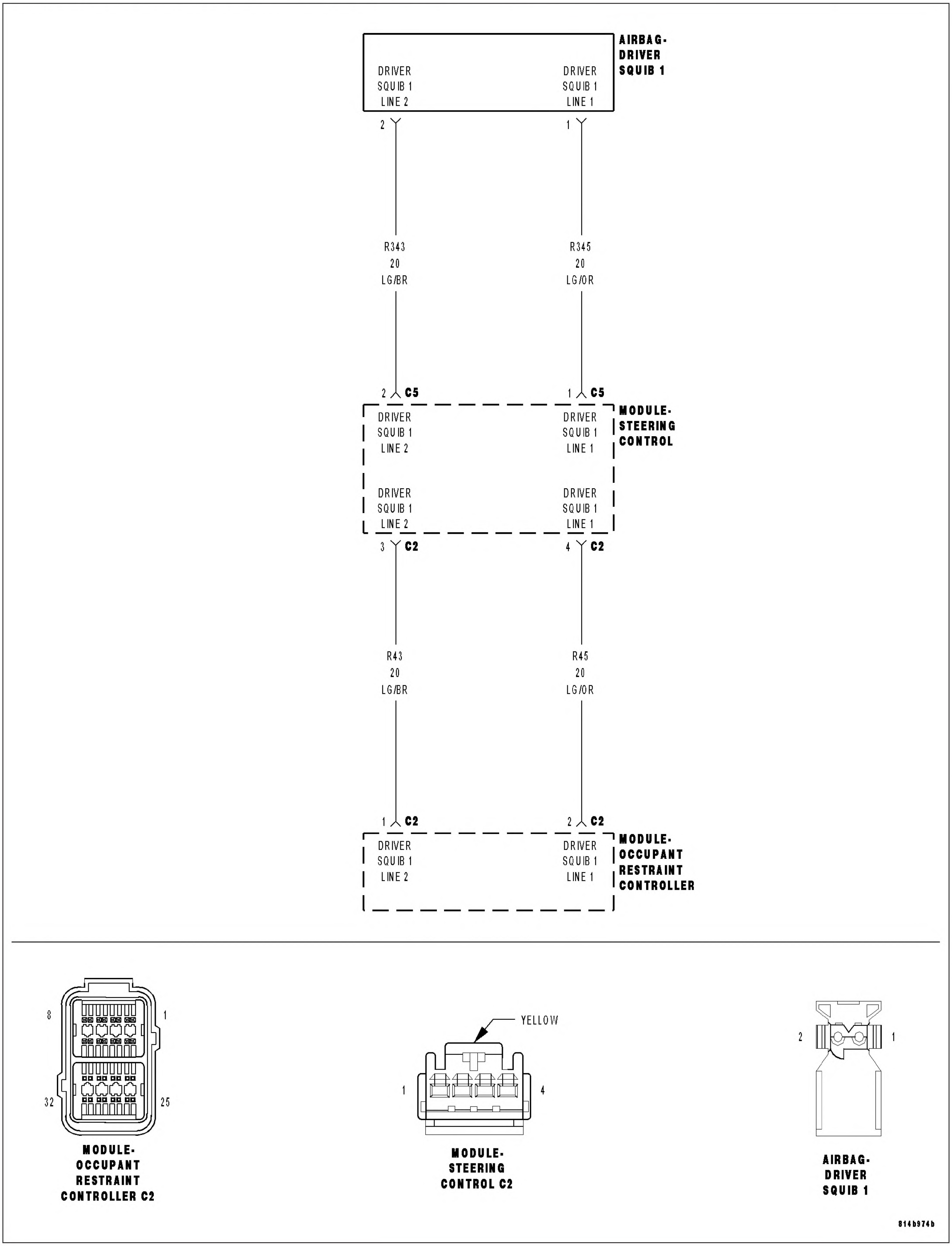
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B01-DRIVER AIRBAG SQUIB 1 CIRCUIT HIGH


AIRBAG-
DRIVER
SQUIB 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
2
1
R343
20
LG/BR
R345
20
LG/OR
2 C5
1 C5
MODULE-
STEERING
CONTROL
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
3 C2
4 C2
R43
20
LG/BR
R45
20
LG/OR
1 C2
2 C2
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
YELLOW
1
4
MODULE-
STEERING
CONTROL C2
2
1
AIRBAG-
DRIVER
SQUIB 1
814b974b

B1B01-DRIVER AIRBAG SQUIB 1 CIRCUIT HIGH (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage on the Driver Squib 1 circuits.
- **Set Condition:**
  The ORC has detected voltage on the Driver Squib 1 circuits.

Possible Causes
(R43) DRIVER SQUIB 1 LINE 2 CIRCUIT OR (R45) DRIVER SQUIB 1 LINE 1 CIRCUIT SHORTED TO BATTERY
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

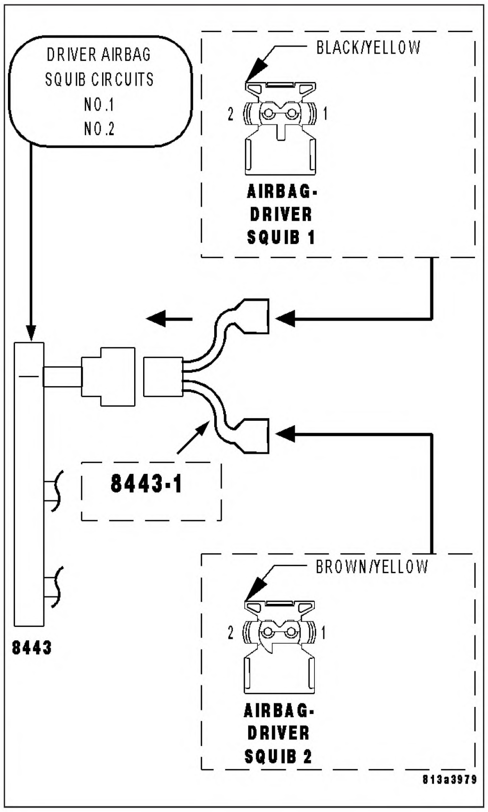
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B01-DRIVER AIRBAG SQUIB 1 CIRCUIT HIGH (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN DRIVER AIRBAG


DRIVER AIRBAG SQUIB CIRCUITS NO.1 NO.2
BLACK/YELLOW
2
1
AIRBAG-DRIVER SQUIB 1
8443-1
BROWN/YELLOW
2
1
AIRBAG-DRIVER SQUIB 2
8443
813a3979

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B01 DRIVER AIRBAG SQUIB 1 CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B01-DRIVER AIRBAG SQUIB 1 CIRCUIT HIGH (CONTINUED)

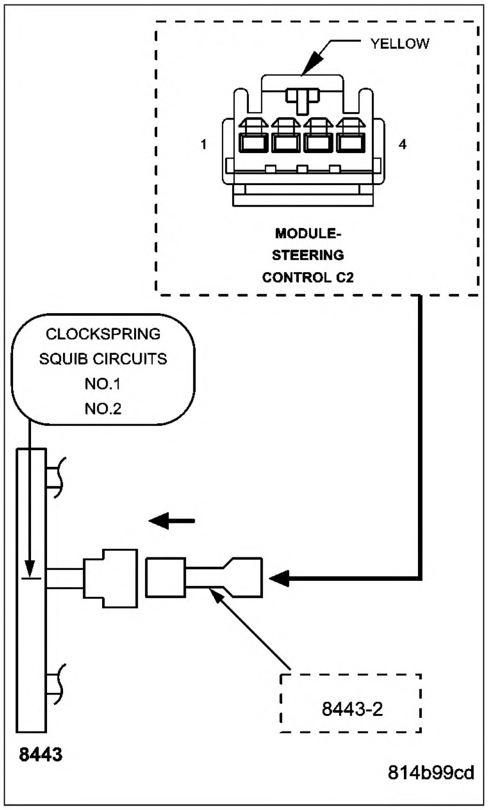
3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR A SHORT TO BATTERY

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module C2 connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.



Does the scan tool display: B1B01 DRIVER AIRBAG SQUIB 1 CIRCUIT HIGH?

Yes >> Go To 4

No >> Replace the Steering Control Module in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. CHECK (R43) DRIVER SQUIB 1 LINE 2 CIRCUIT AND (R45) DRIVER SQUIB 1 LINE 1 CIRCUIT FOR A SHORT TO BATTERY

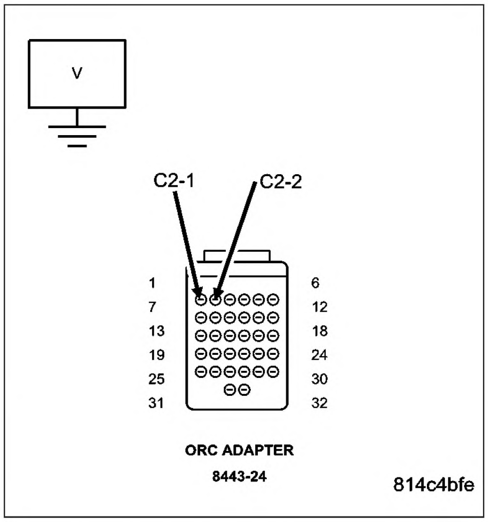
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Steering Control Module connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (R43) Driver Squib 1 Line 2 circuit between the adapter and ground.

Measure the voltage of the (R45) Driver Squib 1 Line 1 circuit between the adapter connector and ground.



Is there any voltage present for either measurement?

Yes >> Repair the Driver Squib 1 circuit(s) for a short to Battery.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 5

B1B01-DRIVER AIRBAG SQUIB 1 CIRCUIT HIGH (CONTINUED)

5. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

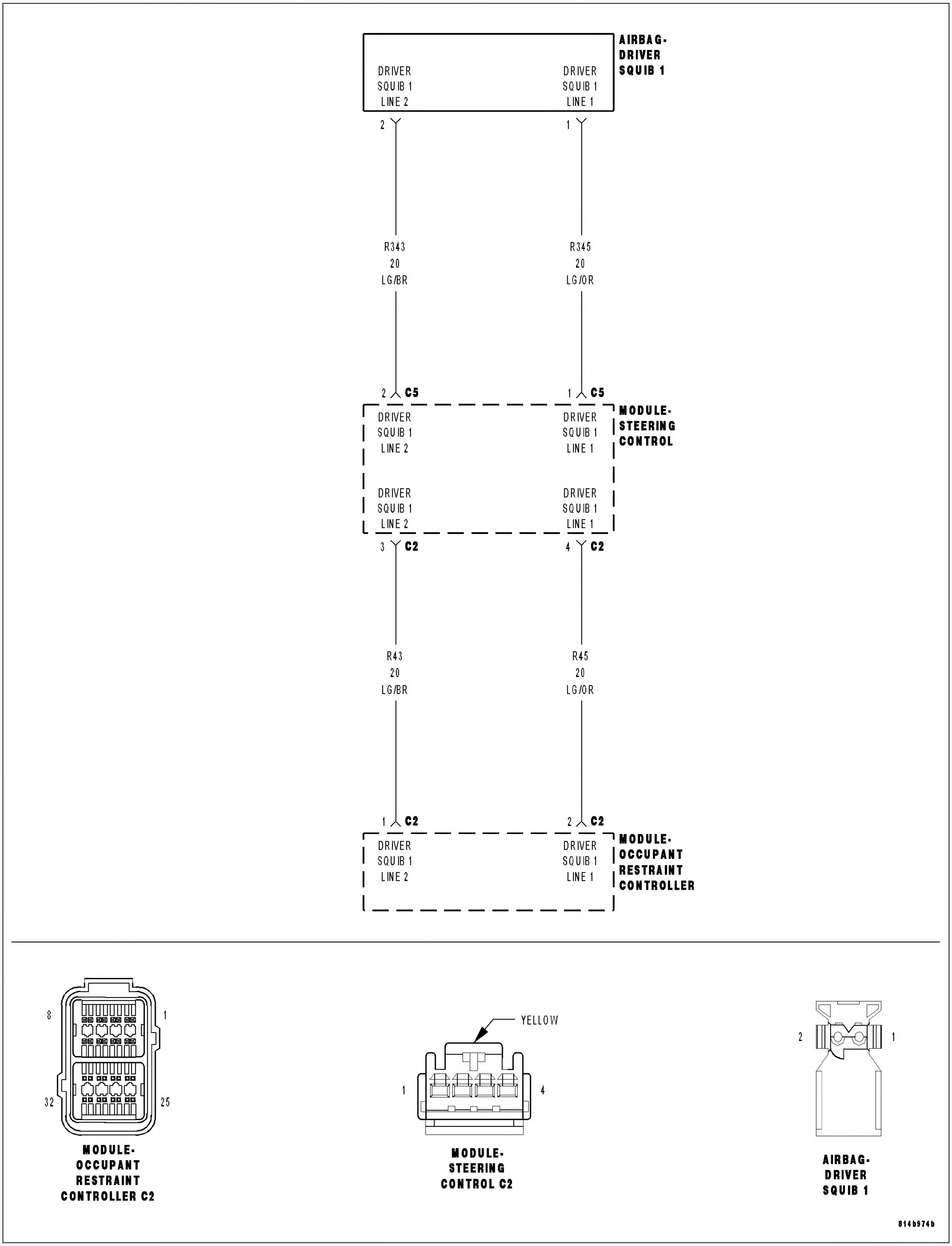
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC's in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B02-DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN


AIRBAG-DRIVER SQUIB 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
2
1
R343 20 LG/BR
R345 20 LG/OR
2 C5
1 C5
MODULE-STEERING CONTROL
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
3 C2
4 C2
R43 20 LG/BR
R45 20 LG/OR
1 C2
2 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
YELLOW
1
4
MODULE-STEERING CONTROL C2
2
1
AIRBAG-DRIVER SQUIB 1
814b974b

B1B02-DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Squib 1 circuits.
- **Set Condition:**
  The ORC has detected an open or high resistance on the Driver Squib 1 circuits.

Possible Causes
(R43) DRIVER SQUIB 1 LINE 2 CIRCUIT OPEN
(R45) DRIVER SQUIB 1 LINE 1 CIRCUIT OPEN
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

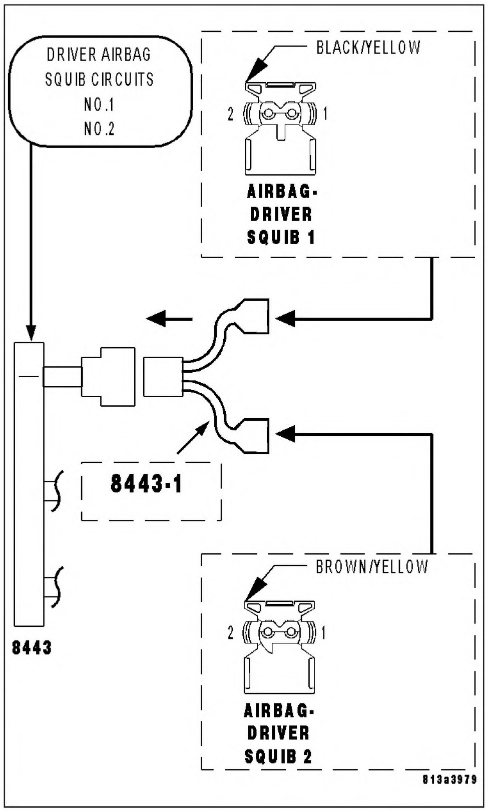
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 7

B1B02-DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

2. CHECK FOR OPEN SQUIB CIRCUITS IN DRIVER AIRBAG


DRIVER AIRBAG
SQUIB CIRCUITS
NO.1
NO.2
BLACK/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 1
8443-1
8443
BROWN/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 2
813a3979

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding. Disconnect the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B02 DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN?

Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B02-DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

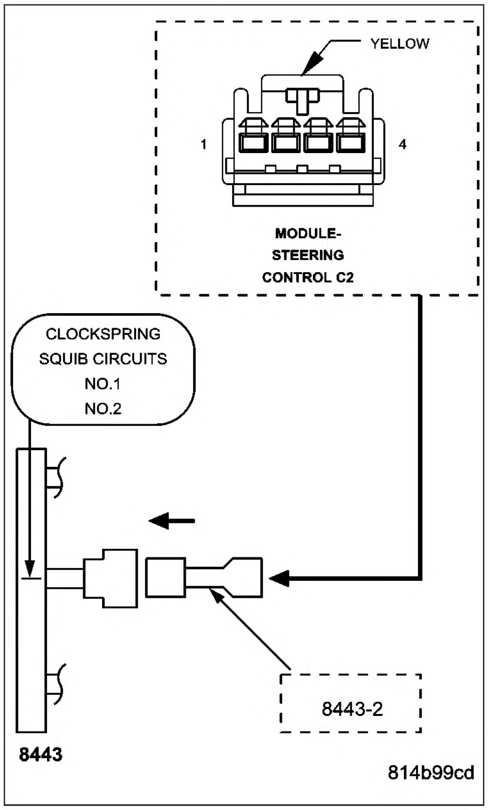
3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module C2 connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.


YELLOW
1
4
MODULE-
STEERING
CONTROL C2
CLOCKSPRING
SQUIB CIRCUITS
NO.1
NO.2
8443-2
8443
814b99cd

Does the scan tool display: B1B02 DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN?

Yes >> Go To 4

No >> Replace the Steering Control Module in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

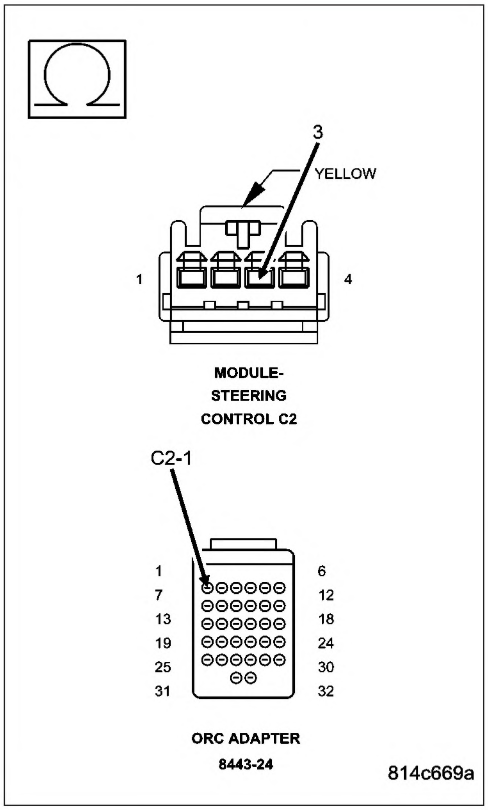
4. CHECK (R43) DRIVER SQUIB 1 LINE 2 CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Steering Control Module connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443–24 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance of the (R43) Driver Squib 1 Line 2 circuit between the Steering Control Module connector and the ORC Load Tool Adaptor.


Ω
3
YELLOW
1
4
MODULE-
STEERING
CONTROL C2
C2-1
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
814c669a

Is the resistance below 1.0 ohm?

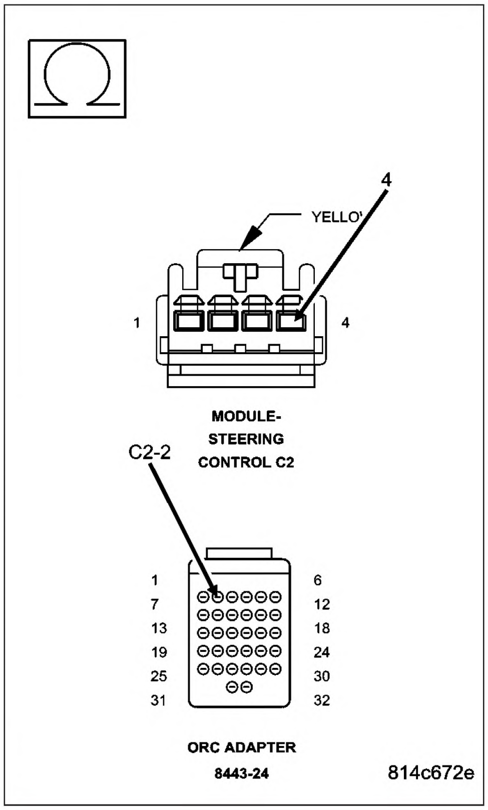
Yes >> Go To 5

No >> Repair the (R43) Driver Squib 1 Line 2 circuit for an open.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B02-DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

5. CHECK (R45) DRIVER SQUIB 1 LINE 1 CIRCUIT FOR AN OPEN

Measure the resistance of the (R45) Driver Squib 1 Line 1 circuit between the Steering Control Module connector and the ORC Load Tool Adaptor.



Is the resistance below 1.0 ohm?

Yes >> Go To 6

No >> Repair the (R45) Driver Squib 1 Line 1 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

6. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B02-DRIVER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

7. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

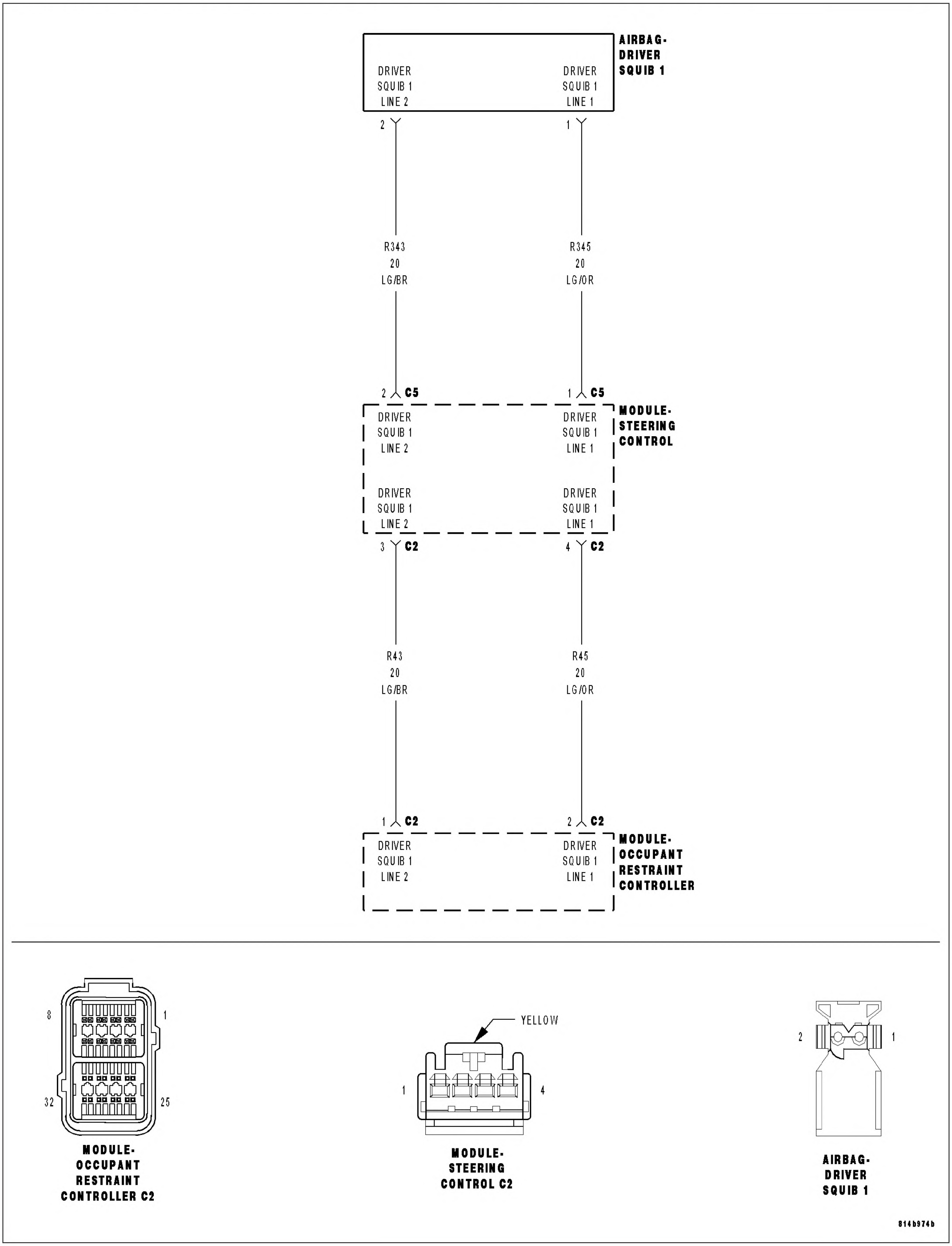
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B03-DRIVER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER


AIRBAG-
DRIVER
SQUIB 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
2
1
R343
20
LG/BR
R345
20
LG/OR
2 C5
1 C5
MODULE-
STEERING
CONTROL
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
3 C2
4 C2
R43
20
LG/BR
R45
20
LG/OR
1 C2
2 C2
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
YELLOW
1
4
MODULE-
STEERING
CONTROL C2
2
1
AIRBAG-
DRIVER
SQUIB 1
814b974b

B1B03-DRIVER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Driver Squib 1 circuits.

Possible Causes
(R43) DRIVER SQUIB 1 LINE 2 CIRCUIT SHORTED TO (R45) DRIVER SQUIB 1 LINE 1 CIRCUIT
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

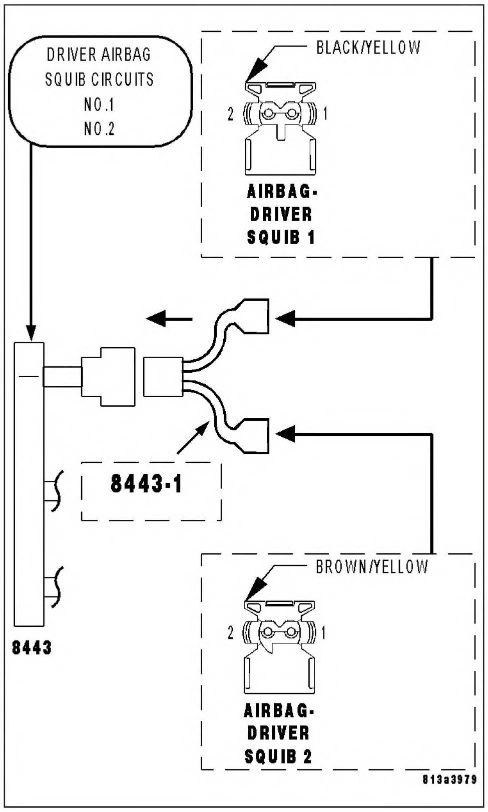
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B03-DRIVER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN DRIVER AIRBAG


DRIVER AIRBAG
SQUIB CIRCUITS
NO.1
NO.2
BLACK/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 1
8443-1
8443
BROWN/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 2
813a3979

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

Disconnect the Driver Airbag Squib connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B03 DRIVER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER?

Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B03-DRIVER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

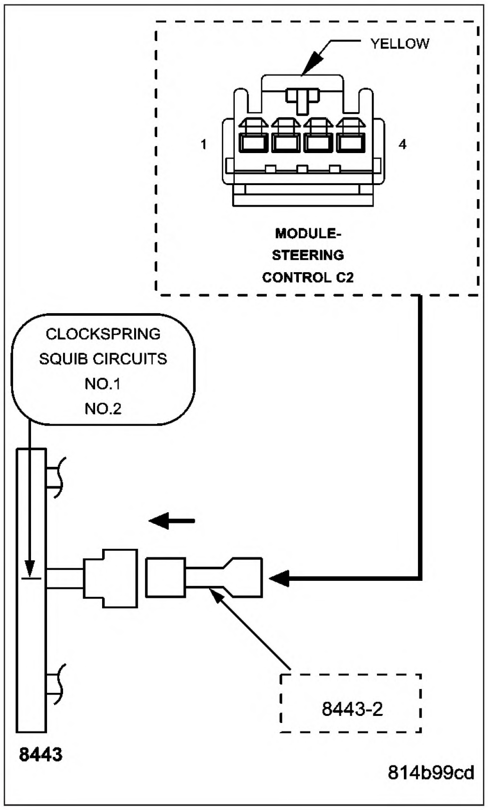
3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR A SHORT TOGETHER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool ORC from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module connector.

NOTE: Check connectors - Clean and repair as necessary.
With the Steering Control Module Connector attached to the steering column, connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC’s.



Does the scan tool display: B1B03 DRIVER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER?

Yes >> Go To 4

No >> Replace the Steering Control Module in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

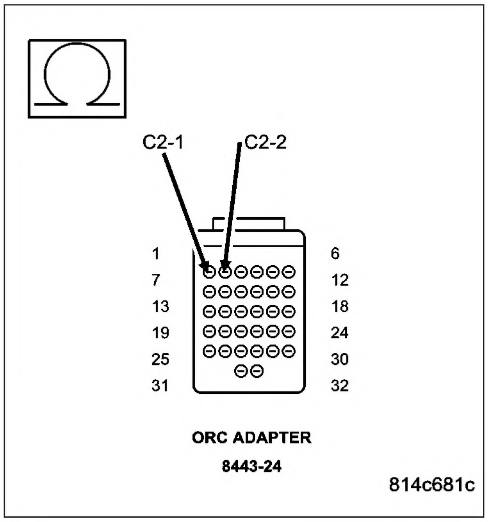
4. CHECK (R43) DRIVER SQUIB 1 LINE 2 CIRCUIT FOR A SHORT TO (R45) DRIVER SQUIB 1 LINE 1 CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Steering Control Module connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance between the (R43) Driver Squib 1 Line 2 circuit and the (R45) Driver Squib 1 Line 1 circuit at the adapter connector.



Is the resistance below 10K ohms?

Yes >> Repair the (R43) Driver Squib 1 Line 2 circuit for a short to the (R45) Driver Squib 1 Line 1 circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 5

B1B03-DRIVER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

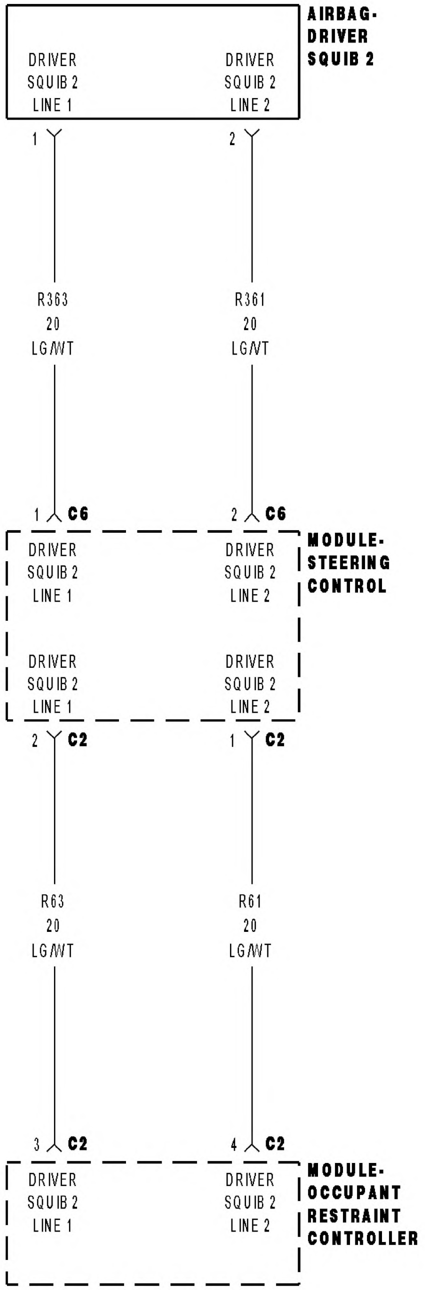
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

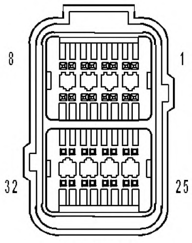
Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

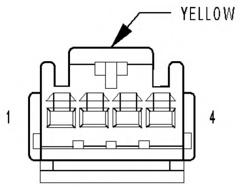
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B04-DRIVER AIRBAG SQUIB 2 CIRCUIT LOW

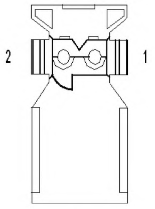

AIRBAG-
DRIVER
SQUIB 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
1
2
R363
20
LG/WT
R361
20
LG/WT
1 C6
2 C6
MODULE-
STEERING
CONTROL
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
2 C2
1 C2
R63
20
LG/WT
R61
20
LG/WT
3 C2
4 C2
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2



**MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2**



**MODULE-
STEERING
CONTROL C2**



**AIRBAG-
DRIVER
SQUIB 2**

814c6be6

B1B04-DRIVER AIRBAG SQUIB 2 CIRCUIT LOW (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Squib 2 circuits.
- **Set Condition:**
  The ORC has detected low resistance on the Driver Squib 2 circuits.

Possible Causes
(R63) DRIVER SQUIB 2 LINE 1 CIRCUIT OR (R61) DRIVER SQUIB 2 LINE 2 CIRCUIT SHORTED TO GROUND
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

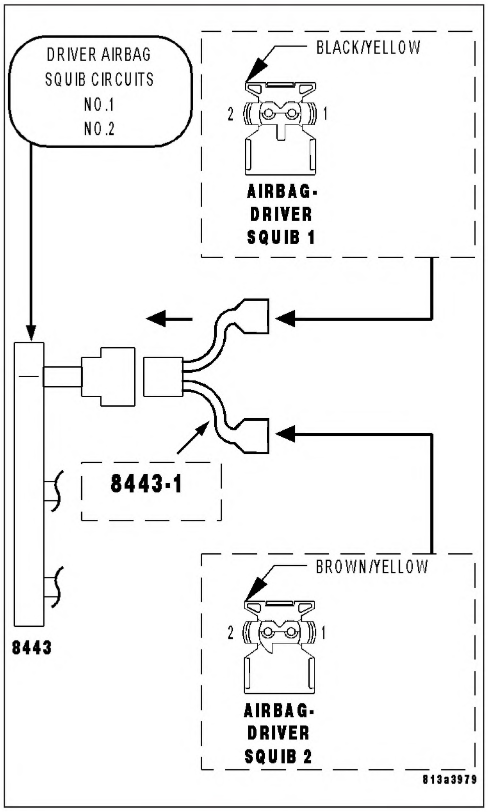
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B04-DRIVER AIRBAG SQUIB 2 CIRCUIT LOW (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN DRIVER AIRBAG


DRIVER AIRBAG
SQUIB CIRCUITS
NO.1
NO.2
BLACK/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 1
8443-1
8443
BROWN/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 2
813a3979

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B04 DRIVER AIRBAG SQUIB 2 CIRCUIT LOW?

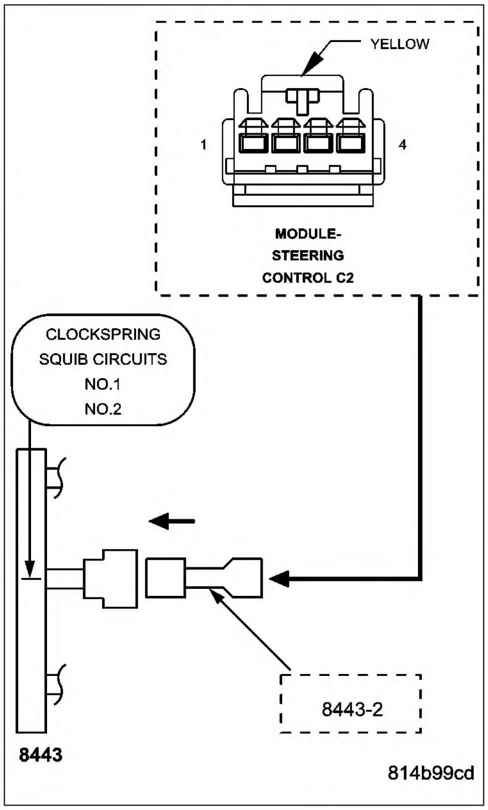
Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR A SHORT TO GROUND


YELLOW
1
4
MODULE-
STEERING
CONTROL C2
CLOCKSPRING
SQUIB CIRCUITS
NO.1
NO.2
8443-2
8443
814b99cd

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool Jumper from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module C2 connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B04 DRIVER AIRBAG SQUIB 2 CIRCUIT LOW?

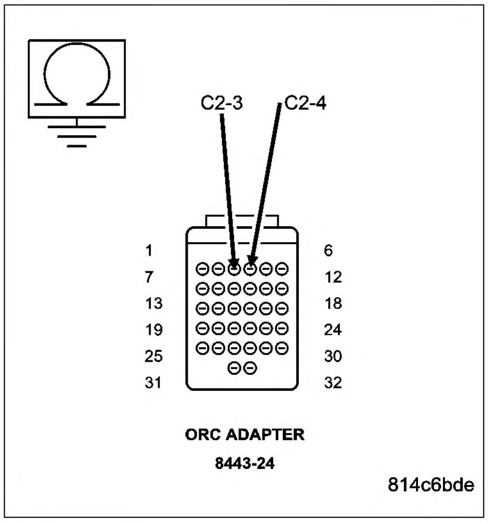
Yes >> Go To 4

No >> Replace the Steering Control Module in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B04-DRIVER AIRBAG SQUIB 2 CIRCUIT LOW (CONTINUED)

4. CHECK (R63) DRIVER SQUIB 2 LINE 1 CIRCUIT AND (R61) DRIVER SQUIB 2 LINE 2 CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Steering Control Module connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance of the (R63) Driver Squib 2 Line 1 circuit between ground and the adaptor.

Measure the resistance of the (R61) Driver Squib 2 Line 2 circuit between ground and the adaptor.

Is the resistance below 10K ohms for either measurement?

Yes >> Repair the Driver Squib 2 circuit(s) for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 5

---

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B04-DRIVER AIRBAG SQUIB 2 CIRCUIT LOW (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

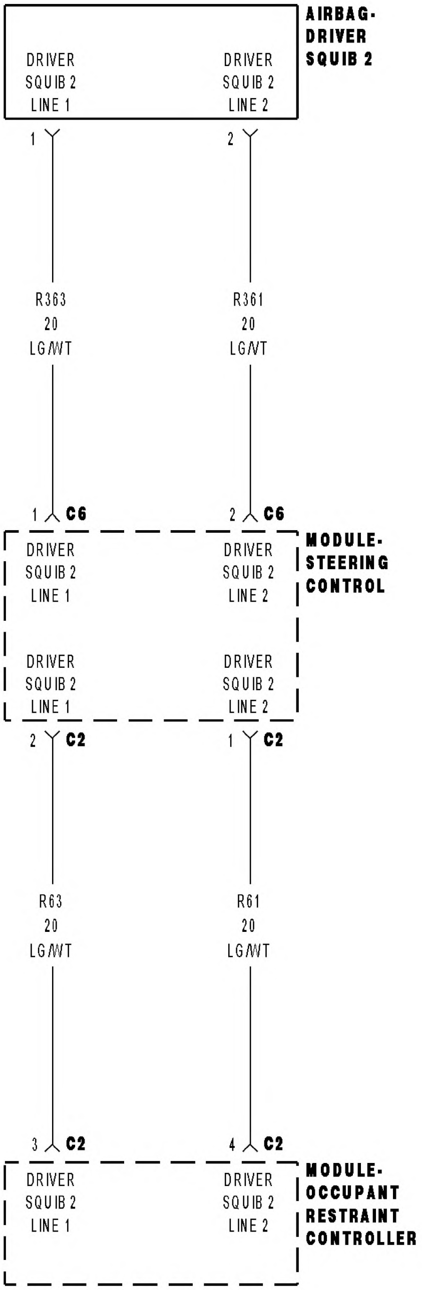
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

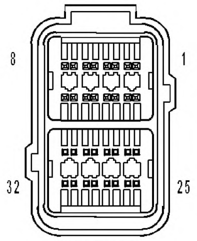
Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

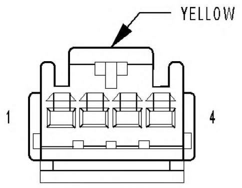
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B05-DRIVER AIRBAG SQUIB 2 CIRCUIT HIGH

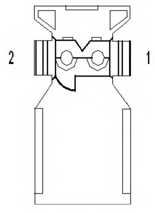

AIRBAG-
DRIVER
SQUIB 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
1
2
R363
20
LG/WT
R361
20
LG/WT
1 C6
2 C6
MODULE-
STEERING
CONTROL
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
2 C2
1 C2
R63
20
LG/WT
R61
20
LG/WT
3 C2
4 C2
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2



**MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2**



**MODULE-
STEERING
CONTROL C2**



**AIRBAG-
DRIVER
SQUIB 2**

814c6be6

B1B05-DRIVER AIRBAG SQUIB 2 CIRCUIT HIGH (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage on the Driver Squib 2 circuits.
- **Set Condition:**
  The ORC has detected voltage on the Driver Squib 2 circuits.

Possible Causes
(R63) DRIVER SQUIB 2 LINE 1 CIRCUIT OR (R61) DRIVER SQUIB 2 LINE 2 CIRCUIT SHORTED TO BATTERY
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The Scan Tool, SRS Airbag Load Tool MRL 8443 and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

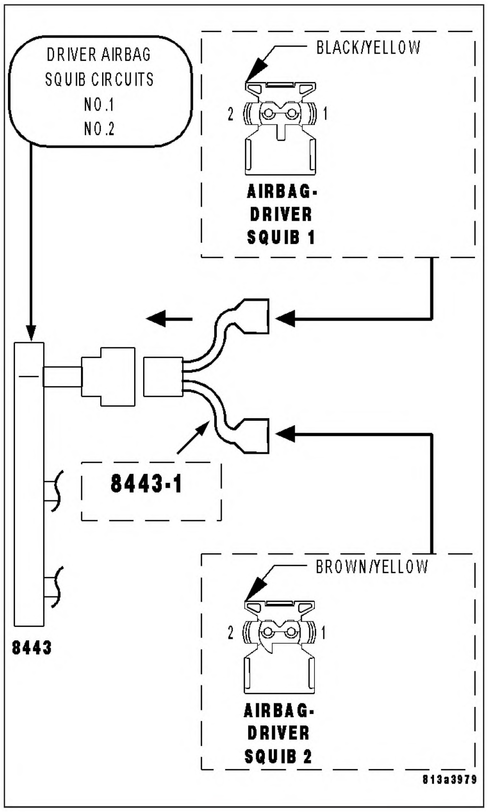
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B05-DRIVER AIRBAG SQUIB 2 CIRCUIT HIGH (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN DRIVER AIRBAG


DRIVER AIRBAG SQUIB CIRCUITS NO.1 NO.2
BLACK/YELLOW
2
1
AIRBAG-DRIVER SQUIB 1
8443-1
BROWN/YELLOW
2
1
AIRBAG-DRIVER SQUIB 2
8443
813a3979

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B05 DRIVER AIRBAG SQUIB 2 CIRCUIT HIGH?

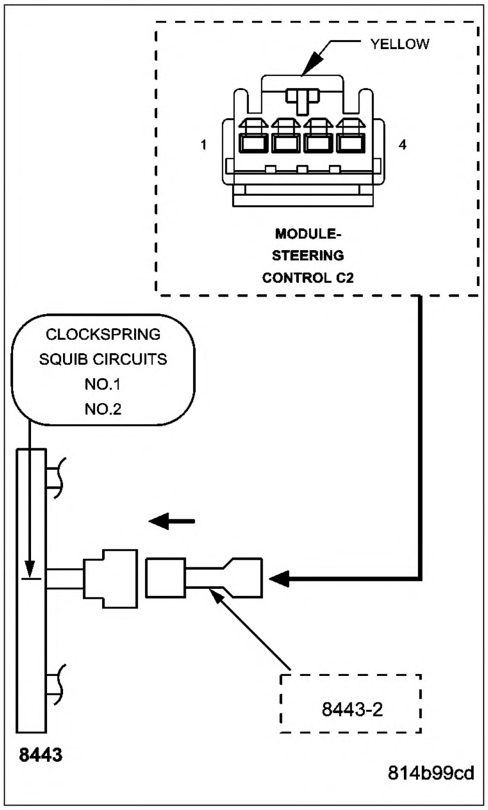
Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR A SHORT TO BATTERY


YELLOW
1
4
MODULE-STEERING CONTROL C2
CLOCKSPRING SQUIB CIRCUITS NO.1 NO.2
8443-2
8443
814b99cd

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module C2 connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B05 DRIVER AIRBAG SQUIB 2 CIRCUIT HIGH?

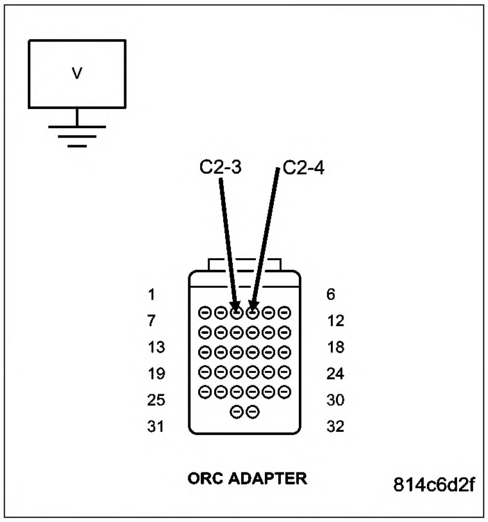
Yes >> Go To 4

No >> Replace the Steering Control Module in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B05-DRIVER AIRBAG SQUIB 2 CIRCUIT HIGH (CONTINUED)

4. CHECK (R63) DRIVER SQUIB 2 LINE 1 CIRCUIT AND (R61) DRIVER SQUIB 2 LINE 2 CIRCUIT FOR A SHORT TO BATTERY



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Steering Control Module connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R63) Driver Squib 2 Line 1 circuit between the Steering Control Module connector and ground.

Measure the voltage of the (R61) Driver Squib 2 Line 2 circuit between the Steering Control Module connector and ground.

Is there any voltage present for either measurement?

Yes >> Repair the Driver Squib 2 circuit(s) for a short to Battery.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 5

---

5. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B05-DRIVER AIRBAG SQUIB 2 CIRCUIT HIGH (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

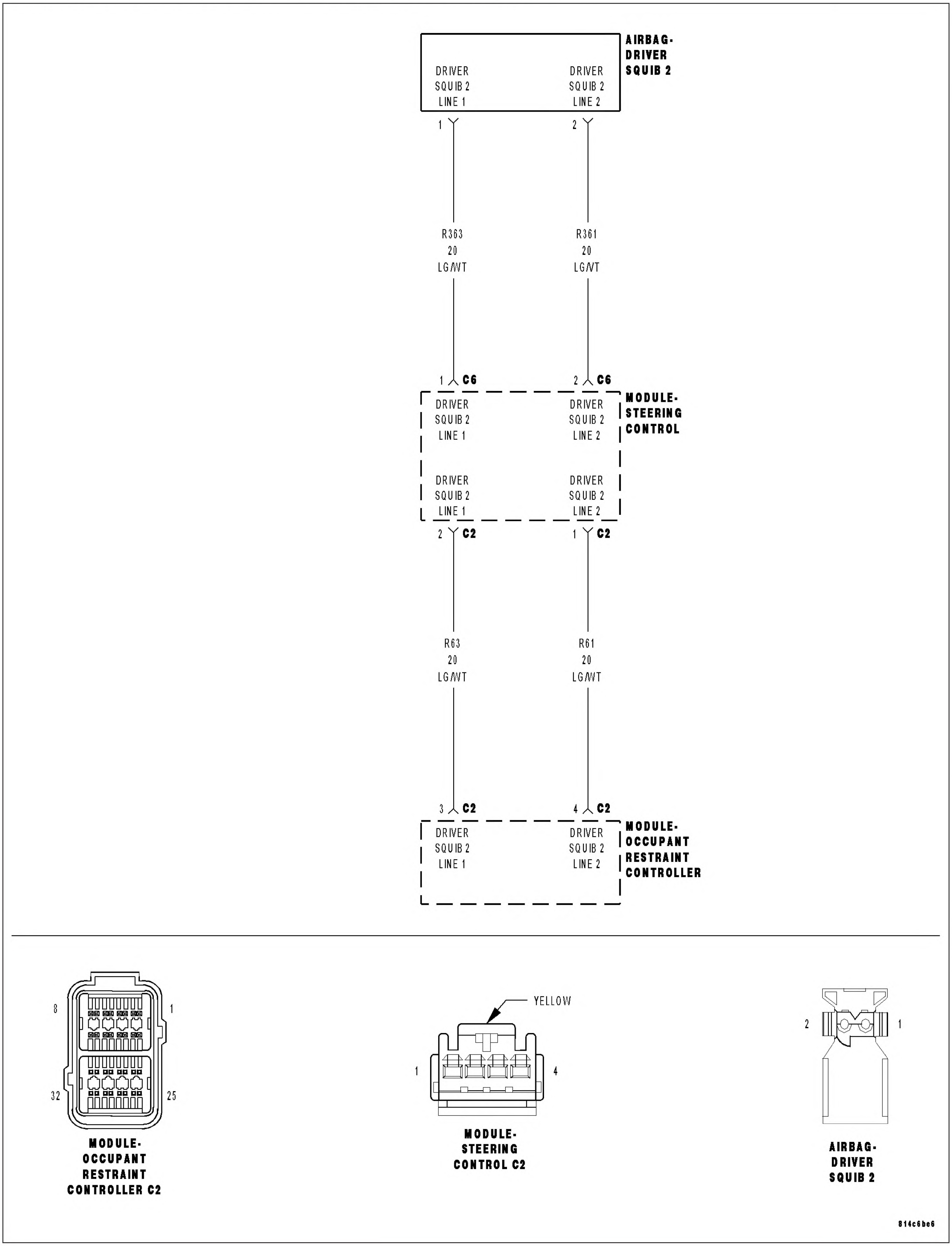
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC's in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B06-DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN


AIRBAG-
DRIVER
SQUIB 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
1
2
R363
20
LG/WT
R361
20
LG/WT
1 C6
2 C6
MODULE-
STEERING
CONTROL
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
2 C2
1 C2
R63
20
LG/WT
R61
20
LG/WT
3 C2
4 C2
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
YELLOW
1
4
MODULE-
STEERING
CONTROL C2
2
1
AIRBAG-
DRIVER
SQUIB 2
814c6be6

B1B06-DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Squib 2 circuits.
- **Set Condition:**
  The ORC has detected an open or high resistance on the Driver Squib 2 circuits.

Possible Causes
(R63) DRIVER SQUIB 2 LINE 1 CIRCUIT OPEN
(R61) DRIVER SQUIB 2 LINE 2 CIRCUIT OPEN
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

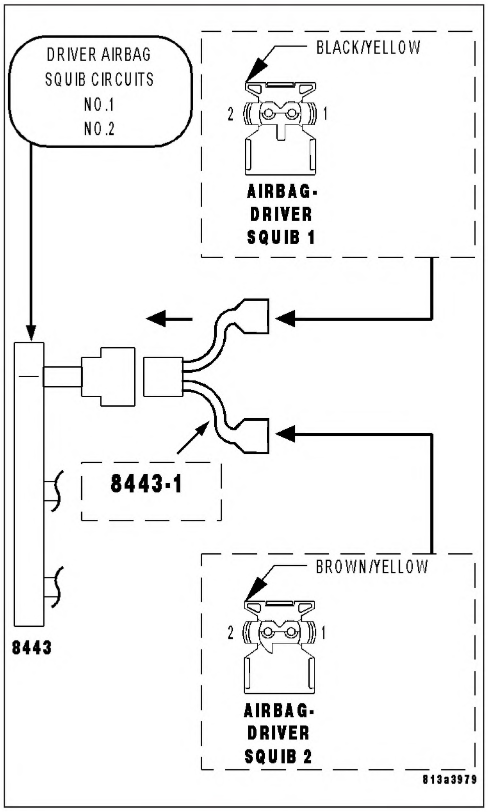
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 7

B1B06-DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

2. CHECK FOR OPEN SQUIB CIRCUITS IN DRIVER AIRBAG


DRIVER AIRBAG
SQUIB CIRCUITS
NO.1
NO.2
BLACK/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 1
8443-1
8443
BROWN/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 2
813a3979

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B06 DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN?

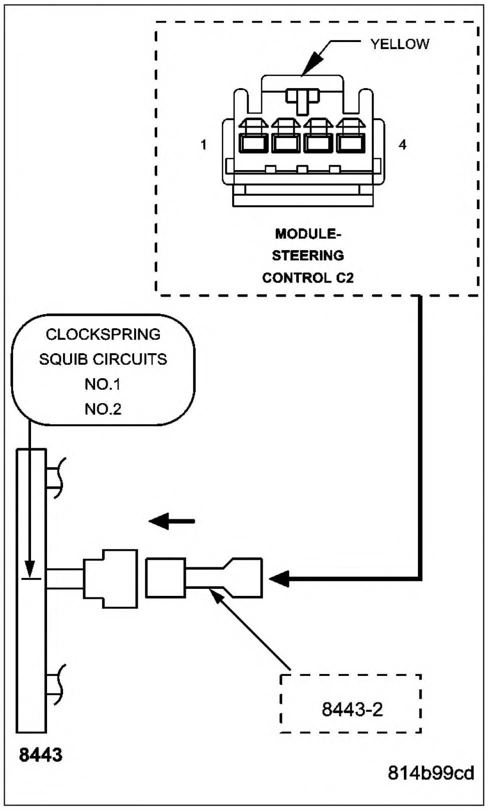
Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR AN OPEN


YELLOW
1
4
MODULE-
STEERING
CONTROL C2
CLOCKSPRING
SQUIB CIRCUITS
NO.1
NO.2
8443-2
8443
814b99cd

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B06 DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN?

Yes >> Go To 4

No >> Replace the Steering Control Module in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B06-DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

4. CHECK (R63) DRIVER SQUIB 2 LINE 1 CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

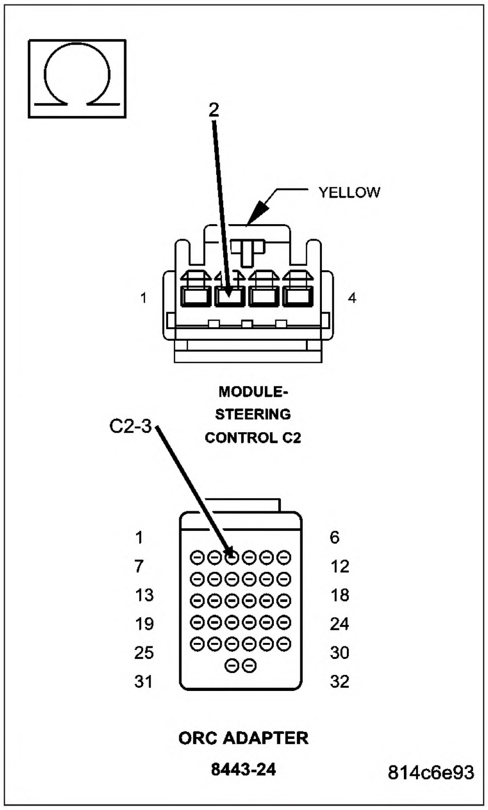
Disconnect the 8443 Load Tool and Jumper from the Steering Control Module connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance of the (R63) Driver Squib 2 Line 1 circuit between the adaptor connector and the ORC Load Tool Adaptor.


Ω
2
YELLOW
1
4
MODULE-
STEERING
CONTROL C2
C2-3
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
814c6e93

Is the resistance below 1.0 ohm?

Yes >> Go To 5

No >> Repair the (R63) Driver Squib 2 Line 1 circuit for an open-.Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B06-DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

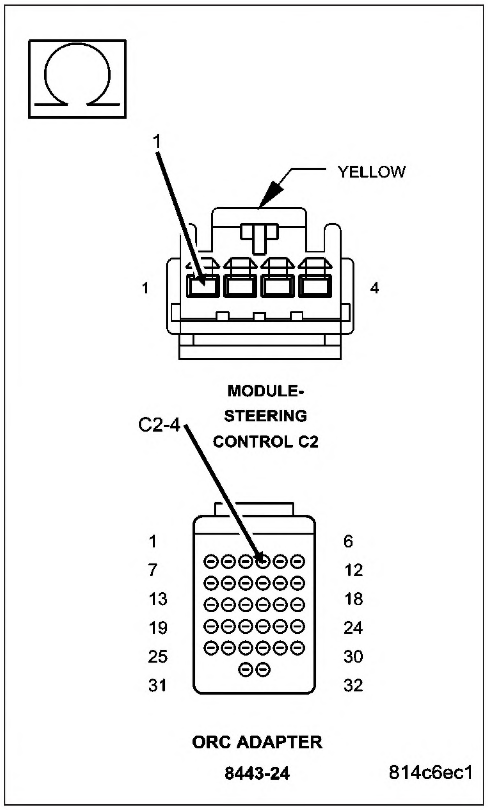
5. CHECK (R61) DRIVER SQUIB 2 LINE 2 CIRCUIT FOR AN OPEN

Measure the resistance of the (R61) Driver Squib 2 Line 2 circuit between the Steering Control Module connector and the ORC Load Tool Adaptor.

Is the resistance below 1.0 ohm?

Yes >> Go To 6

No >> Repair the (R61) Driver Squib 2 Line 2 circuit for an open.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)



---

6. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B06-DRIVER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

7. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

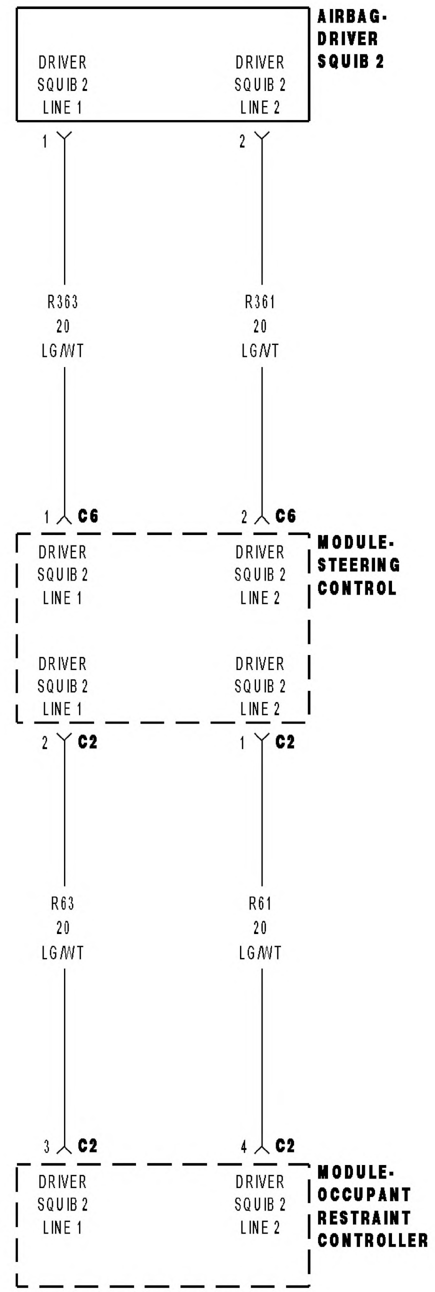
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

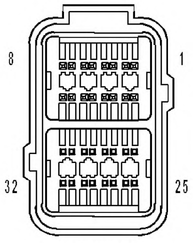
Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

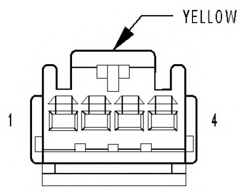
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B07-DRIVER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER

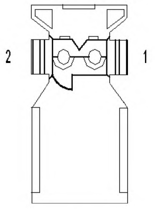

AIRBAG-
DRIVER
SQUIB 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
1
2
R363
20
LG/WT
R361
20
LG/WT
1 C6
2 C6
MODULE-
STEERING
CONTROL
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
2 C2
1 C2
R63
20
LG/WT
R61
20
LG/WT
3 C2
4 C2
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2



MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2



MODULE-
STEERING
CONTROL C2



AIRBAG-
DRIVER
SQUIB 2

814c6be6

B1B07-DRIVER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Squib 2 circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Driver Squib 2 circuits.

Possible Causes
(R63) DRIVER SQUIB 2 LINE 1 CIRCUIT SHORTED TO (R61) DRIVER SQUIB 2 LINE 2 CIRCUIT
STEERING CONTROL MODULE
DRIVER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The Scan Tool, SRS Airbag Load Tool MRL 8443 and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

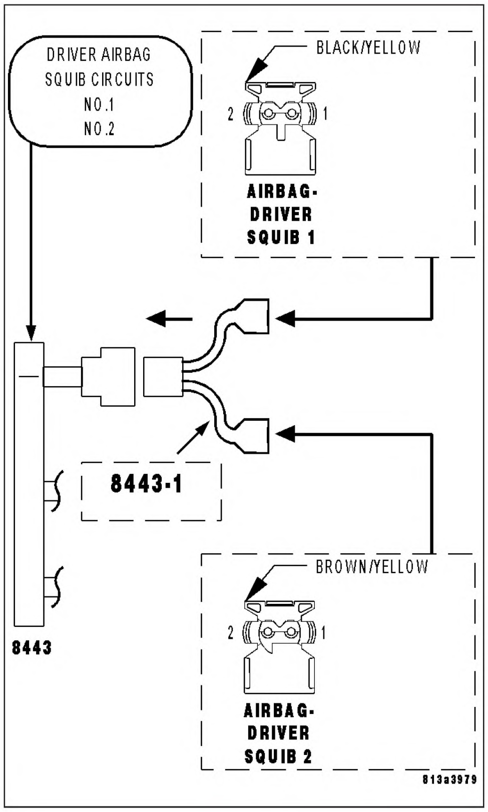
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B07-DRIVER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN DRIVER AIRBAG


DRIVER AIRBAG
SQUIB CIRCUITS
NO.1
NO.2
BLACK/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 1
8443-1
8443
BROWN/YELLOW
2
1
AIRBAG-
DRIVER
SQUIB 2
813a3979

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

Disconnect the Driver Airbag Squib connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Driver Airbag Squib connectors.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B07 DRIVER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER?

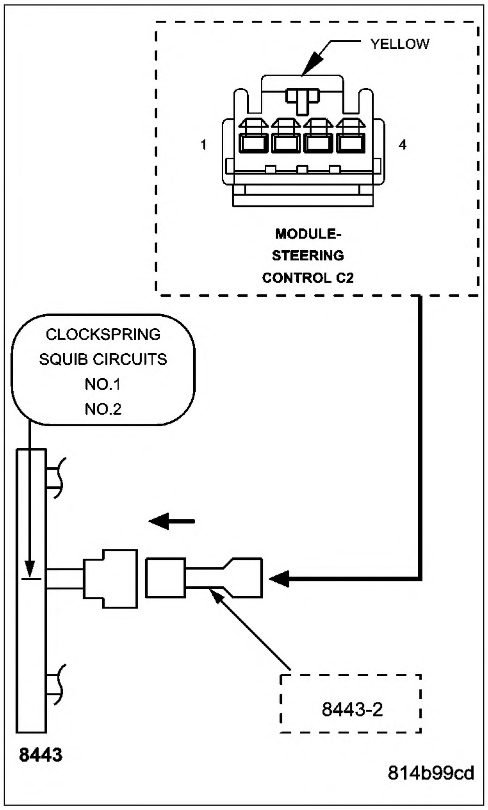
Yes >> Go To 3

No >> Replace the Driver Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK CLOCKSPRING SQUIB CIRCUITS FOR A SHORT TOGETHER


YELLOW
1
4
MODULE-
STEERING
CONTROL C2
CLOCKSPRING
SQUIB CIRCUITS
NO.1
NO.2
8443-2
8443
814b99cd

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool ORC from the Driver Airbag Squib connectors.

Disconnect the Steering Control Module C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Steering Control Module connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B07 DRIVER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER?

Yes >> Go To 4

No >> Replace the Steering Control Module in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B07-DRIVER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER (CONTINUED)

4. CHECK (R63) DRIVER SQUIB 2 LINE 1 CIRCUIT FOR A SHORT TO (R61) DRIVER SQUIB 2 LINE 2 CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

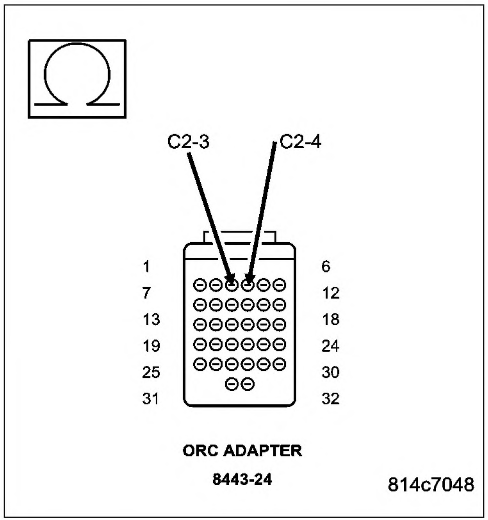
Disconnect the 8443 Load Tool and Jumper from the Steering Control Module connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance between the (R63) Driver Squib 2 Line 1 circuit and the (R61) Driver Squib 2 Line 2 circuit at the adaptor.



Is the resistance below 10K ohms?

Yes >> Repair the (R63) Driver Squib 2 Line 1 circuit for a short to the (R61) Driver Squib 2 Line 2 circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 5

---

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B07-DRIVER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

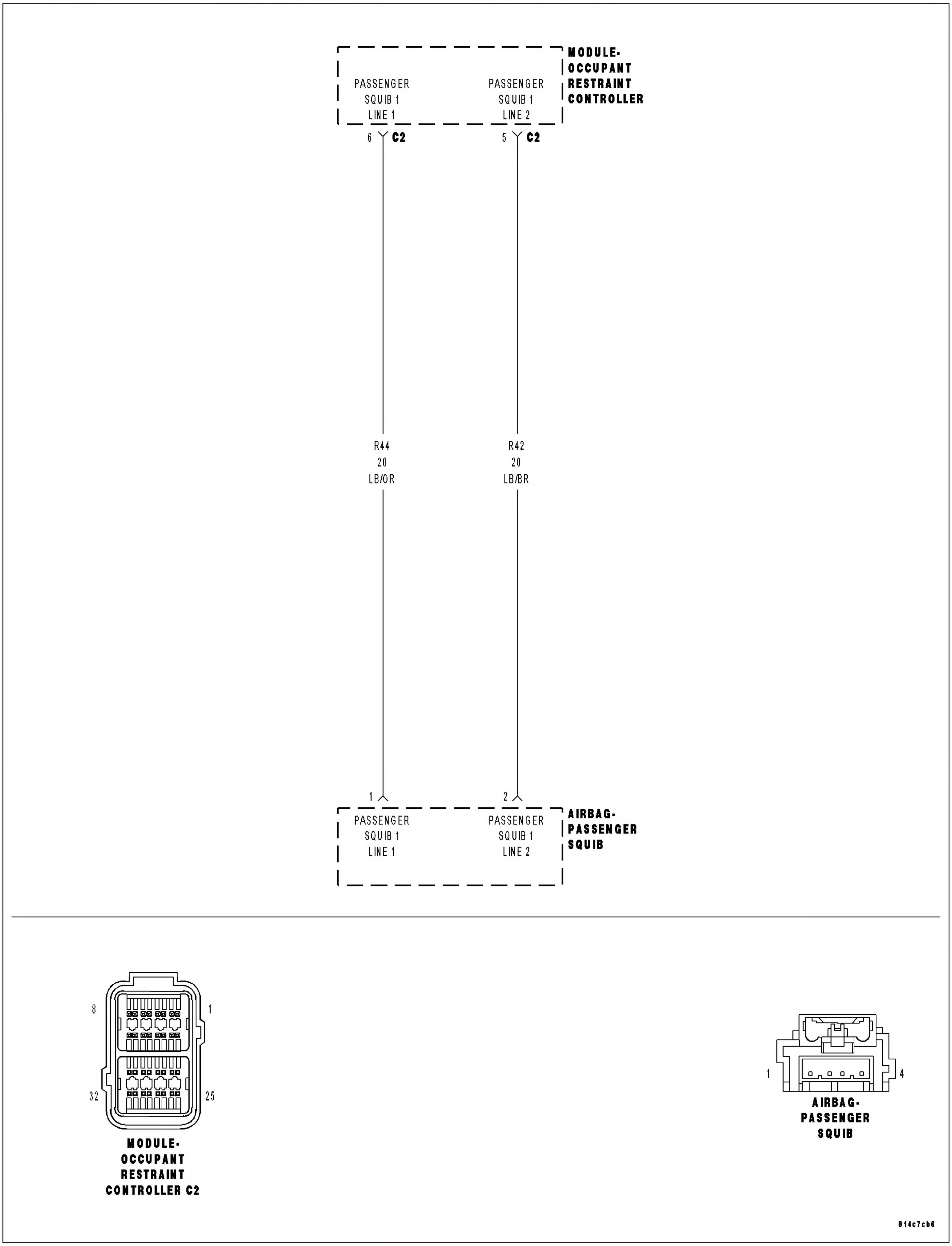
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B08-PASSENGER AIRBAG SQUIB 1 CIRCUIT LOW


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
6
C2
5
C2
R44
20
LB/OR
R42
20
LB/BR
1
2
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
AIRBAG-
PASSENGER
SQUIB
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
1
4
AIRBAG-
PASSENGER
SQUIB
814c7cb6

B1B08-PASSENGER AIRBAG SQUIB 1 CIRCUIT LOW (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance on the Passenger Squib 1 circuits.

Possible Causes
(R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT OR (R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT SHORTED TO GROUND
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

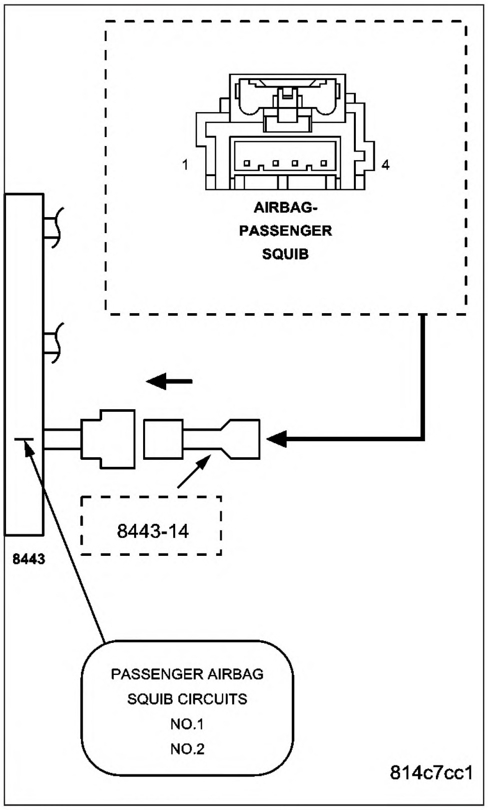
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B08-PASSENGER AIRBAG SQUIB 1 CIRCUIT LOW (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN PASSENGER AIRBAG



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B08 PASSENGER AIRBAG SQUIB 1 CIRCUIT LOW?

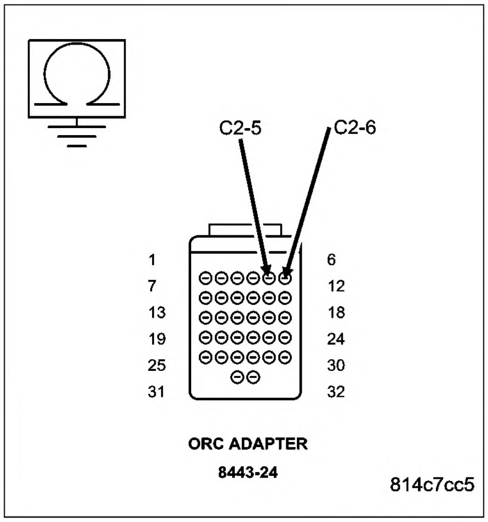
Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT AND (R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance of the (R42) Passenger Squib 1 Line 2 circuit between ground and the adaptor.

Measure the resistance of the (R44) Passenger Squib 1 Line 1 circuit between ground and the adaptor.

Is the resistance below 10K ohms on either circuit?

Yes >> Repair the Passenger Squib 1 circuit(s) for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B08-PASSENGER AIRBAG SQUIB 1 CIRCUIT LOW (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

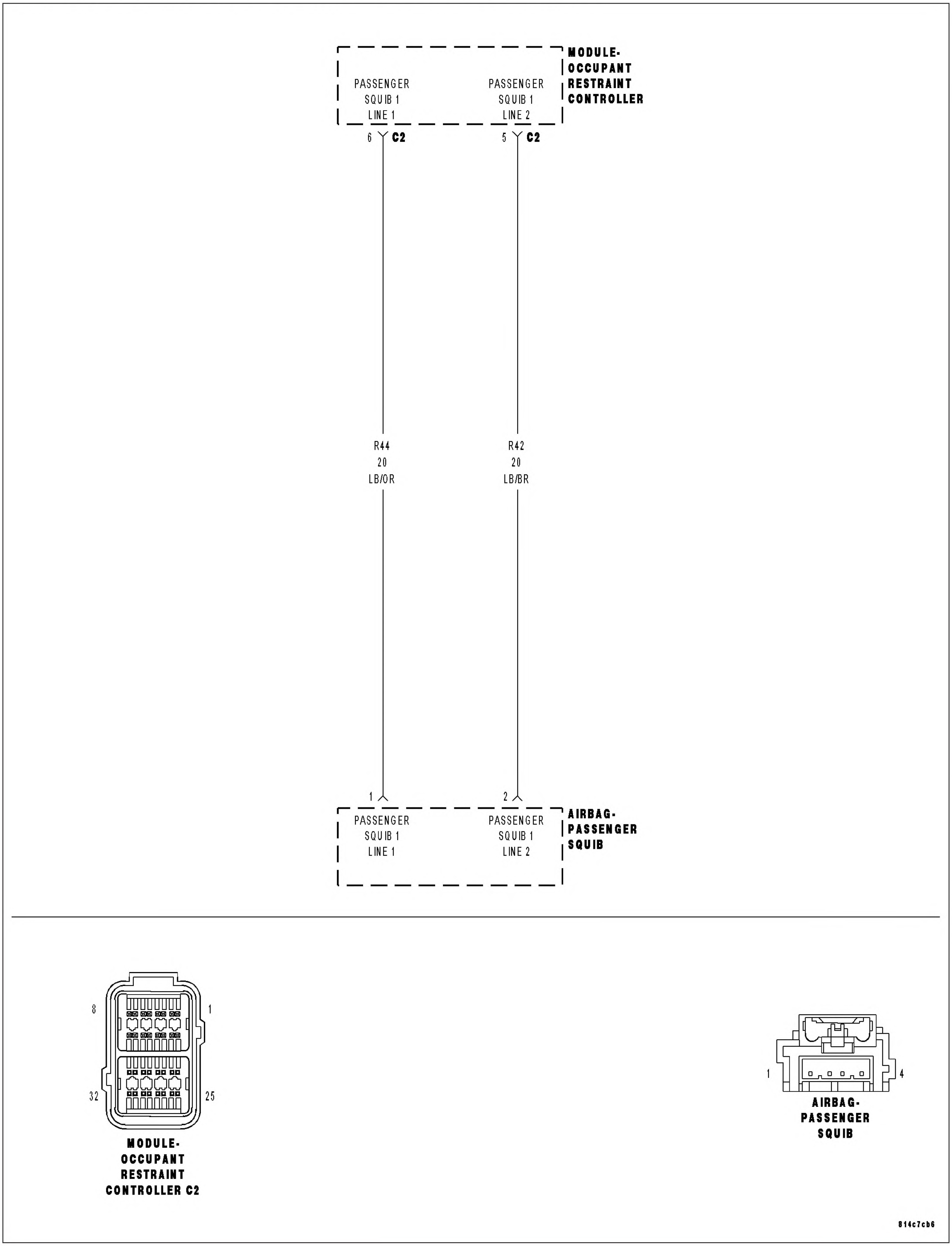
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B09-PASSENGER AIRBAG SQUIB 1 CIRCUIT HIGH


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
6
C2
5
C2
R44
20
LB/OR
R42
20
LB/BR
1
2
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
AIRBAG-
PASSENGER
SQUIB
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
1
4
AIRBAG-
PASSENGER
SQUIB
814c7cb6

B1B09-PASSENGER AIRBAG SQUIB 1 CIRCUIT HIGH (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage on the Passenger Squib 1 circuits.
- **Set Condition:**
  When the ORC has detected voltage on the Passenger Squib 1 circuits.

Possible Causes
(R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT OR (R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT SHORTED TO BATTERY
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B09-PASSENGER AIRBAG SQUIB 1 CIRCUIT HIGH (CONTINUED)

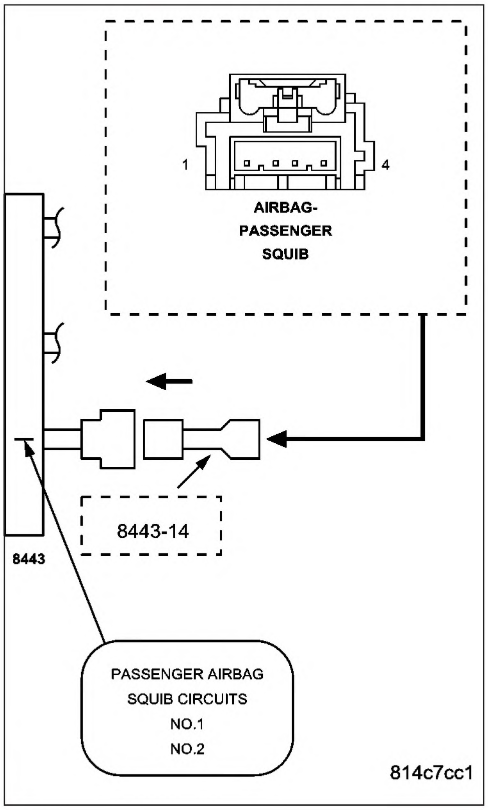
2. CHECK FOR SHORTED SQUIB CIRCUITS IN PASSENGER AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.



Does the scan tool display: B1B09 PASSENGER AIRBAG SQUIB 1 CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT AND (R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT FOR A SHORT TO BATTERY

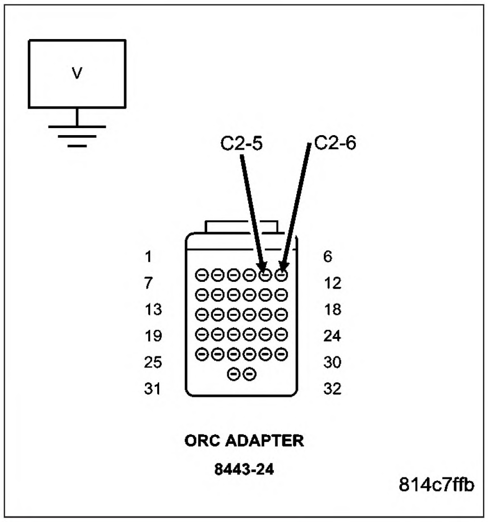
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the voltage of the (R42) Passenger Squib 1 Line 2 circuit between the adaptor and ground.

Measure the voltage of the (R44) Passenger Squib 1 Line 1 circuit between the adaptor and ground.



Is there any voltage present on either circuit?

Yes >> Repair the Passenger Squib 1 circuit(s) for a short to battery.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B09-PASSENGER AIRBAG SQUIB 1 CIRCUIT HIGH (CONTINUED)

4. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

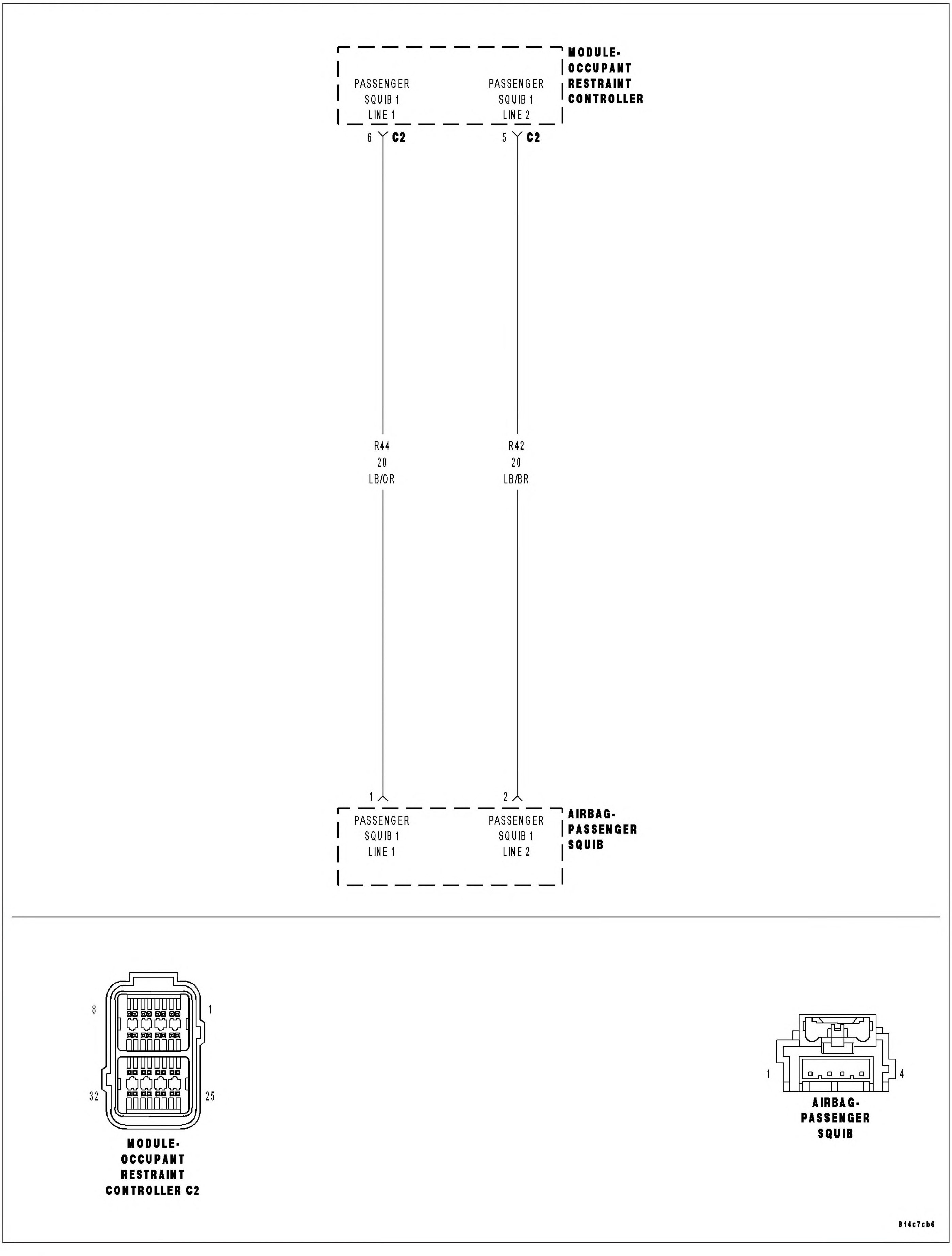
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B0A-PASSENGER AIRBAG SQUIB 1 CIRCUIT OPEN


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
6 C2
5 C2
R44
20
LB/OR
R42
20
LB/BR
1
2
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
AIRBAG-
PASSENGER
SQUIB
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
1
4
AIRBAG-
PASSENGER
SQUIB
814c7cb6

B1B0A-PASSENGER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Squib 1 circuits.
- **Set Condition:**
  The ORC has detected an open or high resistance on the Passenger Squib 1 circuits.

Possible Causes
(R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT OPEN
(R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT OPEN
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

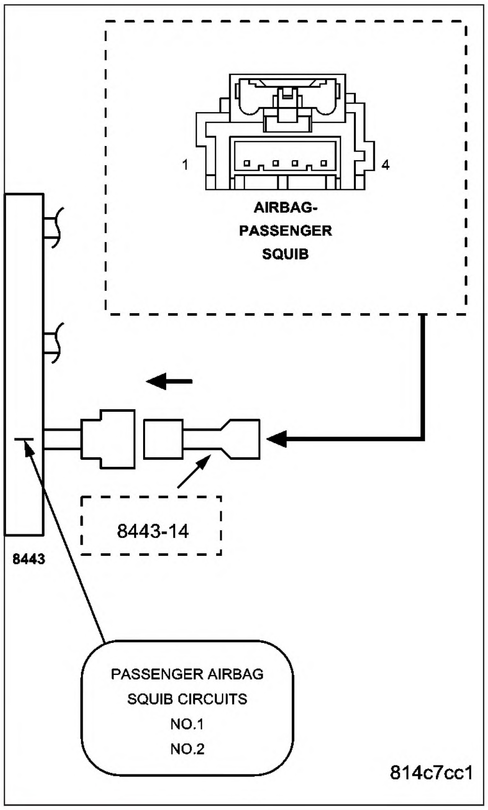
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B0A-PASSENGER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

2. CHECK FOR OPEN SQUIB CIRCUITS IN PASSENGER AIRBAG


1
4
AIRBAG-
PASSENGER
SQUIB
8443
8443-14
PASSENGER AIRBAG
SQUIB CIRCUITS
NO.1
NO.2
814c7cc1

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Airbag Squib connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B0A PASSENGER AIRBAG SQUIB 1 CIRCUIT OPEN?

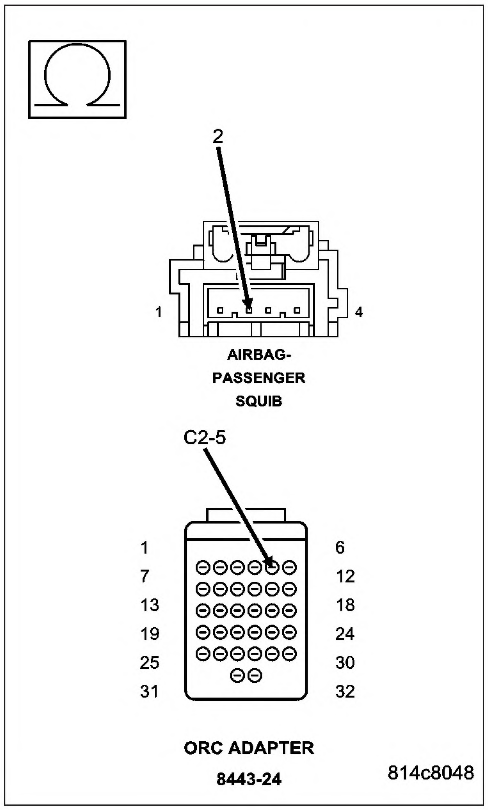
Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT FOR AN OPEN


Ω
2
1
4
AIRBAG-
PASSENGER
SQUIB
C2-5
1
6
7
12
13
18
19
24
25
30
31
32
ORC ADAPTER
8443-24
814c8048

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance of the (R42) Passenger Squib 1 Line 2 circuit between the Passenger Airbag Squib connector and the 8443 ORC Adaptor.

Is the resistance below 1.0 ohm?

Yes >> Go To 4

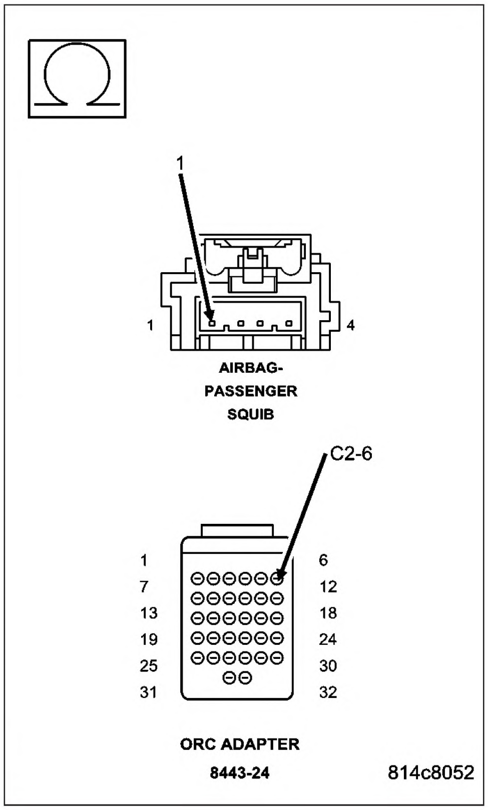
No >> Repair the (R42) Passenger Squib 1 Line 2 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B0A-PASSENGER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

4. CHECK (R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT FOR AN OPEN

Measure the resistance of the (R44) Passenger Squib 1 Line 1 circuit between the Passenger Airbag Squib connector and the 8443 ORC Adaptor.



Is the resistance below 1.0 ohm?

Yes >> Go To 5

No >> Repair the (R44) Passenger Squib 1 Line 1 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

If there are no possible causes remaining, view repair.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B0A-PASSENGER AIRBAG SQUIB 1 CIRCUIT OPEN (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

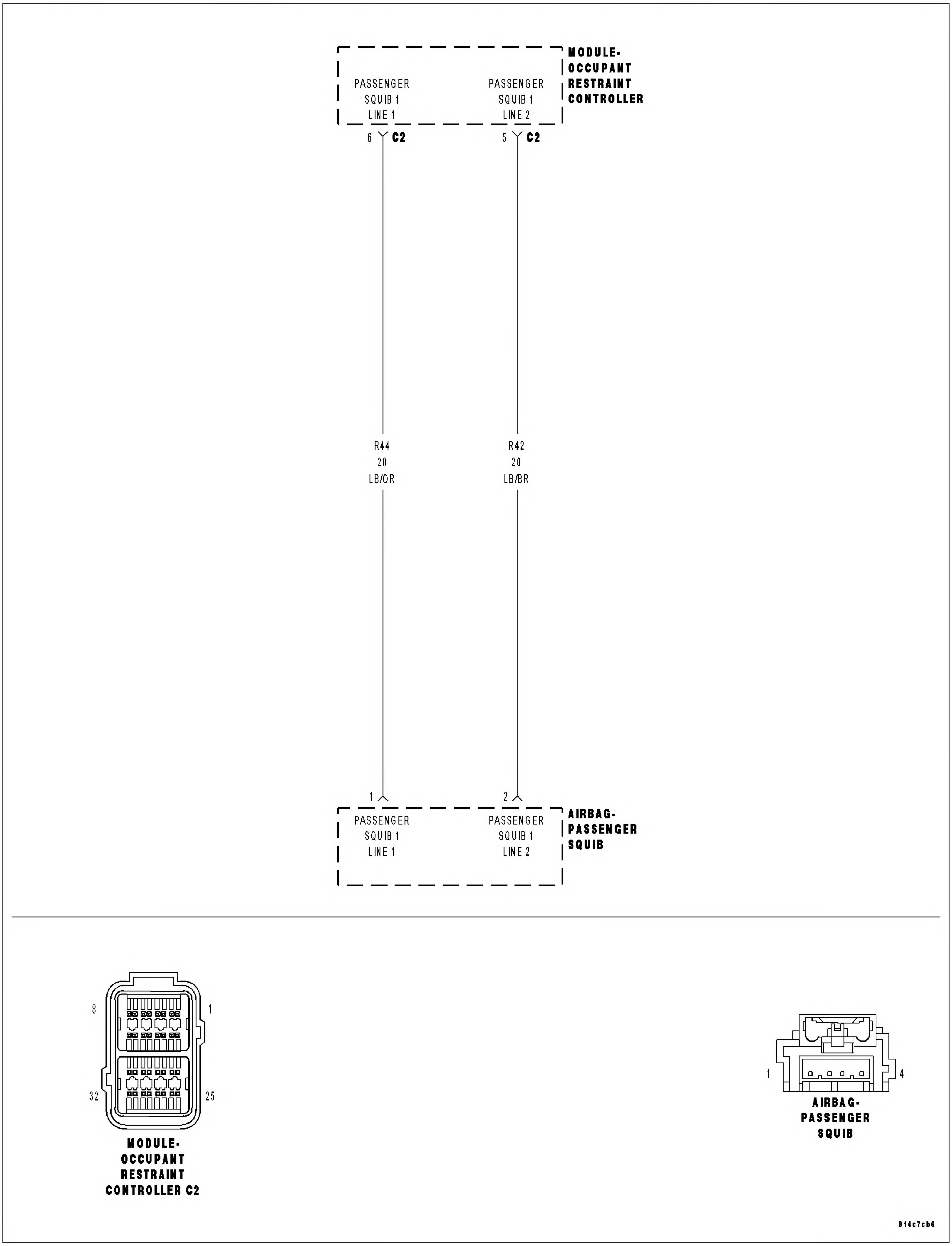
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B0B-PASSENGER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
6
C2
5
C2
R44
20
LB/OR
R42
20
LB/BR
1
2
PASSENGER
SQUIB 1
LINE 1
PASSENGER
SQUIB 1
LINE 2
AIRBAG-
PASSENGER
SQUIB
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
1
4
AIRBAG-
PASSENGER
SQUIB
814c7cb6

B1B0B-PASSENGER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Passenger Squib 1 circuits.

Possible Causes
(R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT SHORTED TO (R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Select Active or Stored DTC.

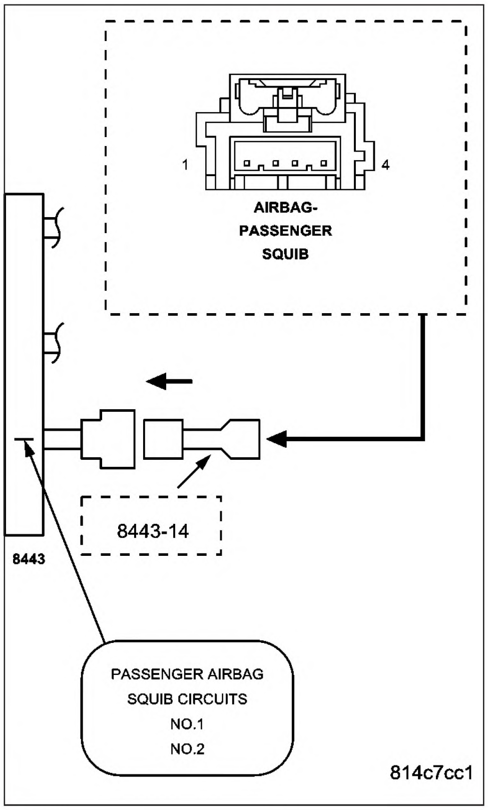
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B0B-PASSENGER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN PASSENGER AIRBAG



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Passenger Airbag Squib connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B0B PASSENGER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER?

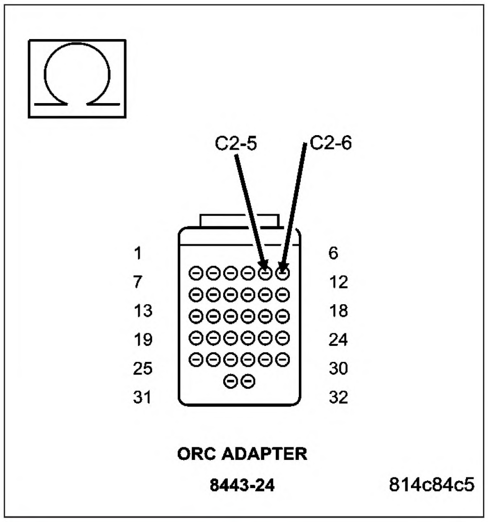
Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R42) PASSENGER SQUIB 1 LINE 2 CIRCUIT FOR A SHORT TO (R44) PASSENGER SQUIB 1 LINE 1 CIRCUIT



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance between the (R42) Passenger Squib 1 Line 2 circuit and the (R44) Passenger Squib 1 Line 1 circuit at the ORC adaptor.

Is the resistance below 10K ohms?

Yes >> Repair the (R42) Passenger Squib 1 Line 2 circuit for a short to the (R44) Passenger Squib 1 Line 1 circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B0B-PASSENGER AIRBAG SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

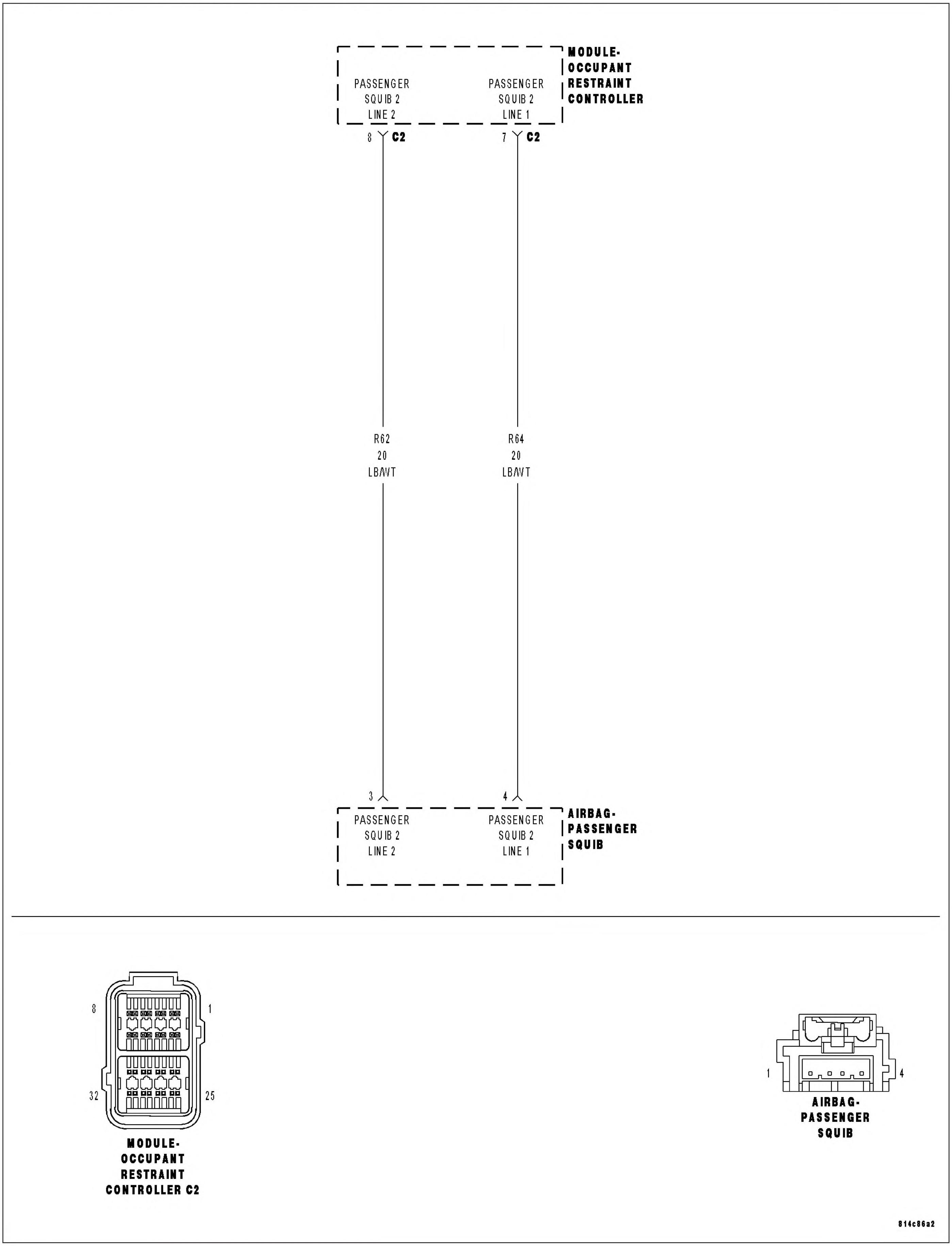
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B0C-PASSENGER AIRBAG SQUIB 2 CIRCUIT LOW


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER SQUIB 2 LINE 2
PASSENGER SQUIB 2 LINE 1
8 C2
7 C2
R62
20
LB/WT
R64
20
LB/WT
3
4
PASSENGER SQUIB 2 LINE 2
PASSENGER SQUIB 2 LINE 1
AIRBAG-
PASSENGER
SQUIB
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
1
4
AIRBAG-
PASSENGER
SQUIB
814c86a2

B1B0C-PASSENGER AIRBAG SQUIB 2 CIRCUIT LOW (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Squib 2 circuits.
- **Set Condition:**
  The ORC has detected low resistance on the Passenger Squib 2 circuits.

Possible Causes
(R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT OR (R62) PASSENGER SQUIB 2 LINE 2 CIRCUIT SHORTED TO GROUND
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

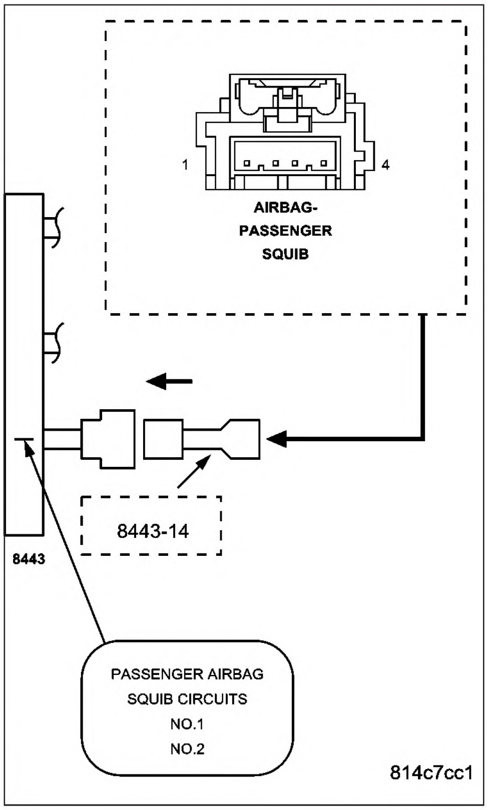
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B0C-PASSENGER AIRBAG SQUIB 2 CIRCUIT LOW (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN PASSENGER AIRBAG



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B0C PASSENGER AIRBAG SQUIB 2 CIRCUIT LOW?

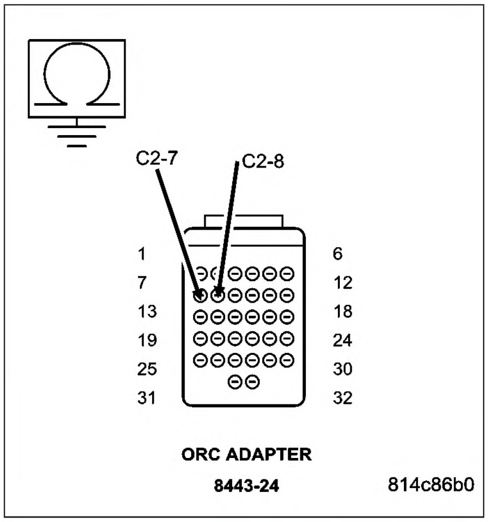
Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT AND (R62) PASSENGER SQUIB 2 LINE 2 CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the resistance of the (R64) Passenger Squib 2 Line 1 circuit between ground and the Passenger Airbag Squib connector.

Measure the resistance of the (R62) Passenger Squib 2 Line 2 circuit between ground and the ORC adaptor.

Is the resistance below 10K ohms on either circuit?

Yes >> Repair the Passenger Squib 2 circuit(s) for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B0C-PASSENGER AIRBAG SQUIB 2 CIRCUIT LOW (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

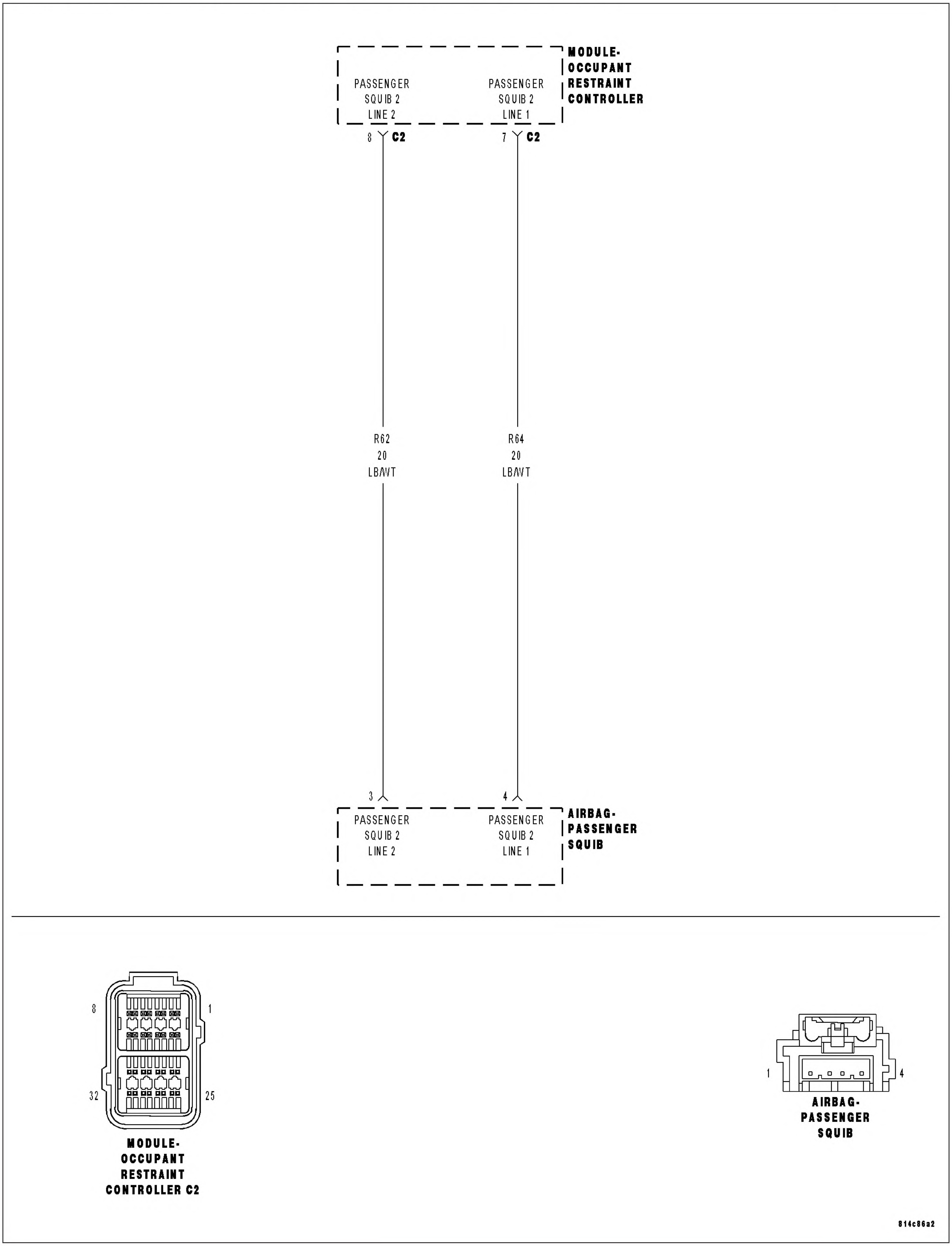
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B0D-PASSENGER AIRBAG SQUIB 2 CIRCUIT HIGH


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
SQUIB 2
LINE 2
PASSENGER
SQUIB 2
LINE 1
8 C2
7 C2
R62
20
LB/WT
R64
20
LB/WT
3
4
PASSENGER
SQUIB 2
LINE 2
PASSENGER
SQUIB 2
LINE 1
AIRBAG-
PASSENGER
SQUIB
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
1
4
AIRBAG-
PASSENGER
SQUIB
814c86a2

B1B0D-PASSENGER AIRBAG SQUIB 2 CIRCUIT HIGH (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage of the Passenger Squib 2 circuits.
- **Set Condition:**
  The ORC has detected voltage on the Passenger Squib 2 circuits.

Possible Causes
(R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT OR (R62) PASSENGER SQUIB 2 LINE 2 CIRCUIT SHORTED TO BATTERY
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B0D-PASSENGER AIRBAG SQUIB 2 CIRCUIT HIGH (CONTINUED)

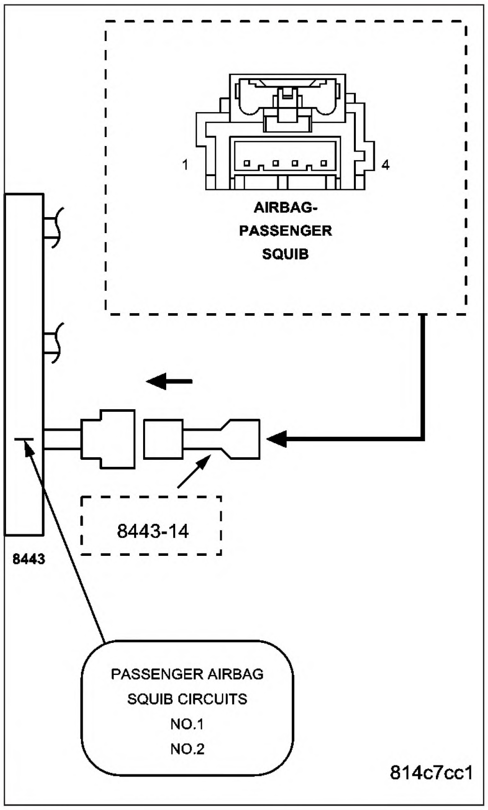
2. CHECK FOR SHORTED SQUIB CIRCUITS IN PASSENGER AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.



Does the scan tool display: B1B0D PASSENGER AIRBAG SQUIB 2 CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT AND (R62) PASSENGER SQUIB 2 LINE 2 CIRCUIT FOR A SHORT TO BATTERY

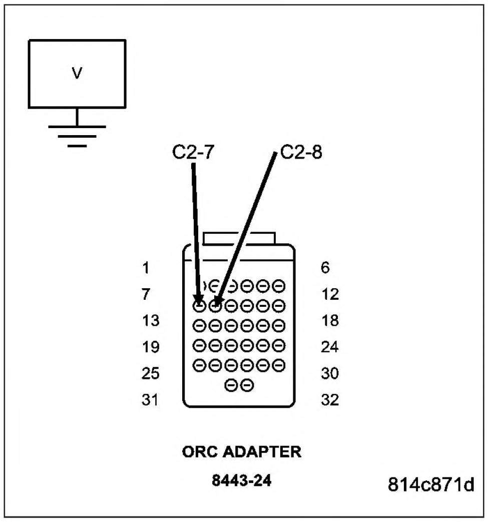
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

Measure the voltage of the (R64) Passenger Squib 2 Line 1 circuit between the ORC adaptor and ground.

Measure the voltage of the (R62) Passenger Squib 2 Line 2 circuit between the ORC adaptor and ground.



Is there any voltage present on either circuit?

Yes >> Repair the Passenger Squib 2 circuit(s) for a short to battery.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B0D-PASSENGER AIRBAG SQUIB 2 CIRCUIT HIGH (CONTINUED)

4. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

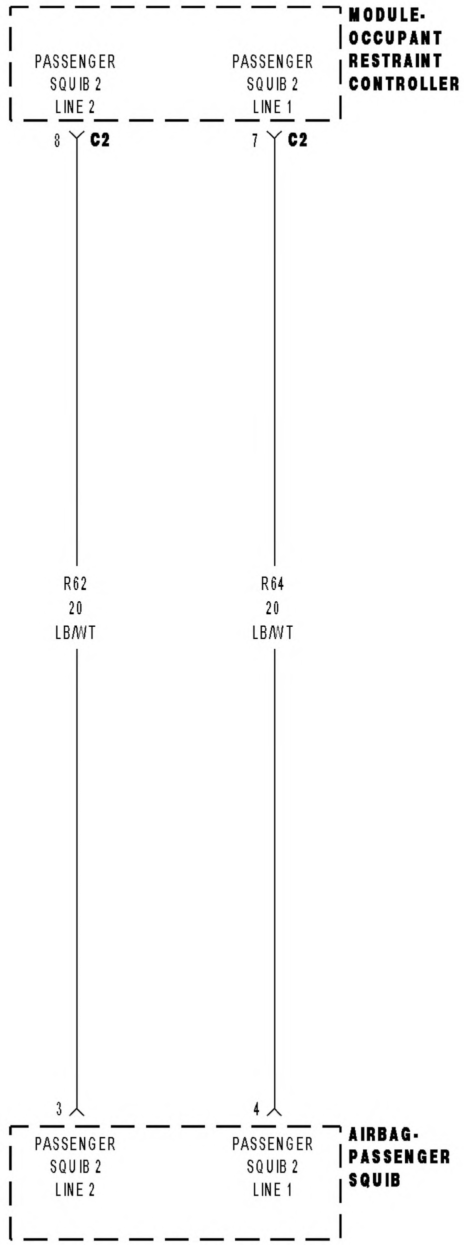
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

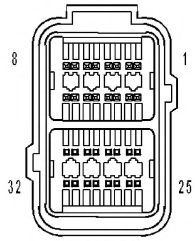
Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

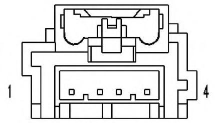
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B0E-PASSENGER AIRBAG SQUIB 2 CIRCUIT OPEN


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
SQUIB 2
LINE 2
PASSENGER
SQUIB 2
LINE 1
8
C2
7
C2
R62
20
LB/WT
R64
20
LB/WT
3
4
PASSENGER
SQUIB 2
LINE 2
PASSENGER
SQUIB 2
LINE 1
AIRBAG-
PASSENGER
SQUIB



**MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2**


1
4

**AIRBAG-
PASSENGER
SQUIB**

814c86a2

B1B0E-PASSENGER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Squib 2 circuits.
- **Set Condition:**
  The ORC has detected an open or high resistance on the Passenger Squib 2 circuits.

Possible Causes
(R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT OPEN
(R62) PASSENGER SQUIB 2 LINE 2 CIRUCIT OPEN
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B0E-PASSENGER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

2. CHECK FOR OPEN SQUIB CIRCUITS IN PASSENGER AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

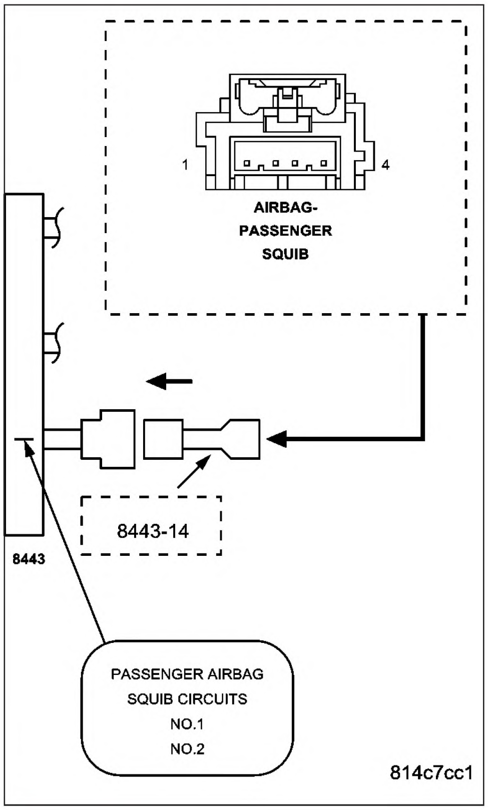
WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B0E PASSENGER AIRBAG SQUIB CIRCUIT OPEN?

Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)



---

3. CHECK (R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

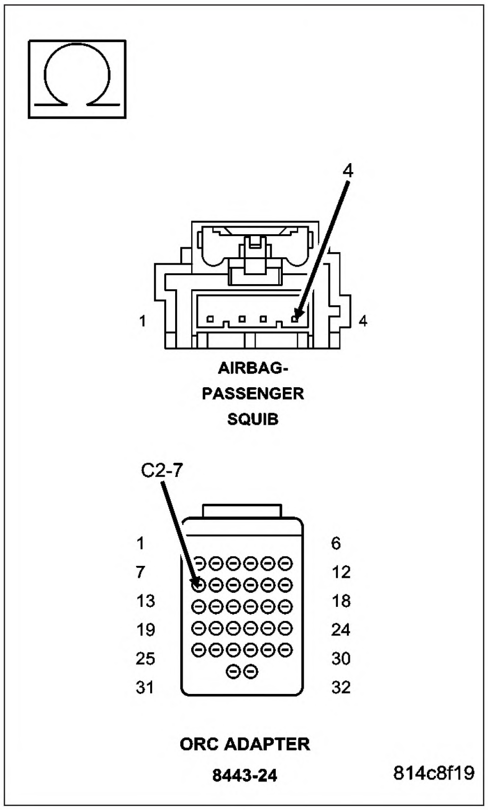
Measure the resistance of the (R64) Passenger Squib 2 Line 1 circuit between the Passenger Airbag Squib connector and the 8443 Load Tool ORC Adaptor.

Is the resistance below 1.0 ohm?

Yes >> Go to 4

No >> Repair the (R64) Passenger Squib 2 Line 1 circuit for an open.

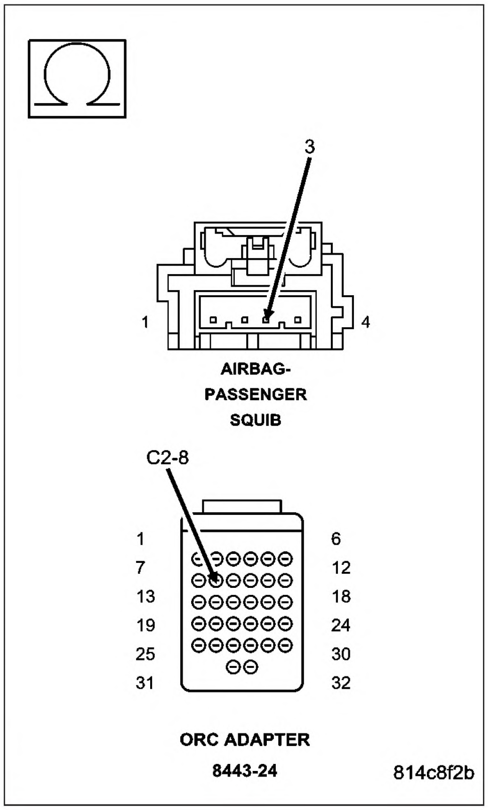
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)



B1B0E-PASSENGER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

4. CHECK (R62) PASSENGER SQUIB 2 LINE 2 CIRCUIT FOR AN OPEN

Measure the resistance of the (R62) Passenger Squib 2 Line 2 circuit between the Passenger Airbag Squib connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1.0 ohm?

Yes >> Go To 5

No >> Repair the (R62) Passenger Squib 2 Line 2 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B0E-PASSENGER AIRBAG SQUIB 2 CIRCUIT OPEN (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Passenger Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

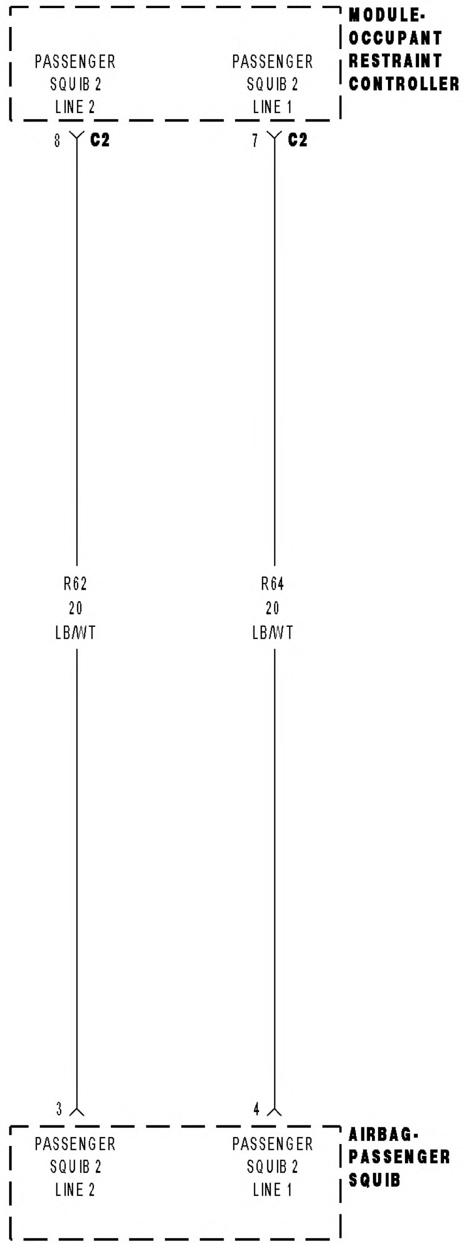
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

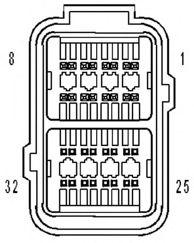
Are any ACTIVE DTCs present?

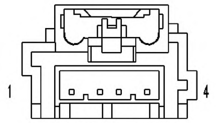
Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B0F-PASSENGER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
SQUIB 2
LINE 2
PASSENGER
SQUIB 2
LINE 1
8
C2
7
C2
R62
20
LB/WT
R64
20
LB/WT
3
4
PASSENGER
SQUIB 2
LINE 2
PASSENGER
SQUIB 2
LINE 1
AIRBAG-
PASSENGER
SQUIB


8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2


1
4
AIRBAG-
PASSENGER
SQUIB

814c86a2

B1B0F-PASSENGER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Squib 2 circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Passenger Squib 2 circuits.

Possible Causes
(R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT SHORTED TO (R62) PASSENGER SQUIB 2 LINE 2 CIRCUIT
PASSENGER AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B0F-PASSENGER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN PASSENGER AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Airbag Squib connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool to the Passenger Airbag Squib connector.

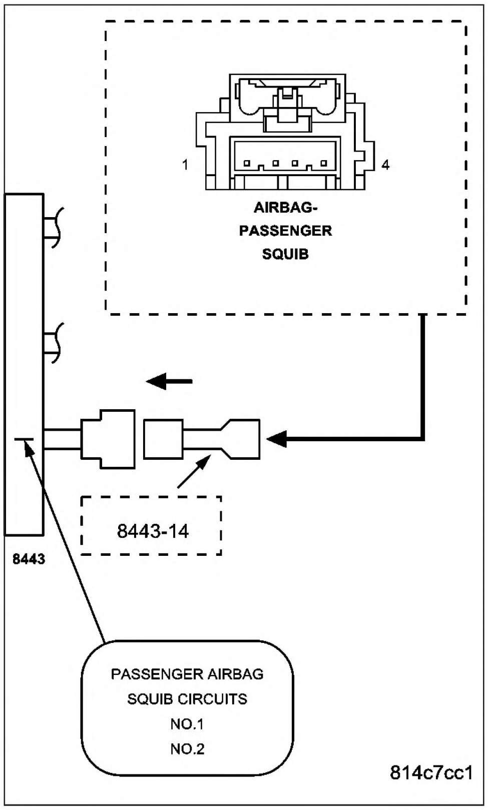
WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B0F PASSENGER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER?

Yes >> Go To 3

No >> Replace the Passenger Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)



---

3. CHECK (R64) PASSENGER SQUIB 2 LINE 1 CIRCUIT FOR A SHORT TO (R62) PASSENGER SQUIB 2 LINE 2 CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool from the Passenger Airbag Squib connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C2 connector.

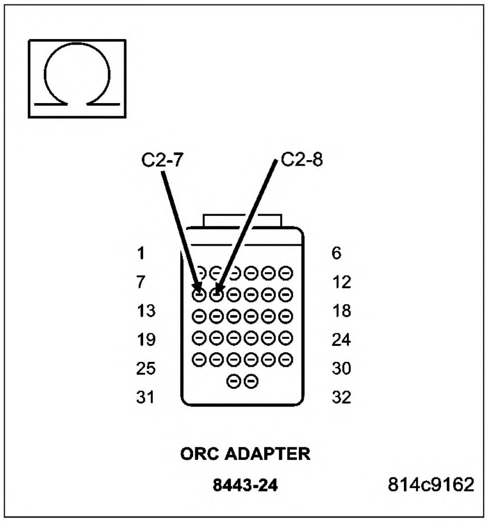
Measure the resistance between the (R64) Passenger Squib 2 Line 1 circuit and the (R62) Passenger Squib 2 Line 2 circuit at the ORC adaptor.

Is the resistance below 10K ohms?

Yes >> Repair the (R64) Passenger Squib 2 Line 1 circuit for a short to the (R62) Passenger Squib 2 Line 2 circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go to 4



B1B0F-PASSENGER AIRBAG SQUIB 2 CIRCUIT SHORTED TOGETHER (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

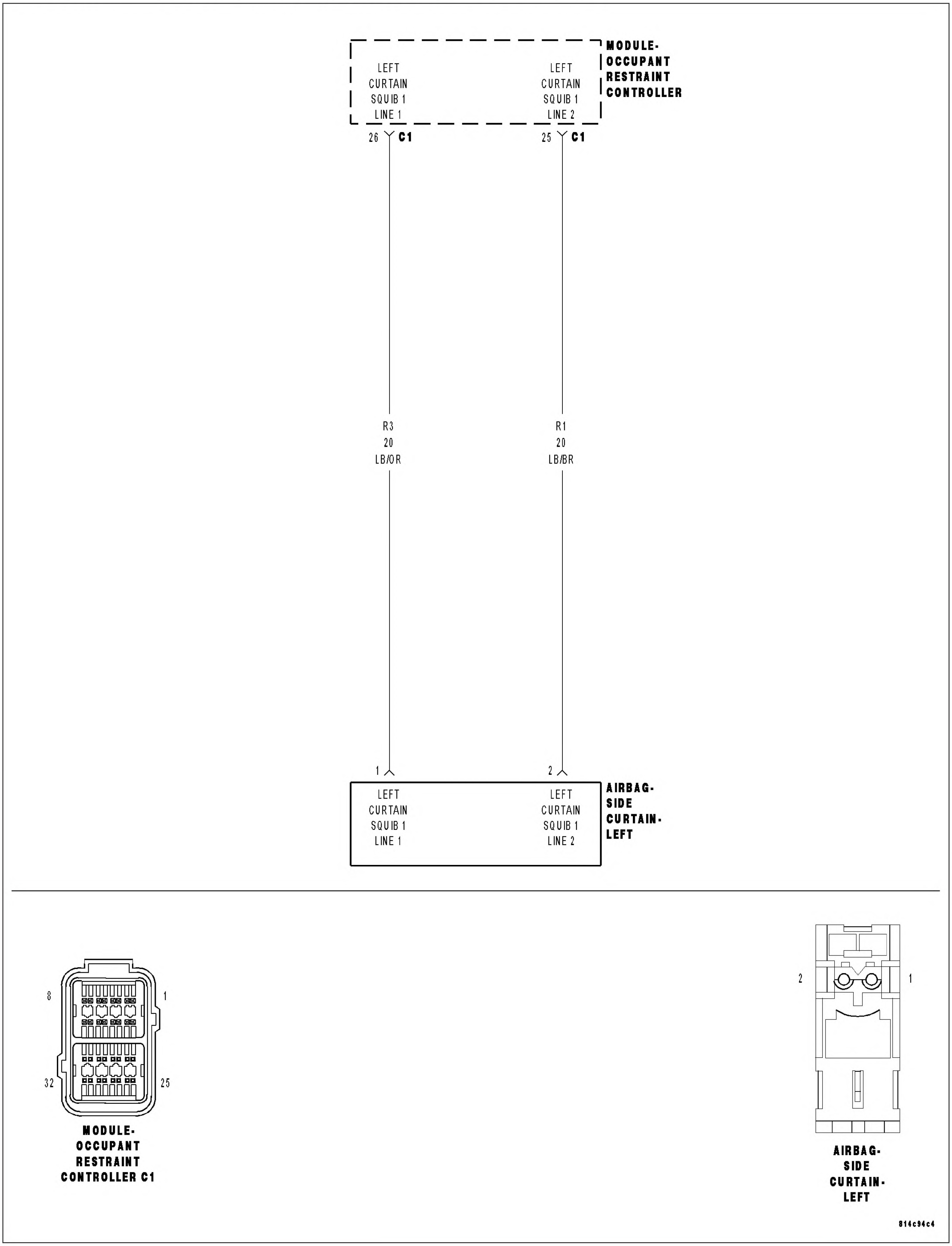
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B18-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT LOW


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
26 C1
25 C1
R3
20
LB/OR
R1
20
LB/BR
1
2
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
LEFT
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
2
1
AIRBAG-
SIDE
CURTAIN-
LEFT
814c94c4

B1B18-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT LOW (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Left Curtain Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance of the Left Curtain Squib 1 circuits.

Possible Causes
(R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT OR (R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT SHORTED TO GROUND
LEFT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B18-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT LOW (CONTINUED)

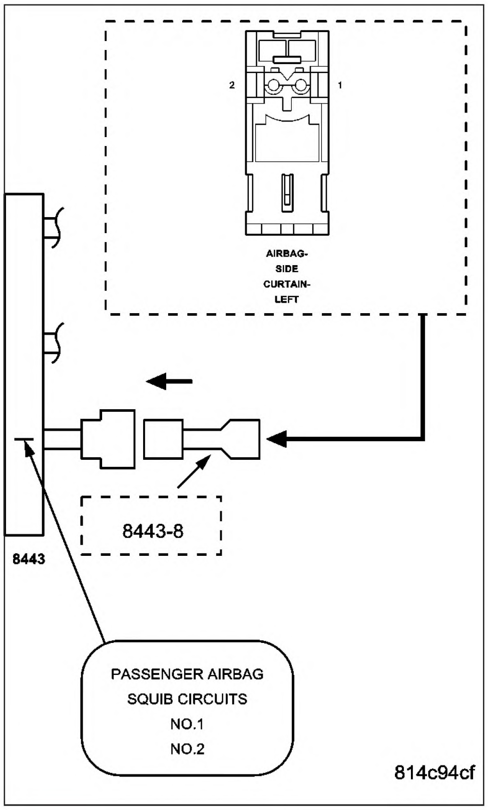
2. CHECK FOR SHORTED SQUIB CIRCUITS IN LEFT SIDE CURTAIN AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.



Does the scan tool display: B1B18 LEFT SIDE CURTAIN SQUIB 1 CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Left Side Curtain Airbag in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT AND (R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT FOR A SHORT TO GROUND

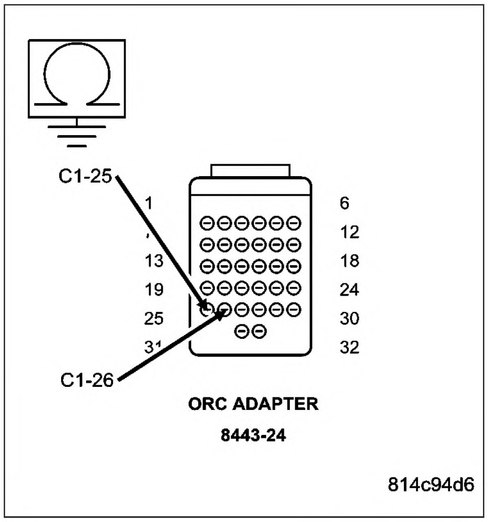
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Left Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R3) Left Curtain Squib 1 Line 1 circuit between ground and the ORC adaptor.

Measure the resistance of the (R1) Left Curtain Squib 1 Line 2 circuit between ground and the ORC adaptor.



Is the resistance below 10K ohms on either circuit?

Yes >> Repair the Left Curtain Squib 1 circuit(s) for a short to ground.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B18-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT LOW (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

IF only stored codes return continue the test until the problem area has been isolated.

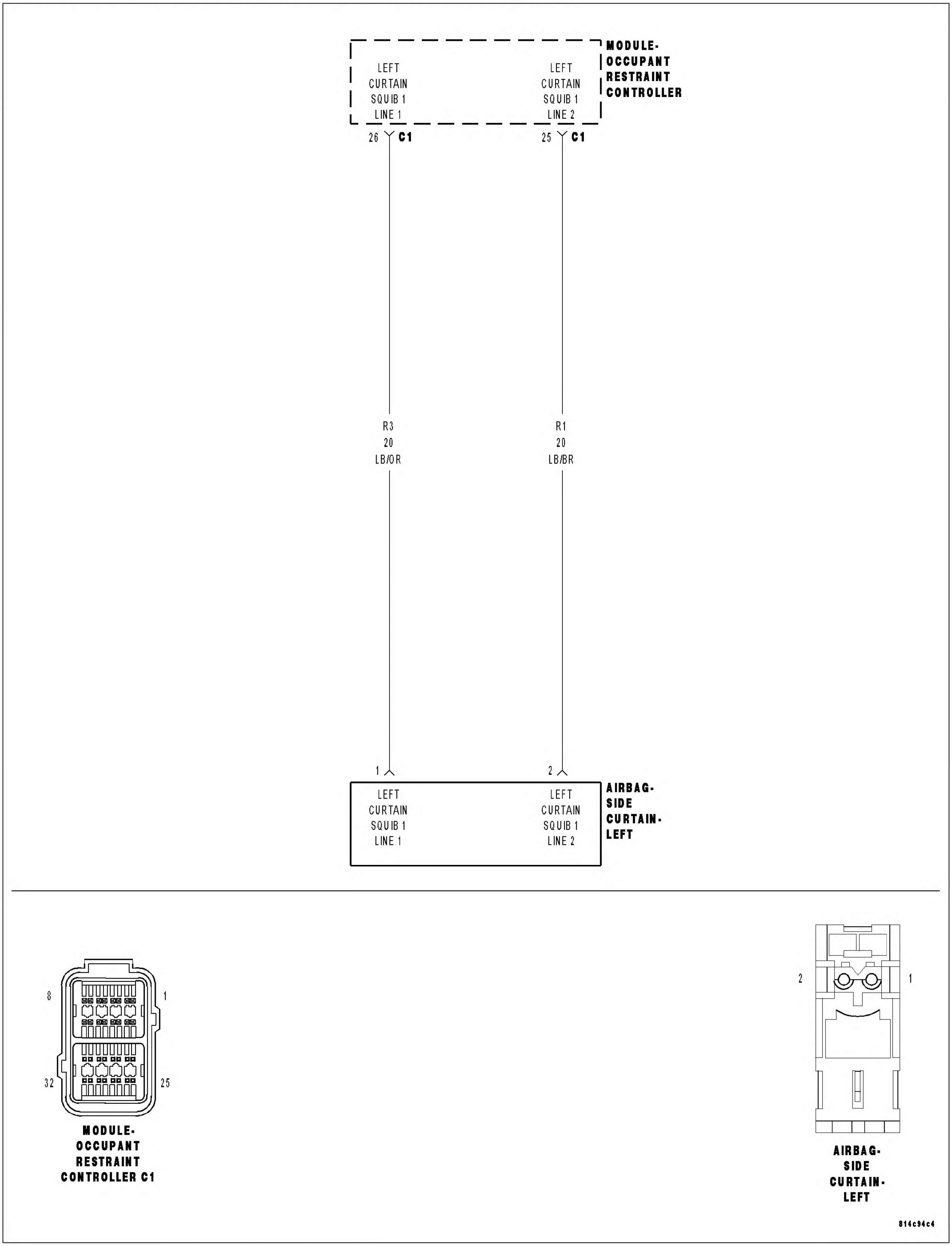
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B19-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
26 C1
25 C1
R3
20
LB/OR
R1
20
LB/BR
1
2
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
LEFT
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
2
1
AIRBAG-
SIDE
CURTAIN-
LEFT
814c94c4

B1B19-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage on the Left Curtain Squib 1 circuits.
- **Set Condition:**
  The ORC has detected voltage on the Left Curtain Squib 1 circuits.

Possible Causes
(R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT OR (R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT SHORTED TO BATTERY
LEFT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B19-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH (CONTINUED)

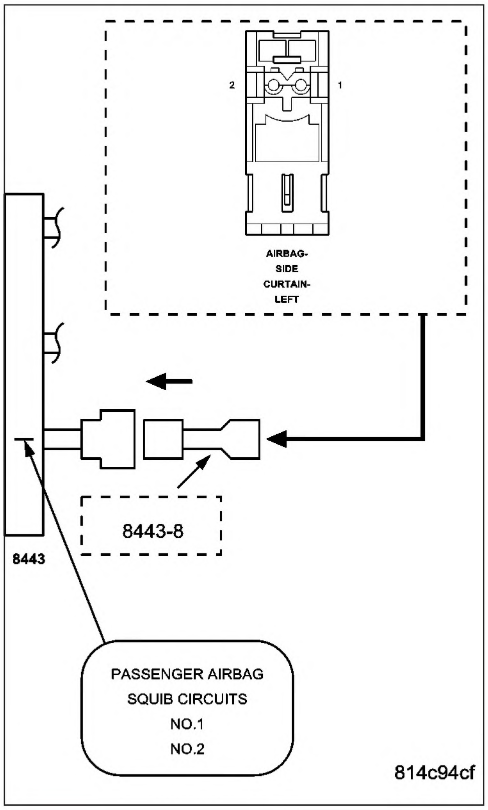
2. CHECK FOR SHORTED SQUIB CIRCUITS IN LEFT SIDE CURTAIN AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.



Does the scan tool display: B1B19 LEFT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Left Side Curtain Airbag in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT AND (R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT FOR A SHORT TO BATTERY

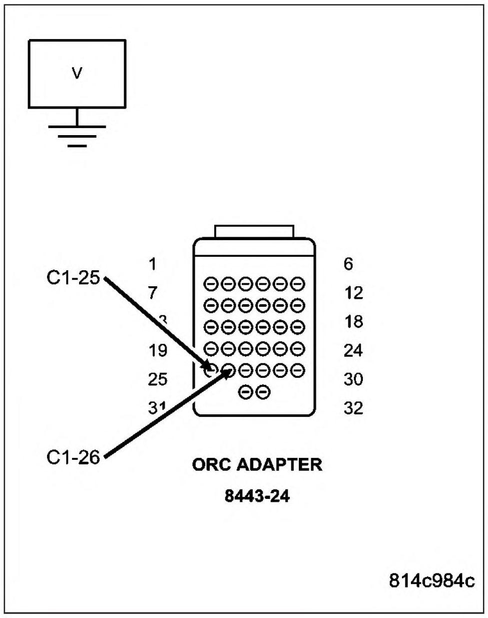
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Left Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the voltage of the (R3) Left Curtain Squib 1 Line 1 circuit between the ORC adaptor and ground.

Measure the voltage of the (R1) Left Curtain Squib 1 Line 2 circuit between the ORC adaptor and ground.



Is there any voltage present on either circuit?

Yes >> Repair the Left Curtain Squib 1 circuit(s) for a short to battery.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B19-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH (CONTINUED)

4. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off then disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

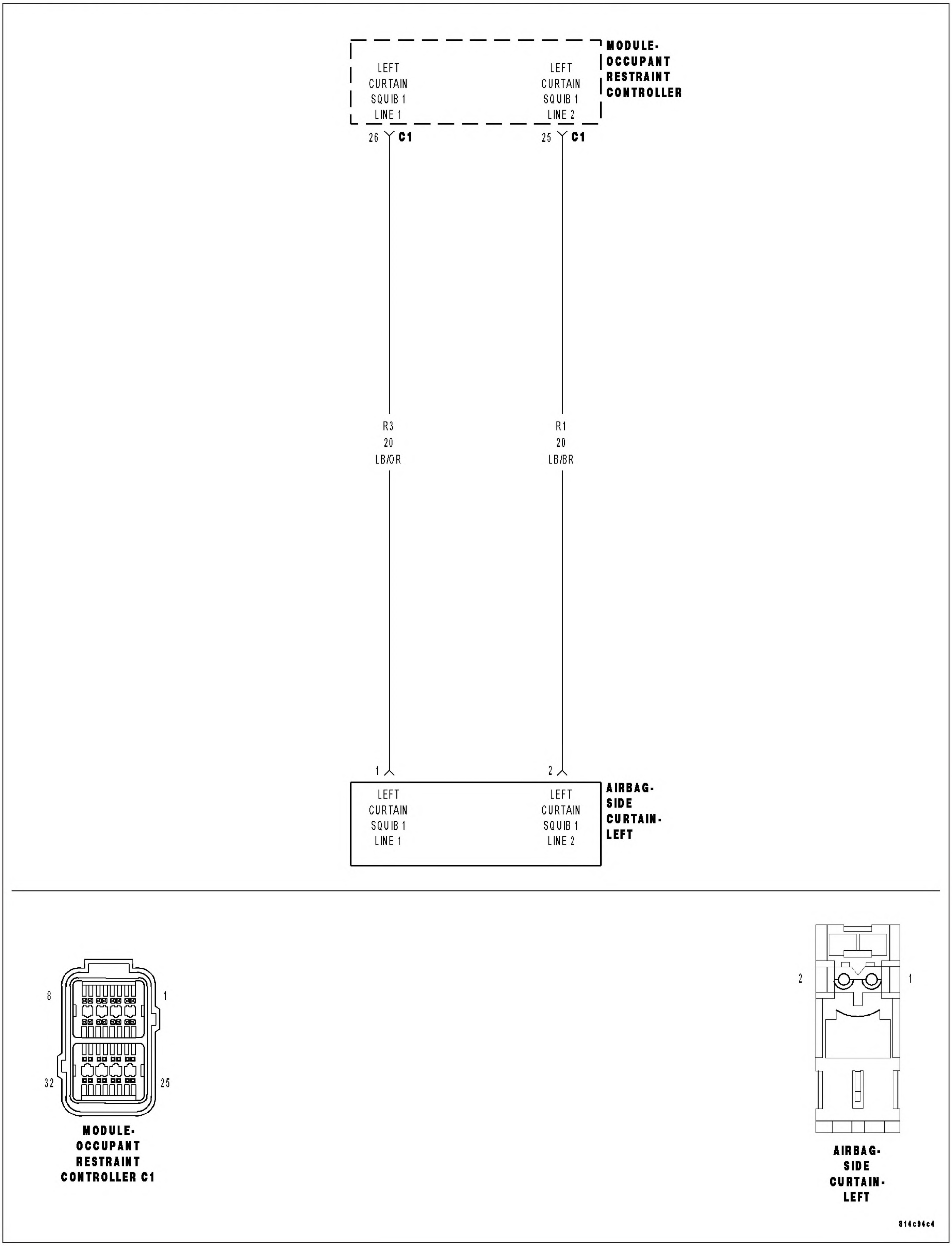
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B1A-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
26 C1
25 C1
R3
20
LB/OR
R1
20
LB/BR
1
2
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
LEFT
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
2
1
AIRBAG-
SIDE
CURTAIN-
LEFT
814c94c4

B1B1A-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Left Curtain Squib 1 circuits.
- **Set Condition:**
  The ORC has detected an open or high resistance on the Left Curtain Squib 1 circuits.

Possible Causes
(R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT OPEN
(R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT OPEN
LEFT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Select Active or Stored DTC.

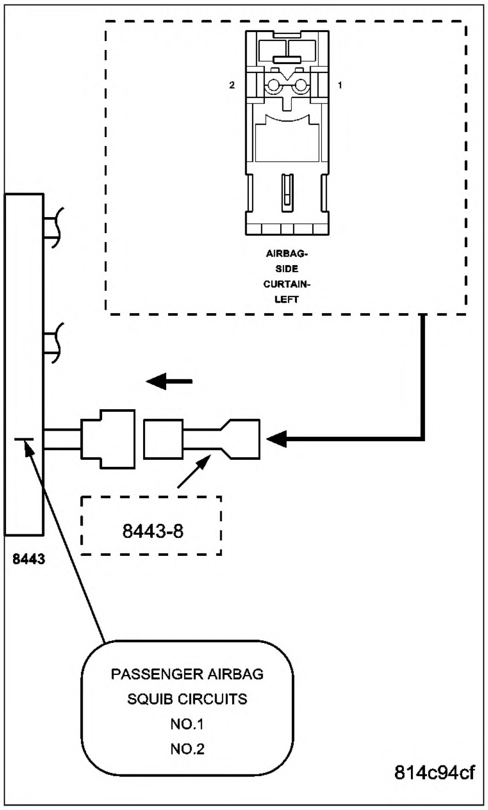
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B1A-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

2. CHECK FOR OPEN SQUIB CIRCUITS IN LEFT SIDE CURTAIN AIRBAG



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B1A LEFT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN?

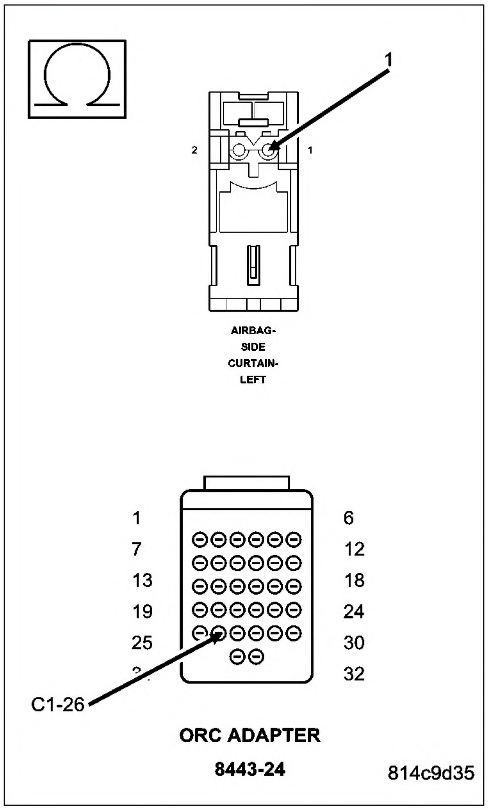
Yes >> Go To 3

No >> Replace the Left Side Curtain Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT FOR AN OPEN



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Left Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R3) Left Curtain Squib 1 Line 1 circuit between the Left Side Curtain Airbag connector and the Load Tool ORC Adaptor.

Is the resistance below 1.0 ohm?

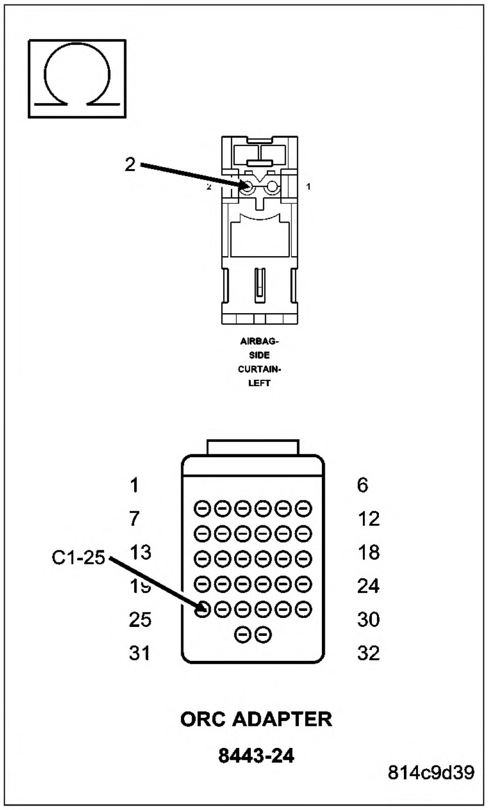
Yes >> Go To 4

No >> Repair the (R3) Left Curtain Squib 1 Line 1 circuit for an open. Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B1A-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

4. CHECK (R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT FOR AN OPEN

Measure the resistance of the (R1) Left Curtain Squib 1 Line 2 circuit between the Left Side Curtain Airbag connector and the Load Tool ORC Adaptor.



Is the resistance below 1.0 ohm?

Yes >> Go To 5

No >> Repair the (R1) Left Curtain Squib 1 Line 2 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B1A-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

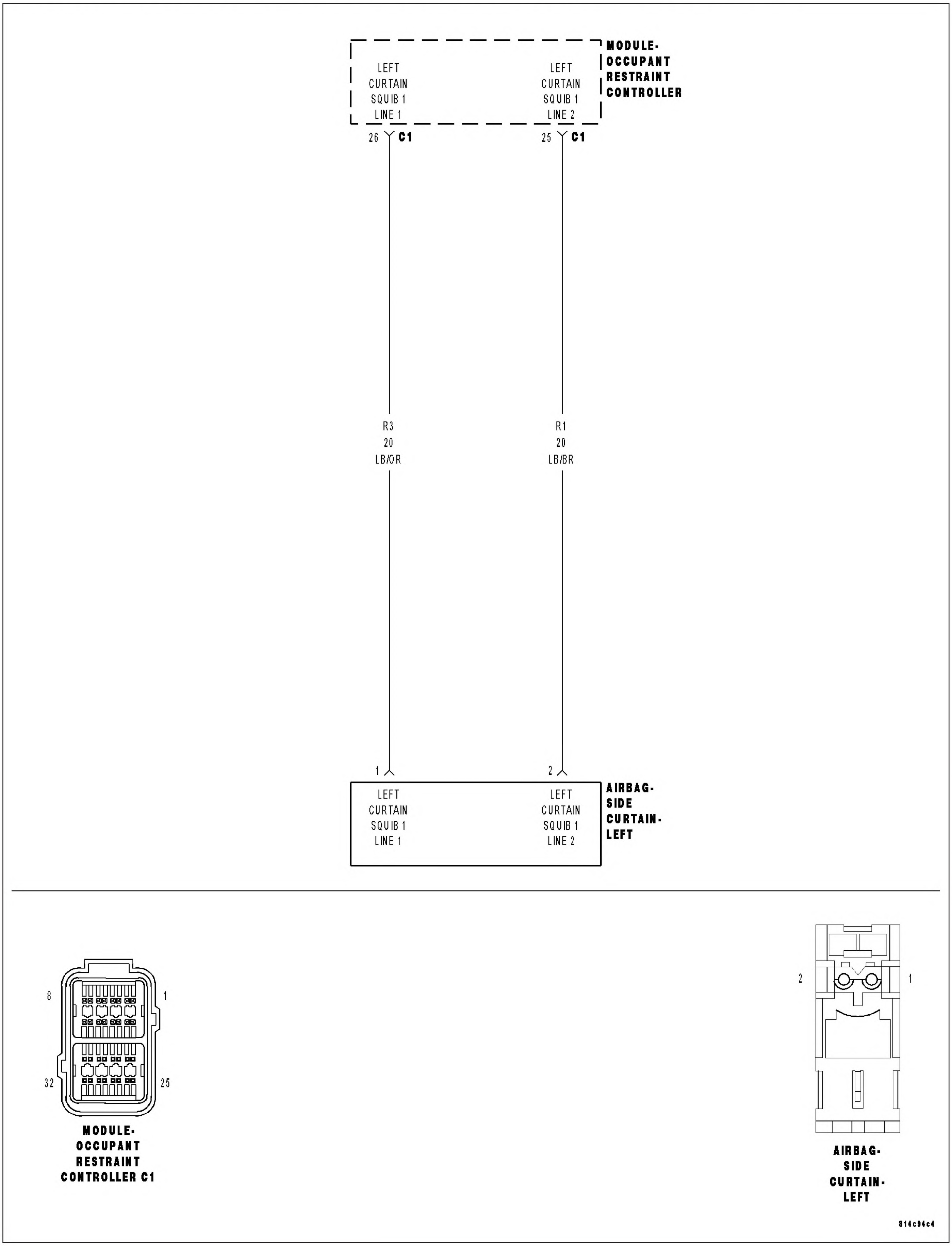
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B1B-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
26 C1
25 C1
R3
20
LB/OR
R1
20
LB/BR
1
2
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
LEFT
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
2
1
AIRBAG-
SIDE
CURTAIN-
LEFT
814c94c4

B1B1B-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Left Curtain Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Left Curtain Squib 1 circuits.

Possible Causes
(R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT SHORTED TO (R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT
LEFT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B1B-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

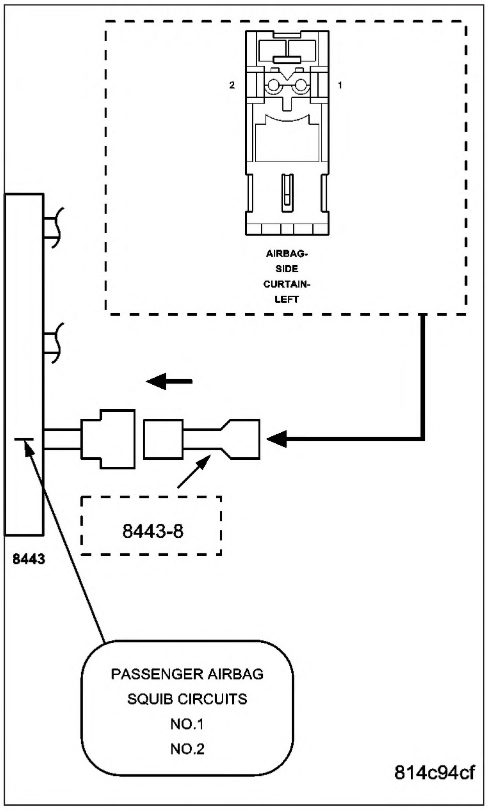
2. CHECK FOR SHORTED SQUIB CIRCUITS IN LEFT SIDE CURTAIN AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Left Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.



Does the scan tool display: B1B1B LEFT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER?

Yes >> Go To 3

No >> Replace the Left Side Curtain Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

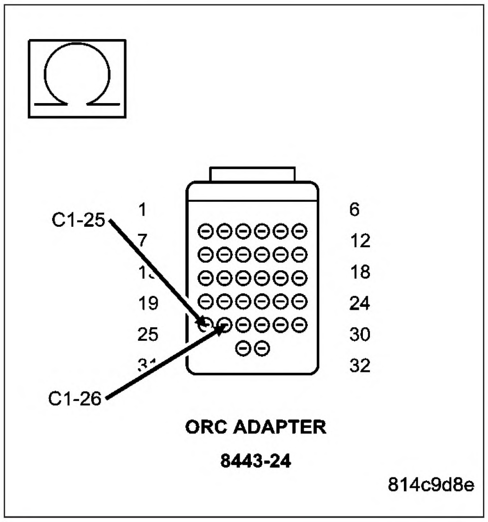
3. CHECK (R3) LEFT CURTAIN SQUIB 1 LINE 1 CIRCUIT FOR A SHORT TO (R1) LEFT CURTAIN SQUIB 1 LINE 2 CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Left Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance between the (R3) Left Curtain Squib 1 Line 1 circuit and the (R1) Left Curtain Squib 1 Line 2 circuit at the ORC adaptor.



Is the resistance below 10K ohms?

Yes >> Repair the (R3) Left Curtain Squib 1 Line 1 circuit for a short to the (R1) Left Curtain Squib 1 Line 2 circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1B1B-LEFT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC’s from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

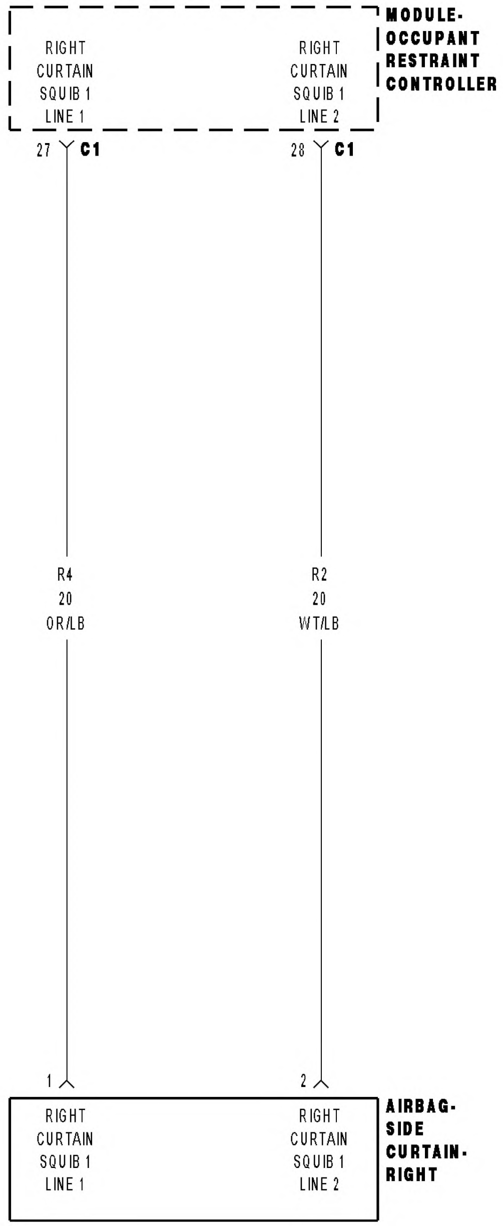
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

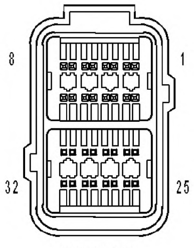
Are any ACTIVE DTC’s present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

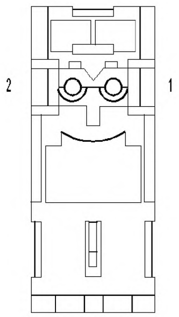
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B20-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT LOW


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
27 C1
28 C1
R4
20
OR/LB
R2
20
WT/LB
1
2
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
RIGHT



**MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1**



**AIRBAG-
SIDE
CURTAIN-
RIGHT**

814c9fc8

B1B20-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT LOW (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Right Curtain Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance on the Right Curtain Squib 1 circuits.

Possible Causes
(R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT OR (R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT SHORTED TO GROUND
RIGHT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

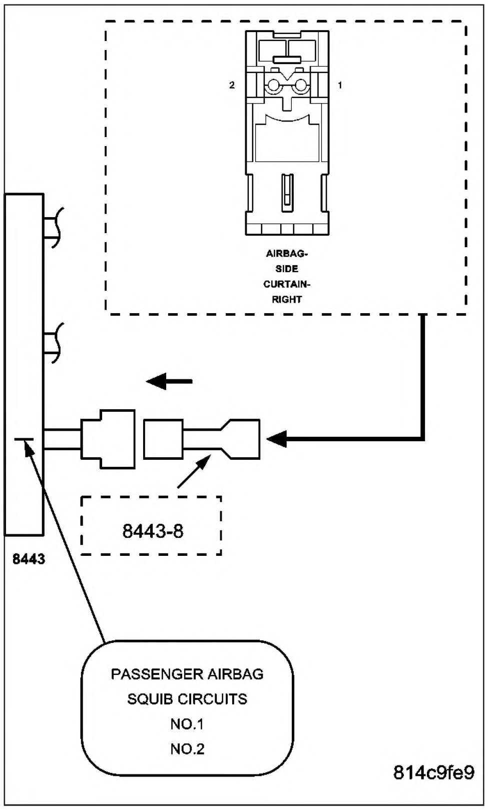
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B20-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT LOW (CONTINUED)

2. CHECK FOR SHORTED SQUIB CIRCUITS IN RIGHT SIDE CURTAIN AIRBAG



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact undeployed curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool and appropriate Jumper to the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B20 RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT LOW?

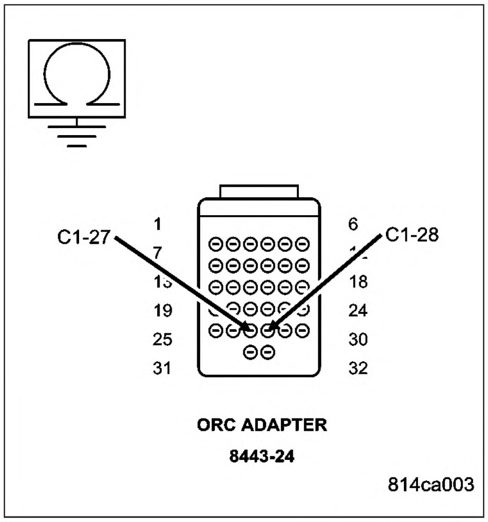
Yes >> Go To 3

No >> Replace the Right Side Curtain Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT AND (R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Right Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R4) Right Curtain Squib 1 Line 1 circuit between ground and the ORC adaptor.

Measure the resistance of the (R2) Right Curtain Squib 1 Line 2 circuit between ground and the ORC adaptor.

Is the resistance below 10K ohms on either circuit?

Yes >> Repair the Right Curtain Squib 1 circuit(s) for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go to 4

B1B20-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT LOW (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

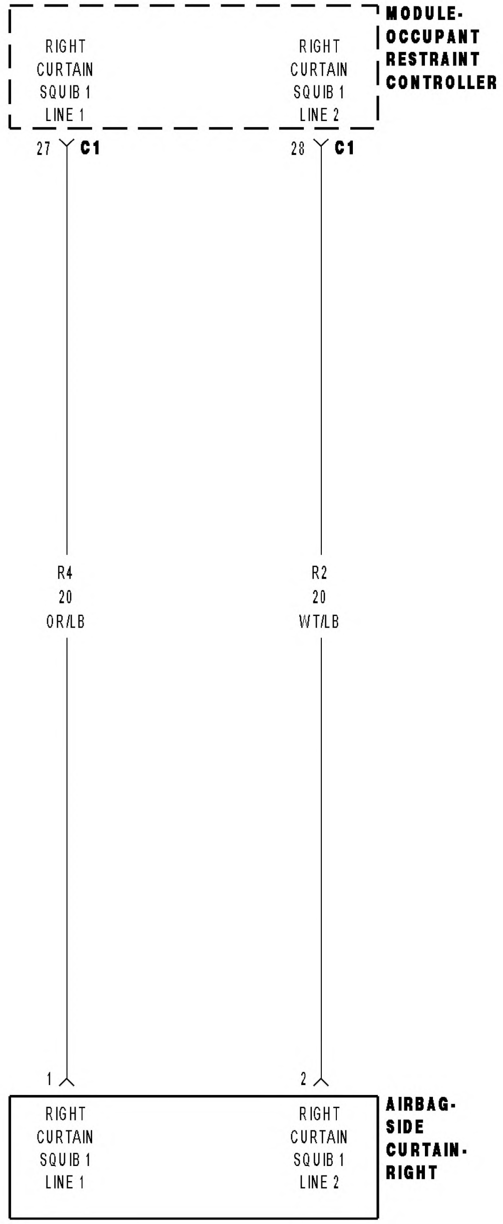
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

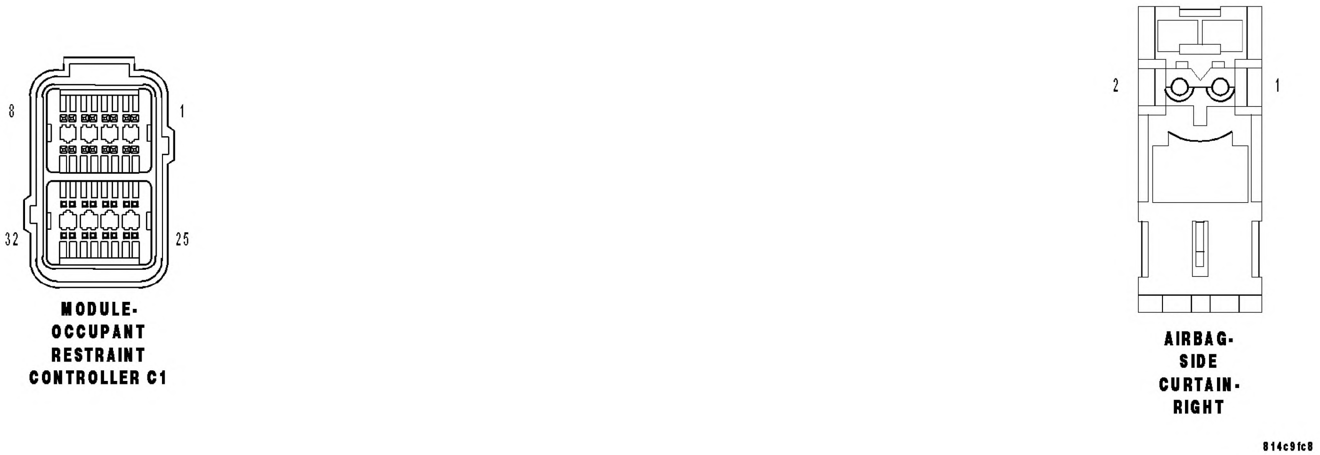
Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B21-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
27 C1
28 C1
R4
20
OR/LB
R2
20
WT/LB
1
2
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
RIGHT


8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
2
1
AIRBAG-
SIDE
CURTAIN-
RIGHT
814c9fc8

B1B21-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage on the Right Curtain Squib 1 circuits.
- **Set Condition:**
  When the ORC detects voltage on the Right Curtain Squib 1 circuits.

Possible Causes
(R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT OR (R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT SHORTED TO BATTERY
RIGHT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B21-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH (CONTINUED)

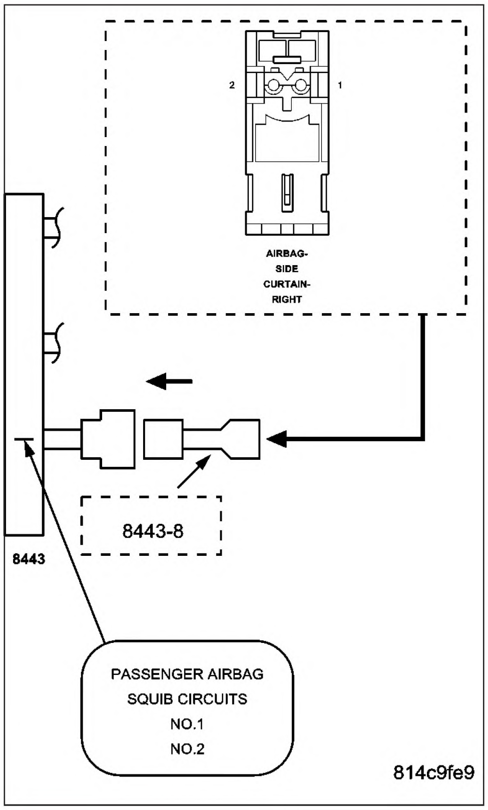
2. CHECK FOR SHORTED SQUIB CIRCUITS IN RIGHT SIDE CURTAIN AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact uncoupled curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.



Does the scan tool display: B1B21 RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Right Side Curtain Airbag in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT AND (R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT FOR A SHORT TO BATTERY

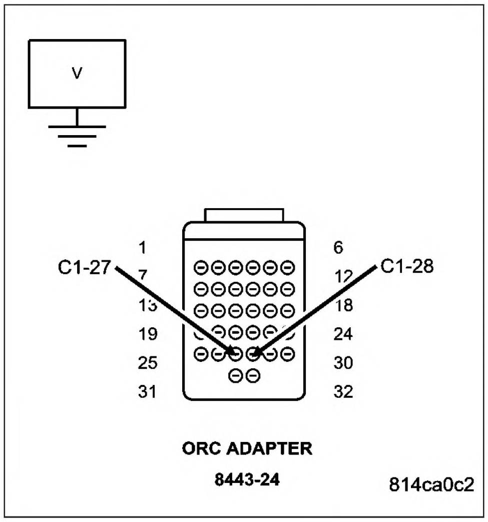
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Right Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the voltage of the (R4) Right Curtain Squib 1 Line 1 circuit between the ORC adaptor and ground.

Measure the voltage of the (R2) Right Curtain Squib 1 Line 2 circuit between the ORC adaptor and ground.



Is there any voltage present on either circuit?

Yes >> Repair the Right Curtain Squib 1 circuit(s) for a short to battery.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go to 4

B1B21-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT HIGH (CONTINUED)

4. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

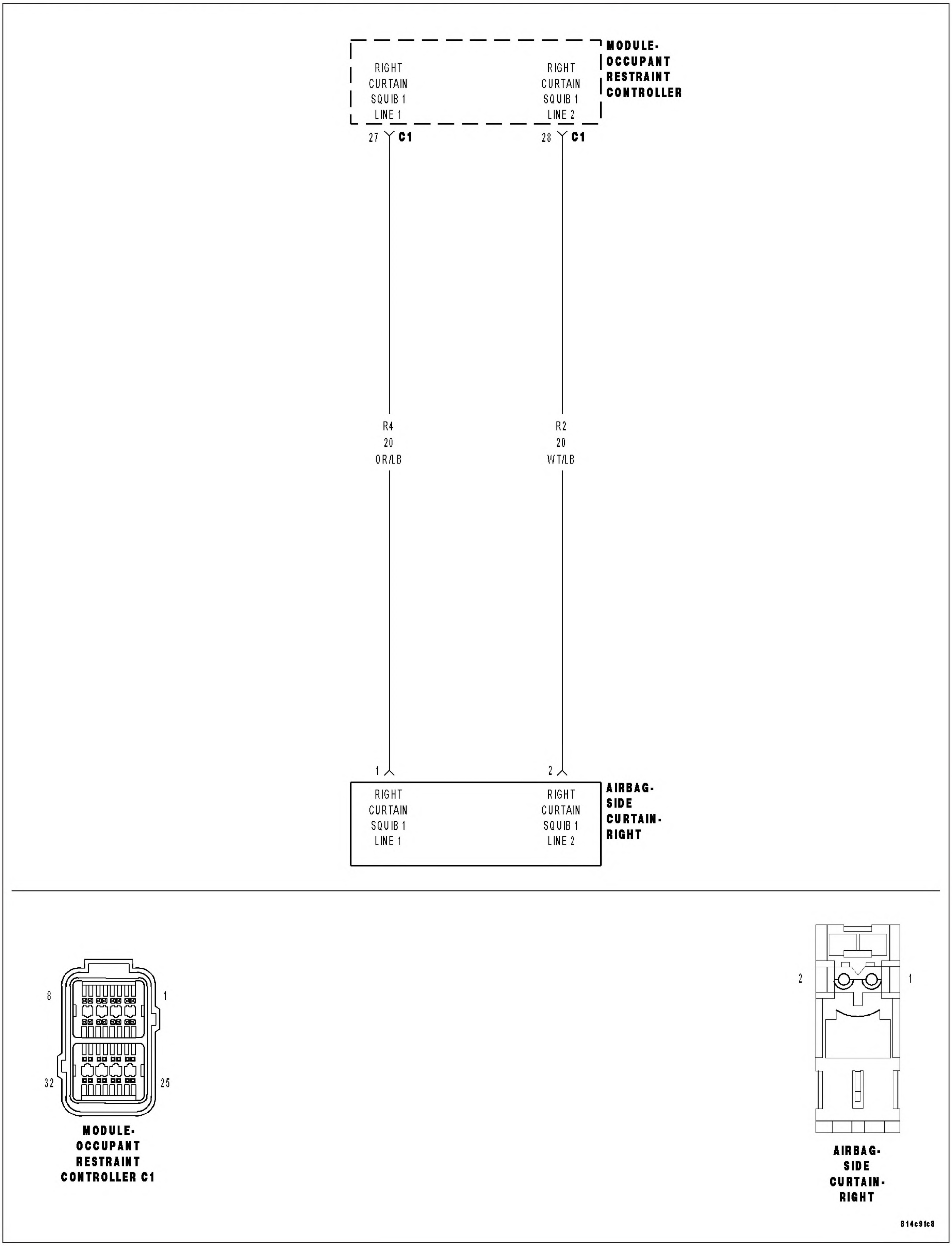
Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer

---

B1B22-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
27 C1
28 C1
R4
20
OR/LB
R2
20
WT/LB
1
2
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
RIGHT
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
2
1
AIRBAG-
SIDE
CURTAIN-
RIGHT
814c9fc8

B1B22-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Right Curtain Squib 1 circuits.
- **Set Condition:**
  When the ORC has detects an open or high resistance on the Right Curtain Squib 1 circuits.

Possible Causes
(R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT OPEN
(R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT OPEN
RIGHT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

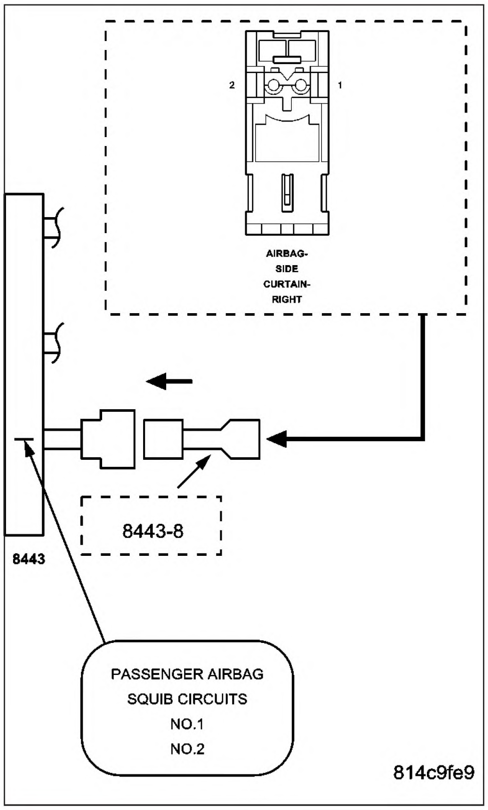
Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

B1B22-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

2. CHECK FOR OPEN SQUIB CIRCUITS IN RIGHT SIDE CURTAIN AIRBAG



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact uncoupled curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B22 RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN?

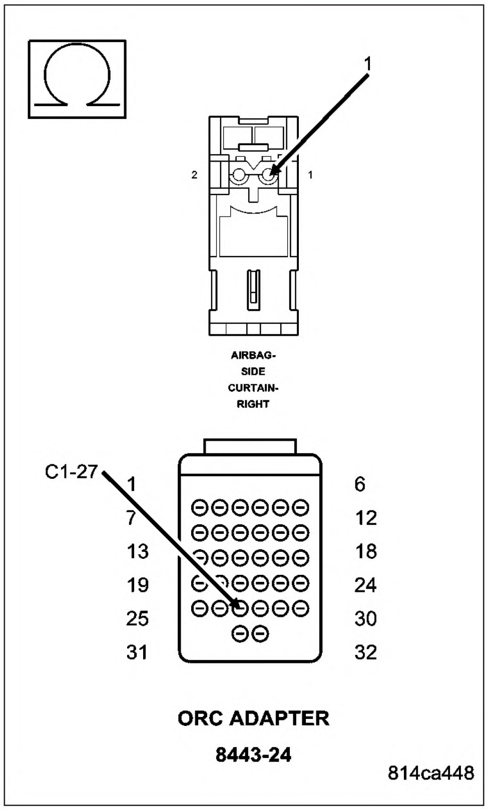
Yes >> Go to 3

No >> Replace the Right Side Curtain Airbag in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK (R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT FOR AN OPEN



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Right Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R4) Right Curtain Squib 1 Line 1 circuit between the Right Side Curtain Airbag connector and the 8443 ORC Adaptor.

Is the resistance below 1.0 ohm?

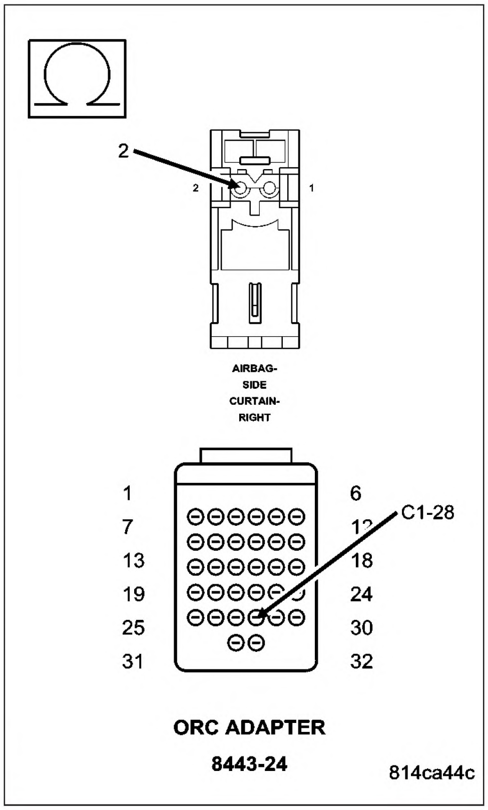
Yes >> Go To 4

No >> Repair the (R4) Right Curtain Squib 1 Line 1 circuit for an open. Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B22-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

4. CHECK (R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT FOR AN OPEN

Measure the resistance of the (R2) Right Curtain Squib 1 Line 2 circuit between the Right Side Curtain Airbag connector and the 8443 ORC Adaptor.



Is the resistance below 1.0 ohm?

Yes >> Go To 5

No >> Repair the (R2) Right Curtain Squib 1 Line 2 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B22-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT OPEN (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

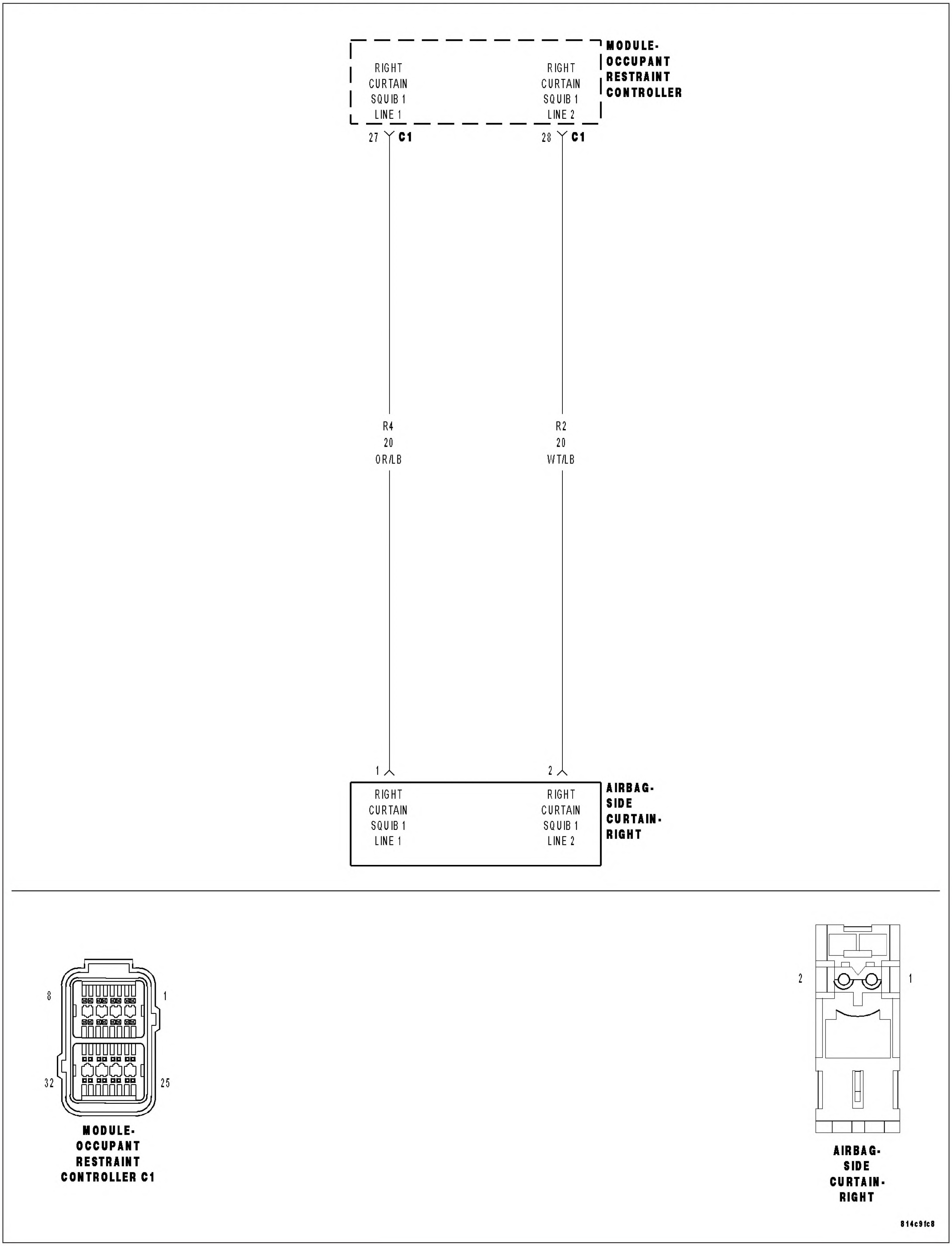
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B23-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
27 C1
28 C1
R4
20
OR/LB
R2
20
WT/LB
1
2
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
AIRBAG-
SIDE
CURTAIN-
RIGHT
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
2
1
AIRBAG-
SIDE
CURTAIN-
RIGHT
814c9fc8

B1B23-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Right Curtain Squib 1 circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Right Curtain Squib 1 circuits.

Possible Causes
(R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT SHORTED TO (R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT
RIGHT SIDE CURTAIN AIRBAG
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

B1B23-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

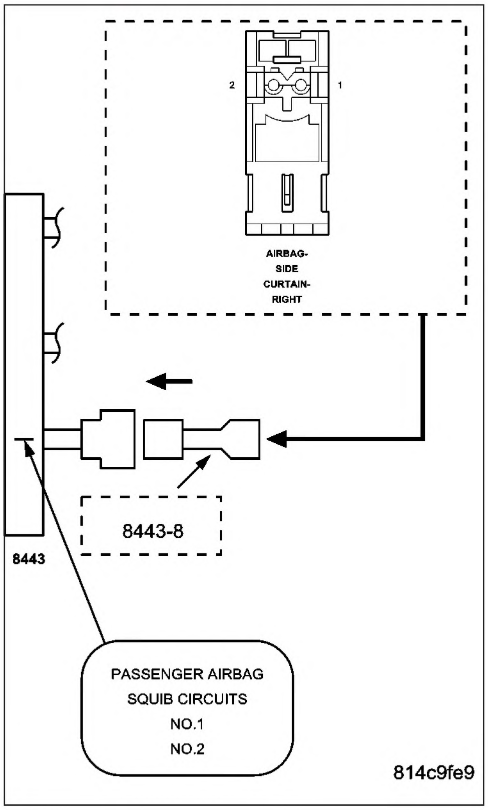
2. CHECK FOR SHORTED SQUIB CIRCUITS IN RIGHT SIDE CURTAIN AIRBAG

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, do not place an intact uncoupled curtain airbag face down on a hard surface, the airbag will propel into the air if accidentally deployed.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Right Side Curtain Airbag connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.


2
1
AIRBAG-SIDE CURTAIN-RIGHT
8443-8
8443
PASSENGER AIRBAG SQUIB CIRCUITS NO.1 NO.2
814c9fe9

Does the scan tool display: B1B23 RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER?

Yes >> Go to 3

No >> Replace the Right Side Curtain Airbag in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

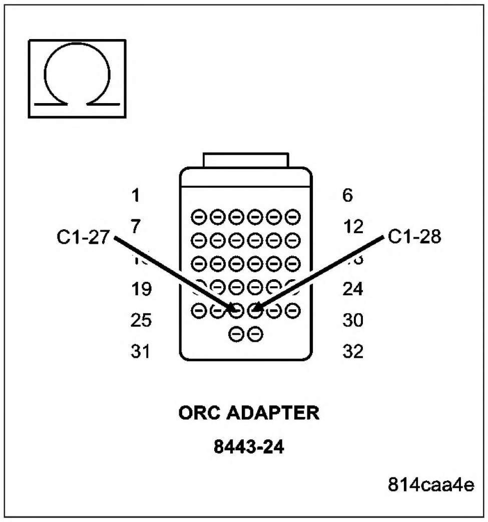
3. CHECK (R4) RIGHT CURTAIN SQUIB 1 LINE 1 CIRCUIT FOR A SHORT TO (R2) RIGHT CURTAIN SQUIB 1 LINE 2 CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the 8443 Load Tool and Jumper from the Right Side Curtain Airbag connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance between the (R4) Right Curtain Squib 1 Line 1 circuit and the (R2) Right Curtain Squib 1 Line 2 circuit at the ORC adaptor.



Is the resistance below 10K ohms?

Yes >> Repair the (R4) Right Curtain Squib 1 Line 1 circuit for a short to the (R2) Right Curtain Squib 1 Line 2 circuit.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go to 4

B1B23-RIGHT SIDE CURTAIN SQUIB 1 CIRCUIT SHORTED TOGETHER (CONTINUED)

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B28-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT LOW

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC has detected low resistance on the Driver Seat Belt Tensioner circuits.

Possible Causes
(R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT OR (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT SHORTED TO GROUND
DRIVER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

---

2. CHECK FOR SHORTED DRIVER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Seat Belt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B28 1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Driver Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B28-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT LOW (CONTINUED)

3. CHECK (R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT AND (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT FOR A SHORT TO GROUND

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Driver Seat Belt Pretensioner connector.

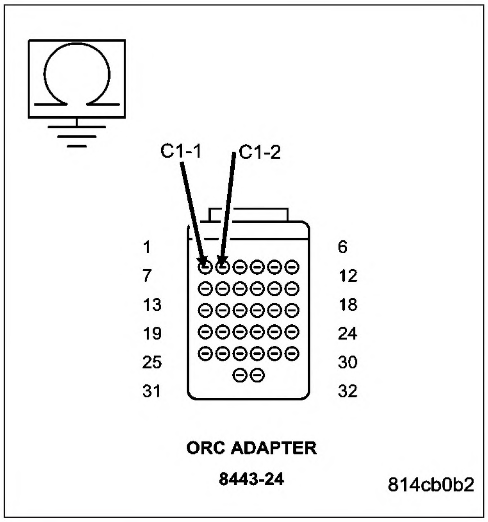
Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R55) Driver Seat Belt Tensioner Line 1 circuit between ground and the ORC adaptor.

Measure the resistance of the (R53) Driver Seat Belt Tensioner Line 2 circuit between ground and the ORC adaptor.



Is the resistance below 10K ohms on either circuit?

Yes >> Repair the Driver Seat Belt Tensioner circuit(s) for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B28-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT LOW (CONTINUED)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B29-1ST ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT HIGH

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage on the Driver Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC detects voltage on the Driver Seat Belt Tensioner circuits.

Possible Causes
(R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT OR (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT SHORTED TO BATTERY
DRIVER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

---

2. CHECK FOR SHORTED DRIVER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Seat Belt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B29 1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Driver Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B29-1ST ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT HIGH (CONTINUED)

3. CHECK (R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT AND (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT FOR A SHORT TO BATTERY

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Driver Seat Belt Pretensioner connector.

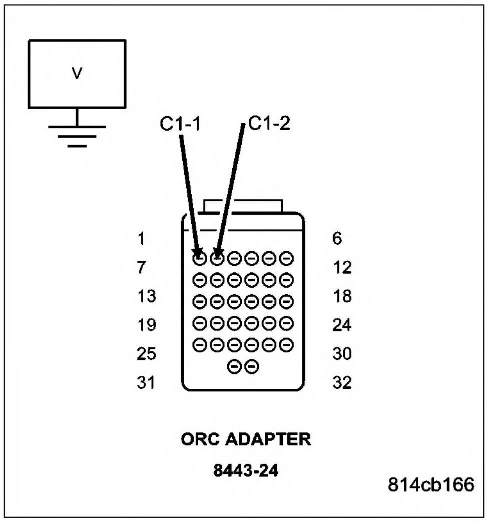
Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the voltage of the (R55) Driver Seat Belt Tensioner Line 1 circuit between the Driver Seat Belt Pretensioner connector and ground.

Measure the voltage of the (R53) Driver Seat Belt Tensioner Line 2 circuit between the Driver Seat Belt Pretensioner connector and ground.



Is there any voltage present on either circuit?

Yes >> Repair the Driver Seat Belt Tensioner circuits with voltage present for a short to battery.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B29-1ST ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT HIGH (CONTINUED)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B2A-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT OPEN

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC has detected an open or high resistance on the Driver Seat Belt Tensioner circuits.

Possible Causes
(R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT OR (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT OPEN
DRIVER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

---

2. CHECK FOR OPEN DRIVER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Seat Belt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B2A 1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT OPEN?

Yes >> Go To 3

No >> Replace the Driver Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2A-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT OPEN (CONTINUED)

3. CHECK (R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Driver Seat Belt Pretensioner connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R55) Driver Seat Belt Tensioner Line 1 circuit between the Driver Seat Belt Pretensioner connector and the 8443 ORC Adaptor.

Is the resistance below 1.0 ohm?

Yes >> Go To 4

No >> Repair the (R55) Driver Seat Belt Tensioner Line 1 circuit for and open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

4. CHECK (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT FOR AN OPEN

Measure the resistance of the (R53) Driver Seat Belt Tensioner Line 2 circuit between the Driver Seat Belt Pretensioner connector and the 8443 ORC Adaptor.

Is the resistance below 1.0 ohm?

Yes >> Go To 5

No >> Repair the (R53) Driver Seat Belt Tensioner Line 2 circuit for and open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2A-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT OPEN (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: TO AVOID PERSONAL INJURY OR DEATH, TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: TO AVOID PERSONAL INJURY OR DEATH, TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B2B-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Driver Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Driver Seat Belt Tensioner circuits.

Possible Causes
(R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT SHORTED TO (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT
DRIVER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. SELECT ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

---

2. CHECK FOR SHORTED DRIVER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Driver Seatbelt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Driver Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B2B 1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER?

Yes >> Go To 3

No >> Replace the Driver Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2B-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK (R55) DRIVER SEAT BELT TENSIONER LINE 1 CIRCUIT FOR A SHORT TO (R53) DRIVER SEAT BELT TENSIONER LINE 2 CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

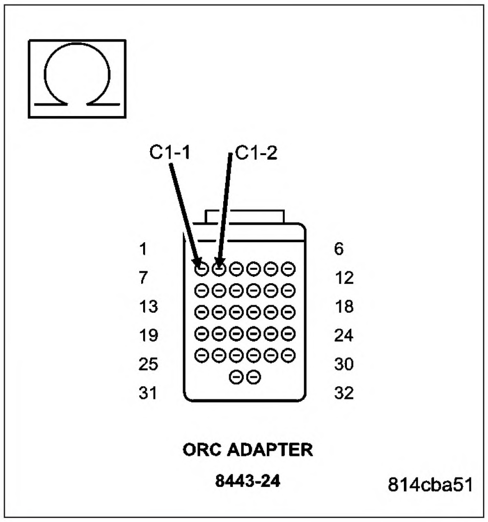
Disconnect the 8443 Load Tool and Jumper from the Driver Seat Belt Pretensioner connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance between the (R55) Driver Seat Belt Tensioner Line 1 circuit and the (R53) Driver Seat Belt Tensioner Line 2 circuit at the ORC adaptor.



Is the resistance below 10K ohms?

Yes >> Repair the (R55) Driver Seat Belt Tensioner Line 1 circuit for a short to the (R53) Driver Seat Belt Tensioner Line 2 circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2B-1st ROW DRIVER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER (CONTINUED)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B2C-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT LOW

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC has detected low resistance on the Passenger Seat Belt Tensioner circuits.

Possible Causes
(R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT OR (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT SHORTED TO GROUND
PASSENGER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

---

2. CHECK FOR SHORTED PASSENGER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Seat Belt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Passenger Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

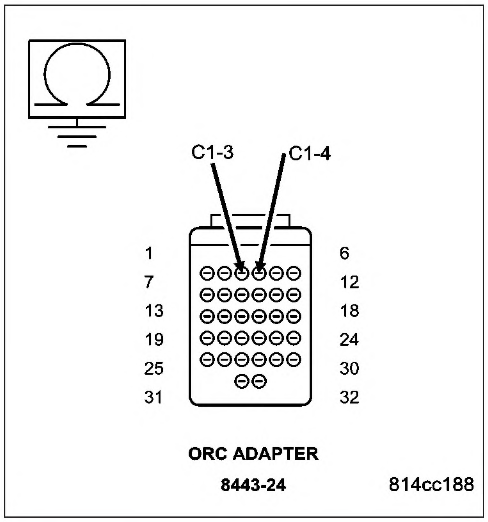
Does the scan tool display: B1B2C 1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Passenger Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2C-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT LOW (CONTINUED)

3. CHECK (R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT AND (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Passenger Seat Belt Pretensioner connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R56) Passenger Seat Belt Tensioner Line 1 circuit between ground and the ORD adaptor.

Measure the resistance of the (R54) Passenger Seat Belt Tensioner Line 2 circuit between ground and the ORC adaptor.

Is the resistance below 10K ohms on either circuit?

Yes >> Repair the Passenger Seat Belt Tensioner circuit(s) for a short to ground.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2C-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT LOW (CONTINUED)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC's present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B2D-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT HIGH

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the voltage on the Passenger Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC detects voltage on the Passenger Seat Belt Tensioner circuits.

Possible Causes
(R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT OR (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT SHORTED TO BATTERY
PASSENGER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

---

2. CHECK FOR SHORTED PASSENGER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Seat Belt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Passenger Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B2D 1st ROW PASSENGER SEAT BELT TENSIONER CIRCUIT HIGH?

Yes >> Go To 3

No >> Replace the Passenger Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2D-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT HIGH (CONTINUED)

3. CHECK (R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT AND (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT FOR A SHORT TO BATTERY

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Passenger Seat Belt Pretensioner connector.

Disconnect the ORC connectors.

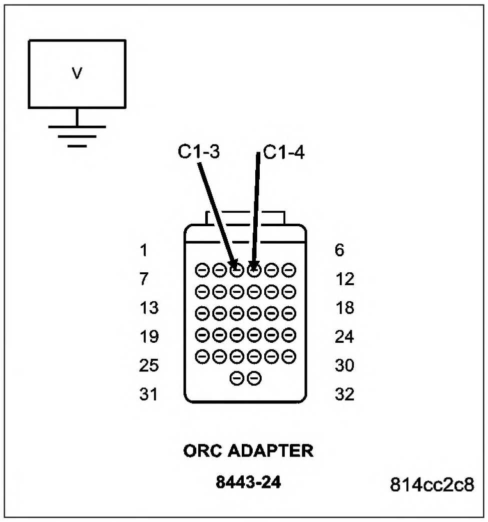
NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R56) Passenger Seat Belt Tensioner Line 1 circuit between the ORC adaptor and ground.

Measure the voltage of the (R54) Passenger Seat Belt Tensioner Line 2 circuit between the ORC adaptor and ground.



Is there any voltage present on either circuit?

Yes >> Repair the Passenger Seat Belt Tensioner circuit9s0 for a short to battery.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

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4. OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2D-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT HIGH (CONTINUED)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer

B1B2E-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT OPEN

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC has detected an open or high resistance on the Passenger Seat Belt Tensioner circuits.

Possible Causes
(R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT OR (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT OPEN
PASSENGER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 6

---

2. CHECK FOR OPEN PASSENGER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Seat Belt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Passenger Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
With the scan tool, read the active ORC DTC's.

Does the scan tool display: B1B2E 1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT OPEN?

Yes >> Go To 3

No >> Replace the Passenger Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2E-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT OPEN (CONTINUED)

3. CHECK (R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the 8443 Load Tool and Jumper from the Passenger Seat Belt Pretensioner connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance of the (R56) Passenger Seat Belt Tensioner Line 1 circuit between the Passenger Seat Belt Pretensioner connector and the 8443 ORC Adaptor.

Is the resistance below 1.0 ohm?

Yes >> Go To 4

No >> Repair the (R56) Passenger Seat Belt Tensioner Line 1 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

4. CHECK (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT FOR AN OPEN

Measure the resistance of the (R54) Passenger Seat Belt Tensioner Line 2 circuit between the Passenger Seat Belt Pretensioner connector and the 8443 ORC Adaptor.

Is the resistance below 1.0 ohm?

Yes >> Go to 5

No >> Repair the (R54) Passenger Seat Belt Tensioner Line 2 circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

5. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2E-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT OPEN (CONTINUED)

6. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B2F-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on, the Occupant Restraint Controller (ORC) monitors the resistance of the Passenger Seat Belt Tensioner circuits.
- **Set Condition:**
  The ORC has detected low resistance between the Passenger Seat Belt Tensioner circuits.

Possible Causes
(R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT SHORTED TO (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT
PASSENGER SEAT BELT PRETENSIONER
ORC

Diagnostic Test

1. DETERMINE ACTIVE OR STORED DTC

NOTE: Ensure the battery is fully charged.

NOTE: The scan tool, SRS Airbag Load Tool MRL 8443, and DVOM are required to perform the following test.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.
Select Active or Stored DTC.

Is the DTC active or stored?

ORC - ACTIVE DTC
Go To 2

ORC - STORED DTC
Go To 5

---

2. CHECK FOR SHORTED PASSENGER SEAT BELT PRETENSIONER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Passenger Seat Belt Pretensioner connector.

NOTE: Check connectors - Clean and repair as necessary.
Connect the 8443 Load Tool and appropriate Jumper to the Passenger Seat Belt Pretensioner connector.

WARNING: To avoid personal injury or death, turn the ignition on then reconnect the battery.
With the scan tool, read the active ORC DTC’s.

Does the scan tool display: B1B2F 1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER?

Yes >> Go To 3

No >> Replace the Passenger Seat Belt Pretensioner in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2F-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER (CONTINUED)

3. CHECK (R56) PASSENGER SEAT BELT TENSIONER LINE 1 CIRCUIT FOR A SHORT TO THE (R54) PASSENGER SEAT BELT TENSIONER LINE 2 CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

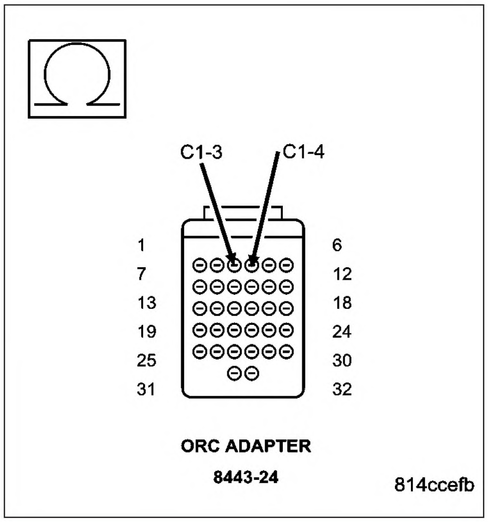
Disconnect the 8443 Load Tool and Jumper from the Passenger Seat Belt Pretensioner connector.

Disconnect the ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the 8443 Load Tool ORC Adaptor to the ORC C1 connector.

Measure the resistance between the (R56) Passenger Seat Belt Tensioner Line 1 circuit and the (R54) Passenger Seat Belt Tensioner Line 2 circuit at the ORC adaptor.



Is the resistance below 10K ohms?

Yes >> Repair the (R56) Passenger Seat Belt Tensioner Line 1 circuit for a short to the (R54) Passenger Seat Belt Tensioner Line 2 circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go to 4

---

4. REPLACE THE ORC

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B2F-1st ROW PASSENGER SEAT BELT PRETENSIONER CIRCUIT SHORTED TOGETHER (CONTINUED)

5. STORED ORC DTC

With the scan tool, record and erase all DTC's from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

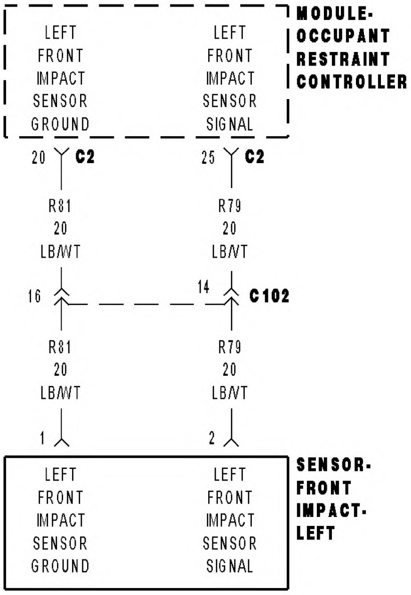
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

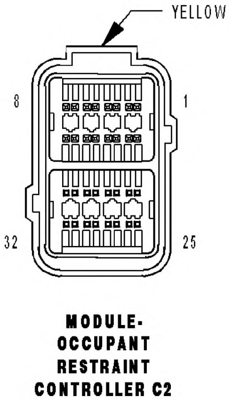
Are any ACTIVE DTC's present?

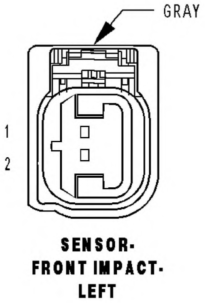
Yes >> Select the appropriate diagnostic procedure from the Table of Contents in this section.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
LEFT FRONT IMPACT SENSOR GROUND
LEFT FRONT IMPACT SENSOR SIGNAL
20 C2
25 C2
R81 20 LB/WT
R79 20 LB/WT
16
14
C102
R81 20 LB/WT
R79 20 LB/WT
1
2
LEFT FRONT IMPACT SENSOR GROUND
LEFT FRONT IMPACT SENSOR SIGNAL
SENSOR-
FRONT
IMPACT-
LEFT


YELLOW
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2


GRAY
1
2
SENSOR-
FRONT IMPACT-
LEFT

8133c184

B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Front Left Impact Sensor over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Front Left Impact Sensor do not establish and maintain valid data communications.

Possible Causes
(R79) SIGNAL CIRCUIT SHORTED TO BATTERY
(R79) SIGNAL CIRCUIT SHORTED TO GROUND
(R79, R81) FRONT LEFT IMPACT SENSOR CIRCUITS SHORTED TOGETHER
(R81) FRONT LEFT IMPACT SENSOR GROUND CIRCUIT OPEN
(R79) FRONT LEFT IMPACT SENSOR SIGNAL CIRCUIT OPEN
ORC, FRONT LEFT IMPACT SENSOR

Diagnostic Test

1. VERIFY THAT DTC B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

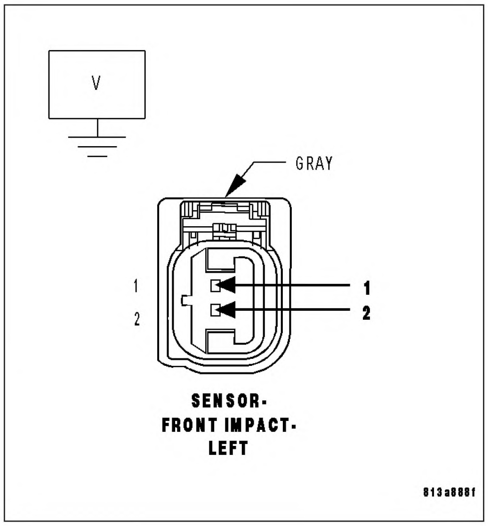
Does the scan tool display active: B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL?

Yes >> Go To 2

No >> Go To 9

B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

2. CHECK THE (R79, R81) FRONT LEFT IMPACT SENSOR SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Front Left Impact Sensor connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R79) Front Left Impact Sensor Signal circuit and (R81) Sensor Ground circuit at the Front Left Impact Sensor connector and ground.

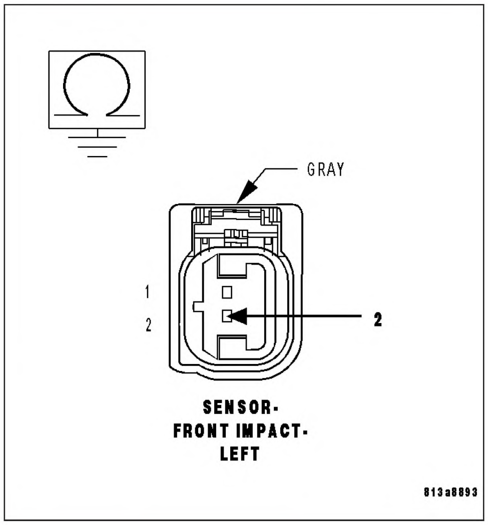
Is there any voltage present?

Yes >> Repair the (R79, R81) Front Left Impact Sensor circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (R79) FRONT LEFT IMPACT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Measure the resistance of the (R79) Front Left Impact Sensor Signal circuit between the Front Left Impact Sensor connector and ground.

Is the resistance below 100K ohms?

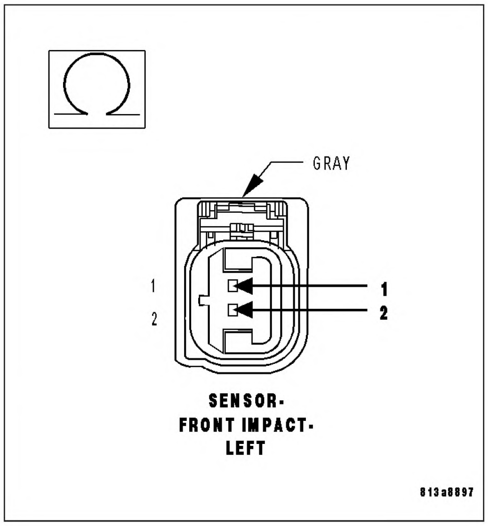
Yes >> Repair the (R79) Front Left Impact Sensor Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

4. CHECK THE (R79, R81) FRONT LEFT IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R79) Front Left Impact Sensor Signal and (R81) Sensor Ground circuits at the Front Left Impact Sensor connector.


GRAY
1
2
1
2
SENSOR-
FRONT IMPACT-
LEFT
813a8897

Is the resistance below 100K ohms?

Yes >> Repair the (R79, R81) Front Left Impact Sensor circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

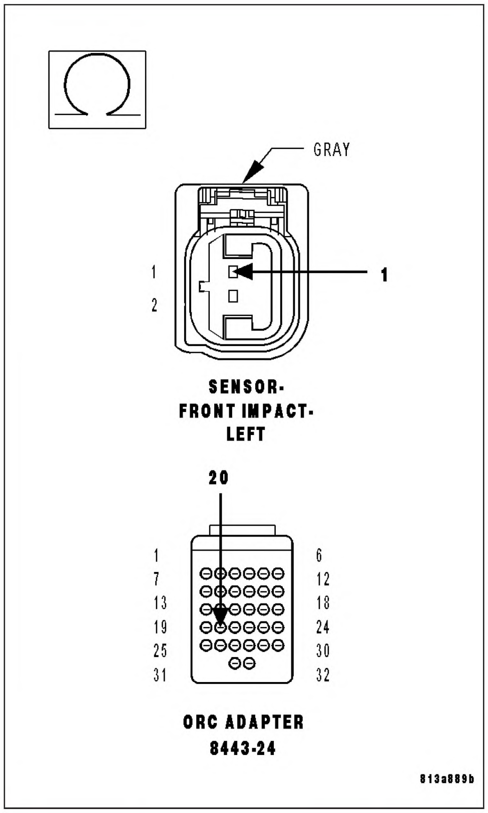
No >> Go To 5

---

5. CHECK THE (R81) FRONT LEFT IMPACT SENSOR GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Restraint Control Module connector.

Measure the resistance of the (R81) Front Left Impact Sensor Ground circuit between the Front Left Impact Sensor connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
FRONT IMPACT-
LEFT
20
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a889b

Is the resistance below 1 ohm?

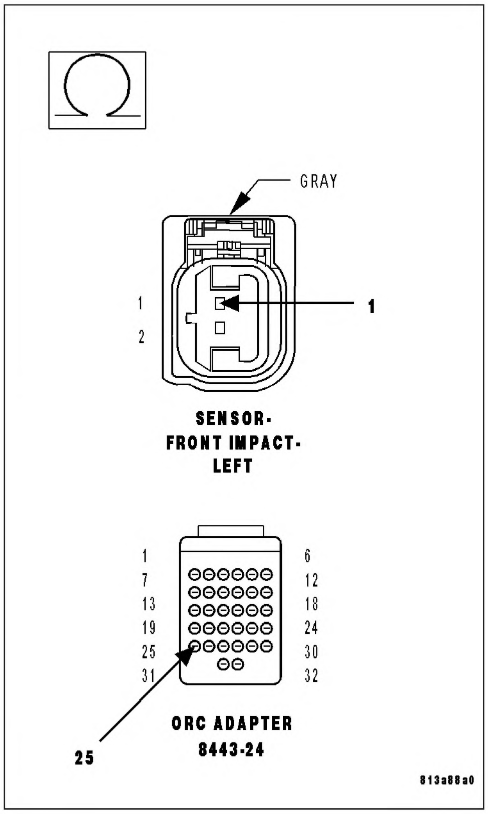
Yes >> Go To 6

No >> Repair the (R81) Front Left Impact Sensor 1 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

6. CHECK THE (R79) FRONT LEFT IMPACT SENSOR CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R79) Front Left Impact Sensor Ground circuit between the Front Left Impact Sensor connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R79) Front Left Impact Sensor Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE FRONT LEFT IMPACT SENSOR

Replace the Front Left Impact Sensor.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Front Left Impact Sensor DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

B1B70-UP-FRONT LEFT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Information.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

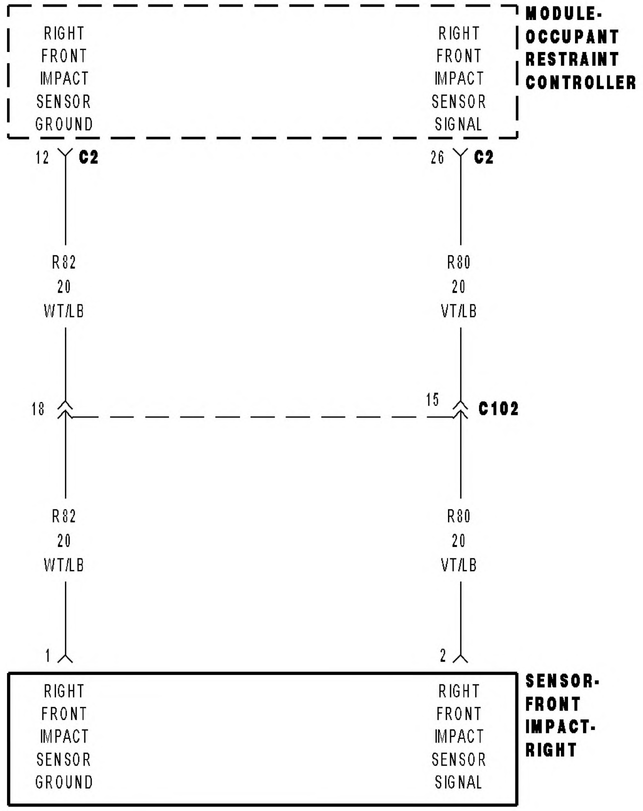
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

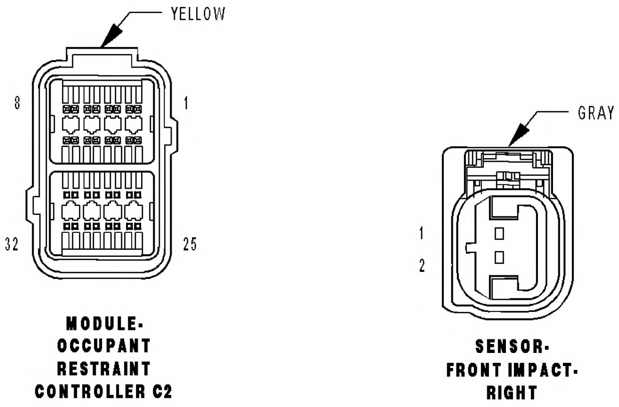
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL


RIGHT FRONT IMPACT SENSOR GROUND
RIGHT FRONT IMPACT SENSOR SIGNAL
MODULE-OCCUPANT RESTRAINT CONTROLLER
12 C2
26 C2
R82
20
WT/LB
R80
20
VT/LB
18
15 C102
R82
20
WT/LB
R80
20
VT/LB
1
2
RIGHT FRONT IMPACT SENSOR GROUND
RIGHT FRONT IMPACT SENSOR SIGNAL
SENSOR-FRONT IMPACT-RIGHT


YELLOW
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
GRAY
1
2
SENSOR-FRONT IMPACT-RIGHT

8133a491

B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Front Right Impact Sensor over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Front Right Impact Sensor do not establish and maintain valid data communications.

Possible Causes
(R80) SIGNAL CIRCUIT SHORTED TO BATTERY
(R80) SIGNAL CIRCUIT SHORTED TO GROUND
(R80, R82) FRONT RIGHT IMPACT SENSOR CIRCUITS SHORTED TOGETHER
(R82) FRONT RIGHT IMPACT SENSOR GROUND CIRCUIT OPEN
(R80) FRONT RIGHT IMPACT SENSOR SIGNAL CIRCUIT OPEN
ORC, FRONT RIGHT IMPACT SENSOR

Diagnostic Test

1. VERIFY THAT DTC B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

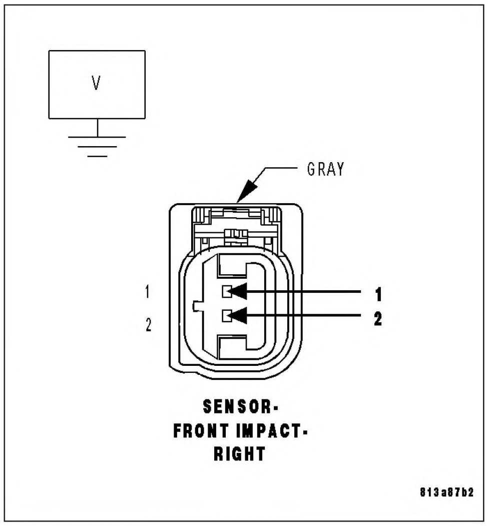
Does the scan tool display active: B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL?

Yes >> Go To 2

No >> Go To 9

B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

2. CHECK THE (R80, R82) FRONT RIGHT IMPACT SENSOR SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Front Right Impact Sensor connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R80) Front Right Impact Sensor Signal circuit and (R82) Sensor Ground circuit at the Front Right Impact Sensor connector and ground.

Is there any voltage present?

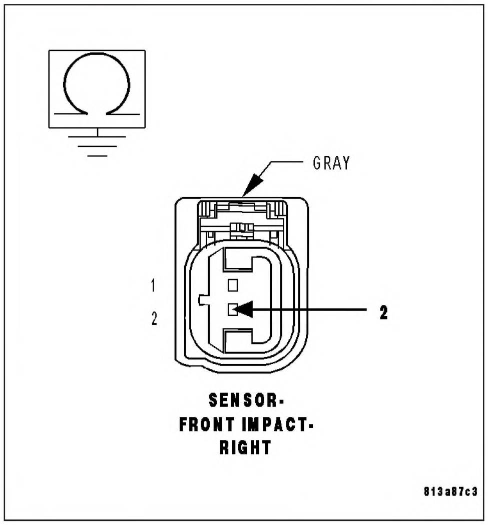
Yes >> Repair the (R80, R82) Front Right Impact Sensor circuits for a short to battery.

Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (R80) FRONT RIGHT IMPACT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

Measure the resistance of the (R80) Front Right Impact Sensor Signal circuit between the Front Right Impact Sensor connector and ground.

Is the resistance below 100K ohms?

Yes >> Repair the (R80) Front Right Impact Sensor Signal circuit for a short to ground.

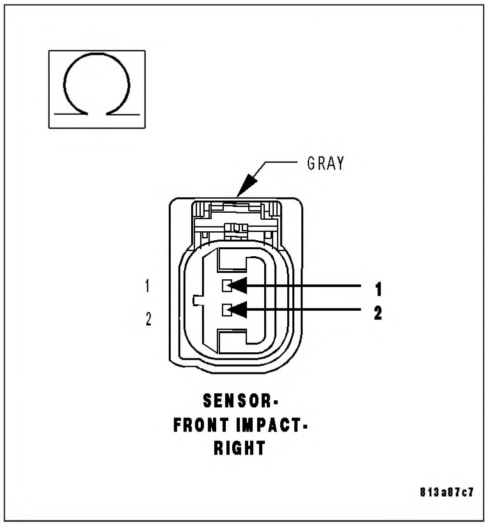
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

4. CHECK THE (R80, R82) FRONT RIGHT IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R80) Front Right Impact Sensor Signal and (R82) Sensor Ground circuits at the Front Right Impact Sensor connector.



GRAY
1
2
1
2
SENSOR-
FRONT IMPACT-
RIGHT
813a87c7

Is the resistance below 100K ohms?

Yes >> Repair the (R80, R82) Front Right Impact Sensor circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

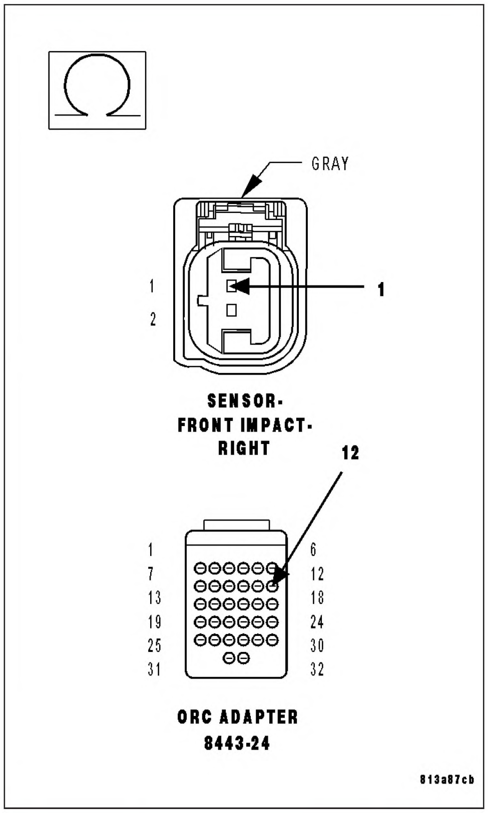
No >> Go To 5

---

5. CHECK THE (R82) FRONT RIGHT IMPACT SENSOR GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R82) Front Right Impact Sensor Ground circuit between the Front Right Impact Sensor connector and the 8443 Load Tool ORC Adaptor.



GRAY
1
2
1
SENSOR-
FRONT IMPACT-
RIGHT
12
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a87cb

Is the resistance below 1 ohm?

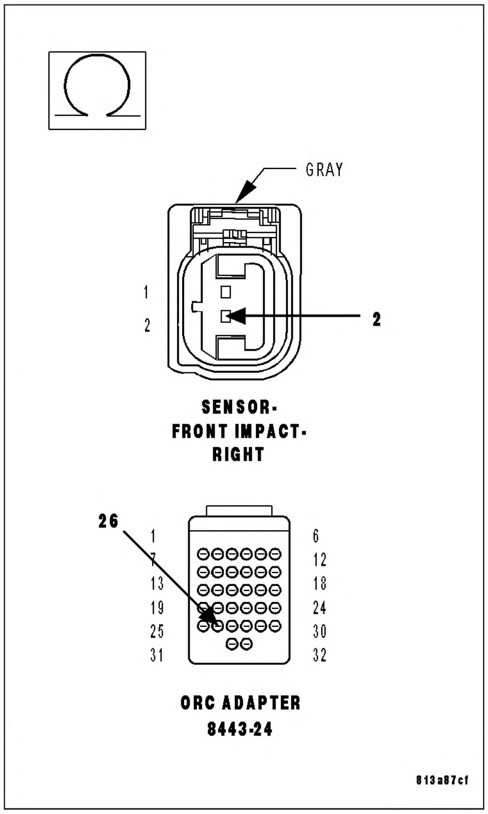
Yes >> Go To 6

No >> Repair the (R82) Front Right Impact Sensor 2 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

6. CHECK THE (R80) FRONT RIGHT IMPACT SENSOR CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R80) Front Right Impact Sensor Signal circuit between the Front Right Impact Sensor connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R80) Front Right Impact Sensor Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE FRONT RIGHT IMPACT SENSOR

Replace the Front Right Impact Sensor.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Front Right Impact Sensor DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

B1B71-UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR INTERNAL (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

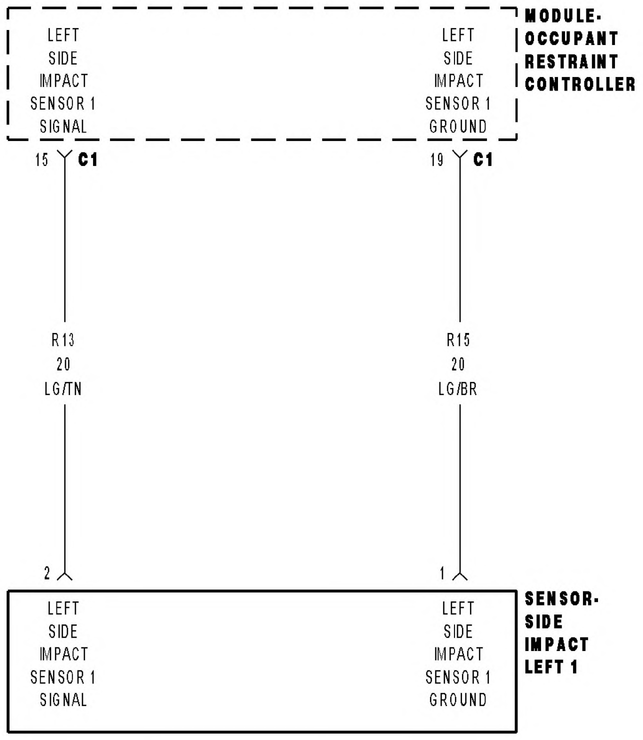
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

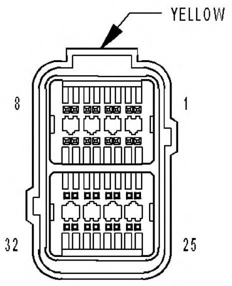
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

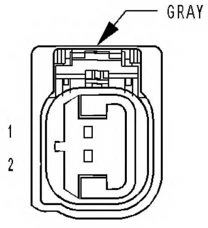
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL


LEFT SIDE IMPACT SENSOR 1 SIGNAL
LEFT SIDE IMPACT SENSOR 1 GROUND
MODULE-OCCUPANT RESTRAINT CONTROLLER
15 C1
19 C1
R13
20
LG/TN
R15
20
LG/BR
2
1
LEFT SIDE IMPACT SENSOR 1 SIGNAL
LEFT SIDE IMPACT SENSOR 1 GROUND
SENSOR-SIDE IMPACT LEFT 1


YELLOW
8
1
32
25

MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1



SENSOR-
SIDE IMPACT-
LEFT 1

8133a4ed

B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Left Side Impact Sensor 1 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Left Side Impact Sensor 1 do not establish and maintain valid data communications.

Possible Causes
(R13) SIGNAL CIRCUIT SHORTED TO BATTERY
(R13) SIGNAL CIRCUIT SHORTED TO GROUND
(R13, R15) LEFT SIDE IMPACT SENSOR 1 CIRCUITS SHORTED TOGETHER
(R15) LEFT SIDE IMPACT SENSOR 1 GROUND CIRCUIT OPEN
(R13) LEFT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT OPEN
ORC, LEFT SIDE IMPACT SENSOR 1

Diagnostic Test

1. VERIFY THAT DTC B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL 1 IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL?

Yes >> Go To 2

No >> Go To 9

B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

2. CHECK THE (R13, R15) LEFT SIDE IMPACT SENSOR 1 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Left front Impact Sensor 1 connector.

Disconnect the ORC connector.

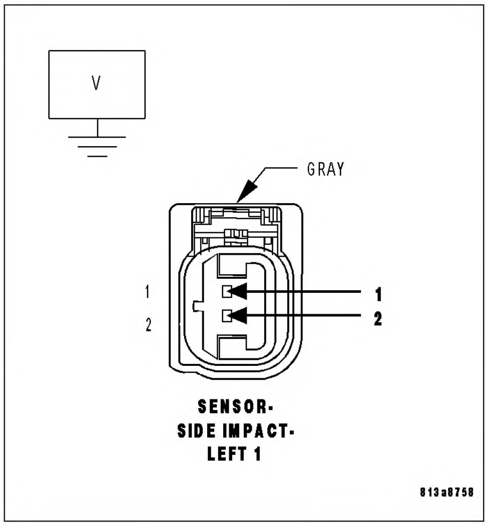
WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R13) Left Side Impact Sensor 1 Signal circuit and (R15) Sensor Ground circuit at the Left Side Impact Sensor 1 connector and ground.

Is there any voltage present?

Yes >> Repair the (R13, R15) Left Side Impact Sensor 1 circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3



---

3. CHECK THE (R13) LEFT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT FOR A SHORT TO GROUND

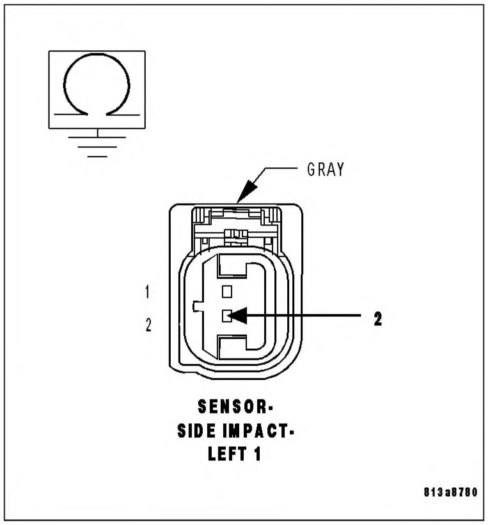
WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

Measure the resistance of the (R13) Left Side Impact Sensor 1 Signal circuit between the Left Side Impact Sensor 1 connector and ground.

Is the resistance below 100K ohms?

Yes >> Repair the (R13) Left Side Impact Sensor 1 Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

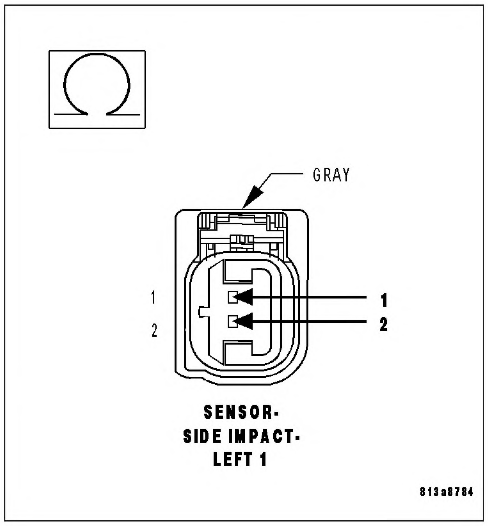
No >> Go To 4



B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

4. CHECK THE (R13, R15) LEFT SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R13) Left Side Impact Sensor 1 Signal and (R15) Sensor Ground circuits at the Left Side Impact Sensor 1 connector.


GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
LEFT 1
813a8784

Is the resistance below 100K ohms?

Yes >> Repair the (R13, R15) Left Side Impact Sensor 1 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

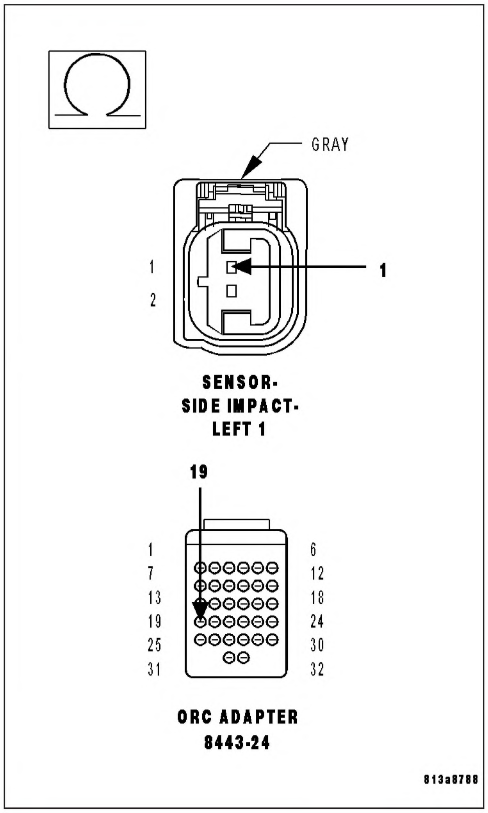
No >> Go To 5

---

5. CHECK THE (R15) LEFT SIDE IMPACT SENSOR 1 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R15) Left Side Impact Sensor 1 Ground circuit between the Left Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
SIDE IMPACT-
LEFT 1
19
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a8788

Is the resistance below 1 ohm?

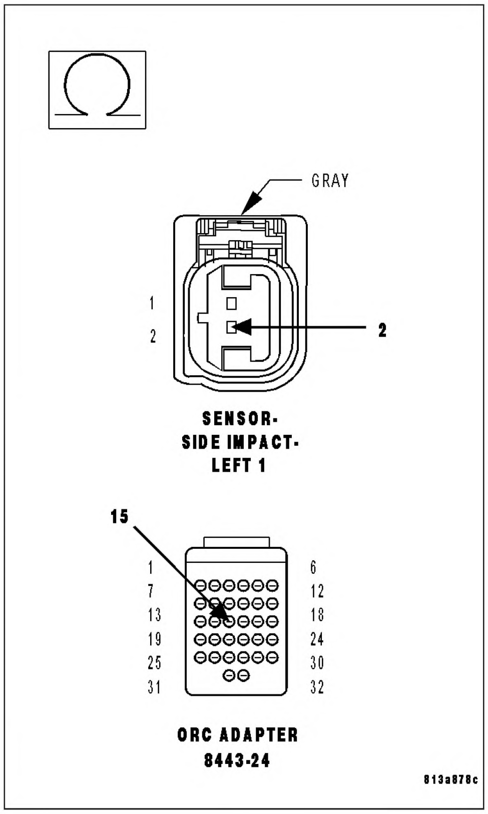
Yes >> Go To 6

No >> Repair the (R15) Left Side Impact Sensor 1 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

6. CHECK THE (R13) LEFT SIDE IMPACT SENSOR 1 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R13) Left Side Impact Sensor 1 Signal circuit between the Left Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R13) Left Side Impact Sensor 1 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE LEFT SIDE IMPACT SENSOR 1

Replace the Left Side Impact Sensor 1.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Left Side Impact Sensor 1 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

B1B72-LEFT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

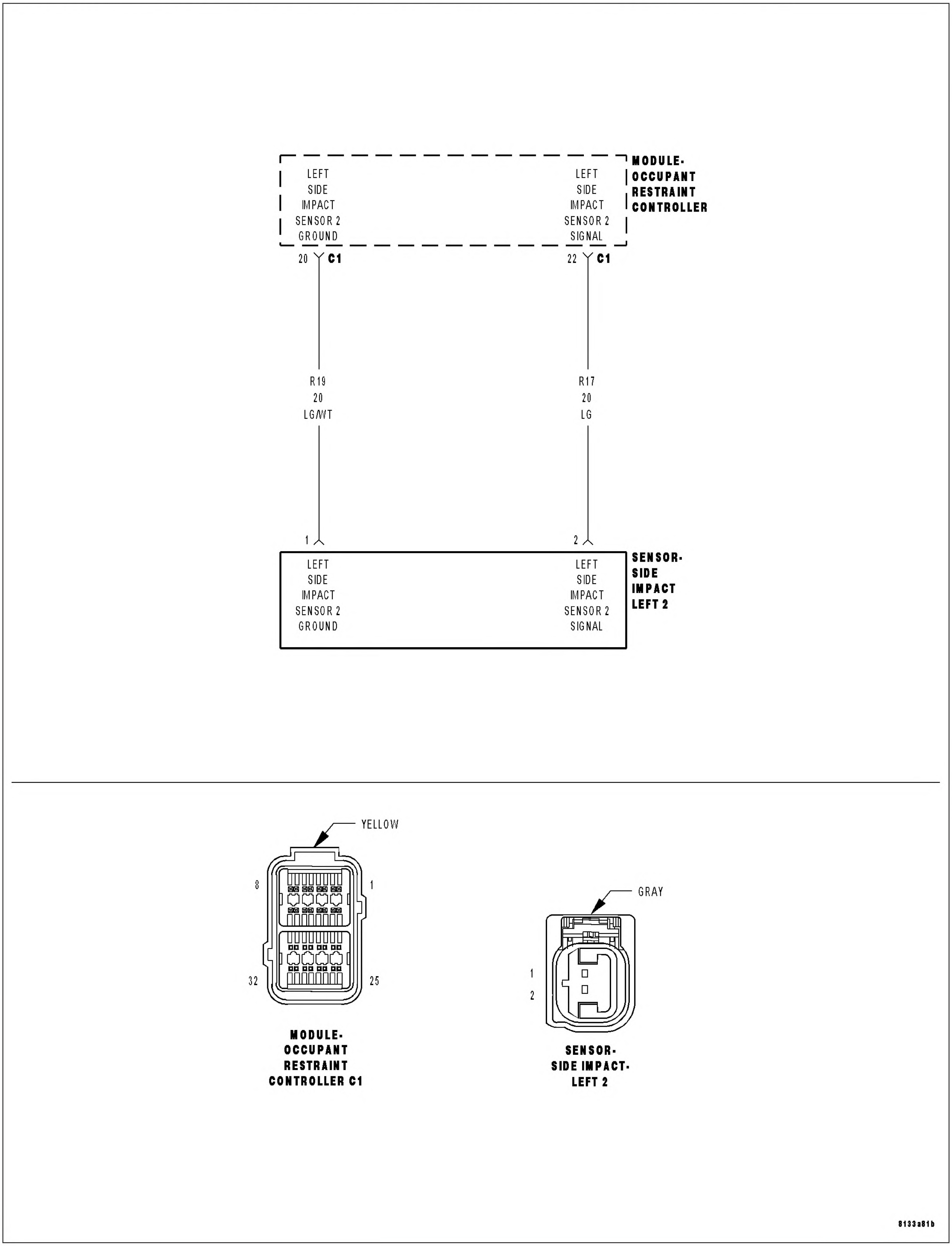
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL


LEFT SIDE IMPACT SENSOR 2 GROUND
LEFT SIDE IMPACT SENSOR 2 SIGNAL
MODULE-OCCUPANT RESTRAINT CONTROLLER
20 C1
22 C1
R19
20
LG/WT
R17
20
LG
1
2
LEFT SIDE IMPACT SENSOR 2 GROUND
LEFT SIDE IMPACT SENSOR 2 SIGNAL
SENSOR-SIDE IMPACT LEFT 2
YELLOW
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C1
GRAY
1
2
SENSOR-SIDE IMPACT-LEFT 2
8133a81b

B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Left Side Impact Sensor 2 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Left Side Impact Sensor 2 do not establish and maintain valid data communications.

Possible Causes
(R17) SIGNAL CIRCUIT SHORTED TO BATTERY
(R17) SIGNAL CIRCUIT SHORTED TO GROUND
(R17, R19) LEFT SIDE IMPACT SENSOR 2 CIRCUITS SHORTED TOGETHER
(R19) LEFT SIDE IMPACT SENSOR 2 GROUND CIRCUIT OPEN
(R17) LEFT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT OPEN
ORC, LEFT SIDE IMPACT SENSOR 2

Diagnostic Test

1. VERIFY THAT DTC B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL?

Yes >> Go To 2

No >> Go To 9

B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

2. CHECK THE (R17, R19) LEFT SIDE IMPACT SENSOR 2 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Left front Impact Sensor 2 connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

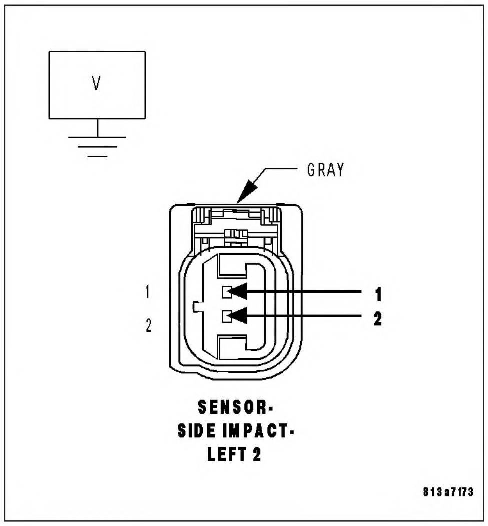
Measure the voltage of the (R17) Left Side Impact Sensor 2 Signal circuit and (R19) Sensor Ground circuit at the Left Side Impact Sensor 2 connector and ground.

Is there any voltage present?

Yes >> Repair the (R17, R19) Left Side Impact Sensor 2 circuits for a short to battery.

Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3



---

3. CHECK THE (R17) LEFT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT FOR A SHORT TO GROUND

WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

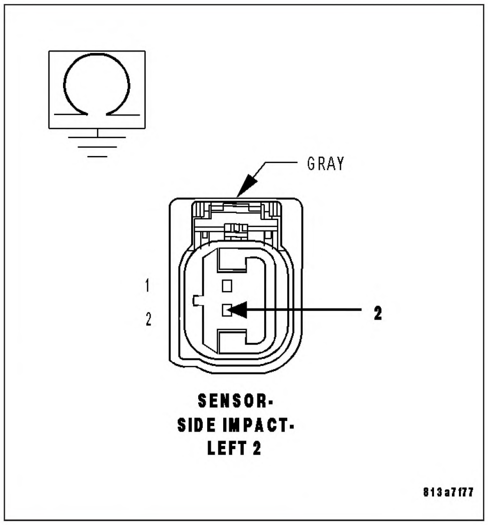
Measure the resistance of the (R17) Left Side Impact Sensor 2 Signal circuit between the Left Side Impact Sensor 2 connector and ground.

Is the resistance below 100K ohms?

Yes >> Repair the (R17) Left Side Impact Sensor 2 Signal circuit for a short to ground.

Perform the ORC VERIFICATION TEST - VER 1.

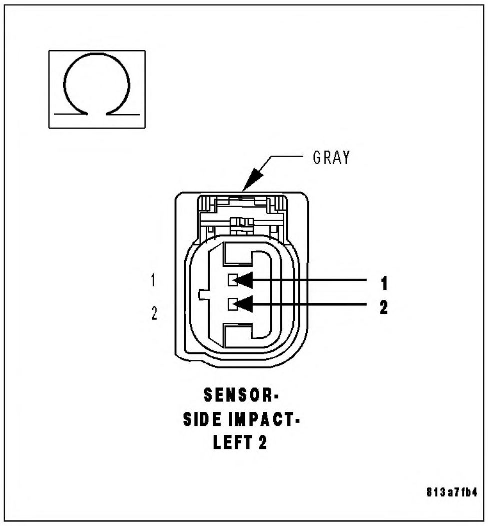
No >> Go To 4



B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

4. CHECK THE (R17, R19) LEFT SIDE IMPACT SENSOR 2 CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R17) Left Side Impact Sensor 2 Signal and (R19) Sensor Ground circuits at the Left Side Impact Sensor 2 connector.


GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
LEFT 2
813a71b4

Is the resistance below 100K ohms?

Yes >> Repair the (R17, R19) Left Side Impact Sensor 2 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

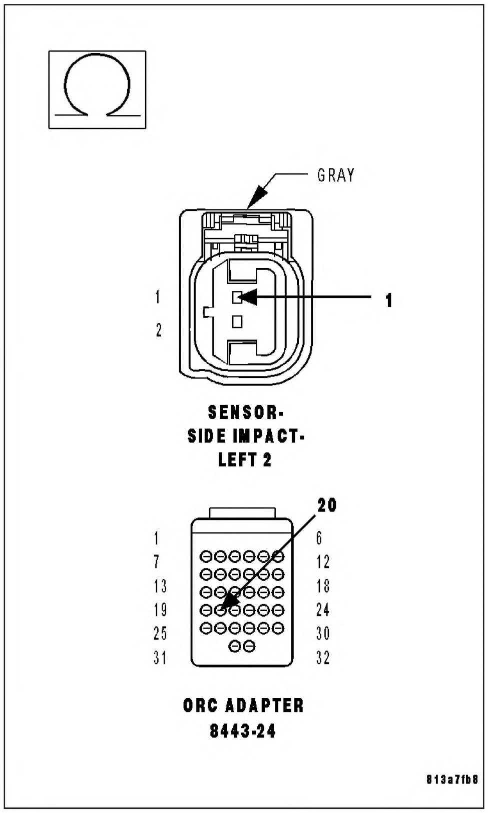
No >> Go To 5

---

5. CHECK THE (R19) LEFT SIDE IMPACT SENSOR 2 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R19) Left Side Impact Sensor 2 Ground circuit between the Left Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
SIDE IMPACT-
LEFT 2
20
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a71b8

Is the resistance below 1 ohm?

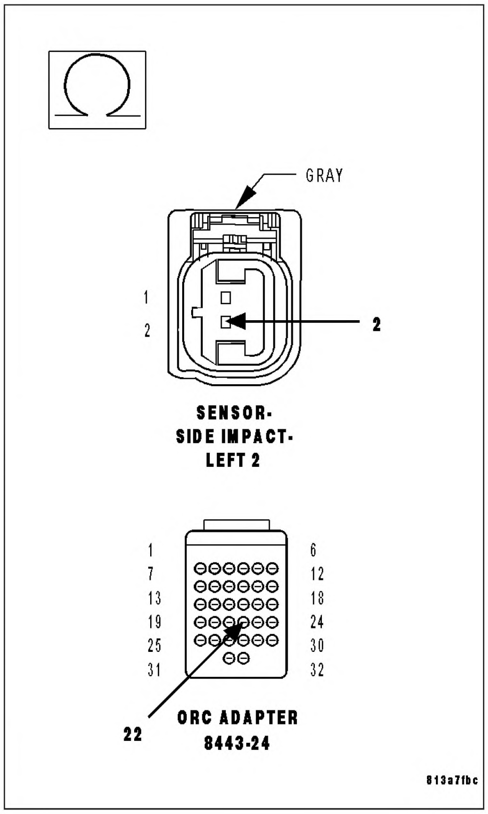
Yes >> Go To 6

No >> Repair the (R19) Left Side Impact Sensor 2 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

6. CHECK THE (R17) LEFT SIDE IMPACT SENSOR 2 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R17) Left Side Impact Sensor 2 Signal circuit between the Left Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R17) Left Side Impact Sensor 2 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE LEFT SIDE IMPACT SENSOR 2

Replace the Left Side Impact Sensor 2.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Left Side Impact Sensor 2 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

B1B73-LEFT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

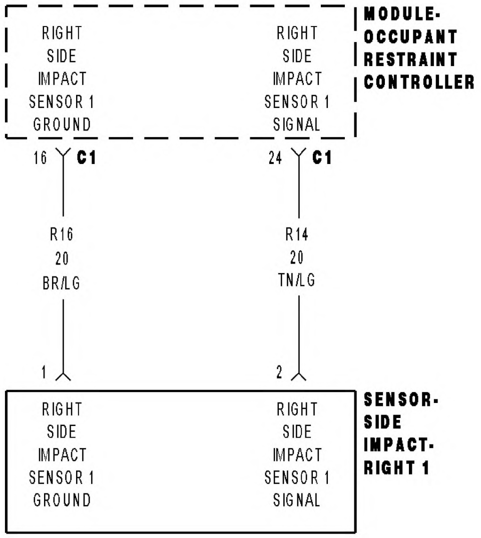
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

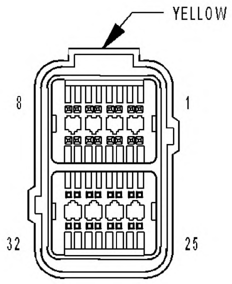
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

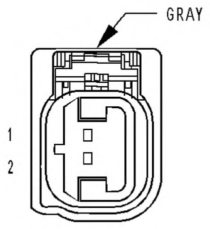
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
RIGHT SIDE IMPACT SENSOR 1 GROUND
RIGHT SIDE IMPACT SENSOR 1 SIGNAL
16 C1
24 C1
R16
20
BR/LG
R14
20
TN/LG
1
2
RIGHT SIDE IMPACT SENSOR 1 GROUND
RIGHT SIDE IMPACT SENSOR 1 SIGNAL
SENSOR-
SIDE
IMPACT-
RIGHT 1


YELLOW
8
1
32
25

MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1



SENSOR-
SIDE IMPACT-
RIGHT 1

8133a88b

B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Right Side Impact Sensor 1 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Right Side Impact Sensor 1 do not establish and maintain valid data communications.

Possible Causes
(R14) SIGNAL CIRCUIT SHORTED TO BATTERY
(R14) SIGNAL CIRCUIT SHORTED TO GROUND
(R14, R16) RIGHT SIDE IMPACT SENSOR 1 CIRCUITS SHORTED TOGETHER
(R16) RIGHT SIDE IMPACT SENSOR 1 GROUND CIRCUIT OPEN
(R14) RIGHT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT OPEN
ORC, RIGHT SIDE IMPACT SENSOR 1

Diagnostic Test

1. VERIFY THAT DTC B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

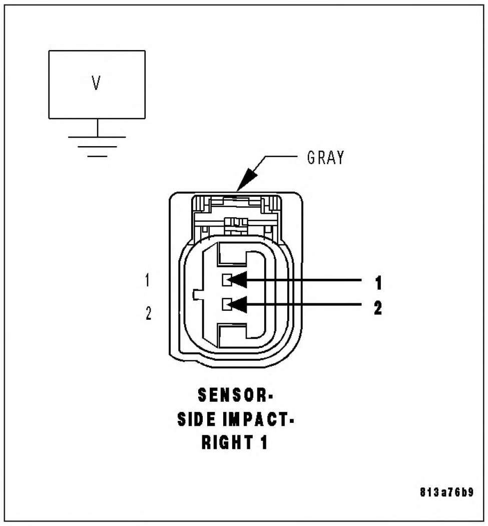
Does the scan tool display active: B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL?

Yes >> Go To 2

No >> Go To 9

B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

2. CHECK THE (R14, R16) RIGHT SIDE IMPACT SENSOR 1 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Right front Impact Sensor 1 connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R14) Right Side Impact Sensor 1 Signal circuit and (R16) Sensor Ground circuit at the Right Side Impact Sensor 1 connector and ground.

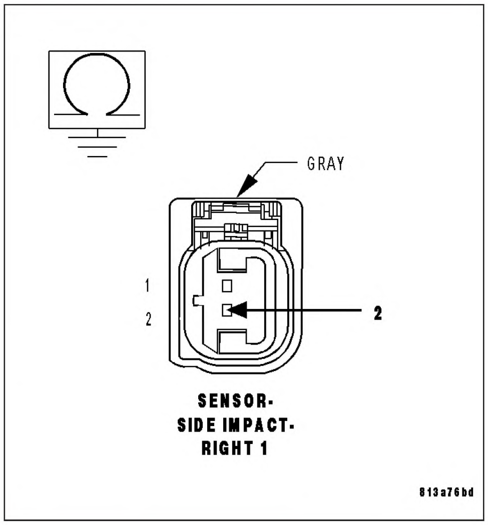
Is there any voltage present?

Yes >> Repair the (R14, R16) Right Side Impact Sensor 1 circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (R14) RIGHT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

Measure the resistance of the (R14) Right Side Impact Sensor 1 Signal circuit between the Right Side Impact Sensor 1 connector and ground.

Is the resistance below 100K ohms?

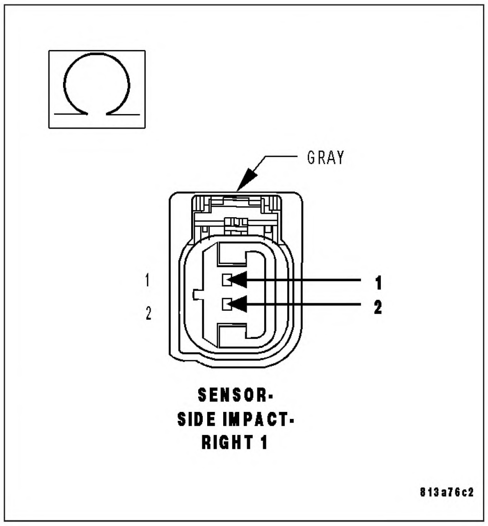
Yes >> Repair the (R14) Right Side Impact Sensor 1 Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

4. CHECK THE (R14, R16) RIGHT SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R14) Right Side Impact Sensor 1 Signal and (R16) Sensor Ground circuits at the Right Side Impact Sensor 1 connector.


GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
RIGHT 1
813a76c2

Is the resistance below 100K ohms?

Yes >> Repair the (R14, R16) Right Side Impact Sensor 1 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

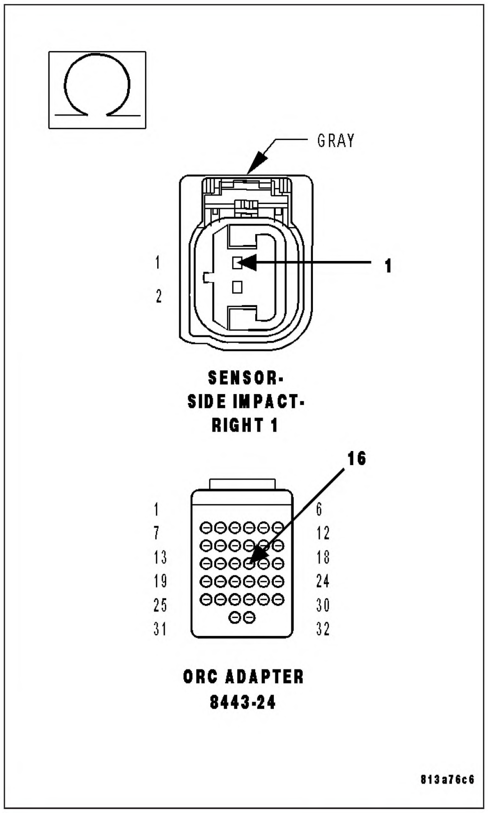
No >> Go To 5

---

5. CHECK THE (R16) RIGHT SIDE IMPACT SENSOR 1 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R16) Right Side Impact Sensor 1 Ground circuit between the Right Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
SIDE IMPACT-
RIGHT 1
16
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a76c6

Is the resistance below 1 ohm?

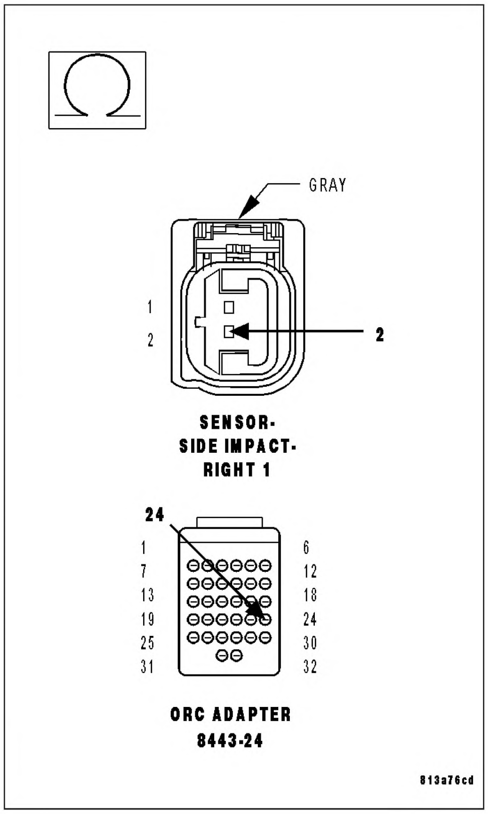
Yes >> Go To 6

No >> Repair the (R16) Right Side Impact Sensor 1 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

6. CHECK THE (R14) RIGHT SIDE IMPACT SENSOR 1 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R14) Right Side Impact Sensor 1 Signal circuit between the Right Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R14) Right Side Impact Sensor 1 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE RIGHT SIDE IMPACT SENSOR 1

Replace the Right Side Impact Sensor 1.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Right Side Impact Sensor 1 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

B1B75-RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 INTERNAL (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

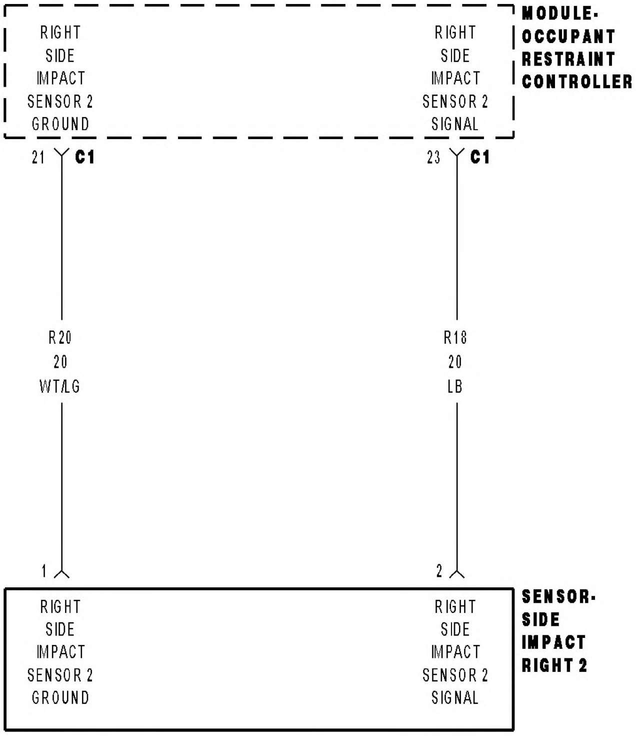
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

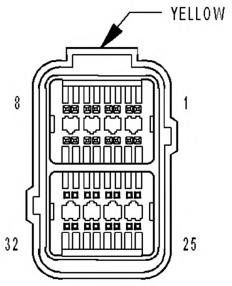
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

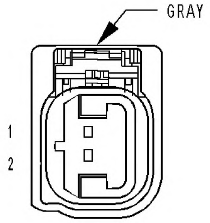
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL


RIGHT SIDE IMPACT SENSOR 2 GROUND
RIGHT SIDE IMPACT SENSOR 2 SIGNAL
MODULE-OCCUPANT RESTRAINT CONTROLLER
21 C1
23 C1
R20
20
WT/LG
R18
20
LB
1
2
RIGHT SIDE IMPACT SENSOR 2 GROUND
RIGHT SIDE IMPACT SENSOR 2 SIGNAL
SENSOR-SIDE IMPACT RIGHT 2


YELLOW
8
1
32
25

MODULE-OCCUPANT RESTRAINT CONTROLLER C1



SENSOR-SIDE IMPACT-RIGHT 2

8133a8a1

B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Right Side Impact Sensor 2 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Right Side Impact Sensor 2 do not establish and maintain valid data communications.

Possible Causes
(R18) SIGNAL CIRCUIT SHORTED TO BATTERY
(R18) SIGNAL CIRCUIT SHORTED TO GROUND
(R18, R20) RIGHT SIDE IMPACT SENSOR 2 CIRCUITS SHORTED TOGETHER
(R20) RIGHT SIDE IMPACT SENSOR 2 GROUND CIRCUIT OPEN
(R18) RIGHT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT OPEN
ORC, RIGHT SIDE IMPACT SENSOR 2

Diagnostic Test

1. VERIFY ACTIVE B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL

Turn the ignition on.

With the scan tool, read ORC DTCs.

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Does the scan tool display an active: B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL?

Yes >> Go To 2

No >> Go To 9

B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

2. CHECK THE (R18, R20) RIGHT SIDE IMPACT SENSOR 2 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY

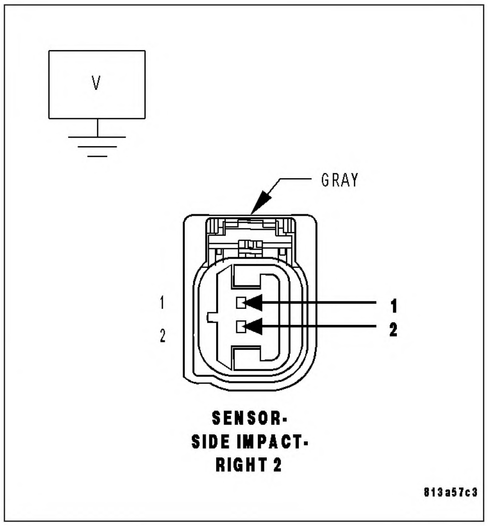
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Right front Impact Sensor 2 connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R18) Right Side Impact Sensor 2 Signal circuit and (R20) Sensor Ground circuit at the Right Side Impact Sensor 2 connector and ground.



Is there any voltage present?

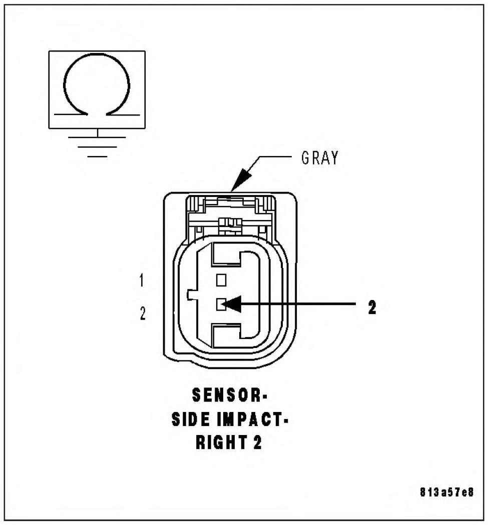
Yes >> Repair the (R18, R20) Right Side Impact Sensor 2 circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (R18) RIGHT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance of the (R18) Right Side Impact Sensor 2 Signal circuit between the Right Side Impact Sensor 2 connector and ground.



Is the resistance below 100K ohms?

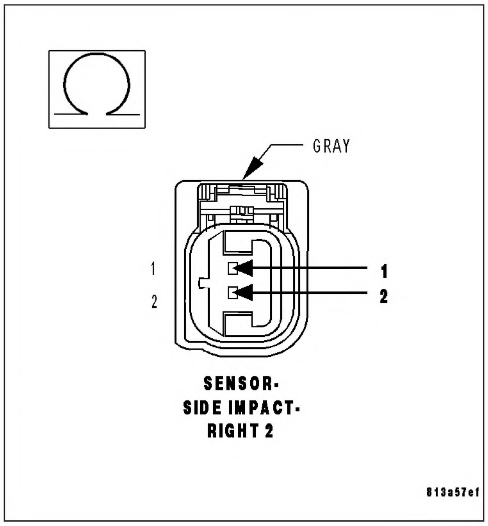
Yes >> Repair the (R18) Right Side Impact Sensor 2 Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

4. CHECK THE (R18, R20) RIGHT SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R18) Right Side Impact Sensor 2 Signal and (R20) Sensor Ground circuits at the Right Side Impact Sensor 2 connector.


GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
RIGHT 2
813a57e1

Is the resistance below 100K ohms?

Yes >> Repair the (R18, R20) Right Side Impact Sensor 2 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

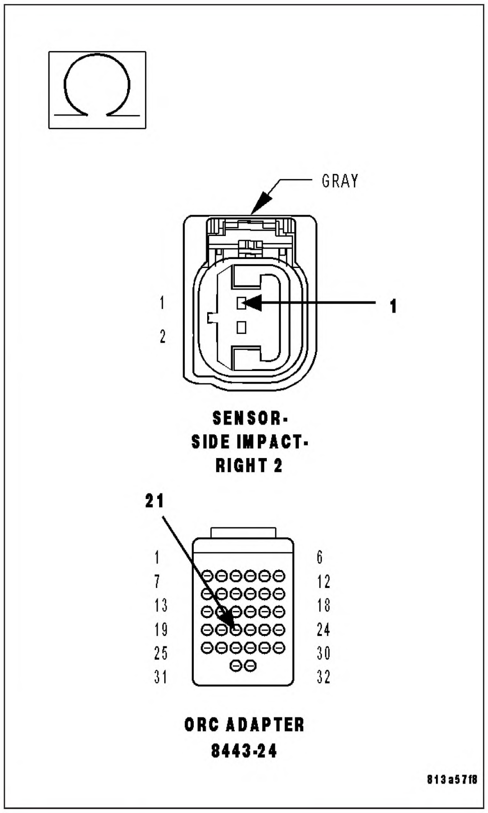
No >> Go To 5

---

5. CHECK THE (R18) RIGHT SIDE IMPACT SENSOR 2 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Restraint Controller C2 connector.

Measure the resistance of the (R20) Right Side Impact Sensor 2 Ground circuit between the Right Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
SIDE IMPACT-
RIGHT 2
21
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a57f8

Is the resistance below 1 ohm?

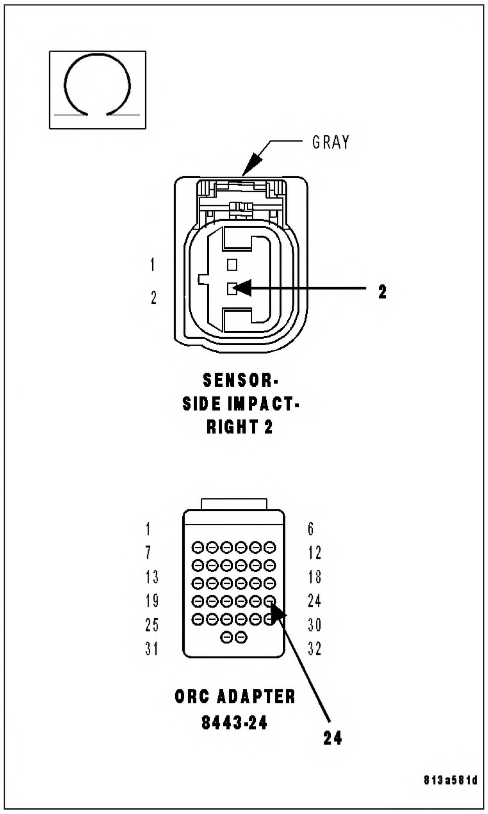
Yes >> Go To 6

No >> Repair the (R20) Right Side Impact Sensor 2 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

6. CHECK THE (R18) RIGHT SIDE IMPACT SENSOR 2 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R18) Right Side Impact Sensor 2 Signal circuit between the Right Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R18) Right Side Impact Sensor 2 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE RIGHT SIDE IMPACT SENSOR 2

Replace the Right Side Impact Sensor 2.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Right Side Impact Sensor 2 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

B1B76-RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 INTERNAL (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

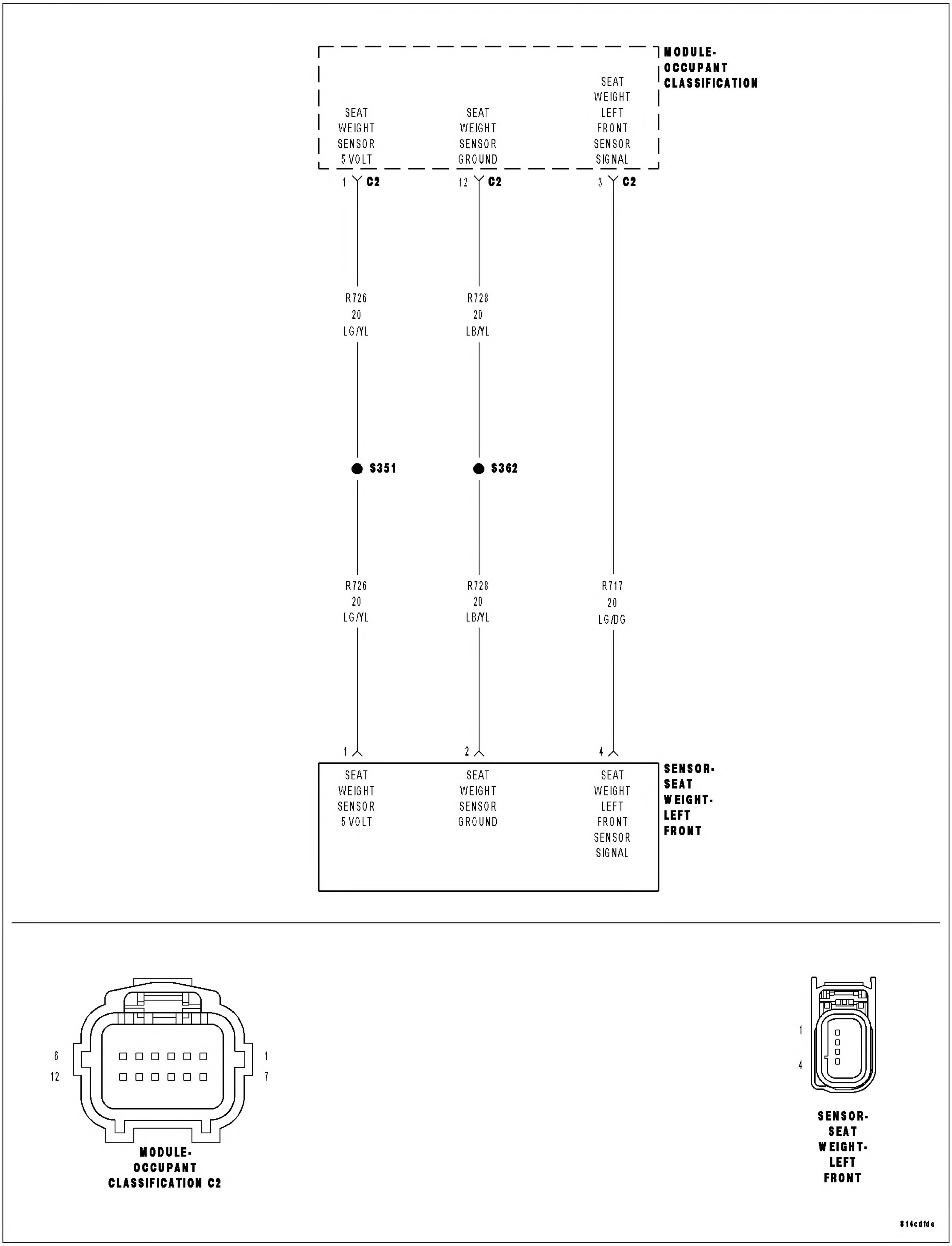
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B78-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT PERFORMANCE


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
1 C2
12 C2
3 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R717 20 LG/DG
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
LEFT
FRONT
6
12
1
7
MODULE-
OCCUPANT
CLASSIFICATION C2
1
4
SENSOR-
SEAT
WEIGHT-
LEFT
FRONT
814cdfde

B1B78-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT PERFORMANCE (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When CAN ignitions status is Run or SNA, during auto zero and while performing the Occupant Classification Module System Verification Test.
- **Set Condition:**
  During the occupant classification verification test: if the module detects that the sensor input is less than 1.4 volts or greater than 3.6 volts. During auto zero: if the module detects that the sensor input is less than 1 volt or greater than 4 volts.

Possible Causes
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
LEFT-FRONT PASSENGER SEAT WEIGHT SENSOR
DAMAGE TO THE PASSENGER SEAT STRUCTURE, RISER ASSEMBLY, CROSSMEMBERS, SEAT TRACKS, FLOOR PAN
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B78–PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT PERFORMANCE IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B78–PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT PERFORMANCE?

Yes >> Go To 3

No >> Go To 5

B1B78-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT PERFORMANCE (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR PERFORMANCE DTCs?

Yes >> Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No - But Other DTCs Present

Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No Active DTCs Present

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B78-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT PERFORMANCE (CONTINUED)

5. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

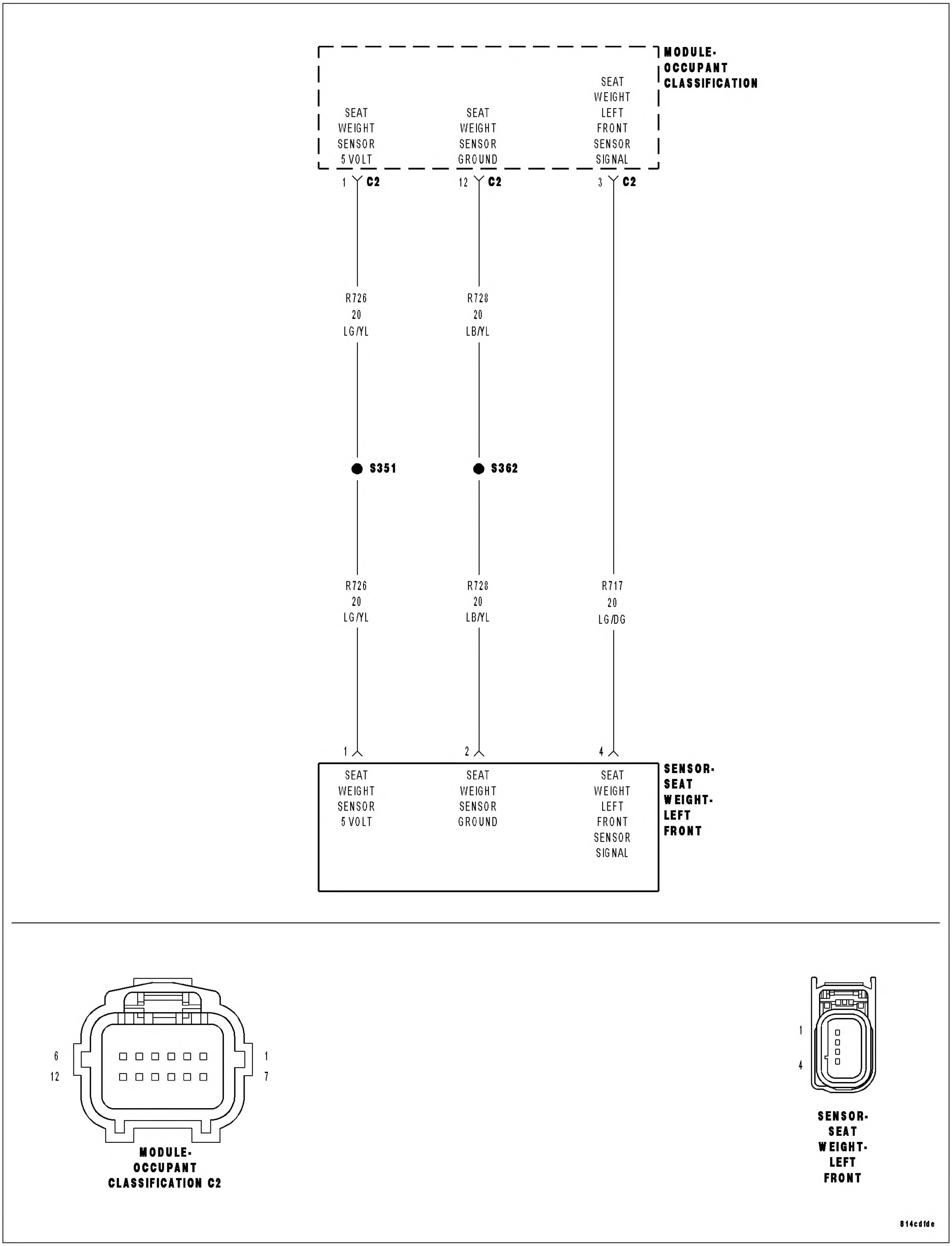
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B79-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
1 C2
12 C2
3 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R717 20 LG/DG
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
LEFT
FRONT
6
12
1
7
MODULE-
OCCUPANT
CLASSIFICATION C2
1
4
SENSOR-
SEAT
WEIGHT-
LEFT
FRONT
814cdfde

B1B79-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is less than 3.4 ± .6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage. This DTC will also set if the (R701) Seat Weight Sensor 5 Volt circuit is shorted to ground. However, this condition would prevent communication with the OCM and cause a Lost Communication With OCM DTC to set in other modules.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT OPEN
(R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT OPEN
LEFT-FRONT SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B79–PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B79–PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Go To 10

B1B79-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary. Then, Go To 5

---

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active – Perform the Diagnosis/Checkout Procedure For Seat Weight Sensors.

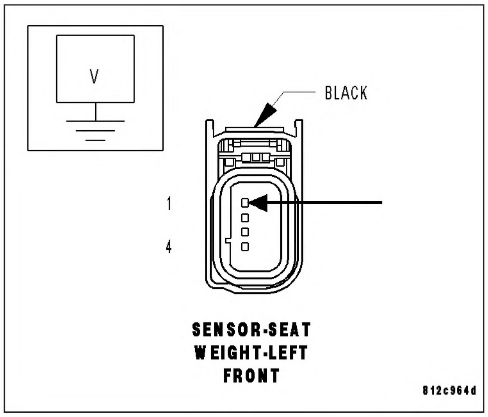
Yes >> Only DTC B1B79 Is Active – Go To 6

No >> Other DTCs Present – Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B79-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW (CONTINUED)

6. CHECK VOLTAGE OF (R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Left-Front Seat Weight Sensor connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R726) Seat Weight Sensor 5 Volt circuit.

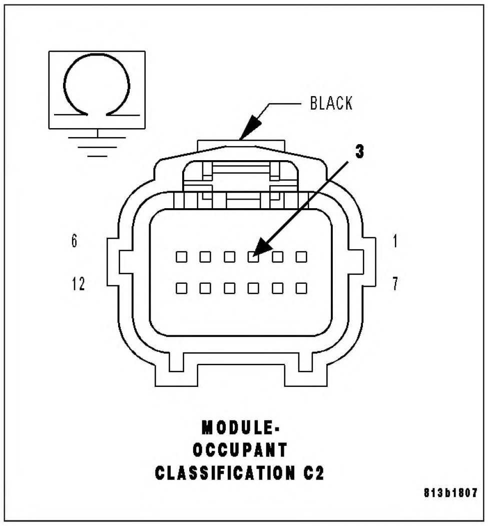
Is the voltage above 4.8 volts?

Yes >> Go To 7

No >> Go To 9

---

7. CHECK (R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the resistance of the (R717) LT-FT Seat Weight Sensor Signal circuit between ground and the OCM C2 connector.

Is the resistance below 10k ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

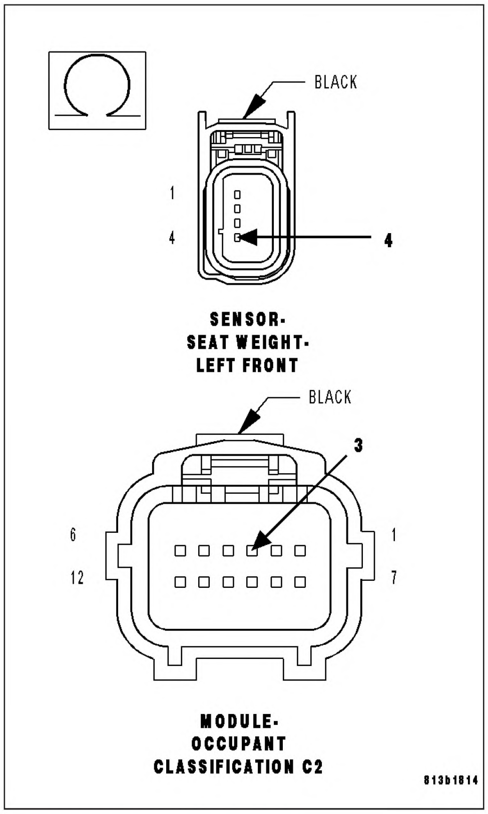
Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B79-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW (CONTINUED)

8. CHECK (R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR AN OPEN


BLACK
1
4
4
SENSOR-SEAT WEIGHT-LEFT FRONT
BLACK
3
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
813b1814

Measure the resistance of the (R717) LT-FT Seat Weight Sensor Signal circuit between the OCM C2 connector and the Left-Front Seat Weight Sensor connector.

Is the resistance below 5.0 ohms?

Yes >> Replace the Left-Front Seat Weight Sensor in accordance with the Service Information. Perform OCS VERIFICATION TEST - VER 1. If DTC B1B79–PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW returns active, replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

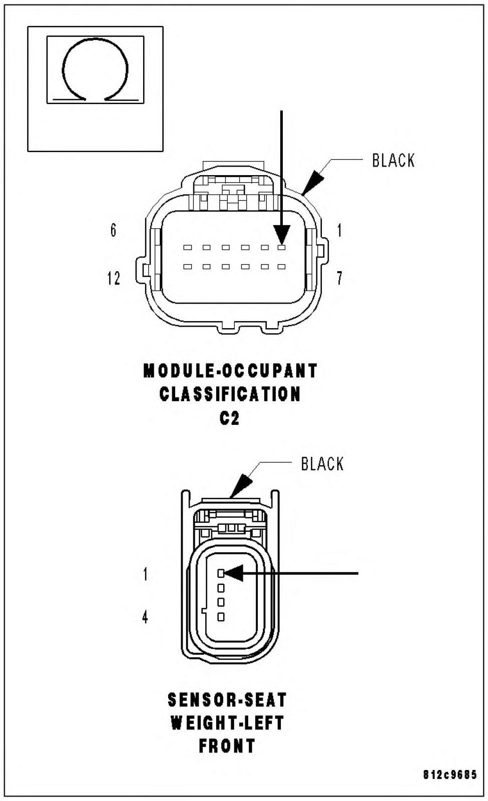
NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

9. CHECK (R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT FOR AN OPEN


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-LEFT FRONT
812c9685

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the resistance of the (R726) Seat Weight Sensor 5 Volt circuit between the OCM C2 connector and the Left-Front Seat Weight Sensor connector.

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B79-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT LOW (CONTINUED)

10. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

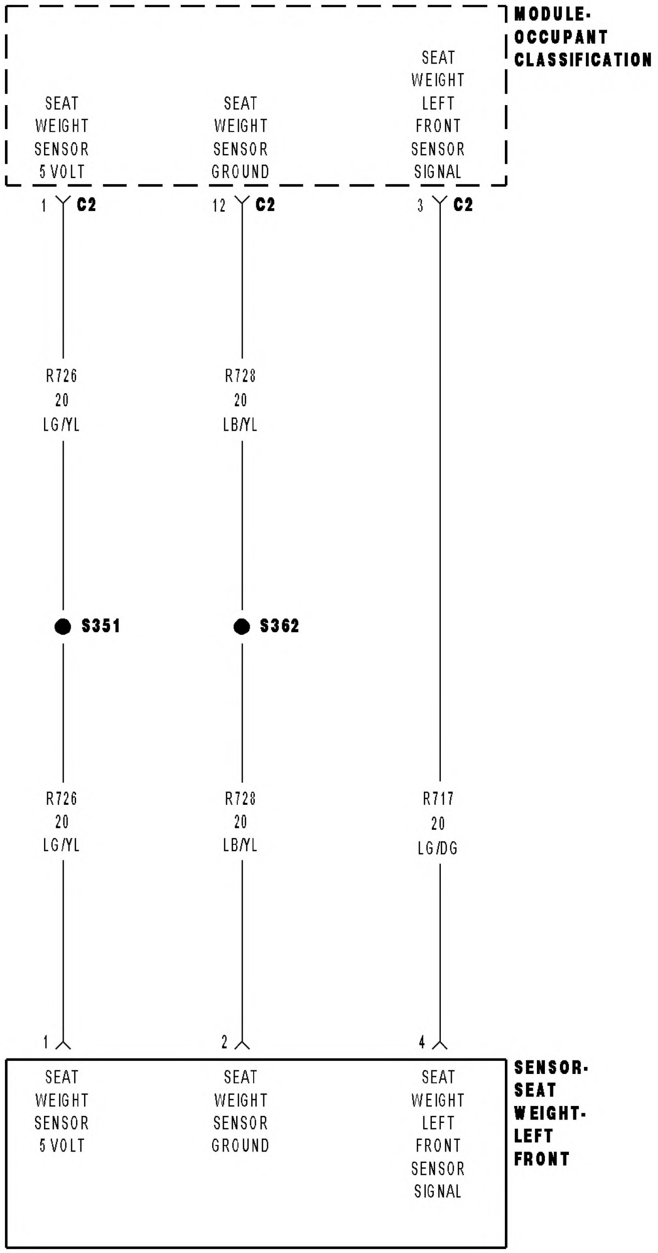
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

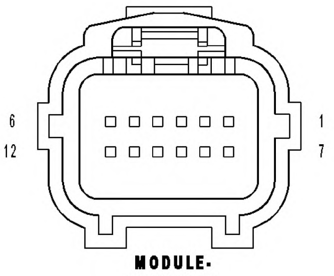
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

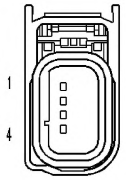
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B7A-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT HIGH


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
1 C2
12 C2
3 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R717 20 LG/DG
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
LEFT
FRONT



MODULE-
OCCUPANT
CLASSIFICATION C2



SENSOR-
SEAT
WEIGHT-
LEFT
FRONT

814cdfde

B1B7A-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is greater than 96 ± 0.6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT
(R728) SEAT WEIGHT SENSOR GROUND CIRCUIT OPEN
LEFT-FRONT SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B7A–PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT HIGH IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B7A–PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT HIGH?

Yes >> Go To 3

No >> Go To 9

B1B7A-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT HIGH (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active –Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Yes >> Only DTC B1B7A Is Active –Go To 6

No >> Other DTCs Present –Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

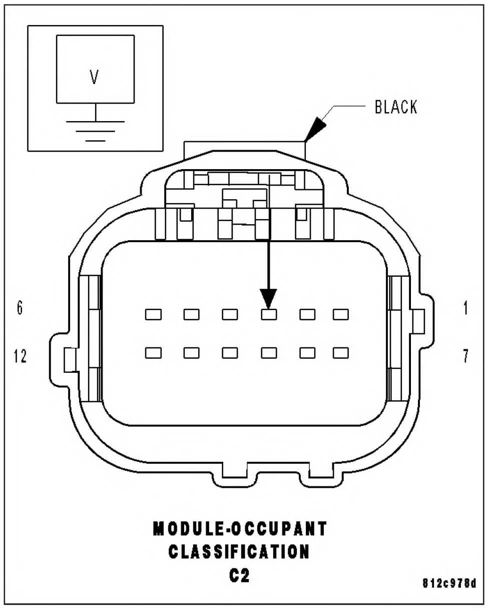
B1B7A-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT HIGH (CONTINUED)

6. CHECK (R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the voltage of the (R717) LT-FT Seat Weight Sensor Signal circuit.



MODULE-OCCUPANT CLASSIFICATION C2

812c978d

Is the voltage above 0.2 volts?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

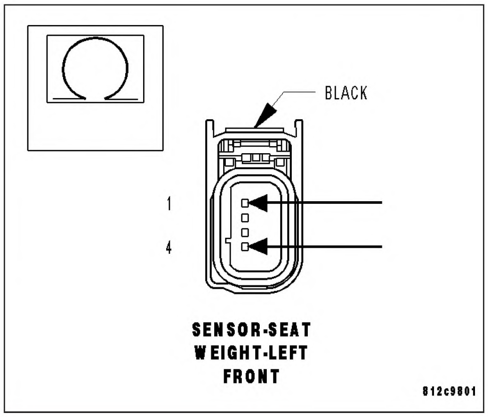
No >> Go To 7

---

7. CHECK (R717) LT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT

Disconnect the Left-Front Seat Weight Sensor connector.

Measure the resistance between the (R717) LT-FT Seat Weight Sensor Signal circuit and the (R701) Seat Weight Sensor 5 Volt circuit.



SENSOR-SEAT WEIGHT-LEFT FRONT

812c9801

Is the resistance below 10K ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

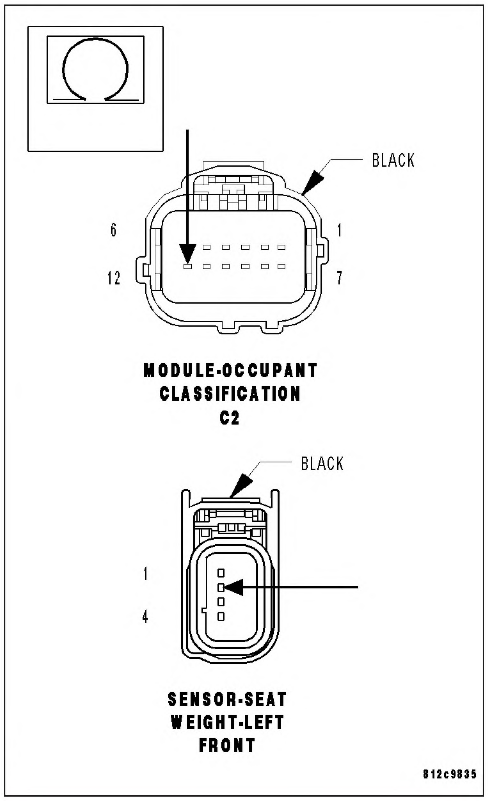
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B7A-PASSENGER SEAT WEIGHT SENSOR 3 - LEFT FRONT INPUT CIRCUIT HIGH (CONTINUED)

8. CHECK (R728) SEAT WEIGHT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (R728) Seat Weight Sensor Ground circuit between the OCM C2 connector and the Left-Front Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-LEFT FRONT
812c9835

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

9. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

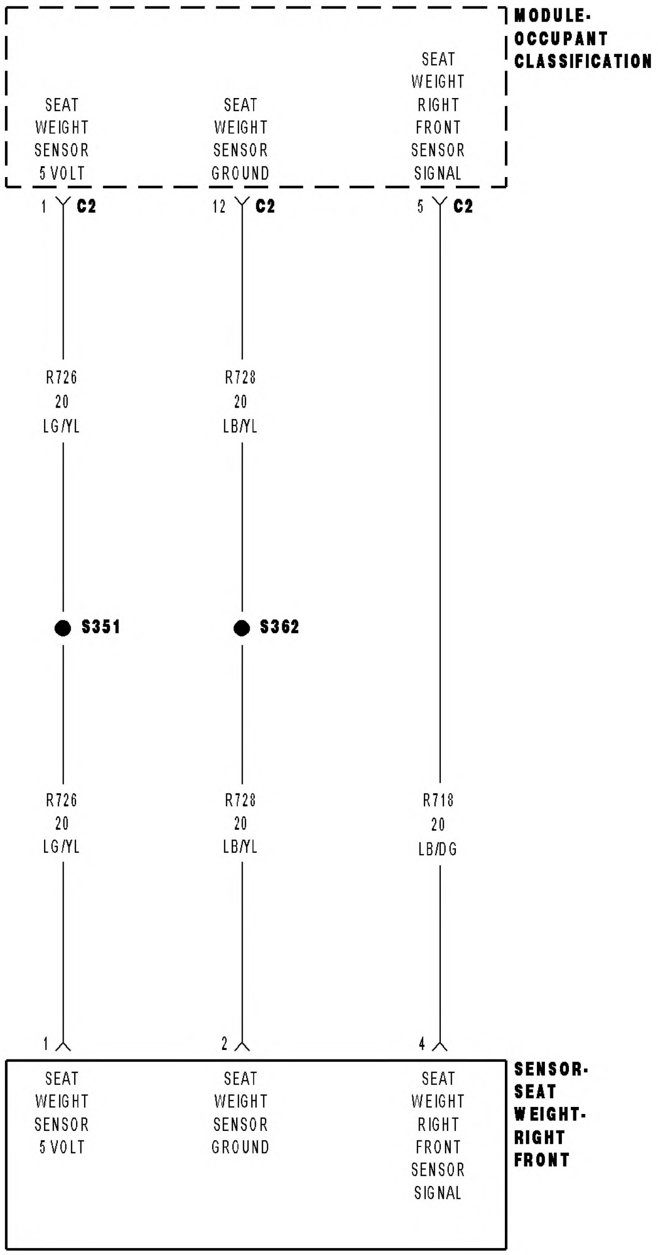
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

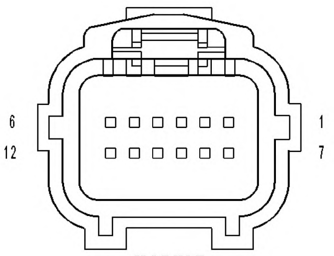
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

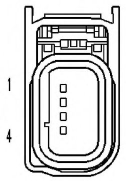
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B7D-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT PERFORMANCE


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
1 C2
12 C2
5 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R718 20 LB/DG
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
RIGHT
FRONT



**MODULE-
OCCUPANT
CLASSIFICATION C2**



**SENSOR-
SEAT
WEIGHT-
RIGHT
FRONT**

814ce16a

B1B7D-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT PERFORMANCE (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When CAN ignitions status is Run or SNA, during auto zero and while performing the Occupant Classification Module System Verification Test.
- **Set Condition:**
  During the occupant classification verification test: if the module detects that the sensor input is less than 1.4 volts or greater than 3.6 volts. During auto zero: if the module detects that the sensor input is less than 1 volt or greater than 4 volts.

Possible Causes
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
RIGHT-FRONT PASSENGER SEAT WEIGHT SENSOR
DAMAGE TO THE PASSENGER SEAT STRUCTURE, RISER ASSEMBLY, CROSSMEMBERS, SEAT TRACKS, FLOOR PAN
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B7D–PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT PERFORMANCE IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B7D–PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT PERFORMANCE?

Yes >> Go To 3

No >> Go To 5

B1B7D-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT PERFORMANCE (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR PERFORMANCE DTCs?

Yes >> Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

No >> Other DTCs Present –Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B7D-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT PERFORMANCE (CONTINUED)

5. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

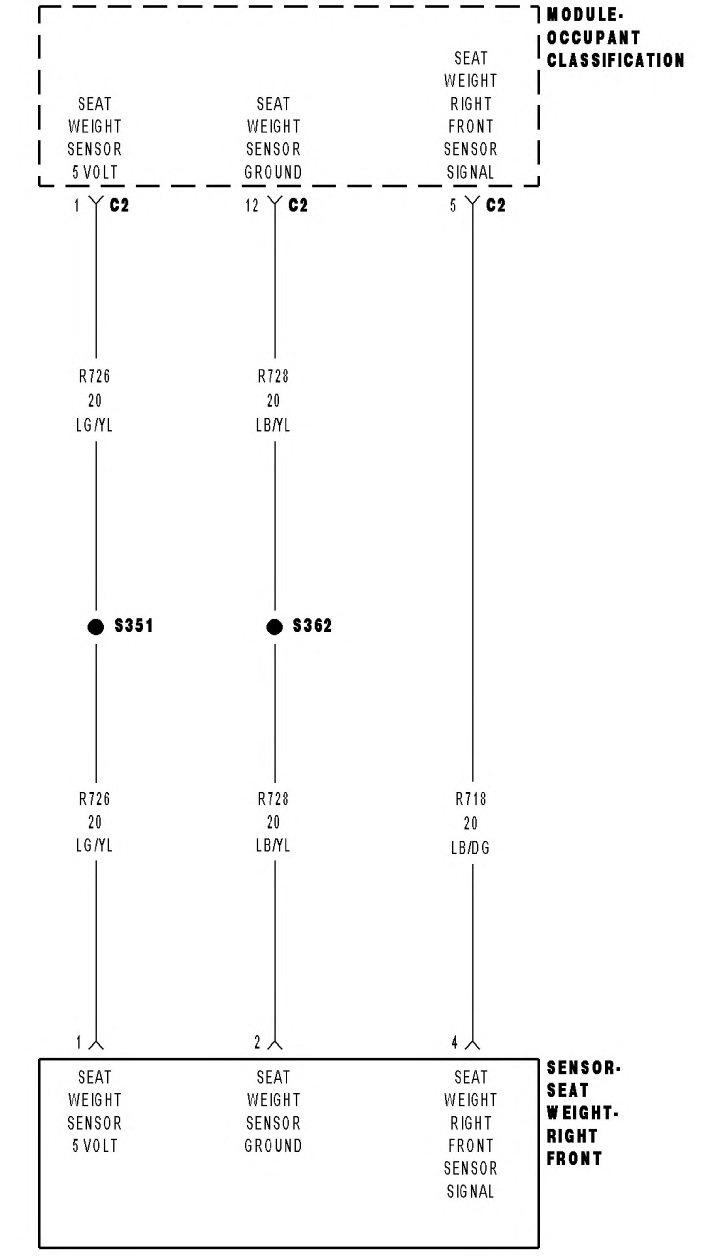
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

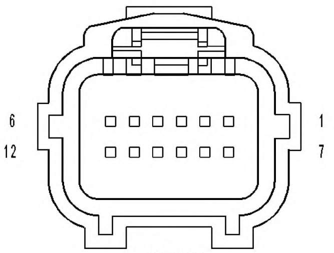
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

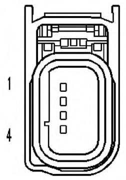
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B7E-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
1 C2
12 C2
5 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R718 20 LB/DG
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
RIGHT
FRONT



MODULE-
OCCUPANT
CLASSIFICATION C2



SENSOR-
SEAT
WEIGHT-
RIGHT
FRONT

814ce16a

B1B7E-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is less than 3.4 ± 0.6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage. This DTC will also set if the (R701) Seat Weight Sensor 5 Volt circuit is shorted to ground. However, this condition would prevent communication with the OCM and cause a Lost Communication With OCM DTC to set in other modules.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT OPEN
(R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT OPEN
RIGHT-FRONT SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B7E–PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B7E–PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Go To 10

B1B7E-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary. Then, Go To 5

---

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active – Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Yes >> Only DTC B1B7E Is Active – Go To 6

No >> Other DTCs Present –Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

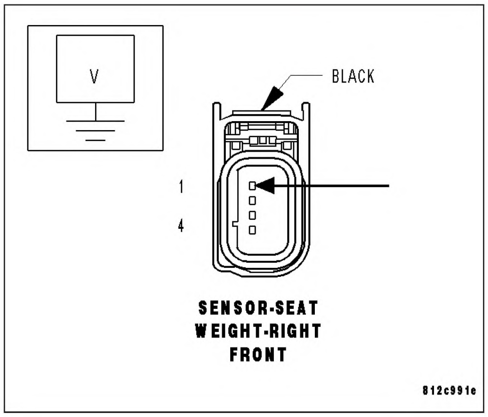
No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B7E-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW (CONTINUED)

6. CHECK VOLTAGE OF (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Right-Front Seat Weight Sensor connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (R701) Seat Weight Sensor 5 Volt circuit.



Is the voltage above 4.8 volts?

Yes >> Go To 7

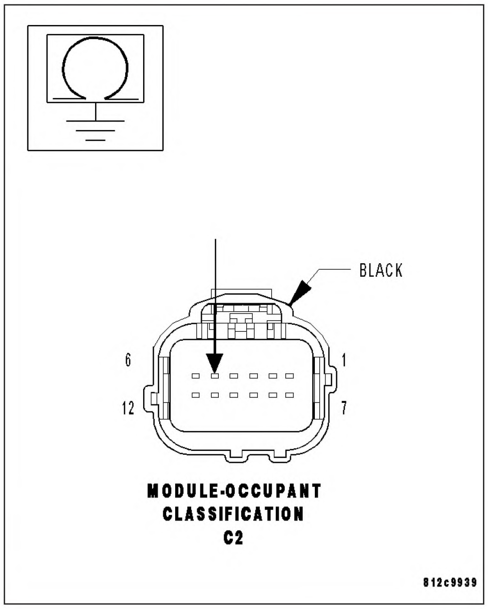
No >> Go To 9

---

7. CHECK (R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the OCM C2 connector.

Measure the resistance of the (R718) RT-FT Seat Weight Sensor Signal circuit between ground and the OCM C2 connector.



Is the resistance below 10k ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

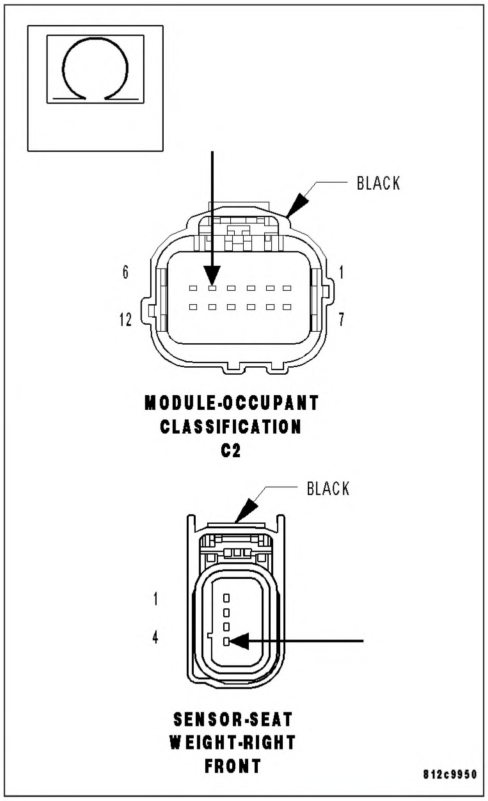
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B7E-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW (CONTINUED)

8. CHECK (R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (R718) RT-FT Seat Weight Sensor Signal circuit between the OCM C2 connector and the Right-Front Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-RIGHT FRONT
812c9950

Is the resistance below 5.0 ohms?

Yes >> Replace the Right-Front Seat Weight Sensor in accordance with the Service Information. Perform OCS VERIFICATION TEST - VER 1. If DTC B1B7E–PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW returns active, replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

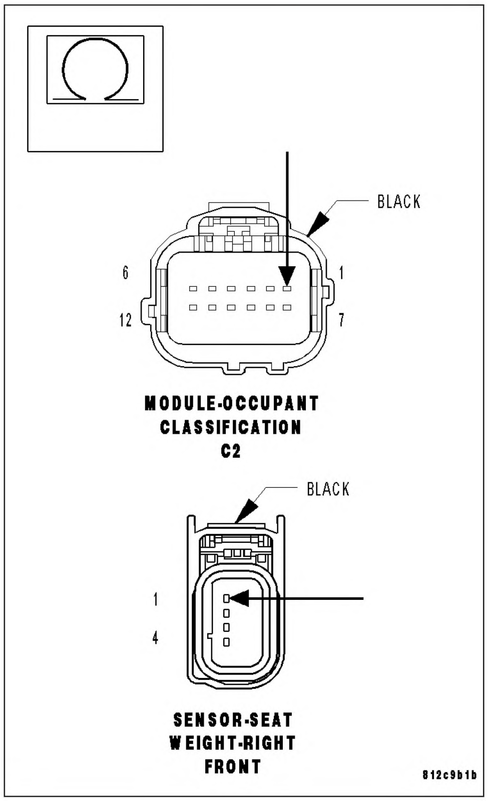
---

9. CHECK (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the resistance of the (R701) Seat Weight Sensor 5 Volt circuit between the OCM C2 connector and the Right-Front Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-RIGHT FRONT
812c9b1b

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B7E-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT LOW (CONTINUED)

10. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

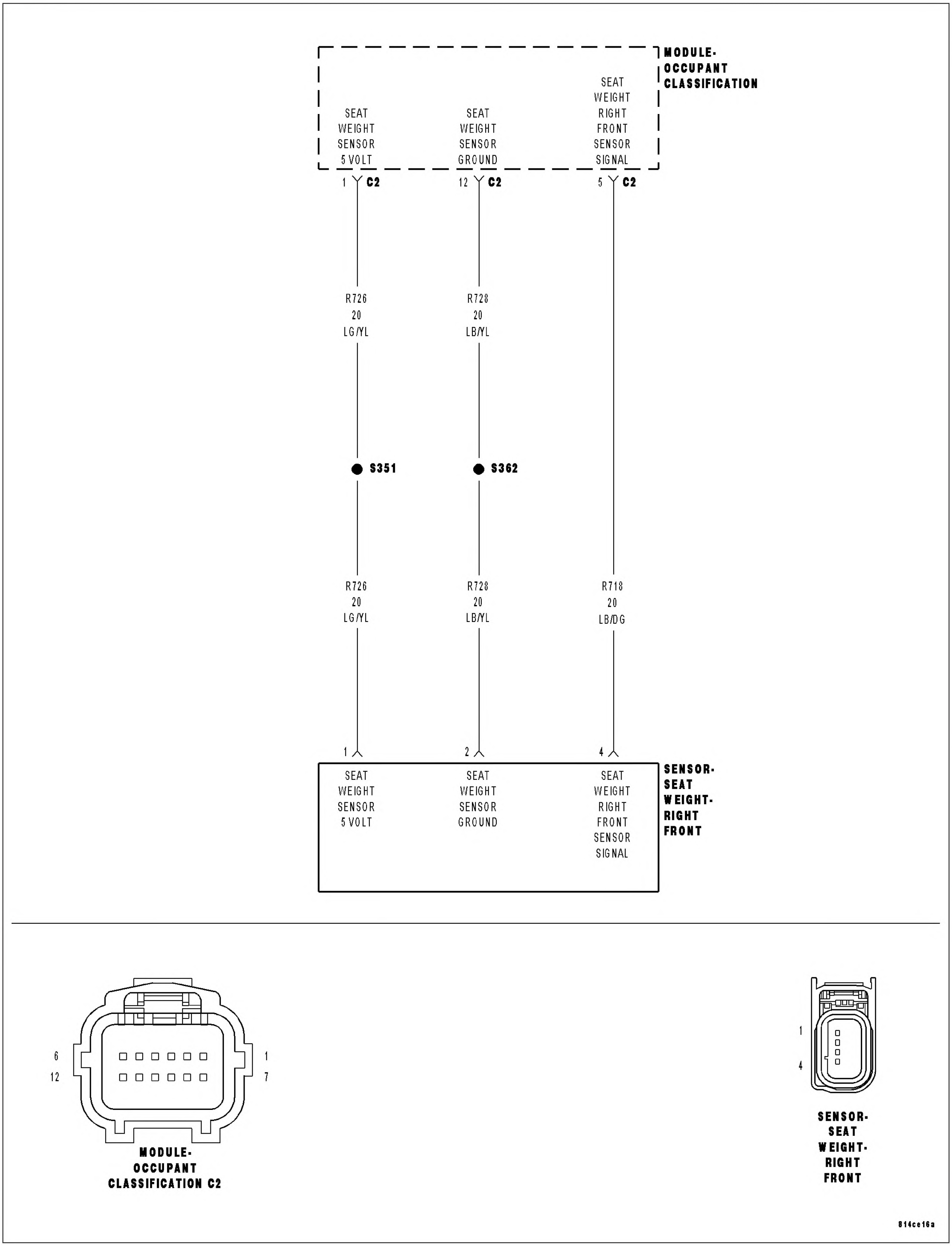
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B7F-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT HIGH


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
1 C2
12 C2
5 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R718 20 LB/DG
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
RIGHT
FRONT
6
12
1
7
MODULE-
OCCUPANT
CLASSIFICATION C2
1
4
SENSOR-
SEAT
WEIGHT-
RIGHT
FRONT
814ce16a

B1B7F-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is greater than 96 ± 0.6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT
(R728) SEAT WEIGHT SENSOR GROUND CIRCUIT OPEN
RIGHT-FRONT SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B7F–PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT HIGH IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B7F–PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT HIGH?

Yes >> Go To 3

No >> Go To 9

B1B7F-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT HIGH (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.
Perform OCS VERIFICATION TEST - VER 1.

---

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active – Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Yes >> Only DTC B1B7F Is Active –Go To 6

No >> But Other DTCs Present –Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

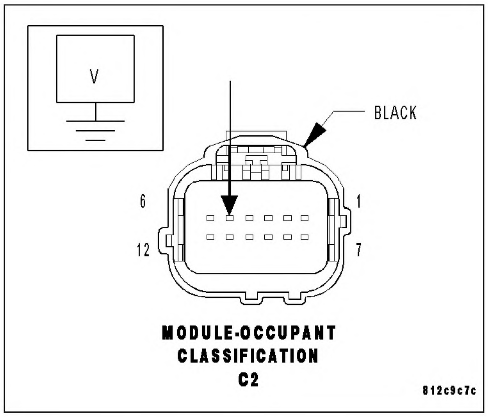
B1B7F-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT HIGH (CONTINUED)

6. CHECK (R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the voltage of the (R718) RT-FT Seat Weight Sensor Signal circuit.



Is the voltage above 0.2 volts?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

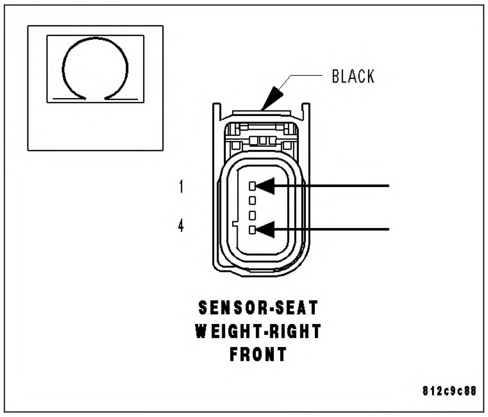
No >> Go To 7

---

7. CHECK (R718) RT-FT SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT

Disconnect the Right-Front Seat Weight Sensor connector.

Measure the resistance between the (R718) RT-FT Seat Weight Sensor Signal circuit and the (R701) Seat Weight Sensor 5 Volt circuit.



Is the resistance below 10K ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

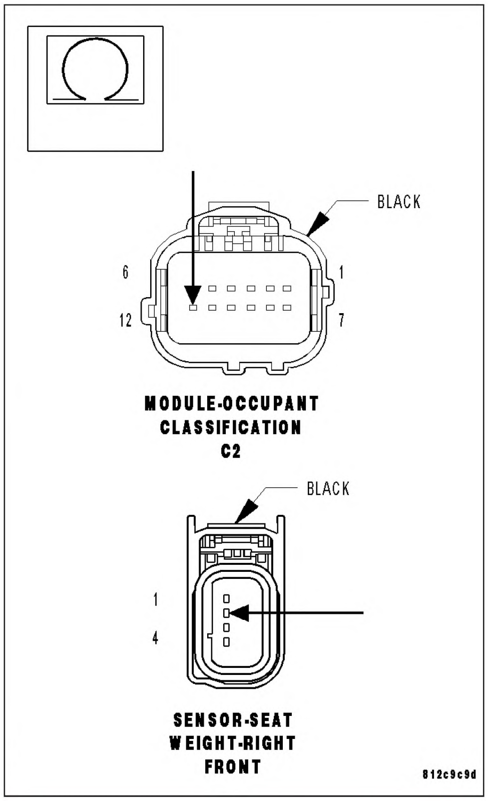
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B7F-PASSENGER SEAT WEIGHT SENSOR 2 - RIGHT FRONT INPUT CIRCUIT HIGH (CONTINUED)

8. CHECK (R728) SEAT WEIGHT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (R728) Seat Weight Sensor Ground circuit between the OCM C2 connector and the Right-Front Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-RIGHT FRONT
812c9c9d

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

9. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

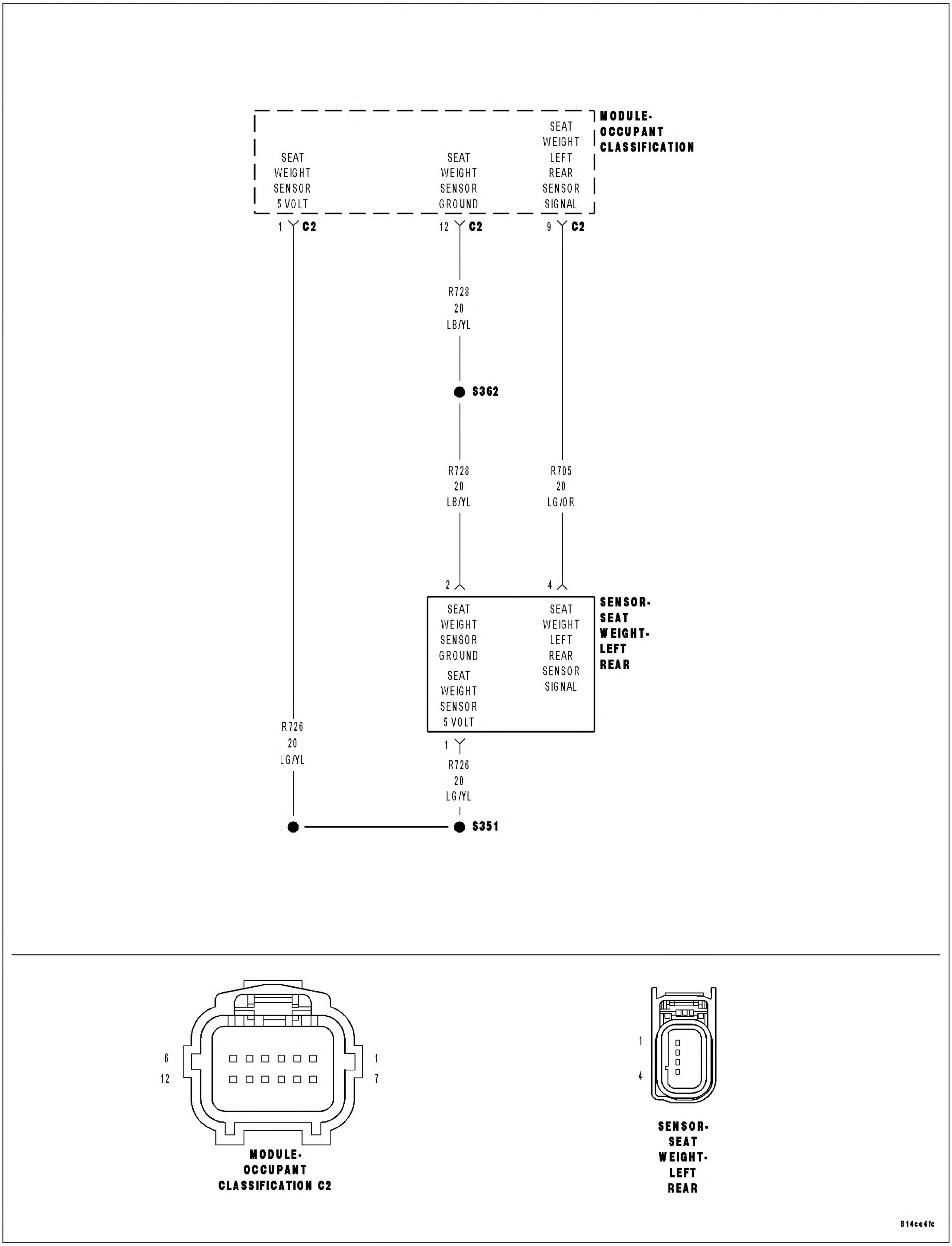
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B82-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR PERFORMANCE


MODULE-
OCCUPANT
CLASSIFICATION
SEAT
WEIGHT
SENSOR
5 VOLT
SEAT
WEIGHT
SENSOR
GROUND
SEAT
WEIGHT
LEFT
REAR
SENSOR
SIGNAL
1 C2
12 C2
9 C2
R728
20
LB/YL
S362
R728
20
LB/YL
R705
20
LG/OR
2
4
SENSOR-
SEAT
WEIGHT-
LEFT
REAR
SEAT
WEIGHT
SENSOR
GROUND
SEAT
WEIGHT
SENSOR
5 VOLT
SEAT
WEIGHT
LEFT
REAR
SENSOR
SIGNAL
R726
20
LG/YL
1
R726
20
LG/YL
S351
6
12
1
7
MODULE-
OCCUPANT
CLASSIFICATION C2
1
4
SENSOR-
SEAT
WEIGHT-
LEFT
REAR
814ce4fc

B1B82-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR PERFORMANCE (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When CAN ignitions status is Run or SNA, during auto zero and while performing the Occupant Classification Module System Verification Test.
- **Set Condition:**
  During the occupant classification verification test: if the module detects that the sensor input is less than 1.4 volts or greater than 3.6 volts. During auto zero: if the module detects that the sensor input is less than 1 volt or greater than 4 volts.

Possible Causes
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
LEFT-REAR PASSENGER SEAT WEIGHT SENSOR
DAMAGE TO THE PASSENGER SEAT STRUCTURE, RISER ASSEMBLY, CROSSMEMBERS, SEAT TRACKS, FLOOR PAN
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B82–PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR PERFORMANCE IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B82–PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR PERFORMANCE?

Yes >> Go To 3

No >> Go To 5

B1B82-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR PERFORMANCE (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR PERFORMANCE DTCs?

Yes >> Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

No >> Other DTCs Present? Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B82-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR PERFORMANCE (CONTINUED)

5. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

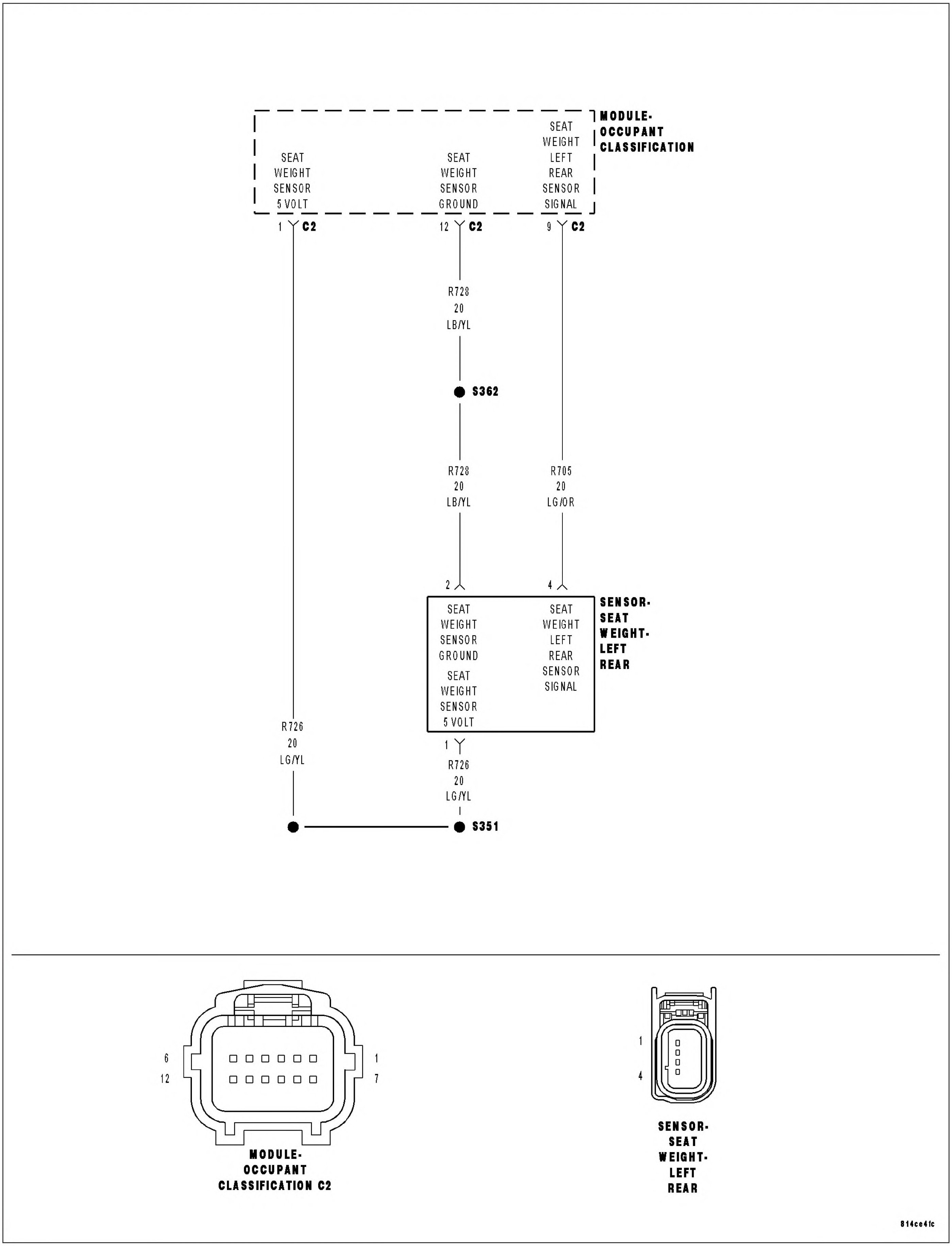
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B83-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
1 C2
12 C2
9 C2
R728
20
LB/YL
S362
R728
20
LB/YL
R705
20
LG/OR
2
4
SENSOR-
SEAT
WEIGHT-
LEFT
REAR
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
1
R726
20
LG/YL
R726
20
LG/YL
S351
6
12
1
7
MODULE-
OCCUPANT
CLASSIFICATION C2
1
4
SENSOR-
SEAT
WEIGHT-
LEFT
REAR
814ce4fc

B1B83-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is less than 3.4 ± 0.6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage. This DTC will also set if the (R701) Seat Weight Sensor 5 Volt circuit is shorted to ground. However, this condition would prevent communication with the OCM and cause a Lost Communication With OCM DTC to set in other modules.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT OPEN
(R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT OPEN
LEFT-REAR SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B83–PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B83–PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Go To 10

B1B83-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active – Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Yes >> Only DTC B1B83 Is Active –Go To 6

No >> Other DTCs Present?Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

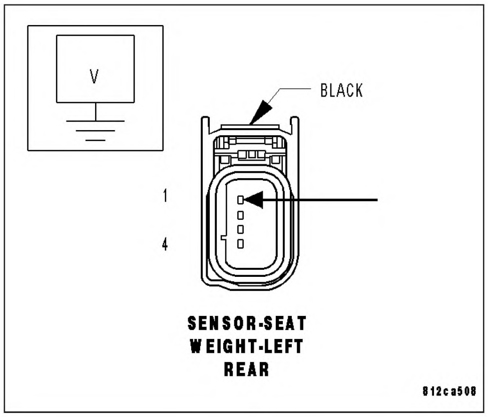
No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B83-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW (CONTINUED)

6. CHECK VOLTAGE OF (R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Left-Rear Seat Weight Sensor connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (R726) Seat Weight Sensor 5 Volt circuit.



Is the voltage above 4.8 volts?

Yes >> Go To 7

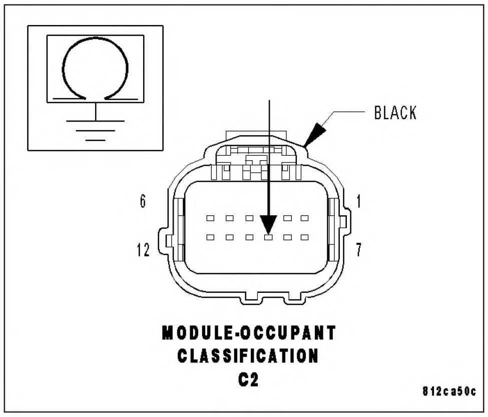
No >> Go To 9

---

7. CHECK (R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the OCM C2 connector.

Measure the resistance of the (R705) LT-RR Seat Weight Sensor Signal circuit between ground and the OCM C2 connector.



Is the resistance below 10k ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

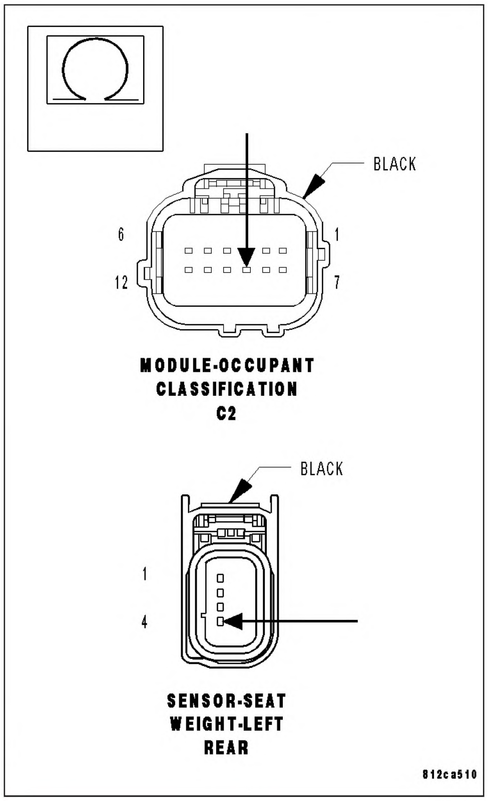
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B83-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW (CONTINUED)

8. CHECK (R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (R705) LT-RR Seat Weight Sensor Signal circuit between the OCM C2 connector and the Left-Rear Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-LEFT REAR
812ca510

Is the resistance below 5.0 ohms?

Yes >> Replace the Left-Rear Seat Weight Sensor in accordance with the Service Information. Perform OCS VERIFICATION TEST - VER 1. If DTC B1B83-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW returns active, replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

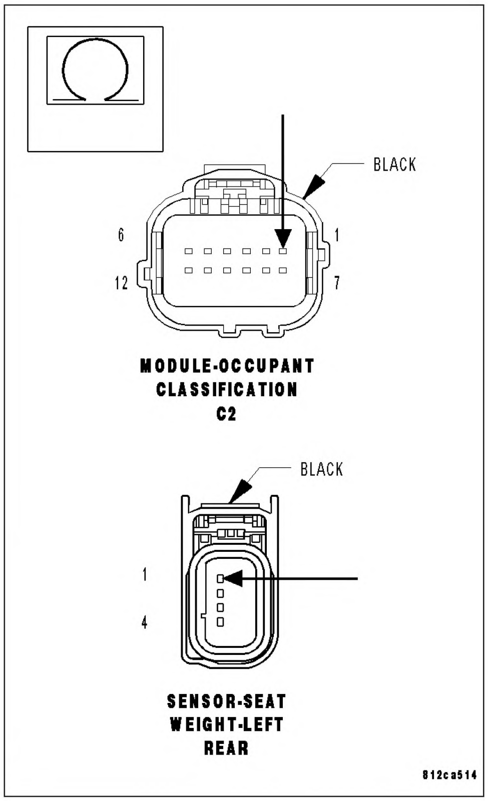
---

9. CHECK (R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the resistance of the (R726) Seat Weight Sensor 5 Volt circuit between the OCM C2 connector and the Left-Rear Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-LEFT REAR
812ca514

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B83-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT LOW (CONTINUED)

10. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

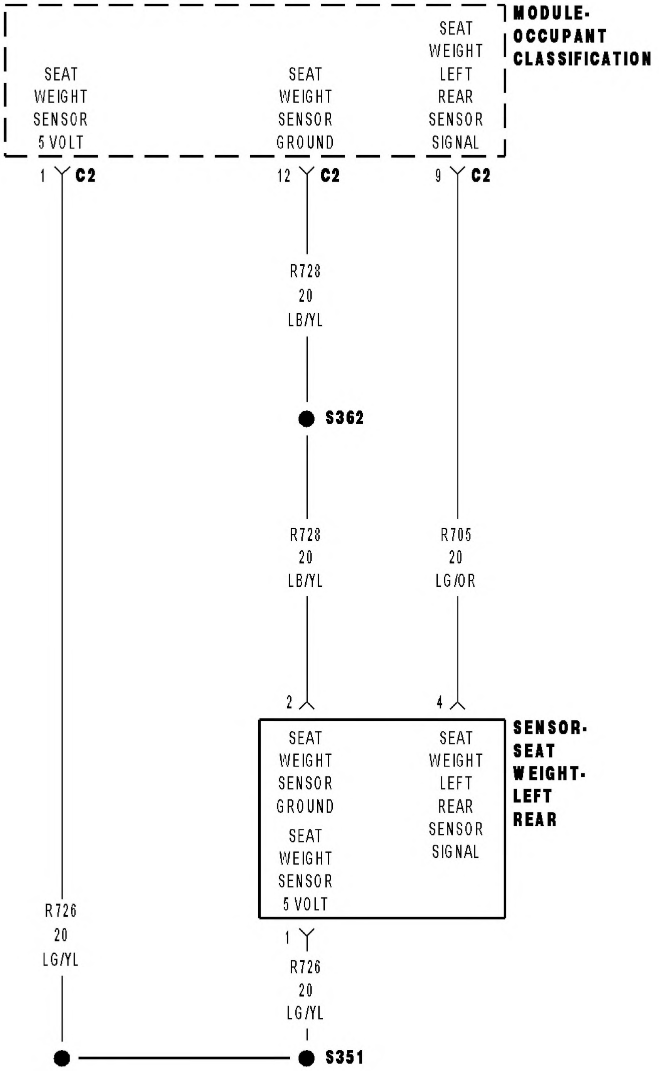
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

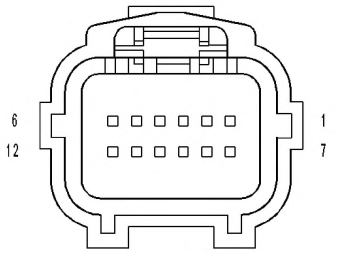
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

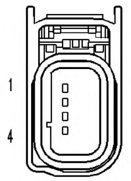
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B84-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT HIGH


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
1 C2
12 C2
9 C2
R728
20
LB/YL
S362
R728
20
LB/YL
R705
20
LG/OR
2
4
SENSOR-
SEAT
WEIGHT-
LEFT
REAR
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
R726
20
LG/YL
1
R726
20
LG/YL
S351



MODULE-
OCCUPANT
CLASSIFICATION C2



SENSOR-
SEAT
WEIGHT-
LEFT
REAR

814ce4fc

B1B84-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is greater than 96 ± 0.6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT
(R728) SEAT WEIGHT SENSOR GROUND CIRCUIT OPEN
LEFT-REAR SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B84–PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT HIGH IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B84–PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT HIGH?

Yes >> Go To 3

No >> Go To 9

B1B84-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT HIGH (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active –Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

Yes >> Only DTC B1B84 Is Active –Go To 6

No >> Other DTCs Present?Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

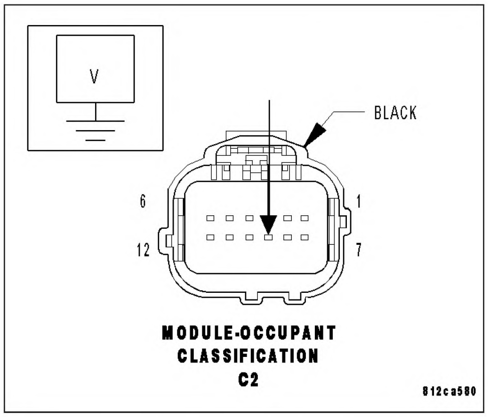
B1B84-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT HIGH (CONTINUED)

6. CHECK (R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the voltage of the (R705) LT-RR Seat Weight Sensor Signal circuit.



Is the voltage above 0.2 volts?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 7

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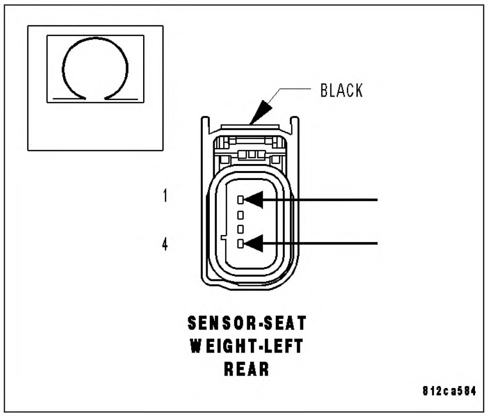
7. CHECK (R705) LT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT

Disconnect the Left-Rear Seat Weight Sensor connector.

Measure the resistance between the (R705) LT-RR Seat Weight Sensor Signal circuit and the (R701) Seat Weight Sensor 5 Volt circuit.



Is the resistance below 10K ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

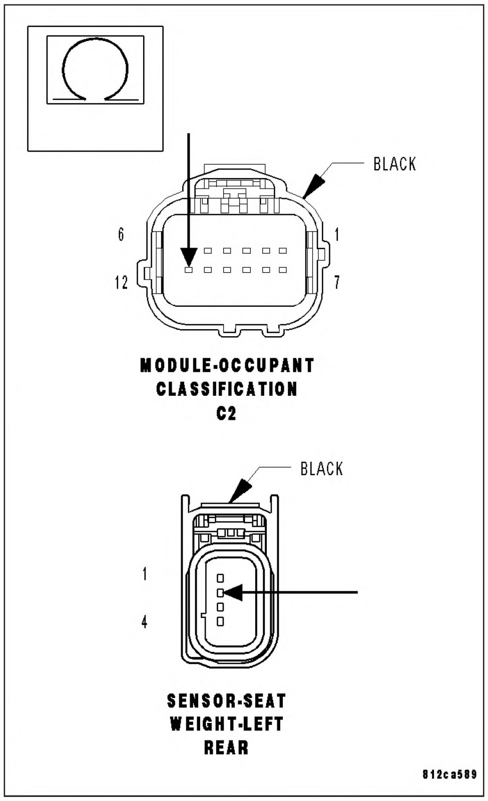
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B84-PASSENGER SEAT WEIGHT SENSOR 4 - LEFT REAR INPUT CIRCUIT HIGH (CONTINUED)

8. CHECK (R728) SEAT WEIGHT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (R728) Seat Weight Sensor Ground circuit between the OCM C2 connector and the Left-Rear Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-LEFT REAR
812ca589

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

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9. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

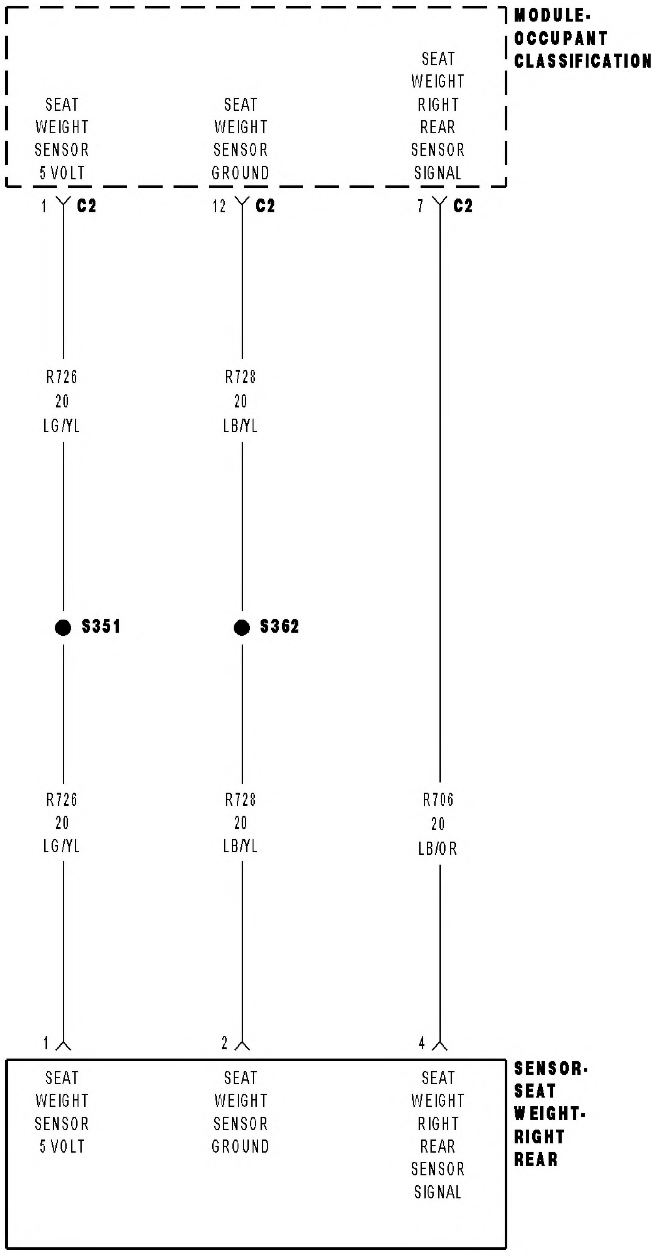
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

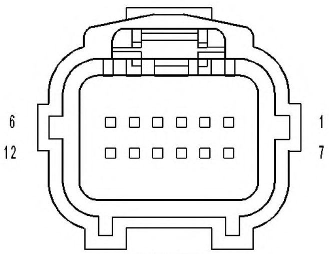
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

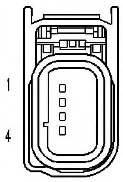
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B87-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR PERFORMANCE


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
1 C2
12 C2
7 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R706 20 LB/OR
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
RIGHT
REAR



MODULE-OCCUPANT CLASSIFICATION C2


1
4

SENSOR-SEAT WEIGHT-RIGHT REAR

814ce8be

B1B87-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR PERFORMANCE (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When CAN ignitions status is Run or SNA, during auto zero and while performing the Occupant Classification Module System Verification Test.
- **Set Condition:**
  During the occupant classification verification test: if the module detects that the sensor input is less than 1.4 volts or greater than 3.6 volts. During auto zero: if the module detects that the sensor input is less than 1 volt or greater than 4 volts.

Possible Causes
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
RIGHT-REAR PASSENGER SEAT WEIGHT SENSOR
DAMAGE TO THE PASSENGER SEAT STRUCTURE, RISER ASSEMBLY, CROSSMEMBERS, SEAT TRACKS, FLOOR PAN
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B87–PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR PERFORMANCE IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B87–PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR PERFORMANCE?

Yes >> Go To 3

No >> Go To 5

B1B87-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR PERFORMANCE (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR PERFORMANCE DTCs?

Yes >> Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

No >> Other DTCs Present?Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B87-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR PERFORMANCE (CONTINUED)

5. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B88-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is less than 3.4 ± 0.6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage. This DTC will also set if the (R701) Seat Weight Sensor 5 Volt circuit is shorted to ground. However, this condition would prevent communication with the OCM and cause a Lost Communication With OCM DTC to set in other modules.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT OPEN
(R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT OPEN
RIGHT-REAR SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B88–PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B88–PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Go To 10

B1B88-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active –Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Yes >> Only DTC B1B88 Is Active –Go To 6

No >> Other DTCs Present?Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

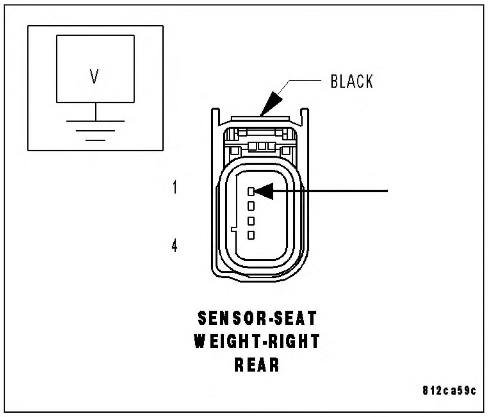
No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B88-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW (CONTINUED)

6. CHECK VOLTAGE OF (R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the Right-Rear Seat Weight Sensor connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (R726) Seat Weight Sensor 5 Volt circuit.



Is the voltage above 4.8 volts?

Yes >> Go To 7

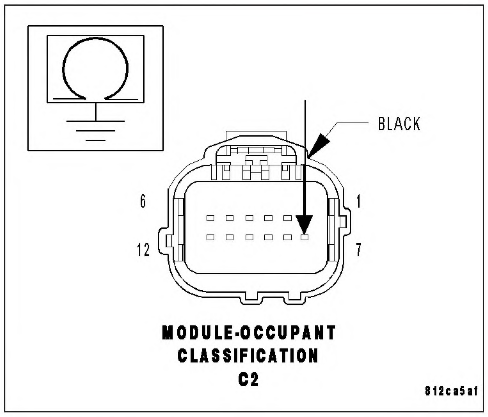
No >> Go To 9

---

7. CHECK (R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the OCM C2 connector.

Measure the resistance of the (R706) RT-RR Seat Weight Sensor Signal circuit between ground and the OCM C2 connector.



Is the resistance below 10k ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

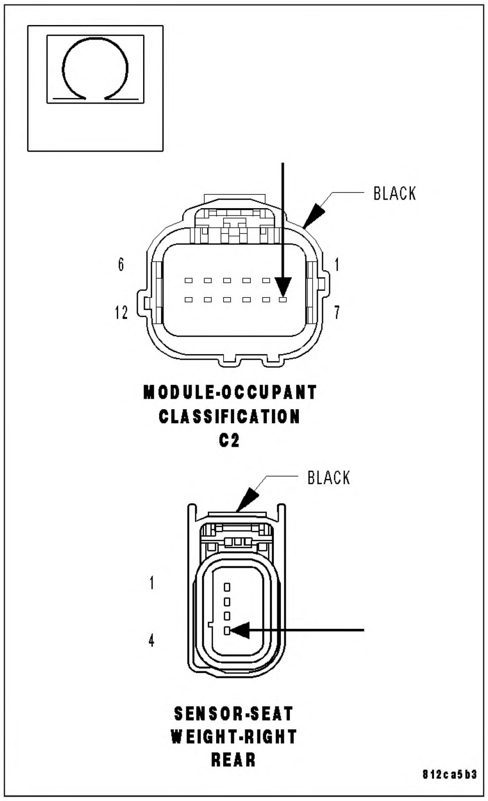
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B88-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW (CONTINUED)

8. CHECK (R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (R706) RT-RR Seat Weight Sensor Signal circuit between the OCM C2 connector and the Right-Rear Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-RIGHT REAR
812ca5b3

Is the resistance below 5.0 ohms?

Yes >> Replace the Right-Rear Seat Weight Sensor in accordance with the Service Information. Perform OCS VERIFICATION TEST - VER 1. If DTC B1B88–PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW returns active, replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

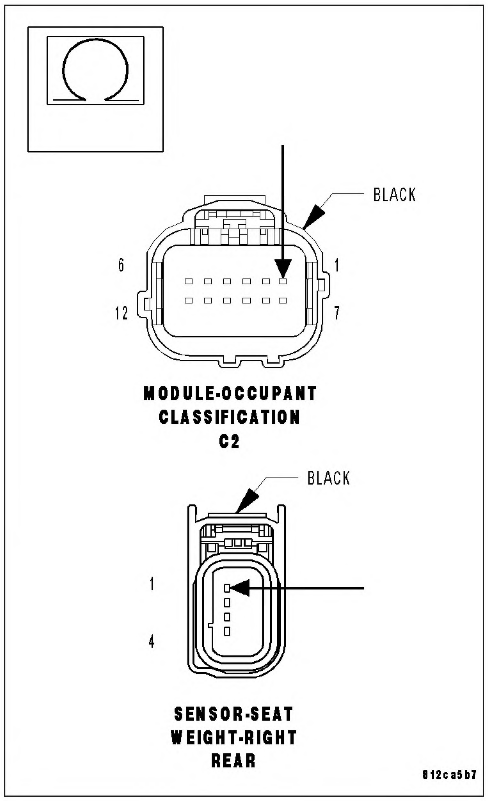
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

9. CHECK (R726) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the resistance of the (R726) Seat Weight Sensor 5 Volt circuit between the OCM C2 connector and the Right-Rear Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-RIGHT REAR
812ca5b7

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B88-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT LOW (CONTINUED)

10. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

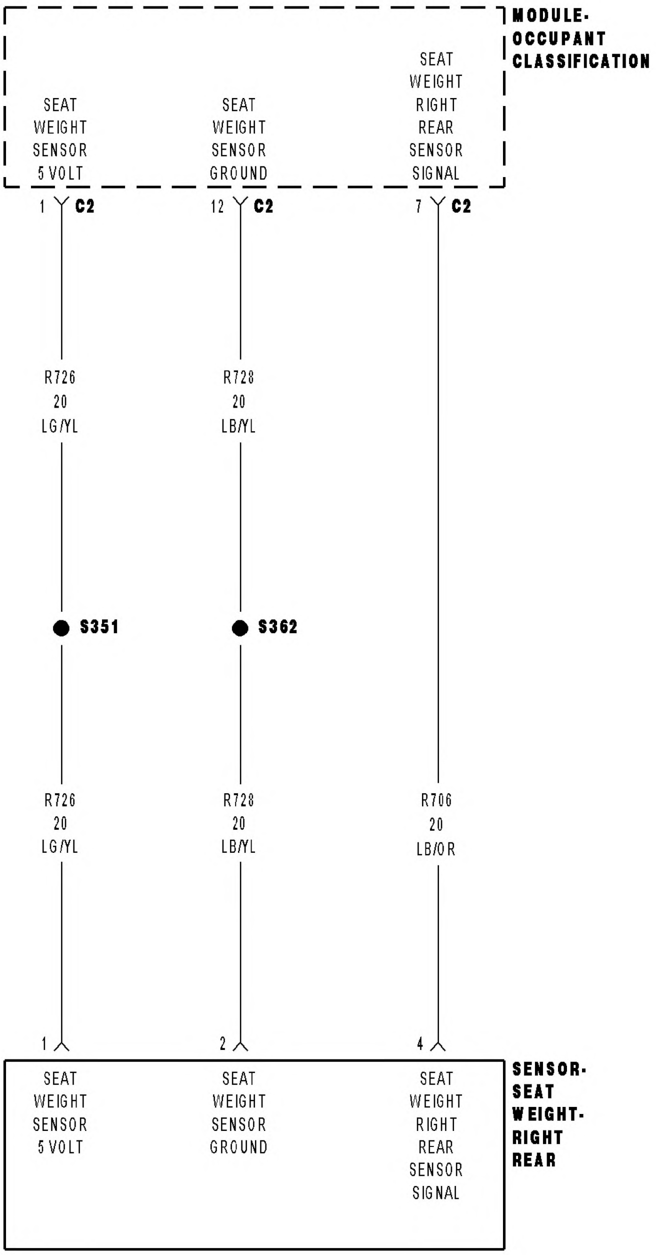
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

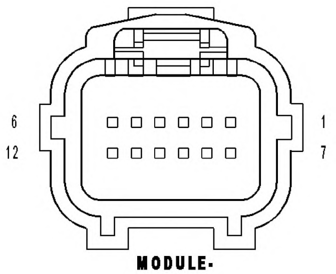
Does the scan tool display any ACTIVE DTCs?

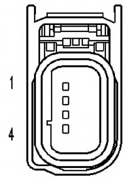
Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B89-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT HIGH


MODULE-
OCCUPANT
CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
1 C2
12 C2
7 C2
R726 20 LG/YL
R728 20 LB/YL
S351
S362
R726 20 LG/YL
R728 20 LB/YL
R706 20 LB/OR
1
2
4
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SENSOR-
SEAT
WEIGHT-
RIGHT
REAR


6
12
1
7
MODULE-
OCCUPANT
CLASSIFICATION C2


1
4
SENSOR-
SEAT
WEIGHT-
RIGHT
REAR
814ce8be

B1B89-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is greater than 96 ± 0.6% of the (R701) Seat Weight Sensor 5 Volt circuit voltage.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT SHORTED TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT
(R728) SEAT WEIGHT SENSOR GROUND CIRCUIT OPEN
RIGHT-REAR SEAT WEIGHT SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B89–PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT HIGH IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B89–PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT HIGH?

Yes >> Go To 3

No >> Go To 9

B1B89-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT HIGH (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1 (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.

Perform OCS VERIFICATION TEST - VER 1 (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK IF MORE THAN ONE PASSENGER SEAT WEIGHT SENSOR DTC IS ACTIVE

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR DTCs?

Yes >> More Than One PASSENGER SEAT WEIGHT SENSOR DTC Is Active?Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors

Yes >> Only DTC B1B89 Is Active
Go To 6

No >> Other DTCs Present? Diagnose and repair the DTCs.
Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1
(Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

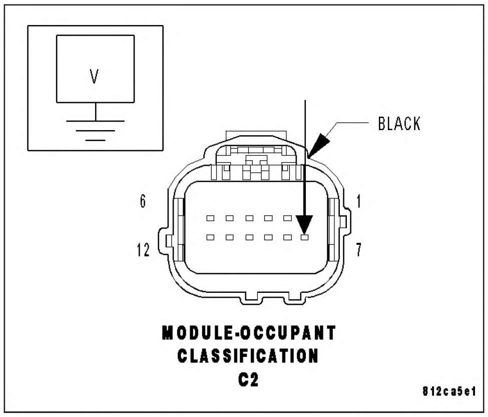
B1B89-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT HIGH (CONTINUED)

6. CHECK (R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C2 connector.

Measure the voltage of the (R706) RT-RR Seat Weight Sensor Signal circuit.



Is the voltage above 0.2 volts?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 7

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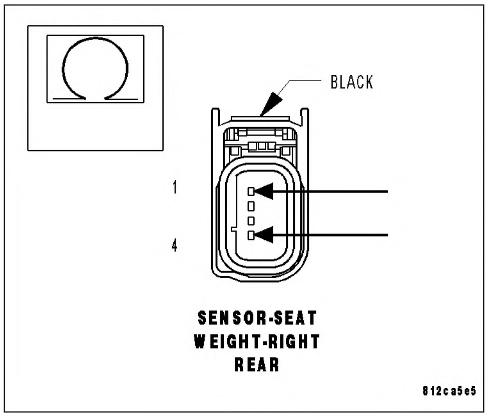
7. CHECK (R706) RT-RR SEAT WEIGHT SENSOR SIGNAL CIRCUIT FOR A SHORT TO (R701) SEAT WEIGHT SENSOR 5 VOLT CIRCUIT

Disconnect the Right-Rear Seat Weight Sensor connector.

Measure the resistance between the (R706) RT-RR Seat Weight Sensor Signal circuit and the (R701) Seat Weight Sensor 5 Volt circuit.



Is the resistance below 10K ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

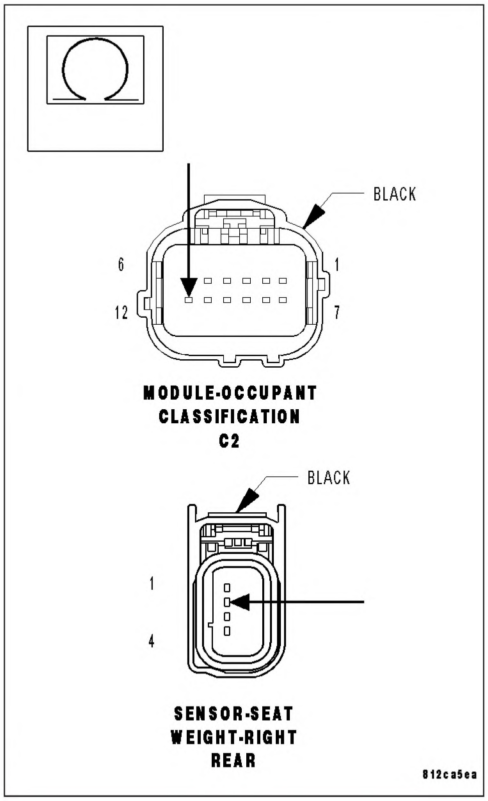
Perform OCS VERIFICATION TEST - VER 1 (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 8

B1B89-PASSENGER SEAT WEIGHT SENSOR 1 - RIGHT REAR INPUT CIRCUIT HIGH (CONTINUED)

8. CHECK (R728) SEAT WEIGHT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (R728) Seat Weight Sensor Ground circuit between the OCM C2 connector and the Right-Rear Seat Weight Sensor connector.


BLACK
6
1
12
7
MODULE-OCCUPANT CLASSIFICATION C2
BLACK
1
4
SENSOR-SEAT WEIGHT-RIGHT REAR
812ca5ea

Is the resistance below 5.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1 (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

9. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

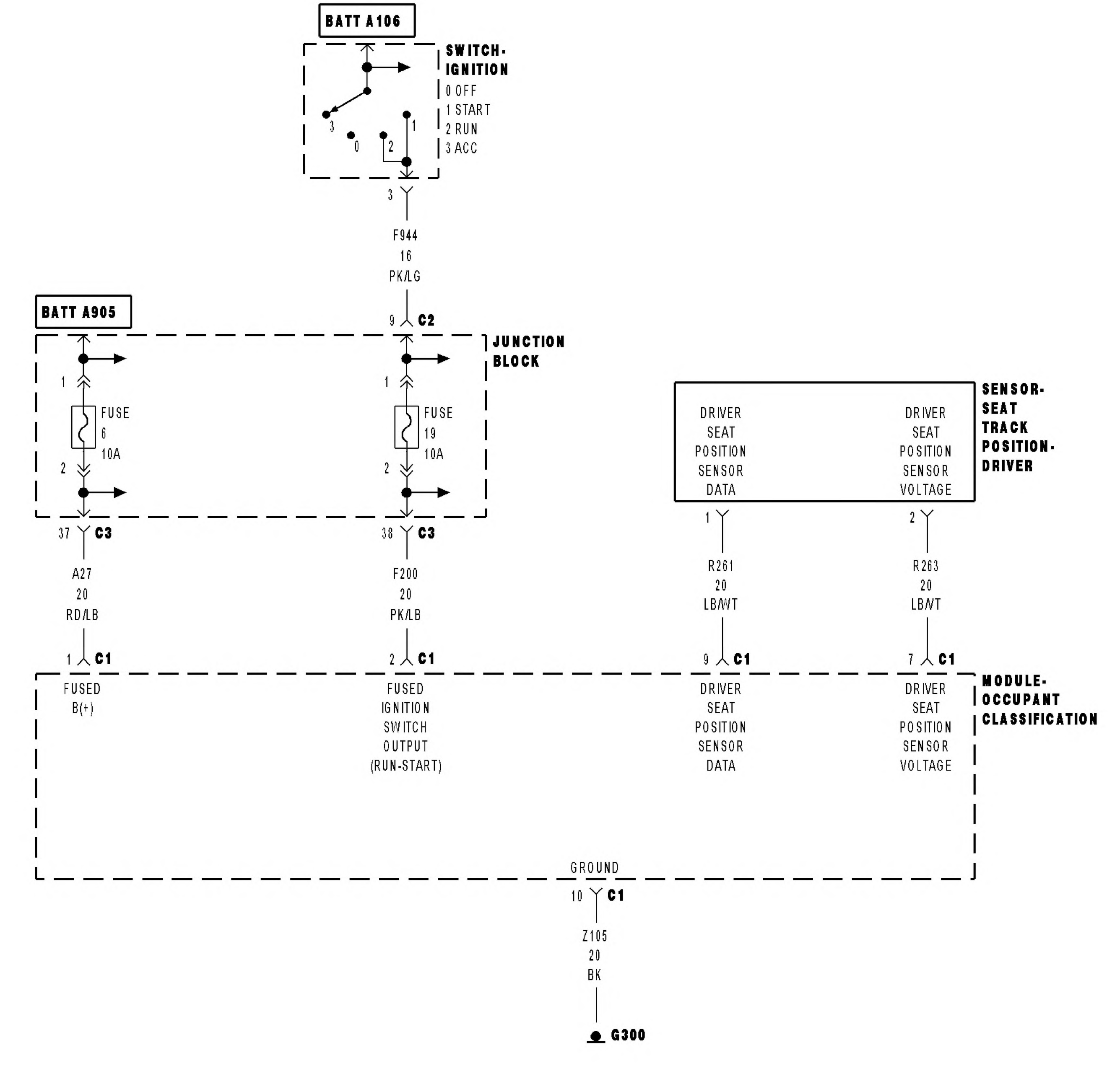
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

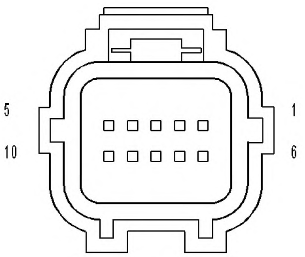
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

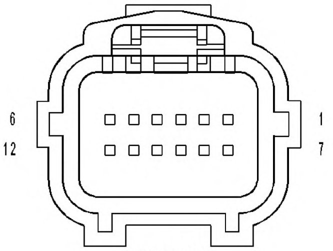
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B8C-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE

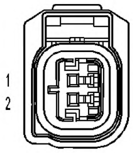

BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE 6 10A
2
1
FUSE 19 10A
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
SENSOR-SEAT TRACK POSITION-DRIVER
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
1
2
R261
20
LB/WT
R263
20
LB/WT
1 C1
2 C1
9 C1
7 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300



MODULE-
OCCUPANT
CLASSIFICATION C1



MODULE-
OCCUPANT
CLASSIFICATION C2



SENSOR-
SEAT
TRACK
POSITION-
DRIVER

814cef55

B1B8C-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is between 8 and 12 mA.

Possible Causes
DRIVER SEAT TRACK POSITION SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, BATTERY FAULTS, & SEAT TRACK POSITION SENSOR CIRCUIT HIGH OR LOW FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, battery faults, or Seat Track Position Sensor Circuit High or Low faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

2. VERIFY THAT B1B8C-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8C-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE?

Yes >> Go To 3

No >> Go To 4

B1B8C-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE (CONTINUED)

3. PERFORM SEAT TRACK POSITION SENSOR PERFORMANCE TEST

With the scan tool, erase OCM DTCs.

Turn the ignition off, wait 10 seconds and then turn the ignition on.

Cycle the driver seat to the full forward position and then to the full rearward position.

Return the driver seat to its approximate original position.

Wait two minutes, and then with the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8C-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE?

Yes >> Replace the Driver Seat Track Position Sensor in accordance with the Service Information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING) If DTC B1B8C-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE returns active, replace the OCM in accordance with the Service Information.

No >> Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

4. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

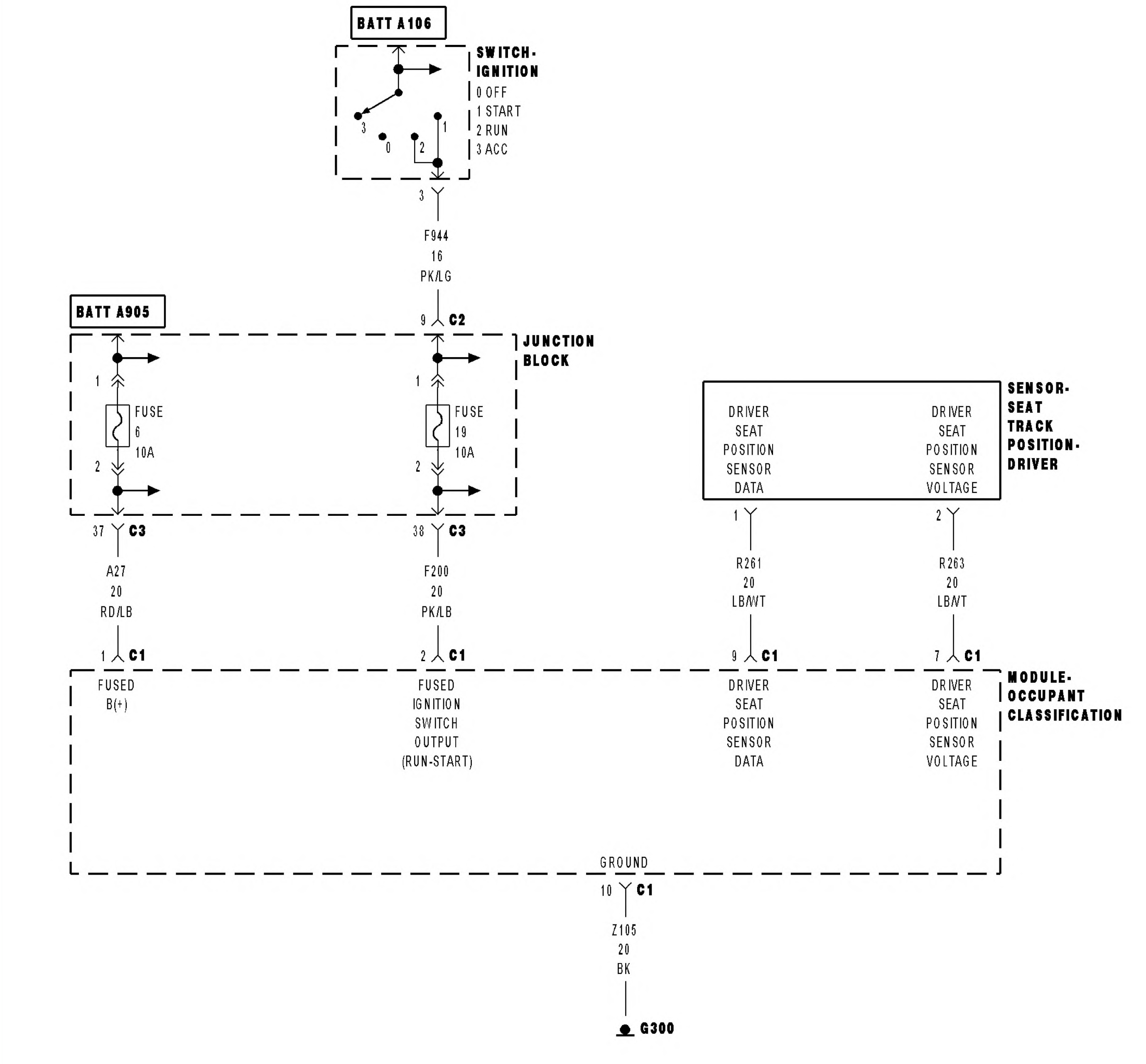
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

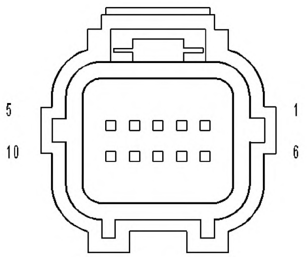
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

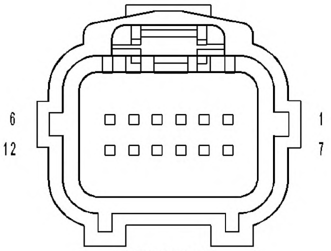
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B8D-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT LOW

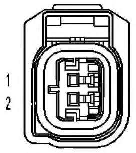

BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
FUSE 6 10A
FUSE 19 10A
1
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
SENSOR-SEAT TRACK POSITION-DRIVER
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
1
2
R261
20
LB/WT
R263
20
LB/WT
1 C1
2 C1
9 C1
7 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300



MODULE-OCCUPANT CLASSIFICATION C1



MODULE-OCCUPANT CLASSIFICATION C2



SENSOR-SEAT TRACK POSITION-DRIVER

814cef55

B1B8D-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT LOW (CONTINUED)

For the Occupant Classification circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN and the module is configured for a Seat Track Position Sensor, the module checks the sensor input current ranges.
- **Set Condition:**
  If the module detects that the sensor input is less than or equal to 0.3 ma. This DTC may set when the current is between 0.3 mA and 2.0 mA.

Possible Causes
DRIVER SEAT HARNESS IMPROPERLY ROUTED
DRIVER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
DRIVER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT, PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT SHORTED TO GROUND
(R263) SEAT POSITION SENSOR VOLTAGE-DRIVER CIRCUIT SHORTED TO GROUND
(R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT OPEN
(R263) SEAT POSITION SENSOR VOLTAGE-DRIVER CIRCUIT OPEN
DRIVER SEAT TRACK POSITION SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B8D-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT LOW IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8D-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT LOW?

Yes >> Go To 3

No >> Go To 7

B1B8D-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT LOW (CONTINUED)

3. INSPECT DRIVER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Driver Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Driver Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT DRIVER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Driver Seat Harness is routed correctly.

Is the Driver Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Driver Seat Harness as necessary.

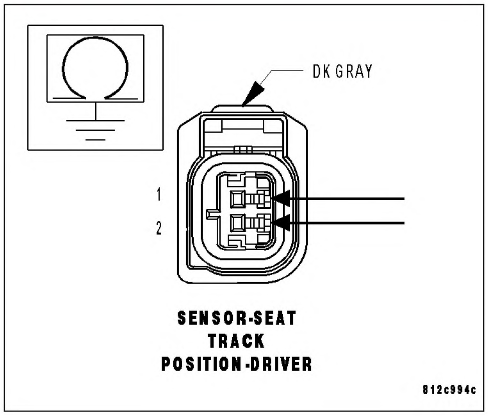
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK (R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT & (R263) SEAT POSITION SENSOR VOLTAGE-DRIVER CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (R261) Seat Position Sensor Data-Driver circuit.

Measure the resistance between ground and the (R263) Seat Position Sensor Voltage-Driver circuit.



Is the resistance below 10k ohms on either circuit?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Driver Seat Harness in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 6

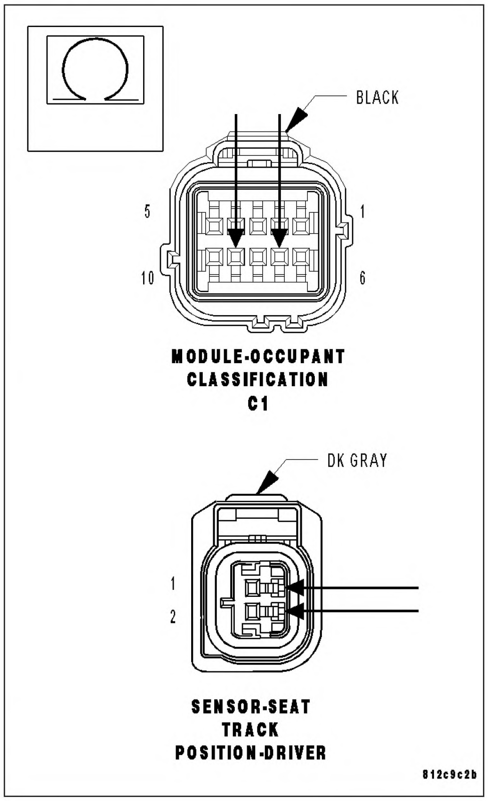
B1B8D-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT LOW (CONTINUED)

6. CHECK (R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT & (R263) SEAT POSITION SENSOR VOLTAGE-DRIVER CIRCUIT FOR AN OPEN

Disconnect the OCM C1 connector.

Measure the resistance of the (R261) Seat Position Sensor Data-Driver circuit between the OCM C1 connector and the Driver Seat Track Position Sensor connector.

Measure the resistance of the (R263) Seat Position Sensor Voltage-Driver circuit between the OCM C1 connector and the Driver Seat Track Position Sensor connector.


BLACK
5
1
10
6
MODULE-OCCUPANT CLASSIFICATION C1
DK GRAY
1
2
SENSOR-SEAT TRACK POSITION-DRIVER
812c9c2b

Is the resistance of either circuit above 5.0 ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Driver Seat Harness in accordance with the Service Information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Replace the OCM in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

7. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

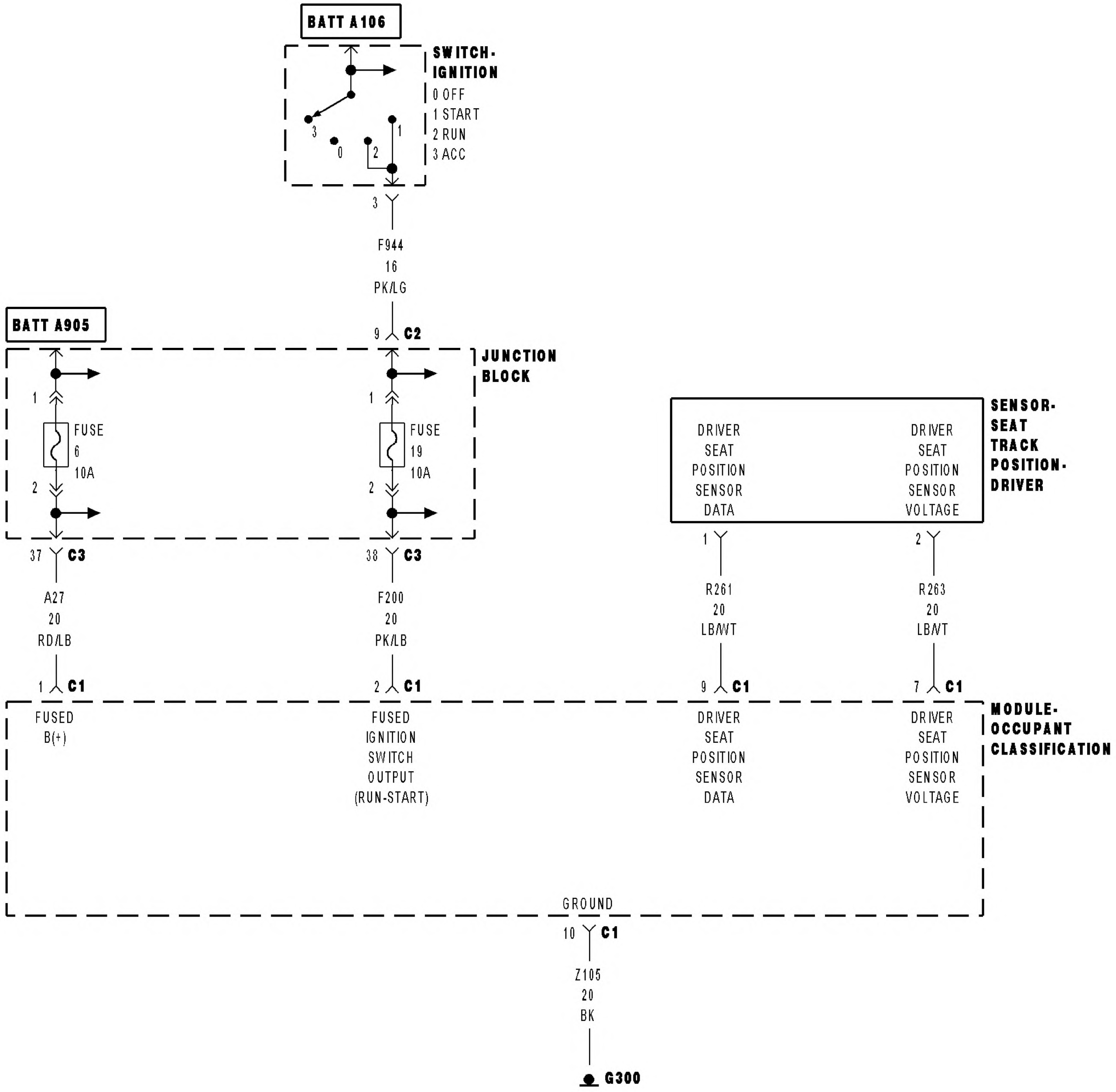
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

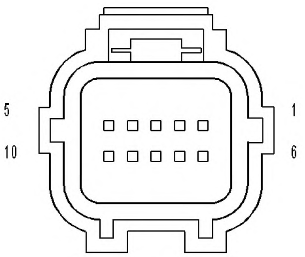
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

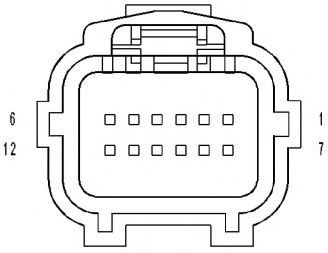
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH

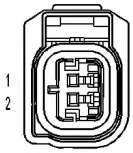

BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
FUSE 6 10A
FUSE 19 10A
1
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
SENSOR-SEAT TRACK POSITION-DRIVER
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
1
2
R261
20
LB/WT
R263
20
LB/WT
1 C1
2 C1
9 C1
7 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300



MODULE-OCCUPANT CLASSIFICATION C1



MODULE-OCCUPANT CLASSIFICATION C2



SENSOR-SEAT TRACK POSITION-DRIVER

814cef55

B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN and the module is configured for a Seat Track Position Sensor, the module checks the sensor input current ranges.
- **Set Condition:**
  If the module detects that the sensor input is greater than or equal to 20.5 mA. This DTC may set when the current is between 17 mA and 20.5 mA.

Possible Causes
DRIVER SEAT HARNESS IMPROPERLY ROUTED
DRIVER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
DRIVER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT, PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT SHORTED TO VOLTAGE
(R263) SEAT POSITION SENSOR VOLTAGE-DRIVER CIRCUIT SHORTED TO VOLTAGE
(R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT SHORTED TO (R263) SEAT POSITION SENSOR VOLTAGE-DRVER CIRCUIT
DRIVER SEAT TRACK POSITION SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH?

Yes >> Go To 3

No >> Go To 8

B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

3. INSPECT DRIVER SEAT HARNESS WIRES & CONNECTORS

With the scan tool, erase OCM DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Driver Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Driver Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT DRIVER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Driver Seat Harness is routed correctly.

Is the Driver Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Driver Seat Harness as necessary.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK FOR DTC B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH WITH DRIVER SEAT TRACK POSITION SENSOR DISCONNECTED

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Driver Seat Track Position Sensor connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Wait two minutes, and then with the scan tool, read OCM DTCs.

Does the scan tool display: B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH?

Yes >> Go To 6

No >> Replace the Driver Seat Track Position Sensor in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

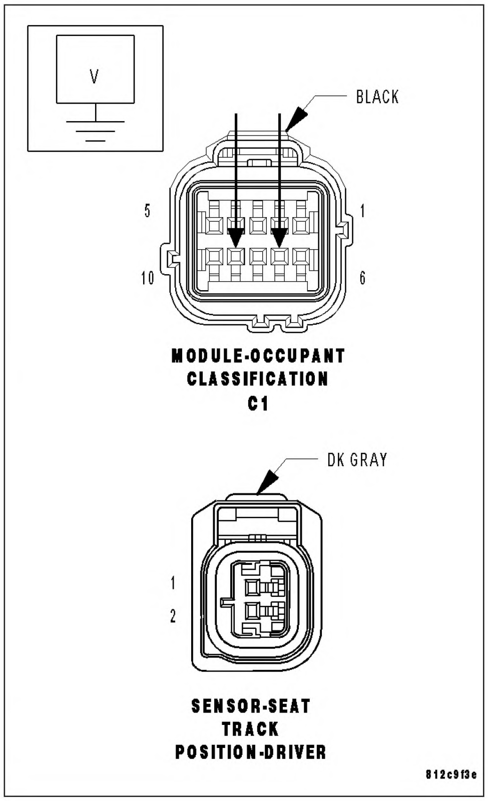
B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

6. CHECK (R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT & (R263) SEAT POSITION SENSOR VOLTAGE-DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the OCM C1 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (R261) Seat Position Sensor Data-Driver circuit.

Measure the voltage of the (R263) Seat Position Sensor Voltage-Driver circuit.


V
BLACK
5
1
10
6
MODULE-OCCUPANT CLASSIFICATION C1
DK GRAY
1
2
SENSOR-SEAT TRACK POSITION-DRIVER
812c9f3e

Is the voltage above 0.2 volts on either circuit?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Driver Seat Harness in accordance with the Service Information.

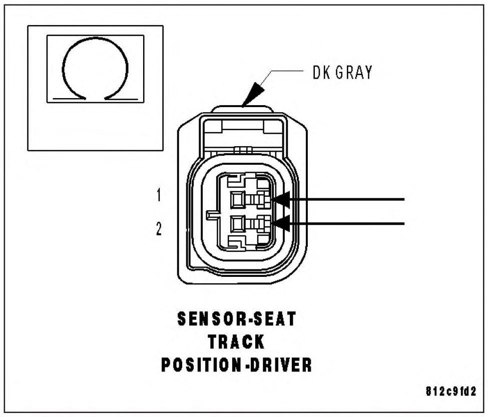
Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 7

---

7. CHECK (R261) SEAT POSITION SENSOR DATA-DRIVER CIRCUIT FOR A SHORT TO (R263) SEAT POSITION SENSOR VOLTAGE-DRIVER CIRCUIT

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Measure the resistance between the (R261) Seat Position Sensor Data-Driver circuit and the (R263) Seat Position Sensor Voltage-Driver circuit.



Is the resistance below 10k ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Driver Seat Harness in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Replace the OCM in accordance with the Service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B8E-DRIVER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

8. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

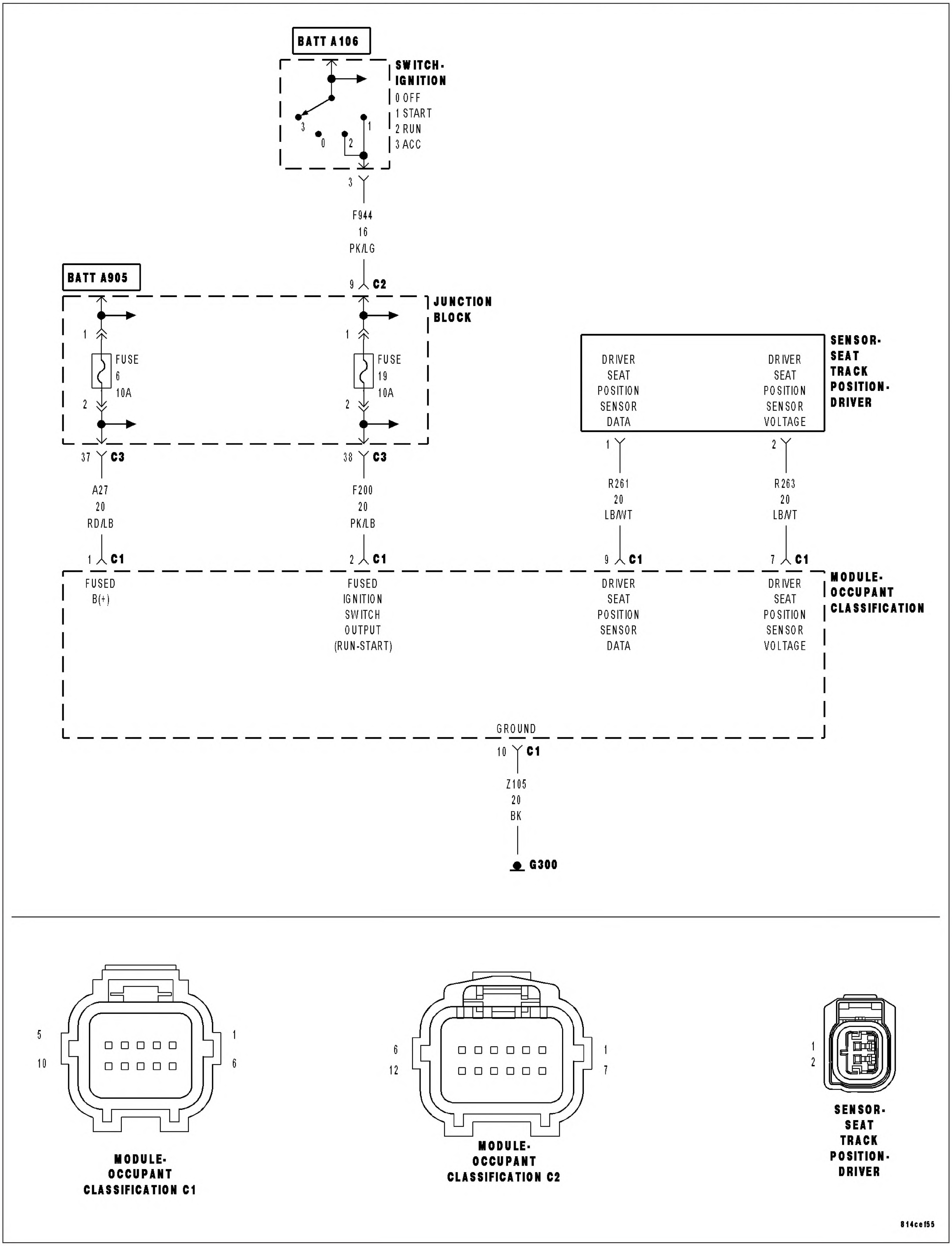
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B91-DRIVER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH


BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE 6 10A
2
1
FUSE 19 10A
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
SENSOR-SEAT TRACK POSITION-DRIVER
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
1
2
R261
20
LB/WT
R263
20
LB/WT
1 C1
2 C1
9 C1
7 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300
5
10
1
6
MODULE-OCCUPANT CLASSIFICATION C1
6
12
1
7
MODULE-OCCUPANT CLASSIFICATION C2
1
2
SENSOR-SEAT TRACK POSITION-DRIVER
814cef55

B1B91-DRIVER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on the OCM monitors the Seat Track Position Sensors circuits.
- **Set Condition:**
  If the module detects current on the Seat Track Position Sensors circuits and the module is not configured for STPS.

Possible Causes
SENSORS
WIRING
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT B1B91-DRIVER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH IS ACTIVE

With the scan tool, erase OCM DTCs.

Turn the ignition off, wait 10 seconds and then turn the ignition on.

Wait 2 minutes, and then with the scan tool, read OCM DTCs.

Does the scan tool display active: B1B91-DRIVER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH?

Yes >> Go To 3

No >> Perform the OCS VERIFICATION TEST-VER. 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B91-DRIVER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH (CONTINUED)

3. VERIFY WIRING

Turn the ignition off.

Inspect the driver and passenger seat wiring for Seat Position Sensors.

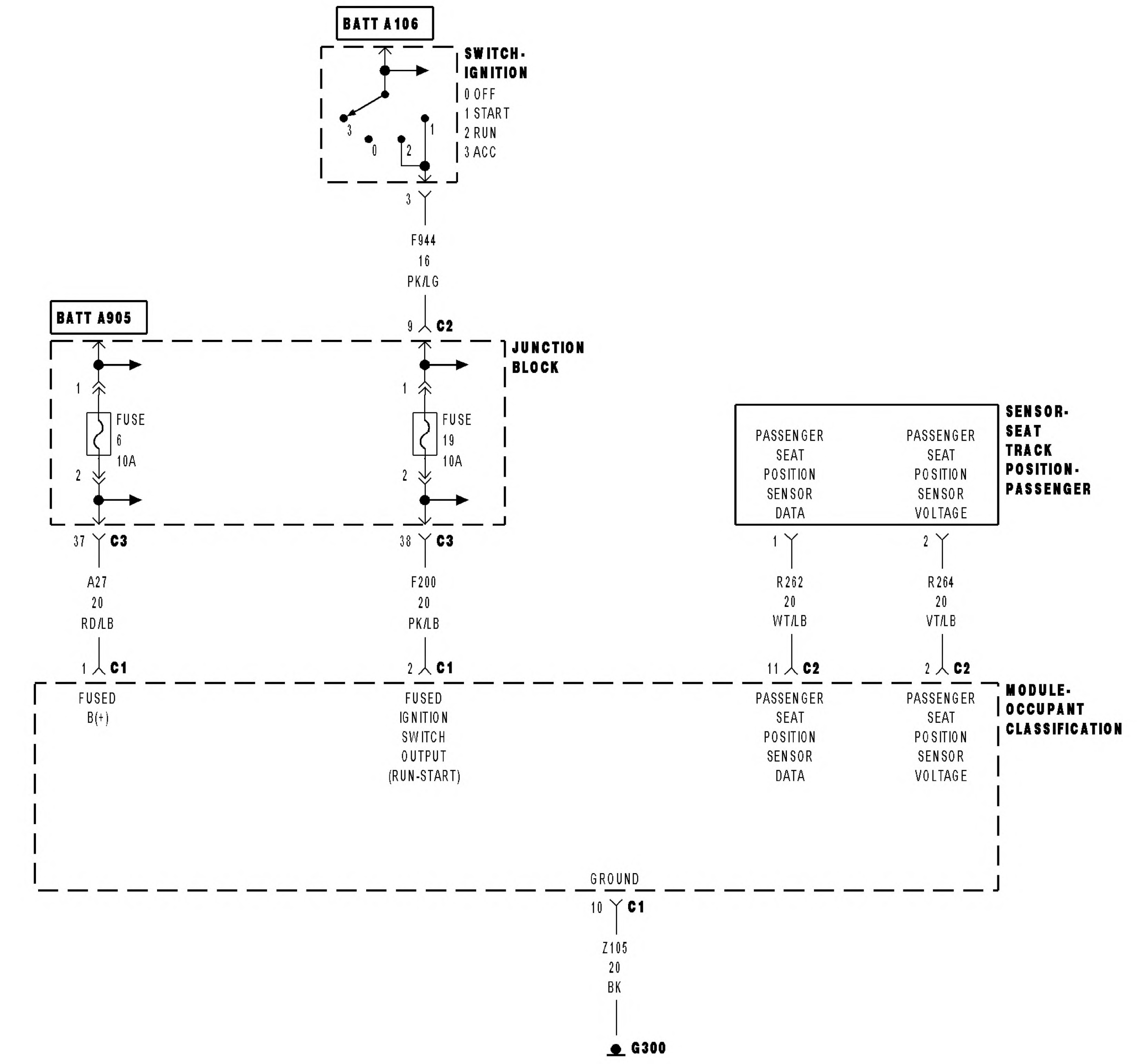
Are Seat Position Sensor(s) present?

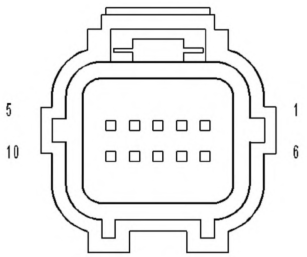
Yes >> Replace the OCM in accordance with the Service Information.

Perform the OCS VERIFICATION TEST-VER. 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

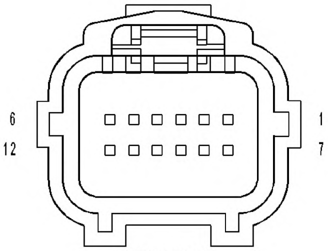
No >> Perform the OCS VERIFICATION TEST-VER. 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B92-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE

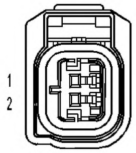

BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE
6
10A
2
1
FUSE
19
10A
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
SENSOR-SEAT TRACK POSITION-PASSENGER
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
1
2
R262
20
WT/LB
R264
20
VT/LB
1 C1
2 C1
11 C2
2 C2
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300



MODULE-OCCUPANT CLASSIFICATION C1



MODULE-OCCUPANT CLASSIFICATION C2



SENSOR-SEAT TRACK POSITION-PASSENGER

814d05d7

B1B92-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects that the sensor input is between 8 and 12 mA.

Possible Causes
DRIVER SEAT TRACK POSITION SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, BATTERY FAULTS, & SEAT TRACK POSITION SENSOR CIRCUIT HIGH OR LOW FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, battery faults, or Seat Track Position Sensor Circuit High or Low faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT B1B8C-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8C-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE?

Yes >> Go To 3

No >> Go To 4

B1B92-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE (CONTINUED)

3. PERFORM SEAT TRACK POSITION SENSOR PERFORMANCE TEST

With the scan tool, erase OCM DTCs.

Turn the ignition off, wait 10 seconds and then turn the ignition on.

Cycle the passenger seat to the full forward position and then to the full rearward position.

Return the passenger seat to its approximate original position.

Wait two minutes, and then with the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8C-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE?

Yes >> Replace the Passenger Seat Track Position Sensor in accordance with the Service Information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING) If DTC B1B8C-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT PERFORMANCE returns active, replace the OCM in accordance with the Service Information.

No >> Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

4. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC’s from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

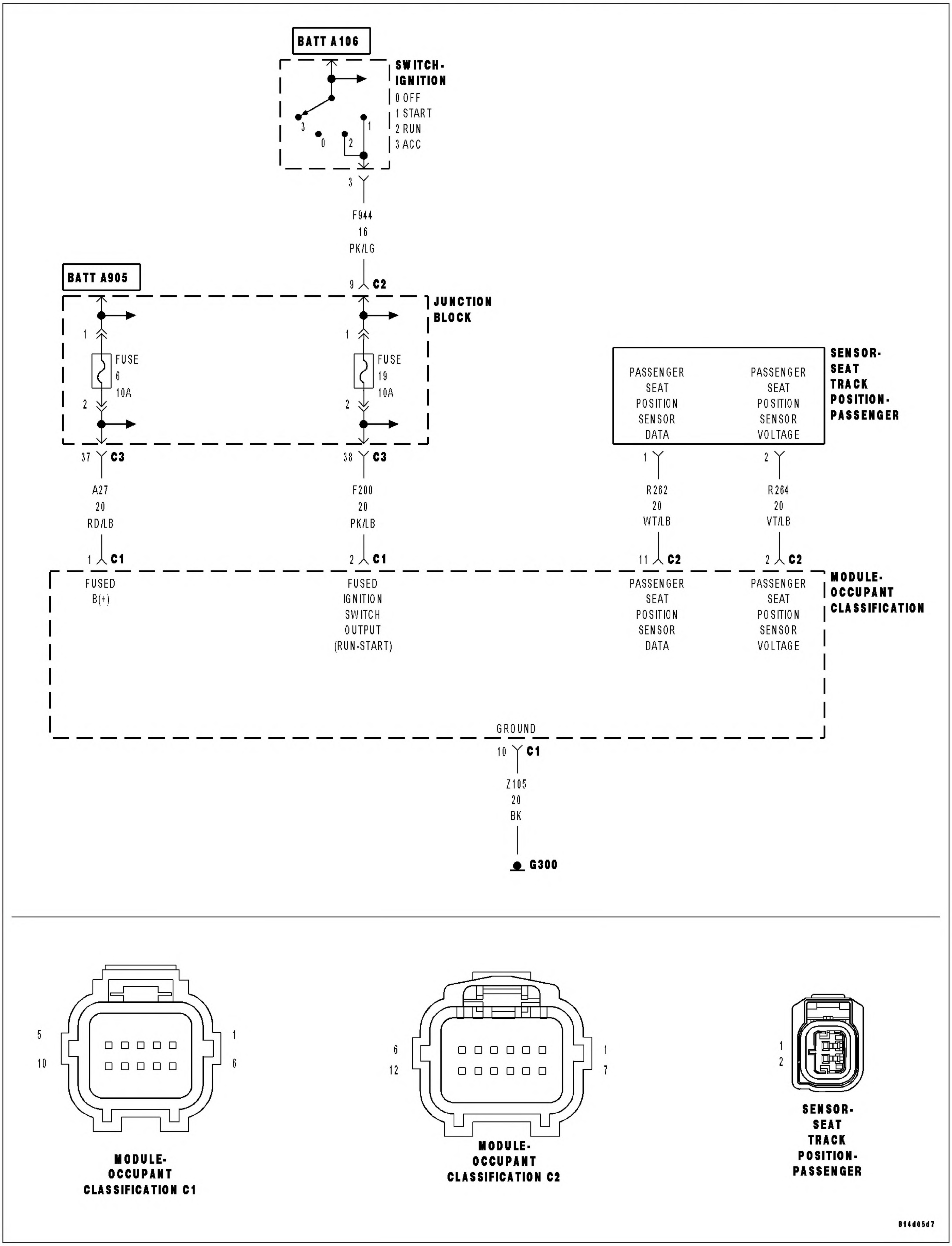
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B93-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT LOW


BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE
6
10A
2
1
FUSE
19
10A
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
SENSOR-SEAT TRACK POSITION-PASSENGER
1
2
R262
20
WT/LB
R264
20
VT/LB
1 C1
2 C1
11 C2
2 C2
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300
5
10
1
6
MODULE-OCCUPANT CLASSIFICATION C1
6
12
1
7
MODULE-OCCUPANT CLASSIFICATION C2
1
2
SENSOR-SEAT TRACK POSITION-PASSENGER
814d05d7

B1B93-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT LOW (CONTINUED)

For the Occupant Classification circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN and the module is configured for a Seat Track Position Sensor, the module checks the sensor input current ranges.
- **Set Condition:**
  If the module detects that the sensor input is less than or equal to 0.3 ma. This DTC may set when the current is between 0.3 mA and 2.0 mA.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT, PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT SHORTED TO GROUND
(R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT SHORTED TO GROUND
(R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT OPEN
(R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT OPEN
PASSENGER SEAT TRACK POSITION SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B8D-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT LOW IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8D-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT LOW?

Yes >> Go To 3

No >> Go To 7

B1B93-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT LOW (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.

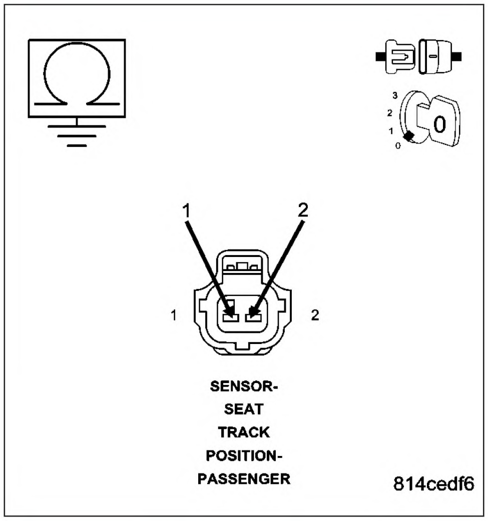
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK (R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT & (R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (R262) Seat Position Sensor Data-Passenger circuit.

Measure the resistance between ground and the (R264) Seat Position Sensor Voltage-Passenger circuit.



Is the resistance below 10k ohms on either circuit?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 6

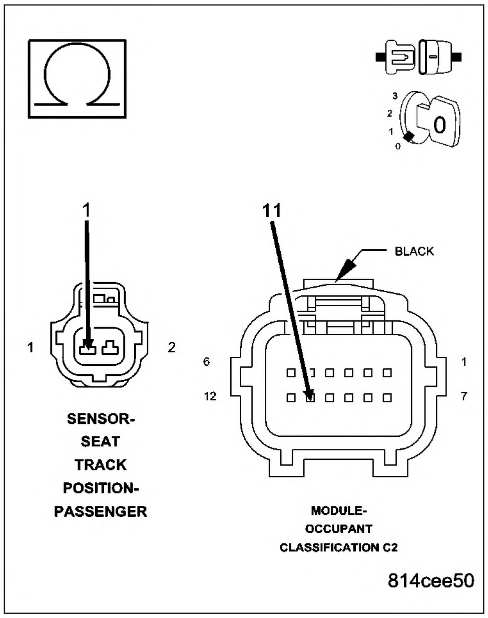
B1B93-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT LOW (CONTINUED)

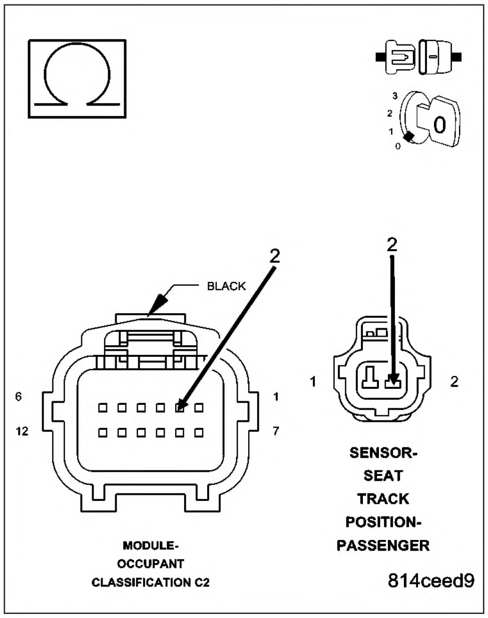
6. CHECK (R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT & (R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT FOR AN OPEN

Disconnect the OCM C1 connector.

Measure the resistance of the (R262) Seat Position Sensor Data-Passenger circuit between the OCM C1 connector and the Passenger Seat Track Position Sensor connector.

Measure the resistance of the (R264) Seat Position Sensor Voltage-Passenger circuit between the OCM C1 connector and the Passenger Seat Track Position Sensor connector.


1
11
BLACK
3
2
1
0
1
2
6
1
12
7
SENSOR-
SEAT
TRACK
POSITION-
PASSENGER
MODULE-
OCCUPANT
CLASSIFICATION C2
814cee50


3
2
1
0
2
2
BLACK
6
1
12
7
1
2
SENSOR-
SEAT
TRACK
POSITION-
PASSENGER
MODULE-
OCCUPANT
CLASSIFICATION C2
814ceed9

Is the resistance of either circuit above 5.0 ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Replace the OCM in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B93-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT LOW (CONTINUED)

7. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

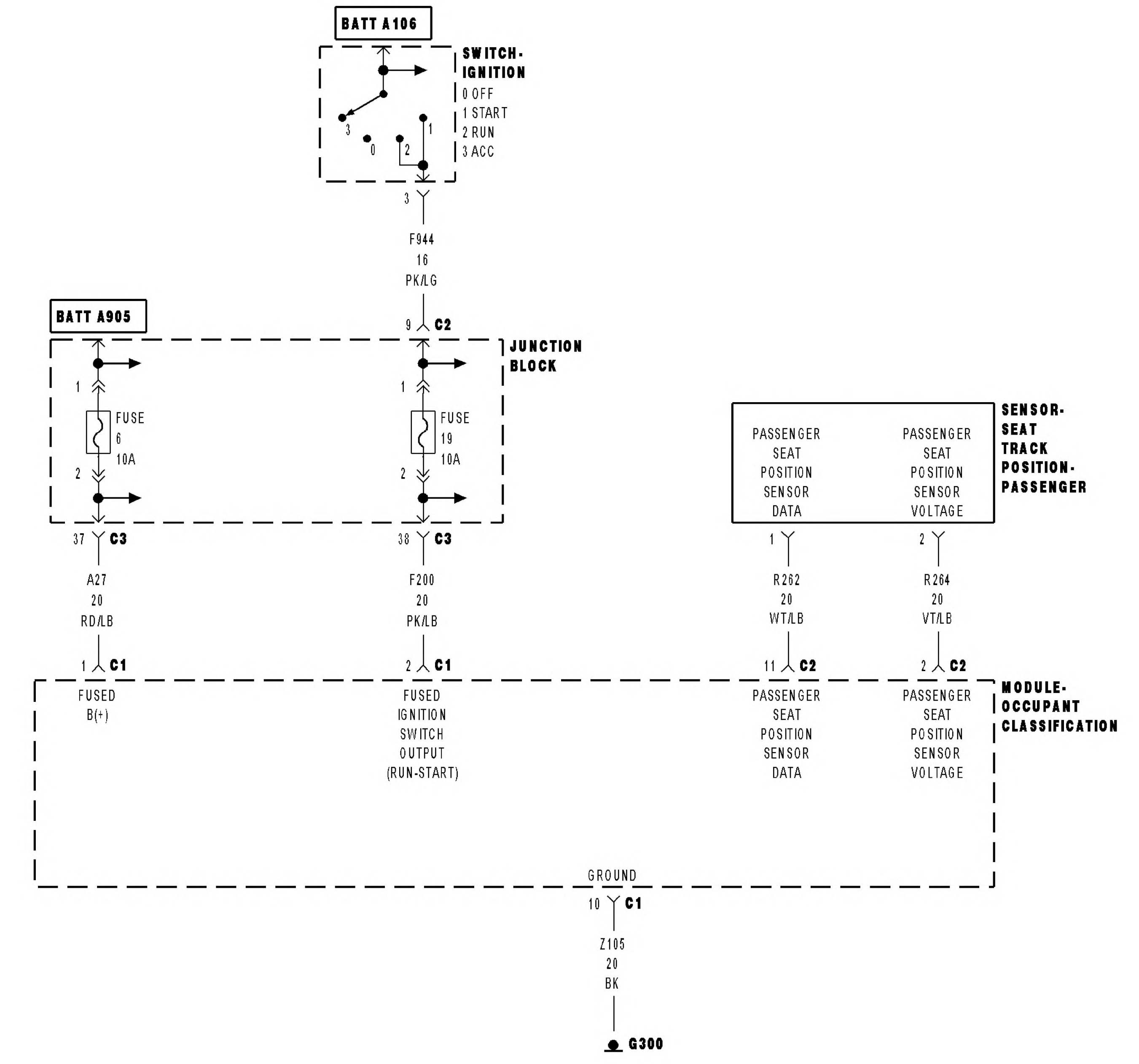
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

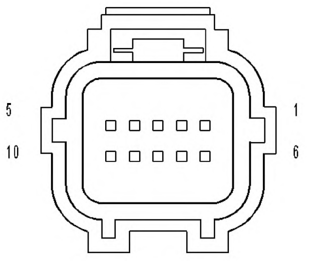
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

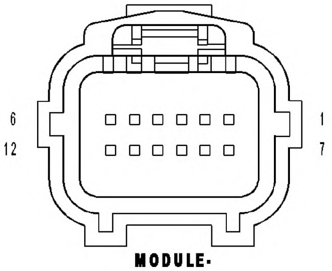
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B94-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH

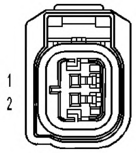

BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
BATT A905
9 C2
JUNCTION BLOCK
1
FUSE
6
10A
2
1
FUSE
19
10A
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
SENSOR-SEAT TRACK POSITION-PASSENGER
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
1
2
R262
20
WT/LB
R264
20
VT/LB
1 C1
2 C1
11 C2
2 C2
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300



MODULE-OCCUPANT CLASSIFICATION C1



MODULE-OCCUPANT CLASSIFICATION C2



SENSOR-SEAT TRACK POSITION-PASSENGER

814d05d7

B1B94-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN and the module is configured for a Seat Track Position Sensor, the module checks the sensor input current ranges.
- **Set Condition:**
  If the module detects that the sensor input is greater than or equal to 20.5 mA. This DTC may set when the current is between 17 mA and 20.5 mA.

Possible Causes
PASSENGER SEAT HARNESS IMPROPERLY ROUTED
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT, PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
(R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT SHORTED TO VOLTAGE
(R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT SHORTED TO VOLTAGE
(R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT SHORTED TO (R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT
PASSENGER SEAT TRACK POSITION SENSOR
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1B8E-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1B8E-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH?

Yes >> Go To 3

No >> Go To 8

B1B94-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

3. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

With the scan tool, erase OCM DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

---

4. VERIFY THAT PASSENGER SEAT HARNESS IS ROUTED CORRECTLY

Verify that the Passenger Seat Harness is routed correctly.

Is the Passenger Seat Harness routed correctly?

Yes >> Go To 5

No >> Reroute the Passenger Seat Harness as necessary.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

5. CHECK FOR DTC B1B8E-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH WITH PASSENGER SEAT TRACK POSITION SENSOR DISCONNECTED

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Passenger Seat Track Position Sensor connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Wait two minutes, and then with the scan tool, read OCM DTCs.

Does the scan tool display: B1B8E-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH?

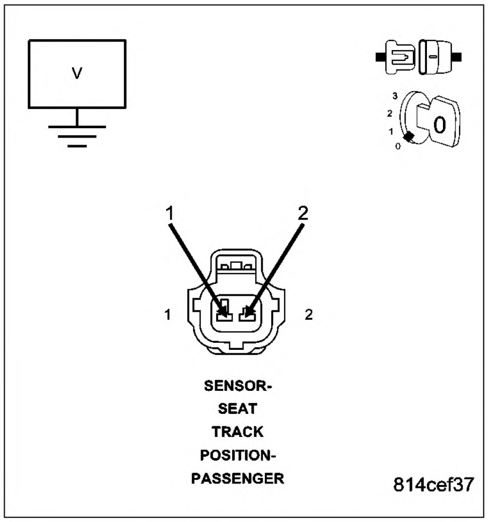
Yes >> Go To 6

No >> Replace the Passenger Seat Track Position Sensor in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B94-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

6. CHECK (R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT & (R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT FOR A SHORT TO VOLTAGE



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect the OCM C1 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (R262) Seat Position Sensor Data-Passenger circuit.

Measure the voltage of the (R264) Seat Position Sensor Voltage-Passenger circuit.

Is the voltage above 0.2 volts on either circuit?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

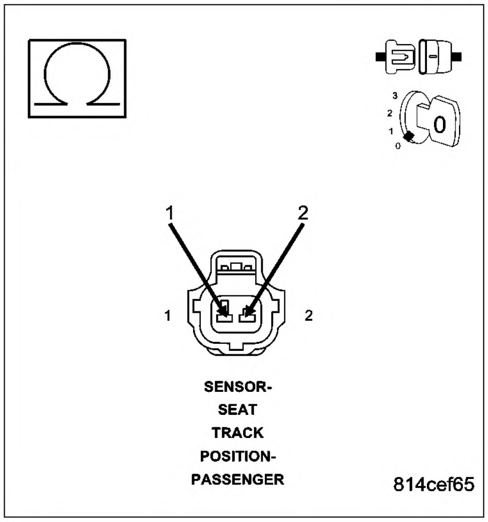
Replace the Passenger Seat Harness in accordance with the Service Information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 7

---

7. CHECK (R262) SEAT POSITION SENSOR DATA-PASSENGER CIRCUIT FOR A SHORT TO (R264) SEAT POSITION SENSOR VOLTAGE-PASSENGER CIRCUIT



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Measure the resistance between the (R262) Seat Position Sensor Data-Passenger circuit and the (R264) Seat Position Sensor Voltage-Passenger circuit.

Is the resistance below 10k ohms?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Replace the OCM in accordance with the Service information.

Perform the OCS VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B94-PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT HIGH (CONTINUED)

8. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

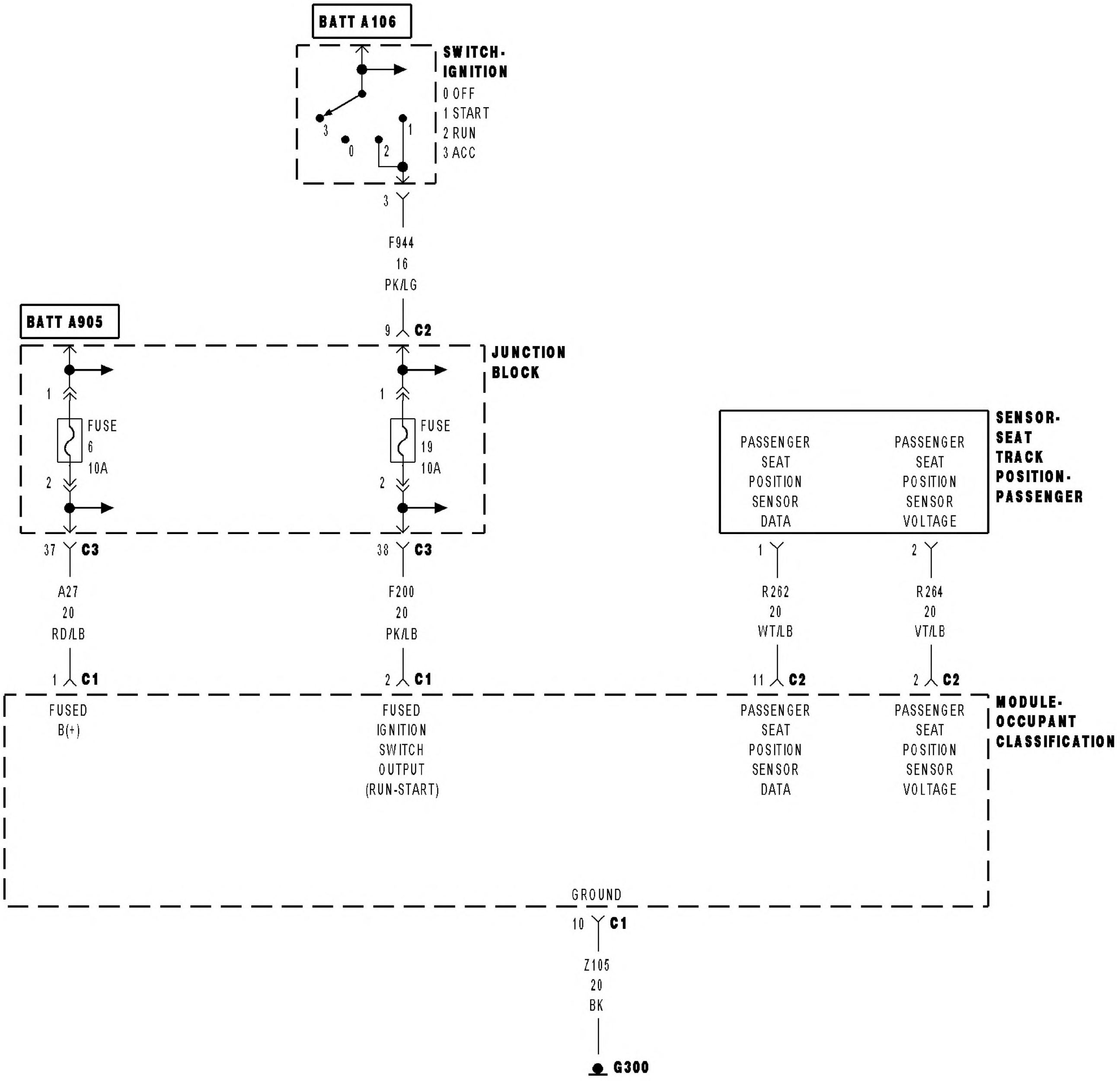
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

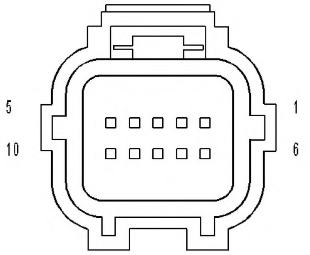
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

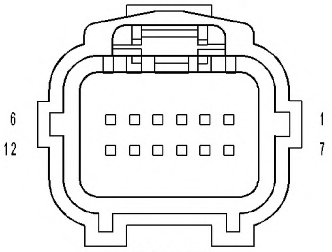
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1B97-PASSENGER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH

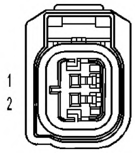

BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE
6
10A
2
1
FUSE
19
10A
2
37 C3
38 C3
A27
20
RD/LB
F200
20
PK/LB
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
SENSOR-SEAT TRACK POSITION-PASSENGER
1
2
R262
20
WT/LB
R264
20
VT/LB
1 C1
2 C1
11 C2
2 C2
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
GROUND
10 C1
Z105
20
BK
G300



MODULE-OCCUPANT CLASSIFICATION C1



MODULE-OCCUPANT CLASSIFICATION C2



SENSOR-SEAT TRACK POSITION-PASSENGER

814d05d7

B1B97-PASSENGER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on the OCM monitors the Seat Track Position Sensors circuits.
- **Set Condition:**
  If the module detects current on the Seat Track Position Sensors circuits and the module is not configured for STPS.

Possible Causes
SENSORS
WIRING
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT B1B91-PASSENGER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH IS ACTIVE

With the scan tool, erase OCM DTCs.

Turn the ignition off, wait 10 seconds and then turn the ignition on.

Wait 2 minutes, and then with the scan tool, read OCM DTCs.

Does the scan tool display active: B1B91-PASSENGER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH?

Yes >> Go To 3

No >> Perform the OCS VERIFICATION TEST-VER. 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1B97-PASSENGER SEAT TRACK POSITION SENSOR CONFIGURATION MISMATCH (CONTINUED)

3. VERIFY WIRING

Turn the ignition off.

Inspect the Passenger and passenger seat wiring for Seat Position Sensors.

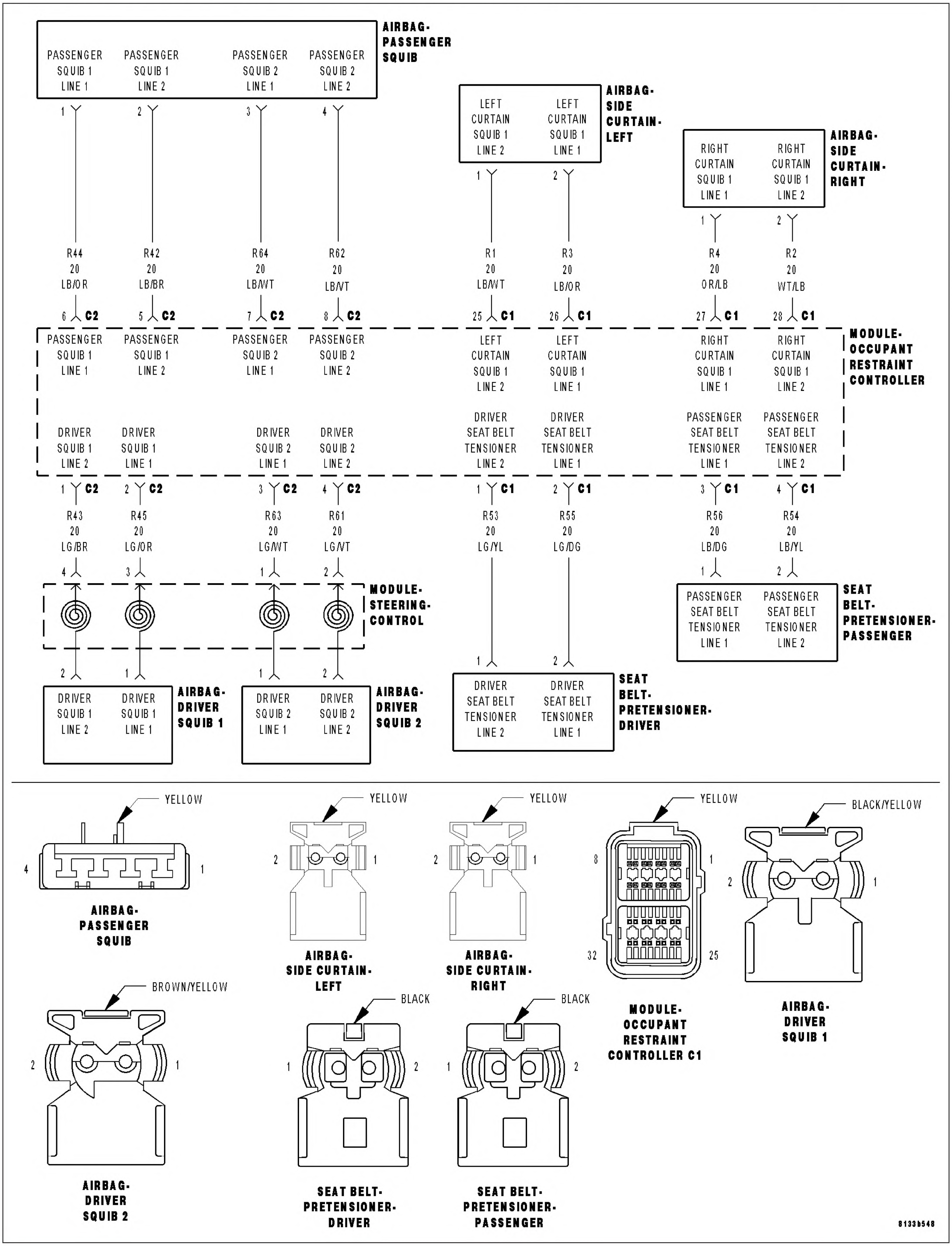
Are Seat Position Sensor(s) present?

Yes >> Replace the OCM in accordance with the Service Information.

Perform the OCS VERIFICATION TEST-VER. 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Perform the OCS VERIFICATION TEST-VER. 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1BA5-AIRBAG SQUIB CONFIGURATION MISMATCH


AIRBAG-PASSENGER SQUIB
PASSENGER SQUIB 1 LINE 1
PASSENGER SQUIB 1 LINE 2
PASSENGER SQUIB 2 LINE 1
PASSENGER SQUIB 2 LINE 2
AIRBAG-SIDE CURTAIN-LEFT
LEFT CURTAIN SQUIB 1 LINE 2
LEFT CURTAIN SQUIB 1 LINE 1
AIRBAG-SIDE CURTAIN-RIGHT
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
R44 20 LB/OR
R42 20 LB/BR
R64 20 LB/WT
R62 20 LB/VT
R1 20 LB/WT
R3 20 LB/OR
R4 20 OR/LB
R2 20 WT/LB
6 C2
5 C2
7 C2
8 C2
25 C1
26 C1
27 C1
28 C1
MODULE-OCCUPANT RESTRAINT CONTROLLER
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
DRIVER SEAT BELT TENSIONER LINE 2
DRIVER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 2
1 C2
2 C2
3 C2
4 C2
1 C1
2 C1
3 C1
4 C1
R43 20 LG/BR
R45 20 LG/OR
R63 20 LG/WT
R61 20 LG/VT
R53 20 LG/YL
R55 20 LG/DG
R56 20 LB/DG
R54 20 LB/YL
MODULE-STEERING-CONTROL
SEAT BELT-PRETENSIONER-PASSENGER
AIRBAG-DRIVER SQUIB 1
AIRBAG-DRIVER SQUIB 2
SEAT BELT-PRETENSIONER-DRIVER
YELLOW
AIRBAG-PASSENGER SQUIB
AIRBAG-SIDE CURTAIN-LEFT
AIRBAG-SIDE CURTAIN-RIGHT
MODULE-OCCUPANT RESTRAINT CONTROLLER C1
BLACK/YELLOW
AIRBAG-DRIVER SQUIB 1
BROWN/YELLOW
AIRBAG-DRIVER SQUIB 2
BLACK
SEAT BELT-PRETENSIONER-DRIVER
SEAT BELT-PRETENSIONER-PASSENGER
8
1
32
25
8133b548

B1BA5-AIRBAG SQUIB CONFIGURATION MISMATCH (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If an Occupant Restraint Controller (ORC) configured for vehicles without side airbags is installed in a vehicle with side airbags.

Possible Causes
POWERTRAIN CONTROL MODULE (PCM)
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. VERIFY THAT DTC B1BA5 AIRBAG SQUIB CONFIGURATION MISMATCH IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: B1BA5 AIRBAG SQUIB CONFIGURATION MISMATCH?

Yes >> Go To 2

No >> Go To 5

---

2. VERIFY THAT VEHICLE IS EQUIPPED WITH OCCUPANT CLASSIFICATION SYSTEM (OCS)

Vehicles equipped with a Occupant Classification System (OCS) will have a Passenger Airbag On/Off Indicator Lamp mounted to the dashboard. Verify that the vehicle is equipped with this indicator lamp.

With the scan tool, select ECU View and check that the Occupant Classification Module (OCM) is active on the bus.

Is the vehicle equipped with an Occupant Classification System (OCS)?

Yes >> Go To 3

No >> Replace the ORC in accordance with Service Information.
Perform ORC VERIFICATION TEST - VER 1.

---

3. CHECK ORC PART NUMBER WITH SCAN TOOL

With the scan tool, select ECU View, select ORC, select ECU Details, and read the ORC part number.

Is the part number correct for the vehicle?

Yes >> Go To 4

No >> Replace the ORC in accordance with Service Information.
Perform ORC VERIFICATION TEST - VER 1.

B1BA5-AIRBAG SQUIB CONFIGURATION MISMATCH (CONTINUED)

4. CHECK VIN WITH SCAN TOOL

With the scan tool, read the VIN.

Is the correct VIN displayed?

Yes >> Replace the ORC in accordance with Service Information.
Perform ORC VERIFICATION TEST - VER 1.

No >> Replace the Powertrain Control Module (PCM) in accordance with Service Information.
Perform ORC VERIFICATION TEST - VER 1.

---

5. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1BA6-OCCUPANT CLASSIFICATION UNDETERMINED

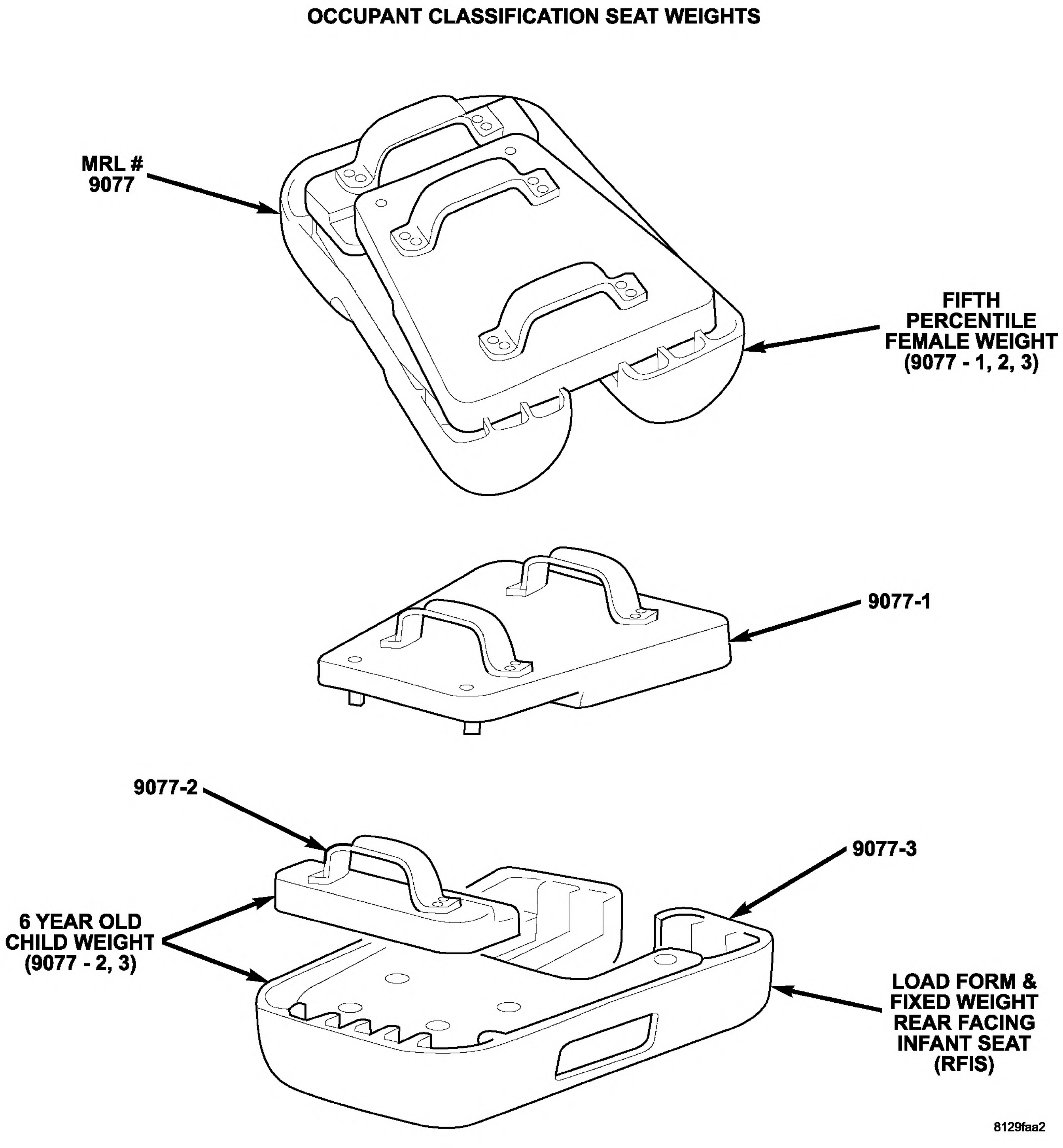
For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on or off.
- **Set Condition:**
  Because other DTCs have made occupant detection impossible. This DTC will set in addition to all sensor and module DTCs and will be erased when the repairs are completed.

Refer to **B1BA7–OCCUPANT CLASSIFICATION SYSTEM VERIFICATION REQUIRED** for the diagnostic test procedure.

B1BA7-OCCUPANT CLASSIFICATION SYSTEM VERIFICATION REQUIRED


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

OCS SEAT WEIGHTS MRL #9077

B1BA7-OCCUPANT CLASSIFICATION SYSTEM VERIFICATION REQUIRED (CONTINUED)

- **When Monitored:**
  With the CAN ignition status as IGN_RUN, the module tries to detect potentially damaging events and monitors the CAN Bus for the X Impact messages (crash event causing one or more airbag or pretensioner to deploy) or upon detecting an Offset Event (if equipped).
- **Set Condition:**
  This DTC will set if the module detects a potentially damaging event or the X Impact messages from the CAN Bus input.

Possible Causes
B1BA7-OCS VERIFICATION REQUIRED DTC ACTIVE

Diagnostic Test

1. CHECK FOR OCCUPANT CLASSIFICATION MODULE (OCM) ACTIVE DTCs:

- ACTIVE INTERNAL FAULTS
- IGNITION FAULTS
- BATTERY FAULT
- SEAT WEIGHT SENSOR DTCs

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs listed above?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1BA7–OCCUPANT CLASSIFICATION SYSTEM VERIFICATION REQUIRED IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BA7–OCCUPANT CLASSIFICATION SYSTEM VERIFICATION REQUIRED?

Yes >> Go To 3

No >> Go To 4

B1BA7-OCCUPANT CLASSIFICATION SYSTEM VERIFICATION REQUIRED (CONTINUED)

3. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that the passenger seat is empty.

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

NOTE: Failure to follow the test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BA7–OCCUPANT CLASSIFICATION SYSTEM VERIFICATION REQUIRED?

Yes >> Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Perform OCS VERIFICATION TEST - VER 1.

No, But Other DTCs Present

Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No Active DTCs Present

Perform OCS VERIFICATION TEST - VER 1.

---

4. CHECK FOR ACTIVE DTC B1BA8–OCM SYSTEM OUT OF CALIBRATION/NOT CALIBRATED

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BA8–OCM SYSTEM OUT OF CALIBRATION/NOT CALIBRATED?

Yes >> Diagnose and repair the DTC. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1.

B1BA8-OCM SYSTEM OUT OF CALIBRATION/NOT CALIBRATED

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is IGN_RUN or SNA.
- **Set Condition:**
  This DTC will set if the module has initiated a rezero and did not successfully complete the system verification, a system verification routine has been aborted or a update option table from flash routine has been completed.

Diagnostic Test

1. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that the passenger seat is empty.

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

NOTE: Failure to follow the test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, proceed as follows.

With the scan tool, read OCM DTCs.

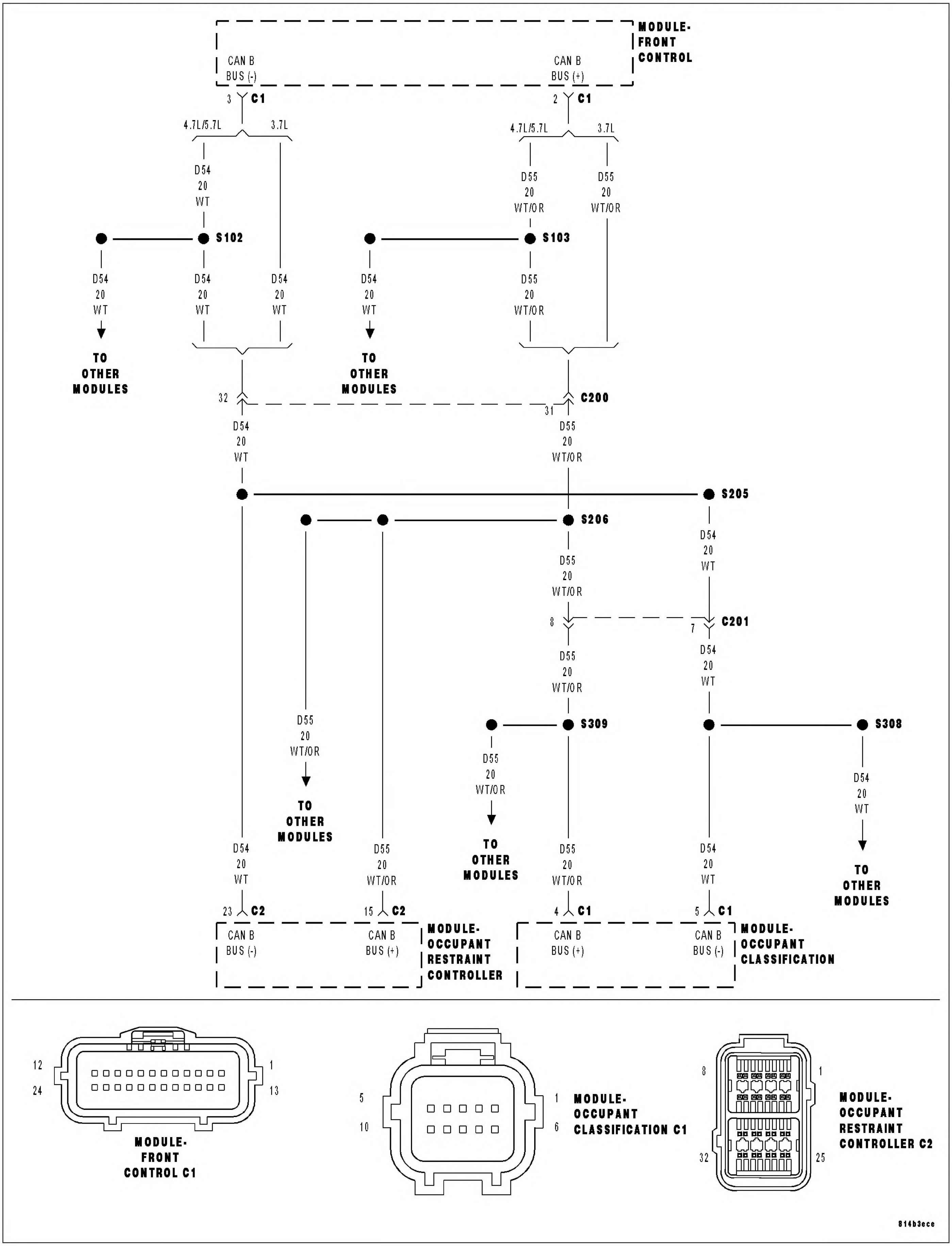
Does the scan tool display any active DTCs?

Yes - B1BA8 DTC Returned
Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Yes - But Other DTCs Present
Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No - Active DTCs Present
Perform OCS VERIFICATION TEST - VER 1.

B1BAA-OCCUPANT CLASSIFICATION MODULE CONFIGURATION MISMATCH


MODULE-
FRONT
CONTROL
CAN B
BUS (-)
CAN B
BUS (+)
3
C1
2
C1
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D54
20
WT
D55
20
WT/OR
D55
20
WT/OR
S102
S103
D54
20
WT
D54
20
WT
D54
20
WT
D54
20
WT
D55
20
WT/OR
TO
OTHER
MODULES
TO
OTHER
MODULES
32
31
C200
D54
20
WT
D55
20
WT/OR
S205
S206
D55
20
WT/OR
D54
20
WT
8
7
C201
D55
20
WT/OR
D54
20
WT
S309
S308
D55
20
WT/OR
TO
OTHER
MODULES
D55
20
WT/OR
TO
OTHER
MODULES
D54
20
WT
TO
OTHER
MODULES
D54
20
WT
D55
20
WT/OR
D55
20
WT/OR
D54
20
WT
23
C2
15
C2
4
C1
5
C1
CAN B
BUS (-)
CAN B
BUS (+)
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
OCCUPANT
CLASSIFICATION
12
24
1
13
MODULE-
FRONT
CONTROL C1
5
10
1
6
MODULE-
OCCUPANT
CLASSIFICATION C1
8
32
1
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
814b3ece

B1BAA-OCCUPANT CLASSIFICATION MODULE CONFIGURATION MISMATCH (CONTINUED)

For the Occupant Restraint System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is IGN_RUN.
- **Set Condition:**
  This DTC will set if the ORC is not configured for Occupant Classification Module and the OCM is active on the CAN Bus. Note: Because all ORCs are originally configured for the OCM the ORC must learn the not equipped with OCM state from the FCM.

Possible Causes
LOSS OF COMMUNICATION BEWEEN ORC AND FCM
MISSING CAN BUS CONFIGURATION MESSAGE
CORRUPT CONFIGURATION MESSAGE
OCCUPANT RESTRAINT CONTROLLER (ORC)

1. DETERMINE ACTIVE OR STORED DTC

With the scan tool, read Occupant Restraints Controller (ORC) DTCs.

Does the scan tool display an active B1BAA-OCCUPANT CLASSIFICATION MODULE CONFIGURATION MISMATCH DTCs?

Active DTC
Go To 2

Stored DTC
Go To 5

---

2. CHECKING FOR CORRUPT CONFIGURATION MESSAGE

With the scan tool, read Occupant Restraints Controller (ORC) DTCs.

Does the scan tool display an active U1414-IMPLAUSIBLE/MISSING ECU NETWORK CONFIGURATION DATA DTCs?

Yes >> Go To U1414-IMPLAUSIBLE/MISSING ECU NETWORK CONFIGURATION DATA DTC (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 3

---

3. CHECKING FOR LOSS OF CAN BUS CONFIGURATION MESSAGE

With the scan tool, read Occupant Restraints Controller (ORC) DTCs.

Does the scan tool display an active U1415-IMPLAUSIBLE/MISSING VEHICLE CONFIGURATION DATA DTCs?

Yes >> Go To U1415-IMPLAUSIBLE/MISSING VEHICLE CONFIGURATION DATA DTC (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 4

B1BAA-OCCUPANT CLASSIFICATION MODULE CONFIGURATION MISMATCH (CONTINUED)

4. CHECKING FOR LOSS OF COMMUNICATION WITH THE FCM

With the scan tool, read Occupant Restraints Controller (ORC) DTCs.

Does the scan tool display an active U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE DTCs?

Yes >> Go To U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE DTC (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 6

5. VERIFYING STORED B1BAA-OCCUPANT CLASSIFICATION MODULE CONFIGURATION MISMATCH DTC

With the scan tool, record and erase all DTC's from the Occupant Restraint Controller.

Turn the ignition off, and wait 15 seconds, then turn the ignition on.

Wait one minute, and read active and stored codes.

Does the scan tool display an active or stored B1BAA-OCCUPANT CLASSIFICATION MODULE CONFIGURATION MISMATCH DTCs?

Yes >> For active DTC-Go To 2

Yes >> For stored-Go To 6

No >> Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

6. REPLACE THE ORC

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller (ORC) is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

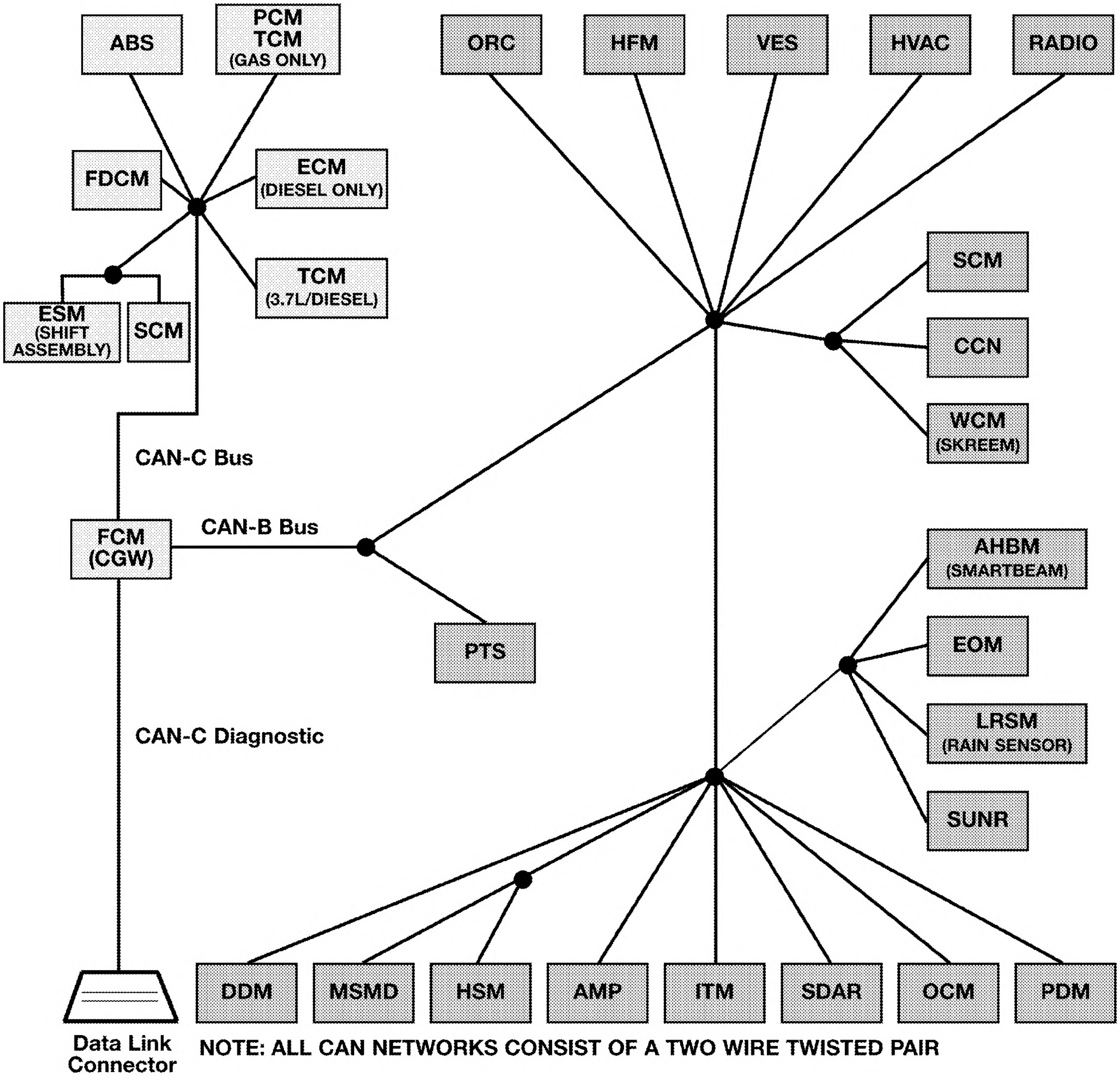
NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1BB8-SRS WARNING INDICATOR STATUS MISMATCH


ABS
PCM
TCM
(GAS ONLY)
ORC
HFM
VES
HVAC
RADIO
FDCM
ECM
(DIESEL ONLY)
TCM
(3.7L/DIESEL)
ESM
(SHIFT
ASSEMBLY)
SCM
SCM
CCN
WCM
(SKREEM)
CAN-C Bus
FCM
(CGW)
CAN-B Bus
AHBM
(SMARTBEAM)
EOM
PTS
LRSM
(RAIN SENSOR)
CAN-C Diagnostic
SUNR
DDM
MSMD
HSM
AMP
ITM
SDAR
OCM
PDM
Data Link
Connector
NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR
814a12dd

B1BB8-SRS WARNING INDICATOR STATUS MISMATCH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  After the Instrument Cluster bulb check is completed, the ORC compares the lamp request by the ORC (On or Off) and the Lamp On request by the Instrument Cluster (On or Off) Can bus messages. Each message is transmitted one time per second or when a change in the lap state occurs.
- **Set Condition:**
  If the lamp request by the ORC (On or Off), and the Lamp On by the Instrument Cluster (On or Off), messages do not match, this code will set.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER, INSTRUMENT CLUSTER MESSAGE MISMATCH
INSTRUMENT CLUSTER
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Restraint Controller (ORC) DTCs.

Select DTC type.

Active
Go To 2

Stored
Go To 5

---

2. CHECK FOR ACTIVE INSTRUMENT CLUSTER DTCs

With the scan tool, read Instrument Cluster DTCs.

Does the scan tool display and active Instrument Cluster DTCs?

Yes >> Refer to symptom list for problems related to the Instrument Cluster.
Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 3

B1BB8-SRS WARNING INDICATOR STATUS MISMATCH (CONTINUED)

3. CHECK THE ORC AND INSTRUMENT CLUSTER FOR LAMP STATUS

With the scan tool view the Instrument Cluster Data Display.

Cycle the ignition key and observe the SRS Indicator Lamp Request status (Set/Not Set) during the Instrument Cluster bulb check.

With the scan tool view the ORC Data Display.

Cycle the ignition key and observe the SRS Indicator Lamp Status (Lamp On/Lamp Off) during the Instrument Cluster bulb check.

Did the Data Display information match the operation of the lamp?

Yes >> Go To 4

No >> Replace the Instrument Cluster in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B1BB8-SRS WARNING INDICATOR STATUS MISMATCH (CONTINUED)

5. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

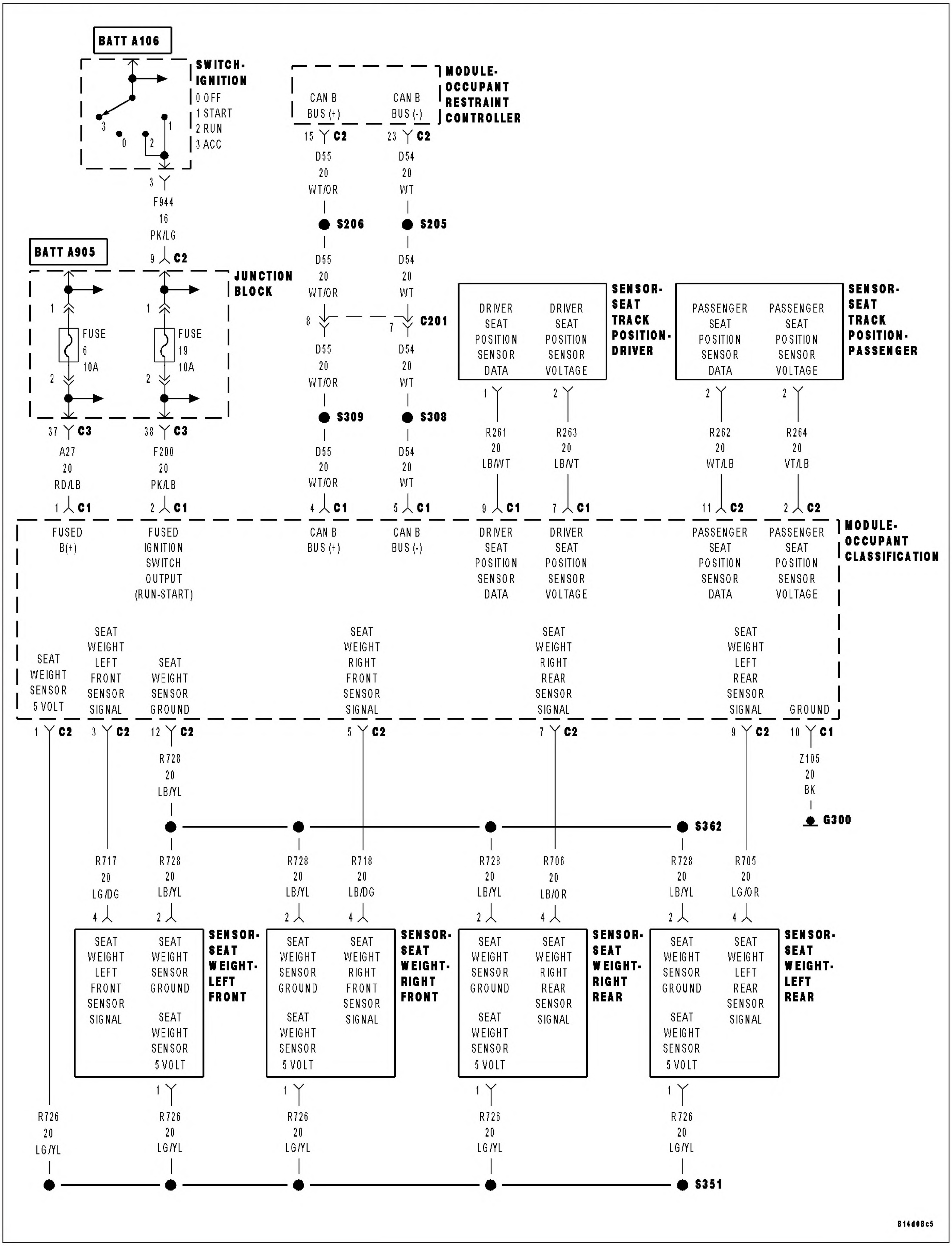
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1BBA-PASSENGER SEAT WEIGHT SENSOR SUPPLY CIRCUIT


BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE
6
10A
2
1
FUSE
19
10A
2
37 C3
A27
20
RD/LB
1 C1
38 C3
F200
20
PK/LB
2 C1
MODULE-OCCUPANT RESTRAINT CONTROLLER
CAN B BUS (+)
CAN B BUS (-)
15 C2
23 C2
D55
20
WT/OR
D54
20
WT
S206
S205
8
7
C201
S309
S308
4 C1
5 C1
SENSOR-SEAT TRACK POSITION-DRIVER
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
1
2
R261
20
LB/WT
R263
20
LB/VT
9 C1
7 C1
SENSOR-SEAT TRACK POSITION-PASSENGER
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
2
2
R262
20
WT/LB
R264
20
VT/LB
11 C2
2 C2
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
GROUND
1 C2
3 C2
12 C2
5 C2
7 C2
9 C2
10 C1
R728
20
LB/YL
Z105
20
BK
G300
S362
R717
20
LG/DG
R728
20
LB/YL
R728
20
LB/YL
R718
20
LB/DG
R728
20
LB/YL
R706
20
LB/OR
R728
20
LB/YL
R705
20
LG/OR
4
2
2
4
2
4
2
4
SENSOR-SEAT WEIGHT-LEFT FRONT
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT FRONT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT REAR
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-LEFT REAR
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
1
1
1
1
R726
20
LG/YL
R726
20
LG/YL
R726
20
LG/YL
R726
20
LG/YL
R726
20
LG/YL
S351
814d08c5

B1BBA-PASSENGER SEAT WEIGHT SENSOR SUPPLY CIRCUIT (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor supply.
- **Set Condition:**
  If the OCM detects that the sensor supply shorted. **NOTE: A shorted supply circuit will cause a 'NO RESPONSE FROM OCM" condition.**

Possible Causes
OCS SUPPLY CIRCUIT SHORTED
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. VERIFY THAT B1BBA-PASSENGER SEAT WEIGHT SENSOR SUPPLY CIRCUIT DTC IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BBA-PASSENGER SEAT WEIGHT SENSOR SUPPLY CIRCUIT?

Yes >> Replace the OCM in accordance with the Service Information.
Perform the OCS VERIFICATION REQUIRED procedure.

No >> Go To 2

---

2. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 3

B1BBA-PASSENGER SEAT WEIGHT SENSOR SUPPLY CIRCUIT (CONTINUED)

3. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTC’s from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

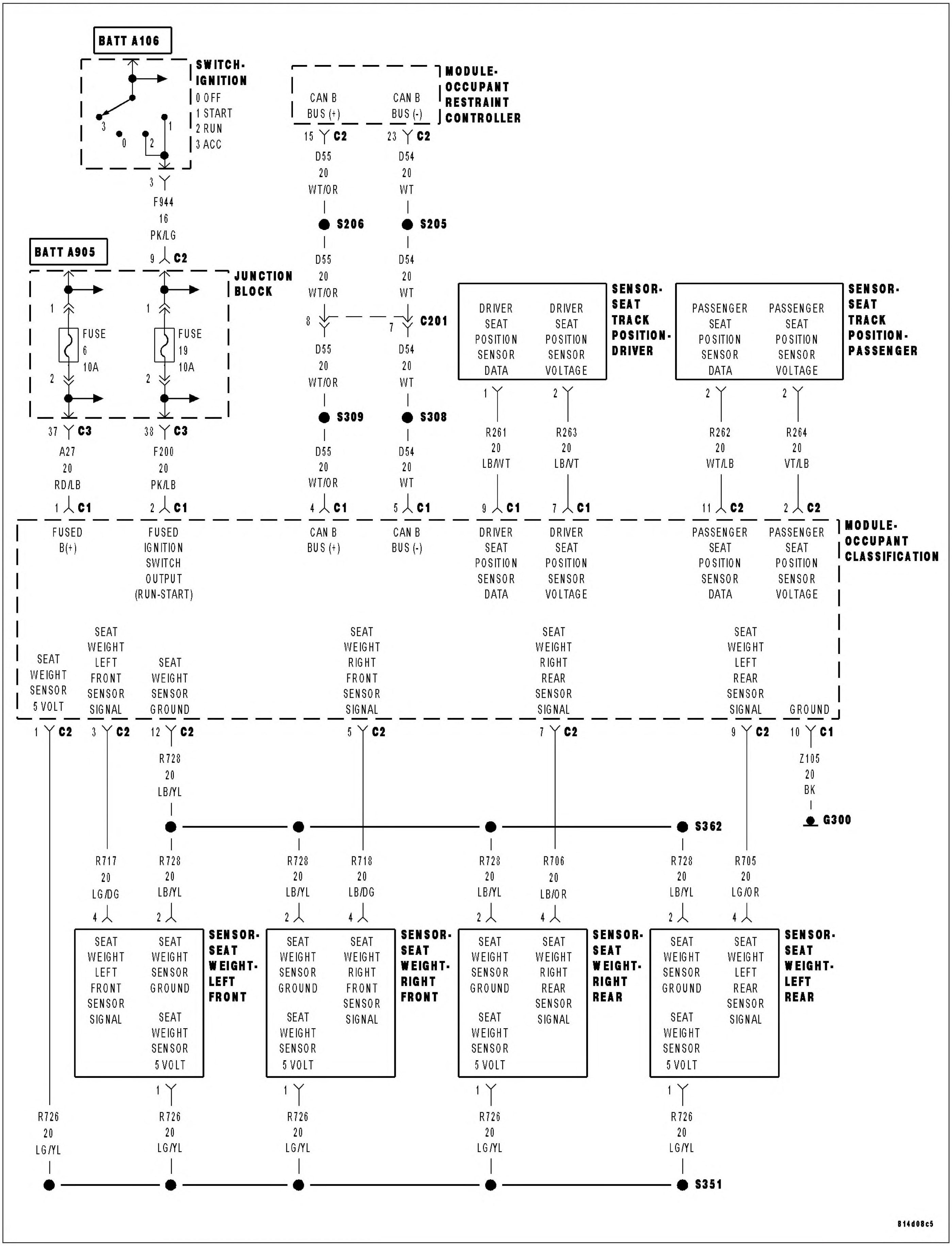
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1BBB-PASSENGER SEAT WEIGHT SENSOR INPUTS SHORTED TOGETHER


BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE
6
10A
2
1
FUSE
19
10A
2
37 C3
A27
20
RD/LB
38 C3
F200
20
PK/LB
MODULE-OCCUPANT RESTRAINT CONTROLLER
CAN B BUS (+)
CAN B BUS (-)
15 C2
D55
20
WT/OR
S206
D55
20
WT/OR
8
D55
20
WT/OR
S309
D55
20
WT/OR
23 C2
D54
20
WT
S205
D54
20
WT
7 C201
D54
20
WT
S308
D54
20
WT
SENSOR-SEAT TRACK POSITION-DRIVER
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
1
R261
20
LB/WT
2
R263
20
LB/VT
SENSOR-SEAT TRACK POSITION-PASSENGER
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
2
R262
20
WT/LB
2
R264
20
VT/LB
1 C1
2 C1
4 C1
5 C1
9 C1
7 C1
11 C2
2 C2
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
DRIVER SEAT POSITION SENSOR DATA
DRIVER SEAT POSITION SENSOR VOLTAGE
PASSENGER SEAT POSITION SENSOR DATA
PASSENGER SEAT POSITION SENSOR VOLTAGE
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
GROUND
1 C2
3 C2
12 C2
5 C2
7 C2
9 C2
10 C1
R728
20
LB/YL
Z105
20
BK
G300
S362
R717
20
LG/DG
R728
20
LB/YL
R728
20
LB/YL
R718
20
LB/DG
R728
20
LB/YL
R706
20
LB/OR
R728
20
LB/YL
R705
20
LG/OR
4
2
2
4
2
4
2
4
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-LEFT FRONT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT FRONT
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT REAR
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-LEFT REAR
1
1
1
1
R726
20
LG/YL
R726
20
LG/YL
R726
20
LG/YL
R726
20
LG/YL
R726
20
LG/YL
S351
814d08c5

B1BBB-PASSENGER SEAT WEIGHT SENSOR INPUTS SHORTED TOGETHER (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN.
- **Set Condition:**
  If the OCM detects any two sensors voltages below 20mV for 10 minutes while any other sensor is greater than 40mV. Note: 1 a/d count is equal to 5mV.**NOTE: A shorted supply circuit will cause a 'NO RESPONSE FROM OCM" condition.**

Possible Causes
OCS SENSOR CIRCUITS SHORTED TOGETHER
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. VERIFY THAT B1BBA-PASSENGER SEAT WEIGHT SENSOR SUPPLY CIRCUIT DTC IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BBB-PASSENGER SEAT WEIGHT SENSOR INPUTS SHORTED TOGETHER ?

Yes >> Replace the OCM in accordance with the Service Information.

Perform the OCS VERIFICATION REQUIRED procedure.

No >> Go To 2

---

2. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Go To 3

B1BBB-PASSENGER SEAT WEIGHT SENSOR INPUTS SHORTED TOGETHER (CONTINUED)

3. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTC’s from the OCM.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If only stored codes return continue the test until the problem area has been isolated.

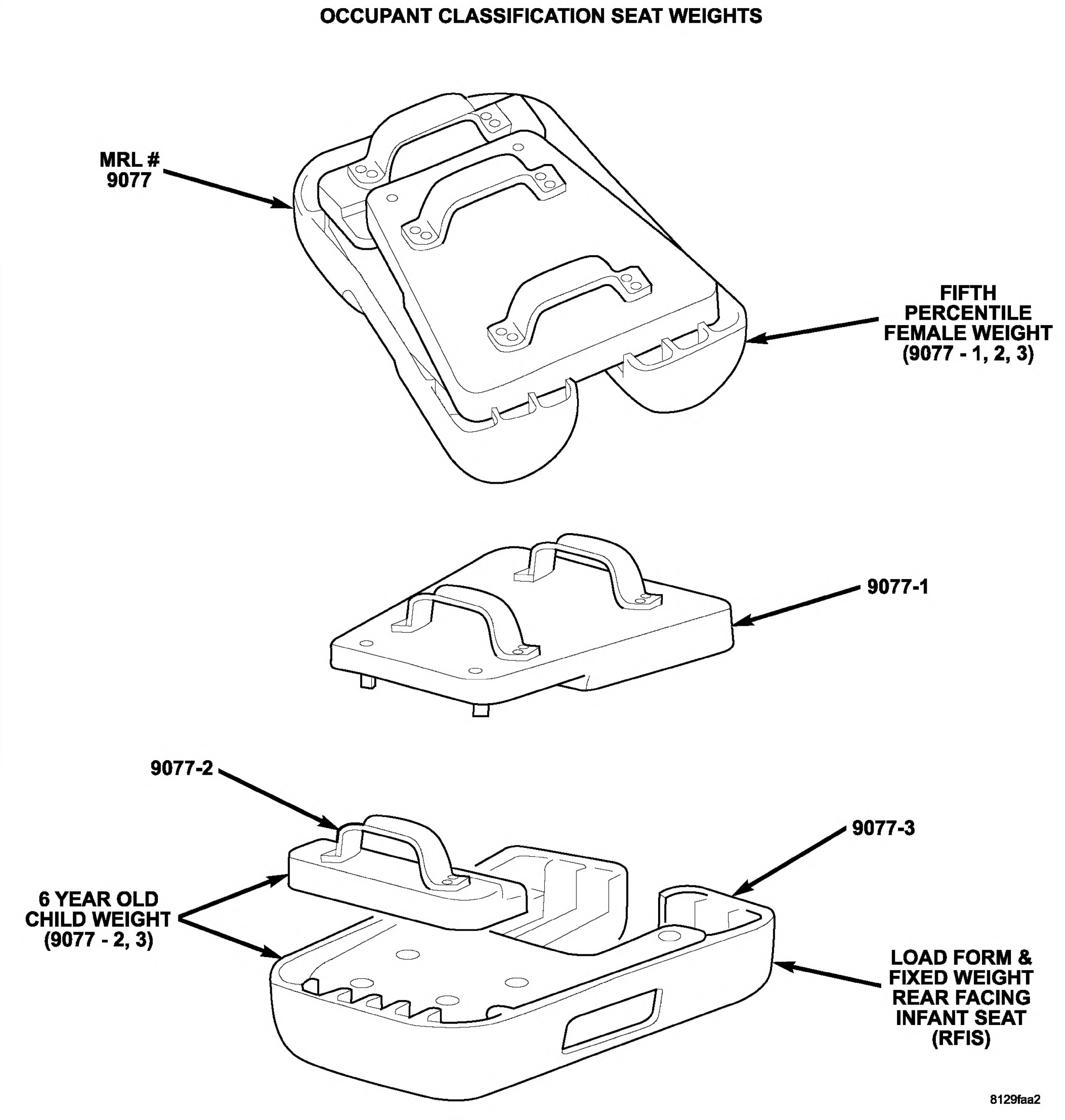
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1BBC-OCS NEGATIVE SYSTEM WEIGHT


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

OCS SEAT WEIGHTS MRL #9077

B1BBC-OCS NEGATIVE SYSTEM WEIGHT (CONTINUED)

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects a seat weight sensor input with the total seat weight below -6.5 kg +/- 1kg.

Possible Causes
DAMAGE TO THE PASSENGER SEAT STRUCTURE, RISER ASSEMBLY, CROSSMEMBERS, SEAT TRACKS, FLOOR PAN
OBJECT UNDER SEAT OR REAR SEAT FOLDED DOWN AND RESTING AGAINST PASSENGER SEAT
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. TEST CONDITIONS

- ACTIVE INTERNAL DTC
- IGNITION DTC
- BATTERY DTC
- SEAT WEIGHT SENSOR DTC

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs listed above?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. ACTIVE OR STORED DTC

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BBC–NEGATIVE SYSTEM WEIGHT?

Yes >> Go To 3

No >> Go To 4

B1BBC-OCS NEGATIVE SYSTEM WEIGHT (CONTINUED)

3. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that the passenger seat is empty.

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

NOTE: Failure to follow the test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BA8–OCS NOT CALIBRATED DTC?

Yes >> Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.
Perform OCS VERIFICATION TEST - VER 1.

No >> But Other DTCs Present? Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> No Active DTCs Present? Perform OCS VERIFICATION TEST - VER 1.

---

4. STORED B1BBC-OCS NEGATIVE SYSTEM WEIGHT DTC

With the scan tool, record and erase all DTC’s from all Airbag System Modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

IF only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTC’s present?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B1BBD-OCM CURRENT CONFIGURATION TABLE UNPROGRAMMED

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  If the Configuration Table is not programmed at the supplier or when the checksum is invalid.
- **Set Condition:**
  This DTC will set if the module was received unprogrammed from the supplier, the vehicle line was not identified correctly or if the flash procedure was not completed successfully

Possible Causes
NEW OCCUPANT CLASSIFICATION MODULE
INTERNAL CHECKSUM FAILURE

Diagnostic Test

1. MODULE CONFIGURATION

Does the scan tool display B1BBD-OCM CURRENT CONFIGURATION TABLE UNPROGRAMMED?

Yes >> Perform the B1BA7–OCS VERIFICATION REQUIRED diagnostic procedure.

No >> Replace the Occupant Classification Module in accordance with the service information.
With the scan tool, perform the OCM SYSTEM VERIFICATION procedure.

B1BC7-DEPLOYMENT DATA RECORD FULL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. CHECK FOR ACTIVE DTC

Turn the ignition on.

With the scan tool, read ORC DTCs.

Is the Deployment Data Record Full DTC active?

Yes >> Go To 2

No >> Perform the ORC VERIFICATION TEST-VER. 1.

---

2. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

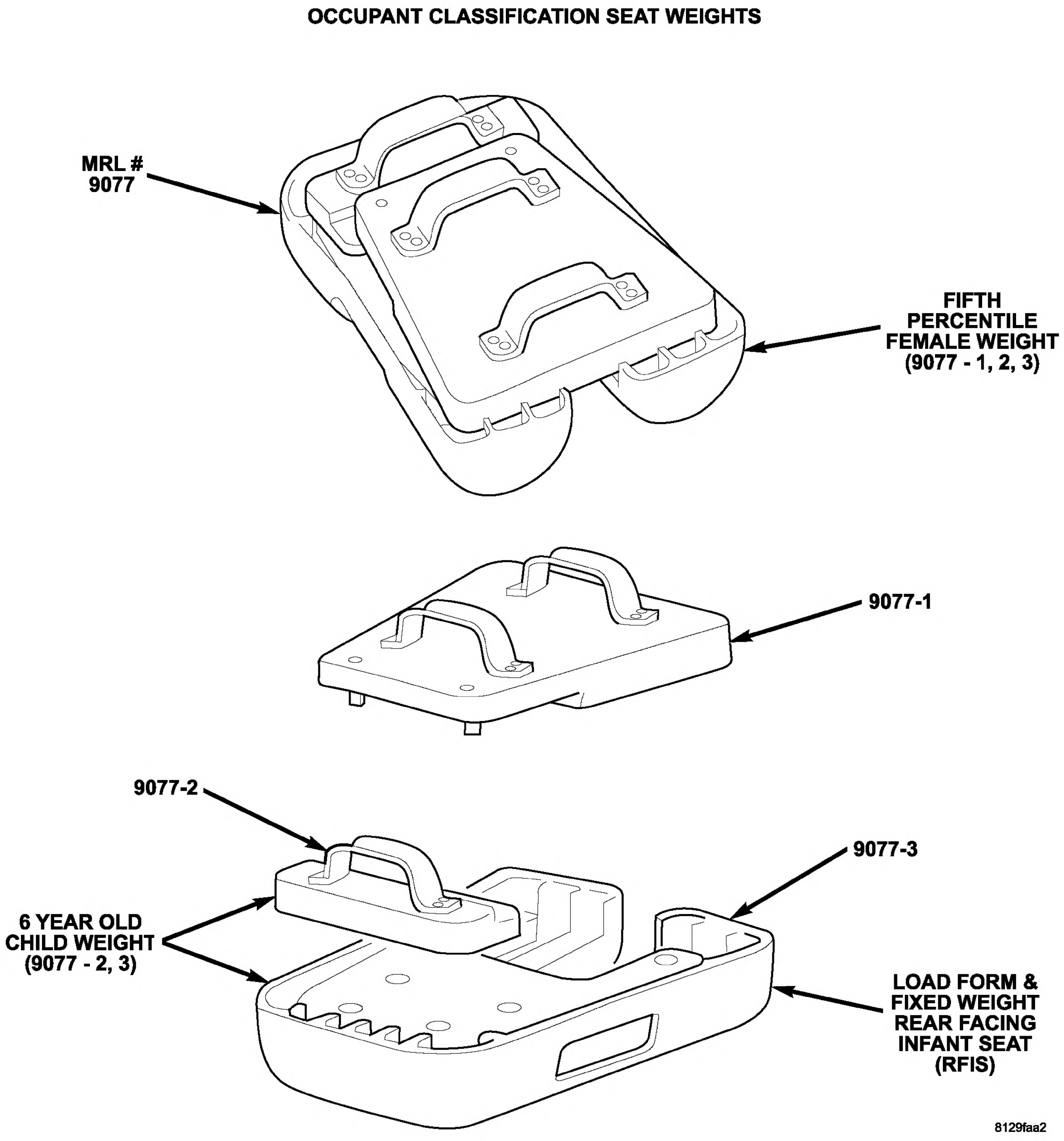
View repair.

Repair

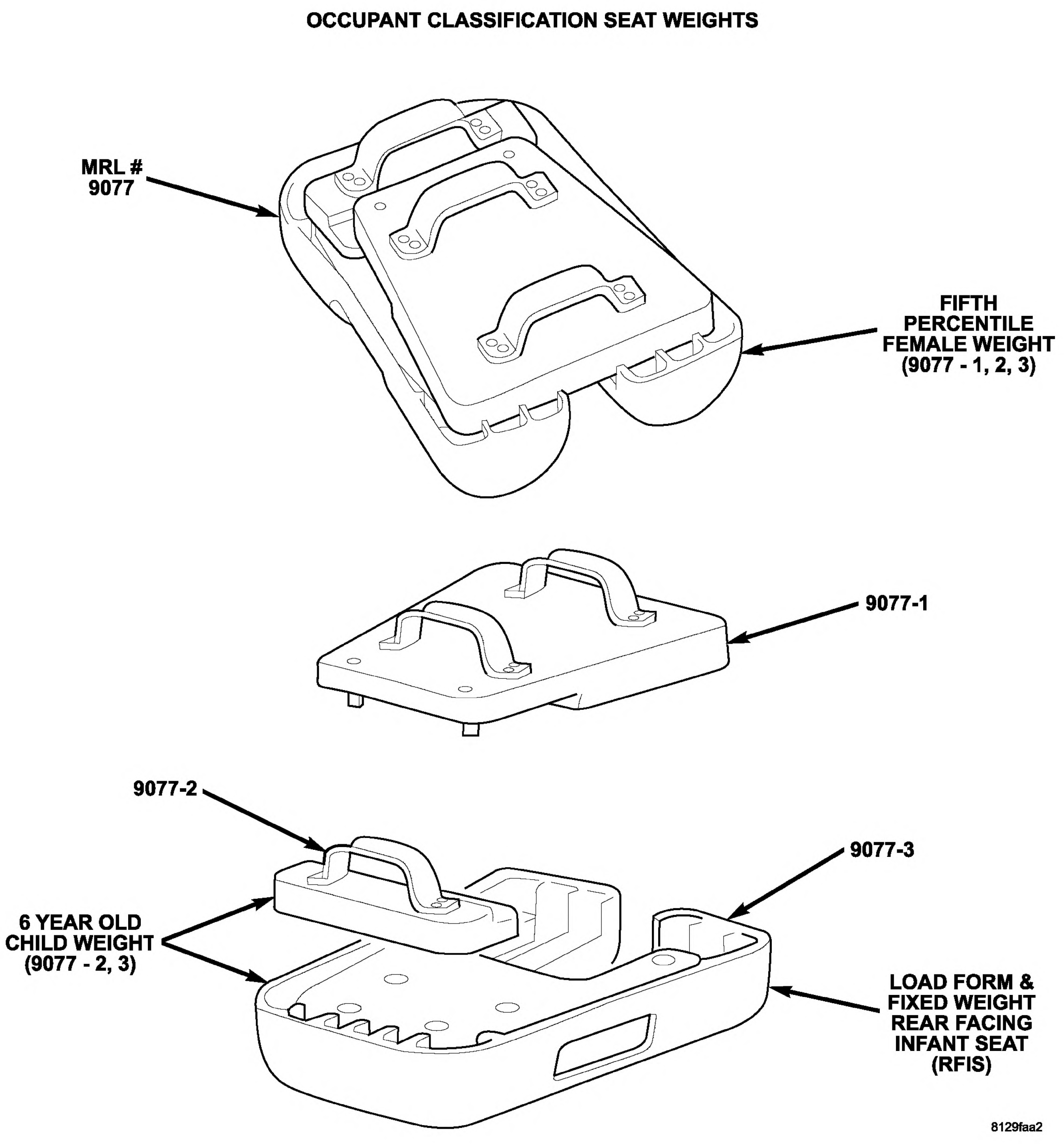
Replace the Occupant Restraint Controller in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1.

B1BC8-PASSENGER SEAT WEIGHT SENSORS PERFORMANCE


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

B1BC8-PASSENGER SEAT WEIGHT SENSORS PERFORMANCE (CONTINUED)


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

OCS SEAT WEIGHTS MRL #9077

B1BC8-PASSENGER SEAT WEIGHT SENSORS PERFORMANCE (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is in IGN_RUN, the module checks the sensor input ranges.
- **Set Condition:**
  If the module detects the difference between 2 sensors is less than 3 A/D (15 mV) counts for 10 consecutive minutes while at least one sensor count is changing and greater than 8 A/D (40 mV) counts.

Possible Causes
OTHER SEAT WEIGHT SENSOR FAULTS ACTIVE IN THE OCM
PASSENGER SEAT HARNESS WIRES CHAFFED, PIERCED, PINCHED, PARTIALLY BROKEN
PASSENGER SEAT HARNESS CONNECTOR TERMINALS BROKEN, BENT PUSHED OUT, SPREAD, CORRODED, CONTAMINATED
PASSENGER SEAT WEIGHT SENSORS
DAMAGE TO THE PASSENGER SEAT STRUCTURE, RISER ASSEMBLY, CROSSMEMBERS, SEAT TRACKS, FLOOR PAN
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR ACTIVE INTERNAL FAULTS, IGNITION FAULTS, & BATTERY FAULTS IN THE OCCUPANT CLASSIFICATION MODULE (OCM)

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

NOTE: This DTC will take 10 minutes to mature, allow plenty of time for the code to mature between as you work through the test steps.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display any active DTCs relating to internal faults, ignition faults, or battery faults?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 2

---

2. VERIFY THAT DTC B1BC8–PASSENGER SEAT WEIGHT SENSORS PERFORMANCE IS ACTIVE

With the scan tool, read OCM DTCs.

Does the scan tool display active: B1BC8–PASSENGER SEAT WEIGHT SENSORS PERFORMANCE?

Yes >> Go To 3

No >> Go To 6

B1BC8-PASSENGER SEAT WEIGHT SENSORS PERFORMANCE (CONTINUED)

3. CHECK FOR OTHER ACTIVE PASSENGER SEAT WEIGHT SENSOR FAULTS IN THE OCM

With the scan tool, read OCM DTCs.

Does the scan tool display any other active Seat Weight Sensor DTCs?

Yes >> Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Go To 4

---

4. INSPECT PASSENGER SEAT HARNESS WIRES & CONNECTORS

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the Passenger Seat Harness wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Are any of these conditions present?

Yes >>

NOTE: Do not attempt to repair the Seat Harness. Replace the Seat Harness if the condition inspecting or testing for is present in the Seat Harness.

Replace the Passenger Seat Harness in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, wait two minutes, and then proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active PASSENGER SEAT WEIGHT SENSOR PERFORMANCE DTCs?

Yes >> Perform the *Diagnosis/Checkout Procedure For Seat Weight Sensors.

Perform OCS VERIFICATION TEST - VER 1.

Yes >> Other DTCs ACTIVE? Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1.

B1BC8-PASSENGER SEAT WEIGHT SENSORS PERFORMANCE (CONTINUED)

6. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

NOTE: This DTC will take 10 minutes to mature, allow plenty of time for the code to mature between as you work through the test steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

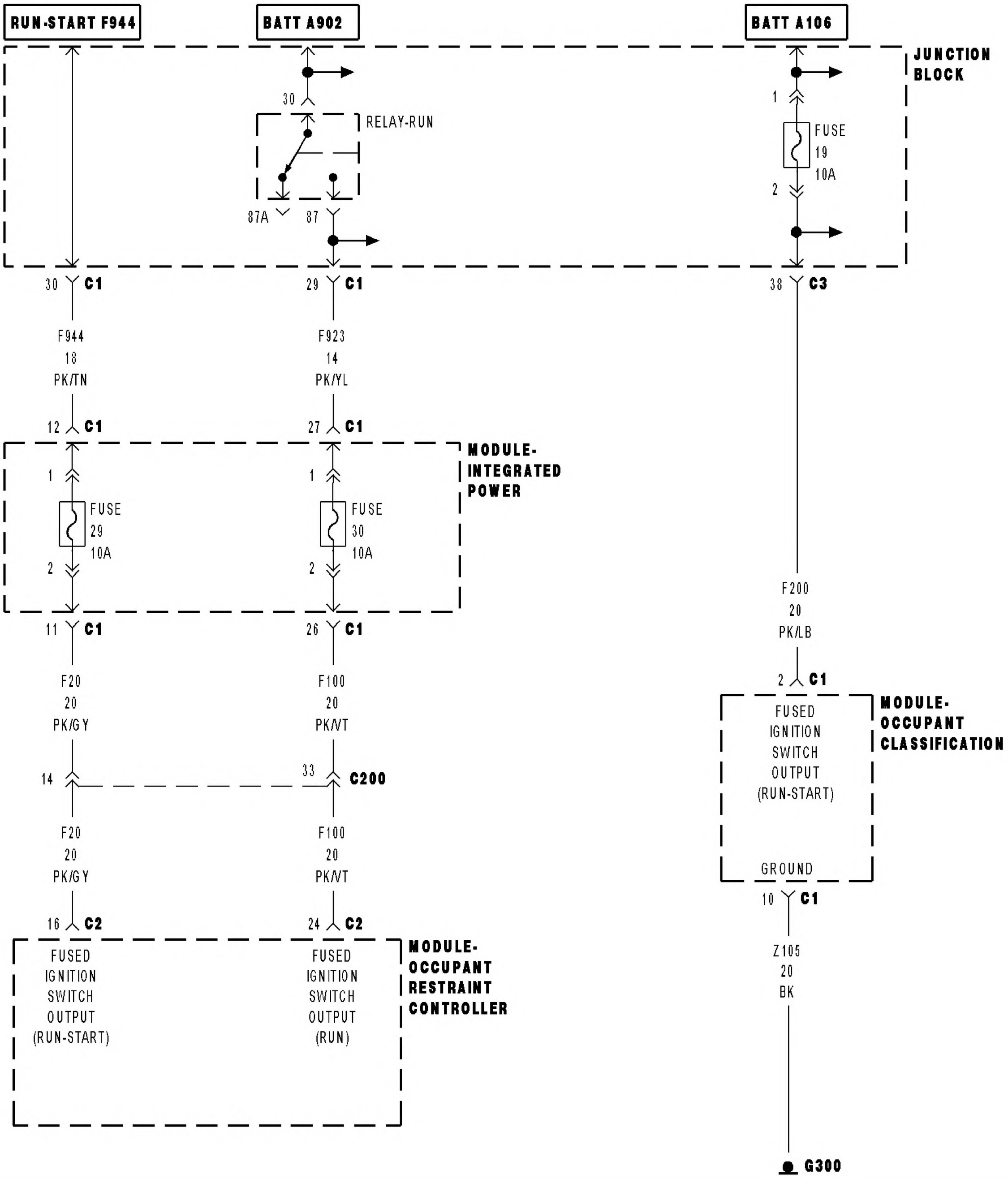
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

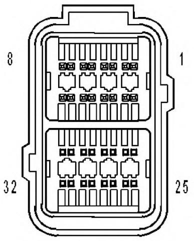
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

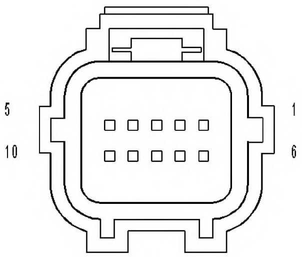
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

B2101-IGNITION RUN/START INPUT CIRCUIT LOW


RUN-START F944
BATT A902
BATT A106
JUNCTION BLOCK
30
RELAY-RUN
87A
87
1
FUSE
19
10A
2
30 C1
29 C1
38 C3
F944
18
PK/TN
F923
14
PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
1
FUSE
29
10A
2
1
FUSE
30
10A
2
11 C1
26 C1
F20
20
PK/GY
F100
20
PK/VT
F200
20
PK/LB
2 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
10 C1
Z105
20
BK
G300
14
33
C200
F20
20
PK/GY
F100
20
PK/VT
16 C2
24 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED IGNITION SWITCH OUTPUT (RUN)



MODULE-OCCUPANT RESTRAINT CONTROLLER C2



MODULE-OCCUPANT CLASSIFICATION C1

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B2101-IGNITION RUN/START INPUT CIRCUIT LOW (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus is RUN or SNA and the IOD status is "IN". The module checks the Fused Ignition Switch Output (Run-Start) circuit voltage input range.
- **Set Condition:**
  With the ignition on, if voltage on the Fused Ignition Switch Output (Run-Start) circuit is equal to or below 6.25 ± 0.25 volts. Within 60 seconds of turning the ignition off, if the Fused Ignition Switch Output (Run-Start) circuit is 2.4 to 5.0 volts.

Possible Causes
ORC - (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT OPEN
ORC - (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT SHORTED TO GROUND
ORC - (F944) IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT OPEN
ORC - OPEN IPM FUSE #29
OCCUPANT RESTRAINT CONTROLLER (ORC)
OCS - (F200) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT OPEN
OCS - (F200) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT SHORTE3D TO GROUNJD
OCS - OPEN JB FUSE #19
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. VERIFY THAT DTC B2101 IGNITION RUN/START INPUT CIRCUIT LOW IS ACTIVE IN THE ORC.

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read Occupant Restraint Controller (ORC) DTCs.

Does the scan tool display active: B2101 IGNITION RUN/START INPUT CIRCUIT LOW?

Yes >> Go To 3

No >> Go To 2

---

2. CHECK FOR ACTIVE DTC B2101 IGNITION RUN/START INPUT CIRCUIT LOW IN OCM.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display active: B2101 IGNITION RUN/START INPUT CIRCUIT LOW?

Yes >> Go To 6

No >> Go To 11

B2101-IGNITION RUN/START INPUT CIRCUIT LOW (CONTINUED)

3. INSPECT AIRBAG RUN-START FUSE (IPM #29)

Turn the ignition off.

Remove the Airbag Run-Start Fuse #29 from the IPM and inspect the fuse.

NOTE: Check connectors - Clean and repair as necessary.

Is the Run/Start fuse open?

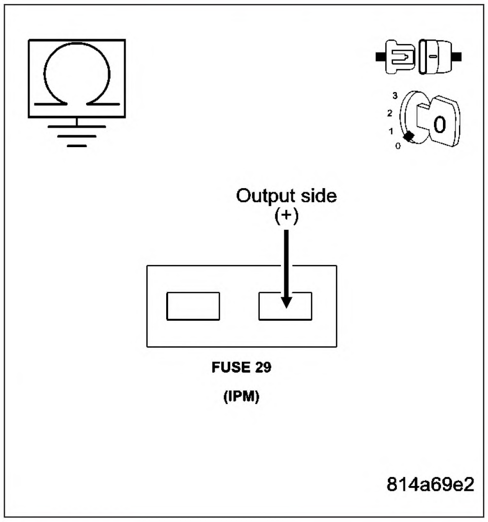
Yes >> Go To 4

No >> Go To 8

---

4. CHECK (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT RESISTANCE

Measure the resistance of the (F20) Fused Ignition Switch Output (Run-Start) circuit between ground and the Airbag Run-Start fuse terminal (output side).



Is the resistance below 100.0 ohms?

Yes >> Go To 5

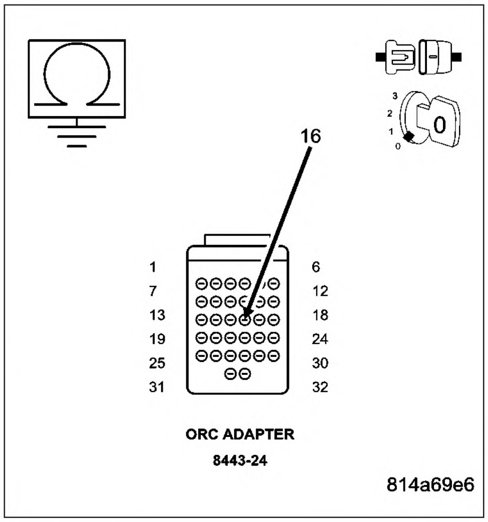
No >> Using the wiring diagram/schematic as a guide, inspect the related wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Replace Airbag Run-Start Fuse.

Perform ORC VERIFICATION TEST - VER 1.

B2101-IGNITION RUN/START INPUT CIRCUIT LOW (CONTINUED)

5. CHECK (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT RESISTANCE WITH ORC CONNECTORS DISCONNECTED



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WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the both ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Connect the Load Tool ORC 8443–24 Adaptor to the ORC C2 connector.

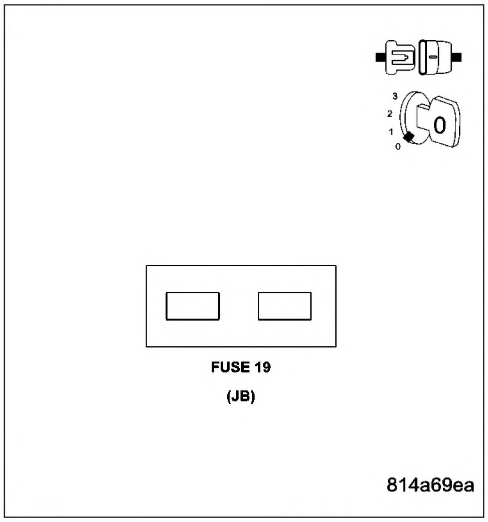
Measure the resistance of the (F20) Fused Ignition Switch Output (Run-Start) circuit between 8443–24 adaptor and ground).

Is the resistance below 100.0 ohms?

Yes >> Repair the (F20) Fused Ignition Switch Output (Run-Start) circuit for a short to ground.
Replace the Airbag Run-Start Fuse.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Replace the ORC in accordance with the Service Information.
Replace the Airbag Run-Start Fuse.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

6. INSPECT AIRBAG RUN-START FUSE (JB #19)



814a69ea

Turn the ignition off.

Remove the Airbag Run-Start Fuse #19 from the Junction Block and inspect the fuse.

NOTE: Check connectors - Clean and repair as necessary.

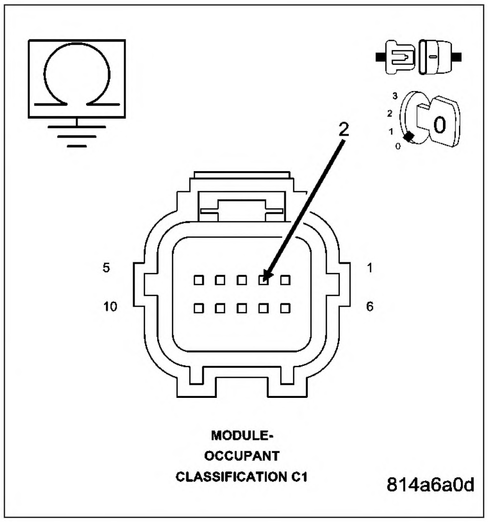
Is the Run/Start fuse open?

Yes >> Go To 7

No >> Go To 10

B2101-IGNITION RUN/START INPUT CIRCUIT LOW (CONTINUED)

7. CHECK (F200) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT RESISTANCE WITH OCM C1 CONNECTOR DISCONNECTED



WARNING: If the Occupant Classification Module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

Disconnect the OCM C1 connector.

Measure the resistance of the (F200) Fused Ignition Switch Output (Run-Start) circuit between ground and the Occupant Classification Module C1 connector.

Is the resistance below 100.0 ohms?

Yes >> Repair the (F200) Fused Ignition Switch Output (Run-Start) circuit for a short to ground.

Replace the Airbag Run-Start Fuse.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

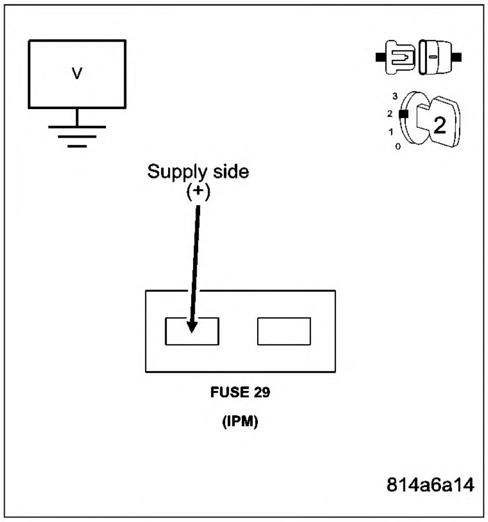
No >> Replace the OCM in accordance with the Service Information.

Replace the Airbag Run-Start Fuse.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

8. CHECK (F944) IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT FOR AN OPEN



Turn the ignition on.

Measure the voltage of the (F944) Ignition Switch Output (Run-Start) circuit at the Airbag Run-Start fuse terminal (supply side).

Is the voltage above 6.0 volts?

Yes >> Go To 9

No >> Repair the open (F944) Ignition Switch Output (Run-Start) circuit.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B2101-IGNITION RUN/START INPUT CIRCUIT LOW (CONTINUED)

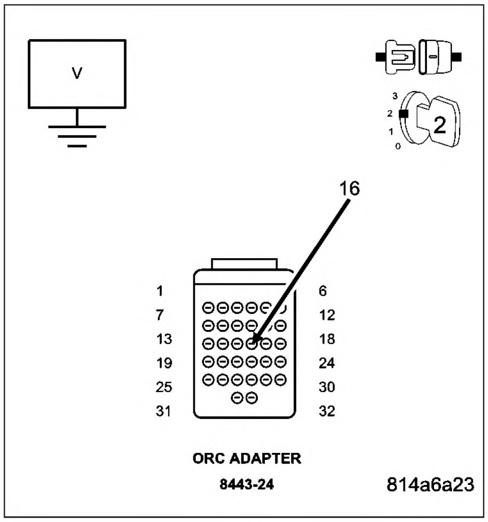
9. CHECK (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Reinstall the Airbag Run-Start Fuse.

Disconnect the both ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Install the Airbag Load tool ORC 8443–24 adaptor to the ORC C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (F20) Fused Ignition Switch Output (Run-Start) Circuit between the 8443–24 connector and ground.



Is the voltage above 6.0 volts?

Yes >> Replace the ORC in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the open (F20) Fused Ignition Switch Output (Run-Start) circuit.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

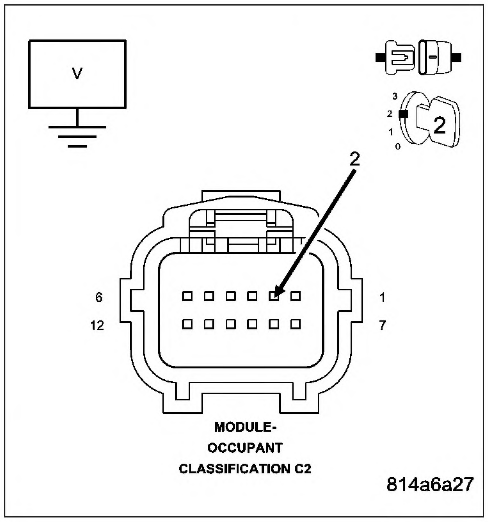
10. CHECK (F200) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Reinstall the JB #19 Airbag Run-Start Fuse.

Disconnect both Occupant Classification Module (OCM) connectors.

NOTE: Check connectors - Clean and repair as necessary.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.
Measure the voltage of the (F200) Fused Ignition Switch Output (Run-Start) Circuit between the OCM connector and ground.



Is the voltage above 6.0 volts?

Yes >> Replace the Occupant Classification Module (OCM) in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the open (F200) Fused Ignition Switch Output (Run-Start) circuit between the OCM and the splice.
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B2101-IGNITION RUN/START INPUT CIRCUIT LOW (CONTINUED)

11. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

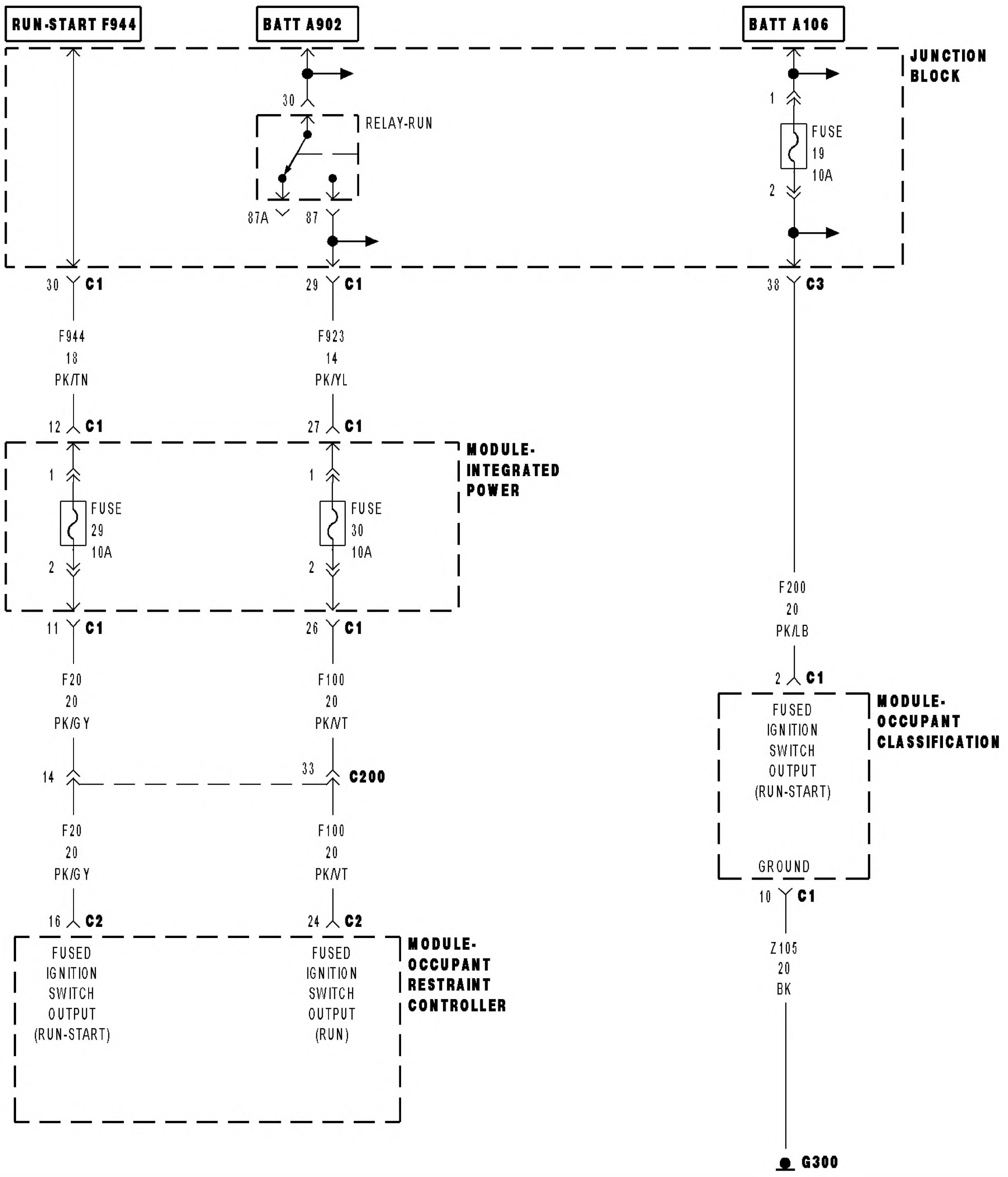
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

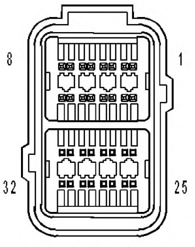
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

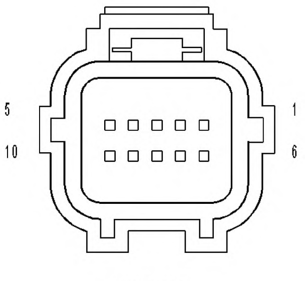
No >> No problem found Erase all codes before returning vehicle to customer.

B2102-IGNITION RUN/START INPUT CIRCUIT HIGH


RUN-START F944
BATT A902
BATT A106
JUNCTION BLOCK
30
RELAY-RUN
87A
87
1
FUSE 19 10A
2
30 C1
29 C1
38 C3
F944 18 PK/TN
F923 14 PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
1
FUSE 29 10A
2
1
FUSE 30 10A
2
11 C1
26 C1
F20 20 PK/GY
F100 20 PK/VT
14
33
C200
F20 20 PK/GY
F100 20 PK/VT
16 C2
24 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED IGNITION SWITCH OUTPUT (RUN)
F200 20 PK/LB
2 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
10 C1
Z105 20 BK
G300



MODULE-OCCUPANT RESTRAINT CONTROLLER C2



MODULE-OCCUPANT CLASSIFICATION C1

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B2102-IGNITION RUN/START INPUT CIRCUIT HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status is RUN or SNA and the IOD status is ″IN″. The module checks the (F201) Fused Ignition Switch Output (Run-Start) circuit voltage input range.
- **Set Condition:**
  If the module detects that the ignition voltage is greater than 24.25 volts ±0.25 volts for 10 seconds.

Possible Causes
VEHICLE CHARGING SYSTEM
VEHICLE WIRING & HARNESS CONNECTORS
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. VERIFY THAT DTC B2102-IGNITION RUN/START INPUT CIRCUIT HIGH IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on, then off, and then on again.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display active: B2102-IGNITION RUN/START INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> Go To 3

---

2. CHECK FOR CHARGING SYSTEM RELATED DTCs IN THE POWERTRAIN CONTROL MODULE (PCM)

With the scan tool in ECU View, select PCM and check for any Charging System related DTCs.

Does the scan tool display any Charging System related DTCs?

Yes >> Diagnose and repair the DTCs. Refer to (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

No >> Replace the ORC in accordance with the Service Information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B2102-IGNITION RUN/START INPUT CIRCUIT HIGH (CONTINUED)

3. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

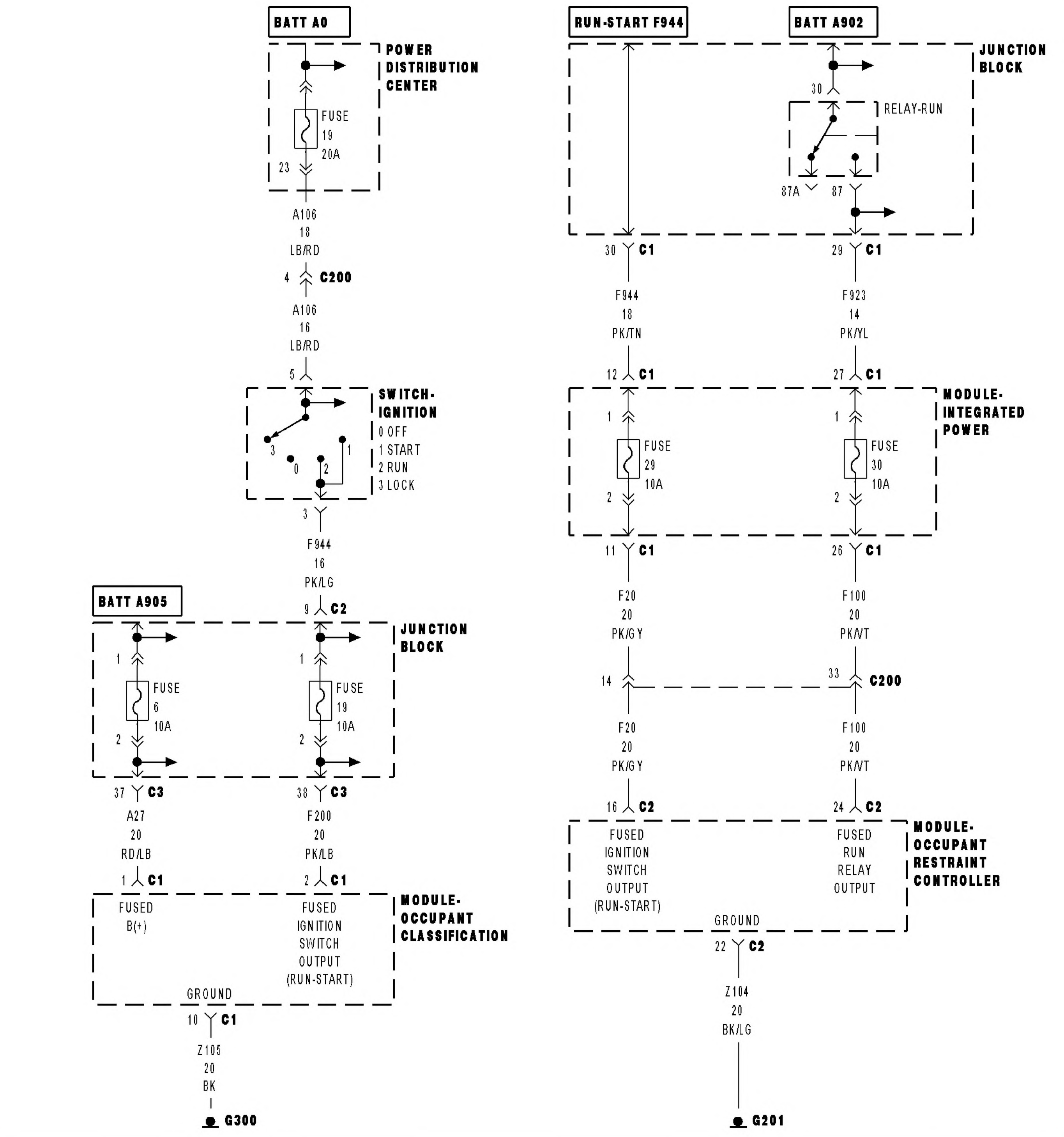
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

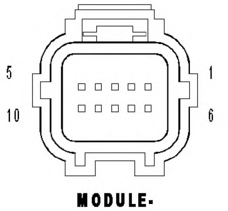
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

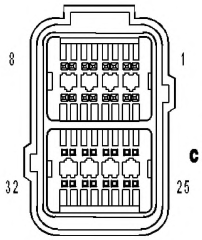
No >> No problem found Erase all codes before returning vehicle to customer.

B210D-BATTERY VOLTAGE LOW

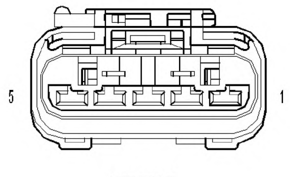

BATT A0
POWER DISTRIBUTION CENTER
FUSE 19 20A
23
A106 18 LB/RD
4 C200
A106 16 LB/RD
5
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 LOCK
3
F944 16 PK/LG
9 C2
BATT A905
JUNCTION BLOCK
1
FUSE 6 10A
2
1
FUSE 19 10A
2
37 C3
A27 20 RD/LB
1 C1
38 C3
F200 20 PK/LB
2 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
10 C1
Z105 20 BK
G300
RUN-START F944
BATT A902
JUNCTION BLOCK
30
RELAY-RUN
87A
87
30 C1
29 C1
F944 18 PK/TN
F923 14 PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
1
FUSE 29 10A
2
1
FUSE 30 10A
2
11 C1
26 C1
F20 20 PK/GY
F100 20 PK/VT
14
33 C200
F20 20 PK/GY
F100 20 PK/VT
16 C2
24 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED RUN RELAY OUTPUT
GROUND
22 C2
Z104 20 BK/LG
G201



MODULE-OCCUPANT CLASSIFICATION C1



MODULE-OCCUPANT RESTRAINT CONTROLLER C2


5
1

SWITCH-IGNITION

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B210D-BATTERY VOLTAGE LOW (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  OCM-While the CAN bus ignition status received is RUN or Signal Not Available (SNA), the module checks the (A27) Fused B+ circuit voltage input range and the (F200) Fused Ignition Switch Output circuit voltage input range.
- **Set Condition:**
  OCM-If the module detects that the battery voltage is less than or equal to 6.25 volts ±0.25 volts.
- **When Monitored:**
  ORC-While the CAN bus ignition status received is RUN or Signal Not Available (SNA), the module checks the (F20) Fused Ignition Switch Output (RUN/START) circuit and the (F100) Fused Run Relay Output (RUN only) circuit voltage input range.
- **Set Condition:**
  ORC-If the module detects that the battery voltage is less than or equal to 6.25 volts ±0.25 volts on either the F20 or F100 circuits.

Possible Causes
OCM (A27) FUSED B(+) CIRCUIT OPEN
OCM (F200) FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
ORC (F20) FUSED IGNITION SWITCH OUTPUT (RUN/START) CIRCUIT OPEN
ORC (F100) FUSED RUN RELAY OUTPUT CIRCUIT OPEN
VEHICLE CHARGING SYSTEM
OCCUPANT CLASSIFICATION MODULE
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

NOTE: Ensure the battery is fully charged.

NOTE: Troubleshoot any PCM charging/cranking DTCs before proceeding.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) DTCs.

Select module and DTC type.

OCM Active
Go To 2

OCM Stored
Go To 4

ORC Active
Go To 3

ORC Stored
Go To 4

B210D-BATTERY VOLTAGE LOW (CONTINUED)

2. TEST THE VOLTAGE OF OCM (A27) FUSED B(+) AND (F200) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUITS.

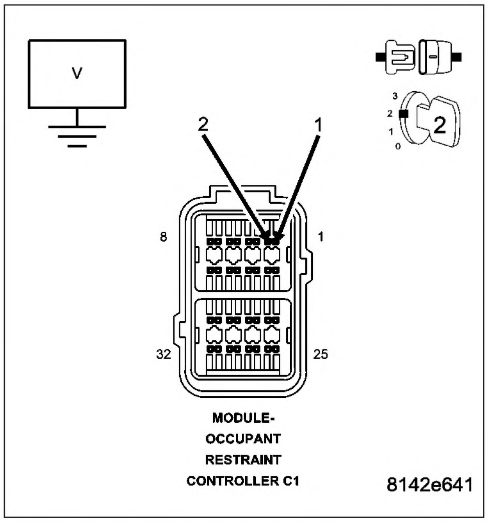
WARNING: WARNING:To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the OCM C1 connector.

WARNING: WARNING:To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage between Ground and the (f200) Fused Ignition Switch Output (Run-Start) circuit.

Measure the voltage between Ground and the (A27) Fused B+ circuit.



8142e641

Is the voltage above 6.75 volts on both circuits?

Yes >> Replace the OCM in accordance with the service information.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the (A27) Fused B(+) and/or (F200) Fused Ignition Switch Output (Run-Start) circuits for an open.

Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. MEASURE THE VOLTAGE OF ORC (F20) FUSED IGNITION SWITCH OUTPUT (RUN/START) AND (F100) FUSED RUN RELAY OUTPUT (RUN) CIRCUITS

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

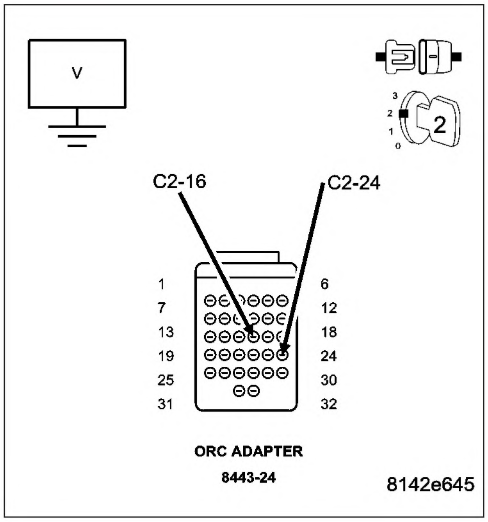
Disconnect the ORC C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the Load Tool ORC 8443–24 Adaptor to the ORC C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage between Ground and the F20 and F100 circuits.



8142e645

Is the voltage above 6.75 volts on both circuits?

Yes >> Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the appropriate circuit or circuits for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B210D-BATTERY VOLTAGE LOW (CONTINUED)

4. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

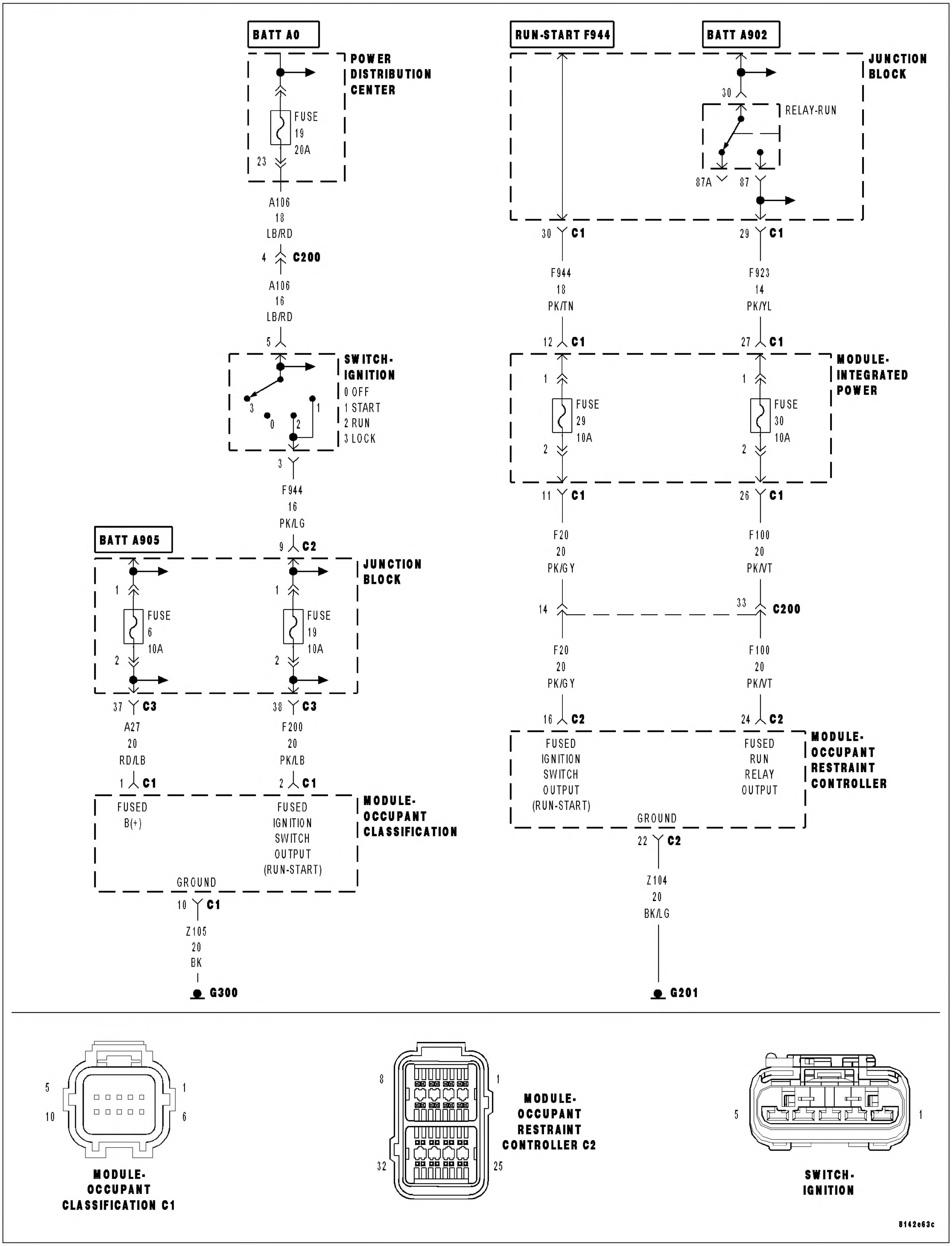
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found. Erase all codes before returning vehicle to customer.

B210E-BATTERY VOLTAGE HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 19 20A
23
A106 18 LB/RD
4 C200
A106 16 LB/RD
5
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 LOCK
3
F944 16 PK/LG
9 C2
BATT A905
JUNCTION BLOCK
FUSE 6 10A
FUSE 19 10A
1
2
37 C3
38 C3
A27 20 RD/LB
F200 20 PK/LB
1 C1
2 C1
MODULE-OCCUPANT CLASSIFICATION
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
10 C1
Z105 20 BK
G300
RUN-START F944
BATT A902
JUNCTION BLOCK
30
RELAY-RUN
87A
87
30 C1
29 C1
F944 18 PK/TN
F923 14 PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
FUSE 29 10A
FUSE 30 10A
11 C1
26 C1
F20 20 PK/GY
F100 20 PK/VT
14
33 C200
16 C2
24 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED RUN RELAY OUTPUT
GROUND
22 C2
Z104 20 BK/LG
G201
5 1 10 6
MODULE-OCCUPANT CLASSIFICATION C1
8 1 32 25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
5 1
SWITCH-IGNITION
8142e63c

B210E-BATTERY VOLTAGE HIGH (CONTINUED)

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the CAN bus ignition status received is RUN or Signal Not Available (SNA), the module checks the (A27) Fused B+ circuit voltage input range.
- **Set Condition:**
  If the module detects that the battery voltage is greater than or equal to 24.25 volts ±0.25 volts for 10 seconds.

Possible Causes
VEHICLE CHARGING SYSTEM
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. CHECK FOR AN ACTIVE DTC

Turn the ignition on, then off, and then on again.

With the scan tool, read OCM DTCs.

Does the scan tool display active: B210E-BATTERY VOLTAGE HIGH?

Yes >> Go To 2

No >> Go To 4

---

2. CHECK THE BATTERY VOLTAGE TO THE OCCUPANT CLASSIFICATION MODULE

With the scan tool in Data Display, read OCM battery voltage.

Is the battery voltage greater than 24.25 volts ±0.25 volts?

Yes >> Go To 3—

No >> Replace the OCM in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

3. CHECK FOR CHARGING SYSTEM RELATED DTCs IN THE POWERTRAIN CONTROL MODULE (PCM)

With the scan tool in ECU View, select PCM and check for any Charging System related DTCs.

Does the scan tool display any Charging System related DTCs?

Yes >> Diagnose and repair the DTCs. Refer to (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

No >> Replace the OCM in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B210E-BATTERY VOLTAGE HIGH (CONTINUED)

4. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

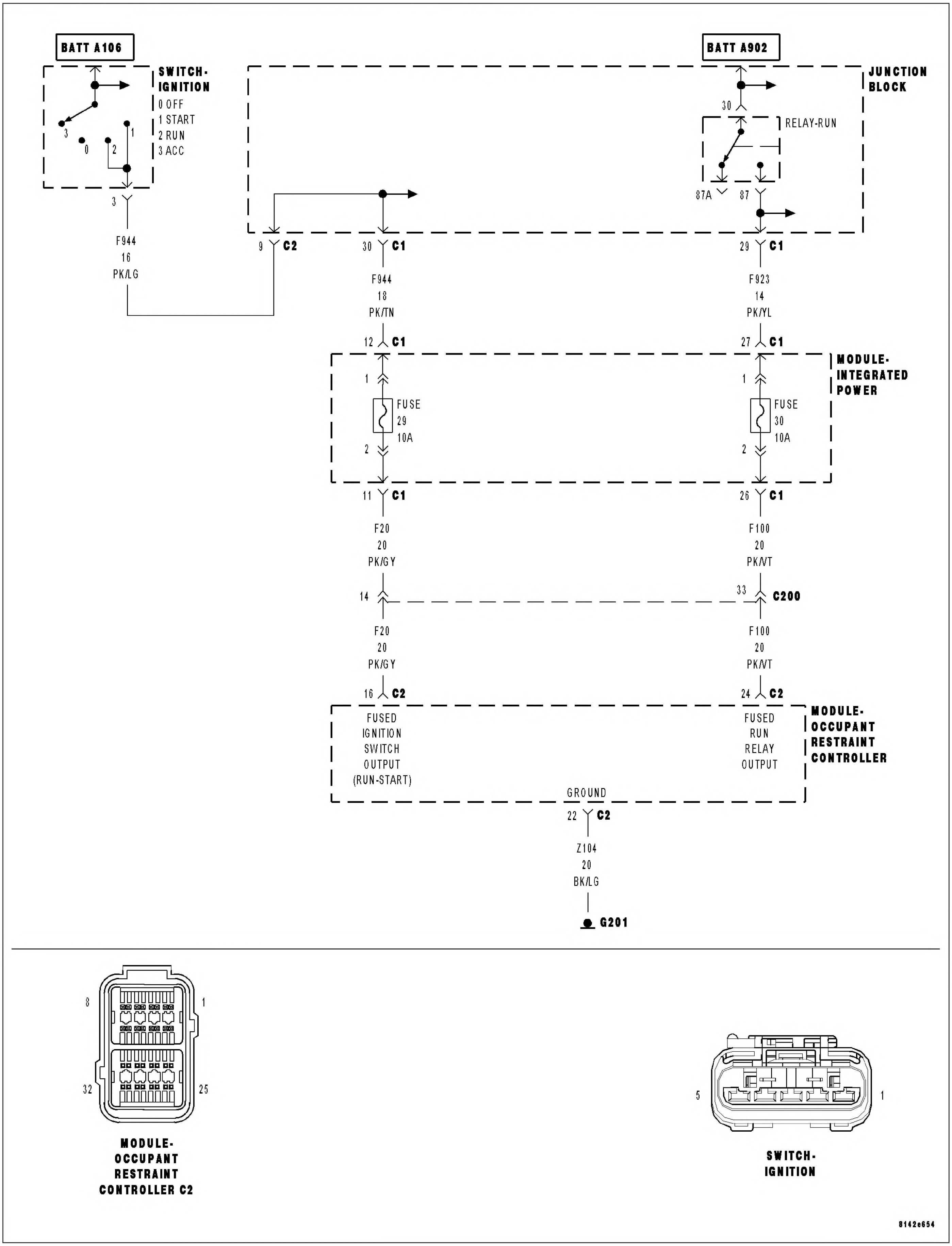
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found. Erase all codes before returning vehicle to customer.

B212C-IGNITION RUN/START INPUT CIRCUIT OPEN


BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
BATT A902
JUNCTION BLOCK
30
RELAY-RUN
87A
87
9 C2
30 C1
29 C1
F944
18
PK/TN
F923
14
PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
1
FUSE
29
10A
2
1
FUSE
30
10A
2
11 C1
26 C1
F20
20
PK/GY
F100
20
PK/VT
14
33 C200
F20
20
PK/GY
F100
20
PK/VT
16 C2
24 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED RUN RELAY OUTPUT
GROUND
22 C2
Z104
20
BK/LG
G201
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
5
1
SWITCH-IGNITION
8142e654

B212C-IGNITION RUN/START INPUT CIRCUIT OPEN (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition in the Run-Start position.
- **Set Condition:**
  If voltage on the (F20) Fused Ignition Switch Output (Run-Start) circuit drops below 6.0 volts.

Possible Causes
(F20) FUSED GNITION SWITCH OUTPUT (RUN-START) CIRCUIT OPEN
(F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT SHORTED TO GROUND
(F944) IGNITION SWITCH OUTPUT CIRCUIT OPEN
OPEN IPM FUSE #29
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. VERIFY THAT DTC B212C IGNITION RUN/START INPUT CIRCUIT OPEN IS ACTIVE IN THE ORC.

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

Record and erase all ORC DTC's.

Wait 10 seconds.

With the scan tool, read Occupant Restraint Controller (ORC) DTCs.

Does the scan tool display active: B212C IGNITION RUN/START INPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> Go To 7

---

2. INSPECT AIRBAG RUN-START FUSE

Turn the ignition off.

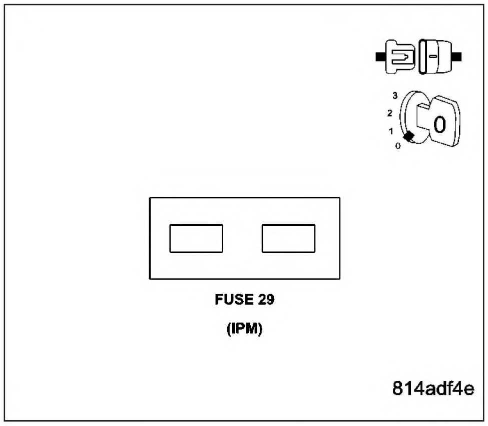
Remove the Airbag Run-Start Fuse #29 from the Integrated Power Module and inspect the fuse.

NOTE: Check connectors - Clean and repair as necessary.

Is the Run/Start fuse open?

Yes >> Go To 3

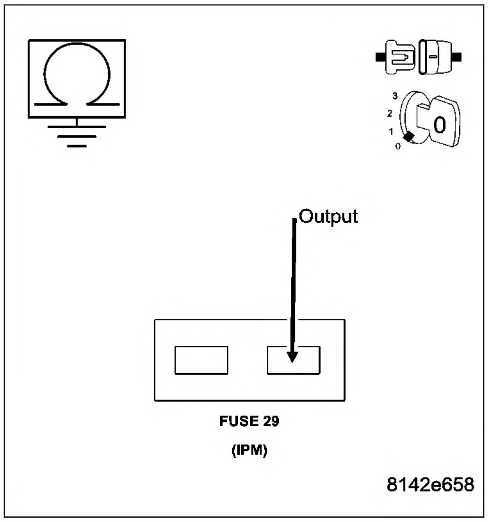
No >> Go To 5



B212C-IGNITION RUN/START INPUT CIRCUIT OPEN (CONTINUED)

3. CHECK (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT RESISTANCE

Measure the resistance of the (F20) Fused Ignition Switch Output (Run-Start) circuit between ground and the Airbag Run-Start fuse terminal (output side).



Is the resistance below 100.0 ohms?

Yes >> Go To 4

No >> Using the wiring diagram/schematic as a guide, inspect the related wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Replace Airbag Run-Start Fuse.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

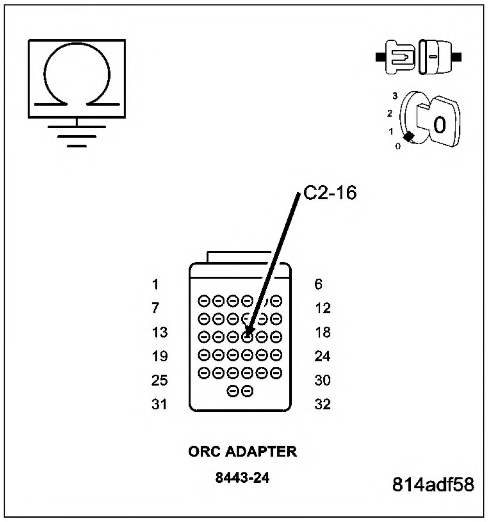
4. CHECK (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT RESISTANCE WITH ORC CONNECTORS DISCONNECTED

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.
Disconnect both ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.
Connect the Load Tool ORC 8443–24 Adaptor to the ORC C2 connector.

Measure the resistance of the (F20) Fused Ignition Switch Output (Run-Start) circuit between the 8443–24 adaptor and ground).



Is the resistance below 100.0 ohms?

Yes >> Repair the (F20) Fused Ignition Switch Output (Run-Start) circuit for a short to ground.

Replace the Airbag Run-Start Fuse.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Replace the ORC in accordance with the Service Information.

Replace the Airbag Run-Start Fuse.

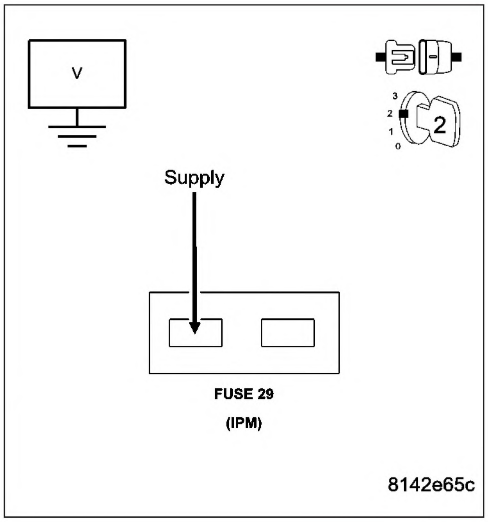
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B212C-IGNITION RUN/START INPUT CIRCUIT OPEN (CONTINUED)

5. CHECK (F944) IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT FOR AN OPEN

Turn the ignition on.

Measure the voltage between Ground and the (F944) Ignition Switch Output (Run-Start) circuit at the Airbag Run-Start fuse terminal (supply side).



Is the voltage above 6.0 volts?

Yes >> Go To 6

No >> Repair the (F944) Ignition Switch Output (Run-Start) circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

6. CHECK (F20) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Reinstall the Airbag Run-Start Fuse.

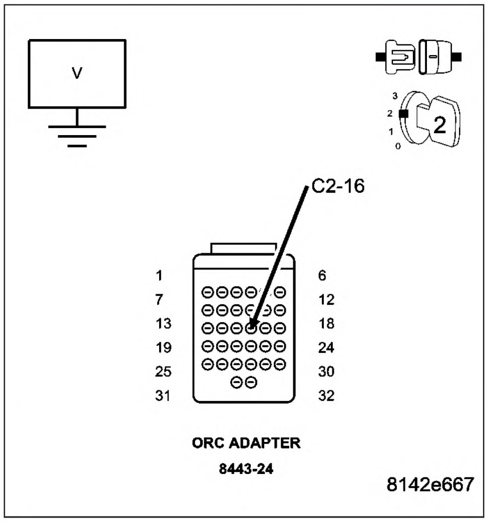
Disconnect the both ORC connectors.

NOTE: Check connectors - Clean and repair as necessary.

Install the Airbag Load tool ORC 8443–24 adaptor to the ORC C2 connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (F20) Fused Ignition Switch Output (Run-Start) Circuit between the 8443–24 connector and ground.



Is the voltage above 6.0 volts?

Yes >> Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the (F20) Fused Ignition Switch Output (Run-Start) circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B212C-IGNITION RUN/START INPUT CIRCUIT OPEN (CONTINUED)

7. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

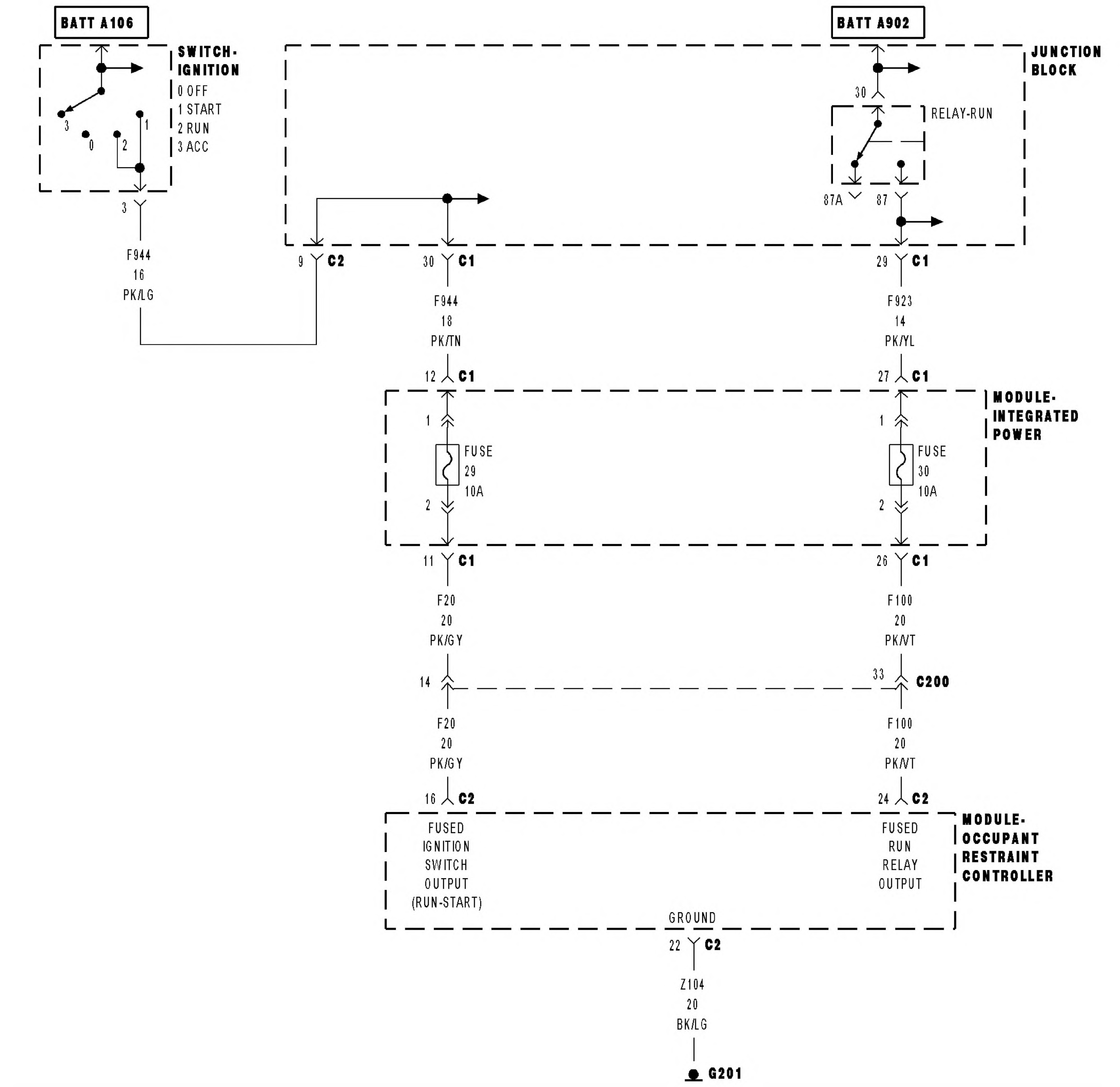
In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

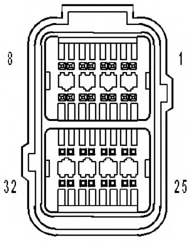
Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

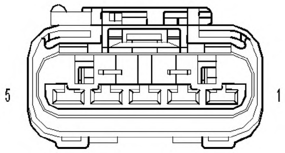
No >> No problem found. Erase all codes before returning the vehicle to the customer.

B212D-IGNITION RUN ONLY INPUT CIRCUIT OPEN


BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
3
F944
16
PK/LG
BATT A902
JUNCTION BLOCK
30
RELAY-RUN
87A
87
9 C2
30 C1
29 C1
F944
18
PK/TN
F923
14
PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
1
FUSE
29
10A
2
1
FUSE
30
10A
2
11 C1
26 C1
F20
20
PK/GY
F100
20
PK/VT
14
33
C200
F20
20
PK/GY
F100
20
PK/VT
16 C2
24 C2
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED RUN RELAY OUTPUT
MODULE-OCCUPANT RESTRAINT CONTROLLER
GROUND
22 C2
Z104
20
BK/LG
G201



MODULE-OCCUPANT RESTRAINT CONTROLLER C2



SWITCH-IGNITION

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B212D-IGNITION RUN ONLY INPUT CIRCUIT OPEN (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition in the Run position.
- **Set Condition:**
  If voltage on the (F100) Fused Run Relay Output circuit drops below 6.0 volts.

Possible Causes
(F923) RUN RELAY OUTPUT CIRCUIT OPEN
(F100) FUSED IGNITION RUN RELAY CIRCUIT OPEN
(F100) FUSED RUN RELAY OUTPUT CIRCUIT SHORT TO GROUND
IPM FUSE #30 OPEN
B2122–IGNITION RUN CONTROL CIRCUIT LOW
RUN RELAY OPEN
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. VERIFY THAT DTC B212D IGNITION RUN ONLY INPUT CIRCUIT OPEN IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

Read and erase all ORC DTC's.

Wait 10 seconds.

With the scan tool, read Occupant Restraint Controller (ORC) DTCs.

Does the scan tool display active: B212D IGNITION RUN ONLY INPUT CIRCUIT OPEN?

Yes >> Go To 2

No >> Go To 9

---

2. CHECK FOR ACTIVE B2122–IGNITION RUN CONTROL CIRCUIT LOW IN THE INSTRUMENT CLUSTER

With the scan tool, read Instrument Cluster (CCN) DTCs.

Does the scan tool display active: B2122 DTC's?

Yes >> Go To (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING)

No >> Go To 3

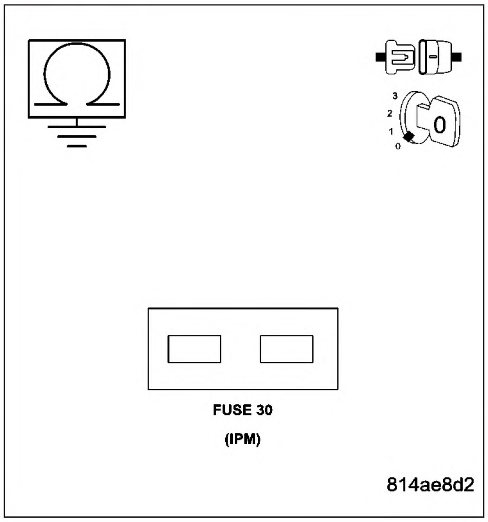
B212D-IGNITION RUN ONLY INPUT CIRCUIT OPEN (CONTINUED)

3. INSPECT AIRBAG RUN CIRCUIT FUSE

Turn the ignition off.

Remove the Airbag Run Circuit Fuse #30 from the IPM and inspect the fuse.

NOTE: Check connectors - Clean and repair as necessary.



Is the fuse open?

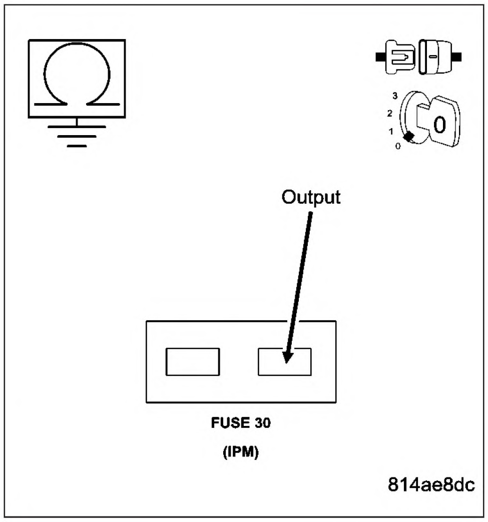
Yes >> Go To 4

No >> Go To 6

---

4. CHECK (F214) FUSED RUN RELAY OUTPUT CIRCUIT RESISTANCE

Measure the resistance of the (F100) Fused Run Relay Output circuit between the Airbag Run Relay Output Circuit fuse #30 (output side) terminal and ground.



Is the resistance below 100.0 ohms?

Yes >> Go To 5

No >> Using the wiring diagram/schematic as a guide, inspect the related wiring and connectors. Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

Replace Airbag Run Circuit Fuse.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B212D-IGNITION RUN ONLY INPUT CIRCUIT OPEN (CONTINUED)

5. CHECK (F100) FUSED RUN RELAY OUTPUT CIRCUIT RESISTANCE WITH ORC C2 CONNECTOR DISCONNECTED

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

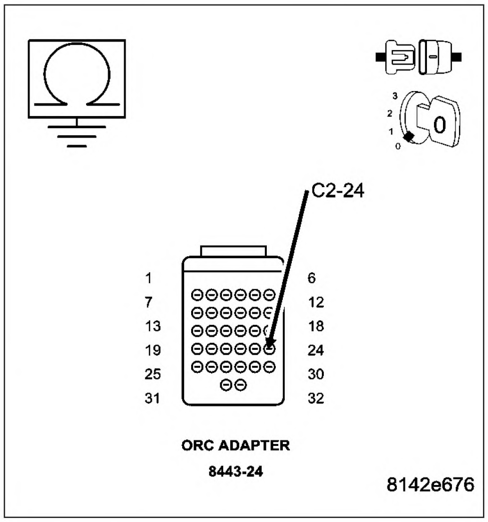
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the ORC C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the Load Tool ORC 8443-24 Adaptor to the ORC C2 connector.

Measure the resistance of the (F100) Fused Run Relay Output circuit between 8443-24 adaptor and ground.



Is the resistance below 100.0 ohms?

Yes >> Repair the (F214) Fused Run Relay Output circuit for a short to ground.
Replace the Airbag Run Circuit Fuse.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

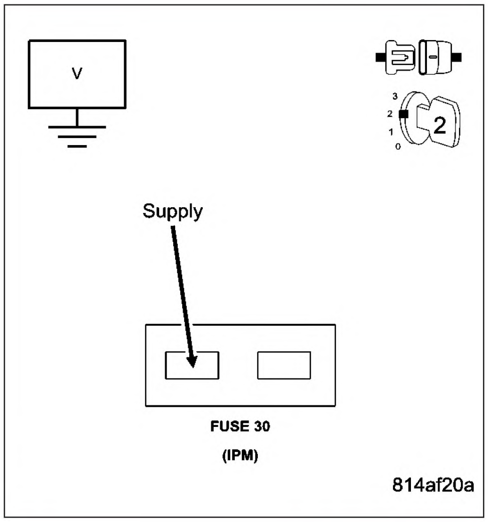
No >> Replace the ORC in accordance with the Service Information.
Replace the Airbag Run Circuit Fuse.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

6. CHECK (F923) RUN RELAY OUTPUT CIRCUIT VOLTAGE

Turn the ignition on.

Measure the voltage of the (F923) Run Relay Output circuit at the Airbag Run Circuit fuse terminal (supply side).



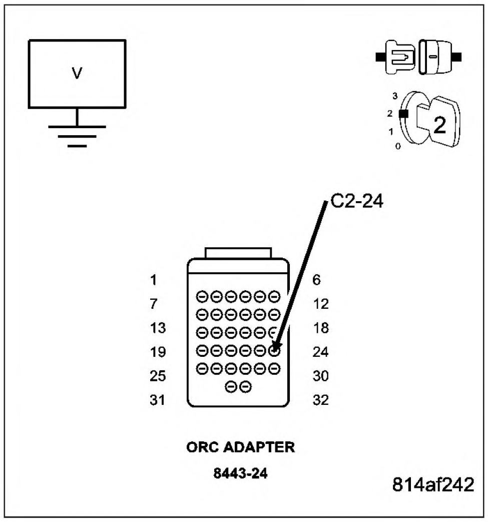
Is the voltage above 6.0 volts?

Yes >> Go To 7

No >> Go To 8

B212D-IGNITION RUN ONLY INPUT CIRCUIT OPEN (CONTINUED)

7. CHECK (F100) FUSED RUN RELAY OUTPUT CIRCUIT FOR AN OPEN



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Reinstall the Airbag Run Circuit Fuse.

Disconnect the ORC C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the Airbag Load Tool ORC 8443-24 Adaptor to the ORC C2 harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (F100) Fused Run Relay Output Circuit between the 8443–24 adaptor and ground.

Is the voltage above 6.0 volts?

Yes >> Replace the ORC in accordance with the Service Information.

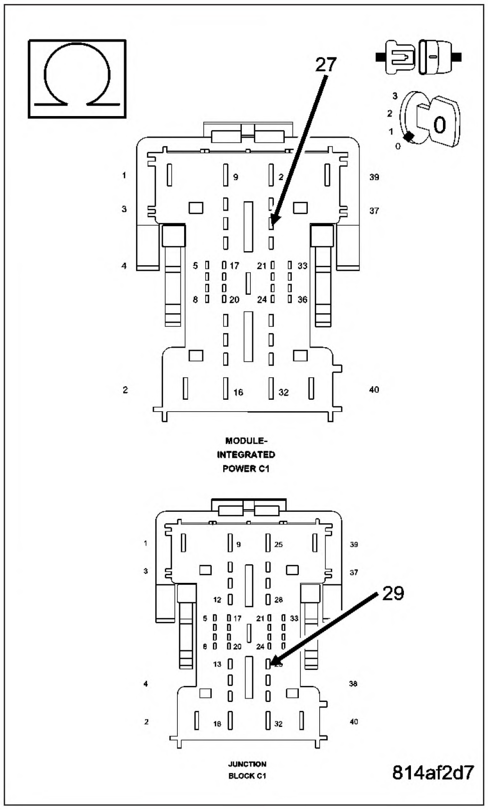
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the open (F100) Fused Run Relay Output circuit between the ORC module and the IPM..

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

8. CHECK (F923) RUN RELAY INOPERATIVE OR OPEN OUTPUT



Turn the ignition off.

Disconnect the Junction Block C1 connector.

Disconnect the Integrated Power Module C1 connector.

NOTE: Check connectors - Clean and repair as necessary.

Measure the resistance of the Run Relay Output circuit from the IPM to the Junction Block.

Is the resistance below 5.0 ohms?

Yes >> Repair the (F923) Run Relay Output circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Replace the Junction Block (the relay is not replaceable).

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B212D-IGNITION RUN ONLY INPUT CIRCUIT OPEN (CONTINUED)

9. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTCs from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool, monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return, continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting the active DTC in question.

Does the scan tool display any ACTIVE DTCs?

Yes >> Select appropriate symptom from Symptom List.

No >> No problem found. Erase all codes before returning vehicle to customer.

B2201-CALIBRATION MISMATCH

- **When Monitored:**
  With the Ignition on.
- **Set Condition:**
  This DTC will be set when the VIN stored in the PCM does not match the VIN stored in the Occupant Restraint Controller (ORC). The ORC does not support a stored B2201 DTC.

Possible Causes
INCORRECT PCM
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. VERIFY THAT DTC B2201-CALIBRATION MISMATCH IS ACTIVE

Turn the ignition on.

With the scan tool, read ORC DTCs.

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Does the scan tool display active: B2201-CALIBRATION MISMATCH?

Yes >> Go To 2

No >> Test Complete.

2. CHECK VIN IN PCM

With the scan tool compare the VIN that is programmed into the PCM to the VIN stored in the ORC.

Does the VIN programmed into the PCM match the VIN stored in the ORC?

Yes >> Go To 3

No >> Replace and program the Powertrain Control Module in accordance with the service information. Ensure the PCM is replaced with the correct vehicle line PCM.
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

3. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

View repair.

Repair

Replace the Occupant Restraint Controller in accordance with the service information.
Perform the ORC VERIFICATION TEST-VER 1.

B2205-ORIGINAL VIN MISSING/MISMATCH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Occupant Restraint Controller will receive and monitor the VIN message from the PCM and record the VIN if different from the last VIN.

Possible Causes
INCORRECT VIN PROGRAMMED IN PCM
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. VERIFY THAT DTC B2205-ORIGINAL VIN MISSING/MISMATCH

Turn the ignition on.

With the scan tool, read ORC DTCs.

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Does the scan tool display active :B2205-ORIGINAL VIN MISSING/MISMATCH?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK VIN IN PCM

With the scan tool compare the VIN that is programmed into the PCM to the VIN on the vehicle.

Does the VIN programmed into the PCM match the vehicles VIN?

Yes >> Go To 3

No >> Replace the Powertrain Control Module in accordance with Service Information.
Perform the (NGC) POWERTRAIN VERIFICATION TEST-VER. 1

---

3. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

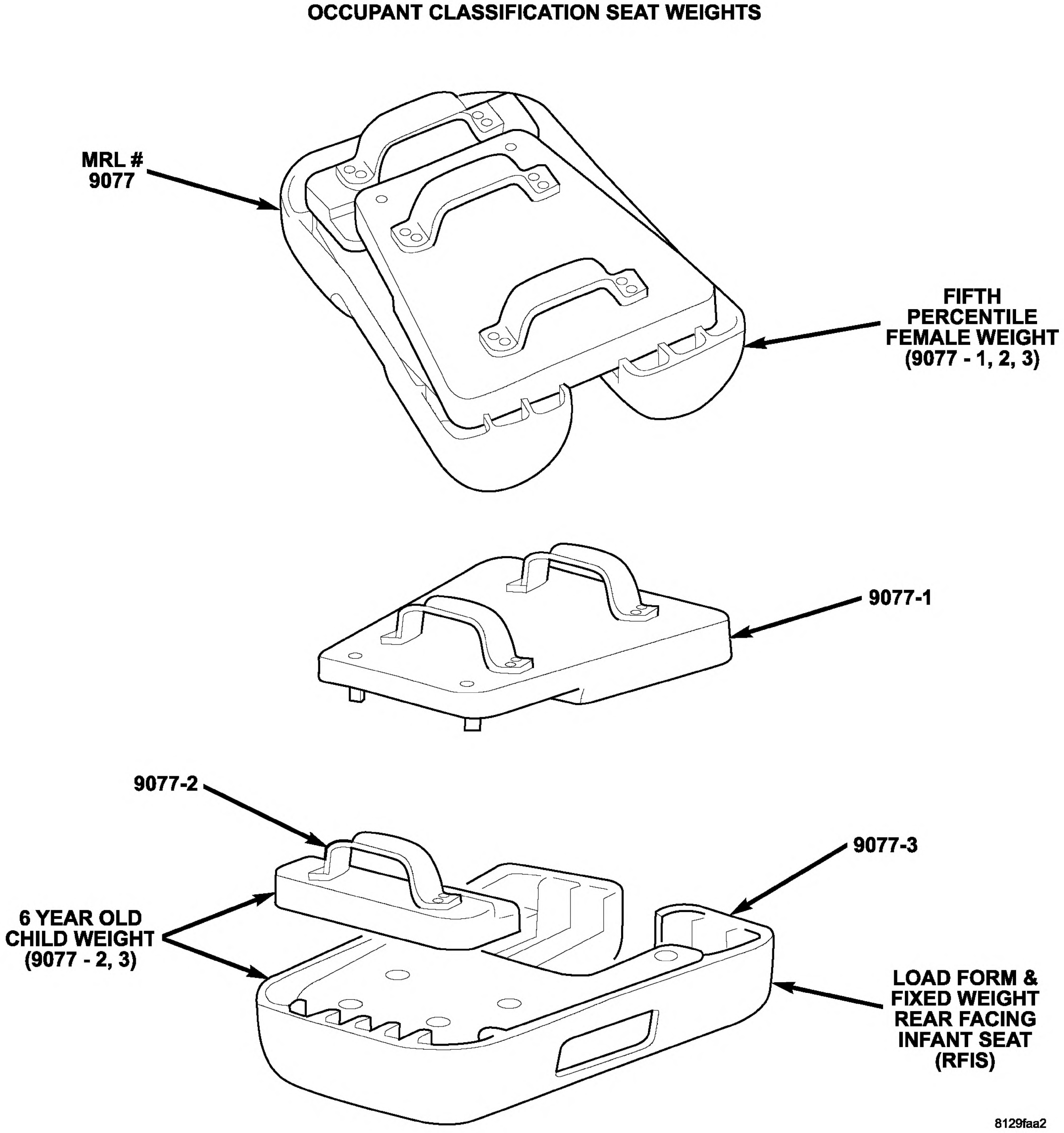
View repair.

Repair

Replace the Occupant Restraint Controller in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1.

B2206-CURRENT VIN MISSING/MISMATCH


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

OCS SEAT WEIGHTS MRL #9077

B2206-CURRENT VIN MISSING/MISMATCH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  During power-up, the ORC and OCM monitors the CAN bus for the VIN message.
- **Set Condition:**
  This DTC will set if the VIN information received from the PCM is different from the stored VIN.

Possible Causes
INCORRECT VIN PROGRAMMED INTO THE PCM
OCCUPANT CLASSIFICATION MODULE (OCM)
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. CHECK FOR ACTIVE DTC

NOTE: Troubleshoot any Ignition, Battery, Seat Weight Sensor, or OCM Internal DTCs BEFORE proceeding

NOTE: Ensure that the battery is fully charged.

With the scan tool, read DTCs.

Select the module and DTC type.

OCM-Active
Go To 2

OCM-Stored
Erase code with scan tool, test complete.

ORC-Active
Go To 4

ORC-Stored
Erase code with scan tool, test complete.

---

2. CHECK THE VIN STORED IN THE PCM

With the scan tool, compare the VIN that is stored in the PCM to the VIN of the vehicle's VIN plate.

Does the VIN stored in the PCM match the vehicle's VIN?

Yes >> Go To 3

No >> Replace and Configure the Powertrain Control Module in accordance with the service information.
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5. Refer to (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

B2206-CURRENT VIN MISSING/MISMATCH (CONTINUED)

3. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that the passenger seat is empty.

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

NOTE: Failure to follow the test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display active: B2206-CURRENT VIN MISSING/MISMATCH?

Yes >> Replace the OCM in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1.

No - But Other DTCs Present
Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No - No Active DTCs Present
Erase all codes before returning vehicle to customer.

---

4. CHECK THE VIN STORED IN THE PCM

With the scan tool, compare the VIN that is stored in the PCM to the VIN of the vehicle's VIN plate.

Does the VIN stored in the PCM match the vehicle's VIN?

Yes >> Go To 5

No >> Replace and Configure the Powertrain Control Module in accordance with the service information.
Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5. Refer to (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

---

5. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

View repair.

Repair
Replace the Occupant Restraint Controller in accordance with the service information.
Perform the ORC VERIFICATION TEST-VER 1.

B2207-OCCUPANT RESTRAINT CONTROLLER INTERNAL 1

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions could result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1.

B2208-OCCUPANT RESTRAINT CONTROLLER INTERNAL 2

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions could result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1.

B2209-OCCUPANT RESTRAINT CONTROLLER INTERNAL 3

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions could result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1.

B220A-OCCUPANT RESTRAINT CONTROLLER INTERNAL 4

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions could result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1.

B220B-OCCUPANT RESTRAINT CONTROLLER FIRING STORED ENERGY

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions can result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1.

B220C-OCCUPANT RESTRAINT CONTROLLER ACCELEROMETER 1 INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions can result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1.

B220D-OCCUPANT RESTRAINT CONTROLLER ACCELEROMETER 2 INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions can result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1.

B220F-OCCUPANT RESTRAINT CONTROLLER CONTROL DRIVER 1

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions can result in accidental airbag deployment and personal injury or death.

When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1

B2210-OCCUPANT RESTRAINT CONTROLLER CONTROL DRIVER 2

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The module's on board diagnostics continuously performs internal circuit tests.
- **Set Condition:**
  This DTC will set if the module identifies an out of range internal circuit.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. REPLACE OCCUPANT RESTRAINT CONTROLLER

Turn the ignition on.

With the scan tool, erase and read ORC DTCs.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take proper precautions can result in accidental airbag deployment and personal injury or death.

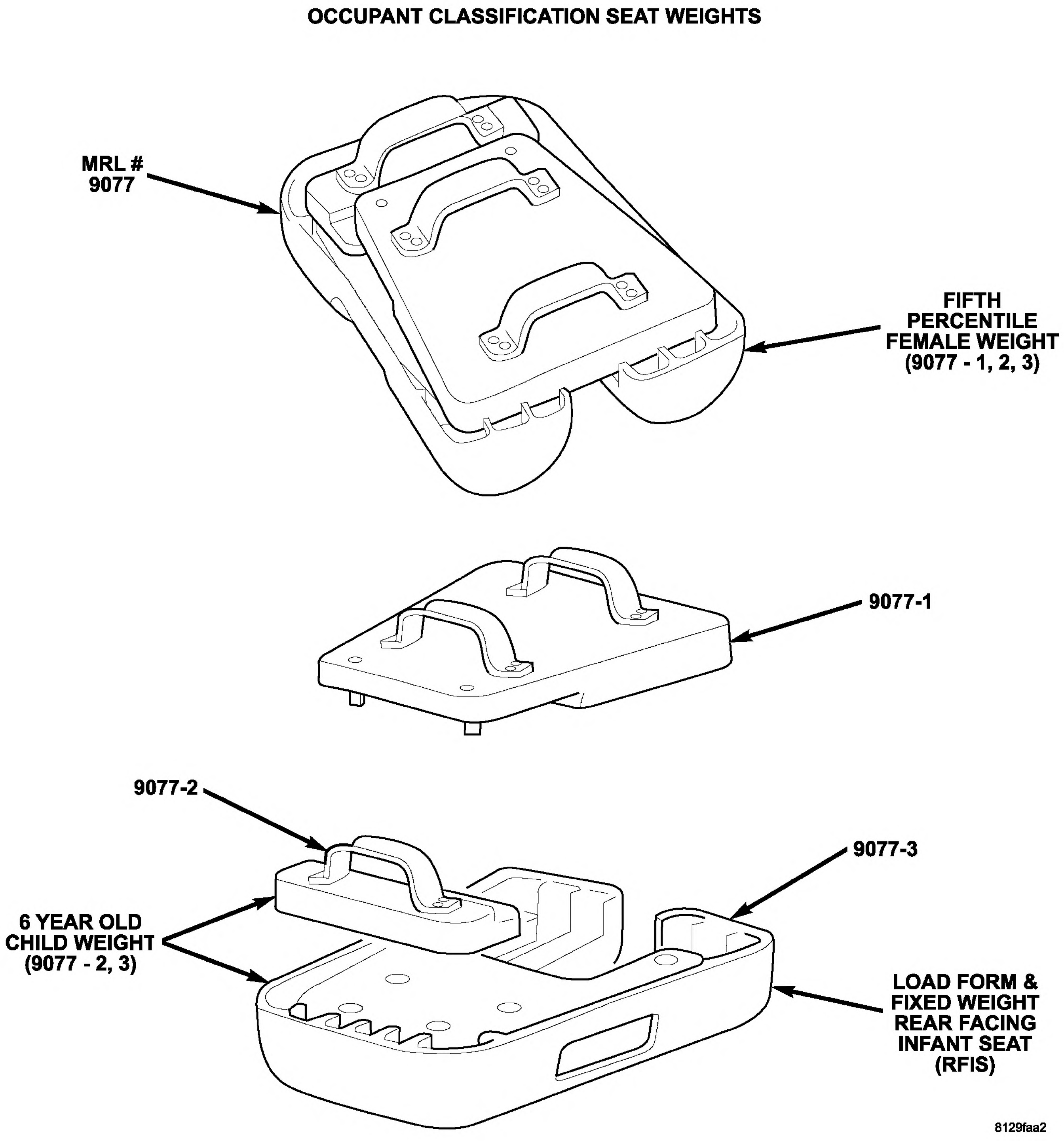
When this code is set, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with the Service Information.

Perform the ORC VERIFICATION TEST-VER. 1

B2212-OCCUPANT CLASSIFICATION MODULE INTERNAL


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

OCS SEAT WEIGHTS MRL #9077

B2212-OCCUPANT CLASSIFICATION MODULE INTERNAL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While the IGN status is RUN or SNA, while the CAN bus system voltage is between 10 and 16 volts, and during the OCS Verification Test.
- **Set Condition:**
  This DTC will set if the module detects an internal failure.

Possible Causes
OCCUPANT CLASSIFICATION MODULE

Diagnostic Test

1. PERFORM THE OCCUPANT CLASSIFICATION MODULE VERIFICATION TEST

NOTE: Ensure that the passenger seat is empty.

NOTE: Ensure that all seat and strain gauge sensor bolts are properly torqued.

With the scan tool, erase OCM DTCs.

Turn the ignition off, wait 10 seconds and turn ignition on.

With the scan tool, read OCM DTCs.

Did the DTC: B2212-OCCUPANT CLASSIFICATION MODULE INTERNAL reset?

Yes >> Go To 2

No >> Perform the OCS VERIFICATION TEST-VER 1.

---

2. PERFORM OCCUPANT CLASSIFICATION MODULE SYSTEM VERIFICATION TEST

Verify that the passenger seat is empty.

Verify that all of the Seat Weight Sensor mounting screws are torqued to specification. Refer to 23 - BODY/SEATS.

NOTE: Failure to follow the test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed on the scan tool. When the test is complete, proceed as follows.

With the scan tool, read OCM DTCs.

Does the scan tool display any active DTCs?

Yes - B2212 is ACTIVE

Replace the Occupant Classification Module in accordance with the service information.

Yes - other DTCs ACTIVE

Diagnose and repair the DTCs. Refer to the Table of Contents in this Section for a complete list of symptoms.

No >> Perform OCS VERIFICATION TEST - VER 1.

B223B-VEHICLE CONFIGURATION MISMATCH

For the Airbag circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Front Control Module sends a message to the Occupant Restraint Controller (ORC) that the vehicle is not equipped with an Occupant Classification Module (OCM) but the ORC is receiving OCM messages over the Can B bus.

Possible Causes
INCORRECT PCM
OCCUPANT RESTRAINT CONTROLLER

Diagnostic Test

1. VERIFY THAT DTC B223B-VEHICLE CONFIGURATION MISMATCH IS ACTIVE

Turn the ignition on.

With the scan tool, read ORC DTCs.

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Does the scan tool display active: B223B-VEHICLE CONFIGURATION MISMATCH?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.
Perform the ORC VERIFICATION TEST-VER. 1

---

2. COMPARE STORED VINS IN THE PCM AND ORC

With the scan tool, read and record the VIN that is stored in the PCM.

With the scan tool, read and record the VIN that is stored in the ORC.

Do the VINs stored in the PCM and ORC match?

Yes >> Go To 3

No >> Replace and program the Powertrain Control Module in accordance with the Service Information. Ensure the PCM is replaced with the correct VIN.

B223B-VEHICLE CONFIGURATION MISMATCH (CONTINUED)

3. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

View repair

Repair

Replace the Occupant Restraint Controller in accordance with the service information.

Perform the ORC VERIFICATION TEST-VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

B223D-OCCUPANT CLASSIFICATION MODULE DTC PRESENT

For the Occupant Classification System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if the ORC receives a bus message with the active OCM DTC Present bit set.

Possible Causes
ACTIVE DTC IN OCCUPANT CLASSIFICATION MODULE
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. ACTIVE OR STORED DTC

With the scan tool, read the OCCUPANT RESTRAINT CONTROLLER active DTCs.

Is the B223D-OCCUPANT CLASSIFICATION MODULE DTC active?

Yes >> Go To 2

No >> With the scan tool, perform the ORC VERIFICATION TEST VER-1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

2. ACTIVE DTC IN OCCUPANT CLASSIFICATION MODULE

With the scan tool, read the OCCUPANT CLASSIFICATION MODULE active DTCs.

Are there any active DTC present?

Yes >> Refer to the symptom list for problems related to the OCCUPANT CLASSIFICATION MODULE (OCM).

No >> Go To 3

---

3. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

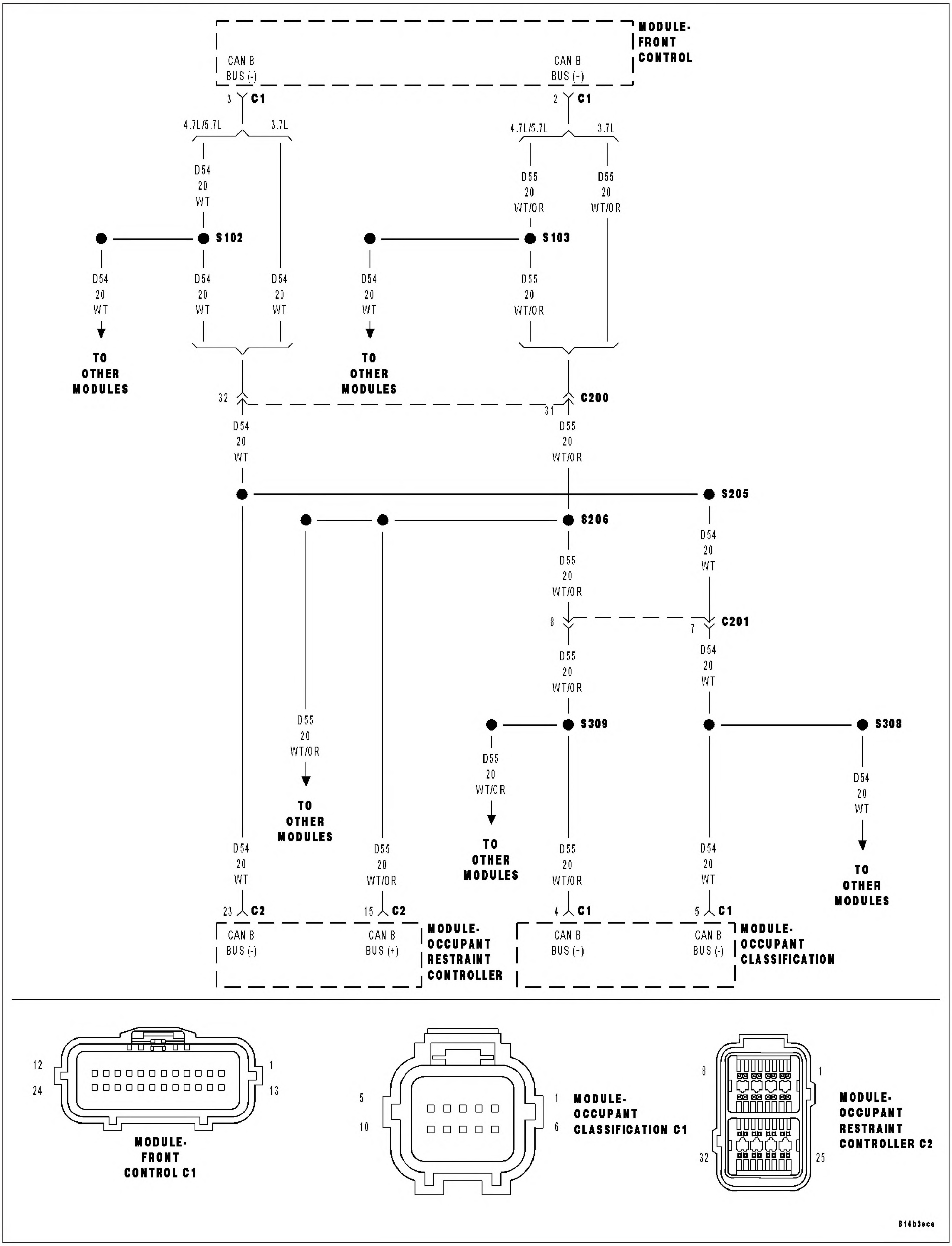
If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

U0019–CAN B BUS–OCM


MODULE-
FRONT
CONTROL
CAN B
BUS (-)
CAN B
BUS (+)
3 C1
2 C1
4.7L/5.7L
3.7L
D54
20
WT
D55
20
WT/OR
S102
S103
TO
OTHER
MODULES
32
31
C200
S205
S206
8
7
C201
S309
S308
23 C2
15 C2
4 C1
5 C1
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
MODULE-
OCCUPANT
CLASSIFICATION
12
1
24
13
MODULE-
FRONT
CONTROL C1
5
1
10
6
MODULE-
OCCUPANT
CLASSIFICATION C1
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
814b3ece

U0019–CAN B BUS–OCM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage, or shorted to ground.

Possible Causes
ACTIVE U0019 CAN B BUS DTC IN FRONT CONTROL MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. VERIFY DTC U0019–CAN B BUS IS ACTIVE

Turn the ignition on.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display active: U0019–CAN B BUS?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also, inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform OCM VERIFICATION TEST – VER 1.

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE (FCM)

With the scan tool, read Front Control Module (FCM) DTCs

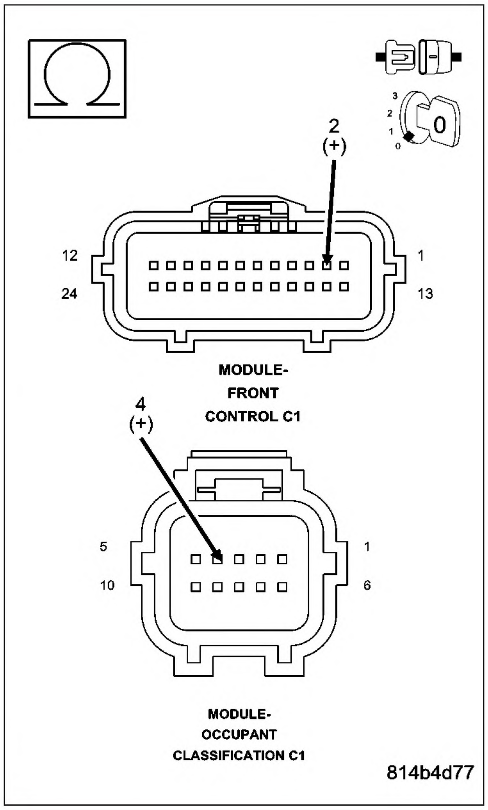
Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING)

No >> Go To 3

U0019–CAN B BUS–OCM (CONTINUED)

3. CHECK (D55) CAN B BUS (+) CIRCUIT FOR AN OPEN


2
(+)
12
24
1
13
MODULE-
FRONT
CONTROL C1
4
(+)
5
10
1
6
MODULE-
OCCUPANT
CLASSIFICATION C1
814b4d77

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Classification Module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

Disconnect the OCM C1 connector.

NOTE: Check connectors - Clean and repair as necessary.

Disconnect the Front Control Module (FCM) C1 connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 connector and the OCM C1 connector.

Is the resistance below 2.0 ohms?

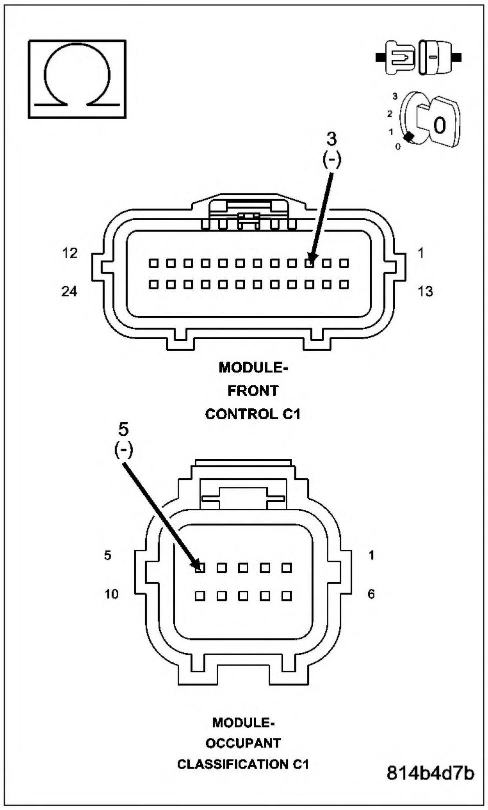
Yes >> Go To 4

No >> Repair the (D55) CAN B Bus (+) circuit for an open.

Perform OCM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. CHECK (D54) CAN B BUS (–) CIRCUIT FOR AN OPEN


3
(-)
12
24
1
13
MODULE-
FRONT
CONTROL C1
5
(-)
5
10
1
6
MODULE-
OCCUPANT
CLASSIFICATION C1
814b4d7b

Measure the resistance of the (D54) CAN B Bus (–) circuit between the Front Control Module C1 connector and the OCM, C1 connector.

Is the resistance below 2.0 ohms?

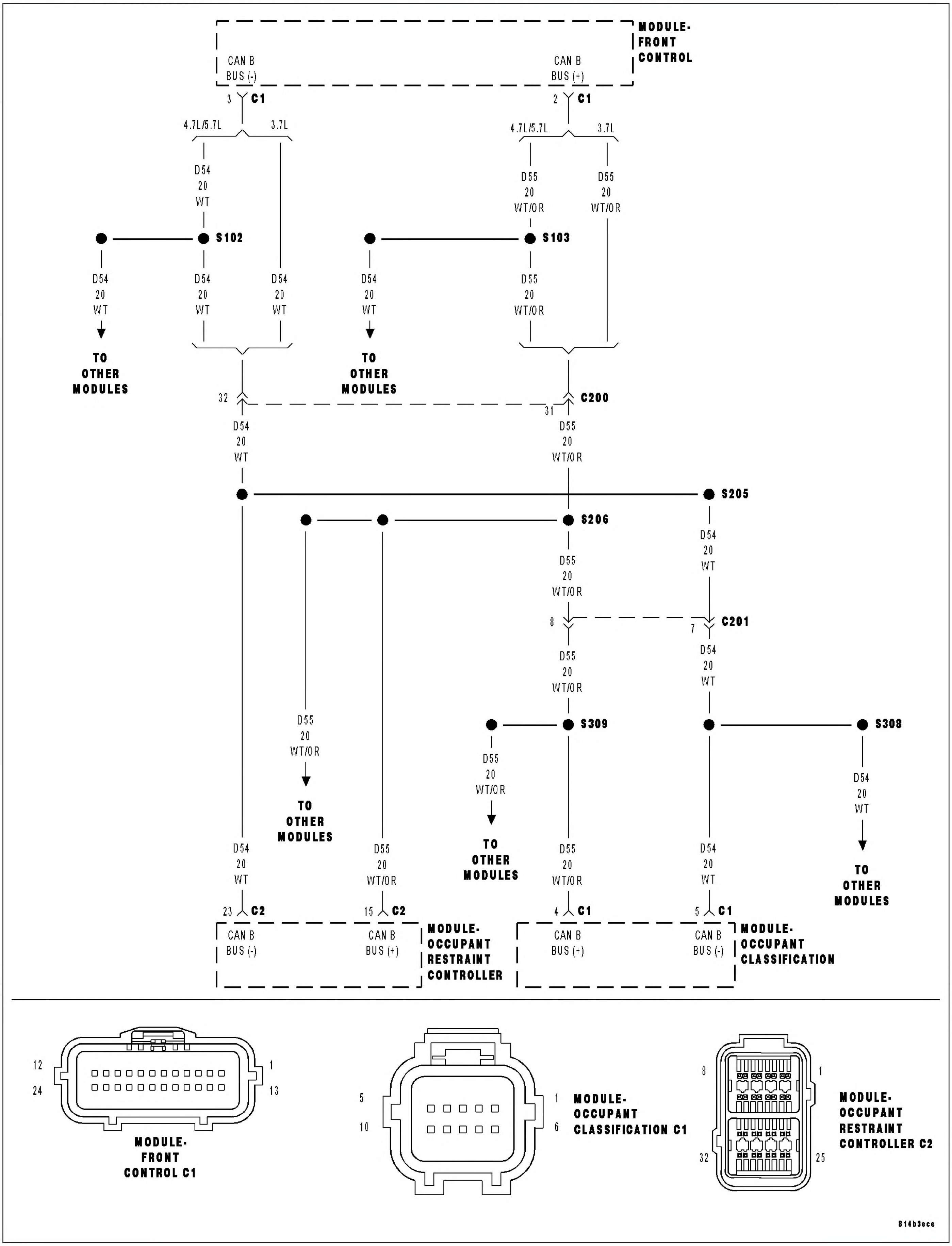
Yes >> Replace the OCM in accordance with the Service Information.

Perform OCM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the (D54) CAN B Bus (–) circuit for an open.

Perform OCM VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

U0019–CAN B BUS–ORC


MODULE-
FRONT
CONTROL
CAN B
BUS (-)
CAN B
BUS (+)
3 C1
2 C1
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D54
20
WT
D55
20
WT/OR
D55
20
WT/OR
S102
S103
D54
20
WT
D54
20
WT
D54
20
WT
D54
20
WT
D55
20
WT/OR
TO
OTHER
MODULES
TO
OTHER
MODULES
32
31
C200
D54
20
WT
D55
20
WT/OR
S205
S206
D55
20
WT/OR
D54
20
WT
8
7
C201
D55
20
WT/OR
D54
20
WT
D55
20
WT/OR
TO
OTHER
MODULES
S309
S308
D55
20
WT/OR
TO
OTHER
MODULES
D54
20
WT
TO
OTHER
MODULES
D54
20
WT
D55
20
WT/OR
D55
20
WT/OR
D54
20
WT
23 C2
15 C2
4 C1
5 C1
CAN B
BUS (-)
CAN B
BUS (+)
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
OCCUPANT
CLASSIFICATION
12
24
1
13
MODULE-
FRONT
CONTROL C1
5
10
1
6
MODULE-
OCCUPANT
CLASSIFICATION C1
8
32
1
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
814b3ece

U0019–CAN B BUS–ORC (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage, or shorted to ground.

Possible Causes
ACTIVE U0019 CAN B BUS DTC IN FRONT CONTROL MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. VERIFY DTC U0019–CAN B BUS IS ACTIVE

Turn the ignition on.

With the scan tool, read Occupant Restraint Controller (ORC) DTCs.

Does the scan tool display active: U0019–CAN B BUS?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also, inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform ORC VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE (FCM)

With the scan tool, read Front Control Module (FCM) DTCs

Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING)

No >> Go To 3

U0019–CAN B BUS–ORC (CONTINUED)

3. CHECK (D55) CAN B BUS (+) CIRCUIT FOR AN OPEN

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

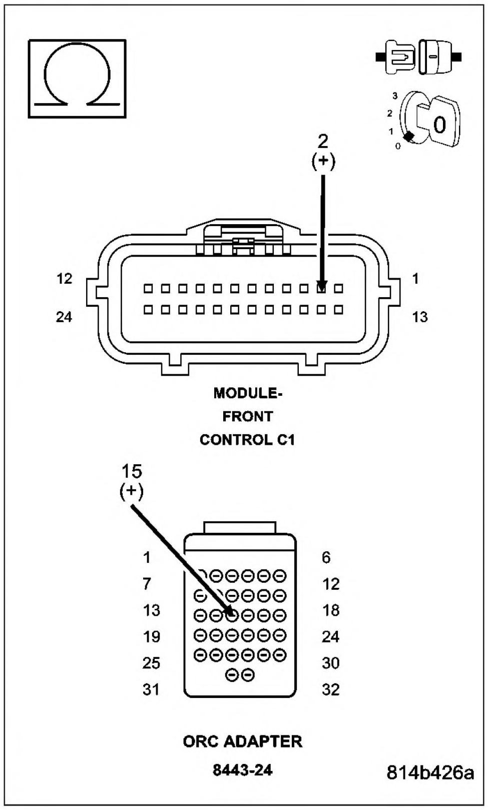
Disconnect the ORC C2 connector.

NOTE: Check connectors - Clean and repair as necessary.

Connect the Load Tool ORC 8443–24 Adaptor to the ORC C2 connector.

Disconnect the Front Control Module (FCM) C1 connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 connector and the ORC C2 connector.


2
(+)
12
24
1
13
MODULE-
FRONT
CONTROL C1
15
(+)
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
814b426a

Is the resistance below 2.0 ohms?

Yes >> Go To 4

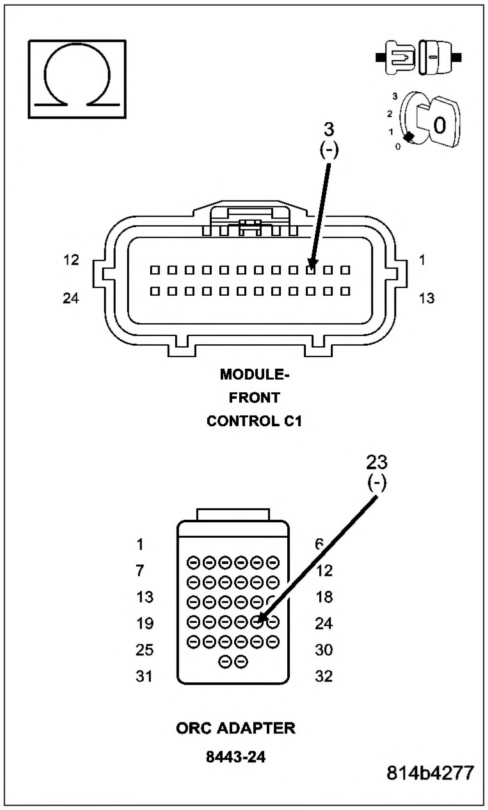
No >> Repair the (D55) CAN B Bus (+) circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. CHECK (D54) CAN B BUS (–) CIRCUIT FOR AN OPEN

Measure the resistance of the (D54) CAN B Bus (–) circuit between the Front Control Module C1 connector and the ORC C2 connector.


3
(-)
12
24
1
13
MODULE-
FRONT
CONTROL C1
23
(-)
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
814b4277

Is the resistance below 2.0 ohms?

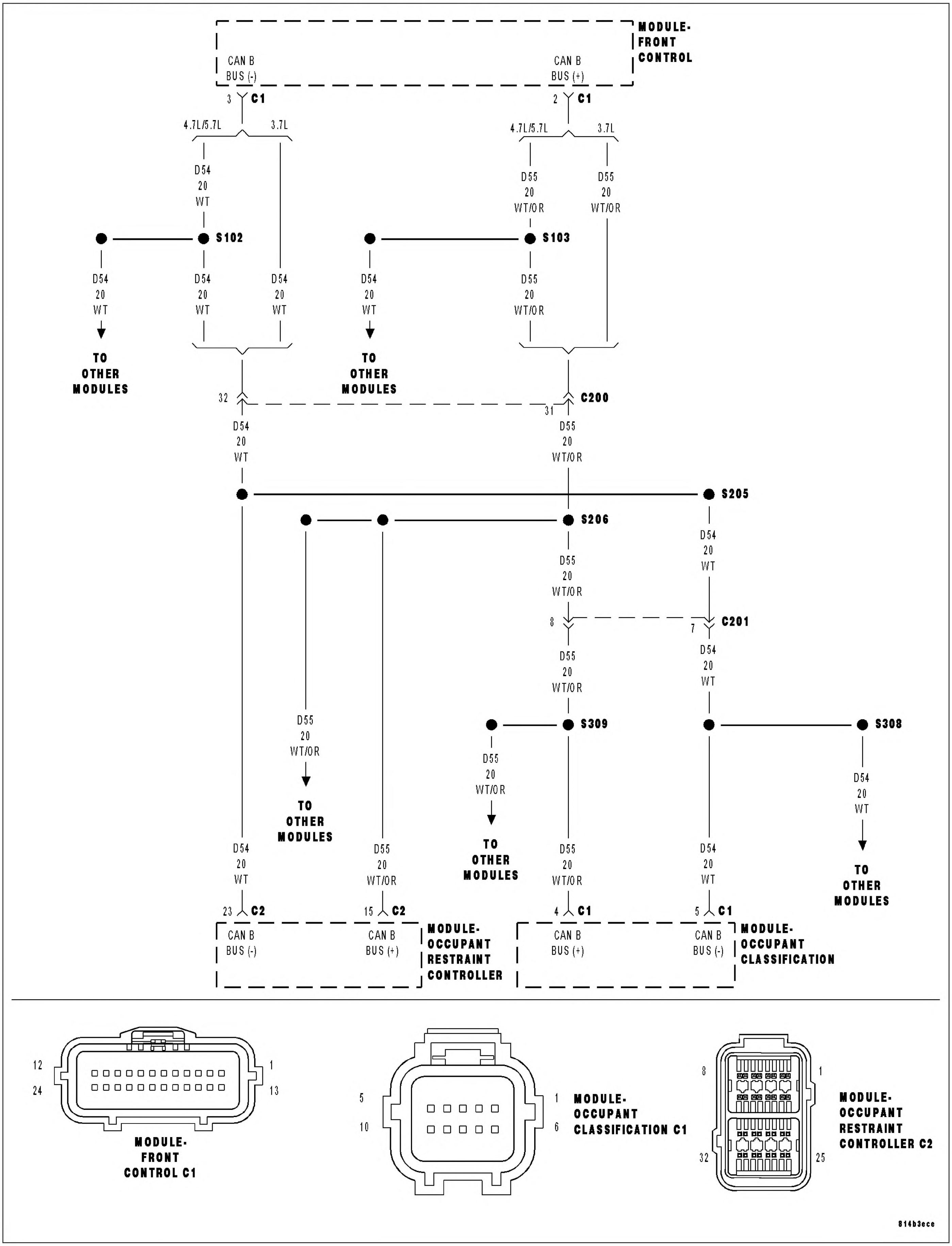
Yes >> Replace the ORC in accordance with the Service Information.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the (D54) CAN B Bus (–) circuit for an open.

Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

U0020-CAN B BUS OFF PERFORMANCE–OCM


MODULE-
FRONT
CONTROL
CAN B
BUS (-)
CAN B
BUS (+)
3 C1
2 C1
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D54
20
WT
D55
20
WT/OR
D55
20
WT/OR
S102
S103
D54
20
WT
D54
20
WT
D54
20
WT
D54
20
WT
D55
20
WT/OR
TO
OTHER
MODULES
TO
OTHER
MODULES
32
31
C200
D54
20
WT
D55
20
WT/OR
S205
S206
D55
20
WT/OR
D54
20
WT
8
7
C201
D55
20
WT/OR
D54
20
WT
S309
S308
D55
20
WT/OR
TO
OTHER
MODULES
D55
20
WT/OR
TO
OTHER
MODULES
D54
20
WT
TO
OTHER
MODULES
D54
20
WT
D55
20
WT/OR
D55
20
WT/OR
D54
20
WT
23 C2
15 C2
4 C1
5 C1
CAN B
BUS (-)
CAN B
BUS (+)
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
OCCUPANT
CLASSIFICATION
12
24
1
13
MODULE-
FRONT
CONTROL C1
5
10
1
6
MODULE-
OCCUPANT
CLASSIFICATION C1
8
32
1
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
814b3ece

U0020-CAN B BUS OFF PERFORMANCE–OCM (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage, or shorted to ground.

Possible Causes
ACTIVE U0020 CAN B BUS DTC IN OCCUPANT CLASSIFICATION MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
OCCUPANT CLASSIFICATION MODULE (OCM)

Diagnostic Test

1. VERIFY DTC U0020–CAN B BUS IS ACTIVE

Turn the ignition on.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display active: U0019–CAN B BUS?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also, inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform ORC VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE (FCM)

With the scan tool, read Front Control Module (FCM) DTCs

Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING).

No >> Go To 3

U0020-CAN B BUS OFF PERFORMANCE–OCM (CONTINUED)

3. CHECK (D55) CAN B BUS (+) CIRCUIT FOR AN OPEN

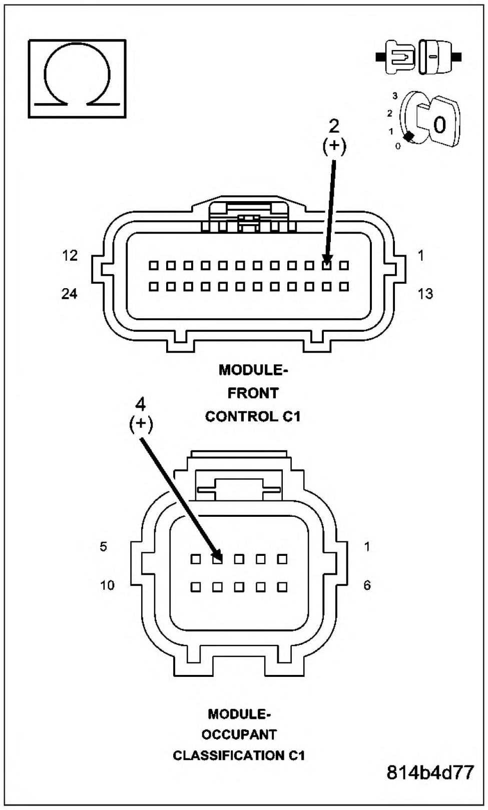
Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the OCM C1 connector.

Disconnect the Front Control Module (FCM) C1 connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 connector and the OCM C1 connector.


2
(+)
12
24
1
13
MODULE-
FRONT
CONTROL C1
4
(+)
5
10
1
6
MODULE-
OCCUPANT
CLASSIFICATION C1
3
2
1
0
0

814b4d77

Is the resistance below 2.0 ohms?

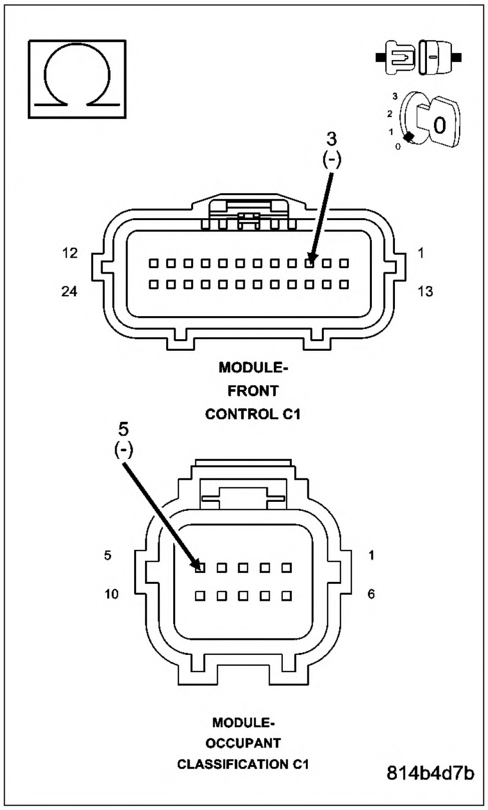
Yes >> Go To 4

No >> Repair the (D55) CAN B Bus (+) circuit for an open.
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. CHECK (D54) CAN B BUS (–) CIRCUIT FOR AN OPEN

Measure the resistance of the (D54) CAN B Bus (–) circuit between the Front Control Module C1 connector and the OCM C1 connector.


3
(-)
12
24
1
13
MODULE-
FRONT
CONTROL C1
5
(-)
5
10
1
6
MODULE-
OCCUPANT
CLASSIFICATION C1
3
2
1
0
0

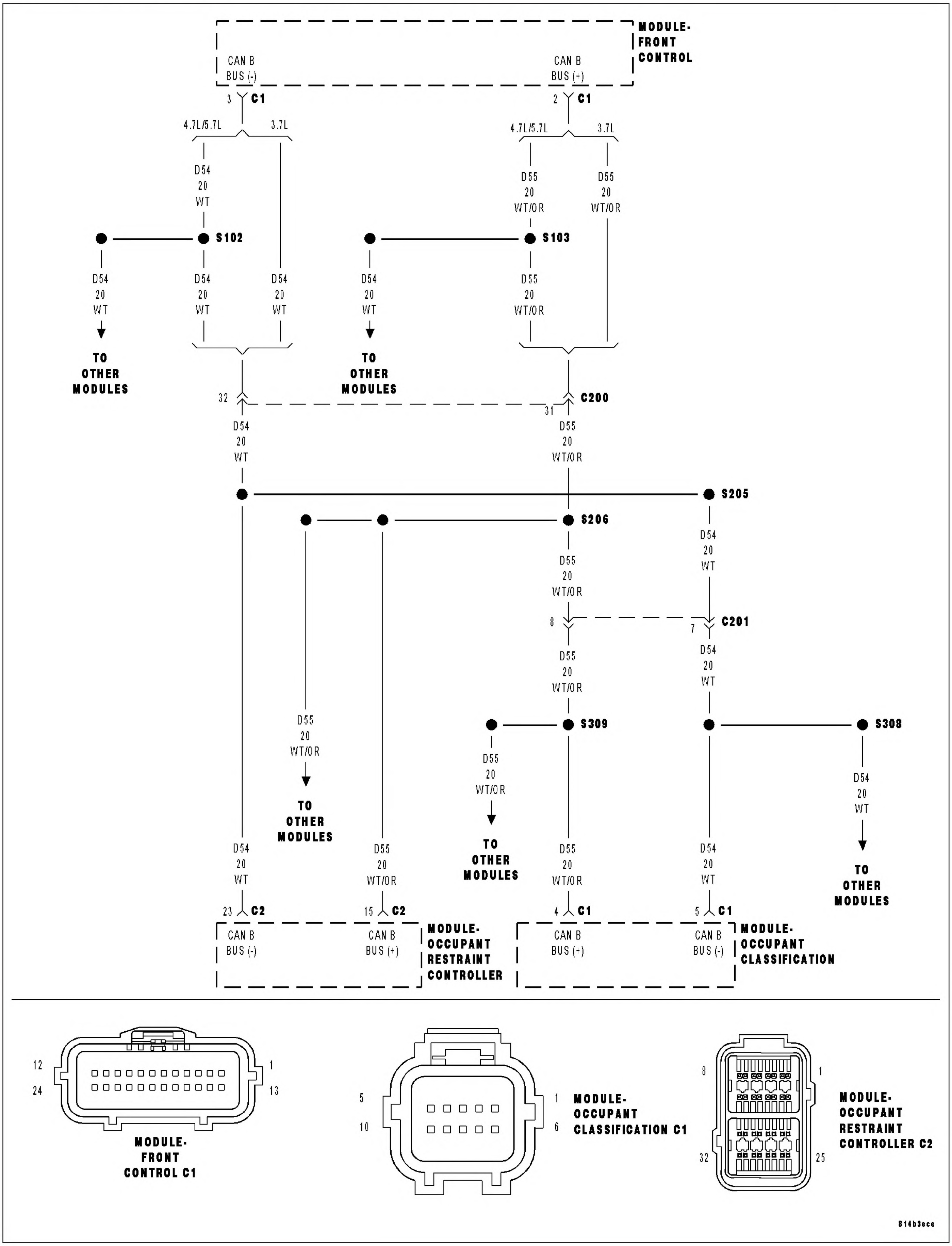
814b4d7b

Is the resistance below 2.0 ohms?

Yes >> Replace the OCM in accordance with the Service Information.
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the (D54) CAN B Bus (–) circuit for an open.
Perform OCS VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

U0020-CAN B BUS OFF PERFORMANCE–ORC


MODULE-FRONT CONTROL
CAN B BUS (-)
CAN B BUS (+)
3 C1
2 C1
4.7L/5.7L
3.7L
D54 20 WT
D55 20 WT/OR
S102
S103
TO OTHER MODULES
32
31
C200
S205
S206
C201
8
7
S309
S308
23 C2
15 C2
4 C1
5 C1
MODULE-OCCUPANT RESTRAINT CONTROLLER
MODULE-OCCUPANT CLASSIFICATION
12
24
1
13
MODULE-FRONT CONTROL C1
5
10
6
MODULE-OCCUPANT CLASSIFICATION C1
8
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
814b3ece

U0020-CAN B BUS OFF PERFORMANCE–ORC (CONTINUED)

For the Air Bag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage, or shorted to ground.

Possible Causes
ACTIVE U0020 CAN B BUS DTC IN OCCUPANT CLASSIFICATION MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. VERIFY DTC U0020–CAN B BUS IS ACTIVE

Turn the ignition on.

With the scan tool, read Occupant Classification Module (OCM) DTCs.

Does the scan tool display active: U0019–CAN B BUS?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also, inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform ORC VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE (FCM)

With the scan tool, read Front Control Module (FCM) DTCs

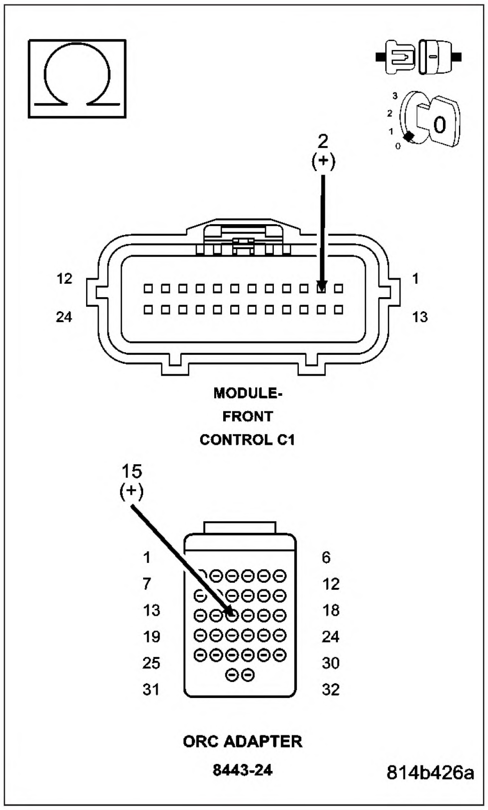
Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING).

No >> Go To 3

U0020-CAN B BUS OFF PERFORMANCE–ORC (CONTINUED)

3. CHECK (D55) CAN B BUS (+) CIRCUIT FOR AN OPEN


2
(+)
12
24
1
13
MODULE-
FRONT
CONTROL C1
15
(+)
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
814b426a

Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the OCM C1 connector.

Disconnect the Front Control Module (FCM) C1 connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 connector and the ORC C2 connector.

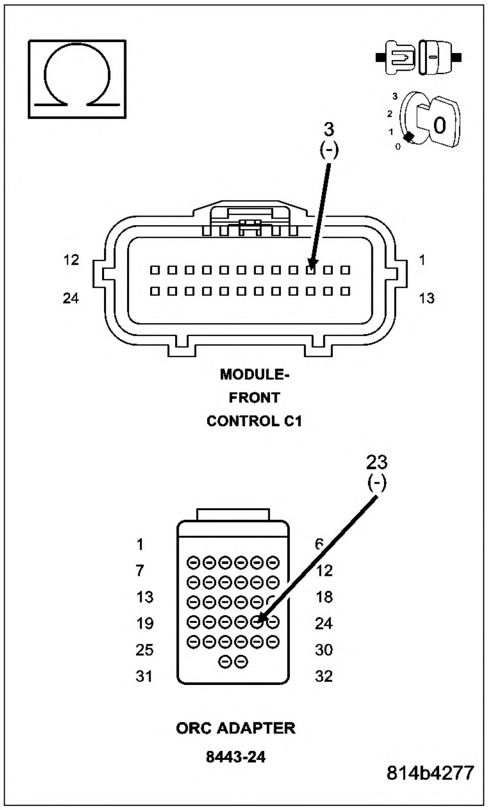
Is the resistance below 2.0 ohms?

Yes >> Go To 4

No >> Repair the (D55) CAN B Bus (+) circuit for an open.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

---

4. CHECK (D54) CAN B BUS (–) CIRCUIT FOR AN OPEN


3
(-)
12
24
1
13
MODULE-
FRONT
CONTROL C1
23
(-)
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
814b4277

Measure the resistance of the (D54) CAN B Bus (–) circuit between the Front Control Module C1 connector and the ORC C2 connector.

Is the resistance below 2.0 ohms?

Yes >> Replace the ORC in accordance with the Service Information.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

No >> Repair the (D54) CAN B Bus (–) circuit for an open.
Perform ORC VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

U0022-CAN B BUS (+) CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0023-CAN B BUS (+) CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0026-CAN B BUS (-) CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE SYSTEM (ABS) CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER (ORC)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156-LOST COMMUNICATION WITH EOM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

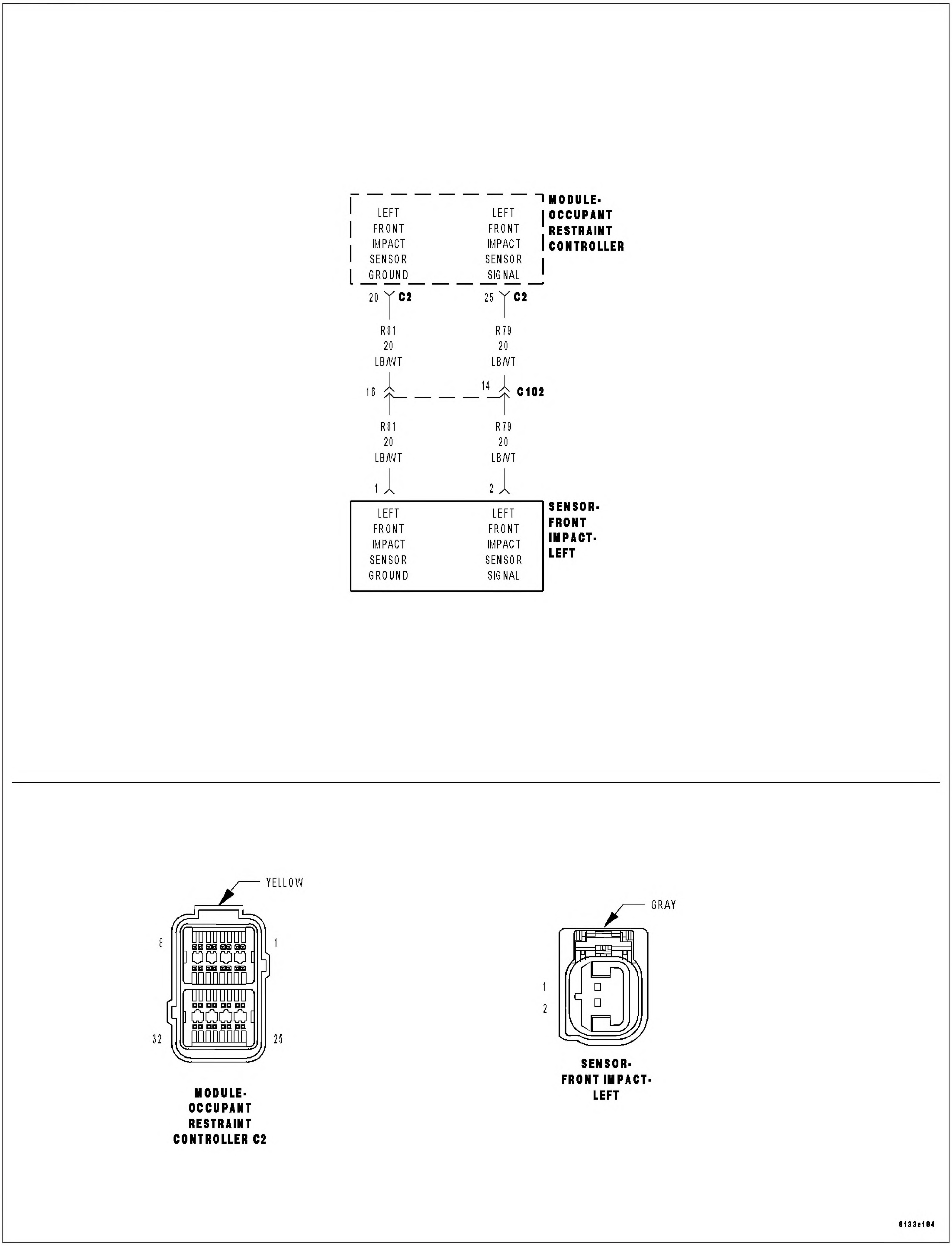
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR


MODULE-OCCUPANT RESTRAINT CONTROLLER
LEFT FRONT IMPACT SENSOR GROUND
LEFT FRONT IMPACT SENSOR SIGNAL
20 C2
25 C2
R81 20 LB/WT
R79 20 LB/VT
16
14
C102
R81 20 LB/WT
R79 20 LB/VT
1
2
SENSOR-FRONT IMPACT-LEFT
LEFT FRONT IMPACT SENSOR GROUND
LEFT FRONT IMPACT SENSOR SIGNAL
YELLOW
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C2
GRAY
1
2
SENSOR-FRONT IMPACT-LEFT
8133e184

U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Front Left Impact Sensor over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Front Left Impact Sensor do not establish and maintain valid data communications.

Possible Causes
(R79) SIGNAL CIRCUIT SHORTED TO BATTERY
(R79) SIGNAL CIRCUIT SHORTED TO GROUND
(R79, R81) FRONT LEFT IMPACT SENSOR CIRCUITS SHORTED TOGETHER
(R81) FRONT LEFT IMPACT SENSOR GROUND CIRCUIT OPEN
(R79) FRONT LEFT IMPACT SENSOR SIGNAL CIRCUIT OPEN
ORC, FRONT LEFT IMPACT SENSOR

Diagnostic Test

1. VERIFY THAT DTC U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

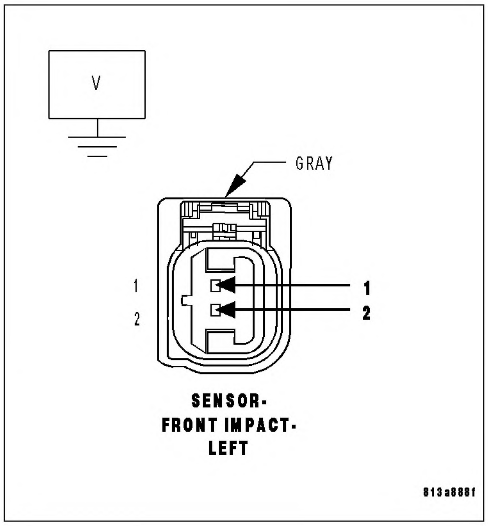
Does the scan tool display active:U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR?

Yes >> Go To 2

No >> Go To 9

U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR (CONTINUED)

2. CHECK THE (R79, R81) FRONT LEFT IMPACT SENSOR SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Front Left Impact Sensor connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R79) Front Left Impact Sensor Signal circuit and (R81) Sensor Ground circuit at the Front Left Impact Sensor connector and ground.

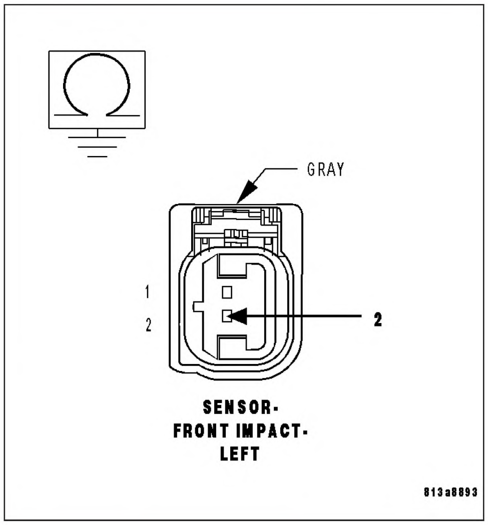
Is there any voltage present?

Yes >> Repair the (R79, R81) Front Left Impact Sensor circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (R79) FRONT LEFT IMPACT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Measure the resistance of the (R79) Front Left Impact Sensor Signal circuit between the Front Left Impact Sensor connector and ground.

Is the resistance below 100K ohms?

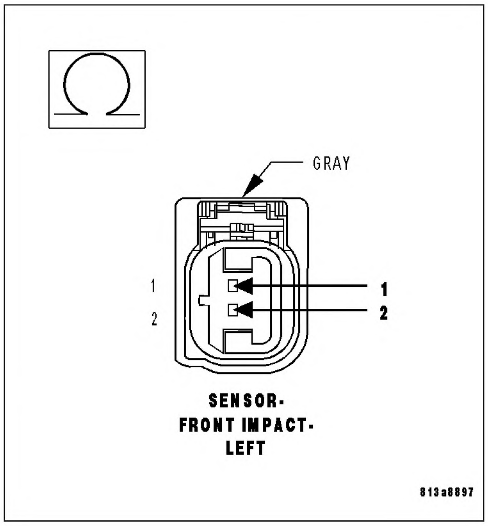
Yes >> Repair the (R79) Front Left Impact Sensor Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR (CONTINUED)

4. CHECK THE (R79, R81) FRONT LEFT IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R79) Front Left Impact Sensor Signal and (R81) Sensor Ground circuits at the Front Left Impact Sensor connector.


GRAY
1
2
1
2
SENSOR-
FRONT IMPACT-
LEFT
813a8897

Is the resistance below 100K ohms?

Yes >> Repair the (R79, R81) Front Left Impact Sensor circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

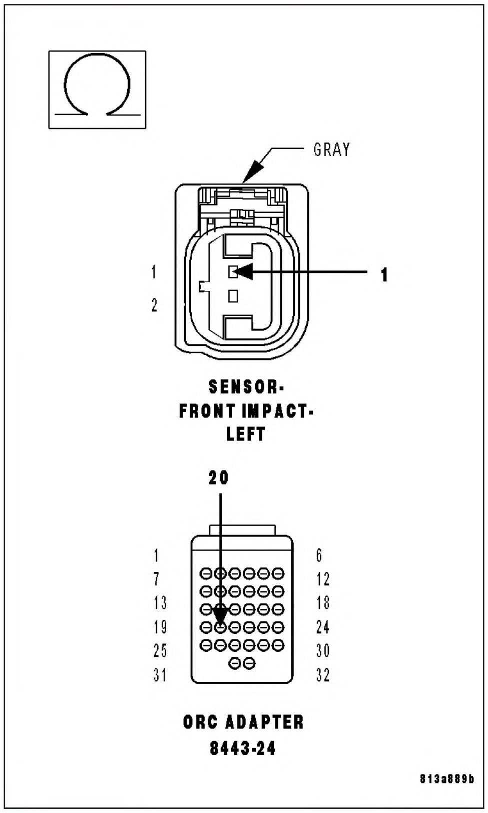
No >> Go To 5

---

5. CHECK THE (R81) FRONT LEFT IMPACT SENSOR GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Restraint Control Module connector.

Measure the resistance of the (R81) Front Left Impact Sensor Ground circuit between the Front Left Impact Sensor connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
FRONT IMPACT-
LEFT
20
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a889b

Is the resistance below 1 ohm?

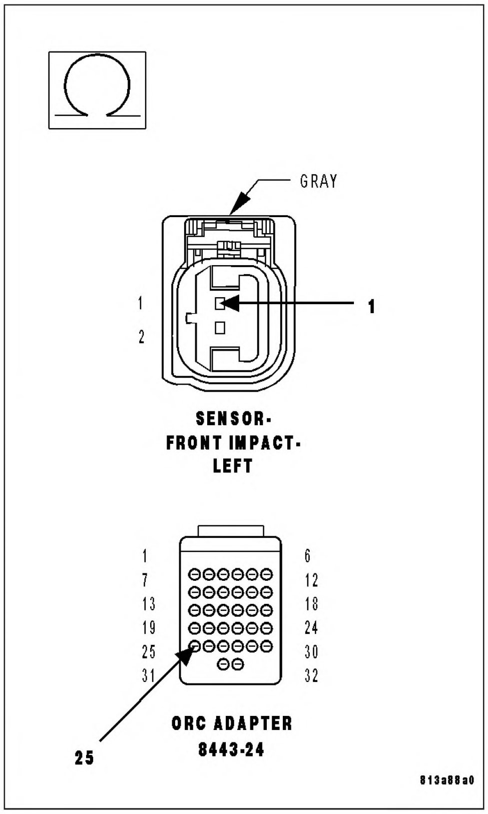
Yes >> Go To 6

No >> Repair the (R81) Front Left Impact Sensor 1 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR (CONTINUED)

6. CHECK THE (R79) FRONT LEFT IMPACT SENSOR CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R79) Front Left Impact Sensor Ground circuit between the Front Left Impact Sensor connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R79) Front Left Impact Sensor Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE FRONT LEFT IMPACT SENSOR

Replace the Front Left Impact Sensor.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Front Left Impact Sensor DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

U0170-LOST COMMUNICATION W/UP-FRONT LEFT SATELLITE ACCELERATION SENSOR (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

View repair

Repair

Replace the Occupant Restraint Controller in accordance with Service Information.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

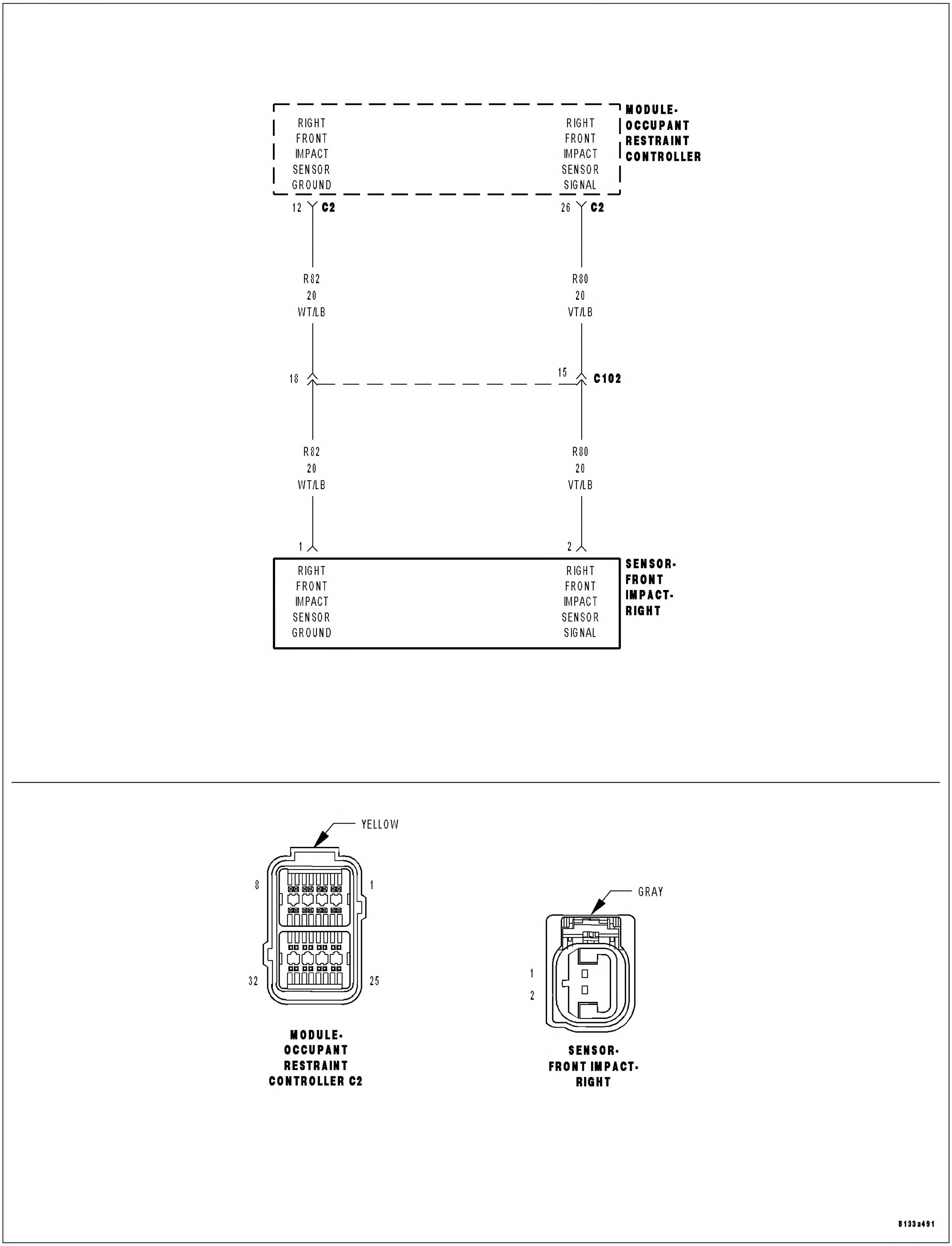
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
RIGHT FRONT IMPACT SENSOR GROUND
RIGHT FRONT IMPACT SENSOR SIGNAL
12 C2
26 C2
R82
20
WT/LB
R80
20
VT/LB
18
15
C102
R82
20
WT/LB
R80
20
VT/LB
1
2
RIGHT FRONT IMPACT SENSOR GROUND
RIGHT FRONT IMPACT SENSOR SIGNAL
SENSOR-
FRONT
IMPACT-
RIGHT
YELLOW
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2
GRAY
1
2
SENSOR-
FRONT IMPACT-
RIGHT
8133a491

U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Front Right Impact Sensor over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Front Right Impact Sensor do not establish and maintain valid data communications.

Possible Causes
(R80) SIGNAL CIRCUIT SHORTED TO BATTERY
(R80) SIGNAL CIRCUIT SHORTED TO GROUND
(R80, R82) FRONT RIGHT IMPACT SENSOR CIRCUITS SHORTED TOGETHER
(R82) FRONT RIGHT IMPACT SENSOR GROUND CIRCUIT OPEN
(R80) FRONT RIGHT IMPACT SENSOR SIGNAL CIRCUIT OPEN
ORC, FRONT RIGHT IMPACT SENSOR

Diagnostic Test

1. VERIFY THAT DTC U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR?

Yes >> Go To 2

No >> Go To 9

U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR (CONTINUED)

2. CHECK THE (R80, R82) FRONT RIGHT IMPACT SENSOR SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY

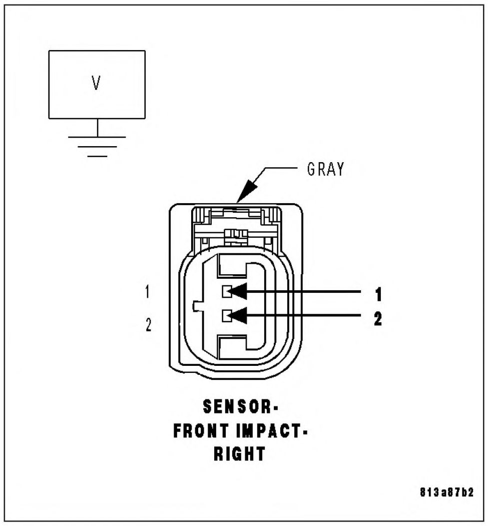
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Front Right Impact Sensor connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R80) Front Right Impact Sensor Signal circuit and (R82) Sensor Ground circuit at the Front Right Impact Sensor connector and ground.



Is there any voltage present?

Yes >> Repair the (R80, R82) Front Right Impact Sensor circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

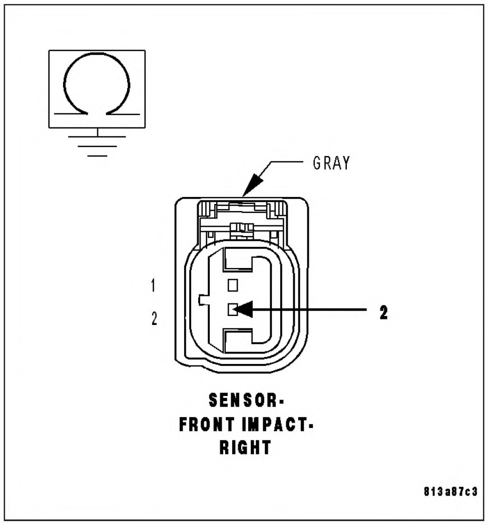
No >> Go To 3

---

3. CHECK THE (R80) FRONT RIGHT IMPACT SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

Measure the resistance of the (R80) Front Right Impact Sensor Signal circuit between the Front Right Impact Sensor connector and ground.



Is the resistance below 100K ohms?

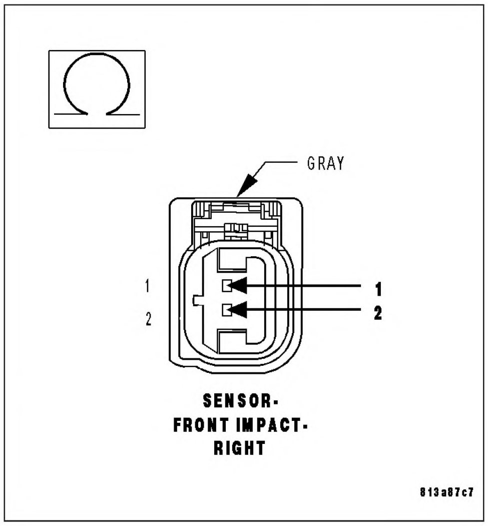
Yes >> Repair the (R80) Front Right Impact Sensor Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR (CONTINUED)

4. CHECK THE (R80, R82) FRONT RIGHT IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R80) Front Right Impact Sensor Signal and (R82) Sensor Ground circuits at the Front Right Impact Sensor connector.


Ω
GRAY
1
2
1
2
SENSOR-
FRONT IMPACT-
RIGHT
813a87c7

Is the resistance below 100K ohms?

Yes >> Repair the (R80, R82) Front Right Impact Sensor circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

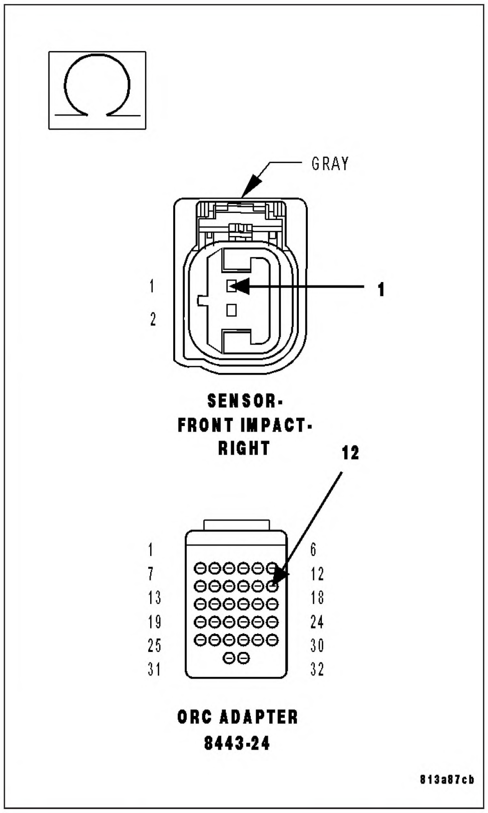
No >> Go To 5

---

5. CHECK THE (R82) FRONT RIGHT IMPACT SENSOR GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R82) Front Right Impact Sensor Ground circuit between the Front Right Impact Sensor connector and the 8443 Load Tool ORC Adaptor.


Ω
GRAY
1
2
1
SENSOR-
FRONT IMPACT-
RIGHT
12
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a87cb

Is the resistance below 1 ohm?

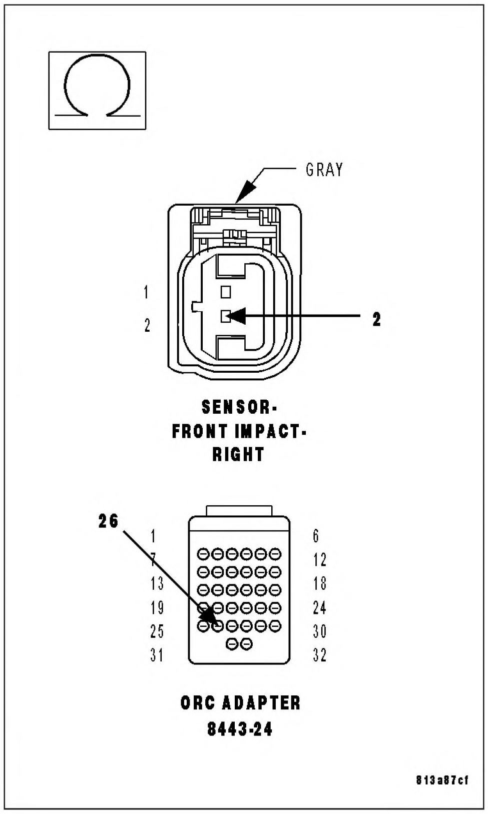
Yes >> Go To 6

No >> Repair the (R82) Front Right Impact Sensor 2 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR (CONTINUED)

6. CHECK THE (R80) FRONT RIGHT IMPACT SENSOR CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R80) Front Right Impact Sensor Signal circuit between the Front Right Impact Sensor connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R80) Front Right Impact Sensor Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE FRONT RIGHT IMPACT SENSOR

Replace the Front Right Impact Sensor.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Front Right Impact Sensor DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

U0171-LOST COMMUNICATION W/UP-FRONT RIGHT SATELLITE ACCELERATION SENSOR (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

View repair

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

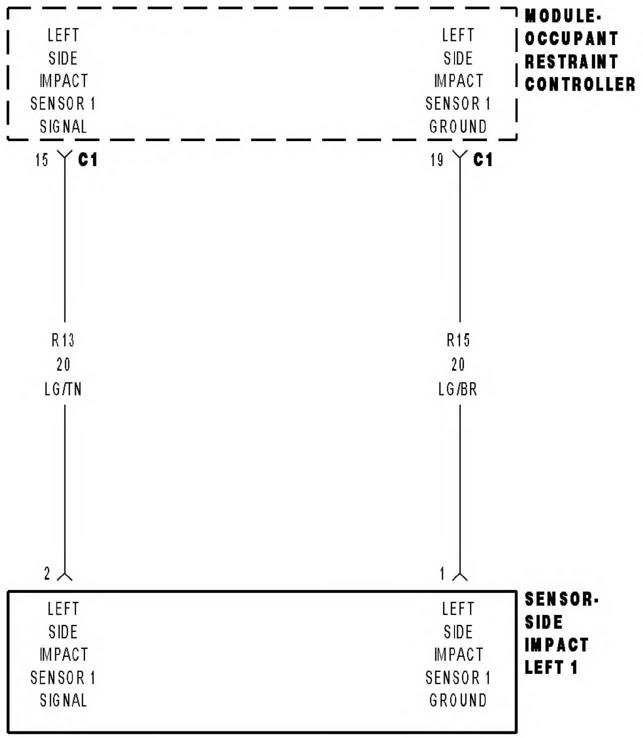
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

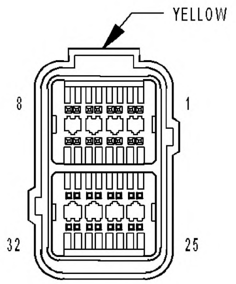
Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

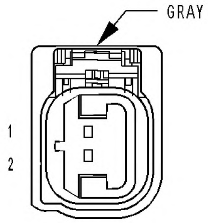
No >> No problem found at this time. Erase all codes before returning vehicle to customer.

U0172-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1


LEFT SIDE IMPACT SENSOR 1 SIGNAL
LEFT SIDE IMPACT SENSOR 1 GROUND
MODULE-OCCUPANT RESTRAINT CONTROLLER
15 C1
19 C1
R13 20 LG/TN
R15 20 LG/BR
2
1
LEFT SIDE IMPACT SENSOR 1 SIGNAL
LEFT SIDE IMPACT SENSOR 1 GROUND
SENSOR-SIDE IMPACT LEFT 1


YELLOW
8
1
32
25

MODULE-OCCUPANT RESTRAINT CONTROLLER C1



SENSOR-SIDE IMPACT-LEFT 1

8133a4ed

U0172-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Left Side Impact Sensor 1 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Left Side Impact Sensor 1 do not establish and maintain valid data communications.

Possible Causes
(R13) SIGNAL CIRCUIT SHORTED TO BATTERY
(R13) SIGNAL CIRCUIT SHORTED TO GROUND
(R13, R15) LEFT SIDE IMPACT SENSOR 1 CIRCUITS SHORTED TOGETHER
(R15) LEFT SIDE IMPACT SENSOR 1 GROUND CIRCUIT OPEN
(R13) LEFT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT OPEN
ORC, LEFT SIDE IMPACT SENSOR 1

Diagnostic Test

1. VERIFY THAT DTC U0172-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1 IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

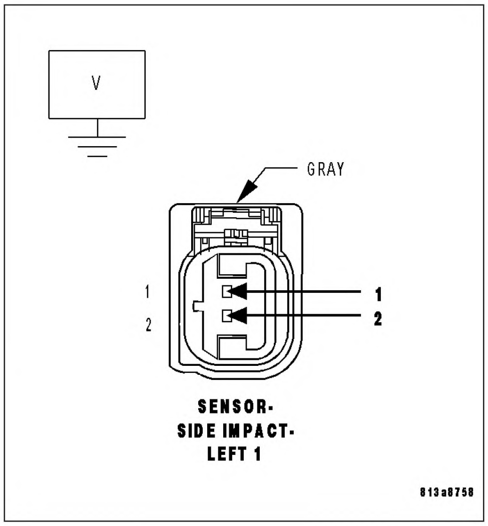
Does the scan tool display active: U0172-LOST COMMUNICATION W/LEFT SIDE IMPACT SENSOR 1?

Yes >> Go To 2

No >> Go To 9

U0172-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

2. CHECK THE (R13, R15) LEFT SIDE IMPACT SENSOR 1 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY



WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Left front Impact Sensor 1 connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R13) Left Side Impact Sensor 1 Signal circuit and (R15) Sensor Ground circuit at the Left Side Impact Sensor 1 connector and ground.

Is there any voltage present?

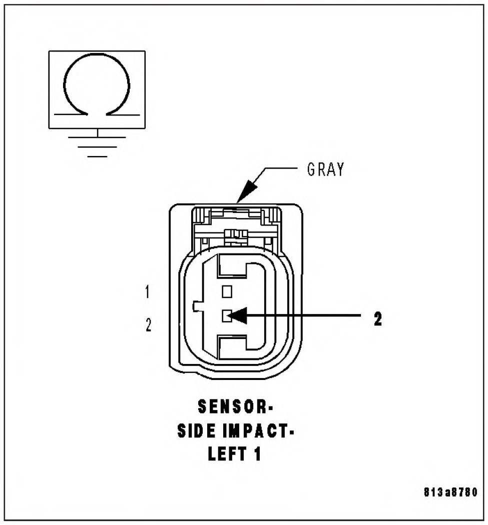
Yes >> Repair the (R13, R15) Left Side Impact Sensor 1 circuits for a short to battery.

Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (R13) LEFT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT FOR A SHORT TO GROUND



WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

Measure the resistance of the (R13) Left Side Impact Sensor 1 Signal circuit between the Left Side Impact Sensor 1 connector and ground.

Is the resistance below 100K ohms?

Yes >> Repair the (R13) Left Side Impact Sensor 1 Signal circuit for a short to ground.

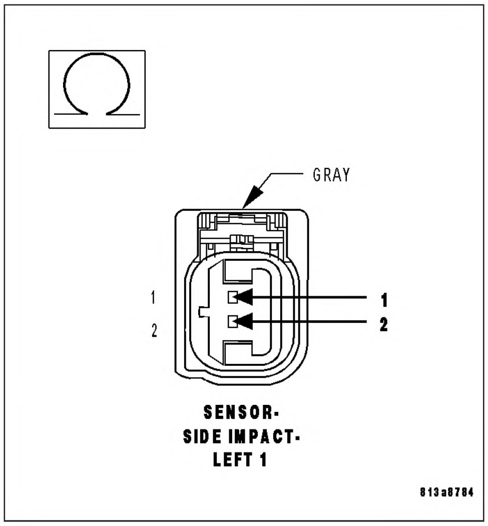
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

U0172-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

4. CHECK THE (R13, R15) LEFT SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R13) Left Side Impact Sensor 1 Signal and (R15) Sensor Ground circuits at the Left Side Impact Sensor 1 connector.


Ω
GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
LEFT 1
813a8784

Is the resistance below 100K ohms?

Yes >> Repair the (R13, R15) Left Side Impact Sensor 1 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

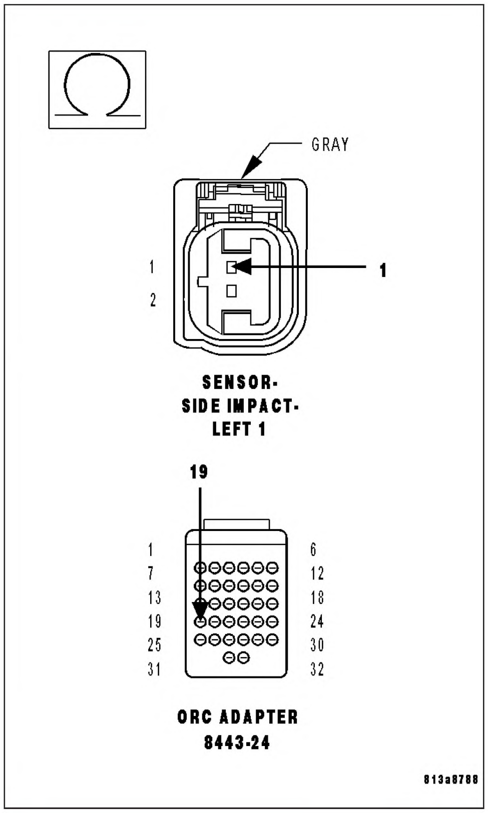
No >> Go To 5

---

5. CHECK THE (R15) LEFT SIDE IMPACT SENSOR 1 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R15) Left Side Impact Sensor 1 Ground circuit between the Left Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.


Ω
GRAY
1
2
1
SENSOR-
SIDE IMPACT-
LEFT 1
19
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a8788

Is the resistance below 1 ohm?

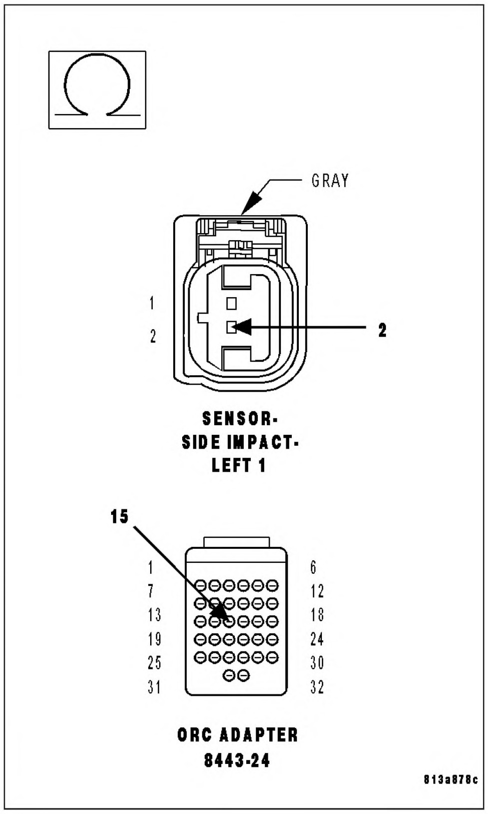
Yes >> Go To 6

No >> Repair the (R15) Left Side Impact Sensor 1 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

U0172-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

6. CHECK THE (R13) LEFT SIDE IMPACT SENSOR 1 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R13) Left Side Impact Sensor 1 Signal circuit between the Left Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R13) Left Side Impact Sensor 1 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE LEFT SIDE IMPACT SENSOR 1

Replace the Left Side Impact Sensor 1.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Left Side Impact Sensor 1 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

U0172-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

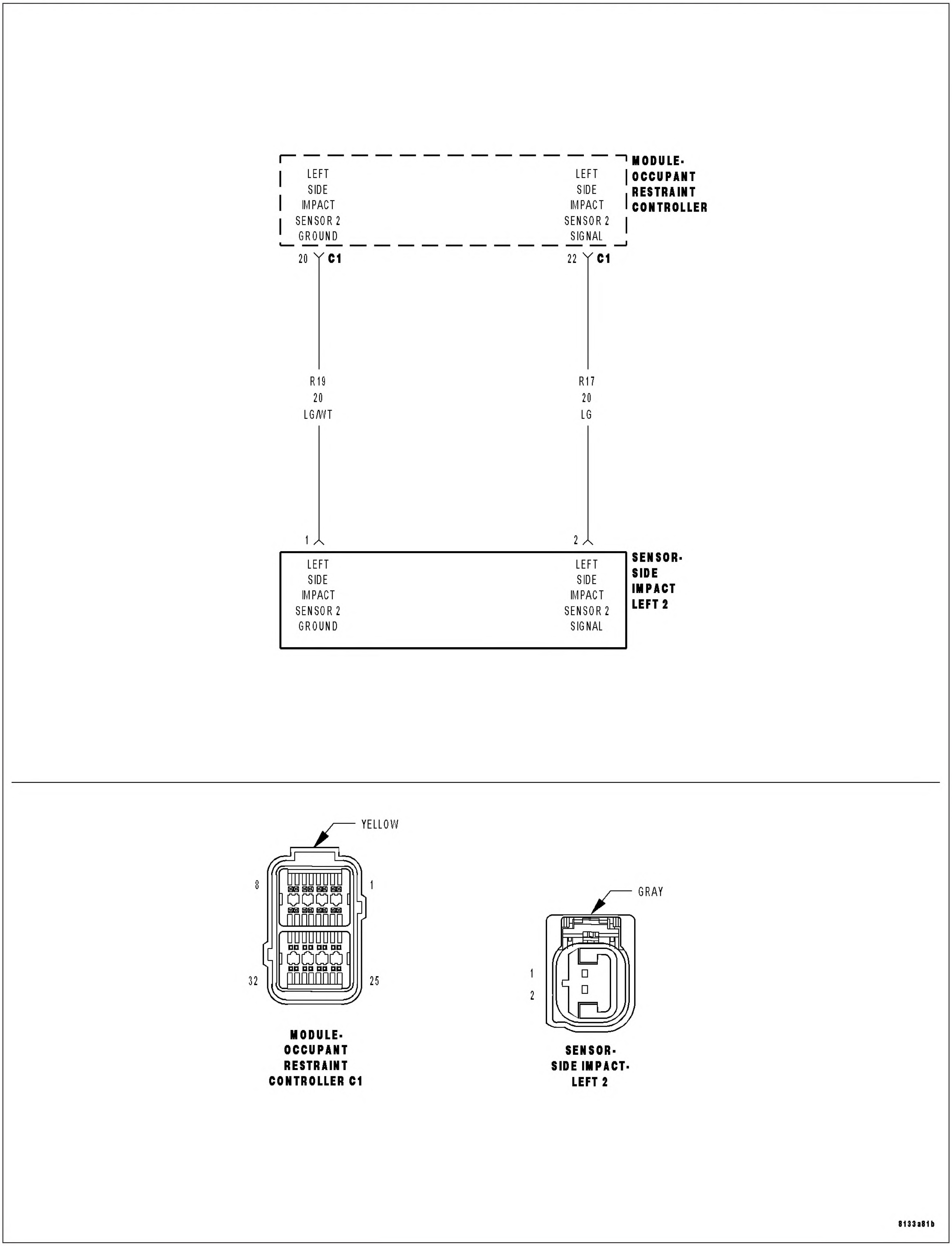
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 2


MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
LEFT SIDE IMPACT SENSOR 2 GROUND
LEFT SIDE IMPACT SENSOR 2 SIGNAL
20 C1
22 C1
R19
20
LG/WT
R17
20
LG
1
2
LEFT SIDE IMPACT SENSOR 2 GROUND
LEFT SIDE IMPACT SENSOR 2 SIGNAL
SENSOR-
SIDE
IMPACT
LEFT 2
YELLOW
8
1
32
25
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C1
GRAY
1
2
SENSOR-
SIDE IMPACT-
LEFT 2
8133a81b

U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Left Side Impact Sensor 2 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Left Side Impact Sensor 2 do not establish and maintain valid data communications.

Possible Causes
(R17) SIGNAL CIRCUIT SHORTED TO BATTERY
(R17) SIGNAL CIRCUIT SHORTED TO GROUND
(R17, R19) LEFT SIDE IMPACT SENSOR 2 CIRCUITS SHORTED TOGETHER
(R19) LEFT SIDE IMPACT SENSOR 2 GROUND CIRCUIT OPEN
(R17) LEFT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT OPEN
ORC, LEFT SIDE IMPACT SENSOR 2

Diagnostic Test

1. VERIFY THAT DTC U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 2 IS ACTIVE

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 1?

Yes >> Go To 2

No >> Go To 9

U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

2. CHECK THE (R17, R19) LEFT SIDE IMPACT SENSOR 2 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Left front Impact Sensor 2 connector.

Disconnect the ORC connector.

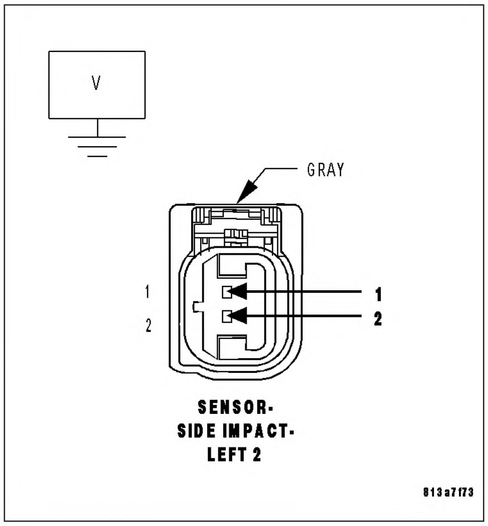
WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R17) Left Side Impact Sensor 2 Signal circuit and (R19) Sensor Ground circuit at the Left Side Impact Sensor 2 connector and ground.

Is there any voltage present?

Yes >> Repair the (R17, R19) Left Side Impact Sensor 2 circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3



---

3. CHECK THE (R17) LEFT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT FOR A SHORT TO GROUND

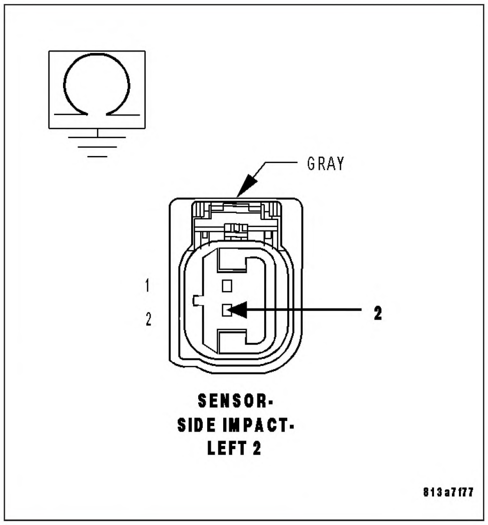
WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

Measure the resistance of the (R17) Left Side Impact Sensor 2 Signal circuit between the Left Side Impact Sensor 2 connector and ground.

Is the resistance below 100K ohms?

Yes >> Repair the (R17) Left Side Impact Sensor 2 Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

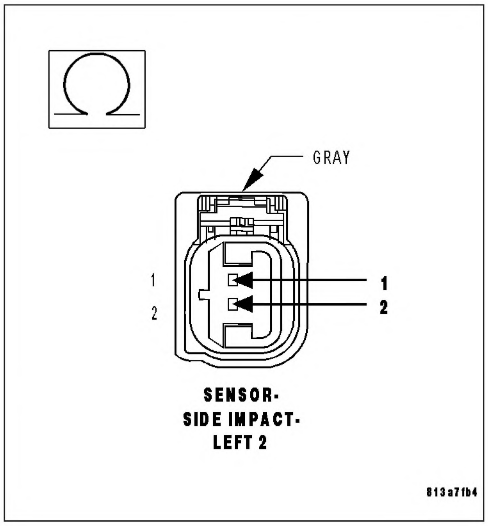
No >> Go To 4



U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

4. CHECK THE (R17, R19) LEFT SIDE IMPACT SENSOR 2 CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R17) Left Side Impact Sensor 2 Signal and (R19) Sensor Ground circuits at the Left Side Impact Sensor 2 connector.


GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
LEFT 2
813a71b4

Is the resistance below 100K ohms?

Yes >> Repair the (R17, R19) Left Side Impact Sensor 2 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

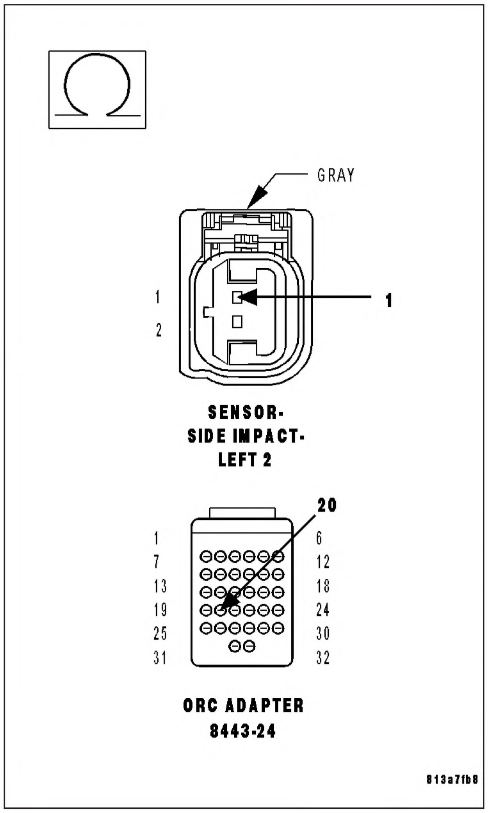
No >> Go To 5

---

5. CHECK THE (R19) LEFT SIDE IMPACT SENSOR 2 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R19) Left Side Impact Sensor 2 Ground circuit between the Left Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
SIDE IMPACT-
LEFT 2
20
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a71b8

Is the resistance below 1 ohm?

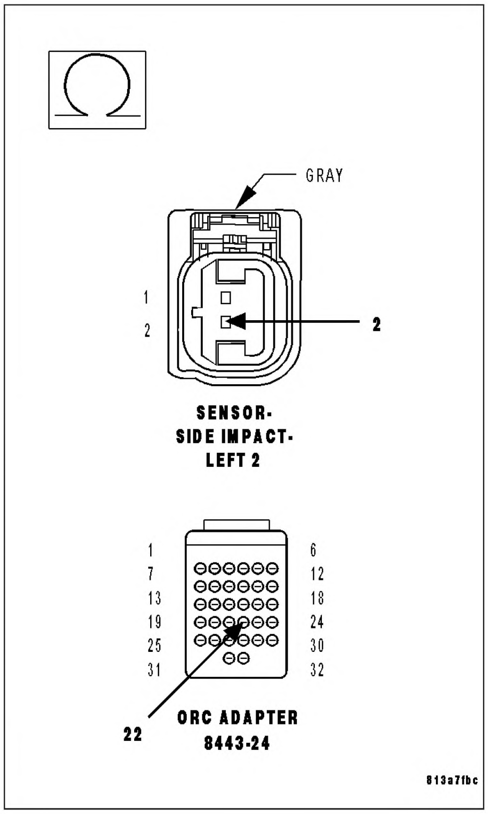
Yes >> Go To 6

No >> Repair the (R19) Left Side Impact Sensor 2 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

6. CHECK THE (R17) LEFT SIDE IMPACT SENSOR 2 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R17) Left Side Impact Sensor 2 Signal circuit between the Left Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R17) Left Side Impact Sensor 2 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE LEFT SIDE IMPACT SENSOR 2

Replace the Left Side Impact Sensor 2.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Left Side Impact Sensor 2 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

U0173-LOST COMMUNICATION W/LEFT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

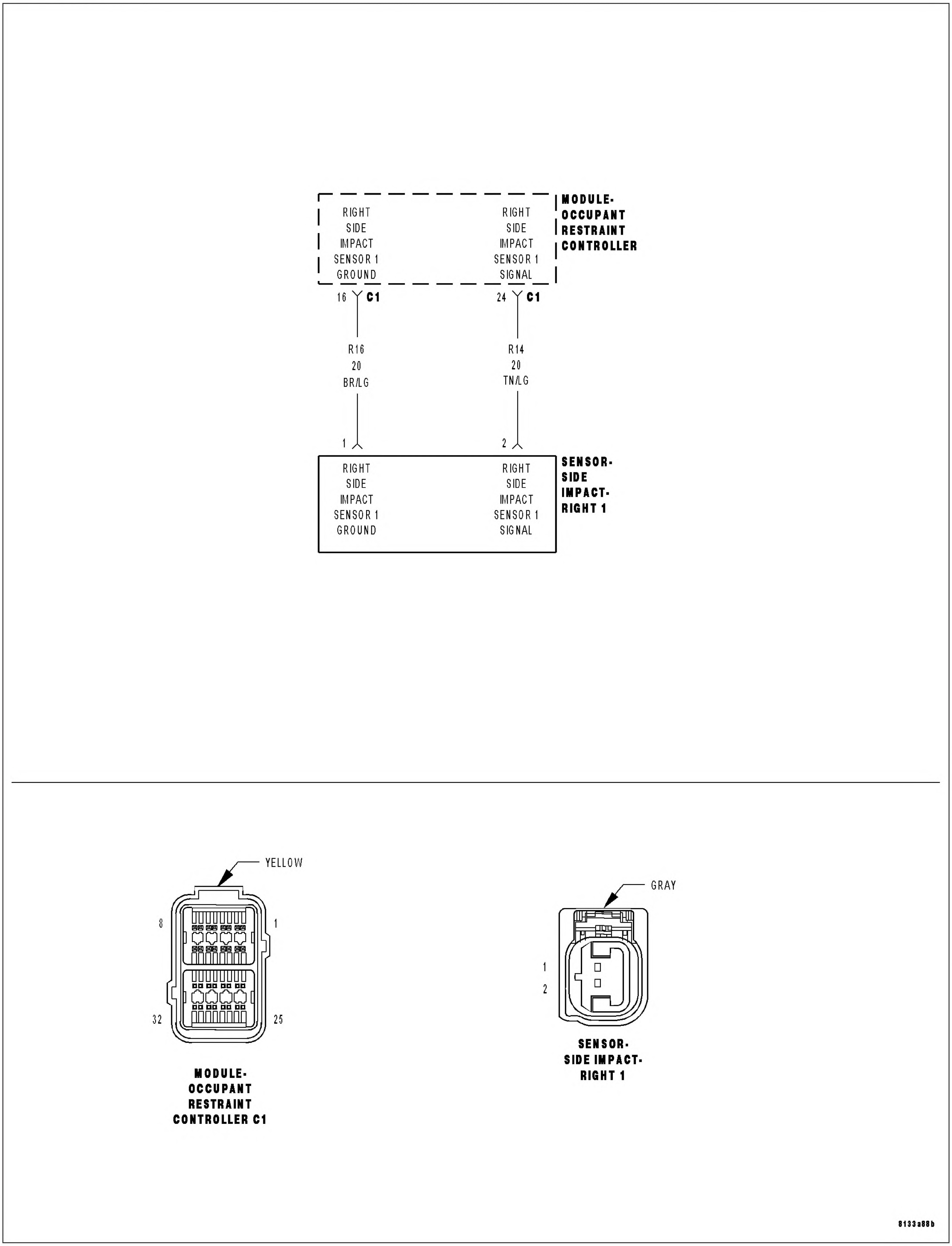
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

U0175-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1


RIGHT SIDE IMPACT SENSOR 1 GROUND
RIGHT SIDE IMPACT SENSOR 1 SIGNAL
MODULE-OCCUPANT RESTRAINT CONTROLLER
16 C1
24 C1
R16 20 BR/LG
R14 20 TN/LG
1
2
RIGHT SIDE IMPACT SENSOR 1 GROUND
RIGHT SIDE IMPACT SENSOR 1 SIGNAL
SENSOR-SIDE IMPACT-RIGHT 1
YELLOW
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C1
GRAY
1
2
SENSOR-SIDE IMPACT-RIGHT 1
8133a88b

U0175-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Right Side Impact Sensor 1 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Right Side Impact Sensor 1 do not establish and maintain valid data communications.

Possible Causes
(R14) SIGNAL CIRCUIT SHORTED TO BATTERY
(R14) SIGNAL CIRCUIT SHORTED TO GROUND
(R14, R16) RIGHT SIDE IMPACT SENSOR 1 CIRCUITS SHORTED TOGETHER
(R16) RIGHT SIDE IMPACT SENSOR 1 GROUND CIRCUIT OPEN
(R14) RIGHT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT OPEN
ORC, RIGHT SIDE IMPACT SENSOR 1

Diagnostic Test

1. VERIFY THAT DTC U0175-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Turn the ignition on.

With the scan tool, read ORC DTCs.

Does the scan tool display active: U0175- LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1?

Yes >> Go To 2

No >> Go To 9

U0175-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

2. CHECK THE (R14, R16) RIGHT SIDE IMPACT SENSOR 1 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Right front Impact Sensor 1 connector.

Disconnect the ORC connector.

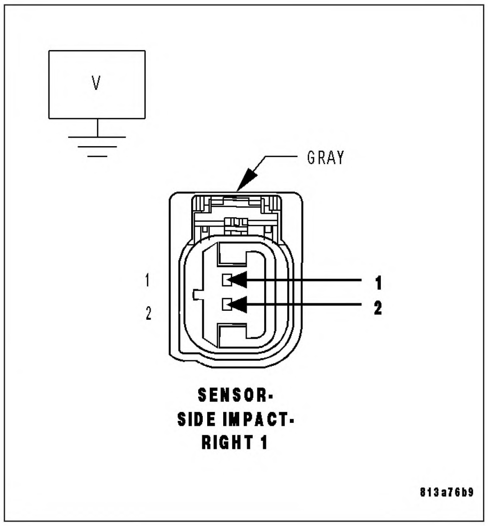
WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R14) Right Side Impact Sensor 1 Signal circuit and (R16) Sensor Ground circuit at the Right Side Impact Sensor 1 connector and ground.

Is there any voltage present?

Yes >> Repair the (R14, R16) Right Side Impact Sensor 1 circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3



---

3. CHECK THE (R14) RIGHT SIDE IMPACT SENSOR 1 SIGNAL CIRCUIT FOR A SHORT TO GROUND

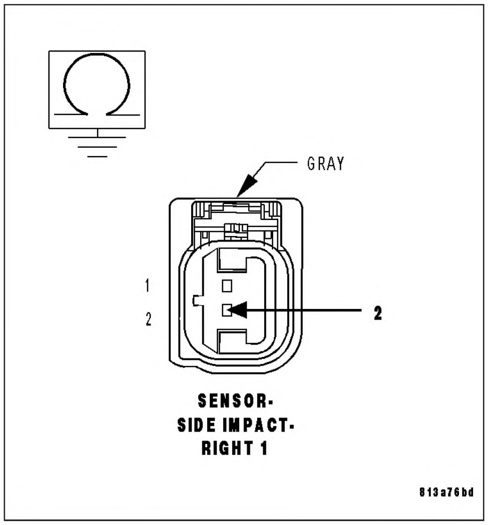
WARNING: To avoid personal injury or death, turn ignition on, then reconnect the battery.

Measure the resistance of the (R14) Right Side Impact Sensor 1 Signal circuit between the Right Side Impact Sensor 1 connector and ground.

Is the resistance below 100K ohms?

Yes >> Repair the (R14) Right Side Impact Sensor 1 Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

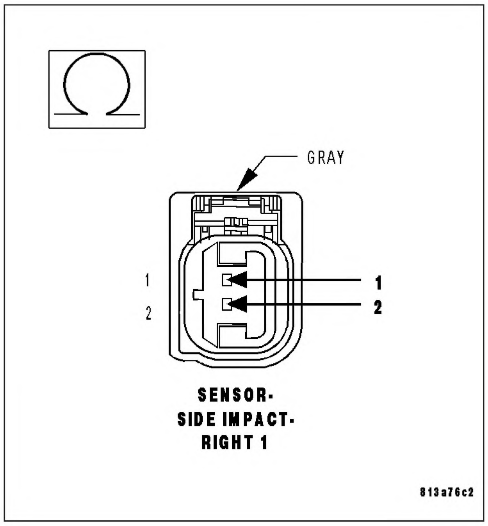
No >> Go To 4



U0175-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

4. CHECK THE (R14, R16) RIGHT SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R14) Right Side Impact Sensor 1 Signal and (R16) Sensor Ground circuits at the Right Side Impact Sensor 1 connector.


GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
RIGHT 1
813a76c2

Is the resistance below 100K ohms?

Yes >> Repair the (R14, R16) Right Side Impact Sensor 1 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

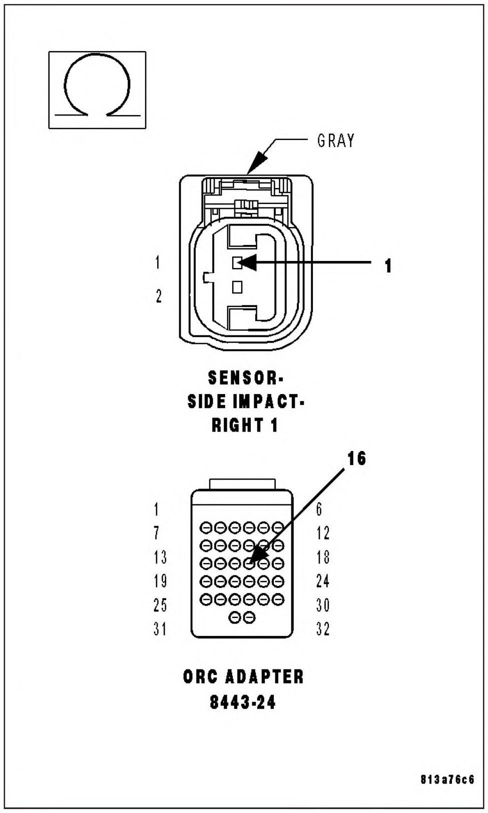
No >> Go To 5

---

5. CHECK THE (R16) RIGHT SIDE IMPACT SENSOR 1 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Control Module connector.

Measure the resistance of the (R16) Right Side Impact Sensor 1 Ground circuit between the Right Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
SIDE IMPACT-
RIGHT 1
16
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a76c6

Is the resistance below 1 ohm?

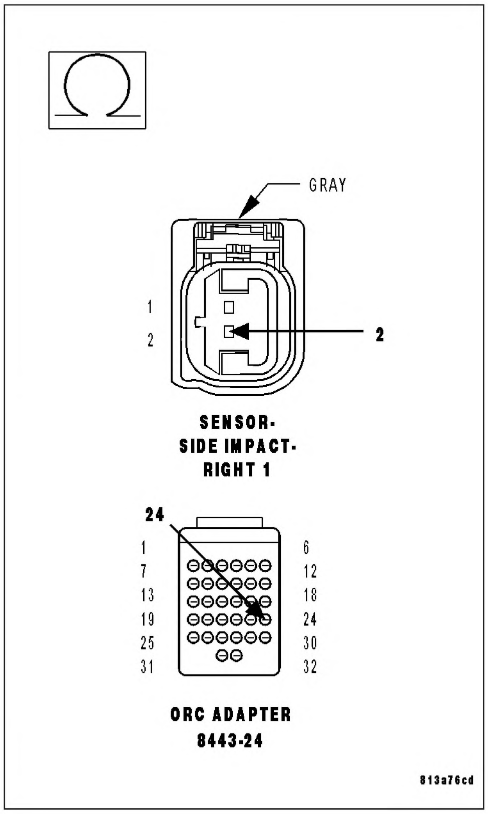
Yes >> Go To 6

No >> Repair the (R16) Right Side Impact Sensor 1 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

U0175-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

6. CHECK THE (R14) RIGHT SIDE IMPACT SENSOR 1 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R14) Right Side Impact Sensor 1 Signal circuit between the Right Side Impact Sensor 1 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R14) Right Side Impact Sensor 1 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE RIGHT SIDE IMPACT SENSOR 1

Replace the Right Side Impact Sensor 1.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Right Side Impact Sensor 1 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

U0175-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 1 (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions could result in accidental airbag deployment and personal injury or death.

If there are no possible causes remaining, view repair.

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR AN INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

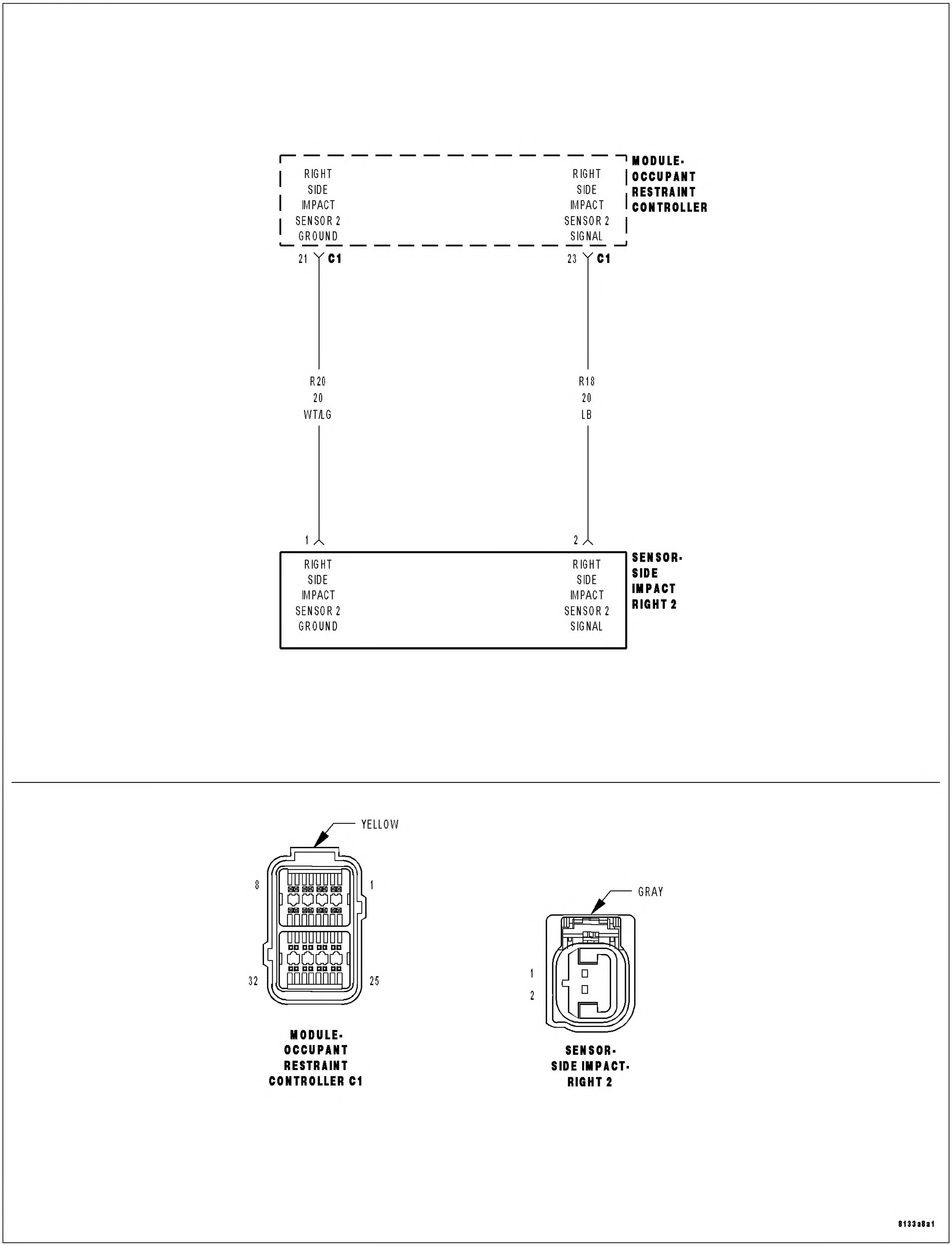
In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2


MODULE-OCCUPANT RESTRAINT CONTROLLER
RIGHT SIDE IMPACT SENSOR 2 GROUND
RIGHT SIDE IMPACT SENSOR 2 SIGNAL
21 C1
23 C1
R20 20 WT/LG
R18 20 LB
1
2
SENSOR-SIDE IMPACT RIGHT 2
RIGHT SIDE IMPACT SENSOR 2 GROUND
RIGHT SIDE IMPACT SENSOR 2 SIGNAL
YELLOW
8
1
32
25
MODULE-OCCUPANT RESTRAINT CONTROLLER C1
GRAY
1
2
SENSOR-SIDE IMPACT-RIGHT 2
8133a8a1

U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

For the Airbag System circuit diagram (Refer to 8 - ELECTRICAL/RESTRAINTS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The Occupant Restraint Controller (ORC) continuously communicates with the Right Side Impact Sensor 2 over the sensor signal circuit. The sensor communication and on board diagnostics are powered by the ORC signal.
- **Set Condition:**
  This code will set, if the ORC and the Right Side Impact Sensor 2 do not establish and maintain valid data communications.

Possible Causes
(R18) SIGNAL CIRCUIT SHORTED TO BATTERY
(R18) SIGNAL CIRCUIT SHORTED TO GROUND
(R18, R20) RIGHT SIDE IMPACT SENSOR 2 CIRCUITS SHORTED TOGETHER
(R20) RIGHT SIDE IMPACT SENSOR 2 GROUND CIRCUIT OPEN
(R18) RIGHT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT OPEN
ORC, RIGHT SIDE IMPACT SENSOR 2

Diagnostic Test

1. VERIFY ACTIVE DTC U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2

Turn the ignition on.

With the scan tool, read ORC DTCs.

NOTE: Ensure the battery is fully charged.

NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.

Does the scan tool display an active: U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2?

Yes >> Go To 2

No >> Go To 9

U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

2. CHECK THE (R18, R20) RIGHT SIDE IMPACT SENSOR 2 SIGNAL AND GROUND CIRCUITS FOR A SHORT TO BATTERY

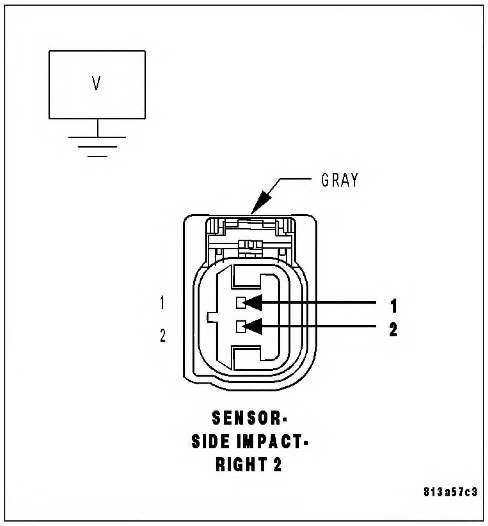
WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Disconnect the Right front Impact Sensor 2 connector.

Disconnect the ORC connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Measure the voltage of the (R18) Right Side Impact Sensor 2 Signal circuit and (R20) Sensor Ground circuit at the Right Side Impact Sensor 2 connector and ground.



Is there any voltage present?

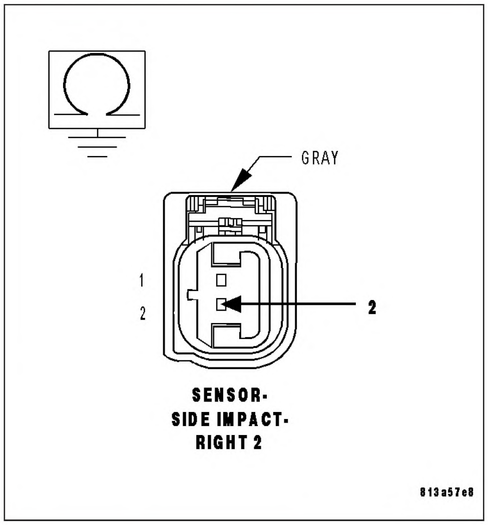
Yes >> Repair the (R18, R20) Right Side Impact Sensor 2 circuits for a short to battery.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (R18) RIGHT SIDE IMPACT SENSOR 2 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance of the (R18) Right Side Impact Sensor 2 Signal circuit between the Right Side Impact Sensor 2 connector and ground.



Is the resistance below 100K ohms?

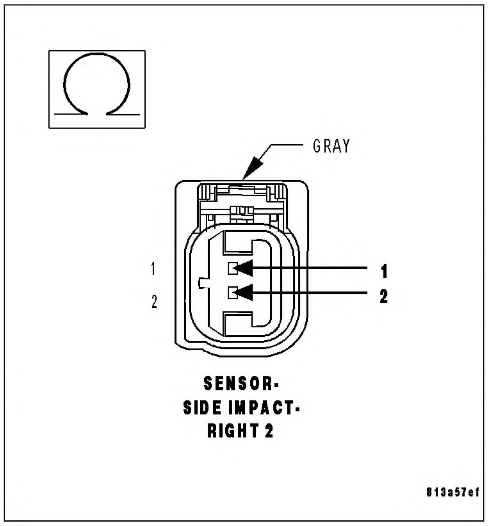
Yes >> Repair the (R18) Right Side Impact Sensor 2 Signal circuit for a short to ground.
Perform the ORC VERIFICATION TEST - VER 1.

No >> Go To 4

U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

4. CHECK THE (R18, R20) RIGHT SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure the resistance between the (R18) Right Side Impact Sensor 2 Signal and (R20) Sensor Ground circuits at the Right Side Impact Sensor 2 connector.


GRAY
1
2
1
2
SENSOR-
SIDE IMPACT-
RIGHT 2
813a57e1

Is the resistance below 100K ohms?

Yes >> Repair the (R18, R20) Right Side Impact Sensor 2 circuits shorted together.
Perform the ORC VERIFICATION TEST - VER 1.

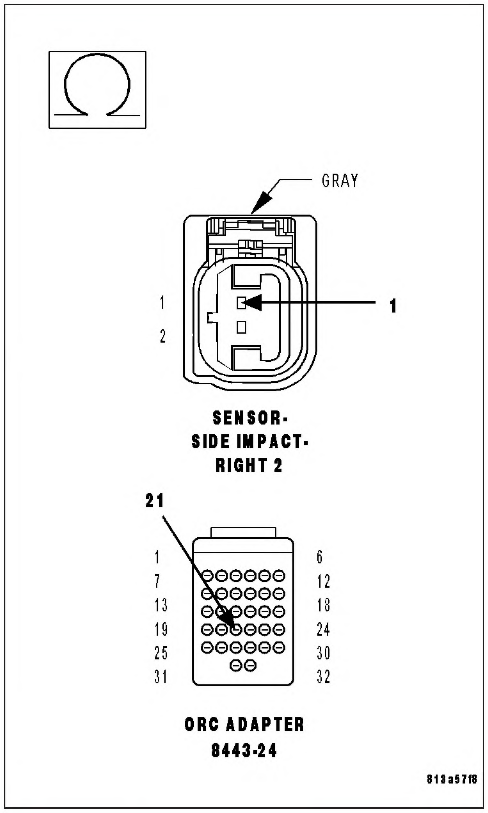
No >> Go To 5

---

5. CHECK THE (R18) RIGHT SIDE IMPACT SENSOR 2 GROUND CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Connect the 8443 Load Tool ORC Adaptor to the Occupant Restraint Controller C2 connector.

Measure the resistance of the (R20) Right Side Impact Sensor 2 Ground circuit between the Right Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.


GRAY
1
2
1
SENSOR-
SIDE IMPACT-
RIGHT 2
21
1
7
13
19
25
31
6
12
18
24
30
32
ORC ADAPTER
8443-24
813a57f8

Is the resistance below 1 ohm?

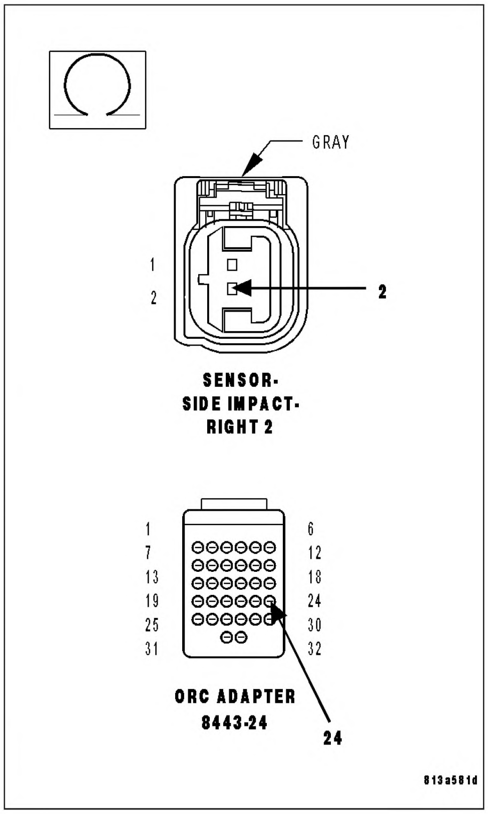
Yes >> Go To 6

No >> Repair the (R20) Right Side Impact Sensor 2 Ground circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

6. CHECK THE (R18) RIGHT SIDE IMPACT SENSOR 2 CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

Measure the resistance of the (R18) Right Side Impact Sensor 2 Signal circuit between the Right Side Impact Sensor 2 connector and the 8443 Load Tool ORC Adaptor.



Is the resistance below 1 ohm?

Yes >> Go To 7

No >> Repair the (R18) Right Side Impact Sensor 2 Signal circuit for an open or high resistance.
Perform the ORC VERIFICATION TEST - VER 1.

---

7. CHECK OPERATION OF THE RIGHT SIDE IMPACT SENSOR 2

Replace the Right Side Impact Sensor 2.

Reconnect the vehicle body harness to the impact sensor.

Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

Connect the scan tool to the Data Link Connector - use the most current software available.

Use the scan tool and erase the stored codes in all airbag system modules.

Turn the Ignition Off, and wait 15 seconds before turning the Ignition On.

Wait one minute, and read active codes and if there are none present read the stored codes.

Did the active Right Side Impact Sensor 2 DTC return?

Yes >> Go To 8

No >> Repair is complete.
Perform the ORC VERIFICATION TEST - VER 1.

U0176-LOST COMMUNICATION W/RIGHT SIDE SATELLITE ACCELERATION SENSOR 2 (CONTINUED)

8. REPLACE THE OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the airbag control module is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.

View Repair

Repair

Replace the Occupant Restraint Controller in accordance with Service Instructions.

Perform the ORC VERIFICATION TEST - VER 1.

---

9. TEST FOR INTERMITTENT CONDITION

With the scan tool, record and erase all DTC's from all Airbag modules.

If any ACTIVE codes are present they must be resolved before diagnosing any stored codes.

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

Look for chaffed, pierced, pinched, or partially broken wires and broken, bent, pushed out, spread, corroded, or contaminated terminals.

The following additional checks may assist you in identifying a possible intermittent problem.

Reconnect any disconnected components and harness connector.

WARNING: To avoid personal injury or death, turn the ignition on, then reconnect the battery.

With the scan tool monitor active codes as you work through the following steps.

WARNING: To avoid personal injury or death, maintain a safe distance from all airbags while performing the following steps.

Wiggle the wiring harness and connectors of the related airbag circuit or component.

If codes are related to the Driver Airbag circuits, rotate the steering wheel from stop to stop.

If only stored codes return continue the test until the problem area has been isolated.

In the previous steps you have attempted to recreate the conditions responsible for setting active DTC in question.

Are any ACTIVE DTCs present?

Yes >> Select the appropriate symptom from Symptom List.

No >> No problem found at this time. Erase all codes before returning vehicle to customer.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE PHONE MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U1414-IMPLAUSIBLE/MISSING ECU CONFIGURATION DATA

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The ORC on board diagnostics continuously monitors the CAN Bus message from the FCM containing the ORC Configuration Data.
- **Set Condition:**
  This DTC will set if the appropriate CAN Bus message is not received by the ORC.

Possible Causes
FRONT CONTROL MODULE

Diagnostic Test

1. FRONT CONTROL MODULE FAILURE

Turn the ignition on.

With the scan tool, read FCM DTCs.

Does the scan tool display any Front Control Module DTCs?

Yes >> Select appropriate symptom from Symptom List. Repair all FCM active DTCs and before diagnosing the ORC DTCs.

No >> Replace the Front Control Module in accordance with the Service Information.
Perform the ORC VERIFICATION TEST-VER. 1

U1415-IMPLAUSIBLE/MISSING VEHICLE CONFIGURATION DATA

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. The ORC on board diagnostics loads the ORC Configuration Data from the FCM CAN Bus message.
- **Set Condition:**
  This DTC will set if the CAN Bus message was received but the information is invalid or corrupt.

Possible Causes
OCCUPANT RESTRAINT CONTROLLER (ORC)

Diagnostic Test

1. OCCUPANT RESTRAINT CONTROLLER

WARNING: To avoid personal injury or death, turn the ignition off, disconnect the battery and wait two minutes before proceeding.

WARNING: If the Occupant Restraint Controller is dropped at any time, it must be replaced. Failure to take the proper precautions can result in accidental airbag deployment and personal injury or death.
Disconnect the ORC harness connector(s).

NOTE: Check connectors - Clean and repair as necessary.

NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.

Repair

Replace the Occupant Restraint Controller in accordance with Service Information.Perform the ORC VERIFICATION TEST-VER. 1

U0212-LOST COMMUNICATION WITH SCM - CAN-B

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

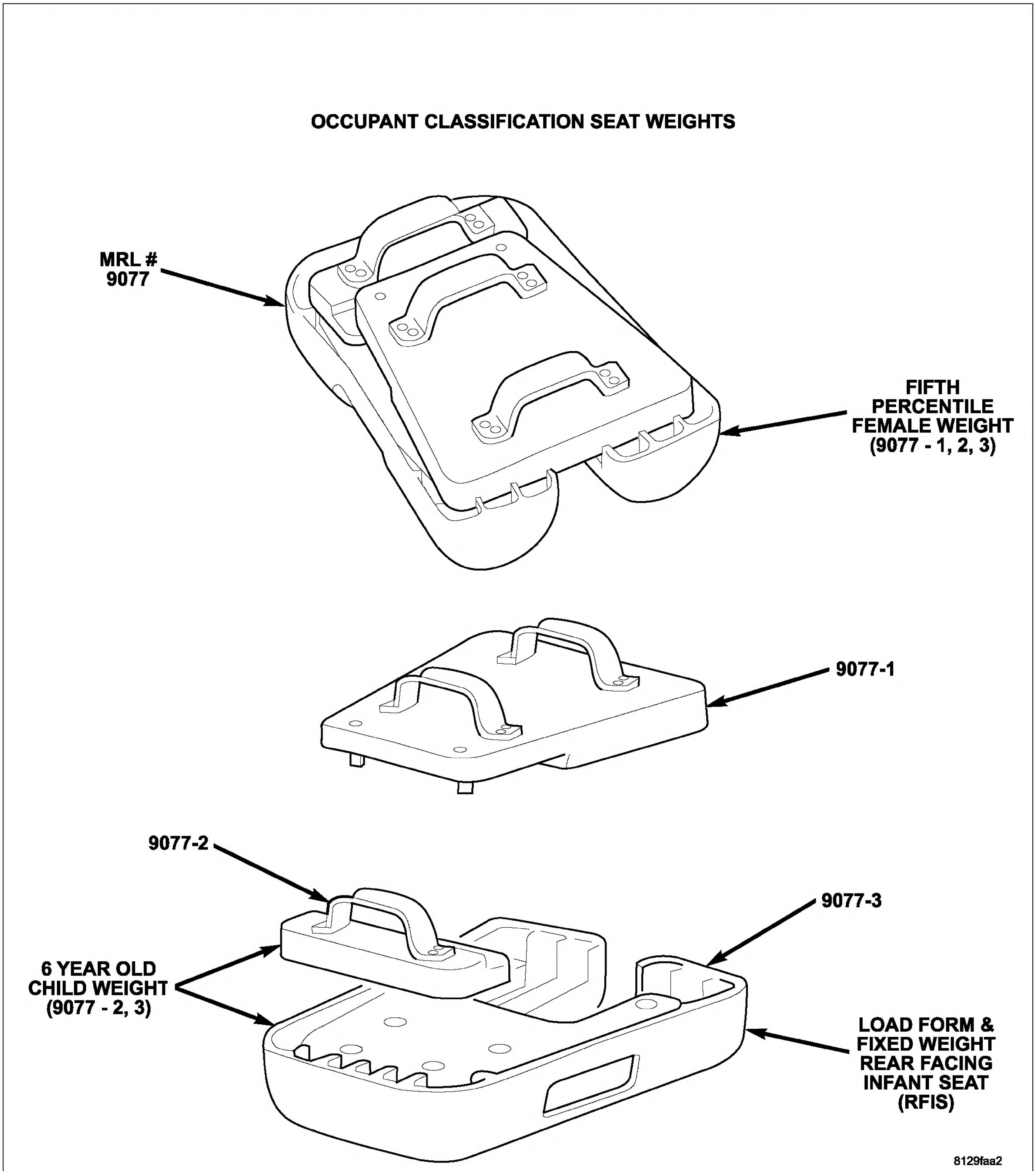
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

*DIAGNOSIS AND CHECKOUT PROCEDURE FOR SEAT WEIGHT SENSORS


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

OCS SEAT WEIGHTS MRL #9077

*DIAGNOSIS AND CHECKOUT PROCEDURE FOR SEAT WEIGHT SENSORS (CONTINUED)

1. VERIFY COMPLAINT

Turn the ignition off.

Move the front passenger seat to the full rear position. Verify that the seat is empty, the seat back is in the normal upright position, and that the seat is not interfering with any interior components.

Verify that all related connectors are properly seated and locked.

Turn the ignition on.

With the scan tool in OCM, select Data Display and note the Passenger Seat Weight Sensor voltage for all four sensors (Left Front, Right Front, Left Rear and Right Rear).

Move the front passenger seat to the mid track position.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors.

Move the front passenger seat to the full forward position.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors. The voltage should be from 1.4 to 3.6 volts for each sensor in each position (full rear, mid track, and full forward).

Is any sensor’s voltage reading out of the acceptable range in any position?

Yes >> Go To 2

No >> Perform test B1BA7 Occupant Classification System Verification Required. If the test passes, the seat weight sensing system is working properly. Return to the procedure that directed you to this procedure.

---

2. CHECKING FOR BENT FLOOR PAN

Turn the ignition off.

Loosen all of the mounting screws retaining the front passenger seat to the vehicle crossmembers, but do not remove them. Verify that the seat is loose and that no binding exists between the seat and the crossmembers.

Move the front passenger seat to the full rear position and then to the full forward position.

Tighten all of the mounting screws to specification. Refer to 23 - BODY/SEATS.

Move the front passenger seat to the full rear position.

Turn the ignition on.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors.

Move the front passenger seat to the mid track position.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors.

Move the front passenger seat to the full forward position.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors. The voltage should be from 1.4 to 3.6 volts for each sensor in each position.

Is any sensor’s voltage reading out of the acceptable range in any position?

Yes >> Go To 3

No >> Perform test B1BA7 Occupant Classification System Verification Required. If the test passes, the seat weight sensing system is working properly. Return to the procedure that directed you to this procedure.

---

*DIAGNOSIS AND CHECKOUT PROCEDURE FOR SEAT WEIGHT SENSORS (CONTINUED)

3. CHECKING SEAT TO RISER STRESS

Turn the ignition off.

Loosen all of the mounting screws retaining the front passenger seat track to the riser, but do not remove them. Verify that the seat track is loose and that no binding exists between the seat track and the risers.

Turn the ignition on.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors. The voltage should be from 1.5 to 3.5 volts for each sensor.

Is any sensor's voltage reading out of the acceptable range?

Yes >> Go To 4

No >> Visually inspect for damaged or bent risers and crossmembers. Also, verify that the riser holes line up with the seat mounts in the crossmembers.

If riser damage is apparent, replace the risers in accordance with the Service Information. Then, reinstall the Seat Weight Sensors, and Go To 6.

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

If crossmember or floorpan damage is present, repair or replace the components as necessary in accordance with the Service Information. Reinstall the seat in the vehicle in accordance with the Service Information. Turn the ignition on. With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the directions displayed on the scan tool. When the test is complete, Go To 1.

---

4. TEST SEAT FRAME

Turn the ignition off.

Remove the front passenger seat from the risers in accordance with the Service Information. Return the risers to their normal mounting position.

Turn the ignition on.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors. The voltage should be from 1.4 to 3.6 volts for each sensor.

Is any sensor's voltage reading out of the acceptable range?

Yes >> Go To 5

No >> Visually inspect for damaged or bent risers, a damaged or bent seat and seat structure, and damaged or bent seat tracks. Also, verify that the holes in the center of the sensors line up with the seat track holes and that the seat track position locating tabs are locked in the same parallel slots. If riser damage is apparent, replace the risers in accordance with the Service Information. Then, reinstall the Seat Weight Sensors, and Go To 6.

If seat or seat track damage is present, replace the components as necessary in accordance with the Service Information. Then, Go To 7

---

*DIAGNOSIS AND CHECKOUT PROCEDURE FOR SEAT WEIGHT SENSORS (CONTINUED)

5. TEST SENSOR

Turn the ignition off.

Loosen the mounting screws of all of the Seat Weight Sensors, but do not remove them. Verify that the sensors are loose and that no binding exists between the sensors and the risers.

Turn the ignition on.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors. The voltage should be from 1.4 to 3.6 volts for each sensor.

Is any sensor's voltage reading out of the acceptable range?

Yes >> Replace any Seat Weight Sensors that have an unacceptable voltage reading in accordance with the Service Information. Then, Go To 6.

No >> Replace the risers in accordance with the Service Information. Then, reinstall the Seat Weight Sensors, and Go To 6

---

6. CHECKING FOR IMPROPER SEAT WEIGHT SENSOR TORQUE

Turn the ignition off.

Tighten all of the Seat Weight Sensor mounting screws to specification. Refer to 23 - BODY/SEATS.

Turn the ignition on.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors. The voltage should be from 1.4 to 3.6 volts for each sensor.

Is any sensor's voltage reading out of the acceptable range?

Yes >> Loosen the mounting screws of all Seat Weight Sensors with an unacceptable voltage reading, and repeat Steps 5 and 6.

No >> Go To 7

---

7. TEST SEAT TRACKS

Turn the ignition off.

Mount the front passenger seat on the risers in accordance with service information.

Turn the ignition on.

Using the scan tool, note the Passenger Seat Weight Sensor voltage for all four sensors. The voltage should be from 1.4 to 3.6 volts for each sensor.

Is any sensor's voltage reading out of the acceptable range?

Yes >> Replace the seat track in accordance with the Service Information. Verify that no binding exists between the seat and risers. Then, repeat Steps 6 and 7.

No >>

NOTE: Failure to follow test instructions or aborting the test will cause faults to set when performing the Occupant Classification Module System Verification Test. To prevent faults due to process errors: Verify That All Tests Steps That Led You Here Were Performed As Directed; Verify That The Ignition Is In Run; Wait 30 Seconds After Changing The Seat Weight Before Proceeding To Allow The System To Stabilize; Only Press Scan Tool Buttons When Directed To Do So; & Perform The Occupant Classification Module System Verification Test To Completion.

Reinstall the seat in the vehicle in accordance with the Service Information. Turn the ignition on. With the scan tool in OCM, select More Options, select System Tests, and select Occupant Classification Module System Verification Test. Run the test by following the instructions displayed by the scan tool. When the test is complete, Go To 1

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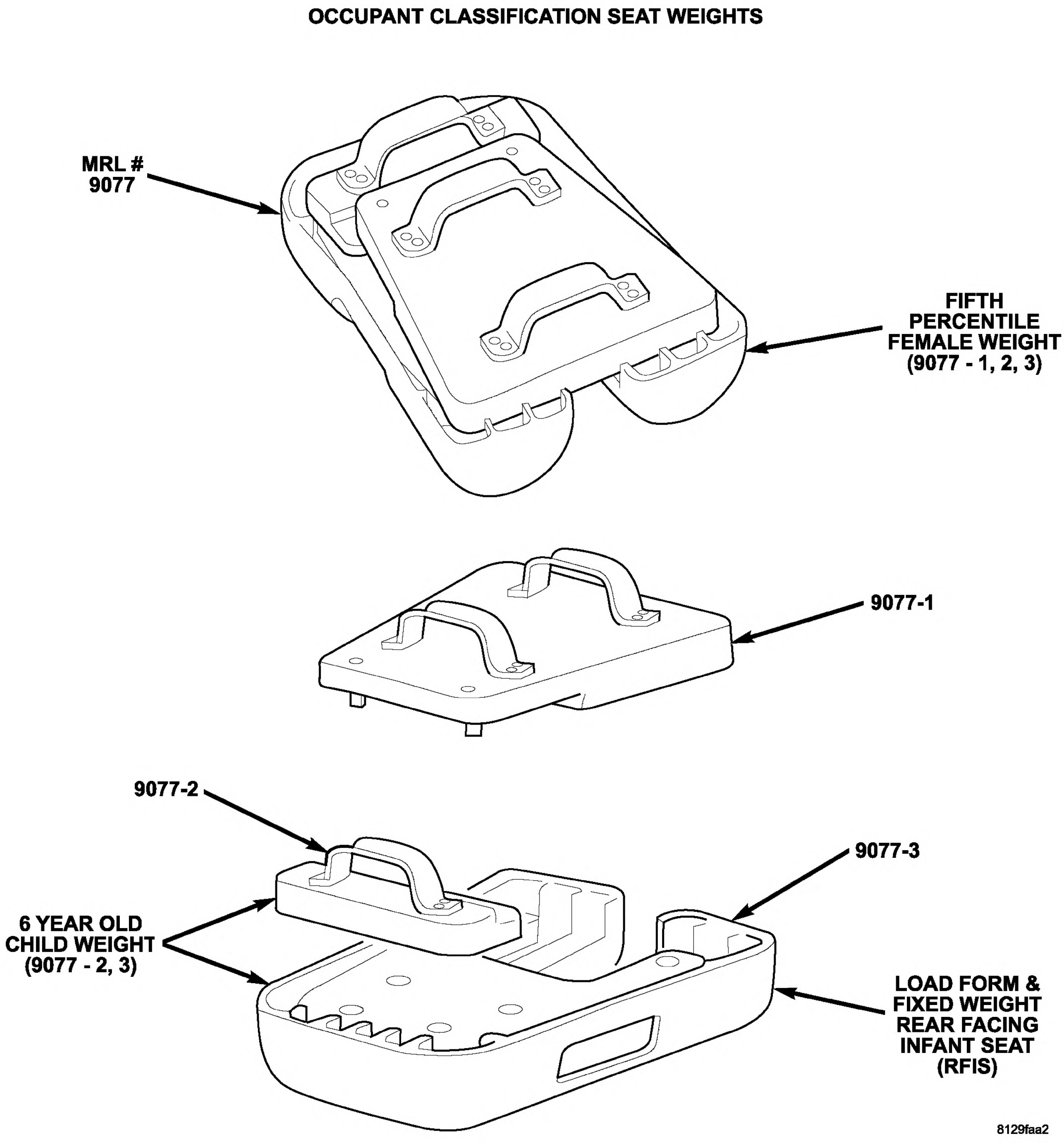
*OCS VERIFICATION TEST - VER 1


OCCUPANT CLASSIFICATION SEAT WEIGHTS
MRL # 9077
FIFTH PERCENTILE FEMALE WEIGHT (9077 - 1, 2, 3)
9077-1
9077-2
9077-3
6 YEAR OLD CHILD WEIGHT (9077 - 2, 3)
LOAD FORM & FIXED WEIGHT REAR FACING INFANT SEAT (RFIS)
8129faa2

*OCS VERIFICATION TEST - VER 1 (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

1. *OCS VERIFICATION TEST - VER 1

1. Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: TO AVOID PERSONAL INJURY OR DEATH, TURN THE IGNITION ON THEN RECONNECT THE BATTERY.

2. Connect the scan tool to the Data Link Connector - use the most current software available.
3. With the scan tool to erase stored DTCs in all airbag system modules.
4. Turn the ignition off, and wait 15 seconds, then turn the ignition on.
5. Wait one minute, and read active codes and if there are none present read the stored codes.
6. Note: Read the DTC's in all airbag system related modules.
7. If the scan tool shows any active or stored codes, return to the Table of Content and follow path specified for that trouble code. If no active or stored codes are present, the repair is complete.

Are any DTC's present or is the original condition still present?

Yes >> Repair is not complete, refer to appropriate symptom list.

No >> Repair is complete.

*ORC VERIFICATION TEST - VER 1

For a complete wiring diagram **Refer to Section 8W**.

1. *ORC VERIFICATION TEST - VER 1

1. Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery.

WARNING: TO AVOID PERSONAL INJURY OR DEATH, TURN THE IGNITION ON THEN RECONNECT THE BATTERY.

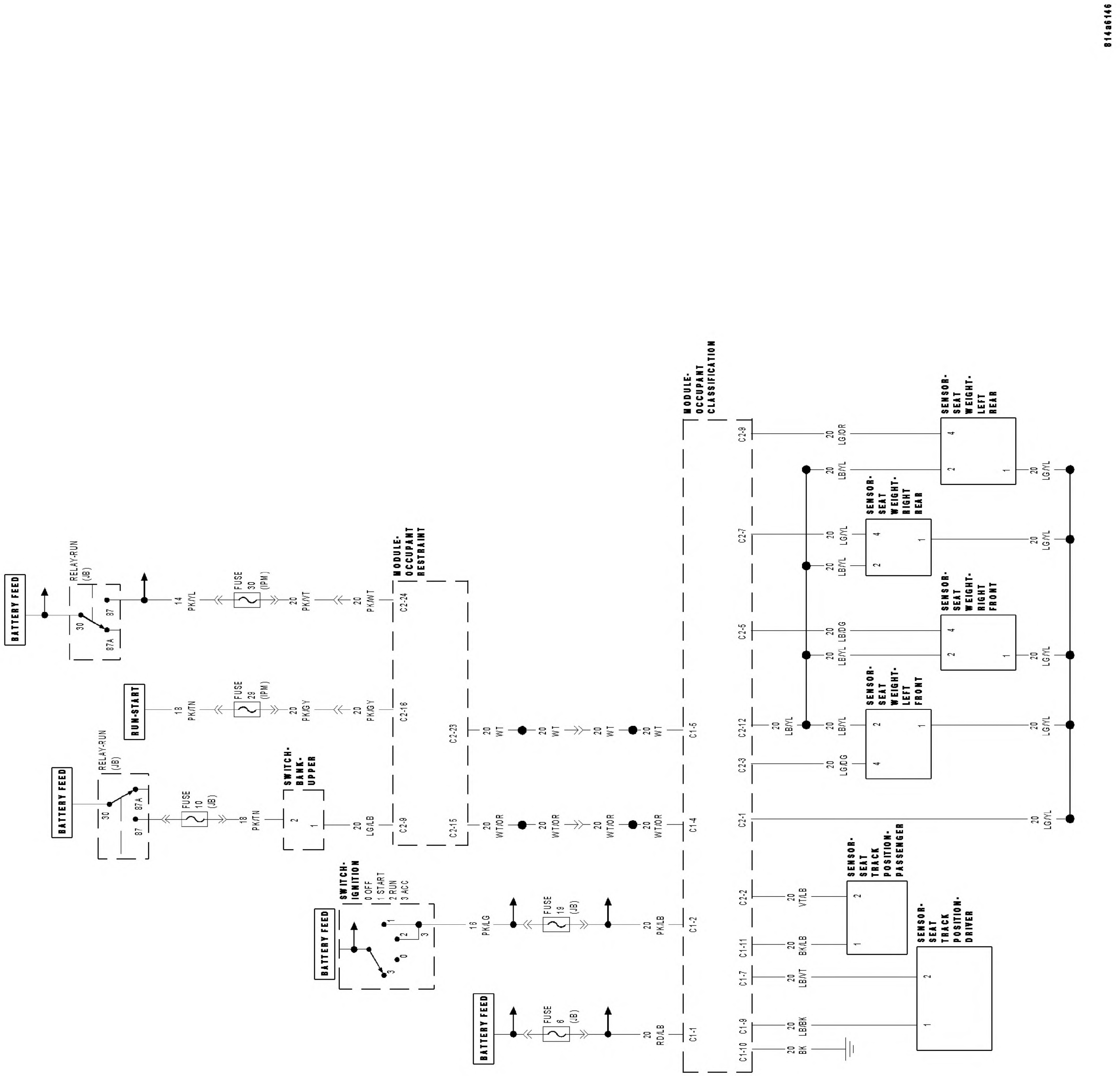
2. Connect the scan tool to the Data Link Connector - use the most current software available.
3. With the scan tool to erase stored DTCs in all airbag system modules.
4. Turn the ignition off, and wait 15 seconds, then turn the ignition on.
5. Wait one minute, and read active codes and if there are none present read the stored codes.
6. Note: If equipped with Airbag On - Off switch, read the DTC's in all switch positions.
7. Note: Read the DTC's in all airbag system related modules.
8. If the scan tool shows any active or stored codes, return to the Table of Contents and follow path specified for that trouble code. If no active or stored codes are present, the repair is complete.

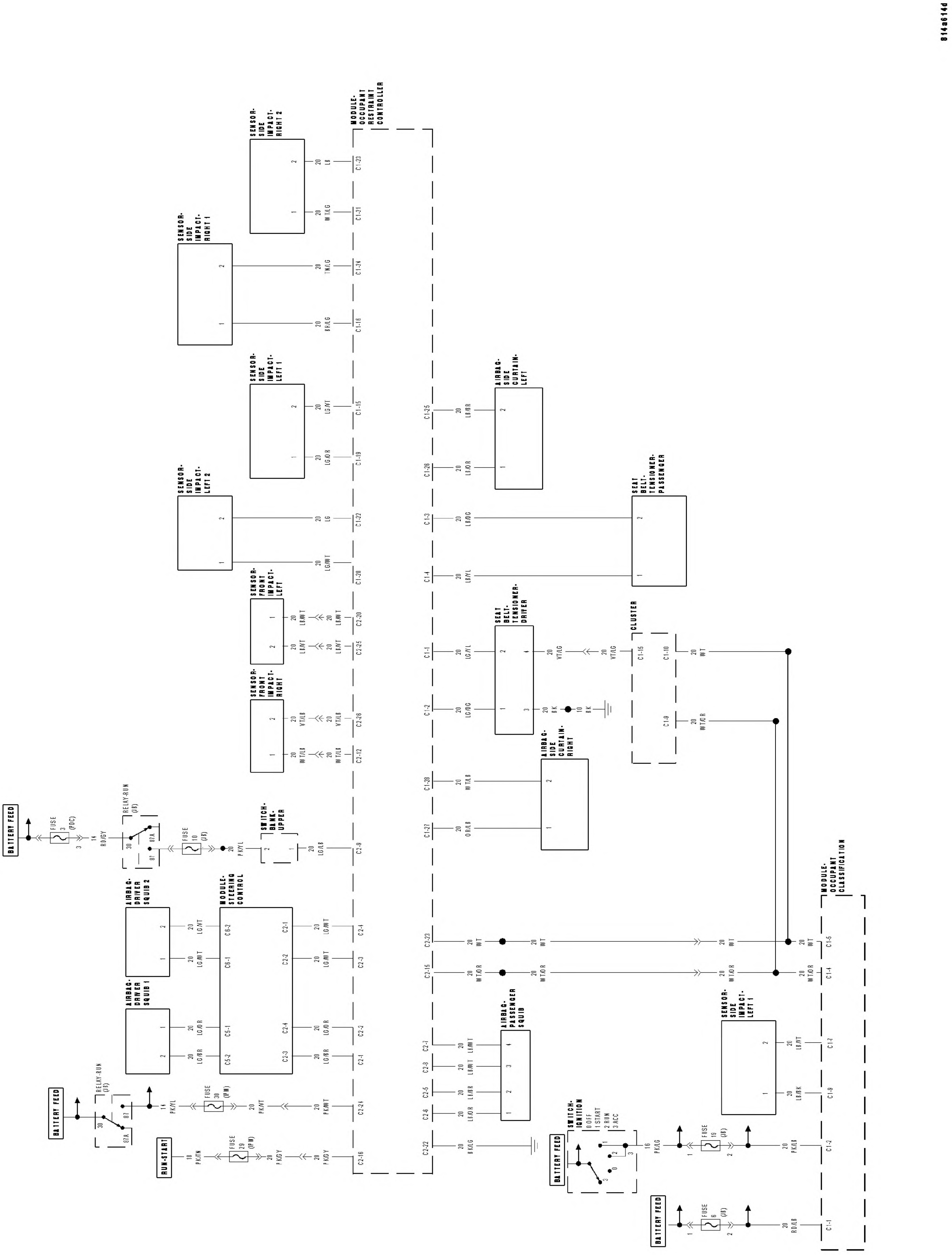
Are any DTC's present or is the original condition still present?

Yes >> Repair is not complete, refer to appropriate symptom list.

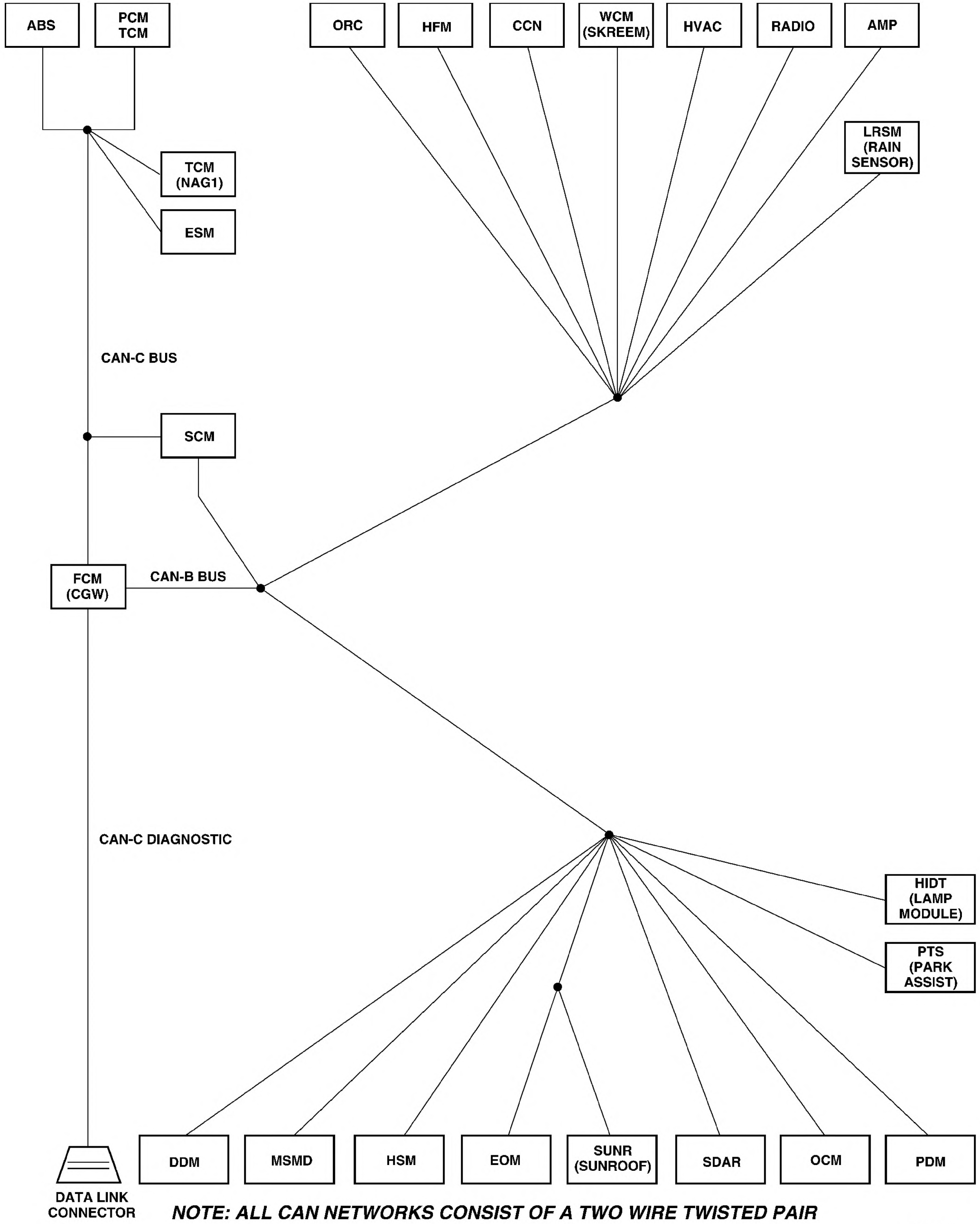
No >> Repair is complete.

SCHEMATICS AND DIAGRAMS


814a6146
BATTERY FEED
RELAY-RUN (JB)
30
87
87A
14 PK/YL
FUSE 30 (IPM)
20 PK/WT
MODULE-OCCUPANT RESTRAINT
C2-24
RUN-START
18 PK/TN
FUSE 29 (IPM)
20 PK/GY
C2-16
FUSE 10 (JB)
18 PK/TN
SWITCH-BANK-UPPER
2
1
20 LG/LB
C2-9
C2-23
C2-15
20 WT
20 WT/OR
C1-5
C1-4
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
16 PK/LG
FUSE 19 (JB)
20 PK/LB
C1-2
FUSE 6 (JB)
20 RD/LB
C1-1
MODULE-OCCUPANT CLASSIFICATION
C2-9
C2-7
C2-5
C2-12
C2-3
C2-1
C2-2
C1-11
C1-7
C1-9
C1-10
20 LG/OR
20 LB/YL
20 LG/YL
20 LB/DG
20 LG/DG
20 VT/LB
20 BK/LB
20 LB/VT
20 LB/BK
20 BK
SENSOR-SEAT WEIGHT-LEFT REAR
SENSOR-SEAT WEIGHT-RIGHT REAR
SENSOR-SEAT WEIGHT-RIGHT FRONT
SENSOR-SEAT WEIGHT-LEFT FRONT
SENSOR-SEAT TRACK POSITION-PASSENGER
SENSOR-SEAT TRACK POSITION-DRIVER
4
2
1



814a614d
MODULE-OCCUPANT RESTRAINT CONTROLLER
SENSOR-SIDE IMPACT-RIGHT 2
SENSOR-SIDE IMPACT-RIGHT 1
SENSOR-SIDE IMPACT-LEFT 1
SENSOR-SIDE IMPACT-LEFT 2
SENSOR-FRONT IMPACT-LEFT
SENSOR-FRONT IMPACT-RIGHT
AIRBAG-SIDE CURTAIN-LEFT
AIRBAG-SIDE CURTAIN-RIGHT
SEAT BELT-TENSIONER-PASSENGER
SEAT BELT-TENSIONER-DRIVER
CLUSTER
SWITCH-BANK-UPPER
AIRBAG-DRIVER SQUIB 1
AIRBAG-DRIVER SQUIB 2
MODULE-STEERING CONTROL
AIRBAG-PASSENGER SQUIB
MODULE-OCCUPANT CLASSIFICATION
SENSOR-SIDE IMPACT-LEFT 1
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
BATTERY FEED
RUN-START
RELAY-RUN (JB)
FUSE 3 (PDC)
FUSE 10 (JB)
FUSE 30 (PM)
FUSE 29 (PM)
FUSE 19 (JB)
FUSE 6 (JB)


ABS
PCM
TCM
ORC
HFM
CCN
WCM
(SKREEM)
HVAC
RADIO
AMP
LRSM
(RAIN
SENSOR)
TCM
(NAG1)
ESM
CAN-C BUS
SCM
FCM
(CGW)
CAN-B BUS
CAN-C DIAGNOSTIC
HIDT
(LAMP
MODULE)
PTS
(PARK
ASSIST)
DATA LINK
CONNECTOR
DDM
MSMD
HSM
EOM
SUNR
(SUNROOF)
SDAR
OCM
PDM

NOTE: ALL CAN NETWORKS CONSIST OF A TWO WIRE TWISTED PAIR

813189db

RESTRAINTS - SERVICE INFORMATION

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OCCUPANT CLASSIFICATION MODULE
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RESTRAINTS - SERVICE INFORMATION

DESCRIPTION

An occupant restraint system is standard factory-installed safety equipment on this model. Available occupant restraints for this model include both active and passive types. Active restraints are those which require the vehicle occupants to take some action to employ, such as fastening a seat belt; while passive restraints require no action by the vehicle occupants to be employed.

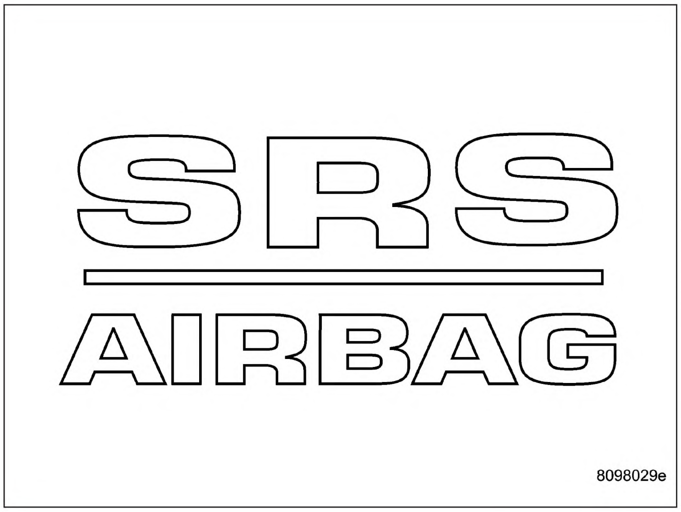
ACTIVE RESTRAINTS

The active restraints for this model include:

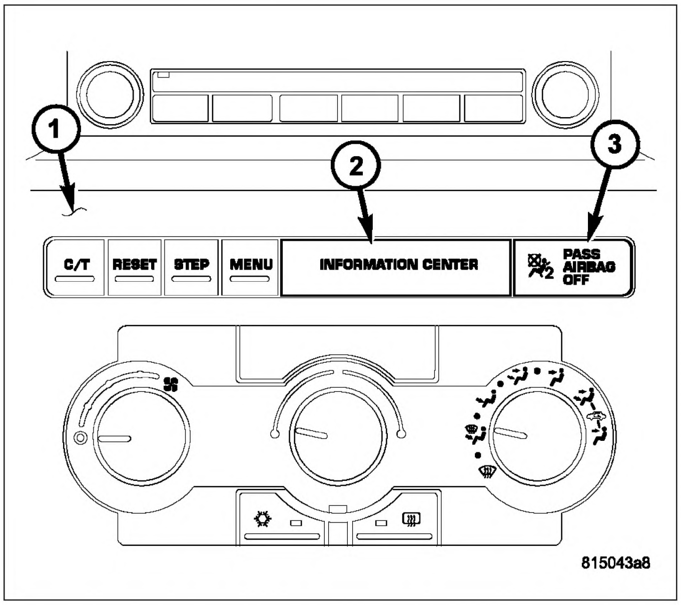
- **Front Seat Belts** - Both front seating positions are equipped with three-point seat belt systems employing a lower B-pillar mounted inertia latch-type emergency locking retractors, height-adjustable upper B-pillar mounted turning loops, a traveling lower seat belt anchor secured to the outboard side of the seat frame, and a traveling end-release seat belt buckle secured to the inboard side of the seat frame. The driver side front seat belt buckle includes an integral Hall-effect seat belt switch that detects whether the driver side front seat belt has been fastened.
- **Rear Seat Belts** - All three rear seating positions are equipped with three-point seat belt systems. The outboard seating position belts employ lower C-pillar mounted inertia latch-type emergency locking retractors, fixed position upper C-pillar mounted turning loops, self-cinching latch plates for compatibility with child seats, and fixed lower seat belt anchors secured to the rear floor panel by fasteners shared with the rear seat back panel bracket. The rear seat center seating position has an inertia latch-type emergency locking retractor that is secured within the seat back to the rear seat back panel. The center retractor also has a cable that connects to the seat back latch, which locks the retractor spool unless the seat back is fully latched. The rear seat center seating position belt lower anchor is secured to the rear floor panel with the left outboard seat belt buckle. All three rear seat belts have fixed end-release seat belt buckles secured to the rear floor panel by fasteners shared with the rear seat back panel bracket, a single buckle unit on the left side and a double buckle unit on the right side.
- **Child Restraint Anchors** - All vehicles are equipped with three, fixed-position, child seat upper tether anchors for the rear seating. Two anchors are integral to the back of the left rear seat back panel, and one is integral to the right rear seat back panel. Two lower anchors are also provided for each rear outboard seating position. The lower anchors are integral to the rear seat back panel bracket on the rear floor panel and are accessed from the front of the rear seat where the seat back meets the seat cushion.

PASSIVE RESTRAINTS

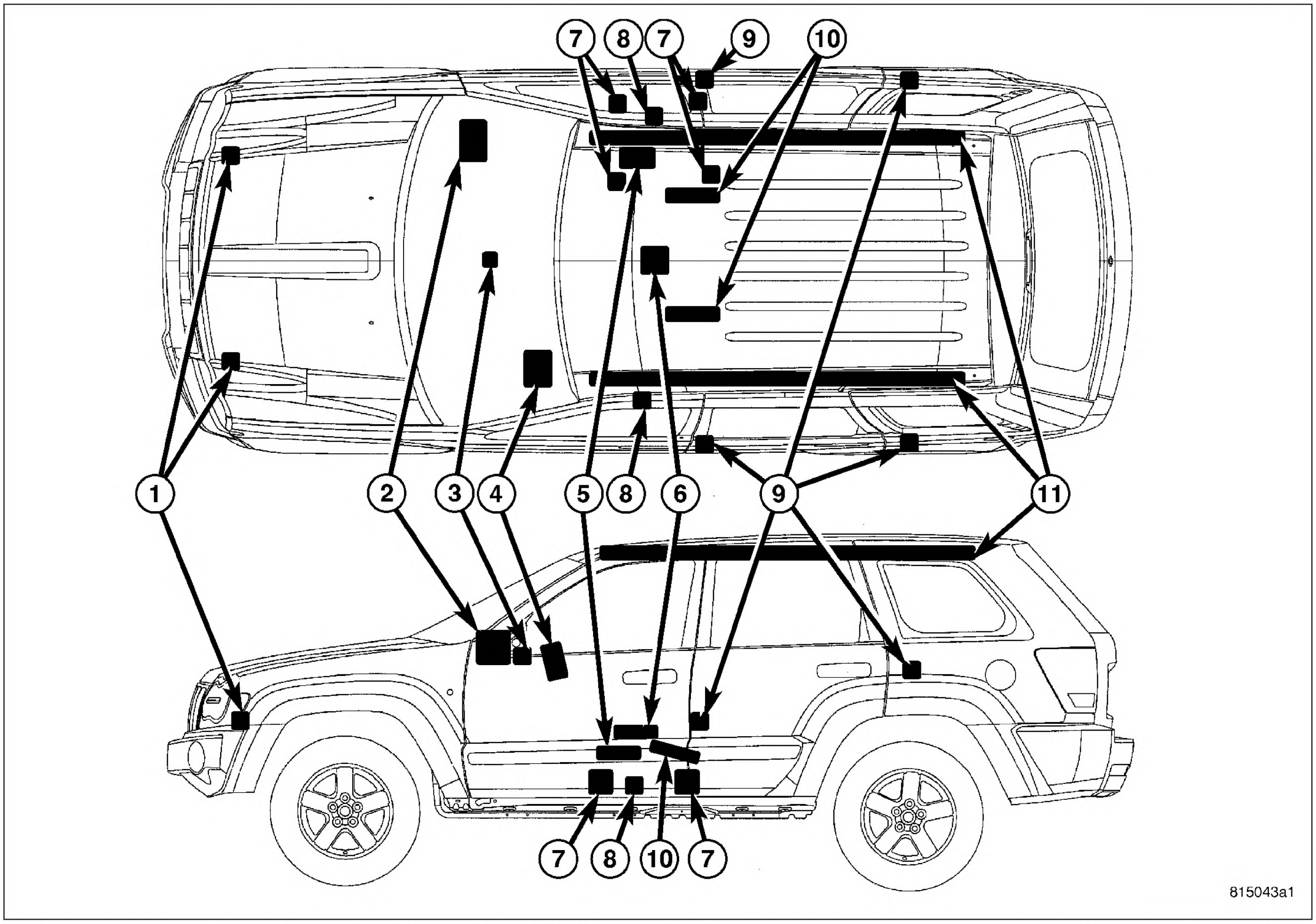
The passive restraints available for this model include the following:



- **Dual Front Airbags** - Multistage driver and front passenger airbags are used in this model. This airbag system is a passive, inflatable, Supplemental Restraint System (SRS) and vehicles with this equipment can be readily identified by the “SRS - AIRBAG” logo molded into the driver airbag trim cover in the center of the steering wheel and also into the passenger airbag area of the instrument panel top pad above the glove box. Vehicles with the airbag system can also be identified by the airbag indicator, which will illuminate in the ElectroMechanical Instrument Cluster (EMIC) for about seven seconds as a bulb test each time the ignition switch is turned to the On position. A pyrotechnic-type seat belt tensioner is also integral to the front seat belt buckle units mounted on the inboard of each front seat cushion frame to work in conjunction with the dual front airbags.



- **Occupant Classification System** - Vehicles manufactured for sale in North America (except Mexico) also include an Occupant Classification System (OCS) with components that are located on the front seats. These components include an Occupant Classification Module (OCM) and four seat weight sensors on the passenger seat, and seat track position sensors on both the driver and passenger seats. Vehicles equipped with the OCS components can be readily identified by a passenger airbag on/off indicator (3) located on the right end of the upper switch pod (2) near the top of the instrument panel lower center bezel (1).
- **Side Curtain Airbags** - Optional side curtain airbags are available for this model when it is also equipped with dual front airbags. This airbag system is a passive, inflatable, Supplemental Restraint System (SRS) and vehicles with this equipment can be readily identified by a molded identification trim button with the “SRS - AIRBAG” logo located on the headliner above each B-pillar.



The supplemental restraint system includes the following major components, which are described in further detail elsewhere in this service information:

- **Airbag Indicator** - The airbag indicator is integral to the ElectroMechanical Instrument Cluster (EMIC), which is located on the instrument panel in front of the driver.
- **Clockspring** - The clockspring is integral to the Steering Control Module (SCM) located near the top of the steering column, directly beneath the steering wheel.
- **Driver Airbag (4)** - The driver airbag is located in the center of the steering wheel, beneath the driver airbag trim cover.
- **Driver Knee Blocker** - The driver knee blocker is a structural unit secured to the back side of and integral to the instrument panel steering column opening cover.
- **Front Impact Sensor (1)** - Two front impact sensors are used on vehicles equipped with dual front airbags, one left side and one right side. One sensor is located on the back side of each vertical member of the radiator support.
- **Occupant Classification Module (5)** - Vehicles equipped with the Occupant Classification System (OCS) include an Occupant Classification Module (OCM) which is secured to the seat frame under the passenger side front seat cushion.
- **Occupant Restraint Controller (6)** - The Occupant Restraint Controller (ORC) is located on a mount on the floor panel transmission tunnel behind the transmission gear selector, and is concealed below the center floor console.
- **Passenger Airbag (2)** - The passenger airbag is located in the instrument panel, beneath the instrument panel top pad and above the glove box on the passenger side of the vehicle.
- **Passenger Airbag On/Off Indicator (3)** - The Occupant Classification System (OCS) includes a passenger airbag on/off indicator which is located in the upper switch pod near the top of the instrument panel lower center bezel.
- **Passenger Knee Blocker** - The passenger knee blocker is a structural reinforcement that is integral to and concealed within the glove box door.

- **Seat Belt Tensioner (10)** - A seat belt tensioner is integral to both front seat belt buckle units on vehicles equipped with dual front airbags. The seat belt buckle tensioner units are secured to the inboard front seat cushion frames and concealed beneath the inboard seat cushion side shield trim.
- **Seat Track Position Sensor (8)** - The Occupant Classification System (OCS) includes two seat track position sensors. One sensor is located on the inboard side of one of the seat adjuster tracks on both the driver and the passenger front seats.
- **Seat Weight Sensor (7)** - Vehicles equipped with the Occupant Classification System (OCS) include four seat weight sensors, one on each corner of the passenger side front seat between the seat cushion frame and the seat track.
- **Side Curtain Airbag (11)** - In vehicles equipped with this option, a side curtain airbag is secured to each inside roof side rail, and extends from the A-pillar to just beyond the C-pillar. The side curtain airbags are concealed above the headliner trim.
- **Side Impact Sensor (9)** - Four side impact sensors are used on vehicles equipped with the optional side curtain airbags, two on each side of the vehicle. One sensor is located behind the B-pillar trim near the base of each B-pillar, and one sensor is located behind the quarter panel trim near the base of each C-pillar.

The ORC, the OCM, and the EMIC each contain a microprocessor and programming that allow them to communicate with each other using the Controller Area Network (CAN) data bus. This method of communication is used by the ORC for control of the airbag indicator in the EMIC. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - DESCRIPTION).

Hard wired circuitry connects the supplemental restraint system components to each other through the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system, and to the supplemental restraint system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

ACTIVE RESTRAINTS

The primary passenger restraints in this or any other vehicle are the standard equipment factory-installed seat belts and child restraint anchors. Seat belts and child restraint anchors are referred to as an active restraint because the vehicle occupants are required to physically fasten and properly adjust these restraints in order to benefit from them. See the owner's manual in the vehicle glove box for more information on the features, use and operation of all of the factory-installed active restraints.

PASSIVE RESTRAINTS

The passive restraints are referred to as a supplemental restraint system because they were designed and are intended to enhance the protection for the occupants of the vehicle **only** when used in conjunction with the seat belts. They are referred to as passive restraints because the vehicle occupants are not required to do anything to make them operate; however, the vehicle occupants must be wearing their seat belts in order to obtain the maximum safety benefit from the factory-installed supplemental restraint system.

The supplemental restraint system electrical circuits are continuously monitored and controlled by a microprocessor and software contained within the Occupant Restraint Controller (ORC). An airbag indicator in the ElectroMechanical Instrument Cluster (EMIC) illuminates for about seven seconds as a bulb test each time the ignition switch is turned to the On or Start positions. Following the bulb test, the airbag indicator is turned on or off by the ORC to indicate the status of the supplemental restraint system. If the airbag indicator comes on at any time other than during the bulb test, it indicates that there is a problem in the supplemental restraint system electrical circuits. Such a problem may cause airbags not to deploy when required, or to deploy when not required.

Deployment of the supplemental restraints depends upon the angle and severity of an impact. Deployment is not based upon vehicle speed; rather, deployment is based upon the rate of deceleration as measured by the forces of gravity (G force) upon the impact sensors. When an impact is severe enough, the microprocessor in the ORC signals the inflator of the appropriate airbag units to deploy their airbag cushions. The front seat belt tensioners are provided with a deployment signal by the ORC in conjunction with the front airbags.

During a frontal vehicle impact, the knee blockers work in concert with properly fastened and adjusted seat belts to restrain both the driver and the front seat passenger in the proper position for an airbag deployment. The knee blockers also absorb and distribute the crash energy from the driver and the front seat passenger to the structure of the instrument panel. The seat belt tensioners remove the slack from the front seat belts to provide further assurance that the driver and front seat passenger are properly positioned and restrained for an airbag deployment.

Typically, the vehicle occupants recall more about the events preceding and following a collision than they do of an airbag deployment itself. This is because the airbag deployment and deflation occur very rapidly. In a typical 48 kilometer-per-hour (30 mile-per-hour) barrier impact, from the moment of impact until the airbags are fully inflated takes about 40 milliseconds. Within one to two seconds from the moment of impact, the airbags are almost entirely deflated. The times cited for these events are approximations, which apply only to a barrier impact at the given speed. Actual times will vary somewhat, depending upon the vehicle speed, impact angle, severity of the impact, and the type of collision.

When the ORC monitors a problem in any of the dual front airbag system circuits or components, including the seat belt tensioners, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit and sends an electronic message to the EMIC to turn on the airbag indicator. Proper testing of the supplemental restraint system components, the Controller Area Network (CAN) data bus, the electronic message inputs to and outputs from the EMIC or the ORC, as well as the retrieval or erasure of a DTC from the ORC or the EMIC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of all of the factory-installed passive restraints.

OCCUPANT CLASSIFICATION SYSTEM

In vehicles equipped with the Occupant Classification System (OCS), the OCS automatically suppresses or enables passenger airbag and seat belt tensioner operation based upon whether or not the passenger side front seat is occupied and, if the seat is occupied, classifies the size of the occupant and whether the seat is occupied by a child seat.

The OCS has an Occupant Classification Module (OCM) that monitors inputs from the seat weight sensors under the passenger side front seat cushion and from the seat track position sensors on the passenger side and driver side seat adjuster tracks. Based upon those inputs the microprocessor within the OCM classifies the occupant of the passenger side front seat, and the proximity of each front seat to the front airbags. The OCM then sends electronic occupant classification messages to the Occupant Restraint Controller (ORC). The microprocessor and programming of the ORC determines whether to enable or disable the deployment circuits for the passenger airbag and seat belt tensioner; and, if enabled, what force level should be used to deploy each front airbag.

The OCS electrical circuits and components are continuously monitored by the OCM, and the OCM is continuously monitored by the ORC. A passenger airbag on/off indicator is located in the upper switch pod near the top of the instrument panel lower center bezel. This indicator receives battery current whenever the ignition switch is in the On or Start positions, and illuminates only when the ORC pulls the indicator control circuit to ground. The indicator illuminates for about seven seconds as a bulb test each time the ignition switch is turned to the On or Start positions. Following the bulb test, the indicator is turned on or off by the ORC based upon the electronic occupant classification messages received from the OCM. This indicator is illuminated whenever the seat is occupied and passenger airbag and seat belt tensioner operation has been suppressed. The indicator is turned off whenever the seat is empty, or when the seat is occupied and the passenger airbag and seat belt tensioner are enabled.

When the OCM monitors a problem in any of the OCS circuits or components, it stores a fault code or DTC in its memory circuit and sends an electronic message to the ORC. The ORC then sends an electronic message to the ElectroMechanical Instrument Cluster (EMIC) to turn on the airbag indicator. If for any reason the OCM is unable to classify the occupant it sends an electronic message to the ORC, and the ORC suppresses passenger airbag and seat belt tensioner operation. Proper testing of the OCS components, the Controller Area Network (CAN) data bus, the electronic message inputs to and outputs from the OCM, the EMIC or the ORC, as well as the retrieval or erasure of a DTC from the OCM, the ORC or the EMIC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the OCS.

WARNING

WARNINGS - RESTRAINT SYSTEM

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death on vehicles equipped with airbags, before performing any welding operations disconnect and isolate the battery negative (ground) cable and disconnect all wire harness connectors from the Occupant Restraint Controller (ORC). Failure to take the proper precautions could result in accidental airbag deployment and other possible damage to the supplemental restraint system circuits and components.

WARNING: To avoid personal injury or death, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate, or bring into contact with electricity. Do not store at temperatures exceeding 93° C (200° F). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 2500 psi.

WARNING: To avoid personal injury or death, when handling a seat belt tensioner retractor, proper care should be exercised to keep fingers out from under the retractor cover and away from the seat belt webbing where it exits from the retractor cover.

WARNING: To avoid personal injury or death, replace all restraint system components only with parts specified in the DaimlerChrysler Mopar Parts Catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid personal injury or death, the fasteners, screws, and bolts originally used for the restraint system components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the restraint system. Any time a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the DaimlerChrysler Mopar Parts Catalog.

WARNING: To avoid personal injury or death, when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down.

DIAGNOSIS AND TESTING

SUPPLEMENTAL RESTRAINT SYSTEM

Proper diagnosis and testing of the supplemental restraint system components, the Controller Area Network (CAN) data bus, the data bus electronic message inputs to and outputs from the ElectroMechanical Instrument Cluster (EMIC), the Occupant Restraint Controller (ORC), or the Occupant Classification Module (OCM) as well as the retrieval or erasure of a Diagnostic Trouble Code (DTC) from the ORC or OCM requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

STANDARD PROCEDURE

HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS

At no time should any source of electricity be permitted near the inflator on the back of a non-deployed airbag or seat belt tensioner. When carrying a non-deployed airbag, the trim cover or airbag cushion side of the unit should be pointed away from the body to minimize injury in the event of an accidental deployment. If the airbag unit is placed on a bench or any other surface, the trim cover or airbag cushion side of the unit should be face up to minimize movement in the event of an accidental deployment.

When handling a non-deployed seat belt tensioner, take proper care to keep fingers away from the scabbard between the buckle and the tensioner unit. In addition, the supplemental restraint system should be disarmed whenever any steering wheel, steering column, seat belt tensioner, airbag, impact sensor, Occupant Classification System (OCS), or instrument panel components require diagnosis or service. Failure to observe this warning could result in accidental airbag deployment and possible personal injury.

All damaged, faulty or non-deployed airbags and seat belt tensioners which are replaced on vehicles are to be handled and disposed of properly. If an airbag or seat belt tensioner unit is faulty or damaged and non-deployed, refer to the Hazardous Substance Control System for proper disposal. Dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local and federal regulations.

SUPPLEMENTAL RESTRAINT STORAGE

Airbags and seat belt tensioners must be stored in their original, special container until they are used for service. Also, they must be stored in a clean, dry environment; away from sources of extreme heat, sparks, and high electrical energy. Always place or store any airbag on a surface with its trim cover or airbag cushion side facing up, to minimize movement in case of an accidental deployment.

SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT

Any vehicle which is to be returned to use following a supplemental restraint deployment, must have the deployed restraints replaced. In addition, if the driver airbag has been deployed, the clockspring/Steering Control Module (SCM) must be replaced. If the passenger airbag is deployed, the instrument panel top pad must be replaced. The seat belt tensioners are deployed by the same signal that deploys the driver and passenger airbags and must also be replaced if either front airbag has been deployed. If a side curtain airbag has been deployed, the complete airbag unit, the headliner, as well as the upper A, B, C and D-pillar trim must be replaced. These components are not intended for reuse and will be damaged or weakened as a result of a supplemental restraint deployment, which may or may not be obvious during a visual inspection.

On vehicles with an optional sunroof, the sunroof drain tubes and hoses must be closely inspected following a side curtain airbag deployment. It is also critical that the mounting surfaces and/or mounting brackets for the Occupant Restraint Controller (ORC), side impact sensors, and front impact sensors be closely inspected and restored to their original conditions following any vehicle impact damage. Because the ORC and each front and side impact sensor are used by the supplemental restraint system to monitor or confirm the direction and severity of a vehicle impact, improper orientation or insecure fastening of these components may cause airbags not to deploy when required, or to deploy when not required.

All other vehicle components should be closely inspected following any supplemental restraint deployment, but are to be replaced only as required by the extent of the visible damage incurred.

AIRBAG SQUIB STATUS

Multistage airbags with multiple initiators (squibs) must be checked to determine that all squibs were used during the deployment event. The driver and passenger airbags in this model are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver or passenger squib 1 and squib 2 circuits to the two initiators in the airbag inflators. Typically, both initiators are used and all potentially hazardous chemicals are burned during an airbag deployment event. However, it is possible for only one initiator to be used due to an airbag system fault; therefore, it is always necessary to confirm that both initiators have been used in order to avoid the improper handling or disposal of potentially live pyrotechnic or hazardous materials. The following procedure should be performed using a diagnostic scan tool to verify the status of both airbag squibs before either deployed airbag is removed from the vehicle for disposal.

CAUTION: Deployed front airbags having two initiators (squibs) in the airbag inflator may or may not have live pyrotechnic material within the inflator. Do not dispose of these airbags unless you are sure of complete deployment. Refer to the Hazardous Substance Control System for proper disposal procedures. Dispose of all non-deployed and deployed airbags and seat belt tensioners in a manner consistent with state, provincial, local, and federal regulations.

1. Be certain that the diagnostic scan tool contains the latest version of the proper diagnostic software. Connect the scan tool to the 16-way Data Link Connector (DLC). The DLC is located on the driver side lower edge of the instrument panel, outboard of the steering column.
2. Turn the ignition switch to the On position.
3. Using the scan tool, read and record the active (current) Diagnostic Trouble Code (DTC) data.

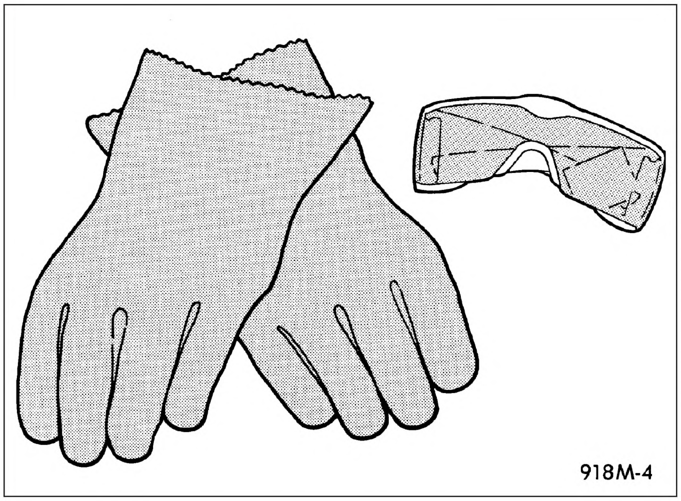
Using the active DTC information, refer to the **Airbag Squib Status** table to determine the status of both driver and/or passenger airbag squibs.

AIRBAG SQUIB STATUS		
IF the Active DTC is:	**Conditions**	**Squib Status**
Driver or Passenger Squib 1 open	**AND** the stored DTC minutes for both Driver or Passenger squibs are within 15 minutes of each other	Both Squib 1 and 2 were used.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 1 open	**AND** the stored DTC minutes for Driver or Passenger Squib 2 open is GREATER than the stored DTC minutes for Driver or Passenger Squib 1 by 15 minutes or more	Squib 1 was used; Squib 2 is live.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 1 open	**AND** the stored DTC minutes for Driver or Passenger Squib 1 open is GREATER than the stored DTC minutes for Driver or Passenger Squib 2 by 15 minutes or more	Squib 1 is live; Squib 2 was used.
Driver or Passenger Squib 2 open		
Driver or Passenger Squib 1 open	**AND** Driver or Passenger Squib 2 open is NOT an active code	Squib 1 was used; Squib 2 is live.
Driver or Passenger Squib 2 open	**AND** Driver or Passenger Squib 1 open is NOT an active code	Squib 1 is live; Squib 2 was used.

If none of the Driver or Passenger Squib 1 or 2 open are active codes, the status of the airbag squibs is unknown. In this case the airbag should be handled and disposed of as if the squibs were both live.

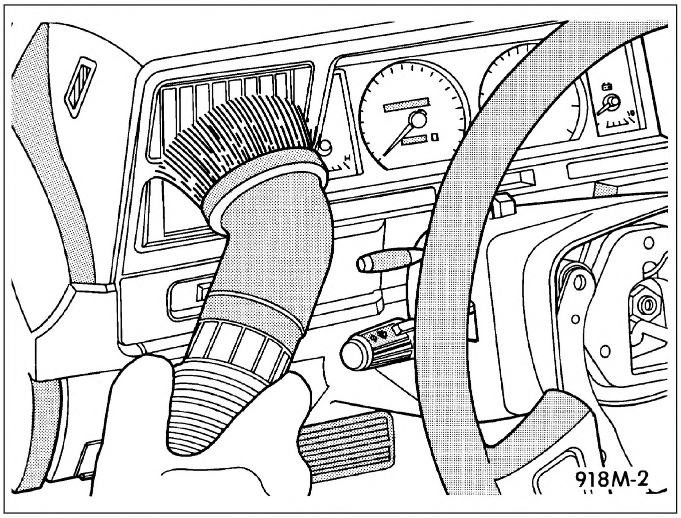
CLEANUP PROCEDURE

Following a supplemental restraint deployment, the vehicle interior will contain a powdery residue. This residue consists primarily of harmless particulate by-products of the small pyrotechnic charge that initiates the propellant used to deploy a supplemental restraint. However, this residue may also contain traces of sodium hydroxide powder, a chemical by-product of the propellant material that is used to generate the inert gas that inflates the airbag. Since sodium hydroxide powder can irritate the skin, eyes, nose, or throat, be certain to wear safety glasses, rubber gloves, and a long-sleeved shirt during cleanup.


918M-4

WARNING: To avoid personal injury or death, if you experience skin irritation during cleanup, run cool water over the affected area. Also, if you experience irritation of the nose or throat, exit the vehicle for fresh air until the irritation ceases. If irritation continues, see a physician.

1. Begin the cleanup by using a vacuum cleaner to remove any residual powder from the vehicle interior. Clean from outside the vehicle and work your way inside, so that you avoid kneeling or sitting on a non-cleaned area.
2. Be certain to vacuum the heater and air conditioning outlets as well. Run the heater and air conditioner blower on the lowest speed setting and vacuum any powder expelled from the outlets.


918M-2

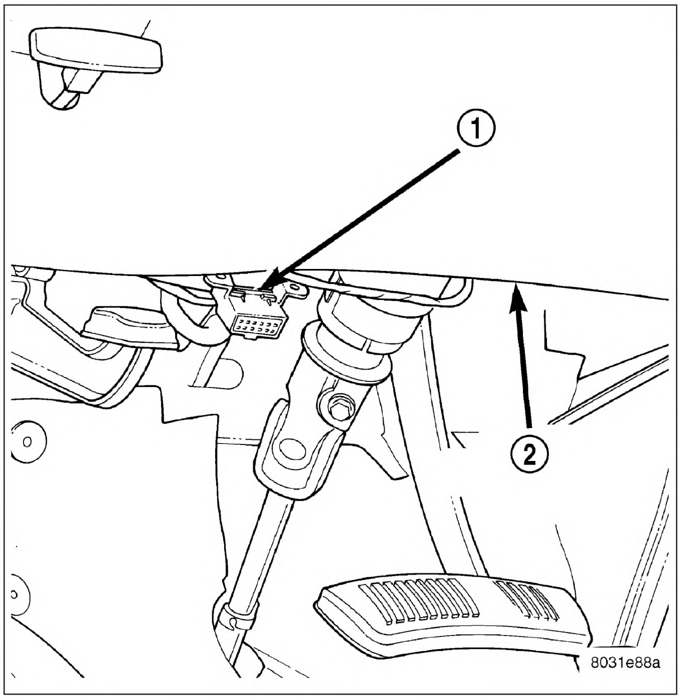
CAUTION: Deployed front airbags having two initiators (squibs) in the airbag inflator may or may not have live pyrotechnic material within the inflator. Do not dispose of these airbags unless you are sure of complete deployment. Refer to AIRBAG SQUIB STATUS . All damaged, faulty, or non-deployed supplemental restraints which are replaced on vehicles are to be handled and disposed of properly. If an airbag or seat belt tensioner unit is faulty or damaged and non-deployed, refer to the Hazardous Substance Control System for proper disposal. Be certain to dispose of all non-deployed and deployed supplemental restraints in a manner consistent with state, provincial, local and federal regulations.

3. Next, remove the deployed supplemental restraints from the vehicle. Refer to the appropriate service removal procedures.
4. You may need to vacuum the interior of the vehicle a second time to recover all of the powder.

SUPPLEMENTAL RESTRAINTS VERIFICATION TEST

The following procedure should be performed using a diagnostic scan tool to verify proper supplemental restraint system operation following the service or replacement of any supplemental restraint system component. In addition, if the vehicle is equipped with the Occupant Classification System and one of the passenger front seat supplemental restraint components has been replaced, following successful completion of the supplemental restraint system verification test procedure, perform the Occupant Classification System Verification Test using a diagnostic scan tool. Refer to the appropriate diagnostic procedures.

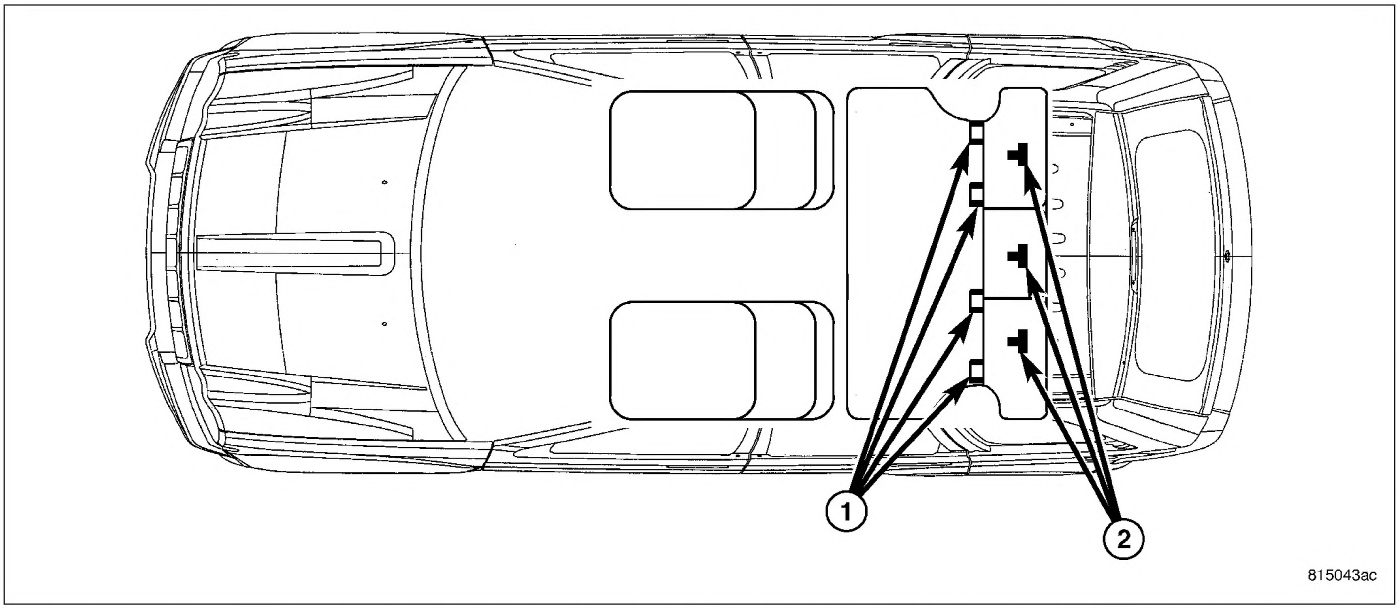
WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.



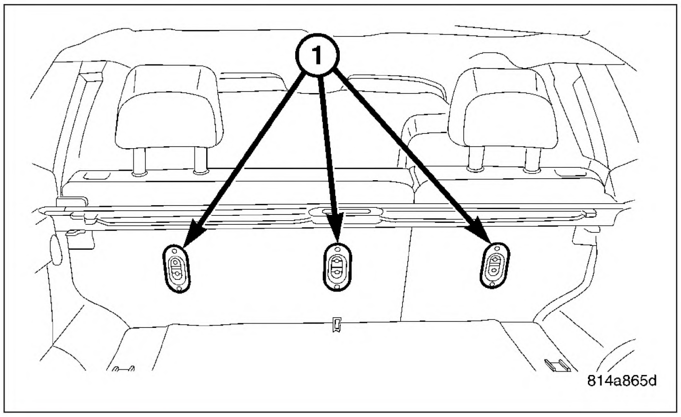
1. During the following test, the battery negative cable remains disconnected and isolated, as it was during the supplemental restraint system component removal and installation procedures.
2. Be certain that the diagnostic scan tool contains the latest version of the proper diagnostic software. Connect the scan tool to the 16-way Data Link Connector (DLC) (1). The DLC is located on the driver side lower edge of the instrument panel (2), outboard of the steering column.
3. Turn the ignition switch to the On position and exit the vehicle with the scan tool.
4. Check to be certain that nobody is in the vehicle, then reconnect the battery negative cable.
5. Using the scan tool, read and record the active (current) Diagnostic Trouble Code (DTC) data.
6. Next, use the scan tool to read and record any stored (historical) DTC data.
7. If any DTC is found in Step 5 or Step 6, refer to the appropriate diagnostic information.
8. Use the scan tool to erase the stored DTC data. If any problems remain, the stored DTC data will not erase. Refer to the appropriate diagnostic information to diagnose any stored DTC that will not erase. If the stored DTC information is successfully erased, go to Step 9.
9. Turn the ignition switch to the Off position for about fifteen seconds, and then back to the On position. Observe the airbag indicator in the instrument cluster. It should light for six to eight seconds, and then go out. This indicates that the supplemental restraint system is functioning normally and that the repairs are complete. If the airbag indicator fails to light, or lights and stays on, there is still an active supplemental restraint system fault or malfunction. Refer to the appropriate diagnostic information to diagnose the problem.

CHILD RESTRAINT ANCHOR

DESCRIPTION

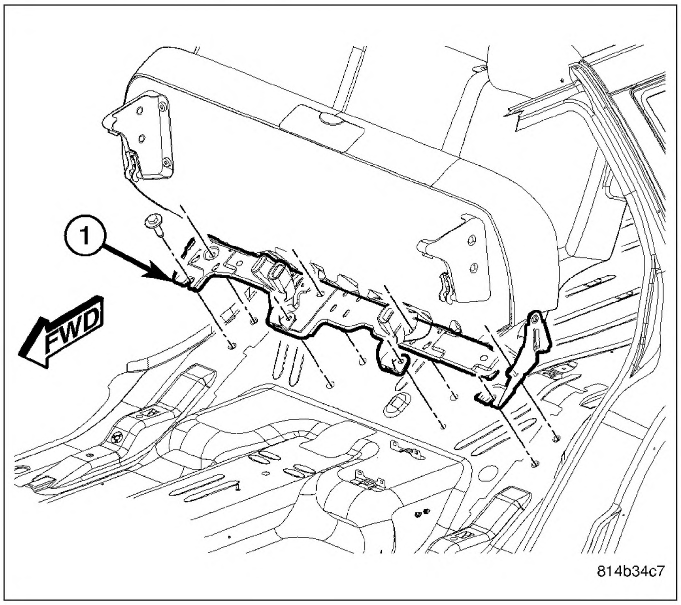


This model is equipped with a Lower Anchors and Tether for CHildren, or LATCH child restraint anchorage system. The LATCH system provides for the installation of suitable child restraints in certain seating positions without using the standard equipment seat belt provided for that seating position. The rear seats in these models are equipped with a fixed-position child restraint upper tether anchor (2) for both the center and the two outboard seating positions, and child restraint lower anchors (1) for the two outboard seating positions only.

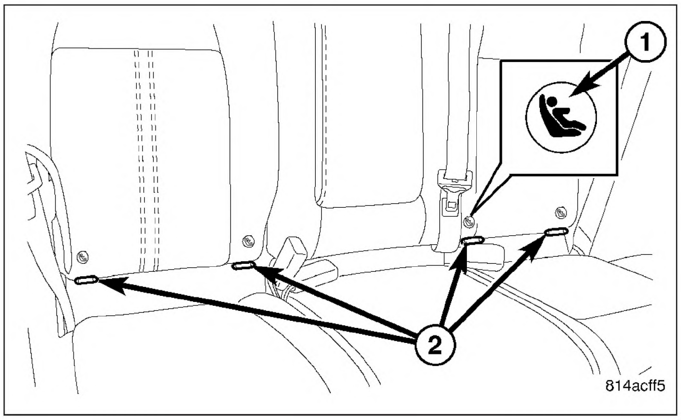


The three upper tether anchors (1) are integral to the rear seat back panels. One anchor is integral to the back of the right rear panel, and two are integral to the left rear panel. These anchors are each constructed from short lengths of heavy-gauge steel wire that is securely welded into stamped steel cups that are integral to the seat back panels. There is a separate molded plastic trim bezel located around each of the three anchors. These child restraint upper tether anchors cannot be adjusted or repaired and, if faulty or damaged, they must be replaced as a unit with their respective rear seat back panels.

The lower anchors are integral to the rear seat back panel bracket (1), which is secured with screws to the rear floor panel just forward of the rear seat back panels and beneath the rear edge of the rear seat cushion. These anchors are each constructed from a heavy-gauge steel wire loop that is securely welded to the seat back panel bracket. The child restraint upper tether anchors cannot be adjusted or repaired and, if faulty or damaged, they must be replaced as a unit with the rear seat back panel bracket.



The rear seat lower anchors (2) are each accessed from the front of their respective seat, at each side where the seat back meets the seat cushion. Round markers (1) with an imprinted child seat icon help identify the anchor locations as they may be otherwise difficult to see with the seat back in the upright position.



OPERATION

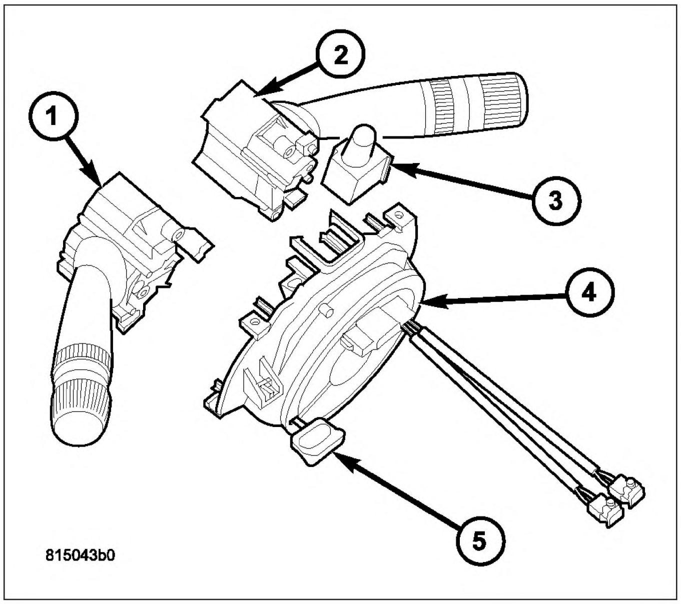
See the owner’s manual in the vehicle glove box for more information on the proper use of all of the factory-installed child restraint anchors.

CLOCKSPRING

DESCRIPTION

The clockspring for this model is internal to and serviced as a unit with the Steering Control Module (SCM) (4). The SCM is secured near the top of the steering column behind the steering wheel. The SCM is a modular unit that also interfaces with and supports the left (lighting) multi-function switch (1), the right (wiper) multi-function switch (2), and the hazard switch (3). Each of these switches can be separated from and are serviced individually from the SCM.

Besides the clockspring, the SCM contains an electronic circuit board and a microprocessor, which allows it to communicate with other electronic modules in the vehicle over the Controller Area Network (CAN) data bus. On models so equipped, the SCM also includes an integral Steering Angle Sensor (SAS). The SCM circuitry, the clockspring, and the SAS are all contained within a flat, round molded plastic case.



The SCM case includes two connector receptacles that face toward the instrument panel. Within the plastic case is a spool-like molded plastic rotor with a large exposed hub. The upper surface of the rotor hub has a large, keyed center hole, an index hole, two short pigtail wires with connectors, and two connector receptacles that face toward the steering wheel. Wound around the rotor spool within the case is a long ribbon-like tape that consists of several thin copper wire leads sandwiched between two thin plastic membranes. The outer end of the tape terminates at the connector receptacles that face the instrument panel, while the inner end of the tape terminates at the pigtail wires and connector receptacles on the hub of the clockspring rotor that face the steering wheel. The lower surface of the rotor hub has a molded plastic turn signal cancel cam with two lobes that is keyed to the clockspring rotor.

The service replacement SCM is shipped with the clockspring pre-centered and with a molded plastic locking pin (5) installed. The locking pin secures the centered clockspring rotor to the SCM case during shipment and handling, but must be removed after the SCM is installed on the steering column and before the steering wheel is installed. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

The clockspring cannot be repaired. If the clockspring is faulty, damaged, or if the driver airbag has been deployed, the SCM/clockspring/SAS unit must be replaced. (Refer to 19 - STEERING/COLUMN/STEERING COLUMN CONTROL MODULE - REMOVAL).

OPERATION

The clockspring is a mechanical electrical circuit component that is used to provide continuous electrical continuity between the fixed instrument panel wire harness and certain electrical components mounted on or in the rotating steering wheel. On this model the rotating electrical components include the driver airbag, the horn switch, the speed control switches, and the remote radio switches, if the vehicle is so equipped. The Steering Control Module (SCM)/clockspring case is positioned and secured near the top of the steering column. The fixed connector receptacles on the back of the fixed SCM/clockspring case connect the clockspring to the vehicle electrical system through two take outs with connectors from the instrument panel wire harness.

The clockspring rotor is movable and is keyed so as to move with the rotation of the steering column shaft and the steering wheel. The lower surface of the clockspring rotor hub engages and indexes the clockspring rotor to the turn signal cancel cam. Two short, yellow-sleeved pigtail wires on the upper surface of the clockspring rotor connect the clockspring to the driver airbag, while a steering wheel wire harness and a driver airbag jumper harness connected to the two connector receptacles on the upper surface of the clockspring rotor complete circuits to the horn switch, the two speed control switches and, if the vehicle is so equipped, to the optional remote radio switches on the steering wheel.

Like the clockspring in a timepiece, the clockspring tape has travel limits and can be damaged by being wound too tightly during full stop-to-stop steering wheel rotation. To prevent this from occurring, the clockspring is centered when it is installed on the steering column. Centering the clockspring indexes the clockspring tape to the movable steering components so that the tape can operate within its designed travel limits. However, if the SCM/clockspring is removed from the steering column or if the steering shaft is disconnected from the steering gear, the clockspring spool can change position relative to the other steering components. The clockspring must be re-centered following completion of this service or the tape may be damaged.

Service replacement SCM/clocksprings are shipped pre-centered and with a locking pin installed. This locking pin should not be removed until the SCM/clockspring has been installed on the steering column. If the locking pin is removed before the SCM/clockspring is installed on a steering column, the clockspring centering procedure must be performed. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

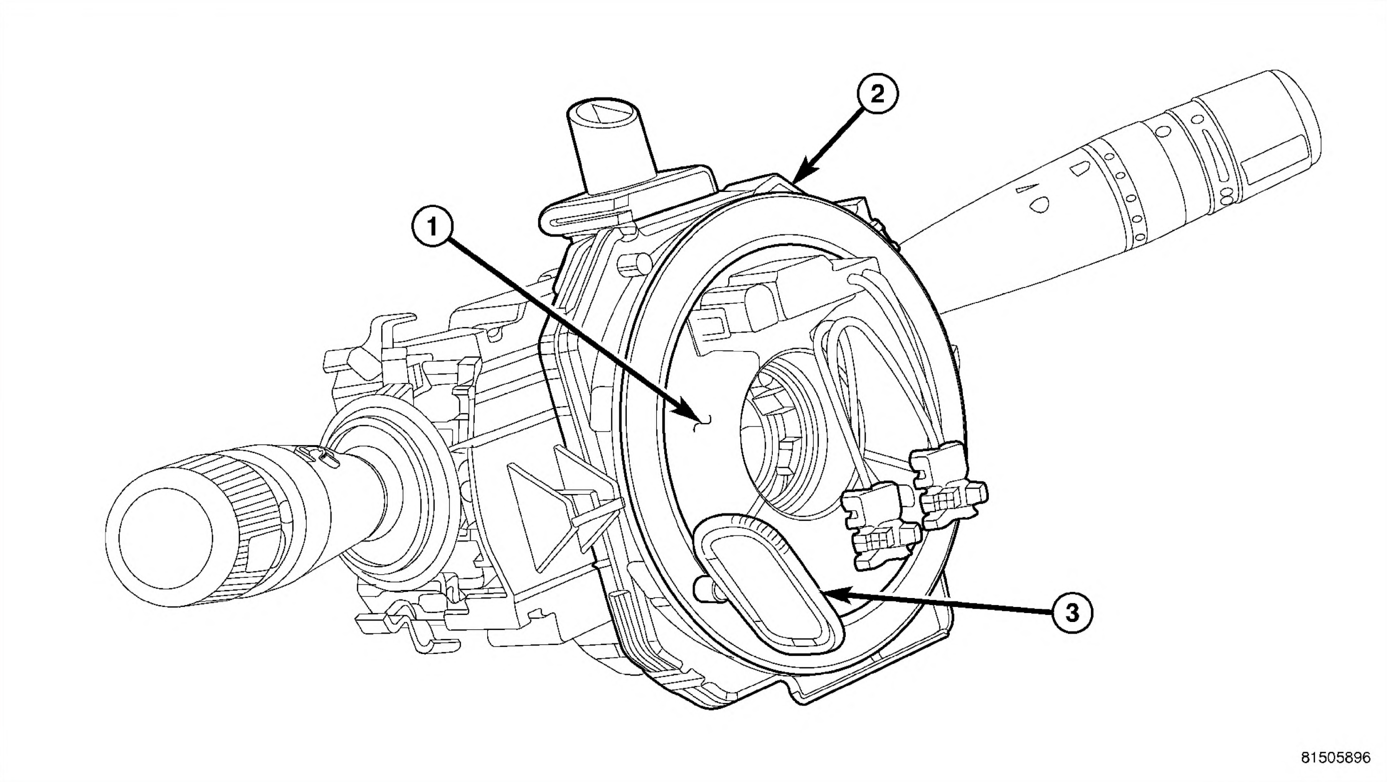
STANDARD PROCEDURE

CLOCKSPRING CENTERING

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

NOTE: A service replacement Steering Control Module (SCM) is shipped with the clockspring pre-centered and with a molded plastic locking pin installed. This locking pin should not be removed until the SCM has been installed on the steering column. If the locking pin is removed before the SCM is installed on a steering column, the clockspring centering procedure must be performed.

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position.

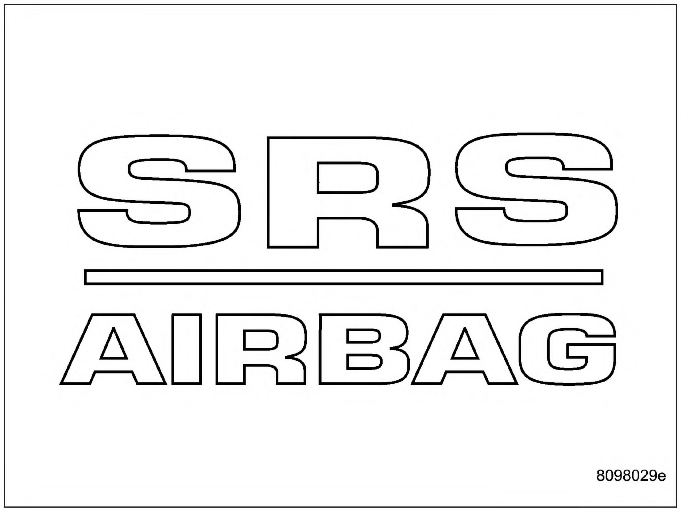


1. Place the front wheels in the straight-ahead position.
2. Remove the Steering Control Module (SCM) (2) from the steering column. (Refer to 19 - STEERING/COLUMN/STEERING CONTROL MODULE - REMOVAL).
3. Hold the SCM in one hand so that it is oriented as it would be when it is installed on the steering column.
4. Use your other hand to rotate the clockspring rotor (1) clockwise to the end of its travel. **Do not apply excessive torque.**
5. From the end of the clockwise travel, rotate the rotor about two and one-half turns counterclockwise. The clockspring airbag pigtail wires and connector receptacles should be at the top and the holes for the clockspring locking pin (3) should be in alignment.
6. The clockspring is now centered. Secure the clockspring rotor to the SCM case to maintain clockspring centering until the SCM is reinstalled on the steering column.
7. The front wheels should still be in the straight-ahead position. Reinstall the SCM onto the steering column. (Refer to 19 - STEERING/COLUMN/STEERING CONTROL MODULE - INSTALLATION).

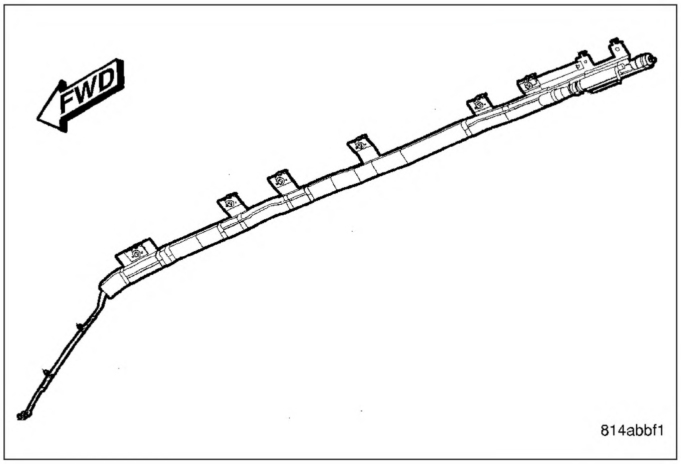
CURTAIN AIRBAG

DESCRIPTION

Optional side curtain airbags are available for this model when it is also equipped with dual front airbags. These airbags are passive, inflatable, Supplemental Restraint System (SRS) components, and vehicles with this equipment can be readily identified by a molded identification trim button with the “SRS - AIRBAG” logo located on the headliner above each B-pillar. This system is designed to reduce injuries to the vehicle occupants in the event of a side impact collision.



Vehicles equipped with side curtain airbags have two individually controlled curtain airbag units. These airbag units are concealed and mounted above the headliner where they are each secured to one of the roof side rails. Each folded airbag cushion is contained within a long extruded plastic channel that extends along the roof rail from the A-pillar at the front of the vehicle to just behind the C-pillar at the rear of the vehicle. A long tether extends down the A-pillar from the front of the airbag cushion. The end of the tether is secured to a slot in the sheet metal with a metal hook, while two additional plastic clips secure the tether to the inside of the A-pillar.



The hybrid-type inflator for each airbag is secured to the roof rail at the rear of the airbag unit between the C-pillar and the D-pillar, and is connected to the airbag cushion by a long tubular manifold. The inflator bracket and the extruded airbag cushion channel are secured with both plastic push-in fasteners and screws to the roof rail. The inflator is initially hung from the roof rail by hooks that are integral to the inflator bracket. The airbag inflator is connected to the vehicle electrical system through a dedicated take out and connector of the body wire harness near the top of the D-pillar.

The side curtain airbag unit cannot be adjusted or repaired and must be replaced if deployed, faulty, or in any way damaged. Once a side curtain airbag has been deployed, the complete airbag unit, the headliner, the upper A, B, and C-pillar trim, and all other visibly damaged components must be replaced.

OPERATION

Each side curtain airbag is deployed individually by an electrical signal generated by the Occupant Restraint Controller (ORC) to which it is connected through left or right curtain airbag line 1 and line 2 (or squib) circuits. The hybrid-type inflator assembly for each airbag contains a small canister of highly compressed inert gas. When the ORC sends the proper electrical signal to the airbag inflator, the electrical energy creates enough heat to ignite chemical pellets within the inflator.

Once ignited, these chemicals burn rapidly and produce the pressure necessary to rupture a containment disk in the inert gas canister. The inflator and inert gas canister are sealed and connected to a tubular manifold so that all of the released gas is directed into the folded curtain airbag cushion, causing the cushion to inflate. As the airbag cushion inflates it will drop down from the roof rail between the edge of the headliner and the side glass/body pillars to form a curtain-like cushion to protect the vehicle occupants during a side impact collision.

The front tether keeps the side curtain bag taut to the side of the vehicle, thus ensuring that the bag will deploy in the proper position. Following the airbag deployment, the airbag cushion quickly deflates by venting the inert gas through the loose weave of the cushion fabric, and the deflated cushion hangs down loosely from the roof rail.

REMOVAL

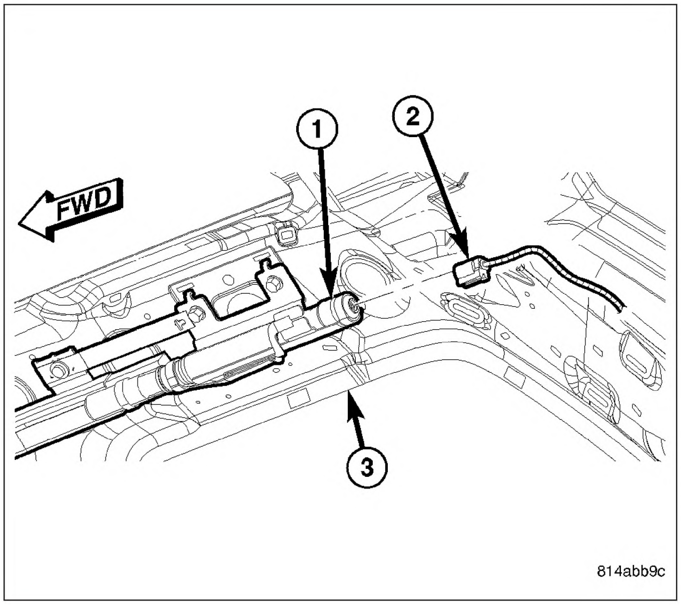
WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

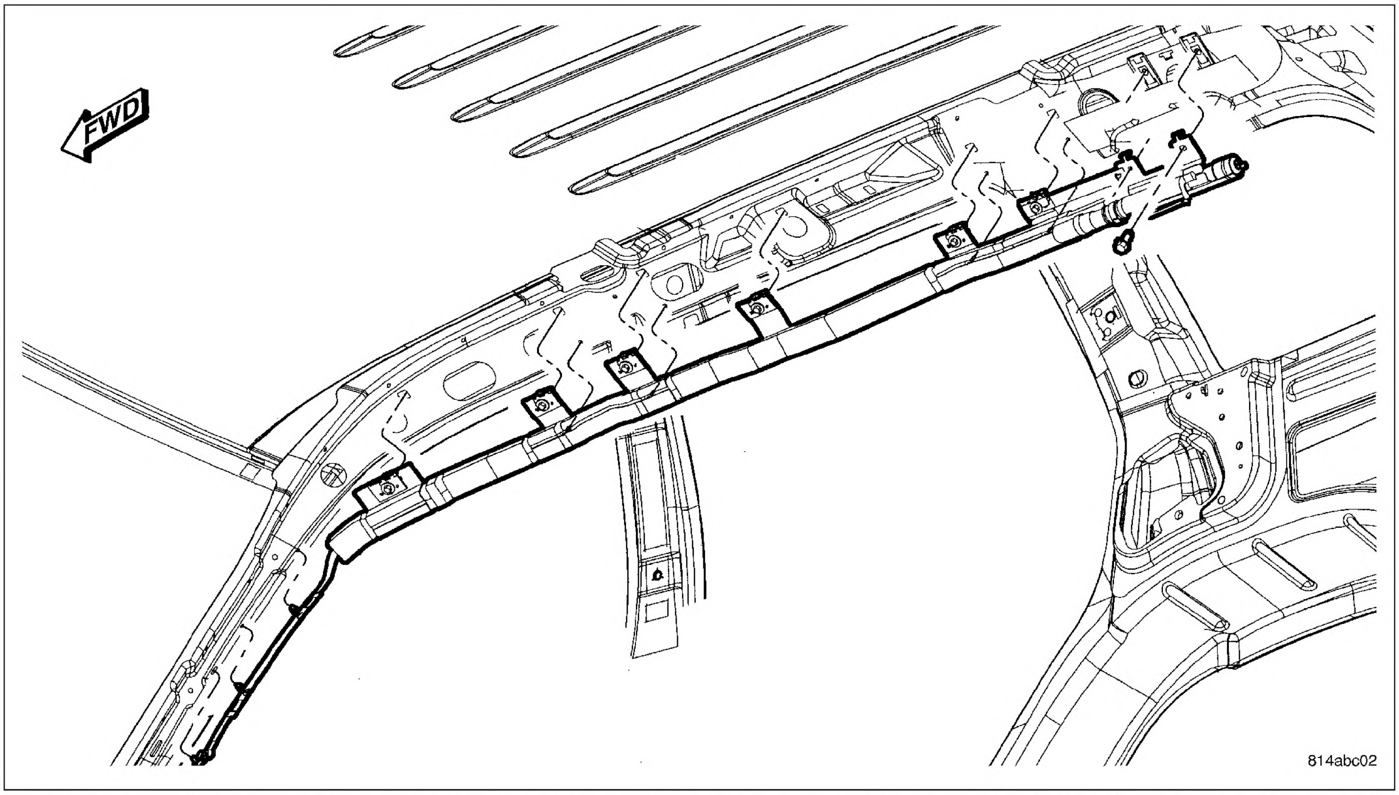
WARNING: To avoid personal injury or death, when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

WARNING: To avoid personal injury or death, use extreme care to prevent any foreign material from entering the side curtain airbag, or becoming entrapped between the side curtain airbag cushion and the headliner. Failure to observe this warning could result in occupant injuries upon airbag deployment.

NOTE: The following procedure is for replacement of a faulty or damaged side curtain airbag. If the airbag is faulty or damaged, but not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the side curtain airbag has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the headliner from the vehicle. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
3. Disconnect the body wire harness connector (2) for the side curtain airbag from the connector receptacle at the back of the inflator (1) on the roof side rail (3) near the D-pillar.





4. Disengage the two plastic retainers, then the hook that secure the side curtain airbag front tether to the inner A-pillar.
5. Remove the six screws that secure the side curtain airbag channel to the J-nuts in the inner roof side rail.
6. Disengage the two plastic push-in fasteners that secure the channel to the roof side rail at the top of the B-pillar.
7. Disengage the two plastic push-in fasteners that secure the channel to the roof side rail at the top of the C-pillar.
8. Remove the two screws that secure the inflator mounting bracket to the U-nuts in the inner roof side rail.
9. Disengage the integral hooks on the inflator mounting bracket from the locating holes in the roof side rail.
10. Remove the side curtain airbag from the vehicle as a unit.

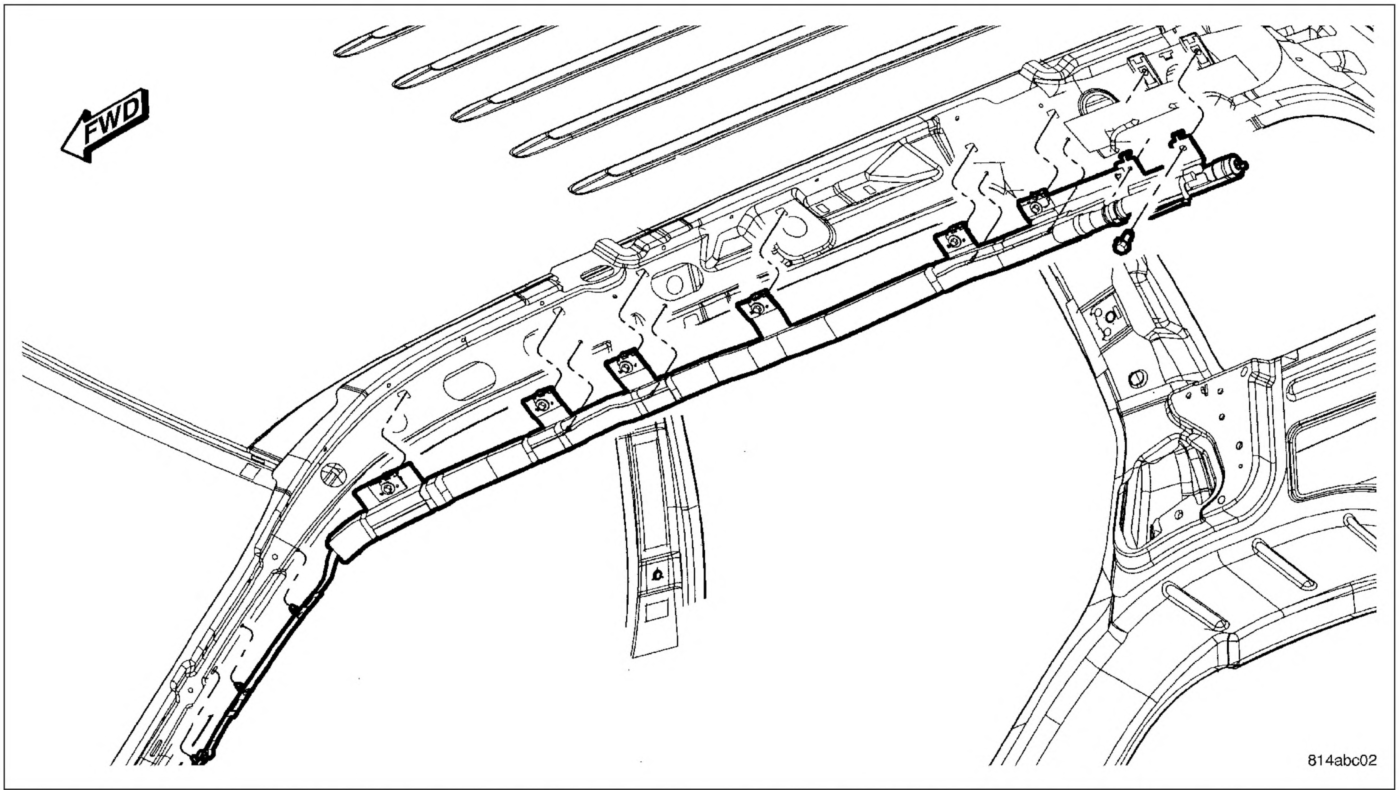
INSTALLATION

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

WARNING: To avoid personal injury or death, use extreme care to prevent any foreign material from entering the side curtain airbag, or becoming entrapped between the side curtain airbag cushion and the headliner. Failure to observe this warning could result in occupant injuries upon airbag deployment.

NOTE: The following procedure is for replacement of a faulty or damaged side curtain airbag. If the airbag is faulty or damaged, but not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the side curtain airbag has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

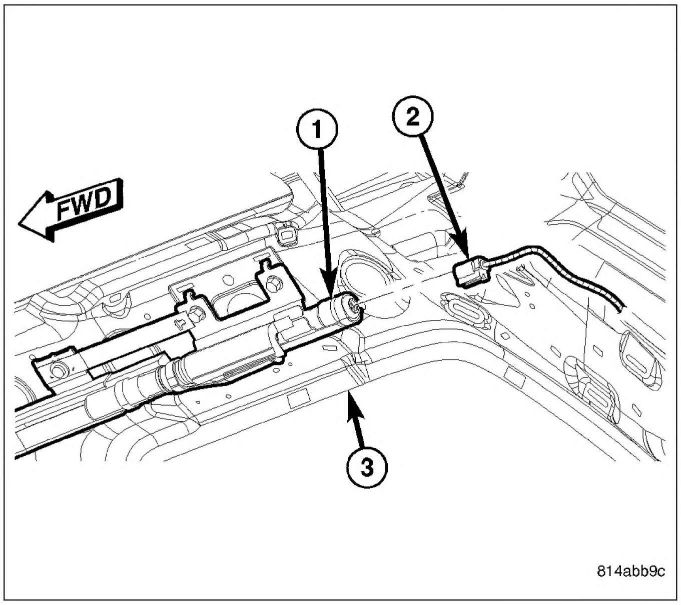


1. Check to be certain that the two U-nuts for the side curtain airbag inflator bracket and the six J-nuts for the airbag channel are properly installed in the inner roof rail and that they are in good condition.
2. Position the side curtain airbag into the vehicle as a unit.
3. Engage the integral hooks on the side curtain airbag inflator mounting bracket into the locating holes in the inner roof side rail near the D-pillar.

4. Install and tighten the two screws that secure the inflator mounting bracket to the U-nuts in the inner roof side rail. Tighten the screws to 6 N·m (50 in. lbs.).

NOTE: Be certain that the airbag cushion is not twisted during installation. If a red stripe on the cushion is visible, the bag is twisted and must be untwisted before it is secured to the roof side rail.

5. Engage the two plastic push-in fasteners that secure the airbag cushion channel to the roof side rail at the top of the C-pillar.
6. Engage the two plastic push-in fasteners that secure the channel to the roof side rail at the top of the B-pillar.
7. Install and tighten the six screws that secure the airbag channel to the J-nuts in the inner roof side rail. Tighten the screws to 6 N·m (50 in. lbs.).
8. Engage the hook on the end of the side curtain airbag front tether into the slot in the inner A-pillar.
9. Engage the two plastic retainers that secure the side curtain airbag front tether to the inner A-pillar.

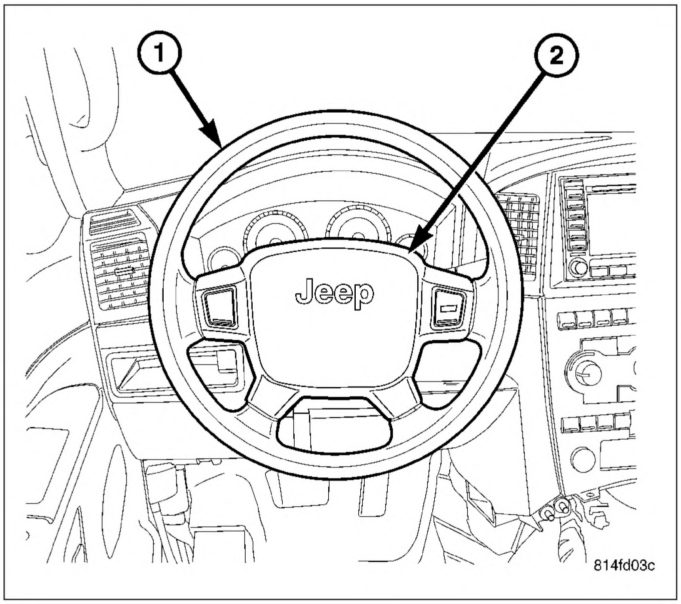


10. Reconnect the body wire harness connector (2) for the side curtain airbag to the connector receptacle at the back of the inflator (1) on the roof side rail (3).
11. Reinstall the headliner into the vehicle. (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
12. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

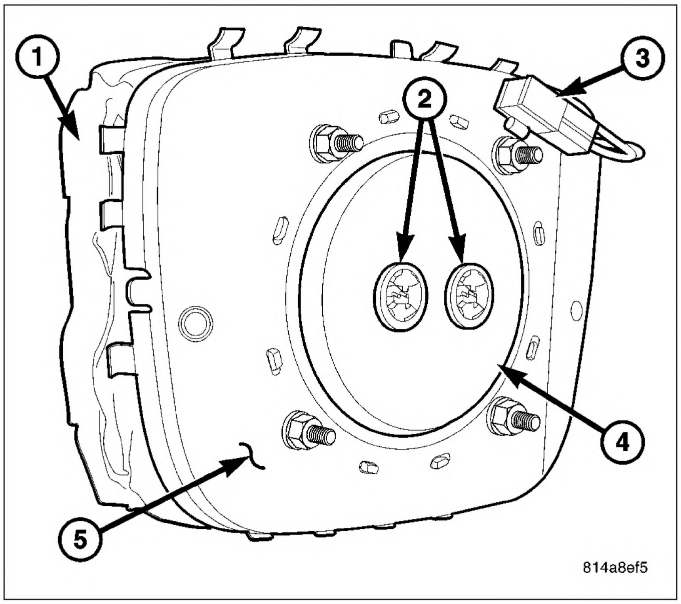
DRIVER AIRBAG

DESCRIPTION

The injection molded, thermoplastic driver airbag protective trim cover (2) is the most visible part of the driver airbag. The driver airbag is located in the center of the steering wheel (1), where it is secured with two screws to the two horizontal spokes of the four-spoke steering wheel armature. A stamped, satin polished emblem with the Jeep® logo is applied to the center of the trim cover. Concealed beneath the driver airbag trim cover are the horn switch, the folded airbag cushion, the airbag cushion retainer, the airbag housing, the airbag inflator, and the retainers that secure the inflator to the airbag housing.



The airbag cushion (1), housing (5), and inflator (4) are secured within an integral receptacle molded into the back of the trim cover. The four vertical walls of this receptacle have numerous small windows with blocking tabs that are engaged by numerous hook formations around the perimeter of the airbag housing. Each hook is inserted through one of the windows and the blocking tab in each window keeps the hook properly engaged with the trim cover, locking the trim cover securely into place on the airbag housing.



The resistive membrane-type horn switch is secured within a plastic tray that is inserted in a pocket or pouch sewn onto the airbag cushion retainer strap, between the trim cover and the folded airbag cushion. The horn switch ground and feed pigtail wires have a molded plastic connector insulator (3) that is secured by an integral retainer in a locator hole near the upper left corner of the airbag housing and is connected to the vehicle electrical system through a dedicated take out and connector of the steering wheel wire harness.

The airbag used in this model is a multistage-type that complies with revised federal airbag standards to deploy with less force than those used in some prior models. A radial deploying fabric airbag cushion with internal tethers is used. The airbag inflator is a dual-initiator, non-azide, pyrotechnic-type unit with four mounting studs and is secured to the stamped metal airbag housing using four flanged hex nuts. Two keyed and color-coded connector receptacles on the driver airbag inflator connect the two inflator initiators to the vehicle electrical system through two yellow-jacketed, two-wire pigtail harnesses of the clockspring.

The driver airbag cannot be repaired, and must be replaced if deployed or in any way damaged. The driver airbag trim cover and the horn switch may be disassembled from the driver airbag unit, and are available for individual service replacement.

OPERATION

The multistage driver airbag is deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver airbag squib 1 and squib 2 circuits to the two initiators in the airbag inflator. By using two initiators, the airbag can be deployed at multiple levels of force. The force level is controlled by the ORC to suit the monitored impact conditions by providing one of four delay intervals between the electrical signals provided to the two initiators. The longer the delay between these signals, the less forcefully the airbag will deploy.

When the ORC sends the proper electrical signals to each initiator, the electrical energy generates enough heat to initiate a small pyrotechnic charge which, in turn ignites chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas. The inflator is sealed to the back of the airbag housing and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the driver airbag trim cover will split at predetermined breakout lines, then fold back out of the way along with the horn switch and tray unit. Following an airbag deployment, the airbag cushion quickly deflates by venting the inert gas towards the instrument panel through vent holes within the fabric used to construct the back (steering wheel side) panel of the airbag cushion.

Some of the chemicals used to create the inert gas may be considered hazardous while in their solid state before they are burned, but they are securely sealed within the airbag inflator. Typically, both initiators are used and all potentially hazardous chemicals are burned during an airbag deployment event. However, it is possible for only one initiator to be used during a deployment due to an airbag system fault; therefore, it is necessary to always confirm that both initiators have been used in order to avoid the improper disposal of potentially live pyrotechnic or hazardous materials. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

The inert gas that is produced when the chemicals are burned is harmless. However, a small amount of residue from the burned chemicals may cause some temporary discomfort if it contacts the skin, eyes, or breathing passages. If skin or eye irritation is noted, rinse the affected area with plenty of cool, clean water. If breathing passages are irritated, move to another area where there is plenty of clean, fresh air to breath. If the irritation is not alleviated by these actions, contact a physician.

REMOVAL

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag cushion and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

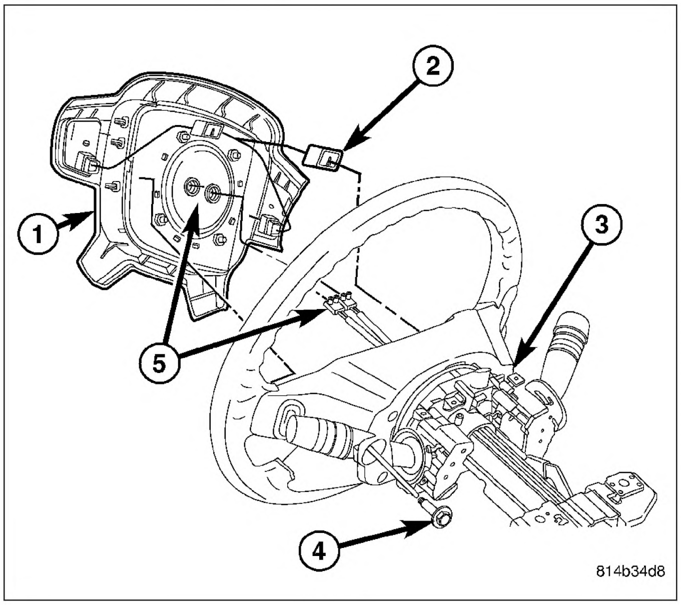
NOTE: The following procedure is for replacement of a faulty or damaged driver airbag. If the airbag is faulty or damaged, but not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the driver airbag has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.

NOTE: It will be necessary to rotate the steering wheel to orient each of the two spokes to which the airbag is secured alternately toward the bottom of the steering column in order to access the fasteners.

2. From the underside of the steering wheel, remove the two screws (4) that secure the driver airbag (1) to the steering wheel armature (3).

CAUTION: Do not pull on the horn switch pigtail wires to disengage the connector from the driver airbag housing or to disconnect the horn switch to driver airbag jumper harness connection. Improper pulling on this pigtail wire or connection can result in damage to the horn switch membrane or the feed and ground circuits.



3. Pull the driver airbag away from the steering wheel far enough to access the electrical connections at the back of the airbag housing.
4. Disconnect the driver airbag jumper harness connector (2) for the horn switch and the cruise control switches on the back of the driver airbag trim cover from the clockspring.

CAUTION: Do not pull on the clockspring pigtail wires or pry on the connector insulator to disengage the connector from the driver airbag inflator connector receptacle. Improper removal of these pigtail wires and their connector insulators can result in damage to the airbag circuits or connector insulators.

5. The clockspring driver airbag pigtail wire connectors are secured by an integral lock to the airbag inflator connector receptacles (5), which are located on the back of the driver airbag housing. Firmly grasp and pull the lock straight out from the connector insulator, then pull the insulators straight out from the airbag inflator to disconnect them from the connector receptacles.
6. Remove the driver airbag from the steering wheel.
7. If the driver airbag has been deployed, the clockspring must be replaced. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - REMOVAL).

DISASSEMBLY

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

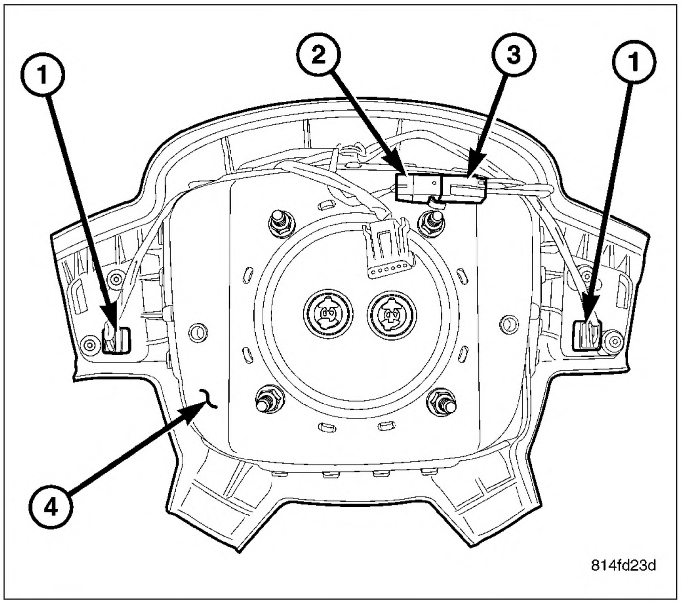
WARNING: To avoid personal injury or death, service of this unit should be performed only by DaimlerChrysler-trained and authorized dealer service technicians. Failure to take the proper precautions or to follow the proper procedures could result in accidental, incomplete, or improper airbag deployment and possible occupant injuries.

WARNING: To avoid personal injury or death, use extreme care to prevent any foreign material from entering the driver airbag, or becoming entrapped between the driver airbag cushion and the driver airbag trim cover. Failure to observe this warning could result in occupant injuries upon airbag deployment.

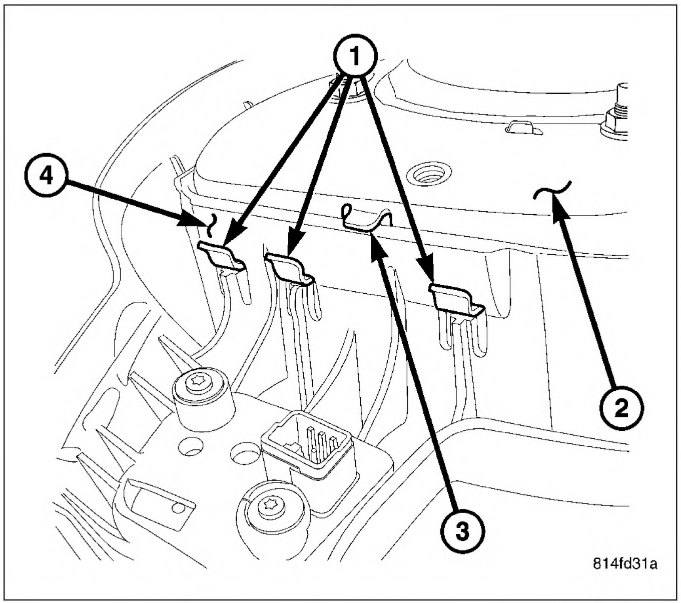
WARNING: To avoid personal injury or death, the driver airbag trim cover must never be painted. Replacement trim covers are serviced in the original colors. Paint may change the way in which the material of the trim cover responds to an airbag deployment. Failure to observe this warning could result in occupant injuries upon airbag deployment.

NOTE: The following procedures can be used to replace the driver airbag trim cover and/or to access the horn switch unit for service. If the driver airbag is faulty or deployed, the entire driver airbag, trim cover, and horn switch must be replaced as a unit.

1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the driver airbag from the steering wheel. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).
3. Place the driver airbag on a suitable work surface with the trim cover facing down. If the trim cover will be reused, be certain to take the proper precautions to prevent the trim cover from receiving cosmetic damage during the following procedures.
4. Disconnect the driver airbag jumper harness connector (2) from the horn switch pigtail wire connector (3).
5. Carefully pry the horn switch pigtail wire connector away from the back of the driver airbag housing (3) far enough to disengage the integral connector retainer from the locator hole just above the upper left inflator mounting stud.



6. Disengage each of the fifteen hooks (1) of the airbag housing (2) from the fifteen windows in the vertical walls of the trim cover (4), one wall at a time. Start by disengaging the two side walls from under the engagement tabs (3), and finish with the upper and lower wall. To disengage the hooks, use hand pressure to push the adjacent edge of the airbag housing firmly and evenly downward into the trim cover receptacle, while at the same time pulling outward on the upper edge of the receptacle wall.
7. With all of the hooks disengaged, lift the housing, inflator, cushion and horn switch as a unit from the receptacle on the back of the driver airbag trim cover.



ASSEMBLY

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

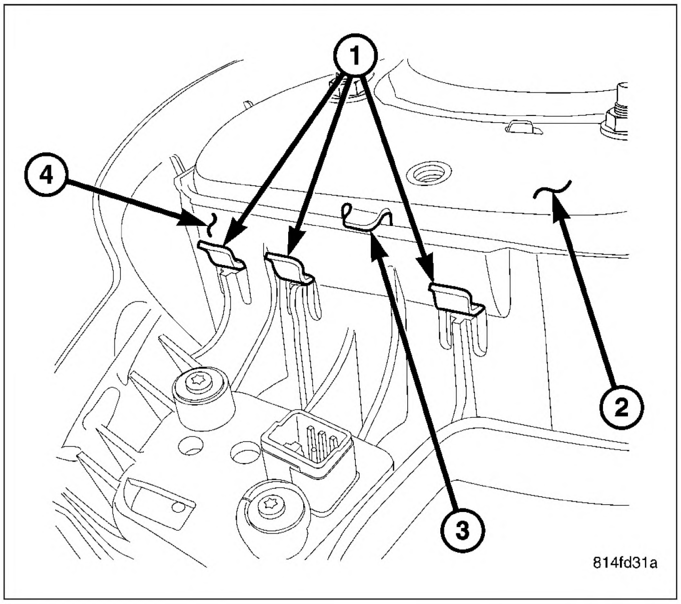
WARNING: To avoid personal injury or death, service of this unit should be performed only by DaimlerChrysler-trained and authorized dealer service technicians. Failure to take the proper precautions or to follow the proper procedures could result in accidental, incomplete, or improper airbag deployment and possible occupant injuries.

WARNING: To avoid personal injury or death, use extreme care to prevent any foreign material from entering the driver airbag, or becoming entrapped between the driver airbag cushion and the driver airbag trim cover. Failure to observe this warning could result in occupant injuries upon airbag deployment.

WARNING: To avoid personal injury or death, the driver airbag trim cover must never be painted. Replacement trim covers are serviced in the original colors. Paint may change the way in which the material of the trim cover responds to an airbag deployment. Failure to observe this warning could result in occupant injuries upon airbag deployment.

NOTE: The following procedures can be used to replace the driver airbag trim cover and/or to access the horn switch unit for service. If the driver airbag is faulty or deployed, the entire driver airbag, trim cover, and horn switch must be replaced as a unit.

NOTE: If the horn switch and tray have been removed from the sewn pouch in the airbag cushion retaining strap, be certain that they are properly reinstalled with the horn switch feed and ground pigtail wires properly oriented before assembling the trim cover onto the airbag housing. (Refer to 8 - ELECTRICAL/HORN/HORN SWITCH - INSTALLATION).



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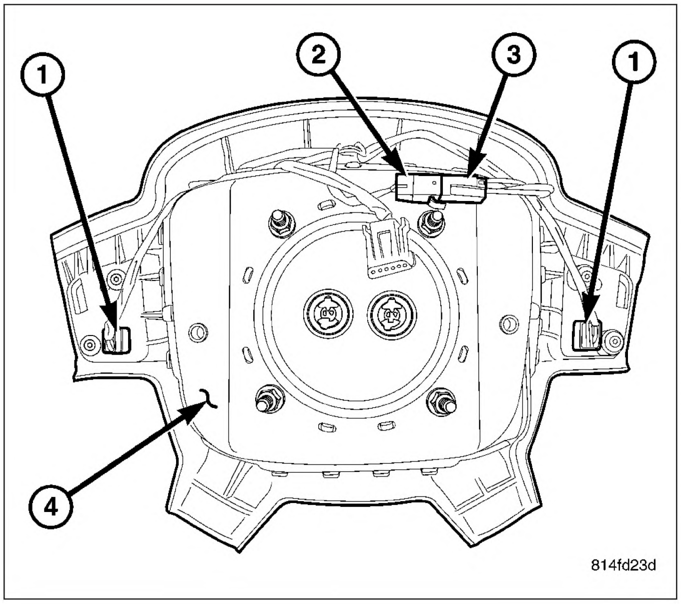
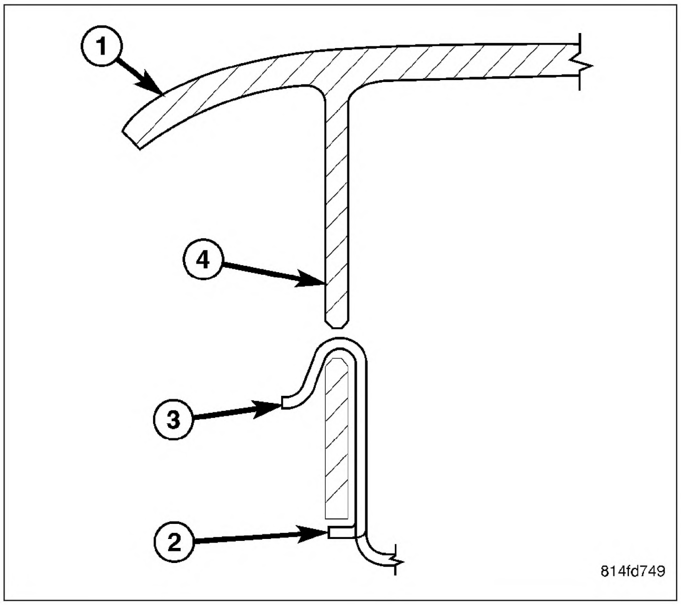
1. If the driver airbag trim cover is being replaced with a new unit, transfer the cruise control switches and the driver airbag jumper harness to the new trim cover. (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - REMOVAL) and (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - INSTALLATION).
2. Place the driver airbag trim cover (4) on a suitable work surface with the airbag receptacle facing up. Be certain to take the proper precautions to prevent the trim cover from receiving cosmetic damage during the following procedures.
3. Carefully position the driver airbag housing (2) into the trim cover receptacle. Be certain that the horn switch feed and ground pigtail wires are not pinched between the housing and the upper vertical wall of the trim cover receptacle.
4. Work around the perimeter of the unit engaging each of the fifteen hooks (1) on the driver airbag housing through the windows in the walls of the trim cover receptacle.

5. Using hand pressure, push the integral retainer of the horn switch pigtail wire connector (3) into the locator hole just above the upper left inflator mounting stud on the back of the airbag housing.
6. Reconnect the driver airbag jumper harness connector (2) to the horn switch pigtail wire connector (3).
7. After the driver airbag has been assembled, try pulling the trim cover and the airbag housing away from each other. This action will fully seat the edges of the windows into the cradles of the hooks and engage the side walls of the trim cover receptacle under the engagement tabs.



8. Before reinstalling the airbag onto the steering wheel, check that the blocking tab (4) in each of the trim cover (1) windows is oriented over the airbag housing hook (3), and the engagement tab (2) on each side of the housing is oriented over the side wall of the trim cover receptacle as shown.
9. Reinstall the driver airbag onto the steering wheel. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).



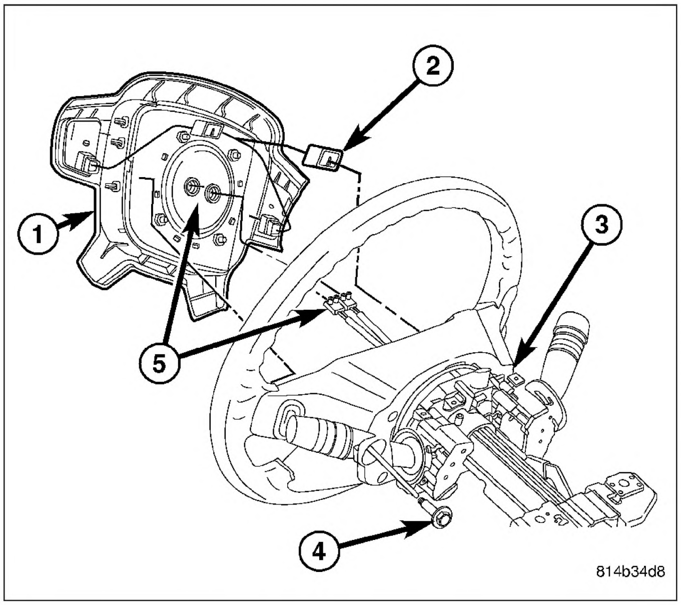
INSTALLATION

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, use extreme care to prevent any foreign material from entering the driver airbag, or becoming entrapped between the driver airbag cushion and the driver airbag trim cover. Failure to observe this warning could result in occupant injuries upon airbag deployment.

WARNING: To avoid personal injury or death, the driver airbag trim cover must never be painted. Replacement airbags are serviced with trim covers in the original colors. Paint may change the way in which the material of the trim cover responds to an airbag deployment. Failure to observe this warning could result in occupant injuries upon airbag deployment.

NOTE: The following procedure is for replacement of a faulty or damaged driver airbag. If the airbag is faulty or damaged, but not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the driver airbag has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).



1. Position the driver airbag (1) close enough to the steering wheel to reconnect the electrical connections on the back of the airbag housing.
2. When installing the driver airbag, reconnect the two clockspring driver airbag pigtail wire connectors to the airbag inflator connector receptacles (5) by pressing straight in on the connectors, then pushing the locks straight into the connectors. Be certain to engage each keyed and color-coded connector to the matching connector receptacle. You can be certain that the connector is fully engaged by listening carefully for a distinct, audible click as the connector latches snap into place.
3. Reconnect the driver airbag jumper harness connector (2) for the horn switch and the cruise control switches on the back of the driver airbag trim cover to the clockspring.
4. Carefully position the driver airbag in the steering wheel (3). Be certain that the clockspring pigtail wires and the driver airbag jumper harness are not pinched between the driver airbag and the steering wheel armature.

NOTE: It will be necessary to rotate the steering wheel to orient each of the two spokes to which the airbag is secured alternately toward the bottom of the steering column in order to access the fasteners.

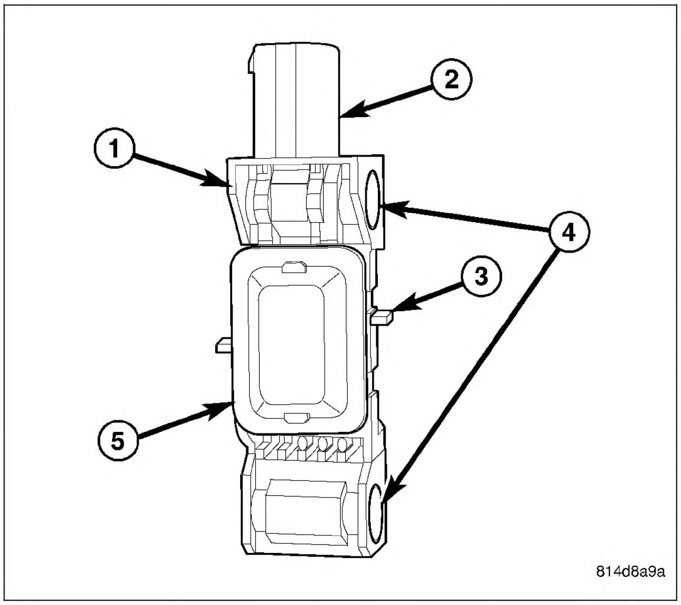
5. From the underside of the steering wheel, install and tighten the two screws (4) that secure the driver airbag to the steering wheel armature. Tighten the screws to 10 N·m (90 in. lbs.).
6. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

IMPACT SENSOR

DESCRIPTION

FRONT

Two front impact sensors (1) are used on this model, one each for the left and right sides of the vehicle. These sensors are mounted remotely from the impact sensor that is internal to the Occupant Restraint Controller (ORC). Each front sensor is secured with two flanged hex nuts to two studs on the backs of the right and left vertical members of the radiator support within the engine compartment. The sensor housing has an integral connector receptacle (2), an integral anti-rotation pin (3), and two integral mounting holes (4) with metal sleeves to provide crush protection.

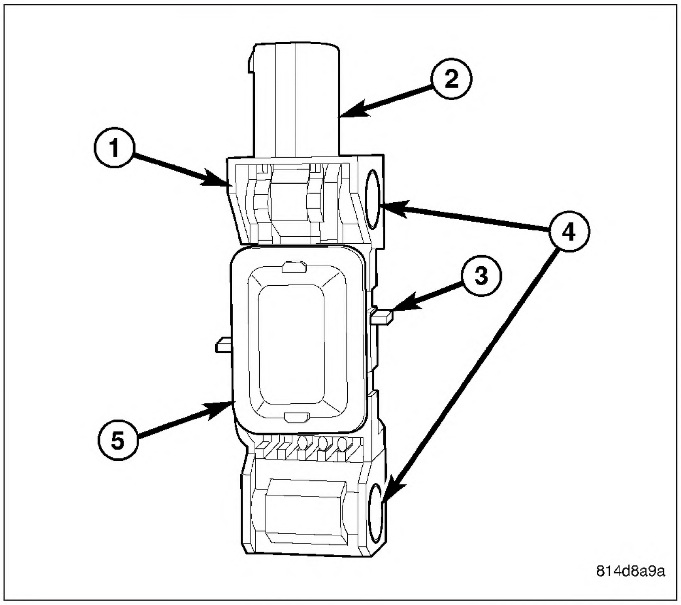


The right and left front impact sensors are identical in construction and calibration. A label on the sensor is imprinted with an arrow, which should always be pointed forward in the vehicle. A cavity in the center of the molded plastic impact sensor housing contains the electronic circuitry of the sensor which includes an electronic communication chip and an electronic impact sensor. Potting material fills the cavity and a stamped cover (5) is crimped over the cavity to seal and protect the internal electronic circuitry and components. The front impact sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness.

The impact sensors cannot be repaired or adjusted and, if damaged or faulty, they must be replaced.

SIDE

Four side impact sensors (2) are used on this model when it is equipped with the optional side curtain airbags, two each for the left and right sides of the vehicle. These sensors are mounted remotely from the impact sensor that is internal to the Occupant Restraint Controller (ORC). Each side sensor is secured with two screws to the inner right or left B-pillar and C-pillar beneath the trim within the passenger compartment. The sensor housing has an integral connector receptacle (3), an integral anti-rotation pin (4), and two integral mounting holes (1) with metal sleeves to provide crush protection.



The right and left side impact sensors are identical in construction and calibration. A label on the sensor is imprinted with an arrow, which should always be pointed forward in the vehicle. A cavity in the center of the molded plastic impact sensor housing contains the electronic circuitry of the sensor which includes an electronic communication chip and an electronic impact sensor. Potting material fills the cavity and a stamped cover (5) is crimped over the cavity to seal and protect the internal electronic circuitry and components. The side impact sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the body wire harness.

The impact sensors cannot be repaired or adjusted and, if damaged or faulty, they must be replaced.

OPERATION

FRONT

The front impact sensors are electronic accelerometers that sense the rate of vehicle deceleration, which provides verification of the direction and severity of an impact. Each sensor also contains an electronic communication chip that allows the unit to communicate the sensor status as well as sensor fault information to the microprocessor in the Occupant Restraint Controller (ORC).

The ORC microprocessor continuously monitors all of the passive restraint system electrical circuits to determine the system readiness. If the ORC detects a monitored system fault, it sets a Diagnostic Trouble Code (DTC) and controls the airbag indicator operation accordingly. The impact sensors each receive battery current and ground through dedicated left and right sensor plus and minus circuits from the ORC. The impact sensors and the ORC communicate by modulating the voltage in the sensor plus circuit.

The hard wired circuits between the front impact sensors and the ORC may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the ORC, the impact sensors, or the electronic message inputs to or outputs from the impact sensors. The most reliable, efficient, and accurate means to diagnose the impact sensors, the ORC, and the electronic message communication between the sensors and the ORC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

SIDE

The side impact sensors are electronic accelerometers that sense the rate of vehicle deceleration, which provides verification of the direction and severity of an impact. Each sensor also contains an electronic communication chip that allows the unit to communicate the sensor status as well as sensor fault information to the microprocessor in the Occupant Restraint Controller (ORC).

The ORC microprocessor continuously monitors all of the side passive restraint system electrical circuits to determine the system readiness. If the ORC detects a monitored system fault, it sets a Diagnostic Trouble Code (DTC) and controls the airbag indicator operation accordingly. The impact sensors each receive battery current and ground through the same left or right sensor plus and minus circuits in a series arrangement from the ORC. The impact sensors and the ORC communicate by modulating the voltage in the sensor plus circuit.

The hard wired circuits between the side impact sensors, and those between the sensors and the ORC may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the ORC, the impact sensors, or the electronic message inputs to or outputs from the impact sensors. The most reliable, efficient, and accurate means to diagnose the impact sensors, the ORC, and the electronic message communication between the sensors and the ORC requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

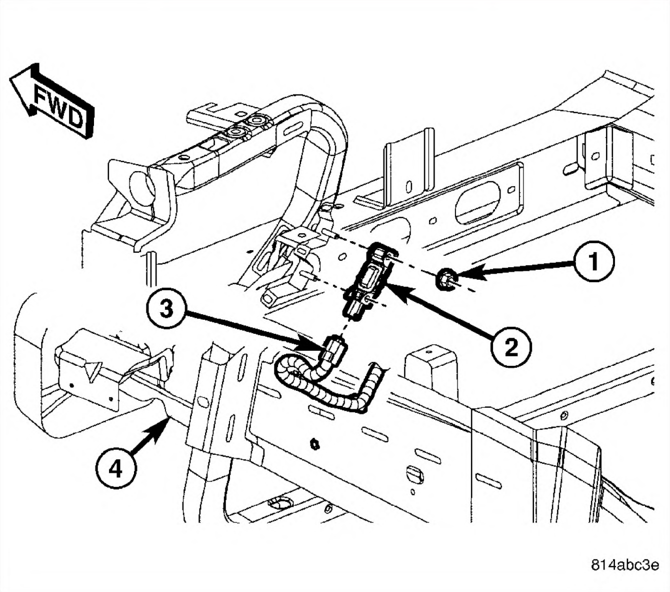
FRONT

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the front impact sensor, as it can damage the impact sensor or affect its calibration. The front impact sensor enables the system to deploy the front supplemental restraints. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front supplemental restraint deployment.

NOTE: The front and side impact sensors are interchangeable.

1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the two nuts (1) that secure the right or left front impact sensor (2) to the studs on the back of the right or left radiator support vertical member.
3. Disconnect the headlamp and dash wire harness connector (3) from the sensor connector receptacle.
4. Remove the right or left front impact sensor from the engine compartment.



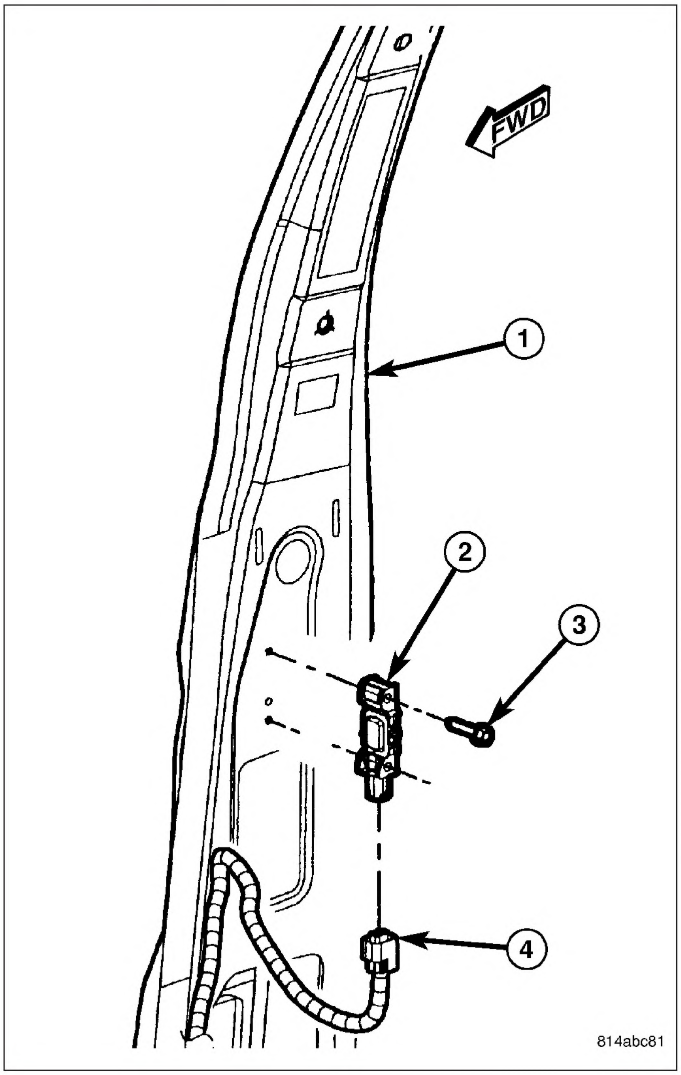
SIDE - B-PILLAR

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side curtain supplemental restraints. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front supplemental restraint deployment.

NOTE: The front and side impact sensors are interchangeable.

1. Adjust the driver or passenger side front seat to its most forward position for easiest access to the B-pillar trim.
2. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
3. Remove the trim from the inside of the lower right or left B-pillar (1). (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).
4. Remove the two screws (3) that secure the side impact sensor (2) to the lower B-pillar.
5. Disconnect the body wire harness connector (4) from the sensor connector receptacle.
6. Remove the sensor from the B-pillar.



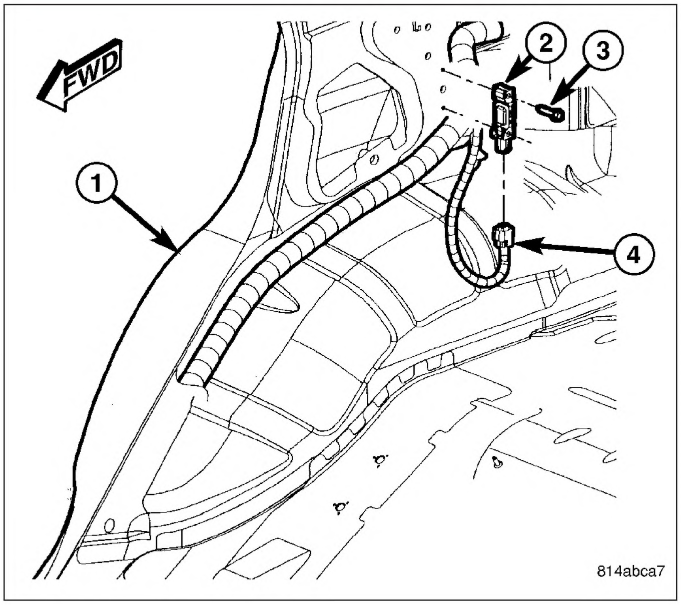
SIDE - C-PILLAR

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side curtain supplemental restraints. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front supplemental restraint deployment.

NOTE: The front and side impact sensors are interchangeable.

1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the quarter trim panel from the lower C-pillar. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).
3. Remove the two screws (3) that secure the side impact sensor (2) to the C-pillar (1).
4. Disconnect the body wire harness connector (4) from the sensor connector receptacle.
5. Remove the sensor from the C-pillar.



INSTALLATION

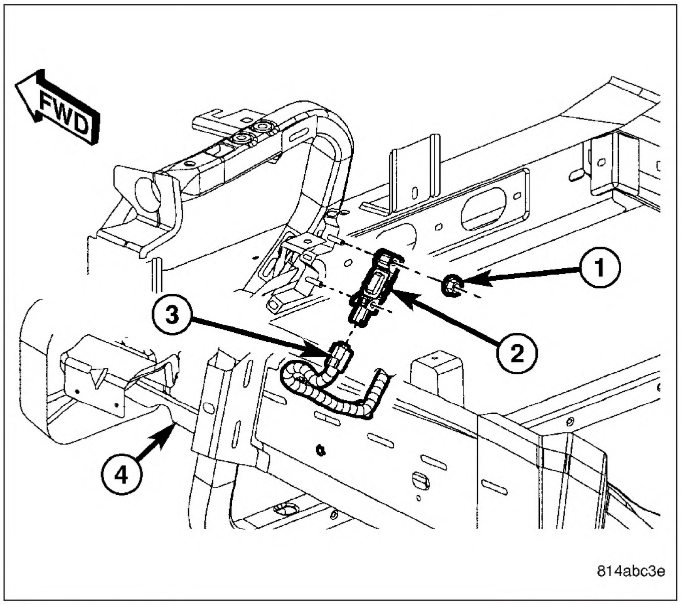
FRONT

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the front impact sensor, as it can damage the impact sensor or affect its calibration. The front impact sensor enables the system to deploy the front supplemental restraints. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front supplemental restraint deployment.

NOTE: The front and side impact sensors are interchangeable.

1. Position the right or left front impact sensor (2) into the engine compartment.
2. Reconnect the headlamp and dash wire harness connector (3) to the sensor connector receptacle.
3. Carefully position the sensor onto the studs on the back of the right or left radiator support vertical member. Be certain that the anti-rotation pin on the back of the sensor is engaged in the center clearance hole of the radiator support and the arrow on the sensor label is pointed forward in the vehicle.
4. Install and tighten the two nuts that secure the sensor to the back of the support vertical member. Tighten the nuts to 8 N·m (70 in. lbs.).
5. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system compo-



nent. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

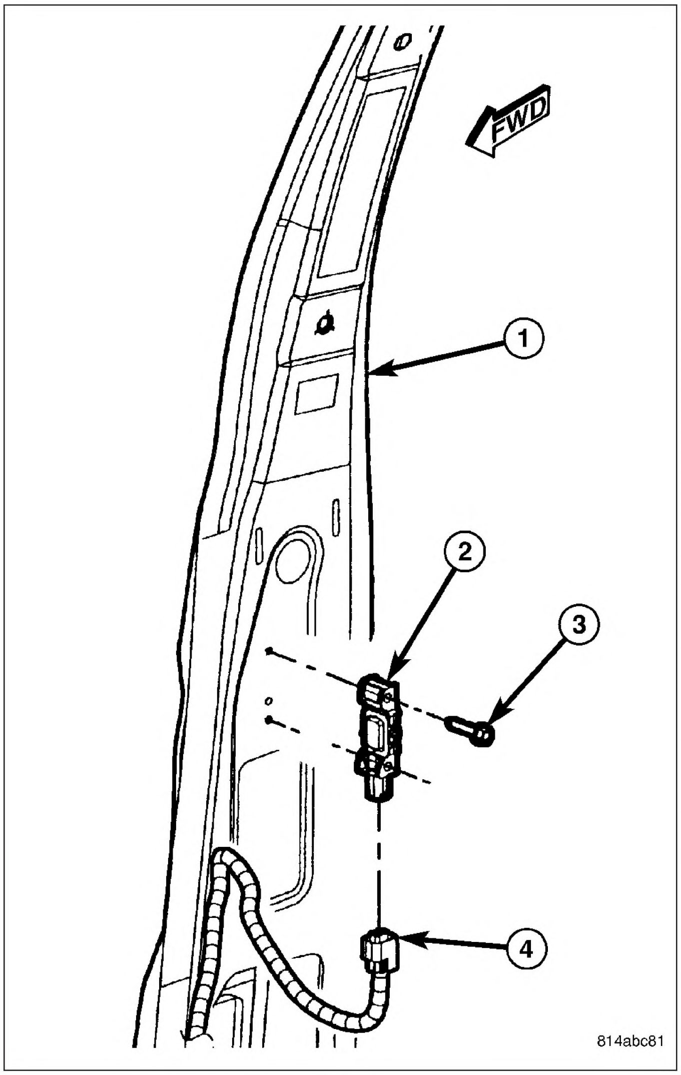
SIDE - B-PILLAR

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side curtain supplemental restraints. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front supplemental restraint deployment.

NOTE: The front and side impact sensors are interchangeable.

1. Position the side impact sensor near the inner B-pillar.
2. Reconnect the body wire harness connector (4) to the sensor connector receptacle.
3. Position the sensor onto the inner B-pillar. Be certain that the anti-rotation pin on the back of the sensor is engaged in the clearance hole of the B-pillar.
4. Install and tighten the two screws that secure the sensor to the inner B-pillar. Tighten the screws to 8 N·m (70 in. lbs.).
5. Reinstall the lower trim onto the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).
6. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

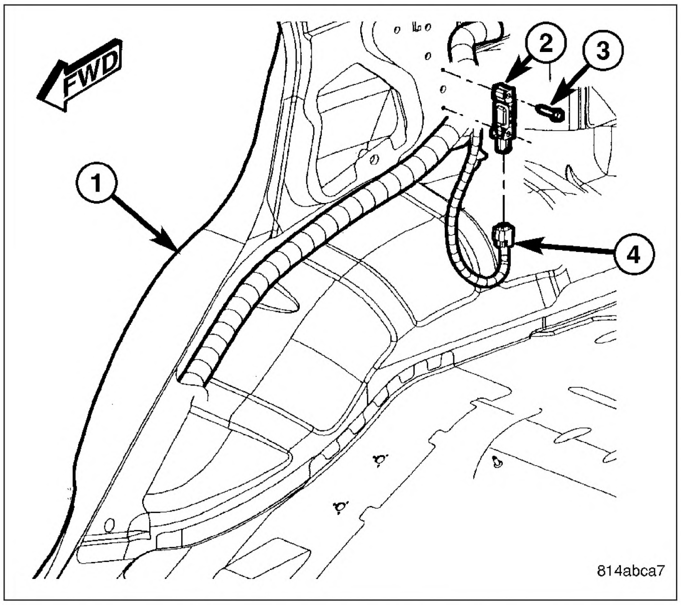


SIDE - C-PILLAR

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the side impact sensor, as it can damage the impact sensor or affect its calibration. The side impact sensor enables the system to deploy the side curtain supplemental restraints. If an impact sensor is accidentally dropped during service, the sensor must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper front supplemental restraint deployment.

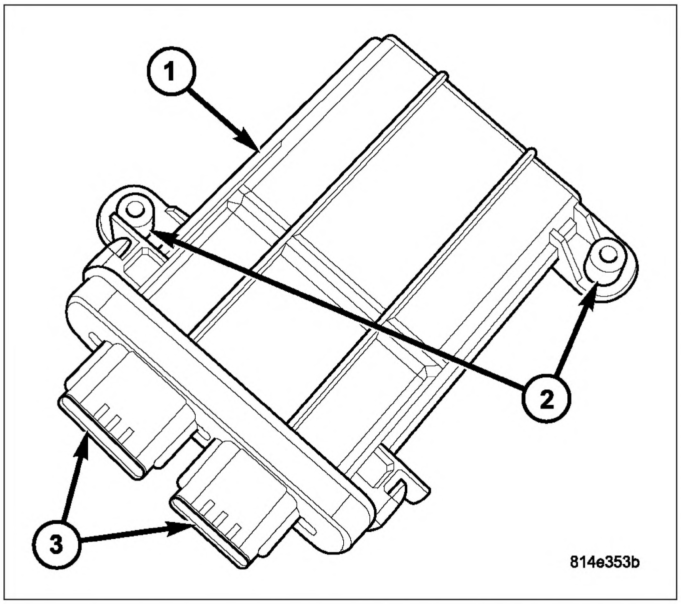
NOTE: The front and side impact sensors are interchangeable.



1. Position the side impact sensor (2) near the inner C-pillar (1).
2. Reconnect the body wire harness connector (4) to the sensor connector receptacle.
3. Position the sensor onto the inner C-pillar. Be certain that the anti-rotation pin on the back of the sensor is engaged in the clearance hole of the C-pillar.
4. Install and tighten the two screws (3) that secure the sensor to the inner C-pillar. Tighten the screws to 8 N·m (70 in. lbs.).
5. Reinstall the quarter trim panel onto the lower C-pillar. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).
6. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

OCCUPANT CLASSIFICATION MODULE

DESCRIPTION



The Occupant Classification Module (OCM) (1) is secured with two screws to a mount on the underside of the passenger side front seat cushion frame near the inboard front corner. Concealed within a hollow in the center of the molded plastic OCM housing is a microprocessor and the other electronic circuitry of the module. The module housing is sealed to enclose and protect the internal electronic circuitry. The OCM software is flash programmable.

Two mounting tabs (2) and two connector receptacles (3) are integral to the OCM housing. The connector receptacles contain terminal pins that connect the OCM to the vehicle electrical system through a dedicated take out and connector of the passenger side front seat wire harness, and a second take out and connector of the body wire harness.

A non-calibrated OCM is available for separate service replacement. The OCM and all of the other components of the Occupant Classification System (OCS) including the passenger side front seat, the seat weight sensors, the passenger or driver seat track position sensor and the seat adjusters, cushion, back, frame, foam, springs, and wiring harness are a factory-calibrated and assembled unit. Any time any one of these components is removed or replaced for any reason, the OCM must be re-calibrated using a diagnostic scan tool, the Occupant Classification Seat Weight special tool, and the Occupant Classification System Verification Test. Refer to the appropriate diagnostic procedures.

The OCM cannot be adjusted or repaired and, if damaged or faulty, it must be replaced.

OPERATION

The microprocessor in the Occupant Classification Module (OCM) contains the Occupant Classification System (OCS) logic circuits. The OCM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the diagnostic scan tool using the Controller Area Network (CAN) data bus. This method of communication is also used for OCS diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

The OCM provides voltage to the four seat weight sensors located on the corners of the passenger side front seat, and to the seat track position sensors on the outboard passenger and driver side front seat upper seat tracks. The OCM then monitors return inputs from each of the sensors on dedicated hard wired data communication circuits. The seat weight sensor input allows the OCM to determine whether the passenger side front seat is occupied and the relative size of the occupant by providing a weight-sensing reference to the load on the seat. The seat track position sensor provides an additional logic input to the OCM microprocessor that allows it to determine the position of the front seat passenger and driver relative to the front airbags.

Pre-programmed decision algorithms and OCS calibration allow the OCM microprocessor to determine when passenger airbag protection is appropriate based upon the seat load as signaled by the seat weight sensors. When the programmed conditions are met, the OCM sends the proper electronic occupant classification messages over the CAN data bus to the Occupant Restraint Controller (ORC), and the ORC enables or disables the deployment circuits for the passenger front supplemental restraints. The ORC also provides a control output for the passenger airbag on/off indicator in the instrument panel based upon the electronic occupant classification messages it receives from the OCM.

The OCM also sends electronic driver and passenger seat track position messages to the ORC over the CAN data bus. The ORC uses the seat track position data as an additional logic input for determining the force level with which to deploy the multistage front airbags.

The OCM microprocessor continuously monitors all of the OCS electrical circuits and components to determine the system readiness. If the OCM detects a monitored system fault, it sets an active and stored Diagnostic Trouble

Code (DTC) and sends the appropriate electronic messages to the ORC over the CAN data bus. Then the ORC sets a DTC and sends messages to control the airbag indicator operation accordingly. An active fault only remains for the duration of the fault, or in some cases for the duration of the current ignition switch cycle, while a stored fault causes a DTC to be stored in memory by the OCM and the ORC. For some DTCs, if a fault does not recur for a number of ignition cycles, the OCM will automatically erase the stored DTC. For other internal faults, the stored DTC is latched forever.

The OCM receives battery current on a fused ignition switch output (run-start) circuit through a fuse in the Junction Block (JB). The OCM receives ground through a ground circuit and take out of the body wire harness. These connections allow the OCM to be operational whenever the ignition switch is in the Start or On positions.

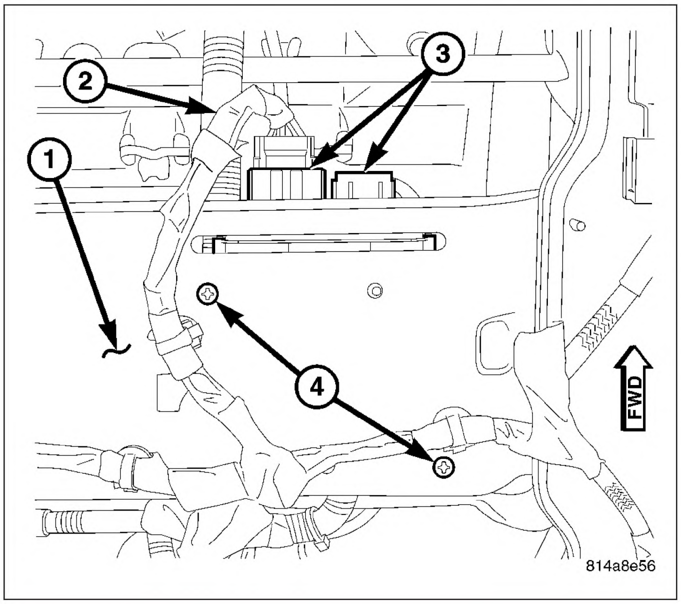
The hard wired inputs and outputs for the OCM may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the OCM, the CAN data bus, or the electronic message inputs to and outputs from the OCM. The most reliable, efficient, and accurate means to diagnose the OCM, the CAN data bus network, and the electronic message inputs to and outputs from the OCM requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

NOTE: A non-calibrated Occupant Classification Module (OCM) is available for separate service replacement. The OCM and all of the other components of the Occupant Classification System (OCS) including the passenger side front seat, the seat weight sensors, the passenger or driver seat track position sensor and the seat adjusters, cushion, back, frame, foam, springs, and wiring harness are a factory-calibrated and assembled unit. Any time any one of these components is removed or replaced for any reason, the OCM must be re-calibrated using a diagnostic scan tool, the Occupant Classification Seat Weight special tool, and the Occupant Classification System Verification Test. Refer to the appropriate diagnostic procedures.

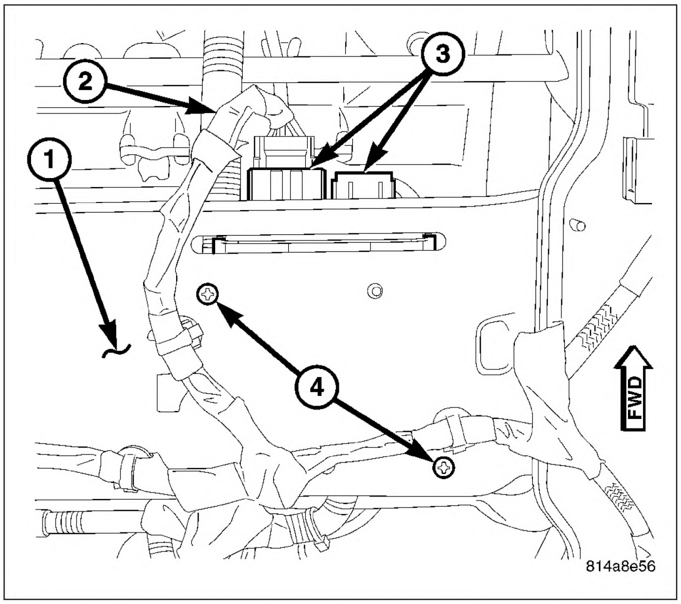
1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the passenger side front seat from the vehicle. (Refer to 23 - BODY/SEATS/SEAT - FRONT - REMOVAL).
3. Disconnect the seat wire harness (2) connector from the Occupant Classification Module (OCM) connector receptacle (3) located on the forward facing side of the module.
4. Remove the two screws (4) that secure the OCM to the bracket (1) on the underside of the passenger side front seat cushion frame.
5. Remove the OCM from the passenger side front seat.



INSTALLATION

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

NOTE: A non-calibrated Occupant Classification Module (OCM) is available for separate service replacement. The OCM and all of the other components of the Occupant Classification System (OCS) including the passenger side front seat, the seat weight sensors, the passenger or driver seat track position sensor and the seat adjusters, cushion, back, frame, foam, springs, and wiring harness are a factory-calibrated and assembled unit. Any time any one of these components is removed or replaced for any reason, the OCM must be re-calibrated using a diagnostic scan tool, the Occupant Classification Seat Weight special tool, and the Occupant Classification System Verification Test. Refer to the appropriate diagnostic procedures.



1. Carefully position the Occupant Classification Module (OCM) to the bracket (1) on the underside of the passenger side front seat cushion frame. When the OCM is correctly positioned, the connector receptacles (3) on the module will be pointed forward in the vehicle.
2. Install and tighten the two screws (4) that secure the OCM to the bracket. Tighten the screws to 2 N·m (20 in. lbs.).
3. Reconnect the seat wire harness (2) connector to the OCM connector receptacle located on the outboard side of the module. Be certain that the latch on the connector is fully engaged.
4. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).
5. Following successful completion of the supplemental restraint system verification test procedure, perform the Occupant Classification System Verification Test using a diagnostic scan tool. Refer to the appropriate diagnostic procedures.

MODULE-OCCUPANT RESTRAINT CONTROLLER

REMOVAL

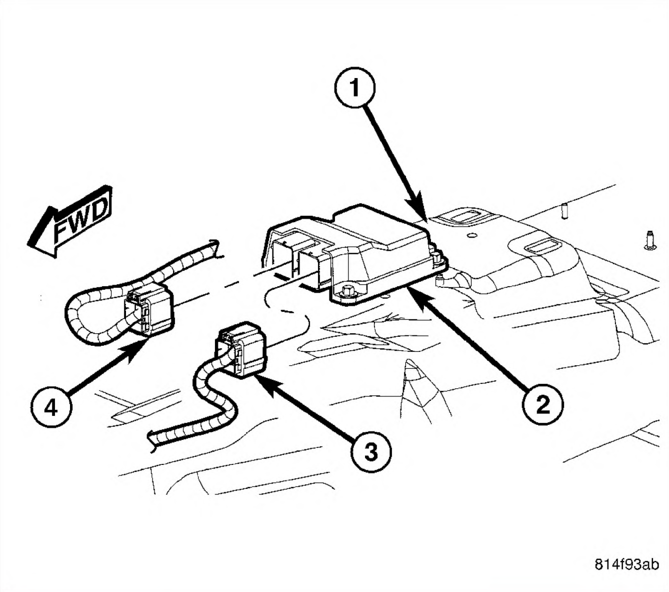
WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the occupant restraint controller, as it can damage the impact sensor or affect its calibration. The occupant restraint controller contains the impact sensor, which enables the system to deploy the supplemental restraints. If an occupant restraint controller is accidentally dropped during service, the module must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper supplemental restraint deployment.

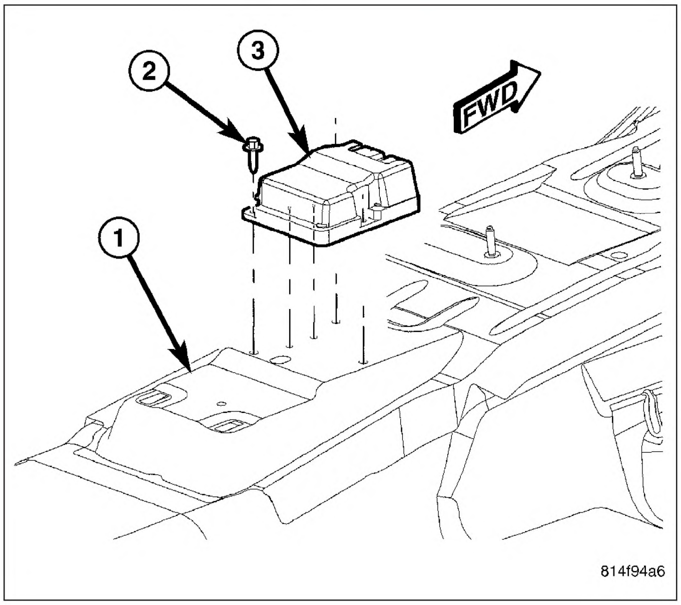
CAUTION: On vehicles equipped with the Occupant Classification System (OCS), never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one. Then perform the supplemental restraint verification test before replacing the other. Both the ORC and the OCM store OCS calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules.

NOTE: Two different Occupant Restraint Controllers (ORC) are available for this vehicle. For vehicles equipped with the optional side curtain airbags, both ORC connector receptacles are black in color and the ORC contains a second bi-directional safing sensor for the side airbags. For vehicles not equipped with the optional side curtain airbags, the ORC connector receptacles are gray.

1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the center console from the top of the floor panel transmission tunnel (1). (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).
3. Disconnect the instrument panel (3) and body (4) wire harness connectors from the Occupant Restraint Controller (ORC) (4) connector receptacles located on the forward facing side of the module. To disconnect the connectors from the ORC:
    a. Slide the red Connector Position Assurance (CPA) lock on the top of the connector toward the front of the vehicle.
    b. Depress the edge of the CPA lock closest to the ORC to release the connector latch tab and pull the connector straight away from the ORC connector receptacle.



4. Remove the three screws (2) that secure the ORC (3) to the ORC mount welded onto the top of the floor panel transmission tunnel (1).
5. Remove the ORC from the ORC mount.



INSTALLATION

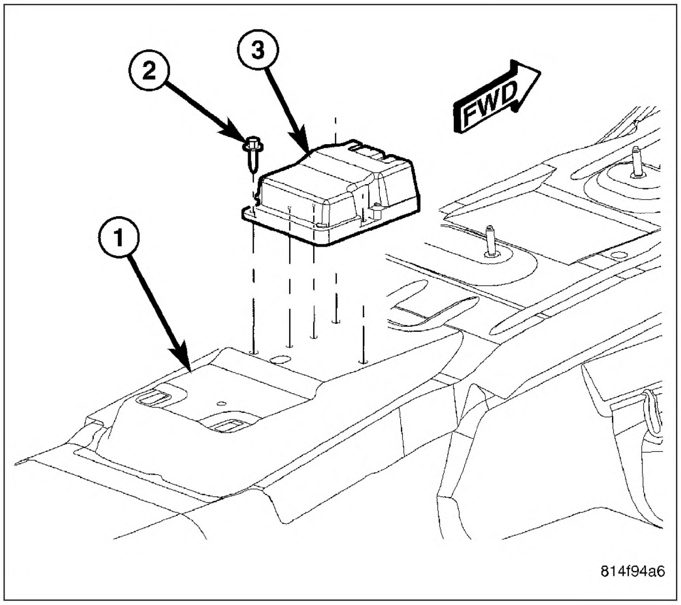
WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, never strike or drop the occupant restraint controller, as it can damage the impact sensor or affect its calibration. The occupant restraint controller contains the impact sensor, which enables the system to deploy the supplemental restraints. If an occupant restraint controller is accidentally dropped during service, the module must be scrapped and replaced with a new unit. Failure to observe this warning could result in accidental, incomplete, or improper supplemental restraint deployment.

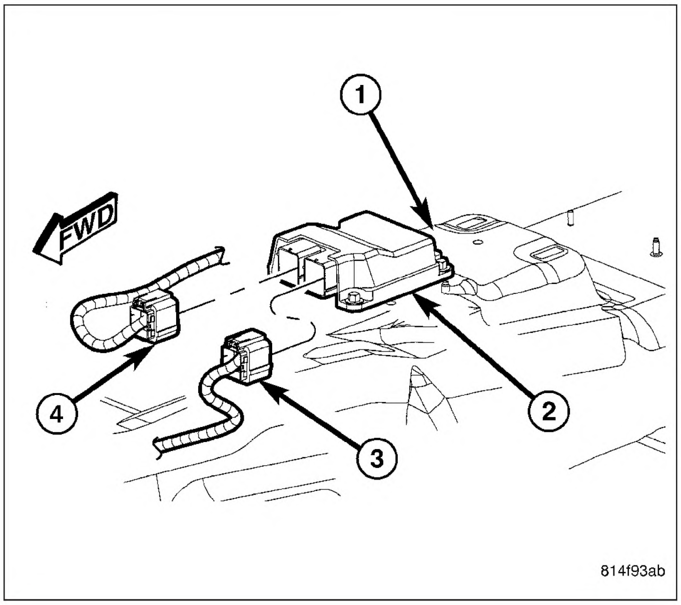
CAUTION: On vehicles equipped with the Occupant Classification System (OCS), never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one. Then perform the supplemental restraint verification test before replacing the other. Both the ORC and the OCM store OCS calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules.

NOTE: Two different Occupant Restraint Controllers (ORC) are available for this vehicle. For vehicles equipped with the optional side curtain airbags, both ORC connector receptacles are black in color and the ORC contains a second bi-directional safing sensor for the side airbags. For vehicles not equipped with the optional side curtain airbags, the ORC connector receptacles are gray.

1. Carefully position the Occupant Restraint Controller (ORC) (3) onto the ORC mount on the floor panel transmission tunnel (1). The bottom of the ORC housing is keyed. When the ORC is correctly positioned, the bottom of the housing will fit flush with the mount and the orientation arrow on the label on top of the housing will be pointed forward in the vehicle.
2. Install and tighten the three screws (2) that secure the ORC to the ORC mount that is welded onto the floor panel transmission tunnel. Tighten the screws to 14 N·m (10 ft. lbs.).



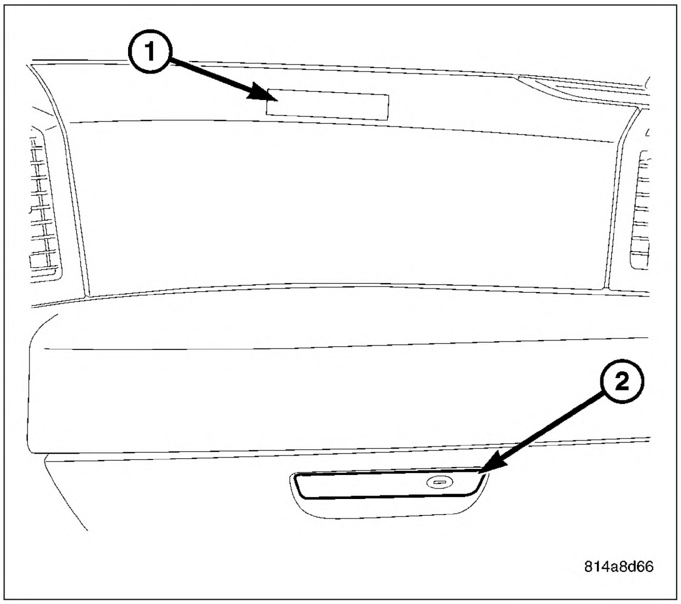
3. Reconnect the instrument panel (3) and body (4) wire harness connectors to the ORC (2) connector receptacles located on the forward facing side of the module. Be certain that the latches and the red CPA locks on both connectors are each fully engaged.
4. Reinstall the center console onto the top of the floor panel transmission tunnel (1). (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).
5. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).



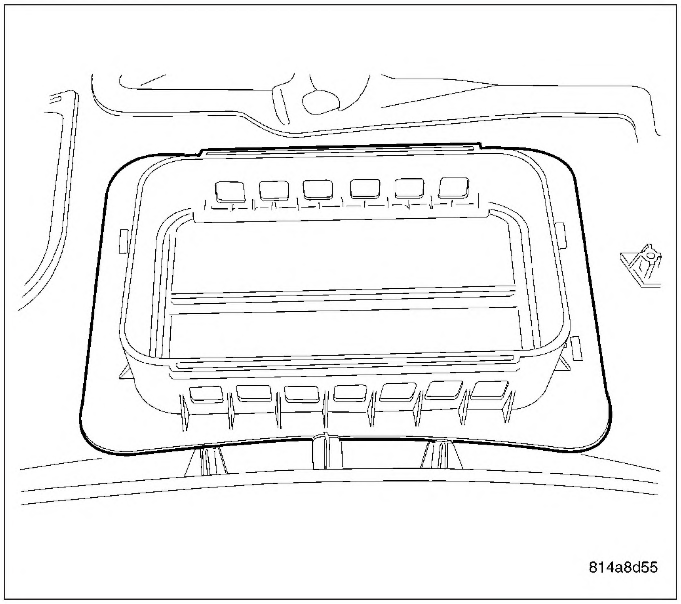
PASSENGER AIRBAG

DESCRIPTION

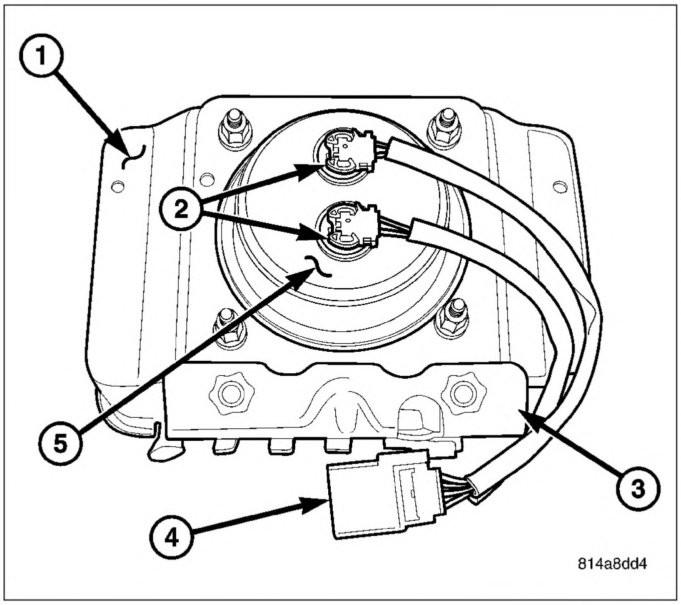
The horizontal surface of the instrument panel top pad (1) above the glove box is the most visible part of the passenger airbag. The passenger airbag door is integral to the top of the instrument panel top pad above the glove box opening on the instrument panel in front of the front seat passenger seating position.



Located below the passenger airbag door area of the instrument panel top pad, the molded thermoplastic passenger airbag retainer is secured to the underside of the top pad. The retainer defines the airbag door breakout area of the top pad and serves as the receptacle for the passenger airbag cushion and housing. Numerous small window openings on the forward and rearward flanges of the receptacle receive mating hook formations stamped into the airbag housing, which locate and secure the housing to the top pad.



The passenger airbag unit (1) is also secured by two screws through a stamped mounting bracket (3) to the instrument panel structural support. The passenger airbag unit used in this model is a multistage type that complies with revised federal airbag standards to deploy with less force than those used in some prior models. The passenger airbag unit consists of a stamped and welded metal housing, the airbag cushion, and the airbag inflator (5). The airbag housing contains the airbag inflator and the folded airbag cushion. An approximately 80 centimeter (31.5 inch) wide by 90 centimeter (35.5 inch) high rectangular fabric cushion is used.



The airbag inflator (5 is a non-azide, pyrotechnic-type unit that is secured to and sealed within the airbag housing. A short four-wire pigtail harness with a keyed, yellow connector insulator (4) connects the two inflator initiators (2) to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness.

The passenger airbag cannot be repaired, and must be replaced if deployed, faulty, or in any way damaged. The passenger airbag door and retainer are serviced only as a unit with the instrument panel top pad. If the passenger airbag is deployed, the instrument panel top pad must also be replaced.

OPERATION

The multistage passenger airbag is deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the passenger airbag squib 1 and squib 2 circuits to the two initiators in the airbag inflator. By using two initiators, the airbag can be deployed at multiple levels of force. The force level is controlled by the ORC to suit the monitored impact conditions by providing one of four delay intervals between the electrical signals provided to the two initiators. The longer the delay between these signals, the less forcefully the airbag will deploy.

When the ORC sends the proper electrical signals to each initiator, the electrical energy generates enough heat to initiate a small pyrotechnic charge which, in turn ignites chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas. The inflator is sealed to the airbag cushion and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the passenger airbag door area of the instrument panel top pad will split at predetermined tear seam lines concealed on the underside of the top pad, then the door will pivot up over the top of the instrument panel and out of the way. Following an airbag deployment, the airbag cushion quickly deflates by venting the inert gas through vent holes within the fabric used to construct the back (windshield side) of the airbag cushion.

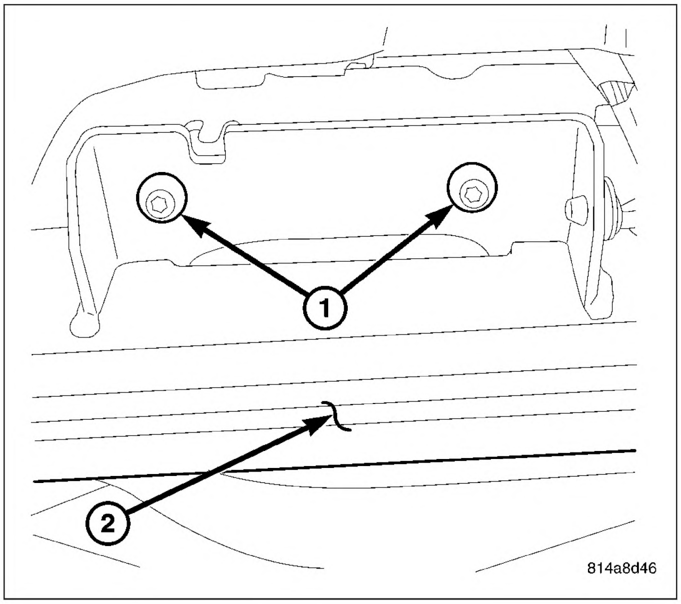
Typically, both initiators are used during an airbag deployment event. However, it is possible for only one initiator to be used during a deployment due to an airbag system fault; therefore, it is necessary to always confirm that both initiators have been used in order to avoid the improper disposal of potentially live pyrotechnic materials. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

REMOVAL

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

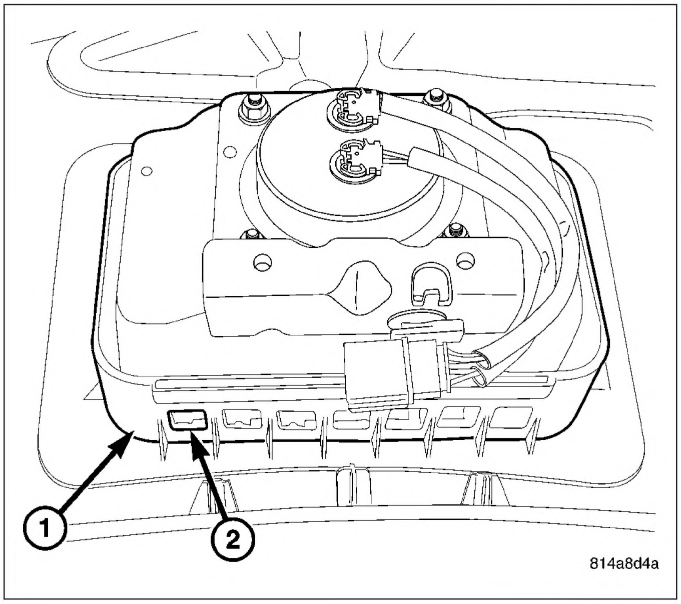
WARNING: To avoid personal injury or death, when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

NOTE: The following procedure is for replacement of a faulty or damaged passenger airbag. If the airbag is faulty or damaged, but not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the passenger airbag has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).



1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Remove the instrument panel from the passenger compartment of the vehicle. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
3. Place the instrument panel on a suitable work surface with the top pad facing down. If the top pad will be reused, be certain to take the proper precautions to prevent the top cover from receiving cosmetic damage during the following procedures.
4. Disconnect the passenger airbag pigtail wire connector from the instrument panel wire harness connector for the airbag. This connector is secured to the passenger airbag mounting bracket. To disconnect the connector:
    a. Slide the red Connector Position Assurance (CPA) lock on the top of the connector toward the side of the connector.
    b. Depress the connector latch tab and pull the two halves of the connector straight away from each other.
5. Remove the two screws (1) that secure the airbag mounting bracket to the instrument panel structural support (2).
6. Remove the top pad from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).

7. Disengage each of the hooks (2) of the airbag housing from the windows in the forward and rearward vertical walls of the airbag retainer (1) on the underside of the top pad. To disengage the hooks, use hand pressure to push the adjacent edge of the airbag housing firmly and evenly downward into the retainer receptacle, while at the same time pulling outward on the upper edge of the receptacle wall.
8. With all of the hooks disengaged, lift the housing, inflator, and cushion as a unit from the retainer receptacle on underside of the instrument panel top pad.



INSTALLATION

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, when removing a deployed airbag, rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the airbag unit and other interior surfaces. In large doses, these deposits may cause irritation to the skin and eyes.

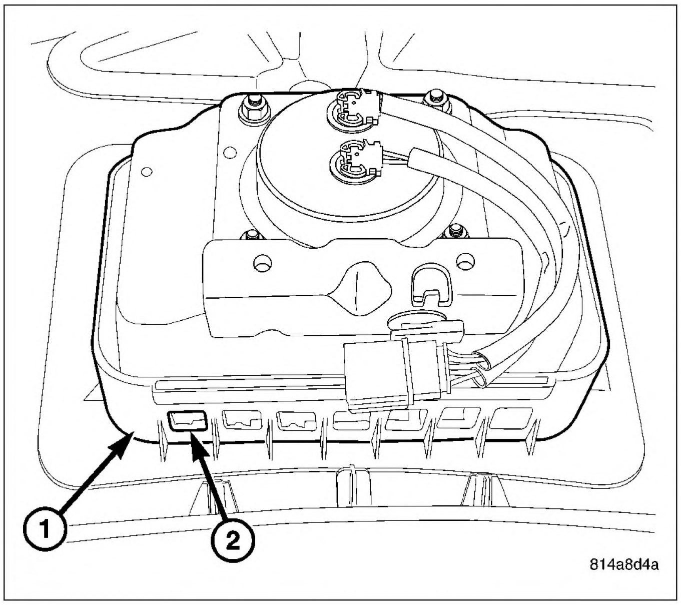
WARNING: Use extreme care to prevent any foreign material from entering the passenger airbag, or becoming entrapped between the passenger airbag cushion and the instrument panel top pad. Failure to observe this warning could result in occupant injuries upon airbag deployment.

WARNING: The instrument panel top pad must never be painted. Replacement top pads are serviced in the original colors. Paint may change the way in which the material of the top pad responds to an airbag deployment. Failure to observe this warning could result in occupant injuries upon airbag deployment.

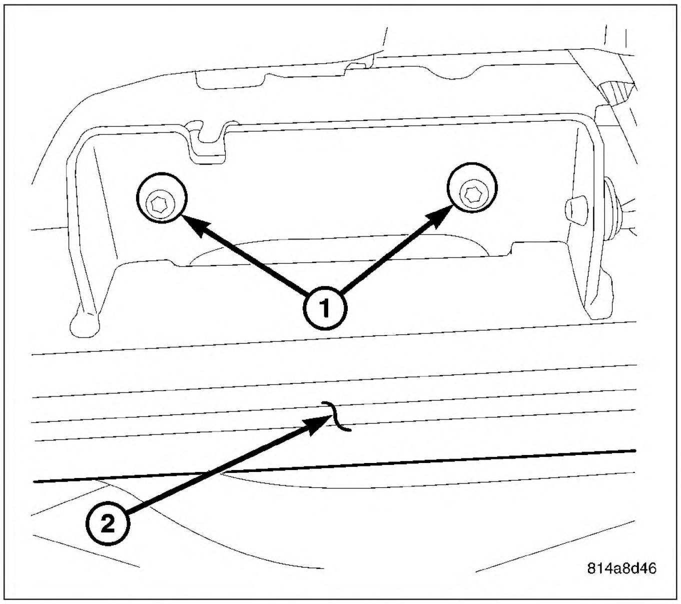
WARNING: Use extreme care to prevent any foreign material from entering the passenger airbag, or becoming entrapped between the passenger airbag cushion and the passenger airbag door provision of the instrument panel top pad. Failure to observe this warning could result in occupant injuries upon airbag deployment.

NOTE: The following procedure is for replacement of a faulty or damaged passenger airbag. If the airbag is faulty or damaged, but not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the passenger airbag has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the airbag from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

1. Place the instrument panel top pad on a suitable work surface with the airbag retainer (1) receptacle facing up. Be certain to take the proper precautions to prevent the top pad from receiving cosmetic damage during the following procedures.
2. Carefully position the passenger airbag housing into the airbag retainer receptacle.
3. Work around the perimeter of the unit engaging each of the hooks (2) on the passenger airbag housing through the windows in the forward and rearward vertical walls of the retainer receptacle.
4. Reinstall the top pad onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - INSTALLATION).

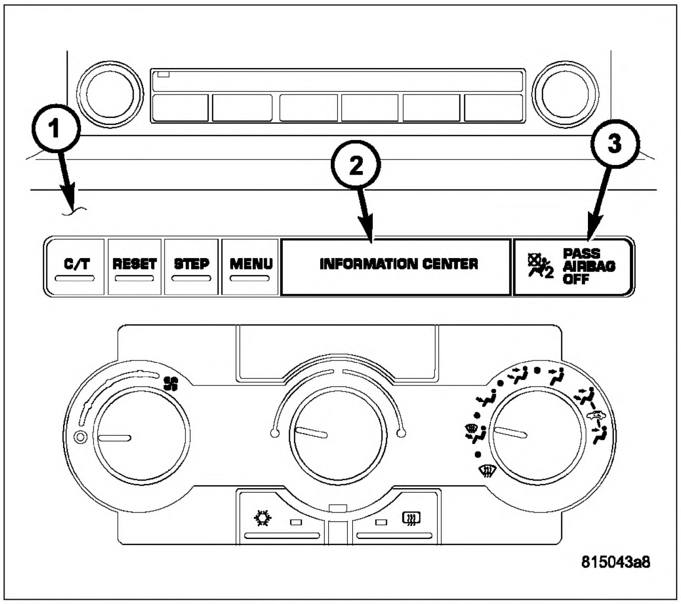


5. Install and tighten the two screws (1) that secure the airbag mounting bracket to the instrument panel structural support (2). Tighten the screws to 12 N·m (105 in. lbs.).
6. Reconnect the passenger airbag pigtail wire connector to the instrument panel wire harness connector for the airbag. This connector is secured to the outside of the outboard airbag unit end bracket. Be certain that the latch on the connector and the red Connector Position Assurance (CPA) lock are each fully engaged.
7. Reinstall the instrument panel into the passenger compartment of the vehicle. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).
8. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).



PASS AIRBAG ON/OFF INDICATOR

DESCRIPTION



Vehicles equipped with the Occupant Classification System (OCS) include a passenger airbag on/off indicator (3), which is located in the right outboard end of the upper switch pod (2) near the top of the instrument panel lower center bezel (1). The passenger airbag on/off indicator consists of a molded plastic housing and a rectangular dark translucent outer lens.

The opaque text “PASS AIRBAG OFF” and an opaque International Control and Display Symbol icon for “Passenger Airbag Off or Not Available” are imprinted on the back of the lens within the indicator. The dark outer lens prevents the indicator text and icon from being clearly visible when it is not illuminated. An amber Light Emitting Diode (LED) behind the lens causes the “PASS AIRBAG OFF” text and icon to appear silhouetted against an amber field through the translucent lens when the indicator is illuminated from behind by the LED.

The passenger airbag on/off indicator cannot be repaired or adjusted and, if faulty or damaged, the upper switch pod unit must be replaced. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD UPPER - REMOVAL).

OPERATION

In the Occupant Classification System (OCS), the passenger airbag on/off indicator gives an indication when the passenger airbag and seat belt tensioner deployment circuits are disabled by the Occupant Restraint Controller (ORC). This indicator is controlled by a transistor within the ORC through a hard wired output based upon ORC programming and electronic occupant classification messages received by the ORC over the Controller Area Network (CAN) data bus from the Occupant Classification Module (OCM).

The passenger airbag on/off indicator Light Emitting Diode (LED) is completely controlled by the ORC. The LED receives a battery current input on the fused ignition switch output (run-start) circuit. Therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the ORC transistor. The ORC will turn on the passenger airbag on/off indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the passenger airbag on/off indicator is illuminated for about six seconds.
- **Child Seat Detected (or Load Less Than Fifth Percentile Female) Occupant Classification Message** - Each time the ORC receives a message from the OCM indicating a child seat has been detected in the passenger side front seat (or that the seat load is less than that of a fifth percentile female) the passenger airbag and seat belt tensioner deployment circuits are deactivated and the passenger airbag on/off indicator will be illuminated. The indicator remains illuminated until the ORC receives an occupant classification message indicating that the passenger side front seat is empty, that the seat is occupied by a load equal to or greater than a fifth percentile female, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Load Undetermined Occupant Classification Message** - Each time the ORC receives a message from the OCM indicating that a load cannot be determined in the passenger side front seat, the passenger airbag and seat belt tensioner deployment circuits are deactivated and the passenger airbag on/off indicator will be illuminated. The indicator remains illuminated until the ORC receives an occupant classification message indicating that the passenger side front seat is empty, that the seat is occupied by a load equal to or greater than a fifth percentile female, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Communication Error** - If the ORC receives invalid occupant classification messages or no messages from the OCM, the passenger airbag on/off indicator is illuminated. The indicator remains illuminated until the ORC receives a valid message from the OCM indicating that the passenger side front seat is empty, that the seat is

occupied by a load equal to or greater than a fifth percentile female, or until the ignition switch is turned to the Off position, whichever occurs first.

The ORC continually monitors the occupant classification messages from the OCM to decide whether the passenger airbag and seat belt tensioner deployment circuits should be activated or deactivated. Note that there may be several seconds of delay between changes in the detected occupant status and passenger airbag on/off indications. This is a programmed feature of the OCM used to prevent a flashing indicator condition resulting from the normal shifting of occupant weight on the passenger seat cushion. The ORC then provides the proper control output to turn the passenger airbag on/off indicator on or off.

The ORC will store a Diagnostic Trouble Code (DTC) for any malfunction it detects. For proper diagnosis of the OCM, the ORC, the CAN data bus, or the electronic message inputs to the ORC that control the passenger airbag on/off indicator, a diagnostic scan tool is required. Refer to the appropriate diagnostic information.

SEAT BELT BUCKLE

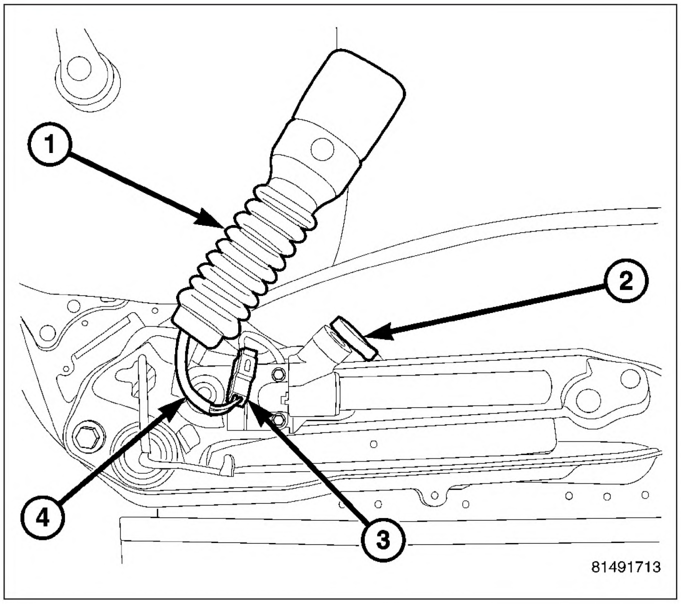
REMOVAL

FRONT

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

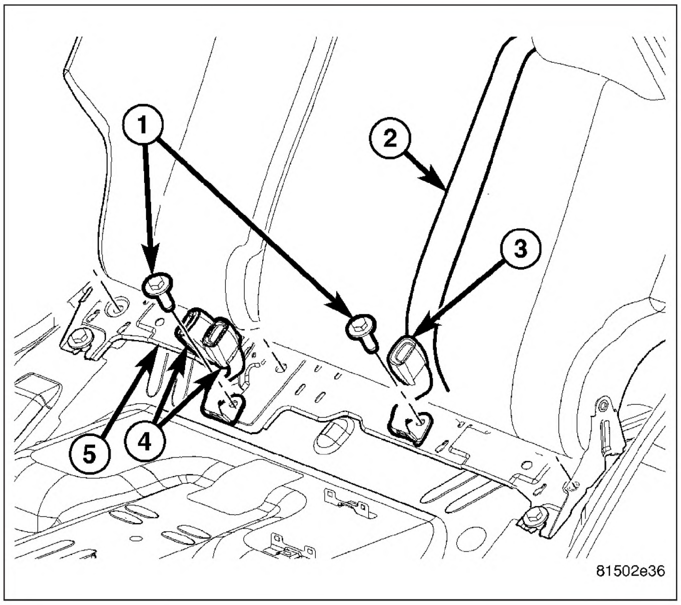
NOTE: The following procedure is for replacement of a faulty or damaged seat belt buckle unit. The front seat belt buckle also includes a seat belt tensioner. If the front seat belt buckle is faulty or damaged, but the seat belt tensioner is not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the seat belt tensioner has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the unit from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).



1. Move the front seat to its most rearward position for easiest access to the front seat belt buckle lower anchor nut.
2. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
3. Remove the console from the floor panel transmission tunnel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).
4. Remove the side shield from the inboard side of the front seat cushion. (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION/COVER - REMOVAL).
5. Disconnect the seat wire harness connector (2) from the seat belt tensioner initiator.
6. On the driver side only, disconnect the seat belt switch pigtail wire connector (3) from the seat wire harness connector for the seat belt switch.
7. Remove the nut (4) that secures the front seat belt buckle (1) lower anchor to the stud on the inboard side of the seat cushion frame.
8. Remove the seat belt buckle and tensioner from the front seat as a unit.

REAR

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.



1. Remove the rear seat cushion from the vehicle. (Refer to 23 - BODY/SEATS/REAR SEAT CUSHION - REMOVAL).
2. Remove the screw (1) that secures the rear seat back bracket (5) and the right outboard and center buckles (4) or the left buckle (3) and center seat belt (2) lower anchor to the rear floor panel.
3. Remove the rear seat belt buckle from the rear floor panel.

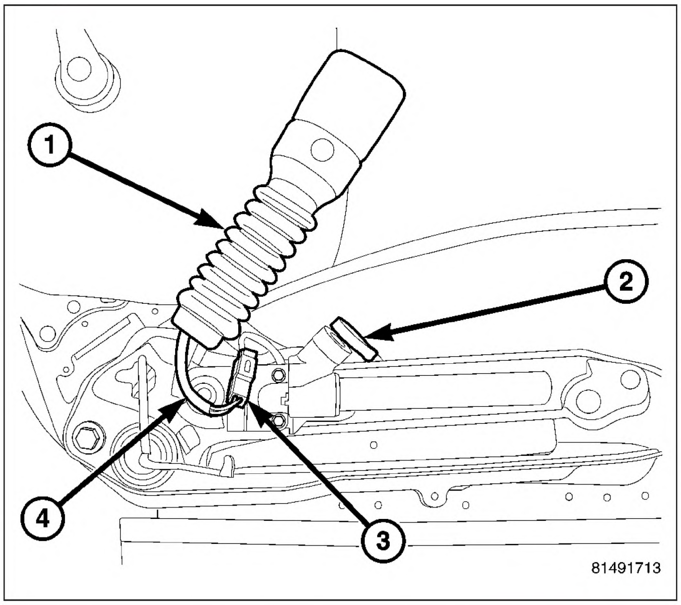
INSTALLATION

FRONT

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

NOTE: The following procedure is for replacement of a faulty or damaged seat belt buckle unit. The front seat belt buckle also includes a seat belt tensioner. If the front seat belt buckle is faulty or damaged, but the seat belt tensioner is not deployed, review the recommended procedures for handling non-deployed supplemental restraints. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - HANDLING NON-DEPLOYED SUPPLEMENTAL RESTRAINTS). If the seat belt tensioner has been deployed, review the recommended procedures for service after a supplemental restraint deployment before removing the unit from the vehicle. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - SERVICE AFTER A SUPPLEMENTAL RESTRAINT DEPLOYMENT).

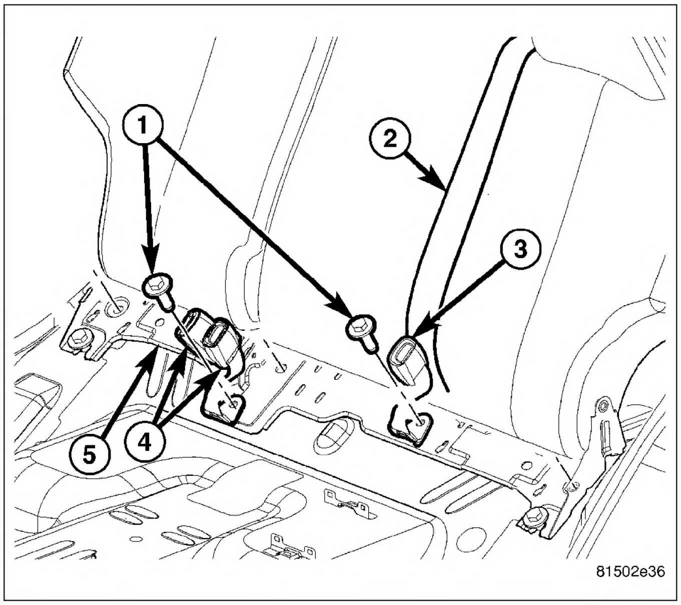


1. Position the front seat belt buckle and tensioner (1) lower anchor onto the stud on the inboard side of the seat cushion frame.
2. Install and tighten the nut that secures the front seat belt buckle lower anchor to the side of the front seat. Tighten the nut to 43 N·m (32 ft. lbs.).
3. On the driver side only, reconnect the seat belt switch pigtail wire connector (3) to the seat wire harness connector for the seat belt switch.
4. Reconnect the seat wire harness connector (2) to the seat belt tensioner initiator.
5. Reinstall the side shield onto the inboard side of the front seat cushion. (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION/COVER - INSTALLATION).
6. Reinstall the console onto the floor panel transmission tunnel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).
7. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).

REAR

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

1. Position the right outboard and center buckles (4) or the left buckle (3) and center seat belt (2) lower anchor to the rear seat back bracket (5) on the rear floor panel.
2. Install and tighten the screw (1) that secures the rear seat belt buckle to the rear floor panel. Tighten the screw to 50 N·m (37 ft. lbs.).
3. Reinstall the rear seat cushion into the vehicle. (Refer to 23 - BODY/SEATS/REAR SEAT CUSHION - INSTALLATION).



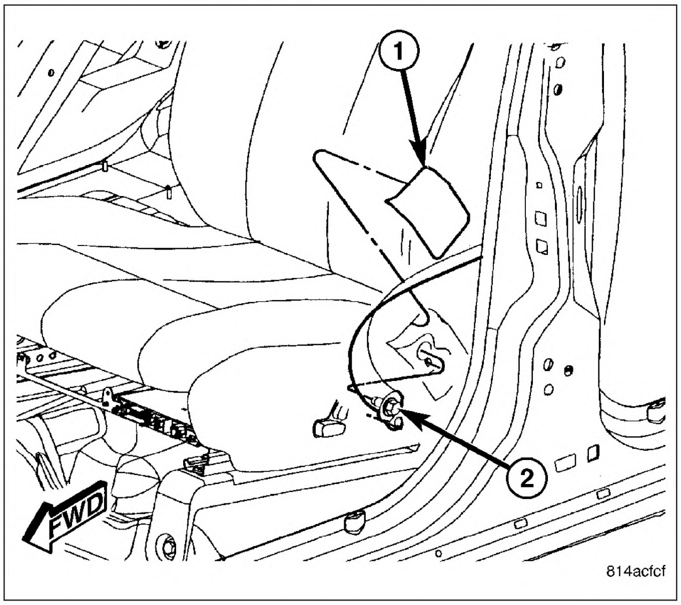
SEAT BELT & RETRACTOR

REMOVAL

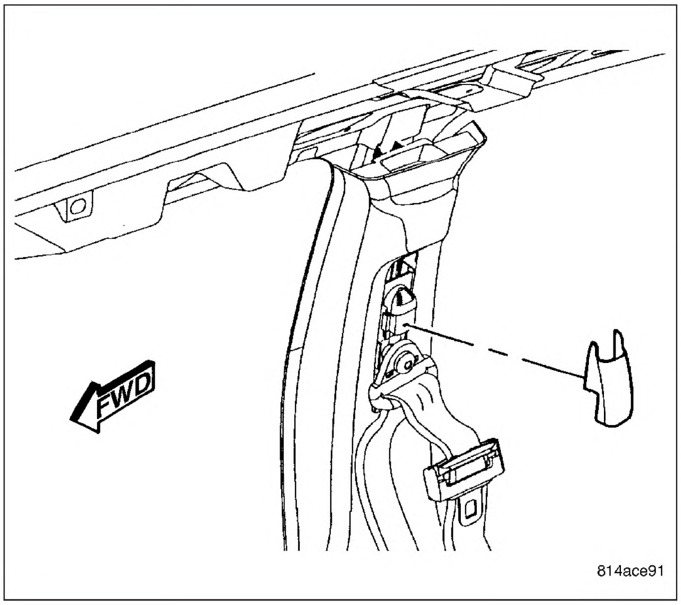
FRONT

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

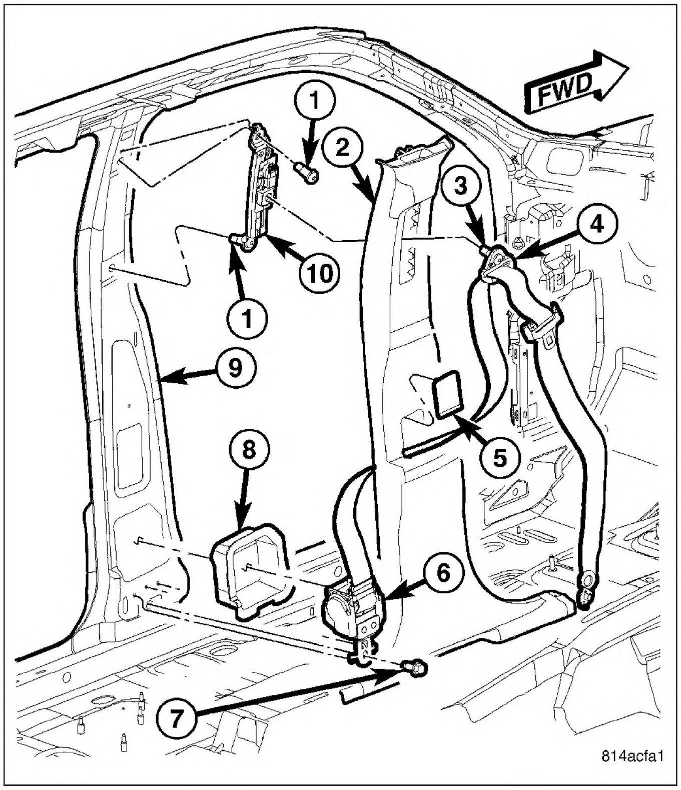
1. Adjust the front seat to its most forward position for easiest access to the front seat belt lower anchor cover (1) and the B-pillar trim.
2. Grasp the upper edge of the lower anchor cover and pull upward to unsnap it from the front seat cushion outboard side shield.
3. Remove the screw (2) that secures the lower anchor to the outboard side of the front seat cushion frame.



4. Firmly grasp the lower end of the turning loop trim cover on the upper B-pillar and pull it straight out to unsnap it from the height adjuster, then lift the bottom of the cover upward and pull outward to disengage the upper tabs from the adjuster.



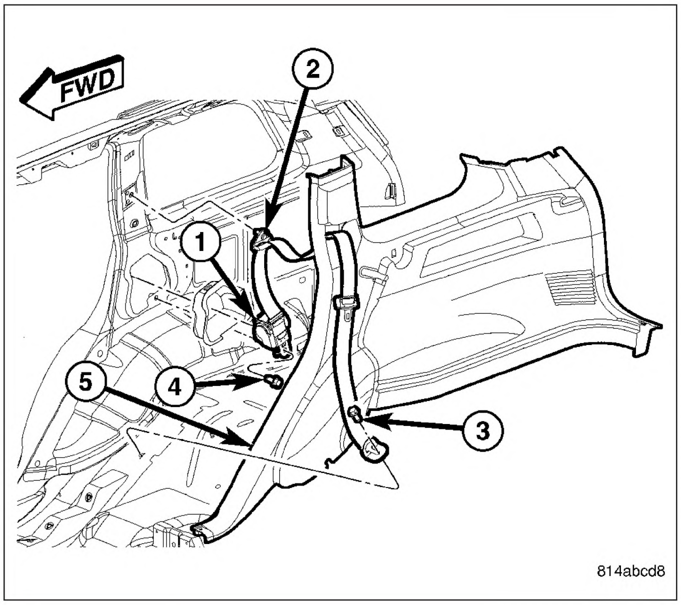
5. Remove the screw (3) that secures the seat belt turning loop (4) to the height adjuster (10).
6. Remove the seat belt turning loop from the height adjuster.
7. Remove the upper trim from the inside of the B-pillar (9). (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).
8. Unsnap and remove the cover (5) from above the seat belt opening in the B-pillar trim (2).
9. Remove the trim from the lower B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).
10. Pull the front seat belt turning loop and lower anchor through the seat belt opening in the lower B-pillar trim.
11. Remove the screw (7) that secures the retractor (6) lower bracket to the base of the inner B-pillar.
12. Remove the front seat belt and retractor from the vehicle as a unit.



REAR OUTBOARD

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

1. Remove the rear seat cushion from the vehicle. (Refer to 23 - BODY/SEATS/REAR SEAT CUSHION - REMOVAL).
2. Loosen the screw (3) that secures the rear outboard seat belt lower anchor and the rear seat back bracket to the rear floor panel.
3. Disengage the lower anchor from the loosened screw.
4. Remove the upper trim from the inside of the C-pillar. (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - REMOVAL).
5. Disengage the seat belt lower anchor from the seat belt opening in the upper C-pillar trim.
6. Remove the trim (5) from the quarter inner panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).
7. Remove the screw (2) that secures the seat belt turning loop to the upper C-pillar.

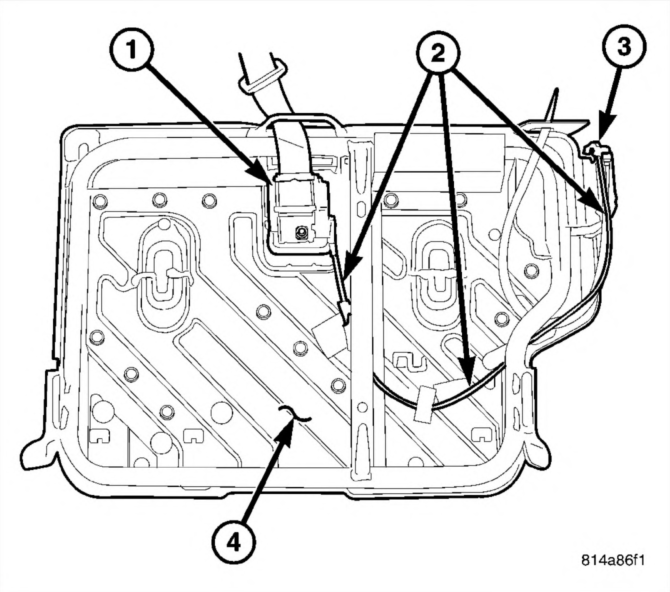


8. Remove the seat belt turning loop from the upper C-pillar.
9. Remove the screw (4) that secures the retractor (1) to the lower C-pillar.
10. Disengage the retractor locator tab from the slot in the lower C-pillar.
11. Remove the rear outboard seat belt and retractor from the lower C-pillar as a unit.

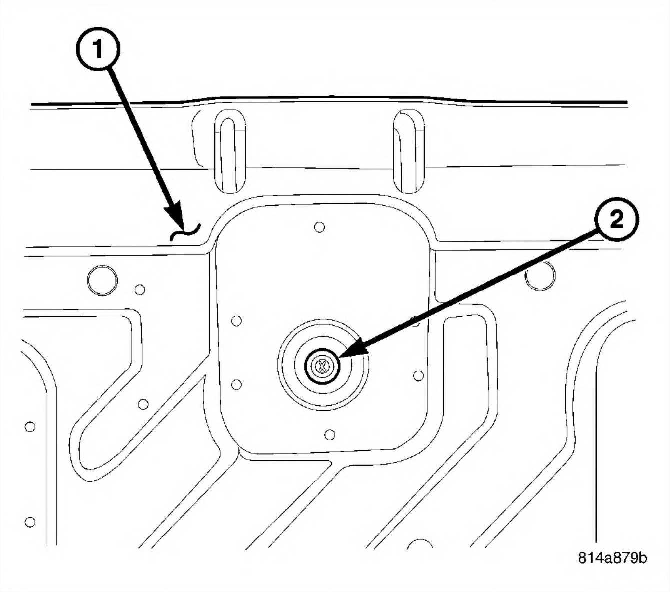
REAR CENTER

WARNING: During and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

1. Remove the left rear seat back panel (4) from the vehicle. (Refer to 23 - BODY/SEATS/REAR SEAT BACK - REMOVAL).
2. Remove the trim from the left rear seat back. (Refer to 23 - BODY/SEATS/REAR SEAT BACK COVER - REMOVAL).
3. Disengage the seat belt lower anchor through the web guide loop integral to the top of the seat back panel.
4. Disengage the retractor lock cable (2) end fitting from the seat back latch mechanism (3) on the upper outboard corner of the seat back panel.
5. Disengage the lock cable from the back panel between the latch and the retractor (1).



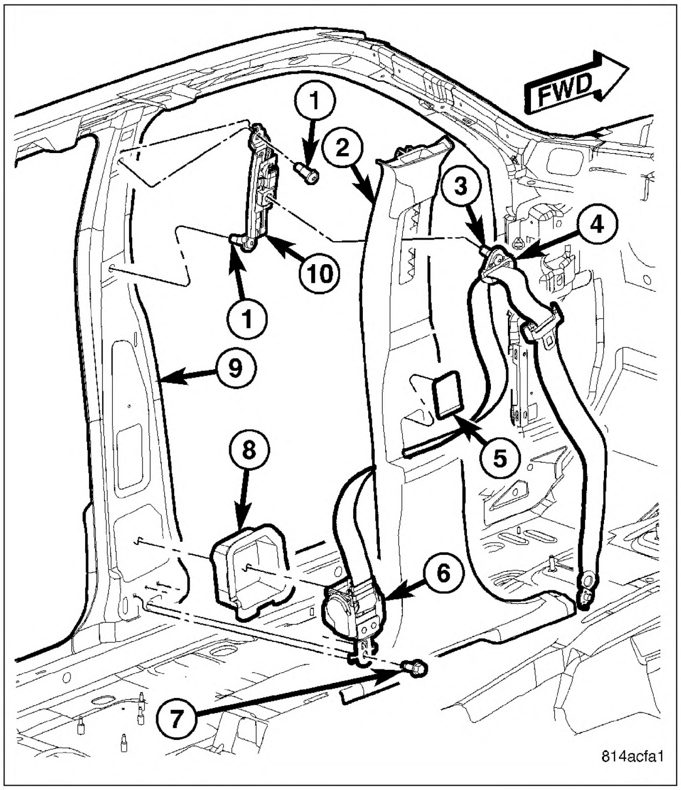
6. Remove the screw (2) from the back of the seat back panel (1) that secures the retractor.
7. Remove the rear center seat belt and retractor unit from the front of the left seat back panel.



INSTALLATION

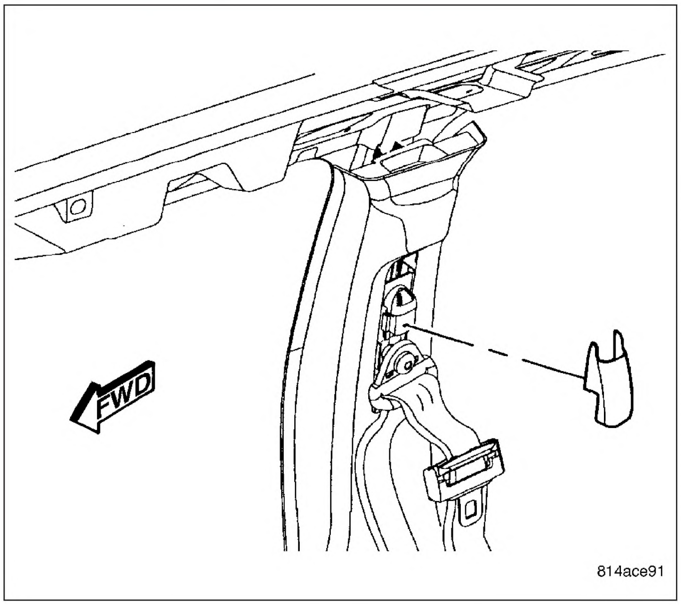
FRONT

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

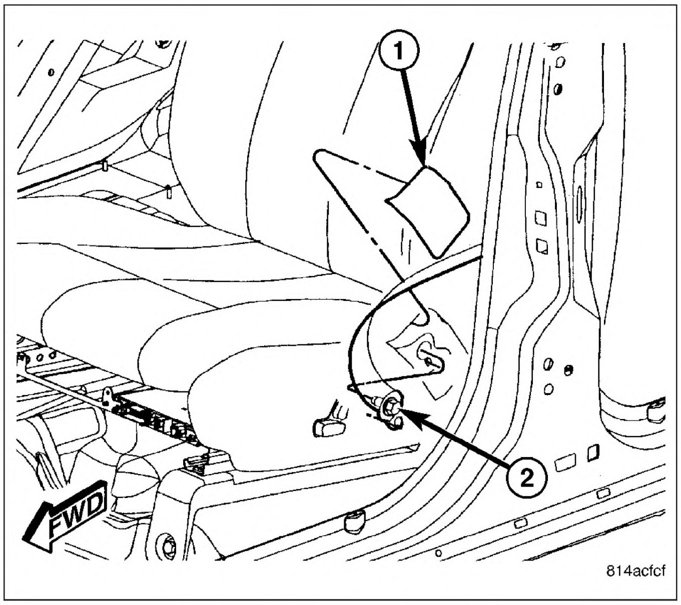


1. Be certain that the retractor shield (8) is properly installed in the inner B-pillar (9) and in good condition before installing the retractor.
2. Position the retractor (6) into the vehicle as a unit.
3. Install and tighten the screw (7) that secures the retractor lower bracket to the base of the inner B-pillar. Tighten the screw to 39 N·m (29 ft. lbs.).
4. Route the front seat belt turning loop (4) and lower anchor through the seat belt opening in the lower B-pillar trim (2).
5. Reinstall the lower trim onto the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).
6. Reinstall the cover (5) into the upper seat belt opening in the B-pillar trim.
7. Reinstall the upper trim onto the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).
8. Position the seat belt turning loop onto the height adjuster (10) on the upper B-pillar. Be certain that the seat belt webbing between the retractor and the turning loop is not twisted.
9. Install and tighten the screw (5) that secures the turning loop to the height adjuster. Tighten the screw to 39 N·m (29 ft. lbs.).

10. Insert the upper tabs of the turning loop trim cover into the slots of the height adjuster on the upper B-pillar, then lower the bottom of the cover and use hand pressure to press firmly and evenly on the cover until it snaps into place.

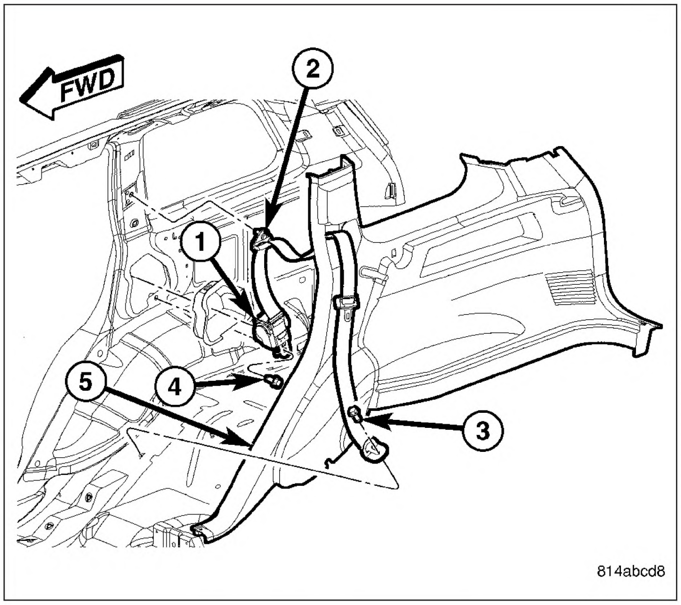


11. Position the seat belt lower anchor to the mounting hole on the outboard side of the front seat cushion frame. Be certain that the seat belt webbing between the turning loop and the lower anchor is not twisted.
12. Install and tighten the screw (2) that secures the lower anchor to the seat. Tighten the screw to 39 N·m (29 ft. lbs.).
13. Reinstall the lower anchor cover (1) onto the front seat cushion outboard side shield.



REAR OUTBOARD

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

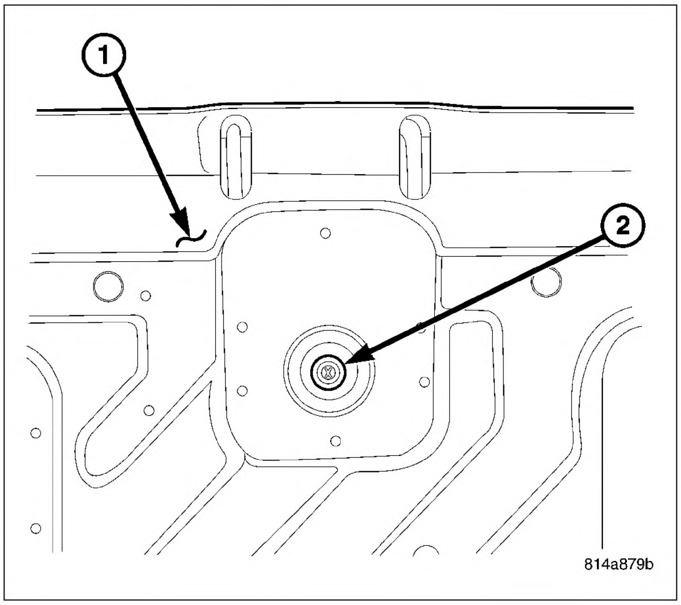


1. Be certain that the retractor shield is properly installed in the inner C-pillar and in good condition before installing the retractor.
2. Position the rear seat belt and retractor (1) to the lower C-pillar.
3. Engage the locator tab on the back of the retractor into the slot in the lower C-pillar.
4. Install and tighten the screw (4) that secures the retractor to the lower C-pillar. Tighten the screw to 39 N·m (29 ft. lbs.).
5. Position the seat belt turning loop to the upper C-pillar. Be certain the seat belt webbing between the retractor and the turning loop is not twisted.
6. Install and tighten the screw (2) that secures the seat belt turning loop to the upper C-pillar. Tighten the screw to 39 N·m (29 ft. lbs.).
7. Reinstall the trim (5) onto the quarter inner panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).
8. Route the seat belt lower anchor through the seat belt opening in the upper C-pillar trim.
9. Reinstall the trim onto the upper C-pillar. (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - INSTALLATION).
10. Engage the seat belt lower anchor under the loosened screw (3) that secures the rear seat back bracket to the rear floor panel. Be certain the seat belt webbing between the turning loop and the lower anchor is not twisted.
11. Tighten the screw that secures the lower anchor and the rear seat back bracket to the rear floor panel. Tighten the screw to 50 N·m (37 ft. lbs.).
12. Reinstall the rear seat cushion into the vehicle. (Refer to 23 - BODY/SEATS/REAR SEAT CUSHION - INSTALLATION).

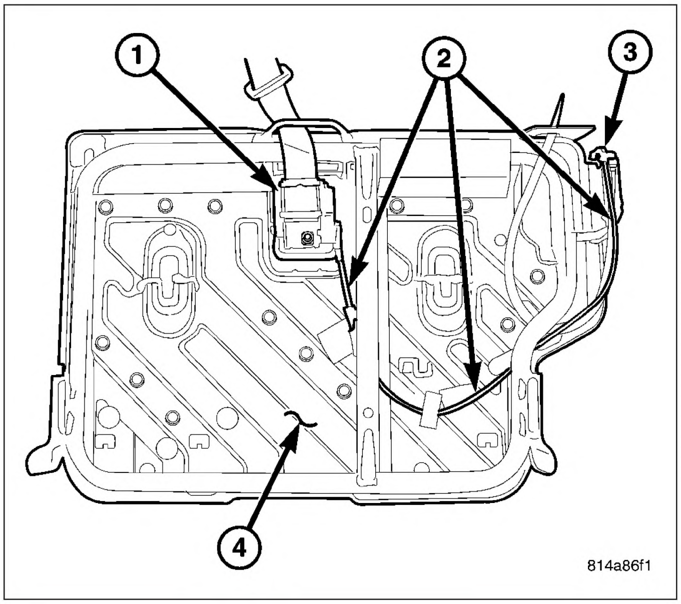
REAR CENTER

WARNING: During and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

1. Position the rear center seat belt and retractor unit onto the front of the left seat back panel (1).
2. Install and tighten the screw (2) from the back of the seat back panel that secures the retractor. Tighten the screw to 43 N·m (32 ft. lbs.).



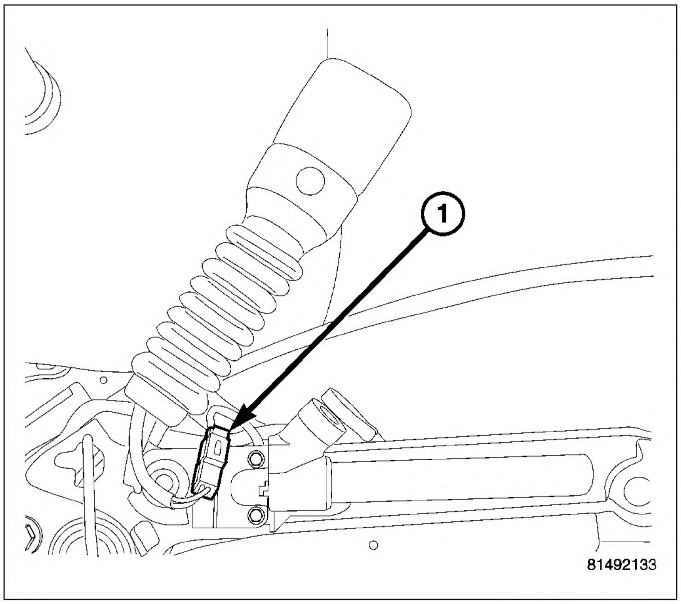
3. Route the retractor lock cable (2) from the retractor to the seat back latch mechanism (3) on the upper outboard corner of the seat back panel (4).
4. Engage the lock cable end fitting to the seat back latch mechanism.
5. Route the seat belt lower anchor through the web guide loop integral to the top of the seat back panel.
6. Reinstall the trim onto the left rear seat back. (Refer to 23 - BODY/SEATS/REAR SEAT BACK COVER - INSTALLATION).
7. Reinstall the left rear seat back panel into the vehicle. (Refer to 23 - BODY/SEATS/REAR SEAT BACK - INSTALLATION).



SEAT BELT SWITCH

DESCRIPTION

The seat belt switch for this model is actually a Hall Effect-type sensor. This sensor consists of a fixed-position, Hall Effect Integrated Circuit (IC) chip and a small permanent magnet that is integral to the driver side front seat belt buckle. The driver side front seat belt buckle is located on a molded plastic scabbard and secured along with the seat belt tensioner mechanism by a nut to the inboard side of the driver side front seat cushion frame. The seat belt switch is connected to the vehicle electrical system through a two-lead pigtail wire and connector (1) on the driver side front seat belt buckle-half, which is connected to a wire harness connector and take out of the seat wire harness. A radio noise suppression capacitor is connected in parallel with the IC where the two pigtail wire leads connect to the IC pins.



The seat belt switch cannot be adjusted or repaired and, if faulty or damaged, the entire driver side front seat belt buckle-half and tensioner unit must be replaced.

OPERATION

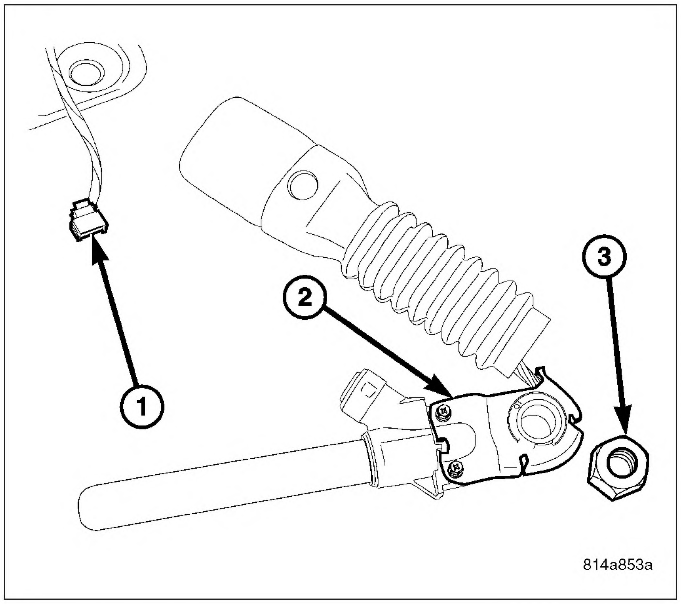
The seat belt switch is designed to provide a status signal to the seat belt switch sense input of the Occupant Restraint Controller (ORC) indicating whether the driver side front seat belt is fastened. The ORC uses the seat belt switch input to determine the status of the driver side front seat belt. The ORC then sends electronic messages to the ElectroMechanical Instrument Cluster (EMIC) to control the seat belt indicator based upon the status of the seat belt switch input.

A spring-loaded slide with a small window-like opening is integral to the buckle latch mechanism. When a seat belt tip-half is inserted and latched into the seat belt buckle, the slide is pushed downward and the window of the slide exposes the Hall Effect Integrated Circuit (IC) chip within the buckle. The field of the permanent magnet induces a current within the chip. The chip provides this induced current as an output to the ORC. When the seat belt is unbuckled, the spring-loaded slide moves upward and shields the IC from the field of the permanent magnet, causing the output current from the seat belt switch to be reduced.

The seat belt switch receives a supply current from the ORC, and the ORC senses the status of the driver side front seat belt through its pigtail wire connection to the seat wire harness. The ORC also monitors the condition of the seat belt switch circuit and will illuminate the airbag indicator in the EMIC then store a Diagnostic Trouble Code (DTC) for any fault that is detected in the seat belt switch circuit. For proper diagnosis of the seat belt switch, a diagnostic scan tool is required. Refer to the appropriate diagnostic information.

SEAT BELT TENSIONER

DESCRIPTION



Seat belt tensioners supplement the dual front airbags for this model. The seat belt tensioners are integral to the front seat belt buckle units, which are secured by a large hex nut (3) to a stud on the outside of the inboard seat cushion frames of the right and left front seats. The tensioner is concealed beneath the molded plastic inner seat cushion side shield. The seat belt tensioner consists (2) primarily of a buckle, an accordion-like molded plastic scabbard, a cable and piston, a pulley and bracket, a steel cylinder tube, and a small pyrotechnically activated gas generator. Except for the buckle and scabbard, all of these components are concealed by the seat cushion side shield.

The seat belt tensioners are controlled by the Occupant Restraint Controller (ORC) and are connected to the vehicle electrical system through a dedicated take out of the seat wire harness by a keyed and latching yellow molded plastic connector insulator (1) to ensure a secure connection. The driver side seat belt tensioner has a second connection through a two-wire pigtail and connector to the seat wire harness for an integral seat belt switch.

The seat belt tensioners cannot be repaired and, if faulty or damaged, the entire front seat belt buckle unit must be replaced. If the front airbags have been deployed, the seat belt tensioners have also been deployed. The seat belt tensioners are not intended for reuse and must be replaced following any front airbag deployment. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT BUCKLE - REMOVAL).

OPERATION

The seat belt tensioners are deployed in conjunction with the front airbags by a signal generated by the Occupant Restraint Controller (ORC) through the driver or passenger seat belt tensioner line 1 and line 2 (or squib) circuits. When the ORC sends the proper electrical signal to the tensioners, the electrical energy generates enough heat to initiate a small pyrotechnic gas generator. The gas generator is installed in one end of a steel cylinder tube where the piston attached to one end of the buckle cable is sealed to the inside circumference of the tube. As the gas expands, it pushes the piston down the tube, pulling the cable around the pulley, drawing the buckle downward, collapsing the scabbard, and removing any excess slack from the seat belt.

Removing excess slack from the front seat belts not only keeps the occupants properly positioned for an airbag deployment following a frontal impact of the vehicle, but also helps to reduce injuries that the occupant might experience in these situations as a result of harmful contact with the steering wheel, steering column, instrument panel and/or windshield. Also, a torsion bar in the seat belt retractor that the retractor spool rides upon is designed to deform in order to control the loading being applied to the occupants by the seat belts during a frontal impact, further reducing the potential for occupant injuries.

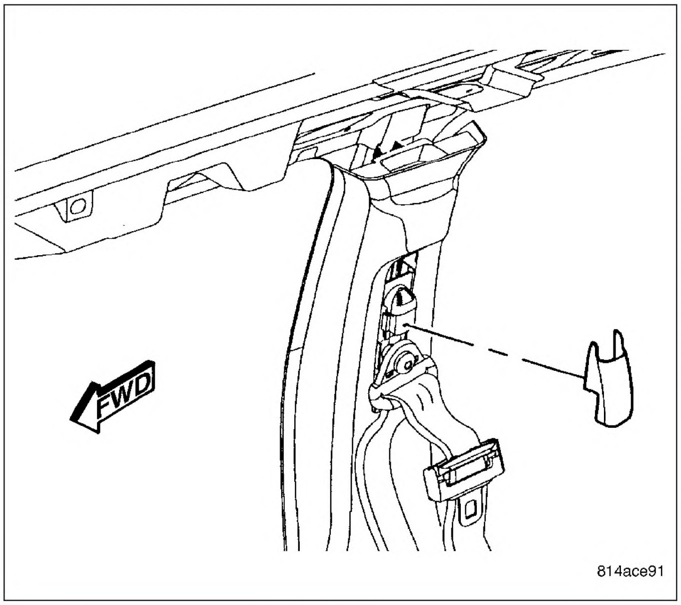
The ORC monitors the condition of the seat belt tensioners through circuit resistance, and will illuminate the airbag indicator in the ElectroMechanical Instrument Cluster (EMIC) and store a Diagnostic Trouble Code (DTC) for any fault that is detected. For proper diagnosis of the seat belt tensioners, a diagnostic scan tool is required. Refer to the appropriate diagnostic information.

SEAT BELT TURNING LOOP ADJUSTER

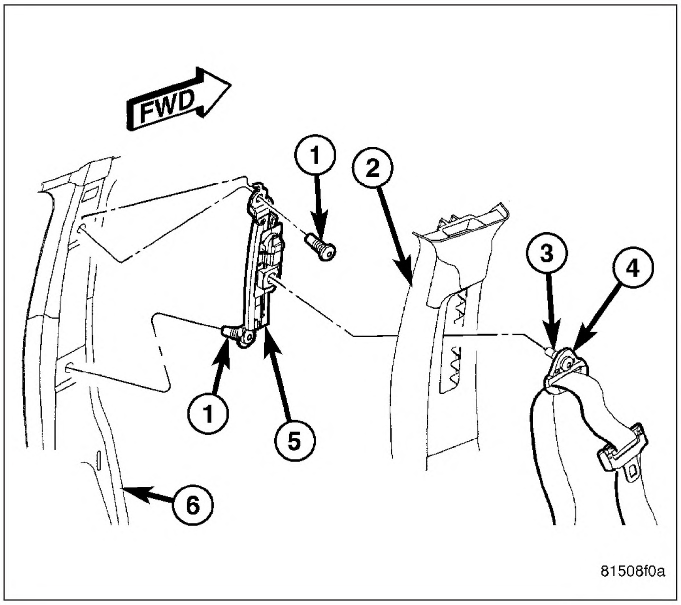
REMOVAL

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

1. Firmly grasp the lower end of the turning loop trim cover on the upper B-pillar and pull it straight out to unsnap it from the height adjuster, then lift the bottom of the cover upward and pull outward to disengage the upper tabs from the adjuster.



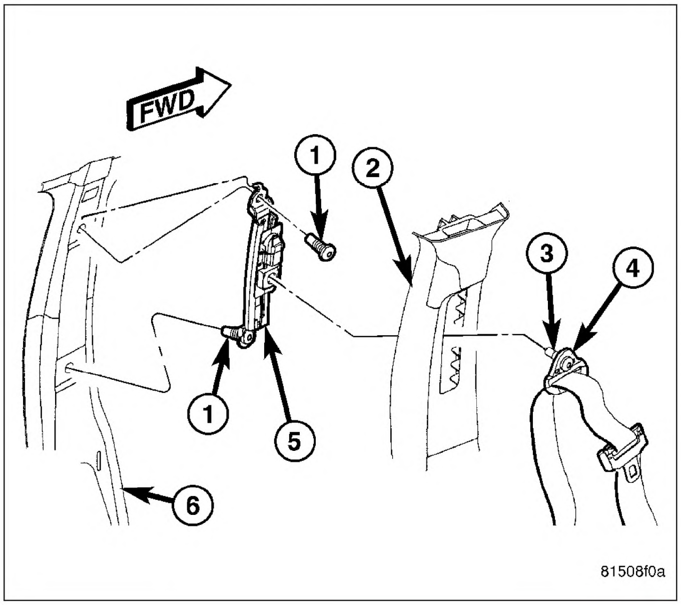
2. Remove the screw (3) that secures the seat belt turning loop (4) to the height adjuster (5).
3. Remove the seat belt turning loop from the height adjuster.
4. Remove the upper trim (2) from the inside of the B-pillar (6). (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).
5. Remove the two screws (1) that secure the height adjuster to the inside of the B-pillar.
6. Remove the adjuster from the B-pillar.



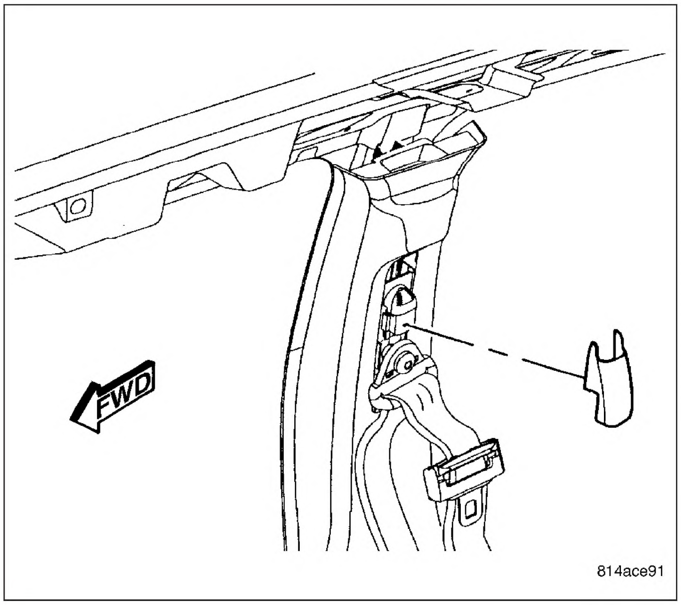
INSTALLATION

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar Parts Catalog.

1. Position the seat belt turning loop adjuster (5) to the inside of the B-pillar (6).
2. Install and tighten the two screws (1) that secure the adjuster to the B-pillar. Tighten the screws to 39 N·m (29 ft. lbs.).
3. Reinstall the upper trim (2) onto the inside of the B-pillar. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).
4. Position the seat belt turning loop (4) onto the height adjuster on the upper B-pillar. Be certain that the seat belt webbing between the retractor and the turning loop is not twisted.
5. Install and tighten the screw (3) that secures the turning loop to the height adjuster. Tighten the screw to 39 N·m (29 ft. lbs.).



6. Insert the upper tabs of the turning loop trim cover into the slots of the height adjuster on the upper B-pillar, then lower the bottom of the cover and use hand pressure to press firmly and evenly on the cover until it snaps into place.

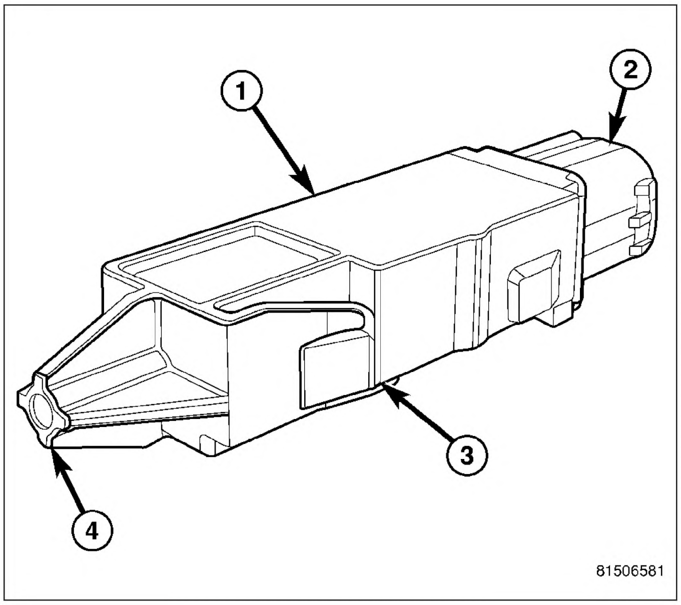


SEAT TRACK POSITION SENSOR

DESCRIPTION

The seat track position sensor (1) is a Hall Effect-type sensor. This sensor consists of a Hall Effect Integrated Circuit (IC) chip encased in potting material within a cavity of the molded plastic sensor housing. The sensor housing has an integral snap feature (3) and snaps into a stamped metal bracket located on the inboard side of one of the seat adjuster tracks on each front seat, then is secured by a screw into a mounting boss (4) at one end of the sensor housing. A molded connector receptacle (2) is integral to the opposite end of the sensor housing from the mounting boss is connected to the vehicle electrical system through a connector and take out of the driver or passenger seat wire harness beneath the front seat cushion frame.

The seat track position sensor cannot be adjusted or repaired and, if faulty or damaged, the entire sensor must be replaced.



OPERATION

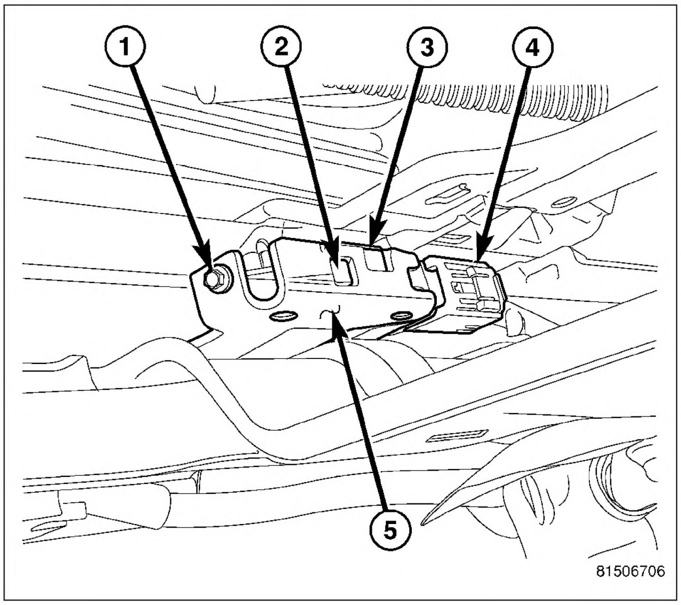
The seat track position sensor is designed to provide a seat position data input to the Occupant Classification Module (OCM) indicating whether the driver front seat is in a full forward or a not full forward position. The OCM sends electronic seat position messages to the Occupant Restraint Controller (ORC) over the Controller Area Network (CAN) data bus. The ORC uses this data as an additional logic input for use in determining the appropriate deployment force to be used when deploying the multistage front airbags.

The seat track position sensor receives a nominal five volt supply from the OCM. The sensor communicates the seat position by modulating the voltage returned to the OCM on a sensor data circuit. The OCM also monitors the condition of the sensor circuits and will store a Diagnostic Trouble Code (DTC) for any fault that is detected, then send messages to the ORC to illuminate the airbag indicator in the instrument cluster. For proper diagnosis of the seat track position sensor, a diagnostic scan tool is required. Refer to the appropriate diagnostic information.

REMOVAL

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

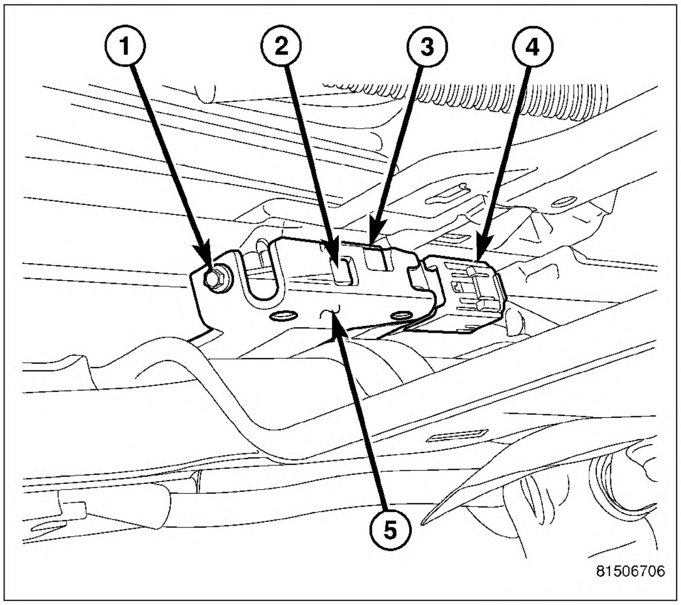
1. Disconnect and isolate the battery negative cable. Wait two minutes for the system capacitor to discharge before further service.
2. Reach under the front seat cushion to access the seat track position sensor (3) in a bracket (5) located on the inboard side of either the inner or outer, driver or passenger seat track.
3. Disconnect the electrical connector (4) from the sensor.
4. Remove the screw (1) that secures the sensor mounting boss to the bracket.
5. Using a small screwdriver, depress the sensor latch feature (2) and pull the sensor out of the bracket.



INSTALLATION

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

1. Reach under the front seat cushion to position the seat track position sensor (3) to the open end of the bracket (5) located on the inboard side of either the inner or outer, driver or passenger seat track.
2. Push the sensor firmly into the bracket until the latch feature (2) snaps into place.
3. Install and tighten the screw (1) that secures the sensor mounting boss to the bracket. Tighten the screw to 2 N·m (15 in. lbs.).
4. Reconnect the seat wire harness connector (4) to the sensor connector receptacle located on the end of the sensor. Be certain that the latch on the connector is fully engaged.
5. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).



6. Following successful completion of the supplemental restraint system verification test procedure, perform the Occupant Classification System Verification Test using a diagnostic scan tool. Refer to the appropriate diagnostic procedures.

SPEED CONTROL

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SPEED CONTROL

DESCRIPTION

3.7L/4.7L Engine

The speed control system is operated by the use of a cable and a vacuum controlled servo. Electronic control of the speed control system is integrated into the Powertrain Control Module (PCM). The controls consist of two steering wheel mounted switches. The switches are labeled: ON/OFF, RES/ACCEL, SET, COAST, and CANCEL.

The system is designed to operate at speeds above 30 mph (50 km/h).

5.7L V-8 Engine

The speed control system is fully and electronically controlled by the Powertrain Control Module (PCM). **A cable and a vacuum controlled servo are not used. This is a servo-less system.** The controls consist of two steering wheel mounted switches. The switches are labeled: ON/OFF, RES/ACCEL, SET, COAST, and CANCEL.

The system is designed to operate at speeds above 30 mph (50 km/h).

OPERATION

When speed control is selected by depressing the ON switch, the PCM (the ECM if equipped with a diesel engine) allows a set speed to be stored in its RAM for speed control. To store a set speed, depress the SET switch while the vehicle is moving at a speed between 35 and 85 mph. In order for the speed control to engage, the brakes cannot be applied, nor can the gear selector be indicating the transmission is in Park or Neutral.

The speed control can be disengaged manually by:

- Stepping on the brake pedal
- Depressing the OFF switch
- Depressing the CANCEL switch.
- Depressing the clutch pedal (if equipped).

NOTE: Depressing the OFF switch or turning off the ignition switch will erase the set speed stored in the PCM (the ECM with a diesel engine).

For added safety, the speed control system is programmed to disengage for any of the following conditions:

- An indication of Park or Neutral
- A rapid increase rpm (indicates that the clutch has been disengaged)
- Excessive engine rpm (indicates that the transmission may be in a low gear)
- The speed signal increases at a rate of 10 mph per second (indicates that the coefficient of friction between the road surface and tires is extremely low)
- The speed signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)

Once the speed control has been disengaged, depressing the RES/ACCEL switch (when speed is greater than 30 mph) restores the vehicle to the target speed that was stored in the PCM (the ECM with a diesel engine).

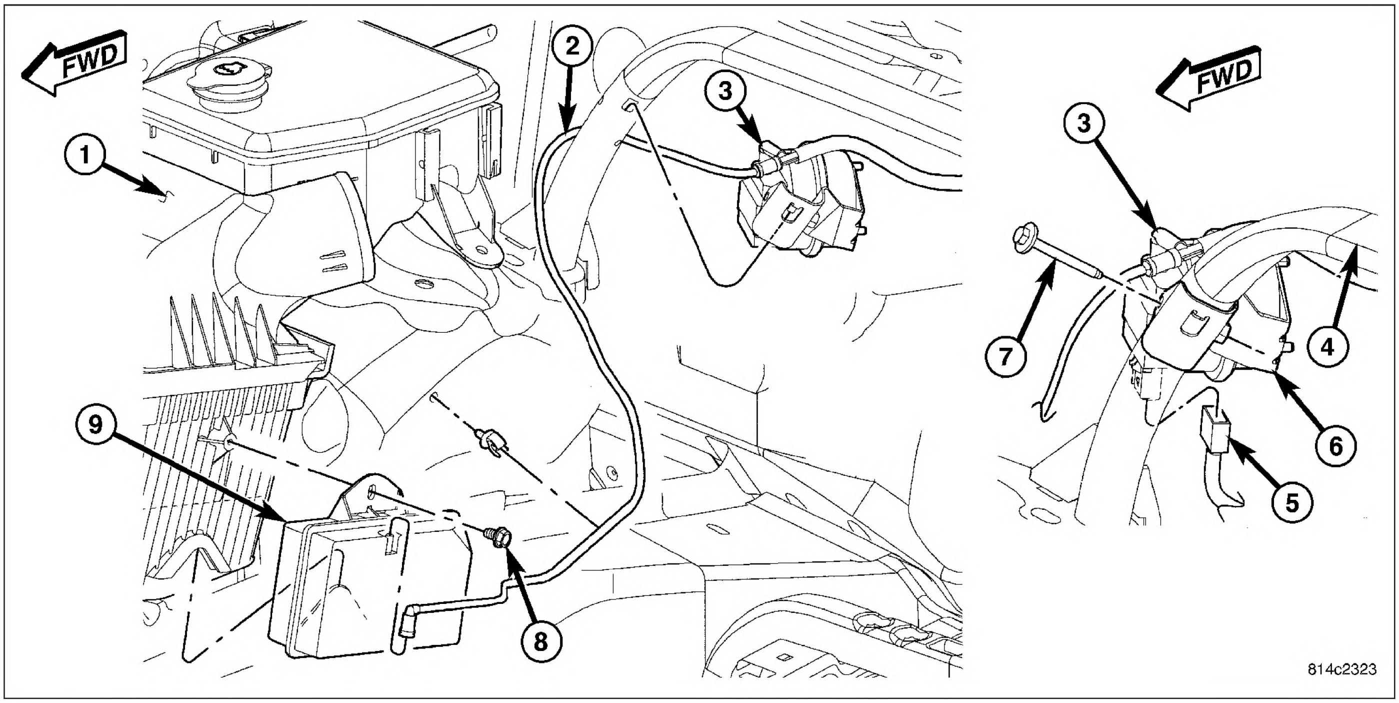
While the speed control is engaged, the driver can increase the vehicle speed by depressing the RES/ACCEL switch. The new target speed is stored in the PCM (the ECM with a diesel engine) when the RES/ACCEL is released. The PCM (the ECM with a diesel engine) also has a ″tap-up″ feature in which vehicle speed increases at a rate of approximately 2 mph for each momentary switch activation of the RES/ACCEL switch.

A “tap down” feature is used to decelerate without disengaging the speed control system. To decelerate from an existing recorded target speed, momentarily depress the COAST switch. For each switch activation, speed will be lowered approximately 1 mph.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - VACUUM SUPPLY TEST

3.7L / 4.7L Engines



1 - Air Cleaner Box
2 - Vacuum Line
3 - Speed Control Servo
4 - Cross Support
5 - Electrical. Connector
6 - Servo Mounting Bracket
7 - Servo Mounting Bolt
8 - Vacuum Reservoir Mounting Bolt
9 - Vacuum Reservoir

Actual engine vacuum, a vacuum reservoir (9) equipped with a one-way check valve, and vacuum lines (2) are used to supply vacuum to the speed control servo.

1. Remove rubber air tube between throttle body and air filter housing to gain access to speed control servo.
2. Disconnect vacuum hose at speed control servo and install a vacuum gauge into the disconnected hose.
3. Start engine and observe gauge at idle. Vacuum gauge should read at least ten inches of mercury.
4. If vacuum is less than ten inches of mercury, determine source of leak. Check vacuum line to engine for leaks. Also check actual engine intake manifold vacuum. If manifold vacuum does not meet this requirement, check for poor engine performance and repair as necessary.
5. If vacuum line to engine is not leaking, check for leak at vacuum reservoir (9). Disconnect vacuum line at reservoir and connect a hand-operated vacuum pump to reservoir fitting. Apply vacuum. Reservoir vacuum should not bleed off. If vacuum is being lost, replace reservoir.
6. The reservoir (9) is equipped with an integral one-way check valve to retain a certain amount of vacuum within the reservoir. Verify operation of one-way check valve and check it for leaks.

5.7 Engine

Vacuum is not used for any part of the speed control system if equipped with a 5.7L V-8 engine.

DIAGNOSIS AND TESTING - ROAD TEST

Perform a vehicle road test to verify reports of speed control system malfunction. The road test should include attention to the speedometer. Speedometer operation should be smooth and without flutter at all speeds.

Flutter in the speedometer indicates a problem which might cause surging in the speed control system. The cause of any speedometer problems should be corrected before proceeding. Refer to Instrument Cluster for speedometer diagnosis.

If a road test verifies a system problem and the speedometer operates properly, check for:

- A Diagnostic Trouble Code (DTC). If a DTC exists, conduct tests per the Powertrain Diagnostic Procedures service manual.
- A misadjusted brake (stop) lamp switch. This could also cause an intermittent problem.
- Loose, damaged or corroded electrical connections at the servo (if used). Corrosion should be removed from electrical terminals and a light coating of Mopar MultiPurpose Grease, or equivalent, applied.
- Leaking vacuum reservoir (if used).
- Loose or leaking vacuum hoses or connections (if used).
- Defective one-way vacuum check valve (if used).
- Secure attachment of both ends of the speed control servo cable (if used).
- Smooth operation of throttle linkage (if used) and throttle body air valve.
- Failed speed control servo (if used). Do the servo vacuum test.

CAUTION: When test probing for voltage or continuity at electrical connectors, care must be taken not to damage connector, terminals or seals. If these components are damaged, intermittent or complete system failure may occur.

SPECIFICATIONS

TORQUE - SPEED CONTROL

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Servo-to-Cross Support Mounting Bolt	-	-	105
Speed Control Switch Mounting Screws	1.7	-	15

CABLE-SPEED CONTROL

DESCRIPTION

The speed control servo cable is connected between the speed control vacuum servo diaphragm and the throttle body control linkage. This cable is used only with 3.7L/4.7L engines.

A speed control servo cable **is not used** if equipped with a 5.7L engine.

OPERATION

This cable causes the throttle control linkage to open or close the throttle valve in response to movement of the vacuum servo diaphragm.

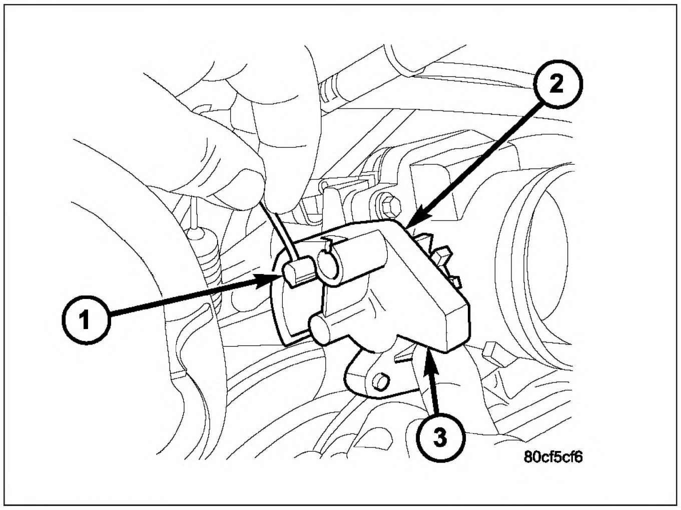
REMOVAL

3.7L / 4.7L ENGINES

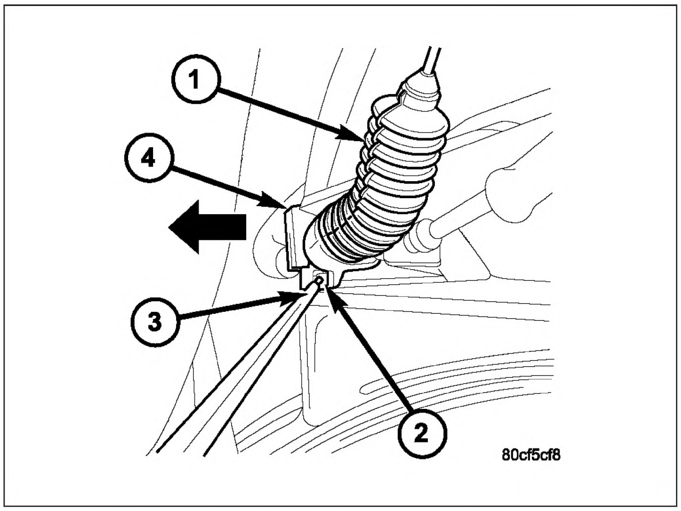
1. Disconnect negative battery cable at battery.
2. Remove air intake tube at top of throttle body.

The accelerator cable must be partially removed to gain access to speed control cable.

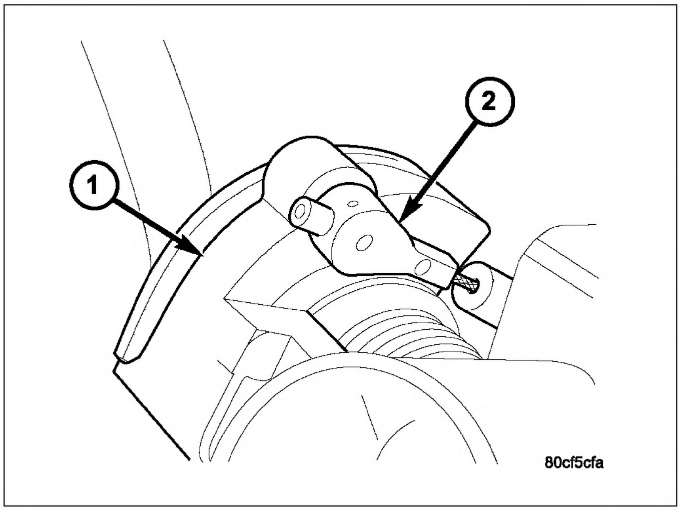
3. Hold throttle in wide open position. While held in this position, slide throttle cable pin (1) from throttle body bellcrank.



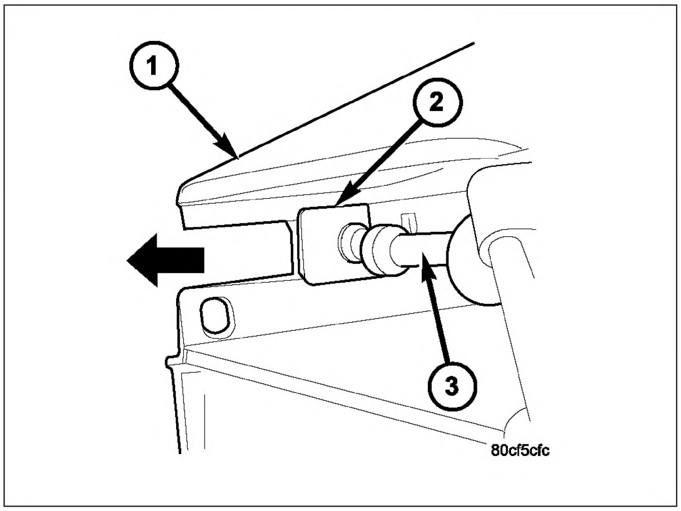
4. Using a pick or small screwdriver, press release tab (2) to release plastic cable mount from bracket. **Press on tab only enough to release cable from bracket. If tab is pressed too much, it will be broken.** Slide plastic mount (4) towards right side of vehicle to remove throttle cable from throttle body bracket.



5. Using finger pressure only, disconnect servo cable connector (2) at throttle body bellcrank pin by pushing connector off bellcrank pin towards front of vehicle. **DO NOT try to pull connector off perpendicular to the bellcrank pin. Connector will be broken.**



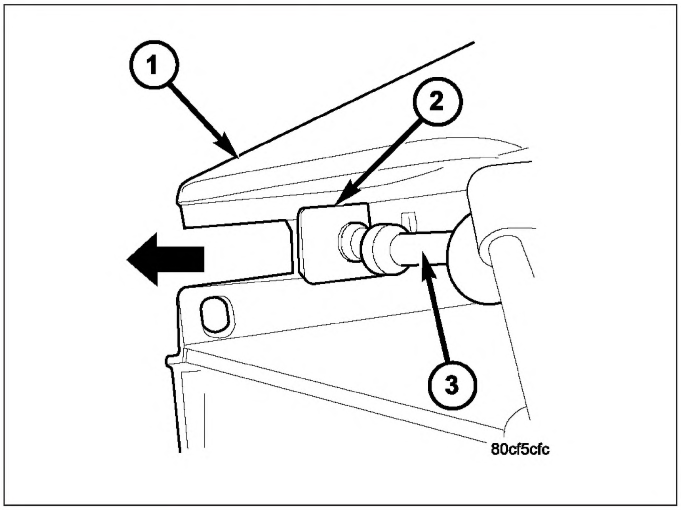
6. Slide speed control cable plastic mount (2) towards right of vehicle to remove cable from throttle body bracket.
7. Remove servo cable from servo. Refer to Servo Removal/Installation.



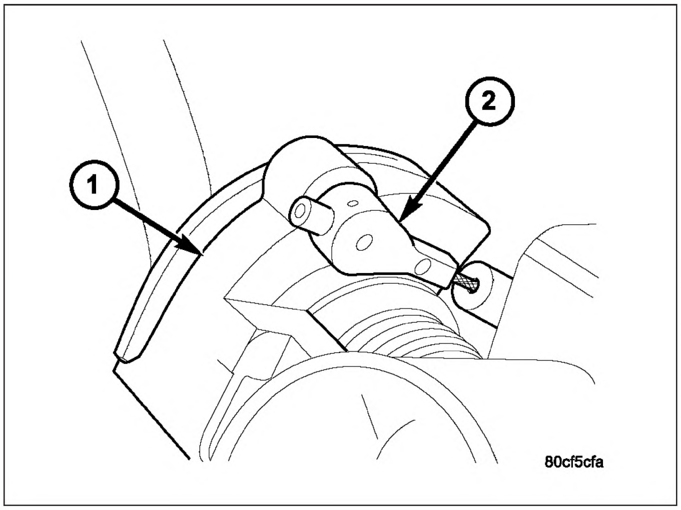
INSTALLATION

3.7L / 4.7L ENGINES

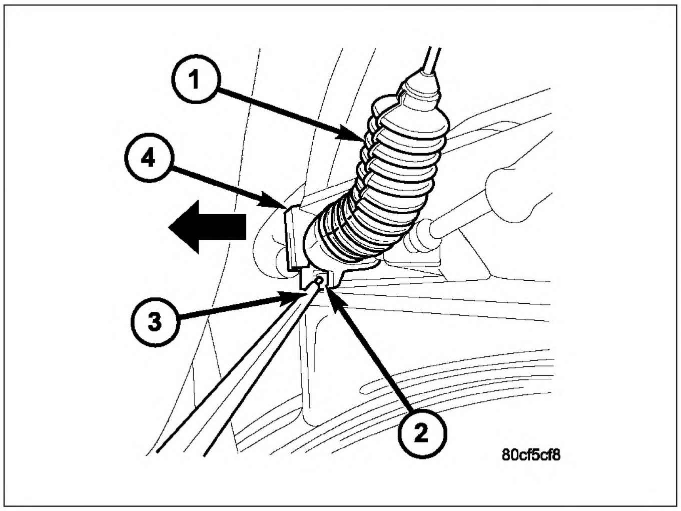
1. Install end of cable to speed control servo. Refer to Servo Removal/Installation.
2. Slide speed control cable plastic mount (2) into throttle body bracket.



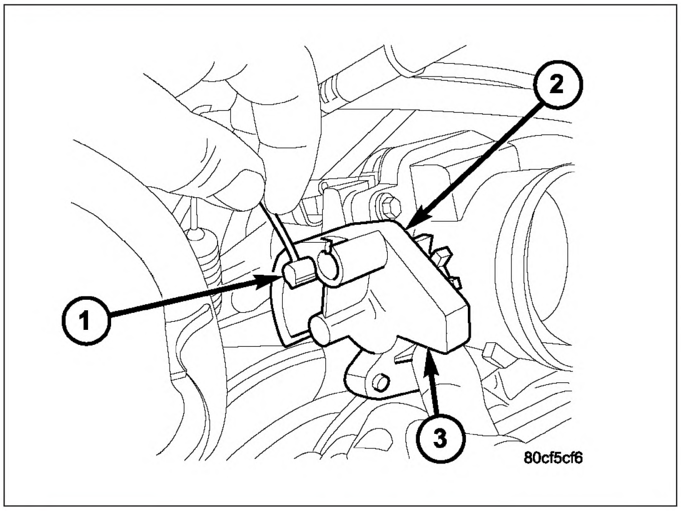
3. Install speed control cable connector (2) onto throttle body bellcrank pin (push rearward to snap into location).



4. Slide throttle (accelerator) cable plastic mount (4) into throttle body bracket. Continue sliding until cable release tab (2) is aligned to hole in throttle body mounting bracket.

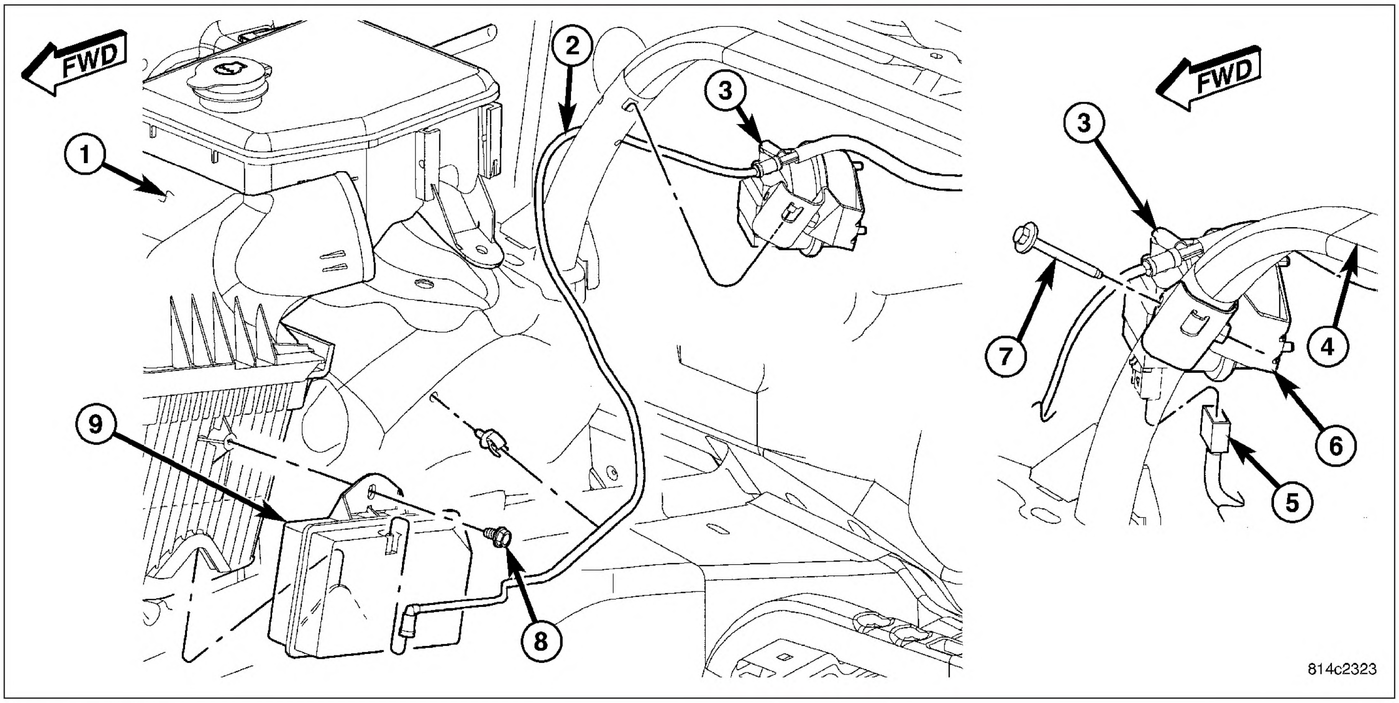


5. While holding throttle to wide open position, place throttle cable pin (1) into throttle body bellcrank.
6. Install air intake tube to top of throttle body.
7. Connect negative battery cable at battery.
8. Before starting engine, operate accelerator pedal to check for any binding.



SERVO-SPEED CONTROL

DESCRIPTION



1 - Air Cleaner Box
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7 - Servo Mounting Bolt
8 - Vacuum Reservoir Mounting Bolt
9 - Vacuum Reservoir

A speed control servo is used only with 3.7L V-6 or 4.7L V-8 engines.

The speed control servo (3) is located in the engine compartment and is attached to the cross-support (4).

The servo unit consists of a solenoid valve body, and a vacuum chamber. The solenoid valve body contains three solenoids:

- Vacuum
- Vent
- Dump

The vacuum chamber contains a diaphragm with a cable attached to control the throttle linkage.

OPERATION

A speed control servo is used only with 3.7L V-6 or 4.7L V-8 engines.

The Powertrain Control Module (PCM) controls the solenoid valve body. The solenoid valve body controls the application and release of vacuum to the diaphragm of the vacuum servo. The servo unit cannot be repaired and is serviced only as a complete assembly.

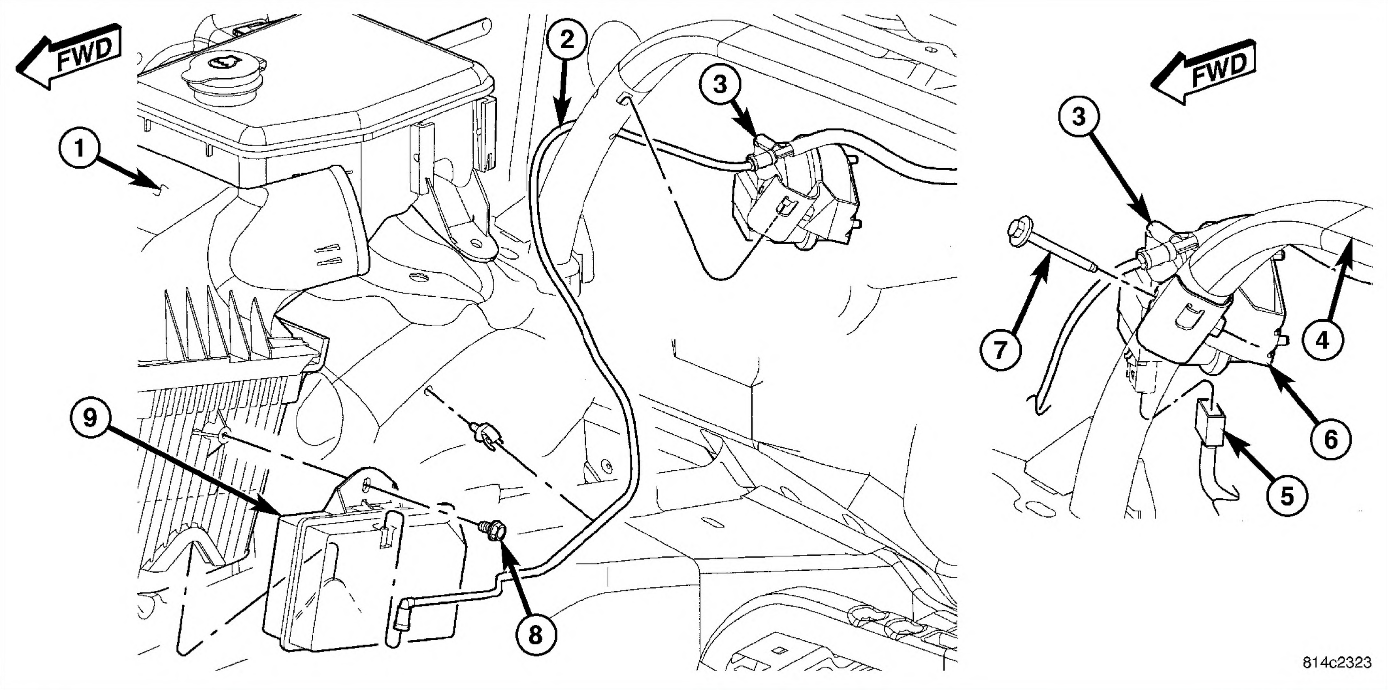
Power is supplied to the servo's by the PCM through the brake switch. The PCM controls the ground path for the vacuum and vent solenoids.

The dump solenoid is energized anytime it receives power. If power to the dump solenoid is interrupted, the solenoid dumps vacuum in the servo. This provides a safety backup to the vent and vacuum solenoids.

The vacuum and vent solenoids must be grounded at the PCM to operate. When the PCM grounds the vacuum servo solenoid, the solenoid allows vacuum to enter the servo and pull open the throttle plate using the cable. When the PCM breaks the ground, the solenoid closes and no more vacuum is allowed to enter the servo. The PCM also operates the vent solenoid via ground. The vent solenoid opens and closes a passage to bleed or hold vacuum in the servo as required.

The PCM duty cycles the vacuum and vent solenoids to maintain the set speed, or to accelerate and decelerate the vehicle. To increase throttle opening, the PCM grounds the vacuum and vent solenoids. To decrease throttle opening, the PCM removes the grounds from the vacuum and vent solenoids. When the brake is released, if vehicle speed exceeds 30 mph to resume, 35 mph to set, and the RES/ACCEL switch has been depressed, ground for the vent and vacuum circuits is restored.

REMOVAL



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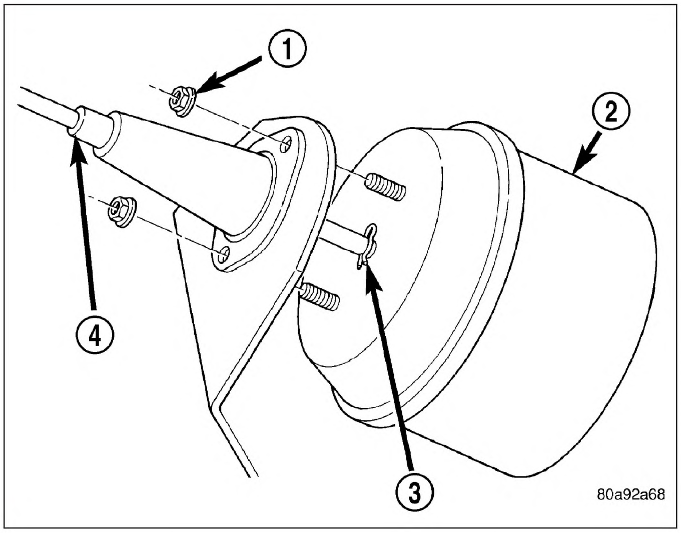
The speed control servo assembly (3) is attached to a cross-support (4) located in the engine compartment.

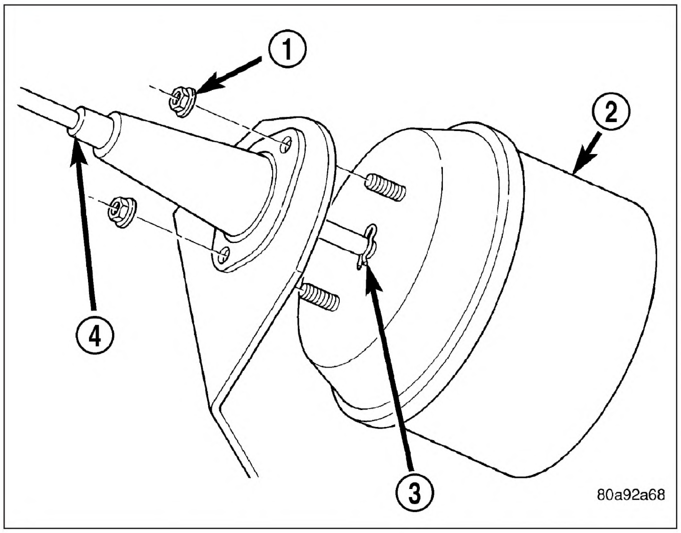
1. Disconnect negative battery cable at battery.
2. Disconnect vacuum line at servo.
3. Disconnect electrical connector (5) at servo.
4. Remove servo mounting bolt (7).
5. Disconnect servo cable at throttle body. Refer to Servo Cable Removal/Installation.

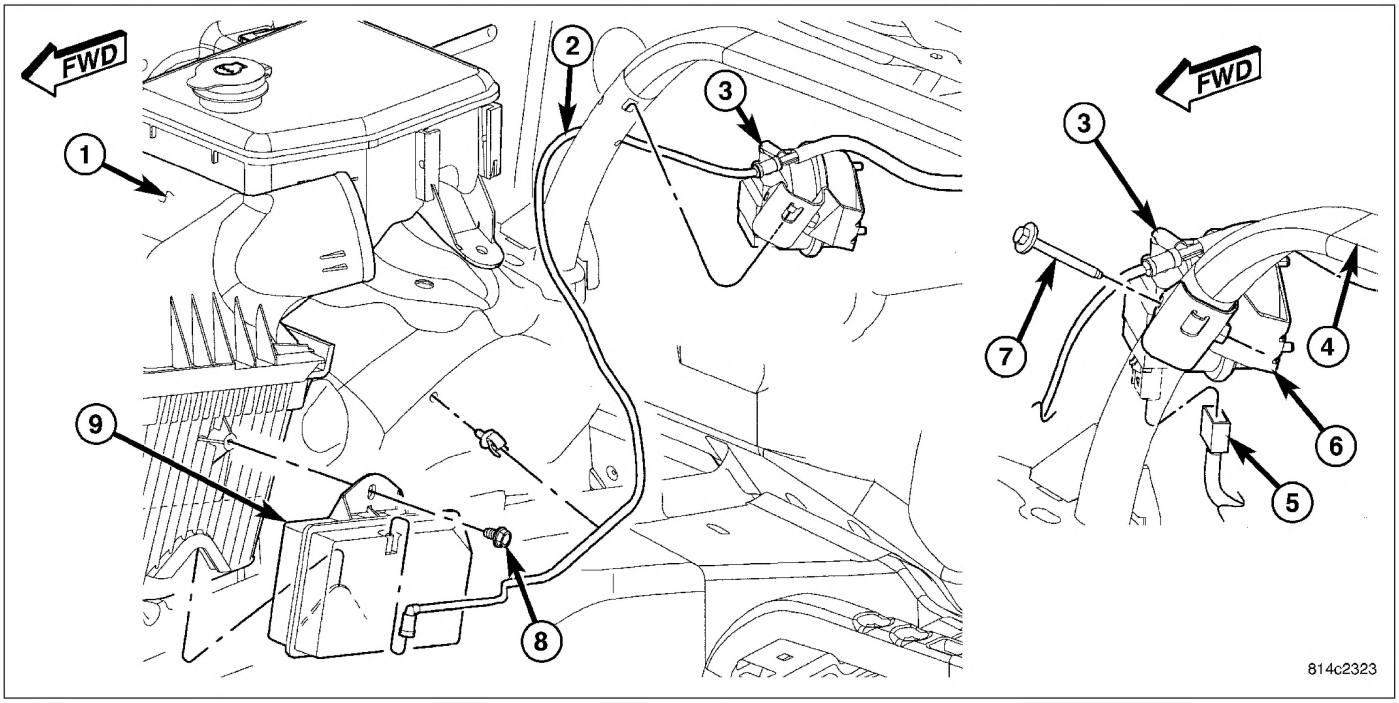
6. Remove 2 mounting nuts (1) holding servo cable sleeve (4) to bracket.
7. Pull speed control cable sleeve and servo away from servo mounting bracket to expose cable retaining clip (3) and remove clip. Note: The servo mounting bracket displayed is a typical bracket and may/may not be applicable to this model vehicle.
8. Remove servo (2) from mounting bracket. While removing, note orientation of servo to bracket.



INSTALLATION

1. Position servo (2) to mounting bracket.
2. Align hole in cable connector with hole in servo pin. Install cable-to-servo retaining clip (3).
3. Insert servo mounting studs through holes in servo mounting bracket.
4. Install two servo-to-mounting bracket nuts (1) and tighten. Refer to torque specifications.





1 - Air Cleaner Box
2 - Vacuum Line
3 - Speed Control Servo
4 - Cross Support
5 - Electrical. Connector
6 - Servo Mounting Bracket
7 - Servo Mounting Bolt
8 - Vacuum Reservoir Mounting Bolt
9 - Vacuum Reservoir

5. Position servo assembly (3) to cross-support (4) and install mounting bolt (7). Tighten bolt. Refer to Torque Specifications.
6. Connect vacuum line at servo.
7. Connect electrical connector (5) at servo.
8. Connect servo cable to throttle body. Refer to Servo Cable Removal/Installation.
9. Connect negative battery cable to battery.
10. Before starting engine, operate accelerator pedal to check for any binding.

SWITCH-SPEED CONTROL

DESCRIPTION

Two separate switch pods operate the speed control system. The steering-wheel-mounted switches use multiplexed circuits to provide inputs to the PCM for ON, OFF, RESUME, ACCELERATE, SET, DECEL and CANCEL modes. Refer to the owner's manual for more information on speed control switch functions and setting procedures.

The individual switches cannot be repaired. If one switch fails, the entire switch module must be replaced.

OPERATION

When speed control is selected by depressing the ON, OFF switch, the PCM allows a set speed to be stored in its RAM for speed control. To store a set speed, depress the SET switch while the vehicle is moving at a speed between approximately 35 and 85 mph. In order for the speed control to engage, the brakes cannot be applied, nor can the gear selector be indicating the transmission is in Park or Neutral.

The speed control can be disengaged manually by:

- Stepping on the brake pedal

- Depressing the OFF switch
- Depressing the CANCEL switch.

The speed control can be disengaged also by any of the following conditions:

- An indication of Park or Neutral (auto. trans.)
- The VSS signal increases at a rate of 10 mph per second (indicates that the co-efficient of friction between the road surface and tires is extremely low)
- Depressing the clutch pedal (manual trans.).
- Excessive engine rpm (indicates that the transmission may be in a low gear)
- The VSS signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)
- If the actual speed is not within 20 mph of the set speed

The previous disengagement conditions are programmed for added safety.

Once the speed control has been disengaged, depressing the ACCEL switch restores the vehicle to the target speed that was stored in the PCM's RAM

NOTE: Depressing the OFF switch will erase the set speed stored in the PCM's RAM.

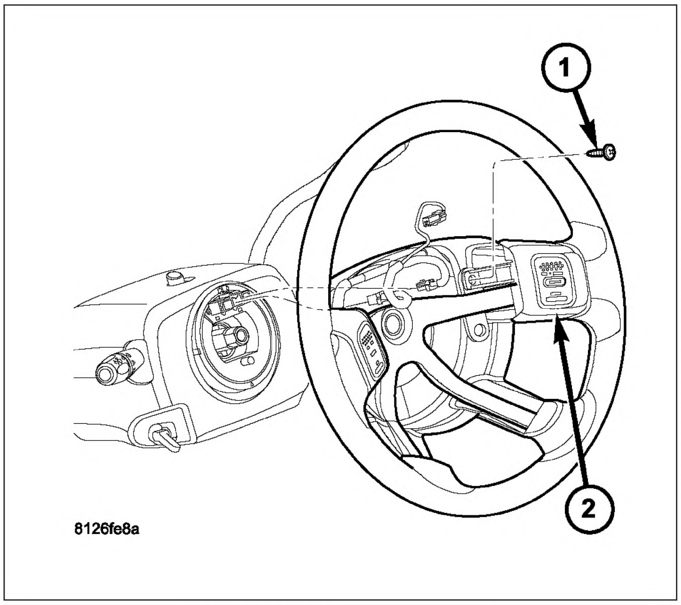
If, while the speed control is engaged, the driver wishes to increase vehicle speed, the PCM is programmed for an acceleration feature. With the ACCEL switch held closed, the vehicle accelerates slowly to the desired speed. The new target speed is stored in the PCM's RAM when the ACCEL switch is released. The PCM also has a ″tap-up″ feature in which vehicle speed increases at a rate of approximately 2 mph for each momentary switch activation of the ACCEL switch.

The PCM also provides a means to decelerate without disengaging speed control. To decelerate from an existing recorded target speed, depress and hold the COAST switch until the desired speed is reached. Then release the switch. The ON, OFF switch operates two components: the PCM's ON, OFF input, and the battery voltage to the brake switch.

REMOVAL

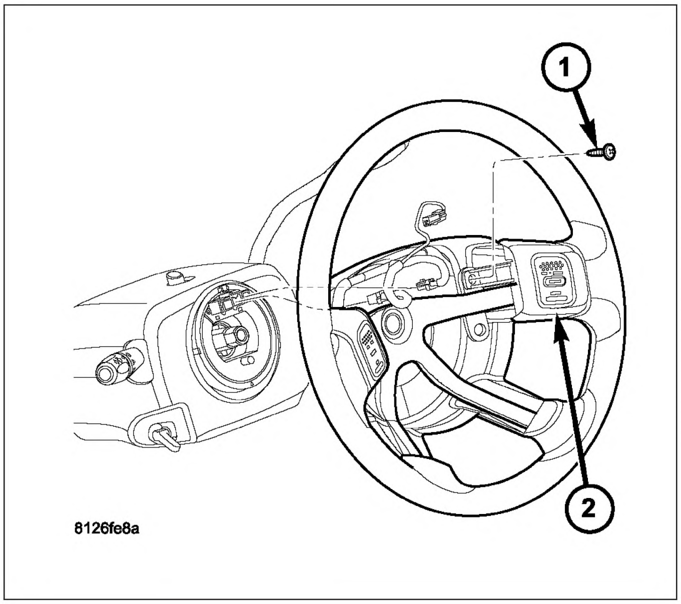
WARNING: BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL AND STEERING COLUMN COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE NEGATIVE (GROUND) BATTERY CABLE. WAIT 2 MINUTES FOR SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

1. Disconnect and isolate negative battery cable from battery.
2. Remove airbag module. Refer to Restraint Systems.
3. Unplug electrical connector.
4. Remove speed control switch mounting screw (1) and remove switch from steering wheel.



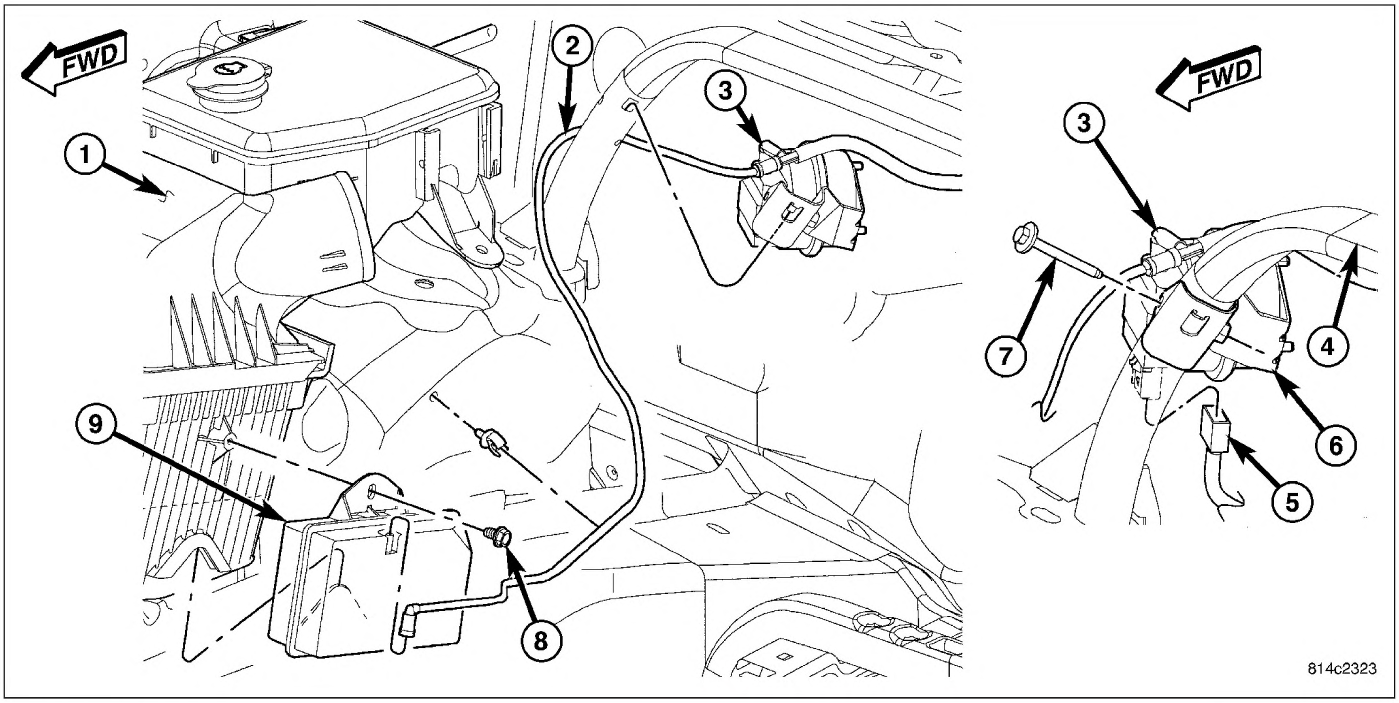
INSTALLATION

1. Position switch (2) to steering wheel.
2. Install switch mounting screw (1) and tighten. Refer to torque specifications.
3. Plug electrical connector into switch.
4. Install airbag module. Refer to Restraint Systems.
5. Connect negative battery cable to battery.



RESERVOIR-VACUUM

DESCRIPTION



1 - Air Cleaner Box
2 - Vacuum Line
3 - Speed Control Servo
4 - Cross Support
5 - Electrical. Connector
6 - Servo Mounting Bracket
7 - Servo Mounting Bolt
8 - Vacuum Reservoir Mounting Bolt
9 - Vacuum Reservoir

The vacuum reservoir is a plastic storage tank connected to an engine vacuum source by vacuum lines.

The reservoir (9) is attached to the side of the air cleaner filter housing (1).

A vacuum reservoir is not used with diesel engines or the 5.7L gas powered engine.

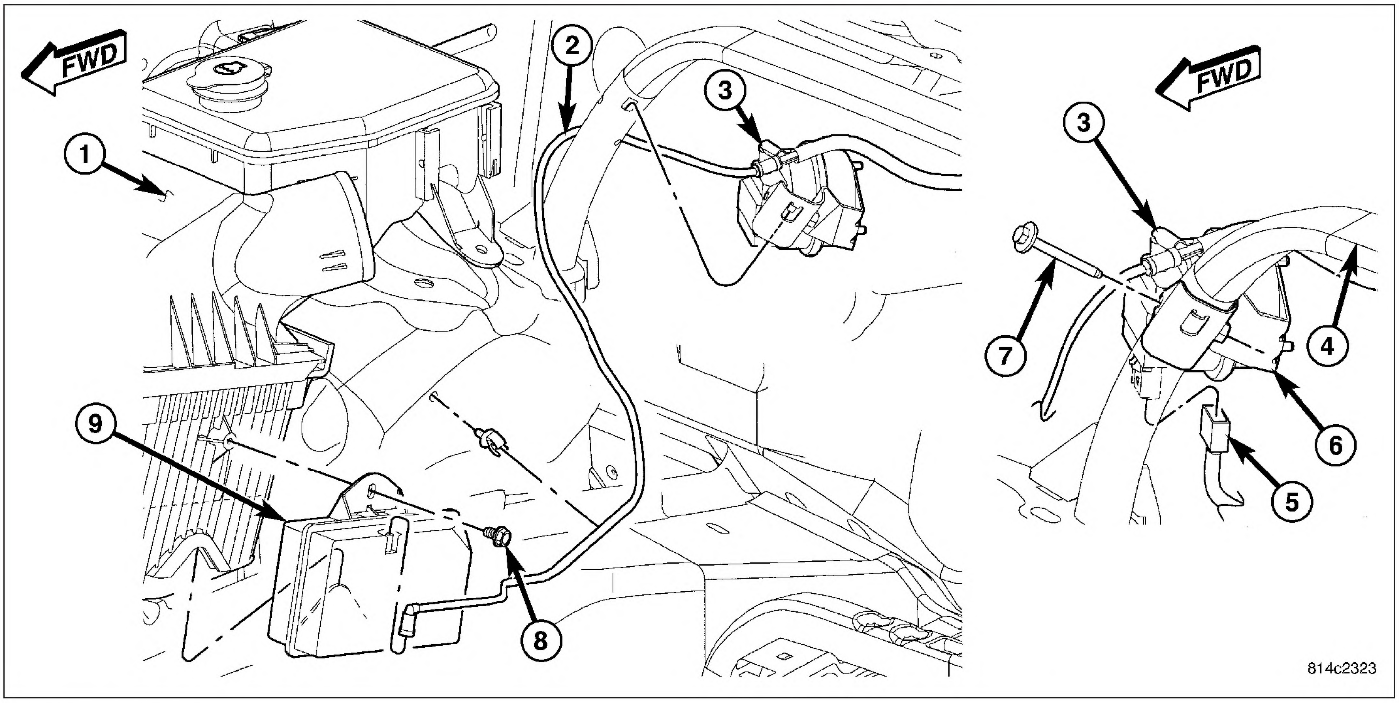
OPERATION

The vacuum reservoir is used to supply the vacuum needed to maintain proper speed control operation when engine vacuum drops, such as in climbing a grade while driving. A one-way check valve is used in the vacuum line between the reservoir and the vacuum source. This check valve is used to trap engine vacuum in the reservoir. On certain vehicle applications, this reservoir is shared with the heating/air-conditioning system. The vacuum reservoir cannot be repaired and must be replaced if faulty.

DIAGNOSIS AND TESTING - VACUUM RESERVOIR

Refer to Diagnosis and Testing — Vacuum Supply Test for procedures.

REMOVAL

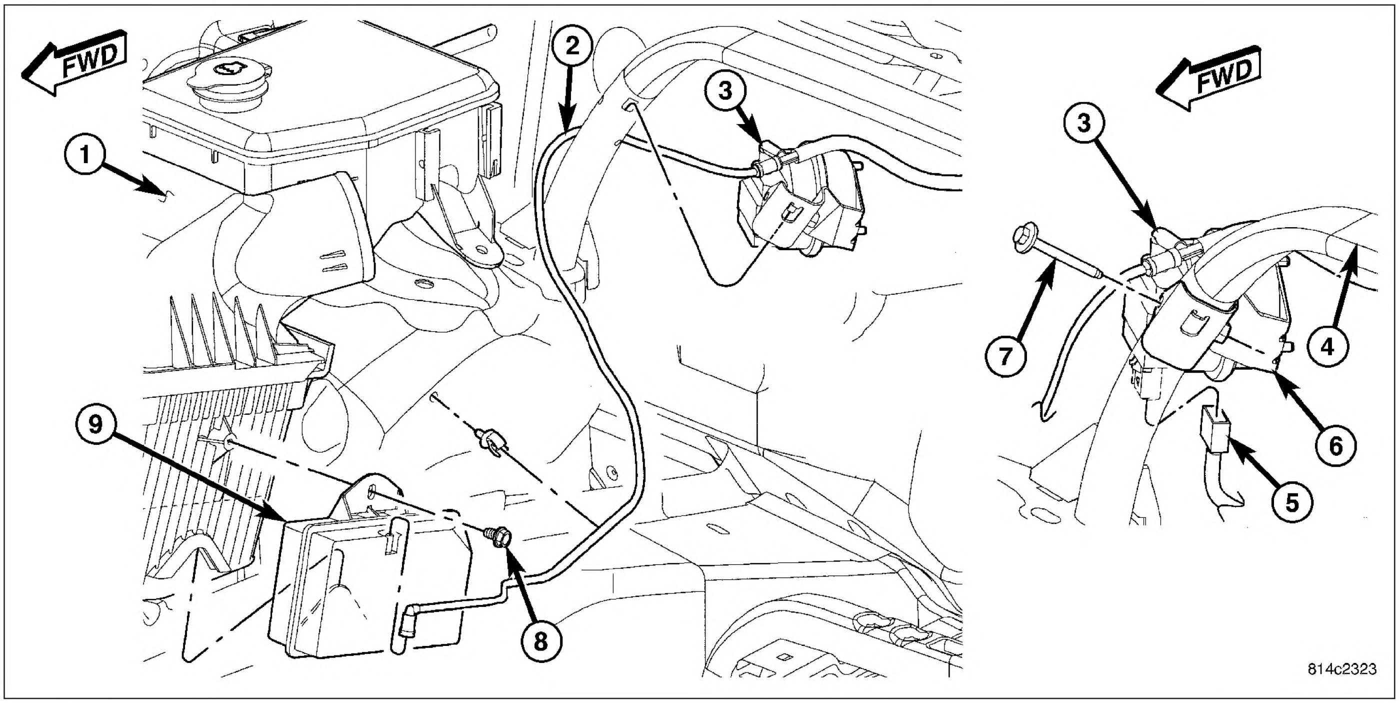


1 - Air Cleaner Box
2 - Vacuum Line
3 - Speed Control Servo
4 - Cross Support
5 - Electrical. Connector
6 - Servo Mounting Bracket
7 - Servo Mounting Bolt
8 - Vacuum Reservoir Mounting Bolt
9 - Vacuum Reservoir

The vacuum reservoir (9) is attached to the side of the air cleaner filter housing (1).

1. Disconnect vacuum line (2) at reservoir.
2. Remove reservoir mounting bolt (8).
3. Remove reservoir (9).

INSTALLATION



1 - Air Cleaner Box
2 - Vacuum Line
3 - Speed Control Servo
4 - Cross Support
5 - Electrical. Connector
6 - Servo Mounting Bracket
7 - Servo Mounting Bolt
8 - Vacuum Reservoir Mounting Bolt
9 - Vacuum Reservoir

1. Position reservoir (9) to air filter housing.
2. Install and tighten mounting bolt (8).
3. Connect vacuum line (2) to reservoir fitting.

VEHICLE THEFT SECURITY

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VEHICLE THEFT SECURITY - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1A24-KEY NOT PROGRAMMED

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.

Possible Causes
KEY NOT PROGRAMMED
SKREEM

Diagnostic Test

1. KEY NOT PROGRAMMED

Turn the ignition on.

Using a scan tool, attempt to program the key(s) into the SKREEM.

Was the programming of the key(s) successful?

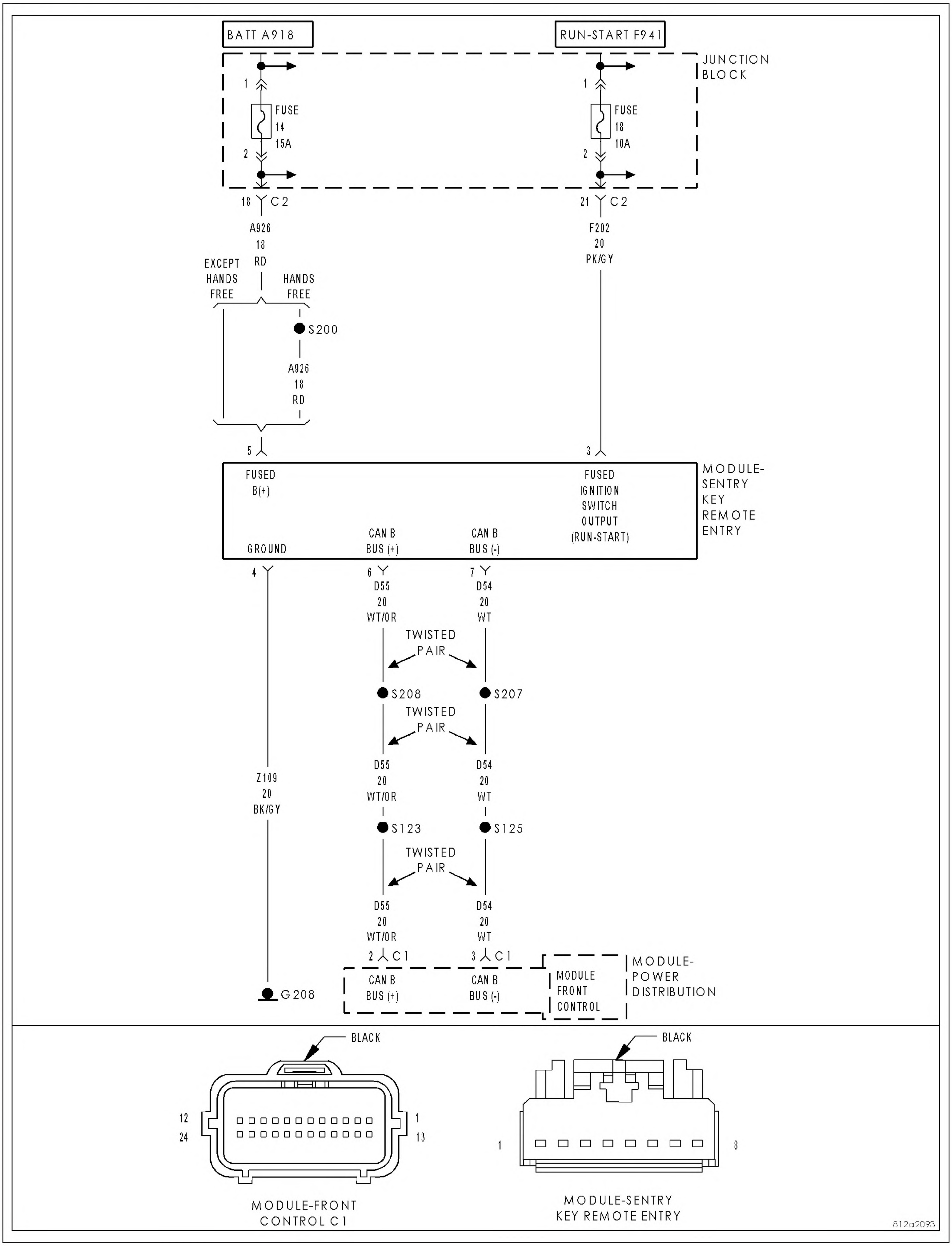
Yes >> Programming of the key(s) were successful. Test complete.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key and attempt to program it into the SKREEM. If the DTC resets, replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B1A25-INVALID KEY


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
FUSE
18
10A
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
5
3
MODULE-SENTRY KEY REMOTE ENTRY
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
S123
S125
Z109
20
BK/GY
G208
2 C1
3 C1
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
BLACK
12
24
1
13
8
MODULE-FRONT CONTROL C1
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A25-INVALID KEY (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to ensure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A25-INVALID KEY (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys, one at a time.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on

With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.

With the scan tool, program the new ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A25-INVALID KEY (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A26-MAXIMUM NUMBER OF KEYS PROGRAMMED

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.
- **Set Condition:**
  When the maximum number of key (8) have been programmed into the SKREEM

Possible Causes
MAXIMUM AMOUNT OF KEY PROGRAMMED INTO SKREEM
SKREEM

Diagnostic Test

1. MAXIMUM AMOUNT OF KEYS PROGRAMMED INTO SKREEM

NOTE: The below procedure has you clearing all the key information within the SKREEM. It is important to obtain all the customer's ignition key(s) so they may be reprogrammed into the module.

Turn the ignition on.

Using a scan tool, clear all the key information in the SKREEM.

Program the all the customer key(s) into the SKREEM (up to eight only)

Was the "Maximum Number of Keys Programmed" display again?

Yes >> Replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Programming of the key(s) were successful. Test complete.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B1A27-SKREEM PROGRAMMING PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.

Possible Causes
SKREEM

Diagnostic Test

1. SKREEM

NOTE: Before continuing review and check the following conditions.

- **Review the repair history of the vehicle. Ensure the vehicle has the correct PCM and SKREEM installed. Check the part numbers.**
- **Using a scan tool, ensure the PCM and SKREEM have been programmed correctly. Compare the PCM VIN to the SKREEM VIN and ensure the two VINS match.**

Turn the ignition on.

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

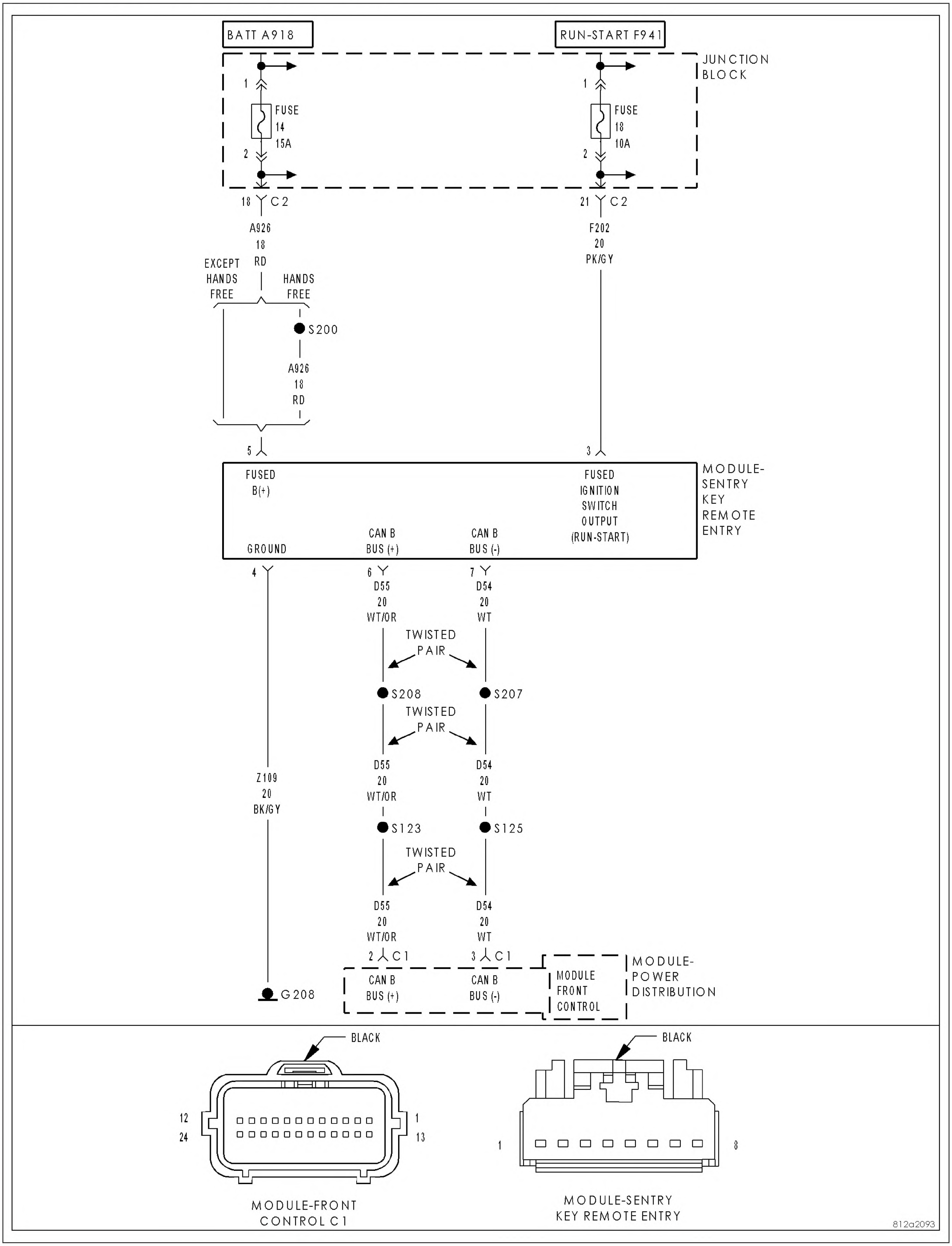
Does the DTC reset?

Yes >> Replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> The DTC is not active at this time. Test complete.

B1A28-ECM MISMATCH WITH SKIM


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
G208
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A28-ECM MISMATCH WITH SKIM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM or PCM reset.
- **Set Condition:**
  When a PCM STATUS message with a Valid Key status is not received by the SKIM within 3.5 seconds of transmitting the last Valid Key Code message to the PCM.

Possible Causes
VERIFYING PCM VIN
REPLACE SKREEM AND CHECK DTC'S
PCM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on and wait 2 minutes.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 4

---

2. VERIFYING THE PCM VIN

Turn the ignition on.

With the scan tool, select Engine system from the main menu.

Display and record the Vehicle Identification Number.

NOTE: Make sure that a VIN has been programmed into the PCM. If a VIN is not displayed, attempt to program the PCM with the correct VIN before continuing.

Does the VIN recorded from the PCM match the VIN of the vehicle?

Yes >> Go To 3

No >> Perform the PCM replaced to update the VIN in the PCM.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B1A28-ECM MISMATCH WITH SKIM (CONTINUED)

3. REPLACE SKREEM AND CHECK DTC'S

Turn the ignition off.

Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Turn the ignition on.

With the scan tool, display and clear all PCM and SKREEM DTC's.

Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle.

With the scan tool, check for SKREEM DTCs.

Does the scan tool display the same DTC?

Yes >> Replace and program the Powertrain Control Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> The repair is complete.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. INTERMITTENT

Turn the ignition off.

NOTE: Check for the following conditions:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

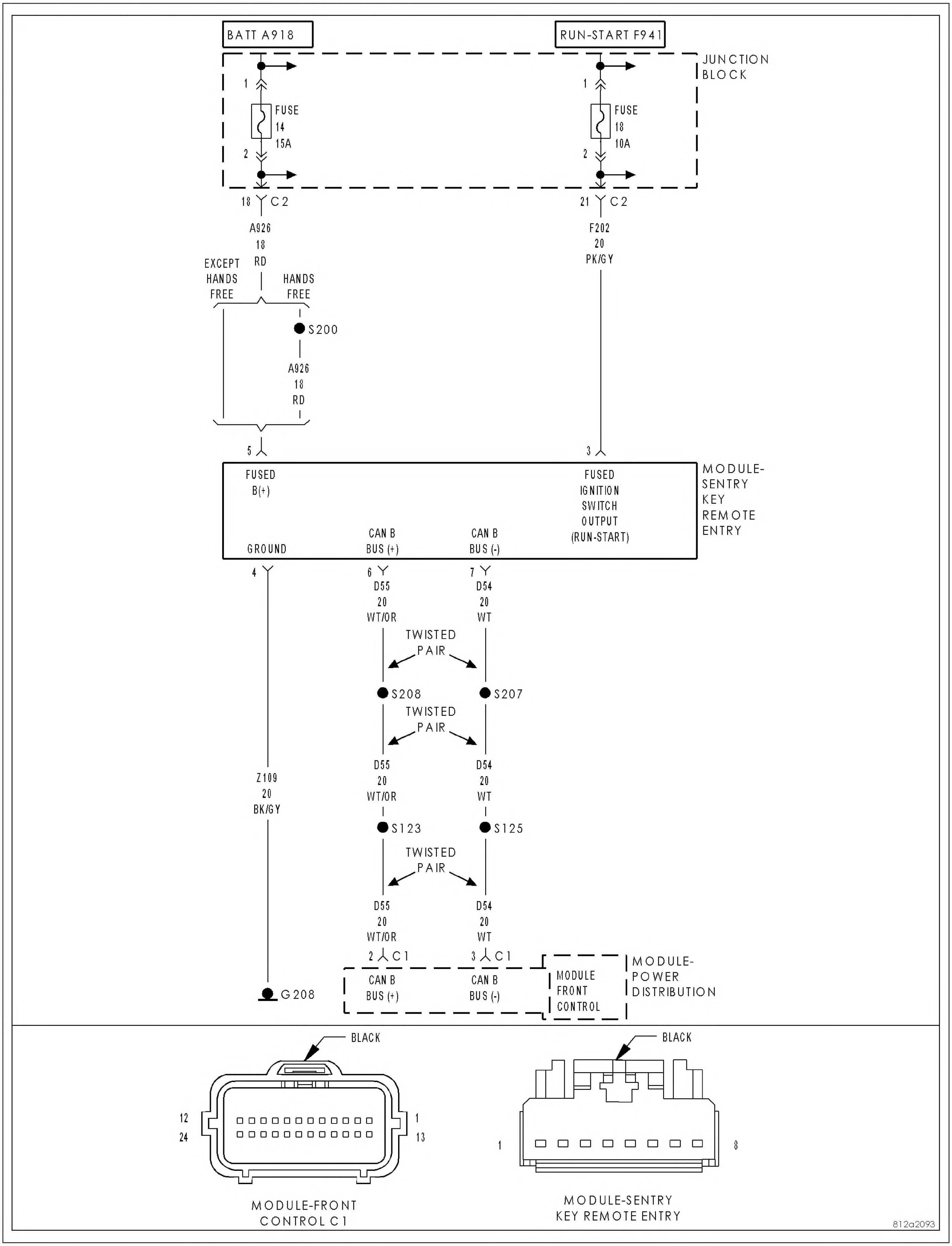
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A29–ECM MISMATCH WITH SKIM


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
MODULE-SENTRY KEY REMOTE ENTRY
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
G208
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A29–ECM MISMATCH WITH SKIM (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM or PCM reset.
- **Set Condition:**
  When a PCM STATUS message with a Valid Key status is not received by the SKIM within 3.5 seconds of transmitting the last Valid Key Code message to the PCM.

Possible Causes
VERIFYING PCM VIN
REPLACE SKREEM AND CHECK DTC'S
PCM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on and wait 2 minutes.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 4

---

2. VERIFYING THE PCM VIN

Turn the ignition on.

With the scan tool, select Engine system from the main menu.

Display and record the Vehicle Identification Number.

NOTE: Make sure that a VIN has been programmed into the PCM. If a VIN is not displayed, attempt to program the PCM with the correct vehicle VIN before continuing.

Does the VIN recorded from the PCM match the VIN of the vehicle?

Yes >> Go To 3

No >> Perform the PCM replaced to update the VIN in the PCM.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B1A29–ECM MISMATCH WITH SKIM (CONTINUED)

3. REPLACE SKREEM AND CHECK DTC'S

Turn the ignition off.

Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Turn the ignition on.

With the scan tool, display and clear all PCM and SKREEM DTC's.

Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle.

With the scan tool, check for SKREEM DTCs.

Does the scan tool display the same DTC?

Yes >> Replace and program the Powertrain Control Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> The repair is complete.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

4. INTERMITTENT

Turn the ignition off.

NOTE: Check for the following conditions:

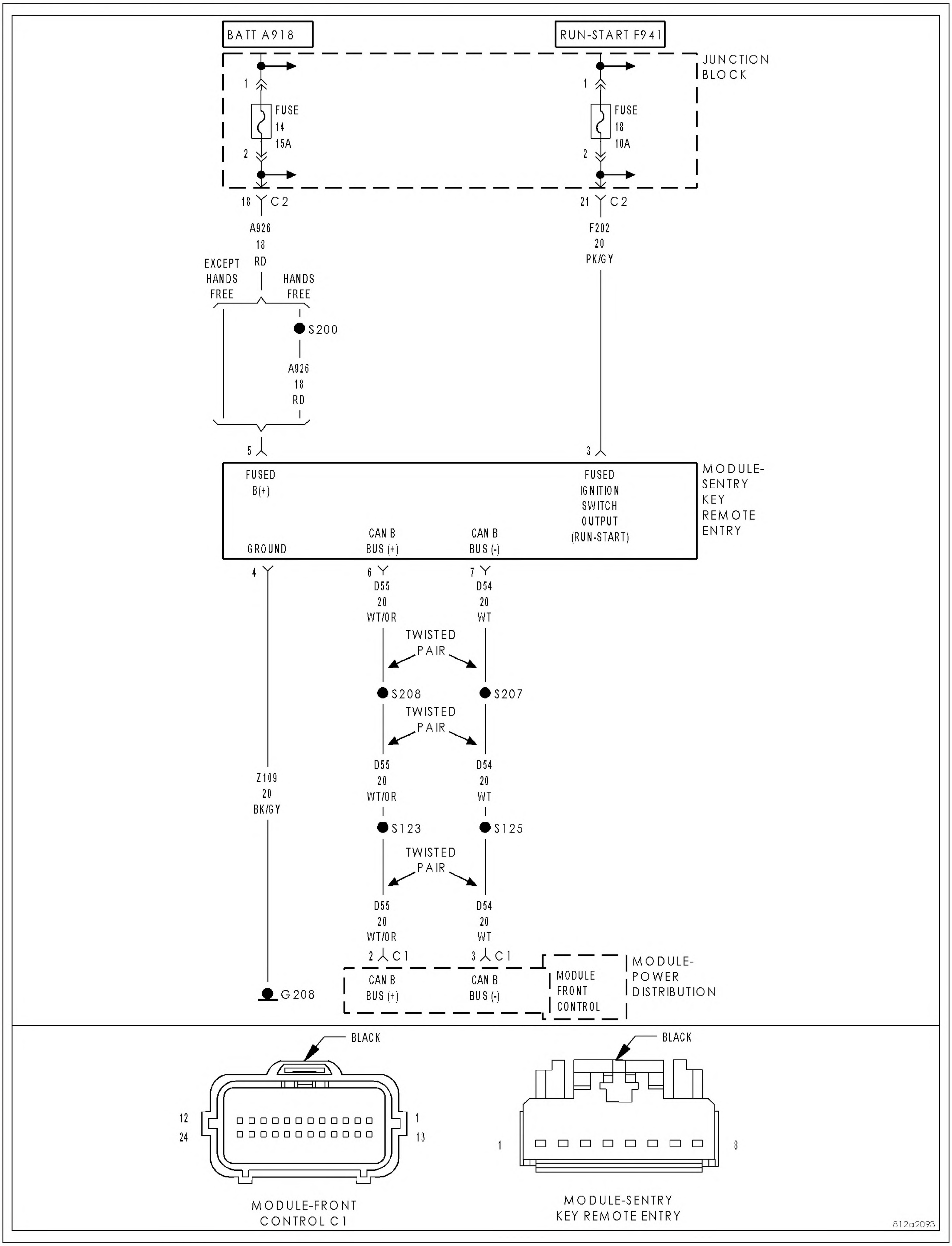
- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A2A-KEY 1 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
MODULE-SENTRY KEY REMOTE ENTRY
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
G208
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A2A-KEY 1 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs.

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A2A-KEY 1 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys, one at a time.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.

With the scan tool, program the new ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A2A-KEY 1 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

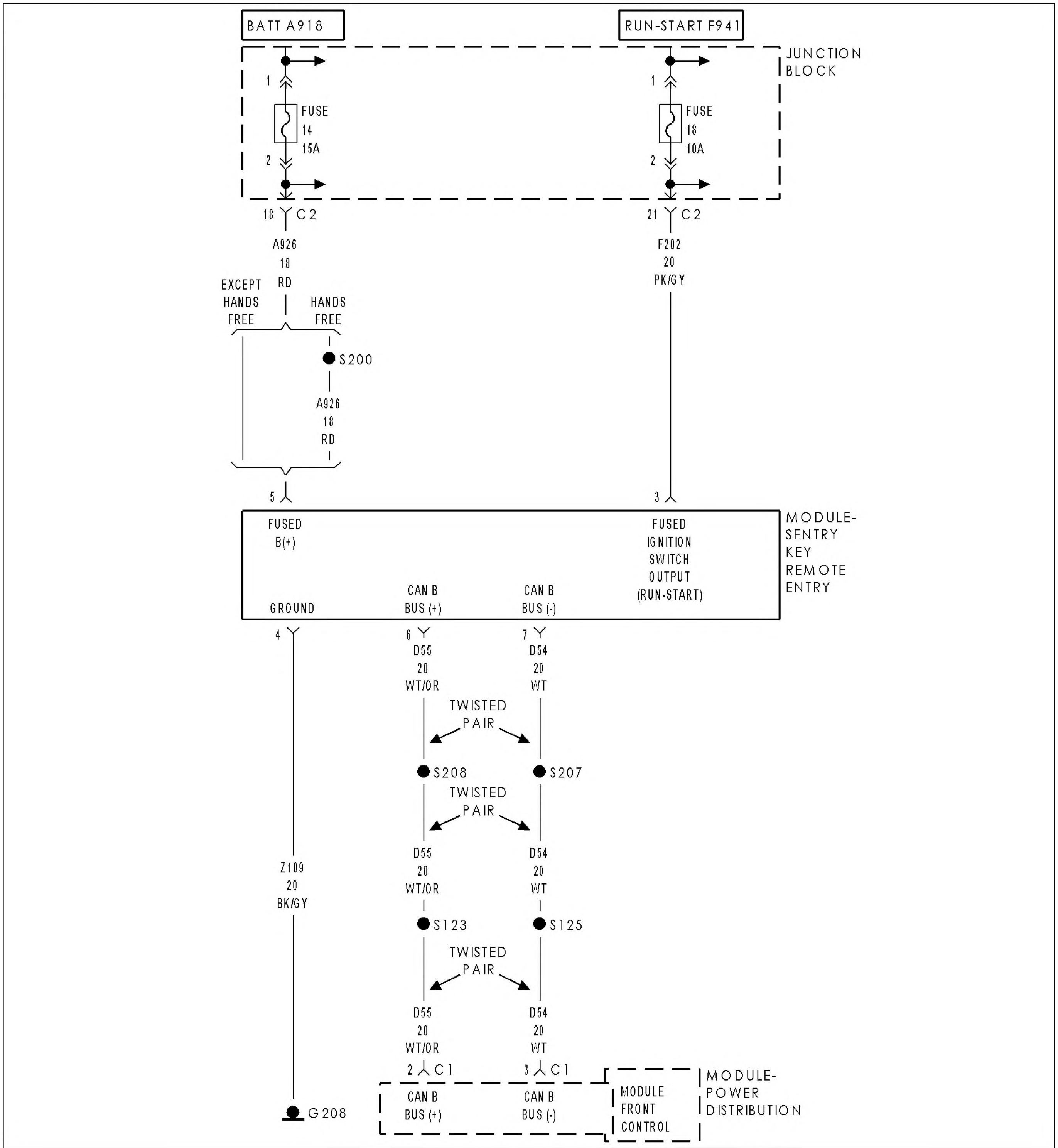
Were any problems found?

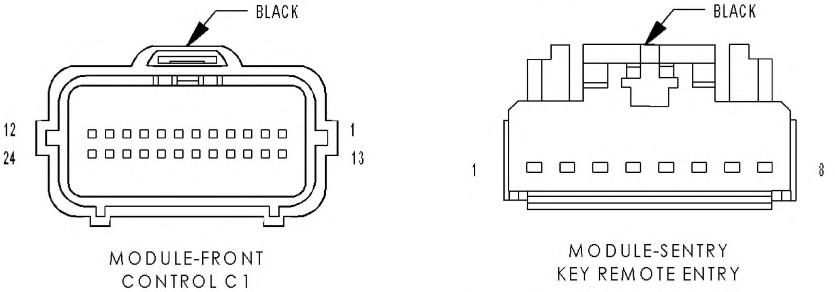
Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A2BA-KEY 2 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
FUSE 18 10A
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
CAN B BUS (+)
CAN B BUS (-)
MODULE-SENTRY KEY REMOTE ENTRY
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
Z109 20 BK/GY
S123
S125
2 C1
3 C1
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208


BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A2BA-KEY 2 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A2BA-KEY 2 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.

With the scan tool, erase the SKREEM DTCs.
Turn the ignition off.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.
With the scan tool, erase the SKREEM DTCs.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.
With the scan tool, program the new ignition key to the SKREEM.
With the scan tool, erase the SKREEM DTCs.
Turn the ignition off.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A2BA-KEY 2 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

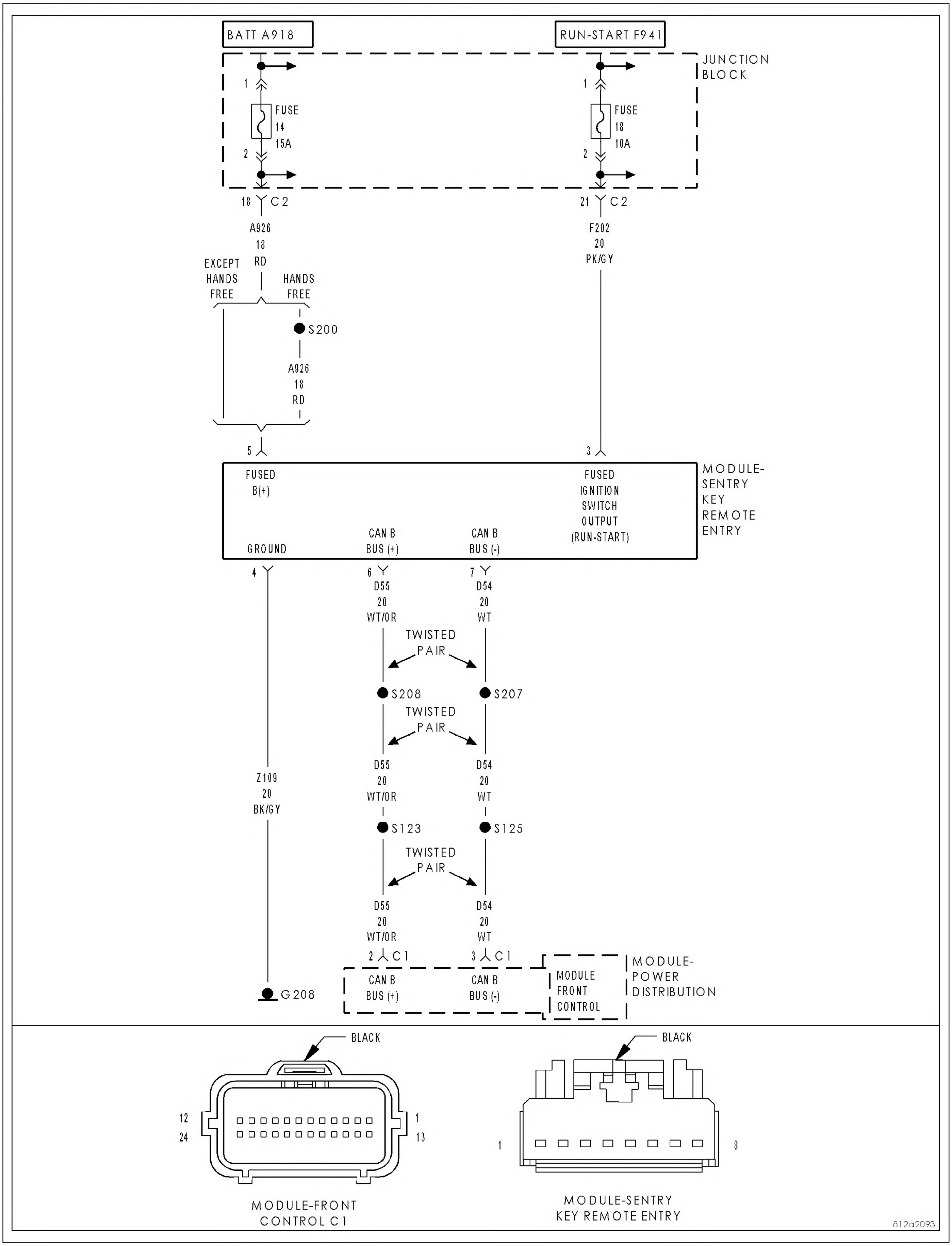
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A2C-KEY 3 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
1
FUSE 18 10A
2
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
CAN B BUS (+)
CAN B BUS (-)
MODULE-SENTRY KEY REMOTE ENTRY
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
Z109 20 BK/GY
S123
S125
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A2C-KEY 3 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A2C-KEY 3 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.

With the scan tool, program the new ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A2C-KEY 3 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

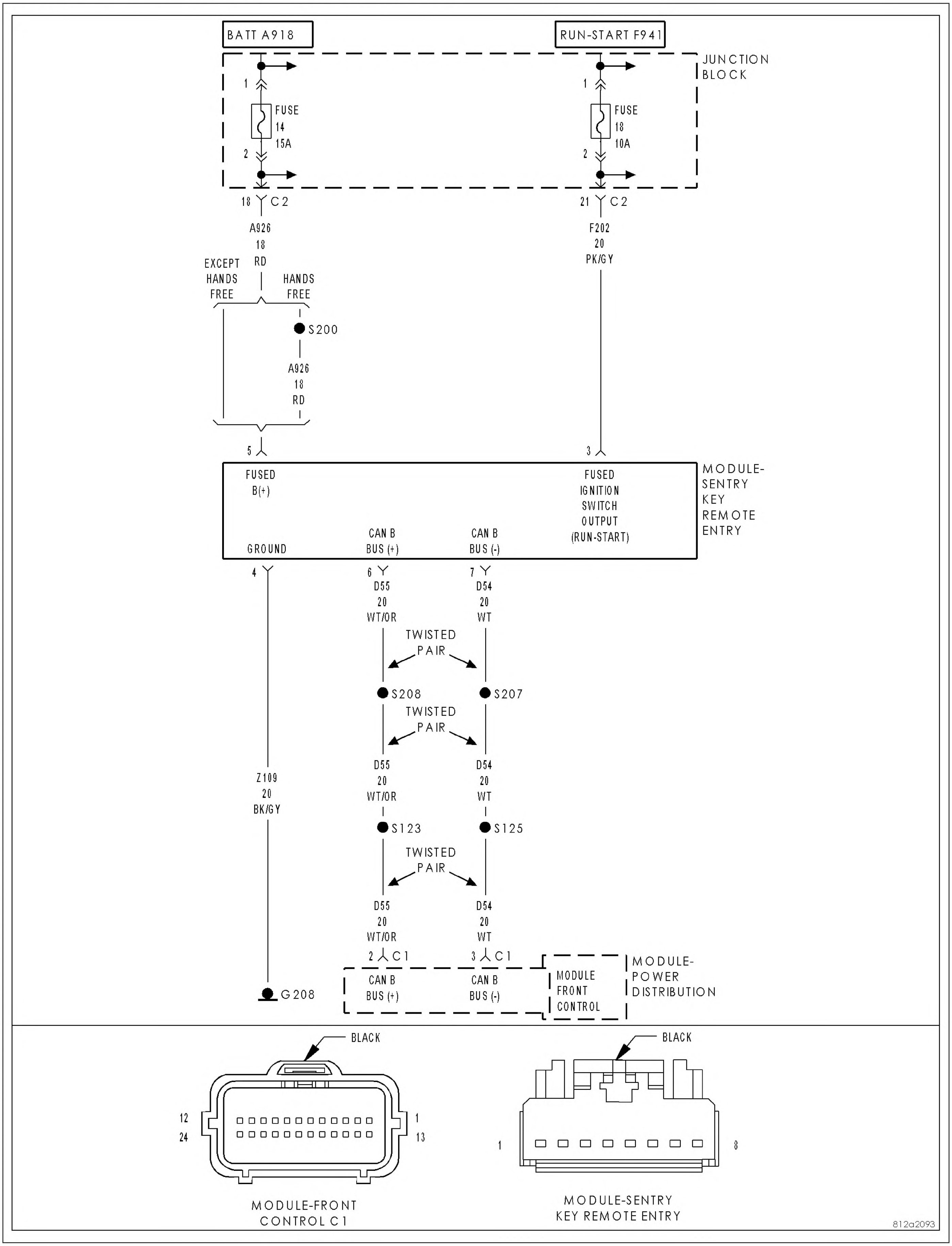
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A2D-KEY 4 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
CAN B BUS (+)
CAN B BUS (-)
MODULE-SENTRY KEY REMOTE ENTRY
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A2D-KEY 4 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A2D-KEY 4 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys, one at a time.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.

With the scan tool, program the new ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A2D-KEY 4 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

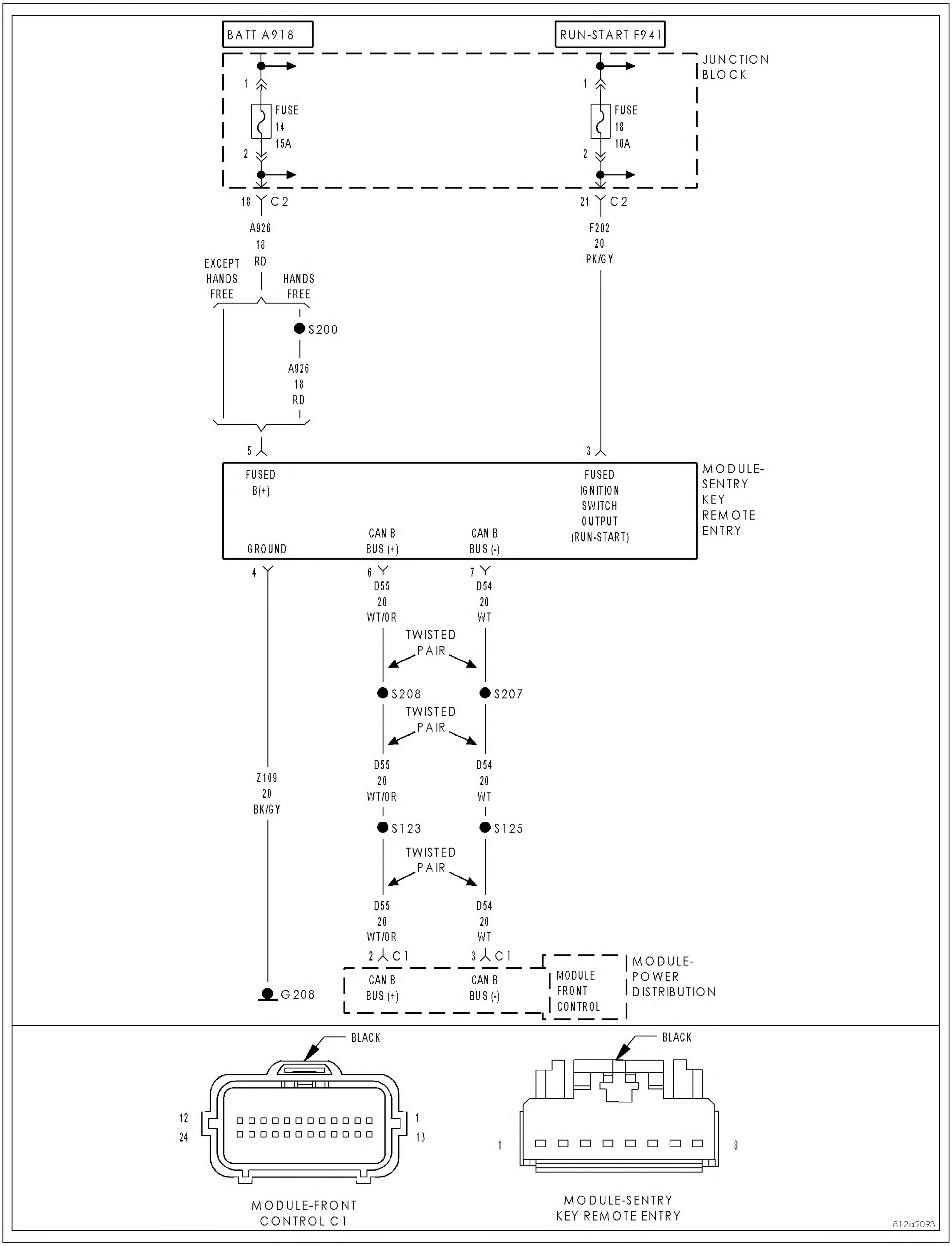
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A2E-KEY 5 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A2E-KEY 5 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A2E-KEY 5 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys, one at a time.

With the scan tool, erase the SKREEM DTCs.
Turn the ignition off.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.
With the scan tool, erase the SKREEM DTCs.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.
With the scan tool, program the new ignition key to the SKREEM.
With the scan tool, erase the SKREEM DTCs.
Turn the ignition off.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A2E-KEY 5 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

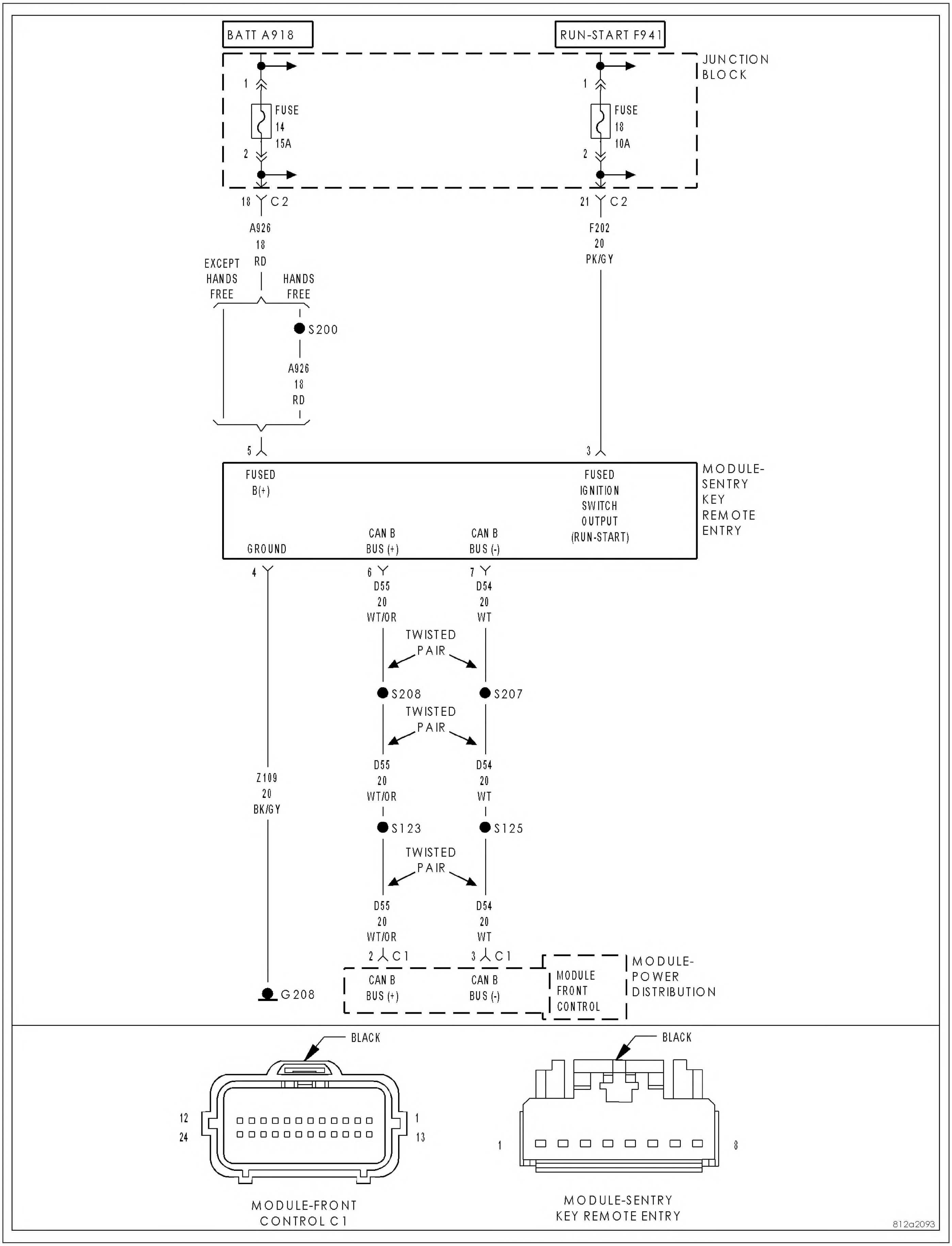
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A2F-KEY 6 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A2F-KEY 6 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A2F-KEY 6 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys, one at a time.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.

With the scan tool, program the new ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A2F-KEY 6 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

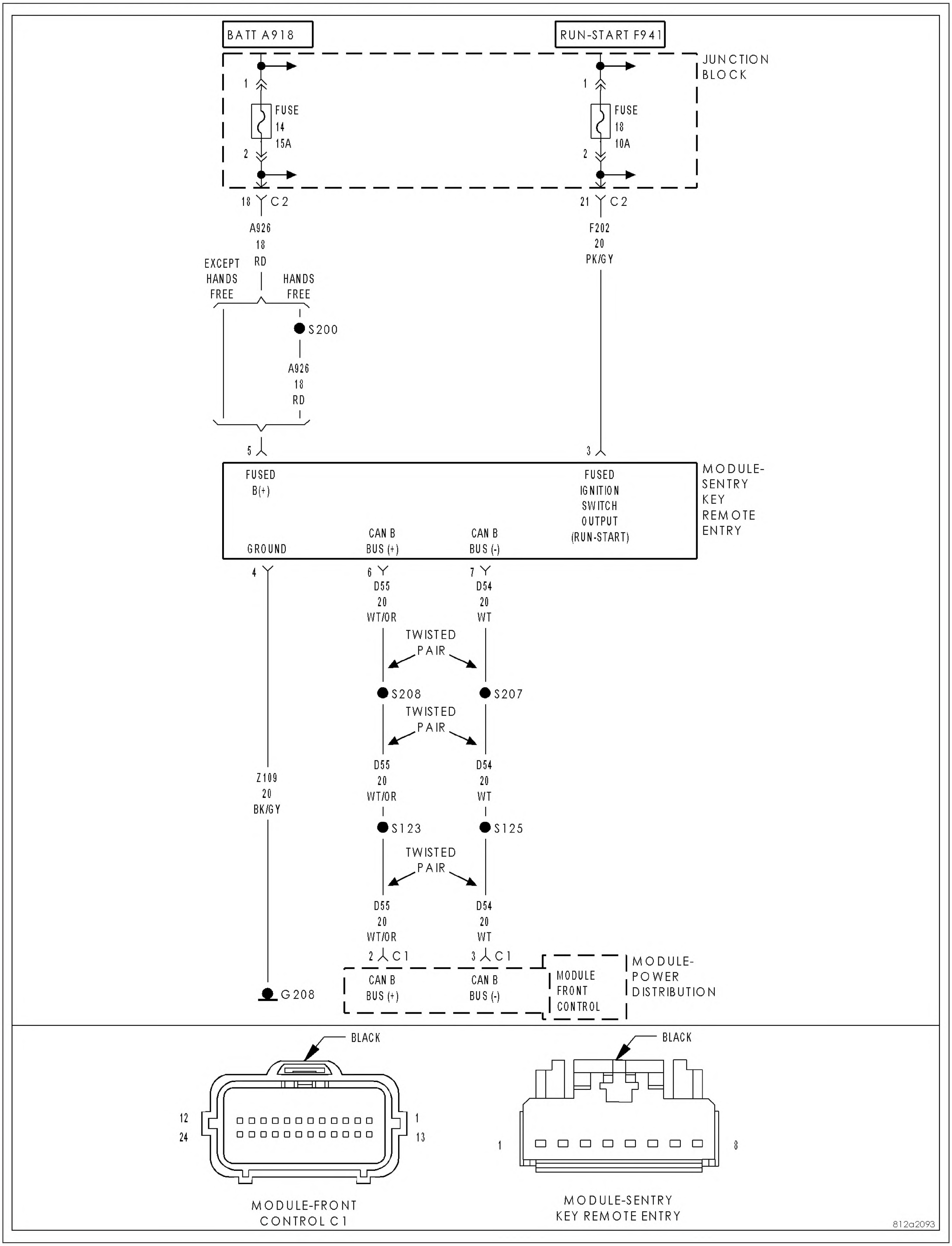
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A30-KEY 7 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
1
FUSE 18 10A
2
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
TWISTED PAIR
Z109 20 BK/GY
D55 20 WT/OR
D54 20 WT
S123
S125
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A30-KEY 7 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A30-KEY 7 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.

With the scan tool, program the new ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A30-KEY 7 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

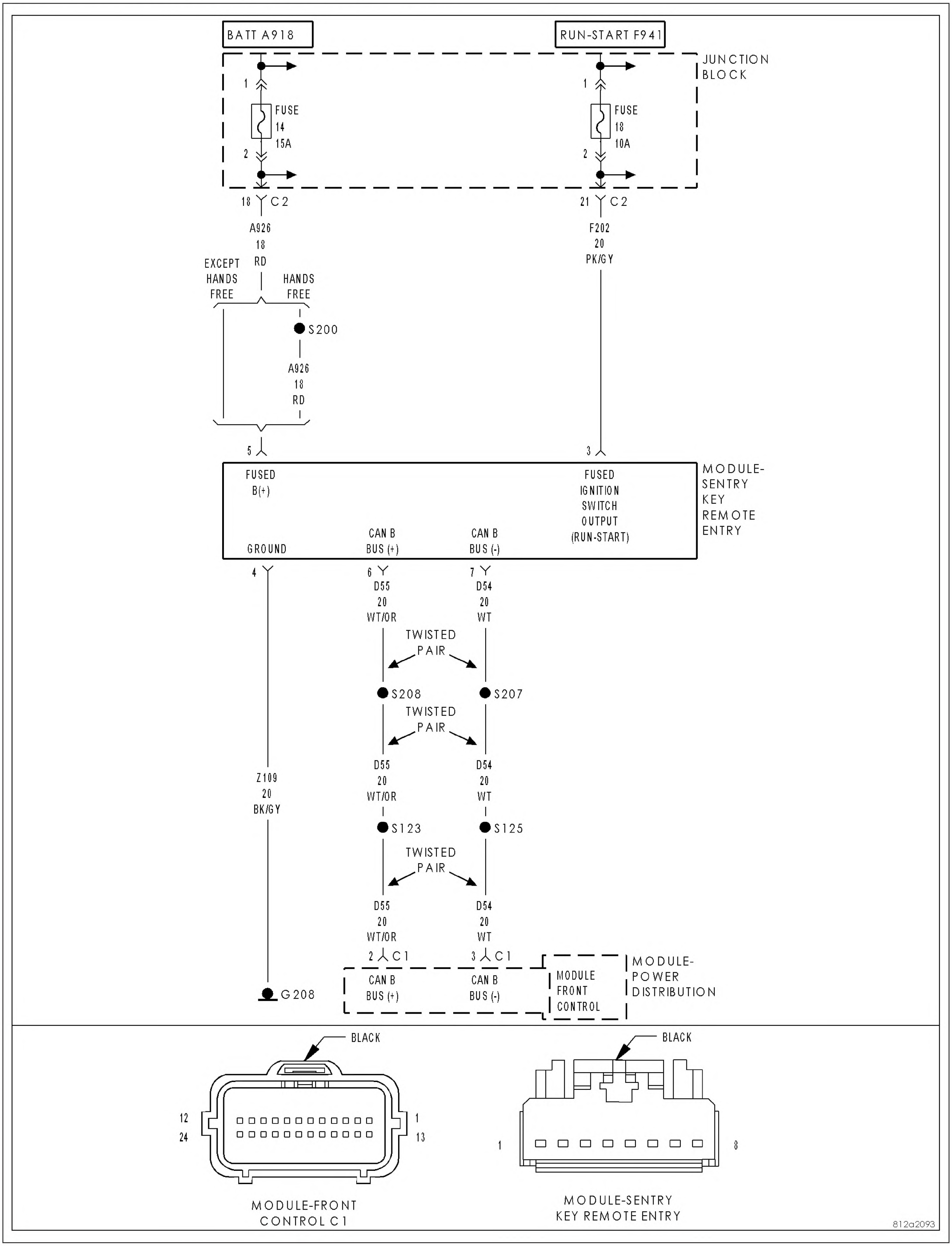
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A31-KEY 8 COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A31-KEY 8 COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

---

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A31-KEY 8 COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys, one at a time.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.

With the scan tool, program the new ignition key to the SKREEM.

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A31-KEY 8 COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

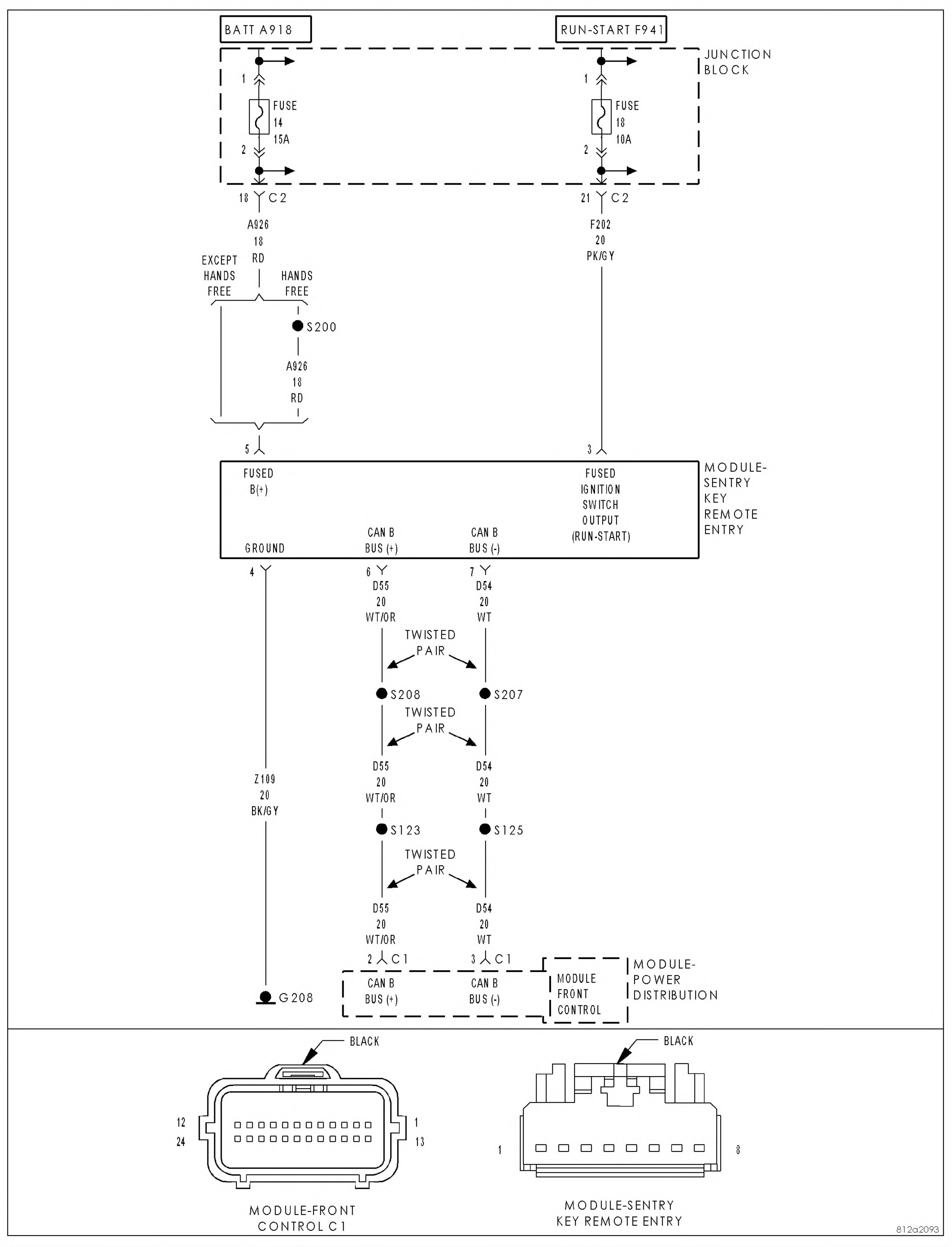
Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B1A35-UNIDENTIFIED KEY COMMUNICATION ERROR


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
1
FUSE 18 10A
2
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
TWISTED PAIR
Z109 20 BK/GY
D55 20 WT/OR
D54 20 WT
S123
S125
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
2 C1
3 C1
G208
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B1A35-UNIDENTIFIED KEY COMMUNICATION ERROR (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on and during Key Programming Mode.
- **Set Condition:**
  When the SKREEM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

Possible Causes
MULTIPLE KEY OPERATION
IGNITION KEY
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, read and record the SKREEM DTCs.

With the scan tool, erase the SKREEM DTCs

NOTE: Perform the following test several times to make sure the DTC is current.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 6

2. CHECKING FOR MULTIPLE KEYS

Are there multiple vehicle ignition keys available?

Yes >> Go To 3

No >> Go To 4

B1A35-UNIDENTIFIED KEY COMMUNICATION ERROR (CONTINUED)

3. MULTIPLE KEY OPERATION

NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys, one at a time.

With the scan tool, erase the SKREEM DTCs.
Turn the ignition off.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Is the DTC present for all ignition keys?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace the ignition key(s) that cause the SKIM DTC.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. REPROGRAM KEY

With the scan tool, attempt to reprogram the ignition key to the SKREEM.
With the scan tool, erase the SKREEM DTCs.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Go To 5

No >> Test complete.

---

5. PROGRAM NEW IGNITION KEY

Replace the ignition key with a new key.
With the scan tool, program the new ignition key to the SKREEM.
With the scan tool, erase the SKREEM DTCs.
Turn the ignition off.
Wait 10 seconds.
Turn the ignition on.
With the scan tool, read the SKREEM DTCs.

Does the DTC set again?

Yes >> Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test complete.

B1A35-UNIDENTIFIED KEY COMMUNICATION ERROR (CONTINUED)

6. INTERMITTENT WIRING HARNESS PROBLEM

Turn the ignition off.

NOTE: Check the following items:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

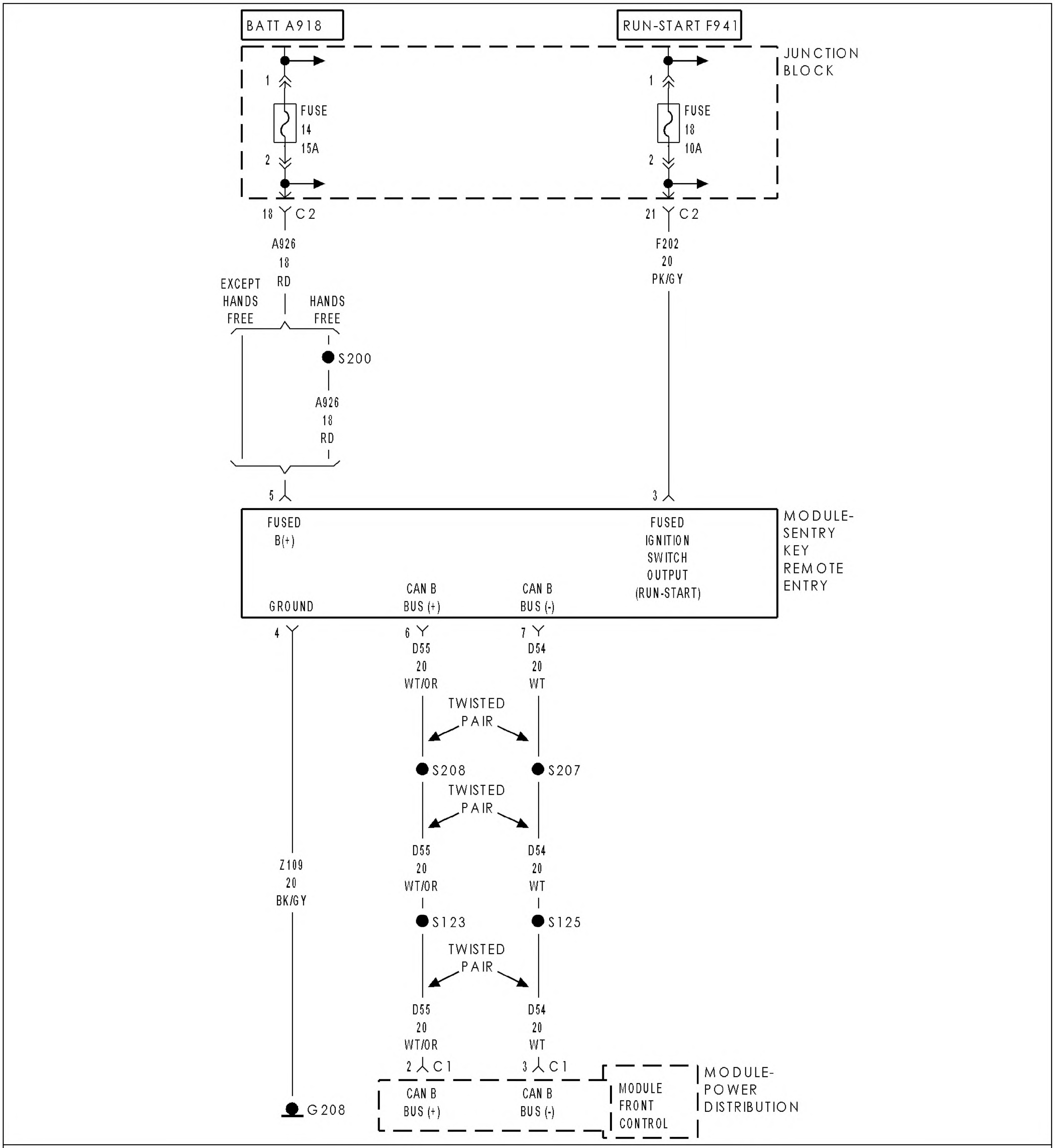
Were any problems found?

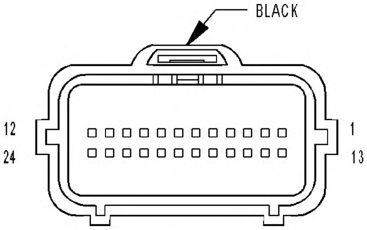
Yes >> Repair wiring harness/connectors as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

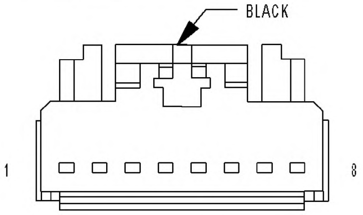
No >> Test Complete.

B2101-IGNITION RUN/START INPUT LOW


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18
C2
21
C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2
C1
3
C1
G208
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION


BLACK
12
24
1
13

MODULE-FRONT CONTROL C1



MODULE-SENTRY KEY REMOTE ENTRY

812a2093

B2101-IGNITION RUN/START INPUT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.
- **Set Condition:**
  The SKREEM has detected the ignition switch input voltage below a calibrated value.

Possible Causes
FUSED IGNTION SWITCH OUTPUT (RUN-START) CIRCUIT OPEN
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

NOTE: Diagnose any related Powertrain DTC(s) before continuing.

With a scan tool, read and record DTC(s).

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Go To 3

No >> Go to 2

---

2. INTERMITTENT CONDITION

NOTE: Check for any of the follow conditions:

- **Poor wire to terminal connection**
- **Corroded terminals**
- **Backed out or loose terminals**
- **Broken wire internal to the insulation**
- **Dirty (partial) module ground**

With the ignition on, wiggle the related wires.

Using a scan tool, read DTC(s).

Does the DTC reset?

Yes >> Repair the wiring as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> DTC is not active at this time. Test complete.

B2101-IGNITION RUN/START INPUT LOW (CONTINUED)

3. FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT OPENED

NOTE: Check the related fuses to the Fused Ignition Switch Output (Run-Start) circuit. If the fuse is found to be open, repair the circuit for a shorted condition.

Turn the ignition off.

Disconnect the SKREEM harness connector.

Turn the ignition on.

Using a 12 volt test light connected to ground, probe the Fused Ignition Switch Output (Run-Start) circuit in the SKREEM harness connector.

Does the test light illuminate brightly?

Yes >> Go to 4

No >> Repair the Fused Ignition Switch Output (Run-Start) circuit for an open.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. SKREEM

NOTE: A dirty (partial) ground can cause abnormal conditions within a system. Ensure the module has a good ground before continuing.

Turn the ignition off.

Reconnect the SKREEM connector

Back probe the Fused Ignition Switch Output (Run-Start) circuit.

Start the engine.

Using the scan tool, view battery voltage under Data Display in the Engine category.

Compare the voltage on the scan tool to the voltage reading on the voltmeter.

Is the voltage on the scan tool equal to the voltmeter reading +/- .5 volt?

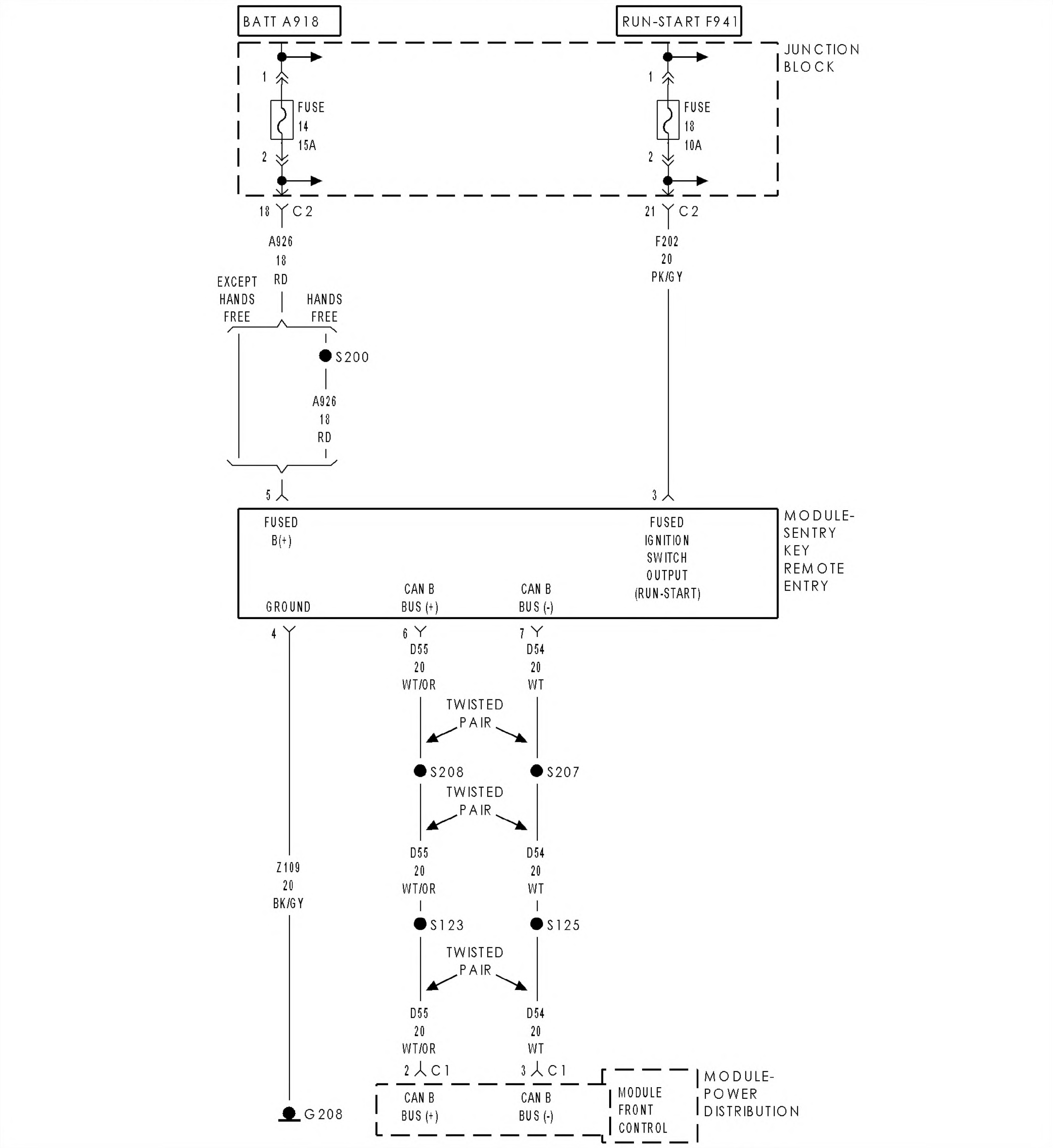
Yes >> Replace and program the SKREEM in accordance with the Service Information.

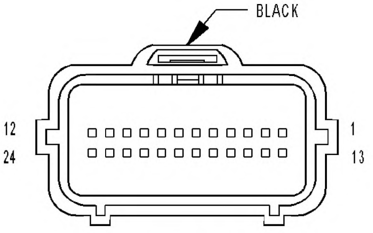
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Repair the Fused Ignition Switch Output (Run-Start) circuit for high resistance.

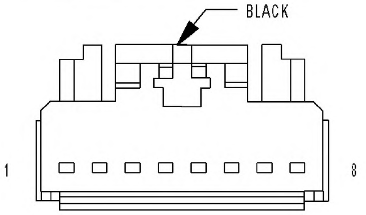
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B2102-IGNITION RUN/START INPUT HIGH


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
MODULE-SENTRY KEY REMOTE ENTRY
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208


BLACK
12
24
1
13

MODULE-FRONT CONTROL C1



MODULE-SENTRY KEY REMOTE ENTRY

812a2093

B2102-IGNITION RUN/START INPUT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.
- **Set Condition:**
  The SKREEM has detected the ignition switch input voltage above a calibrated value.

Possible Causes
FUSED IGNTION SWITCH OUTPUT (RUN-START) CIRCUIT
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

NOTE: Diagnose any related Powertrain DTC(s) before continuing.

With a scan tool, read and record DTC(s).

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Go To 3

No >> Go to 2

---

2. INTERMITTENT CONDITION

NOTE: Check for any of the follow conditions:

- **Poor wire to terminal connection**
- **Corroded terminals**
- **Backed out or loose terminals**
- **Broken wire internal to the insulation**
- **Dirty (partial) module ground**

With the ignition on, wiggle the related wires.

Using a scan tool, read DTC(s).

Does the DTC reset?

Yes >> Repair the wiring as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> DTC is not active at this time. Test complete.

B2102-IGNITION RUN/START INPUT HIGH (CONTINUED)

3. FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT SHORTED TO BATTERY VOLTAGE

NOTE: A dirty (partial) ground can cause abnormal conditions within a system. Ensure the module has a good ground before continuing.

Turn the ignition off.

Disconnect the SKREEM harness connector.

Using a 12 volt test light connected to ground, probe the Fused Ignition Switch Output (Run-Start) circuit in the SKREEM harness connector.

Does the test light illuminate brightly?

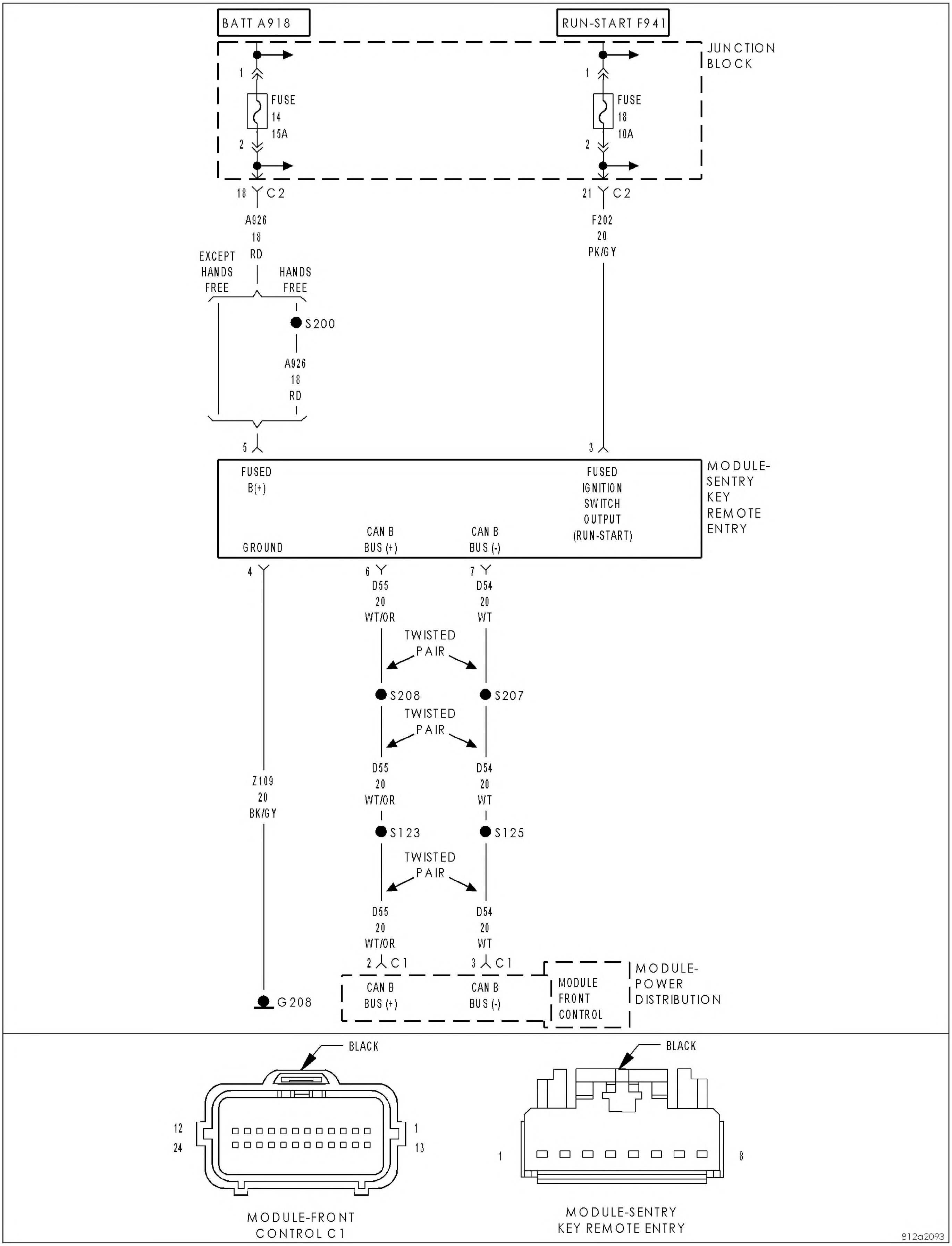
Yes >> Repair the Fused Ignition Switch Output (Run-Start) circuit for a short to voltage.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B210A-SYSTEM VOLTAGE LOW


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
G208
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B210A-SYSTEM VOLTAGE LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.
- **Set Condition:**
  The SKREEM has detected the system voltage is below a calibrated value.

Possible Causes
FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT OPEN
FUSED (B+) CIRCUIT OPEN
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

NOTE: Diagnose any related Powertrain DTC(s) before continuing.

With a scan tool, read and record DTC(s).

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Go To 3

No >> Go to 2

---

2. INTERMITTENT CONDITION

NOTE: Check for any of the follow conditions:
- **Poor wire to terminal connection**
- **Corroded terminals**
- **Backed out or loose terminals**
- **Broken wire internal to the insulation**
- **Dirty (partial) module ground**

With the ignition on, wiggle the related wires.

Using a scan tool, read DTC(s).

Does the DTC reset?

Yes >> Repair the wiring as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> DTC is not active at this time. Test complete.

B210A-SYSTEM VOLTAGE LOW (CONTINUED)

3. FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT OPEN

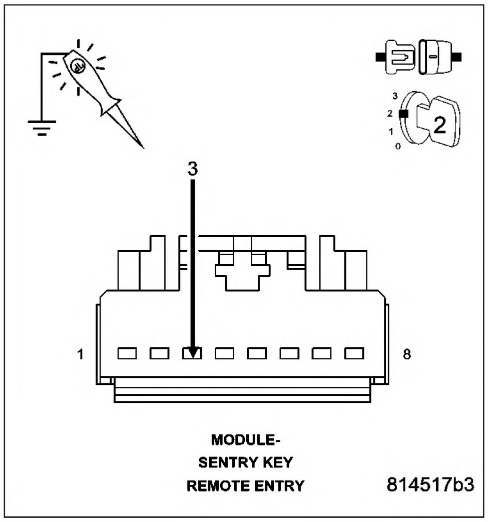
NOTE: Check the related fuses to the Fused Ignition Switch Output (Run-Start) circuit. If the fuse is found to be open repair the circuit for a shorted condition.

Turn the ignition off.

Disconnect the SKREEM harness connector.

Turn the ignition on.

Using a 12 volt test light connected to ground, probe the Fused Ignition Switch Output (Run-Start) circuit in the SKREEM harness connector.



Does the test light illuminate brightly?

Yes >> Go to 4

No >> Repair the Fused Ignition Switch Output (Run-Start) circuit for an open.

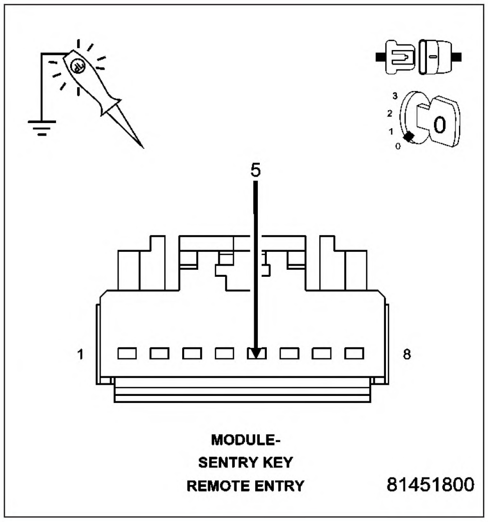
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. FUSED (B+) CIRCUIT OPEN

Turn the ignition off.

Using a 12 volt test light connected to ground, probe the Fused (B+) circuit in the SKREEM harness connector.



Does the test light illuminate brightly?

Yes >> Go to 5

No >> Repair the Fused (B+) circuit for an open.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B210A-SYSTEM VOLTAGE LOW (CONTINUED)

5. SKREEM

NOTE: Repeat the below procedure for both the Fused Ignition Switch Output (Run-Start) circuit and the Fused (B+) circuit.

NOTE: A dirty (partial) ground can cause abnormal conditions within a system. Make sure the module has a good ground before continuing.

Turn the ignition off.

Reconnect the SKREEM connector.

Back probe the Fused Ignition Switch Output (Run-Start) circuit and then the Fused (B+) circuit.

Start the engine.

Using the scan tool, view battery voltage under Data Display in the Engine category.

Compare the voltage on the scan tool to the voltage reading on the voltmeter.

Is the voltage on the scan tool equal to the voltmeter reading +/- .5 volt?

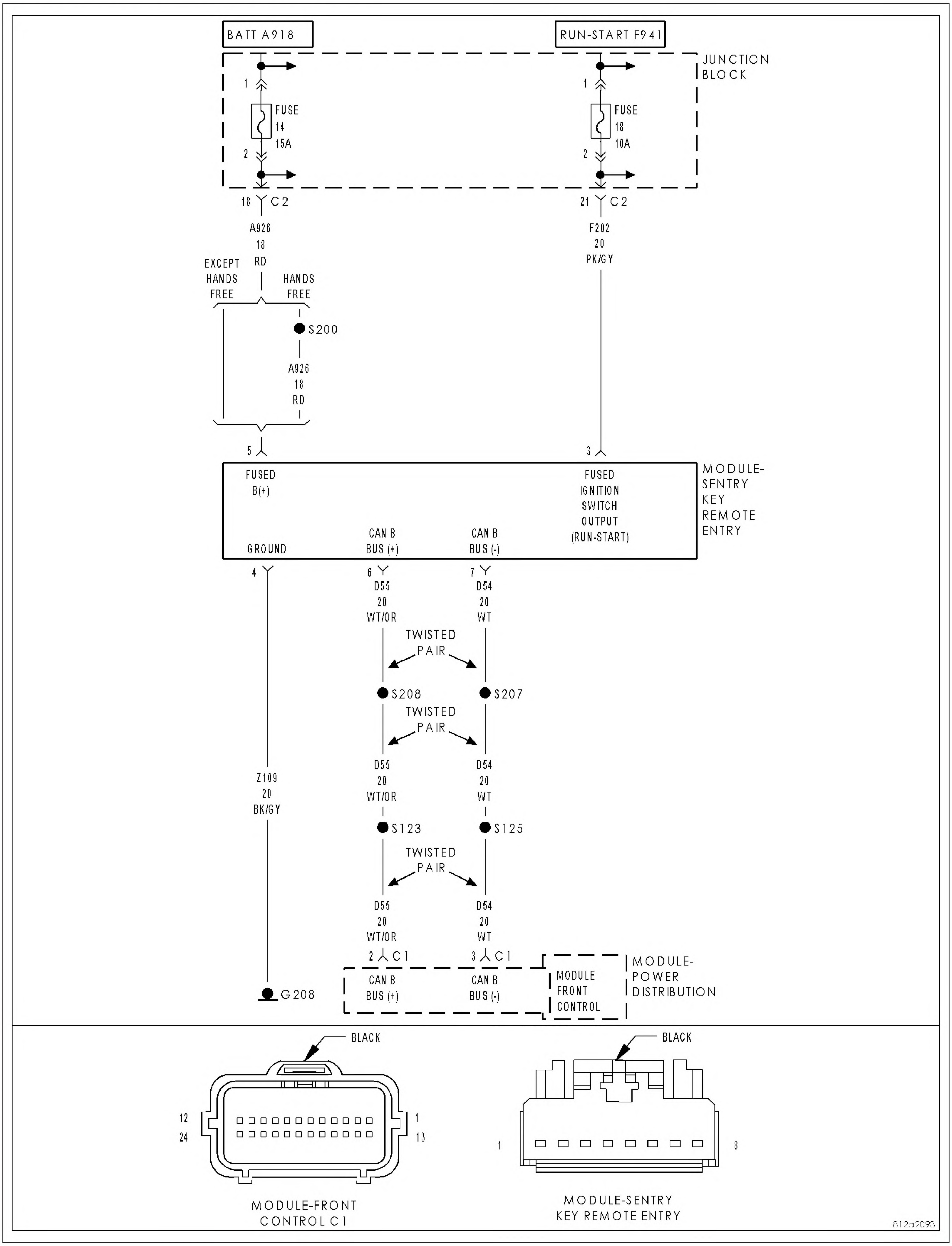
Yes >> Replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Repair the circuit(s) that indicated the incorrect voltage.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B210D-SYSTEM VOLTAGE HIGH


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
1
FUSE 18 10A
2
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
Z109 20 BK/GY
S123
S125
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B210D-SYSTEM VOLTAGE HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.
- **Set Condition:**
  The SKREEM has detected the system voltage above a calibrated value.

Possible Causes
FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

NOTE: Diagnose any related Powertrain DTC(s) before continuing.

With a scan tool, read and record DTC(s).

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Go To 3

No >> Go to 2

---

2. INTERMITTENT CONDITION

NOTE: Check for any of the follow conditions:
- **Poor wire to terminal connection**
- **Corroded terminals**
- **Backed out or loose terminals**
- **Broken wire internal to the insulation**
- **Dirty (partial) module ground**

With the ignition on, wiggle the related wires.

Using a scan tool, read DTC(s).

Does the DTC reset?

Yes >> Repair the wiring as necessary.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> DTC is not active at this time. Test complete.

B210D-SYSTEM VOLTAGE HIGH (CONTINUED)

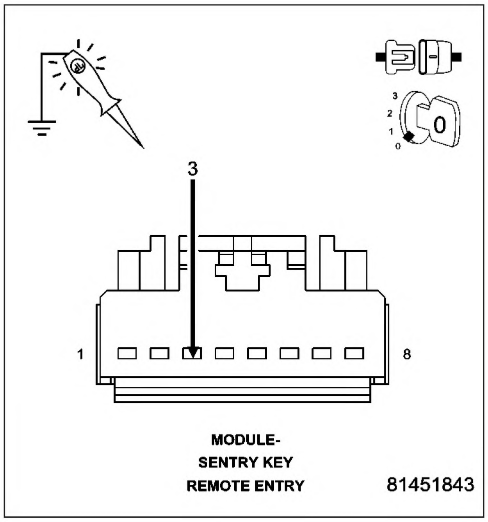
3. FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT SHORTED TO BATTERY VOLTAGE

NOTE: A dirty (partial) ground can cause abnormal conditions within a system. Make sure the module has a good ground before continuing.

Turn the ignition off.

Disconnect the SKREEM harness connector.

Using a 12 volt test light connected to ground, probe the Fused Ignition Switch Output (Run-Start) circuit in the SKREEM harness connector.



Does the test light illuminate brightly?

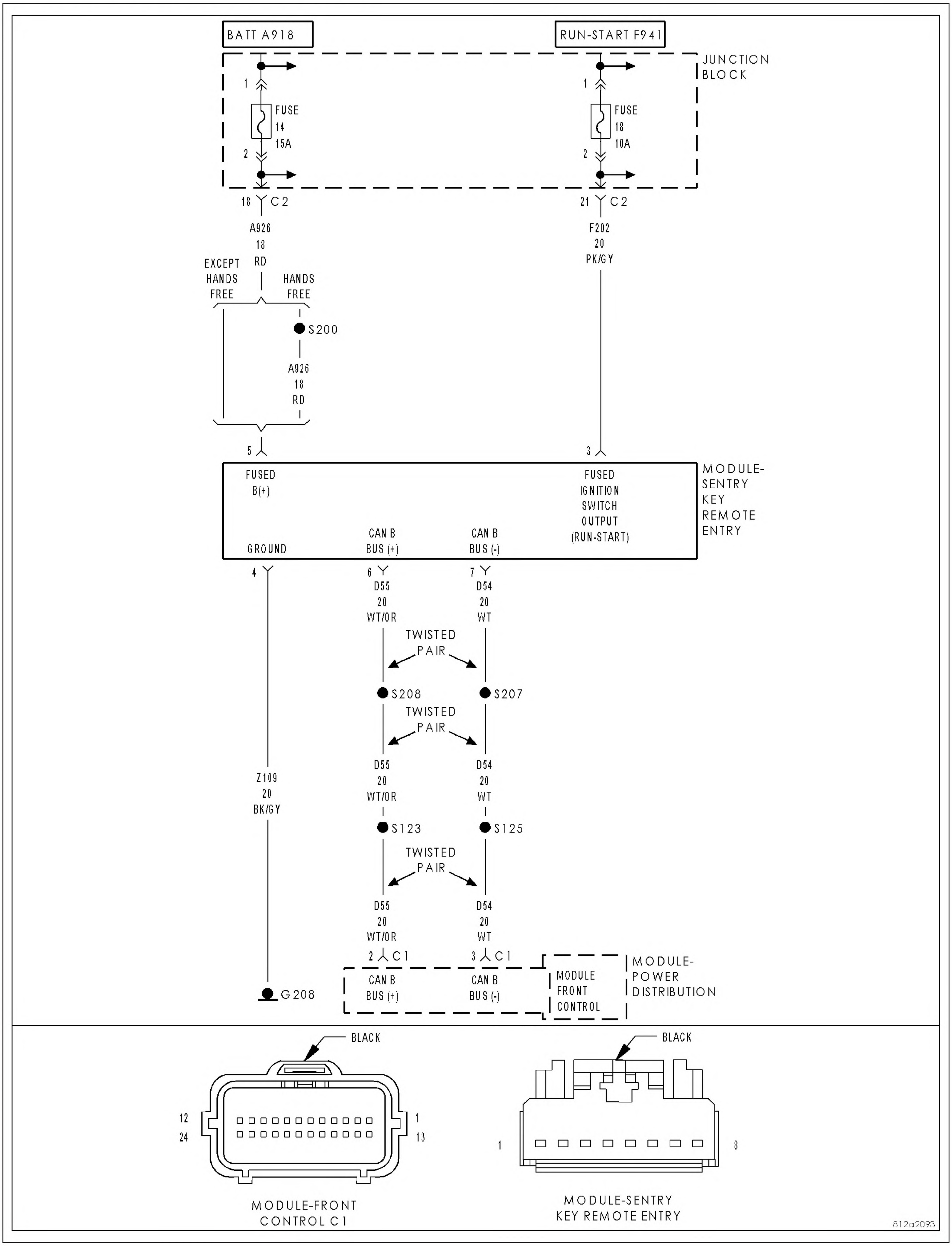
Yes >> Repair the Fused Ignition Switch Output (Run-Start) circuit for a short to voltage.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Replace and reprogram the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B210D-BATTERY VOLTAGE LOW


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE
14
15A
2
1
FUSE
18
10A
2
18 C2
21 C2
A926
18
RD
F202
20
PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926
18
RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55
20
WT/OR
D54
20
WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
Z109
20
BK/GY
S123
S125
TWISTED PAIR
D55
20
WT/OR
D54
20
WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
BLACK
1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B210D-BATTERY VOLTAGE LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.
- **Set Condition:**
  The SKREEM has detected the Fused (B+) input voltage below a calibrated value.

Possible Causes
FUSED (B+) CIRCUIT OPEN
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

NOTE: Diagnose any related Powertrain DTC(s) before continuing.

With a scan tool, read and record DTC(s).

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Go To 3

No >> Go to 2

---

2. INTERMITTENT CONDITION

NOTE: Check for any of the follow conditions:

- **Poor wire to terminal connection**
- **Corroded terminals**
- **Backed out or loose terminals**
- **Broken wire internal to the insulation**
- **Dirty (partial) module ground**
- **Dirty (partial) module ground**

With the ignition on, wiggle the related wires.

Using a scan tool, read DTC(s).

Does the DTC reset?

Yes >> Repair the wiring as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> DTC is not active at this time. Test complete.

B210D-BATTERY VOLTAGE LOW (CONTINUED)

3. FUSED (B+) CIRCUIT OPEN

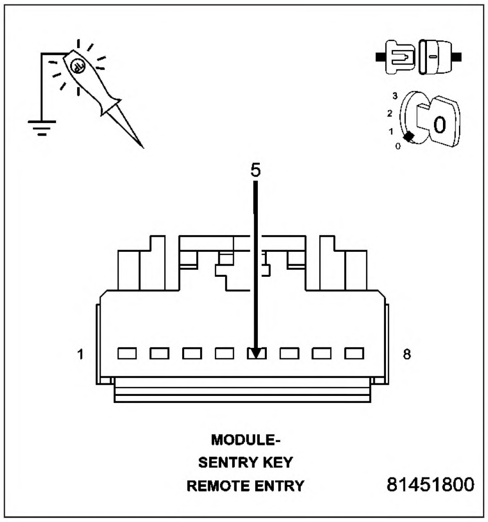
NOTE: Check the related fuses to the Fused (B+) circuit. If the fuse is found to be open repair the circuit for a shorted condition.

Turn the ignition off.

Disconnect the SKREEM harness connector.

Turn the ignition on.

Using a 12 volt test light connected to ground, probe the Fused (B+) circuit in the SKREEM harness connector.



Does the test light illuminate brightly?

Yes >> Go to 4

No >> Repair the Fused (B+) circuit for an open.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. SKREEM

NOTE: A dirty (partial) ground can cause abnormal conditions within a system. Make sure the module has a good ground before continuing.

Turn the ignition off.

Reconnect the SKREEM connector

Back probe the Fused (B+) circuit.

Start the engine.

Using the scan tool, view battery voltage under Data Display in the Engine category.

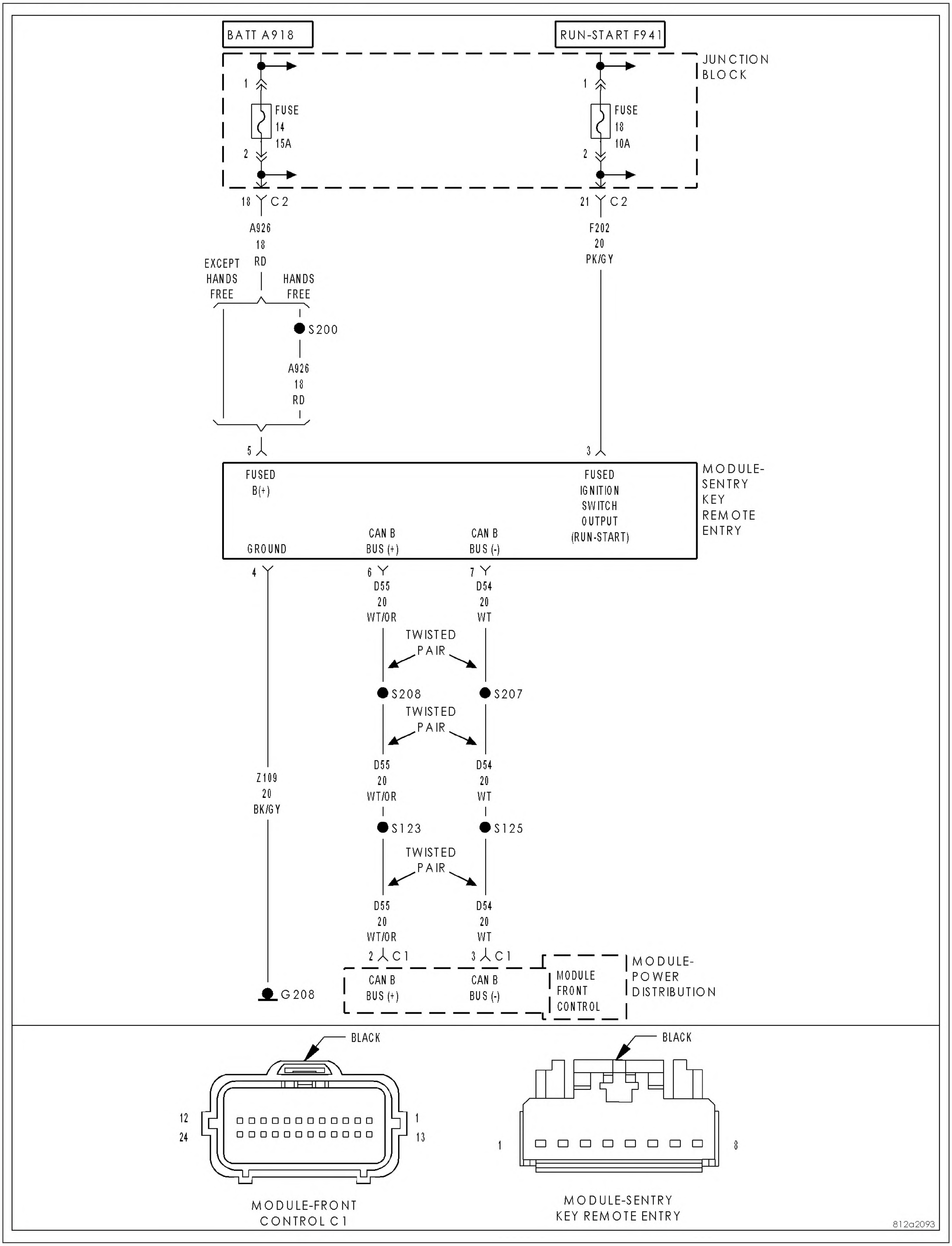
Compare the voltage on the scan tool to the voltage reading on the voltmeter.

Is the voltage on the scan tool equal to the voltmeter reading +/- .5 volt?

Yes >> Replace and program the SKREEM in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Repair the Fused (B+) circuit for high resistances.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B210E-BATTERY VOLTAGE HIGH


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
FUSE 18 10A
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
Z109 20 BK/GY
S123
S125
2 C1
3 C1
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
MODULE-FRONT CONTROL C1
8
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B210E-BATTERY VOLTAGE HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.
- **Set Condition:**
  The SKREEM has detected the Fused (B+) input voltage above a calibrated value.

Possible Causes
FUSED (B+) CIRCUIT
SKREEM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

NOTE: Diagnose any related Powertrain DTC(s) before continuing.

With a scan tool, read and record DTC(s).

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Go To 3

No >> Go to 2

---

2. INTERMITTENT CONDITION

NOTE: Check for any of the follow conditions:
- **Poor wire to terminal connection**
- **Corroded terminals**
- **Backed out or loose terminals**
- **Broken wire internal to the insulation**
- **Dirty (partial) module ground**

With the ignition on, wiggle the related wires.

Using a scan tool, read DTC(s).

Does the DTC reset?

Yes >> Repair the wiring as necessary.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> DTC is not active at this time. Test complete.

B210E-BATTERY VOLTAGE HIGH (CONTINUED)

3. SKREEM

NOTE: A dirty (partial) ground can cause abnormal conditions with a system. Make sure the module has a good ground before continuing.

Turn the ignition off.

Back probe the Fused (B+) circuit in the SKREEM harness connector.

Start the engine.

Using a scan tool, view the battery voltage under Data Display in the Engine category.

Compare the voltage on the scan tool to the voltage reading on the voltmeter.

Is the voltage on the scan tool equal to the voltmeter reading +/- .5 volt?

Yes >> Replace and program the SKREEM in accordance with the Service Information.Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Repair the Fused (B+) circuit.Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B2204-ECU CONFIGURATION MISMATCH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.

Possible Causes
SKREEM

Diagnostic Test

1. SKREEM

NOTE: Before continuing review and check the following conditions.
- **Review the repair history of the vehicle. Ensure the vehicle has the correct PCM and SKREEM installed. Check the part numbers.**
- **Using a scan tool, ensure the PCM and SKREEM have been programmed correctly. Compare the PCM VIN to the SKREEM VIN and ensure the two VINS match.**

Turn the ignition on.

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

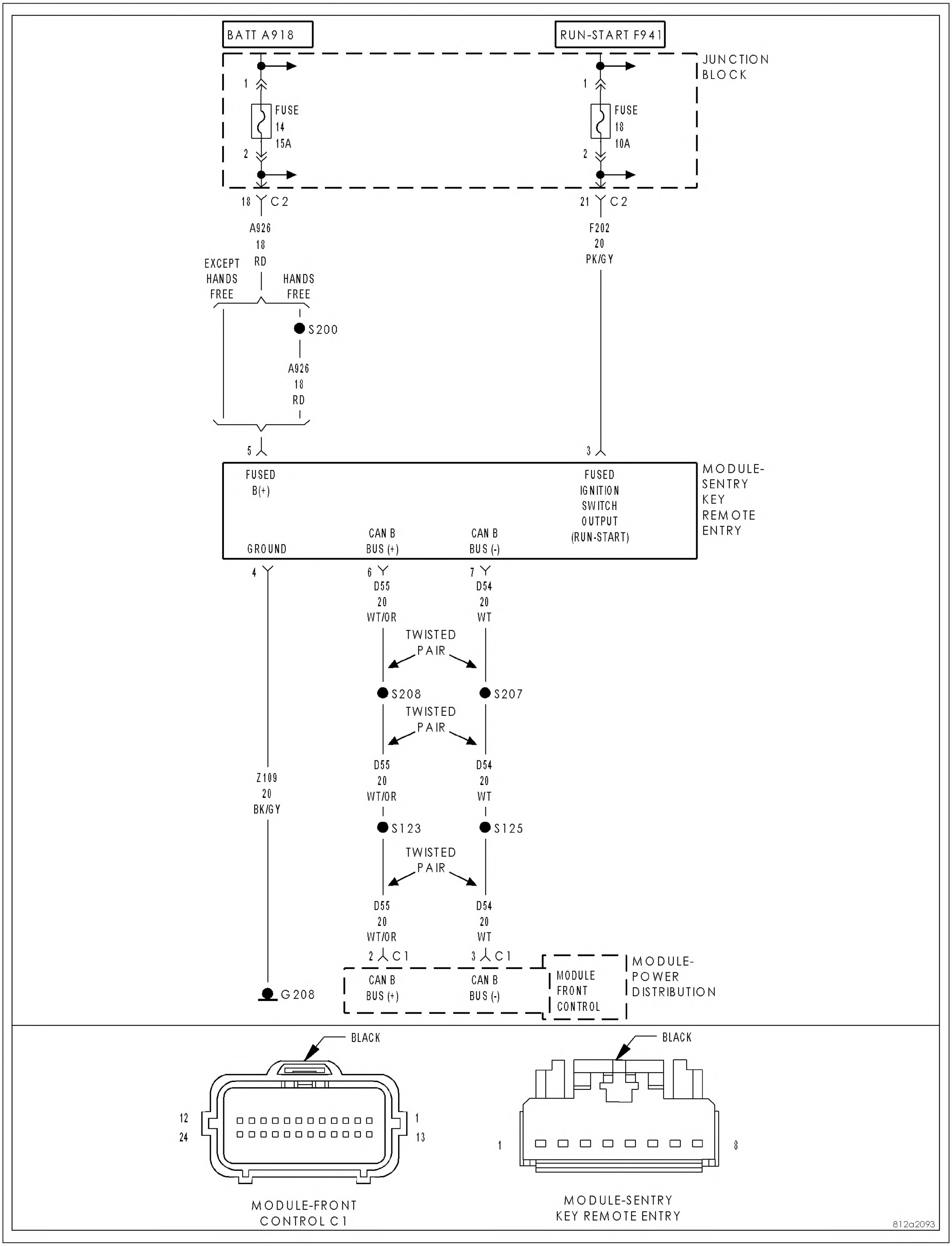
Does the DTC reset?

Yes >> Replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> The DTC is not active at this time. Test complete.

B2205-ORIGINAL VIN MISSING/MISMATCH


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
FUSE 18 10A
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
Z109 20 BK/GY
S123
S125
2 C1
3 C1
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208
BLACK
12
24
1
13
8
MODULE-FRONT CONTROL C1
MODULE-SENTRY KEY REMOTE ENTRY
812a2093

B2205-ORIGINAL VIN MISSING/MISMATCH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM or PCM reset.
- **Set Condition:**
  When a PCM STATUS message with a Valid Key status is not received by the SKIM within 3.5 seconds of transmitting the last Valid Key Code message to the PCM.

Possible Causes
VERIFYING PCM VIN
REPLACE SKREEM AND CHECK DTC'S
PCM

Diagnostic Test

1. DETERMINING IF DTC IS CURRENT

With the scan tool, erase the SKREEM DTCs.

Turn the ignition off.

Wait 10 seconds.

Turn the ignition on and wait 2 minutes.

With the scan tool, read the SKREEM DTCs.

Does the scan tool display the DTC that was previously erased?

Yes >> Go To 2

No >> Go To 4

---

2. VERIFYING THE PCM VIN

Turn the ignition on.

With the scan tool, select Engine system from the main menu.

Display and record the Vehicle Identification Number.

NOTE: Make sure that a VIN has been programmed into the PCM. If a VIN is not displayed, attempt to program the PCM with the correct VIN before continuing.

Does the VIN recorded from the PCM match the VIN of the vehicle?

Yes >> Go To 3

No >> Perform the PCM replaced to update the VIN in the PCM.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

B2205-ORIGINAL VIN MISSING/MISMATCH (CONTINUED)

3. REPLACE SKREEM AND CHECK DTC'S

Turn the ignition off.

Replace and program the Sentry Key Remote Entry Module in accordance with the Service Information.

Turn the ignition on.

With the scan tool, display and clear all PCM and SKREEM DTC's.

Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle.

With the scan tool, check for SKREEM DTCs.

Does the scan tool display the same DTC?

Yes >> Replace and program the Powertrain Control Module in accordance with the Service Information.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> The repair is complete.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

4. INTERMITTENT

Turn the ignition off.

NOTE: Check for the following conditions:

- **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.**
- **Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.**
- **Refer to any Technical Service Bulletins (TSB) that may apply.**

Were any problems found?

Yes >> Repair wiring harness/connectors as necessary.
Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

B2224-SKREEM INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.

Possible Causes
SKREEM

Diagnostic Test

1. SKREEM

NOTE: Before continuing review and check the following conditions.

- **Review the repair history of the vehicle. Ensure the vehicle has the correct PCM and SKREEM installed. Check the part numbers.**
- **Using a scan tool, ensure the PCM and SKREEM have been programmed correctly. Compare the PCM VIN to the SKREEM VIN and ensure the two VINS match.**

Turn the ignition on.

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> The DTC is not active at this time. Test complete.

B2228-SKREEM INTERNAL - RKE RECEIVER

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.

Possible Causes
SKREEM

Diagnostic Test

1. SKREEM

NOTE: Before continuing review and check the following conditions.

- **Review the repair history of the vehicle. Ensure the vehicle has the correct PCM and SKREEM installed. Check the part numbers.**
- **Using a scan tool, ensure the PCM and SKREEM have been programmed correctly. Compare the PCM VIN to the SKREEM VIN and ensure the two VINS match.**

Turn the ignition on.

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

Does the DTC reset?

Yes >> Replace and program the SKREEM in accordance with the Service Information.

Perform SKREEM VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> The DTC is not active at this time. Test complete.

B2229-SKREEM INTERNAL - SKIM IMMOBILIZER

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition switch on.

Possible Causes
SKREEM

Diagnostic Test

1. SKREEM

NOTE: Before continuing review and check the following conditions.

- **Review the repair history of the vehicle. Ensure the vehicle has the correct PCM and SKREEM installed. Check the part numbers.**
- **Using a scan tool, ensure the PCM and SKREEM have been programmed correctly. Compare the PCM VIN to the SKREEM VIN and ensure the two VINS match.**

Turn the ignition on.

With the scan tool, clear DTC(s).

Perform 5 ignition cycles, leaving the ignition switch on for a minimum of 90 seconds per cycle.

Using the scan tool, read DTC(s).

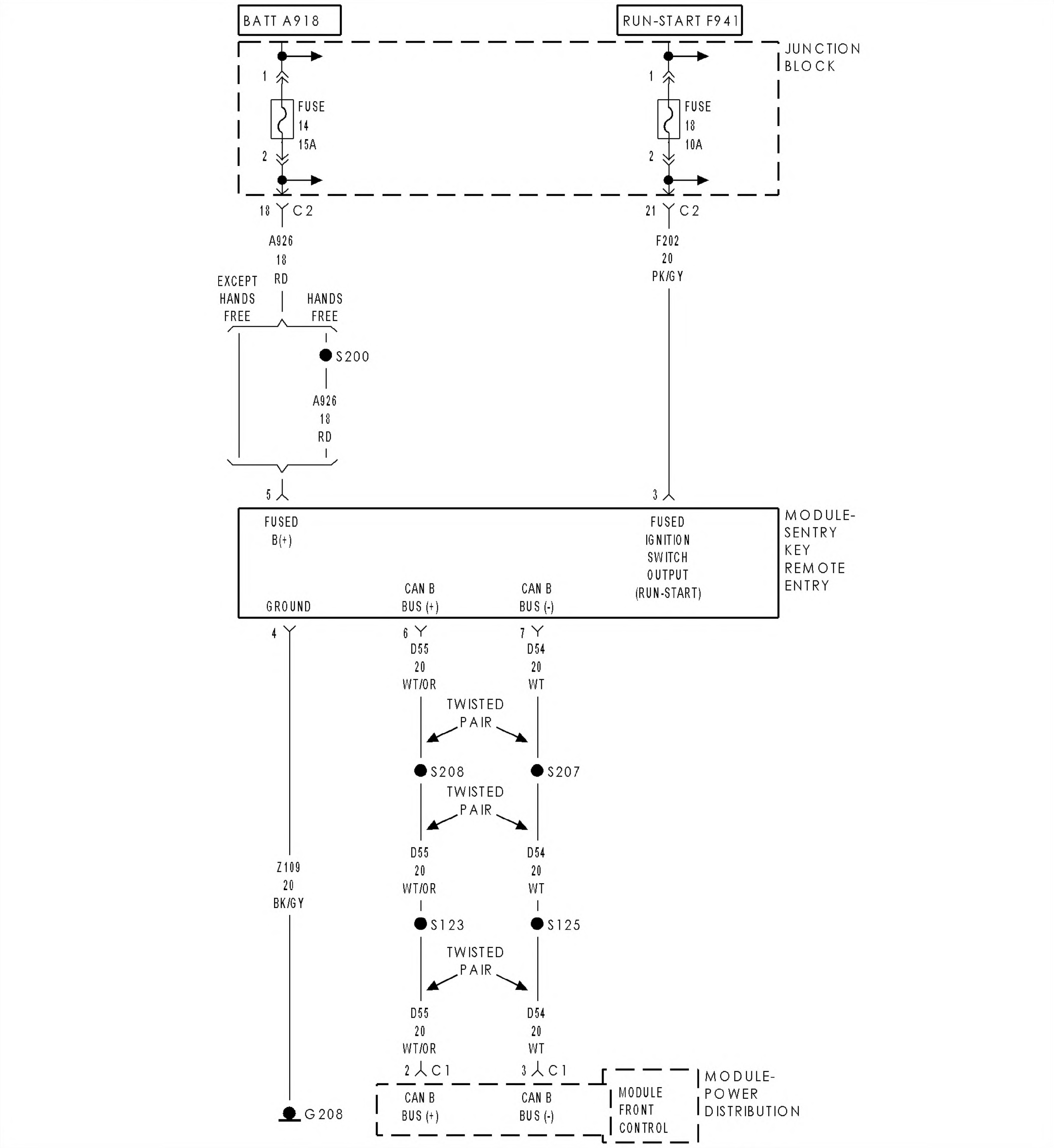
Does the DTC reset?

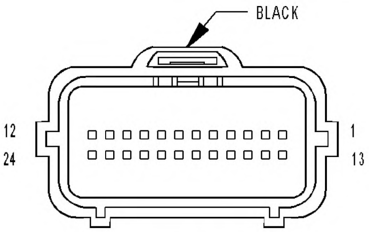
Yes >> Replace and program the SKREEM in accordance with the Service Information.

Perform VERIFICATION TEST. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

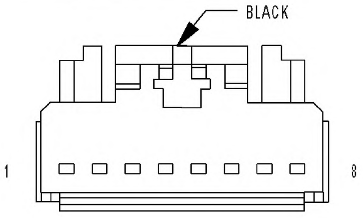
No >> The DTC is not active at this time. Test complete.

U0019–CAN B BUS


BATT A918
RUN-START F941
JUNCTION BLOCK
1
FUSE 14 15A
2
1
FUSE 18 10A
2
18 C2
21 C2
A926 18 RD
F202 20 PK/GY
EXCEPT HANDS FREE
HANDS FREE
S200
A926 18 RD
5
3
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-SENTRY KEY REMOTE ENTRY
GROUND
CAN B BUS (+)
CAN B BUS (-)
4
6
7
D55 20 WT/OR
D54 20 WT
TWISTED PAIR
S208
S207
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
Z109 20 BK/GY
S123
S125
TWISTED PAIR
D55 20 WT/OR
D54 20 WT
2 C1
3 C1
CAN B BUS (+)
CAN B BUS (-)
MODULE FRONT CONTROL
MODULE-POWER DISTRIBUTION
G208


BLACK
12
24
1
13

MODULE-FRONT CONTROL C1



MODULE-SENTRY KEY REMOTE ENTRY

812a2093

U0019–CAN B BUS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage or shorted to ground.

Possible Causes
CAN B BUS DTC's IN FRONT CONTROL MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
SENTRY KEY REMOTE ENTRY MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTCS

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK FRONT CONTROL MODULE DTC's

With the scan tool, read Front Control Module active DTC's

Does the scan tool display any CAN B BUS DTC's – ACTIVE?

Yes >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING)

No >> Go To 3

U0019–CAN B BUS (CONTINUED)

3. (D55) CAN B BUS (+) CIRCUIT OPEN

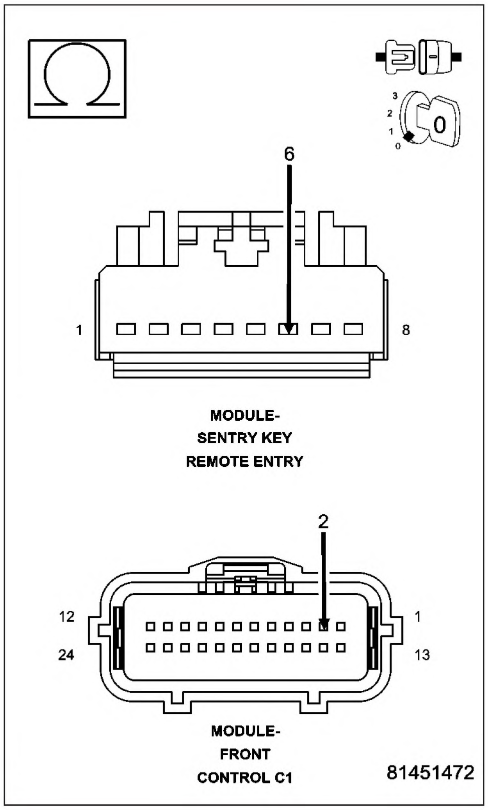
Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the Sentry Key Remote Entry Module connector.

Disconnect the Front Control Module C1 connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 connector and the Sentry Key Remote Entry Module connector.


6
1
8
MODULE-
SENTRY KEY
REMOTE ENTRY
2
12
1
24
13
MODULE-
FRONT
CONTROL C1
81451472

Is the resistance below 2.0 ohms?

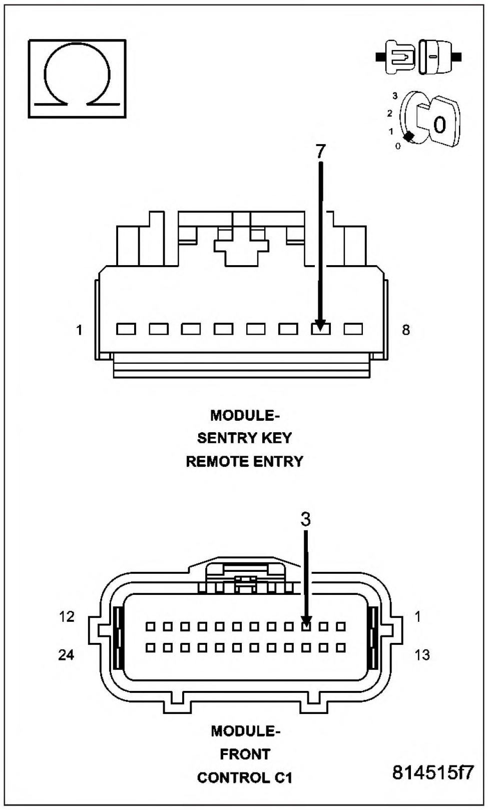
Yes >> Go To 4

No >> Repair the (D55) CAN B Bus (+) circuit for an open. Perform BODY VERIFICATION TEST - VER 1.

U0019–CAN B BUS (CONTINUED)

4. (D54) CAN B BUS (–) CIRCUIT OPEN

Measure the resistance of the (D54) CAN B Bus (1) circuit between the Front Control Module C1 connector and the Sentry Key Remote Entry Module connector.


7
1
8
MODULE-
SENTRY KEY
REMOTE ENTRY
3
12
24
1
13
MODULE-
FRONT
CONTROL C1
814515f7

Is the resistance below 2.0 ohms?

Yes >> Replace the Sentry Key Remote Entry Module in accordance with the service information.
Perform BODY VERIFICATION TEST - VER 1.

No >> Repair the (D54) CAN B Bus (–) circuit for an open.
Perform BODY VERIFICATION TEST - VER 1.

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0146-LOST COMMUNICATION WITH CENTRAL GATEWAY

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) and perform the U0141-Lost Communication With Front Control Module test for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

STANDARD PROCEDURE

SKREEM VERIFICATION

For a complete wiring diagram **Refer to Section 8W**.

Diagnostic Test

1. SKREEM VERIFICATION

NOTE: When entering the PIN, care should be taken because the SKREEM will only allow 3 consecutive attempts to enter the correct PIN. If 3 consecutive incorrect PIN's are entered the SKREEM will Lock Out the scan tool. To exit Lock Mode, the ignition key must remain the Run position for I hour. All accessories must be off. A battery charger connected to the battery during this time period is recommended.

1. Reconnect the previously disconnected components and connectors.
2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKREEM. This number can be obtained from the vehicle invoice or from the DaimlerChrysler Customer Center (Phone 1-800-992-1997).
3. With the scan tool, select Miscellaneous Functions, WCM/Wireless Control Module. Then select the desired procedure and follow the display on the scan tool.
4. If the SKREEM was replaced, ensure all the customer's key have been programmed to the new module.
5. With the scan tool, ease all DTCs. Perform 5 ignition key cycles, leaving the key on for at least 90 seconds per cycle.
6. With the scan tool, read SKREEM DTC(s).

Are there any SKREEM DTC(s) present?

Yes >> Repair not complete, refer to the appropriate symptom.

No >> Repair is complete.

VEHICLE THEFT SECURITY - SERVICE INFORMATION

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VEHICLE THEFT SECURITY - SERVICE INFORMATION

DESCRIPTION

VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is designed to provide perimeter protection against unauthorized vehicle use or tampering by monitoring the vehicle doors, the liftgate, the liftgate flip-up glass, the ignition system and, only on vehicles built for sale in certain international markets where it is required equipment, the hood. If unauthorized vehicle use or tampering is detected, the system responds by pulsing the horn and flashing the exterior lamps. In many markets the VTSS also includes the Sentry Key Immobilizer System (SKIS), which provides passive vehicle protection by preventing the engine from operating unless a valid electronically encoded key is detected in the ignition lock cylinder.

The VTSS includes the following major components:

- **Door Ajar Switch**
- **Driver Cylinder Lock Switch**
- **Hood Ajar Switch** (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/HOOD AJAR SWITCH - DESCRIPTION).
- **Liftgate Ajar Switch**
- **Liftgate Flip-Up Glass Ajar Switch**
- **Low Beam Headlamp Relay**
- **VTSS Indicator** (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/VTSS INDICATOR - DESCRIPTION).

Certain functions and features of the VTSS rely upon resources shared with or controlled by other modules in the vehicle over the Controller Area Network (CCN) data bus network. The other modules that may affect VTSS operation are:

- **Cab Compartment Node (CCN)** (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DESCRIPTION).
- **Driver Memory Mirror Module** (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/MEMORY HEATED SEAT/MIRROR MODULE - DESCRIPTION).
- **Passenger Memory Mirror Module** (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/MEMORY HEATED SEAT/MIRROR MODULE - DESCRIPTION).
- **Steering Control Module (SCM)** (Refer to 19 - STEERING/COLUMN/STEERING COLUMN CONTROL MODULE - DESCRIPTION).

SENTRY KEY IMMOBILIZER SYSTEM

The Sentry Key Immobilizer System (SKIS) includes the following major components, which are described in further detail elsewhere in this service manual:

- **Powertrain Control Module (PCM)**
- **Sentry Key REmote Entry Module (SKREEM)**
- **Sentry Key Transponder**
- **SKIS Indicator**

Except for the Sentry Key transponders, which rely upon Radio Frequency (RF) communication, hard wired circuitry connects the SKIS components to the electrical system of the vehicle. Refer to the appropriate wiring information.

OPERATION

VEHICLE THEFT SECURITY SYSTEM

The ElectroMechanical Instrument Cluster (EMIC) is used on this model to control and integrate many of the functions and features included in the Vehicle Theft Security System (VTSS). In the VTSS, the EMIC/CCN receives inputs indicating the status of the door ajar switches, the liftgate ajar switch and the ignition switch. The EMIC will process the information from all of these inputs, internally control the security indicator as appropriate, and send electronic messages to the Front Control Module (FCM) over the Controller Area Network (CAN) data bus. The FCM internally controls the output to the hazard warning lamps and sends a control output to energize or de-energize the horn relay as appropriate.

Following are paragraphs describing the operation of each of the VTSS features.

ENABLING

The EMIC must have the VTSS function electronically enabled in order for the VTSS to perform as designed. The logic in the EMIC keeps its VTSS function dormant until it is enabled using a diagnostic scan tool. The VTSS function of the EMIC is enabled on vehicles equipped with the VTSS option at the factory, but a service replacement EMIC must be VTSS-enabled by the dealer using a diagnostic scan tool. Refer to the appropriate diagnostic information.

ARMING

Passive arming of the VTSS occurs when the vehicle is exited with the key removed from the ignition switch, the headlamps are turned off, and the doors are locked while they are open using the power lock switch. Active arming occurs when the “Lock” button on the Remote Keyless Entry (RKE) transmitter is depressed to lock the vehicle. For active arming to occur, the doors must be closed and the ignition switch must be in the Off position when the RKE transmitter “Lock” button is depressed. The power lock switch will not function if the key is in the ignition switch or the headlamps are turned on with the driver side front door open.

Pre-arming of the VTSS is initiated when a door or the liftgate is open when the vehicle is locked using a power door lock switch or when the RKE transmitter “Lock” button is depressed. Pre-arming will not occur if the key is in the ignition switch or the headlamps are turned on with the driver side front door open. When the VTSS is pre-armed, the arming sequence is delayed until all of the doors and the liftgate have been closed. The VTSS will remain in “Pre-Armed” mode for up to seventeen seconds after all doors and the liftgate have been closed.

Once the VTSS begins the passive or active arming sequence, the security indicator in the instrument cluster will flash rapidly for about seventeen seconds. This indicates that VTSS arming is in progress. If the ignition switch is turned to the On position, a door or the liftgate is opened, a door or the liftgate is unlocked by any means, or the RKE “Panic” button is depressed during the seventeen second arming process, the security indicator will stop flashing and the arming process will abort. Once the seventeen second arming sequence is successfully completed, the security indicator will flash at a slower rate, indicating that the VTSS is armed.

DISARMING

Disarming of the VTSS is only possible if the vehicle is equipped with the optional Sentry Key Immobilizer System (SKIS). On vehicles with SKIS, turning the ignition switch to the On position using a valid SKIS key will passively disarm VTSS. Active disarming of the VTSS occurs when the vehicle is unlocked by depressing the “Unlock” button of the RKE transmitter. Once the alarm has been activated, either disarming method will also deactivate the alarm. Depressing the “Panic” button on the RKE transmitter will **not** disarm the VTSS.

POWER-UP MODE

When the armed VTSS senses that the battery has been disconnected and reconnected, it enters its power-up mode. In the power-up mode the alarm system remains armed following a battery failure or disconnect. If the VTSS was armed prior to a battery disconnect or failure, the technician or vehicle operator will have to actively or passively disarm the alarm system after the battery is reconnected. The power-up mode will also apply if the battery goes dead while the system is armed, and battery jump-starting is attempted. The VTSS will be armed until the technician or vehicle operator has actively or passively disarmed the alarm system. If the VTSS is in the disarmed mode prior to a battery disconnect or failure, it will remain disarmed after the battery is reconnected or replaced, or if jump-starting is attempted.

TAMPER ALERT

The VTSS tamper alert feature will sound the horn three times upon disarming, if the alarm was triggered and has since timed-out (about eighteen minutes) or if the battery has been disconnected and reconnected. This feature alerts the vehicle operator that the VTSS alarm was activated while the vehicle was unattended.

SENTRY KEY IMMOBILIZER SYSTEM

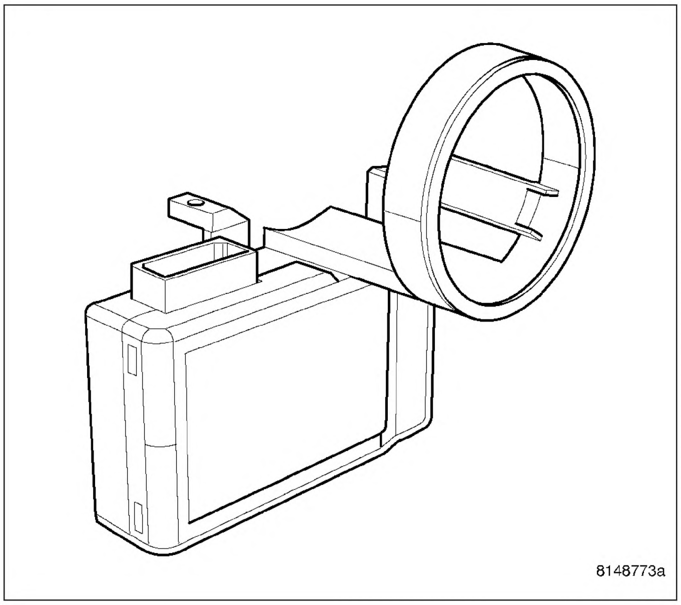
The Sentry Key Immobilizer System (SKIS) is designed to provide passive protection against unauthorized vehicle use by disabling the engine after about two seconds of running, whenever any method other than a valid Sentry Key is used to start the vehicle. The SKIS is considered a passive protection system because it is always active when the ignition system is energized and does not require any customer intervention. The SKIS uses Radio Frequency (RF) communication to obtain confirmation that the key in the ignition switch is a valid key for operating the vehicle. The microprocessor-based SKIS hardware and software also uses electronic messages to communicate with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - OPERATION).

Pre-programmed Sentry Key transponders are provided with the vehicle from the factory. Each Sentry Key REmote Entry Module (SKREEM) will recognize a maximum of eight Sentry Keys. If the customer would like additional keys other than those provided with the vehicle, they may be purchased from any authorized dealer. These additional keys must be programmed to the SKREEM in the vehicle in order for the system to recognize them as valid keys. This can be done by the dealer using a scan tool or, if Customer Learn programming is an available SKIS feature in the market where the vehicle was purchased, the customer can program the additional keys, as long as at least two valid Sentry Keys are already available. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/TRANSPONDER KEY - STANDARD PROCEDURE - TRANSPONDER PROGRAMMING).

The SKIS performs a self-test each time the ignition switch is turned to the On position, and will store fault information in the form of a Diagnostic Trouble Code (DTC) if a system malfunction is detected. The SKIS can be diagnosed, and any stored DTC can be retrieved using a scan tool. Refer to the appropriate diagnostic information.

MODULE-SENTRY KEY REMOTE ENTRY

DESCRIPTION



The Sentry Key REmote Entry Module (SKREEM) is sometimes referred to as the Wireless Control Module (WCM). The SKREEM is the primary component of the Sentry Key Immobilizer System (SKIS). It is also the receiver for the Remote Keyless Entry (RKE) system and the Tire Pressure Monitoring System. The SKREEM is located on the instrument panel, just to the right of the steering column, mounted around the ignition lock cylinder housing and is concealed beneath the instrument panel. The molded black plastic housing for the SKREEM has an integral molded plastic halo-like antenna ring. When the SKREEM is properly installed, the antenna ring is oriented around the circumference of the ignition lock cylinder housing.

A single integral connector is located next to the antenna ring on the SKREEM housing. The SKREEM is connected to the vehicle electrical system through a the instrument panel wire harness. The SKREEM cannot be adjusted or repaired. If faulty or damaged, the entire SKREEM unit must be replaced.

OPERATION

The Sentry Key REmote Entry Module (SKREEM) contains a Radio Frequency (RF) transceiver and a microprocessor. The SKREEM transmits RF signals to, and receives RF signals from the Sentry Key transponder through a tuned antenna enclosed within the molded plastic antenna ring integral to the SKREEM housing. If this antenna ring is not mounted properly around the ignition lock cylinder housing, communication problems between the SKREEM and the transponder may arise. These communication problems will result in Sentry Key transponder-related faults. The SKREEM also serves as the Remote Keyless Entry (RKE) RF receiver. The SKREEM communicates over the Controller Area Network (CAN) data bus with the ElectroMechanical Instrument Cluster (EMIC), the Powertrain Control Module (PCM), and/or the diagnostic scan tool.

The SKREEM retains in memory the ID numbers of any Sentry Key transponder that is programmed into it. A maximum of eight Sentry Key transponders can be programmed into the SKREEM. For added system security, each SKREEM is programmed with a unique Secret Key code. This code is stored in memory, sent over the CAN data bus to the PCM, and is encoded to the transponder of every Sentry Key that is programmed into the SKREEM. Therefore, the Secret Key code is a common element that is found in every component of the Sentry Key Immobilizer System (SKIS). Another security code, called a PIN, is used to gain access to the SKREEM Secured Access Mode. The Secured Access Mode is required during service to perform the SKIS initialization and Sentry Key transponder programming procedures. The SKREEM also stores the Vehicle Identification Number (VIN) in its memory, which it learns through a CAN data bus message from the PCM during SKIS initialization.

In the event that a SKREEM replacement is required, the Secret Key code can be transferred to the new SKREEM from the PCM using the diagnostic scan tool and the SKIS initialization procedure. Proper completion of the SKIS initialization will allow the existing Sentry Keys to be programmed into the new SKREEM so that new keys will not be required. In the event that the original Secret Key code cannot be recovered, SKREEM replacement will also require new Sentry Keys. The diagnostic scan tool will alert the technician during the SKIS initialization procedure if new Sentry Keys are required.

When the ignition switch is turned to the On position, the SKREEM transmits an RF signal to the transponder in the ignition key. The SKREEM then waits for an RF signal response from the transponder. If the response received identifies the key as valid, the SKREEM sends a valid key message to the PCM over the CAN data bus. If the response received identifies the key as invalid or if no response is received from the key transponder, the SKREEM sends an invalid key message to the PCM. The PCM will enable or disable engine operation based upon the status of the SKREEM messages. It is important to note that the default condition in the PCM is an invalid key; therefore, if no message is received from the SKREEM by the PCM, the engine will be disabled and the vehicle immobilized after two seconds of running.

The SKREEM also sends security indicator status messages to the EMIC over the CAN data bus to tell the EMIC how to operate the security indicator. The security indicator status message from the SKREEM tells the EMIC to turn the indicator on for about three seconds each time the ignition switch is turned to the On position as a bulb test. After completion of the bulb test, the SKREEM sends security indicator status messages to the EMIC to turn the indicator off, turn the indicator on, or to flash the indicator on and off. If the security indicator flashes or stays on solid after the bulb test, it signifies a SKIS fault. If the SKREEM detects a system malfunction and/or the SKIS has become inoperative, the security indicator will stay on solid. If the SKREEM detects an invalid key or if a key transponder-related fault exists, the security indicator will flash. If the vehicle is equipped with the Customer Learn transponder programming feature, the SKREEM will also send messages to the EMIC to flash the security indicator whenever the Customer Learn programming mode is being utilized (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/TRANSPONDER KEY - STANDARD PROCEDURE - TRANSPONDER PROGRAMMING).

The SKIS performs a self-test each time the ignition switch is turned to the On position, and will store fault information in the form of a Diagnostic Trouble Code (DTC) in SKREEM memory if a system malfunction is detected. The SKREEM can be diagnosed, and any stored DTC can be retrieved using a diagnostic scan tool. Refer to the appropriate diagnostic information.

STANDARD PROCEDURE

SENTRY KEY IMMOBILIZER SYSTEM INITIALIZATION

The Sentry Key Immobilizer System (SKIS) must be initialized following a Sentry Key REmote Entry Module (SKREEM) replacement. SKIS initialization requires the use of a scan tool. Initialization will also require that you have access to the unique four-digit PIN code that was assigned to the original SKREEM. The PIN code **must** be used to enter the Secured Access Mode in the SKREEM. This PIN number may be obtained from the vehicle owner, from the original vehicle invoice, or from the DaimlerChrysler Customer Center. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE - PCM/SKIM PROGRAMMING).

NOTE: If a Powertrain Control Module (PCM) is replaced on a vehicle equipped with the Sentry Key Immobilizer System (SKIS), the unique Secret Key data must be transferred from the Sentry Key REmote Entry Module (SKREEM) to the new PCM using the PCM replacement procedure. This procedure also requires the use of a scan tool and the unique four-digit PIN code to enter the Secured Access Mode in the SKREEM. Refer to the appropriate diagnostic information for the proper PCM replacement procedures.

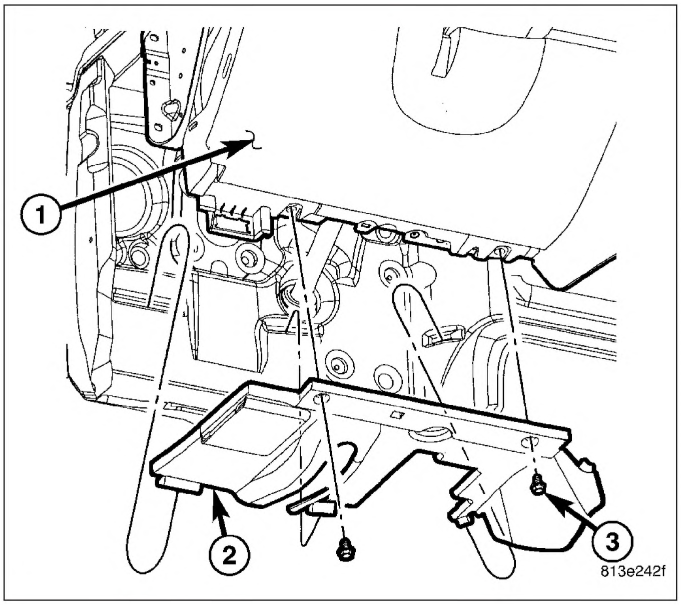
REMOVAL

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

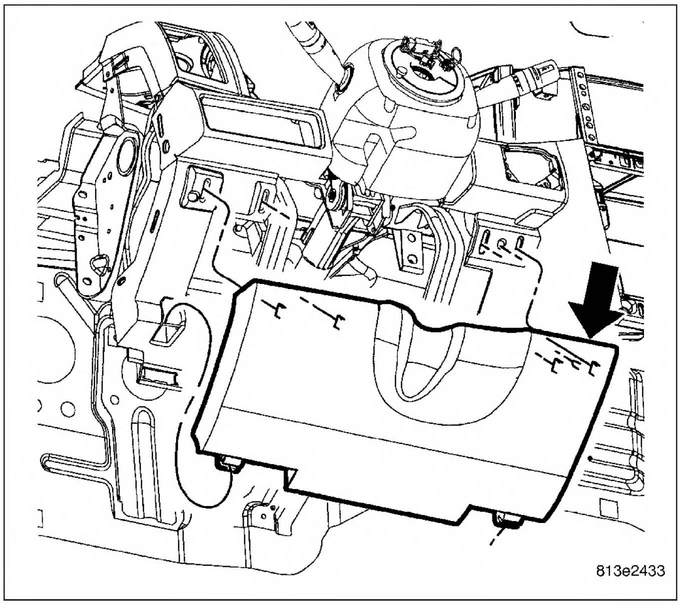
1. Disconnect and isolate the battery negative cable.

WARNING: Wait two minutes for the airbag system reserve capacitor to discharge before beginning any airbag system or component service. Failure to do so may result in accidental airbag deployment, personal injury or death.

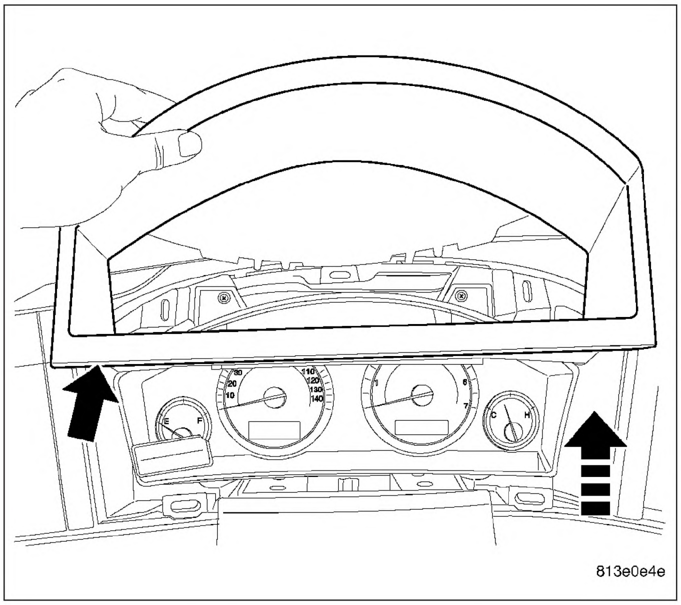
2. Remove the left silencer panel (2) underneath the instrument panel.



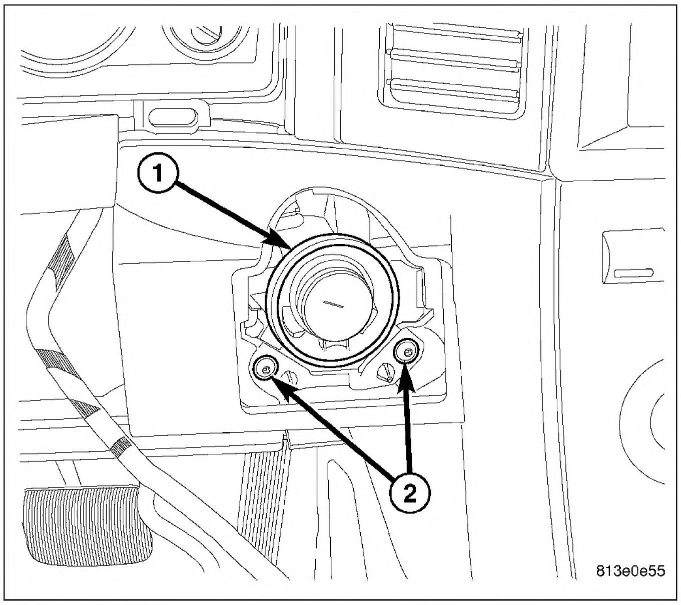
3. Remove the steering column opening cover.



4. Remove the cluster bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/ CLUSTER BEZEL - REMOVAL).



5. Using a trim stick (special tool #C-4755) or equivalent, and gently pry out ignition cylinder bezel.
6. Remove the screws (2) and remove the ignition cylinder (1) by pushing back through the instrument panel.
7. Reach up behind the left side of the center stack and disconnect the ignition switch and SKREEM electrical connectors.
8. Remove the one mounting bolt holding the SKREEM to the ignition cylinder housing.



NOTE: When a PCM and the SKREEM are replaced at the same time (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE - PCM/SKREEM PROGRAMMING), and follow this order:

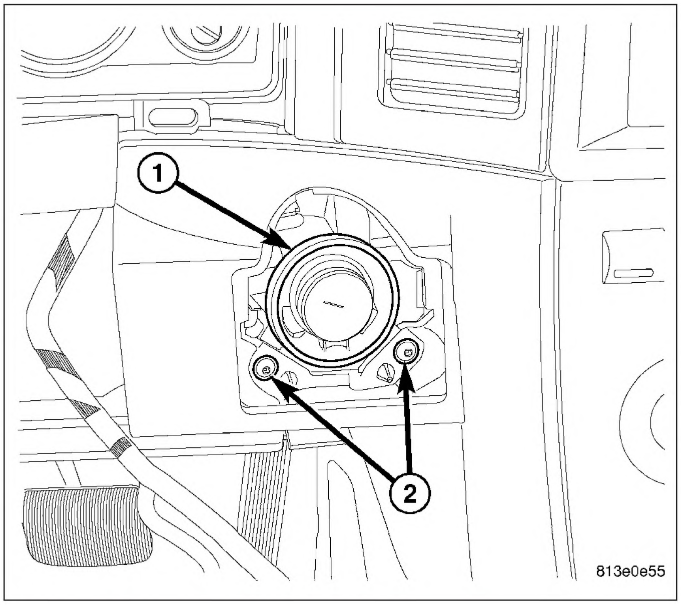
- Program the new PCM.
- Program the new SKREEM.
- Replace all ignition keys and program them to the new SKREEM.

INSTALLATION

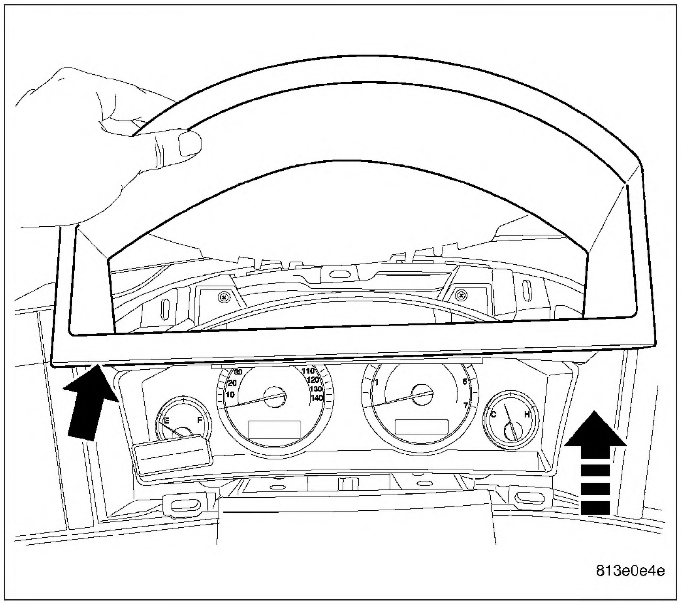
NOTE: When a PCM and the SKREEM are replaced at the same time (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE - PCM/SKREEM PROGRAMMING), and follow this order:

- Program the new PCM.
- Program the new SKREEM.
- Replace all ignition keys and program them to the new SKREEM.

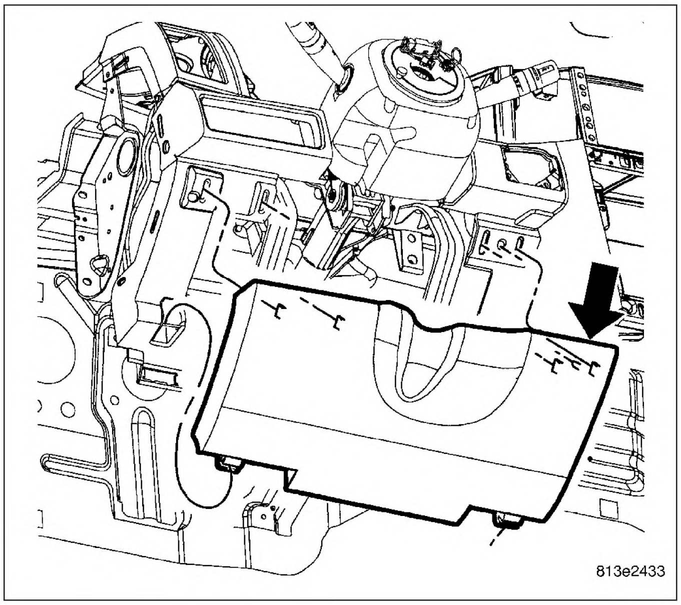
1. Position the SKREEM with the antenna ring around the ignition lock cylinder.
2. Install the one mounting bolt holding the SKREEM to the ignition cylinder housing.
3. Reach up behind the left side of the center stack and connect the ignition switch and SKREEM electrical connectors.
4. Install the ignition cylinder by pushing it up through the instrument panel from behind, and install the screws (2).
5. Install the ignition cylinder bezel by firmly pushing it into place.



6. Install the cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION).

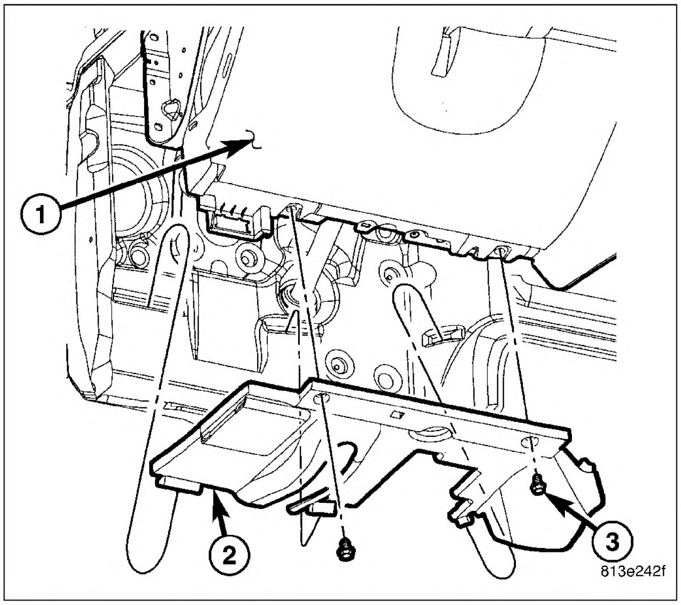


7. Install the steering column opening cover.



8. Install the left silencer panel (2) underneath the instrument panel.
9. Connect the battery negative cable.

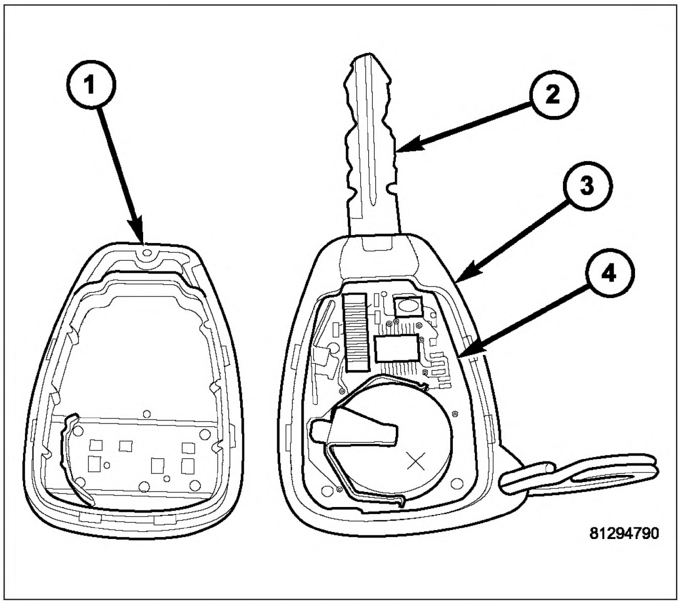
NOTE: On vehicles equipped with the optional Sentry Key Immobilizer System (SKIS) if the SKREEM is replaced with a new unit, a diagnostic scan tool MUST be used to initialize the new SKREEM and to program at least two Sentry Key transponders before the vehicle can be operated (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/SENTRY KEY REMOTE ENTRY MODULE - STANDARD PROCEDURE - SKIS INITIALIZATION).



TRANSPONDER KEY

DESCRIPTION

Each ignition key (2) used in the Sentry Key Immobilizer System (SKIS) has a transponder chip included on the circuit board (4) beneath the cover (1) of the integral Remote Keyless Entry (RKE) transmitter (3). In addition to having to be cut to match the mechanical coding of the ignition lock cylinder and programmed for operation of the RKE system, each new Sentry Key has a unique transponder identification code that is permanently programmed into it by the manufacturer, and which must be programmed into the Sentry Key REmote Entry Module (SKREEM) to be recognized by the SKIS as a valid key. The Sentry Key transponder cannot be adjusted or repaired. If faulty or damaged, the entire key and RKE transmitter unit must be replaced.



OPERATION

When the ignition switch is turned to the On position, the Sentry Key REmote Entry Module (SKREEM) communicates through its antenna with the Sentry Key transponder using a Radio Frequency (RF) signal. The SKREEM then listens for a RF response from the transponder through the same antenna. The Sentry Key transponder chip is within the range of the SKREEM transceiver antenna ring when it is inserted into the ignition lock cylinder. The SKREEM determines whether a valid key is present in the ignition lock cylinder based upon the response from the transponder. If a valid key is detected, that fact is communicated by the SKREEM to the Powertrain Control Module (PCM) over the Controller Area Network (CAN) data bus, and the PCM allows the engine to continue running. If the PCM receives an invalid key message, or receives no message from the SKREEM over the CAN data bus, the engine will be disabled after about two seconds of operation. The ElectroMechanical Instrument Cluster (EMIC) will also respond to the invalid key message on the CAN data bus by flashing the security indicator on and off.

Each Sentry Key has a unique transponder identification code permanently programmed into it by the manufacturer. Likewise, the SKREEM has a unique Secret Key code programmed into it by the manufacturer. When a Sentry Key is programmed into the memory of the SKREEM, the SKREEM stores the transponder identification code from the Sentry Key, and the Sentry Key learns the Secret Key code from the SKREEM. Once the Sentry Key learns the Secret Key code of the SKREEM, it is permanently stored in the memory of the transponder. Therefore, once a Sentry Key has been programmed to a particular vehicle, it cannot be used on any other vehicle (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/TRANSPONDER KEY - STANDARD PROCEDURE - TRANSPONDER PROGRAMMING).

The SKIS performs a self-test each time the ignition switch is turned to the On position, and will store key-related fault information in the form of a Diagnostic Trouble Code (DTC) in SKREEM memory if a Sentry Key transponder problem is detected. The Sentry Key transponder chip can be diagnosed, and any stored DTC can be retrieved using a diagnostic scan tool. Refer to the appropriate diagnostic information.

STANDARD PROCEDURE

SENTRY KEY TRANSPONDER PROGRAMMING

All Sentry Keys included with the vehicle are pre-programmed to work with the Sentry Key Immobilizer System (SKIS) when it is shipped from the factory. The Sentry Key REmote Entry Module (SKREEM) can be programmed to recognize up to a total of eight Sentry Keys. When programming a blank Sentry Key transponder, the key must first be cut to match the ignition switch lock cylinder in the vehicle for which it will be used. Once the additional or new key has been cut, the SKREEM must be programmed to recognize it as a valid key. There are two possible methods to program the SKREEM to recognize a new or additional valid key, the Secured Access Method and the Customer Learn Method. Following are the details of these two programming methods.

SECURED ACCESS METHOD

The Secured Access method applies to all vehicles. This method requires the use of a diagnostic scan tool. This method will also require that you have access to the unique four-digit PIN code that was assigned to the original SKREEM. The PIN code **must** be used to enter the Secured Access Mode in the SKREEM. This PIN number may be obtained from the vehicle owner, from the original vehicle invoice, or from the DaimlerChrysler Customer Center. Refer to the appropriate diagnostic information for the proper Secured Access method programming procedures.

CUSTOMER LEARN METHOD

The Customer Learn feature is only available on domestic vehicles, or those vehicles which have a U.S. country code designator. This programming method also requires access to at least two valid Sentry Keys. If two valid Sentry Keys are not available, or if the vehicle does not have a U.S. country code designator, the Secured Access Method **must** be used to program new or additional valid keys to the SKREEM. The Customer Learn programming method procedures are as follows:

1. Obtain the blank Sentry Key(s) that are to be programmed as valid keys for the vehicle. Cut the blank key(s) to match the ignition switch lock cylinder mechanical key codes.
2. Insert one of the two valid Sentry Keys into the ignition switch and turn the ignition switch to the On position.
3. After the ignition switch has been in the On position for longer than three seconds, but no more than fifteen seconds, cycle the ignition switch back to the Off position. Replace the first valid Sentry Key in the ignition switch lock cylinder with the second valid Sentry Key and turn the ignition switch back to the On position. The second valid Sentry Key must be inserted in the lock cylinder within fifteen seconds of removing the first valid key.
4. About ten seconds after the completion of Step 3, the security indicator in the instrument cluster will start to flash to indicate that the system has entered the Customer Learn programming mode.
5. Within sixty seconds of entering the Customer Learn programming mode, turn the ignition switch to the Off position, replace the valid Sentry Key with a blank Sentry Key transponder, and turn the ignition switch back to the On position.
6. About ten seconds after the completion of Step 5, the security indicator will stop flashing, stay on solid for three seconds, then turn off to indicate that the blank Sentry Key has been successfully programmed. The SKIS will immediately exit the Customer Learn programming mode. After the ignition is cycled the vehicle may be started using the newly programmed valid Sentry Key.

Each of these steps must be repeated and completed in their entirety for each additional Sentry Key that is to be programmed. If the above steps are not completed in the given sequence, or within the allotted time, the SKREEM will exit the Customer Learn programming mode and the programming will be unsuccessful. The SKREEM will also automatically exit the Customer Learn programming mode if it sees a non-blank Sentry Key transponder when it should see a blank, if it has already programmed eight (8) valid Sentry Keys, or if the ignition switch is turned to the Off position for more than about fifty seconds.

NOTE: If an attempt is made to start the vehicle while in the Customer Learn mode (security indicator flashing), the SKIS will respond as though the vehicle were being started with an invalid key. In other words, the engine will stall after about two seconds of operation. No faults will be set.

NOTE: Once a Sentry Key has been programmed as a valid key to a vehicle, it cannot be programmed as a valid key for use on any other vehicle.

VTSS/SKIS INDICATOR

DESCRIPTION

A Vehicle Theft Security System (VTSS) / Sentry Key Immobilizer System (SKIS) indicator is standard equipment on all instrument clusters, but is only functional on vehicles equipped with the optional VTSS/SKIS. The amber VTSS/SKIS indicator is located to the right of the tachometer.

OPERATION

The Vehicle Theft Security System (VTSS) / Sentry Key Immobilizer System (SKIS) indicator gives an indication to the vehicle operator of the status of the VTSS/SKIS. This lamp is controlled the instrument cluster circuit board based upon messages received by the cluster from the Sentry Key REmote Entry Module (SKREEM) over the Controller Area Network (CAN) data bus. The VTSS/SKIS indicator lamp receives battery current on the instrument cluster circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions. The lamp only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the SKIS indicator lamp for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position, the SKREEM tells the cluster to illuminate the lamp for about three seconds.
- **SKIS Lamp-On Message** - Each time the cluster receives a SKIS lamp-on message from the SKREEM, the lamp will be illuminated. The lamp can be flashed on and off, or illuminated solid, as dictated by the message from the SKREEM. For more information on the SKIS and the SKIS lamp control parameters, (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - OPERATION - SENTRY KEY IMMOBILIZER SYSTEM). The lamp remains illuminated until the cluster receives a lamp-off message from the SKREEM or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test with the scan tool, the lamp will be turned on for the duration of the test to confirm the functionality of the lamp and the cluster.

The SKREEM performs a self-test each time the ignition switch is turned to the On position to decide whether the system is in good operating condition. The SKREEM then sends a message to the instrument cluster. If the SKIS indicator fails to light during the bulb test, refer to the appropriate diagnostic information. If the instrument cluster turns on the VTSS/SKIS indicator after the bulb test, either solid or flashing, it indicates that a SKIS malfunction has occurred or that the VTSS/SKIS is inoperative. For proper diagnosis of the SKIS, the CAN data bus, or the message inputs to the instrument cluster that control the VTSS/SKIS indicator lamp, a scan tool and the appropriate diagnostic information are required.

WIPERS/WASHERS

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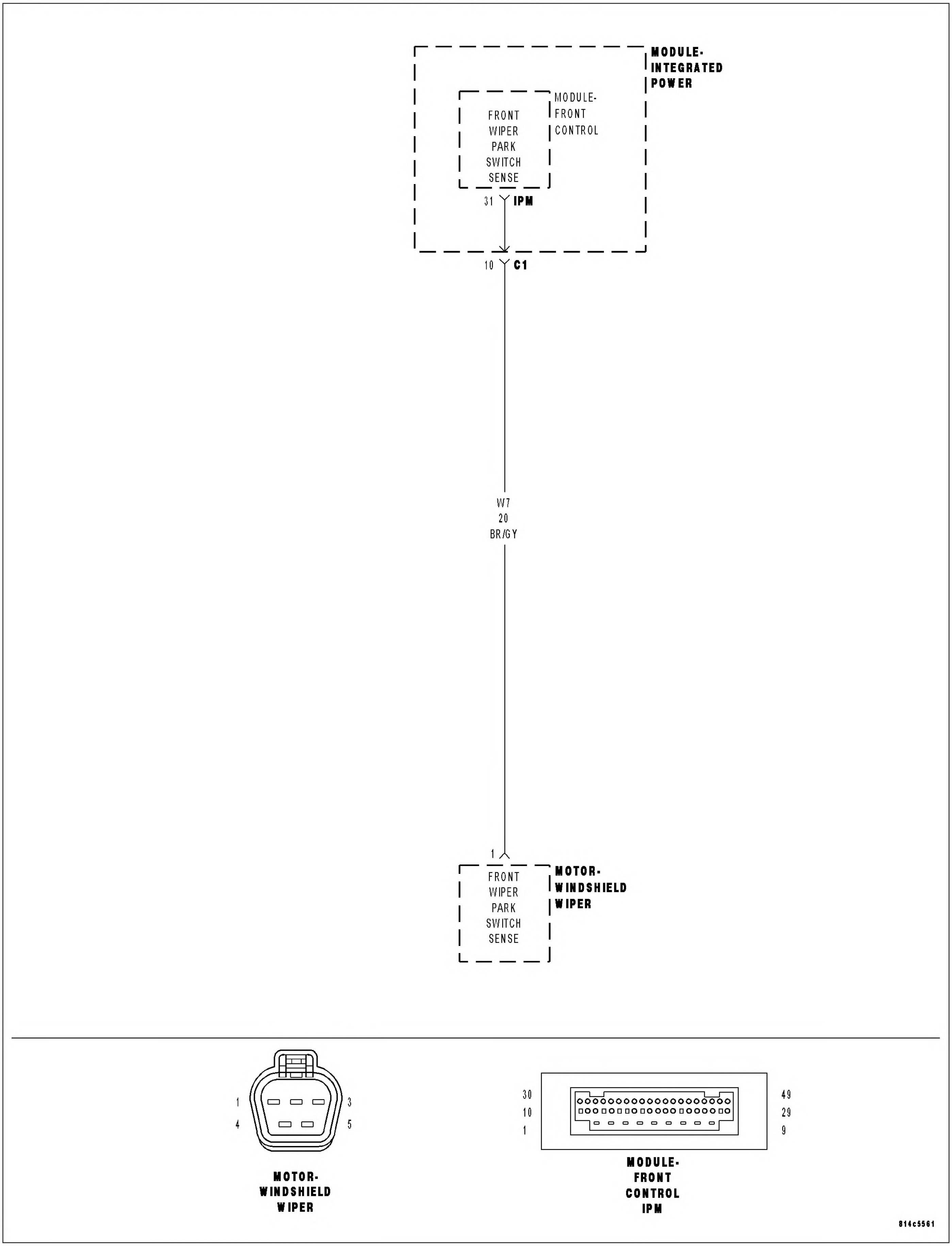
WIPERS/WASHERS - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B2304-WIPER PARK SWITCH INPUT CIRCUIT LOW


MODULE-
INTEGRATED
POWER
MODULE-
FRONT
CONTROL
FRONT
WIPER
PARK
SWITCH
SENSE
31
IPM
10
C1
W7
20
BR/GY
1
FRONT
WIPER
PARK
SWITCH
SENSE
MOTOR-
WINDSHIELD
WIPER
1
3
4
5
MOTOR-
WINDSHIELD
WIPER
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
814c5561

B2304-WIPER PARK SWITCH INPUT CIRCUIT LOW (CONTINUED)

For the Front/Rear Wipers/Washers circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The FCM detects a short to ground condition.

Possible Causes
FRONT WIPER MOTOR
(W7) FRONT WIPER PARK SWITCH SENSE CIRCUIT SHORT TO GROUND
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.
With the Scan Tool, clear all FCM DTC's.
Turn the Wipers on.
With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2304-WIPER PARK SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. WIPER MOTOR

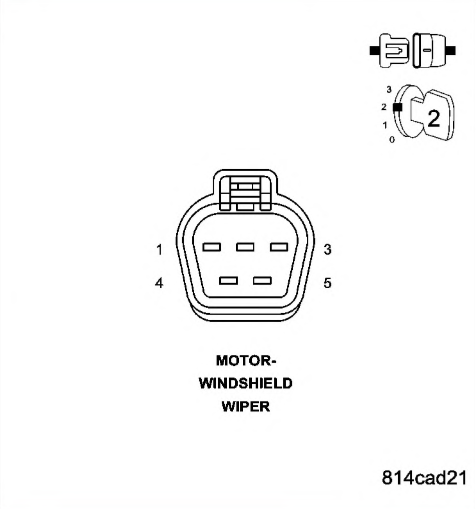
With the scan tool, erase DTCs.
Turn the ignition off.
Disconnect the Front Wiper Motor harness connector.
Turn the ignition on.
Wait 30 seconds
With the scan tool, read DTCs.

Does the Scan Tool read: B2305-WIPER PARK SWITCH INPUT CIRCUIT HIGH?

Yes >> Replace the Front Wiper Motor in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3



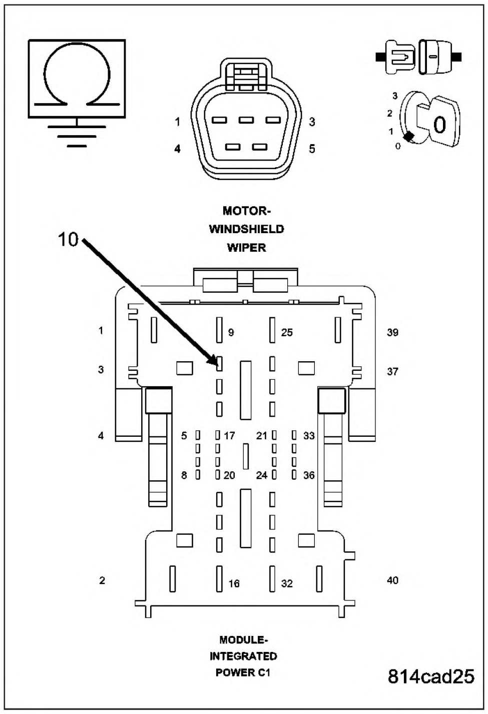
B2304-WIPER PARK SWITCH INPUT CIRCUIT LOW (CONTINUED)

3. (W7) FRONT WIPER MOTOR PARK SWITCH SENSE CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the IPM C1 harness connector.

Measure the resistance between ground and the (W7) Front Wiper Park Switch Sense circuit.


1
3
4
5
MOTOR-
WINDSHIELD
WIPER
10
1
3
4
2
9
25
39
37
40
5
17
21
33
8
20
24
36
16
32
MODULE-
INTEGRATED
POWER C1
814cad25

Is the resistance below 5.0 ohms?

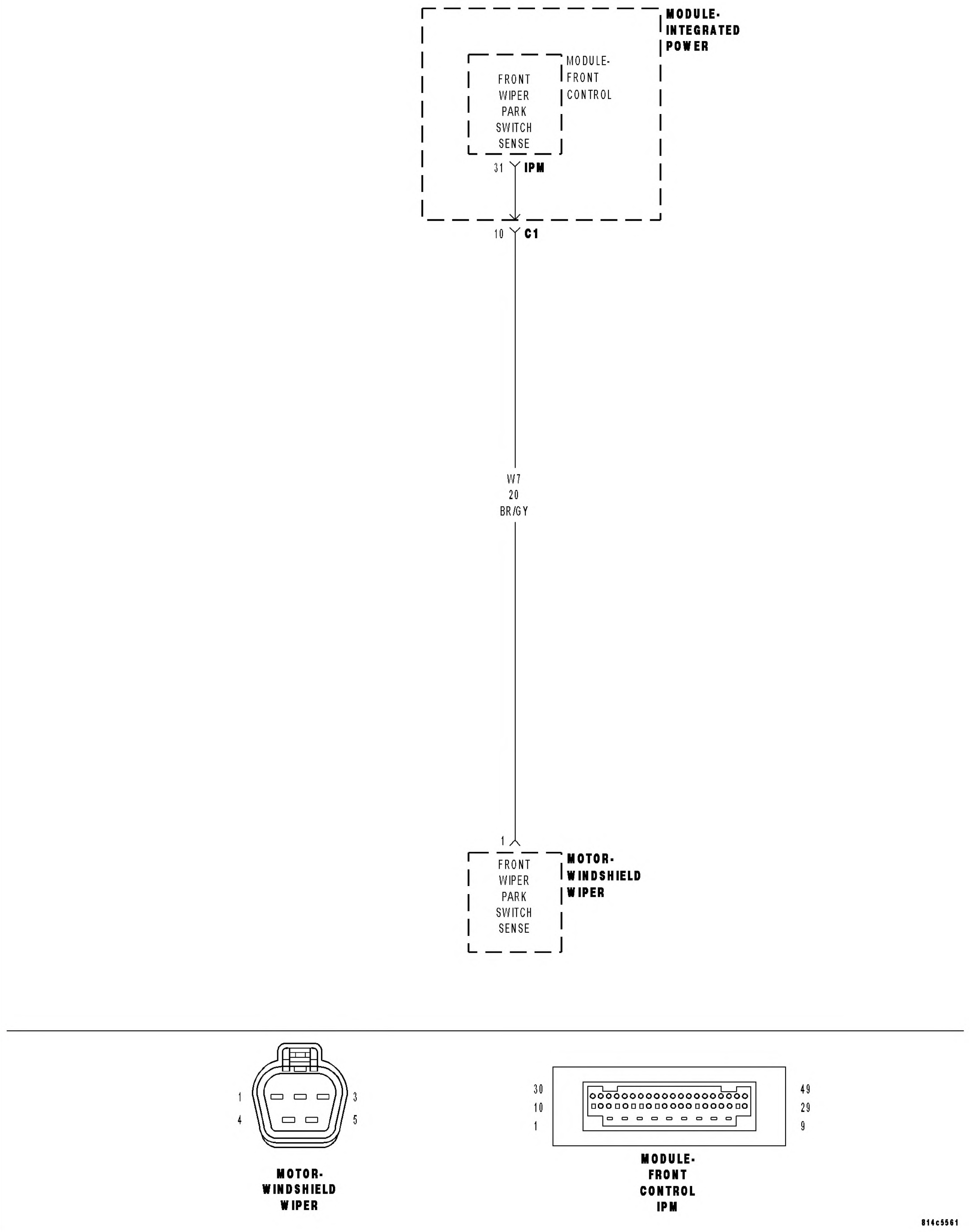
Yes >> Repair the (W7) Front Wiper Park Switch Sense circuit for a short to ground condition.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2305-WIPER PARK SWITCH INPUT CIRCUIT HIGH


MODULE-
INTEGRATED
POWER
MODULE-
FRONT
CONTROL
FRONT
WIPER
PARK
SWITCH
SENSE
31
IPM
10
C1
W7
20
BR/GY
1
FRONT
WIPER
PARK
SWITCH
SENSE
MOTOR-
WINDSHIELD
WIPER
1
3
4
5
MOTOR-
WINDSHIELD
WIPER
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
814c5561

B2305-WIPER PARK SWITCH INPUT CIRCUIT HIGH (CONTINUED)

For the Rear Wipers/Washers circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The FCM detects an open condition.

Possible Causes
(W7) FRONT WIPER PARK SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Front Wipers on.

With the Scan Tool, read the Front Wiper DTC's.

Does the Scan Tool read: B2305-WIPER PARK SWITCH INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. (W7) FRONT WIPER PARK SWITCH SENSE CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Front Wiper Motor harness connector.

Disconnect the IPM C1 harness connector.

Measure the voltage on the (W7) Front Wiper Park Switch Sense circuit.

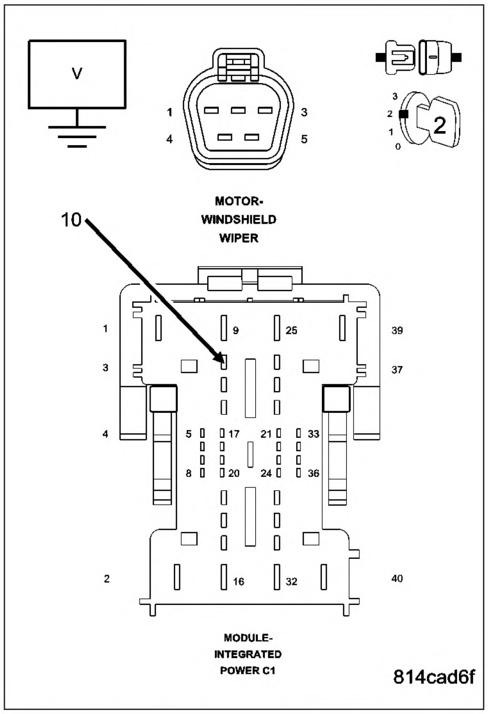
Is the voltage above 5.0 volts?

Yes >> Repair the (W7) Front Wiper Park Switch Sense circuit for a short to voltage.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the FCM in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B2313-WIPER ON/OFF CONTROL CIRCUIT LOW

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the FCM detects a short/low condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Wiper ON/OFF relay with and known good relay.

With the Scan Tool, clear all FCM DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2313-WIPER ON/OFF CONTROL CIRCUIT LOW?

Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2314-WIPER ON/OFF CONTROL CIRCUIT HIGH

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the FCM detects a short/HIGH condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Wiper ON/OFF relay with and known good relay.

With the Scan Tool, clear all FCM DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2314-WIPER ON/OFF CONTROL CIRCUIT HIGH?

Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2315-WIPER ON/OFF CONTROL CIRCUIT OPEN

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the FCM detects a short/low condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Wiper ON/OFF relay with and known good relay.

With the Scan Tool, clear all FCM DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2315-WIPER ON/OFF CONTROL CIRCUIT OPEN?

Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2317-WIPER HI/LOW CONTROL CIRCUIT LOW

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the FCM detects a short/low condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Wiper HI/LOW relay with and known good relay.

With the Scan Tool, clear all FCM DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2317-WIPER HI/LOW CONTROL CIRCUIT LOW?

Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2318-WIPER HI/LOW CONTROL CIRCUIT HIGH

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the FCM detects a short/HIGH condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Wiper HI/LOW relay with and known good relay.

With the Scan Tool, clear all FCM DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2318-WIPER HI/LOW CONTROL CIRCUIT HIGH?

Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2319-WIPER HI/LOW CONTROL CIRCUIT OPEN

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the FCM detects a short/low condition.

Possible Causes
INTEGRATED POWER MODULE

Diagnostic Test

1. INTEGRATED POWER MODULE

Turn the ignition off.

Replace the Wiper HI/LOW relay with and known good relay.

With the Scan Tool, clear all FCM DTC’s.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC’s.

Does the Scan Tool read: B2319-WIPER HI/LOW CONTROL CIRCUIT OPEN?

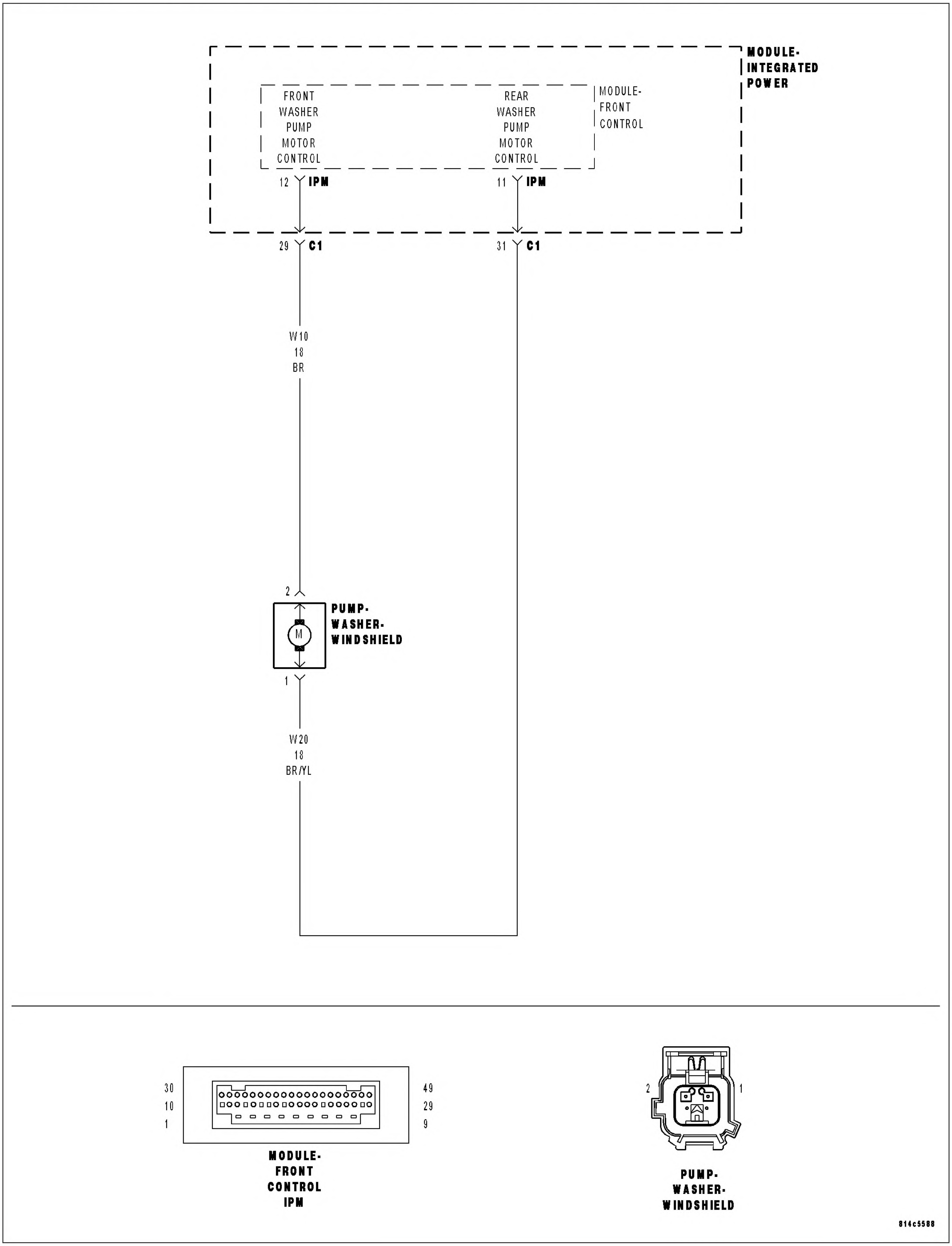
Yes >> Replace the Integrated Power Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Test complete.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B231F-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT LOW


MODULE-
INTEGRATED
POWER
FRONT
WASHER
PUMP
MOTOR
CONTROL
REAR
WASHER
PUMP
MOTOR
CONTROL
MODULE-
FRONT
CONTROL
12 IPM
11 IPM
29 C1
31 C1
W10
18
BR
2
PUMP-
WASHER-
WINDSHIELD
M
1
W20
18
BR/YL
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
2
1
PUMP-
WASHER-
WINDSHIELD
814c5588

B231F-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT LOW (CONTINUED)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the FCM detects a short/low condition on the washer Pump Motor Control circuit.

Possible Causes
(W10)/(W20) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TOGETHER
(W10) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO GROUND
(W20) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO GROUND
WIPER WASHER PUMP
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Washers on.

With the Scan Tool, read the Wiper/Washers DTC's.

Does the Scan Tool read: B231F-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. WASHER PUMP MOTOR

Turn the ignition off.

Disconnect the Washer Pump Motor connector.

Turn the ignition on.

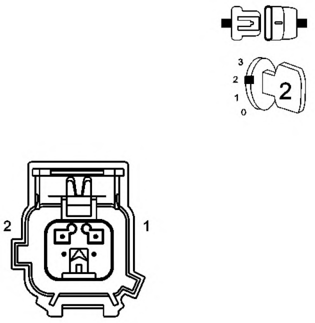
With the Scan Tool, read the DTC's.

Does the Scan Tool read:B231F-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the Washer Pump Motor in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



PUMP-
WASHER-
WINDSHIELD

814cb0ba

B231F-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT LOW (CONTINUED)

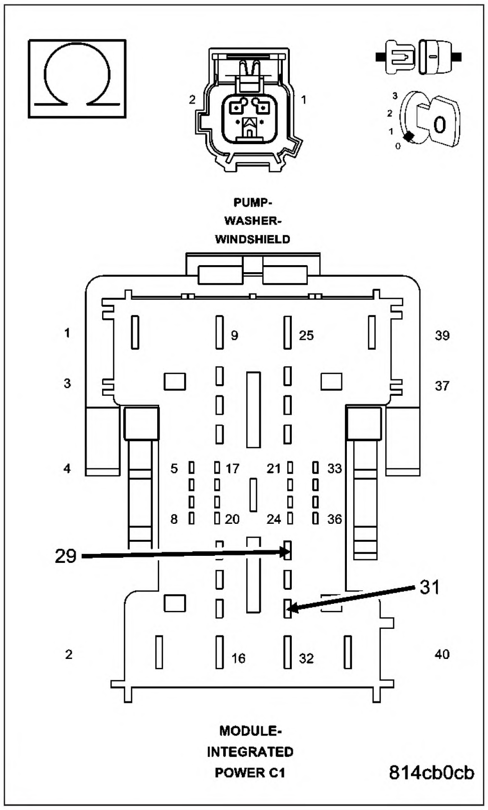
3. (W10)/(W20) WASHER PUMP MOTOR CONTROL CIRCUITS SHORT TOGETHER

Turn the ignition off.

Disconnect the Washer Pump Motor harness connector.

Disconnect the IPM C1 harness connector.

Measure the resistance between the (W10) and (W20) Washer Pump Motor Control circuits.


2
1
3
2
1
0
0
PUMP-
WASHER-
WINDSHIELD
1
9
25
39
3
37
4
5
17
21
33
8
20
24
36
29
31
2
16
32
40
MODULE-
INTEGRATED
POWER C1
814cb0cb

Is the resistance below 5.0 ohms?

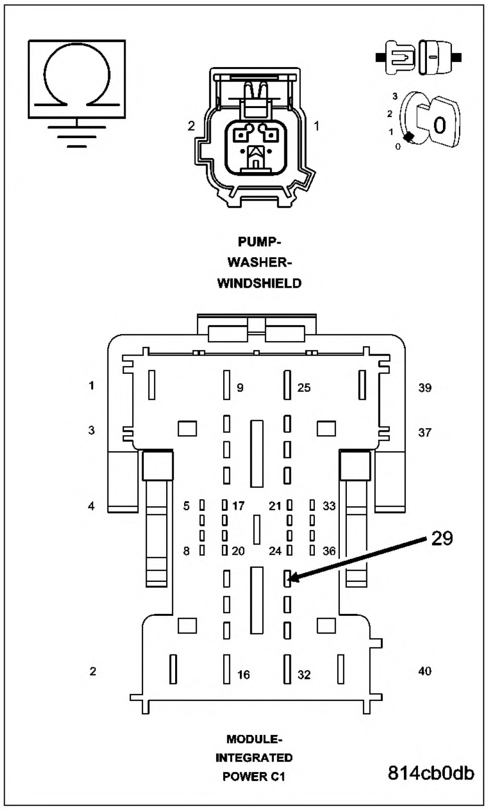
Yes >> Repair the (W10) and (W20) Washer Pump Motor Control circuits for a short together.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 4

4. (W10) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (W10) Washer Pump Motor Control circuit.


2
1
3
2
1
0
0
PUMP-
WASHER-
WINDSHIELD
1
9
25
39
3
37
4
5
17
21
33
8
20
24
36
29
2
16
32
40
MODULE-
INTEGRATED
POWER C1
814cb0db

Is the resistance below 5.0 ohms?

Yes >> Repair the (W10) Washer Pump Motor Control circuit for a short to ground.

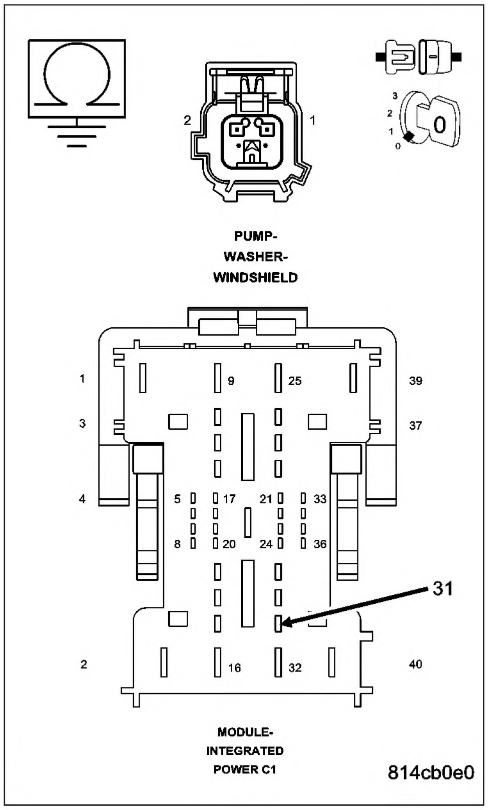
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 5

B231F-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT LOW (CONTINUED)

5. (W20) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (W20) Washer Pump Motor Control circuit.


2
1
3
2
1
0
PUMP-
WASHER-
WINDSHIELD
1
9
25
39
3
37
4
5
17
21
33
8
20
24
36
31
2
16
32
40
MODULE-
INTEGRATED
POWER C1
814cb0e0

Is the resistance below 5.0 ohms?

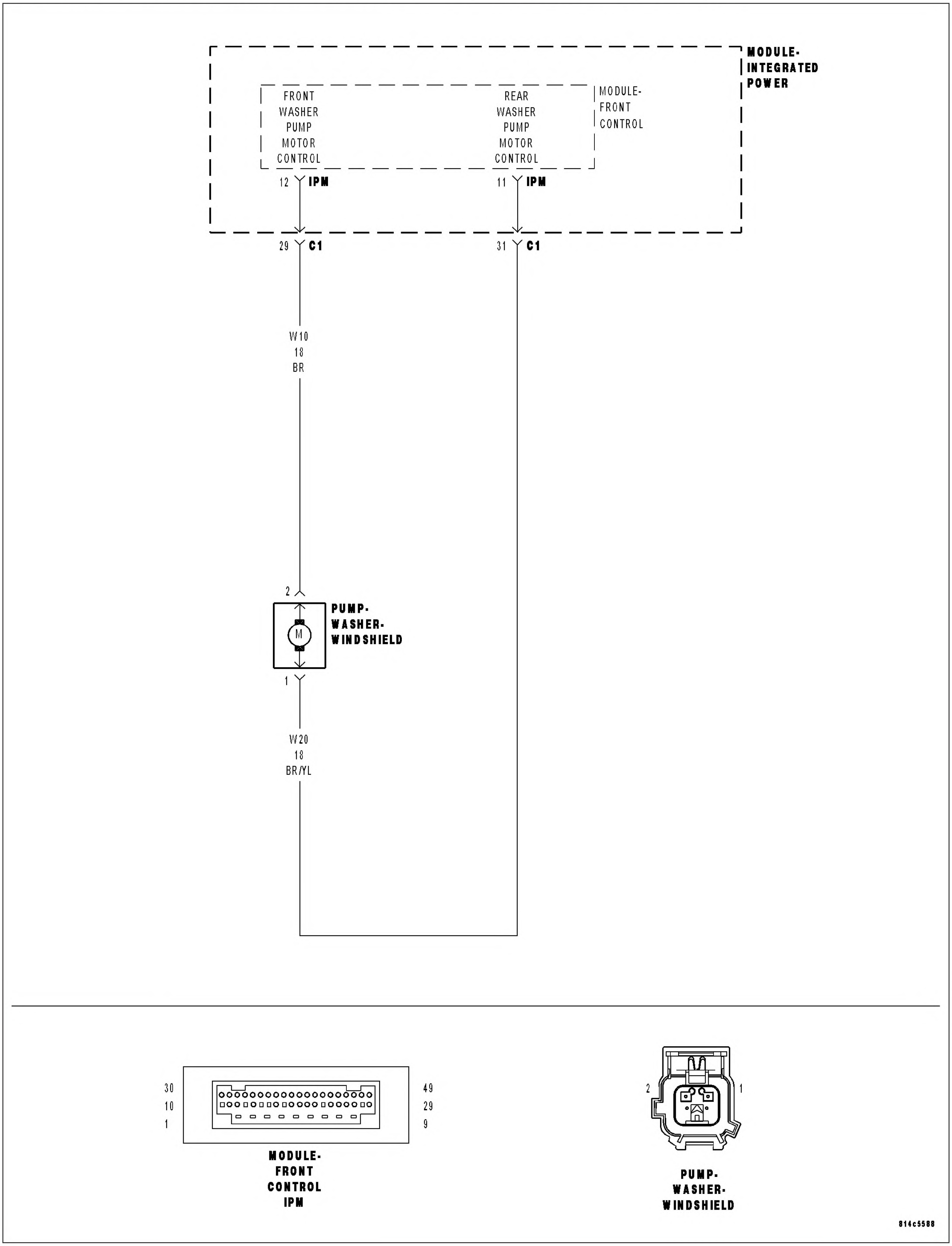
Yes >> Repair the (W20) Washer Pump Motor Control circuit for a short to ground.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2320-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT HIGH


MODULE-
INTEGRATED
POWER
MODULE-
FRONT
CONTROL
FRONT
WASHER
PUMP
MOTOR
CONTROL
REAR
WASHER
PUMP
MOTOR
CONTROL
12 IPM
11 IPM
29 C1
31 C1
W10
18
BR
2
PUMP-
WASHER-
WINDSHIELD
M
1
W20
18
BR/YL
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
2
1
PUMP-
WASHER-
WINDSHIELD
814c5588

B2320-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT HIGH (CONTINUED)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The FCM detects an open condition.

Possible Causes
(W10) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO VOLTAGE
(W20) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO VOLTAGE
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Washers on.

With the Scan Tool, read the Wiper/Washers DTC's.

Does the Scan Tool read: B2320-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2320-FRONT/REAR WASHER MOTOR CONTROL CIRCUIT HIGH (CONTINUED)

2. (W10) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO VOLTAGE

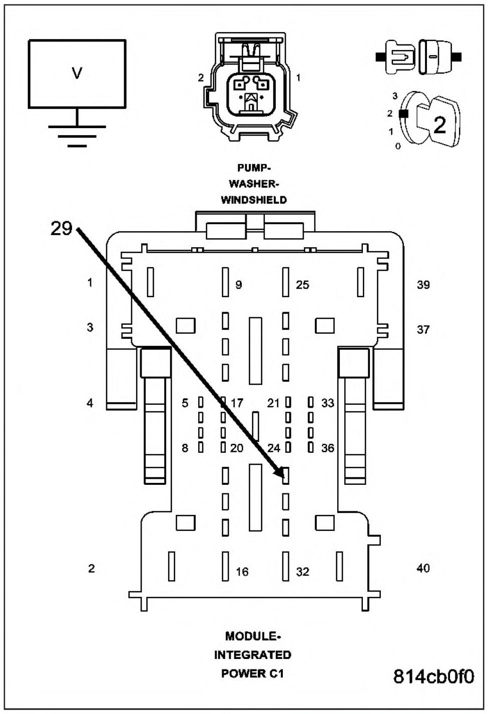
Turn the ignition off.

Disconnect the IPM C1 harness connector.

Disconnect the Washer Pump Motor harness connector.

Turn the ignition on.

Measure the voltage of the (W10) Washer Pump Motor Control circuit.


V
2
1
3
2
1
0
2
PUMP-
WASHER-
WINDSHIELD
29
1
9
25
39
3
37
4
5
17
21
33
8
20
24
36
2
16
32
40
MODULE-
INTEGRATED
POWER C1
814cb0f0

Is the voltage above 5.0 volts?

Yes >> Repair the (W10) Washer Pump Motor Control circuit for a short to voltage.

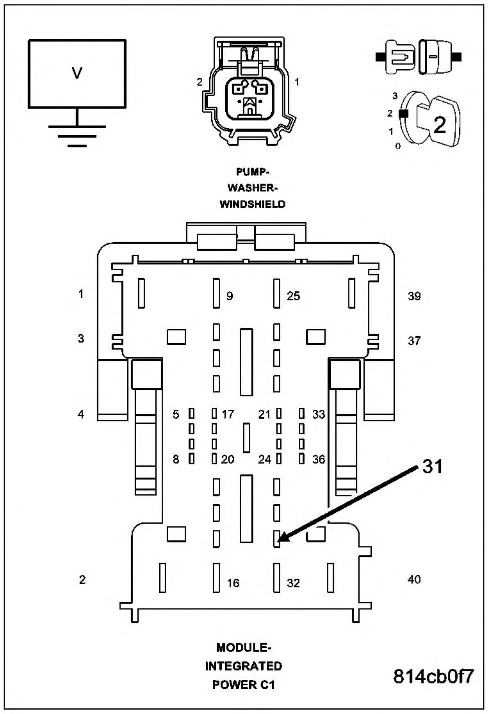
Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Go To 3

---

3. (W20) WASHER PUMP MOTOR CONTROL CIRCUIT SHORT TO VOLTAGE

Measure the Voltage of the (W20) Washer Pump Motor Control circuit.


V
2
1
3
2
1
0
2
PUMP-
WASHER-
WINDSHIELD
1
9
25
39
3
37
4
5
17
21
33
8
20
24
36
31
2
16
32
40
MODULE-
INTEGRATED
POWER C1
814cb0f7

Is the voltage above 5.0 volts?

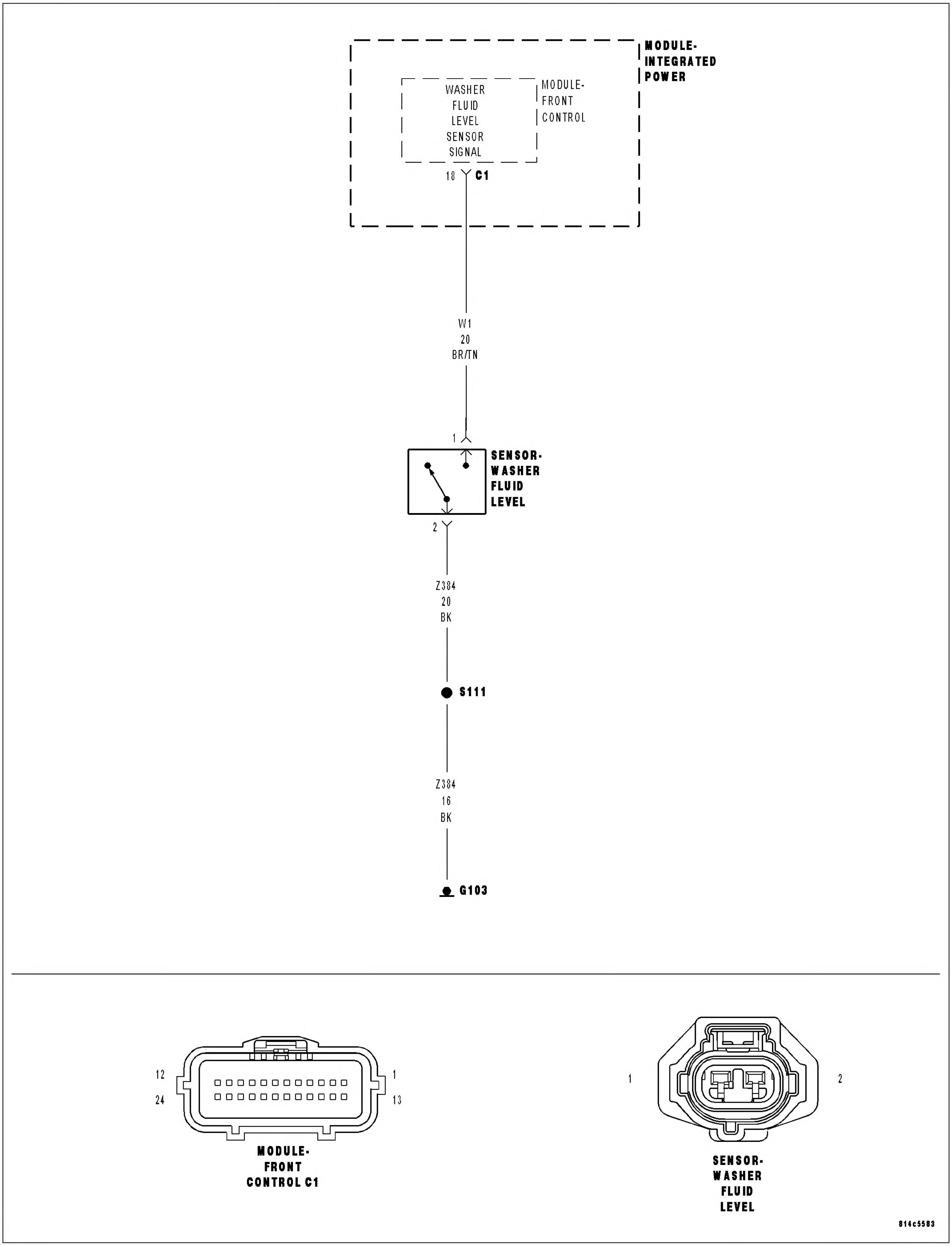
Yes >> Repair the (W20) Washer Pump Motor Control circuit for a short to voltage.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2328-WASHER FLUID LEVEL SENSOR INPUT CIRCUIT HIGH


MODULE-
INTEGRATED
POWER
WASHER
FLUID
LEVEL
SENSOR
SIGNAL
MODULE-
FRONT
CONTROL
18
C1
W1
20
BR/TN
1
SENSOR-
WASHER
FLUID
LEVEL
2
Z384
20
BK
S111
Z384
16
BK
G103
12
24
1
13
MODULE-
FRONT
CONTROL C1
1
2
SENSOR-
WASHER
FLUID
LEVEL
814c5583

B2328-WASHER FLUID LEVEL SENSOR INPUT CIRCUIT HIGH (CONTINUED)

For the Rear Wipers/Washers circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the FCM detects a high condition.

Possible Causes
(W1) WASHER FLUID LEVEL SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
FRONT CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all FCM DTC's.

Turn the Wipers on.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2328-WASHER FLUID LEVEL SENSOR INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. (W1) WASHER FLUID LEVEL SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Washer Fluid Level Sensor connector.

Disconnect the Front Control Module C1 connector.

Turn the ignition on.

Measure the voltage of the (W1) Washer Fluid Level Sensor Signal circuit.

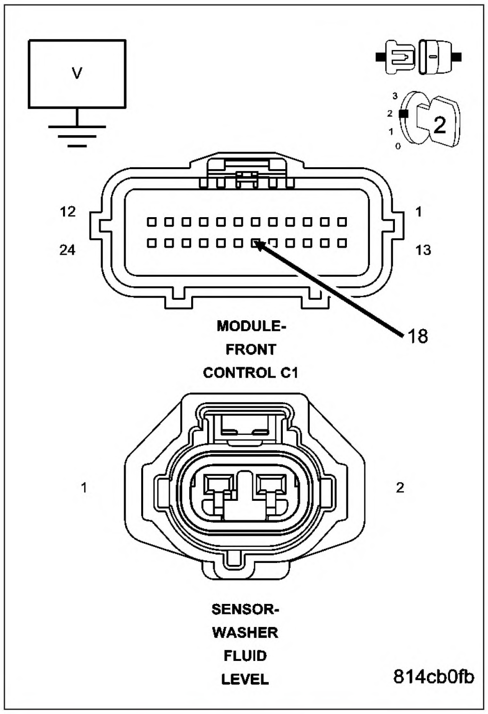
Is the voltage above 5.0 volts?

Yes >> Repair the (W1) Washer Fluid Level Sensor Signal circuit for a short to voltage.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Front Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)



B2301-WIPER MODE SWITCH INPUT CIRCUIT LOW (SCM)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the Steering Control Module detects a short/LOW condition.

Possible Causes
WIPER MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B2301-WIPER MODE SWITCH INPUT CIRCUIT LOW?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

2. MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Wiper Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 7 and 9. Move the switch position from OFF to HIGH while measuring.

OFF = 1581 ohms

DELAY 1 = 695 ohms

DELAY 2 = 463 ohms

DELAY 3 = 323 ohms

DELAY 4 = 232 ohms

DELAY 5 = 169 ohms

LOW = 96 ohms

HIGH = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B2302-WIPER MODE SWITCH INPUT CIRCUIT HIGH (SCM)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
- With the ignition on.
- **Set Condition:**
- When the Steering Control Module detects a short/HIGH condition.

Possible Causes
MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC’s.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC’s.

Does the Scan Tool read: B2302-WIPER MODE SWITCH INPUT CIRCUIT HIGH?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Wiper Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 7 and 9. Move the switch position from OFF to HIGH while measuring.

OFF = 1581 ohms
DELAY 1 = 695 ohms
DELAY 2 = 463 ohms
DELAY 3 = 323 ohms
DELAY 4 = 232 ohms
DELAY 5 = 169 ohms
LOW = 96 ohms
HIGH = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B230A-REAR WIPER SWITCH INPUT CIRCUIT LOW (SCM)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Steering Control Module detects a short/HIGH condition.

Possible Causes
WIPER MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B230A-REAR WIPER SWITCH INPUT CIRCUIT LOW (SCM)?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. WIPER MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Wiper Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 4 and 5. Move the switch into each position while measuring.

OFF = 1045 ohms
INTERMITTENT = 382 ohms
WIPE = 174 ohms
WASH = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B230B-REAR WIPER SWITCH INPUT CIRCUIT HIGH (SCM)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  When the Steering Control Module detects a short/HIGH condition.

Possible Causes
WIPER MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B230B-REAR WIPER SWITCH INPUT CIRCUIT HIGH (SCM)?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. WIPER MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Wiper Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 4 and 5. Move the switch into each position while measuring.

OFF = 1045 ohms
INTERMITTENT = 382 ohms
WIPE = 174 ohms
WASH = 0 ohms

Is the resistance in each position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B232D-WASHER SWITCH STUCK (SCM)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**

Possible Causes
WIPER MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B232D-WASHER SWITCH STUCK?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. WIPER MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Wiper Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 1 and 2. Move the switch into the WASH position while measuring.

WASH = 0 ohms

Is the resistance in the WASH position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B232E-REAR WASHER SWITCH STUCK (SCM)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**

Possible Causes
WIPER MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B232E-REAR WASHER SWITCH STUCK (SCM)?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. WIPER MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Wiper Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 4 and 5. Move the switch into the WASH position while measuring.

WASH = 0 ohms

Is the resistance in the WASH position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

B232F-MIST SWITCH STUCK (SCM)

For the Wiper/Washer system circuit diagram (Refer to 8 - ELECTRICAL/WIPERS/WASHERS - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**

Possible Causes
WIPER MULTIFUNCTION SWITCH
STEERING CONTROL MODULE

Diagnostic Test

1. INTERMITTENT CONDITION

Turn the ignition on.

With the Scan Tool, clear all CCN DTC's.

Turn the Wipers ON then OFF.

With the Scan Tool, read the Wiper DTC's.

Does the Scan Tool read: B232F-MIST SWITCH STUCK (SCM)?

Yes >> Go To 2

No >> The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

---

2. WIPER MULTIFUNCTION SWITCH

Turn the ignition off.

Using the correct service procedure, remove the Wiper Multi-Function Switch.

Measure the internal resistance of the Multifunction Switch between cavities 1 and 2. Move the switch into the MIST position while measuring.

MIST = 650 ohms

Is the resistance in the MIST position correct?

Yes >> Replace the Steering Control Module in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

No >> Replace the Multifunction Switch in accordance with the service information.

Perform the BODY VERIFICATION TEST — VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE)

FRONT WIPERS/WASHERS - SERVICE INFORMATION

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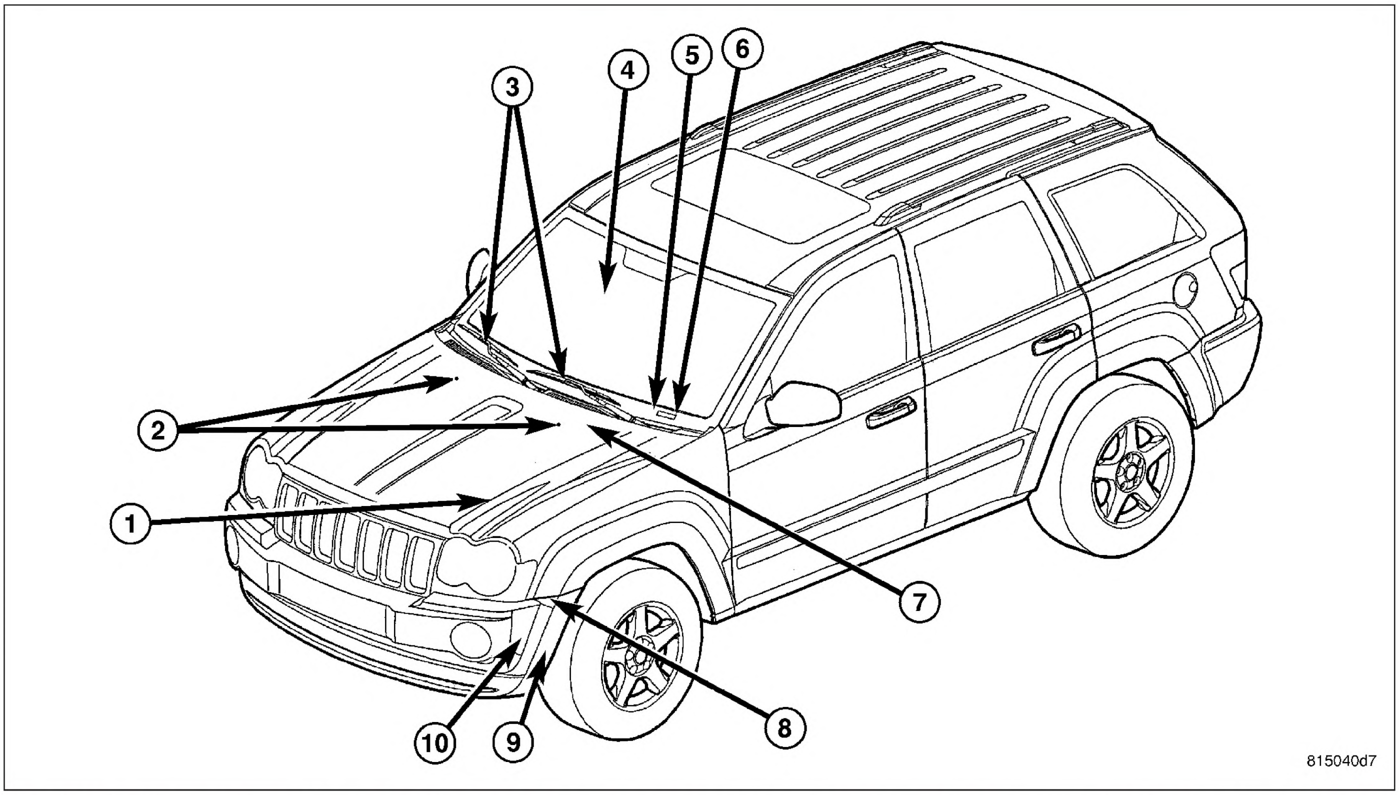
FRONT WIPERS/WASHERS - SERVICE INFORMATION

DESCRIPTION



An electrically operated intermittent front wiper and washer system is standard factory-installed safety equipment on this model. The front wiper and washer system includes the following major components, which are described in further detail elsewhere in this service information:

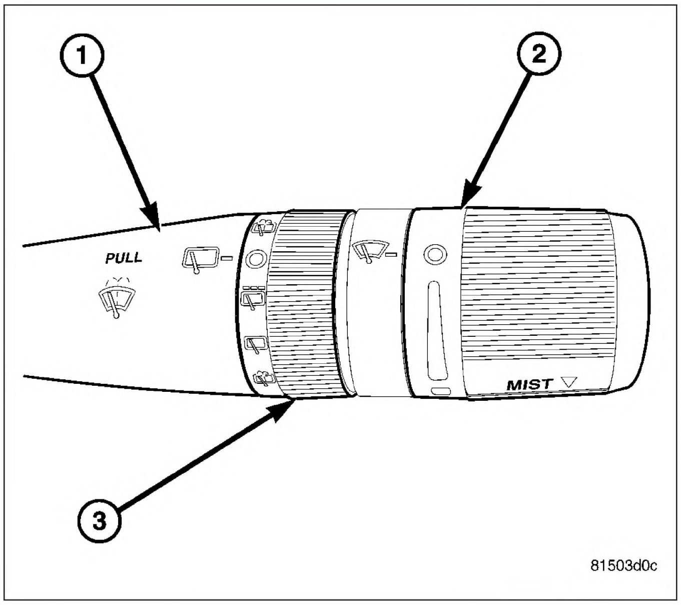
- **Front Control Module** - The front control module (FCM) (1) is integral to the integrated power module (IPM). The IPM is located in the engine compartment, near the battery. (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/INTEGRATED POWER MODULE - DESCRIPTION).
- **Front Washer Nozzles** - Two fluidic front washer nozzles (2) are secured with integral retainers to dedicated openings in the hood located near the base of the windshield.
- **Front Wiper Arms & Blades** - The two front wiper arms (3) are secured with nuts to the threaded studs on the ends of the two wiper pivot shafts, which extend through the cowl plenum cover/grille panel located near the base of the windshield. The two front wiper blades are secured to the two front wiper arms with an integral latch, and are parked on the glass near the bottom of the windshield when the front wiper system is not in operation.
- **Rain Sensor Module** - A rain sensor module (RSM) (4) us used on models equipped with the optional automatic wiper feature. The RSM is located on a bracket bonded to the inside surface of the windshield glass, just to the right of the inside rear view mirror.
- **Multi-Function Switch** - The right (wiper) multi-function switch (5) is secured to the right side of steering column, just below the steering wheel. Only the control stalk for the switch is visible, while the remainder of the switch is concealed beneath the steering column shrouds. The right multi-function switch contains all of the switches for both the front and rear wiper and washer systems and is directly connected to the steering control module (SCM).
- **Steering Control Module** - The steering control module (SCM) (6) is secured to the steering column, just behind the steering wheel. The SCM sends all wiper/washer request signals to the front control module (FCM) (Refer to 19 - STEERING/COLUMN/STEERING COLUMN CONTROL MODULE - DESCRIPTION).
- **Front Wiper Module** - The front wiper module (7) includes the wiper module bracket, three rubber-isolated wiper module mounts, front wiper motor, wiper motor crank arm, two wiper drive links and the two front wiper pivots. The front wiper pivot shafts are the only visible components of the front wiper module. The remainder of the module is concealed within the cowl plenum beneath the cowl plenum cover/grille panel.

- **Washer Reservoir** - The washer reservoir (8) is concealed between the left inner fender shield and the left outer fender panel, behind the inner fender liner and ahead of the left front wheel. The washer reservoir filler neck is the only visible portion of the reservoir and, it is accessed from the left front corner of the engine compartment.
- **Washer Fluid Level Switch** - The washer fluid level switch (9) is located in a dedicated hole on the lower outboard side of the washer reservoir, behind the inner fender liner ahead of the left front wheel, near the windshield washer pump.
- **Wiper High-Low Relay** - The wiper high-low relay is an International Standards Organization (ISO) micro relay located in the IPM in the engine compartment near the battery.
- **Wiper On-Off Relay** - The wiper on-off relay is an International Standards Organization (ISO) micro relay located in the IPM in the engine compartment near the battery.
- **Windshield Washer Plumbing** - The plumbing for the front washer system consists of rubber hoses and molded plastic fittings. The plumbing is routed along the left side of the engine compartment from the washer reservoir, and then to the underneath of the hood where it connects to the front washer nozzle fittings.
- **Windshield Washer Pump** - The windshield washer pump (10) is located in a dedicated hole on the lower outboard side of the washer reservoir, behind the inner fender liner ahead of the left front wheel, near the washer fluid level switch. The washer pump/motor supplies washer fluid to both the front and rear washer systems.

Hard wired circuitry connects the wiper and washer system components to the steering control module (SCM) and the front control module (FCM). These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the wiper and washer system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

The front wiper and washer system is designed to provide the vehicle operator with a convenient, safe, and reliable means of maintaining visibility through the windshield glass. The various components of this system are designed to convert electrical energy produced by the vehicle electrical system into the mechanical action of the wiper blades to wipe the outside surface of the glass, as well as into the hydraulic action of the washer system to apply washer fluid stored in an on-board reservoir to the area of the glass to be wiped. When combined, these components provide the means to effectively maintain clear visibility for the vehicle operator by removing excess accumulations of rain, snow, bugs, mud, or other minor debris from the outside windshield glass surface that might be encountered while driving the vehicle under numerous types of inclement operating conditions.



The vehicle operator initiates all front and rear wiper and washer system functions with the control stalk of the right (wiper) multi-function switch (1) that extends from the right side of the steering column. Rotating the front wiper control knob (2) on the end of the control stalk, selects the Off, Delay, Low, or High operating modes of the front wiper system. In the Delay mode, the control knob also allows the vehicle operator to select from one of five intermittent wipe Delay intervals. Pulling the control stalk rearward actuates the momentary front washer system switch, which selects the Wash and Wipe-After-Wash modes depending upon when and how long the front Wash switch is held closed. Rotating the rear wiper control knob (3) on control stalk, selects all operating modes of the rear wiper system. Refer to 8 - ELECTRICAL/WIPERS/WASHERS - REAR - OPERATION for more information. The multi-function switch provides hard wired resistor multiplexed inputs to the steering control module (SCM) for all of the wiper and washer system functions. The SCM then sends electronic messages to the front control module (FCM) over the controller area network (CAN) data bus requesting the appropriate wiper and washer system operating modes.

Front wiper/washer system operation is completely controlled by the SCM and FCM logic circuits, and that logic will only allow these systems to operate when the ignition switch is in the Accessory or On positions. Battery current is directed from the integrated power module (IPM) to the wiper on/off relay and the wiper high/low relay in the IPM through a fused B(+) circuit. The FCM uses low side drivers to control wiper system operation by energizing or de-energizing the wiper high/low and wiper on/off relays. The FCM uses a high side driver to control the operation of the windshield washer pump. The right multi-function switch circuitry receives a clean ground output from the SCM on a multi-function switch return circuit, then provides resistor multiplexed inputs to the SCM on an intermittent wipe mux circuit to indicate the selected wiper system mode and on a wash/beam select mux circuit to indicate the selected washer system mode.

The hard wired circuits and components of the wiper and washer system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the SCM, FCM or the electronic message inputs to or outputs from the SCM or the FCM that control the wiper and washer system operating modes. The most reliable, efficient, and accurate means to diagnose the SCM or the FCM inputs and outputs related to the various wiper and washer system operating modes requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

OPERATING MODES

The following briefly describes the operation of each of the wiper and washer system operating modes.

CONTINUOUS WIPE MODE

When the Low position of the control knob on the control stalk of the multi-function switch is selected the SCM sends an electronic wiper switch low message to the FCM, which energizes the wiper on/off relay. This directs battery current through the normally open contacts of the energized wiper on/off relay and the normally closed contacts of the de-energized wiper high/low relay to the low speed brush of the wiper motor, causing the wipers to cycle at low speed.

When the High position of the control knob is selected the SCM sends an electronic wiper switch high message to the FCM, which energizes both the wiper on/off relay and the wiper high/low relay. This directs battery current through the normally open contacts of the energized wiper on/off relay and the normally open contacts of the energized wiper high/low relay to the high speed brush of the wiper motor, causing the wipers to cycle at high speed.

When the Off position of the multi-function switch control knob is selected, the SCM sends an electronic wiper switch off message to the FCM. If the wiper motor was operating at high speed, the FCM immediately de-energizes the wiper high/low relay causing the wiper motor to return to low speed operation. Then one of two events will occur. The event that occurs depends upon the position of the wiper blades on the windshield at the moment that the control knob Off position is selected.

If the wiper blades are in the down position on the windshield when the Off position is selected, the park switch that is integral to the wiper motor is closed to ground and provides a hard wired park switch sense input to the FCM. The FCM then de-energizes the wiper on/off relay and the wiper motor ceases to operate. If the wiper blades are not in the down position on the windshield at the moment the Off position is selected, the park switch is an open circuit and the FCM keeps the wiper on/off relay energized, which causes the wiper motor to continue running at low speed until the wiper blades are in the down position on the windshield and the park switch input to the FCM is again closed to ground.

INTERMITTENT WIPE MODE

When the control knob on the control stalk of the multi-function switch is moved to one of the Delay interval positions the SCM sends an electronic wiper switch delay message to the FCM, then the FCM electronic intermittent wipe logic circuit responds by calculating the correct length of time between wiper sweeps based upon the selected delay interval input. The FCM monitors the changing state of the wiper motor park switch through a hard wired park switch sense input. This input allows the FCM to determine the proper intervals at which to energize and de-energize the wiper on/off relay to operate the wiper motor intermittently for one low speed cycle at a time.

The FCM logic is also programmed to provide vehicle speed sensitivity to the selected intermittent wipe delay intervals. In order to provide this feature the FCM monitors electronic vehicle speed messages from the powertrain control module (PCM) and doubles the selected delay interval whenever the vehicle speed is approximately 16 km/h (10 mph) or less.

MIST WIPE MODE

When the control knob on the control stalk of the multi-function switch is moved to the Mist position for less than about one-half second, the SCM sends an electronic washer switch message to the FCM, then the FCM energizes the wiper on/off relay for one complete wipe cycle. The FCM de-energizes the relay when the state of the park switch sense changes to ground, parking the wiper blades near the base of the windshield.

WASH MODE

When the control stalk of the right multi-function switch is pulled rearward to the front momentary Wash position for more than about one-half second with the wiper system operating, the SCM sends an electronic washer switch message to the FCM, which directs battery current to the windshield washer pump. This will cause the washer pump to be energized for as long as the Wash switch is held closed (up to approximately 10 seconds) and to be de-energize when the control stalk is released.

When the control stalk is pulled rearward to the front momentary Wash position while the front wiper system is operating in one of the Delay interval positions, the windshield washer pump operation is the same. However, the FCM also energizes the wiper on/off relay to override the selected delay interval and operate the wiper motor in a continuous low speed mode for as long as the control stalk is held in the front momentary Wash position, then de-energizes the relay and reverts to the selected delay mode interval several wipe cycles after the control stalk is released. If the Wash switch is held closed for more than approximately ten seconds, the FCM will suspend windshield washer pump operation until the control stalk is released for about two seconds, then cycled back to the Wash position.

WIPE-AFTER-WASH MODE

When the control stalk of the right multi-function switch is pulled rearward to the front momentary Wash position for more than about one-half second while the wiper system is not operating, the SCM sends an electronic washer switch message to the FCM, which directs battery current to the windshield washer pump and energizes the wiper on/off relay. This will cause the washer pump to be energized and operate the wiper motor in a continuous low speed mode for as long as the Wash switch is held closed (up to approximately ten seconds). When the control stalk is released, the FCM de-energizes the windshield washer pump, but allows the wiper motor to operate for two additional wipe cycles before it de-energizes the wiper on/off relay and parks the wiper blades near the base of the windshield.

If the control stalk is held rearward for more than about ten seconds, the FCM will suspend windshield washer pump operation until the stalk is released for about two seconds, then cycled back to the Wash position; however, the wipers will continue to operate for as long as the Wash switch is held closed. The FCM monitors the changing state of the wiper motor park switch through a hard wired wiper park switch sense circuit input. This input allows the FCM to count the number of wipe cycles that occur after the Wash switch is released, and to determine the proper interval at which to de-energize the wiper on/off relay to complete the wipe-after-wash mode cycle.

DIAGNOSIS AND TESTING

FRONT WIPER & WASHER SYSTEM

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment, possible personal injury or death.

If the front wiper motor operates, but the wipers do not move on the windshield, replace the faulty front wiper module. If the windshield washer pump operates, but no washer fluid is dispensed on the glass; or, if the wipers operate, but chatter, lift, or do not clear the glass, clean and inspect the wiper and washer system components as required. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - CLEANING) and (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - INSPECTION).

The hard wired rear wiper and washer system circuits and components may be diagnosed and tested using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods may not prove conclusive in the diagnosis of the steering control module (SCM), front control module (FCM), integrated power module (IPM), power distribution center (PDC), controller area network (CAN) data bus, or the electronic message inputs or outputs used to provide wiper and washer system service or many of the electronic features of the front wiper and washer system. The most reliable, efficient, and accurate means to diagnose the SCM, FCM, IPM, PDC, CAN data bus and the electronic message inputs and outputs for the front wiper and washer system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

CLEANING - WIPER & WASHER SYSTEM

WIPER SYSTEM

CAUTION: Protect the rubber squeegees of the wiper blades from any petroleum-based cleaners, solvents, or contaminants. These products can rapidly deteriorate the rubber squeegees.

The squeegees of wiper blades exposed to the elements for a long time tend to lose their wiping effectiveness. Periodic cleaning of the squeegees is suggested to remove any deposits of salt or road film. The wiper blades, arms, and windshield glass should only be cleaned using a sponge or soft cloth and windshield washer fluid, a mild detergent, or a non-abrasive cleaner. If the wiper blades continue to leave streaks, smears, hazing, or beading on the glass after thorough cleaning of the squeegees and the glass, the entire wiper blade assembly must be replaced.

WASHER SYSTEM

CAUTION: Never introduce petroleum-based cleaners, solvents, or contaminants into the washer system. These products can rapidly deteriorate the rubber seals and hoses of the washer system, as well as the rubber squeegees of the wiper blades.

CAUTION: Never use compressed air to flush the washer system plumbing. Compressed air pressures are too great for the washer system plumbing components and will result in further system damage. Never use sharp instruments to clear a plugged washer nozzle or damage to the nozzle orifice and improper nozzle spray patterns will result.

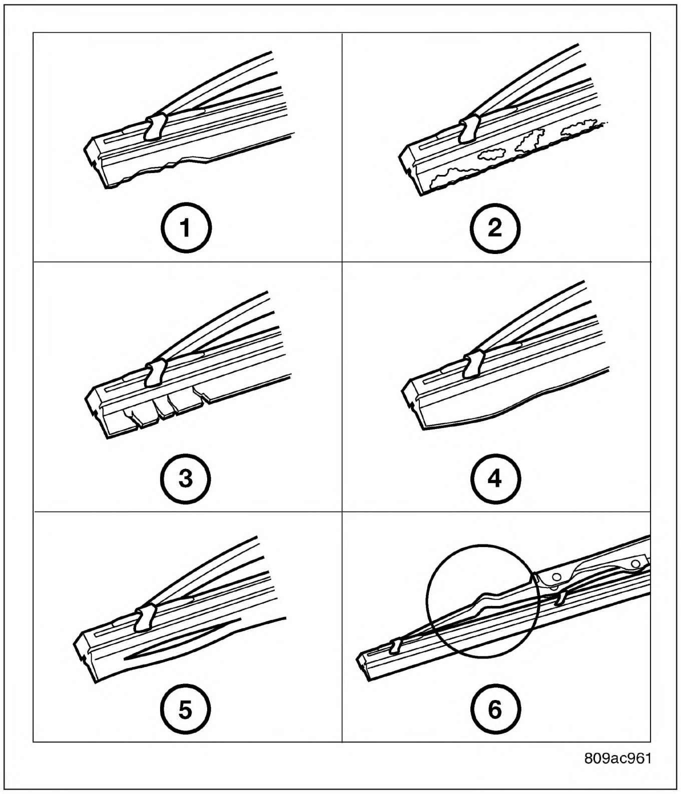
If the washer system is contaminated with foreign material, drain the washer reservoir by removing the windshield washer pump from the reservoir. Clean foreign material from the inside of the washer pump inlet filter screen and the washer reservoir using clean washer fluid, a mild detergent, or a non-abrasive cleaner. Flush foreign material from the washer system plumbing by first disconnecting the washer hoses from the washer nozzles, then running the washer pump to run clean washer fluid or water through the system. Plugged or restricted washer nozzles should be carefully back-flushed using compressed air. If the washer nozzle obstruction cannot be cleared, replace the washer nozzle.

INSPECTION - FRONT WIPER & WASHER SYSTEM

WIPER SYSTEM

The wiper blades and wiper arms should be inspected periodically, not just when wiper performance problems are experienced. This inspection should include the following points:

1. Carefully inspect the wiper blades for any indications of worn or uneven edges (1), foreign material deposits (2), hardening or cracking (3), deformation or fatigue (4), or splitting (5). Inspect the wiper blade support components and the wiper arms for damage (6) or corrosion. If the wiper arms and blades are contaminated with any foreign material, clean them and the glass as required. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - CLEANING). If a wiper blade or arm is damaged, or if corrosion is evident, replace the affected wiper arm or blade with a new unit. Do not attempt to repair a wiper arm or blade that is damaged or corroded.
2. Carefully lift the wiper blade off of the glass. Note the action of the wiper arm hinge. The wiper arm should pivot freely at the hinge, but with no lateral looseness evident. If there is any binding evident in the wiper arm hinge, or there is evident lateral play in the wiper arm hinge, replace the wiper arm.



CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

3. Once proper hinge action of the wiper arm is confirmed, check the hinge for proper spring tension. Remove the wiper blade from the wiper arm. Either place a small postal scale between the blade end of the wiper arm and the glass, or carefully lift the blade end of the arm away from the glass using a small fish scale. Compare the scale readings between the right and left wiper arms. Replace a wiper arm if it has comparatively lower spring tension, as evidenced by a lower scale reading.
4. After cleaning and inspecting the wiper components and the glass, if the wiper blade still fails to clear the glass without smearing, streaking, chattering, hazing, or beading, replace the wiper blade.

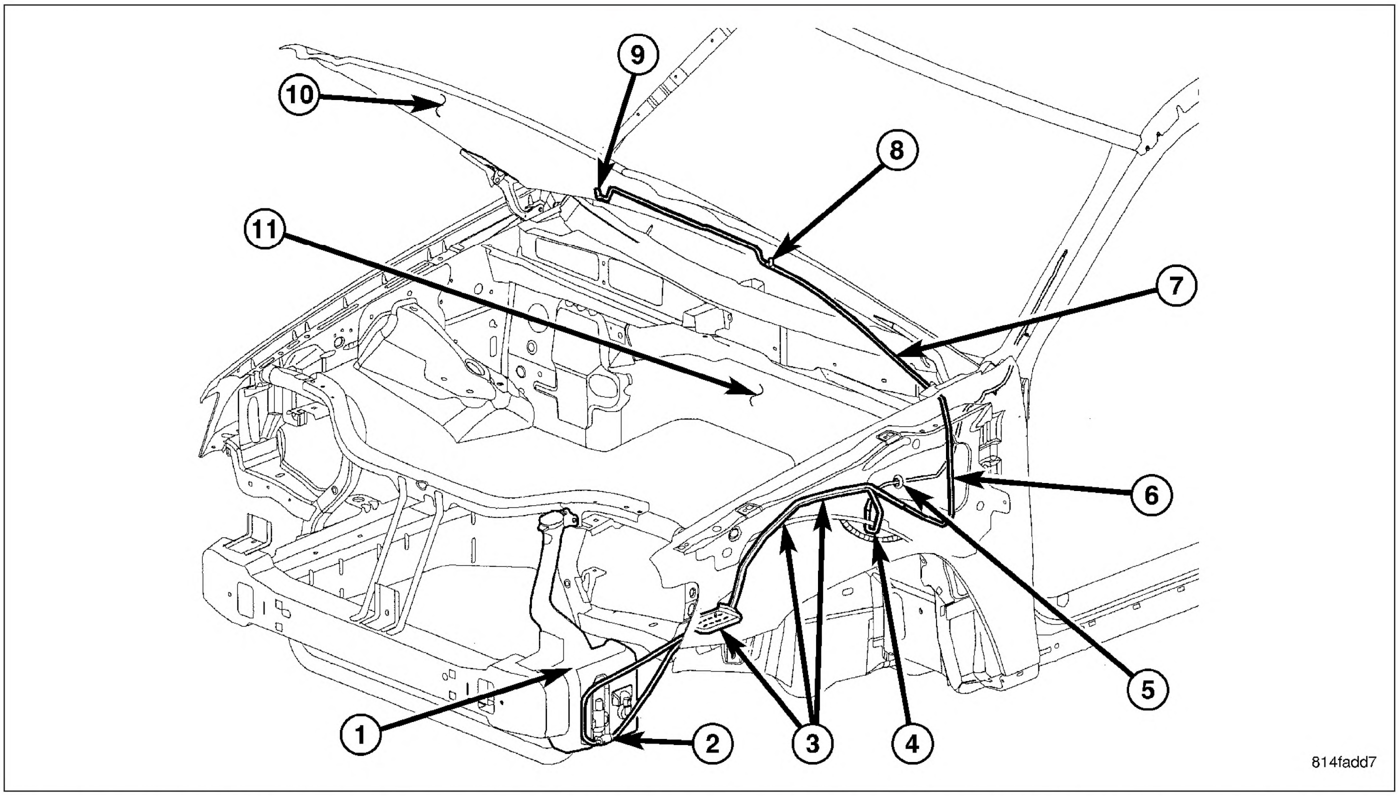
WASHER SYSTEM

The washer system components should be inspected periodically, not just when washer performance problems are experienced. This inspection should include the following points:

1. Check for ice or other foreign material in the washer reservoir. If contaminated, clean and flush the washer system. (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - CLEANING).
2. Inspect the washer plumbing for pinched, leaking, deteriorated, or incorrectly routed hoses and damaged or disconnected hose fittings. Replace damaged or deteriorated hoses and hose fittings. Leaking washer hoses can sometimes be repaired by cutting the hose at the leak and splicing it back together using an in-line connector fitting. Similarly, sections of deteriorated hose can be cut out and replaced by splicing in new sections of hose using in-line connector fittings. Whenever routing a washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts. Also, sharp bends that might pinch the washer hose must be avoided.

HOSE-WINDSHIELD WASHER

DESCRIPTION



The front washer plumbing consists of a small diameter rubber hose (6) that is routed along with the rear washer hose (4) from the washer reservoir (1) located at the left front corner of the engine compartment. Both hoses are attached to their respective front or rear outlet nipple of the windshield washer pump (2) located near the bottom of the reservoir. The hoses are then secured to the body by three plastic push-pin type retainers (3) before entering the engine compartment near the left side of the dash panel (11).

In the engine compartment, the two washer hoses are routed separately. The front hose is routed up toward the hood (10), while the rear hose is routed through a grommet and a hole (5) in the dash panel into the passenger compartment.

The front hose is then secured to the underside of the hood panel reinforcement at the left side of the hood by a plastic push-pin type retainer (7). Two plastic in-line fittings and a molded rubber tee (8) provide the take out for the left washer nozzles, and a plastic in-line fitting with a rubber elbow (9) terminate and connect the front hose at the right washer nozzle.

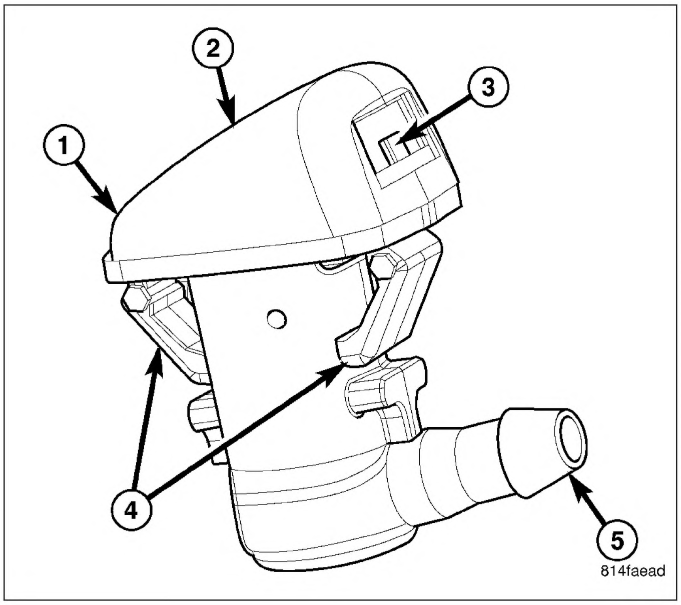
Washer hose is available for service only as roll stock, which must then be cut to length. The molded plastic washer hose fittings cannot be repaired. If these fittings are faulty or damaged, they must be replaced.

OPERATION

Washer fluid in the washer reservoir is pressurized and fed by the windshield washer pump through the front washer system plumbing and fittings to the two front washer nozzles. Whenever routing the washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts; and, sharp bends that might pinch the hose must be avoided.

FRONT WASHER NOZZLE

DESCRIPTION



The two front washer nozzles (1) have integral snap features (4) that secure them in dedicated holes located in the hood near the base of the windshield. The domed upper surface (2) of the washer nozzles is visible on the top of the hood, and the nozzle orifices (3) are oriented towards the windshield glass. The washer plumbing fittings (5) for the washer nozzles are concealed beneath the inner hood panel. These fluidic washer nozzles are constructed of molded plastic.

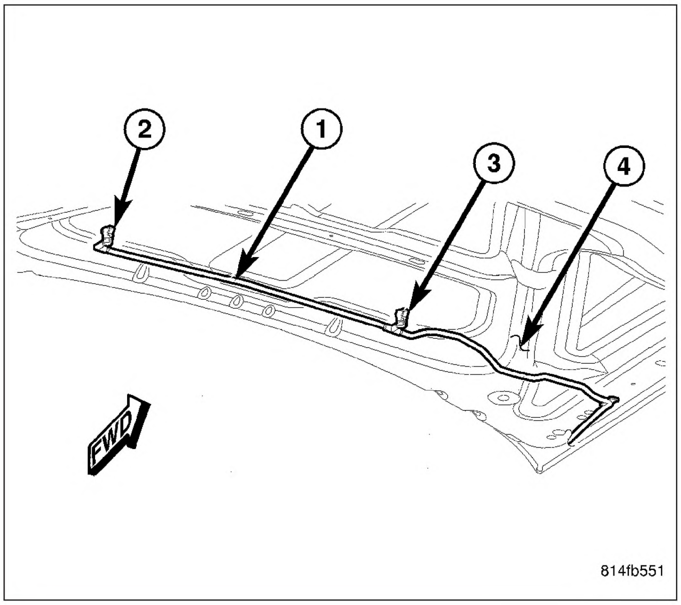
The washer nozzles cannot be adjusted or repaired and, if faulty or damaged, they must be replaced.

OPERATION

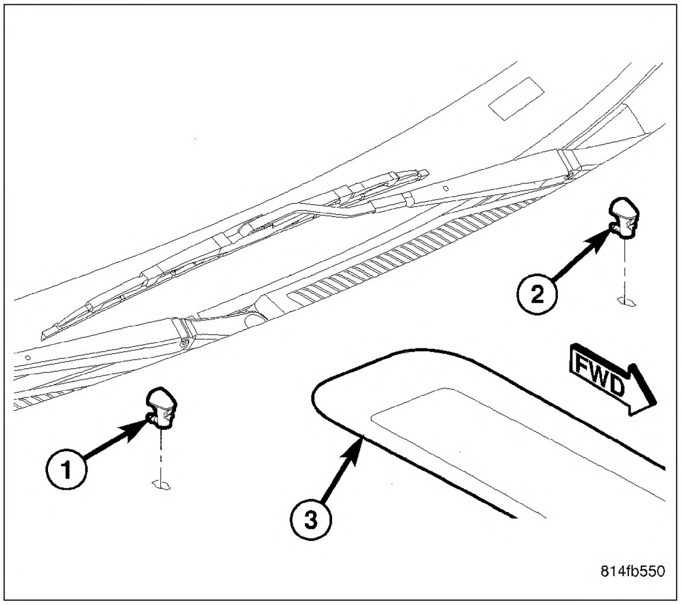
The two front washer nozzles are designed to dispense washer fluid into the wiper pattern area on the outside of the windshield glass. Pressurized washer fluid is fed to each nozzle from the washer reservoir by the windshield washer pump through a single hose, which is attached to a barbed nipple on each front washer nozzle below the inner hood panel. A fluidic matrix within the washer nozzle causes the pressurized washer fluid to be emitted from the nozzle orifice as an oscillating stream to more effectively cover a larger area of the glass to be cleaned.

REMOVAL

1. From the underside of the hood (4), disconnect the washer nozzle hose (1) from the barbed nipple of the front washer nozzles (2 and 3) as required.

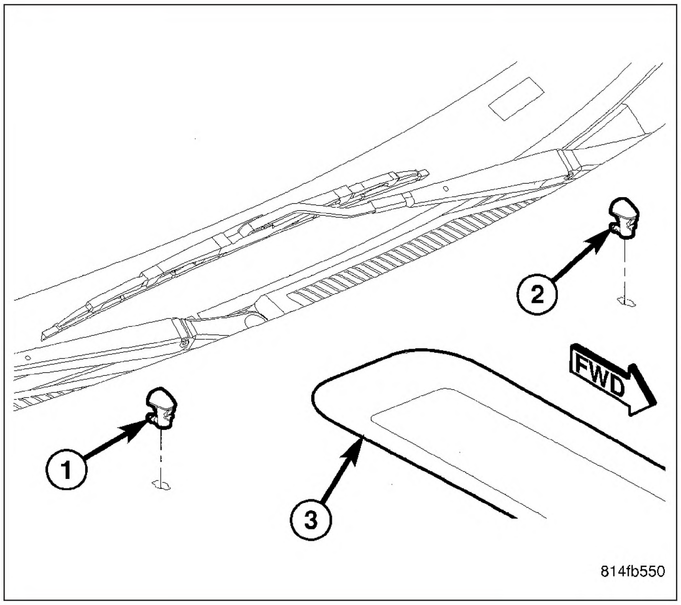


2. From the underside of the hood (3), release the integral snap features of the front washer nozzles (1 and 2) and push the nozzles out through the mounting hole toward the top side of the hood as required.

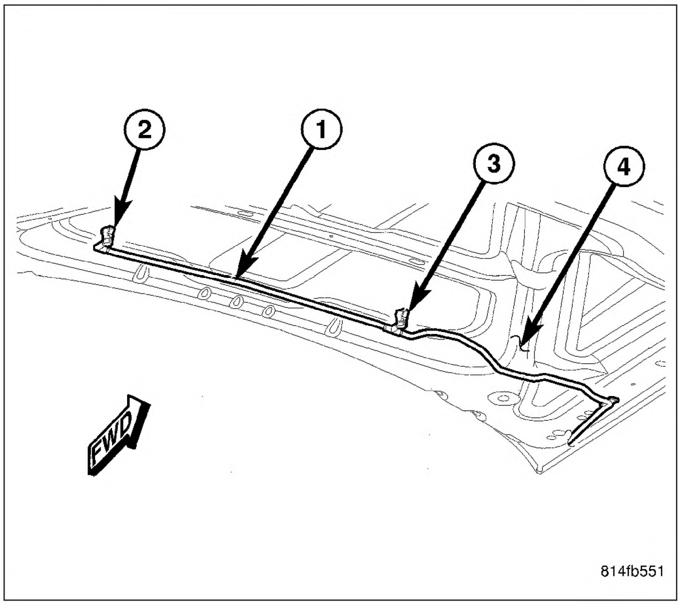


INSTALLATION

1. From the top of the hood (3) , position the nipple end of the front washer nozzles (1 and 2) through the mounting hole as required and engage the anti-rotation tab of the nipple into the anti-rotation notch in the mounting hole.
2. Push firmly and evenly on the top of the front washer nozzle until the integral snap features lock into place on the underside of the hood.

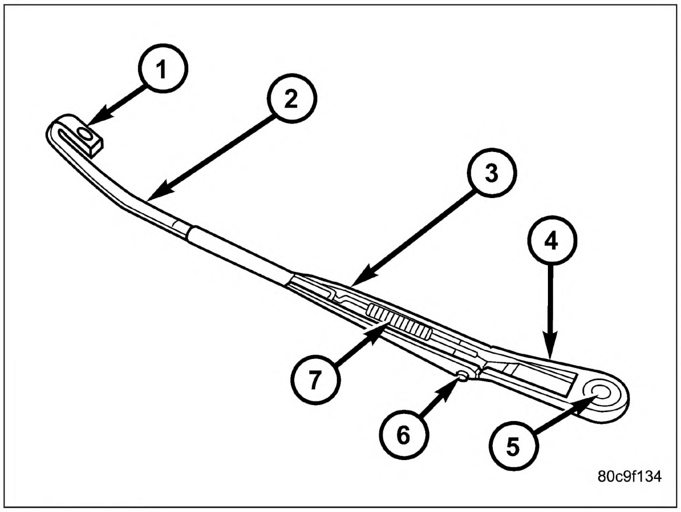


3. From the underside of the hood (4), reconnect the washer hose (1) to the barbed nipple of the front washer nozzles (2 and 3) as required.



FRONT WIPER ARM

DESCRIPTION



The front wiper arms are the rigid members located between the wiper pivots that protrude from the cowl plenum cover/grille panel near the base of the windshield and the wiper blades on the windshield glass. These wiper arms feature an over-center hinge (6) that allows easy access to the windshield glass for cleaning. The wiper arm has a die cast metal pivot end (4) with a large tapered mounting hole (5) at one end. A molded black plastic cap fits over the wiper arm retaining nut to conceal the nut and this mounting hole following wiper arm installation.

The wide end of a tapered, stamped steel channel (3) hinges on and is secured with a hinge pin to the blade end of the wiper arm pivot end. One end of a long, rigid, stamped steel strap (2), with a small hole near its pivot end, is riveted and crimped within the narrow end of the stamped steel channel. The tip of the wiper blade end of this strap is bent back under itself to form a small hook (1). Concealed within the stamped steel channel is a long tension spring (7) which is engaged with a wire hook to the underside of the die cast pivot end and is hooked through a small hole in the steel strap. The entire wiper arm has a satin black finish applied to all of its visible surfaces.

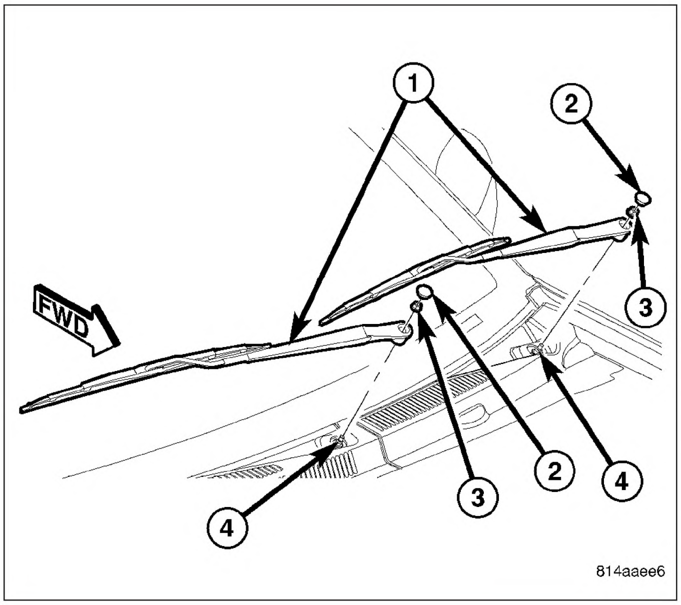
A wiper arm cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

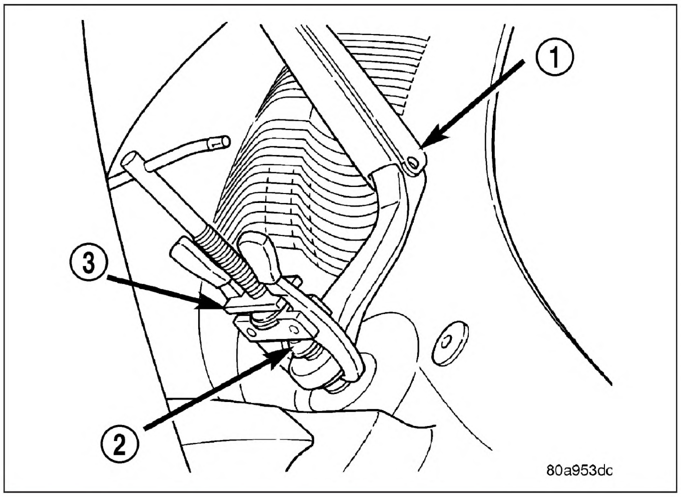
The front wiper arms are designed to mechanically transmit the motion from the wiper pivots to the wiper blades. The wiper arm must be properly indexed to the wiper pivot in order to maintain the proper wiper blade travel on the glass. The tapered mounting hole in the wiper arm pivot end interlocks with the serrations on the tapered outer circumference of the wiper pivot shaft, allowing positive engagement and finite adjustment of this connection. The mounting nut locks the wiper arm to the threaded stud of the wiper pivot shaft. The spring-loaded wiper arm hinge controls the down-force applied through the tip of the wiper arm to the wiper blade on the glass. The hook formation on the tip of the wiper arm provides a cradle for securing and latching the wiper blade pivot block to the wiper arm.

REMOVAL

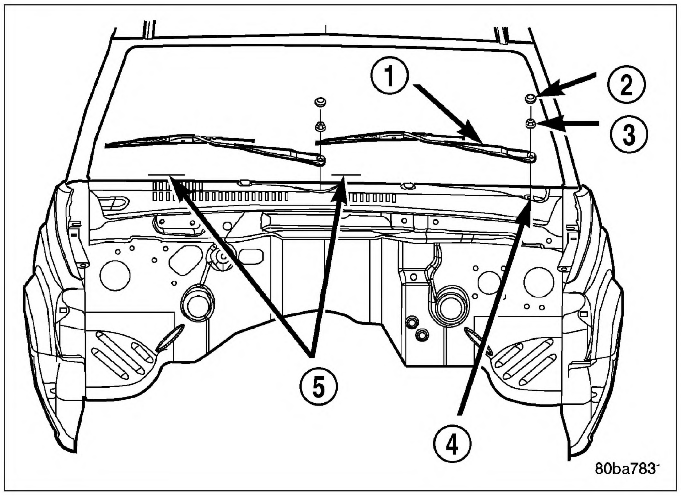
1. Lift the front wiper arm (1) to its over-center position to relieve the spring tension on the wiper pivot shaft connection.
2. Using a trim stick C-4755 or equivalent, carefully pry off the plastic cap (2) from the pivot end of the wiper arm.
3. Remove the nut (3) that secures the wiper arm to the wiper pivot shaft (4).



4. If necessary, use a suitable battery terminal puller (3) to disengage the wiper arm (1) from the wiper pivot shaft (2).
5. Disengage the front wiper arm pivot from the wiper pivot shaft and remove the front wiper arm.



INSTALLATION

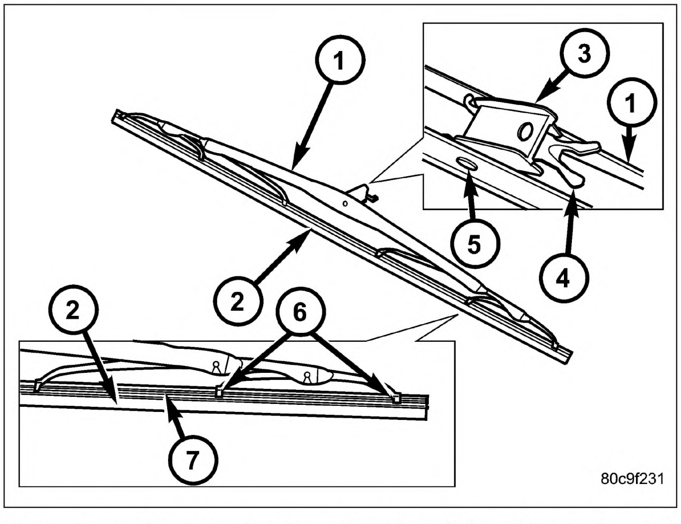


NOTE: Be certain that the wiper motor is in the park position before attempting to install the front wiper arms. Turn the ignition switch to the On position and move the right (wiper) multi-function switch control knob to its Off position. If the wiper pivots move, wait until they stop moving, then turn the ignition switch back to the Off position. The wiper motor is now in its park position.

1. The front wiper arms (1) must be indexed to the wiper pivot shafts (4) with the wiper motor in the park position to be properly installed. Position the front wiper arm pivot ends onto the wiper pivot shafts so that the lower edge of the blade is aligned with the wiper alignment lines (5) as shown in the illustration.
2. Once the wiper blade is aligned, lift the wiper arm away from the windshield slightly to relieve the spring tension on the pivot end and push the pivot hole on the end of the wiper arm down firmly and evenly over the wiper pivot shaft.
3. Install the nut (3) that secures the wiper arm to the wiper pivot shaft. Tighten the nut to 22 N·m (16 ft. lbs.).
4. Wet the windshield glass, then operate the front wipers. Turn the front wipers Off, then check for the correct wiper arm position and readjust as required.
5. Install the plastic cap (2) onto the wiper arm pivot.

FRONT WIPER BLADE

DESCRIPTION



Each front wiper blade is secured by an integral pivot pin (5) and a pivot block (3) with a release tab (4) to the hook formation on the tip of the front wiper arms. The front wiper blades rest on the glass near the base of the windshield when the wipers are not in operation. Each wiper blade consists of the following components:

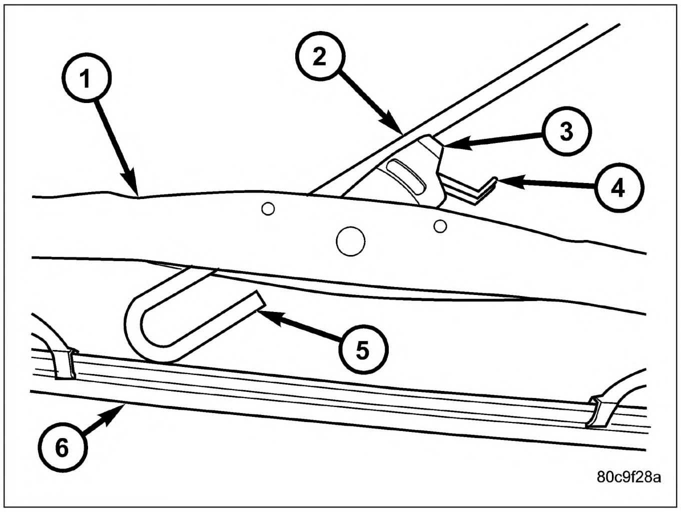
- **Superstructure** - The superstructure (1) includes several stamped steel bridges and links with claw formations that grip the wiper blade element (2). Also included in this unit is the latching, molded plastic pivot block that secures the superstructure to the wiper arm.
- **Element** - The wiper blade element is the resilient rubber member of the wiper blade that contacts the glass
- **Flexor** - The flexor (7) is a rigid metal component running along the length of each side of the wiper element where it is gripped by the claws (6) of the superstructure.

All Grand Cherokee models have two 52.50 centimeter (20.67 inch) long windshield wiper blades with non-replaceable rubber elements (squeegees). The wiper blades cannot be adjusted or repaired and, if faulty, worn, or damaged, the entire wiper blade unit must be replaced.

OPERATION

The front wiper blades are moved back and forth across the glass by the front wiper arms when the wipers are being operated. The wiper blade superstructure is the flexible frame that grips the wiper blade element and evenly distributes the force of the spring-loaded wiper arm along the length of the element. The combination of the wiper arm force and the flexibility of the superstructure makes the element conform to and maintain proper contact with the glass, even as the blade is moved over the varied curvature that may be encountered across the glass surface. The wiper element flexor provides the claws of the blade superstructure with a rigid, yet flexible component on the element which can be gripped. The rubber element is designed to be stiff enough to maintain an even cleaning edge as it is drawn across the glass, yet resilient enough to conform to the glass surface and flip from one cleaning edge to the other each time the wiper blade changes directions.

REMOVAL



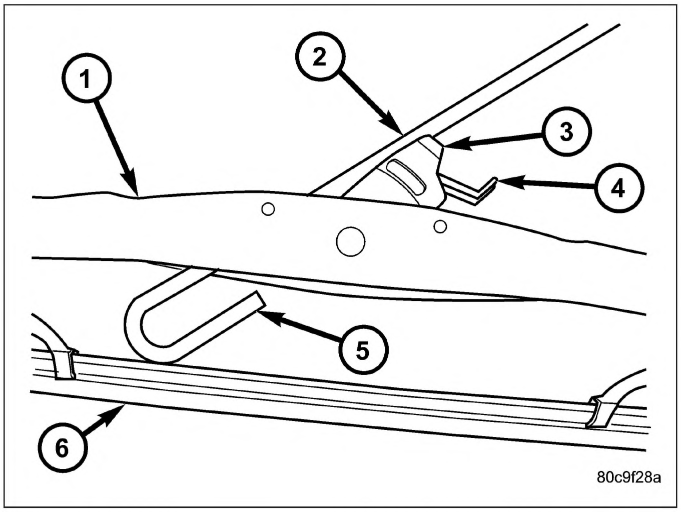
NOTE: The notched end of the wiper element flexor should always be oriented towards the end of the wiper blade that is nearest to the wiper pivot.

1. Lift the front wiper arm (2) to raise the superstructure (1) and element (6) off of the glass, until the wiper arm hinge is in its over-center position.
2. Depress the release tab (4) and slide the superstructure away from the tip of the wiper arm until the pivot block (3) is disengaged from the hook (5) on the end of the wiper arm.

CAUTION: Do not allow the wiper arm to spring back against the glass without the wiper blade in place or the glass may be damaged.

3. Extract the hook of the wiper arm from the opening in the wiper blade superstructure and remove the wiper blade and.
4. Gently lower the tip of the wiper arm back onto the windshield glass.

INSTALLATION



NOTE: The notched end of the wiper element flexor should always be oriented towards the end of the wiper blade that is nearest to the wiper pivot.

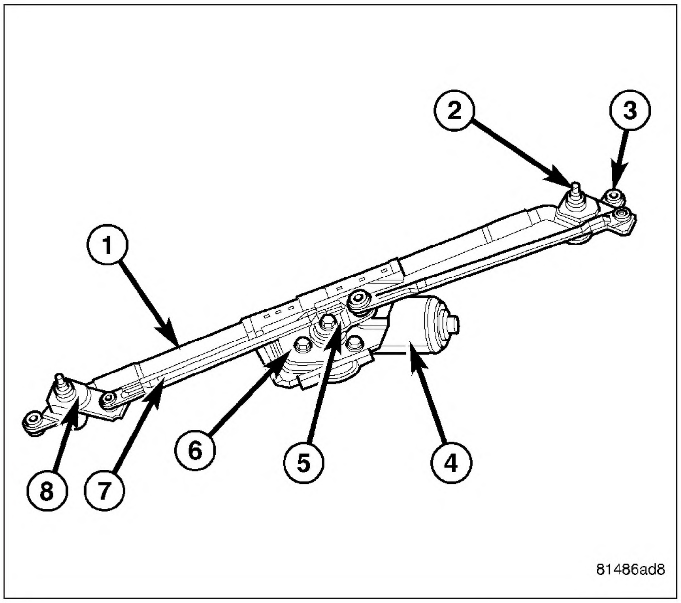
1. Lift the front wiper arm (2) off of the windshield glass, until the wiper arm hinge is in its over-center position.
2. Position the front wiper blade near the hook (5) located on the tip of the wiper arm with the notched end of the wiper element (6) oriented towards the end of the arm that is nearest to the wiper pivot.
3. Insert the wiper arm hook through the opening in the wiper blade superstructure (1) ahead of the pivot block (3) far enough to engage the pivot block with the hook.
4. Slide the pivot block up into the hook until the latch release tab (4) snaps into the locked position. Latch engagement will be accompanied by an audible click.

5. Gently lower the wiper blade onto the windshield glass.

FRONT WIPER MODULE

DESCRIPTION

The front wiper module is secured to the cowl plenum panel beneath the cowl plenum cover/grille panel. The ends of the wiper pivot shafts protrude through dedicated openings in the cowl plenum cover/grille panel to drive the wiper arms and blades and are the only visible components of the front wiper module.



The front wiper module consists of the following major components:

- **Bracket** - The front wiper module bracket (1) consists of a long tubular steel main member that has a stamped pivot bracket formation near each end where the two wiper pivots (2) are secured. The front wiper module bracket is secured with three bolts through rubber insulators (3). A stamped steel mounting plate (6) for the wiper motor (4) is secured with welds near the center of the main member.
- **Crank Arm** - The front wiper motor crank arm (5) is a stamped steel unit with a slotted hole on the driven end that is secured to the wiper motor output shaft with a nut, and a ball stud secured to the drive end.
- **Linkage** - Two stamped steel drive links (7) connect the wiper motor crank arm to the wiper pivot lever arms (8). The right side drive link has a plastic socket-type bushing on each end. The left side drive link has a plastic socket-type bushing on one end, and a plastic sleeve-type bushing on the other end. The socket-type bushing on one end of each drive link is snap-fit over the ball stud on the lever arm of its respective pivot. The left side drive link sleeve-type bushing end is then fit over the motor crank arm ball stud, and the other socket-type bushing of the right side drive link is snap-fit over the exposed end of the wiper motor crank arm ball stud.
- **Motor** - The front wiper motor is secured with three bolts to the motor mounting plate near the center of the wiper module bracket. The wiper motor output shaft passes through a hole in the module bracket, where a nut secures the wiper motor crank arm to the motor output shaft. The two-speed permanent magnet wiper motor features an integral transmission, an internal park switch, and an internal automatic resetting circuit breaker.
- **Pivots** - The two front wiper pivots are secured to the ends of the wiper module bracket. The lever arms that extend from the bottom of the pivot shafts each have a ball stud on their end. The upper end of each pivot shaft where the wiper arms will be fastened each is tapered and serrated with a threaded stud formation at the tip.

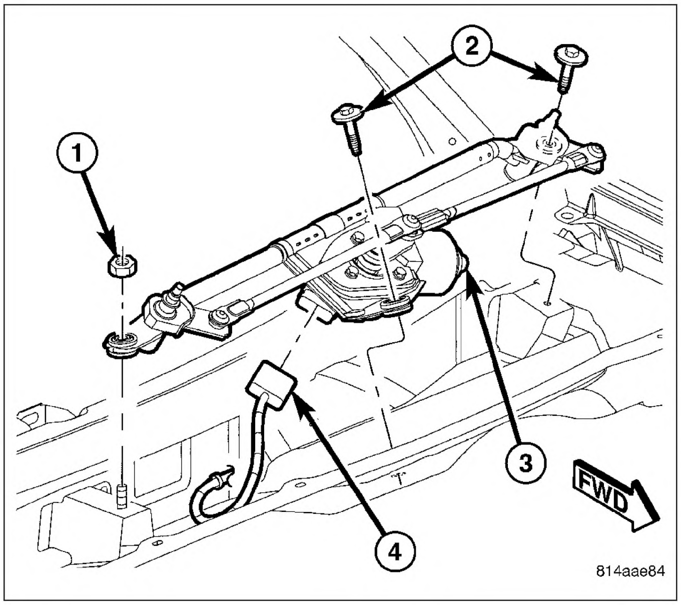
The front wiper module cannot be adjusted or repaired. If any component of the module is faulty or damaged, the entire front wiper module unit must be replaced. The reinforcement bracket and stud plate are available for individual service replacement.

OPERATION

The front wiper module operation is controlled by the battery current inputs received by the wiper motor from the wiper on/off and wiper high/low relays. The wiper motor speed is controlled by current flow to either the low speed or the high speed set of brushes. The park switch is a single pole, single throw, momentary switch within the wiper motor that is mechanically actuated by the wiper motor transmission components. The park switch alternately closes the wiper park switch sense circuit to ground or to battery current, depending upon the position of the wipers on the glass. This feature allows the motor to complete its current wipe cycle after the wiper system has been turned Off, and to park the wiper blades in the lowest portion of the wipe pattern. The automatic resetting circuit breaker protects the motor from overloads. The wiper motor crank arm, the two wiper linkage members, and the two wiper pivots mechanically convert the rotary output of the wiper motor to the back and forth wiping motion of the wiper arms and blades on the glass.

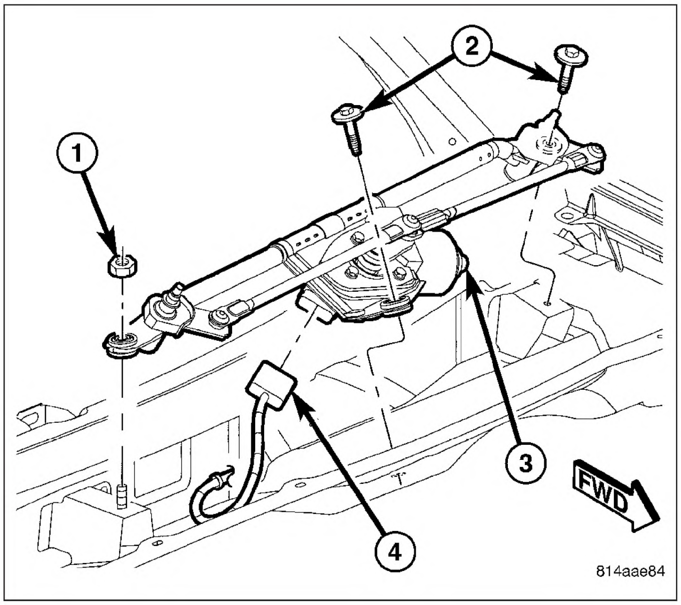
REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Remove both front wiper arms (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS/FRONT WIPER ARMS - REMOVAL).
3. Remove the cowl plenum cover/grille panel (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).
4. Remove the nut (1) and the two bolts (2) that secure the front wiper module to the cowl plenum panel.
5. Disconnect the wire harness connector (4) from the front wiper motor (3).
6. Remove the front wiper module from the cowl plenum.



INSTALLATION

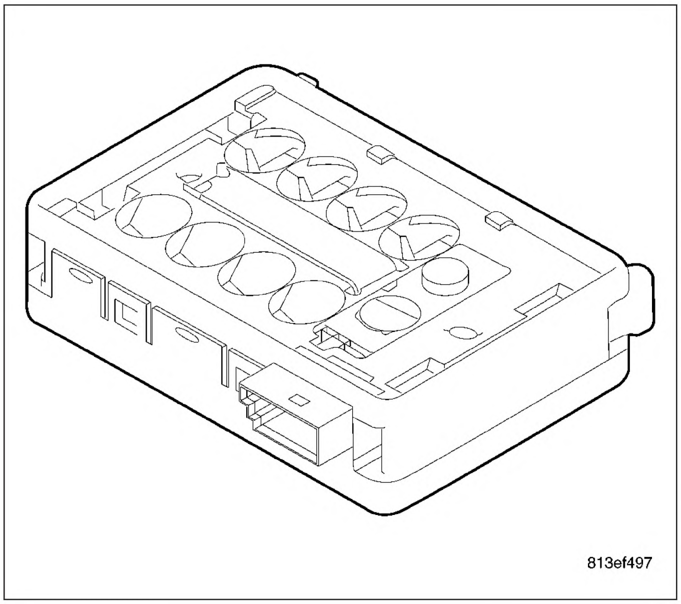
1. Position the front wiper module to the cowl plenum and connect the wire harness connector (4) to the wiper motor (3).
2. Loosely install the one nut (1) and the two bolts (2) that secure the front wiper module to the cowl plenum panel.
3. Working from left to right, tighten the two bolts and one nut to 5 N·m (45 in. lbs.).
4. Install the cowl plenum cover/grille panel (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).
5. Install the front wiper arms (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS/FRONT WIPER ARMS - INSTALLATION).
6. Reconnect the negative battery cable.



RAIN SENSOR MODULE

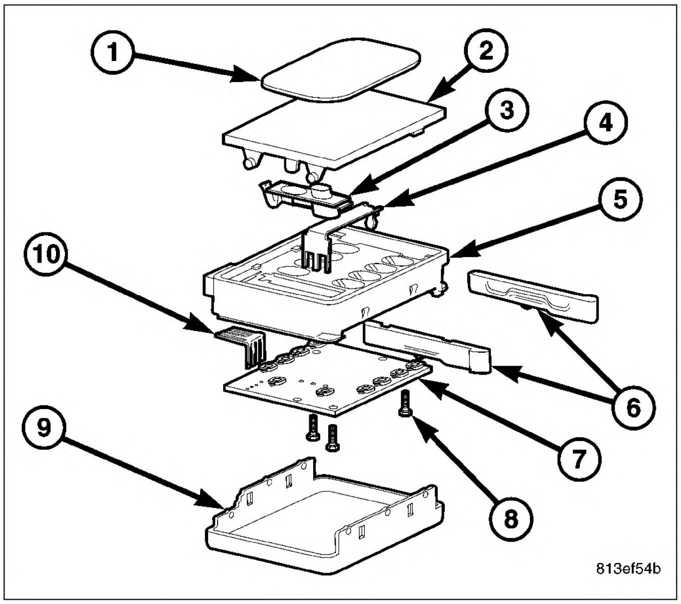
DESCRIPTION

The rain sensor module is the primary component of the automatic wiper system and is located on the inside of the windshield, just to the right of the rear view mirror mounting button.



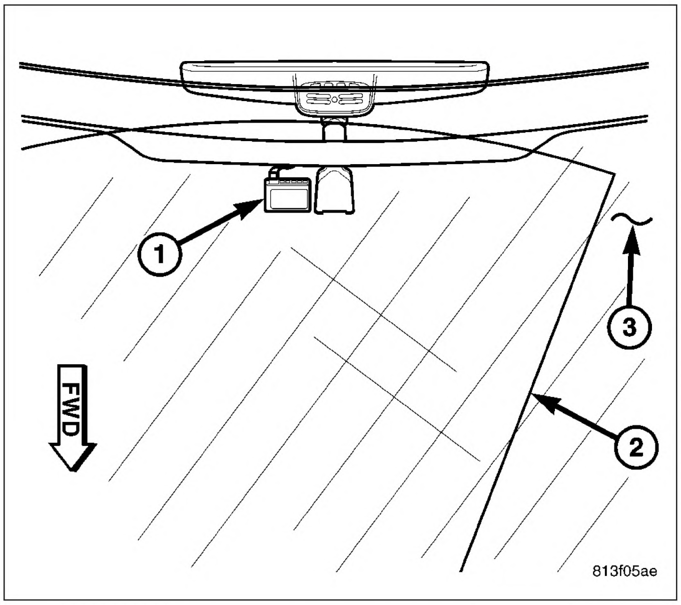
Sliding cam locks (6) on each side of the sensor housing (5) (either side of the connector) secures the sensor to the mounting bracket (2) which is bonded (1) to the windshield glass. A small screwdriver can be used to push in on the tabs until the slider protrudes from the opposing side of the sensor housing. Concealed within the sensor housing is the electronic circuitry of the module, which includes four infrared diodes (3), four photocells (4), and a microprocessor (7) and connector wiring (10). The electronic circuity components are held together by screws (8) and housing bezel (9).

The rain sensor software is Flash compatible, which means it can be reprogrammed using Flash reprogramming procedures. However, if any of the hardware of the sensor is damaged or faulty, the entire rain sensor module must be replaced. The rain sensor bracket is avalable for service replacement.



OPERATION

The microprocessor-based rain sensor module (1) senses moisture in the wipe pattern (2) on the outside of the windshield glass (3) and sends wipe commands to the front control module (FCM). Four infrared diodes within the sensor generate infrared light beams that are aimed by four of the convex optical lenses near the base of the sensor through the windshield glass. Four additional convex optical lenses near the top of the sensor are focused on the infrared light beams on the outside of the windshield glass and allow the four photocells within the sensor to sense changes in the intensity of these infrared light beams. When sufficient moisture accumulates within the wipe pattern on the windshield glass, the sensor detects a change in the monitored infrared light beam intensity.

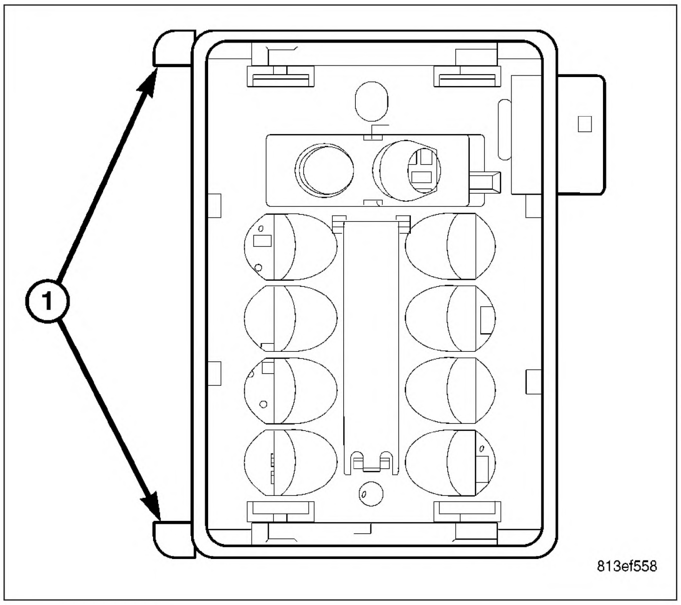


The internal programming of the sensor then sends the appropriate electronic wipe command messages to the FCM over the controller area network (CAN) data bus. The FCM responds by activating or deactivating the front wiper system. The steering control module (SCM) sends electronic sensitivity level messages to the rain sensor module over the CAN data bus based upon the driver-selected sensitivity setting of the control knob on the control stalk of the right multi-function switch. The higher the selected sensitivity setting the more sensitive the rain sensor is to the accumulated moisture on the windshield glass, and the more frequently the sensor will send wipe commands to the FCM to operate the front wiper system.

The rain sensor module operates on battery current received through a fuse in the power distribution center (PDC) on a fused B+ circuit. The rain sensor module receives ground at all times through the body wire harness. It is important to note that the default condition of the automatic wiper system is low. Therefore, if no message is received by the FCM from the rain sensor module for more than about five seconds when in the Auto sensitivity wipe mode, the wipers will default to a constant low wipe state.

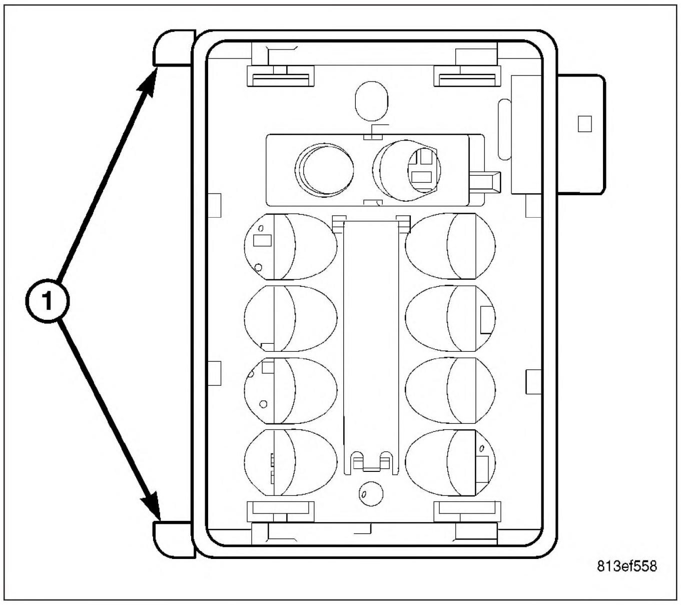
The rain sensor module ground and battery current inputs may be diagnosed using conventional diagnostic tools and methods. The most reliable, efficient, and accurate means to diagnose the rain sensor module requires the use of a scan tool and the appropriate diagnostic information.

REMOVAL



1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector from the rain sensor module.
3. Using a small screwdriver or equivalent, push in on the tabs from the connector side of the sensor housing until the two sliders (1) protrude from the opposing side of the housing.
4. Gently pull each slider out from the sensor housing until the cam locks release the sensor from the mounting bracket located on the windshield glass.

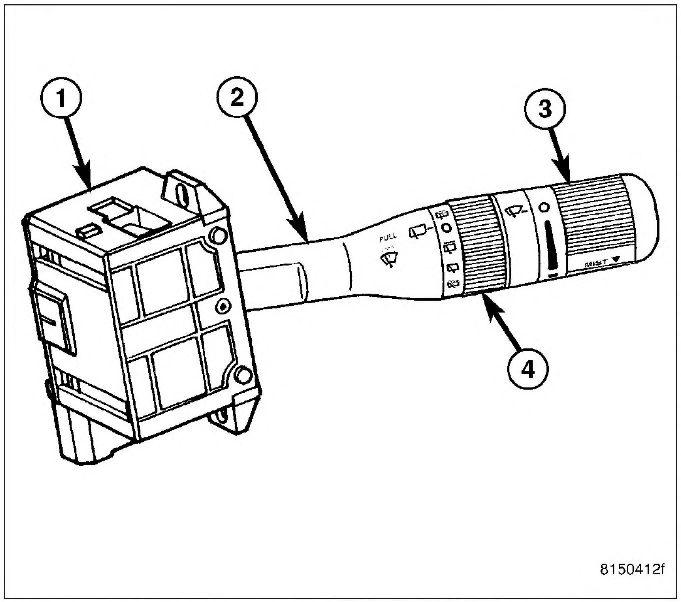
INSTALLATION



1. Verify that the two sliders (1) are positioned in the downward position, sticking out of the side opposite of the rain sensor module connector.
2. Position the rain sensor module over the mounting bracket located on the windshield glass and gently push down to seat it on the bracket.
3. Push the two sliders inward until they are flush with the side of the sensor housing and the cam locks are fully engaged.
4. Connect the wire harness connector to the rain sensor module.
5. Reconnect the negative battery cable.

RIGHT MULTI-FUNCTION SWITCH

DESCRIPTION



The right (wiper) multi-function switch (1) is secured to the right side of the multi-function switch mounting housing at the top of the steering column, just below the steering wheel. The only visible component of the right multi-function switch is the control stalk (2) that extends through a dedicated opening in the right side of the steering column shrouds. The remainder of the right multi-function switch is concealed beneath the steering column shrouds. The switch housing and its control stalk are constructed of molded plastic. A single connector receptacle is located on the back of the switch housing and connects the switch directly to the steering control module (SCM) in the steering column. The right (wiper) multi-function switch is secured to the multi-function switch mounting housing near the top of the steering column by two screws and two plastic retaining tabs.

The right (wiper) multi-function switch control stalk has both white nomenclature and International Control and Display Symbol icons applied to it, which clearly identify its many functions. The control stalk has a control knob (3) on its end for the front wiper system with a flattened face to allow it to be easily rotated. Just below the control knob is a knurled control sleeve (4) for the rear wiper/washer system. The right multi-function switch is the primary control for the front and rear wiper and washer systems, and contains switches and circuitry to provide signals to the SCM.

The right (wiper) multi-function switch cannot be adjusted or repaired and if any function of the switch is faulty, or if the switch is damaged, the entire right (wiper) multi-function switch must be replaced.

The right (wiper) multi-function switch supports the following functions and features:

- **Automatic Front Wipe Mode** - On models equipped with the optional automatic wiper system, the internal circuitry and hardware of the right (wiper) multi-function switch control knob provide an automatic front wipe mode with five sensitivity positions.
- **Continuous Front Wipe Modes** - The internal circuitry and hardware of the right (wiper) multi-function switch control knob provide two continuous front wipe switch positions, low speed or high speed.
- **Intermittent Front Wipe Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control knob provide an intermittent front wipe mode with five delay interval positions, except on models equipped with the optional automatic wiper system.
- **Front Wiper Mist Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control knob provide a front wiper system mist mode.
- **Front Washer Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control stalk provide front washer system operation.
- **Front Wipe-After-Wash Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control stalk provide a wipe-after-wash mode.
- **Continuous Rear Wipe Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control sleeve provides one continuous rear wipe switch position.
- **Intermittent Rear Wipe Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control sleeve provide one fixed interval intermittent rear wipe mode switch position.
- **Rear Washer Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control sleeve provides two positions for rear washer system operation.

OPERATION

The right (wiper) multi-function switch uses resistor multiplexing to control the many functions and features it provides. The switch receives a clean ground from the steering control module (SCM) on a multi-function switch return circuit. It then provides outputs to the SCM on a wash select switch signal circuit to control washer selection and on an intermittent wiper switch signal circuit to control the wipers.

The right (wiper) multi-function switch operates as follows:

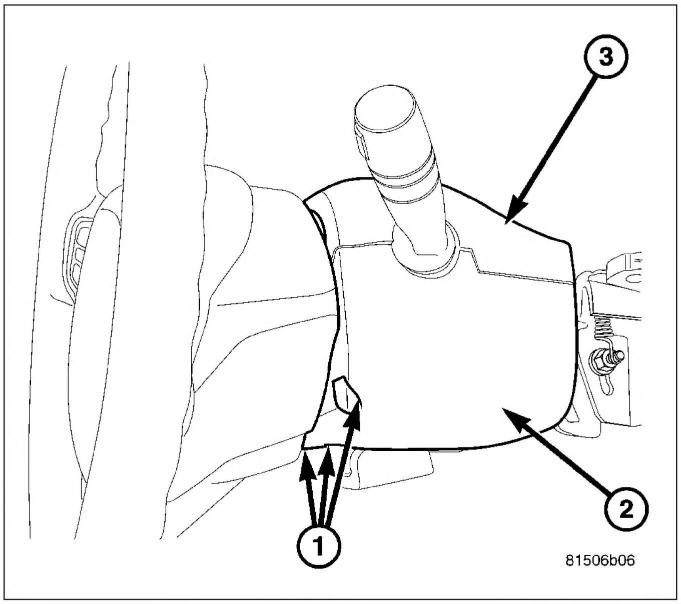
- **Washer Control** - The control stalk of the right multi-function switch is pulled rearward towards the steering wheel to momentarily activate the windshield washer pump in the front washer mode. The windshield washer pump will continue to operate in the front washer mode until the control stalk is released. The windshield washer pump will operate in the rear washer mode when the knurled control sleeve on the control stalk of the right multi-function switch is rotated to either of the two rear washer mode positions. The multi-function switch provides an output to the SCM, which responds by sending electronic washer switch status messages to the front control module (FCM) over the controller area network (CAN) data bus. The FCM responds by energizing or de-energizing the windshield washer pump in the front or rear washer mode.
- **Wiper Control** - The control knob on the end of the multi-function switch control stalk is rotated to one of the two continuous wiper detents, to one of five intermittent wiper detents, or to the Off position to select the front wiper mode. The rear wiper will operate when the knurled control sleeve on the control stalk of the right multi-function switch is rotated to either the continuous rear wipe position or to the fixed interval intermittent rear wipe position. The multi-function switch provides an output to the SCM, which responds by sending electronic wiper switch status messages to the FCM over the CAN data bus. The FCM responds by energizing or de-energizing the wiper on/off and high/low relays in the integrated power module (IPM) for wiper system control.

The multi-function switch and the multiplexed inputs to the SCM are diagnosed using a diagnostic scan tool (Refer to 8R - WIPER/WASHERS - Electrical Diagnostics for more information).

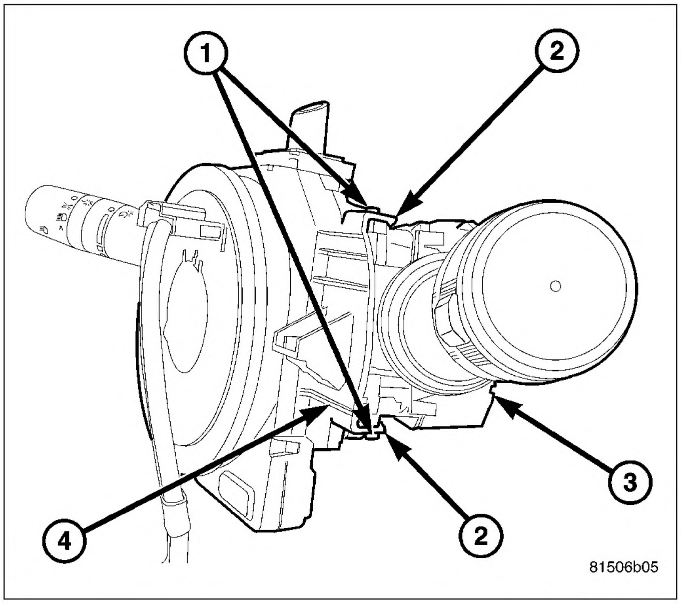
REMOVAL

WARNING: on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, driver airbag, passenger airbag, seat belt tensioner, side curtain airbag, front impact sensor, side impact sensor, or instrument panel component diagnosis or service. disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. this is the only sure way to disable the supplemental restraint system. failure to take the proper precautions could result in accidental airbag deployment, possible personal injury or death.

1. Disconnect and isolate the negative battery cable.
2. From below the steering column, remove the three screws (1) that secure the lower steering column shroud (2) to the multi-function switch mounting housing.
3. Using hand pressure, push gently inward on both sides of the upper shroud (3) near the parting line between the upper and lower shrouds to release the snap features that secure the two shroud halves together.
4. Remove both the upper and lower shrouds from the steering column.

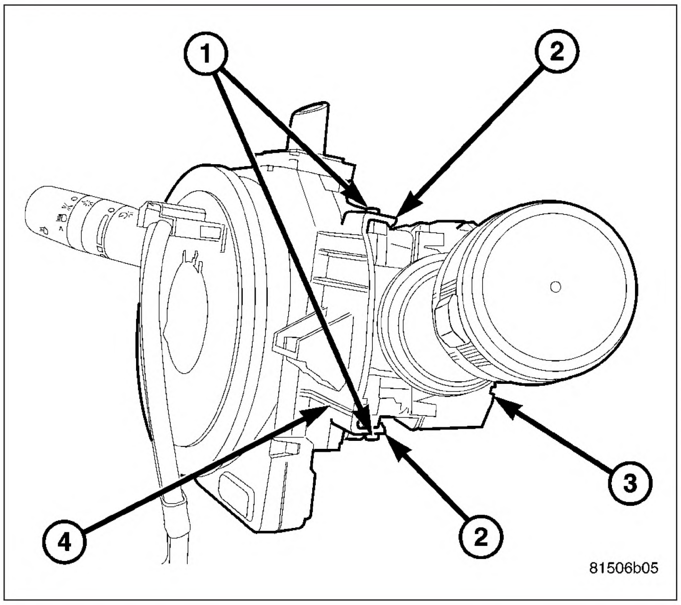


5. Remove the two screws (1) that secure the right multi-function switch (3) to the multi-function switch mounting housing (4).
6. Disengage the two retaining tabs (2) that secure the right multi-function switch to the multi-function switch mounting housing.
7. Disconnect the right multi-function switch from the steering control module (SCM) and remove the switch.

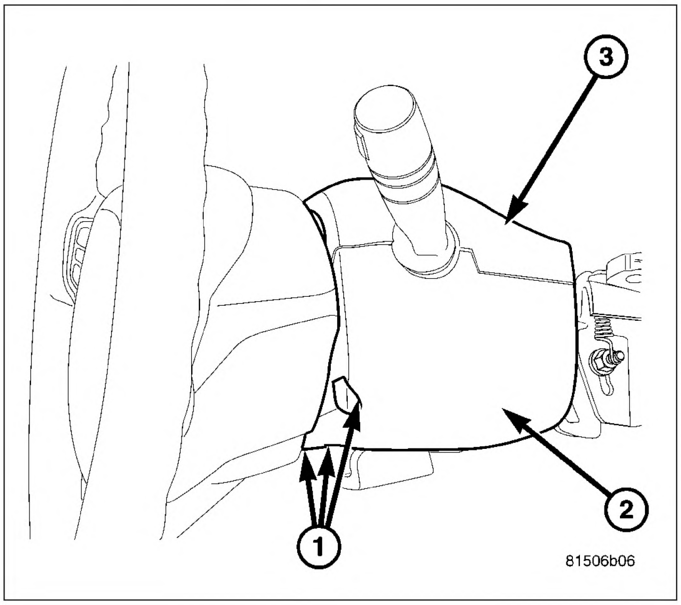


INSTALLATION

1. Position the right multi-function switch (3) onto the multi-function switch mounting housing (4) and connect it to the steering control module (SCM).
2. Engage the two retaining tabs (2) that secure the right multi-function switch to the multi-function switch mounting housing.
3. Install the two screws (1) that secure the right multi-function switch to the multi-function switch mounting housing. Tighten the screws to 2.5 N·m (22 in. lbs.).



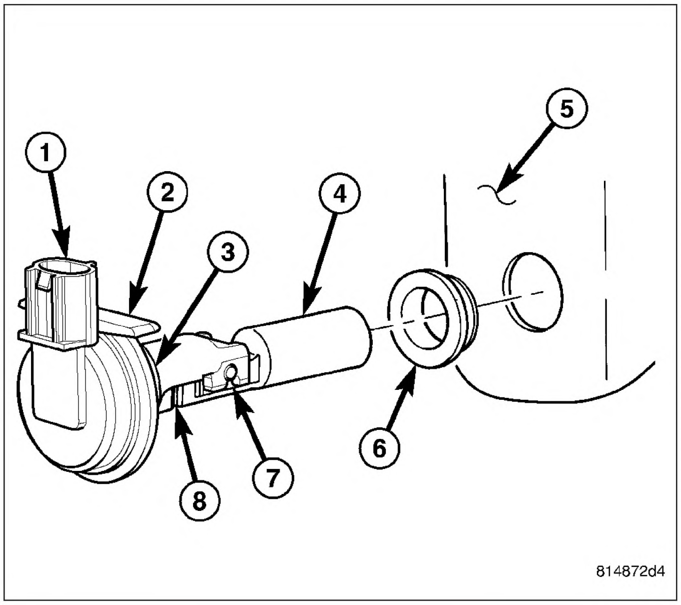
4. Position the lower steering column shroud (2) to the underside of the steering column.
5. Install the three screws (1) that secure the lower steering column shroud to the multi-function switch mounting housing. Tighten the screws to 2 N·m (17 in. lbs.).
6. Position the upper column shroud (3) over the steering column with the hazard warning switch button inserted through the hole in the upper shroud.
7. Align the snap features on the upper and lower shrouds and apply hand pressure to snap them together.
8. Reconnect the negative battery cable.



SENSOR-WASHER FLUID LEVEL

DESCRIPTION

The washer fluid level switch is located on the left outboard side of the washer reservoir (5), near the windshield washer pump. The washer fluid level switch is a single pole, single throw reed-type switch. Only the molded plastic positioning flange (2) and the integral connector receptacle (1) are visible when the switch is installed in the reservoir. A seal flange with a large barbed nipple (3) on the switch housing passes through a rubber grommet (6) installed in the dedicated switch mounting hole of the washer reservoir.



A small, molded plastic float (4) with two pivot pins is attached to the stanchion (7) that extend toward the float from the nipple. A small magnet (8) is secured within the end of the float nearest the nipple and a reed switch is concealed within the nipple. A diagnostic resistor is connected between the two switch terminals within the switch mounting flange.

The washer fluid level switch cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The washer fluid level switch uses a pivoting, oblong float to monitor the level of the washer fluid in the washer reservoir. The float contains a small magnet. When the float pivots, the proximity of this magnet to a stationary reed switch within the nipple formation of the switch changes. When the fluid level in the washer reservoir is at or above the float level, the float moves to a vertical position, the influence of the float magnetic field is removed from the reed switch, and the normally open reed switch contacts open. When the fluid level in the washer reservoir falls below the level of the pivoting float, the float moves to a horizontal position, the influence of the float magnetic field is applied to the reed switch, and the contacts of the normally open reed switch close.

The washer fluid level switch is connected to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness. The switch is connected in series between a clean ground and the front washer pump motor control circuit of the front control module (FCM). When the switch closes, the FCM senses the ground on the washer pump motor control circuit. The FCM is programmed to respond to this input by sending an electronic washer fluid indicator lamp-on message to the instrument cluster over the controller area network (CAN) data bus. The instrument cluster responds to this message by illuminating the washer fluid indicator, sounding an audible chime tone warning and suppressing requests for rear washer system operation.

The washer fluid level switch may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the steering control module (SCM), FCM or the electronic message inputs to or outputs from the SCM and the FCM that control the operation of the washer fluid visual and/or audible indicators. The most reliable, efficient, and accurate means to diagnose the washer fluid level indicator, SCM, FCM or the electronic message inputs and outputs related to the washer fluid indicator requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

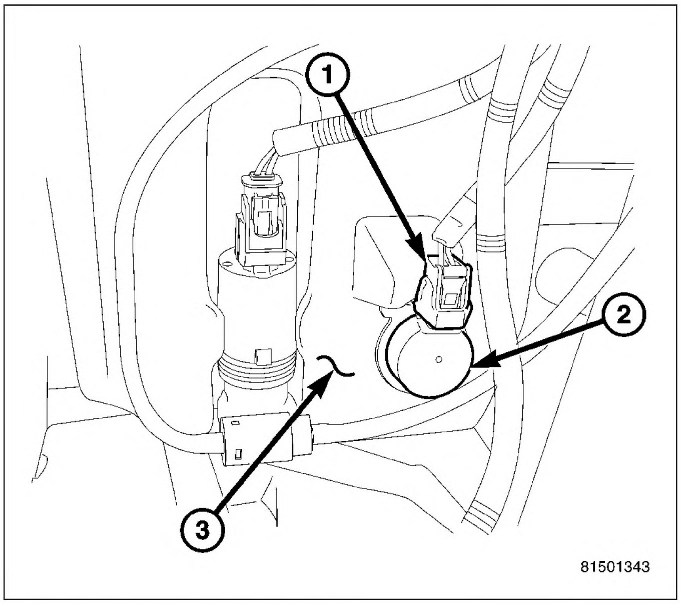
REMOVAL

NOTE: The washer fluid level switch can be removed from the washer reservoir without removing the reservoir from the vehicle.

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle.
3. Remove the liner from the left front fender wheel house.
4. Disconnect the wire harness connector (1) from the top of the washer fluid level switch (2).

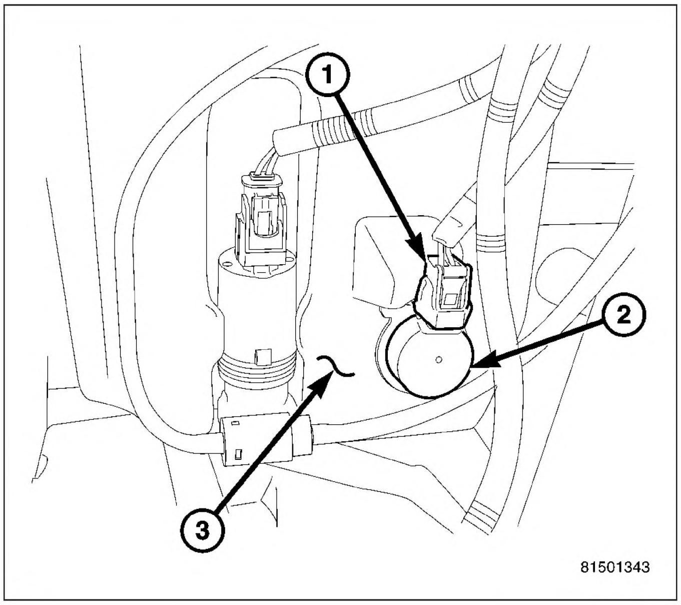
CAUTION: Care must be taken not to damage the reservoir during washer fluid level switch removal.

5. Using a trim stick C-4755 or equivalent, gently pry the barbed nipple of the washer fluid level switch out of the rubber grommet located on the reservoir (3).
6. Carefully rotate the washer fluid level switch until it can be removed from the reservoir sump and remove and discard the rubber grommet.



INSTALLATION

1. Lubricate a new rubber grommet with clean washer fluid and install it into the washer fluid level switch mounting hole located in the outboard side of the washer reservoir (3).
2. Position the barbed nipple of the washer fluid level switch (2) to the rubber grommet in the reservoir and press firmly and evenly on the switch until it is fully seated in the rubber grommet.
3. Connect the wire harness connector (1) to the top of the washer fluid level switch.
4. Install the liner into the left front fender wheel house.
5. Lower the vehicle.
6. Refill the washer reservoir with the washer fluid drained during removal.
7. Reconnect the negative battery cable.

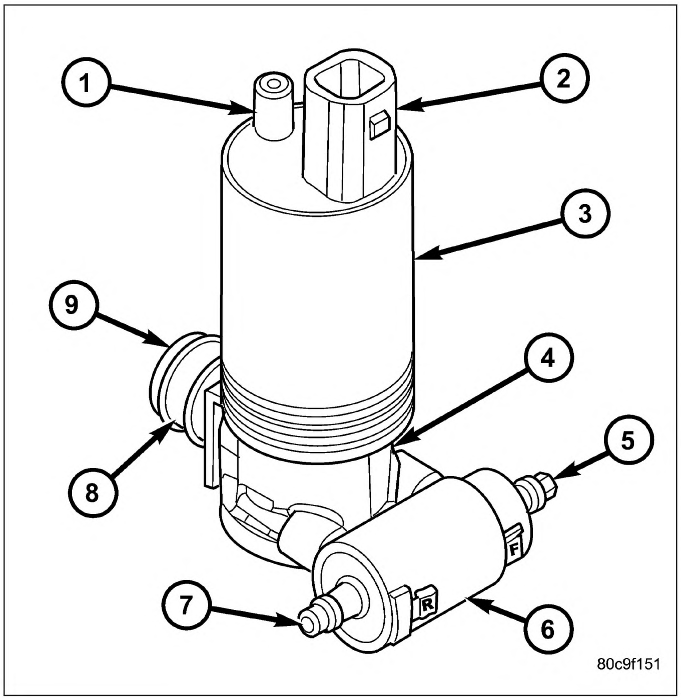


PUMP-WASHER-WINDSHIELD

DESCRIPTION

The windshield washer pump (3) is located on the outboard side of the washer reservoir, in the left front fender wheel house ahead of the front wheel and the left front wheel house splash shield. A small permanently lubricated and sealed reversible electric motor is coupled to the rotor-type pump (4). The use of an integral valve body (6) allows the windshield washer pump to provide washer fluid to either the front or the rear washer systems, depending upon the direction of the pump impeller rotation.

A seal flange with a barbed inlet nipple (8) on the pump housing passes through a rubber grommet installed in a dedicated mounting hole of the washer reservoir. A removable molded plastic filter screen (9) inserted into the inlet nipple prevents most debris from entering the pump housing. When the pump is installed in the reservoir the front barbed outlet nipple (5) on the pump valve body housing connects the unit to the front washer hose, and the rear barbed outlet nipple (7) connects the unit to the rear washer hose. The letters “F” and “R” molded into the valve body housing adjacent to each nipple provide further clarification of the nipple assignments.

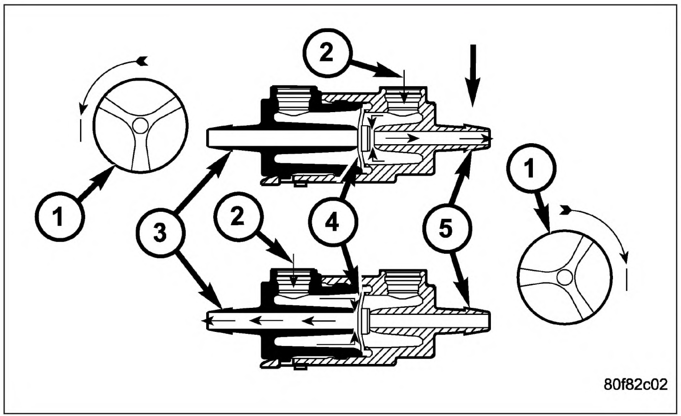


The windshield washer pump is retained on the reservoir by the interference fit between the barbed pump inlet nipple and the rubber grommet, which is a light press fit. The top of the washer pump is also secured to the washer reservoir by the use of a snap post (1) on the motor and a snap post receptacle molded into the reservoir that allows for mounting of the washer pump without the use of fasteners. An integral connector receptacle (2) on the top of the motor housing connects the unit to the vehicle electrical system through a dedicated take out and connector of the headlamp and dash wire harness.

The windshield washer pump cannot be repaired and, if faulty or damaged, it must be replaced.

OPERATION

The windshield washer pump features a reversible electric motor. The direction of the motor is controlled by hard wired outputs from the front control module (FCM). When battery current and ground are applied to the two pump motor terminals, the motor rotates in one direction. When the polarity of these connections is reversed, the motor rotates in the opposite direction. When the pump motor is energized, the rotor-type pump pressurizes the washer fluid and forces it through one of the two pump outlet nipples, and into the front or rear washer plumbing.



The FCM controls the hard wired outputs to the pump motor based upon electronic washer request messages received over the controller area network (CAN) data bus from the steering control module (SCM). The SCM monitors a resistor multiplexed input from the front and rear washer switch circuitry contained within the multi-function switch to determine the proper washer request message to send. Whenever the low washer fluid indicator is illuminated, the FCM is programmed to suppress all rear washer requests in order to give priority to the vehicle operator's need for forward visibility.

Washer fluid is gravity-fed from the washer reservoir to the inlet port of the washer pump housing. An integral valve body is located in a housing on the outlet port side (2) of the pump housing. A diaphragm (4) in this valve body controls which washer system plumbing receives the washer fluid being pressurized by the pump. When the pump is not operating the diaphragm is biased to close all washer fluid flow in the rear washer system and, in this way it also performs the function of the rear washer system check valve.

When the pump impeller (1) rotates in the counterclockwise direction (viewed from the bottom), the biased diaphragm is sealing off the rear washer system outlet and nipple so the pressurized washer fluid is pushed out through the pump front outlet port and the front washer outlet nipple (5). When the pump impeller rotates in the clockwise direction (viewed from the bottom), pressurized washer fluid is pushed out through the pump rear outlet port and moves the diaphragm to open the rear washer outlet nipple and seal off the front washer outlet nipple, then the pressurized washer fluid is pushed out through the rear washer outlet nipple (3).

The windshield washer pump and the hard wired motor control circuits from the FCM may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the SCM, FCM, CAN data bus or the electronic messages used to provide windshield washer pump control. The most reliable, efficient, and accurate means to diagnose the SCM, FCM, CAN data bus and the electronic messages for the windshield washer pump control requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

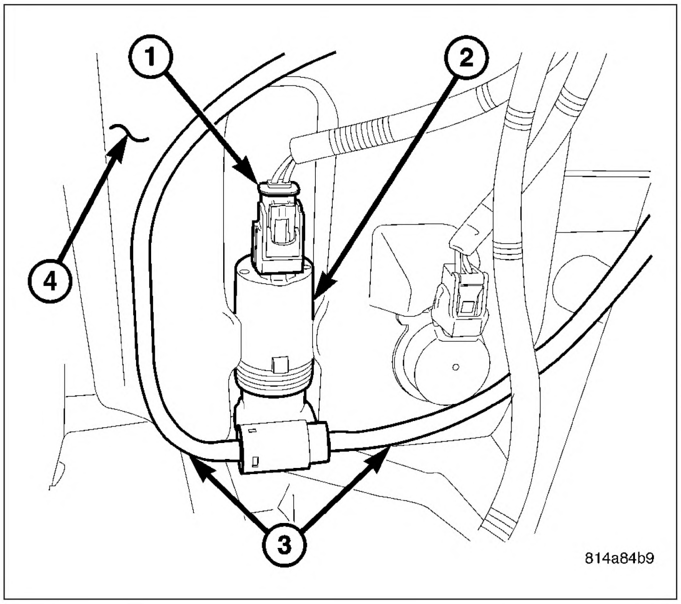
REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Raise and support the vehicle.
3. Remove the liner from the left front fender wheel house.
4. Disconnect the wire harness connector (1) from the top of the windshield washer pump (2).

NOTE: To aid in reinstallation, note the installed position of the washer hoses prior to disconnecting them from the windshield washer pump.

5. Disconnect the washer hoses (3) from the barbed outlet nipples of the windshield washer pump and allow the washer fluid to drain into a clean container for reuse.

CAUTION: Care must be taken not to damage the reservoir during windshield washer pump removal.

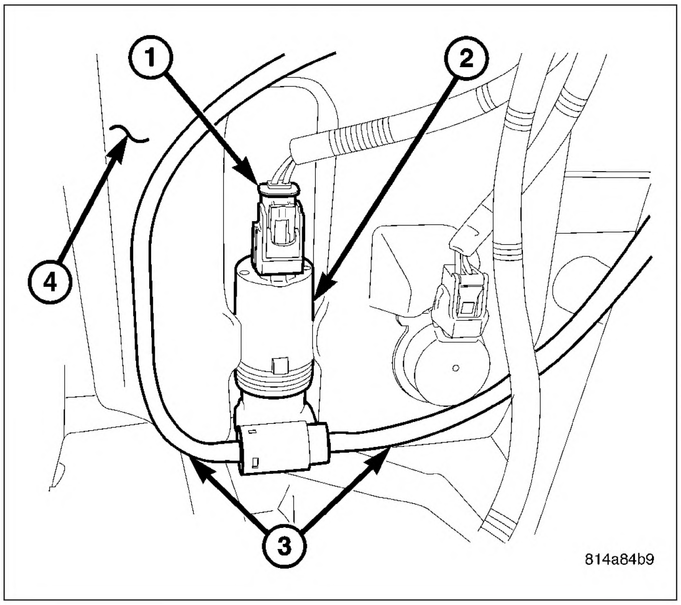


6. Using a trim stick C-4755 or equivalent, gently pry the barbed inlet nipple of the windshield washer pump out of the rubber grommet located on the reservoir (4) and remove and discard the rubber grommet.

INSTALLATION

1. Lubricate a new rubber grommet with clean washer fluid and install it into the washer pump mounting hole located in the outboard side of the washer reservoir (4).
2. Position the barbed inlet nipple of the windshield washer pump (2) to the rubber grommet in the reservoir and press firmly and evenly on the pump until it is fully seated in the rubber grommet.

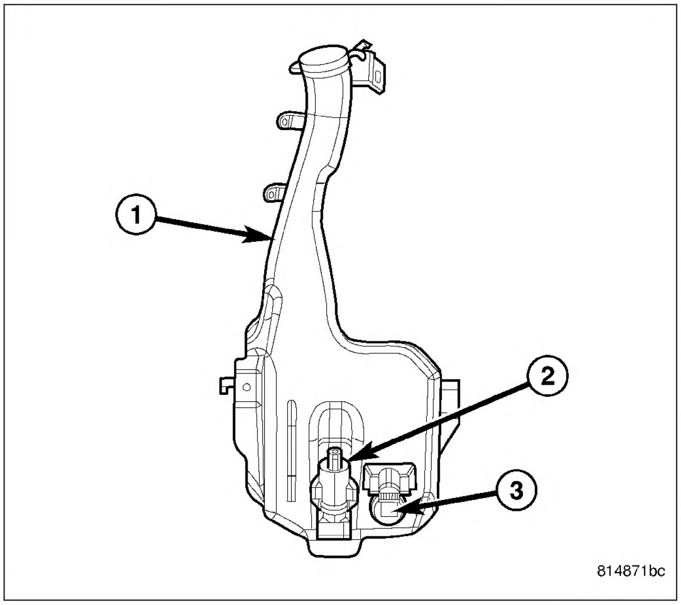
NOTE: Make sure to properly connect the washer hoses to the windshield washer pump. Failure to properly connect the hoses will cause the front and rear washer systems to operate incorrectly.



3. Properly connect the two washer hoses (3) to the barbed outlet nipples of the windshield washer pump.
4. Connect the wire harness connector (1) to the top of the windshield washer pump.
5. Install the liner into the left front fender wheel house.
6. Lower the vehicle.
7. Refill the washer reservoir with the washer fluid drained during removal.
8. Reconnect the negative battery cable.

WASHER RESERVOIR

DESCRIPTION



A single washer fluid reservoir (1) is used for both the front and rear washer systems. The molded plastic washer fluid reservoir is mounted on the outboard side of the left front frame rail in front of the left front wheel, where it is concealed by the front inner fender liner. The only visible component of the washer reservoir is the filler neck and cap unit, which extends through a hole in the left front wheel house extension panel into the engine compartment. A bright yellow plastic filler cap with a rubber seal and an International Control and Display Symbol icon for “Windshield Washer” and the text “Washer Fluid Only” molded into it snaps over the open end of the filler neck. The cap hinges on and is secured to a molded-in hook formation on the rear of the reservoir filler neck.

There are separate, dedicated mounting holes on the outboard side of the reservoir provided for the windshield washer pump (2) and the washer fluid level switch (3). The inboard side of the washer reservoir has two integral flanges that are secured to the outside of the left front frame rail by two screws. A pop rivet secures the reservoir filler neck to the left side of the upper radiator crossmember near the front of the engine compartment. The left front fender wheel house inner liner must be removed to access the washer reservoir for service.

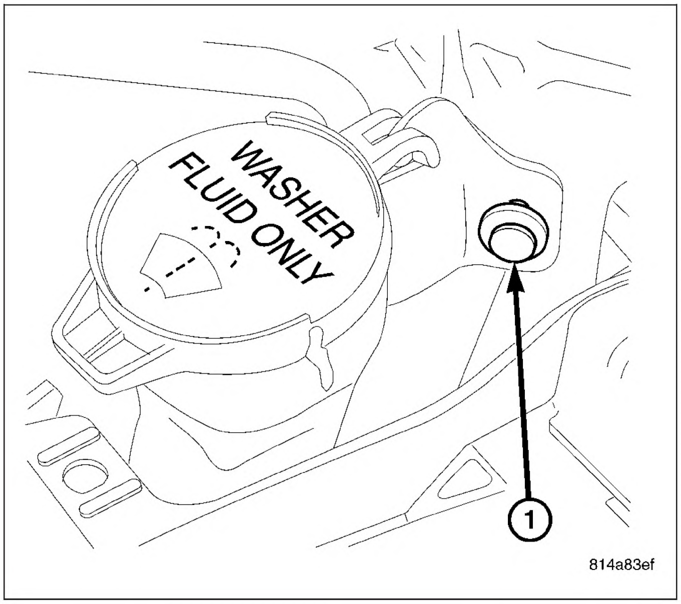
The washer reservoir cannot be repaired and, if faulty or damaged, it must be replaced. The washer reservoir, rubber grommets for the windshield washer pump and the washer fluid level switch and the filler cap are available for individual service replacement.

OPERATION

The washer fluid reservoir provides a secure, on-vehicle storage location for a large reserve of washer fluid for operation of the front and rear washer systems. The washer reservoir filler neck provides a clearly marked and readily accessible point from which to add washer fluid to the reservoir. The windshield washer pump is located in a sump area near the left front of the reservoir to be certain that washer fluid will be available to the washer pump as the fluid level in the reservoir becomes depleted. The windshield washer pump is mounted in the lowest position in the sump. The washer fluid level switch is mounted just above the sump area of the reservoir so that there will be adequate warning to the vehicle operator that the washer fluid level is low, before the washer system will no longer operate.

REMOVAL

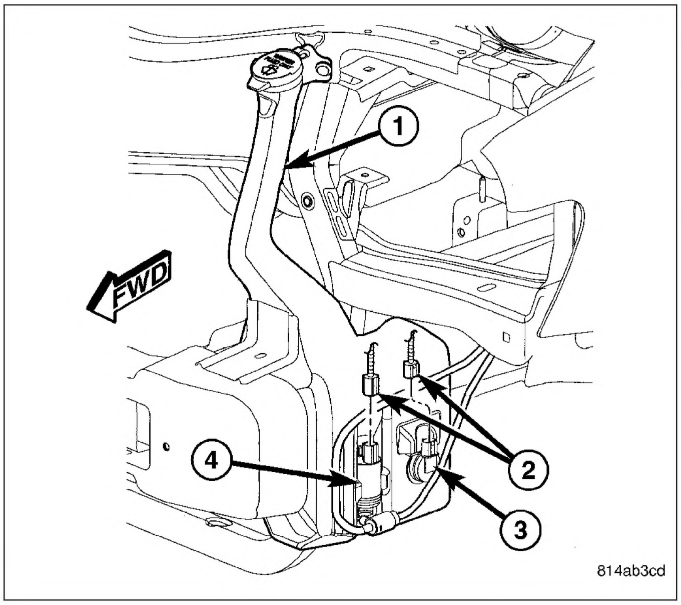
1. Disconnect and isolate the negative battery cable.
2. Open the washer reservoir filler cap and remove the filler cap hinge from the hook on the filler neck.
3. Remove the retainer (1) that secures the washer reservoir filler neck to the upper radiator support.



4. Raise and support the vehicle.
5. Remove the liner from the left front fender wheel house to gain access to the washer reservoir (1).
6. Disconnect the wire harness connectors (2) from the washer fluid level switch (3) and the windshield washer pump (4).

NOTE: To aid in reinstallation, note the installed position of the washer hoses prior to disconnecting them from the windshield washer pump.

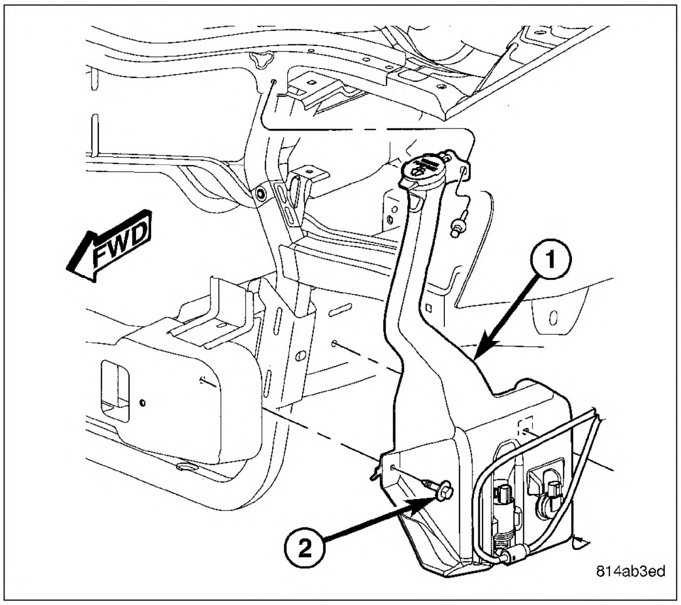
7. Disconnect the two washer hoses from the windshield washer pump and allow the washer fluid to drain into a clean container for reuse.



8. Remove the two screws (2) that secure the washer reservoir (1) to the left front frame rail.

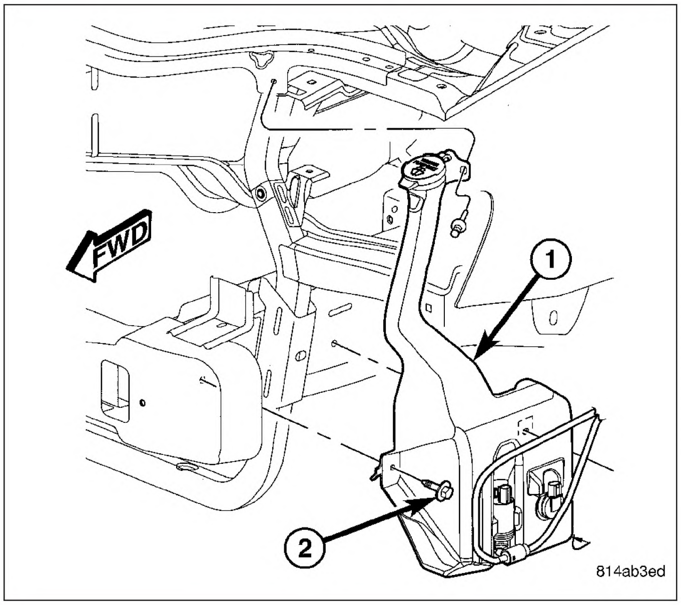
CAUTION: Care must be taken not to damage the reservoir during removal.

9. Remove the washer reservoir from underneath the vehicle. Rotate the reservoir as necessary to gain clearance.



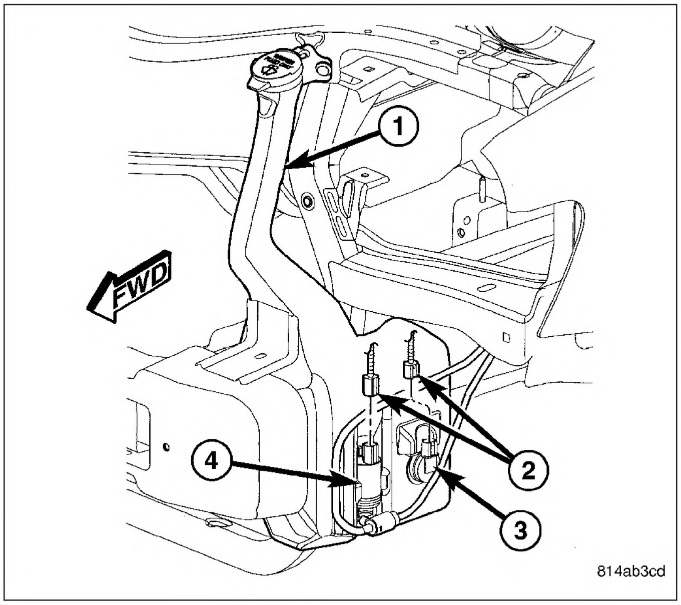
INSTALLATION

1. Position the washer reservoir into the left front fender wheel house from underneath the vehicle.
2. Raise the washer reservoir to position the filler neck into the engine compartment. Rotate the reservoir as necessary to gain clearance.
3. Install the two screws that secure the washer reservoir to the left front frame rail. Tighten the screws to 7 N·m (60 in. lbs.).

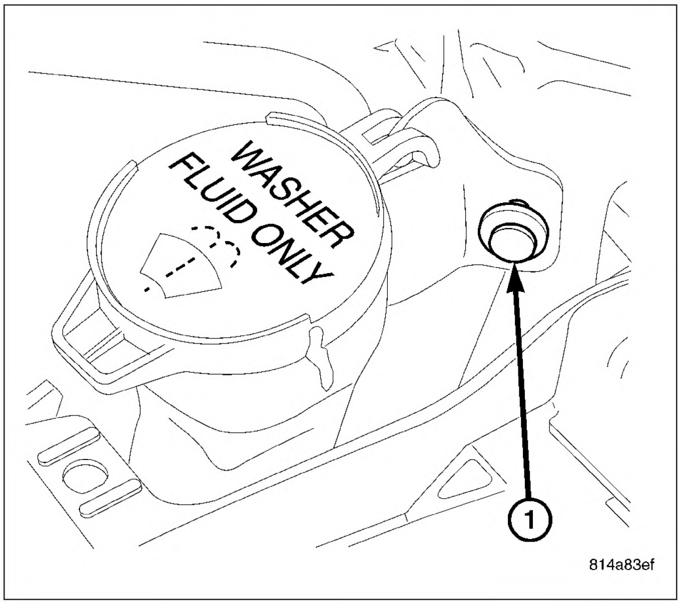


NOTE: Make sure to properly connect the washer hoses to the windshield washer pump. Failure to properly connect the hoses will cause the front and rear washer systems to operate incorrectly.

4. Properly connect the two washer hoses to the windshield washer pump on the reservoir (1).
5. Connect the wire harness connectors (2) to the washer fluid level switch (3) and the windshield washer pump (4).
6. Install the liner into the left front fender wheel house.



7. Lower the vehicle.
8. Install the retainer (1) that secures the washer reservoir filler neck to the upper radiator support.
9. Install the washer reservoir filler cap hinge onto the hook on the filler neck and close the cap.
10. Refill the washer reservoir with the washer fluid drained during removal.
11. Reconnect the battery negative cable.

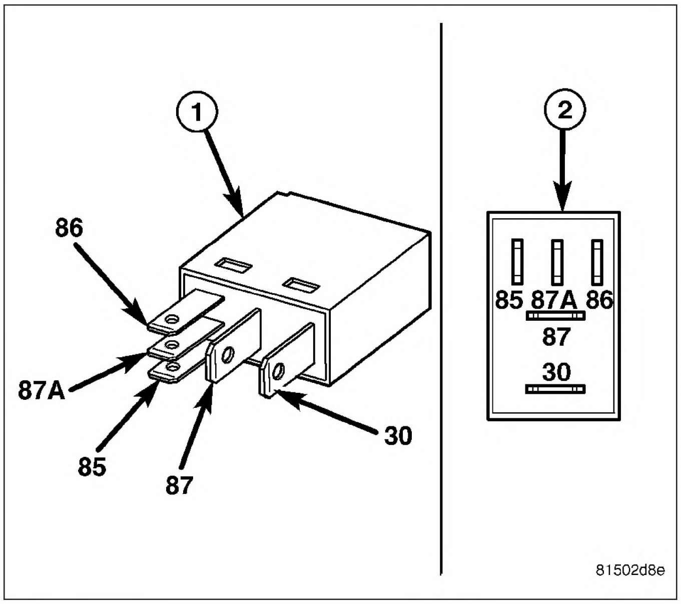


RELAY-WIPER HIGH/LOW

DESCRIPTION

The wiper high/low relay (1) is a International Standards Organization (ISO) micro relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns (2). This relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs through five integral male spade-type terminals that extend from the relay base plate.

The wiper high/low relay is located in the integrated power module (IPM) in the engine compartment, near the battery. Refer to the layout label on the underside of the IPM cover for specific relay cavity assignment information. The wiper high/low relay cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.



OPERATION

The wiper high/low relay is an electromechanical switch that uses a low current input from the front control module (FCM) to control a high current output to the front wiper motor. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The wiper high/low relay terminals are connected to the vehicle electrical system through a connector receptacle in the integrated power module (IPM). The inputs and outputs of the wiper high/low relay include:

- **Common Feed Terminal** - The common feed terminal (30) is connected to the output of the wiper on/off relay at all times through the wiper on/off relay output circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the FCM through a wiper high/low relay control circuit. The FCM controls wiper motor operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the power distribution center (PDC) through a fused ignition switch output (run-acc) circuit.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the high speed brush of the wiper motor through a wiper high/low relay high speed output circuit, and is connected to the high speed brush whenever the relay is energized.
- **Normally Closed Terminal** - The normally closed terminal (87A) is connected to the low speed brush of the wiper motor through a wiper high/low relay low speed output circuit, and is connected to the low speed brush whenever the relay is de-energized.

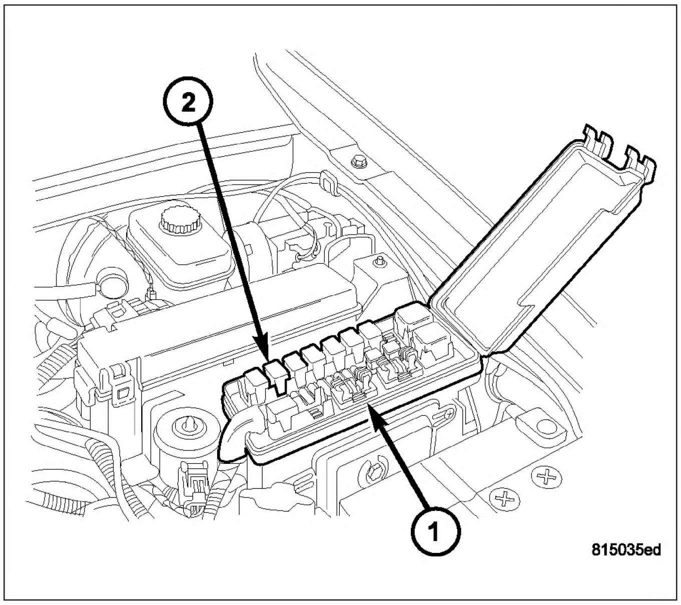
The wiper high/low relay can be diagnosed using conventional diagnostic tools and methods. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the steering control module (SCM), FCM or the electronic message inputs to or outputs from the SCM and the FCM that control the operation of the wiper high/low relay. The most reliable, efficient, and accurate means to diagnose the wiper high/low relay, SCM, FCM or the electronic message inputs and outputs related to the wiper high/low relay operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Open the cover of the integrated power module (IPM) (1) located in the engine compartment.

NOTE: Refer to the fuse and relay layout map on the inside of the IPM cover for wiper high/low relay location.

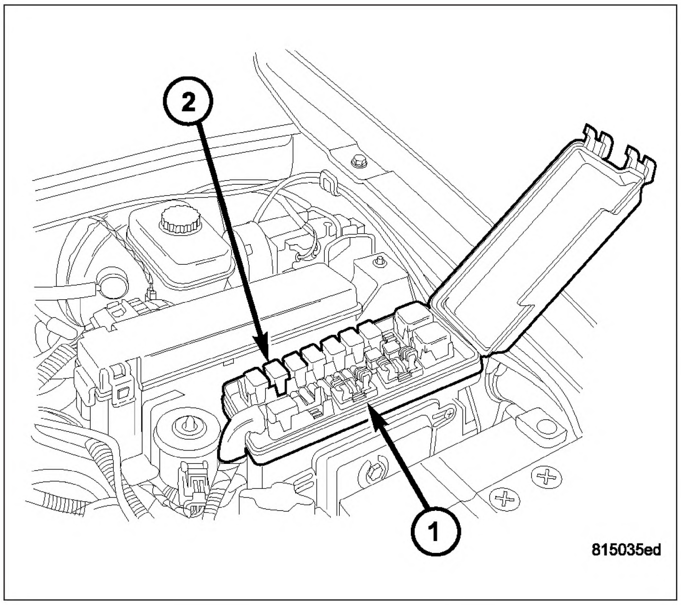
3. Remove the wiper high/low relay (2) from the IPM.



INSTALLATION

NOTE: Refer to the fuse and relay layout map on the inside of the integrated power module (IPM) cover for wiper high/low relay location.

1. Position the wiper high/low relay (2) into the proper receptacle of the IPM (1) located in the engine compartment.
2. Align the wiper high/low relay terminals with the terminal cavities in the IPM receptacle and push down firmly on the relay until the terminals are fully seated.
3. Close the cover of the IPM.
4. Reconnect the negative battery cable.

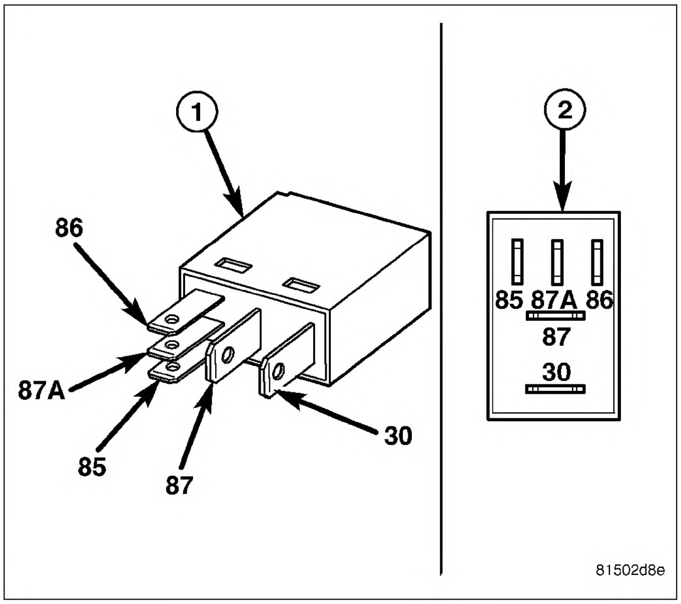


RELAY-WIPER ON/OFF

DESCRIPTION

The wiper on/off relay (1) is a International Standards Organization (ISO) micro relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns (2). This relay is contained within a small, rectangular, molded plastic housing and is connected to all of the required inputs and outputs through five integral male spade-type terminals that extend from the relay base plate.

The wiper on/off relay is located in the intergrated power module (IPM) in the engine compartment near the battery. Refer to the layout label on the underside of the IPM cover for specific relay cavity assignment information. The wiper on/off relay cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.



OPERATION

The wiper on/off relay is an electromechanical switch that uses a low current input from the front control module (FCM) to control a high current output to the wiper motor. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The wiper on/off relay terminals are connected to the vehicle electrical system through a connector receptacle in the integrated power module (IPM). The inputs and outputs of the wiper on/off relay include:

- **Common Feed Terminal** - The common feed terminal (30) is connected to the common feed terminal of the wiper high/low relay at all times through the wiper on/off relay output circuit.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the FCM through a wiper on/off relay control circuit. The FCM controls wiper motor operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives battery current at all times from a fuse in the power distribution center (PDC) through a fused ignition switch output (run-acc) circuit.
- **Normally Open Terminal** - The normally open terminal (87) receives battery current at all times from a fuse in the PDC through a fused ignition switch output (run-acc) circuit, and provides battery current to the wiper on/off relay output circuit whenever the relay is energized.
- **Normally Closed Terminal** - The normally closed terminal (87A) is connected to ground at all times through a take out of the headlamp and dash wire harness with an eyelet terminal connector that is secured by a screw to the front end sheet metal, and is connected to the wiper on/off relay output circuit whenever the relay is de-energized.

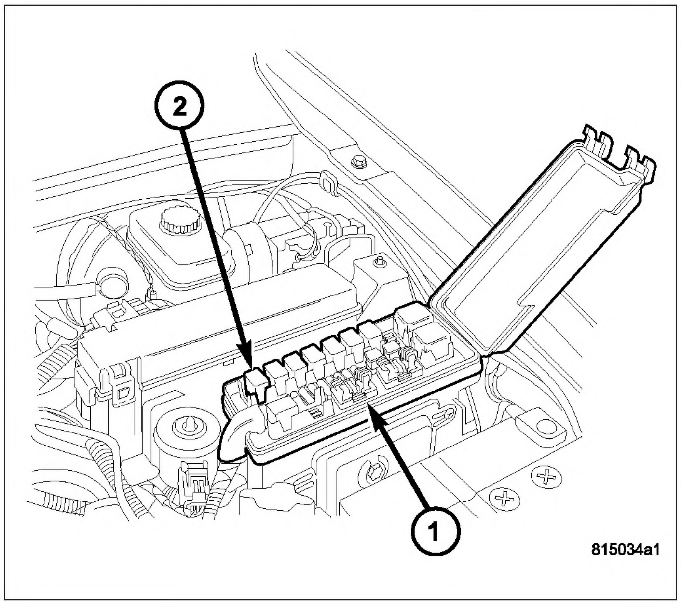
The wiper on/off relay may be diagnosed using conventional diagnostic tools and methods. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the steering control module (SCM), FCM or the electronic message inputs to or outputs from the SCM and the FCM that control the operation of the wiper on/off relay. The most reliable, efficient, and accurate means to diagnose the wiper on/off relay, SCM, FCM or the electronic message inputs and outputs related to the wiper on/off relay operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Open the cover of the integrated power module (IPM) (1) located in the engine compartment.

NOTE: Refer to the fuse and relay layout map on the inside of the IPM cover for wiper on/off relay location.

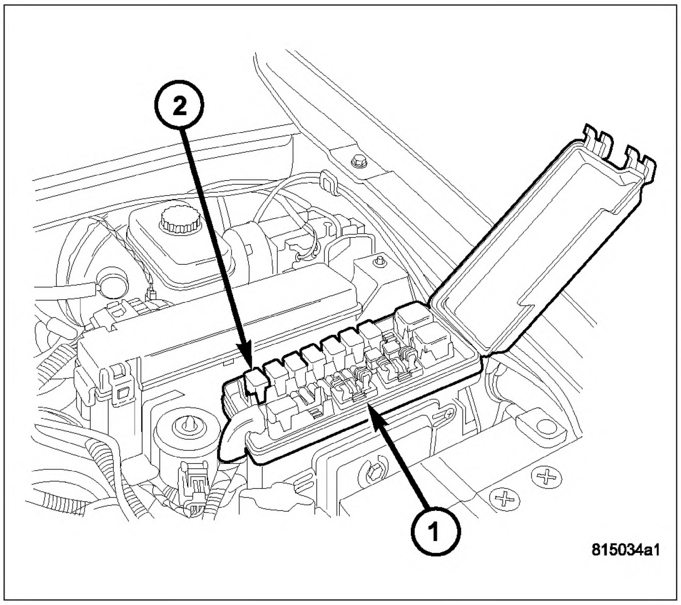
3. Remove the wiper on/off relay (2) from the IPM.



INSTALLATION

NOTE: Refer to the fuse and relay layout map on the inside of the integrated power module (IPM) cover for wiper on/off relay location.

1. Position the wiper on/off relay (2) into the proper receptacle of the IPM (1) located in the engine compartment.
2. Align the wiper on/off relay terminals with the terminal cavities in the IPM receptacle and push down firmly on the relay until the terminals are fully seated.
3. Close the cover of the IPM.
4. Reconnect the negative battery cable.



REAR WIPERS/WASHERS - SERVICE INFORMATION

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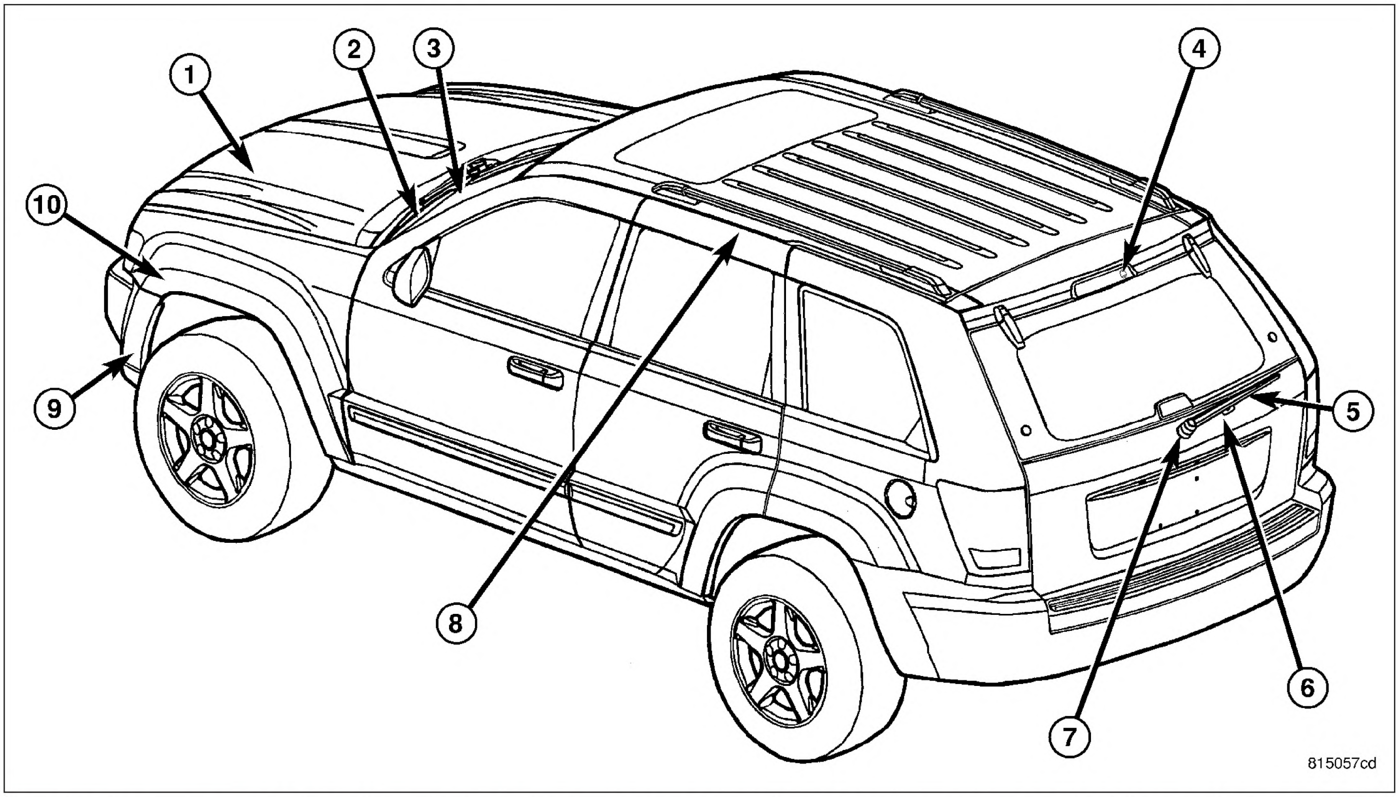
REAR WIPERS/WASHERS - SERVICE INFORMATION

DESCRIPTION



An electrically operated fixed interval intermittent rear wiper and washer system is standard factory-installed equipment on this model. The rear wiper and washer system includes the following major components, which are described in further detail elsewhere in this service information:

- **Front Control Module** - The front control module (FCM) (1) is integral to the integrated power module (IPM). The IPM is located in the engine compartment, near the battery. (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/INTEGRATED POWER MODULE - DESCRIPTION).
- **Steering Control Module** - The steering control module (SCM) (2) is secured to the steering column, just behind the steering wheel. The SCM sends all wiper/washer request signals to the front control module (FCM) (Refer to 19 - STEERING/COLUMN/STEERING COLUMN CONTROL MODULE - DESCRIPTION).
- **Multi-Function Switch** - The right (wiper) multi-function switch (3) is secured to the right side of steering column, just below the steering wheel. Only the control stalk for the switch is visible, while the remainder of the switch is concealed beneath the steering column shrouds. The right multi-function switch contains all of the switches for both the front and rear wiper and washer systems and is directly connected to the steering control module (SCM).
- **Rear Washer Nozzle** - The rear washer nozzle (4) is integral to the center high-mounted stop lamp (CHMSL) located in the liftgate outer panel above the liftgate glass. The rear washer nozzle includes an integral check valve.
- **Rear Washer Plumbing** - The plumbing (8) for the rear washer system consists of rubber hoses and molded plastic fittings. The plumbing is routed along the left side of the engine compartment from the washer reservoir, through the dash into the passenger compartment, up the left cowl side and A-pillar to the headliner, and above the headliner to the rear roof header. The plumbing is then routed through grommets in the rear roof header and the liftgate inner panel to the fitting for the rear washer nozzle.
- **Rear Wiper Arm and Blade** - The single rear wiper arm (5) is secured by a nut directly to the rear wiper motor output shaft, which extends through the center of the liftgate outer panel near the base of the liftgate glass. The rear wiper blade is secured to the rear wiper arm with an integral latch, and is parked off of the liftgate glass when the rear wiper system is not in operation.
- **Rear Wiper Arm Park Ramp** - The molded rubber rear wiper arm park ramp (6) is secured with a bolt to the liftgate outer panel to the right of the rear wiper motor output shaft bezel. When the rear wiper system is not in operation, the rear wiper arm is parked off of the liftgate glass on this ramp so that it will not interfere with or be damaged by the flip-up glass operation.
- **Rear Wiper Module** - The rear wiper module (7) includes the module bracket, two rubber-isolated wiper module mounts and the rear wiper motor. The wiper motor output shaft is the only visible component of the rear wiper module. The remainder of the module is concealed within the liftgate beneath the liftgate glass opening.
- **Rear Wiper Relay** - The rear wiper relay is an International Standards Organization (ISO) micro relay located in the junction block (JB) in the passenger compartment, underneath the driver side of the instrument panel.
- **Washer Pump/Motor** - The washer pump (9) is located in a dedicated hole on the lower outboard side of the washer reservoir, behind the inner fender liner ahead of the left front wheel, near the washer fluid level switch. The washer pump supplies washer fluid to both the front and rear washer systems.
- **Washer Reservoir** - The washer reservoir (10) is concealed between the left inner fender shield and the left outer fender panel, behind the inner fender liner and ahead of the left front wheel. The washer reservoir filler neck is the only visible portion of the reservoir and, it is accessed from the left front corner of the engine compartment.

Hard wired circuitry connects the wiper and washer system components to the steering control module (SCM) and the front control module (FCM). These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the wiper and washer system components through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

The rear wiper and washer system is intended to provide the vehicle operator with a convenient, safe, and reliable means of maintaining visibility through the liftgate flip-up glass. The various components of this system are designed to convert electrical energy produced by the vehicle electrical system into the mechanical action of the wiper blade to wipe the outside surface of the glass, as well as into the hydraulic action of the washer system to apply washer fluid stored in an on-board reservoir to the area of the glass to be wiped. When combined, these components provide the means to effectively maintain clear visibility for the vehicle operator by removing excess accumulations of rain, snow, bugs, mud, or other minor debris from the outside liftgate flip-up glass surface that might be encountered while driving the vehicle under numerous types of inclement operating conditions.

The vehicle operator initiates all rear wiper and washer system functions with the control stalk of the right multi-function switch that extends from the right side of the steering column, just below the steering wheel. Rotating the control sleeve on the control stalk to the various detent positions selects the rear wiper and washer system operating modes. The multi-function switch provides resistor multiplexed inputs to the steering control module (SCM) for all of the wiper and washer system functions. The SCM then sends electronic messages to the front control module (FCM) over the controller area network (CAN) data bus requesting the appropriate wiper and washer system operating modes.

Rear wiper/washer system operation is completely controlled by the SCM and FCM logic circuits, and that logic will only allow these systems to operate when the ignition switch is in the Accessory or On positions. Battery current is directed from the integrated power module (IPM) to the rear wiper relay in the junction block (JB) through a fused B(+) circuit. The right multi-function switch circuitry receives a clean ground output from the SCM on a multi-function switch return circuit, then provides resistor multiplexed inputs to the SCM on an intermittent wipe mux circuit to indicate the selected wiper system mode and on a wash select mux circuit to indicate the selected washer system mode.

The hard wired circuits and components of the rear wiper and washer system may be diagnosed and tested using conventional diagnostic tools and procedures. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the SCM, FCM or the electronic message inputs to or outputs from the SCM or the FCM that control the rear wiper and washer system operating modes. The most reliable, efficient, and accurate means to diagnose the SCM or the FCM inputs and outputs related to the various wiper and washer system operating modes requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

OPERATING MODES

The following briefly describes the operation of each of the rear wiper and washer system operating modes.

CONTINUOUS WIPE MODE

When the continuous wipe position of the control sleeve on the control stalk of the multi-function switch is selected the SCM sends an electronic rear wiper switch message to the FCM, which energizes the rear wiper relay. This directs battery current through the normally open contacts of the energized rear wiper relay to the rear wiper motor, causing the wipers to cycle at a fixed speed.

INTERMITTENT WIPE MODE

When the intermittent wipe position of the control sleeve on the control stalk of the multi-function switch is selected the SCM sends an electronic rear wiper switch message to the FCM, then the FCM electronic wipe logic circuit responds by operating the rear wiper motor at a predetermined fixed delay interval, between wiper sweeps.

WASH MODE

When the control sleeve of the right multi-function switch is rotated counter-clockwise to the rear momentary Wash position for more than about one-half second with the rear wiper system operating, the SCM sends an electronic washer switch message to the FCM, which directs battery current to the windshield washer pump. This will cause the washer pump to be energized for as long as the rear Wash switch is held closed (up to approximately ten seconds) and to be de-energize when the control sleeve is released.

WIPE-AFTER-WASH MODE

When the control sleeve of the right multi-function switch is rotated clockwise to the rear momentary Wash position for more than about one-half second while the rear wiper system is not operating, the SCM sends an electronic washer switch message to the FCM, which directs battery current to the windshield washer pump and energizes the rear wiper relay. This will cause the washer pump to be energized and operate the rear wiper motor in a continuous speed mode for as long as the rear Wash switch is held closed (up to approximately ten seconds). When the control sleeve is released, the FCM de-energizes the windshield washer pump, but allows the rear wiper motor to operate for two additional wipe cycles before it de-energizes the rear wiper relay and parks the rear wiper blade.

DIAGNOSIS AND TESTING

REAR WIPER & WASHER SYSTEM

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment, possible personal injury or death.

If the rear wiper motor operates, but the wipers do not move on the windshield or the rear glass, replace the faulty rear wiper module. If the washer pump operates, but no washer fluid is dispensed on the rear glass; or, if the wipers operate, but chatter, lift, or do not clear the glass, clean and inspect the rear wiper and washer system components as required (Refer to 8 - ELECTRICAL/FRONT WIPERS/WASHERS - CLEANING) and (Refer to 8 - ELECTRICAL/ FRONT WIPERS/WASHERS - INSPECTION).

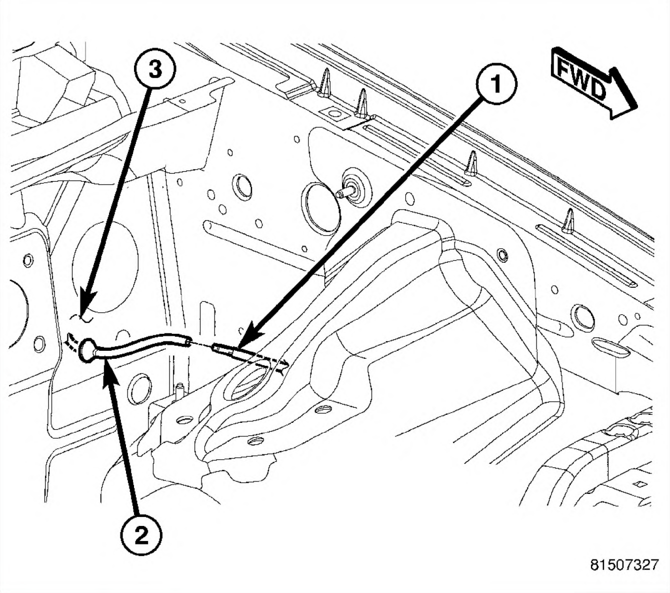
The hard wired wiper and washer system circuits and components may be diagnosed and tested using conventional diagnostic tools and procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods may not prove conclusive in the diagnosis of the steering control module (SCM), front control module (FCM), integrated power module (IPM), junction block (JB), controller area network (CAN) data bus, or the electronic message inputs or outputs used to provide wiper and washer system service or many of the electronic features of the rear wiper and washer system. The most reliable, efficient, and accurate means to diagnose the SCM, FCM, IPM, JB, CAN data bus and the electronic message inputs and outputs for the rear wiper and washer system requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

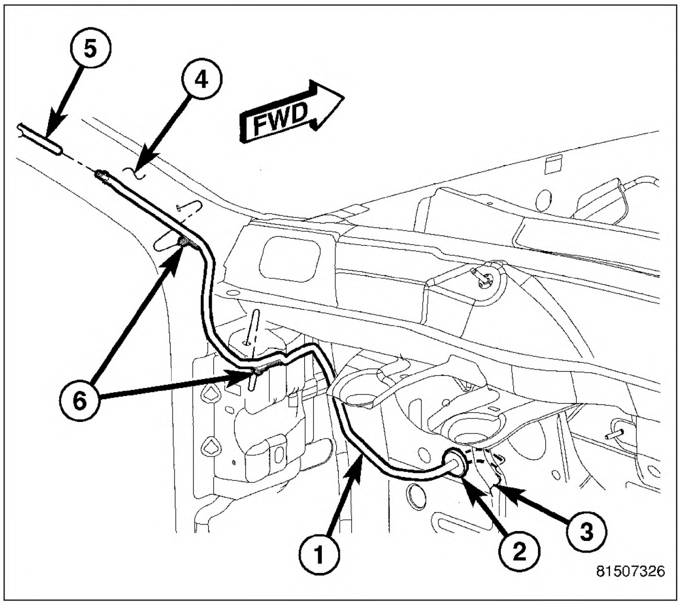
REAR WASHER HOSES/TUBES

DESCRIPTION

The rear washer plumbing consists of small diameter rubber hoses and molded plastic in-line connector fittings. The rear washer reservoir hose (1) is connected to the rear washer barbed outlet nipple of the windshield washer pump below the left front wheel house extension and routed up along the left inner fender to the engine compartment. Just forward of the dash panel (3) in the engine compartment, an in-line connector with barbed nipples joins the rear washer hose to the A-pillar hose (2).



The A-pillar hose (1) passes through a hole with a rubber grommet (2) in the dash panel (3) into the passenger compartment where it is attached to the A-pillar (4) with two plastic push-pin type retainers (6). The A-pillar hose is then routed up the left A-pillar to the headliner. At the headliner, an in-line connector joins the A-pillar hose to the headliner hose (5). The headliner hose is routed above the headliner and along the left roof side rail to the rear of the vehicle. At the rear of the vehicle, the headliner hose is routed above the headliner and along the upper liftgate opening panel toward the right side of the vehicle. The headliner hose then passes through a hole with a rubber grommet in the upper liftgate opening panel and through another hole with a rubber grommet into the upper inner liftgate panel to the rear washer nozzle.



Washer hose is available for service only as roll stock, which must then be cut to length. The headliner washer hose is integral to the headliner and, if faulty or damaged, the headliner unit must be replaced. The molded plastic washer hose fittings cannot be repaired. If these fittings are faulty or damaged, they must be replaced.

OPERATION

Washer fluid in the washer reservoir is pressurized and fed by the winshield washer pump through the rear washer system plumbing and fittings to the rear washer nozzle located on the center high-mounted stop lamp (CHMSL) on the top of the liftgate outer panel. Whenever routing the washer hose or a wire harness containing a washer hose, it must be routed away from hot, sharp, or moving parts and, any sharp bends that might pinch the hose must be avoided.

REAR WASHER NOZZLE

DESCRIPTION

The rear washer nozzle is a fluidic type unit constructed of molded plastic that includes an integral check valve. The rear washer nozzle is integral to the center high-mounted stop lamp (CHMSL). The washer plumbing nipple is concealed between the liftgate outer and inner panels.

OPERATION

The rear washer nozzle is designed to dispense washer fluid into the wiper pattern area on the outside of the liftgate flip-up glass. Pressurized washer fluid is fed to the nozzle from the washer reservoir by the windshield washer pump through a single hose, which is attached to a barbed nipple on the back of the rear washer nozzle. A fluidic matrix within the washer nozzle causes the pressurized washer fluid to be emitted from the nozzle orifice as an oscillating stream to more effectively cover a larger area of the glass to be cleaned.

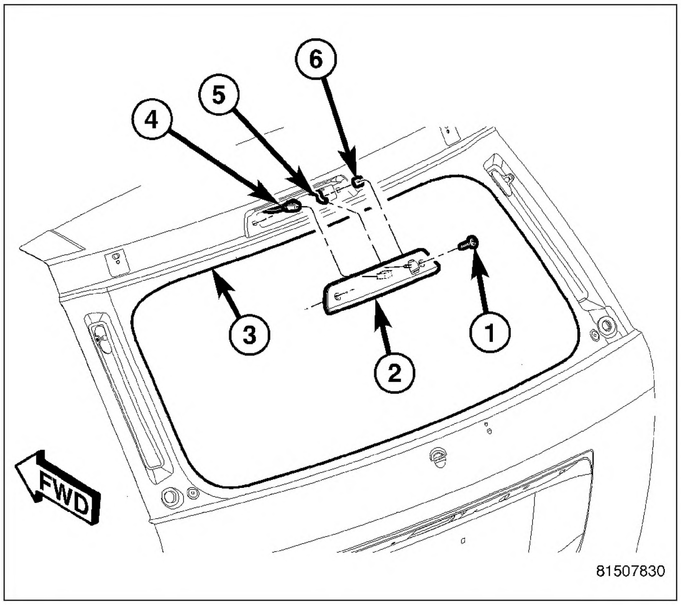
The integral rear nozzle check valve provides more than one function in this application. It prevents washer fluid from draining out of the rear washer supply hoses back to the washer reservoir. This drain-back would result in a lengthy delay from when the rear washer switch is actuated until washer fluid was dispensed through the rear washer nozzle, because the washer pump would have to refill the rear washer plumbing from the reservoir to the nozzle. Such a drain-back condition could also result in water, dirt, or other outside contaminants being siphoned into the washer system through the washer nozzle orifice. This water could subsequently freeze and plug the nozzle, while other contaminants could interfere with proper nozzle operation and cause improper nozzle spray patterns. In addition, the rear check valve prevents washer fluid from siphoning out through the rear washer nozzle after the rear washer system is turned Off.

When the windshield washer pump pressurizes and pumps washer fluid from the reservoir through the rear washer plumbing, the fluid pressure unseats a check ball from a seat within the valve by overriding the pressure applied to the ball within the valve by a small coiled spring. With the check ball unseated, washer fluid is allowed to flow toward the rear washer nozzle. When the washer pump stops operating, the spring pressure on the check ball seats the ball in the valve and fluid flow in either direction within the rear washer plumbing is prevented. The rear washer nozzle and check valve cannot be adjusted or repaired and, if faulty or damaged, the entire center high-mounted stop lamp (CHMSL) must be replaced.

REMOVAL

NOTE: The rear washer system check valve is integral to the rear washer nozzle, which is part of the center high-mounted stop lamp.

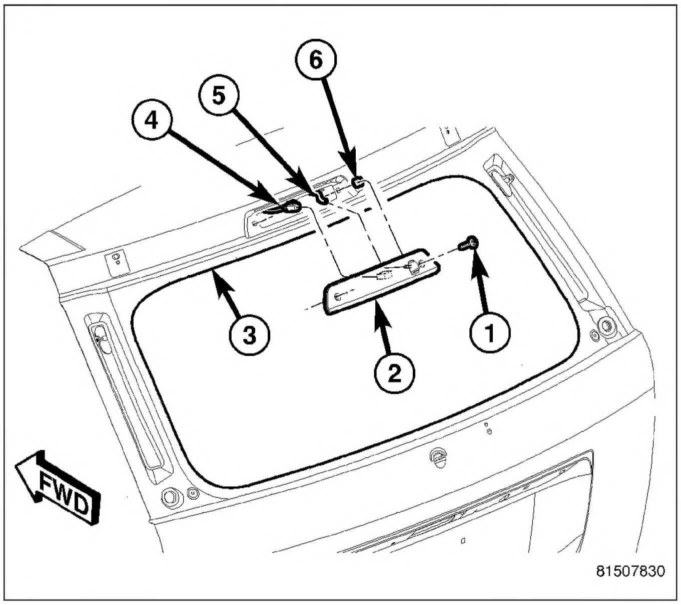
1. Disconnect and isolate the negative battery cable.
2. Remove the two screws (1) that secure the center high-mounted stop lamp (CHMSL) (2) to the rear of the liftgate (3).
3. Pull the CHMSL out from the liftgate outer panel far enough to access the wiring harness connector (4) and the washer supply hose (5).
4. Disconnect the wire harness connector from the CHMSL.
5. Disconnect the washer supply hose from the barbed nipple of the rear washer nozzle and remove the CHMSL.
6. If required, remove the two plastic retaining nuts (6) from the liftgate inner panel and discard.



INSTALLATION

NOTE: The rear washer system check valve and the rear washer nozzle are integral to the center high-mounted stop lamp (CHMSL).

1. If removed, install two new plastic retaining nuts (6) onto the liftgate inner panel (3).
2. Position the center high-mounted stop lamp (CHMSL) (2) to the liftgate outer panel.
3. Connect the washer supply hose (5) to the barbed nipple of the rear washer nozzle located on the CHMSL.
4. Connect the wire harness connector (4) to the CHMSL.
5. Install the CHMSL into the opening of the liftgate outer panel.
6. Install the two screws (1) that secure the CHMSL to the liftgate. Tighten the screws securely.

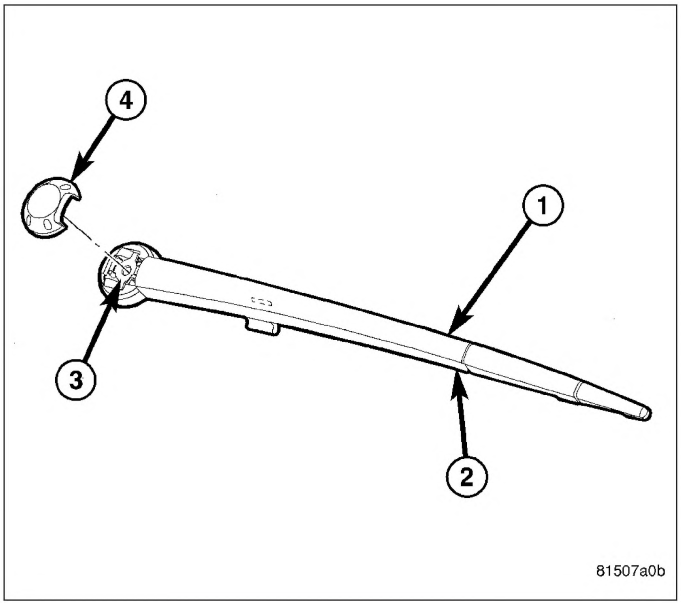


ARM-LIFTGATE WIPER

DESCRIPTION

The rear wiper arm (1) is the rigid member located between the rear wiper motor output shaft that protrudes from the outer liftgate panel near the base of the liftgate glass opening and the rear wiper blade (2). The wiper arm is constructed of molded black plastic. A hinged pivot end is also molded plastic, except for a tapered metal sleeve (3) that receives the wiper motor output shaft and a plate where the arm retaining nut is supported. A molded plastic cap (4) with a snap feature fits in the hole over the wiper arm retaining nut to conceal the nut and mounting hole following wiper arm installation.

The wiper arm hinge, pivot block and tension spring are all concealed on the underside of the wide end of the arm. The matching wiper blade has two pivot pins that latch into a receptacle concealed within the narrow end of the arm.



OPERATION

The rear wiper arm is designed to mechanically transmit the motion from the rear wiper motor output shaft to the rear wiper blade. The wiper arm must be properly indexed to the motor output shaft in order to maintain the proper wiper blade travel on the glass.

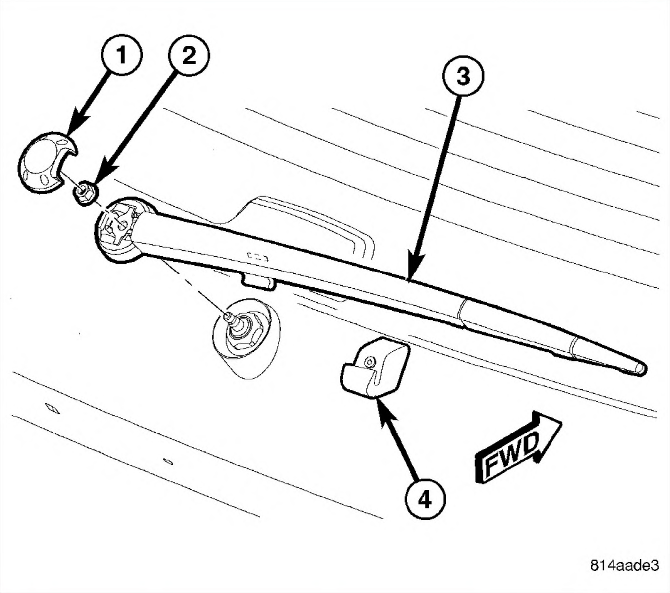
The tapered hole in the wiper arm pivot end interlocks with the serrations on the outer circumference of the tapered motor output shaft, allowing positive engagement and finite adjustment of this connection. A hex nut secures the wiper arm pivot end to the threads on the rear wiper motor output shaft and the plastic cap snaps over this connection for a neat appearance. The spring-loaded wiper arm hinge controls the down-force applied through the tip of the wiper arm to the wiper blade on the liftgate glass. The hook formation on the tip of the wiper arm provides a cradle for securing and latching the wiper blade pivot block to the wiper arm.

REMOVAL

1. Using a trim stick C-4755 or equivalent, gently pry the plastic cap (1) until it unsnaps from the mounting hole on the pivot end of the rear wiper arm (3).
2. Remove the nut (2) that secures the rear wiper arm to the rear wiper motor output shaft.

CAUTION: The use of a battery terminal puller when removing the rear wiper arm is NOT recommended as this may damage the rear wiper arm.

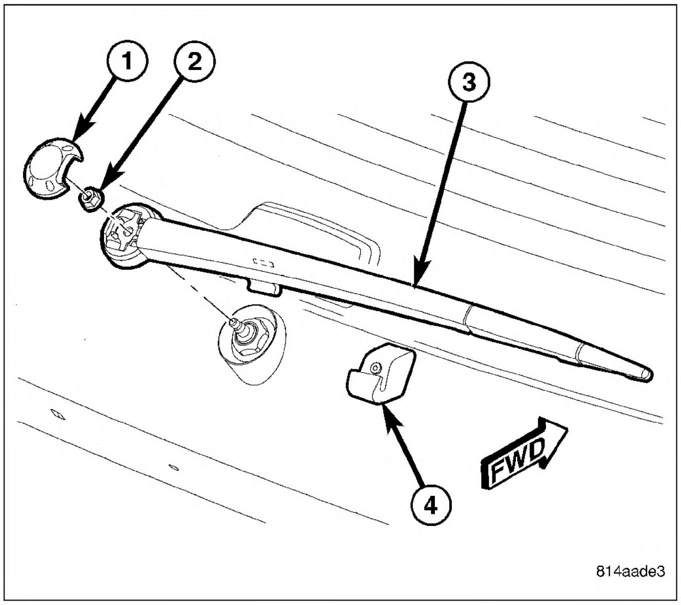
3. Use a slight rocking action to remove the rear wiper arm from the output shaft.



INSTALLATION

NOTE: Be certain that the rear wiper motor is in the park position before attempting to install the rear wiper arm. Turn the ignition switch to the On position and move the rear wiper switch to its Off position. If the wiper motor output shaft moves, wait until it stops moving, then turn the ignition switch back to the Off position. The wiper motor is now in its park position.

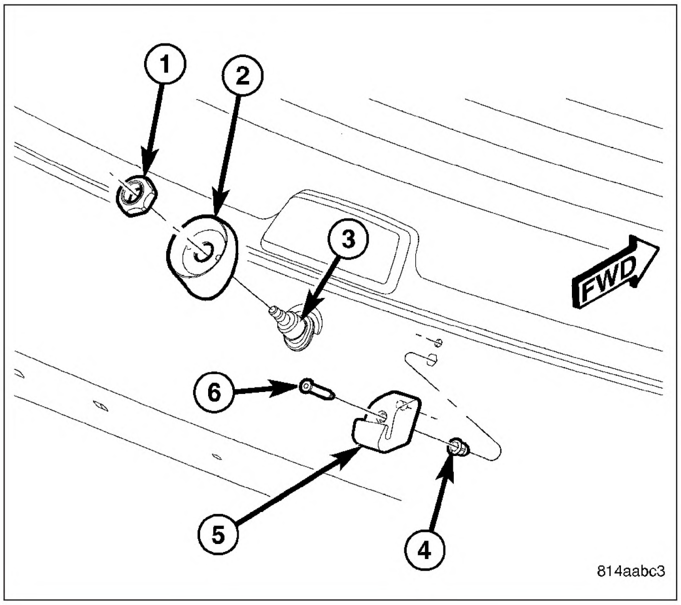
1. Index the rear wiper arm (3) to the rear wiper motor output shaft with the rear wiper motor in its Park position and with the rear wiper arm seated in the molded rubber rear wiper arm park ramp (4).
2. With the rear wiper arm properly indexed, push the tapered mounting hole on the pivot end of the wiper arm down over the output shaft.
3. Install the nut (2) that secures the rear wiper arm to the rear wiper motor output shaft. Tighten the nut to 9 N·m (80 in. lbs.).
4. Wet the liftgate glass and operate the rear wiper system. Then turn the rear wiper switch to the Off position and check for correct wiper arm position. Adjust as required.
5. Install the plastic cap (1) onto the pivot end of the rear wiper arm.



WIPER ARM PARK RAMP

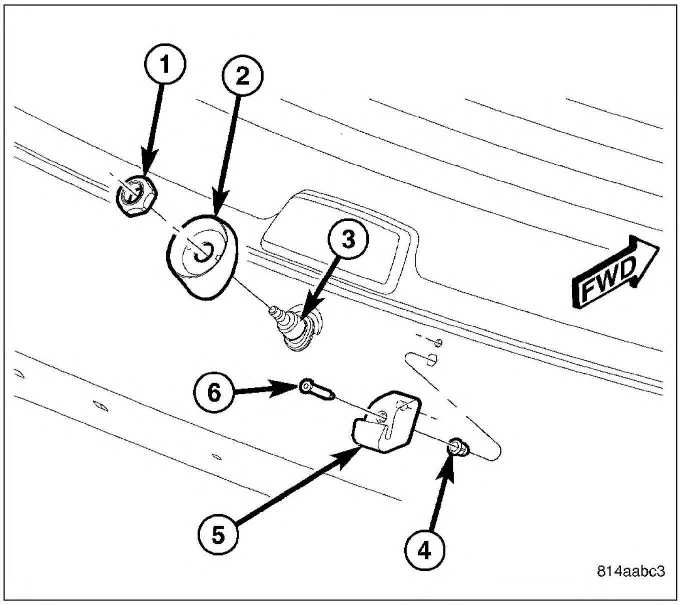
REMOVAL

1. Disengage the rear wiper arm from the wiper arm park ramp (5) located on the right side of the liftgate just below the liftgate flip-up glass.
2. Lift the rear wiper arm and blade away from the liftgate until the wiper arm hinge is in its over-center position.
3. Remove the screw (6) that secures the wiper arm park ramp to the liftgate outer panel.
4. Remove the wiper arm park ramp from the liftgate outer panel.



INSTALLATION

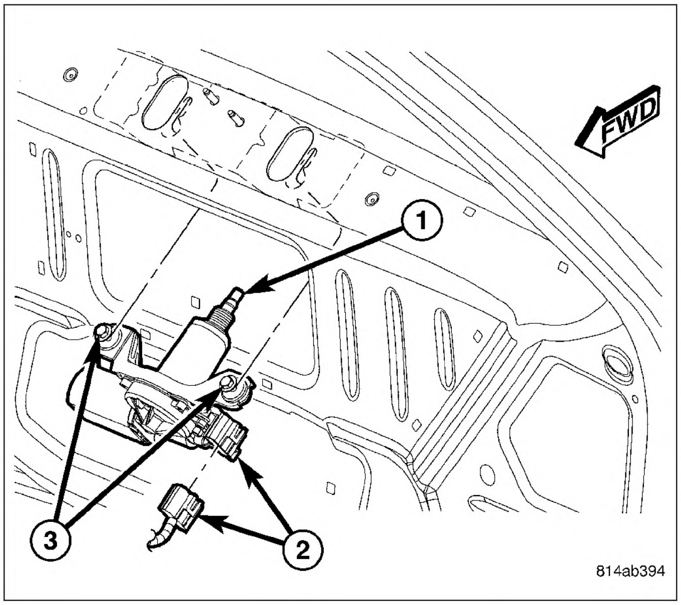
1. Position the rear wiper arm park ramp (5) onto the liftgate outer panel.
2. Install the screw (6) that secures the wiper arm park ramp to the liftgate outer panel. Tighten the screw to 5.6 N·m (50 in. lbs.).
3. Position the rear wiper arm and blade into the wiper arm park ramp.



MOTOR-REAR WINDOW WIPER

DESCRIPTION

The rear wiper motor is concealed within the liftgate, below the liftgate glass and behind the liftgate inner trim panel. The end of the motor output shaft (1) that extends through the liftgate outer panel to drive the rear wiper arm and blade is the only visible component of the rear wiper motor. A rubber bezel and grommet is engaged within the output shaft hole of the liftgate outer panel and seals the output shaft where it passes through the panel. An integral connector receptacle (2) connect the rear wiper motor to the vehicle electrical system through a dedicated take out and connector of the liftgate wire harness. The rear wiper motor consists of the following major components:



- **Bracket** - The rear wiper motor bracket consists of a mounting plate for the wiper motor that is secured with two bolts and rubber isolators (3) to the liftgate inner panel.
- **Motor** - The single-speed permanent magnet rear wiper motor is secured to the rear wiper motor bracket. The wiper motor includes an integral transmission, motor output shaft, automatic resetting circuit breaker and the rear wiper motor park switch.

OPERATION

Rear wiper motor operation is controlled by the rear wiper relay, which controls battery current flow to the rear wiper motor based upon control outputs from the front control module (FCM). The FCM uses internal programming, hard wired outputs from the rear wiper motor park switch, and electronic messages received over the controller area network (CAN) data bus from the steering control module (SCM).

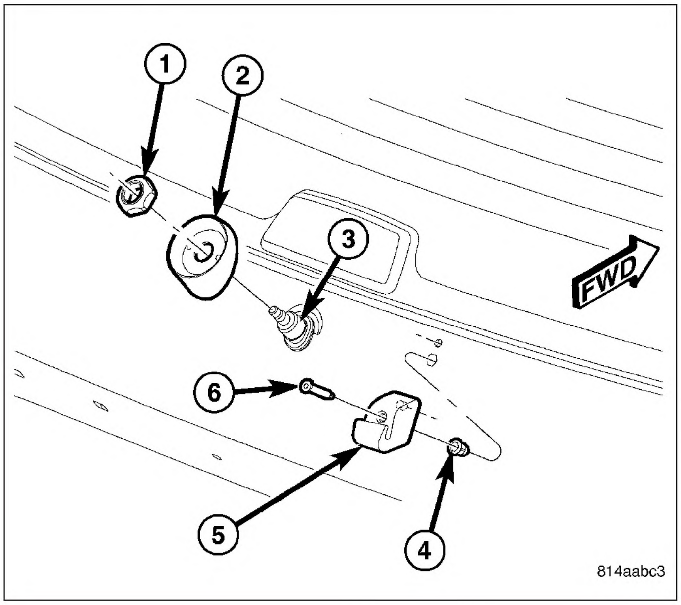
The rear wiper motor park switch is a single pole, single throw, momentary switch within the wiper motor that is mechanically actuated by the wiper motor transmission components. The park switch alternately closes and opens a path to ground for the rear wiper motor control circuit input to the FCM, depending upon the position of the rear wiper blade on the liftgate glass. This feature allows the FCM to monitor the number of rear wiper motor cycles, as well as to keep the rear wiper relay energized long enough for the motor to complete its current wipe cycle after the wiper system or the ignition has been turned Off, and to park the wiper blade.

The rear wiper motor is grounded at all times through a take out with an eyelet terminal connector in the body wire harness that is secured to a ground location in the passenger compartment. The automatic resetting circuit breaker protects the motor from overloads. The rear wiper motor transmission converts the rotary output of the wiper motor to the back and forth wiping motion of the rear wiper arm and blade on the liftgate glass.

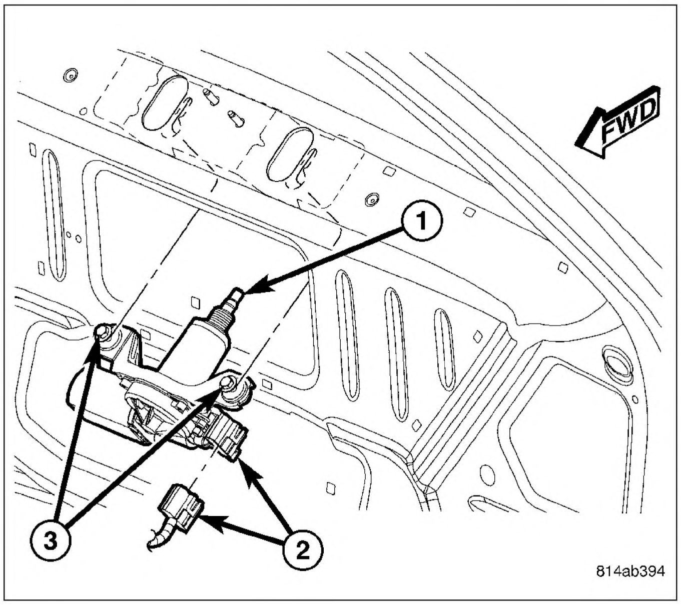
The hard wired inputs and outputs of the rear wiper motor may be diagnosed using conventional diagnostic tools and methods. Refer to the appropriate wiring information. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the SCM, FCM, CAN data bus or the electronic message inputs used to control rear wiper motor operation. The most reliable, efficient, and accurate means to diagnose the SCM, FCM, CAN data bus and the electronic message inputs and outputs that control rear wiper motor operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Remove the rear wiper arm (Refer to 8 - ELECTRICAL/REAR WIPERS/WASHERS/REAR WIPER ARM - REMOVAL).
3. Remove nut (1) and the bezel (2) from the rear wiper motor output shaft (3).

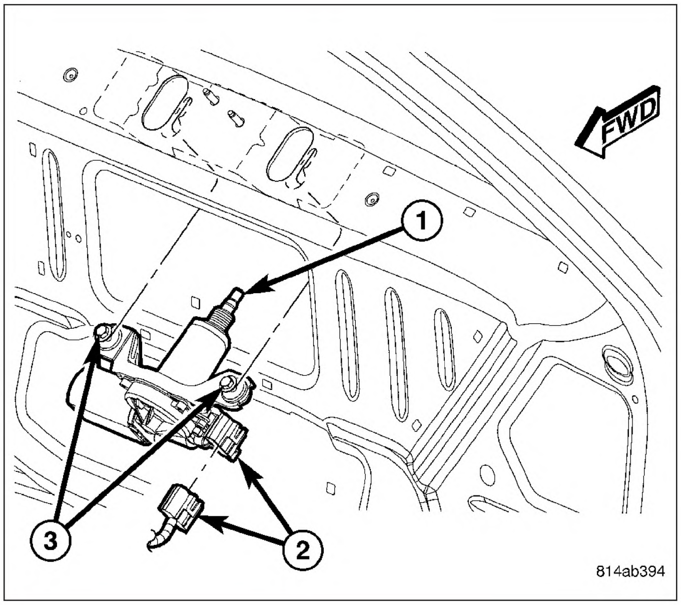


4. Remove the trim panel from the liftgate inner panel (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - REMOVAL).
5. Disconnect the wire harness connector from the rear wiper motor connector (3).
6. Loosen the two bolts (3) that secure the motor mounting bracket to the liftgate inner panel.
7. Pull the rear wiper motor (1) forward to disengage the two bolts from the liftgate and remove the rear wiper motor.

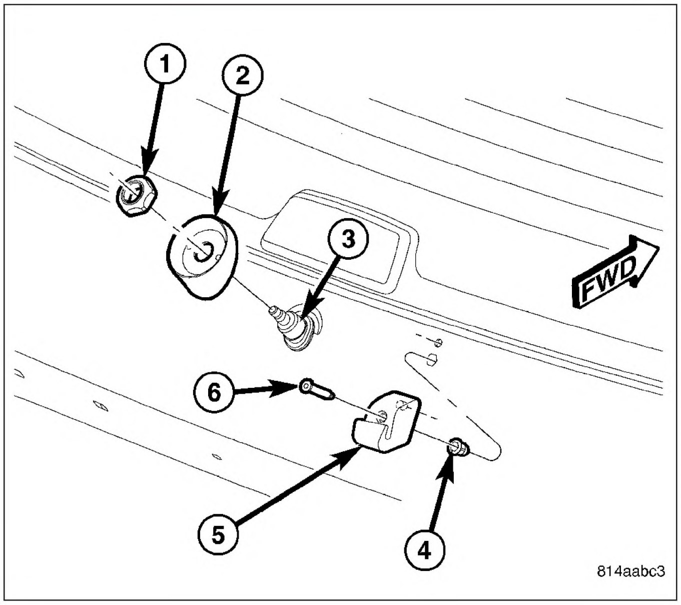


INSTALLATION

1. Position the rear wiper motor (1) and mounting bracket bolts (3) into the liftgate as an assembly.
2. Tighten the two bolts that secure the mounting bracket to the liftgate. Tighten the bolts to 8 N·m (72 in. lbs.).
3. Connect the wire harness connector to the motor connector receptacle (2).
4. Install the trim panel onto the liftgate inner panel (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - INSTALLATION).



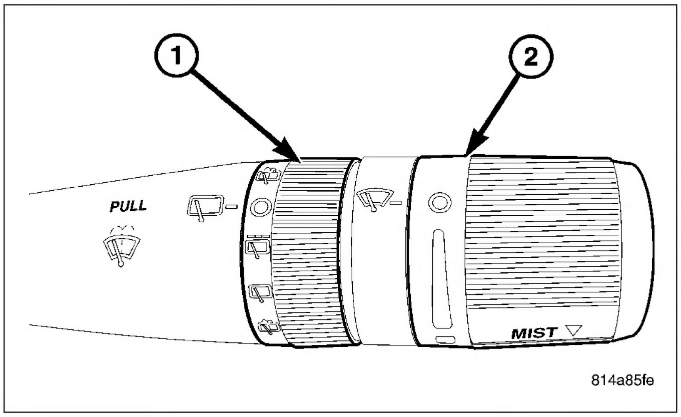
5. From the outside of the liftgate, install the bezel (2) over the motor output shaft (3) and engage it in the mounting hole of the liftgate outer panel.
6. Install the nut (1) that secures the bezel to the motor output shaft. Tighten the nut to 4.5 N·m (40 in. lbs.).
7. Install the rear wiper arm (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION).
8. Reconnect the negative battery cable.



RIGHT MULTI-FUNCTION SWITCH

DESCRIPTION

The right (wiper) multi-function switch is secured to the right side of the multi-function switch mounting housing at the top of the steering column, just below the steering wheel. The only visible component of the right multi-function switch is the control stalk that extends through a dedicated opening in the right side of the steering column shrouds and contains the rear wiper/washer control sleeve (1) and the front wiper control knob (2). The remainder of the right multi-function switch is concealed beneath the steering column shrouds. Refer to 8 - ELECTRICAL/WIPERS/WASHERS/RIGHT MULTI-FUNCTION SWITCH - DESCRIPTION for more information.

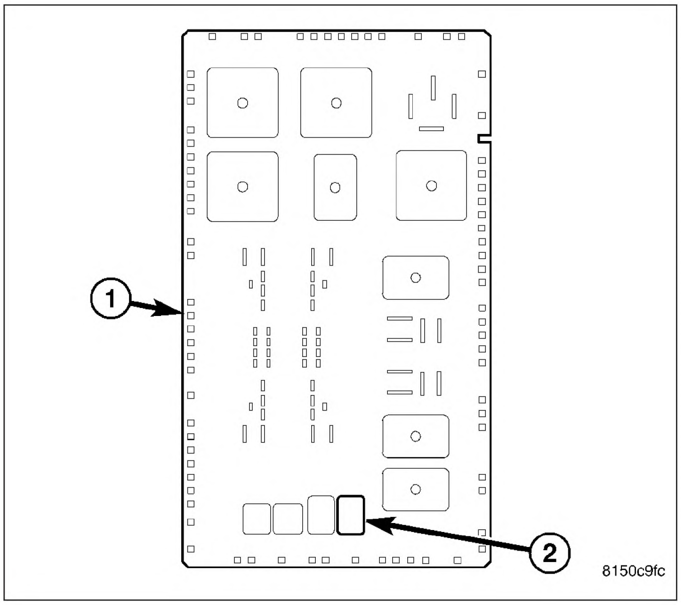


RELAY-WIPER-REAR

DESCRIPTION

The rear wiper relay (2) conforms to ISO specifications for current capacities, terminal functions and patterns. This relay is contained within a small, rectangular, housing and is connected to all of the required inputs and outputs through hard-wired connections to the base plate of the junction block (JB) (1).

The JB is located in the passenger compartment, underneath the driver side of the instrument panel. The rear wiper relay cannot be adjusted or repaired and, if found faulty or damaged, the entire junction block base plate must be replaced.



OPERATION

The rear wiper relay is an electromechanical switch that uses a low current input from the front control module (FCM) to control a high current output to the rear wiper motor. The movable common feed contact point is held against the fixed normally closed contact point by spring pressure. When the relay coil is energized, an electromagnetic field is produced by the coil windings. This electromagnetic field draws the movable relay contact point away from the fixed normally closed contact point, and holds it against the fixed normally open contact point. When the relay coil is de-energized, spring pressure returns the movable contact point back against the fixed normally closed contact point. A resistor is connected in parallel with the relay coil in the relay, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

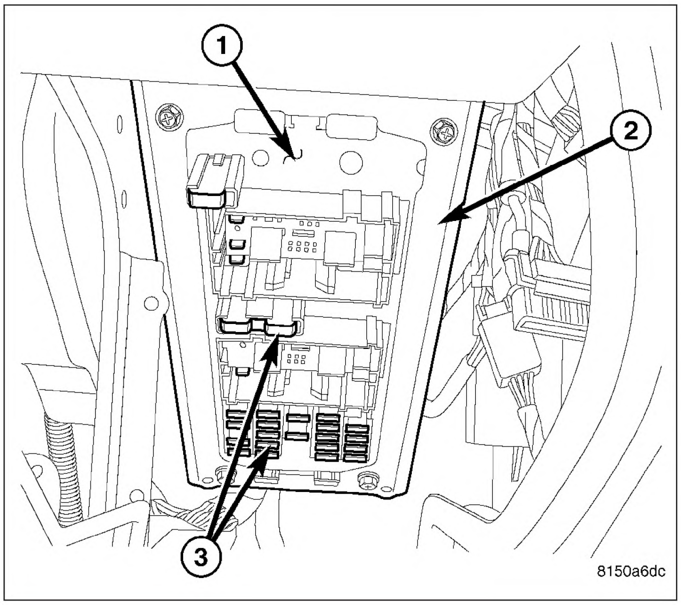
The rear wiper relay terminals are connected to the vehicle electrical system through hard-wired connections to the junction block (JB). The inputs and outputs of the rear wiper relay include:

- **Common Feed Terminal** - The common feed terminal (30) recieves battery (B+) current through a fuse in the JB at all times.
- **Coil Ground Terminal** - The coil ground terminal (85) is connected to a control output of the FCM through a rear wiper control circuit. The FCM controls rear wiper motor operation by controlling a ground path through this circuit.
- **Coil Battery Terminal** - The coil battery terminal (86) receives fused battery current at all times.
- **Normally Open Terminal** - The normally open terminal (87) is connected to the rear wiper motor control circuity whenever the relay is energized.
- **Normally Closed Terminal** - The normally closed terminal (87A) is not connected to any circuit in this application, but provides a battery current output only when the rear wiper relay coil is de-energized.

The rear wiper relay can be diagnosed using conventional diagnostic tools and methods. However, conventional diagnostic methods may not prove conclusive in the diagnosis of the steering control module (SCM), FCM or the electronic message inputs to or outputs from the SCM and the FCM that control the operation of the rear wiper relay. The most reliable, efficient, and accurate means to diagnose the rear wiper relay, SCM, FCM or the electronic message inputs and outputs related to the rear wiper relay operation requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

REMOVAL

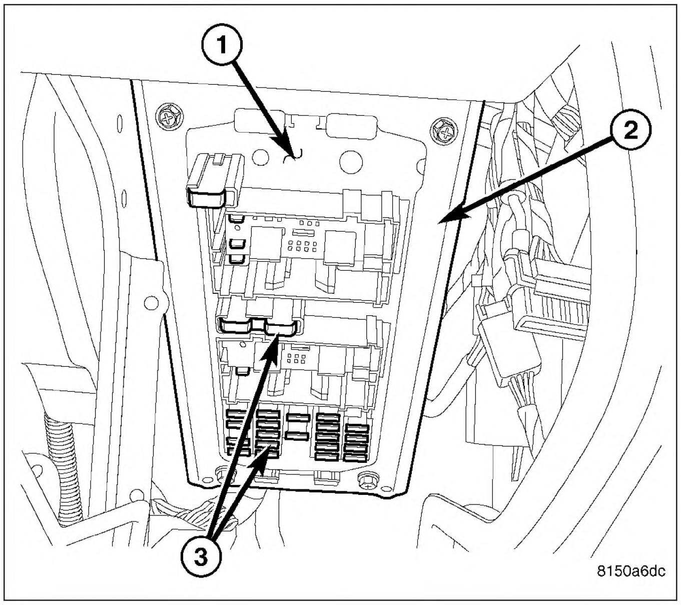
1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connectors and remove the junction block (JB) (1) from the mounting bracket (2) underneath the left side of the instrument panel (Refer to 8 - ELECTRICAL/ POWER DISTRIBUTION/JUNCTION BLOCK - REMOVAL).



NOTE: To aid in reinstallation, note the installed positions of all of the replaceable ISO relays and all fuses prior to removing them from the base plate of the JB.

3. Remove all of the fuses and replaceable ISO relays (3) from the bottom and top side of the JB base plate.

INSTALLATION



CAUTION: Make sure to properly position of all of the replaceable ISO relays and all fuses into the base plate of the junction block (JB). Failure to properly install the relays and fuses could cause possible damage to vehicle wiring and electronic systems.

1. Position the replaceable ISO relays and fuses (3) to the bottom and the top side of the base plate of the junction block (JB) (1).
2. Align the relay and fuse terminals with there proper terminal cavities in the JB and push down firmly on the relays and fuses until their terminals are fully seated.
3. Install the junction block (JB) onto the mounting bracket (2) and connect the wire harness connectors (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - INSTALLATION).
4. Reconnect the negative battery cable.

NAVIGATION/TELECOMMUNICATION

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NAVIGATION/TELECOMMUNICATION - ELECTRICAL DIAGNOSTICS

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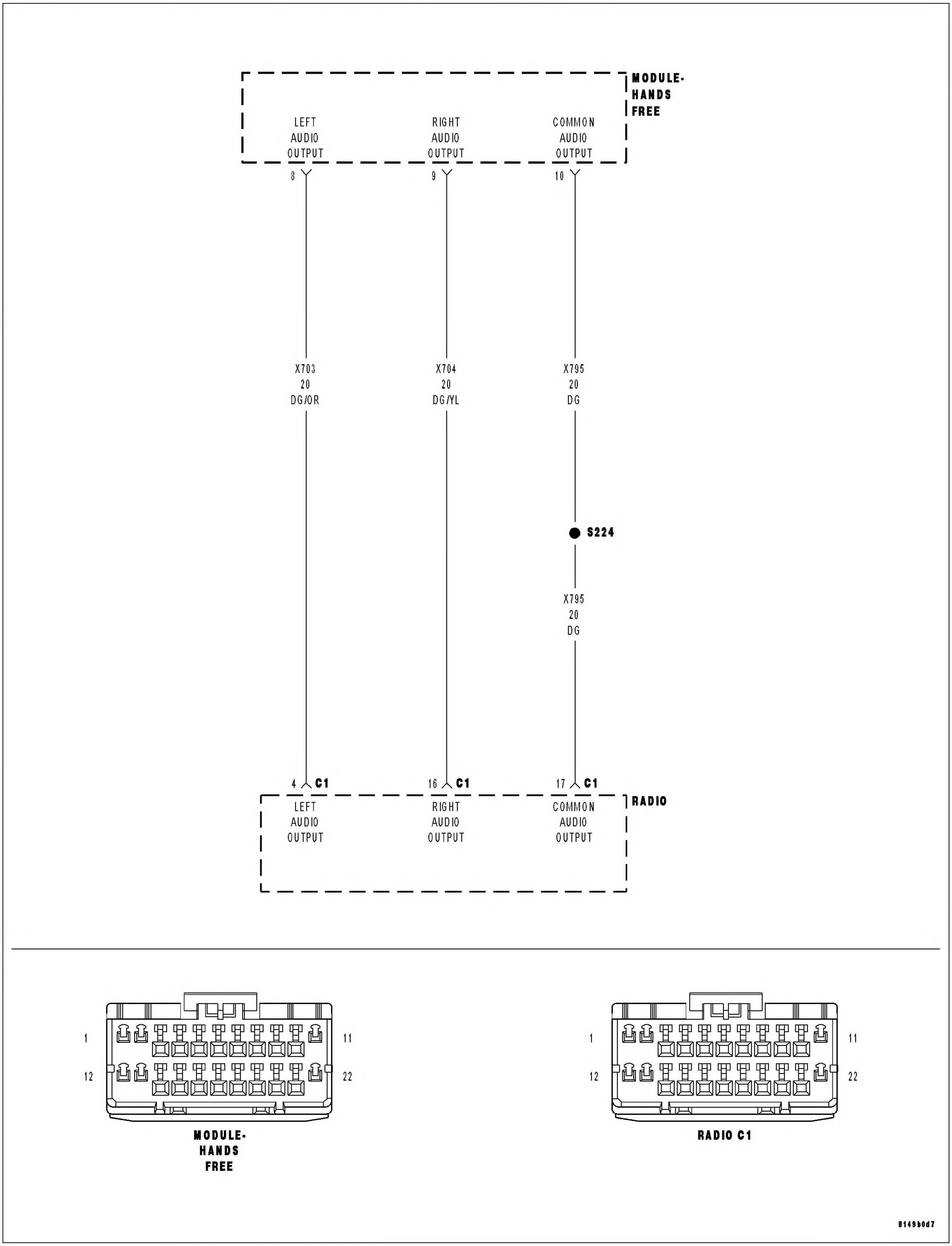
NAVIGATION/TELECOMMUNICATION - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

B1411-HFM LEFT AUDIO OUTPUT CIRCUIT LOW


MODULE-
HANDS
FREE
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT
8
9
10
X703 20 DG/OR
X704 20 DG/YL
X795 20 DG
S224
X795 20 DG
4 C1
16 C1
17 C1
RADIO
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT
1
11
12
22
MODULE-
HANDS
FREE
1
11
12
22
RADIO C1
8149b0d7

B1411-HFM LEFT AUDIO OUTPUT CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects low voltage on the (X703) Left Audio Output circuit.

Possible Causes
(X703) LEFT AUDIO OUTPUT CIRCUIT OPEN
(X703) LEFT AUDIO OUTPUT CIRCUIT SHORT TO GROUND
(X795) COMMON AUDIO OUTPUT CIRCUIT OPEN
(X703) LEFT AUDIO OUTPUT CIRCUIT SHORT TO (X795) COMMON AUDIO OUTPUT CIRCUIT
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

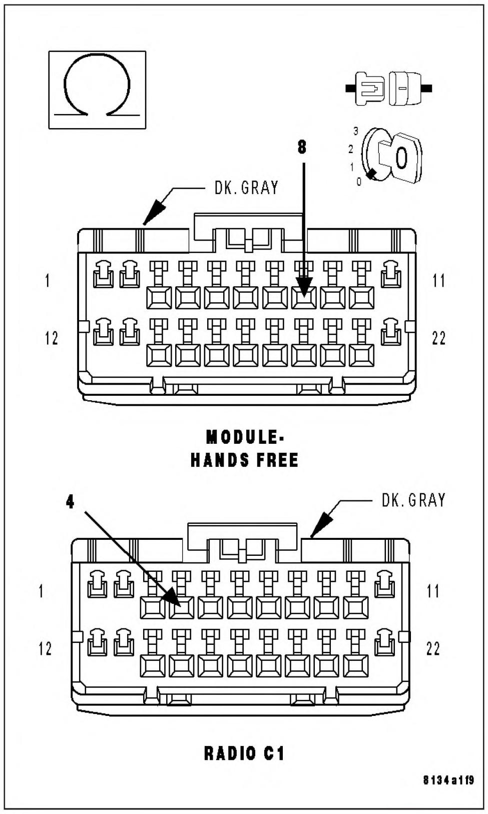
Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B1411-HFM LEFT AUDIO OUTPUT CIRCUIT LOW (CONTINUED)

2. (X703) LEFT AUDIO OUTPUT CIRCUIT OPEN


8
DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
4
DK. GRAY
1
11
12
22
RADIO C1
8134a1f9

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Disconnect the Radio C1 harness connector.

Measure the resistance of the (X703) Left Audio Output circuit between the HFM connector and the radio connector.

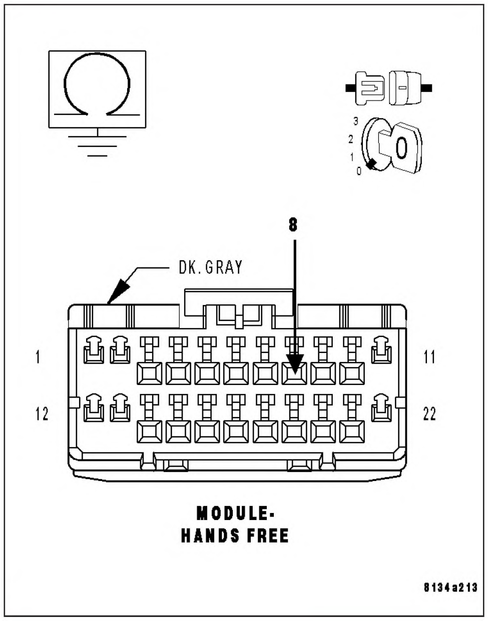
Is the resistance below 5.0 ohms?

Yes >> Go To 3

No >> Repair the (X703) Left Audio Output circuit for an open
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. (X703) LEFT AUDIO OUTPUT CIRCUIT SHORT TO GROUND


8
DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
8134a213

Measure the resistance between ground and the (X703) Left Audio Output circuit.

Is the resistance below 5.0 ohms?

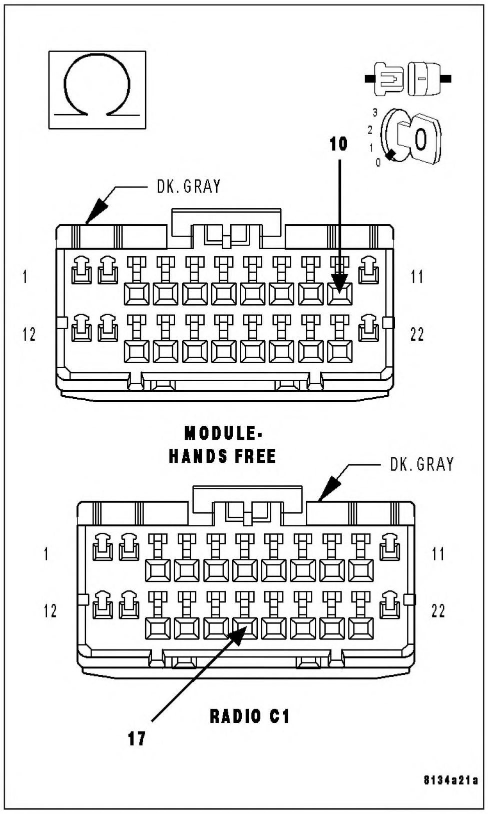
Yes >> Repair the (X703) Left Audio Output circuit for short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1411-HFM LEFT AUDIO OUTPUT CIRCUIT LOW (CONTINUED)

4. (X795) COMMON AUDIO OUTPUT CIRCUIT OPEN

Measure the resistance of the (X795) Common Audio Output circuit between the HFM connector and the radio connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

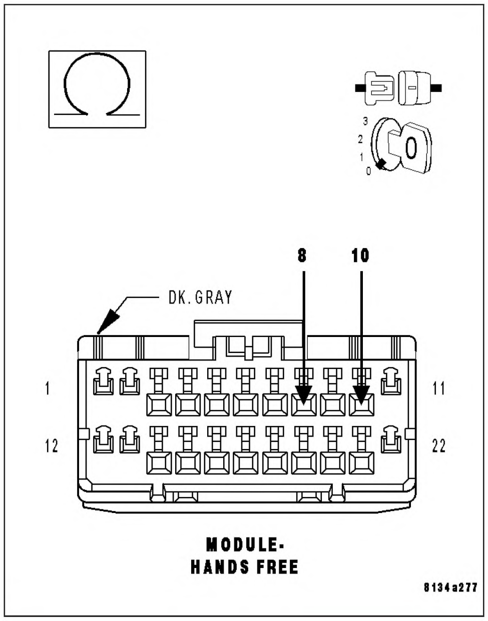
No >> Repair the (X795) Common Audio Output circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

5. (X703) LEFT AUDIO OUTPUT CIRCUIT SHORT TO (X795) COMMON AUDIO OUTPUT CIRCUIT

Measure the resistance between the (X703) Left Audio Output circuit and the (X795) Common Audio Output circuit.



Is the resistance below 5.0 ohms?

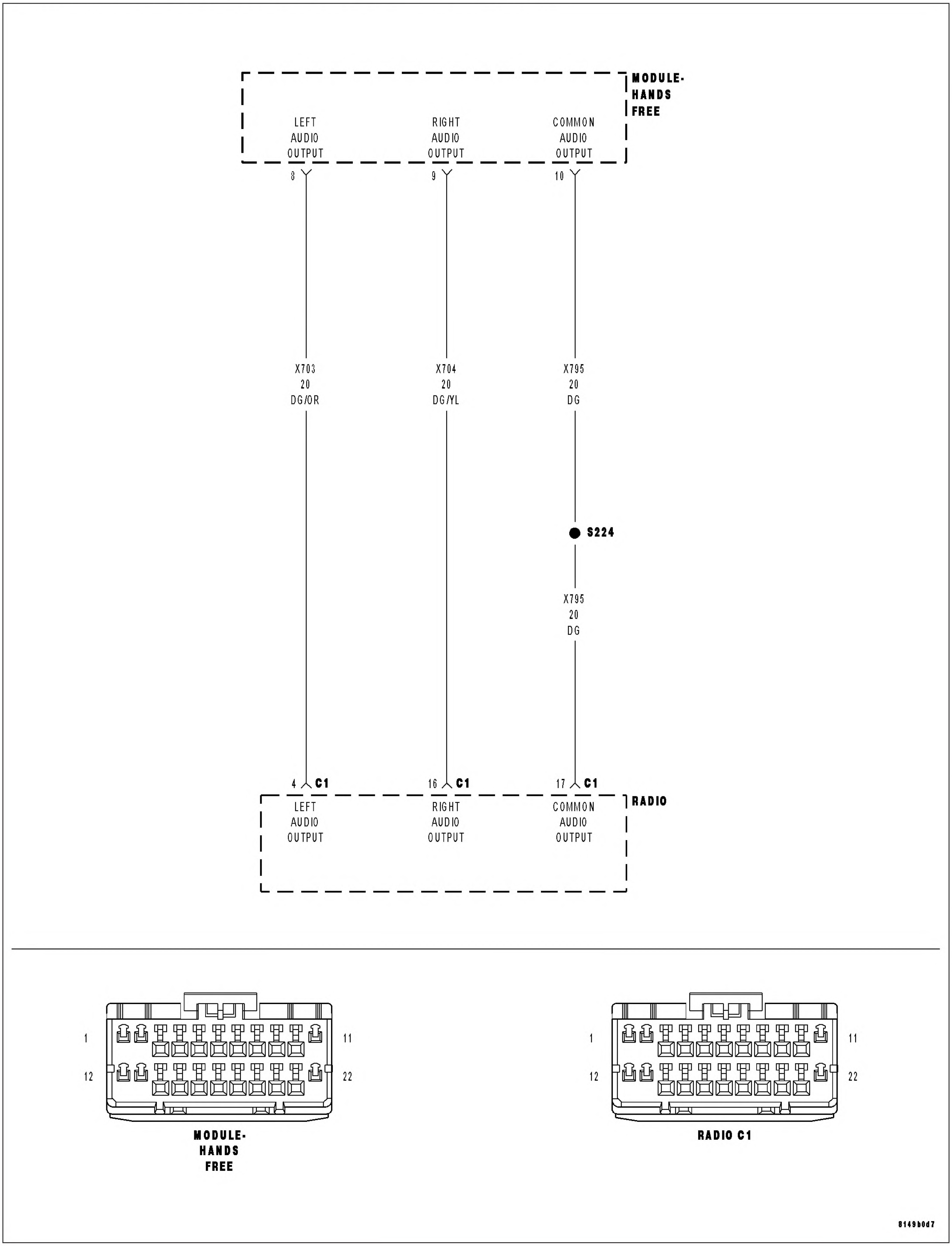
Yes >> Repair the (X703) Left Audio Output circuit for a short to the (X795) Common Audio Output circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1412-HFM LEFT AUDIO OUTPUT CIRCUIT HIGH


MODULE-
HANDS
FREE
LEFT
AUDIO
OUTPUT
RIGHT
AUDIO
OUTPUT
COMMON
AUDIO
OUTPUT
8
9
10
X703
20
DG/OR
X704
20
DG/YL
X795
20
DG
S224
X795
20
DG
4 C1
16 C1
17 C1
RADIO
LEFT
AUDIO
OUTPUT
RIGHT
AUDIO
OUTPUT
COMMON
AUDIO
OUTPUT
1
11
12
22
MODULE-
HANDS
FREE
1
11
12
22
RADIO C1
8149b0d7

B1412-HFM LEFT AUDIO OUTPUT CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects high voltage on the (X703) Left Audio Output circuit.

Possible Causes
(X703) LEFT AUDIO OUTPUT CIRCUIT OPEN
(X795) COMMON AUDIO OUTPUT CIRCUIT OPEN
(X703) LEFT AUDIO OUTPUT CIRCUIT SHORT TO VOLTAGE
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC’s.

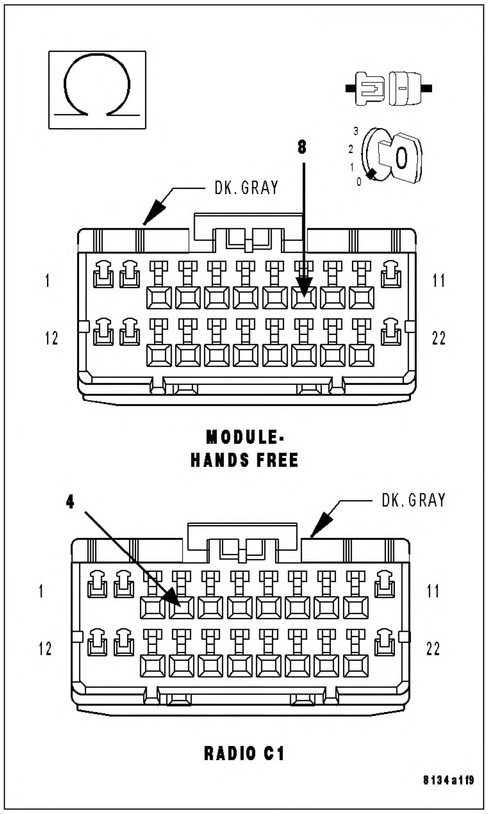
Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B1412-HFM LEFT AUDIO OUTPUT CIRCUIT HIGH (CONTINUED)

2. (X703) LEFT AUDIO OUTPUT CIRCUIT OPEN


8
DK. GRAY
3
2
1
0
0
1
11
12
22
MODULE-
HANDS FREE
4
DK. GRAY
1
11
12
22
RADIO C1
8134a119

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Disconnect the Radio C1 harness connector.

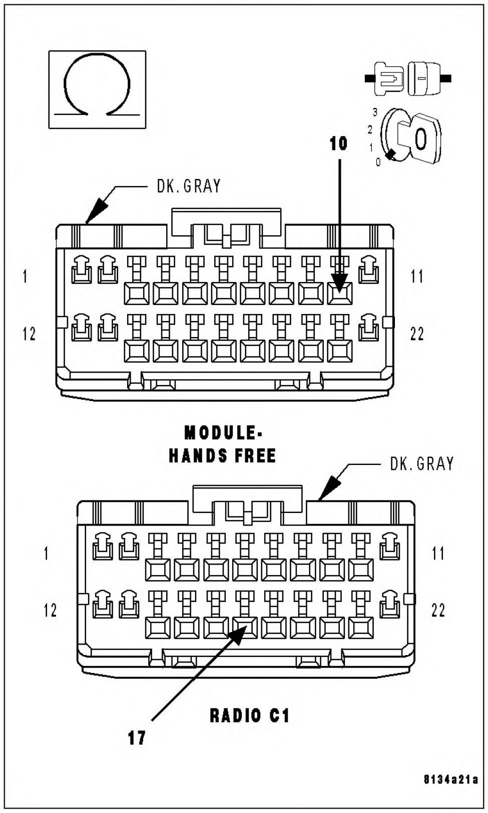
Measure the resistance of the (X703) Left Audio Output circuit between the HFM connector and the radio connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 3

No >> Repair the (X703) Left Audio Output circuit for an open
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

3. (X795) COMMON AUDIO OUTPUT CIRCUIT OPEN


3
2
1
0
0
10
DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
DK. GRAY
1
11
12
22
RADIO C1
17
8134a21a

Measure the resistance of the (X795) Common Audio Output circuit between the HFM connector and the radio connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 4

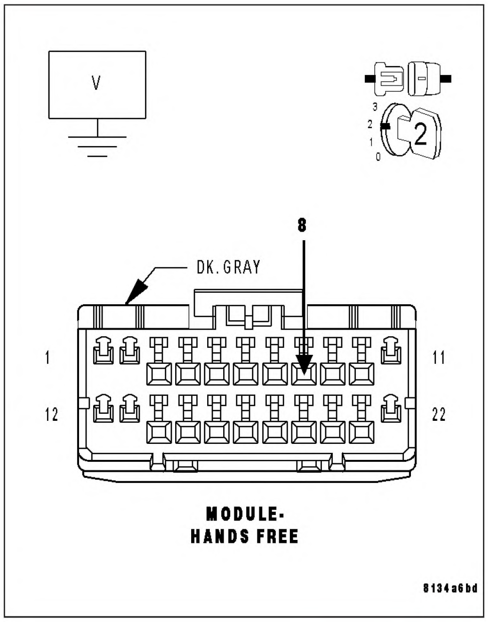
No >> Repair the (X795) Common Audio Output circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1412-HFM LEFT AUDIO OUTPUT CIRCUIT HIGH (CONTINUED)

4. (X703) LEFT AUDIO OUTPUT CIRCUIT SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (X703) Left Audio Output circuit.



Is the voltage above 1.0 volts?

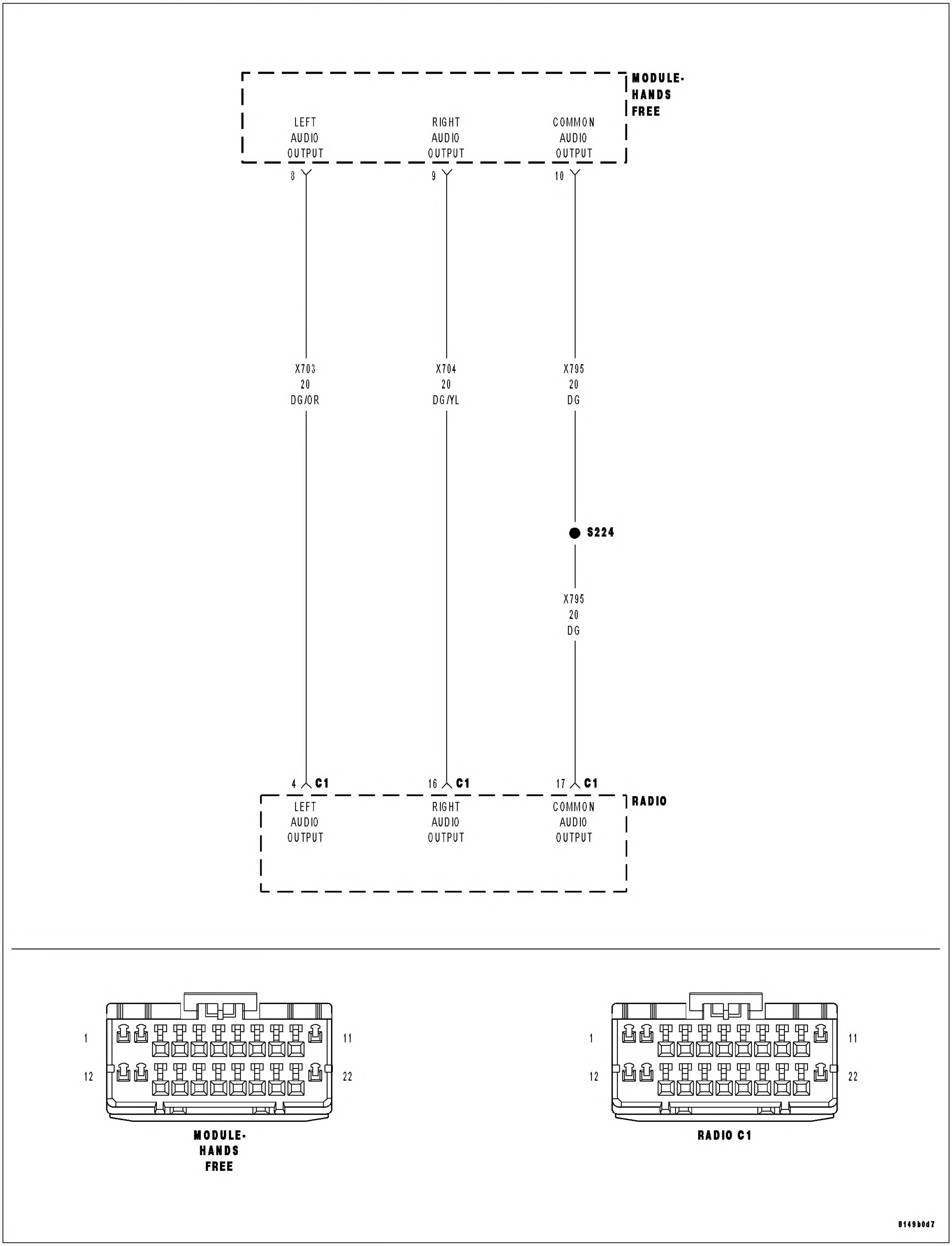
Yes >> Repair the (X703) Left Audio Output circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1415-HFM RIGHT AUDIO OUTPUT CIRCUIT LOW


MODULE-
HANDS
FREE
LEFT
AUDIO
OUTPUT
RIGHT
AUDIO
OUTPUT
COMMON
AUDIO
OUTPUT
8
9
10
X703
20
DG/OR
X704
20
DG/YL
X795
20
DG
S224
X795
20
DG
4 C1
16 C1
17 C1
RADIO
LEFT
AUDIO
OUTPUT
RIGHT
AUDIO
OUTPUT
COMMON
AUDIO
OUTPUT
1
11
12
22
MODULE-
HANDS
FREE
1
11
12
22
RADIO C1
8149b0d7

B1415-HFM RIGHT AUDIO OUTPUT CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects low voltage on the (X704) Right Audio Output circuit.

Possible Causes
(X704) RIGHT AUDIO OUTPUT CIRCUIT OPEN
(X704) RIGHT AUDIO OUTPUT CIRCUIT SHORT TO GROUND
(X795) COMMON AUDIO OUTPUT CIRCUIT OPEN
(X704) RIGHT AUDIO OUTPUT CIRCUIT SHORT TO (X795) COMMON AUDIO OUTPUT CIRCUIT
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B1415-HFM RIGHT AUDIO OUTPUT CIRCUIT LOW (CONTINUED)

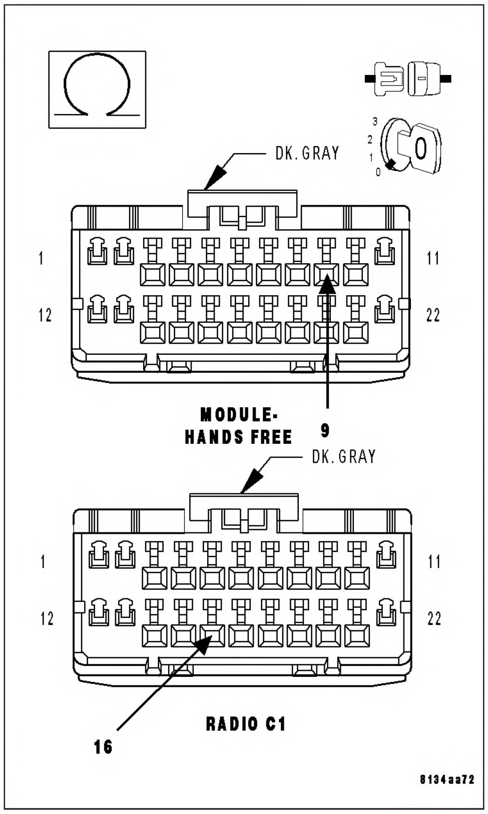
2. (X704) RIGHT AUDIO OUTPUT CIRCUIT OPEN

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Disconnect the Radio C1 harness connector.

Measure the resistance of the (X704) Right Audio Output circuit between the HFM connector and the radio connector.


DK. GRAY
3
2
1
0
1
11
12
22
MODULE-
HANDS FREE
9
DK. GRAY
1
11
12
22
RADIO C1
16
8134aa72

Is the resistance below 5.0 ohms?

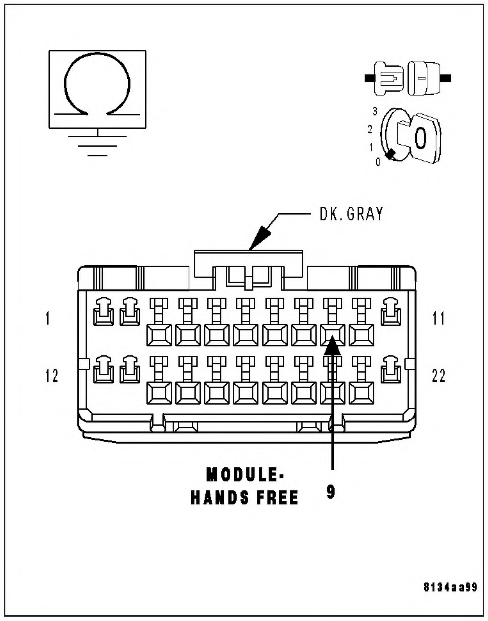
Yes >> Go To 3

No >> Repair the (X704) Right Audio Output circuit for an open. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. (X704) RIGHT AUDIO OUTPUT CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (X704) Right Audio Output circuit.


DK. GRAY
3
2
1
0
1
11
12
22
MODULE-
HANDS FREE
9
8134aa99

Is the resistance below 5.0 ohms?

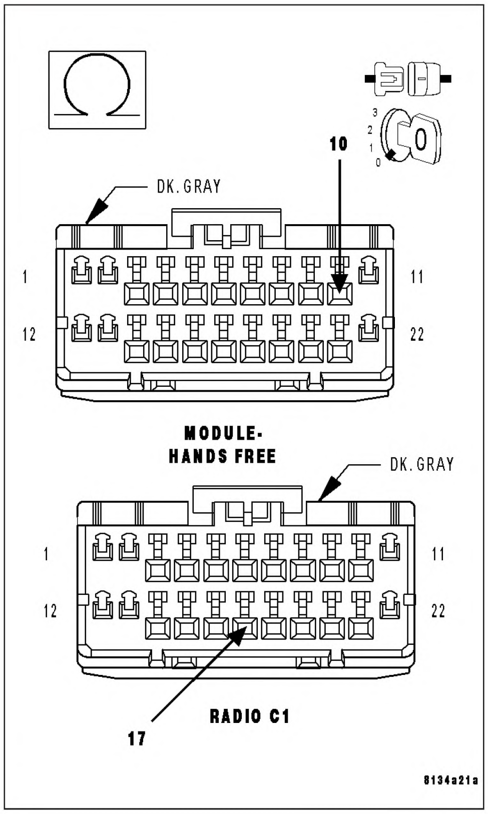
Yes >> Repair the (X704) Right Audio Output circuit for short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1415-HFM RIGHT AUDIO OUTPUT CIRCUIT LOW (CONTINUED)

4. (X795) COMMON AUDIO OUTPUT CIRCUIT OPEN

Measure the resistance of the (X795) Common Audio Output circuit between the HFM connector and the radio connector.



Is the resistance below 5.0 ohms?

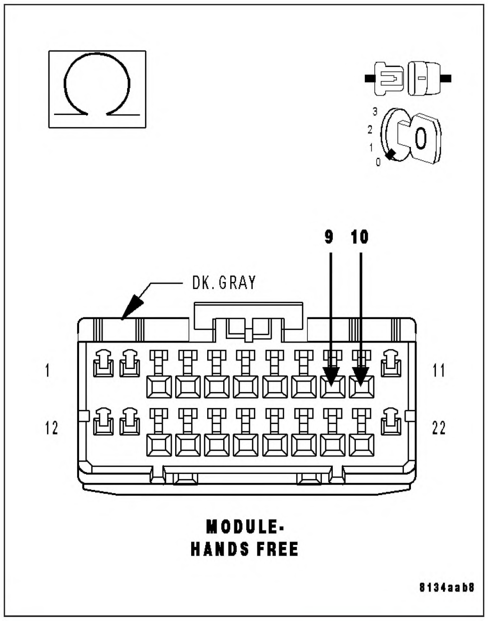
Yes >> Go To 5

No >> Repair the (X795) Common Audio Output circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

5. (X704) RIGHT AUDIO OUTPUT CIRCUIT SHORT TO (X795) COMMON AUDIO OUTPUT CIRCUIT

Measure the resistance between the (X704) Right Audio Output circuit and the (X795) Common Audio Output circuit.



Is the resistance below 5.0 ohms?

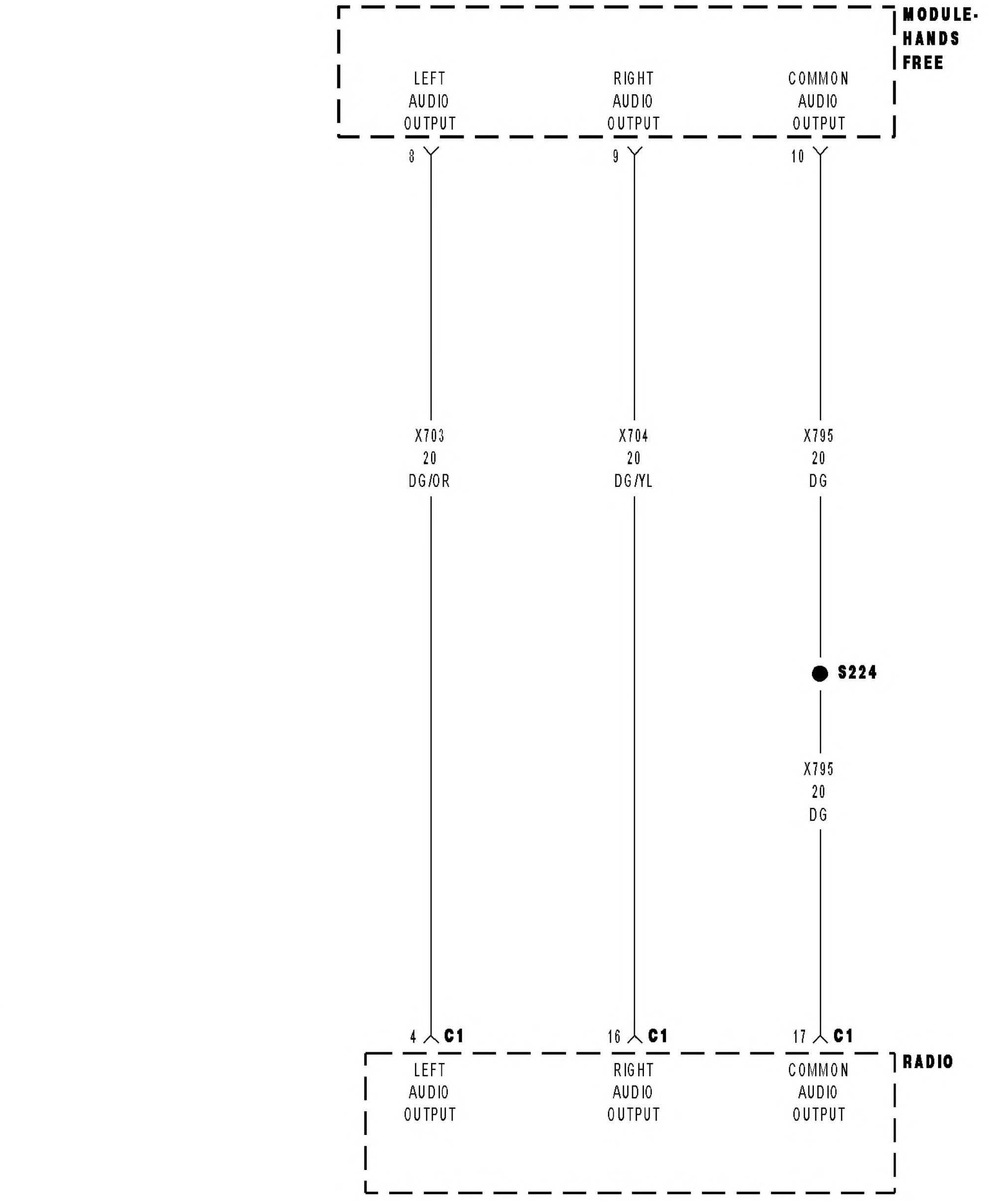
Yes >> Repair the (X704) Right Audio Output circuit for a short to the (X795) Common Audio Output circuit.

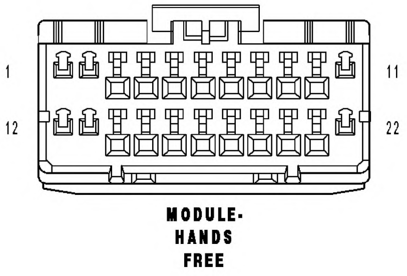
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

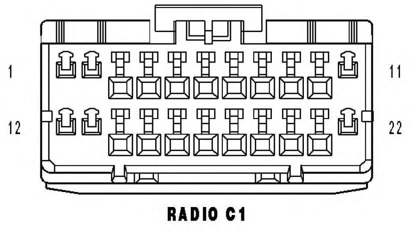
No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1416-HFM RIGHT AUDIO OUTPUT CIRCUIT HIGH


MODULE-
HANDS
FREE
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT
8
9
10
X703
20
DG/OR
X704
20
DG/YL
X795
20
DG
S224
X795
20
DG
4 C1
16 C1
17 C1
RADIO
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT


1
11
12
22
MODULE-
HANDS
FREE


1
11
12
22
RADIO C1

8149b0d7

B1416-HFM RIGHT AUDIO OUTPUT CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects high voltage on the (X704) Right Audio Output circuit.

Possible Causes
(X704) RIGHT AUDIO OUTPUT CIRCUIT OPEN
(X795) COMMON AUDIO OUTPUT CIRCUIT OPEN
(X704) RIGHT AUDIO OUTPUT CIRCUIT SHORT TO VOLTAGE
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

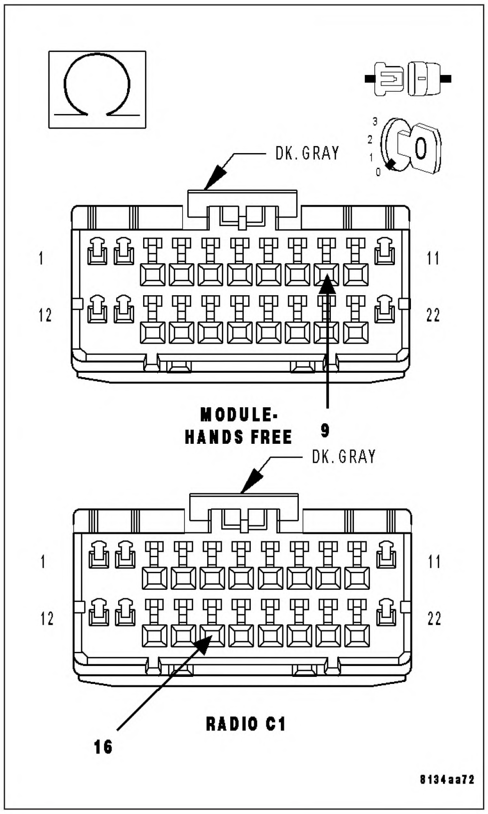
Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B1416-HFM RIGHT AUDIO OUTPUT CIRCUIT HIGH (CONTINUED)

2. (X704) RIGHT AUDIO OUTPUT CIRCUIT OPEN


DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
9
DK. GRAY
1
11
12
22
RADIO C1
16
8134aa72

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Disconnect the Radio C1 harness connector.

Measure the resistance of the (X704) Right Audio Output circuit between the HFM connector and the radio connector.

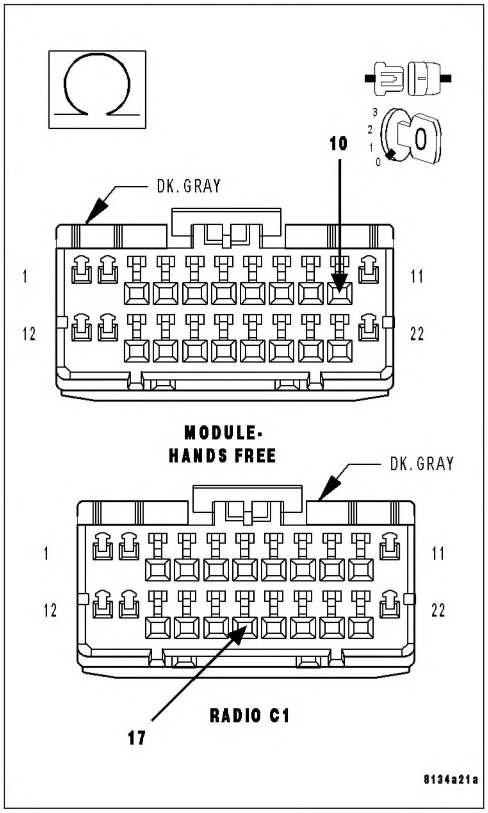
Is the resistance below 5.0 ohms?

Yes >> Go To 3

No >> Repair the (X704) Right Audio Output circuit for an open

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

3. (X795) COMMON AUDIO OUTPUT CIRCUIT OPEN


10
DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
DK. GRAY
1
11
12
22
RADIO C1
17
8134a21a

Measure the resistance of the (X795) Common Audio Output circuit between the HFM connector and the radio connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (X795) Common Audio Output circuit for an open.

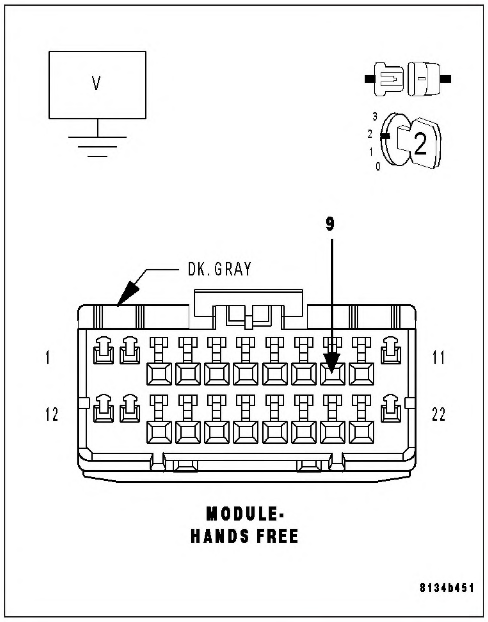
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1416-HFM RIGHT AUDIO OUTPUT CIRCUIT HIGH (CONTINUED)

4. (X704) RIGHT AUDIO OUTPUT CIRCUIT SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (X704) Right Audio Output circuit.



Is the voltage above 1.0 volts?

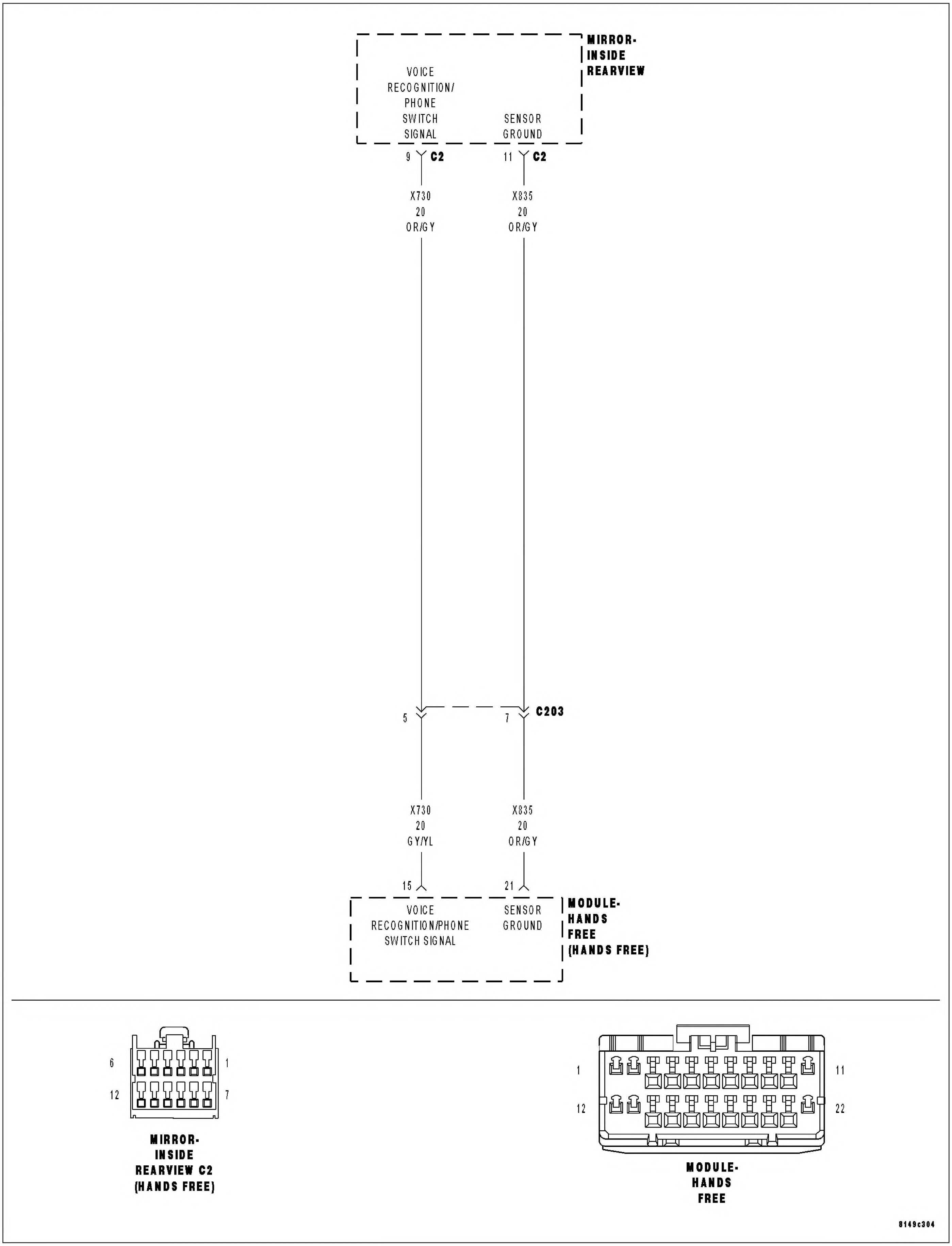
Yes >> Repair the (X704) Right Audio Output circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1435-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT PERFORMANCE


MIRROR-
INSIDE
REARVIEW
VOICE
RECOGNITION/
PHONE
SWITCH
SIGNAL
SENSOR
GROUND
9 C2
11 C2
X730
20
OR/GY
X835
20
OR/GY
5
7
C203
X730
20
GY/YL
X835
20
OR/GY
15
21
VOICE
RECOGNITION/PHONE
SWITCH SIGNAL
SENSOR
GROUND
MODULE-
HANDS
FREE
(HANDS FREE)
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
1
11
12
22
MODULE-
HANDS
FREE
8149c304

B1435-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects an invalid voltage signal on the (X730) Voice Recognition/Phone Switch Signal circuit.

Possible Causes
INSIDE REAR VIEW MIRROR
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK THE VOLTAGE OF THE (X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL

Turn the ignition off.

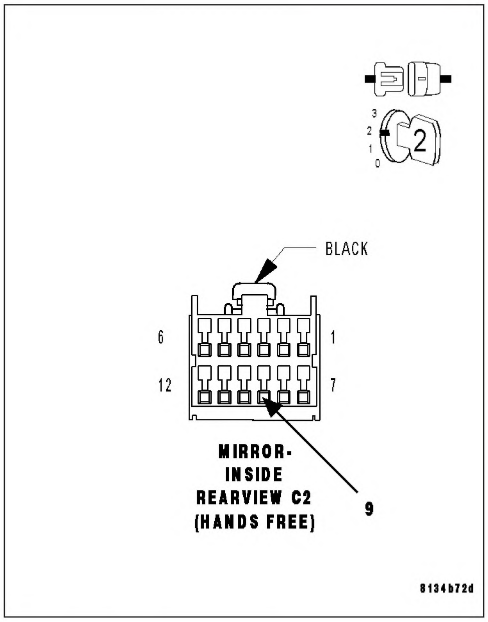
Disconnect the Inside Rear View Mirror C2 harness connector.

Turn the ignition on.

With the scan tool, monitor the VR Phone Switch voltage.

While monitoring the VR Phone Switch voltage, momentarily connect a jumper wire between the (X730) Voice Recognition/Phone Switch Signal circuit and ground.

NOTE: The scan tool sensor voltage should switch from above 4.7 volts when the jumper is not connected to below 0.6 volts when the jumper is connected.



Does the sensor voltage switch from above 4.7 volts to below 0.6 volt as described?

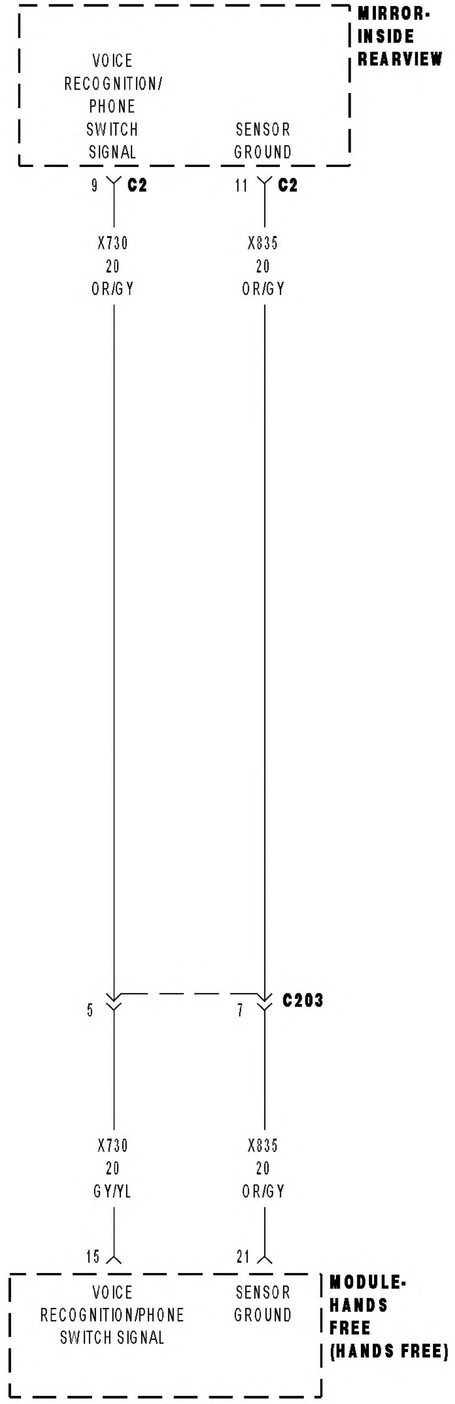
Yes >> Replace the Inside Rear View Mirror in accordance with the service information.

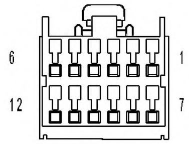
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

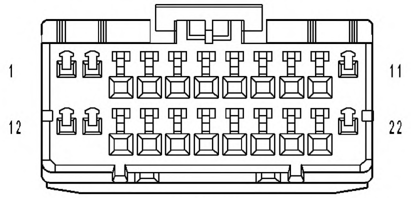
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1436-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT LOW


MIRROR-
INSIDE
REARVIEW
VOICE
RECOGNITION/
PHONE
SWITCH
SIGNAL
SENSOR
GROUND
9 C2
11 C2
X730
20
OR/GY
X835
20
OR/GY
5
7
C203
X730
20
GY/YL
X835
20
OR/GY
15
21
VOICE
RECOGNITION/PHONE
SWITCH SIGNAL
SENSOR
GROUND
MODULE-
HANDS
FREE
(HANDS FREE)



MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)



MODULE-
HANDS
FREE

8149c304

B1436-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects voltage below 0.6 volts on the (X730) Voice Recognition/Phone Switch Signal circuit.

Possible Causes
INSIDE REAR VIEW MIRROR
(X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL CIRCUIT SHORT TO (X835) SENSOR GROUND CIRCUIT
(X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL CIRCUIT SHORT TO GROUND
HANDS FREE MODULE

Diagnostic Test

1. Check for active DTC

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

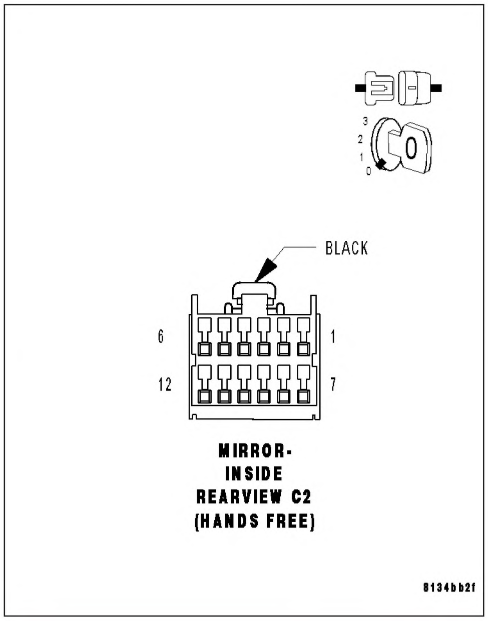
2. CHECK THE VOLTAGE OF THE (X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL

Turn the ignition off.

Disconnect the Inside Rear View Mirror C2 harness connector.

Turn the ignition on.

With the scan tool, monitor the VR Phone Switch voltage.



Is the voltage above 4.7 volts?

Yes >> Replace the Inside Rear View Mirror in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

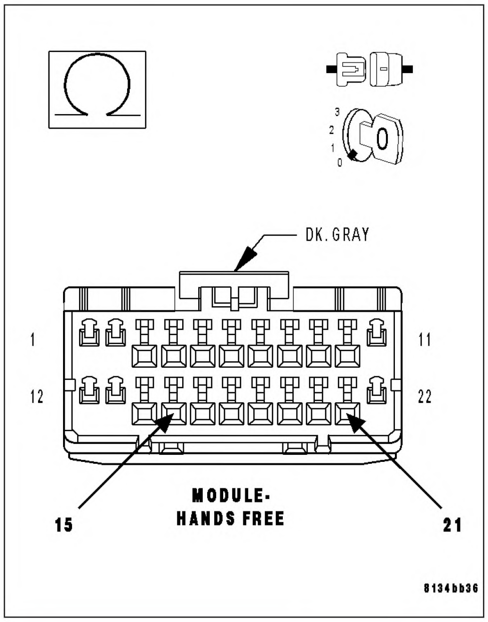
B1436-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT LOW (CONTINUED)

3. (X730) VOICE/RECOGNITION/PHONE SWITCH SIGNAL CIRCUIT SHORTED TO THE (X835) SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Measure the resistance between the (X730) Voice Recognition/Phone Switch Signal circuit and the (X835) Sensor Ground circuit.



Is the resistance below 100.0 ohms?

Yes >> Repair the (X730) Voice Recognition/Phone Switch Signal circuit for a short to the (X835) Sensor Ground circuit.

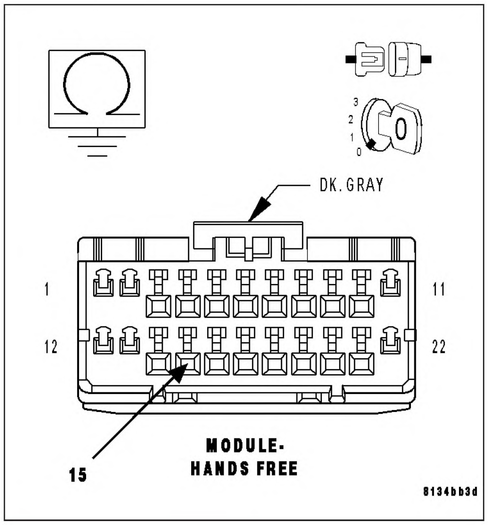
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. (X730) VOICE/RECOGNITION/PHONE SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (X730) Voice Recognition/Phone Switch Signal circuit.



Is the resistance below 100.0 ohms?

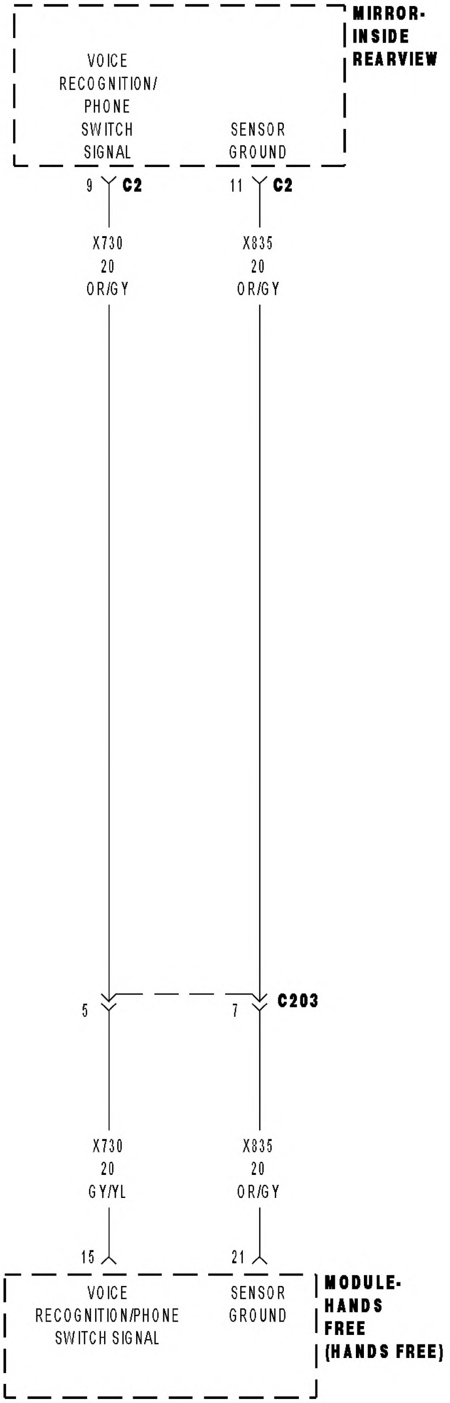
Yes >> Repair the (X730) Voice Recognition/Phone Switch Signal circuit for a short to ground.

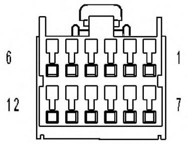
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

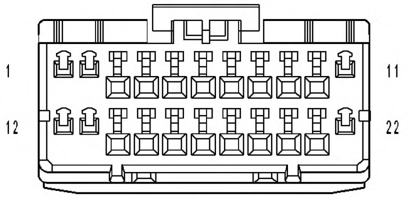
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1437-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT HIGH


MIRROR-
INSIDE
REARVIEW
VOICE
RECOGNITION/
PHONE
SWITCH
SIGNAL
SENSOR
GROUND
9 C2
11 C2
X730
20
OR/GY
X835
20
OR/GY
5
7
C203
X730
20
GY/YL
X835
20
OR/GY
15
21
VOICE
RECOGNITION/PHONE
SWITCH SIGNAL
SENSOR
GROUND
MODULE-
HANDS
FREE
(HANDS FREE)



MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)



MODULE-
HANDS
FREE

8149c304

B1437-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects voltage above 4.7 volts on the (X730) Voice Recognition/Phone Switch Signal circuit.

Possible Causes
(X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL CIRCUIT SHORT TO VOLTAGE
(X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL CIRCUIT OPEN
(X835) SENSOR GROUND CIRCUIT OPEN
INSIDE REAR VIEW MIRROR
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC’s.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

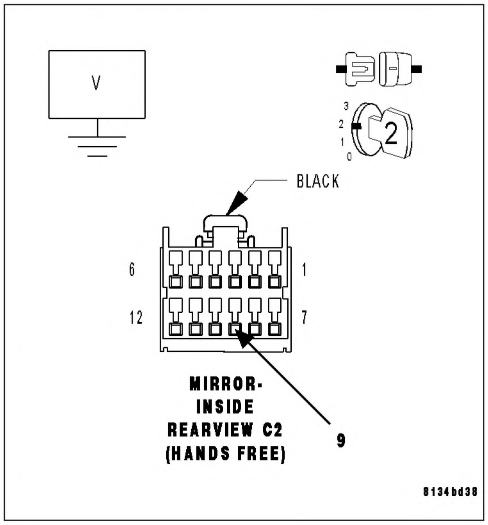
2. CHECK THE VOLTAGE OF THE (X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL

Turn the ignition off.

Disconnect the Inside Rear View Mirror C2 harness connector.

Turn the ignition on.

Measure the voltage of the (X730) Voice Recognition/Phone Switch Signal circuit.



Is the voltage above 5.3 volts?

Yes >> Repair the (X730) Voice Recognition/Phone Switch Signal circuit for a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

B1437-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT HIGH (CONTINUED)

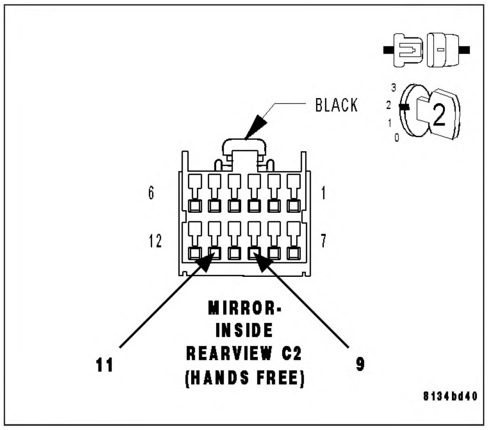
3. INSIDE REAR VIEW MIRROR

Turn the ignition off.

Connect a jumper wire between (X730) Voice Recognition/Phone Switch Signal circuit and the (X835) Sensor Ground circuit.

Turn the ignition on.

With the scan tool, monitor the VR Phone Switch Voltage.


BLACK
3
2
1
0
2
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
11
9
8134bd40

Is the voltage approximately 0 volts?

Yes >> Replace the Inside Rear View Mirror in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

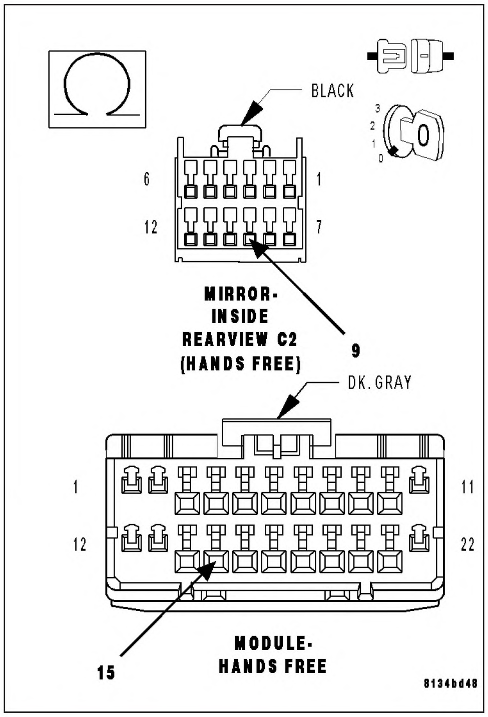
---

4. (X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Measure the resistance of the (X730) Voice Recognition/Phone Switch Signal circuit between the HFM connector and the inside rear view mirror connector.


Ω
BLACK
3
2
1
0
0
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
9
DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
15
8134bd48

Is the resistance below 5.0 ohms?

Yes >> Go To 5

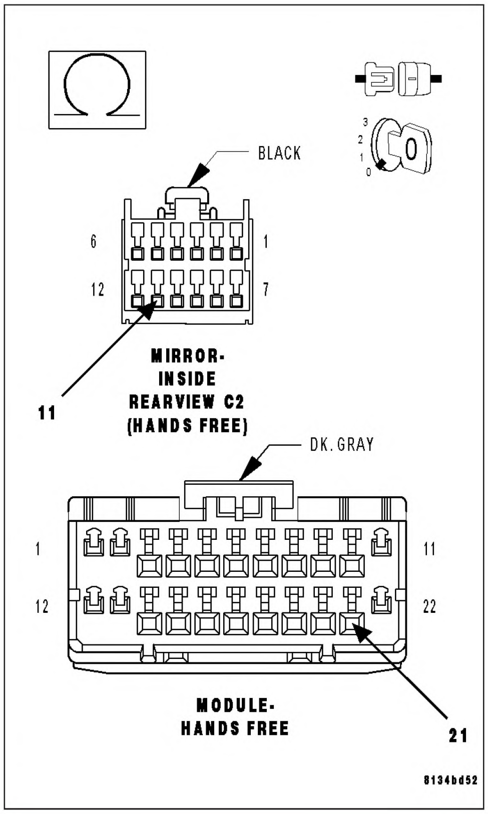
No >> Repair the (X730) Voice Recognition/Phone Switch Signal circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1437-VOICE RECOGNITION/PHONE SWITCH INPUT CIRCUIT HIGH (CONTINUED)

5. (X835) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (X835) Sensor Ground circuit between the HFM connector and the inside rear view mirror connector.


BLACK
6
1
12
7
11
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
DK.GRAY
1
11
12
22
MODULE-
HANDS FREE
21
8134bd52

Is the resistance below 5.0 ohms?

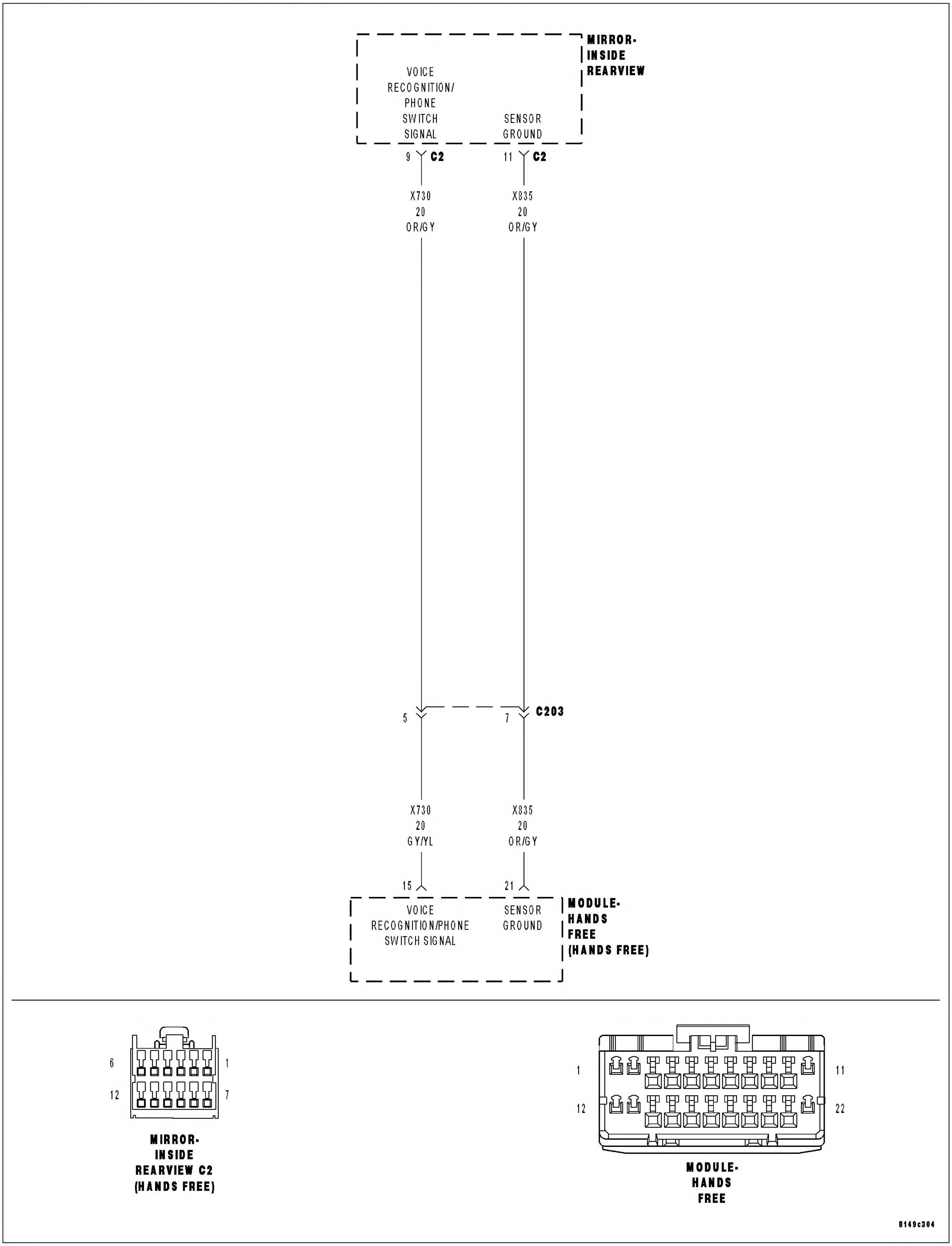
Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (X835) Sensor Ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1438–VOICE RECOGNITION SWITCH STUCK


MIRROR-
INSIDE
REARVIEW
VOICE
RECOGNITION/
PHONE
SWITCH
SIGNAL
SENSOR
GROUND
9 C2
11 C2
X730
20
OR/GY
X835
20
OR/GY
5
7
C203
X730
20
GY/YL
X835
20
OR/GY
15
21
VOICE
RECOGNITION/PHONE
SWITCH SIGNAL
SENSOR
GROUND
MODULE-
HANDS
FREE
(HANDS FREE)
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
1
11
12
22
MODULE-
HANDS
FREE
8149c304

B1438–VOICE RECOGNITION SWITCH STUCK (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects voltage between 3.5 volts and 4.0 volts on the (X730) Voice Recognition/Phone Switch Signal circuit for more than 30 seconds.

Possible Causes
INSIDE REAR VIEW MIRROR
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTCS

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK THE VOLTAGE OF THE (X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL

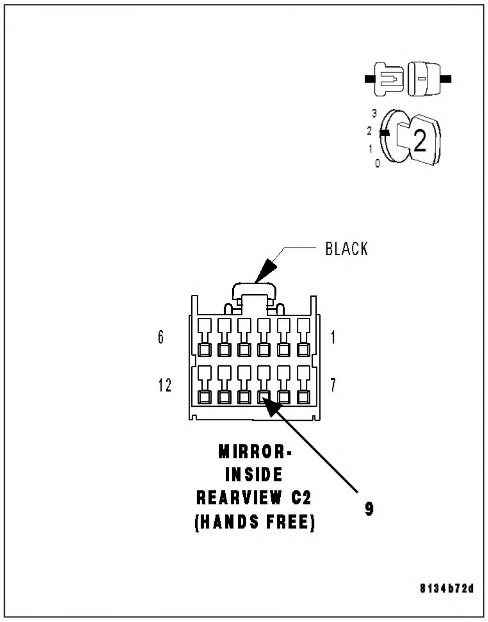
Turn the ignition off.

Disconnect the Inside Rear View Mirror C2 harness connector.

Turn the ignition on.

With the scan tool, monitor the VR Phone Switch voltage.

While monitoring the VR Phone Switch voltage, momentarily connect a jumper wire between (X730) Voice Recognition/Phone Switch Signal circuit and ground.



NOTE: The scan tool sensor voltage should switch from above 4.7 volts when the jumper is not connected to below 0.6 volts when the jumper is connected.

Does the sensor voltage switch from above 4.7 volts to below 0.6 volt as described?

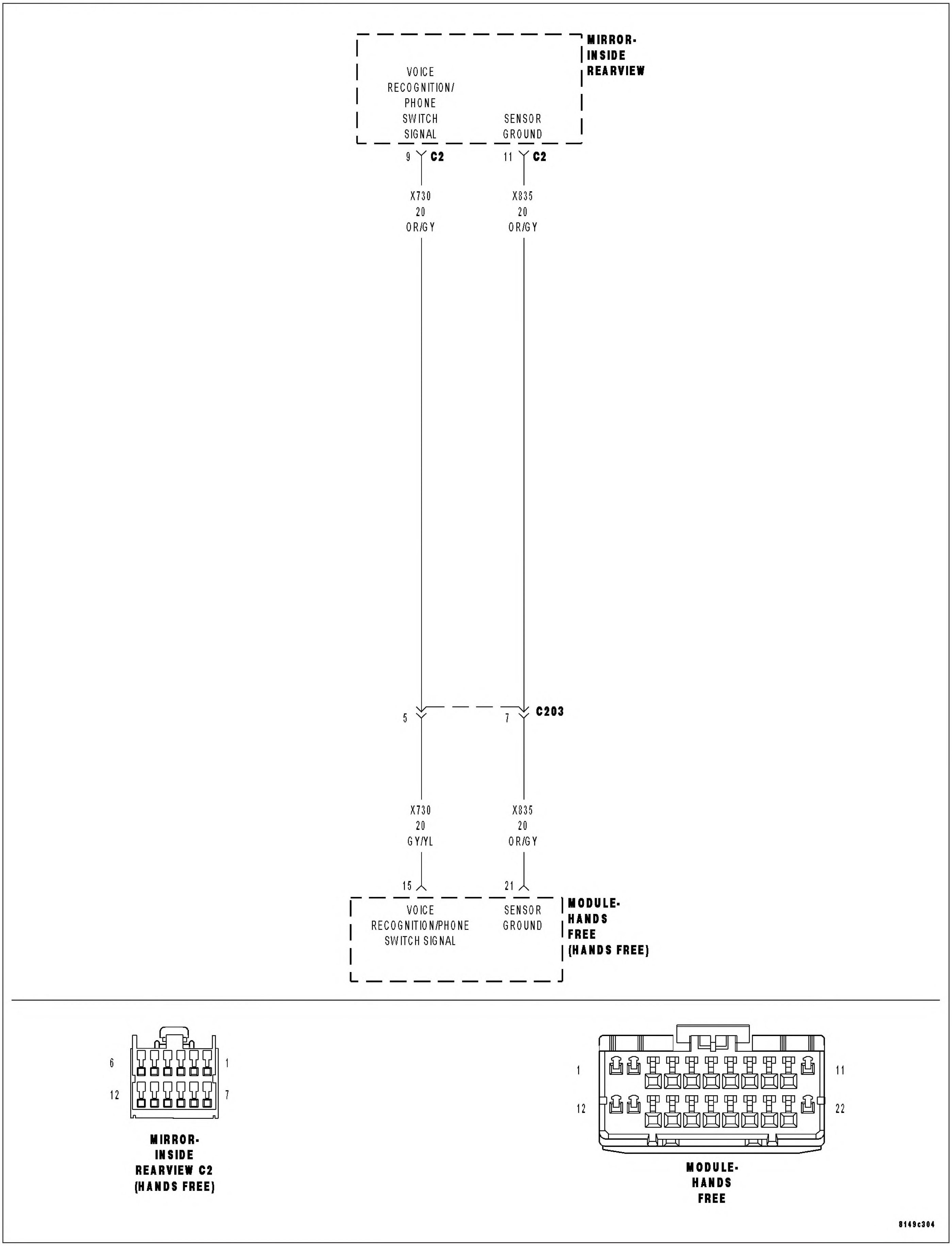
Yes >> Replace the Inside Rear View Mirror in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1439-PHONE SWITCH STUCK


MIRROR-
INSIDE
REARVIEW
VOICE
RECOGNITION/
PHONE
SWITCH
SIGNAL
SENSOR
GROUND
9 C2
11 C2
X730
20
OR/GY
X835
20
OR/GY
5
7
C203
X730
20
GY/YL
X835
20
OR/GY
15
21
VOICE
RECOGNITION/PHONE
SWITCH SIGNAL
SENSOR
GROUND
MODULE-
HANDS
FREE
(HANDS FREE)
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
1
11
12
22
MODULE-
HANDS
FREE
8149c304

B1439-PHONE SWITCH STUCK (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects voltage between 2.8 volts and 3.3 volts on the (X730) Voice Recognition/Phone Switch Signal circuit for more than 30 seconds.

Possible Causes
INSIDE REAR VIEW MIRROR
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTCS

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

2. CHECK THE VOLTAGE OF THE (X730) VOICE RECOGNITION/PHONE SWITCH SIGNAL

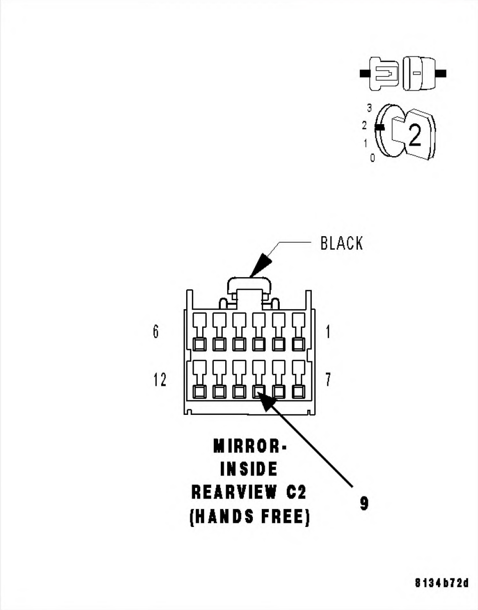
Turn the ignition off.

Disconnect the Inside Rear View Mirror C2 harness connector.

Turn the ignition on.

With the scan tool, monitor the VR Phone Switch voltage.

While monitoring the VR Phone Switch voltage, momentarily connect a jumper wire between (X730) Voice Recognition/Phone Switch Signal circuit and ground.



NOTE: The scan tool sensor voltage should switch from above 4.7 volts when the jumper is not connected to below 0.6 volts when the jumper is connected.

Does the sensor voltage switch from above 4.7 volts to below 0.6 volt as described?

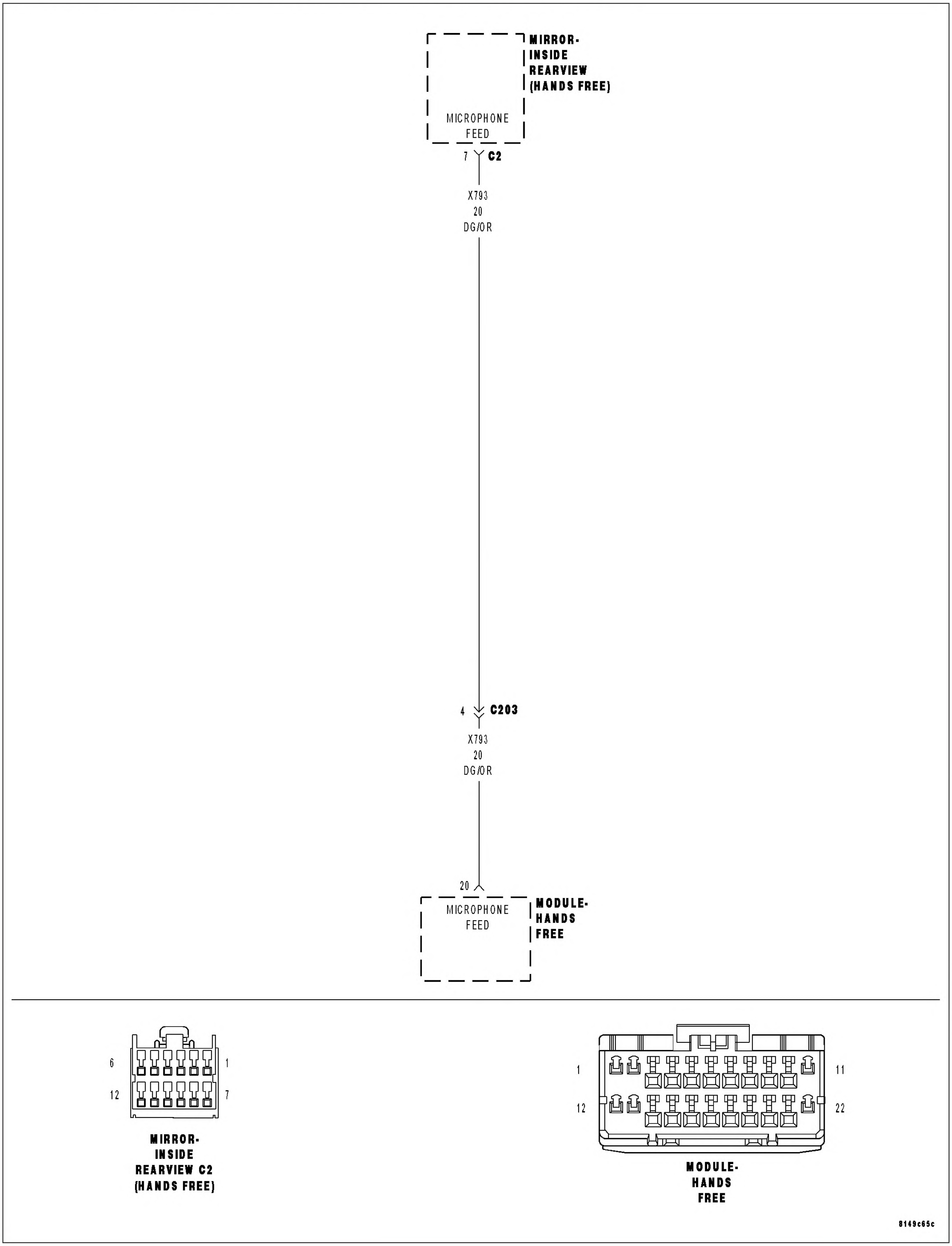
Yes >> Replace the Inside Rear View Mirror in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B145A-TELEMATICS MIRROR CONTROL CIRCUIT HIGH


MIRROR-
INSIDE
REARVIEW
(HANDS FREE)
MICROPHONE
FEED
7
C2
X793
20
DG/OR
4
C203
X793
20
DG/OR
20
MICROPHONE
FEED
MODULE-
HANDS
FREE
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
1
11
12
22
MODULE-
HANDS
FREE
8149c65c

B145A-TELEMATICS MIRROR CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects high voltage on the (X793) Microphone Feed circuit.

Possible Causes
(X793) MICROPHONE FEED CIRCUIT OPEN
(X793) MICROPHONE FEED CIRCUIT SHORT TO VOLTAGE
INSIDE REAR VIEW MIRROR
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

Attempt to make a phone call with the system.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B145A-TELEMATICS MIRROR CONTROL CIRCUIT HIGH (CONTINUED)

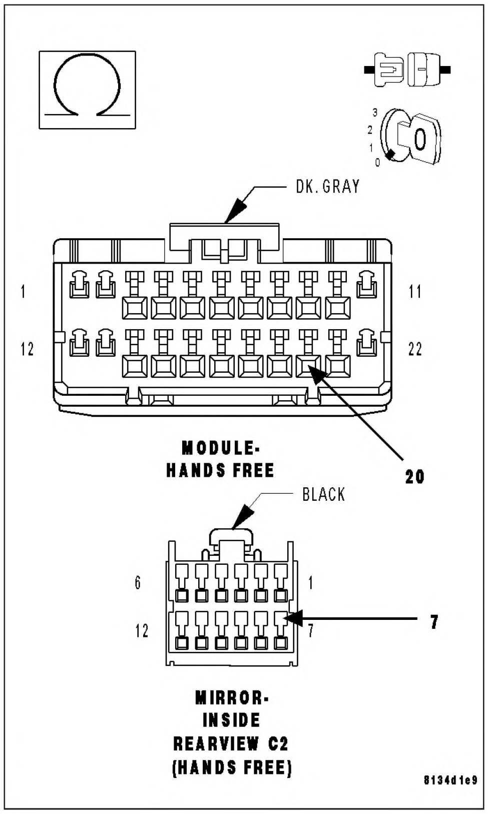
2. (X793) MICROPHONE FEED CIRCUIT OPEN

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Disconnect the Inside Rear View Mirror C2 harness connector.

Measure the resistance of the (X793) Microphone Feed circuit between the HFM connector and the inside rear view mirror connector.


DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
20
BLACK
6
1
12
7
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
8134d1e9

Is the resistance below 5.0 ohms?

Yes >> Go To 3

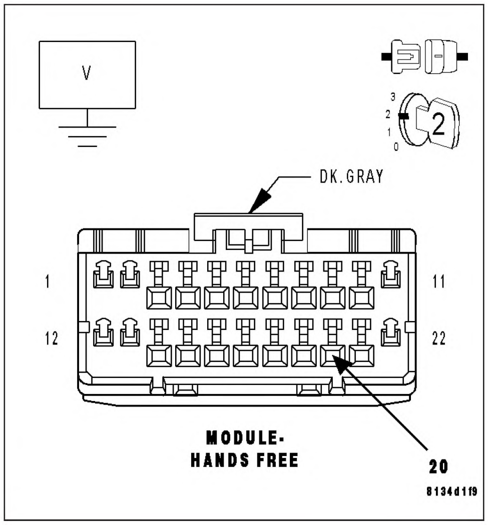
No >> Repair the (X793) Microphone Feed circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. (X793) MICROPHONE FEED CIRCUIT SHORT TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (X793) Microphone Feed circuit.


V
DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
20
8134d1f9

Is the voltage above 1.0 volt?

Yes >> Repair the (X793) Microphone Feed circuit for short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B145A-TELEMATICS MIRROR CONTROL CIRCUIT HIGH (CONTINUED)

4. INSIDE REAR VIEW MIRROR

Replace the Inside Rear View Mirror in accordance with the service information.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

Attempt to make a phone call with the system.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

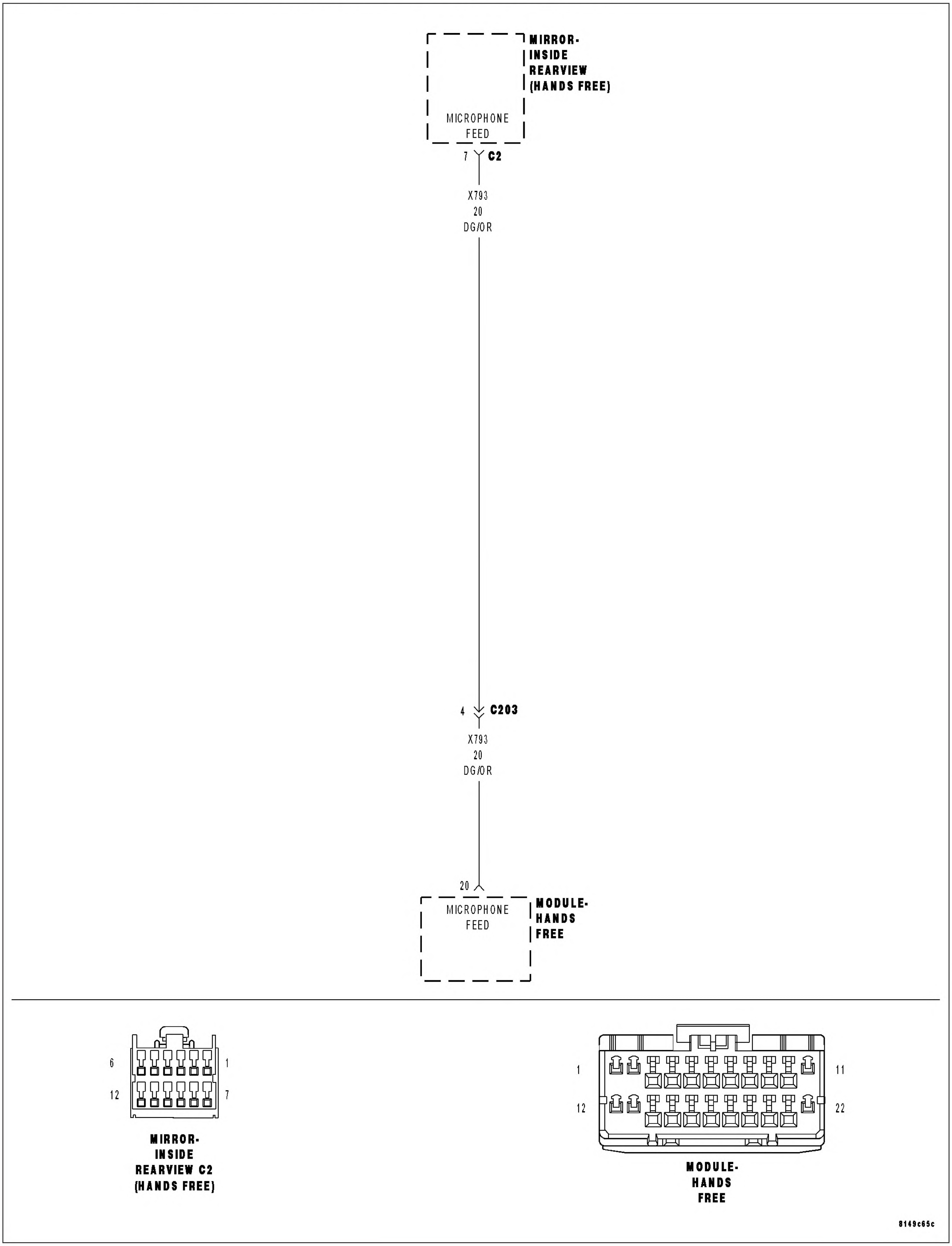
Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1459-TELEMATICS MIRROR CONTROL CIRCUIT LOW


MIRROR-
INSIDE
REARVIEW
(HANDS FREE)
MICROPHONE
FEED
7
C2
X793
20
DG/OR
4
C203
X793
20
DG/OR
20
MICROPHONE
FEED
MODULE-
HANDS
FREE
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
1
11
12
22
MODULE-
HANDS
FREE
8149c65c

B1459-TELEMATICS MIRROR CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects low voltage on the (X793) Microphone Feed circuit.

Possible Causes
(X793) MICROPHONE FEED CIRCUIT OPEN
(X793) MICROPHONE FEED CIRCUIT SHORT TO GROUND
INSIDE REAR VIEW MIRROR
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

Attempt to make a phone call with the system.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B1459-TELEMATICS MIRROR CONTROL CIRCUIT LOW (CONTINUED)

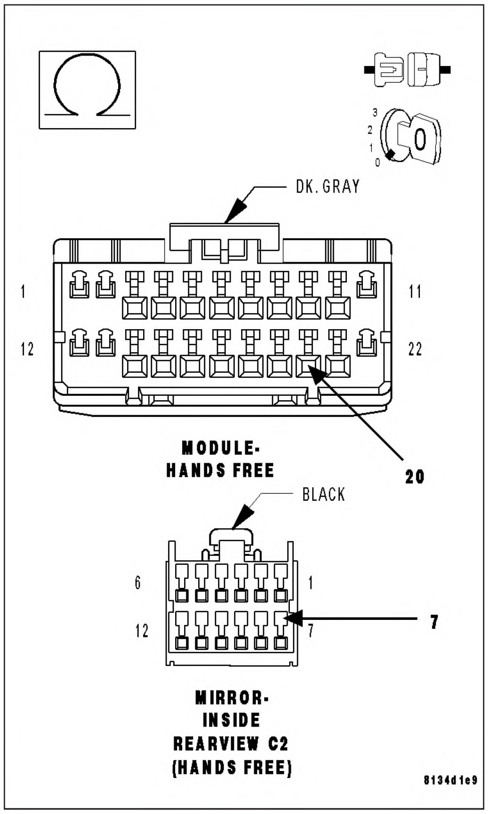
2. (X793) MICROPHONE FEED CIRCUIT OPEN

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Disconnect the Inside Rear View Mirror C2 harness connector.

Measure the resistance of the (X793) Microphone Feed circuit between the HFM connector and the inside rear view mirror connector.


DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
20
BLACK
6
1
12
7
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
8134d1e9

Is the resistance below 5.0 ohms?

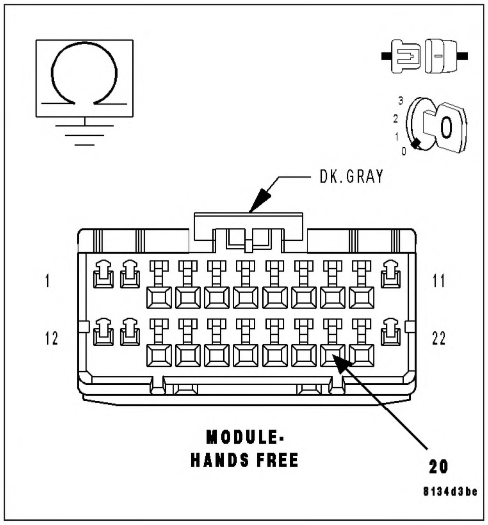
Yes >> Go To 3

No >> Repair the (X793) Microphone Feed circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. (X793) MICROPHONE FEED CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (X793) Microphone Feed circuit.


DK. GRAY
1
11
12
22
MODULE-
HANDS FREE
20
8134d3be

Is the resistance below 100.0 ohms?

Yes >> Repair the (X793) Microphone Feed circuit for short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

B1459-TELEMATICS MIRROR CONTROL CIRCUIT LOW (CONTINUED)

4. INSIDE REAR VIEW MIRROR

Replace the Inside Rear View Mirror in accordance with the service information.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

Attempt to make a phone call with the system.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

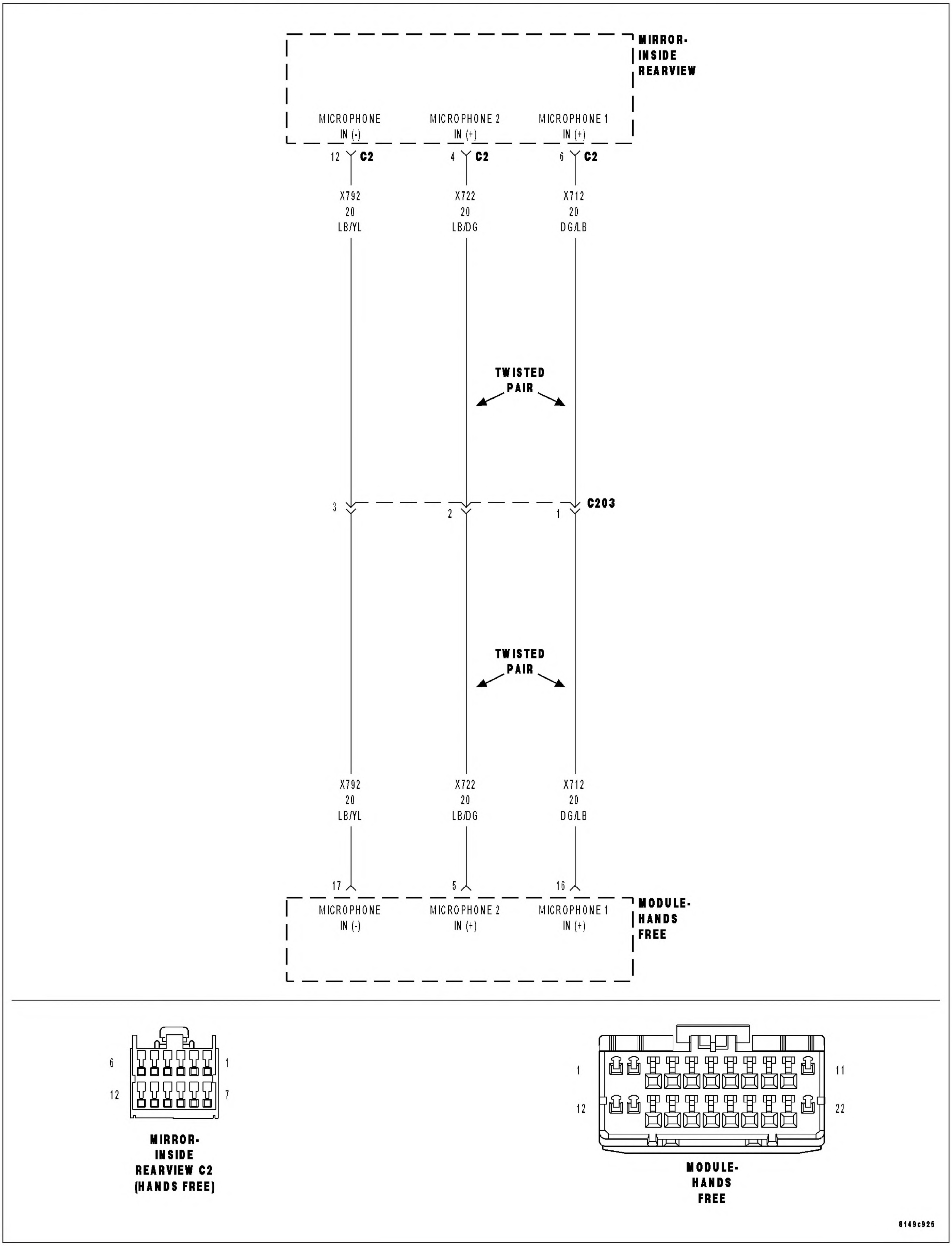
Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1492–GENERAL MICROPHONE PERFORMANCE


MIRROR-
INSIDE
REARVIEW
MICROPHONE
IN (-)
MICROPHONE 2
IN (+)
MICROPHONE 1
IN (+)
12 C2
4 C2
6 C2
X792
20
LB/YL
X722
20
LB/DG
X712
20
DG/LB
TWISTED
PAIR
3
2
1
C203
TWISTED
PAIR
X792
20
LB/YL
X722
20
LB/DG
X712
20
DG/LB
17
5
16
MICROPHONE
IN (-)
MICROPHONE 2
IN (+)
MICROPHONE 1
IN (+)
MODULE-
HANDS
FREE
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
1
11
12
22
MODULE-
HANDS
FREE
8149c925

B1492–GENERAL MICROPHONE PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects a fault in any of the microphone circuits.

Possible Causes
(X712) MICROPHONE 1 IN (+) CIRCUIT OPEN
(X722) MICROPHONE 2 IN (+) CIRCUIT OPEN
(X792) MICROPHONE IN (-) CIRCUIT OPEN
(X712) (X722) (X792) MICROPHONE CIRCUITS SHORTED TO GROUND
(X712) (X722) (X792) MICROPHONE CIRCUITS SHORTED TO VOLTAGE
(X712) (X722) (X792) MICROPHONE CIRCUITS SHORTED TOGETHER
INSIDE REAR VIEW MIRROR
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

Attempt to make a phone call with the system.

With the scan tool, read the active DTC's.

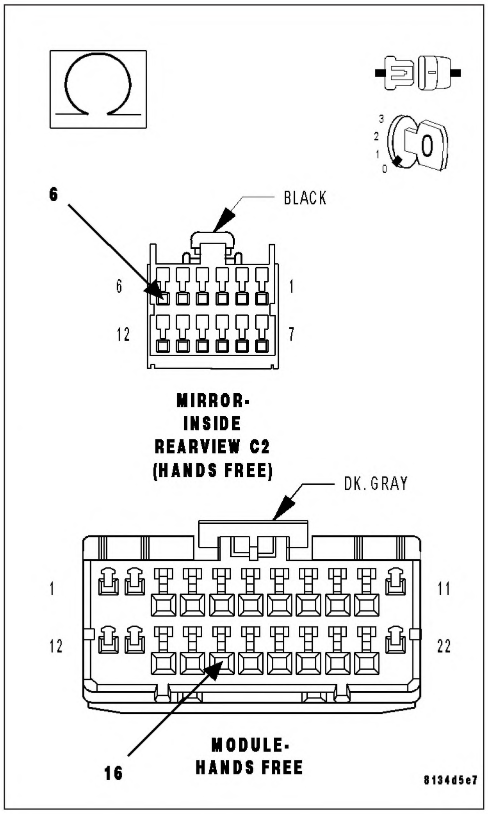
Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B1492–GENERAL MICROPHONE PERFORMANCE (CONTINUED)

2. (X712) MICROPHONE 1 IN (+) CIRCUIT OPEN


6
BLACK
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
DK. GRAY
1
11
12
22
16
MODULE-
HANDS FREE
8134d5e7

Turn the ignition off.

Disconnect the Hands Free Module harness connector.

Disconnect the Inside Rear View Mirror C2 harness connector.

Measure the resistance of the (X712) Microphone 1 IN (+) circuit between the HFM connector and the inside rear view mirror connector.

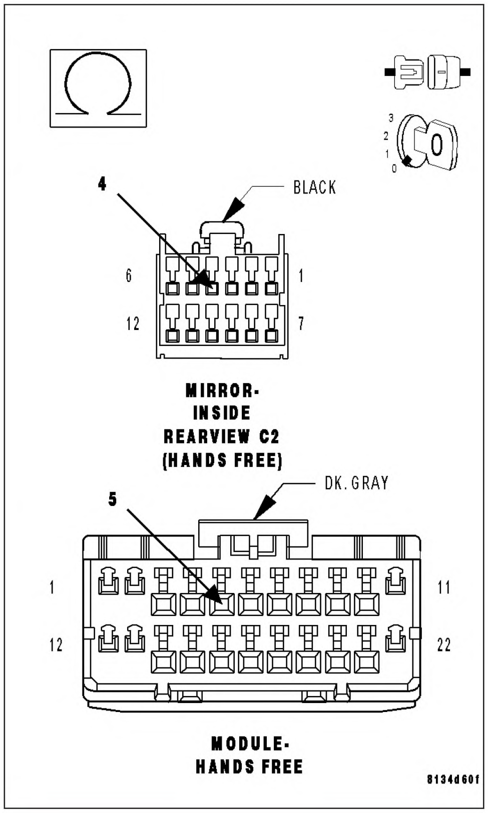
Is the resistance below 5.0 ohms?

Yes >> Go To 3

No >> Repair the (X712) Microphone 1 IN (+) circuit for an open. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. (X722) MICROPHONE 2 IN (+) CIRCUIT OPEN


4
BLACK
6
1
12
7
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
DK. GRAY
5
1
11
12
22
MODULE-
HANDS FREE
8134d601

Measure the resistance of the (X722) Microphone 2 IN (+) circuit between the HFM connector and the inside rear view mirror connector.

Is the resistance below 5.0 ohms?

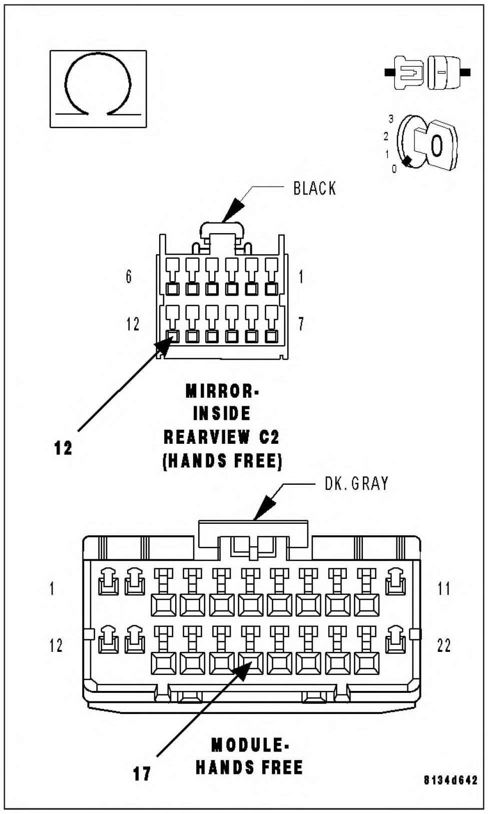
Yes >> Go To 4

No >> Repair the (X722) Microphone 2 IN (+) circuit for an open. Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1492–GENERAL MICROPHONE PERFORMANCE (CONTINUED)

4. (X792) MICROPHONE IN (-) CIRCUIT OPEN

Measure the resistance of the (X792) Microphone IN (-) circuit between the HFM connector and the inside rear view mirror connector.


BLACK
6
1
12
7
12
MIRROR-
INSIDE
REARVIEW C2
(HANDS FREE)
DK.GRAY
1
11
12
22
17
MODULE-
HANDS FREE
8134d642

Is the resistance below 5.0 ohms?

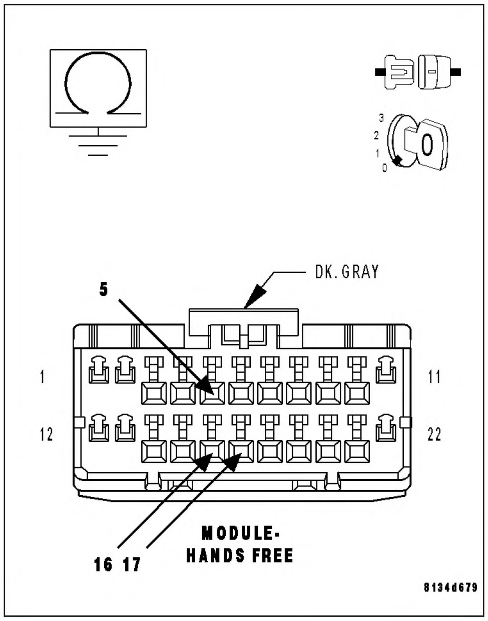
Yes >> Go To 5

No >> Repair the (X792) Microphone IN (-) circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

5. (X712) (X722) (X792) MICROPHONE CIRCUITS SHORTED TO GROUND

Measure the resistance between ground and each (X712) (X722) (X792) Microphone circuit.


DK.GRAY
5
1
11
12
22
16 17
MODULE-
HANDS FREE
8134d679

Is the resistance below 100.0 ohms?

Yes >> Repair the Microphone circuit that measured below 100.0 ohms for short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

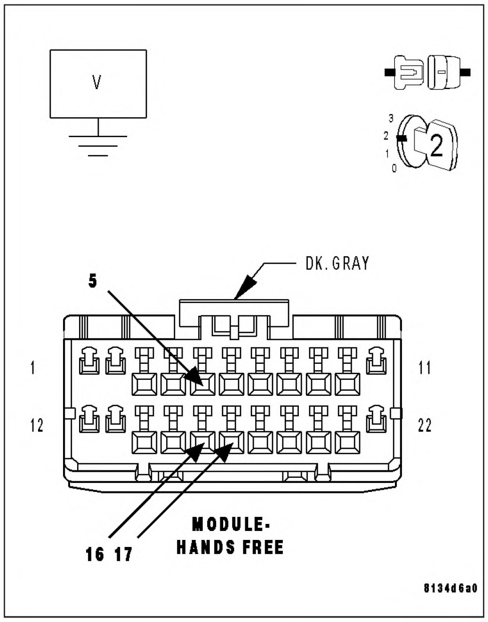
No >> Go To 6

B1492–GENERAL MICROPHONE PERFORMANCE (CONTINUED)

6. (X712) (X722) (X792) MICROPHONE CIRCUITS SHORTED TO VOLTAGE

Turn the ignition on.

Measure the voltage of each (X712) (X722) (X792) Microphone circuit.


V
3
2
1
0
2
DK. GRAY
5
1
11
12
22
16 17
MODULE-
HANDS FREE
8134d6a0

Is the voltage above 1.0 volt?

Yes >> Repair the Microphone circuit that measured above 1.0 volt for short to voltage.

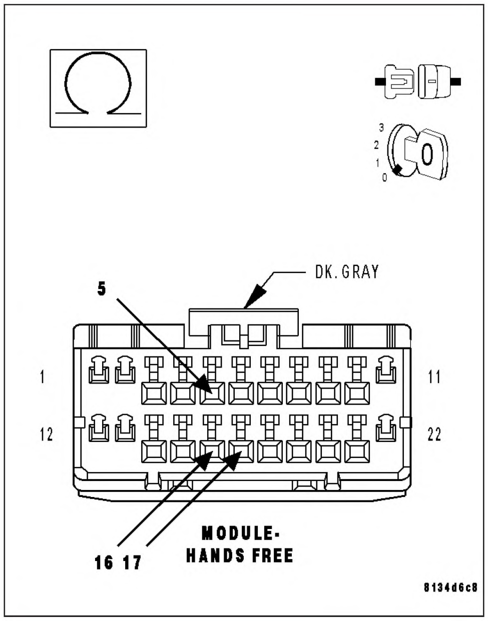
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 7

7. (X712) (X722) (X792) MICROPHONE CIRCUITS SHORTED TOGETHER

Turn the ignition off.

Measure the resistance between each (X712) (X722) (X792) Microphone circuit.


3
2
1
0
0
DK. GRAY
5
1
11
12
22
16 17
MODULE-
HANDS FREE
8134d6c8

Is the resistance below 100.0 ohms?

Yes >> Repair the Microphone circuit that measured below 100.0 ohms for a short together.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 8

B1492–GENERAL MICROPHONE PERFORMANCE (CONTINUED)

8. INSIDE REAR VIEW MIRROR

Replace the Inside Rear View Mirror in accordance with the service information.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

Attempt to make a phone call with the system.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2203–ROM CHECKSUM PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects a fault during an internal diagnostic check.

Possible Causes
HANDS FREE MODULE

Diagnostic Test

1. REPLACE THE HANDS FREE MODULE IF DTC IS ACTIVE

With the scan tool, read the active DTC’s.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC’s.

Does the scan tool display this DTC as active?

Yes >> Replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B222A-VEHICLE LINE MISMATCH

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module will receive and monitor the vehicle line message from the PCM and record the vehicle line if different from the last vehicle line.

Possible Causes
INCORRECT PCM
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTC

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK VEHICLE LINE IN PCM

With the scan tool compare the vehicle line that is programmed into the PCM to the vehicle line of the vehicle.

Does the vehicle line programmed into the PCM match the vehicle?

Yes >> Inspect the wiring and connectors for damage or shorted circuits. If ok, replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace and program the Powertrain Control Module in accordance with the service information. Ensure the PCM is replaced with the correct vehicle line PCM.

Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 5.

B222E–FLASH CHECKSUM PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects a fault during an internal diagnostic check.

Possible Causes
HANDS FREE MODULE

Diagnostic Test

1. REPLACE THE HANDS FREE MODULE IF DTC IS ACTIVE

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B222F–FLASH WRITE PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects a fault during an internal diagnostic check.

Possible Causes
HANDS FREE MODULE

Diagnostic Test

1. REPLACE THE HANDS FREE MODULE IF DTC IS ACTIVE

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B2223-(HFM) HANDS FREE PHONE INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects a fault during an internal diagnostic check.

Possible Causes
HANDS FREE MODULE

Diagnostic Test

1. REPLACE THE HANDS FREE MODULE IF DTC IS ACTIVE

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

B2230–RAM WRITE PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Hands Free Module detects a fault during an internal diagnostic check.

Possible Causes
HANDS FREE MODULE

Diagnostic Test

1. REPLACE THE HANDS FREE MODULE IF DTC IS ACTIVE

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

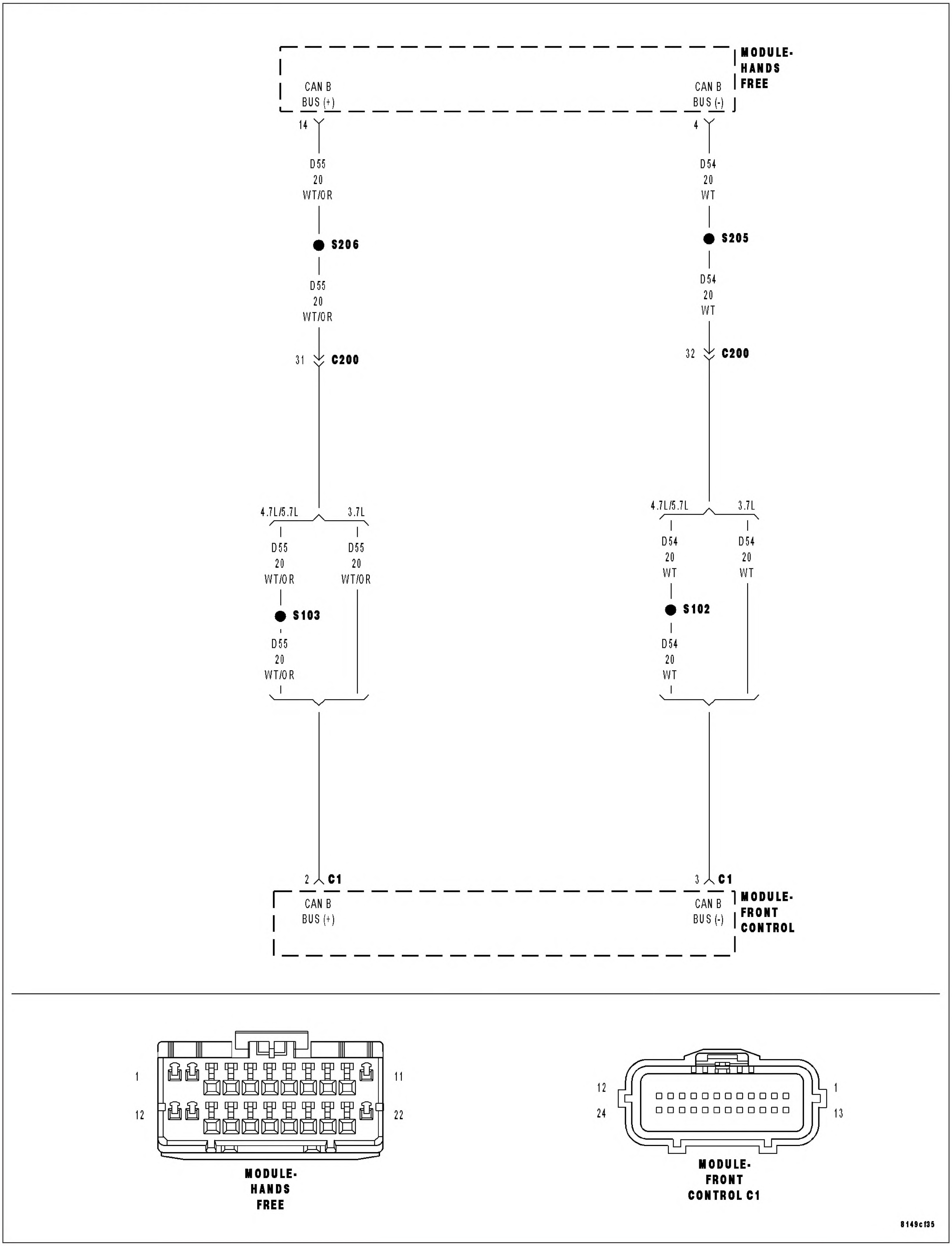
Does the scan tool display this DTC as active?

Yes >> Replace and program the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

U0019–CAN B BUS


MODULE-
HANDS
FREE
CAN B
BUS (+)
CAN B
BUS (-)
14
4
D55
20
WT/OR
D54
20
WT
S206
S205
31
C200
32
C200
4.7L/5.7L
3.7L
S103
S102
2
C1
3
C1
MODULE-
FRONT
CONTROL
1
11
12
22
12
1
24
13
MODULE-
HANDS
FREE
MODULE-
FRONT
CONTROL C1
8149cf35

U0019–CAN B BUS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  Whenever the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage or shorted to ground.

Possible Causes
CAN B BUS DTC's IN FRONT CONTROL MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
HANDS FREE MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTCS

With the scan tool, read the active DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

2. CHECK FRONT CONTROL MODULE DTC's

With the scan tool, read Front Control Module active DTC's

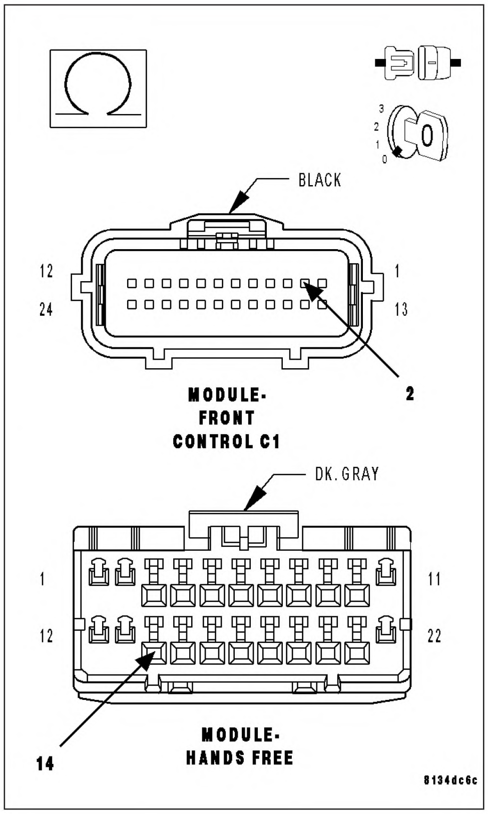
Does the scan tool display any CAN B BUS DTC's – ACTIVE?

Yes >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING)

No >> Go To 3

U0019–CAN B BUS (CONTINUED)

3. (D55) CAN B BUS (+) CIRCUIT OPEN


BLACK
12
24
1
13
2
MODULE-
FRONT
CONTROL C1
DK. GRAY
1
12
11
22
14
MODULE-
HANDS FREE
8134dc6c

Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the Hands Free Module connector.

Disconnect the Front Control Module C1 connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 connector and the Hands Free Module connector.

Is the resistance below 2.0 ohms?

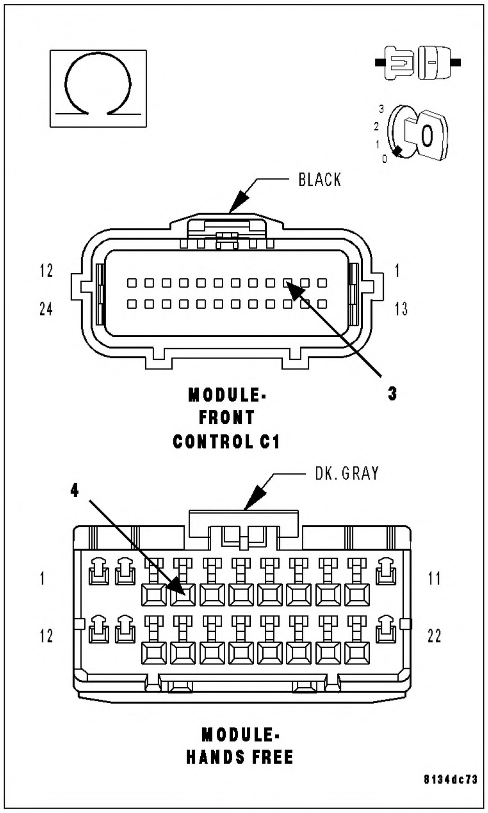
Yes >> Go To 4

No >> Repair the (D55) CAN B Bus (+) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. (D54) CAN B BUS (–) CIRCUIT OPEN


BLACK
12
24
1
13
3
MODULE-
FRONT
CONTROL C1
DK. GRAY
4
1
12
11
22
MODULE-
HANDS FREE
8134dc73

Measure the resistance of the (D54) CAN B Bus (–) circuit between the Front Control Module C1 connector and the Hands Free Module connector.

Is the resistance below 2.0 ohms?

Yes >> Replace the Hands Free Module in accordance with the service information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D54) CAN B Bus (–) circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156-LOST COMMUNICATION WITH EOM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212-LOST COMMUNICATION WITH SCCM - CAN B

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

NAVIGATION/TELECOMMUNICATION - SERVICE INFORMATION

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NAVIGATION/TELECOMMUNICATION - SERVICE INFORMATION

DESCRIPTION

TELECOMMUNICATIONS

The hands-free cellular system uses Bluetooth™ technology to provide wireless communication between the operator's compatible cellular telephone and the vehicle's on-board receiver.

The system uses voice recognition technology to control operation. The incoming voice is broadcast through the vehicle's radio speakers, automatically overriding any other audio signals on the front speakers when the hands-free system is in use. A microphone in the rear view mirror receives the vehicle occupant's voices. If a call is in progress when the ignition is switched off, the hands-free system will continue to operate until the call ends, or the call is transferred to the cellular phone.

The system will communicate with a telephone that is anywhere within the vehicle. However, covering the hand held phone or the hands-free phone module with a metal object may block the signal. The system will recognize up to seven telephones, each of which is given a spoken identification by the user during the setup process. The system includes Spanish and French voice recognition in addition to English.

Two buttons on the rearview mirror, identified with ISO icons, control the system: A ″phone″ button turns the system on and off; a ″voice recognition″ (or voice command) button prompts the hands-free system to listen for a voice command.

OPERATION

TELECOMMUNICATION

Two buttons on the rearview mirror, identified with ISO icons, control the system: A ″phone″ button turns the system on and off; a ″voice recognition″ (or voice command) button prompts the hands-free system to listen for a voice command. The system includes the following features:

- Phonebook - Stores telephone numbers for later recall by name or other verbal identification, called a voice tag, and memory location.
- Four memory locations - Home, Work, Cellular and Pager. A maximum of 32 unique names or voice tags may be stored at the same time, with a different number in each of the four memory locations.
- Voice tag dialing - Dials the number associated with a voice tag and memory location.
- Digit dialing - Dials the telephone number by recognizing the names of the digits as they are spoken.
- Receiving calls - A voice prompt notifies the user of an incoming call. A voice response accepts or rejects the call without manual intervention.
- Privacy Mode - Switches the call to the handheld telephone and the hands-free system and back again using the “voice recognition” (or “voice command”) button and a voice command, if desired.

DIAGNOSIS AND TESTING

TELECOMMUNICATION

Any diagnosis of the Telecommunication system should begin with the use of scan tool. For information on the use of the scan tool, refer to the appropriate Diagnostic Service information.

For complete circuit diagrams, refer to the appropriate wiring information.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

TELECOMMUNICATION SYSTEM DIAGNOSIS

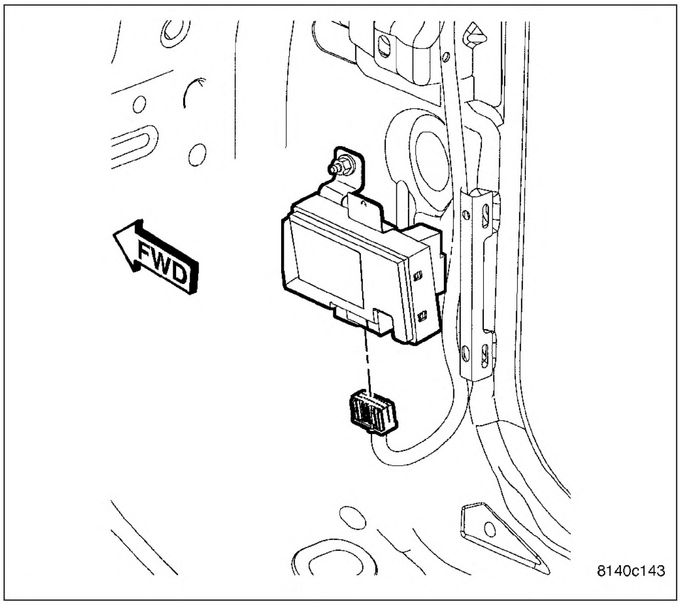
CONDITION	POSSIBLE CAUSE	CORRECTION
Phone Not Available	1. Bluetooth phone not paired to the system.	1. Ensure that phone(s) are paired (programmed) to the system.
	2. Bluetooth phone not present or turned OFF.	2. Make sure paired phone is present, turned ON and that the Bluetooth option is enabled on the phone.
	3. Bluetooth phone has low battery.	3. At low battery levels, some phones will turn off Bluetooth functionality. Ensure cellular phone is charged to an adequate level.
Phone Pairing Failed	1. Phone does not support Hands Free Profile	1. The Telecommunication system requires the cellular phone to be Bluetooth™ enabled, as well as supporting the Hands Free Profile. The customer will have to upgrade their phone to one supporting Hands Free Profile. A list of suggested phones is available at: http://www.chrysler.com/uconnect.
	2. Phone not Bluetooth enabled.	2. The Telecommunication system requires the cellular phone to be Bluetooth™ enabled. A list of suggested phones is available at: http://www.chrysler.com/uconnect.
	3. PIN entered on the phone is not the same as PIN spoken to the system.	3. The PIN spoken to the system must be the same PIN entered into the phone.
	4. Phone has reached maximum number of allowed devices paired.	4. Remove one of the previously paired devices from it's list.
Poor Voice Recognition	1. Microphone failure	1. Using a scan tool, check for microphone fault codes.
	2. Customer not waiting for the beep before speaking.	2. Ensure customer is waiting for the system ″beep″ prior to beginning the speech to be recognized.
	3. Customer not speaking in a smooth normal manner.	3. Verify that the customer is attempting to use the system with a smooth consistent voice. The system is designed to accept normal speech spoken at a normal tone, some people tend to speak to a computer loud and slow, which results in reduced performance.
	4. Rear view mirror not properly attached to mounting.	4. Mirror must be firmly mounted to the mounting location. Ensure that mirror is tightened to the specified torque.
	5. High levels of noise in vehicle compartment	5. System performance is increased when noise conditions in the vehicle are lowered. Ideal conditions include windows closed.

CONDITION	POSSIBLE CAUSE	CORRECTION
	6. Object interfering with microphone input	6. Verify that there is no object, hanging from the mirror, that could be obstructing the microphone.
	7. User not saying ″send″ after a pager dialing request	7. User must say ″send″ at the end of a Pager Dialing request.
	8. Other passengers talking while customer is attempting to use the system	8. Although designed for primary use by the driver, the microphone will pick up passengers in any seat of the vehicle. System performance is increased in low noise environments.
Phonebook names not recognized consistently	1. Phonebook names recorded in high noise conditions	1. For increased system performance, it is recommended that the phone book entries are recorded in a low noise environment. That is, vehicle in park, with windows up.
	2. Phonebook name(s) short	2. For increased performance it is recommended that the user use both first and last name as a phonebook entry. Example ″ Daniel Johnson″ as opposed to ″Dan″.
	3. Phonebook names recorded by another user	3. It is recommended that each user of the system record their own phonebook entries. This will increase the recognition performance.
	4. Similar names in phonebook	4. For increased system performance it is recommended that the user do not enter similar sounding names in the phonebook.
	5. Object interfering with microphone input	5. Object interfering with microphone input.
Poor Phone audio quality.	1. Microphone failure	1. Use a scan tool, and check for Microphone faults.
	2. Rear view mirror not properly fixed to mounting button	2. Mirror must be firmly mounted to the mounting location. Tighten mirror to the specified torque.
	3. System being used in high noise conditions	3. System performance is increased when noise conditions in the vehicle are lowered. Ideal conditions include windows closed.
No Phone Audio	1. Phone setting cause phone audio to be routed to handset.	1. Route audio to ″Hands free″ device.

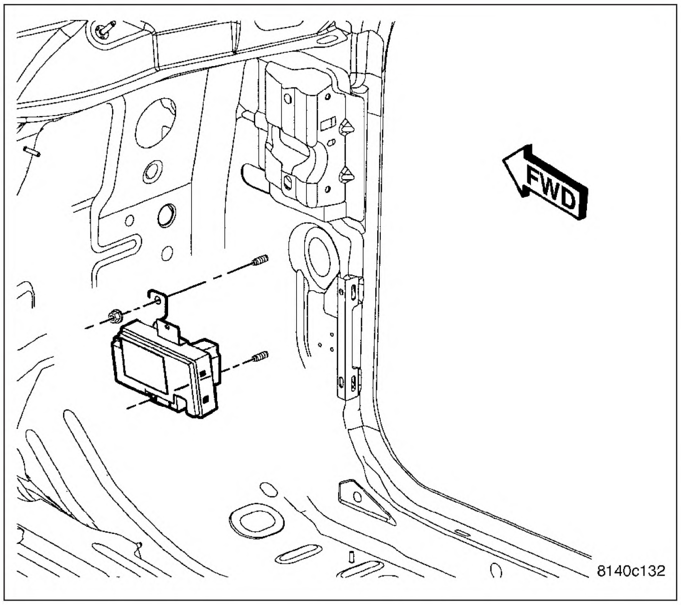
MODULE-HANDS FREE

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Remove the right side cowl panel trim.
3. Disconnect the electrical harness connector.

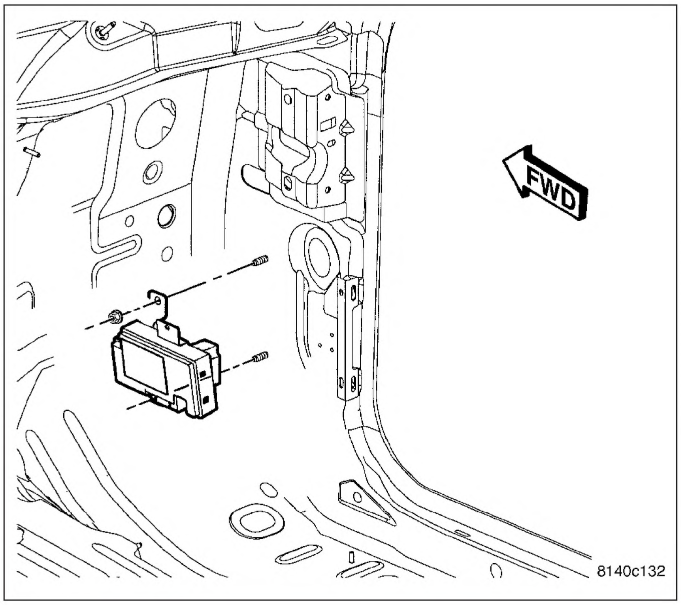


4. Remove the mounting bracket fasteners.
5. Remove the hands free module fasteners from the mounting bracket and remove module.

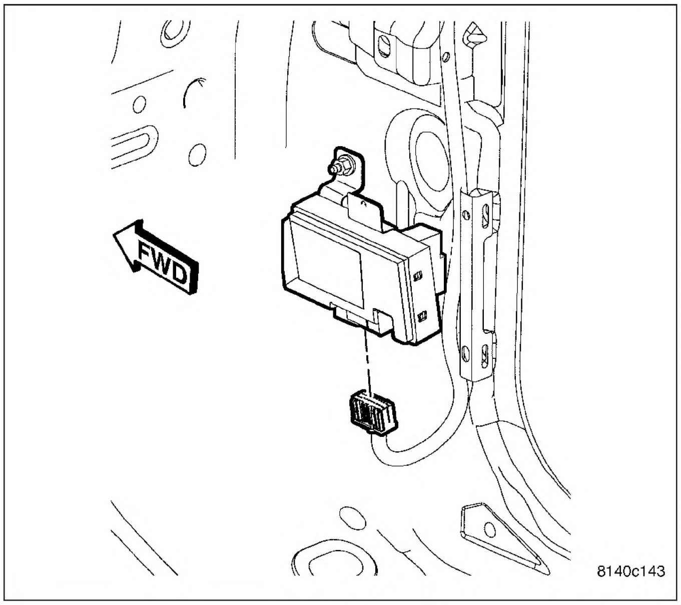


INSTALLATION

1. Position hands free module to the mounting bracket.
2. Install and tighten mounting fasteners.
3. Position mounting bracket and module to side cowl panel.
4. Install and tighten mounting fasteners.



5. Connect wire harness connector.
6. Install side cowl panel trim.
7. Connect battery negative cable.



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WIRING DIAGRAM INFORMATION

DESCRIPTION

DESCRIPTION - HOW TO USE WIRING DIAGRAMS

DaimlerChrysler Corporation wiring diagrams are designed to provide information regarding the vehicles wiring content. In order to effectively use the wiring diagrams to diagnose and repair DaimlerChrysler Corporation vehicles, it is important to understand all of their features and characteristics.

Diagrams are arranged such that the power (B+) side of the circuit is placed near the top of the page, and the ground (B-) side of the circuit is placed near the bottom of the page.

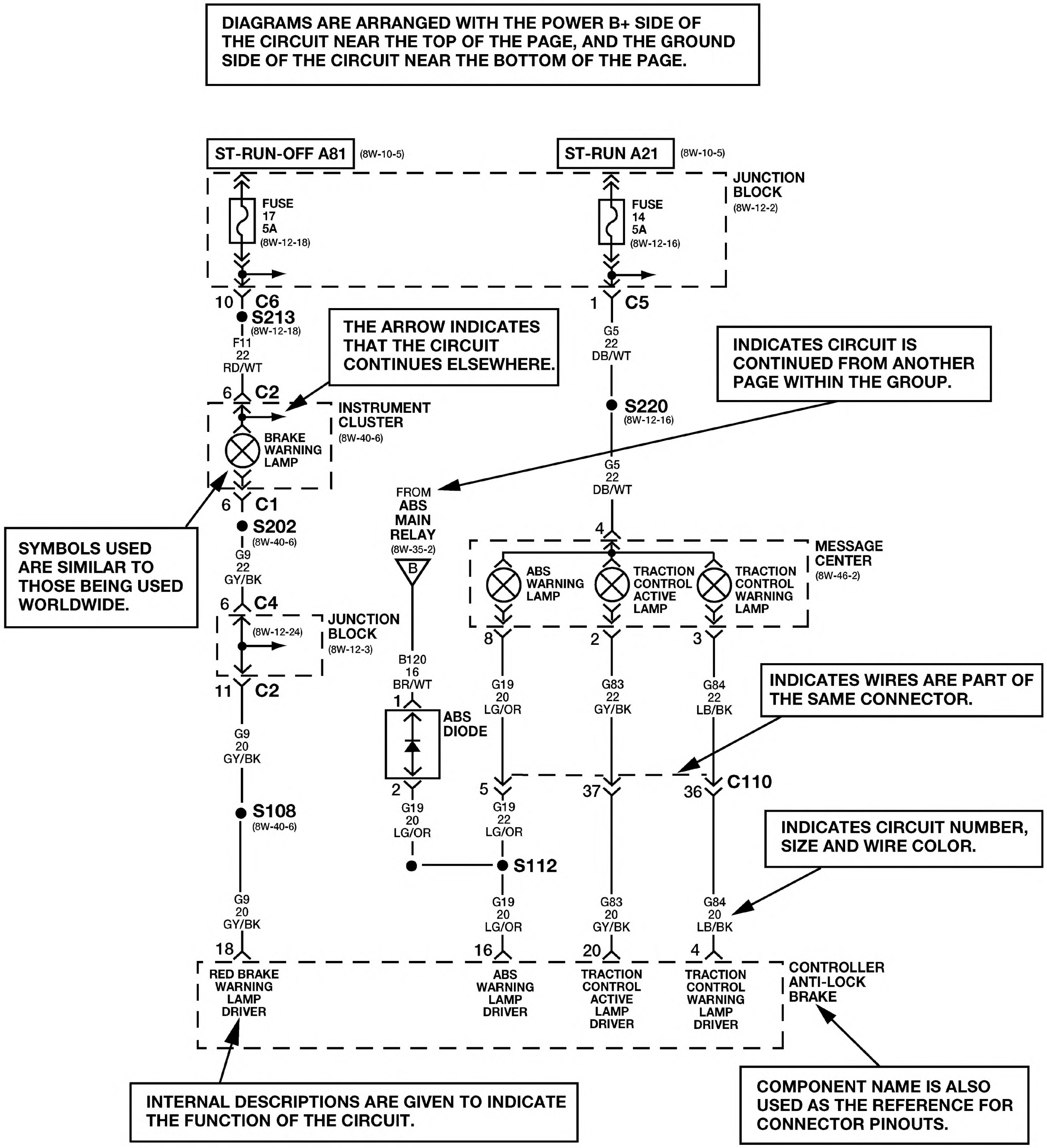
All switches, components, and modules are shown in the at rest position with the doors closed and the key removed from the ignition.

Components are shown two ways. A solid line around a component indicates that the component is complete. A dashed line around the component indicates that the component is being shown is not complete. Incomplete components have a reference number to indicate the page where the component is shown complete.

It is important to realize that no attempt is made on the diagrams to represent components and wiring as they appear on the vehicle. For example, a short piece of wire is treated the same as a long one. In addition, switches and other components are shown as simply as possible, with regard to function only.

SYMBOLS

International symbols are used throughout the wiring diagrams. These symbols are consistent with those being used around the world.



DIAGRAMS ARE ARRANGED WITH THE POWER B+ SIDE OF THE CIRCUIT NEAR THE TOP OF THE PAGE, AND THE GROUND SIDE OF THE CIRCUIT NEAR THE BOTTOM OF THE PAGE.

THE ARROW INDICATES THAT THE CIRCUIT CONTINUES ELSEWHERE.

INDICATES CIRCUIT IS CONTINUED FROM ANOTHER PAGE WITHIN THE GROUP.

SYMBOLS USED ARE SIMILAR TO THOSE BEING USED WORLDWIDE.

INDICATES WIRES ARE PART OF THE SAME CONNECTOR.

INDICATES CIRCUIT NUMBER, SIZE AND WIRE COLOR.

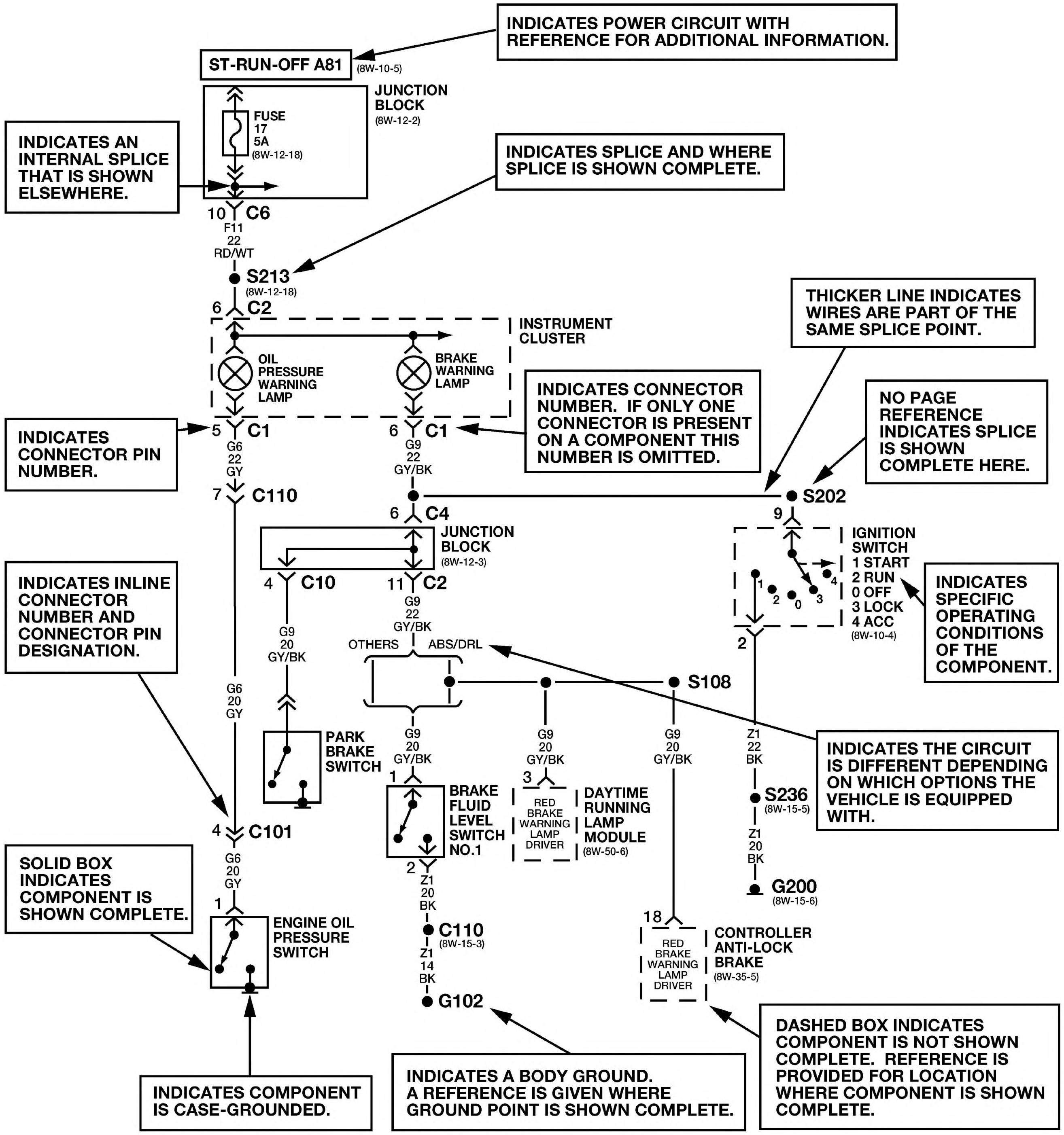
INTERNAL DESCRIPTIONS ARE GIVEN TO INDICATE THE FUNCTION OF THE CIRCUIT.

COMPONENT NAME IS ALSO USED AS THE REFERENCE FOR CONNECTOR PINOUTS.

ST-RUN-OFF A81
(8W-10-5)
ST-RUN A21
(8W-10-5)
JUNCTION BLOCK
(8W-12-2)
FUSE 17 5A
(8W-12-18)
FUSE 14 5A
(8W-12-16)
10 C6
S213
(8W-12-18)
F11 22 RD/WT
1 C5
G5 22 DB/WT
S220
(8W-12-16)
G5 22 DB/WT
6 C2
INSTRUMENT CLUSTER
(8W-40-6)
BRAKE WARNING LAMP
6 C1
S202
(8W-40-6)
G9 22 GY/BK
6 C4
JUNCTION BLOCK
(8W-12-3)
(8W-12-24)
11 C2
G9 20 GY/BK
S108
(8W-40-6)
G9 20 GY/BK
18
FROM ABS MAIN RELAY
(8W-35-2)
B
B120 16 BR/WT
1
ABS DIODE
2
G19 20 LG/OR
4
MESSAGE CENTER
(8W-46-2)
ABS WARNING LAMP
TRACTION CONTROL ACTIVE LAMP
TRACTION CONTROL WARNING LAMP
8
2
3
G19 20 LG/OR
G83 22 GY/BK
G84 22 LB/BK
5
37
36
C110
G19 22 LG/OR
S112
G19 20 LG/OR
G83 20 GY/BK
G84 20 LB/BK
16
20
4
CONTROLLER ANTI-LOCK BRAKE
RED BRAKE WARNING LAMP DRIVER
ABS WARNING LAMP DRIVER
TRACTION CONTROL ACTIVE LAMP DRIVER
TRACTION CONTROL WARNING LAMP DRIVER

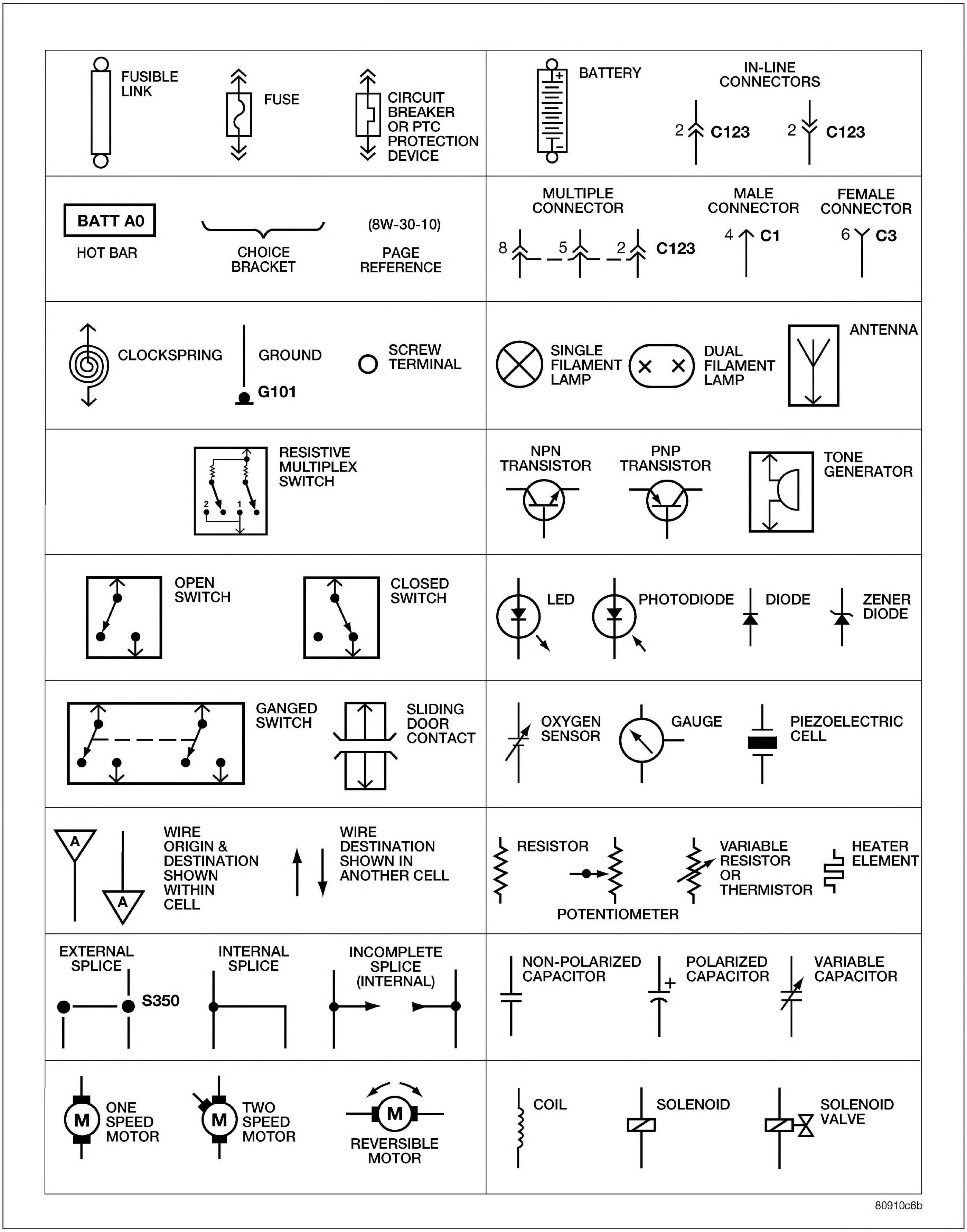
The System shown here is an EXAMPLE ONLY. It does not represent the actual circuit shown in the WIRING DIAGRAM SECTION.

80c06d01


INDICATES POWER CIRCUIT WITH REFERENCE FOR ADDITIONAL INFORMATION.
ST-RUN-OFF A81
(8W-10-5)
JUNCTION BLOCK
(8W-12-2)
FUSE
17
5A
(8W-12-18)
INDICATES AN INTERNAL SPLICE THAT IS SHOWN ELSEWHERE.
INDICATES SPLICE AND WHERE SPLICE IS SHOWN COMPLETE.
10
C6
F11
22
RD/WT
S213
(8W-12-18)
6
C2
INSTRUMENT CLUSTER
OIL PRESSURE WARNING LAMP
BRAKE WARNING LAMP
THICKER LINE INDICATES WIRES ARE PART OF THE SAME SPLICE POINT.
INDICATES CONNECTOR NUMBER. IF ONLY ONE CONNECTOR IS PRESENT ON A COMPONENT THIS NUMBER IS OMITTED.
NO PAGE REFERENCE INDICATES SPLICE IS SHOWN COMPLETE HERE.
INDICATES CONNECTOR PIN NUMBER.
5
C1
G6
22
GY
6
C1
G9
22
GY/BK
7
C110
S202
6
C4
9
JUNCTION BLOCK
(8W-12-3)
IGNITION SWITCH
1 START
2 RUN
0 OFF
3 LOCK
4 ACC
(8W-10-4)
1
2
0
3
4
INDICATES SPECIFIC OPERATING CONDITIONS OF THE COMPONENT.
INDICATES INLINE CONNECTOR NUMBER AND CONNECTOR PIN DESIGNATION.
4
C10
11
C2
G9
22
GY/BK
G9
20
GY/BK
OTHERS
ABS/DRL
S108
2
G6
20
GY
PARK BRAKE SWITCH
G9
20
GY/BK
G9
20
GY/BK
G9
20
GY/BK
Z1
22
BK
INDICATES THE CIRCUIT IS DIFFERENT DEPENDING ON WHICH OPTIONS THE VEHICLE IS EQUIPPED WITH.
1
BRAKE FLUID LEVEL SWITCH NO.1
3
RED BRAKE WARNING LAMP DRIVER
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
S236
(8W-15-5)
4
C101
Z1
20
BK
SOLID BOX INDICATES COMPONENT IS SHOWN COMPLETE.
G6
20
GY
2
Z1
20
BK
G200
(8W-15-6)
1
ENGINE OIL PRESSURE SWITCH
C110
(8W-15-3)
Z1
14
BK
18
RED BRAKE WARNING LAMP DRIVER
CONTROLLER ANTI-LOCK BRAKE
(8W-35-5)
G102
DASHED BOX INDICATES COMPONENT IS NOT SHOWN COMPLETE. REFERENCE IS PROVIDED FOR LOCATION WHERE COMPONENT IS SHOWN COMPLETE.
INDICATES COMPONENT IS CASE-GROUNDED.
INDICATES A BODY GROUND. A REFERENCE IS GIVEN WHERE GROUND POINT IS SHOWN COMPLETE.

The System shown here is an EXAMPLE ONLY. It does not represent the actual circuit shown in the WIRING DIAGRAM SECTION.

80c06d02


FUSIBLE LINK
FUSE
CIRCUIT BREAKER OR PTC PROTECTION DEVICE
BATTERY
IN-LINE CONNECTORS
2
C123
2
C123
BATT A0
HOT BAR
CHOICE BRACKET
(8W-30-10)
PAGE REFERENCE
MULTIPLE CONNECTOR
8
5
2
C123
MALE CONNECTOR
4
C1
FEMALE CONNECTOR
6
C3
CLOCKSPRING
GROUND
G101
SCREW TERMINAL
SINGLE FILAMENT LAMP
DUAL FILAMENT LAMP
ANTENNA
RESISTIVE MULTIPLEX SWITCH
2
1
NPN TRANSISTOR
PNP TRANSISTOR
TONE GENERATOR
OPEN SWITCH
CLOSED SWITCH
LED
PHOTODIODE
DIODE
ZENER DIODE
GANGED SWITCH
SLIDING DOOR CONTACT
OXYGEN SENSOR
GAUGE
PIEZOELECTRIC CELL
A
A
WIRE ORIGIN & DESTINATION SHOWN WITHIN CELL
WIRE DESTINATION SHOWN IN ANOTHER CELL
RESISTOR
POTENTIOMETER
VARIABLE RESISTOR OR THERMISTOR
HEATER ELEMENT
EXTERNAL SPLICE
S350
INTERNAL SPLICE
INCOMPLETE SPLICE (INTERNAL)
NON-POLARIZED CAPACITOR
POLARIZED CAPACITOR
+
VARIABLE CAPACITOR
M
ONE SPEED MOTOR
M
TWO SPEED MOTOR
M
REVERSIBLE MOTOR
COIL
SOLENOID
SOLENOID VALVE
80910c6b

TERMINOLOGY

This is a list of terms and definitions used in the wiring diagrams.

LHD	Left Hand Drive Vehicles
RHD	Right Hand Drive Vehicles
ATX	Automatic Transmissions-Front Wheel Drive
MTX	Manual Transmissions-Front Wheel Drive
AT	Automatic Transmissions-Rear Wheel Drive
MT	Manual Transmissions-Rear Wheel Drive
SOHC	Single Over Head Cam Engine
DOHC	Double Over Head Cam Engine
Export	Vehicles Built For Sale In Markets Other Than North America
Except Export	Vehicles Built For Sale In North America

DESCRIPTION - CIRCUIT INFORMATION

Each wire shown in the diagrams contains a code which identifies the main circuit, a specific part of the main circuit, gage of wire, and color. An example would be **A 2 18 LB/YL**. This is a Battery Feed circuit, level two, eighteen gauge, light blue with a yellow tracer.

WIRE COLOR CODE CHART

COLOR CODE	COLOR
BL	BLUE
BK	BLACK
BR	BROWN
DB	DARK BLUE
DG	DARK GREEN
GY	GRAY
LB	LIGHT BLUE
LG	LIGHT GREEN
OR	ORANGE
PK	PINK
RD	RED
TN	TAN
VT	VIOLET
WT	WHITE
YL	YELLOW
*	WITH TRACER

DESCRIPTION - CIRCUIT FUNCTIONS

All circuits in the diagrams use an alpha/numeric code to identify the wire and it's function. To identify which circuit code applies to a system, refer to the Circuit Identification Code Chart. This chart shows the main circuits only and does not show the secondary codes that may apply to some models.

CIRCUIT IDENTIFICATION CODE CHART

CIRCUIT	FUNCTION
A	BATTERY FEED
B	BRAKE CONTROLS
C	CLIMATE CONTROLS
D	DIAGNOSTIC CIRCUITS
E	DIMMING ILLUMINATION CIRCUITS
F	FUSED CIRCUITS
G	MONITORING CIRCUITS (GAUGES)
H	MULTIPLE
I	NOT USED
J	OPEN
K	POWERTRAIN CONTROL MODULE
L	EXTERIOR LIGHTING
M	INTERIOR LIGHTING
N	MULTIPLE
O	NOT USED
P	POWER OPTION (BATTERY FEED)
Q	POWER OPTIONS (IGNITION FEED)
R	PASSIVE RESTRAINT
S	SUSPENSION/STEERING
T	TRANSMISSION/TRANSAXLE/ TRANSFER CASE
U	OPEN
V	SPEED CONTROL, WIPER/ WASHER
W	WIPERS
X	AUDIO SYSTEMS
Y	TEMPORARY
Z	GROUNDS

DESCRIPTION - SECTION IDENTIFICATION AND INFORMATION

The wiring diagrams are grouped into individual sections. If a component is most likely found in a particular group, it will be shown complete (all wires, connectors, and pins) within that group. For example, the Auto Shutdown Relay is most likely to be found in Group 30, so it is shown there complete. It can, however, be shown partially in another group if it contains some associated wiring.

Splice diagrams in Section 8W-70 show the entire splice and provide references to other sections the splices serves. Section 8W-70 only contains splice diagrams that are not shown in their entirety somewhere else in the wiring diagrams.

Section 8W-80 shows each connector and the circuits involved with that connector. The connectors are identified using the name/number on the diagram pages.

DESCRIPTION - CONNECTOR, GROUND AND SPLICE INFORMATION

CAUTION: Not all connectors are serviced. Some connectors are serviced only with a harness. A typical example might be the Supplemental Restraint System connectors. Always check parts availability before attempting a repair.

IDENTIFICATION

In-line connectors are identified by a number, as follows:

- In-line connectors located in the engine compartment are C100 series numbers.
- In-line connectors located in the instrument panel area are C200 series numbers.
- In-line connectors located in the body are C300 series numbers.
- Jumper harness connectors are C400 series numbers.
- Grounds and ground connectors are identified with a “G” and follow the same series numbering as the in-line connectors.
- Splices are identified with an “S” and follow the same series numbering as the in-line connectors.
- Component connectors are identified by the component name instead of a number. Multiple connectors on a component use a C1, C2, etc. identifier.

LOCATIONS

Section 8W-91 contains connector/ground/splice location illustrations. The illustrations contain the connector name (or number)/ground number/splice number and component identification. Connector/ground/splice location charts in section 8W-91 reference the figure numbers of the illustrations.

The abbreviation T/O is used in the component location section to indicate a point in which the wiring harness branches out to a component. The abbreviation N/S means Not Shown in the illustrations

WARNING

WARNINGS - GENERAL

WARNINGS provide information to prevent personal injury and vehicle damage. Below is a list of general warnings that should be followed any time a vehicle is being serviced.

WARNING: Always wear safety glasses for eye protection.

WARNING: Use safety stands anytime a procedure requires being under a vehicle.

WARNING: Be sure that the ignition switch always is in the off position, unless the procedure requires it to be on.

WARNING: Set the parking brake when working on any vehicle. An automatic transmission should be in park. A manual transmission should be in neutral.

WARNING: Operate the engine only in a well-ventilated area.

WARNING: Keep away from moving parts when the engine is running, especially the fan and belts.

WARNING: To prevent serious burns, avoid contact with hot parts such as the radiator, exhaust manifold(s), tail pipe, catalytic converter and muffler.

WARNING: Do not allow flame or sparks near the battery. Gases are always present in and around the battery.

WARNING: Always remove rings, watches, loose hanging jewelry and avoid loose clothing.

DIAGNOSIS AND TESTING - WIRING HARNESS

TROUBLESHOOTING TOOLS

When diagnosing a problem in an electrical circuit there are several common tools necessary. These tools are listed and explained below.

- Jumper Wire - This is a test wire used to connect two points of a circuit. It can be used to bypass an open in a circuit.

WARNING: Never use a jumper wire across a load, such as a motor, connected between a battery feed and ground.

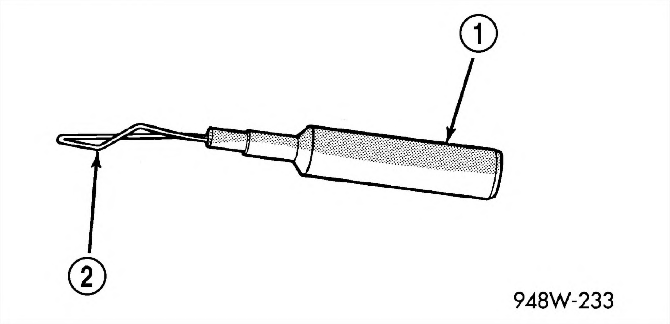
- Voltmeter - Used to check for voltage on a circuit. Always connect the black lead to a known good ground and the red lead to the positive side of the circuit.

CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking voltages in these circuits, use a meter with a 10 - megohm or greater impedance rating.

- Ohmmeter - Used to check the resistance between two points of a circuit. Low or no resistance in a circuit means good continuity.

CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking resistance in these circuits use a meter with a 10 - megohm or greater impedance rating. In addition, make sure the power is disconnected from the circuit. Circuits that are powered up by the vehicle's electrical system can cause damage to the equipment and provide false readings.

- Probing Tools - These tools are used for probing terminals in connectors. Select the proper size tool from Special Tool Package 6807, and insert the probing end (2) into the terminal being tested. Use the other end of the tool (1) to insert the meter probe.



INTERMITTENT AND POOR CONNECTIONS

Most intermittent electrical problems are caused by faulty electrical connections or wiring. It is also possible for a sticking component or relay to cause a problem. Before condemning a component or wiring assembly, check the following items.

- Connectors are fully seated
- Spread terminals, or terminal push out
- Terminals in the wiring assembly are fully seated into the connector/component and locked into position
- Dirt or corrosion on the terminals. Any amount of corrosion or dirt could cause an intermittent problem
- Damaged connector/component casing exposing the item to dirt or moisture
- Wire insulation that has rubbed through causing a short to ground
- Some or all of the wiring strands broken inside of the insulation
- Wiring broken inside of the insulation

TROUBLESHOOTING WIRING PROBLEMS

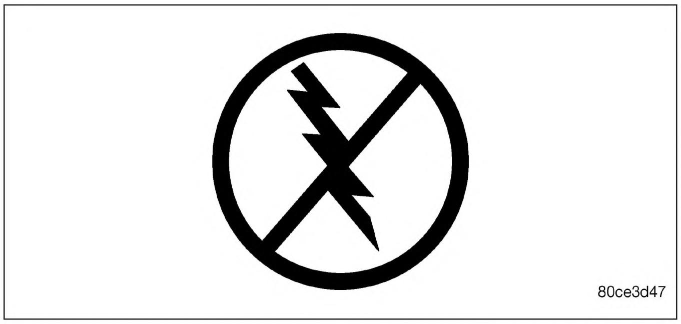
When troubleshooting wiring problems there are six steps which can aid in the procedure. The steps are listed and explained below. Always check for non-factory items added to the vehicle before doing any diagnosis. If the vehicle is equipped with these items, disconnect them to verify these add-on items are not the cause of the problem.

1. Verify the problem.
2. Verify any related symptoms. Do this by performing operational checks on components that are in the same circuit. Refer to the wiring diagrams.
3. Analyze the symptoms. Use the wiring diagrams to determine what the circuit is doing, where the problem most likely is occurring and where the diagnosis will continue.
4. Isolate the problem area.
5. Repair the problem area.
6. Verify the proper operation. For this step, check for proper operation of all items on the repaired circuit. Refer to the wiring diagrams.

STANDARD PROCEDURE

STANDARD PROCEDURE - ELECTROSTATIC DISCHARGE (ESD) SENSITIVE DEVICES

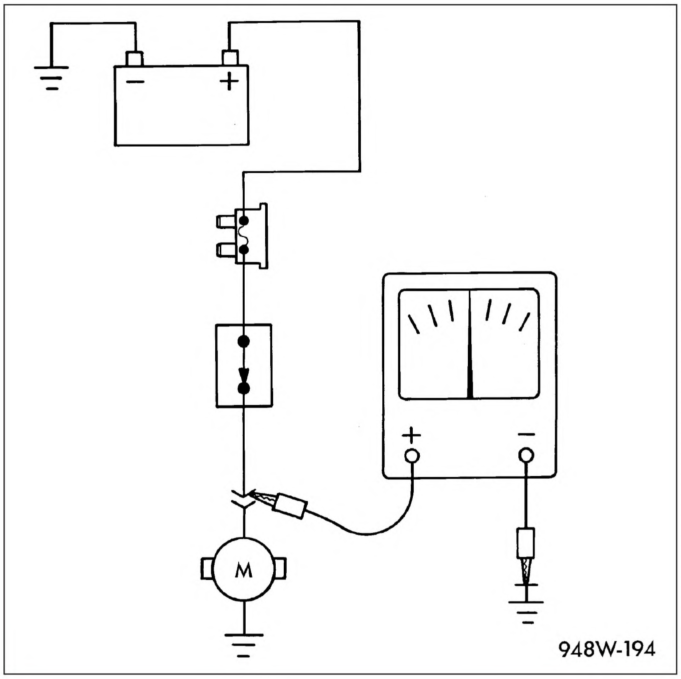
All ESD sensitive components are solid state and a symbol is used to indicate this. When handling any component with this symbol, comply with the following procedures to reduce the possibility of electrostatic charge build up on the body and inadvertent discharge into the component. If it is not known whether the part is ESD sensitive, assume that it is.



1. Always touch a known good ground before handling the part. This should be repeated while handling the part and more frequently after sliding across a seat, sitting down from a standing position, or walking a distance.
2. Avoid touching electrical terminals of the part, unless instructed to do so by a written procedure.
3. When using a voltmeter, be sure to connect the ground lead first.
4. Do not remove the part form it's protective packing until it is time to install the part.
5. Before removing the part from it's pakage, ground the pakage to a known good ground on the vehicle.

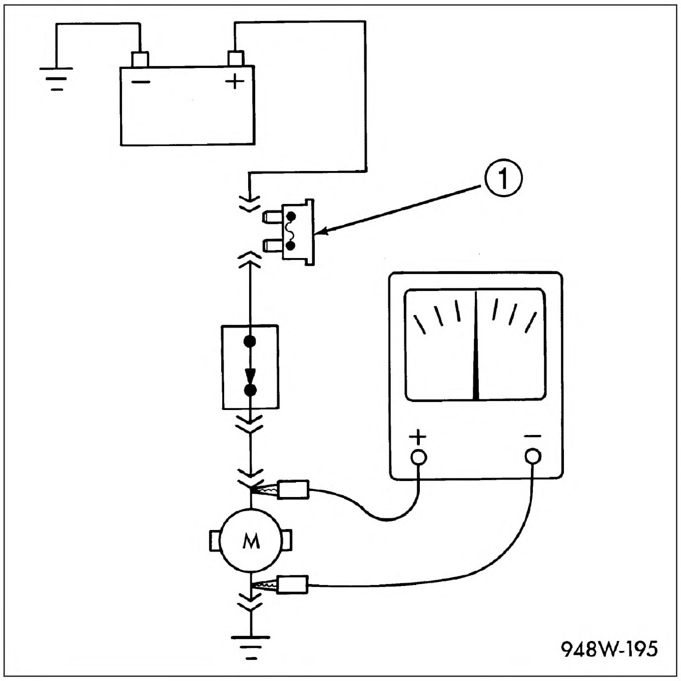
STANDARD PROCEDURE - TESTING OF VOLTAGE POTENTIAL

1. Connect the ground lead of a voltmeter to a known good ground.
2. Connect the other lead of the voltmeter to the selected test point. The vehicle ignition may need to be turned ON to check voltage. Refer to the appropriate test procedure.



STANDARD PROCEDURE - TESTING FOR CONTINUITY

1. Remove the fuse (1) for the circuit being checked or, disconnect the battery.
2. Connect one lead of the ohmmeter to one side of the circuit being tested
3. Connect the other lead to the other end of the circuit being tested. Low or no resistance means good continuity.



STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND

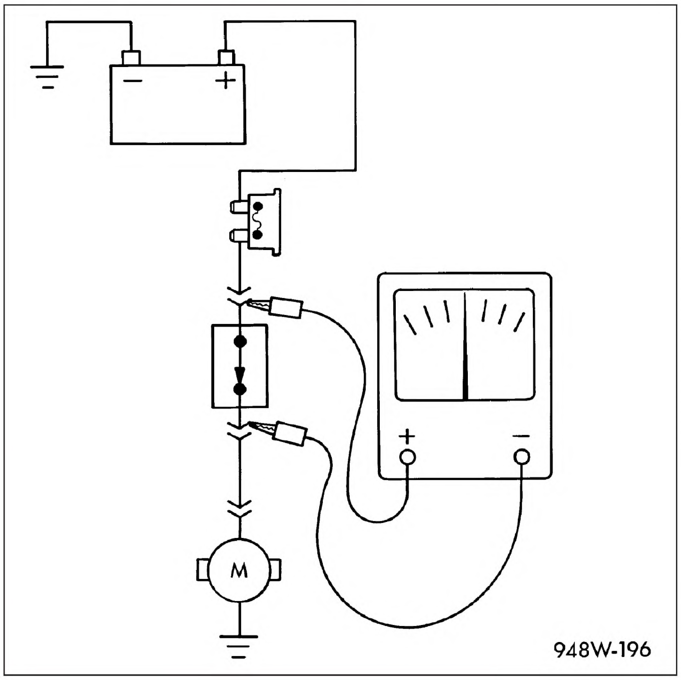
1. Remove the fuse and disconnect all items involved with the fuse.
2. Connect a test light or a voltmeter across the terminals of the fuse.
3. Starting at the fuse block, wiggle the wiring harness about six to eight inches apart and watch the voltmeter/test lamp.
4. If the voltmeter registers voltage or the test lamp glows, there is a short to ground in that general area of the wiring harness.

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND ON FUSES POWERING SEVERAL LOADS

1. Refer to the wiring diagrams and disconnect or isolate all items on the suspected fused circuits.
2. Replace the blown fuse.
3. Supply power to the fuse by turning ON the ignition switch or re-connecting the battery.
4. Start connecting or energizing the items in the fuse circuit one at a time. When the fuse blows the circuit with the short to ground has been isolated.

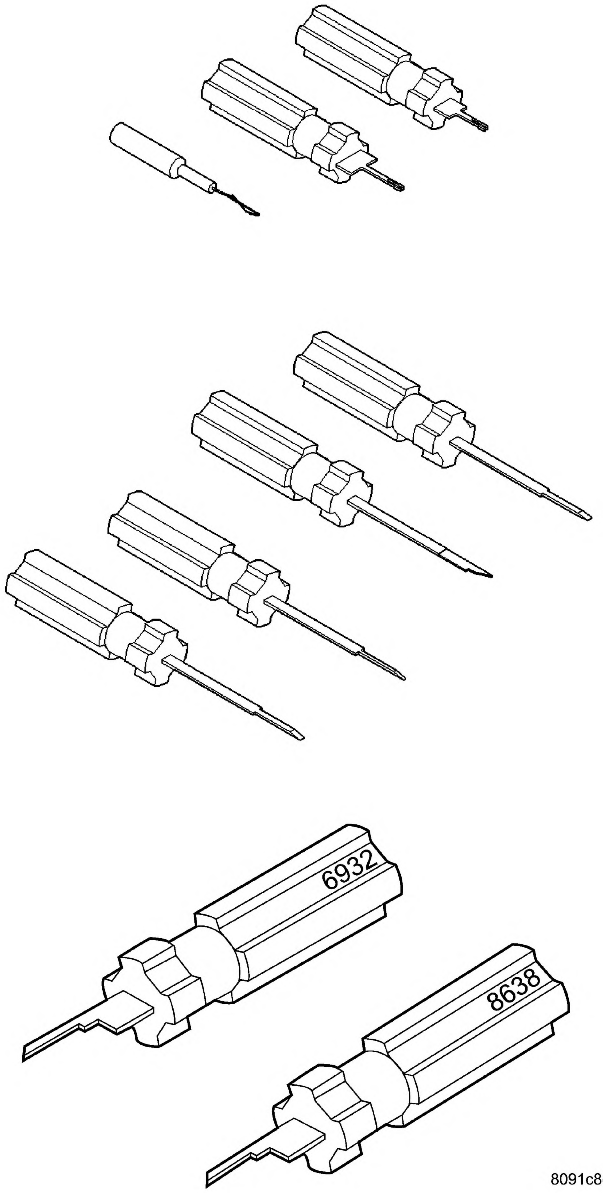
STANDARD PROCEDURE - TESTING FOR A VOLTAGE DROP

1. Connect the positive lead of the voltmeter to the side of the circuit closest to the battery.
2. Connect the other lead of the voltmeter to the other side of the switch, component or circuit.
3. Operate the item.
4. The voltmeter will show the difference in voltage between the two points.



SPECIAL TOOLS

WIRING/TERMINAL



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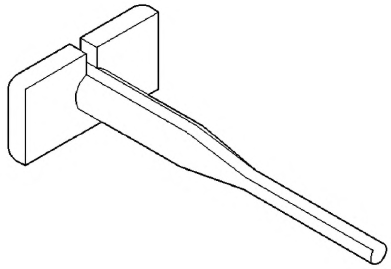
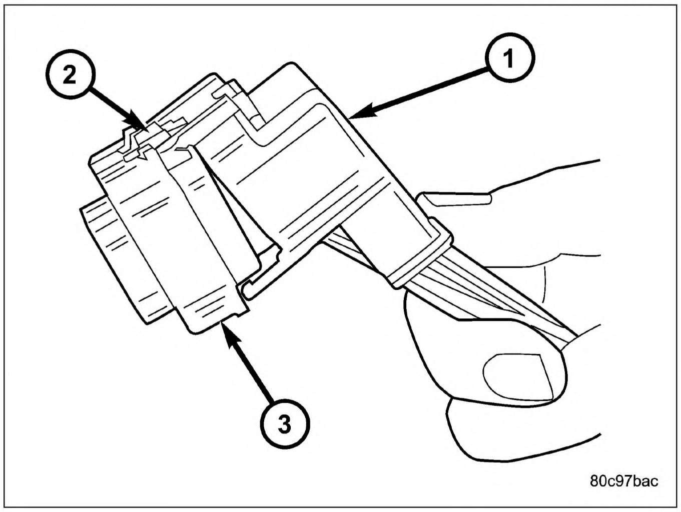
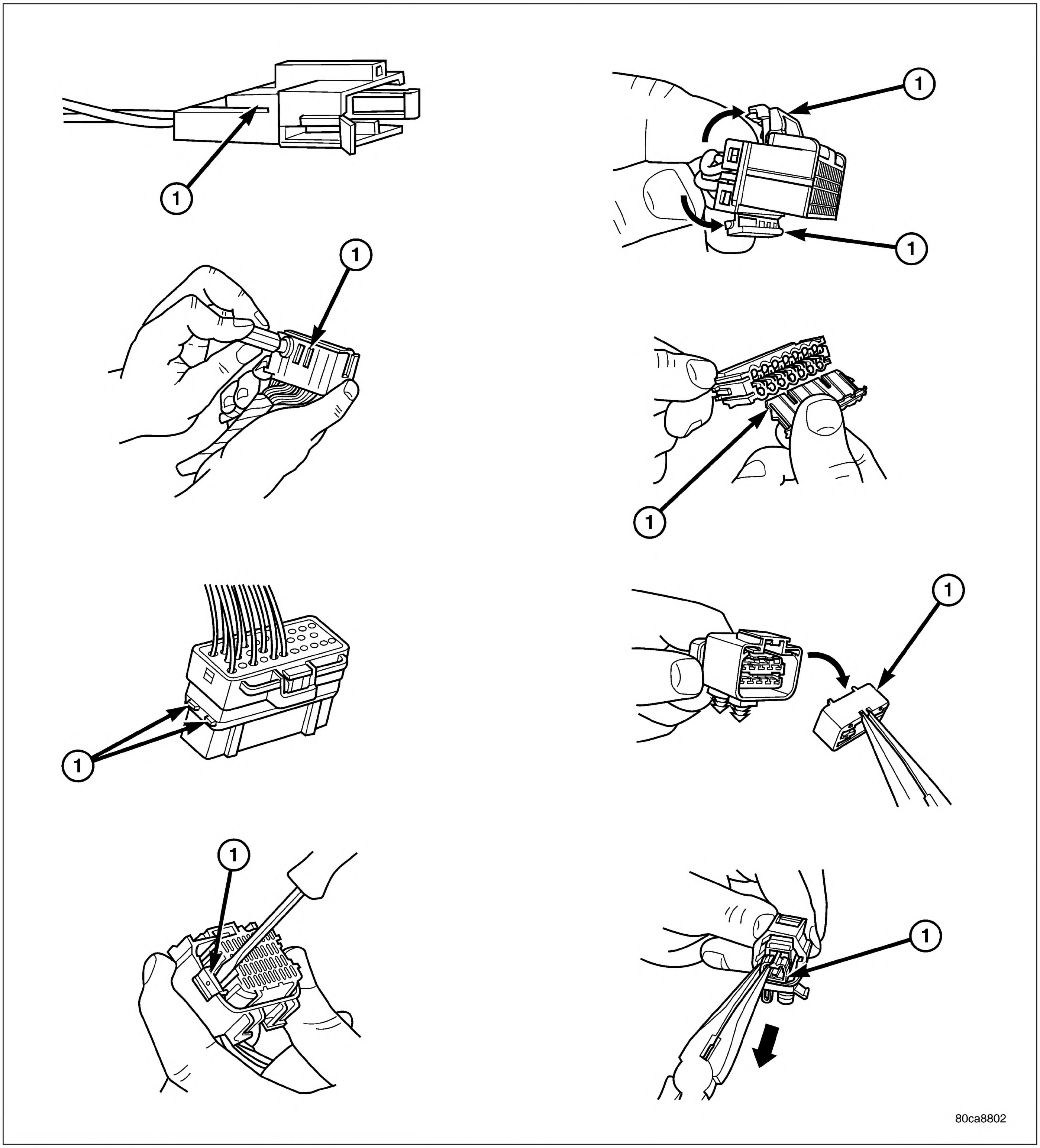


CONNECTOR

REMOVAL

1. Disconnect battery.
2. Release Connector Lock (2).
3. Disconnect the connector (3) being repaired from its mating half/component.
4. Remove the dress cover (if applicable) (1).




1
1
1
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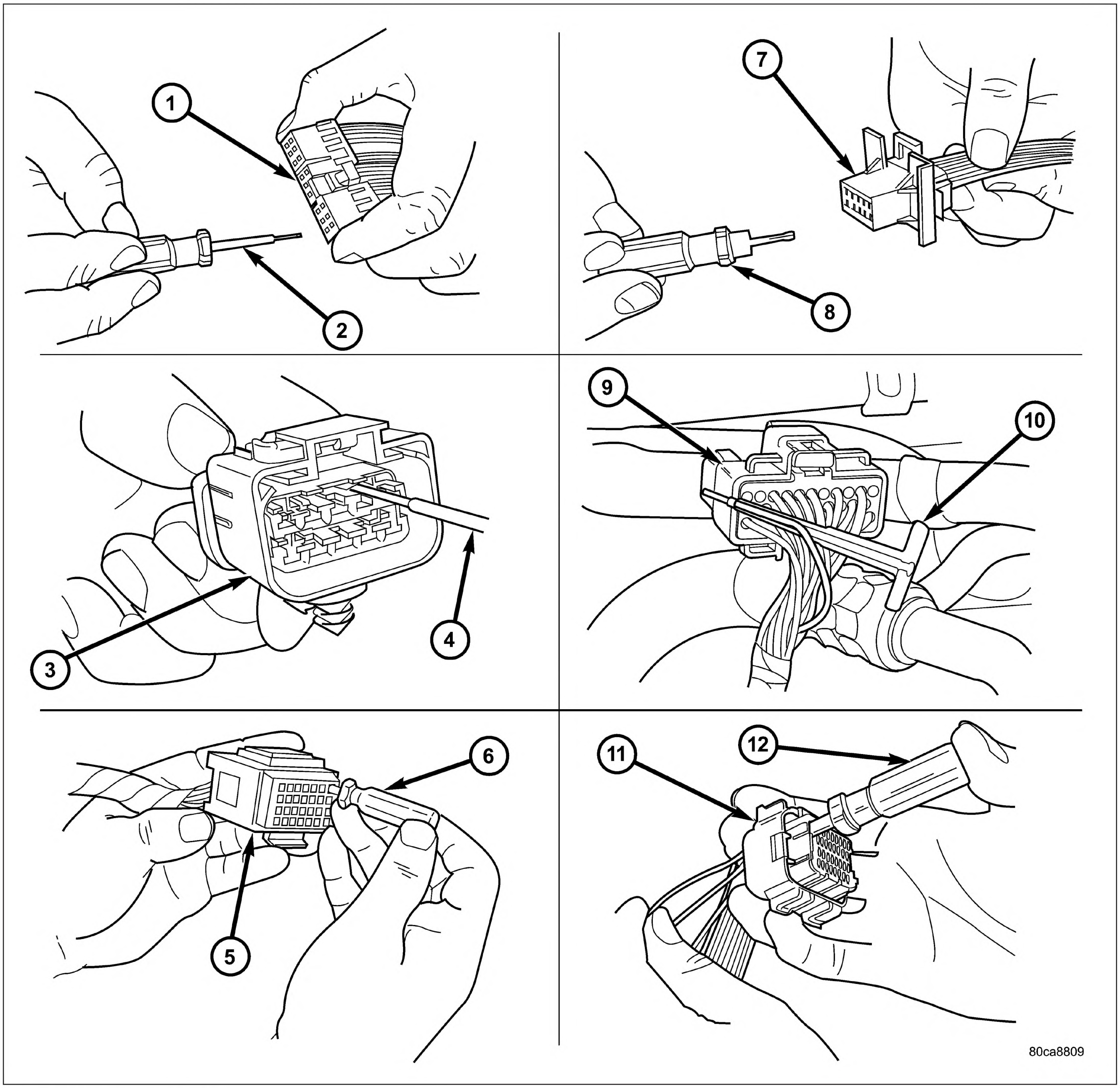
80ca8802

5. Release the Secondary Terminal Lock, if required (1).



1 - TYPICAL CONNECTOR
2 - PICK FROM SPECIAL TOOL KIT 6680
3 - APEX CONNECTOR
4 - PICK FROM SPECIAL TOOL KIT 6680
5 - AUGAT CONNECTOR
6 - SPECIAL TOOL 6932
7 - MOLEX CONNECTOR
8 - SPECIAL TOOL 6742
9 - THOMAS AND BETTS CONNECTOR
10 - SPECIAL TOOL 6934
11 - TYCO CONNECTOR
12 - SPECIAL TOOL 8638

6. Position the connector locking finger away from the terminal using the proper special tool. Pull on the wire to remove the terminal from the connector.

INSTALLATION

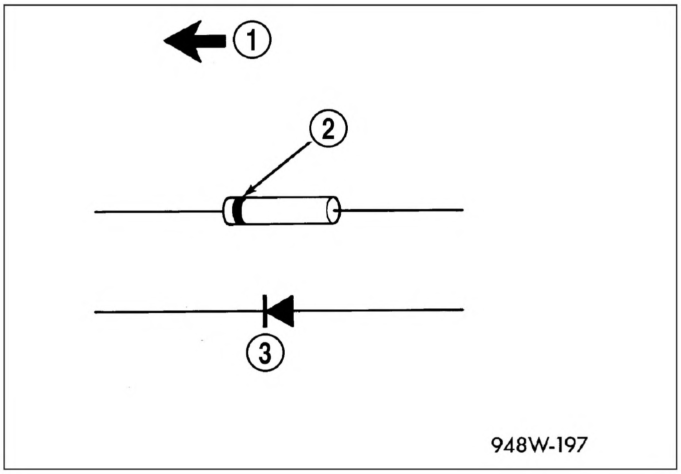
1. Insert the removed terminal in the same cavity on the repair connector.

2. Repeat steps for each terminal in the connector, being sure that all wires are inserted into the proper cavities. For additional connector pin-out identification, refer to the wiring diagrams.
3. When the connector is re-assembled, the secondary terminal lock must be placed in the locked position to prevent terminal push out.
4. Replace dress cover (if applicable).
5. Connect connector to its mating half/component.
6. Connect battery and test all affected systems.

DIODE

REMOVAL

1. Disconnect the battery.
2. Locate the diode in the harness, and remove the protective covering.
3. Remove the diode from the harness, pay attention to the current flow direction (1) (2) (3).



INSTALLATION

1. Remove the insulation from the wires in the harness. Only remove enough insulation to solder in the new diode.
2. Install the new diode in the harness, making sure current flow is correct. If necessary, refer to the appropriate wiring diagram for current flow.
3. Solder the connection together using rosin core type solder only. **Do not use acid core solder.**
4. Tape the diode to the harness using electrical tape. Make sure the diode is completely sealed from the elements.
5. Re-connect the battery and test affected systems.

TERMINAL

REMOVAL

1. Follow steps for removing terminals described in the connector removal section.
2. Cut the wire 6 inches from the back of the connector.

INSTALLATION

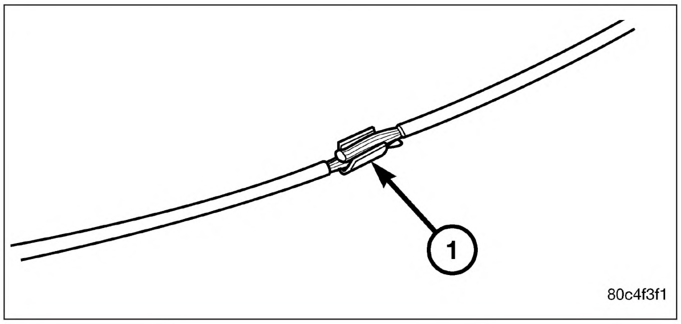
1. Select a wire from the terminal repair kit that best matches the color and gage of the wire being repaired.
2. Cut the repair wire to the proper length and remove one–half (1/2) inch of insulation.
3. Splice the repair wire to the wire harness (see wire splicing procedure) .
4. Insert the repaired wire into the connector.
5. Install the connector locking wedge, if required, and reconnect the connector to its mating half/component.
6. Re-tape the wire harness starting at 1–1/2 inches behind the connector and 2 inches past the repair.
7. Connect battery and test all affected systems.

WIRE

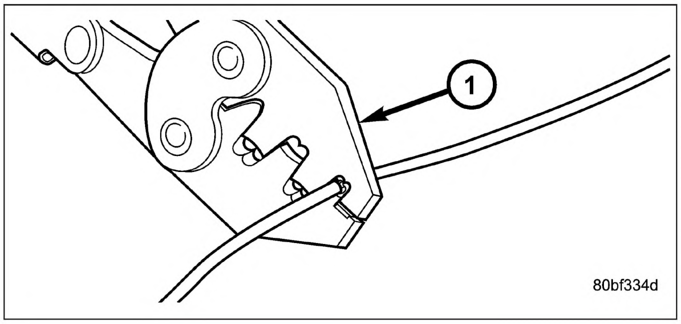
STANDARD PROCEDURE - WIRE SPLICING

When splicing a wire, it is important that the correct gage be used as shown in the wiring diagrams.

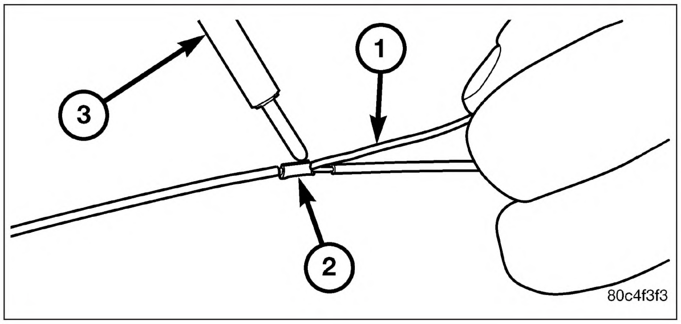
1. Remove one-half (1/2) inch of insulation from each wire that needs to be spliced.
2. Place a piece of adhesive lined heat shrink tubing on one side of the wire. Make sure the tubing will be long enough to cover and seal the entire repair area.
3. Place the strands of wire overlapping each other inside of the splice clip (1).



4. Using crimping tool (1), Mopar p/n 05019912AA, crimp the splice clip and wires together.

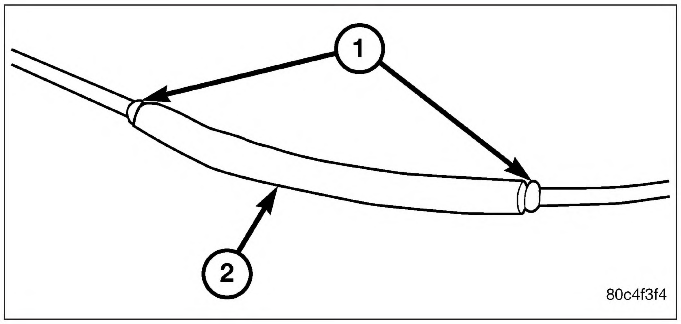


5. Solder (3) the connection (2) together using rosin core type solder (1) only.



CAUTION: DO NOT USE ACID CORE SOLDER.

6. Center the heat shrink tubing (2) over the joint and heat using a heat gun. Heat the joint until the tubing is tightly sealed and sealant (1) comes out of both ends of the tubing.



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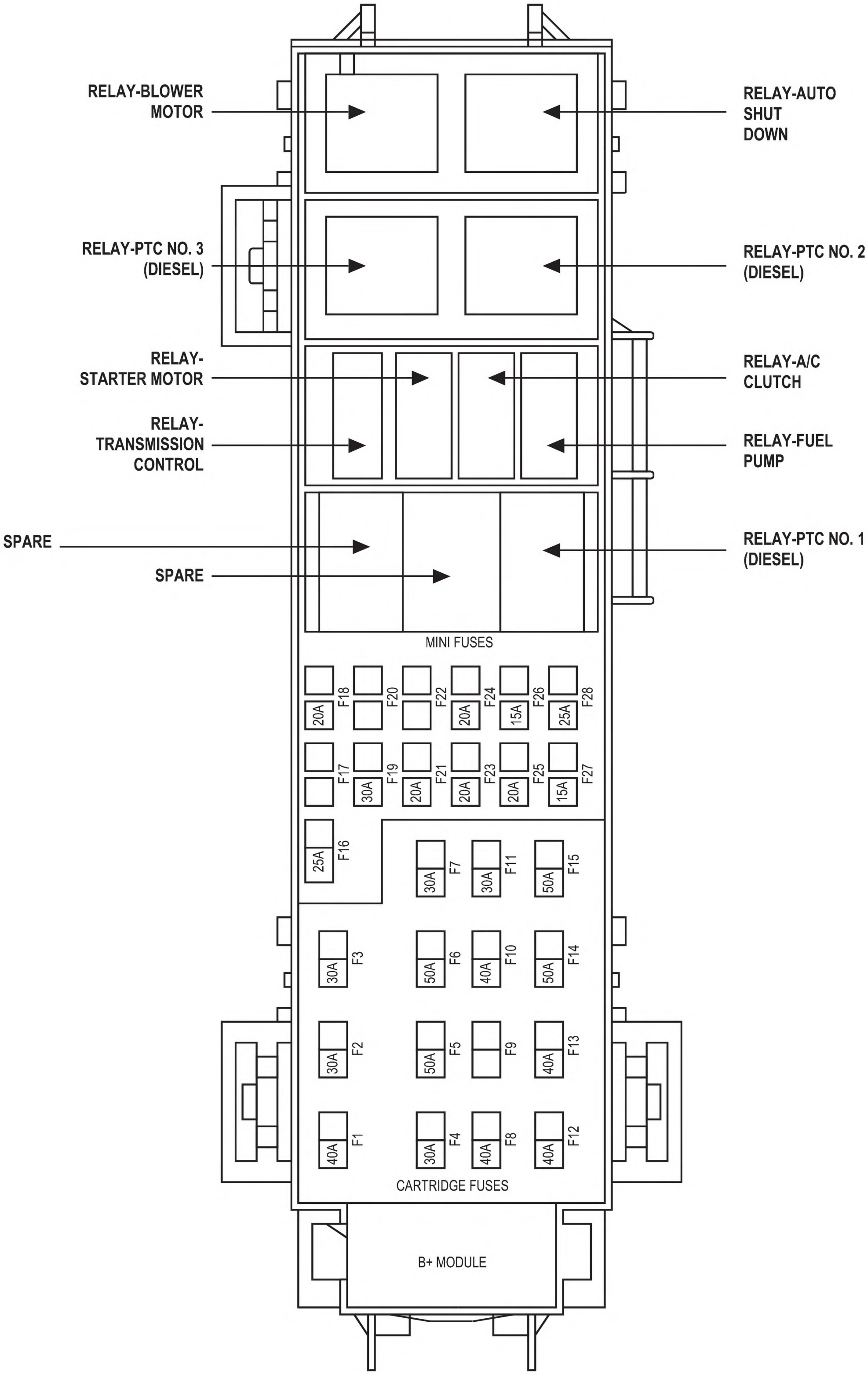
Fuse 4	8W-10-7, 9
Fuse 6	8W-10-7, 9, 12
Fuse 7	8W-10-7, 10
Fuse 8	8W-10-7, 10
Fuse 9	8W-10-9
Fuse 10	8W-10-7, 11
Fuse 11	8W-10-7, 11
Fuse 12	8W-10-7, 9, 11
Fuse 13	8W-10-7, 8, 12
Fuse 14	8W-10-7
Fuse 16	8W-10-8, 12, 13, 14
Fuse 17	8W-10-9
Fuse 18	8W-10-8, 16
Fuse 19	8W-10-8, 16, 17
Fuse 20	8W-10-8, 16, 17
Fuse 21	8W-10-8, 18
Fuse 22	8W-10-9
Fuse 23	8W-10-8, 18
Fuse 24	8W-10-8, 17, 18
Fuse 25	8W-10-8, 17, 18
Fuse 27	8W-10-8, 18
Fuse 28	8W-10-13, 19
Fusible Link	8W-10-6
G104	8W-10-6
G105	8W-10-6
G900	8W-10-17
Generator	8W-10-6
Injector-Fuel-No. 1	8W-10-19
Injector-Fuel-No. 2	8W-10-19
Injector-Fuel-No. 3	8W-10-19
Injector-Fuel-No. 4	8W-10-19
Injector-Fuel-No. 5	8W-10-19
Injector-Fuel-No. 6	8W-10-19
Injector-Fuel-No. 7	8W-10-19
Injector-Fuel-No. 8	8W-10-19
Junction Block	8W-10-7, 9, 10, 11, 12, 17
Module-Antilock Brakes	8W-10-7, 8, 9, 18
Module-Final Drive Control	8W-10-8, 18
Module-Front Blower Power	8W-10-9
Module-Front Control	8W-10-14
Module-Hydraulic Cooling Fan	8W-10-18
Module-Integrated Power	8W-10-6, 7, 14
Module-Powertrain Control	8W-10-8, 13, 16, 17, 19
Module-Steering Control	8W-10-17
Motor-Blower	8W-10-9
Power Distribution Center	8W-10-2, 6, 7, 8, 9, 10, 11, 12, 14, 16, 18, 19
Relay-A/C Clutch	8W-10-8, 16
Relay-Auto Shut Down	8W-10-13
Relay-Blower Motor	8W-10-7, 9
Relay-Door Lock	8W-10-10, 12
Relay-Door Unlock-Driver	8W-10-10, 12
Relay-Door Unlock-Passenger	8W-10-10, 12
Relay-Flip-Up Glass	8W-10-9
Relay-Fuel Pump	8W-10-8, 18
Relay-Power Outlet	8W-10-7, 11
Relay-Rear Window Defogger	8W-10-7, 11
Relay-Run	8W-10-9, 12
Relay-Run/Accessory	8W-10-11, 12
Relay-Run/Accessory Delay	8W-10-10
Relay-Starter Motor	8W-10-11, 17
Relay-Transmission Control	8W-10-16
Relay-Wiper-Rear	8W-10-9, 12
Starter	8W-10-6
Switch-Ignition	8W-10-8, 16, 17
Switch-Stop Lamp	8W-10-8, 18

POWER DISTRIBUTION CENTER


RELAY-BLOWER MOTOR
RELAY-AUTO SHUT DOWN
RELAY-PTC NO. 3 (DIESEL)
RELAY-PTC NO. 2 (DIESEL)
RELAY-STARTER MOTOR
RELAY-A/C CLUTCH
RELAY-TRANSMISSION CONTROL
RELAY-FUEL PUMP
SPARE
SPARE
RELAY-PTC NO. 1 (DIESEL)
MINI FUSES
20A F18
F20
F22
20A F24
15A F26
25A F28
F17
30A F19
20A F21
20A F23
20A F25
15A F27
25A F16
30A F7
30A F11
50A F15
30A F3
50A F6
40A F10
50A F14
30A F2
50A F5
F9
40A F13
40A F1
30A F4
40A F8
40A F12
CARTRIDGE FUSES
B+ MODULE

WK501002

FUSES

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A502 12RD/LG	FUSED B(+)
2	30A	A907 14RD/DB	FUSED B(+)
3	30A	A902 14RD/GY	FUSED B(+)
4	30A	A107 12TN/RD	FUSED B(+)
5	50A	A923 10RD ○○	FUSED B(+)
6	50A	A924 10RD/VT	FUSED B(+)
7	30A	A611 14RD	FUSED B(+)
8	40A	A906 12RD/OR	FUSED B(+)
9	-	-	-
10	40A	A901 12RD/TN	FUSED B(+)
11	30A	A925 14RD/LG	FUSED B(+)
12	40A	A908 12RD/VT	FUSED B(+)
13	40A	A905 12RD/WT	FUSED B(+)
14	-	-	-
15	-	-	-
16	25A	A15 16RD/TN	FUSED B(+)
17	-	-	-
18	20A	A917 18RD/DG	FUSED B(+)
19	20A	A106 18LB/RD	FUSED B(+)
20	20A	A209 18RD ○	FUSED B(+)
21	30A	A200 12RD/DG	FUSED B(+)
22	-	-	-
23	20A	A927 18RD/BR	FUSED B(+)
24	20A	A916 16RD/GY ○	FUSED B(+)
24	20A	A916 16RD ○○	FUSED B(+)
25	20A	A926 18RD/TN	FUSED B(+)
26	15A	K542 14BR ○○	FUSED ASD RELAY OUTPUT
27	15A	A103 18GY/RD	FUSED B(+)
28	25A	F42 16DG/LG	FUSED ASD RELAY OUTPUT

○ GAS
○○ DIESEL

WK501003

RELAY-A/C CLUTCH

CAVITY	CIRCUIT	FUNCTION
30	A917 18RD	FUSED B(+)
85	C13 20LB/OR	A/C CLUTCH RELAY CONTROL
86	A15 16RD/TN ○○	FUSED B(+)
86	F942 20PK/LG ○	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	C3 18DB/YL	A/C CLUTCH RELAY OUTPUT
87A	-	-

RELAY-AUTO SHUT DOWN

CAVITY	CIRCUIT	FUNCTION
30	A924 10RD	FUSED B(+)
85	K342 20BR/WT	ASD RELAY OUTPUT
86	A924 10RD	FUSED B(+)
87	A142 10RD/OR	ASD RELAY OUTPUT
87A	-	-

RELAY-BLOWER MOTOR-

CAVITY	CIRCUIT	FUNCTION
30	A502 12RD/LG	FUSED B(+)
85	Z387 20BK	GROUND
86	F921 20PK/YL	FUSED RUN RELAY OUTPUT
87	C7 12DB	FUSED RUN RELAY OUTPUT
87A	-	-

RELAY-FUEL PUMP

CAVITY	CIRCUIT	FUNCTION
30	A916 16RD	FUSED B(+)
85	K31 20BR	FUEL PUMP RELAY CONTROL
85	A15 16RD/TN ○○	FUSED B(+)
86	F942 20PK/LG ○	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	A109 16OR/RD	FUSED B(+)
87A	-	-

RELAY-PTC NO. 1 (DIESEL)

CAVITY	CIRCUIT	FUNCTION
30	A923 10RD	FUSED B(+)
85	K360 20GY/BR	PTC NO. 1 RELAY CONTROL
86	A15 16RD/TN	FUSED B(+)
87	N113 10DB/OR	PTC NO. 1 RELAY OUTPUT
87A	-	-

○ GAS
○○ DIESEL

WK501004

**RELAY-
PTC NO. 2
(DIESEL)**

CAVITY	CIRCUIT	FUNCTION
30	A915 10RD	FUSED B(+)
85	K361 20BR/WT	PTC NO. 2 RELAY CONTROL
86	A15 16RD/TN	FUSED B(+)
87	N114 10DB/LB	PTC NO. 2 RELAY OUTPUT
87A	-	-

**RELAY-
PTC NO. 3
(DIESEL)**

CAVITY	CIRCUIT	FUNCTION
30	A918 10RD	FUSED B(+)
85	K363 20OR/BR	PTC NO. 3 RELAY CONTROL
86	A15 16RD/TN	FUSED B(+)
87	N115 10DB/YL	PTC NO. 3 RELAY OUTPUT
87A	-	-

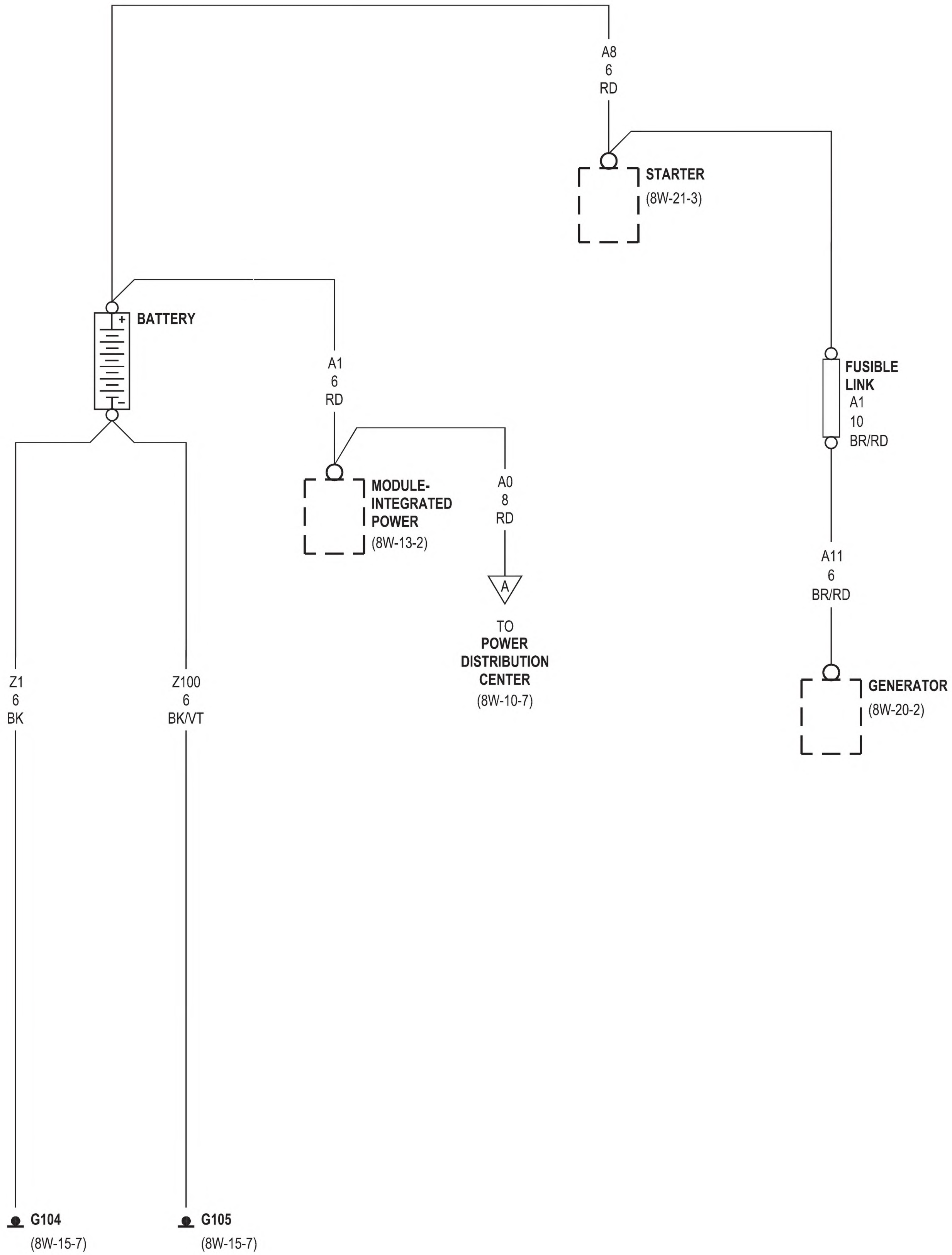
**RELAY-
STARTER
MOTOR**

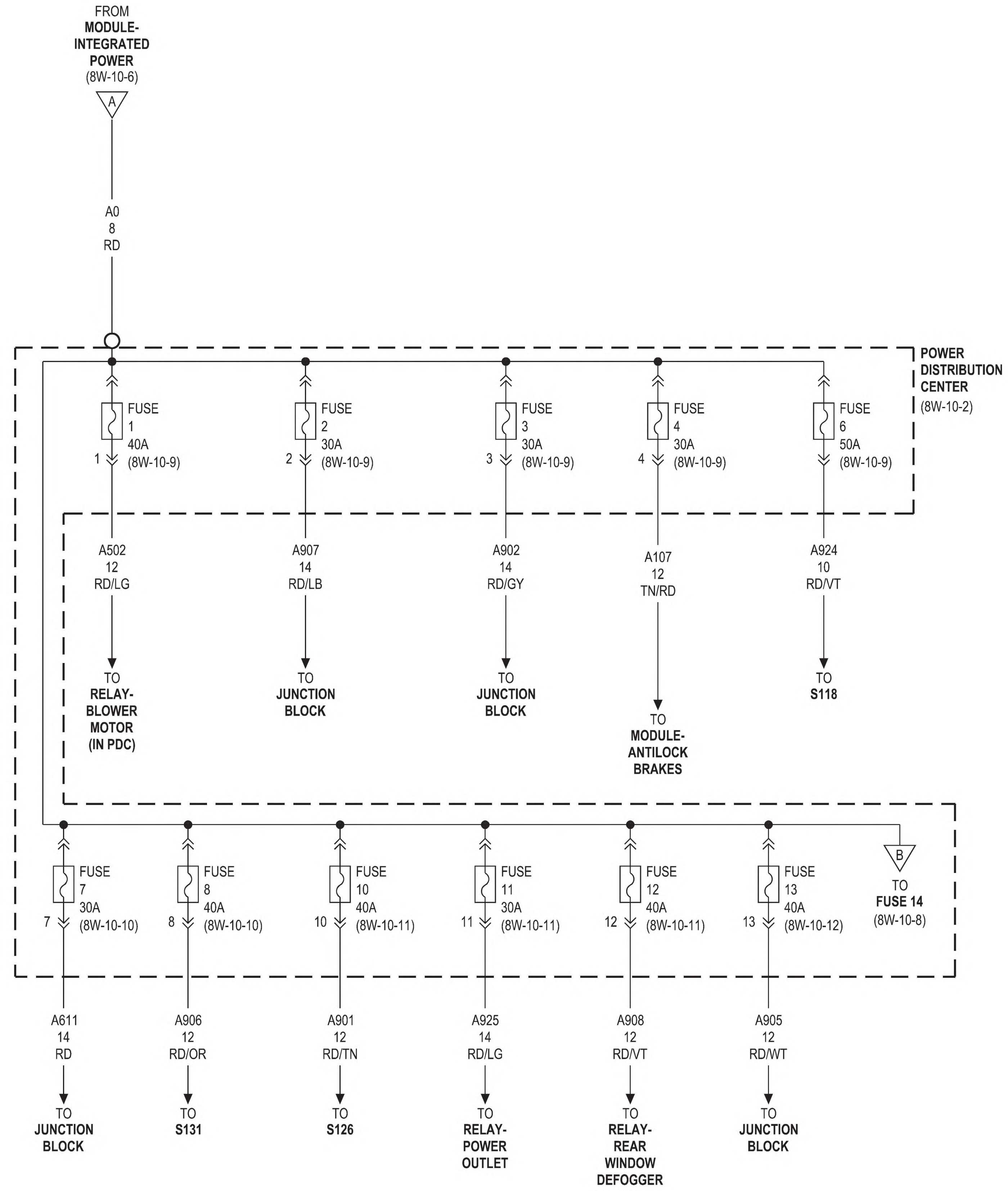
CAVITY	CIRCUIT	FUNCTION
30	A901 12RD	FUSED B(+)
85	T752 20DG/OR	ENGINE STARTER MOTOR RELAY CONTROL
86	F942 20PK/LG ○○	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	F26 18PK/OR ○	FUSED IGNITION SWITCH OUTPUT (START)
87	T750 12YL/GY	ENGINE STARTER MOTOR RELAY OUTPUT
87A	-	-

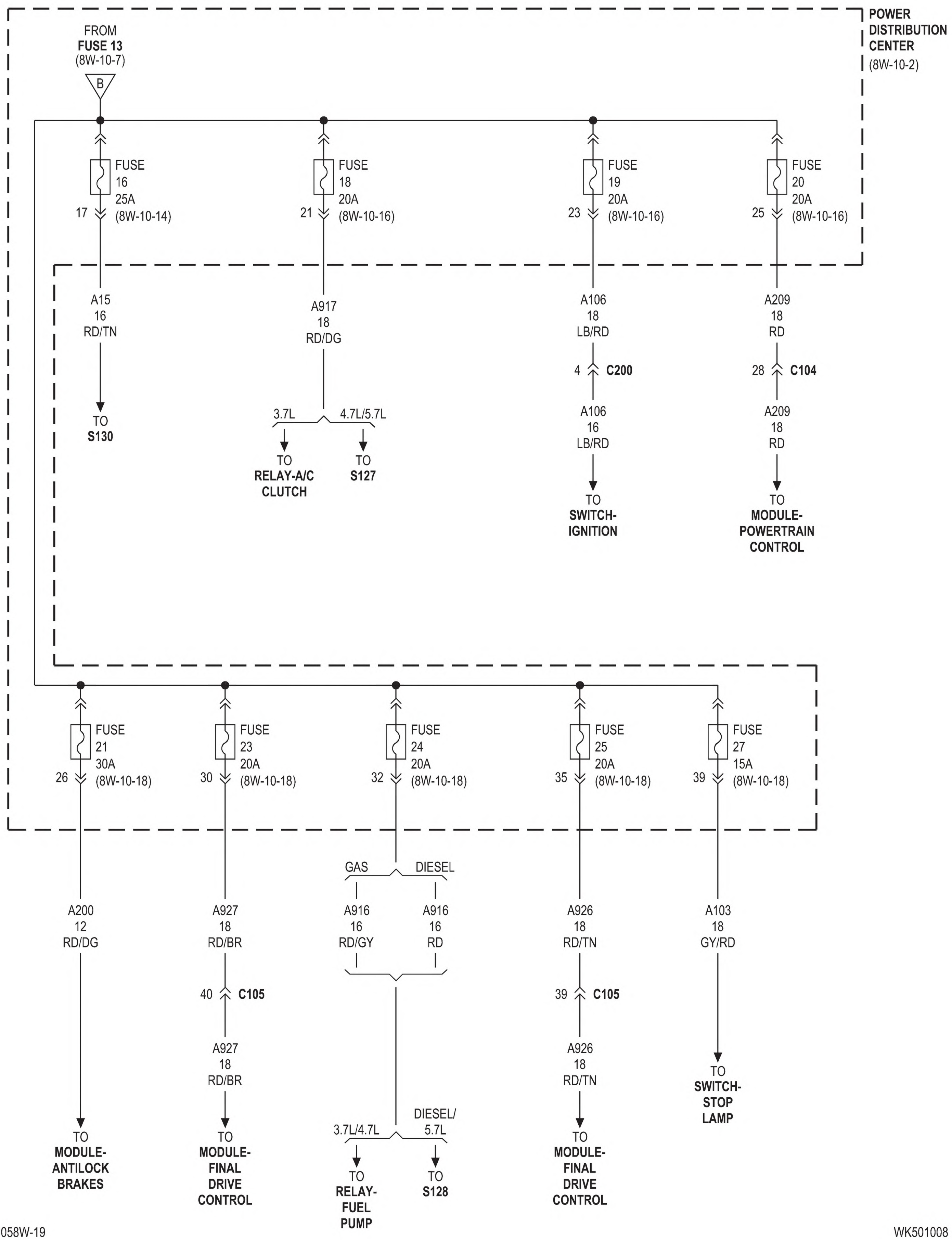
**RELAY-
TRANSMISSION
CONTROL**

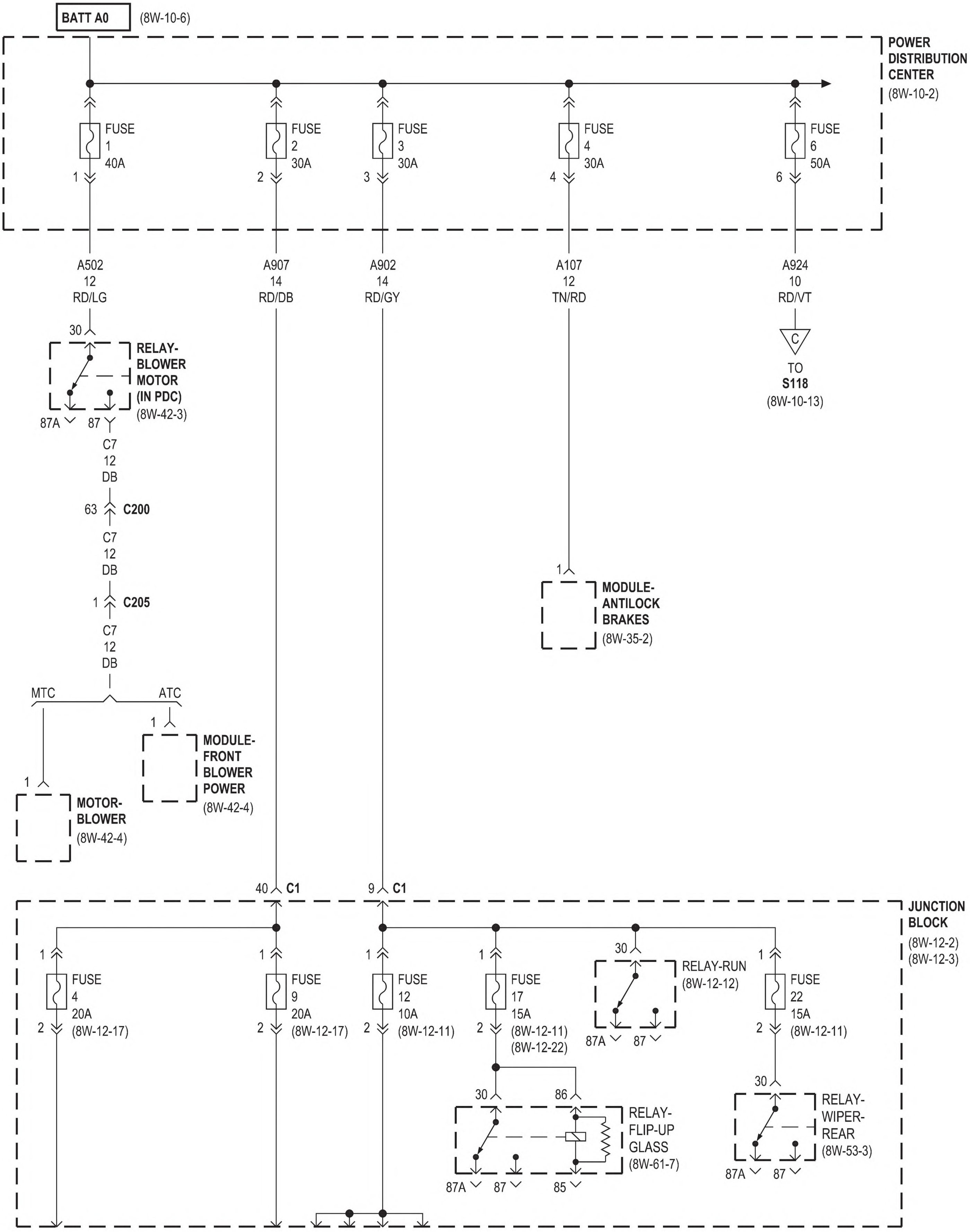
CAVITY	CIRCUIT	FUNCTION
30	A917 18RD	FUSED B(+)
85	Z387 20BK	GROUND
86	T15 20YL/BR	TRANSMISSION CONTROL RELAY CONTROL
87	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
87A	-	-

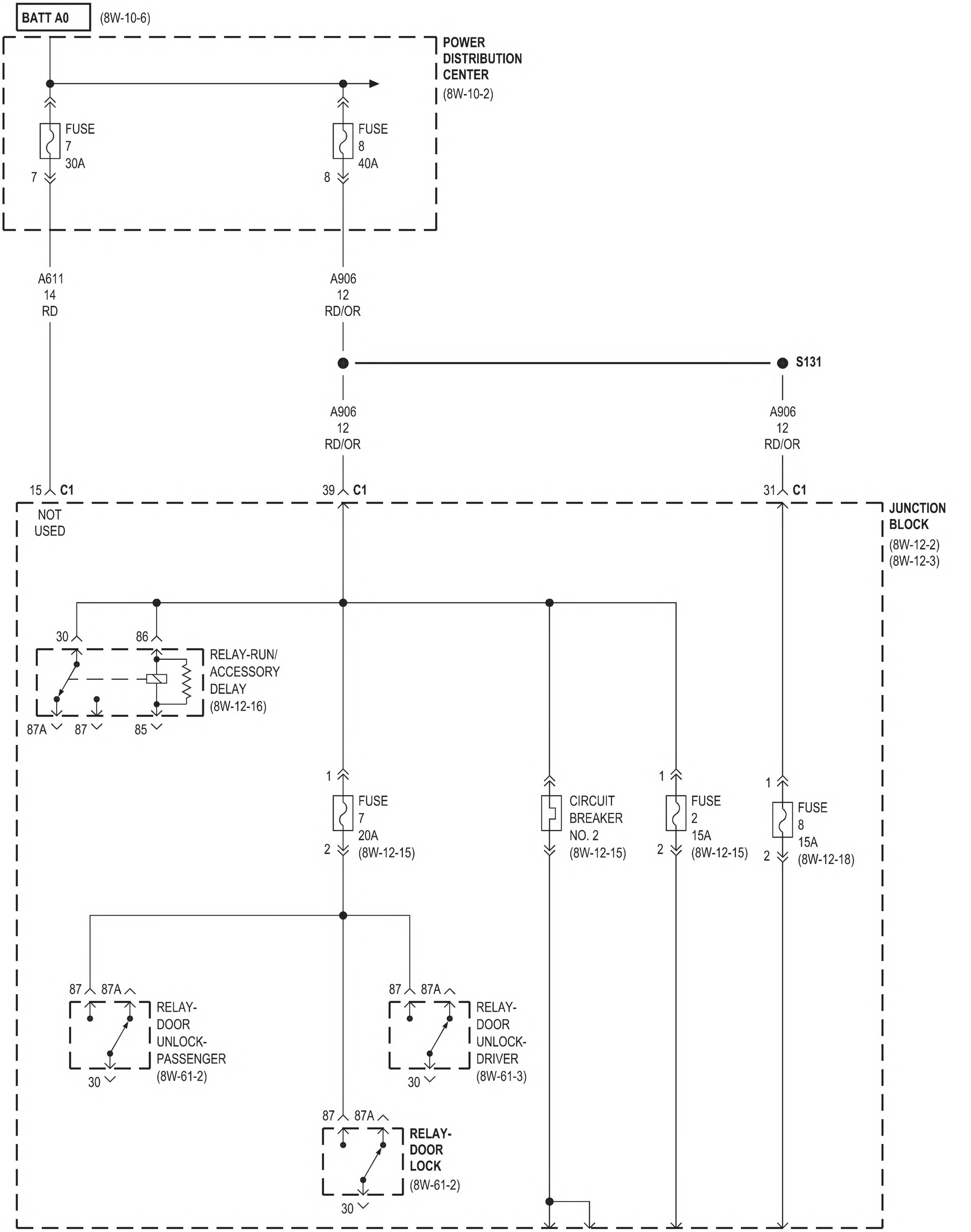
○ GAS
○○ DIESEL

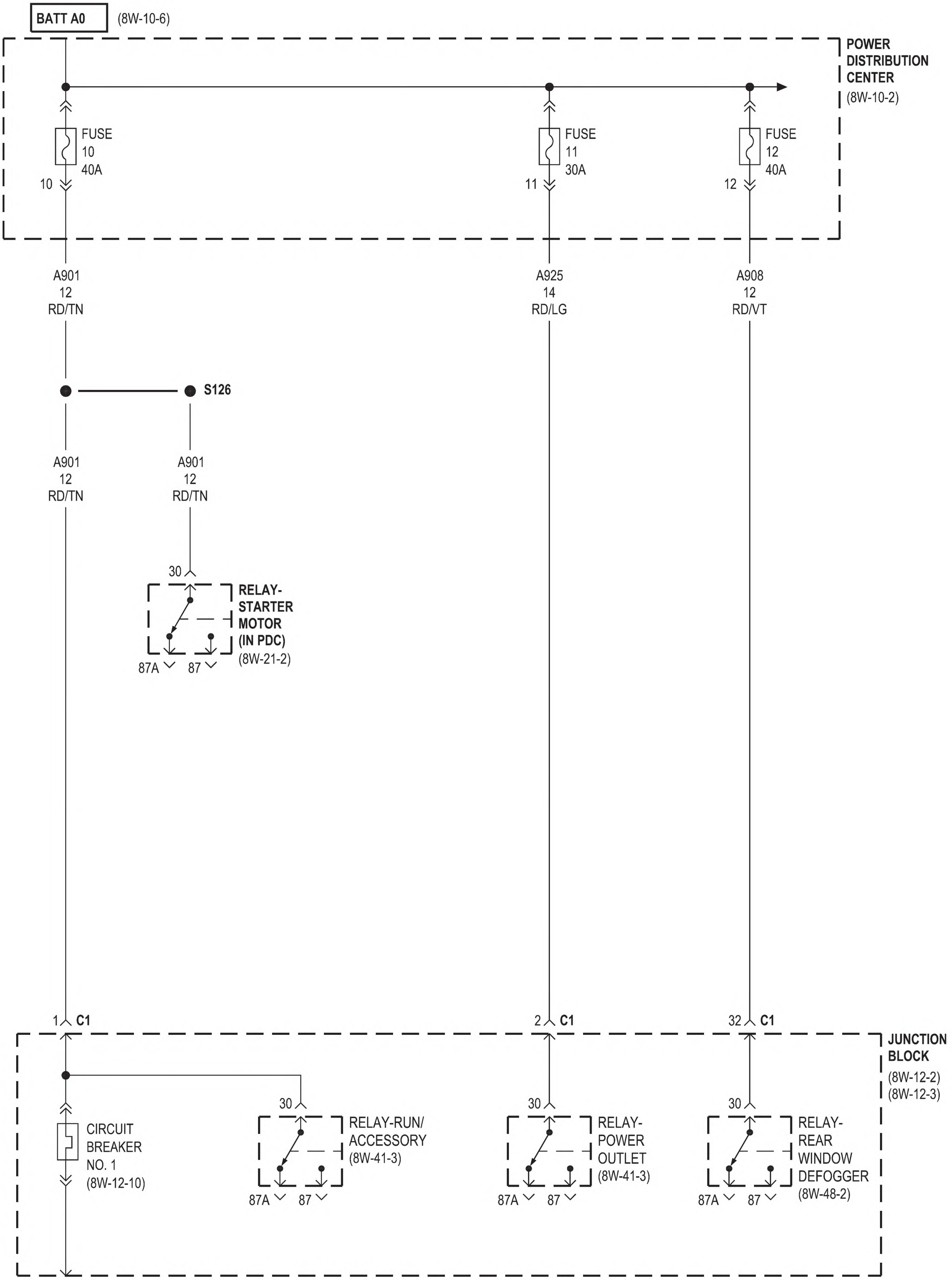

A8
6
RD
STARTER
(8W-21-3)
BATTERY
A1
6
RD
FUSIBLE
LINK
A1
10
BR/RD
MODULE-
INTEGRATED
POWER
(8W-13-2)
A0
8
RD
A
TO
POWER
DISTRIBUTION
CENTER
(8W-10-7)
A11
6
BR/RD
GENERATOR
(8W-20-2)
Z1
6
BK
Z100
6
BK/VT
G104
(8W-15-7)
G105
(8W-15-7)

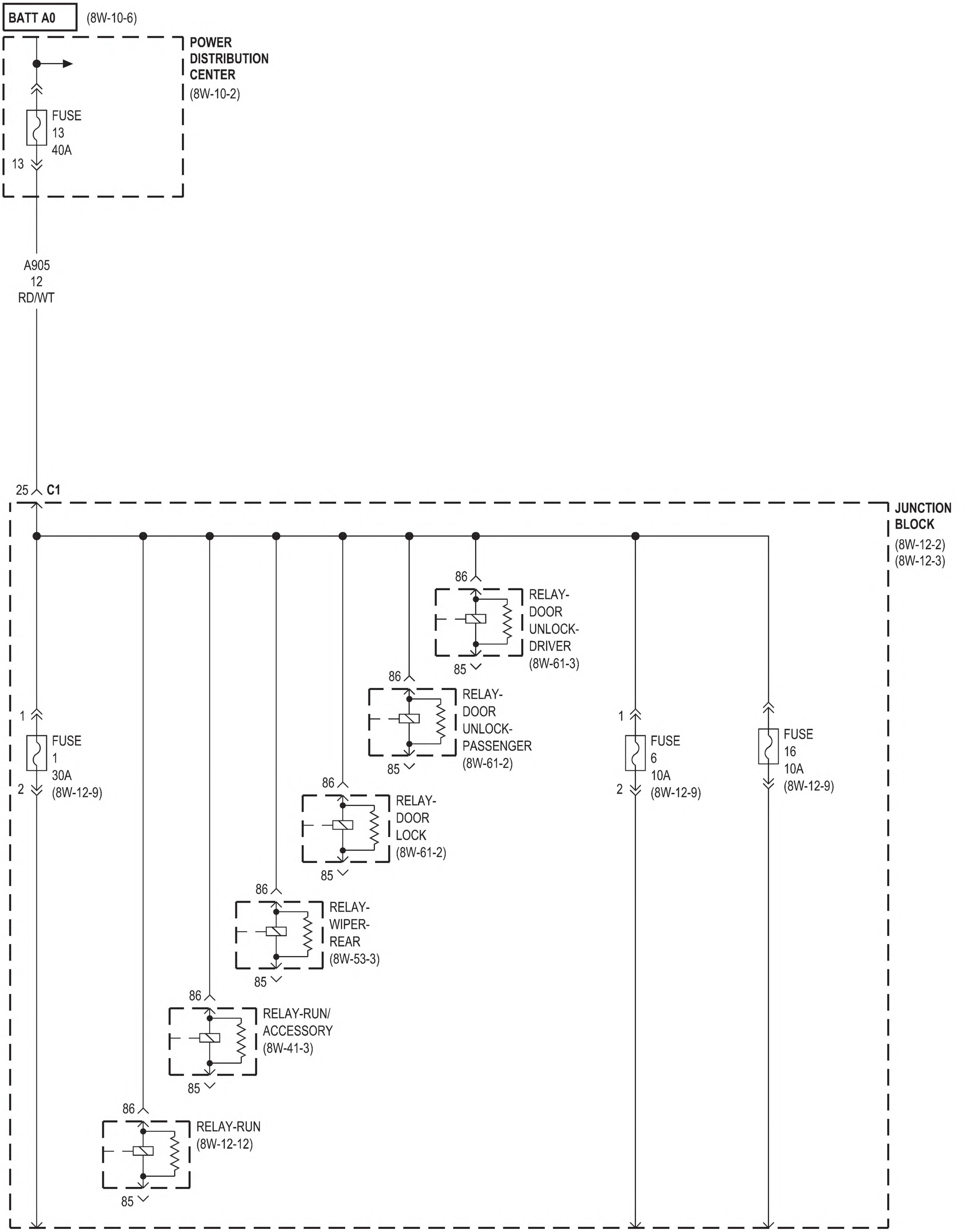

FROM
MODULE-INTEGRATED POWER
(8W-10-6)
A
A0
8
RD
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 1 40A (8W-10-9)
1
FUSE 2 30A (8W-10-9)
2
FUSE 3 30A (8W-10-9)
3
FUSE 4 30A (8W-10-9)
4
FUSE 6 50A (8W-10-9)
A502 12 RD/LG
TO RELAY-BLOWER MOTOR (IN PDC)
A907 14 RD/LB
TO JUNCTION BLOCK
A902 14 RD/GY
TO JUNCTION BLOCK
A107 12 TN/RD
TO MODULE-ANTILOCK BRAKES
A924 10 RD/VT
TO S118
FUSE 7 30A (8W-10-10)
7
FUSE 8 40A (8W-10-10)
8
FUSE 10 40A (8W-10-11)
10
FUSE 11 30A (8W-10-11)
11
FUSE 12 40A (8W-10-11)
12
FUSE 13 40A (8W-10-12)
13
B
TO FUSE 14 (8W-10-8)
A611 14 RD
TO JUNCTION BLOCK
A906 12 RD/OR
TO S131
A901 12 RD/TN
TO S126
A925 14 RD/LG
TO RELAY-POWER OUTLET
A908 12 RD/VT
TO RELAY-REAR WINDOW DEFOGGER
A905 12 RD/WT
TO JUNCTION BLOCK

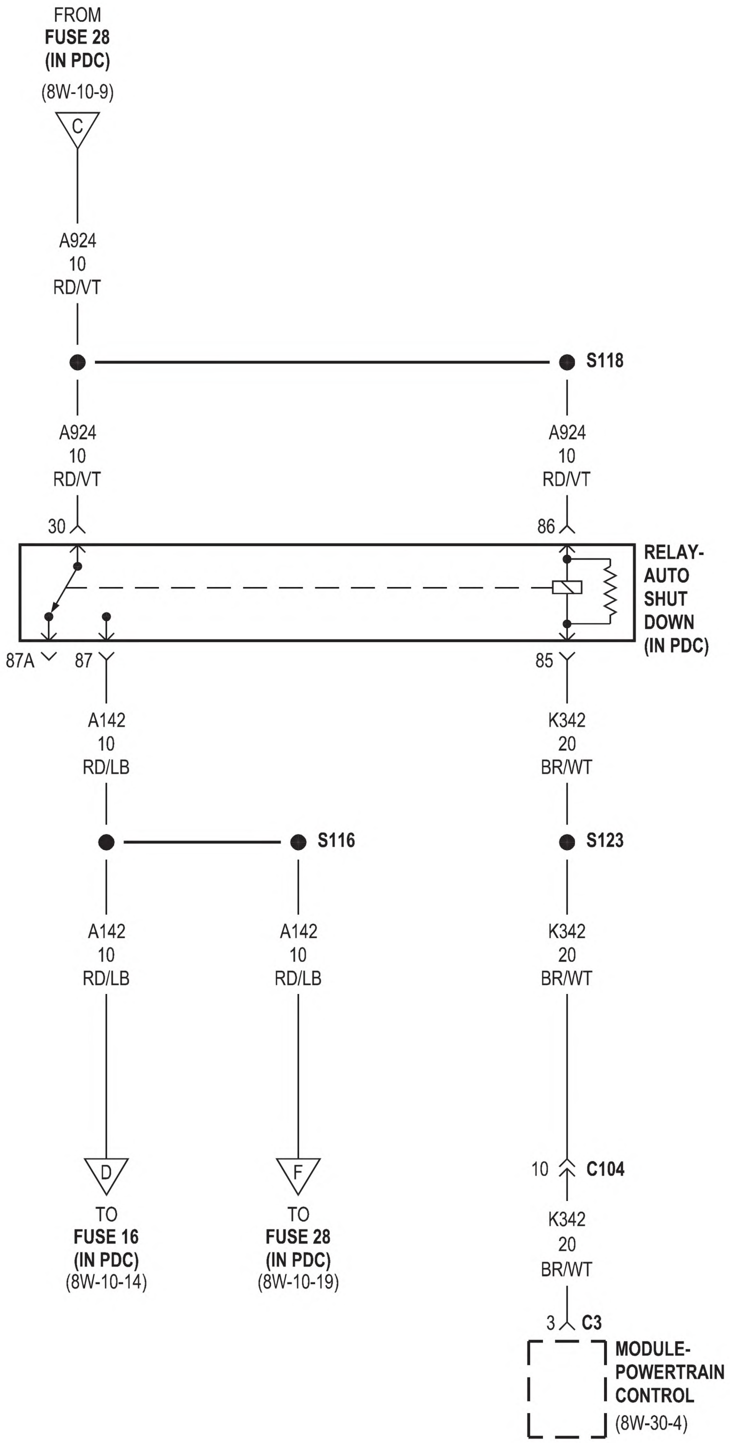

POWER
DISTRIBUTION
CENTER
(8W-10-2)
FROM
FUSE 13
(8W-10-7)
B
FUSE
16
25A
17
(8W-10-14)
FUSE
18
20A
21
(8W-10-16)
FUSE
19
20A
23
(8W-10-16)
FUSE
20
20A
25
(8W-10-16)
A15
16
RD/TN
TO
S130
A917
18
RD/DG
3.7L
4.7L/5.7L
TO
RELAY-A/C
CLUTCH
TO
S127
A106
18
LB/RD
4
C200
A106
16
LB/RD
TO
SWITCH-
IGNITION
A209
18
RD
28
C104
A209
18
RD
TO
MODULE-
POWERTRAIN
CONTROL
FUSE
21
30A
26
(8W-10-18)
FUSE
23
20A
30
(8W-10-18)
FUSE
24
20A
32
(8W-10-18)
FUSE
25
20A
35
(8W-10-18)
FUSE
27
15A
39
(8W-10-18)
A200
12
RD/DG
TO
MODULE-
ANTILOCK
BRAKES
A927
18
RD/BR
40
C105
A927
18
RD/BR
TO
MODULE-
FINAL
DRIVE
CONTROL
GAS
DIESEL
A916
16
RD/GY
A916
16
RD
3.7L/4.7L
DIESEL/
5.7L
TO
RELAY-
FUEL
PUMP
TO
S128
A926
18
RD/TN
39
C105
A926
18
RD/TN
TO
MODULE-
FINAL
DRIVE
CONTROL
A103
18
GY/RD
TO
SWITCH-
STOP
LAMP
WK501008

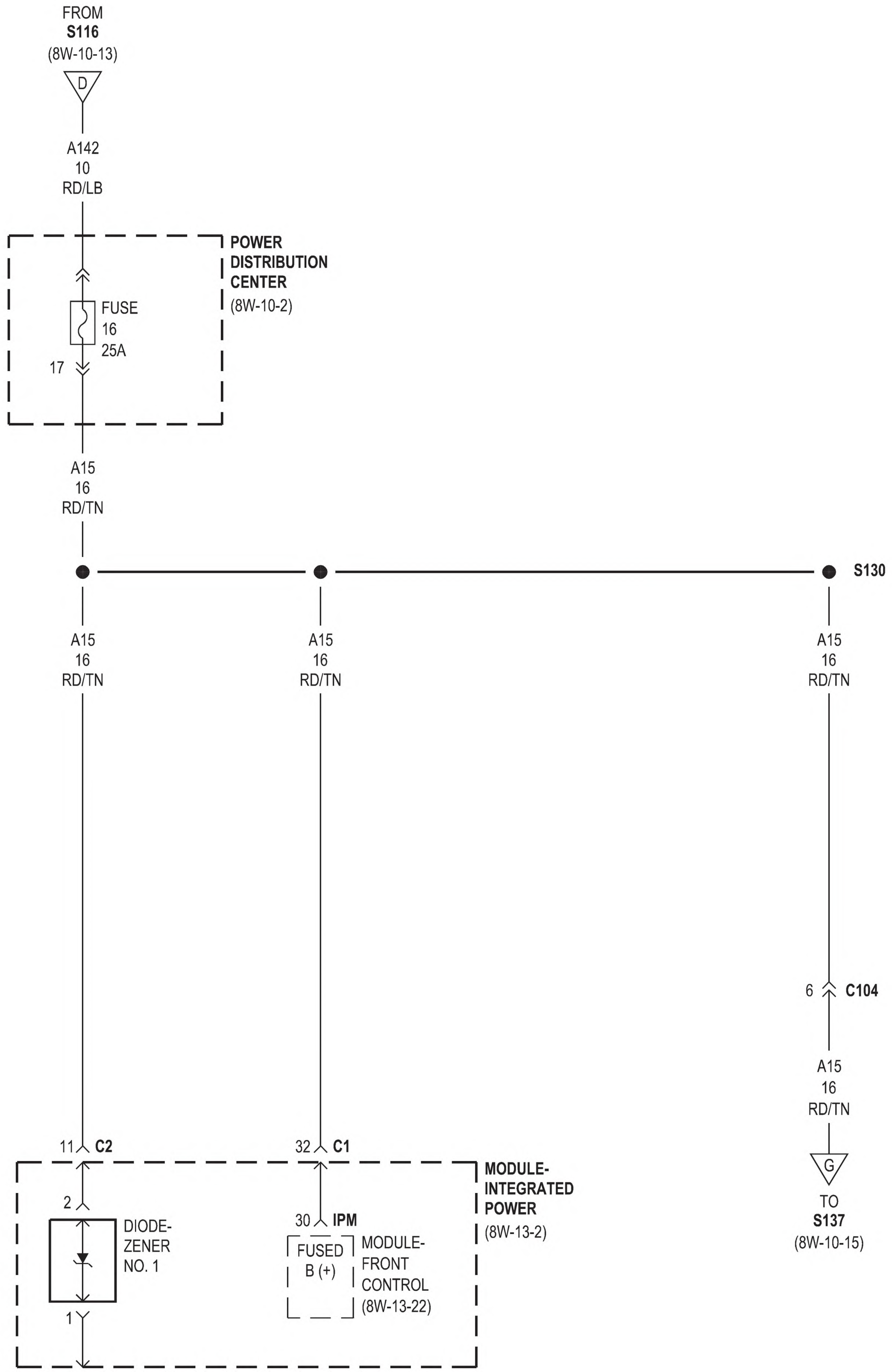

BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 1 40A
1
FUSE 2 30A
2
FUSE 3 30A
3
FUSE 4 30A
4
FUSE 6 50A
6
A502 12 RD/LG
A907 14 RD/DB
A902 14 RD/GY
A107 12 TN/RD
A924 10 RD/VT
C
TO S118
(8W-10-13)
30
RELAY-BLOWER MOTOR (IN PDC)
(8W-42-3)
87A
87
C7 12 DB
63
C200
C7 12 DB
1
C205
C7 12 DB
MTC
ATC
1
MODULE-FRONT BLOWER POWER
(8W-42-4)
1
MOTOR-BLOWER
(8W-42-4)
1
MODULE-ANTILOCK BRAKES
(8W-35-2)
40
C1
9
C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE 4 20A
2
(8W-12-17)
1
FUSE 9 20A
2
(8W-12-17)
1
FUSE 12 10A
2
(8W-12-11)
1
FUSE 17 15A
2
(8W-12-11)
(8W-12-22)
30
RELAY-RUN
(8W-12-12)
87A
87
1
FUSE 22 15A
2
(8W-12-11)
30
86
RELAY-FLIP-UP GLASS
(8W-61-7)
87A
87
85
30
RELAY-WIPER-REAR
(8W-53-3)
87A
87

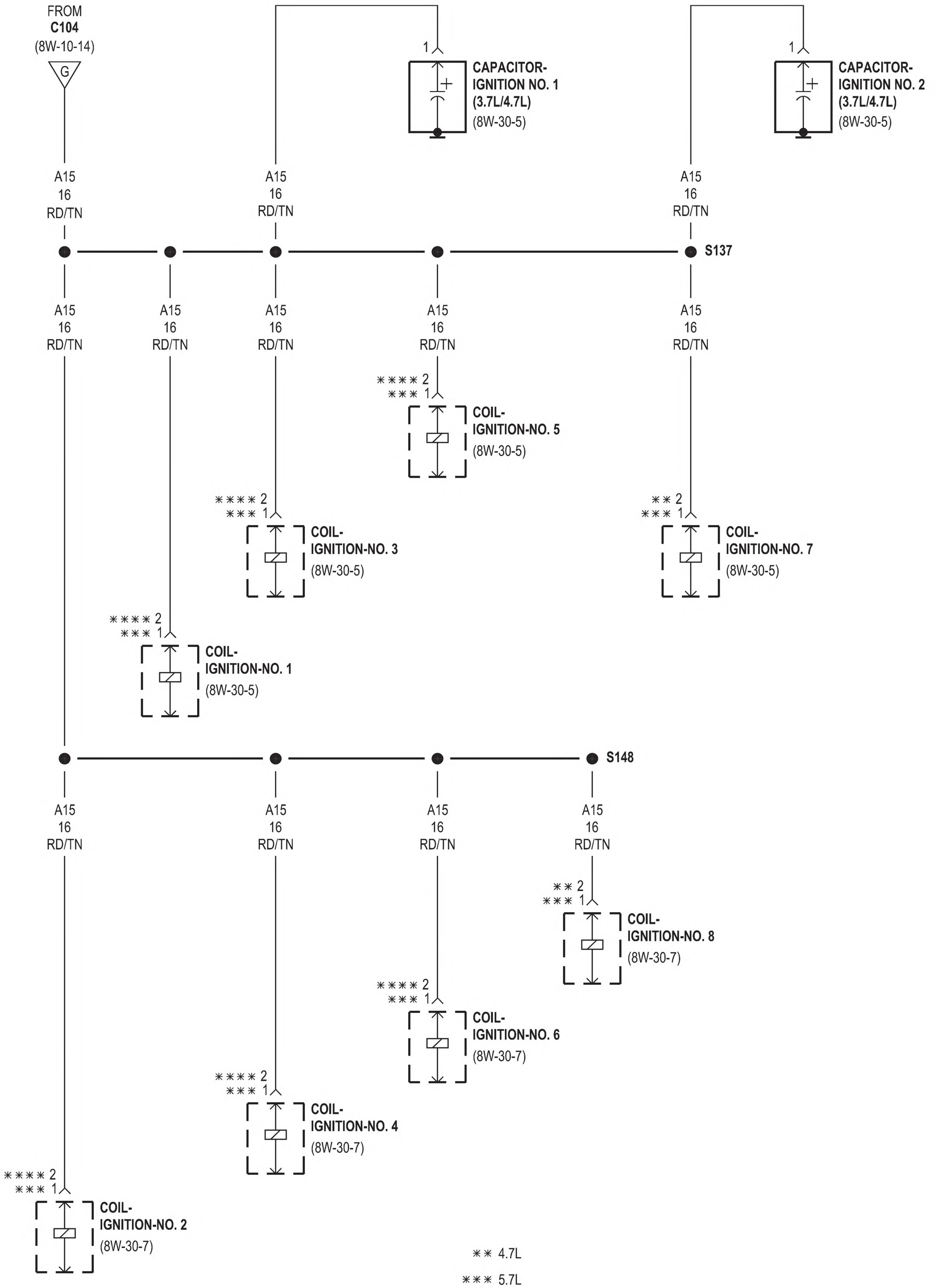

BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 7 30A
7
FUSE 8 40A
8
A611 14 RD
A906 12 RD/OR
S131
A906 12 RD/OR
A906 12 RD/OR
15 C1
NOT USED
39 C1
31 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
86
RELAY-RUN/ ACCESSORY DELAY
(8W-12-16)
87A
87
85
1
FUSE 7 20A
2
(8W-12-15)
CIRCUIT BREAKER NO. 2
(8W-12-15)
1
FUSE 2 15A
2
(8W-12-15)
1
FUSE 8 15A
2
(8W-12-18)
87
87A
RELAY- DOOR UNLOCK- PASSENGER
(8W-61-2)
30
87
87A
RELAY- DOOR UNLOCK- DRIVER
(8W-61-3)
30
87
87A
RELAY- DOOR LOCK
(8W-61-2)
30


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 10 40A
10
FUSE 11 30A
11
FUSE 12 40A
12
A901 12 RD/TN
A925 14 RD/LG
A908 12 RD/VT
S126
A901 12 RD/TN
A901 12 RD/TN
30
RELAY-STARTER MOTOR (IN PDC)
(8W-21-2)
87A
87
1 C1
2 C1
32 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
CIRCUIT BREAKER NO. 1
(8W-12-10)
30
RELAY-RUN/ ACCESSORY
(8W-41-3)
87A
87
30
RELAY-POWER OUTLET
(8W-41-3)
87A
87
30
RELAY-REAR WINDOW DEFOGGER
(8W-48-2)
87A
87


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 13 40A
13
A905
12
RD/WT
25
C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
86
RELAY-DOOR UNLOCK-DRIVER
(8W-61-3)
85
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
RELAY-DOOR LOCK
(8W-61-2)
RELAY-WIPER-REAR
(8W-53-3)
RELAY-RUN/ ACCESSORY
(8W-41-3)
RELAY-RUN
(8W-12-12)
1
FUSE 1 30A
(8W-12-9)
2
FUSE 6 10A
(8W-12-9)
FUSE 16 10A
(8W-12-9)


FROM
FUSE 28
(IN PDC)
(8W-10-9)
C
A924
10
RD/VT
S118
A924
10
RD/VT
A924
10
RD/VT
30
86
RELAY-
AUTO
SHUT
DOWN
(IN PDC)
87A
87
85
A142
10
RD/LB
K342
20
BR/WT
S116
S123
A142
10
RD/LB
A142
10
RD/LB
K342
20
BR/WT
10
C104
D
F
TO
FUSE 16
(IN PDC)
(8W-10-14)
TO
FUSE 28
(IN PDC)
(8W-10-19)
K342
20
BR/WT
3
C3
MODULE-
POWERTRAIN
CONTROL
(8W-30-4)

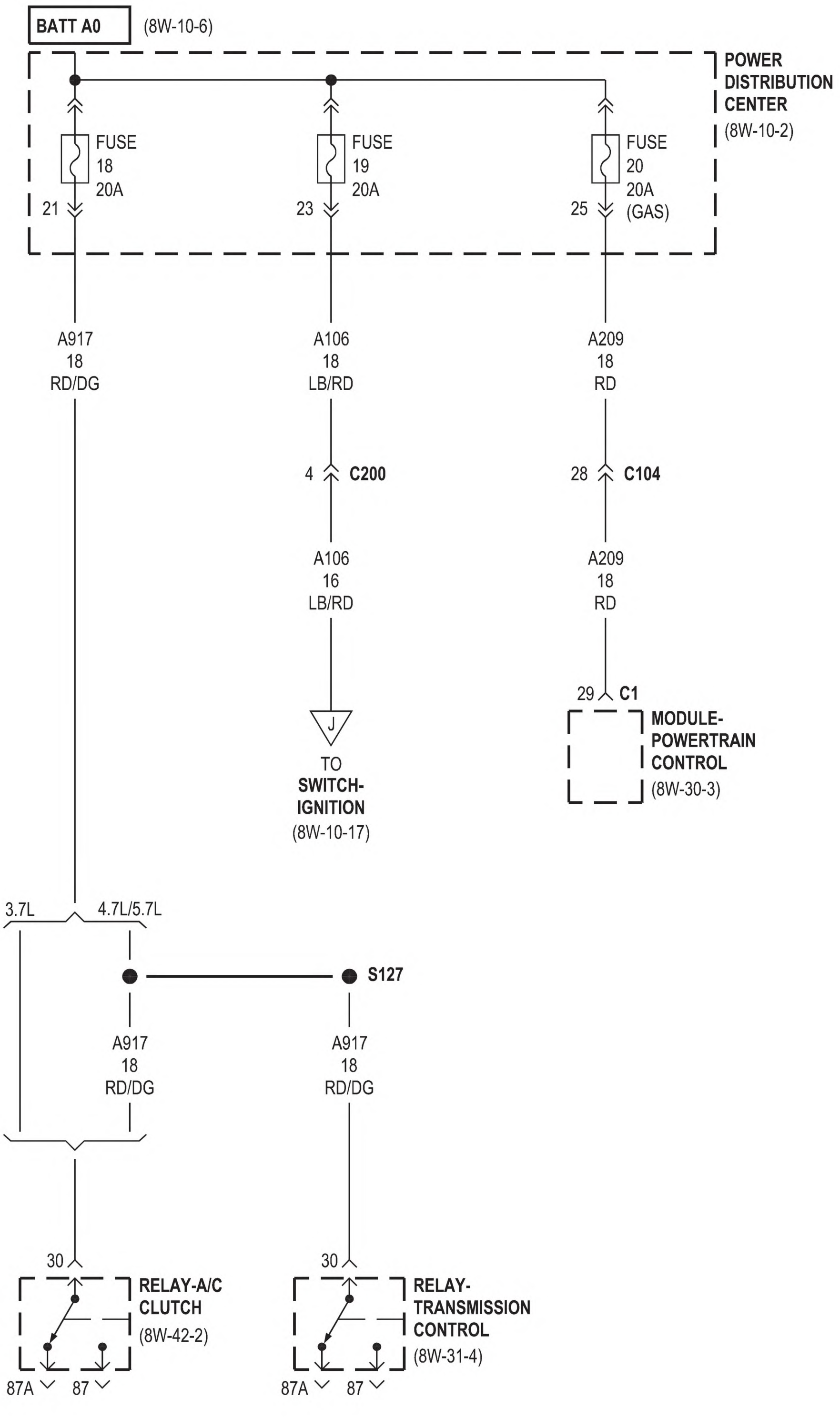

FROM
S116
(8W-10-13)
D
A142
10
RD/LB
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
16
25A
17
A15
16
RD/TN
S130
A15
16
RD/TN
A15
16
RD/TN
A15
16
RD/TN
6
C104
A15
16
RD/TN
G
TO
S137
(8W-10-15)
11
C2
32
C1
MODULE-
INTEGRATED
POWER
(8W-13-2)
2
DIODE-
ZENER
NO. 1
1
30
IPM
FUSED
B (+)
MODULE-
FRONT
CONTROL
(8W-13-22)

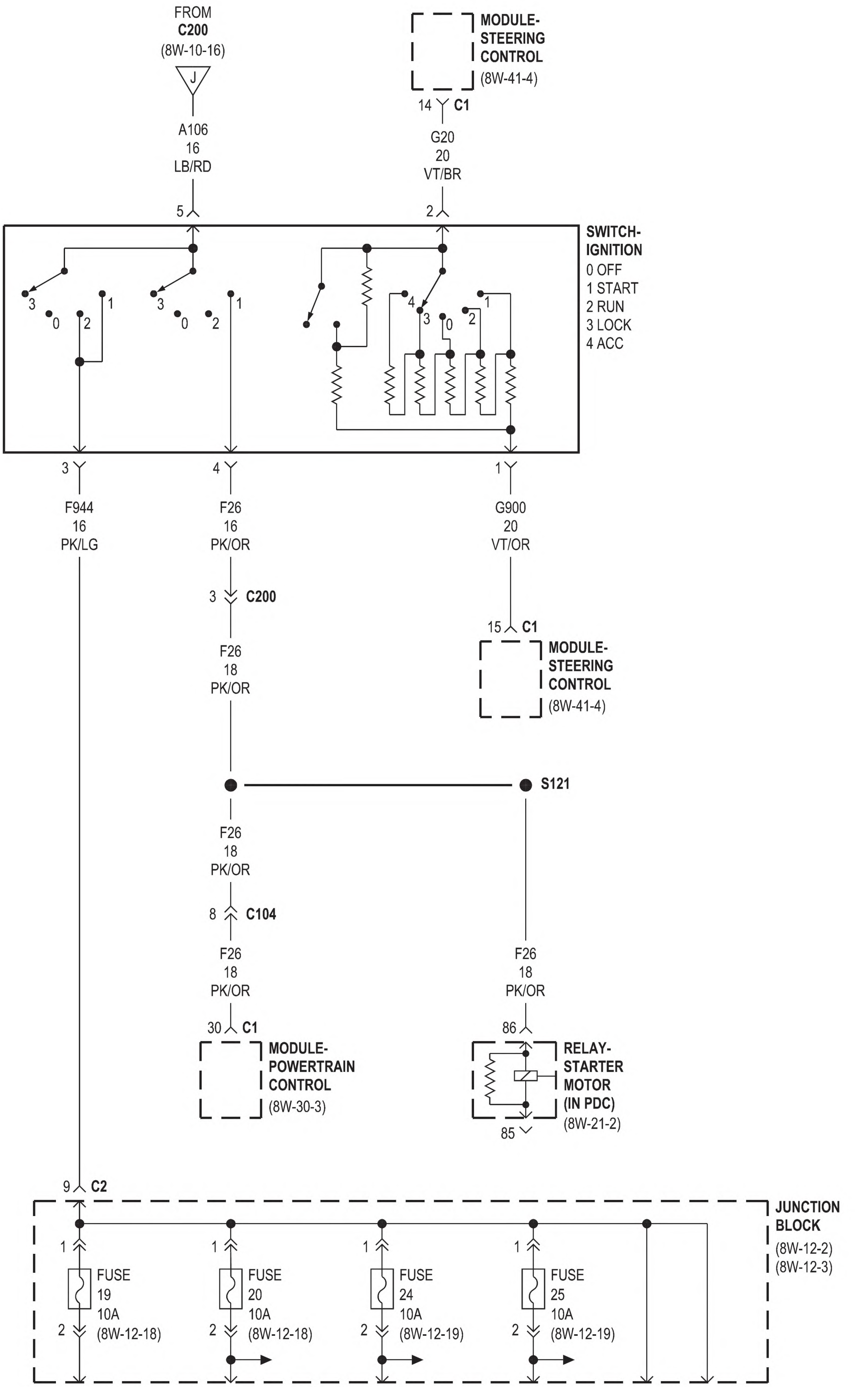

FROM
C104
(8W-10-14)
G
A15
16
RD/TN
1
CAPACITOR-
IGNITION NO. 1
(3.7L/4.7L)
(8W-30-5)
CAPACITOR-
IGNITION NO. 2
(3.7L/4.7L)
(8W-30-5)
S137
S148
∗∗∗∗ 2
∗∗∗ 1
∗∗ 2
COIL-
IGNITION-NO. 1
(8W-30-5)
COIL-
IGNITION-NO. 2
(8W-30-7)
COIL-
IGNITION-NO. 3
(8W-30-5)
COIL-
IGNITION-NO. 4
(8W-30-7)
COIL-
IGNITION-NO. 5
(8W-30-5)
COIL-
IGNITION-NO. 6
(8W-30-7)
COIL-
IGNITION-NO. 7
(8W-30-5)
COIL-
IGNITION-NO. 8
(8W-30-7)

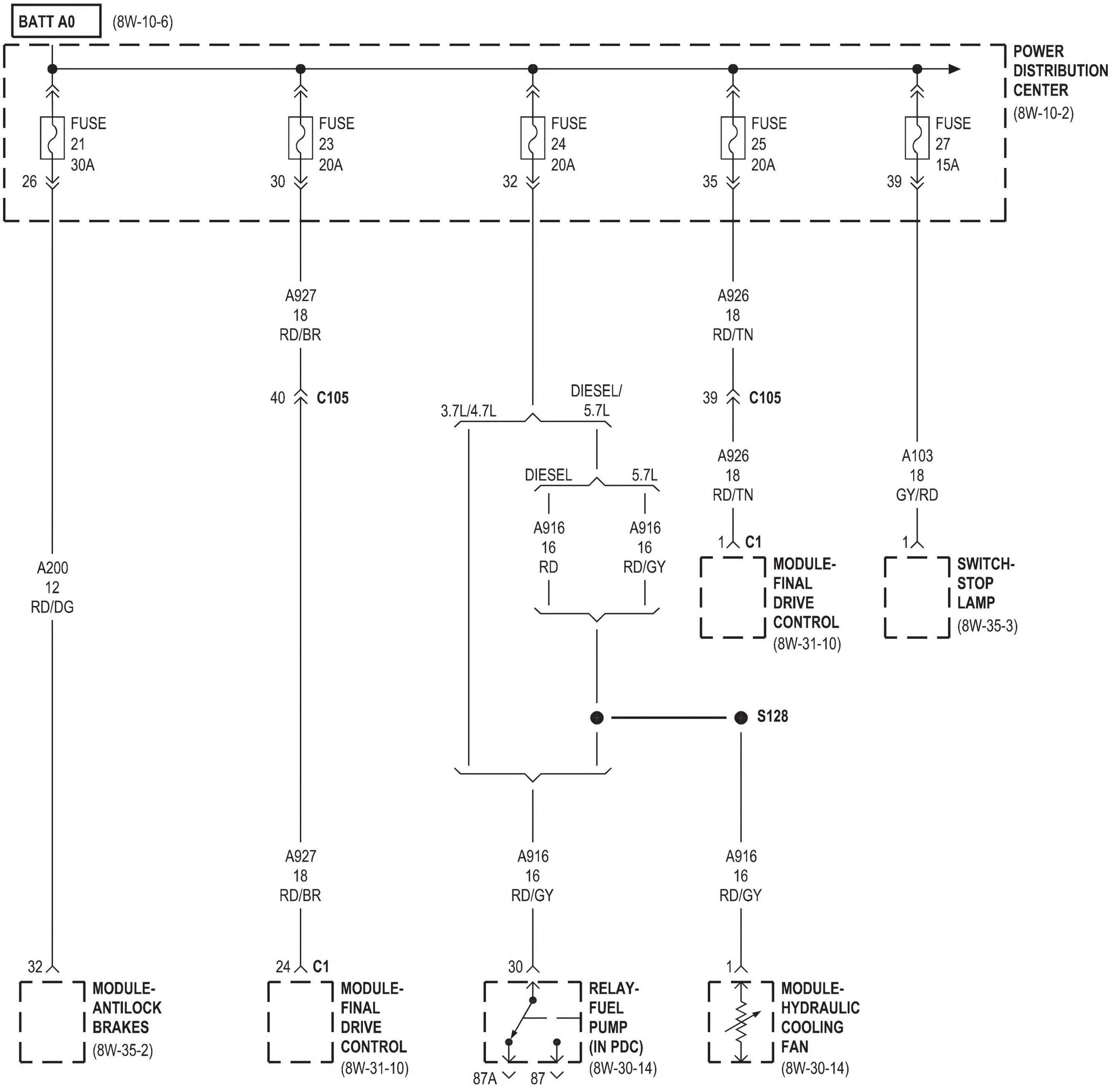
∗∗ 4.7L

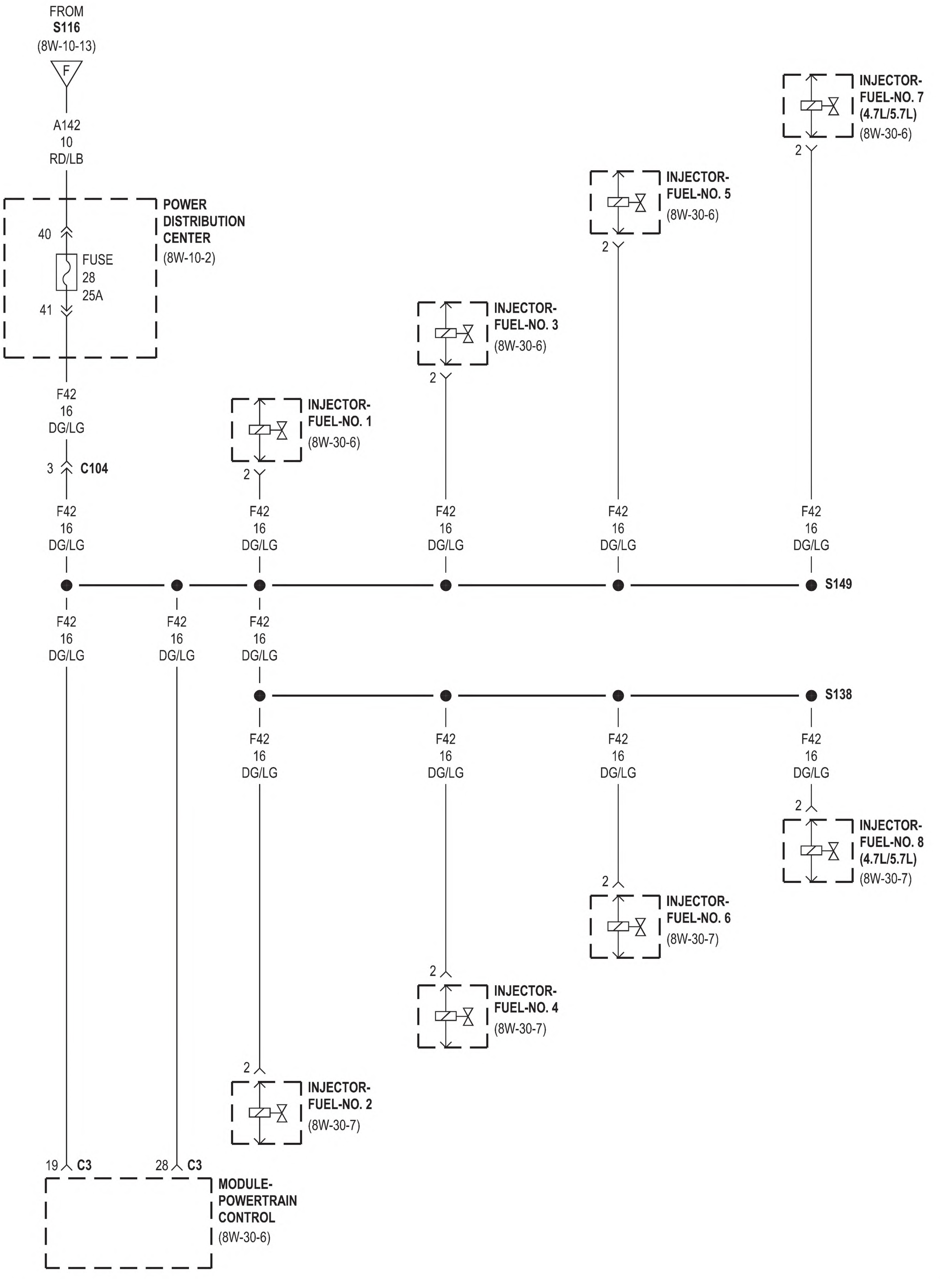
∗∗∗ 5.7L

∗∗∗∗ 3.7L/4.7L


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 18 20A
21
FUSE 19 20A
23
FUSE 20 20A (GAS)
25
A917 18 RD/DG
A106 18 LB/RD
A209 18 RD
4 C200
28 C104
A106 16 LB/RD
A209 18 RD
J
TO SWITCH-IGNITION
(8W-10-17)
29 C1
MODULE-POWERTRAIN CONTROL
(8W-30-3)
3.7L
4.7L/5.7L
S127
A917 18 RD/DG
A917 18 RD/DG
30
RELAY-A/C CLUTCH
(8W-42-2)
87A
87
30
RELAY-TRANSMISSION CONTROL
(8W-31-4)
87A
87


FROM
C200
(8W-10-16)
J
A106
16
LB/RD
5
MODULE-
STEERING
CONTROL
(8W-41-4)
14
C1
G20
20
VT/BR
2
SWITCH-
IGNITION
0 OFF
1 START
2 RUN
3 LOCK
4 ACC
3
0
2
1
3
0
2
1
4
3
0
2
1
3
4
1
F944
16
PK/LG
F26
16
PK/OR
G900
20
VT/OR
3
C200
F26
18
PK/OR
15
C1
MODULE-
STEERING
CONTROL
(8W-41-4)
S121
F26
18
PK/OR
8
C104
F26
18
PK/OR
F26
18
PK/OR
30
C1
MODULE-
POWERTRAIN
CONTROL
(8W-30-3)
86
RELAY-
STARTER
MOTOR
(IN PDC)
(8W-21-2)
85
9
C2
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
19
10A
(8W-12-18)
2
1
FUSE
20
10A
(8W-12-18)
2
1
FUSE
24
10A
(8W-12-19)
2
1
FUSE
25
10A
(8W-12-19)
2


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 21 30A
26
FUSE 23 20A
30
FUSE 24 20A
32
FUSE 25 20A
35
FUSE 27 15A
39
A200 12 RD/DG
A927 18 RD/BR
40 C105
A926 18 RD/TN
39 C105
3.7L/4.7L
DIESEL/ 5.7L
DIESEL
5.7L
A916 16 RD
A916 16 RD/GY
A926 18 RD/TN
A103 18 GY/RD
1 C1
MODULE- FINAL DRIVE CONTROL
(8W-31-10)
1
SWITCH- STOP LAMP
(8W-35-3)
S128
A927 18 RD/BR
A916 16 RD/GY
A916 16 RD/GY
32
MODULE- ANTILOCK BRAKES
(8W-35-2)
24 C1
MODULE- FINAL DRIVE CONTROL
(8W-31-10)
30
RELAY- FUEL PUMP (IN PDC)
(8W-30-14)
87A
87
1
MODULE- HYDRAULIC COOLING FAN
(8W-30-14)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S116
(8W-10-13)
F
A142
10
RD/LB
40
FUSE
28
25A
41
POWER
DISTRIBUTION
CENTER
(8W-10-2)
F42
16
DG/LG
3
C104
INJECTOR-
FUEL-NO. 1
(8W-30-6)
INJECTOR-
FUEL-NO. 3
(8W-30-6)
INJECTOR-
FUEL-NO. 5
(8W-30-6)
INJECTOR-
FUEL-NO. 7
(4.7L/5.7L)
(8W-30-6)
2
S149
S138
INJECTOR-
FUEL-NO. 8
(4.7L/5.7L)
(8W-30-7)
INJECTOR-
FUEL-NO. 6
(8W-30-7)
INJECTOR-
FUEL-NO. 4
(8W-30-7)
INJECTOR-
FUEL-NO. 2
(8W-30-7)
19
C3
28
C3
MODULE-
POWERTRAIN
CONTROL
(8W-30-6)

8W-12 JUNCTION BLOCK

Component	Page
Amplifier-Radio	8W-12-9
Assembly-Shift Lever	8W-12-21
Circuit Breaker No. 1	8W-12-10
Circuit Breaker No. 2 (JB)	8W-12-15
Circuit Breaker No. 3	8W-12-16
Cluster	8W-12-9, 10, 12, 18, 21, 22
Control-A/C-Heater	8W-12-13, 20, 21
Data Link Connector	8W-12-9
Fuse 1	8W-12-8, 9
Fuse 2	8W-12-15, 17
Fuse 3	8W-12-11, 17
Fuse 4	8W-12-17
Fuse 6	8W-12-8, 9
Fuse 7	8W-12-15, 16, 21, 23
Fuse 8	8W-12-15, 18
Fuse 9	8W-12-17
Fuse 10	8W-12-10, 12, 13
Fuse 11	8W-12-18
Fuse 12	8W-12-11, 17
Fuse 13	8W-12-8
Fuse 14	8W-12-18
Fuse 15	8W-12-12
Fuse 16	8W-12-8, 9
Fuse 17	8W-12-11, 22
Fuse 19	8W-12-18
Fuse 20	8W-12-18, 19
Fuse 21	8W-12-16
Fuse 22	8W-12-11, 12
Fuse 24	8W-12-18, 19
Fuse 25	8W-12-19
Fuse 27	8W-12-20
Fuse 28	8W-12-20
Fuse 29	8W-12-19
Fuse 30	8W-12-12
G100	8W-12-10
Glass-Liftgate	8W-12-17
Junction Block	8W-12-2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
Lamp-Cargo	8W-12-14
Lamp-Chmsl	8W-12-21
Lamp-Courtesy-Lower Left	8W-12-11
Lamp-Courtesy-Lower Right	8W-12-11
Lamp-Door Handle-Left Front	8W-12-14
Lamp-Door Handle-Right Front	8W-12-14
Lamp-Glove Box	8W-12-11
Lamp-Tail Stop Turn-Left	8W-12-21
Lamp-Tail Stop Turn-Right	8W-12-21
Lamp-Vanity-Left	8W-12-14
Lamp-Vanity-Right	8W-12-14
Latch-Door-Driver	8W-12-23
Latch-Door-Left Rear	8W-12-23
Latch-Door-Liftgate	8W-12-23
Latch-Door-Passenger	8W-12-23
Latch-Door-Right Rear	8W-12-23
Latch-Flip-Up Glass	8W-12-22
Media System-Monitor/Dvd	8W-12-20
Mirror-Inside Rearview	8W-12-13
Mirror-Outside Rearview-Driver	8W-12-17
Mirror-Outside Rearview-Passenger	8W-12-17
Module-Antilock Brakes	8W-12-19
Module-Electronic Overhead	8W-12-13, 20
Module-Final Drive Control	8W-12-13
Module-Front Control	8W-12-16, 19, 20, 21
Module-Hands Free	8W-12-20
Module-Heated Seat	8W-12-15
Module-Integrated Power	8W-12-10, 12, 16, 19, 20
Module-Memory Mirror-Driver	8W-12-14
Module-Memory Mirror-Passenger	8W-12-14
Module-Memory Seat	8W-12-15
Module-Occupant Classification	8W-12-9, 18
Module-Park Assist	8W-12-13
Module-Powertrain Control	8W-12-19
Module-Sentry Key Remote Entry	8W-12-18, 20
Module-Steering Control	8W-12-9
Module-Transmission Control	8W-12-19
Motor-Rear Window Wiper	8W-12-11
Motor/Module-Sunroof	8W-12-15
Power Distribution Center	8W-12-8, 10, 11, 15, 17, 18, 21
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Power Outlet-Instrument Panel	8W-12-18
Power Outlet-Rear	8W-12-17
Radio	8W-12-20
Receiver-Satellite	8W-12-20
Relay-A/C Clutch	8W-12-19
Relay-Blower Motor	8W-12-13
Relay-Door Lock	8W-12-8, 15, 22, 23
Relay-Door Unlock-Driver	8W-12-8, 15, 22, 23
Relay-Door Unlock-Passenger	8W-12-8, 15, 22, 23
Relay-Flip-Up Glass	8W-12-11, 22
Relay-Fuel Pump	8W-12-19
Relay-Power Outlet	8W-12-10, 18
Relay-Rear Window Defogger	8W-12-12, 13, 17
Relay-Run	8W-12-8, 11, 12
Relay-Run/Accessory	8W-12-8, 10
Relay-Run/Accessory Delay	8W-12-15, 16
Relay-Stop Lamp Inhibit	8W-12-19, 21
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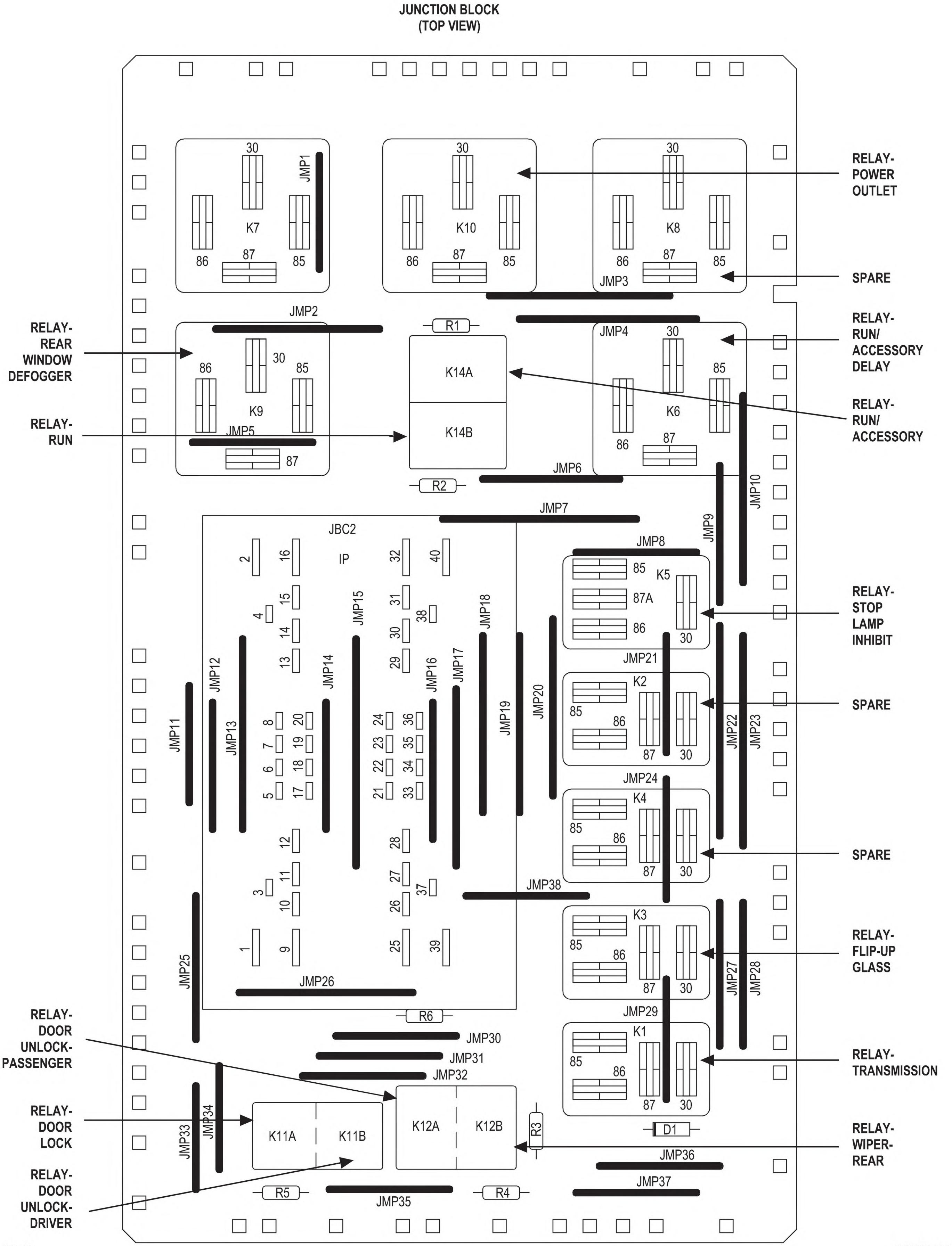
Relay-Wiper High/Low	8W-12-10
Relay-Wiper On/Off	8W-12-10
Relay-Wiper-Rear	8W-12-8, 11, 20
Sensor-Rain	8W-12-16
Switch-Bank-Lower	8W-12-13, 21
Switch-Bank-Upper	8W-12-13, 21
Switch-Ignition	8W-12-18
Switch-Mirror	8W-12-14, 16
Switch-Seat-Driver	8W-12-15
Switch-Seat-Passenger	8W-12-15
Switch-Stop Lamp	8W-12-19, 21
Switch-Transfer Case Selector	8W-12-19, 21
Switch-Window/Door Lock-Driver	8W-12-16
Switch-Window/Door Lock-Passenger	8W-12-16
Transponder-Tire Pressure-Left Front	8W-12-12
Transponder-Tire Pressure-Right Front	8W-12-12
Transponder-Tire Pressure-Right Rear	8W-12-12
Wiring-Trailer Tow 7-Way	8W-12-18


JUNCTION BLOCK
(TOP VIEW)
RELAY-
POWER
OUTLET
SPARE
RELAY-
REAR
WINDOW
DEFOGGER
RELAY-
RUN/
ACCESSORY
DELAY
RELAY-
RUN/
ACCESSORY
RELAY-
RUN
RELAY-
STOP
LAMP
INHIBIT
SPARE
SPARE
RELAY-
FLIP-UP
GLASS
RELAY-
TRANSMISSION
RELAY-
DOOR
UNLOCK-
PASSENGER
RELAY-
DOOR
LOCK
RELAY-
WIPER-
REAR
RELAY-
DOOR
UNLOCK-
DRIVER
K7
K10
K8
K9
K6
K14A
K14B
K5
K2
K4
K3
K1
K11A
K11B
K12A
K12B
JBC2
IP
30
86
87
85
87A
R1
R2
R3
R4
R5
R6
D1
JMP1
JMP2
JMP3
JMP4
JMP5
JMP6
JMP7
JMP8
JMP9
JMP10
JMP11
JMP12
JMP13
JMP14
JMP15
JMP16
JMP17
JMP18
JMP19
JMP20
JMP21
JMP22
JMP23
JMP24
JMP25
JMP26
JMP27
JMP28
JMP29
JMP30
JMP31
JMP32
JMP33
JMP34
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JMP37
JMP38
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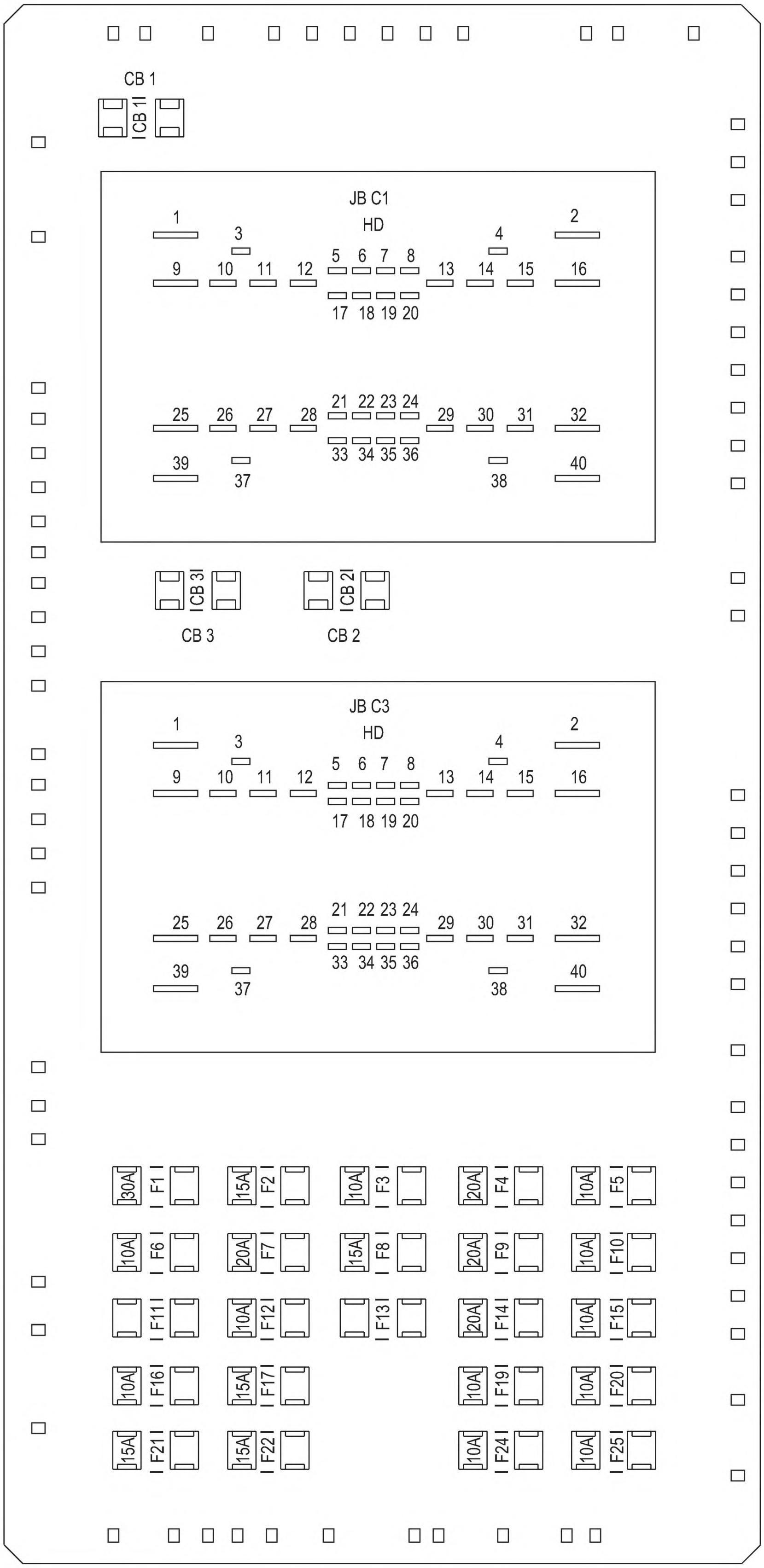
40

JUNCTION BLOCK
(BOTTOM VIEW)


CB 1
CB 1
JB C1
HD
1
2
3
4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
21 22 23 24
25 26 27 28
29 30 31 32
33 34 35 36
37
38
39
40
CB 3
CB 3
CB 2
CB 2
JB C3
HD
1
2
3
4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
21 22 23 24
25 26 27 28
29 30 31 32
33 34 35 36
37
38
39
40
30A F1
15A F2
10A F3
20A F4
10A F5
10A F6
20A F7
15A F8
20A F9
10A F10
F11
10A F12
F13
20A F14
10A F15
10A F16
15A F17
10A F19
10A F20
15A F21
15A F22
10A F24
10A F25

WK501203 J058W-19

FUSES

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	30A	A116 14YL/RD	FUSED B(+)
2	15A	A932 18RD/DG	FUSED B(+)
3	10A	C17 20LB/WT	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
4	20A	A205 14RD/OR	FUSED B(+)
5	-	-	-
6	10A	A27 20RD/LB	FUSED B(+)
7	20A	A213 16RD/TN	FUSED B(+)
8	15A	A935 18RD	FUSED B(+)
9	20A	A405 14RD/DB	FUSED B(+)
10	10A	F921 20PK/YL	FUSED RUN RELAY OUTPUT
11	-	-	-
12	10A	A931 20RD	FUSED B(+)
13	-	-	-
14	20A	A207 16RD/LG	POWER OUTLET RELAY OUTPUT
15	10A	F924 20PK/YL	FUSED RUN RELAY OUTPUT
16	10A	A108 20LG/RD	FUSED B(+)
17	15A	A933 18RD	FUSED B(+)
18	-	-	-
19	10A	F200 20PK/LB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
20	10A	F941 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
21	15A	A934 18RD/OR	FUSED RUN/ACCESSORY DELAY RELAY OUTPUT
22	15A	A960 18RD	FUSED B(+)
23	-	-	-
24	10A	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
25	10A	F943 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)

CIRCUIT BREAKER

C.B.	AMPS	FUSED CIRCUIT	FUNCTION
1	20A	A5 16RD/VT	FUSED B(+)
2	20A	A33 16RD/YL	FUSED B(+)
3	20A	A929 16RD	FUSED RUN/ACCESSORY DELAY RELAY OUTPUT

RELAYS

RELAY-DOOR LOCK

CAVITY	CIRCUIT	FUNCTION
30	P778 16LG/LB	DOOR LOCK RELAY OUTPUT
85	P777 20LG/DG	DOOR LOCK RELAY CONTROL
86	A905 12RD	FUSED B(+)
87	A213 16RD/TN	FUSED B(+)
87A	Z387 16BK	GROUND

RELAY-DOOR UNLOCK-DRIVER

CAVITY	CIRCUIT	FUNCTION
30	P701 16LG/DG	DRIVER DOOR UNLOCK RELAY OUTPUT
85	P1 20TN/LG	DRIVER DOOR UNLOCK RELAY CONTROL
86	A905 12RD	FUSED B(+)
87	A213 16RD/TN	FUSED B(+)
87A	Z387 16BK	GROUND

RELAY-DOOR UNLOCK-PASSENGER

CAVITY	CIRCUIT	FUNCTION
30	P792 16LG/TN	DOOR UNLOCK RELAY OUTPUT
85	P292 20VT/LG	DOOR UNLOCK RELAY CONTROL
86	A905 12RD	FUSED B(+)
87	A213 16RD/TN	FUSED B(+)
87A	Z387 16BK	GROUND

RELAY-FLIP-UP GLASS

CAVITY	CIRCUIT	FUNCTION
30	A933 18RD	FUSED B(+)
85	Q82 20LG/OR	FLIP-UP GLASS RELAY CONTROL
86	A933 18RD	FUSED B(+)
87	Q81 18OR/GY	FLIP-UP GLASS RELAY OUTPUT
87A	-	-

RELAYS

RELAY-POWER OUTLET

CAVITY	CIRCUIT	FUNCTION
30	A925 14RD	FUSED B(+)
85	Z387 16BK	GROUND
86	F981 14PK/YL	ACCESSORY DELAY RELAY OUTPUT
87	A930 14RD	FUSED B(+)
87A	-	-

RELAY-REAR WINDOW DEFOGGER

CAVITY	CIRCUIT	FUNCTION
30	A908 12RD	FUSED B(+)
85	C115 20DB	DEFOGGER RELAY CONTROL
86	F921 20PK/YL	FUSED RUN RELAY OUTPUT
87	C515 12LB/OR	REAR WINDOW DEFOGGER RELAY OUTPUT
87A	-	-

RELAY-RUN

CAVITY	CIRCUIT	FUNCTION
30	A902 14RD	FUSED B(+)
85	F102 20PK/DB	FUSED IGNITION SWITCH OUTPUT (RUN)
86	A905 12RD	FUSED B(+)
87	F923 14PK/YL	RUN RELAY OUTPUT
87A	-	-

RELAY-RUN/ACCESSORY

CAVITY	CIRCUIT	FUNCTION
30	A901 12RD	FUSED B(+)
85	F103 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
86	A905 12RD	FUSED B(+)
87	F981 14PK/YL	ACCESSORY DELAY RELAY OUTPUT
87A	-	-

RELAYS

RELAY-RUN/ACCESSORY DELAY

CAVITY	CIRCUIT	FUNCTION
30	A906 12RD	FUSED B(+)
85	P305 20LG/LB	ACCESSORY DELAY RELAY CONTROL
86	A906 12RD	FUSED B(+)
87	A139 12RD/YL	ACCESSORY DELAY RELAY OUTPUT
87A	-	-

RELAY-STOP LAMP INHIBIT

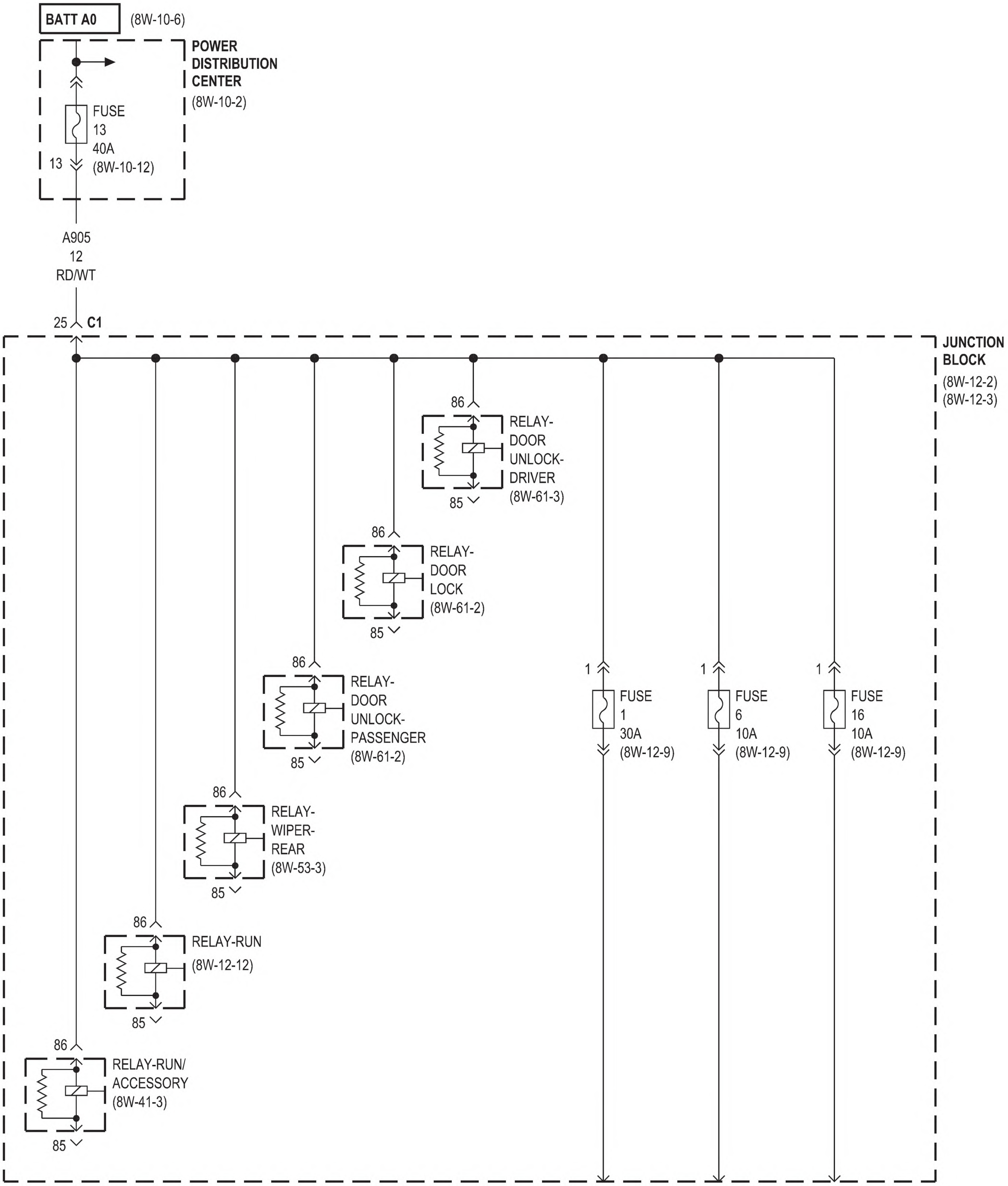
CAVITY	CIRCUIT	FUNCTION
30	L950 18WT/LG	STOP LAMP INHIBIT RELAY FEED
85	B45 20DG/LB	STOP LAMP INHIBIT RELAY CONTROL
86	F943 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	-	-
87A	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT

RELAY-TRANSMISSION

CAVITY	CIRCUIT	FUNCTION
30	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
85	Z387 16BK	GROUND
86	F945 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87	F946 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
87A	-	-

RELAY-WIPER-REAR

CAVITY	CIRCUIT	FUNCTION
30	A960 18RD	FUSED B(+)
85	W12 20BR/OR	REAR WIPER RELAY CONTROL
86	A905 12RD	FUSED B(+)
87	A46 18RD/GY	FUSED B(+)
87A	-	-


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
13
40A
(8W-10-12)
13
A905
12
RD/WT
25
C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
86
RELAY-DOOR UNLOCK-DRIVER
(8W-61-3)
85
86
RELAY-DOOR LOCK
(8W-61-2)
85
86
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
85
86
RELAY-WIPER-REAR
(8W-53-3)
85
86
RELAY-RUN
(8W-12-12)
85
86
RELAY-RUN/ACCESSORY
(8W-41-3)
85
1
FUSE
1
30A
(8W-12-9)
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FUSE
6
10A
(8W-12-9)
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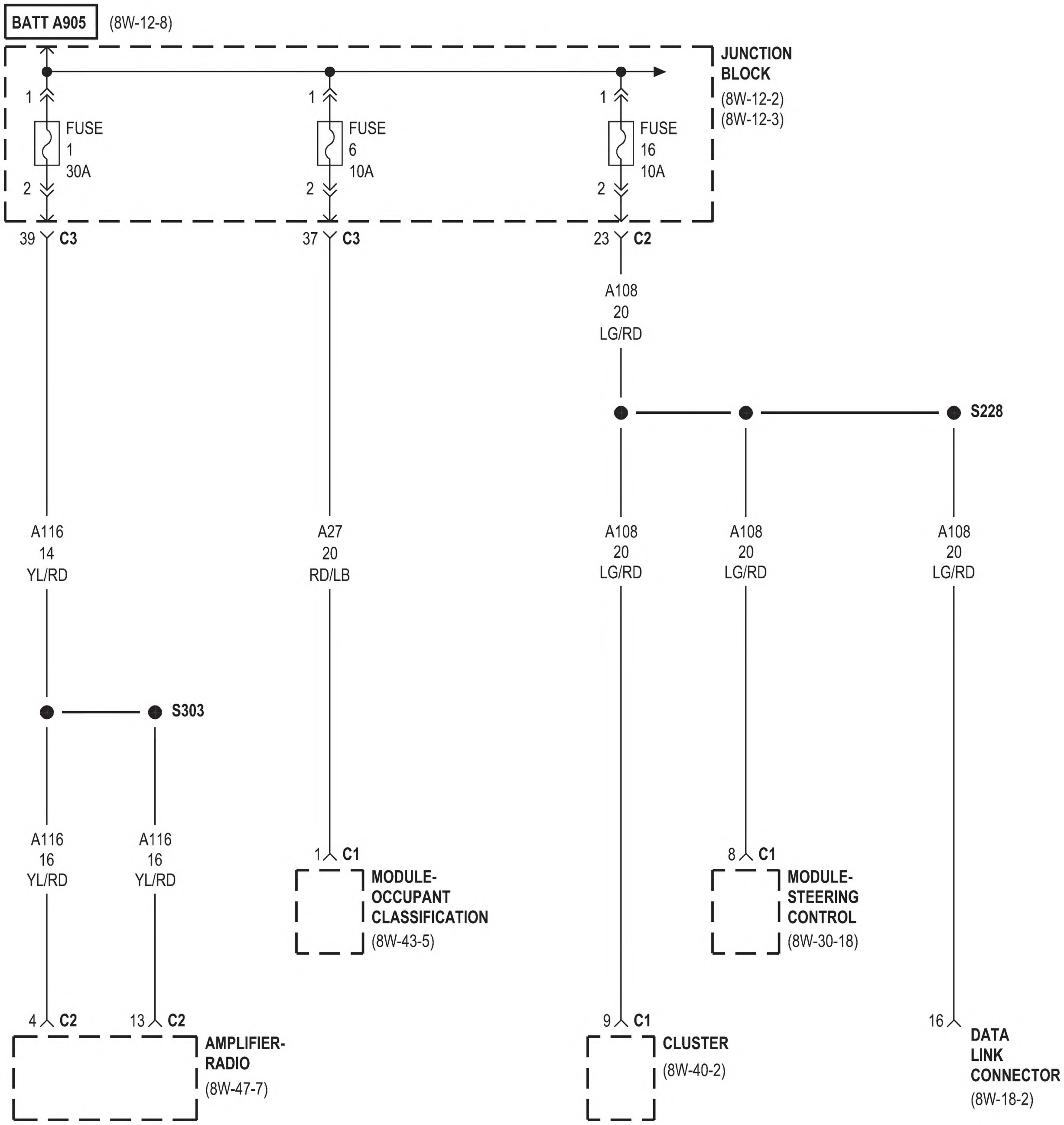
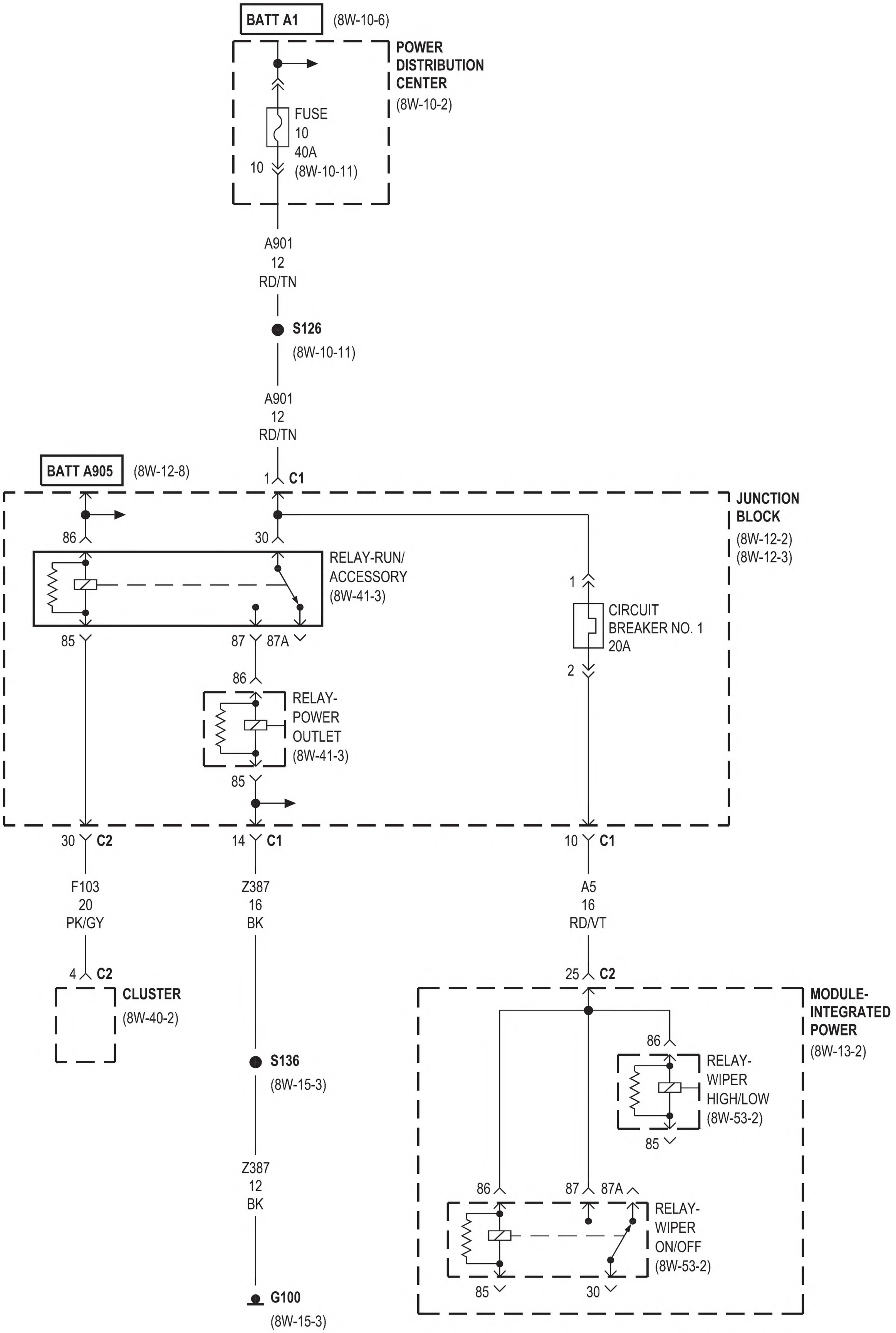
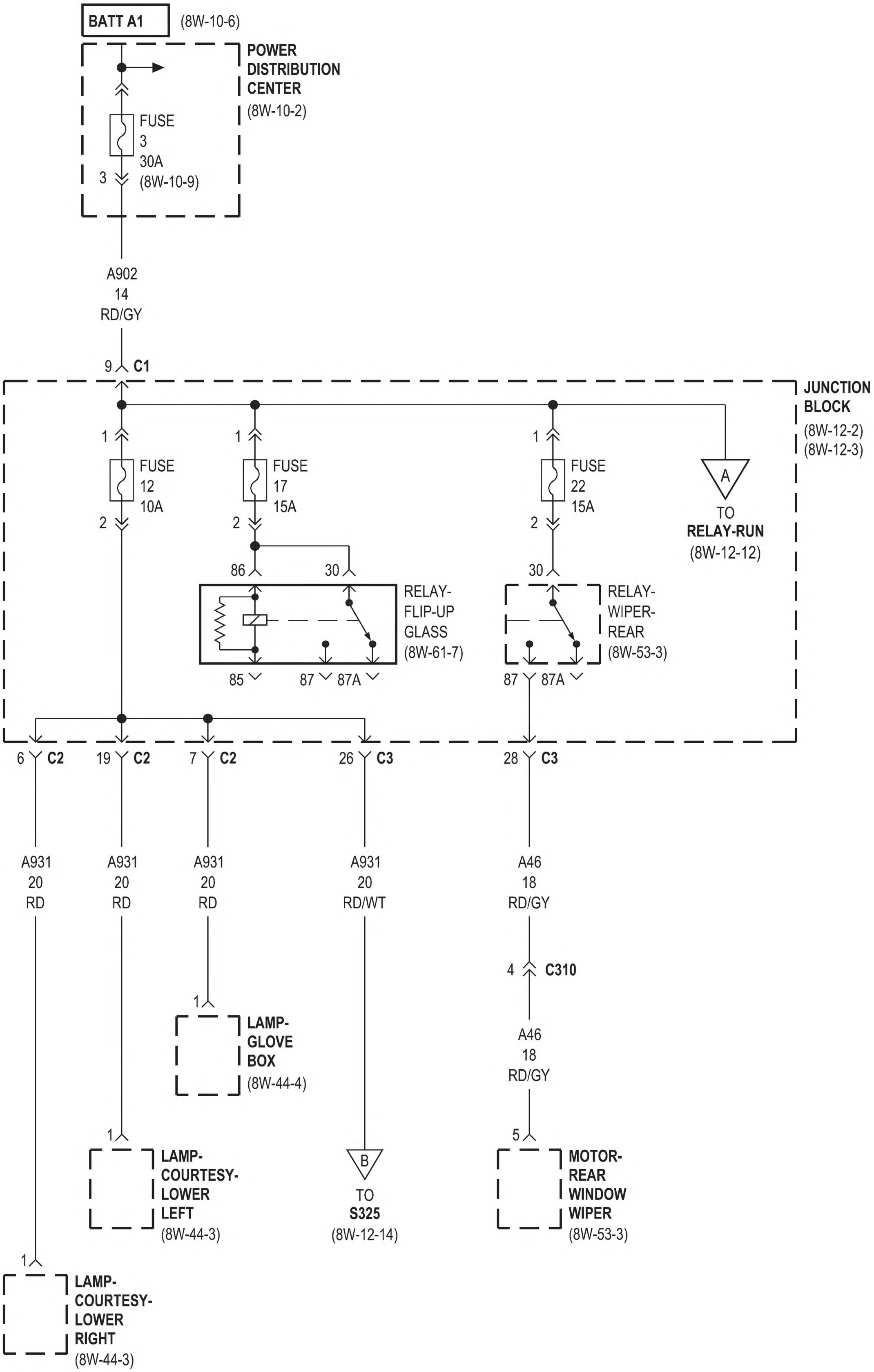
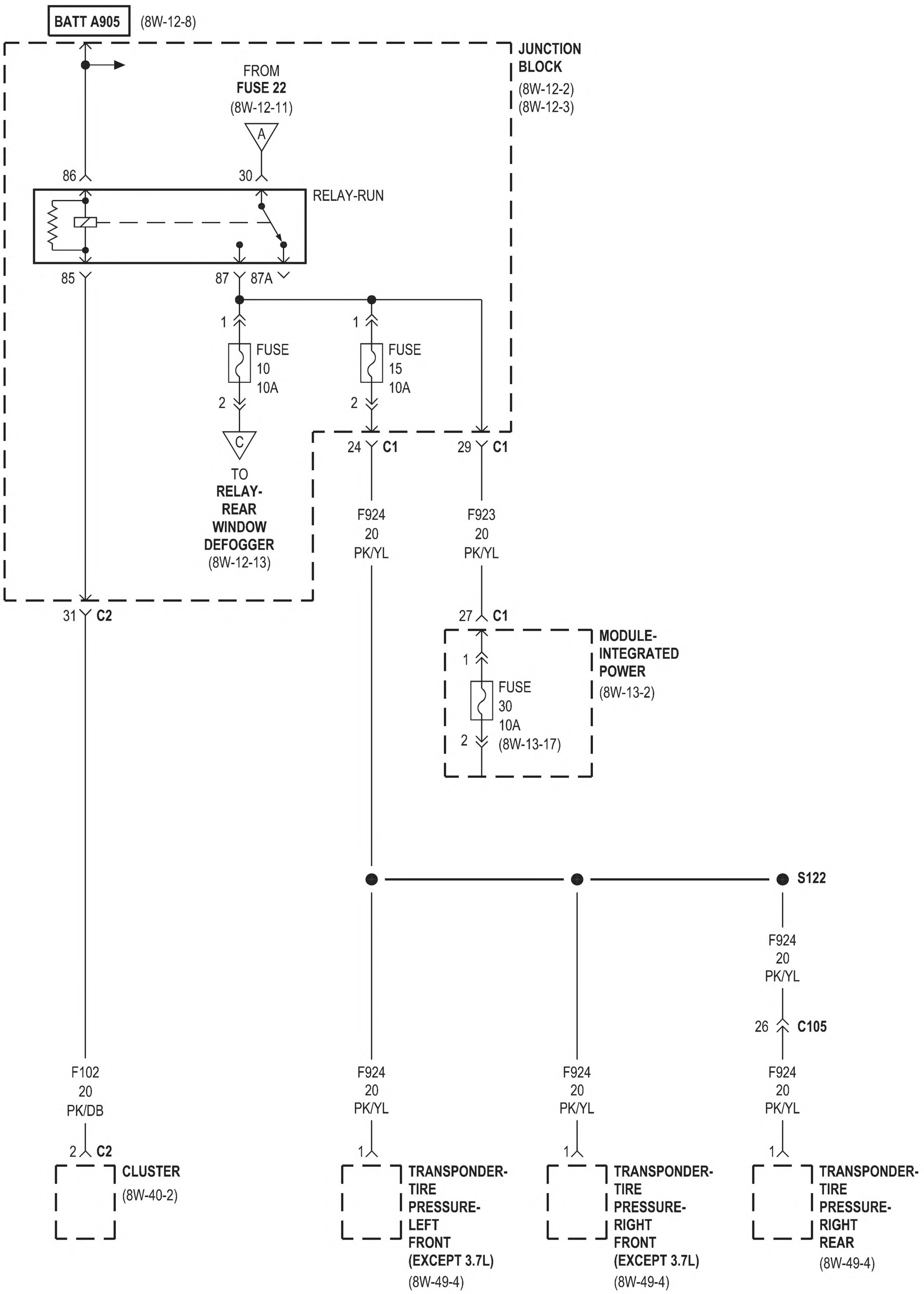
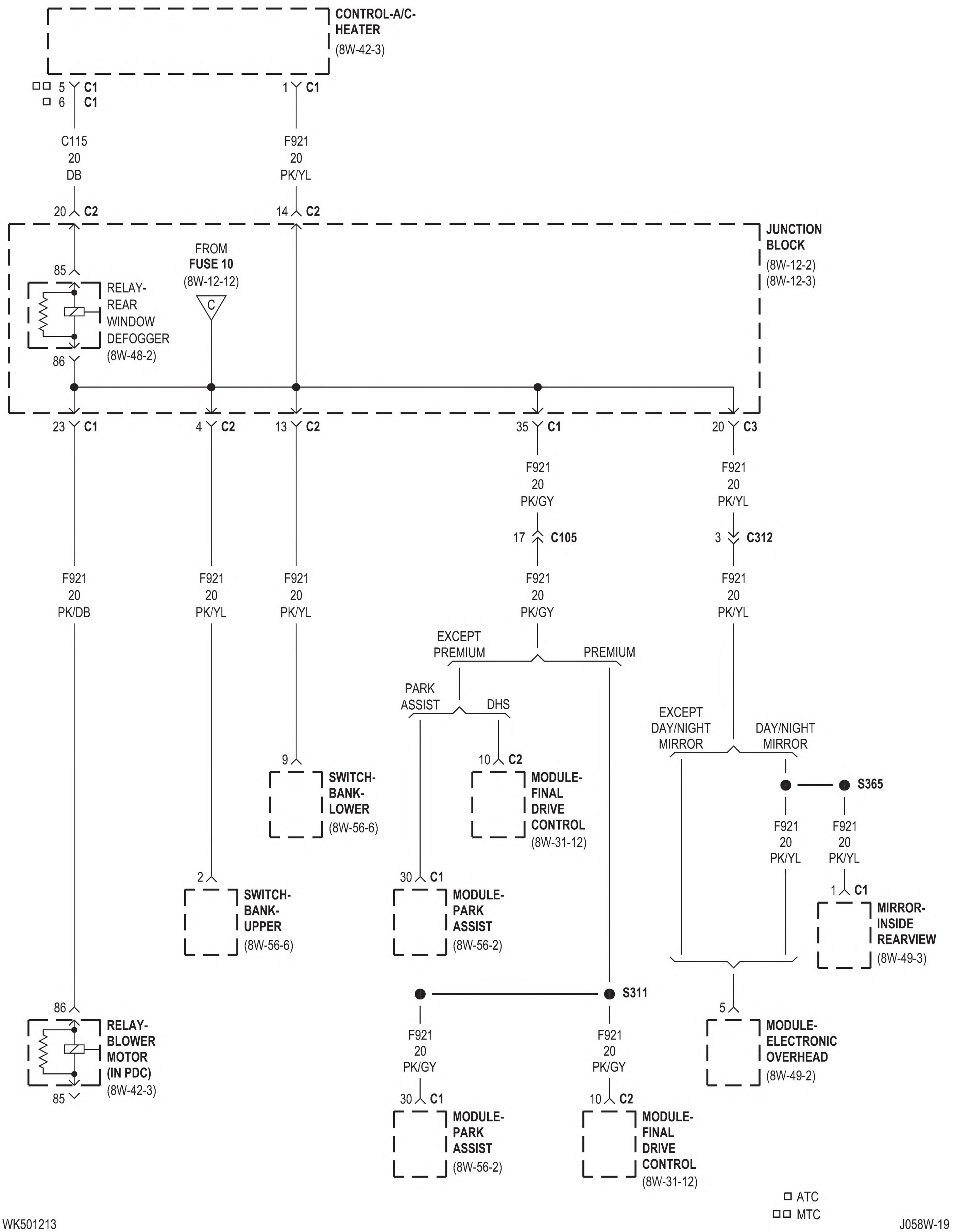
FUSE
16
10A
(8W-12-9)

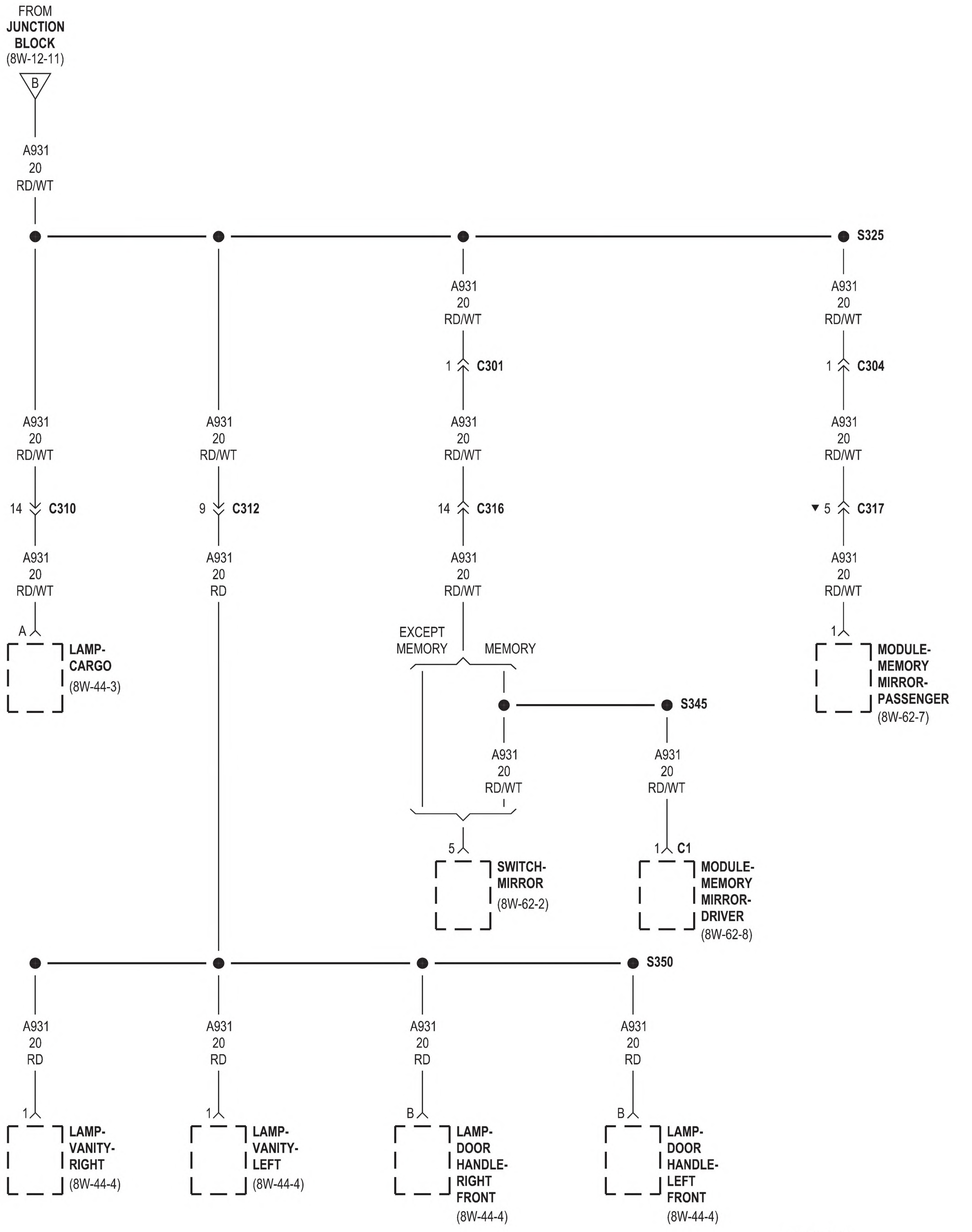

BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE 1 30A
2
1
FUSE 6 10A
2
1
FUSE 16 10A
2
39 C3
37 C3
23 C2
A108 20 LG/RD
S228
A116 14 YL/RD
A27 20 RD/LB
A108 20 LG/RD
A108 20 LG/RD
A108 20 LG/RD
S303
A116 16 YL/RD
A116 16 YL/RD
1 C1
MODULE-OCCUPANT CLASSIFICATION
(8W-43-5)
8 C1
MODULE-STEERING CONTROL
(8W-30-18)
4 C2
13 C2
AMPLIFIER-RADIO
(8W-47-7)
9 C1
CLUSTER
(8W-40-2)
16
DATA LINK CONNECTOR
(8W-18-2)


BATT A1
(8W-10-6)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
10
40A
(8W-10-11)
10
A901
12
RD/TN
S126
(8W-10-11)
A901
12
RD/TN
BATT A905
(8W-12-8)
1 C1
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
86
30
RELAY-RUN/
ACCESSORY
(8W-41-3)
1
CIRCUIT
BREAKER NO. 1
20A
2
85
87
87A
86
RELAY-
POWER
OUTLET
(8W-41-3)
85
30 C2
14 C1
10 C1
F103
20
PK/GY
Z387
16
BK
A5
16
RD/VT
4 C2
CLUSTER
(8W-40-2)
25 C2
MODULE-
INTEGRATED
POWER
(8W-13-2)
S136
(8W-15-3)
86
RELAY-
WIPER
HIGH/LOW
(8W-53-2)
85
Z387
12
BK
86
87
87A
RELAY-
WIPER
ON/OFF
(8W-53-2)
85
30
G100
(8W-15-3)

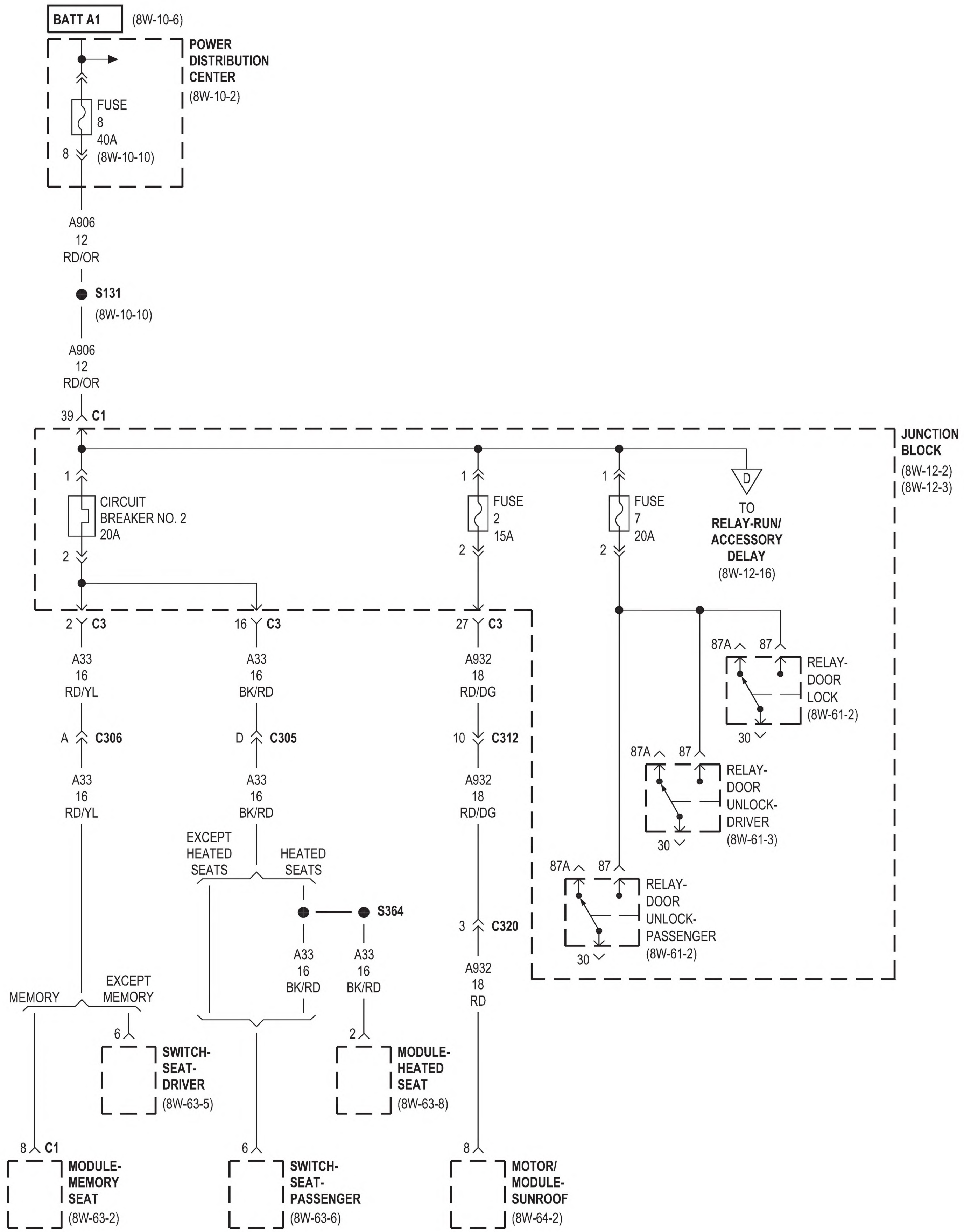

BATT A1
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
3
30A
(8W-10-9)
3
A902
14
RD/GY
9 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
12
10A
2
1
FUSE
17
15A
2
1
FUSE
22
15A
2
A
TO
RELAY-RUN
(8W-12-12)
86
30
RELAY-FLIP-UP GLASS
(8W-61-7)
85
87
87A
30
RELAY-WIPER-REAR
(8W-53-3)
87
87A
6 C2
19 C2
7 C2
26 C3
28 C3
A931
20
RD
A931
20
RD
A931
20
RD
A931
20
RD/WT
A46
18
RD/GY
4 C310
A46
18
RD/GY
1
LAMP-GLOVE BOX
(8W-44-4)
1
LAMP-COURTESY-LOWER LEFT
(8W-44-3)
B
TO
S325
(8W-12-14)
5
MOTOR-REAR WINDOW WIPER
(8W-53-3)
1
LAMP-COURTESY-LOWER RIGHT
(8W-44-3)

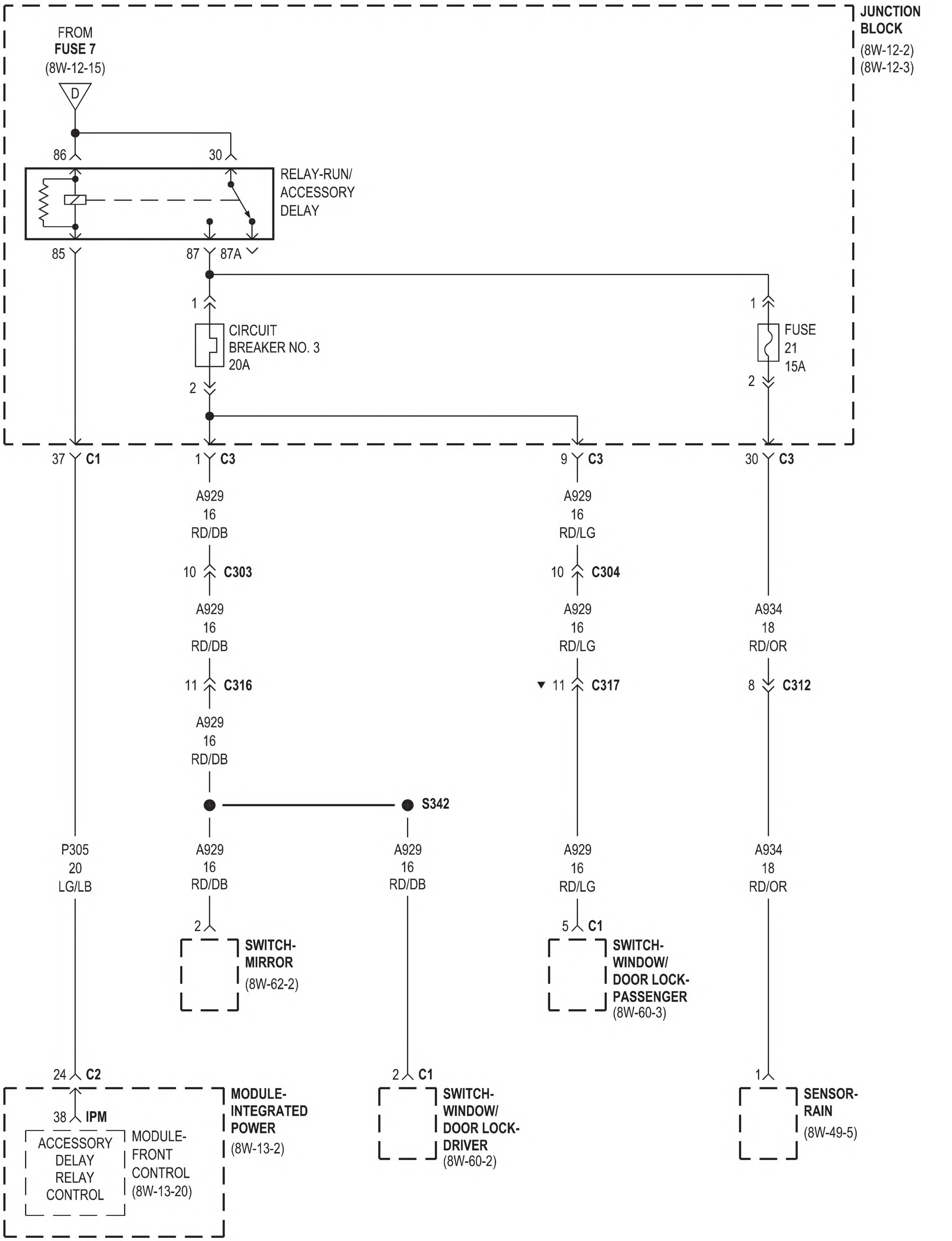

BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FROM FUSE 22
(8W-12-11)
A
86
30
RELAY-RUN
85
87
87A
1
FUSE 10 10A
2
C
TO RELAY-REAR WINDOW DEFOGGER
(8W-12-13)
1
FUSE 15 10A
2
24 C1
29 C1
F924 20 PK/YL
F923 20 PK/YL
31 C2
27 C1
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE 30 10A
2
(8W-13-17)
S122
F924 20 PK/YL
26 C105
F102 20 PK/DB
F924 20 PK/YL
F924 20 PK/YL
F924 20 PK/YL
2 C2
CLUSTER
(8W-40-2)
1
TRANSPONDER-TIRE PRESSURE-LEFT FRONT (EXCEPT 3.7L)
(8W-49-4)
1
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L)
(8W-49-4)
1
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
(8W-49-4)


CONTROL-A/C-
HEATER
(8W-42-3)
□□ 5 C1
□ 6 C1
1 C1
C115
20
DB
F921
20
PK/YL
20 C2
14 C2
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
85
RELAY-
REAR
WINDOW
DEFOGGER
(8W-48-2)
86
FROM
FUSE 10
(8W-12-12)
C
23 C1
4 C2
13 C2
35 C1
20 C3
F921
20
PK/GY
F921
20
PK/YL
17 C105
3 C312
F921
20
PK/DB
F921
20
PK/YL
F921
20
PK/YL
F921
20
PK/GY
F921
20
PK/YL
EXCEPT
PREMIUM
PREMIUM
PARK
ASSIST
DHS
EXCEPT
DAY/NIGHT
MIRROR
DAY/NIGHT
MIRROR
9
SWITCH-
BANK-
LOWER
(8W-56-6)
10 C2
MODULE-
FINAL
DRIVE
CONTROL
(8W-31-12)
S365
F921
20
PK/YL
F921
20
PK/YL
2
SWITCH-
BANK-
UPPER
(8W-56-6)
30 C1
MODULE-
PARK
ASSIST
(8W-56-2)
1 C1
MIRROR-
INSIDE
REARVIEW
(8W-49-3)
S311
86
RELAY-
BLOWER
MOTOR
(IN PDC)
(8W-42-3)
85
5
MODULE-
ELECTRONIC
OVERHEAD
(8W-49-2)
F921
20
PK/GY
F921
20
PK/GY
30 C1
MODULE-
PARK
ASSIST
(8W-56-2)
10 C2
MODULE-
FINAL
DRIVE
CONTROL
(8W-31-12)
□ ATC
□□ MTC

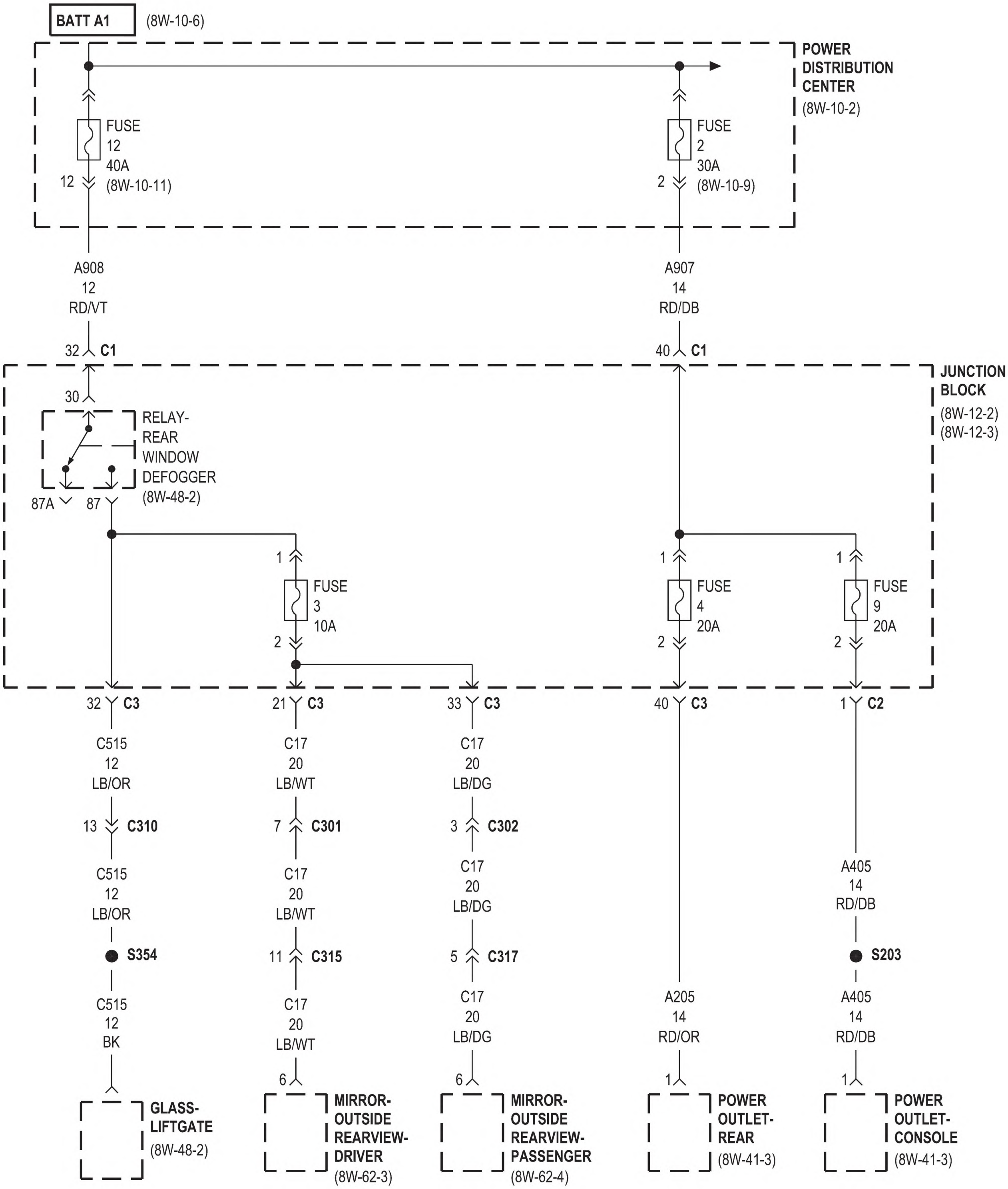

FROM
JUNCTION
BLOCK
(8W-12-11)
B
A931
20
RD/WT
S325
A931 20 RD/WT
1 C301
1 C304
A931 20 RD/WT
14 C310
9 C312
14 C316
▼ 5 C317
A931 20 RD
A
LAMP-
CARGO
(8W-44-3)
1
MODULE-
MEMORY
MIRROR-
PASSENGER
(8W-62-7)
EXCEPT
MEMORY
MEMORY
S345
5
SWITCH-
MIRROR
(8W-62-2)
1 C1
MODULE-
MEMORY
MIRROR-
DRIVER
(8W-62-8)
S350
1
LAMP-
VANITY-
RIGHT
(8W-44-4)
1
LAMP-
VANITY-
LEFT
(8W-44-4)
B
LAMP-
DOOR
HANDLE-
RIGHT
FRONT
(8W-44-4)
B
LAMP-
DOOR
HANDLE-
LEFT
FRONT
(8W-44-4)

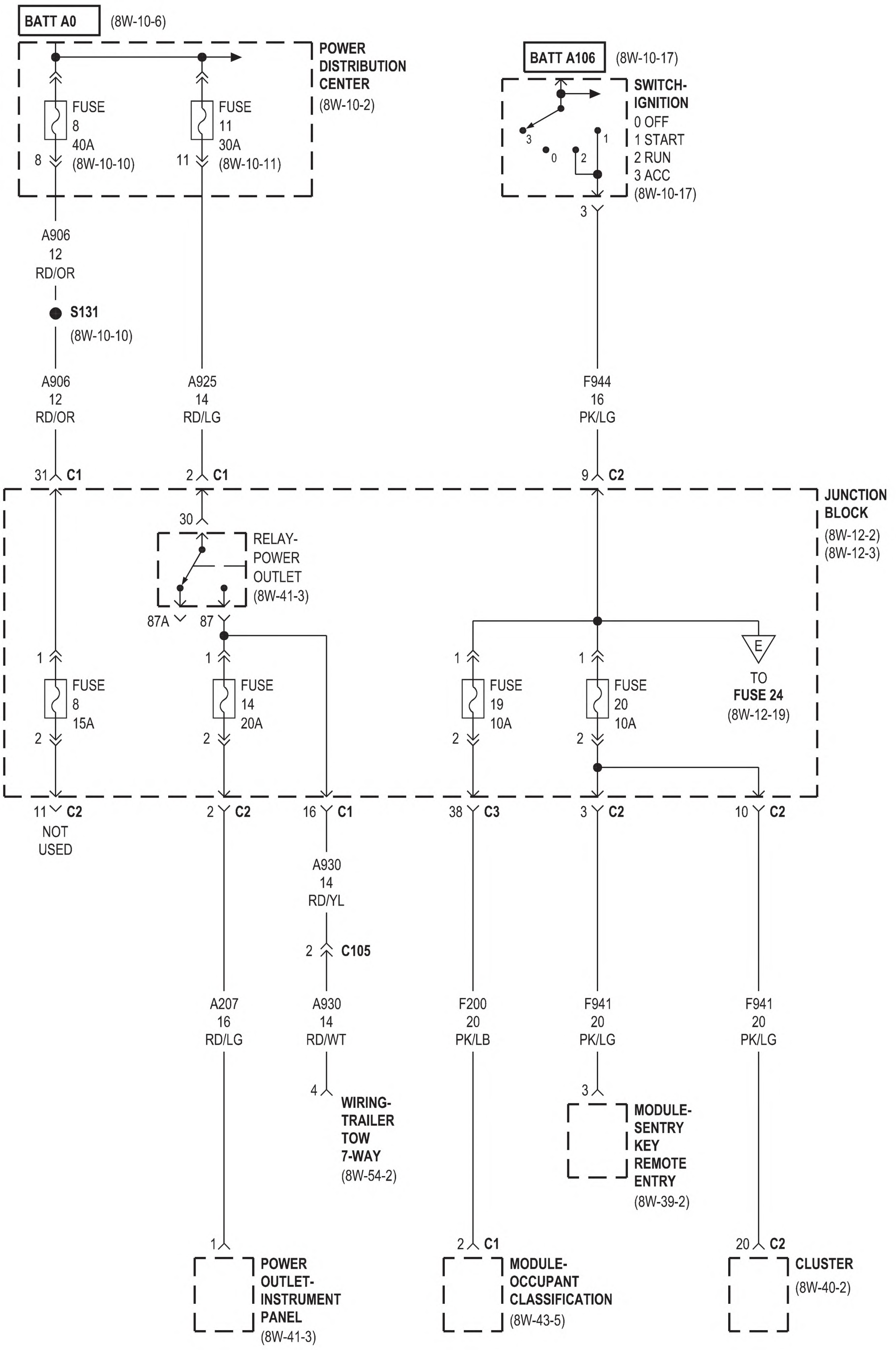
▼ MEMORY


BATT A1
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
8
40A
(8W-10-10)
8
A906
12
RD/OR
S131
(8W-10-10)
A906
12
RD/OR
39
C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
CIRCUIT BREAKER NO. 2
20A
2
1
FUSE
2
15A
2
1
FUSE
7
20A
2
D
TO
RELAY-RUN/ ACCESSORY DELAY
(8W-12-16)
2
C3
16
C3
27
C3
A33
16
RD/YL
A
C306
A33
16
RD/YL
A33
16
BK/RD
D
C305
A33
16
BK/RD
EXCEPT HEATED SEATS
HEATED SEATS
S364
A33
16
BK/RD
A33
16
BK/RD
A932
18
RD/DG
10
C312
A932
18
RD/DG
3
C320
A932
18
RD
87A
87
RELAY-DOOR LOCK
(8W-61-2)
30
87A
87
RELAY-DOOR UNLOCK-DRIVER
(8W-61-3)
30
87A
87
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
30
MEMORY
EXCEPT MEMORY
6
SWITCH-SEAT-DRIVER
(8W-63-5)
2
MODULE-HEATED SEAT
(8W-63-8)
8
C1
MODULE-MEMORY SEAT
(8W-63-2)
6
SWITCH-SEAT-PASSENGER
(8W-63-6)
8
MOTOR/ MODULE-SUNROOF
(8W-64-2)


JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FROM
FUSE 7
(8W-12-15)
D
86
30
RELAY-RUN/ ACCESSORY DELAY
85
87
87A
1
CIRCUIT BREAKER NO. 3 20A
2
1
FUSE 21 15A
2
37 C1
1 C3
9 C3
30 C3
A929 16 RD/DB
10 C303
A929 16 RD/DB
11 C316
A929 16 RD/DB
S342
A929 16 RD/DB
A929 16 RD/DB
2
SWITCH-MIRROR
(8W-62-2)
2 C1
SWITCH-WINDOW/ DOOR LOCK-DRIVER
(8W-60-2)
A929 16 RD/LG
10 C304
A929 16 RD/LG
▼ 11 C317
A929 16 RD/LG
5 C1
SWITCH-WINDOW/ DOOR LOCK-PASSENGER
(8W-60-3)
A934 18 RD/OR
8 C312
A934 18 RD/OR
1
SENSOR-RAIN
(8W-49-5)
P305 20 LG/LB
24 C2
38 IPM
ACCESSORY DELAY RELAY CONTROL
MODULE-FRONT CONTROL
(8W-13-20)
MODULE-INTEGRATED POWER
(8W-13-2)

▼ MEMORY


BATT A1
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 12 40A (8W-10-11)
12
FUSE 2 30A (8W-10-9)
2
A908 12 RD/VT
A907 14 RD/DB
32 C1
40 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-REAR WINDOW DEFOGGER
(8W-48-2)
87A
87
1
FUSE 3 10A
2
FUSE 4 20A
FUSE 9 20A
32 C3
21 C3
33 C3
40 C3
1 C2
C515 12 LB/OR
13 C310
S354
C515 12 BK
C17 20 LB/WT
7 C301
11 C315
C17 20 LB/DG
3 C302
5 C317
A205 14 RD/OR
A405 14 RD/DB
S203
6
GLASS-LIFTGATE
(8W-48-2)
MIRROR-OUTSIDE REARVIEW-DRIVER
(8W-62-3)
MIRROR-OUTSIDE REARVIEW-PASSENGER
(8W-62-4)
POWER OUTLET-REAR
(8W-41-3)
POWER OUTLET-CONSOLE
(8W-41-3)


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 8 40A (8W-10-10)
8
FUSE 11 30A (8W-10-11)
11
A906 12 RD/OR
S131
(8W-10-10)
A906 12 RD/OR
A925 14 RD/LG
BATT A106
(8W-10-17)
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
(8W-10-17)
3
0
1
2
3
F944 16 PK/LG
31 C1
2 C1
9 C2
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-POWER OUTLET
(8W-41-3)
87A
87
1
FUSE 8 15A
2
1
FUSE 14 20A
2
1
FUSE 19 10A
2
1
FUSE 20 10A
2
E
TO FUSE 24
(8W-12-19)
11 C2
NOT USED
2 C2
16 C1
38 C3
3 C2
10 C2
A930 14 RD/YL
2 C105
A930 14 RD/WT
4
WIRING-TRAILER TOW 7-WAY
(8W-54-2)
A207 16 RD/LG
F200 20 PK/LB
F941 20 PK/LG
F941 20 PK/LG
3
MODULE-SENTRY KEY REMOTE ENTRY
(8W-39-2)
1
POWER OUTLET-INSTRUMENT PANEL
(8W-41-3)
2 C1
MODULE-OCCUPANT CLASSIFICATION
(8W-43-5)
20 C2
CLUSTER
(8W-40-2)

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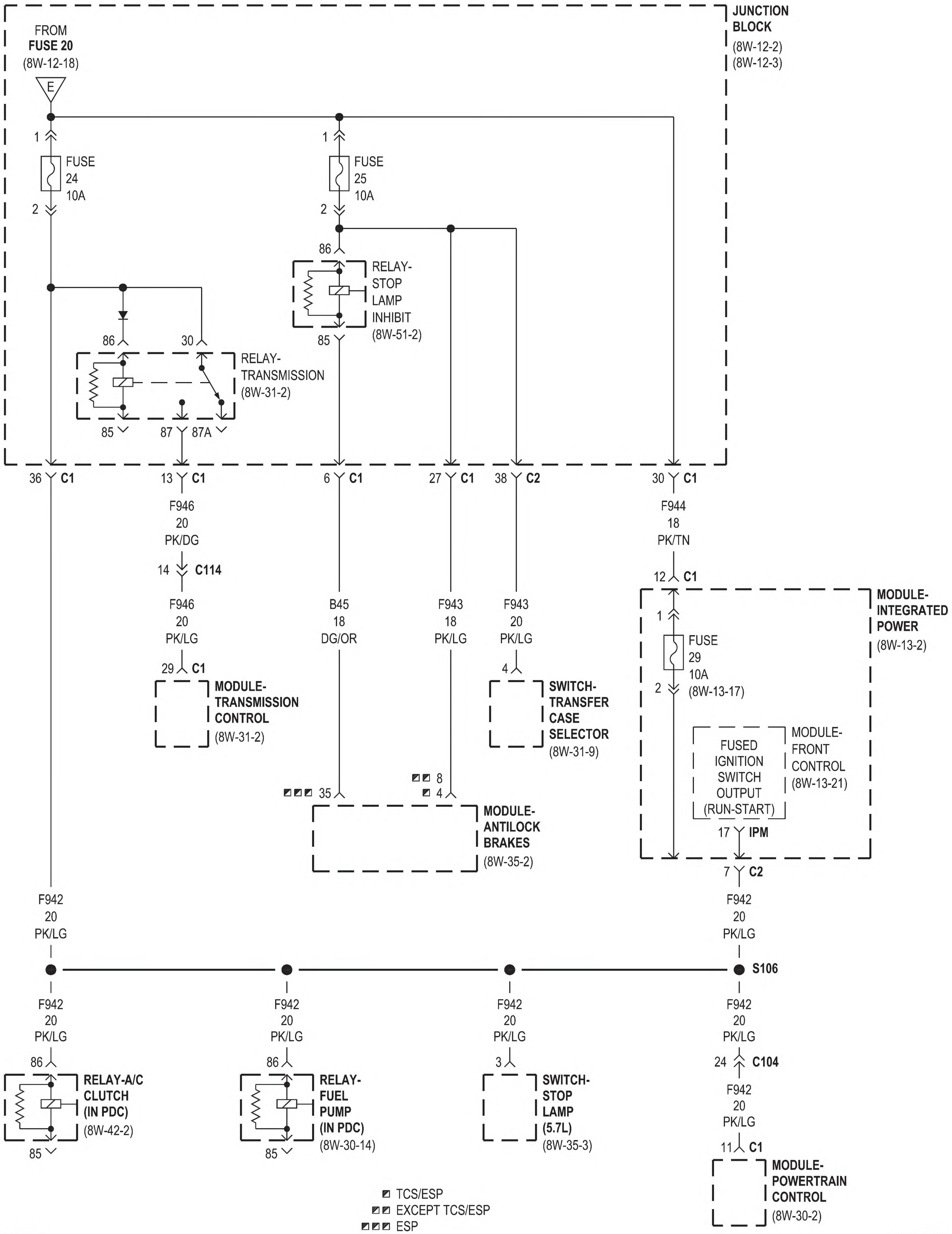
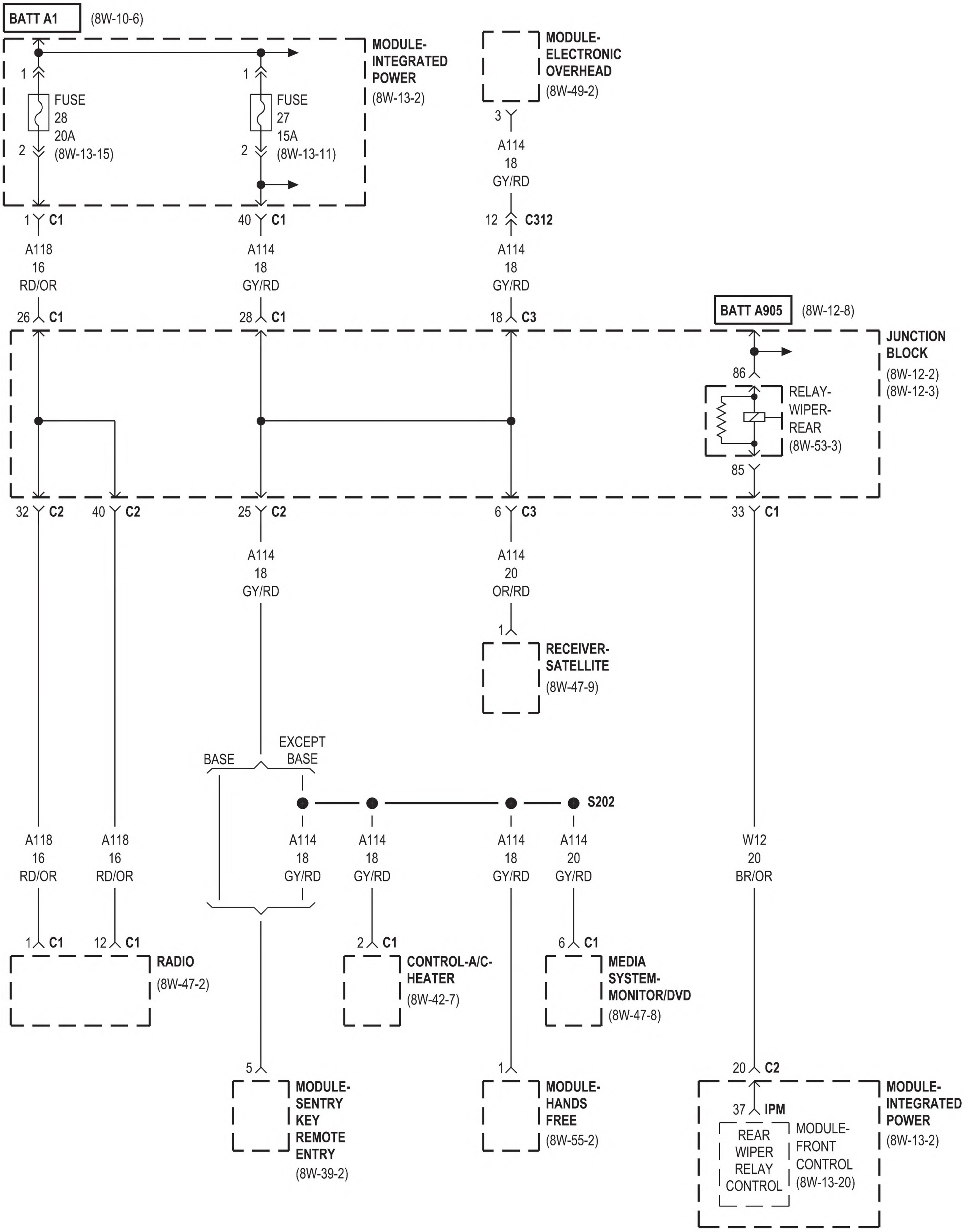
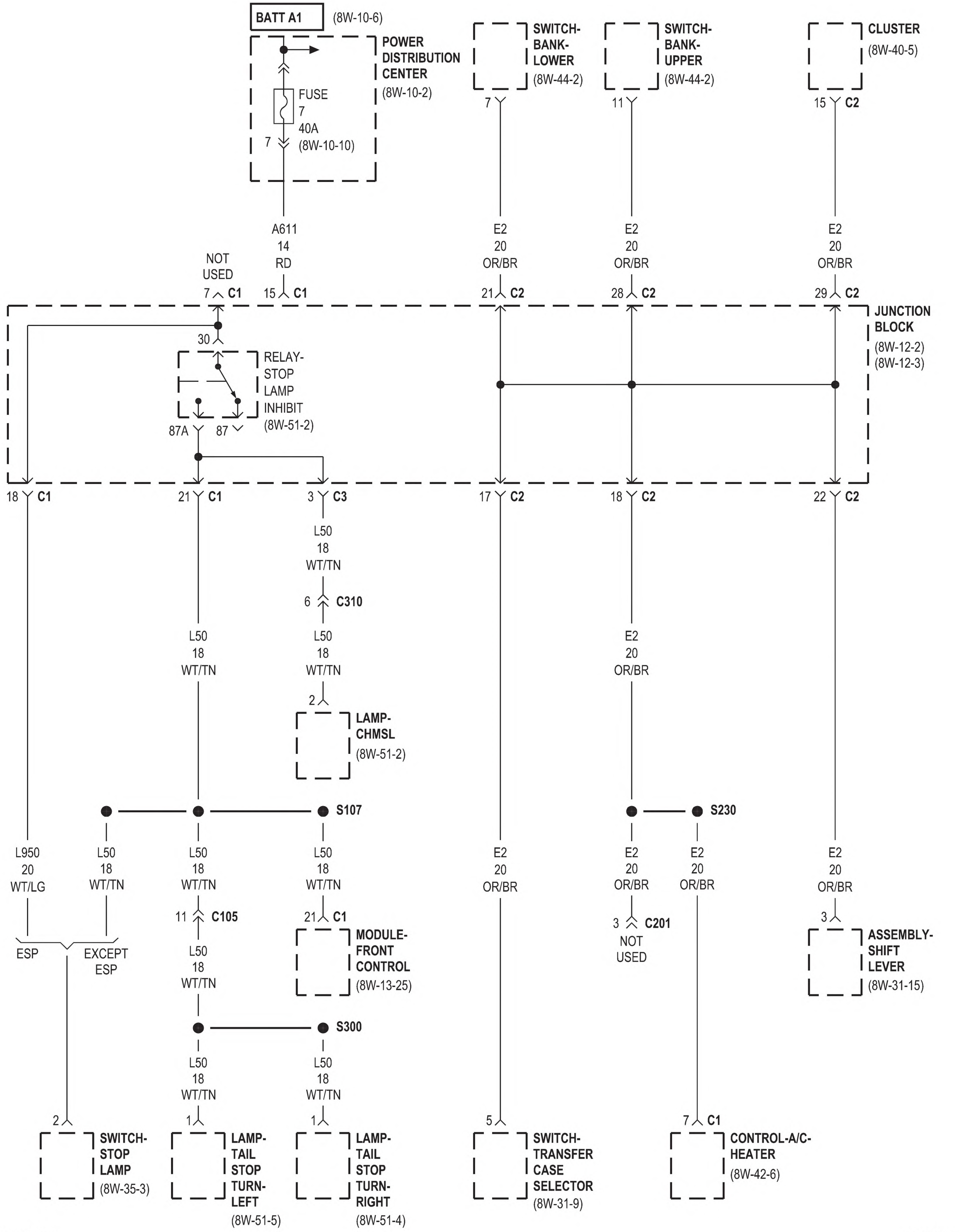
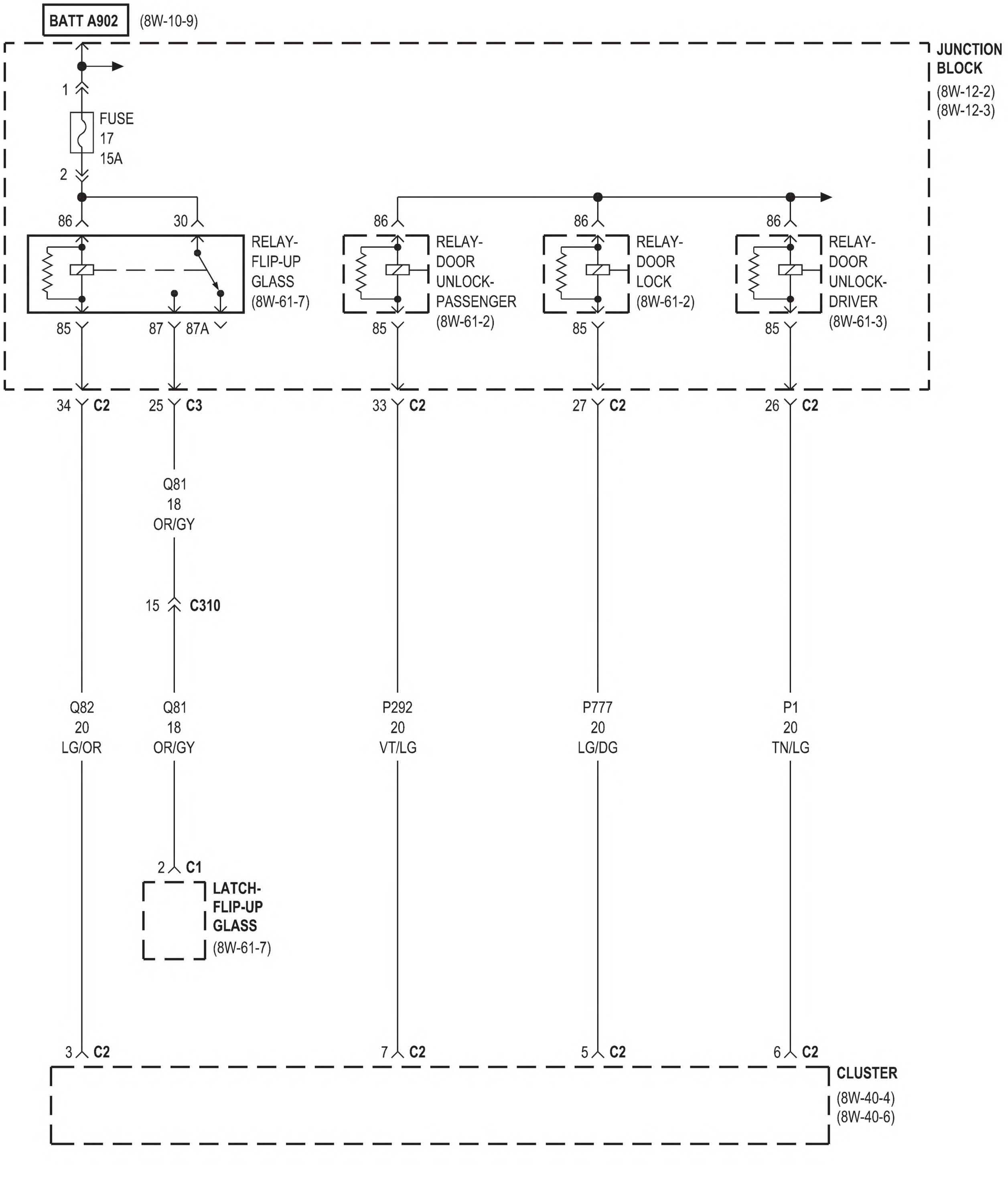
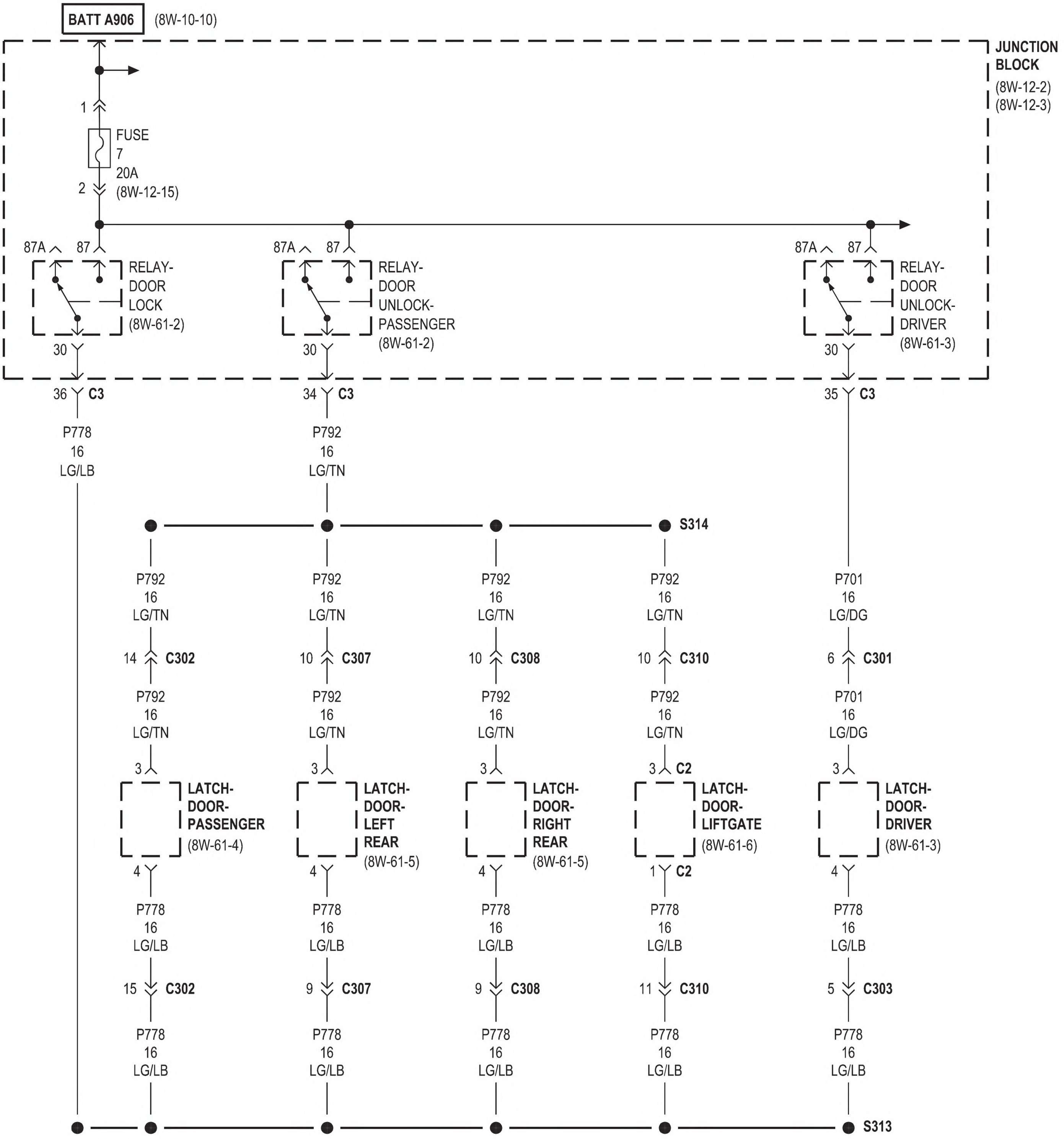

JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FROM
FUSE 20
(8W-12-18)
E
1
FUSE
24
10A
2
1
FUSE
25
10A
2
86
RELAY-
STOP
LAMP
INHIBIT
(8W-51-2)
85
86
30
RELAY-
TRANSMISSION
(8W-31-2)
85
87
87A
36 C1
13 C1
6 C1
27 C1
38 C2
30 C1
F946
20
PK/DG
14 C114
F946
20
PK/LG
29 C1
MODULE-
TRANSMISSION
CONTROL
(8W-31-2)
B45
18
DG/OR
F943
18
PK/LG
F943
20
PK/LG
4
SWITCH-
TRANSFER
CASE
SELECTOR
(8W-31-9)
▨▨ 8
▨ 4
▨▨▨ 35
MODULE-
ANTILOCK
BRAKES
(8W-35-2)
F944
18
PK/TN
12 C1
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
29
10A
(8W-13-17)
2
FUSED
IGNITION
SWITCH
OUTPUT
(RUN-START)
MODULE-
FRONT
CONTROL
(8W-13-21)
17 IPM
7 C2
F942
20
PK/LG
F942
20
PK/LG
S106
F942
20
PK/LG
86
RELAY-A/C
CLUTCH
(IN PDC)
(8W-42-2)
85
F942
20
PK/LG
86
RELAY-
FUEL
PUMP
(IN PDC)
(8W-30-14)
85
F942
20
PK/LG
3
SWITCH-
STOP
LAMP
(5.7L)
(8W-35-3)
F942
20
PK/LG
24 C104
F942
20
PK/LG
11 C1
MODULE-
POWERTRAIN
CONTROL
(8W-30-2)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
▨▨▨ ESP


BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
28
20A
(8W-13-15)
2
1
FUSE
27
15A
(8W-13-11)
2
MODULE-
ELECTRONIC
OVERHEAD
(8W-49-2)
3
A114
18
GY/RD
12 C312
A114
18
GY/RD
1 C1
A118
16
RD/OR
40 C1
A114
18
GY/RD
26 C1
28 C1
18 C3
BATT A905
(8W-12-8)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
86
RELAY-
WIPER-
REAR
(8W-53-3)
85
32 C2
40 C2
25 C2
6 C3
33 C1
A114
18
GY/RD
A114
20
OR/RD
1
RECEIVER-
SATELLITE
(8W-47-9)
BASE
EXCEPT
BASE
S202
A118
16
RD/OR
A118
16
RD/OR
A114
18
GY/RD
A114
18
GY/RD
A114
18
GY/RD
A114
20
GY/RD
W12
20
BR/OR
1 C1
12 C1
RADIO
(8W-47-2)
2 C1
CONTROL-A/C-
HEATER
(8W-42-7)
6 C1
MEDIA
SYSTEM-
MONITOR/DVD
(8W-47-8)
5
MODULE-
SENTRY
KEY
REMOTE
ENTRY
(8W-39-2)
1
MODULE-
HANDS
FREE
(8W-55-2)
20 C2
37 IPM
REAR
WIPER
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-20)
MODULE-
INTEGRATED
POWER
(8W-13-2)


BATT A1
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 7 40A
(8W-10-10)
7
SWITCH-BANK-LOWER
(8W-44-2)
7
SWITCH-BANK-UPPER
(8W-44-2)
11
CLUSTER
(8W-40-5)
15 C2
A611 14 RD
E2 20 OR/BR
E2 20 OR/BR
E2 20 OR/BR
NOT USED
7 C1
15 C1
21 C2
28 C2
29 C2
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-STOP LAMP INHIBIT
(8W-51-2)
87A
87
18 C1
21 C1
3 C3
17 C2
18 C2
22 C2
L50 18 WT/TN
6 C310
L50 18 WT/TN
2
LAMP-CHMSL
(8W-51-2)
L50 18 WT/TN
E2 20 OR/BR
S107
S230
L950 20 WT/LG
L50 18 WT/TN
L50 18 WT/TN
L50 18 WT/TN
E2 20 OR/BR
E2 20 OR/BR
E2 20 OR/BR
E2 20 OR/BR
11 C105
21 C1
3 C201
NOT USED
3
ESP
EXCEPT ESP
MODULE-FRONT CONTROL
(8W-13-25)
ASSEMBLY-SHIFT LEVER
(8W-31-15)
L50 18 WT/TN
S300
L50 18 WT/TN
L50 18 WT/TN
2
1
1
5
7 C1
SWITCH-STOP LAMP
(8W-35-3)
LAMP-TAIL STOP TURN-LEFT
(8W-51-5)
LAMP-TAIL STOP TURN-RIGHT
(8W-51-4)
SWITCH-TRANSFER CASE SELECTOR
(8W-31-9)
CONTROL-A/C-HEATER
(8W-42-6)

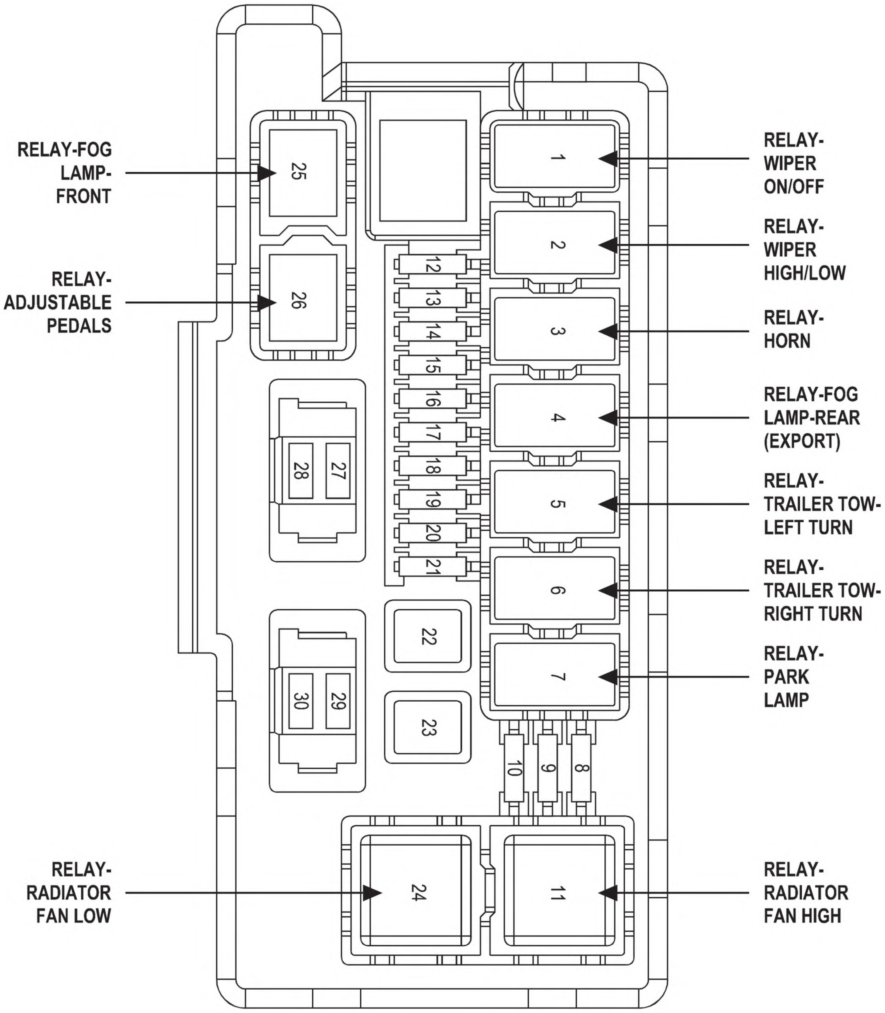

BATT A902
(8W-10-9)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
17
15A
2
86
30
RELAY-
FLIP-UP
GLASS
(8W-61-7)
85
87
87A
86
RELAY-
DOOR
UNLOCK-
PASSENGER
(8W-61-2)
85
86
RELAY-
DOOR
LOCK
(8W-61-2)
85
86
RELAY-
DOOR
UNLOCK-
DRIVER
(8W-61-3)
85
34 C2
25 C3
33 C2
27 C2
26 C2
Q81
18
OR/GY
15 C310
Q82
20
LG/OR
Q81
18
OR/GY
P292
20
VT/LG
P777
20
LG/DG
P1
20
TN/LG
2 C1
LATCH-
FLIP-UP
GLASS
(8W-61-7)
3 C2
7 C2
5 C2
6 C2
CLUSTER
(8W-40-4)
(8W-40-6)


BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
7
20A
(8W-12-15)
2
87A
87
RELAY-DOOR LOCK
(8W-61-2)
30
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
RELAY-DOOR UNLOCK-DRIVER
(8W-61-3)
36 C3
34 C3
35 C3
P778
16
LG/LB
P792
16
LG/TN
S314
P701
16
LG/DG
14 C302
10 C307
10 C308
10 C310
6 C301
3
3 C2
LATCH-DOOR-PASSENGER
(8W-61-4)
LATCH-DOOR-LEFT REAR
(8W-61-5)
LATCH-DOOR-RIGHT REAR
(8W-61-5)
LATCH-DOOR-LIFTGATE
(8W-61-6)
LATCH-DOOR-DRIVER
(8W-61-3)
4
1 C2
15 C302
9 C307
9 C308
11 C310
5 C303
S313

8W-13 INTEGRATED POWER MODULE

Component	Page
Assembly-Shift Lever	8W-13-21
Circuit Breaker No. 1	8W-13-18
Cluster	8W-13-16, 24
Data Link Connector	8W-13-23
Diode-Zener No. 1	8W-13-26
Diode-Zener No. 2	8W-13-26
Fan Module-Condenser Cooling	8W-13-15
Fuse 8	8W-13-16
Fuse 9	8W-13-16
Fuse 10	8W-13-16
Fuse 12	8W-13-9, 11
Fuse 13	8W-13-9, 11
Fuse 14	8W-13-9, 12
Fuse 15	8W-13-9, 13
Fuse 16	8W-13-9, 12, 22, 26
Fuse 18	8W-13-9, 11
Fuse 19	8W-13-9, 14
Fuse 20	8W-13-9, 11
Fuse 21	8W-13-9, 10, 14
Fuse 22	8W-13-9, 10, 14
Fuse 23	8W-13-10, 15
Fuse 24	8W-13-21
Fuse 27	8W-13-10, 11
Fuse 28	8W-13-10, 15
Fuse 29	8W-13-17
Fuse 30	8W-13-17
G100	8W-13-16, 18, 22, 23, 26
G101	8W-13-20, 23
Horn-No. 1	8W-13-12
Junction Block	8W-13-10, 11, 15, 17, 18, 20, 21, 25
Lamp-Chmsl	8W-13-25
Lamp-Fog-Left Front	8W-13-13
Lamp-Fog-Right Front	8W-13-13
Lamp-Headlamp-Left	8W-13-13, 16, 25
Lamp-Headlamp-Right	8W-13-13, 16, 25
Lamp-License Plate	8W-13-16
Lamp-Tail Stop Turn-Left	8W-13-14, 16, 19, 21
Lamp-Tail Stop Turn-Right	8W-13-12, 16, 19
Mirror-Inside Rearview	8W-13-19
Module-Antilock Brakes	8W-13-23
Module-Electronic Overhead	8W-13-11
Module-Final Drive Control	8W-13-14
Module-Front Control	8W-13-9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25
Module-Hydraulic Cooling Fan	8W-13-20
Module-Integrated Power	8W-13-2, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 26
Module-Occupant Restraint Controller	8W-13-17
Module-Powertrain Control	8W-13-21
Module-Sentry Key Remote Entry	8W-13-11
Module-Steering Control	8W-13-24
Motor-Fuel Pump	8W-13-26
Motor-Windshield Wiper	8W-13-18, 19
Power Distribution Center	8W-13-22, 26
Pump-Washer-Windshield	8W-13-19
Radio	8W-13-15
Receiver-Satellite	8W-13-11
Relay-A/C Clutch	8W-13-21
Relay-Adjustable Pedals	8W-13-9, 12
Relay-Auto Shut Down	8W-13-22, 26
Relay-Fog Lamp	8W-13-9, 13
Relay-Fuel Pump	8W-13-21, 26
Relay-Horn	8W-13-9, 12
Relay-Park Lamp	8W-13-10, 16
Relay-Radiator Fan High	8W-13-10, 15
Relay-Radiator Fan Low	8W-13-10, 15
Relay-Run	8W-13-17
Relay-Run/Accessory Delay	8W-13-20
Relay-Stop Lamp Inhibit	8W-13-25
Relay-Trailer Tow-Left Turn	8W-13-9, 14
Relay-Trailer Tow-Right Turn	8W-13-9, 14
Relay-Wiper High/Low	8W-13-18
Relay-Wiper On/Off	8W-13-18
Relay-Wiper-Rear	8W-13-20
Sensor-Ambient Air Temperature	8W-13-25
Sensor-Brake Fluid Level	8W-13-23
Sensor-Washer Fluid Level	8W-13-25
Switch-Bank-Lower	8W-13-12
Switch-Bank-Upper	8W-13-16
Switch-Stop Lamp	8W-13-21
Transducer-A/C Pressure	8W-13-19, 20, 24
Wiring-Trailer Tow 4-Way	8W-13-16
Wiring-Trailer Tow 7-Way	8W-13-16, 19

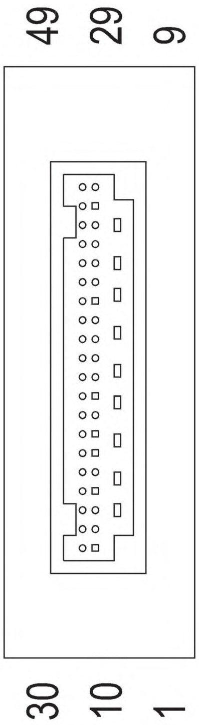
MODULE- INTEGRATED POWER


RELAY-FOG LAMP-FRONT
RELAY-ADJUSTABLE PEDALS
RELAY-RADIATOR FAN LOW
RELAY-WIPER ON/OFF
RELAY-WIPER HIGH/LOW
RELAY-HORN
RELAY-FOG LAMP-REAR (EXPORT)
RELAY-TRAILER TOW-LEFT TURN
RELAY-TRAILER TOW-RIGHT TURN
RELAY-PARK LAMP
RELAY-RADIATOR FAN HIGH
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

FUSES
(IPM)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	10A	L777 20WT/VT	FUSED PARK LAMP RELAY OUTPUT
9	10A	L76 18WT/BR	FUSED PARK LAMP RELAY OUTPUT
10	10A	L778 20WT/LB	FUSED PARK LAMP RELAY OUTPUT
11	-	-	-
12	20A	A911 18RD	FUSED B(+)
13	20A	A910 18RD	FUSED B(+)
14	20A	A903 18BR	FUSED B(+)
15	20A	A39 18RD/LG	FUSED B(+)
16	20A	A43 18RD/DG	FUSED B(+)
17	20A	A928 18RD	FUSED B(+)
18	20A	A913 18RD	FUSED B(+)
19	20A	A919 18RD	FUSED B(+)
20	20A	A912 18RD	FUSED B(+)
21	20A	A921 18RD	FUSED B(+)
22	30A	A909 14RD	FUSED B(+)
23	50A	A16 10RD/BR	FUSED B(+)
24	-	-	-
25	-	-	-
26	-	-	-
27	15A	A114 18GY/RD	FUSED B(+) -
28	20A	A118 16RD/OR	FUSED B(+)
29	10A	F20 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
30	10A	F100 20PK/VT	FUSED IGNITION SWITCH OUTPUT (RUN)

MODULE- FRONT CONTROL IPM



CAVITY	CIRCUIT	FUNCTION
1	-	-
2	A911 18RD	FUSED B(+)
3	A910 18RD	FUSED B(+)
4	A913 18RD	FUSED B(+)
5	A912 18RD	FUSED B(+)
6	-	-
7	L1 18WT/LG	BACK-UP LAMP FEED
8	-	-
9	-	-
10	K360 20GY/BR (DIESEL)	PTC NO. 1 RELAY CONTROL
11	W20 18BR/YL	REAR WASHER PUMP MOTOR CONTROL
12	W10 18BR	FRONT WASHER PUMP MOTOR CONTROL
13	F1 18PK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
14	K361 20BR/WT (DIESEL)	PTC NO. 2 RELAY CONTROL
15	A114 20GY/RD (5.7L EXPORT)	FUSED B(+)
15	A114 18GY/RD (EXCEPT 5.7L EXPORT)	FUSED B(+)
16	-	-
17	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
18	Z387 16BK	GROUND
18	Z387 18BK (EXCEPT 5.7L EXPORT)	GROUND
19	Z131 18BK/DG	GROUND
20	-	-
21	L656 20WT/DG (TRAILER TOW)	RIGHT TRAILER TOW BRAKE LAMP RELAY CONTROL
22	L655 20WT/OR (TRAILER TOW)	LEFT TRAILER TOW BRAKE LAMP RELAY CONTROL
23	-	-
24	Z131 18BK/DG	GROUND
25	Z387 16BK	GROUND

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MODULE- FRONT CONTROL IPM
(CONTINUED)

CAVITY	CIRCUIT	FUNCTION
26	L139 20WT/YL	FRONT FOG LAMP RELAY CONTROL
27	W5 20BR/LG	WIPER ON/OFF RELAY CONTROL
28	L239 20WT/DG	REAR FOG LAMP RELAY CONTROL
29	W2 20BR/LG	HIGH/LOW WIPER RELAY CONTROL
30	A15 16RD/TN	FUSED ASD RELAY OUTPUT
31	W7 20BR/GY	FRONT WIPER PARK SWITCH SENSE
32	Z131 18BK/DG	GROUND
33	Z387 16BK	GROUND
33	Z387 18BK (EXCEPT 5.7L EXPORT)	GROUND
34	L62 18WT/OR	RIGHT REAR TURN SIGNAL CONTROL
35	C918 20BK/LB	FCM SENSOR RETURN
36	-	-
37	W12 20BR/OR	REAR WIPER RELAY CONTROL
38	P305 20LG/LB	ACCESSORY DELAY RELAY CONTROL
39	-	-
40	-	-
41	Z387 16BK	GROUND
41	Z387 18BK (EXCEPT 5.7L EXPORT)	GROUND
42	-	-
43	L63 18WT/DG	LEFT REAR TURN SIGNAL CONTROL
44	-	-
45	K173 20BR/VT (5.7L)	HYDRAULIC RADIATOR FAN SOLENOID CONTROL
46	P201 20LG/DB (ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS RELAY CONTROL
47	X4 20DG/WT	HORN RELAY CONTROL
48	L779 20WT/LB	PARK LAMP RELAY CONTROL
49	N112 20DB/OR (3.7L/DIESEL)	RADIATOR FAN HIGH RELAY CONTROL

RELAYS

RELAY-ADJUSTABLE PEDALS

CAVITY	CIRCUIT	FUNCTION
30	A903 18RD	FUSED B(+)
85	P201 20LG/DB	ADJUSTABLE PEDALS RELAY CONTROL
86	A903 18RD	FUSED B(+)
87	-	-
87A	A72 18RD/OR	ADJUSTABLE PEDALS RELAY OUTPUT

RELAY-FOG LAMP-FRONT

CAVITY	CIRCUIT	FUNCTION
30	A39 18RD/LG	FUSED B(+)
85	L139 20WT/YL	FRONT FOG LAMP RELAY CONTROL
86	A39 18RD/LG	FUSED B(+)
87	L89 18WT/YL	FRONT FOG LAMP OUTPUT
87A	-	-

RELAY-HORN

CAVITY	CIRCUIT	FUNCTION
30	A43 18RD/DG	FUSED B(+)
85	X4 20DG/WT	HORN RELAY CONTROL
86	A43 18RD/DG	FUSED B(+)
87	X2 18DG/OR	HORN RELAY OUTPUT
87A	-	-

RELAY-PARK LAMP

CAVITY	CIRCUIT	FUNCTION
30	L678 08BR	PARK LAMP RELAY OUTPUT
85	L779 20WT/LB	PARK LAMP RELAY CONTROL
86	A1 06RD	B(+)
87	A1 06RD	B(+)
87A	Z387 20BK	GROUND

RELAYS

**RELAY-
RADIATOR
FAN
HIGH**

CAVITY	CIRCUIT	FUNCTION
30	A16 10RD/BR	FUSED B(+)
85	N112 20DB/OR	RADIATOR FAN HIGH RELAY CONTROL
86	A16 10RD/BR	FUSED B(+)
87	N23 10DB/DG	HIGH SPEED RADIATOR FAN RELAY OUTPUT
87A	-	-

**RELAY-
RADIATOR
FAN
LOW**

CAVITY	CIRCUIT	FUNCTION
30	A16 10RD/BR	FUSED B(+)
85	N201 20DB/LG	LOW SPEED RADIATOR FAN RELAY CONTROL
86	A16 10RD/BR	FUSED B(+)
87	N24 10DG/DB	LOW SPEED RADIATOR FAN RELAY OUTPUT
87A	-	-

**RELAY-
TRAILER
TOW-
LEFT
TURN**

CAVITY	CIRCUIT	FUNCTION
30	A919 18RD	FUSED B(+)
85	L655 20WT/OR	LEFT TRAILER TOW BRAKE LAMP RELAY CONTROL
86	A919 18RD	FUSED B(+)
87	L615 18WT/LB	TRAILER TOW TURN SIGNAL
87A	-	-

**RELAY-
TRAILER
TOW-
RIGHT
TURN**

CAVITY	CIRCUIT	FUNCTION
30	A921 18RD	FUSED B(+)
85	L656 20WT/DG	RIGHT TRAILER TOW BRAKE LAMP RELAY CONTROL
86	A921 18RD	FUSED B(+)
87	L614 18WT/DB	TRAILER TOW TURN SIGNAL
87A	-	-

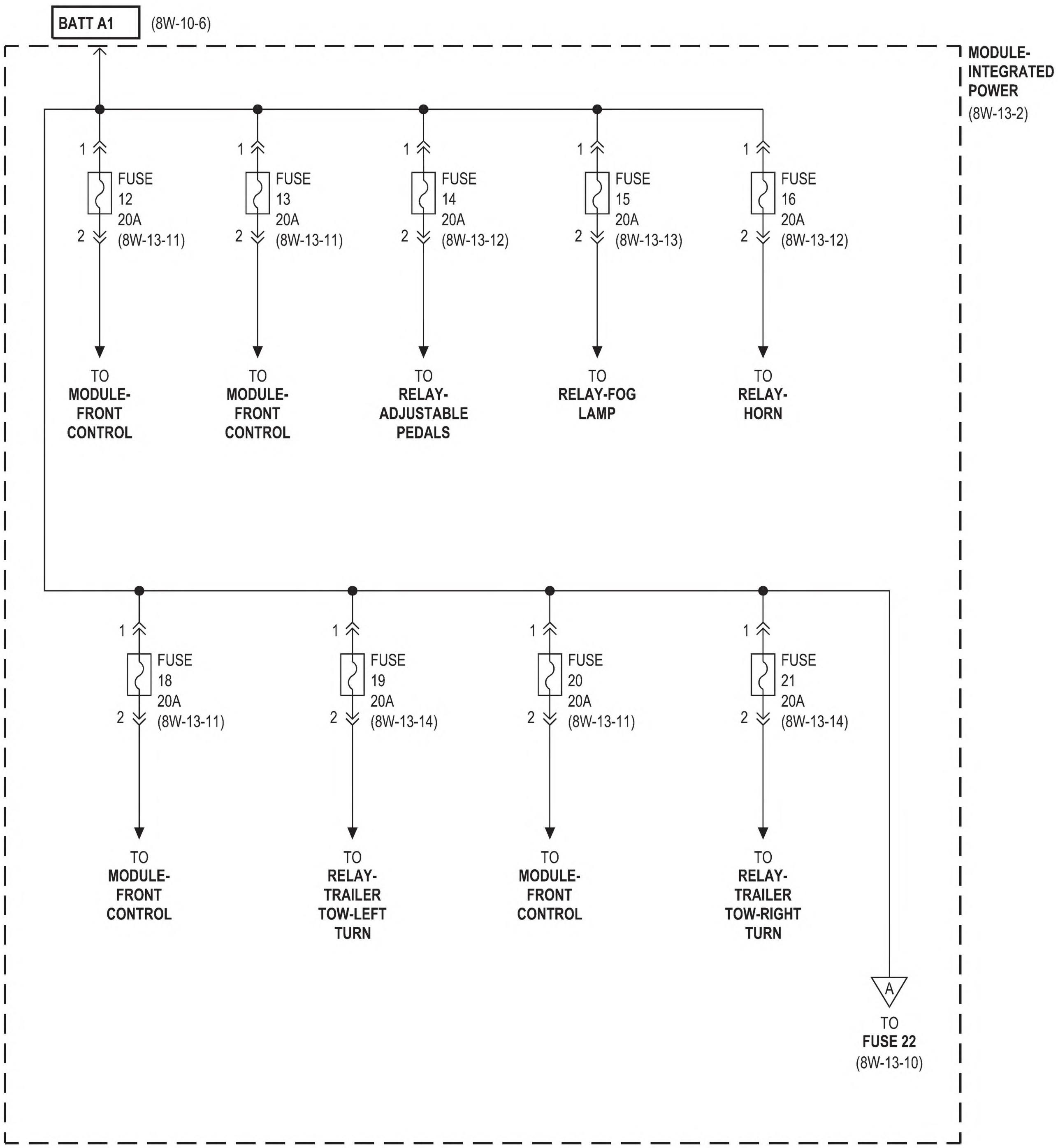
RELAYS

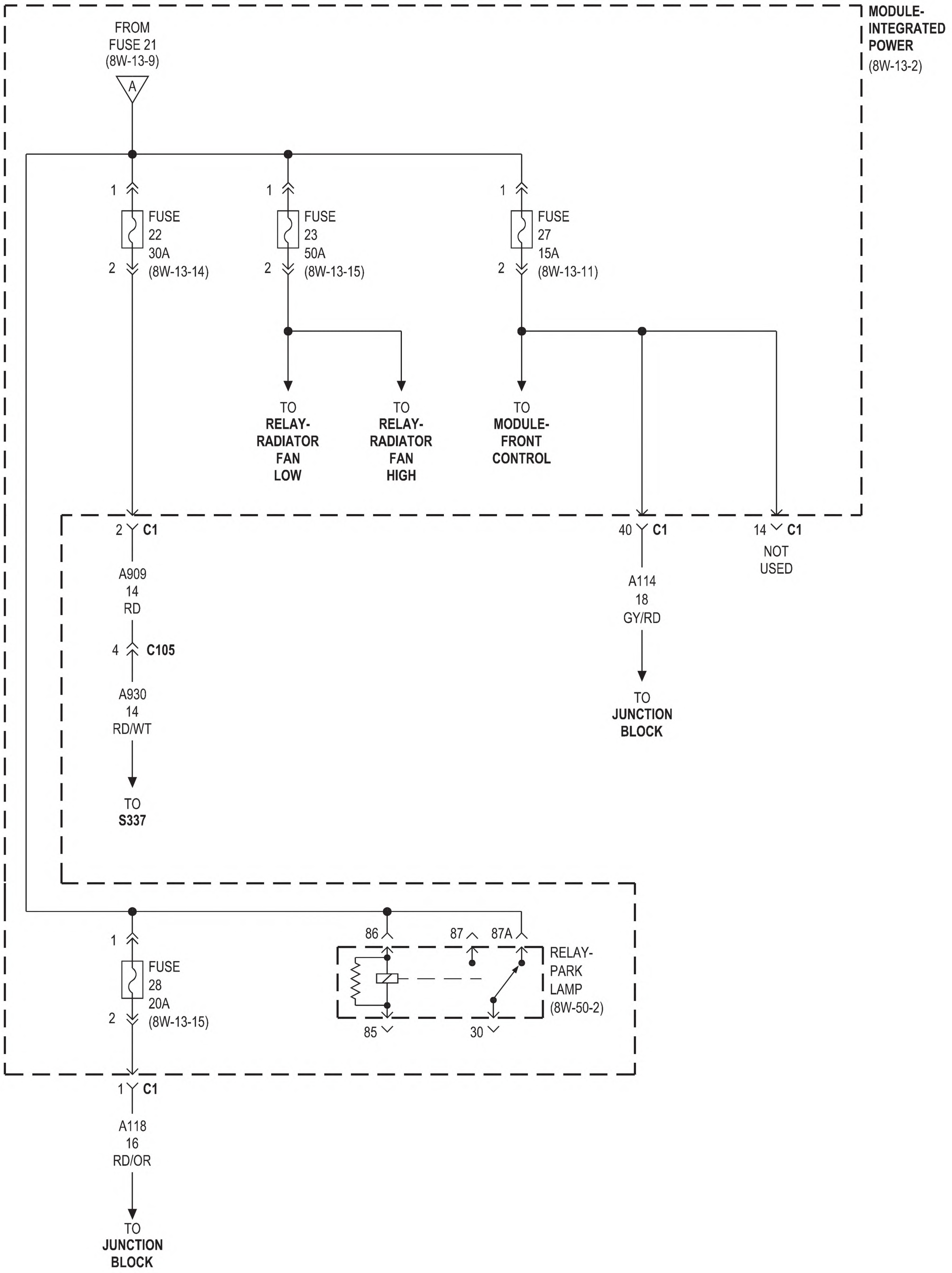
RELAY-WIPER HIGH/LOW

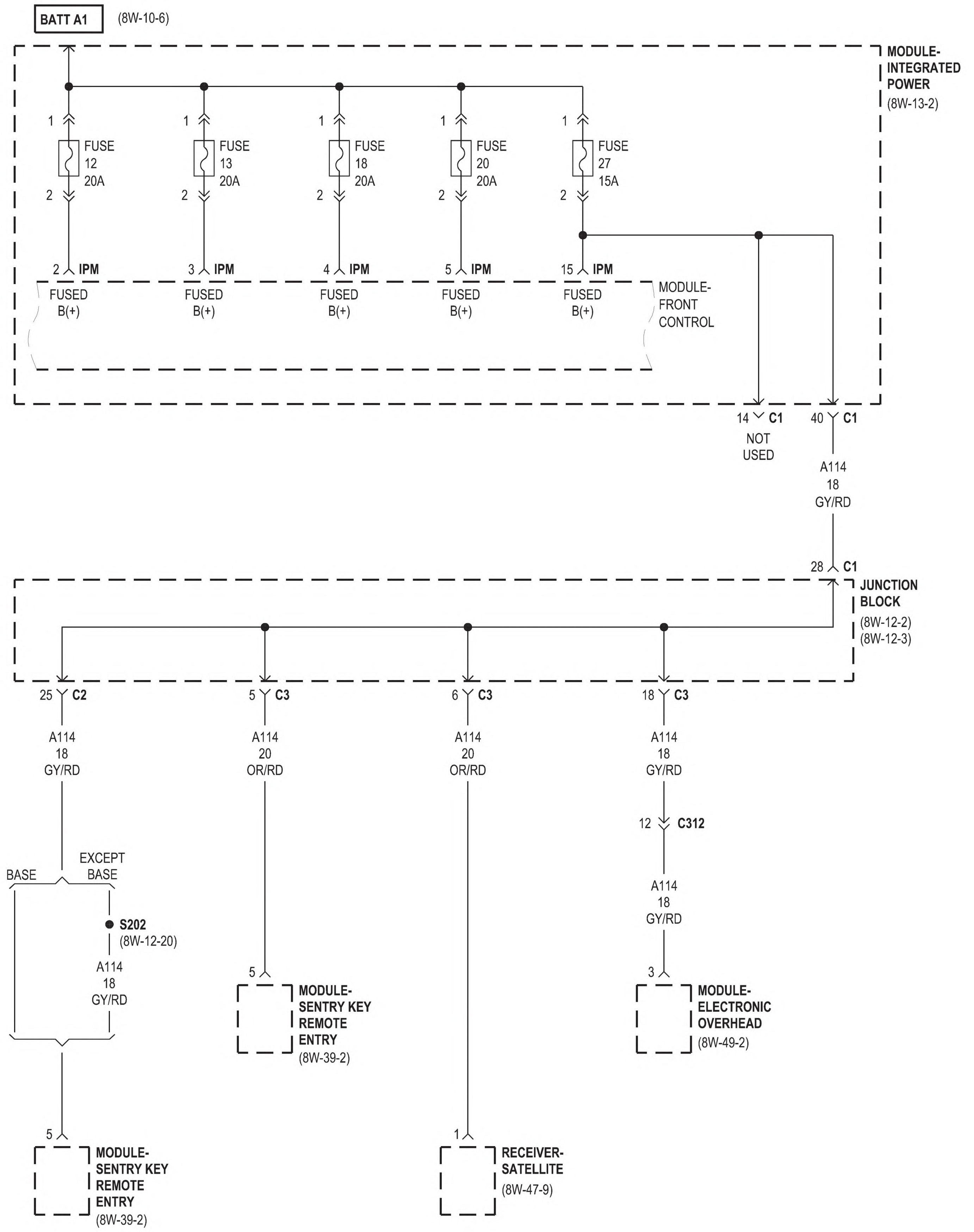
CAVITY	CIRCUIT	FUNCTION
30	W6 16BR/LB	WIPER ON/OFF RELAY OUTPUT
85	W2 20BR/LG	HIGH/LOW WIPER RELAY CONTROL
86	A5 16RD/VT	FUSED B(+)
87	W4 16BR/OR	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
87A	W3 16BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT

RELAY-WIPER ON/OFF

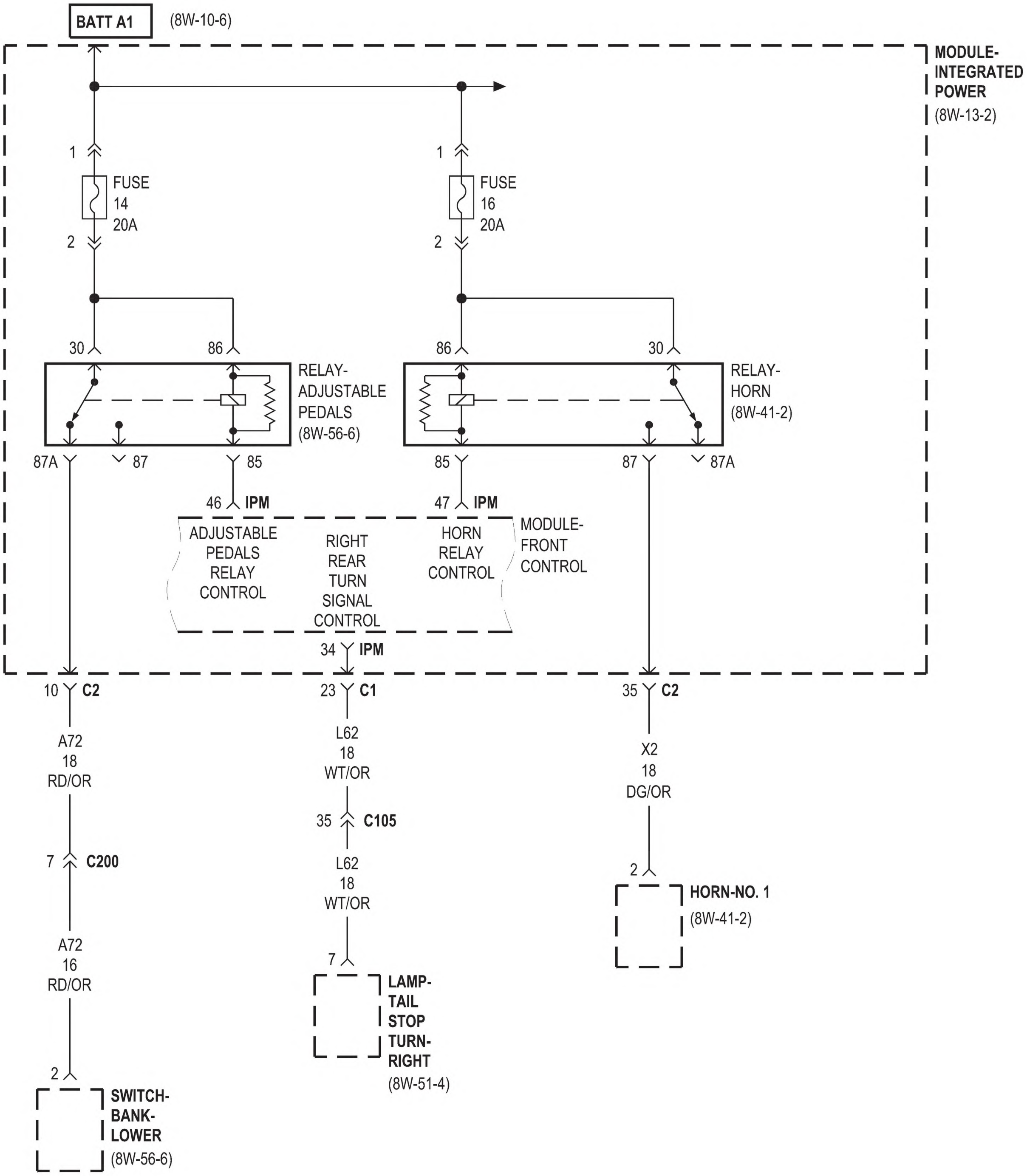
CAVITY	CIRCUIT	FUNCTION
30	W6 16BR/LB	WIPER ON/OFF RELAY OUTPUT
85	W5 20BR/LG	WIPER ON/OFF RELAY CONTROL
86	A5 16RD/VT	FUSED B(+)
87	A5 16RD/VT	FUSED B(+)
87A	Z387 16BK	GROUND

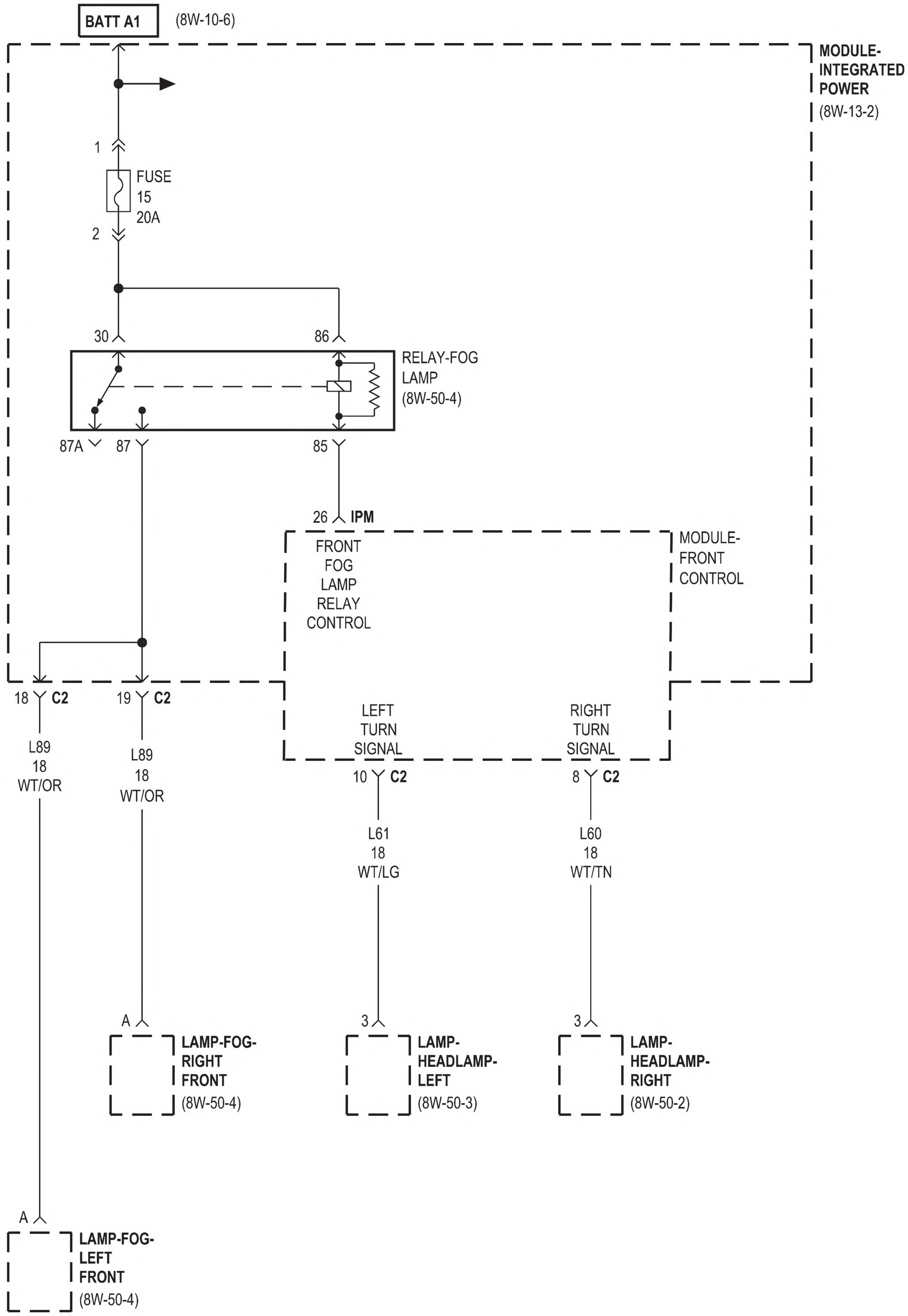

BATT A1
(8W-10-6)
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE 12 20A
2
(8W-13-11)
TO MODULE-FRONT CONTROL
1
FUSE 13 20A
2
(8W-13-11)
TO MODULE-FRONT CONTROL
1
FUSE 14 20A
2
(8W-13-12)
TO RELAY-ADJUSTABLE PEDALS
1
FUSE 15 20A
2
(8W-13-13)
TO RELAY-FOG LAMP
1
FUSE 16 20A
2
(8W-13-12)
TO RELAY-HORN
1
FUSE 18 20A
2
(8W-13-11)
TO MODULE-FRONT CONTROL
1
FUSE 19 20A
2
(8W-13-14)
TO RELAY-TRAILER TOW-LEFT TURN
1
FUSE 20 20A
2
(8W-13-11)
TO MODULE-FRONT CONTROL
1
FUSE 21 20A
2
(8W-13-14)
TO RELAY-TRAILER TOW-RIGHT TURN
A
TO FUSE 22
(8W-13-10)

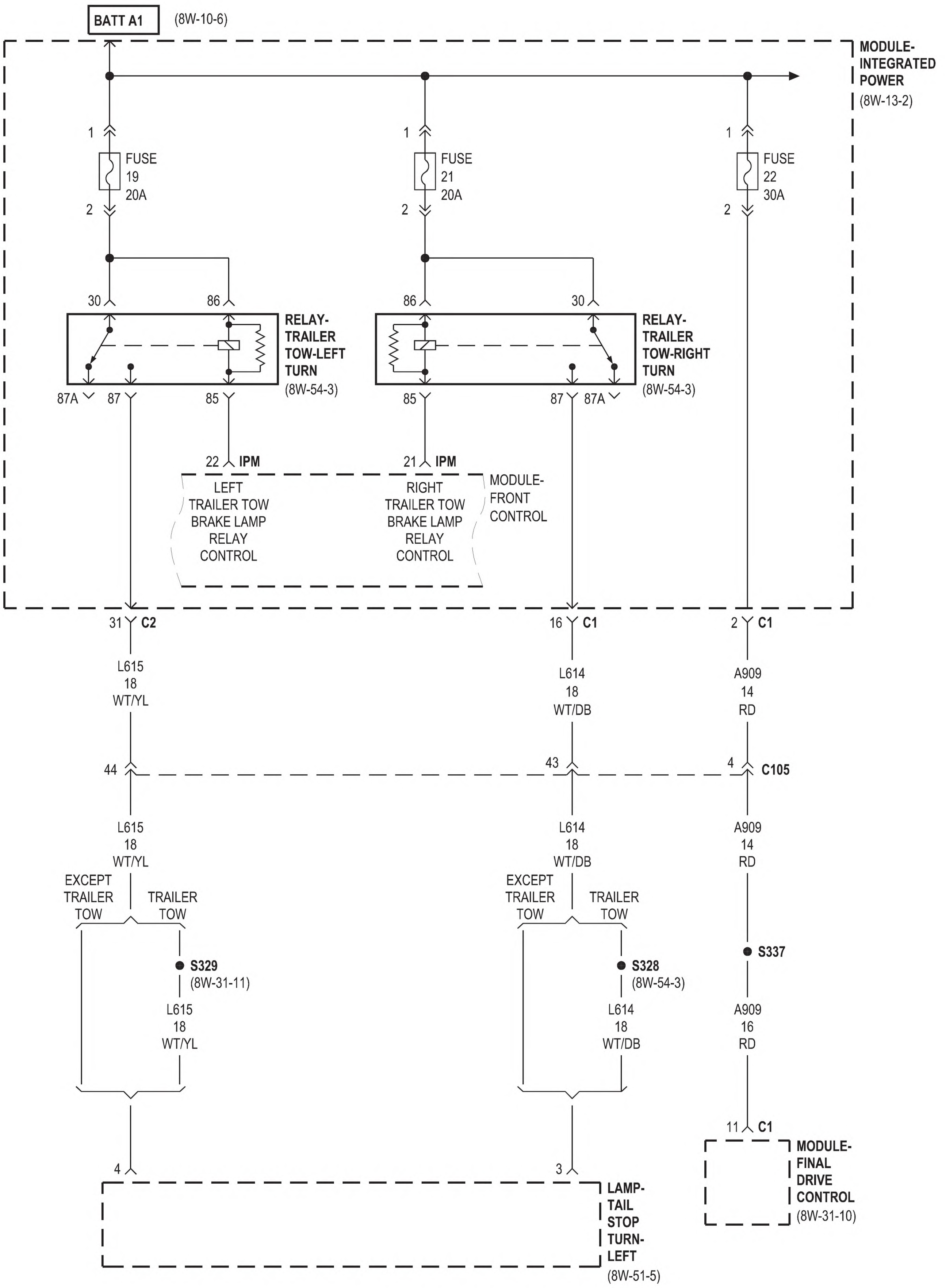

MODULE-
INTEGRATED
POWER
(8W-13-2)
FROM
FUSE 21
(8W-13-9)
A
1
FUSE
22
30A
(8W-13-14)
2
1
FUSE
23
50A
(8W-13-15)
2
1
FUSE
27
15A
(8W-13-11)
2
TO
RELAY-
RADIATOR
FAN
LOW
TO
RELAY-
RADIATOR
FAN
HIGH
TO
MODULE-
FRONT
CONTROL
2 C1
A909
14
RD
4 C105
A930
14
RD/WT
TO
S337
40 C1
A114
18
GY/RD
TO
JUNCTION
BLOCK
14 C1
NOT
USED
1
FUSE
28
20A
(8W-13-15)
2
86
87
87A
RELAY-
PARK
LAMP
(8W-50-2)
85
30
1 C1
A118
16
RD/OR
TO
JUNCTION
BLOCK

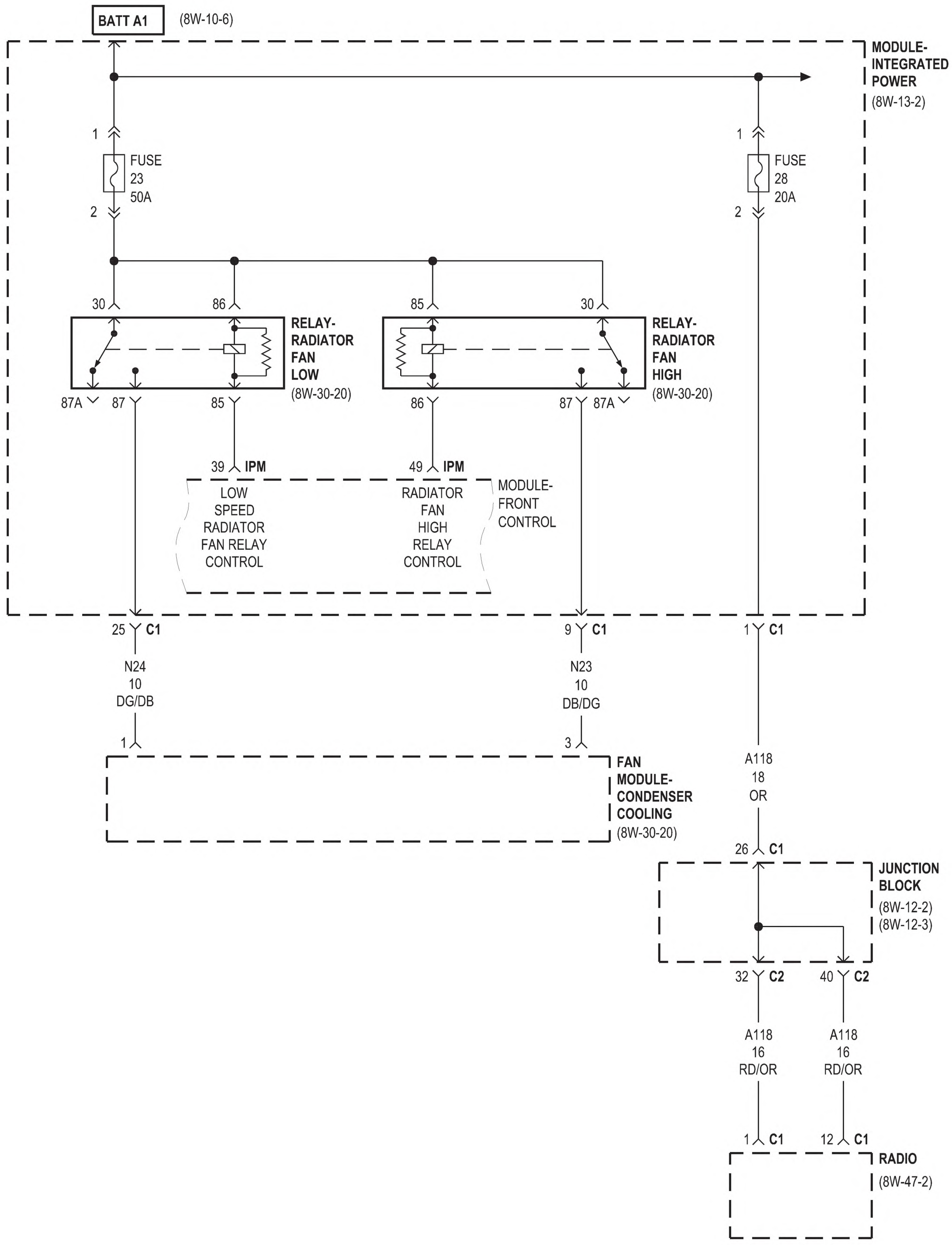

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
12
20A
2
1
FUSE
13
20A
2
1
FUSE
18
20A
2
1
FUSE
20
20A
2
1
FUSE
27
15A
2
2 IPM
3 IPM
4 IPM
5 IPM
15 IPM
FUSED
B(+)
FUSED
B(+)
FUSED
B(+)
FUSED
B(+)
FUSED
B(+)
MODULE-
FRONT
CONTROL
14 C1
NOT
USED
40 C1
A114
18
GY/RD
28 C1
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
25 C2
A114
18
GY/RD
5 C3
A114
20
OR/RD
6 C3
A114
20
OR/RD
18 C3
A114
18
GY/RD
12 C312
A114
18
GY/RD
BASE
EXCEPT
BASE
S202
(8W-12-20)
A114
18
GY/RD
5
MODULE-
SENTRY KEY
REMOTE
ENTRY
(8W-39-2)
3
MODULE-
ELECTRONIC
OVERHEAD
(8W-49-2)
5
MODULE-
SENTRY KEY
REMOTE
ENTRY
(8W-39-2)
1
RECEIVER-
SATELLITE
(8W-47-9)

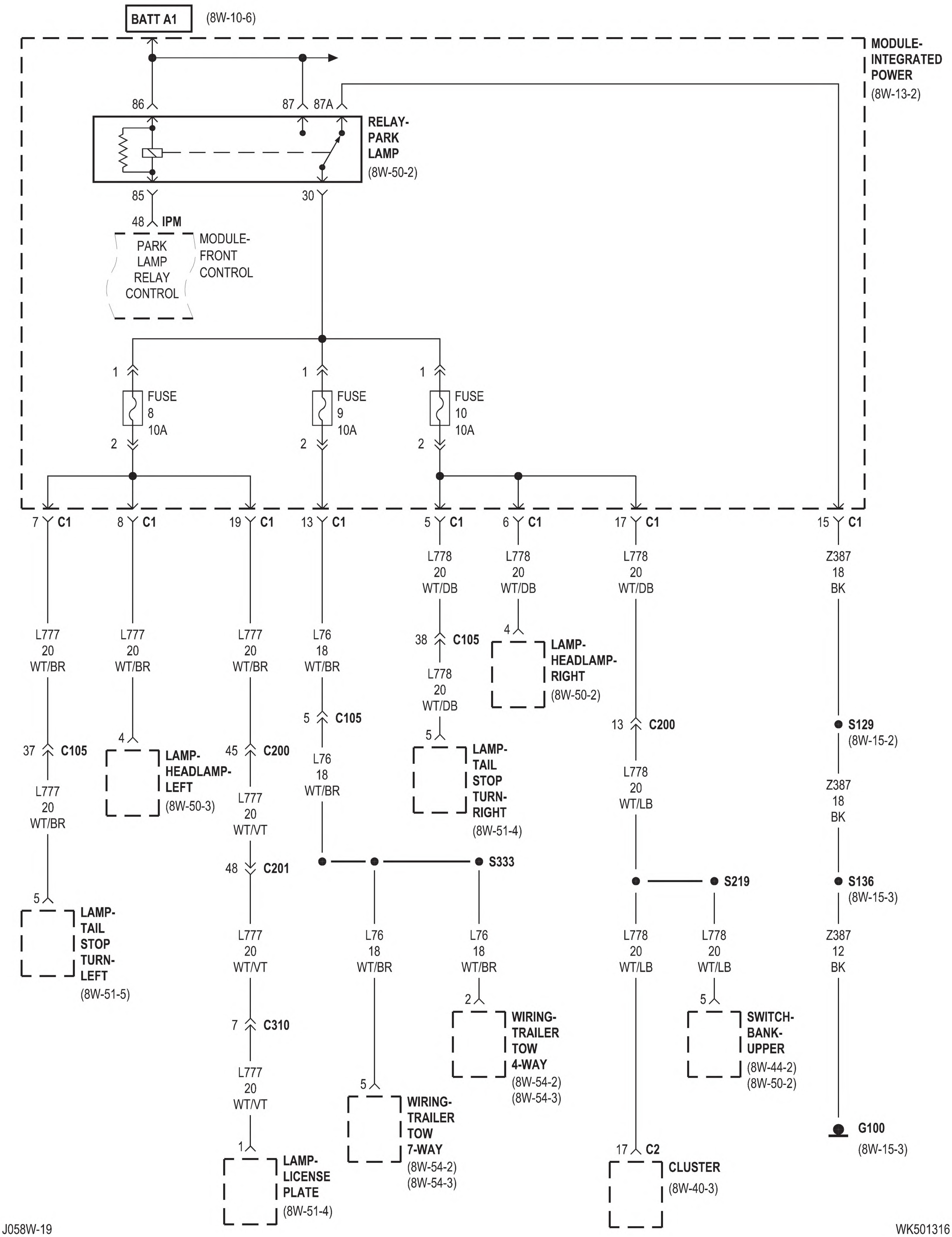
WK501311

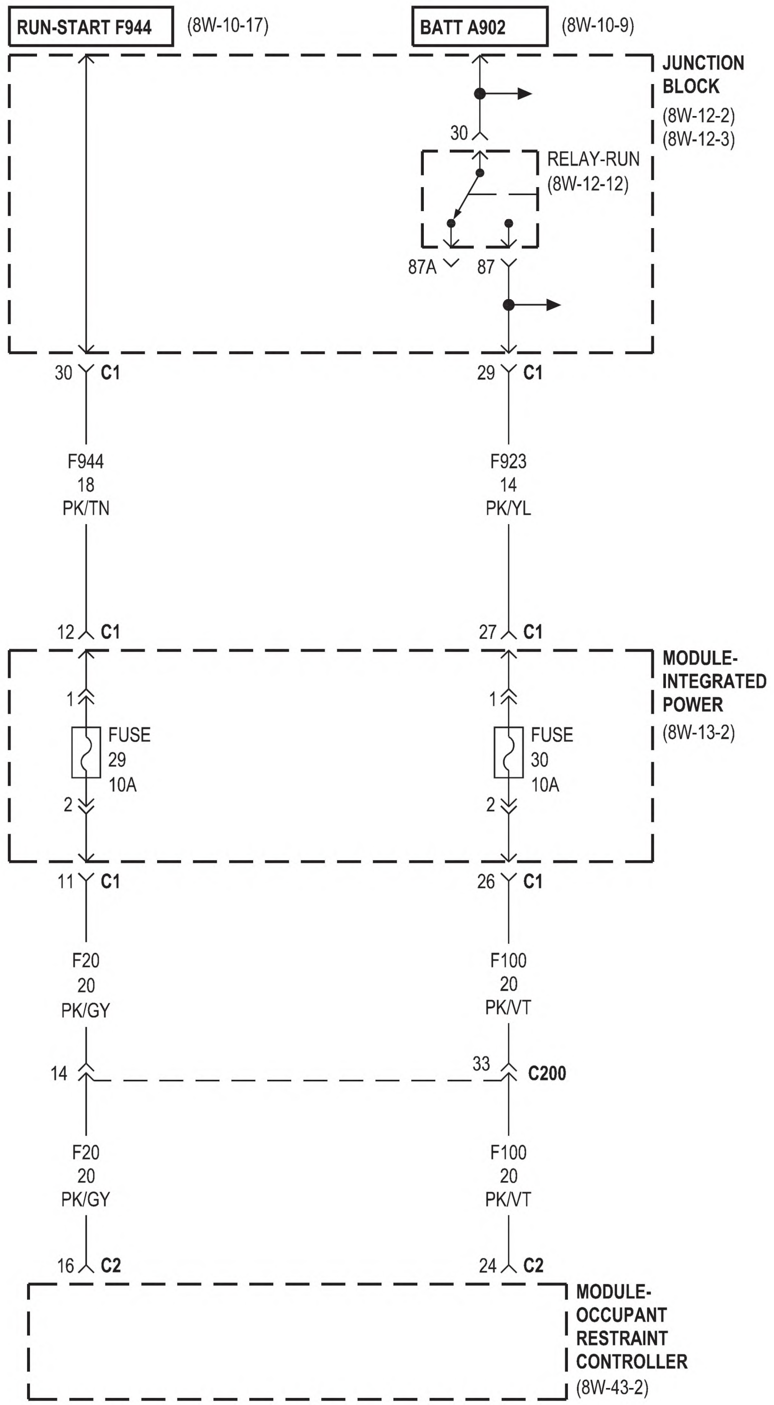

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
14
20A
2
1
FUSE
16
20A
2
30
86
86
30
RELAY-
ADJUSTABLE
PEDALS
(8W-56-6)
RELAY-
HORN
(8W-41-2)
87A
87
85
85
87
87A
46 IPM
47 IPM
ADJUSTABLE
PEDALS
RELAY
CONTROL
RIGHT
REAR
TURN
SIGNAL
CONTROL
HORN
RELAY
CONTROL
MODULE-
FRONT
CONTROL
34 IPM
10 C2
23 C1
35 C2
A72
18
RD/OR
L62
18
WT/OR
X2
18
DG/OR
35 C105
7 C200
L62
18
WT/OR
2
HORN-NO. 1
(8W-41-2)
A72
16
RD/OR
7
LAMP-
TAIL
STOP
TURN-
RIGHT
(8W-51-4)
2
SWITCH-
BANK-
LOWER
(8W-56-6)

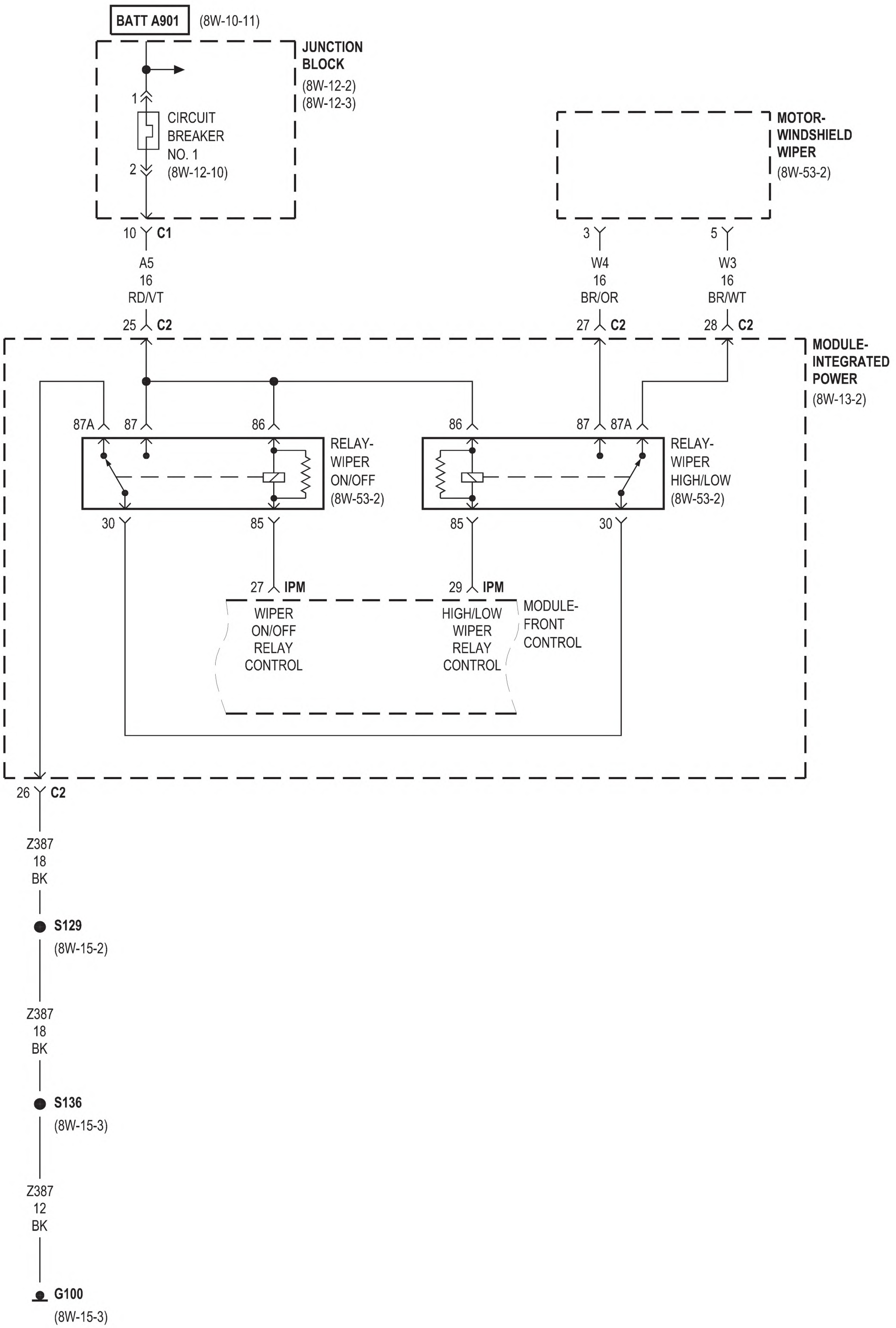

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
15
20A
2
30
86
RELAY-FOG
LAMP
(8W-50-4)
87A
87
85
26
IPM
FRONT
FOG
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
18
C2
19
C2
L89
18
WT/OR
L89
18
WT/OR
LEFT
TURN
SIGNAL
RIGHT
TURN
SIGNAL
10
C2
8
C2
L61
18
WT/LG
L60
18
WT/TN
A
LAMP-FOG-
RIGHT
FRONT
(8W-50-4)
3
LAMP-
HEADLAMP-
LEFT
(8W-50-3)
3
LAMP-
HEADLAMP-
RIGHT
(8W-50-2)
A
LAMP-FOG-
LEFT
FRONT
(8W-50-4)

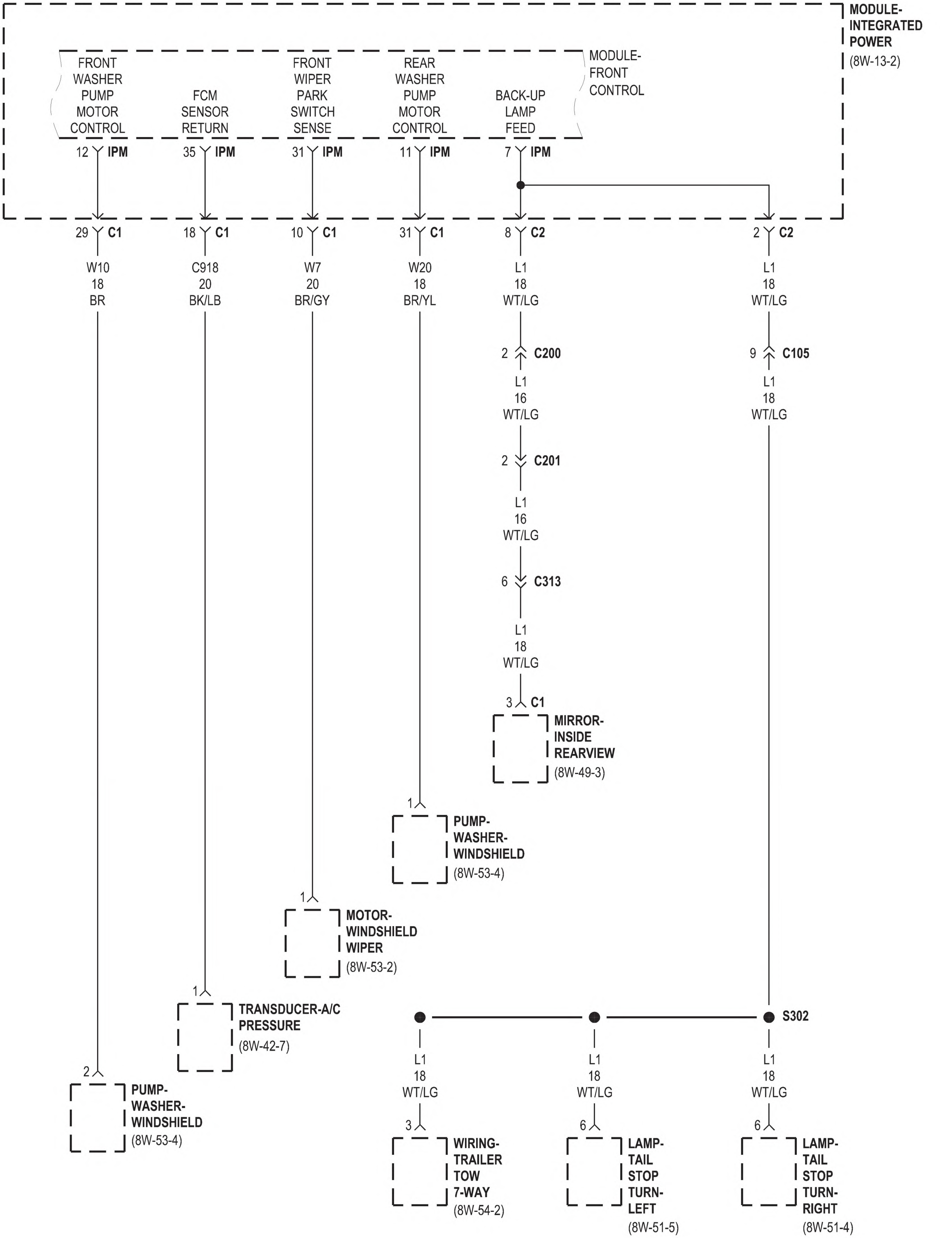

BATT A1
(8W-10-6)
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE 19 20A
2
1
FUSE 21 20A
2
1
FUSE 22 30A
2
30
86
RELAY-TRAILER TOW-LEFT TURN
(8W-54-3)
87A
87
85
86
30
RELAY-TRAILER TOW-RIGHT TURN
(8W-54-3)
85
87
87A
22 IPM
21 IPM
LEFT TRAILER TOW BRAKE LAMP RELAY CONTROL
RIGHT TRAILER TOW BRAKE LAMP RELAY CONTROL
MODULE-FRONT CONTROL
31 C2
16 C1
2 C1
L615 18 WT/YL
L614 18 WT/DB
A909 14 RD
44
43
4
C105
L615 18 WT/YL
L614 18 WT/DB
A909 14 RD
EXCEPT TRAILER TOW
TRAILER TOW
EXCEPT TRAILER TOW
TRAILER TOW
S329
(8W-31-11)
L615 18 WT/YL
S328
(8W-54-3)
L614 18 WT/DB
S337
A909 16 RD
11 C1
MODULE-FINAL DRIVE CONTROL
(8W-31-10)
4
3
LAMP-TAIL STOP TURN-LEFT
(8W-51-5)

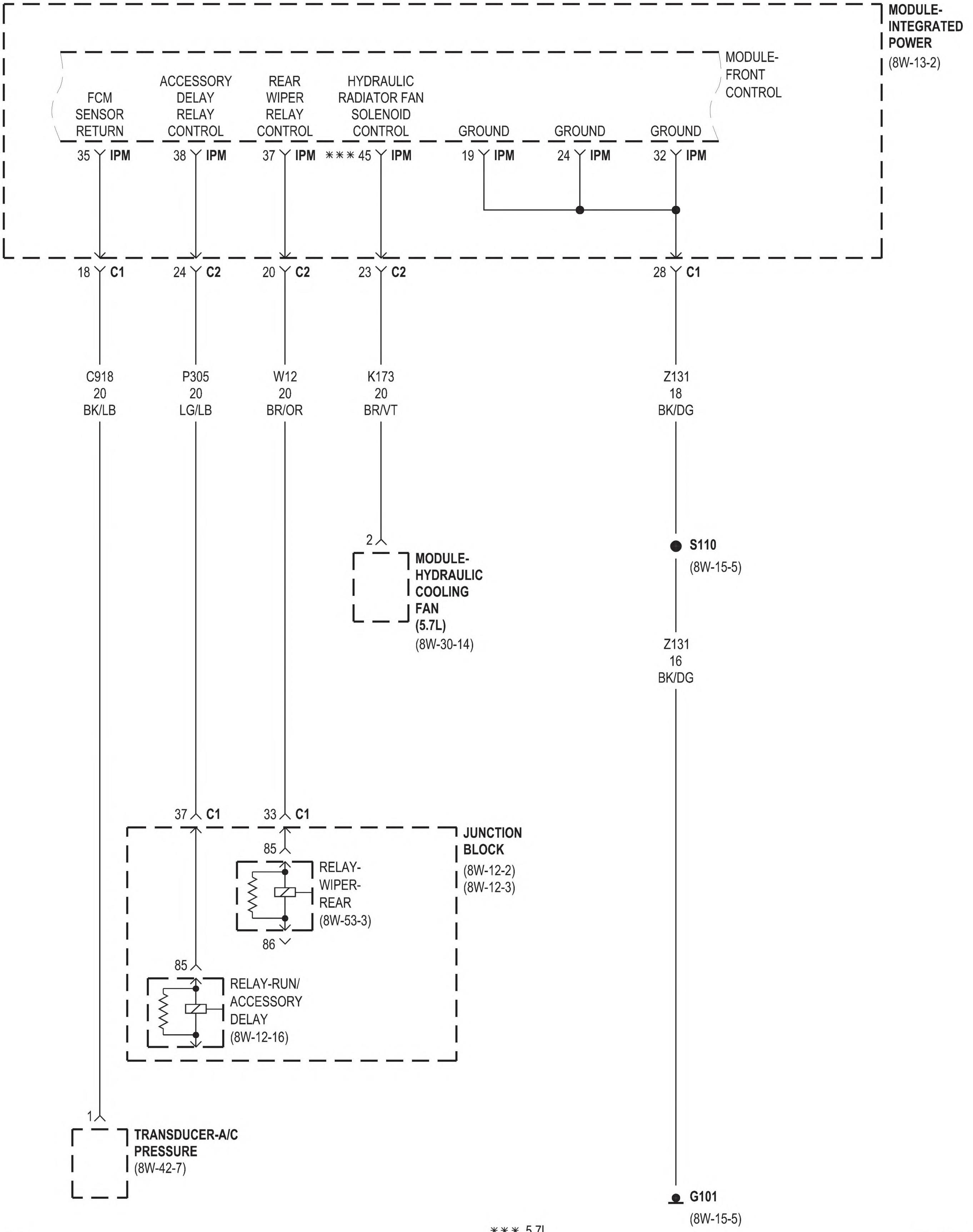

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
23
50A
2
1
FUSE
28
20A
2
30
86
85
30
RELAY-
RADIATOR
FAN
LOW
(8W-30-20)
RELAY-
RADIATOR
FAN
HIGH
(8W-30-20)
87A
87
85
86
87
87A
39 IPM
49 IPM
LOW
SPEED
RADIATOR
FAN RELAY
CONTROL
RADIATOR
FAN
HIGH
RELAY
CONTROL
MODULE-
FRONT
CONTROL
25 C1
9 C1
1 C1
N24
10
DG/DB
N23
10
DB/DG
1
3
FAN
MODULE-
CONDENSER
COOLING
(8W-30-20)
A118
18
OR
26 C1
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
32 C2
40 C2
A118
16
RD/OR
A118
16
RD/OR
1 C1
12 C1
RADIO
(8W-47-2)


BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
86
87
87A
RELAY-
PARK
LAMP
(8W-50-2)
85
30
48 IPM
PARK
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
1
FUSE
8
10A
2
1
FUSE
9
10A
2
1
FUSE
10
10A
2
7 C1
8 C1
19 C1
13 C1
5 C1
6 C1
17 C1
15 C1
L778
20
WT/DB
L778
20
WT/DB
L778
20
WT/DB
Z387
18
BK
L777
20
WT/BR
L777
20
WT/BR
L777
20
WT/BR
L76
18
WT/BR
38 C105
L778
20
WT/DB
4
LAMP-
HEADLAMP-
RIGHT
(8W-50-2)
5 C105
L76
18
WT/BR
13 C200
S129
(8W-15-2)
37 C105
4
LAMP-
HEADLAMP-
LEFT
(8W-50-3)
45 C200
5
LAMP-
TAIL
STOP
TURN-
RIGHT
(8W-51-4)
L777
20
WT/BR
L777
20
WT/VT
L778
20
WT/LB
Z387
18
BK
48 C201
S333
S219
S136
(8W-15-3)
5
LAMP-
TAIL
STOP
TURN-
LEFT
(8W-51-5)
L777
20
WT/VT
L76
18
WT/BR
L76
18
WT/BR
L778
20
WT/LB
L778
20
WT/LB
Z387
12
BK
2
WIRING-
TRAILER
TOW
4-WAY
(8W-54-2)
(8W-54-3)
5
SWITCH-
BANK-
UPPER
(8W-44-2)
(8W-50-2)
7 C310
L777
20
WT/VT
5
WIRING-
TRAILER
TOW
7-WAY
(8W-54-2)
(8W-54-3)
G100
(8W-15-3)
1
LAMP-
LICENSE
PLATE
(8W-51-4)
17 C2
CLUSTER
(8W-40-3)

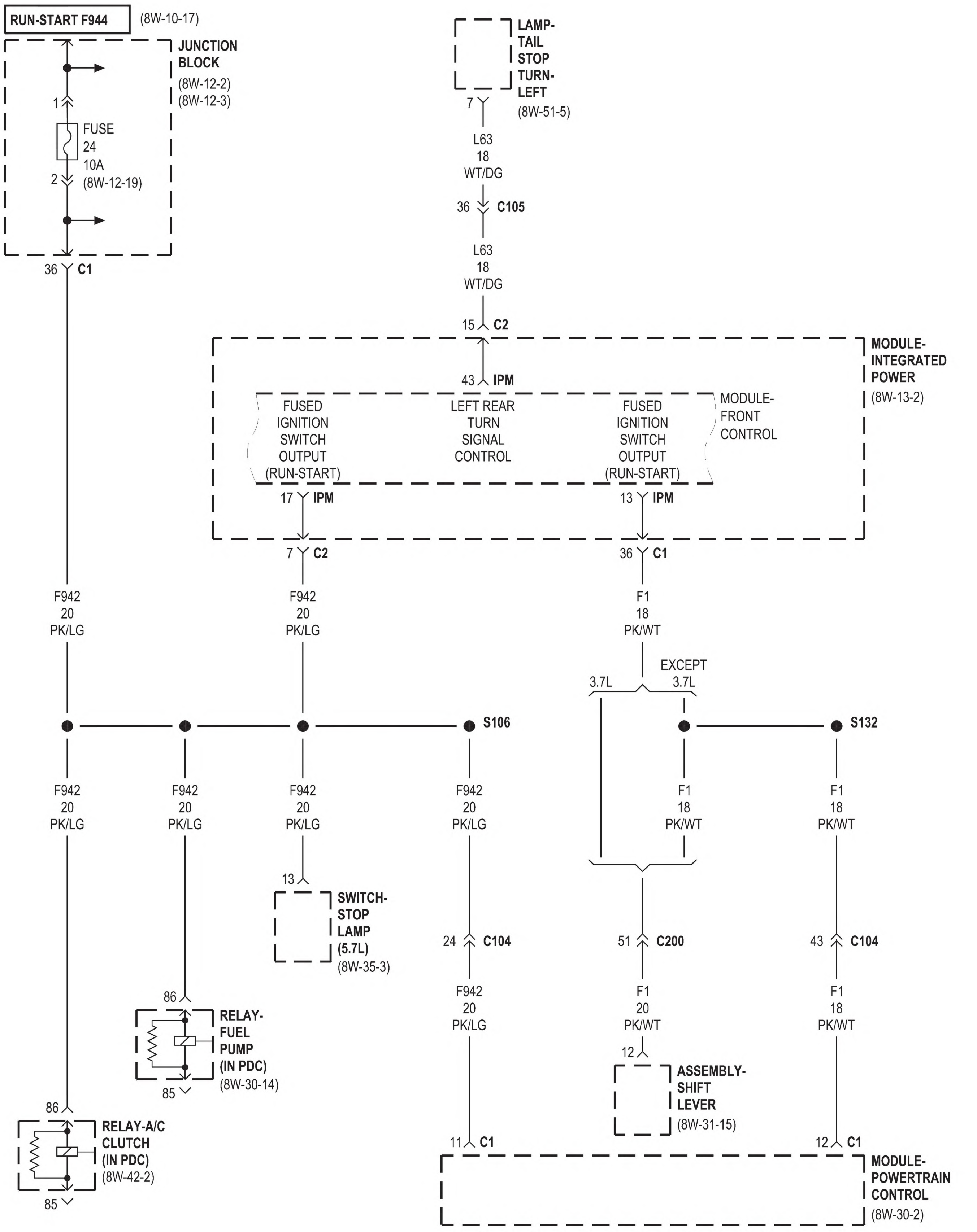

RUN-START F944
(8W-10-17)
BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
87A
87
30 C1
29 C1
F944
18
PK/TN
F923
14
PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE
29
10A
2
1
FUSE
30
10A
2
11 C1
26 C1
F20
20
PK/GY
F100
20
PK/VT
14
33
C200
F20
20
PK/GY
F100
20
PK/VT
16 C2
24 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
(8W-43-2)

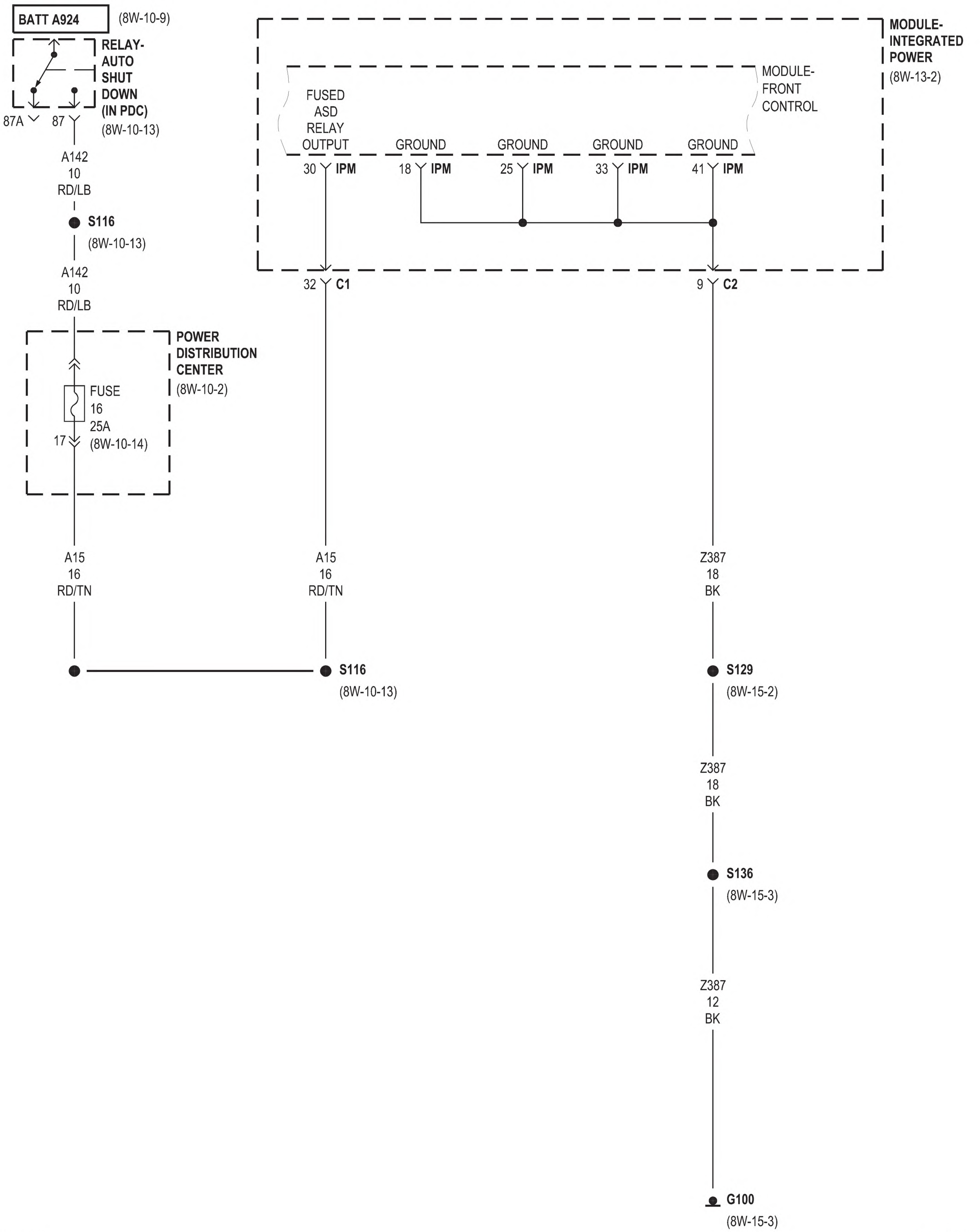

BATT A901
(8W-10-11)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
CIRCUIT BREAKER NO. 1
(8W-12-10)
2
10 C1
A5
16
RD/VT
25 C2
MOTOR-WINDSHIELD WIPER
(8W-53-2)
3
W4
16
BR/OR
27 C2
5
W3
16
BR/WT
28 C2
MODULE-INTEGRATED POWER
(8W-13-2)
87A
87
86
RELAY-WIPER ON/OFF
(8W-53-2)
30
85
86
87
87A
RELAY-WIPER HIGH/LOW
(8W-53-2)
85
30
27 IPM
29 IPM
WIPER ON/OFF RELAY CONTROL
HIGH/LOW WIPER RELAY CONTROL
MODULE-FRONT CONTROL
26 C2
Z387
18
BK
S129
(8W-15-2)
Z387
18
BK
S136
(8W-15-3)
Z387
12
BK
G100
(8W-15-3)

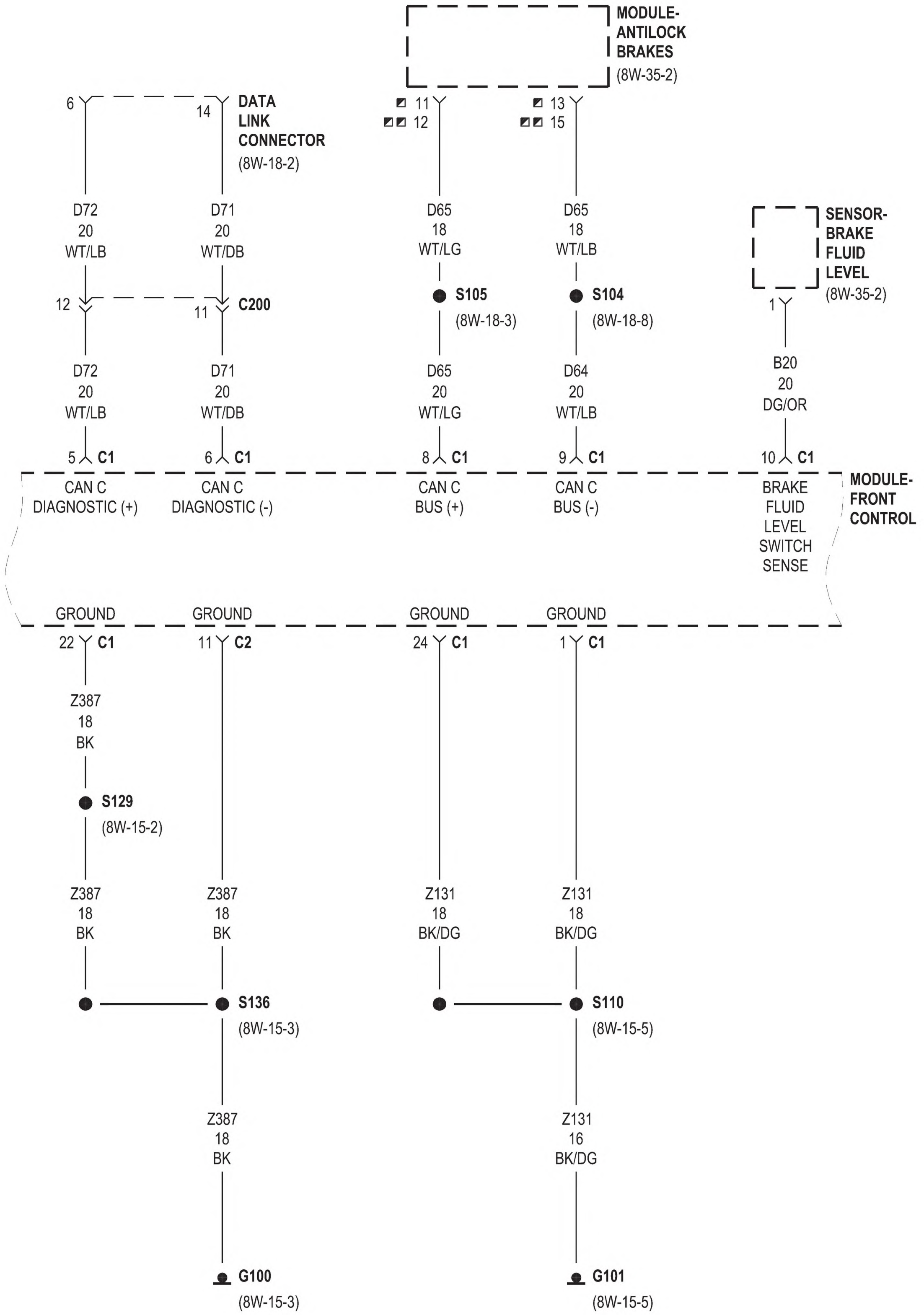

MODULE-
INTEGRATED
POWER
(8W-13-2)
MODULE-
FRONT
CONTROL
FRONT WASHER PUMP MOTOR CONTROL
FCM SENSOR RETURN
FRONT WIPER PARK SWITCH SENSE
REAR WASHER PUMP MOTOR CONTROL
BACK-UP LAMP FEED
12 IPM
35 IPM
31 IPM
11 IPM
7 IPM
29 C1
18 C1
10 C1
31 C1
8 C2
2 C2
W10 18 BR
C918 20 BK/LB
W7 20 BR/GY
W20 18 BR/YL
L1 18 WT/LG
L1 18 WT/LG
2 C200
9 C105
L1 16 WT/LG
L1 18 WT/LG
2 C201
L1 16 WT/LG
6 C313
L1 18 WT/LG
3 C1
MIRROR-
INSIDE
REARVIEW
(8W-49-3)
1
PUMP-
WASHER-
WINDSHIELD
(8W-53-4)
1
MOTOR-
WINDSHIELD
WIPER
(8W-53-2)
1
TRANSDUCER-A/C
PRESSURE
(8W-42-7)
2
PUMP-
WASHER-
WINDSHIELD
(8W-53-4)
S302
L1 18 WT/LG
L1 18 WT/LG
L1 18 WT/LG
3
WIRING-
TRAILER
TOW
7-WAY
(8W-54-2)
6
LAMP-
TAIL
STOP
TURN-
LEFT
(8W-51-5)
6
LAMP-
TAIL
STOP
TURN-
RIGHT
(8W-51-4)


MODULE-
INTEGRATED
POWER
(8W-13-2)
MODULE-
FRONT
CONTROL
FCM
SENSOR
RETURN
ACCESSORY
DELAY
RELAY
CONTROL
REAR
WIPER
RELAY
CONTROL
HYDRAULIC
RADIATOR FAN
SOLENOID
CONTROL
GROUND
GROUND
GROUND
35 IPM
38 IPM
37 IPM
✱✱✱ 45 IPM
19 IPM
24 IPM
32 IPM
18 C1
24 C2
20 C2
23 C2
28 C1
C918
20
BK/LB
P305
20
LG/LB
W12
20
BR/OR
K173
20
BR/VT
Z131
18
BK/DG
2
MODULE-
HYDRAULIC
COOLING
FAN
(5.7L)
(8W-30-14)
S110
(8W-15-5)
Z131
16
BK/DG
37 C1
33 C1
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
85
RELAY-
WIPER-
REAR
(8W-53-3)
86
85
RELAY-RUN/
ACCESSORY
DELAY
(8W-12-16)
1
TRANSDUCER-A/C
PRESSURE
(8W-42-7)
G101
(8W-15-5)

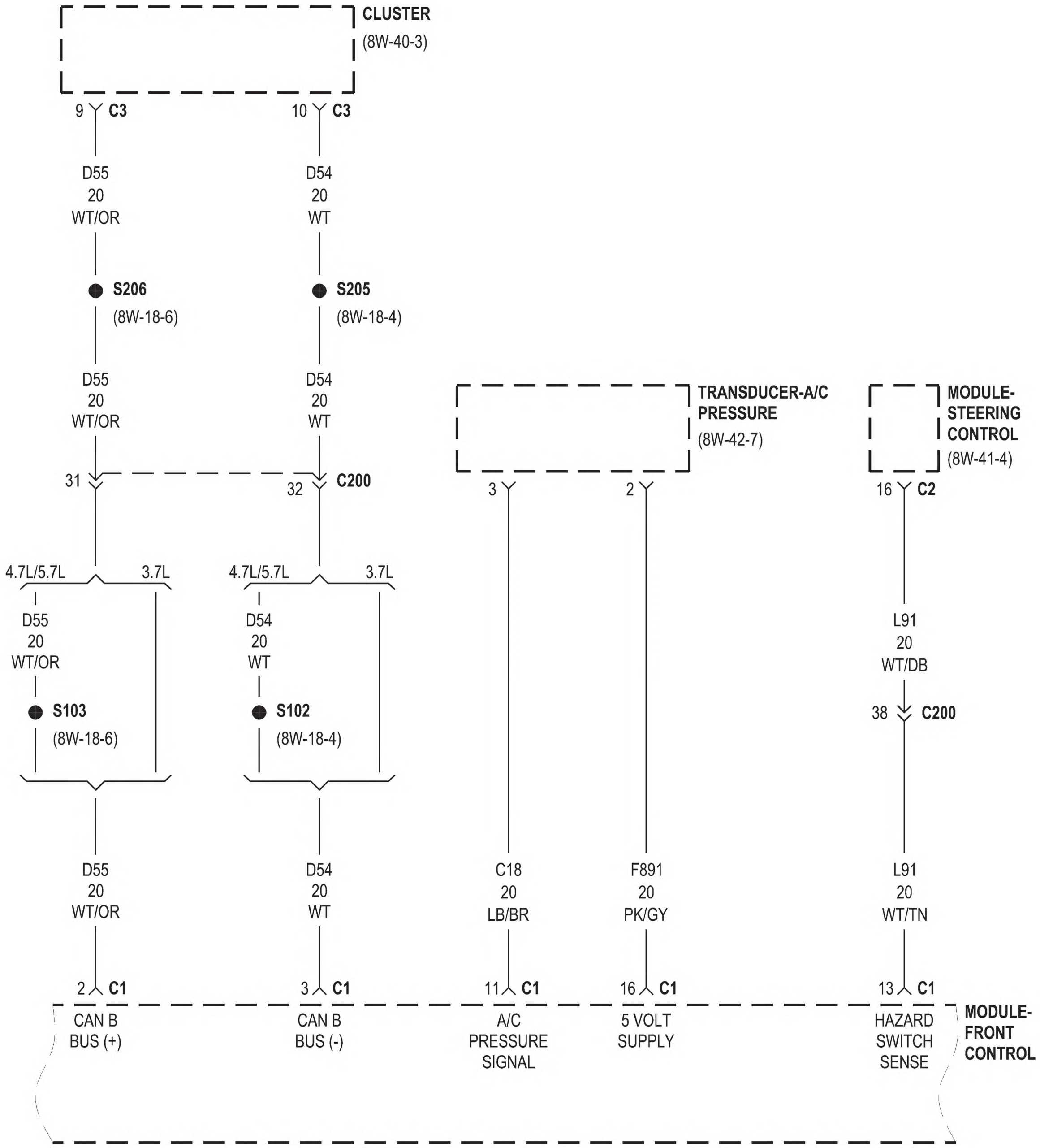
✱✱✱ 5.7L

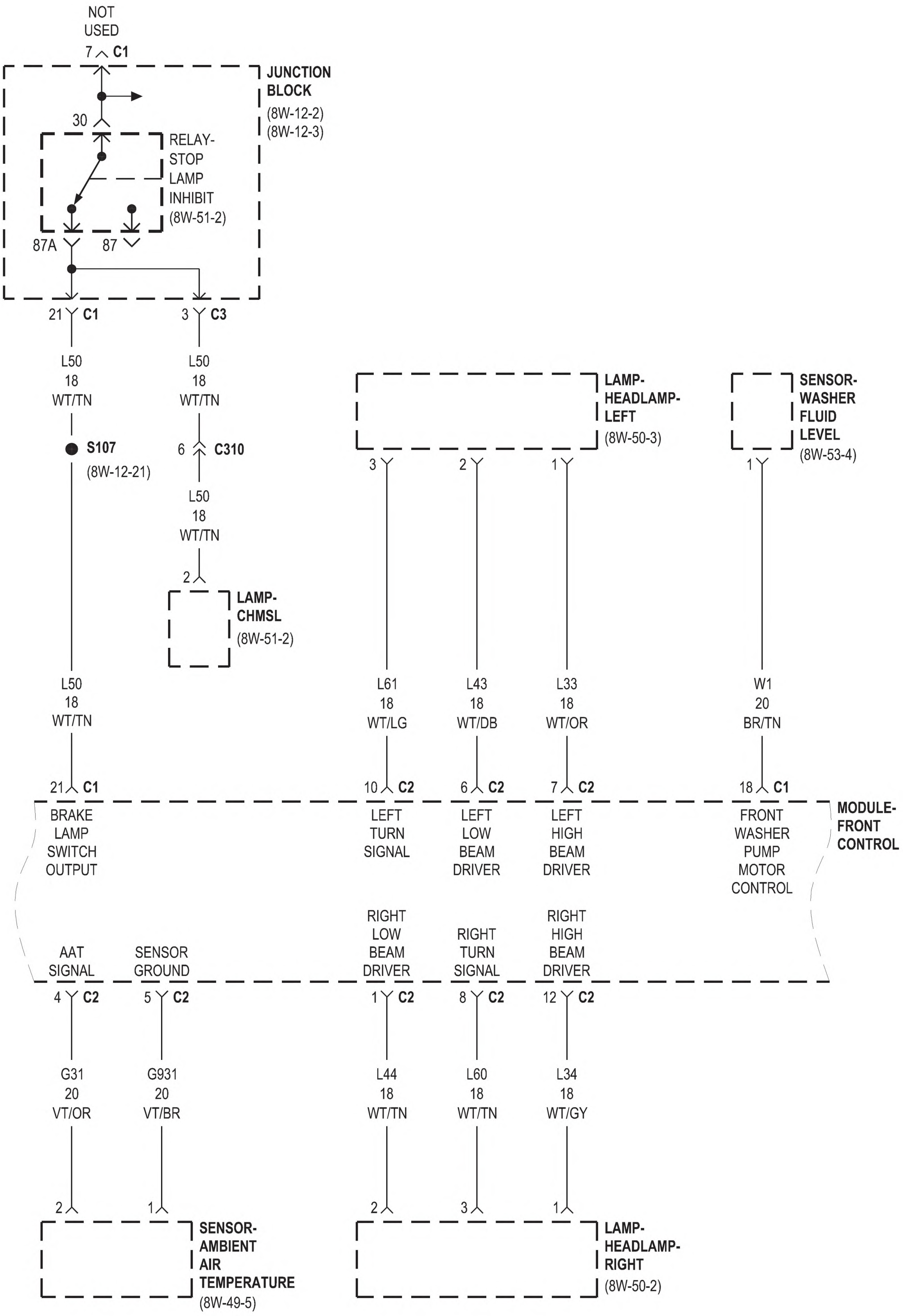

RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE 24 10A
2
(8W-12-19)
36 C1
LAMP-TAIL STOP TURN-LEFT
(8W-51-5)
7
L63 18 WT/DG
36 C105
L63 18 WT/DG
15 C2
MODULE-INTEGRATED POWER
(8W-13-2)
43 IPM
FUSED IGNITION SWITCH OUTPUT (RUN-START)
LEFT REAR TURN SIGNAL CONTROL
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-FRONT CONTROL
17 IPM
13 IPM
7 C2
36 C1
F942 20 PK/LG
F942 20 PK/LG
F1 18 PK/WT
3.7L
EXCEPT 3.7L
S106
S132
F942 20 PK/LG
F942 20 PK/LG
F942 20 PK/LG
F942 20 PK/LG
F1 18 PK/WT
F1 18 PK/WT
13
SWITCH-STOP LAMP (5.7L)
(8W-35-3)
24 C104
51 C200
43 C104
F942 20 PK/LG
F1 20 PK/WT
F1 18 PK/WT
86
RELAY-FUEL PUMP (IN PDC)
85
(8W-30-14)
12
ASSEMBLY-SHIFT LEVER
(8W-31-15)
86
RELAY-A/C CLUTCH (IN PDC)
(8W-42-2)
85
11 C1
12 C1
MODULE-POWERTRAIN CONTROL
(8W-30-2)

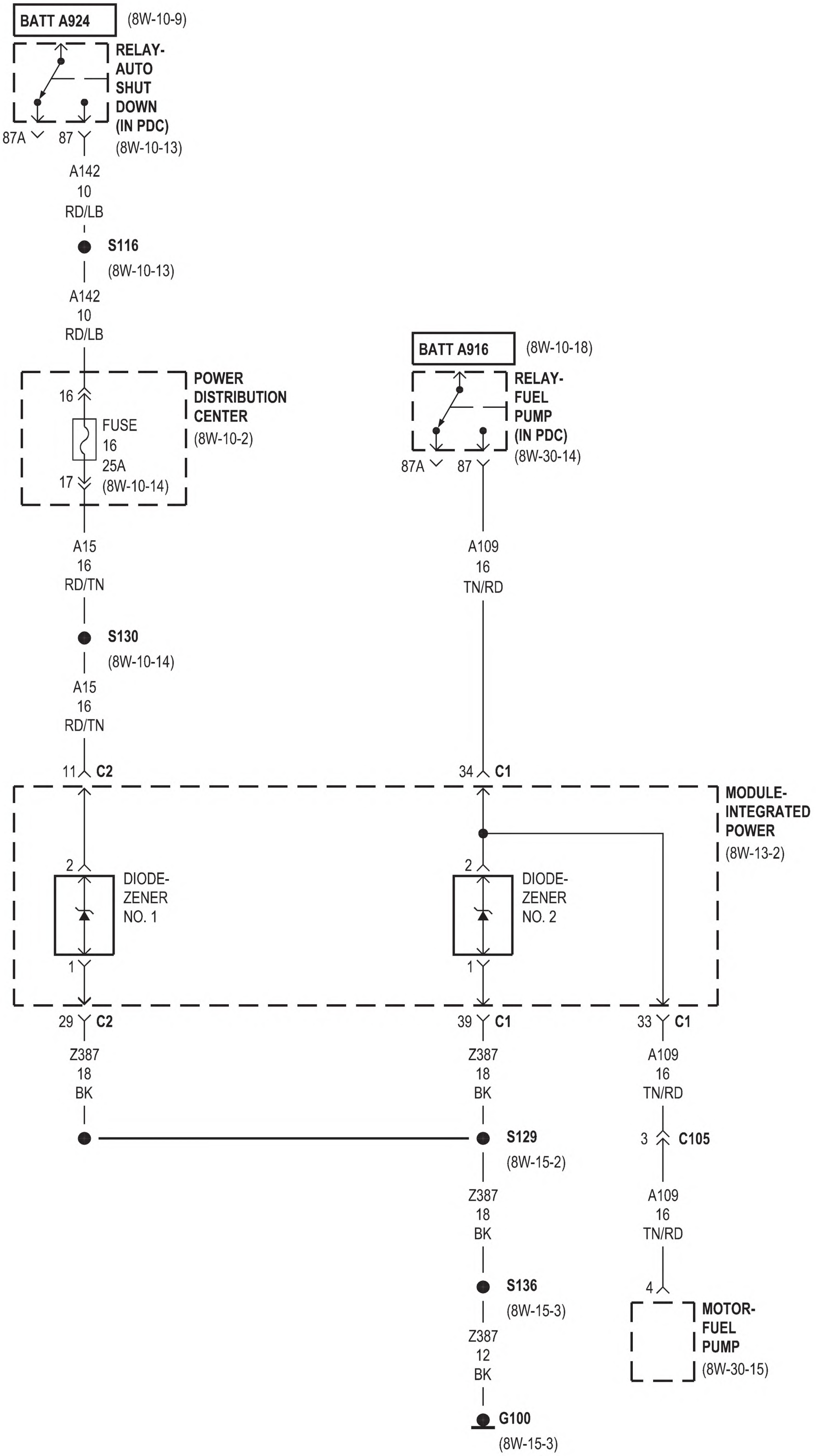

BATT A924
(8W-10-9)
RELAY-
AUTO
SHUT
DOWN
(IN PDC)
(8W-10-13)
87A
87
A142
10
RD/LB
S116
(8W-10-13)
A142
10
RD/LB
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
16
25A
(8W-10-14)
17
A15
16
RD/TN
MODULE-
INTEGRATED
POWER
(8W-13-2)
MODULE-
FRONT
CONTROL
FUSED
ASD
RELAY
OUTPUT
GROUND
GROUND
GROUND
GROUND
30 IPM
18 IPM
25 IPM
33 IPM
41 IPM
32 C1
9 C2
A15
16
RD/TN
S116
(8W-10-13)
Z387
18
BK
S129
(8W-15-2)
Z387
18
BK
S136
(8W-15-3)
Z387
12
BK
G100
(8W-15-3)


MODULE-
ANTILOCK
BRAKES
(8W-35-2)
6
14
DATA
LINK
CONNECTOR
(8W-18-2)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D72
20
WT/LB
D71
20
WT/DB
D65
18
WT/LG
D65
18
WT/LB
SENSOR-
BRAKE
FLUID
LEVEL
(8W-35-2)
12
11
C200
S105
(8W-18-3)
S104
(8W-18-8)
1
D72
20
WT/LB
D71
20
WT/DB
D65
20
WT/LG
D64
20
WT/LB
B20
20
DG/OR
5 C1
6 C1
8 C1
9 C1
10 C1
CAN C
DIAGNOSTIC (+)
CAN C
DIAGNOSTIC (-)
CAN C
BUS (+)
CAN C
BUS (-)
BRAKE
FLUID
LEVEL
SWITCH
SENSE
MODULE-
FRONT
CONTROL
GROUND
GROUND
GROUND
GROUND
22 C1
11 C2
24 C1
1 C1
Z387
18
BK
S129
(8W-15-2)
Z387
18
BK
Z387
18
BK
Z131
18
BK/DG
Z131
18
BK/DG
S136
(8W-15-3)
S110
(8W-15-5)
Z387
18
BK
Z131
16
BK/DG
G100
(8W-15-3)
G101
(8W-15-5)

▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


CLUSTER
(8W-40-3)
9 C3
10 C3
D55
20
WT/OR
D54
20
WT
S206
(8W-18-6)
S205
(8W-18-4)
D55
20
WT/OR
D54
20
WT
TRANSDUCER-A/C PRESSURE
(8W-42-7)
MODULE-STEERING CONTROL
(8W-41-4)
31
32 C200
3
2
16 C2
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D55
20
WT/OR
D54
20
WT
L91
20
WT/DB
S103
(8W-18-6)
S102
(8W-18-4)
38 C200
D55
20
WT/OR
D54
20
WT
C18
20
LB/BR
F891
20
PK/GY
L91
20
WT/TN
2 C1
3 C1
11 C1
16 C1
13 C1
CAN B BUS (+)
CAN B BUS (-)
A/C PRESSURE SIGNAL
5 VOLT SUPPLY
HAZARD SWITCH SENSE
MODULE-FRONT CONTROL


NOT USED
7 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-STOP LAMP INHIBIT
(8W-51-2)
87A
87
21 C1
3 C3
L50 18 WT/TN
L50 18 WT/TN
S107
(8W-12-21)
6 C310
L50 18 WT/TN
2
LAMP-CHMSL
(8W-51-2)
LAMP-HEADLAMP-LEFT
(8W-50-3)
3
2
1
SENSOR-WASHER FLUID LEVEL
(8W-53-4)
1
L50 18 WT/TN
L61 18 WT/LG
L43 18 WT/DB
L33 18 WT/OR
W1 20 BR/TN
21 C1
10 C2
6 C2
7 C2
18 C1
MODULE-FRONT CONTROL
BRAKE LAMP SWITCH OUTPUT
LEFT TURN SIGNAL
LEFT LOW BEAM DRIVER
LEFT HIGH BEAM DRIVER
FRONT WASHER PUMP MOTOR CONTROL
AAT SIGNAL
SENSOR GROUND
RIGHT LOW BEAM DRIVER
RIGHT TURN SIGNAL
RIGHT HIGH BEAM DRIVER
4 C2
5 C2
1 C2
8 C2
12 C2
G31 20 VT/OR
G931 20 VT/BR
L44 18 WT/TN
L60 18 WT/TN
L34 18 WT/GY
2
1
2
3
1
SENSOR-AMBIENT AIR TEMPERATURE
(8W-49-5)
LAMP-HEADLAMP-RIGHT
(8W-50-2)


BATT A924
(8W-10-9)
RELAY-
AUTO
SHUT
DOWN
(IN PDC)
(8W-10-13)
87A
87
A142
10
RD/LB
S116
(8W-10-13)
A142
10
RD/LB
POWER
DISTRIBUTION
CENTER
(8W-10-2)
16
FUSE
16
25A
17
(8W-10-14)
A15
16
RD/TN
S130
(8W-10-14)
A15
16
RD/TN
BATT A916
(8W-10-18)
RELAY-
FUEL
PUMP
(IN PDC)
(8W-30-14)
87A
87
A109
16
TN/RD
11 C2
34 C1
MODULE-
INTEGRATED
POWER
(8W-13-2)
2
DIODE-
ZENER
NO. 1
1
2
DIODE-
ZENER
NO. 2
1
29 C2
39 C1
33 C1
Z387
18
BK
Z387
18
BK
A109
16
TN/RD
S129
(8W-15-2)
3 C105
Z387
18
BK
A109
16
TN/RD
S136
(8W-15-3)
4
MOTOR-
FUEL
PUMP
(8W-30-15)
Z387
12
BK
G100
(8W-15-3)

J058W-19 WK501326

8W-15 GROUND DISTRIBUTION

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G101	8W-15-5, 6
G102	8W-15-6
G103	8W-15-6
G104	8W-15-7
G105	8W-15-7
G200	8W-15-7, 8
G201	8W-15-7
G300	8W-15-9
G301	8W-15-11
G302	8W-15-12
G303	8W-15-10
Generator	8W-15-4
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Heater-Cushion Pad-Left	8W-15-10
Heater-Cushion Pad-Right	8W-15-9
Heater-Seat Back-Left	8W-15-10
Heater-Seat Back-Right	8W-15-9
Horn-No. 1	8W-15-6
Junction Block	8W-15-3
Lamp-Chmsl	8W-15-11
Lamp-Fog-Left Front	8W-15-4
Lamp-Fog-Right Front	8W-15-4
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Lamp-Headlamp-Right	8W-15-6
Lamp-License Plate	8W-15-11
Lamp-Tail Stop Turn-Left	8W-15-12
Lamp-Tail Stop Turn-Right	8W-15-12
Latch-Door-Driver	8W-15-10
Latch-Door-Left Rear	8W-15-10
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Module-Memory Mirror-Passenger	8W-15-9
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Module-Occupant Restraint Controller	8W-15-7
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Module-Powertrain Control	8W-15-6
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Module-Steering Control	8W-15-7
Module-Transmission Control	8W-15-4
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Power Outlet-Instrument Panel	8W-15-8
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Receiver-Satellite	8W-15-9
Relay-Blower Motor	8W-15-3
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Relay-Door Unlock-Driver	8W-15-3
Relay-Door Unlock-Passenger	8W-15-3
Relay-Park Lamp	8W-15-2
Relay-Power Outlet	8W-15-3
Relay-Transmission Control	8W-15-3
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Seat Belt-Tensioner-Driver	8W-15-10
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Sensor-Oxygen-Left Front	8W-15-5
Sensor-Oxygen-Left Rear	8W-15-5
Sensor-Oxygen-Right Front	8W-15-5
Sensor-Oxygen-Right Rear	8W-15-5
Sensor-Rain	8W-15-11
Sensor-Washer Fluid Level	8W-15-6
Servo-Speed Control	8W-15-6
Solenoid-Multi Displacement System Cyl 1	8W-15-5
Solenoid-Multi Displacement System Cyl 4	8W-15-5
Solenoid-Multi Displacement System Cyl 6	8W-15-5
Solenoid-Multi Displacement System Cyl 7	8W-15-5
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Switch-Bank-Upper	8W-15-7, 8
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Switch-Seat-Passenger	8W-15-9
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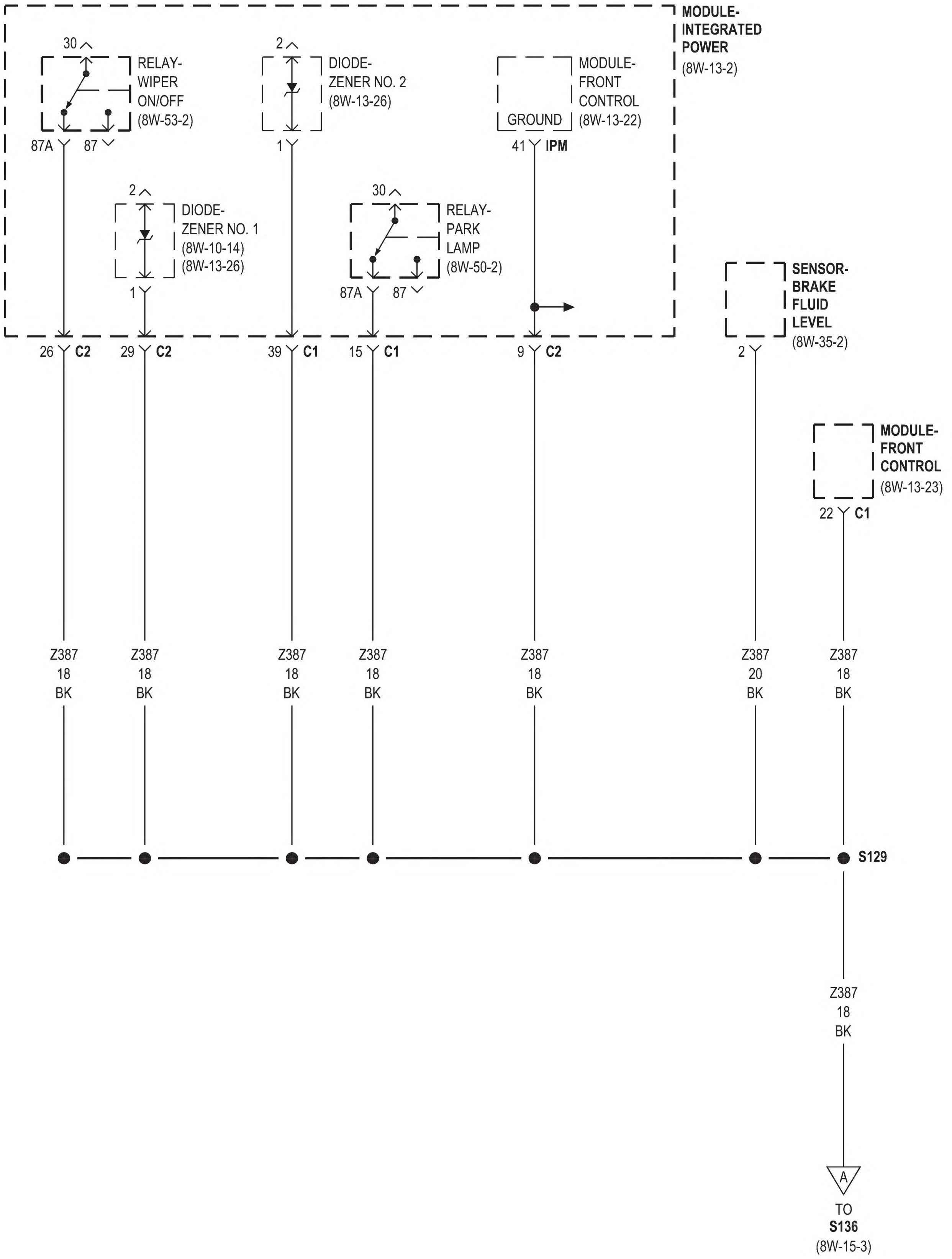
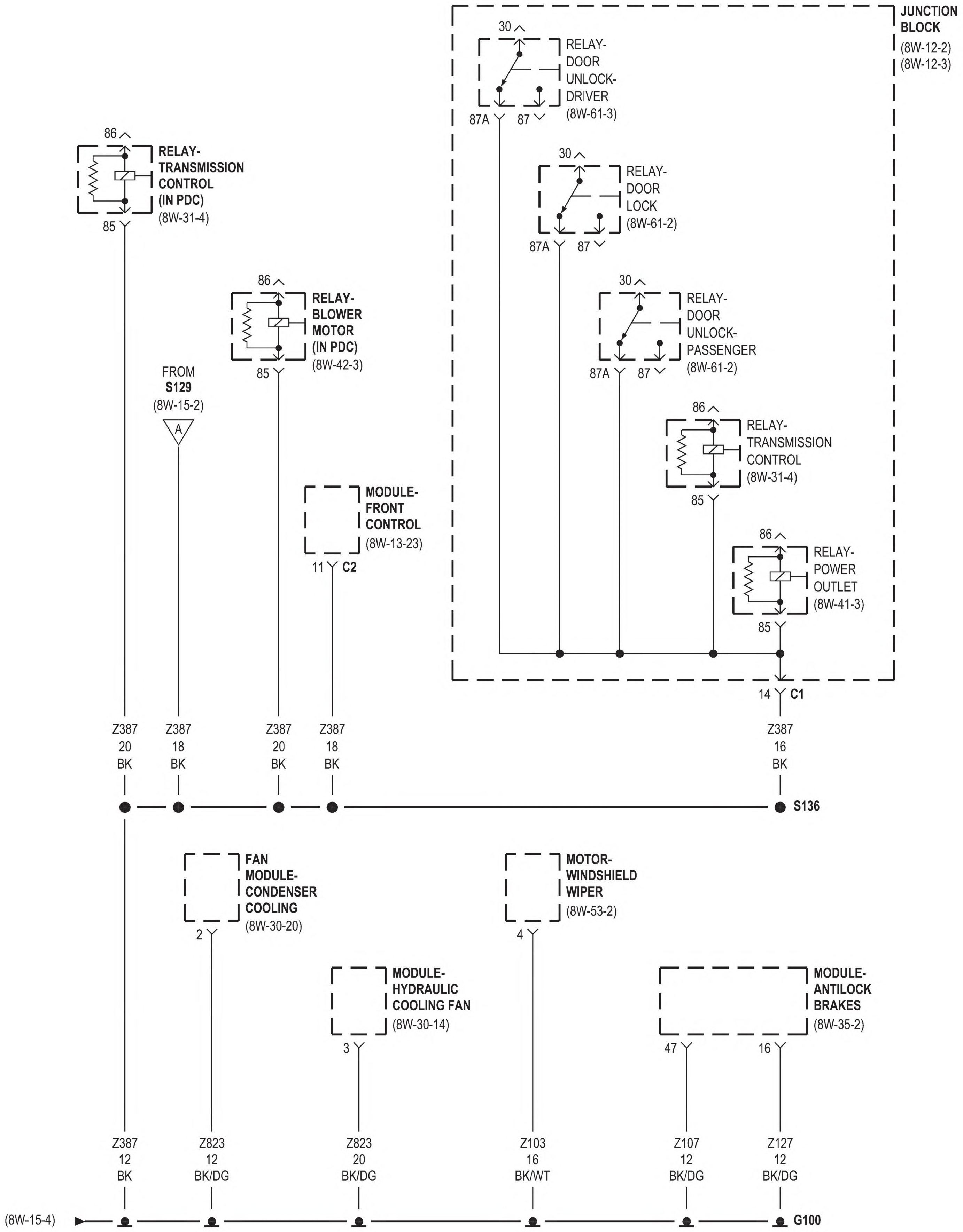
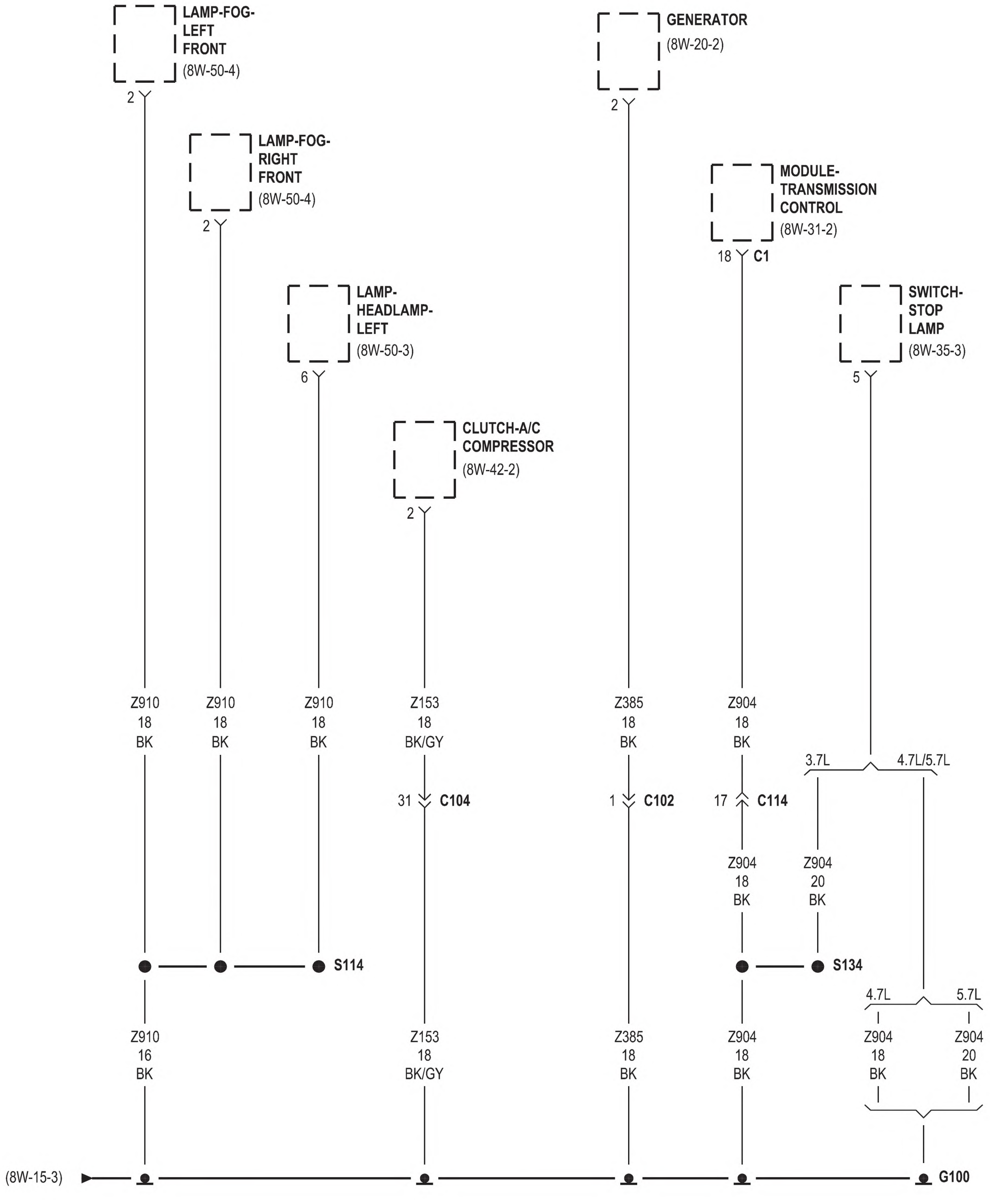
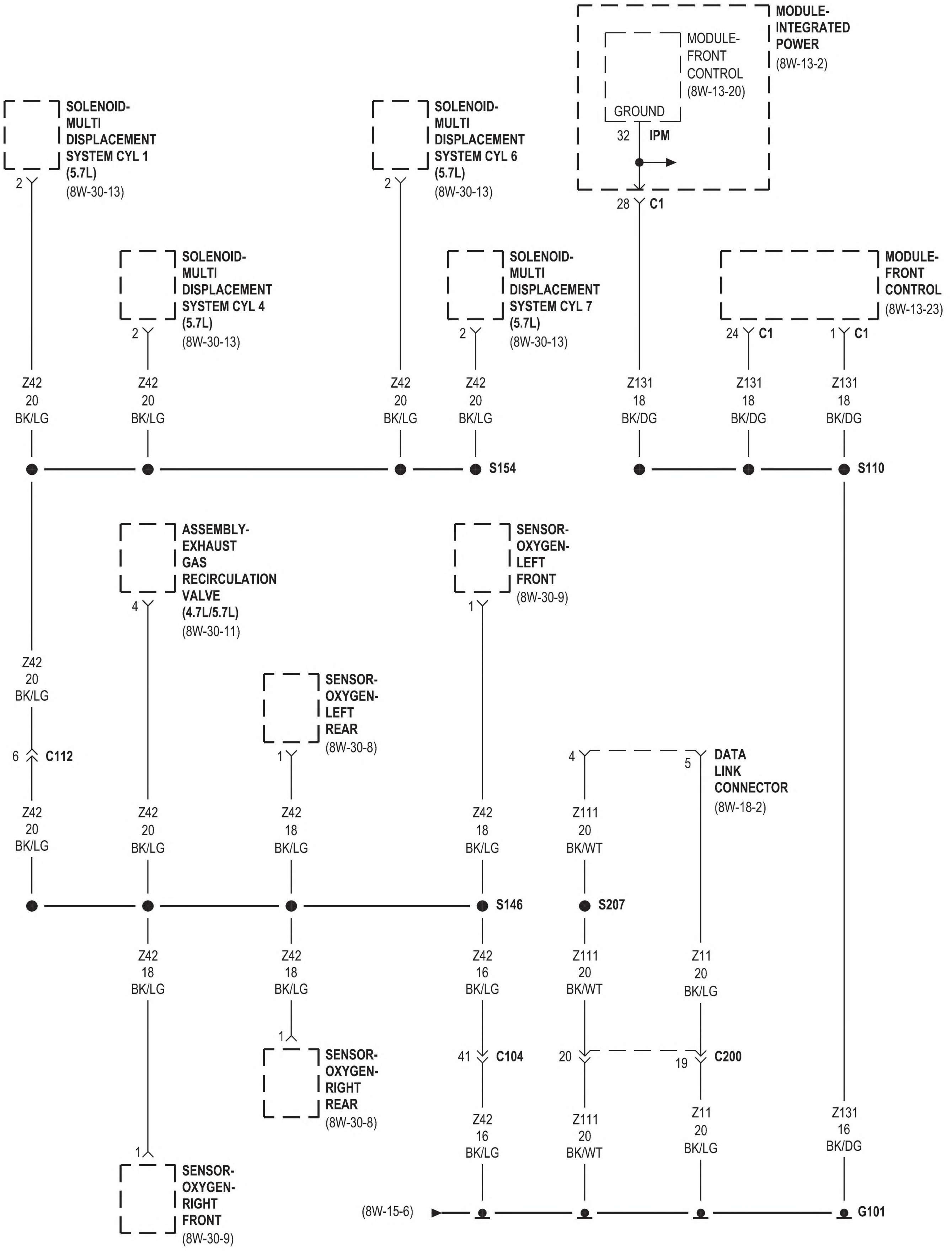
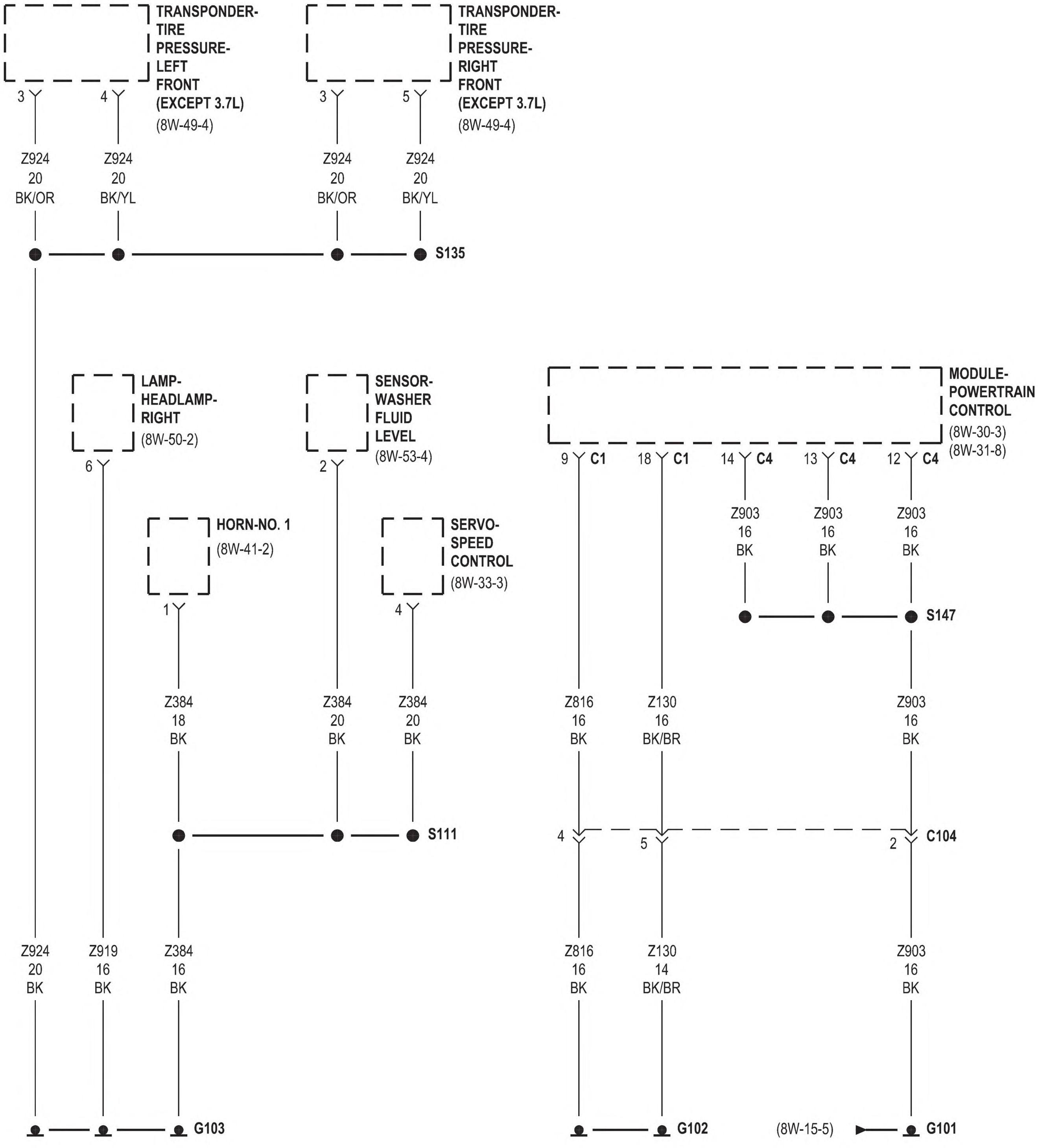
Wiring-Trailer Tow 4-Way	8W-15-12
Wiring-Trailer Tow 7-Way	8W-15-12

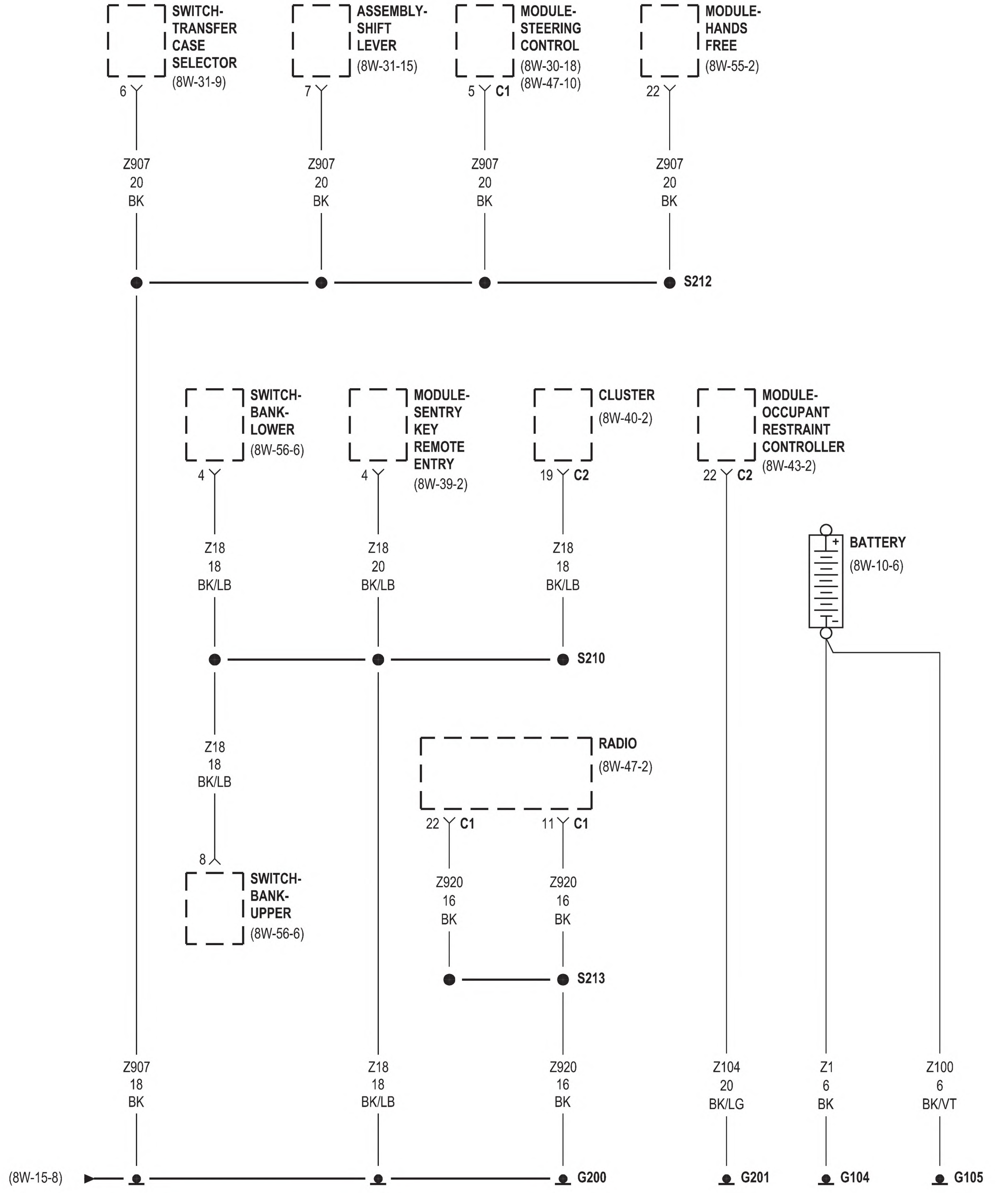

MODULE-
INTEGRATED
POWER
(8W-13-2)
30
RELAY-
WIPER
ON/OFF
(8W-53-2)
87A
87
2
DIODE-
ZENER NO. 2
(8W-13-26)
1
MODULE-
FRONT
CONTROL
(8W-13-22)
GROUND
41 IPM
2
DIODE-
ZENER NO. 1
(8W-10-14)
(8W-13-26)
1
30
RELAY-
PARK
LAMP
(8W-50-2)
87A
87
SENSOR-
BRAKE
FLUID
LEVEL
(8W-35-2)
26 C2
29 C2
39 C1
15 C1
9 C2
2
MODULE-
FRONT
CONTROL
(8W-13-23)
22 C1
Z387 18 BK
Z387 18 BK
Z387 18 BK
Z387 18 BK
Z387 18 BK
Z387 20 BK
Z387 18 BK
S129
Z387 18 BK
A
TO
S136
(8W-15-3)

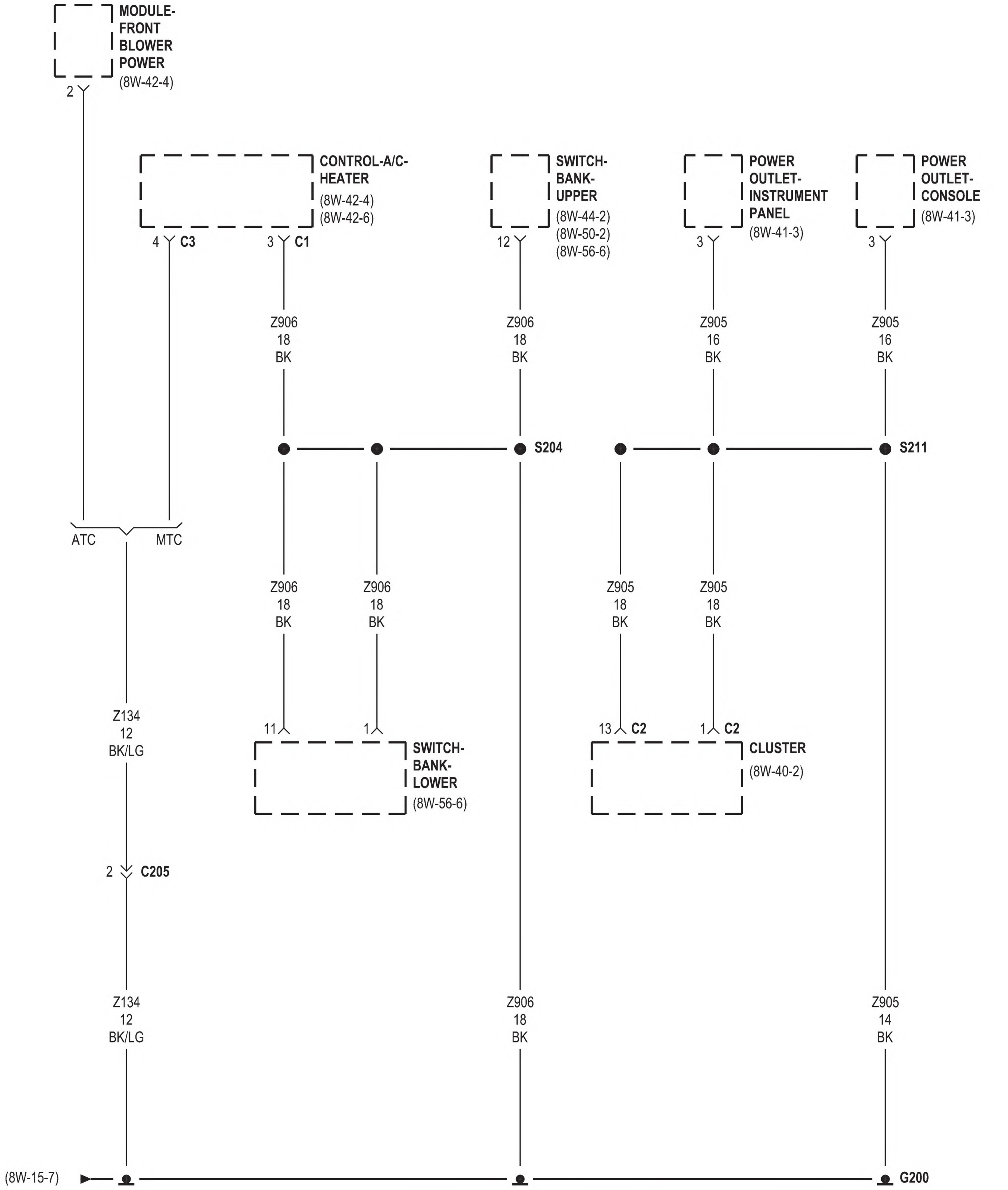

JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-DOOR UNLOCK-DRIVER
(8W-61-3)
87A
87
30
RELAY-DOOR LOCK
(8W-61-2)
87A
87
30
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
87A
87
86
RELAY-TRANSMISSION CONTROL
(8W-31-4)
85
86
RELAY-POWER OUTLET
(8W-41-3)
85
14 C1
86
RELAY-TRANSMISSION CONTROL (IN PDC)
(8W-31-4)
85
86
RELAY-BLOWER MOTOR (IN PDC)
(8W-42-3)
85
FROM S129
(8W-15-2)
A
MODULE-FRONT CONTROL
(8W-13-23)
11 C2
Z387 20 BK
Z387 18 BK
Z387 20 BK
Z387 18 BK
Z387 16 BK
S136
FAN MODULE-CONDENSER COOLING
(8W-30-20)
2
MOTOR-WINDSHIELD WIPER
(8W-53-2)
4
MODULE-HYDRAULIC COOLING FAN
(8W-30-14)
3
MODULE-ANTILOCK BRAKES
(8W-35-2)
47
16
Z387 12 BK
Z823 12 BK/DG
Z823 20 BK/DG
Z103 16 BK/WT
Z107 12 BK/DG
Z127 12 BK/DG
(8W-15-4)
G100

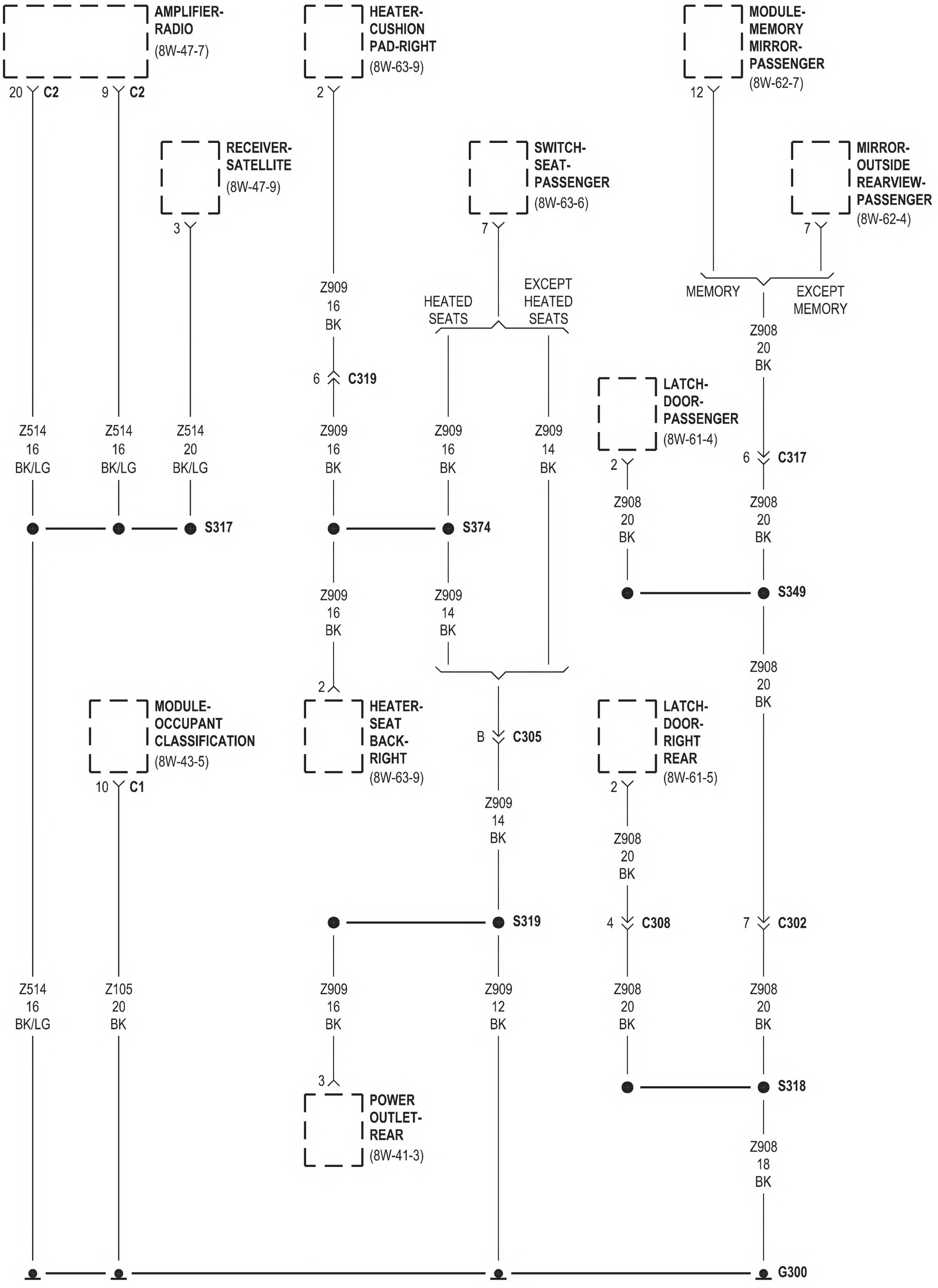

LAMP-FOG-
LEFT
FRONT
(8W-50-4)
2
LAMP-FOG-
RIGHT
FRONT
(8W-50-4)
2
LAMP-
HEADLAMP-
LEFT
(8W-50-3)
6
CLUTCH-A/C
COMPRESSOR
(8W-42-2)
2
GENERATOR
(8W-20-2)
2
MODULE-
TRANSMISSION
CONTROL
(8W-31-2)
18 C1
SWITCH-
STOP
LAMP
(8W-35-3)
5
Z910 18 BK
Z910 18 BK
Z910 18 BK
Z153 18 BK/GY
Z385 18 BK
Z904 18 BK
3.7L
4.7L/5.7L
31 C104
1 C102
17 C114
Z904 18 BK
Z904 20 BK
S114
S134
4.7L
5.7L
Z910 16 BK
Z153 18 BK/GY
Z385 18 BK
Z904 18 BK
Z904 18 BK
Z904 20 BK
(8W-15-3)
G100

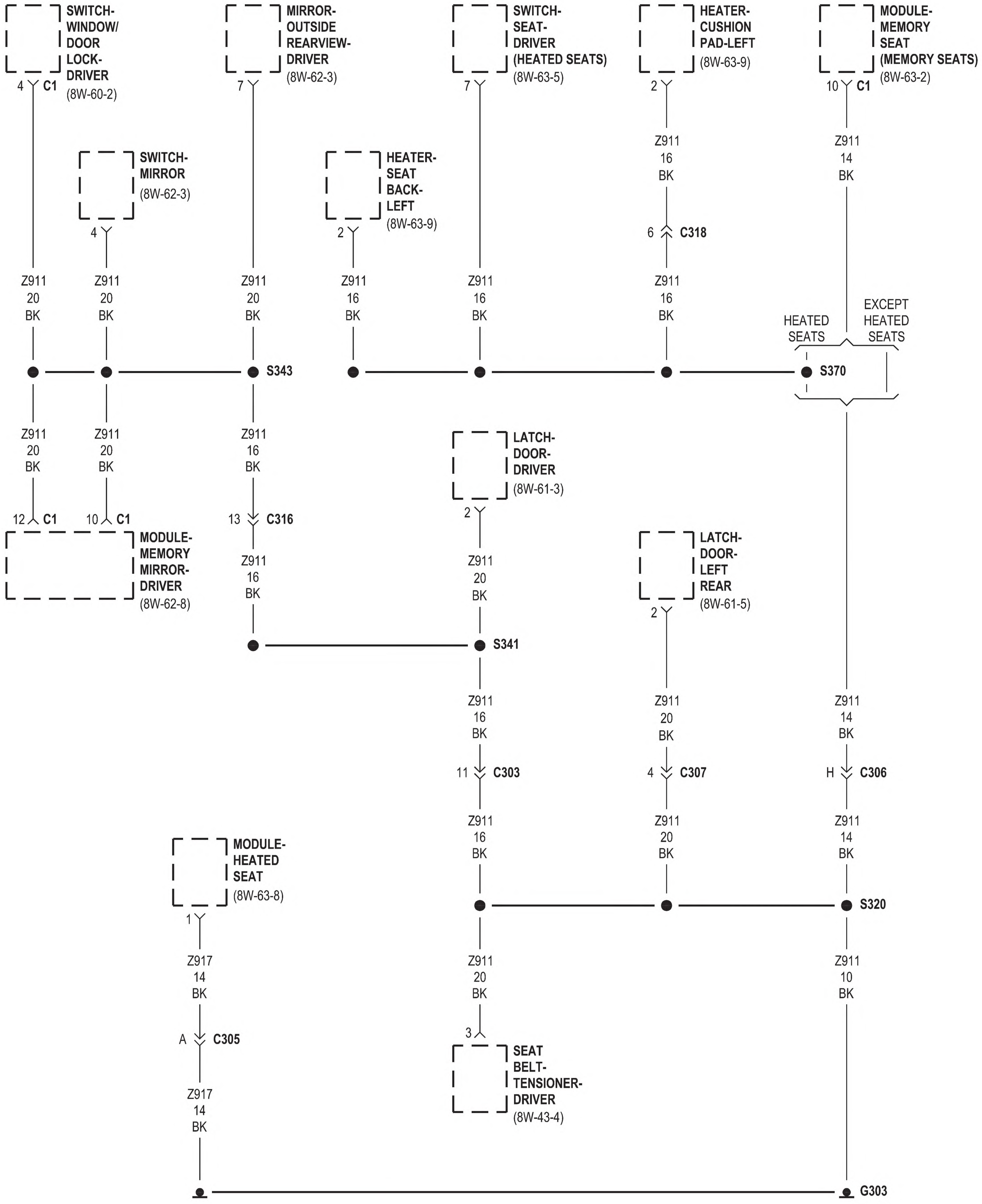

MODULE-
INTEGRATED
POWER
(8W-13-2)
MODULE-
FRONT
CONTROL
(8W-13-20)
GROUND
32
IPM
28 C1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
(5.7L)
(8W-30-13)
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
(5.7L)
(8W-30-13)
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 4
(5.7L)
(8W-30-13)
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
(5.7L)
(8W-30-13)
2
MODULE-
FRONT
CONTROL
(8W-13-23)
24 C1
1 C1
Z42 20 BK/LG
Z42 20 BK/LG
Z42 20 BK/LG
Z42 20 BK/LG
Z131 18 BK/DG
Z131 18 BK/DG
Z131 18 BK/DG
S154
S110
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
(8W-30-11)
4
SENSOR-
OXYGEN-
LEFT
FRONT
(8W-30-9)
1
Z42 20 BK/LG
6 C112
SENSOR-
OXYGEN-
LEFT
REAR
(8W-30-8)
1
4
5
DATA
LINK
CONNECTOR
(8W-18-2)
Z42 20 BK/LG
Z42 20 BK/LG
Z42 18 BK/LG
Z42 18 BK/LG
Z111 20 BK/WT
S146
S207
Z42 18 BK/LG
Z42 18 BK/LG
Z42 16 BK/LG
Z111 20 BK/WT
Z11 20 BK/LG
1
SENSOR-
OXYGEN-
RIGHT
REAR
(8W-30-8)
41 C104
20
19 C200
Z42 16 BK/LG
Z111 20 BK/WT
Z11 20 BK/LG
Z131 16 BK/DG
1
SENSOR-
OXYGEN-
RIGHT
FRONT
(8W-30-9)
(8W-15-6)
G101


TRANSPONDER-TIRE PRESSURE-LEFT FRONT (EXCEPT 3.7L)
(8W-49-4)
3
4
Z924 20 BK/OR
Z924 20 BK/YL
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L)
(8W-49-4)
3
5
Z924 20 BK/OR
Z924 20 BK/YL
S135
LAMP-HEADLAMP-RIGHT
(8W-50-2)
6
SENSOR-WASHER FLUID LEVEL
(8W-53-4)
2
HORN-NO. 1
(8W-41-2)
1
SERVO-SPEED CONTROL
(8W-33-3)
4
Z384 18 BK
Z384 20 BK
Z384 20 BK
S111
Z924 20 BK
Z919 16 BK
Z384 16 BK
G103
MODULE-POWERTRAIN CONTROL
(8W-30-3)
(8W-31-8)
9 C1
18 C1
14 C4
13 C4
12 C4
Z903 16 BK
Z903 16 BK
Z903 16 BK
S147
Z816 16 BK
Z130 16 BK/BR
Z903 16 BK
4
5
2
C104
Z816 16 BK
Z130 14 BK/BR
Z903 16 BK
G102
(8W-15-5)
G101


SWITCH-TRANSFER CASE SELECTOR
(8W-31-9)
6
ASSEMBLY-SHIFT LEVER
(8W-31-15)
7
MODULE-STEERING CONTROL
(8W-30-18)
(8W-47-10)
5 C1
MODULE-HANDS FREE
(8W-55-2)
22
Z907
20
BK
S212
SWITCH-BANK-LOWER
(8W-56-6)
4
MODULE-SENTRY KEY REMOTE ENTRY
(8W-39-2)
4
CLUSTER
(8W-40-2)
19 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
(8W-43-2)
22 C2
BATTERY
(8W-10-6)
Z18
18
BK/LB
Z18
20
BK/LB
S210
RADIO
(8W-47-2)
22 C1
11 C1
8
SWITCH-BANK-UPPER
(8W-56-6)
Z920
16
BK
S213
Z907
18
BK
Z18
18
BK/LB
Z920
16
BK
Z104
20
BK/LG
Z1
6
BK
Z100
6
BK/VT
(8W-15-8)
G200
G201
G104
G105


MODULE-
FRONT
BLOWER
POWER
(8W-42-4)
2
CONTROL-A/C-
HEATER
(8W-42-4)
(8W-42-6)
4 C3
3 C1
SWITCH-
BANK-
UPPER
(8W-44-2)
(8W-50-2)
(8W-56-6)
12
POWER
OUTLET-
INSTRUMENT
PANEL
(8W-41-3)
3
POWER
OUTLET-
CONSOLE
(8W-41-3)
3
Z906
18
BK
Z906
18
BK
Z905
16
BK
Z905
16
BK
S204
S211
ATC
MTC
Z906
18
BK
Z906
18
BK
Z905
18
BK
Z905
18
BK
Z134
12
BK/LG
11
1
SWITCH-
BANK-
LOWER
(8W-56-6)
13 C2
1 C2
CLUSTER
(8W-40-2)
2 C205
Z134
12
BK/LG
Z906
18
BK
Z905
14
BK
(8W-15-7)
G200


AMPLIFIER-
RADIO
(8W-47-7)
20 C2
9 C2
HEATER-
CUSHION
PAD-RIGHT
(8W-63-9)
2
MODULE-
MEMORY
MIRROR-
PASSENGER
(8W-62-7)
12
RECEIVER-
SATELLITE
(8W-47-9)
3
SWITCH-
SEAT-
PASSENGER
(8W-63-6)
7
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
(8W-62-4)
7
MEMORY
EXCEPT MEMORY
Z909 16 BK
HEATED SEATS
EXCEPT HEATED SEATS
Z908 20 BK
6 C319
LATCH-
DOOR-
PASSENGER
(8W-61-4)
2
6 C317
Z514 16 BK/LG
Z514 16 BK/LG
Z514 20 BK/LG
Z909 16 BK
Z909 16 BK
Z909 14 BK
Z908 20 BK
Z908 20 BK
S317
S374
S349
Z909 16 BK
Z909 14 BK
Z908 20 BK
2
MODULE-
OCCUPANT
CLASSIFICATION
(8W-43-5)
10 C1
HEATER-
SEAT
BACK-
RIGHT
(8W-63-9)
B C305
LATCH-
DOOR-
RIGHT
REAR
(8W-61-5)
2
Z909 14 BK
Z908 20 BK
S319
4 C308
7 C302
Z514 16 BK/LG
Z105 20 BK
Z909 16 BK
Z909 12 BK
Z908 20 BK
Z908 20 BK
S318
3
POWER
OUTLET-
REAR
(8W-41-3)
Z908 18 BK
G300


SWITCH-WINDOW/DOOR LOCK-DRIVER
(8W-60-2)
4 C1
MIRROR-OUTSIDE REARVIEW-DRIVER
(8W-62-3)
7
SWITCH-SEAT-DRIVER (HEATED SEATS)
(8W-63-5)
7
HEATER-CUSHION PAD-LEFT
(8W-63-9)
2
MODULE-MEMORY SEAT (MEMORY SEATS)
(8W-63-2)
10 C1
SWITCH-MIRROR
(8W-62-3)
4
HEATER-SEAT BACK-LEFT
(8W-63-9)
2
Z911 16 BK
6 C318
Z911 14 BK
Z911 20 BK
Z911 20 BK
Z911 20 BK
Z911 16 BK
Z911 16 BK
Z911 16 BK
HEATED SEATS
EXCEPT HEATED SEATS
S343
S370
Z911 20 BK
Z911 20 BK
Z911 16 BK
12 C1
10 C1
13 C316
MODULE-MEMORY MIRROR-DRIVER
(8W-62-8)
LATCH-DOOR-DRIVER
(8W-61-3)
2
Z911 16 BK
Z911 20 BK
LATCH-DOOR-LEFT REAR
(8W-61-5)
2
S341
Z911 16 BK
Z911 20 BK
Z911 14 BK
11 C303
4 C307
H C306
Z911 16 BK
Z911 20 BK
Z911 14 BK
MODULE-HEATED SEAT
(8W-63-8)
1
S320
Z917 14 BK
Z911 20 BK
Z911 10 BK
A C305
3
SEAT BELT-TENSIONER-DRIVER
(8W-43-4)
Z917 14 BK
G303

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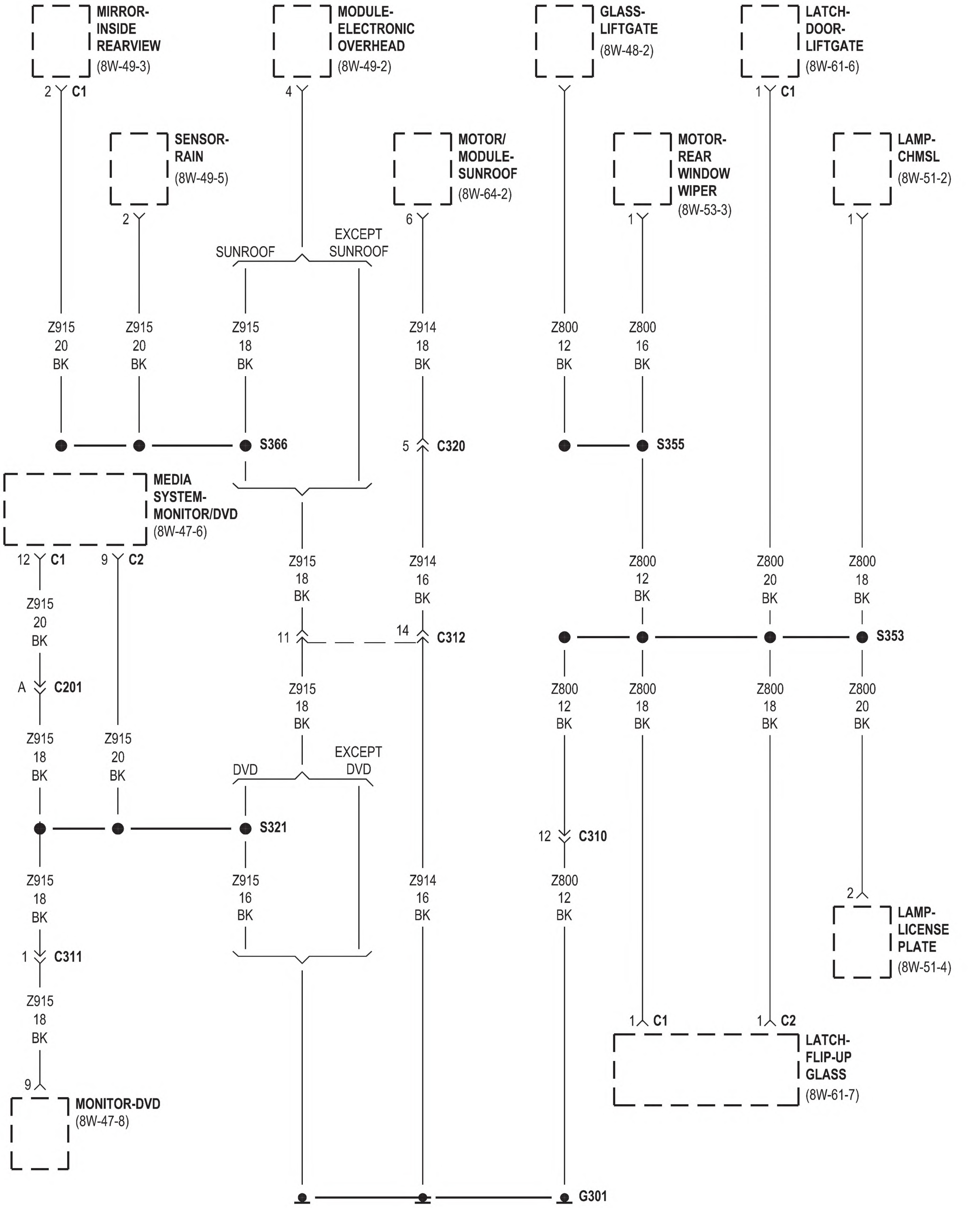
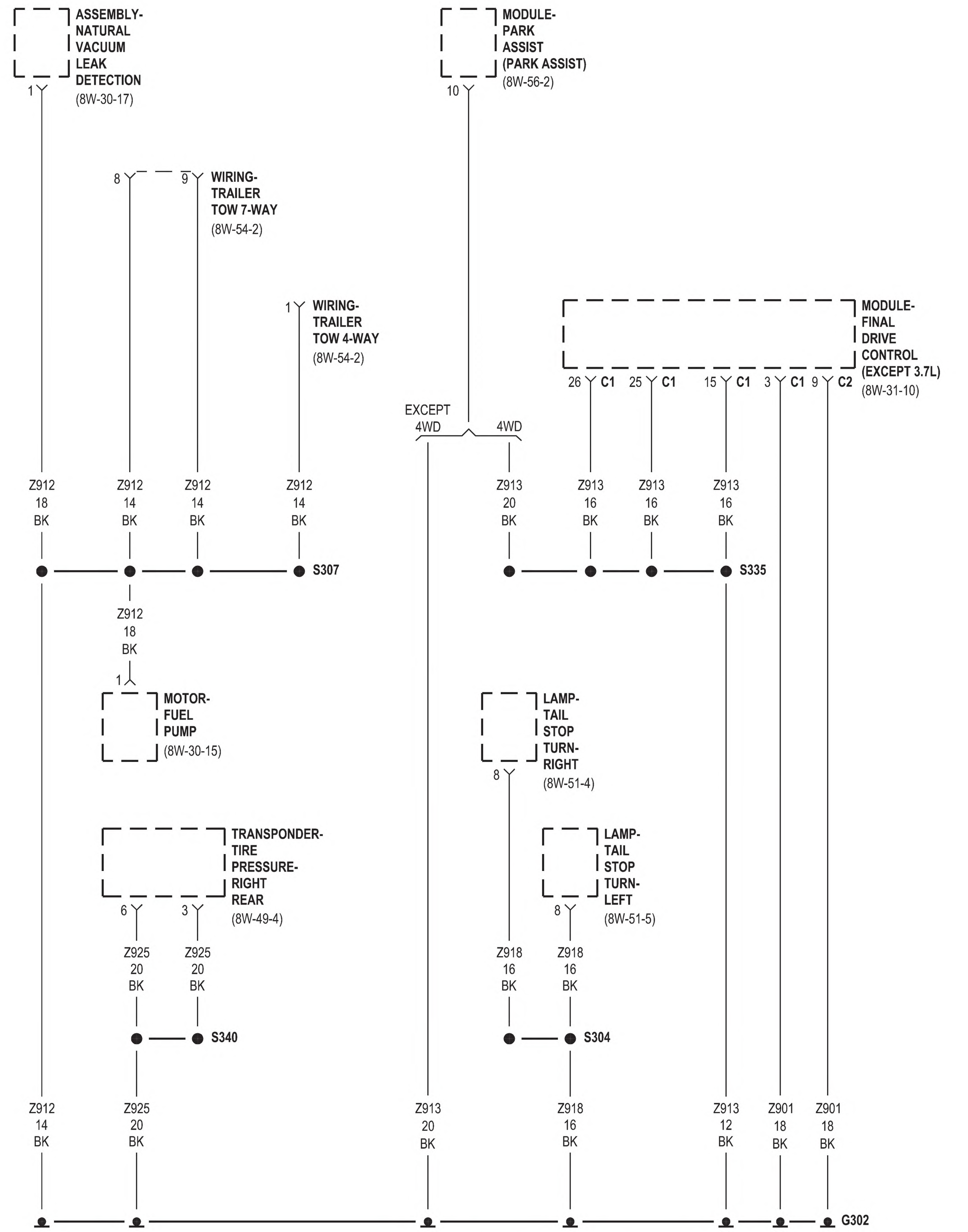

MIRROR-
INSIDE
REARVIEW
(8W-49-3)
2 C1
MODULE-
ELECTRONIC
OVERHEAD
(8W-49-2)
4
GLASS-
LIFTGATE
(8W-48-2)
LATCH-
DOOR-
LIFTGATE
(8W-61-6)
1 C1
SENSOR-
RAIN
(8W-49-5)
2
MOTOR/
MODULE-
SUNROOF
(8W-64-2)
6
MOTOR-
REAR
WINDOW
WIPER
(8W-53-3)
1
LAMP-
CHMSL
(8W-51-2)
1
SUNROOF
EXCEPT
SUNROOF
Z915
20
BK
Z915
20
BK
Z915
18
BK
Z914
18
BK
Z800
12
BK
Z800
16
BK
S366
5 C320
S355
MEDIA
SYSTEM-
MONITOR/DVD
(8W-47-6)
12 C1
9 C2
Z915
18
BK
Z914
16
BK
Z800
12
BK
Z800
20
BK
Z800
18
BK
Z915
20
BK
11
14 C312
S353
A C201
Z915
18
BK
Z800
12
BK
Z800
18
BK
Z800
18
BK
Z800
20
BK
Z915
18
BK
Z915
20
BK
DVD
EXCEPT
DVD
S321
12 C310
Z915
18
BK
Z915
16
BK
Z914
16
BK
Z800
12
BK
2
LAMP-
LICENSE
PLATE
(8W-51-4)
1 C311
Z915
18
BK
1 C1
1 C2
LATCH-
FLIP-UP
GLASS
(8W-61-7)
9
MONITOR-DVD
(8W-47-8)
G301


ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
(8W-30-17)
1
MODULE-
PARK
ASSIST
(PARK ASSIST)
(8W-56-2)
10
8
9
WIRING-
TRAILER
TOW 7-WAY
(8W-54-2)
1
WIRING-
TRAILER
TOW 4-WAY
(8W-54-2)
MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
(8W-31-10)
26 C1
25 C1
15 C1
3 C1
9 C2
EXCEPT
4WD
4WD
Z912 18 BK
Z912 14 BK
Z912 14 BK
Z912 14 BK
Z913 20 BK
Z913 16 BK
Z913 16 BK
Z913 16 BK
S307
S335
Z912 18 BK
1
MOTOR-
FUEL
PUMP
(8W-30-15)
LAMP-
TAIL
STOP
TURN-
RIGHT
(8W-51-4)
8
TRANSPONDER-
TIRE
PRESSURE-
RIGHT
REAR
(8W-49-4)
6
3
LAMP-
TAIL
STOP
TURN-
LEFT
(8W-51-5)
8
Z925 20 BK
Z925 20 BK
Z918 16 BK
Z918 16 BK
S340
S304
Z912 14 BK
Z925 20 BK
Z913 20 BK
Z918 16 BK
Z913 12 BK
Z901 18 BK
Z901 18 BK
G302

8W-18 BUS COMMUNICATIONS

Component	Page
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Assembly-Shift Lever	8W-18-3, 8
Cluster	8W-18-4, 6
Control-A/C-Heater	8W-18-4, 6
Data Link Connector	8W-18-2
Fuse 16	8W-18-2
G101	8W-18-2
Junction Block	8W-18-2
Media System-Monitor/Dvd	8W-18-4, 6
Mirror-Inside Rearview	8W-18-5, 7
Module-Antilock Brakes	8W-18-2, 3, 8
Module-Electronic Overhead	8W-18-5, 7
Module-Final Drive Control	8W-18-3, 8
Module-Front Control	8W-18-2, 3, 4, 6, 8
Module-Hands Free	8W-18-4, 6
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Module-Memory Mirror-Driver	8W-18-5, 7
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Module-Occupant Classification	8W-18-5, 7
Module-Occupant Restraint Controller	8W-18-4, 6
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Module-Powertrain Control	8W-18-2, 3, 8
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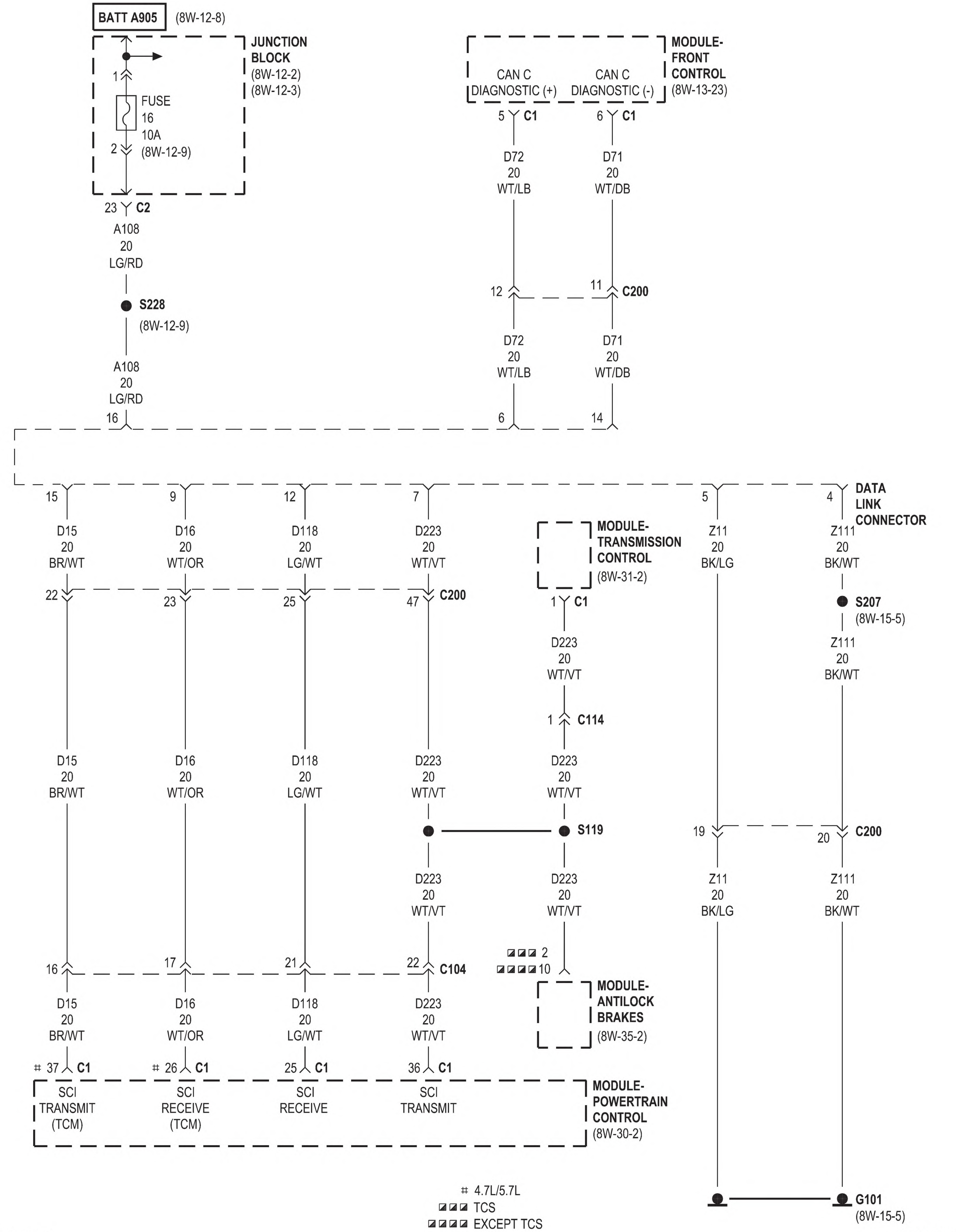
Motor/Module-Sunroof	8W-18-5, 7
Radio	8W-18-4, 6
Receiver-Satellite	8W-18-5, 7
Sensor-Rain	8W-18-5, 7


BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
16
10A
(8W-12-9)
2
23 C2
A108
20
LG/RD
S228
(8W-12-9)
A108
20
LG/RD
16
MODULE-FRONT CONTROL
(8W-13-23)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
5 C1
6 C1
D72
20
WT/LB
D71
20
WT/DB
12
11 C200
D72
20
WT/LB
D71
20
WT/DB
6
14
DATA LINK CONNECTOR
15
9
12
7
5
4
D15
20
BR/WT
D16
20
WT/OR
D118
20
LG/WT
D223
20
WT/VT
MODULE-TRANSMISSION CONTROL
(8W-31-2)
Z11
20
BK/LG
Z111
20
BK/WT
22
23
25
47 C200
1 C1
S207
(8W-15-5)
D223
20
WT/VT
Z111
20
BK/WT
1 C114
D15
20
BR/WT
D16
20
WT/OR
D118
20
LG/WT
D223
20
WT/VT
D223
20
WT/VT
S119
19
20 C200
D223
20
WT/VT
D223
20
WT/VT
Z11
20
BK/LG
Z111
20
BK/WT
▨▨▨ 2
▨▨▨▨ 10
MODULE-ANTILOCK BRAKES
(8W-35-2)
16
17
21
22 C104
D15
20
BR/WT
D16
20
WT/OR
D118
20
LG/WT
D223
20
WT/VT
# 37 C1
# 26 C1
25 C1
36 C1
SCI TRANSMIT (TCM)
SCI RECEIVE (TCM)
SCI RECEIVE
SCI TRANSMIT
MODULE-POWERTRAIN CONTROL
(8W-30-2)
G101
(8W-15-5)
# 4.7L/5.7L
▨▨▨ TCS
▨▨▨▨ EXCEPT TCS

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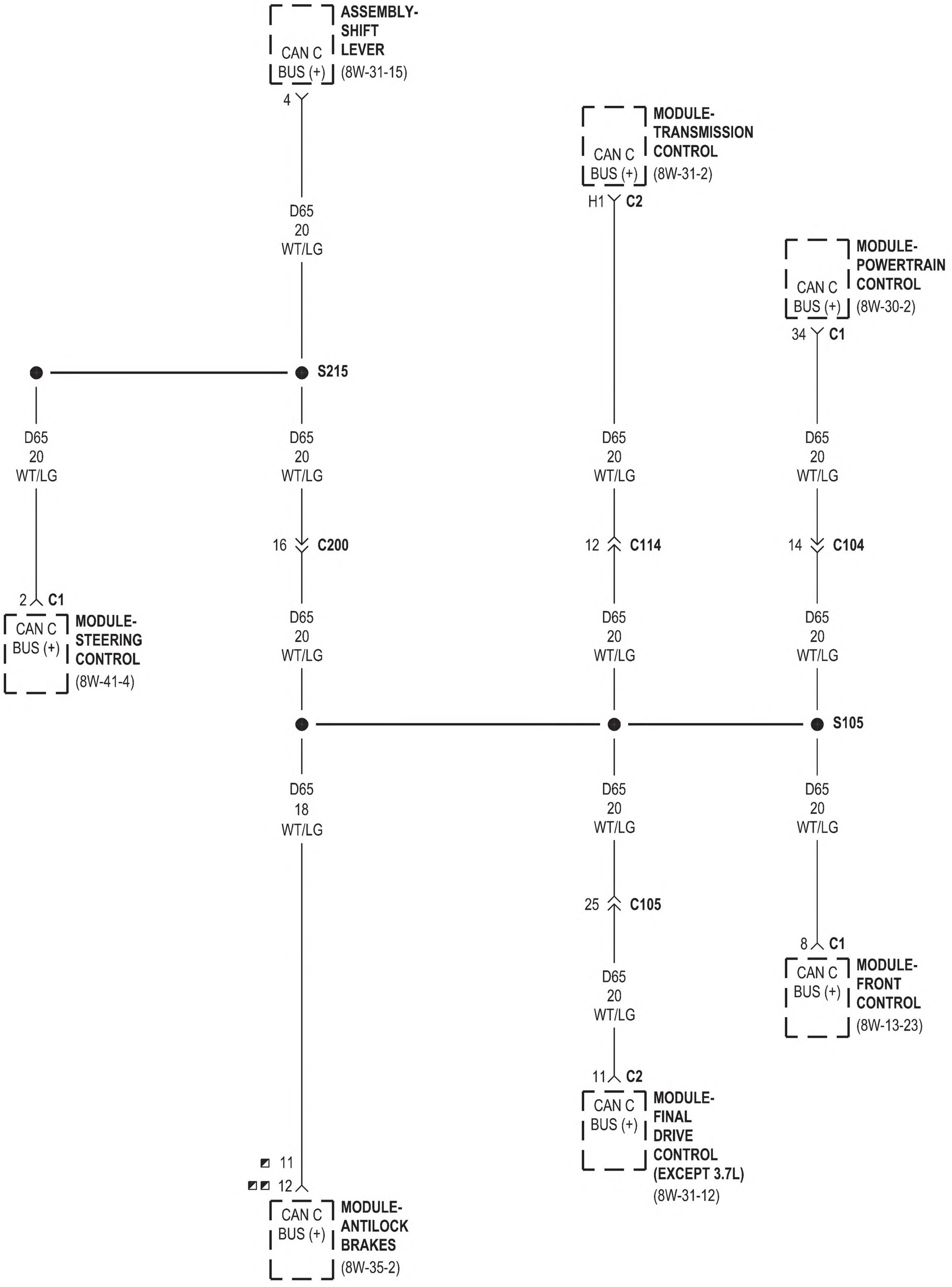
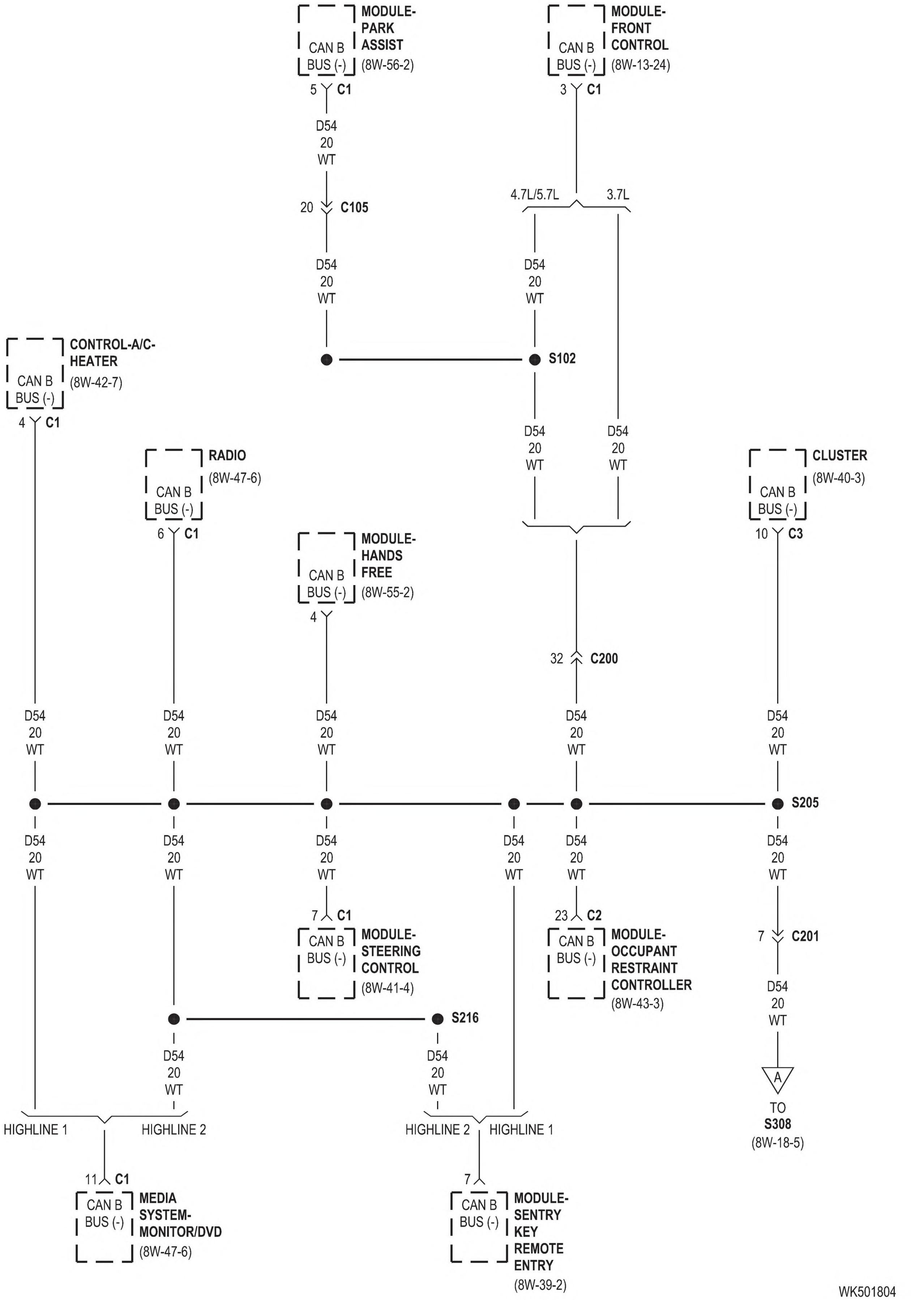
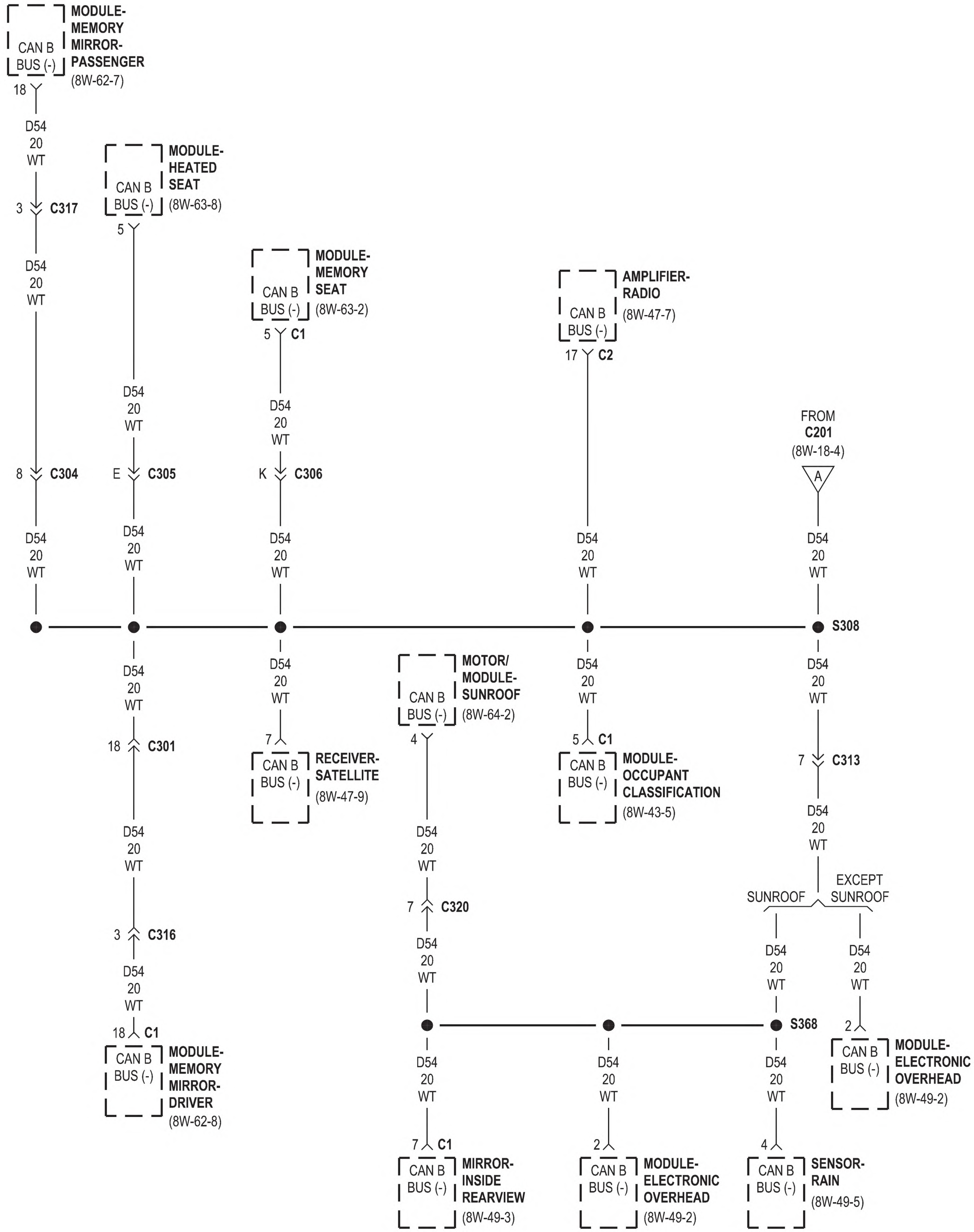
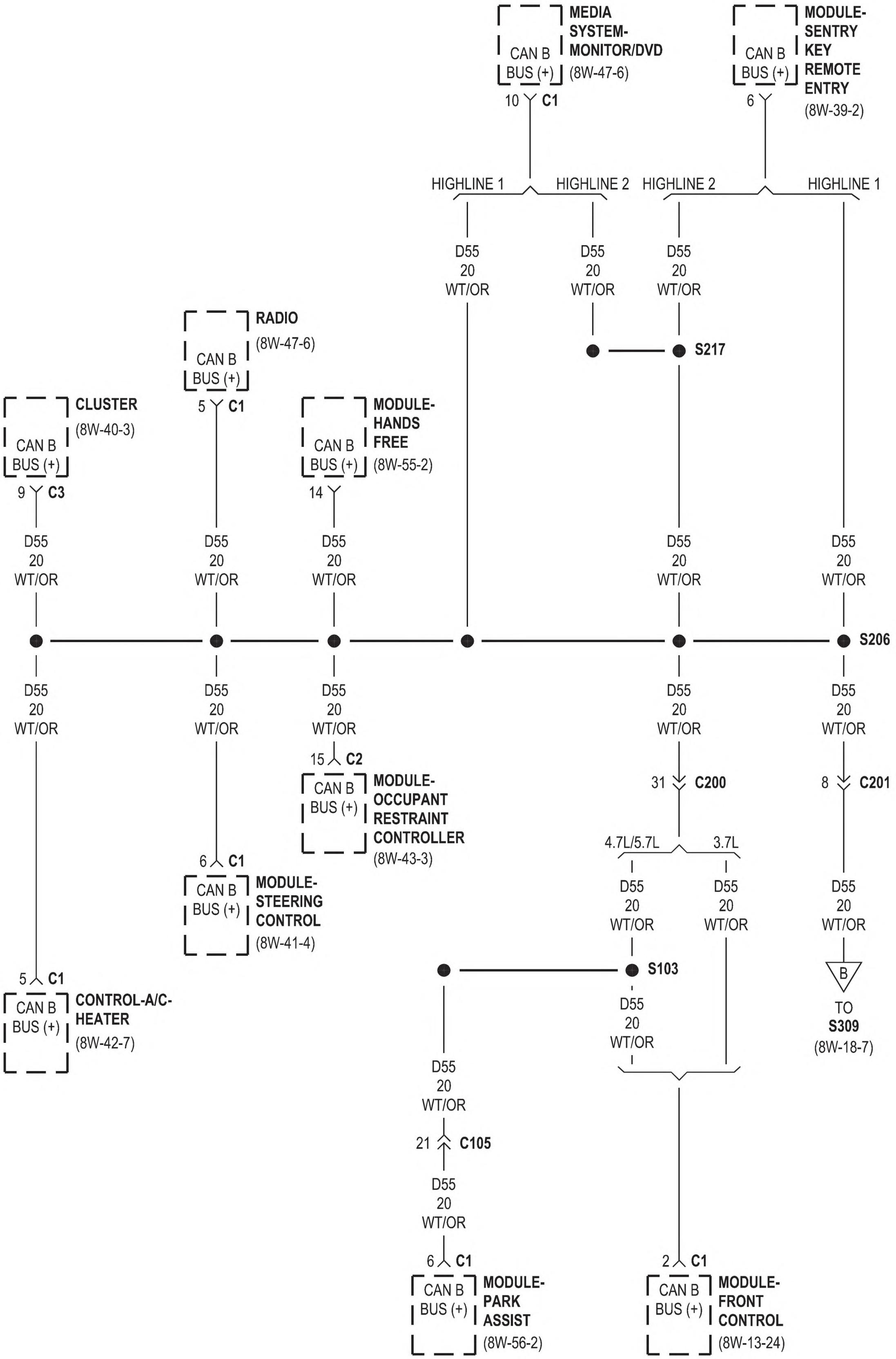
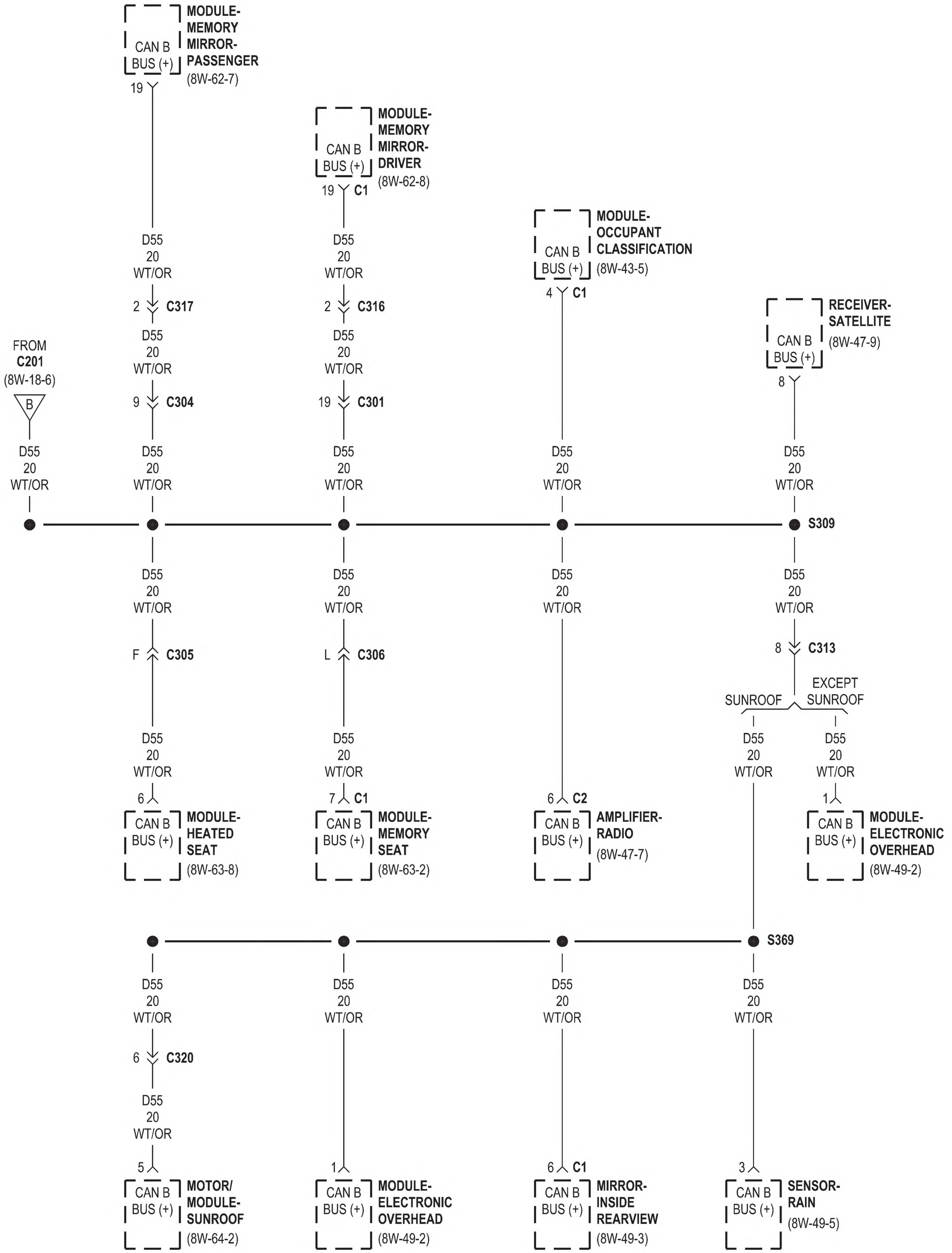

ASSEMBLY-
SHIFT
LEVER
CAN C
BUS (+)
(8W-31-15)
4
D65
20
WT/LG
MODULE-
TRANSMISSION
CONTROL
CAN C
BUS (+)
(8W-31-2)
H1
C2
MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (+)
(8W-30-2)
34
C1
S215
D65
20
WT/LG
16
C200
12
C114
14
C104
2
C1
MODULE-
STEERING
CONTROL
CAN C
BUS (+)
(8W-41-4)
S105
D65
18
WT/LG
25
C105
8
C1
MODULE-
FRONT
CONTROL
CAN C
BUS (+)
(8W-13-23)
11
C2
MODULE-
FINAL
DRIVE
CONTROL
(EXCEPT 3.7L)
(8W-31-12)
◩ 11
◩◩ 12
MODULE-
ANTILOCK
BRAKES
CAN C
BUS (+)
(8W-35-2)

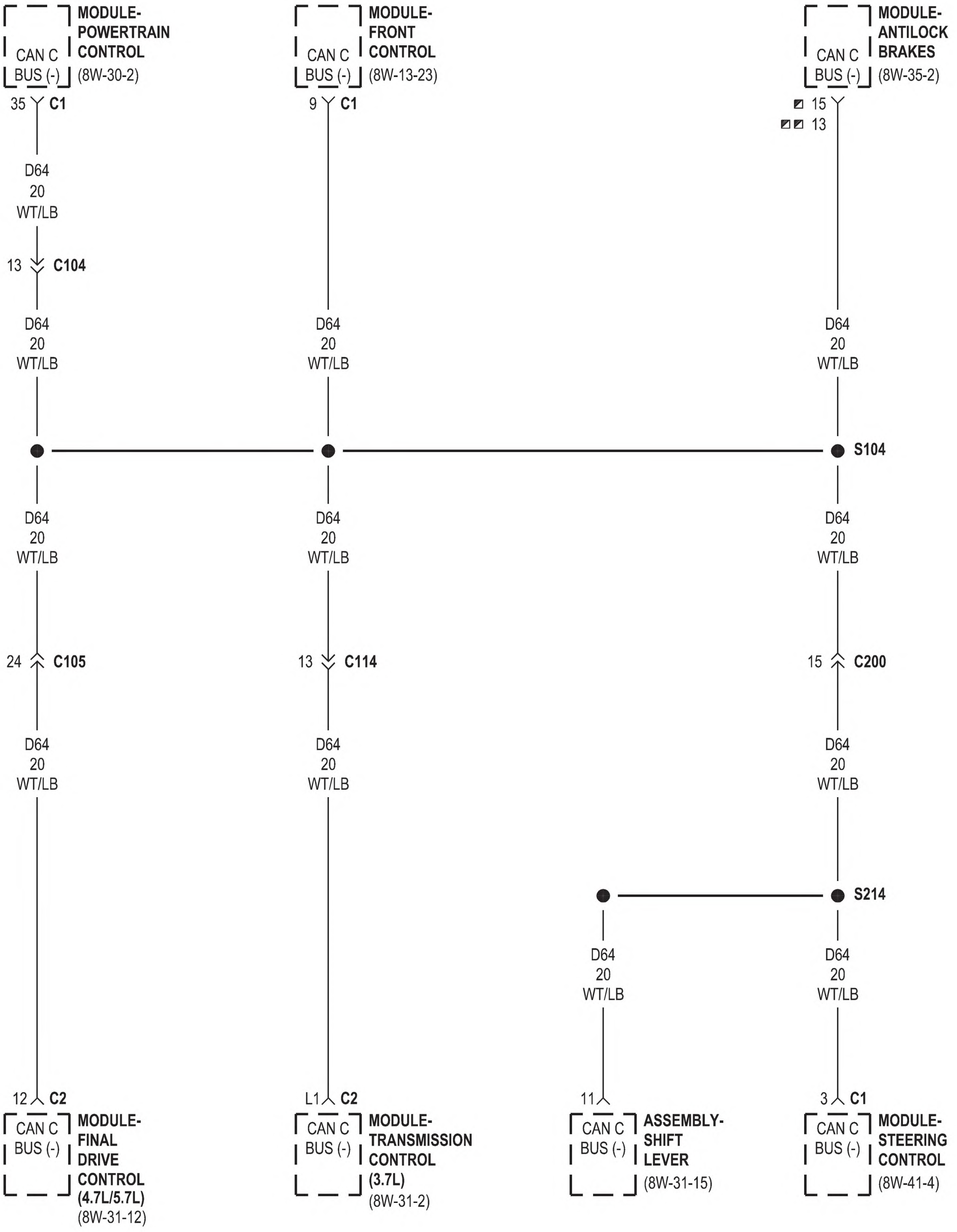
◩ TCS/ESP
◩◩ EXCEPT TCS/ESP


MODULE-PARK ASSIST
CAN B BUS (-)
(8W-56-2)
5 C1
D54 20 WT
20 C105
MODULE-FRONT CONTROL
(8W-13-24)
3 C1
4.7L/5.7L
3.7L
S102
CONTROL-A/C-HEATER
(8W-42-7)
4 C1
RADIO
(8W-47-6)
6 C1
MODULE-HANDS FREE
(8W-55-2)
4
32 C200
CLUSTER
(8W-40-3)
10 C3
S205
7 C1
MODULE-STEERING CONTROL
(8W-41-4)
23 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
(8W-43-3)
7 C201
A
TO S308
(8W-18-5)
S216
HIGHLINE 1
HIGHLINE 2
11 C1
MEDIA SYSTEM-MONITOR/DVD
(8W-47-6)
7
MODULE-SENTRY KEY REMOTE ENTRY
(8W-39-2)


CAN B BUS (-)
MODULE-MEMORY MIRROR-PASSENGER
(8W-62-7)
18
D54 20 WT
3 C317
CAN B BUS (-)
MODULE-HEATED SEAT
(8W-63-8)
5
CAN B BUS (-)
MODULE-MEMORY SEAT
(8W-63-2)
5 C1
CAN B BUS (-)
AMPLIFIER-RADIO
(8W-47-7)
17 C2
FROM C201 (8W-18-4)
A
8 C304
E C305
K C306
S308
18 C301
7
CAN B BUS (-)
RECEIVER-SATELLITE
(8W-47-9)
CAN B BUS (-)
MOTOR/ MODULE-SUNROOF
(8W-64-2)
4
5 C1
CAN B BUS (-)
MODULE-OCCUPANT CLASSIFICATION
(8W-43-5)
7 C313
SUNROOF
EXCEPT SUNROOF
7 C320
3 C316
18 C1
CAN B BUS (-)
MODULE-MEMORY MIRROR-DRIVER
(8W-62-8)
S368
2
CAN B BUS (-)
MODULE-ELECTRONIC OVERHEAD
(8W-49-2)
7 C1
CAN B BUS (-)
MIRROR-INSIDE REARVIEW
(8W-49-3)
2
CAN B BUS (-)
MODULE-ELECTRONIC OVERHEAD
(8W-49-2)
4
CAN B BUS (-)
SENSOR-RAIN
(8W-49-5)


MEDIA SYSTEM-MONITOR/DVD
(8W-47-6)
CAN B BUS (+)
10 C1
MODULE-SENTRY KEY REMOTE ENTRY
(8W-39-2)
CAN B BUS (+)
6
HIGHLINE 1
HIGHLINE 2
HIGHLINE 2
HIGHLINE 1
D55 20 WT/OR
S217
RADIO
(8W-47-6)
CAN B BUS (+)
5 C1
CLUSTER
(8W-40-3)
CAN B BUS (+)
9 C3
MODULE-HANDS FREE
(8W-55-2)
CAN B BUS (+)
14
S206
15 C2
MODULE-OCCUPANT RESTRAINT CONTROLLER
(8W-43-3)
31 C200
8 C201
4.7L/5.7L
3.7L
6 C1
MODULE-STEERING CONTROL
(8W-41-4)
S103
B
TO S309
(8W-18-7)
5 C1
CONTROL-A/C-HEATER
(8W-42-7)
21 C105
6 C1
MODULE-PARK ASSIST
(8W-56-2)
2 C1
MODULE-FRONT CONTROL
(8W-13-24)

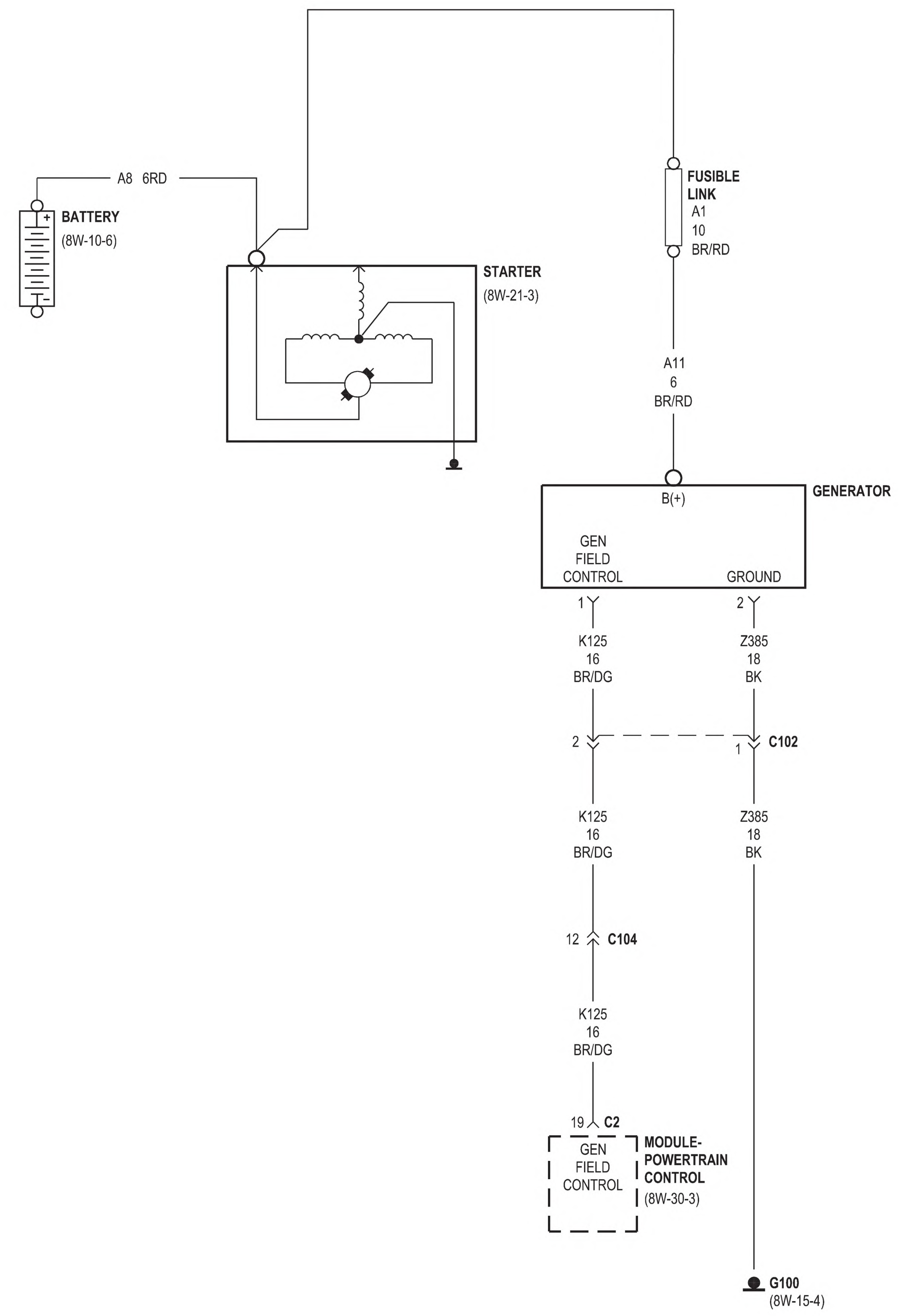

MODULE-MEMORY MIRROR-PASSENGER (8W-62-7)
CAN B BUS (+)
19
MODULE-MEMORY MIRROR-DRIVER (8W-62-8)
CAN B BUS (+)
19 C1
MODULE-OCCUPANT CLASSIFICATION (8W-43-5)
CAN B BUS (+)
4 C1
RECEIVER-SATELLITE (8W-47-9)
CAN B BUS (+)
8
D55 20 WT/OR
2 C317
2 C316
9 C304
19 C301
FROM C201 (8W-18-6)
B
S309
F C305
L C306
8 C313
SUNROOF
EXCEPT SUNROOF
6
MODULE-HEATED SEAT (8W-63-8)
7 C1
MODULE-MEMORY SEAT (8W-63-2)
6 C2
AMPLIFIER-RADIO (8W-47-7)
1
MODULE-ELECTRONIC OVERHEAD (8W-49-2)
S369
6 C320
5
MOTOR/MODULE-SUNROOF (8W-64-2)
1
MODULE-ELECTRONIC OVERHEAD (8W-49-2)
6 C1
MIRROR-INSIDE REARVIEW (8W-49-3)
3
SENSOR-RAIN (8W-49-5)


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
(8W-30-2)
35 C1
D64
20
WT/LB
13 C104
MODULE-
FRONT
CONTROL
CAN C
BUS (-)
(8W-13-23)
9 C1
MODULE-
ANTILOCK
BRAKES
CAN C
BUS (-)
(8W-35-2)
◪ 15
◪◪ 13
S104
24 C105
13 C114
15 C200
S214
12 C2
L1 C2
11
3 C1
MODULE-
FINAL
DRIVE
CONTROL
(4.7L/5.7L)
(8W-31-12)
MODULE-
TRANSMISSION
CONTROL
(3.7L)
(8W-31-2)
ASSEMBLY-
SHIFT
LEVER
(8W-31-15)
MODULE-
STEERING
CONTROL
(8W-41-4)

◪ TCS/ESP
◪◪ EXCEPT TCS/ESP

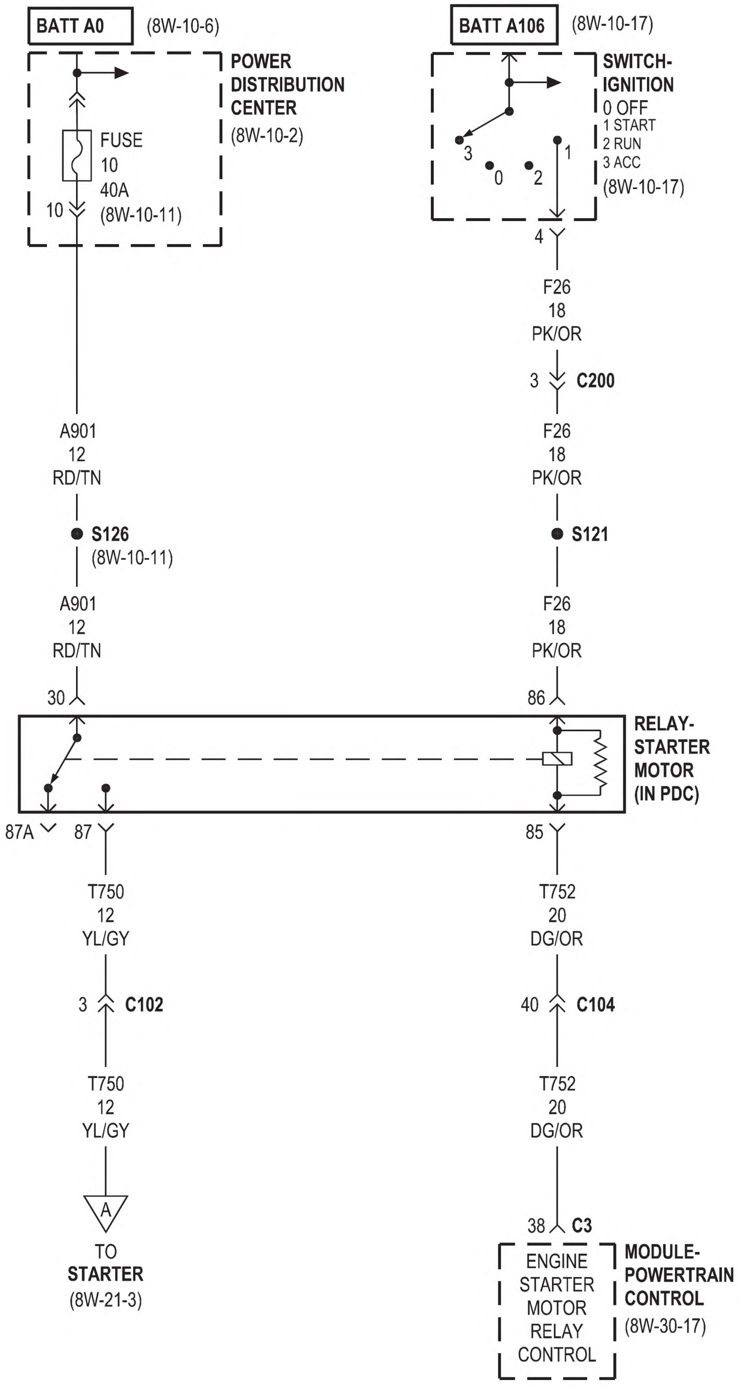
8W-20 CHARGING SYSTEM

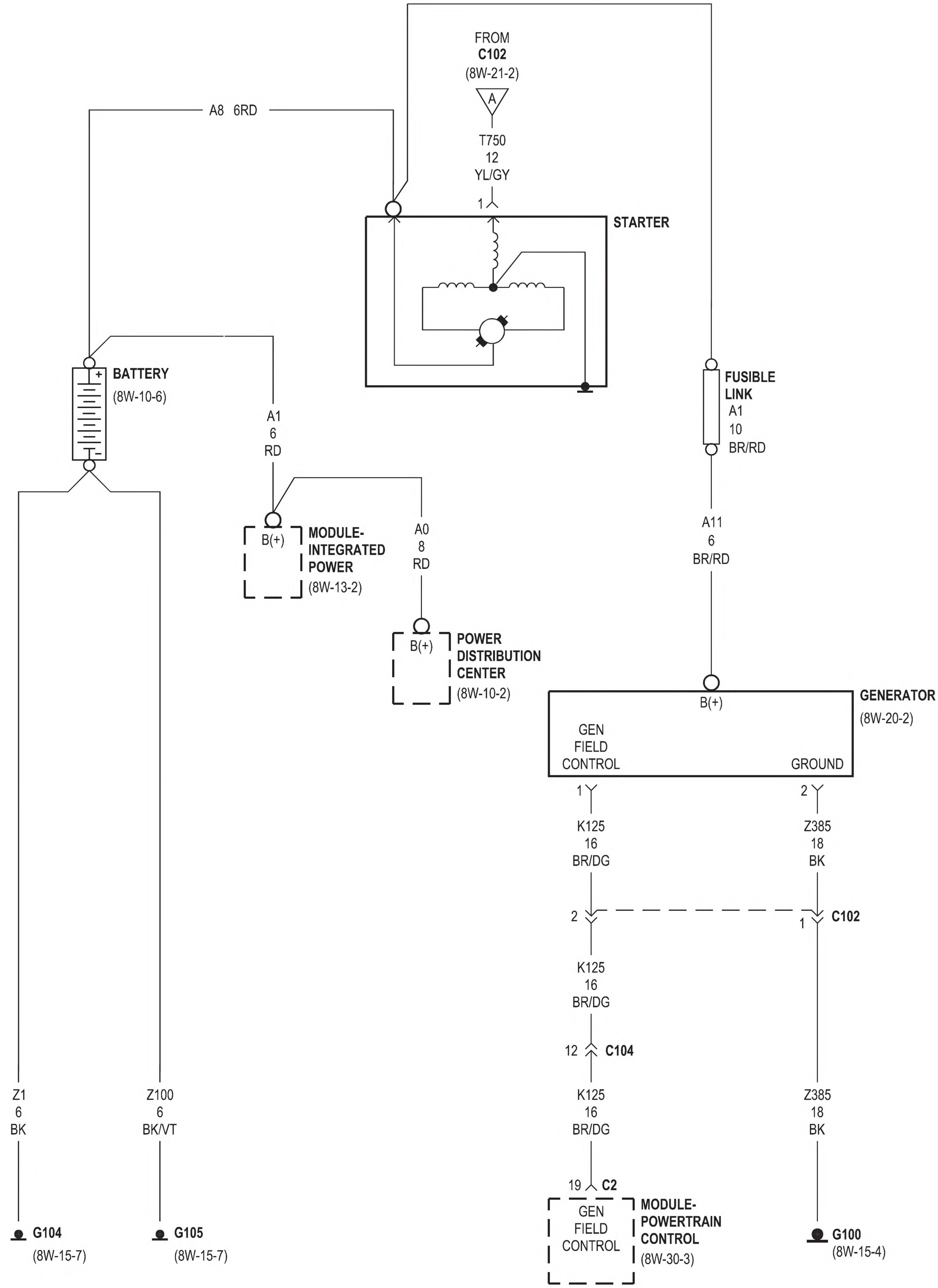
Component	Page
Battery	8W-20-2
Fusible Link	8W-20-2
G100	8W-20-2
Generator	8W-20-2
Module-Powertrain Control	8W-20-2
Starter	8W-20-2


A8 6RD
BATTERY
(8W-10-6)
+
-
STARTER
(8W-21-3)
FUSIBLE
LINK
A1
10
BR/RD
A11
6
BR/RD
GENERATOR
B(+)
GEN
FIELD
CONTROL
GROUND
1
2
K125
16
BR/DG
Z385
18
BK
2
1
C102
K125
16
BR/DG
Z385
18
BK
12
C104
K125
16
BR/DG
19
C2
GEN
FIELD
CONTROL
MODULE-
POWERTRAIN
CONTROL
(8W-30-3)
G100
(8W-15-4)

8W-21 STARTING SYSTEM

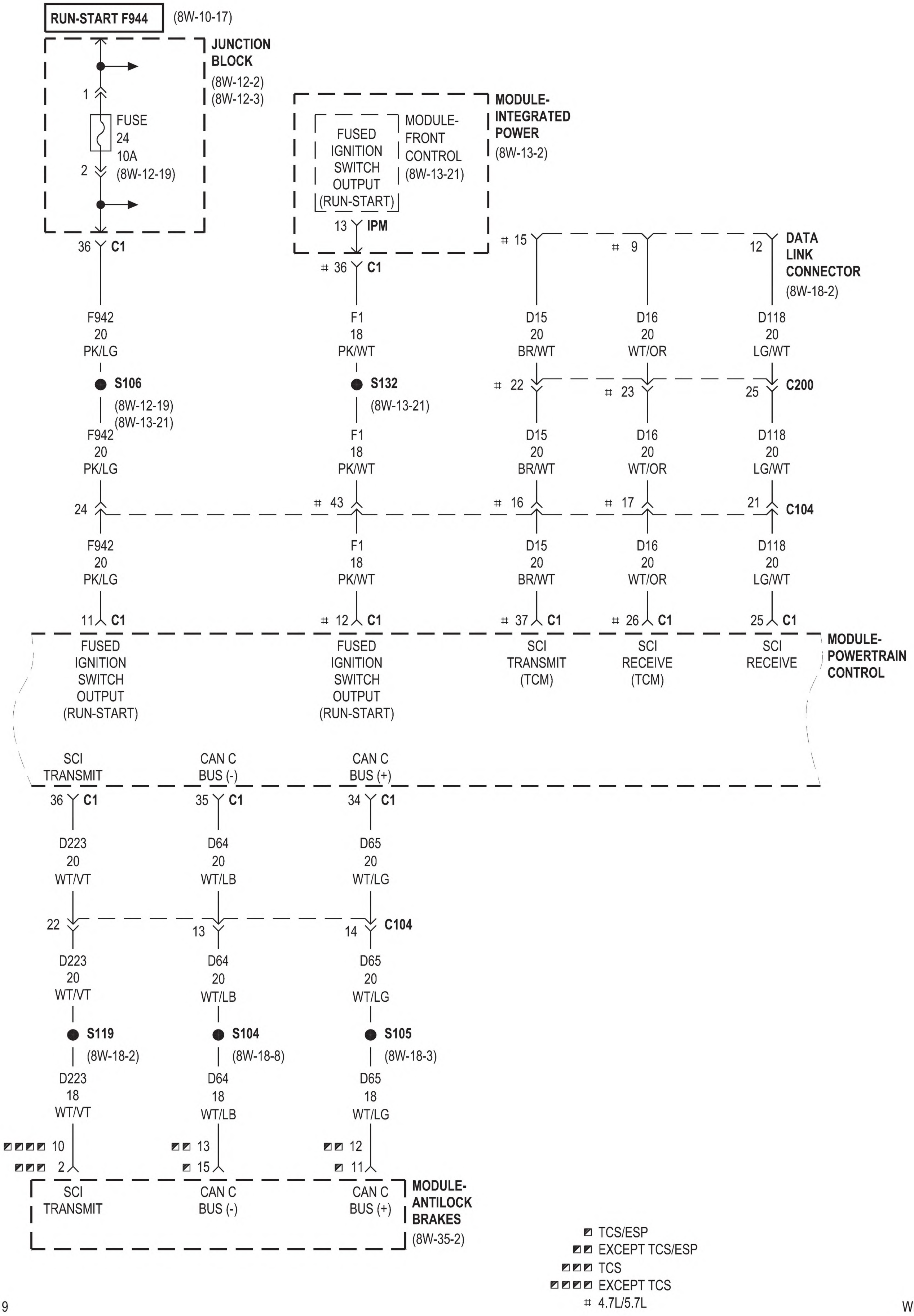
Component	Page
Battery	8W-21-3
Fuse 10	8W-21-2
Fusible Link	8W-21-3
G100	8W-21-3
G104	8W-21-3
G105	8W-21-3
Generator	8W-21-3
Module-Integrated Power	8W-21-3
Module-Powertrain Control	8W-21-2, 3
Power Distribution Center	8W-21-2, 3
Relay-Starter Motor	8W-21-2
Starter	8W-21-2, 3
Switch-Ignition	8W-21-2


BATT A0
(8W-10-6)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
10
40A
(8W-10-11)
10
BATT A106
(8W-10-17)
SWITCH-
IGNITION
0 OFF
1 START
2 RUN
3 ACC
(8W-10-17)
3
0
2
1
4
F26
18
PK/OR
3
C200
F26
18
PK/OR
S121
F26
18
PK/OR
A901
12
RD/TN
S126
(8W-10-11)
A901
12
RD/TN
30
86
RELAY-
STARTER
MOTOR
(IN PDC)
87A
87
85
T750
12
YL/GY
3
C102
T750
12
YL/GY
A
TO
STARTER
(8W-21-3)
T752
20
DG/OR
40
C104
T752
20
DG/OR
38
C3
ENGINE
STARTER
MOTOR
RELAY
CONTROL
MODULE-
POWERTRAIN
CONTROL
(8W-30-17)

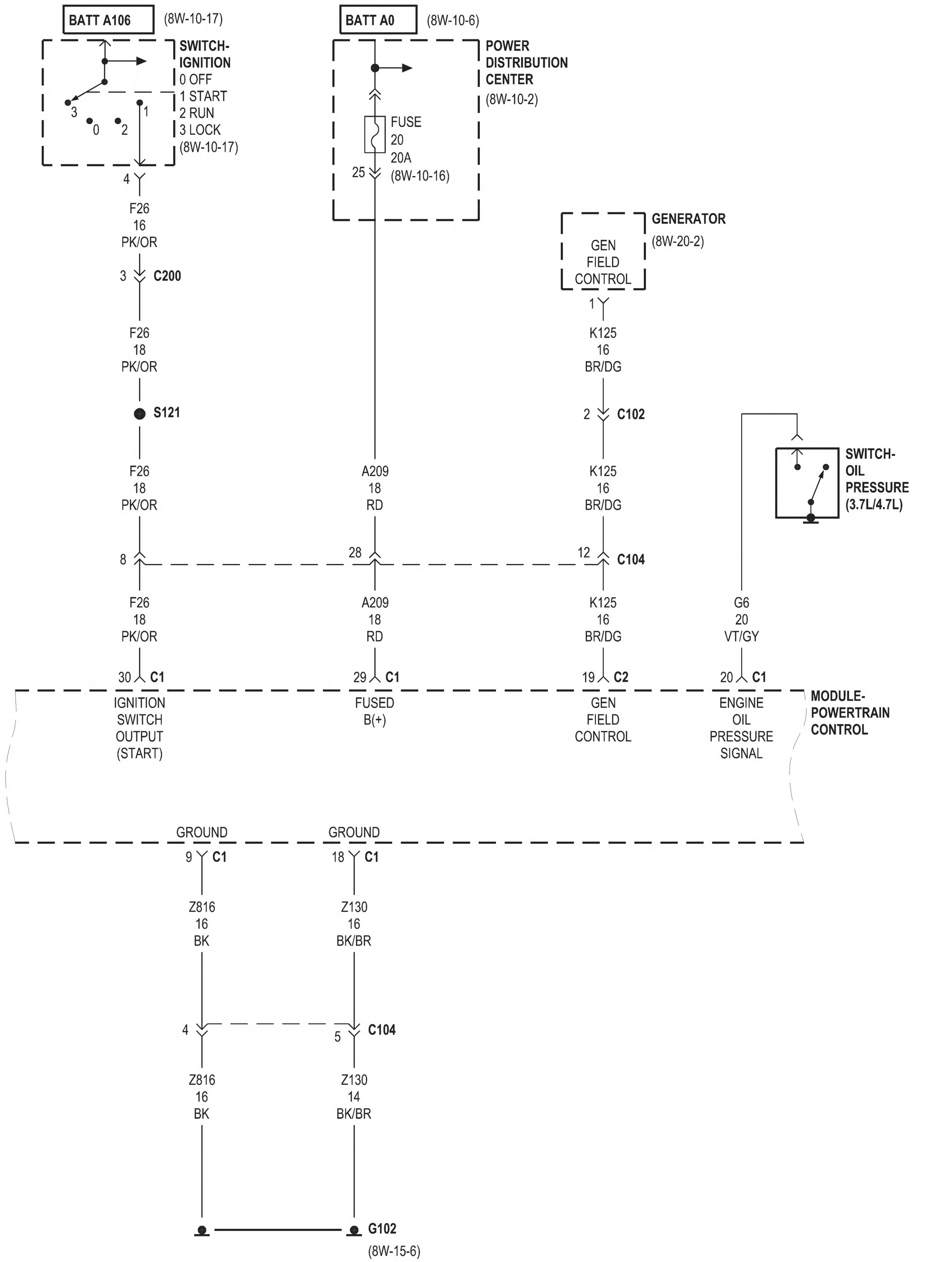

FROM
C102
(8W-21-2)
A
T750
12
YL/GY
1
A8 6RD
STARTER
BATTERY
(8W-10-6)
+
-
A1
6
RD
FUSIBLE
LINK
A1
10
BR/RD
B(+)
MODULE-
INTEGRATED
POWER
(8W-13-2)
A0
8
RD
B(+)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
A11
6
BR/RD
B(+)
GENERATOR
(8W-20-2)
GEN
FIELD
CONTROL
GROUND
1
2
K125
16
BR/DG
Z385
18
BK
2
1
C102
K125
16
BR/DG
12
C104
K125
16
BR/DG
Z385
18
BK
Z1
6
BK
Z100
6
BK/VT
19
C2
GEN
FIELD
CONTROL
MODULE-
POWERTRAIN
CONTROL
(8W-30-3)
G104
(8W-15-7)
G105
(8W-15-7)
G100
(8W-15-4)

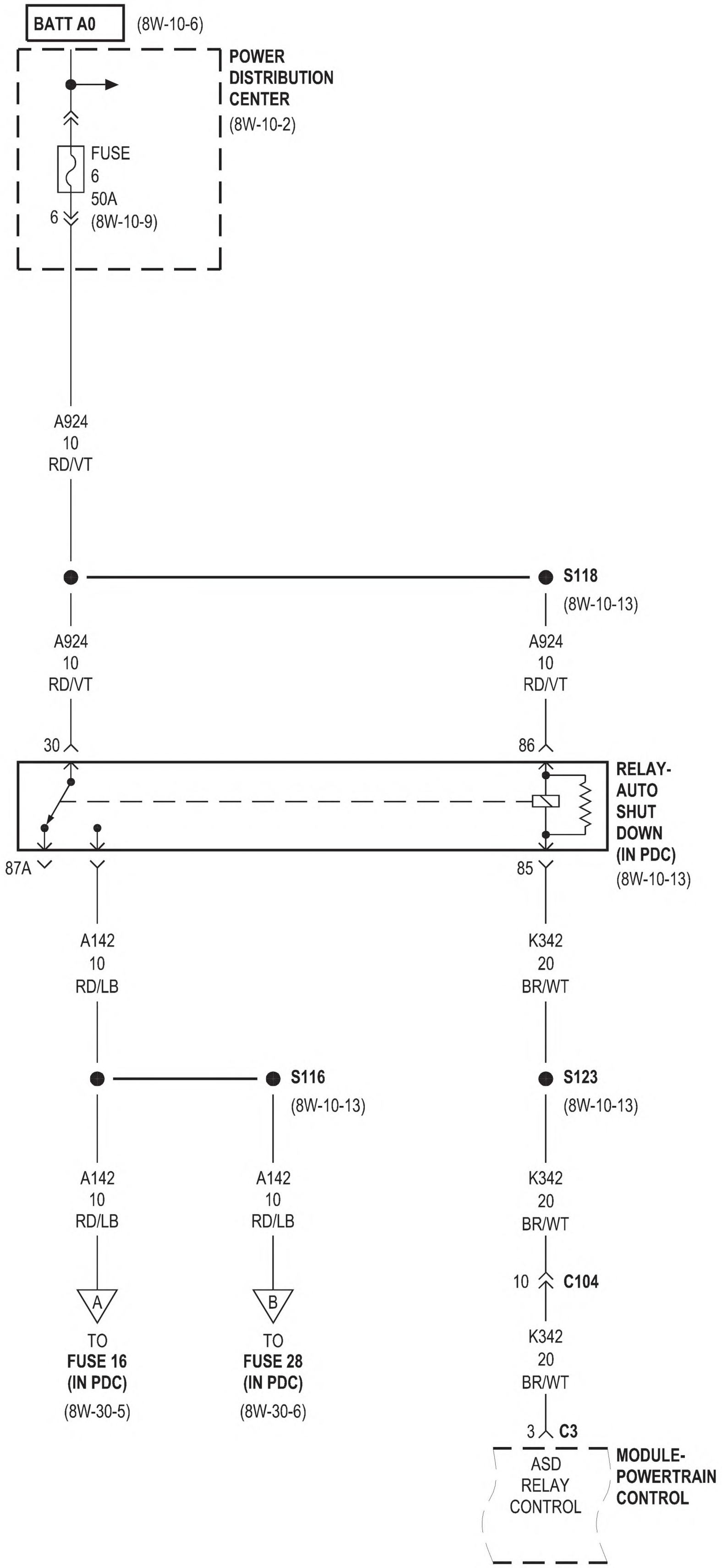
8W-30 FUEL/IGNITION SYSTEM

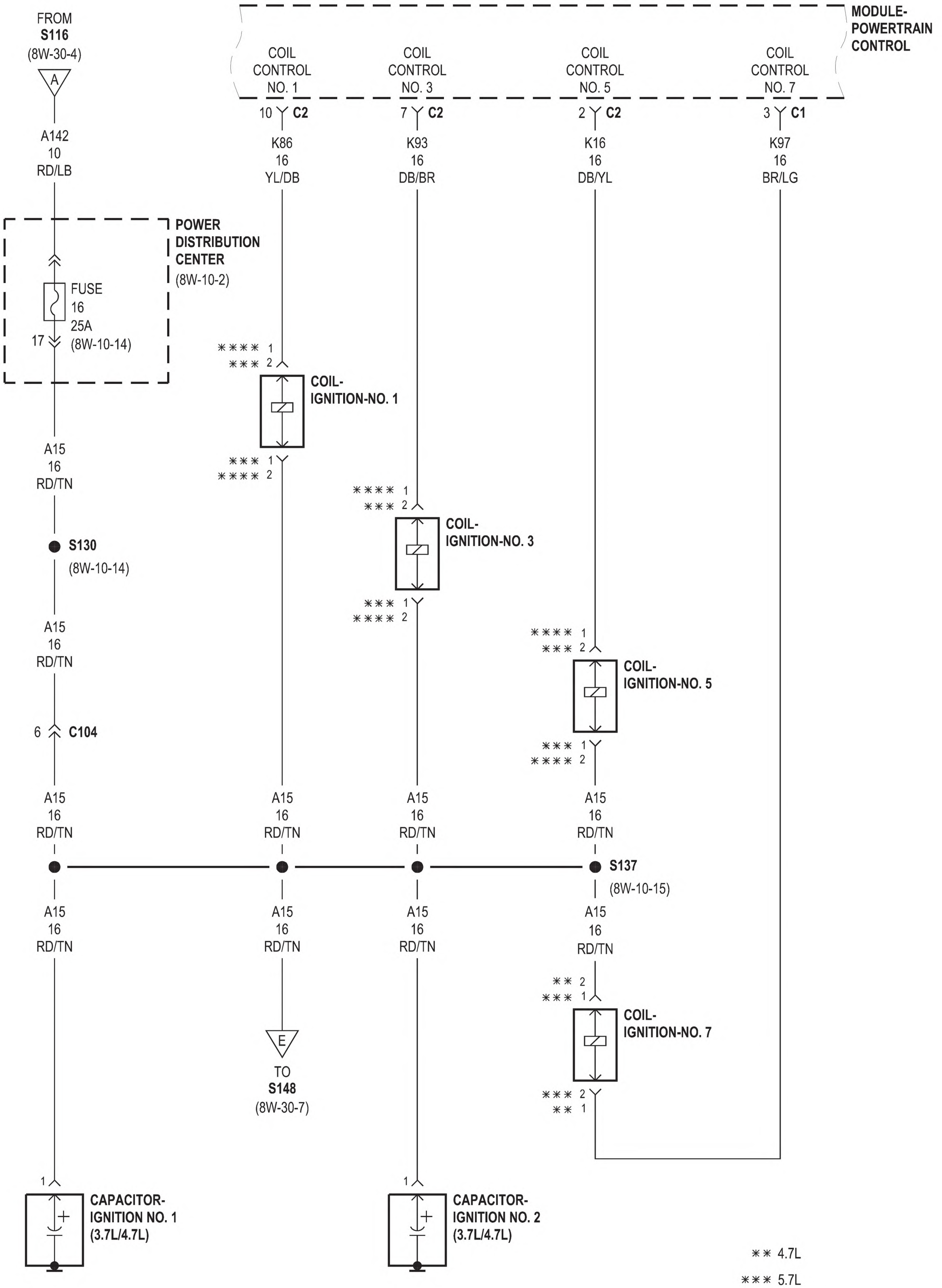
Component	Page
Assembly-Exhaust Gas Recirculation Valve	8W-30-11
Assembly-Natural Vacuum Leak Detection	8W-30-17
Assembly-Shift Lever	8W-30-19
Capacitor-Ignition No. 1	8W-30-5
Capacitor-Ignition No. 2	8W-30-5
Cluster	8W-30-15
Coil-Ignition-No. 1	8W-30-5
Coil-Ignition-No. 2	8W-30-7
Coil-Ignition-No. 3	8W-30-5
Coil-Ignition-No. 4	8W-30-7
Coil-Ignition-No. 5	8W-30-5
Coil-Ignition-No. 6	8W-30-7
Coil-Ignition-No. 7	8W-30-5
Coil-Ignition-No. 8	8W-30-7
Data Link Connector	8W-30-2
Diode-Zener No. 2	8W-30-15
Fan Module-Condenser Cooling	8W-30-20
Fuse 6	8W-30-4
Fuse 16	8W-30-4, 5, 18
Fuse 20	8W-30-3
Fuse 23	8W-30-20
Fuse 24	8W-30-2, 14
Fuse 28	8W-30-4, 6
G100	8W-30-14, 15, 20
G101	8W-30-8, 9, 11, 13
G102	8W-30-3
G200	8W-30-18
G302	8W-30-15, 17
Generator	8W-30-3
Injector-Fuel-No. 1	8W-30-6
Injector-Fuel-No. 2	8W-30-7
Injector-Fuel-No. 3	8W-30-6
Injector-Fuel-No. 4	8W-30-7
Injector-Fuel-No. 5	8W-30-6
Injector-Fuel-No. 6	8W-30-7
Injector-Fuel-No. 7	8W-30-6
Injector-Fuel-No. 8	8W-30-7
Junction Block	8W-30-2, 14, 18
Module-Antilock Brakes	8W-30-2
Module-Front Control	8W-30-2, 14, 20
Module-Hydraulic Cooling Fan	8W-30-14
Module-Integrated Power	8W-30-2, 14, 15, 20
Module-Powertrain Control	8W-30-2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19
Module-Steering Control	8W-30-18
Motor-Fuel Pump	8W-30-15
Motor-Iac	8W-30-17
Power Distribution Center	8W-30-3, 4, 5, 6, 14
Relay-A/C Clutch	8W-30-18
Relay-Auto Shut Down	8W-30-4
Relay-Fuel Pump	8W-30-14, 15
Relay-Radiator Fan High	8W-30-20
Relay-Radiator Fan Low	8W-30-20
Relay-Starter Motor	8W-30-17
Sensor-Accelerator Pedal Position	8W-30-10
Sensor-Camshaft Position	8W-30-11
Sensor-Crankshaft Position	8W-30-12
Sensor-Engine Coolant Temperature	8W-30-16
Sensor-Intake Air Temperature	8W-30-16
Sensor-Knock	8W-30-16
Sensor-Knock No. 1	8W-30-16
Sensor-Knock No. 2	8W-30-16
Sensor-Line Pressure	8W-30-11
Sensor-Map	8W-30-11
Sensor-Oil Pressure	8W-30-10
Sensor-Oil Temperature	8W-30-10
Sensor-Oxygen-Left Front	8W-30-9
Sensor-Oxygen-Left Rear	8W-30-8
Sensor-Oxygen-Right Front	8W-30-9
Sensor-Oxygen-Right Rear	8W-30-8
Sensor-Throttle Position	8W-30-12
Servo-Speed Control	8W-30-18
Solenoid-EVAP/Purge	8W-30-19
Solenoid-Multi Displacement System Cyl 1	8W-30-13
Solenoid-Multi Displacement System Cyl 4	8W-30-13
Solenoid-Multi Displacement System Cyl 6	8W-30-13
Solenoid-Multi Displacement System Cyl 7	8W-30-13
Switch-Ignition	8W-30-3
Switch-Oil Pressure	8W-30-3
Switch-Stop Lamp	8W-30-19
Throttle Body	8W-30-12


RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
24
10A
(8W-12-19)
2
36 C1
F942 20 PK/LG
S106
(8W-12-19)
(8W-13-21)
F942 20 PK/LG
24
F942 20 PK/LG
11 C1
MODULE-INTEGRATED POWER
(8W-13-2)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-FRONT CONTROL
(8W-13-21)
13 IPM
# 36 C1
F1 18 PK/WT
S132
(8W-13-21)
F1 18 PK/WT
# 43
F1 18 PK/WT
# 12 C1
# 15
# 9
12
DATA LINK CONNECTOR
(8W-18-2)
D15 20 BR/WT
D16 20 WT/OR
D118 20 LG/WT
# 22
# 23
25
C200
D15 20 BR/WT
D16 20 WT/OR
D118 20 LG/WT
# 16
# 17
21
C104
D15 20 BR/WT
D16 20 WT/OR
D118 20 LG/WT
# 37 C1
# 26 C1
25 C1
MODULE-POWERTRAIN CONTROL
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
SCI TRANSMIT (TCM)
SCI RECEIVE (TCM)
SCI RECEIVE
SCI TRANSMIT
CAN C BUS (-)
CAN C BUS (+)
36 C1
35 C1
34 C1
D223 20 WT/VT
D64 20 WT/LB
D65 20 WT/LG
22
13
14
C104
D223 20 WT/VT
D64 20 WT/LB
D65 20 WT/LG
S119
(8W-18-2)
S104
(8W-18-8)
S105
(8W-18-3)
D223 18 WT/VT
D64 18 WT/LB
D65 18 WT/LG
▨▨▨▨ 10
▨▨▨ 2
▨▨ 13
▨ 15
▨▨ 12
▨ 11
SCI TRANSMIT
CAN C BUS (-)
CAN C BUS (+)
MODULE-ANTILOCK BRAKES
(8W-35-2)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
▨▨▨ TCS
▨▨▨▨ EXCEPT TCS
# 4.7L/5.7L

WK503002


BATT A106
(8W-10-17)
SWITCH-
IGNITION
0 OFF
1 START
2 RUN
3 LOCK
(8W-10-17)
3
0
2
1
4
F26
16
PK/OR
3
C200
F26
18
PK/OR
S121
F26
18
PK/OR
BATT A0
(8W-10-6)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
20
20A
(8W-10-16)
25
A209
18
RD
GENERATOR
(8W-20-2)
GEN
FIELD
CONTROL
1
K125
16
BR/DG
2
C102
K125
16
BR/DG
SWITCH-
OIL
PRESSURE
(3.7L/4.7L)
8
28
12
C104
F26
18
PK/OR
A209
18
RD
K125
16
BR/DG
G6
20
VT/GY
30 C1
29 C1
19 C2
20 C1
IGNITION
SWITCH
OUTPUT
(START)
FUSED
B(+)
GEN
FIELD
CONTROL
ENGINE
OIL
PRESSURE
SIGNAL
MODULE-
POWERTRAIN
CONTROL
GROUND
GROUND
9 C1
18 C1
Z816
16
BK
Z130
16
BK/BR
4
5
C104
Z816
16
BK
Z130
14
BK/BR
G102
(8W-15-6)


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
6
50A
(8W-10-9)
6
A924
10
RD/VT
S118
(8W-10-13)
A924
10
RD/VT
A924
10
RD/VT
30
86
RELAY-AUTO SHUT DOWN (IN PDC)
(8W-10-13)
87A
85
A142
10
RD/LB
K342
20
BR/WT
S116
(8W-10-13)
S123
(8W-10-13)
A142
10
RD/LB
A142
10
RD/LB
K342
20
BR/WT
10
C104
K342
20
BR/WT
A
TO
FUSE 16
(IN PDC)
(8W-30-5)
B
TO
FUSE 28
(IN PDC)
(8W-30-6)
3
C3
ASD RELAY CONTROL
MODULE-POWERTRAIN CONTROL


FROM
S116
(8W-30-4)
A
A142
10
RD/LB
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
16
25A
17
(8W-10-14)
A15
16
RD/TN
S130
(8W-10-14)
6
C104
MODULE-POWERTRAIN CONTROL
COIL CONTROL NO. 1
COIL CONTROL NO. 3
COIL CONTROL NO. 5
COIL CONTROL NO. 7
10 C2
7 C2
2 C2
3 C1
K86
16
YL/DB
K93
16
DB/BR
K16
16
DB/YL
K97
16
BR/LG
∗∗∗∗ 1
∗∗∗ 2
∗∗∗ 1
∗∗∗∗ 2
COIL-IGNITION-NO. 1
COIL-IGNITION-NO. 3
COIL-IGNITION-NO. 5
∗∗ 2
∗∗∗ 1
∗∗∗ 2
∗∗ 1
COIL-IGNITION-NO. 7
S137
(8W-10-15)
E
TO
S148
(8W-30-7)
1
CAPACITOR-IGNITION NO. 1 (3.7L/4.7L)
CAPACITOR-IGNITION NO. 2 (3.7L/4.7L)
∗∗ 4.7L
∗∗∗ 5.7L
∗∗∗∗ 3.7L/4.7L

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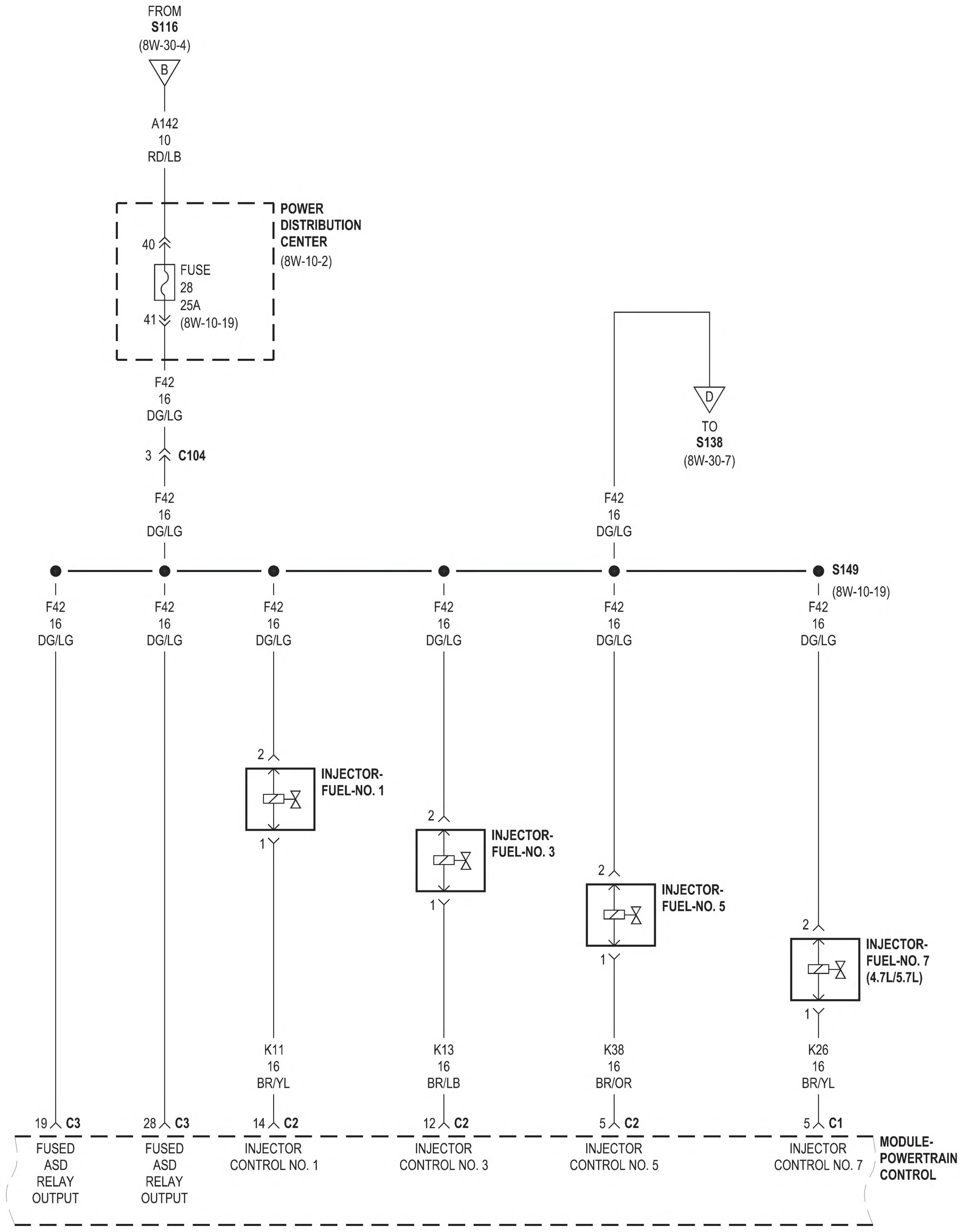
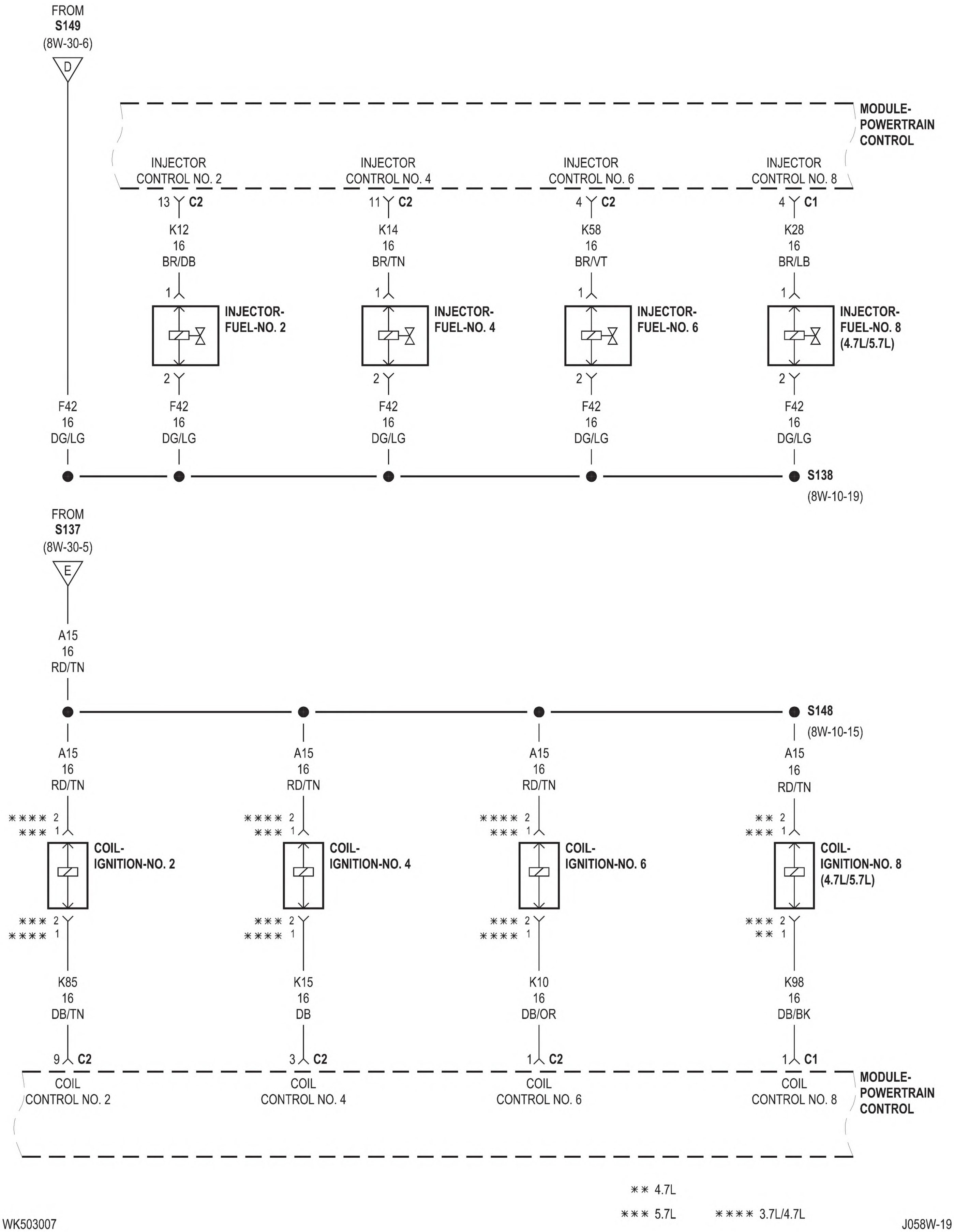
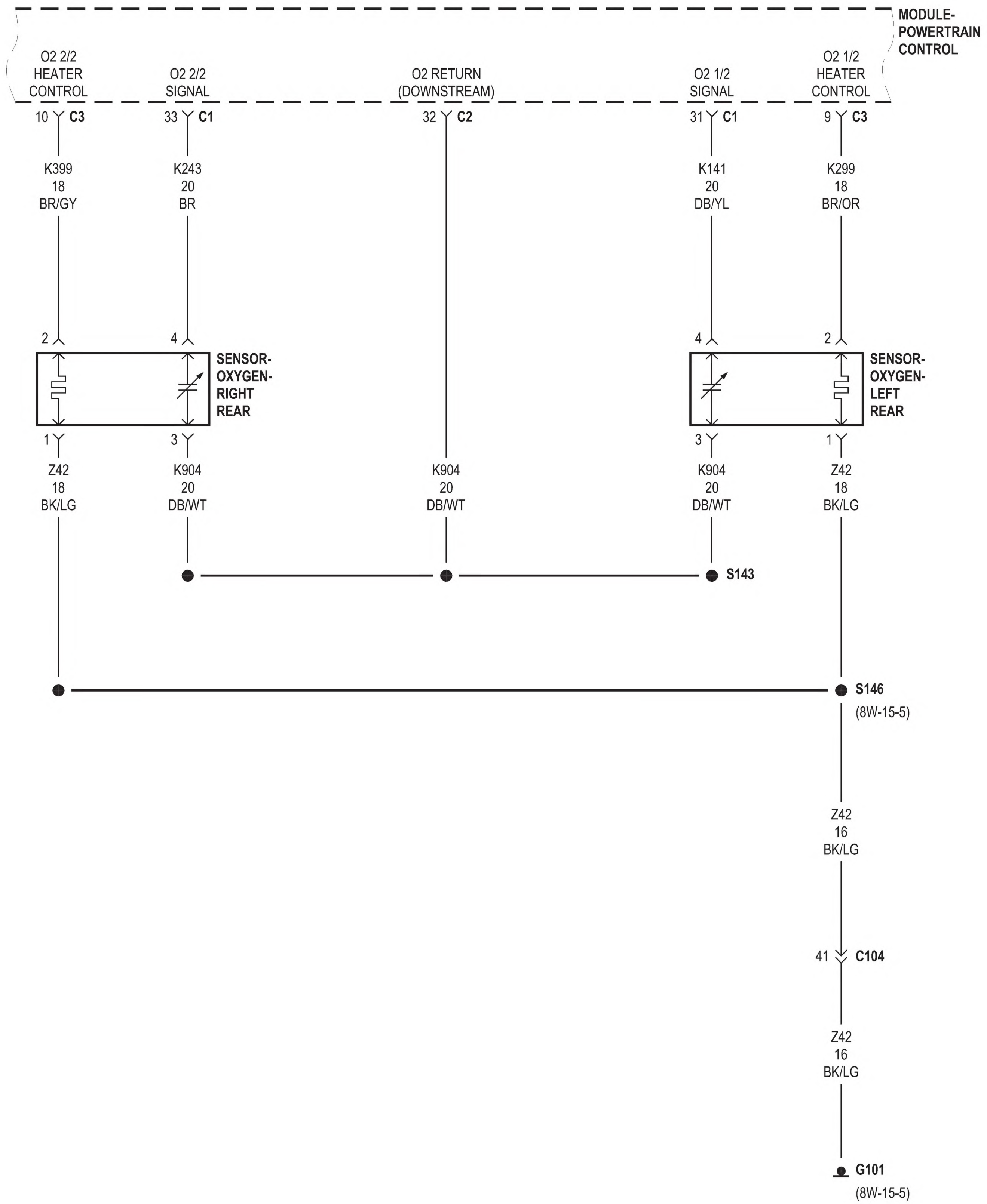
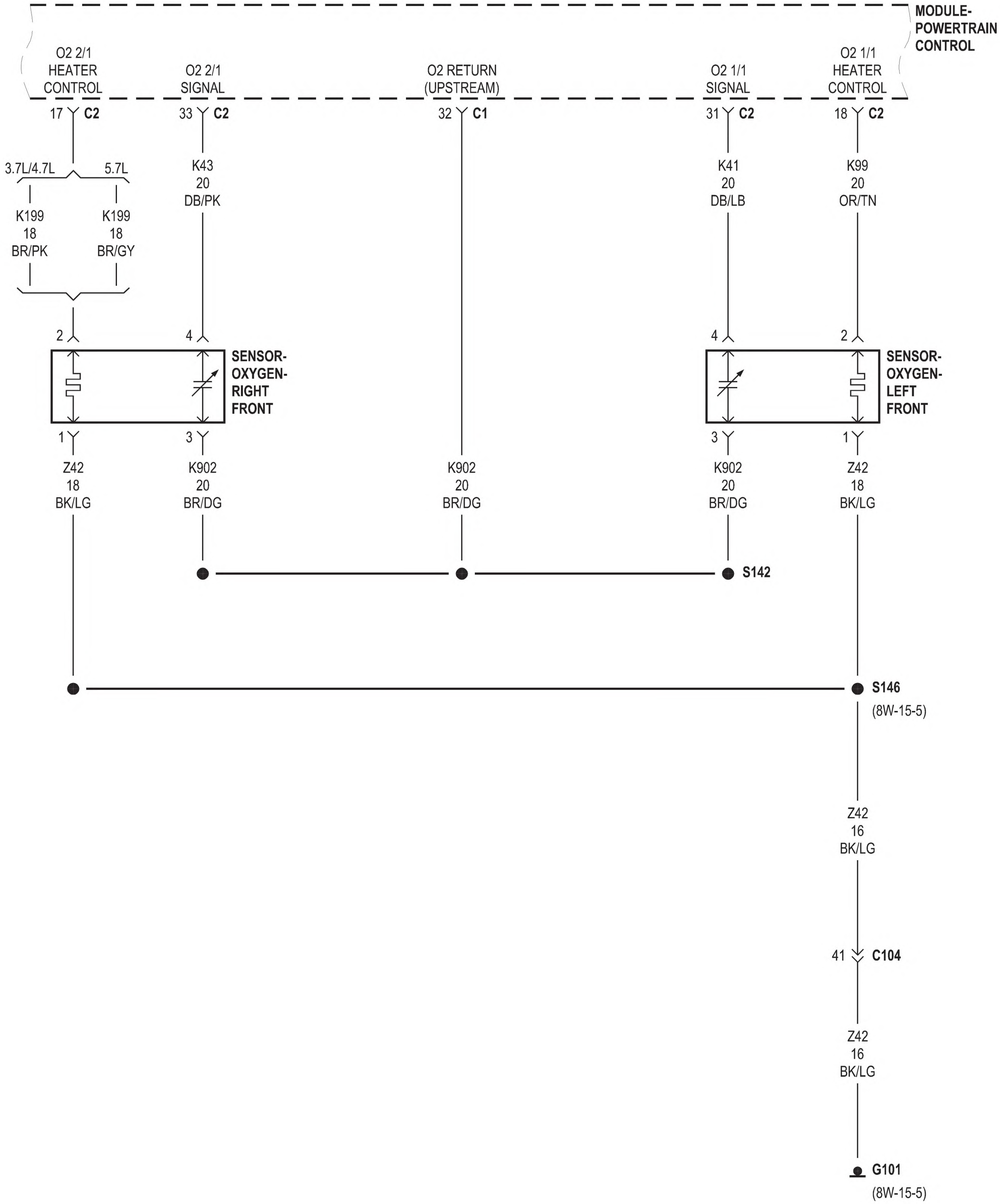
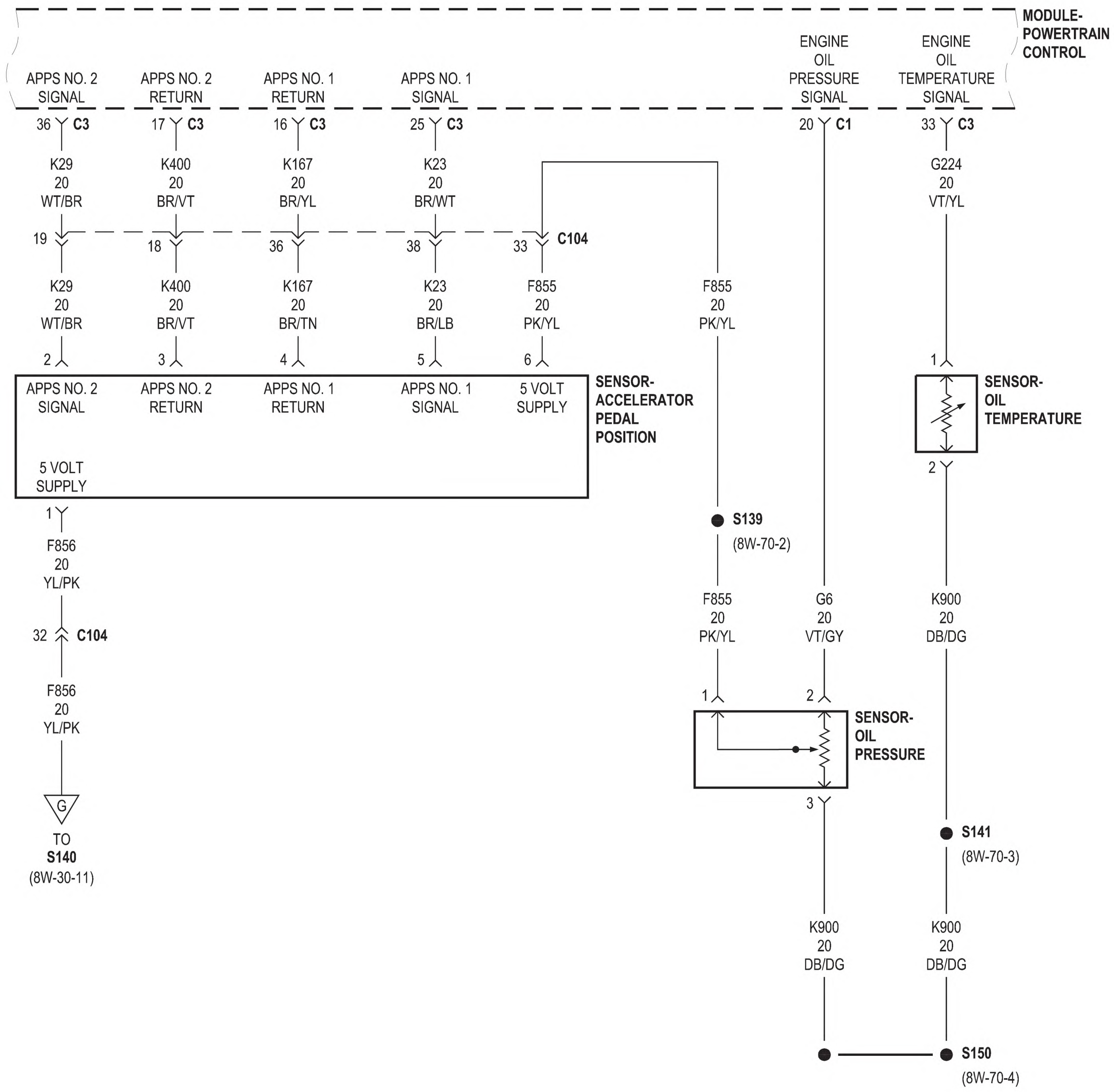
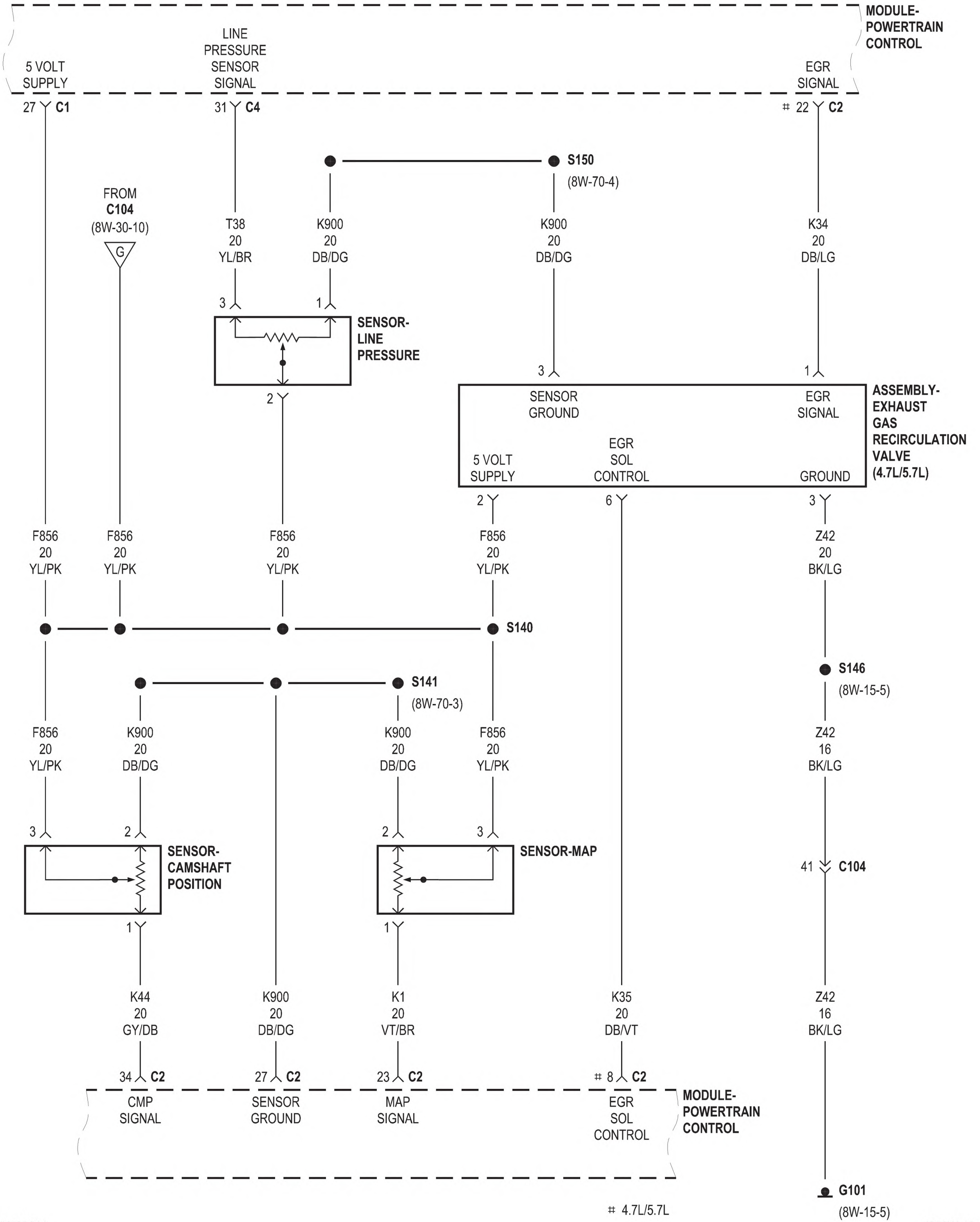

FROM
S116
(8W-30-4)
B
A142
10
RD/LB
POWER
DISTRIBUTION
CENTER
(8W-10-2)
40
FUSE
28
25A
(8W-10-19)
41
F42
16
DG/LG
3
C104
F42
16
DG/LG
D
TO
S138
(8W-30-7)
F42
16
DG/LG
S149
(8W-10-19)
F42
16
DG/LG
2
INJECTOR-
FUEL-NO. 1
1
2
INJECTOR-
FUEL-NO. 3
1
2
INJECTOR-
FUEL-NO. 5
1
2
INJECTOR-
FUEL-NO. 7
(4.7L/5.7L)
1
K11
16
BR/YL
K13
16
BR/LB
K38
16
BR/OR
K26
16
BR/YL
19 C3
28 C3
14 C2
12 C2
5 C2
5 C1
FUSED
ASD
RELAY
OUTPUT
FUSED
ASD
RELAY
OUTPUT
INJECTOR
CONTROL NO. 1
INJECTOR
CONTROL NO. 3
INJECTOR
CONTROL NO. 5
INJECTOR
CONTROL NO. 7
MODULE-
POWERTRAIN
CONTROL


FROM
S149
(8W-30-6)
D
MODULE-POWERTRAIN CONTROL
INJECTOR CONTROL NO. 2
INJECTOR CONTROL NO. 4
INJECTOR CONTROL NO. 6
INJECTOR CONTROL NO. 8
13 C2
11 C2
4 C2
4 C1
K12 16 BR/DB
K14 16 BR/TN
K58 16 BR/VT
K28 16 BR/LB
1
INJECTOR-FUEL-NO. 2
INJECTOR-FUEL-NO. 4
INJECTOR-FUEL-NO. 6
INJECTOR-FUEL-NO. 8 (4.7L/5.7L)
2
F42 16 DG/LG
S138
(8W-10-19)
FROM
S137
(8W-30-5)
E
A15 16 RD/TN
S148
(8W-10-15)
**** 2
*** 1
** 2
COIL-IGNITION-NO. 2
COIL-IGNITION-NO. 4
COIL-IGNITION-NO. 6
COIL-IGNITION-NO. 8 (4.7L/5.7L)
*** 2
**** 1
** 1
K85 16 DB/TN
K15 16 DB
K10 16 DB/OR
K98 16 DB/BK
9 C2
3 C2
1 C2
1 C1
COIL CONTROL NO. 2
COIL CONTROL NO. 4
COIL CONTROL NO. 6
COIL CONTROL NO. 8
MODULE-POWERTRAIN CONTROL
** 4.7L
*** 5.7L
**** 3.7L/4.7L


MODULE-
POWERTRAIN
CONTROL
O2 2/2
HEATER
CONTROL
O2 2/2
SIGNAL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
10 C3
33 C1
32 C2
31 C1
9 C3
K399
18
BR/GY
K243
20
BR
K141
20
DB/YL
K299
18
BR/OR
2
4
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
SENSOR-
OXYGEN-
LEFT
REAR
1
3
3
1
Z42
18
BK/LG
K904
20
DB/WT
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
(8W-15-5)
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
(8W-15-5)

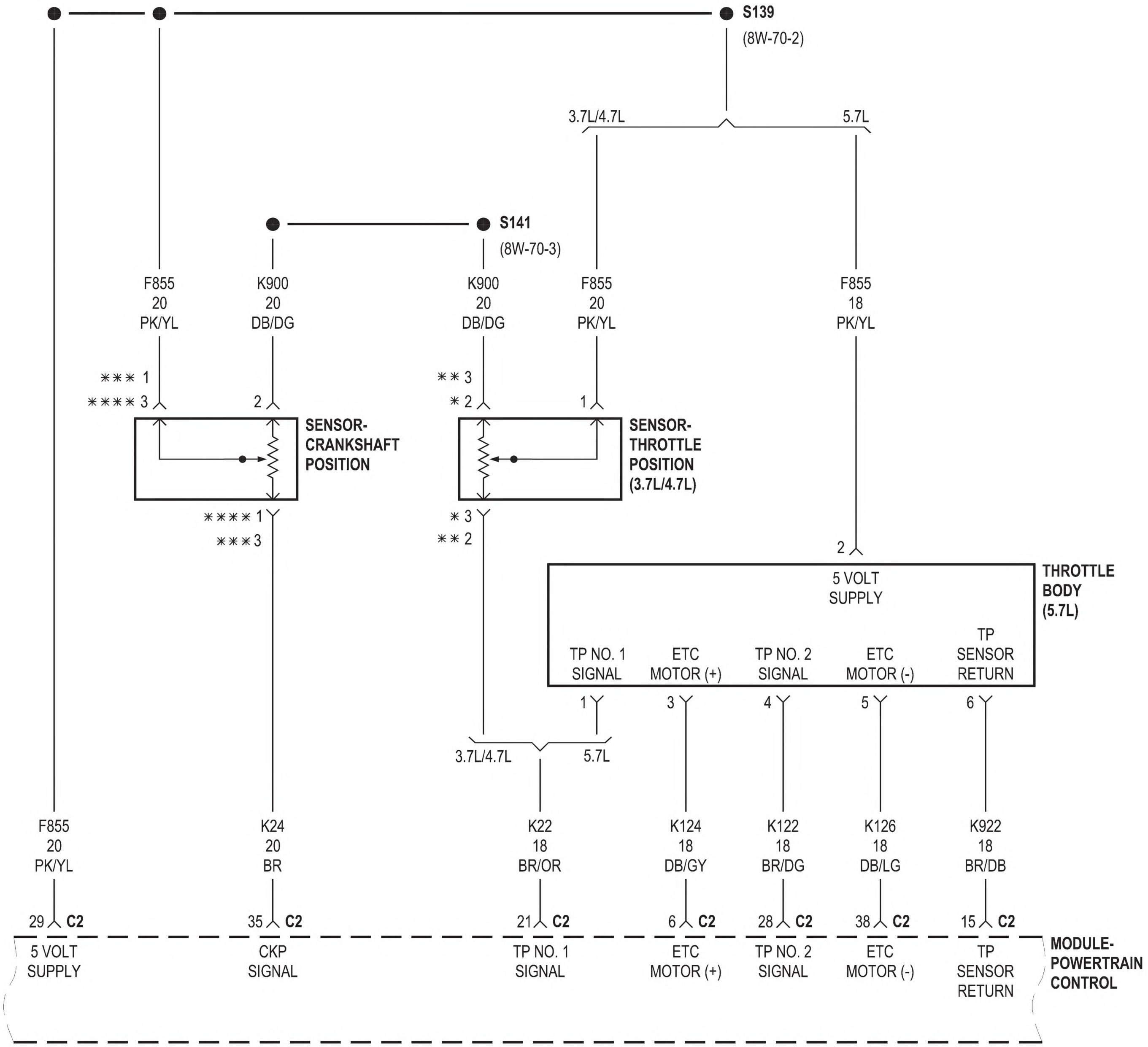

MODULE-
POWERTRAIN
CONTROL
O2 2/1
HEATER
CONTROL
O2 2/1
SIGNAL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
17 C2
33 C2
32 C1
31 C2
18 C2
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
K43
20
DB/PK
K41
20
DB/LB
K99
20
OR/TN
2
4
SENSOR-
OXYGEN-
RIGHT
FRONT
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
1
3
3
1
Z42
18
BK/LG
K902
20
BR/DG
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
(8W-15-5)
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
(8W-15-5)


MODULE-
POWERTRAIN
CONTROL
APPS NO. 2 SIGNAL
APPS NO. 2 RETURN
APPS NO. 1 RETURN
APPS NO. 1 SIGNAL
ENGINE OIL PRESSURE SIGNAL
ENGINE OIL TEMPERATURE SIGNAL
36 C3
17 C3
16 C3
25 C3
20 C1
33 C3
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/YL
K23 20 BR/WT
G224 20 VT/YL
19
18
36
38
33
C104
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/TN
K23 20 BR/LB
F855 20 PK/YL
F855 20 PK/YL
2
3
4
5
6
APPS NO. 2 SIGNAL
APPS NO. 2 RETURN
APPS NO. 1 RETURN
APPS NO. 1 SIGNAL
5 VOLT SUPPLY
5 VOLT SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
1
SENSOR-
OIL
TEMPERATURE
2
1
F856 20 YL/PK
32 C104
F856 20 YL/PK
G
TO
S140
(8W-30-11)
S139
(8W-70-2)
F855 20 PK/YL
G6 20 VT/GY
K900 20 DB/DG
1
2
SENSOR-
OIL
PRESSURE
3
S141
(8W-70-3)
K900 20 DB/DG
K900 20 DB/DG
S150
(8W-70-4)


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
LINE
PRESSURE
SENSOR
SIGNAL
EGR
SIGNAL
27 C1
31 C4
# 22 C2
S150
(8W-70-4)
FROM
C104
(8W-30-10)
G
T38
20
YL/BR
K900
20
DB/DG
K900
20
DB/DG
K34
20
DB/LG
3
1
SENSOR-
LINE
PRESSURE
2
3
1
SENSOR
GROUND
EGR
SIGNAL
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
5 VOLT
SUPPLY
EGR
SOL
CONTROL
GROUND
2
6
3
F856
20
YL/PK
F856
20
YL/PK
F856
20
YL/PK
F856
20
YL/PK
Z42
20
BK/LG
S140
S146
(8W-15-5)
S141
(8W-70-3)
F856
20
YL/PK
K900
20
DB/DG
K900
20
DB/DG
F856
20
YL/PK
Z42
16
BK/LG
3
2
SENSOR-
CAMSHAFT
POSITION
2
3
SENSOR-MAP
41 C104
1
1
K44
20
GY/DB
K900
20
DB/DG
K1
20
VT/BR
K35
20
DB/VT
Z42
16
BK/LG
34 C2
27 C2
23 C2
# 8 C2
CMP
SIGNAL
SENSOR
GROUND
MAP
SIGNAL
EGR
SOL
CONTROL
MODULE-
POWERTRAIN
CONTROL
G101
(8W-15-5)
# 4.7L/5.7L

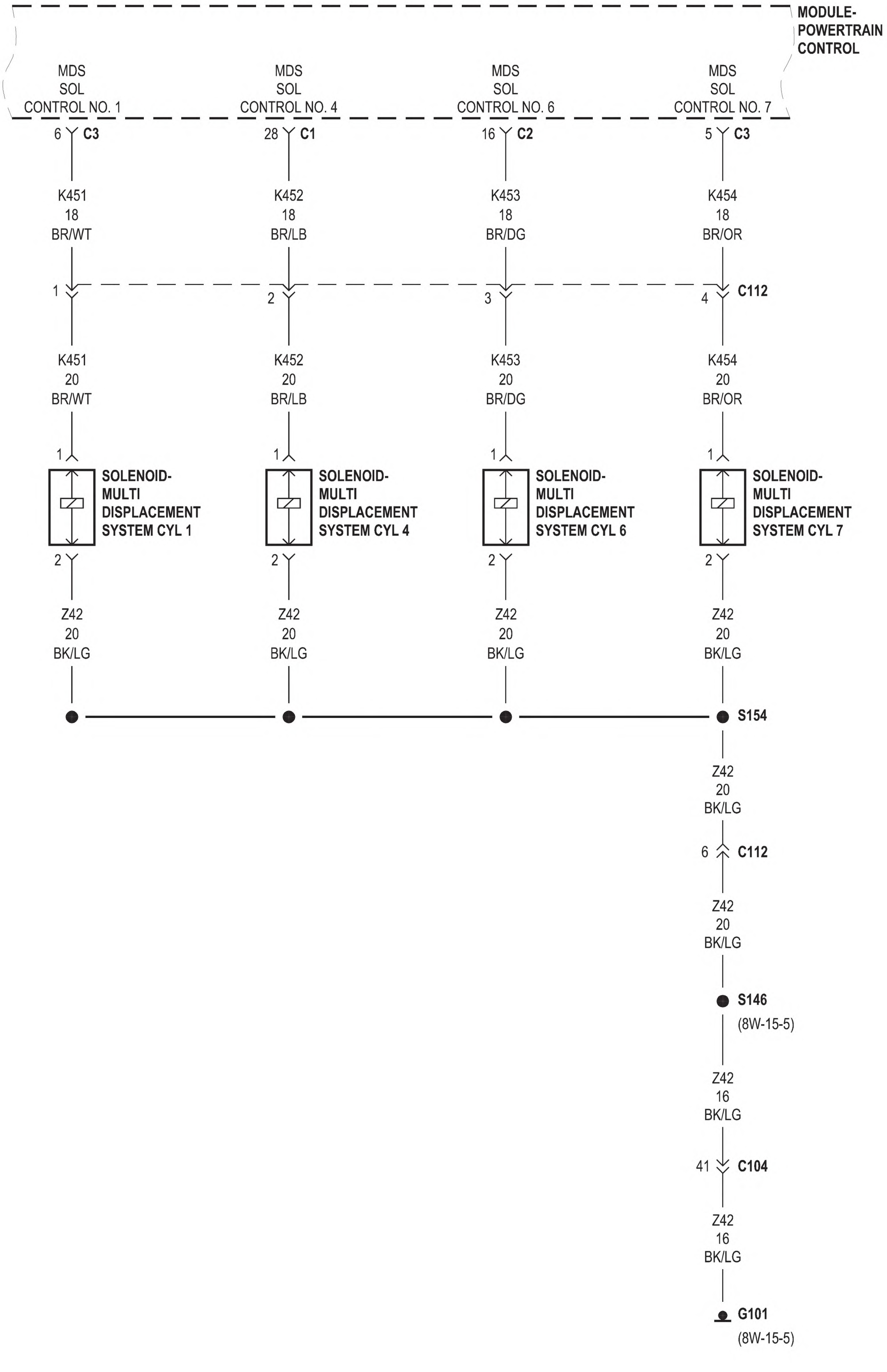
WK503011

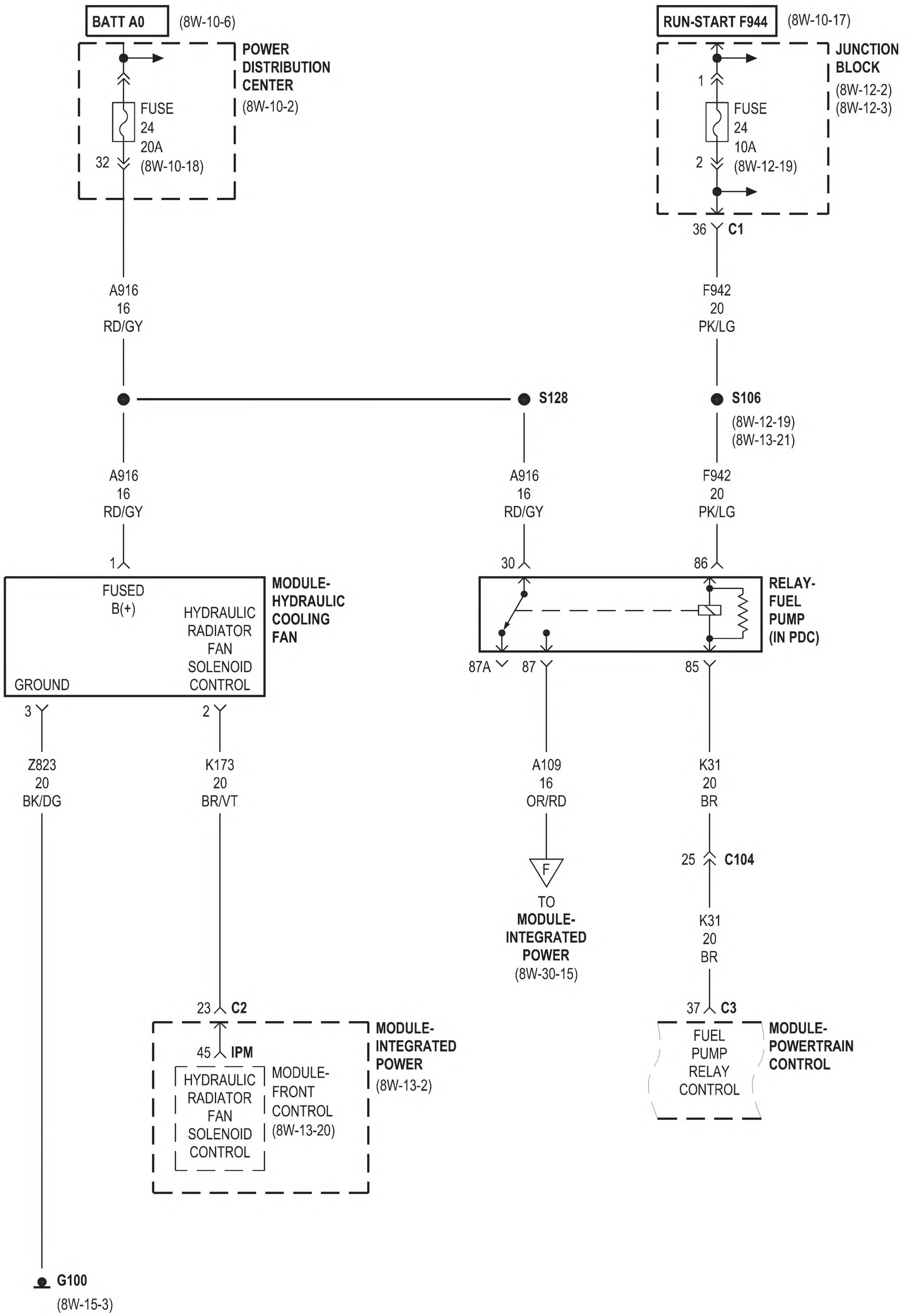
J058W-19

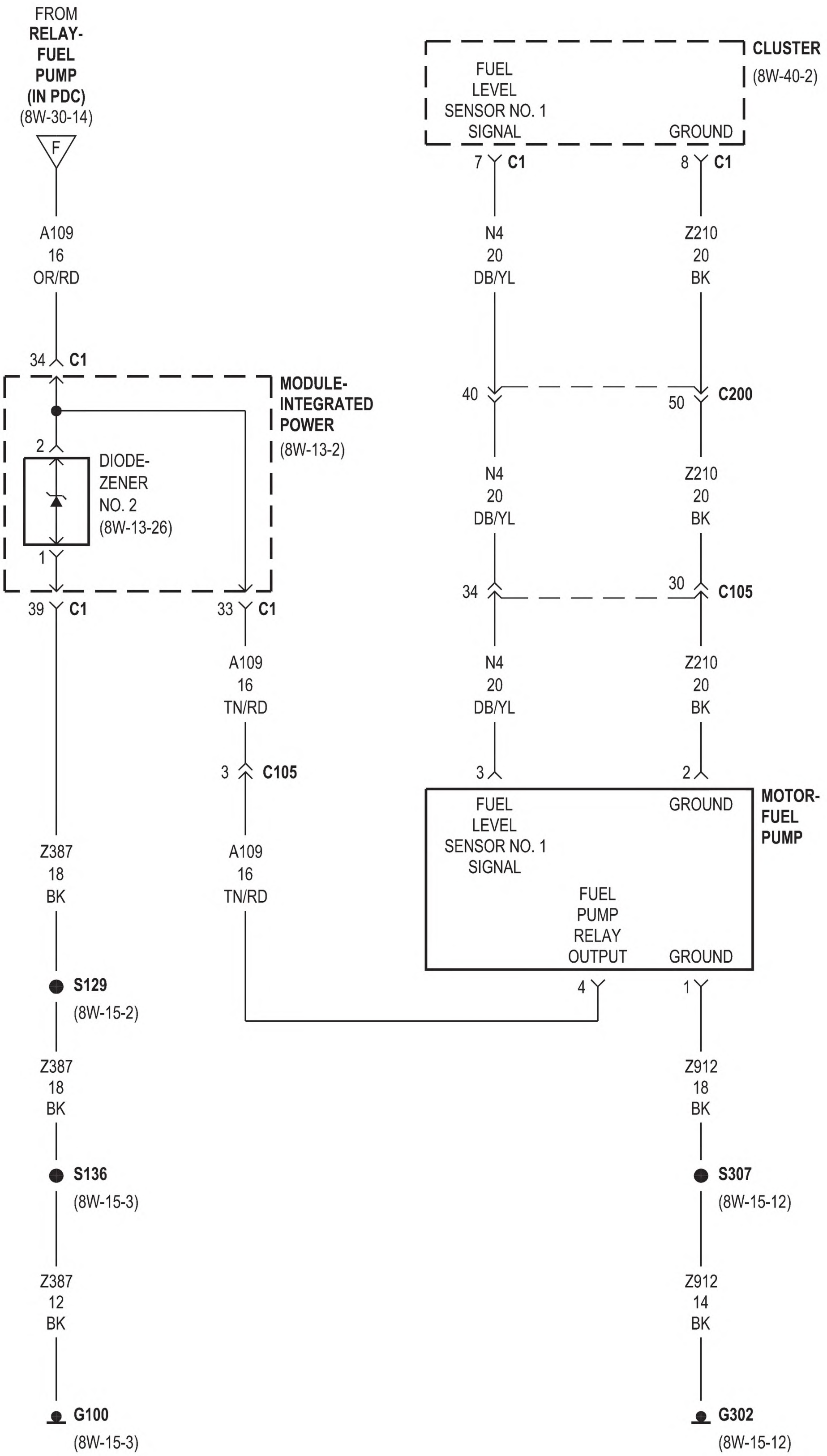

S139
(8W-70-2)
3.7L/4.7L
5.7L
S141
(8W-70-3)
F855
20
PK/YL
K900
20
DB/DG
K900
20
DB/DG
F855
20
PK/YL
F855
18
PK/YL
∗∗∗ 1
∗∗∗∗ 3
2
∗∗ 3
∗ 2
1
SENSOR-
CRANKSHAFT
POSITION
SENSOR-
THROTTLE
POSITION
(3.7L/4.7L)
∗∗∗∗ 1
∗∗∗ 3
∗ 3
∗∗ 2
2
5 VOLT
SUPPLY
THROTTLE
BODY
(5.7L)
TP NO. 1
SIGNAL
ETC
MOTOR (+)
TP NO. 2
SIGNAL
ETC
MOTOR (-)
TP
SENSOR
RETURN
1
3
4
5
6
3.7L/4.7L
5.7L
F855
20
PK/YL
K24
20
BR
K22
18
BR/OR
K124
18
DB/GY
K122
18
BR/DG
K126
18
DB/LG
K922
18
BR/DB
29 C2
35 C2
21 C2
6 C2
28 C2
38 C2
15 C2
5 VOLT
SUPPLY
CKP
SIGNAL
TP NO. 1
SIGNAL
ETC
MOTOR (+)
TP NO. 2
SIGNAL
ETC
MOTOR (-)
TP
SENSOR
RETURN
MODULE-
POWERTRAIN
CONTROL

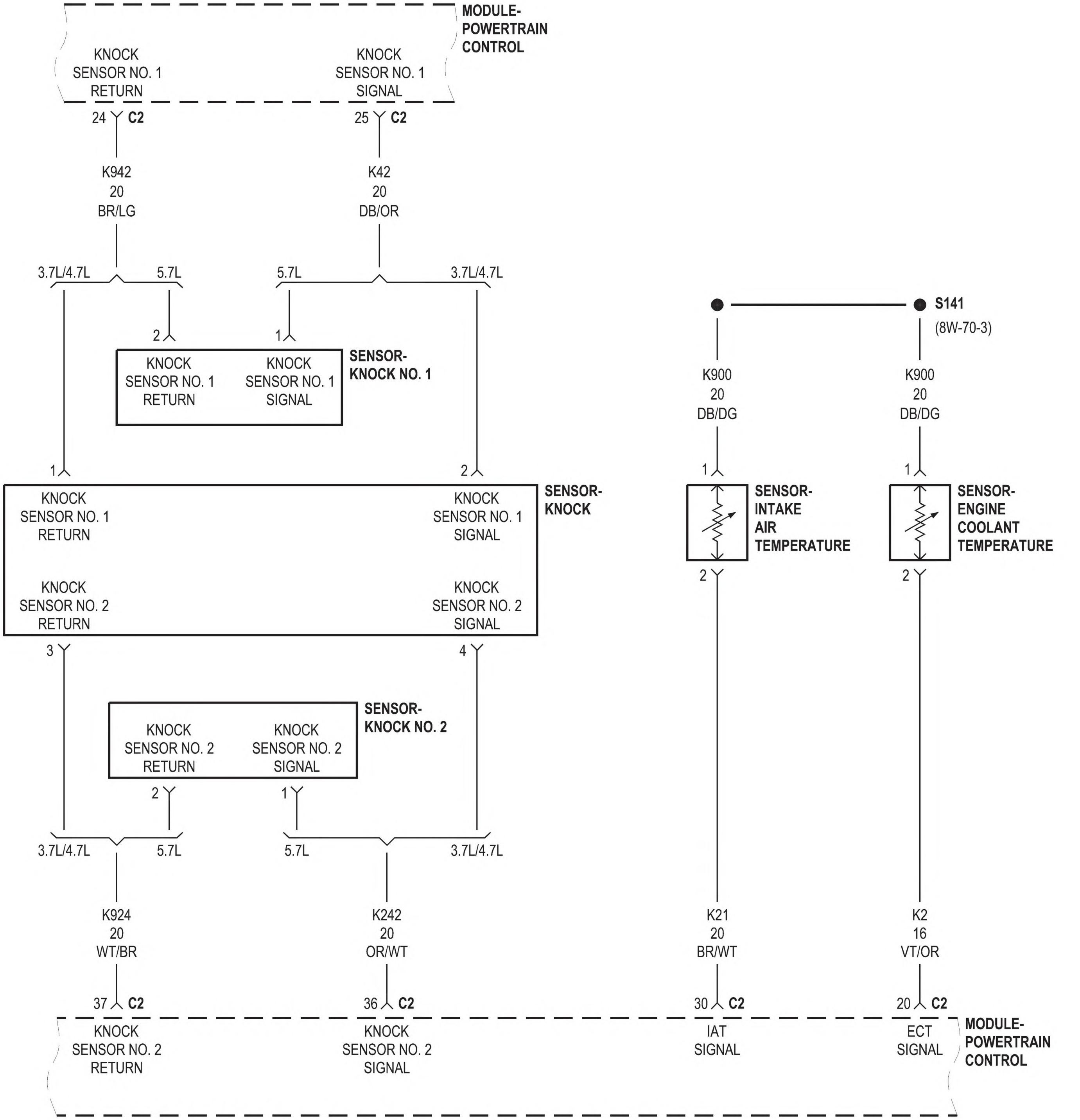
∗ 3.7L
∗∗∗ 5.7L
∗∗ 4.7L
∗∗∗∗ 3.7L/4.7L

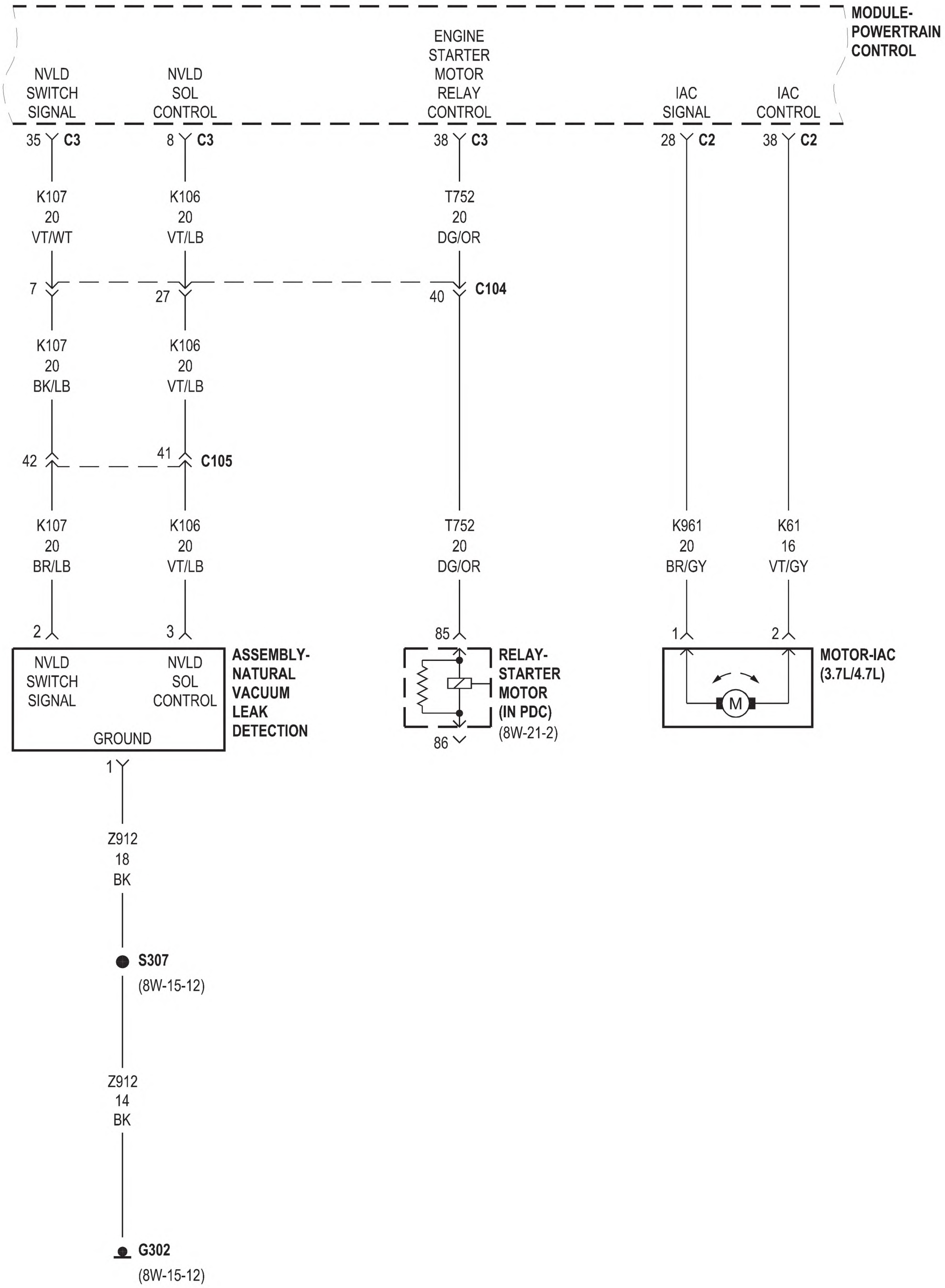
5.7L

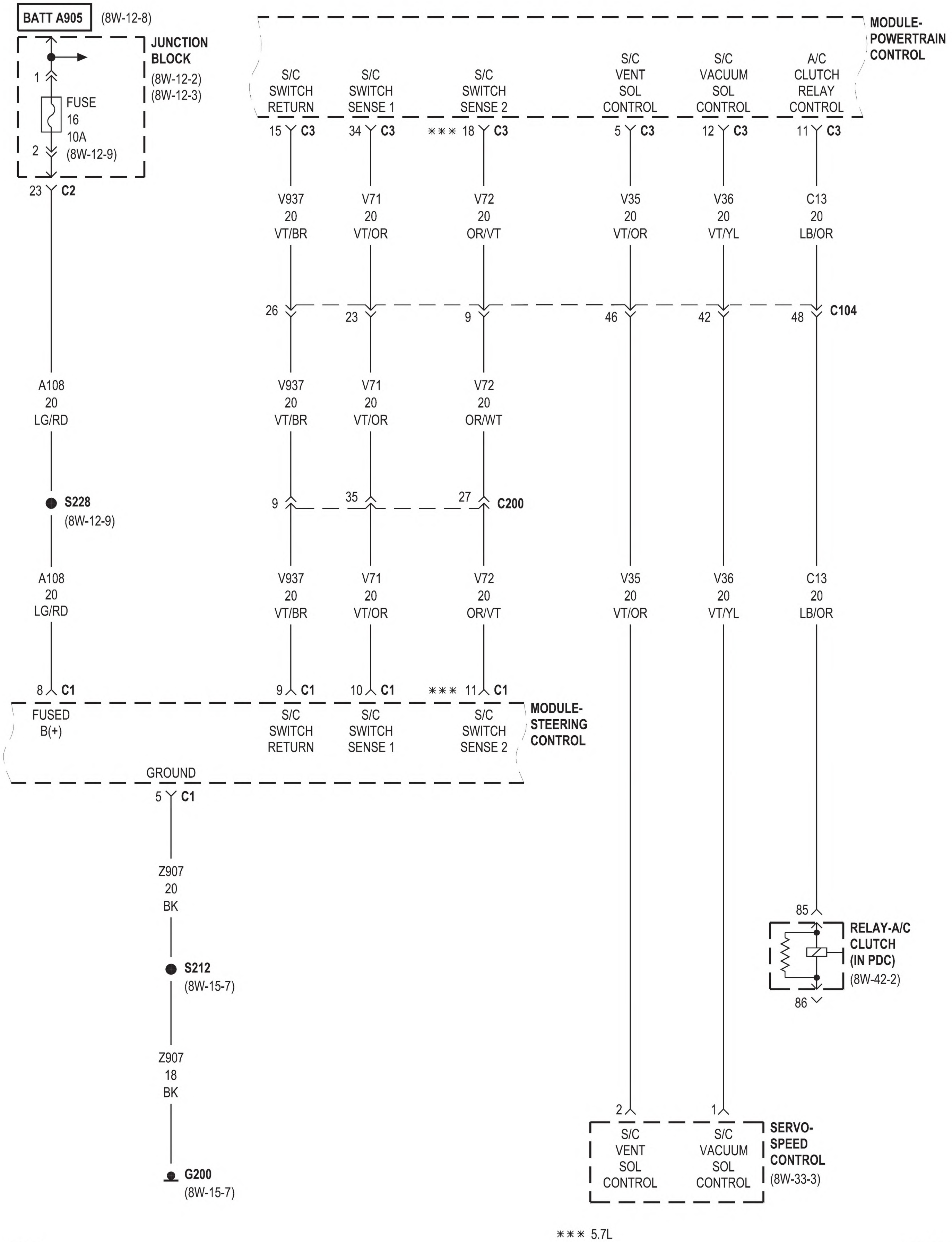

MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 1
MDS
SOL
CONTROL NO. 4
MDS
SOL
CONTROL NO. 6
MDS
SOL
CONTROL NO. 7
6 C3
28 C1
16 C2
5 C3
K451
18
BR/WT
K452
18
BR/LB
K453
18
BR/DG
K454
18
BR/OR
1
2
3
4 C112
K451
20
BR/WT
K452
20
BR/LB
K453
20
BR/DG
K454
20
BR/OR
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 4
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6 C112
Z42
20
BK/LG
S146
(8W-15-5)
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
(8W-15-5)


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 24 20A
(8W-10-18)
32
RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE 24 10A
(8W-12-19)
2
36 C1
A916 16 RD/GY
F942 20 PK/LG
S128
S106
(8W-12-19)
(8W-13-21)
A916 16 RD/GY
A916 16 RD/GY
F942 20 PK/LG
1
FUSED B(+)
HYDRAULIC RADIATOR FAN SOLENOID CONTROL
GROUND
MODULE-HYDRAULIC COOLING FAN
30
86
RELAY-FUEL PUMP (IN PDC)
87A
87
85
3
2
Z823 20 BK/DG
K173 20 BR/VT
A109 16 OR/RD
K31 20 BR
F
TO MODULE-INTEGRATED POWER
(8W-30-15)
25 C104
K31 20 BR
23 C2
45 IPM
HYDRAULIC RADIATOR FAN SOLENOID CONTROL
MODULE-FRONT CONTROL
(8W-13-20)
MODULE-INTEGRATED POWER
(8W-13-2)
37 C3
FUEL PUMP RELAY CONTROL
MODULE-POWERTRAIN CONTROL
G100
(8W-15-3)

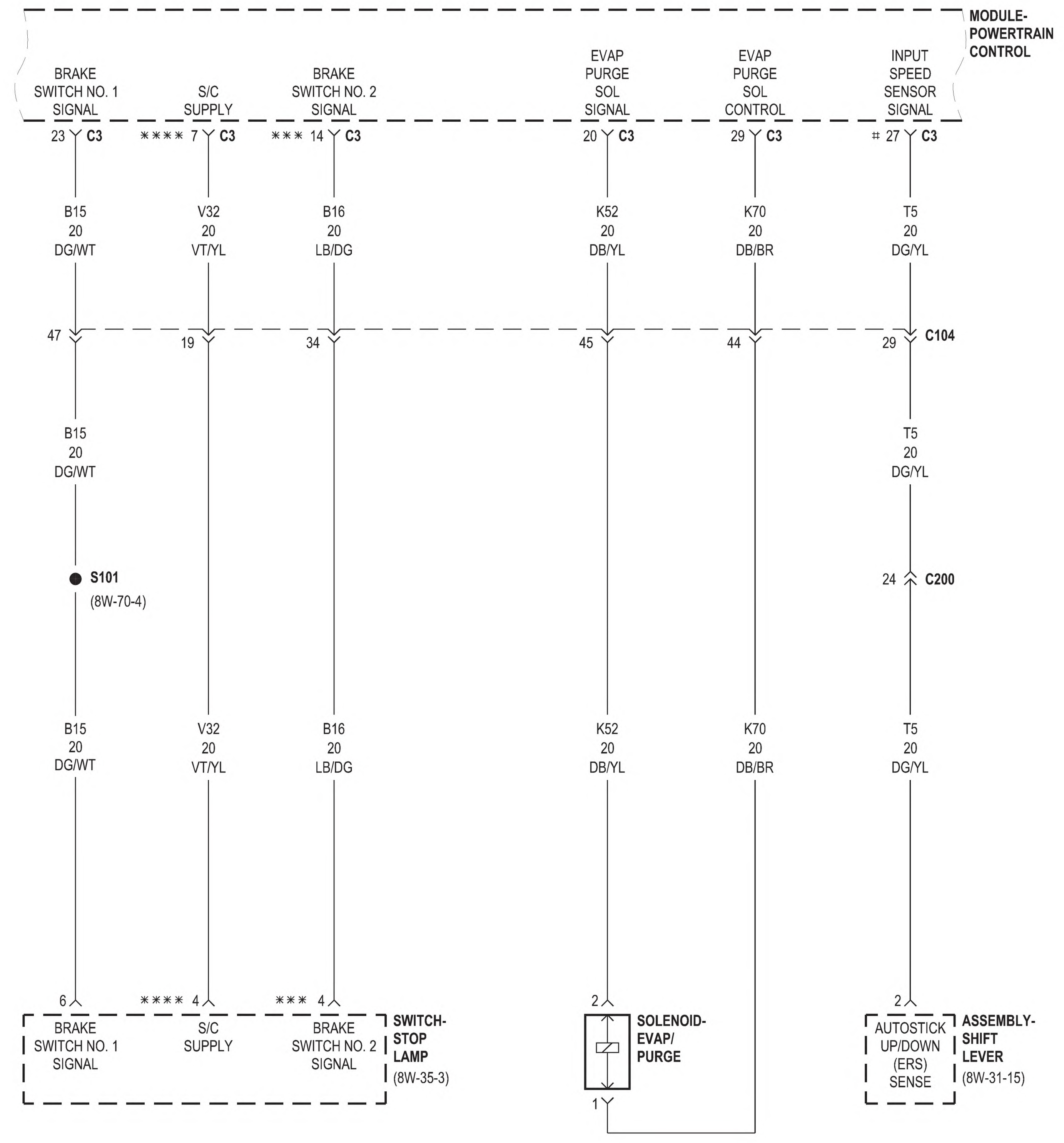

FROM
RELAY-
FUEL
PUMP
(IN PDC)
(8W-30-14)
F
A109
16
OR/RD
34 C1
MODULE-
INTEGRATED
POWER
(8W-13-2)
2
DIODE-
ZENER
NO. 2
(8W-13-26)
1
39 C1
33 C1
A109
16
TN/RD
3 C105
A109
16
TN/RD
Z387
18
BK
S129
(8W-15-2)
Z387
18
BK
S136
(8W-15-3)
Z387
12
BK
G100
(8W-15-3)
CLUSTER
(8W-40-2)
FUEL
LEVEL
SENSOR NO. 1
SIGNAL
GROUND
7 C1
8 C1
N4
20
DB/YL
Z210
20
BK
40
50
C200
N4
20
DB/YL
Z210
20
BK
34
30
C105
N4
20
DB/YL
Z210
20
BK
3
2
MOTOR-
FUEL
PUMP
FUEL
LEVEL
SENSOR NO. 1
SIGNAL
GROUND
FUEL
PUMP
RELAY
OUTPUT
GROUND
4
1
Z912
18
BK
S307
(8W-15-12)
Z912
14
BK
G302
(8W-15-12)


MODULE-
POWERTRAIN
CONTROL
KNOCK SENSOR NO. 1 RETURN
KNOCK SENSOR NO. 1 SIGNAL
24 C2
25 C2
K942
20
BR/LG
K42
20
DB/OR
3.7L/4.7L
5.7L
5.7L
3.7L/4.7L
2
1
KNOCK SENSOR NO. 1 RETURN
KNOCK SENSOR NO. 1 SIGNAL
SENSOR-
KNOCK NO. 1
1
2
SENSOR-
KNOCK
KNOCK SENSOR NO. 1 RETURN
KNOCK SENSOR NO. 1 SIGNAL
KNOCK SENSOR NO. 2 RETURN
KNOCK SENSOR NO. 2 SIGNAL
3
4
SENSOR-
KNOCK NO. 2
KNOCK SENSOR NO. 2 RETURN
KNOCK SENSOR NO. 2 SIGNAL
2
1
3.7L/4.7L
5.7L
5.7L
3.7L/4.7L
K924
20
WT/BR
K242
20
OR/WT
37 C2
36 C2
KNOCK SENSOR NO. 2 RETURN
KNOCK SENSOR NO. 2 SIGNAL
S141
(8W-70-3)
K900
20
DB/DG
K900
20
DB/DG
1
1
SENSOR-
INTAKE
AIR
TEMPERATURE
SENSOR-
ENGINE
COOLANT
TEMPERATURE
2
2
K21
20
BR/WT
K2
16
VT/OR
30 C2
20 C2
IAT SIGNAL
ECT SIGNAL
MODULE-
POWERTRAIN
CONTROL


MODULE-POWERTRAIN CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
ENGINE STARTER MOTOR RELAY CONTROL
IAC SIGNAL
IAC CONTROL
35 C3
8 C3
38 C3
28 C2
38 C2
K107 20 VT/WT
K106 20 VT/LB
T752 20 DG/OR
7
27
40 C104
K107 20 BK/LB
K106 20 VT/LB
42
41 C105
K107 20 BR/LB
K106 20 VT/LB
T752 20 DG/OR
K961 20 BR/GY
K61 16 VT/GY
2
3
85
1
2
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-NATURAL VACUUM LEAK DETECTION
RELAY-STARTER MOTOR (IN PDC)
(8W-21-2)
86
M
MOTOR-IAC (3.7L/4.7L)
1
Z912 18 BK
S307
(8W-15-12)
Z912 14 BK
G302
(8W-15-12)


BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
16
10A
(8W-12-9)
2
23 C2
A108
20
LG/RD
S228
(8W-12-9)
A108
20
LG/RD
8 C1
MODULE-POWERTRAIN CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C VENT SOL CONTROL
S/C VACUUM SOL CONTROL
A/C CLUTCH RELAY CONTROL
15 C3
34 C3
*** 18 C3
5 C3
12 C3
11 C3
V937
20
VT/BR
V71
20
VT/OR
V72
20
OR/VT
V35
20
VT/OR
V36
20
VT/YL
C13
20
LB/OR
26
23
9
46
42
48
C104
V937
20
VT/BR
V71
20
VT/OR
V72
20
OR/WT
9
35
27
C200
V937
20
VT/BR
V71
20
VT/OR
V72
20
OR/VT
V35
20
VT/OR
V36
20
VT/YL
C13
20
LB/OR
9 C1
10 C1
*** 11 C1
MODULE-STEERING CONTROL
FUSED B(+)
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
GROUND
5 C1
Z907
20
BK
S212
(8W-15-7)
Z907
18
BK
G200
(8W-15-7)
85
RELAY-A/C CLUTCH (IN PDC)
(8W-42-2)
86
2
1
S/C VENT SOL CONTROL
S/C VACUUM SOL CONTROL
SERVO-SPEED CONTROL
(8W-33-3)

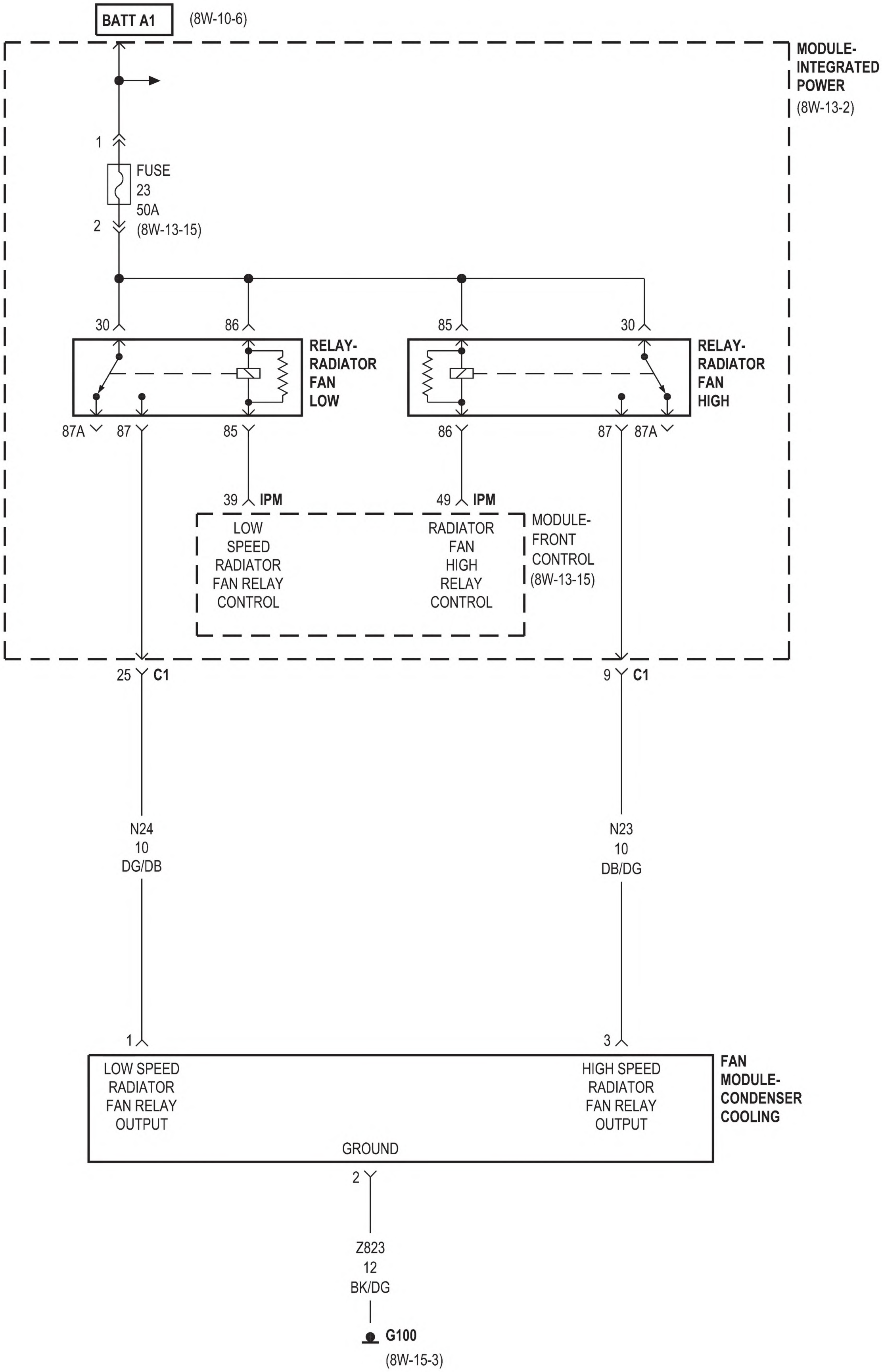
*** 5.7L


MODULE-
POWERTRAIN
CONTROL
BRAKE SWITCH NO. 1 SIGNAL
S/C SUPPLY
BRAKE SWITCH NO. 2 SIGNAL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
INPUT SPEED SENSOR SIGNAL
23 C3
∗∗∗∗ 7 C3
∗∗∗ 14 C3
20 C3
29 C3
♯ 27 C3
B15 20 DG/WT
V32 20 VT/YL
B16 20 LB/DG
K52 20 DB/YL
K70 20 DB/BR
T5 20 DG/YL
47
19
34
45
44
29
C104
B15 20 DG/WT
T5 20 DG/YL
S101
(8W-70-4)
24
C200
B15 20 DG/WT
V32 20 VT/YL
B16 20 LB/DG
K52 20 DB/YL
K70 20 DB/BR
T5 20 DG/YL
6
∗∗∗∗ 4
∗∗∗ 4
2
1
2
BRAKE SWITCH NO. 1 SIGNAL
S/C SUPPLY
BRAKE SWITCH NO. 2 SIGNAL
SWITCH-
STOP
LAMP
(8W-35-3)
SOLENOID-
EVAP/
PURGE
AUTOSTICK UP/DOWN (ERS) SENSE
ASSEMBLY-
SHIFT
LEVER
(8W-31-15)

♯ 4.7L/5.7L

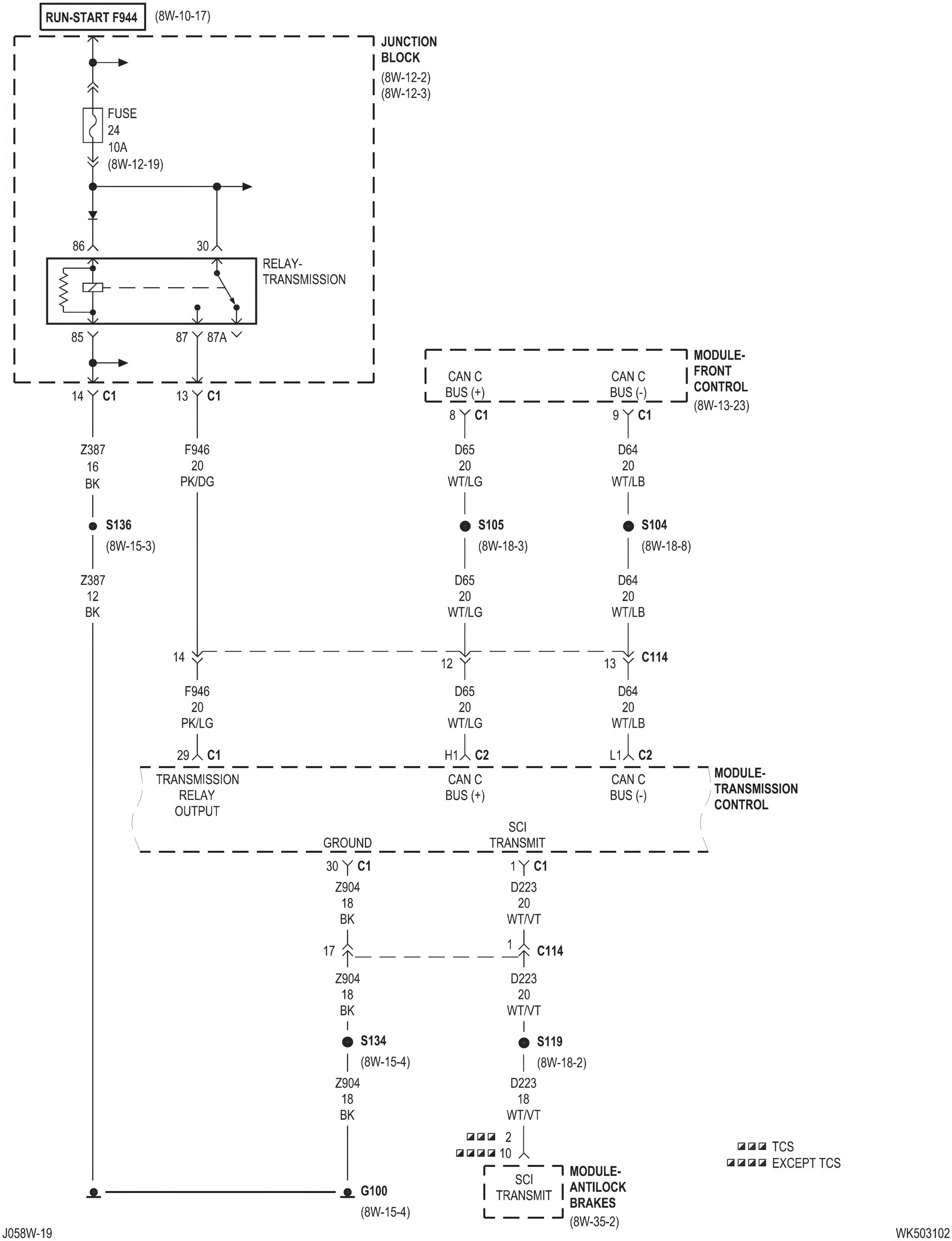
∗∗∗ 5.7L

∗∗∗∗ 3.7L/4.7L

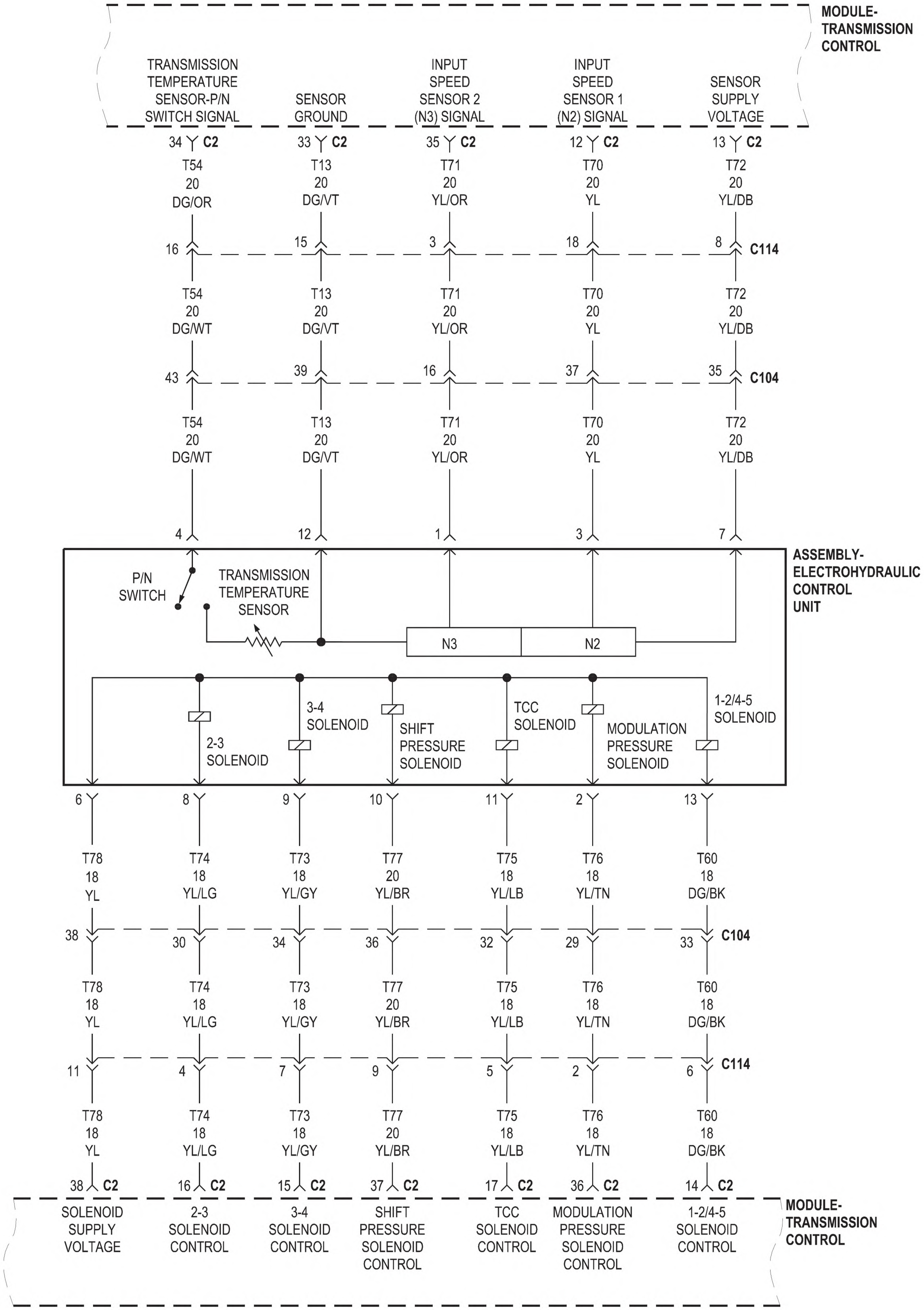

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
23
50A
(8W-13-15)
2
30
86
85
30
RELAY-
RADIATOR
FAN
LOW
RELAY-
RADIATOR
FAN
HIGH
87A
87
85
86
87
87A
39
IPM
49
IPM
LOW
SPEED
RADIATOR
FAN RELAY
CONTROL
RADIATOR
FAN
HIGH
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-15)
25
C1
9
C1
N24
10
DG/DB
N23
10
DB/DG
1
3
LOW SPEED
RADIATOR
FAN RELAY
OUTPUT
HIGH SPEED
RADIATOR
FAN RELAY
OUTPUT
GROUND
FAN
MODULE-
CONDENSER
COOLING
2
Z823
12
BK/DG
G100
(8W-15-3)

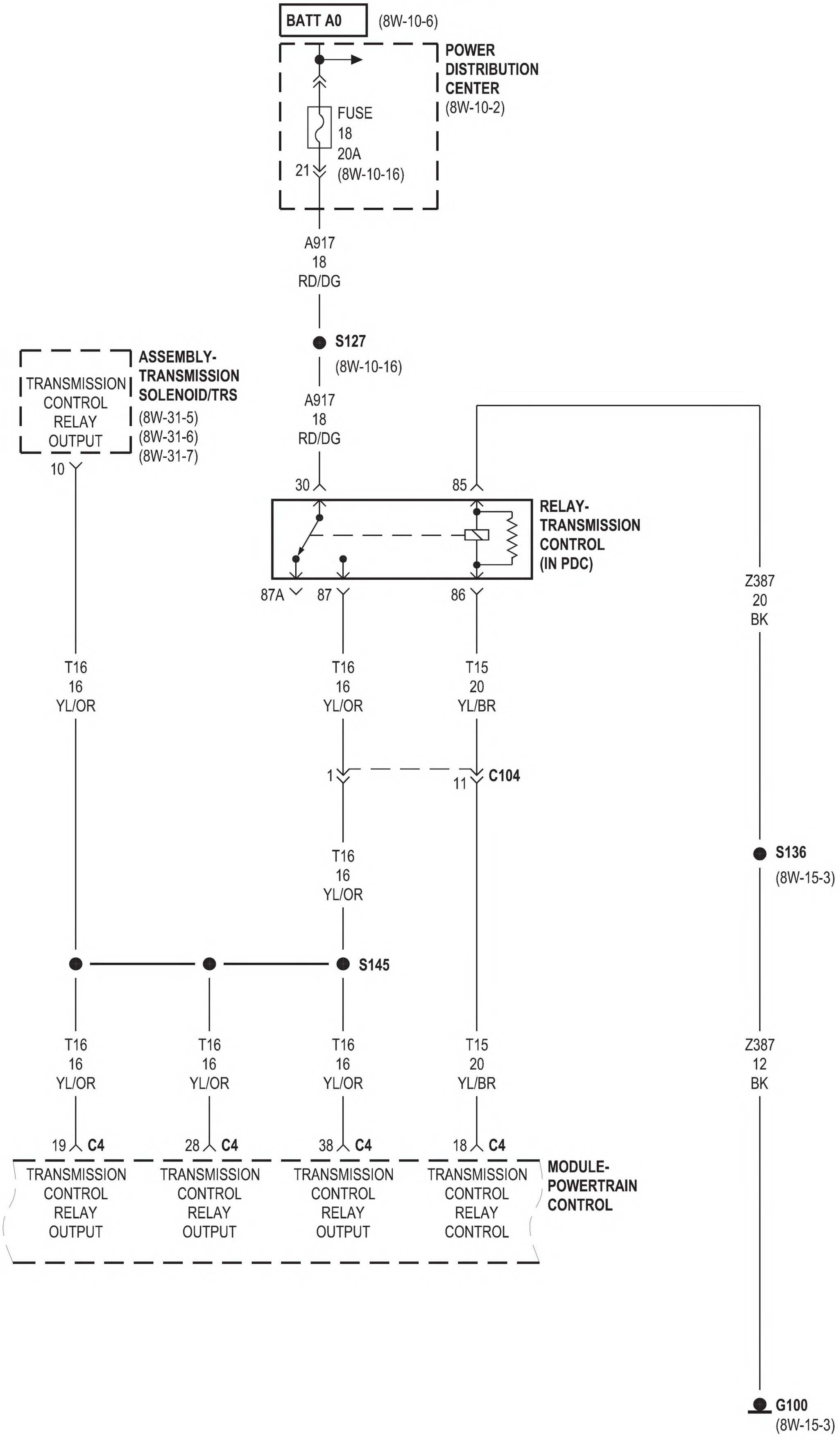
8W-31 TRANSMISSION CONTROL SYSTEM

Component	Page
Assembly-Electrohydraulic Control Unit	8W-31-3
Assembly-Shift Lever	8W-31-15
Assembly-Transmission Solenoid/TRS	8W-31-4, 5, 6, 7
Cluster	8W-31-9
Fuse 10	8W-31-12
Fuse 18	8W-31-4
Fuse 22	8W-31-10
Fuse 23	8W-31-10
Fuse 24	8W-31-2
Fuse 25	8W-31-9, 10
G100	8W-31-2, 4
G101	8W-31-8
G200	8W-31-9, 15
G302	8W-31-10
Junction Block	8W-31-2, 9, 12, 15
Module-Antilock Brakes	8W-31-2, 12
Module-Final Drive Control	8W-31-9, 10, 11, 12, 13, 14
Module-Front Control	8W-31-2, 15
Module-Integrated Power	8W-31-10, 15
Module-Powertrain Control	8W-31-4, 5, 6, 7, 8, 15
Module-Transmission Control	8W-31-2, 3
Motor-Transfer Case	8W-31-11
Power Distribution Center	8W-31-4, 10
Relay-Run	8W-31-12
Relay-Transmission	8W-31-2
Relay-Transmission Control	8W-31-4, 5, 6
Sensor-Dhs Pressure	8W-31-14
Sensor-Input Speed	8W-31-8
Sensor-Line Pressure	8W-31-7
Sensor-Output Speed	8W-31-8
Solenoid-Dhs Pressure Control	8W-31-13
Solenoid-Directional Control Valve-B	8W-31-13
Solenoid-Directional Control Valve-G	8W-31-13
Solenoid-Front Differential	8W-31-11
Solenoid-Rear Differential	8W-31-11
Switch-Bank-Lower	8W-31-8
Switch-Bank-Upper	8W-31-15
Switch-Stop Lamp	8W-31-15
Switch-Transfer Case Selector	8W-31-9, 11

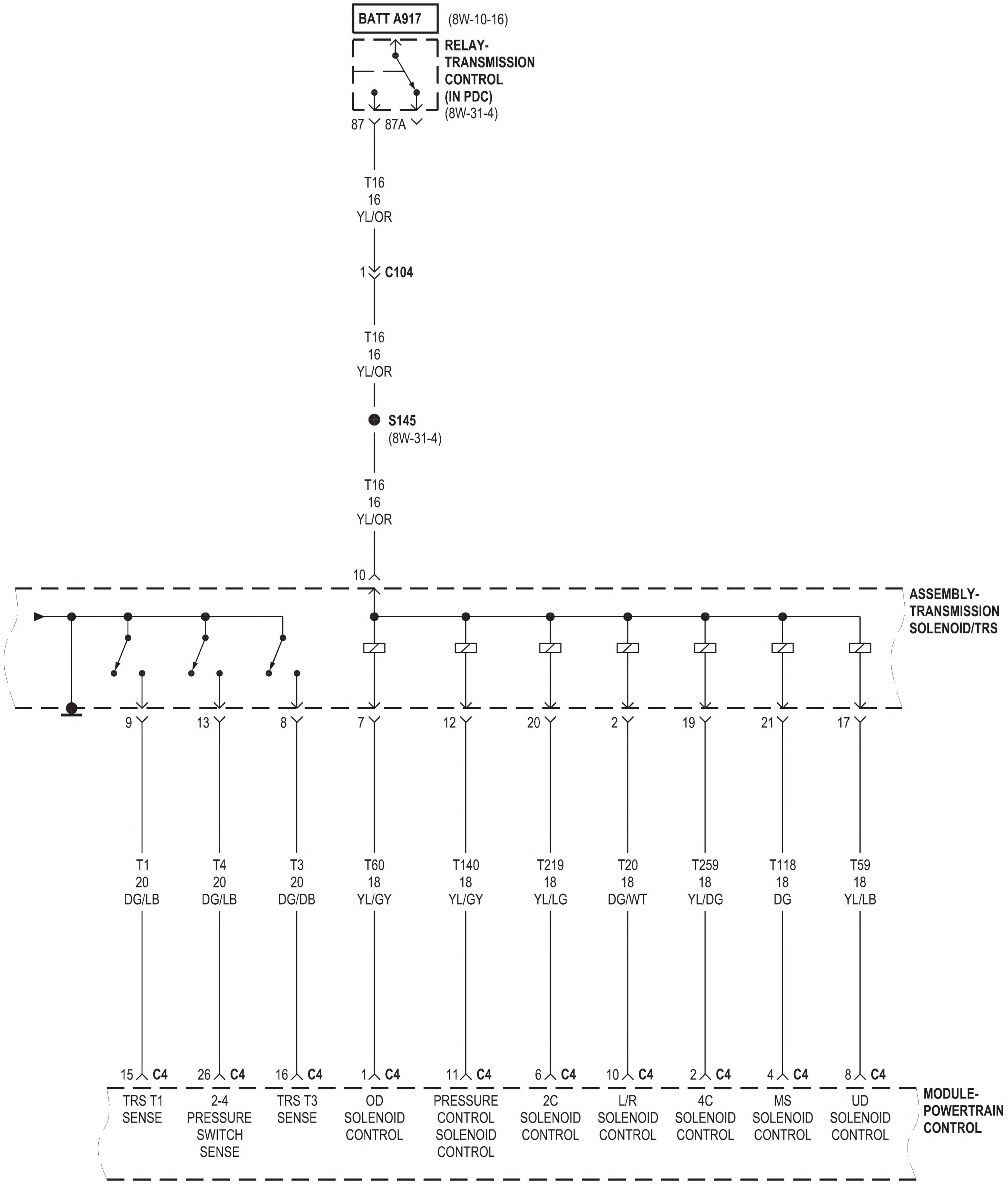

RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE
24
10A
(8W-12-19)
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387
16
BK
F946
20
PK/DG
S136
(8W-15-3)
Z387
12
BK
MODULE-FRONT CONTROL
(8W-13-23)
CAN C BUS (+)
CAN C BUS (-)
8 C1
9 C1
D65
20
WT/LG
D64
20
WT/LB
S105
(8W-18-3)
S104
(8W-18-8)
D65
20
WT/LG
D64
20
WT/LB
14
12
13
C114
F946
20
PK/LG
D65
20
WT/LG
D64
20
WT/LB
29 C1
H1 C2
L1 C2
MODULE-TRANSMISSION CONTROL
TRANSMISSION RELAY OUTPUT
CAN C BUS (+)
CAN C BUS (-)
GROUND
SCI TRANSMIT
30 C1
1 C1
Z904
18
BK
D223
20
WT/VT
17
1
C114
Z904
18
BK
D223
20
WT/VT
S134
(8W-15-4)
S119
(8W-18-2)
Z904
18
BK
D223
18
WT/VT
▨▨▨ 2
▨▨▨▨ 10
MODULE-ANTILOCK BRAKES
SCI TRANSMIT
(8W-35-2)
G100
(8W-15-4)
▨▨▨ TCS
▨▨▨▨ EXCEPT TCS

WK503102

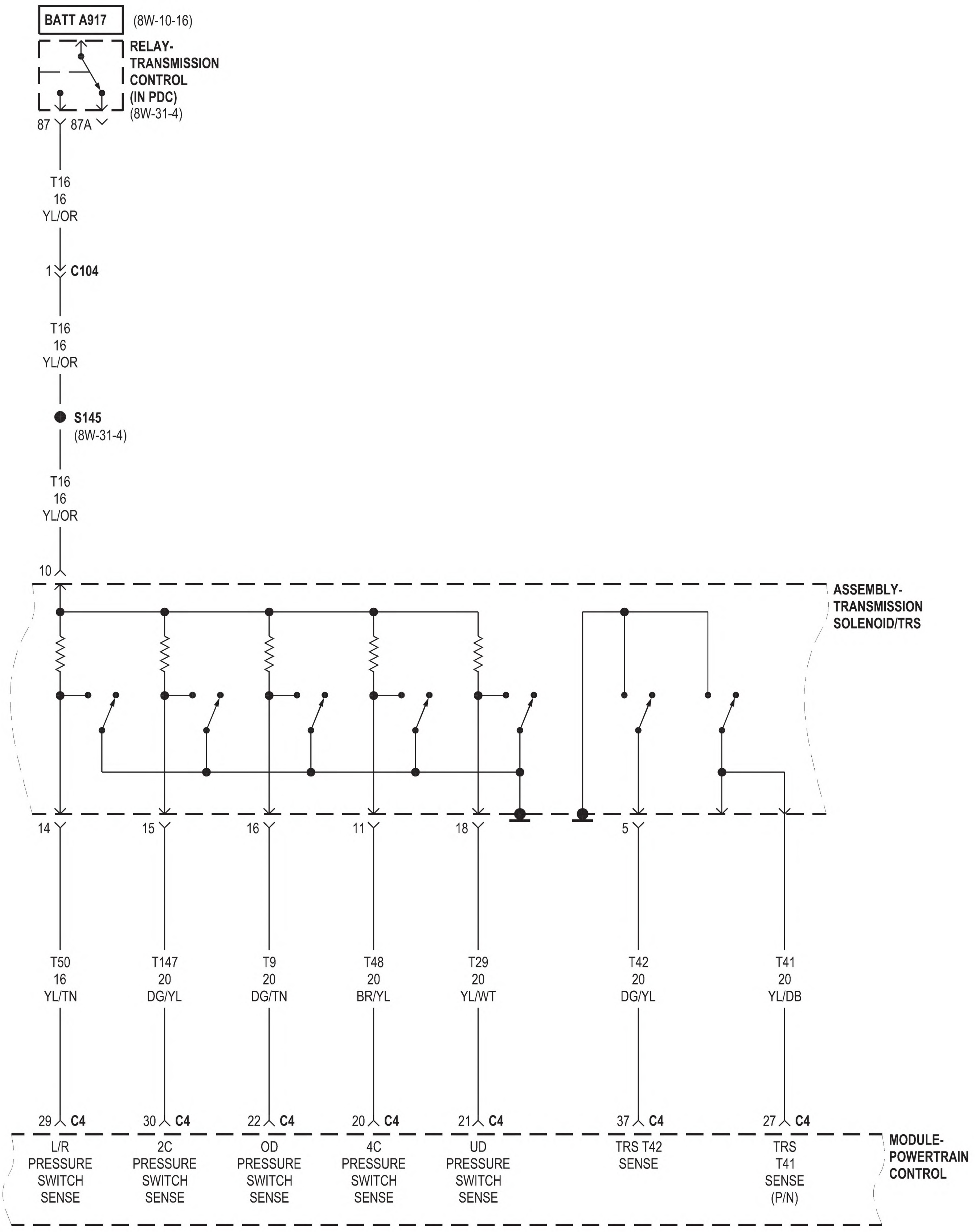

MODULE-
TRANSMISSION
CONTROL
TRANSMISSION
TEMPERATURE
SENSOR-P/N
SWITCH SIGNAL
SENSOR
GROUND
INPUT
SPEED
SENSOR 2
(N3) SIGNAL
INPUT
SPEED
SENSOR 1
(N2) SIGNAL
SENSOR
SUPPLY
VOLTAGE
34 C2
33 C2
35 C2
12 C2
13 C2
T54 20 DG/OR
T13 20 DG/VT
T71 20 YL/OR
T70 20 YL
T72 20 YL/DB
16
15
3
18
8
C114
T54 20 DG/WT
T13 20 DG/VT
T71 20 YL/OR
T70 20 YL
T72 20 YL/DB
43
39
16
37
35
C104
T54 20 DG/WT
T13 20 DG/VT
T71 20 YL/OR
T70 20 YL
T72 20 YL/DB
4
12
1
3
7
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL
UNIT
P/N
SWITCH
TRANSMISSION
TEMPERATURE
SENSOR
N3
N2
2-3
SOLENOID
3-4
SOLENOID
SHIFT
PRESSURE
SOLENOID
TCC
SOLENOID
MODULATION
PRESSURE
SOLENOID
1-2/4-5
SOLENOID
6
8
9
10
11
2
13
T78 18 YL
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T76 18 YL/TN
T60 18 DG/BK
38
30
34
36
32
29
33
C104
T78 18 YL
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T76 18 YL/TN
T60 18 DG/BK
11
4
7
9
5
2
6
C114
T78 18 YL
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T76 18 YL/TN
T60 18 DG/BK
38 C2
16 C2
15 C2
37 C2
17 C2
36 C2
14 C2
SOLENOID
SUPPLY
VOLTAGE
2-3
SOLENOID
CONTROL
3-4
SOLENOID
CONTROL
SHIFT
PRESSURE
SOLENOID
CONTROL
TCC
SOLENOID
CONTROL
MODULATION
PRESSURE
SOLENOID
CONTROL
1-2/4-5
SOLENOID
CONTROL
MODULE-
TRANSMISSION
CONTROL


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
18
20A
(8W-10-16)
21
A917
18
RD/DG
S127
(8W-10-16)
A917
18
RD/DG
TRANSMISSION CONTROL RELAY OUTPUT
ASSEMBLY-TRANSMISSION SOLENOID/TRS
(8W-31-5)
(8W-31-6)
(8W-31-7)
10
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
Z387
20
BK
T16
16
YL/OR
T16
16
YL/OR
T15
20
YL/BR
1
11
C104
T16
16
YL/OR
S136
(8W-15-3)
S145
T16
16
YL/OR
T16
16
YL/OR
T16
16
YL/OR
T15
20
YL/BR
Z387
12
BK
19 C4
28 C4
38 C4
18 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
MODULE-POWERTRAIN CONTROL
G100
(8W-15-3)
WK503104

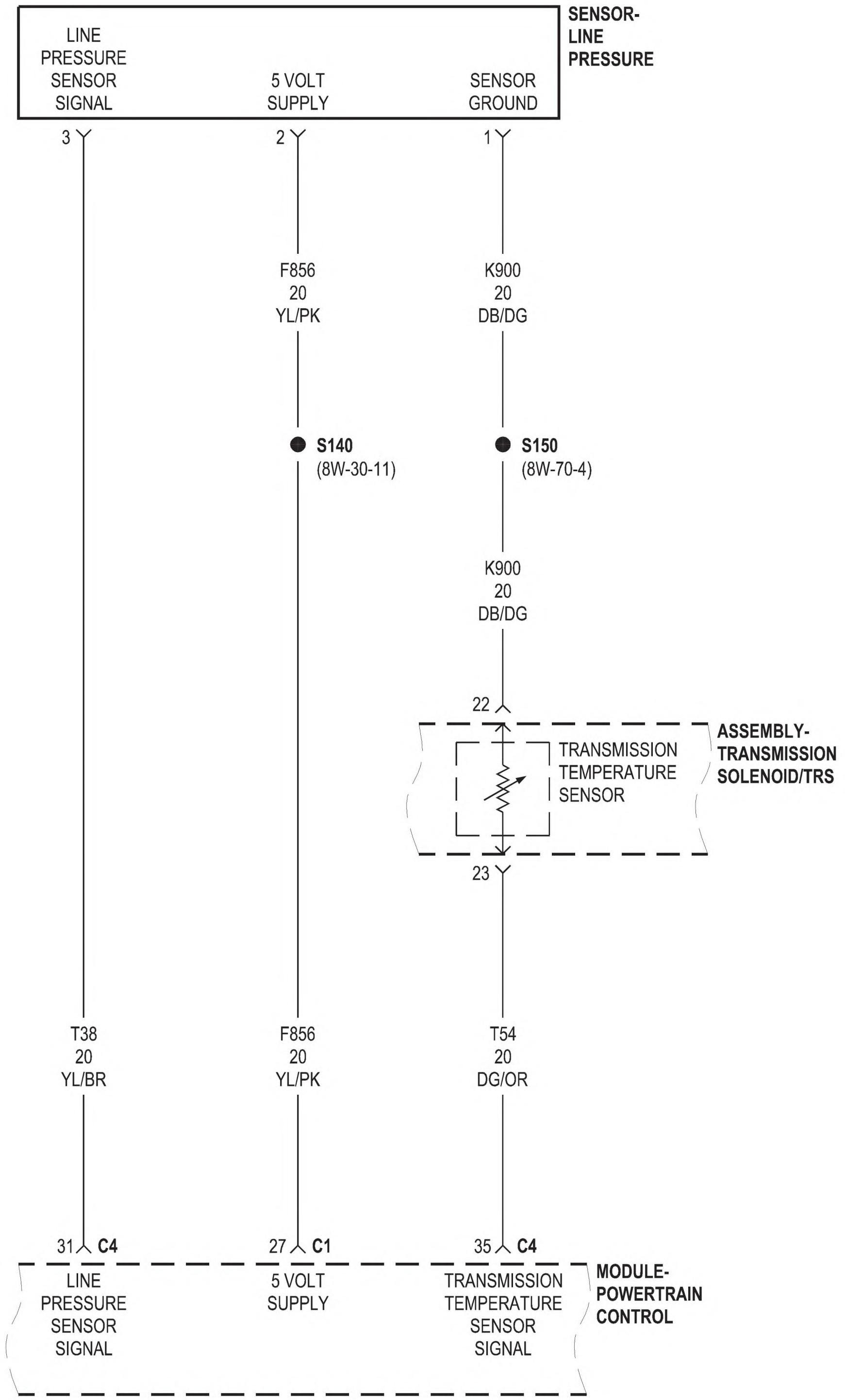
4.7L/5.7L

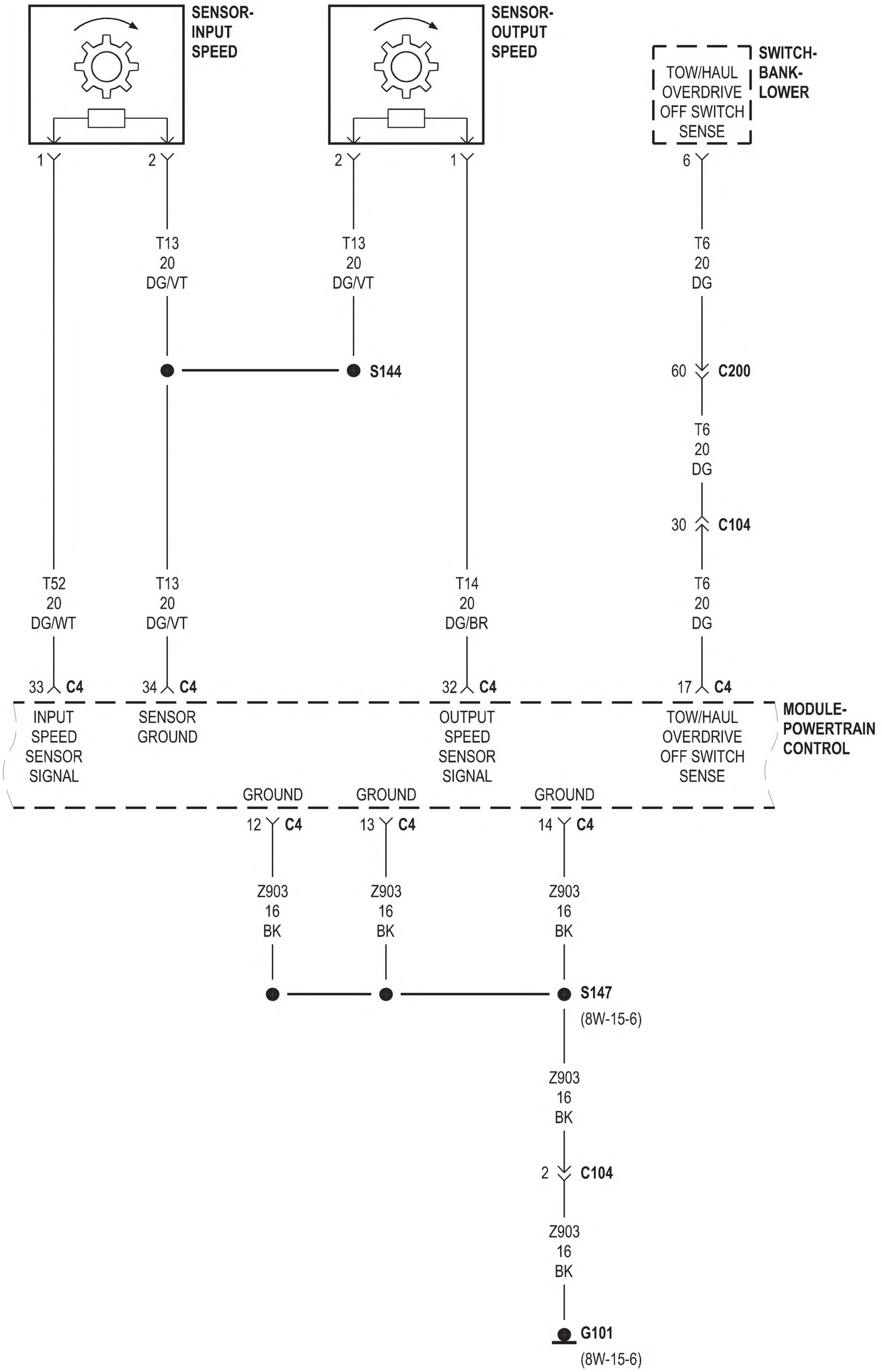

BATT A917
(8W-10-16)
RELAY-
TRANSMISSION
CONTROL
(IN PDC)
(8W-31-4)
87
87A
T16
16
YL/OR
1
C104
T16
16
YL/OR
S145
(8W-31-4)
T16
16
YL/OR
10
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
9
13
8
7
12
20
2
19
21
17
T1
20
DG/LB
T4
20
DG/LB
T3
20
DG/DB
T60
18
YL/GY
T140
18
YL/GY
T219
18
YL/LG
T20
18
DG/WT
T259
18
YL/DG
T118
18
DG
T59
18
YL/LB
15 C4
26 C4
16 C4
1 C4
11 C4
6 C4
10 C4
2 C4
4 C4
8 C4
TRS T1 SENSE
2-4 PRESSURE SWITCH SENSE
TRS T3 SENSE
OD SOLENOID CONTROL
PRESSURE CONTROL SOLENOID CONTROL
2C SOLENOID CONTROL
L/R SOLENOID CONTROL
4C SOLENOID CONTROL
MS SOLENOID CONTROL
UD SOLENOID CONTROL
MODULE-
POWERTRAIN
CONTROL

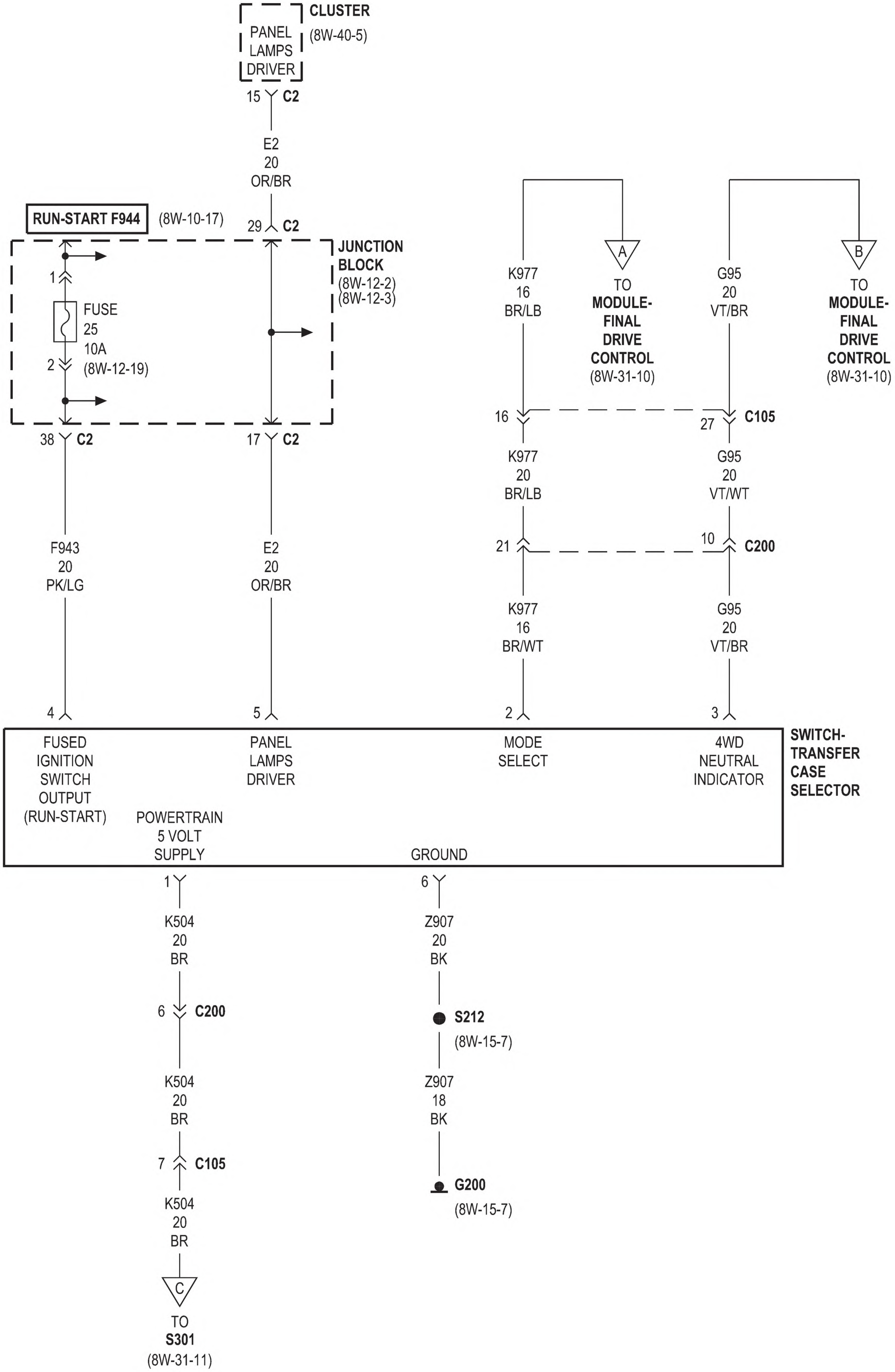
4.7L/5.7L


BATT A917
(8W-10-16)
RELAY-
TRANSMISSION
CONTROL
(IN PDC)
(8W-31-4)
87
87A
T16
16
YL/OR
1
C104
T16
16
YL/OR
S145
(8W-31-4)
T16
16
YL/OR
10
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
14
15
16
11
18
5
T50
16
YL/TN
T147
20
DG/YL
T9
20
DG/TN
T48
20
BR/YL
T29
20
YL/WT
T42
20
DG/YL
T41
20
YL/DB
29 C4
30 C4
22 C4
20 C4
21 C4
37 C4
27 C4
L/R
PRESSURE
SWITCH
SENSE
2C
PRESSURE
SWITCH
SENSE
OD
PRESSURE
SWITCH
SENSE
4C
PRESSURE
SWITCH
SENSE
UD
PRESSURE
SWITCH
SENSE
TRS T42
SENSE
TRS
T41
SENSE
(P/N)
MODULE-
POWERTRAIN
CONTROL

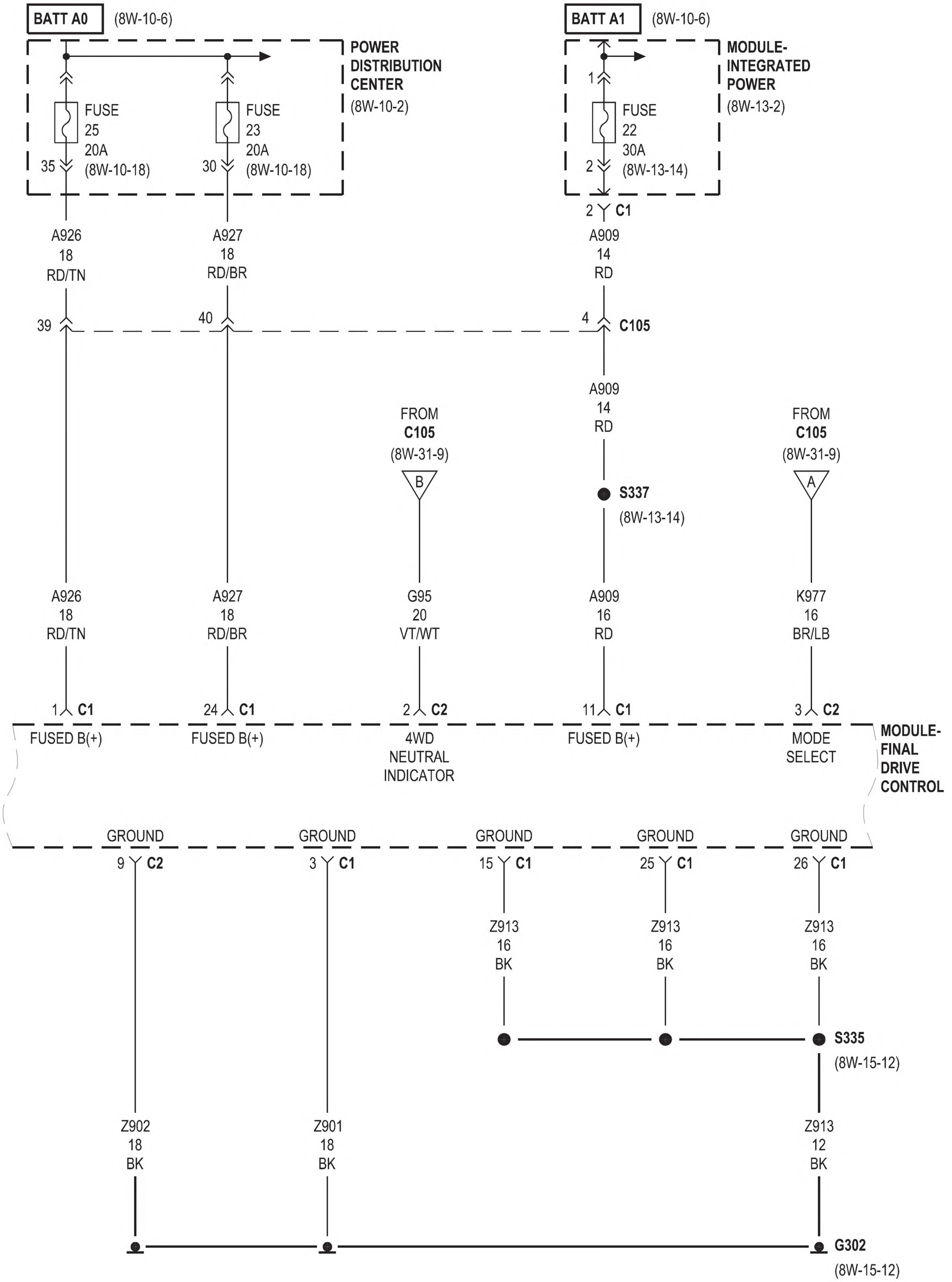
4.7L/5.7L

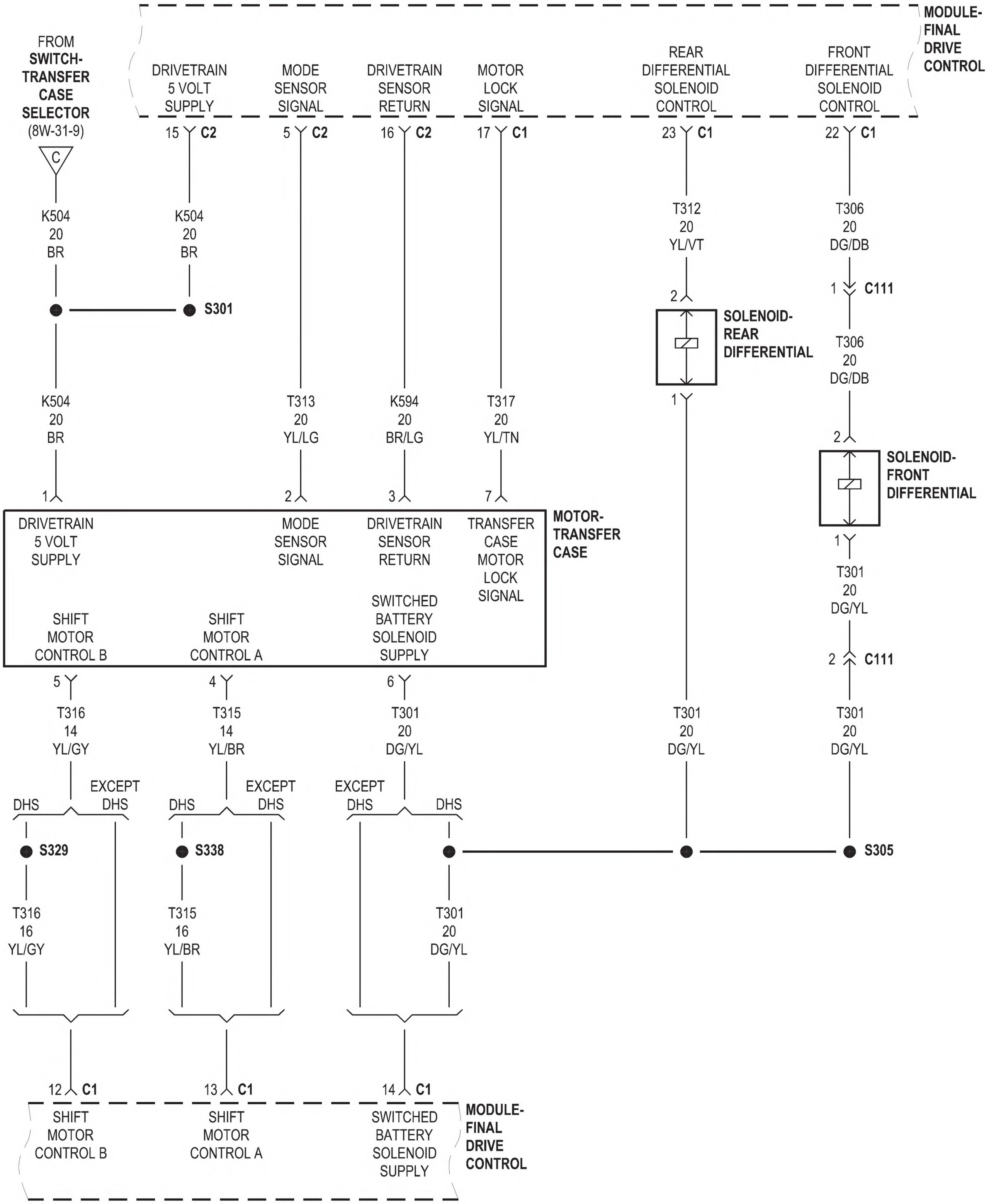

SENSOR-
LINE
PRESSURE
LINE PRESSURE SENSOR SIGNAL
5 VOLT SUPPLY
SENSOR GROUND
3
2
1
F856
20
YL/PK
K900
20
DB/DG
S140
(8W-30-11)
S150
(8W-70-4)
K900
20
DB/DG
22
TRANSMISSION TEMPERATURE SENSOR
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
23
T38
20
YL/BR
F856
20
YL/PK
T54
20
DG/OR
31 C4
27 C1
35 C4
LINE PRESSURE SENSOR SIGNAL
5 VOLT SUPPLY
TRANSMISSION TEMPERATURE SENSOR SIGNAL
MODULE-
POWERTRAIN
CONTROL


SENSOR-
INPUT
SPEED
SENSOR-
OUTPUT
SPEED
TOW/HAUL
OVERDRIVE
OFF SWITCH
SENSE
SWITCH-
BANK-
LOWER
1
2
2
1
6
T13
20
DG/VT
T13
20
DG/VT
T6
20
DG
S144
60
C200
T6
20
DG
30
C104
T52
20
DG/WT
T13
20
DG/VT
T14
20
DG/BR
T6
20
DG
33 C4
34 C4
32 C4
17 C4
INPUT
SPEED
SENSOR
SIGNAL
SENSOR
GROUND
OUTPUT
SPEED
SENSOR
SIGNAL
TOW/HAUL
OVERDRIVE
OFF SWITCH
SENSE
MODULE-
POWERTRAIN
CONTROL
GROUND
GROUND
GROUND
12 C4
13 C4
14 C4
Z903
16
BK
Z903
16
BK
Z903
16
BK
S147
(8W-15-6)
Z903
16
BK
2
C104
Z903
16
BK
G101
(8W-15-6)

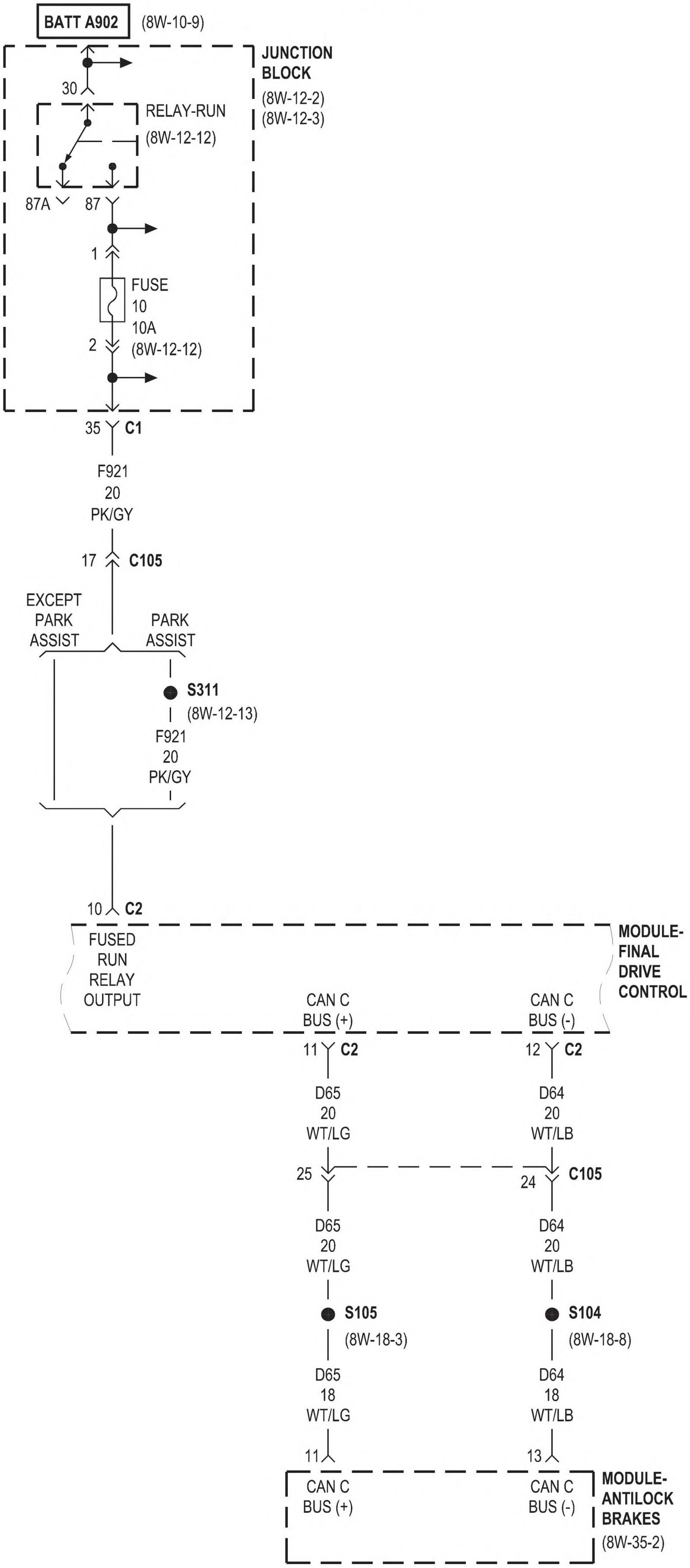

CLUSTER
PANEL LAMPS DRIVER
(8W-40-5)
15 C2
E2
20
OR/BR
RUN-START F944
(8W-10-17)
29 C2
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
25
10A
(8W-12-19)
2
38 C2
17 C2
F943
20
PK/LG
E2
20
OR/BR
K977
16
BR/LB
A
TO MODULE-FINAL DRIVE CONTROL
(8W-31-10)
G95
20
VT/BR
B
TO MODULE-FINAL DRIVE CONTROL
(8W-31-10)
16
27 C105
K977
20
BR/LB
G95
20
VT/WT
21
10 C200
K977
16
BR/WT
G95
20
VT/BR
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504
20
BR
Z907
20
BK
6 C200
S212
(8W-15-7)
K504
20
BR
Z907
18
BK
7 C105
G200
(8W-15-7)
K504
20
BR
C
TO S301
(8W-31-11)

4.7L/5.7L

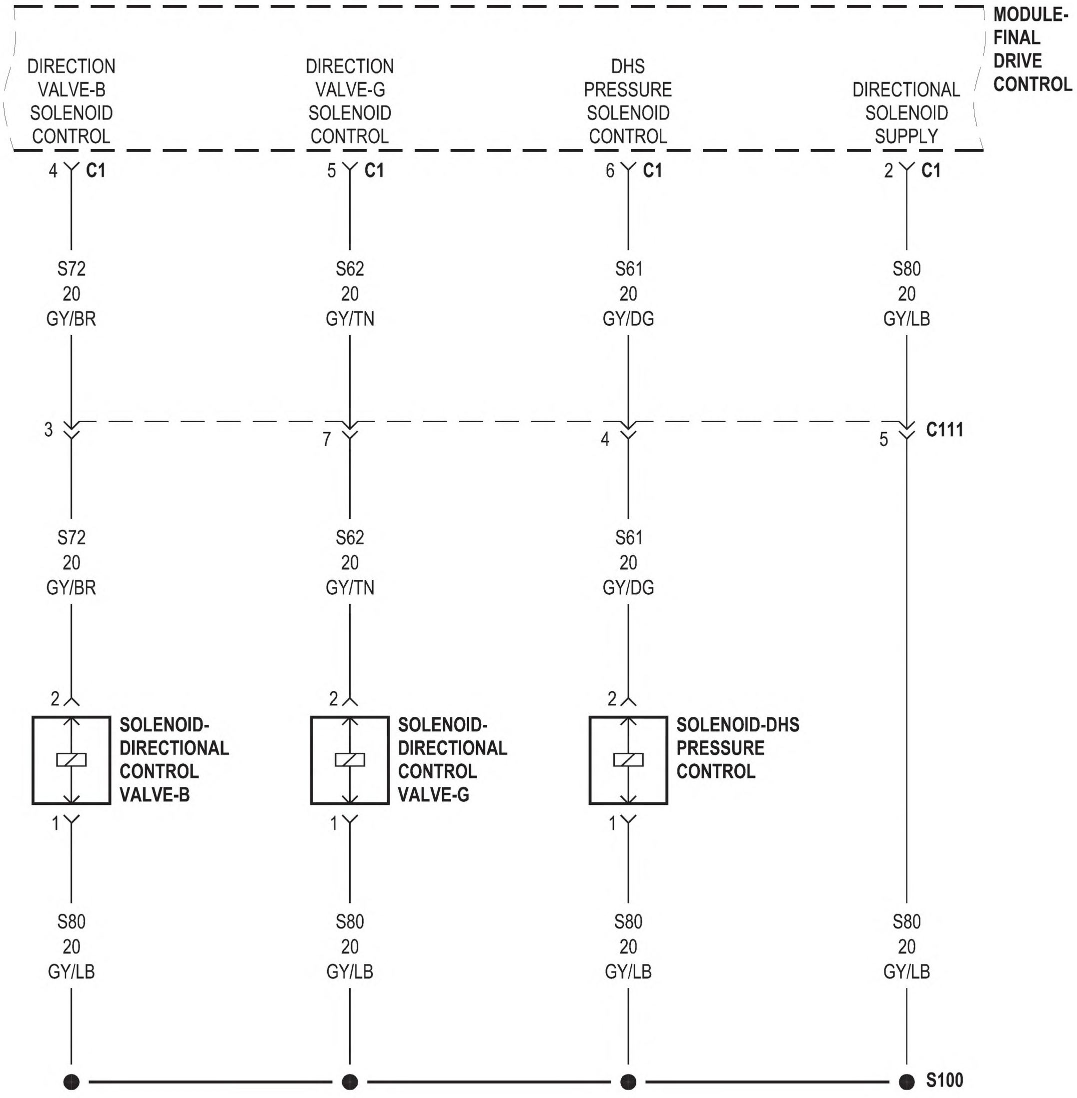

BATT A0 (8W-10-6)
POWER DISTRIBUTION CENTER (8W-10-2)
FUSE 25 20A (8W-10-18)
FUSE 23 20A (8W-10-18)
35
30
BATT A1 (8W-10-6)
MODULE-INTEGRATED POWER (8W-13-2)
1
FUSE 22 30A (8W-13-14)
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
FROM C105 (8W-31-9)
B
S337 (8W-13-14)
FROM C105 (8W-31-9)
A
A926 18 RD/TN
A927 18 RD/BR
G95 20 VT/WT
A909 16 RD
K977 16 BR/LB
1 C1
24 C1
2 C2
11 C1
3 C2
FUSED B(+)
FUSED B(+)
4WD NEUTRAL INDICATOR
FUSED B(+)
MODE SELECT
MODULE-FINAL DRIVE CONTROL
GROUND
GROUND
GROUND
GROUND
GROUND
9 C2
3 C1
15 C1
25 C1
26 C1
Z913 16 BK
Z913 16 BK
Z913 16 BK
S335 (8W-15-12)
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302 (8W-15-12)


MODULE-FINAL DRIVE CONTROL
FROM SWITCH-TRANSFER CASE SELECTOR (8W-31-9)
C
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
MOTOR LOCK SIGNAL
REAR DIFFERENTIAL SOLENOID CONTROL
FRONT DIFFERENTIAL SOLENOID CONTROL
15 C2
5 C2
16 C2
17 C1
23 C1
22 C1
K504 20 BR
K504 20 BR
T312 20 YL/VT
T306 20 DG/DB
S301
1 C111
2
SOLENOID-REAR DIFFERENTIAL
1
T306 20 DG/DB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
2
SOLENOID-FRONT DIFFERENTIAL
1
2
3
7
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
1
T301 20 DG/YL
2 C111
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
T301 20 DG/YL
T301 20 DG/YL
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL

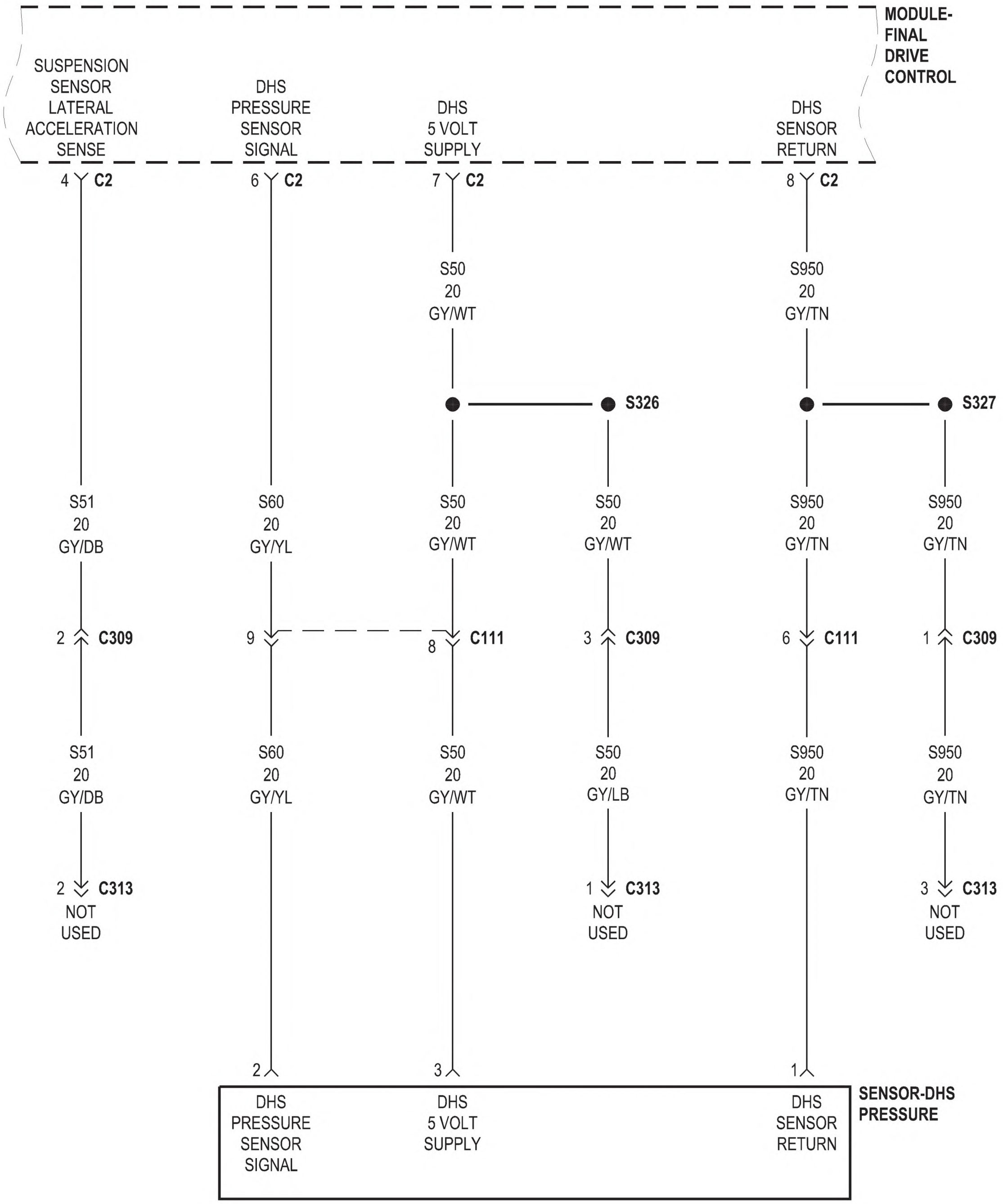
4.7L/5.7L

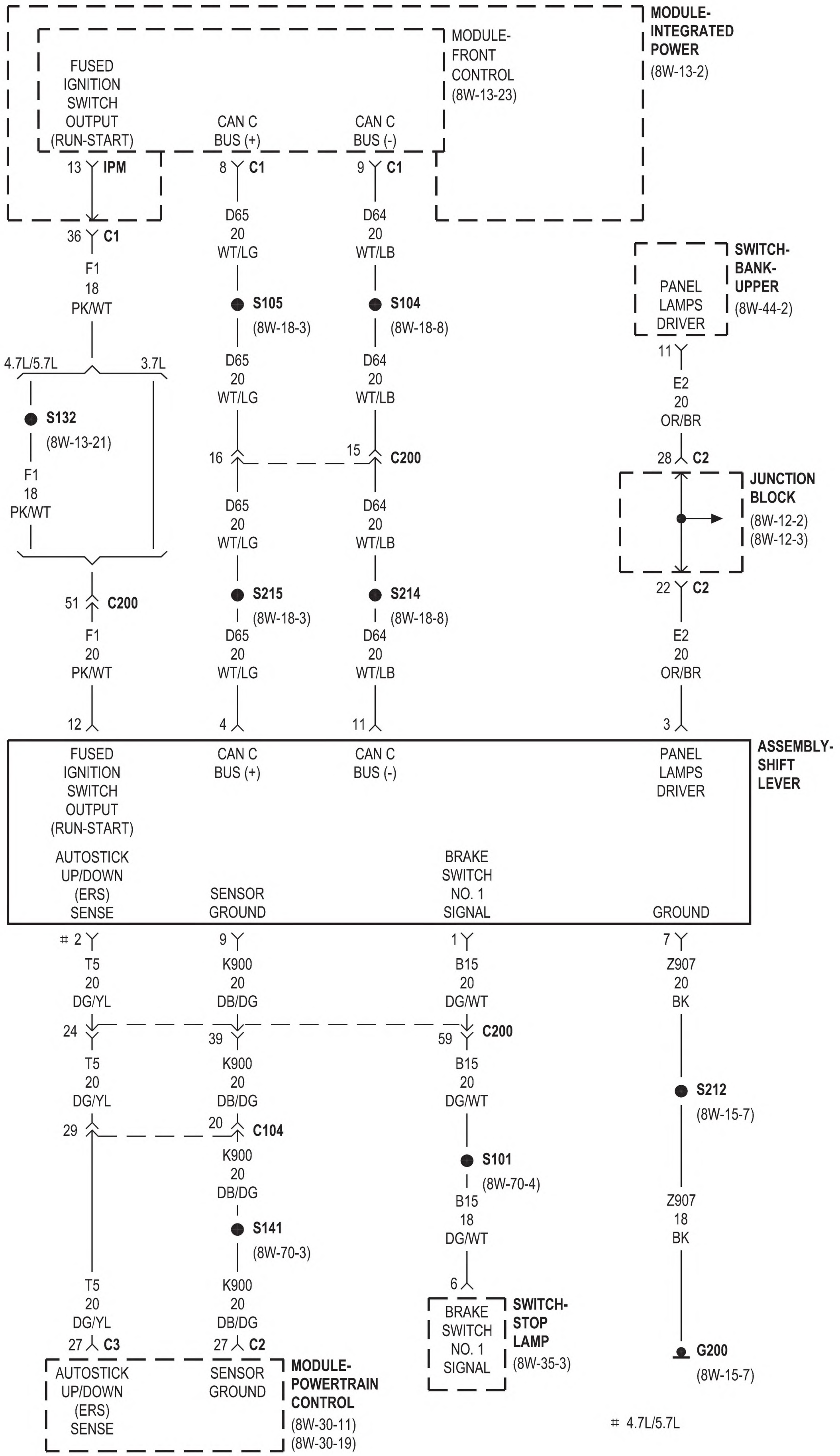

BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
87A
87
1
FUSE
10
10A
(8W-12-12)
2
35
C1
F921
20
PK/GY
17
C105
EXCEPT PARK ASSIST
PARK ASSIST
S311
(8W-12-13)
F921
20
PK/GY
10
C2
FUSED RUN RELAY OUTPUT
MODULE-FINAL DRIVE CONTROL
CAN C BUS (+)
CAN C BUS (-)
11
C2
12
C2
D65
20
WT/LG
D64
20
WT/LB
25
24
C105
D65
20
WT/LG
D64
20
WT/LB
S105
(8W-18-3)
S104
(8W-18-8)
D65
18
WT/LG
D64
18
WT/LB
11
13
CAN C BUS (+)
CAN C BUS (-)
MODULE-ANTILOCK BRAKES
(8W-35-2)

DHS


MODULE-
FINAL
DRIVE
CONTROL
DIRECTION VALVE-B SOLENOID CONTROL
DIRECTION VALVE-G SOLENOID CONTROL
DHS PRESSURE SOLENOID CONTROL
DIRECTIONAL SOLENOID SUPPLY
4 C1
5 C1
6 C1
2 C1
S72 20 GY/BR
S62 20 GY/TN
S61 20 GY/DG
S80 20 GY/LB
3
7
4
5
C111
S72 20 GY/BR
S62 20 GY/TN
S61 20 GY/DG
2
2
2
SOLENOID-DIRECTIONAL CONTROL VALVE-B
SOLENOID-DIRECTIONAL CONTROL VALVE-G
SOLENOID-DHS PRESSURE CONTROL
1
1
1
S80 20 GY/LB
S80 20 GY/LB
S80 20 GY/LB
S80 20 GY/LB
S100

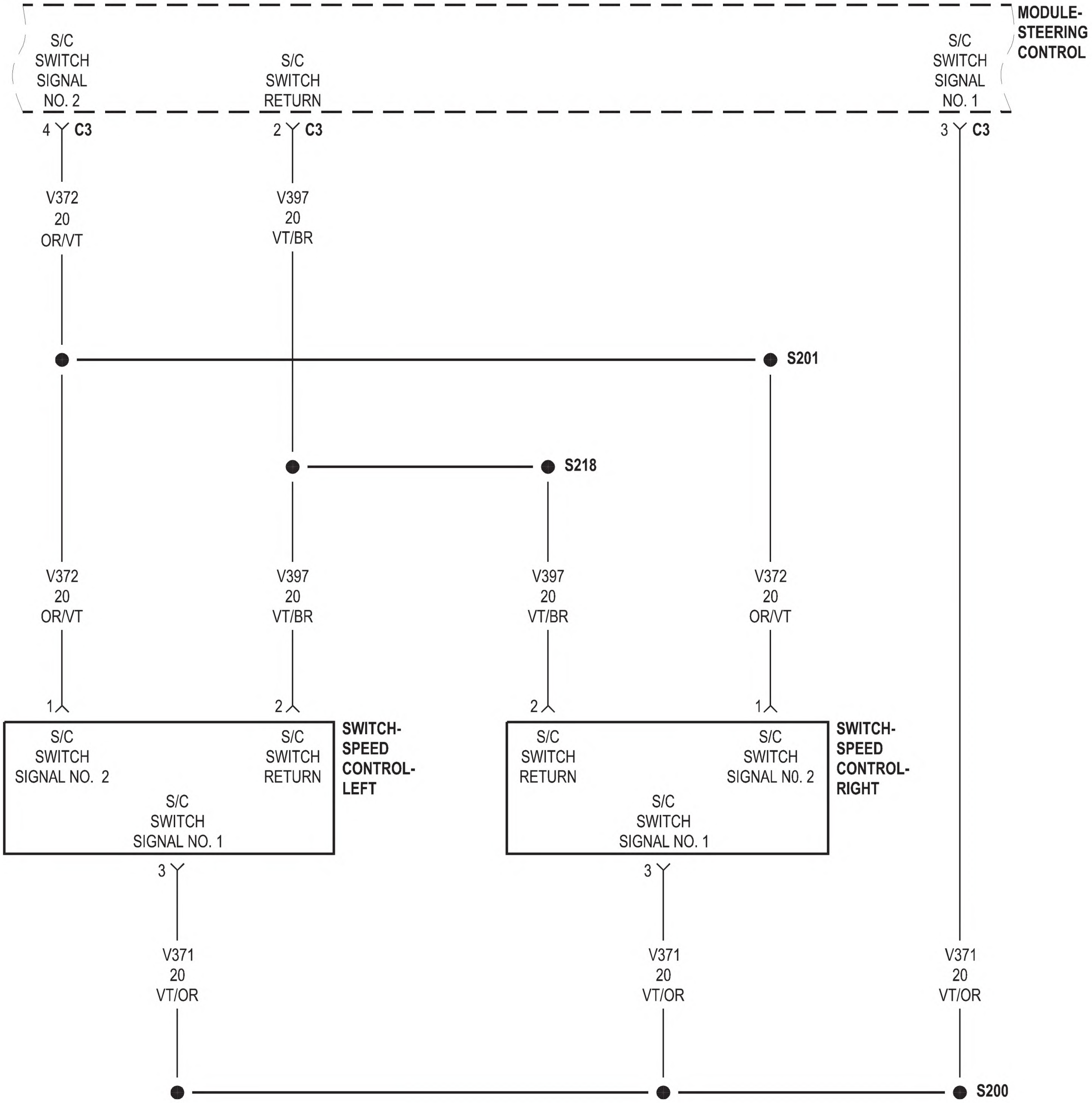
DHS


MODULE-FINAL DRIVE CONTROL
SUSPENSION SENSOR LATERAL ACCELERATION SENSE
DHS PRESSURE SENSOR SIGNAL
DHS 5 VOLT SUPPLY
DHS SENSOR RETURN
4 C2
6 C2
7 C2
8 C2
S50 20 GY/WT
S950 20 GY/TN
S326
S327
S51 20 GY/DB
S60 20 GY/YL
S50 20 GY/WT
S50 20 GY/WT
S950 20 GY/TN
S950 20 GY/TN
2 C309
9
8 C111
3 C309
6 C111
1 C309
S51 20 GY/DB
S60 20 GY/YL
S50 20 GY/WT
S50 20 GY/LB
S950 20 GY/TN
S950 20 GY/TN
2 C313 NOT USED
1 C313 NOT USED
3 C313 NOT USED
2
3
1
SENSOR-DHS PRESSURE
DHS PRESSURE SENSOR SIGNAL
DHS 5 VOLT SUPPLY
DHS SENSOR RETURN

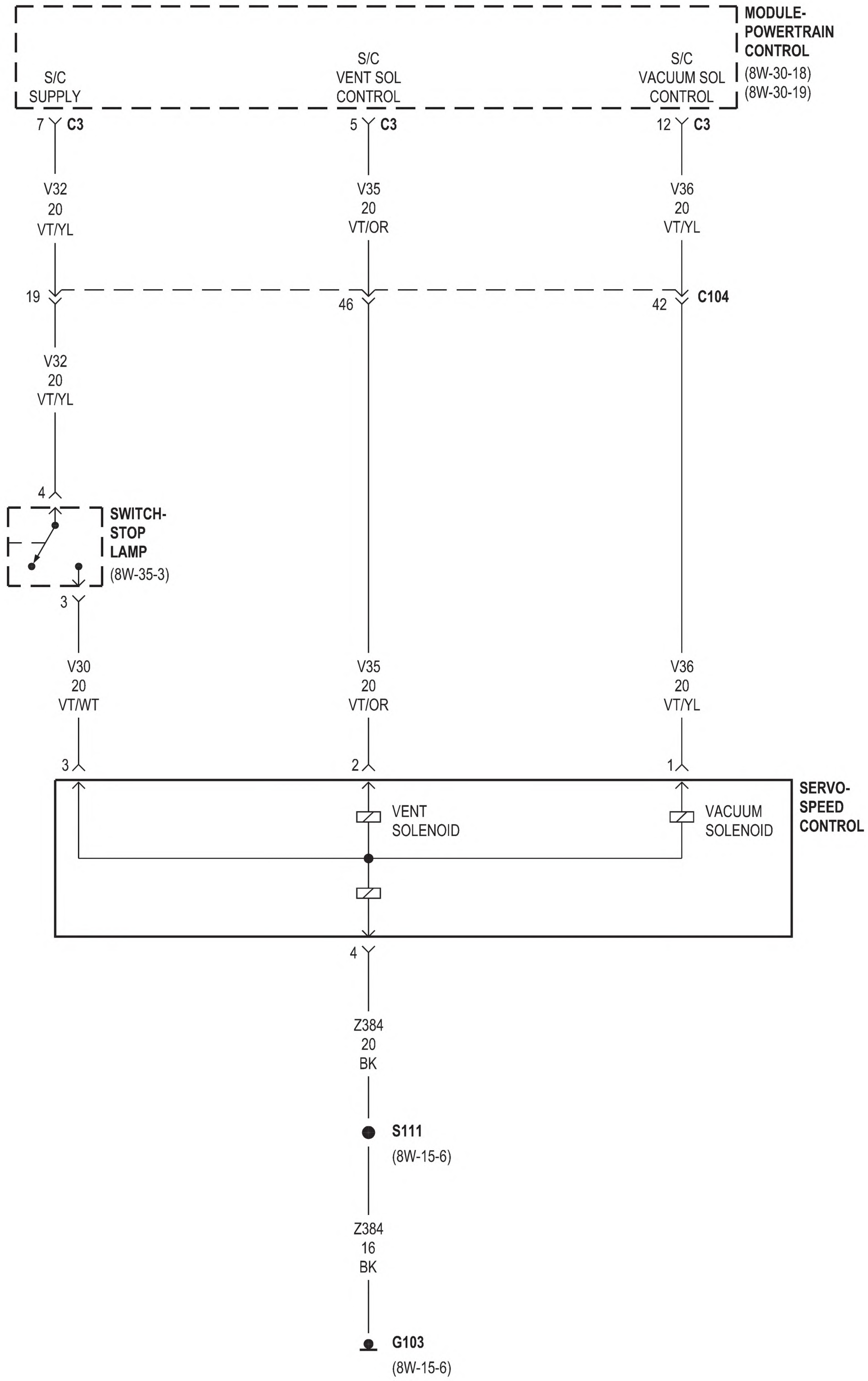

MODULE-
INTEGRATED
POWER
(8W-13-2)
MODULE-
FRONT
CONTROL
(8W-13-23)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN C BUS (+)
CAN C BUS (-)
13 IPM
8 C1
9 C1
36 C1
F1 18 PK/WT
D65 20 WT/LG
D64 20 WT/LB
S105 (8W-18-3)
S104 (8W-18-8)
4.7L/5.7L
3.7L
S132 (8W-13-21)
F1 18 PK/WT
16
15 C200
S215 (8W-18-3)
S214 (8W-18-8)
51 C200
F1 20 PK/WT
SWITCH-
BANK-
UPPER
(8W-44-2)
PANEL LAMPS DRIVER
11
E2 20 OR/BR
28 C2
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
22 C2
12
4
11
3
ASSEMBLY-
SHIFT
LEVER
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN C BUS (+)
CAN C BUS (-)
PANEL LAMPS DRIVER
AUTOSTICK UP/DOWN (ERS) SENSE
SENSOR GROUND
BRAKE SWITCH NO. 1 SIGNAL
GROUND
⌗ 2
9
1
7
T5 20 DG/YL
K900 20 DB/DG
B15 20 DG/WT
Z907 20 BK
24
39
59 C200
S212 (8W-15-7)
29
20 C104
S101 (8W-70-4)
B15 18 DG/WT
S141 (8W-70-3)
Z907 18 BK
6
27 C3
27 C2
BRAKE SWITCH NO. 1 SIGNAL
SWITCH-
STOP
LAMP
(8W-35-3)
G200 (8W-15-7)
AUTOSTICK UP/DOWN (ERS) SENSE
SENSOR GROUND
MODULE-
POWERTRAIN
CONTROL
(8W-30-11)
(8W-30-19)
⌗ 4.7L/5.7L

8W-33 VEHICLE SPEED CONTROL

Component	**Page**
G103	8W-33-3
Module-Powertrain Control	8W-33-3
Module-Steering Control	8W-33-2
Servo-Speed Control	8W-33-3
Switch-Speed Control-Left	8W-33-2
Switch-Speed Control-Right	8W-33-2
Switch-Stop Lamp	8W-33-3

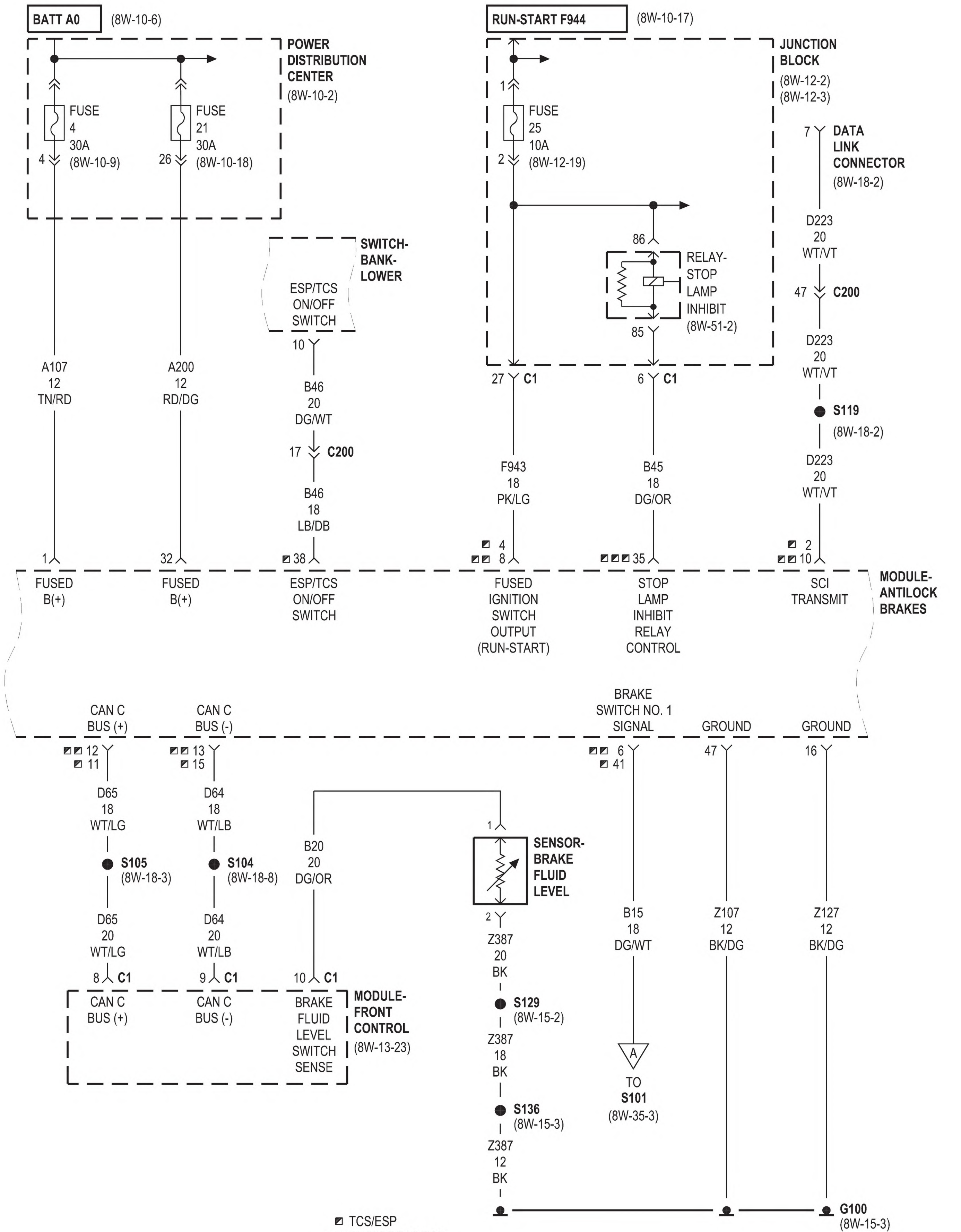

MODULE-
STEERING
CONTROL
S/C SWITCH SIGNAL NO. 2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO. 1
4 C3
2 C3
3 C3
V372 20 OR/VT
V397 20 VT/BR
S201
S218
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
1
2
2
1
S/C SWITCH SIGNAL NO. 2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO. 1
SWITCH-SPEED CONTROL-LEFT
S/C SWITCH RETURN
S/C SWITCH SIGNAL N0. 2
S/C SWITCH SIGNAL NO. 1
SWITCH-SPEED CONTROL-RIGHT
3
3
V371 20 VT/OR
V371 20 VT/OR
V371 20 VT/OR
S200

3.7L/4.7L

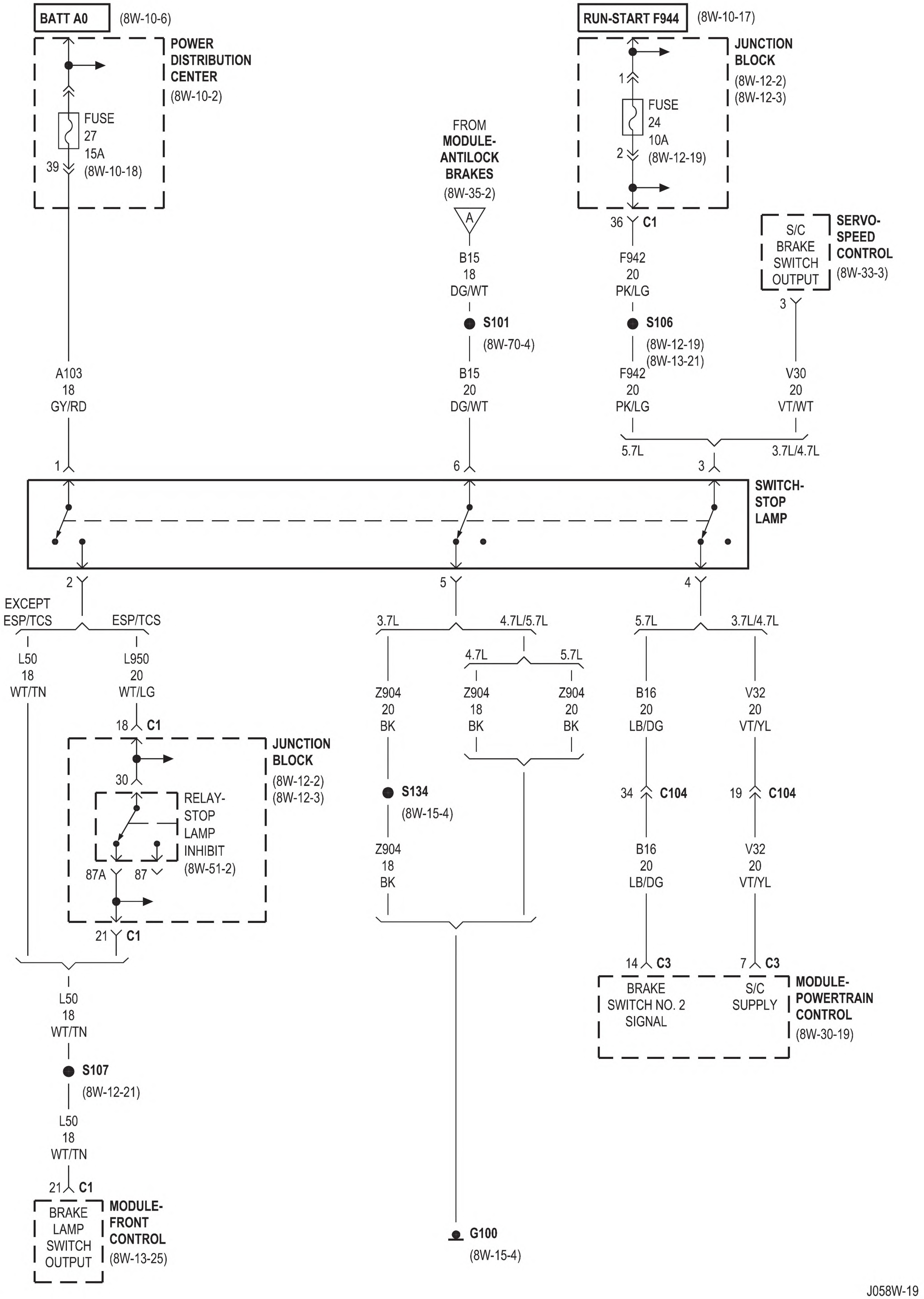

MODULE-
POWERTRAIN
CONTROL
(8W-30-18)
(8W-30-19)
S/C SUPPLY
S/C VENT SOL CONTROL
S/C VACUUM SOL CONTROL
7 C3
5 C3
12 C3
V32 20 VT/YL
V35 20 VT/OR
V36 20 VT/YL
19
46
42
C104
V32 20 VT/YL
4
SWITCH-
STOP
LAMP
(8W-35-3)
3
V30 20 VT/WT
V35 20 VT/OR
V36 20 VT/YL
3
2
1
SERVO-
SPEED
CONTROL
VENT SOLENOID
VACUUM SOLENOID
4
Z384 20 BK
S111
(8W-15-6)
Z384 16 BK
G103
(8W-15-6)

8W-35 ANTILOCK BRAKES

Component	Page
Data Link Connector	8W-35-2
Fuse 4	8W-35-2
Fuse 21	8W-35-2
Fuse 24	8W-35-3
Fuse 25	8W-35-2
Fuse 27	8W-35-3
G100	8W-35-2, 3
Junction Block	8W-35-2, 3
Module-Antilock Brakes	8W-35-2, 3, 4, 5, 6
Module-Front Control	8W-35-2, 3
Module-Powertrain Control	8W-35-3
Power Distribution Center	8W-35-2, 3
Relay-Stop Lamp Inhibit	8W-35-2, 3
Sensor-Brake Fluid Level	8W-35-2
Sensor-Brake Pressure	8W-35-6
Sensor-Brake Travel	8W-35-6
Sensor-Dynamics	8W-35-5
Sensor-Wheel Speed-Abs-Left Front	8W-35-4
Sensor-Wheel Speed-Abs-Left Rear	8W-35-4
Sensor-Wheel Speed-Abs-Right Front	8W-35-4
Sensor-Wheel Speed-Abs-Right Rear	8W-35-4
Servo-Speed Control	8W-35-3
Switch-Bank-Lower	8W-35-2
Switch-Stop Lamp	8W-35-3

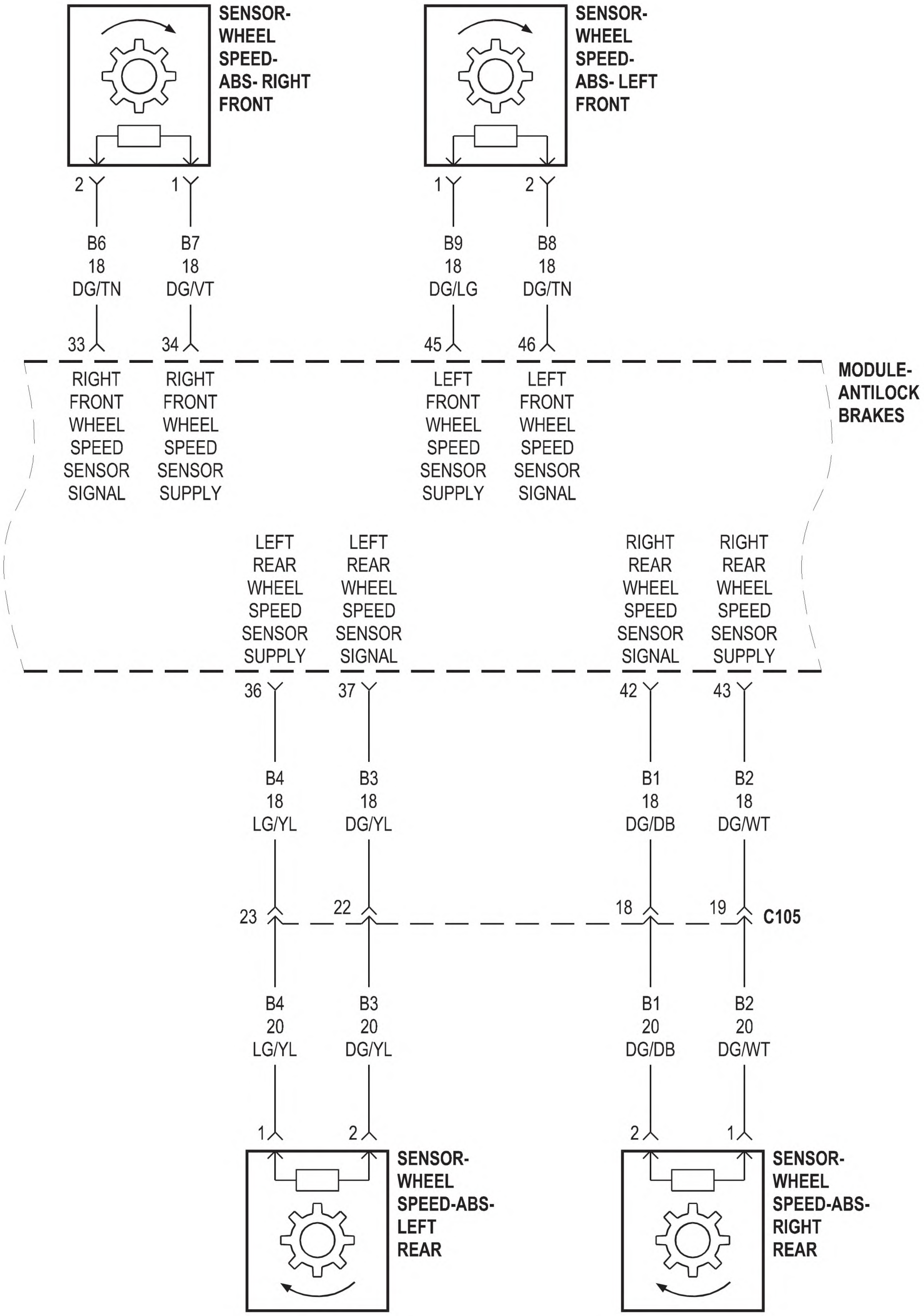

BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 4 30A (8W-10-9)
4
FUSE 21 30A (8W-10-18)
26
RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE 25 10A (8W-12-19)
2
86
RELAY-STOP LAMP INHIBIT
(8W-51-2)
85
27 C1
6 C1
7 DATA LINK CONNECTOR
(8W-18-2)
D223 20 WT/VT
47 C200
D223 20 WT/VT
S119
(8W-18-2)
D223 20 WT/VT
SWITCH-BANK-LOWER
ESP/TCS ON/OFF SWITCH
10
A107 12 TN/RD
A200 12 RD/DG
B46 20 DG/WT
17 C200
B46 18 LB/DB
F943 18 PK/LG
B45 18 DG/OR
1
32
▨ 38
▨ 4
▨▨ 8
▨▨▨ 35
▨ 2
▨▨ 10
MODULE-ANTILOCK BRAKES
FUSED B(+)
FUSED B(+)
ESP/TCS ON/OFF SWITCH
FUSED IGNITION SWITCH OUTPUT (RUN-START)
STOP LAMP INHIBIT RELAY CONTROL
SCI TRANSMIT
CAN C BUS (+)
CAN C BUS (-)
BRAKE SWITCH NO. 1 SIGNAL
GROUND
GROUND
▨▨ 12
▨ 11
▨▨ 13
▨ 15
▨▨ 6
▨ 41
47
16
D65 18 WT/LG
S105
(8W-18-3)
D65 20 WT/LG
D64 18 WT/LB
S104
(8W-18-8)
D64 20 WT/LB
B20 20 DG/OR
1
SENSOR-BRAKE FLUID LEVEL
2
Z387 20 BK
S129
(8W-15-2)
Z387 18 BK
S136
(8W-15-3)
Z387 12 BK
B15 18 DG/WT
A
TO S101
(8W-35-3)
Z107 12 BK/DG
Z127 12 BK/DG
G100
(8W-15-3)
8 C1
9 C1
10 C1
CAN C BUS (+)
CAN C BUS (-)
BRAKE FLUID LEVEL SWITCH SENSE
MODULE-FRONT CONTROL
(8W-13-23)

▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
▨▨▨ ESP

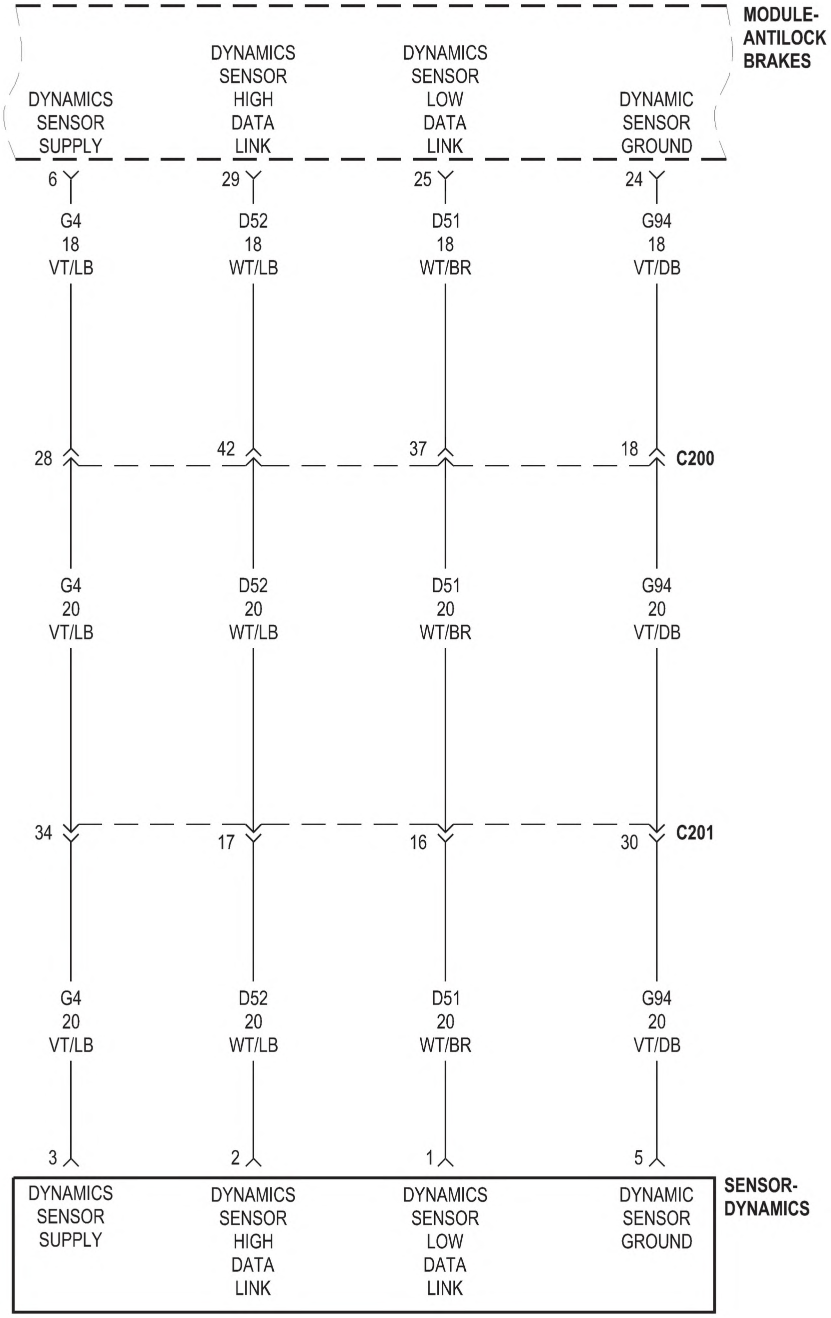

BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
27
15A
(8W-10-18)
39
A103
18
GY/RD
1
FROM
MODULE-ANTILOCK BRAKES
(8W-35-2)
A
B15
18
DG/WT
S101
(8W-70-4)
B15
20
DG/WT
6
RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
24
10A
(8W-12-19)
2
36
C1
F942
20
PK/LG
S106
(8W-12-19)
(8W-13-21)
F942
20
PK/LG
S/C BRAKE SWITCH OUTPUT
SERVO-SPEED CONTROL
(8W-33-3)
3
V30
20
VT/WT
5.7L
3.7L/4.7L
3
SWITCH-STOP LAMP
2
EXCEPT ESP/TCS
ESP/TCS
L50
18
WT/TN
L950
20
WT/LG
18
C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-STOP LAMP INHIBIT
(8W-51-2)
87A
87
21
C1
L50
18
WT/TN
S107
(8W-12-21)
L50
18
WT/TN
21
C1
BRAKE LAMP SWITCH OUTPUT
MODULE-FRONT CONTROL
(8W-13-25)
5
3.7L
4.7L/5.7L
4.7L
5.7L
Z904
20
BK
Z904
18
BK
Z904
20
BK
S134
(8W-15-4)
Z904
18
BK
G100
(8W-15-4)
4
5.7L
3.7L/4.7L
B16
20
LB/DG
V32
20
VT/YL
34
C104
19
C104
B16
20
LB/DG
V32
20
VT/YL
14
C3
7
C3
BRAKE SWITCH NO. 2 SIGNAL
S/C SUPPLY
MODULE-POWERTRAIN CONTROL
(8W-30-19)

WK503503

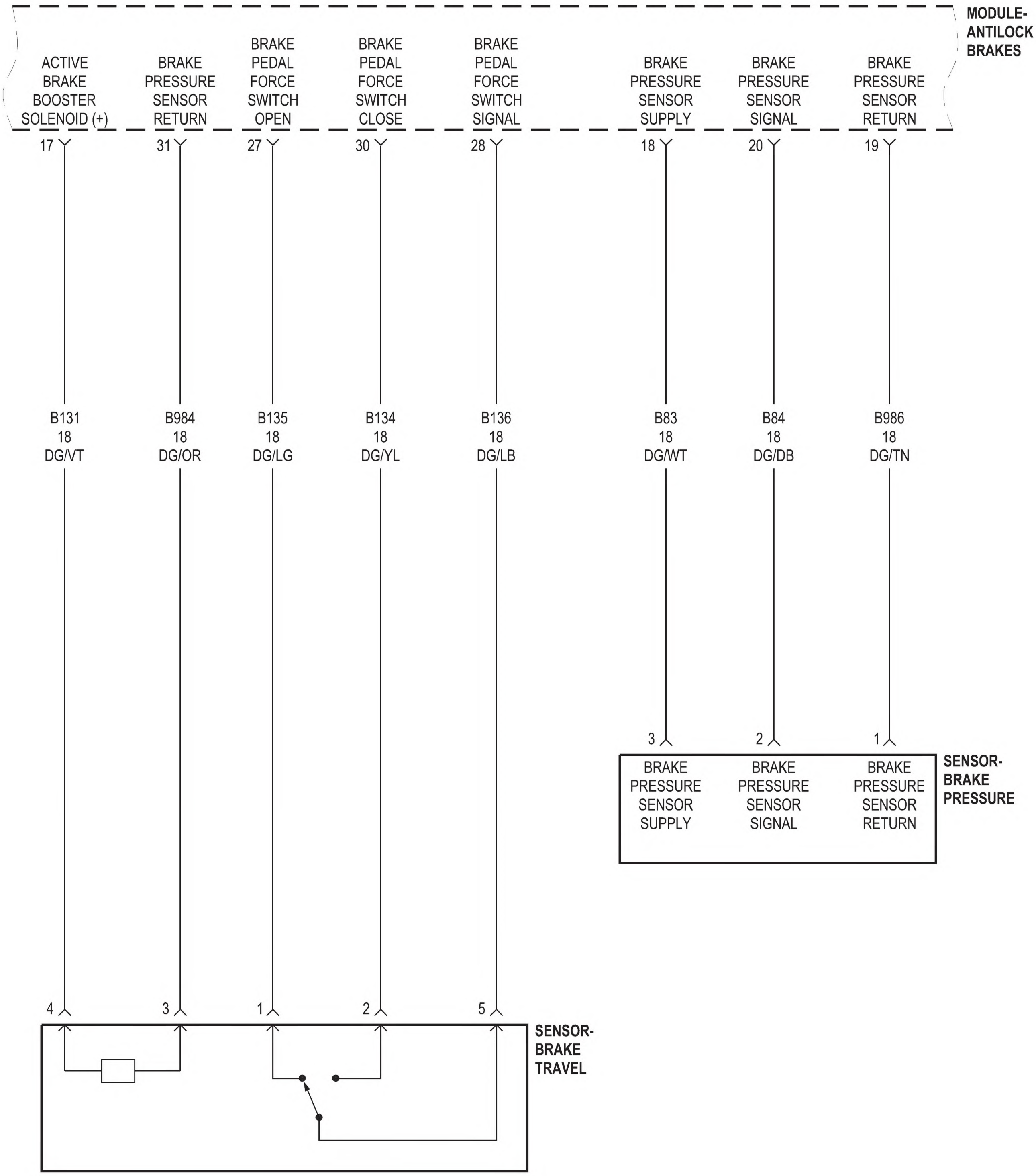
J058W-19


SENSOR-WHEEL SPEED-ABS- RIGHT FRONT
SENSOR-WHEEL SPEED-ABS- LEFT FRONT
2
1
1
2
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19
C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-ABS-LEFT REAR
SENSOR-WHEEL SPEED-ABS-RIGHT REAR

ESP

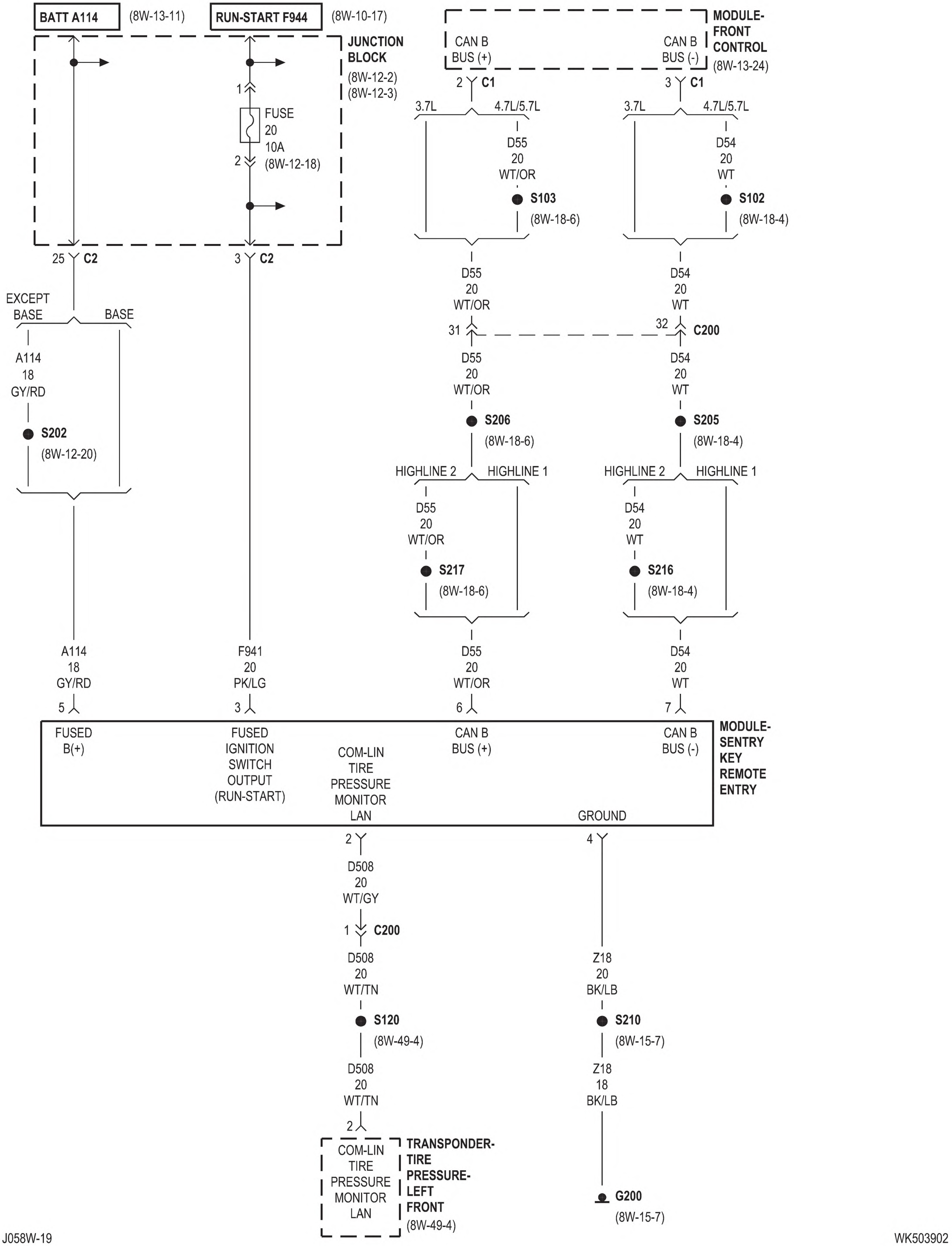

MODULE-
ANTILOCK
BRAKES
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMIC SENSOR GROUND
6
29
25
24
G4 18 VT/LB
D52 18 WT/LB
D51 18 WT/BR
G94 18 VT/DB
28
42
37
18
C200
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
34
17
16
30
C201
G4 20 VT/LB
D52 20 WT/LB
D51 20 WT/BR
G94 20 VT/DB
3
2
1
5
DYNAMICS SENSOR SUPPLY
DYNAMICS SENSOR HIGH DATA LINK
DYNAMICS SENSOR LOW DATA LINK
DYNAMIC SENSOR GROUND
SENSOR-
DYNAMICS

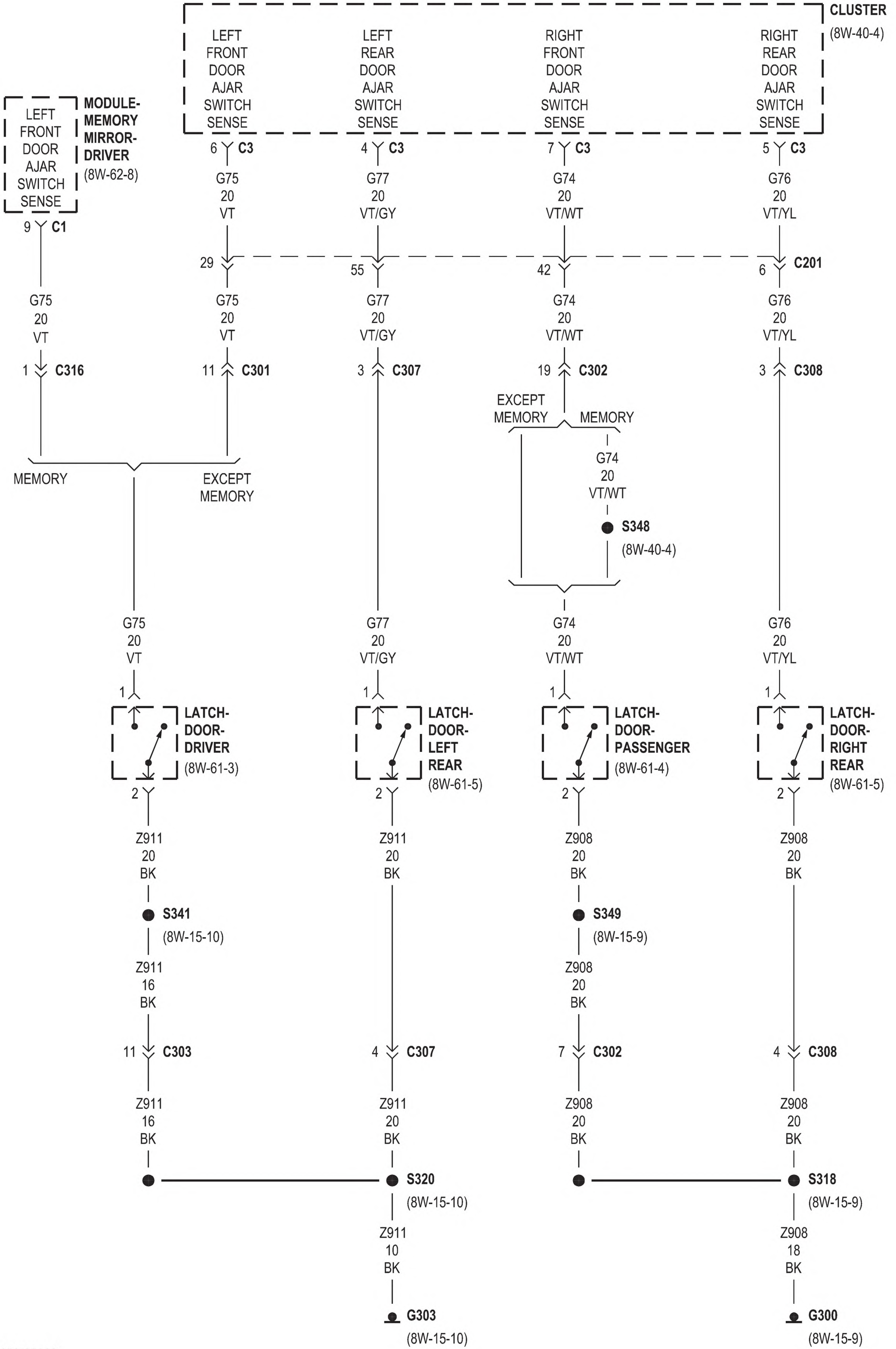
ESP

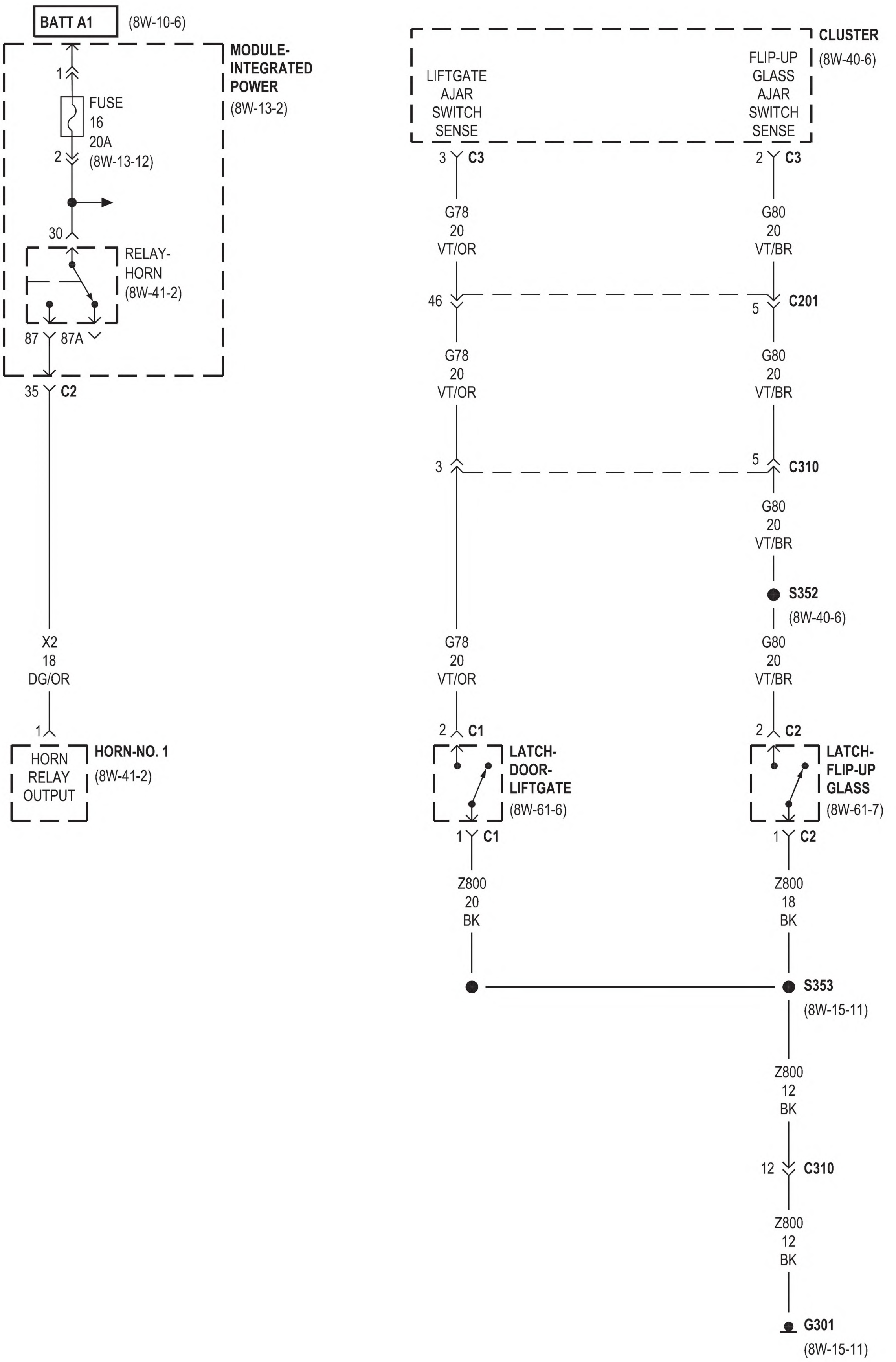

MODULE-
ANTILOCK
BRAKES
ACTIVE BRAKE BOOSTER SOLENOID (+)
BRAKE PRESSURE SENSOR RETURN
BRAKE PEDAL FORCE SWITCH OPEN
BRAKE PEDAL FORCE SWITCH CLOSE
BRAKE PEDAL FORCE SWITCH SIGNAL
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
17
31
27
30
28
18
20
19
B131 18 DG/VT
B984 18 DG/OR
B135 18 DG/LG
B134 18 DG/YL
B136 18 DG/LB
B83 18 DG/WT
B84 18 DG/DB
B986 18 DG/TN
3
2
1
BRAKE PRESSURE SENSOR SUPPLY
BRAKE PRESSURE SENSOR SIGNAL
BRAKE PRESSURE SENSOR RETURN
SENSOR-
BRAKE
PRESSURE
4
3
1
2
5
SENSOR-
BRAKE
TRAVEL

8W-39 VEHICLE THEFT SECURITY SYSTEM

Component **Page**
Cluster 8W-39-3, 4
Fuse 16 . . . . 8W-39-4
Fuse 20 . . . . 8W-39-2
G200 . . . . 8W-39-2
G300 . . . . 8W-39-3
G301 . . . . 8W-39-4
G303 . . . . 8W-39-3
Horn-No. 1 . . . . 8W-39-4
Junction Block 8W-39-2
Latch-Door-Driver 8W-39-3
Latch-Door-Left Rear 8W-39-3
Component **Page**
Latch-Door-Liftgate 8W-39-4
Latch-Door-Passenger 8W-39-3
Latch-Door-Right Rear 8W-39-3
Latch-Flip-Up Glass 8W-39-4
Module-Front Control 8W-39-2
Module-Integrated Power 8W-39-4
Module-Memory Mirror-Driver 8W-39-3
Module-Sentry Key Remote Entry 8W-39-2
Relay-Horn 8W-39-4
Transponder-Tire Pressure-Left Front 8W-39-2

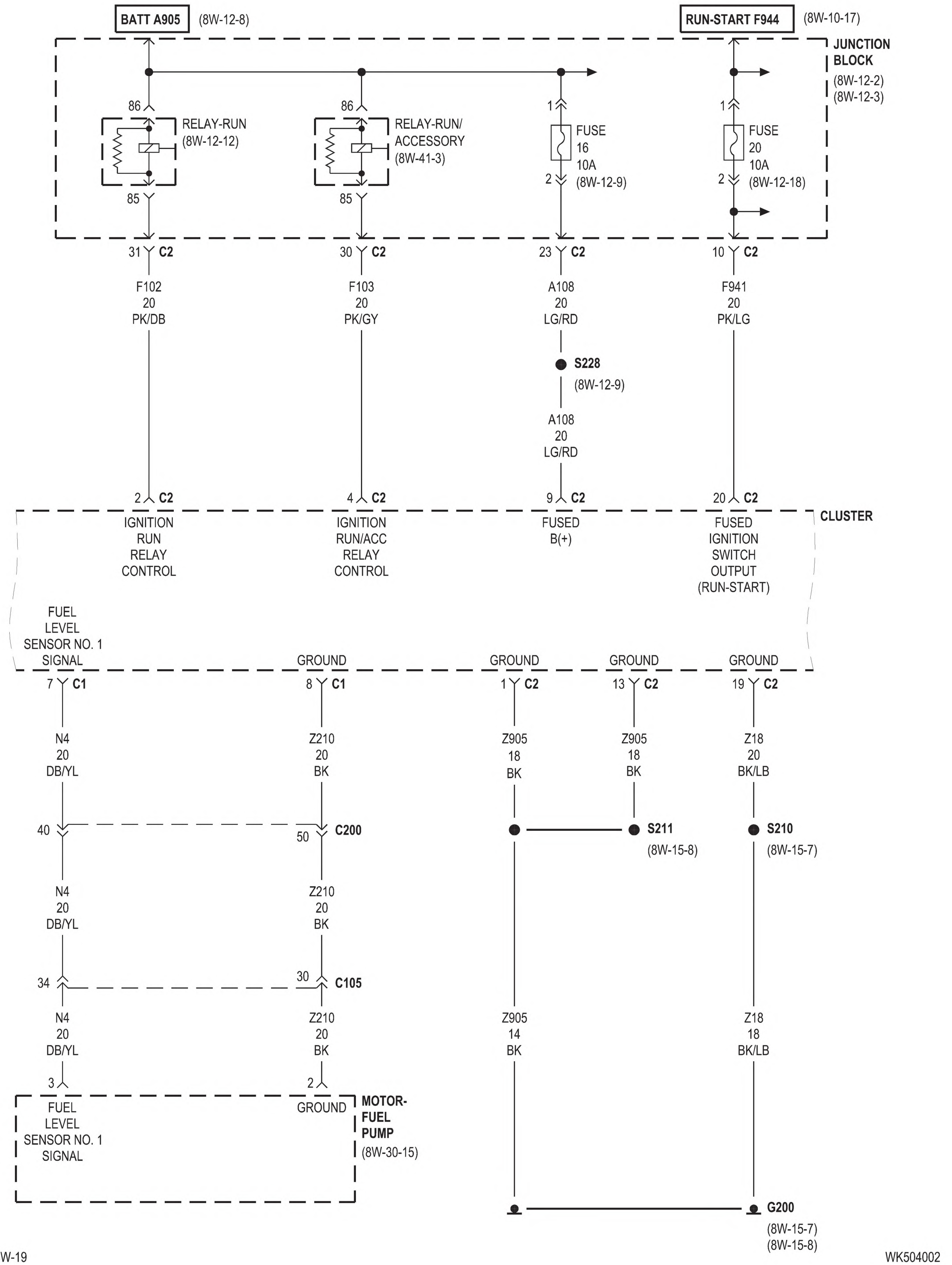

BATT A114
(8W-13-11)
RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
20
10A
(8W-12-18)
2
25 C2
3 C2
MODULE-FRONT CONTROL
(8W-13-24)
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
3.7L
4.7L/5.7L
D55
20
WT/OR
S103
(8W-18-6)
D54
20
WT
S102
(8W-18-4)
EXCEPT BASE
BASE
A114
18
GY/RD
S202
(8W-12-20)
D55
20
WT/OR
D54
20
WT
31
32
C200
D55
20
WT/OR
D54
20
WT
S206
(8W-18-6)
S205
(8W-18-4)
HIGHLINE 2
HIGHLINE 1
HIGHLINE 2
HIGHLINE 1
D55
20
WT/OR
S217
(8W-18-6)
D54
20
WT
S216
(8W-18-4)
A114
18
GY/RD
F941
20
PK/LG
D55
20
WT/OR
D54
20
WT
5
3
6
7
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
COM-LIN TIRE PRESSURE MONITOR LAN
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
2
4
D508
20
WT/GY
1 C200
D508
20
WT/TN
S120
(8W-49-4)
D508
20
WT/TN
2
Z18
20
BK/LB
S210
(8W-15-7)
Z18
18
BK/LB
COM-LIN TIRE PRESSURE MONITOR LAN
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
(8W-49-4)
G200
(8W-15-7)

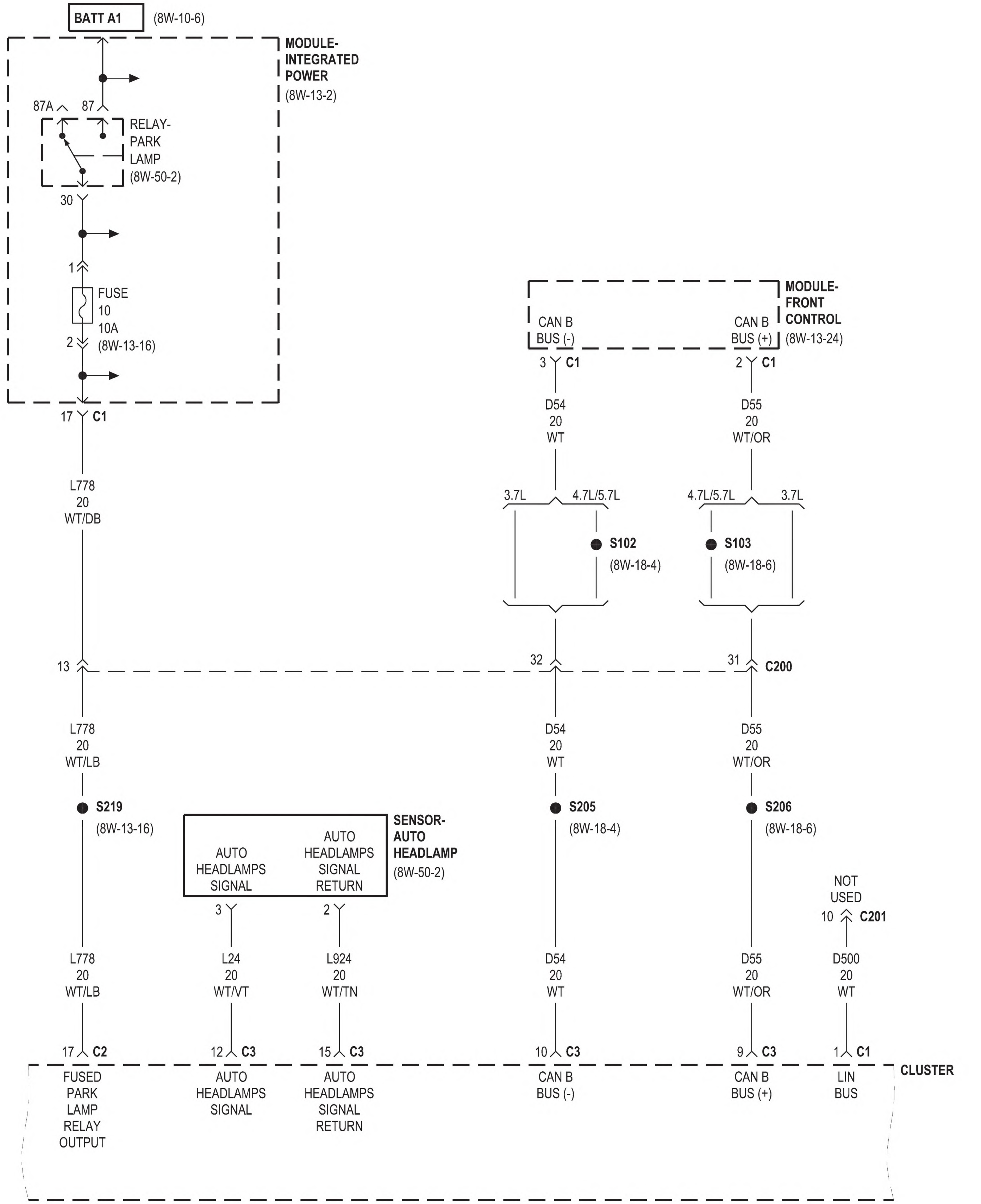

CLUSTER
(8W-40-4)
LEFT FRONT DOOR AJAR SWITCH SENSE
LEFT REAR DOOR AJAR SWITCH SENSE
RIGHT FRONT DOOR AJAR SWITCH SENSE
RIGHT REAR DOOR AJAR SWITCH SENSE
6 C3
4 C3
7 C3
5 C3
G75 20 VT
G77 20 VT/GY
G74 20 VT/WT
G76 20 VT/YL
29
55
42
6 C201
MODULE-MEMORY MIRROR-DRIVER
(8W-62-8)
LEFT FRONT DOOR AJAR SWITCH SENSE
9 C1
G75 20 VT
1 C316
11 C301
3 C307
19 C302
3 C308
MEMORY
EXCEPT MEMORY
EXCEPT MEMORY
MEMORY
G74 20 VT/WT
S348
(8W-40-4)
G75 20 VT
G77 20 VT/GY
G74 20 VT/WT
G76 20 VT/YL
1
LATCH-DOOR-DRIVER
(8W-61-3)
LATCH-DOOR-LEFT REAR
(8W-61-5)
LATCH-DOOR-PASSENGER
(8W-61-4)
LATCH-DOOR-RIGHT REAR
(8W-61-5)
2
Z911 20 BK
Z908 20 BK
S341
(8W-15-10)
S349
(8W-15-9)
Z911 16 BK
Z908 20 BK
11 C303
4 C307
7 C302
4 C308
Z911 16 BK
Z911 20 BK
Z908 20 BK
Z908 20 BK
S320
(8W-15-10)
S318
(8W-15-9)
Z911 10 BK
Z908 18 BK
G303
(8W-15-10)
G300
(8W-15-9)

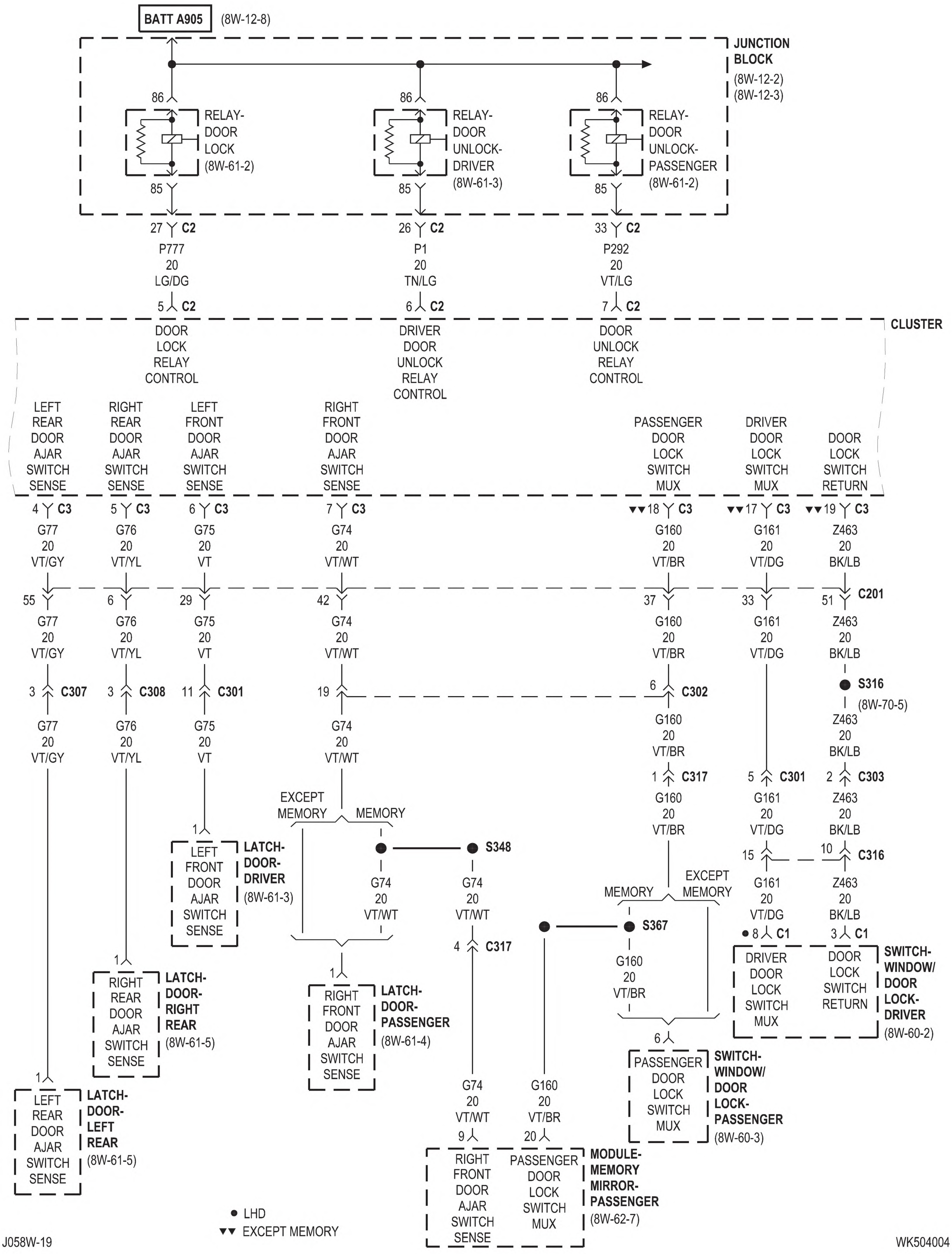

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
16
20A
(8W-13-12)
2
30
RELAY-
HORN
(8W-41-2)
87
87A
35
C2
X2
18
DG/OR
1
HORN
RELAY
OUTPUT
HORN-NO. 1
(8W-41-2)
CLUSTER
(8W-40-6)
LIFTGATE
AJAR
SWITCH
SENSE
FLIP-UP
GLASS
AJAR
SWITCH
SENSE
3 C3
2 C3
G78
20
VT/OR
G80
20
VT/BR
46
5
C201
3
5
C310
S352
(8W-40-6)
2 C1
2 C2
LATCH-
DOOR-
LIFTGATE
(8W-61-6)
LATCH-
FLIP-UP
GLASS
(8W-61-7)
1 C1
1 C2
Z800
20
BK
Z800
18
BK
S353
(8W-15-11)
Z800
12
BK
12
C310
G301
(8W-15-11)

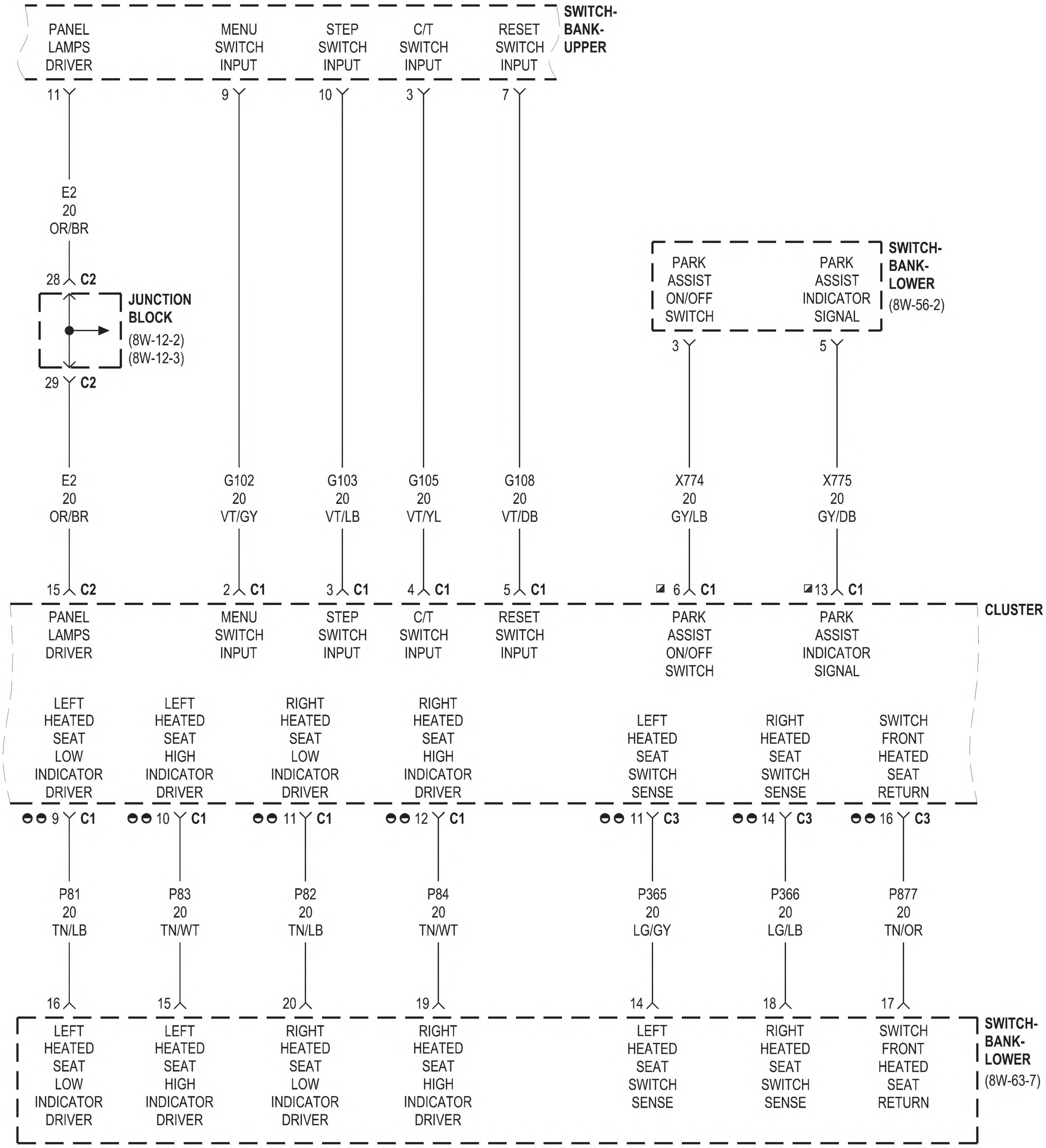
8W-40 INSTRUMENT CLUSTER

Component	Page
Cluster	8W-40-2, 3, 4, 5, 6
Control-A/C-Heater	8W-40-6
Fuse 10	8W-40-3
Fuse 16	8W-40-2
Fuse 17	8W-40-6
Fuse 20	8W-40-2
G200	8W-40-2
Junction Block	8W-40-2, 4, 5, 6
Lamp-Courtesy-Lower Left	8W-40-6
Lamp-Glove Box	8W-40-6
Lamp-License Plate	8W-40-6
Latch-Door-Driver	8W-40-4
Latch-Door-Left Rear	8W-40-4
Latch-Door-Liftgate	8W-40-6
Latch-Door-Passenger	8W-40-4
Latch-Door-Right Rear	8W-40-4
Latch-Flip-Up Glass	8W-40-6
Module-Front Control	8W-40-3
Module-Integrated Power	8W-40-3
Module-Memory Mirror-Passenger	8W-40-4
Motor-Fuel Pump	8W-40-2
Motor-Rear Window Wiper	8W-40-6
Relay-Door Lock	8W-40-4
Relay-Door Unlock-Driver	8W-40-4
Relay-Door Unlock-Passenger	8W-40-4
Relay-Flip-Up Glass	8W-40-6
Relay-Park Lamp	8W-40-3
Relay-Run	8W-40-2
Relay-Run/Accessory	8W-40-2
Seat Belt-Tensioner-Driver	8W-40-6
Sensor-Auto Headlamp	8W-40-3
Switch-Bank-Lower	8W-40-5
Switch-Bank-Upper	8W-40-5
Switch-Parking Brake	8W-40-6
Switch-Window/Door Lock-Driver	8W-40-4
Switch-Window/Door Lock-Passenger	8W-40-4


BATT A905
(8W-12-8)
RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
86
RELAY-RUN
(8W-12-12)
85
86
RELAY-RUN/ ACCESSORY
(8W-41-3)
85
1
FUSE 16 10A
2
(8W-12-9)
1
FUSE 20 10A
2
(8W-12-18)
31 C2
F102 20 PK/DB
30 C2
F103 20 PK/GY
23 C2
A108 20 LG/RD
S228
(8W-12-9)
A108 20 LG/RD
10 C2
F941 20 PK/LG
2 C2
4 C2
9 C2
20 C2
CLUSTER
IGNITION RUN RELAY CONTROL
IGNITION RUN/ACC RELAY CONTROL
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUEL LEVEL SENSOR NO. 1 SIGNAL
GROUND
GROUND
GROUND
GROUND
7 C1
8 C1
1 C2
13 C2
19 C2
N4 20 DB/YL
Z210 20 BK
Z905 18 BK
Z905 18 BK
Z18 20 BK/LB
40
50
C200
S211
(8W-15-8)
S210
(8W-15-7)
N4 20 DB/YL
Z210 20 BK
34
30
C105
N4 20 DB/YL
Z210 20 BK
Z905 14 BK
Z18 18 BK/LB
3
2
FUEL LEVEL SENSOR NO. 1 SIGNAL
GROUND
MOTOR-FUEL PUMP
(8W-30-15)
G200
(8W-15-7)
(8W-15-8)

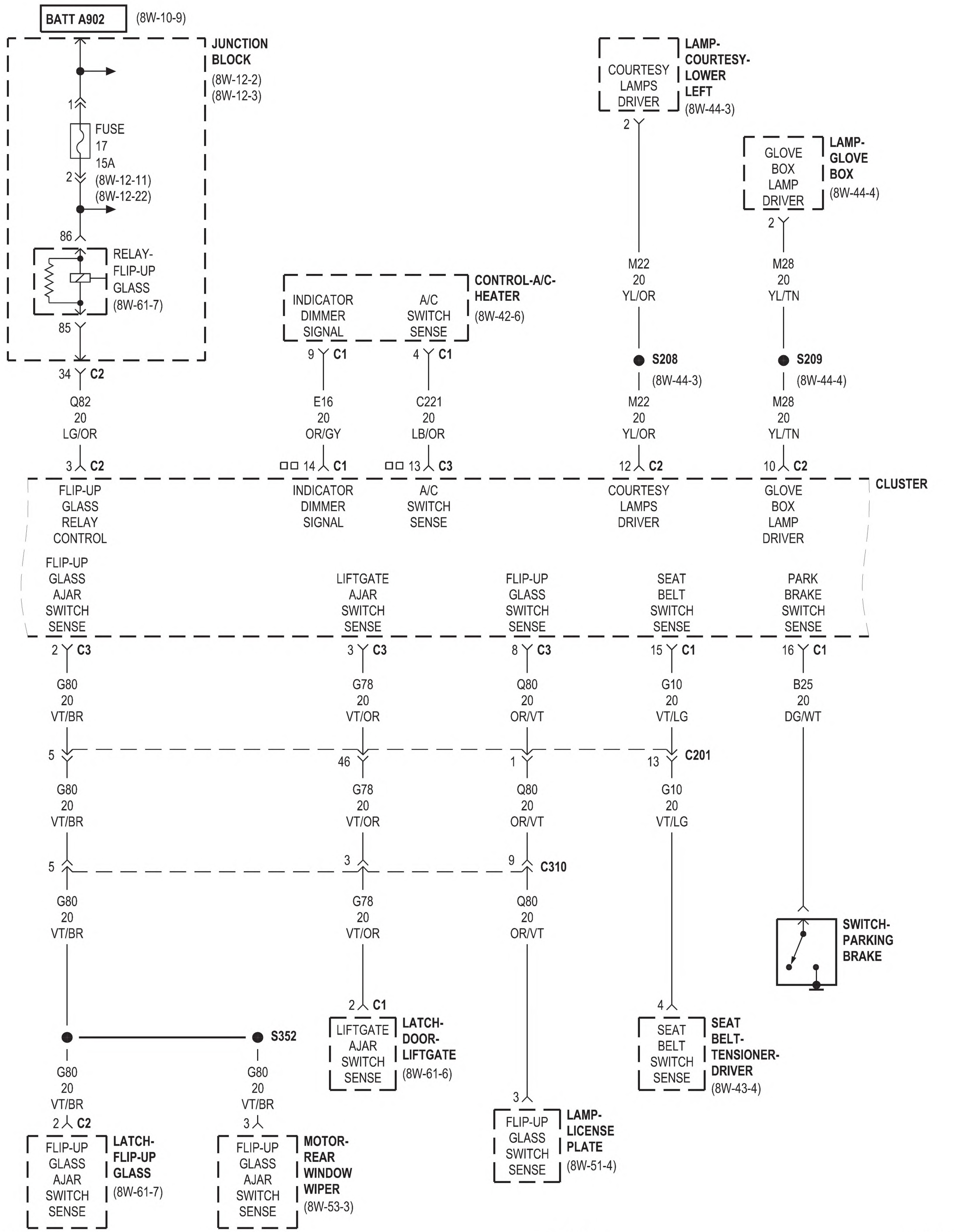

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
87A
87
RELAY-
PARK
LAMP
(8W-50-2)
30
1
FUSE
10
10A
(8W-13-16)
2
17
C1
L778
20
WT/DB
13
L778
20
WT/LB
S219
(8W-13-16)
L778
20
WT/LB
17
C2
MODULE-
FRONT
CONTROL
(8W-13-24)
CAN B
BUS (-)
CAN B
BUS (+)
3
C1
2
C1
D54
20
WT
D55
20
WT/OR
3.7L
4.7L/5.7L
4.7L/5.7L
3.7L
S102
(8W-18-4)
S103
(8W-18-6)
32
31
C200
D54
20
WT
D55
20
WT/OR
S205
(8W-18-4)
S206
(8W-18-6)
SENSOR-
AUTO
HEADLAMP
(8W-50-2)
AUTO
HEADLAMPS
SIGNAL
AUTO
HEADLAMPS
SIGNAL
RETURN
3
2
L24
20
WT/VT
L924
20
WT/TN
NOT
USED
10
C201
D54
20
WT
D55
20
WT/OR
D500
20
WT
12
C3
15
C3
10
C3
9
C3
1
C1
CLUSTER
FUSED
PARK
LAMP
RELAY
OUTPUT
AUTO
HEADLAMPS
SIGNAL
AUTO
HEADLAMPS
SIGNAL
RETURN
CAN B
BUS (-)
CAN B
BUS (+)
LIN
BUS


BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
86
RELAY-DOOR LOCK
(8W-61-2)
85
86
RELAY-DOOR UNLOCK-DRIVER
(8W-61-3)
85
86
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
85
27 C2
P777
20
LG/DG
5 C2
26 C2
P1
20
TN/LG
6 C2
33 C2
P292
20
VT/LG
7 C2
CLUSTER
DOOR LOCK RELAY CONTROL
DRIVER DOOR UNLOCK RELAY CONTROL
DOOR UNLOCK RELAY CONTROL
LEFT REAR DOOR AJAR SWITCH SENSE
RIGHT REAR DOOR AJAR SWITCH SENSE
LEFT FRONT DOOR AJAR SWITCH SENSE
RIGHT FRONT DOOR AJAR SWITCH SENSE
PASSENGER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
4 C3
G77
20
VT/GY
5 C3
G76
20
VT/YL
6 C3
G75
20
VT
7 C3
G74
20
VT/WT
▼▼18 C3
G160
20
VT/BR
▼▼17 C3
G161
20
VT/DG
▼▼19 C3
Z463
20
BK/LB
C201
55
6
29
42
37
33
51
G77
20
VT/GY
G76
20
VT/YL
G75
20
VT
G74
20
VT/WT
G160
20
VT/BR
G161
20
VT/DG
Z463
20
BK/LB
3 C307
3 C308
11 C301
19
6 C302
S316
(8W-70-5)
G77
20
VT/GY
G76
20
VT/YL
G75
20
VT
G74
20
VT/WT
G160
20
VT/BR
Z463
20
BK/LB
1 C317
5 C301
2 C303
G160
20
VT/BR
G161
20
VT/DG
Z463
20
BK/LB
EXCEPT MEMORY
MEMORY
S348
G74
20
VT/WT
G74
20
VT/WT
4 C317
15
10 C316
G161
20
VT/DG
Z463
20
BK/LB
MEMORY
EXCEPT MEMORY
S367
G160
20
VT/BR
• 8 C1
3 C1
1
LEFT FRONT DOOR AJAR SWITCH SENSE
LATCH-DOOR-DRIVER
(8W-61-3)
1
RIGHT REAR DOOR AJAR SWITCH SENSE
LATCH-DOOR-RIGHT REAR
(8W-61-5)
1
RIGHT FRONT DOOR AJAR SWITCH SENSE
LATCH-DOOR-PASSENGER
(8W-61-4)
DRIVER DOOR LOCK SWITCH MUX
DOOR LOCK SWITCH RETURN
SWITCH-WINDOW/DOOR LOCK-DRIVER
(8W-60-2)
6
PASSENGER DOOR LOCK SWITCH MUX
SWITCH-WINDOW/DOOR LOCK-PASSENGER
(8W-60-3)
1
LEFT REAR DOOR AJAR SWITCH SENSE
LATCH-DOOR-LEFT REAR
(8W-61-5)
G74
20
VT/WT
G160
20
VT/BR
9
20
RIGHT FRONT DOOR AJAR SWITCH SENSE
PASSENGER DOOR LOCK SWITCH MUX
MODULE-MEMORY MIRROR-PASSENGER
(8W-62-7)
● LHD
▼▼ EXCEPT MEMORY
J058W-19
WK504004


SWITCH-BANK-UPPER
PANEL LAMPS DRIVER
MENU SWITCH INPUT
STEP SWITCH INPUT
C/T SWITCH INPUT
RESET SWITCH INPUT
11
9
10
3
7
E2 20 OR/BR
28 C2
29 C2
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
SWITCH-BANK-LOWER
(8W-56-2)
PARK ASSIST ON/OFF SWITCH
PARK ASSIST INDICATOR SIGNAL
3
5
E2 20 OR/BR
G102 20 VT/GY
G103 20 VT/LB
G105 20 VT/YL
G108 20 VT/DB
X774 20 GY/LB
X775 20 GY/DB
15 C2
2 C1
3 C1
4 C1
5 C1
◪ 6 C1
◪ 13 C1
CLUSTER
PANEL LAMPS DRIVER
MENU SWITCH INPUT
STEP SWITCH INPUT
C/T SWITCH INPUT
RESET SWITCH INPUT
PARK ASSIST ON/OFF SWITCH
PARK ASSIST INDICATOR SIGNAL
LEFT HEATED SEAT LOW INDICATOR DRIVER
LEFT HEATED SEAT HIGH INDICATOR DRIVER
RIGHT HEATED SEAT LOW INDICATOR DRIVER
RIGHT HEATED SEAT HIGH INDICATOR DRIVER
LEFT HEATED SEAT SWITCH SENSE
RIGHT HEATED SEAT SWITCH SENSE
SWITCH FRONT HEATED SEAT RETURN
●● 9 C1
●● 10 C1
●● 11 C1
●● 12 C1
●● 11 C3
●● 14 C3
●● 16 C3
P81 20 TN/LB
P83 20 TN/WT
P82 20 TN/LB
P84 20 TN/WT
P365 20 LG/GY
P366 20 LG/LB
P877 20 TN/OR
16
15
20
19
14
18
17
SWITCH-BANK-LOWER
(8W-63-7)
LEFT HEATED SEAT LOW INDICATOR DRIVER
LEFT HEATED SEAT HIGH INDICATOR DRIVER
RIGHT HEATED SEAT LOW INDICATOR DRIVER
RIGHT HEATED SEAT HIGH INDICATOR DRIVER
LEFT HEATED SEAT SWITCH SENSE
RIGHT HEATED SEAT SWITCH SENSE
SWITCH FRONT HEATED SEAT RETURN

◪ PARK ASSIST
●● HEATED SEATS

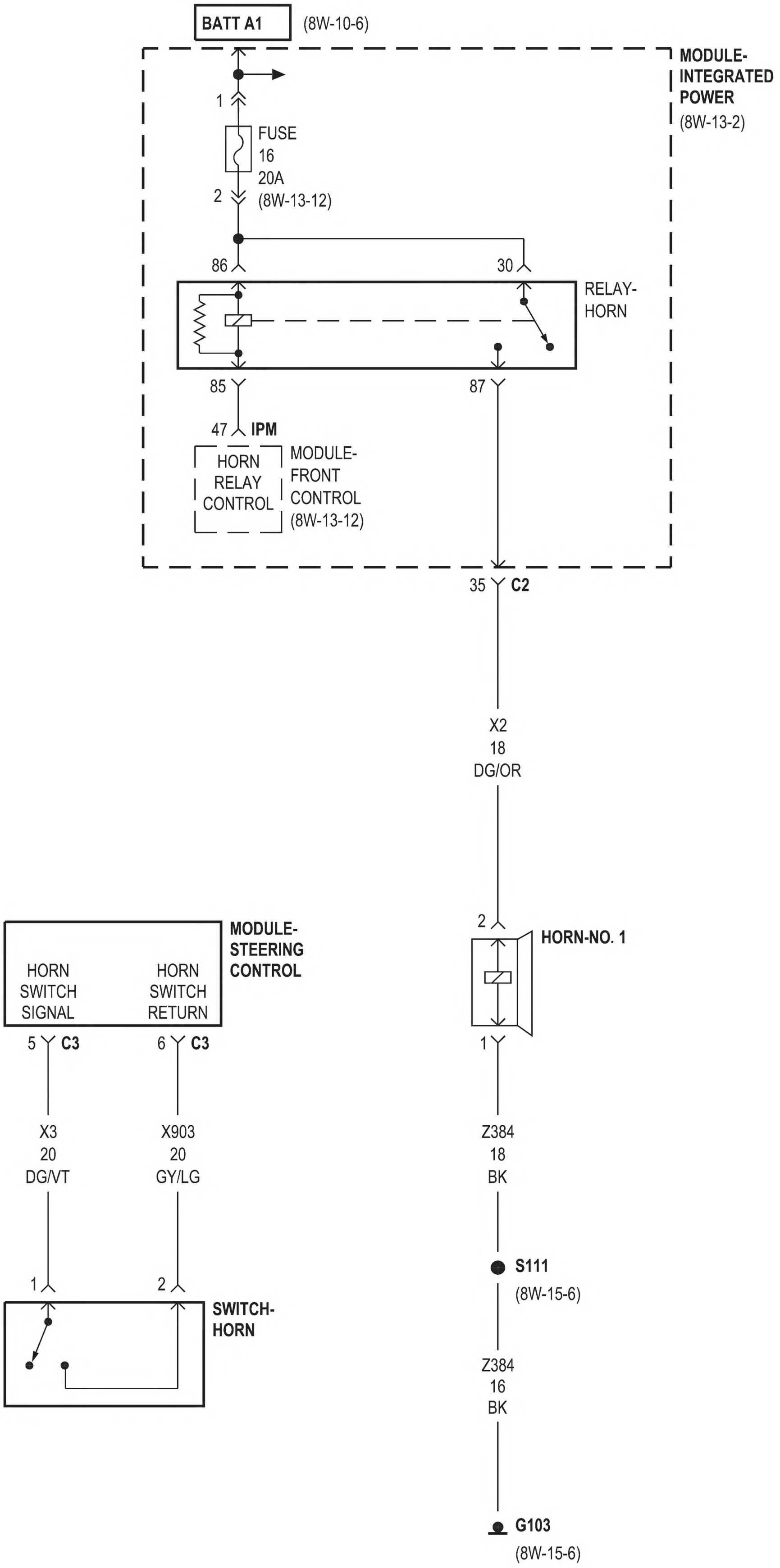
WK504005

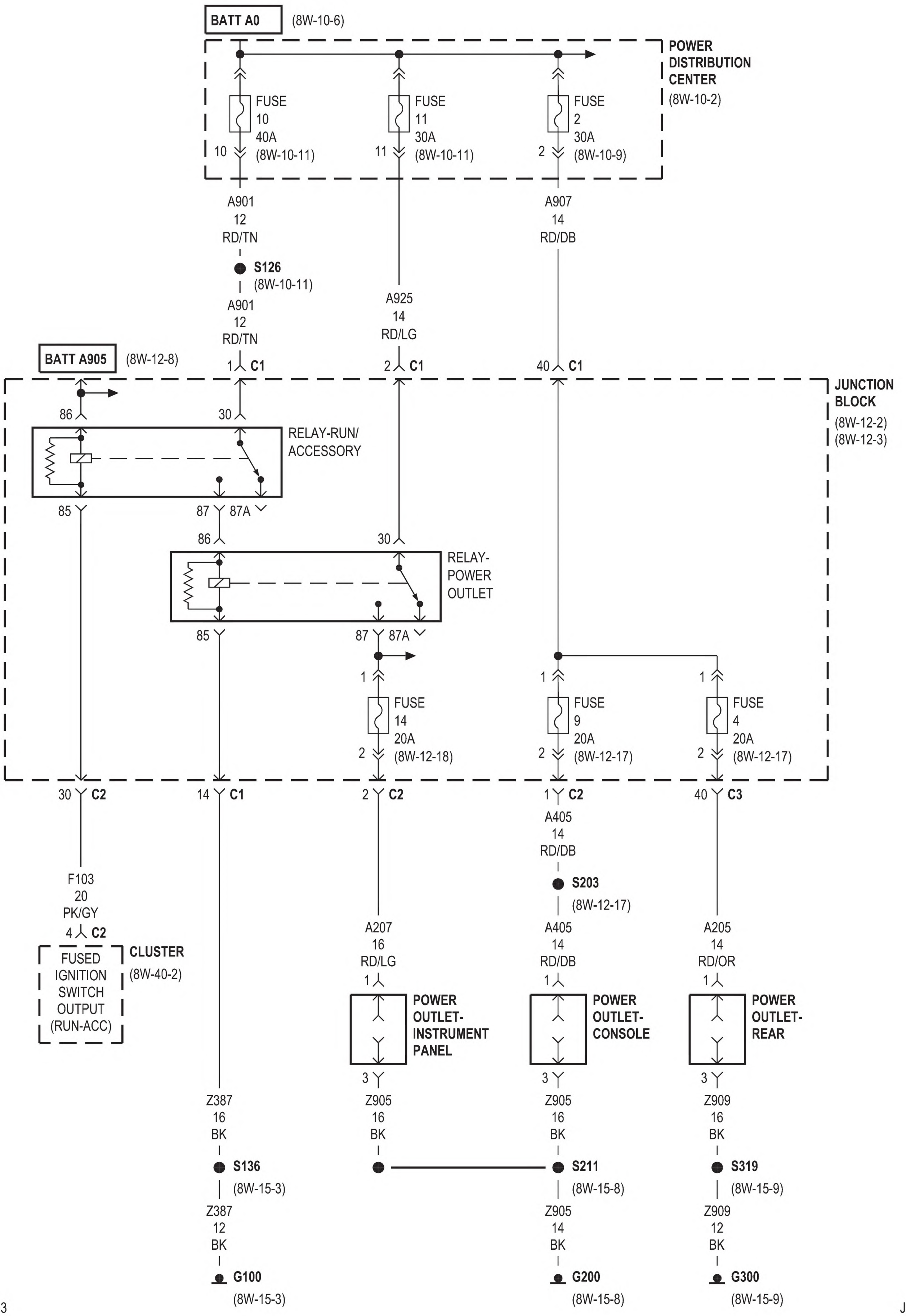

BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
17
15A
2
(8W-12-11)
(8W-12-22)
86
RELAY-FLIP-UP GLASS
(8W-61-7)
85
34 C2
Q82
20
LG/OR
3 C2
CONTROL-A/C-HEATER
(8W-42-6)
INDICATOR DIMMER SIGNAL
A/C SWITCH SENSE
9 C1
4 C1
E16
20
OR/GY
C221
20
LB/OR
□□ 14 C1
□□ 13 C3
COURTESY LAMPS DRIVER
LAMP-COURTESY-LOWER LEFT
(8W-44-3)
2
M22
20
YL/OR
S208
(8W-44-3)
M22
20
YL/OR
12 C2
GLOVE BOX LAMP DRIVER
LAMP-GLOVE BOX
(8W-44-4)
2
M28
20
YL/TN
S209
(8W-44-4)
M28
20
YL/TN
10 C2
CLUSTER
FLIP-UP GLASS RELAY CONTROL
INDICATOR DIMMER SIGNAL
A/C SWITCH SENSE
COURTESY LAMPS DRIVER
GLOVE BOX LAMP DRIVER
FLIP-UP GLASS AJAR SWITCH SENSE
LIFTGATE AJAR SWITCH SENSE
FLIP-UP GLASS SWITCH SENSE
SEAT BELT SWITCH SENSE
PARK BRAKE SWITCH SENSE
2 C3
3 C3
8 C3
15 C1
16 C1
G80
20
VT/BR
G78
20
VT/OR
Q80
20
OR/VT
G10
20
VT/LG
B25
20
DG/WT
5
46
1
13
C201
G80
20
VT/BR
G78
20
VT/OR
Q80
20
OR/VT
G10
20
VT/LG
5
3
9
C310
G80
20
VT/BR
G78
20
VT/OR
Q80
20
OR/VT
SWITCH-PARKING BRAKE
2 C1
LIFTGATE AJAR SWITCH SENSE
LATCH-DOOR-LIFTGATE
(8W-61-6)
4
SEAT BELT SWITCH SENSE
SEAT BELT-TENSIONER-DRIVER
(8W-43-4)
S352
G80
20
VT/BR
G80
20
VT/BR
3
FLIP-UP GLASS SWITCH SENSE
LAMP-LICENSE PLATE
(8W-51-4)
2 C2
FLIP-UP GLASS AJAR SWITCH SENSE
LATCH-FLIP-UP GLASS
(8W-61-7)
3
FLIP-UP GLASS AJAR SWITCH SENSE
MOTOR-REAR WINDOW WIPER
(8W-53-3)

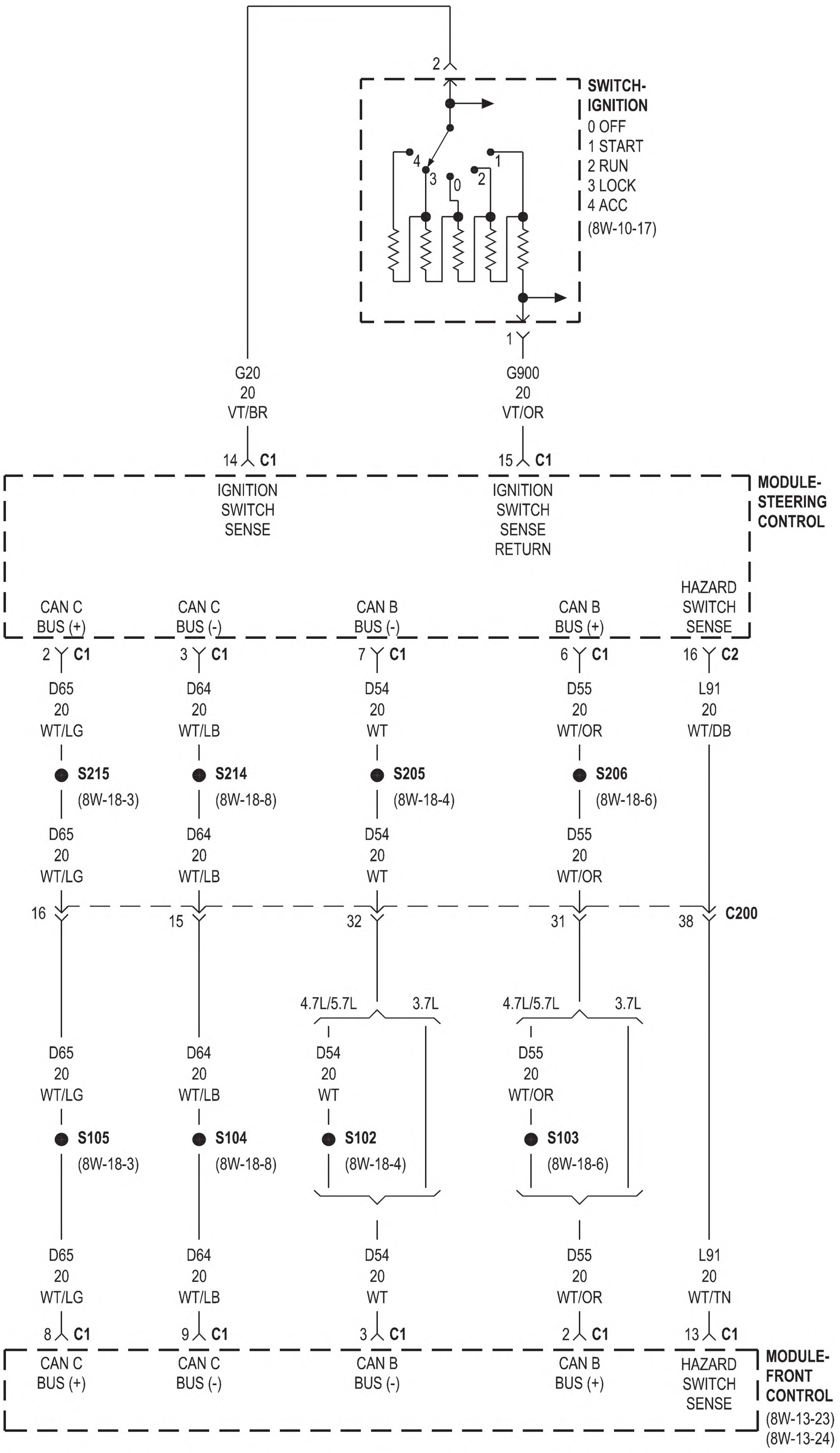
J058W-19 □□ MTC WK504006

8W-41 HORN/POWER OUTLET

Component	Page
Cluster	8W-41-3
Fuse 2	8W-41-3
Fuse 4	8W-41-3
Fuse 9	8W-41-3
Fuse 10	8W-41-3
Fuse 11	8W-41-3
Fuse 14	8W-41-3
Fuse 16	8W-41-2
G100	8W-41-3
G103	8W-41-2
G200	8W-41-3
G300	8W-41-3
Horn-No. 1	8W-41-2
Junction Block	8W-41-3
Module-Front Control	8W-41-2, 4
Module-Integrated Power	8W-41-2
Module-Steering Control	8W-41-2, 4
Power Distribution Center	8W-41-3
Power Outlet-Console	8W-41-3
Power Outlet-Instrument Panel	8W-41-3
Power Outlet-Rear	8W-41-3
Relay-Horn	8W-41-2
Relay-Power Outlet	8W-41-3
Relay-Run/Accessory	8W-41-3
Switch-Horn	8W-41-2
Switch-Ignition	8W-41-4

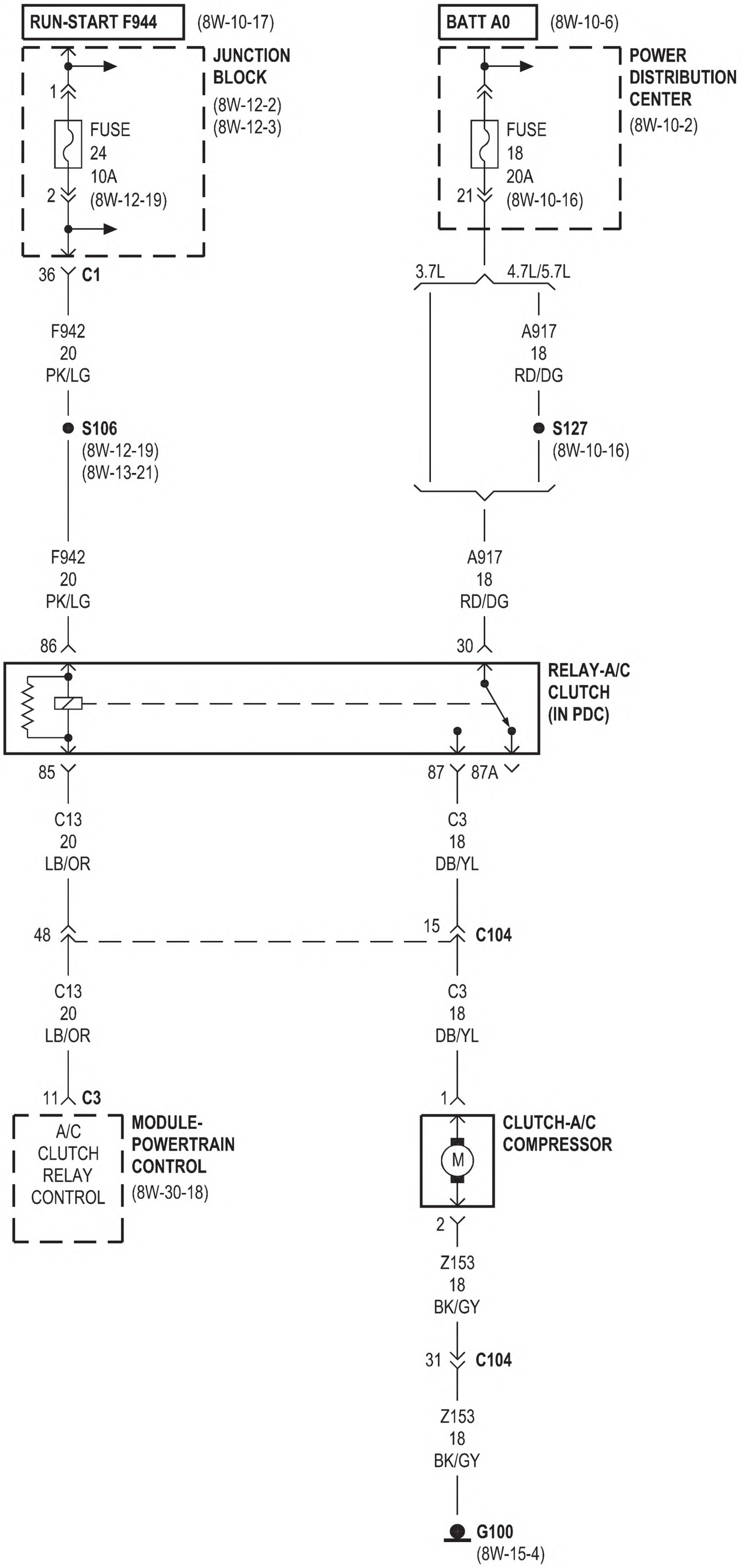

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
16
20A
(8W-13-12)
2
86
30
RELAY-
HORN
85
87
47
IPM
HORN
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-12)
35
C2
X2
18
DG/OR
MODULE-
STEERING
CONTROL
HORN
SWITCH
SIGNAL
HORN
SWITCH
RETURN
5
C3
6
C3
2
HORN-NO. 1
1
X3
20
DG/VT
X903
20
GY/LG
Z384
18
BK
1
2
SWITCH-
HORN
S111
(8W-15-6)
Z384
16
BK
G103
(8W-15-6)

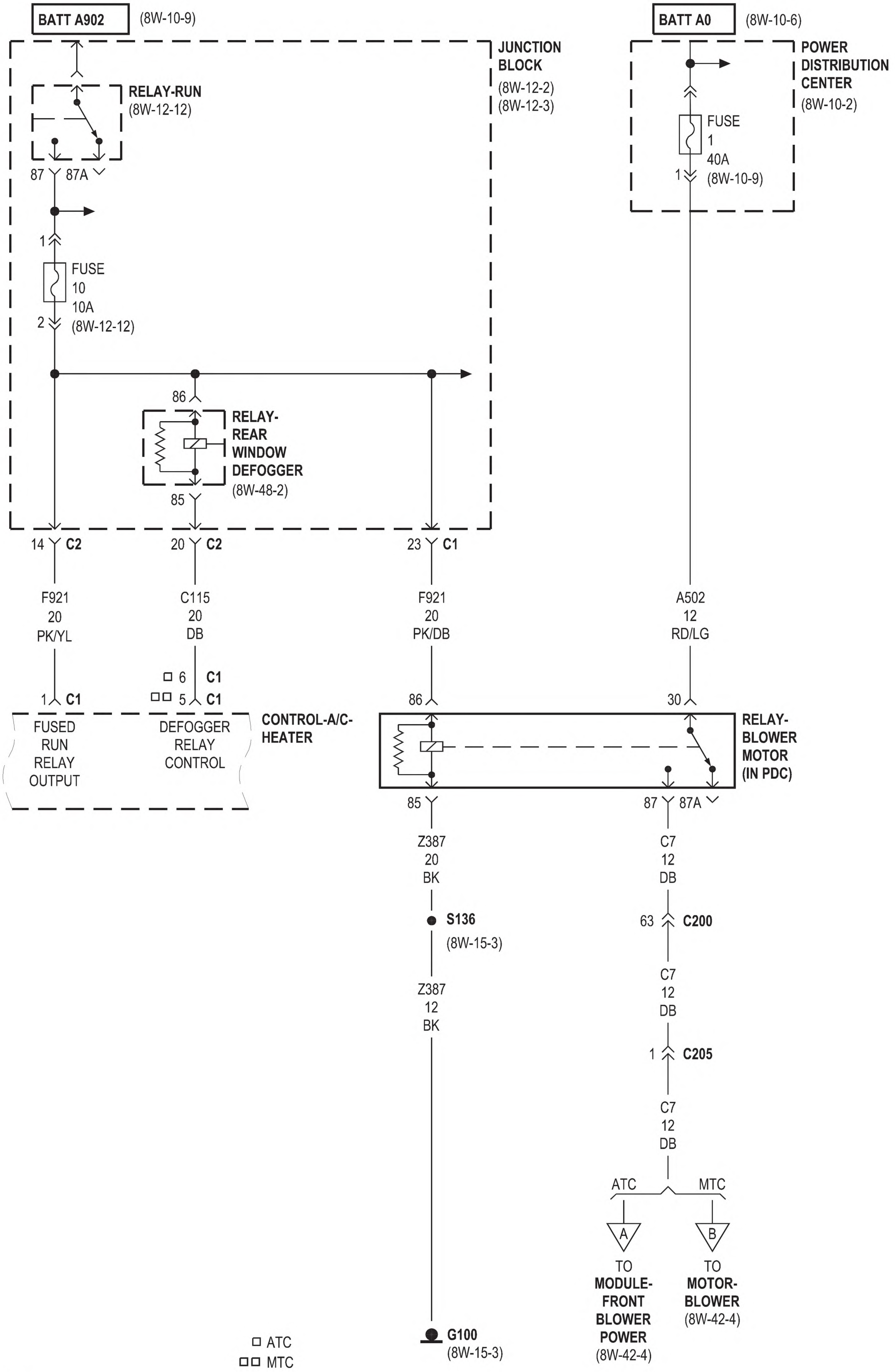

BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 10 40A (8W-10-11)
10
FUSE 11 30A (8W-10-11)
11
FUSE 2 30A (8W-10-9)
2
A901 12 RD/TN
S126
(8W-10-11)
A901 12 RD/TN
A925 14 RD/LG
A907 14 RD/DB
BATT A905
(8W-12-8)
1 C1
2 C1
40 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
86
30
RELAY-RUN/ ACCESSORY
85
87
87A
86
30
RELAY- POWER OUTLET
85
87
87A
1
FUSE 14 20A (8W-12-18)
2
1
FUSE 9 20A (8W-12-17)
2
1
FUSE 4 20A (8W-12-17)
2
30 C2
14 C1
2 C2
1 C2
40 C3
F103 20 PK/GY
4 C2
FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
CLUSTER
(8W-40-2)
A405 14 RD/DB
S203
(8W-12-17)
A207 16 RD/LG
A405 14 RD/DB
A205 14 RD/OR
1
POWER OUTLET- INSTRUMENT PANEL
3
1
POWER OUTLET- CONSOLE
3
1
POWER OUTLET- REAR
3
Z387 16 BK
S136
(8W-15-3)
Z387 12 BK
G100
(8W-15-3)
Z905 16 BK
Z905 16 BK
S211
(8W-15-8)
Z905 14 BK
G200
(8W-15-8)
Z909 16 BK
S319
(8W-15-9)
Z909 12 BK
G300
(8W-15-9)

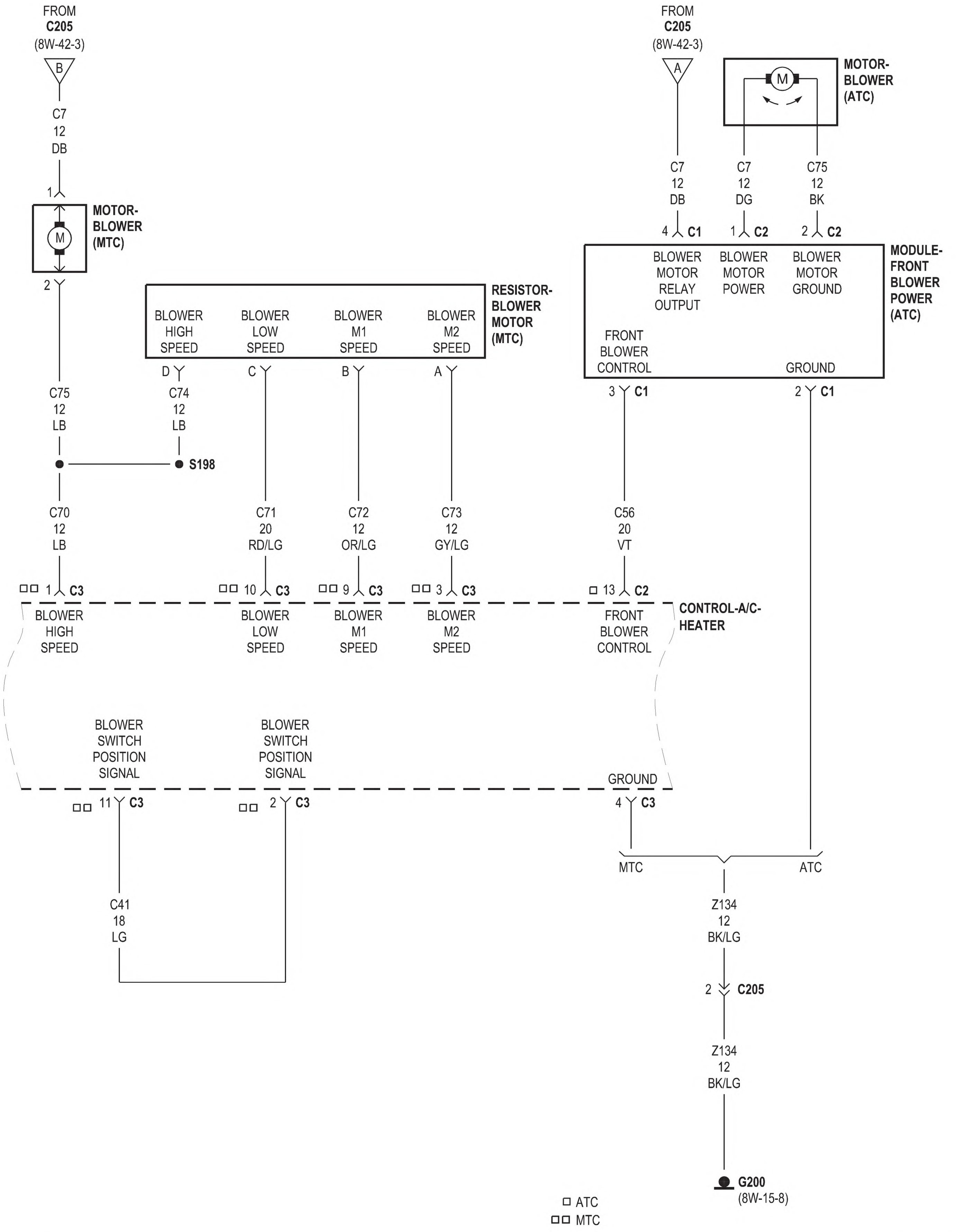

2
SWITCH-
IGNITION
0 OFF
1 START
2 RUN
3 LOCK
4 ACC
(8W-10-17)
4
3
0
2
1
1
G20
20
VT/BR
G900
20
VT/OR
14 C1
15 C1
IGNITION
SWITCH
SENSE
IGNITION
SWITCH
SENSE
RETURN
MODULE-
STEERING
CONTROL
CAN C
BUS (+)
CAN C
BUS (-)
CAN B
BUS (-)
CAN B
BUS (+)
HAZARD
SWITCH
SENSE
2 C1
3 C1
7 C1
6 C1
16 C2
D65
20
WT/LG
D64
20
WT/LB
D54
20
WT
D55
20
WT/OR
L91
20
WT/DB
S215
(8W-18-3)
S214
(8W-18-8)
S205
(8W-18-4)
S206
(8W-18-6)
D65
20
WT/LG
D64
20
WT/LB
D54
20
WT
D55
20
WT/OR
16
15
32
31
38
C200
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D65
20
WT/LG
D64
20
WT/LB
D54
20
WT
D55
20
WT/OR
S105
(8W-18-3)
S104
(8W-18-8)
S102
(8W-18-4)
S103
(8W-18-6)
D65
20
WT/LG
D64
20
WT/LB
D54
20
WT
D55
20
WT/OR
L91
20
WT/TN
8 C1
9 C1
3 C1
2 C1
13 C1
CAN C
BUS (+)
CAN C
BUS (-)
CAN B
BUS (-)
CAN B
BUS (+)
HAZARD
SWITCH
SENSE
MODULE-
FRONT
CONTROL
(8W-13-23)
(8W-13-24)

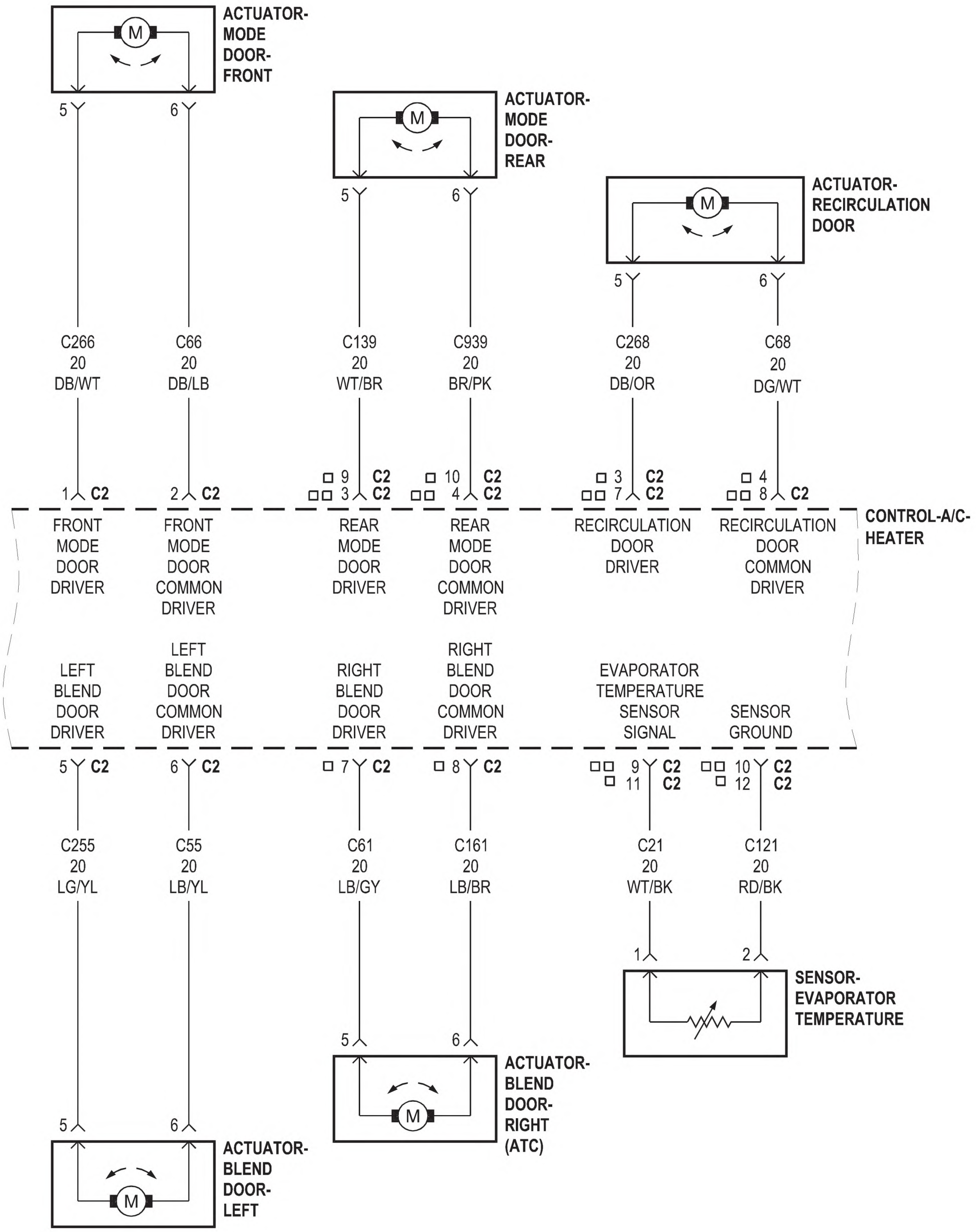
8W-42 AIR CONDITIONING/HEATER

Component	Page
Actuator-Blend Door-Left	8W-42-5
Actuator-Blend Door-Right	8W-42-5
Actuator-Mode Door-Front	8W-42-5
Actuator-Mode Door-Rear	8W-42-5
Actuator-Recirculation Door	8W-42-5
Cluster	8W-42-6, 7
Clutch-A/C Compressor	8W-42-2
Control-A/C-Heater	8W-42-3, 4, 5, 6, 7
Fuse 1	8W-42-3
Fuse 10	8W-42-3
Fuse 18	8W-42-2
Fuse 24	8W-42-2
Fuse 27	8W-42-7
G100	8W-42-2, 3
G200	8W-42-4, 6
Junction Block	8W-42-2, 3, 6, 7
Module-Front Blower Power	8W-42-3, 4
Module-Front Control	8W-42-7
Module-Integrated Power	8W-42-7
Module-Powertrain Control	8W-42-2
Motor-Blower	8W-42-3, 4
Power Distribution Center	8W-42-2, 3
Relay-A/C Clutch	8W-42-2
Relay-Blower Motor	8W-42-3
Relay-Rear Window Defogger	8W-42-3
Relay-Run	8W-42-3
Resistor-Blower Motor	8W-42-4
Sensor-EVAPOrator Temperature	8W-42-5
Sensor-Sun	8W-42-7
Transducer-A/C Pressure	8W-42-7

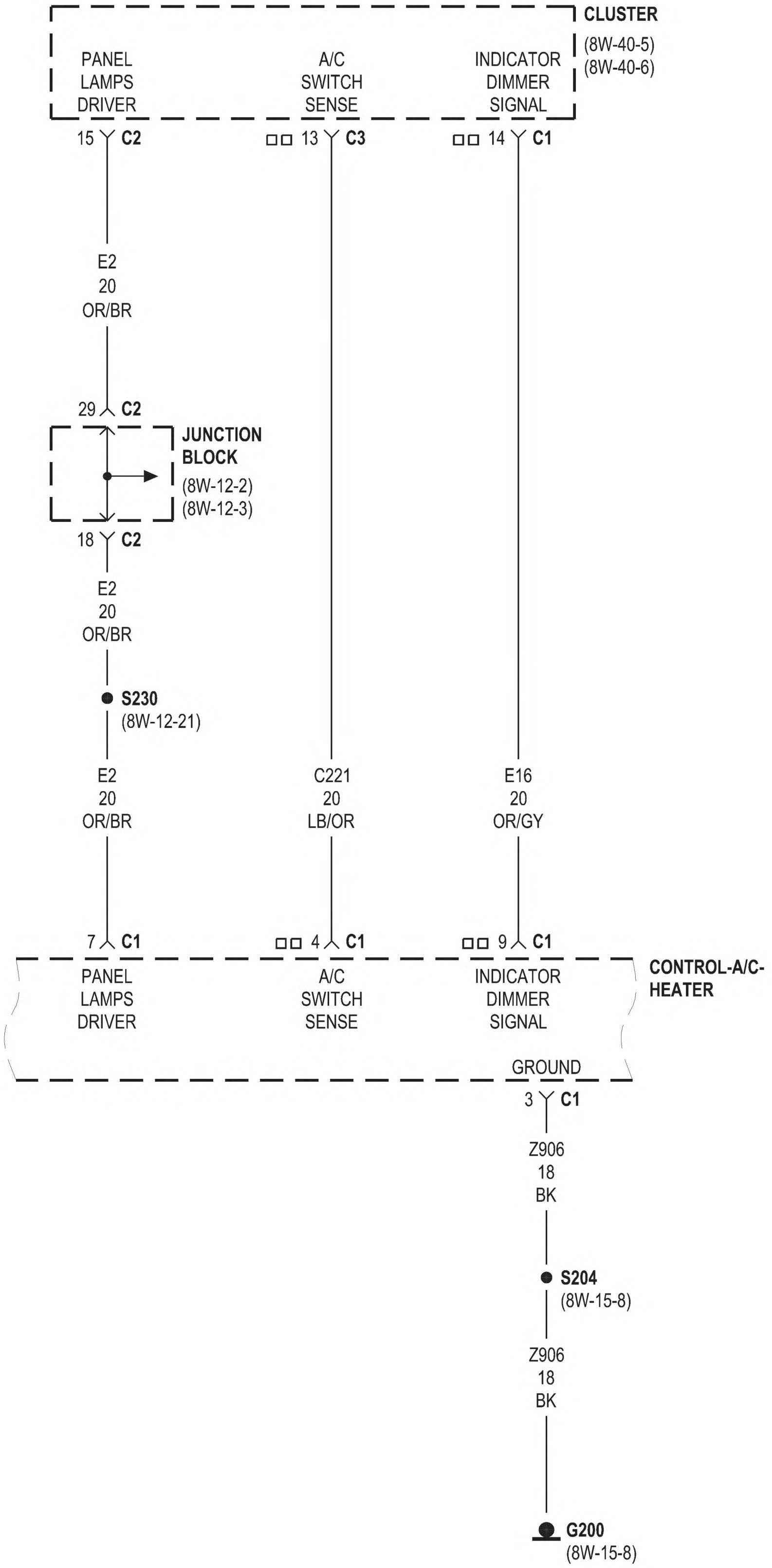

RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
24
10A
(8W-12-19)
2
36 C1
F942
20
PK/LG
S106
(8W-12-19)
(8W-13-21)
F942
20
PK/LG
86
BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
18
20A
(8W-10-16)
21
3.7L
4.7L/5.7L
A917
18
RD/DG
S127
(8W-10-16)
A917
18
RD/DG
30
RELAY-A/C CLUTCH (IN PDC)
85
87
87A
C13
20
LB/OR
C3
18
DB/YL
48
15
C104
C13
20
LB/OR
C3
18
DB/YL
11 C3
A/C CLUTCH RELAY CONTROL
MODULE-POWERTRAIN CONTROL
(8W-30-18)
1
M
CLUTCH-A/C COMPRESSOR
2
Z153
18
BK/GY
31 C104
Z153
18
BK/GY
G100
(8W-15-4)


BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
RELAY-RUN
(8W-12-12)
87
87A
1
FUSE
10
10A
2
(8W-12-12)
86
RELAY-REAR WINDOW DEFOGGER
(8W-48-2)
85
14 C2
20 C2
23 C1
F921
20
PK/YL
C115
20
DB
F921
20
PK/DB
1 C1
□ 6 C1
□□ 5 C1
CONTROL-A/C-HEATER
FUSED RUN RELAY OUTPUT
DEFOGGER RELAY CONTROL
BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
1
40A
1
(8W-10-9)
A502
12
RD/LG
86
30
RELAY-BLOWER MOTOR (IN PDC)
85
87
87A
Z387
20
BK
S136
(8W-15-3)
Z387
12
BK
G100
(8W-15-3)
C7
12
DB
63
C200
C7
12
DB
1
C205
C7
12
DB
ATC
MTC
A
B
TO MODULE-FRONT BLOWER POWER
(8W-42-4)
TO MOTOR-BLOWER
(8W-42-4)
□ ATC
□□ MTC


FROM
C205
(8W-42-3)
B
C7
12
DB
1
MOTOR-
BLOWER
(MTC)
M
2
C75
12
LB
C74
12
LB
D
S198
RESISTOR-
BLOWER
MOTOR
(MTC)
BLOWER
HIGH
SPEED
BLOWER
LOW
SPEED
BLOWER
M1
SPEED
BLOWER
M2
SPEED
C
B
A
C70
12
LB
C71
20
RD/LG
C72
12
OR/LG
C73
12
GY/LG
FROM
C205
(8W-42-3)
A
MOTOR-
BLOWER
(ATC)
M
C7
12
DB
C7
12
DG
C75
12
BK
4 C1
1 C2
2 C2
MODULE-
FRONT
BLOWER
POWER
(ATC)
BLOWER
MOTOR
RELAY
OUTPUT
BLOWER
MOTOR
POWER
BLOWER
MOTOR
GROUND
FRONT
BLOWER
CONTROL
GROUND
3 C1
2 C1
C56
20
VT
□□ 1 C3
□□ 10 C3
□□ 9 C3
□□ 3 C3
□ 13 C2
CONTROL-A/C-
HEATER
BLOWER
HIGH
SPEED
BLOWER
LOW
SPEED
BLOWER
M1
SPEED
BLOWER
M2
SPEED
FRONT
BLOWER
CONTROL
BLOWER
SWITCH
POSITION
SIGNAL
BLOWER
SWITCH
POSITION
SIGNAL
GROUND
□□ 11 C3
□□ 2 C3
4 C3
MTC
ATC
C41
18
LG
Z134
12
BK/LG
2 C205
Z134
12
BK/LG
G200
(8W-15-8)
□ ATC
□□ MTC

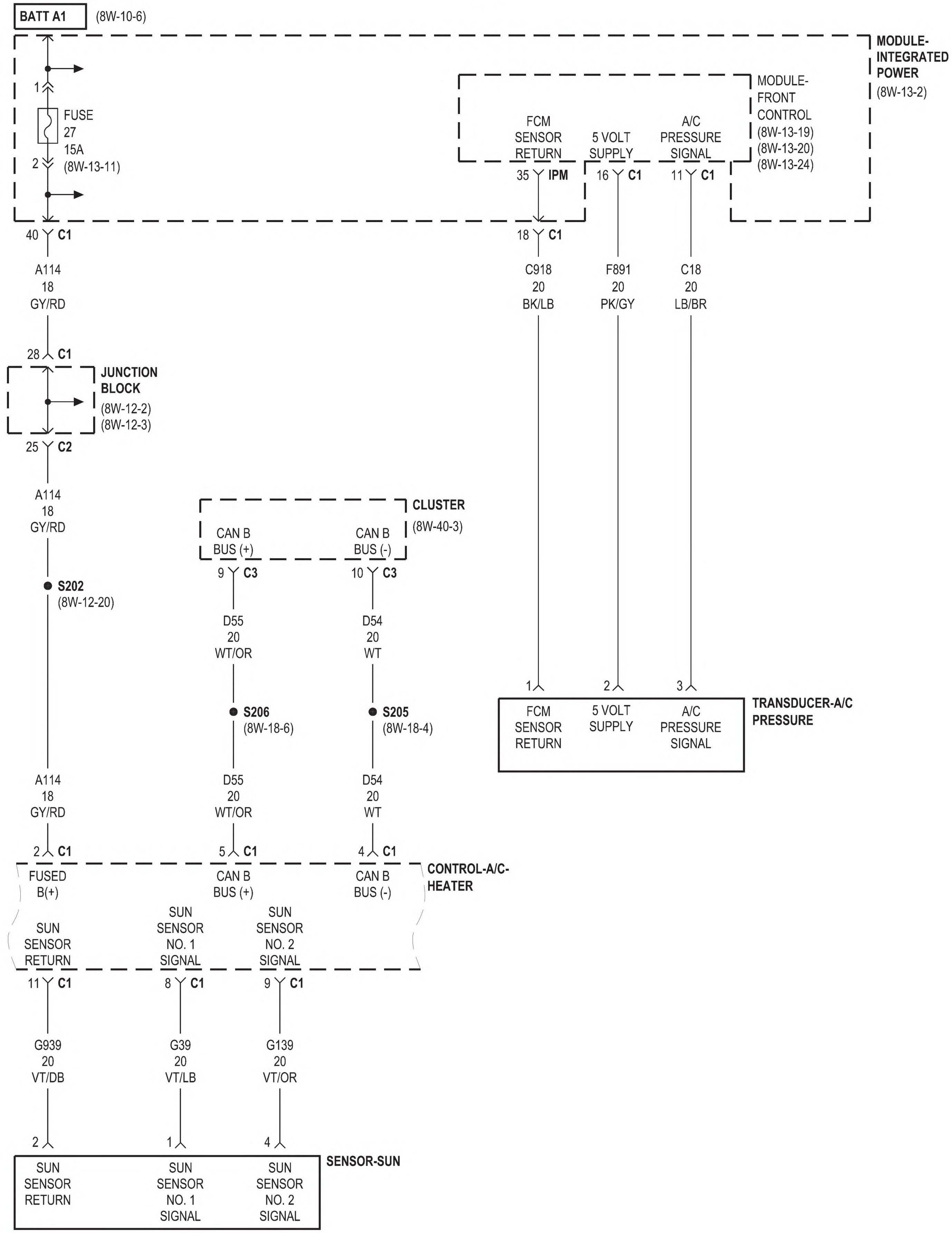

ACTUATOR-MODE DOOR-FRONT
M
5
6
ACTUATOR-MODE DOOR-REAR
M
5
6
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
□ 9 C2
□□ 3 C2
□ 10 C2
□□ 4 C2
□ 3 C2
□□ 7 C2
□ 4
□□ 8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
RIGHT BLEND DOOR DRIVER
RIGHT BLEND DOOR COMMON DRIVER
EVAPORATOR TEMPERATURE SENSOR SIGNAL
SENSOR GROUND
5 C2
6 C2
□ 7 C2
□ 8 C2
□□ 9 C2
□ 11 C2
□□ 10 C2
□ 12 C2
C255 20 LG/YL
C55 20 LB/YL
C61 20 LB/GY
C161 20 LB/BR
C21 20 WT/BK
C121 20 RD/BK
1
2
SENSOR-EVAPORATOR TEMPERATURE
5
6
ACTUATOR-BLEND DOOR-RIGHT (ATC)
M
5
6
ACTUATOR-BLEND DOOR-LEFT
M

□ ATC
□□ MTC


CLUSTER
(8W-40-5)
(8W-40-6)
PANEL LAMPS DRIVER
A/C SWITCH SENSE
INDICATOR DIMMER SIGNAL
15 C2
□□ 13 C3
□□ 14 C1
E2 20 OR/BR
29 C2
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
18 C2
E2 20 OR/BR
S230
(8W-12-21)
E2 20 OR/BR
C221 20 LB/OR
E16 20 OR/GY
7 C1
□□ 4 C1
□□ 9 C1
CONTROL-A/C-HEATER
PANEL LAMPS DRIVER
A/C SWITCH SENSE
INDICATOR DIMMER SIGNAL
GROUND
3 C1
Z906 18 BK
S204
(8W-15-8)
Z906 18 BK
G200
(8W-15-8)

□□ MTC

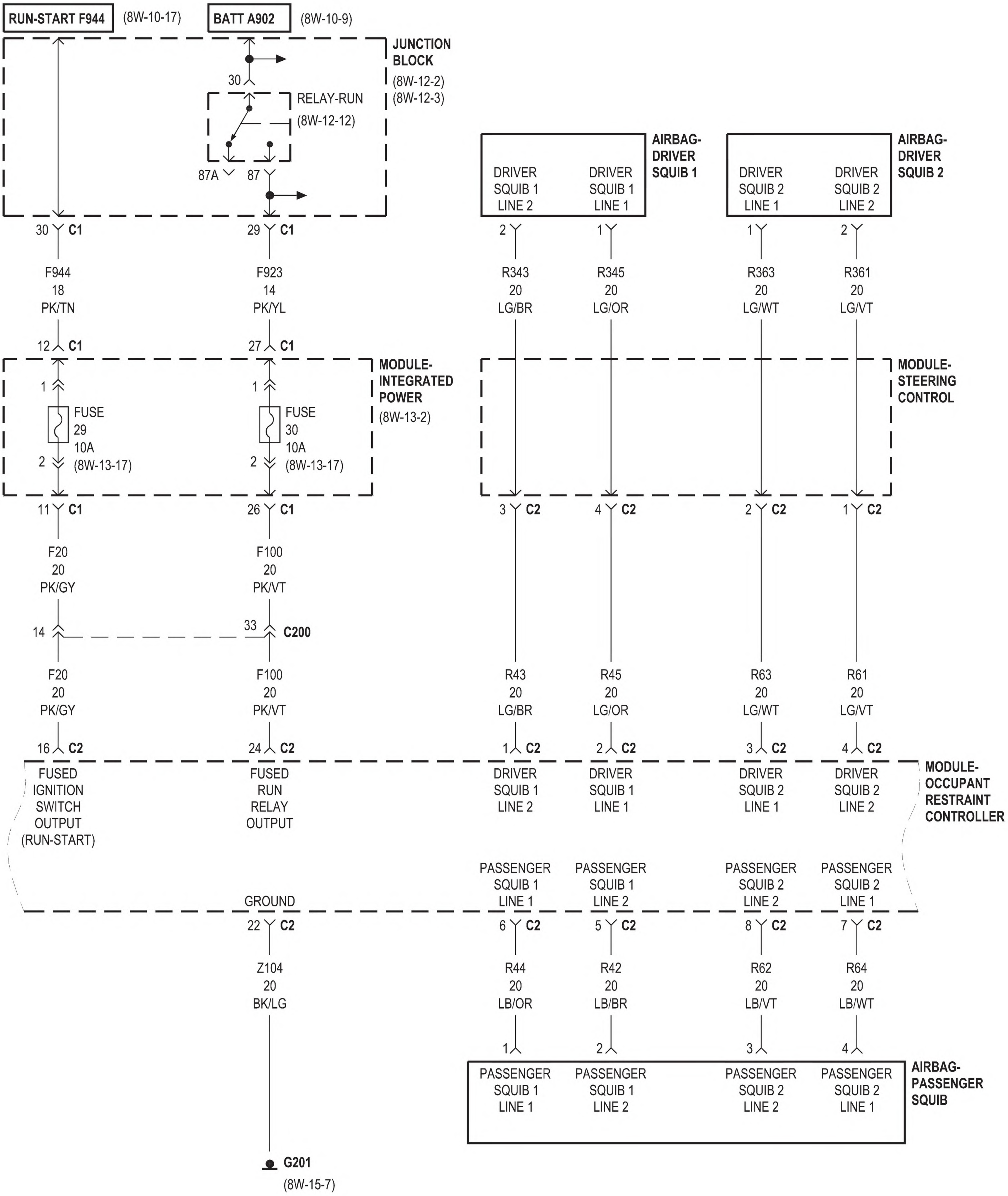
ATC


BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
27
15A
(8W-13-11)
2
MODULE-
FRONT
CONTROL
(8W-13-19)
(8W-13-20)
(8W-13-24)
FCM
SENSOR
RETURN
5 VOLT
SUPPLY
A/C
PRESSURE
SIGNAL
35 IPM
16 C1
11 C1
40 C1
18 C1
A114
18
GY/RD
C918
20
BK/LB
F891
20
PK/GY
C18
20
LB/BR
28 C1
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
25 C2
A114
18
GY/RD
CLUSTER
(8W-40-3)
CAN B
BUS (+)
CAN B
BUS (-)
9 C3
10 C3
S202
(8W-12-20)
D55
20
WT/OR
D54
20
WT
S206
(8W-18-6)
S205
(8W-18-4)
1
2
3
FCM
SENSOR
RETURN
5 VOLT
SUPPLY
A/C
PRESSURE
SIGNAL
TRANSDUCER-A/C
PRESSURE
A114
18
GY/RD
D55
20
WT/OR
D54
20
WT
2 C1
5 C1
4 C1
CONTROL-A/C-
HEATER
FUSED
B(+)
CAN B
BUS (+)
CAN B
BUS (-)
SUN
SENSOR
RETURN
SUN
SENSOR
NO. 1
SIGNAL
SUN
SENSOR
NO. 2
SIGNAL
11 C1
8 C1
9 C1
G939
20
VT/DB
G39
20
VT/LB
G139
20
VT/OR
2
1
4
SENSOR-SUN
SUN
SENSOR
RETURN
SUN
SENSOR
NO. 1
SIGNAL
SUN
SENSOR
NO. 2
SIGNAL

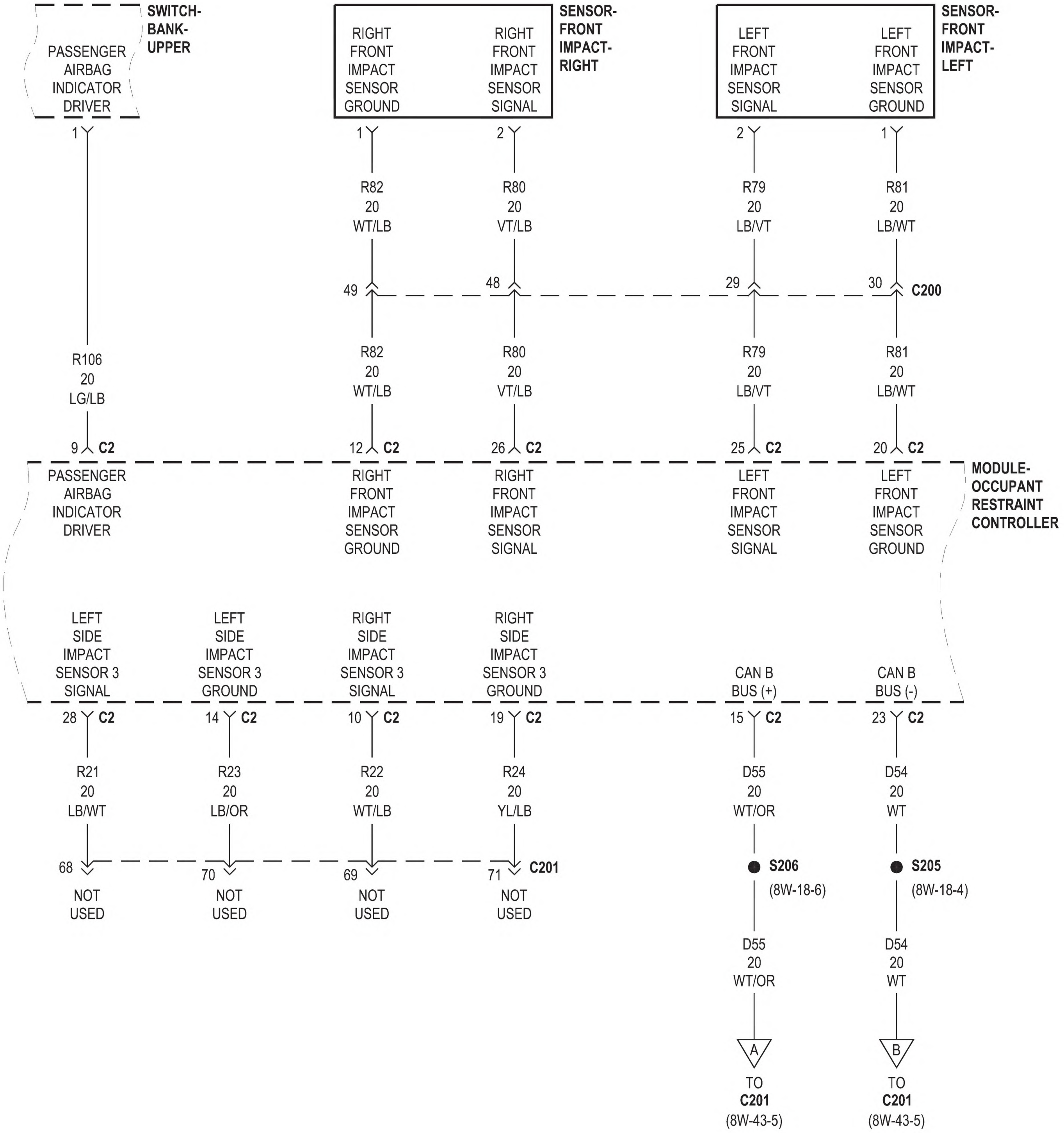
WK504207

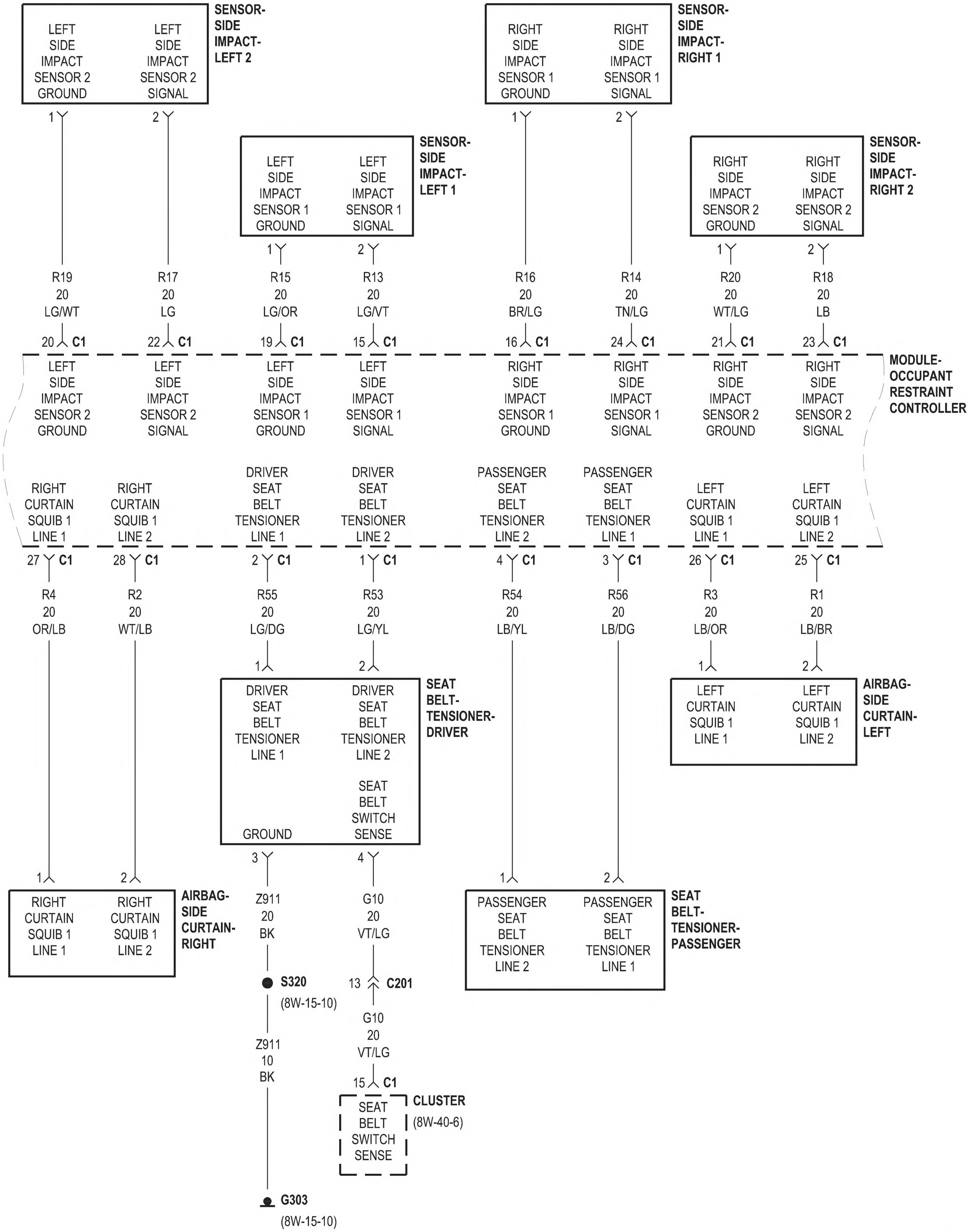
8W-43 AIRBAG SYSTEM

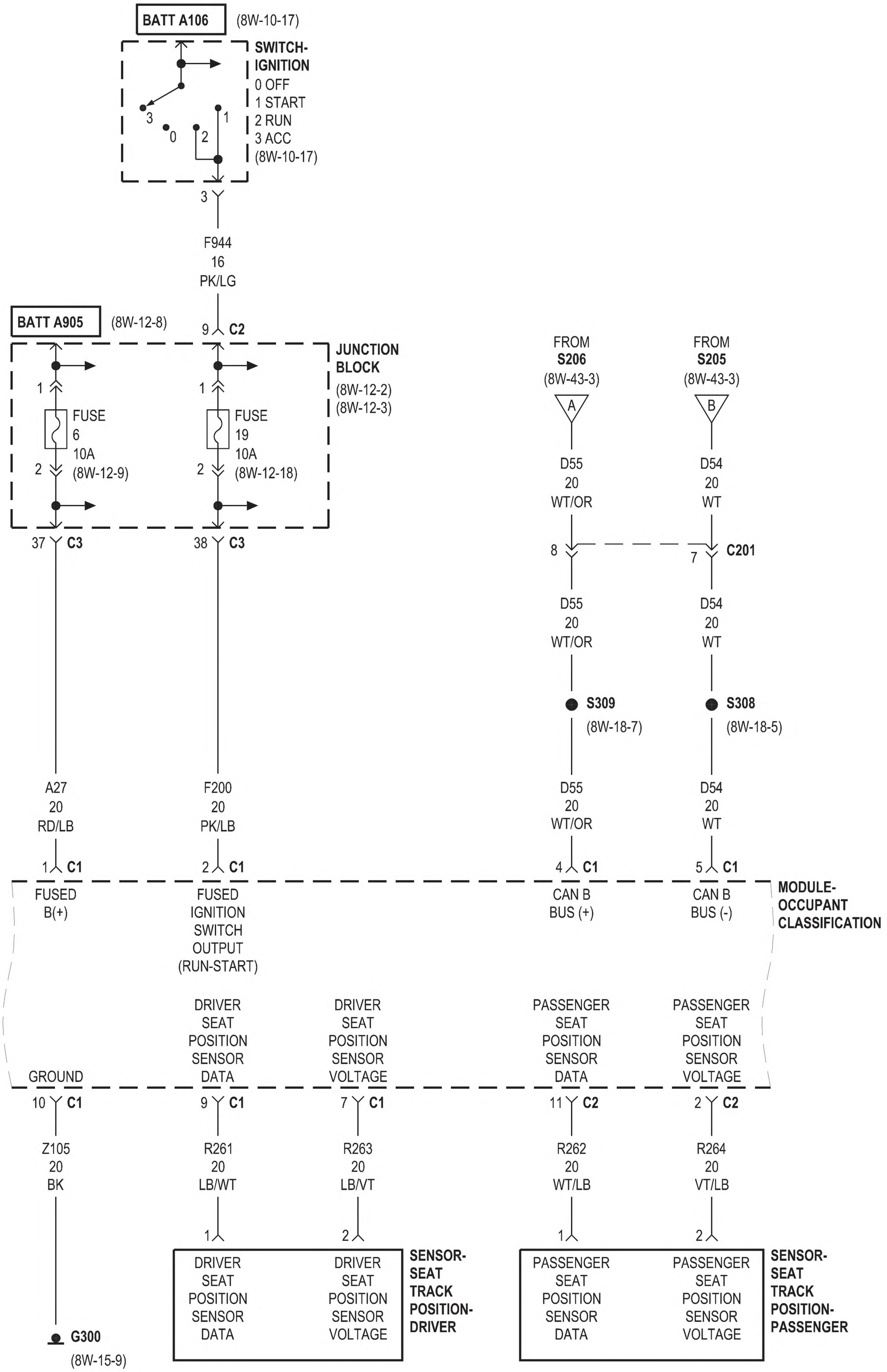
Component	Page
Airbag-Driver Squib 1	8W-43-2
Airbag-Driver Squib 2	8W-43-2
Airbag-Passenger Squib	8W-43-2
Airbag-Side Curtain-Left	8W-43-4
Airbag-Side Curtain-Right	8W-43-4
Cluster	8W-43-4
Fuse 6	8W-43-5
Fuse 19	8W-43-5
Fuse 29	8W-43-2
Fuse 30	8W-43-2
G201	8W-43-2
G300	8W-43-5
G303	8W-43-4
Junction Block	8W-43-2, 5
Module-Integrated Power	8W-43-2
Module-Occupant Classification	8W-43-5, 6
Module-Occupant Restraint Controller	8W-43-2, 3, 4
Module-Steering Control	8W-43-2
Relay-Run	8W-43-2
Seat Belt-Tensioner-Driver	8W-43-4
Seat Belt-Tensioner-Passenger	8W-43-4
Sensor-Front Impact-Left	8W-43-3
Sensor-Front Impact-Right	8W-43-3
Sensor-Seat Track Position-Driver	8W-43-5
Sensor-Seat Track Position-Passenger	8W-43-5
Sensor-Seat Weight-Left Front	8W-43-6
Sensor-Seat Weight-Left Rear	8W-43-6
Sensor-Seat Weight-Right Front	8W-43-6
Sensor-Seat Weight-Right Rear	8W-43-6
Sensor-Side Impact-Left 1	8W-43-4
Sensor-Side Impact-Left 2	8W-43-4
Sensor-Side Impact-Right 1	8W-43-4
Sensor-Side Impact-Right 2	8W-43-4
Switch-Bank-Upper	8W-43-3
Switch-Ignition	8W-43-5


RUN-START F944
(8W-10-17)
BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
87A
87
30 C1
29 C1
F944
18
PK/TN
F923
14
PK/YL
12 C1
27 C1
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE
29
10A
2
(8W-13-17)
1
FUSE
30
10A
2
(8W-13-17)
11 C1
26 C1
F20
20
PK/GY
F100
20
PK/VT
14
33
C200
F20
20
PK/GY
F100
20
PK/VT
16 C2
24 C2
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED RUN RELAY OUTPUT
GROUND
22 C2
Z104
20
BK/LG
G201
(8W-15-7)
AIRBAG-DRIVER SQUIB 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
AIRBAG-DRIVER SQUIB 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
2
1
1
2
R343
20
LG/BR
R345
20
LG/OR
R363
20
LG/WT
R361
20
LG/VT
MODULE-STEERING CONTROL
3 C2
4 C2
2 C2
1 C2
R43
20
LG/BR
R45
20
LG/OR
R63
20
LG/WT
R61
20
LG/VT
1 C2
2 C2
3 C2
4 C2
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
MODULE-OCCUPANT RESTRAINT CONTROLLER
PASSENGER SQUIB 1 LINE 1
PASSENGER SQUIB 1 LINE 2
PASSENGER SQUIB 2 LINE 2
PASSENGER SQUIB 2 LINE 1
6 C2
5 C2
8 C2
7 C2
R44
20
LB/OR
R42
20
LB/BR
R62
20
LB/VT
R64
20
LB/WT
1
2
3
4
PASSENGER SQUIB 1 LINE 1
PASSENGER SQUIB 1 LINE 2
PASSENGER SQUIB 2 LINE 2
PASSENGER SQUIB 2 LINE 1
AIRBAG-PASSENGER SQUIB

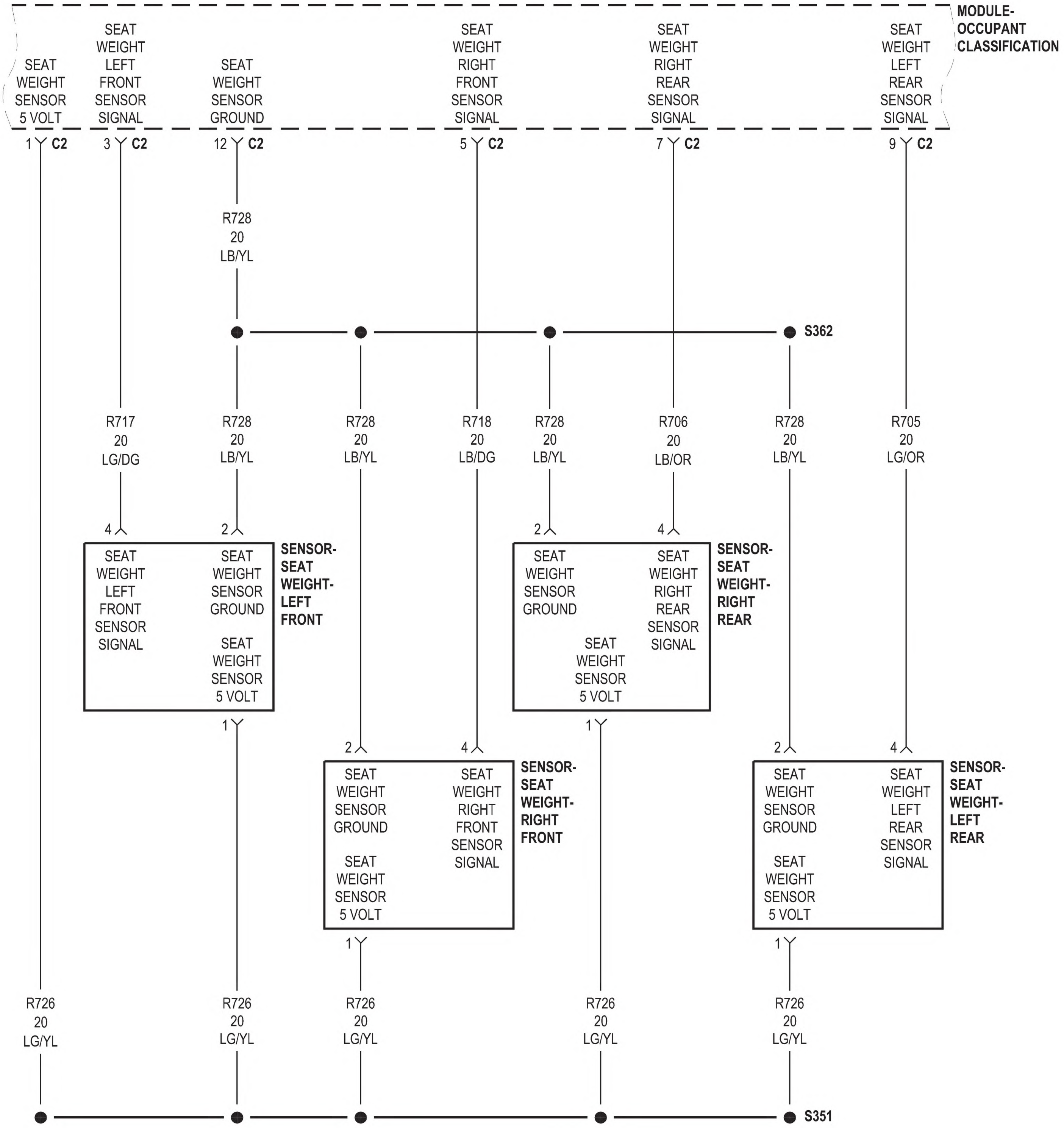
WK504302


SWITCH-
BANK-
UPPER
PASSENGER
AIRBAG
INDICATOR
DRIVER
1
R106
20
LG/LB
9 C2
SENSOR-
FRONT
IMPACT-
RIGHT
RIGHT
FRONT
IMPACT
SENSOR
GROUND
RIGHT
FRONT
IMPACT
SENSOR
SIGNAL
1
2
R82
20
WT/LB
R80
20
VT/LB
49
48
12 C2
26 C2
SENSOR-
FRONT
IMPACT-
LEFT
LEFT
FRONT
IMPACT
SENSOR
SIGNAL
LEFT
FRONT
IMPACT
SENSOR
GROUND
2
1
R79
20
LB/VT
R81
20
LB/WT
29
30
C200
25 C2
20 C2
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
PASSENGER
AIRBAG
INDICATOR
DRIVER
RIGHT
FRONT
IMPACT
SENSOR
GROUND
RIGHT
FRONT
IMPACT
SENSOR
SIGNAL
LEFT
FRONT
IMPACT
SENSOR
SIGNAL
LEFT
FRONT
IMPACT
SENSOR
GROUND
LEFT
SIDE
IMPACT
SENSOR 3
SIGNAL
LEFT
SIDE
IMPACT
SENSOR 3
GROUND
RIGHT
SIDE
IMPACT
SENSOR 3
SIGNAL
RIGHT
SIDE
IMPACT
SENSOR 3
GROUND
CAN B
BUS (+)
CAN B
BUS (-)
28 C2
14 C2
10 C2
19 C2
15 C2
23 C2
R21
20
LB/WT
R23
20
LB/OR
R22
20
WT/LB
R24
20
YL/LB
D55
20
WT/OR
D54
20
WT
68
70
69
71
C201
NOT
USED
NOT
USED
NOT
USED
NOT
USED
S206
(8W-18-6)
S205
(8W-18-4)
D55
20
WT/OR
D54
20
WT
A
B
TO
C201
(8W-43-5)
TO
C201
(8W-43-5)


LEFT SIDE IMPACT SENSOR 2 GROUND
LEFT SIDE IMPACT SENSOR 2 SIGNAL
SENSOR-SIDE IMPACT-LEFT 2
RIGHT SIDE IMPACT SENSOR 1 GROUND
RIGHT SIDE IMPACT SENSOR 1 SIGNAL
SENSOR-SIDE IMPACT-RIGHT 1
LEFT SIDE IMPACT SENSOR 1 GROUND
LEFT SIDE IMPACT SENSOR 1 SIGNAL
SENSOR-SIDE IMPACT-LEFT 1
RIGHT SIDE IMPACT SENSOR 2 GROUND
RIGHT SIDE IMPACT SENSOR 2 SIGNAL
SENSOR-SIDE IMPACT-RIGHT 2
1
2
1
2
1
2
1
2
R19 20 LG/WT
R17 20 LG
R15 20 LG/OR
R13 20 LG/VT
R16 20 BR/LG
R14 20 TN/LG
R20 20 WT/LG
R18 20 LB
20 C1
22 C1
19 C1
15 C1
16 C1
24 C1
21 C1
23 C1
MODULE-OCCUPANT RESTRAINT CONTROLLER
LEFT SIDE IMPACT SENSOR 2 GROUND
LEFT SIDE IMPACT SENSOR 2 SIGNAL
LEFT SIDE IMPACT SENSOR 1 GROUND
LEFT SIDE IMPACT SENSOR 1 SIGNAL
RIGHT SIDE IMPACT SENSOR 1 GROUND
RIGHT SIDE IMPACT SENSOR 1 SIGNAL
RIGHT SIDE IMPACT SENSOR 2 GROUND
RIGHT SIDE IMPACT SENSOR 2 SIGNAL
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
DRIVER SEAT BELT TENSIONER LINE 1
DRIVER SEAT BELT TENSIONER LINE 2
PASSENGER SEAT BELT TENSIONER LINE 2
PASSENGER SEAT BELT TENSIONER LINE 1
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
27 C1
28 C1
2 C1
1 C1
4 C1
3 C1
26 C1
25 C1
R4 20 OR/LB
R2 20 WT/LB
R55 20 LG/DG
R53 20 LG/YL
R54 20 LB/YL
R56 20 LB/DG
R3 20 LB/OR
R1 20 LB/BR
1
2
DRIVER SEAT BELT TENSIONER LINE 1
DRIVER SEAT BELT TENSIONER LINE 2
SEAT BELT SWITCH SENSE
GROUND
SEAT BELT-TENSIONER-DRIVER
1
2
LEFT CURTAIN SQUIB 1 LINE 1
LEFT CURTAIN SQUIB 1 LINE 2
AIRBAG-SIDE CURTAIN-LEFT
3
4
1
2
RIGHT CURTAIN SQUIB 1 LINE 1
RIGHT CURTAIN SQUIB 1 LINE 2
AIRBAG-SIDE CURTAIN-RIGHT
Z911 20 BK
G10 20 VT/LG
1
2
PASSENGER SEAT BELT TENSIONER LINE 2
PASSENGER SEAT BELT TENSIONER LINE 1
SEAT BELT-TENSIONER-PASSENGER
S320 (8W-15-10)
13 C201
G10 20 VT/LG
Z911 10 BK
15 C1
SEAT BELT SWITCH SENSE
CLUSTER (8W-40-6)
G303 (8W-15-10)


BATT A106
(8W-10-17)
SWITCH-
IGNITION
0 OFF
1 START
2 RUN
3 ACC
(8W-10-17)
3
0
2
1
3
F944
16
PK/LG
BATT A905
(8W-12-8)
9 C2
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
6
10A
(8W-12-9)
2
1
FUSE
19
10A
(8W-12-18)
2
37 C3
38 C3
FROM
S206
(8W-43-3)
A
FROM
S205
(8W-43-3)
B
D55
20
WT/OR
D54
20
WT
8
7 C201
D55
20
WT/OR
D54
20
WT
S309
(8W-18-7)
S308
(8W-18-5)
A27
20
RD/LB
F200
20
PK/LB
D55
20
WT/OR
D54
20
WT
1 C1
2 C1
4 C1
5 C1
FUSED
B(+)
FUSED
IGNITION
SWITCH
OUTPUT
(RUN-START)
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
OCCUPANT
CLASSIFICATION
DRIVER
SEAT
POSITION
SENSOR
DATA
DRIVER
SEAT
POSITION
SENSOR
VOLTAGE
PASSENGER
SEAT
POSITION
SENSOR
DATA
PASSENGER
SEAT
POSITION
SENSOR
VOLTAGE
GROUND
10 C1
9 C1
7 C1
11 C2
2 C2
Z105
20
BK
R261
20
LB/WT
R263
20
LB/VT
R262
20
WT/LB
R264
20
VT/LB
1
2
1
2
DRIVER
SEAT
POSITION
SENSOR
DATA
DRIVER
SEAT
POSITION
SENSOR
VOLTAGE
SENSOR-
SEAT
TRACK
POSITION-
DRIVER
PASSENGER
SEAT
POSITION
SENSOR
DATA
PASSENGER
SEAT
POSITION
SENSOR
VOLTAGE
SENSOR-
SEAT
TRACK
POSITION-
PASSENGER
G300
(8W-15-9)

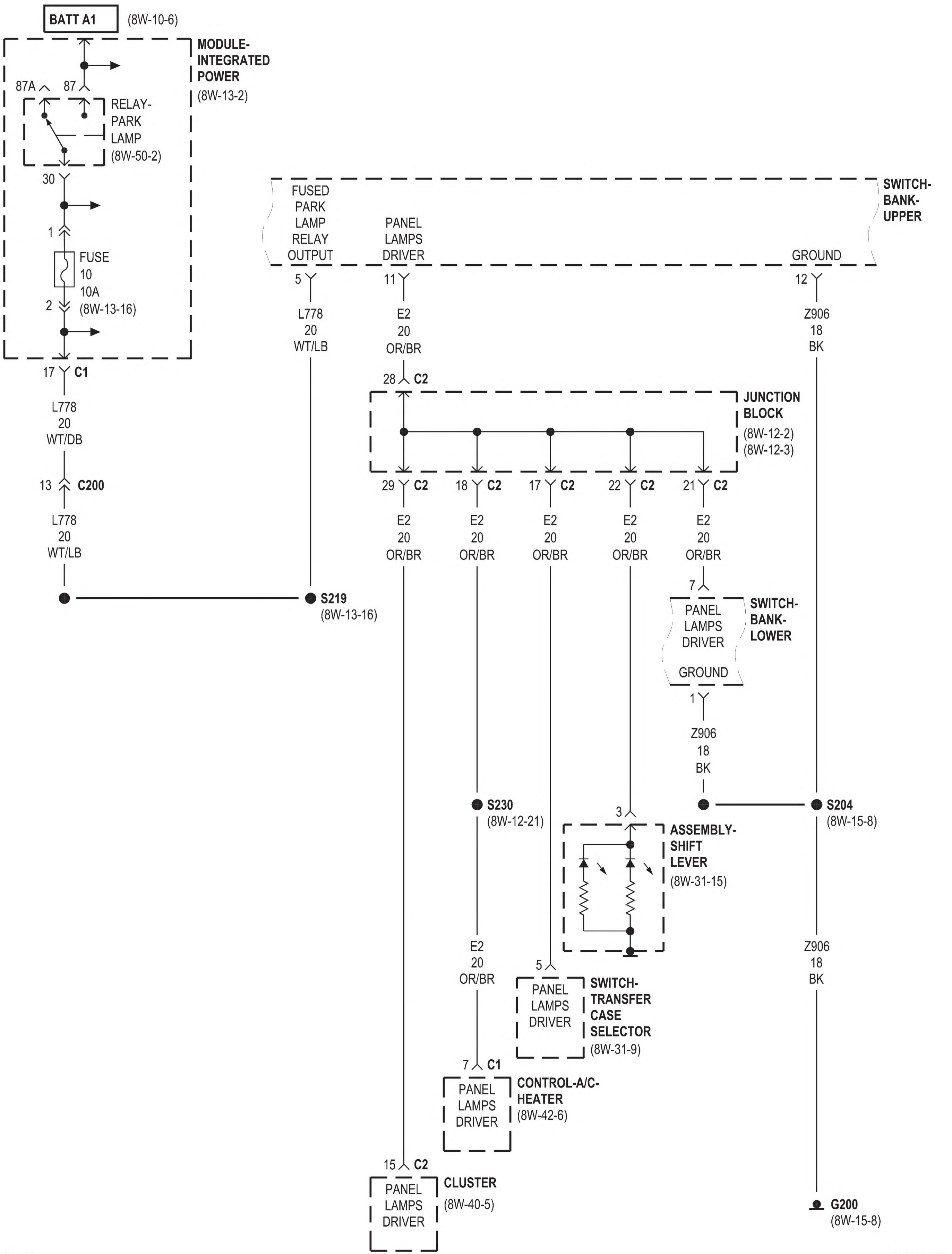
WK504305

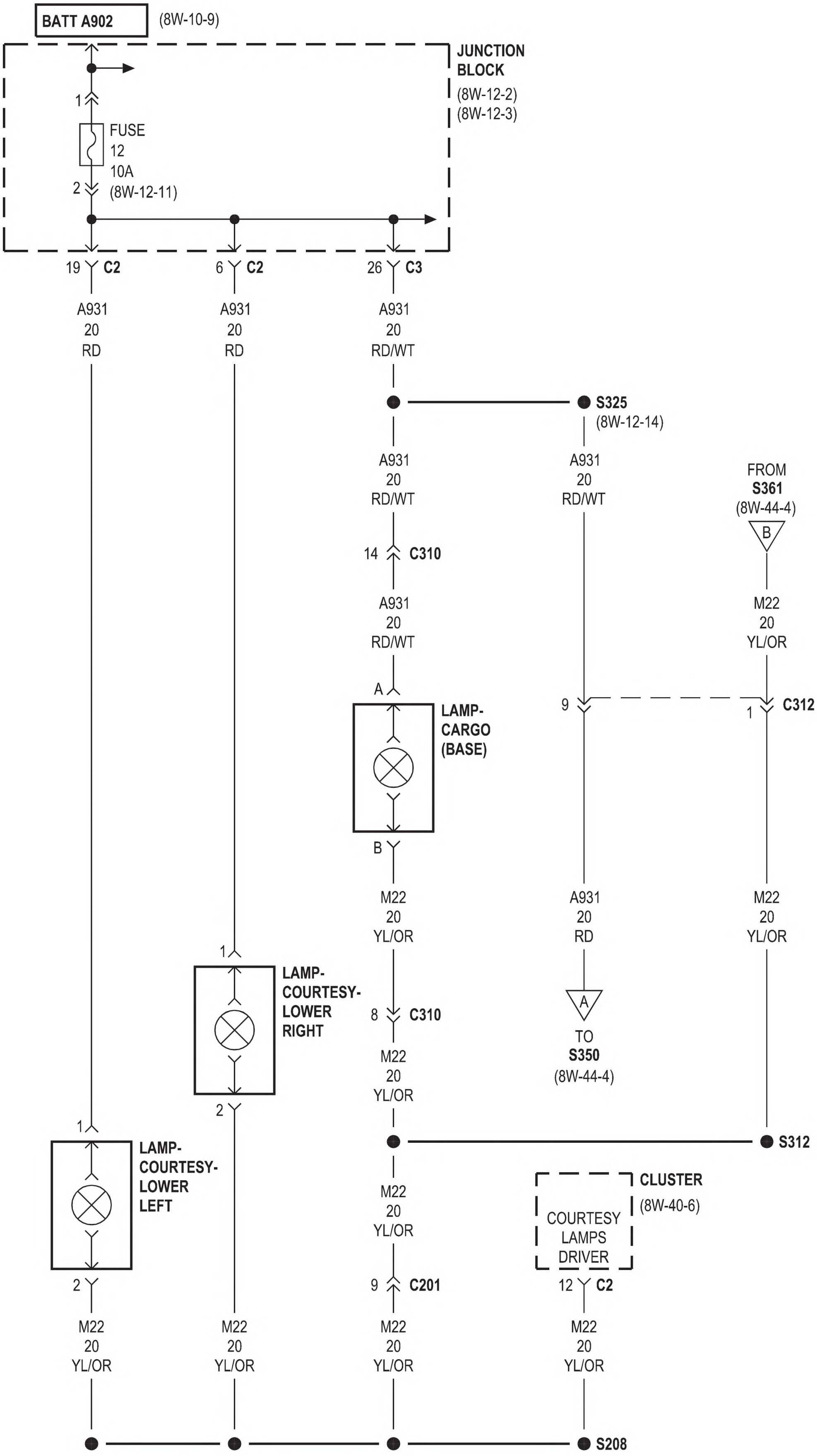

MODULE-OCCUPANT CLASSIFICATION
SEAT WEIGHT SENSOR 5 VOLT
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
1 C2
3 C2
12 C2
5 C2
7 C2
9 C2
R728 20 LB/YL
S362
R717 20 LG/DG
R728 20 LB/YL
R728 20 LB/YL
R718 20 LB/DG
R728 20 LB/YL
R706 20 LB/OR
R728 20 LB/YL
R705 20 LG/OR
4
2
SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-LEFT FRONT
1
2
4
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT REAR
1
2
4
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-RIGHT FRONT
1
2
4
SEAT WEIGHT SENSOR GROUND
SEAT WEIGHT LEFT REAR SENSOR SIGNAL
SEAT WEIGHT SENSOR 5 VOLT
SENSOR-SEAT WEIGHT-LEFT REAR
1
R726 20 LG/YL
R726 20 LG/YL
R726 20 LG/YL
R726 20 LG/YL
R726 20 LG/YL
S351

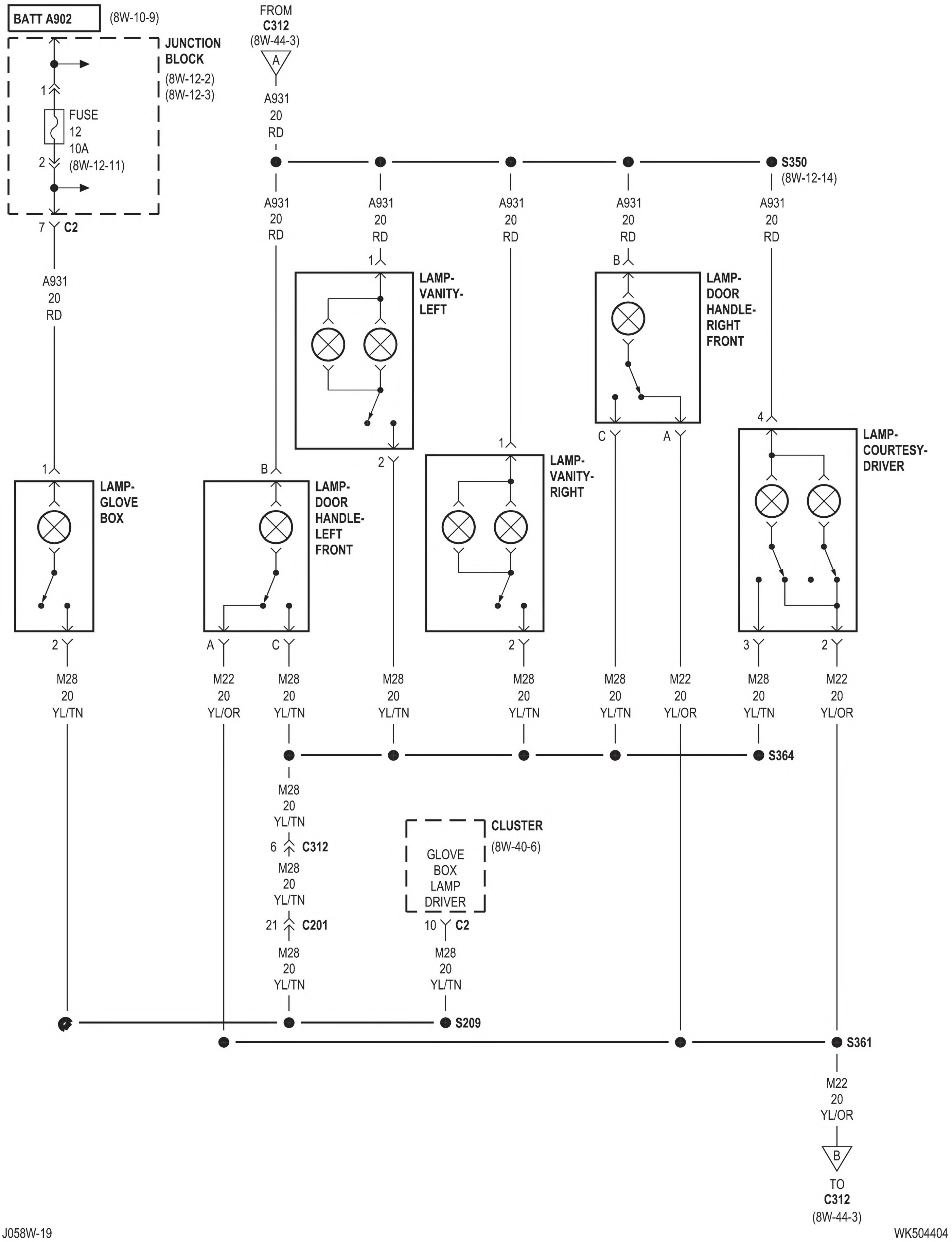
WK504306

8W-44 INTERIOR LIGHTING

Component	Page
Assembly-Shift Lever	8W-44-2
Cluster	8W-44-2, 3, 4
Control-A/C-Heater	8W-44-2
Fuse 10	8W-44-2
Fuse 12	8W-44-3, 4
G200	8W-44-2
Junction Block	8W-44-2, 3, 4
Lamp-Cargo	8W-44-3
Lamp-Courtesy-Driver	8W-44-4
Lamp-Courtesy-Lower Left	8W-44-3
Lamp-Courtesy-Lower Right	8W-44-3
Lamp-Door Handle-Left Front	8W-44-4
Lamp-Door Handle-Right Front	8W-44-4
Lamp-Glove Box	8W-44-4
Lamp-Vanity-Left	8W-44-4
Lamp-Vanity-Right	8W-44-4
Module-Integrated Power	8W-44-2
Relay-Park Lamp	8W-44-2
Switch-Bank-Lower	8W-44-2
Switch-Bank-Upper	8W-44-2
Switch-Transfer Case Selector	8W-44-2


BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
87A
87
RELAY-
PARK
LAMP
(8W-50-2)
30
1
FUSE
10
10A
(8W-13-16)
2
17 C1
L778
20
WT/DB
13 C200
L778
20
WT/LB
S219
(8W-13-16)
FUSED
PARK
LAMP
RELAY
OUTPUT
PANEL
LAMPS
DRIVER
GROUND
SWITCH-
BANK-
UPPER
5
L778
20
WT/LB
11
E2
20
OR/BR
12
Z906
18
BK
28 C2
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
29 C2
18 C2
17 C2
22 C2
21 C2
E2
20
OR/BR
E2
20
OR/BR
E2
20
OR/BR
E2
20
OR/BR
E2
20
OR/BR
7
PANEL
LAMPS
DRIVER
GROUND
SWITCH-
BANK-
LOWER
1
Z906
18
BK
S230
(8W-12-21)
3
ASSEMBLY-
SHIFT
LEVER
(8W-31-15)
S204
(8W-15-8)
E2
20
OR/BR
5
PANEL
LAMPS
DRIVER
SWITCH-
TRANSFER
CASE
SELECTOR
(8W-31-9)
Z906
18
BK
7 C1
PANEL
LAMPS
DRIVER
CONTROL-A/C-
HEATER
(8W-42-6)
15 C2
PANEL
LAMPS
DRIVER
CLUSTER
(8W-40-5)
G200
(8W-15-8)
J058W-19

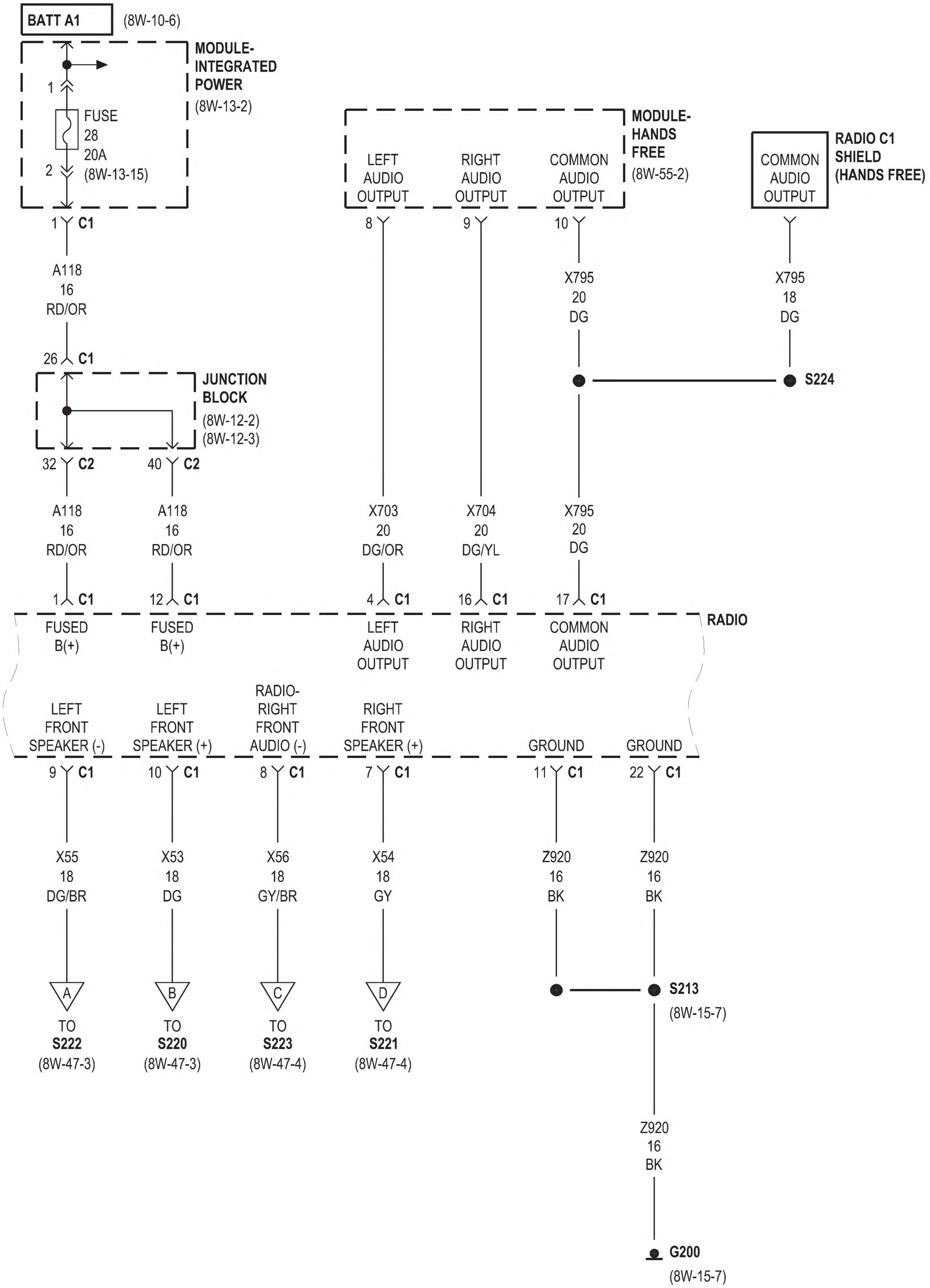

BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
12
10A
(8W-12-11)
2
19 C2
6 C2
26 C3
A931
20
RD
A931
20
RD
A931
20
RD/WT
S325
(8W-12-14)
A931
20
RD/WT
A931
20
RD/WT
FROM
S361
(8W-44-4)
B
14 C310
A931
20
RD/WT
M22
20
YL/OR
A
LAMP-
CARGO
(BASE)
9
C312
1
B
M22
20
YL/OR
A931
20
RD
M22
20
YL/OR
1
LAMP-
COURTESY-
LOWER
RIGHT
8 C310
A
TO
S350
(8W-44-4)
M22
20
YL/OR
2
1
LAMP-
COURTESY-
LOWER
LEFT
S312
M22
20
YL/OR
CLUSTER
(8W-40-6)
COURTESY
LAMPS
DRIVER
2
9 C201
12 C2
M22
20
YL/OR
M22
20
YL/OR
M22
20
YL/OR
M22
20
YL/OR
S208

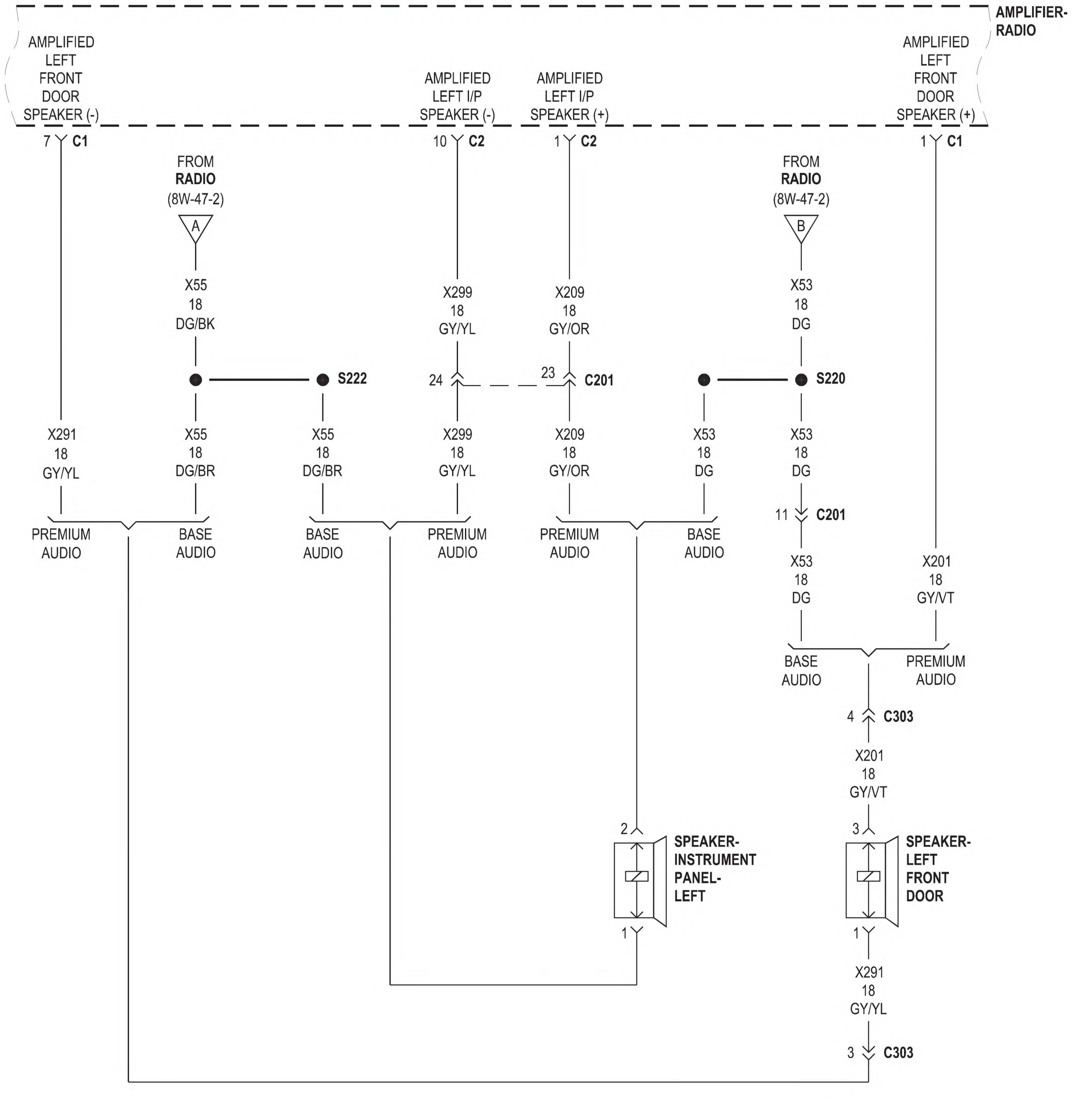


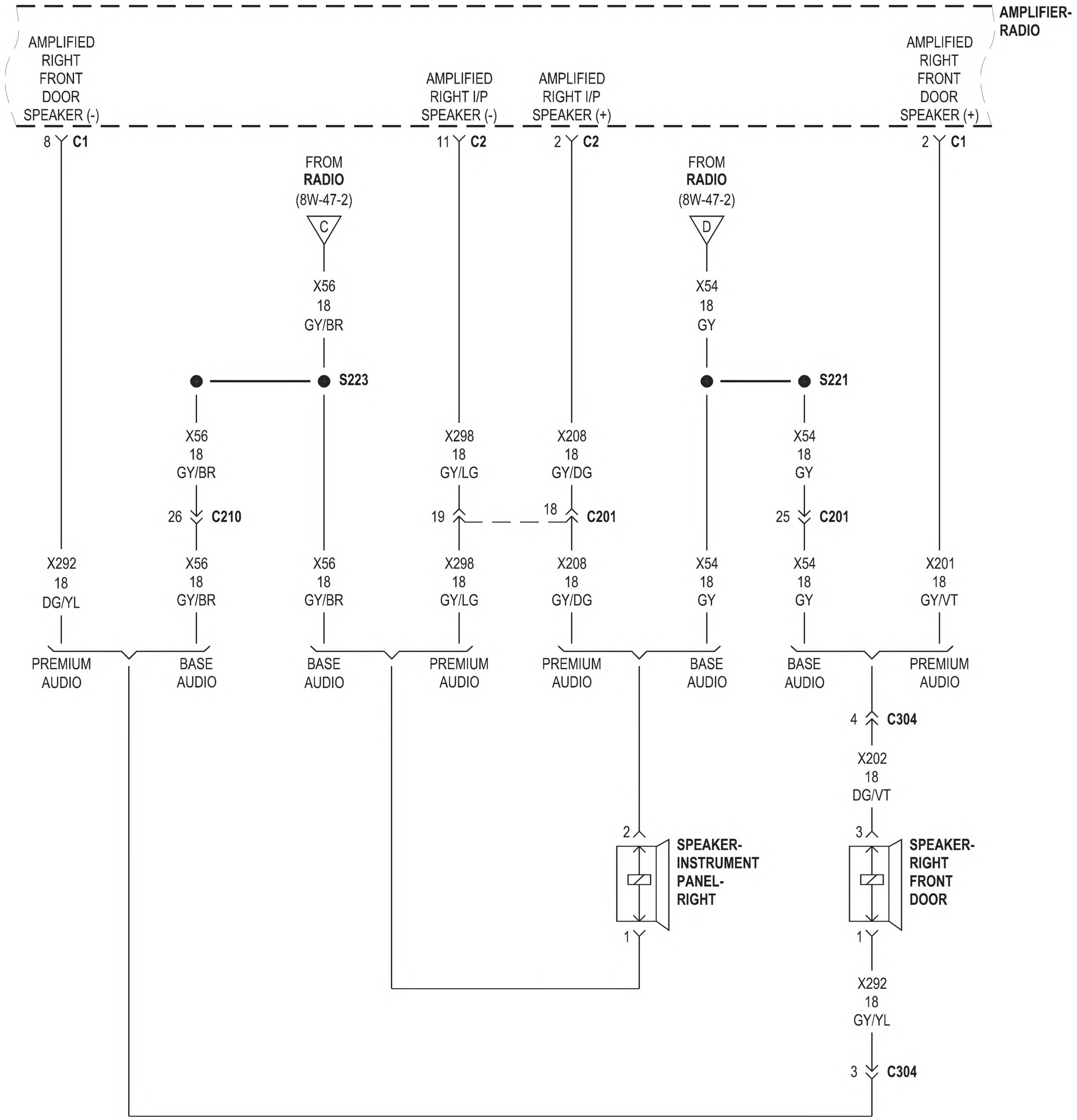
BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
12
10A
(8W-12-11)
2
7 C2
A931
20
RD
FROM
C312
(8W-44-3)
A
A931
20
RD
S350
(8W-12-14)
A931 20 RD
A931 20 RD
A931 20 RD
A931 20 RD
A931 20 RD
1
LAMP-VANITY-LEFT
2
B
LAMP-DOOR HANDLE-RIGHT FRONT
C
A
4
LAMP-COURTESY-DRIVER
3
2
1
LAMP-VANITY-RIGHT
2
1
LAMP-GLOVE BOX
2
B
LAMP-DOOR HANDLE-LEFT FRONT
A
C
M28 20 YL/TN
M22 20 YL/OR
M28 20 YL/TN
M28 20 YL/TN
M28 20 YL/TN
M28 20 YL/TN
M22 20 YL/OR
M28 20 YL/TN
M22 20 YL/OR
S364
M28
20
YL/TN
6 C312
M28
20
YL/TN
21 C201
M28
20
YL/TN
CLUSTER
(8W-40-6)
GLOVE BOX LAMP DRIVER
10 C2
M28
20
YL/TN
S209
S361
M22
20
YL/OR
B
TO
C312
(8W-44-3)
J058W-19
WK504404

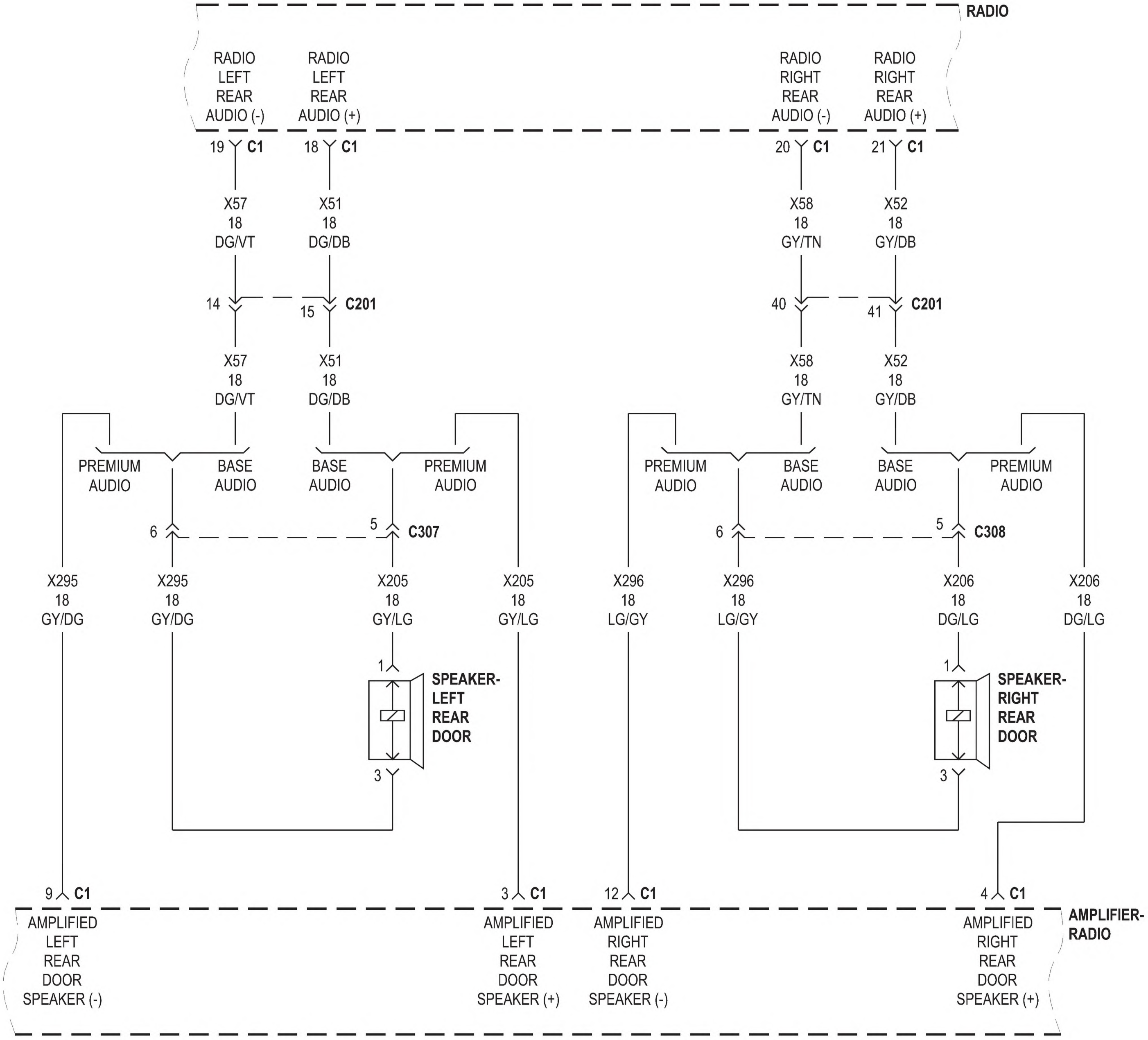
8W-47 AUDIO/VIDEO SYSTEM

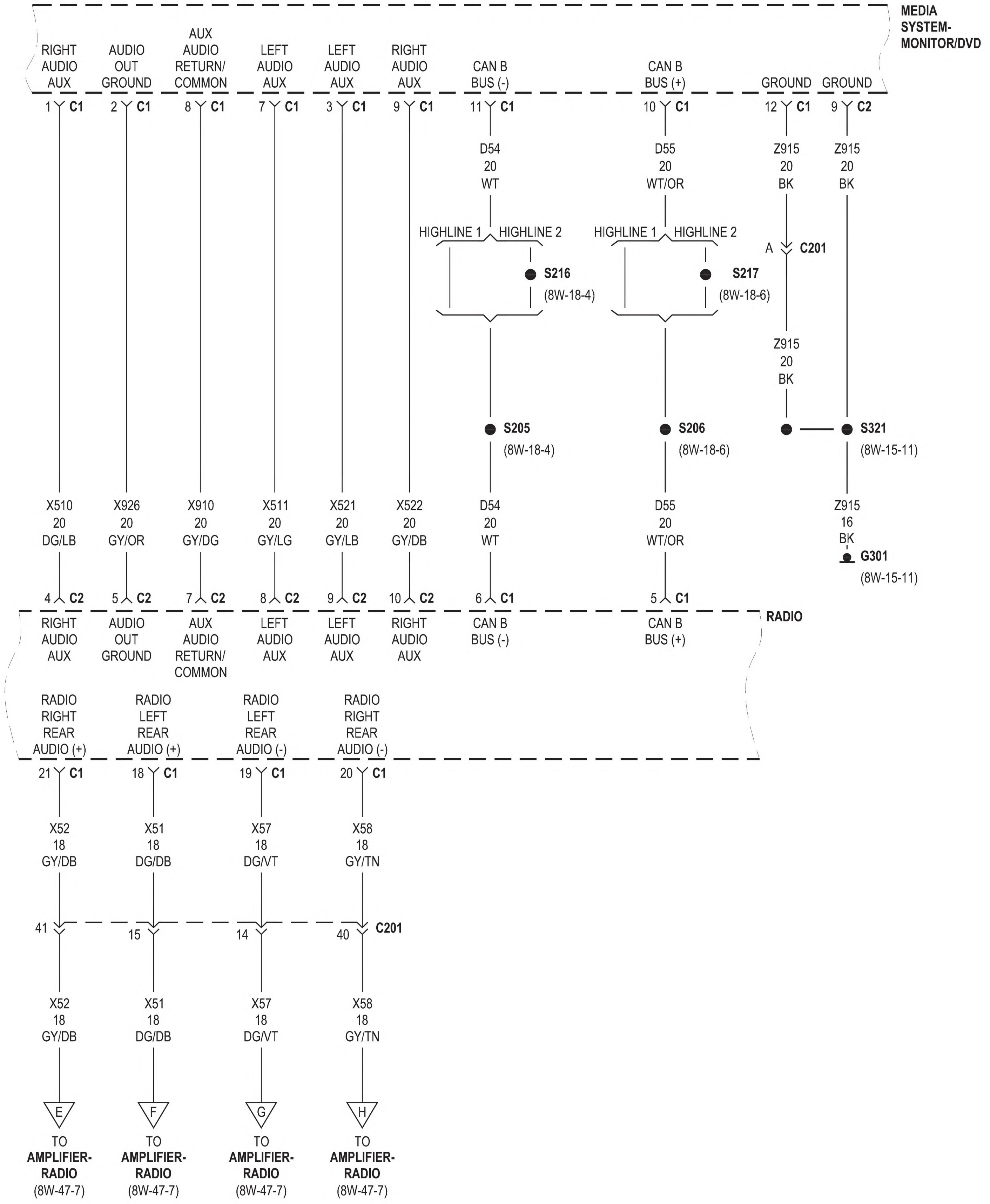
Component	Page
Amplifier-Radio	8W-47-3, 4, 5, 6, 7
Cluster	8W-47-7, 9
Fuse 1	8W-47-7
Fuse 16	8W-47-10
Fuse 27	8W-47-8, 9
Fuse 28	8W-47-2
G200	8W-47-2, 10
G300	8W-47-7, 9
G301	8W-47-6, 8
Junction Block	8W-47-2, 7, 8, 9, 10
Media System-Monitor/Dvd	8W-47-6, 8
Media System-Monitor/Dvd Shield	8W-47-8
Module-Hands Free	8W-47-2
Module-Integrated Power	8W-47-2, 8, 9
Module-Steering Control	8W-47-10
Monitor-Dvd	8W-47-8
Radio	8W-47-2, 3, 4, 5, 6, 9
Radio C1 Shield	8W-47-2
Radio C2 Shield	8W-47-9
Receiver-Satellite	8W-47-9
Receiver-Satellite Radio	8W-47-9
Speaker-Instrument Panel-Left	8W-47-3
Speaker-Instrument Panel-Right	8W-47-4
Speaker-Left Front Door	8W-47-3
Speaker-Left Rear Door	8W-47-5
Speaker-Right Front Door	8W-47-4
Speaker-Right Rear Door	8W-47-5
Switch-Remote Radio-Left	8W-47-10
Switch-Remote Radio-Right	8W-47-10


BATT A1
(8W-10-6)
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE
28
20A
(8W-13-15)
2
1 C1
A118
16
RD/OR
26 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
32 C2
40 C2
A118
16
RD/OR
A118
16
RD/OR
MODULE-HANDS FREE
(8W-55-2)
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT
8
9
10
X795
20
DG
RADIO C1 SHIELD (HANDS FREE)
COMMON AUDIO OUTPUT
X795
18
DG
S224
X703
20
DG/OR
X704
20
DG/YL
X795
20
DG
1 C1
12 C1
4 C1
16 C1
17 C1
RADIO
FUSED B(+)
FUSED B(+)
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT
LEFT FRONT SPEAKER (-)
LEFT FRONT SPEAKER (+)
RADIO-RIGHT FRONT AUDIO (-)
RIGHT FRONT SPEAKER (+)
GROUND
GROUND
9 C1
10 C1
8 C1
7 C1
11 C1
22 C1
X55
18
DG/BR
X53
18
DG
X56
18
GY/BR
X54
18
GY
Z920
16
BK
Z920
16
BK
A
B
C
D
TO S222 (8W-47-3)
TO S220 (8W-47-3)
TO S223 (8W-47-4)
TO S221 (8W-47-4)
S213
(8W-15-7)
Z920
16
BK
G200
(8W-15-7)

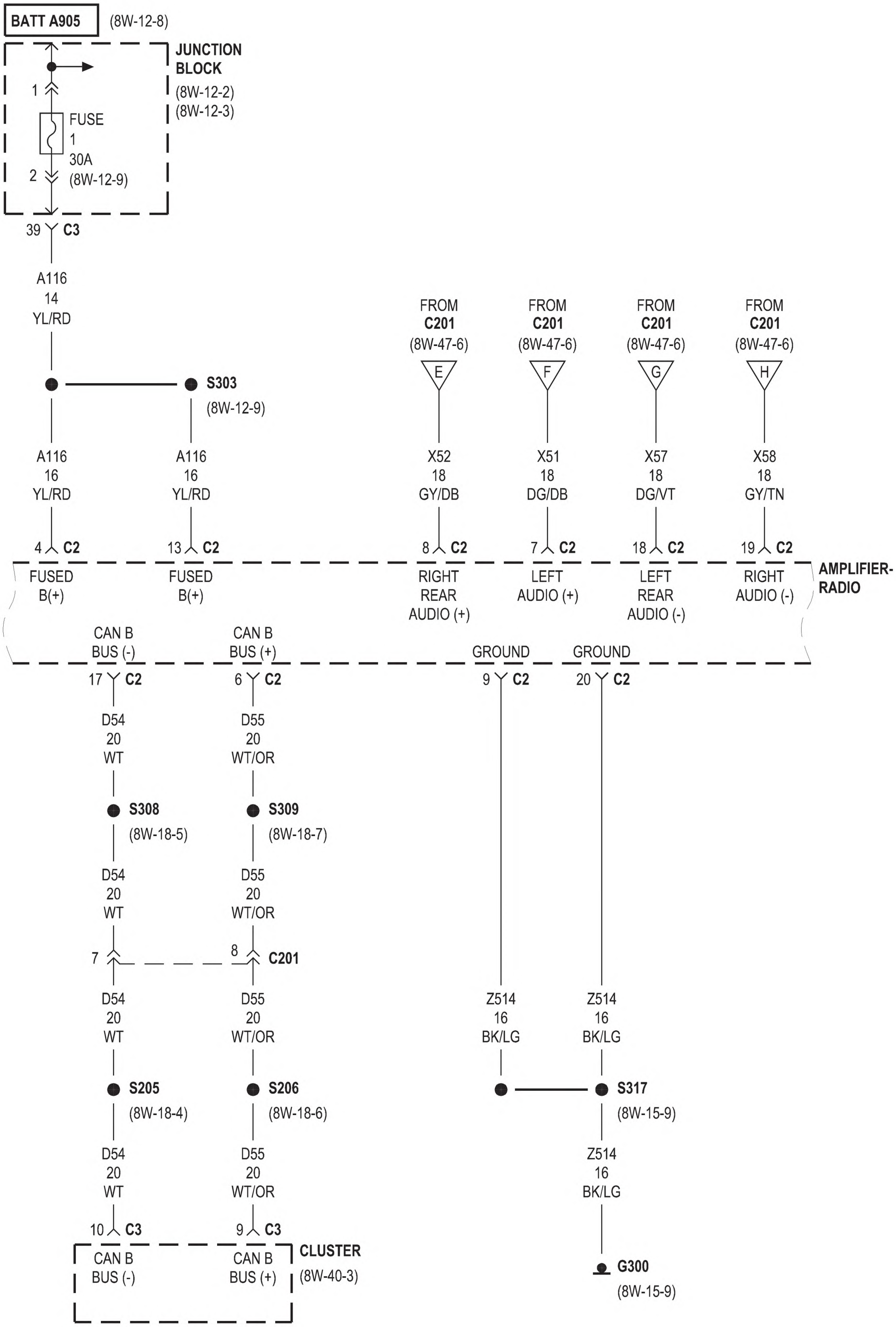

AMPLIFIER-
RADIO
AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
AMPLIFIED LEFT I/P SPEAKER (-)
AMPLIFIED LEFT I/P SPEAKER (+)
AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
7 C1
10 C2
1 C2
1 C1
FROM RADIO (8W-47-2) A
FROM RADIO (8W-47-2) B
X55 18 DG/BK
X299 18 GY/YL
X209 18 GY/OR
X53 18 DG
S222
24 23 C201
S220
X291 18 GY/YL
X55 18 DG/BR
X55 18 DG/BR
X299 18 GY/YL
X209 18 GY/OR
X53 18 DG
X53 18 DG
11 C201
PREMIUM AUDIO
BASE AUDIO
BASE AUDIO
PREMIUM AUDIO
PREMIUM AUDIO
BASE AUDIO
X53 18 DG
X201 18 GY/VT
BASE AUDIO
PREMIUM AUDIO
4 C303
X201 18 GY/VT
2
SPEAKER-INSTRUMENT PANEL-LEFT
1
3
SPEAKER-LEFT FRONT DOOR
1
X291 18 GY/YL
3 C303


AMPLIFIER-RADIO
AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
AMPLIFIED RIGHT I/P SPEAKER (-)
AMPLIFIED RIGHT I/P SPEAKER (+)
AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
8 C1
11 C2
2 C2
2 C1
FROM RADIO (8W-47-2) C
FROM RADIO (8W-47-2) D
X56 18 GY/BR
X54 18 GY
S223
S221
X56 18 GY/BR
X298 18 GY/LG
X208 18 GY/DG
X54 18 GY
26 C210
19
18 C201
25 C201
X292 18 DG/YL
X56 18 GY/BR
X56 18 GY/BR
X298 18 GY/LG
X208 18 GY/DG
X54 18 GY
X54 18 GY
X201 18 GY/VT
PREMIUM AUDIO
BASE AUDIO
BASE AUDIO
PREMIUM AUDIO
PREMIUM AUDIO
BASE AUDIO
BASE AUDIO
PREMIUM AUDIO
4 C304
X202 18 DG/VT
2
3
SPEAKER-INSTRUMENT PANEL-RIGHT
SPEAKER-RIGHT FRONT DOOR
1
1
X292 18 GY/YL
3 C304

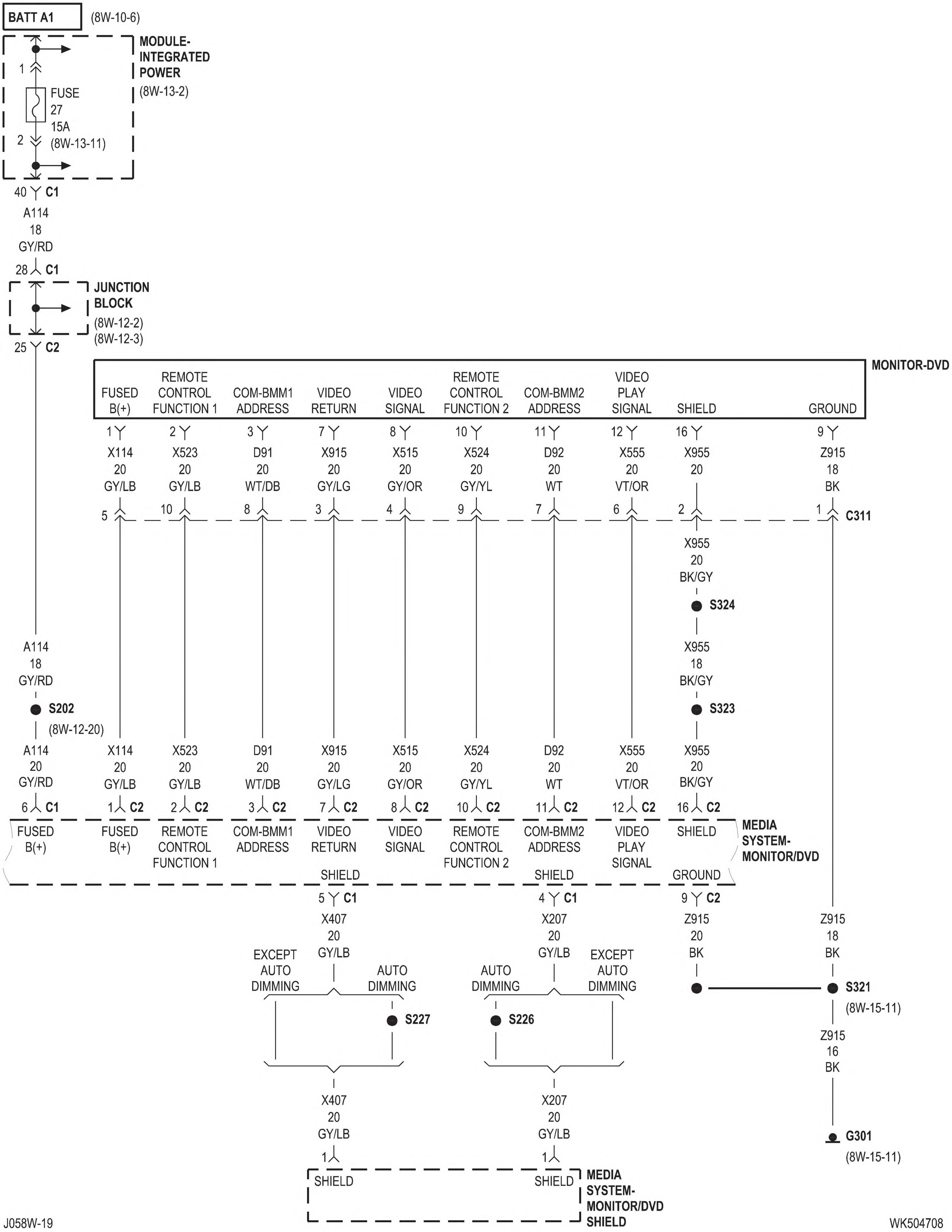

RADIO
RADIO LEFT REAR AUDIO (-)
RADIO LEFT REAR AUDIO (+)
RADIO RIGHT REAR AUDIO (-)
RADIO RIGHT REAR AUDIO (+)
19 C1
18 C1
20 C1
21 C1
X57 18 DG/VT
X51 18 DG/DB
X58 18 GY/TN
X52 18 GY/DB
14
15
C201
40
41
C201
X57 18 DG/VT
X51 18 DG/DB
X58 18 GY/TN
X52 18 GY/DB
PREMIUM AUDIO
BASE AUDIO
BASE AUDIO
PREMIUM AUDIO
PREMIUM AUDIO
BASE AUDIO
BASE AUDIO
PREMIUM AUDIO
6
5
C307
6
5
C308
X295 18 GY/DG
X295 18 GY/DG
X205 18 GY/LG
X205 18 GY/LG
X296 18 LG/GY
X296 18 LG/GY
X206 18 DG/LG
X206 18 DG/LG
1
SPEAKER-LEFT REAR DOOR
3
1
SPEAKER-RIGHT REAR DOOR
3
9 C1
3 C1
12 C1
4 C1
AMPLIFIED LEFT REAR DOOR SPEAKER (-)
AMPLIFIED LEFT REAR DOOR SPEAKER (+)
AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
AMPLIFIER-RADIO


MEDIA SYSTEM-MONITOR/DVD
RIGHT AUDIO AUX
AUDIO OUT GROUND
AUX AUDIO RETURN/ COMMON
LEFT AUDIO AUX
LEFT AUDIO AUX
RIGHT AUDIO AUX
CAN B BUS (-)
CAN B BUS (+)
GROUND
GROUND
1 C1
2 C1
8 C1
7 C1
3 C1
9 C1
11 C1
10 C1
12 C1
9 C2
D54 20 WT
D55 20 WT/OR
Z915 20 BK
Z915 20 BK
HIGHLINE 1
HIGHLINE 2
HIGHLINE 1
HIGHLINE 2
A C201
S216 (8W-18-4)
S217 (8W-18-6)
Z915 20 BK
S205 (8W-18-4)
S206 (8W-18-6)
S321 (8W-15-11)
X510 20 DG/LB
X926 20 GY/OR
X910 20 GY/DG
X511 20 GY/LG
X521 20 GY/LB
X522 20 GY/DB
D54 20 WT
D55 20 WT/OR
Z915 16 BK
G301 (8W-15-11)
4 C2
5 C2
7 C2
8 C2
9 C2
10 C2
6 C1
5 C1
RADIO
RIGHT AUDIO AUX
AUDIO OUT GROUND
AUX AUDIO RETURN/ COMMON
LEFT AUDIO AUX
LEFT AUDIO AUX
RIGHT AUDIO AUX
CAN B BUS (-)
CAN B BUS (+)
RADIO RIGHT REAR AUDIO (+)
RADIO LEFT REAR AUDIO (+)
RADIO LEFT REAR AUDIO (-)
RADIO RIGHT REAR AUDIO (-)
21 C1
18 C1
19 C1
20 C1
X52 18 GY/DB
X51 18 DG/DB
X57 18 DG/VT
X58 18 GY/TN
41
15
14
40
C201
X52 18 GY/DB
X51 18 DG/DB
X57 18 DG/VT
X58 18 GY/TN
E
F
G
H
TO AMPLIFIER-RADIO (8W-47-7)
TO AMPLIFIER-RADIO (8W-47-7)
TO AMPLIFIER-RADIO (8W-47-7)
TO AMPLIFIER-RADIO (8W-47-7)

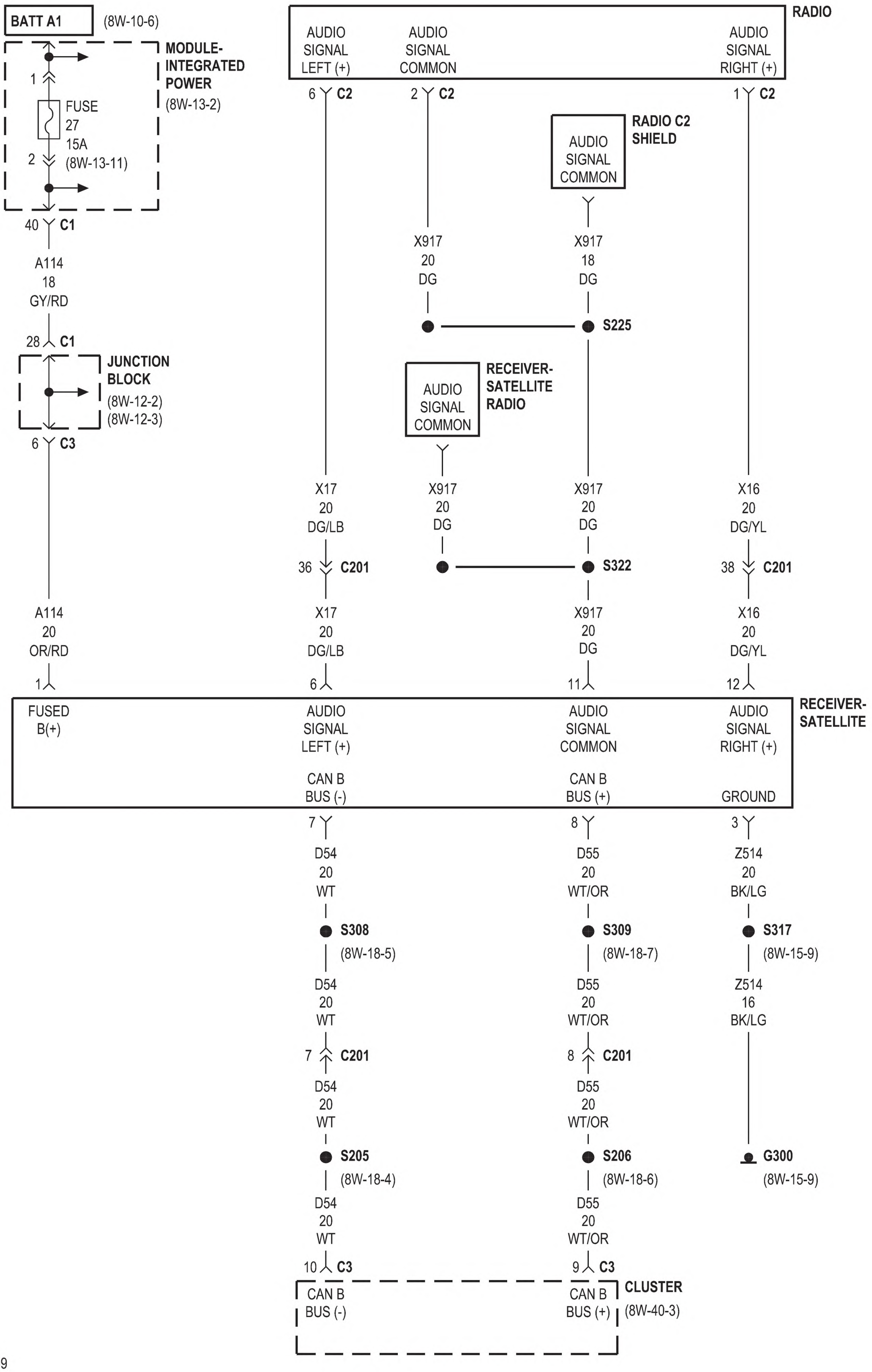
PREMIUM AUDIO


BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
1
30A
(8W-12-9)
2
39 C3
A116
14
YL/RD
S303
(8W-12-9)
A116
16
YL/RD
A116
16
YL/RD
FROM C201 (8W-47-6) E
FROM C201 (8W-47-6) F
FROM C201 (8W-47-6) G
FROM C201 (8W-47-6) H
X52
18
GY/DB
X51
18
DG/DB
X57
18
DG/VT
X58
18
GY/TN
4 C2
13 C2
8 C2
7 C2
18 C2
19 C2
AMPLIFIER-RADIO
FUSED B(+)
FUSED B(+)
RIGHT REAR AUDIO (+)
LEFT AUDIO (+)
LEFT REAR AUDIO (-)
RIGHT AUDIO (-)
CAN B BUS (-)
CAN B BUS (+)
GROUND
GROUND
17 C2
6 C2
9 C2
20 C2
D54
20
WT
D55
20
WT/OR
S308
(8W-18-5)
S309
(8W-18-7)
D54
20
WT
D55
20
WT/OR
7
8
C201
D54
20
WT
D55
20
WT/OR
Z514
16
BK/LG
Z514
16
BK/LG
S205
(8W-18-4)
S206
(8W-18-6)
S317
(8W-15-9)
D54
20
WT
D55
20
WT/OR
Z514
16
BK/LG
10 C3
9 C3
CAN B BUS (-)
CAN B BUS (+)
CLUSTER
(8W-40-3)
G300
(8W-15-9)

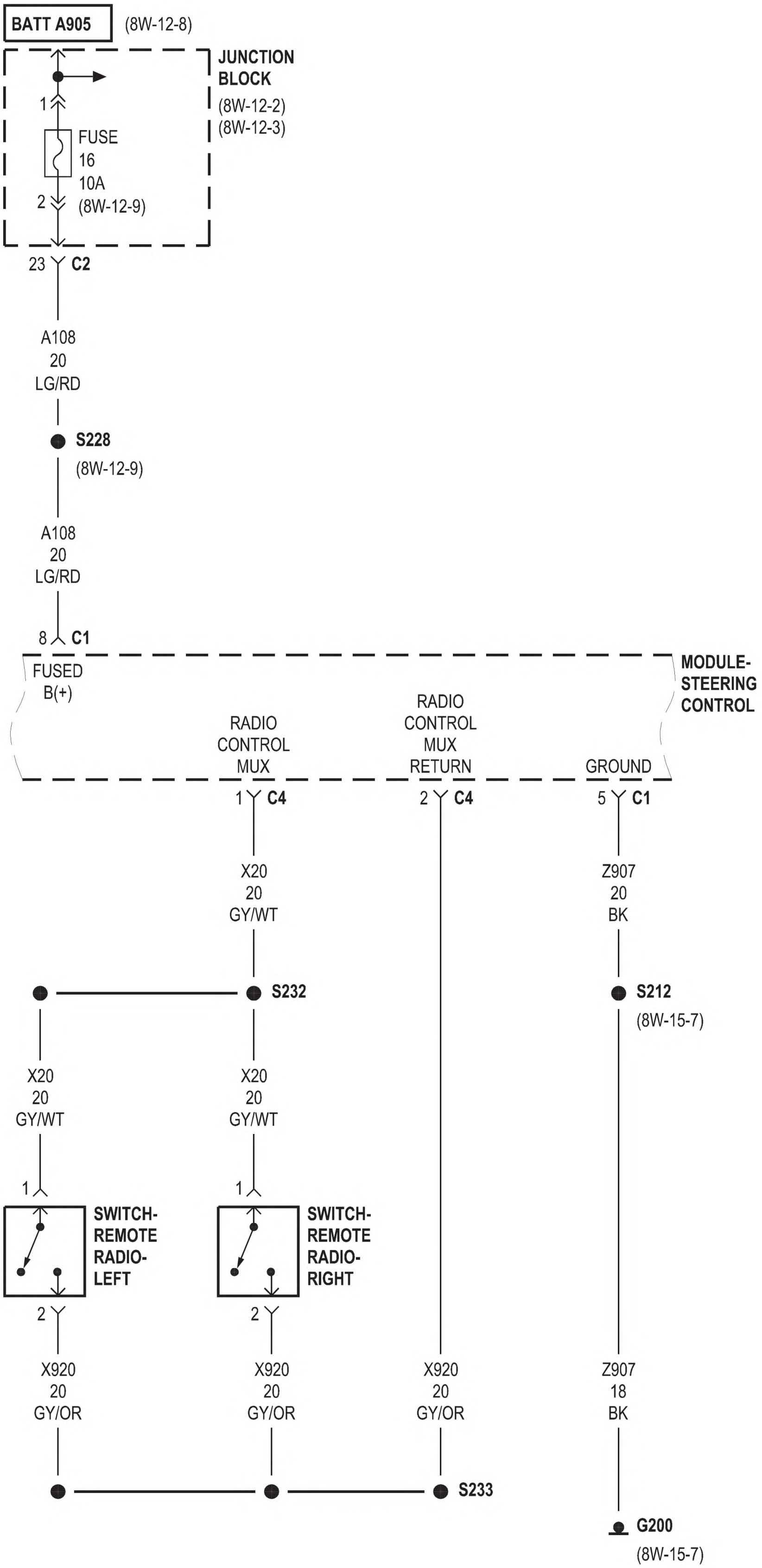
DVD


BATT A1
(8W-10-6)
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE
27
15A
(8W-13-11)
2
40 C1
A114
18
GY/RD
28 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
25 C2
MONITOR-DVD
FUSED B(+)
REMOTE CONTROL FUNCTION 1
COM-BMM1 ADDRESS
VIDEO RETURN
VIDEO SIGNAL
REMOTE CONTROL FUNCTION 2
COM-BMM2 ADDRESS
VIDEO PLAY SIGNAL
SHIELD
GROUND
1 X114 20 GY/LB
2 X523 20 GY/LB
3 D91 20 WT/DB
7 X915 20 GY/LG
8 X515 20 GY/OR
10 X524 20 GY/YL
11 D92 20 WT
12 X555 20 VT/OR
16 X955 20
9 Z915 18 BK
5
10
8
3
4
9
7
6
2
1
C311
X955
20
BK/GY
S324
X955
18
BK/GY
S323
A114
18
GY/RD
S202
(8W-12-20)
A114 20 GY/RD
X114 20 GY/LB
X523 20 GY/LB
D91 20 WT/DB
X915 20 GY/LG
X515 20 GY/OR
X524 20 GY/YL
D92 20 WT
X555 20 VT/OR
X955 20 BK/GY
6 C1
1 C2
2 C2
3 C2
7 C2
8 C2
10 C2
11 C2
12 C2
16 C2
MEDIA SYSTEM-MONITOR/DVD
FUSED B(+)
FUSED B(+)
REMOTE CONTROL FUNCTION 1
COM-BMM1 ADDRESS
VIDEO RETURN
VIDEO SIGNAL
REMOTE CONTROL FUNCTION 2
COM-BMM2 ADDRESS
VIDEO PLAY SIGNAL
SHIELD
SHIELD
SHIELD
GROUND
5 C1
4 C1
9 C2
X407 20 GY/LB
X207 20 GY/LB
Z915 20 BK
Z915 18 BK
EXCEPT AUTO DIMMING
AUTO DIMMING
AUTO DIMMING
EXCEPT AUTO DIMMING
S227
S226
S321
(8W-15-11)
Z915
16
BK
G301
(8W-15-11)
X407 20 GY/LB
X207 20 GY/LB
1
1
SHIELD
SHIELD
MEDIA SYSTEM-MONITOR/DVD SHIELD

SATELLITE

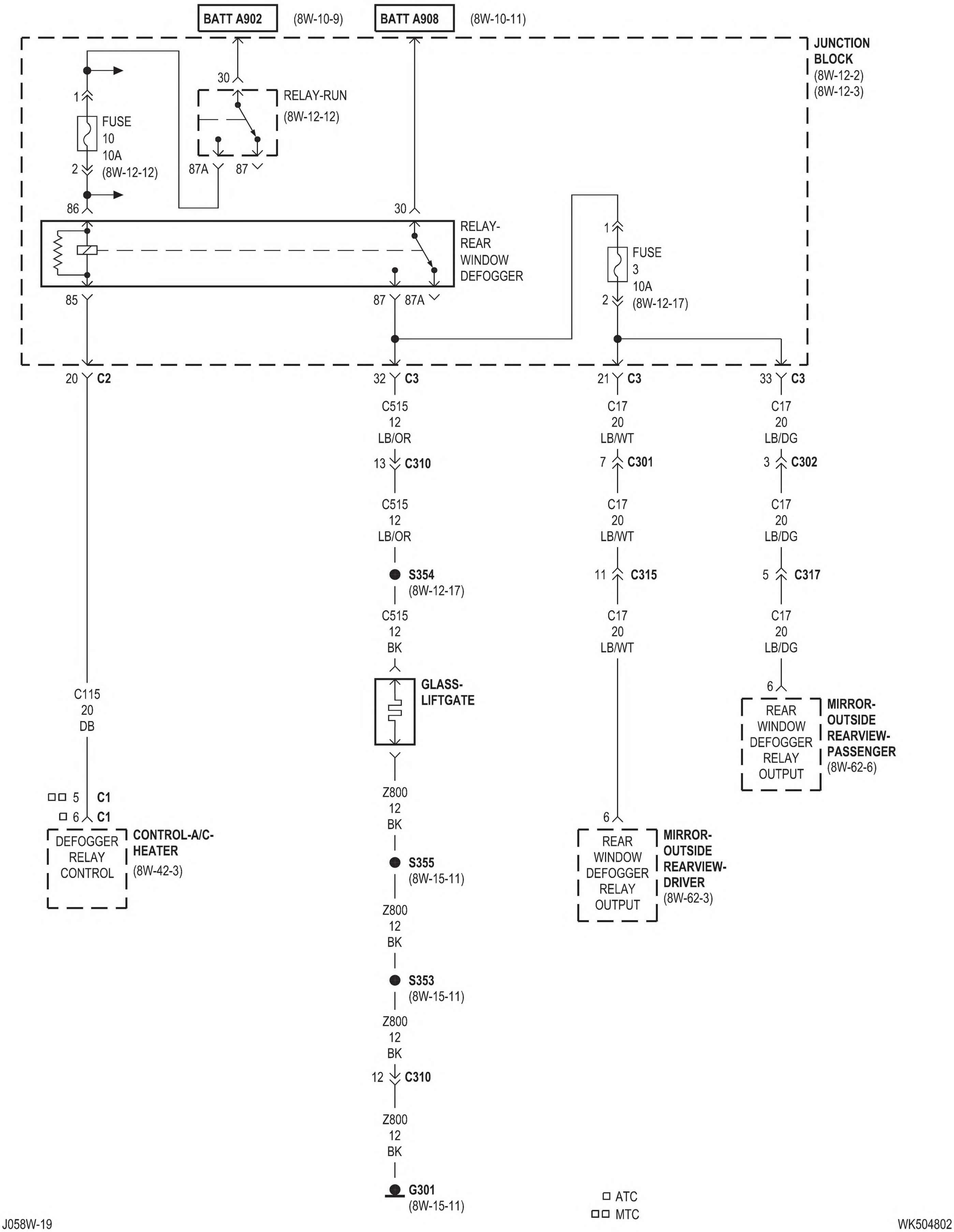

BATT A1
(8W-10-6)
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE
27
15A
(8W-13-11)
2
40 C1
A114
18
GY/RD
28 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
6 C3
A114
20
OR/RD
1
RADIO
AUDIO SIGNAL LEFT (+)
AUDIO SIGNAL COMMON
AUDIO SIGNAL RIGHT (+)
6 C2
2 C2
1 C2
RADIO C2 SHIELD
AUDIO SIGNAL COMMON
X917
20
DG
X917
18
DG
S225
RECEIVER-SATELLITE RADIO
AUDIO SIGNAL COMMON
X17
20
DG/LB
X917
20
DG
X917
20
DG
X16
20
DG/YL
36 C201
S322
38 C201
X17
20
DG/LB
X917
20
DG
X16
20
DG/YL
6
11
12
RECEIVER-SATELLITE
FUSED B(+)
AUDIO SIGNAL LEFT (+)
AUDIO SIGNAL COMMON
AUDIO SIGNAL RIGHT (+)
CAN B BUS (-)
CAN B BUS (+)
GROUND
7
8
3
D54
20
WT
D55
20
WT/OR
Z514
20
BK/LG
S308
(8W-18-5)
S309
(8W-18-7)
S317
(8W-15-9)
D54
20
WT
D55
20
WT/OR
Z514
16
BK/LG
7 C201
8 C201
D54
20
WT
D55
20
WT/OR
S205
(8W-18-4)
S206
(8W-18-6)
G300
(8W-15-9)
D54
20
WT
D55
20
WT/OR
10 C3
9 C3
CLUSTER
(8W-40-3)
CAN B BUS (-)
CAN B BUS (+)

REMOTE RADIO


BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
16
10A
(8W-12-9)
2
23 C2
A108
20
LG/RD
S228
(8W-12-9)
A108
20
LG/RD
8 C1
FUSED B(+)
RADIO CONTROL MUX
RADIO CONTROL MUX RETURN
GROUND
MODULE-STEERING CONTROL
1 C4
2 C4
5 C1
X20
20
GY/WT
Z907
20
BK
S232
S212
(8W-15-7)
X20
20
GY/WT
X20
20
GY/WT
1
1
SWITCH-REMOTE RADIO-LEFT
SWITCH-REMOTE RADIO-RIGHT
2
2
X920
20
GY/OR
X920
20
GY/OR
X920
20
GY/OR
Z907
18
BK
S233
G200
(8W-15-7)

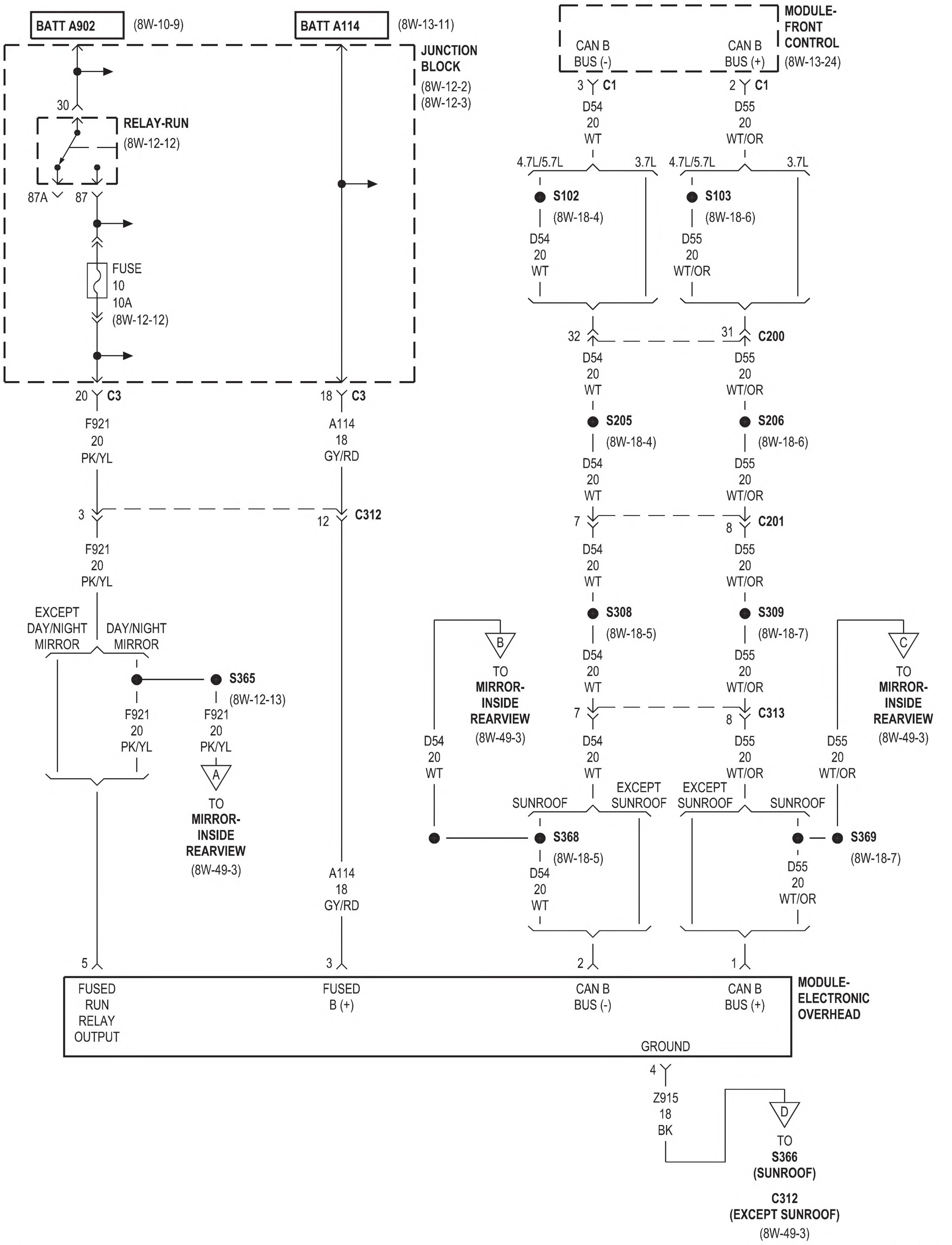
8W-48 REAR WINDOW DEFOGGER

Component	**Page**
Control-A/C-Heater	8W-48-2
Fuse 3	8W-48-2
Fuse 10	8W-48-2
G301	8W-48-2
Glass-Liftgate	8W-48-2
Junction Block	8W-48-2
Mirror-Outside Rearview-Driver	8W-48-2
Mirror-Outside Rearview-Passenger	8W-48-2
Relay-Rear Window Defogger	8W-48-2
Relay-Run	8W-48-2

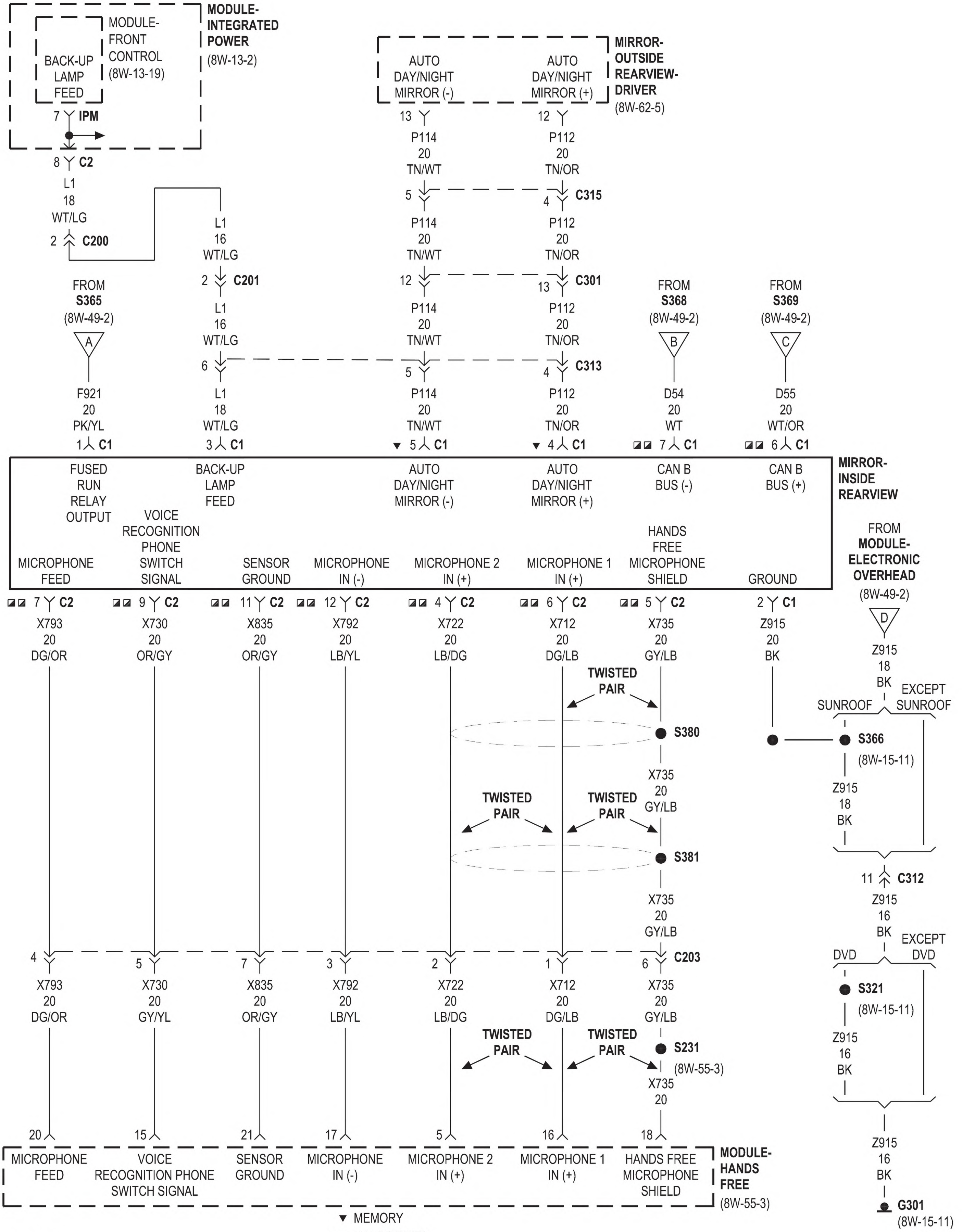

BATT A902
(8W-10-9)
BATT A908
(8W-10-11)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
1
FUSE
10
10A
(8W-12-12)
2
87A
87
86
30
RELAY-REAR WINDOW DEFOGGER
85
87
87A
1
FUSE
3
10A
(8W-12-17)
2
20 C2
32 C3
21 C3
33 C3
C515
12
LB/OR
13 C310
C515
12
LB/OR
S354
(8W-12-17)
C515
12
BK
GLASS-LIFTGATE
Z800
12
BK
S355
(8W-15-11)
Z800
12
BK
S353
(8W-15-11)
Z800
12
BK
12 C310
Z800
12
BK
G301
(8W-15-11)
C17
20
LB/WT
7 C301
C17
20
LB/WT
11 C315
C17
20
LB/WT
6
REAR WINDOW DEFOGGER RELAY OUTPUT
MIRROR-OUTSIDE REARVIEW-DRIVER
(8W-62-3)
C17
20
LB/DG
3 C302
C17
20
LB/DG
5 C317
C17
20
LB/DG
6
REAR WINDOW DEFOGGER RELAY OUTPUT
MIRROR-OUTSIDE REARVIEW-PASSENGER
(8W-62-6)
C115
20
DB
□□ 5 C1
□ 6 C1
DEFOGGER RELAY CONTROL
CONTROL-A/C-HEATER
(8W-42-3)
□ ATC
□□ MTC

8W-49 OVERHEAD CONSOLE

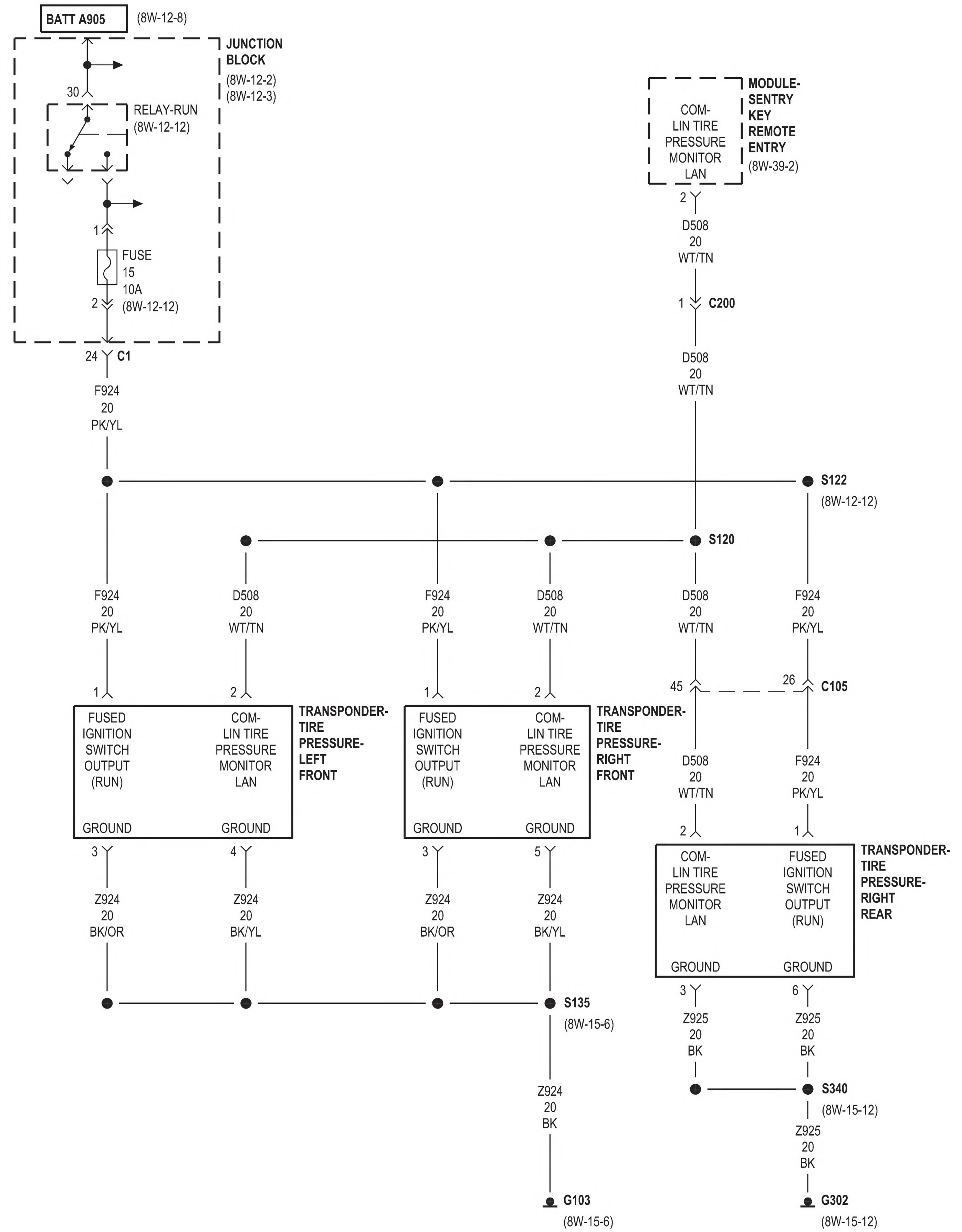
Component	Page
Cluster	8W-49-5
Fuse 10	8W-49-2
Fuse 15	8W-49-4
Fuse 21	8W-49-5
G103	8W-49-4
G301	8W-49-3, 5
G302	8W-49-4
Junction Block	8W-49-2, 4, 5
Mirror-Inside Rearview	8W-49-2, 3
Mirror-Outside Rearview-Driver	8W-49-3
Module-Electronic Overhead	8W-49-2, 3
Module-Front Control	8W-49-2, 3, 5
Module-Hands Free	8W-49-3
Module-Integrated Power	8W-49-3
Module-Sentry Key Remote Entry	8W-49-4
Relay-Run	8W-49-2, 4
Relay-Run/Accessory Delay	8W-49-5
Sensor-Ambient Air Temperature	8W-49-5
Sensor-Rain	8W-49-5
Transponder-Tire Pressure-Left Front	8W-49-4
Transponder-Tire Pressure-Right Front	8W-49-4
Transponder-Tire Pressure-Right Rear	8W-49-4



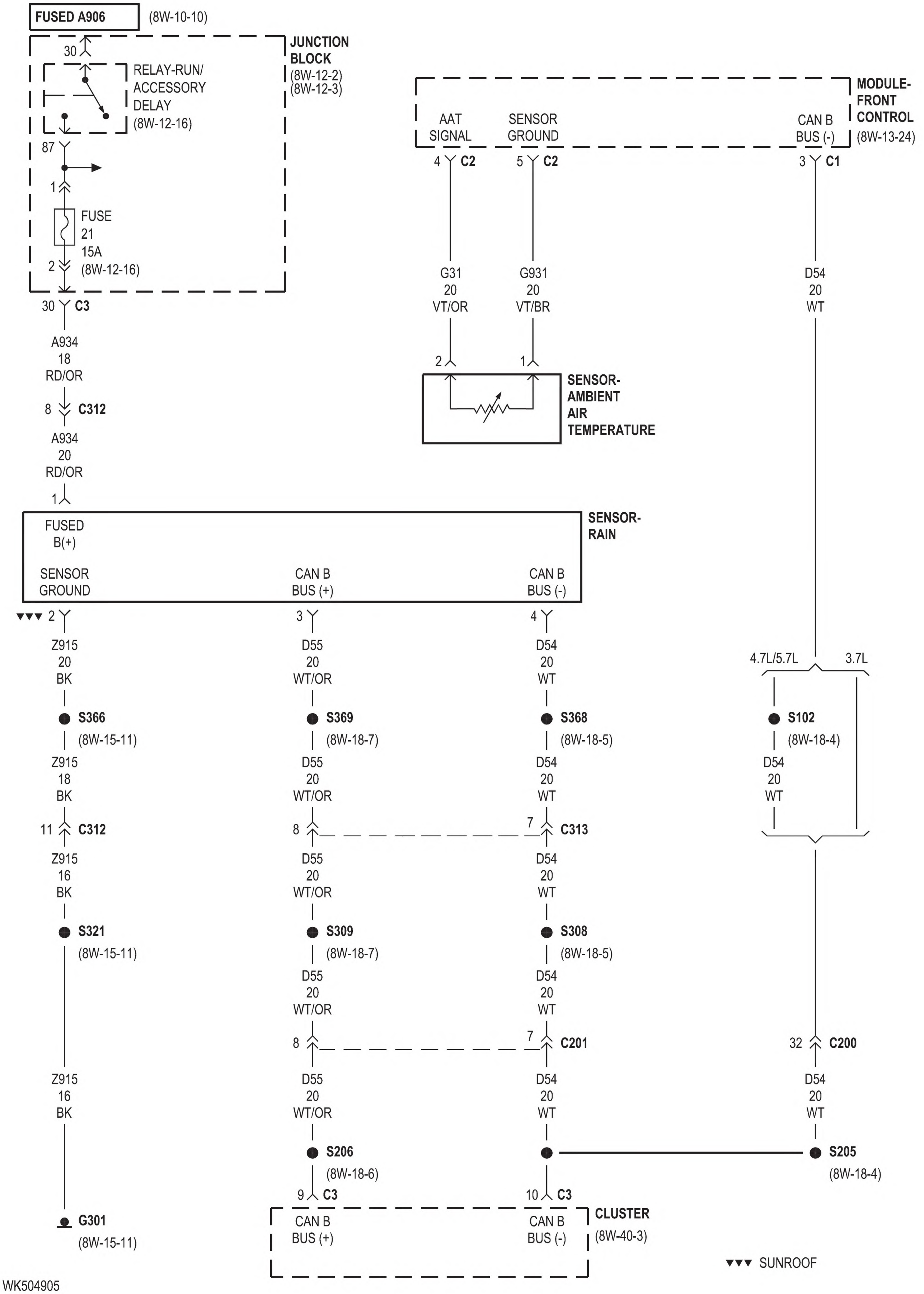
BATT A902
(8W-10-9)
BATT A114
(8W-13-11)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
87A
87
FUSE
10
10A
(8W-12-12)
20 C3
18 C3
F921
20
PK/YL
A114
18
GY/RD
3
12
C312
EXCEPT DAY/NIGHT MIRROR
DAY/NIGHT MIRROR
S365
(8W-12-13)
A
TO MIRROR-INSIDE REARVIEW
(8W-49-3)
MODULE-FRONT CONTROL
(8W-13-24)
CAN B BUS (-)
CAN B BUS (+)
3 C1
2 C1
D54
20
WT
D55
20
WT/OR
4.7L/5.7L
3.7L
S102
(8W-18-4)
S103
(8W-18-6)
32
31
C200
S205
(8W-18-4)
S206
(8W-18-6)
7
8
C201
S308
(8W-18-5)
S309
(8W-18-7)
B
TO MIRROR-INSIDE REARVIEW
(8W-49-3)
C
TO MIRROR-INSIDE REARVIEW
(8W-49-3)
C313
SUNROOF
EXCEPT SUNROOF
S368
(8W-18-5)
S369
(8W-18-7)
5
3
2
1
FUSED RUN RELAY OUTPUT
FUSED B (+)
CAN B BUS (-)
CAN B BUS (+)
MODULE-ELECTRONIC OVERHEAD
GROUND
4
Z915
18
BK
D
TO S366 (SUNROOF)
C312 (EXCEPT SUNROOF)
(8W-49-3)


MODULE-INTEGRATED POWER
(8W-13-2)
MODULE-FRONT CONTROL
(8W-13-19)
BACK-UP LAMP FEED
7 IPM
8 C2
L1
18
WT/LG
2 C200
L1
16
WT/LG
2 C201
L1
16
WT/LG
6
L1
18
WT/LG
3 C1
MIRROR-OUTSIDE REARVIEW-DRIVER
(8W-62-5)
AUTO DAY/NIGHT MIRROR (-)
AUTO DAY/NIGHT MIRROR (+)
13
12
P114
20
TN/WT
P112
20
TN/OR
5
4 C315
12
13 C301
5
4 C313
▼ 5 C1
▼ 4 C1
FROM S365
(8W-49-2)
A
F921
20
PK/YL
1 C1
FROM S368
(8W-49-2)
B
D54
20
WT
◪◪ 7 C1
FROM S369
(8W-49-2)
C
D55
20
WT/OR
◪◪ 6 C1
MIRROR-INSIDE REARVIEW
FUSED RUN RELAY OUTPUT
BACK-UP LAMP FEED
AUTO DAY/NIGHT MIRROR (-)
AUTO DAY/NIGHT MIRROR (+)
CAN B BUS (-)
CAN B BUS (+)
VOICE RECOGNITION PHONE SWITCH SIGNAL
HANDS FREE MICROPHONE SHIELD
MICROPHONE FEED
SENSOR GROUND
MICROPHONE IN (-)
MICROPHONE 2 IN (+)
MICROPHONE 1 IN (+)
GROUND
◪◪ 7 C2
X793
20
DG/OR
◪◪ 9 C2
X730
20
OR/GY
◪◪ 11 C2
X835
20
OR/GY
◪◪ 12 C2
X792
20
LB/YL
◪◪ 4 C2
X722
20
LB/DG
◪◪ 6 C2
X712
20
DG/LB
◪◪ 5 C2
X735
20
GY/LB
2 C1
Z915
20
BK
TWISTED PAIR
S380
X735
20
GY/LB
TWISTED PAIR
TWISTED PAIR
S381
X735
20
GY/LB
FROM MODULE-ELECTRONIC OVERHEAD
(8W-49-2)
D
Z915
18
BK
SUNROOF
EXCEPT SUNROOF
S366
(8W-15-11)
Z915
18
BK
11 C312
Z915
16
BK
DVD
EXCEPT DVD
S321
(8W-15-11)
Z915
16
BK
Z915
16
BK
G301
(8W-15-11)
4
5
7
3
2
1
6 C203
X793
20
DG/OR
X730
20
GY/YL
X835
20
OR/GY
X792
20
LB/YL
X722
20
LB/DG
X712
20
DG/LB
X735
20
GY/LB
TWISTED PAIR
TWISTED PAIR
S231
(8W-55-3)
X735
20
20
15
21
17
5
16
18
MODULE-HANDS FREE
(8W-55-3)
MICROPHONE FEED
VOICE RECOGNITION PHONE SWITCH SIGNAL
SENSOR GROUND
MICROPHONE IN (-)
MICROPHONE 2 IN (+)
MICROPHONE 1 IN (+)
HANDS FREE MICROPHONE SHIELD

▼ MEMORY
◪◪ HANDS FREE

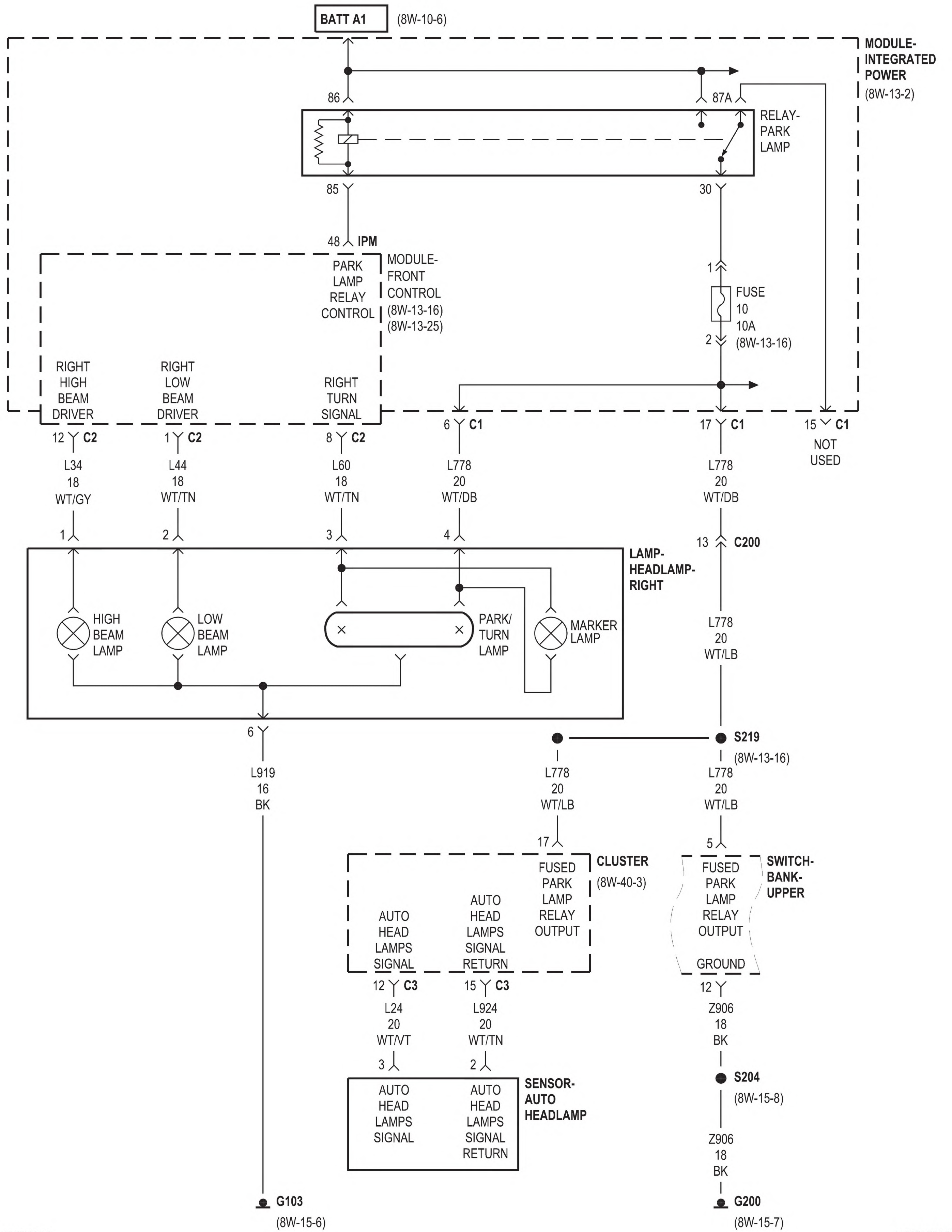

BATT A905
(8W-12-8)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
1
FUSE
15
10A
2
(8W-12-12)
24
C1
F924
20
PK/YL
MODULE-SENTRY KEY REMOTE ENTRY
(8W-39-2)
COM-LIN TIRE PRESSURE MONITOR LAN
2
D508
20
WT/TN
1
C200
D508
20
WT/TN
S122
(8W-12-12)
S120
F924
20
PK/YL
D508
20
WT/TN
F924
20
PK/YL
D508
20
WT/TN
D508
20
WT/TN
F924
20
PK/YL
1
2
1
2
45
26
C105
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
D508
20
WT/TN
F924
20
PK/YL
2
1
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED IGNITION SWITCH OUTPUT (RUN)
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
3
5
Z924
20
BK/OR
Z924
20
BK/YL
Z924
20
BK/OR
Z924
20
BK/YL
S135
(8W-15-6)
Z924
20
BK
G103
(8W-15-6)
3
6
Z925
20
BK
Z925
20
BK
S340
(8W-15-12)
Z925
20
BK
G302
(8W-15-12)

WK504904

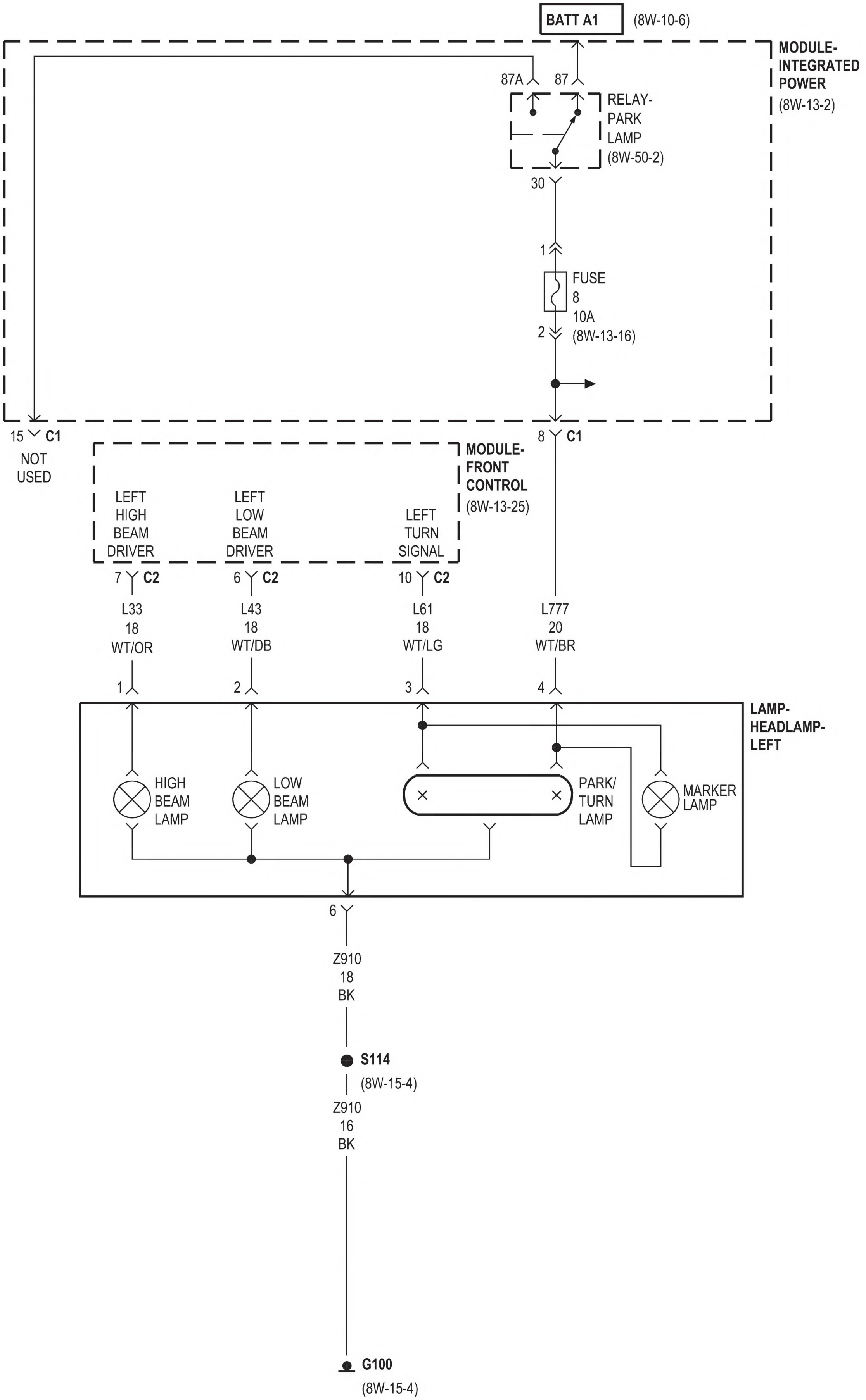

FUSED A906
(8W-10-10)
30
RELAY-RUN/
ACCESSORY
DELAY
(8W-12-16)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
87
1
FUSE
21
15A
(8W-12-16)
2
30 C3
A934
18
RD/OR
8 C312
A934
20
RD/OR
1
MODULE-
FRONT
CONTROL
(8W-13-24)
AAT
SIGNAL
SENSOR
GROUND
CAN B
BUS (-)
4 C2
5 C2
3 C1
G31
20
VT/OR
G931
20
VT/BR
D54
20
WT
2
1
SENSOR-
AMBIENT
AIR
TEMPERATURE
SENSOR-
RAIN
FUSED
B(+)
SENSOR
GROUND
CAN B
BUS (+)
CAN B
BUS (-)
▼▼▼ 2
3
4
Z915
20
BK
D55
20
WT/OR
D54
20
WT
4.7L/5.7L
3.7L
S366
(8W-15-11)
S369
(8W-18-7)
S368
(8W-18-5)
S102
(8W-18-4)
Z915
18
BK
D55
20
WT/OR
D54
20
WT
D54
20
WT
11 C312
8
7 C313
Z915
16
BK
D55
20
WT/OR
D54
20
WT
S321
(8W-15-11)
S309
(8W-18-7)
S308
(8W-18-5)
D55
20
WT/OR
D54
20
WT
8
7 C201
32 C200
Z915
16
BK
D55
20
WT/OR
D54
20
WT
D54
20
WT
S206
(8W-18-6)
S205
(8W-18-4)
9 C3
10 C3
G301
(8W-15-11)
CAN B
BUS (+)
CAN B
BUS (-)
CLUSTER
(8W-40-3)
▼▼▼ SUNROOF

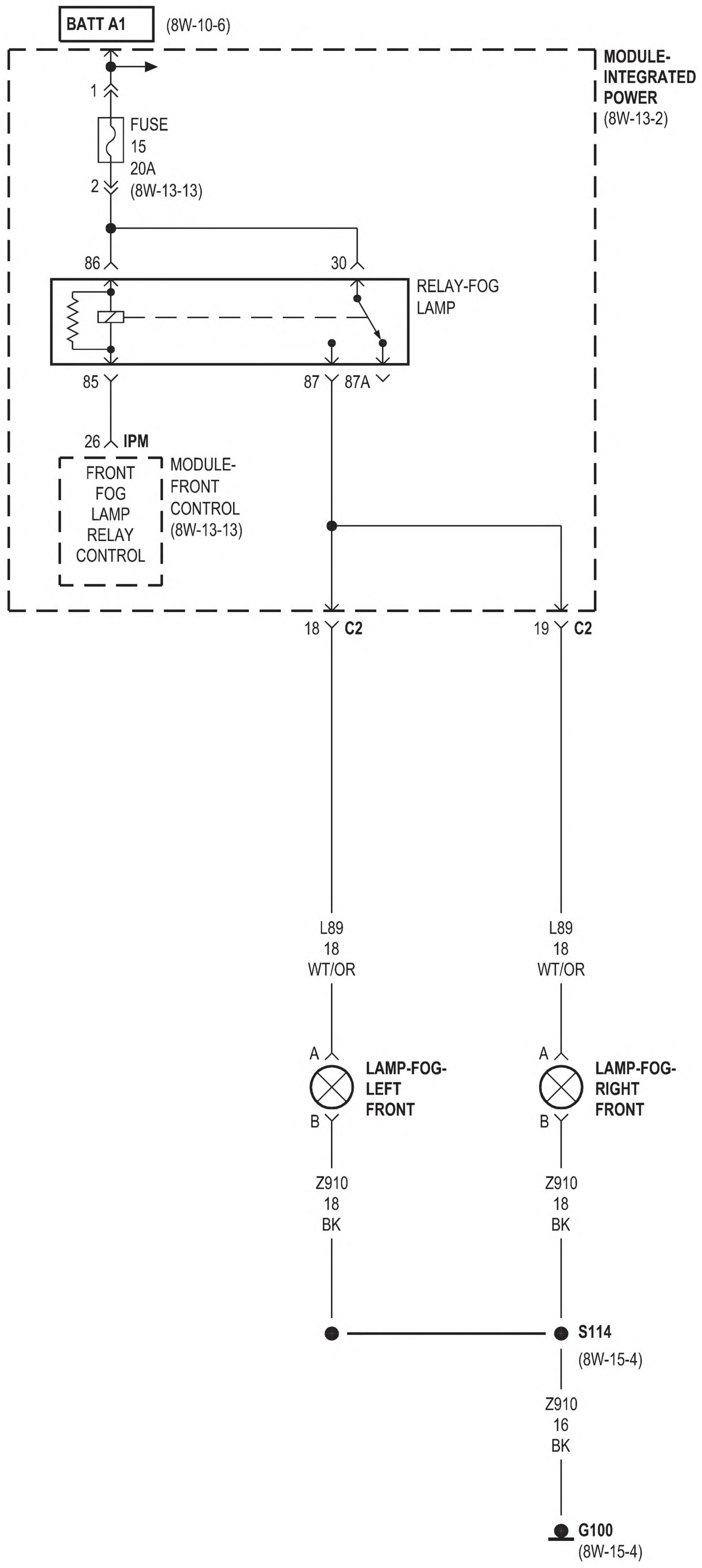
8W-50 FRONT LIGHTING

Component	Page
Cluster	8W-50-2
Fuse 8	8W-50-3
Fuse 10	8W-50-2
Fuse 15	8W-50-4
G100	8W-50-3, 4
G103	8W-50-2
G200	8W-50-2
High Beam Lamp	8W-50-2, 3
Lamp-Fog-Left Front	8W-50-4
Lamp-Fog-Right Front	8W-50-4
Lamp-Headlamp-Left	8W-50-3
Lamp-Headlamp-Right	8W-50-2
Low Beam Lamp	8W-50-2, 3
Marker Lamp	8W-50-2, 3
Module-Front Control	8W-50-2, 3, 4
Module-Integrated Power	8W-50-2, 3, 4
Park/Turn Lamp	8W-50-2, 3
Relay-Fog Lamp	8W-50-4
Relay-Park Lamp	8W-50-2, 3
Sensor-Auto Headlamp	8W-50-2
Switch-Bank-Upper	8W-50-2


BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
86
87A
RELAY-
PARK
LAMP
85
30
48
IPM
PARK
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-16)
(8W-13-25)
1
FUSE
10
10A
(8W-13-16)
2
RIGHT
HIGH
BEAM
DRIVER
RIGHT
LOW
BEAM
DRIVER
RIGHT
TURN
SIGNAL
12 C2
1 C2
8 C2
6 C1
17 C1
15 C1
NOT
USED
L34
18
WT/GY
L44
18
WT/TN
L60
18
WT/TN
L778
20
WT/DB
L778
20
WT/DB
1
2
3
4
13 C200
LAMP-
HEADLAMP-
RIGHT
HIGH
BEAM
LAMP
LOW
BEAM
LAMP
PARK/
TURN
LAMP
MARKER
LAMP
L778
20
WT/LB
6
S219
(8W-13-16)
L919
16
BK
L778
20
WT/LB
L778
20
WT/LB
17
5
CLUSTER
(8W-40-3)
FUSED
PARK
LAMP
RELAY
OUTPUT
AUTO
HEAD
LAMPS
SIGNAL
AUTO
HEAD
LAMPS
SIGNAL
RETURN
FUSED
PARK
LAMP
RELAY
OUTPUT
GROUND
SWITCH-
BANK-
UPPER
12 C3
15 C3
12
L24
20
WT/VT
L924
20
WT/TN
Z906
18
BK
3
2
S204
(8W-15-8)
SENSOR-
AUTO
HEADLAMP
AUTO
HEAD
LAMPS
SIGNAL
AUTO
HEAD
LAMPS
SIGNAL
RETURN
Z906
18
BK
G103
(8W-15-6)
G200
(8W-15-7)

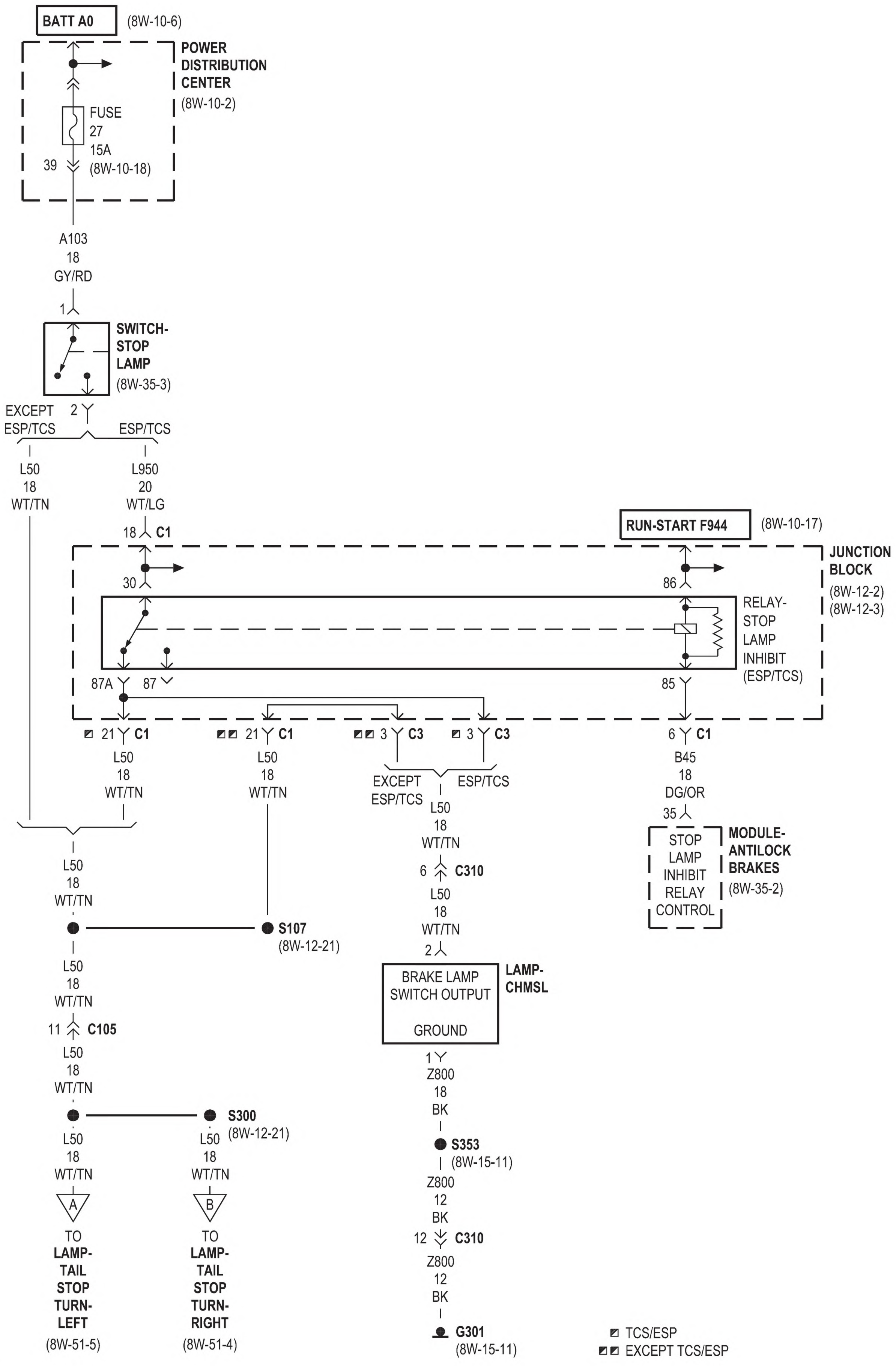
J058W-19 WK505002


BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
87A
87
RELAY-
PARK
LAMP
(8W-50-2)
30
1
FUSE
8
10A
(8W-13-16)
2
15
C1
NOT
USED
8
C1
MODULE-
FRONT
CONTROL
(8W-13-25)
LEFT
HIGH
BEAM
DRIVER
LEFT
LOW
BEAM
DRIVER
LEFT
TURN
SIGNAL
7 C2
6 C2
10 C2
L33
18
WT/OR
L43
18
WT/DB
L61
18
WT/LG
L777
20
WT/BR
1
2
3
4
LAMP-
HEADLAMP-
LEFT
HIGH
BEAM
LAMP
LOW
BEAM
LAMP
PARK/
TURN
LAMP
MARKER
LAMP
6
Z910
18
BK
S114
(8W-15-4)
Z910
16
BK
G100
(8W-15-4)

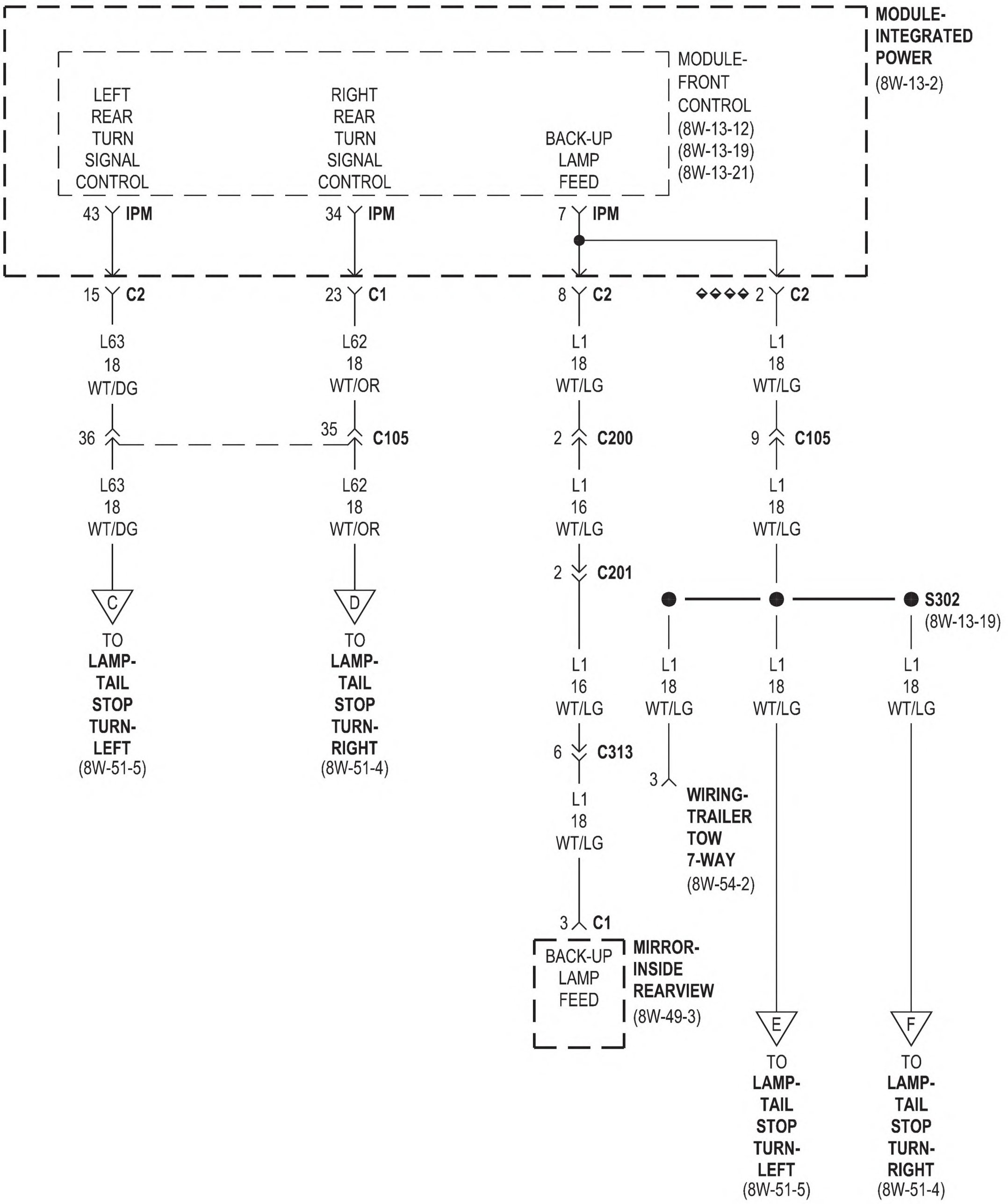

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
15
20A
(8W-13-13)
2
86
30
RELAY-FOG
LAMP
85
87
87A
26
IPM
FRONT
FOG
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-13)
18
C2
19
C2
L89
18
WT/OR
L89
18
WT/OR
A
LAMP-FOG-
LEFT
FRONT
B
A
LAMP-FOG-
RIGHT
FRONT
B
Z910
18
BK
Z910
18
BK
S114
(8W-15-4)
Z910
16
BK
G100
(8W-15-4)

8W-51 REAR LIGHTING

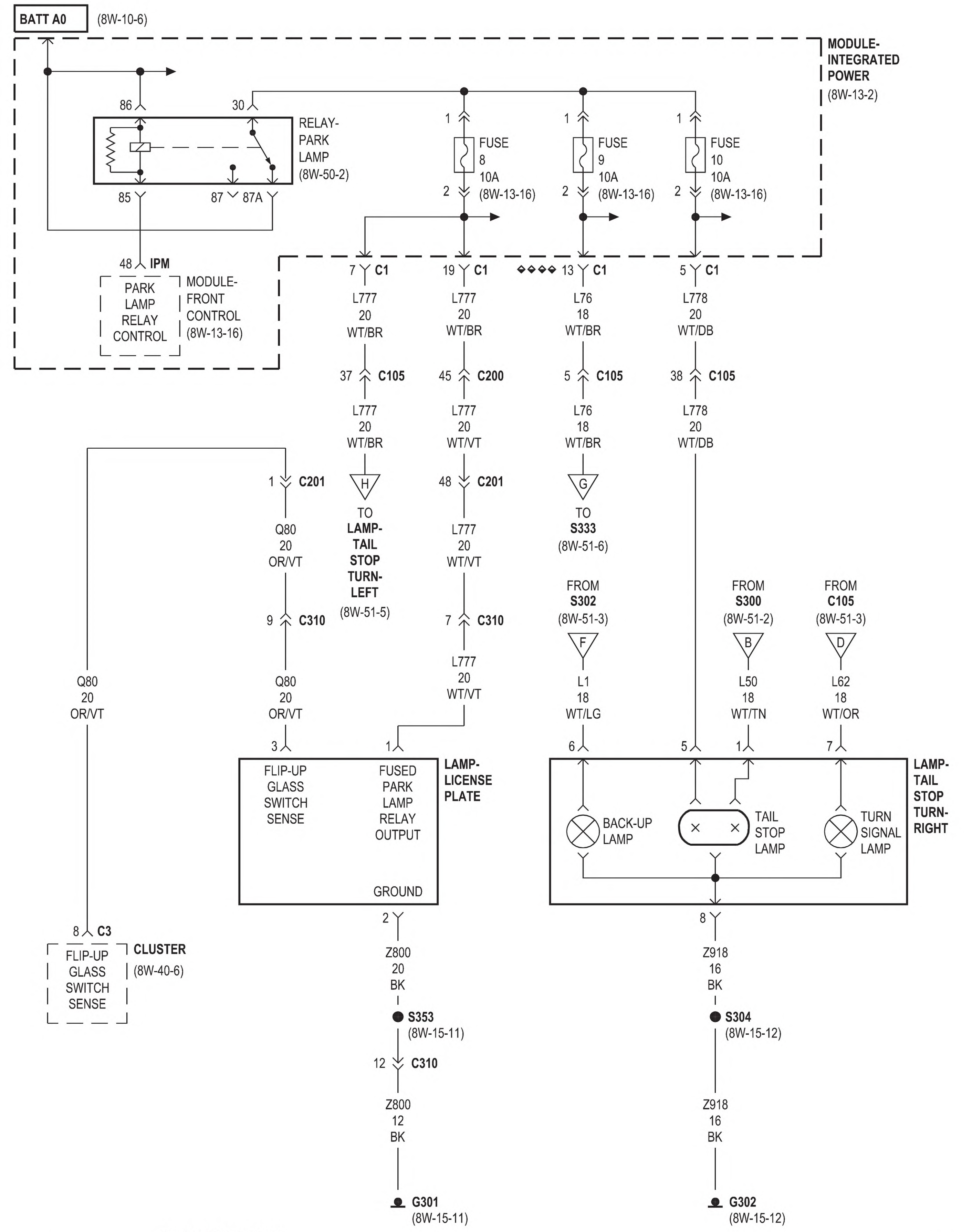
Component	Page
Back-Up Lamp	8W-51-4, 5
Cluster	8W-51-4
Fuse 8	8W-51-4
Fuse 9	8W-51-4
Fuse 10	8W-51-4
Fuse 19	8W-51-5
Fuse 21	8W-51-5
Fuse 27	8W-51-2
G301	8W-51-2, 4
G302	8W-51-4, 5, 6
Junction Block	8W-51-2
Lamp-Chmsl	8W-51-2
Lamp-License Plate	8W-51-4
Lamp-Tail Stop Turn-Left	8W-51-2, 3, 4, 5
Lamp-Tail Stop Turn-Right	8W-51-2, 3, 4
Mirror-Inside Rearview	8W-51-3
Module-Antilock Brakes	8W-51-2
Module-Front Control	8W-51-3, 4
Module-Integrated Power	8W-51-3, 4, 5
Power Distribution Center	8W-51-2
Relay-Park Lamp	8W-51-4
Relay-Stop Lamp Inhibit	8W-51-2
Relay-Trailer Tow-Left Turn	8W-51-5
Relay-Trailer Tow-Right Turn	8W-51-5
Switch-Stop Lamp	8W-51-2
Tail Stop Lamp	8W-51-4, 5
Turn Signal Lamp	8W-51-4, 5
Wiring-Trailer Tow 4-Way	8W-51-6
Wiring-Trailer Tow 7-Way	8W-51-3, 6


BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
27
15A
(8W-10-18)
39
A103
18
GY/RD
1
SWITCH-STOP LAMP
(8W-35-3)
2
EXCEPT ESP/TCS
ESP/TCS
L50
18
WT/TN
L950
20
WT/LG
18 C1
RUN-START F944
(8W-10-17)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
86
RELAY-STOP LAMP INHIBIT (ESP/TCS)
87A
87
85
▨ 21 C1
▨▨ 21 C1
▨▨ 3 C3
▨ 3 C3
6 C1
L50
18
WT/TN
L50
18
WT/TN
EXCEPT ESP/TCS
ESP/TCS
L50
18
WT/TN
B45
18
DG/OR
35
STOP LAMP INHIBIT RELAY CONTROL
MODULE-ANTILOCK BRAKES
(8W-35-2)
L50
18
WT/TN
S107
(8W-12-21)
6 C310
L50
18
WT/TN
2
BRAKE LAMP SWITCH OUTPUT
GROUND
LAMP-CHMSL
1
Z800
18
BK
S353
(8W-15-11)
Z800
12
BK
12 C310
Z800
12
BK
G301
(8W-15-11)
L50
18
WT/TN
11 C105
L50
18
WT/TN
S300
(8W-12-21)
L50
18
WT/TN
L50
18
WT/TN
A
B
TO LAMP-TAIL STOP TURN-LEFT
(8W-51-5)
TO LAMP-TAIL STOP TURN-RIGHT
(8W-51-4)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP

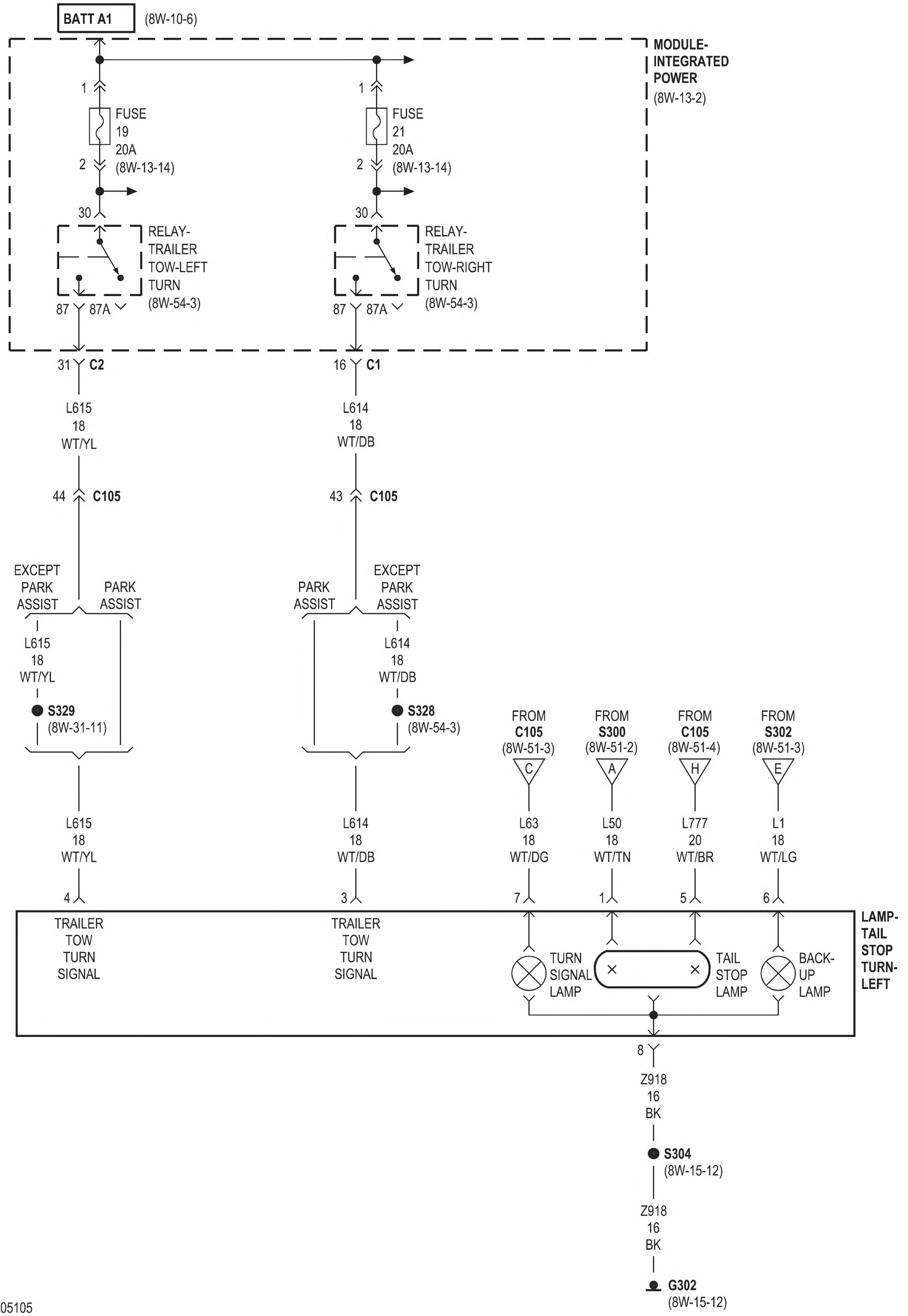
J058W-19 WK505102

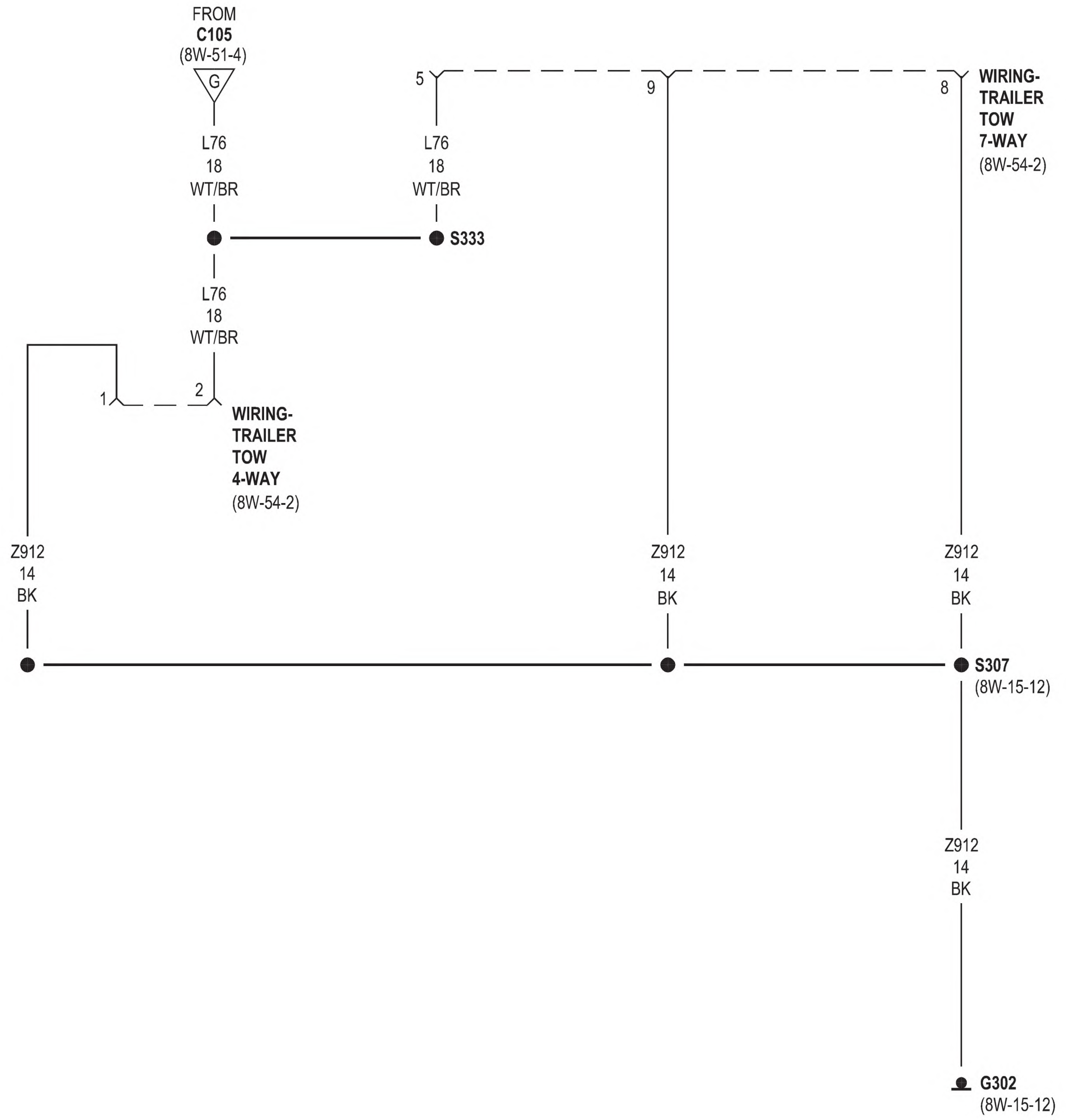

MODULE-
INTEGRATED
POWER
(8W-13-2)
MODULE-
FRONT
CONTROL
(8W-13-12)
(8W-13-19)
(8W-13-21)
LEFT REAR TURN SIGNAL CONTROL
RIGHT REAR TURN SIGNAL CONTROL
BACK-UP LAMP FEED
43 IPM
34 IPM
7 IPM
15 C2
23 C1
8 C2
◆◆◆◆ 2 C2
L63 18 WT/DG
L62 18 WT/OR
L1 18 WT/LG
L1 18 WT/LG
36
35 C105
2 C200
9 C105
L63 18 WT/DG
L62 18 WT/OR
L1 16 WT/LG
L1 18 WT/LG
2 C201
S302
(8W-13-19)
C
TO LAMP-TAIL STOP TURN-LEFT (8W-51-5)
D
TO LAMP-TAIL STOP TURN-RIGHT (8W-51-4)
L1 16 WT/LG
L1 18 WT/LG
L1 18 WT/LG
L1 18 WT/LG
6 C313
3
WIRING-TRAILER TOW 7-WAY (8W-54-2)
L1 18 WT/LG
3 C1
BACK-UP LAMP FEED
MIRROR-INSIDE REARVIEW (8W-49-3)
E
TO LAMP-TAIL STOP TURN-LEFT (8W-51-5)
F
TO LAMP-TAIL STOP TURN-RIGHT (8W-51-4)

◆◆◆◆ TRAILER TOW


BATT A0
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
86
30
RELAY-
PARK
LAMP
(8W-50-2)
85
87
87A
1
FUSE
8
10A
(8W-13-16)
2
1
FUSE
9
10A
(8W-13-16)
2
1
FUSE
10
10A
(8W-13-16)
2
48 IPM
PARK
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-16)
7 C1
L777
20
WT/BR
19 C1
L777
20
WT/BR
◆◆◆◆ 13 C1
L76
18
WT/BR
5 C1
L778
20
WT/DB
37 C105
L777
20
WT/BR
45 C200
L777
20
WT/VT
5 C105
L76
18
WT/BR
38 C105
L778
20
WT/DB
H
TO
LAMP-
TAIL
STOP
TURN-
LEFT
(8W-51-5)
G
TO
S333
(8W-51-6)
1 C201
Q80
20
OR/VT
48 C201
L777
20
WT/VT
9 C310
7 C310
L777
20
WT/VT
Q80
20
OR/VT
Q80
20
OR/VT
FROM
S302
(8W-51-3)
F
L1
18
WT/LG
FROM
S300
(8W-51-2)
B
L50
18
WT/TN
FROM
C105
(8W-51-3)
D
L62
18
WT/OR
3
1
FLIP-UP
GLASS
SWITCH
SENSE
FUSED
PARK
LAMP
RELAY
OUTPUT
GROUND
LAMP-
LICENSE
PLATE
6
5
1
7
BACK-UP
LAMP
TAIL
STOP
LAMP
TURN
SIGNAL
LAMP
LAMP-
TAIL
STOP
TURN-
RIGHT
8 C3
FLIP-UP
GLASS
SWITCH
SENSE
CLUSTER
(8W-40-6)
2
Z800
20
BK
S353
(8W-15-11)
12 C310
Z800
12
BK
G301
(8W-15-11)
8
Z918
16
BK
S304
(8W-15-12)
Z918
16
BK
G302
(8W-15-12)

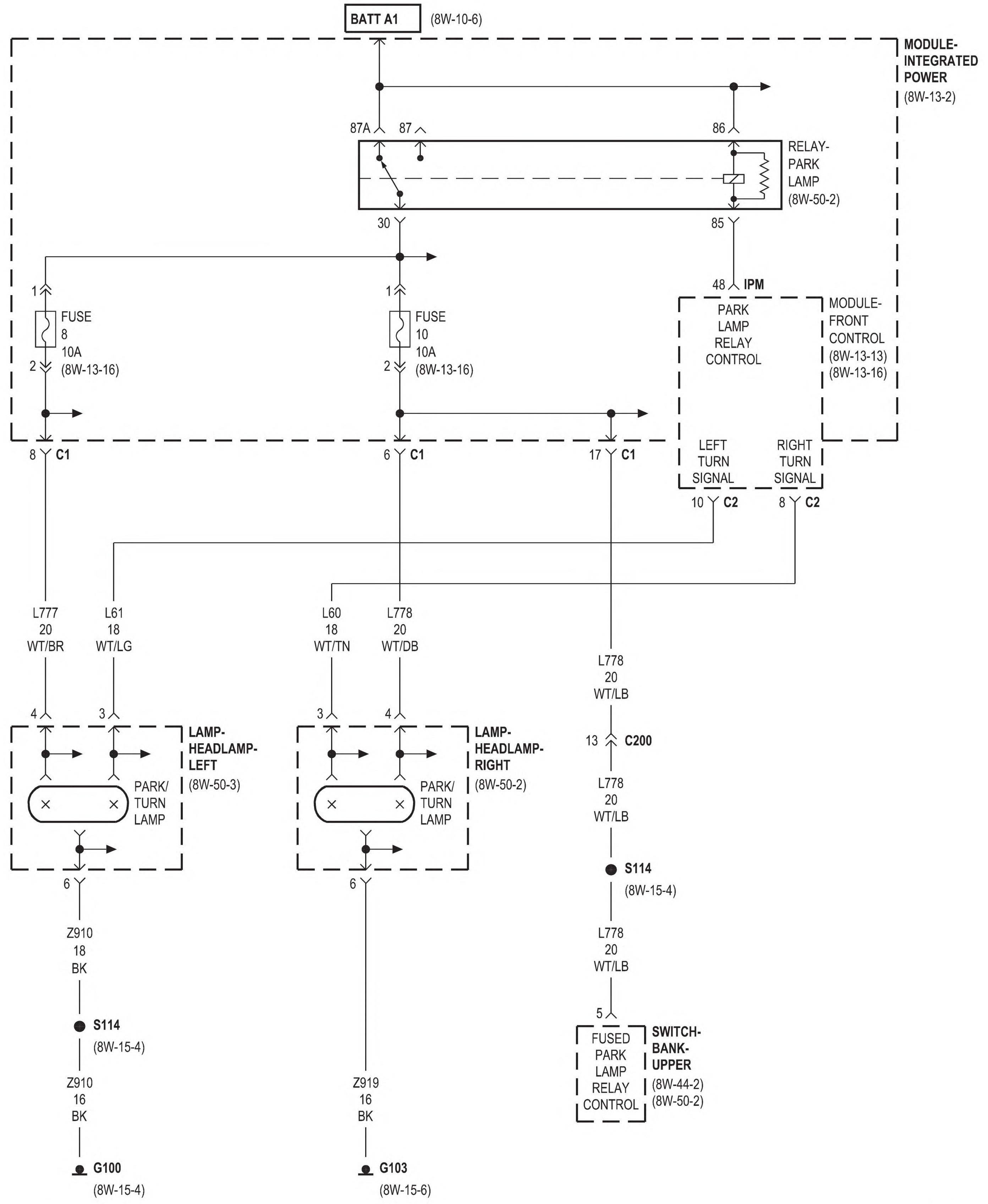
◆◆◆◆ TRAILER TOW

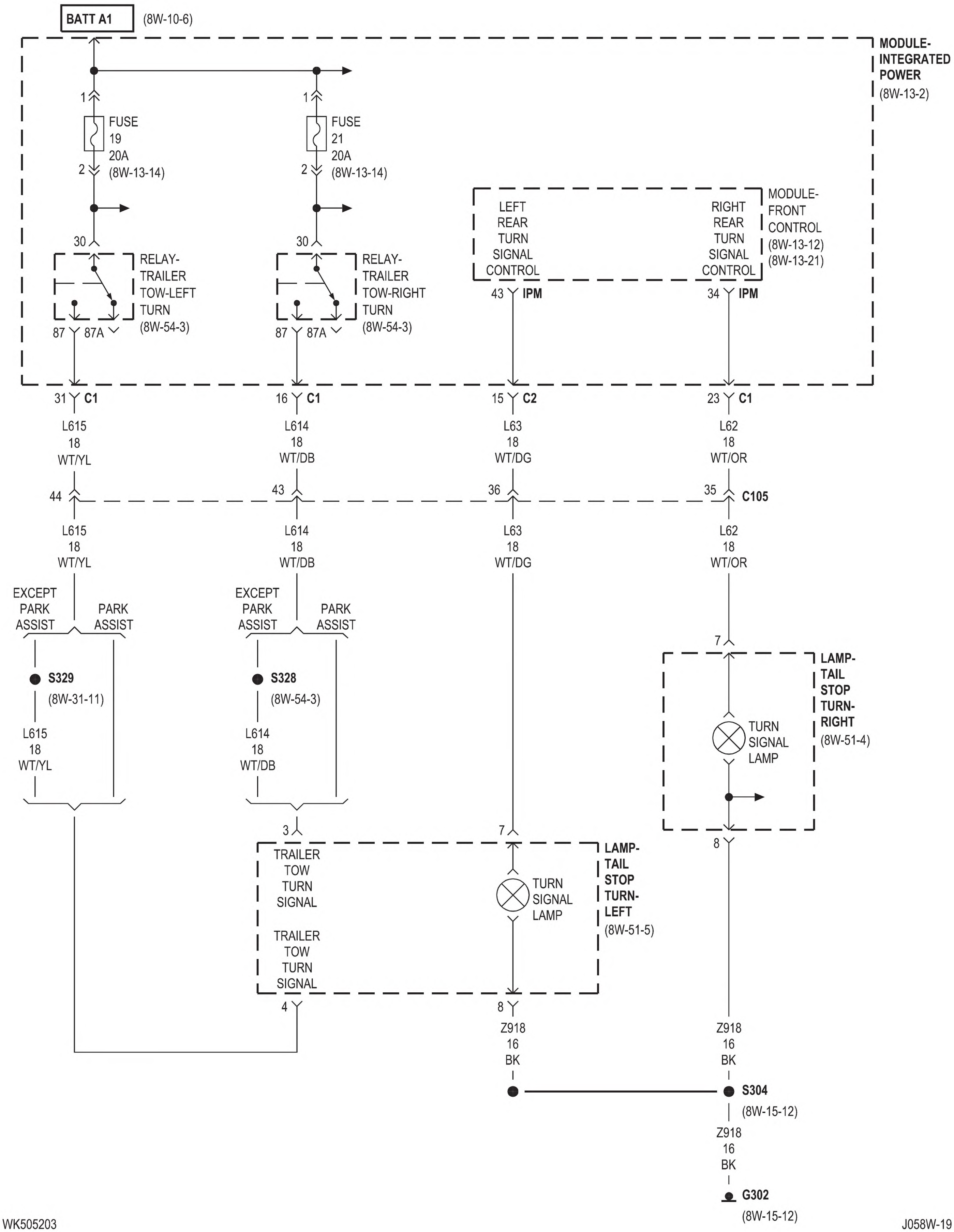

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
19
20A
(8W-13-14)
2
1
FUSE
21
20A
(8W-13-14)
2
30
RELAY-
TRAILER
TOW-LEFT
TURN
(8W-54-3)
87
87A
30
RELAY-
TRAILER
TOW-RIGHT
TURN
(8W-54-3)
87
87A
31 C2
16 C1
L615
18
WT/YL
L614
18
WT/DB
44 C105
43 C105
EXCEPT
PARK
ASSIST
PARK
ASSIST
PARK
ASSIST
EXCEPT
PARK
ASSIST
L615
18
WT/YL
S329
(8W-31-11)
L614
18
WT/DB
S328
(8W-54-3)
FROM
C105
(8W-51-3)
C
FROM
S300
(8W-51-2)
A
FROM
C105
(8W-51-4)
H
FROM
S302
(8W-51-3)
E
L615
18
WT/YL
L614
18
WT/DB
L63
18
WT/DG
L50
18
WT/TN
L777
20
WT/BR
L1
18
WT/LG
4
3
7
1
5
6
TRAILER
TOW
TURN
SIGNAL
TRAILER
TOW
TURN
SIGNAL
TURN
SIGNAL
LAMP
TAIL
STOP
LAMP
BACK-
UP
LAMP
LAMP-
TAIL
STOP
TURN-
LEFT
8
Z918
16
BK
S304
(8W-15-12)
Z918
16
BK
G302
(8W-15-12)


FROM
C105
(8W-51-4)
G
L76
18
WT/BR
5
9
8
WIRING-
TRAILER
TOW
7-WAY
(8W-54-2)
L76
18
WT/BR
L76
18
WT/BR
S333
L76
18
WT/BR
1
2
WIRING-
TRAILER
TOW
4-WAY
(8W-54-2)
Z912
14
BK
Z912
14
BK
Z912
14
BK
S307
(8W-15-12)
Z912
14
BK
G302
(8W-15-12)

8W-52 TURN SIGNALS

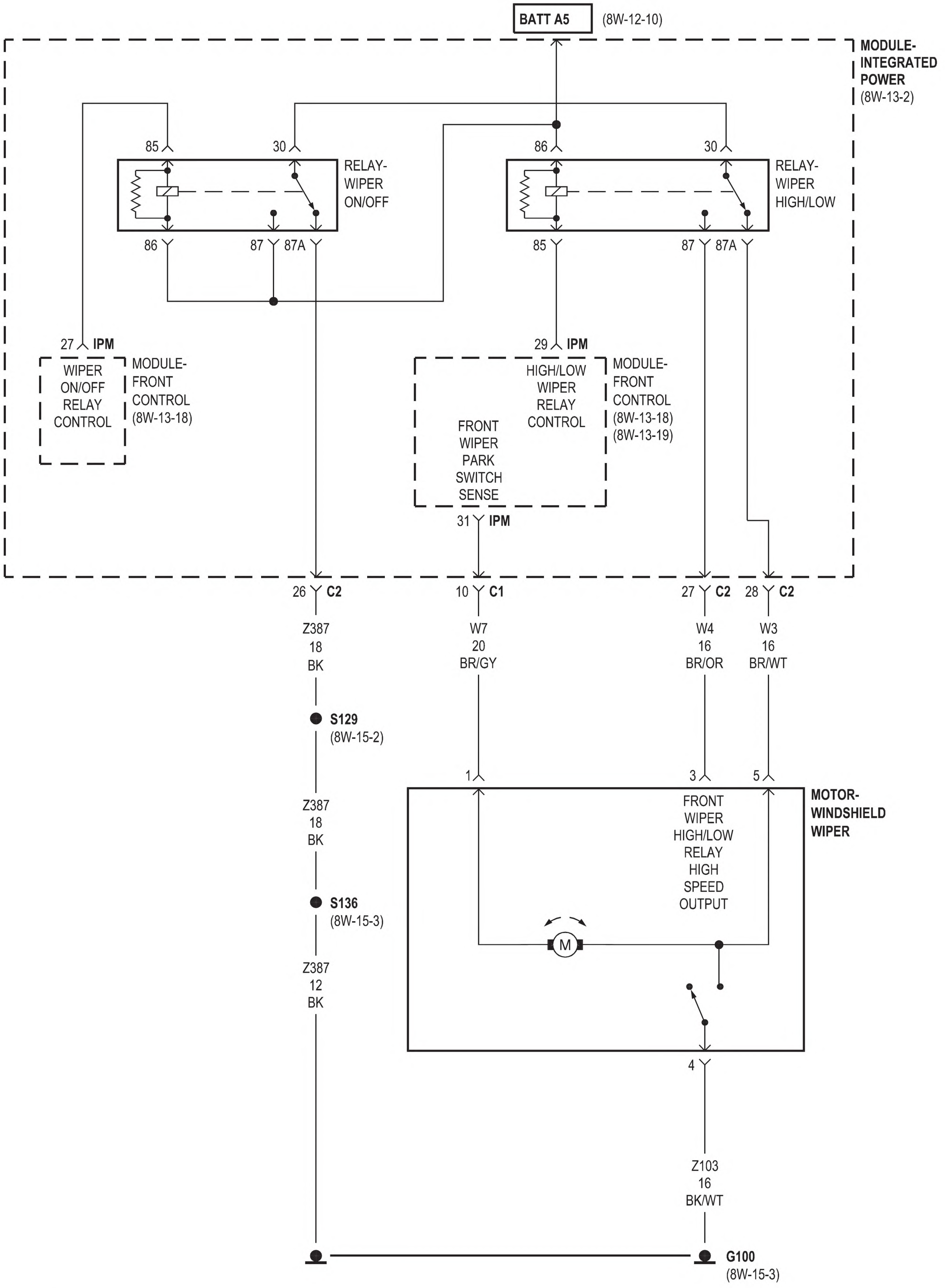
Component	Page
Fuse 8	8W-52-2
Fuse 10	8W-52-2
Fuse 19	8W-52-3
Fuse 21	8W-52-3
G100	8W-52-2
G103	8W-52-2
G302	8W-52-3
Lamp-Headlamp-Left	8W-52-2
Lamp-Headlamp-Right	8W-52-2
Lamp-Tail Stop Turn-Left	8W-52-3
Lamp-Tail Stop Turn-Right	8W-52-3
Module-Front Control	8W-52-2, 3
Module-Integrated Power	8W-52-2, 3
Relay-Park Lamp	8W-52-2
Relay-Trailer Tow-Left Turn	8W-52-3
Relay-Trailer Tow-Right Turn	8W-52-3
Switch-Bank-Upper	8W-52-2

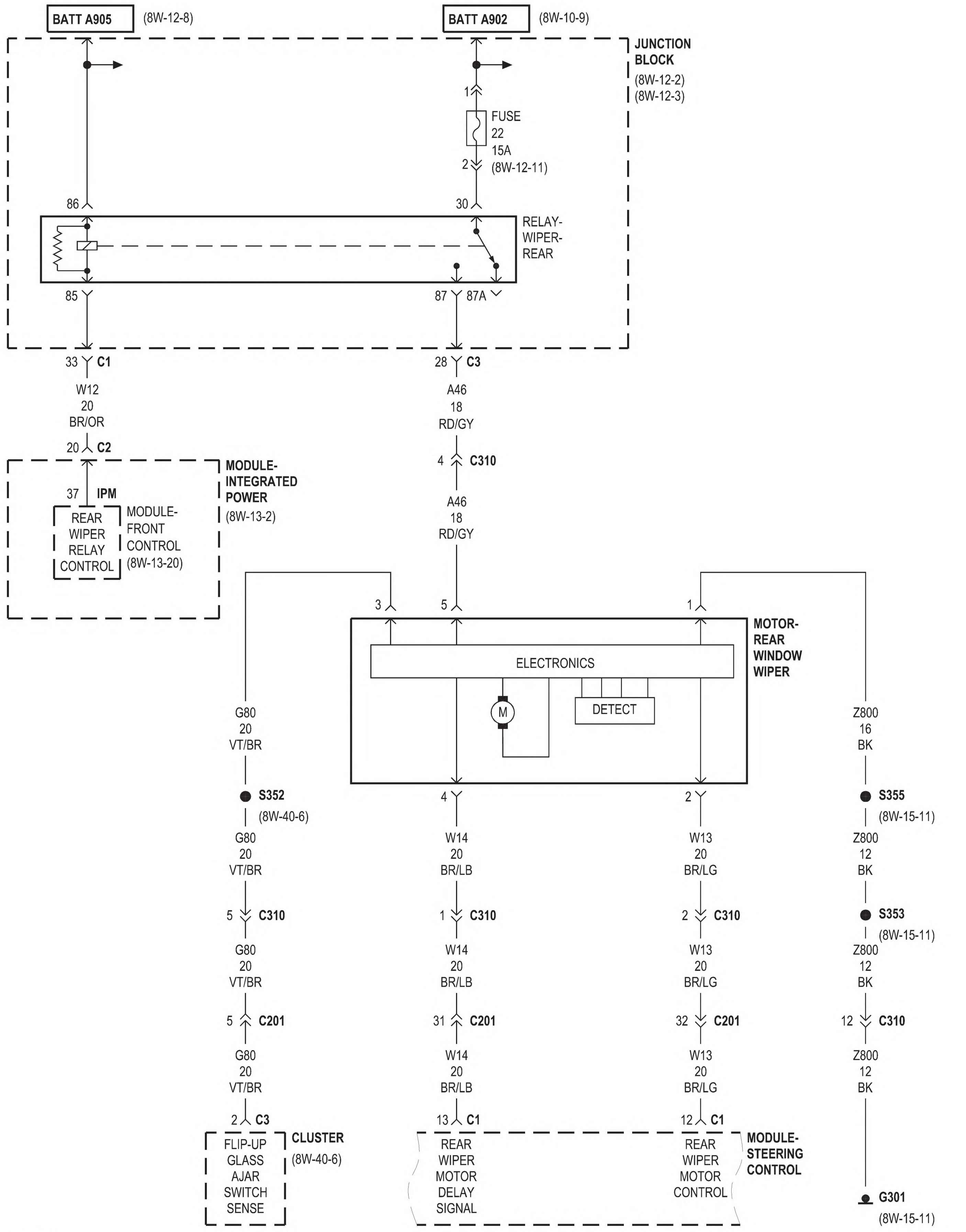

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
87A
87
86
RELAY-
PARK
LAMP
(8W-50-2)
30
85
48 IPM
1
FUSE
8
10A
(8W-13-16)
2
1
FUSE
10
10A
(8W-13-16)
2
PARK
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-13)
(8W-13-16)
LEFT
TURN
SIGNAL
RIGHT
TURN
SIGNAL
8 C1
6 C1
17 C1
10 C2
8 C2
L777
20
WT/BR
L61
18
WT/LG
L60
18
WT/TN
L778
20
WT/DB
L778
20
WT/LB
4
3
3
4
LAMP-
HEADLAMP-
LEFT
(8W-50-3)
PARK/
TURN
LAMP
LAMP-
HEADLAMP-
RIGHT
(8W-50-2)
PARK/
TURN
LAMP
13 C200
L778
20
WT/LB
S114
(8W-15-4)
L778
20
WT/LB
6
6
Z910
18
BK
S114
(8W-15-4)
Z910
16
BK
G100
(8W-15-4)
Z919
16
BK
G103
(8W-15-6)
5
FUSED
PARK
LAMP
RELAY
CONTROL
SWITCH-
BANK-
UPPER
(8W-44-2)
(8W-50-2)

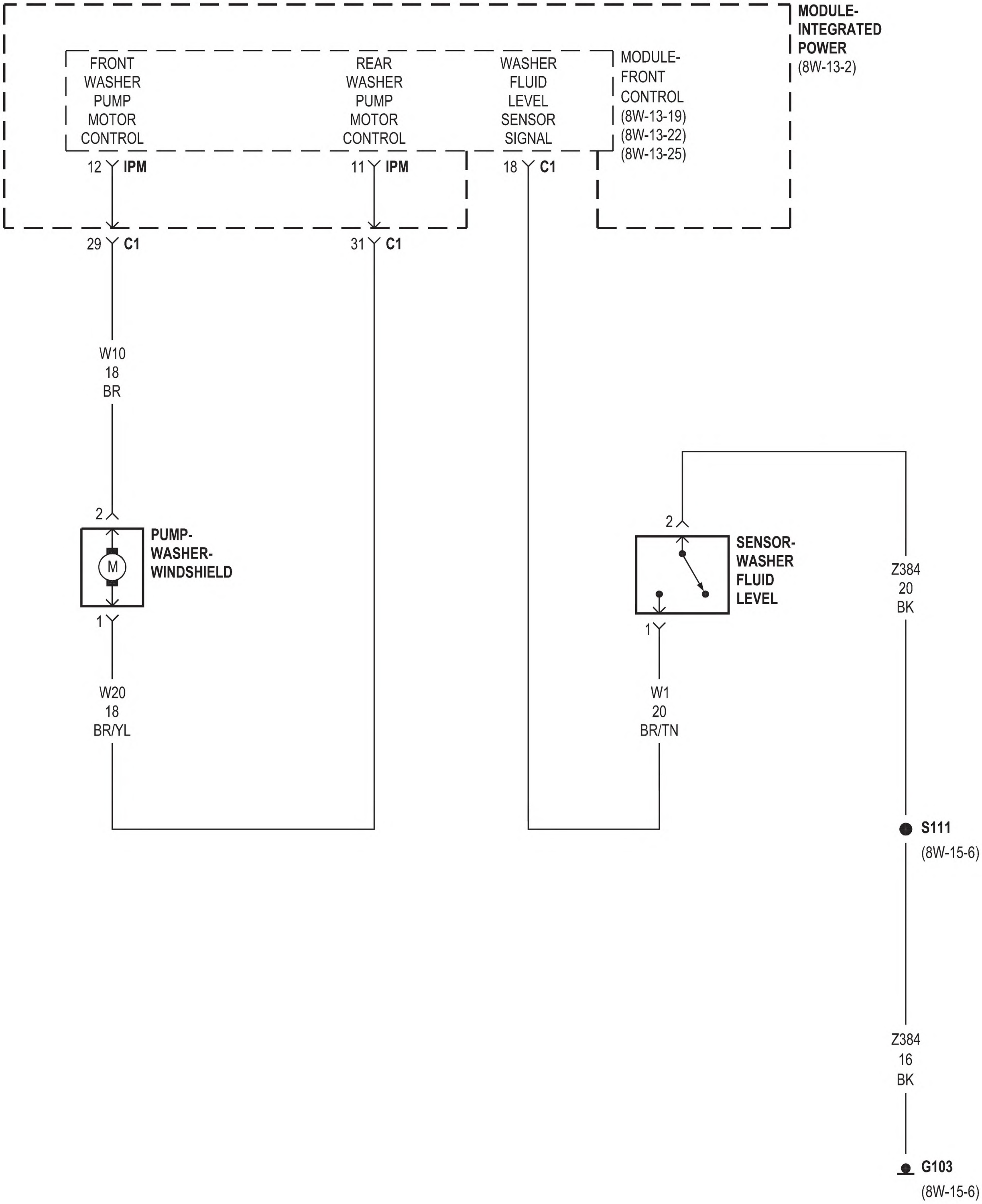

BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
19
20A
(8W-13-14)
2
1
FUSE
21
20A
(8W-13-14)
2
30
RELAY-
TRAILER
TOW-LEFT
TURN
(8W-54-3)
87
87A
30
RELAY-
TRAILER
TOW-RIGHT
TURN
(8W-54-3)
87
87A
LEFT
REAR
TURN
SIGNAL
CONTROL
RIGHT
REAR
TURN
SIGNAL
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-12)
(8W-13-21)
43 IPM
34 IPM
31 C1
L615
18
WT/YL
16 C1
L614
18
WT/DB
15 C2
L63
18
WT/DG
23 C1
L62
18
WT/OR
44
43
36
35
C105
L615
18
WT/YL
L614
18
WT/DB
L63
18
WT/DG
L62
18
WT/OR
EXCEPT
PARK
ASSIST
PARK
ASSIST
S329
(8W-31-11)
L615
18
WT/YL
EXCEPT
PARK
ASSIST
PARK
ASSIST
S328
(8W-54-3)
L614
18
WT/DB
7
LAMP-
TAIL
STOP
TURN-
RIGHT
(8W-51-4)
TURN
SIGNAL
LAMP
8
3
7
TRAILER
TOW
TURN
SIGNAL
TRAILER
TOW
TURN
SIGNAL
TURN
SIGNAL
LAMP
LAMP-
TAIL
STOP
TURN-
LEFT
(8W-51-5)
4
8
Z918
16
BK
Z918
16
BK
S304
(8W-15-12)
Z918
16
BK
G302
(8W-15-12)

8W-53 WIPERS

Component	Page
Cluster	8W-53-3
Fuse 22	8W-53-3
G100	8W-53-2
G103	8W-53-4
G301	8W-53-3
Junction Block	8W-53-3
Module-Front Control	8W-53-2, 3, 4
Module-Integrated Power	8W-53-2, 3, 4
Module-Steering Control	8W-53-3
Motor-Rear Window Wiper	8W-53-3
Motor-Windshield Wiper	8W-53-2
Pump-Washer-Windshield	8W-53-4
Relay-Wiper High/Low	8W-53-2
Relay-Wiper On/Off	8W-53-2
Relay-Wiper-Rear	8W-53-3
Sensor-Washer Fluid Level	8W-53-4

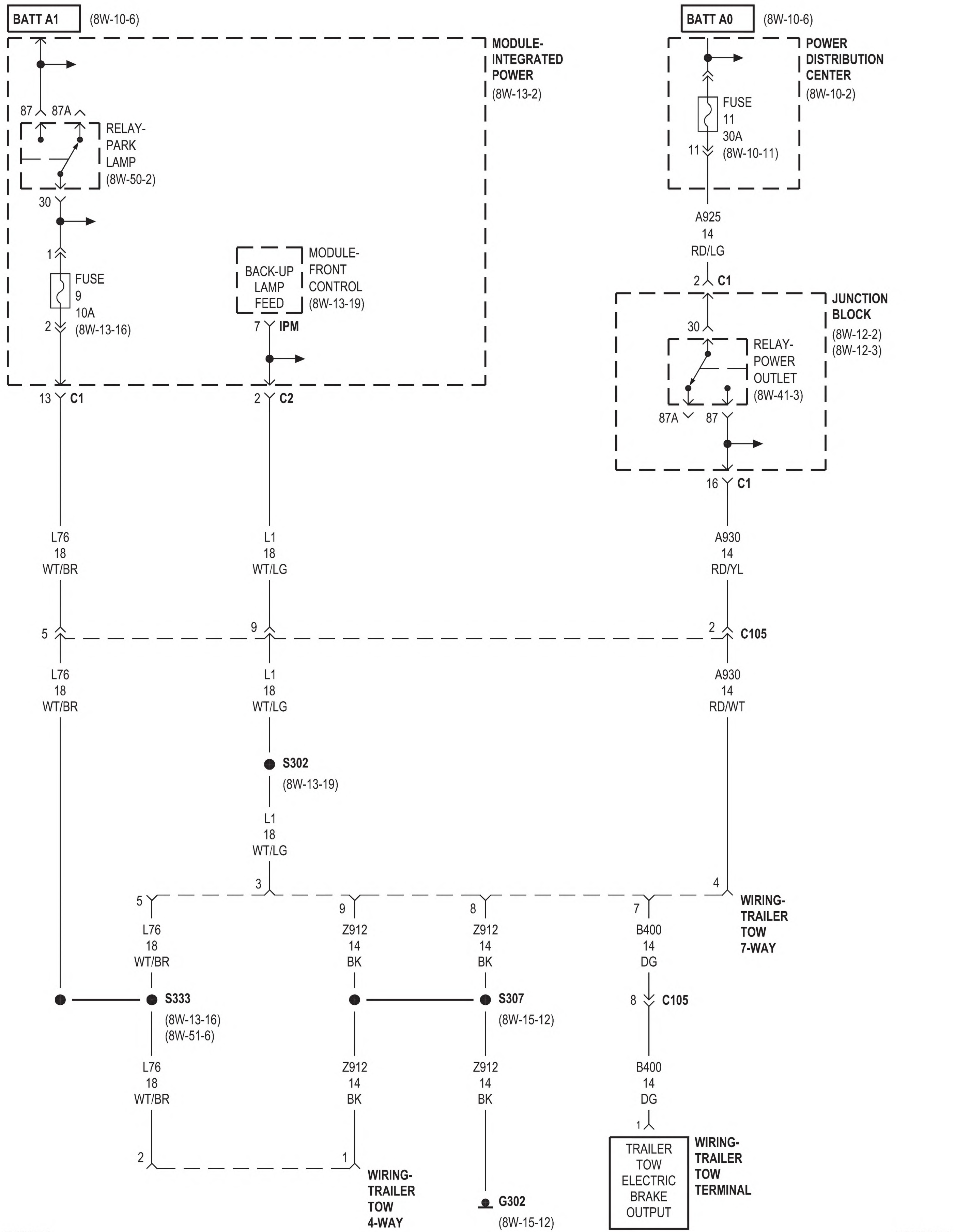

BATT A5
(8W-12-10)
MODULE-
INTEGRATED
POWER
(8W-13-2)
85
30
86
30
RELAY-
WIPER
ON/OFF
RELAY-
WIPER
HIGH/LOW
86
87
87A
85
87
87A
27 IPM
WIPER
ON/OFF
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-18)
29 IPM
HIGH/LOW
WIPER
RELAY
CONTROL
FRONT
WIPER
PARK
SWITCH
SENSE
MODULE-
FRONT
CONTROL
(8W-13-18)
(8W-13-19)
31 IPM
26 C2
10 C1
27 C2
28 C2
Z387
18
BK
W7
20
BR/GY
W4
16
BR/OR
W3
16
BR/WT
S129
(8W-15-2)
Z387
18
BK
S136
(8W-15-3)
Z387
12
BK
1
3
5
MOTOR-
WINDSHIELD
WIPER
FRONT
WIPER
HIGH/LOW
RELAY
HIGH
SPEED
OUTPUT
M
4
Z103
16
BK/WT
G100
(8W-15-3)


BATT A905
(8W-12-8)
BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
22
15A
(8W-12-11)
2
86
30
RELAY-WIPER-REAR
85
87
87A
33
C1
W12
20
BR/OR
20
C2
28
C3
A46
18
RD/GY
4
C310
A46
18
RD/GY
MODULE-INTEGRATED POWER
(8W-13-2)
37
IPM
REAR WIPER RELAY CONTROL
MODULE-FRONT CONTROL
(8W-13-20)
3
5
1
MOTOR-REAR WINDOW WIPER
ELECTRONICS
M
DETECT
G80
20
VT/BR
Z800
16
BK
S352
(8W-40-6)
4
2
S355
(8W-15-11)
G80
20
VT/BR
W14
20
BR/LB
W13
20
BR/LG
Z800
12
BK
5
C310
1
C310
2
C310
S353
(8W-15-11)
G80
20
VT/BR
W14
20
BR/LB
W13
20
BR/LG
Z800
12
BK
5
C201
31
C201
32
C201
12
C310
G80
20
VT/BR
W14
20
BR/LB
W13
20
BR/LG
Z800
12
BK
2
C3
13
C1
12
C1
FLIP-UP GLASS AJAR SWITCH SENSE
CLUSTER
(8W-40-6)
REAR WIPER MOTOR DELAY SIGNAL
REAR WIPER MOTOR CONTROL
MODULE-STEERING CONTROL
G301
(8W-15-11)

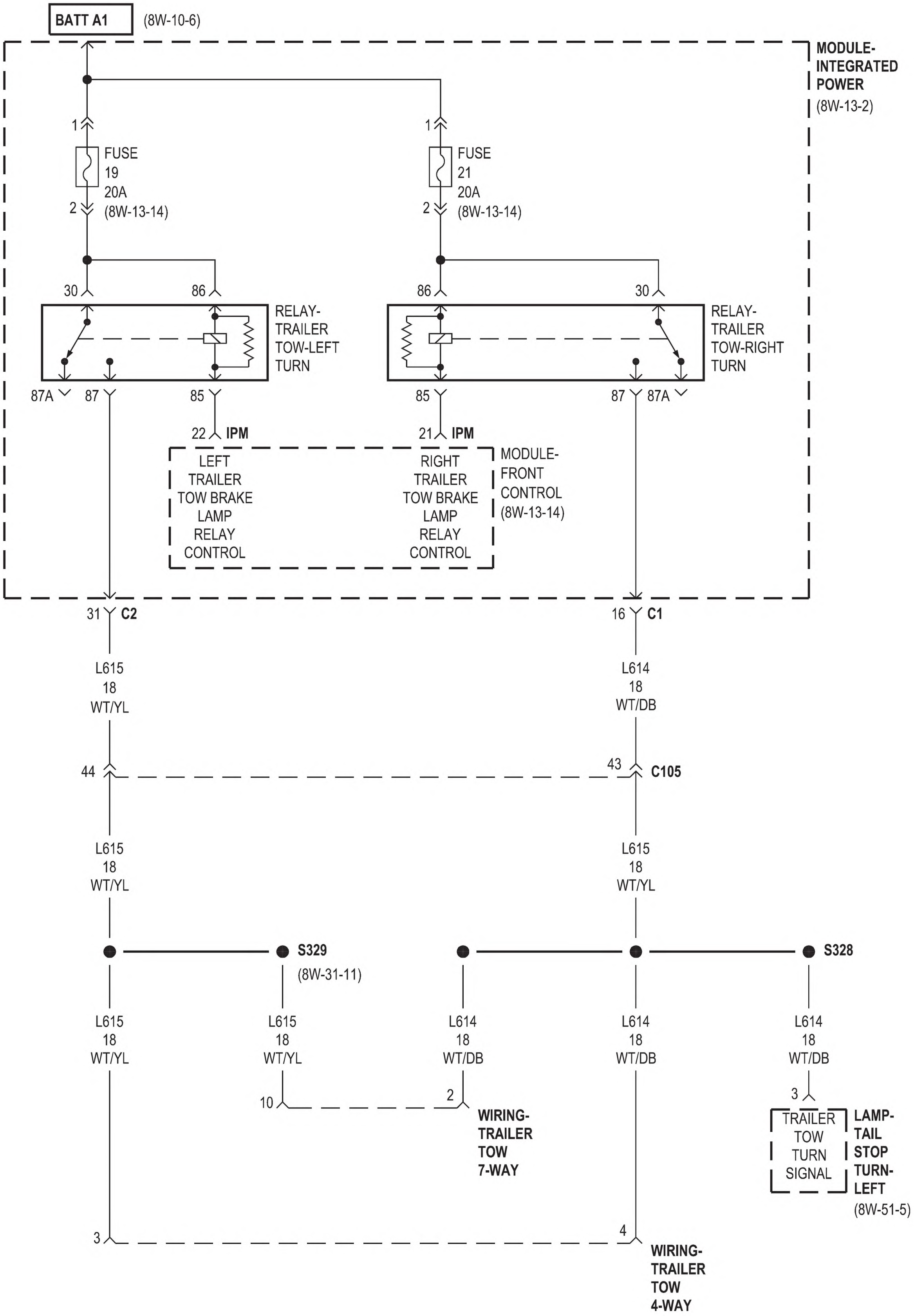

MODULE-
INTEGRATED
POWER
(8W-13-2)
FRONT WASHER PUMP MOTOR CONTROL
REAR WASHER PUMP MOTOR CONTROL
WASHER FLUID LEVEL SENSOR SIGNAL
MODULE-
FRONT
CONTROL
(8W-13-19)
(8W-13-22)
(8W-13-25)
12 IPM
11 IPM
18 C1
29 C1
31 C1
W10
18
BR
2
PUMP-
WASHER-
WINDSHIELD
M
1
W20
18
BR/YL
2
SENSOR-
WASHER
FLUID
LEVEL
1
W1
20
BR/TN
Z384
20
BK
S111
(8W-15-6)
Z384
16
BK
G103
(8W-15-6)

8W-54 TRAILER TOW

Component	Page
Fuse 9	8W-54-2
Fuse 11	8W-54-2
Fuse 19	8W-54-3
Fuse 21	8W-54-3
G302	8W-54-2
Junction Block	8W-54-2
Lamp-Tail Stop Turn-Left	8W-54-3
Module-Front Control	8W-54-2, 3
Module-Integrated Power	8W-54-2, 3
Power Distribution Center	8W-54-2
Relay-Park Lamp	8W-54-2
Relay-Power Outlet	8W-54-2
Relay-Trailer Tow-Left Turn	8W-54-3
Relay-Trailer Tow-Right Turn	8W-54-3
Wiring-Trailer Tow 4-Way	8W-54-2, 3
Wiring-Trailer Tow 7-Way	8W-54-2, 3
Wiring-Trailer Tow Terminal	8W-54-2

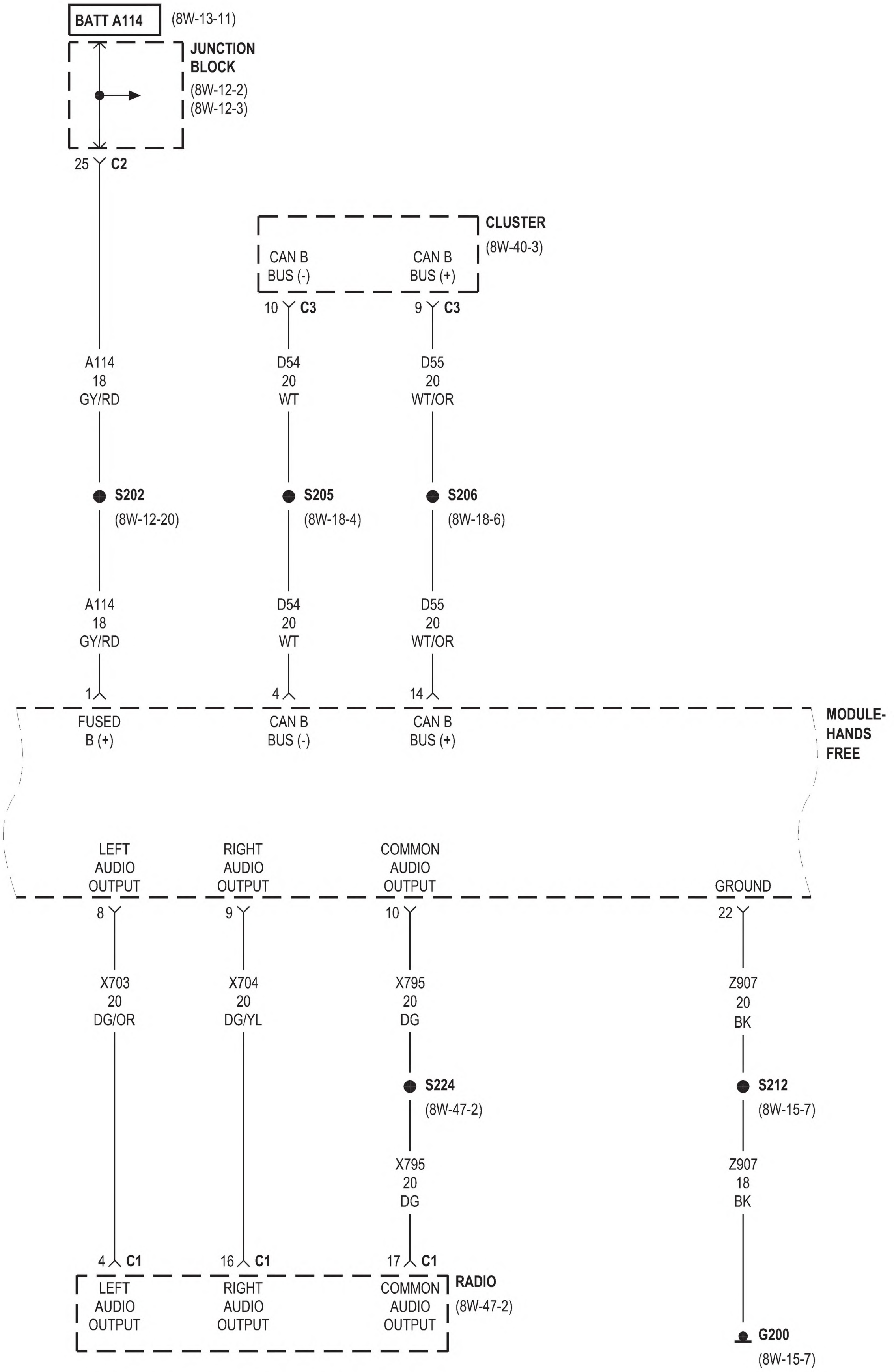

BATT A1
(8W-10-6)
MODULE-INTEGRATED POWER
(8W-13-2)
87
87A
RELAY-PARK LAMP
(8W-50-2)
30
1
FUSE
9
10A
(8W-13-16)
2
BACK-UP LAMP FEED
MODULE-FRONT CONTROL
(8W-13-19)
7
IPM
13
C1
2
C2
BATT A0
(8W-10-6)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
11
30A
(8W-10-11)
11
A925
14
RD/LG
2
C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-POWER OUTLET
(8W-41-3)
87A
87
16
C1
L76
18
WT/BR
L1
18
WT/LG
A930
14
RD/YL
5
9
2
C105
L76
18
WT/BR
L1
18
WT/LG
A930
14
RD/WT
S302
(8W-13-19)
L1
18
WT/LG
5
3
9
8
7
4
WIRING-TRAILER TOW 7-WAY
L76
18
WT/BR
Z912
14
BK
Z912
14
BK
B400
14
DG
S333
(8W-13-16)
(8W-51-6)
S307
(8W-15-12)
8
C105
L76
18
WT/BR
Z912
14
BK
Z912
14
BK
B400
14
DG
2
1
WIRING-TRAILER TOW 4-WAY
G302
(8W-15-12)
1
TRAILER TOW ELECTRIC BRAKE OUTPUT
WIRING-TRAILER TOW TERMINAL

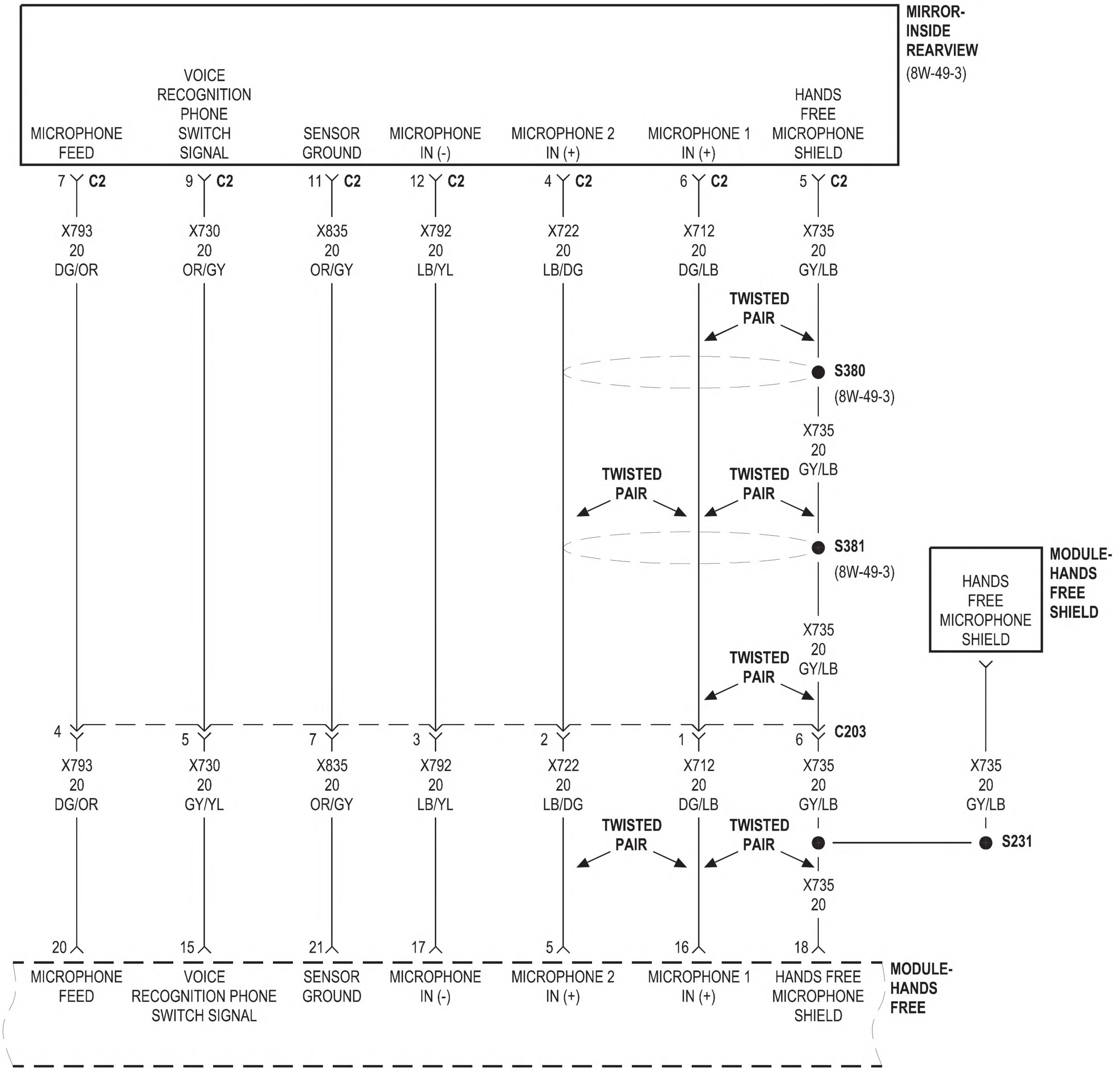
WK505402


BATT A1
(8W-10-6)
MODULE-
INTEGRATED
POWER
(8W-13-2)
1
FUSE
19
20A
2
(8W-13-14)
1
FUSE
21
20A
2
(8W-13-14)
30
86
RELAY-
TRAILER
TOW-LEFT
TURN
86
30
RELAY-
TRAILER
TOW-RIGHT
TURN
87A
87
85
85
87
87A
22 IPM
21 IPM
LEFT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
RIGHT
TRAILER
TOW BRAKE
LAMP
RELAY
CONTROL
MODULE-
FRONT
CONTROL
(8W-13-14)
31 C2
16 C1
L615
18
WT/YL
L614
18
WT/DB
44
43 C105
L615
18
WT/YL
L615
18
WT/YL
S329
(8W-31-11)
S328
L615
18
WT/YL
L615
18
WT/YL
L614
18
WT/DB
L614
18
WT/DB
L614
18
WT/DB
10
2
WIRING-
TRAILER
TOW
7-WAY
3
TRAILER
TOW
TURN
SIGNAL
LAMP-
TAIL
STOP
TURN-
LEFT
(8W-51-5)
3
4
WIRING-
TRAILER
TOW
4-WAY

8W-55 NAVIGATION/TELECOMMUNICATIONS

Component	Page
Cluster	8W-55-2
G200	8W-55-2
Junction Block	8W-55-2
Mirror-Inside Rearview	8W-55-3
Module-Hands Free	8W-55-2, 3
Module-Hands Free Shield	8W-55-3
Radio	8W-55-2

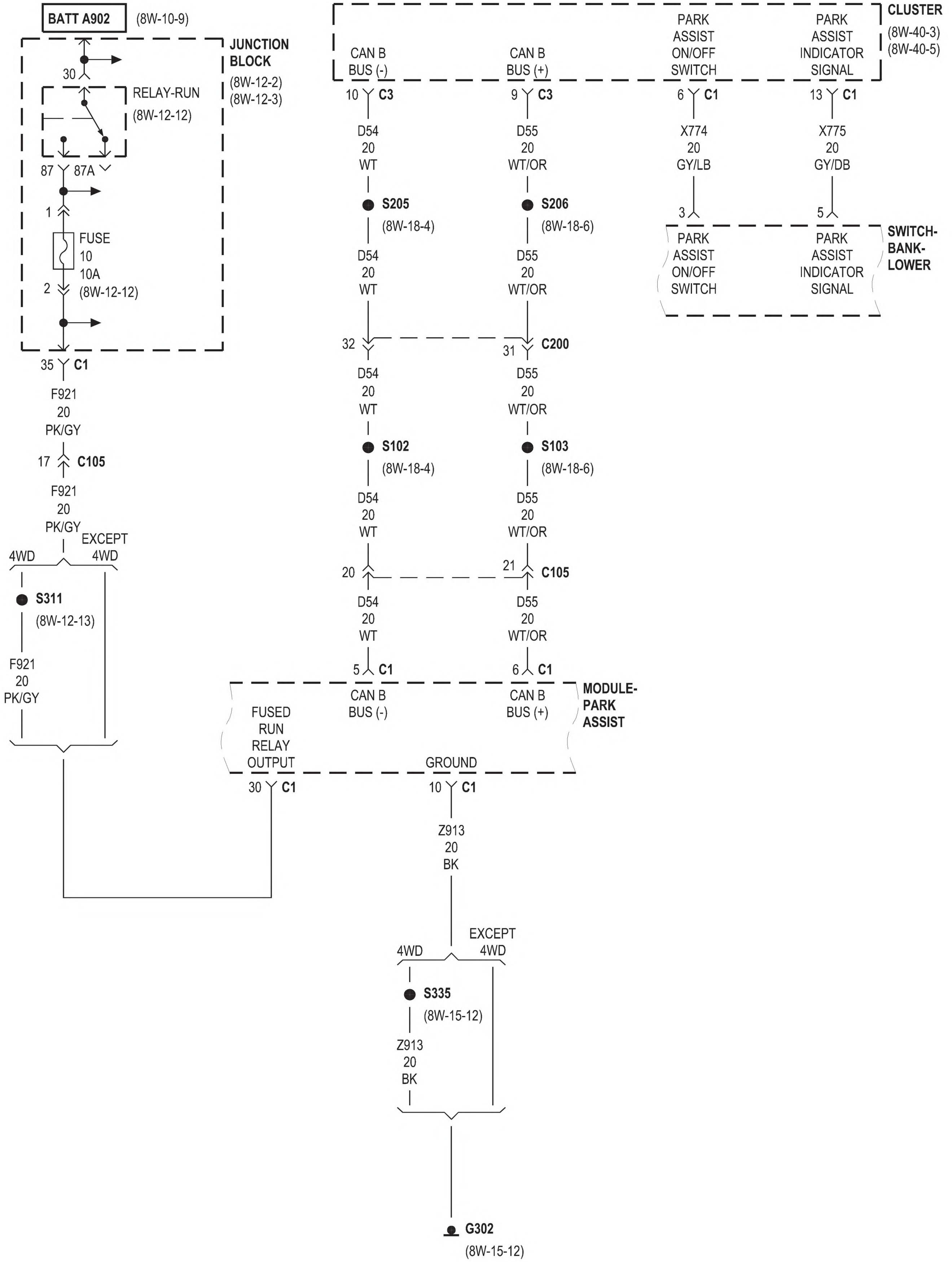

BATT A114
(8W-13-11)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
25 C2
CLUSTER
(8W-40-3)
CAN B BUS (-)
CAN B BUS (+)
10 C3
9 C3
A114 18 GY/RD
D54 20 WT
D55 20 WT/OR
S202 (8W-12-20)
S205 (8W-18-4)
S206 (8W-18-6)
A114 18 GY/RD
D54 20 WT
D55 20 WT/OR
1
4
14
FUSED B (+)
CAN B BUS (-)
CAN B BUS (+)
MODULE-HANDS FREE
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT
GROUND
8
9
10
22
X703 20 DG/OR
X704 20 DG/YL
X795 20 DG
Z907 20 BK
S224 (8W-47-2)
S212 (8W-15-7)
X795 20 DG
Z907 18 BK
4 C1
16 C1
17 C1
LEFT AUDIO OUTPUT
RIGHT AUDIO OUTPUT
COMMON AUDIO OUTPUT
RADIO
(8W-47-2)
G200
(8W-15-7)


MIRROR-INSIDE REARVIEW
(8W-49-3)
MICROPHONE FEED
VOICE RECOGNITION PHONE SWITCH SIGNAL
SENSOR GROUND
MICROPHONE IN (-)
MICROPHONE 2 IN (+)
MICROPHONE 1 IN (+)
HANDS FREE MICROPHONE SHIELD
7 C2
9 C2
11 C2
12 C2
4 C2
6 C2
5 C2
X793 20 DG/OR
X730 20 OR/GY
X835 20 OR/GY
X792 20 LB/YL
X722 20 LB/DG
X712 20 DG/LB
X735 20 GY/LB
TWISTED PAIR
S380
(8W-49-3)
X735 20 GY/LB
TWISTED PAIR
TWISTED PAIR
S381
(8W-49-3)
X735 20 GY/LB
TWISTED PAIR
MODULE-HANDS FREE SHIELD
HANDS FREE MICROPHONE SHIELD
4
5
7
3
2
1
6
C203
X793 20 DG/OR
X730 20 GY/YL
X835 20 OR/GY
X792 20 LB/YL
X722 20 LB/DG
X712 20 DG/LB
X735 20 GY/LB
X735 20 GY/LB
TWISTED PAIR
TWISTED PAIR
S231
X735 20
20
15
21
17
5
16
18
MICROPHONE FEED
VOICE RECOGNITION PHONE SWITCH SIGNAL
SENSOR GROUND
MICROPHONE IN (-)
MICROPHONE 2 IN (+)
MICROPHONE 1 IN (+)
HANDS FREE MICROPHONE SHIELD
MODULE-HANDS FREE

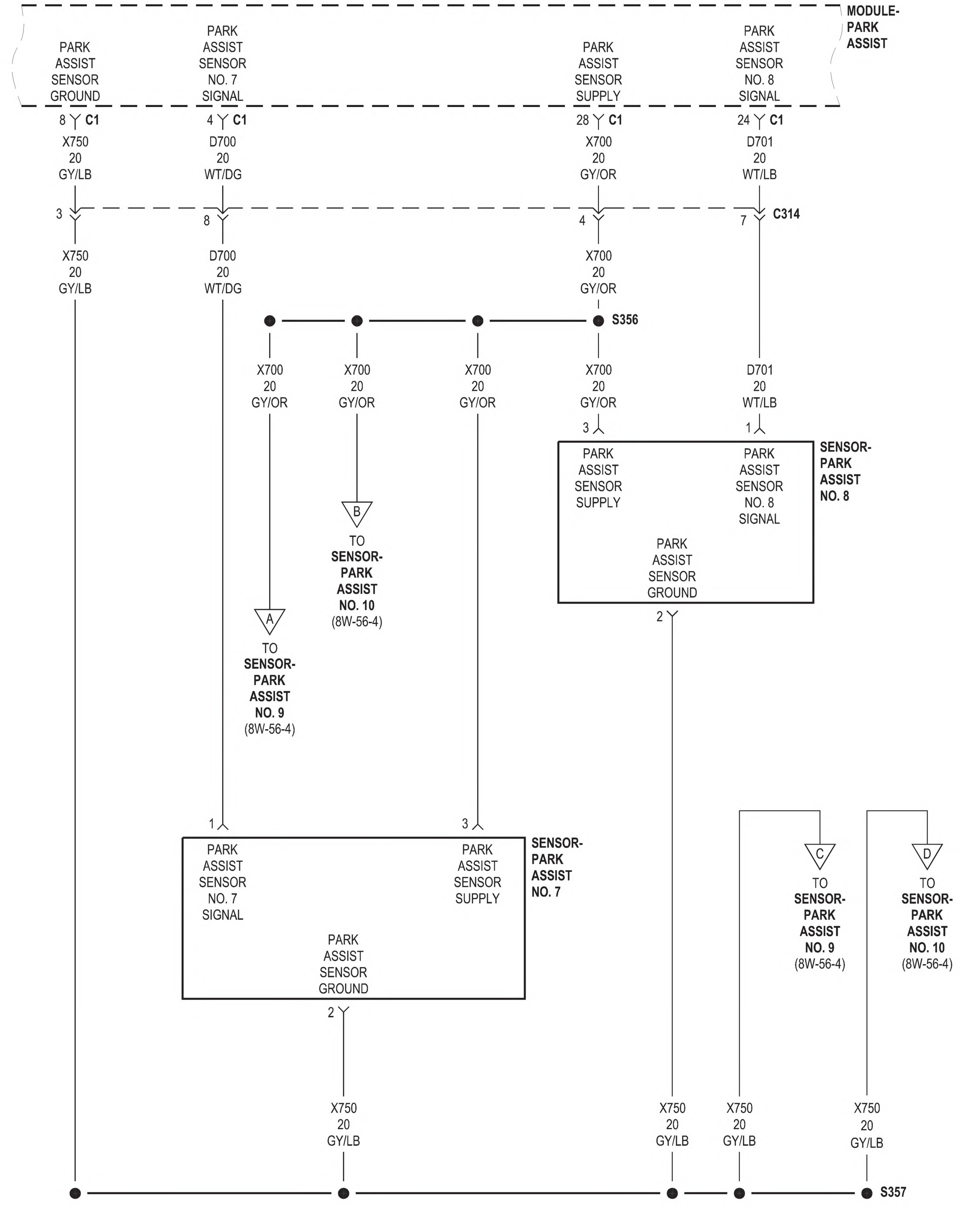
8W-56 CONVENIENCE SYSTEMS

Component	Page
Cluster	8W-56-2
Fuse 10	8W-56-2, 6
Fuse 14	8W-56-6
G200	8W-56-6
G302	8W-56-2
Junction Block	8W-56-2, 6
Module-Front Control	8W-56-6
Module-Integrated Power	8W-56-6
Module-Memory Seat	8W-56-7
Module-Park Assist	8W-56-2, 3, 4, 5
Module-Park Display-Rear	8W-56-5
Motor-Adjustable Pedals	8W-56-6, 7
Relay-Adjustable Pedals	8W-56-6
Relay-Run	8W-56-2, 6
Sensor-Park Assist No. 7	8W-56-3
Sensor-Park Assist No. 8	8W-56-3
Sensor-Park Assist No. 9	8W-56-3, 4
Sensor-Park Assist No. 10	8W-56-3, 4
Switch-Bank-Lower	8W-56-2, 6
Switch-Bank-Upper	8W-56-6

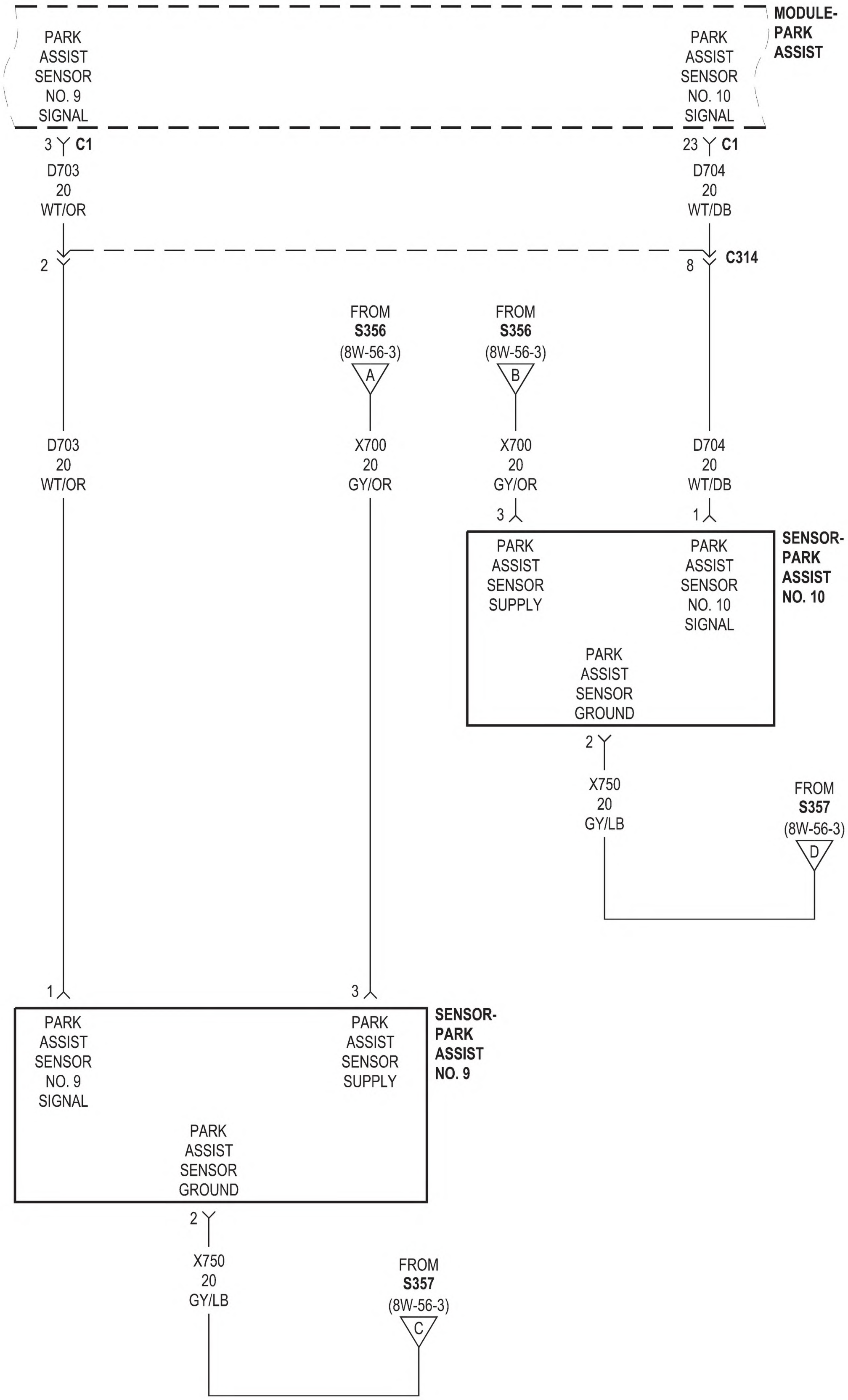
PARK ASSIST


BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
87
87A
1
FUSE
10
10A
(8W-12-12)
2
35 C1
F921
20
PK/GY
17 C105
F921
20
PK/GY
4WD
EXCEPT 4WD
S311
(8W-12-13)
F921
20
PK/GY
CLUSTER
(8W-40-3)
(8W-40-5)
CAN B BUS (-)
CAN B BUS (+)
PARK ASSIST ON/OFF SWITCH
PARK ASSIST INDICATOR SIGNAL
10 C3
9 C3
6 C1
13 C1
D54
20
WT
D55
20
WT/OR
X774
20
GY/LB
X775
20
GY/DB
S205
(8W-18-4)
S206
(8W-18-6)
3
5
SWITCH-BANK-LOWER
PARK ASSIST ON/OFF SWITCH
PARK ASSIST INDICATOR SIGNAL
D54
20
WT
D55
20
WT/OR
32
31
C200
D54
20
WT
D55
20
WT/OR
S102
(8W-18-4)
S103
(8W-18-6)
D54
20
WT
D55
20
WT/OR
20
21
C105
D54
20
WT
D55
20
WT/OR
5 C1
6 C1
MODULE-PARK ASSIST
CAN B BUS (-)
CAN B BUS (+)
FUSED RUN RELAY OUTPUT
GROUND
30 C1
10 C1
Z913
20
BK
4WD
EXCEPT 4WD
S335
(8W-15-12)
Z913
20
BK
G302
(8W-15-12)

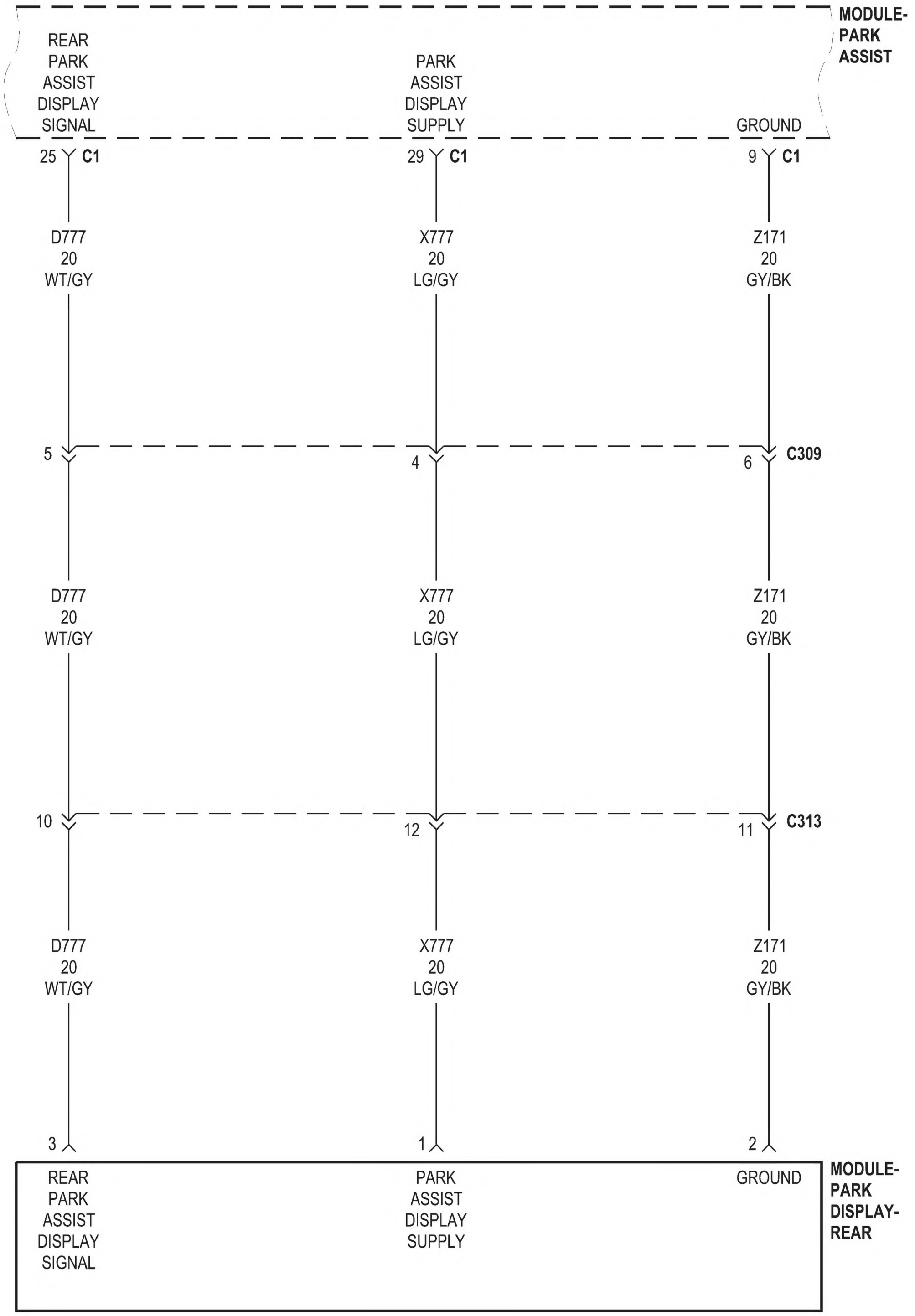
PARK ASSIST


MODULE-PARK ASSIST
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR NO. 7 SIGNAL
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR NO. 8 SIGNAL
8 C1
4 C1
28 C1
24 C1
X750 20 GY/LB
D700 20 WT/DG
X700 20 GY/OR
D701 20 WT/LB
3
8
4
7
C314
S356
SENSOR-PARK ASSIST NO. 8
3
1
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR NO. 8 SIGNAL
PARK ASSIST SENSOR GROUND
2
B
TO SENSOR-PARK ASSIST NO. 10 (8W-56-4)
A
TO SENSOR-PARK ASSIST NO. 9 (8W-56-4)
SENSOR-PARK ASSIST NO. 7
1
3
PARK ASSIST SENSOR NO. 7 SIGNAL
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR GROUND
2
C
TO SENSOR-PARK ASSIST NO. 9 (8W-56-4)
D
TO SENSOR-PARK ASSIST NO. 10 (8W-56-4)
S357

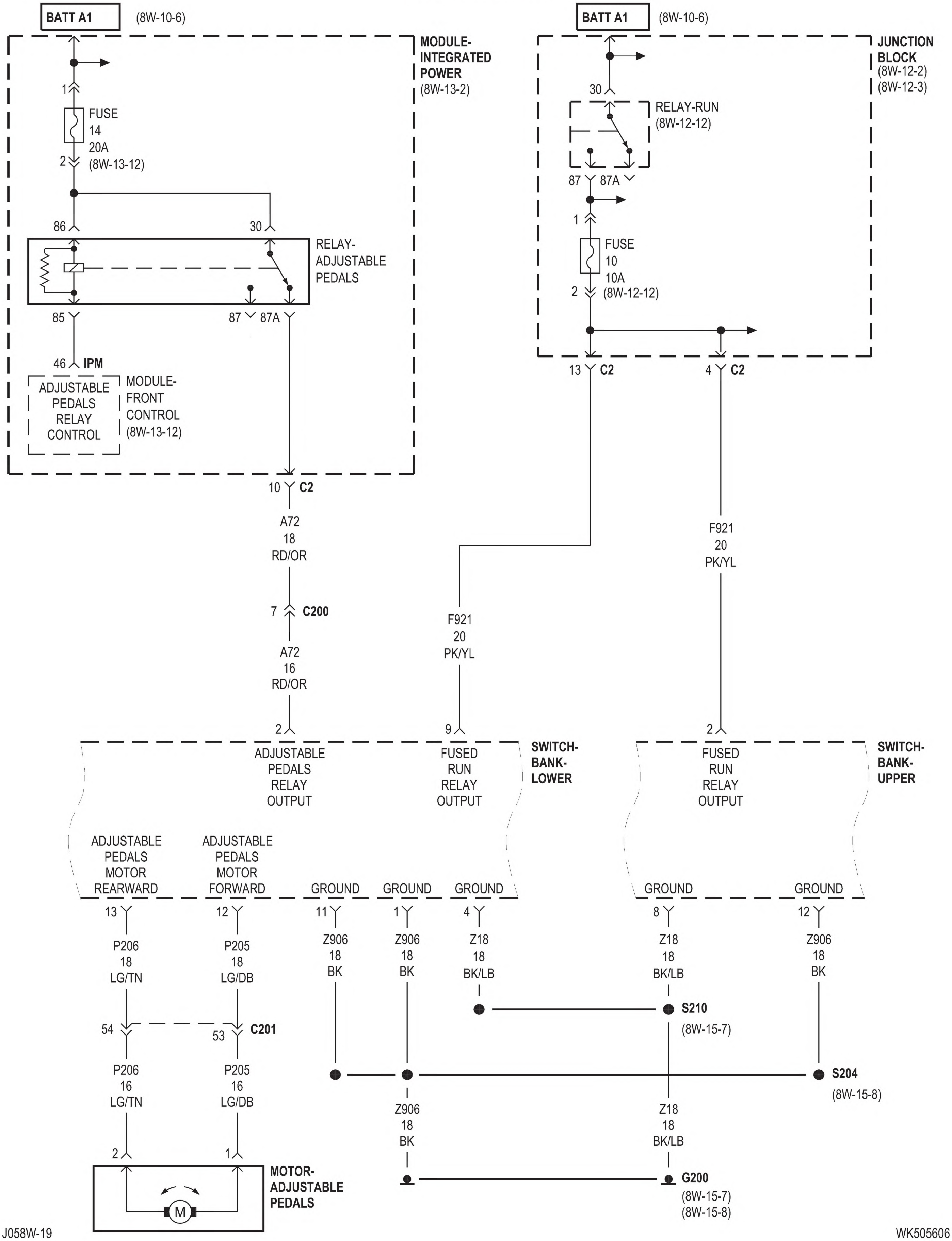
PARK ASSIST

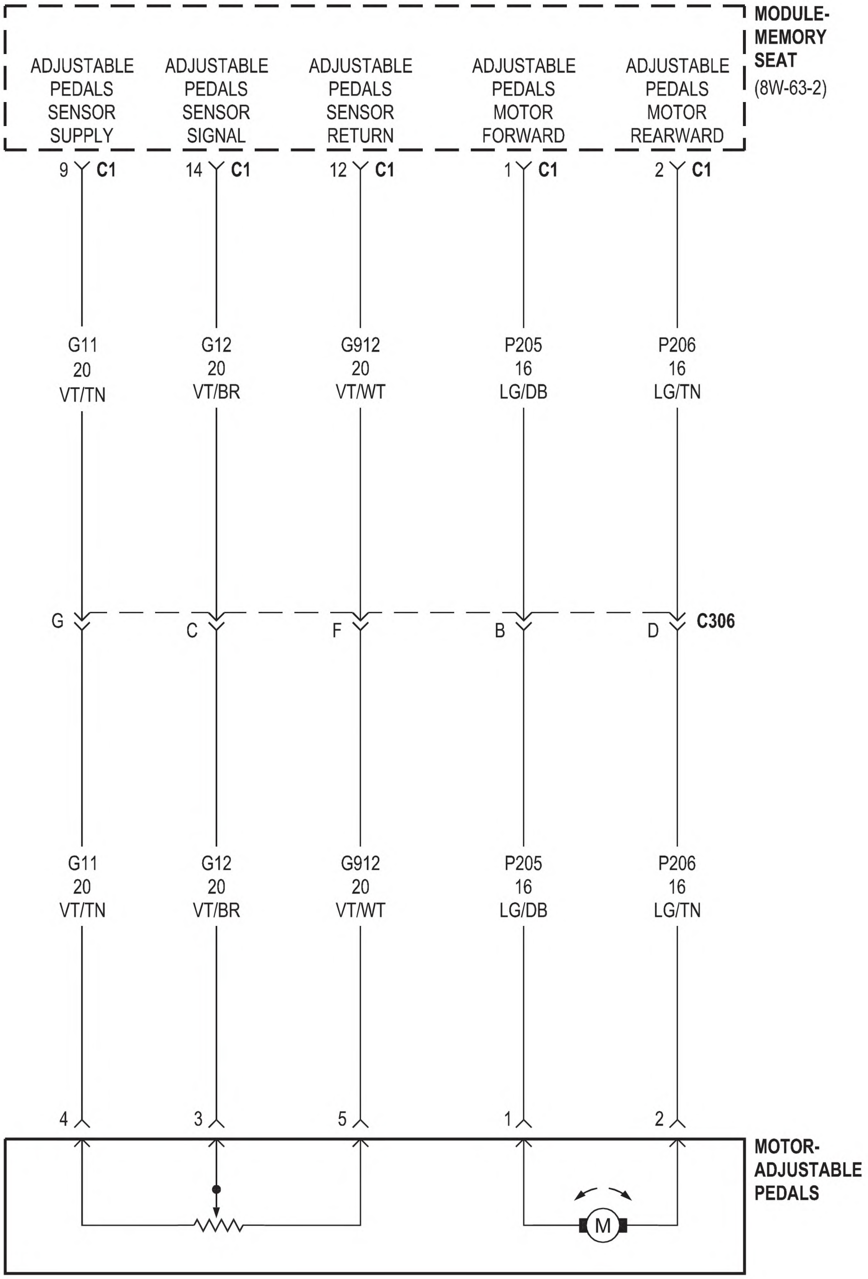

MODULE-
PARK
ASSIST
PARK ASSIST SENSOR NO. 9 SIGNAL
PARK ASSIST SENSOR NO. 10 SIGNAL
3 C1
23 C1
D703
20
WT/OR
D704
20
WT/DB
2
8
C314
FROM S356 (8W-56-3)
A
FROM S356 (8W-56-3)
B
D703
20
WT/OR
X700
20
GY/OR
X700
20
GY/OR
D704
20
WT/DB
3
1
SENSOR-
PARK
ASSIST
NO. 10
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR NO. 10 SIGNAL
PARK ASSIST SENSOR GROUND
2
X750
20
GY/LB
FROM S357 (8W-56-3)
D
1
3
SENSOR-
PARK
ASSIST
NO. 9
PARK ASSIST SENSOR NO. 9 SIGNAL
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR GROUND
2
X750
20
GY/LB
FROM S357 (8W-56-3)
C

PARK ASSIST


MODULE-
PARK
ASSIST
REAR
PARK
ASSIST
DISPLAY
SIGNAL
PARK
ASSIST
DISPLAY
SUPPLY
GROUND
25 C1
29 C1
9 C1
D777
20
WT/GY
X777
20
LG/GY
Z171
20
GY/BK
5
4
6
C309
D777
20
WT/GY
X777
20
LG/GY
Z171
20
GY/BK
10
12
11
C313
D777
20
WT/GY
X777
20
LG/GY
Z171
20
GY/BK
3
1
2
REAR
PARK
ASSIST
DISPLAY
SIGNAL
PARK
ASSIST
DISPLAY
SUPPLY
GROUND
MODULE-
PARK
DISPLAY-
REAR

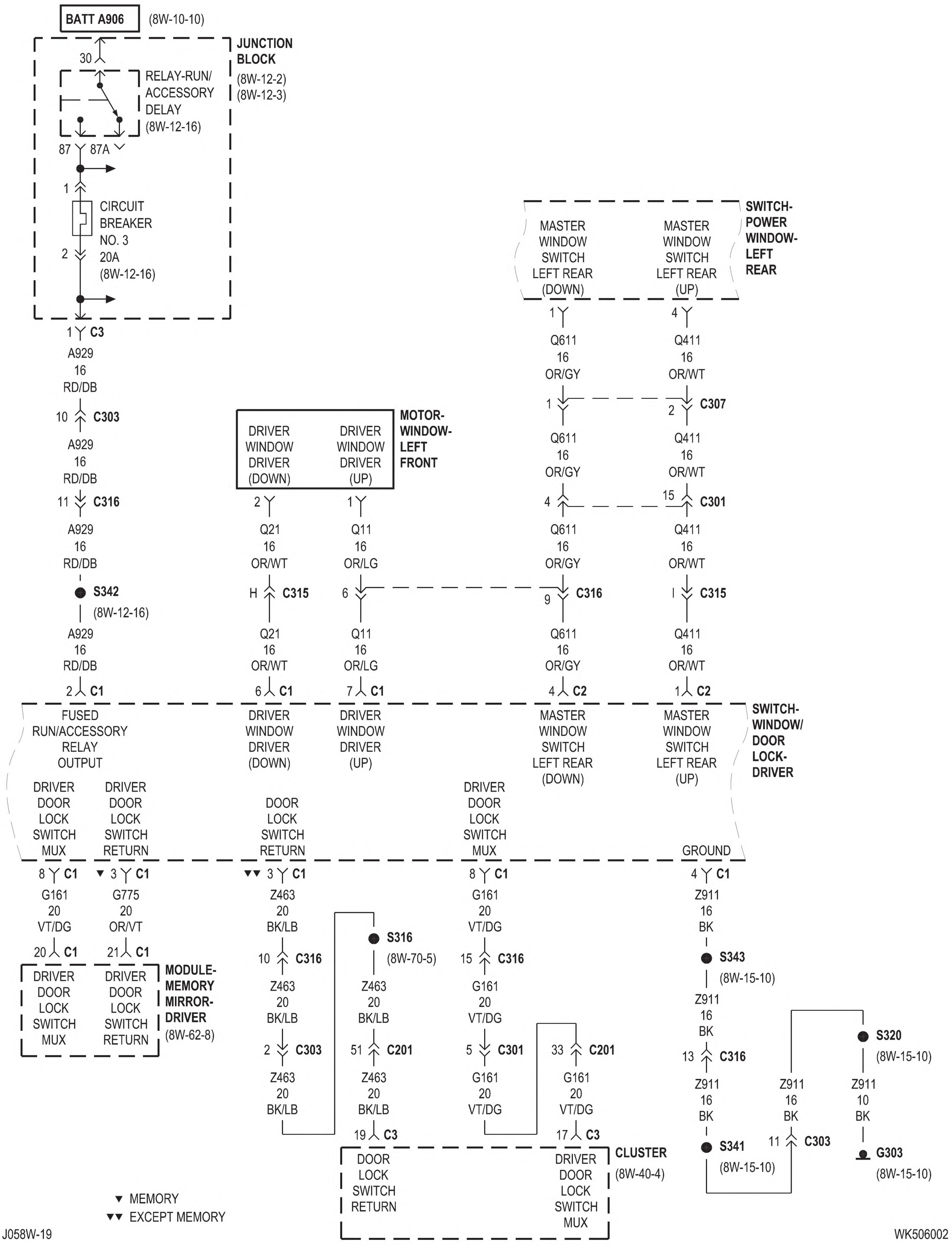
EXCEPT MEMORY

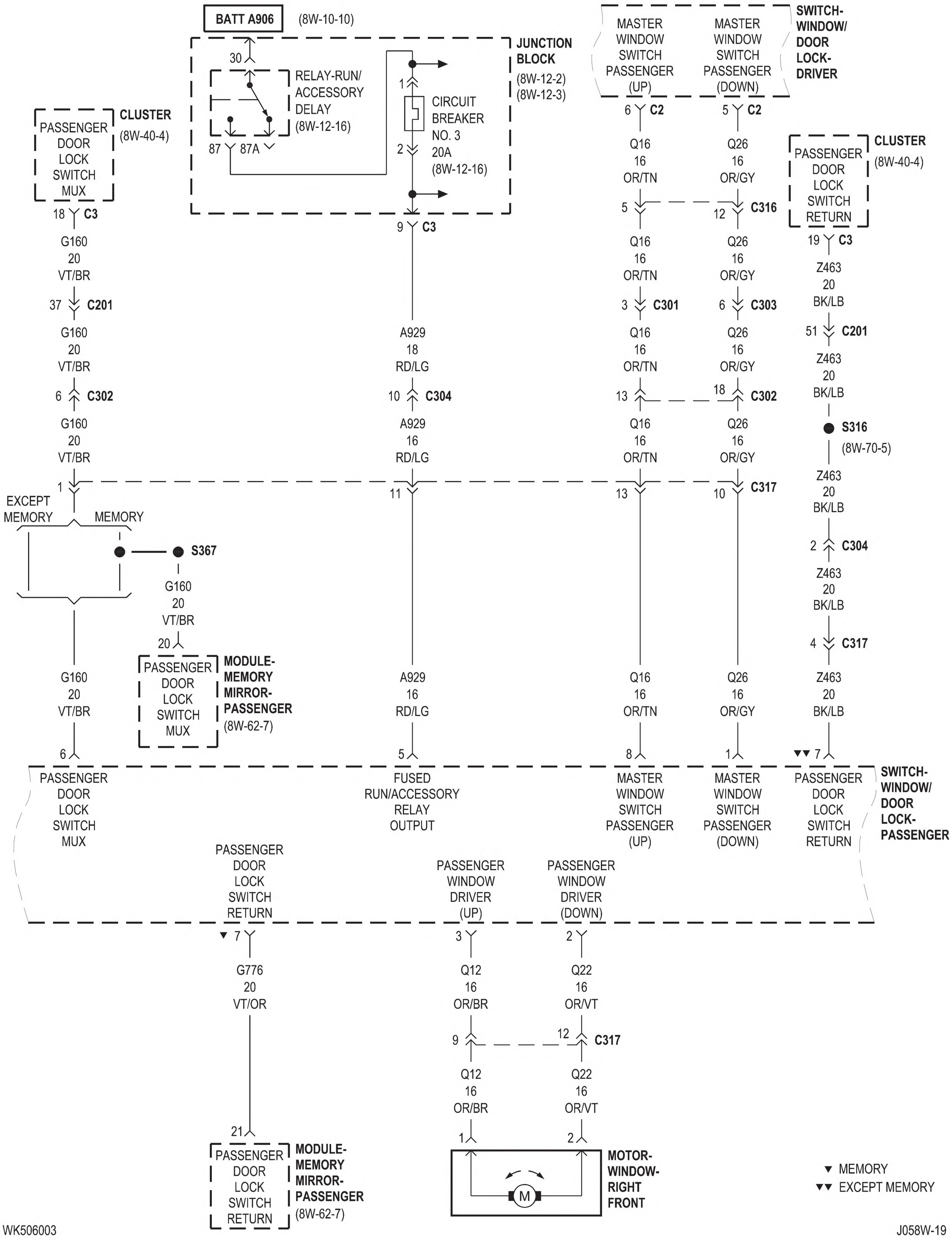

BATT A1
(8W-10-6)
MODULE-INTEGRATED POWER
(8W-13-2)
1
FUSE
14
20A
2
(8W-13-12)
86
30
RELAY-ADJUSTABLE PEDALS
85
87
87A
46
IPM
ADJUSTABLE PEDALS RELAY CONTROL
MODULE-FRONT CONTROL
(8W-13-12)
10
C2
A72
18
RD/OR
7
C200
A72
16
RD/OR
BATT A1
(8W-10-6)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
87
87A
1
FUSE
10
10A
2
(8W-12-12)
13
C2
4
C2
F921
20
PK/YL
F921
20
PK/YL
2
9
2
ADJUSTABLE PEDALS RELAY OUTPUT
FUSED RUN RELAY OUTPUT
SWITCH-BANK-LOWER
FUSED RUN RELAY OUTPUT
SWITCH-BANK-UPPER
ADJUSTABLE PEDALS MOTOR REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
GROUND
GROUND
GROUND
GROUND
GROUND
13
12
11
1
4
8
12
P206
18
LG/TN
P205
18
LG/DB
Z906
18
BK
Z906
18
BK
Z18
18
BK/LB
Z18
18
BK/LB
Z906
18
BK
S210
(8W-15-7)
54
53
C201
S204
(8W-15-8)
P206
16
LG/TN
P205
16
LG/DB
Z906
18
BK
Z18
18
BK/LB
2
1
M
MOTOR-ADJUSTABLE PEDALS
G200
(8W-15-7)
(8W-15-8)


MODULE-
MEMORY
SEAT
(8W-63-2)
ADJUSTABLE PEDALS SENSOR SUPPLY
ADJUSTABLE PEDALS SENSOR SIGNAL
ADJUSTABLE PEDALS SENSOR RETURN
ADJUSTABLE PEDALS MOTOR FORWARD
ADJUSTABLE PEDALS MOTOR REARWARD
9 C1
14 C1
12 C1
1 C1
2 C1
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
4
3
5
1
2
M
MOTOR-
ADJUSTABLE
PEDALS

8W-60 POWER WINDOWS

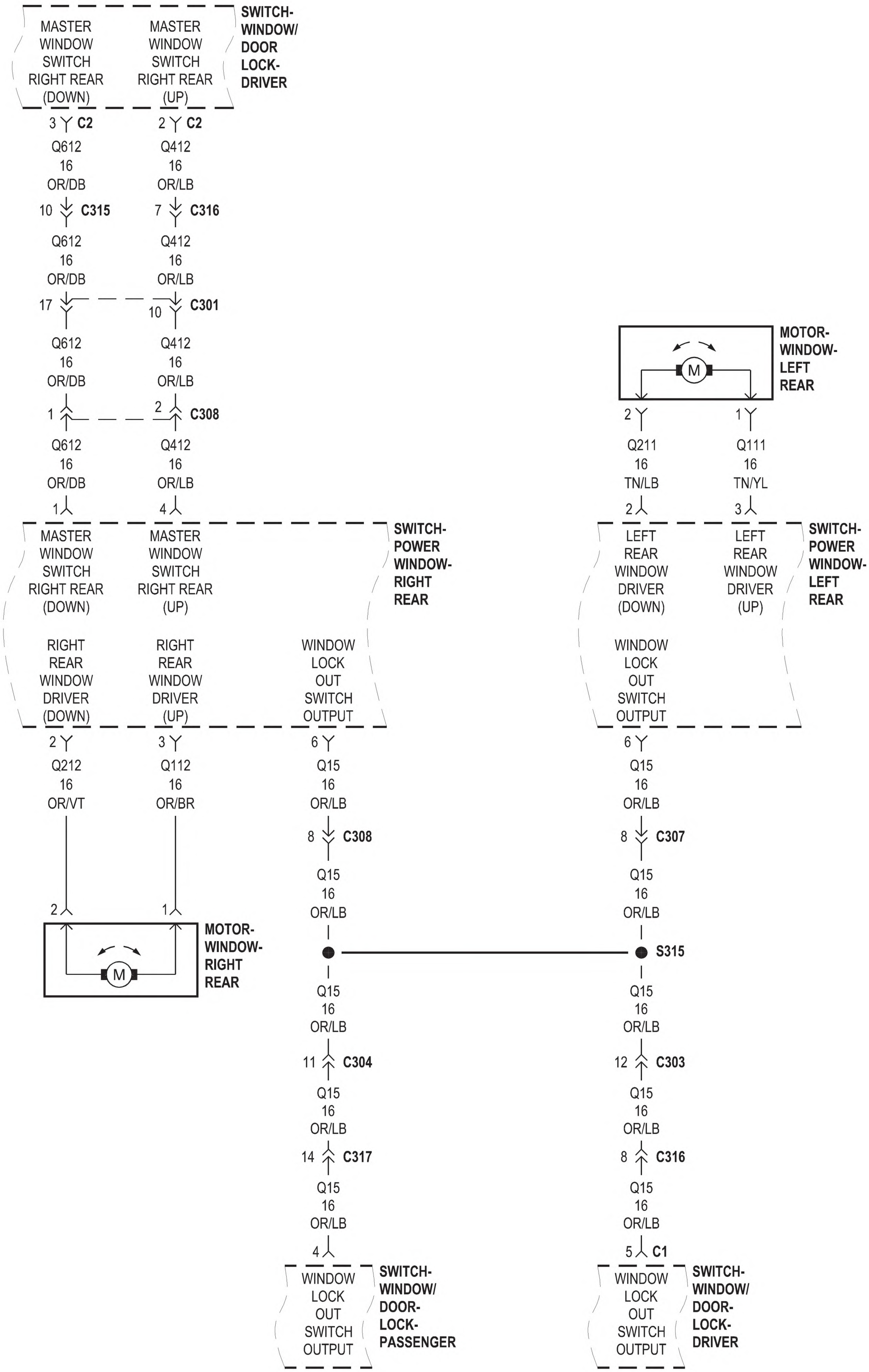
Component	Page
Circuit Breaker No. 3	8W-60-2, 3
Cluster	8W-60-2, 3
G303	8W-60-2
Junction Block	8W-60-2, 3
Module-Memory Mirror-Driver	8W-60-2
Module-Memory Mirror-Passenger	8W-60-3
Motor-Window-Left Front	8W-60-2
Motor-Window-Left Rear	8W-60-4
Motor-Window-Right Front	8W-60-3
Motor-Window-Right Rear	8W-60-4
Relay-Run/Accessory Delay	8W-60-2, 3
Switch-Power Window-Left Rear	8W-60-2, 4
Switch-Power Window-Right Rear	8W-60-4
Switch-Window/Door Lock-Driver	8W-60-2, 3, 4
Switch-Window/Door Lock-Passenger	8W-60-3
Switch-Window/Door-Lock-Driver	8W-60-4
Switch-Window/Door-Lock-Passenger	8W-60-4


BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN/ ACCESSORY DELAY
(8W-12-16)
87
87A
1
CIRCUIT BREAKER NO. 3
20A
(8W-12-16)
2
1 C3
A929
16
RD/DB
10 C303
A929
16
RD/DB
11 C316
A929
16
RD/DB
S342
(8W-12-16)
A929
16
RD/DB
2 C1
DRIVER WINDOW DRIVER (DOWN)
DRIVER WINDOW DRIVER (UP)
MOTOR-WINDOW-LEFT FRONT
2
1
Q21
16
OR/WT
Q11
16
OR/LG
H C315
6
Q21
16
OR/WT
Q11
16
OR/LG
6 C1
7 C1
MASTER WINDOW SWITCH LEFT REAR (DOWN)
MASTER WINDOW SWITCH LEFT REAR (UP)
SWITCH-POWER WINDOW-LEFT REAR
1
4
Q611
16
OR/GY
Q411
16
OR/WT
1
2 C307
Q611
16
OR/GY
Q411
16
OR/WT
4
15 C301
Q611
16
OR/GY
Q411
16
OR/WT
9 C316
I C315
Q611
16
OR/GY
Q411
16
OR/WT
4 C2
1 C2
FUSED RUN/ACCESSORY RELAY OUTPUT
DRIVER WINDOW DRIVER (DOWN)
DRIVER WINDOW DRIVER (UP)
MASTER WINDOW SWITCH LEFT REAR (DOWN)
MASTER WINDOW SWITCH LEFT REAR (UP)
SWITCH-WINDOW/ DOOR LOCK-DRIVER
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
DOOR LOCK SWITCH RETURN
DRIVER DOOR LOCK SWITCH MUX
GROUND
8 C1
▼ 3 C1
▼▼ 3 C1
8 C1
4 C1
G161
20
VT/DG
G775
20
OR/VT
Z463
20
BK/LB
G161
20
VT/DG
Z911
16
BK
20 C1
21 C1
S316
(8W-70-5)
DRIVER DOOR LOCK SWITCH MUX
DRIVER DOOR LOCK SWITCH RETURN
MODULE-MEMORY MIRROR-DRIVER
(8W-62-8)
10 C316
Z463
20
BK/LB
Z463
20
BK/LB
15 C316
G161
20
VT/DG
S343
(8W-15-10)
Z911
16
BK
2 C303
51 C201
5 C301
33 C201
13 C316
Z463
20
BK/LB
Z463
20
BK/LB
G161
20
VT/DG
G161
20
VT/DG
S320
(8W-15-10)
Z911
16
BK
Z911
16
BK
Z911
10
BK
19 C3
17 C3
CLUSTER
(8W-40-4)
DOOR LOCK SWITCH RETURN
DRIVER DOOR LOCK SWITCH MUX
S341
(8W-15-10)
11 C303
G303
(8W-15-10)
▼ MEMORY
▼▼ EXCEPT MEMORY
J058W-19
WK506002


BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN/ ACCESSORY DELAY
(8W-12-16)
87
87A
1
CIRCUIT BREAKER NO. 3
20A
(8W-12-16)
2
9 C3
A929 18 RD/LG
10 C304
A929 16 RD/LG
11
A929 16 RD/LG
5
FUSED RUN/ACCESSORY RELAY OUTPUT
CLUSTER
(8W-40-4)
PASSENGER DOOR LOCK SWITCH MUX
18 C3
G160 20 VT/BR
37 C201
G160 20 VT/BR
6 C302
G160 20 VT/BR
1
EXCEPT MEMORY
MEMORY
S367
G160 20 VT/BR
20
PASSENGER DOOR LOCK SWITCH MUX
MODULE-MEMORY MIRROR-PASSENGER
(8W-62-7)
G160 20 VT/BR
6
PASSENGER DOOR LOCK SWITCH MUX
SWITCH-WINDOW/ DOOR LOCK-DRIVER
MASTER WINDOW SWITCH PASSENGER (UP)
MASTER WINDOW SWITCH PASSENGER (DOWN)
6 C2
5 C2
Q16 16 OR/TN
Q26 16 OR/GY
5
12 C316
Q16 16 OR/TN
Q26 16 OR/GY
3 C301
6 C303
Q16 16 OR/TN
Q26 16 OR/GY
13
18 C302
Q16 16 OR/TN
Q26 16 OR/GY
13
10 C317
Q16 16 OR/TN
Q26 16 OR/GY
8
1
MASTER WINDOW SWITCH PASSENGER (UP)
MASTER WINDOW SWITCH PASSENGER (DOWN)
CLUSTER
(8W-40-4)
PASSENGER DOOR LOCK SWITCH RETURN
19 C3
Z463 20 BK/LB
51 C201
Z463 20 BK/LB
S316
(8W-70-5)
Z463 20 BK/LB
2 C304
Z463 20 BK/LB
4 C317
Z463 20 BK/LB
▼▼ 7
PASSENGER DOOR LOCK SWITCH RETURN
SWITCH-WINDOW/ DOOR LOCK-PASSENGER
PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER WINDOW DRIVER (UP)
PASSENGER WINDOW DRIVER (DOWN)
▼ 7
G776 20 VT/OR
21
PASSENGER DOOR LOCK SWITCH RETURN
MODULE-MEMORY MIRROR-PASSENGER
(8W-62-7)
3
2
Q12 16 OR/BR
Q22 16 OR/VT
9
12 C317
Q12 16 OR/BR
Q22 16 OR/VT
1
2
M
MOTOR-WINDOW-RIGHT FRONT
▼ MEMORY
▼▼ EXCEPT MEMORY

WK506003

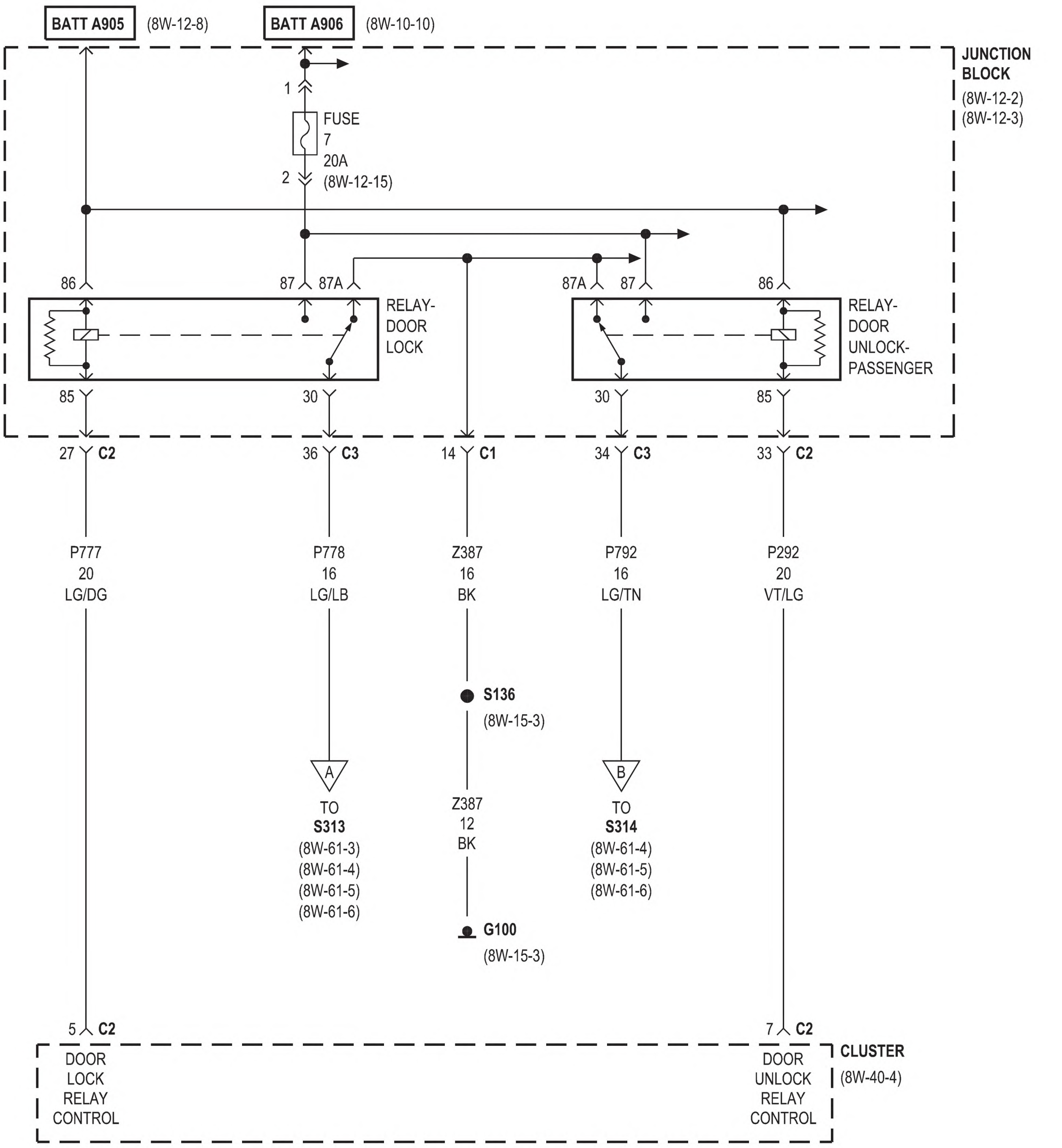
J058W-19

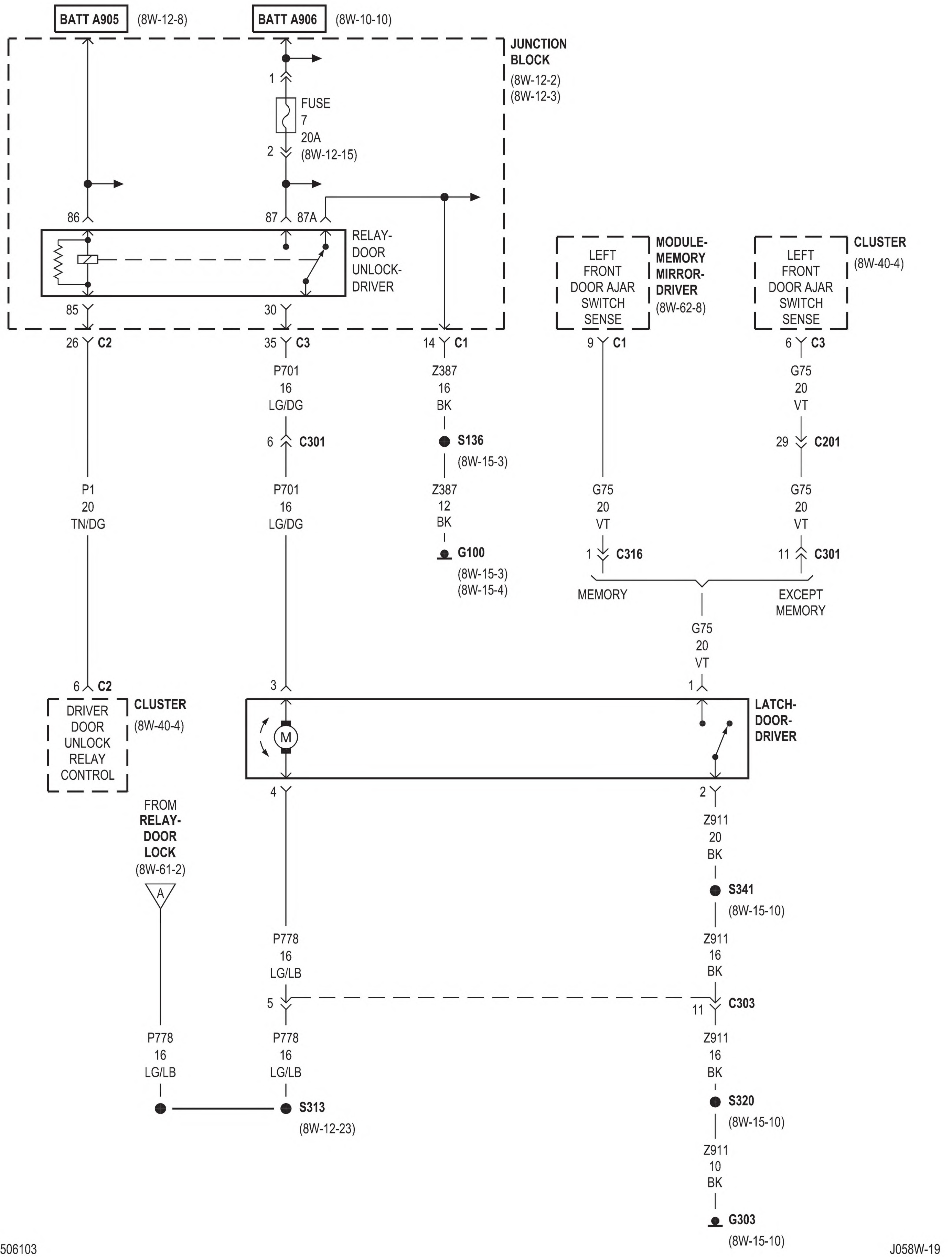

SWITCH-WINDOW/DOOR LOCK-DRIVER
MASTER WINDOW SWITCH RIGHT REAR (DOWN)
MASTER WINDOW SWITCH RIGHT REAR (UP)
3 C2
2 C2
Q612 16 OR/DB
Q412 16 OR/LB
10 C315
7 C316
Q612 16 OR/DB
Q412 16 OR/LB
17
10 C301
Q612 16 OR/DB
Q412 16 OR/LB
1
2 C308
Q612 16 OR/DB
Q412 16 OR/LB
1
4
SWITCH-POWER WINDOW-RIGHT REAR
MASTER WINDOW SWITCH RIGHT REAR (DOWN)
MASTER WINDOW SWITCH RIGHT REAR (UP)
RIGHT REAR WINDOW DRIVER (DOWN)
RIGHT REAR WINDOW DRIVER (UP)
WINDOW LOCK OUT SWITCH OUTPUT
2
3
6
Q212 16 OR/VT
Q112 16 OR/BR
Q15 16 OR/LB
8 C308
Q15 16 OR/LB
2
1
M
MOTOR-WINDOW-RIGHT REAR
MOTOR-WINDOW-LEFT REAR
M
2
1
Q211 16 TN/LB
Q111 16 TN/YL
2
3
SWITCH-POWER WINDOW-LEFT REAR
LEFT REAR WINDOW DRIVER (DOWN)
LEFT REAR WINDOW DRIVER (UP)
WINDOW LOCK OUT SWITCH OUTPUT
6
Q15 16 OR/LB
8 C307
Q15 16 OR/LB
S315
Q15 16 OR/LB
Q15 16 OR/LB
11 C304
12 C303
Q15 16 OR/LB
Q15 16 OR/LB
14 C317
8 C316
Q15 16 OR/LB
Q15 16 OR/LB
4
5 C1
WINDOW LOCK OUT SWITCH OUTPUT
SWITCH-WINDOW/DOOR-LOCK-PASSENGER
WINDOW LOCK OUT SWITCH OUTPUT
SWITCH-WINDOW/DOOR-LOCK-DRIVER

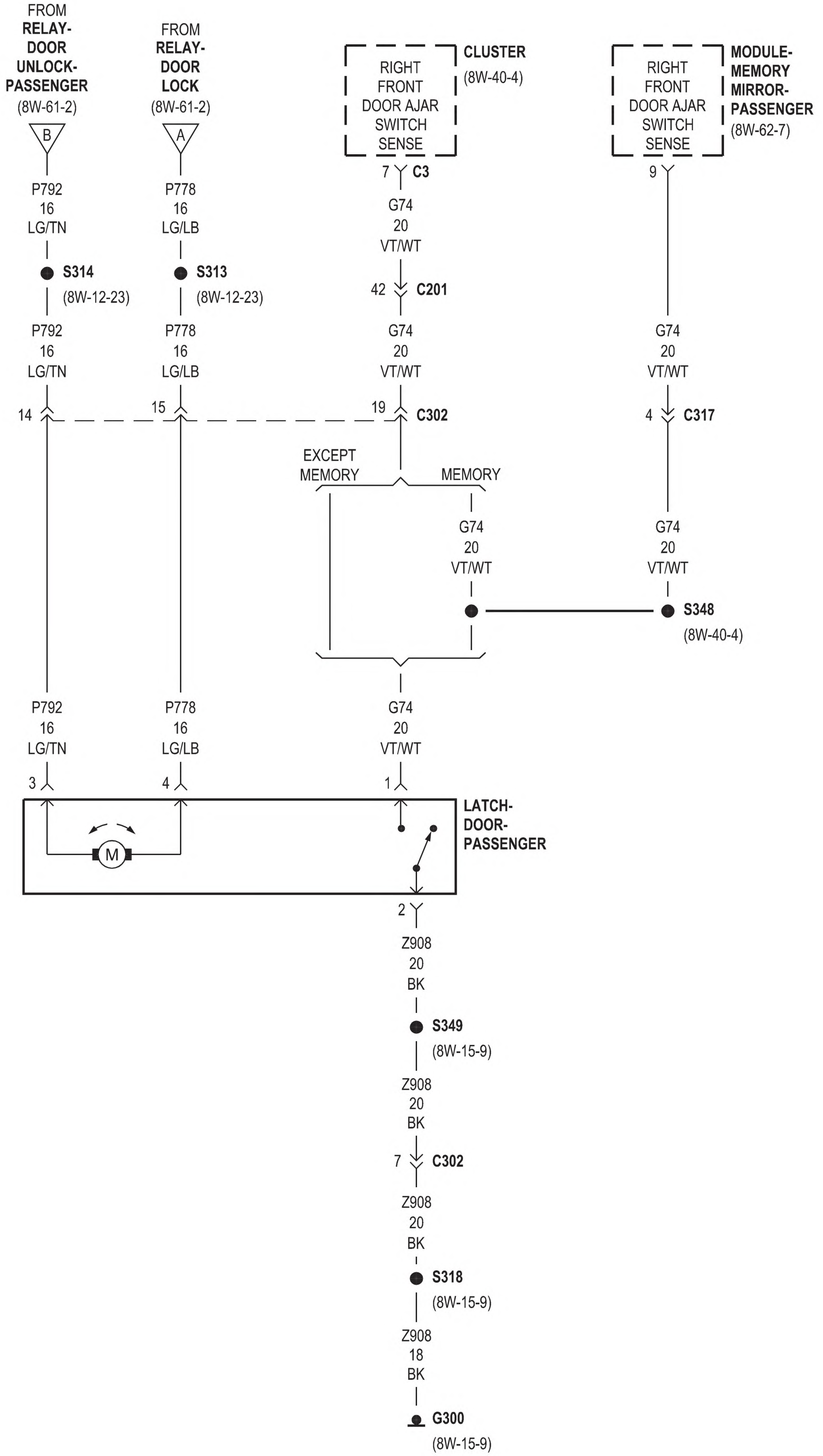
WK506004

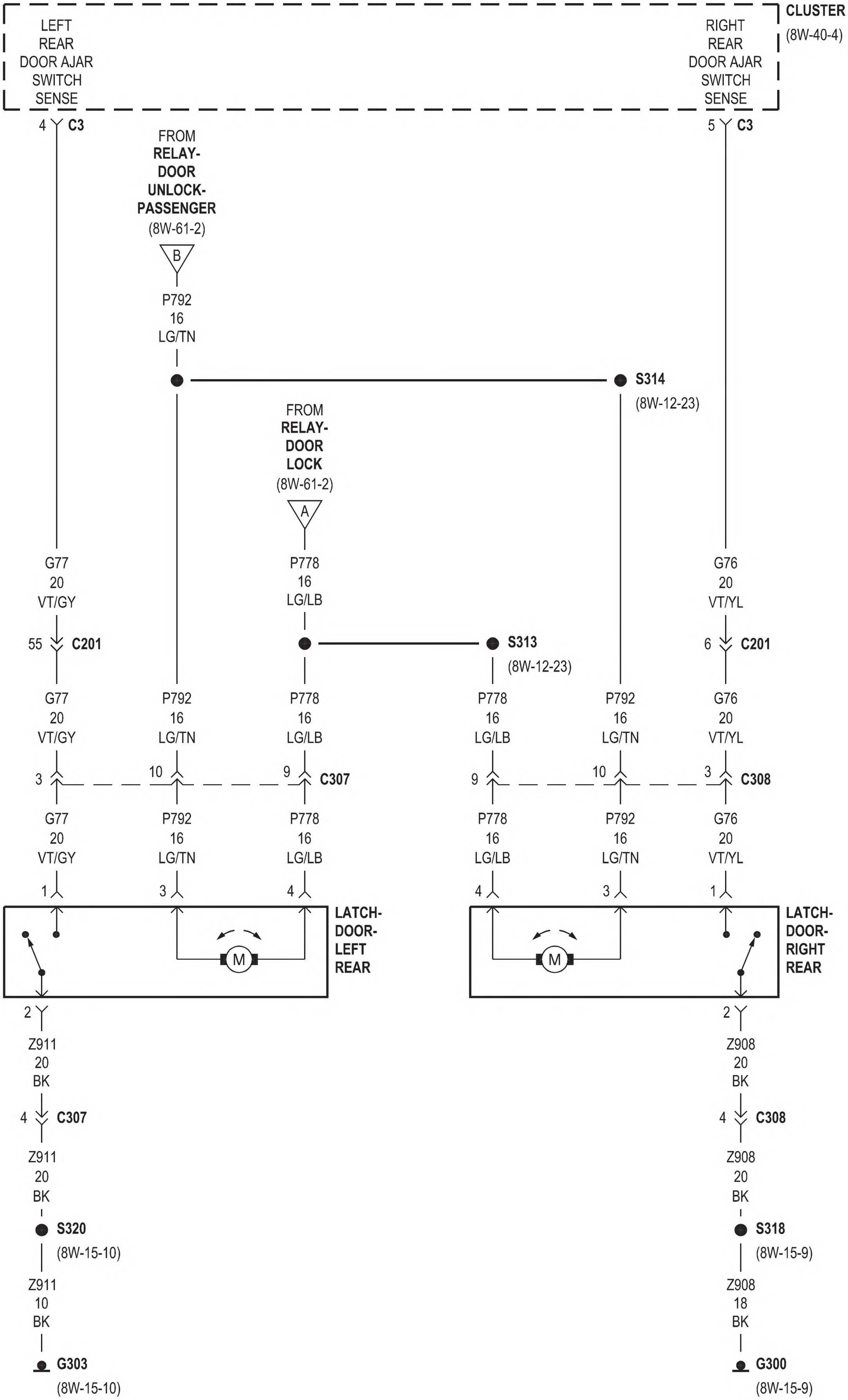
8W-61 POWER DOOR LOCKS

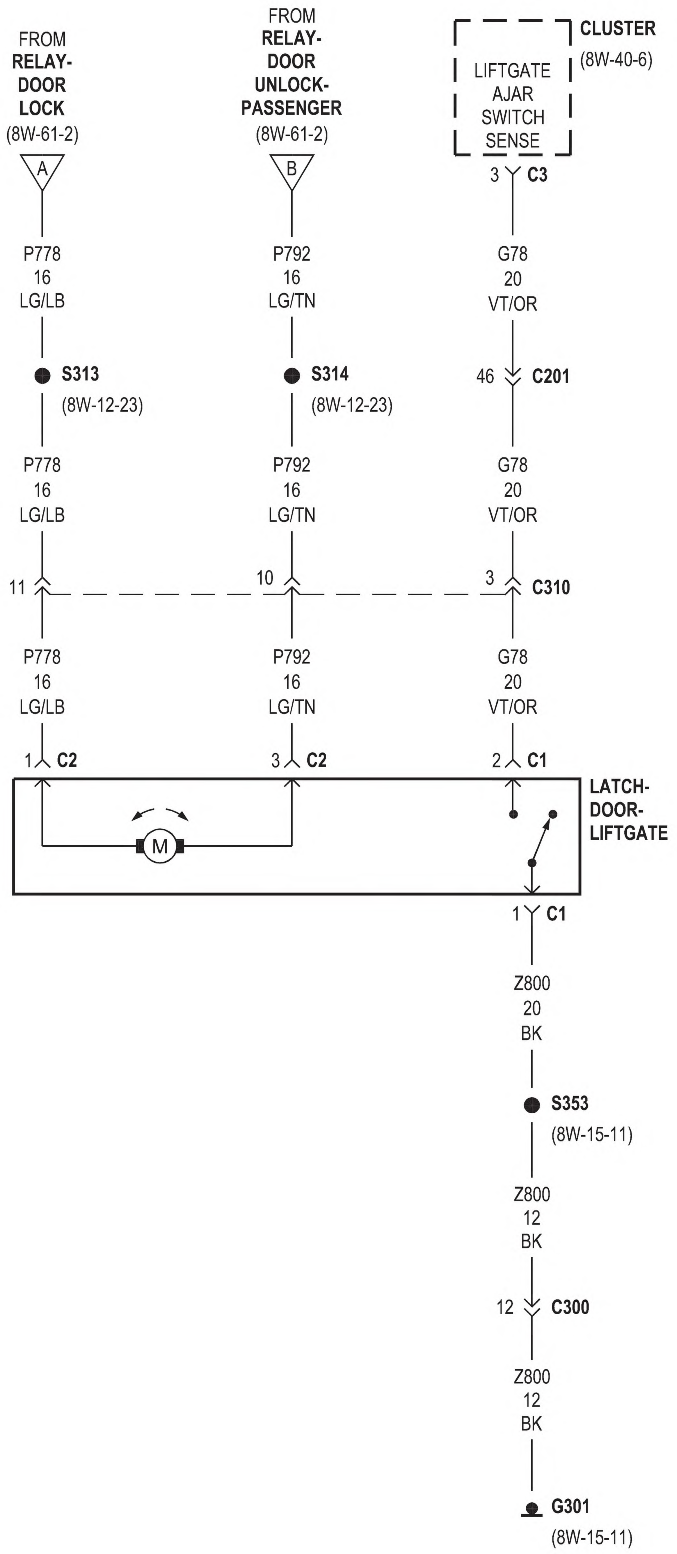
Component	**Page**
Cluster	8W-61-2, 3, 4, 5, 6, 7
Fuse 7	8W-61-2, 3
Fuse 17	8W-61-7
G100	8W-61-2, 3
G300	8W-61-4, 5
G301	8W-61-6, 7
G303	8W-61-3, 5
Junction Block	8W-61-2, 3, 7
Latch-Door-Driver	8W-61-3
Latch-Door-Left Rear	8W-61-5
Latch-Door-Liftgate	8W-61-6
Latch-Door-Passenger	8W-61-4
Latch-Door-Right Rear	8W-61-5
Latch-Flip-Up Glass	8W-61-7
Module-Memory Mirror-Driver	8W-61-3
Module-Memory Mirror-Passenger	8W-61-4
Relay-Door Lock	8W-61-2, 3, 4, 5, 6
Relay-Door Unlock-Driver	8W-61-3
Relay-Door Unlock-Passenger	8W-61-2, 4, 5, 6
Relay-Flip-Up Glass	8W-61-7

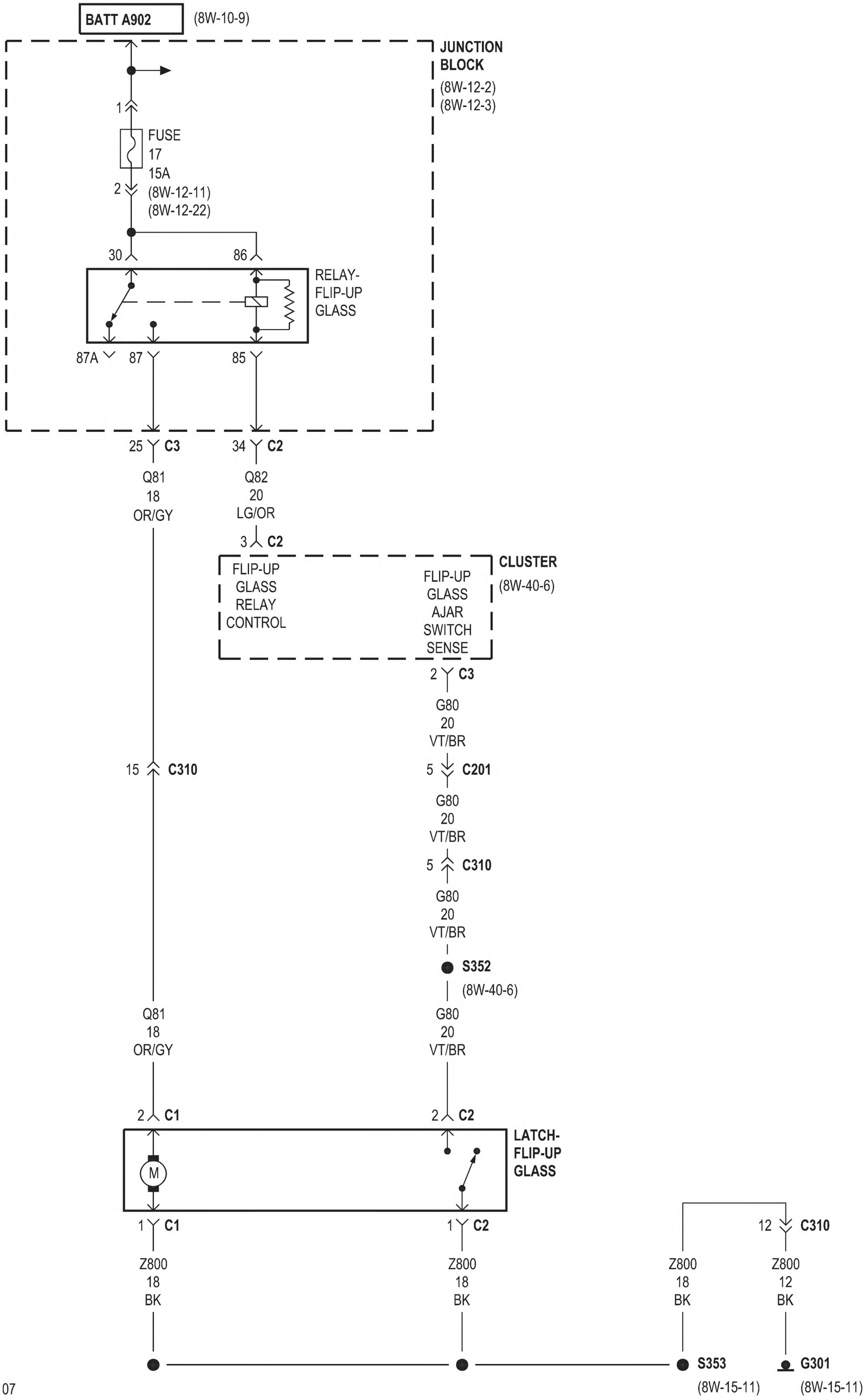

BATT A905
(8W-12-8)
BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
7
20A
(8W-12-15)
2
86
87
87A
RELAY-DOOR LOCK
87A
87
86
RELAY-DOOR UNLOCK-PASSENGER
85
30
30
85
27 C2
36 C3
14 C1
34 C3
33 C2
P777
20
LG/DG
P778
16
LG/LB
Z387
16
BK
P792
16
LG/TN
P292
20
VT/LG
S136
(8W-15-3)
A
TO
S313
(8W-61-3)
(8W-61-4)
(8W-61-5)
(8W-61-6)
Z387
12
BK
B
TO
S314
(8W-61-4)
(8W-61-5)
(8W-61-6)
G100
(8W-15-3)
5 C2
7 C2
CLUSTER
(8W-40-4)
DOOR LOCK RELAY CONTROL
DOOR UNLOCK RELAY CONTROL


BATT A905
(8W-12-8)
BATT A906
(8W-10-10)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
7
20A
(8W-12-15)
2
86
87
87A
RELAY-
DOOR
UNLOCK-
DRIVER
85
30
26 C2
35 C3
14 C1
P701
16
LG/DG
Z387
16
BK
6 C301
S136
(8W-15-3)
P1
20
TN/DG
P701
16
LG/DG
Z387
12
BK
G100
(8W-15-3)
(8W-15-4)
LEFT
FRONT
DOOR AJAR
SWITCH
SENSE
MODULE-
MEMORY
MIRROR-
DRIVER
(8W-62-8)
9 C1
G75
20
VT
1 C316
MEMORY
LEFT
FRONT
DOOR AJAR
SWITCH
SENSE
CLUSTER
(8W-40-4)
6 C3
G75
20
VT
29 C201
G75
20
VT
11 C301
EXCEPT
MEMORY
G75
20
VT
6 C2
DRIVER
DOOR
UNLOCK
RELAY
CONTROL
CLUSTER
(8W-40-4)
3
1
M
LATCH-
DOOR-
DRIVER
4
2
FROM
RELAY-
DOOR
LOCK
(8W-61-2)
A
Z911
20
BK
S341
(8W-15-10)
P778
16
LG/LB
Z911
16
BK
5
11 C303
P778
16
LG/LB
P778
16
LG/LB
Z911
16
BK
S313
(8W-12-23)
S320
(8W-15-10)
Z911
10
BK
G303
(8W-15-10)


FROM
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
B
FROM
RELAY-DOOR LOCK
(8W-61-2)
A
RIGHT FRONT DOOR AJAR SWITCH SENSE
CLUSTER
(8W-40-4)
RIGHT FRONT DOOR AJAR SWITCH SENSE
MODULE-MEMORY MIRROR-PASSENGER
(8W-62-7)
7 C3
9
P792 16 LG/TN
P778 16 LG/LB
G74 20 VT/WT
S314 (8W-12-23)
S313 (8W-12-23)
42 C201
G74 20 VT/WT
P792 16 LG/TN
P778 16 LG/LB
14
15
19 C302
4 C317
EXCEPT MEMORY
MEMORY
G74 20 VT/WT
G74 20 VT/WT
S348 (8W-40-4)
P792 16 LG/TN
P778 16 LG/LB
G74 20 VT/WT
3
4
1
M
LATCH-DOOR-PASSENGER
2
Z908 20 BK
S349 (8W-15-9)
Z908 20 BK
7 C302
Z908 20 BK
S318 (8W-15-9)
Z908 18 BK
G300 (8W-15-9)

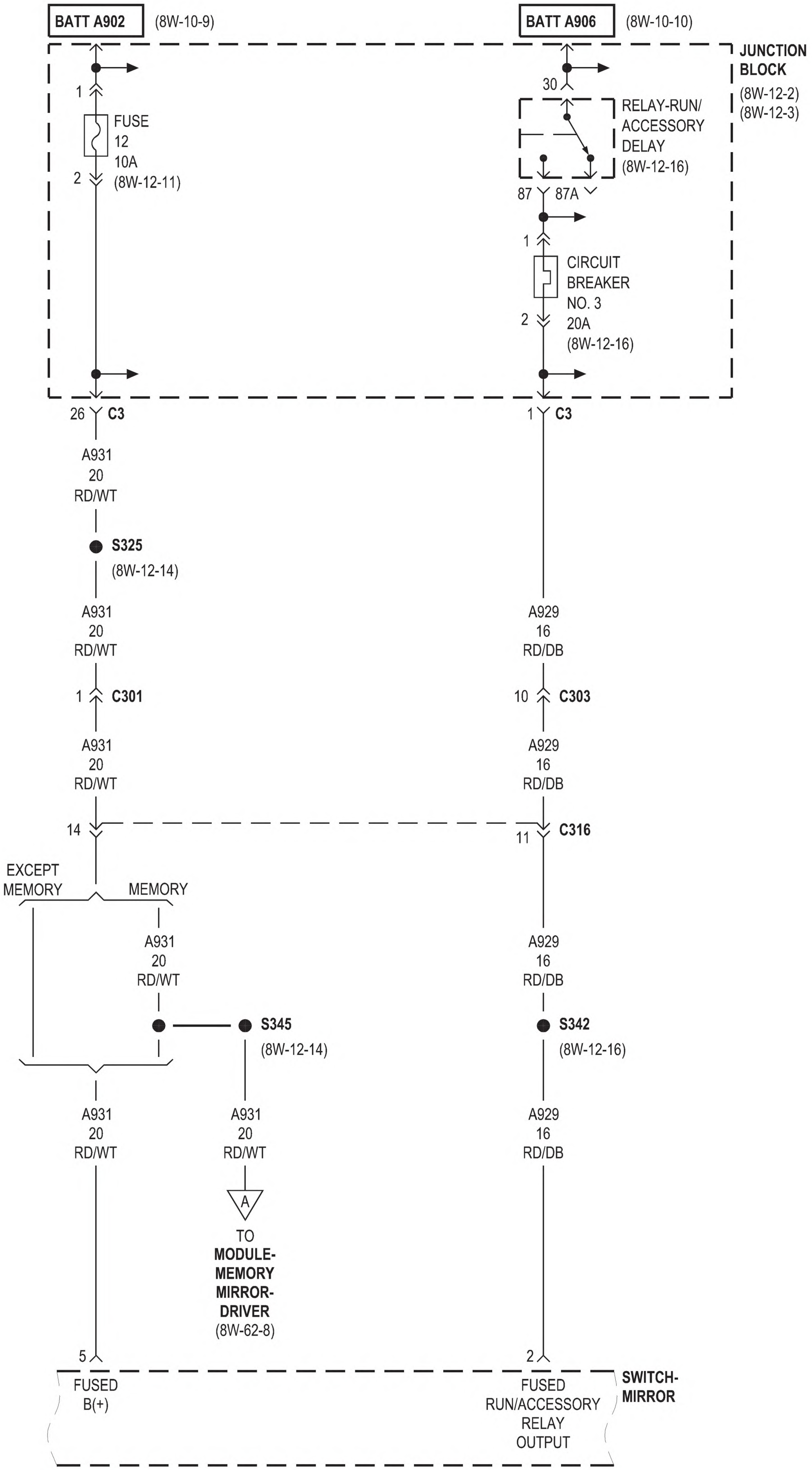

CLUSTER
(8W-40-4)
LEFT REAR DOOR AJAR SWITCH SENSE
RIGHT REAR DOOR AJAR SWITCH SENSE
4 C3
5 C3
FROM RELAY-DOOR UNLOCK-PASSENGER (8W-61-2)
B
P792 16 LG/TN
S314
(8W-12-23)
FROM RELAY-DOOR LOCK (8W-61-2)
A
P778 16 LG/LB
G77 20 VT/GY
G76 20 VT/YL
55 C201
6 C201
S313
(8W-12-23)
P778 16 LG/LB
P792 16 LG/TN
3 10 9 C307
9 10 3 C308
1 3 4
4 3 1
M
LATCH-DOOR-LEFT REAR
LATCH-DOOR-RIGHT REAR
2
Z911 20 BK
4 C307
S320
(8W-15-10)
Z911 10 BK
G303
(8W-15-10)
Z908 20 BK
4 C308
S318
(8W-15-9)
Z908 18 BK
G300
(8W-15-9)

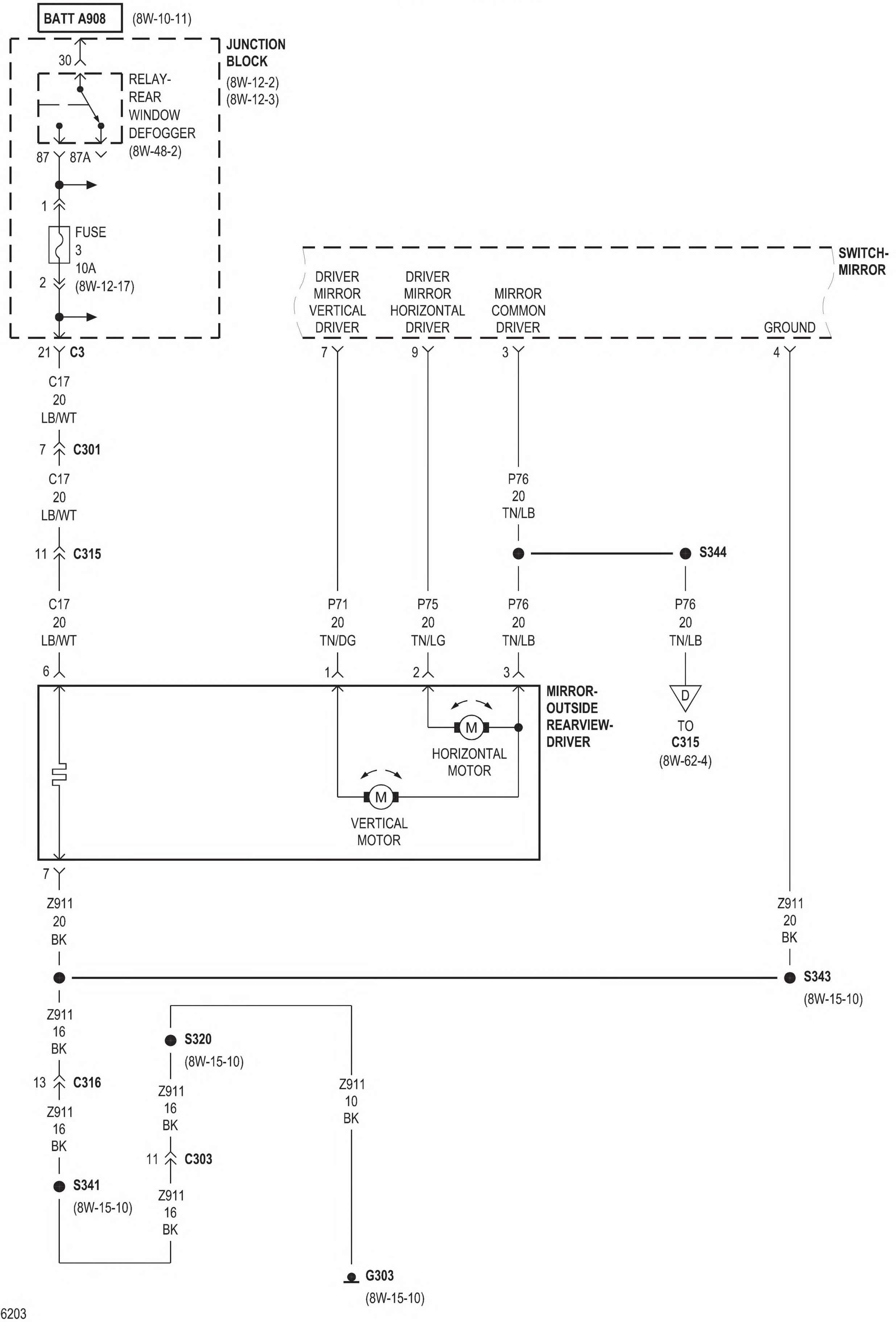

FROM
RELAY-DOOR LOCK
(8W-61-2)
A
FROM
RELAY-DOOR UNLOCK-PASSENGER
(8W-61-2)
B
CLUSTER
(8W-40-6)
LIFTGATE AJAR SWITCH SENSE
3 C3
P778 16 LG/LB
P792 16 LG/TN
G78 20 VT/OR
46 C201
S313
(8W-12-23)
S314
(8W-12-23)
P778 16 LG/LB
P792 16 LG/TN
G78 20 VT/OR
11
10
3 C310
P778 16 LG/LB
P792 16 LG/TN
G78 20 VT/OR
1 C2
3 C2
2 C1
LATCH-DOOR-LIFTGATE
M
1 C1
Z800 20 BK
S353
(8W-15-11)
Z800 12 BK
12 C300
Z800 12 BK
G301
(8W-15-11)

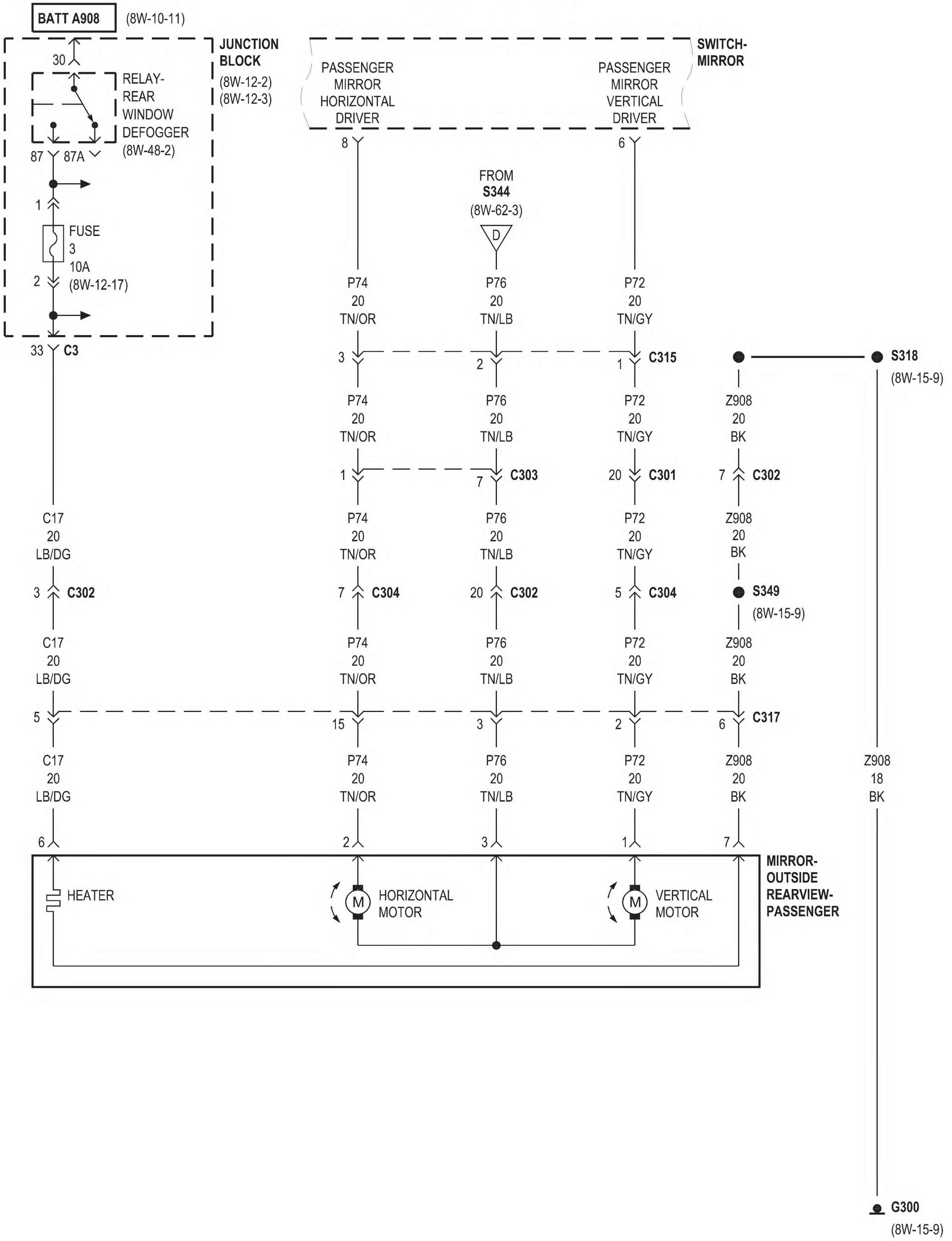

BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
17
15A
2
(8W-12-11)
(8W-12-22)
30
86
RELAY-FLIP-UP GLASS
87A
87
85
25 C3
34 C2
Q81
18
OR/GY
Q82
20
LG/OR
3 C2
CLUSTER
(8W-40-6)
FLIP-UP GLASS RELAY CONTROL
FLIP-UP GLASS AJAR SWITCH SENSE
2 C3
G80
20
VT/BR
15 C310
5 C201
G80
20
VT/BR
5 C310
G80
20
VT/BR
S352
(8W-40-6)
Q81
18
OR/GY
G80
20
VT/BR
2 C1
2 C2
M
LATCH-FLIP-UP GLASS
1 C1
1 C2
12 C310
Z800
18
BK
Z800
18
BK
Z800
18
BK
Z800
12
BK
S353
(8W-15-11)
G301
(8W-15-11)

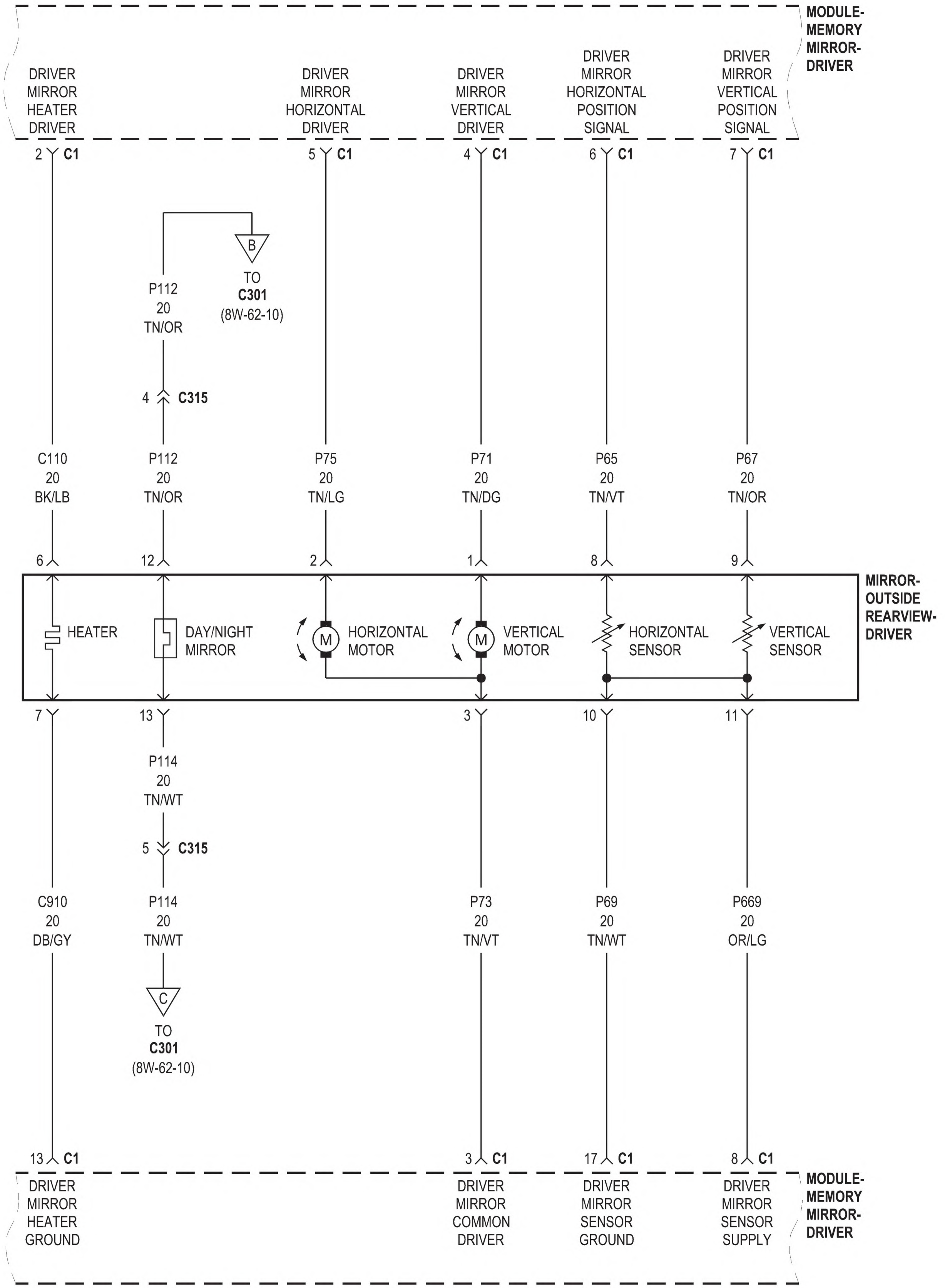
8W-62 POWER MIRRORS

Component	Page
Circuit Breaker No. 3	8W-62-2
Cluster	8W-62-7, 8
Fuse 3	8W-62-3, 4
Fuse 10	8W-62-10
Fuse 12	8W-62-2, 7
G300	8W-62-4, 7
G301	8W-62-10
G303	8W-62-3, 8
Junction Block	8W-62-2, 3, 4, 7, 10
Latch-Door-Driver	8W-62-8
Latch-Door-Passenger	8W-62-7
Mirror-Inside Rearview	8W-62-10
Mirror-Outside Rearview-Driver	8W-62-3, 5
Mirror-Outside Rearview-Passenger	8W-62-4, 6
Module-Electronic Overhead	8W-62-10
Module-Front Control	8W-62-10
Module-Integrated Power	8W-62-10
Module-Memory Mirror-Driver	8W-62-2, 5, 8, 9
Module-Memory Mirror-Passenger	8W-62-6, 7
Relay-Rear Window Defogger	8W-62-3, 4
Relay-Run	8W-62-10
Relay-Run/Accessory Delay	8W-62-2
Switch-Memory Set	8W-62-9
Switch-Mirror	8W-62-2, 3, 4, 9
Switch-Window/Door Lock-Driver	8W-62-8
Switch-Window/Door Lock-Passenger	8W-62-7

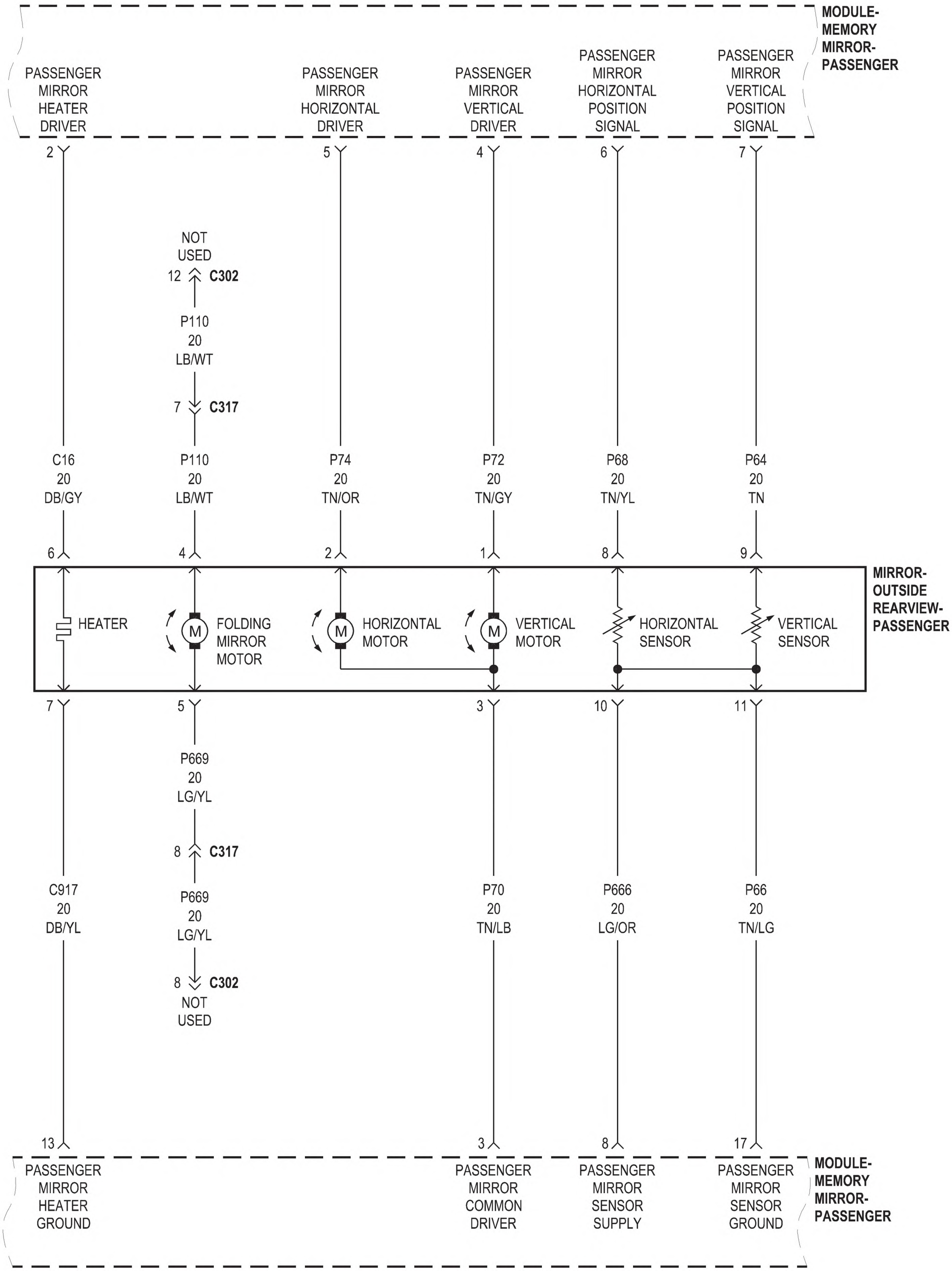

BATT A902
(8W-10-9)
BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
12
10A
(8W-12-11)
2
30
RELAY-RUN/ ACCESSORY DELAY
(8W-12-16)
87
87A
1
CIRCUIT BREAKER NO. 3
20A
(8W-12-16)
2
26
C3
1
C3
A931
20
RD/WT
S325
(8W-12-14)
A929
16
RD/DB
1
C301
10
C303
14
11
C316
EXCEPT MEMORY
MEMORY
S345
(8W-12-14)
S342
(8W-12-16)
A
TO MODULE-MEMORY MIRROR-DRIVER
(8W-62-8)
5
2
SWITCH-MIRROR
FUSED B(+)
FUSED RUN/ACCESSORY RELAY OUTPUT

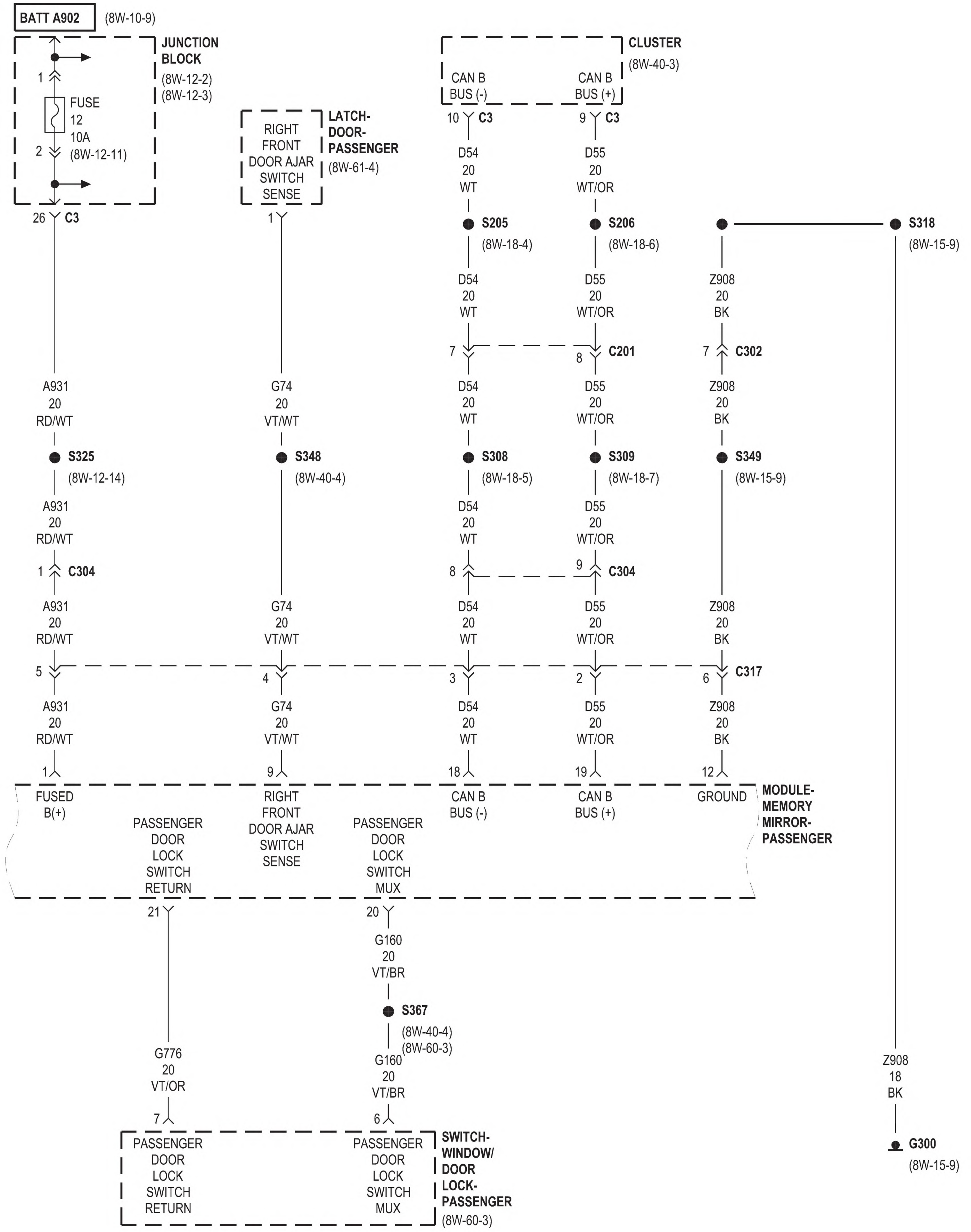

BATT A908
(8W-10-11)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-REAR WINDOW DEFOGGER
(8W-48-2)
87
87A
1
FUSE
3
10A
(8W-12-17)
2
21
C3
C17
20
LB/WT
7
C301
C17
20
LB/WT
11
C315
C17
20
LB/WT
6
SWITCH-MIRROR
DRIVER MIRROR VERTICAL DRIVER
DRIVER MIRROR HORIZONTAL DRIVER
MIRROR COMMON DRIVER
GROUND
7
9
3
4
P76
20
TN/LB
S344
P71
20
TN/DG
P75
20
TN/LG
P76
20
TN/LB
P76
20
TN/LB
1
2
3
D
TO
C315
(8W-62-4)
MIRROR-OUTSIDE REARVIEW-DRIVER
M
HORIZONTAL MOTOR
M
VERTICAL MOTOR
7
Z911
20
BK
Z911
20
BK
S343
(8W-15-10)
Z911
16
BK
13
C316
Z911
16
BK
S341
(8W-15-10)
S320
(8W-15-10)
Z911
16
BK
11
C303
Z911
16
BK
Z911
10
BK
G303
(8W-15-10)


BATT A908
(8W-10-11)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-REAR WINDOW DEFOGGER
(8W-48-2)
87
87A
1
FUSE 3 10A
2
(8W-12-17)
33
C3
SWITCH-MIRROR
PASSENGER MIRROR HORIZONTAL DRIVER
PASSENGER MIRROR VERTICAL DRIVER
8
6
FROM S344
(8W-62-3)
D
P74 20 TN/OR
P76 20 TN/LB
P72 20 TN/GY
3
2
1
C315
S318
(8W-15-9)
Z908 20 BK
1
7
C303
20
C301
7
C302
C17 20 LB/DG
3
C302
7
C304
20
C302
5
C304
S349
(8W-15-9)
5
15
3
2
6
C317
Z908 18 BK
6
2
3
1
7
HEATER
HORIZONTAL MOTOR
M
VERTICAL MOTOR
M
MIRROR-OUTSIDE REARVIEW-PASSENGER
G300
(8W-15-9)

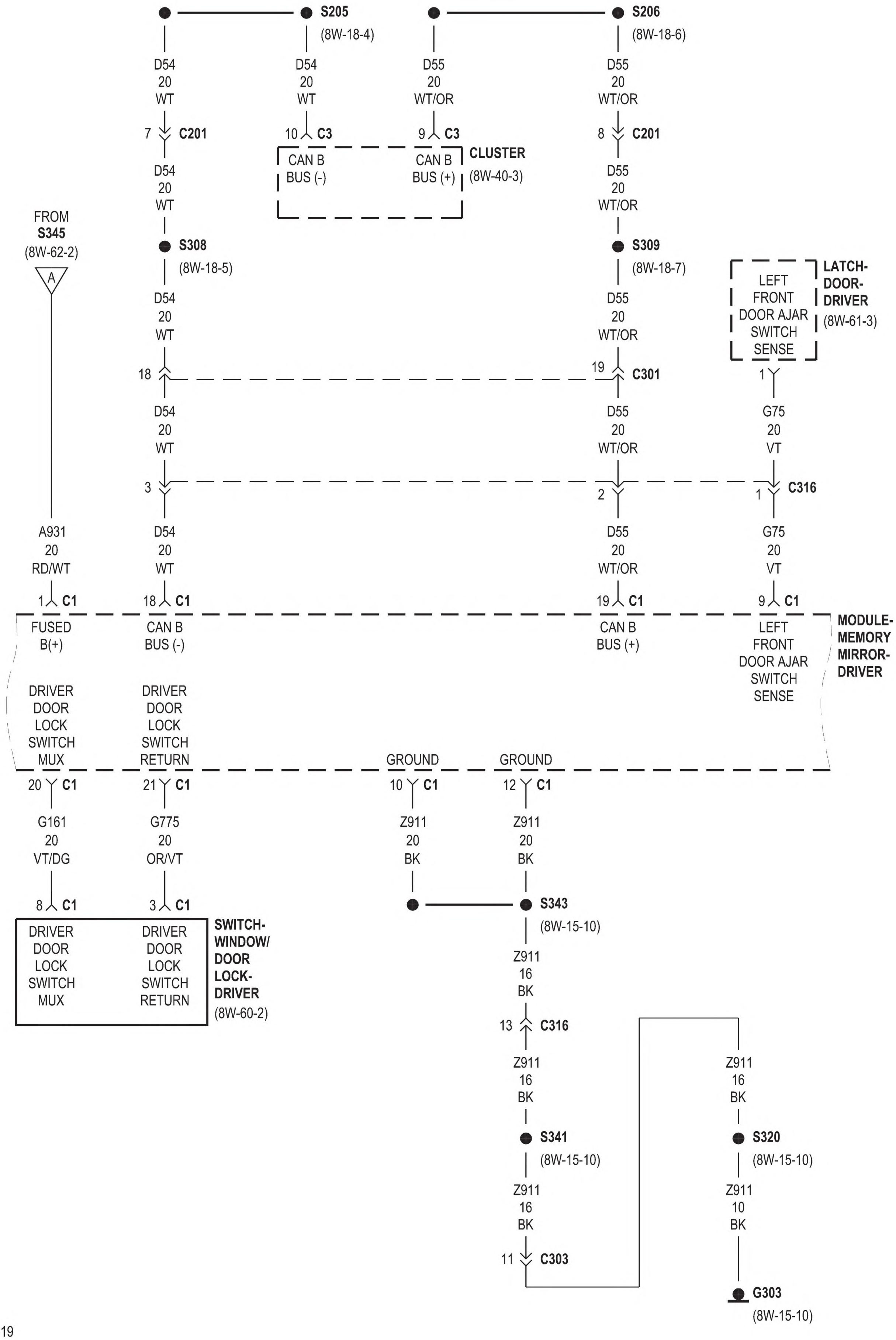

MODULE-MEMORY MIRROR-DRIVER
DRIVER MIRROR HEATER DRIVER
DRIVER MIRROR HORIZONTAL DRIVER
DRIVER MIRROR VERTICAL DRIVER
DRIVER MIRROR HORIZONTAL POSITION SIGNAL
DRIVER MIRROR VERTICAL POSITION SIGNAL
2 C1
5 C1
4 C1
6 C1
7 C1
B
TO C301 (8W-62-10)
P112 20 TN/OR
4 C315
C110 20 BK/LB
P112 20 TN/OR
P75 20 TN/LG
P71 20 TN/DG
P65 20 TN/VT
P67 20 TN/OR
6
12
2
1
8
9
MIRROR-OUTSIDE REARVIEW-DRIVER
HEATER
DAY/NIGHT MIRROR
M
HORIZONTAL MOTOR
M
VERTICAL MOTOR
HORIZONTAL SENSOR
VERTICAL SENSOR
7
13
3
10
11
P114 20 TN/WT
5 C315
C910 20 DB/GY
P114 20 TN/WT
P73 20 TN/VT
P69 20 TN/WT
P669 20 OR/LG
C
TO C301 (8W-62-10)
13 C1
3 C1
17 C1
8 C1
DRIVER MIRROR HEATER GROUND
DRIVER MIRROR COMMON DRIVER
DRIVER MIRROR SENSOR GROUND
DRIVER MIRROR SENSOR SUPPLY
MODULE-MEMORY MIRROR-DRIVER

MEMORY

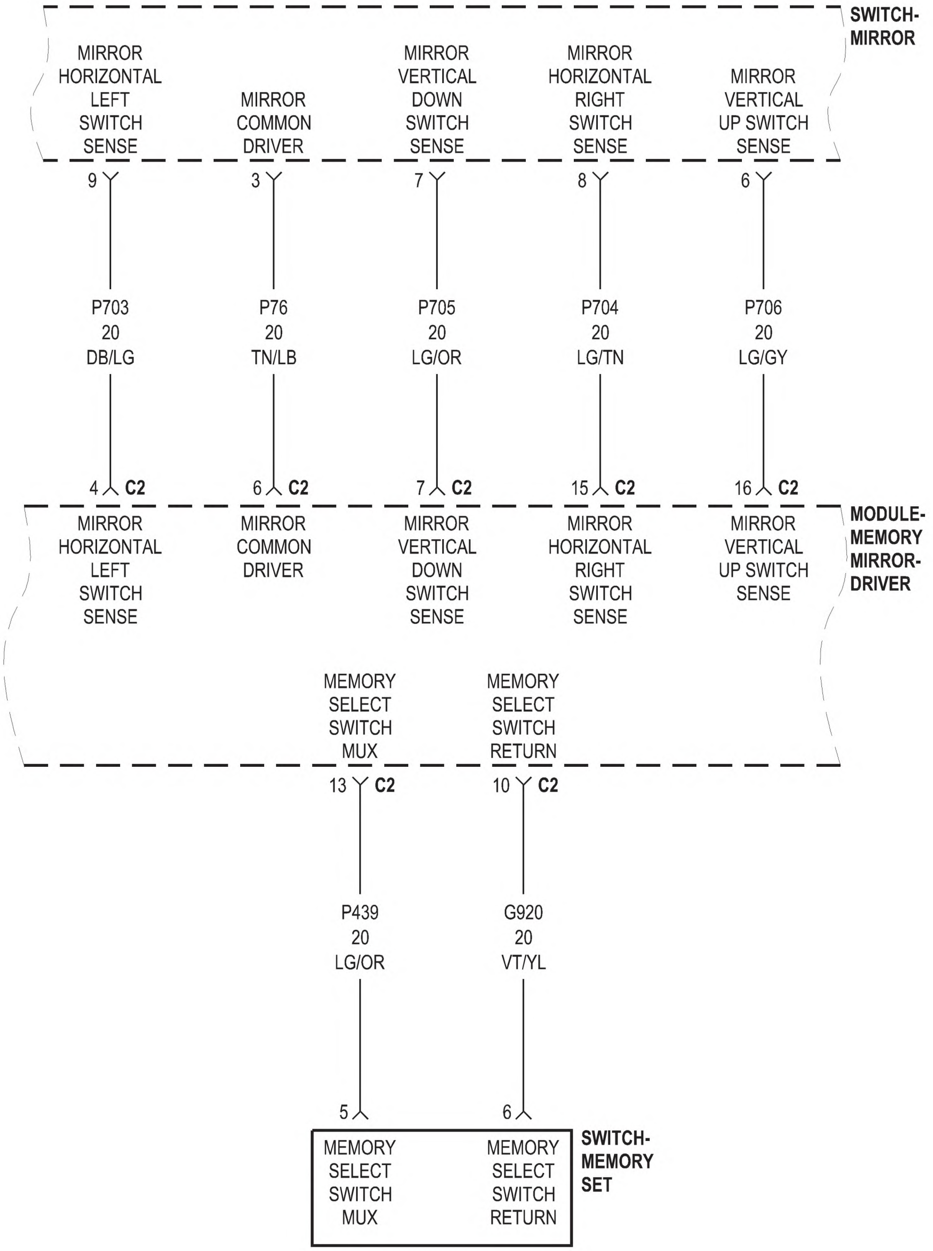

MODULE-
MEMORY
MIRROR-
PASSENGER
PASSENGER MIRROR HEATER DRIVER
PASSENGER MIRROR HORIZONTAL DRIVER
PASSENGER MIRROR VERTICAL DRIVER
PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
PASSENGER MIRROR VERTICAL POSITION SIGNAL
2
5
4
6
7
NOT USED
12
C302
P110
20
LB/WT
7
C317
C16
20
DB/GY
P110
20
LB/WT
P74
20
TN/OR
P72
20
TN/GY
P68
20
TN/YL
P64
20
TN
6
4
2
1
8
9
MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
HEATER
M
FOLDING MIRROR MOTOR
M
HORIZONTAL MOTOR
M
VERTICAL MOTOR
HORIZONTAL SENSOR
VERTICAL SENSOR
7
5
3
10
11
P669
20
LG/YL
8
C317
C917
20
DB/YL
P669
20
LG/YL
P70
20
TN/LB
P666
20
LG/OR
P66
20
TN/LG
8
C302
NOT USED
13
3
8
17
PASSENGER MIRROR HEATER GROUND
PASSENGER MIRROR COMMON DRIVER
PASSENGER MIRROR SENSOR SUPPLY
PASSENGER MIRROR SENSOR GROUND
MODULE-
MEMORY
MIRROR-
PASSENGER

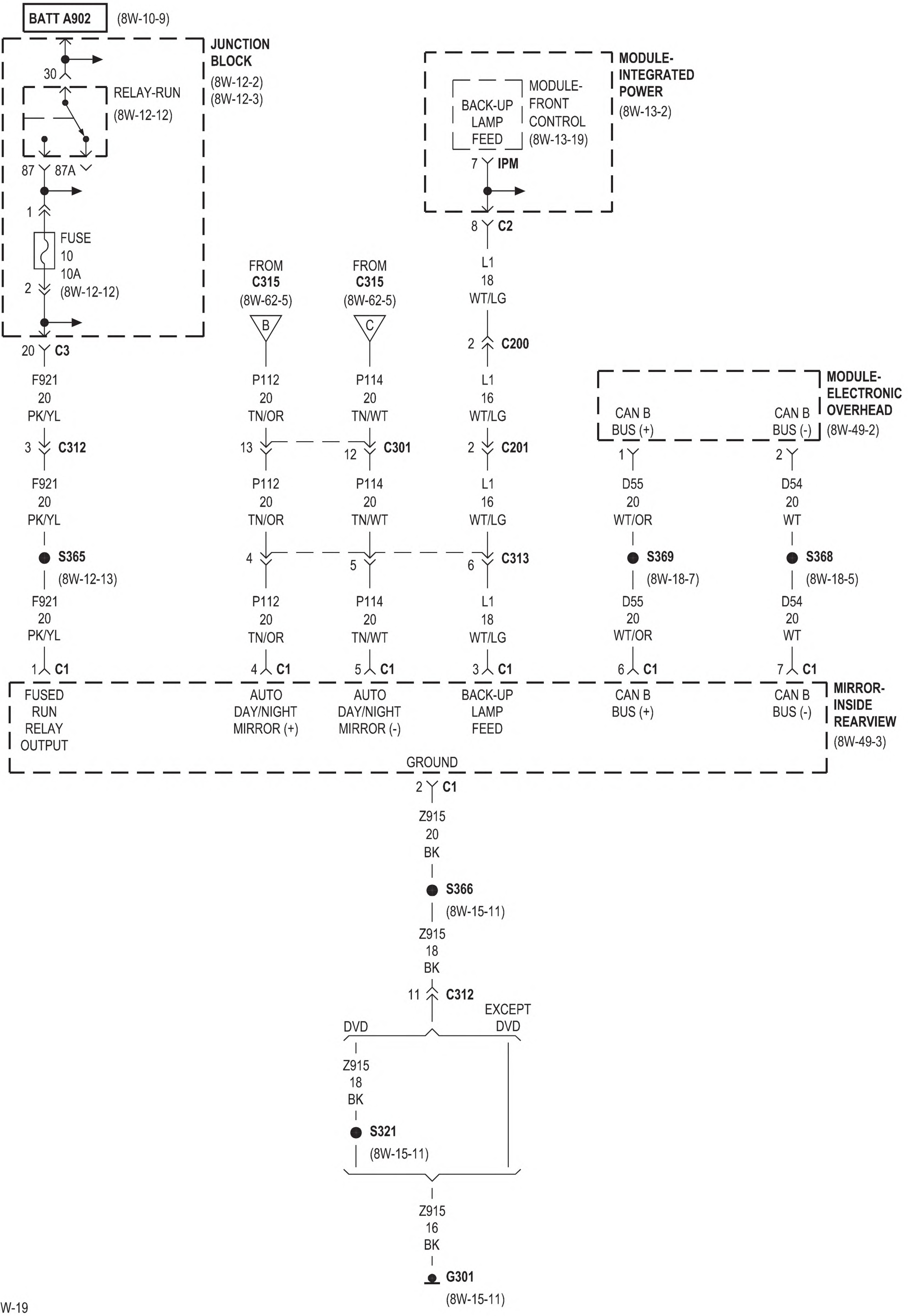

BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
12
10A
(8W-12-11)
2
26 C3
A931 20 RD/WT
S325
(8W-12-14)
A931 20 RD/WT
1 C304
A931 20 RD/WT
5
A931 20 RD/WT
1
RIGHT FRONT DOOR AJAR SWITCH SENSE
LATCH-DOOR-PASSENGER
(8W-61-4)
1
G74 20 VT/WT
S348
(8W-40-4)
G74 20 VT/WT
4
G74 20 VT/WT
9
CLUSTER
(8W-40-3)
CAN B BUS (-)
CAN B BUS (+)
10 C3
9 C3
D54 20 WT
D55 20 WT/OR
S205
(8W-18-4)
S206
(8W-18-6)
D54 20 WT
D55 20 WT/OR
7
8 C201
D54 20 WT
D55 20 WT/OR
S308
(8W-18-5)
S309
(8W-18-7)
D54 20 WT
D55 20 WT/OR
8
9 C304
D54 20 WT
D55 20 WT/OR
3
2
D54 20 WT
D55 20 WT/OR
18
19
S318
(8W-15-9)
Z908 20 BK
7 C302
Z908 20 BK
S349
(8W-15-9)
Z908 20 BK
6 C317
Z908 20 BK
12
FUSED B(+)
PASSENGER DOOR LOCK SWITCH RETURN
RIGHT FRONT DOOR AJAR SWITCH SENSE
PASSENGER DOOR LOCK SWITCH MUX
CAN B BUS (-)
CAN B BUS (+)
GROUND
MODULE-MEMORY MIRROR-PASSENGER
21
20
G160 20 VT/BR
S367
(8W-40-4)
(8W-60-3)
G160 20 VT/BR
G776 20 VT/OR
7
6
PASSENGER DOOR LOCK SWITCH RETURN
PASSENGER DOOR LOCK SWITCH MUX
SWITCH-WINDOW/DOOR LOCK-PASSENGER
(8W-60-3)
Z908 18 BK
G300
(8W-15-9)

MEMORY


S205
(8W-18-4)
S206
(8W-18-6)
D54
20
WT
D55
20
WT/OR
7 C201
10 C3
9 C3
8 C201
CAN B
BUS (-)
CAN B
BUS (+)
CLUSTER
(8W-40-3)
FROM
S345
(8W-62-2)
A
S308
(8W-18-5)
S309
(8W-18-7)
LEFT
FRONT
DOOR AJAR
SWITCH
SENSE
LATCH-
DOOR-
DRIVER
(8W-61-3)
18
19 C301
1
G75
20
VT
3
2
1 C316
A931
20
RD/WT
1 C1
18 C1
19 C1
9 C1
FUSED
B(+)
CAN B
BUS (-)
CAN B
BUS (+)
LEFT
FRONT
DOOR AJAR
SWITCH
SENSE
MODULE-
MEMORY
MIRROR-
DRIVER
DRIVER
DOOR
LOCK
SWITCH
MUX
DRIVER
DOOR
LOCK
SWITCH
RETURN
GROUND
GROUND
20 C1
21 C1
10 C1
12 C1
G161
20
VT/DG
G775
20
OR/VT
Z911
20
BK
8 C1
3 C1
S343
(8W-15-10)
DRIVER
DOOR
LOCK
SWITCH
MUX
DRIVER
DOOR
LOCK
SWITCH
RETURN
SWITCH-
WINDOW/
DOOR
LOCK-
DRIVER
(8W-60-2)
Z911
16
BK
13 C316
S341
(8W-15-10)
S320
(8W-15-10)
Z911
10
BK
11 C303
G303
(8W-15-10)

MEMORY


SWITCH-MIRROR
MIRROR HORIZONTAL LEFT SWITCH SENSE
MIRROR COMMON DRIVER
MIRROR VERTICAL DOWN SWITCH SENSE
MIRROR HORIZONTAL RIGHT SWITCH SENSE
MIRROR VERTICAL UP SWITCH SENSE
9
3
7
8
6
P703 20 DB/LG
P76 20 TN/LB
P705 20 LG/OR
P704 20 LG/TN
P706 20 LG/GY
4 C2
6 C2
7 C2
15 C2
16 C2
MODULE-MEMORY MIRROR-DRIVER
MIRROR HORIZONTAL LEFT SWITCH SENSE
MIRROR COMMON DRIVER
MIRROR VERTICAL DOWN SWITCH SENSE
MIRROR HORIZONTAL RIGHT SWITCH SENSE
MIRROR VERTICAL UP SWITCH SENSE
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN
13 C2
10 C2
P439 20 LG/OR
G920 20 VT/YL
5
6
SWITCH-MEMORY SET
MEMORY SELECT SWITCH MUX
MEMORY SELECT SWITCH RETURN


BATT A902
(8W-10-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
30
RELAY-RUN
(8W-12-12)
87
87A
1
FUSE
10
10A
(8W-12-12)
2
20
C3
F921
20
PK/YL
3
C312
F921
20
PK/YL
S365
(8W-12-13)
F921
20
PK/YL
1
C1
MODULE-INTEGRATED POWER
(8W-13-2)
BACK-UP LAMP FEED
MODULE-FRONT CONTROL
(8W-13-19)
7
IPM
8
C2
L1
18
WT/LG
2
C200
L1
16
WT/LG
2
C201
L1
16
WT/LG
6
C313
L1
18
WT/LG
3
C1
FROM C315
(8W-62-5)
B
P112
20
TN/OR
13
P112
20
TN/OR
4
P112
20
TN/OR
4
C1
FROM C315
(8W-62-5)
C
P114
20
TN/WT
12
C301
P114
20
TN/WT
5
P114
20
TN/WT
5
C1
MODULE-ELECTRONIC OVERHEAD
(8W-49-2)
CAN B BUS (+)
CAN B BUS (-)
1
D55
20
WT/OR
S369
(8W-18-7)
D55
20
WT/OR
6
C1
2
D54
20
WT
S368
(8W-18-5)
D54
20
WT
7
C1
MIRROR-INSIDE REARVIEW
(8W-49-3)
FUSED RUN RELAY OUTPUT
AUTO DAY/NIGHT MIRROR (+)
AUTO DAY/NIGHT MIRROR (-)
BACK-UP LAMP FEED
CAN B BUS (+)
CAN B BUS (-)
GROUND
2
C1
Z915
20
BK
S366
(8W-15-11)
Z915
18
BK
11
C312
DVD
EXCEPT DVD
Z915
18
BK
S321
(8W-15-11)
Z915
16
BK
G301
(8W-15-11)

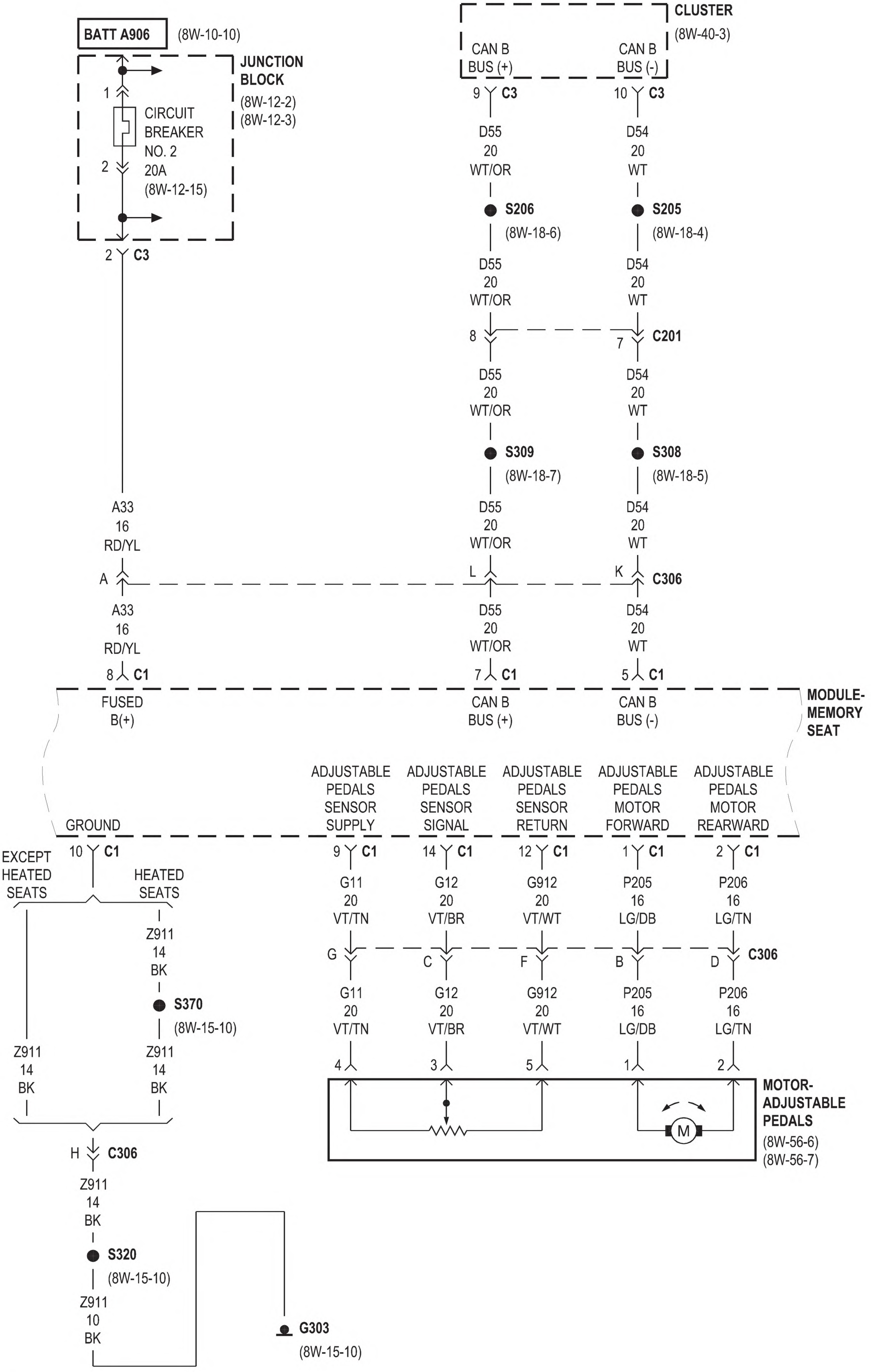
8W-63 POWER SEAT

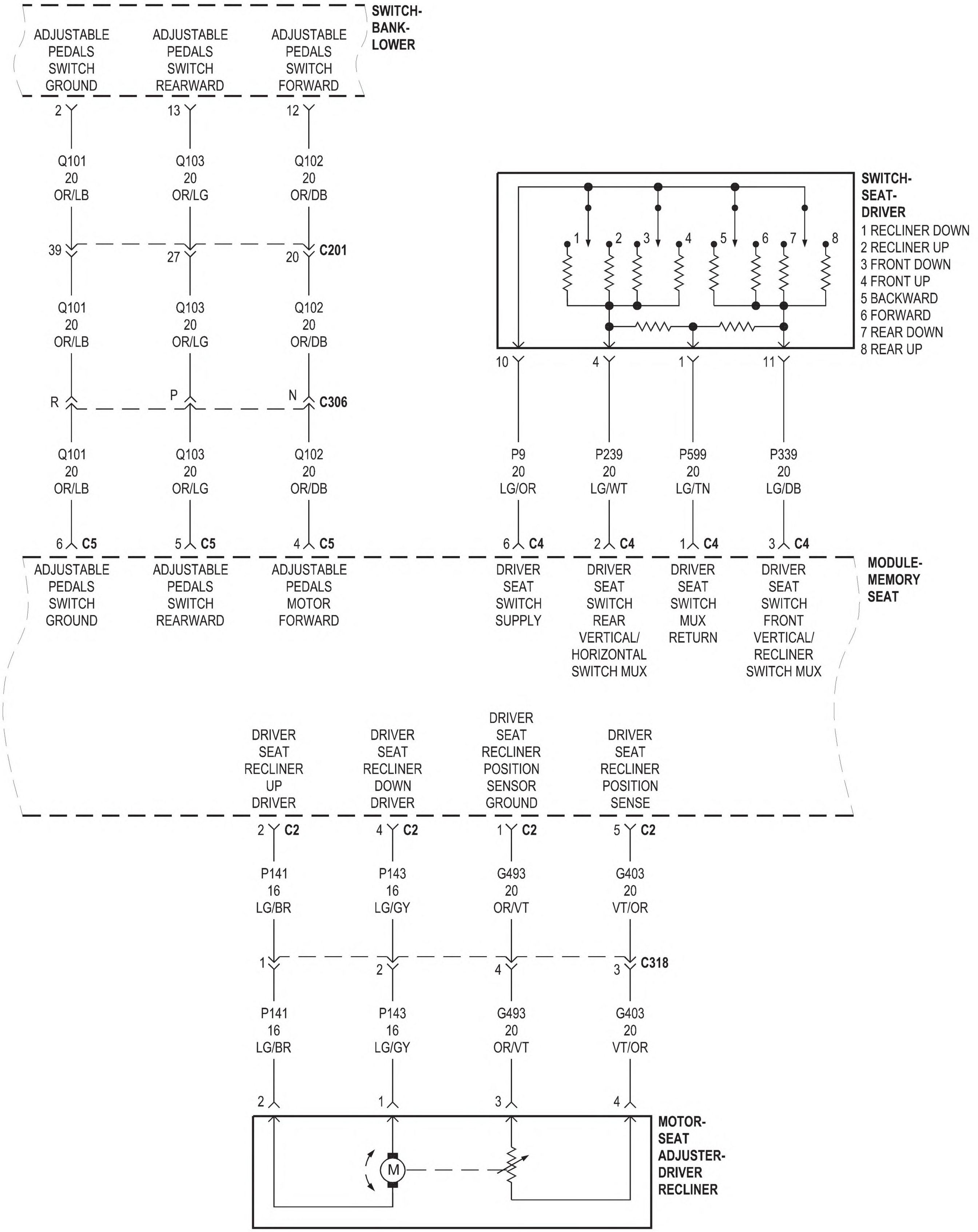
Component **Page**

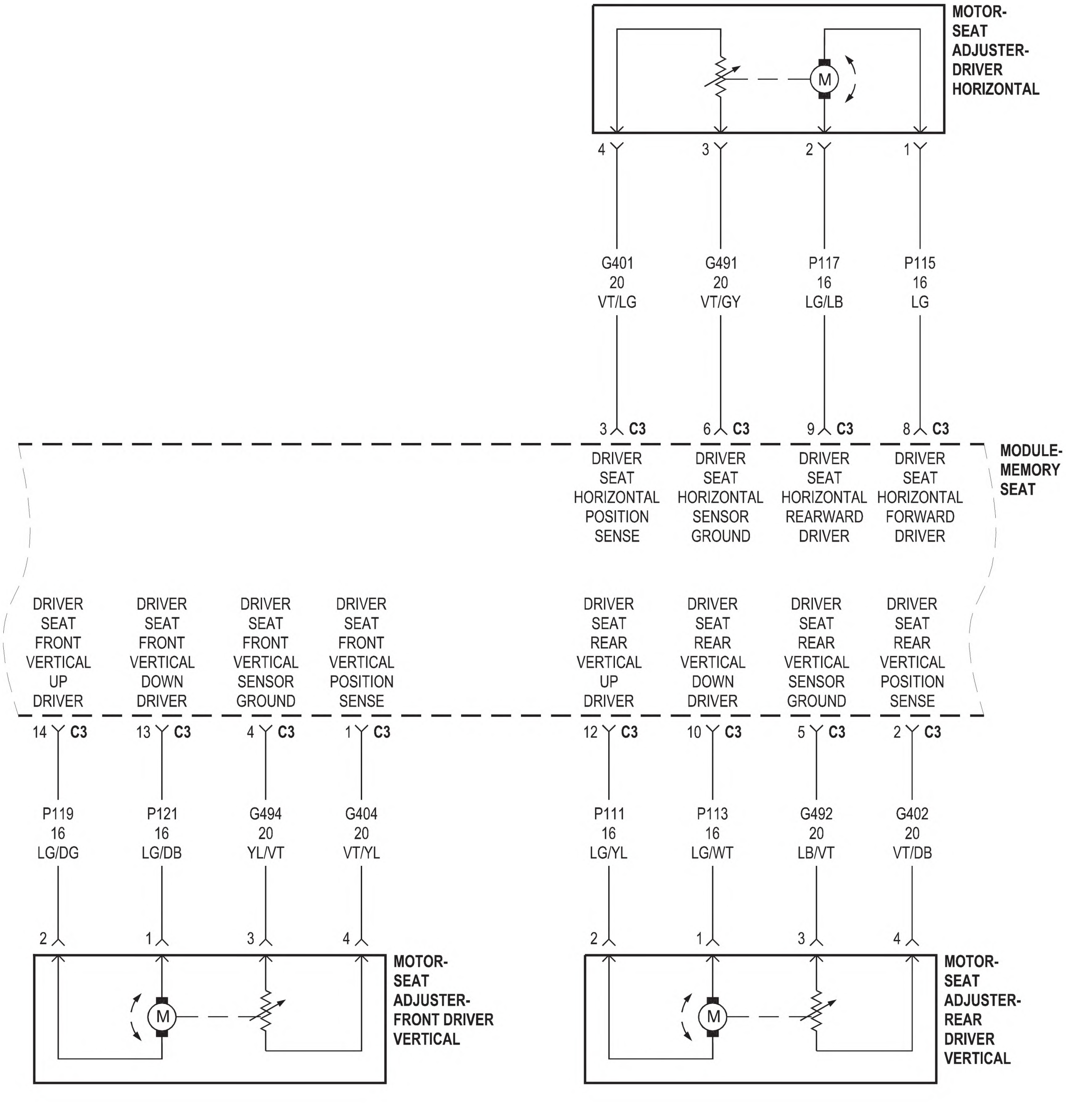
Circuit Breaker No. 2 . . . . 8W-63-2, 6
Circuit Breaker No. 2 (JB) 8W-63-5, 8
Cluster 8W-63-2, 7, 8
G300 . . . . 8W-63-6, 9
G303 . . . . 8W-63-2, 5, 8, 9
Heater-Cushion Pad-Left 8W-63-9
Heater-Cushion Pad-Right 8W-63-9
Heater-Seat Back-Left 8W-63-9
Heater-Seat Back-Right 8W-63-9
Junction Block 8W-63-2, 5, 6, 8
Module-Heated Seat 8W-63-6, 8, 9
Module-Memory Seat 8W-63-2, 3, 4
Motor-Adjustable Pedals 8W-63-2

Component **Page**

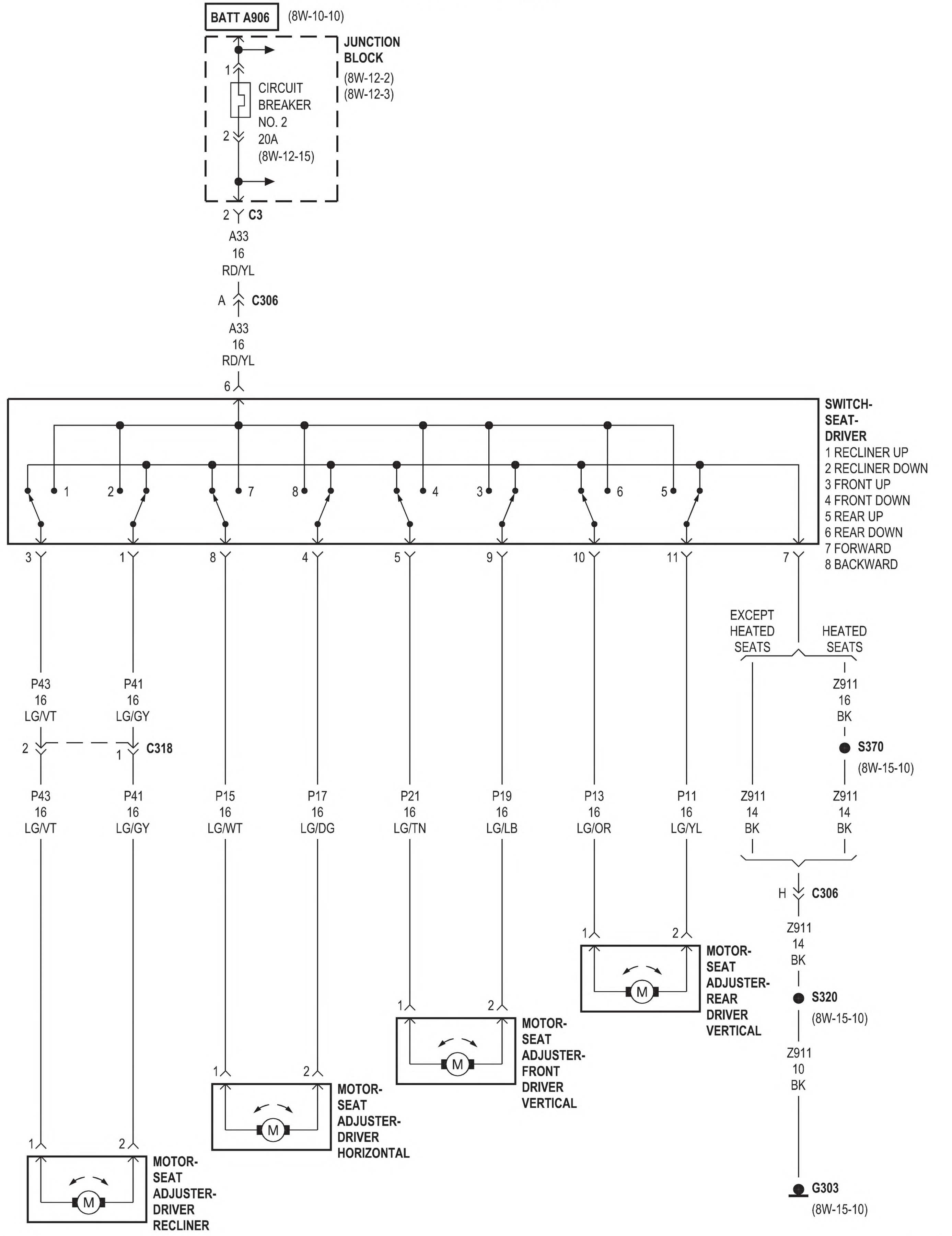
Motor-Seat Adjuster-Driver Horizontal . . 8W-63-4, 5
Motor-Seat Adjuster-Driver Recliner . . . 8W-63-3, 5
Motor-Seat Adjuster-Front Driver
  Vertical 8W-63-4, 5
Motor-Seat Adjuster-Passenger
  Horizontal 8W-63-6
Motor-Seat Adjuster-Passenger Recliner . . . 8W-63-6
Motor-Seat Adjuster-Rear Driver
  Vertical 8W-63-4, 5
Switch-Bank-Lower 8W-63-3, 7
Switch-Seat-Driver 8W-63-3, 5
Switch-Seat-Passenger 8W-63-6

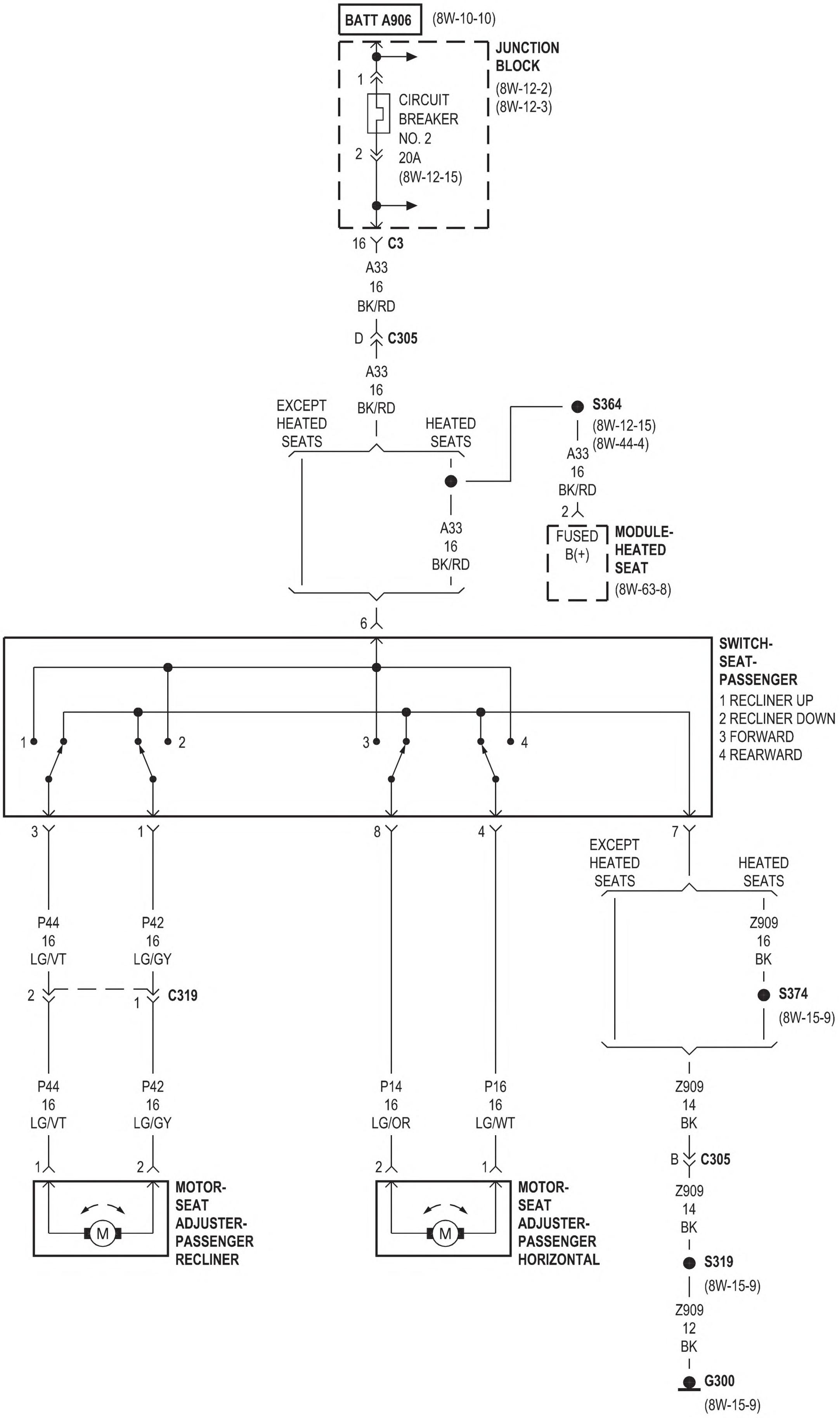

BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
CIRCUIT BREAKER NO. 2 20A (8W-12-15)
2
2 C3
A33 16 RD/YL
A
A33 16 RD/YL
8 C1
CLUSTER
(8W-40-3)
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206 (8W-18-6)
S205 (8W-18-4)
D55 20 WT/OR
D54 20 WT
8
7
C201
D55 20 WT/OR
D54 20 WT
S309 (8W-18-7)
S308 (8W-18-5)
D55 20 WT/OR
D54 20 WT
L
K
C306
D55 20 WT/OR
D54 20 WT
7 C1
5 C1
MODULE-MEMORY SEAT
FUSED B(+)
CAN B BUS (+)
CAN B BUS (-)
GROUND
ADJUSTABLE PEDALS SENSOR SUPPLY
ADJUSTABLE PEDALS SENSOR SIGNAL
ADJUSTABLE PEDALS SENSOR RETURN
ADJUSTABLE PEDALS MOTOR FORWARD
ADJUSTABLE PEDALS MOTOR REARWARD
10 C1
9 C1
14 C1
12 C1
1 C1
2 C1
EXCEPT HEATED SEATS
HEATED SEATS
Z911 14 BK
S370 (8W-15-10)
Z911 14 BK
Z911 14 BK
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
G
C
F
B
D
C306
G11 20 VT/TN
G12 20 VT/BR
G912 20 VT/WT
P205 16 LG/DB
P206 16 LG/TN
4
3
5
1
2
M
MOTOR-ADJUSTABLE PEDALS
(8W-56-6)
(8W-56-7)
H C306
Z911 14 BK
S320 (8W-15-10)
Z911 10 BK
G303 (8W-15-10)


SWITCH-BANK-LOWER
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS SWITCH FORWARD
2
13
12
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
39
27
20
C201
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
R
P
N
C306
Q101 20 OR/LB
Q103 20 OR/LG
Q102 20 OR/DB
6 C5
5 C5
4 C5
SWITCH-SEAT-DRIVER
1 RECLINER DOWN
2 RECLINER UP
3 FRONT DOWN
4 FRONT UP
5 BACKWARD
6 FORWARD
7 REAR DOWN
8 REAR UP
1
2
3
4
5
6
7
8
10
4
1
11
P9 20 LG/OR
P239 20 LG/WT
P599 20 LG/TN
P339 20 LG/DB
6 C4
2 C4
1 C4
3 C4
MODULE-MEMORY SEAT
ADJUSTABLE PEDALS SWITCH GROUND
ADJUSTABLE PEDALS SWITCH REARWARD
ADJUSTABLE PEDALS MOTOR FORWARD
DRIVER SEAT SWITCH SUPPLY
DRIVER SEAT SWITCH REAR VERTICAL/ HORIZONTAL SWITCH MUX
DRIVER SEAT SWITCH MUX RETURN
DRIVER SEAT SWITCH FRONT VERTICAL/ RECLINER SWITCH MUX
DRIVER SEAT RECLINER UP DRIVER
DRIVER SEAT RECLINER DOWN DRIVER
DRIVER SEAT RECLINER POSITION SENSOR GROUND
DRIVER SEAT RECLINER POSITION SENSE
2 C2
4 C2
1 C2
5 C2
P141 16 LG/BR
P143 16 LG/GY
G493 20 OR/VT
G403 20 VT/OR
1
2
4
3
C318
P141 16 LG/BR
P143 16 LG/GY
G493 20 OR/VT
G403 20 VT/OR
2
1
3
4
M
MOTOR-SEAT ADJUSTER-DRIVER RECLINER

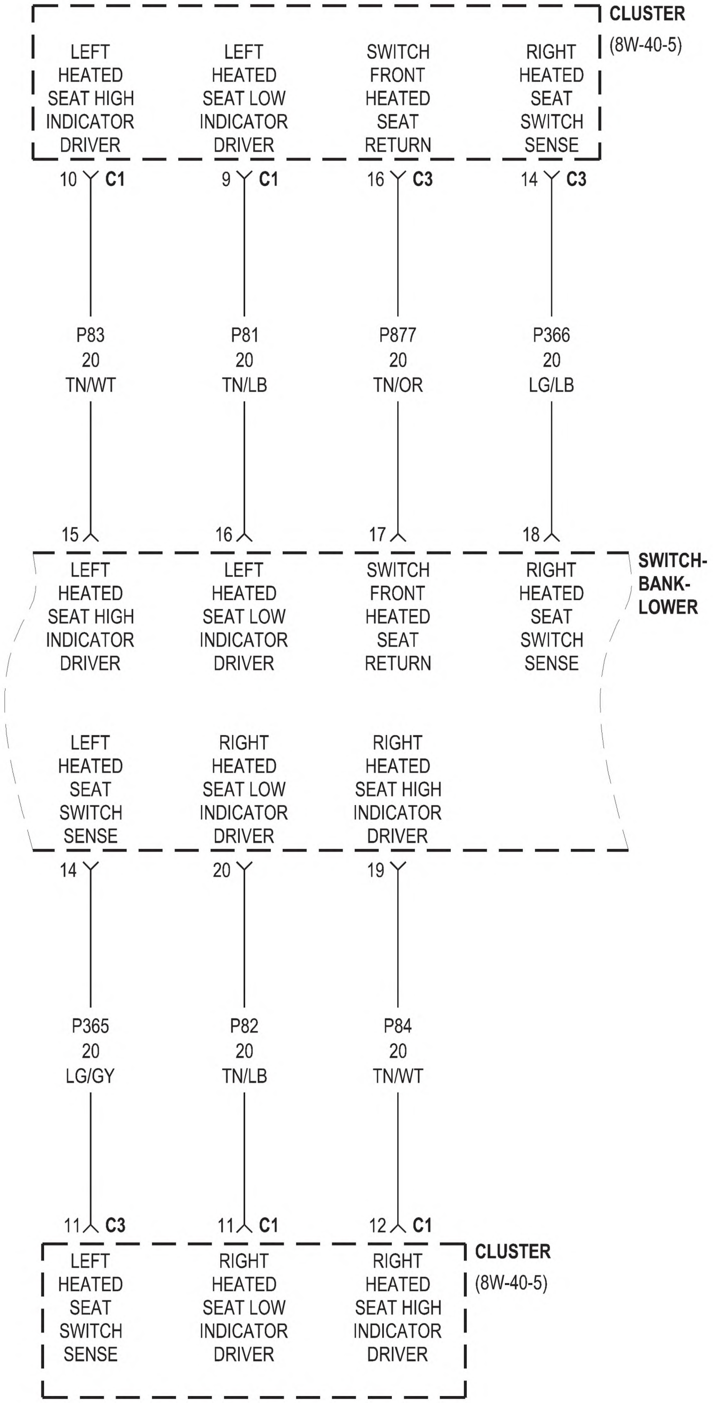

MOTOR-SEAT ADJUSTER-DRIVER HORIZONTAL
M
4
3
2
1
G401 20 VT/LG
G491 20 VT/GY
P117 16 LG/LB
P115 16 LG
3 C3
6 C3
9 C3
8 C3
MODULE-MEMORY SEAT
DRIVER SEAT HORIZONTAL POSITION SENSE
DRIVER SEAT HORIZONTAL SENSOR GROUND
DRIVER SEAT HORIZONTAL REARWARD DRIVER
DRIVER SEAT HORIZONTAL FORWARD DRIVER
DRIVER SEAT FRONT VERTICAL UP DRIVER
DRIVER SEAT FRONT VERTICAL DOWN DRIVER
DRIVER SEAT FRONT VERTICAL SENSOR GROUND
DRIVER SEAT FRONT VERTICAL POSITION SENSE
DRIVER SEAT REAR VERTICAL UP DRIVER
DRIVER SEAT REAR VERTICAL DOWN DRIVER
DRIVER SEAT REAR VERTICAL SENSOR GROUND
DRIVER SEAT REAR VERTICAL POSITION SENSE
14 C3
13 C3
4 C3
1 C3
12 C3
10 C3
5 C3
2 C3
P119 16 LG/DG
P121 16 LG/DB
G494 20 YL/VT
G404 20 VT/YL
P111 16 LG/YL
P113 16 LG/WT
G492 20 LB/VT
G402 20 VT/DB
2
1
3
4
2
1
3
4
M
M
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL

8W-63 POWER SEAT
EXCEPT MEMORY

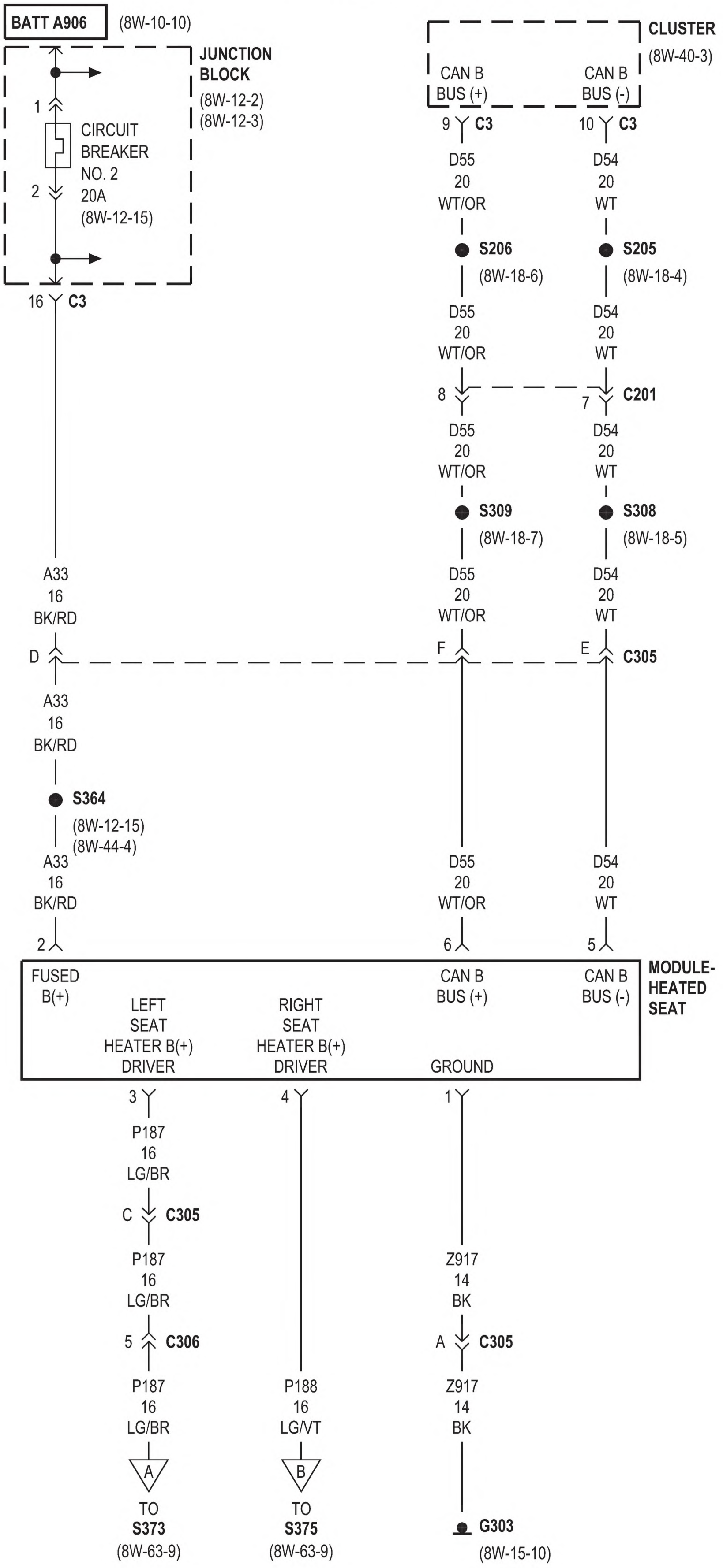

BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
CIRCUIT BREAKER NO. 2 20A
(8W-12-15)
2
2
C3
A33
16
RD/YL
A
C306
A33
16
RD/YL
6
SWITCH-SEAT-DRIVER
1 RECLINER UP
2 RECLINER DOWN
3 FRONT UP
4 FRONT DOWN
5 REAR UP
6 REAR DOWN
7 FORWARD
8 BACKWARD
1
2
7
8
4
3
6
5
3
1
8
4
5
9
10
11
7
EXCEPT HEATED SEATS
HEATED SEATS
P43
16
LG/VT
P41
16
LG/GY
2
1
C318
Z911
16
BK
S370
(8W-15-10)
P43
16
LG/VT
P41
16
LG/GY
P15
16
LG/WT
P17
16
LG/DG
P21
16
LG/TN
P19
16
LG/LB
P13
16
LG/OR
P11
16
LG/YL
Z911
14
BK
Z911
14
BK
H
C306
Z911
14
BK
S320
(8W-15-10)
Z911
10
BK
G303
(8W-15-10)
1
2
MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL
1
2
MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL
1
2
MOTOR-SEAT ADJUSTER-DRIVER HORIZONTAL
1
2
MOTOR-SEAT ADJUSTER-DRIVER RECLINER
M


BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
CIRCUIT BREAKER NO. 2 20A
(8W-12-15)
2
16 C3
A33 16 BK/RD
D C305
A33 16 BK/RD
EXCEPT HEATED SEATS
HEATED SEATS
S364
(8W-12-15)
(8W-44-4)
A33 16 BK/RD
2
FUSED B(+)
MODULE-HEATED SEAT
(8W-63-8)
A33 16 BK/RD
6
SWITCH-SEAT-PASSENGER
1 RECLINER UP
2 RECLINER DOWN
3 FORWARD
4 REARWARD
1
2
3
4
3
1
8
4
7
EXCEPT HEATED SEATS
HEATED SEATS
Z909 16 BK
S374
(8W-15-9)
P44 16 LG/VT
P42 16 LG/GY
2
1
C319
P44 16 LG/VT
P42 16 LG/GY
P14 16 LG/OR
P16 16 LG/WT
Z909 14 BK
B C305
Z909 14 BK
S319
(8W-15-9)
Z909 12 BK
G300
(8W-15-9)
1
2
2
1
M
M
MOTOR-SEAT ADJUSTER-PASSENGER RECLINER
MOTOR-SEAT ADJUSTER-PASSENGER HORIZONTAL

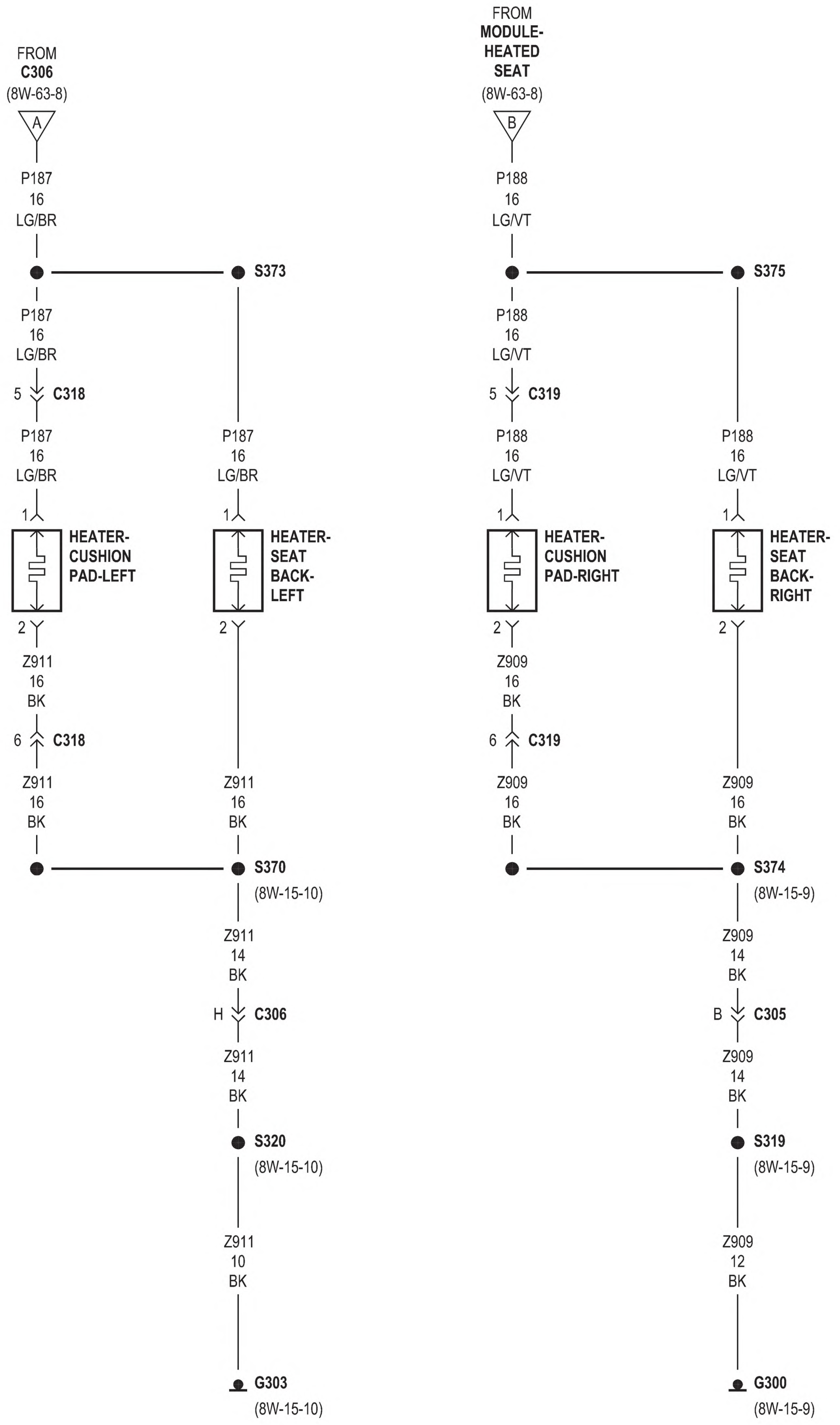
HEATED SEATS


CLUSTER
(8W-40-5)
LEFT HEATED SEAT HIGH INDICATOR DRIVER
LEFT HEATED SEAT LOW INDICATOR DRIVER
SWITCH FRONT HEATED SEAT RETURN
RIGHT HEATED SEAT SWITCH SENSE
10 C1
9 C1
16 C3
14 C3
P83 20 TN/WT
P81 20 TN/LB
P877 20 TN/OR
P366 20 LG/LB
15
16
17
18
SWITCH-BANK-LOWER
LEFT HEATED SEAT HIGH INDICATOR DRIVER
LEFT HEATED SEAT LOW INDICATOR DRIVER
SWITCH FRONT HEATED SEAT RETURN
RIGHT HEATED SEAT SWITCH SENSE
LEFT HEATED SEAT SWITCH SENSE
RIGHT HEATED SEAT LOW INDICATOR DRIVER
RIGHT HEATED SEAT HIGH INDICATOR DRIVER
14
20
19
P365 20 LG/GY
P82 20 TN/LB
P84 20 TN/WT
11 C3
11 C1
12 C1
CLUSTER
(8W-40-5)
LEFT HEATED SEAT SWITCH SENSE
RIGHT HEATED SEAT LOW INDICATOR DRIVER
RIGHT HEATED SEAT HIGH INDICATOR DRIVER

HEATED SEATS

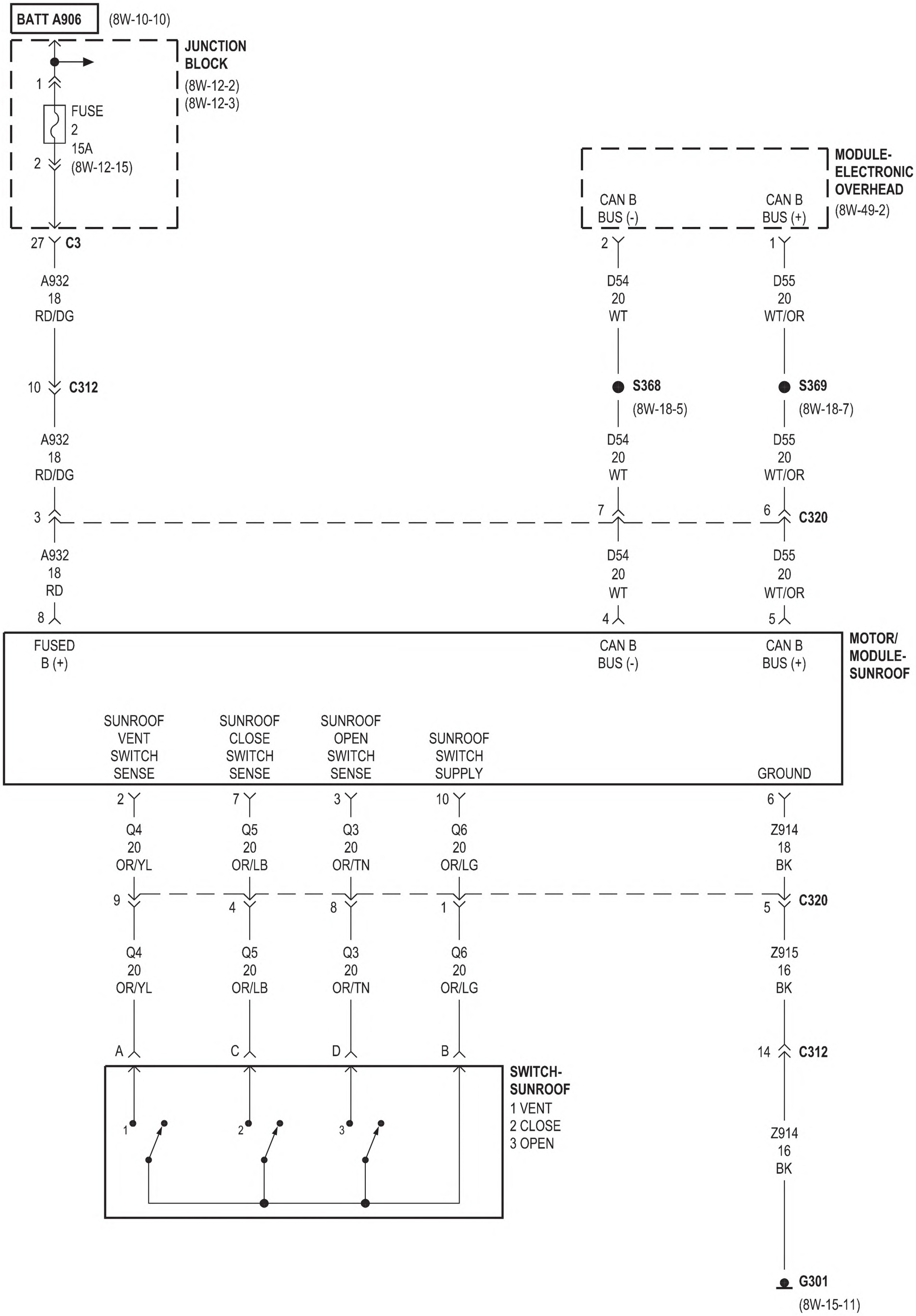

BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
CIRCUIT BREAKER NO. 2 20A
(8W-12-15)
2
16 C3
CLUSTER
(8W-40-3)
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
(8W-18-6)
S205
(8W-18-4)
D55 20 WT/OR
D54 20 WT
8
7 C201
D55 20 WT/OR
D54 20 WT
S309
(8W-18-7)
S308
(8W-18-5)
D55 20 WT/OR
D54 20 WT
A33 16 BK/RD
D
F
E C305
A33 16 BK/RD
S364
(8W-12-15)
(8W-44-4)
A33 16 BK/RD
D55 20 WT/OR
D54 20 WT
2
6
5
MODULE-HEATED SEAT
FUSED B(+)
LEFT SEAT HEATER B(+) DRIVER
RIGHT SEAT HEATER B(+) DRIVER
CAN B BUS (+)
CAN B BUS (-)
GROUND
3
4
1
P187 16 LG/BR
C C305
P187 16 LG/BR
5 C306
P187 16 LG/BR
P188 16 LG/VT
Z917 14 BK
A C305
Z917 14 BK
A
B
TO S373 (8W-63-9)
TO S375 (8W-63-9)
G303 (8W-15-10)

HEATED SEATS


FROM
C306
(8W-63-8)
A
P187
16
LG/BR
S373
P187
16
LG/BR
5
C318
P187
16
LG/BR
P187
16
LG/BR
1
HEATER-
CUSHION
PAD-LEFT
1
HEATER-
SEAT
BACK-
LEFT
2
Z911
16
BK
6
C318
Z911
16
BK
2
Z911
16
BK
S370
(8W-15-10)
Z911
14
BK
H
C306
Z911
14
BK
S320
(8W-15-10)
Z911
10
BK
G303
(8W-15-10)
FROM
MODULE-
HEATED
SEAT
(8W-63-8)
B
P188
16
LG/VT
S375
P188
16
LG/VT
5
C319
P188
16
LG/VT
P188
16
LG/VT
1
HEATER-
CUSHION
PAD-RIGHT
1
HEATER-
SEAT
BACK-
RIGHT
2
Z909
16
BK
6
C319
Z909
16
BK
2
Z909
16
BK
S374
(8W-15-9)
Z909
14
BK
B
C305
Z909
14
BK
S319
(8W-15-9)
Z909
12
BK
G300
(8W-15-9)

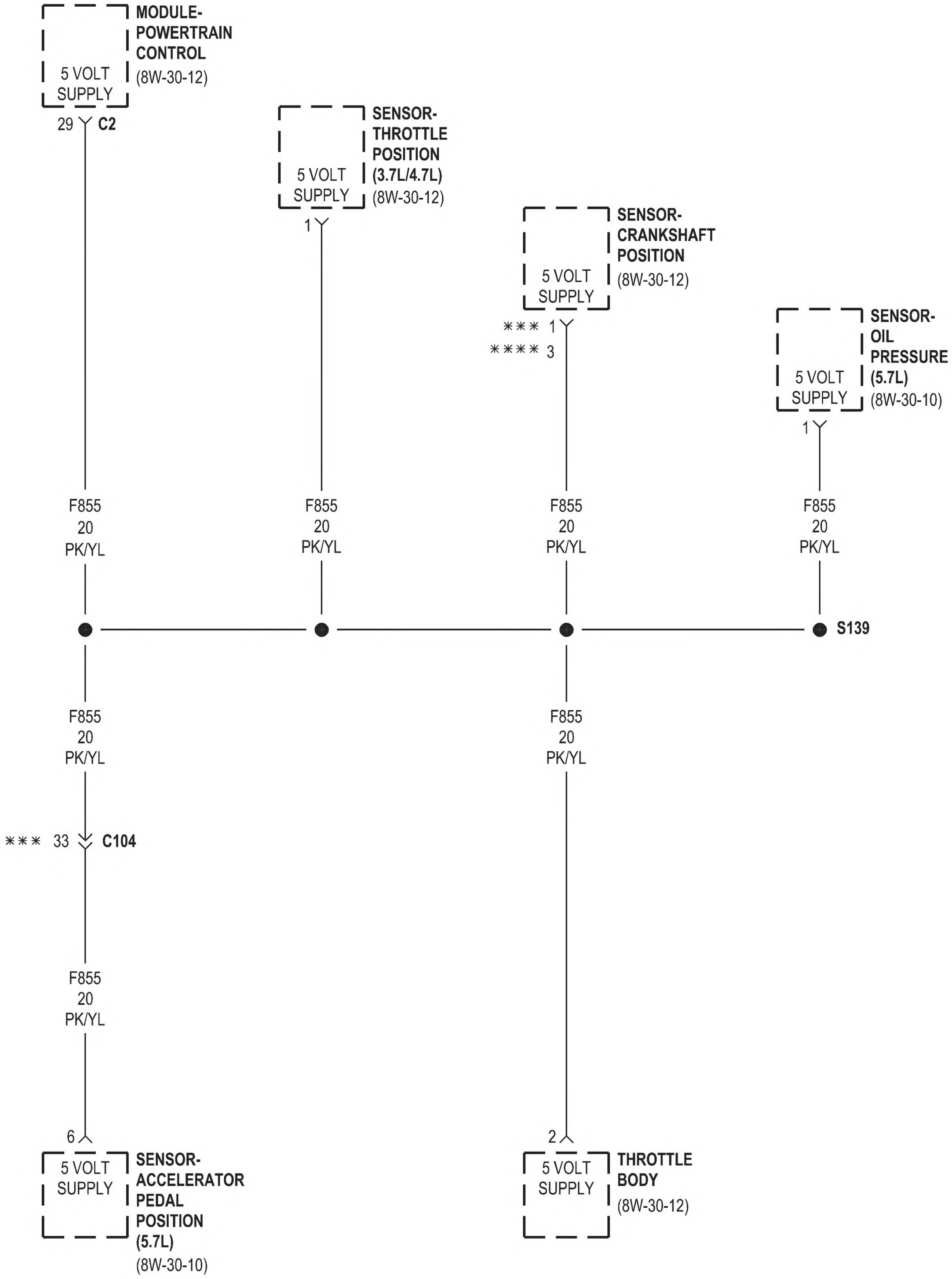
8W-64 POWER SUNROOF

Component	Page
Fuse 2	8W-64-2
G301	8W-64-2
Junction Block	8W-64-2
Module-Electronic Overhead	8W-64-2
Motor/Module-Sunroof	8W-64-2
Switch-Sunroof	8W-64-2


BATT A906
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
FUSE
2
15A
(8W-12-15)
2
27
C3
A932
18
RD/DG
10
C312
A932
18
RD/DG
3
A932
18
RD
8
MODULE-ELECTRONIC OVERHEAD
(8W-49-2)
CAN B BUS (-)
CAN B BUS (+)
2
1
D54
20
WT
D55
20
WT/OR
S368
(8W-18-5)
S369
(8W-18-7)
D54
20
WT
D55
20
WT/OR
7
6
C320
D54
20
WT
D55
20
WT/OR
4
5
MOTOR/ MODULE-SUNROOF
FUSED B (+)
CAN B BUS (-)
CAN B BUS (+)
SUNROOF VENT SWITCH SENSE
SUNROOF CLOSE SWITCH SENSE
SUNROOF OPEN SWITCH SENSE
SUNROOF SWITCH SUPPLY
GROUND
2
7
3
10
6
Q4
20
OR/YL
Q5
20
OR/LB
Q3
20
OR/TN
Q6
20
OR/LG
Z914
18
BK
9
4
8
1
5
C320
Q4
20
OR/YL
Q5
20
OR/LB
Q3
20
OR/TN
Q6
20
OR/LG
Z915
16
BK
A
C
D
B
14
C312
SWITCH-SUNROOF
1 VENT
2 CLOSE
3 OPEN
1
2
3
Z914
16
BK
G301
(8W-15-11)

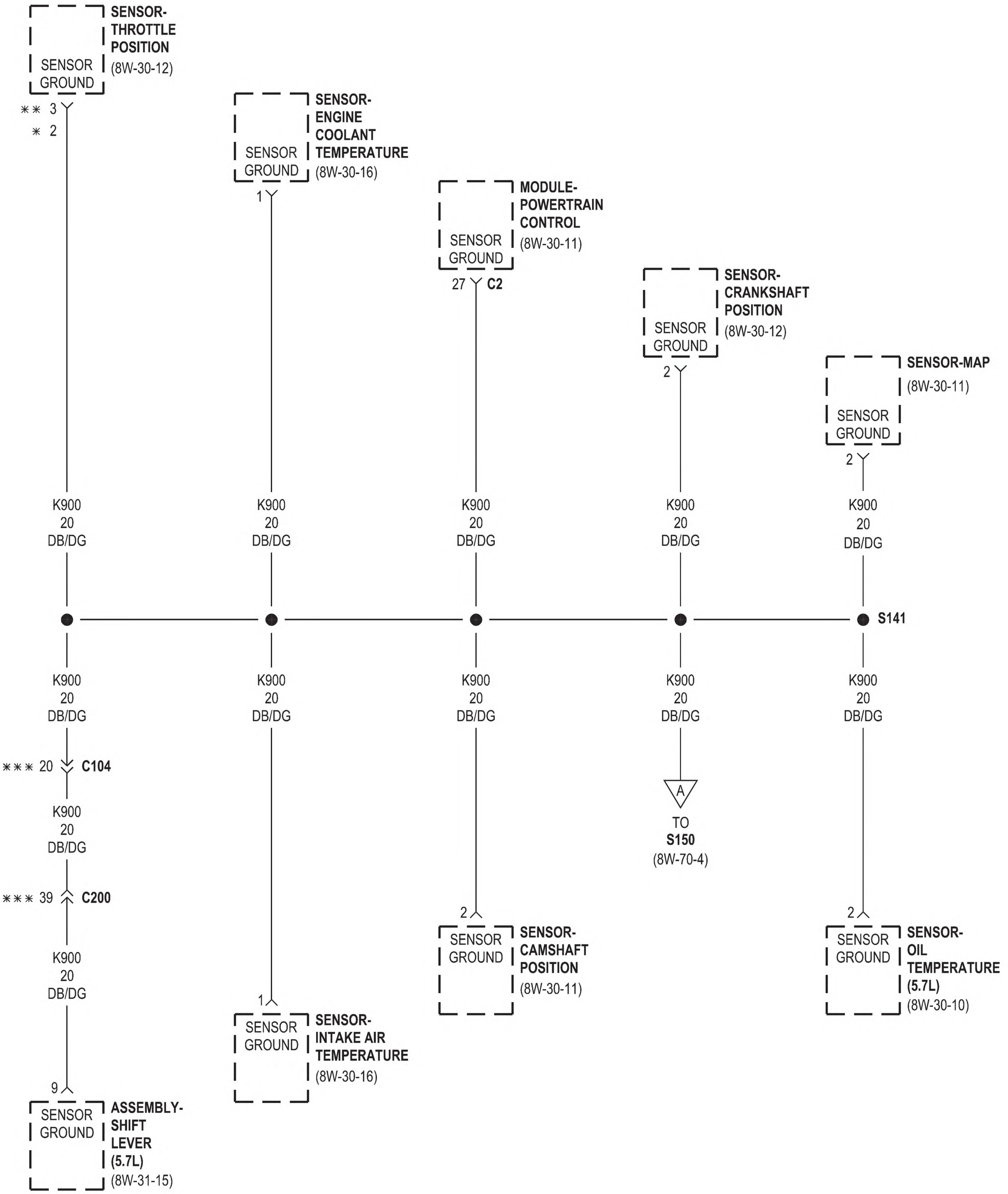
8W-70 SPLICE INFORMATION

Component	**Page**
S100	8W-31-13
S101	8W-70-4
S102	8W-18-4
S103	8W-18-6
S104	8W-18-8
S105	8W-18-3
S106	8W-13-19, 21
S107	8W-12-21
S110	8W-15-5
S111	8W-15-6
S114	8W-15-4
S116	8W-10-13
S118	8W-10-13
S119	8W-18-2
S120	8W-49-4
S121	8W-30-2, 3, 17
S122	8W-12-12
S123	8W-10-13
S126	8W-10-11
S127	8W-10-16
S128	8W-30-14, 18
S129	8W-15-2
S130	8W-10-14
S131	8W-10-10
S132	8W-13-21
S134	8W-15-4
S135	8W-15-6
S136	8W-15-3
S137	8W-10-15
S138	8W-10-19
S139	8W-70-2
S140	8W-30-11
S141	8W-70-3
S142	8W-30-9
S143	8W-30-8
S144	8W-31-8
S145	8W-31-4
S146	8W-15-5
S147	8W-15-6
S148	8W-10-15
S149	8W-10-19
S150	8W-70-4
S154	8W-30-5, 13
S198	8W-42-4
S200	8W-33-2
S201	8W-33-2
S202	8W-12-20
S203	8W-12-17
S204	8W-15-8
S205	8W-18-4
S206	8W-18-6
S207	8W-15-5
S208	8W-44-3
S209	8W-44-4
S210	8W-15-7
S211	8W-15-8
S212	8W-15-7
S213	8W-15-7
S214	8W-18-8
S215	8W-18-3
S216	8W-18-4
S217	8W-18-6
S218	8W-33-2
S219	8W-13-16
S220	8W-47-3
S221	8W-47-4
S222	8W-47-3
S223	8W-47-4
S224	8W-47-2
S225	8W-47-9
S226	8W-47-8
S227	8W-47-8
S228	8W-12-9
S230	8W-12-21
S231	8W-55-3
S232	8W-47-10
S233	8W-47-10
S300	8W-12-21
S301	8W-31-11
S302	8W-13-19
S303	8W-12-9
S304	8W-15-12
S305	8W-31-11
S307	8W-15-12
S308	8W-18-5
S309	8W-18-7
S311	8W-12-13
S312	8W-44-3
S313	8W-12-23
S314	8W-12-23
S315	8W-60-4
S316	8W-70-5
S317	8W-15-9
S318	8W-15-9
S319	8W-15-9
S320	8W-15-10
S321	8W-15-11
S322	8W-47-9
S323	8W-47-8
S324	8W-47-8
S325	8W-12-14
S326	8W-31-14
S327	8W-31-14
S328	8W-54-3
S329	8W-31-11
S333	8W-13-16
S333	8W-51-6
S335	8W-15-12
S337	8W-13-14
S338	8W-31-11
S340	8W-15-12
S341	8W-15-10
S342	8W-12-16
S343	8W-15-10
S344	8W-62-3
S345	8W-12-14
S348	8W-40-4
S349	8W-15-9
S350	8W-12-14
S351	8W-43-6
S352	8W-40-6
S353	8W-15-11
S354	8W-12-17
S355	8W-15-11
S356	8W-56-3
S357	8W-56-3
S361	8W-44-4
S362	8W-43-6
S364	8W-12-15
S364	8W-44-4
S365	8W-12-13
S366	8W-15-11
S367	8W-60-3, 4
S368	8W-18-5
S369	8W-18-7
S370	8W-15-10
S373	8W-63-9
S374	8W-15-9
S375	8W-63-9
S380	8W-49-3
S381	8W-49-3


MODULE-
POWERTRAIN
CONTROL
(8W-30-12)
5 VOLT SUPPLY
29 C2
SENSOR-
THROTTLE
POSITION
(3.7L/4.7L)
(8W-30-12)
5 VOLT SUPPLY
1
SENSOR-
CRANKSHAFT
POSITION
(8W-30-12)
5 VOLT SUPPLY
∗∗∗ 1
∗∗∗∗ 3
SENSOR-
OIL
PRESSURE
(5.7L)
(8W-30-10)
5 VOLT SUPPLY
1
F855 20 PK/YL
F855 20 PK/YL
F855 20 PK/YL
F855 20 PK/YL
S139
F855 20 PK/YL
F855 20 PK/YL
∗∗∗ 33 C104
F855 20 PK/YL
6
5 VOLT SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
(5.7L)
(8W-30-10)
2
5 VOLT SUPPLY
THROTTLE
BODY
(8W-30-12)

∗∗∗ 5.7L

∗∗∗∗ 3.7L/4.7L

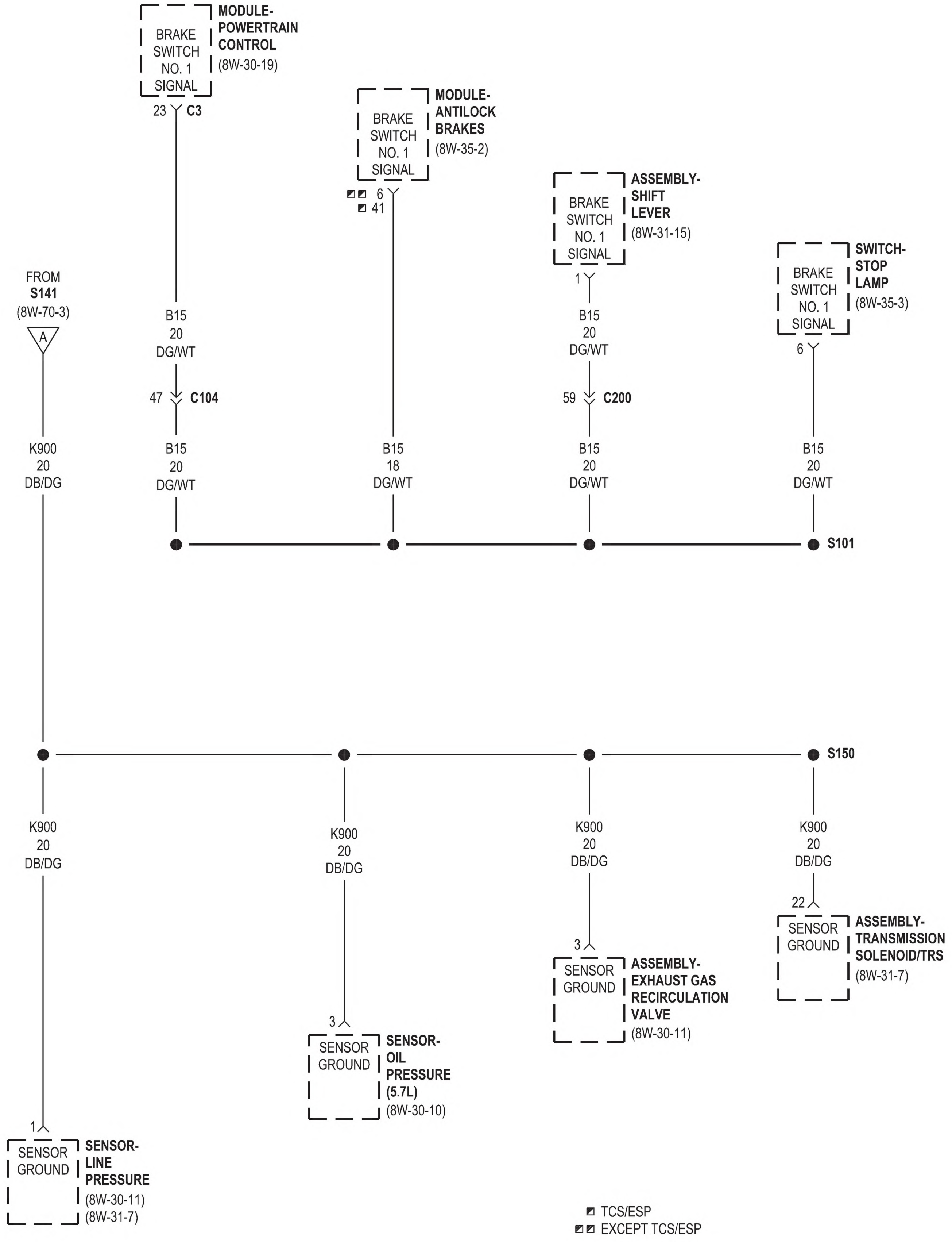

SENSOR-THROTTLE POSITION
(8W-30-12)
SENSOR GROUND
✱✱ 3
✱ 2
SENSOR-ENGINE COOLANT TEMPERATURE
(8W-30-16)
SENSOR GROUND
1
MODULE-POWERTRAIN CONTROL
(8W-30-11)
SENSOR GROUND
27
C2
SENSOR-CRANKSHAFT POSITION
(8W-30-12)
SENSOR GROUND
2
SENSOR-MAP
(8W-30-11)
SENSOR GROUND
2
K900 20 DB/DG
S141
✱✱✱ 20
C104
✱✱✱ 39
C200
9
SENSOR GROUND
ASSEMBLY-SHIFT LEVER (5.7L)
(8W-31-15)
1
SENSOR GROUND
SENSOR-INTAKE AIR TEMPERATURE
(8W-30-16)
2
SENSOR GROUND
SENSOR-CAMSHAFT POSITION
(8W-30-11)
A
TO S150
(8W-70-4)
2
SENSOR GROUND
SENSOR-OIL TEMPERATURE (5.7L)
(8W-30-10)

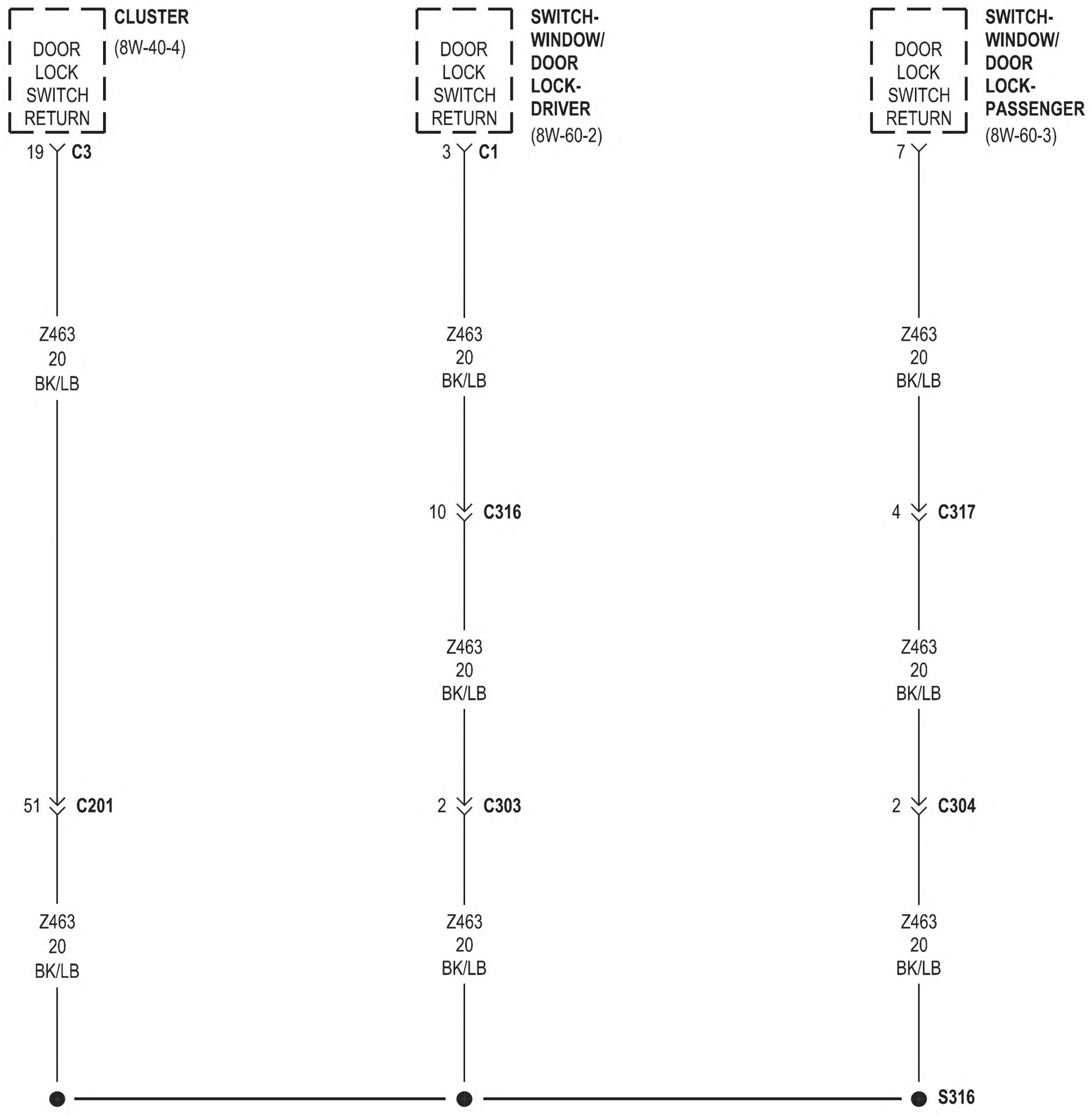
✱ 3.7L

✱✱ 4.7L

✱✱✱ 5.7L

4.7L/5.7L


MODULE-
POWERTRAIN
CONTROL
(8W-30-19)
BRAKE SWITCH NO. 1 SIGNAL
23 C3
B15 20 DG/WT
47 C104
B15 20 DG/WT
MODULE-
ANTILOCK
BRAKES
(8W-35-2)
BRAKE SWITCH NO. 1 SIGNAL
▨▨ 6
▨ 41
B15 18 DG/WT
ASSEMBLY-
SHIFT
LEVER
(8W-31-15)
BRAKE SWITCH NO. 1 SIGNAL
1
B15 20 DG/WT
59 C200
B15 20 DG/WT
SWITCH-
STOP
LAMP
(8W-35-3)
BRAKE SWITCH NO. 1 SIGNAL
6
B15 20 DG/WT
S101
FROM
S141
(8W-70-3)
A
K900 20 DB/DG
S150
K900 20 DB/DG
K900 20 DB/DG
K900 20 DB/DG
K900 20 DB/DG
1
SENSOR GROUND
SENSOR-
LINE
PRESSURE
(8W-30-11)
(8W-31-7)
3
SENSOR GROUND
SENSOR-
OIL
PRESSURE
(5.7L)
(8W-30-10)
3
SENSOR GROUND
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(8W-30-11)
22
SENSOR GROUND
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(8W-31-7)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


CLUSTER
(8W-40-4)
DOOR LOCK SWITCH RETURN
19
C3
Z463
20
BK/LB
51
C201
Z463
20
BK/LB
SWITCH-WINDOW/DOOR LOCK-DRIVER
(8W-60-2)
DOOR LOCK SWITCH RETURN
3
C1
Z463
20
BK/LB
10
C316
Z463
20
BK/LB
2
C303
Z463
20
BK/LB
SWITCH-WINDOW/DOOR LOCK-PASSENGER
(8W-60-3)
DOOR LOCK SWITCH RETURN
7
Z463
20
BK/LB
4
C317
Z463
20
BK/LB
2
C304
Z463
20
BK/LB
S316

8W-80 CONNECTOR PIN-OUTS

Component	Page
Actuator-Blend Door-Left	8W-80-5
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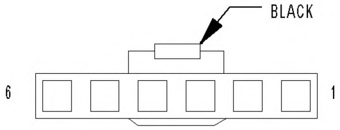
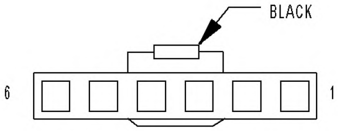


ACTUATOR-BLEND DOOR-LEFT

ACTUATOR-BLEND DOOR-LEFT - BLACK 6 WAY

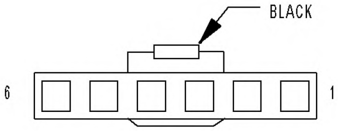
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	C255 20LG/YL	LEFT BLEND DOOR DRIVER
6	C55 20LB/YL	LEFT BLEND DOOR COMMON DRIVER



ACTUATOR-BLEND DOOR-RIGHT (ATC)

ACTUATOR-BLEND DOOR-RIGHT (ATC) - BLACK 6 WAY

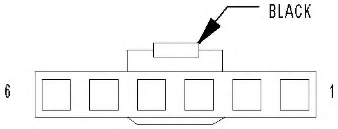
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	C61 20LB/GY	RIGHT BLEND DOOR DRIVER
6	C161 20LB/BR	RIGHT BLEND DOOR COMMON DRIVER



ACTUATOR-MODE DOOR-FRONT

ACTUATOR-MODE DOOR-FRONT - BLACK 6 WAY

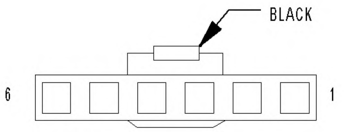
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	C266 20DB/WT	FRONT MODE DOOR DRIVER
6	C66 20DB/LB	FRONT MODE DOOR COMMON DRIVER



ACTUATOR-MODE DOOR-REAR

ACTUATOR-MODE DOOR-REAR - BLACK 6 WAY

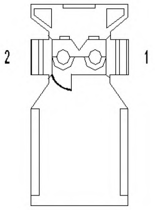
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	C139 20WT/BR	REAR MODE DOOR DRIVER
6	C939 20BR/PK	REAR MODE DOOR COMMON DRIVER



ACTUATOR-RECIRCULATION DOOR

ACTUATOR-RECIRCULATION DOOR - BLACK 6 WAY

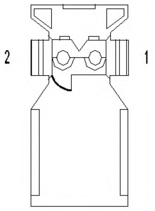
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	C268 20DB/OR	RECIRCULATION DOOR DRIVER
6	C68 20DG/WT	RECIRCULATION DOOR COMMON DRIVER



AIRBAG-DRIVER SQUIB 1

AIRBAG-DRIVER SQUIB 1 - 2 WAY

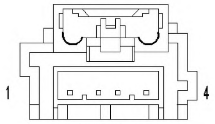
CAV	CIRCUIT	FUNCTION
1	R345 20LG/OR	DRIVER SQUIB 1 LINE 1
2	R343 20LG/BR	DRIVER SQUIB 1 LINE 2



AIRBAG-DRIVER SQUIB 2

AIRBAG-DRIVER SQUIB 2 - 2 WAY

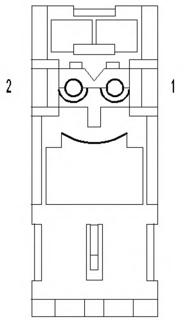
CAV	CIRCUIT	FUNCTION
1	R363 20LG/WT	DRIVER SQUIB 2 LINE 1
2	R361 20LG/VT	DRIVER SQUIB 2 LINE 2



AIRBAG-PASSENGER SQUIB

AIRBAG-PASSENGER SQUIB - 4 WAY

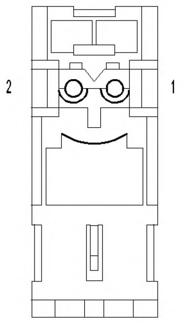
CAV	CIRCUIT	FUNCTION
1	R44 20LB/OR	PASSENGER SQUIB 1 LINE 1
2	R42 20LB/BR	PASSENGER SQUIB 1 LINE 2
3	R62 20LB/VT	PASSENGER SQUIB 2 LINE 2
4	R64 20LB/WT	PASSENGER SQUIB 2 LINE 1



AIRBAG-SIDE CURTAIN-LEFT

AIRBAG-SIDE CURTAIN-LEFT - 2 WAY

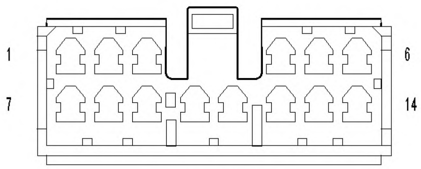
CAV	CIRCUIT	FUNCTION
1	R3 20LB/OR	LEFT CURTAIN SQUIB 1 LINE 1
2	R1 20LB/BR	LEFT CURTAIN SQUIB 1 LINE 2



AIRBAG-SIDE CURTAIN-RIGHT

AIRBAG-SIDE CURTAIN-RIGHT - 2 WAY

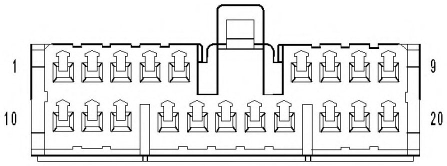
CAV	CIRCUIT	FUNCTION
1	R4 20OR/LB	RIGHT CURTAIN SQUIB 1 LINE 1
2	R2 20WT/LB	RIGHT CURTAIN SQUIB 1 LINE 2



AMPLIFIER-RADIO C1 (PREMIUM AUDIO)

AMPLIFIER-RADIO C1 (PREMIUM AUDIO) - 14 WAY

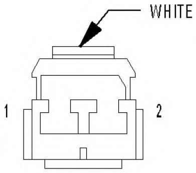
CAV	CIRCUIT	FUNCTION
1	X201 18GY/VT	AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
2	X202 18DG/VT	AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
3	X205 18GY/LG	AMPLIFIED LEFT REAR DOOR SPEAKER (+)
4	X206 18DG/LG	AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
5	-	-
6	-	-
7	X291 18GY/YL	AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
8	X292 18DG/YL	AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
9	X295 18GY/DG	AMPLIFIED LEFT REAR DOOR SPEAKER (-)
10	-	-
11	-	-
12	X296 18LG/GY	AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
13	-	-
14	-	-



AMPLIFIER RADIO C2 (PREMIUM AUDIO)

AMPLIFIER-RADIO C2 (PREMIUM AUDIO) - 20 WAY

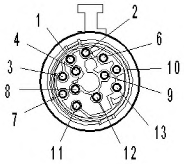
CAV	CIRCUIT	FUNCTION
1	X209 18GY/OR	AMPLIFIED LEFT I/P SPEAKER (+)
2	X208 18GY/DG	AMPLIFIED RIGHT I/P SPEAKER (+)
3	-	-
4	A116 16YL/RD	FUSED B(+)
5	-	-
6	D55 20WT/OR	CAN B BUS (+)
7	X51 18DG/DB	RADIO LEFT REAR AUDIO (+)
8	X52 18GY/DB	RIGHT REAR AUDIO (+)
9	Z514 16BK/LG	GROUND
10	X299 18GY/YL	AMPLIFIED LEFT I/P SPEAKER (-)
11	X298 18GY/LG	AMPLIFIED RIGHT I/P SPEAKER (-)
12	-	-
13	A116 16YL/RD	FUSED B(+)
14	-	-
15	-	-
16	-	-
17	D54 20WT	CAN B BUS (-)
18	X57 18DG/VT	LEFT REAR AUDIO (-)
19	X58 18GY/TN	RADIO RIGHT REAR AUDIO (-)
20	Z514 16BK/LG	GROUND



ANTENNA (EXPORT)

ANTENNA (EXPORT) - WHITE 2 WAY

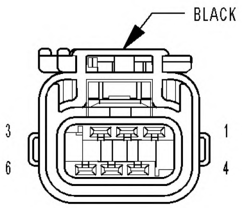
CAV	CIRCUIT	FUNCTION
1	A934 18RD/OR	FUSED RUN/ACCESSORY RELAY OUTPUT
2	-	-



ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)

ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L) - 13 WAY

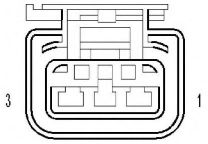
CAV	CIRCUIT	FUNCTION
1	T71 20YL/OR	INPUT SPEED SENSOR 2 (N3) SIGNAL
2	T76 20YL/TN	MODULATION PRESSURE SOLENOID CONTROL
3	T70 20YL	INPUT SPEED SENSOR 1 (N2) SIGNAL
4	T54 20DG/WT	TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
5	-	-
6	T78 18YL	SOLENOID SUPPLY VOLTAGE
7	T72 20YL/DB	SENSOR SUPPLY VOLTAGE
8	T74 18YL/LG	2-3 SOLENOID CONTROL
9	T73 18YL/GY	3-4 SOLENOID CONTROL
10	T77 20YL/BR	SHIFT PRESSURE SOLENOID CONTROL
11	T75 18YL/LB	TCC SOLENOID CONTROL
12	T13 20DG/VT	SENSOR GROUND
13	T60 18DG/BK	1-2/4-5 SOLENOID CONTROL



ASSEMBLY-EXHAUST GAS RECIRCULATION VALVE (4.7L/5.7L)

ASSEMBLY-EXHAUST GAS RECIRCULATION VALVE (4.7L/5.7L) - BLACK 6 WAY

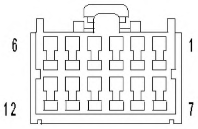
CAV	CIRCUIT	FUNCTION
1	K34 20DB/LG	EGR SIGNAL
2	F856 20YL/PK	5 VOLT SUPPLY
3	K900 20DB/DG	SENSOR GROUND
4	Z42 20BK/LG	GROUND
5	-	-
6	K35 20DB/VT	EGR SOL CONTROL



ASSEMBLY-NATURAL VACUUM LEAK DETECTION

ASSEMBLY-NATURAL VACUUM LEAK DETECTION - 3 WAY

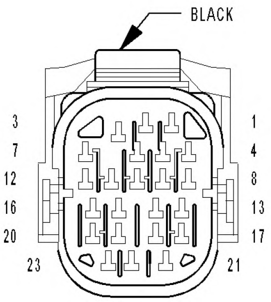
CAV	CIRCUIT	FUNCTION
1	Z912 18BK	GROUND
2	K107 20BR/LB	NVLD SWITCH SIGNAL
3	K106 20VT/LB	NVLD SOL CONTROL



ASSEMBLY-SHIFT LEVER

ASSEMBLY-SHIFT LEVER - 12 WAY

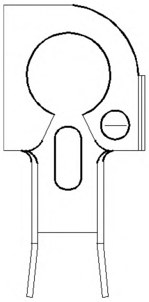
CAV	CIRCUIT	FUNCTION
1	B15 20DG/WT	BRAKE SWITCH NO. 1 SIGNAL
2	T5 20DG/YL (4.7L/5.7L)	AUTOSTICK UP/DOWN (ERS) SENSE
3	E2 20OR/BR	PANEL LAMPS DRIVER
4	D65 20WT/LG	CAN C BUS (+)
5	-	-
6	-	-
7	Z907 20BK	GROUND
8	-	-
9	K900 20DB/DG	SENSOR GROUND
10	-	-
11	D64 20WT/LB	CAN C BUS (-)
12	F1 20PK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)



ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)

ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE) - BLACK 23 WAY

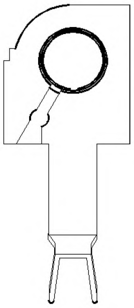
CAV	CIRCUIT	FUNCTION
1	-	-
2	T20 18DG/WT	L/R SOLENOID CONTROL
3	-	-
4	T41 20YL/DB	TRS T41 SENSE (P/N)
5	T42 20DG/YL	TRS T42 SENSE
6	-	-
7	T60 18YL/GY	OD SOLENOID CONTROL
8	T3 20DG/DB	TRS T3 SENSE
9	T1 20DG/LB	TRS T1 SENSE
10	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
11	T48 20BR/YL	4C PRESSURE SWITCH SENSE
12	T140 18YL/GY	PRESSURE CONTROL SOLENOID CONTROL
13	T4 20DG/LB	2-4 PRESSURE SWITCH SENSE
14	T50 16YL/TN	L/R PRESSURE SWITCH SENSE
15	T147 20DG/YL	2C PRESSURE SWITCH SENSE
16	T9 20DG/TN	OD PRESSURE SWITCH SENSE
17	T59 18YL/LB	UD SOLENOID CONTROL
18	T29 20YL/WT	UD PRESSURE SWITCH SENSE
19	T259 18YL/DG	4C SOLENOID CONTROL
20	T219 18YL/LG	2C SOLENOID CONTROL
21	T118 18DG	MS SOLENOID CONTROL
22	K900 20DB/DG	SENSOR GROUND
23	T54 20DG/OR	TRANSMISSION TEMPERATURE SENSOR SIGNAL



BATTERY-NEGATIVE (DIESEL)

BATTERY-NEGATIVE (DIESEL) - 1 WAY

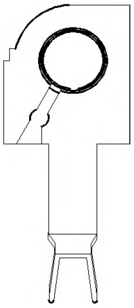
CAV	CIRCUIT	FUNCTION
1	Z1 04BK	GROUND
1	Z100 04BK/VT	GROUND



BATTERY-NEGATIVE (GAS)

BATTERY-NEGATIVE (GAS) - 1 WAY

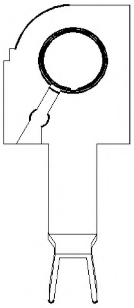
CAV	CIRCUIT	FUNCTION
1	Z1 06BK	GROUND
1	Z100 06BK/VT	GROUND



BATTERY-POSITIVE (GAS)

BATTERY-POSITIVE (GAS) - 1 WAY

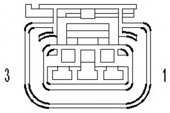
CAV	CIRCUIT	FUNCTION
1	A1 06RD	B(+)
1	A8 06RD	B(+)



BATTERY-POSITIVE (DIESEL)

BATTERY-POSITIVE (DIESEL) - 1 WAY

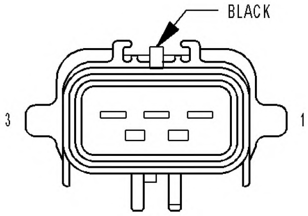
CAV	CIRCUIT	FUNCTION
1	A1 04RD	B(+)
1	A8 04RD	B(+)



C102

C102 - (HEADLAMP AND DASH SIDE)

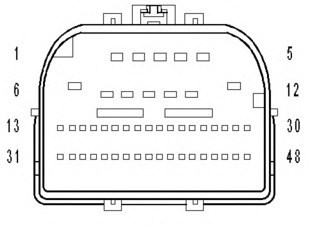
CAV	CIRCUIT
1	Z385 18BK (GAS)
2	K125 16BR/DG (GAS)
3	T750 12YL/GY



C102

C102 - BLACK (BATTERY SIDE)

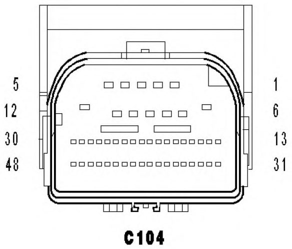
CAV	CIRCUIT
1	Z385 18BK (GAS)
2	K125 16BR/DG (GAS)
3	T750 12YL/GY



C104

C104 - (ENGINE SIDE)

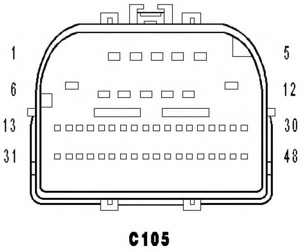
CAV	CIRCUIT
1	T16 16YL/OR (4.7L/5.7L)
2	Z903 16BK (4.7L/5.7L)
3	F42 16DG/LG (GAS)
4	Z816 16BK (GAS)
5	Z130 16BK/BR (GAS)
6	A15 16RD/TN
7	K107 20VT/WT (GAS)
8	F26 18PK/OR (GAS)
9	V72 20OR/VT (5.7L)
10	K342 20BR/WT (GAS)
11	T15 20YL/BR (4.7L/5.7L)
12	K125 16BR/DG (GAS)
13	D64 20WT/LB (GAS)
14	D65 20WT/LG (GAS)
15	C3 18DB/YL (GAS)
16	T71 20YL/OR (3.7L/DIESEL)
16	D15 20BR/WT (4.7L/5.7L)
17	D16 20WT/OR (4.7L/5.7L)
18	K400 20BR/VT (5.7L)
19	V32 20VT/YL (3.7L/4.7L)
19	K29 20WT/BR (5.7L)
20	K900 20DB/DG (GAS)
21	D118 20LG/WT (GAS)
22	D223 20WT/VT (GAS)
23	V71 20VT/OR (GAS)
24	F942 20PK/LG (GAS)
25	K31 20BR (GAS)
26	V937 20VT/BR (GAS)
27	K106 20VT/LB (GAS)
28	A209 18RD (GAS)
29	T76 20YL/TN (3.7L)
29	T5 20DG/YL (4.7L/5.7L)
30	T74 18YL/LG (3.7L)
30	T6 20DG (4.7L/5.7L)
31	Z153 18BK/GY (GAS)
32	T75 18YL/LB (3.7L)
32	F856 20YL/PK (5.7L)
33	T60 18DG/BK (3.7L)
33	F855 20PK/YL (5.7L)
34	T73 18YL/GY (3.7L)
34	B16 20LB/DG (5.7L)
35	T72 20YL/DB (3.7L)
36	T77 20YL/BR (3.7L)
36	K167 20BR/YL (5.7L)
37	T70 20YL (3.7L)
38	T78 18YL (3.7L)
38	K23 20BR/WT (5.7L)
39	T13 20DG/VT (3.7L)
40	T752 20DG/OR (GAS)
41	Z42 16BK/LG (GAS)
42	V36 20VT/YL (3.7L/4.7L)
43	T54 20DG/WT (3.7L)
43	F1 18PK/WT (4.7L/5.7L)
44	K70 20DB/BR (GAS)
45	K52 20DB/YL (GAS)
46	V35 20VT/OR (3.7L/4.7L)
47	B15 20DG/WT (GAS)
48	C13 20LB/OR (GAS)



C104

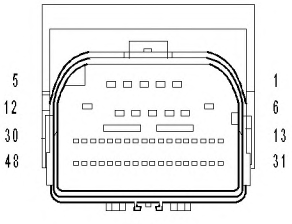
C104 - (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	T16 16YL/OR (4.7L/5.7L)
2	Z903 16BK (4.7L/5.7L)
3	F42 16DG/LG (GAS)
4	Z816 16BK (GAS)
5	Z130 14BK/BR (GAS)
6	A15 16RD/TN
7	K107 20BK/LB (GAS)
8	F26 18PK/OR (GAS)
9	V72 20OR/VT (GAS)
10	K342 20BR/WT (GAS)
11	T15 20YL/BR (4.7L/5.7L)
12	K125 16BR/DG (GAS)
13	D64 20WT/LB (GAS)
14	D65 20WT/LG (GAS)
15	C3 18DB/YL
16	T71 20YL/OR (3.7L/DIESEL)
16	D15 20BR/WT (4.7L/5.7L)
17	D16 20WT/OR (4.7L/5.7L)
18	K400 20BR/VT (5.7L)
19	V32 20VT/YL (3.7L/4.7L)
19	K29 20WT/BR (5.7L)
20	K900 20DB/DG
21	D118 20LG/WT (GAS)
22	D223 20WT/VT (GAS)
23	V71 20VT/OR (GAS)
24	F942 20PK/LG (GAS)
25	K31 20BR (GAS)
26	V937 20VT/BR (GAS)
27	F944 18PK/TN (DIESEL)
27	K106 20VT/LB (GAS)
28	A209 18RD (GAS)
29	T76 20YL/TN (3.7L/DIESEL)
29	T5 20DG/YL (4.7L/5.7L)
30	T74 18YL/LG (3.7L/DIESEL)
30	T6 20DG (4.7L/5.7L)
31	Z153 18BK/GY
32	T75 18YL/LB (3.7L/DIESEL)
32	F856 20YL/PK (5.7L)
33	T60 18DG/BK (3.7L/DIESEL)
33	F855 20PK/YL (5.7L)
34	T73 18YL/GY (3.7L/DIESEL)
34	B16 20LB/DG (5.7L)
35	T72 20YL/DB (3.7L/DIESEL)
36	T77 20YL/BR (3.7L/DIESEL)
36	K167 20BR/TN (5.7L)
37	T70 20YL (3.7L/DIESEL)
38	T78 18YL (3.7L/DIESEL)
38	K23 20BR/LB (5.7L)
39	T13 20DG/VT (3.7L/DIESEL)
40	T752 20DG/OR (GAS)
41	Z42 16BK/LG (3.7L/DIESEL)
42	V36 20VT/YL (3.7L/4.7L)
43	T54 20DG/WT (3.7L/DIESEL)
43	F1 18PK/WT (4.7L/5.7L)
44	K70 20DB/BR (GAS)
45	K52 20DB/YL (GAS)
46	V35 20VT/OR (3.7L/4.7L)
47	B15 20DG/WT (GAS)
48	C13 20LB/OR (GAS)



C105 - (UNDERBODY SIDE)

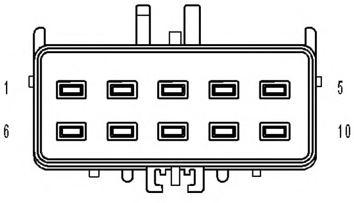
CAV	CIRCUIT
1	A35 18RD/DG (EXPORT)
2	A930 14RD/WT (EXPORT/TRAILER TOW)
3	A109 16TN/RD
4	A909 14RD
5	L76 18WT/BR
6	-
7	K504 20BR (EXCEPT 3.7L)
8	B400 14DG
9	L1 18WT/LG
10	A907 14RD/DB (EXPORT)
11	L50 18WT/TN
12	-
13	D702 20WT/YL (EXPORT)
14	D708 20WT/LB (EXPORT)
15	D709 20WT/BR (EXPORT)
16	K977 16BR/LB (EXCEPT 3.7L)
17	F921 20PK/GY (EXCEPT 3.7L)
18	B1 20DG/DB
19	B2 20DG/WT
20	D54 20WT (EXCEPT 3.7L)
21	D55 20WT/OR (EXCEPT 3.7L)
22	B3 20DG/YL
23	B4 20LG/YL
24	D64 20WT/LB (EXCEPT 3.7L)
25	D65 20WT/LG (EXCEPT 3.7L)
26	F924 20PK/YL
27	G95 20VT/WT (EXPORT)
28	D706 20WT/TN (EXPORT)
29	D707 20WT/LG (EXPORT)
30	Z210 20BK
31	D705 20WT/OR (EXPORT)
32	X778 20GY/DB (EXPORT)
33	Z172 20BK/OR (EXPORT)
34	N4 20DB/YL
35	L62 18WT/OR
36	L63 18WT/DG
37	L777 20WT/BR
38	L778 20WT/DB
39	A926 18RD/TN
40	A927 18RD/BR
41	K106 20VT/LB (GAS)
42	K107 20BR/LB (GAS)
43	L614 18WT/DB
44	L615 18WT/YL
45	D508 20WT/TN
46	Z169 20BK/LG (EXPORT)
47	X702 20GY/LB (EXPORT)
48	D778 20WT/OR (EXPORT)



C105

C105 - (HEADLAMP AND DASH SIDE)

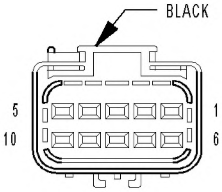
CAV	CIRCUIT
1	A35 18RD/DG (EXPORT)
2	A930 14RD/YL
3	A109 16TN/RD
4	A909 14RD
5	L76 18WT/BR
6	-
7	K504 20BR (EXCEPT 3.7L)
8	B400 14DG
9	L1 18WT/LG
10	A907 14RD/DB (EXPORT)
11	L50 18WT/TN
12	-
13	D702 20WT/YL (EXPORT)
14	D708 20WT/LB (EXPORT)
15	D709 20WT/BR (EXPORT)
16	K977 20BR/LB (EXCEPT 3.7L)
17	F921 20PK/GY (DHS)
18	B1 18DG/DB
19	B2 18DG/WT
20	D54 20WT (EXCEPT 3.7L)
21	D55 20WT/OR (EXCEPT 3.7L)
22	B3 18DG/YL
23	B4 18LG/YL
24	D64 20WT/LB (EXCEPT 3.7L)
25	D65 20WT/LG (EXCEPT 3.7L)
26	F924 20PK/YL
27	G95 20VT/WT (EXPORT)
28	D706 20WT/TN (EXPORT)
29	D707 20WT/LG (EXPORT)
30	Z210 20BK
31	D705 20WT/OR (EXPORT)
32	X778 20GY/DB (EXPORT)
33	Z172 20BK/OR (EXPORT)
34	N4 20DB/YL
35	L62 18WT/OR
36	L63 18WT/DG
37	L777 20WT/BR
38	L778 20WT/DB
39	A926 18RD/TN
40	A927 18RD/BR
41	K106 20VT/LB (GAS)
42	K107 20BK/LB (GAS)
43	L614 18WT/DB
44	L615 18WT/YL
45	D508 20WT/TN
46	Z169 20BK/LG (EXPORT)
47	X702 20GY/LB (EXPORT)
48	D778 20WT/OR (EXPORT)



C111
(DHS)

C111 (DHS) - (UNDERBODY SIDE)

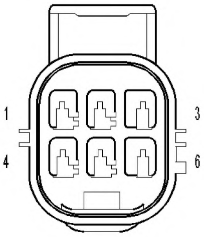
CAV	CIRCUIT
1	T306 20DG/DB
2	T301 20DG/YL
3	S72 20GY/BR
4	S61 20GY/DG
5	S80 20GY/LB
6	S950 20GY/TN
7	S62 20GY/TN
8	S50 20GY/WT
9	S60 20GY/YL
10	-



C111
(DHS)

C111 (DHS) - (CRADLE FRONT SIDE)

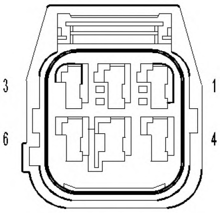
CAV	CIRCUIT
1	T306 20DG/DB
2	T301 20DG/YL
3	S72 20GY/BR
4	S61 20GY/DG
5	S80 20GY/LB
6	S950 20GY/TN
7	S62 20GY/TN
8	S50 20GY/WT
9	S60 20GY/YL
10	-



C112
(5.7L)

C112 (5.7L) - (ENGINE SIDE)

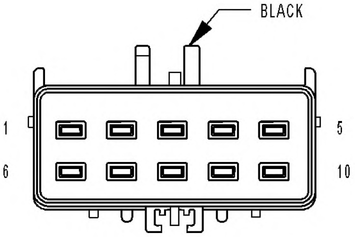
CAV	CIRCUIT
1	K451 18BR/WT
2	K452 18BR/LB
3	K453 18BR/DG
4	K454 18BR/OR
5	-
6	Z42 20BK/LG



C112
(5.7L)

C112 (5.7L) - (MDS SIDE)

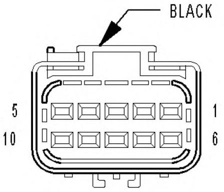
CAV	CIRCUIT
1	K451 20BR/WT
2	K452 20BR/LB
3	K453 20BR/DG
4	K454 20BR/OR
5	-
6	Z42 20BK/LG



C113
(EXPORT)

C113 (EXPORT) - BLACK (FRONT FASCIA SIDE)

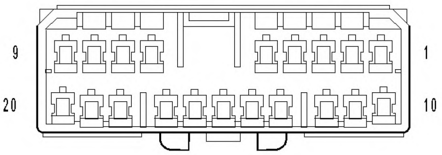
CAV	CIRCUIT
1	D702 20WT/YL
2	D705 20WT/OR
3	D706 20WT/TN
4	D707 20WT/LG
5	D708 20WT/LB
6	D709 20WT/BR
7	X702 20GY/LB
8	Z169 20BK/LG
9	-
10	-



C113
(EXPORT)

C113 (EXPORT) - BLACK (HEADLAMP AND DASH SIDE)

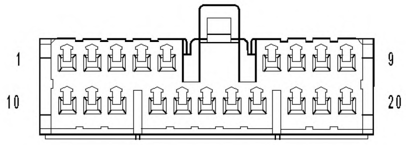
CAV	CIRCUIT
1	D702 20WT/YL
2	D705 20WT/OR
3	D706 20WT/TN
4	D707 20WT/LG
5	D708 20WT/LB
6	D709 20WT/BR
7	X702 20GY/LB
8	Z169 20BK/LG
9	-
10	-



C114
(DIESEL/3.7L A/T)

C114 (DIESEL/3.7L A/T) - (HEADLAMP AND DASH SIDE)

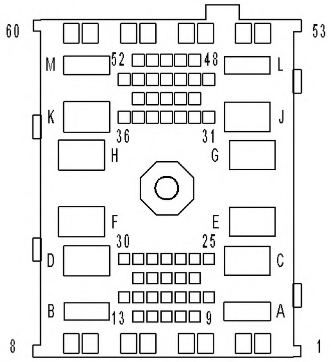
CAV	CIRCUIT
1	D223 20WT/VT
2	T76 20YL/TN
3	T71 20YL/OR
4	T74 18YL/LG
5	T75 18YL/LB
6	T60 18DG/BK
7	T73 18YL/GY
8	T72 20YL/DB
9	T77 20YL/BR
10	-
11	T78 18YL
12	D65 20WT/LG
13	D64 20WT/LB
14	F946 20PK/DG
15	T13 20DG/VT
16	T54 20DG/WT
17	Z904 18BK
18	T70 20YL
19	-
20	-



C114
(DIESEL/3.7L A/T)

C114 (DIESEL/3.7L A/T) - (TRANSMISSION SIDE)

CAV	CIRCUIT
1	D223 20WT/VT
2	T76 20YL/TN
3	T71 20YL/OR
4	T74 18YL/LG
5	T75 18YL/LB
6	T60 18DG/BK
7	T73 18YL/GY
8	T72 20YL/DB
9	T77 20YL/BR
10	-
11	T78 18YL
12	D65 20WT/LG
13	D64 20WT/LB
14	F946 20PK/LG
15	T13 20DG/VT
16	T54 20DG/OR
17	Z904 18BK
18	T70 20YL
19	-
20	-



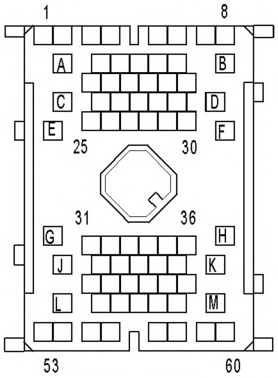
C200

C200 - (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	D508 20WT/TN
2	L1 18WT/LG
3	F26 18PK/OR
4	A106 18LB/RD
5	Z172 20BK/OR
6	K504 20BR
7	A72 18RD/OR
8	-
9	V937 20VT/BR
10	G95 20VT/WT
11	D71 20WT/DB
12	D72 20WT/LB
13	L778 20WT/DB
14	F20 20PK/GY
15	D64 20WT/LB
16	D65 20WT/LG
17	B46 18LB/DB
18	G94 18VT/DB
19	Z11 20BK/LG
20	Z111 20BK/WT
21	K977 20BR/LB
22	D15 20BR/WT
23	D16 20WT/OR
24	T5 20DG/YL
25	D118 20LG/WT
26	X778 20GY/DB
27	V72 20OR/VT
28	G4 18VT/LB
29	R79 20LB/VT

C200 - (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
30	R81 20LB/WT
31	D55 20WT/OR
32	D54 20WT
33	F100 20PK/VT
34	-
35	V71 20VT/OR
36	D778 20WT/OR
37	D51 18WT/BR
38	L91 20WT/TN
39	K900 20DB/DG
40	N4 20DB/YL
41	D96 20WT/LB
42	D52 18WT/LB
43	-
44	-
45	L777 20WT/BR
46	L13 20WT/YL
47	D223 20WT/VT
48	R80 20VT/LB
49	R82 20WT/LB
50	Z210 20BK
51	F1 18PK/WT
52	-
53	-
54	K342 20BR/WT
55	-
56	-
57	-
58	-
59	B15 20DG/WT
60	T6 20DG
A	-
B	-
C	C7 12DB
D	-
E	N114 10DB/LB (DIESEL)
F	N115 10DB/YL (DIESEL)
G	N113 10DB/OR (DIESEL)
H	C105 20LB/LG
J	-
K	-
L	-
M	-



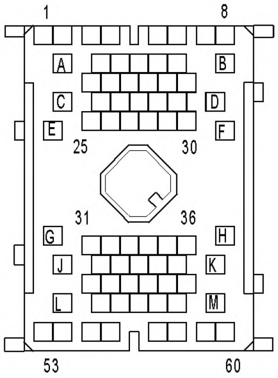
C200

C200 - (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	D508 20WT/GY
2	L1 16WT/LG
3	F26 16PK/OR
4	A106 16LB/RD
5	Z172 20BK/OR
6	K504 20BR
7	A72 16RD/OR
8	-
9	V937 20VT/BR
10	G95 20VT/BR
11	D71 20WT/DB
12	D72 20WT/LB
13	L778 20WT/LB
14	F20 20PK/GY
15	D64 20WT/LB
16	D65 20WT/LG
17	B46 20DG/WT
18	G94 20VT/DB
19	Z11 20BK/LG
20	Z111 20BK/WT
21	K977 16BR/WT
22	D15 20BR/WT
23	D16 20WT/OR
24	T5 20DG/YL
25	D118 20LG/WT
26	X778 20GY/DB
27	V72 20OR/VT
28	G4 20VT/LB
29	R79 20LB/VT
30	R81 20LB/WT
31	D55 20WT/OR
32	D54 20WT
33	F100 20PK/VT
34	-
35	V71 20VT/OR
36	D778 20WT/OR
37	D51 20WT/BR
38	L91 20WT/DB
39	K900 20DB/DG
40	N4 20DB/YL
41	D96 20WT/BK
42	D52 20WT/LB
43	-
44	-
45	L777 20WT/VT
46	L13 20WT/YL
47	D223 20WT/VT
48	R80 20VT/LB
49	R82 20WT/LB
50	Z210 20BK
51	F1 20PK/WT
52	-
53	
54	K342 20BR/WT

C200 - (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
55	K343 20BR/YL
56	-
57	-
58	-
59	B15 20DG/WT
60	T6 20DG
A	-
B	-
C	C7 12DB
D	-
E	N114 10DB/LB (DIESEL)
F	N115 10DB/YL (DIESEL)
G	N113 10DB/OR (DIESEL)
H	C105 18LB/LG
J	-
K	-
L	-
M	-



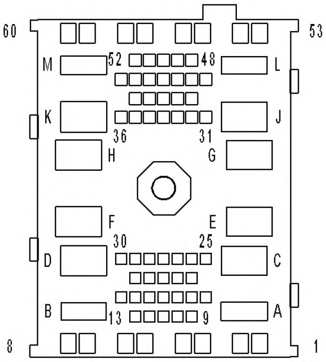
C201

C201 - (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	Q80 20OR/VT
2	L1 16WT/LG
3	E2 20OR/BR
4	-
5	G80 20VT/BR
6	G76 20VT/YL
7	D54 20WT
8	D55 20WT/OR
9	M22 20YL/OR
10	D500 20WT
11	X53 18DG
12	X55 18DG/BR
13	G10 20VT/LG
14	X57 18DG/VT
15	X51 18DG/DB
16	D51 20WT/BR
17	D52 20WT/LB
18	X208 18GY/DG
19	X298 18GY/LG
20	Q102 20OR/DB
21	M28 20YL/TN
22	-
23	X209 18GY/OR
24	X299 18GY/YL
25	X54 18GY
26	X56 18GY/BR
27	Q103 20OR/LG
28	X917 20DG
29	G75 20VT
30	G94 20VT/DB
31	W14 20BR/LB
32	W13 20BR/LG

C201 - (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
33	G161 20VT/DG
34	G4 20VT/LB
35	-
36	X17 20DG/OR
37	G160 20VT/BR
38	X16 20DG/YL
39	Q101 20OR/LB
40	X58 18GY/TN
41	X52 18GY/DB
42	G74 20VT/WT
43	-
44	D96 20WT/BK
45	-
46	G78 20VT/OR
47	-
48	L777 20WT/VT
49	-
50	-
51	Z463 20BK/LB
52	-
53	P205 16LG/DB
54	P206 16LG/TN
55	G77 20VT/GY
56	-
57	-
58	-
59	-
60	-
A	Z915 20BK
B	-
C	-
D	-
E	-
F	-
G	-
H	R21 20LB/WT
J	R22 20WT/LB
K	R23 20LB/DB
L	R24 20YL/LB
M	-



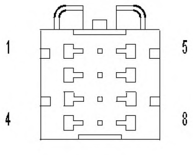
C200

C201 - (BODY SIDE)

CAV	CIRCUIT
1	Q80 20OR/VT
2	L1 16WT/LG
3	-
4	-
5	G80 20VT/BR
6	G76 20VT/YL
7	D54 20WT
8	D55 20WT/OR
9	M22 20YL/OR
10	-
11	X53 18DG
12	X55 18DG/BR
13	G10 20VT/LG
14	X57 18DG/VT
15	X51 18DG/DB
16	D51 20WT/BR
17	D52 20WT/LB
18	X208 18GY/DG
19	X298 18GY/LG
20	Q102 20OR/DB
21	M28 20YL/TN
22	-
23	X209 18GY/OR
24	X299 18GY/YL
25	X54 18GY
26	X56 18GY/BR
27	Q103 20OR/LG
28	X917 20DG
29	G75 20VT
30	G94 20VT/DB
31	W14 20BR/LB
32	W13 20BR/LG
33	G161 20VT/DG
34	G4 20VT/LB
35	-
36	X17 20DG/LB
37	G160 20VT/BR
38	X16 20DG/YL
39	Q101 20OR/LB
40	X58 18GY/TN
41	X52 18GY/DB
42	G74 20VT/WT
43	-
44	D96 20WT/BK
45	-
46	G78 20VT/OR
47	-
48	L777 20WT/VT
49	-
50	-
51	Z463 20BK/LB
52	-
53	P205 16LG/DB
54	P206 16LG/TN

C201 - (BODY SIDE)

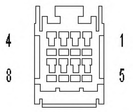
CAV	CIRCUIT
55	G77 20VT/GY
56	-
57	-
58	-
59	-
60	-
A	Z915 18BK
B	-
C	-
D	-
E	-
F	-
G	-
H	-
J	-
K	-
L	-
M	-



C203

C203 - (AUXILIARY AUDIO SIDE)

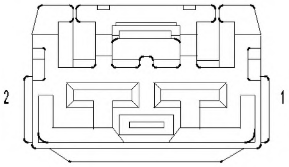
CAV	CIRCUIT
1	X712 20DG/LB
2	X722 20LB/DG
3	X792 20LB/YL
4	X793 20DG/OR
5	X739 20GY/YL
6	X735 20GY/LB
7	X835 20OR/GY
8	-



C203

C203 - (INSTRUMENT PANEL SIDE)

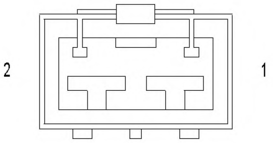
CAV	CIRCUIT
1	X712 20DG/LB
2	X722 20LB/DG
4	X793 20DG/OR
5	X730 20GY/YL
6	X735 20GY/LB
7	X835 20OR/GY
8	-



C205

C205 - (INSTRUMENT PANEL SIDE)

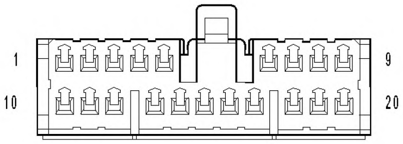
CAV	CIRCUIT
1	C7 12DB
2	Z134 12BK/LG



C205

C205 - LT. GRAY (HVAC JUMPER SIDE)

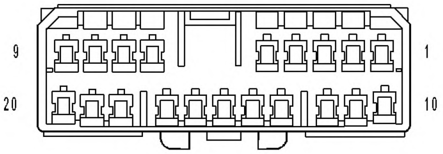
CAV	CIRCUIT
1	C7 12DB
2	Z134 12BK/LG



C301

C301 - (BODY SIDE)

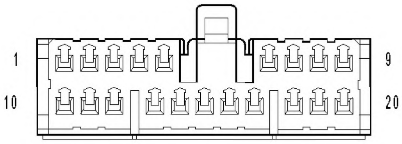
CAV	CIRCUIT
1	A931 20RD/WT
2	G160 20VT/BR
3	Q16 16OR/TN
4	Q611 16OR/GY
5	G161 20VT/DG
6	P701 16LG/DG
7	C17 20LB/WT
8	P110 20LB/WT
9	P699 20LG/YL
10	Q412 16OR/LB
11	G75 20VT
12	P114 20TN/WT
13	P112 20TN/OR
14	-
15	Q411 16OR/WT
16	-
17	Q612 16OR/DB
18	D54 20WT
19	D55 20WT/OR
20	P72 20TN/GY



C301

C301 - (DRIVER DOOR SIDE)

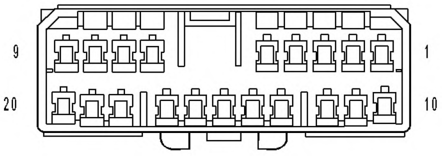
CAV	CIRCUIT
1	A931 20RD/WT
2	G160 20VT/BR
3	Q16 16OR/TN
4	Q611 16OR/GY
5	G161 20VT/DG
6	P701 16LG/DG
7	C17 20LB/WT
8	P110 20LB/WT
9	P699 20LG/YL
10	Q412 16OR/LB
11	G75 20VT
12	P114 20TN/WT
13	P112 20TN/OR
14	G74 20VT/WT
15	Q411 16OR/WT
16	-
17	Q612 16OR/DB
18	D54 20WT
19	D55 20WT/OR
20	P72 20TN/GY



C302

C302 - (BODY SIDE)

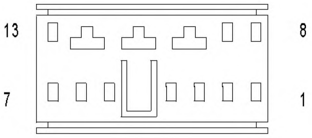
CAV	CIRCUIT
1	-
2	-
3	C17 20LB/DG
4	-
5	-
5	G161 20VT/DG (3.7L RHD)
6	G160 20VT/BR (EXCEPT 3.7L RHD)
7	Z908 20BK
8	P699 20LG/YL (EXPORT)
9	-
10	-
11	-
12	P110 20LB/WT (EXPORT)
13	Q16 16OR/TN
14	P792 16LG/TN
15	P778 16LG/LB
16	-
17	G75 20VT (3.7L RHD)
18	Q26 16OR/GY
19	G74 20VT/WT (EXCEPT 3.7L RHD)
20	P76 20TN/LB (3.7L)



C302

C302 - (PASSENGER DOOR SIDE)

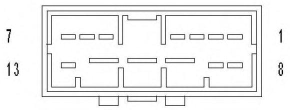
CAV	CIRCUIT
1	-
2	-
3	C17 20LB/DG (EXCEPT MEMORY MIRRORS)
4	-
5	G161 20VT/DG (RHD)
6	G160 20VT/BR (LHD)
7	Z908 20BK
8	P699 20LG/YL (HEATED MIRRORS)
9	-
10	-
11	-
12	P110 20LB/WT (HEATED MIRRORS)
13	Q16 16OR/TN
14	P792 16LG/TN
15	P778 16LG/LB
16	-
17	G75 20VT (RHD)
18	Q26 16OR/GY
19	G74 20VT/WT (LHD)
20	P76 20TN/LB (EXCEPT MEMORY MIRRORS)



C303

C303 - (BODY SIDE)

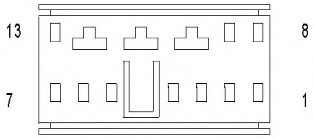
CAV	CIRCUIT
1	P74 20TN/OR (MEMORY MIRRORS)
2	Z463 20BK/LB (MEMORY MIRRORS)
3	X55 18DG/BR (EXCEPT PREMIUM AUDIO)
3	X291 18GY/YL (PREMIUM AUDIO)
4	X53 18DG (EXCEPT PREMIUM AUDIO)
4	X201 18GY/VT (PREMIUM AUDIO)
5	P778 16LG/LB
6	Q26 16OR/GY
7	P76 20TN/LB (EXCEPT PREMIUM AUDIO)
8	-
9	-
10	A929 16RD/DB
11	Z911 16BK
12	Q15 16OR/LB
13	-



C303

C303 - (DRIVER DOOR SIDE)

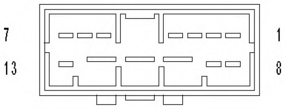
CAV	CIRCUIT
1	P74 20TN/OR (EXCEPT MEMORY MIRRORS)
2	Z463 20BK/LB (EXCEPT MEMORY MIRRORS)
3	X291 18GY/YL
4	X201 18GY/VT
5	P778 16LG/LB
6	Q26 16OR/GY
7	P76 20TN/LB (EXCEPT MEMORY MIRRORS)
8	-
9	-
10	A929 16RD/DB
11	Z911 16BK
12	Q15 16OR/LB
13	-



C304

C304 - (BODY SIDE)

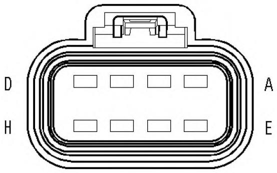
CAV	CIRCUIT
1	A931 20RD/WT (MEMORY)
2	Z463 20BK/LB (EXCEPT MEMORY MIRRORS)
3	X56 18GY/BR (EXCEPT PREMIUM AUDIO)
3	X292 18DG/YL (PREMIUM AUDIO)
4	X54 18GY (EXCEPT PREMIUM AUDIO)
4	X202 18DG/VT (PREMIUM AUDIO)
5	P72 20TN/GY (EXCEPT MEMORY MIRRORS)
6	-
7	P74 20TN/OR (EXCEPT MEMORY MIRRORS)
8	D54 20WT (MEMORY MIRRORS)
9	D55 20WT/OR (MEMORY MIRRORS)
10	A929 16RD/LG
11	Q15 16OR/LB
12	-
13	-



C304

C304 - (PASSENGER DOOR SIDE)

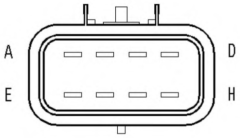
CAV	CIRCUIT
1	A931 20RD/WT (MEMORY MIRRORS)
2	Z463 20BK/LB (EXCEPT MEMORY MIRRORS)
3	X292 18DG/YL
4	X202 18DG/VT
5	P72 20TN/GY (EXCEPT MEMORY MIRRORS)
6	-
7	P74 20TN/OR (EXCEPT MEMORY MIRRORS)
8	D54 20WT (MEMORY MIRRORS)
9	D55 20WT/OR (MEMORY MIRRORS)
10	A929 16RD/LG
11	Q15 16OR/LB
12	-
13	-



C305

C305 - (BODY SIDE)

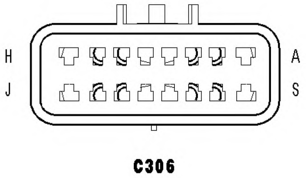
CAV	CIRCUIT
A	Z917 14BK (LHD EXCEPT EXPORT 3.7L)
B	Z909 14BK
C	P187 16LG/BR (LHD EXCEPT EXPORT 3.7L)
D	A33 16BK/RD
E	D54 20WT (LHD EXCEPT EXPORT 3.7L)
F	D55 20WT/OR (LHD EXCEPT EXPORT 3.7L)
G	P188 16LG/VT (RHD MEMORY SEAT)
H	-



C305

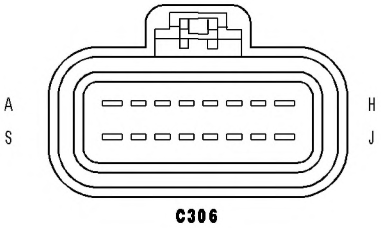
C305 - (PASSENGER SEAT SIDE)

CAV	CIRCUIT
A	Z917 14BK (LHD HEATED SEATS)
B	Z909 14BK
C	P187 16LG/BR (LHD HEATED SEATS)
D	A33 16BK/RD
E	D54 20WT (LHD HEATED SEATS)
F	D55 20WT/OR (LHD HEATED SEATS)
G	P188 16LG/VT (RHD)
H	-



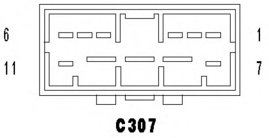
C306 - (DRIVER SEAT SIDE)

CAV	CIRCUIT
A	A33 16RD/YL
B	P205 16LG/DB (LHD MEMORY)
C	G12 20VT/BR (LHD MEMORY)
D	P206 16LG/TN (LHD MEMORY)
E	P187 16LG/BR (LHD HEATED SEATS)
F	G912 20VT/WT (LHD MEMORY)
G	G11 20VT/TN (LHD MEMORY)
H	Z911 14BK
J	P188 16LG/VT (RHD HEATED SEATS)
K	D54 20WT (MEMORY)
L	D55 20WT/OR (MEMORY/HEATED SEATS)
M	-
N	Q102 20OR/DB (LHD MEMORY)
P	Q103 20OR/LG (LHD MEMORY)
R	Q101 20OR/LB (LHD MEMORY)
S	Z917 14BK (RHD HEATED SEATS)



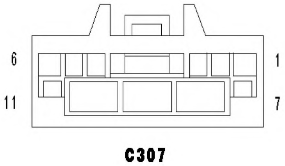
C306 - (BODY SIDE)

CAV	CIRCUIT
A	A33 16RD/YL
B	P205 16LG/DB (LHD MEMORY)
C	G12 20VT/BR (LHD MEMORY)
D	P206 16LG/TN (LHD MEMORY)
E	P187 16LG/BR (LHD HEATED SEATS)
F	G912 20VT/WT (LHD MEMORY)
G	G11 20VT/TN (LHD MEMORY)
H	Z911 14BK
J	P188 16LG/VT (RHD HEATED SEATS)
K	D54 20WT (MEMORY)
L	D55 20WT/OR (MEMORY/HEATED SEATS)
M	-
N	Q102 20OR/DB (LHD MEMORY)
P	Q103 20OR/LG (LHD MEMORY)
R	Q101 20OR/LB (LHD MEMORY)
S	Z917 14BK (RHD HEATED SEATS)



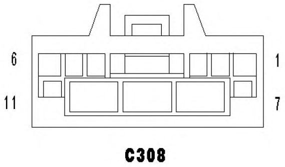
C307 - (LEFT REAR DOOR SIDE)

CAV	CIRCUIT
1	Q611 16OR/GY
2	Q411 16OR/WT
3	G77 20VT/GY
4	Z911 20BK
5	X205 18GY/LG
6	X295 18GY/DG
7	-
8	Q15 16OR/LB
9	P778 16LG/LB
10	P792 16LG/TN
11	-



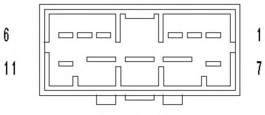
C307 - (BODY SIDE) 11 WAY

CAV	CIRCUIT
1	Q611 16OR/GY
2	Q411 16OR/WT
3	G77 20VT/GY
4	Z911 20BK
5	X51 18DG/DB (EXCEPT PREMIUM AUDIO)
5	X205 18GY/LG (PREMIUM AUDIO)
6	X57 18DG/VT (EXCEPT PREMIUM AUDIO)
6	X295 18GY/DG (PREMIUM AUDIO)
7	-
8	Q15 16OR/LB
9	P778 16LG/LB
10	P792 16LG/TN
11	-



C308 - (BODY SIDE)

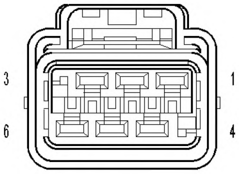
CAV	CIRCUIT
1	Q612 16OR/DB
3	G76 20VT/YL
4	Z908 20BK
5	X52 18GY/DB (EXCEPT PREMIUM AUDIO)
5	X52 18GY/DB (PREMIUM AUDIO)
6	X58 18GY/TN (EXCEPT PREMIUM AUDIO)
6	X296 18LG/GY (PREMIUM AUDIO)
7	-
8	Q15 16OR/LB
9	P778 16LG/LB
10	P792 16LG/TN
11	-



C308

C308 - (RIGHT REAR DOOR SIDE)

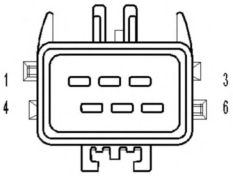
CAV	CIRCUIT
1	Q612 16OR/DB
2	Q412 16OR/LB
3	G76 20VT/YL
4	Z908 20BK
5	X206 18DG/LG
6	X296 18LG/GY
7	-
8	Q15 16OR/LB
9	P778 16LG/LB
10	P792 16LG/TN
11	-



C309

C309 - (UNDERBODY SIDE)

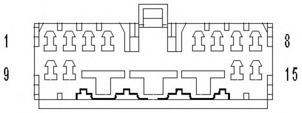
CAV	CIRCUIT
1	S950 20GY/TN
2	S51 20GY/DB
3	S50 20GY/WT
4	X777 20LG/GY
5	D777 20WT/GY
6	Z171 20GY/BK



C309

C309 - (BODY SIDE)

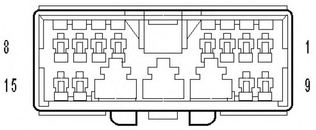
CAV	CIRCUIT
1	S950 20GY/TN
2	S51 20GY/DB
3	S50 20GY/WT
4	X777 20LG/GY (MEMORY)
5	D777 20WT/GY (MEMORY)
6	Z171 20GY/BK (MEMORY)



C310

C310 - (LIFTGATE SIDE)

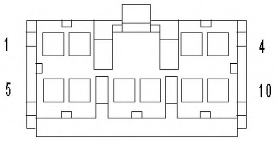
CAV	CIRCUIT
1	W14 20BR/LB
2	W13 20BR/LG
3	G78 20VT/OR
4	A46 18RD/GY
5	G80 20VT/BR
6	L50 18WT/TN
7	L777 20WT/VT
8	M22 20YL/OR
9	Q80 20OR/VT
10	P792 16LG/TN
11	P778 16LG/LB
12	Z800 12BK
13	C515 12LB/OR
14	A931 20RD/WT
15	Q81 18OR/GY



C310

C310 - (BODY SIDE)

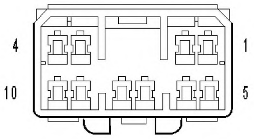
CAV	CIRCUIT
1	W14 20BR/LB
2	W13 20BR/LG
3	G78 20VT/OR
4	A46 18RD/GY
5	G80 20VT/BR
6	L50 18WT/TN
7	L777 20WT/VT
8	M22 20YL/OR
9	Q80 20OR/VT
10	P792 16LG/TN
11	P778 16LG/LB
12	Z800 12BK
13	C515 12LB/OR
14	A931 20RD/WT
15	Q81 18OR/GY



C311

C311 - (AUXILIARY AUDIO SIDE)

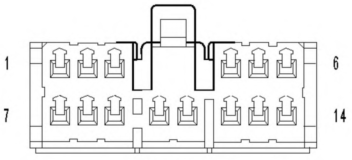
CAV	CIRCUIT
1	Z915 18BK
2	X955 20SHLD
3	X915 20GY/LG
4	X515 20GY/OR
5	X114 20GY/LB
6	X555 20VT/OR
7	D92 20WT
8	D91 20WT/DB
9	X524 20GY/YL
10	X523 20GY/LB



C311

C311 - (BODY SIDE)

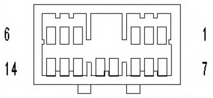
CAV	CIRCUIT
1	Z915 18BK
2	X955 20BK/GY
3	X915 20GY/LG
4	X515 20GY/OR
5	X114 20GY/LB
6	X555 20VT/OR
7	D92 20WT
8	D91 20WT/DB
9	X524 20GY/YL
10	X523 20GY/LB



C312

C312 - (OVERHEAD SIDE)

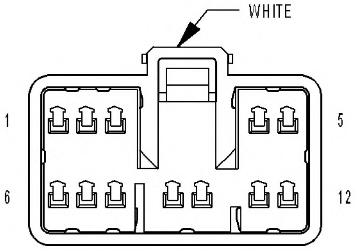
CAV	CIRCUIT
1	M22 20YL/OR
2	G946 20LG/VT (EXPORT)
3	F921 20PK/YL
4	-
5	-
6	M28 20YL/TN
7	G460 20DG/VT (EXPORT)
8	A934 20RD/OR
9	A931 20RD
10	A932 18RD/DG (SUNROOF)
11	Z915 18BK
12	A114 18GY/RD
13	G945 20VT/DG (EXPORT)
14	Z914 16BK (SUNROOF)



C312

C312 - (BODY SIDE)

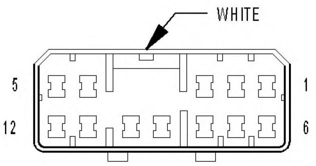
CAV	CIRCUIT
1	M22 20YL/OR
2	G946 20LG/VT (EXPORT)
3	F921 20PK/YL
4	-
5	-
6	M28 20YL/TN
7	G460 20DG/VT (EXPORT)
8	A934 18RD/OR
9	A931 20RD/WT
10	A932 18RD/DG (SUNROOF)
11	Z915 16BK
12	A114 18GY/RD
13	G945 20VT/DG (EXPORT)
14	Z914 16BK (SUNROOF)



C313

C313 - WHITE (OVERHEAD SIDE)

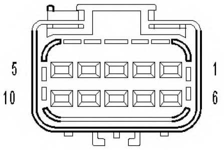
CAV	CIRCUIT
1	S50 20GY/WT (DHS)
2	S51 20GY/DB (DHS)
3	S950 20GY/TN (DHS)
4	P112 20TN/OR (MEMORY)
5	P114 20TN/WT (MEMORY)
6	L1 18WT/LG
7	D54 20WT
8	D55 20WT/OR
9	A645 20RD/VT (EXPORT)
10	D777 20WT/GY (PARK ASSIST)
11	Z171 20GY/BK (PARK ASSIST)
12	X777 20LG/GY (PARK ASSIST)



C313

C313 - WHITE (BODY SIDE)

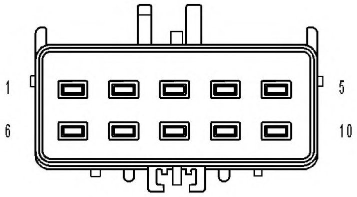
CAV	CIRCUIT
1	S50 20GY/WT (DHS)
2	S51 20GY/DB (DHS)
3	S950 20GY/TN (DHS)
4	P112 20TN/OR (MEMORY)
5	P114 20TN/WT (MEMORY)
6	L1 16WT/LG
7	D54 20WT
8	D55 20WT/OR
9	A645 20RD/VT (EXPORT)
10	D777 20WT/GY (PARK ASSIST)
11	Z171 20GY/BK (PARK ASSIST)
12	X777 20LG/GY (PARK ASSIST)



C314
(REAR PARK ASSIST)

C314 (REAR PARK ASSIST) - (REAR FASCIA SIDE)

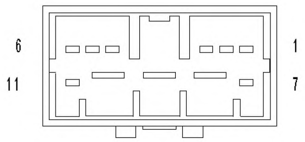
CAV	CIRCUIT
1	A35 18RD/DG (EXPORT)
2	D703 20WT/OR
3	X750 20GY/LB
4	X700 20GY/OR
5	-
6	-
7	D701 20WT/LB
8	D704 20WT/DB
9	D700 20WT/DG
10	Z918 18BK (EXPORT)



C314
(REAR PARK ASSIST)

C314 (REAR PARK ASSIST) - (UNDERBODY SIDE)

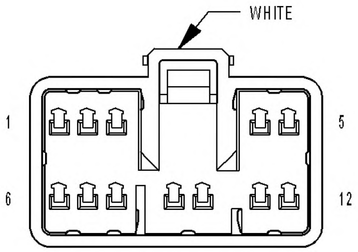
CAV	CIRCUIT
1	A35 18RD/DG (EXPORT)
2	D703 20WT/OR
3	X750 20GY/LB
4	X700 20GY/OR
5	-
6	-
7	D701 20WT/LB
8	D704 20WT/DB
9	D700 20WT/DG
10	Z918 18BK (EXPORT)



C315

C315 - (DRIVER DOOR JUMPER SIDE)

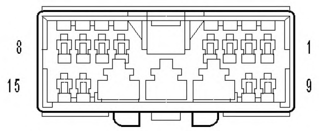
CAV	CIRCUIT
1	P72 20TN/GY (EXCEPT VTSS)
2	P76 20TN/LB (EXCEPT VTSS)
3	P74 20TN/OR (EXCEPT VTSS)
4	P112 20TN/OR (VTSS)
5	P114 20TN/WT (VTSS)
6	P110 20LB/WT (HEATED MIRRORS)
7	P699 20LG/YL (HEATED MIRRORS)
8	Q21 16OR/WT
9	Q411 16OR/WT
10	Q612 16OR/DB
11	C17 20LB/WT (EXCEPT VTSS)
12	-



C315

C315 - WHITE (DRIVER DOOR SIDE)

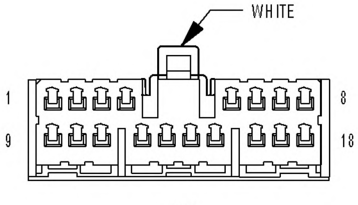
CAV	CIRCUIT
1	P72 20TN/GY (EXCEPT VTSS)
2	P76 20TN/LB (EXCEPT VTSS)
3	P74 20TN/OR (EXCEPT VTSS)
4	P112 20TN/OR (VTSS)
5	P114 20TN/WT (VTSS)
6	P110 20LB/WT (HEATED MIRRORS)
7	P699 20LG/YL (HEATED MIRRORS)
8	Q21 16OR/WT
9	Q411 16OR/WT
10	Q612 16OR/DB
11	C17 20LB/WT (EXCEPT VTSS)
12	-



C316

C316 - (DRIVER DOOR JUMPER SIDE)

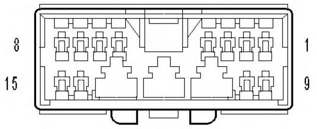
CAV	CIRCUIT
1	G75 20VT (VTSS)
2	D55 20WT/OR (VTSS)
3	D54 20WT (VTSS)
4	G160 20VT/BR (RHD HEATED MIRROR)
5	Q16 16OR/TN
6	Q11 16OR/LG
7	Q412 16OR/LB
8	Q15 16OR/LB
9	Q611 16OR/GY
10	Z463 20BK/LB (EXCEPT VTSS)
11	A929 16RD/DB
12	Q26 16OR/GY
13	Z911 16BK
14	A931 20RD/WT
15	G161 20VT/DG (LHD EXCEPT VTSS)
16	-
17	-
18	-



C316

C316 - WHITE (DRIVER DOOR SIDE)

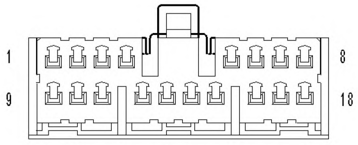
CAV	CIRCUIT
1	G75 20VT (VTSS)
2	D55 20WT/OR (VTSS)
3	D54 20WT (VTSS)
4	G160 20VT/BR (RHD HEATED MIRROR)
5	Q16 16OR/TN
6	Q11 16OR/LG
7	Q412 16OR/LB
8	Q15 16OR/LB
9	Q611 16OR/GY
10	Z463 20BK/LB (EXCEPT VTSS)
11	A929 16RD/DB
12	Q26 16OR/GY
13	Z911 16BK
14	A931 20RD/WT
15	G161 20VT/DG (LHD EXCEPT VTSS)
16	-
17	-
18	-



C317

C317 - (PASSENGER DOOR JUMPER SIDE)

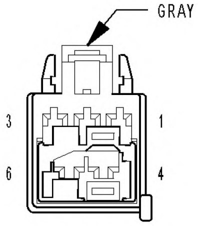
CAV	CIRCUIT
1	G160 20VT/BR (LHD)
1	G161 20VT/DG (RHD)
2	P72 20TN/GY (EXCEPT MEMORY)
2	D55 20WT/OR (MEMORY)
3	P76 20TN/LB (EXCEPT MEMORY)
3	D54 20WT (MEMORY)
4	Z463 20BK/LB (EXCEPT MEMORY)
4	G74 20VT/WT (MEMORY)
5	C17 20LB/DG (EXCEPT MEMORY)
5	A931 20RD/WT (MEMORY)
6	Z908 20BK
7	-
7	P110 20LB/WT (HEATED MIRRORS)
8	-
8	P699 20LG/YL (HEATED MIRRORS)
9	Q12 16OR/BR
10	Q26 16OR/GY
11	A929 16RD/LG
12	Q22 16OR/VT
13	Q16 16OR/TN
14	Q15 16OR/LB
15	-



C317

C317 - (PASSENGER DOOR SIDE)

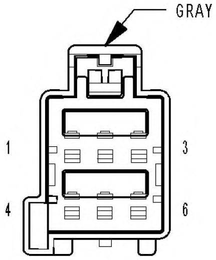
CAV	CIRCUIT
1	G160 20VT/BR (LHD)
1	G161 20VT/DG (RHD)
2	P72 20TN/GY (EXCEPT MEMORY)
2	D55 20WT/OR (MEMORY)
3	P76 20TN/LB (EXCEPT MEMORY)
3	D54 20WT (MEMORY)
4	Z463 20BK/LB (EXCEPT MEMORY)
4	G74 20VT/WT (MEMORY)
5	C17 20LB/DG (EXCEPT MEMORY)
5	A931 20RD/WT (MEMORY)
6	Z908 20BK
7	P110 20LB/WT (HEATED MIRRORS)
8	P699 20LG/YL (HEATED MIRRORS)
9	Q12 16OR/BR
10	Q26 16OR/GY
11	A929 16RD/LG
12	Q22 16OR/VT
13	Q16 16OR/TN
14	Q15 16OR/LB
15	P74 20TN/OR (EXCEPT MEMORY)
16	-
17	-
18	-



C318

C318 - GRAY (DRIVER SEAT JUMPER SIDE)

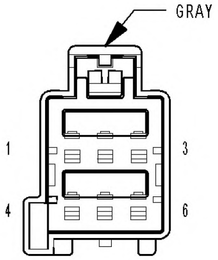
CAV	CIRCUIT
1	P141 16LG/BR
2	P43 16LG/VT (EXCEPT MEMORY)
2	P143 16LG/GY (MEMORY)
3	G403 20VT/OR (MEMORY)
4	G493 20OR/VT (MEMORY)
5	P187 16LG/BR (HEATED SEATS)
6	Z911 16BK (HEATED SEATS)



C318

C318 - GRAY (DRIVER SEAT SIDE)

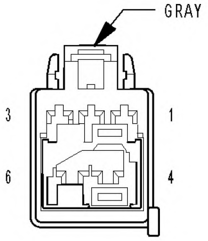
CAV	CIRCUIT
1	P41 16LG/GY (EXCEPT MEMORY)
1	P141 16LG/BR (MEMORY)
2	P43 16LG/VT (EXCEPT MEMORY)
2	P143 16LG/GY (MEMORY)
3	G403 20VT/OR (MEMORY)
4	G493 20OR/VT (MEMORY)
5	P187 16LG/BR (HEATED SEATS)
6	Z911 16BK (HEATED SEATS)



C319

C319 - GRAY (PASSENGER SEAT SIDE)

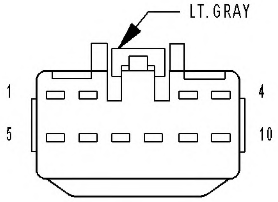
CAV	CIRCUIT
1	P42 16LG/GY
2	P44 16LG/VT
3	-
4	-
5	P188 16LG/VT (HEATED SEATS)
6	Z909 16BK (HEATED SEATS)



C319

C319 - GRAY (PASSENGER SEAT JUMPER SIDE)

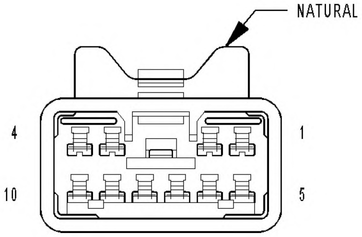
CAV	CIRCUIT
1	P42 16LG/GY
2	P44 16LG/VT
3	-
4	-
5	P188 16LG/VT (HEATED SEATS)
6	Z909 16BK (HEATED SEATS)



C320

C320 - LT. GRAY (OVERHEAD SIDE)

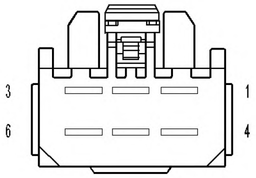
CAV	CIRCUIT
1	Q6 20OR/LG
2	-
3	A932 18RD/DG
4	Q5 20OR/LB
5	Z914 16BK
6	D55 20WT/OR
7	D54 20WT
8	Q3 20OR/TN
9	Q4 20OR/YL
10	-



C320

C320 - NATURAL (SUNROOF SIDE)

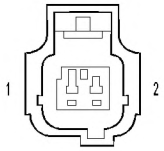
CAV	CIRCUIT
1	Q6 20OR/LG
2	-
3	A932 18RD
4	Q5 20OR/LB
5	Z914 18BK
6	D55 20WT/OR
7	D54 20WT
8	Q3 20OR/TN
9	Q4 20OR/YL
10	-



CABIN HEATER (DIESEL)

CABIN HEATER (DIESEL) - 6 WAY

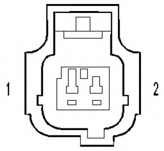
CAV	CIRCUIT	FUNCTION
1	N115 10DB/YL	PTC NO. 3 RELAY OUTPUT
2	Z149 10BK/DG	GROUND
3	N113 10DB/OR	PTC NO. 1 RELAY OUTPUT
4	Z922 10BK	GROUND
5	N114 10DB/LB	PTC NO. 2 RELAY OUTPUT
6	-	-



CAPACITOR-IGNITION NO. 1 (3.7L/4.7L)

CAPACITOR-IGNITION NO. 1 (3.7L/4.7L) - 2 WAY

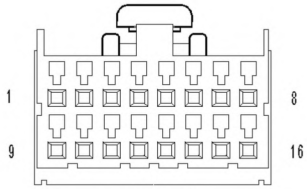
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	-	-



CAPACITOR-IGNITION NO. 2 (3.7L/4.7L)

CAPACITOR-IGNITION NO. 2 (3.7L/4.7L) - 2 WAY

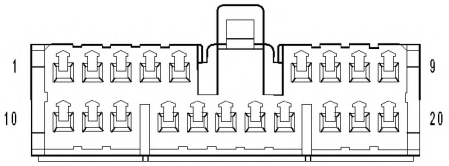
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	-	-



CLUSTER C1

CLUSTER C1 - 16 WAY

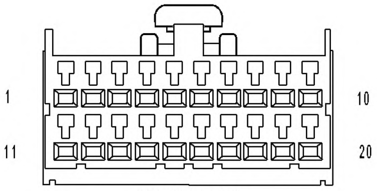
CAV	CIRCUIT	FUNCTION
1	D500 20WT	LIN BUS
2	G102 20VT/GY	MENU SWITCH INPUT
3	G103 20VT/LB	STEP SWITCH INPUT
4	G105 20VT/YL	C/T SWITCH INPUT
5	G108 20VT/DB	RESET SWITCH INPUT
6	X774 20GY/LB (PARK ASSIST)	PARK ASSIST ON/OFF SWITCH
7	N4 20DB/YL	FUEL LEVEL SENSOR NO. 1 SIGNAL
8	Z210 20BK	GROUND
9	P81 20TN/LB	LEFT HEATED SEAT LOW INDICATOR DRIVER
10	P83 20TN/WT	LEFT HEATED SEAT HIGH INDICATOR DRIVER
11	P82 20TN/LB	RIGHT HEATED SEAT LOW INDICATOR DRIVER
12	P84 20TN/WT	RIGHT HEATED SEAT HIGH INDICATOR DRIVER
13	X775 20GY/DB (PARK ASSIST)	PARK ASSIST INDICATOR SIGNAL
14	E16 20OR/GY (MTC)	INDICATOR DIMMER SIGNAL
15	G10 20VT/LG	SEAT BELT SWITCH SENSE
16	B25 20DG/WT	PARK BRAKE SWITCH SENSE



CLUSTER C2

CLUSTER C2 - 20 WAY

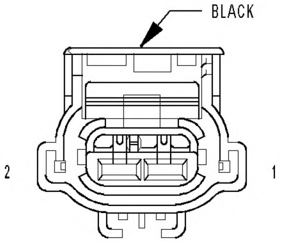
CAV	CIRCUIT	FUNCTION
1	Z905 18BK	GROUND
2	F102 20PK/DB	IGNITION RUN RELAY CONTROL
3	Q82 20LG/OR	FLIP-UP GLASS RELAY CONTROL
4	F103 20PK/GY	IGNITION RUN/ACC RELAY CONTROL
5	P777 20LG/DG	DOOR LOCK RELAY CONTROL
6	P1 20TN/LG	DRIVER DOOR UNLOCK RELAY CONTROL
7	P292 20VT/LG	DOOR UNLOCK RELAY CONTROL
8	-	-
9	A108 20LG/RD	FUSED B(+)
10	M28 20YL/TN	GLOVE BOX LAMP DRIVER
11	-	-
12	M22 20YL/OR	COURTESY LAMPS DRIVER
13	Z905 18BK	GROUND
14	-	-
15	E2 20OR/BR	PANEL LAMPS DRIVER
16	-	-
17	L778 20WT/LB	FUSED PARK LAMP RELAY OUTPUT
18	-	-
19	Z18 20BK/LB	GROUND
20	F941 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)



CLUSTER C3

CLUSTER C3 - 20 WAY

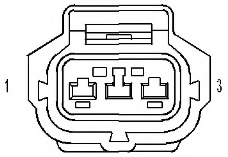
CAV	CIRCUIT	FUNCTION
1	-	-
2	G80 20VT/BR	FLIP-UP GLASS AJAR SWITCH SENSE
3	G78 20VT/OR	LIFTGATE AJAR SWITCH SENSE
4	G77 20VT/GY	LEFT REAR DOOR AJAR SWITCH SENSE
5	G76 20VT/YL	RIGHT REAR DOOR AJAR SWITCH SENSE
6	G75 20VT	LEFT FRONT DOOR AJAR SWITCH SENSE
7	G74 20VT/WT	RIGHT FRONT DOOR AJAR SWITCH SENSE
8	Q80 20OR/VT	FLIP-UP GLASS SWITCH SENSE
9	D55 20WT/OR	CAN B BUS (+)
10	D54 20WT	CAN B BUS (-)
11	P365 20LG/GY (HEATED SEATS)	LEFT HEATED SEAT SWITCH SENSE
12	L24 20WT/VT	AUTO HEADLAMPS SIGNAL
13	C221 20LB/OR (MTC)	A/C SWITCH SENSE
14	P366 20LG/LB (HEATED SEATS)	RIGHT HEATED SEAT SWITCH SENSE
15	L924 20WT/TN	AUTO HEADLAMPS SIGNAL RETURN
16	P877 20TN/OR (HEATED SEATS)	SWITCH-FRONT HEATED SEAT RETURN
17	G161 20VT/DG (EXCEPT MEMORY)	DRIVER DOOR LOCK SWITCH MUX
18	G160 20VT/BR (EXCEPT MEMORY)	PASSENGER DOOR LOCK SWITCH MUX
19	Z463 20BK/LB (EXCEPT MEMORY)	DOOR LOCK SWITCH RETURN
20	-	-



CLUTCH-A/C COMPRESSOR (GAS)

CLUTCH-A/C COMPRESSOR (GAS) - BLACK 2 WAY

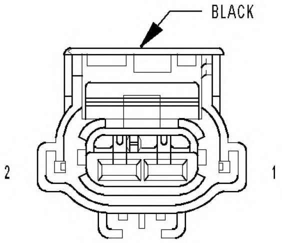
CAV	CIRCUIT	FUNCTION
1	C3 18DB/YL	A/C CLUTCH RELAY OUTPUT
2	Z153 18BK/GY	GROUND



COIL-IGNITION-NO. 1 (3.7L/4.7L)

COIL-IGNITION-NO. 1 (3.7L/4.7L) - 3 WAY

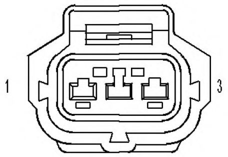
CAV	CIRCUIT	FUNCTION
1	K86 16YL/DB	COIL CONTROL NO. 1
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 1 (5.7L)

COIL-IGNITION-NO. 1 (5.7L) - BLACK 2 WAY

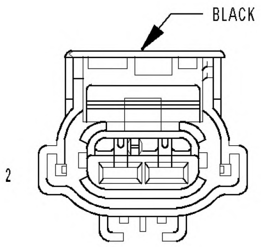
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K86 16YL/DB	COIL CONTROL NO. 1



COIL-IGNITION-NO. 2 (3.7L/4.7L)

COIL-IGNITION-NO. 2 (3.7L/4.7L) - 3 WAY

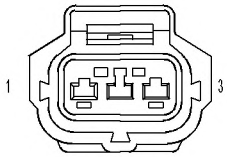
CAV	CIRCUIT	FUNCTION
1	K85 16DB/TN	COIL CONTROL NO. 2
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 2 (5.7L)

COIL-IGNITION-NO. 2 (5.7L) - BLACK 2 WAY

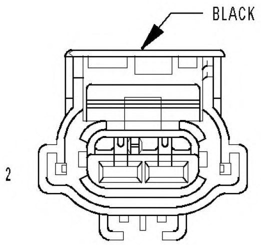
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K85 16DB/TN	COIL CONTROL NO. 2



COIL-IGNITION-NO. 3 (3.7L/4.7L)

COIL-IGNITION-NO. 3 (3.7L/4.7L) - 3 WAY

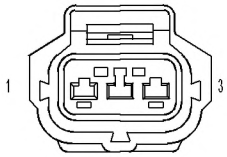
CAV	CIRCUIT	FUNCTION
1	K93 16DB/BR	COIL CONTROL NO. 3
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 3 (5.7L)

COIL-IGNITION-NO. 3 (5.7L) - BLACK 2 WAY

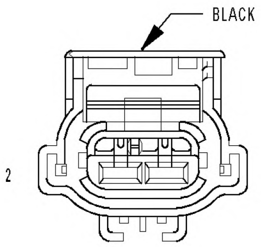
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K93 16DB/BR	COIL CONTROL NO. 3



COIL-IGNITION-NO. 4 (3.7L/4.7L)

COIL-IGNITION-NO. 4 (3.7L/4.7L) - 3 WAY

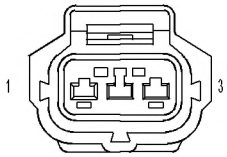
CAV	CIRCUIT	FUNCTION
1	K15 16DB	COIL CONTROL NO. 4
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 4 (5.7L)

COIL-IGNITION-NO. 4 (5.7L) - BLACK 2 WAY

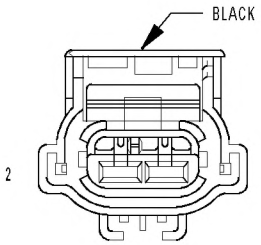
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K15 16DB	COIL CONTROL NO. 4



COIL-IGNITION-NO. 5 (3.7L/4.7L)

COIL-IGNITION-NO. 5 (3.7L/4.7L) - 3 WAY

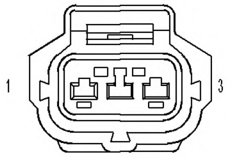
CAV	CIRCUIT	FUNCTION
1	K16 16DB/YL	COIL CONTROL NO. 5
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 5 (5.7L)

COIL-IGNITION-NO. 5 (5.7L) - BLACK 2 WAY

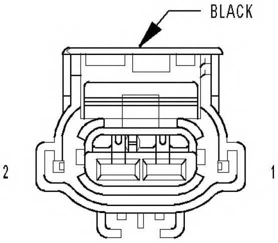
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K16 16DB/YL	COIL CONTROL NO. 5



COIL-IGNITION-NO. 6 (3.7L/4.7L)

COIL-IGNITION-NO. 6 (3.7L/4.7L) - 3 WAY

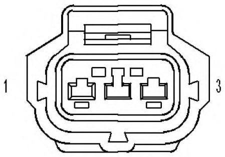
CAV	CIRCUIT	FUNCTION
1	K10 16DB/OR	COIL CONTROL NO. 6
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 6 (5.7L)

COIL-IGNITION-NO. 6 (5.7L) - BLACK 2 WAY

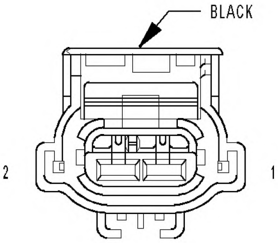
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K10 16DB/OR	COIL CONTROL NO. 6



COIL-IGNITION-NO. 7 (4.7L)

COIL-IGNITION-NO. 7 (4.7L) - 3 WAY

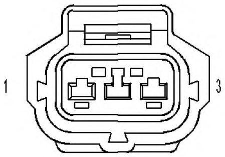
CAV	CIRCUIT	FUNCTION
1	K97 16BR/LG	COIL CONTROL NO. 7
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 7 (5.7L)

COIL-IGNITION-NO. 7 (5.7L) - BLACK 2 WAY

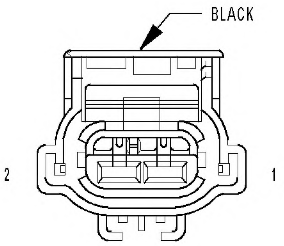
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K97 16BR/LG	COIL CONTROL NO. 7



COIL-IGNITION-NO. 8 (4.7L)

COIL-IGNITION-NO. 8 (4.7L) - 3 WAY

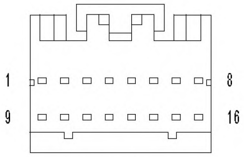
CAV	CIRCUIT	FUNCTION
1	K98 16DB/BK	COIL CONTROL NO. 8
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT
3	-	-



COIL-IGNITION-NO. 8 (5.7L)

COIL-IGNITION-NO. 8 (5.7L) - BLACK 2 WAY

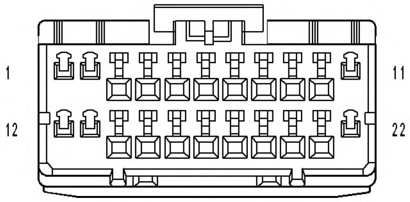
CAV	CIRCUIT	FUNCTION
1	A15 16RD/TN	FUSED ASD RELAY OUTPUT
2	K98 16DB/BK	COIL CONTROL NO. 8



CONTROL-A/C-HEATER C1 (MTC)

CONTROL-A/C-HEATER C1 (MTC) - 16 WAY

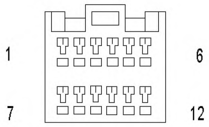
CAV	CIRCUIT	FUNCTION
1	F921 20PK/YL	FUSED RUN RELAY OUTPUT
2	-	-
3	Z906 18BK	GROUND
4	C221 20LB/OR	A/C SWITCH SENSE
5	C115 20DB	DEFOGGER RELAY CONTROL
6	-	-
7	E2 20OR/BR	PANEL LAMPS DRIVER
8	-	-
9	E16 20OR/GY	INDICATOR DIMMER SIGNAL
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-



CONTROL-A/C-HEATER C1 (ATC)

CONTROL-A/C-HEATER C1 (ATC) - 22 WAY

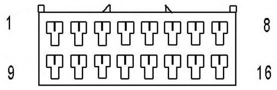
CAV	CIRCUIT	FUNCTION
1	F921 20PK/YL	FUSED RUN RELAY OUTPUT
2	A114 18GY/RD	FUSED B(+)
3	Z906 18BK	GROUND
4	D54 20WT	CAN B BUS (-)
5	D55 20WT/OR	CAN B BUS (+)
6	C115 20DB	DEFOGGER RELAY CONTROL
7	E2 20OR/BR	PANEL LAMPS DRIVER
8	G39 20VT/LB	SUN SENSOR NO. 1 SIGNAL
9	G139 20VT/OR	SUN SENSOR NO. 2 SIGNAL
10	-	-
11	G939 20VT/DB	SUN SENSOR RETURN
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-



CONTROL-A/C-HEATER C2 (MTC)

CONTROL-A/C-HEATER C2 (MTC) - 12 WAY

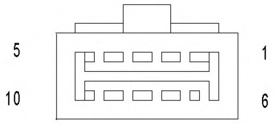
CAV	CIRCUIT	FUNCTION
1	C266 20DB/WT	FRONT MODE DOOR DRIVER
2	C66 20DB/LB	FRONT MODE DOOR COMMON DRIVER
3	C139 20WT/BR	REAR MODE DOOR DRIVER
4	C939 20BR/PK	REAR MODE DOOR COMMON DRIVER
5	C255 20LG/YL	LEFT BLEND DOOR DRIVER
6	C55 20LB/YL	LEFT BLEND DOOR COMMON DRIVER
7	C268 20DB/OR	RECIRCULATION DOOR DRIVER
8	C68 20DG/WT	RECIRCULATION DOOR COMMON DRIVER
9	C21 20WT/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
10	C121 20RD/BK	SENSOR GROUND
11	C41 18LG	BLOWER SWITCH POSITION SIGNAL
12	-	-



CONTROL-A/C-HEATER C2 (ATC)

CONTROL-A/C-HEATER C2 (ATC) - 16 WAY

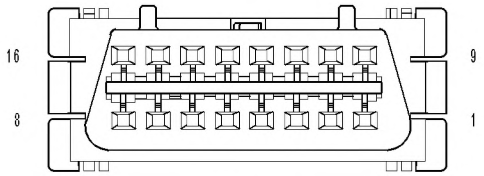
CAV	CIRCUIT	FUNCTION
1	C266 20DB/WT	FRONT MODE DOOR DRIVER
2	C66 20DB/LB	FRONT MODE DOOR COMMON DRIVER
3	C268 20DB/OR	RECIRCULATION DOOR DRIVER
4	C68 20DG/WT	RECIRCULATION DOOR COMMON DRIVER
5	C255 20LG/YL	LEFT BLEND DOOR DRIVER
6	C55 20LB/YL	LEFT BLEND DOOR COMMON DRIVER
7	C61 20LB/GY	RIGHT BLEND DOOR DRIVER
8	C161 20LB/BR	RIGHT BLEND DOOR COMMON DRIVER
9	C139 20WT/BR	REAR MODE DOOR DRIVER
10	C939 20BR/PK	REAR MODE DOOR COMMON DRIVER
11	C21 20WT/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
12	C121 20RD/BK	SENSOR GROUND
13	C56 20VT	FRONT BLOWER CONTROL
14	-	
15	-	
16	-	



CONTROL-A/C-HEATER C3 (MTC)

CONTROL-A/C-HEATER C3 (MTC) - 10 WAY

CAV	CIRCUIT	FUNCTION
1	C70 12LB	BLOWER HIGH SPEED
2	C41 18LG	BLOWER SWITCH POSITION SIGNAL
3	C73 12GY/LG	BLOWER M2 SPEED
4	Z134 12BK/LG	GROUND
5	-	-
6	-	-
7	-	-
8	-	-
9	C72 12OR/LG	BLOWER M1 SPEED
10	C71 20RD/LG	BLOWER LOW SPEED



DATA LINK CONNECTOR

DATA LINK CONNECTOR - 16 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	Z111 20BK/WT	GROUND
5	Z11 20BK/LG	GROUND
6	D72 20WT/LB	CAN C DIAGNOSTIC (+)
7	D223 20WT/VT	SCI TRANSMIT
8	-	-
9	D16 20WT/OR	SCI RECEIVE (TCM)
10	-	-
11	-	-
12	D118 20LG/WT	SCI RECEIVE
13	-	-
14	D71 20WT/DB	CAN C DIAGNOSTIC (-)
15	D15 20BR/WT	SCI TRANSMIT (TCM)
16	A108 20LG/RD	FUSED B(+)

CONNECTOR
NOT
AVAILABLE

DIODE - 2 WAY

CAV	CIRCUIT	FUNCTION
1	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	F945 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)

CONNECTOR
NOT
AVAILABLE

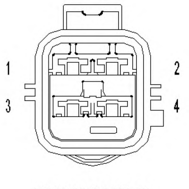
DIODE-ZENER NO. 1 - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z387 18BK	GROUND
2	A15 16RD/TN	FUSED ASD RELAY OUTPUT

CONNECTOR
NOT
AVAILABLE

DIODE-ZENER NO. 2 - 2 WAY

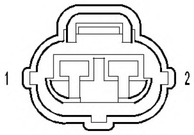
CAV	CIRCUIT	FUNCTION
1	Z387 18BK	GROUND
2	A109 16OR/RD	FUEL PUMP RELAY OUTPUT



FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)

FAN MODULE-CONDENSER COOLING (3.7L/4.7L) - 4 WAY

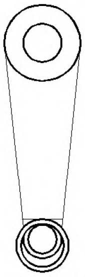
CAV	CIRCUIT	FUNCTION
1	N24 10DG/DB	LOW SPEED RADIATOR FAN RELAY OUTPUT
2	Z823 12BK/DG	GROUND
3	N23 10DB/DG	HIGH SPEED RADIATOR FAN RELAY OUTPUT
4	-	-



GENERATOR (GAS)

GENERATOR (GAS) - 2 WAY

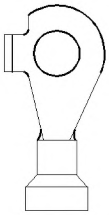
CAV	CIRCUIT	FUNCTION
1	K125 16BR/DG	GEN FIELD CONTROL
2	Z385 18BK	GROUND



GENERATOR-EYELET (GAS)

GENERATOR-EYELET (GAS) - 1 WAY

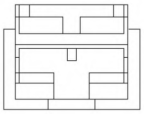
CAV	CIRCUIT	FUNCTION
1	A11 06BR/RD	FUSED B(+)



GENERATOR-EYELET (DIESEL)

GENERATOR-EYELET (DIESEL) - 1 WAY

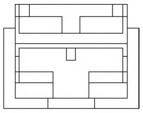
CAV	CIRCUIT	FUNCTION
1	A11 04BR/RD	FUSED B(+)



GLASS-LIFTGATE (HEATED GROUND)

GLASS-LIFTGATE (HEATED GROUND) - 1 WAY

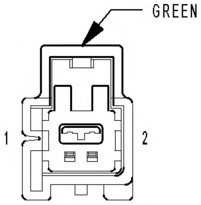
CAV	CIRCUIT	FUNCTION
1	Z800 12BK	GROUND



GLASS-LIFTGATE (HEATED FEED)

GLASS-LIFTGATE (HEATED FEED) - 1 WAY

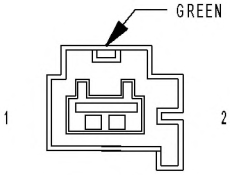
CAV	CIRCUIT	FUNCTION
1	C515 12BK	REAR WINDOW DEFOGGER RELAY OUTPUT



HEATER-CUSHION PAD-LEFT

HEATER-CUSHION PAD-LEFT - GREEN 2 WAY

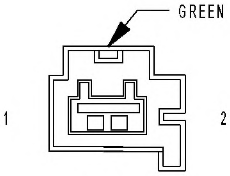
CAV	CIRCUIT	FUNCTION
1	P187 16LG/BR	LEFT SEAT HEATER B(+) DRIVER
2	Z911 16BK	GROUND



HEATER-CUSHION PAD-LEFT (COMPONENT SIDE)

HEATER-CUSHION PAD-LEFT (COMPONENT SIDE) - GREEN 2 WAY

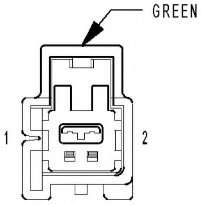
CAV	CIRCUIT	FUNCTION
1	18YL	LEFT SEAT HEATER B(+) DRIVER
2	18YL	GROUND



HEATER-CUSHION PAD-RIGHT (COMPONENT SIDE)

HEATER-CUSHION PAD-RIGHT (COMPONENT SIDE) - GREEN 2 WAY

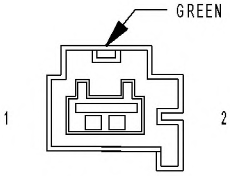
CAV	CIRCUIT	FUNCTION
1	18YL	RIGHT SEAT HEATER B(+) DRIVER
2	18YL	GROUND



HEATER-CUSHION PAD-RIGHT

HEATER-CUSHION PAD-RIGHT - GREEN 2 WAY

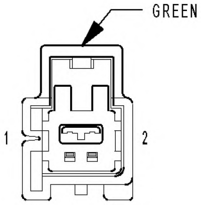
CAV	CIRCUIT	FUNCTION
1	P188 16LG/VT	RIGHT SEAT HEATER B(+) DRIVER
2	Z909 16BK	GROUND



HEATER-SEAT BACK-LEFT (COMPONENT SIDE)

HEATER-SEAT BACK-LEFT (COMPONENT SIDE) - GREEN 2 WAY

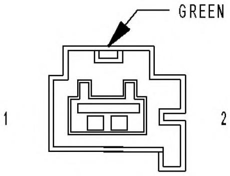
CAV	CIRCUIT	FUNCTION
1	18BK	GROUND
2	18LG/RD	LEFT SEAT HEATER B(+) DRIVER



HEATER-SEAT BACK-LEFT

HEATER-SEAT BACK-LEFT - GREEN 2 WAY

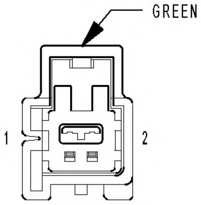
CAV	CIRCUIT	FUNCTION
1	P187 16LG/BR	LEFT SEAT HEATER B(+) DRIVER
2	Z911 16BK	GROUND



HEATER-SEAT BACK-RIGHT (COMPONENT SIDE)

HEATER-SEAT BACK-RIGHT (COMPONENT SIDE) - GREEN 2 WAY

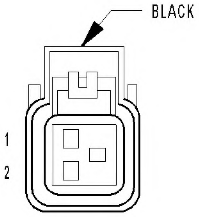
CAV	CIRCUIT	FUNCTION
1	18BK	GROUND
2	18LG/RD	RIGHT SEAT HEATER B(+) DRIVER



HEATER-SEAT BACK-RIGHT

HEATER-SEAT BACK-RIGHT - GREEN 2 WAY

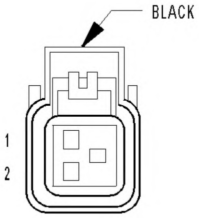
CAV	CIRCUIT	FUNCTION
1	P188 16LG/VT	RIGHT SEAT HEATER B(+) DRIVER
2	Z909 16BK	GROUND



HORN-NO. 1

HORN-NO. 1 - BLACK 2 WAY

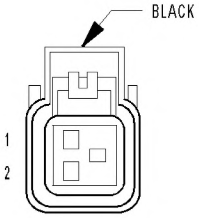
CAV	CIRCUIT	FUNCTION
1	Z384 18BK	GROUND
2	X2 18DG/OR	HORN RELAY OUTPUT



INJECTOR-FUEL-NO. 1 (GAS)

INJECTOR-FUEL-NO. 1 (GAS) - BLACK 2 WAY

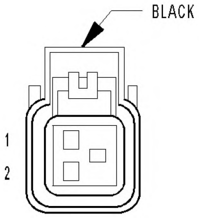
CAV	CIRCUIT	FUNCTION
1	K11 16BR/YL	INJECTOR CONTROL NO. 1
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



INJECTOR-FUEL-NO. 2 (GAS)

INJECTOR-FUEL-NO. 2 (GAS) - BLACK 2 WAY

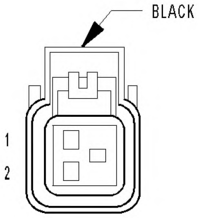
CAV	CIRCUIT	FUNCTION
1	K12 16BR/DB	INJECTOR CONTROL NO. 2
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



INJECTOR-FUEL-NO. 3 (GAS)

INJECTOR-FUEL-NO. 3 (GAS) - BLACK 2 WAY

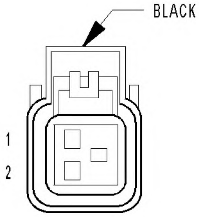
CAV	CIRCUIT	FUNCTION
1	K13 16BR/LB	INJECTOR CONTROL NO. 3
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



INJECTOR-FUEL-NO. 4 (GAS)

INJECTOR-FUEL-NO. 4 (GAS) - BLACK 2 WAY

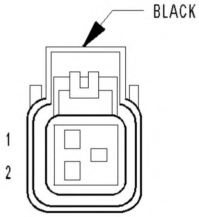
CAV	CIRCUIT	FUNCTION
1	K14 16BR/TN	INJECTOR CONTROL NO. 4
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



INJECTOR-FUEL-NO. 5 (GAS)

INJECTOR-FUEL-NO. 5 (GAS) - BLACK 2 WAY

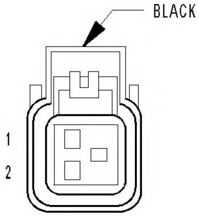
CAV	CIRCUIT	FUNCTION
1	K38 16BR/OR	INJECTOR CONTROL NO. 5
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



INJECTOR-FUEL-NO. 6 (GAS)

INJECTOR-FUEL-NO. 6 (GAS) - BLACK 2 WAY

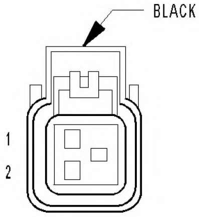
CAV	CIRCUIT	FUNCTION
1	K58 16BR/VT	INJECTOR CONTROL NO. 6
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



INJECTOR-FUEL-NO. 7 (4.7L/5.7L)

INJECTOR-FUEL-NO. 7 (4.7L/5.7L) - BLACK 2 WAY

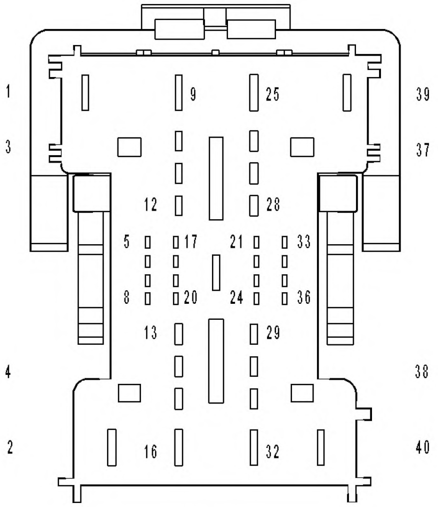
CAV	CIRCUIT	FUNCTION
1	K26 16BR/YL	INJECTOR CONTROL NO. 7
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



INJECTOR-FUEL-NO. 8 (4.7L/5.7L)

INJECTOR-FUEL-NO. 8 (4.7L/5.7L) - BLACK 2 WAY

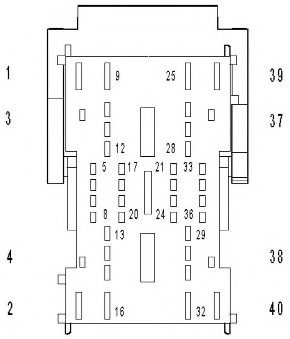
CAV	CIRCUIT	FUNCTION
1	K28 16BR/LB	INJECTOR CONTROL NO. 8
2	F42 16DG/LG	FUSED ASD RELAY OUTPUT



JUNCTION BLOCK C1

JUNCTION BLOCK C1 - 40 WAY

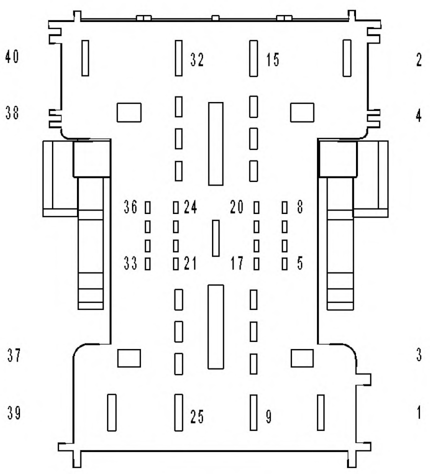
CAV	CIRCUIT	FUNCTION
1	A901 12RD/TN	FUSED B(+)
2	A925 14RD/LG	FUSED B(+)
3	-	-
4	-	-
5	-	-
6	B45 18DG/OR (ESP)	STOP LAMP INHIBIT RELAY CONTROL
7	L950 20WT/LG (DIESEL)	STOP LAMP INHIBIT RELAY FEED
8	-	-
9	A902 14RD/GY	FUSED B(+)
10	A5 16RD/VT	FUSED B(+)
11	-	-
12	-	-
13	F946 20PK/DG (A/T)	TRANSMISSION CONTROL MODULE RELAY OUTPUT
14	Z387 16BK	GROUND
15	A611 14RD	FUSED B(+)
16	A930 14RD/YL	POWER OUTLET RELAY OUTPUT
17	-	-
18	L950 20WT/LG	STOP LAMP INHIBIT RELAY FEED
19	-	-
20	-	-
21	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
22	-	-
23	F921 20PK/DB	FUSED RUN RELAY OUTPUT
24	F924 20PK/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
25	A905 12RD/WT	FUSED B(+)
26	A118 16RD/OR	FUSED B(+)
27	F943 18PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
28	A114 18GY/RD	FUSED B(+)
29	F923 14PK/YL	RUN RELAY OUTPUT
30	F944 18PK/TN	IGNITION SWITCH OUTPUT (RUN-START)
31	A906 12RD/OR	FUSED B(+)
32	A908 12RD/VT	FUSED B(+)
33	W12 20BR/OR	REAR WIPER RELAY CONTROL
34	-	-
35	F921 20PK/GY	FUSED RUN RELAY OUTPUT
36	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
37	P305 20LG/LB	ACCESSORY DELAY RELAY CONTROL
38	-	-
39	A906 12RD/OR	FUSED B(+)
40	A907 14RD/DB	FUSED B(+)



JUNCTION BLOCK C2

JUNCTION BLOCK C2 - 40 WAY

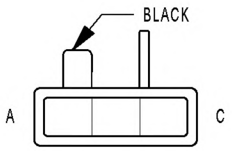
CAV	CIRCUIT	FUNCTION
1	A405 14RD/DB	FUSED B(+)
2	A207 16RD/LG	FUSED POWER OUTLET RELAY OUTPUT
3	F941 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	F921 20PK/YL	FUSED RUN RELAY OUTPUT
5	-	-
6	A931 20RD	FUSED B(+)
7	A931 20RD	FUSED B(+)
8	-	-
9	F944 16PK/LG	IGNITION SWITCH OUTPUT (RUN-START)
10	F941 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	A935 18RD (EXPORT)	FUSED B(+)
12	-	-
13	F921 20PK/YL	FUSED RUN RELAY OUTPUT
14	F921 20PK/YL	FUSED RUN RELAY OUTPUT
15	-	-
16	-	-
17	E2 20OR/BR	PANEL LAMPS DRIVER
18	E2 20OR/BR	PANEL LAMPS DRIVER
19	A931 20RD	FUSED B(+)
20	C115 20DB	DEFOGGER RELAY CONTROL
21	E2 20OR/BR	PANEL LAMPS DRIVER
22	E2 20OR/BR	PANEL LAMPS DRIVER
23	A108 20LG/RD	FUSED B(+)
24	-	-
25	A114 18GY/RD	FUSED B(+)
26	P1 20TN/LG	DRIVER DOOR UNLOCK RELAY CONTROL
27	P777 20LG/DG	DOOR LOCK RELAY CONTROL
28	E2 20OR/BR	PANEL LAMPS DRIVER
29	E2 20OR/BR	PANEL LAMPS DRIVER
30	F103 20PK/GY	IGNITION RUN/ACC RELAY CONTROL
31	F102 20PK/DB	IGNITION RUN RELAY CONTROL
32	A118 16RD/OR	FUSED B(+)
33	P292 20VT/LG	DOOR UNLOCK RELAY CONTROL
34	Q82 20LG/OR	FLIP-UP GLASS RELAY CONTROL
35	-	-
36	-	-
37	-	-
38	F943 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
39	-	-
40	A118 16RD/OR	FUSED B(+)



JUNCTION BLOCK C3

JUNCTION BLOCK C3 - 40 WAY

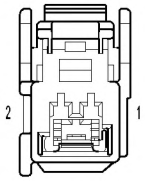
CAV	CIRCUIT	FUNCTION
1	A929 16RD/DB	FUSED RUN/ACCESSORY RELAY OUTPUT
2	A33 16RD/YL (POWER SEATS)	FUSED B(+)
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
4	-	-
5	-	-
6	A114 20OR/RD	FUSED B(+)
7	-	-
8	-	-
9	A929 16RD/LG	FUSED RUN/ACCESSORY RELAY OUTPUT
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	A33 16BK/RD	FUSED B(+)
17	-	-
18	A114 18GY/RD	FUSED B(+)
19	-	-
20	F921 20PK/YL	FUSED RUN RELAY OUTPUT
21	C17 20LB/WT	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
22	-	-
23	-	-
24	-	-
25	Q81 18OR/GY	FLIP-UP GLASS RELAY OUTPUT
26	A931 20RD/WT	FUSED B(+)
27	A932 18RD/DG	FUSED B(+)
28	A46 18RD/GY	REAR WIPER RELAY OUTPUT
29	-	-
30	A934 18RD/OR	FUSED RUN/ACCESSORY RELAY OUTPUT
31	-	-
32	C515 12LB/OR	REAR WINDOW DEFOGGER RELAY OUTPUT
33	C17 20LB/DG	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
34	P792 16LG/TN	DOOR UNLOCK RELAY OUTPUT
35	P701 16LG/DG	DRIVER DOOR UNLOCK RELAY OUTPUT
36	P778 16LG/LB	DOOR LOCK RELAY OUTPUT
37	A27 20RD/LB (EXCEPT EXPORT)	FUSED B(+)
38	F200 20PK/LB (EXCEPT EXPORT)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
39	A116 14YL/RD (PREMIUM AUDIO)	FUSED B(+)
40	A205 14RD/OR	FUSED B(+)



LAMP-CARGO (BASE)

LAMP-CARGO (BASE) - BLACK 3 WAY

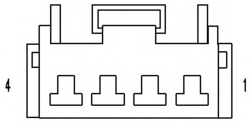
CAV	CIRCUIT	FUNCTION
A	A931 20RD/WT	FUSED B(+)
B	M22 20YL/OR	COURTESY LAMPS DRIVER
C	-	-



LAMP-CHMSL (BASE)

LAMP-CHMSL (BASE) - 2 WAY

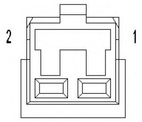
CAV	CIRCUIT	FUNCTION
1	Z800 18BK	GROUND
2	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT



LAMP-COURTESY-DRIVER

LAMP-COURTESY-DRIVER - 4 WAY

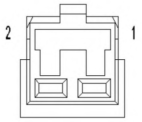
CAV	CIRCUIT	FUNCTION
1	-	-
2	M22 20YL/OR	COURTESY LAMPS DRIVER
3	M28 20YL/TN	GLOVE BOX LAMP DRIVER
4	A931 20RD	FUSED B(+)



LAMP-COURTESY-LOWER-LEFT

LAMP-COURTESY-LOWER-LEFT - 2 WAY

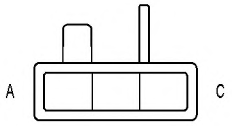
CAV	CIRCUIT	FUNCTION
1	A931 20RD	FUSED B(+)
2	M22 20YL/OR	COURTESY LAMPS DRIVER



LAMP-COURTESY-LOWER-RIGHT

LAMP-COURTESY-LOWER-RIGHT - 2 WAY

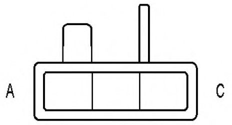
CAV	CIRCUIT	FUNCTION
1	A931 20RD	FUSED B(+)
2	M22 20YL/OR	COURTESY LAMPS DRIVER



LAMP-DOOR HANDLE-LEFT FRONT

LAMP-DOOR HANDLE-LEFT FRONT - 3 WAY

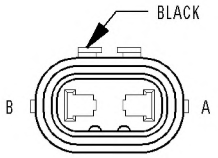
CAV	CIRCUIT	FUNCTION
1	M22 20YL/OR	COURTESY LAMPS DRIVER
2	A931 20RD	FUSED B(+)
3	M28 20YL/TN	GLOVE BOX LAMP DRIVER



LAMP-DOOR HANDLE-RIGHT FRONT

LAMP-DOOR HANDLE-RIGHT FRONT - 3 WAY

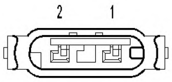
CAV	CIRCUIT	FUNCTION
1	M22 20YL/OR	COURTESY LAMPS DRIVER
2	A931 20RD	FUSED B(+)
3	M28 20YL/TN	GLOVE BOX LAMP DRIVER



LAMP-FOG-LEFT FRONT

LAMP-FOG-LEFT FRONT - BLACK 2 WAY

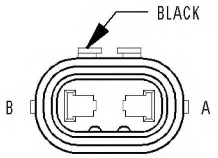
CAV	CIRCUIT	FUNCTION
A	L89 18WT/OR	FRONT FOG LAMP RELAY OUTPUT
B	Z910 18BK	GROUND



LAMP-FOG-LEFT REAR

LAMP-FOG-LEFT REAR - 2 WAY

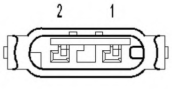
CAV	CIRCUIT	FUNCTION
1	Z918 18BK	GROUND
2	A35 18RD/DG	FUSED B(+)



LAMP-FOG-RIGHT FRONT

LAMP-FOG-RIGHT FRONT - BLACK 2 WAY

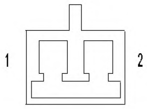
CAV	CIRCUIT	FUNCTION
A	L89 18WT/OR	FRONT FOG LAMP RELAY OUTPUT
B	Z910 18BK	GROUND



LAMP-FOG-RIGHT REAR (EXPORT)

LAMP-FOG-RIGHT REAR (EXPORT) - 2 WAY

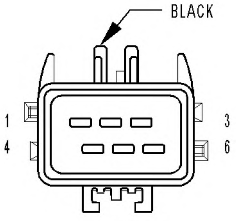
CAV	CIRCUIT	FUNCTION
1	Z918 18BK	GROUND
2	A35 18RD/DG	FUSED B(+)



LAMP-GLOVE BOX

LAMP-GLOVE BOX - 2 WAY

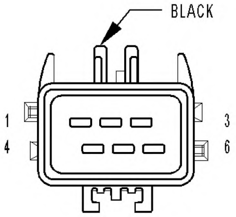
CAV	CIRCUIT	FUNCTION
1	A931 20RD	FUSED B(+)
2	M28 20YL/TN	GLOVE BOX LAMP DRIVER



LAMP-HEADLAMP-LEFT

LAMP-HEADLAMP-LEFT - BLACK 6 WAY

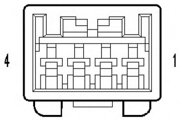
CAV	CIRCUIT	FUNCTION
1	L33 18WT/OR	LEFT HIGH BEAM DRIVER
2	L43 18WT/DB	LEFT LOW BEAM DRIVER
3	L61 18WT/LG	LEFT TURN SIGNAL
4	L777 20WT/BR	FUSED PARK LAMP RELAY OUTPUT
5	L13 20WT/YL (EXPORT)	HEADLAMP LEVEL SENSOR SIGNAL
6	Z910 18BK	GROUND



LAMP-HEADLAMP-RIGHT

LAMP-HEADLAMP-RIGHT - BLACK 6 WAY

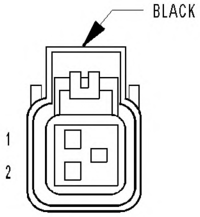
CAV	CIRCUIT	FUNCTION
1	L34 18WT/GY	RIGHT HIGH BEAM DRIVER
2	L44 18WT/TN	RIGHT LOW BEAM DRIVER
3	L60 18WT/TN	RIGHT TURN SIGNAL
4	L778 20WT/DB	FUSED PARK LAMP RELAY OUTPUT
5	L13 20WT/YL (EXPORT)	HEADLAMP LEVEL SENSOR SIGNAL
6	Z919 16BK	GROUND



LAMP-LICENSE PLATE

LAMP-LICENSE PLATE - 4 WAY

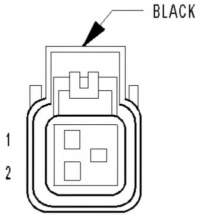
CAV	CIRCUIT	FUNCTION
1	L777 20WT/VT	FUSED PARK LAMP RELAY OUTPUT
2	Z800 20BK	GROUND
3	Q80 20OR/VT	FLIP-UP GLASS SWITCH SENSE
4	-	-



LAMP-SIDE REPEATER-LEFT (EXPORT)

LAMP-SIDE REPEATER-LEFT (EXPORT) - BLACK 2 WAY

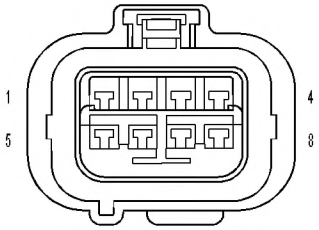
CAV	CIRCUIT	FUNCTION
1	L61 18WT/LG	LEFT TURN SIGNAL
2	Z910 20BK	GROUND



LAMP-SIDE REPEATER-RIGHT (EXPORT)

LAMP-SIDE REPEATER-RIGHT (EXPORT) - BLACK 2 WAY

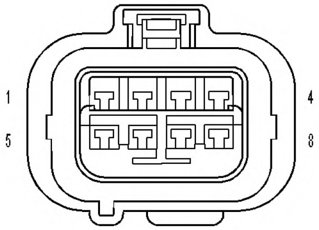
CAV	CIRCUIT	FUNCTION
1	L60 18WT/TN	RIGHT TURN SIGNAL
2	Z919 20BK	GROUND



LAMP-TAIL STOP TURN-LEFT

LAMP-TAIL STOP TURN-LEFT - 8 WAY

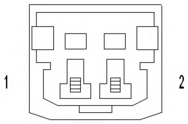
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	A35 18RD/DG (EXPORT)	FUSED B(+)
3	L614 18WT/DB (EXCEPT EXPORT)	TRAILER TOW TURN SIGNAL
4	L615 18WT/YL (EXCEPT EXPORT)	TRAILER TOW TURN SIGNAL
5	L777 20WT/BR	FUSED PARK LAMP RELAY OUTPUT
6	L1 18WT/LG	BACK-UP LAMP FEED
7	L63 18WT/DG	LEFT REAR TURN SIGNAL CONTROL
8	Z918 16BK	GROUND



LAMP-TAIL STOP TURN-RIGHT

LAMP-TAIL STOP TURN-RIGHT - 8 WAY

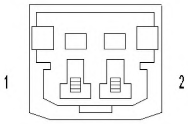
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	A35 18RD/DG (EXPORT)	FUSED B(+)
3	-	-
4	-	-
5	L778 20WT/DB	FUSED PARK LAMP RELAY OUTPUT
6	L1 18WT/LG	BACK-UP LAMP FEED
7	L62 18WT/OR	RIGHT REAR TURN SIGNAL CONTROL
8	Z918 16BK	GROUND



LAMP-VANITY-LEFT

LAMP-VANITY-LEFT - 2 WAY

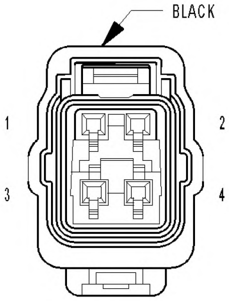
CAV	CIRCUIT	FUNCTION
1	A931 20RD	FUSED B(+)
2	M28 20YL/TN	GLOVE BOX LAMP DRIVER



LAMP-VANITY-RIGHT

LAMP-VANITY-RIGHT - 2 WAY

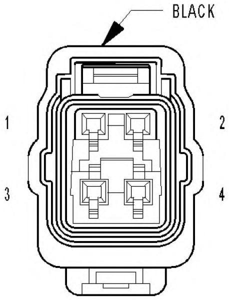
CAV	CIRCUIT	FUNCTION
1	A931 20RD	FUSED B(+)
2	M28 20YL/TN	GLOVE BOX LAMP DRIVER



LATCH-DOOR-DRIVER

LATCH-DOOR-DRIVER - BLACK 4 WAY

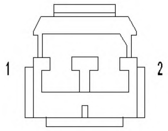
CAV	CIRCUIT	FUNCTION
1	G75 20VT (LHD)	LEFT FRONT DOOR AJAR SWITCH SENSE
1	G74 20VT/WT (RHD)	RIGHT FRONT DOOR AJAR SWITCH SENSE
2	Z911 16BK	GROUND
3	P701 16LG/DG	DRIVER DOOR UNLOCK RELAY OUTPUT
4	P778 16LG/LB	DOOR LOCK RELAY OUTPUT



LATCH-DOOR-LEFT REAR

LATCH-DOOR-LEFT REAR - BLACK 4 WAY

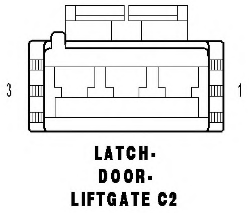
CAV	CIRCUIT	FUNCTION
1	G77 20VT/GY	LEFT REAR DOOR AJAR SWITCH SENSE
2	Z911 20BK	GROUND
3	P792 16LG/TN	DOOR UNLOCK RELAY OUTPUT
4	P778 16LG/LB	DOOR LOCK RELAY OUTPUT



LATCH-DOOR-LIFTGATE C1

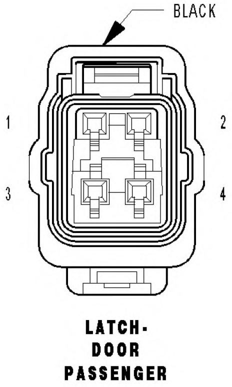
LATCH-DOOR-LIFTGATE C1 - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z800 20BK	GROUND
2	G78 20VT/OR	LIFTGATE AJAR SWITCH SENSE


3
1
LATCH-
DOOR-
LIFTGATE C2

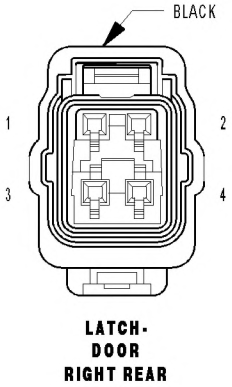
LATCH-DOOR-LIFTGATE C2 - 3 WAY

CAV	CIRCUIT	FUNCTION
1	P778 16LG/LB	DOOR LOCK RELAY OUTPUT
2	-	-
3	P792 16LG/TN	DOOR UNLOCK RELAY OUTPUT


BLACK
1
2
3
4
LATCH-
DOOR
PASSENGER

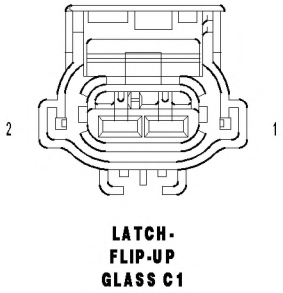
LATCH-DOOR-PASSENGER - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	G74 20VT/WT (LHD)	RIGHT FRONT DOOR AJAR SWITCH SENSE
1	G75 20VT (RHD)	LEFT FRONT DOOR AJAR SWITCH SENSE
2	Z908 20BK	GROUND
3	P792 16LG/TN	DOOR UNLOCK RELAY OUTPUT
4	P778 16LG/LB	DOOR LOCK RELAY OUTPUT


BLACK
1
2
3
4
LATCH-
DOOR
RIGHT REAR

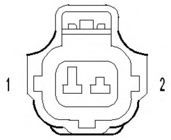
LATCH-DOOR-RIGHT REAR - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	G76 20VT/YL	RIGHT REAR DOOR AJAR SWITCH SENSE
2	Z908 20BK	GROUND
3	P792 16LG/TN	DOOR UNLOCK RELAY OUTPUT
4	P778 16LG/LB	DOOR LOCK RELAY OUTPUT


2
1
LATCH-
FLIP-UP
GLASS C1

LATCH-FLIP-UP GLASS C1 - 2 WAY

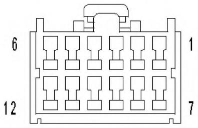
CAV	CIRCUIT	FUNCTION
1	Z800 18BK	GROUND
2	Q81 18OR/GY	FLIP-UP GLASS RELAY OUTPUT



LATCH-FLIP-UP GLASS C2

LATCH-FLIP-UP GLASS C2 - 2 WAY

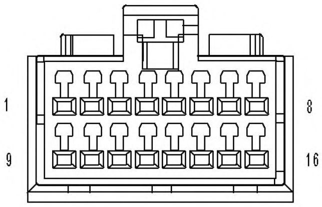
CAV	CIRCUIT	FUNCTION
1	Z800 18BK	GROUND
2	G80 20VT/BR	FLIP-UP GLASS AJAR SWITCH SENSE



MEDIA SYSTEM-MONITOR/ DVD C1 (PREMIUM AUDIO)

MEDIA SYSTEM-MONITOR/DVD C1 (PREMIUM AUDIO) - 12 WAY

CAV	CIRCUIT	FUNCTION
1	X510 20DG/LB	RIGHT AUDIO AUX
2	X926 20GY/OR	AUDIO OUT GROUND
3	X521 20GY/LB	LEFT AUDIO AUX
4	X207 20GY/LB	SHIELD
5	X407 20GY/LB	SHIELD
6	A114 20GY/RD	FUSED B(+)
7	X511 20GY/LG	LEFT AUDIO AUX
8	X910 20GY/DG	AUX AUDIO RETURN/COMMON
9	X522 20GY/DB	RIGHT AUDIO AUX
10	D55 20WT/OR	CAN B BUS (+)
11	D54 20WT	CAN B BUS (-)
12	Z915 20BK	GROUND



MEDIA SYSTEM-MONITOR/ DVD C2 (PREMIUM AUDIO)

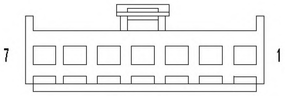
MEDIA SYSTEM-MONITOR/DVD C2 (PREMIUM AUDIO) - 16 WAY

CAV	CIRCUIT	FUNCTION
1	X114 20GY/LB	FUSED B (+)
2	X523 20GY/LB	REMOTE CONTROL FUNCTION 1
3	D91 20WT/DB	COM - BMM1 ADDRESS
4	-	-
5	-	-
6	-	-
7	X915 20GY/LG	VIDEO RETURN
8	X515 20GY/OR	VIDEO SIGNAL
9	Z915 20BK	GROUND
10	X524 20GY/YL	REMOTE CONTROL FUNCTION 2
11	D92 20WT	COM - BMM2 ADDRESS
12	X555 20VT/OR	VIDEO PLAY SIGNAL
13	-	-
14	-	-
15	-	-
16	X955 20BK/GY	SHIELD

CONNECTOR NOT AVAILABLE

MEDIA SYSTEM-MONITOR/DVD SHIELD - 1 WAY

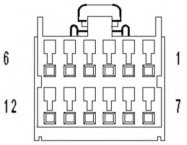
CAV	CIRCUIT	FUNCTION
1	X207 20GY/LB	SHIELD



MIRROR-INSIDE REARVIEW C1

MIRROR-INSIDE REARVIEW C1 - 7 WAY

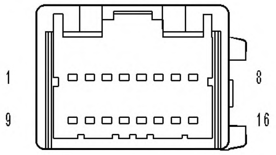
CAV	CIRCUIT	FUNCTION
1	F921 20PK/YL	FUSED RUN RELAY OUTPUT
2	Z915 20BK	GROUND
3	L1 18WT/LG	BACK-UP LAMP FEED
4	P112 20TN/OR	AUTO DAY/NIGHT MIRROR (+)
5	P114 20TN/WT	AUTO DAY/NIGHT MIRROR (-)
6	D55 20WT/OR (SMART BEAM)	CAN B BUS (+)
7	D54 20WT (SMART BEAM)	CAN B BUS (-)



MIRROR-INSIDE REARVIEW C2 (HANDS FREE)

MIRROR-INSIDE REARVIEW C2 (HANDS FREE) - 12 WAY

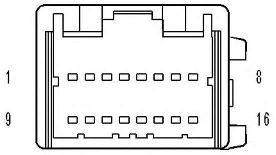
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	X722 20LB/DG	MICROPHONE 2 IN (+)
5	X735 20GY/LB	HANDS FREE MICROPHONE SHIELD
6	X712 20DG/LB	MICROPHONE 1 IN (+)
7	X793 20DG/OR	MICROPHONE FEED
8	-	-
9	X730 20OR/GY	VOICE RECOGNITION/PHONE SWITCH SIGNAL
10	-	-
11	X835 20OR/GY	SENSOR GROUND
12	X792 20LB/YL	MICROPHONE IN (-)



MIRROR-OUTSIDE REARVIEW-DRIVER

MIRROR-OUTSIDE REARVIEW-DRIVER - 16 WAY

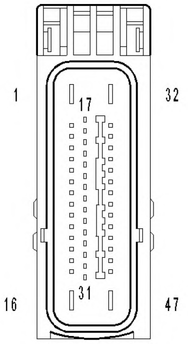
CAV	CIRCUIT	FUNCTION
1	P71 20TN/DG	DRIVER MIRROR VERTICAL DRIVER
2	P75 20TN/LG	DRIVER MIRROR HORIZONTAL DRIVER
3	P76 20TN/LB (EXCEPT MEMORY MIRRORS)	MIRROR COMMON DRIVER
3	P73 20TN/VT (MEMORY MIRRORS)	DRIVER MIRROR COMMON DRIVER
4	P110 20LB/WT (FOLDING MIRRORS)	FOLDING MIRROR RETURN
5	P699 20LG/YL (FOLDING MIRRORS)	MIRROR-POWER FOLDING/UNFOLDING
6	C17 20 LB/WT (EXCEPT MEMORY MIRRORS)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
6	C110 20DB/LB (MEMORY MIRRORS)	DRIVER MIRROR HEATER DRIVER
7	Z911 20 BK (EXCEPT MEMORY MIRRORS)	GROUND
7	C910 20DB/GY (MEMORY MIRRORS)	DRIVER MIRROR HEATER GROUND
8	P65 20TN/VT (MEMORY MIRRORS)	DRIVER MIRROR HORIZONTAL POSITION SIGNAL
9	P67 20TN/OR (MEMORY MIRRORS)	DRIVER MIRROR VERTICAL POSITION SIGNAL
10	P69 20TN/WT (MEMORY MIRRORS)	DRIVER MIRROR SENSOR GROUND
11	P669 20OR/LG (MEMORY MIRRORS)	DRIVER MIRROR SENSOR SUPPLY
12	P112 20TN/OR (MEMORY MIRRORS)	AUTO DAY/NIGHT MIRROR (+)
13	P114 20TN/WT (MEMORY MIRRORS)	AUTO DAY/NIGHT MIRROR (-)
14	-	-
15	-	-
16	-	-



MIRROR-OUTSIDE REARVIEW-PASSENGER

MIRROR-OUTSIDE REARVIEW-PASSENGER - 16 WAY

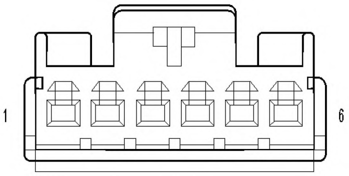
CAV	CIRCUIT	FUNCTION
1	P72 20TN/GY	PASSENGER MIRROR VERTICAL DRIVER
2	P74 20TN/OR	PASSENGER MIRROR HORIZONTAL DRIVER
3	P70 20TN/LB	PASSENGER MIRROR COMMON DRIVER
4	P110 20LB/WT	FOLDING MIRROR RETURN
5	P699 20LG/YL (FOLDING MIRRORS)	MIRROR-POWER FOLDING/UNFOLDING
6	C17 20LB/DG (EXCEPT MEMORY MIRRORS)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
6	C16 20DB/GY (MEMORY MIRRORS)	PASSENGER MIRROR HEATER DRIVER
7	Z908 20 BK (EXCEPT MEMORY MIRRORS)	GROUND
7	C917 20DB/YL (MEMORY MIRRORS)	PASSENGER MIRROR HEATER GROUND
8	P68 20TN/YL (MEMORY MIRRORS)	PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
9	P64 20TN (MEMORY MIRRORS)	PASSENGER MIRROR VERTICAL POSITION SIGNAL
10	P666 20LG/OR (MEMORY MIRRORS)	PASSENGER MIRROR SENSOR SUPPLY
11	P66 20TN/LG (MEMORY MIRRORS)	PASSENGER MIRROR SENSOR GROUND
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-



MODULE-ANTILOCK BRAKES

MODULE-ANTILOCK BRAKES - 47 WAY

CAV	CIRCUIT	FUNCTION
1	A107 12TN/RD	FUSED B(+)
2	D223 18WT/VT (TCS)	SCI TRANSMIT
3	-	-
4	F943 18PK/LG (EXCEPT TCS)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	-	-
6	G4 18VT/LB (ESP)	DYNAMICS SENSOR SUPPLY
6	B15 18DG/WT (EXCEPT TCS/ESP)	BRAKE SWITCH NO. 1 SIGNAL
7	-	-
8	F943 18PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
9	-	-
10	D223 18WT/VT (EXCEPT TCS)	SCI TRANSMIT
11	D65 18WT/LG (TCS/ESP)	CAN C BUS (+)
12	D65 18WT/LG (EXCEPT TCS/ESP)	CAN C BUS (+)
13	D64 18WT/LB (EXCEPT TCS/ESP)	CAN C BUS (-)
14	-	-
15	D64 18WT/LB (TCS/ESP)	CAN C BUS (-)
16	Z127 12BK/DG	GROUND
17	B131 18DG/VT (ESP)	ACTIVE BRAKE BOOSTER SOLENOID(+)
18	B83 18DG/WT (TCS/ESP)	BRAKE PRESSURE SENSOR SUPPLY
19	B986 18DG/TN (TCS/ESP)	BRAKE PRESSURE SENSOR RETURN
20	B84 18DG/DB (TCS/ESP)	BRAKE PRESSURE SENSOR SIGNAL
21	-	-
22	-	-
23	-	-
24	G94 18VT/DB (ESP)	DYNAMICS SENSOR GROUND
25	D51 18WT/BR (ESP)	DYNAMICS SENSOR LOW DATA LINK
26	-	-
27	B135 18DG/LG (ESP)	BRAKE PEDAL FORCE SWITCH OPEN
28	B136 18DG/LB (ESP)	BRAKE PEDAL FORCE SWITCH SIGNAL
29	D52 18WT/LB (ESP)	DYNAMICS SENSOR HIGH DATA LINK
30	B134 18DG/YL (ESP)	BRAKE PEDAL FORCE SWITCH CLOSE
31	B984 18DG/OR (ESP)	BRAKE PRESSURE SENSOR RETURN
32	A200 12RD/DG	FUSED B(+)
33	B6 18DG/TN	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
34	B7 18DG/VT	RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
35	B45 18DG/OR (ESP)	STOP LAMP INHIBIT RELAY CONTROL
36	B4 18LG/YL	LEFT REAR WHEEL SPEED SENSOR SUPPLY
37	B3 18DG/YL	LEFT REAR WHEEL SPEED SENSOR SIGNAL
38	B46 18LB/DB (TCS/ESP)	ESP/TCS ON/OFF SWITCH
39	-	-
40	-	-
41	B15 18DG/WT (TCS/ESP)	BRAKE SWITCH NO. 1 SIGNAL
42	B1 18DG/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
43	B2 18DG/WT	RIGHT REAR WHEEL SPEED SENSOR SUPPLY
44	-	-
45	B9 18DG/LG	LEFT FRONT WHEEL SPEED SENSOR SUPPLY
46	B8 18DG/TN	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
47	Z107 12BK/DG	GROUND



MODULE-ELECTRONIC OVERHEAD

MODULE-ELECTRONIC OVERHEAD - 6 WAY

CAV	CIRCUIT	FUNCTION
1	D55 20WT/OR	CAN B BUS (+)
2	D54 20WT	CAN B BUS (-)
3	A114 18GY/RD	FUSED B(+)
4	Z915 18BK	GROUND
5	F921 20PK/YL	FUSED RUN RELAY OUTPUT
6	-	-

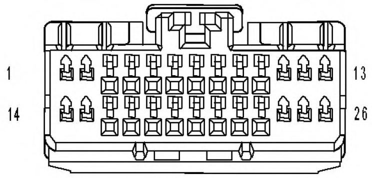
CONNECTOR NOT AVAILABLE

MODULE-ENGINE CONTROL (DIESEL) - 58 WAY

CAV	CIRCUIT	FUNCTION
1	K542 14BR	FUSED ASD RELAY OUTPUT
2	Z816 14BK	GROUND
3	A15 14RD/TN	FUSED ASD RELAY OUTPUT
4	Z130 14BK/BR	GROUND
5	F42 14DG/LG	FUSED ASD RELAY OUTPUT
6	Z130 14BK/BR	GROUND
7	K167 16BR/TN	APPS NO. 1 RETURN
8	-	-
10	-	-
11	-	-
12	K29 20WT/BR	APPS NO. 2 SIGNAL
13	-	-
14	-	-
15	F855 20PK/YL	5 VOLT SUPPLY
16	-	-
17	F856 20YL/PK	5 VOLT SUPPLY
18	-	-
19	-	-
20	-	-
21	-	-
22	V71 20VT/OR	S/C SWITCH SENSE 1
23	-	-
24	K23 20BR/LB	APPS NO. 1 SIGNAL
25	-	-
26	V72 20OR/VT	S/C SWITCH SENSE 2
27	-	-
28	V937 20VT/BR	S/C SWITCH RETURN
29	-	-
30	-	-
31	-	-
32	K31 20BR	FUEL PUMP RELAY CONTROL
33	-	-
34	-	-
35	B16 20LB/DG	BRAKE SWITCH NO. 2 SIGNAL
36	L950 20WT/LG	STOP LAMP INHIBIT RELAY FEED
37	-	-
38	-	-
39	-	-
40	K400 20BR/VT	APPS NO. 2 RETURN
41	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
42	K342 20BR/WT	ASD RELAY CONTROL
43	D223 20WT/VT	SCI TRANSMIT
44	T752 20DG/OR	ENGINE STARTER MOTOR RELAY CONTROL
45	-	-

MODULE-ENGINE CONTROL (DIESEL) - 58 WAY

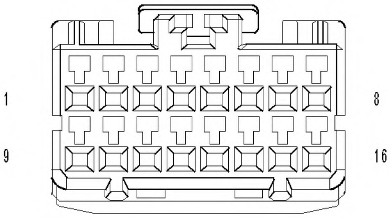
CAV	CIRCUIT	FUNCTION
46	-	-
47	-	-
48	F26 18PK/OR	FUSED IGNITION SWITCH OUTPUT (START)
49	-	-
50	-	-
51	D65 20WT/LG	CAN C BUS (+)
52	D64 20WT/LB	CAN C BUS (-)
53	-	-
54	C13 20LB/OR	A/C CLUTCH RELAY CONTROL
55	K363 20OR/BR	PTC NO. 3 RELAY CONTROL
56	-	-
57	-	-
58	-	-



**MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)**

MODULE-FINAL DRIVE CONTROL C1 (EXCEPT 3.7L) - 26 WAY

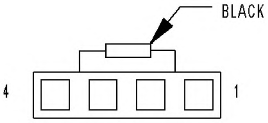
CAV	CIRCUIT	FUNCTION
1	A926 18RD/TN	FUSED B(+)
2	S80 20GY/LB (DHS)	DIRECTIONAL SOLENOID SUPPLY
3	Z901 18BK	GROUND
4	S72 20GY/BR (DHS)	DIRECTION VALVE-B SOLENOID CONTROL
5	S62 20GY/TN (DHS)	DIRECTION VALVE-G SOLENOID CONTROL
6	S61 20GY/DG (DHS)	DHS PRESSURE SOLENOID CONTROL
7	-	-
8	-	-
9	-	-
10	-	-
11	A909 16RD	FUSED B(+)
12	T316 14YL/GY	SHIFT MOTOR CONTROL B
13	T315 16YL/BR	SHIFT MOTOR CONTROL A
14	T301 20DG/YL	SWITCHED BATTERY SOLENOID SUPPLY
15	Z913 16BK	GROUND
16	-	-
17	T317 20YL/TN	TRANSFER CASE MOTOR LOCK SIGNAL
18	-	-
19	-	-
20	-	-
21	-	-
22	T306 20DG/DB (DHS)	FRONT DIFFERENTIAL SOLENOID CONTROL
23	T312 20YL/VT (DHS)	REAR DIFFERENTIAL SOLENOID CONTROL
24	A927 18RD/BR	FUSED B(+)
25	Z913 16BK	GROUND
26	Z913 16BK	GROUND



MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L)

MODULE-FINAL DRIVE CONTROL C2 (EXCEPT 3.7L) - 16 WAY

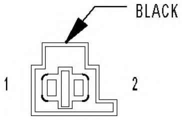
CAV	CIRCUIT	FUNCTION
1	-	-
2	G95 20VT/WT	4WD NEUTRAL INDICATOR
3	K977 16BR/LB	MODE SELECT
4	S51 20GY/DB (DHS)	SUSPENSION SENSOR LATERAL ACCELERATION SENSE
5	T313 20YL/LG	MODE SENSOR SIGNAL
6	S60 20GY/YL (DHS)	DHS PRESSURE SENSOR SIGNAL
7	S50 20GY/WT (DHS)	DHS 5 VOLT SUPPLY
8	S950 20GY/TN (DHS)	DHS SENSOR RETURN
9	Z902 18BK	GROUND
10	F921 20PK/GY	FUSED RUN RELAY OUTPUT
11	D65 20WT/LG	CAN C BUS (+)
12	D64 20WT/LB	CAN C BUS (-)
13	-	-
14	-	-
15	K504 20BR	DRIVETRAIN 5 VOLT SUPPLY
16	K594 20BR/LG	DRIVETRAIN SENSOR RETURN



MODULE-FRONT BLOWER POWER C1 (ATC)

MODULE-FRONT BLOWER POWER C1 (ATC) - BLACK 4 WAY

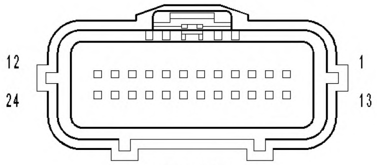
CAV	CIRCUIT	FUNCTION
1	-	-
2	Z134 12BK/LG	GROUND
3	C56 20VT	FRONT BLOWER CONTROL
4	C7 12DB	BLOWER MOTOR RELAY OUTPUT



MODULE-FRONT BLOWER POWER C2 (ATC)

MODULE-FRONT BLOWER POWER C2 (ATC) - BLACK 2 WAY

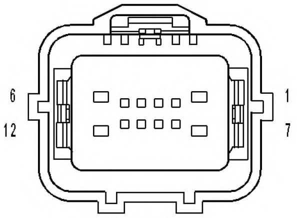
CAV	CIRCUIT	FUNCTION
1	C7	BLOWER MOTOR POWER
2	C75	BLOWER MOTOR GROUND



**MODULE-
FRONT
CONTROL C1**

MODULE-FRONT CONTROL C1 - 24 WAY

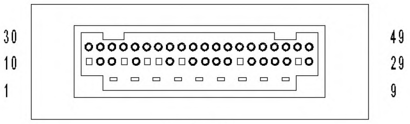
CAV	CIRCUIT	FUNCTION
1	Z131 18BK/DG	GROUND
2	D55 20WT/OR	CAN B BUS (+)
3	D54 20WT	CAN B BUS (-)
4	-	-
5	D72 20WT/LB	CAN C DIAGNOSTIC (+)
6	D71 20WT/DB	CAN C DIAGNOSTIC (-)
7	-	-
8	D65 20WT/LG	CAN C BUS (+)
9	D64 20WT/LB	CAN C BUS (-)
10	B20 20DG/OR	BRAKE FLUID LEVEL SWITCH SENSE
11	C18 20LB/BR	A/C PRESSURE SIGNAL
12	-	-
13	L91 20WT/TN	HAZARD SWITCH SENSE
14	-	-
15	-	-
16	F891 20PK/GY	5 VOLT SUPPLY
17	-	-
18	W1 20BR/TN	WASHER FLUID LEVEL SENSOR SIGNAL
19	-	-
20	-	-
21	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
22	Z387 18BK	GROUND
23	G70 20VT/LB (EXPORT)	HOOD AJAR SWITCH SENSE
24	Z131 18BK/DG	GROUND



**MODULE-
FRONT
CONTROL C2**

MODULE-FRONT CONTROL C2 - 12 WAY

CAV	CIRCUIT	FUNCTION
1	L44 18WT/TN	RIGHT LOW BEAM DRIVER
2	-	-
3	-	-
4	G31 20VT/OR	AAT SIGNAL
5	G931 20VT/BR	SENSOR GROUND
6	L43 18WT/DB	LEFT LOW BEAM DRIVER
7	L33 18WT/OR	LEFT HIGH BEAM DRIVER
8	L60 18WT/TN	RIGHT TURN SIGNAL
9	-	-
10	L61 18WT/LG	LEFT TURN SIGNAL
11	Z387 18BK	GROUND
12	L34 18WT/GY	RIGHT HIGH BEAM DRIVER



MODULE-FRONT CONTROL IPM

MODULE-FRONT CONTROL IPM - 49 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	A911 18RD	FUSED B(+)
3	A910 18RD	FUSED B(+)
4	A913 18RD	FUSED B(+)
5	A912 18RD	FUSED B(+)
6	-	-
7	L1 18WT/LG	BACK-UP LAMP FEED
8	-	-
9	-	-
10	K360 20GY/BR (DIESEL)	PTC NO. 1 RELAY CONTROL
11	W20 18BR/YL	REAR WASHER PUMP MOTOR CONTROL
12	W10 18BR	FRONT WASHER PUMP MOTOR CONTROL
13	F1 18PK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
14	K361 20BR/WT (DIESEL)	PTC NO. 2 RELAY CONTROL
15	A114 20GY/RD (5.7L EXPORT)	FUSED B(+)
15	A114 18GY/RD (EXCEPT 5.7L EXPORT)	FUSED B(+)
16	-	-
17	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
18	Z387 16BK	GROUND
18	Z387 18BK (EXCEPT 5.7L EXPORT)	GROUND
19	Z131 18BK/DG	GROUND
20	-	-
21	L656 20WT/DG (TRAILER TOW)	RIGHT TRAILER TOW BRAKE LAMP RELAY CONTROL
22	L655 20WT/OR (TRAILER TOW)	LEFT TRAILER TOW BRAKE LAMP RELAY CONTROL
23	-	-
24	Z131 18BK/DG	GROUND
25	Z387 16BK	GROUND
26	L139 20WT/YL	FRONT FOG LAMP RELAY CONTROL
27	W5 20BR/LG	WIPER ON/OFF RELAY CONTROL
28	L239 20WT/DG	REAR FOG LAMP RELAY CONTROL
29	W2 20BR/LG	HIGH/LOW WIPER RELAY CONTROL
30	A15 16RD/TN	FUSED ASD RELAY OUTPUT
31	W7 20BR/GY	FRONT WIPER PARK SWITCH SENSE
32	Z131 18BK/DG	GROUND
33	Z387 16BK	GROUND
33	Z387 18BK (EXCEPT 5.7L EXPORT)	GROUND
34	L62 18WT/OR	RIGHT REAR TURN SIGNAL CONTROL
35	C918 20BK/LB	FCM SENSOR RETURN
36	-	-
37	W12 20BR/OR	REAR WIPER RELAY CONTROL
38	P305 20LG/LB	ACCESSORY DELAY RELAY CONTROL
39	-	-
40	-	-
41	Z387 16BK	GROUND
41	Z387 18BK (EXCEPT 5.7L EXPORT)	GROUND
42	-	-
43	L63 18WT/DG	LEFT REAR TURN SIGNAL CONTROL
44	-	-
45	K173 20BR/VT (EXCEPT 3.7L/DIESEL)	HYDRAULIC RADIATOR FAN SOLENOID CONTROL
46	P201 20LG/DB (ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS RELAY CONTROL
47	X4 20DG/WT	HORN RELAY CONTROL
48	L779 20WT/LB	PARK LAMP RELAY CONTROL
49	N112 20DB/OR (3.7L/DIESEL)	RADIATOR FAN HIGH RELAY CONTROL

CONNECTOR NOT AVAILABLE

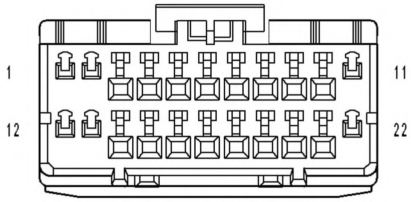
MODULE-GLOW PLUG (DIESEL) - 1 WAY

CAV	CIRCUIT	FUNCTION
1	A904 10RD	FUSED B(+)

CONNECTOR NOT AVAILABLE

MODULE-GLOW PLUG TERMINAL (DIESEL) - 1 WAY

CAV	CIRCUIT	FUNCTION
1	A904 10RD	FUSED B(+)



MODULE-HANDS FREE

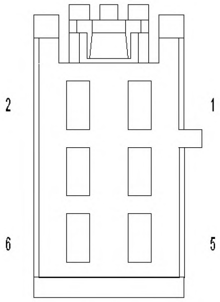
MODULE-HANDS FREE - 22 WAY

CAV	CIRCUIT	FUNCTION
1	A114 18GY/RD	FUSED B(+)
2	-	-
3	-	-
4	D54 20WT	CAN B BUS (-)
5	X722 20LB/DG	MICROPHONE 2 IN (+)
6	-	-
7	-	-
8	X703 20DG/OR	LEFT AUDIO OUTPUT
9	X704 20DG/YL	RIGHT AUDIO OUTPUT
10	X795 20DG	COMMON AUDIO OUTPUT
11	-	-
12	-	-
13	-	-
14	D55 20WT/OR	CAN B BUS (+)
15	X730 20GY/YL	VOICE RECOGNITION/PHONE SWITCH SIGNAL
16	X712 20DG/LB	MICROPHONE 1 IN (+)
17	X792 20LB/YL	MICROPHONE IN (-)
18	X735 20NA	HANDS FREE MICROPHONE SHIELD
19	-	-
20	X793 20DG/OR	MICROPHONE FEED
21	X835 20OR/GY	SENSOR GROUND
22	Z907 20BK	GROUND

CONNECTOR NOT AVAILABLE

MODULE-HANDS FREE SHIELD - 1 WAY

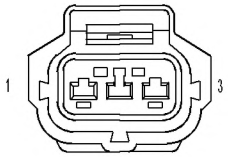
CAV	CIRCUIT	FUNCTION
1	X735 20GY/LB	HANDS FREE MICROPHONE SHIELD



MODULE-HEATED SEAT

MODULE-HEATED SEAT - 6 WAY

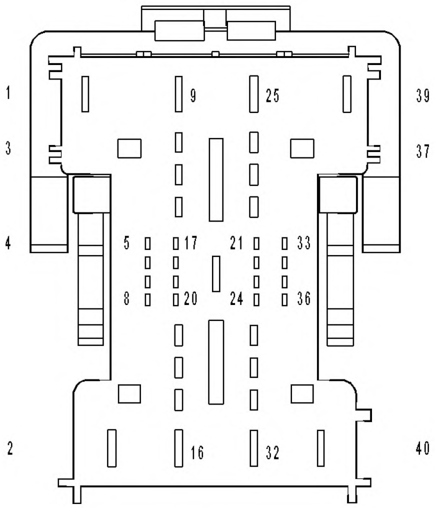
CAV	CIRCUIT	FUNCTION
1	Z917 14BK	GROUND
2	A33 16BK/RD (LHD)	FUSED B(+)
2	A33 16RD/YL (RHD)	FUSED B(+)
3	P187 16LG/BR	LEFT SEAT HEATER B(+) DRIVER
4	P188 16LG/VT	RIGHT SEAT HEATER B(+) DRIVER
5	D54 20WT	CAN B BUS (-)
6	D55 20WT/OR	CAN B BUS (+)



MODULE-HYDRAULIC COOLING FAN (HEC)

MODULE-HYDRAULIC COOLING FAN (HEC) - 3 WAY

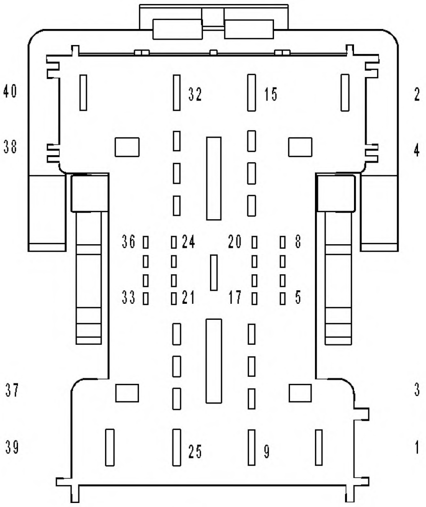
CAV	CIRCUIT	FUNCTION
1	A916 16RD/GY	FUSED B(+)
2	K173 20BR/VT	HYDRAULIC RADIATOR FAN SOLENOID CONTROL
3	Z823 20BK/DG	GROUND



MODULE-INTEGRATED POWER C1

MODULE-INTEGRATED POWER C1 - 40 WAY

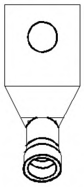
CAV	CIRCUIT	FUNCTION
1	A118 16RD/OR	FUSED B(+)
2	A909 14RD	FUSED B(+)
3	-	-
4	-	-
5	L778 20WT/DB	FUSED PARK LAMP RELAY OUTPUT
6	L778 20WT/DB	FUSED PARK LAMP RELAY OUTPUT
7	L777 20WT/BR	FUSED PARK LAMP RELAY OUTPUT
8	L777 20WT/BR	FUSED PARK LAMP RELAY OUTPUT
9	N23 10DB/DG (3.7L/4.7L)	HIGH SPEED RADIATOR FAN RELAY OUTPUT
10	W7 20BR/GY	FRONT WIPER PARK SWITCH SENSE
11	F20 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F944 18PK/TN	IGNITION SWITCH OUTPUT (RUN-START)
13	L76 18WT/BR	FUSED PARK LAMP RELAY OUTPUT
14	A114 18GY/RD (EXPORT)	FUSED B(+)
15	Z387 18BK	GROUND
16	L614 18WT/DB	TRAILER TOW TURN SIGNAL
17	L778 20WT/DB	FUSED PARK LAMP RELAY OUTPUT
18	C918 20BK/LB	FCM SENSOR RETURN
19	L777 20WT/BR	FUSED PARK LAMP RELAY OUTPUT
20	-	-
21	-	-
22	-	-
23	L62 18WT/OR	RIGHT REAR TURN SIGNAL CONTROL
24	K361 20BR/WT (DIESEL)	PTC NO. 2 RELAY CONTROL
25	N24 10DG/DB (3.7L/4.7L)	LOW SPEED RADIATOR FAN RELAY OUTPUT
26	F100 20PK/VT	FUSED RUN RELAY OUTPUT
27	F923 14PK/YL	RUN RELAY OUTPUT
28	Z131 18BK/DG	GROUND
29	W10 18BR	FRONT WASHER PUMP MOTOR CONTROL
30	K360 20GY/BR (DIESEL)	PTC NO. 1 RELAY CONTROL
31	W20 18BR/YL	REAR WASHER PUMP MOTOR CONTROL
32	A15 16RD/TN	FUSED ASD RELAY OUTPUT
33	A109 16TN/RD	FUEL PUMP RELAY OUTPUT
34	A109 16TN/RD	FUEL PUMP RELAY OUTPUT
35	-	-
36	F1 18PK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
37	-	-
38	-	-
39	Z387 18BK	GROUND
40	A114 18GY/RD	FUSED B(+)



MODULE-INTEGRATED POWER C2

MODULE-INTEGRATED POWER C2 - 40 WAY

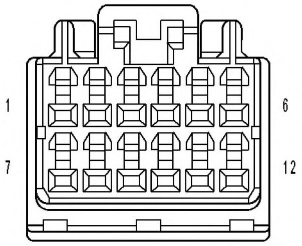
CAV	CIRCUIT	FUNCTION
1	-	-
2	L1 18WT/LG	BACK-UP LAMP FEED
3	-	-
4	-	-
5	-	-
6	-	-
7	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
8	L1 18WT/LG	BACK-UP LAMP FEED
9	Z387 18BK	GROUND
10	A72 18RD/OR (3.7L/4.7L LHD)	ADJUSTABLE PEDALS RELAY OUTPUT
11	A15 16RD/TN	FUSED ASD RELAY OUTPUT
12	-	-
13	-	-
14	-	-
15	L63 18WT/DG	LEFT REAR TURN SIGNAL CONTROL
16	-	-
17	-	-
18	L89 18WT/OR	FRONT FOG LAMP RELAY OUTPUT
19	L89 18WT/OR	FRONT FOG LAMP RELAY OUTPUT
20	W12 20BR/OR	REAR WIPER RELAY CONTROL
21	-	-
22	-	-
23	K173 20BR/VT (5.7L/DIESEL)	HYDRAULIC RADIATOR FAN SOLENOID CONTROL
24	P305 20LG/LB	ACCESSORY DELAY RELAY CONTROL
25	A5 16RD/VT	FUSED B(+)
26	Z387 18BK	GROUND
27	W4 16BR/OR	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
28	W3 16BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT
29	Z387 18BK	GROUND
30	-	-
31	L615 18WT/YL	TRAILER TOW TURN SIGNAL
32	-	-
33	-	-
34	-	-
35	X2 18DG/OR	HORN RELAY OUTPUT
36	A35 18RD/DG (EXPORT)	FUSED B(+)
37	-	-
38	-	-
39	-	-
40	-	-



MODULE-INTEGRATED POWER EYELET (B+)

MODULE-INTEGRATED POWER EYELET (B+) - 1 WAY

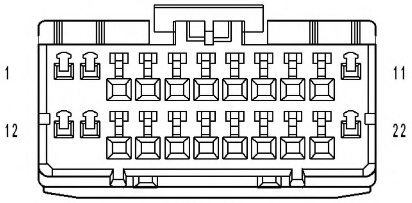
CAV	CIRCUIT
1	A0 06RD (DIESEL)
1	A1 04RD (DIESEL)
1	A1 06RD (GAS)
1	A0 08RD (GAS)



MODULE-INTRUSION TRANSCEIVER (EXPORT)

MODULE-INTRUSION TRANSCEIVER (EXPORT) - 12 WAY

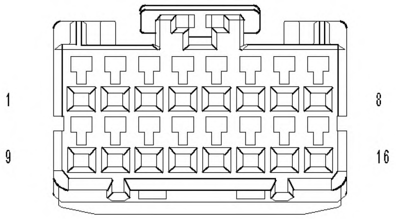
CAV	CIRCUIT	FUNCTION
1	A114 20OR/RD	FUSED B(+)
2	-	-
3	A645 20RD/VT	REAR INTRUSION SENSOR SIGNAL
4	G460 20DG/VT	FRONT INTRUSION SENSOR SIGNAL
5	D96 20WT/BK	SIREN SIGNAL CONTROL
6	D55 20WT/OR	CAN B BUS (+)
7	Z915 20BK	GROUND
8	-	-
9	G945 20VT/DG	SENSOR GROUND
10	G946 20LG/VT	SENSOR GROUND
11	-	-
12	D54 20WT	CAN B BUS (-)



MODULE-MEMORY MIRROR-DRIVER C1

MODULE-MEMORY MIRROR-DRIVER C1 - 22 WAY

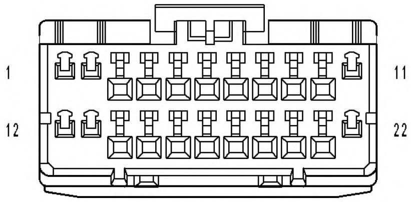
CAV	CIRCUIT	FUNCTION
1	A931 20RD/WT	FUSED B(+)
2	C110 20DB/LB	DRIVER MIRROR HEATER DRIVER
3	P73 20TN/VT	DRIVER MIRROR COMMON DRIVER
4	P71 20TN/DG	DRIVER MIRROR VERTICAL DRIVER
5	P75 20TN/LG	DRIVER MIRROR HORIZONTAL DRIVER
6	P65 20TN/VT	DRIVER MIRROR HORIZONTAL POSITION SIGNAL
7	P67 20TN/OR	DRIVER MIRROR VERTICAL POSITION SIGNAL
8	P669 20OR/LG	DRIVER MIRROR SENSOR SUPPLY
9	G75 20VT	LEFT FRONT DOOR AJAR SWITCH SENSE
10	Z911 20BK	GROUND
11	-	-
12	Z911 20BK	GROUND
13	C910 20DB/GY	DRIVER MIRROR HEATER GROUND
14	-	-
15	-	-
16	-	-
17	P69 20TN/WT	DRIVER MIRROR SENSOR GROUND
18	D54 20WT	CAN B BUS (-)
19	D55 20WT/OR	CAN B BUS (+)
20	G161 20VT/DG	DRIVER DOOR LOCK SWITCH MUX
21	G775 20OR/VT	DRIVER DOOR LOCK SWITCH RETURN
22	-	-



MODULE-MEMORY MIRROR-DRIVER C2

MODULE-MEMORY MIRROR-DRIVER C2 - 16 WAY

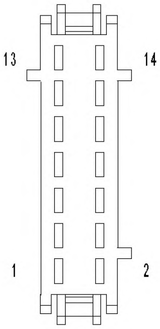
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	P703 20DB/LG	MIRROR HORIZONTAL LEFT SWITCH SENSE
5	-	-
6	P76 20TN/LB	MIRROR COMMON DRIVER
7	P705 20LG/OR	MIRROR VERTICAL DOWN SWITCH SENSE
8	-	-
9	-	-
10	G920 20VT/YL	MEMORY SELECT SWITCH RETURN
11	-	-
12	-	-
13	P439 20LG/OR	MEMORY SELECT SWITCH MUX
14	-	-
15	P704 20LG/TN	MIRROR HORIZONTAL RIGHT SWITCH SENSE
16	P706 20LG/GY	MIRROR VERTICAL UP SWITCH SENSE



MODULE-MEMORY MIRROR-PASSENGER

MODULE-MEMORY MIRROR-PASSENGER - 22 WAY

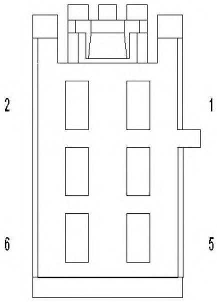
CAV	CIRCUIT	FUNCTION
1	A931 20RD/WT	FUSED B(+)
2	C16 20DB/GY	PASSENGER MIRROR HEATER DRIVER
3	P70 20TN/LB	PASSENGER MIRROR COMMON DRIVER
4	P72 20TN/GY	PASSENGER MIRROR VERTICAL DRIVER
5	P74 20TN/OR	PASSENGER MIRROR HORIZONTAL DRIVER
6	P68 20TN/YL	PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
7	P64 20TN	PASSENGER MIRROR VERTICAL POSITION SIGNAL
8	P666 20LG/OR	PASSENGER MIRROR SENSOR SUPPLY
9	G74 20VT/WT	RIGHT FRONT DOOR AJAR SWITCH SENSE
10	-	-
11	-	-
12	Z908 20BK	GROUND
13	C917 20DB/YL	PASSENGER MIRROR HEATER GROUND
14	-	-
15	-	-
16	-	-
17	P66 20TN/LG	PASSENGER MIRROR SENSOR GROUND
18	D54 20WT	CAN B BUS (-)
19	D55 20WT/OR	CAN B BUS (+)
20	G160 20VT/BR	PASSENGER DOOR LOCK SWITCH MUX
21	G776 20VT/OR	PASSENGER DOOR LOCK SWITCH RETURN
22	-	-



MODULE-MEMORY SEAT C1

MODULE-MEMORY SEAT C1 - 14 WAY

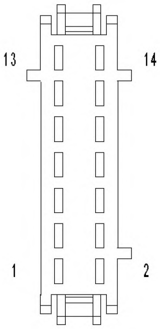
CAV	CIRCUIT	FUNCTION
1	P205 16LG/DB (LHD MEMORY PEDALS)	ADJUSTABLE PEDALS MOTOR FORWARD
2	P206 16LG/TN (LHD MEMORY PEDALS)	ADJUSTABLE PEDALS MOTOR REARWARD
3	-	-
4	-	-
5	D54 20WT	CAN B BUS (-)
6	-	-
7	D55 20WT/OR	CAN B BUS (+)
8	A33 16RD/YL	FUSED B(+)
9	G11 20VT/TN (LHD MEMORY PEDALS)	ADJUSTABLE PEDALS SENSOR SUPPLY
10	Z911 14BK	GROUND
11	-	-
12	G912 20VT/WT (LHD MEMORY PEDALS)	ADJUSTABLE PEDALS SENSOR RETURN
13	-	-
14	G12 20VT/BR (LHD MEMORY PEDALS)	ADJUSTABLE PEDALS SENSOR SIGNAL



MODULE-MEMORY SEAT C2

MODULE-MEMORY SEAT C2 - 6 WAY

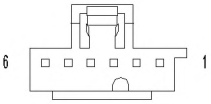
CAV	CIRCUIT	FUNCTION
1	G493 20OR/VT	DRIVER SEAT RECLINER POSITION SENSOR GROUND
2	P141 16LG/BR	DRIVER SEAT RECLINER UP DRIVER
3	-	-
4	P143 16LG/GY	DRIVER SEAT RECLINER DOWN DRIVER
5	G403 20VT/OR	DRIVER SEAT RECLINER POSITION SENSE
6	-	-



MODULE-MEMORY SEAT C3

MODULE-MEMORY SEAT C3 - 14 WAY

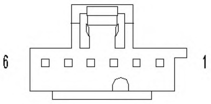
CAV	CIRCUIT	FUNCTION
1	G404 20VT/YL	DRIVER SEAT FRONT VERTICAL POSITION SENSE
2	G402 20VT/DB	DRIVER SEAT REAR VERTICAL POSITION SENSE
3	G401 20VT/LG	DRIVER SEAT HORIZONTAL POSITION SENSE
4	G494 20YL/VT	DRIVER SEAT FRONT VERTICAL SENSOR GROUND
5	G492 20LB/VT	DRIVER SEAT REAR VERTICAL SENSOR GROUND
6	G491 20VT/GY	DRIVER SEAT HORIZONTAL SENSOR GROUND
7	-	-
8	P115 16LG	DRIVER SEAT HORIZONTAL FORWARD DRIVER
9	P117 16LG/LB	DRIVER SEAT HORIZONTAL REARWARD DRIVER
10	P113 16LG/WT	DRIVER SEAT REAR VERTICAL DOWN DRIVER
11	-	-
12	P111 16LG/YL	DRIVER SEAT REAR VERTICAL UP DRIVER
13	P121 16LG/DB	DRIVER SEAT FRONT VERTICAL DOWN DRIVER
14	P119 16LG/DG	DRIVER SEAT FRONT VERTICAL UP DRIVER



MODULE-MEMORY SEAT C4

MODULE-MEMORY SEAT C4 - 6 WAY

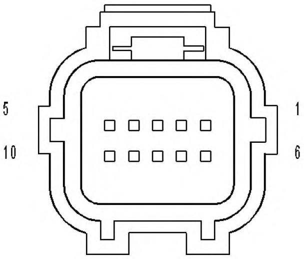
CAV	CIRCUIT	FUNCTION
1	P599 20LG/TN	DRIVER SEAT SWITCH MUX RETURN
2	P239 20LG/WT	DRIVER SEAT SWITCH REAR VERTICAL/HORIZONTAL SWITCH MUX
3	P339 20LG/DB	DRIVER SEAT SWITCH FRONT VERTICAL/RECLINER SWITCH MUX
4	-	-
5	-	-
6	P9 20LG/OR	DRIVER SEAT SWITCH SUPPLY



MODULE-MEMORY SEAT C5 (LHD)

MODULE-MEMORY SEAT C5 (LHD) - 6 WAY

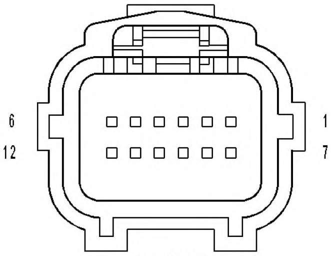
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	Q102 20OR/DB	ADJUSTABLE PEDALS SWITCH FORWARD
5	Q103 20OR/LG	ADJUSTABLE PEDALS SWITCH REARWARD
6	Q101 20OR/LB	ADJUSTABLE PEDALS SWITCH GROUND



MODULE-OCCUPANT CLASSIFICATION C1

MODULE-OCCUPANT CLASSIFICATION C1 - 10 WAY

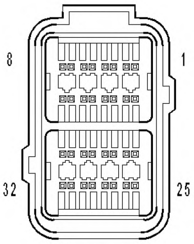
CAV	CIRCUIT	FUNCTION
1	A27 20RD/LB	FUSED B(+)
2	F200 20PK/LB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	-	-
4	D55 20WT/OR	CAN B BUS (+)
5	D54 20WT	CAN B BUS (-)
6	-	-
7	R263 20LB/VT	DRIVER SEAT POSITION SENSOR VOLTAGE
8	-	-
9	R261 20LB/WT	DRIVER SEAT POSITION SENSOR DATA
10	Z105 20BK	GROUND



MODULE-OCCUPANT CLASSIFICATION C2

MODULE-OCCUPANT CLASSIFICATION C2 - 12 WAY

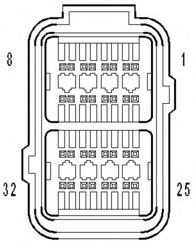
CAV	CIRCUIT	FUNCTION
1	R726 20LG/YL	SEAT WEIGHT SENSOR 5 VOLT
2	R264 20VT/LB	PASSENGER SEAT POSITION SENSOR VOLTAGE
3	R717 20LG/DG	SEAT WEIGHT LEFT FRONT SENSOR SIGNAL
4	-	-
5	R718 20LB/DG	SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL
6	-	-
7	R706 20LB/OR	SEAT WEIGHT RIGHT REAR SENSOR SIGNAL
8	-	-
9	R705 20LG/OR	SEAT WEIGHT LEFT REAR SENSOR SIGNAL
10	-	-
11	R262 20WT/LB	PASSENGER SEAT POSITION SENSOR DATA
12	R728 20LB/YL	SEAT WEIGHT SENSOR GROUND



MODULE-OCCUPANT RESTRAINT CONTROLLER C1

MODULE-OCCUPANT RESTRAINT CONTROLLER C1 - 32 WAY

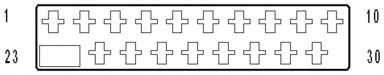
CAV	CIRCUIT	FUNCTION
1	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
2	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1
3	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1
4	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	R13 20LG/VT (SAB)	LEFT SIDE IMPACT SENSOR 1 SIGNAL
16	R16 20BR/LG (SAB)	RIGHT SIDE IMPACT SENSOR 1 GROUND
17	-	-
18	-	-
19	R15 20LG/OR (SAB)	LEFT SIDE IMPACT SENSOR 1 GROUND
20	R19 20LG/WT (SAB)	LEFT SIDE IMPACT SENSOR 2 GROUND
21	R20 20WT/LG (SAB)	RIGHT SIDE IMPACT SENSOR 2 GROUND
22	R17 20LG (SAB)	LEFT SIDE IMPACT SENSOR 2 SIGNAL
23	R18 20LB (SAB)	RIGHT SIDE IMPACT SENSOR 2 SIGNAL
24	R14 20TN/LG (SAB)	RIGHT SIDE IMPACT SENSOR 1 SIGNAL
25	R1 20LB/BR (SAB)	LEFT CURTAIN SQUIB 1 LINE 2
26	R3 20LB/OR (SAB)	LEFT CURTAIN SQUIB 1 LINE 1
27	R4 20OR/LB (SAB)	RIGHT CURTAIN SQUIB 1 LINE 1
28	R2 20WT/LB (SAB)	RIGHT CURTAIN SQUIB 1 LINE 2
29	-	-
30	-	-
31	-	-
32	-	-



**MODULE-
OCCUPANT
RESTRAINT
CONTROLLER C2**

MODULE-OCCUPANT RESTRAINT CONTROLLER C2 - 32 WAY

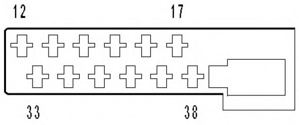
CAV	CIRCUIT	FUNCTION
1	R43 20LG/BR	DRIVER SQUIB 1 LINE 2
2	R45 20LG/OR	DRIVER SQUIB 1 LINE 1
3	R63 20LG/WT	DRIVER SQUIB 2 LINE 1
4	R61 20LG/VT	DRIVER SQUIB 2 LINE 2
5	R42 20LB/BR	PASSENGER SQUIB 1 LINE 2
6	R44 20LB/OR	PASSENGER SQUIB 1 LINE 1
7	R64 20LB/WT	PASSENGER SQUIB 2 LINE 1
8	R62 20LB/VT	PASSENGER SQUIB 2 LINE 2
9	R106 20LG/LB	PASSENGER AIRBAG INDICATOR DRIVER
10	-	-
11	-	-
12	R82 20WT/LB	RIGHT FRONT IMPACT SENSOR GROUND
13	-	-
14	-	-
15	D55 20WT/OR	CAN B BUS (+)
16	F20 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
17	-	-
18	-	-
19	-	-
20	R81 20LB/WT	LEFT FRONT IMPACT SENSOR GROUND
21	-	-
22	Z104 20BK/LG	GROUND
23	D54 20WT	CAN B BUS (-)
24	F100 20PK/VT	FUSED RUN RELAY OUTPUT
25	R79 20LB/VT	LEFT FRONT IMPACT SENSOR SIGNAL
26	R80 20VT/LB	RIGHT FRONT IMPACT SENSOR SIGNAL
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-



**MODULE-
PARK ASSIST C1
(PARK ASSIST)**

MODULE-PARK ASSIST C1 (PARK ASSIST) - 18 WAY

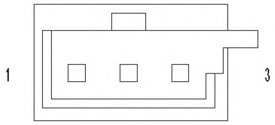
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	D703 20WT/OR	PARK ASSIST SENSOR NO. 9 SIGNAL
4	D700 20WT/DG	PARK ASSIST SENSOR NO. 7 SIGNAL
5	D54 20WT	CAN B BUS (-)
6	D55 20WT/OR	CAN B BUS (+)
7	-	-
8	X750 20GY/LB	PARK ASSIST SENSOR GROUND
9	Z171 20GY/BK	GROUND
10	Z913 20BK	GROUND
23	D704 20WT/DB	PARK ASSIST SENSOR NO. 10 SIGNAL
24	D701 20WT/LB	PARK ASSIST SENSOR NO. 8 SIGNAL
25	D777 20WT/GY	REAR PARK ASSIST DISPLAY SIGNAL
26	-	-
27	-	-
28	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY
29	X777 20LG/GY	PARK ASSIST DISPLAY SUPPLY
30	F921 20PK/GY	FUSED RUN RELAY OUTPUT



**MODULE-
PARK ASSIST C2
(PARK ASSIST)**

MODULE-PARK ASSIST C2 (PARK ASSIST) - 12 WAY

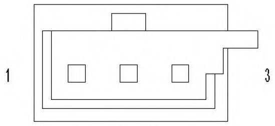
CAV	CIRCUIT	FUNCTION
12	Z172 20BK/OR	GROUND
13	Z169 20BK/LG	GROUND
14	D778 20WT/OR	FRONT PARK ASSIST DISPLAY SIGNAL
15	D708 20WT/LB	PARK ASSIST SENSOR NO. 5 SIGNAL
16	D706 20WT/TN	PARK ASSIST SENSOR NO. 3 SIGNAL
17	D702 20WT/YL	PARK ASSIST SENSOR NO. 1 SIGNAL
33	X778 20GY/DB	PARK ASSIST DISPLAY COMMUNICATION FEED
34	X702 20GY/LB	FRONT PARK ASSIST SENSOR SUPPLY
35	D709 20WT/BR	PARK ASSIST SENSOR NO. 6 SIGNAL
36	D707 20WT/LG	PARK ASSIST SENSOR NO. 4 SIGNAL
37	D705 20WT/OR	PARK ASSIST SENSOR NO. 2 SIGNAL
38	-	-



**MODULE-
PARK-
DISPLAY-
FRONT
(FRONT PARK ASSIST)**

MODULE-PARK-DISPLAY-FRONT (FRONT PARK ASSIST) - 3 WAY

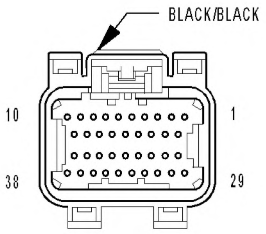
CAV	CIRCUIT	FUNCTION
1	X778 20GY/DB	PARK ASSIST DISPLAY COMMUNICATION FEED
2	Z172 20BK/OR	GROUND
3	D778 20WT/OR	FRONT PARK ASSIST DISPLAY SIGNAL



**MODULE-
PARK-
DISPLAY-
REAR
(REAR PARK ASSIST)**

MODULE-PARK-DISPLAY-REAR (REAR PARK ASSIST) - 3 WAY

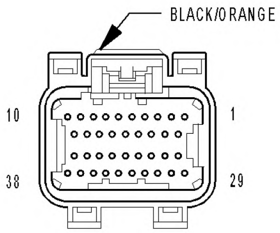
CAV	CIRCUIT	FUNCTION
1	X777 20LG/GY	PARK ASSIST DISPLAY SUPPLY
2	Z171 20GY/BK	GROUND
3	D777 20WT/GY	REAR PARK ASSIST DISPLAY SIGNAL



MODULE-POWERTRAIN CONTROL C1

MODULE-POWERTRAIN CONTROL C1 - BLACK/BLACK 38 WAY

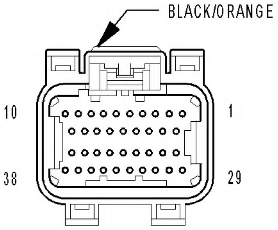
CAV	CIRCUIT	FUNCTION
1	K98 16DB/BK (EXCEPT 3.7L)	COIL CONTROL NO. 8
2	-	-
3	K97 16BR/LG (EXCEPT 3.7L)	COIL CONTROL NO. 7
4	K28 16BR/LB (EXCEPT 3.7L)	INJECTOR CONTROL NO. 8
5	K26 16BR/YL (EXCEPT 3.7L)	INJECTOR CONTROL NO. 7
6	-	-
7	-	-
8	-	-
9	Z816 16BK	GROUND
10	-	-
11	F942 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F1 18PK/WT (EXCEPT 3.7L)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	Z130 16BK/BR	GROUND
19	-	-
20	G6 20VT/GY	ENGINE OIL PRESSURE SIGNAL
21	-	-
22	-	-
23	-	-
24	-	-
25	D118 20LG/WT	SCI RECEIVE
26	D16 20WT/OR (EXCEPT 3.7L)	SCI RECEIVE (TCM)
27	F856 20YL/PK	5 VOLT SUPPLY
28	K452 18BR/LB (5.7L)	MDS SOL CONTROL NO. 4
29	A209 18RD	FUSED B(+)
30	F26 18PK/OR	FUSED IGNITION SWITCH OUTPUT (START)
31	K141 20DB/YL	02 1/2 SIGNAL
32	K902 20BR/DG	02 RETURN (UPSTREAM)
33	K243 20BR	O2 2/2 SIGNAL
34	D65 20WT/LG	CAN C BUS (+)
35	D64 20WT/LB	CAN C BUS (-)
36	D223 20WT/VT	SCI TRANSMIT
37	D15 20BR/WT (EXCEPT 3.7L)	SCI TRANSMIT (TCM)
38	-	-



MODULE-POWERTRAIN CONTROL C2 (5.7L)

MODULE-POWERTRAIN CONTROL C2 (5.7L) - BLACK/ORANGE 38 WAY

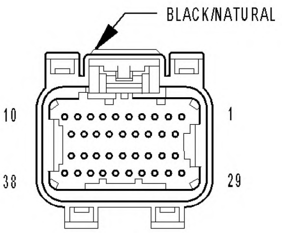
CAV	CIRCUIT	FUNCTION
1	K10 16DB/OR	COIL CONTROL NO. 6
2	K16 16DB/YL	COIL CONTROL NO. 5
3	K15 16DB	COIL CONTROL NO. 4
4	K58 16BR/VT	INJECTOR CONTROL NO. 6
5	K38 16BR/OR	INJECTOR CONTROL NO. 5
6	K124 18DB/GY	ETC MOTOR (+)
7	K93 16DB/BR	COIL CONTROL NO. 3
8	K35 20DB/VT	EGR SOL CONTROL
9	K85 16DB/TN	COIL CONTROL NO. 2
10	K86 16YL/DB	COIL CONTROL NO. 1
11	K14 16BR/TN	INJECTOR CONTROL NO. 4
12	K13 16BR/LB	INJECTOR CONTROL NO. 3
13	K12 16BR/DB	INJECTOR CONTROL NO. 2
14	K11 16BR/YL	INJECTOR CONTROL NO. 1
15	K922 18BR/DB	TP SENSOR RETURN
16	K453 18BR/DG	MDS SOL CONTROL NO. 6
17	K199 18BR/GY	O2 2/1 HEATER CONTROL
18	K99 20OR/TN	O2 1/1 HEATER CONTROL
19	K125 16BR/DG	GEN FIELD CONTROL
20	K2 16VT/OR	ECT SIGNAL
21	K22 18BR/OR	TP NO. 1 SIGNAL
22	K34 20DB/LG	EGR SIGNAL
23	K1 20VT/BR	MAP SIGNAL
24	K942 20BR/LG	KNOCK SENSOR NO. 1 RETURN
25	K42 20DB/OR	KNOCK SENSOR NO. 1 SIGNAL
26	-	-
27	K900 20DB/DG	SENSOR GROUND
28	K122 18BR/DG	TP NO. 2 SIGNAL
29	F855 20PK/YL	5 VOLT SUPPLY
30	K21 20BR/WT	IAT SIGNAL
31	K41 20DB/LB	O2 1/1 SIGNAL
32	K904 20DB/WT	O2 RETURN (DOWNSTREAM)
33	K43 20DB/PK	O2 2/1 SIGNAL
34	K44 20GY/DB	CMP SIGNAL
35	K24 20BR	CKP SIGNAL
36	K242 20OR/WT	KNOCK SENSOR NO. 2 SIGNAL
37	K924 20WT/BR	KNOCK SENSOR NO. 2 RETURN
38	K126 18DB/LG	ETC MOTOR (-)



MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)

MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L) - BLACK/ORANGE 38 WAY

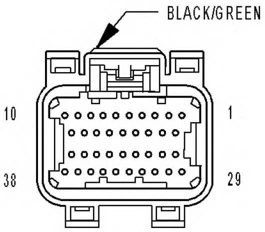
CAV	CIRCUIT	FUNCTION
1	K10 16DB/OR	COIL CONTROL NO. 6
2	K16 16DB/YL	COIL CONTROL NO. 5
3	K15 16DB	COIL CONTROL NO. 4
4	K58 16BR/VT	INJECTOR CONTROL NO. 6
5	K38 16BR/OR	INJECTOR CONTROL NO. 5
6	-	-
7	K93 16DB/BR	COIL CONTROL NO. 3
8	K35 20DB/VT (4.7L)	EGR SOL CONTROL
9	K85 16DB/TN	COIL CONTROL NO. 2
10	K86 16YL/DB	COIL CONTROL NO. 1
11	K14 16BR/TN	INJECTOR CONTROL NO. 4
12	K13 16BR/LB	INJECTOR CONTROL NO. 3
13	K12 16BR/DB	INJECTOR CONTROL NO. 2
14	K11 16BR/YL	INJECTOR CONTROL NO. 1
15	-	-
16	-	-
17	K199 18BR/PK	O2 2/1 HEATER CONTROL
18	K99 20OR/TN	O2 1/1 HEATER CONTROL
19	K125 16BR/DG	GEN FIELD CONTROL
20	K2 16VT/OR	ECT SIGNAL
21	K22 18BR/OR	TP NO. 1 SIGNAL
22	K34 20DB/LG (4.7L)	EGR SIGNAL
23	K1 20VT/BR	MAP SIGNAL
24	K942 20BR/LG	KNOCK SENSOR NO. 1 RETURN
25	K42 20DB/OR	KNOCK SENSOR NO. 1 SIGNAL
26	-	-
27	K900 20DB/DG	SENSOR GROUND
28	K961 20BR/GY	IAC SIGNAL
29	F855 20PK/YL	5 VOLT SUPPLY
30	K21 20BR/WT	IAT SIGNAL
31	K41 20DB/LB	O2 1/1 SIGNAL
32	K904 20DB/WT	O2 RETURN (DOWNSTREAM)
33	K43 20DB/PK	O2 2/1 SIGNAL
34	K44 20GY/DB	CMP SIGNAL
35	K24 20BR	CKP SIGNAL
36	K242 20OR/WT	KNOCK SENSOR NO. 2 SIGNAL
37	K924 20WT/BR	KNOCK SENSOR NO. 2 RETURN
38	K61 16VT/GY	IAC CONTROL



MODULE-POWERTRAIN CONTROL C3

MODULE-POWERTRAIN CONTROL C3 - BLACK/NATURAL 38 WAY

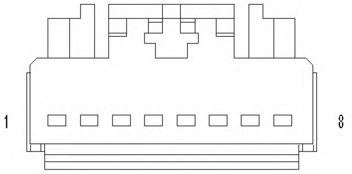
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	K342 20BR/WT	ASD RELAY CONTROL
4	-	-
5	V35 20VT/OR (3.7L/4.7L)	S/C VENT SOL CONTROL
5	K454 18BR/OR (5.7L)	MDS SOL CONTROL NO. 7
6	K451 18BR/WT (5.7L)	MDS SOL CONTROL NO. 1
7	V32 20VT/YL (4.7L)	S/C SUPPLY
8	K106 20VT/LB	NVLD SOL CONTROL
9	K299 18BR/OR	O2 1/2 HEATER CONTROL
10	K399 18BR/GY	O2 2/2 HEATER CONTROL
11	C13 20LB/OR	A/C CLUTCH RELAY CONTROL
12	V36 20VT/YL (3.7L/4.7L)	S/C VACUUM SOL CONTROL
13	-	-
14	B16 20LB/DG (5.7L)	BRAKE SWITCH NO. 2 SIGNAL
15	V937 20VT/BR	S/C SWITCH RETURN
16	K167 20BR/YL (5.7L)	APPS NO. 1 RETURN
17	K400 20BR/VT (5.7L)	APPS NO. 2 RETURN
18	V72 20OR/VT (5.7L)	S/C SWITCH SENSE 2
19	F42 16DG/LG	FUSED ASD RELAY OUTPUT
20	K52 20DB/YL	EVAP PURGE SOL SIGNAL
21	-	-
22	-	-
23	B15 20DG/WT	BRAKE SWITCH NO. 1 SIGNAL
24	-	-
25	K23 20BR/WT (5.7L)	APPS NO. 1 SIGNAL
26	-	-
27	T5 20DG/YL (4.7L/5.7L)	AUTOSTICK UP/DOWN (ERS) SENSE
28	F42 16DG/LG	FUSED ASD RELAY OUTPUT
29	K70 20DB/BR	EVAP PURGE SOL CONTROL
30	-	-
31	-	-
32	-	-
33	G224 20VT/YL (5.7L)	ENGINE OIL TEMPERATURE SIGNAL
34	V71 20VT/OR	S/C SWITCH SENSE 1
35	K107 20VT/WT	NVLD SWITCH SIGNAL
36	K29 20WT/BR (5.7L)	APPS NO. 2 SIGNAL
37	K31 20BR	FUEL PUMP RELAY CONTROL
38	T752 20DG/OR	ENGINE STARTER MOTOR RELAY CONTROL



MODULE-POWERTRAIN CONTROL C4

MODULE-POWERTRAIN CONTROL C4 - BLACK/GREEN 38 WAY

CAV	CIRCUIT	FUNCTION
1	T60 18YL/GY	OD SOLENOID CONTROL
2	T259 18YL/DG	4C SOLENOID CONTROL
3	-	-
4	T118 18DG	MS SOLENOID CONTROL
5	-	-
6	T219 18YL/LG	2C SOLENOID CONTROL
7	-	-
8	T59 18YL/LB	UD SOLENOID CONTROL
9	-	-
10	T20 18DG/WT	L/R SOLENOID CONTROL
11	T140 18YL/GY	PRESSURE CONTROL SOLENOID CONTROL
12	Z903 16BK	GROUND
13	Z903 16BK	GROUND
14	Z903 16BK	GROUND
15	T1 20DG/LB	TRS T1 SENSE
16	T3 20DG/DB	TRS T3 SENSE
17	T6 20DG	TOW/HAUL OVERDRIVE OFF SWITCH SENSE
18	T15 20YL/BR	TRANSMISSION CONTROL RELAY CONTROL
19	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
20	T48 20BR/YL	4C PRESSURE SWITCH SENSE
21	T29 20YL/WT	UD PRESSURE SWITCH SENSE
22	T9 20DG/TN	OD PRESSURE SWITCH SENSE
23	-	-
24	-	-
25	-	-
26	T4 20DG/LB	2-4 PRESSURE SWITCH SENSE
27	T41 20YL/DB	TRS T41 SENSE (P/N)
28	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
29	T50 16YL/TN	L/R PRESSURE SWITCH SENSE
30	T147 20DG/YL	2C PRESSURE SWITCH SENSE
31	T38 20YL/BR	LINE PRESSURE SENSOR SIGNAL
32	T14 20DG/BR	OUTPUT SPEED SENSOR SIGNAL
33	T52 20DG/WT	INPUT SPEED SENSOR SIGNAL
34	T13 20DG/VT	SENSOR GROUND
35	T54 20DG/OR	TRANSMISSION TEMPERATURE SENSOR SIGNAL
36	-	-
37	T42 20DG/YL	TRS T42 SENSE
38	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT



MODULE-SENTRY KEY REMOTE ENTRY

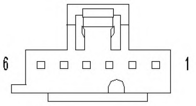
MODULE-SENTRY KEY REMOTE ENTRY - 8 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D508 20WT/GY	COM - LIN TIRE PRESSURE MONITOR LAN
3	F941 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	Z18 20BK/LB	GROUND
5	A114 18GY/RD	FUSED B(+)
6	D55 20WT/OR	CAN B BUS (+)
7	D54 20WT	CAN B BUS (-)
8	-	-

CONNECTOR NOT AVAILABLE

MODULE-STEERING COLUMN-LOCK (RHD EXPORT) - 4 WAY

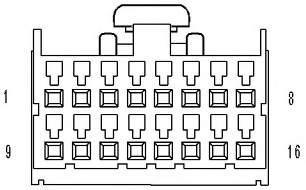
CAV	CIRCUIT	FUNCTION
1	A935 18RD	FUSED B(+)
2	Z906 18BK	GROUND
3	A306 18RD/VT	FUSED B(+)
4	D506 20WT/DG	COM - LIN STEERING COLUMN LAN



MODULE-STEERING COLUMN-LOCK TRANSLATOR (RHD EXPORT)

MODULE-STEERING COLUMN-LOCK TRANSLATOR (RHD EXPORT) - 6 WAY

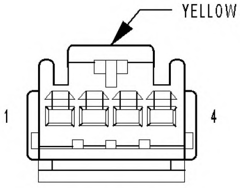
CAV	CIRCUIT	FUNCTION
1	A108 20LG/RD	FUSED B(+)
2	Z907 20BK	GROUND
3	D506 20WT/DG	COM - LIN STEERING COLUMN LAN
4	D55 20WT/OR	CAN B BUS (+)
5	D54 20WT	CAN B BUS (-)
6	-	-



MODULE-STEERING CONTROL C1

MODULE-STEERING CONTROL C1 - 16 WAY

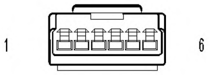
CAV	CIRCUIT	FUNCTION
1	-	-
2	D65 20WT/LG	CAN C BUS (+)
3	D64 20WT/LB	CAN C BUS (-)
4	-	-
5	Z907 20BK	GROUND
6	D55 20WT/OR	CAN B BUS (+)
7	D54 20WT	CAN B BUS (-)
8	A108 20LG/RD	FUSED B(+)
9	V937 20VT/BR	S/C SWITCH RETURN
10	V71 20VT/OR	S/C SWITCH SENSE 1
11	V72 20OR/VT	S/C SWITCH SENSE 2
12	W13 20BR/LG	REAR WIPER MOTOR CONTROL
13	W14 20BR/LB	REAR WIPER MOTOR DELAY SIGNAL
14	G20 20VT/BR	IGNITION SWITCH SENSE
15	G900 20VT/OR	IGNITION SWITCH SENSE RETURN
16	L91 20WT/DB	HAZARD SWITCH SENSE



MODULE-STEERING CONTROL C2

MODULE-STEERING CONTROL C2 - YELLOW 4 WAY

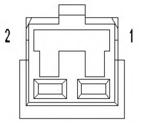
CAV	CIRCUIT	FUNCTION
1	R61 20LG/VT	DRIVER SQUIB 2 LINE 2
2	R63 20LG/WT	DRIVER SQUIB 2 LINE 1
3	R43 20LG/BR	DRIVER SQUIB 1 LINE 2
4	R45 20LG/OR	DRIVER SQUIB 1 LINE 1



MODULE-STEERING CONTROL C3

MODULE-STEERING CONTROL C3 - 6 WAY

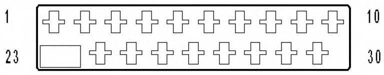
CAV	CIRCUIT	FUNCTION
1	-	-
2	V397 20VT/BR	S/C SWITCH RETURN
3	V371 20VT/OR	S/C SWITCH SIGNAL NO. 1
4	V372 20OR/VT	S/C SWITCH SIGNAL NO. 2
5	X3 20DG/VT	HORN SWITCH SIGNAL
6	X903 20GY/LG	HORN SWITCH RETURN



MODULE-STEERING CONTROL C4 (REMOTE RADIO)

MODULE-STEERING CONTROL C4 (REMOTE RADIO) - 2 WAY

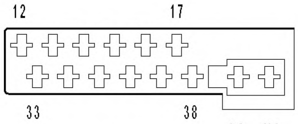
CAV	CIRCUIT	FUNCTION
1	X20 20GY/WT	RADIO CONTROL MUX
2	X920 20GY/OR	RADIO CONTROL MUX RETURN



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL) - 18 WAY

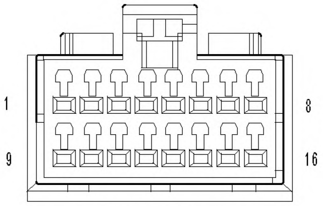
CAV	CIRCUIT	FUNCTION
1	D223 20WT/VT	SCI TRANSMIT
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	F946 20PK/LG	TRANSMISSION RELAY OUTPUT
30	Z904 18BK	GROUND



MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL) - 12 WAY

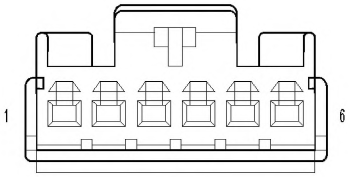
CAV	CIRCUIT	FUNCTION
12	T70 20YL	INPUT SPEED SENSOR 1 (N2) SIGNAL
13	T72 20YL/DB	SENSOR SUPPLY VOLTAGE
14	T60 18DG/BK	1-2/4-5 SOLENOID CONTROL
15	T73 18YL/GY	3-4 SOLENOID CONTROL
16	T74 18YL/LG	2-3 SOLENOID CONTROL
17	T75 18YL/LB	TCC SOLENOID CONTROL
33	T13 20DG/VT	SENSOR GROUND
34	T54 20DG/OR	TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
35	T71 20YL/OR	INPUT SPEED SENSOR 2 (N3) SIGNAL
36	T76 20YL/TN	MODULATION PRESSURE SOLENOID CONTROL
37	T77 20YL/BR	SHIFT PRESSURE SOLENOID CONTROL
38	T78 18YL	SOLENOID SUPPLY VOLTAGE
H1	D65 20WT/LG	CAN C BUS (+)
L1	D64 20WT/LB	CAN C BUS (-)



MONITOR-DVD

MONITOR-DVD - 16 WAY

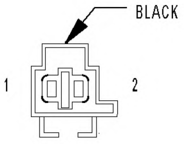
CAV	CIRCUIT	FUNCTION
1	X114 20GY/LB	FUSED B (+)
2	X523 20GY/LB	REMOTE CONTROL FUNCTION 1
3	D91 20WT/DB	COM - BMM1 ADDRESS
4	-	-
5	-	-
6	-	-
7	X915 20GY/LG	VIDEO RETURN
8	X515 20GY/OR	VIDEO SIGNAL
9	Z915 18BK	GROUND
10	X524 20GY/YL	REMOTE CONTROL FUNCTION 2
11	D92 20WT	COM - BMM2 ADDRESS
12	X555 20VT/OR	VIDEO PLAY SIGNAL
13	-	-
14	-	-
15	-	-
16	X955 20SHLD	SHIELD



MOTOR-ADJUSTABLE PEDALS

MOTOR-ADJUSTABLE PEDALS - 6 WAY

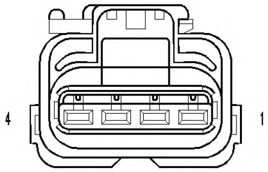
CAV	CIRCUIT	FUNCTION
1	P205 16LG/DB	ADJUSTABLE PEDALS MOTOR FORWARD
2	P206 16LG/TN	ADJUSTABLE PEDALS MOTOR REARWARD
3	G12 20VT/BR (MEMORY ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SENSOR SIGNAL
4	G11 20VT/TN (MEMORY ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SENSOR SUPPLY
5	G912 20VT/WT (MEMORY ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SENSOR RETURN
6	-	-



MOTOR-BLOWER (MTC)

MOTOR-BLOWER (MTC) - BLACK 2 WAY

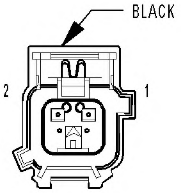
CAV	CIRCUIT	FUNCTION
1	C7 12DB	BLOWER MOTOR RELAY OUTPUT
2	C75 12LB	BLOWER HIGH SPEED



MOTOR-FUEL PUMP

MOTOR-FUEL PUMP - 4 WAY

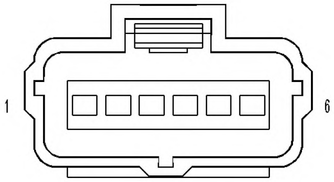
CAV	CIRCUIT	FUNCTION
1	Z912 18BK	GROUND
2	Z210 20BK	GROUND
3	N4 20DB/YL	FUEL LEVEL SENSOR NO. 1 SIGNAL
4	A109 16TN/RD	FUEL PUMP RELAY OUTPUT



MOTOR-IAC (3.7L/4.7L)

MOTOR-IAC (3.7L/4.7L) - BLACK 2 WAY

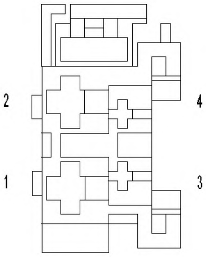
CAV	CIRCUIT	FUNCTION
1	K961 20BR/GY	IAC SIGNAL
2	K61 16VT/GY	IAC CONTROL



MOTOR-REAR WINDOW WIPER

MOTOR-REAR WINDOW WIPER - 6 WAY

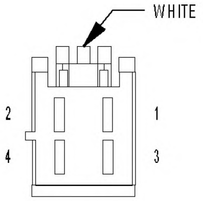
CAV	CIRCUIT	FUNCTION
1	Z800 16BK	GROUND
2	W13 20BR/LG	REAR WIPER MOTOR CONTROL
3	G80 20VT/BR	FLIP-UP GLASS AJAR SWITCH SENSE
4	W14 20BR/LB	REAR WIPER MOTOR DELAY SIGNAL
5	A46 18RD/GY	REAR WIPER RELAY OUTPUT
6	-	-



MOTOR-SEAT ADJUSTER-DRIVER HORIZONTAL

MOTOR-SEAT ADJUSTER-DRIVER HORIZONTAL - 4 WAY

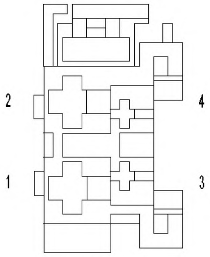
CAV	CIRCUIT	FUNCTION
1	P15 16LG/WT (LHD EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL FORWARD DRIVER
1	P115 16LG (LHD MEMORY SEATS)	DRIVER SEAT HORIZONTAL FORWARD DRIVER
1	P17 16LG/DG (RHD EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL REARWARD DRIVER
1	P117 16LG/LB (RHD MEMORY SEATS)	DRIVER SEAT HORIZONTAL REARWARD DRIVER
2	P17 16LG/DG (LHD EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL REARWARD DRIVER
2	P117 16LG/LB (LHD MEMORY SEATS)	DRIVER SEAT HORIZONTAL REARWARD DRIVER
2	P15 16LG/WT (RHD EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL FORWARD DRIVER
2	P115 16LG (RHD MEMORY SEATS)	DRIVER SEAT HORIZONTAL FORWARD DRIVER
3	G491 20VT/GY	DRIVER SEAT HORIZONTAL SENSOR GROUND
4	G401 20VT/LG	DRIVER SEAT HORIZONTAL POSITION SENSE



MOTOR-SEAT ADJUSTER-DRIVER RECLINER

MOTOR-SEAT ADJUSTER-DRIVER RECLINER - WHITE 4 WAY

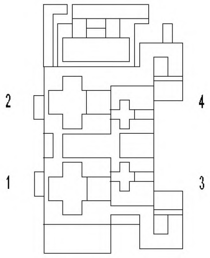
CAV	CIRCUIT	FUNCTION
1	P43 16LG/VT (EXCEPT MEMORY SEATS)	DRIVER SEAT RECLINER UP DRIVER
1	P143 16LG/GY (MEMORY SEATS)	DRIVER SEAT RECLINER DOWN DRIVER
2	P41 16LG/GY (EXCEPT MEMORY SEATS)	DRIVER SEAT RECLINER DOWN DRIVER
2	P141 16LG/BR (MEMORY SEATS)	DRIVER SEAT RECLINER UP DRIVER
3	G493 20OR/VT	DRIVER SEAT RECLINER POSITION SENSOR GROUND
4	G403 20VT/OR	DRIVER SEAT RECLINER POSITION SENSE



MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL

MOTOR-SEAT ADJUSTER-FRONT DRIVER VERTICAL - 4 WAY

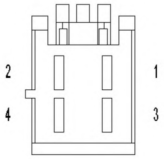
CAV	CIRCUIT	FUNCTION
1	P21 16LG/TN (EXCEPT MEMORY)	DRIVER SEAT FRONT DOWN DRIVER
1	P121 16LG/DB (MEMORY)	DRIVER SEAT FRONT VERTICAL DOWN DRIVER
2	P19 16LG/LB (EXCEPT MEMORY)	DRIVER SEAT FRONT UP DRIVER
2	P119 16LG/DG (MEMORY)	DRIVER SEAT FRONT VERTICAL UP DRIVER
3	G494 20YL/VT	DRIVER SEAT FRONT VERTICAL SENSOR GROUND
4	G404 20VT/YL	DRIVER SEAT FRONT VERTICAL POSITION SENSE



MOTOR-SEAT ADJUSTER-PASSENGER HORIZONTAL

MOTOR-SEAT ADJUSTER-PASSENGER HORIZONTAL - 4 WAY

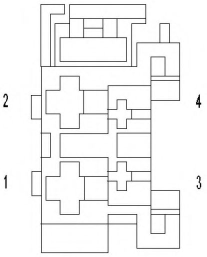
CAV	CIRCUIT	FUNCTION
1	P16 16LG/WT (LHD)	PASSENGER SEAT HORIZONTAL REARWARD DRIVER
1	P14 16LG/OR (RHD)	PASSENGER SEAT HORIZONTAL FORWARD DRIVER
2	P14 16LG/OR (LHD)	PASSENGER SEAT HORIZONTAL FORWARD DRIVER
2	P16 16LG/WT (RHD)	PASSENGER SEAT HORIZONTAL REARWARD DRIVER
3	-	-
4	-	-



MOTOR-SEAT ADJUSTER-PASSENGER RECLINER (LHD)

MOTOR-SEAT ADJUSTER-PASSENGER RECLINER (LHD) - 4 WAY

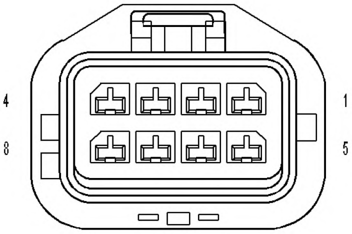
CAV	CIRCUIT	FUNCTION
1	P44 16LG/VT	PASSENGER SEAT RECLINER SWITCH UP
2	P42 16LG/GY	PASSENGER SEAT RECLINER SWITCH DOWN
3	-	-
4	-	-



MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL

MOTOR-SEAT ADJUSTER-REAR DRIVER VERTICAL - 4 WAY

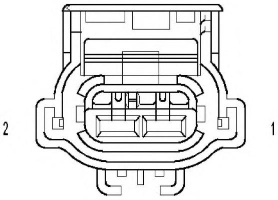
CAV	CIRCUIT	FUNCTION
1	P13 16LG/OR (EXCEPT MEMORY SEATS)	DRIVER SEAT REAR RISER DOWN DRIVER
1	P113 16LG/WT (MEMORY SEATS)	DRIVER SEAT REAR VERTICAL DOWN DRIVER
2	P11 16LG/YL (EXCEPT MEMORY SEATS)	DRIVER SEAT REAR RISER UP DRIVER
2	P111 16LG/YL (MEMORY SEATS)	DRIVER SEAT REAR VERTICAL UP DRIVER
3	G492 20LB/VT (MEMORY SEATS)	DRIVER SEAT REAR VERTICAL SENSOR GROUND
4	G402 20VT/DB (MEMORY SEATS)	DRIVER SEAT REAR VERTICAL POSITION SENSE



MOTOR-TRANSFER CASE

MOTOR-TRANSFER CASE - 8 WAY

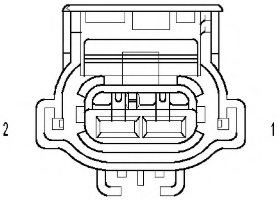
CAV	CIRCUIT	FUNCTION
1	K504 20BR	DRIVETRAIN 5 VOLT SUPPLY
2	T313 20YL/LG	MODE SENSOR SIGNAL
3	K594 20BR/LG	DRIVETRAIN SENSOR RETURN
4	T315 14YL/BR	SHIFT MOTOR CONTROL A
5	T316 14YL/GY	SHIFT MOTOR CONTROL B
6	T301 20DG/YL	SWITCHED BATTERY SOLENOID SUPPLY
7	T317 20YL/TN	TRANSFER CASE MOTOR LOCK SIGNAL
8	-	-



MOTOR-WINDOW-LEFT FRONT

MOTOR-WINDOW-LEFT FRONT - 2 WAY

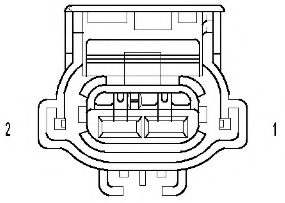
CAV	CIRCUIT	FUNCTION
1	Q11 16OR/LG	DRIVER WINDOW DRIVER (UP)
2	Q21 16OR/WT	DRIVER WINDOW DRIVER (DOWN)



MOTOR-WINDOW-LEFT REAR

MOTOR-WINDOW-LEFT REAR - 2 WAY

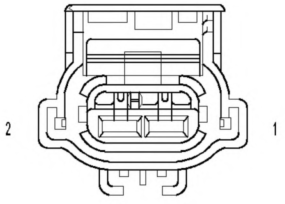
CAV	CIRCUIT	FUNCTION
1	Q111 16TN/YL	LEFT REAR WINDOW DRIVER (UP)
2	Q211 16TN/LB	LEFT REAR WINDOW DRIVER (DOWN)



MOTOR-WINDOW-RIGHT FRONT

MOTOR-WINDOW-RIGHT FRONT - 2 WAY

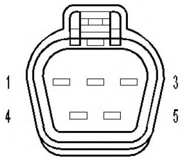
CAV	CIRCUIT	FUNCTION
1	Q12 16OR/BR	PASSENGER WINDOW DRIVER UP
2	Q22 16OR/VT	PASSENGER WINDOW DRIVER DOWN



MOTOR-WINDOW-RIGHT REAR

MOTOR-WINDOW-RIGHT REAR - 2 WAY

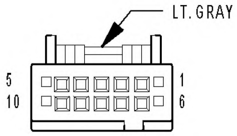
CAV	CIRCUIT	FUNCTION
1	Q112 16OR/BR	RIGHT REAR WINDOW DRIVER (UP)
2	Q212 16OR/VT	RIGHT REAR WINDOW DRIVER (DOWN)



MOTOR-WINDSHIELD WIPER

MOTOR-WINDSHIELD WIPER - 5 WAY

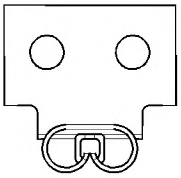
CAV	CIRCUIT	FUNCTION
1	W7 20BR/GY (LHD)	FRONT WIPER PARK SWITCH SENSE
1	W3 16BR/WT (RHD)	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT
2	-	-
3	W4 16BR/OR	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
3	W7 20BR/GY (RHD)	FRONT WIPER PARK SWITCH SENSE
4	Z103 16BK/WT (LHD)	GROUND
4	W4 16BR/OR (RHD)	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
5	W3 16 BR/WT (LHD)	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT
5	Z103 16BK/WT (RHD)	GROUND



MOTOR/MODULE-SUNROOF

MOTOR/MODULE-SUNROOF - LT. GRAY 10 WAY

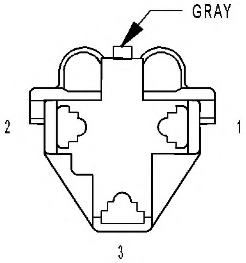
CAV	CIRCUIT	FUNCTION
1	-	-
2	Q4 20OR/YL	SUNROOF VENT SWITCH SENSE
3	Q3 20OR/TN	SUNROOF OPEN SWITCH SENSE
4	D54 20WT	CAN B BUS (-)
5	D55 20WT/OR	CAN B BUS (+)
6	Z914 18BK	GROUND
7	Q5 20OR/LB	SUNROOF CLOSE SWITCH SENSE
8	A932 18RD	FUSED B(+)
9	D270 20WT	SUNROOF DIAGNOSTIC
10	Q6 20OR/LG	SUNROOF SWITCH SUPPLY



PDC EYELET (B+)

PDC EYELET (B+) - 1 WAY

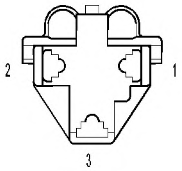
CAV	CIRCUIT
1	A0 06RD (DIESEL)
1	A904 10RD (DIESEL)
1	A0 08RD (GAS)



POWER OUTLET-CONSOLE

POWER OUTLET-CONSOLE - GRAY 3 WAY

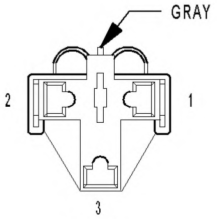
CAV	CIRCUIT	FUNCTION
1	A405 14RD/DB	FUSED B(+)
2	-	-
3	Z905 16BK	GROUND



POWER OUTLET-INSTRUMENT PANEL

POWER OUTLET-INSTRUMENT PANEL - 3 WAY

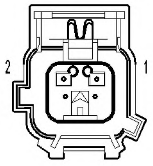
CAV	CIRCUIT	FUNCTION
1	A207 16RD/LG	FUSED POWER OUTLET RELAY OUTPUT
2	-	-
3	Z905 16BK	GROUND



POWER OUTLET-REAR

POWER OUTLET-REAR - GRAY 3 WAY

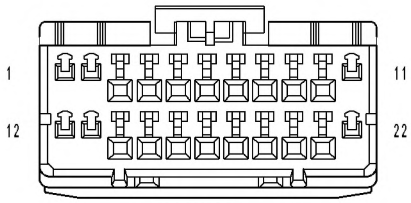
CAV	CIRCUIT	FUNCTION
1	A205 14RD/OR	FUSED B(+)
2	-	-
3	Z909 16BK	GROUND



PUMP-WASHER-WINDSHIELD

PUMP-WASHER-WINDSHIELD - 2 WAY

CAV	CIRCUIT	FUNCTION
1	W20 18BR/YL	REAR WASHER PUMP MOTOR CONTROL
2	W10 18BR	FRONT WASHER PUMP MOTOR CONTROL



RADIO C1

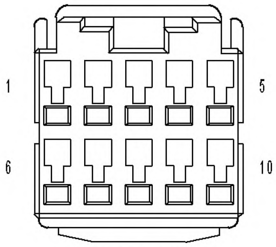
RADIO C1 - 22 WAY

CAV	CIRCUIT	FUNCTION
1	A118 16RD/OR	FUSED B(+)
2	-	-
3	-	-
4	X703 20DG/OR (HANDS FREE)	LEFT AUDIO OUTPUT
5	D55 20WT/OR	CAN B BUS (+)
6	D54 20WT	CAN B BUS (-)
7	X54 18GY (BASE AUDIO)	RIGHT FRONT SPEAKER (+)
8	X56 18GY/BR (BASE AUDIO)	LEFT FRONT SPEAKER (-)
9	X55 18DG/BR (BASE AUDIO)	LEFT FRONT SPEAKER (-)
10	X53 18DG (BASE AUDIO)	LEFT FRONT SPEAKER (+)
11	Z920 16BK	GROUND
12	A118 16RD/OR	FUSED B(+)
13	-	-
14	-	-
15	-	-
16	X704 20DG/YL (HANDS FREE)	RIGHT AUDIO OUTPUT
17	X795 20DG (HANDS FREE)	COMMON AUDIO OUTPUT
18	X51 18DG/DB	RADIO LEFT REAR AUDIO (+)
19	X57 18DG/VT	RADIO-LEFT REAR AUDIO (-)
20	X58 18GY/TN	RADIO RIGHT REAR AUDIO (-)
21	X52 18GY/DB	RIGHT REAR AUDIO (+)
22	Z920 16BK	GROUND

CONNECTOR NOT AVAILABLE

RADIO C1 SHIELD (HANDS FREE) - 1 WAY

CAV	CIRCUIT	FUNCTION
1	X795 18DG	COMMON AUDIO OUTPUT



RADIO C2

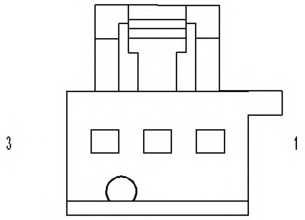
RADIO C2 - 10 WAY

CAV	CIRCUIT	FUNCTION
1	X16 20DG/YL (EXCEPT HANDS FREE)	AUDIO SIGNAL RIGHT (+)
2	X917 20DG (EXCEPT HANDS FREE)	AUDIO SIGNAL COMMON
3	-	-
4	X510 20DG/LB (DVD)	RIGHT AUDIO AUX
5	X926 20GY/OR (DVD)	AUDIO OUT GROUND
6	X17 20DG/OR (EXCEPT SATELLITE RADIO)	AUDIO SIGNAL LEFT (+)
6	X17 20DG/LB (SATELLITE RADIO)	AUDIO SIGNAL LEFT (+)
7	X910 20GY/DG (DVD)	AUX AUDIO RETURN/COMMON
8	X511 20GY/LG (DVD)	LEFT AUDIO AUX
9	X521 20GY/LB (DVD)	LEFT AUDIO AUX
10	X522 20GY/DB (DVD)	RIGHT AUDIO AUX

CONNECTOR
NOT
AVAILABLE

RADIO C2 SHIELD (SATELLITE RADIO) - 1 WAY

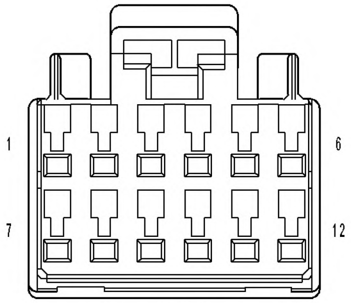
CAV	CIRCUIT	FUNCTION
1	X917 18DG	AUDIO SIGNAL COMMON



RECEIVER-
INTRUSION
TRANSLATOR
(VTSS)

RECEIVER-INTRUSION TRANSLATOR (VTSS) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	G460 20DG/VT	FRONT INTRUSION SENSOR SIGNAL
2	-	-
3	G946 20LG/VT	SENSOR GROUND



RECEIVER-
SATELLITE

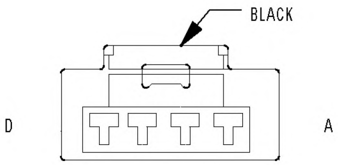
RECEIVER-SATELLITE - 12 WAY

CAV	CIRCUIT	FUNCTION
1	A114 20OR/RD	FUSED B(+)
2	-	-
3	Z514 20BK/LG	GROUND
4	-	-
5	-	-
6	X17 20DG/LB	AUDIO SIGNAL LEFT (+)
7	D54 20WT	CAN B BUS (-)
8	D55 20WT/OR	CAN B BUS (+)
9	-	-
10	-	-
11	X917 20DG	AUDIO SIGNAL COMMON
12	X16 20DG/YL	AUDIO SIGNAL RIGHT (+)

CONNECTOR
NOT
AVAILABLE

RECEIVER-SATELLITE RADIO - 1 WAY

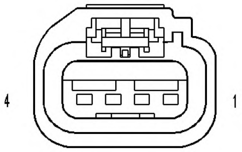
CAV	CIRCUIT	FUNCTION
1	X917 18NA	AUDIO SIGNAL COMMON



RESISTOR-BLOWER MOTOR (MTC)

RESISTOR-BLOWER MOTOR (MTC) - BLACK 4 WAY

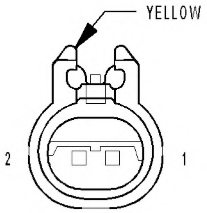
CAV	CIRCUIT	FUNCTION
A	C73 12GY/LG	BLOWER M2 SPEED
B	C72 12OR/LG	BLOWER M1 SPEED
C	C71 20RD/LG	BLOWER LOW SPEED
D	C74 12LB	BLOWER HIGH SPEED



SEAT BELT-TENSIONER-DRIVER

SEAT BELT-TENSIONER-DRIVER - 4 WAY

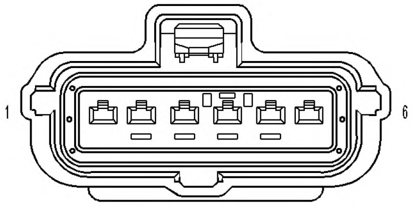
CAV	CIRCUIT	FUNCTION
1	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1
2	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
3	Z911 20BK	GROUND
4	G10 20VT/LG	SEAT BELT SWITCH SENSE



SEAT BELT-TENSIONER-PASSENGER

SEAT BELT-TENSIONER-PASSENGER - YELLOW 2 WAY

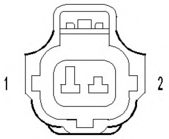
CAV	CIRCUIT	FUNCTION
1	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
2	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1



SENSOR-ACCELERATOR PEDAL POSITION (5.7L/DIESEL)

SENSOR-ACCELERATOR PEDAL POSITION (5.7L/DIESEL) - 6 WAY

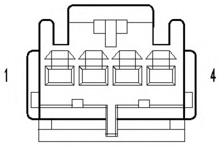
CAV	CIRCUIT	FUNCTION
1	F856 20YL/PK	5 VOLT SUPPLY
2	K29 20WT/BR	APPS NO. 2 SIGNAL
3	K400 20BR/VT	APPS NO. 2 RETURN
4	K167 20BR/TN (5.7L)	APPS NO. 1 RETURN
4	K167 16BR/TN (DIESEL)	APPS NO. 1 RETURN
5	K23 20BR/LB	APPS NO. 1 SIGNAL
6	F855 20PK/YL	5 VOLT SUPPLY



SENSOR-AMBIENT AIR TEMPERATURE

SENSOR-AMBIENT AIR TEMPERATURE - 2 WAY

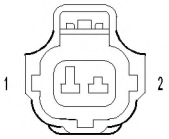
CAV	CIRCUIT	FUNCTION
1	G931 20VT/BR	SENSOR GROUND
2	G31 20VT/OR	AAT SIGNAL



SENSOR-AUTO HEADLAMP

SENSOR-AUTO HEADLAMP - 4 WAY

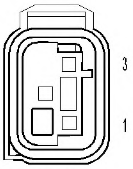
CAV	CIRCUIT	FUNCTION
1	-	-
2	L924 20WT/TN	AUTO HEADLAMPS SIGNAL RETURN
3	L24 20WT/VT	AUTO HEADLAMPS SIGNAL
4	-	-



SENSOR-BRAKE FLUID LEVEL

SENSOR-BRAKE FLUID LEVEL - 2 WAY

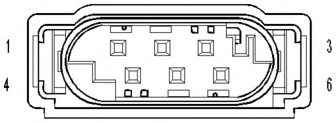
CAV	CIRCUIT	FUNCTION
1	B20 20DG/OR	BRAKE FLUID LEVEL SWITCH SENSE
2	Z387 20BK	GROUND



SENSOR-BRAKE PRESSURE

SENSOR-BRAKE PRESSURE - 3 WAY

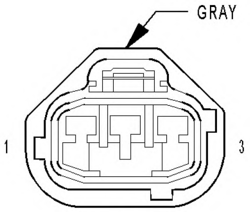
CAV	CIRCUIT	FUNCTION
1	B986 18DG/TN	BRAKE PRESSURE SENSOR RETURN
2	B84 18DG/DB	BRAKE PRESSURE SENSOR SIGNAL
3	B83 18DG/WT	BRAKE PRESSURE SENSOR SUPPLY



SENSOR-BRAKE TRAVEL (ESP)

SENSOR-BRAKE TRAVEL (ESP) - 6 WAY

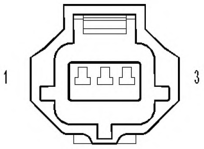
CAV	CIRCUIT	FUNCTION
1	B135 18DG/LG	BRAKE PEDAL FORCE SWITCH OPEN
2	B134 18DG/YL	BRAKE PEDAL FORCE SWITCH CLOSE
3	B984 18DG/OR	BRAKE PRESSURE SENSOR RETURN
4	B131 18DG/VT	ACTIVE BRAKE BOOSTER SOLENOID(+)
5	B136 18DG/LB	BRAKE PEDAL FORCE SWITCH SIGNAL
6	-	-



SENSOR-CAMSHAFT POSITION (GAS)

SENSOR-CAMSHAFT POSITION (GAS) - GRAY 3 WAY

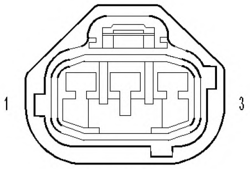
CAV	CIRCUIT	FUNCTION
1	K44 20GY/DB	CMP SIGNAL
2	K900 20DB/DG	SENSOR GROUND
3	F856 20YL/PK	5 VOLT SUPPLY



SENSOR-CRANKSHAFT POSITION (3.7L)

SENSOR-CRANKSHAFT POSITION (3.7L) - 3 WAY

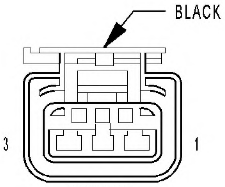
CAV	CIRCUIT	FUNCTION
1	K24 20BR	CKP SIGNAL
2	K900 20DB/DG	SENSOR GROUND
3	F855 20PK/YL	5 VOLT SUPPLY



SENSOR-CRANKSHAFT POSITION (4.7L)

SENSOR-CRANKSHAFT POSITION (4.7L) - BLACK 3 WAY

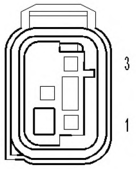
CAV	CIRCUIT	FUNCTION
1	K24 20BR	CKP SIGNAL
2	K900 20DB/DG	SENSOR GROUND
3	F855 20PK/YL	5 VOLT SUPPLY



SENSOR-CRANKSHAFT POSITION (5.7L)

SENSOR-CRANKSHAFT POSITION (5.7L) - BLACK 3 WAY

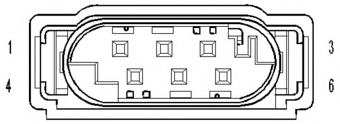
CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL	5 VOLT SUPPLY
2	K900 20DB/DG	SENSOR GROUND
3	K24 20BR	CKP SIGNAL



SENSOR-DHS PRESSURE (DHS)

SENSOR-DHS PRESSURE (DHS) - 3 WAY

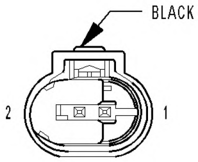
CAV	CIRCUIT	FUNCTION
1	S950 20GY/TN	DHS SENSOR RETURN
2	S60 20GY/YL	DHS PRESSURE SENSOR SIGNAL
3	S50 20GY/WT	DHS 5 VOLT SUPPLY



SENSOR-DYNAMICS (ESP)

SENSOR-DYNAMICS (ESP) - 6 WAY

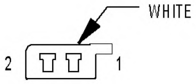
CAV	CIRCUIT	FUNCTION
1	D51 20WT/BR	DYNAMICS SENSOR LOW DATA LINK
2	D52 20WT/LB	DYNAMICS SENSOR HIGH DATA LINK
3	G4 20VT/LB	DYNAMICS SENSOR SUPPLY
4	-	-
5	G94 20VT/DB	DYNAMICS SENSOR GROUND
6	-	-



SENSOR-ENGINE COOLANT TEMPERATURE

SENSOR-ENGINE COOLANT TEMPERATURE - BLACK 2 WAY

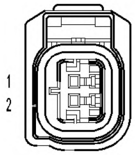
CAV	CIRCUIT	FUNCTION
1	K900 20DB/DG	SENSOR GROUND
2	K2 16VT/OR	ECT SIGNAL



SENSOR-EVAPORATOR TEMPERATURE

SENSOR-EVAPORATOR TEMPERATURE - WHITE 2 WAY

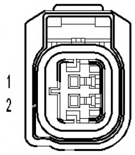
CAV	CIRCUIT	FUNCTION
1	C21 20WT/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
2	C121 20RD/BK	SENSOR GROUND



SENSOR-FRONT IMPACT-LEFT

SENSOR-FRONT IMPACT-LEFT - 2 WAY

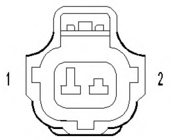
CAV	CIRCUIT	FUNCTION
1	R81 20LB/WT	LEFT FRONT IMPACT SENSOR GROUND
2	R79 20LB/VT	LEFT FRONT IMPACT SENSOR SIGNAL



SENSOR-FRONT IMPACT-RIGHT

SENSOR-FRONT IMPACT-RIGHT - 2 WAY

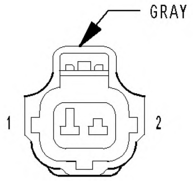
CAV	CIRCUIT	FUNCTION
1	R82 20WT/LB	RIGHT FRONT IMPACT SENSOR GROUND
2	R80 20VT/LB	RIGHT FRONT IMPACT SENSOR SIGNAL



SENSOR-INPUT SPEED (4.7L/5.7L)

SENSOR-INPUT SPEED (4.7L/5.7L) - 2 WAY

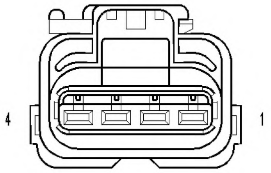
CAV	CIRCUIT	FUNCTION
1	T52 20DG/WT	INPUT SPEED SENSOR SIGNAL
2	T13 20DG/VT	SENSOR GROUND



SENSOR-INTAKE AIR TEMPERATURE (GAS)

SENSOR-INTAKE AIR TEMPERATURE (GAS) - GRAY 2 WAY

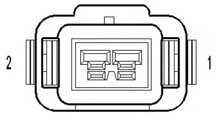
CAV	CIRCUIT	FUNCTION
1	K900 20DB/DG	SENSOR GROUND
2	K21 20BR/WT	IAT SIGNAL



SENSOR-KNOCK (3.7L/4.7L)

SENSOR-KNOCK (3.7L/4.7L) - 4 WAY

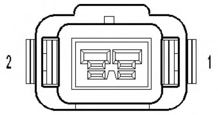
CAV	CIRCUIT	FUNCTION
1	K942 20BR/LG	KNOCK SENSOR NO. 1 RETURN
2	K42 20DB/OR	KNOCK SENSOR NO. 1 SIGNAL
3	K924 20WT/BR	KNOCK SENSOR NO. 2 RETURN
4	K242 20OR/WT	KNOCK SENSOR NO. 2 SIGNAL



SENSOR-KNOCK NO. 1 (5.7L)

SENSOR-KNOCK NO. 1 (5.7L) - 2 WAY

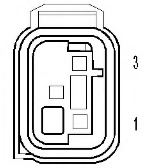
CAV	CIRCUIT	FUNCTION
1	K42 20DB/OR	KNOCK SENSOR NO. 1 SIGNAL
2	K942 20BR/LG	KNOCK SENSOR NO. 1 RETURN



SENSOR-KNOCK NO. 2 (5.7L)

SENSOR-KNOCK NO. 2 (5.7L) - 2 WAY

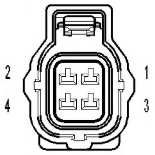
CAV	CIRCUIT	FUNCTION
1	K242 20OR/WT	KNOCK SENSOR NO. 2 SIGNAL
2	K924 20WT/BR	KNOCK SENSOR NO. 2 RETURN



SENSOR-LATERAL ACCELERATION

SENSOR-LATERAL ACCELERATION - 3 WAY

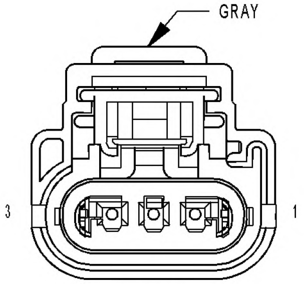
CAV	CIRCUIT	FUNCTION
1	S950 20GY/TN	DHS SENSOR RETURN
2	S51 20GY/DB	SUSPENSION SENSOR LATERAL ACCELERATION SENSE
3	S50 20GY/WT	DHS 5 VOLT SUPPLY



SENSOR-LINE PRESSURE (545RFE)

SENSOR-LINE PRESSURE (545RFE) - 4 WAY

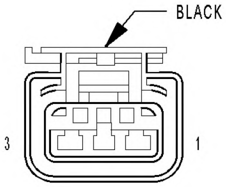
CAV	CIRCUIT	FUNCTION
1	K900 20DB/DG	SENSOR GROUND
2	F856 20YL/PK	5 VOLT SUPPLY
3	T38 20YL/BR	LINE PRESSURE SENSOR SIGNAL
4	-	-



SENSOR-MAP (GAS)

SENSOR-MAP (GAS) - GRAY 3 WAY

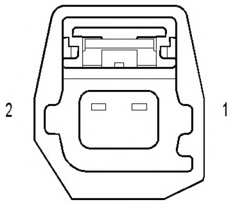
CAV	CIRCUIT	FUNCTION
1	K1 20VT/BR	MAP SIGNAL
2	K900 20DB/DG	SENSOR GROUND
3	F856 20YL/PK	5 VOLT SUPPLY



SENSOR-OIL PRESSURE (5.7L)

SENSOR-OIL PRESSURE (5.7L) - BLACK 3 WAY

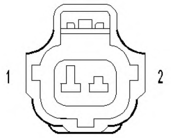
CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL	5 VOLT SUPPLY
2	G6 20VT/GY	ENGINE OIL PRESSURE SIGNAL
3	K900 20DB/DG	SENSOR GROUND



SENSOR-OIL TEMPERATURE (5.7L)

SENSOR-OIL TEMPERATURE (5.7L) - 2 WAY

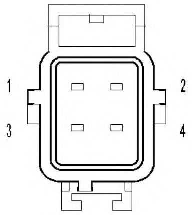
CAV	CIRCUIT	FUNCTION
1	G224 20VT/YL	ENGINE OIL TEMPERATURE SIGNAL
2	K900 20DB/DG	SENSOR GROUND



SENSOR-OUTPUT SPEED (4.7L/5.7L)

SENSOR-OUTPUT SPEED (4.7L/5.7L) - 2 WAY

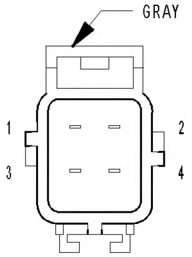
CAV	CIRCUIT	FUNCTION
1	T14 20DG/BR	OUTPUT SPEED SENSOR SIGNAL
2	T13 20DG/VT	SENSOR GROUND



SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)

SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L) - 4 WAY

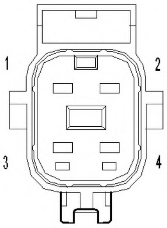
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K99 20OR/TN	O2 1/1 HEATER CONTROL
3	K902 20BR/DG	02 RETURN (UPSTREAM)
4	K41 20DB/LB	O2 1/1 SIGNAL



SENSOR-OXYGEN-LEFT FRONT (4.7L)

SENSOR-OXYGEN-LEFT FRONT (4.7L) - GRAY 4 WAY

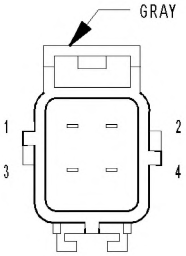
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K99 20OR/TN	O2 1/1 HEATER CONTROL
3	K902 20BR/DG	02 RETURN (UPSTREAM)
4	K41 20DB/LB	O2 1/1 SIGNAL



SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)

SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L) - 4 WAY

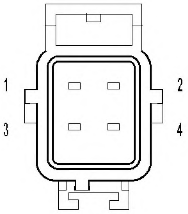
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K299 18BR/OR	O2 1/2 HEATER CONTROL
3	K904 20DB/WT	O2 RETURN (DOWNSTREAM)
4	K141 20DB/YL	02 1/2 SIGNAL



SENSOR-OXYGEN-LEFT REAR (4.7L)

SENSOR-OXYGEN-LEFT REAR (4.7L) - GRAY 4 WAY

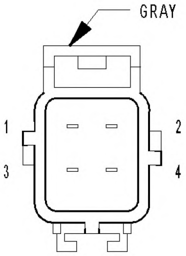
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K299 18BR/OR	O2 1/2 HEATER CONTROL
3	K904 20DB/WT	O2 RETURN (DOWNSTREAM)
4	K141 20DB/YL	02 1/2 SIGNAL



SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)

SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L) - 4 WAY

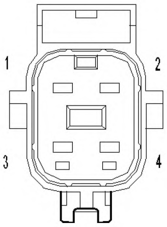
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K199 18BR/PK (3.7L)	O2 2/1 HEATER CONTROL
2	K199 18BR/GY (5.7L)	O2 2/1 HEATER CONTROL
3	K902 20BR/DG	02 RETURN (UPSTREAM)
4	K43 20DB/PK	O2 2/1 SIGNAL



SENSOR-OXYGEN-RIGHT FRONT (4.7L)

SENSOR-OXYGEN-RIGHT FRONT (4.7L) - GRAY 4 WAY

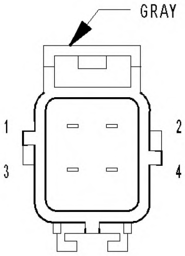
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K199 18BR/PK	O2 2/1 HEATER CONTROL
3	K902 20BR/DG	02 RETURN (UPSTREAM)
4	K43 20DB/PK	O2 2/1 SIGNAL



SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)

SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L) - 4 WAY

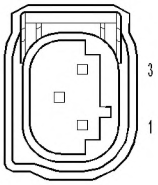
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K399 18BR/GY	O2 2/2 HEATER CONTROL
3	K904 20DB/WT	O2 RETURN (DOWNSTREAM)
4	K243 20BR	O2 2/2 SIGNAL



SENSOR-OXYGEN-RIGHT REAR (4.7L)

SENSOR-OXYGEN-RIGHT REAR (4.7L) - GRAY 4 WAY

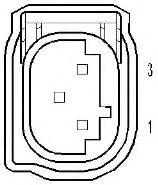
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K399 18BR/GY	O2 2/2 HEATER CONTROL
3	K904 20DB/WT	O2 RETURN (DOWNSTREAM)
4	K243 20BR	O2 2/2 SIGNAL



SENSOR-PARK ASSIST NO. 1 (FRONT PARK ASSIST)

SENSOR-PARK ASSIST NO. 1 (FRONT PARK ASSIST) - 3 WAY

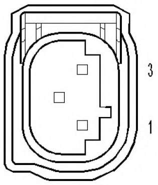
CAV	CIRCUIT	FUNCTION
1	D702 20WT/YL	PARK ASSIST SENSOR NO. 1 SIGNAL
2	Z169 20BK/LG	GROUND
3	X702 20GY/LB	FRONT PARK ASSIST SENSOR SUPPLY



SENSOR-PARK ASSIST NO. 2 (FRONT PARK ASSIST)

SENSOR-PARK ASSIST NO. 2 (FRONT PARK ASSIST) - 3 WAY

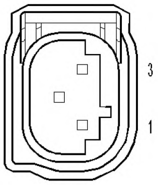
CAV	CIRCUIT	FUNCTION
1	D705 20WT/OR	PARK ASSIST SENSOR NO. 2 SIGNAL
2	Z169 20BK/LG	GROUND
3	X702 20GY/LB	FRONT PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 3
(FRONT PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 3 (FRONT PARK ASSIST) - 3 WAY

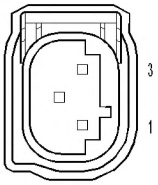
CAV	CIRCUIT	FUNCTION
1	D706 20WT/TN	PARK ASSIST SENSOR NO. 3 SIGNAL
2	Z169 20BK/LG	GROUND
3	X702 20GY/LB	FRONT PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 4
(FRONT PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 4 (FRONT PARK ASSIST) - 3 WAY

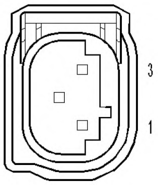
CAV	CIRCUIT	FUNCTION
1	D707 20WT/LG	PARK ASSIST SENSOR NO. 4 SIGNAL
2	Z169 20BK/LG	GROUND
3	X702 20GY/LB	FRONT PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 5
(FRONT PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 5 (FRONT PARK ASSIST) - 3 WAY

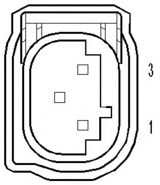
CAV	CIRCUIT	FUNCTION
1	D708 20WT/LB	PARK ASSIST SENSOR NO. 5 SIGNAL
2	Z169 20BK/LG	GROUND
3	X702 20GY/LB	FRONT PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 6
(FRONT PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 6 (FRONT PARK ASSIST) - 3 WAY

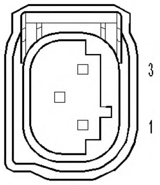
CAV	CIRCUIT	FUNCTION
1	D709 20WT/BR	PARK ASSIST SENSOR NO. 6 SIGNAL
2	Z169 20BK/LG	GROUND
3	X702 20GY/LB	FRONT PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 7
(REAR PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 7 (REAR PARK ASSIST) - 3 WAY

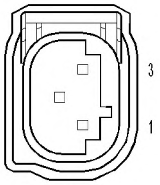
CAV	CIRCUIT	FUNCTION
1	D700 20WT/DG	PARK ASSIST SENSOR NO. 7 SIGNAL
2	X750 20GY/LB	PARK ASSIST SENSOR GROUND
3	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 8
(REAR PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 8 (REAR PARK ASSIST) - 3 WAY

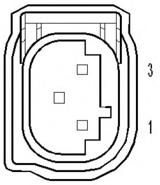
CAV	CIRCUIT	FUNCTION
1	D701 20WT/LB	PARK ASSIST SENSOR NO. 8 SIGNAL
2	X750 20GY/LB	PARK ASSIST SENSOR GROUND
3	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 9
(REAR PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 9 (REAR PARK ASSIST) - 3 WAY

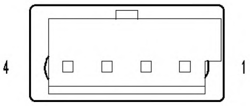
CAV	CIRCUIT	FUNCTION
1	D703 20WT/OR	PARK ASSIST SENSOR NO. 9 SIGNAL
2	X750 20GY/LB	PARK ASSIST SENSOR GROUND
3	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY



**SENSOR-
PARK ASSIST NO. 10
(REAR PARK
ASSIST)**

SENSOR-PARK ASSIST NO. 10 (REAR PARK ASSIST) - 3 WAY

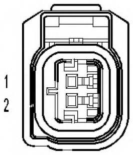
CAV	CIRCUIT	FUNCTION
1	D704 20WT/DB	PARK ASSIST SENSOR NO. 10 SIGNAL
2	X750 20GY/LB	PARK ASSIST SENSOR GROUND
3	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY



SENSOR-RAIN

SENSOR-RAIN - 4 WAY

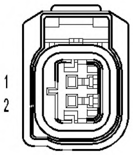
CAV	CIRCUIT	FUNCTION
1	A934 20RD/OR	FUSED RUN/ACCESSORY RELAY OUTPUT
2	Z915 20BK	GROUND
3	D55 20WT/OR	CAN B BUS (+)
4	D54 20WT	CAN B BUS (-)



SENSOR-SEAT TRACK POSITION-DRIVER

SENSOR-SEAT TRACK POSITION-DRIVER - 2 WAY

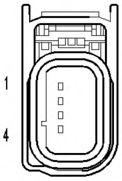
CAV	CIRCUIT	FUNCTION
1	R261 20LB/WT	DRIVER SEAT POSITION SENSOR DATA
2	R263 20LB/VT	DRIVER SEAT POSITION SENSOR VOLTAGE



SENSOR-SEAT TRACK POSITION-PASSENGER

SENSOR-SEAT TRACK POSITION-PASSENGER - 2 WAY

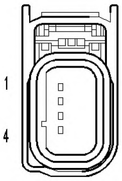
CAV	CIRCUIT	FUNCTION
1	R262 20WT/LB	PASSENGER SEAT POSITION SENSOR DATA
2	R264 20VT/LB	PASSENGER SEAT POSITION SENSOR VOLTAGE



SENSOR-SEAT WEIGHT-LEFT FRONT

SENSOR-SEAT WEIGHT-LEFT FRONT - 4 WAY

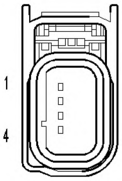
CAV	CIRCUIT	FUNCTION
1	R726 20LG/YL	SEAT WEIGHT SENSOR 5 VOLT
2	R728 20LB/YL	SEAT WEIGHT SENSOR GROUND
3	-	-
4	R717 20LG/DG	SEAT WEIGHT LEFT FRONT SENSOR SIGNAL



SENSOR-SEAT WEIGHT-LEFT REAR

SENSOR-SEAT WEIGHT-LEFT REAR - 4 WAY

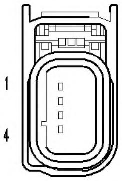
CAV	CIRCUIT	FUNCTION
1	R726 20LG/YL	SEAT WEIGHT SENSOR 5 VOLT
2	R728 20LB/YL	SEAT WEIGHT SENSOR GROUND
3	-	-
4	R705 20LG/OR	SEAT WEIGHT LEFT REAR SENSOR SIGNAL



SENSOR-SEAT WEIGHT-RIGHT FRONT

SENSOR-SEAT WEIGHT-RIGHT FRONT - 4 WAY

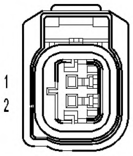
CAV	CIRCUIT	FUNCTION
1	R726 20LG/YL	SEAT WEIGHT SENSOR 5 VOLT
2	R728 20LB/YL	SEAT WEIGHT SENSOR GROUND
3	-	-
4	R718 20LB/DG	SEAT WEIGHT RIGHT FRONT SENSOR SIGNAL



SENSOR-SEAT WEIGHT-RIGHT REAR

SENSOR-SEAT WEIGHT-RIGHT REAR - 4 WAY

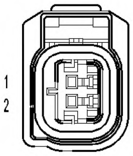
CAV	CIRCUIT	FUNCTION
1	R726 20LG/YL	SEAT WEIGHT SENSOR 5 VOLT
2	R728 20LB/YL	SEAT WEIGHT SENSOR GROUND
3	-	-
4	R706 20LB/OR	SEAT WEIGHT RIGHT REAR SENSOR SIGNAL



SENSOR-SIDE IMPACT-LEFT 1

SENSOR-SIDE IMPACT-LEFT 1 - 2 WAY

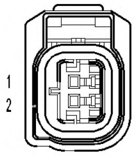
CAV	CIRCUIT	FUNCTION
1	R15 20LG/OR	LEFT SIDE IMPACT SENSOR 1 GROUND
2	R13 20LG/VT	LEFT SIDE IMPACT SENSOR 1 SIGNAL



SENSOR-SIDE IMPACT-LEFT 2

SENSOR-SIDE IMPACT-LEFT 2 - 2 WAY

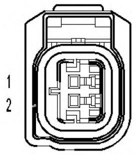
CAV	CIRCUIT	FUNCTION
1	R19 20LG/WT	LEFT SIDE IMPACT SENSOR 2 GROUND
2	R17 20LG	LEFT SIDE IMPACT SENSOR 2 SIGNAL



SENSOR-SIDE IMPACT-RIGHT 1

SENSOR-SIDE IMPACT-RIGHT 1 - 2 WAY

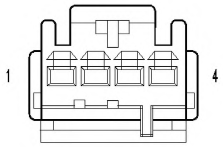
CAV	CIRCUIT	FUNCTION
1	R16 20BR/LG	RIGHT SIDE IMPACT SENSOR 1 GROUND
2	R14 20TN/LG	RIGHT SIDE IMPACT SENSOR 1 SIGNAL



SENSOR-SIDE IMPACT-RIGHT 2

SENSOR-SIDE IMPACT-RIGHT 2 - 2 WAY

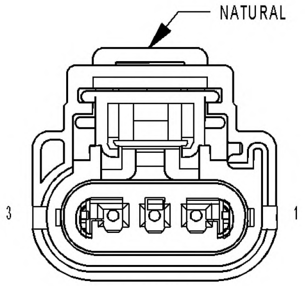
CAV	CIRCUIT	FUNCTION
1	R20 20WT/LG	RIGHT SIDE IMPACT SENSOR 2 GROUND
2	R18 20LB	RIGHT SIDE IMPACT SENSOR 2 SIGNAL



SENSOR-SUN

SENSOR-SUN - 4 WAY

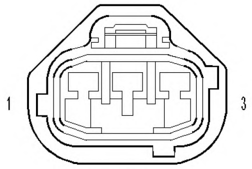
CAV	CIRCUIT	FUNCTION
1	G39 20VT/LB	SUN SENSOR NO. 1 SIGNAL
2	G939 20VT/DB	SUN SENSOR RETURN
3	-	-
4	G139 20VT/OR	SUN SENSOR NO. 2 SIGNAL



SENSOR-THROTTLE POSITION (3.7L)

SENSOR-THROTTLE POSITION (3.7L) - NATURAL 3 WAY

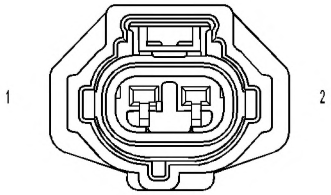
CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL	5 VOLT SUPPLY
2	K900 20DB/DG	SENSOR GROUND
3	K22 18BR/OR	TP NO. 1 SIGNAL



SENSOR-THROTTLE POSITION (4.7L)

SENSOR-THROTTLE POSITION (4.7L) - 3 WAY

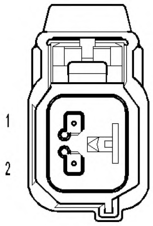
CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL	5 VOLT SUPPLY
2	K22 18BR/OR	TP NO. 1 SIGNAL
3	K900 20DB/DG	SENSOR GROUND



SENSOR-WASHER FLUID LEVEL

SENSOR-WASHER FLUID LEVEL - 2 WAY

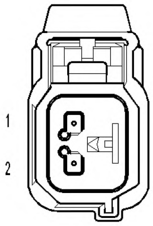
CAV	CIRCUIT	FUNCTION
1	W1 20BR/TN	WASHER FLUID LEVEL SENSOR SIGNAL
2	Z384 20BK	GROUND



SENSOR-WHEEL SPEED-ABS-LEFT FRONT

SENSOR-WHEEL SPEED-ABS-LEFT FRONT - 2 WAY

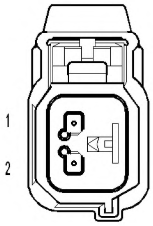
CAV	CIRCUIT	FUNCTION
1	B9 18DG/LG	LEFT FRONT WHEEL SPEED SENSOR SUPPLY
2	B8 18DG/TN	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



SENSOR-WHEEL SPEED-ABS-LEFT REAR

SENSOR-WHEEL SPEED-ABS-LEFT REAR - 2 WAY

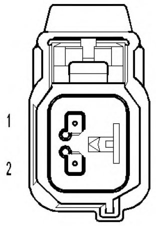
CAV	CIRCUIT	FUNCTION
1	B4 20LG/YL	LEFT REAR WHEEL SPEED SENSOR SUPPLY
2	B3 20DG/YL	LEFT REAR WHEEL SPEED SENSOR SIGNAL



SENSOR-WHEEL SPEED-ABS-RIGHT FRONT

SENSOR-WHEEL SPEED-ABS-RIGHT FRONT - 2 WAY

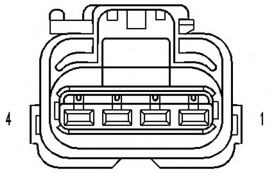
CAV	CIRCUIT	FUNCTION
1	B7 18DG/VT	RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
2	B6 18DG/TN	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL



SENSOR-WHEEL SPEED-ABS-RIGHT REAR

SENSOR-WHEEL SPEED-ABS-RIGHT REAR - 2 WAY

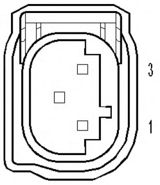
CAV	CIRCUIT	FUNCTION
1	B2 20DG/WT	RIGHT REAR WHEEL SPEED SENSOR SUPPLY
2	B1 20DG/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL



SERVO-SPEED CONTROL (3.7L/4.7L)

SERVO-SPEED CONTROL (3.7L/4.7L) - 4 WAY

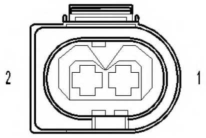
CAV	CIRCUIT	FUNCTION
1	V36 20VT/YL	S/C VACUUM SOL CONTROL
2	V35 20VT/OR	S/C VENT SOL CONTROL
3	V30 20VT/WT	S/C BRAKE SWITCH OUTPUT
4	Z384 20BK	GROUND



SIREN (EXPORT)

SIREN (EXPORT) - 3 WAY

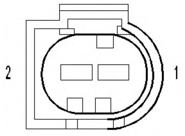
CAV	CIRCUIT	FUNCTION
1	A114 18GY/RD	FUSED B(+)
2	Z387 18BK	GROUND
3	D96 20WT/LB	SIREN SIGNAL CONTROL



SOLENOID-DHS PRESSURE CONTROL (DHS)

SOLENOID-DHS PRESSURE CONTROL (DHS) - 2 WAY

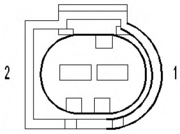
CAV	CIRCUIT	FUNCTION
1	S80 20GY/LB	DIRECTIONAL SOLENOID SUPPLY
2	S61 20GY/DG	DHS PRESSURE SOLENOID CONTROL



SOLENOID-DIRECTIONAL CONTROL VALVE-B (DHS)

SOLENOID-DIRECTIONAL CONTROL VALVE-B (DHS) - 2 WAY

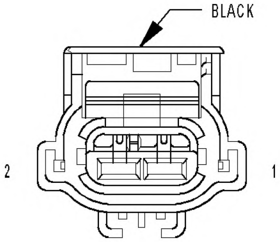
CAV	CIRCUIT	FUNCTION
1	S80 20GY/LB	DIRECTIONAL SOLENOID SUPPLY
2	S72 20GY/BR	DIRECTION VALVE-B SOLENOID CONTROL



SOLENOID-DIRECTIONAL CONTROL VALVE-G (DHS)

SOLENOID-DIRECTIONAL CONTROL VALVE-G (DHS) - 2 WAY

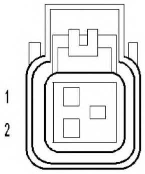
CAV	CIRCUIT	FUNCTION
1	S80 20GY/LB	DIRECTIONAL SOLENOID SUPPLY
2	S62 20GY/TN	DIRECTION VALVE-G SOLENOID CONTROL



SOLENOID-EVAP/PURGE (GAS)

SOLENOID-EVAP/PURGE (GAS) - BLACK 2 WAY

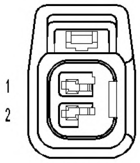
CAV	CIRCUIT	FUNCTION
1	K70 20DB/BR	EVAP PURGE SOL CONTROL
2	K52 20DB/YL	EVAP PURGE SOL SIGNAL



SOLENOID-FRONT DIFFERENTIAL

SOLENOID-FRONT DIFFERENTIAL - 2 WAY

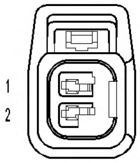
CAV	CIRCUIT	FUNCTION
1	T301 20DG/YL	SWITCHED BATTERY SOLENOID SUPPLY
2	T306 20DG/DB	FRONT DIFFERENTIAL SOLENOID CONTROL



SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 1 (5.7L)

SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 1 (5.7L) - 2 WAY

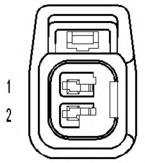
CAV	CIRCUIT	FUNCTION
1	K451 20BR/WT	MDS SOL CONTROL NO. 1
2	Z42 20BK/LG	GROUND



SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 4 (5.7L)

SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 4 (5.7L) - 2 WAY

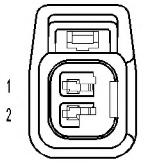
CAV	CIRCUIT	FUNCTION
1	K452 20BR/LB	MDS SOL CONTROL NO. 4
2	Z42 20BK/LG	GROUND



SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 6 (5.7L)

SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 6 (5.7L) - 2 WAY

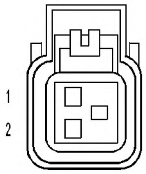
CAV	CIRCUIT	FUNCTION
1	K453 20BR/DG	MDS SOL CONTROL NO. 6
2	Z42 20BK/LG	GROUND



SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 7 (5.7L)

SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 7 (5.7L) - 2 WAY

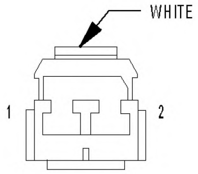
CAV	CIRCUIT	FUNCTION
1	K454 20BR/OR	MDS SOL CONTROL NO. 7
2	Z42 20BK/LG	GROUND



SOLENOID-REAR DIFFERENTIAL

SOLENOID-REAR DIFFERENTIAL - 2 WAY

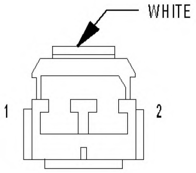
CAV	CIRCUIT	FUNCTION
1	T301 20DG/YL	SWITCHED BATTERY SOLENOID SUPPLY
2	T312 20YL/VT	REAR DIFFERENTIAL SOLENOID CONTROL



SPEAKER-INSTRUMENT PANEL-LEFT

SPEAKER-INSTRUMENT PANEL-LEFT - WHITE 2 WAY

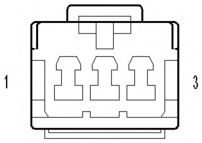
CAV	CIRCUIT	FUNCTION
1	X55 18DG/BR (EXCEPT PREMIUM AUDIO)	LEFT FRONT SPEAKER (-)
1	X299 18GY/YL (PREMIUM AUDIO)	AMPLIFIED LEFT I/P SPEAKER (-)
2	X53 18DG (EXCEPT PREMIUM AUDIO)	LEFT FRONT SPEAKER (+)
2	X209 18GY/OR (PREMIUM AUDIO)	AMPLIFIED LEFT I/P SPEAKER (+)



SPEAKER-INSTRUMENT PANEL-RIGHT

SPEAKER-INSTRUMENT PANEL-RIGHT - WHITE 2 WAY

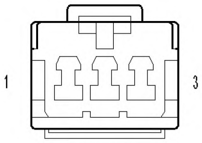
CAV	CIRCUIT	FUNCTION
1	X56 18GY/BR (EXCEPT PREMIUM AUDIO)	LEFT FRONT SPEAKER (-)
1	X298 18GY/LG (PREMIUM AUDIO)	AMPLIFIED RIGHT I/P SPEAKER (-)
2	X54 18GY (EXCEPT PREMIUM AUDIO)	RIGHT FRONT SPEAKER (+)
2	X208 18GY/DG (PREMIUM AUDIO)	AMPLIFIED RIGHT I/P SPEAKER (+)



SPEAKER-LEFT FRONT DOOR

SPEAKER-LEFT FRONT DOOR - 3 WAY

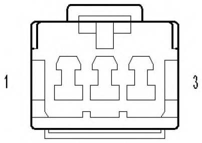
CAV	CIRCUIT	FUNCTION
1	X291 18GY/YL	AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
2	-	-
3	X201 18GY/VT	AMPLIFIED LEFT FRONT DOOR SPEAKER (+)



SPEAKER-LEFT REAR DOOR

SPEAKER-LEFT REAR DOOR - 3 WAY

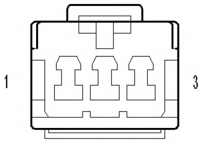
CAV	CIRCUIT	FUNCTION
1	X205 18GY/LG	AMPLIFIED LEFT REAR DOOR SPEAKER (+)
2	-	-
3	X295 18GY/DG	AMPLIFIED LEFT REAR DOOR SPEAKER (-)



SPEAKER-RIGHT FRONT DOOR

SPEAKER-RIGHT FRONT DOOR - 3 WAY

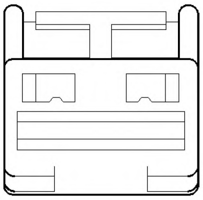
CAV	CIRCUIT	FUNCTION
1	X292 18DG/YL	AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
2	-	-
3	X202 18DG/VT	AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)



SPEAKER-RIGHT REAR DOOR

SPEAKER-RIGHT REAR DOOR - 3 WAY

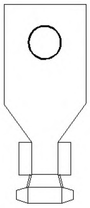
CAV	CIRCUIT	FUNCTION
1	X206 18DG/LG	AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
2	-	-
3	X296 18LG/GY	AMPLIFIED RIGHT REAR DOOR SPEAKER (-)



STARTER

STARTER - 1 WAY

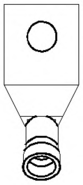
CAV	CIRCUIT	FUNCTION
1	T750 12YL/GY	ENGINE STARTER MOTOR RELAY OUTPUT



STARTER-EYELET (GAS)

STARTER-EYELET (GAS) - 1 WAY

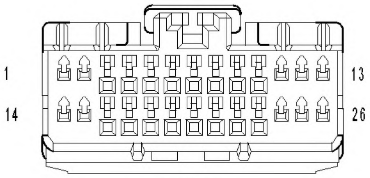
CAV	CIRCUIT	FUNCTION
1	A11 10BR/RD	FUSED B(+)
1	A8 06RD	B(+)



STARTER-EYELET (DIESEL)

STARTER-EYELET (DIESEL) - 1 WAY

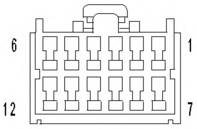
CAV	CIRCUIT	FUNCTION
1	A11 08BR/RD	FUSED B(+)
1	A8 04RD	B(+)



SWITCH-BANK-LOWER

SWITCH-BANK-LOWER - 26 WAY

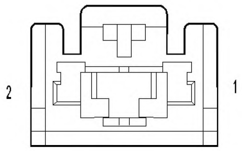
CAV	CIRCUIT	FUNCTION
1	Z906 18BK (ADJUSTABLE PEDALS)	GROUND
2	A72 16RD/OR (EXCEPT MEMORY)	ADJUSTABLE PEDALS RELAY OUTPUT
2	Q101 20OR/LB (MEMORY)	ADJUSTABLE PEDALS SWITCH GROUND
3	X774 20GY/LB (PARK ASSIST)	PARK ASSIST ON/OFF SWITCH
4	Z18 18BK/LB	GROUND
5	X775 20GY/DB (PARK ASSIST)	PARK ASSIST INDICATOR SIGNAL
6	T6 20DG	TOW/HAUL OVERDRIVE OFF SWITCH SENSE
7	E2 20OR/BR	PANEL LAMPS DRIVER
8	-	-
9	F921 20PK/YL	FUSED RUN RELAY OUTPUT
10	B46 20DG/WT	ESP/TCS ON/OFF SWITCH
11	Z906 18BK	GROUND
12	P205 16 LG/DB (EXCEPT MEMORY ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS MOTOR FORWARD
12	Q102 20OR/DB (MEMORY ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SWITCH FORWARD
13	P206 16LG/TN (EXCEPT MEMORY ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS MOTOR REARWARD
13	Q103 20OR/LG (MEMORY ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SWITCH REARWARD
14	P365 20LG/GY (POWER/HEATED SEATS)	LEFT HEATED SEAT SWITCH SENSE
15	P83 20TN/WT (POWER/HEATED SEATS)	LEFT HEATED SEAT HIGH INDICATOR DRIVER
16	P81 20TN/LB (POWER/HEATED SEATS)	LEFT HEATED SEAT LOW INDICATOR DRIVER
17	P877 20TN/OR (POWER/HEATED SEATS)	SWITCH-FRONT HEATED SEAT RETURN
18	P366 20LG/LB (POWER/HEATED SEATS)	RIGHT HEATED SEAT SWITCH SENSE
19	P84 20TN/WT (POWER/HEATED SEATS)	RIGHT HEATED SEAT HIGH INDICATOR DRIVER
20	P82 20TN/LB (POWER/HEATED SEATS)	RIGHT HEATED SEAT LOW INDICATOR DRIVER
21	-	-
22	-	-
23	-	-
24	-	-
26	-	-



SWITCH-BANK-UPPER

SWITCH-BANK-UPPER - 12 WAY

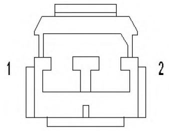
CAV	CIRCUIT	FUNCTION
1	R106 20LG/LB	PASSENGER AIRBAG INDICATOR DRIVER
2	F921 20PK/YL	FUSED RUN RELAY OUTPUT
3	G105 20VT/YL	C/T SWITCH INPUT
4	L13 20WT/YL (EXPORT)	HEADLAMP LEVEL SENSOR SIGNAL
5	L778 20WT/LB	FUSED PARK LAMP RELAY OUTPUT
6	-	-
7	G108 20VT/DB	RESET SWITCH INPUT
8	Z18 20BK/LB	GROUND
9	G102 20VT/GY	MENU SWITCH INPUT
10	G103 20VT/LB	STEP SWITCH INPUT
11	E2 20OR/BR	PANEL LAMPS DRIVER
12	Z906 18BK	GROUND



SWITCH-EXTENDED IDLE

SWITCH-EXTENDED IDLE - 2 WAY

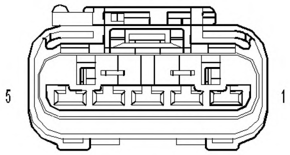
CAV	CIRCUIT	FUNCTION
1	K342 20BR/WT	ASD RELAY CONTROL
2	K343 20BR/YL	FUSED ASD RELAY OUTPUT



SWITCH-HORN

SWITCH-HORN - 2 WAY

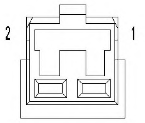
CAV	CIRCUIT	FUNCTION
1	X3 20DG/VT	HORN SWITCH SIGNAL
2	X903 20GY/LG	HORN SWITCH RETURN



SWITCH-IGNITION

SWITCH-IGNITION - 5 WAY

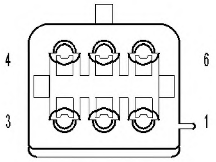
CAV	CIRCUIT	FUNCTION
1	G900 20VT/OR	IGNITION SWITCH SENSE RETURN
2	G20 20VT/BR	IGNITION SWITCH SENSE
3	F944 16PK/LG	IGNITION SWITCH OUTPUT (RUN-START)
4	F26 16PK/OR	FUSED IGNITION SWITCH OUTPUT (START)
5	A106 16LB/RD	FUSED B(+)



SWITCH-IGNITION (ELV EXPORT)

SWITCH-IGNITION (ELV EXPORT) - 2 WAY

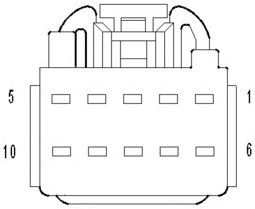
CAV	CIRCUIT	FUNCTION
1	A306 18RD/VT	FUSED B(+)
2	A935 18RD	FUSED B(+)



SWITCH-MEMORY SET

SWITCH-MEMORY SET - 6 WAY

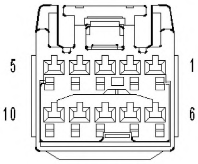
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	P439 20LG/OR	MEMORY SELECT SWITCH MUX
6	G920 20VT/YL	MEMORY SELECT SWITCH RETURN



SWITCH-MIRROR (EXPORT)

SWITCH-MIRROR (EXPORT) - 10 WAY

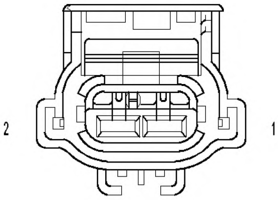
CAV	CIRCUIT	FUNCTION
1	P110 20LB/WT	FOLDING MIRROR RETURN
2	A929 16RD/DB	FUSED RUN/ACCESSORY RELAY OUTPUT
3	P76 20TN/LB	MIRROR COMMON DRIVER
4	Z911 20BK	GROUND
5	A931 20RD/WT	FUSED B(+)
6	P706 20LG/GY	MIRROR VERTICAL UP SWITCH SENSE
7	P705 20LG/OR	MIRROR VERTICAL DOWN SWITCH SENSE
8	P704 20LG/TN	MIRROR HORIZONTAL RIGHT SWITCH SENSE
9	P703 20DB/LG	MIRROR HORIZONTAL LEFT SWITCH SENSE
10	P699 20LG/YL	MIRROR-POWER FOLDING/UNFOLDING



SWITCH-MIRROR (EXCEPT EXPORT)

SWITCH-MIRROR (EXCEPT EXPORT) - 10 WAY

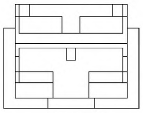
CAV	CIRCUIT	FUNCTION
1	-	-
2	A929 16RD/DB	FUSED RUN/ACCESSORY RELAY OUTPUT
3	P76 20TN/LB	MIRROR COMMON DRIVER
4	Z911 20BK	GROUND
5	A931 20RD/WT	FUSED B(+)
6	P72 20TN/GY (EXCEPT PREMIUM)	PASSENGER MIRROR VERTICAL DRIVER
6	P706 20LG/GY (PREMIUM)	MIRROR VERTICAL UP SWITCH SENSE
7	P71 20 TN/DG (EXCEPT PREMIUM)	DRIVER MIRROR VERTICAL DRIVER
7	P705 20LG/OR (PREMIUM)	MIRROR VERTICAL DOWN SWITCH SENSE
8	P74 20 TN/OR (EXCEPT PREMIUM)	PASSENGER MIRROR HORIZONTAL DRIVER
8	P704 20LG/TN (PREMIUM)	MIRROR HORIZONTAL RIGHT SWITCH SENSE
9	P75 20 TN/LG (EXCEPT PREMIUM)	DRIVER MIRROR HORIZONTAL DRIVER
9	P703 20DB/LG (PREMIUM)	MIRROR HORIZONTAL LEFT SWITCH SENSE
10	-	-



SWITCH-OIL PRESSURE (3.7L/4.7L)

SWITCH-OIL PRESSURE (3.7L/4.7L) - 2 WAY

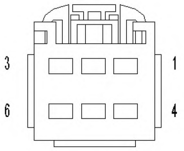
CAV	CIRCUIT	FUNCTION
1	G6 20VT/GY	ENGINE OIL PRESSURE SIGNAL
2	-	-



SWITCH-PARKING BRAKE

SWITCH-PARKING BRAKE - 1 WAY

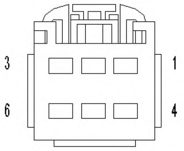
CAV	CIRCUIT	FUNCTION
1	B25 20DG/WT	PARK BRAKE SWITCH SENSE



SWITCH-POWER WINDOW-LEFT REAR

SWITCH-POWER WINDOW-LEFT REAR - 6 WAY

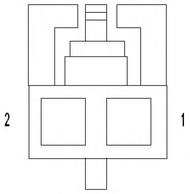
CAV	CIRCUIT	FUNCTION
1	Q611 16OR/GY	MASTER WINDOW SWITCH LEFT REAR (DOWN)
2	Q211 16TN/LB	LEFT REAR WINDOW DRIVER (DOWN)
3	Q111 16TN/YL	LEFT REAR WINDOW DRIVER (UP)
4	Q411 16OR/WT	MASTER WINDOW SWITCH LEFT REAR (UP)
5	-	-
6	Q15 16OR/LB	WINDOW LOCK OUT SWITCH OUTPUT



SWITCH-POWER WINDOW-RIGHT REAR

SWITCH-POWER WINDOW-RIGHT REAR - 6 WAY

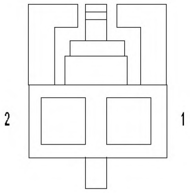
CAV	CIRCUIT	FUNCTION
1	Q612 16OR/DB	MASTER WINDOW SWITCH RIGHT REAR (DOWN)
2	Q212 16OR/VT	RIGHT REAR WINDOW DRIVER (DOWN)
3	Q112 16OR/BR	RIGHT REAR WINDOW DRIVER (UP)
4	Q412 16OR/LB	MASTER WINDOW SWITCH RIGHT REAR (UP)
5	-	-
6	Q15 16OR/LB	WINDOW LOCK OUT SWITCH OUTPUT



SWITCH-REMOTE RADIO-LEFT

SWITCH-REMOTE RADIO-LEFT - 2 WAY

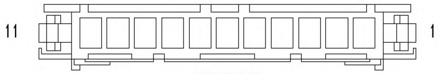
CAV	CIRCUIT	FUNCTION
1	X20 20GY/WT	RADIO CONTROL MUX
2	X920 20GY/OR	RADIO CONTROL MUX RETURN



SWITCH-REMOTE RADIO-RIGHT

SWITCH-REMOTE RADIO-RIGHT - 2 WAY

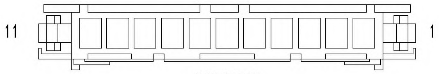
CAV	CIRCUIT	FUNCTION
1	X20 20GY/WT	RADIO CONTROL MUX
2	X920 20GY/OR	RADIO CONTROL MUX RETURN



SWITCH-SEAT-DRIVER (EXCEPT MEMORY)

SWITCH-SEAT-DRIVER (EXCEPT MEMORY) - 11 WAY

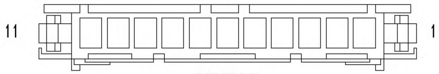
CAV	CIRCUIT	FUNCTION
1	P41 16LG/GY	DRIVER SEAT RECLINER DOWN DRIVER
2	-	-
3	P43 16LG/VT	DRIVER SEAT RECLINER UP DRIVER
4	P17 16LG/DG	DRIVER SEAT HORIZONTAL REARWARD DRIVER
5	P21 16LG/TN	DRIVER SEAT FRONT DOWN DRIVER
6	A33 16RD/YL	FUSED B(+)
7	Z911 14BK (EXCEPT HEATED SEATS)	GROUND
7	Z911 16BK (HEATED SEATS)	GROUND
8	P15 16LG/WT	DRIVER SEAT HORIZONTAL FORWARD DRIVER
9	P19 16LG/LB	DRIVER SEAT FRONT UP
10	P13 16LG/OR	DRIVER SEAT REAR RISER DOWN DRIVER
11	P11 16LG/YL	DRIVER SEAT REAR RISER UP DRIVER



SWITCH-SEAT-DRIVER (MEMORY)

SWITCH-SEAT-DRIVER (MEMORY) - 11 WAY

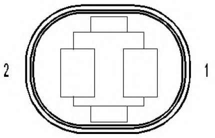
CAV	CIRCUIT	FUNCTION
1	P599 20LG/TN	DRIVER SEAT SWITCH MUX RETURN
2	-	-
2	-	-
3	-	-
4	P239 20LG/WT	DRIVER SEAT SWITCH REAR VERTICAL/HORIZONTAL SWITCH MUX
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	P9 20LG/OR	DRIVER SEAT SWITCH SUPPLY
11	P339 20LG/DB	DRIVER SEAT SWITCH FRONT VERTICAL/RECLINER SWITCH MUX



SWITCH-SEAT-PASSENGER

SWITCH-SEAT-PASSENGER - 11 WAY

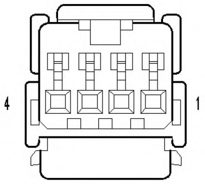
CAV	CIRCUIT	FUNCTION
1	P42 16LG/GY	PASSENGER SEAT RECLINER SWITCH DOWN
2	-	-
3	P44 16LG/VT	PASSENGER SEAT RECLINER SWITCH UP
4	P16 16LG/WT	PASSENGER SEAT HORIZONTAL REARWARD DRIVER
5	-	-
6	A33 16BK/RD	FUSED B(+)
7	Z909 14BK (EXCEPT HEATED SEATS)	GROUND
7	Z909 16BK (HEATED SEATS)	GROUND
8	P14 16LG/OR	PASSENGER SEAT HORIZONTAL FORWARD DRIVER
9	-	-
10	-	-
11	-	-



SWITCH-SECURITY HOOD (EXPORT)

SWITCH-SECURITY HOOD (EXPORT) - 2 WAY

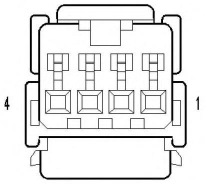
CAV	CIRCUIT	FUNCTION
1	G70 20VT/LB	HOOD AJAR SWITCH SENSE
2	Z384 20BK	GROUND



SWITCH-SPEED CONTROL-LEFT

SWITCH-SPEED CONTROL-LEFT - 4 WAY

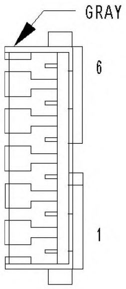
CAV	CIRCUIT	FUNCTION
1	V372 20OR/VT	S/C SWITCH SIGNAL NO. 2
2	V397 20VT/BR	S/C SWITCH RETURN
3	V371 20VT/OR	S/C SWITCH SIGNAL NO. 1
4	-	-



SWITCH-SPEED CONTROL-RIGHT

SWITCH-SPEED CONTROL-RIGHT - 4 WAY

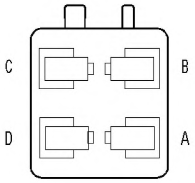
CAV	CIRCUIT	FUNCTION
1	V372 20OR/VT	S/C SWITCH SIGNAL NO. 2
2	V397 20VT/BR	S/C SWITCH RETURN
3	V371 20VT/OR	S/C SWITCH SIGNAL NO. 1
4	-	-



SWITCH-STOP LAMP

SWITCH-STOP LAMP - GRAY 6 WAY

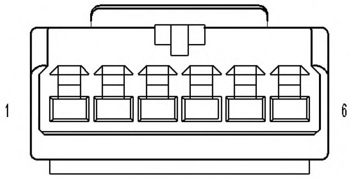
CAV	CIRCUIT	FUNCTION
1	A103 18GY/RD	FUSED B(+)
2	L950 20WT/LG (ESP)	STOP LAMP INHIBIT RELAY FEED
2	L50 18WT/TN (EXCEPT ESP)	BRAKE LAMP SWITCH OUTPUT
3	V30 20VT/WT (3.7L/4.7L)	S/C BRAKE SWITCH OUTPUT
3	F942 20PK/LG (5.7L)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	Z904 20BK (DIESEL)	GROUND
4	V32 20 VT/YL (3.7L/4.7L)	S/C SUPPLY
4	B16 20LB/DG (5.7L)	BRAKE SWITCH NO. 2 SIGNAL
4	B15 20DG/WT (DIESEL)	BRAKE SWITCH NO. 1 SIGNAL
5	V32 20 VT/YL (3.7L/4.7L)	S/C SUPPLY
5	Z904 20BK (5.7L/DIESEL)	GROUND
6	B16 20LB/DG (DIESEL)	BRAKE SWITCH NO. 2 SIGNAL
6	B15 20 DG/WT (GAS)	BRAKE SWITCH NO. 1 SIGNAL



SWITCH-SUNROOF

SWITCH-SUNROOF - 4 WAY

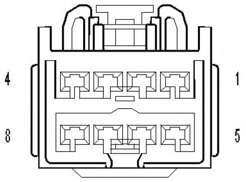
CAV	CIRCUIT	FUNCTION
A	Q4 20OR/YL	SUNROOF VENT SWITCH SENSE
B	Q6 20OR/LG	SUNROOF SWITCH SUPPLY
C	Q5 20OR/LB	SUNROOF CLOSE SWITCH SENSE
D	Q3 20OR/TN	SUNROOF OPEN SWITCH SENSE



SWITCH-TRANSFER CASE SELECTOR

SWITCH-TRANSFER CASE SELECTOR - 6 WAY

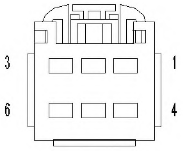
CAV	CIRCUIT	FUNCTION
1	K504 20BR	DRIVETRAIN 5 VOLT SUPPLY
2	K977 16BR/WT	MODE SELECT
3	G95 20VT/BR	4WD NEUTRAL INDICATOR
4	F943 20PK/LG	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	E2 20OR/BR	PANEL LAMPS DRIVER
6	Z907 20BK	GROUND



SWITCH-WINDOW/DOOR LOCK-DRIVER C1

SWITCH-WINDOW/DOOR LOCK-DRIVER C1 - 8 WAY

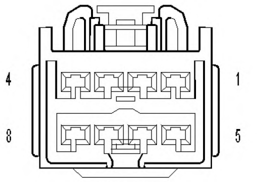
CAV	CIRCUIT	FUNCTION
1	-	-
2	A929 16RD/DB	FUSED RUN/ACCESSORY RELAY OUTPUT
3	Z463 20BK/LB (EXCEPT MEMORY)	DOOR LOCK SWITCH RETURN
3	G775 20OR/VT (MEMORY)	DRIVER DOOR LOCK SWITCH RETURN
4	Z911 16BK	GROUND
5	Q15 16OR/LB	WINDOW LOCK OUT SWITCH OUTPUT
6	Q21 16OR/WT	DRIVER WINDOW DRIVER (DOWN)
7	Q11 16OR/LG	DRIVER WINDOW DRIVER (UP)
8	G161 20VT/DG (LHD)	DRIVER DOOR LOCK SWITCH MUX
8	G160 20VT/BR (RHD)	PASSENGER DOOR LOCK SWITCH MUX



SWITCH-WINDOW/DOOR LOCK-DRIVER C2

SWITCH-WINDOW/DOOR LOCK-DRIVER C2 - 6 WAY

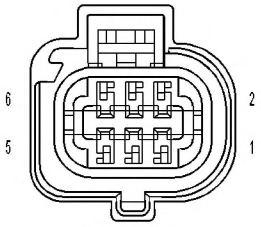
CAV	CIRCUIT	FUNCTION
1	Q411 16OR/WT	MASTER WINDOW SWITCH LEFT REAR (UP)
2	Q412 16OR/LB	MASTER WINDOW SWITCH RIGHT REAR (UP)
3	Q612 16OR/DB	MASTER WINDOW SWITCH RIGHT REAR (DOWN)
4	Q611 16OR/GY	MASTER WINDOW SWITCH LEFT REAR (DOWN)
5	Q26 16OR/GY	MASTER WINDOW SWITCH PASSENGER (DOWN)
6	Q16 16OR/TN	MASTER WINDOW SWITCH PASSENGER (UP)



SWITCH-WINDOW/DOOR LOCK-PASSENGER

SWITCH-WINDOW/DOOR LOCK-PASSENGER - 8 WAY

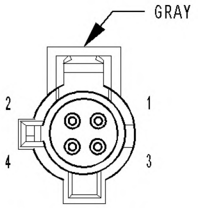
CAV	CIRCUIT	FUNCTION
1	Q26 16OR/GY	MASTER WINDOW SWITCH PASSENGER (DOWN)
2	Q22 16OR/VT	PASSENGER WINDOW DRIVER DOWN
3	Q12 16OR/BR	PASSENGER WINDOW DRIVER UP
4	Q15 16OR/LB	WINDOW LOCK OUT SWITCH OUTPUT
5	A929 16RD/LG	FUSED RUN/ACCESSORY RELAY OUTPUT
6	G160 20VT/BR	PASSENGER DOOR LOCK SWITCH MUX
7	Z463 20BK/LB (EXCEPT MEMORY)	DOOR LOCK SWITCH RETURN
7	G776 20VT/OR (MEMORY)	PASSENGER DOOR LOCK SWITCH RETURN
8	Q16 16OR/TN	MASTER WINDOW SWITCH PASSENGER (UP)



THROTTLE BODY (5.7L)

THROTTLE BODY (5.7L) - 6 WAY

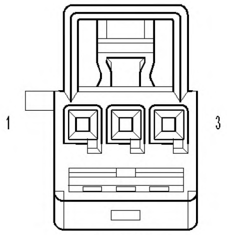
CAV	CIRCUIT	FUNCTION
1	K22 18BR/OR	TP NO. 1 SIGNAL
2	F855 18PK/YL	5 VOLT SUPPLY
3	K124 18DB/GY	ETC MOTOR (+)
4	K122 18BR/DG	TP NO. 2 SIGNAL
5	K126 18DB/LG	ETC MOTOR (-)
6	K922 18BR/DB	TP SENSOR RETURN



TRANSDUCER-A/C PRESSURE

TRANSDUCER-A/C PRESSURE - GRAY 4 WAY

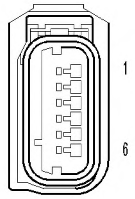
CAV	CIRCUIT	FUNCTION
1	C918 20BK/LB	FCM SENSOR RETURN
2	F891 20PK/GY	5 VOLT SUPPLY
3	C18 20LB/BR	A/C PRESSURE SIGNAL
4	-	-



TRANSMITTER-INTRUSION TRANSLATOR (VTSS)

TRANSMITTER-INTRUSION TRANSLATOR (VTSS) - 3 WAY

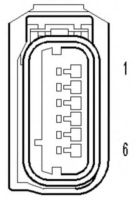
CAV	CIRCUIT	FUNCTION
1	A645 20RD/VT	REAR INTRUSION SENSOR SIGNAL
2	-	-
3	G945 20VT/DG	SENSOR GROUND



TRANSPONDER-TIRE PRESSURE-LEFT FRONT (EXCEPT 3.7L)

TRANSPONDER-TIRE PRESSURE-LEFT FRONT (EXCEPT 3.7L) - 6 WAY

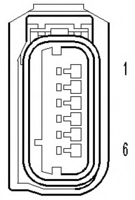
CAV	CIRCUIT	FUNCTION
1	F924 20PK/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
2	D508 20WT/TN	COM - LIN TIRE PRESSURE MONITOR LAN
3	Z924 20BK/OR	GROUND
4	Z924 20BK/YL	GROUND
5	-	-
6	-	-



TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L)

TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L) - 6 WAY

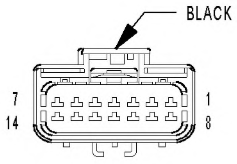
CAV	CIRCUIT	FUNCTION
1	F924 20PK/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
2	D508 20WT/TN	COM - LIN TIRE PRESSURE MONITOR LAN
3	Z924 20BK/OR	GROUND
4	-	-
5	Z924 20BK/YL	GROUND
6	-	-



TRANSPONDER-TIRE PRESSURE-RIGHT REAR

TRANSPONDER-TIRE PRESSURE-RIGHT REAR - 6 WAY

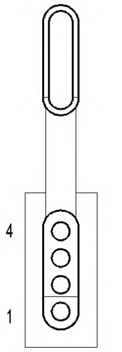
CAV	CIRCUIT	FUNCTION
1	F924 20PK/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
2	D508 20WT/TN	COM - LIN TIRE PRESSURE MONITOR LAN
3	Z925 20BK	GROUND
4	-	-
5	-	-
6	Z925 20BK	GROUND



WIRING-TRAILER TOW 10-WAY (EXPORT)

WIRING-TRAILER TOW 10-WAY (EXPORT) - BLACK 14 WAY

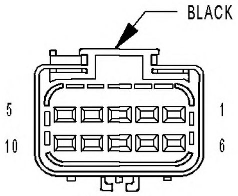
CAV	CIRCUIT	FUNCTION
1	L62 18WT/OR	RIGHT REAR TURN SIGNAL CONTROL
2	A35 18RD/DG	FUSED B(+)
3	Z923 14BK	GROUND
4	L63 18WT/DG	LEFT REAR TURN SIGNAL CONTROL
5	L777 20WT/BR	FUSED PARK LAMP RELAY OUTPUT
6	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
7	L777 20WT/BR	FUSED PARK LAMP RELAY OUTPUT
8	L1 18WT/LG	BACK-UP LAMP FEED
9	A907 14RD/DB	FUSED B(+)
10	A930 14RD/WT	POWER OUTLET RELAY OUTPUT
11	Z923 14BK	GROUND
12	B400 14DG	TRAILER TOW ELECTRIC BRAKE OUTPUT
13	Z923 14BK	GROUND
14	-	-



WIRING-TRAILER TOW 4-WAY

WIRING-TRAILER TOW 4-WAY - 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z912 14BK	GROUND
2	L76 18WT/BR	FUSED PARK LAMP RELAY OUTPUT
3	L615 18WT/YL	TRAILER TOW TURN SIGNAL
4	L614 18WT/DB	TRAILER TOW TURN SIGNAL



WIRING-TRAILER TOW 7-WAY

WIRING-TRAILER TOW 7-WAY - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	L614 18WT/DB	TRAILER TOW TURN SIGNAL
3	L1 18WT/LG	BACK-UP LAMP FEED
4	A930 14RD/WT	POWER OUTLET RELAY OUTPUT
5	L76 18WT/BR	FUSED PARK LAMP RELAY OUTPUT
6	-	-
7	B400 14DG	TRAILER TOW ELECTRIC BRAKE OUTPUT
8	Z912 14BK	GROUND
9	Z912 14BK	GROUND
10	L615 18WT/YL	TRAILER TOW TURN SIGNAL

CONNECTOR NOT AVAILABLE

WIRING-TRAILER TOW TERMINAL - 1 WAY

CAV	CIRCUIT	FUNCTION
1	B400 14DG	TRAILER TOW ELECTRIC BRAKE OUTPUT

8W-91 CONNECTOR/GROUND/SPLICE LOCATION

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page

CONNECTOR/GROUND/SPLICE LOCATION
DESCRIPTION 1

CONNECTOR/GROUND/SPLICE LOCATION

DESCRIPTION

This section provides illustrations identifying connector, ground and splice locations in the vehicle. Connector, ground and splice indexes are provided. Use the wiring diagrams in each section for connector, ground and splice identification. Refer to the appropriate index for the proper figure number. For items that are not shown in this section N/S is placed in the Fig. column.

CONNECTORS

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Actuator-Blend Door-Left	BK	Left Side HVAC Unit	28
Actuator-Blend Door-Right(ATC)	BK	Center HVAC Unit	29
Actuator-Mode Door-Front	BK	Left Side HVAC Unit	28
Actuator-Mode Door-Rear	BK	Center HVAC Unit	29
Actuator-Recirculation Door	BK	Right Side HVAC Unit	29
Airbag-Driver Squib 1	BK	Rear of Steering Wheel Pad	35
Airbag-Driver Squib 2	BR	Rear of Steering Wheel Pad	35
Airbag-Passenger Squib	YL	Passenger Side Instrument Panel	N/S
Airbag-Side Curtain-Left	YL	Left Upper Rear Body	47
Airbag-Side Curtain-Right	YL	Right Upper Rear Body	48
Amplifier-Radio C1 (Premium Audio)		Left Rear Floor of Cargo Compartment	47
Amplifier-Radio C2 (Premium Audio)		Left Rear Floor of Cargo Compartment	47
Antenna-Radio (Base Audio)		Right Side Instrument Panel	34
Antenna-Radio (Premium Audio)		Right Rear Body	48
Antenna-Satellite Radio No. 1		Center Rear Roof	49
Antenna-Satellite Radio No. 2		Center Rear Roof	49
Assembly-Electrohydraulic Control Unit (3.7L)		Right Side of Transmission	19
Assembly-Exhaust Gas Recirculation Valve (4.7L)	BK	Left Rear Top of Engine	17

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Assembly-Exhaust Gas Recirculation Valve (5.7L)	BK	Right Front of Engine	22
Assembly-Natural Vacuum Leak Detection		Left Rear Underbody	59
Assembly-Shift Lever		At Base of Shift Lever	42
Assembly-Transmission Solenoid/TRS (45RFE)	BK	Left Side of Transmission	20, 25
Battery-Negative		Left Front Engine Compartment	12, 13
Battery-Positive		Left Front Engine Compartment	12, 13
C102	BK	Left Side of Engine	1, 12, 13
C104		Left Engine Compartment	6, 17, 22
C105		Left Front underbody	1, 62
C111 (DHS)		Lower Left Front Engine Compartment	27, 62
C112 (5.7L)		Left Rear Engine	23
C200		Lower Left of Instrument Panel	2, 32
C201		Lower Left of Instrument Panel	32, 44
C203		Right Kick Panel	33, 36
C205	LT GY	Lower Left of Instrument Panel	28, 30
C301		Front of Left Front Door	44, 53
C302		Front of Right Front Door	45, 54
C303		Front of Left Front Door	44, 53
C304		Front of Right Front Door	45, 54
C305		Right Side Body Floor	45, 51
C306		Below Driver Door	46, 50
C307		Front of Left Rear Door	47, 55
C308		Front of Right Rear Door	45, 55
C309		Below Left Rear Door	47, 56
C310		Top of Liftgate	47, 63
C311		Left Rear Headliner	39, 47
C312		Left Rear Headliner	39, 47
C313	WT	Left Rear Headliner	39, 47
C314 (Rear Park Assist)		Left Side Bumper	59, 64
C315	WT	Driver Door	53
C316	WT	Driver Door	53
C317		Passenger Door	54
C318	GY	Rear of Driver Seat	N/S
C319	GY	Right Rear of Passenger Seat	52
C320 (Overhead Side)	LT GY	Right Rear Headliner	40
C320 (Sunroof Side)	NAT	Right Rear Headliner	40
Capacitor-Ignition No. 1 (3.7L/4.7L)		Left Top Engine	17
Capacitor-Ignition No. 2 (3.7L/4.7L)		Right Side Engine	18

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Cluster C1		Driver Side Instrument Panel	N/S
Cluster C2		Driver Side Instrument Panel	N/S
Cluster C3		Driver Side Instrument Panel	N/S
Cllutch-A/C Compressor (3.7L/4.7L)	BK	Front Top of Engine	15
Cllutch-A/C Compressor (5.7L)	BK	Lower Left Front of Engine	23
Coil-Ignition-No. 1 (3.7L/4.7L)	BK	Left Top of Engine	17
Coil-Ignition-No. 1 (5.7L)	BK	Left Top of Engine	23
Coil-Ignition-No. 2 (3.7L/4.7L)	BK	Right Top of Engine	18
Coil-Ignition-No. 2 (5.7L)	BK	Right Top of Engine	24
Coil-Ignition-No. 3 (3.7L/4.7L)	BK	Left Top of Engine	17
Coil-Ignition-No. 3 (5.7L)	BK	Left Top of Engine	23
Coil-Ignition-No. 4 (3.7L/4.7L)	BK	Right Top of Engine	18
Coil-Ignition-No. 4 (5.7L)	BK	Right Top of Engine	24
Coil-Ignition-No. 5 (3.7L/4.7L)	BK	Left Top of Engine	17
Coil-Ignition-No. 5 (5.7L)	BK	Left Top of Engine	23
Coil-Ignition-No. 6 (3.7L/4.7L)	BK	Right Top of Engine	18
Coil-Ignition-No. 6 (5.7L)	BK	Right Top of Engine	24
Coil-Ignition-No. 7 (4.7L)	BK	Left Top of Engine	17
Coil-Ignition-No. 7 (5.7L)	BK	Left Top of Engine	23
Coil-Ignition-No. 8 (4.7L)	BK	Right Top of Engine	18
Coil-Ignition-No. 8 (5.7L)	BK	Right Top of Engine	24
Control-A/C-Heater C1 (ATC)		Center Instrument Panel at Rear of Control	N/S
Control-A/C-Heater C1 (MTC)		Center Instrument Panel at Rear of Control	N/S
Control-A/C-Heater C2 (ATC)		Center Instrument Panel	28
Control-A/C-Heater C2 (MTC)		Center Instrument Panel	N/S
Control-A/C-Heater C3 (MTC)		Center Instrument Panel	N/S
Data Link Connector C1		Lower Driver Side Instrument Panel	31
Fan Module-Condenser Cooling (3.7L/4.7L)		Left Front Engine Compartment	7
Generator		Left Front Top of Engine	12, 14
Generator-Eyelet		Left Front Top of Engine	12, 14
Glass-Liftgate (Heated Feed)		Top Right of Liftgate	63
Glass-Liftgate (Heated Ground)		Top Left of Liftgate	63
Heater-Cushion Pad-Driver	LG	Bottom of Driver Seat	N/S
Heater-Cushion Pad-Passenger	LG	Bottom of Passenger Seat	51
Heater-Seat Back-Driver	LG	Under Left Side Cover of Seat	N/S
Heater-Seat Back-Passenger	LG	Under Right Side Cover of Seat	N/S
Horn	BK	Right Front Engine Compartment	9

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Injector-Fuel-No. 1 (GAS)	BK	Left Front Top of Engine	17, 22, 25
Injector-Fuel-No. 2 (GAS)	BK	Right Top of Engine	18, 24
Injector-Fuel-No. 3 (GAS)	BK	Left Top of Engine	17, 22
Injector-Fuel-No. 4 (GAS)	BK	Right Top of Engine	18, 24
Injector-Fuel-No. 5 (GAS)	BK	Left Top of Engine	17, 22
Injector-Fuel-No. 6 (GAS)	BK	Right Top of Engine	18, 24
Injector-Fuel-No. 7 (4.7L/5.7L)	BK	Left Top of Engine	17, 22
Injector-Fuel-No. 8 (4.7L/5.7L)	BK	Right Top of Engine	18, 24
Junction Block C1		Lower Left Instrument Panel	2
Junction Block C2		Lower Left Instrument Panel	N/S
Junction Block C3		Lower Left Instrument Panel	44
Lamp-Cargo (Base)	BK	Lower Center Liftgate	63
Lamp-CHMSL (Base)		Top Center Liftgate	63
Lamp-Courtesy-Driver		Front Center Headliner	N/S
Lamp-Courtesy-I/Panel Lower-Left		Instrument Panel above Left Footwell	N/S
Lamp-Courtesy-I/Panel Lower-Right		Instrument Panel above Right Footwell	N/S
Lamp-Door Handle-Left Front		Left Side Headliner	N/S
Lamp-Door Handle-Right Front		Right Side Headliner	N/S
Lamp-Fog-Left Front	BK	Lower Left Front Fascia	8
Lamp-Fog-Right Front	BK	Lower Right Front Fascia	9
Lamp-Glove Box		Top of inner Glove Box	N/S
Lamp-Headlamp-Left	BK	Rear of Left Headlamp Assembly	8
Lamp-Headlamp-Right	BK	Rear of Right Headlamp Assembly	9
Lamp-License Plate		Lower Center Liftgate	63
Lamp-Tail/Stop/Turn-Left		At Left Rear Lamp Assembly	59
Lamp-Tail/Stop/Turn-Right		At Right Rear Lamp Assembly	60
Lamp-Vanity-Left		At Left Visor	N/S
Lamp-Vanity-Right		At Right Visor	N/S
Latch-Door-Driver	BK	Upper Rear Driver Door	53
Latch-Door-Left Rear	BK	Upper Rear Left Rear Door	55
Latch-Door-Liftgare C1		Lower Center of Liftgate	63
Latch-Door-Liftgare C2		Lower Center of Liftgate	63
Latch-Door-Passenger	BK	Upper Rear Passenger Door	54
Latch-Door-Right Rear	BK	Upper Rear Right Rear Door	55
Latch-Flipper Glass C1		Lower Center Liftgate	63
Latch-Flipper Glass C2		Lower Center Liftgate	63
Media System-Monitor/DVD C1 (Premium Audio)		Rear of Center Console	43
Media System-Monitor/DVD C2 (Premium Audio)		Rear of Center Console	46

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Mirror-Inside Rearview C1		Front on Inside Rearview Mirror	37
Mirror-Inside Rearview C2		Front on Inside Rearview Mirror	36, 37
Mirror-Outside Rearview-Driver		Upper Front of Driver Door	53
Mirror-Outside Rearview-Passenger		Upper Front of Passenger Door	54
Module-Antilock Brakes		Left Rear Engine Compartment	6
Module-Electronic Overhead		Front Center Headliner	N/S
Module-Final Drive Control C1 (Except 3.7L)		Below Left Rear Seat	56
Module-Final Drive Control C2 (Except 3.7L)		Below Left Rear Seat	56
Module-Front Blower Power C1 (ATC)	BK	Right Side of HVAC Unit	29
Module-Front Blower Power C2 (ATC)	BK	Right Side of HVAC Unit	29
Module-Front Control C1		Left Side Engine Compartment	6
Module-Front Control C2		Left Side Engine Compartment	6
Module-Front Control IPM		Side of Integrated Power Module	N/S
Module-Hands Free		Right Kick Panel	33
Module-Heated Seat		Below Passenger Seat	51
Module-Hydraulic Cooling Fan (HEC) (5.7L)			N/S
Module-Integrated Power C1		Left Side of Engine Compartment	6
Module-Integrated Power C2		Left Side of Engine Compartment	6
Module-Integrated Power Eyelet (B+)		Left Side of Engine Compartment	11
Module-Memory Mirror-Driver C1		In Driver Door	53
Module-Memory Mirror-Driver C2		In Driver Door	53
Module-Memory Mirror-Passenger		In Passenger Door	N/S
Module-Memory Seat C1		Below Driver Seat	50
Module-Memory Seat C2		Below Driver Seat	50
Module-Memory Seat C3		Below Driver Seat	50
Module-Memory Seat C4		Below Driver Seat	50
Module-Memory Seat C5 (LHD)		Below Driver Seat	50
Module-Occupant Classification C1		Below Passenger Seat	45
Module-Occupant Classification C2		Below Passenger Seat	N/S
Module-Occupant Restraint Controller C1		Below Center Console	46

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Module-Occupant Restraint Controller C2		Below Center Console	43
Module-Park Assist C1		Below Left Rear Seat	56
Module-Park Assist C2		Below Left Rear Seat	56
Module-Park-Display-Rear (Rear Park Assist)		Rear Center Headliner	N/S
Module-Powertrain Control C1	BK/BK	Right Rear of Engine Compartment	18, 24
Module-Powertrain Control C2 (3.7L/4.7L)	BK/OR	Right Rear of Engine Compartment	18
Module-Powertrain Control C2 (5.7L)	BK/OR	Right Rear of Engine Compartment	24
Module-Powertrain Control C3 (3.7L)	BK/NAT	Right Rear of Engine Compartment	18
Module-Powertrain Control C3 (4.7L/5.7L)	BK/NAT	Right Rear of Engine Compartment	24
Module-Powertrain Control C4	BK/GN	Right Rear of Engine Compartment	18, 24
Module-Sentry Key Remote Entry		At Steering Column	N/S
Module-Steering Control C1		At Steering Column	N/S
Module-Steering Control C2	YL	At Steering Column	N/S
Module-Steering Control C3		Steering Wheel	35
Module-Steering Control C4		Steering Wheel	35
Monitor-DVD		Center Headliner	38, 41
Motor-Adjustable Pedal		At Pedal Assembly	44
Motor-Blower	BK	Right Side of HVAC Unit	29
Motor-Fuel Pump		Top of Fuel Tank	57
Motor-IAC (3.7L/4.7L)	BK	Top of Engine	17
Motor-Rear Window Wiper		Lower Center of Liftgate	63
Motor-Seat Adjuster-Driver Horizontal		Below Driver Seat	50
Motor-Seat Adjuster-Driver Recliner	WT	Below Driver Seat	N/S
Motor-Seat Adjuster-Front Driver Vertical		Bottom of Driver Seat	N/S
Motor Seat Adjuster-Passenger Horizontal		Below Passenger Seat	57
Motor Seat Adjuster-Passenger Recliner (LHD)	WT	Right Rear of Passenger Seat	52
Motor-Seat Adjuster-Rear Driver Vertical		Bottom of Driver Seat	N/S
Motor-Transfer Case		At Transfer Case	61
Motor-Window-Left Front		Center of Left Front Door	53
Motor-Window-Left Rear		Center of Left Rear Door	55

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Motor-Window-Right Front		Center of Right Front Door	54
Motor-Window-Right Rear		Center of Right Rear Door	55
Motor-Windshield Wiper		Top Left of Plenum	5
Motor/Module-Sunroof	LT GY	On Sunroof Assembly	N/S
Power Distribution Center Eyelet B+		Left Side of Engine Compartment	11
Power Outlet-Console	GY	Center Console at Rear of Power Outlet	N/S
Power Outlet-Instrument Panel		Center Stack at Rear of Power Outlet	N/S
Power Outlet-Rear	GY	Left Rear Cargo Area	47
Pump-Washer-Windshield		Left Front Engine Compartment	8
Radio C1		Center Indtrument Panel at Rear of Radio	N/S
Radio C1 Shield (Hands Free)		Center Indtrument Panel at Rear of Radio	N/S
Radio C2		Center Indtrument Panel at Rear of Radio	N/S
Radio C2 Shield (Satellite Radio)		Center Indtrument Panel at Rear of Radio	N/S
Receiver-Intrusion Translator (VTSS)			N/S
Receiver-Satellite Radio		Right Rear Side Body	48, 49
Receiver-Satellite Anetnna No.1		Right Rear Side Body	49
Receiver-Satellite Anetnna No.2		Right Rear Side Body	49
Resistor-Blower Motor (MTC)	BK	Right Side HVAC Unit	N/S
Seat Belt-Tensioner-Driver		Left Side of Driver Seat	46
Seat Belt-Tensioner-Passenger	YL	Right Side of Passenger Seat	45
Sensor-Accelerator Pedal Position (5.7L/Diesel)		Base of Accelerator Pedal	4
Sensor-Ambient Air Temperature		Front Center Engine Compartment	7
Sensor-Auto Headlamp		Top Center Instrument Panel	N/S
Sensor-Brake Fluid Level		Left Rear Engine Compartment	6
Sensor-Brake Perssure		Left Engine Compartment	6
Sensor-Brake Travel (ESP/BSC)		Left Engine Compartment	6
Sensor-Camshaft Position (GAS)	GY	Right Front Engine	16, 22
Sensor-Crankshaft Position (3.7L/4.7L)	BK	Lower Front Engine	16
Sensor-Crankshaft Position (5.7L)	BK	Front of Engine	22
Sensor-DHS Pressure		Front Cradle	27

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Sensor-Dynamics (ESP)		Right Body Behind Right Front Seat	46
Sensor-Engine Coolant Temperature (3.7L/4.7L/5.7L Except HEC)	BK	Front Top of Engine	15
Sensor-Engine Coolant Temperature (5.7L HEC/ Diesel)	BK	Left Front of Engine	25
Sensor-Evaporator Temperature	WT	Left Side HVAC Unit	28
Sensor-Front Impact-Left		Left Front Engine Compartment	8
Sensor-Front Impact-Right		Right Front Engine Compartment	7
Sensor-Imput Speed (4.7L/5.7L)		Left Side Transmission	20, 25
Sensor-Intake Air Temperature (GAS)	GY	Top Front of Engine	18, 24
Sensor-Knock (3.7L/4.7L)		Right Side of Engine	18
Sensor-Knock No. 1 (5.7L)		Left Side of Engine	23
Sensor-Knock No. 2 (5.7L)		Front of Engine	22
Sensor-Lateral Acceleration		Front Center Headliner	N/S
Sensor-Line Pressure (545RFE)		Right Rear of Transmission	21, 26
Sensor-MAP (3.7L/4.7L)	GY	Front Top of Engine	15
Sensor-MAP (5.7L)	GY	Rear Top of Engine	23
Sensor-Oil Pressure (5.7L)	BK	Lower Right Front of Engine	23
Sensor-Oil Temperature (5.7L)		Lower Right Front of Engine	22
Sensor-Output Speed (4.7L5.7L)		Left Side of Transmission	20, 25
Sensor-Oxygen-Left Front (3.7L)		Left Front near Transmission	19
Sensor-Oxygen-Left Front (4.7L)	GY	Left Front near Transmission	20
Sensor-Oxygen-Left Front (5.7L)		Left Rear of Engine	23
Sensor-Oxygen-Left Rear (3.7L)		Near Rear of Transmission	19
Sensor-Oxygen-Left Rear (4.7L)	GY	Right Side of Transmission	21
Sensor-Oxygen-Left Rear (5.7L)		Right Front near Transmission	26
Sensor-Oxygen-Right Front (3.7L)		Right Front near Transmission	19
Sensor-Oxygen-Right Front (4.7L)	GY	Right Front near Transmission	21
Sensor-Oxygen-Right Front (5.7L)		Right Front near Transmission	26

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Sensor-Oxygen-Right Rear (3.7L)		Right Rear near Transmission	19
Sensor-Oxygen-Right Rear (4.7L)	GY	Right Rear near Transmission	21
Sensor-Oxygen-Right Rear (5.7L)		Right Rear near Transmission	26
Sensor-Park Assist No. 7 (Rear)		Right Side of Rear Bumper	64
Sensor-Park Assist No. 8 (Rear)		Right Middle of Rear Bumper	64
Sensor-Park Assist No. 9 (Rear)		Left Middle of Rear Bumper	64
Sensor-Park Assist No. 10 (Rear)		Left Side of Rear Bumper	64
Sensor-Rain		Front of Headliner	N/S
Sensor-Seat Track Position-Driver		Below Driver Seat	46
Sensor-Seat Track Position-Passenger		Below Passenger Seat	N/S
Sensor-Seat Weight-Left Front		Below Left Front of Passenger Seat	N/S
Sensor-Seat Weight-Left Rear		Below Left Rear of Passenger Seat	N/S
Sensor-Seat Weight-Right Front		Below Right Front of Passenger Seat	N/S
Sensor-Seat Weight-Right Rear		Below Right Rear of Passenger Seat	N/S
Sensor-Side Impact-Left 1		Left B-Pillar	47
Sensor-Side Impact-Left 2		Rear of Left Rear Door	47
Sensor-Side Impact-Right 1		Right B-Pillar	45
Sensor-Side Impact-Right 2		Behind Right Rear Door	48
Sensor-Sun		Top Center Instrument Panel	N/S
Sensor-Throttle Position (3.7L)	NAT	Top of Engine	17
Sensor-Throttle Position (4.7L)		Top of Engine	17
Sensor-Washer Fluid Level		Left Front of Engine Compartment	8
Sensor-Wheel Speed-ABS-Left Front		Left Front of Engine Compartment	1
Sensor-Wheel Speed-ABS-Left Rear		Left Rear Underbody	57
Sensor-Wheel Speed-ABS-Right Front		Right Front Engine Compartment	N/S
Sensor-Wheel Speed-ABS-Right Rear		Right Rear Underbody	57
Servo-Speed Control (3.7L/4.7L)		Left Rear Engine Compartment	1

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Solenoid-DHS Pressure Control (DHS)		Front Cradle	27
Solenoid-Directional Control Valve-B (DHS)		Front Cradle	27
Solenoid-Directional Control Valve-G (DHS)		Front Cradle	27
Solenoid-Evap/Purge (GAS)	BK	Left Side of Engine Compartment	6
Solenoid-Front Differential		Front Cradle	27
Solenoid-Multi Displacement System Cyl 1 (5.7L)		Top of Engine	N/S
Solenoid-Multi Displacement System Cyl 4 (5.7L)		Top of Engine	N/S
Solenoid-Multi Displacement System Cyl 6 (5.7L)		Top of Engine	N/S
Solenoid-Multi Displacement System Cyl 7 (5.7L)		Top of Engine	N/S
Solenoid-Rear Differential		Rear Underbody	57
Speaker-Instrument Panel-Left	WT	Left Side Instrument Panel	N/S
Speaker-Instrument Panel-Right	WT	Right Side Instrument Panel	N/S
Speaker-Left Front Door		Center of Left Front Door	53
Speaker-Left Rear Door		Center of Left Rear Door	55
Speaker-Right Front Door		Center of Right Front Door	54
Speaker-Right Rear Door		Center of Right Rear Door	55
Starter		Lower Left Rear of Engine	12, 14
Starter-Eyelet		Lower Left Rear of Engine	12, 14
Switch-Bank-Lower		Center Stack at Rear of Switch Bank	N/S
Switch-Bank-Upper		Center Stack at Rear of Switch Bank	N/S
Switch-Extended Idle (DSL)			N/S
Switch-Horn		Center of Steering Wheel	N/S
Switch-Ignition		Steering Column	N/S
Switch-Memory		Driver Door Panel	53
Switch-Mirror		Left Front Door Panel	53
Switch-Oil Pressure (3.7L/4.7L)		Lower Front Engine	15
Switch-Parking Brake		Below Center Console	43
Switch-Power Window-Left Rear		Left Rear Door	55
Switch-Power Window-Right Rear		Right Rear Door	55
Switch-Remote Radio-Left		Left Steering Wheel	35
Switch-Remote Radio-Right		Right Steering Wheel	35
Switch-Seat-Driver		Side of Driver Seat	N/S
Switch-Seat-Passenger		Side of Passenger Seat	52

CONNECTOR NAME/ NUMBER	COLOR	LOCATION	FIG.
Switch-Speed Control-Left		Left Steering Wheel	35
Switch-Speed Control-Right		Right Steering Wheel	35
Switch-Stop Lamp	GY	Lower Left Instrument Panel	3, 4
Switch-Sunroof		Front Center Headliner	N/S
Switch-Transfer Case Selector		Base of Shift Lever Assembly	42
Switch-Window/Door Lock-Driver C1		Driver Door	53
Switch-Window/Door Lock-Driver C2		Driver Door	53
Switch-Window/Door Lock-Passenger C1		Passenger Door	54
Throttle Body (5.7L)		Top Front of Engine	24
Transducer-A/C Pressure	GY	Right Front Engine Compartment	9
Transmitter-Intrusion Translator (VTSS) (Export)			N/S
Transponder-Tire Pressure Left Front		Left Front Wheel Well	10
Transponder-Tire Pressure Right Front		Right Front Wheel Well	10
Transponder-Tire Pressure Right Rear		Right Rear Underbody	60
Wiring-Trailer Tow 10-Way	BK	Rear Chassis	58
Wiring-Trailer Tow 4-Way		Rear Underbody	57
Wiring-Trailer Tow 7-Way	BK	Rear Underbody	57

GROUNDS

GROUND	LOCATION	FIG.
G100	Left Rear Engine Compartment	5
G101	Left Side Engine Compartment	6
G102	Left Side Engine Compartment	6
G103	Headlamp and Dash Harness	N/S
G104	Left Side Engine Compartment	11
G105	Lower Left Rear Engine	12, 14
G200	Left Instrument Panel Near Data Link Connector T/O	N/S
G201	Center Body	43
G300	Behind Passenger Seat	45
G301	Rear of Left Rear Door	47
G302	Below Left Rear Seat	56
G303	Floor Near Left Side of Driver Seat	46

SPLICES

SPLICE	LOCATION	FIG.
S100	Top of Front Cradle Valve Assembly	27
S101	In Headlamp and Dash Harness	N/S
S102	In Headlamp and Dash Harness	N/S
S103	In Headlamp and Dash Harness	N/S
S104	In Headlamp and Dash Harness	N/S
S105	In Headlamp and Dash Harness	N/S
S106	In Headlamp and Dash Harness	N/S
S107	In Headlamp and Dash Harness	N/S
S110	In Headlamp and Dash Harness	N/S
S111	In Headlamp and Dash Harness	N/S
S112	Lower Left Rear of Engine	12, 14
S114	In Headlamp and Dash Harness	N/S
S116	In Headlamp and Dash Harness	N/S
S118	In Headlamp and Dash Harness	N/S
S119	In Headlamp and Dash Harness	N/S
S120	In Headlamp and Dash Harness	N/S
S121	In Headlamp and Dash Harness	N/S
S122	In Headlamp and Dash Harness	N/S
S123	In Headlamp and Dash Harness	N/S
S126	In Headlamp and Dash Harness	N/S
S127	In Headlamp and Dash Harness	N/S
S128	In Headlamp and Dash Harness	N/S
S129	In Headlamp and Dash Harness	N/S
S130	In Headlamp and Dash Harness	N/S
S131	In Headlamp and Dash Harness	N/S
S132	In Headlamp and Dash Harness	N/S
S134	In Headlamp and Dash Harness	N/S
S135	In Headlamp and Dash Harness	N/S
S136	In Headlamp and Dash Harness	N/S
S137	Left Top of Engine	17, 23
S138 (3.7L/4.7L)	Right Side of Engine	18
S138 (5.7L)	Right Side of Engine	24
S139 (3.7L)	Rear of Engine	19
S139 (4.7L)	Right Rear of Engine	18
S139 (5.7L)	Right Rear in Engine Compartment	24
S140 (3.7L)	Right Rear in Engine Compartment	18
S140 (4.7L)	Rear of Engine	20
S140 (5.7L)	Rear of Engine	26
S141 (3.7L/4.7L)	Right Rear of Engine	18
S141 (5.7L)	Right Rear of Engine	24
S142 (3.7L)	Rear of Engine	19

SPLICE	LOCATION	FIG.
S142 (4.7L)	Right Rear in Engine Compartment	18
S142 (5.7L)	Right Rear in Engine Compartment	24
S143 (3.7L)	Right Side of Transmission	19
S143 (4.7L)	Right Front of Transmission	21
S143 (5.7L)	Right Front of Transmission	26
S144	Front of Transmission	20, 25
S145	Right Rear in Engine Compartment	18, 24
S146 (3.7L)	Right Side of Transmission	19
S146 (4.7L)	Right Front of Transmission	21
S146 (5.7L)	Front of Transmission	26
S147	Right Rear in Engine Compartment	18, 24
S148 (3.7L/4.7L)	Right Side of Engine	18
S148 (5.7L)	Right Side of Engine	24
S149	Left Rear of Engine	17, 22
S150	Right Rear of Engine	18, 24
S154	Top of Engine	N/S
S200	On Steering Wheel	N/S
S201	On Steering Wheel	N/S
S202	Left Instrument Panel Near T/O for Ignition Switch	N/S
S203	Left Instrument Panel Near T/O for C202	N/S
S204	Center Stack in Switch Bank C1 T/O	N/S
S205	Left Instrument Panel Near T/O for Cluster C1	N/S
S206	Left Instrument Panel Near T/O for Cluster C1	N/S
S207	Lower Left Instrument Panel	32
S208	Instrument Panel	N/S
S209	Lower Left Instrument Panel	32
S210	Left Instrument Panel Near T/O for Ignition Switch	N/S
S211	Left Instrument Panel Near T/O for Ignition Switch	N/S
S212	Lower Center Stack Near T/O for Instrument Panel Power Outlet	42
S213	Center Stack In T/O for Radio C1 and C2	N/S
S214	Lower Center Stack Near T/O for Instrument Panel Power Outlet	42
S215	Lower Center Stack Near T/O for Instrument Panel Power Outlet	42
S216	Left Instrument Panel Near T/O for Cluster C3	N/S
S217	Left Instrument Panel Near T/O for Cluster C3	N/S
S218	On Steering Wheel	N/S
S219	Lower Left Instrument Panel	32
S220	Instrument Panel	N/S
S221	Instrument Panel	N/S
S222	Instrument Panel	N/S
S223	Instrument Panel	N/S

SPLICE	LOCATION	FIG.
S224	Center Stack In T/O for Radio C1	N/S
S225	Center Stack In T/O for Radio C2	N/S
S226	Center Body	43
S227	Center Body	43
S228	Left Instrument Panel Near T/O for Left Courtesy Lamp	N/S
S230	Left Instrument Panel Near T/O for Data Link Connector	N/S
S231	Right Kick Panel	33
S232	On Steering Wheel	N/S
S233	On Steering Wheel	N/S
S234	Right Side of HVAC unit	29
S300	Rear Underbody	57
S301	Left Front Underbody	62
S302	Rear Underbody	57
S303	Left Rear Body	47
S304	Rear Underbody	57
S305	Center Body	61
S306	Below Passenger Seat	46
S307	Rear Underbody	57
S308	Below Driver Seat	46
S309	Below Driver Seat	46
S310	Rear Underbody	57
S311	Below Left Rear Door	56
S312	Left Rear Body	47
S313	Below Driver Seat	46
S314	Below Driver Seat	46
S315	Below Driver Seat	46
S316	Below Passenger Seat	46
S317	Below Left Rear Door	46
S318	Right Side Body Under Right Front Door	45
S319	Right Side Body Under Right Rear Door	45
S320	Right Side Body Under Right Front Door	46
S321	Left Body Under Left Rear Door	47
S322	In T/O for Satellite Receiver	48
S323	On Body Harness	N/S
S324	Left Rear Body	47
S325	Left Body Under Left Rear Door	47
S326	Center Underbody	61
S327	Center Underbody	61
S328	Rear Underbody	57
S329	On Underbody Harness	N/S
S331	Rear Underbody	57
S332	Rear Underbody	57
S333	Rear Underbody	57

SPLICE	LOCATION	FIG.
S334	Rear Underbody	57
S335	On Underbody Harness	N/S
S336	Below Left Rear Seat	56
S337	On Underbody Harness	N/S
S338	On Underbody Harness	N/S
S339	On Underbody Harness	N/S
S340	Right Rear Underbody	60
S341	In Driver Door	53
S342	In Driver Door	53
S343	In Driver Door	53
S344	In Driver Door	53
S345	In Driver Door	53
S346	In Driver Door	53
S347	In Driver Door	53
S348	In Passenger Door	54
S349	In Passenger Door	54
S350 (Base)	Center Front Headliner	36
S350 (Except Base)	Left Rear Headliner	41
S351	Under Passenger Seat	N/S
S352	Lower Center Liftgate	63
S353	Left Side of Liftgate	63
S354	Upper Right Liftgate	63
S355	Upper Left Liftgate	63
S356	Center Rear Bunper	64
S357	Center Rear Bunper	64
S361	Left Rear Headliner	41
S362	Under Passenger Seat	N/S
S364	Left Rear Headliner	41
S365	Left Rear Headliner	41
S366	Left Rear Headliner	41
S367	In Passenger Door	N/S
S368	Left Rear Headliner	41
S369	Left Rear Headliner	41
S370	Below Driver Seat	50
S371	Below Passenger Seat	51
S373	Below Driver Seat	50
S374	Below Passenger Seat	51
S375	Below Passenger Seat	51
S376	Lower Right A-Pillar	36

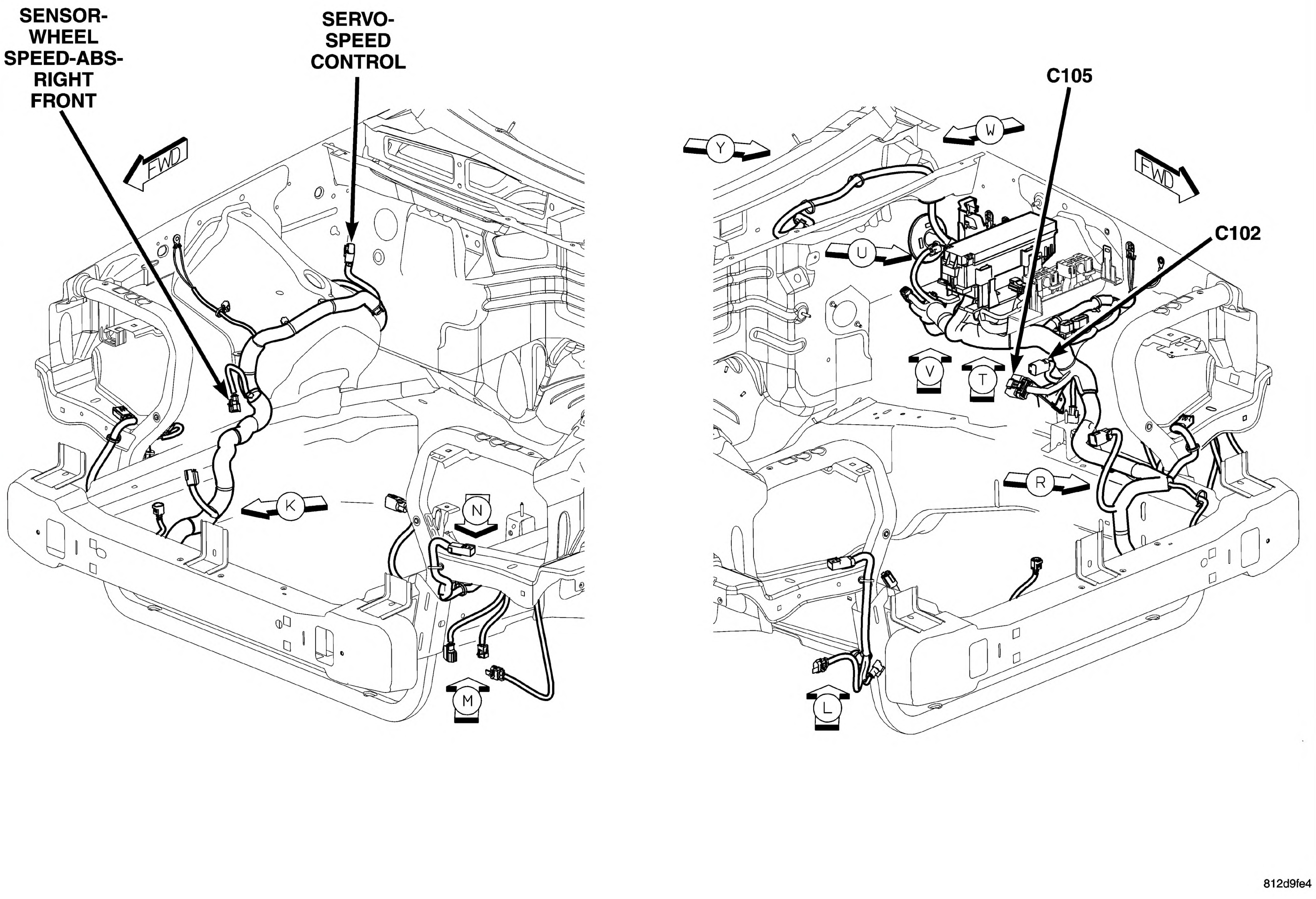

SENSOR-
WHEEL
SPEED-ABS-
RIGHT
FRONT
SERVO-
SPEED
CONTROL
FWD
K
N
M
C105
C102
Y
W
FWD
U
V
T
R
L
812d9fe4

Fig. 1 LEFT AND RIGHT SIDE ENGINE COMPARTMENT

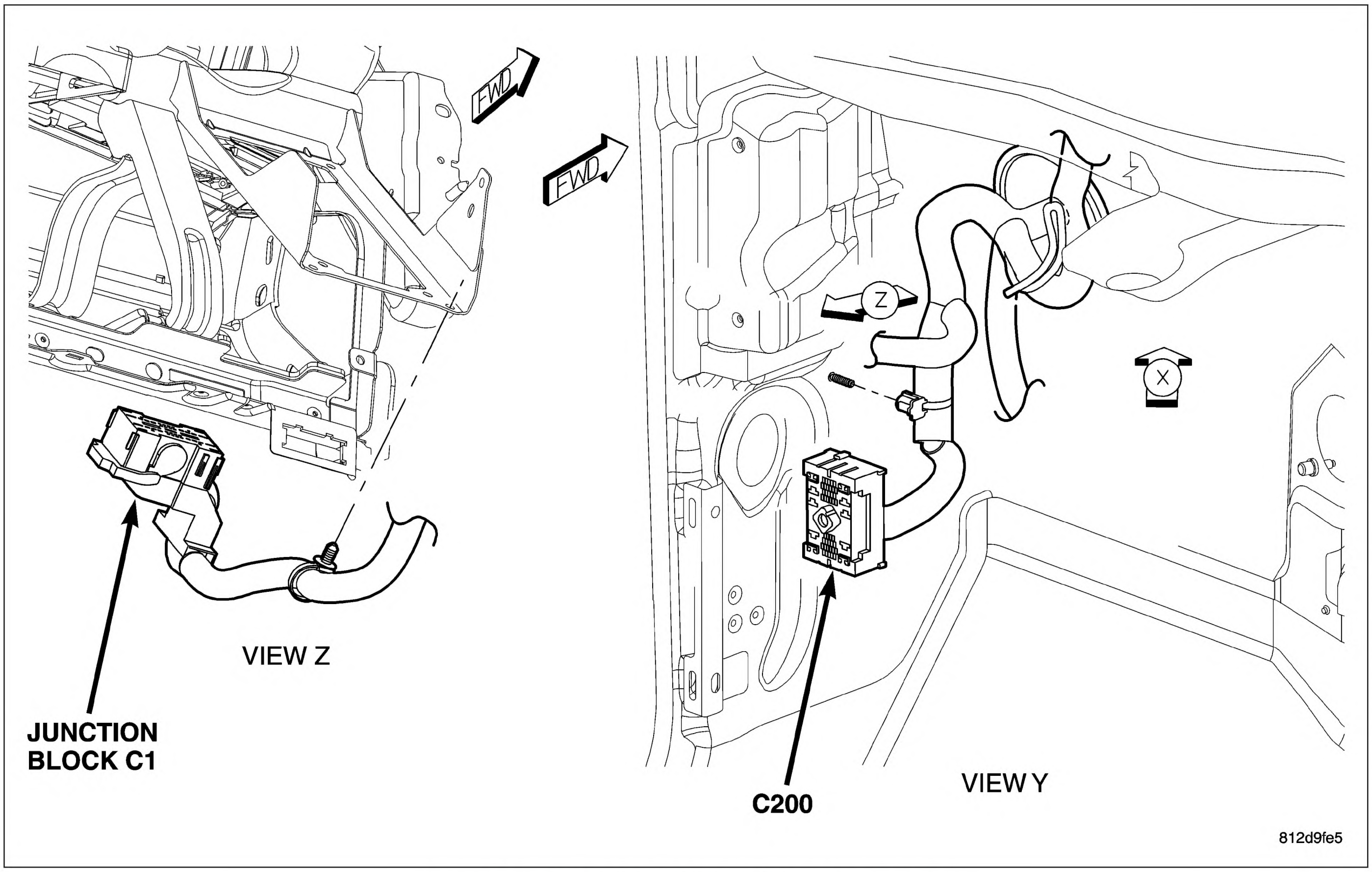

FWD
FWD
Z
X
VIEW Z
JUNCTION BLOCK C1
C200
VIEW Y
812d9fe5

Fig. 2 LEFT DASH INLINE CONNECTORS

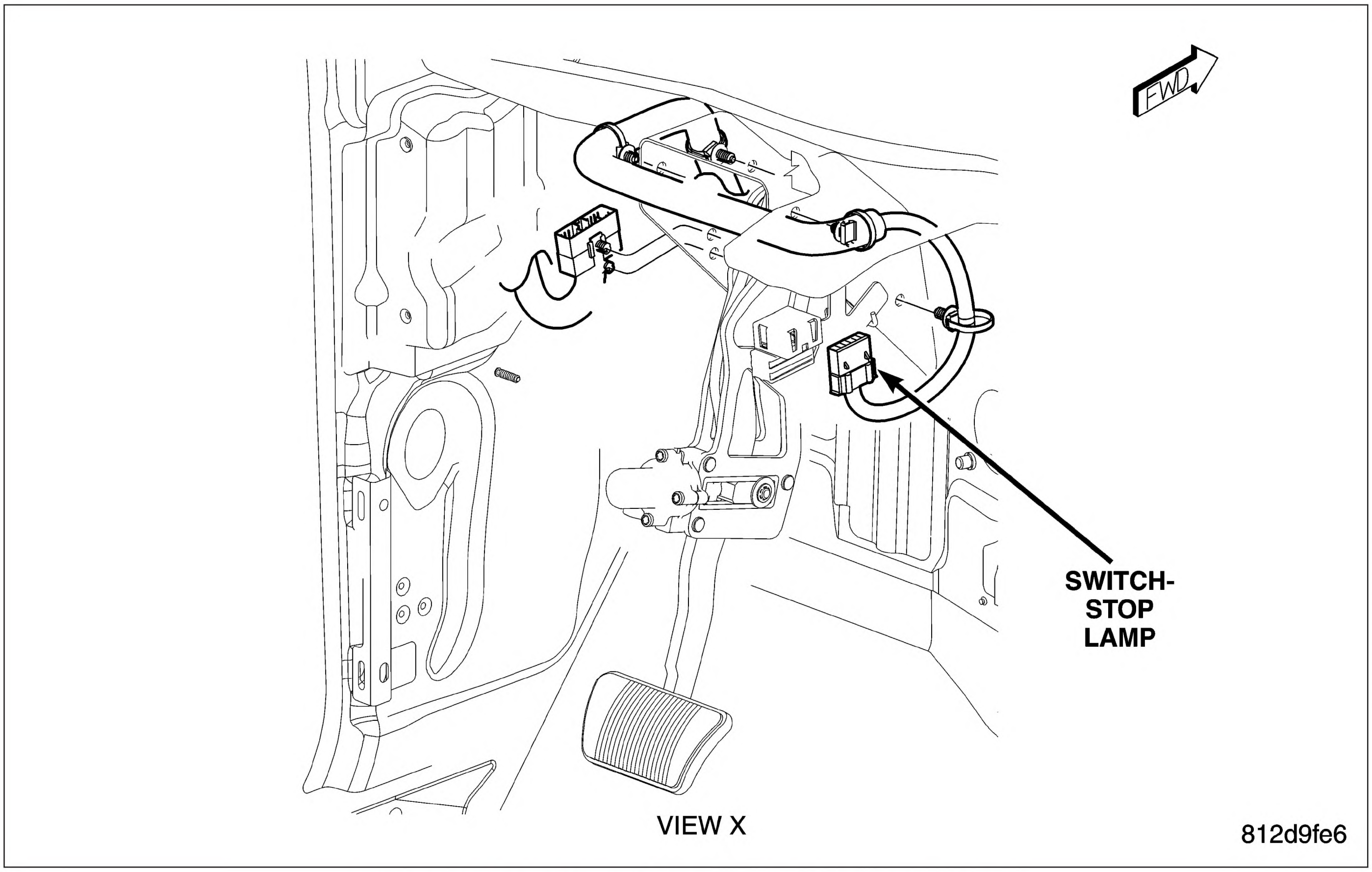

FWD
SWITCH-STOP LAMP
VIEW X
812d9fe6

Fig. 3 LOWER LEFT INSTRUMENT PANEL (3.7L/4.7L)

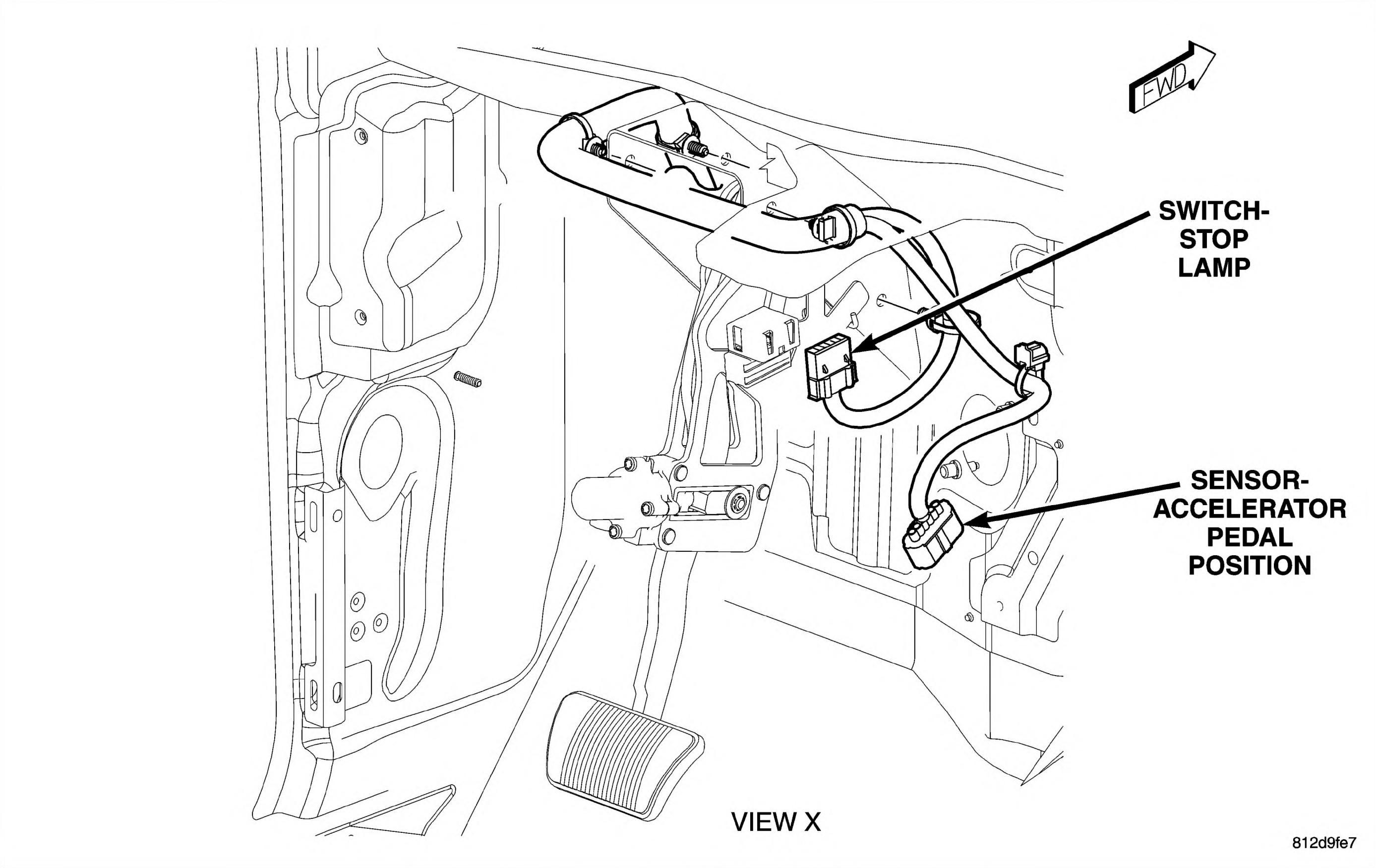

FWD
SWITCH-
STOP
LAMP
SENSOR-
ACCELERATOR
PEDAL
POSITION
VIEW X
812d9fe7

Fig. 4 LOWER LEFT INSTRUMENT PANEL (5.7)

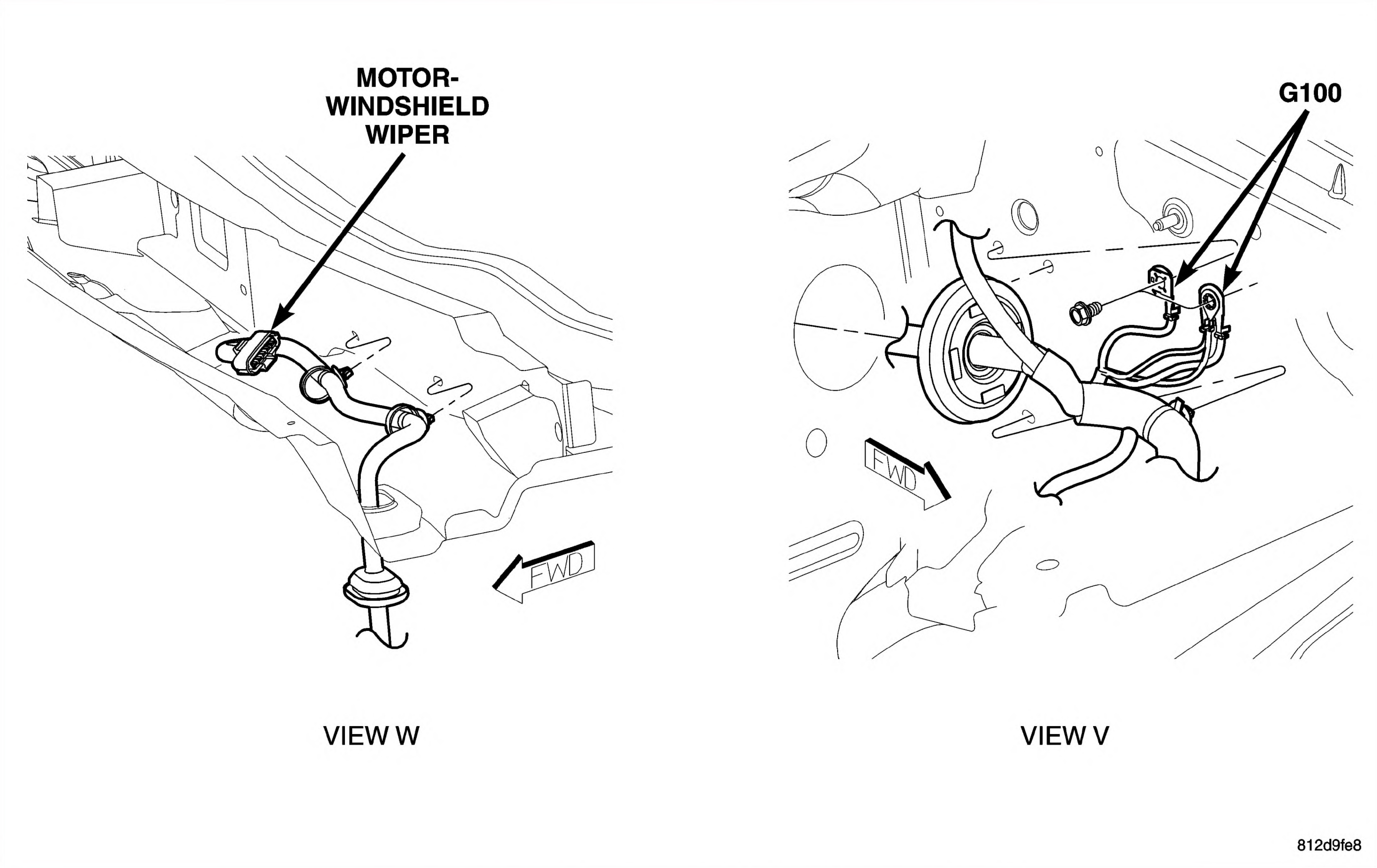

MOTOR-
WINDSHIELD
WIPER
FWD
VIEW W
G100
FWD
VIEW V
812d9fe8

Fig. 5 UPPER LEFT REAR ENGINE COMPARTMENT

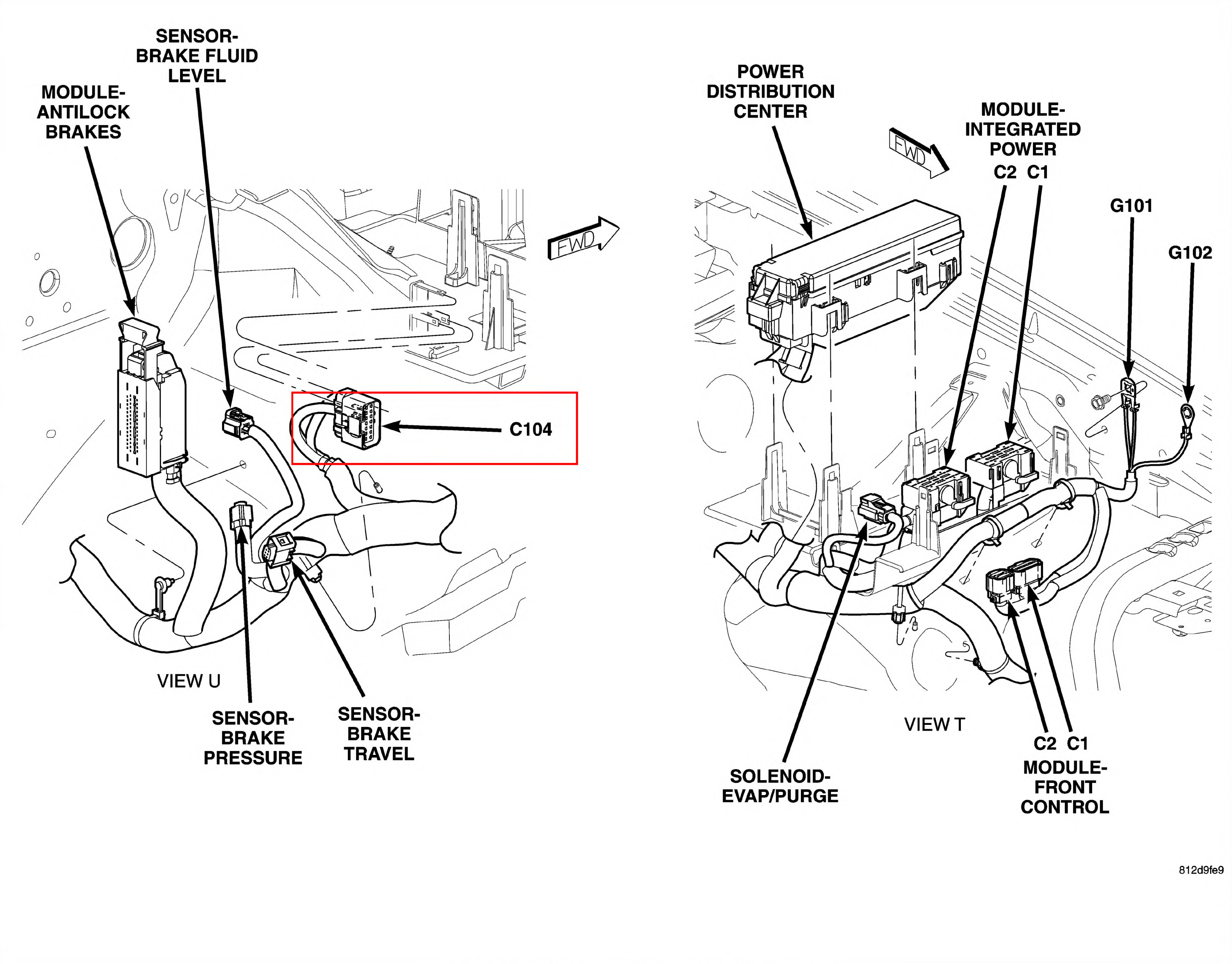

MODULE-
ANTILOCK
BRAKES
SENSOR-
BRAKE FLUID
LEVEL
FWD
C104
VIEW U
SENSOR-
BRAKE
PRESSURE
SENSOR-
BRAKE
TRAVEL
POWER
DISTRIBUTION
CENTER
FWD
MODULE-
INTEGRATED
POWER
C2 C1
G101
G102
VIEW T
SOLENOID-
EVAP/PURGE
C2 C1
MODULE-
FRONT
CONTROL
812d9fe9

Fig. 6 LEFT SIDE ENGINE COMPARTMENT

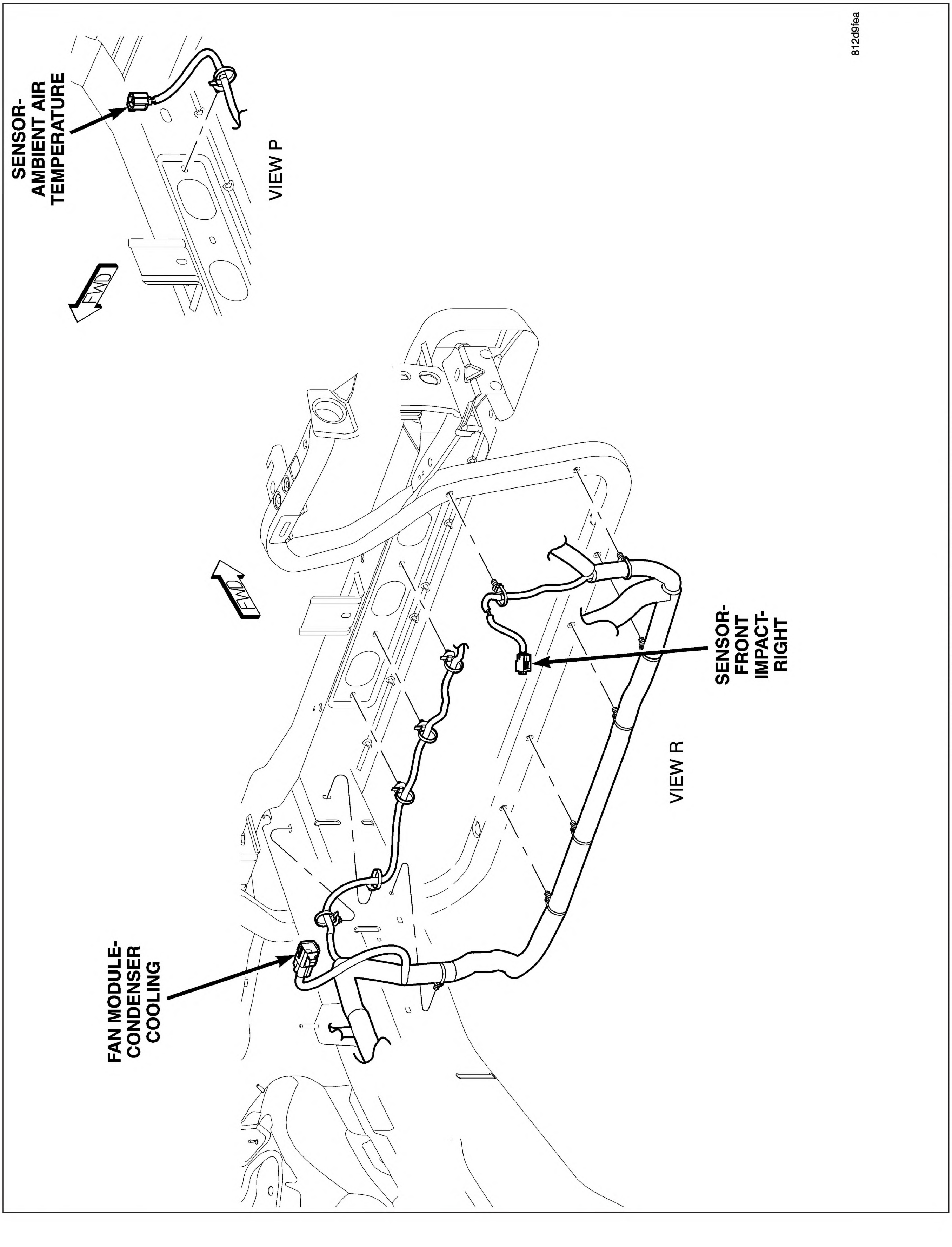

812d9fea
SENSOR-
AMBIENT AIR
TEMPERATURE
VIEW P
FWD
FWD
SENSOR-
FRONT
IMPACT-
RIGHT
VIEW R
FAN MODULE-
CONDENSER
COOLING

Fig. 7 FRONT ENGINE COMPARTMENT

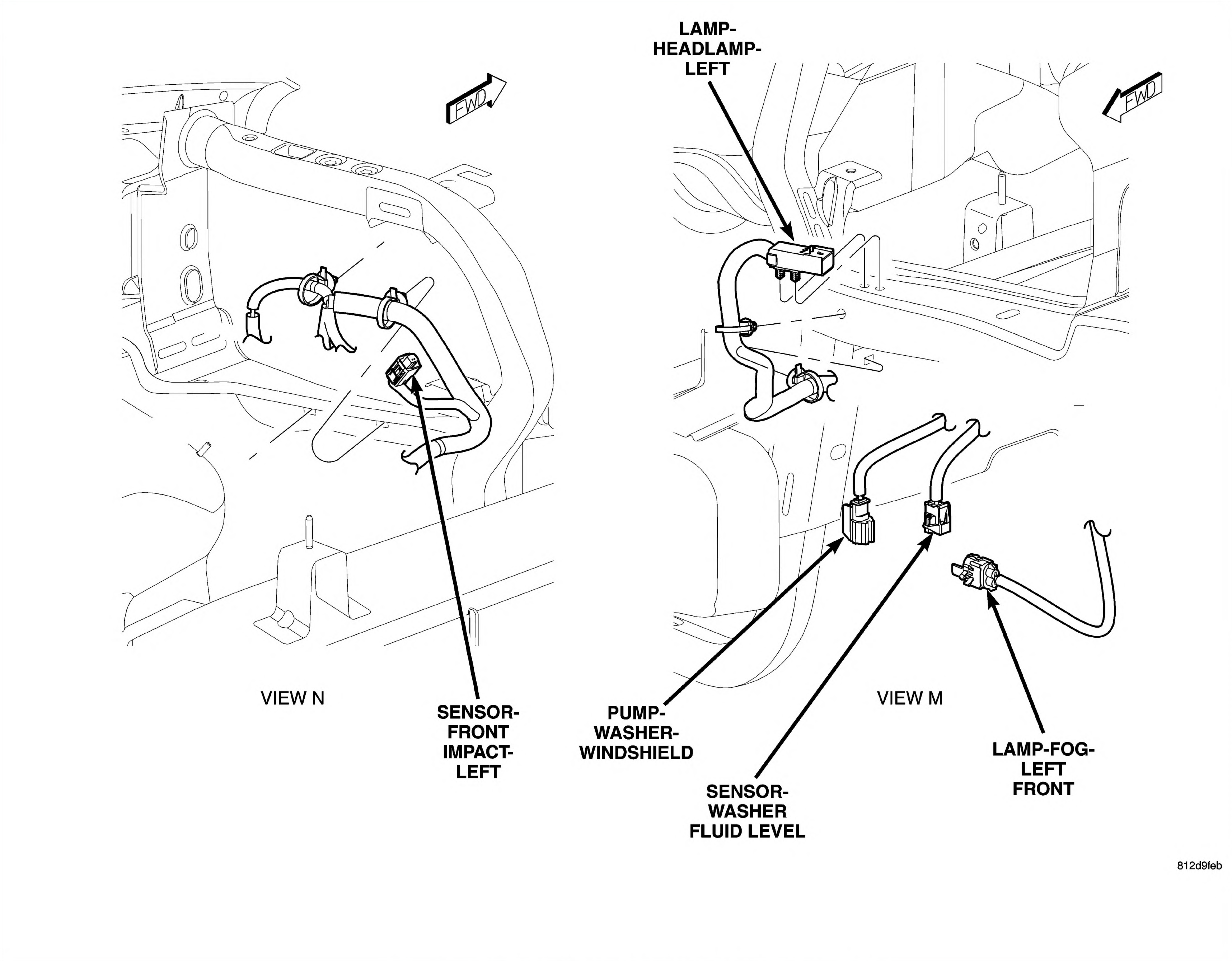

LAMP-
HEADLAMP-
LEFT
FWD
FWD
VIEW N
SENSOR-
FRONT
IMPACT-
LEFT
PUMP-
WASHER-
WINDSHIELD
VIEW M
SENSOR-
WASHER
FLUID LEVEL
LAMP-FOG-
LEFT
FRONT
812d9feb

Fig. 8 UPPER LEFT FRONT ENGINE COMPARTMENT

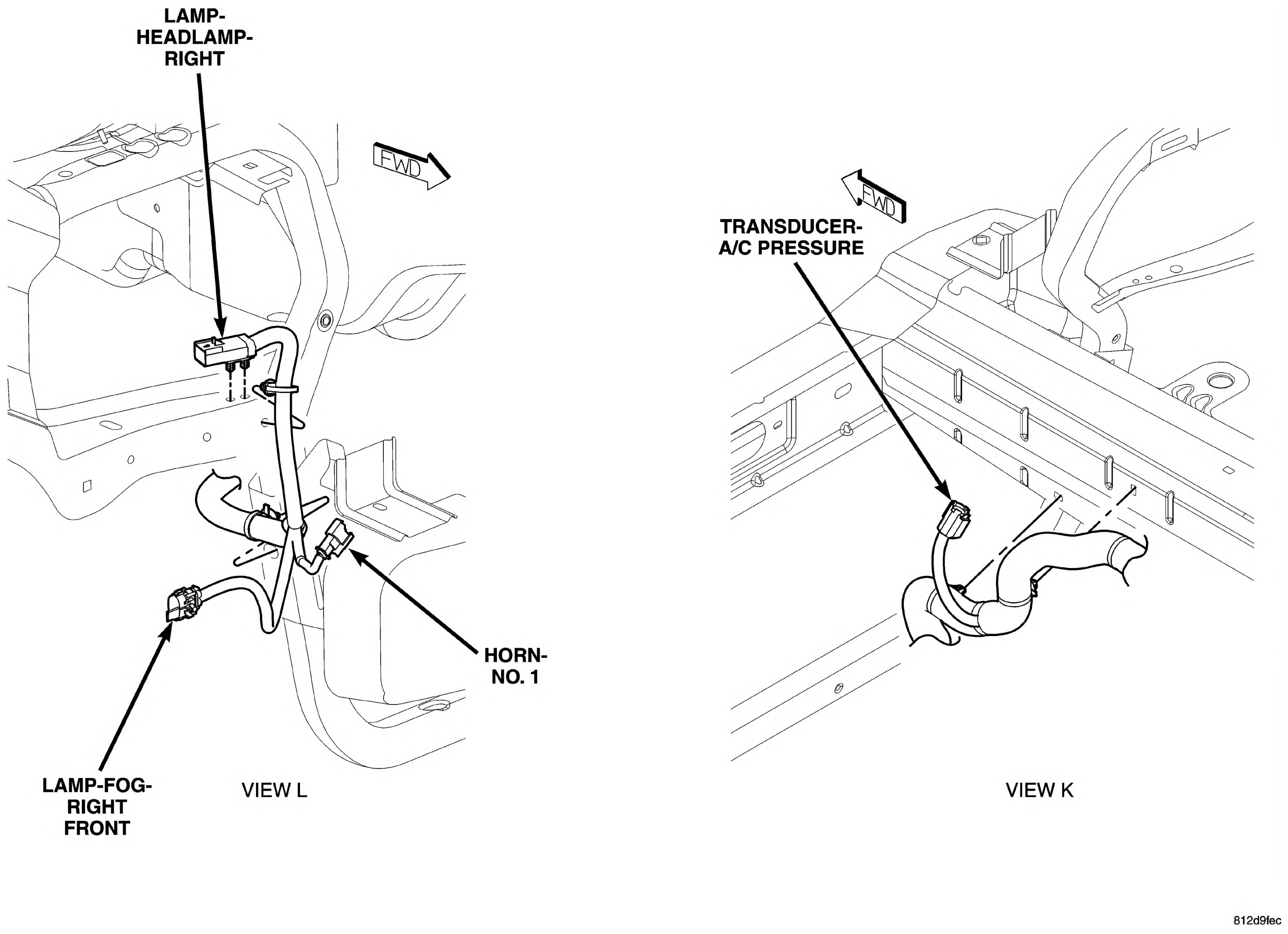

LAMP-
HEADLAMP-
RIGHT
FWD
LAMP-FOG-
RIGHT
FRONT
HORN-
NO. 1
VIEW L
FWD
TRANSDUCER-
A/C PRESSURE
VIEW K
812d9fec

Fig. 9 UPPER RIGHT FRONT ENGINE COMPARTMENT

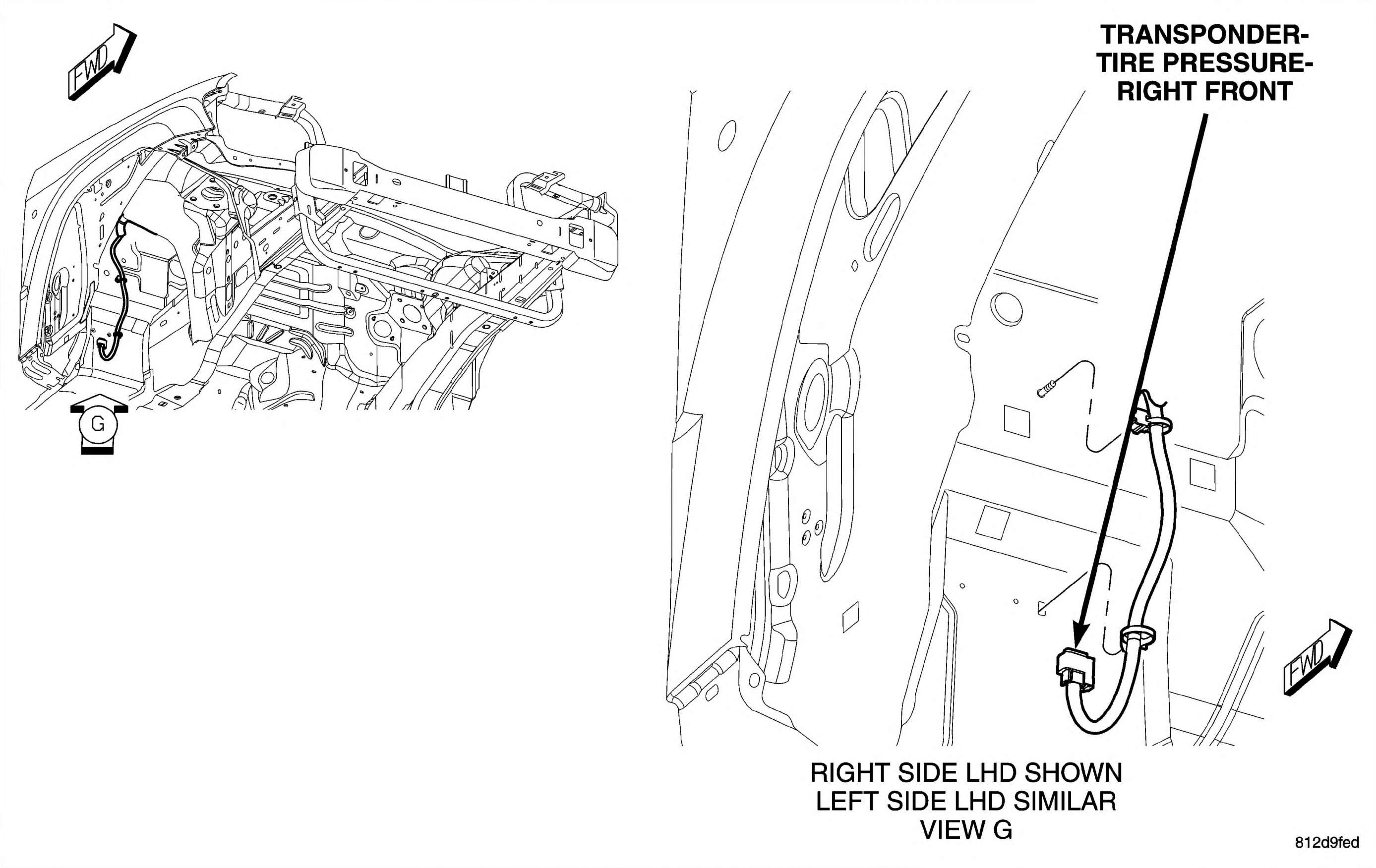

FWD
G
TRANSPONDER-
TIRE PRESSURE-
RIGHT FRONT
FWD
RIGHT SIDE LHD SHOWN
LEFT SIDE LHD SIMILAR
VIEW G
812d9fed

Fig. 10 RIGHT FRONT WHEEL WELL

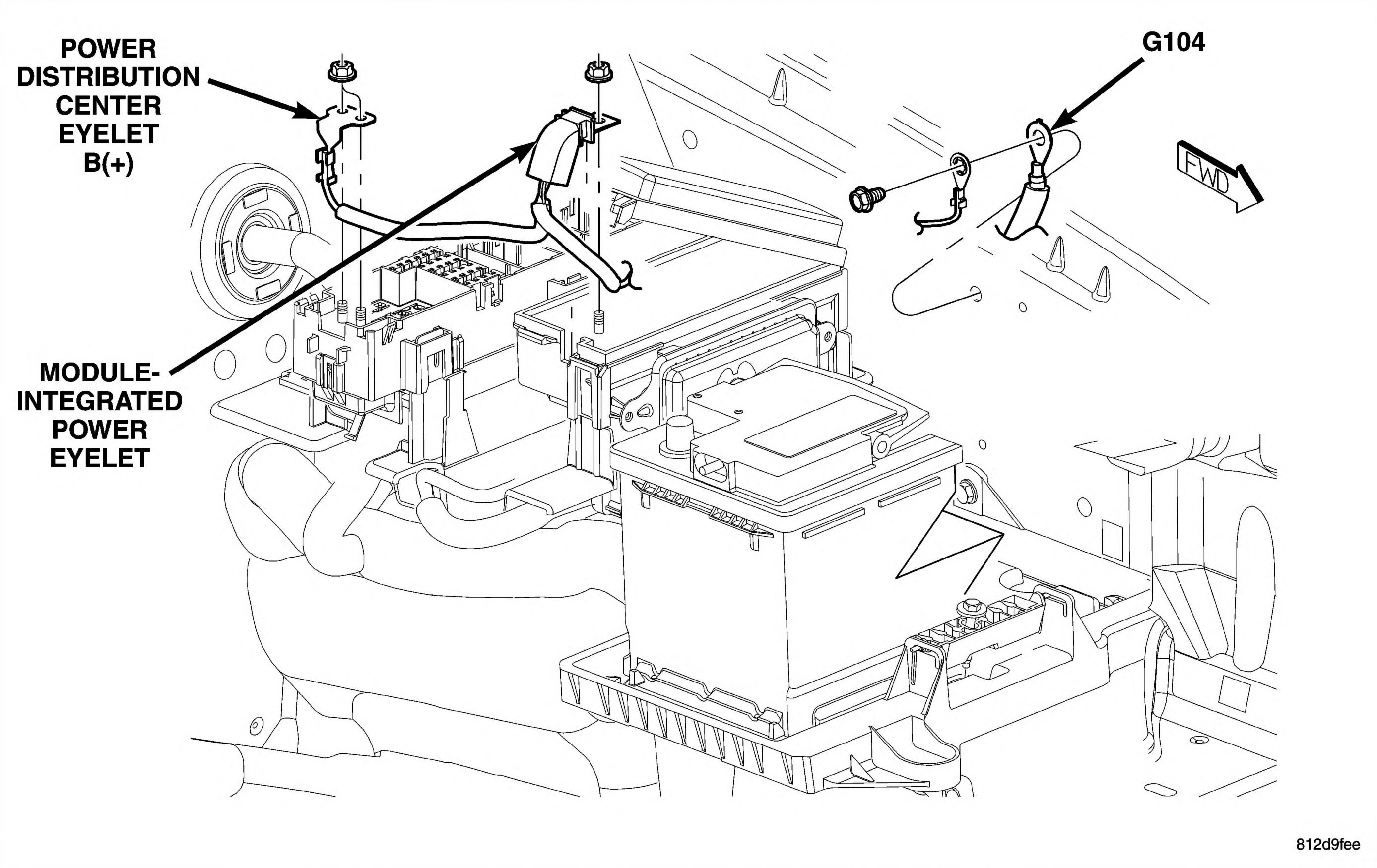

POWER
DISTRIBUTION
CENTER
EYELET
B(+)
MODULE-
INTEGRATED
POWER
EYELET
G104
FWD
812d9fee

Fig. 11 IPM AND PDC BATTERY CONNECTIONS

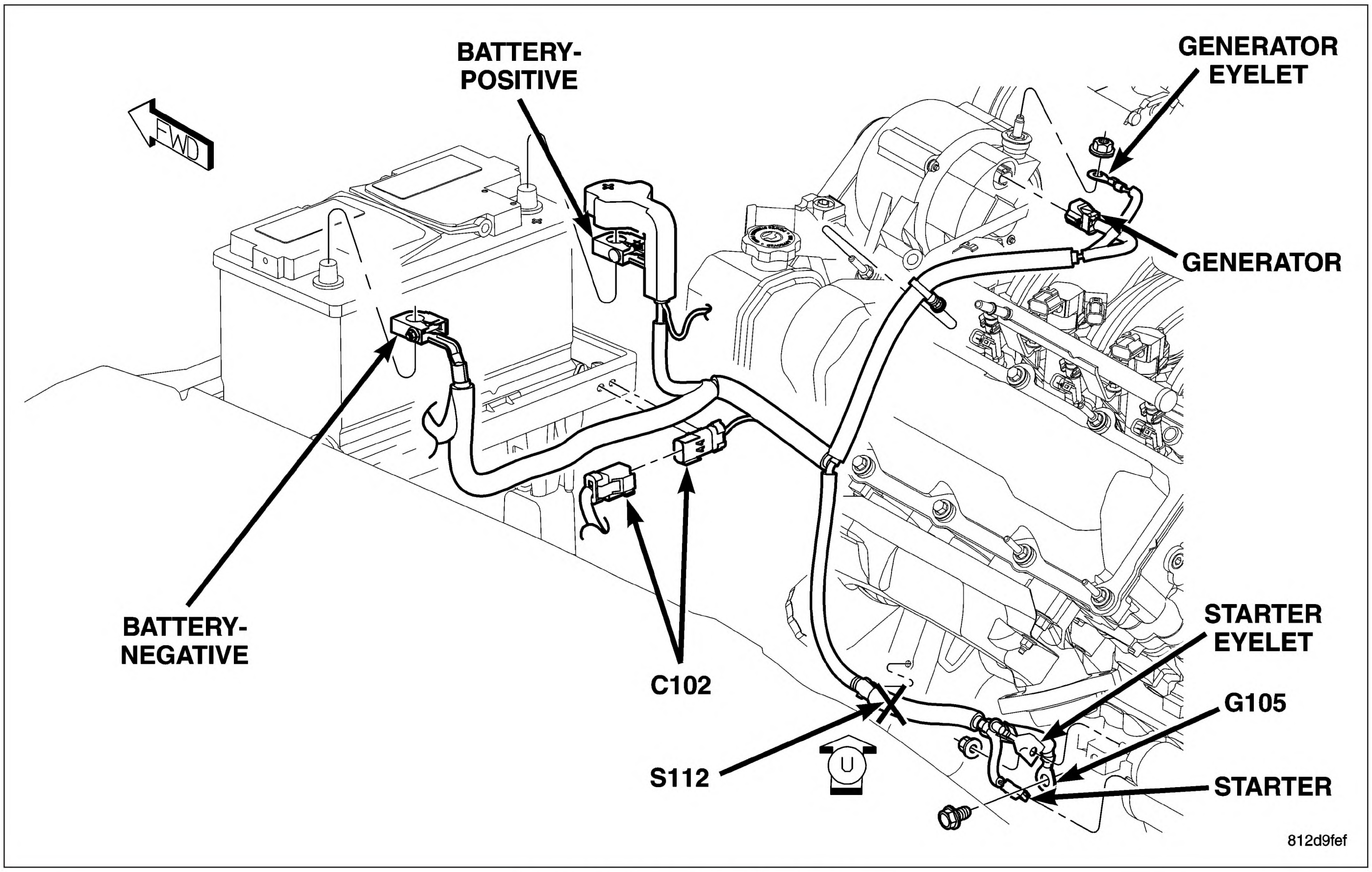

BATTERY-
POSITIVE
GENERATOR
EYELET
FWD
GENERATOR
BATTERY-
NEGATIVE
C102
STARTER
EYELET
G105
S112
STARTER
U
812d9fef

Fig. 12 BATTERY (3.7L/4.7L)

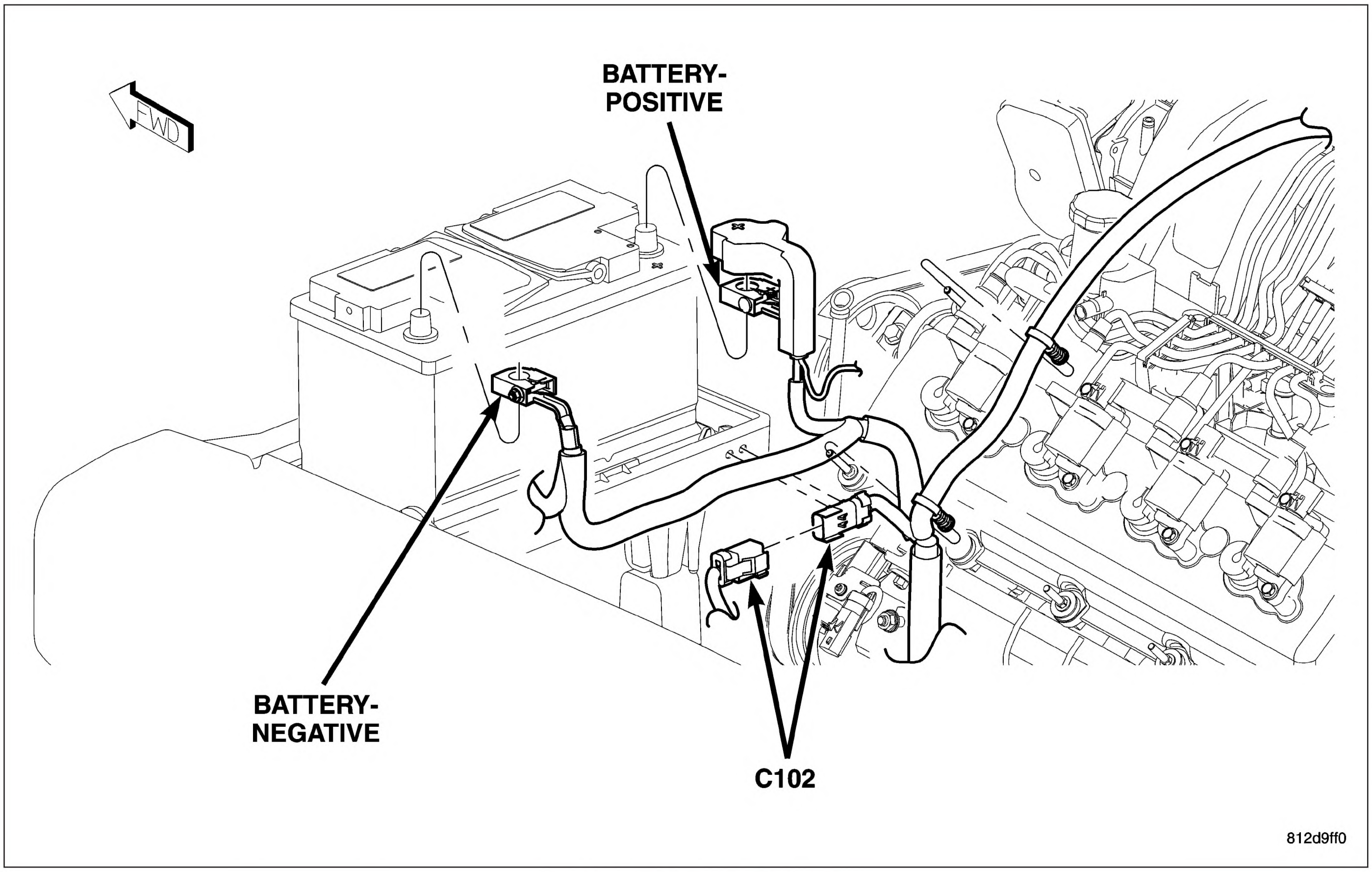

BATTERY-
POSITIVE
FWD
BATTERY-
NEGATIVE
C102
812d9ff0

Fig. 13 BATTERY (5.7L)

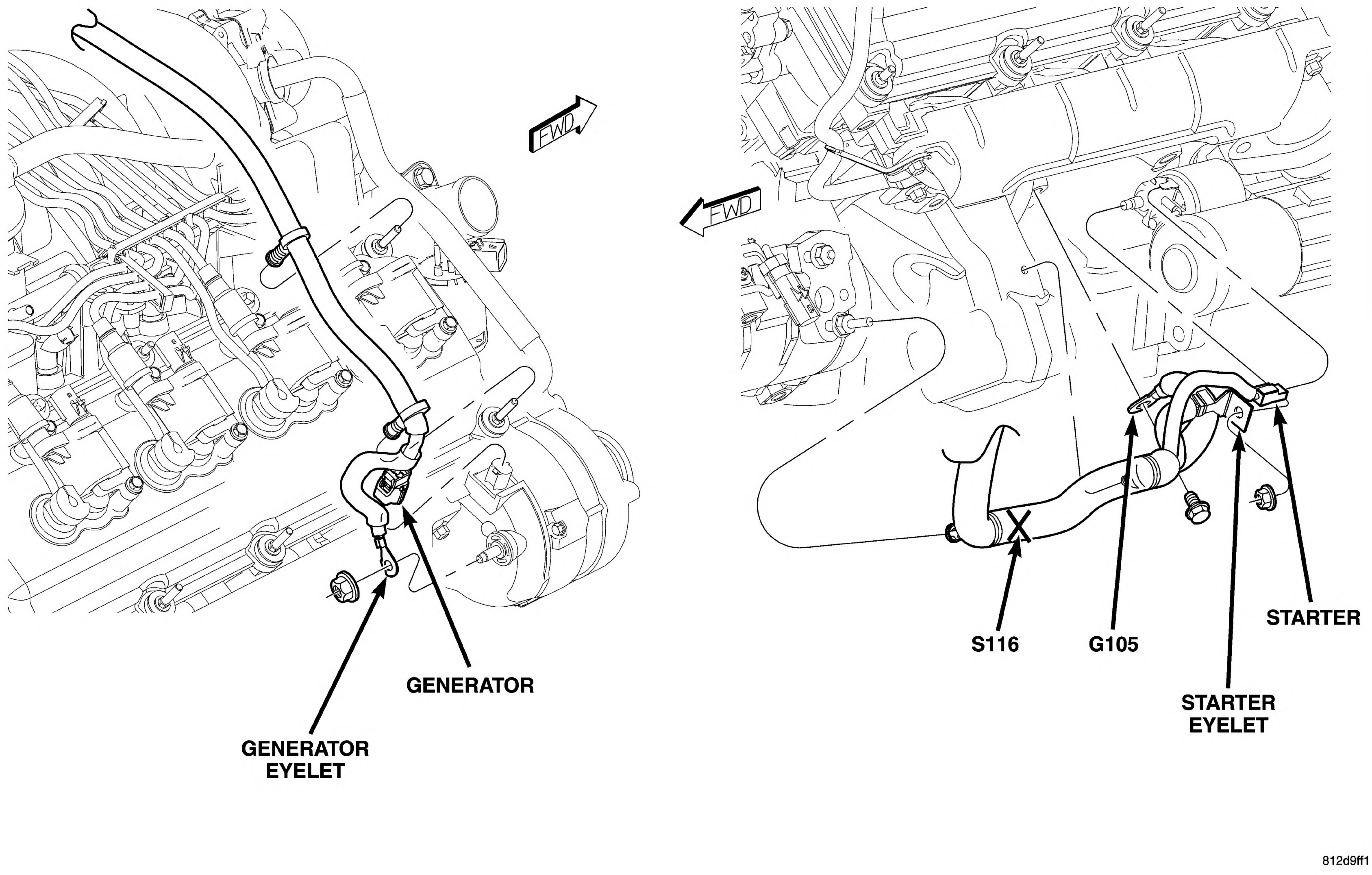

FWD
FWD
GENERATOR
GENERATOR EYELET
STARTER
STARTER EYELET
G105
S116
812d9ff1

Fig. 14 GENERATOR AND STARTER (5.7L)

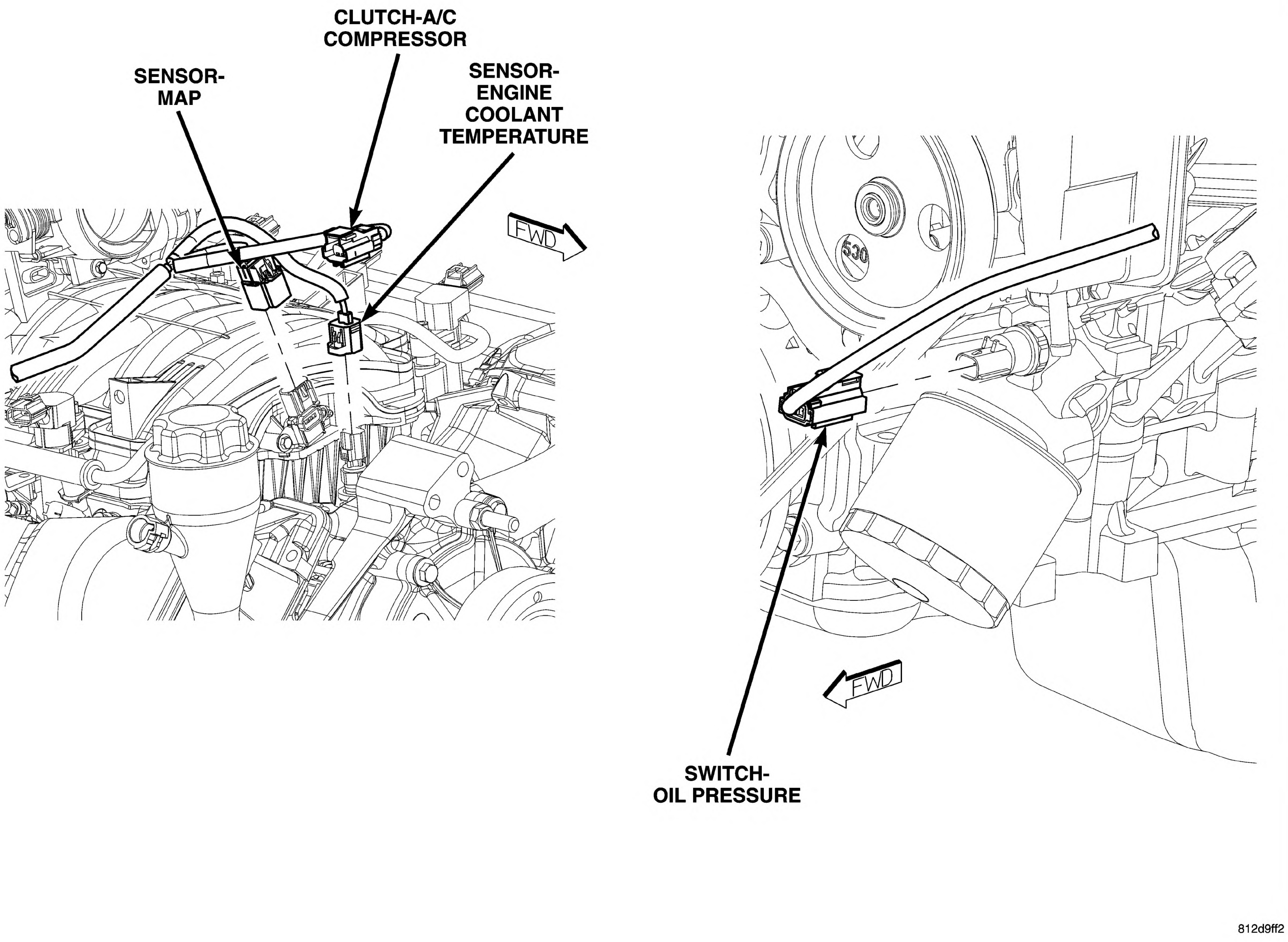

CLUTCH-A/C COMPRESSOR
SENSOR-MAP
SENSOR-ENGINE COOLANT TEMPERATURE
FWD
530
FWD
SWITCH-OIL PRESSURE
812d9ff2

Fig. 15 FRONT ENGINE (3.7L/4.7L)

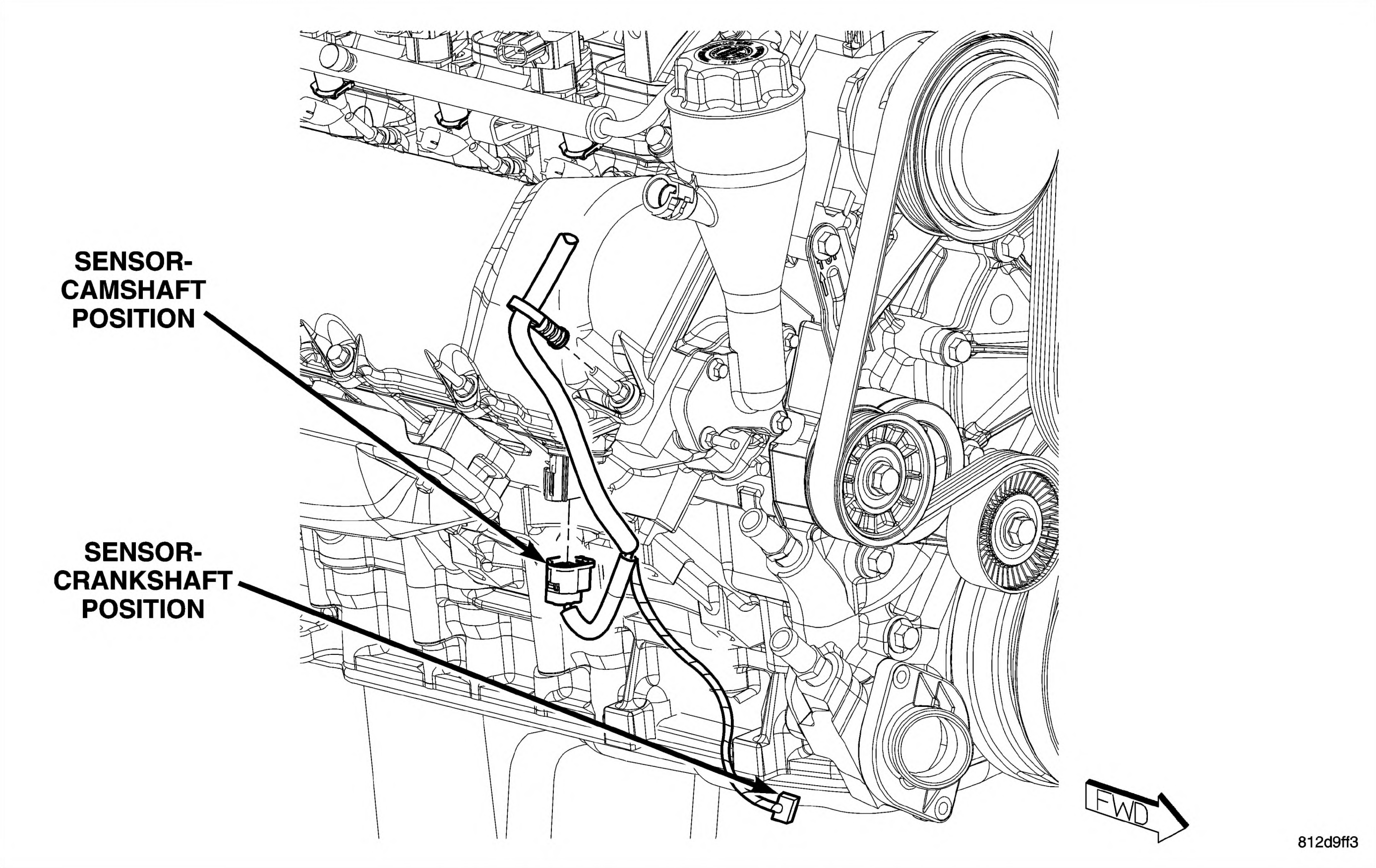

SENSOR-
CAMSHAFT
POSITION
SENSOR-
CRANKSHAFT
POSITION
FWD
812d9ff3

Fig. 16 LOWER FRONT RIGHT ENGINE (3.7L/4.7L)

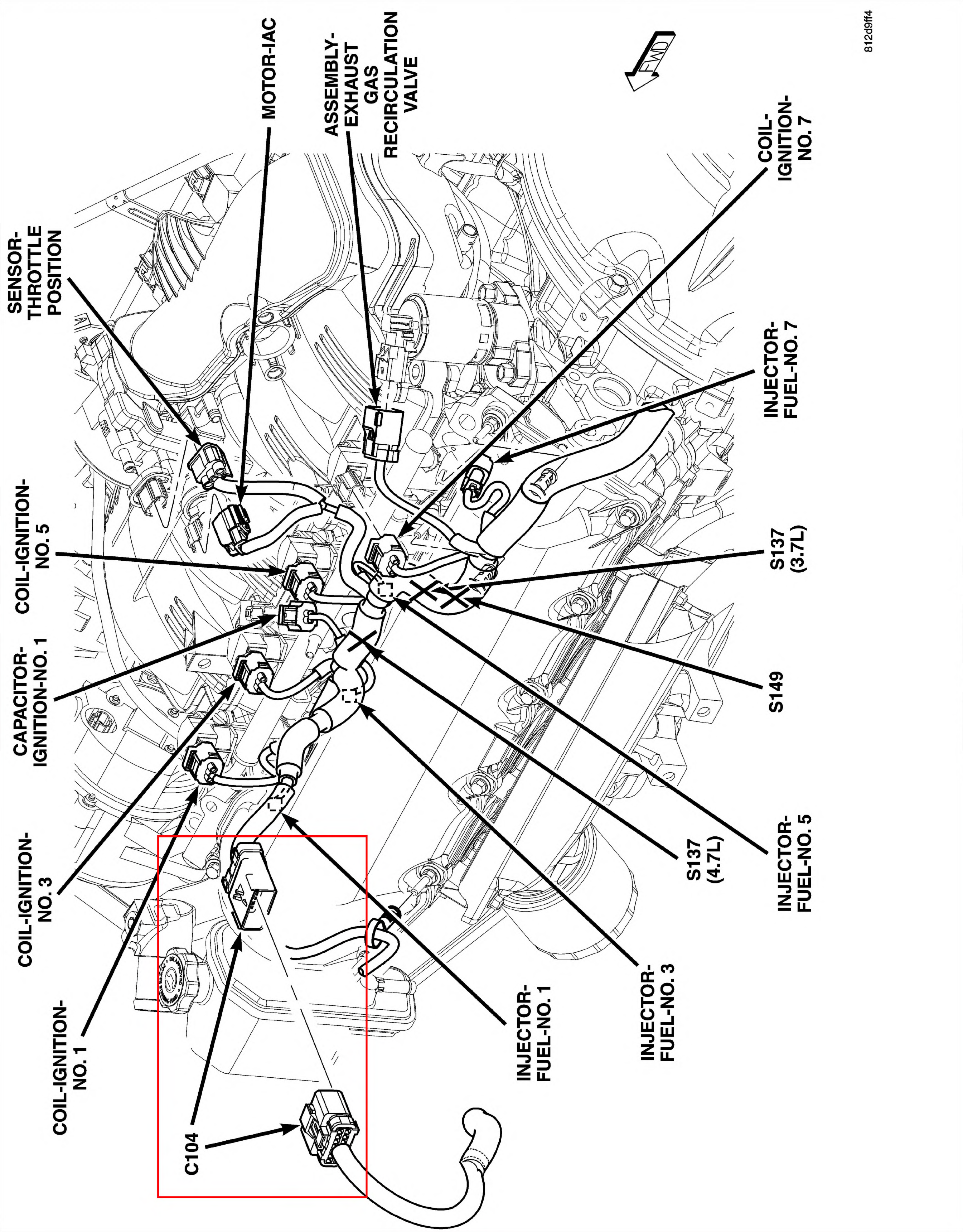

SENSOR-THROTTLE POSITION
MOTOR-IAC
ASSEMBLY-EXHAUST GAS RECIRCULATION VALVE
COIL-IGNITION-NO. 7
FWD
812d9ff4
COIL-IGNITION-NO. 5
CAPACITOR-IGNITION-NO. 1
COIL-IGNITION-NO. 3
COIL-IGNITION-NO. 1
C104
INJECTOR-FUEL-NO. 1
INJECTOR-FUEL-NO. 3
S137 (4.7L)
INJECTOR-FUEL-NO. 5
S149
S137 (3.7L)
INJECTOR-FUEL-NO. 7

Fig. 17 LEFT SIDE ENGINE (3.7L/4.7L)

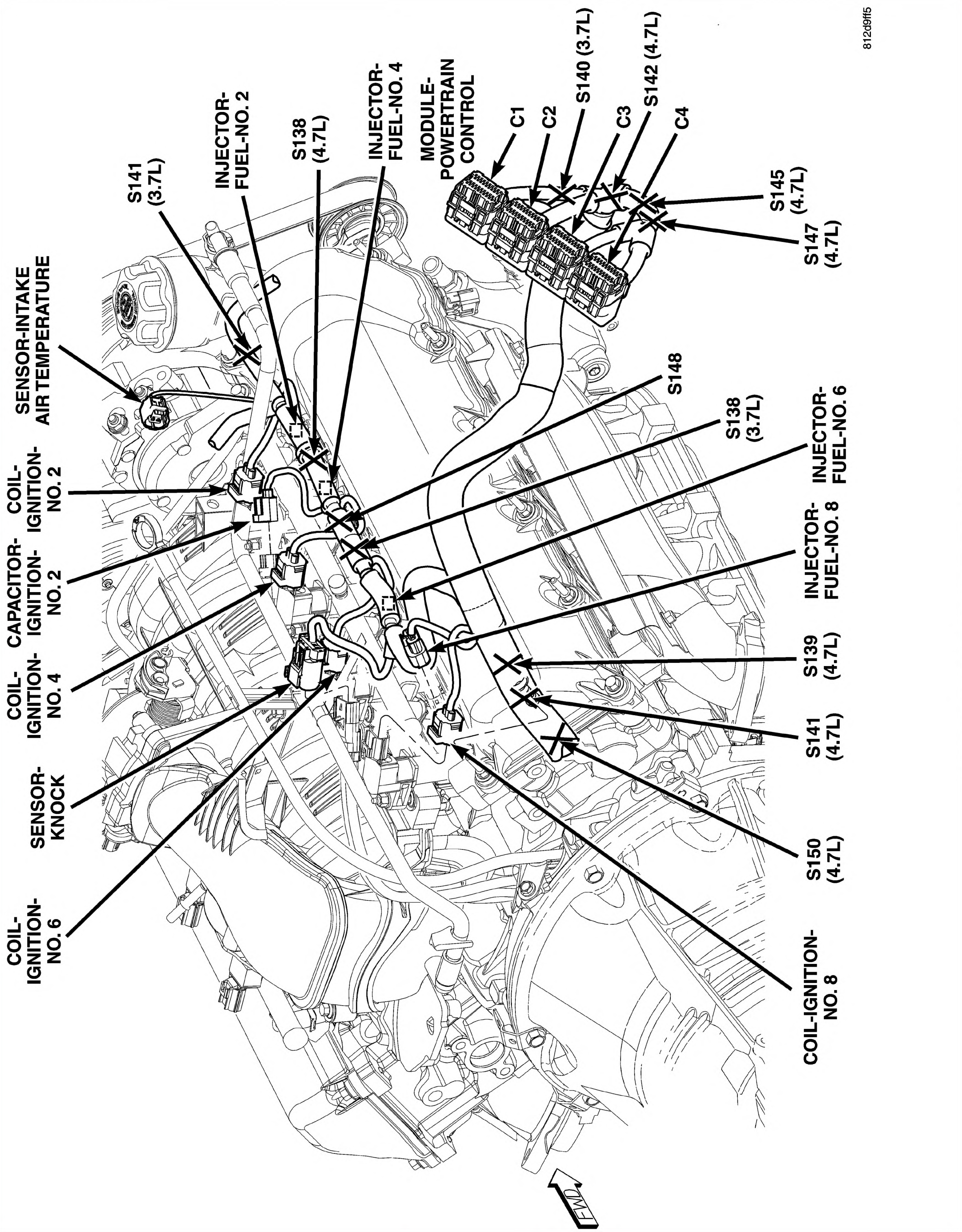

812d9ff5
SENSOR-INTAKE AIR TEMPERATURE
S141 (3.7L)
INJECTOR-FUEL-NO. 2
S138 (4.7L)
INJECTOR-FUEL-NO. 4
MODULE-POWERTRAIN CONTROL
C1
C2
S140 (3.7L)
C3
S142 (4.7L)
C4
S145 (4.7L)
S147 (4.7L)
S148
S138 (3.7L)
INJECTOR-FUEL-NO. 6
INJECTOR-FUEL-NO. 8
S139 (4.7L)
S141 (4.7L)
S150 (4.7L)
COIL-IGNITION-NO. 8
COIL-IGNITION-NO. 2
CAPACITOR-IGNITION-NO. 2
COIL-IGNITION-NO. 4
SENSOR-KNOCK
COIL-IGNITION-NO. 6
FWD

Fig. 18 RIGHT REAR ENGINE (3.7L/4.7L)

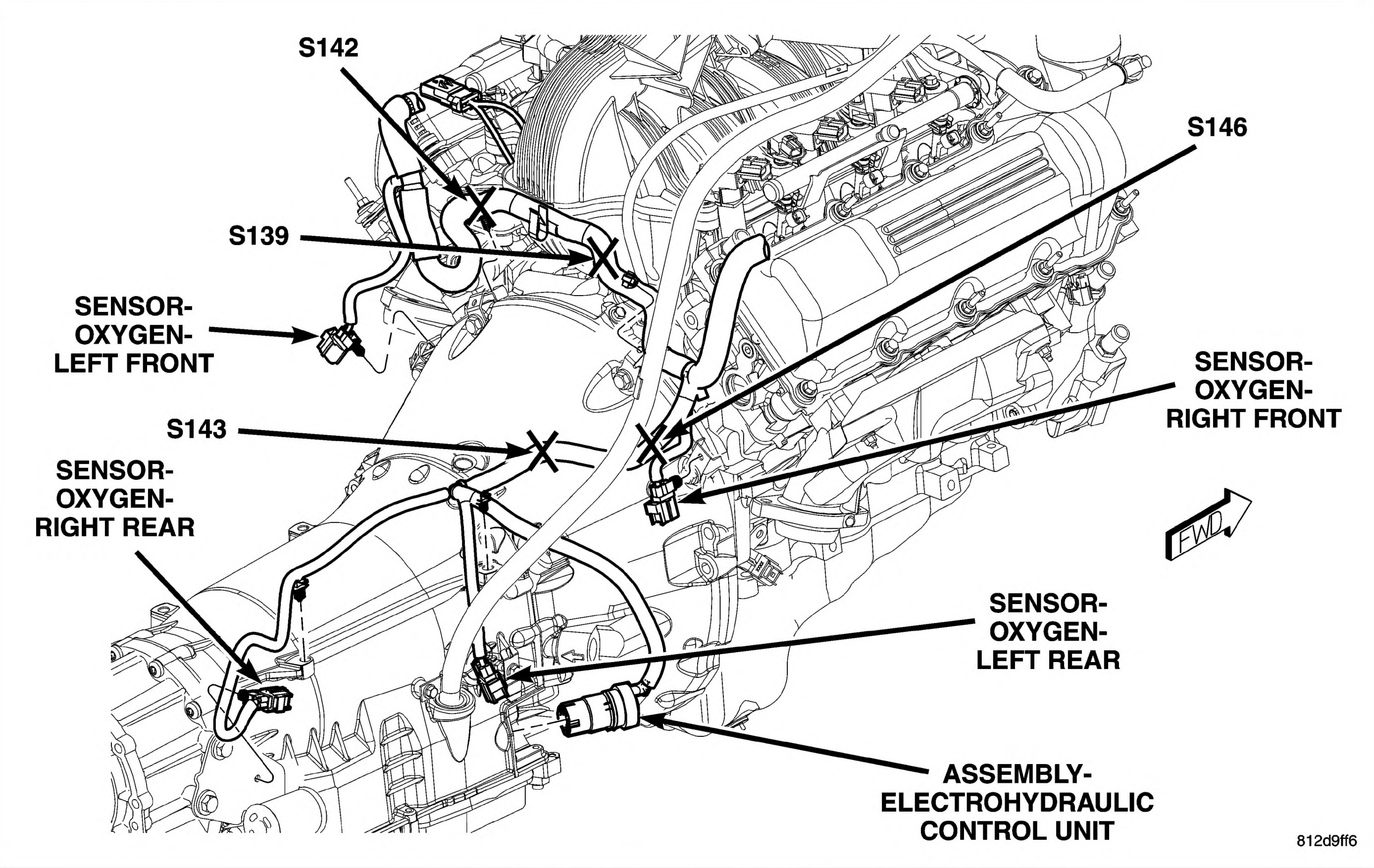

S142
S146
S139
SENSOR-OXYGEN-LEFT FRONT
SENSOR-OXYGEN-RIGHT FRONT
S143
SENSOR-OXYGEN-RIGHT REAR
FWD
SENSOR-OXYGEN-LEFT REAR
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT
812d9ff6

Fig. 19 TRANSMISSION (3.7L)

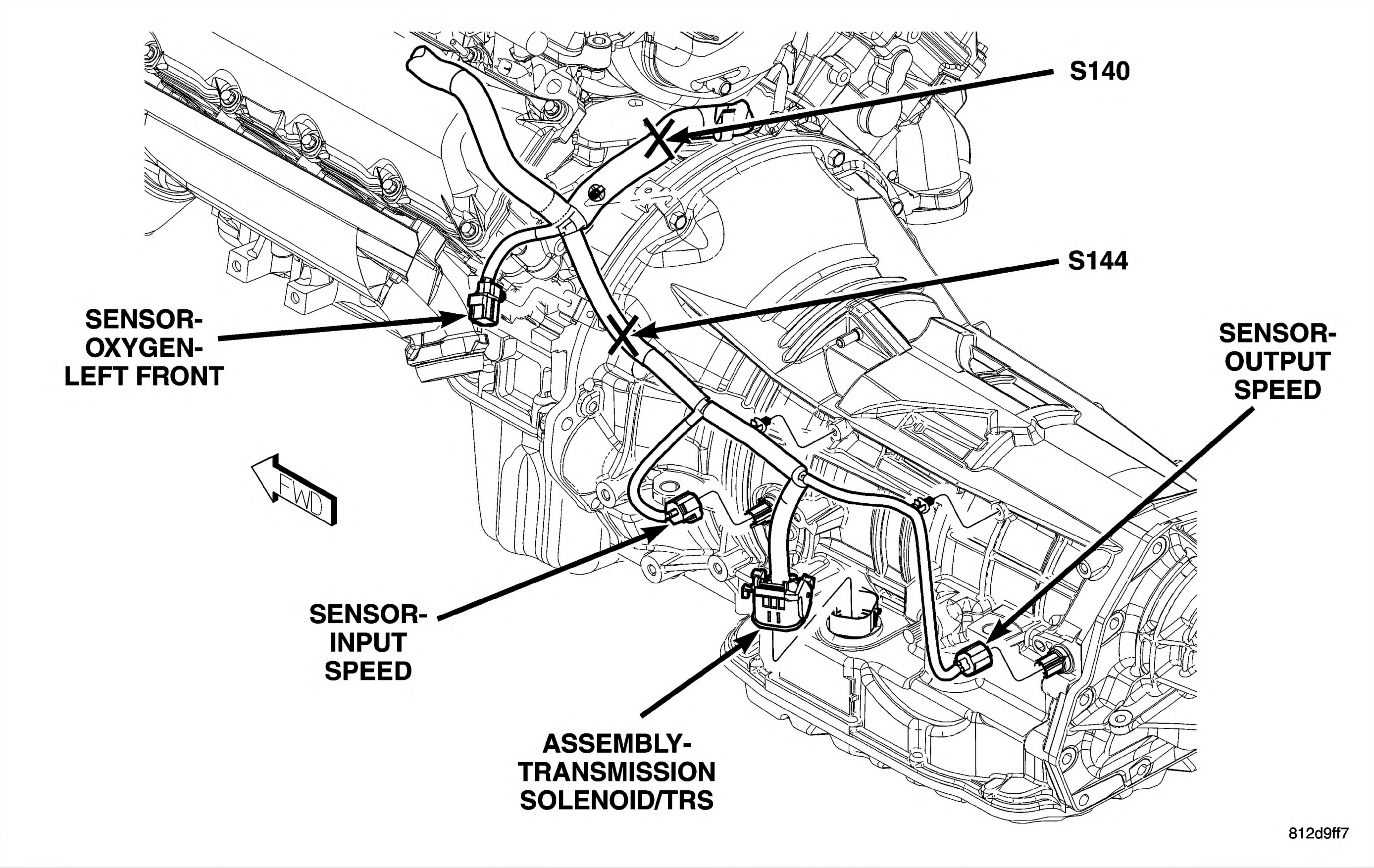

S140
S144
SENSOR-OXYGEN-LEFT FRONT
SENSOR-OUTPUT SPEED
FWD
SENSOR-INPUT SPEED
ASSEMBLY-TRANSMISSION SOLENOID/TRS
812d9ff7

Fig. 20 TRANSMISSION (4.7L)

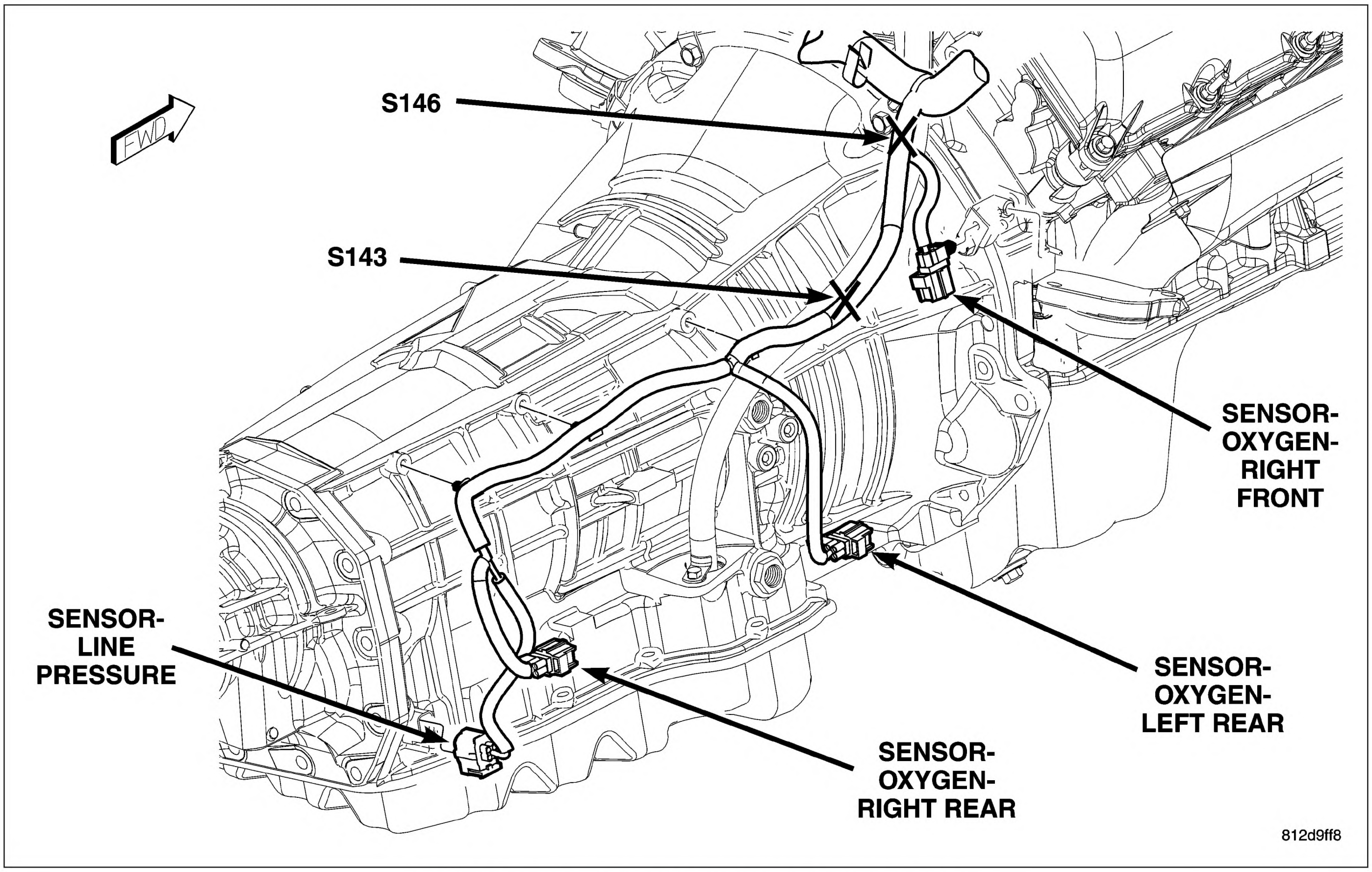

FWD
S146
S143
SENSOR-OXYGEN-RIGHT FRONT
SENSOR-LINE PRESSURE
SENSOR-OXYGEN-LEFT REAR
SENSOR-OXYGEN-RIGHT REAR
812d9ff8

Fig. 21 RIGHT SIDE TRANSMISSION (4.7L)

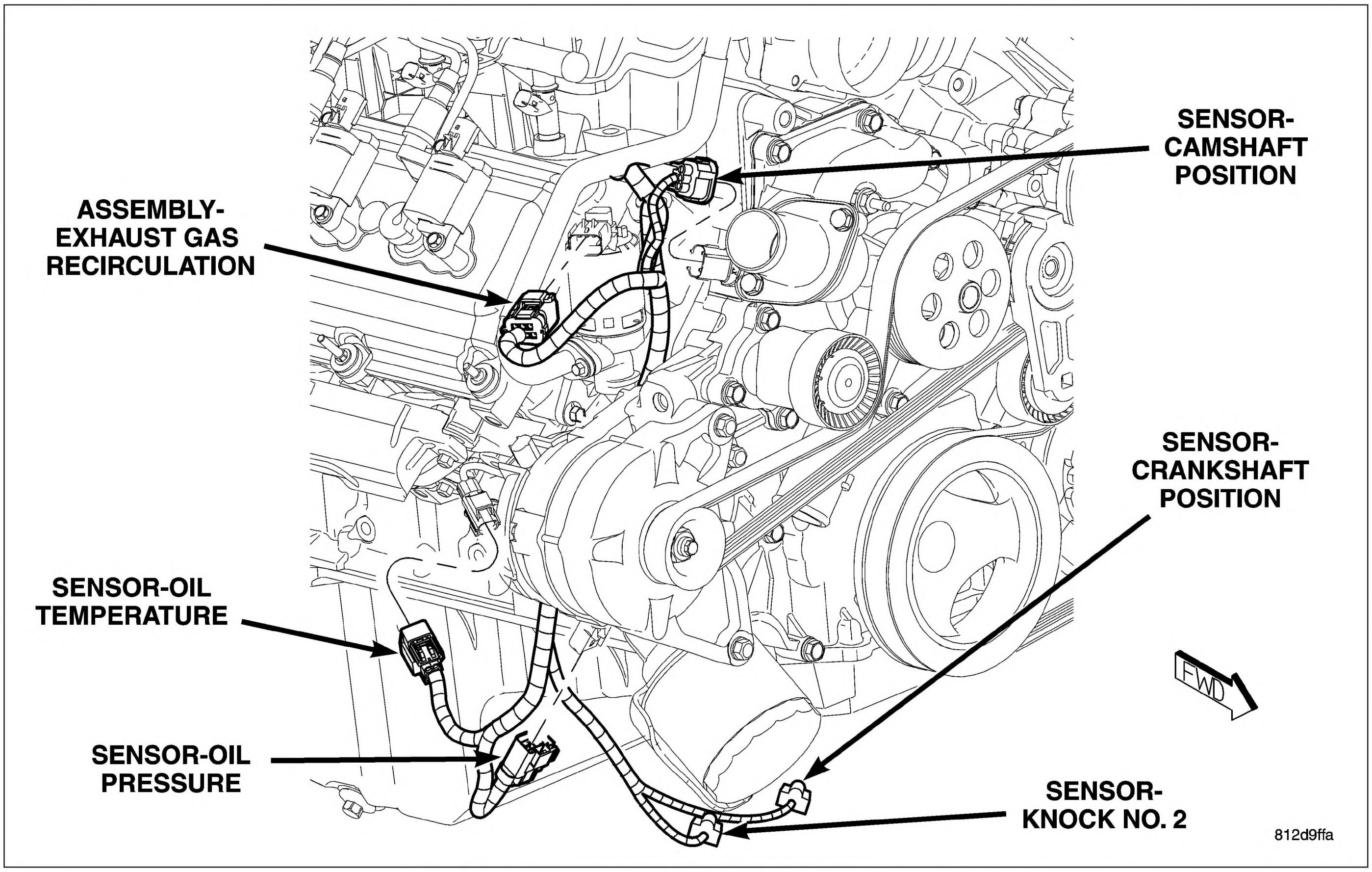

SENSOR-CAMSHAFT POSITION
ASSEMBLY-EXHAUST GAS RECIRCULATION
SENSOR-CRANKSHAFT POSITION
SENSOR-OIL TEMPERATURE
FWD
SENSOR-OIL PRESSURE
SENSOR-KNOCK NO. 2
812d9ffa

Fig. 22 LOWER RIGHT FRONT ENGINE (5.7L)

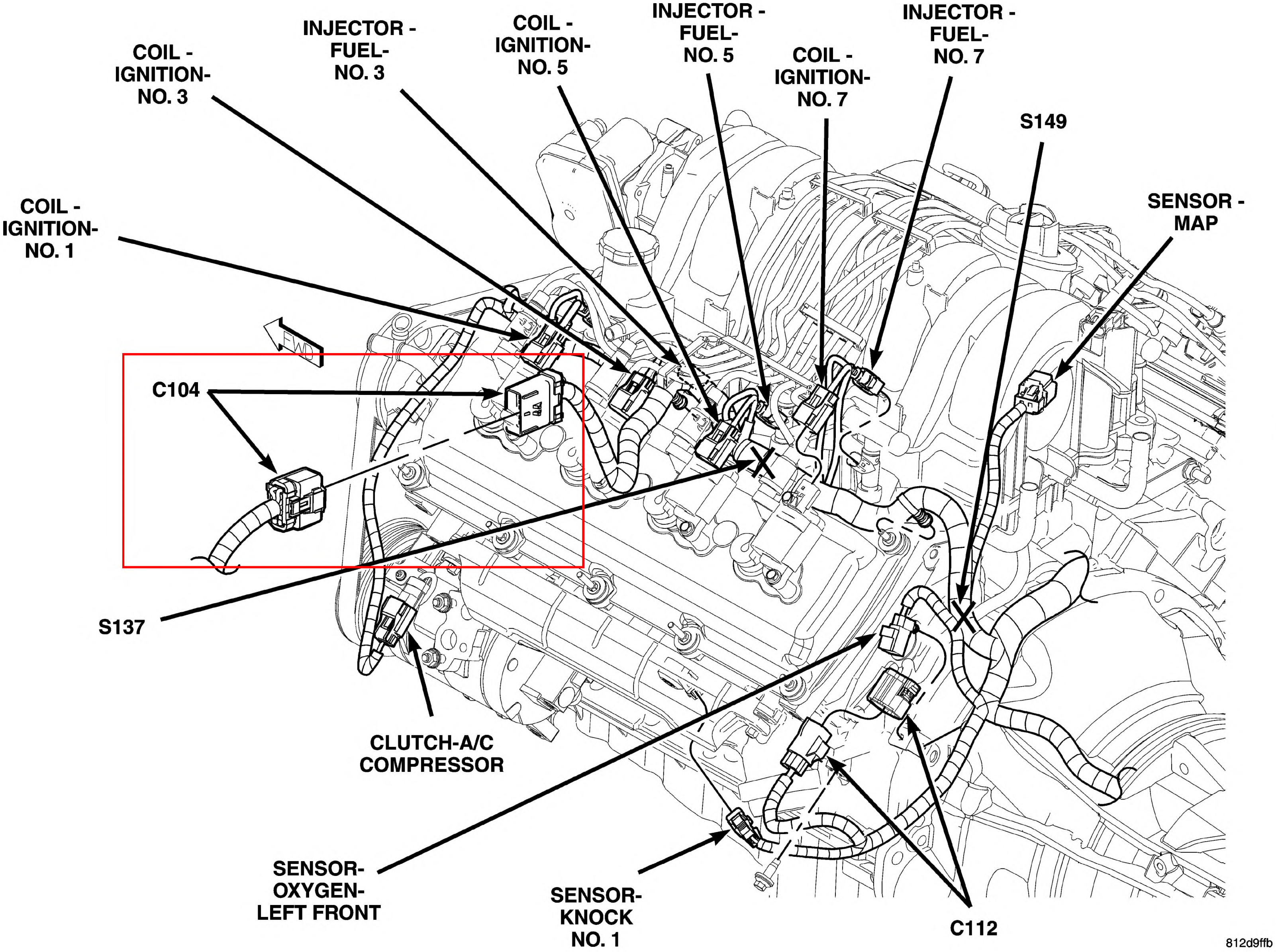

COIL - IGNITION- NO. 3
INJECTOR - FUEL- NO. 3
COIL - IGNITION- NO. 5
INJECTOR - FUEL- NO. 5
COIL - IGNITION- NO. 7
INJECTOR - FUEL- NO. 7
S149
SENSOR - MAP
COIL - IGNITION- NO. 1
C104
FWD
S137
CLUTCH-A/C COMPRESSOR
SENSOR- OXYGEN- LEFT FRONT
SENSOR- KNOCK NO. 1
C112
812d9ffb

Fig. 23 ENGINE (5.7L)

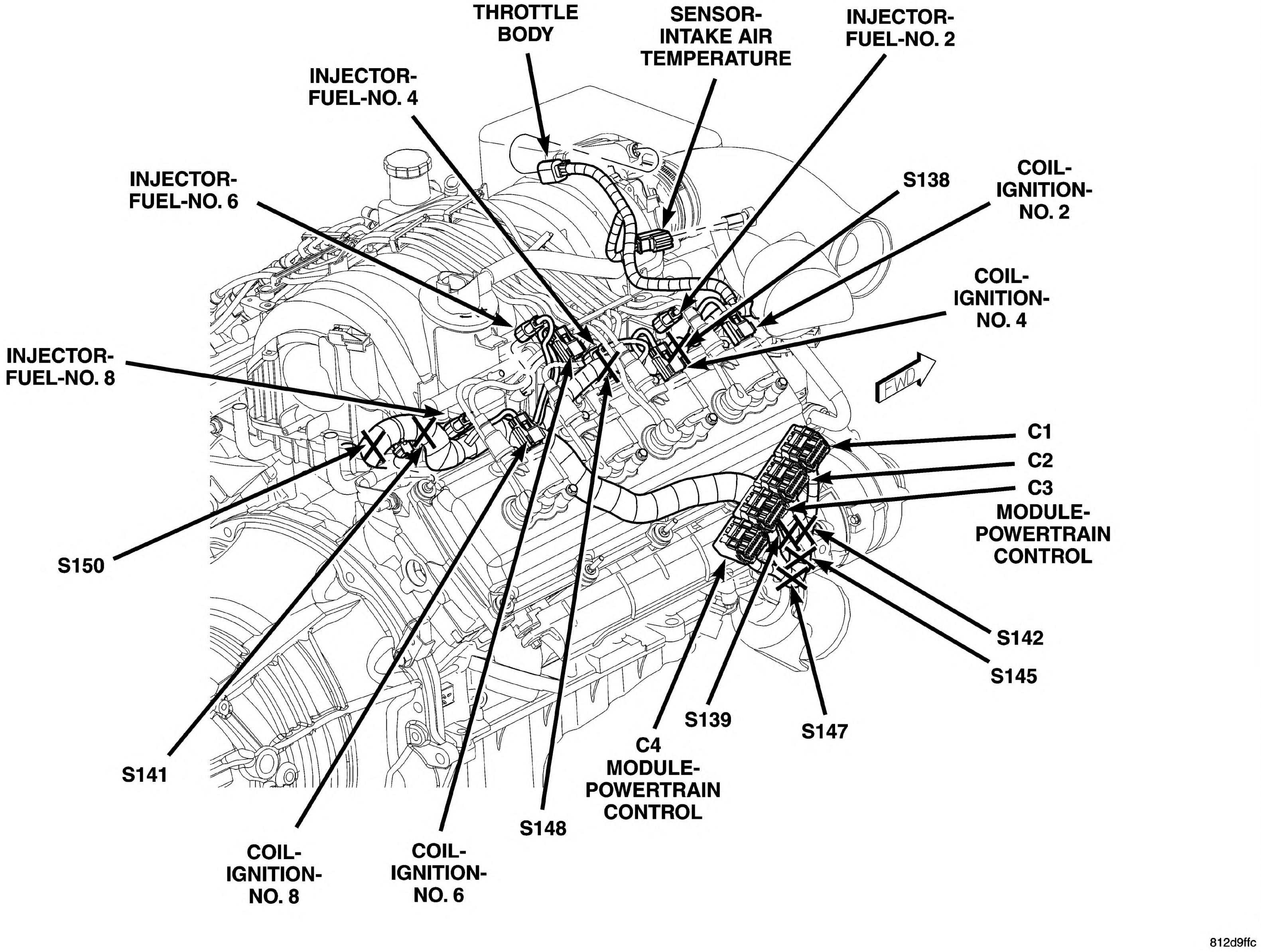

THROTTLE BODY
SENSOR-INTAKE AIR TEMPERATURE
INJECTOR-FUEL-NO. 2
INJECTOR-FUEL-NO. 4
INJECTOR-FUEL-NO. 6
S138
COIL-IGNITION-NO. 2
COIL-IGNITION-NO. 4
FWD
INJECTOR-FUEL-NO. 8
C1
C2
C3
MODULE-POWERTRAIN CONTROL
S150
S142
S145
S139
S147
C4
MODULE-POWERTRAIN CONTROL
S141
S148
COIL-IGNITION-NO. 8
COIL-IGNITION-NO. 6
812d9ffc

Fig. 24 RIGHT SIDE ENGINE (5.7L)

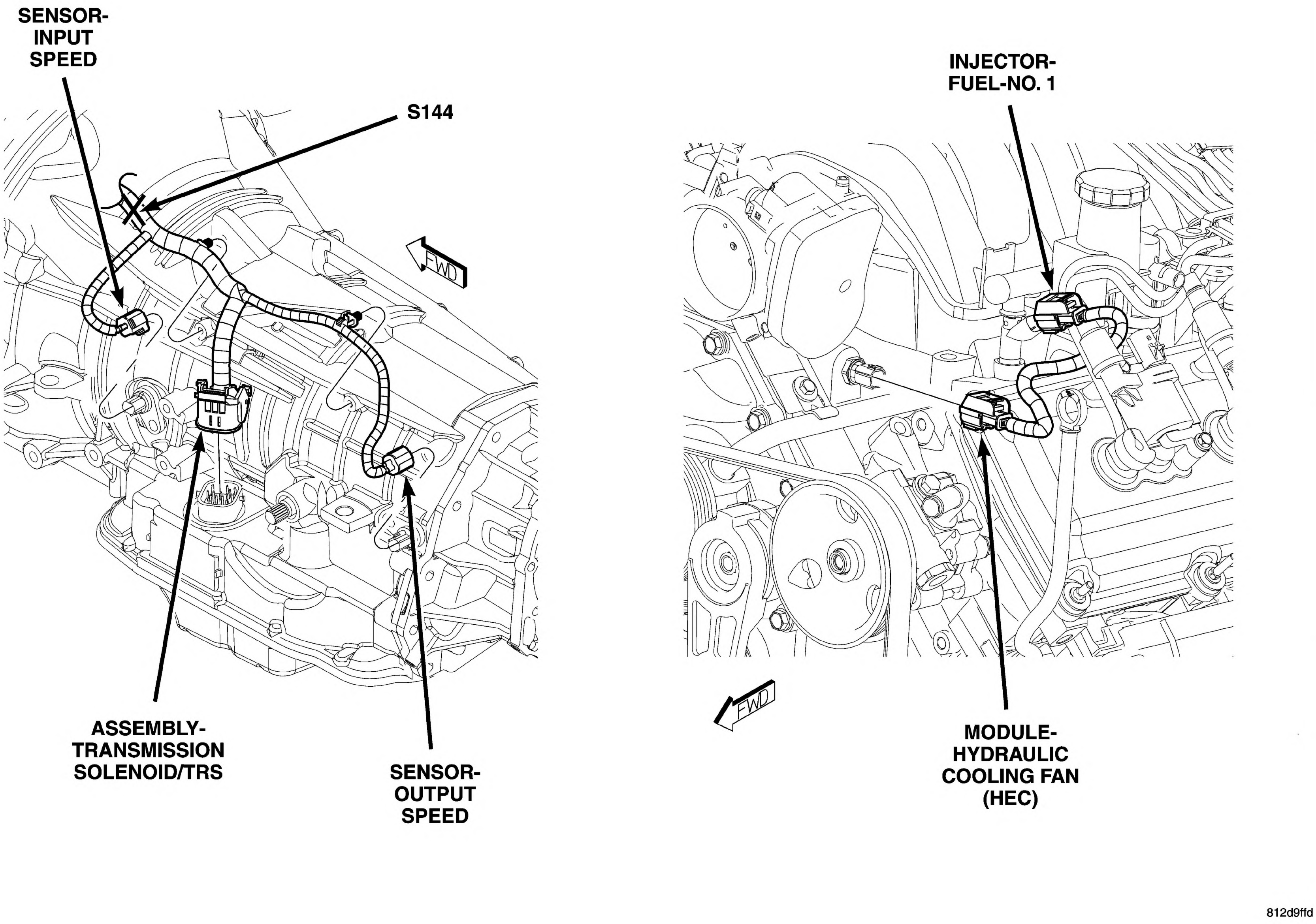

SENSOR-
INPUT
SPEED
S144
FWD
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
SENSOR-
OUTPUT
SPEED
INJECTOR-
FUEL-NO. 1
FWD
MODULE-
HYDRAULIC
COOLING FAN
(HEC)
812d9ffd

Fig. 25 LEFT TRANSMISSION AND LEFT FRONT ENGINE (5.7L)

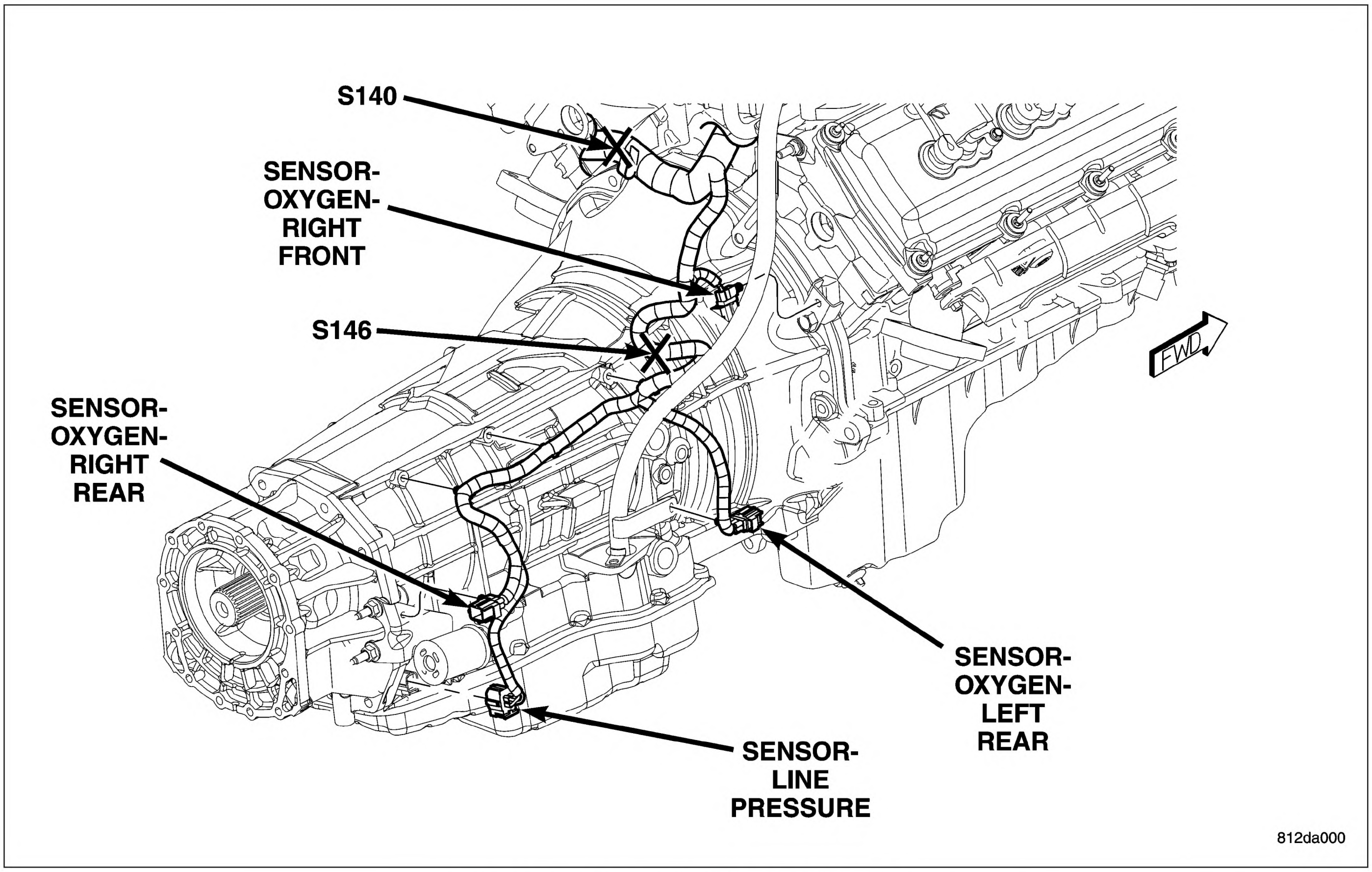
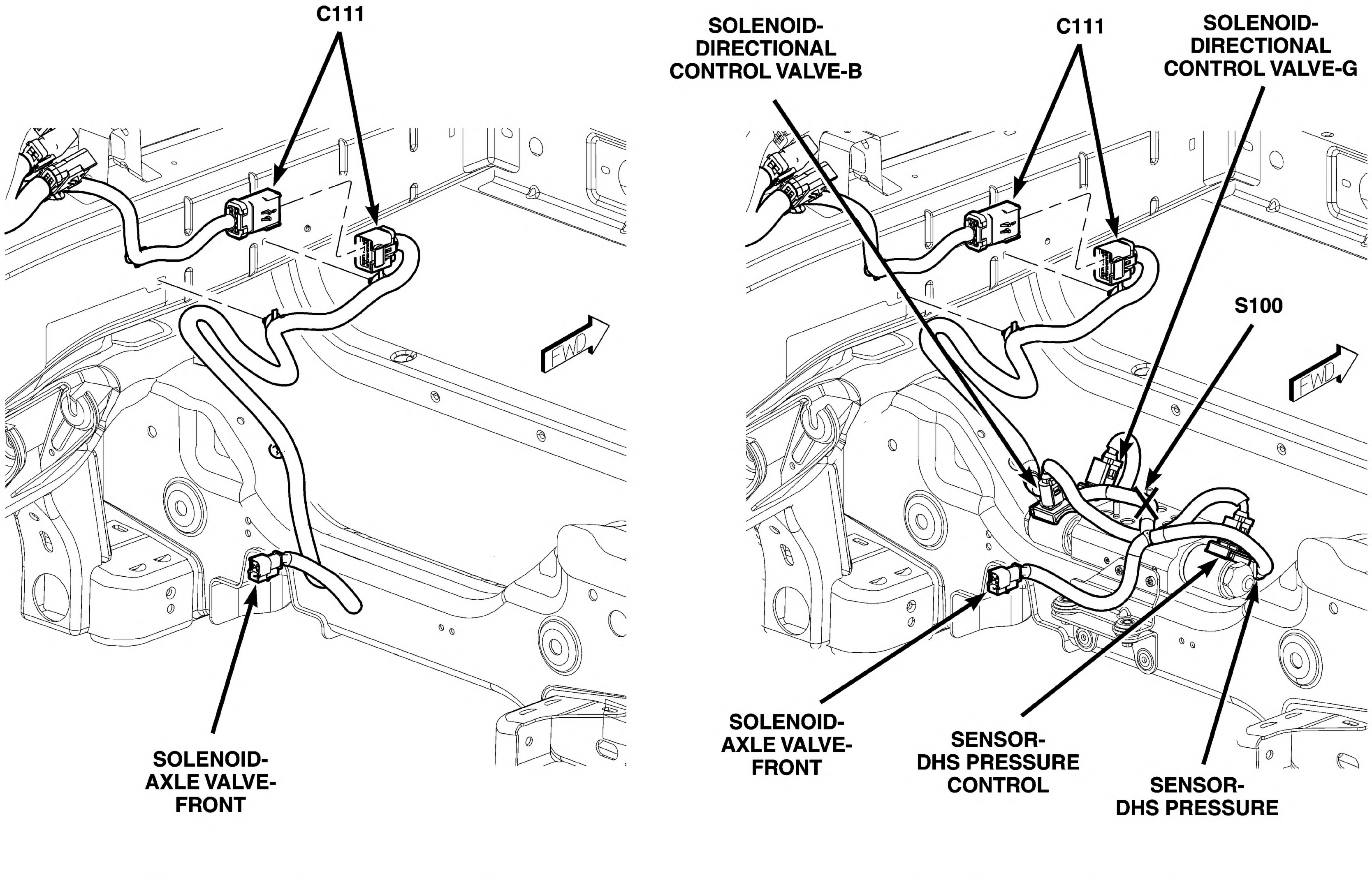

S140
SENSOR-OXYGEN-RIGHT FRONT
S146
SENSOR-OXYGEN-RIGHT REAR
SENSOR-OXYGEN-LEFT REAR
SENSOR-LINE PRESSURE
FWD
812da000

Fig. 26 RIGHT TRANSMISSION (5.7L)


C111
SOLENOID-AXLE VALVE-FRONT
SOLENOID-DIRECTIONAL CONTROL VALVE-B
C111
SOLENOID-DIRECTIONAL CONTROL VALVE-G
S100
SOLENOID-AXLE VALVE-FRONT
SENSOR-DHS PRESSURE CONTROL
SENSOR-DHS PRESSURE
FWD
FWD

EXCEPT DYNAMIC HANDLING SYSTEM

DYNAMIC HANDLING SYSTEM

812da001

Fig. 27 FRONT CRADLE

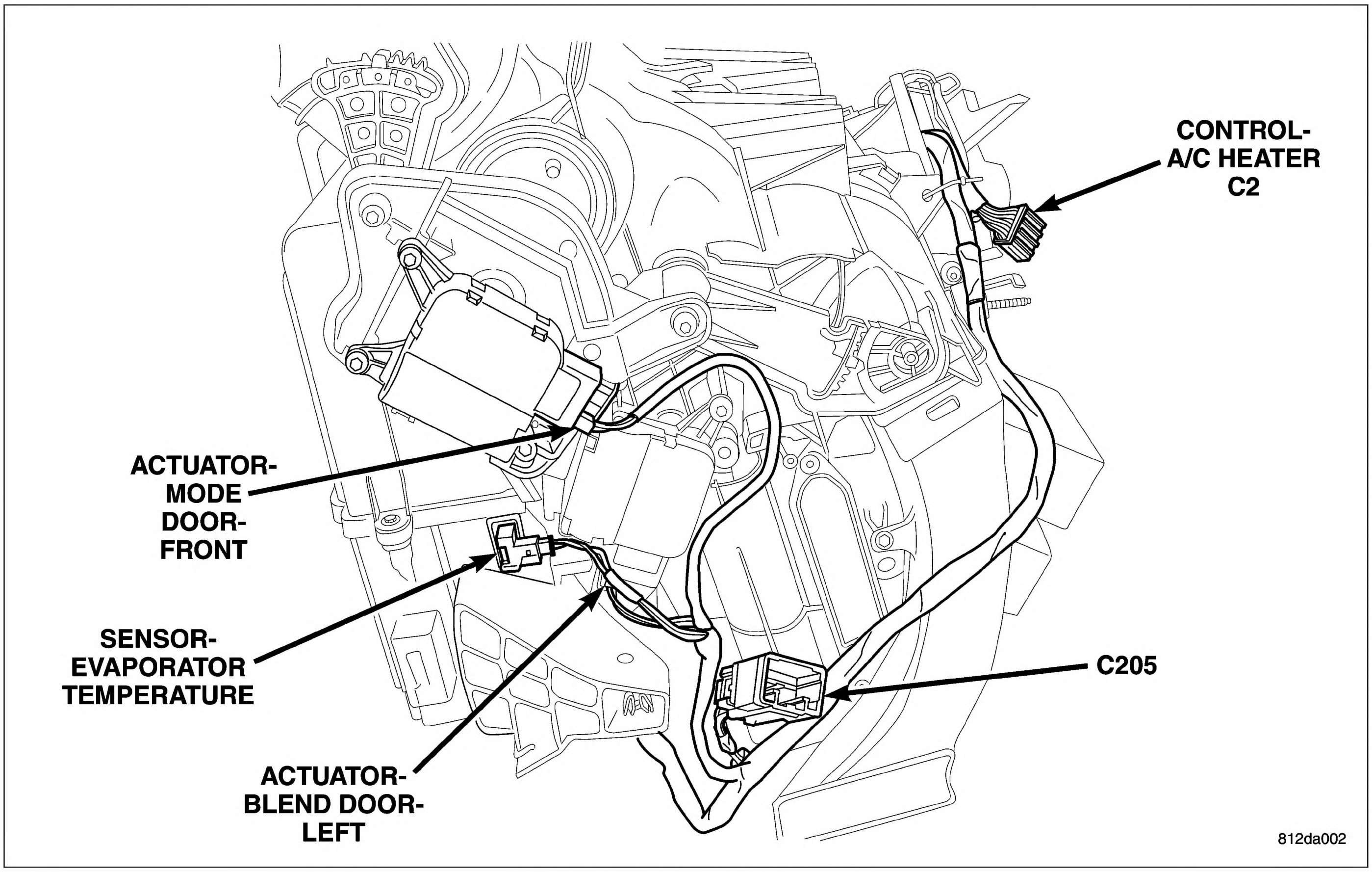

CONTROL-
A/C HEATER
C2
ACTUATOR-
MODE
DOOR-
FRONT
SENSOR-
EVAPORATOR
TEMPERATURE
C205
ACTUATOR-
BLEND DOOR-
LEFT
812da002

Fig. 28 LEFT SIDE HVAC

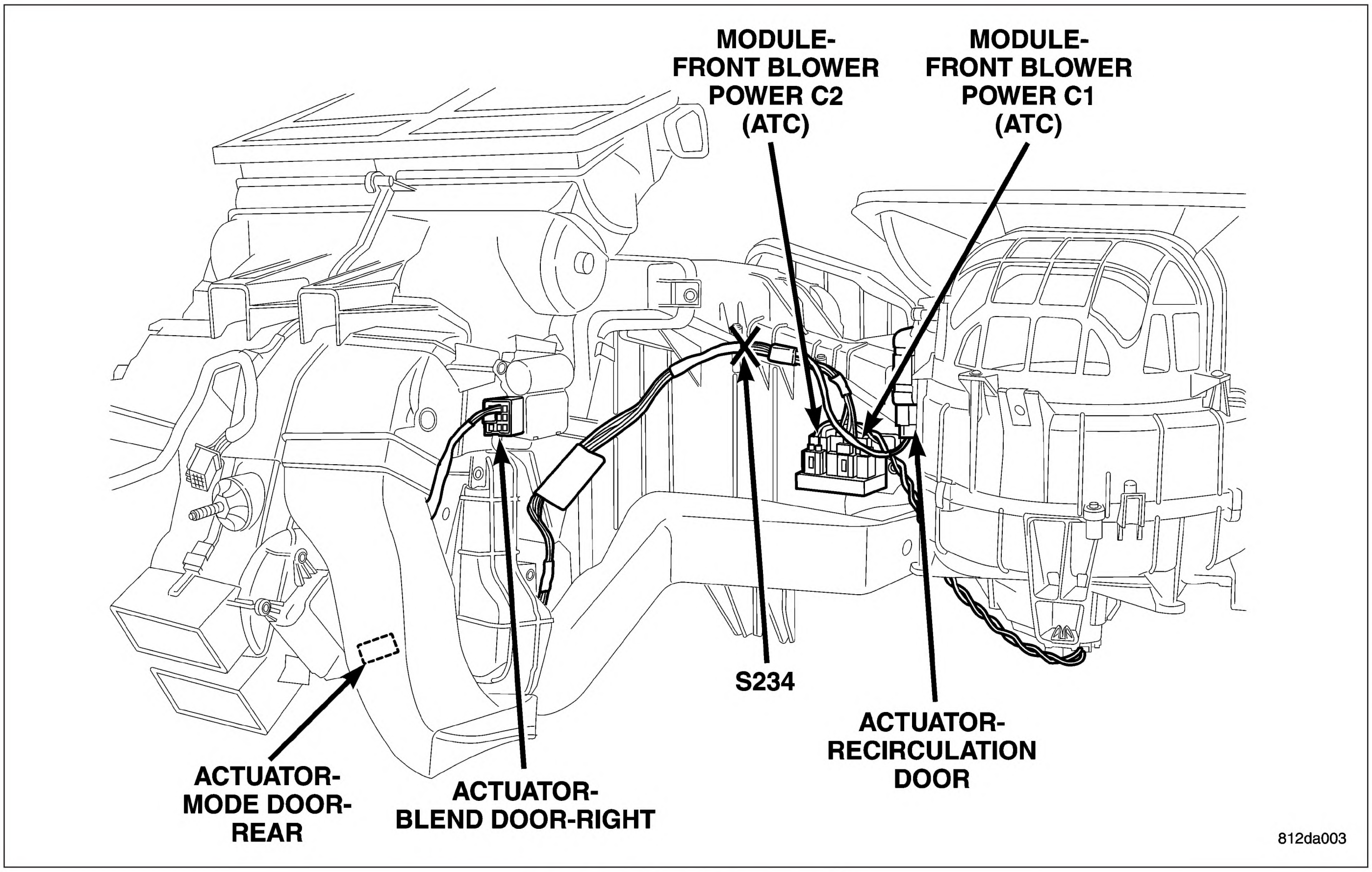

MODULE-
FRONT BLOWER
POWER C2
(ATC)
MODULE-
FRONT BLOWER
POWER C1
(ATC)
S234
ACTUATOR-
RECIRCULATION
DOOR
ACTUATOR-
MODE DOOR-
REAR
ACTUATOR-
BLEND DOOR-RIGHT
812da003

Fig. 29 RIGHT SIDE HVAC

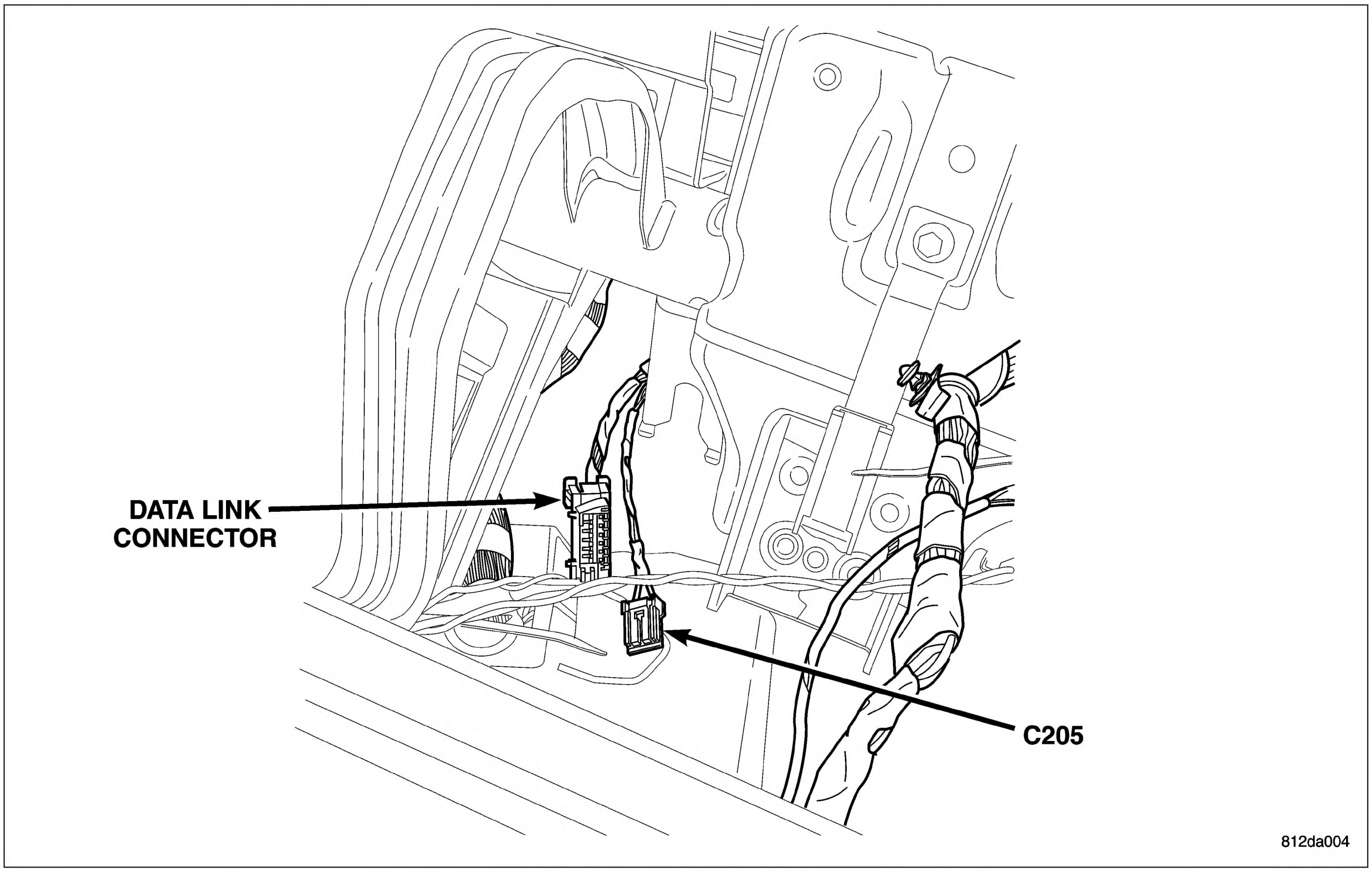

DATA LINK CONNECTOR
C205
812da004

Fig. 30 LOWER LEFT INSTRUMENT PANEL

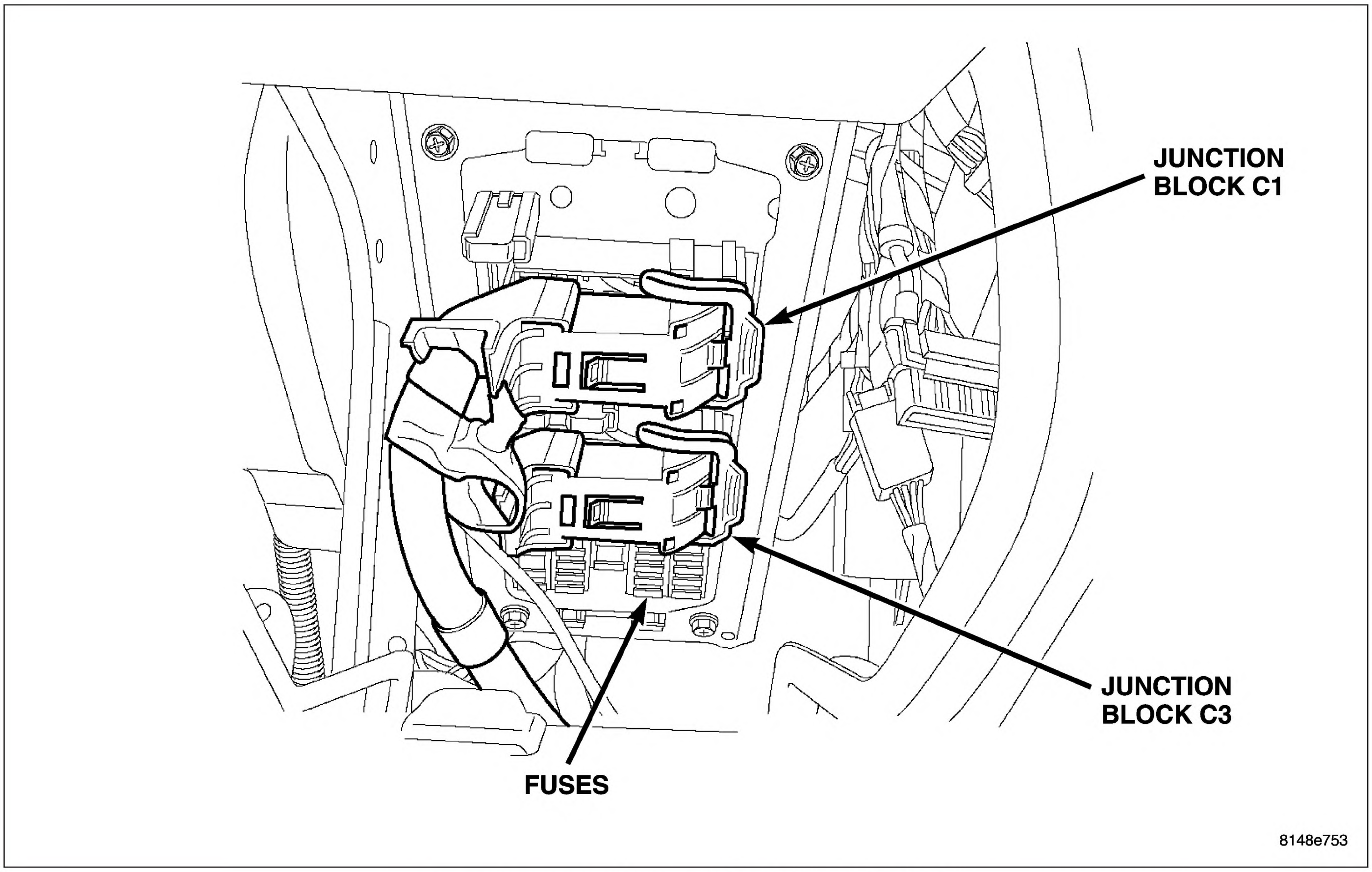

JUNCTION BLOCK C1
JUNCTION BLOCK C3
FUSES
8148e753

Fig. 31 JUNCTION BLOCK CONNECTORS

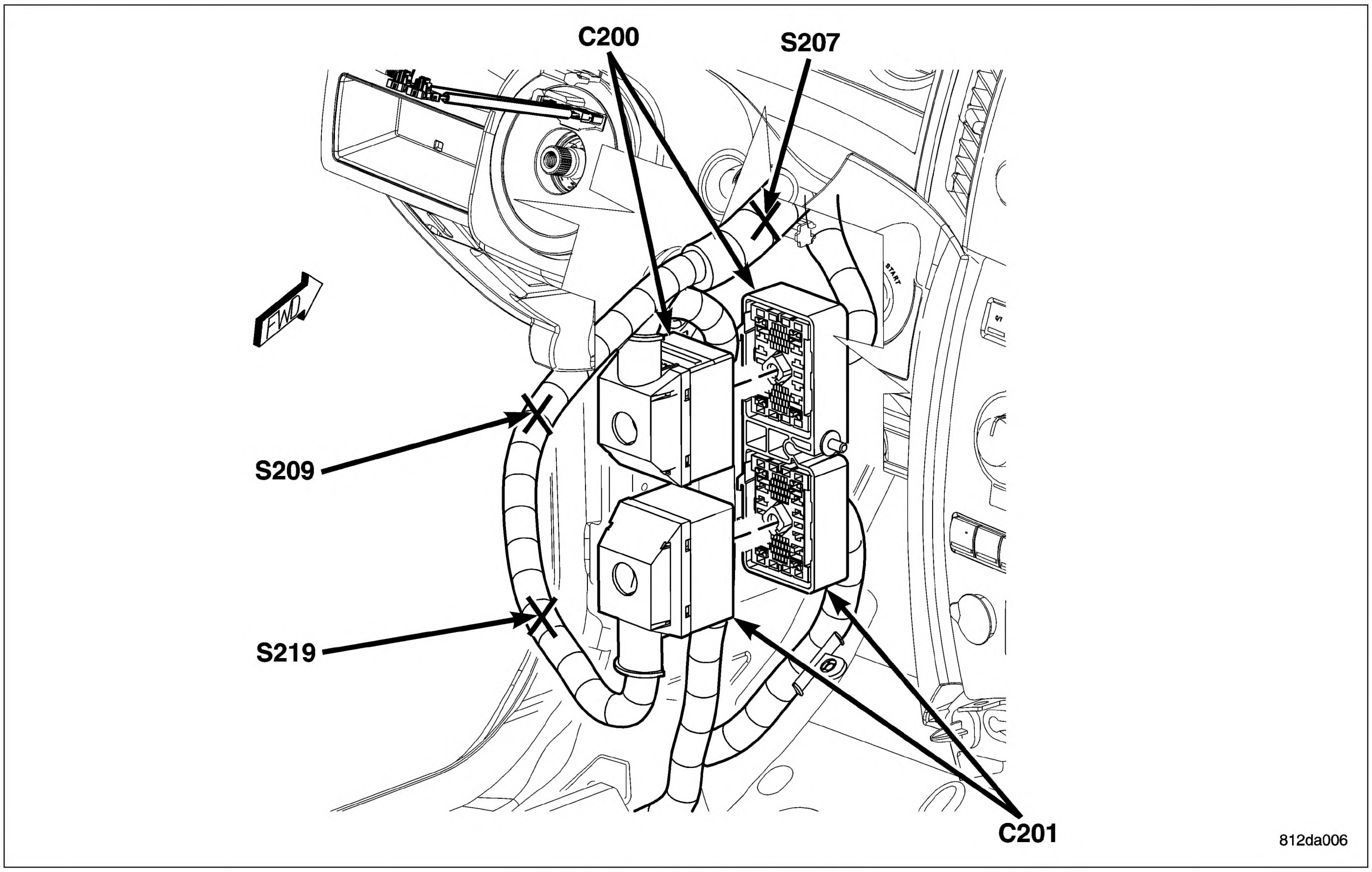

C200
S207
FWD
S209
S219
C201
812da006

Fig. 32 LEFT KICK PANEL

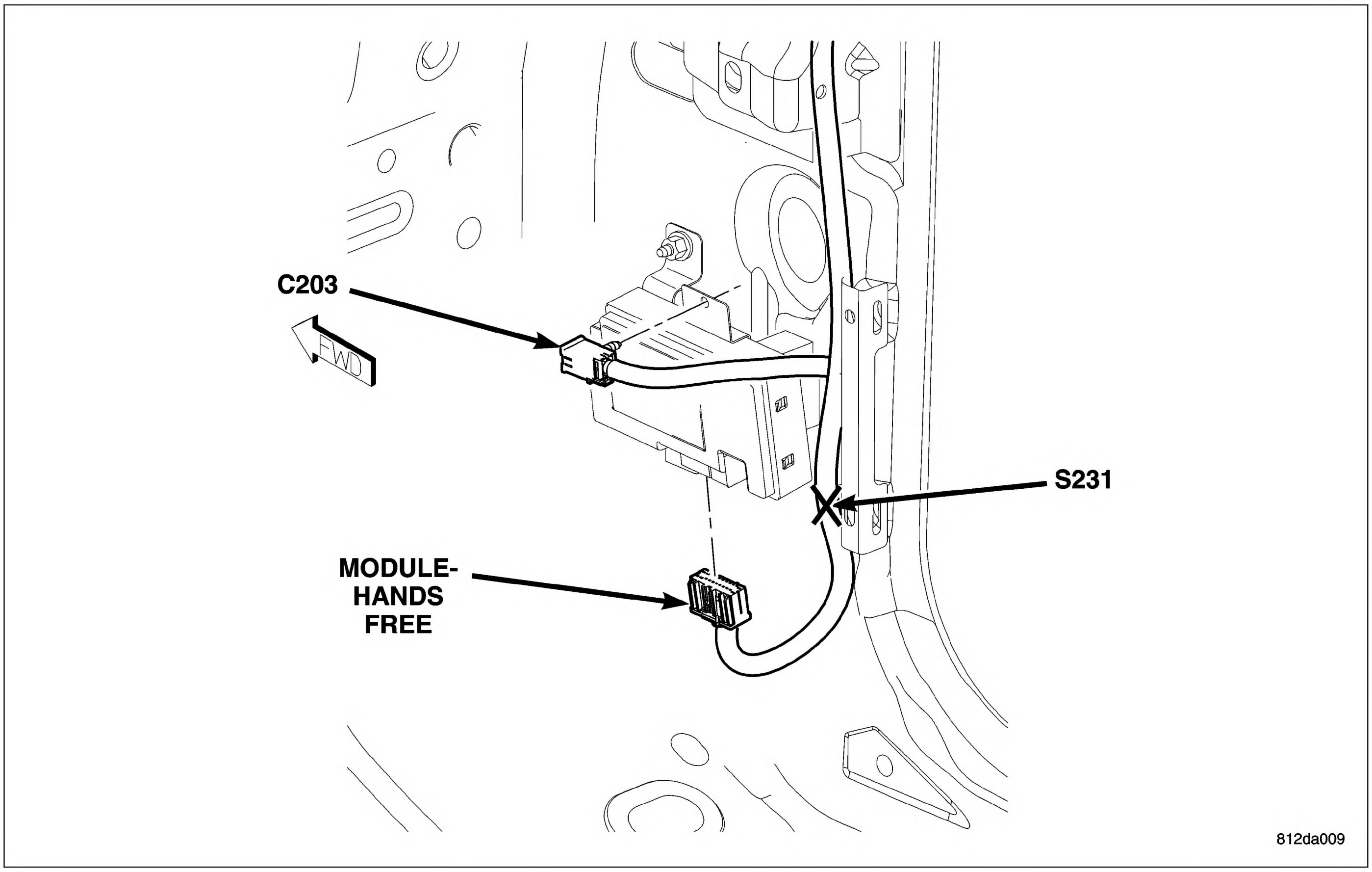

C203
FWD
S231
MODULE-
HANDS
FREE
812da009

Fig. 33 RIGHT KICK PANEL

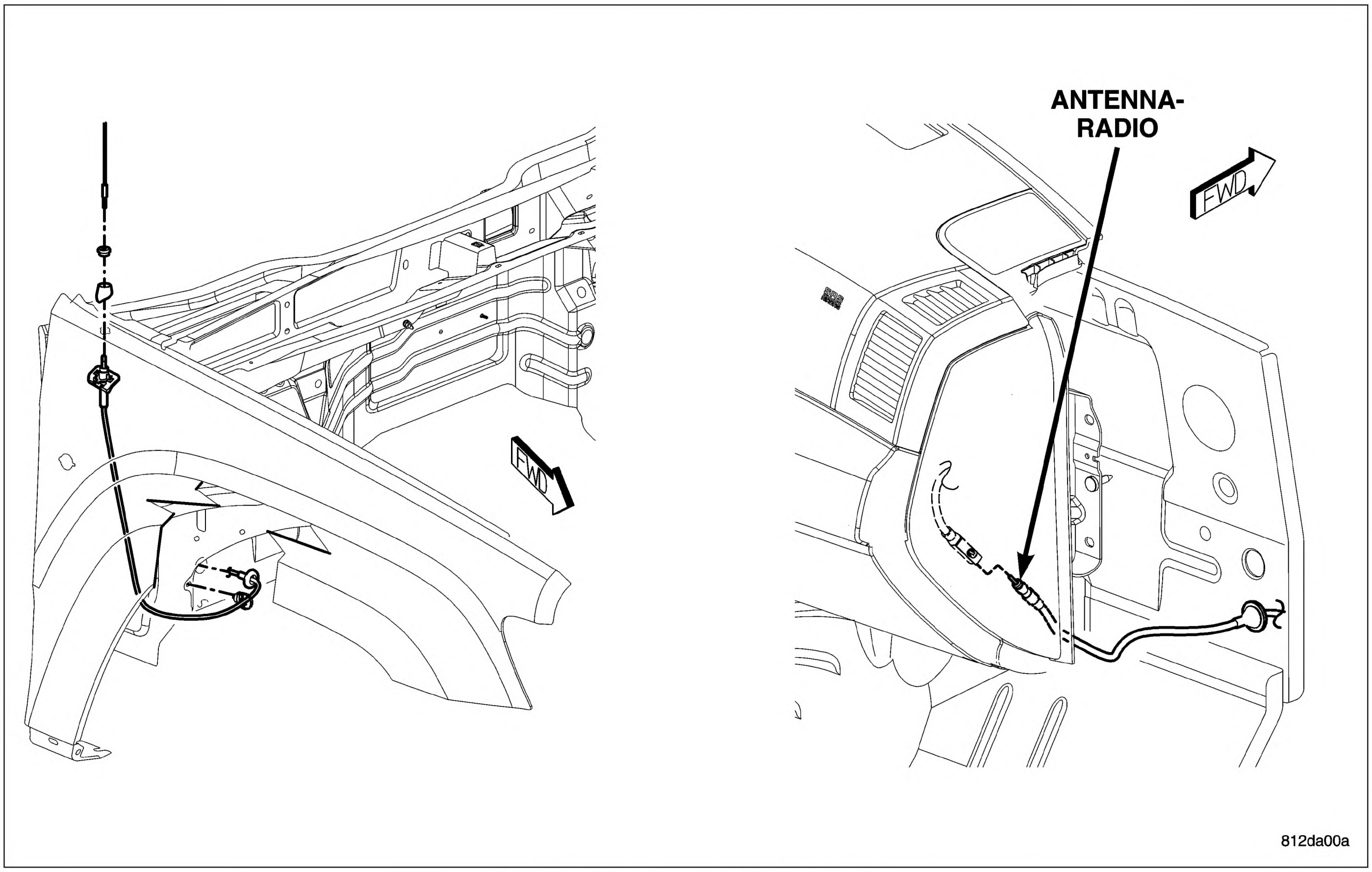

ANTENNA-
RADIO
FWD
FWD
812da00a

Fig. 34 RADIO ANTENNA (BASE)

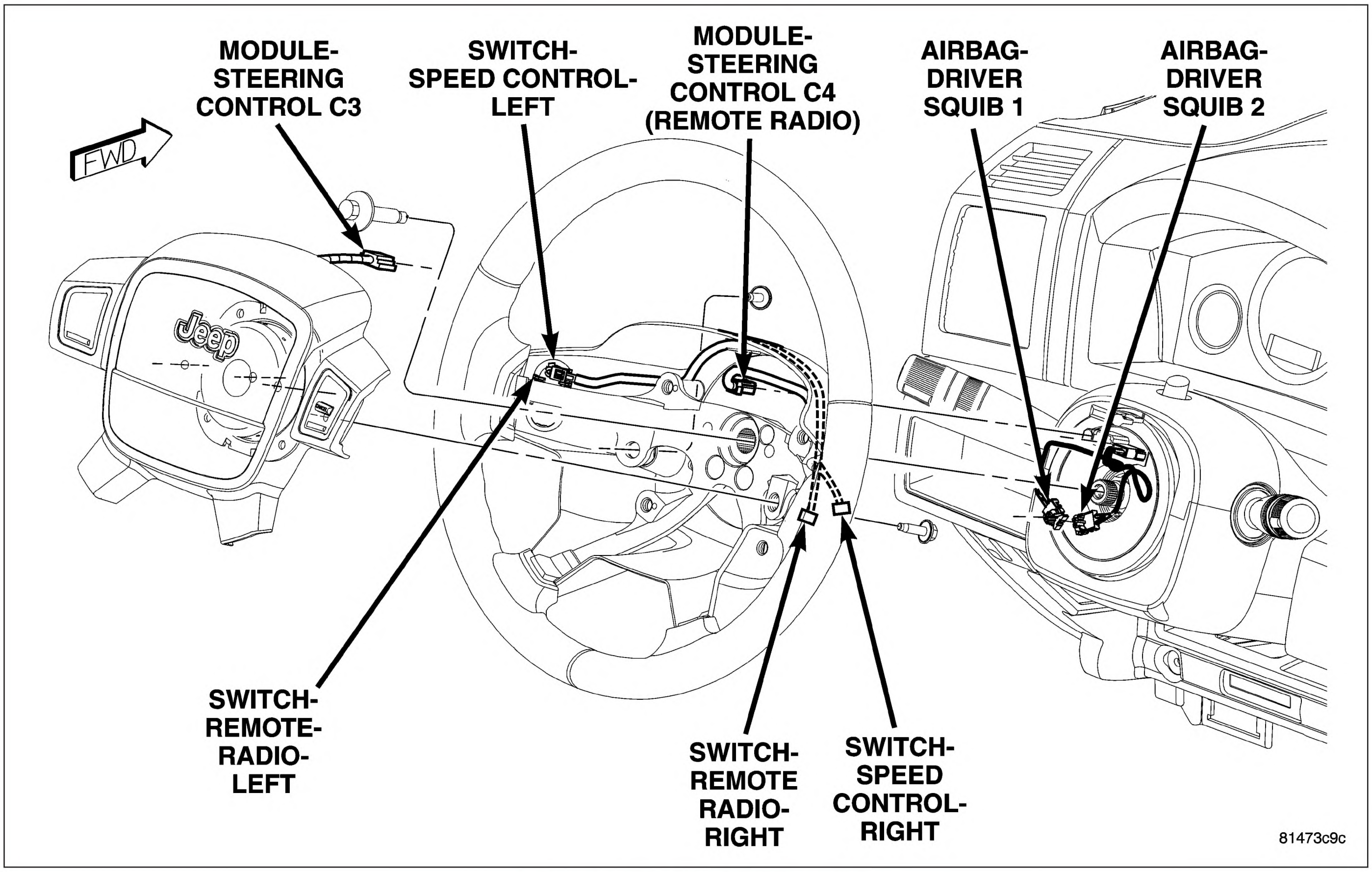

MODULE-
STEERING
CONTROL C3
SWITCH-
SPEED CONTROL-
LEFT
MODULE-
STEERING
CONTROL C4
(REMOTE RADIO)
AIRBAG-
DRIVER
SQUIB 1
AIRBAG-
DRIVER
SQUIB 2
FWD
Jeep
SWITCH-
REMOTE-
RADIO-
LEFT
SWITCH-
REMOTE
RADIO-
RIGHT
SWITCH-
SPEED
CONTROL-
RIGHT
81473c9c

Fig. 35 STEERING WHEEL

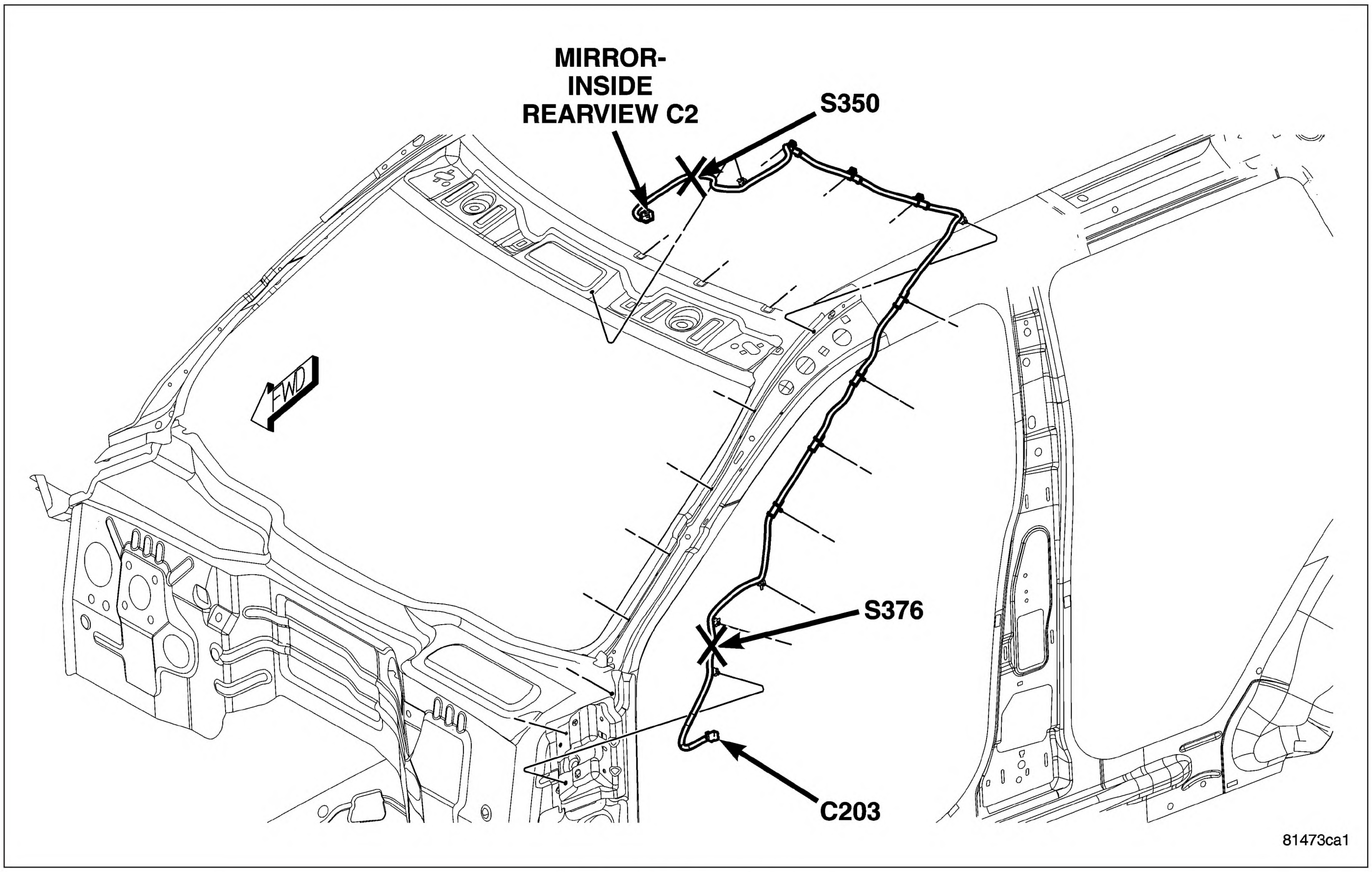

MIRROR-
INSIDE
REARVIEW C2
S350
FWD
S376
C203
81473ca1

Fig. 36 A-PILLAR

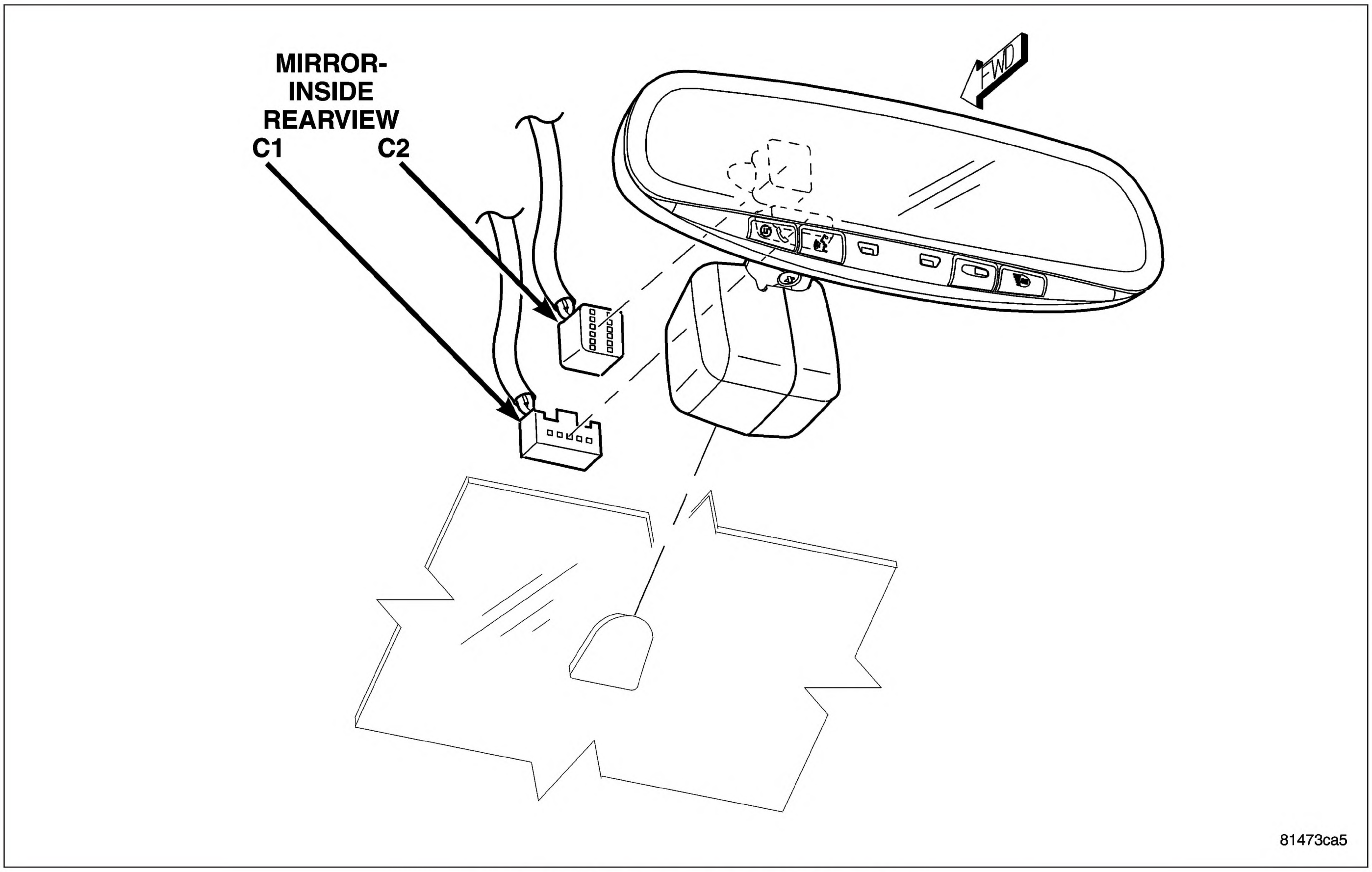

MIRROR-
INSIDE
REARVIEW
C1
C2
FWD
81473ca5

Fig. 37 INSIDE REARVIEW MIRROR

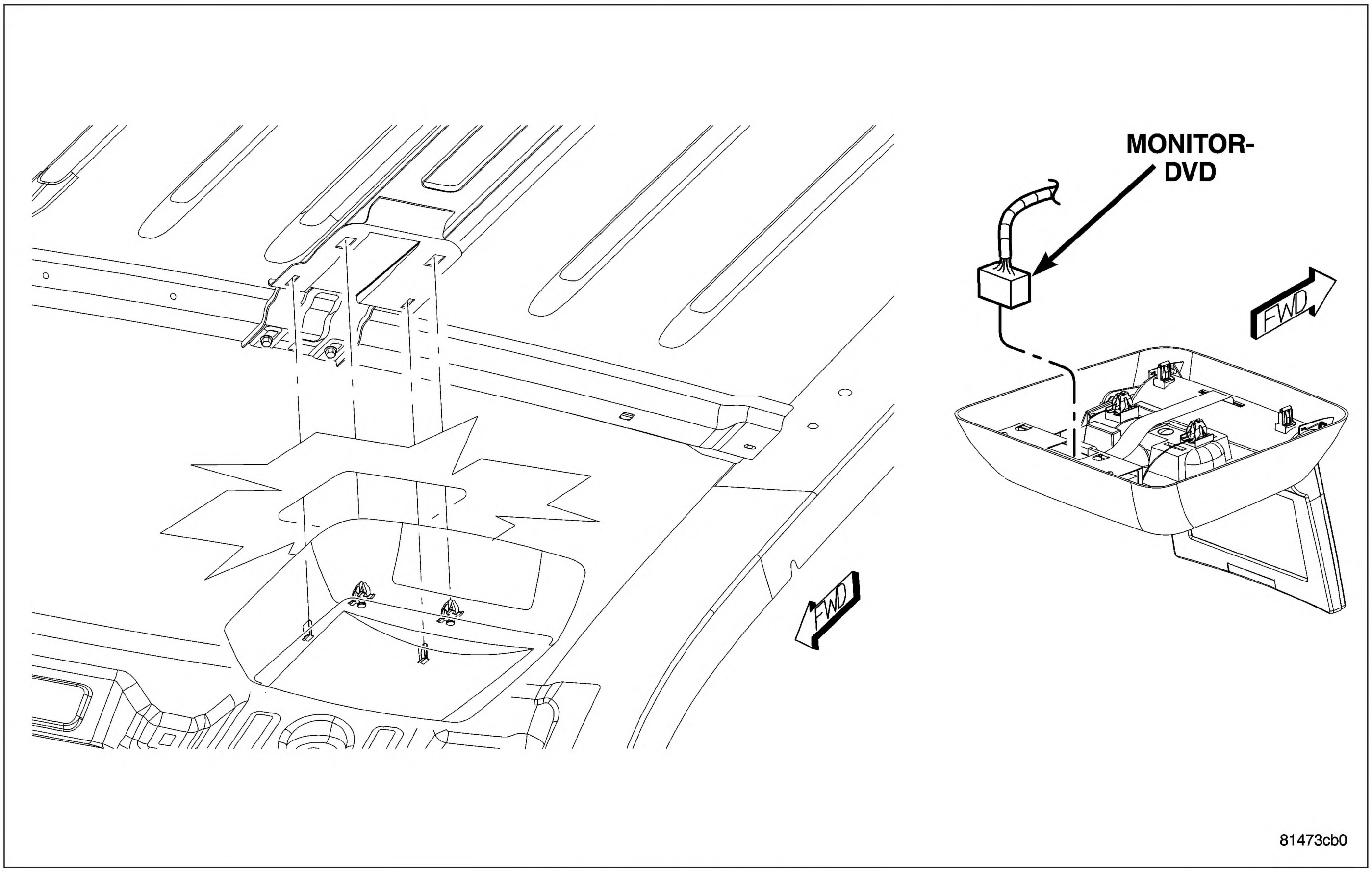

MONITOR-
DVD
FWD
FWD
81473cb0

Fig. 38 DVD MONITOR

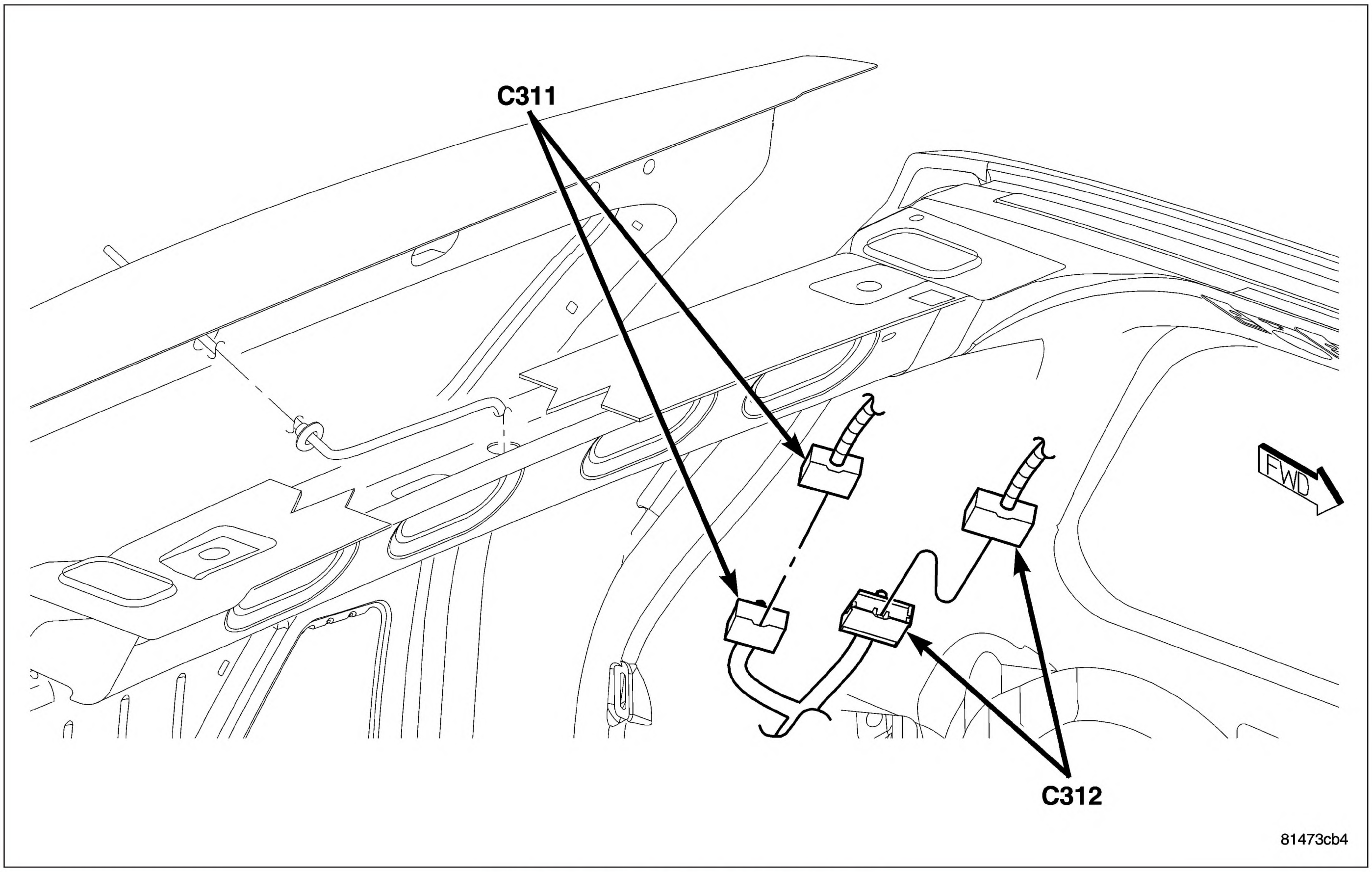

C311
FWD
C312
81473cb4

Fig. 39 LEFT REAR HEADLINER

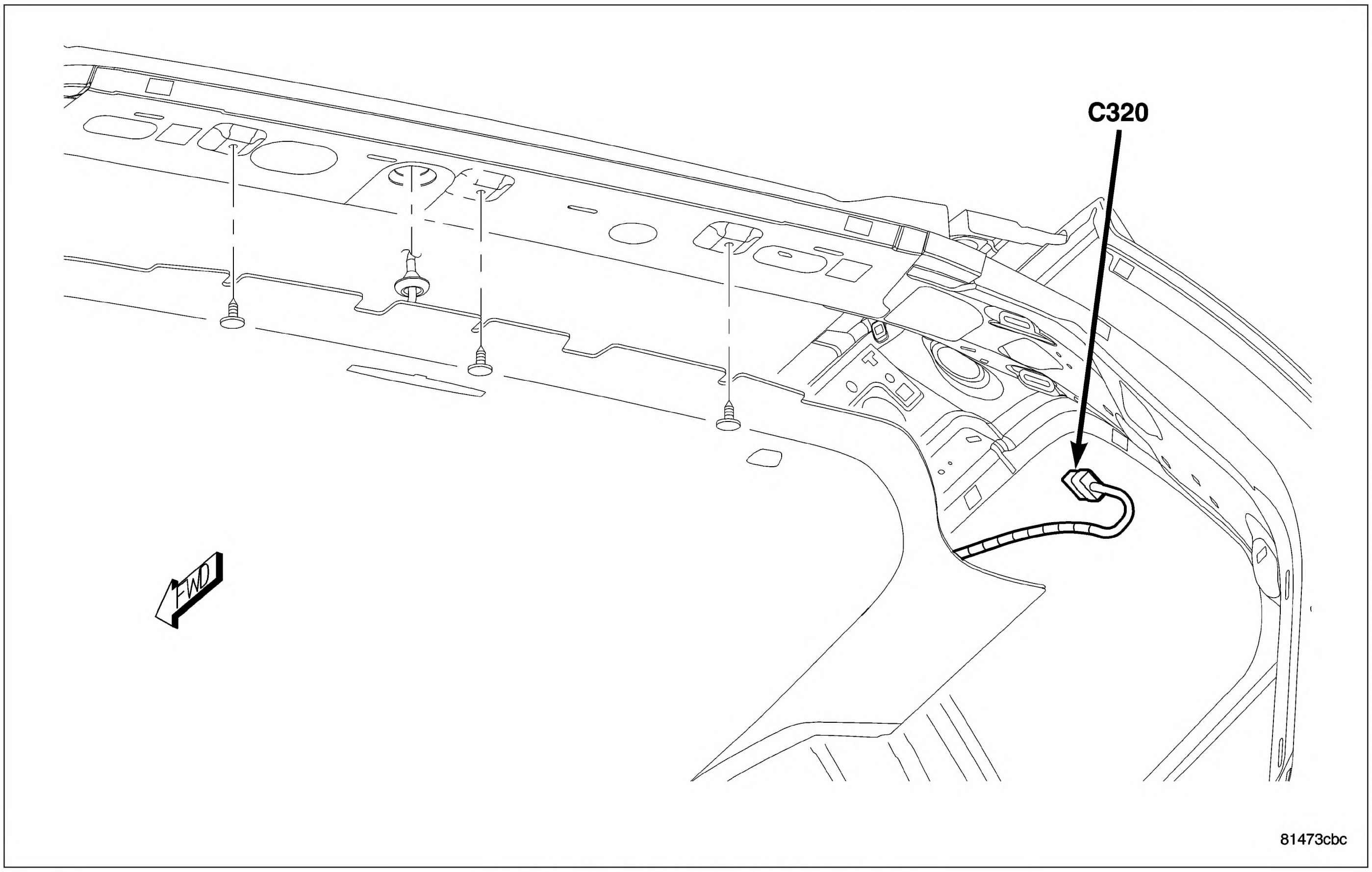

C320
FWD
81473cbc

Fig. 40 RIGHT REAR HEADLINER

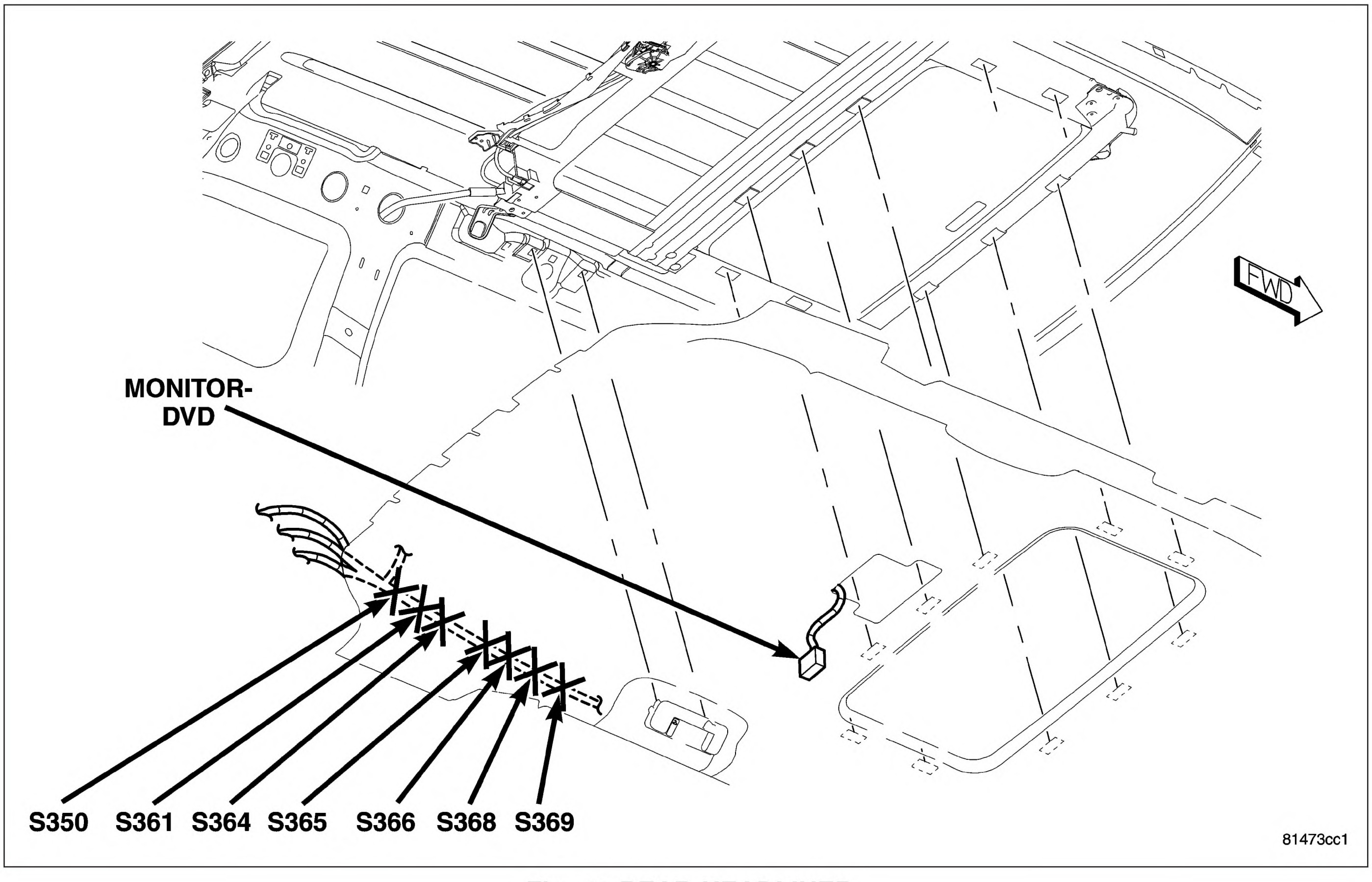

FWD
MONITOR-
DVD
S350
S361
S364
S365
S366
S368
S369
81473cc1

Fig. 41 REAR HEADLINER

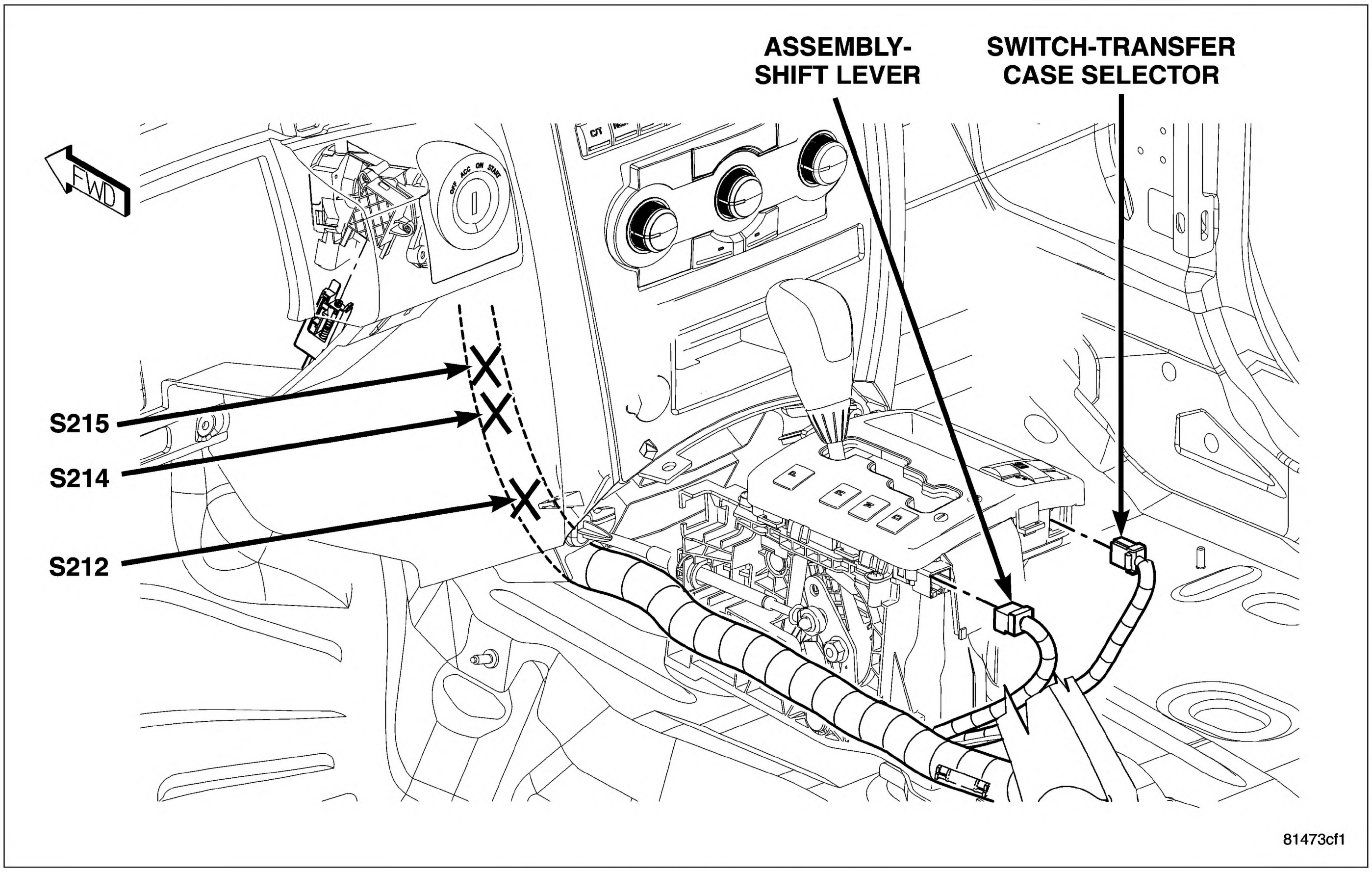

ASSEMBLY-
SHIFT LEVER
SWITCH-TRANSFER
CASE SELECTOR
FWD
S215
S214
S212
81473cf1

Fig. 42 SHIFT ASSEMBLY

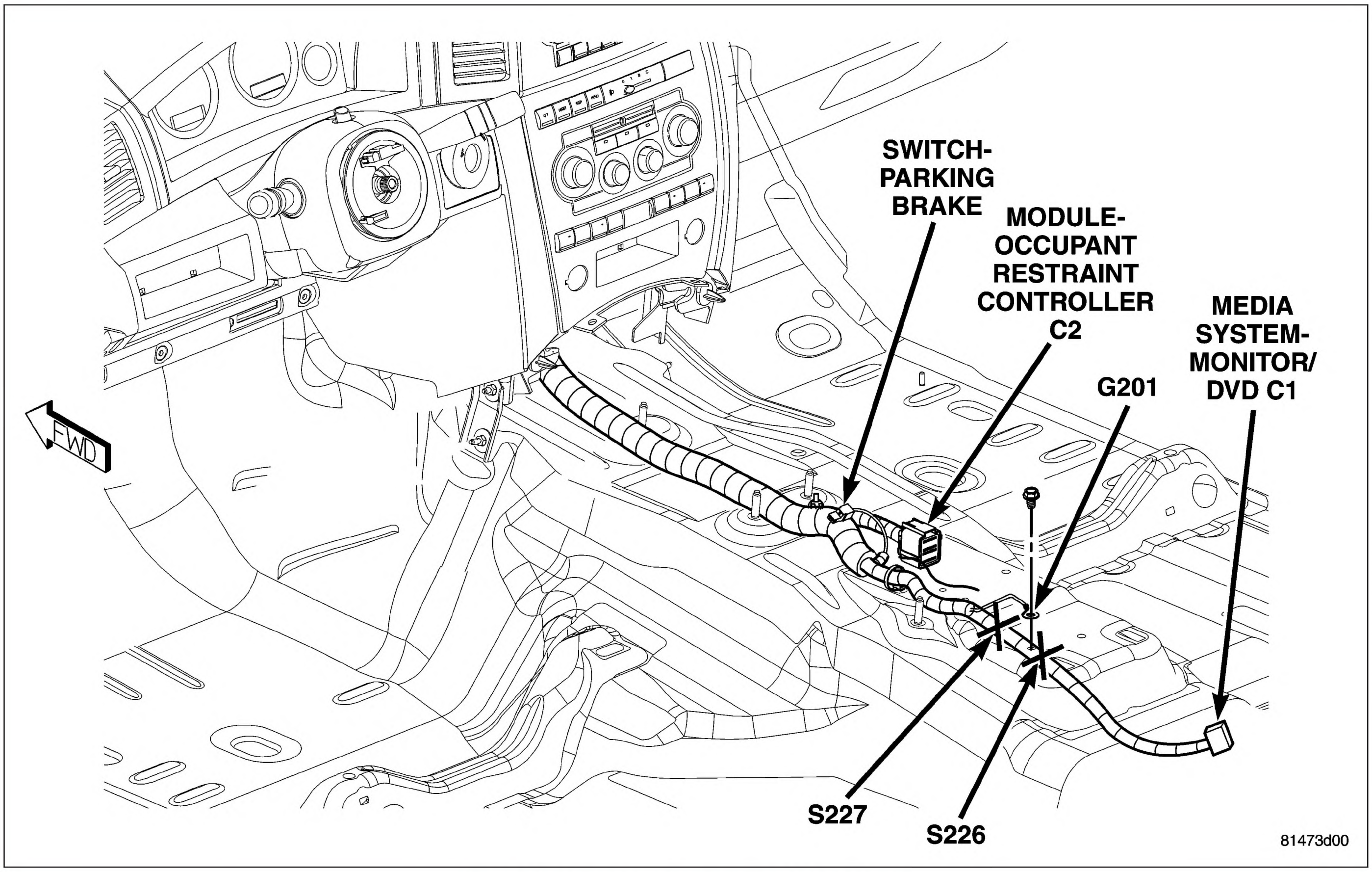

SWITCH-
PARKING
BRAKE
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
C2
MEDIA
SYSTEM-
MONITOR/
DVD C1
G201
FWD
S227
S226
81473d00

Fig. 43 BELOW CENTER CONSOLE

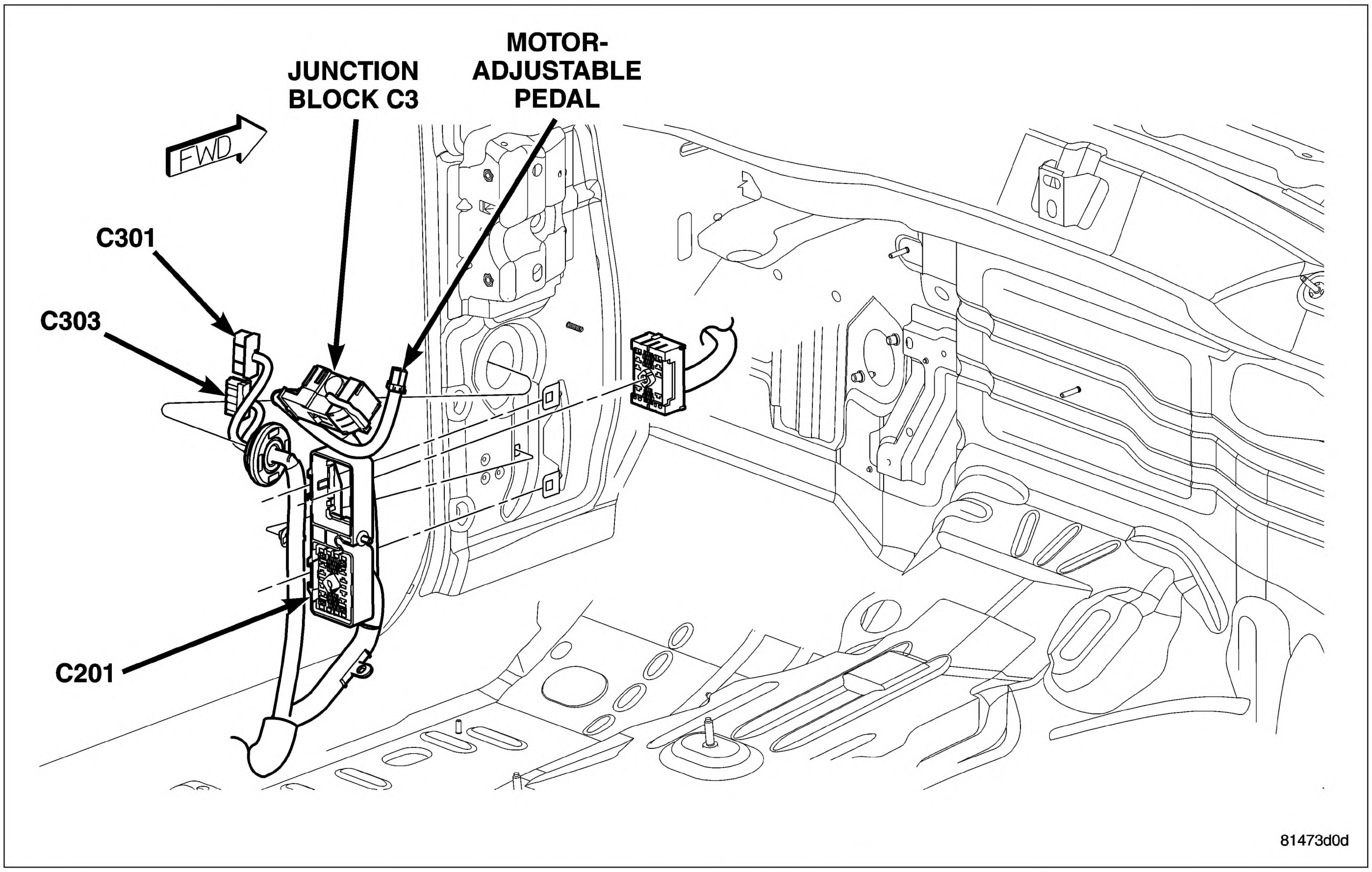

JUNCTION BLOCK C3
MOTOR-ADJUSTABLE PEDAL
FWD
C301
C303
C201
81473d0d

Fig. 44 LEFT FRONT BODY

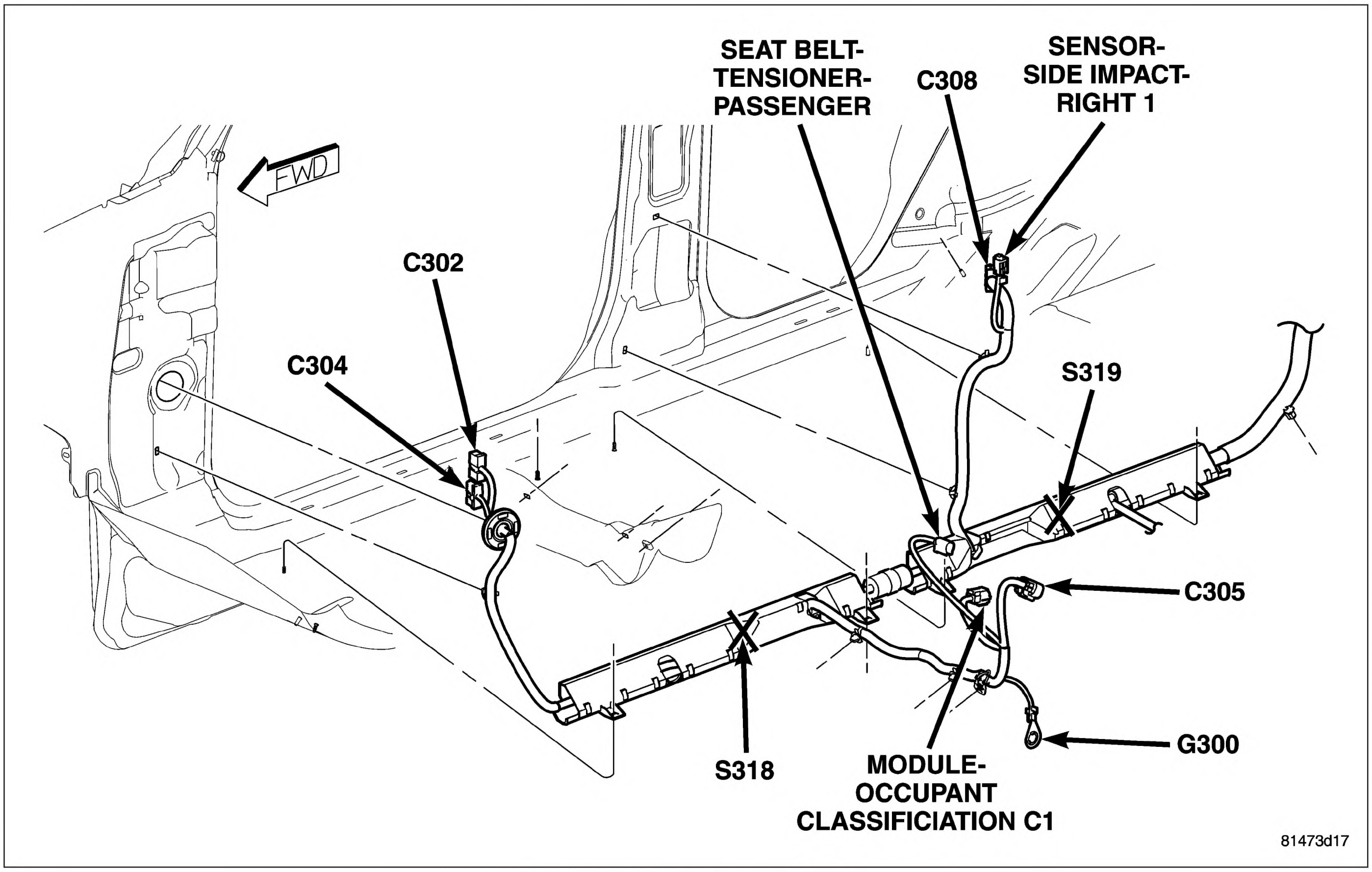

SEAT BELT-TENSIONER-PASSENGER
C308
SENSOR-SIDE IMPACT-RIGHT 1
FWD
C302
C304
S319
C305
G300
S318
MODULE-OCCUPANT CLASSIFICIATION C1
81473d17

Fig. 45 RIGHT SIDE BODY

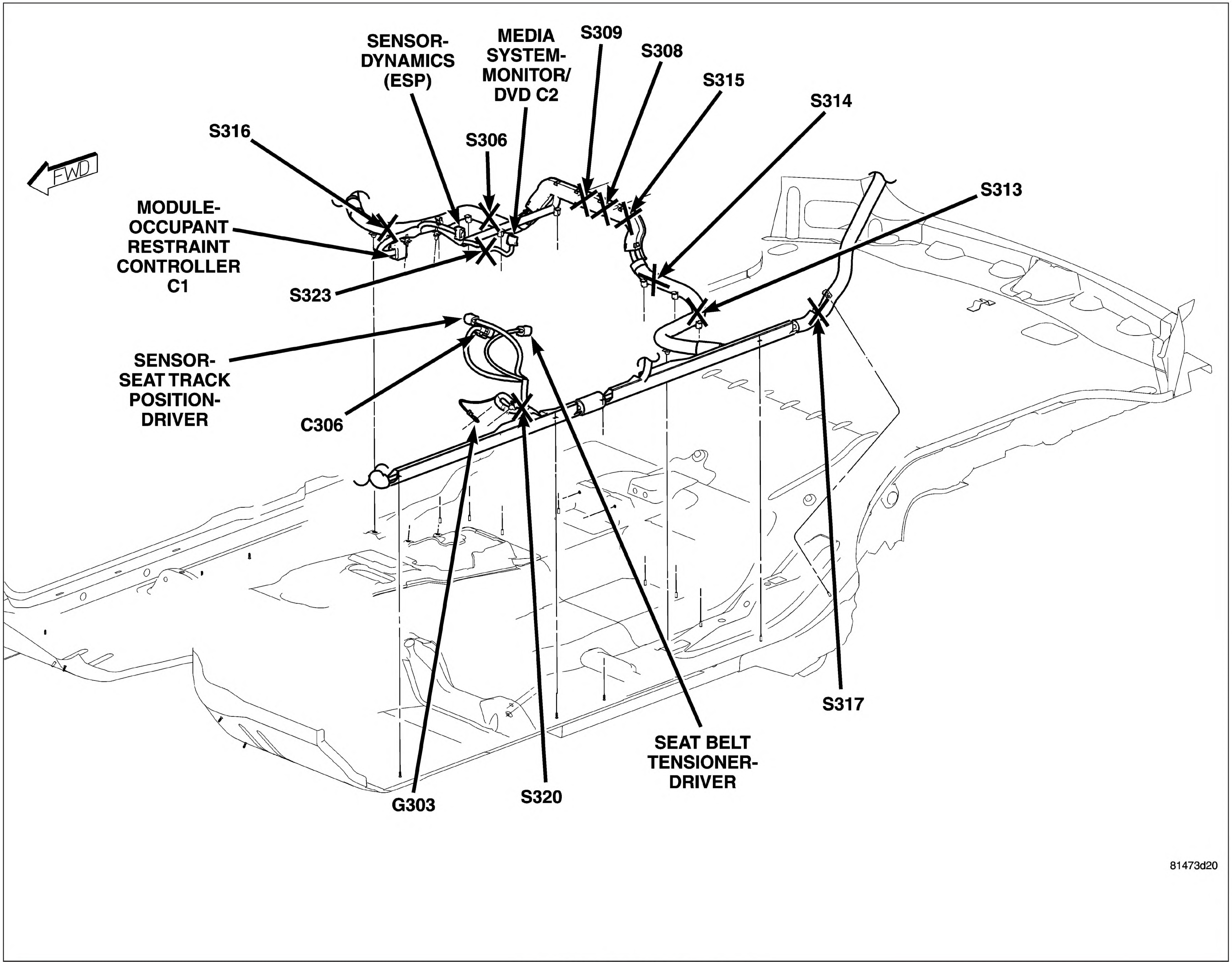

SENSOR-
DYNAMICS
(ESP)
MEDIA
SYSTEM-
MONITOR/
DVD C2
S309
S308
S315
S314
S316
S306
S313
FWD
MODULE-
OCCUPANT
RESTRAINT
CONTROLLER
C1
S323
SENSOR-
SEAT TRACK
POSITION-
DRIVER
C306
S317
SEAT BELT
TENSIONER-
DRIVER
G303
S320
81473d20

Fig. 46 LEFT SIDE BODY

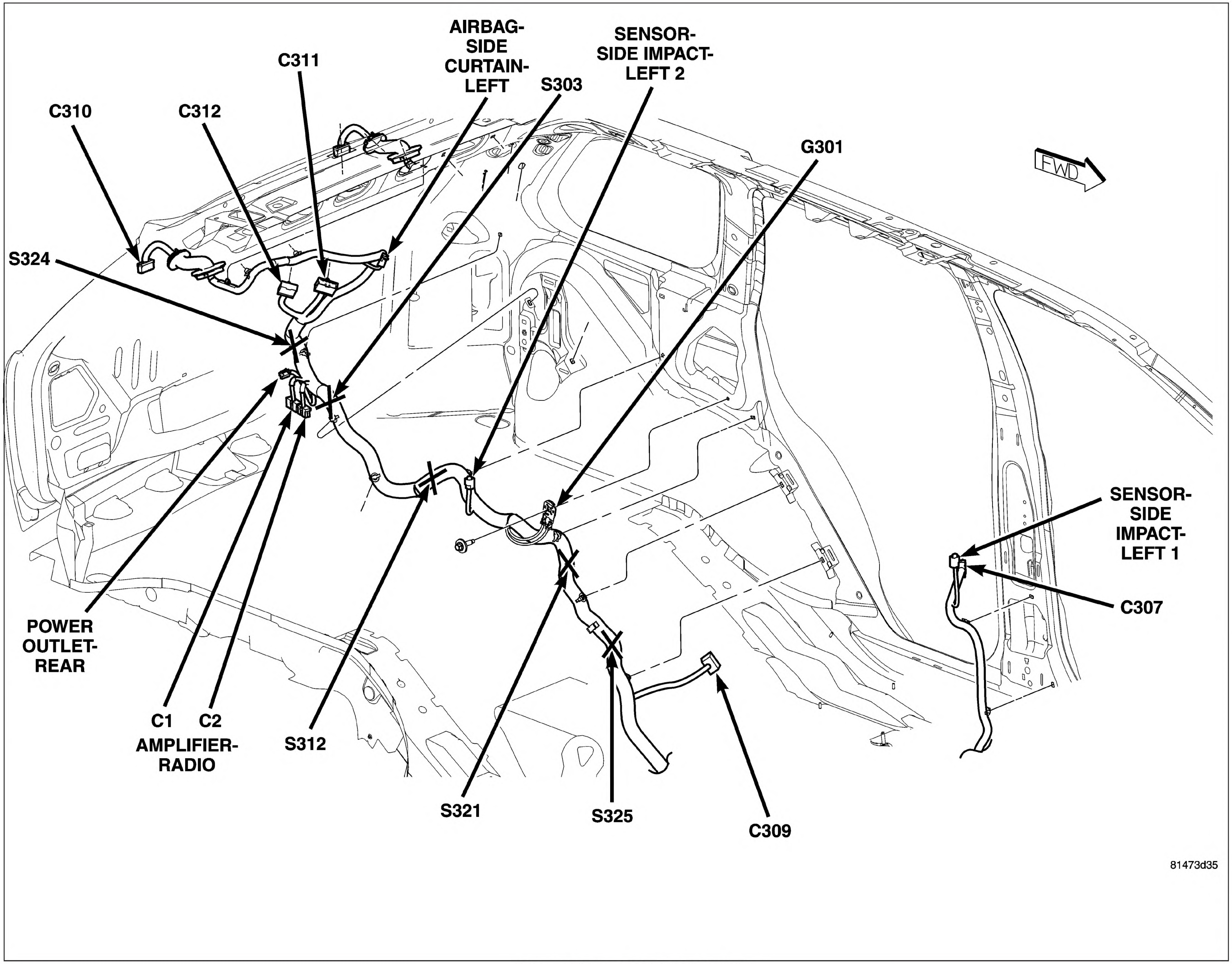

AIRBAG-
SIDE
CURTAIN-
LEFT
SENSOR-
SIDE IMPACT-
LEFT 2
C311
S303
C310
C312
G301
FWD
S324
SENSOR-
SIDE
IMPACT-
LEFT 1
C307
POWER
OUTLET-
REAR
C1 C2
AMPLIFIER-
RADIO
S312
S321
S325
C309
81473d35

Fig. 47 LEFT REAR BODY

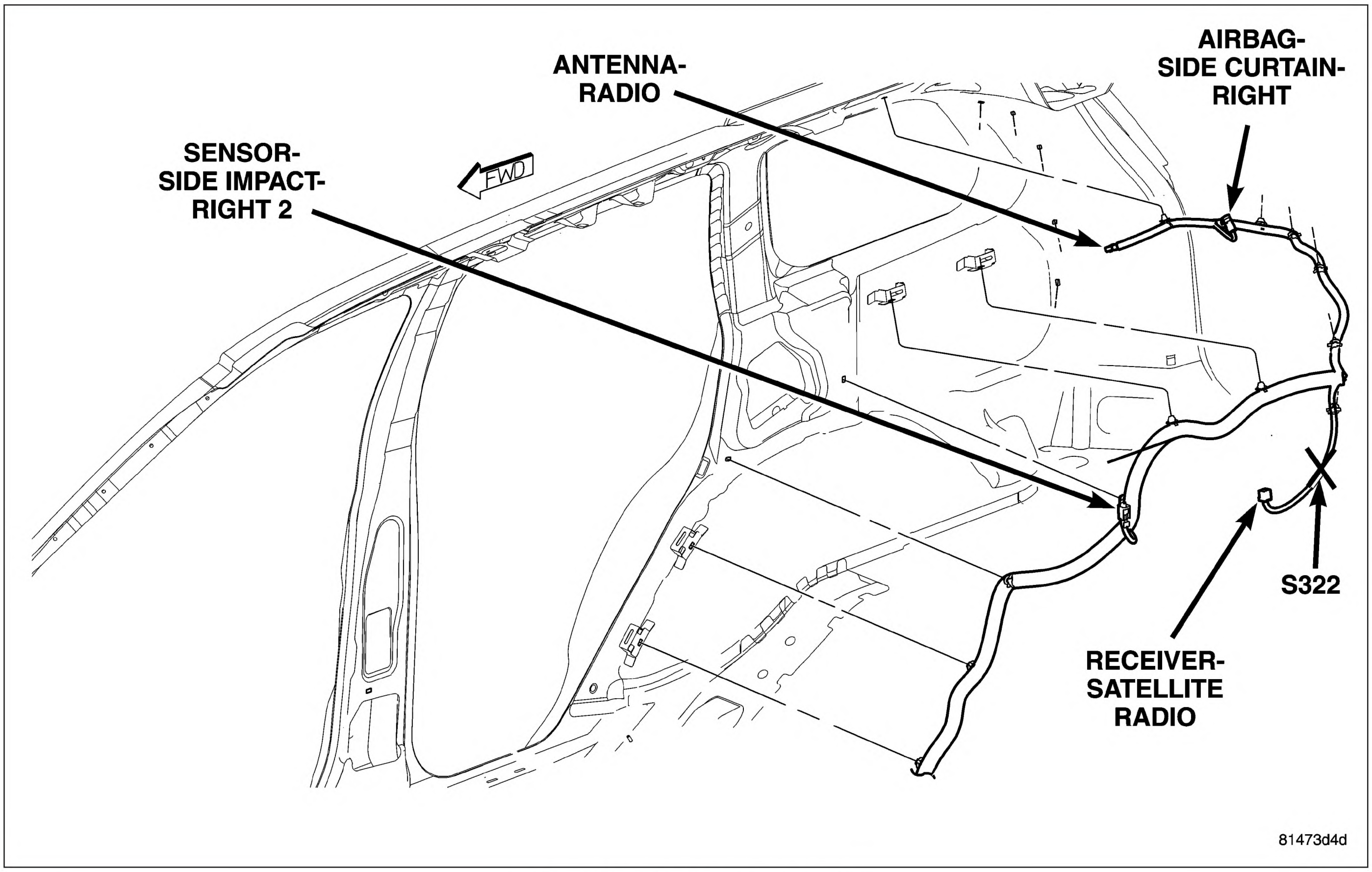

ANTENNA-
RADIO
AIRBAG-
SIDE CURTAIN-
RIGHT
SENSOR-
SIDE IMPACT-
RIGHT 2
FWD
S322
RECEIVER-
SATELLITE
RADIO
81473d4d

Fig. 48 RIGHT REAR BODY

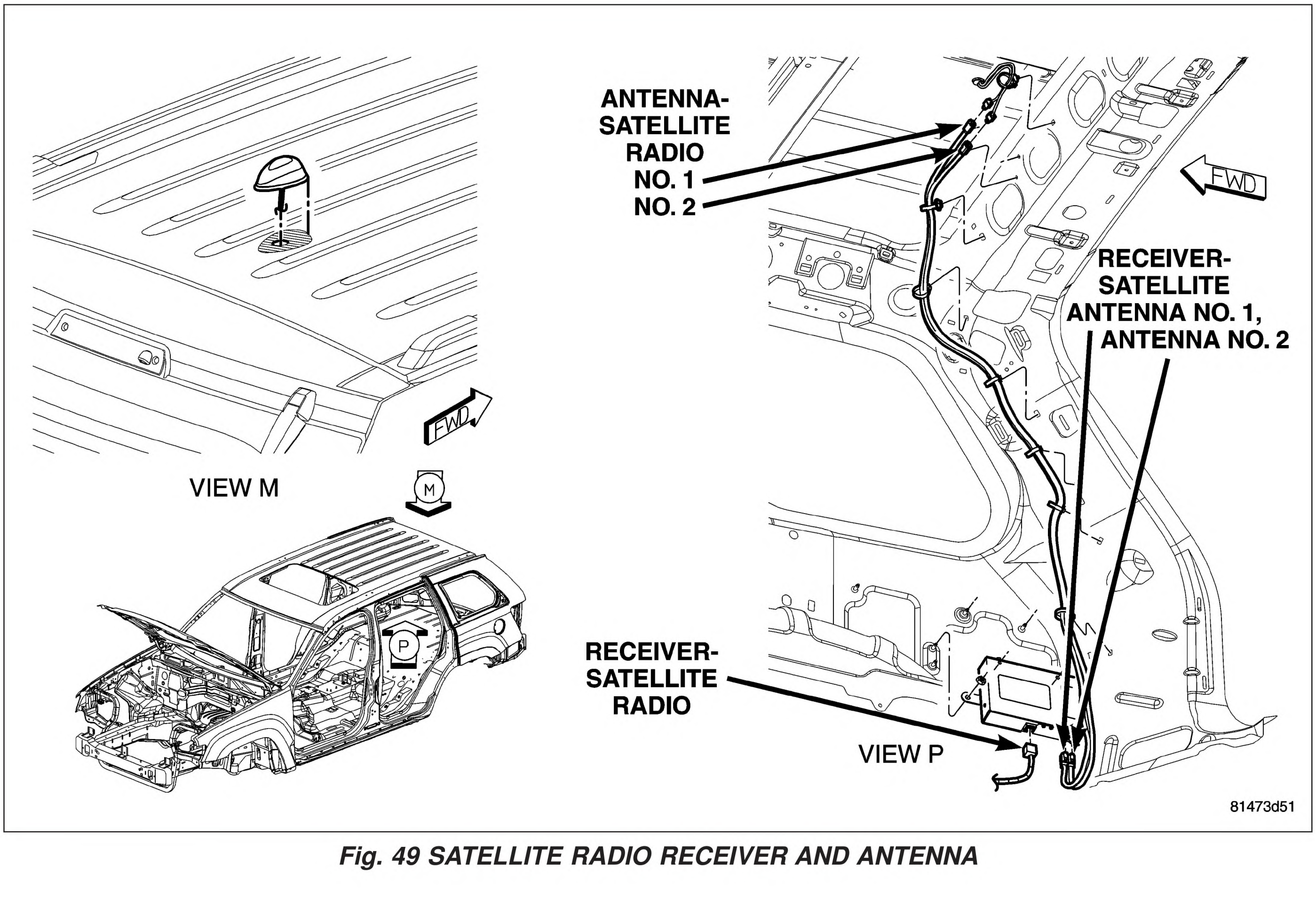

ANTENNA-
SATELLITE
RADIO
NO. 1
NO. 2
FWD
RECEIVER-
SATELLITE
ANTENNA NO. 1,
ANTENNA NO. 2
FWD
VIEW M
M
P
RECEIVER-
SATELLITE
RADIO
VIEW P
81473d51

Fig. 49 SATELLITE RADIO RECEIVER AND ANTENNA

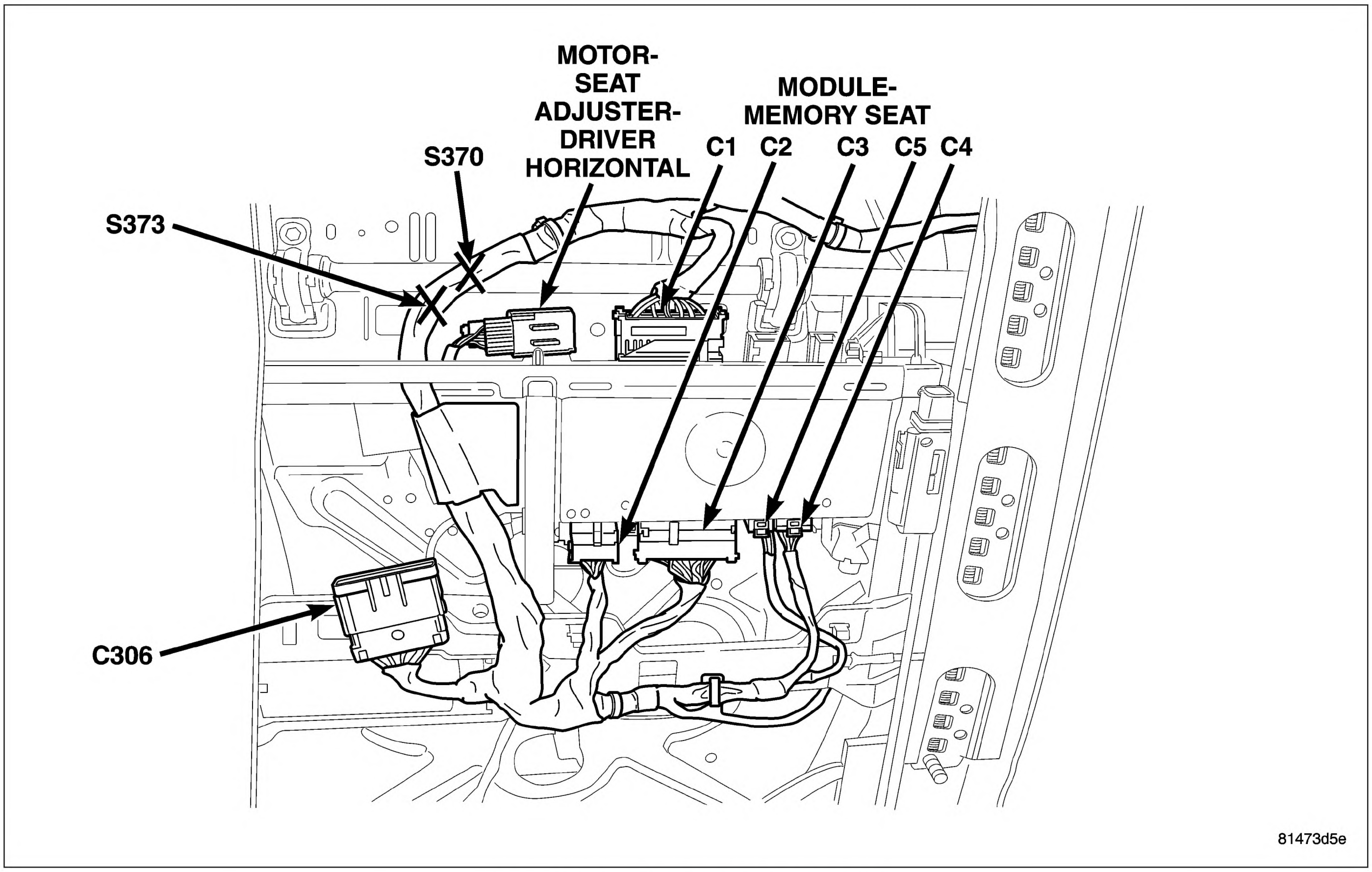

MOTOR-
SEAT
ADJUSTER-
DRIVER
HORIZONTAL
MODULE-
MEMORY SEAT
C1
C2
C3
C5
C4
S370
S373
C306
81473d5e

Fig. 50 DRIVER SEAT BOTTOM

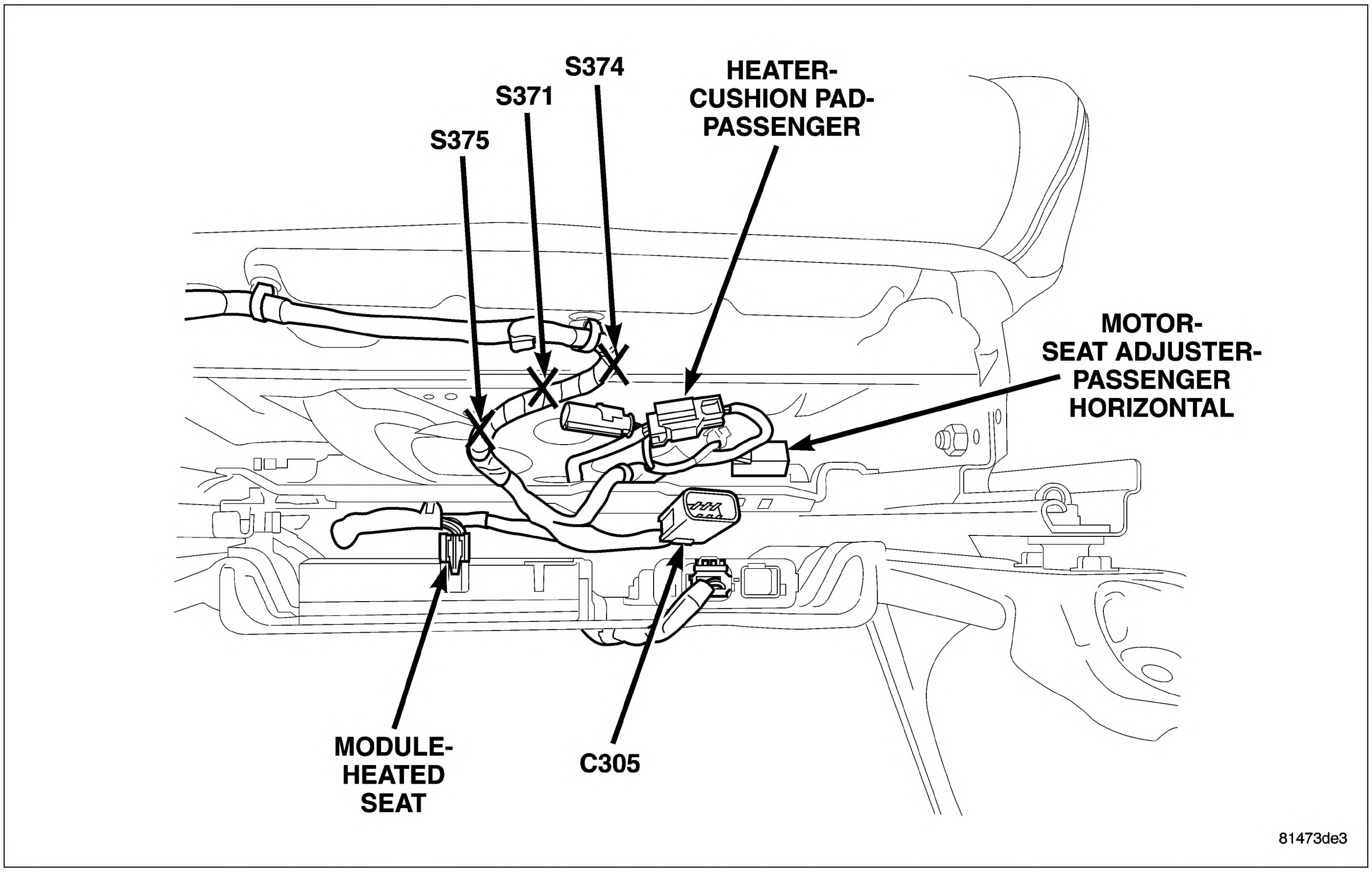

S374
S371
S375
HEATER-
CUSHION PAD-
PASSENGER
MOTOR-
SEAT ADJUSTER-
PASSENGER
HORIZONTAL
MODULE-
HEATED
SEAT
C305
81473de3

Fig. 51 PASSENGER SEAT BOTTOM

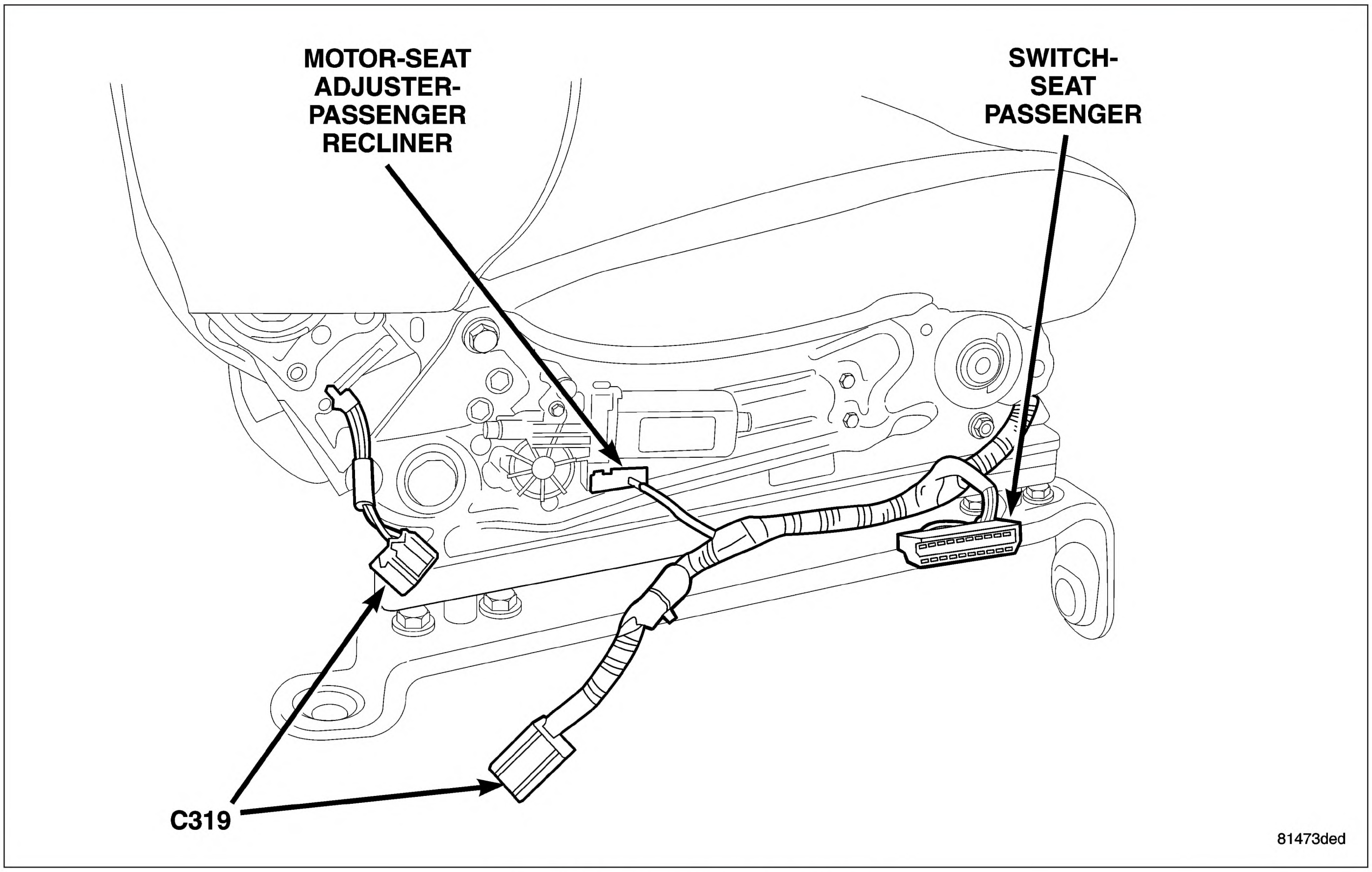

MOTOR-SEAT ADJUSTER-PASSENGER RECLINER
SWITCH-SEAT PASSENGER
C319
81473ded

Fig. 52 PASSENGER SEAT SIDE

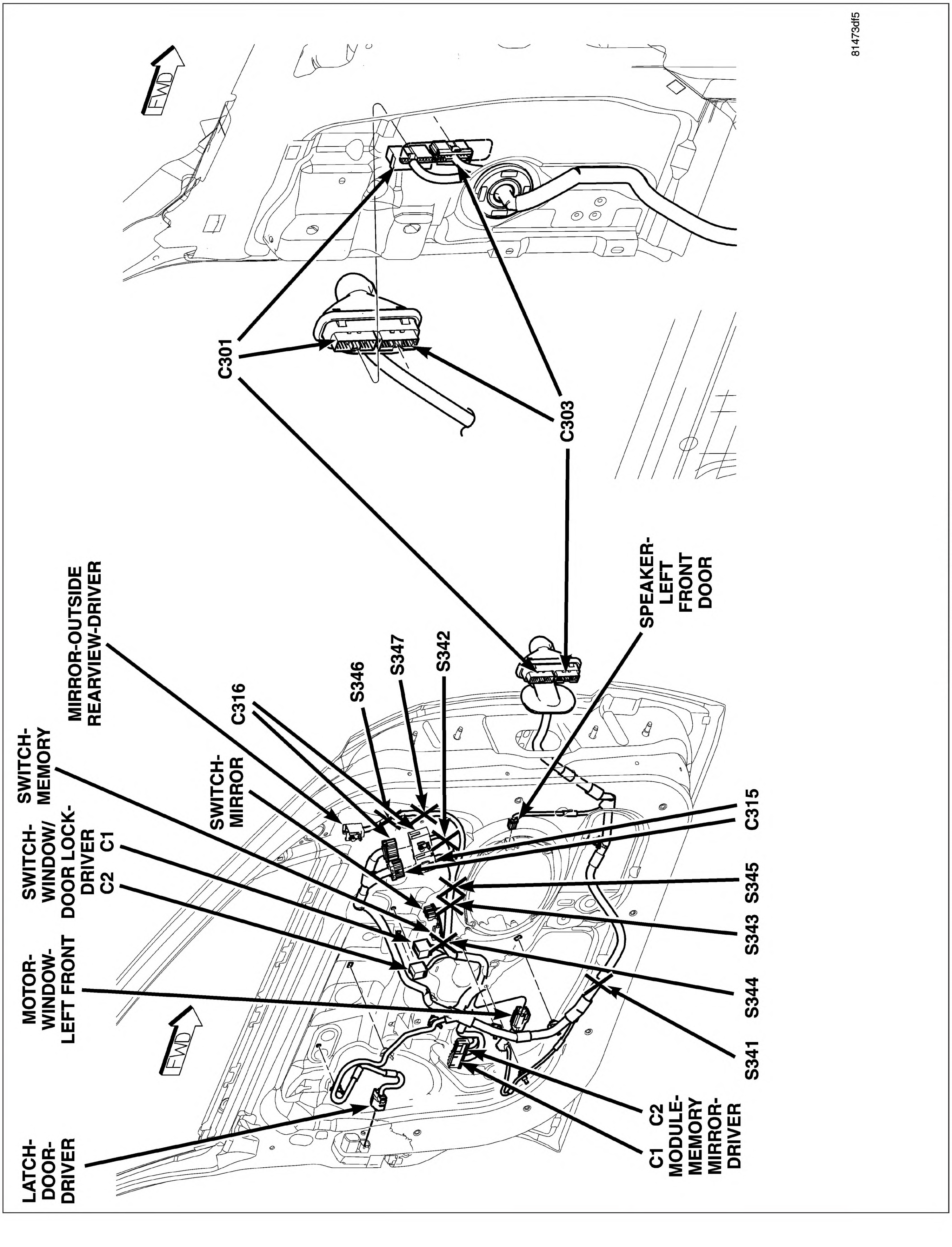

81473df5
FWD
C301
C303
SPEAKER-LEFT FRONT DOOR
MIRROR-OUTSIDE REARVIEW-DRIVER
C316
S346
S347
S342
SWITCH-MEMORY
SWITCH-MIRROR
SWITCH-WINDOW/DOOR LOCK-DRIVER
C2 C1
MOTOR-WINDOW-LEFT FRONT
FWD
LATCH-DOOR-DRIVER
C315
S345
S343
S344
S341
C1 C2
MODULE-MEMORY MIRROR-DRIVER

Fig. 53 DRIVER DOOR

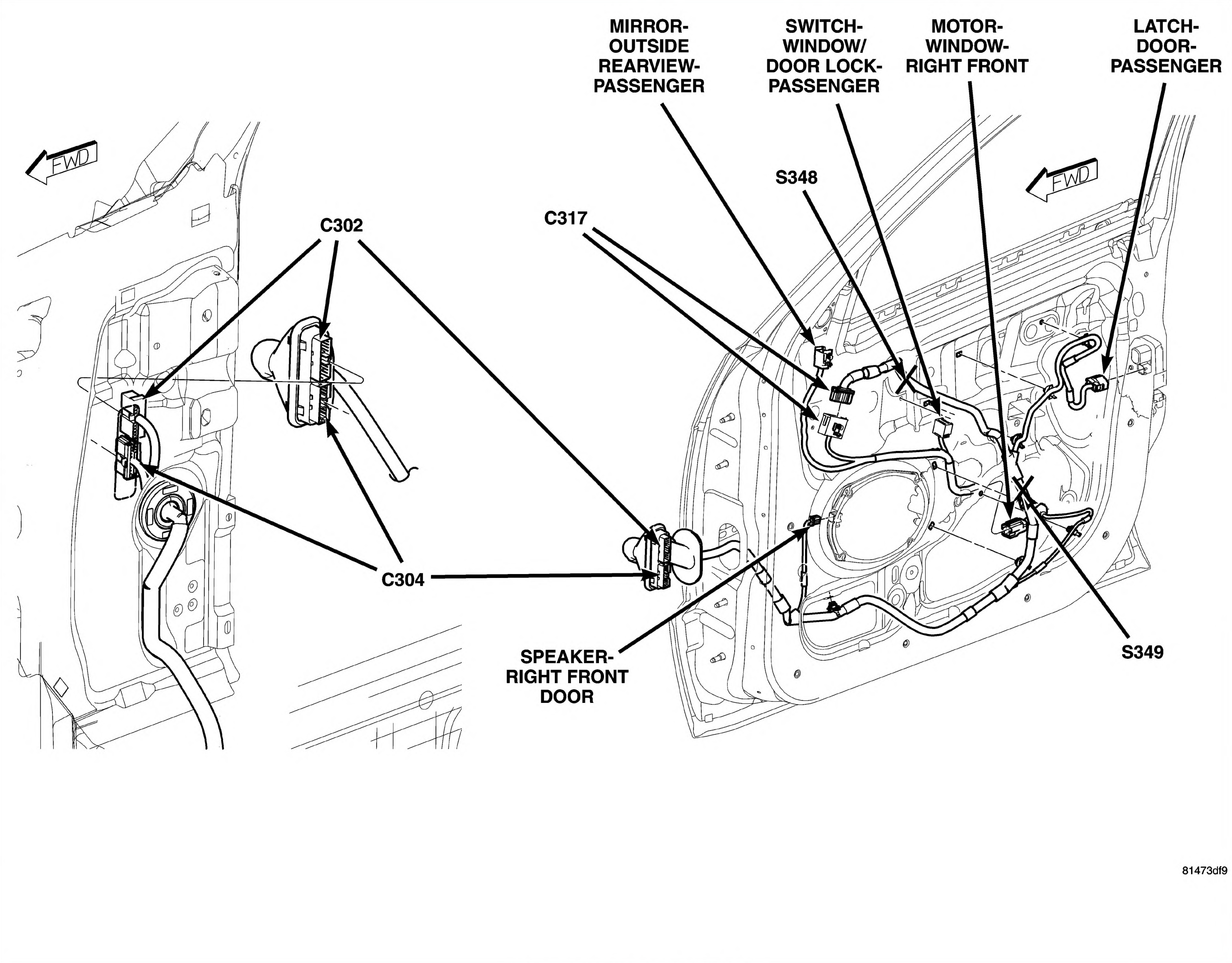

MIRROR-
OUTSIDE
REARVIEW-
PASSENGER
SWITCH-
WINDOW/
DOOR LOCK-
PASSENGER
MOTOR-
WINDOW-
RIGHT FRONT
LATCH-
DOOR-
PASSENGER
FWD
S348
C317
C302
FWD
C304
SPEAKER-
RIGHT FRONT
DOOR
S349
81473df9

Fig. 54 PASSENGER DOOR

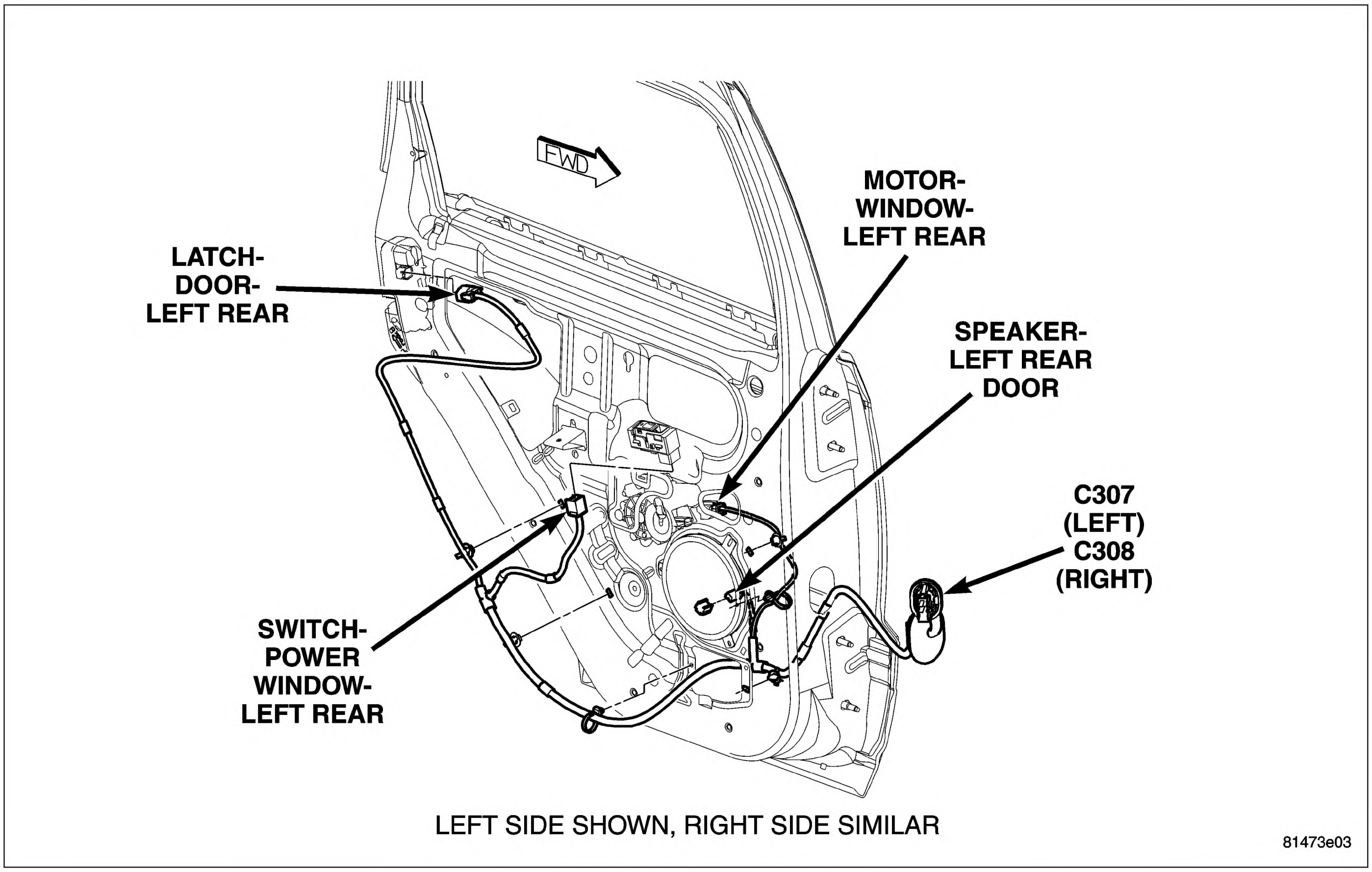

FWD
LATCH-
DOOR-
LEFT REAR
MOTOR-
WINDOW-
LEFT REAR
SPEAKER-
LEFT REAR
DOOR
C307
(LEFT)
C308
(RIGHT)
SWITCH-
POWER
WINDOW-
LEFT REAR
LEFT SIDE SHOWN, RIGHT SIDE SIMILAR
81473e03

Fig. 55 REAR DOOR

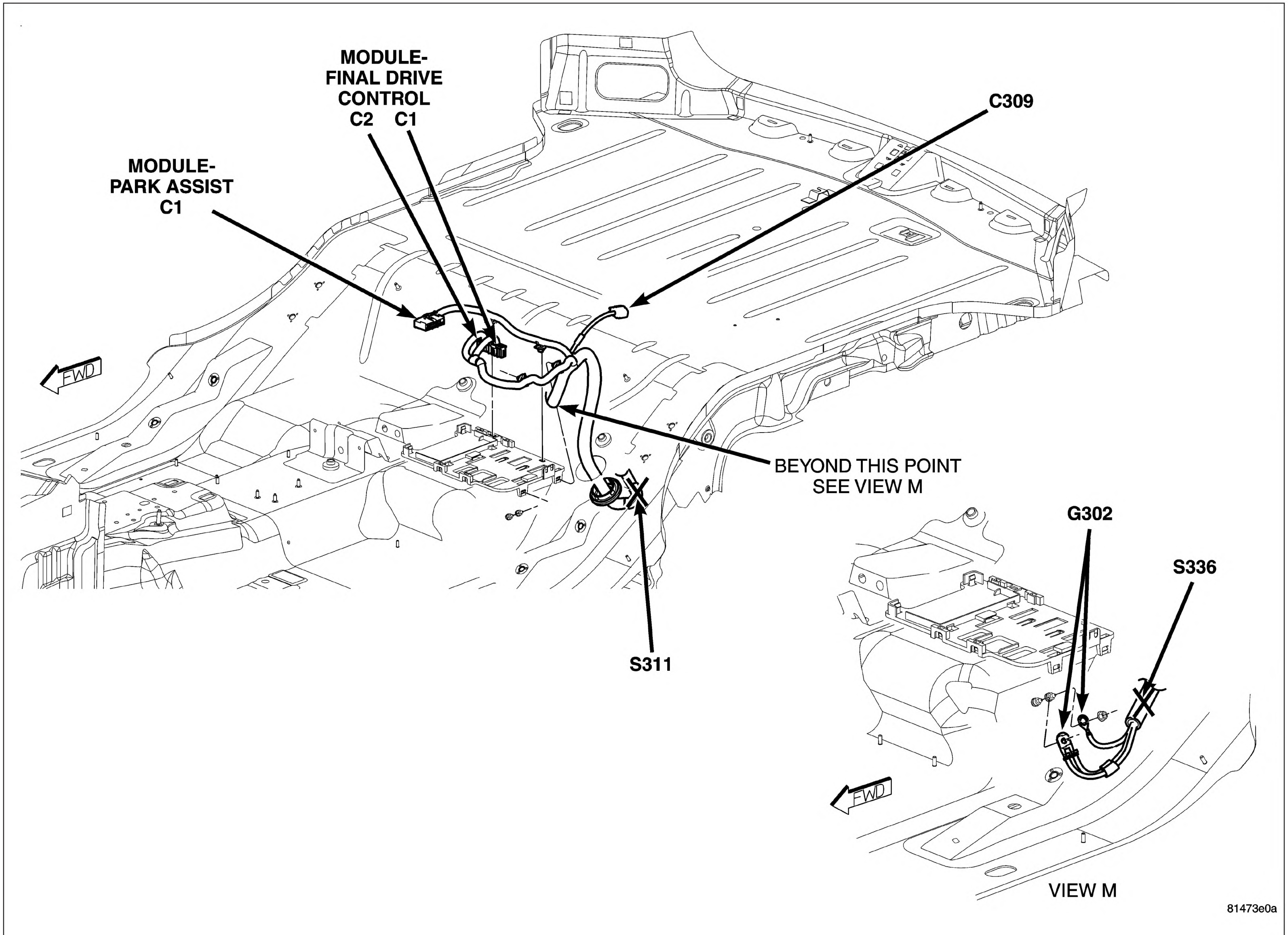

MODULE-
FINAL DRIVE
CONTROL
C2 C1
MODULE-
PARK ASSIST
C1
C309
FWD
BEYOND THIS POINT
SEE VIEW M
S311
G302
S336
FWD
VIEW M
81473e0a

Fig. 56 CENTER UNDER BODY

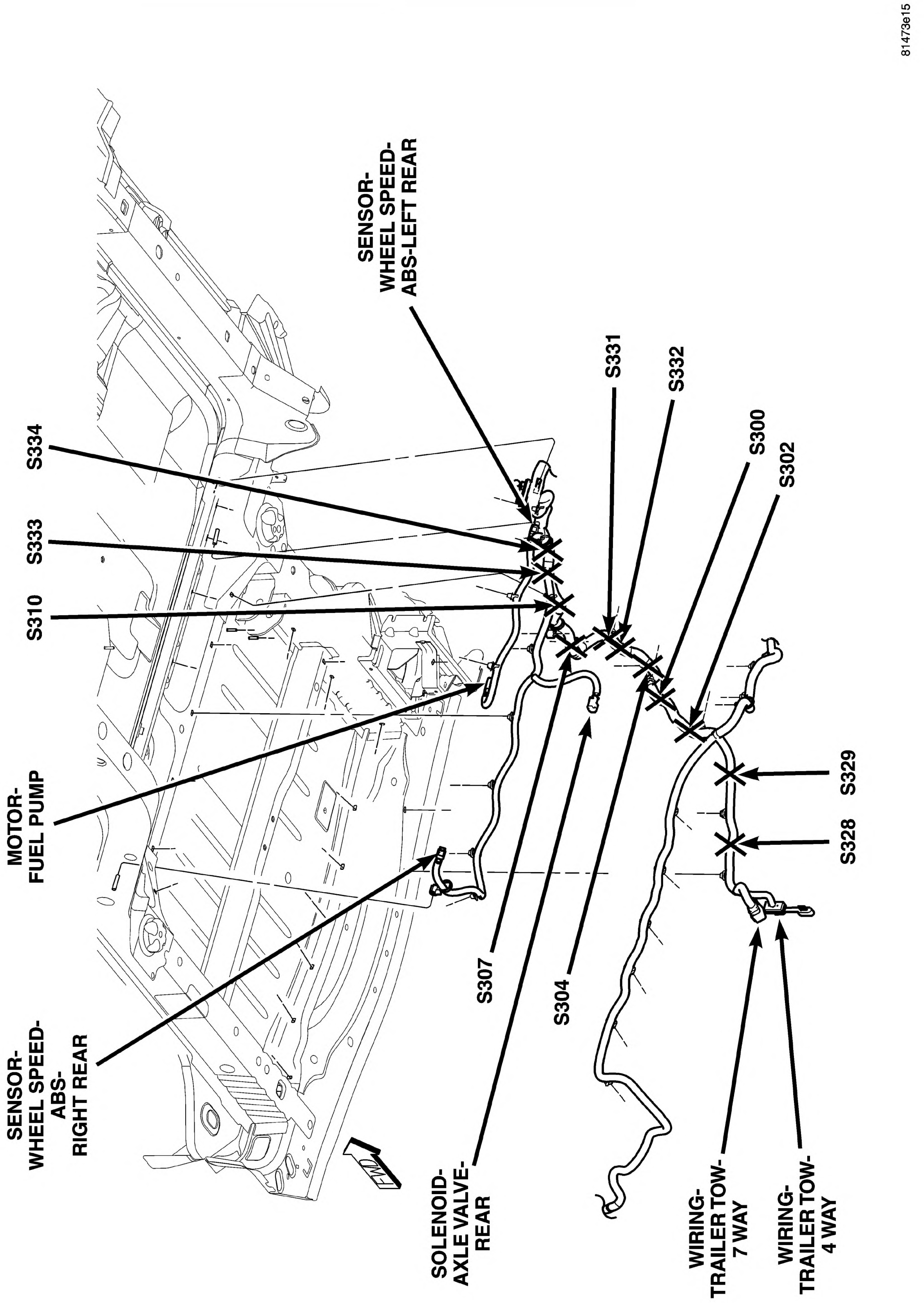

81473e15
SENSOR-WHEEL SPEED-ABS-LEFT REAR
S334
S333
S310
S331
S332
S300
S302
MOTOR-FUEL PUMP
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
S307
S304
S329
S328
FWD
SOLENOID-AXLE VALVE-REAR
WIRING-TRAILER TOW-7 WAY
WIRING-TRAILER TOW-4 WAY

Fig. 57 REAR UNDERBODY

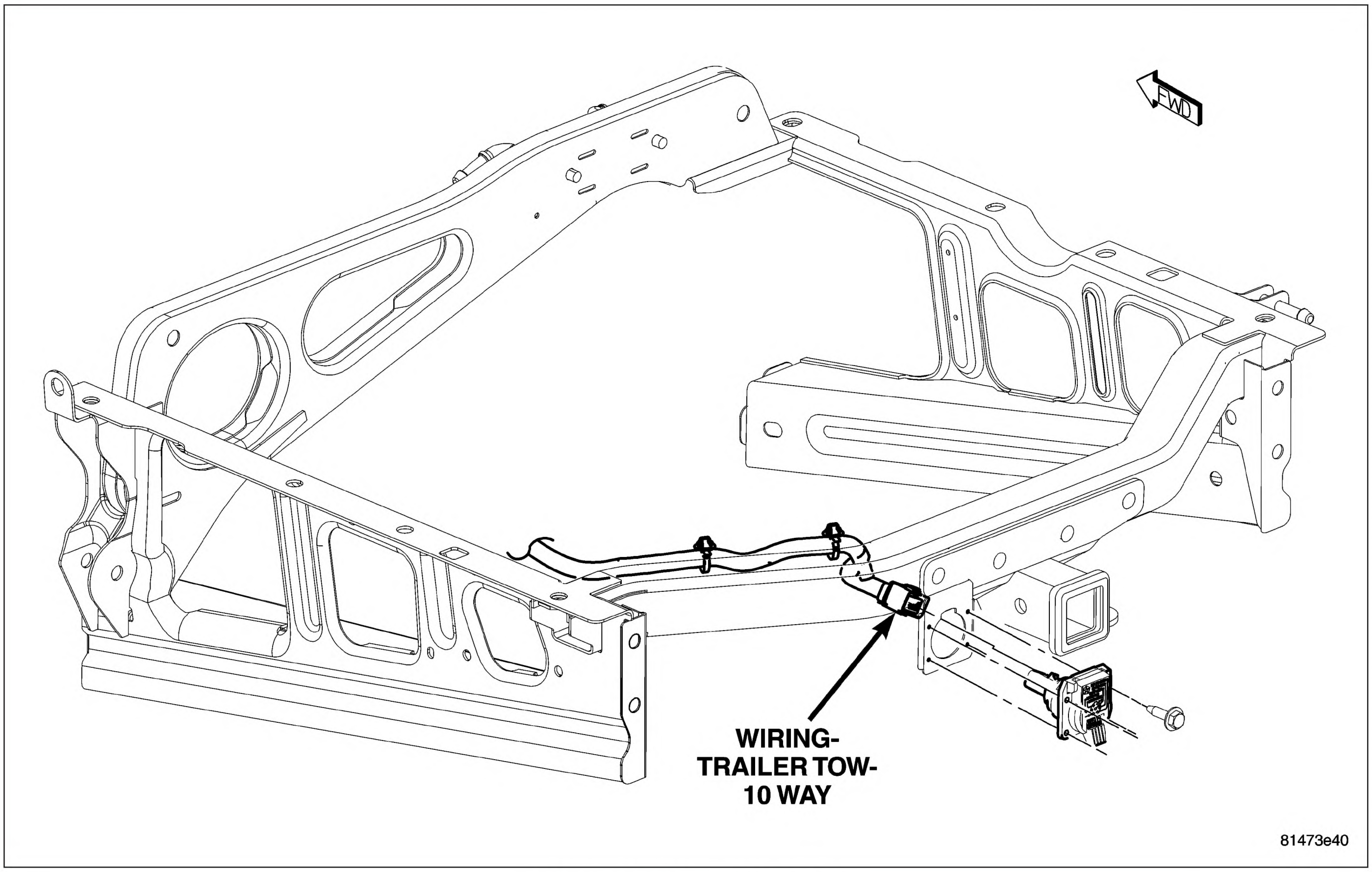

FWD
WIRING-
TRAILER TOW-
10 WAY
81473e40

Fig. 58 REAR CHASSIS

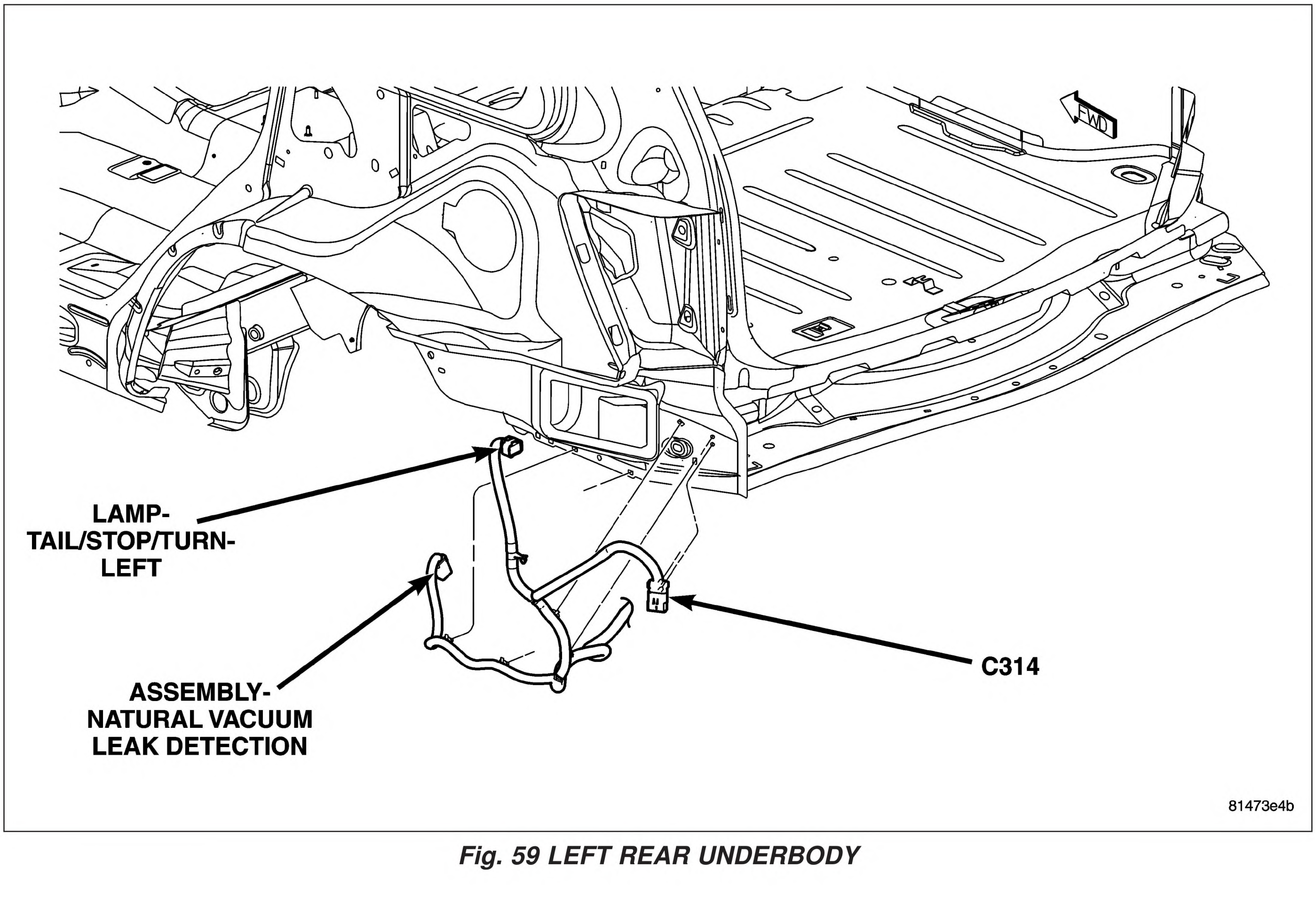

FWD
LAMP-
TAIL/STOP/TURN-
LEFT
C314
ASSEMBLY-
NATURAL VACUUM
LEAK DETECTION
81473e4b

Fig. 59 LEFT REAR UNDERBODY

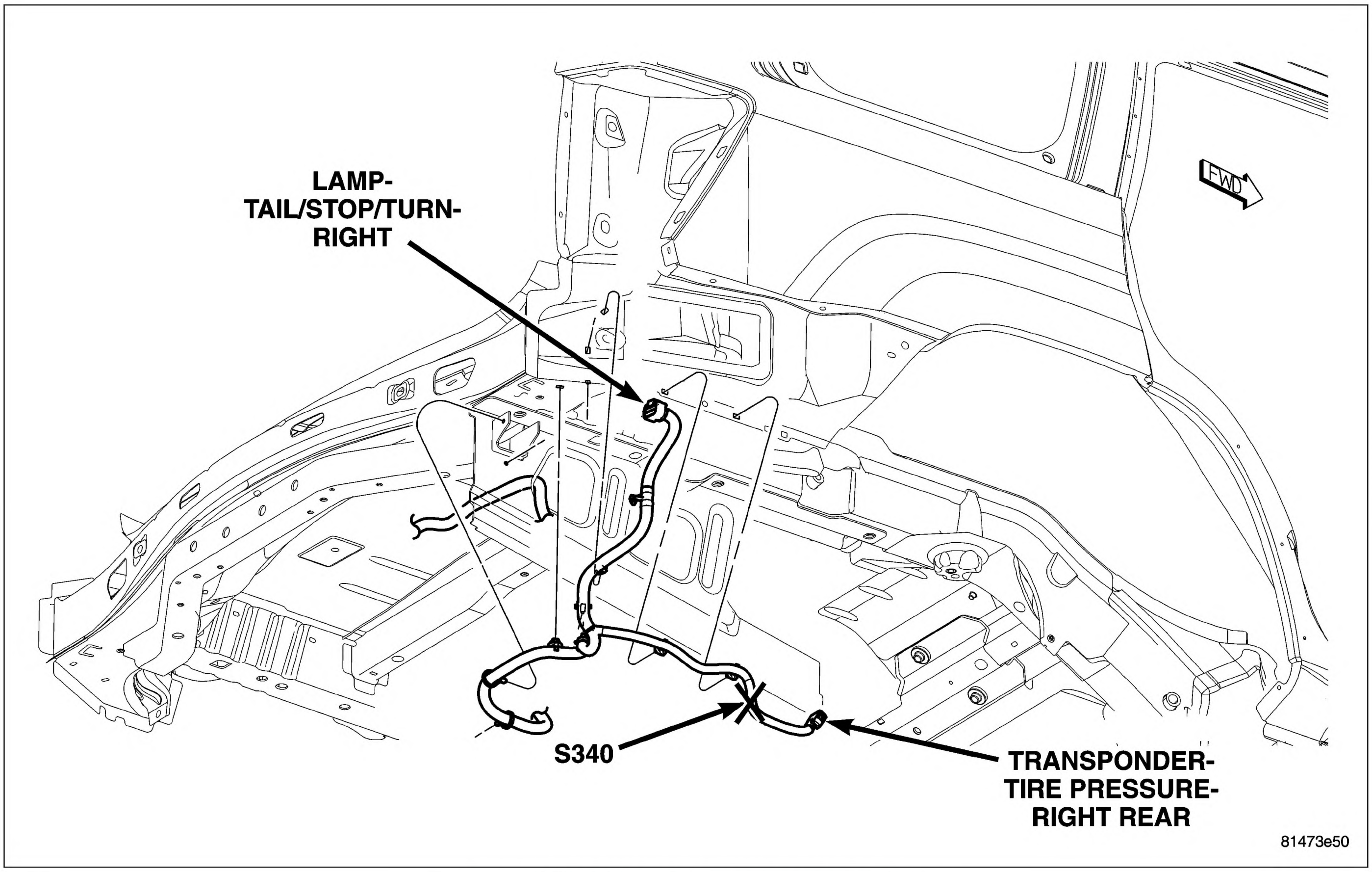

LAMP-
TAIL/STOP/TURN-
RIGHT
FWD
S340
TRANSPONDER-
TIRE PRESSURE-
RIGHT REAR
81473e50

Fig. 60 RIGHT REAR UNDERBODY

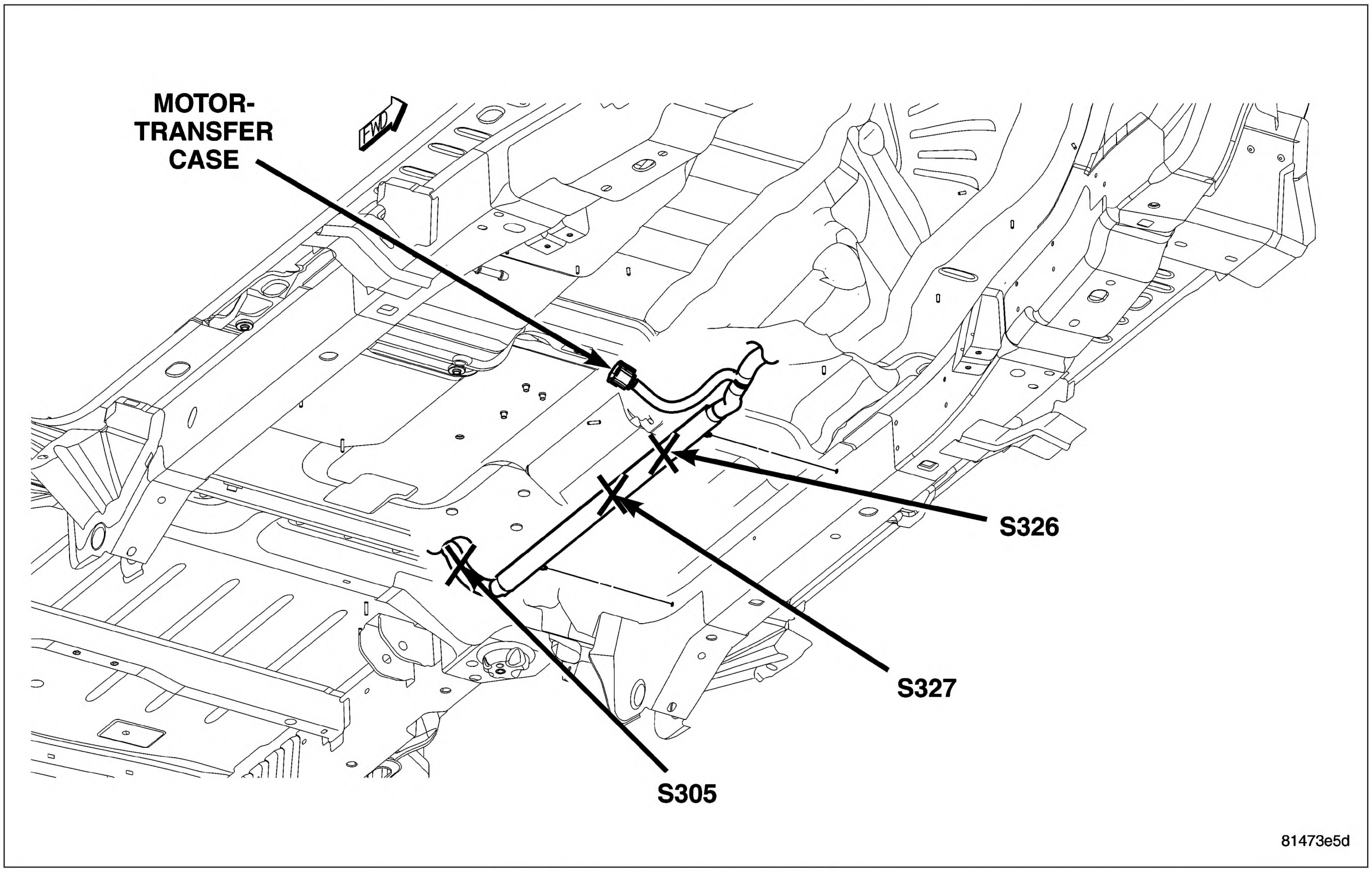

MOTOR-
TRANSFER
CASE
FWD
S326
S327
S305
81473e5d

Fig. 61 CENTER UNDERBODY

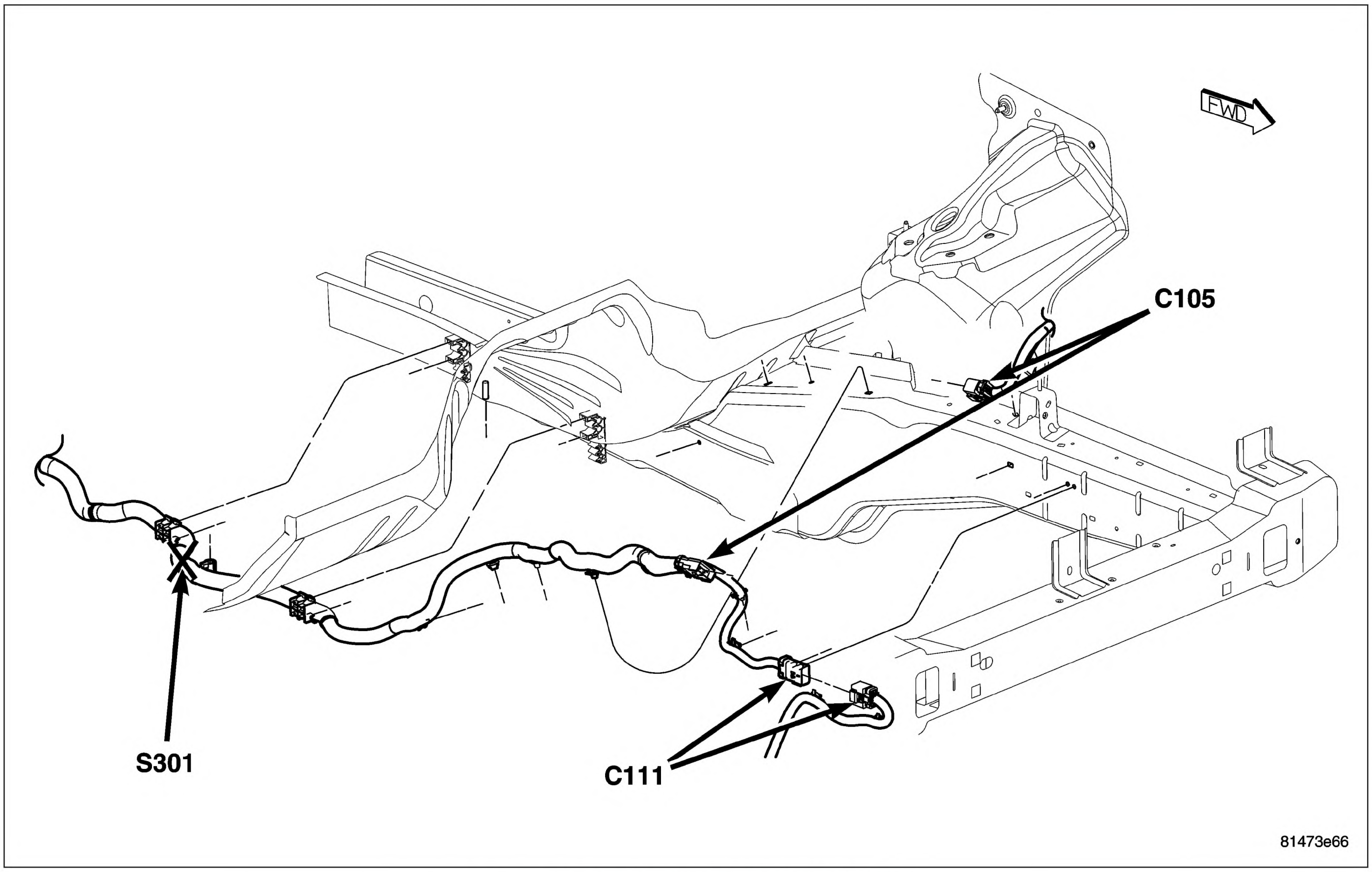

FWD
C105
S301
C111
81473e66

Fig. 62 LEFT FRONT UNDERBODY

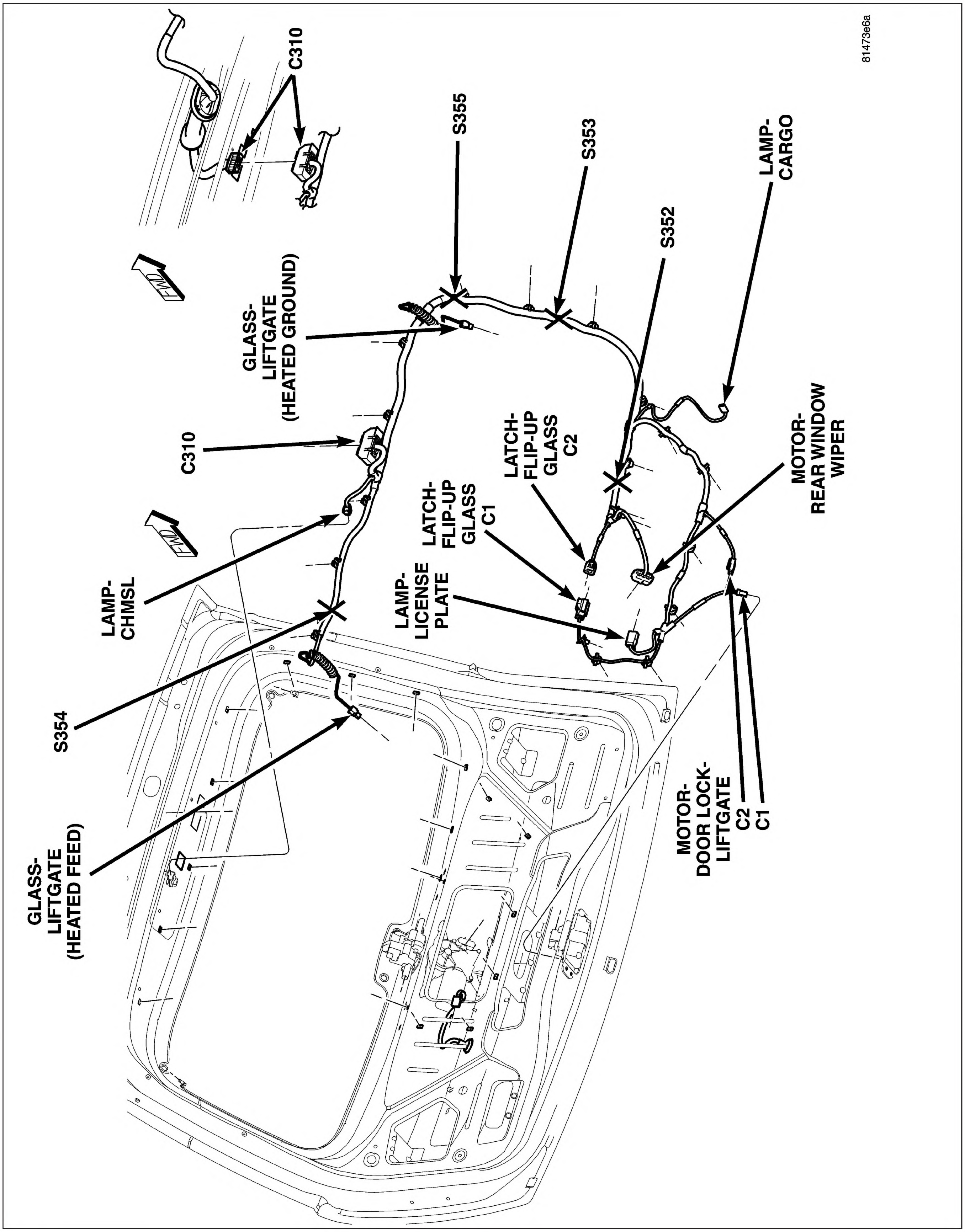

C310
S355
S353
S352
LAMP-
CARGO
GLASS-
LIFTGATE
(HEATED GROUND)
C310
LATCH-
FLIP-UP
GLASS
C2
MOTOR-
REAR WINDOW
WIPER
LATCH-
FLIP-UP
GLASS
C1
LAMP-
CHMSL
LAMP-
LICENSE
PLATE
S354
GLASS-
LIFTGATE
(HEATED FEED)
MOTOR-
DOOR LOCK-
LIFTGATE
C2
C1
FWD
FWD
81473e6a

Fig. 63 LIFTGATE

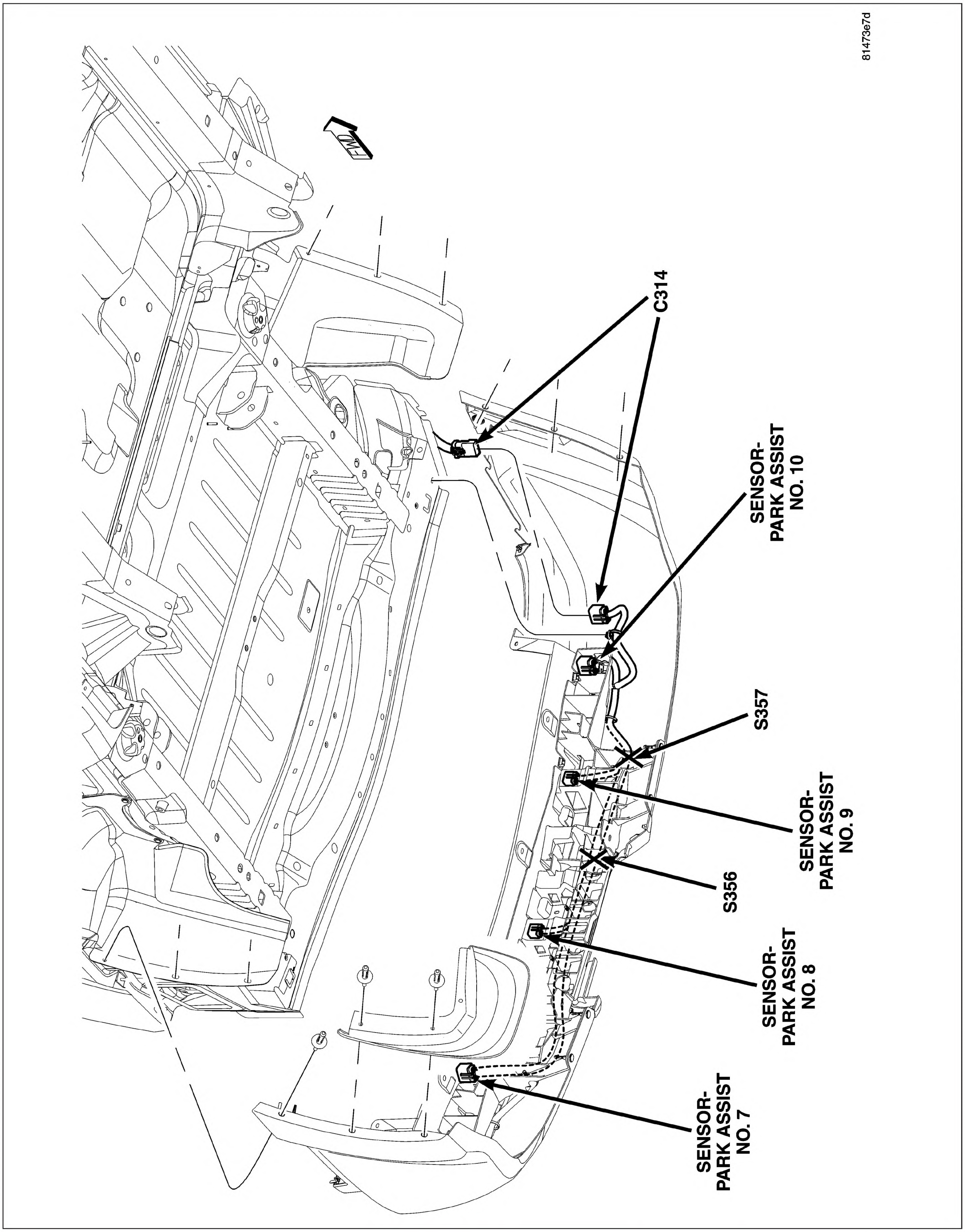

81473e7d
FWD
C314
SENSOR-PARK ASSIST NO. 10
S357
SENSOR-PARK ASSIST NO. 9
S356
SENSOR-PARK ASSIST NO. 8
SENSOR-PARK ASSIST NO. 7

Fig. 64 REAR BUMPER

8W-97 POWER DISTRIBUTION

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POWER OUTLET
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POWER DISTRIBUTION

DESCRIPTION

This group covers the various standard and optional power distribution components used on this model. The power distribution system for this vehicle consists of the following components:

- Front Control Module (FCM)
- Integrated Power Module (IPM)
- Power Distribution Center (PDC)
- Junction Block (JB)
- Power Outlets

The power distribution system also incorporates various types of circuit control and protection features, including:

- Automatic resetting circuit breakers
- Blade-type fuses
- Bus bars
- Cartridge fuses
- Circuit splice blocks
- Flashers
- Fusible links
- Standard and Micro-Relays

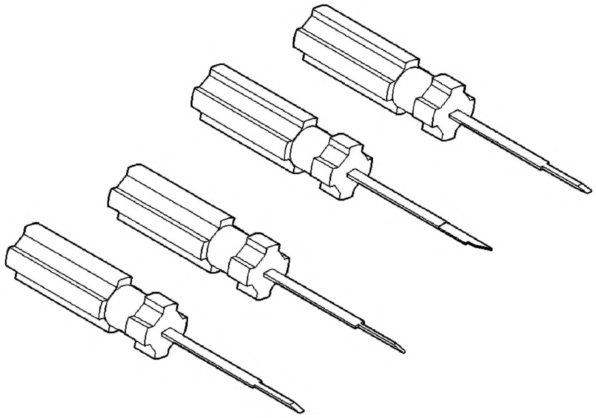
Following are general descriptions of the major components in the power distribution system. See the owner's manual in the vehicle glove box for more information on the features and use of all of the power distribution system components. Refer to Wiring Diagrams for complete circuit diagrams.

OPERATION

The power distribution system for this vehicle is designed to provide safe, reliable, and centralized distribution points for the electrical current required to operate all of the standard and optional factory-installed electrical and electronic powertrain, chassis, safety, security, comfort and convenience systems. At the same time, the power distribution system was designed to provide ready access to these electrical distribution points for the vehicle technician to use when conducting diagnosis and repair of faulty circuits. The power distribution system can also prove useful for the sourcing of additional electrical circuits that may be required to provide the electrical current needed to operate accessories that the vehicle owner may choose to have installed in the aftermarket.

SPECIAL TOOLS

POWER DISTRIBUTION SYSTEMS

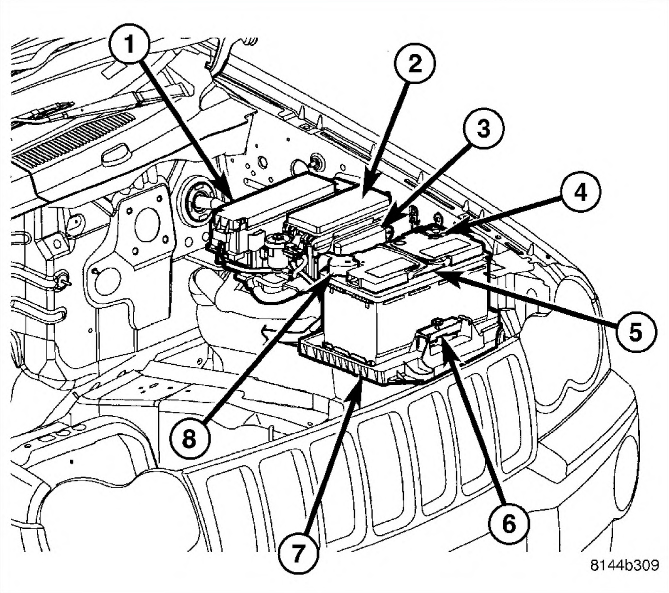


INTEGRATED POWER MODULE

DESCRIPTION

The Integrated Power Module (IPM) (2) is a combination of a printed circuit board based module that contains fuses and relays and the Front Control Module (FCM) (3). The FCM contains electronics that control the IPM as well as other vehicle functions. The IPM connects directly to the battery positive via a stud located on top of the unit. The ground connection is via electrical connectors. The IPM provides the primary means of voltage distribution and protection for many vehicle systems.

The IPM (2) is located in the engine compartment, next to the battery (5) and in front of the Power Distribution Center (PDC) (1). It is secured to a bracket with three locating slots that snap onto the bracket tabs holding it securely in place. The printed circuit board portion of the IPM cannot be repaired and must be replaced if inoperative or damaged, (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/INTEGRATED POWER MODULE - REMOVAL).

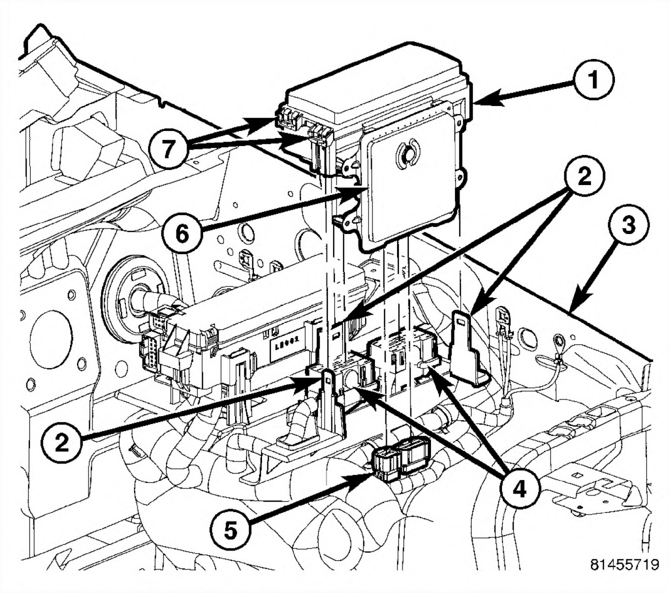


OPERATION

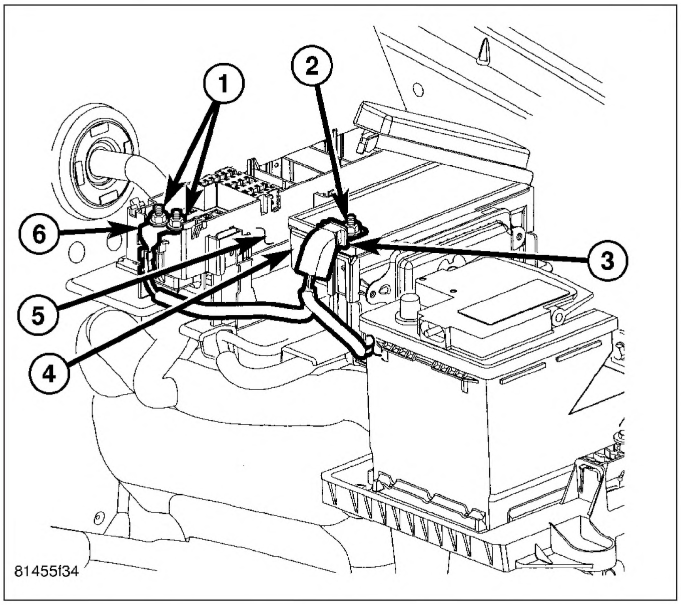
All of the current from the battery and the generator output enters the integrated power module via a stud on the top of the module. Internal connections of all of the power distribution center circuits is accomplished by a combination of bus bars and a printed circuit board.

REMOVAL

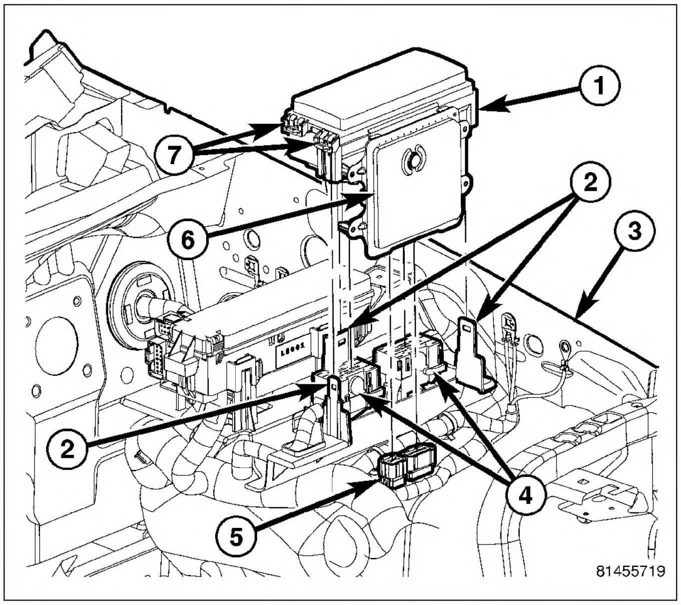
1. Disconnect and isolate the battery negative cable.
2. Remove the Integrated Power Module (IPM) cover by pulling up on the cover tabs (7) and pivoting the cover outward.



3. Remove the nut (2) from the IPM B+ terminal stud.
4. Remove the battery positive cable (3) from the IPM B+ terminal stud.



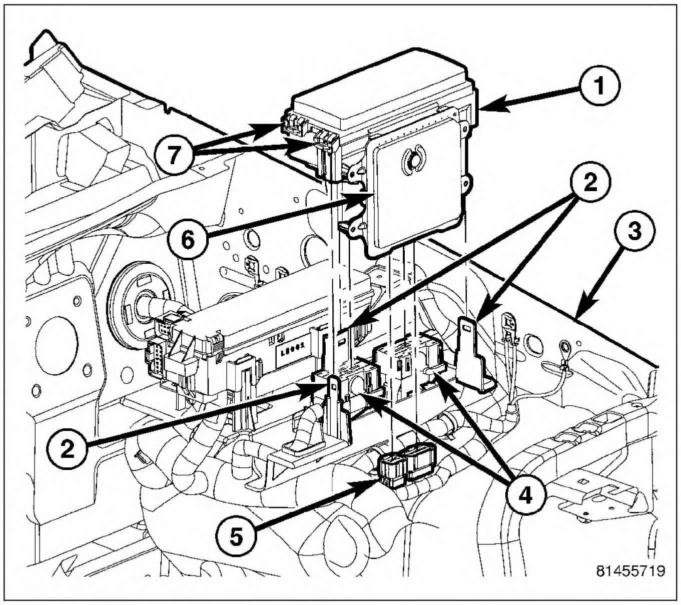
5. Using a suitable flat bladed tool, depress the three retaining clips and lift the IPM (1) straight up off of the bracket tabs (2).
6. Disconnect the two IPM connectors (4).
7. Disconnect the two Front Control Module (FCM) connectors (5).
8. Remove the IPM assembly from the vehicle.



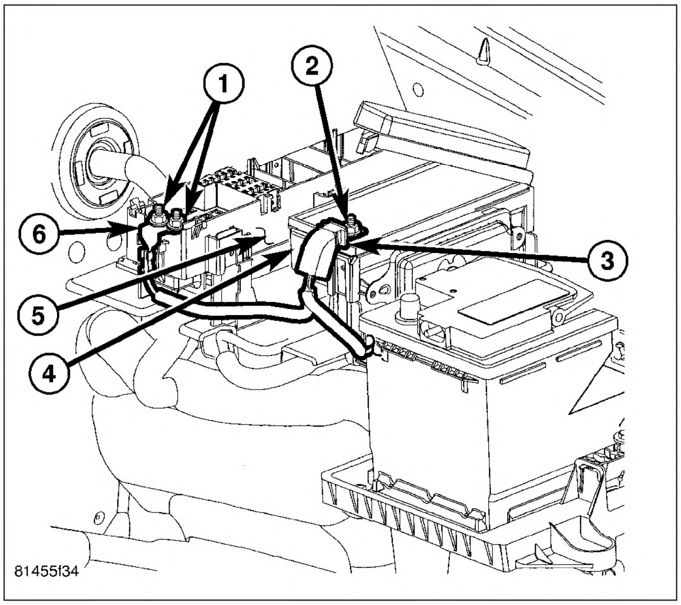
INSTALLATION

NOTE: If replacing the Integrated Power Module (IPM) (1) with a new assembly it will be necessary to transfer the circuit protection devices as well as the Front Control Module to the new IPM.

1. Position the IPM into the vehicle.
2. Connect the two Front Control Module (FCM) connectors (5).
3. Connect the two IPM connectors (4).
4. Position the IPM over the three bracket tabs (2) and apply downward pressure until the retaining clips snap into place securely.



5. Install the battery positive cable (3) from the IPM B+ terminal stud.
6. Install the nut (2) from the IPM B+ terminal stud.
7. Close the IPM cover ensuring the locking tabs snap firmly in place.
8. Connect the battery negative cable.



IOD FUSE

DESCRIPTION

All vehicles are equipped with an Ignition-Off Draw (IOD) fuse that is disconnected within the Integrated Power Module when the vehicle is shipped from the factory. Dealer personnel are to reconnect the IOD fuse in the Integrated Power Module as part of the preparation procedures performed just prior to new vehicle delivery. The IOD fuse can be removed to avoid discharging the battery by disconnecting non-essential, low-current memory functions that are normally on at all times. A detent on the IOD fuse holder allows it to be stored in its normal cavity but out of contact. The holder is pushed into place to restore power to the systems it supplies. The following circuits are protected by the IOD fuse:

- Cluster (CCN)
- Diagnostic Connector
- Map Lamps
- Glove Box Lamp
- Courtesy Lamps
- Radio

OPERATION

The term ignition-off draw identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. The IOD fuse feeds the memory and sleep mode functions for some of the electronic modules in the vehicle as well as various other accessories that require battery current when the ignition switch is in the Off position. The only reason the IOD fuse is disconnected is to reduce the normal IOD of the vehicle electrical system during new vehicle transportation and pre-delivery storage to reduce battery depletion, while still allowing vehicle operation so that the vehicle can be loaded, unloaded and moved as needed.

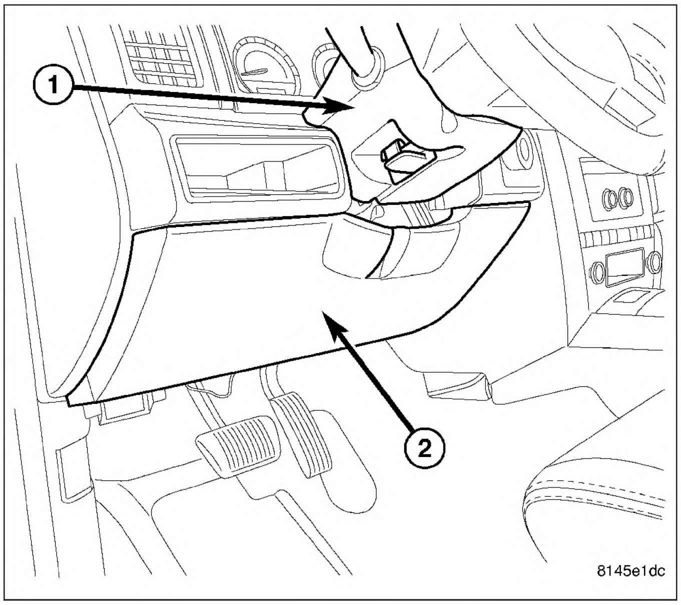
The IOD fuse is disconnected from Integrated Power Module when the vehicle is shipped from the assembly plant. Dealer personnel must reconnect the IOD fuse when the vehicle is being prepared for delivery in order to restore full electrical system operation. Once the vehicle is prepared for delivery, the IOD function of this fuse becomes transparent and the fuse that has been assigned the IOD designation becomes another Fused B(+) circuit fuse.

The IOD fuse can be used by the vehicle owner as a convenient means of reducing battery depletion when a vehicle is to be stored for periods not to exceed about thirty days. However, it must be remembered that disconnecting the IOD fuse will not eliminate IOD, but only reduce this normal condition. If a vehicle will be stored for more than about thirty days, the battery negative cable should be disconnected to eliminate normal IOD; and, the battery should be tested and recharged at regular intervals during the vehicle storage period to prevent the battery from becoming discharged or damaged.

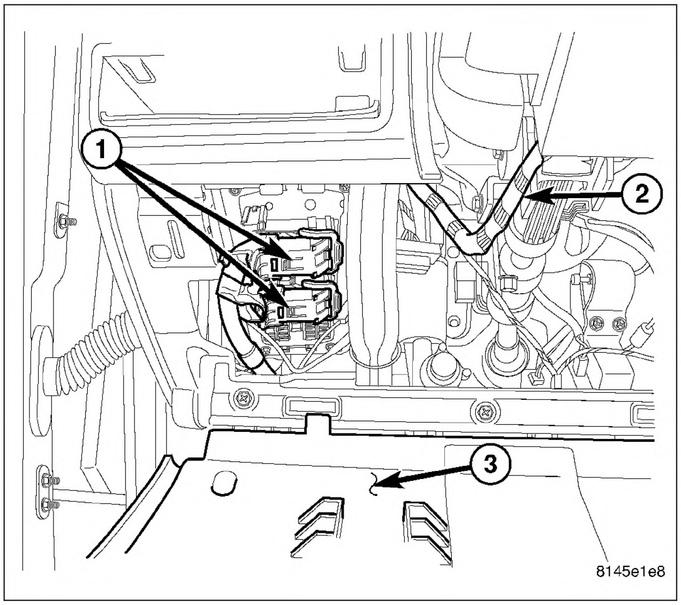
JUNCTION BLOCK

DESCRIPTION

An electrical Junction Block (JB) is concealed beneath the driver side of the instrument panel in the passenger compartment of the vehicle. The JB is accessed by pulling down on the steering column opening cover (2) exposing the lower steering column and portions of the instrument panel wiring harness. The JB combines the functions previously provided by a separate fuse-block module and relay center. The JB serves to simplify and centralize numerous electrical components, as well as to distribute electrical current to many of the accessory systems in the vehicle. It also eliminates the need for numerous splice connections. The JB houses blade-type mini fuses, blade-type automatic resetting circuit breakers, the electronic combination flasher and International Standards Organization (ISO) relays.



The molded plastic JB housing is secured with four screws and two snap retainers to the JB mounting bracket behind the instrument panel steering column opening cover (3). The steering column opening cover can be pulled downward to disengage the latches and provide service access to all of the fuses, relays and wire harness connectors (1) of the JB. Refer to **Steering Column Opening Cover** in Body for additional service information.



The JB contains six relays that are integral to the housing assembly. The relays cannot be replaced separately. If any of the relays are diagnosed inoperative or damaged the complete JB unit must be replaced. The six relays are:

- Lock relay
- Unlock relay
- Driver door unlock relay
- Rear wiper relay
- Ignition “RUN” relay
- Ignition “RUN/ACCESSORY DELAY” relay

The JB unit cannot be repaired and is only serviced as an assembly. If any internal circuit or the JB housing is inoperative or damaged, the entire JB unit must be replaced, (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/ JUNCTION BLOCK - REMOVAL) for the appropriate procedure.

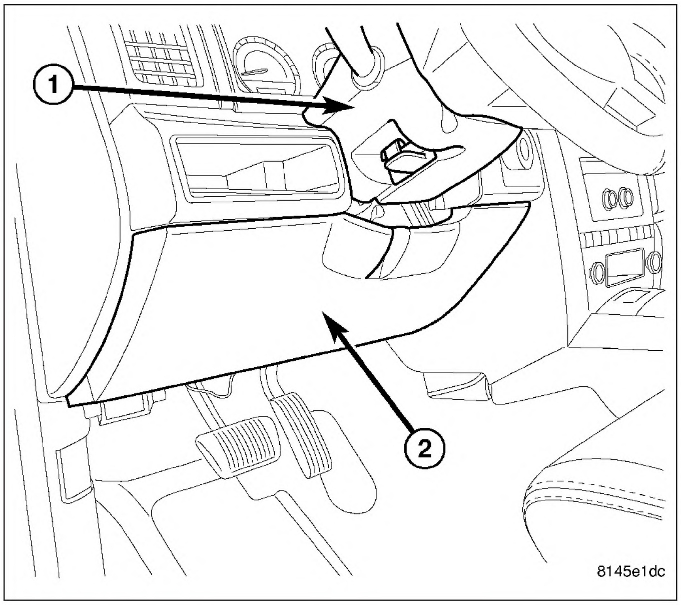
OPERATION

All of the circuits entering and leaving the Junction Block (JB) do so through three wire harness connectors, which are connected to the JB through integral connector receptacles molded into the JB housing. Internal connection of all of the JB circuits is accomplished by a printed circuit board. **Refer to the appropriate wiring information for complete circuit diagrams.** The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

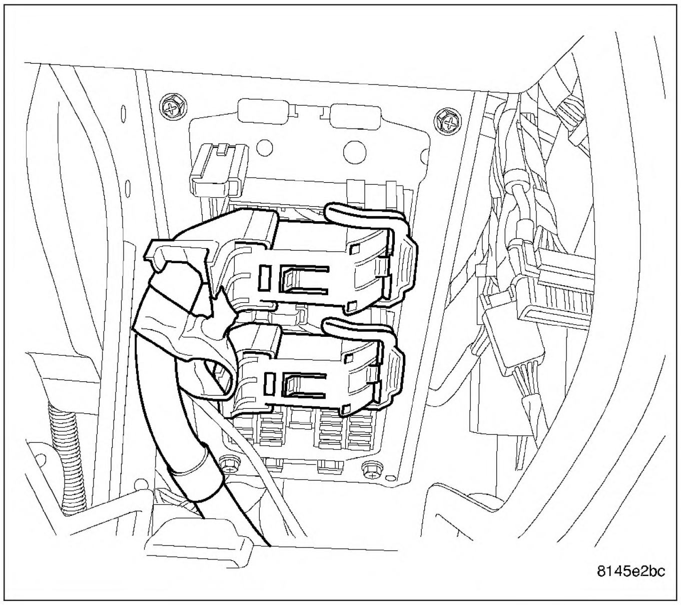
REMOVAL

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

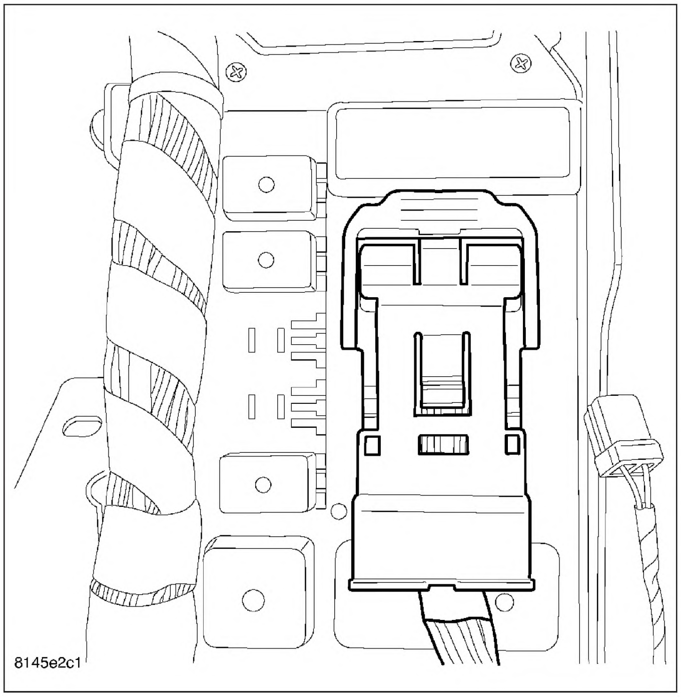
1. Disconnect and isolate the battery negative cable.
2. Remove the steering column opening cover (2). This is accomplished by pulling outward on the upper edge of the cover to disengage the retaining clips and removing the screw at the bottom of the cover.



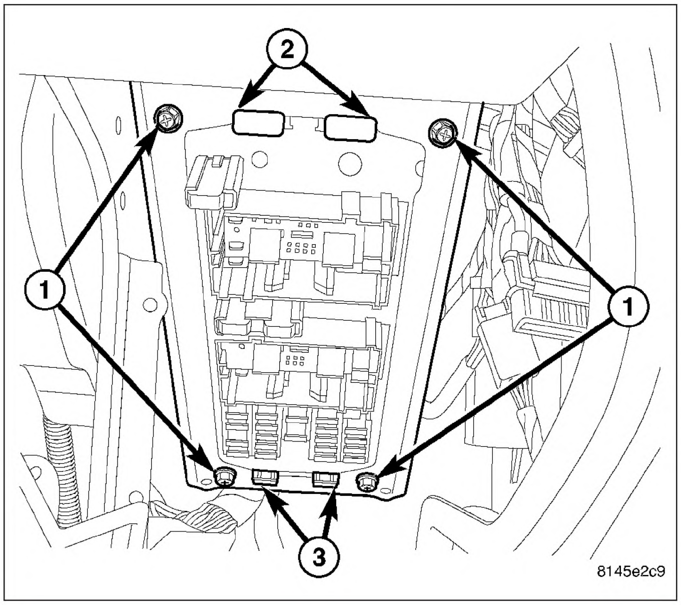
3. Disconnect the two bottom side Junction Block (JB) connectors.



4. Reach behind the JB to disconnect the top side JB connector.

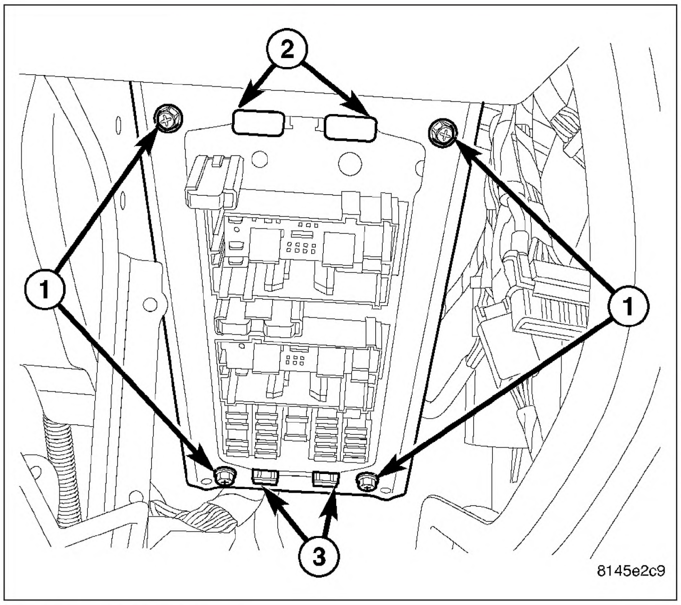


5. Remove the screws (1) that secure the JB to the mounting bracket.
6. Disengage the two snap clips (2) that secure the top of the JB to the mounting bracket. Push the top of the junction block out of the top of the bracket and pull it upward to disengage the lower retaining tabs (3).
7. Remove the JB from the vehicle by lowering out of the opening at the bottom of the instrument panel.

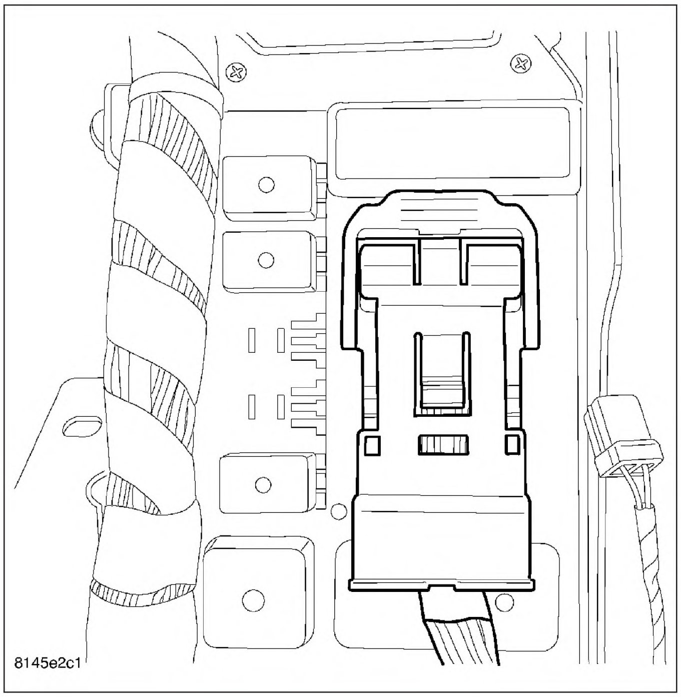


INSTALLATION

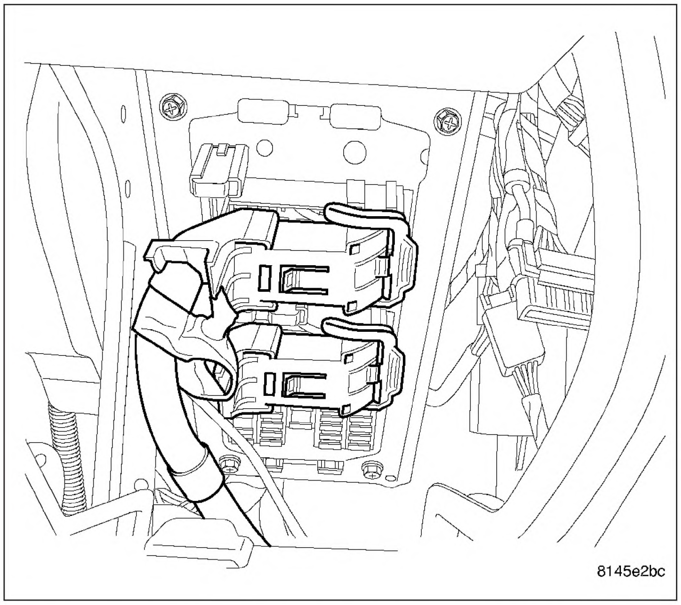
NOTE: If the Junction Block (JB) is being replaced with a new unit, be certain to transfer each of the fuses, circuit breakers and relays from the inoperative JB to the proper cavities of the replacement JB. Refer to Junction Block in Wiring Diagrams for the location of complete circuit diagrams and cavity assignments for the JB.



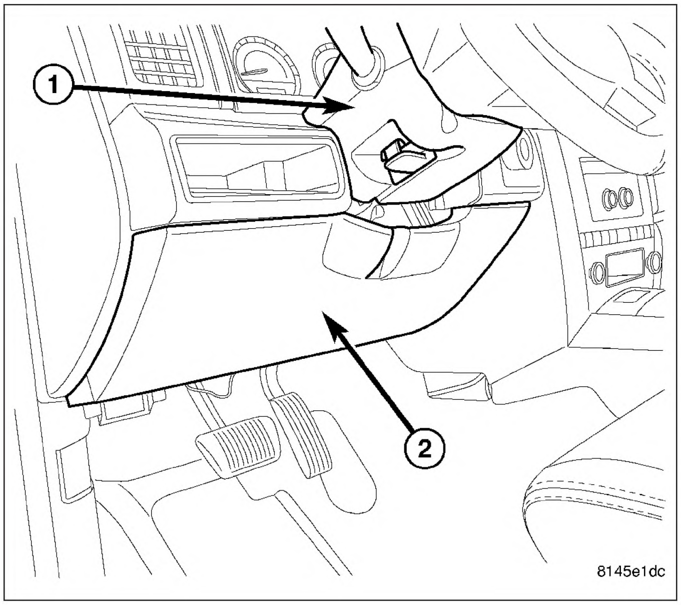
1. Position the JB into its mounting location on the JB mounting bracket.
2. Align the two lower retaining tabs (3) with the slots in the bottom of the bracket.
3. Align the snap clips (2) at the top of the JB with the mounting slots in the top of the bracket.
4. Grasp the JB firmly with both hands and push it into the bracket to engage the two snap clips (2) that secure the top of the JB.
5. Install and tighten the four screws (1) that secure the JB to the mounting bracket. Tighten the screws to 2.2 N·m (20 in. lbs.).
6. Reconnect the top side wire harness connector to the connector receptacle on the JB.



7. Reconnect the bottom side wire harness connectors to the connector receptacles on the JB.



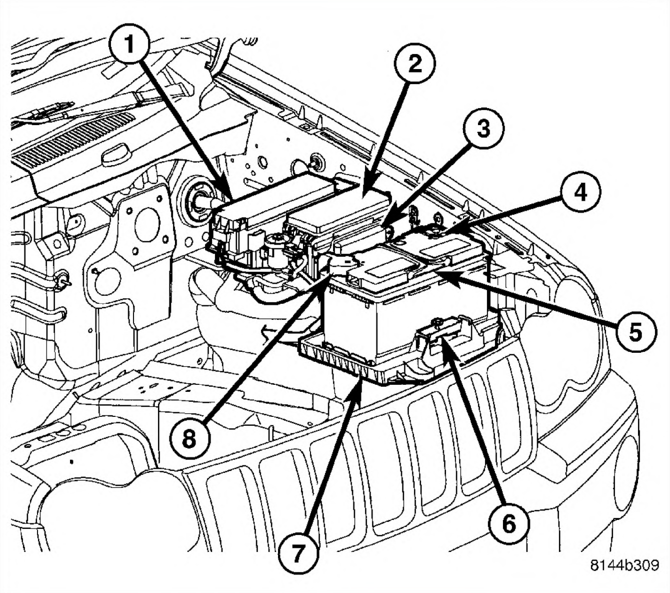
8. Install the steering column opening cover (2). Install the screw and firmly push the top of the panel inward to engage the top retaining clips.
9. Reconnect the battery negative cable.



POWER DISTRIBUTION CENTER

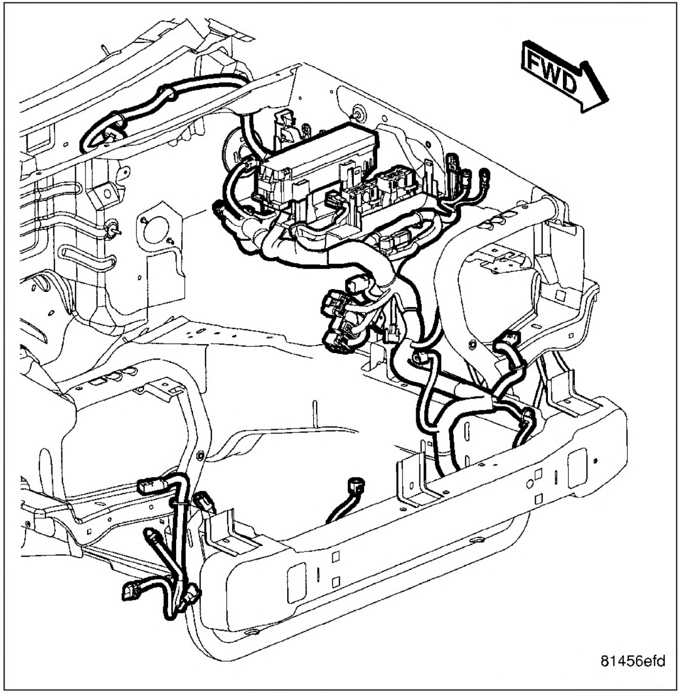
DESCRIPTION

The electrical current distributed throughout this vehicle is directed through the Power Distribution Center (PDC) (1) and Integrated Power Module (IPM) (2). The PDC is located in the left front corner of the engine compartment, between the IPM and the brake master cylinder. The PDC houses maxi-type cartridge fuses, which replace all in-line fusible links. The PDC also houses blade-type mini fuses, and International Standards Organization (ISO) relays.



The PDC housing is secured in the engine compartment at three points. Integral mounts on both sides of the PDC housing engage and latch to stanchions that are integral to the molded plastic support bracket. The PDC is integral to the headlamp and dash wire harness, which exits from the bottom of the PDC housing. The PDC housing has a molded plastic cover that includes two integral latches and pivot hooks that snap over a hinge pin on the side of the PDC housing. The PDC cover is easily opened or removed for service access and has a convenient fuse and relay layout map integral to the inside surface of the cover to ensure proper component identification.

The PDC cannot be repaired and is only serviced as a unit with the headlamp and dash wire harness. If the PDC main housing unit, fuse wedges or the bus bars are inoperative or damaged, the complete headlamp and dash wire harness unit must be replaced.



OPERATION

All of the current from the battery and the generator output enters the PDC through two cables and a single two-holed eyelet that is secured with nuts to the two PDC B(+) terminal studs just inside the front end of the PDC housing. The PDC cover is unlatched and opened to access the battery and generator output connection B(+) terminal studs, the fuses or the relays. Internal connection of all of the PDC circuits is accomplished by an intricate combination of hard wiring and bus bars.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

POWER OUTLET

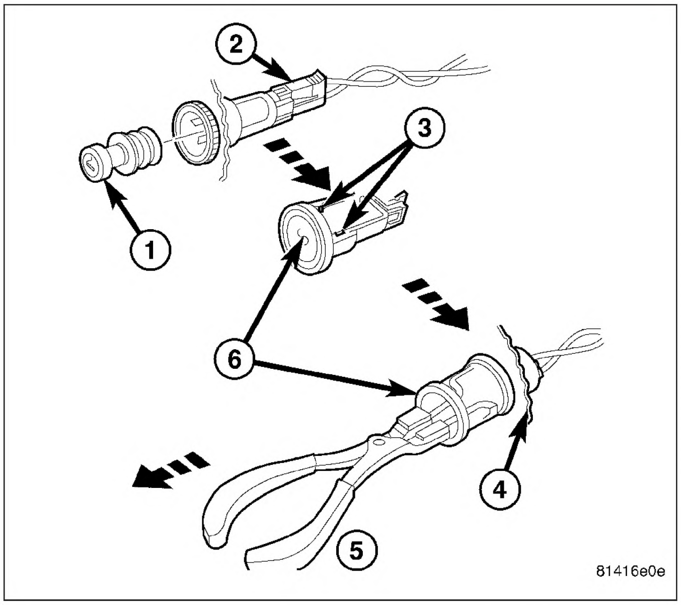
DESCRIPTION

This vehicle is equipped with three 12–volt electrical outlets. The outlets are located in the following locations:

- One outlet in the cargo area left quarter trim panel.
- Two outlets in the instrument panel center stack under the heat/air conditioning controller.

All of the outlets have power at all times, and include tethered covers.

REMOVAL



1. Disconnect and isolate the battery negative cable.
2. Pull the cigar lighter knob and element (1) out of the cigar lighter receptacle base (6), or unsnap the protective cap from the power outlet receptacle base (6).
3. Look inside the cigar lighter or power outlet receptacle base and note the position of the rectangular retaining bosses (3) of the mount that secures the receptacle base to the panel (4).
4. Insert a pair of external snap ring pliers (5) into the cigar lighter or power outlet receptacle base and engage the tips of the pliers with the retaining bosses of the mount.
5. Squeeze the pliers to disengage the mount retaining bosses from the receptacle base and, using a gentle rocking motion, pull the pliers and the receptacle base out of the mount.
6. Pull the receptacle base away from the instrument panel far enough to access the instrument panel wire harness connector (2).
7. Disconnect the instrument panel wire harness connector (2) from the cigar lighter or power outlet receptacle base (6).
8. Remove the cigar lighter or power outlet mount from the instrument panel.

INSTALLATION

1. Connect the instrument panel wire harness connector to the cigar lighter or power outlet receptacle base connector receptacle.
2. Install the cigar lighter or power outlet mount into the instrument panel.
3. Align the splines on the outside of the cigar lighter or power outlet receptacle base connector receptacle with the grooves on the inside of the mount.
4. Press firmly on the cigar lighter or power outlet receptacle base until the retaining bosses of the mount are fully engaged in their receptacles.
5. Install the cigar lighter knob and element into the cigar lighter receptacle base, or the protective cap into the power outlet receptacle base.
6. Connect the battery negative cable.

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ENGINE ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Diagnostic Test

1. NO RESPONSE

Make sure the scan tool will communicate with the appropriate modules.

Are you currently experiencing a NO RESPONSE condition?

Yes >> The NO RESPONSE condition must be properly diagnosed before continuing.

Refer to the appropriate BUS Communication test in Section 8 ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS.

No >> Go To 2

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2. NO START

Is the customer complaint a NO START condition?

Yes >> Check the vehicle for any NO START related PCM DTC(s) or Vehicle Theft Security related DTC(s).

If no Theft related DTC(s) are present, refer to the Non DTC Diagnostic Procedures that relate to Fuel and Starting.

No >> Go To 3

---

3. VEHICLE HISTORY AND TSB(s)

Continue by reading PCM DTC(s) and record the related Freeze Frame data if any DTC(s) are present.

Whether or not any DTC(s) are present you will want to check the following items which may assist in repairing the customers complaint successfully.

Check the vehicles repair history.

If the vehicle has a repair history that pertains to the customer's current complaint, review the repair.

Inpect the vehicle for any aftermarket accessories that may have been installed incorrectly.

Check for any TSB(s) related to the customer's complaint or DTC(s).

If a TSB applies, follow the instructions per the TSB.

Choose the following scenario that best applies.

The TSB repaired the customers complaint.
Testing complete.

A DTC is present, no TSB applies, or the TSB didn't repair the customers complaint.
Go To 4

No DTC(s) are present.
Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE (CONTINUED)

4. WIRE HARNESS INSPECTION

Clear the DTC(s).

Attempt to duplicate the customer complaint.

Whether the customer complaint can be duplicated or not, make a quick wire harness inspection related to the DTC(s) that were previously cleared.

Check the Powertrain Control Module connectors, the suspected component connection, in-line connectors, wire harness splices, PCM power and ground circuits, and any related fuses.

If the DTC(s) are fuel or air related, check the fuel level and quality.

Were any repairs made that fixed the customer's complaint?

Yes >> Testing complete.

No >> Refer to the diagnostic test procedure related to the DTC.

INTERMITTENT CONDITION

For the Engine circuit diagrams (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

POSSIBLE CAUSES
INTERMITTENT CONDITION

Diagnostic Test

1. INTERMITTENT CONDITION

NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Refer to any Technical Service Bulletins (TSBs) that may apply.

Review the scan tool Freeze Frame information. If possible, try to duplicate the conditions under which the DTC set.

With the engine running at normal operating temperature, monitor the scan tool parameters related to the DTC while wiggling the wire harness. Look for parameter values to change and/or a DTC to set.

Turn the ignition off.

Visually inspect the related wire harness. Disconnect all the related harness connectors. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.

Perform a voltage drop test on the related circuits between the suspected faulty component and the PCM.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Inspect and clean all PCM, engine, and chassis grounds that are related to the most current DTC.

If numerous trouble codes were set, use a wire schematic and look for any common ground or supply circuits.

For any Relay DTCs, actuate the Relay with the scan tool and wiggle the related wire harness to try to interrupt the actuation.

For intermittent Evaporative Emission trouble codes perform a visual and physical inspection of the related parts including hoses and the Fuel Filler cap.

For intermittent Misfire DTC’s check for restrictions in the Intake and Exhaust system, proper installation of Sensors, vacuum leaks, and binding components that are run by the accessory drive belt.

Use the scan tool to perform a System Test if one applies to failing component.

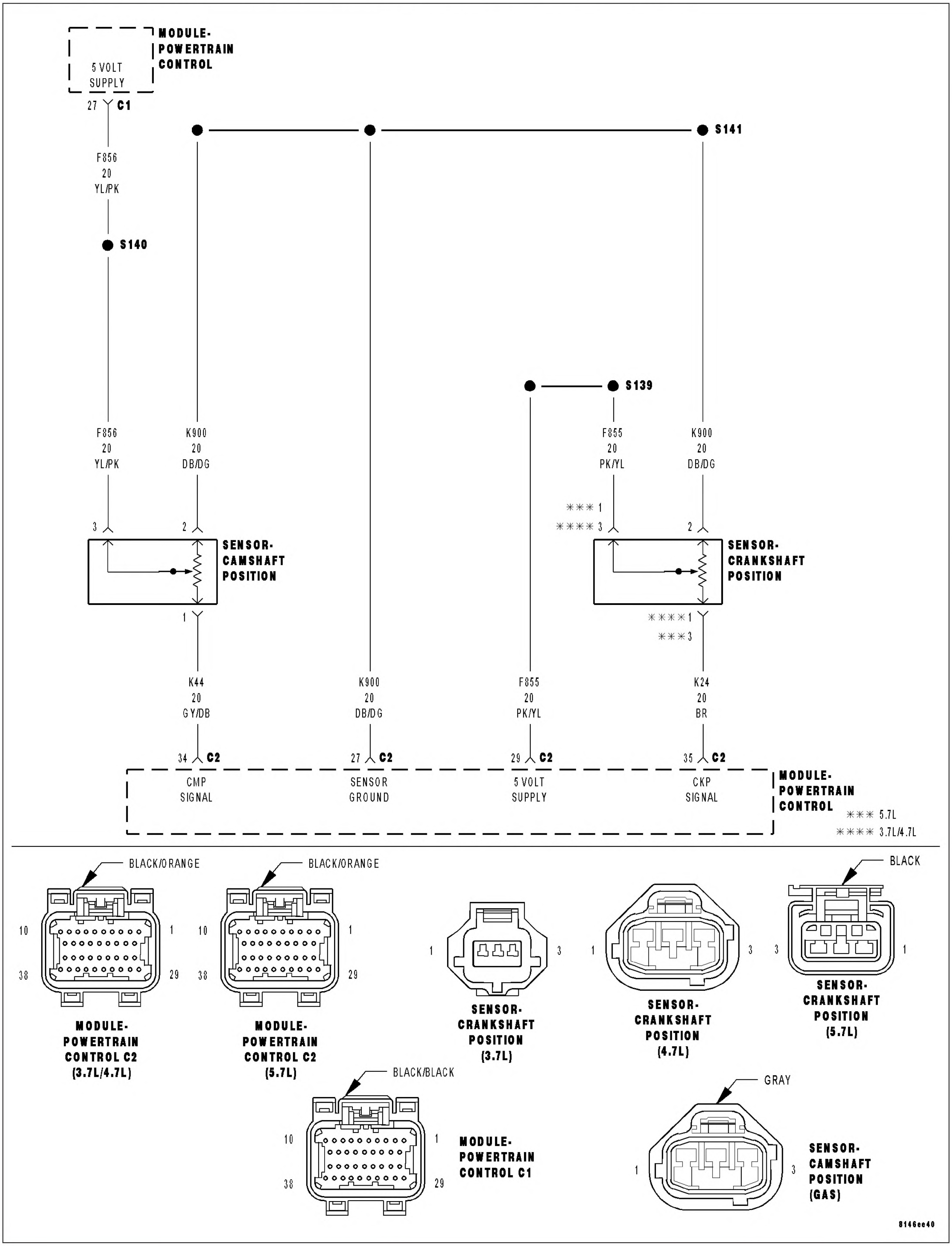
A co-pilot, data recorder, and/or lab scope should be used to help diagnose intermittent conditions.

Were any problems found during the above inspections?

Yes >> Perform the necessary repairs.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P0016–CRANKSHAFT / CAMSHAFT TIMING MISALIGNMENT


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27 C1
F856
20
YL/PK
S140
S141
S139
F856
20
YL/PK
K900
20
DB/DG
F855
20
PK/YL
K900
20
DB/DG
3
2
✳✳✳ 1
✳✳✳✳ 3
2
SENSOR-
CAMSHAFT
POSITION
SENSOR-
CRANKSHAFT
POSITION
1
✳✳✳✳ 1
✳✳✳ 3
K44
20
GY/DB
K900
20
DB/DG
F855
20
PK/YL
K24
20
BR
34 C2
27 C2
29 C2
35 C2
CMP
SIGNAL
SENSOR
GROUND
5 VOLT
SUPPLY
CKP
SIGNAL
MODULE-
POWERTRAIN
CONTROL
✳✳✳ 5.7L
✳✳✳✳ 3.7L/4.7L
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(4.7L)
BLACK
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
GRAY
1
3
SENSOR-
CAMSHAFT
POSITION
(GAS)
8146ee40

P0016–CRANKSHAFT / CAMSHAFT TIMING MISALIGNMENT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine cranking and Engine running
- **Set Condition:**
  Powertrain Control Module detects an error when the camshaft position is out of phase with the crankshaft position. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
ERRATIC CAM POSITION SENSOR SIGNAL
CAMSHAFT POSITION SENSOR TONE WHEEL/PULSE RING
ERRATIC CRANKSHAFT POSITION SENSOR SIGNAL
CRANKSHAFT POSITION SENSOR TONE WHEEL/PULSE RING
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

With the scan tool clear the DTC(s).

Start the engine and run until operating temp is reached. (Closed Loop)

If the DTC does not reset it may be necessary to test drive the vehicle.

Does the P0016 return?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. CHECKING THE CMP SIGNAL WITH A LAB SCOPE

With a lab scope, backprobe the (K44) CMP Signal circuit at the CMP Sensor harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Start the engine.

Observe the lab scope screen.

Are there any irregular or missing signals?

Yes >> Go To 3

No >> Go To 6

P0016–CRANKSHAFT / CAMSHAFT TIMING MISALIGNMENT (CONTINUED)

3. CMP WIRE HARNESS INSPECTION

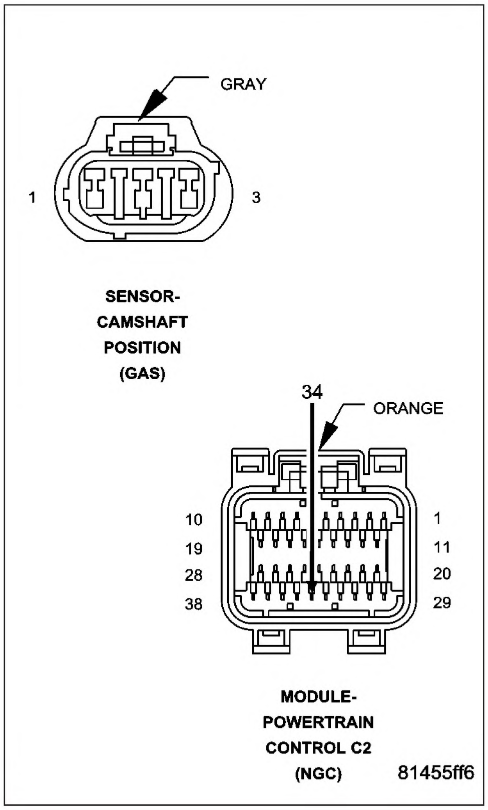
Turn the ignition off.

Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.

Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are torqued to their proper specification.

Refer to any TSBs that may apply.



Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. TONE WHEEL/PULSE RING INSPECTION

Remove the Camshaft Position Sensor.

Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement.

Were any problems found?

Yes >> Repair or replace the Tone Wheel/Pulse Ring as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

5. CAMSHAFT POSITION SENSOR

If there are no possible causes remaining, view repair.

Repair

Replace the Camshaft Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0016–CRANKSHAFT / CAMSHAFT TIMING MISALIGNMENT (CONTINUED)

6. ERRATIC CMP SIGNAL

Turn the ignition off.

Remove the lab scope probe.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

With scan tool, erase DTCs.

Start the engine.

Gently tap on and wiggle the Cam Position Sensor.

Ignition on, engine not running.

Inspect the Sensor connector and harness connector, and inspect the PCM connector and harness connector for loose, bent, corroded, or pushed out pins/terminals.

Inspect the related wire harness and the splices in the CMP circuit.

Does the P0016 return?

Yes >> Repair the wiring/connector concerns as needed or replace the Camshaft Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

7. CHECKING THE CKP SIGNAL WITH A LAB SCOPE

Turn the ignition off.

With a lab scope, backprobe the (K24) CKP Signal circuit at the CKP harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Start the engine.

Observe the lab scope screen.

Are there any irregular or missing signals?

Yes >> Go To 8

No >> Go To 10

P0016–CRANKSHAFT / CAMSHAFT TIMING MISALIGNMENT (CONTINUED)

8. CKP WIRE HARNESS INSPECTION

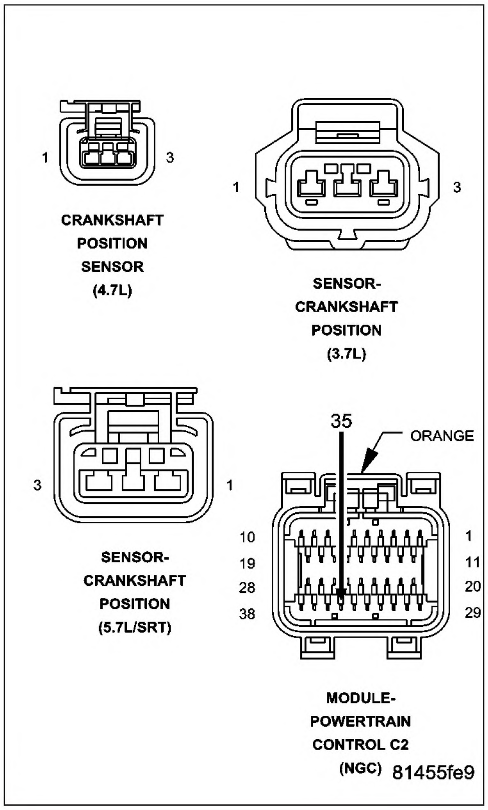
Turn the ignition off.

Visually inspect the related wire harness. Look for any chafed, pierced, pinched, or partially broken wires.

Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are torqued to their proper specification.

Refer to any TSBs that may apply.


1
3
CRANKSHAFT POSITION SENSOR (4.7L)
1
3
SENSOR-CRANKSHAFT POSITION (3.7L)
3
1
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
35
ORANGE
10
19
28
38
1
11
20
29
MODULE-POWERTRAIN CONTROL C2 (NGC)
81455fe9

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. TONE WHEEL/FLEX PLATE INSPECTION

Remove the Crankshaft Position Sensor.

Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement.

Were any problems found?

Yes >> Repair or replace the Tone Wheel/Flex Plate as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Crankshaft Position Sensor.
Perform thePOWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE).

P0016–CRANKSHAFT / CAMSHAFT TIMING MISALIGNMENT (CONTINUED)

10. ERRATIC CKP SIGNAL

NOTE: The conditions that set this DTC are not present at this time. The following test may help in identifying the intermittent condition.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Start the engine.

Gently tap on and wiggle the Crank Position Sensor.

Turn the ignition off.

Inspect the Sensor connector and harness connector, and inspect the PCM connector and harness connector for loose, bent, corroded, or pushed out pins/terminals.

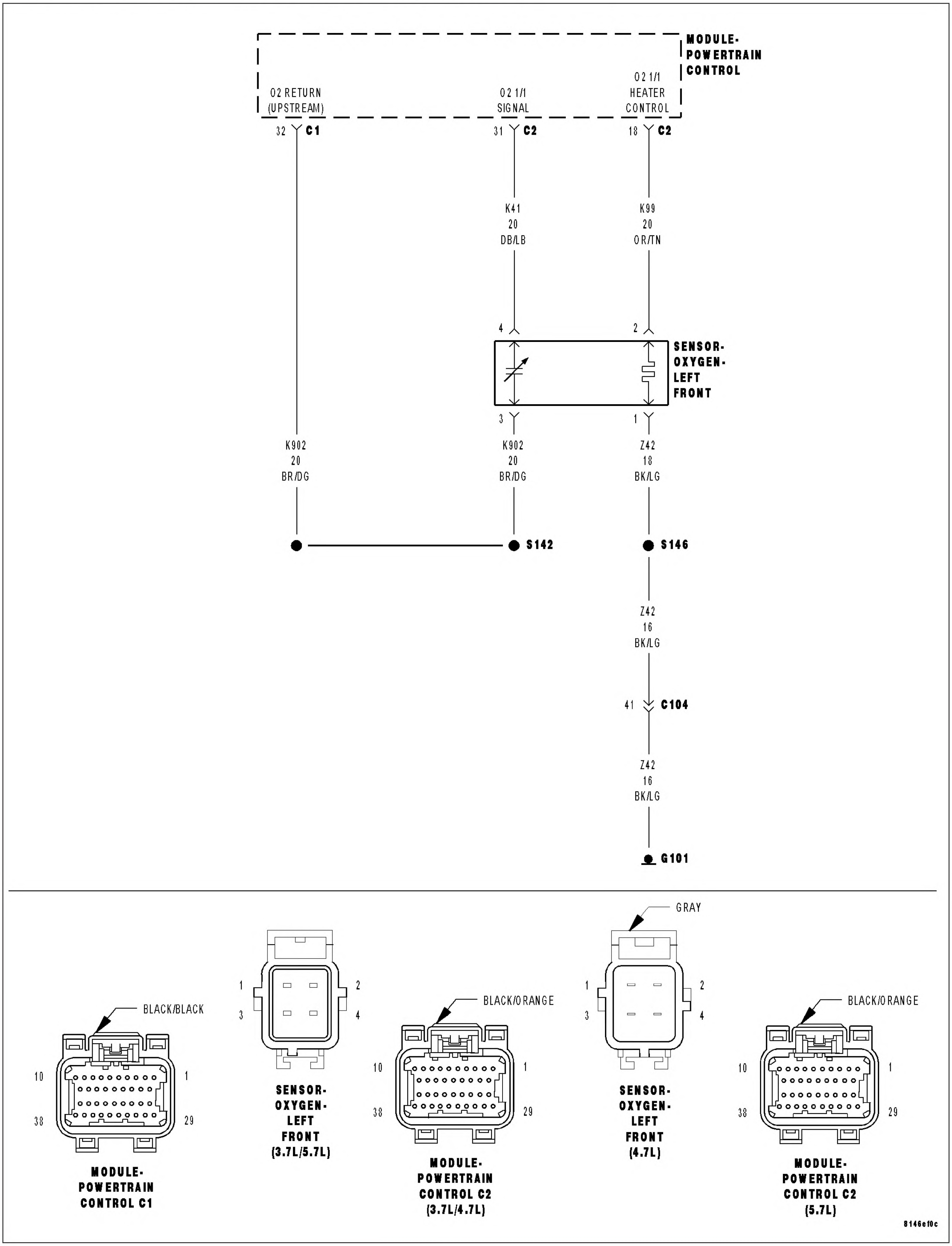
Inspect the related wire harness and the splices in the CKP circuits.

Were any problems found?

Yes >> Repair the wiring/connector concerns as needed or replace the Crankshaft Position Sensor.
Perform POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
32 C1
31 C2
18 C2
K41
20
DB/LB
K99
20
OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146ef0c

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is powered.
- **Set Condition:**
  Desired state does not match Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K99) O2 SENSOR 1/1 HEATER CONTROL CIRCUIT SHORTED TO GROUND
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test.

With the scan tool, monitor 1/1 O2 Sensor voltage for at least 2 minutes.

Does the O2 Sensor voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 1/1 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element, between the Heater Control terminal and the Heater ground terminal at the component.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

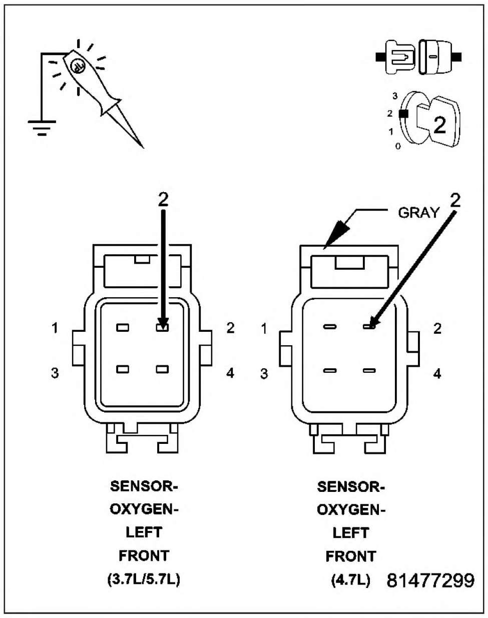
P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Ignition on, engine not running.

With a scan tool, actuate the O2 1/1 Heater Test with the O2 Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K99) O2 1/1 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
81477299

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

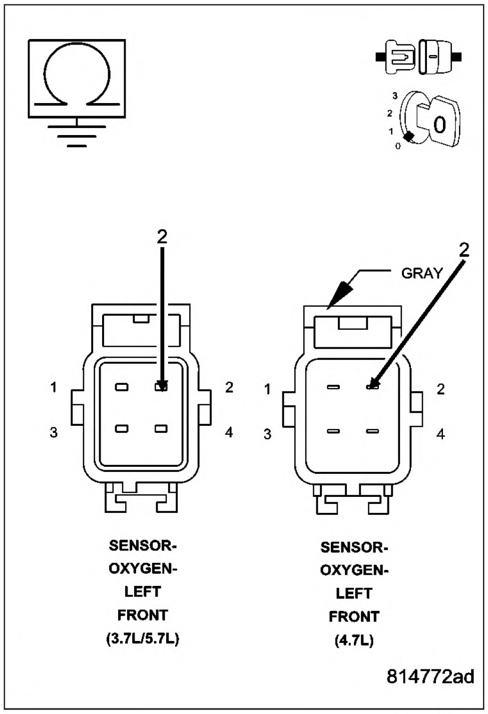
---

4. (K99) O2 1/1 HEATER CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K99) O2 1/1 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
0
2
2
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
814772ad

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K99) O2 1/1 Heater Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0031-O2 SENSOR 1/1 HEATER CIRCUIT LOW (CONTINUED)

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

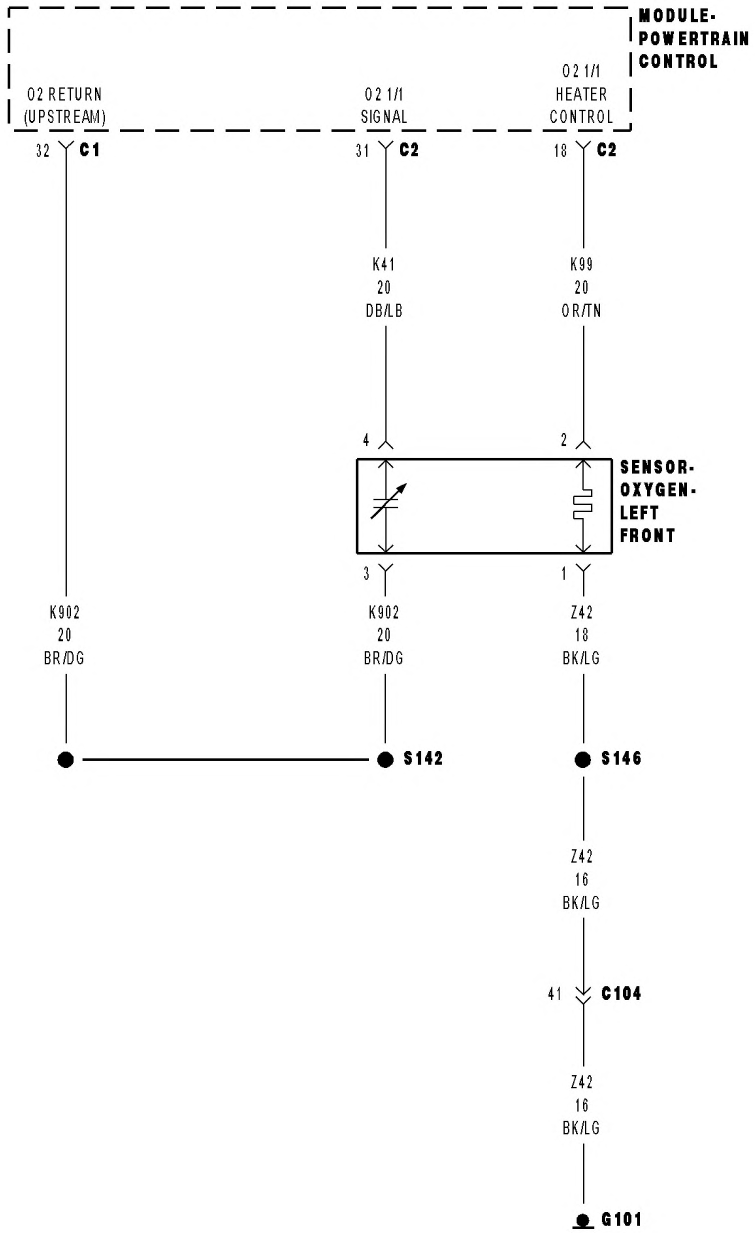
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

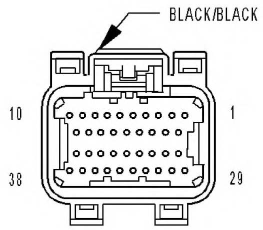
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

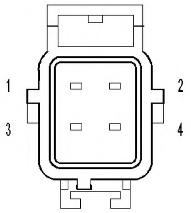
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH

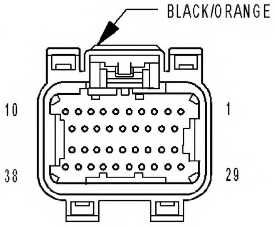

MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
32 C1
31 C2
18 C2
K41
20
DB/LB
K99
20
OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/BLACK
10
1
38
29

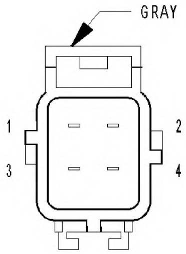
**MODULE-
POWERTRAIN
CONTROL C1**



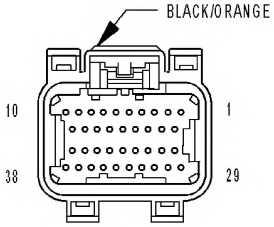
**SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**



**SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**

8146ef0c

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.
- **Set Condition:**
  Desired state does not equal Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K99) O2 1/1 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 1/1 HEATER GROUND CIRCUIT OPEN
(K99) O2 1/1 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTC's

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 1/1 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element between the O2 Heater Control terminal and the O2 Heater ground terminal at the component.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

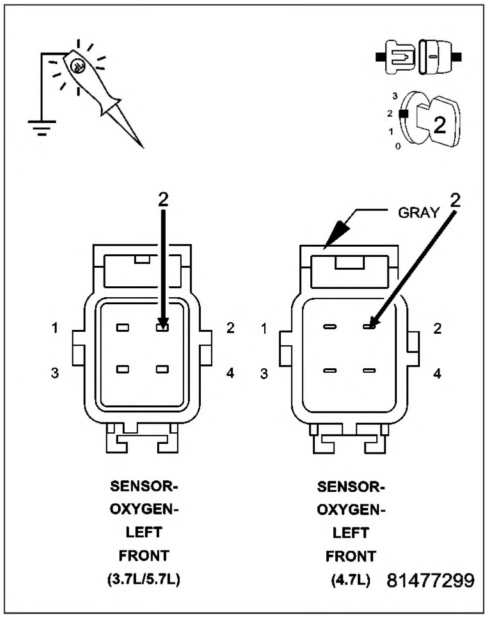
P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH (CONTINUED)

3. (K99) O2 1/1 HEATER CONTROL CIRCUIT

Ignition on, engine not running.

With a scan tool, actuate the O2 1/1 Heater Test with the Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K99) O2 1/1 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
81477299

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Go To 4

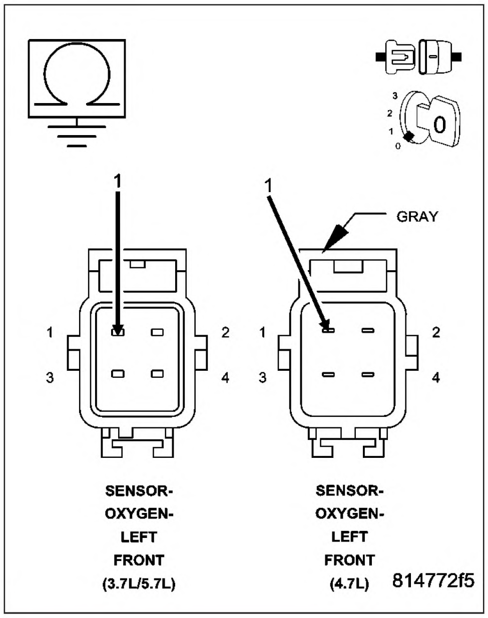
No >> Go To 5

---

4. (Z42) O2 HEATER GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance between an engine ground and the (Z42) O2 1/1 Heater ground circuit in the O2 Sensor harness connector.


3
2
1
0
0
1
1
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
814772f5

Is the resistance below 5.0 ohms?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Repair the open in the (Z42) O2 1/1 Heater ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH (CONTINUED)

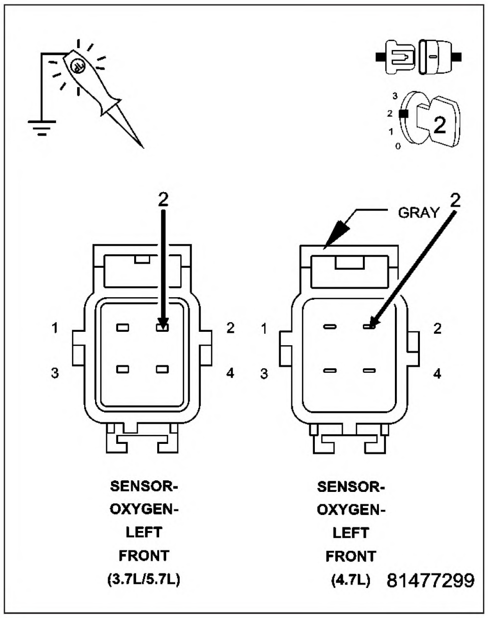
5. (K99) O2 1/1 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, probe the (K99) O2 1/1 Heater Control circuit in the O2 Sensor harness connector.


2
GRAY
2
1
2
3
4
1
2
3
4
2
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
81477299

Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage in the (K99) O2 1/1 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

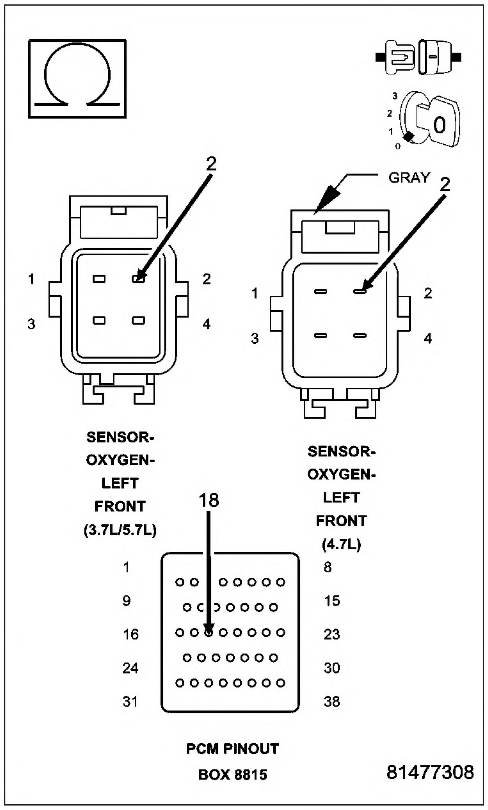
---

6. (K99) O2 1/1 HEATER CONTROL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K99) O2 1/1 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


0
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
18
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
81477308

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K99) O2 1/1 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0032-O2 SENSOR 1/1 HEATER CIRCUIT HIGH (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

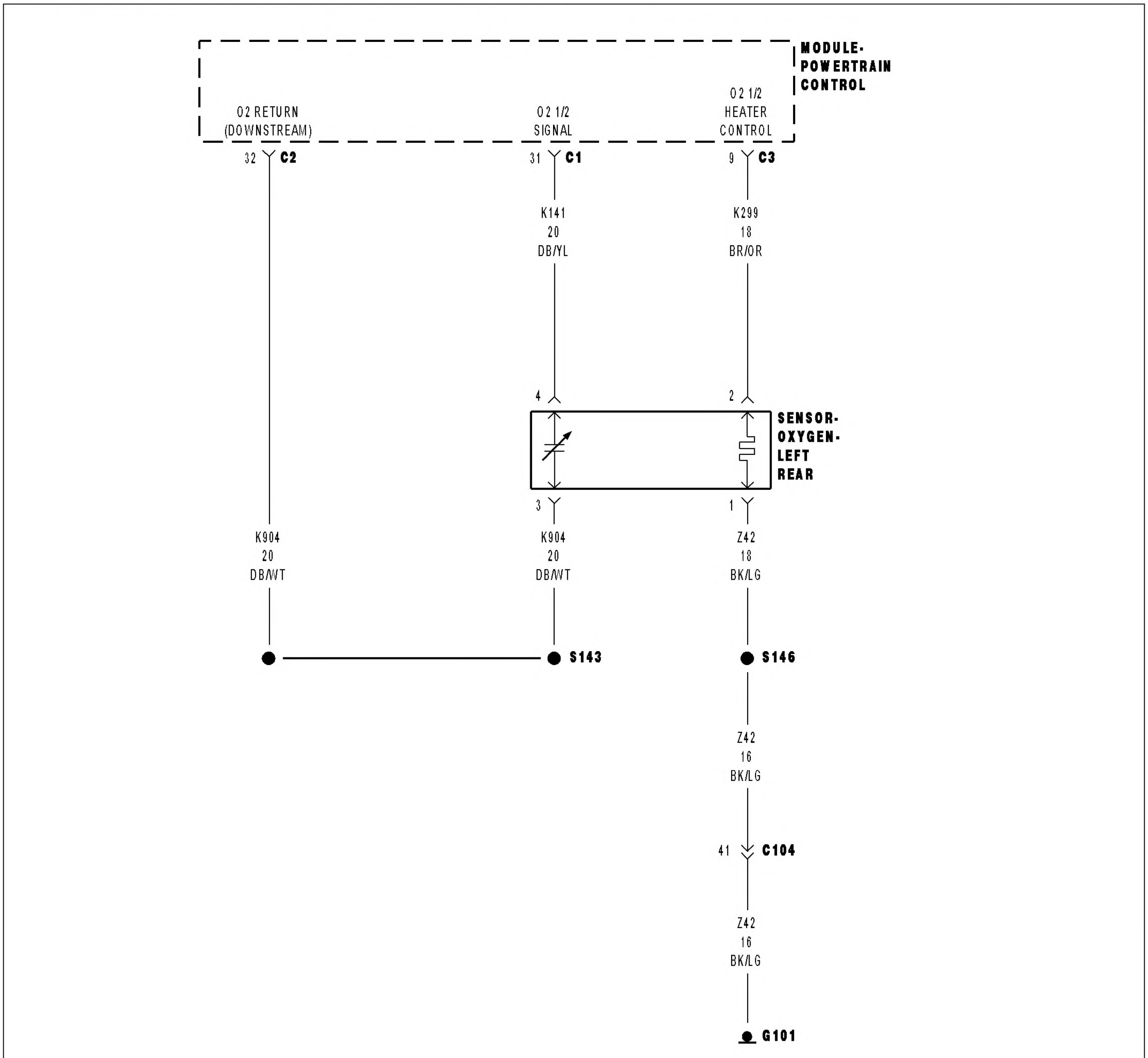
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

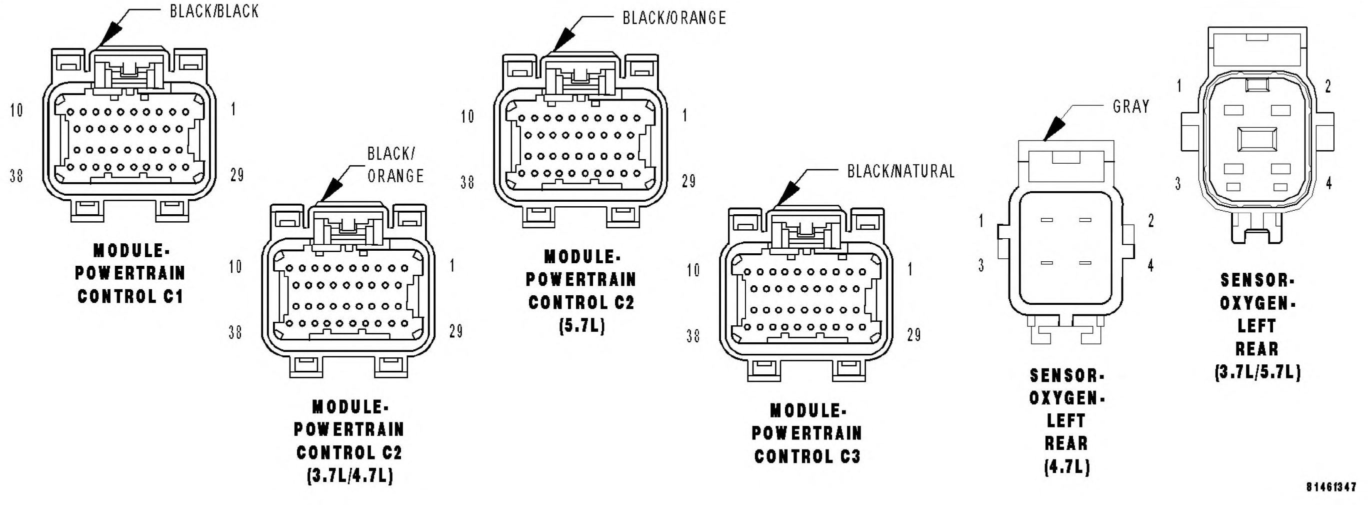
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32 C2
31 C1
9 C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
8146f347

P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW (CONTINUED)

For the Engine circuit diagrams (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is on.
- **Set Condition:**
  Desired state does not match Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K299) O2 1/2 HEATER CONTROL CIRCUIT SHORTED TO GROUND
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 1/2 Heater Test.

With the scan tool, monitor 1/2 O2 Sensor voltage for at least 2 minutes.

Does the O2 Sensor voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 1/2 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element, between the O2 Heater Control terminal and the O2 Heater ground terminal at the component.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

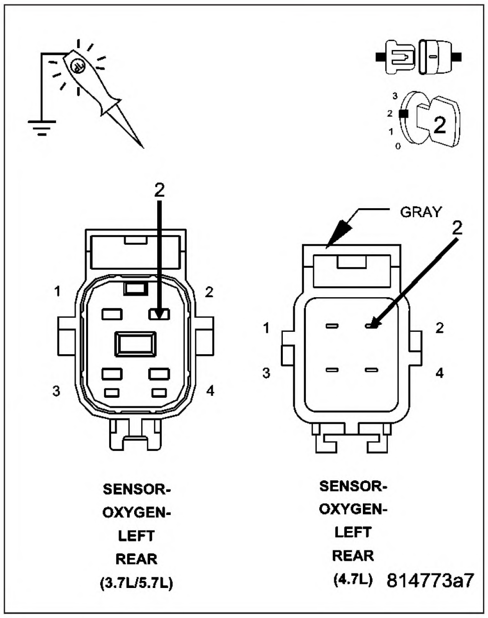
P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test with the 1/2 O2 Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K299) O2 1/2 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
814773a7

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

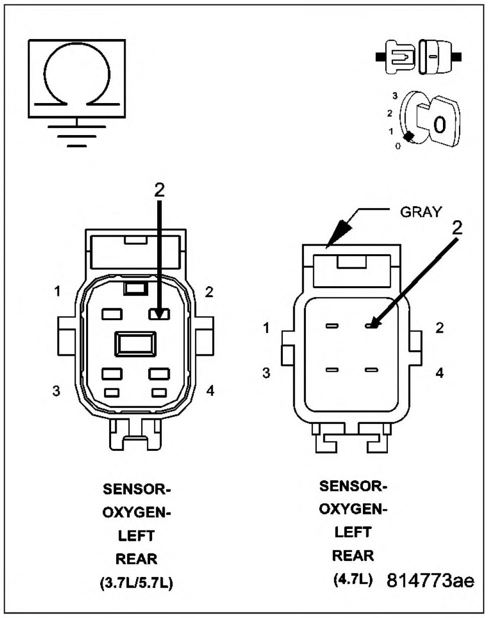
---

4. (K299) O2 1/2 HEATER CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K299) O2 1/2 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
0
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
814773ae

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K299) O2 1/2 Heater Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0037-O2 SENSOR 1/2 HEATER CIRCUIT LOW (CONTINUED)

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

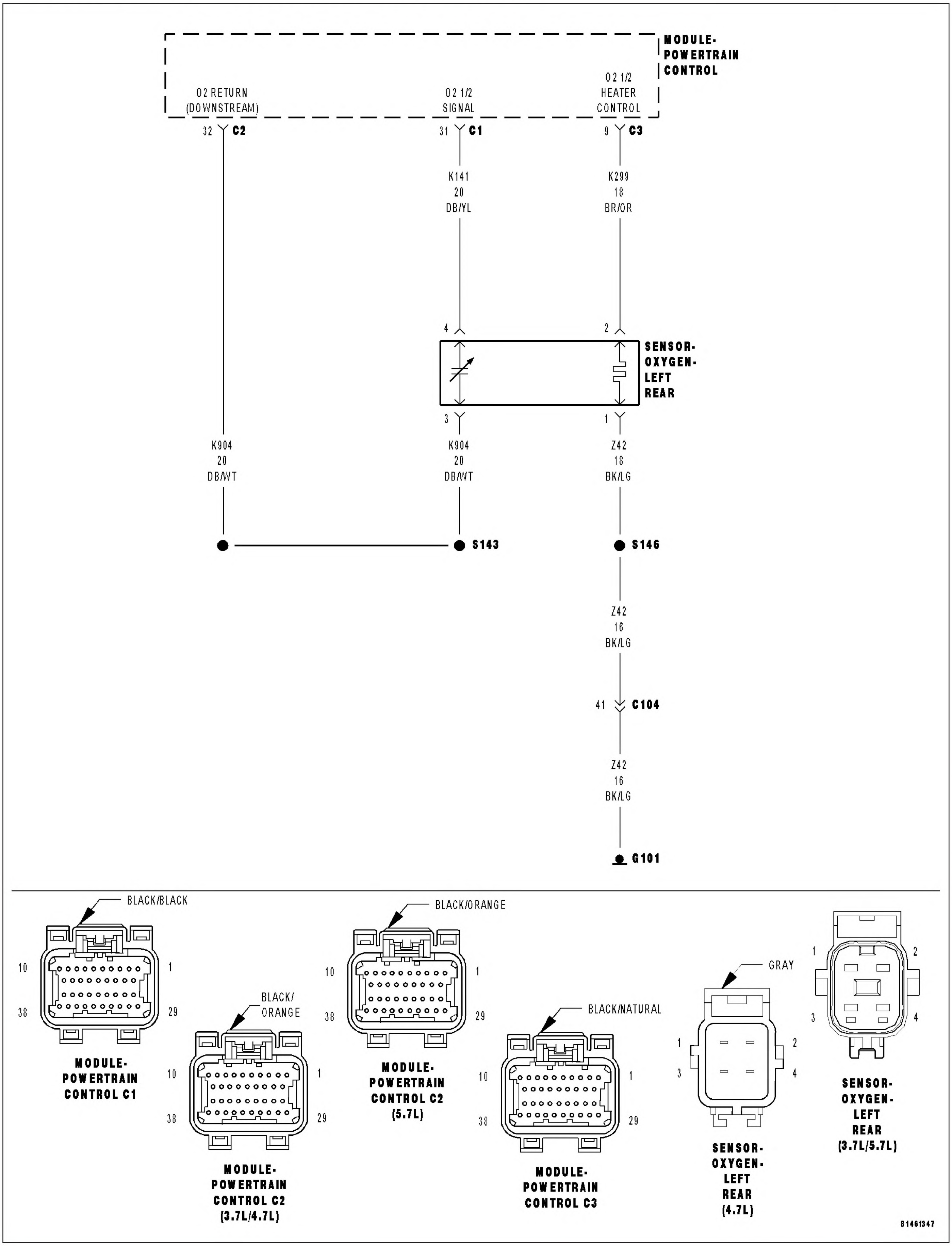
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32 C2
31 C1
9 C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
MODULE-
POWERTRAIN
CONTROL C3
GRAY
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
81461347

P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.
- **Set Condition:**
  Desired state does not equal Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K299) O2 1/2 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 1/2 HEATER GROUND CIRCUIT OPEN
(K299) O2 SENSOR 1/2 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTC's.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 1/2 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element, between the Heater Control terminal and the Heater ground terminal at the component.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

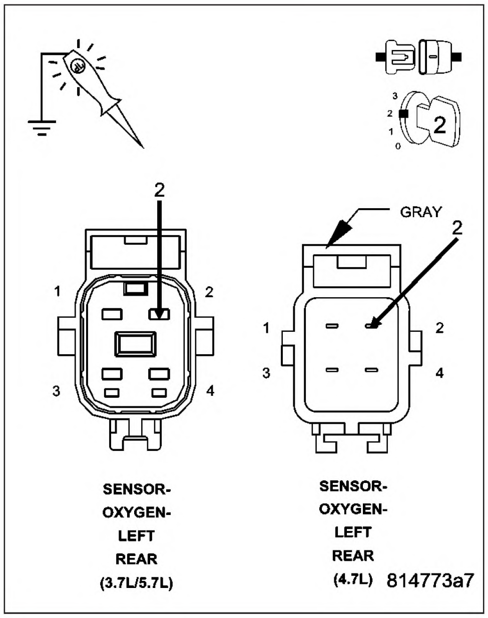
P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH (CONTINUED)

3. (K299) O2 1/2 HEATER CONTROL CIRCUIT

Ignition on, engine not running.

With a scan tool, actuate the O2 1/2 Heater Test with the O2 Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K299) O2 1/2 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
814773a7

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Go To 4

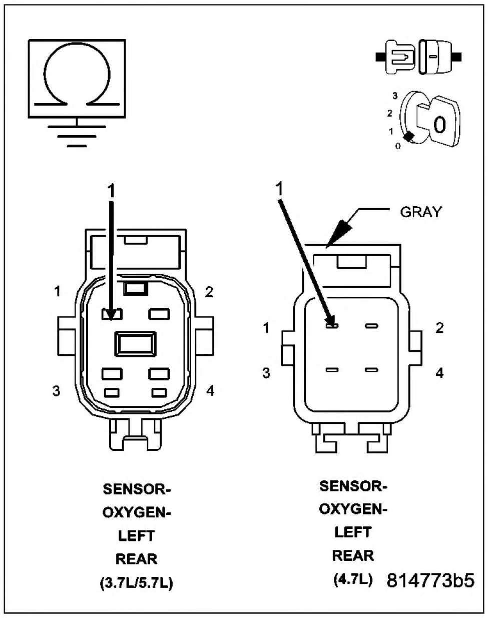
No >> Go To 5

---

4. (Z42) O2 HEATER GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance between an engine ground and the (Z42) O2 1/2 Heater ground circuit in the O2 Sensor harness connector.


3
2
1
0
0
1
1
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
814773b5

Is the resistance below 5.0 ohms?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Repair the open in the (Z42) O2 1/2 Heater ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH (CONTINUED)

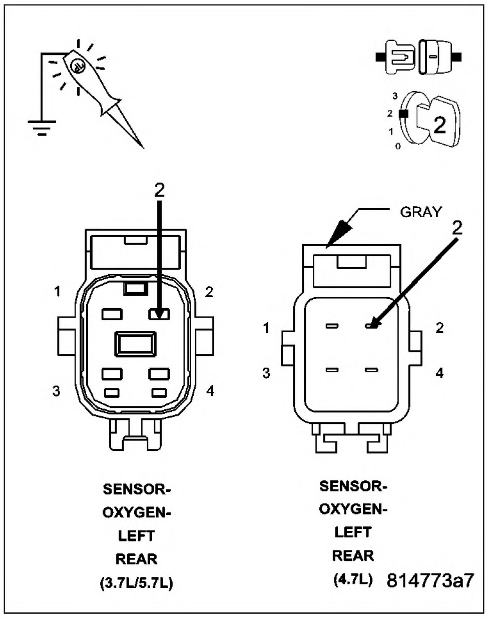
5. (K299) O2 1/2 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Using a 12-volt test light connect to ground, probe the (K299) O2 1/2 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
814773a7

Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage in the (K299) O2 1/2 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

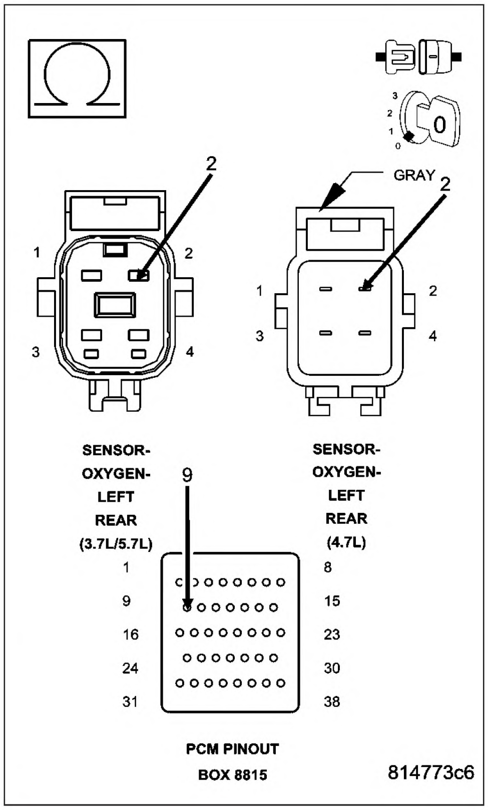
---

6. (K299) O2 1/2 HEATER CONTROL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K299) O2 1/2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
9
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
814773c6

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K299) O2 1/2 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0038-O2 SENSOR 1/2 HEATER CIRCUIT HIGH (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

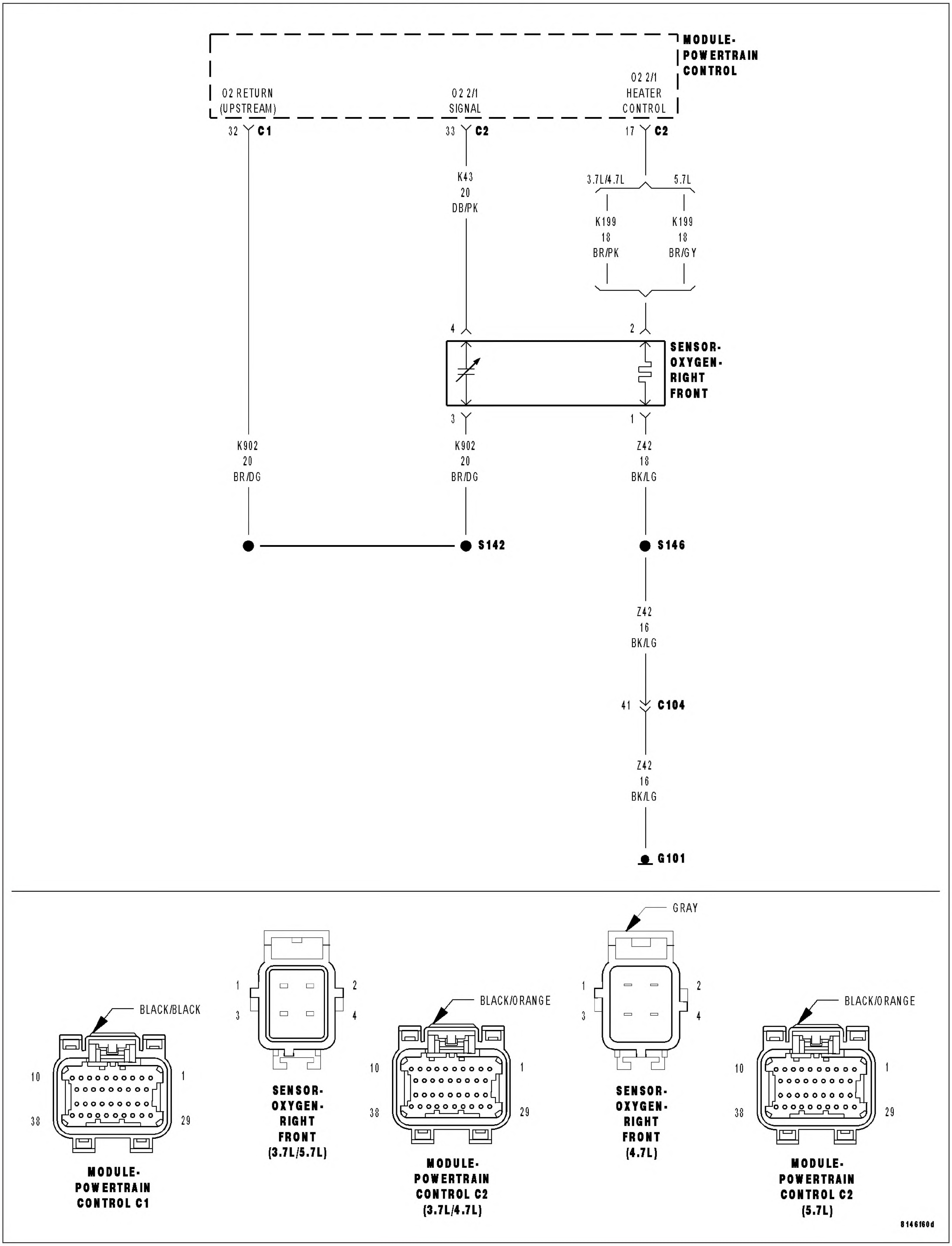
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is on.
- **Set Condition:**
  Desired state does not match Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K199) O2 2/1 HEATER CONTROL CIRCUIT SHORTED TO GROUND
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test.

With a scan tool, monitor 2/1 O2 Sensor voltage for at least 2 minutes.

Does the O2 Sensor voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 2/1 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element, between the Heater Control terminal and the Heater ground terminal at the component.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

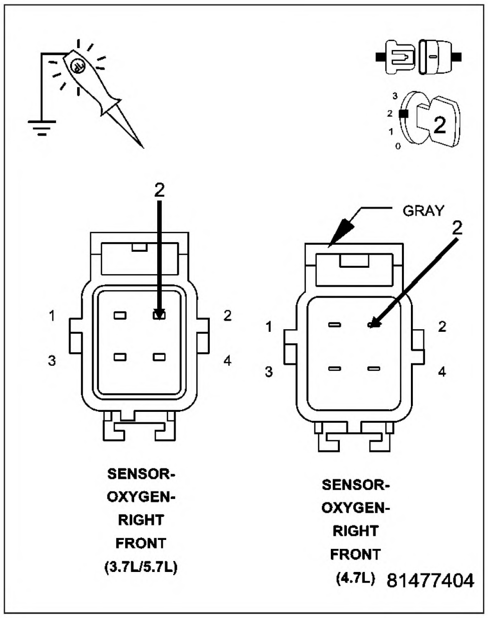
P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test with the O2 Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K199) O2 2/1 Heater Control circuit in the O2 Sensor harness connector.


2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
81477404

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

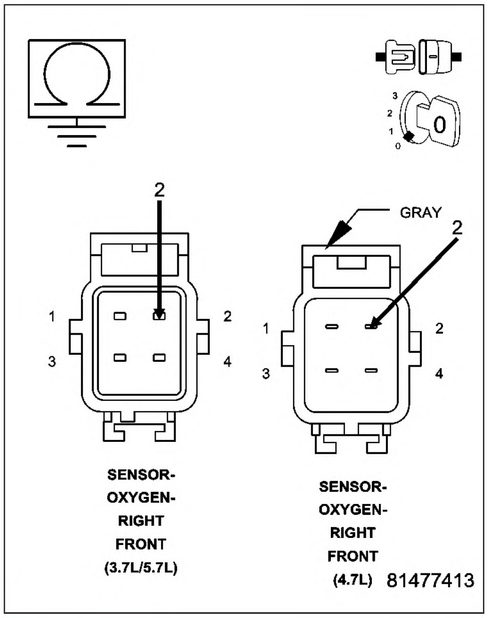
---

4. (K199) O2 2/1 HEATER CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K199) O2 2/1 Heater Control circuit in the O2 Sensor harness connector.


2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
81477413

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K199) O2 2/1 Sensor Heater Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0051-O2 SENSOR 2/1 HEATER CIRCUIT LOW (CONTINUED)

5. PCM

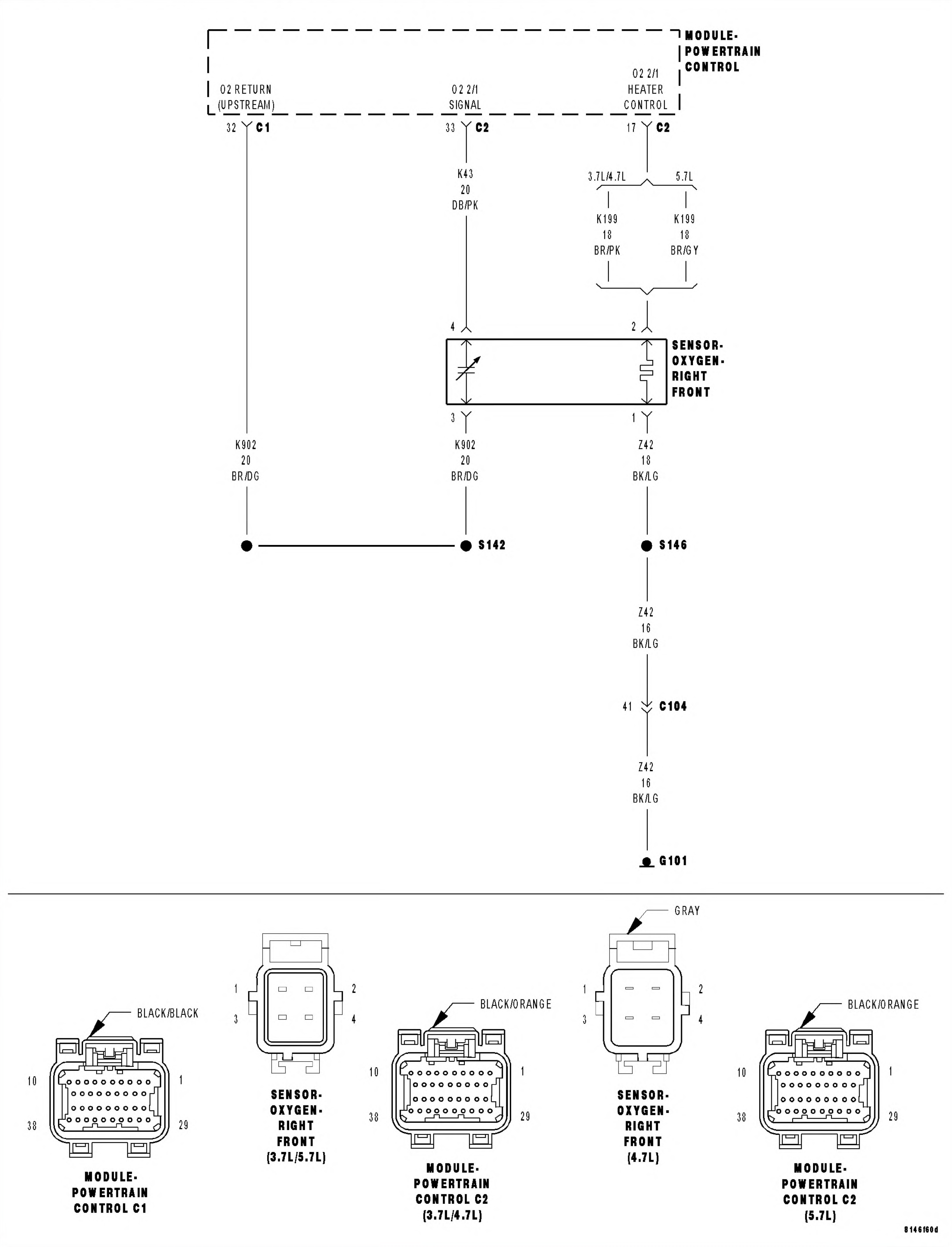
NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes	>>	Repair as necessary. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)
No	>>	Replace and program the Powertrain Control Module per Service Information. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.
- **Set Condition:**
  Desired state does not equal Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K199) O2 2/1 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 2/1 HEATER GROUND CIRCUIT OPEN
(K199) O2 2/1 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTC’s.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 2/1 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element, between the O2 Heater Control terminal and the Heater ground terminal at the component connector.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

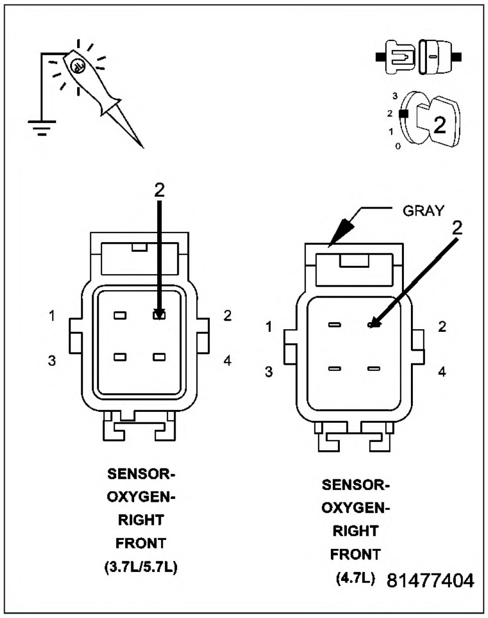
P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH (CONTINUED)

3. (K199) O2 2/1 HEATER CONTROL CIRCUIT

Ignition on, engine not running.

With the scan tool, actuate the O2 Heater Test with the Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K199) O2 2/1 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
81477404

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Go To 4

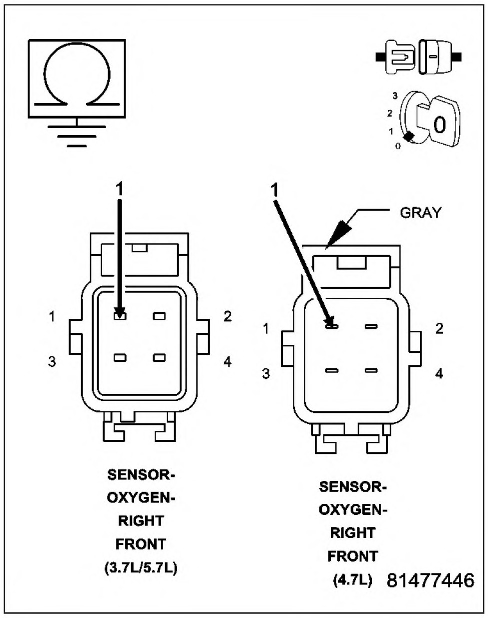
No >> Go To 5

---

4. (Z42) O2 2/1 HEATER GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance between an engine ground and the (Z42) O2 2/1 Heater ground circuit in the O2 Sensor harness connector.


3
2
1
0
0
1
1
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
81477446

Is the resistance below 5.0 ohms?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Repair the open in the (Z42) O2 2/1 Heater ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH (CONTINUED)

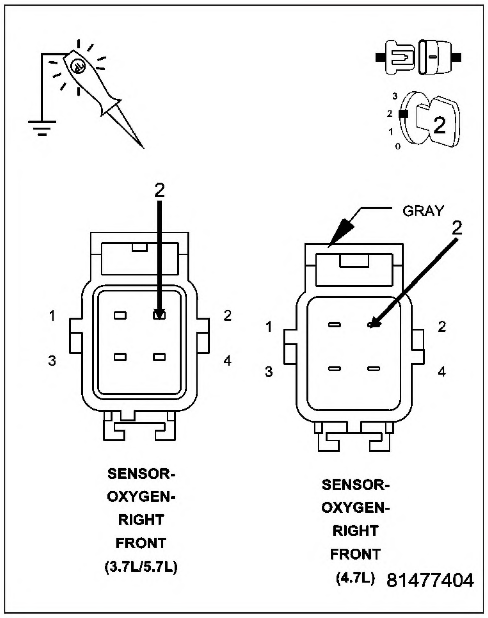
5. (K199) O2 2/1 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, probe the (K199) O2 2/1 Heater Control circuit in the O2 Sensor harness connector.


2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
81477404

Does the test light illuminate?

Yes >> Repair the short to battery voltage in the (K199) O2 2/1 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

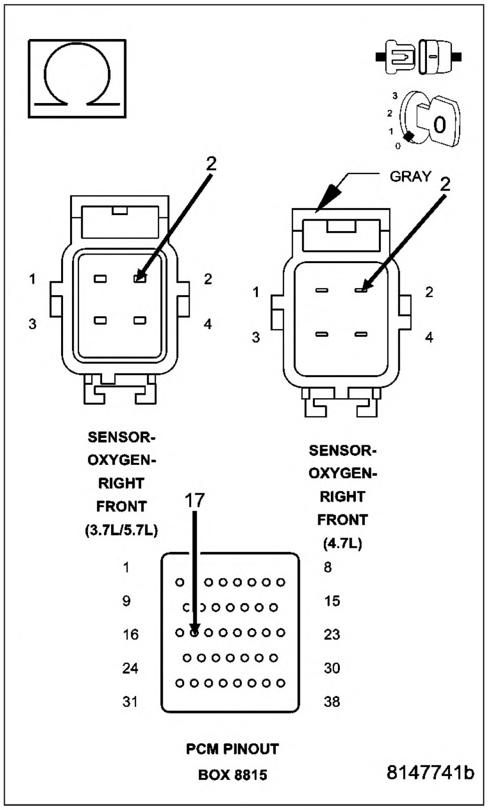
---

6. (K199) O2 2/1 HEATER CONTROL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K199) O2 2/1 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


0
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
17
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147741b

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K199) O2 2/1 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0052-O2 SENSOR 2/1 HEATER CIRCUIT HIGH (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

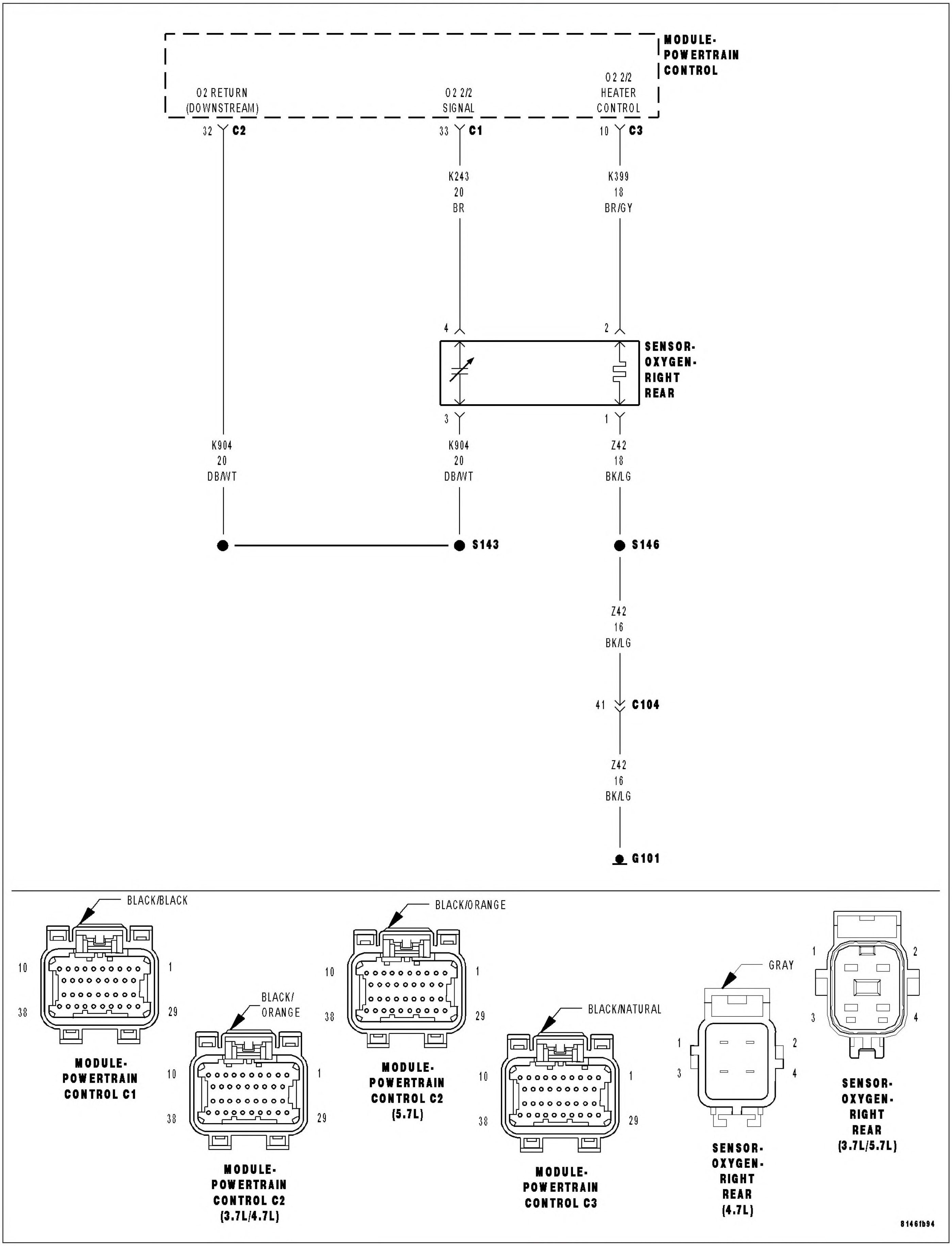
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0057-O2 SENSOR 2/2 HEATER CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32 C2
33 C1
10 C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P0057-O2 SENSOR 2/2 HEATER CIRCUIT LOW (CONTINUED)

For the Engine circuit diagrams (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is on.
- **Set Condition:**
  Desired state does not match Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K399) O2 SENSOR 2/2 HEATER CONTROL CIRCUIT SHORTED TO GROUND
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test.

With the scan tool, monitor 2/2 O2 Sensor voltage for at least 2 minutes.

Does the O2 Sensor voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 2/2 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element, between the O2 Heater Control terminal and the O2 Heater ground terminal in the component connector.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

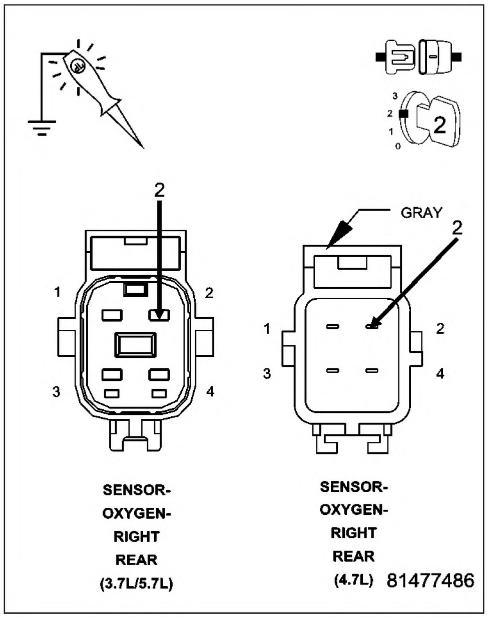
P0057-O2 SENSOR 2/2 HEATER CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test with the O2 Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K399) O2 2/2 Heater Control circuit in the O2 Sensor harness connector.


2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
81477486

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

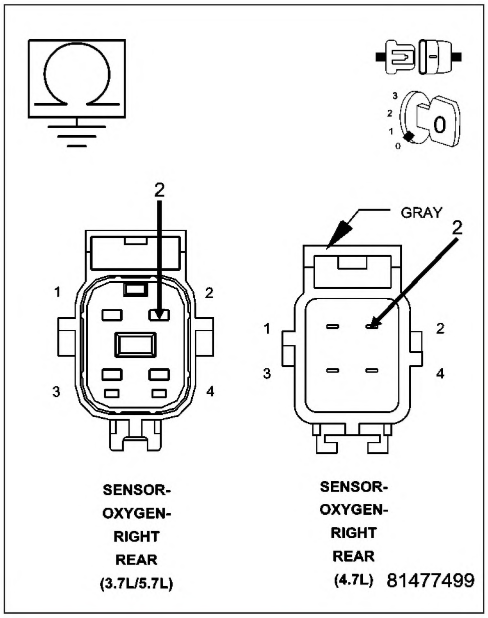
---

4. (K399) O2 2/2 HEATER CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K399) O2 2/2 Heater Control circuit in the O2 Sensor harness connector.


2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
81477499

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K399) O2 2/2 Sensor Heater Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0057-O2 SENSOR 2/2 HEATER CIRCUIT LOW (CONTINUED)

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

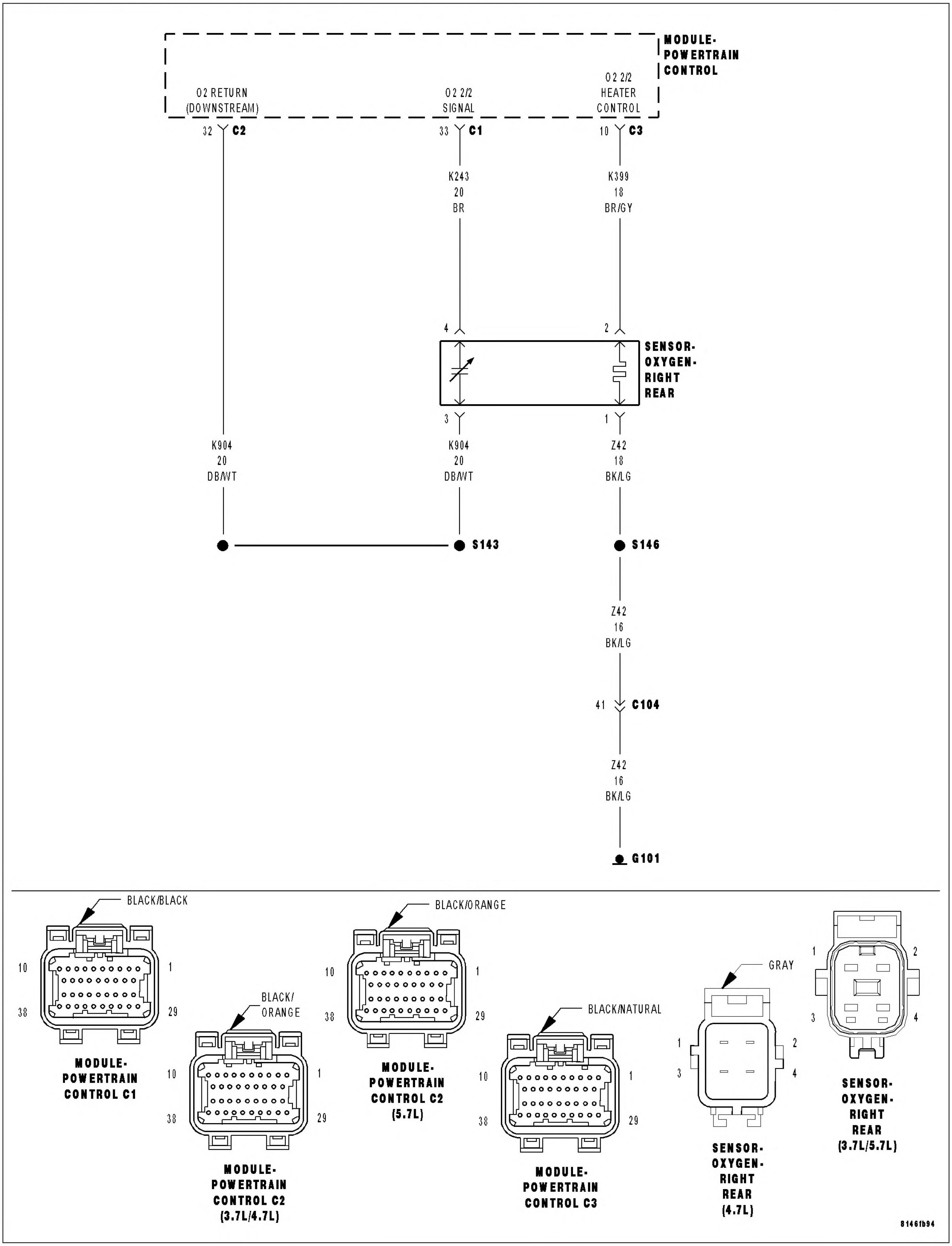
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0058-O2 SENSOR 2/2 HEATER CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32 C2
33 C1
10 C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P0058-O2 SENSOR 2/2 HEATER CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Battery voltage above 10.6 volts, ASD is powered up, and O2 heater is off.
- **Set Condition:**
  Desired state does not equal Actual state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K399) O2 2/2 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 2/2 HEATER GROUND CIRCUIT OPEN
(K399) O2 2/2 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTC's.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. O2 HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 Sensor to cool down to room temperature.

Disconnect the 2/2 O2 Sensor harness connector.

Measure the resistance across the O2 Sensor Heater element, between the O2 Heater Control terminal and the O2 Heater ground terminal in the component connector.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the O2 Sensor Heater Element resistance between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

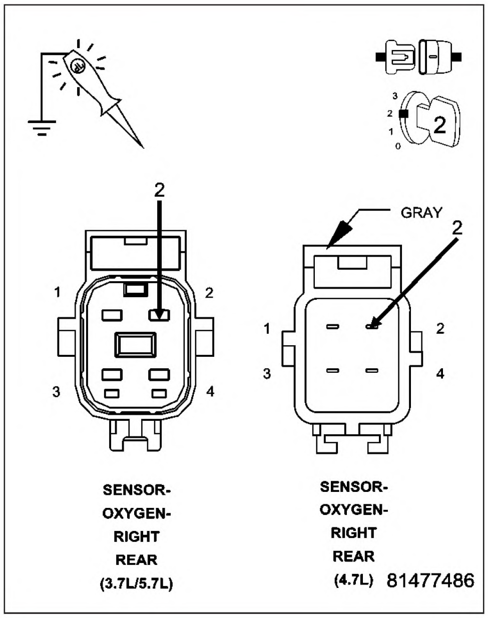
P0058-O2 SENSOR 2/2 HEATER CIRCUIT HIGH (CONTINUED)

3. (K399) O2 2/2 HEATER CONTROL CIRCUIT

Ignition on, engine not running.

With a scan tool, actuate the O2 2/2 Heater Test with the Sensor harness connector still disconnected.

Using a 12-volt test light connected to ground, probe the (K399) O2 2/2 Heater Control circuit in the O2 Sensor harness connector.


3
2
1
0
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
81477486

Does the test light illuminate brightly and flash on and off during the actuation?

Yes >> Go To 4

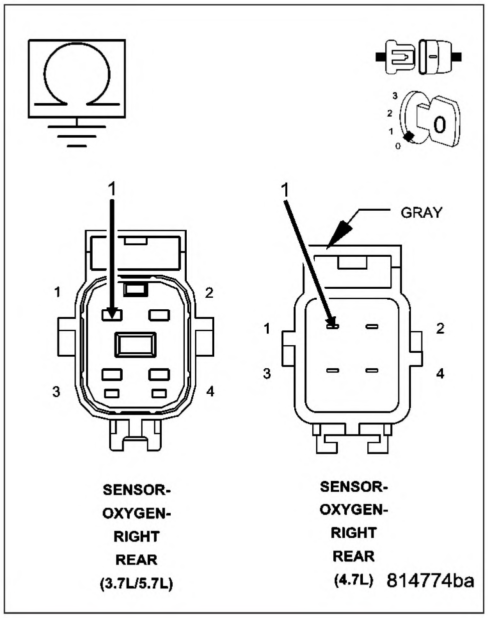
No >> Go To 5

---

4. (Z42) O2 HEATER GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance between an engine ground and the (Z42) O2 2/2 Heater ground circuit in the O2 Sensor harness connector.


3
2
1
0
0
1
1
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
814774ba

Is the resistance below 5.0 ohms?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Repair the open in the (Z42) O2 2/2 Heater ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0058-O2 SENSOR 2/2 HEATER CIRCUIT HIGH (CONTINUED)

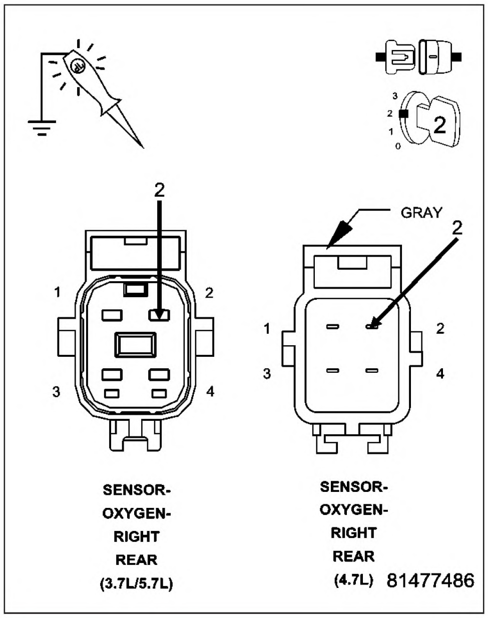
5. (K399) O2 2/2 HEATER CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, probe the (K399) O2 Heater 2/2 Control circuit in the O2 Sensor harness connector.


2
1
0
3
2
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT REAR (4.7L)
81477486

Does the test light illuminate?

Yes >> Repair the short to battery voltage in the (K399) O2 2/2 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

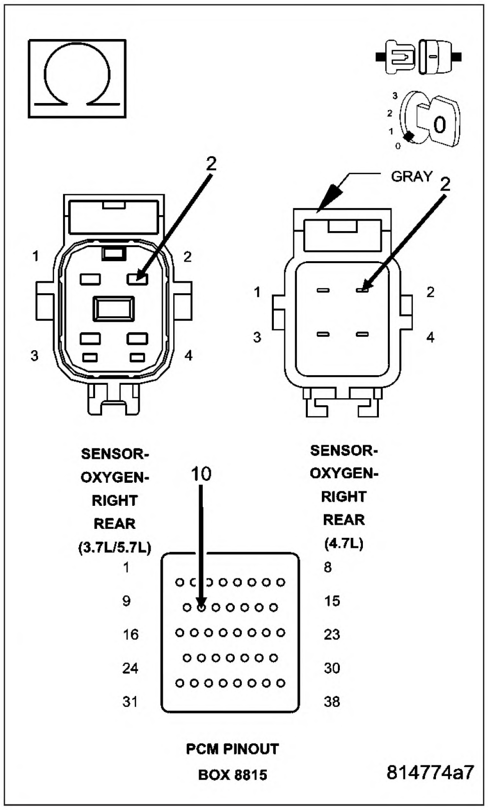
No >> Go To 6

6. (K399) O2 2/2 HEATER CONTROL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM hanrness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K399) O2 2/2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT REAR (4.7L)
10
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
814774a7

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K399) O2 2/2 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0058-O2 SENSOR 2/2 HEATER CIRCUIT HIGH (CONTINUED)

7. PCM

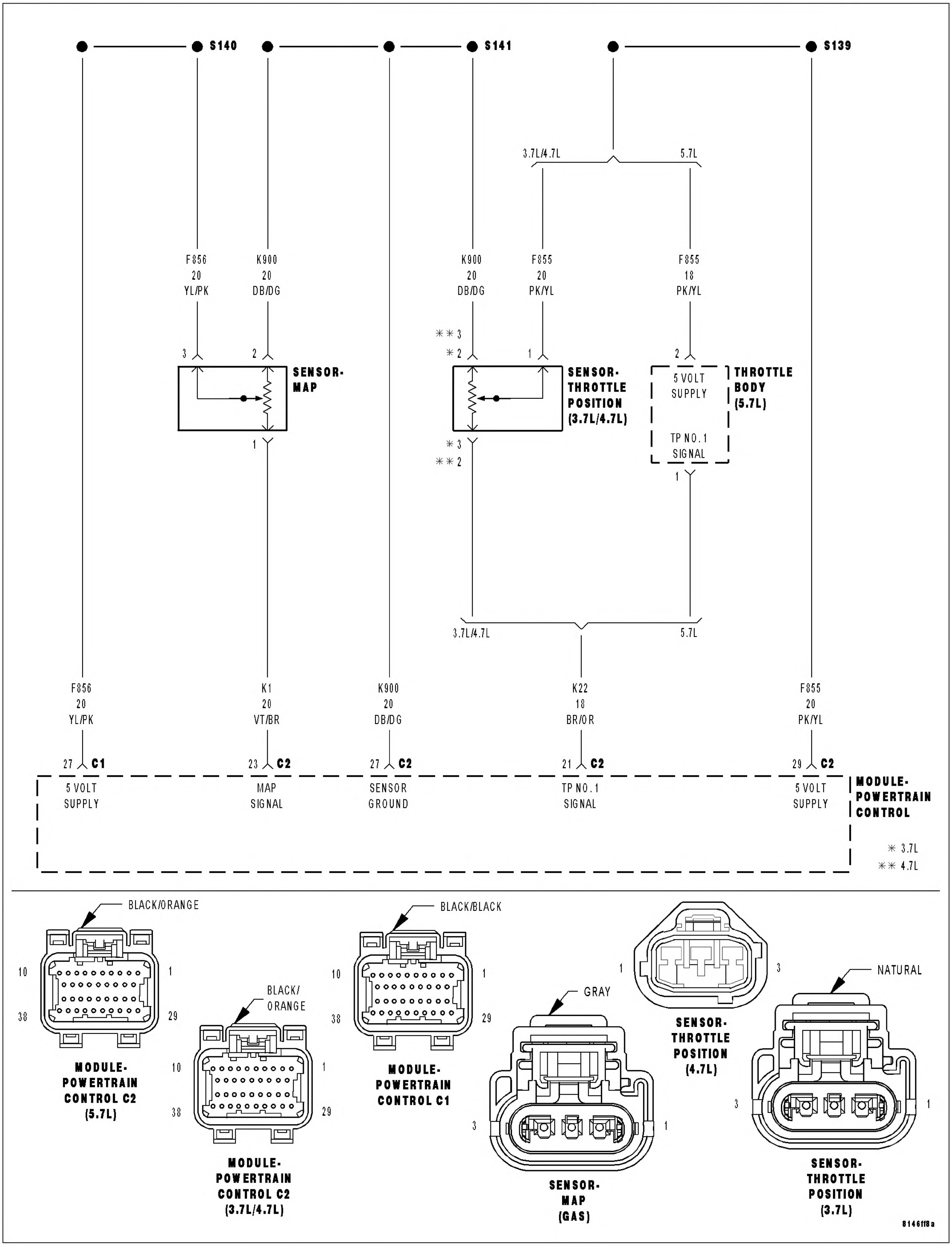
NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes	>>	Repair as necessary. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)
No	>>	Replace and program the Powertrain Control Module per Service Information. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION


S140
S141
S139
3.7L/4.7L
5.7L
F856 20 YL/PK
K900 20 DB/DG
K900 20 DB/DG
F855 20 PK/YL
F855 18 PK/YL
✻✻3
✻2
3
2
1
2
SENSOR-MAP
1
SENSOR-THROTTLE POSITION (3.7L/4.7L)
5 VOLT SUPPLY
TP NO.1 SIGNAL
THROTTLE BODY (5.7L)
✻3
✻✻2
1
3.7L/4.7L
5.7L
F856 20 YL/PK
K1 20 VT/BR
K900 20 DB/DG
K22 18 BR/OR
F855 20 PK/YL
27 C1
23 C2
27 C2
21 C2
29 C2
5 VOLT SUPPLY
MAP SIGNAL
SENSOR GROUND
TP NO.1 SIGNAL
5 VOLT SUPPLY
MODULE-POWERTRAIN CONTROL
✻ 3.7L
✻✻ 4.7L
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
GRAY
3
1
SENSOR-MAP (GAS)
1
3
SENSOR-THROTTLE POSITION (4.7L)
NATURAL
3
1
SENSOR-THROTTLE POSITION (3.7L)
8146ff8a

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

This DTC sets when an unexpected high intake manifold air flow condition exists that can lead to increased engine speed and puts the NGC into a High Air flow Protection limiting mode. The High Air flow Protection feature includes RPM limits for when a Throttle and/or MAP sensor limp-in fault is present.

- **When Monitored:**
  During all drive modes
- **Set Condition:**
  If vacuum drops below 1.5″Hg with engine RPM greater than 2000 RPM and closed throttle. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
VACUUM LEAK
RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K22) TP SENSOR NO.1 SIGNAL CIRCUIT
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
MAP SENSOR
THROTTLE POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Diagnose any TP Sensor or MAP Sensor component DTCs before continuing.

NOTE: If the P0501 - No Vehicle Speed Signal is set long with this DTC, refer to the P0501 diagnostics before continuing.

NOTE: The throttle plate and linkage should be free from binding and carbon build up.

NOTE: Make sure the throttle plate is at the idle position.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

2. VACUUM LEAK

NOTE: This code is enabled on engines with a plastic intake manifold and is intended to shut down the engine if a large crack occurs.

NOTE: A large vacuum leak is most likely the cause of this DTC.

Inspect the Intake Manifold for leaks and cracks.

Inspect the Power Brake Booster for any vacuum leaks.

Inspect the PCV system for proper operation and vacuum leaks.

Inspect the throttle plate to see if it is bent and will close entirely, if it is bent it may need to be replaced.

Inspect the MAP Sensor for proper installation.

Verify the engine is free from any mechanical failures.

Were any vacuum leaks found?

Yes >> Repair the vacuum leak as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. MAP SENSOR OPERATION

Start the engine.

With a scan tool, monitor the MAP Sensor voltage.

Snap the throttle.

Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at wide open throttle?

Yes >> Go To 4

No >> Go To 11

---

4. TP SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor voltage while slowly pressing the throttle pedal from closed to wide open throttle.

Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

5. EXCESSIVE RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

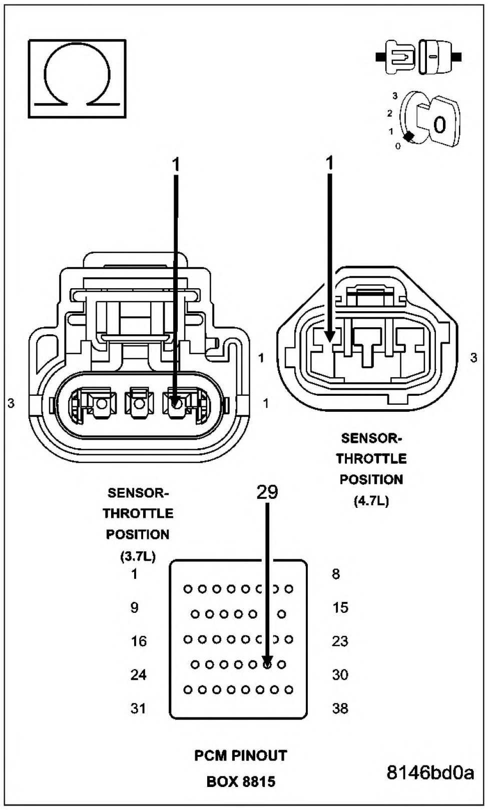
Turn the ignition off.

Disconnect the TP Sensor harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.


1
1
3
1
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
29
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8146bd0a

Is the resistance below 5.0 ohms?

Yes >> Go To 6

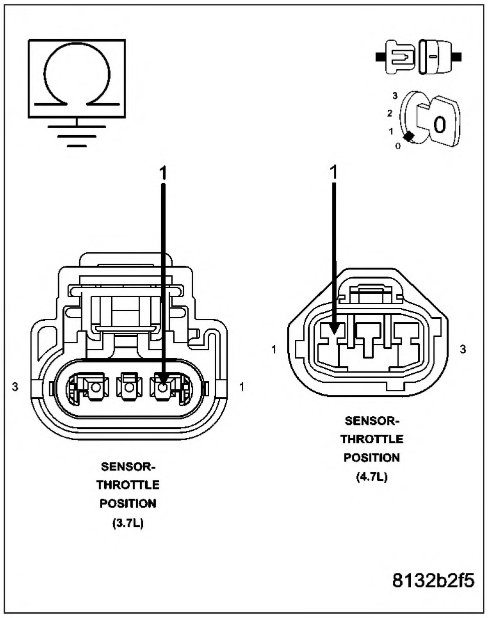
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and (F855) 5-volt Supply circuit in the TP Sensor harness connector.


1
1
3
1
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
8132b2f5

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

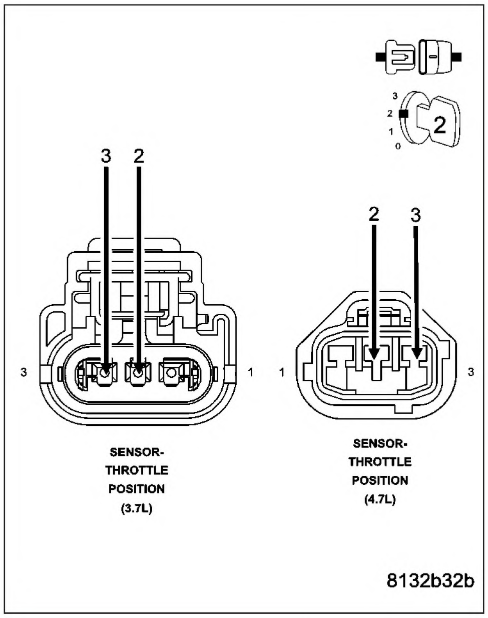
7. THROTTLE POSITION SENSOR

Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor voltage.

Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K900) Sensor ground circuit in the Sensor harness connector.


2
3
2
1
0
3 2
2 3
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
8132b32b

Does the TP Sensor voltage change from approximately 4.9 volts to below 0.5 of a volt with the jumper wire installed?

Yes >> Replace the Throttle Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

NOTE: Remove the jumper wire before continuing.

---

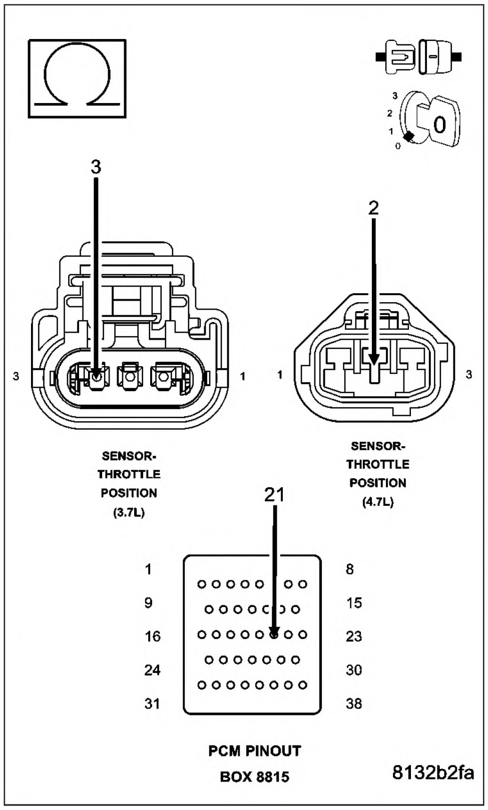
8. EXCESSIVE RESISTANCE IN THE (K22) TP NO.1 SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
3
2
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
21
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8132b2fa

Is the resistance below 5.0 ohms?

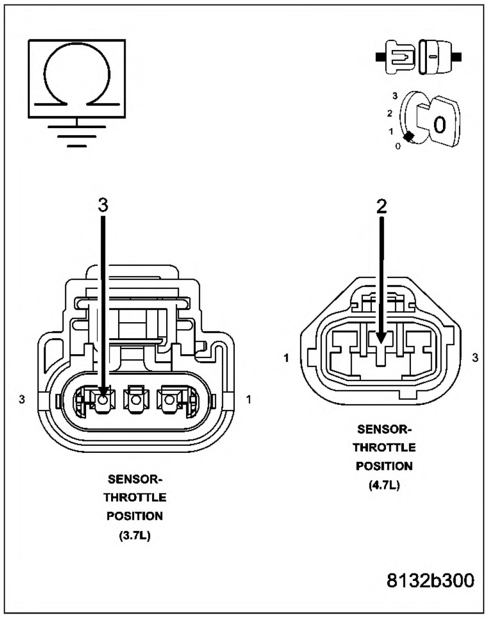
Yes >> Go To 9

No >> Repair the excessive resistance in the (K22) TP Sensor No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

9. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit in the TP Sensor harness connector.


3
2
3
1
1
3
SENSOR-THROTTLE POSITION (4.7L)
SENSOR-THROTTLE POSITION (3.7L)
8132b300

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

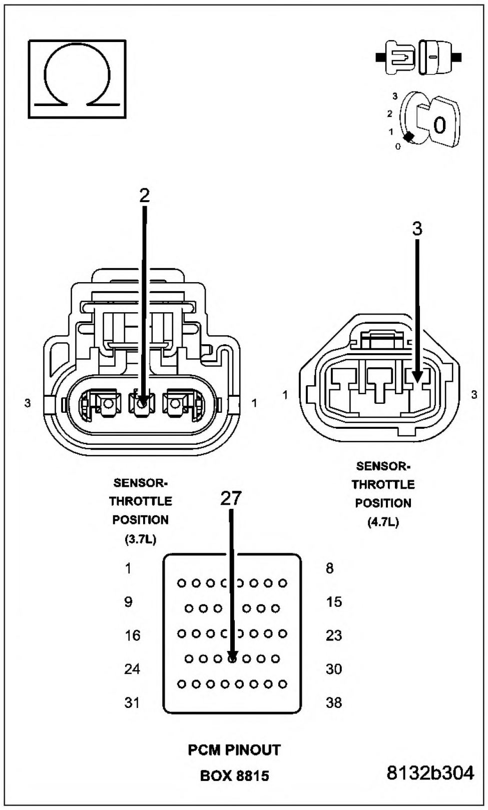
No >> Go To 10

---

10. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.


2
3
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
27
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8132b304

Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

11. EXCESSIVE RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

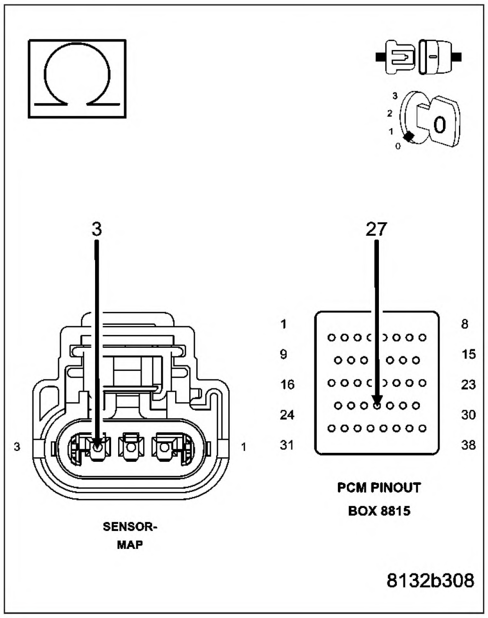
Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.


3
27
3
1
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
SENSOR-
MAP
8132b308

Is the resistance below 5.0 ohms?

Yes >> Go To 12

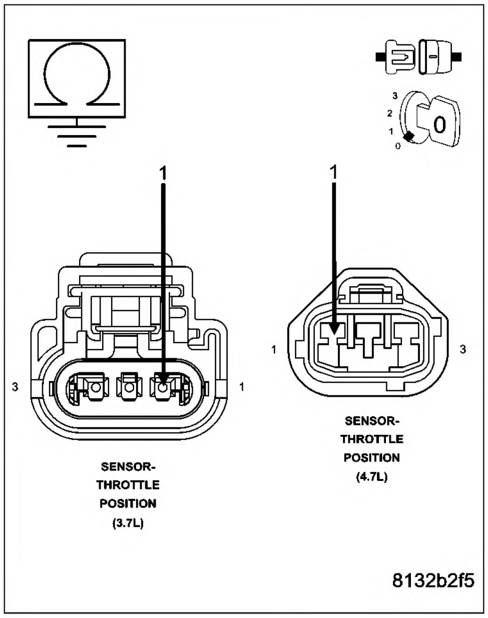
No >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

12. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.


1
1
3
1
1
3
SENSOR-
THROTTLE
POSITION
(3.7L)
SENSOR-
THROTTLE
POSITION
(4.7L)
8132b2f5

Is the resistance above 100k ohms?

Yes >> Go To 13

No >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

13. MAP SENSOR

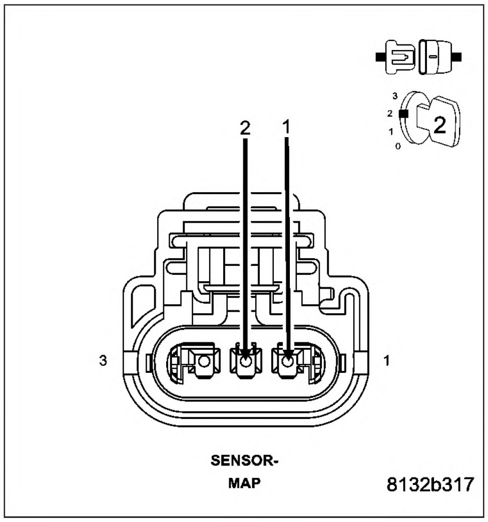
Turn the ignition off.

Connect the C1 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the MAP Sensor voltage.

Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit.



8132b317

Does the scan tool display MAP voltage from approximately 4.9 volts to below 0.5 of a volt with the jumper wire installed?

Yes >> Replace the MAP Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

NOTE: Remove the jumper wire before continuing.

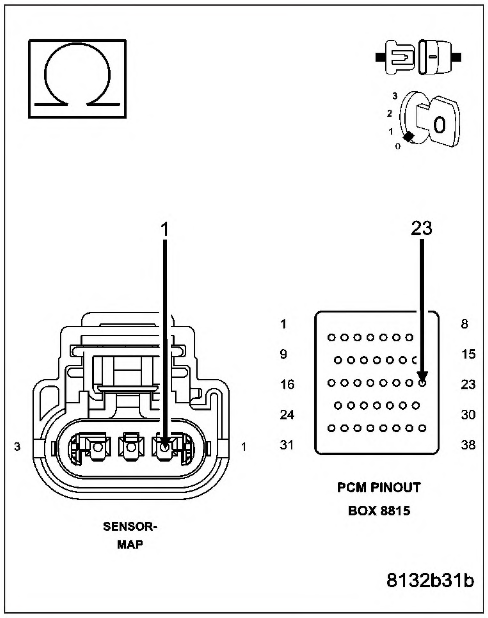
14. EXCESSIVE RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



8132b31b

Is the resistance below 5.0 ohms?

Yes >> Go To 15

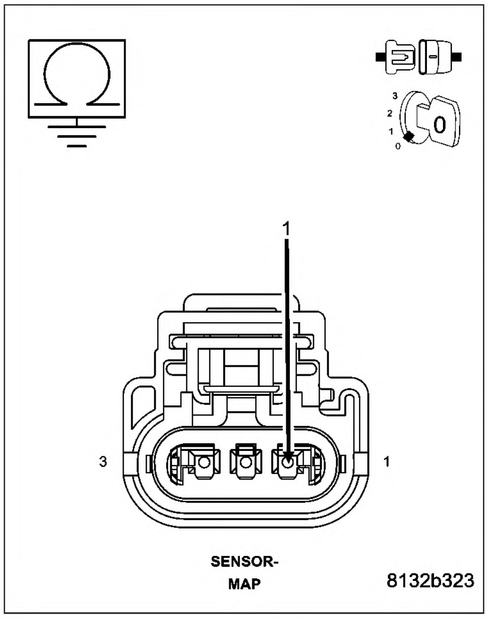
No >> Repair the excessive resistance in the (K1) MAP Signal circuit

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

15. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K1) MAP Signal circuit in the MAP Sensor harness connector.



Is the resistance below 100 ohms?

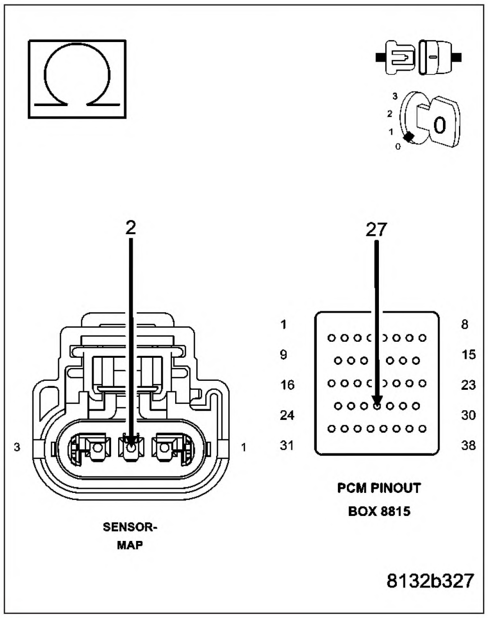
Yes >> Repair the short to ground in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16

16. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0068-MANIFOLD PRESSURE/THROTTLE POSITION CORRELATION (CONTINUED)

17. PCM

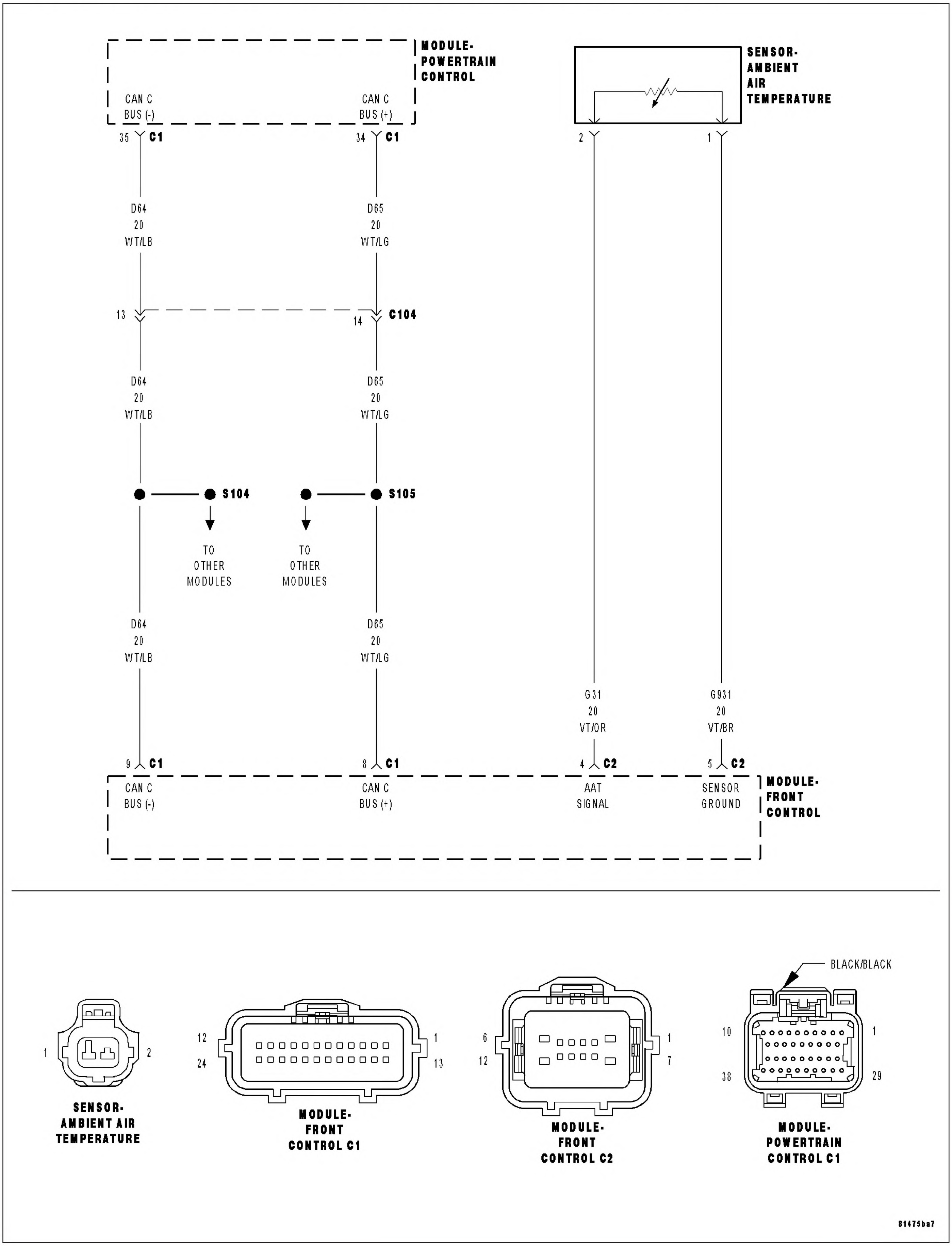
NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0071-AMBIENT AIR TEMPERATURE SENSOR PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
SENSOR-
AMBIENT
AIR
TEMPERATURE
2
1
D64
20
WT/LB
D65
20
WT/LG
13
14 C104
S104
S105
TO
OTHER
MODULES
TO
OTHER
MODULES
G31
20
VT/OR
G931
20
VT/BR
9 C1
8 C1
4 C2
5 C2
CAN C
BUS (-)
CAN C
BUS (+)
AAT
SIGNAL
SENSOR
GROUND
MODULE-
FRONT
CONTROL
SENSOR-
AMBIENT AIR
TEMPERATURE
MODULE-
FRONT
CONTROL C1
MODULE-
FRONT
CONTROL C2
MODULE-
POWERTRAIN
CONTROL C1
BLACK/BLACK
12
24
1
13
6
12
1
7
10
38
1
29
81475ba7

P0071-AMBIENT AIR TEMPERATURE SENSOR PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

Ambient Air Temperature Sensor performance looks at the outputs of three temperature sensors and compare them under cold start conditions. Following a start to run delay time, the outputs of the ambient, engine coolant, and intake air temperature sensors will be compared. If the engine coolant and intake air temperature sensors agree and the ambient air temperature does not agree, the ambient air temperature sensor is declared as irrational.

- **When Monitored:**
  Engine off time is greater than 480 minutes. Ambient temperature is greater than 4 deg C (38 deg F).
- **Set Condition:**
  After a calibrated amount of cool down time the PCM compares the ECT Sensor, IAT Sensor, and the Ambient Air Temp Sensor values. If the IAT Sensor value is not within –10 deg C (18 deg F) of the other two temperature sensors. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(G31) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(G31) AAT SIGNAL CIRCUIT OPEN
(G931) SENSOR GROUND CIRCUIT OPEN
(G31) AAT SIGNAL CIRCUIT SHORTED TO GROUND
(G31) AAT SIGNAL CIRCUIT SHORTED TO THE (G931) SENSOR GROUND CIRCUIT
AMBIENT AIR TEMPERATURE SENSOR
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Diagnose any CAN - C Communication DTCs before continuing.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0071-AMBIENT AIR TEMPERATURE SENSOR PERFORMANCE (CONTINUED)

2. (G31) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

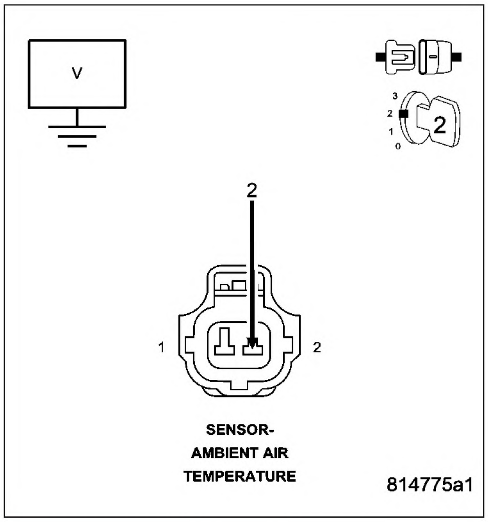
Disconnect the C2 FCM harness connector.

Disconnect the AAT Sensor harness connector.

NOTE: Visually inspect both the component and the FCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.

Ignition on, engine not running.

Measure the voltage on the (G31) AAT Signal circuit in the AAT Sensor harness connector.



Is the voltage above 5.2 volts?

Yes >> Repair the short to voltage in the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

3. AAT SENSOR VOLTAGE ABOVE 4.6 VOLTS

Turn the ignition off.

Connect the C2 FCM harness connector.

Ignition on, engine not running.

With a scan tool, read the AAT voltage.

Is the voltage above 4.6 volts?

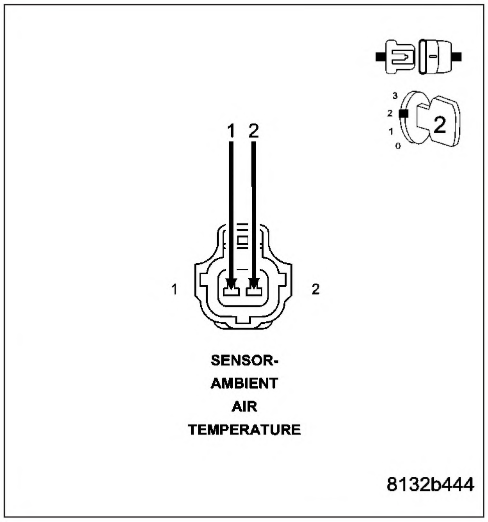
Yes >> Go To 4

No >> Go To 7

4. AAT SENSOR

Connect a jumper wire between the (G31) AAT Signal circuit and the (G931) Sensor ground circuit in the AAT Sensor harness connector.

With a scan tool, read the AAT voltage.



Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the AAT Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

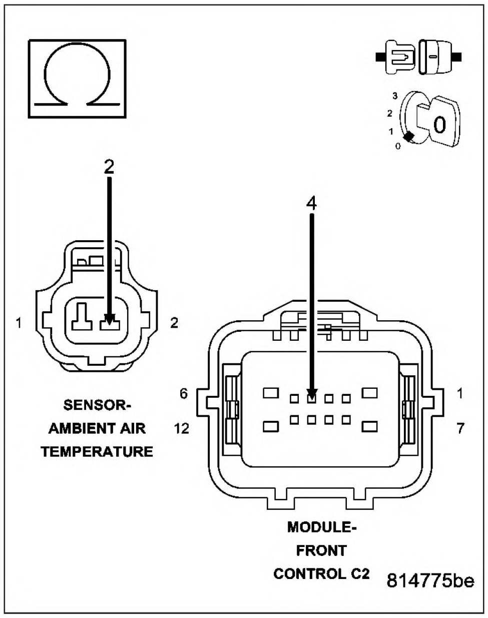
P0071-AMBIENT AIR TEMPERATURE SENSOR PERFORMANCE (CONTINUED)

5. (G31) AAT SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 FCM harness connector.

Measure the resistance of the (G31) AAT Signal circuit from the AAT Sensor harness connector to the C2 FCM harness connector.


2
4
1
2
6
12
1
7
SENSOR-
AMBIENT AIR
TEMPERATURE
MODULE-
FRONT
CONTROL C2
814775be

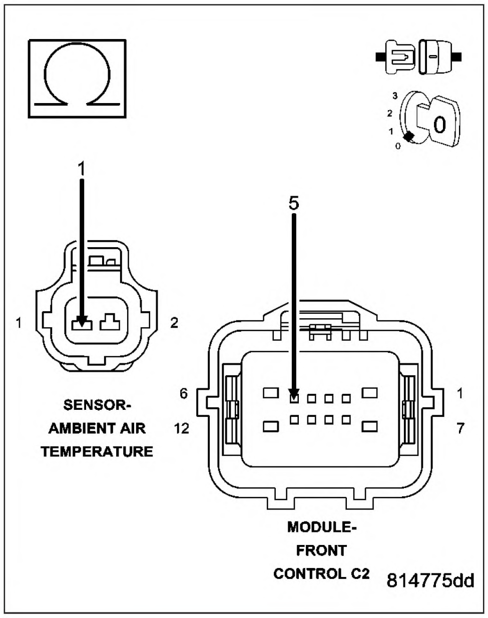
Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

6. (G931) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (G931) Sensor ground circuit from the AAT Sensor harness connector to the C2 FCM harness connector.


1
5
1
2
6
12
1
7
SENSOR-
AMBIENT AIR
TEMPERATURE
MODULE-
FRONT
CONTROL C2
814775dd

Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the open in the (G931) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

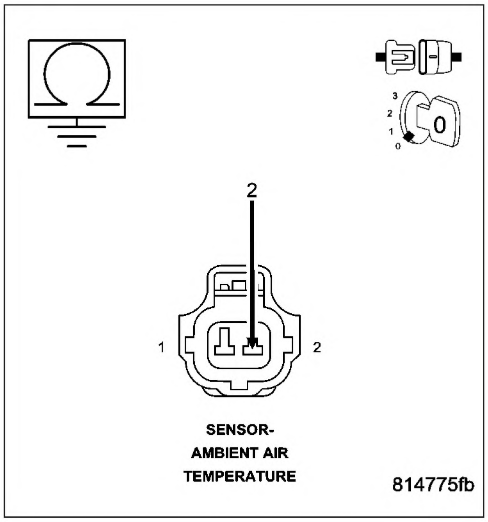
P0071-AMBIENT AIR TEMPERATURE SENSOR PERFORMANCE (CONTINUED)

7. (G31) AAT SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 FCM harness connector.

Measure the resistance between ground and the (G31) AAT Signal circuit in the AAT Sensor harness connector.



Is the resistance below 100 ohms?

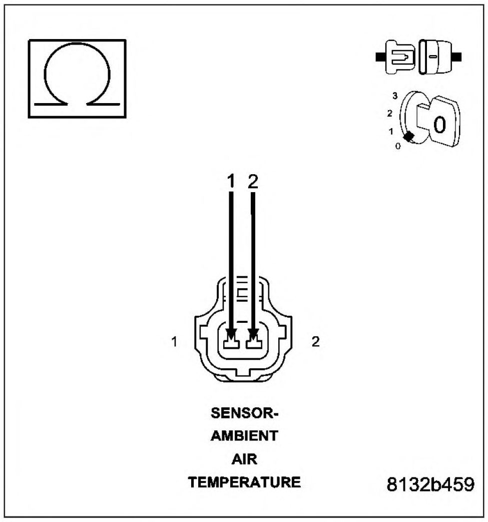
Yes >> Repair the short to ground in the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. (G31) AAT SIGNAL CIRCUIT SHORTED TO THE (G931) SENSOR GROUND CIRCUIT

Measure the resistance between the (G31) AAT Signal circuit and the (G931) Sensor ground circuit in the AAT Sensor harness connector.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (G931) Sensor ground circuit and the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

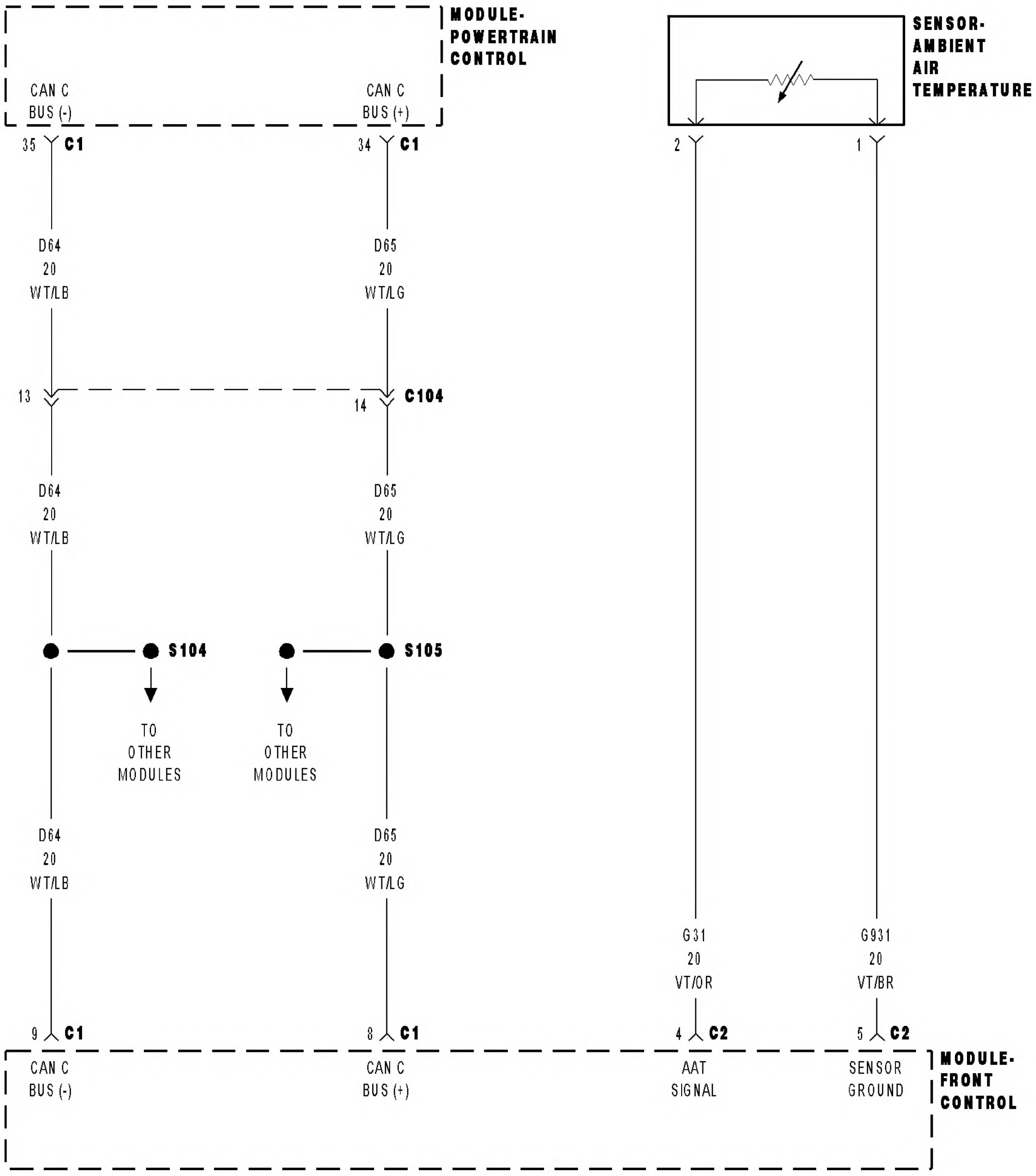
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

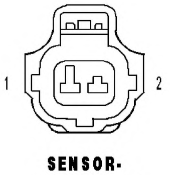
Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST VER - 1.

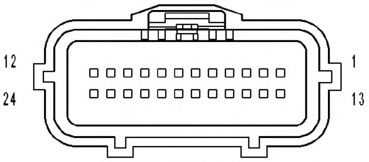
No >> Replace the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST VER - 1.

P0072-AMBIENT AIR TEMPERATURE SENSOR CIRCUIT LOW

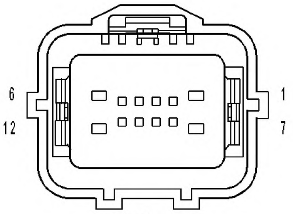

MODULE-
POWERTRAIN
CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
SENSOR-
AMBIENT
AIR
TEMPERATURE
2
1
D64 20 WT/LB
D65 20 WT/LG
13
14 C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
TO OTHER MODULES
TO OTHER MODULES
D64 20 WT/LB
D65 20 WT/LG
G31 20 VT/OR
G931 20 VT/BR
9 C1
8 C1
4 C2
5 C2
CAN C BUS (-)
CAN C BUS (+)
AAT SIGNAL
SENSOR GROUND
MODULE-
FRONT
CONTROL



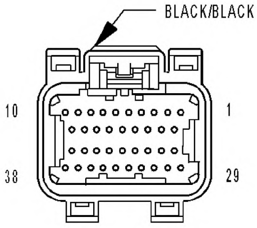
SENSOR-
AMBIENT AIR
TEMPERATURE



MODULE-
FRONT
CONTROL C1



MODULE-
FRONT
CONTROL C2


BLACK/BLACK
10
38
1
29

MODULE-
POWERTRAIN
CONTROL C1

81475ba7

P0072-AMBIENT AIR TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The ignition key on.
- **Set Condition:**
  Ambient Temperature Sensor is less than 0.078 of a volt at the PCM for 2.8 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(G31) AAT SIGNAL CIRCUIT SHORTED TO GROUND
(G31) AAT SIGNAL CIRCUIT SHORTED TO THE (G931) SENSOR GROUND CIRCUIT
AMBIENT AIR TEMPERATURE SENSOR
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. AAT SENSOR VOLTAGE BELOW 0.078 OF A VOLT

NOTE: Diagnose any CAN - C Communication DTCs before continuing.

Ignition on, engine not running.

With a scan tool, read the Ambient Air Temperature Sensor voltage.

Is the voltage below 0.078 of a volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. CHECKING AAT SENSOR

Turn the ignition off.

Disconnect the Ambient Air Temperature Sensor harness connector.

Ignition on, engine not running.

With a scan tool, read the AAT Sensor voltage.

Is the voltage above 4.6 volts?

Yes >> Replace the Ambient Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

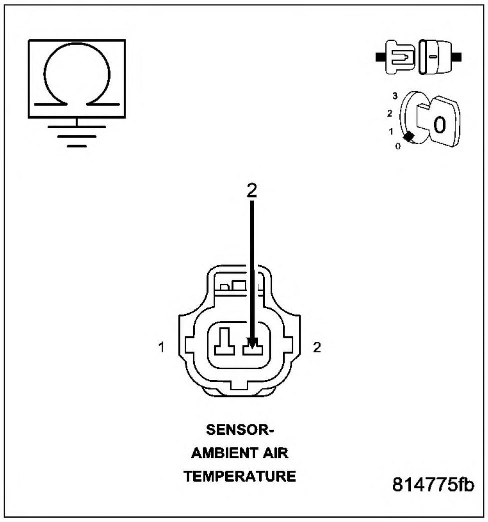
P0072-AMBIENT AIR TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

3. (G31) AAT SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 FCM harness connector.

Measure the resistance between ground and the (G31) AAT Signal circuit in the AAT Sensor harness connector.



Is the resistance below 100 ohms?

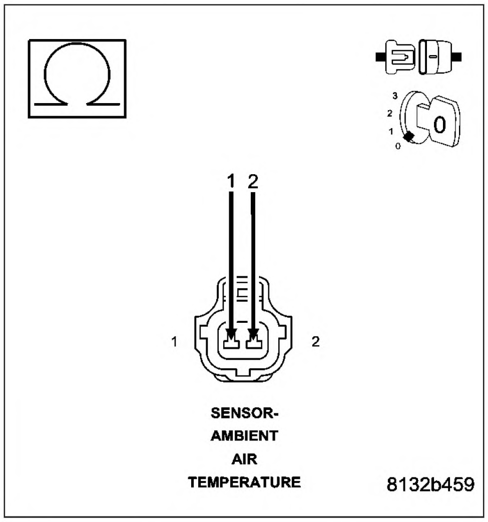
Yes >> Repair the short to ground in the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (G31) AAT SIGNAL CIRCUIT SHORTED TO THE (G931) SENSOR GROUND CIRCUIT

Measure the resistance between the (G931) Sensor ground circuit and the (G31) AAT Signal circuit in the AAT Sensor harness connector.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (G931) Sensor ground circuit and the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

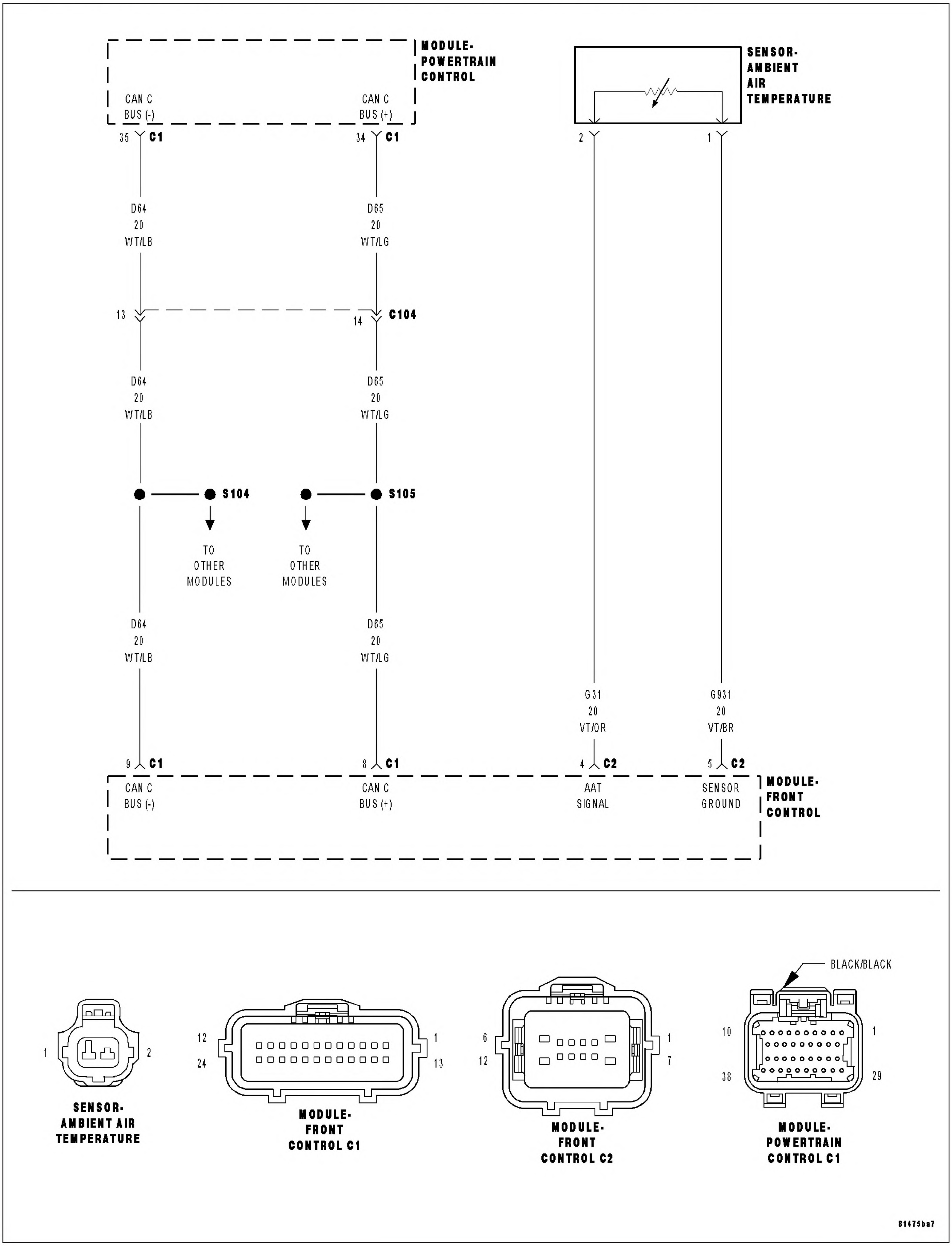
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST VER - 1.

No >> Replace and program the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST VER - 1.

P0073–AMBIENT AIR TEMPERATURE SENSOR CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
SENSOR-
AMBIENT
AIR
TEMPERATURE
2
1
D64
20
WT/LB
D65
20
WT/LG
13
14 C104
D64
20
WT/LB
D65
20
WT/LG
S104
S105
TO
OTHER
MODULES
TO
OTHER
MODULES
D64
20
WT/LB
D65
20
WT/LG
G31
20
VT/OR
G931
20
VT/BR
9 C1
8 C1
4 C2
5 C2
CAN C
BUS (-)
CAN C
BUS (+)
AAT
SIGNAL
SENSOR
GROUND
MODULE-
FRONT
CONTROL
1
2
SENSOR-
AMBIENT AIR
TEMPERATURE
12
24
1
13
MODULE-
FRONT
CONTROL C1
6
12
1
7
MODULE-
FRONT
CONTROL C2
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
81475ba7

P0073–AMBIENT AIR TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  The Ambient Temperature Sensor voltage is greater than 4.98 volts at the PCM for 2.8 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(G31) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(G31) AAT SIGNAL CIRCUIT OPEN
(G931) SENSOR GROUND CIRCUIT OPEN
AMBIENT AIR TEMPERATURE SENSOR
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. AAT SENSOR VOLTAGE ABOVE 4.98 VOLTS

Ignition on, engine not running.

With a scan tool, read the Ambient Air Temperature Sensor voltage.

Is the voltage above 4.98 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. AAT SENSOR

Turn the ignition off.

Disconnect the Ambient Air Temperature Sensor harness connector.

Connect a jumper wire between the (G31) AAT Signal circuit and the (G931) Sensor ground circuit in the AAT Sensor harness connector.

Ignition on, engine not running.

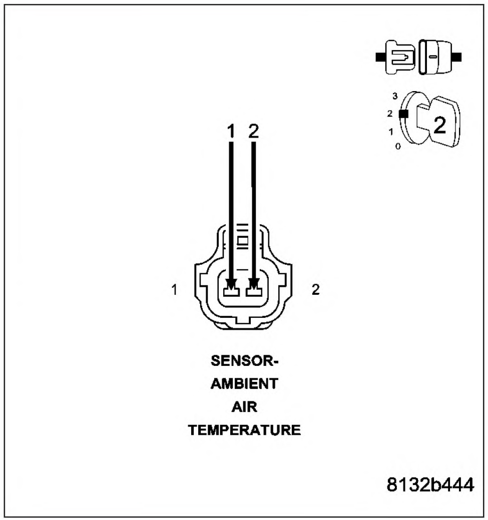
With a scan tool, read AAT Sensor voltage.

Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the Ambient Air Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.



P0073–AMBIENT AIR TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

3. (G31) AAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 FCM harness connector.

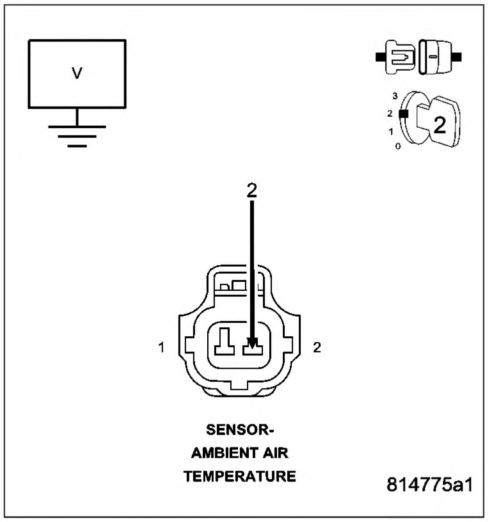
Ignition on, engine not running.

Measure the voltage on the (G31) AAT Signal circuit in the AAT Sensor harness connector.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4


V
3
2
1
0
2
2
1
2
SENSOR-
AMBIENT AIR
TEMPERATURE
814775a1

---

4. (G31) AAT SIGNAL CIRCUIT OPEN

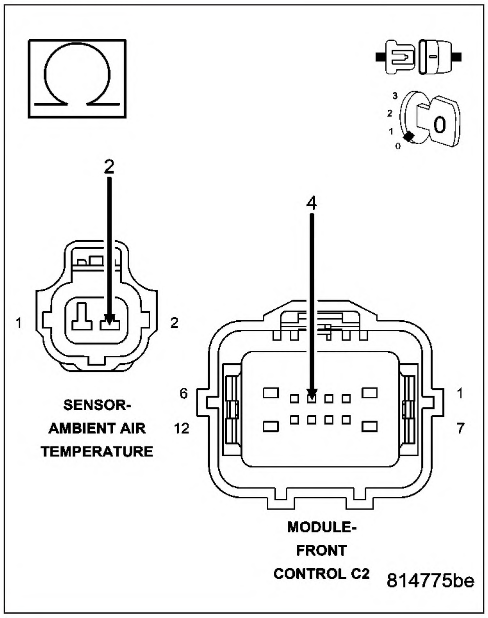
Turn the ignition off.

Measure the resistance of the (G31) AAT Signal circuit from the AAT Sensor harness connector to the C2 FCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

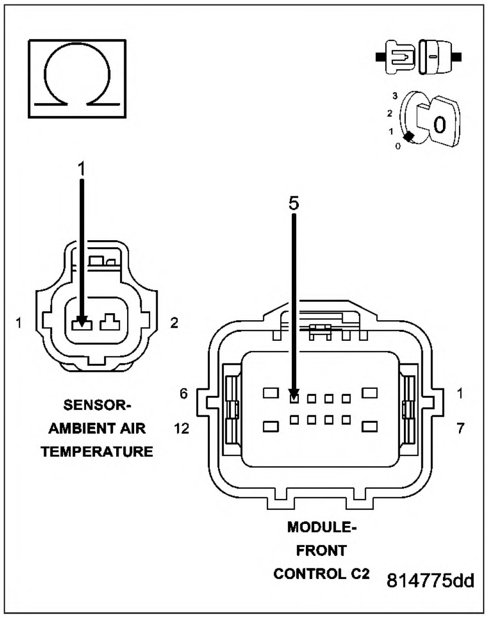
No >> Repair the open in the (G31) AAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


Ω
3
2
1
0
0
2
4
1
2
SENSOR-
AMBIENT AIR
TEMPERATURE
6
12
1
7
MODULE-
FRONT
CONTROL C2
814775be

P0073–AMBIENT AIR TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

5. (G931) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (G931) Sensor ground circuit from the AAT Sensor harness connector to the C2 FCM harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (G931) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

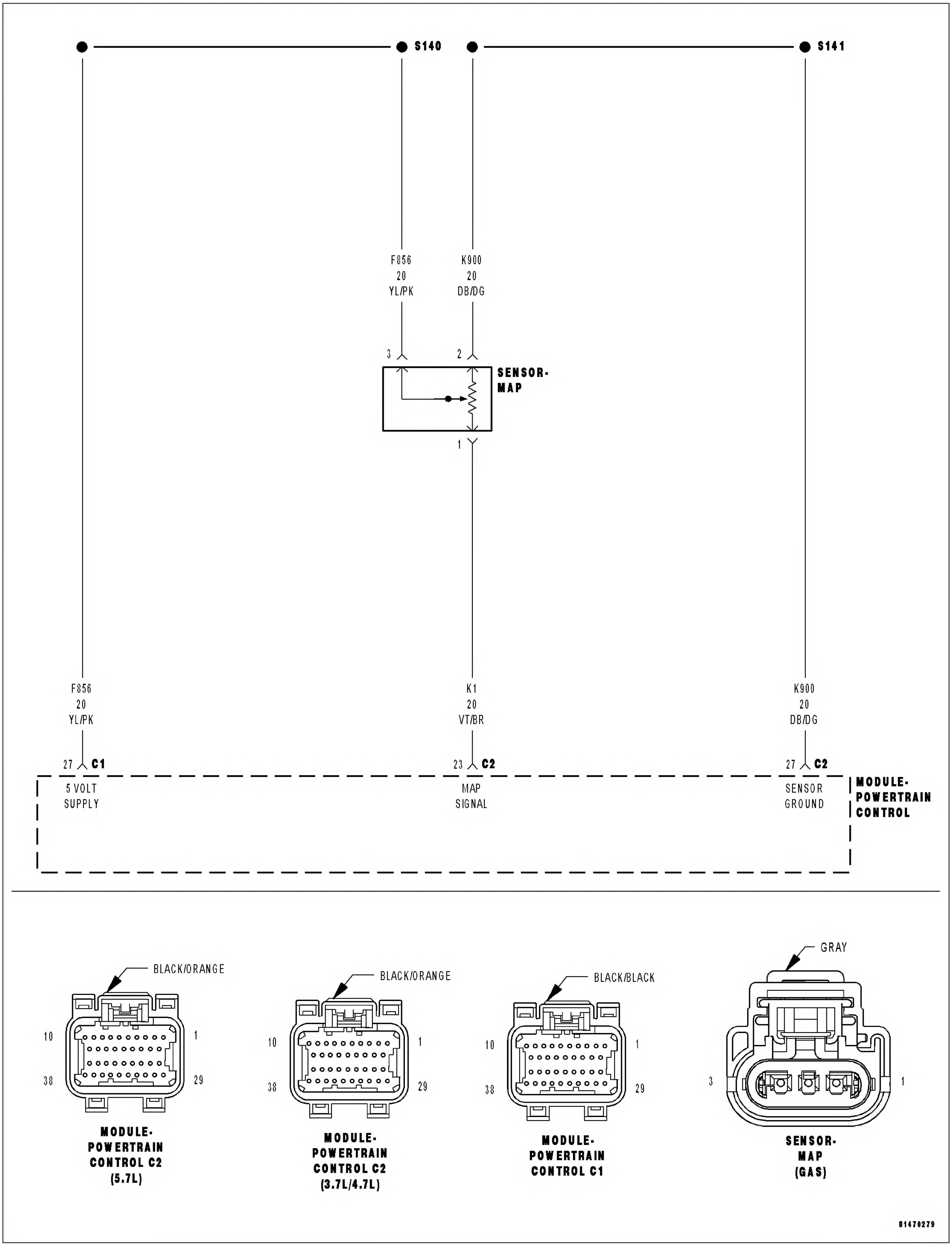
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST VER - 1.

No >> Replace the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST VER - 1.

P0107-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT LOW


S140
S141
F856
20
YL/PK
K900
20
DB/DG
3
2
SENSOR-
MAP
1
F856
20
YL/PK
K1
20
VT/BR
K900
20
DB/DG
27 C1
23 C2
27 C2
5 VOLT
SUPPLY
MAP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
GRAY
3
1
SENSOR-
MAP
(GAS)
81470279

P0107-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine speed between 600 to 3500 RPM. Battery voltage greater than 10 volts.
- **Set Condition:**
  The MAP sensor signal voltage is below 0.08 of a volt for 3.0 seconds. One Trip Fault. Three good trips to turn off the MIL, (5.7L ETC light will flash.)

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
(K1) MAP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
MAP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. MAP SENSOR VOLTAGE BELOW 0.08 OF A VOLT

Ignition on, engine not running.

With a scan tool, read the MAP Sensor voltage.

Is the voltage below 0.08 of a volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the MAP Sensor harness connector.

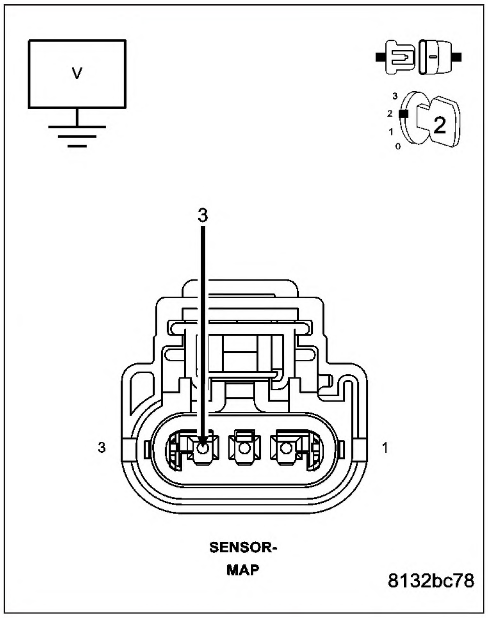
Ignition on, engine not running.

Measure the voltage on the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.

Is the voltage between 4.5 to 5.2 volts?

Yes >> Go To 3

No >> Go To 6



P0107-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

3. MAP SENSOR

With a scan tool, monitor the MAP Sensor voltage with the Sensor harness connector disconnected.

Is the voltage above 4.5 volts?

Yes >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

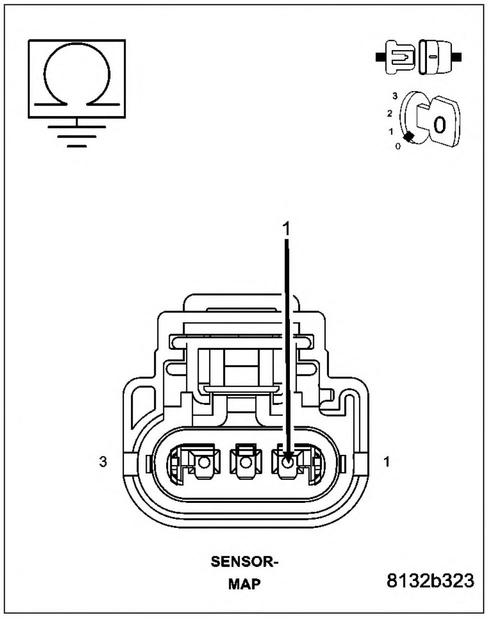
Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K1) MAP Signal circuit in the MAP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5



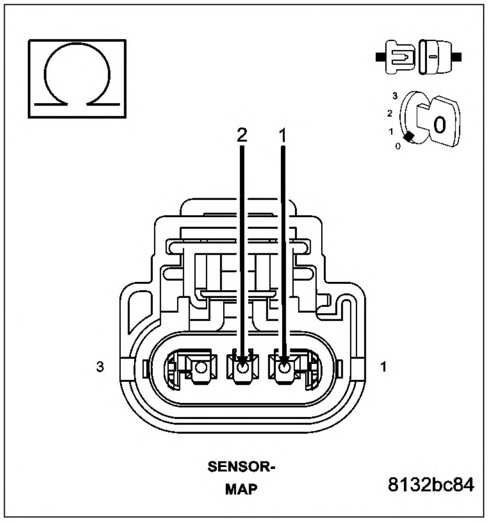
5. (K1) MAP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit in the MAP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K900) Sensor ground and the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8



P0107-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

6. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

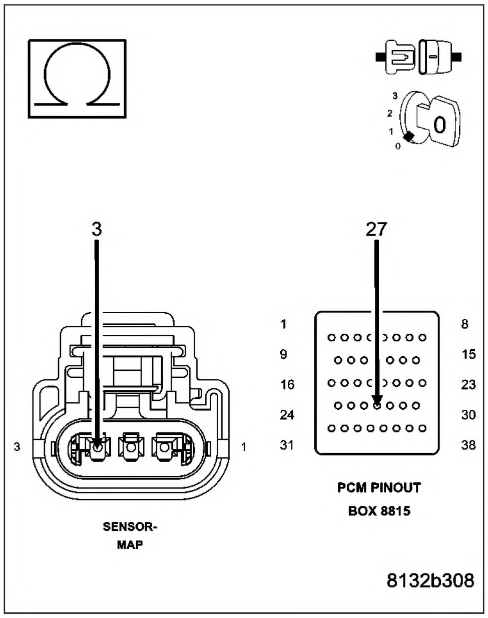
Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

7. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

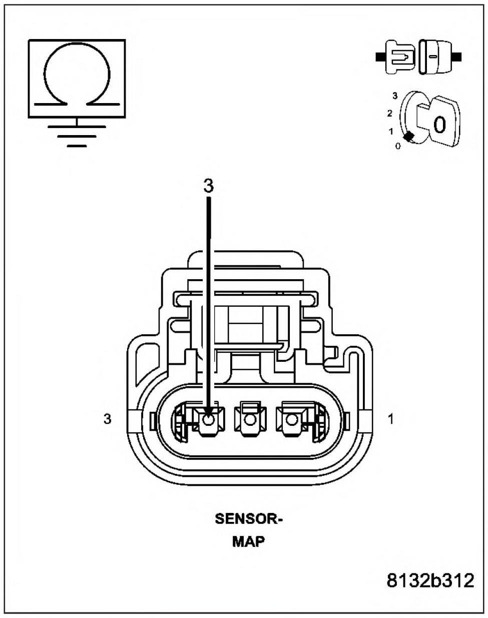
Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8



P0107-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

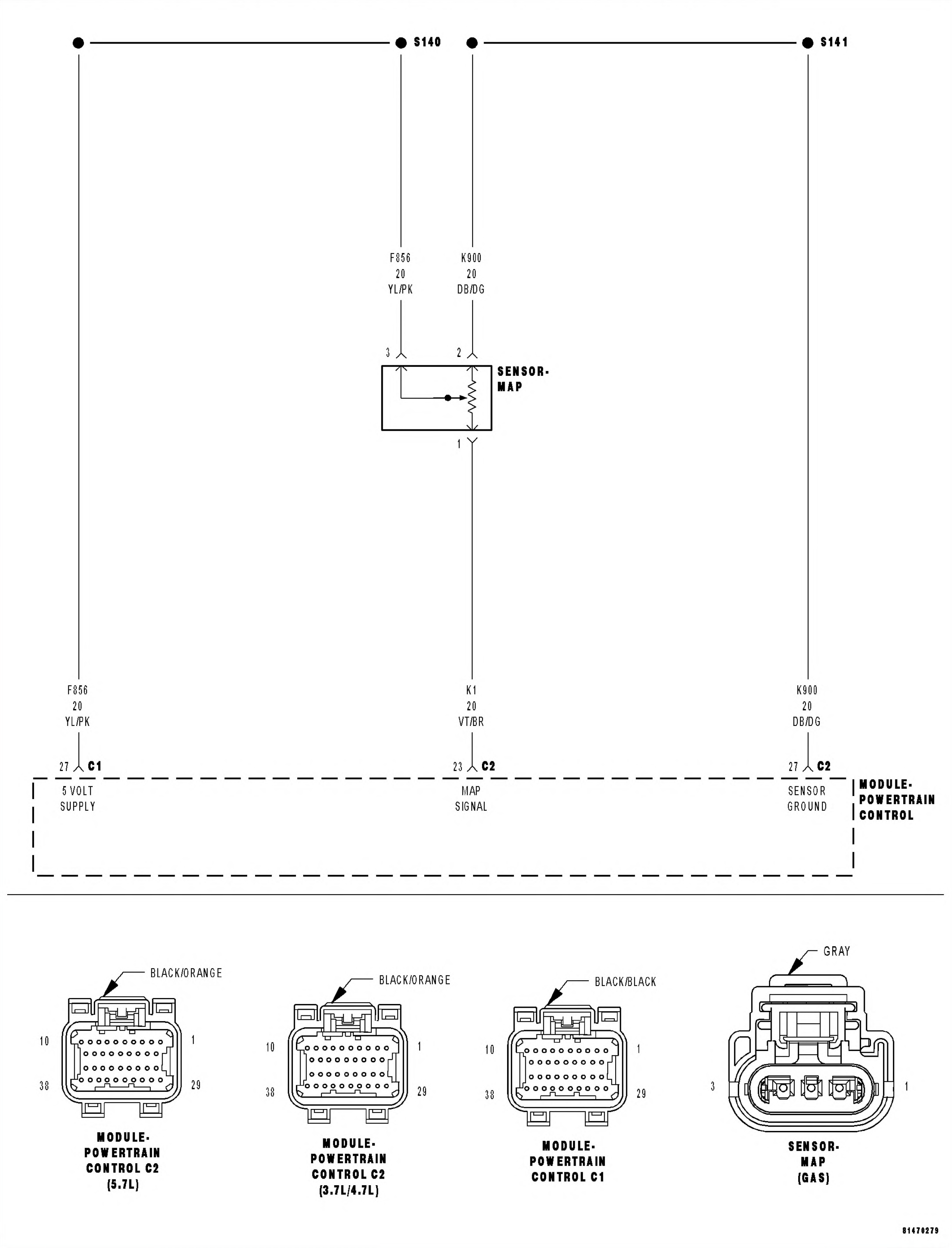
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0108-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT HIGH


S140
S141
F856
20
YL/PK
K900
20
DB/DG
3
2
SENSOR-
MAP
1
F856
20
YL/PK
K1
20
VT/BR
K900
20
DB/DG
27 C1
23 C2
27 C2
5 VOLT
SUPPLY
MAP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
GRAY
3
1
SENSOR-
MAP
(GAS)
81470279

P0108-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine speed between 600 to 3500 RPM. Battery voltage greater than 10.37 volts.
- **Set Condition:**
  The MAP sensor signal voltage is greater than 4.92 volts for 3.0 seconds. One trip fault. Three good trips to turn off the MIL. (5.7L ETC light will flash).

Possible Causes
(K1) MAP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K1) MAP SIGNAL CIRCUIT OPEN
(K1) MAP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
MAP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. MAP SENSOR VOLTAGE ABOVE 4.92 VOLTS

Start the engine.

With a scan tool, read the MAP Sensor voltage.

Is the voltage above 4.92 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. MAP SENSOR

Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit in the Sensor harness connector.

Ignition on, engine not running.

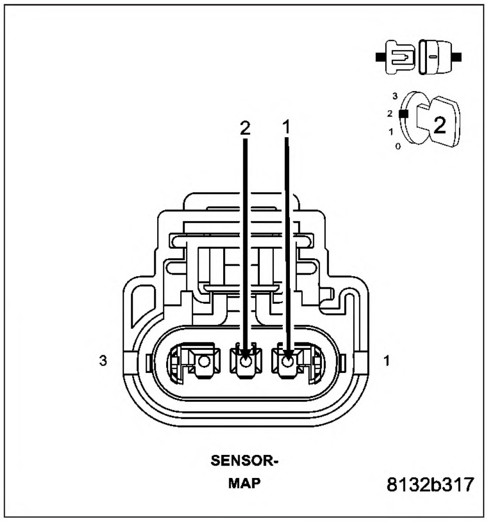
With a scan tool, monitor the MAP Sensor voltage.

Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.



P0108-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

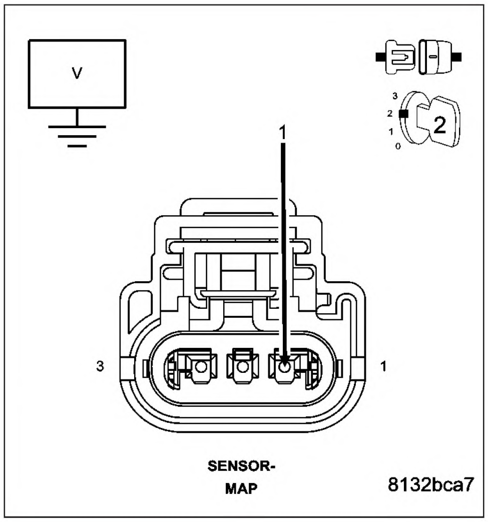
3. (K1) MAP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

Ignition on, engine not running.

Measure the voltage on the (K1) MAP Signal circuit in the MAP Sensor harness connector.



Is the voltage above 5.2 volts?

Yes >> Repair the short to battery voltage in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

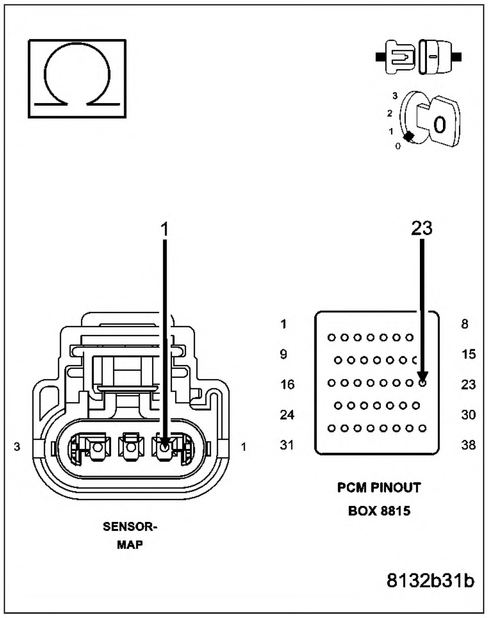
---

4. (K1) MAP SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

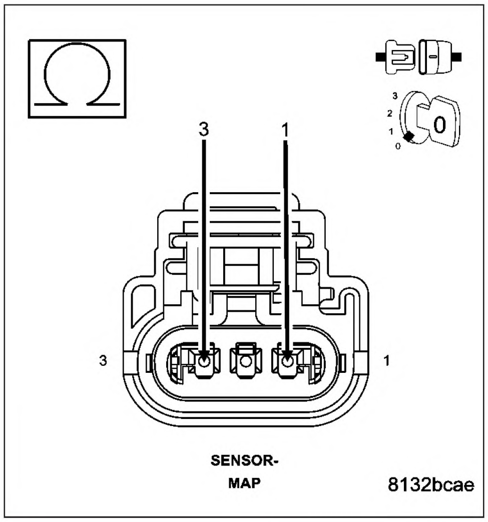
Yes >> Go To 5

No >> Repair the open in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0108-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

5. (K1) MAP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (K1) MAP Signal circuit and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.


3
1
3
1
3
2
1
0
0
SENSOR-
MAP
8132bcae

Is the resistance below 100 ohms?

Yes >> Repair the short between the (F856) 5-volt Supply circuit and the (K1) MAP Signal circuit.

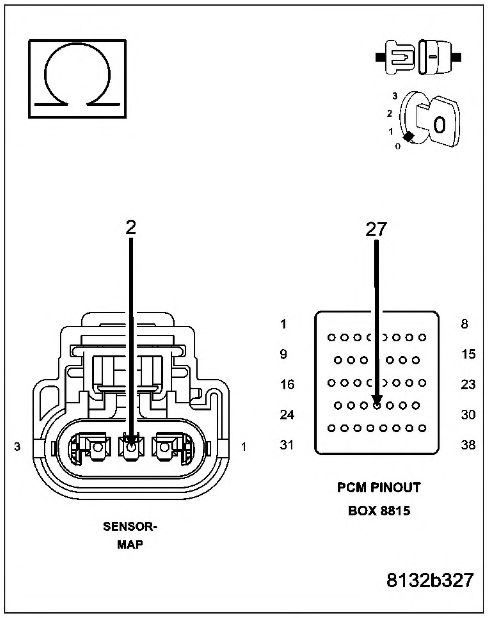
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
2
27
1
9
16
24
31
8
15
23
30
38
3
1
SENSOR-
MAP
PCM PINOUT
BOX 8815
8132b327

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0108-MANIFOLD ABSOLUTE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

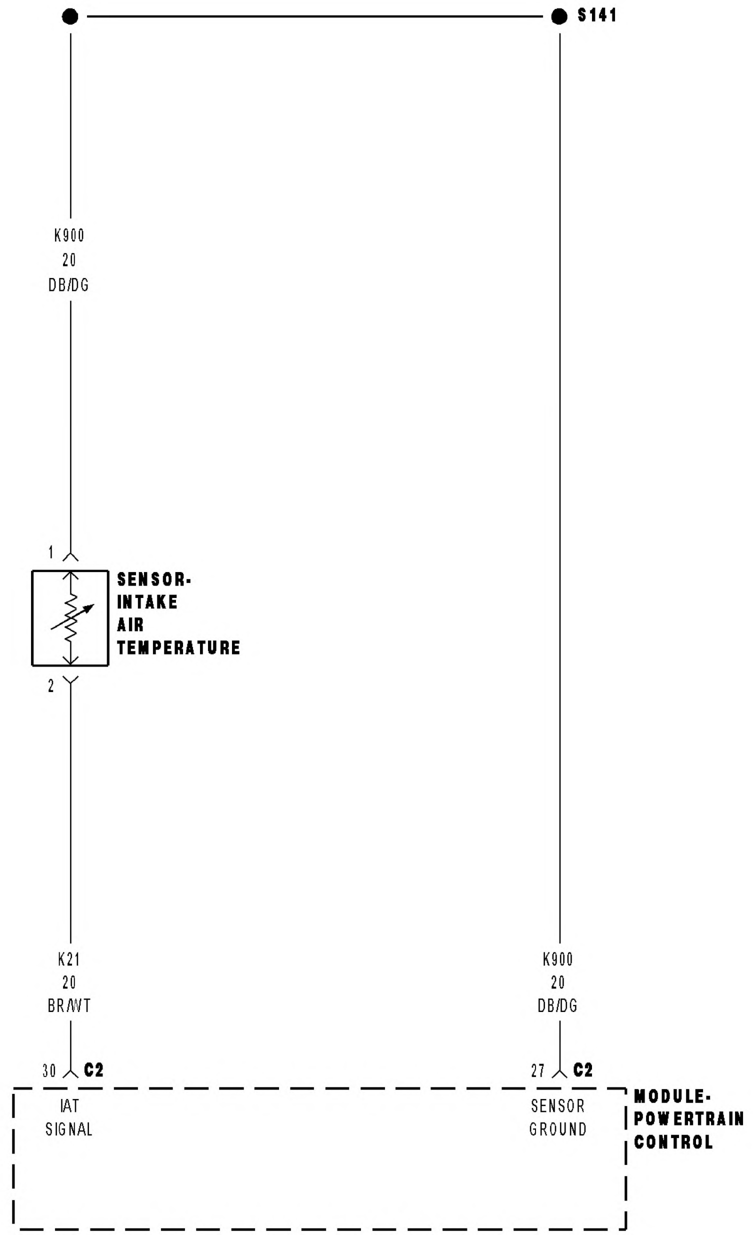
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

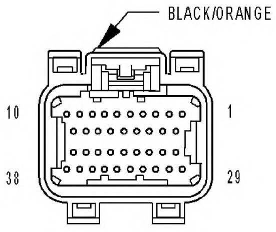
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

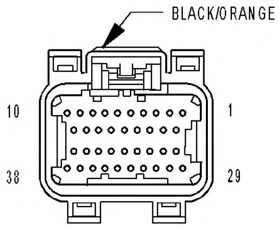
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0111-INTAKE AIR TEMPERATURE SENSOR RATIONALITY

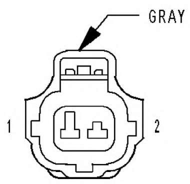

S141
K900
20
DB/DG
1
SENSOR-
INTAKE
AIR
TEMPERATURE
2
K21
20
BR/WT
K900
20
DB/DG
30
C2
27
C2
IAT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**



**SENSOR-
INTAKE AIR
TEMPERATURE
(GAS)**

814702bd

P0111-INTAKE AIR TEMPERATURE SENSOR RATIONALITY (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

Intake Air Temperature Sensor performance looks at the outputs of three temperature sensors and compare them under cold start conditions. Following a start to run delay time, the outputs of the ambient, engine coolant, and intake air temperature sensors will be compared. If the engine coolant and ambient air temperature sensors agree and the intake air temperature does not agree, the intake air temperature sensor is declared as irrational.

- **When Monitored:**
  The engine off time is greater than 480 minutes. Ambient Temperature if greater than 4 deg C (38 deg F).
- **Set Condition:**
  After a calibrated amount of cool down time the PCM compares the ECT Sensor, IAT Sensor, and the Ambient Air Temp Sensor values. If the IAT Sensor value is not within 10 deg C of the other two temperature sensors. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K21) IAT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(K21) IAT SIGNAL CIRCUIT SHORTED TO GROUND
(K21) IAT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
INTAKE AIR TEMPERATURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

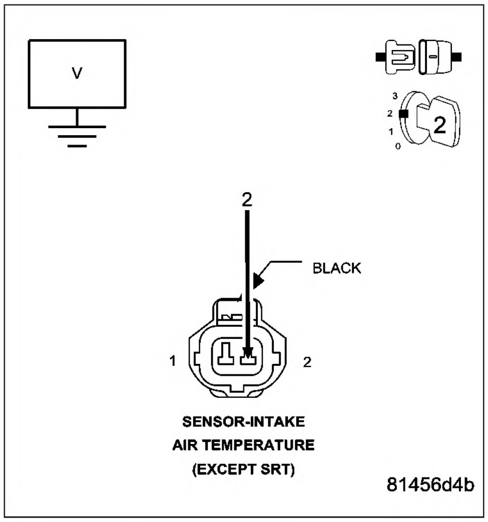
Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0111-INTAKE AIR TEMPERATURE SENSOR RATIONALITY (CONTINUED)

2. (K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE



Turn the ignition off.

Disconnect the C2 PCM harness connector.

Disconnect the IAT Sensor harness connector.

NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.

Ignition on, engine not running.

Measure the voltage on the (K21) IAT Signal circuit in the IAT Sensor harness connector.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K21) IAT Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. IAT SENSOR VOLTAGE ABOVE 4.6 VOLTS

Turn the ignition off.

Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, read the IAT voltage.

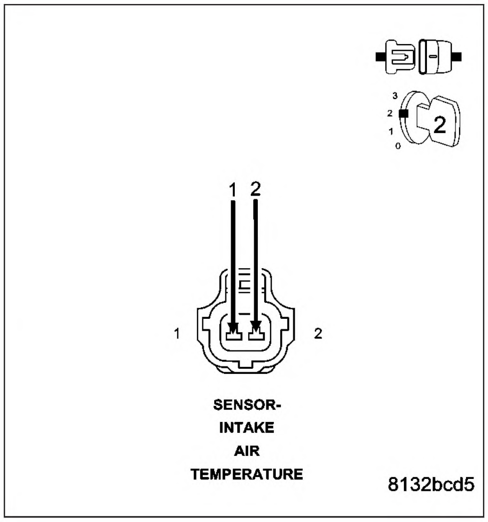
Is the voltage above 4.6 volts?

Yes >> Go To 4

No >> Go To 7

---

4. IAT SENSOR



Connect a jumper wire between the (K21) IAT Signal circuit and the (K900) Sensor ground circuit in the IAT Sensor harness connector.

With a scan tool, read the IAT voltage.

Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the IAT Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

P0111-INTAKE AIR TEMPERATURE SENSOR RATIONALITY (CONTINUED)

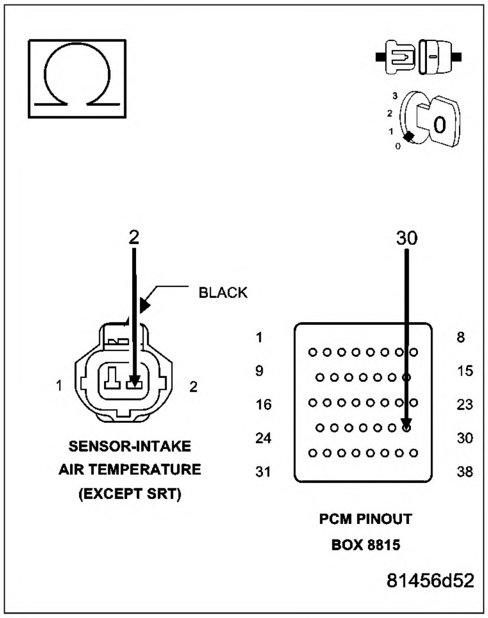
5. (K21) IAT SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K21) IAT Signal circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815.


2
30
BLACK
1
2
1
8
9
15
16
23
24
30
31
38
SENSOR-INTAKE AIR TEMPERATURE (EXCEPT SRT)
PCM PINOUT BOX 8815
81456d52

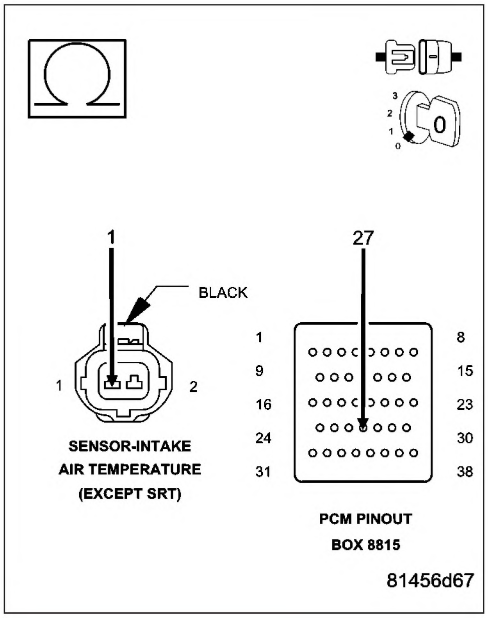
Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K21) IAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

6. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815.


1
27
BLACK
1
2
1
8
9
15
16
23
24
30
31
38
SENSOR-INTAKE AIR TEMPERATURE (EXCEPT SRT)
PCM PINOUT BOX 8815
81456d67

Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0111-INTAKE AIR TEMPERATURE SENSOR RATIONALITY (CONTINUED)

7. (K21) IAT SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

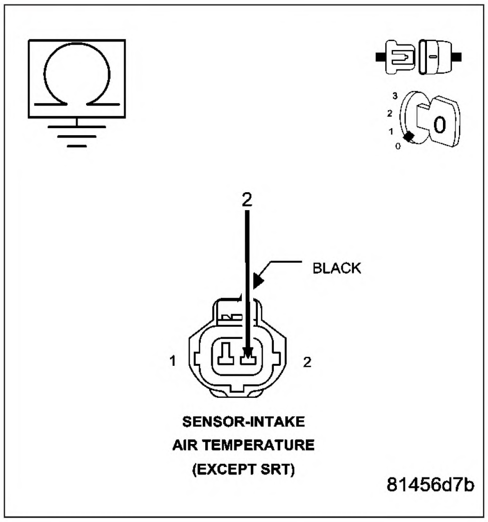
Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K21) IAT Signal circuit in the IAT Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K21) IAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8



---

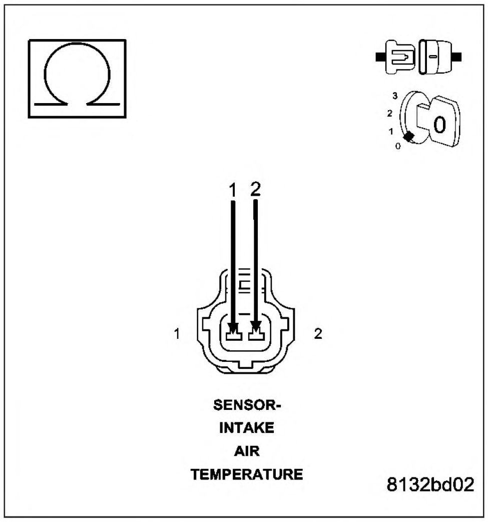
8. (K21) IAT SIGNAL SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K21) IAT Signal circuit and the (K900) Sensor ground circuit in the IAT Sensor harness connector.

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K900) Sensor ground and the (K21) IAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9



---

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

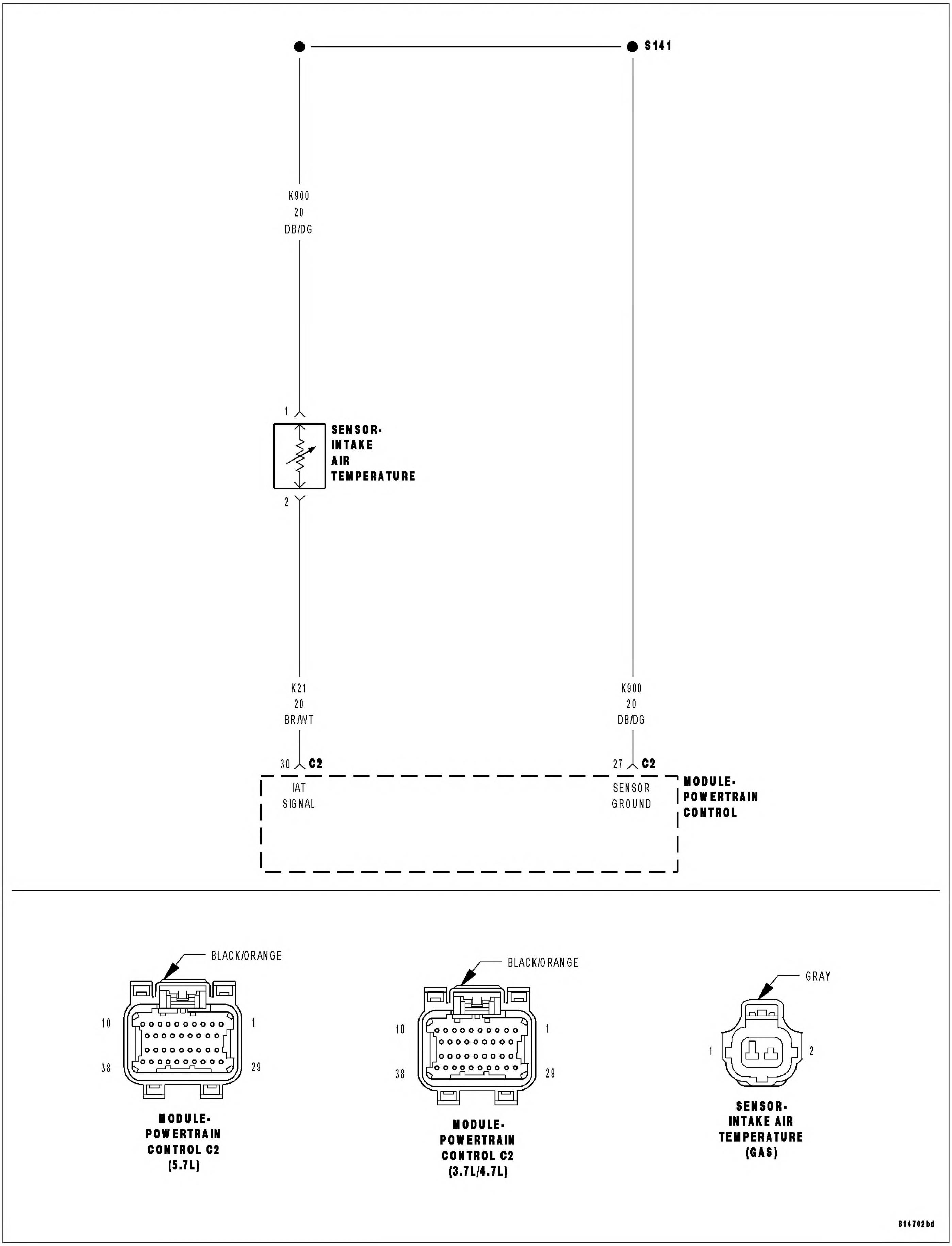
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0112-INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW


S141
K900
20
DB/DG
1
2
SENSOR-
INTAKE
AIR
TEMPERATURE
K21
20
BR/WT
K900
20
DB/DG
30
C2
27
C2
IAT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
SENSOR-
INTAKE AIR
TEMPERATURE
(GAS)
814702bd

P0112-INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and battery voltage greater than 10.4 volts.
- **Set Condition:**
  When the Inlet Air Temp Sensor Signal circuit voltage is less than .078 volt for more than 2.8 seconds. One trip failure. Three good trips to clear the MIL.

Possible Causes
(K21) IAT SIGNAL SHORTED TO GROUND
(K21) IAT SIGNAL SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
INTAKE AIR TEMPERATURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. IAT SENSOR VOLTAGE BELOW 0.078 OF A VOLT

Ignition on, engine not running.
With a scan tool, read the IAT voltage.

Is the voltage below 0.078 of a volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. IAT SENSOR

Turn the ignition off.
Disconnect the IAT Sensor harness connector.
Ignition on, engine not running.
With a scan tool, read IAT voltage.

Is the voltage above 0.05 of a volt?

Yes >> Replace the Intake Air Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

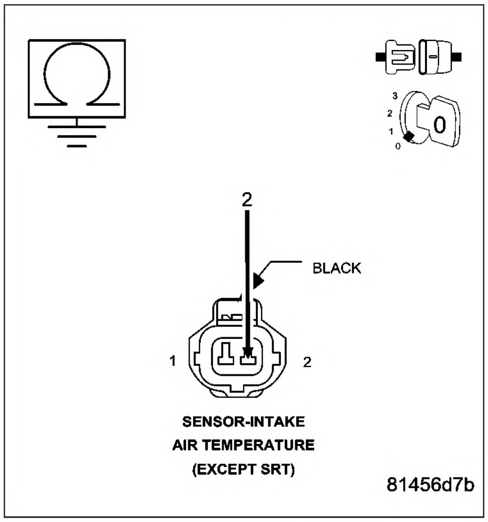
P0112-INTAKE AIR TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

3. (K21) IAT SIGNAL SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K21) IAT Signal circuit in the IAT Sensor harness connector.



Is the resistance below 100 ohms?

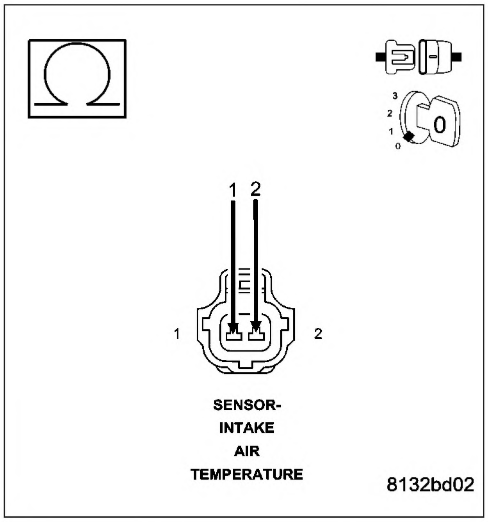
Yes >> Repair the short to ground in the (K21) IAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (K21) IAT SIGNAL SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K21) IAT Signal circuit and the (K900) Sensor ground circuit in the IAT Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short between the (K900) Sensor ground circuit and the (K21) IAT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

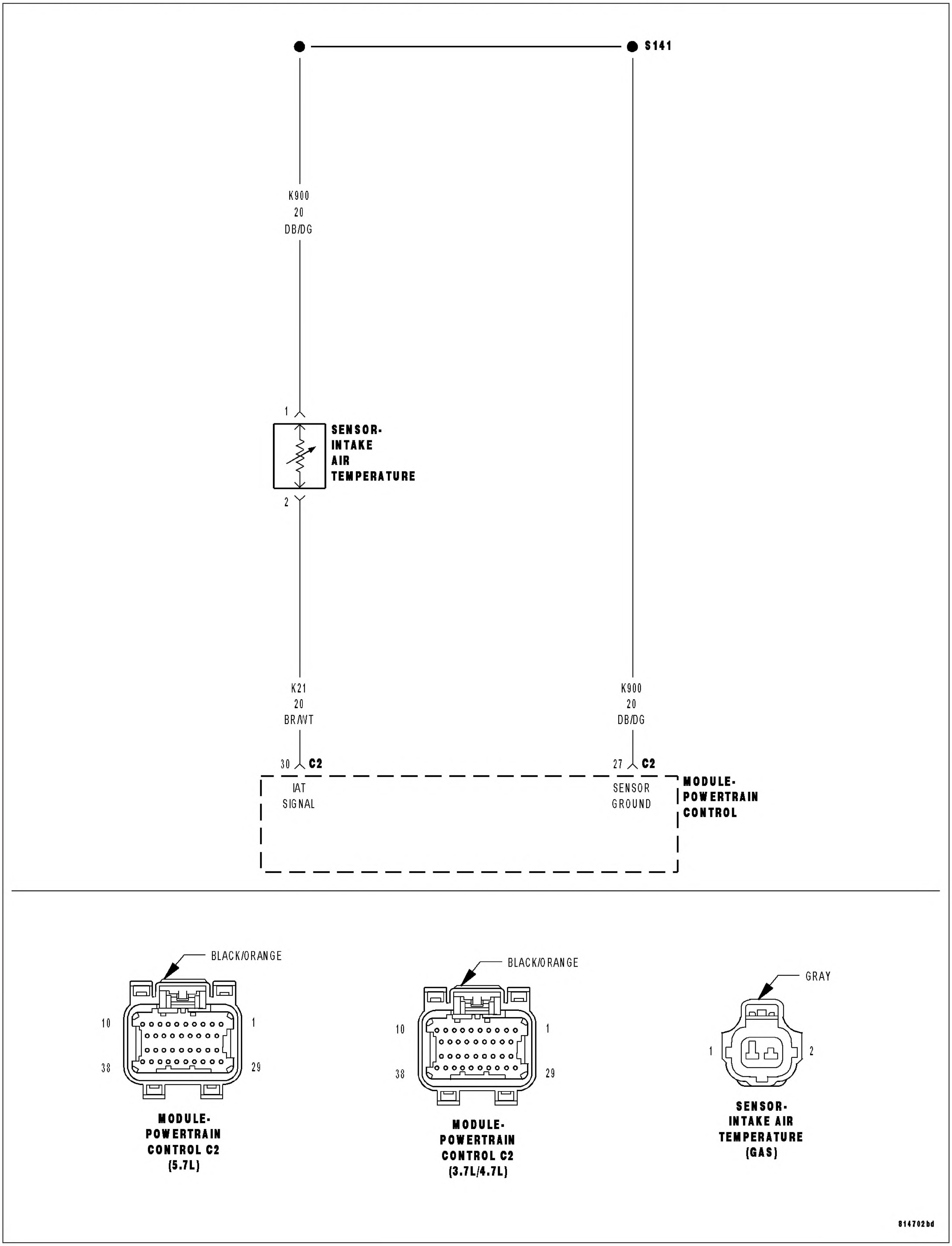
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0113-INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH


S141
K900
20
DB/DG
1
SENSOR-
INTAKE
AIR
TEMPERATURE
2
K21
20
BR/WT
K900
20
DB/DG
30 C2
27 C2
IAT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
SENSOR-
INTAKE AIR
TEMPERATURE
(GAS)
814702bd

P0113-INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine System Schematic circuit diagram. (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts.
- **Set Condition:**
  The Intake Air Temperature (IAT) sensor circuit voltage at the PCM goes above 4.98 volts for 2.8 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K21) IAT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
IAT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. IAT SENSOR VOLTAGE ABOVE 4.98 VOLTS

Ignition on, engine not running.

With a scan tool, read the Intake Air Temperature Sensor voltage.

Is the voltage above 4.98 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

2. IAT SENSOR

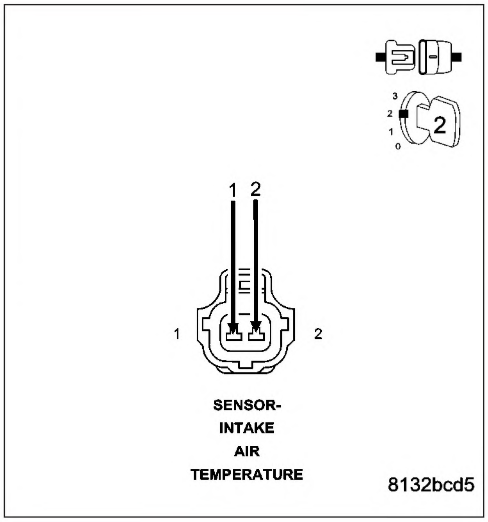
Turn the ignition off.

Disconnect the Intake Air Temperature Sensor harness connector.

Connect a jumper wire between the (K21) IAT Signal circuit and the (K900) Sensor ground circuit in the IAT Sensor harness connector.

Ignition on, engine not running.

With a scan tool, read the IAT Sensor voltage.



Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the IAT Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.

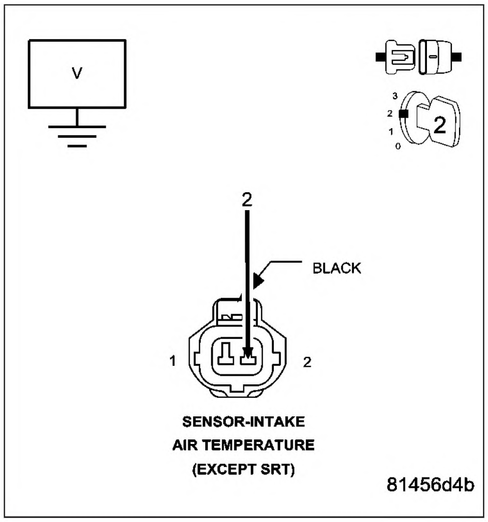
P0113-INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

3. (K21) IAT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K21) IAT Signal circuit in the IAT Sensor harness connector.


V
2
2
BLACK
1
2
SENSOR-INTAKE
AIR TEMPERATURE
(EXCEPT SRT)
81456d4b

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K21) IAT Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

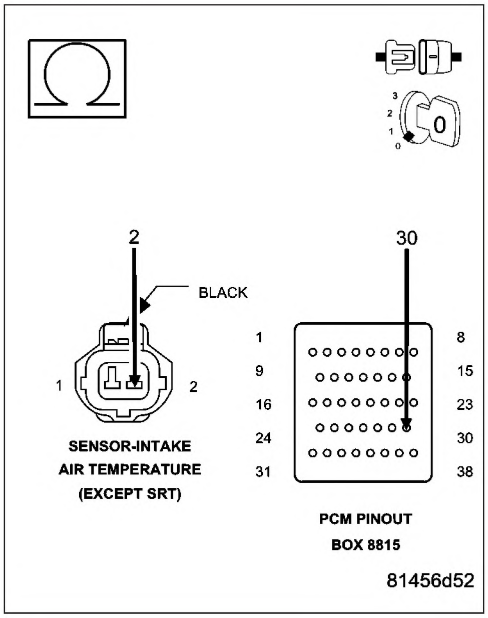
No >> Go To 4

4. (K21) IAT SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K21) IAT Signal circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815.


0
2
30
BLACK
1
2
1
9
16
24
31
8
15
23
30
38
SENSOR-INTAKE
AIR TEMPERATURE
(EXCEPT SRT)
PCM PINOUT
BOX 8815
81456d52

Is the resistance below 5.0 ohms?

Yes >> Go To 5

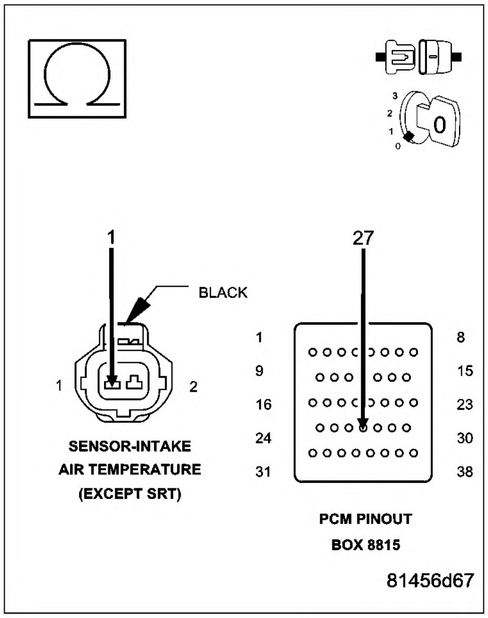
No >> Repair the open in the (K21) IAT Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0113-INTAKE AIR TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

5. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the IAT Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

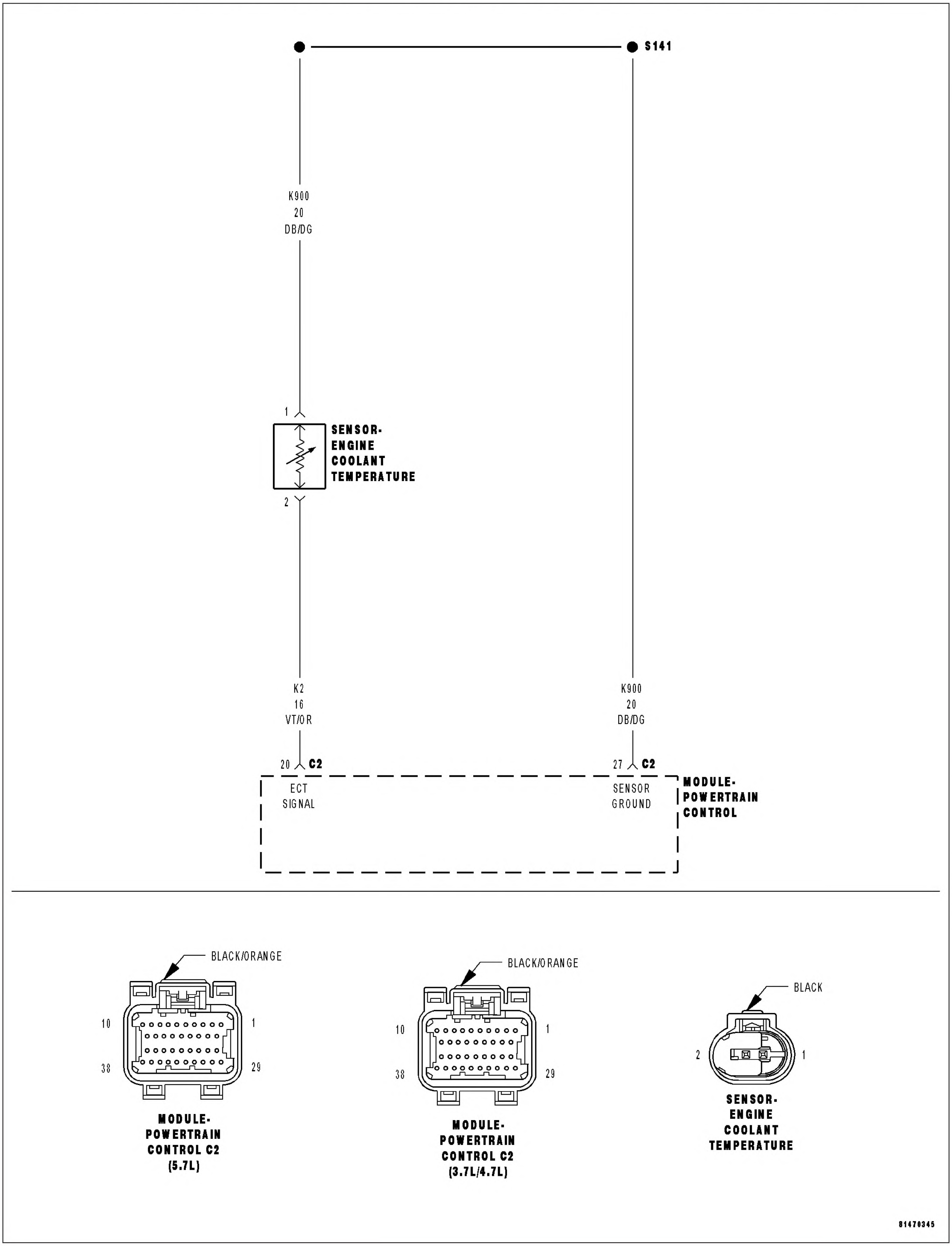
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0116–ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT PERFORMANCE


S141
K900
20
DB/DG
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
2
K2
16
VT/OR
K900
20
DB/DG
20 C2
27 C2
ECT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
81470345

P0116–ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

For the Engine System Schematic circuit diagram. (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

Engine Coolant Temperature Sensor performance looks at the outputs of three temperature sensors and compare them under cold start conditions. Following a start to run delay time, the outputs of the ambient, engine coolant, and intake air temperature sensors will be compared. If the intake air and ambient air temperature sensors agree and the engine coolant temperature does not agree, the engine coolant temperature sensor is declared as irrational.

- **When Monitored:**
  Engine off time is greater than 480 minutes. Ambient temperature is greater than 4 deg C (38 deg F).
- **Set Condition:**
  After a calibrated amount of cool down time the PCM compares the ECT Sensor, IAT Sensor, and the Ambient Air Temp Sensor values. If the ECT Sensor value is not within 10 deg C of the other two temperature sensors. Two Trip Fault. Three good trips to turn off the MIL. (5.7L ETC lamp will illuminate with the MIL.)

Possible Causes
(K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K2) ECT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND
(K2) ECT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND
ECT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0116–ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

2. (K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

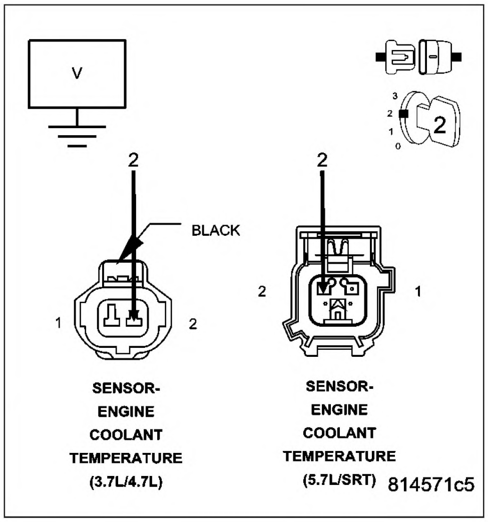
Disconnect the C2 PCM harness connector.

Disconnect the ECT Sensor harness connector.

NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.

Ignition on, engine not running.

Measure the voltage on the (K2) ECT Signal circuit in the ECT Sensor harness connector.


V
3
2
1
0
2
2
2
BLACK
1
2
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
814571c5

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K2) ECT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. ECT SENSOR VOLTAGE ABOVE 4.6 VOLTS

Turn the ignition off.

Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, read the ECT voltage.

Is the voltage above 4.6 volts?

Yes >> Go To 4

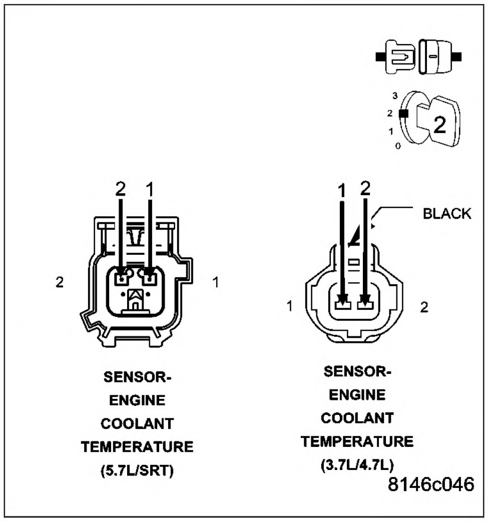
No >> Go To 7

---

4. ECT SENSOR

Connect a jumper wire between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit in the ECT Sensor harness connector.

With a scan tool, read the ECT voltage.


3
2
1
0
2
2 1
1 2
BLACK
2
1
1
2
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
8146c046

Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the ECT Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

P0116–ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

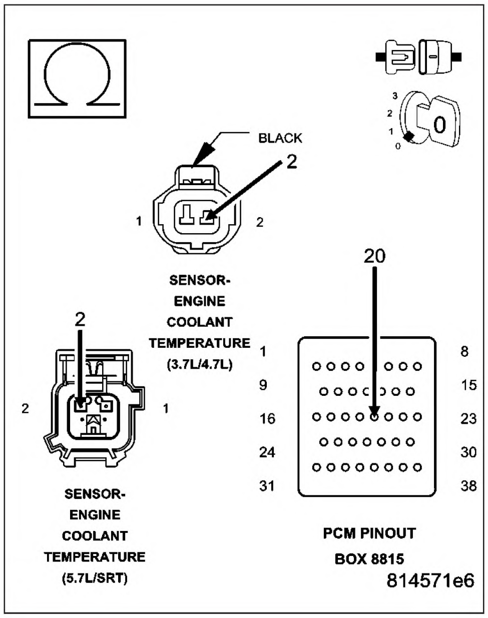
5. (K2) ECT SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K2) ECT Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.


BLACK
2
1
2
20
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
2
2
1
1
8
9
15
16
23
24
30
31
38
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
PCM PINOUT
BOX 8815
814571e6

Is the resistance below 5.0 ohms?

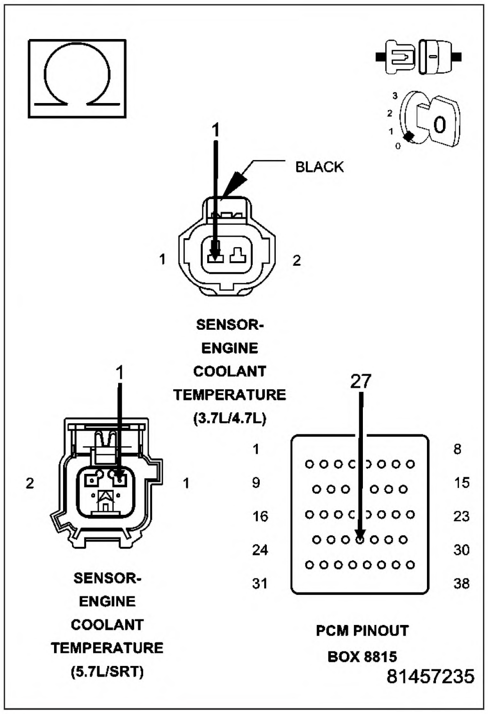
Yes >> Go To 6

No >> Repair the open in the (K2) ECT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.


1
BLACK
1
2
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
1
27
2
1
1
8
9
15
16
23
24
30
31
38
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
PCM PINOUT
BOX 8815
81457235

Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

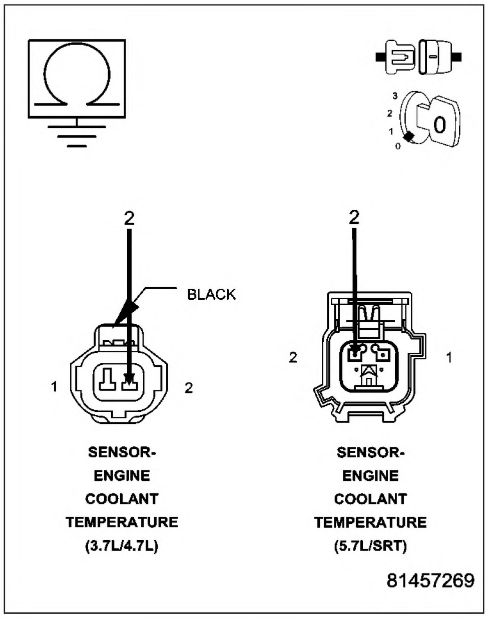
P0116–ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

7. (K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K2) ECT Signal circuit in the ECT Sensor harness connector.


3
2
1
0
0
2
2
BLACK
1
2
2
1
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
81457269

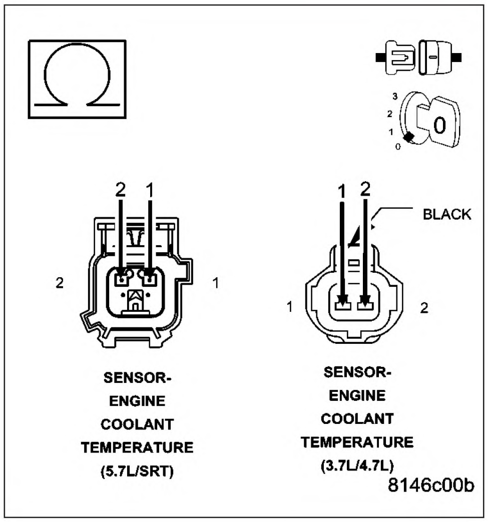
Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K2) ECT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

8. (K2) ECT SIGNAL CIRCIUT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit in the ECT Sensor harness connector.


3
2
1
0
0
2 1
2
1
1 2
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
8146c00b

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K900) Sensor ground circuit and the (K2) ECT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

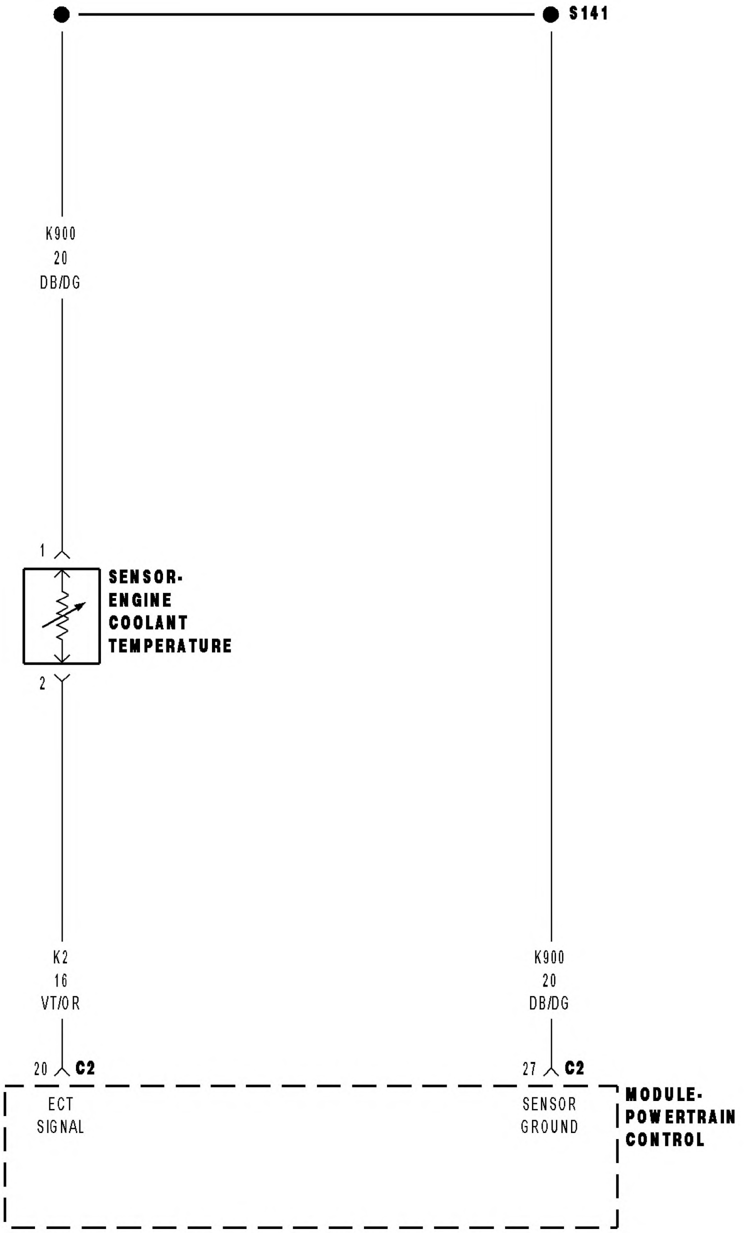
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

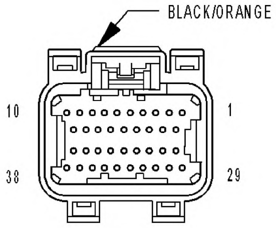
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

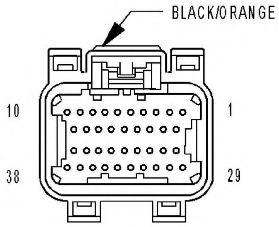
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0117-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW

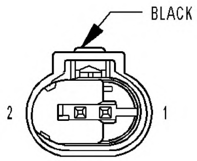

S141
K900
20
DB/DG
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
2
K2
16
VT/OR
K900
20
DB/DG
20 C2
27 C2
ECT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**



**SENSOR-
ENGINE
COOLANT
TEMPERATURE**

81470345

P0117-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The engine coolant temperature sensor is a negative temperature coefficient thermistor-type sensor whose resistance varies inversely with temperature. At cold temperatures the sensor resistance is high so the voltage is high. As the coolant temperature increases the resistance decreases and the voltage becomes low.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts.
- **Set Condition:**
  The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM is less than 0.078 of a volt for more than 2.8 seconds. One Trip Fault. Three good trips to clear the MIL.

Possible Causes
(K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND
(K2) ECT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
ECT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ECT SENSOR VOLTAGE BELOW 0.078 OF A VOLT

Ignition on, engine not running.
With a scan tool, read the ECT voltage.

Is the voltage below 0.078 of a volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. ECT SENSOR

Turn the ignition off.
Disconnect the ECT harness connector.
Ignition on, engine not running.
With a scan tool, read ECT voltage.

Is the voltage above 1.0 volt?

Yes >> Replace the ECT Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

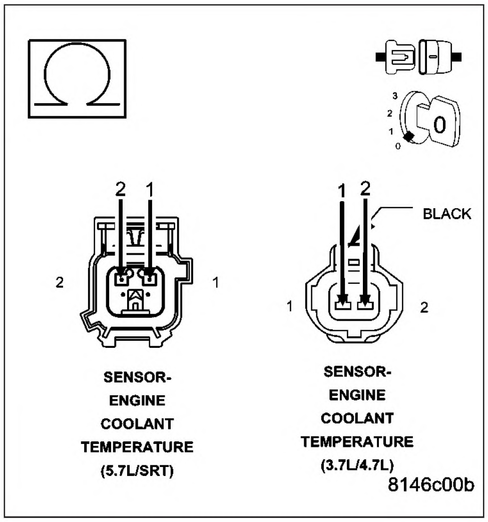
P0117-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

3. (K2) ECT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between the (K900) Sensor ground circuit and the (K2) ECT Signal circuit in the ECT Sensor harness connector.


3
2
1
0
0
2 1
2
1
1 2
BLACK
1
2
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
8146c00b

Is the resistance below 5.0 ohms?

Yes >> Repair the short to between the (K900) Sensor ground circuit and the (K2) ECT Signal circuit.

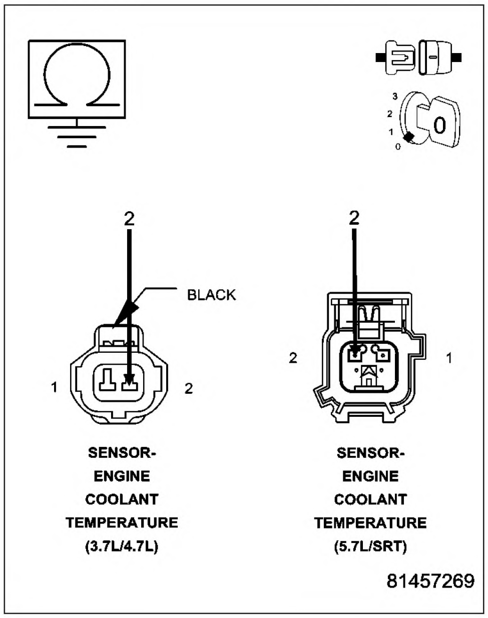
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (K2) ECT SIGNAL CIRCUIT SHORTED GROUND

Measure the resistance between ground and the (K2) ECT Signal circuit in the ECT Sensor harness connector.


3
2
1
0
0
2
BLACK
1
2
2
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
81457269

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K2) ECT Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

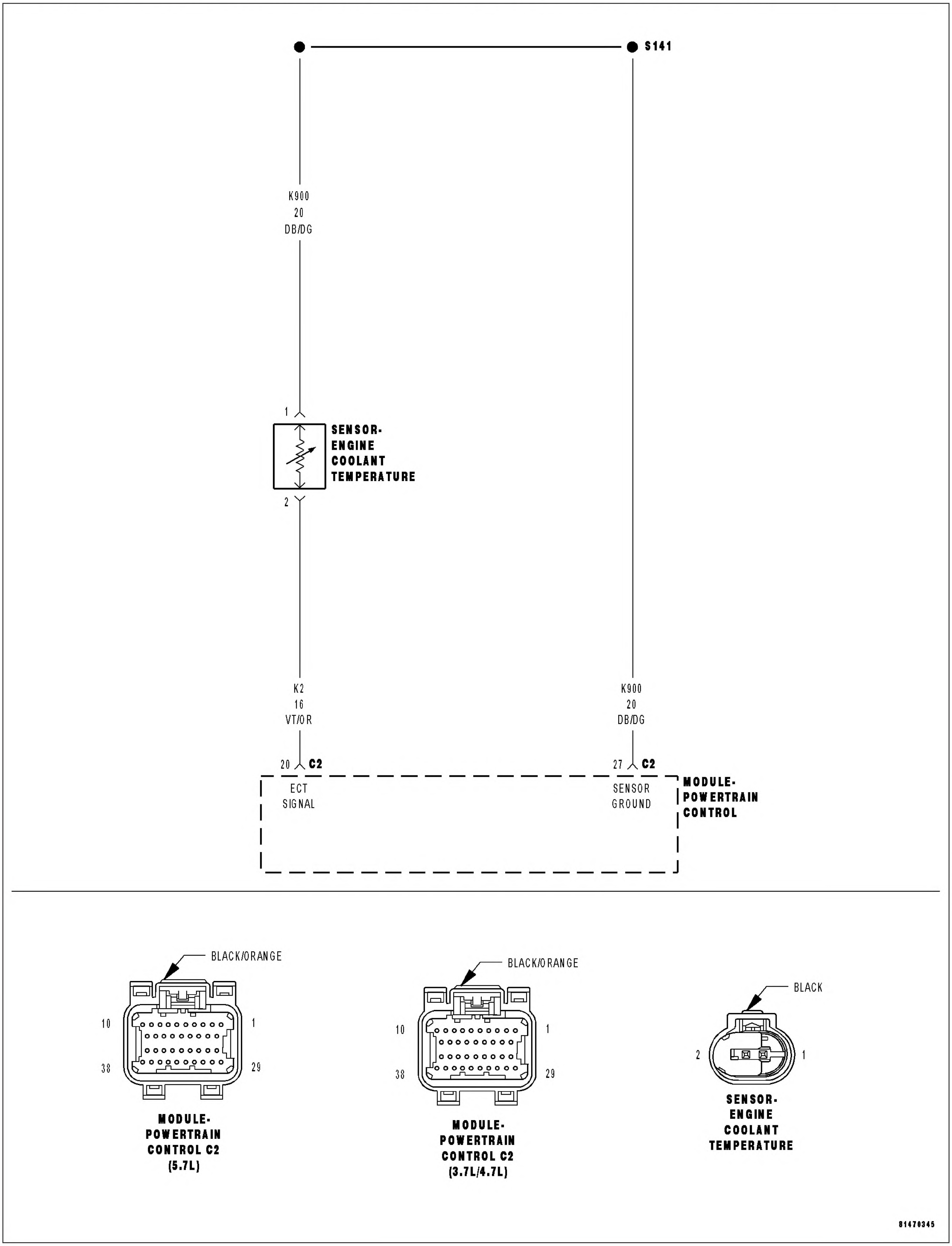
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0118-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH


S141
K900
20
DB/DG
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
2
K2
16
VT/OR
K900
20
DB/DG
20 C2
27 C2
ECT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
81470345

P0118-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts.
- **Set Condition:**
  The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM is greater than 4.98 volts for more than 2.8 seconds. One Trip Fault. Three good trips to turn off the MIL. (5.7L ETC lamp will illuminate with the MIL.)

Possible Causes
(K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K2) ECT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
ECT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ECT SENSOR VOLTAGE ABOVE 4.98 VOLTS

Ignition on, engine not running.

With a scan tool, read the ECT voltage.

Is the voltage above 4.98 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. ECT SENSOR

Turn the ignition off.

Disconnect the ECT harness connector.

Connect a jumper wire between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit in the ECT harness connector.

Ignition on, engine not running.

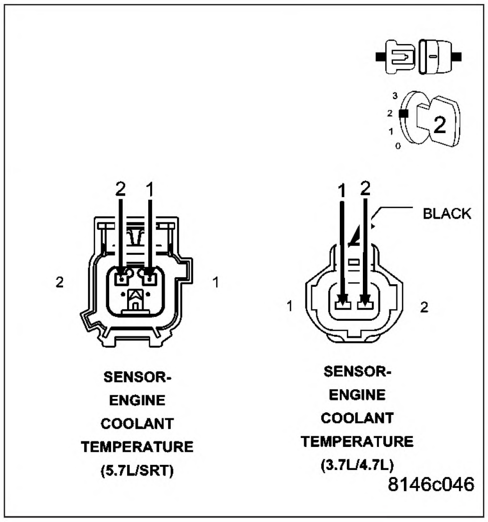
With a scan tool, read ECT voltage.

Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the ECT Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.


3
2
1
0
2
2 1
2
1
1 2
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
8146c046

P0118-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

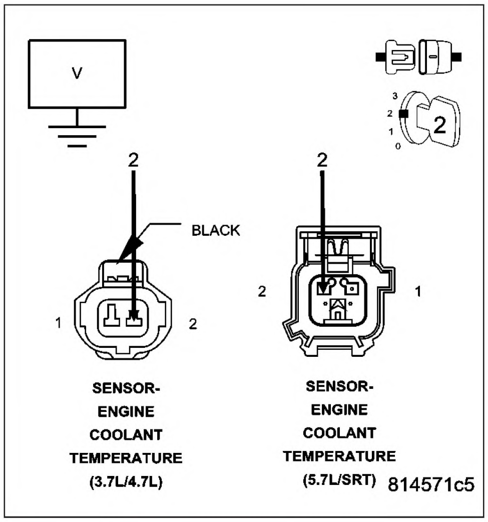
3. (K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K2) ECT Signal circuit in the ECT Sensor harness connector.


V
2
2
3
2
1
0
2
BLACK
1
2
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
814571c5

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K2) ECT Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

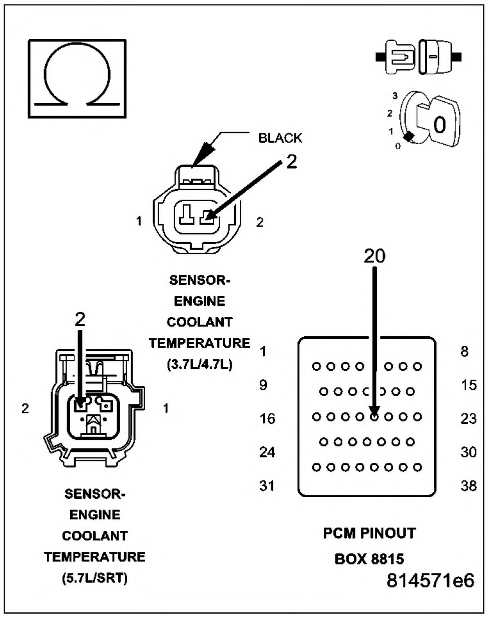
---

4. (K2) ECT SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K2) ECT Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
BLACK
2
1
2
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
20
2
2
1
1
9
16
24
31
8
15
23
30
38
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
PCM PINOUT
BOX 8815
814571e6

Is the resistance below 5.0 ohms?

Yes >> Go To 5

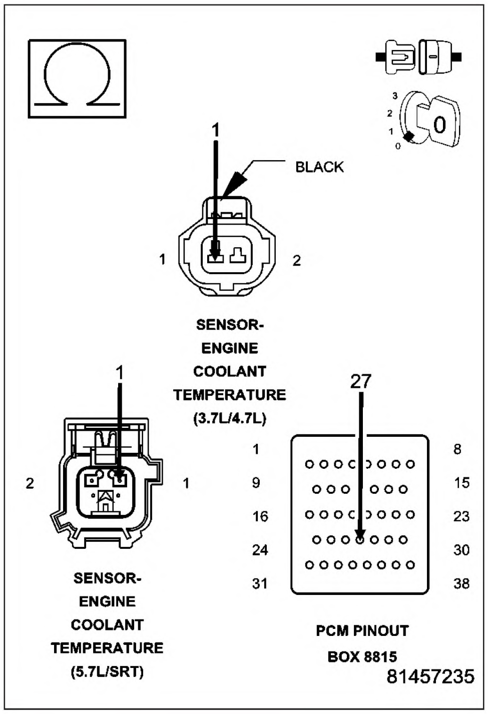
No >> Repair the open in the (K2) ECT Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0118-ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

5. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.



1
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
1
2
1
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
27
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
81457235

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

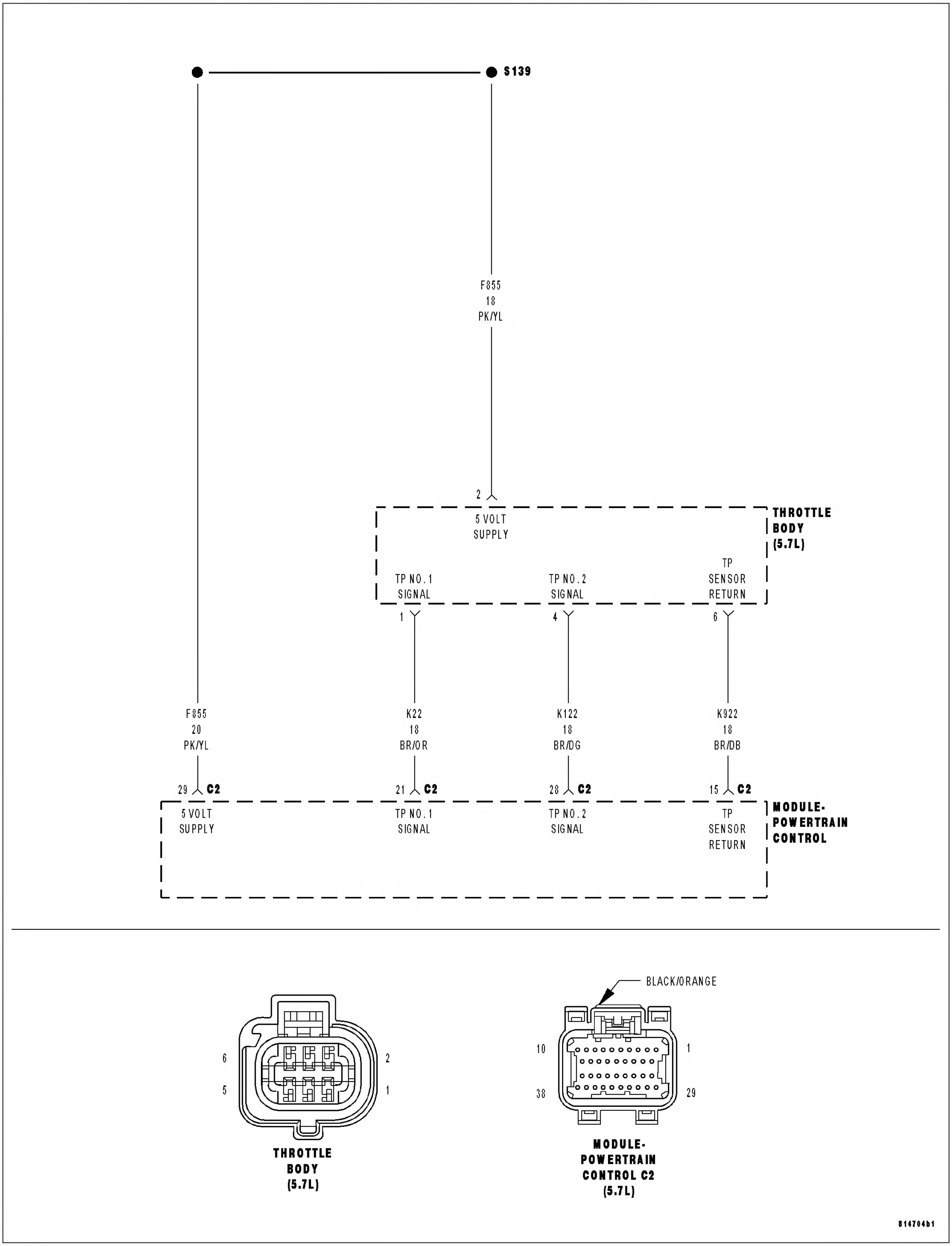
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE


S139
F855
18
PK/YL
2
5 VOLT
SUPPLY
THROTTLE
BODY
(5.7L)
TP NO. 1
SIGNAL
TP NO. 2
SIGNAL
TP
SENSOR
RETURN
1
4
6
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
29 C2
21 C2
28 C2
15 C2
5 VOLT
SUPPLY
TP NO. 1
SIGNAL
TP NO. 2
SIGNAL
TP
SENSOR
RETURN
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
6
5
2
1
10
38
1
29
THROTTLE
BODY
(5.7L)
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
814704b1

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and No MAP Sensor DTCs set.
- **Set Condition:**
  TP Sensor signals do not correlate to the MAP Sensor signal. One Trip Fault. ETC light will illuminate. P2135 should set with this code also.

Possible Causes
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
RESISTANCE IN THE (K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO (K122) TP SENSOR NO.2 SIGNAL CIRCUIT
THROTTLE POSITION SENSOR/THROTTLE BODY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

NOTE: Diagnose any other TP Sensor DTC(s) before continuing.

NOTE: The throttle plate should be free from binding and carbon build up.

NOTE: Make sure the throttle plate is at the idle position.

Ignition on, engine not running.

NOTE: Inspect the engine for vacuum leaks.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 11

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

2. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Disconnect the Throttle Body harness connector.

Ignition on, engine not running.

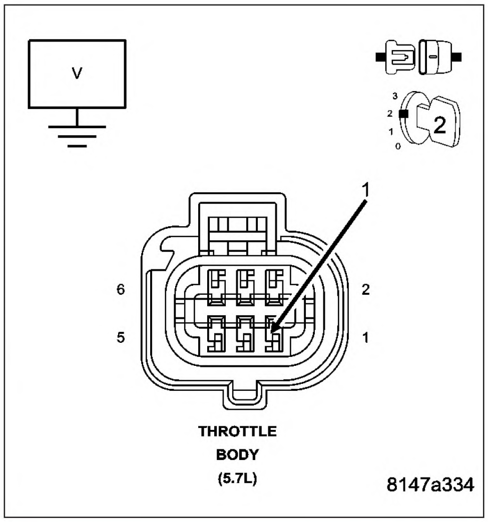
Measure the voltage on the (K22) TP No.1 Signal and the (K122) TP No.2 Signal circuits in the Throttle Body harness connector.

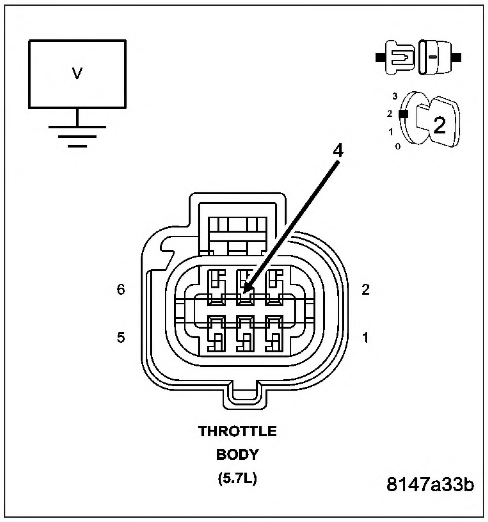
Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K22) TP Sensor No.1 or (K122) TP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3


V
3
2
1
0
2
1
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a334


V
3
2
1
0
2
4
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a33b

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

3. THROTTLE POSITION SENSOR

Turn the ignition off.

Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor No.1 and No.2 voltage.

Connect a jumper wire between the (K922) Sensor Return circuit and the (K22) TP Sensor No.1 Signal circuit.

NOTE: TP Sensor No.1 voltage should change from approximately 4.5 volts to less than 0.5 of a volt.

For TP Sensor No.2, connect a jumper wire between (F855) 5-volt supply circuit and the (K122) TP Sensor No.2 signal circuit.

NOTE: TP Sensor No.2 voltage should change from approximately 0 volts to 5.0 volts?

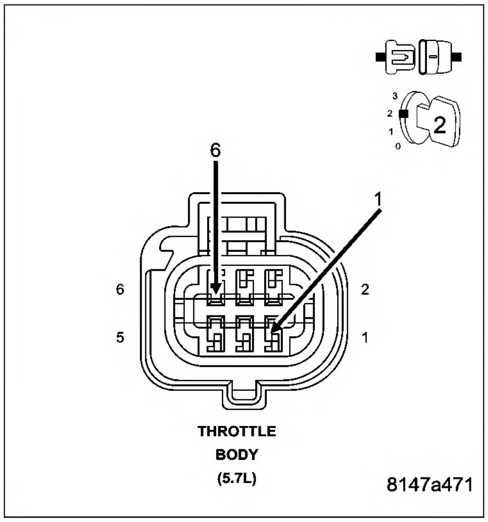
Is the voltage reading within the listed specification when the jumper wire is installed?

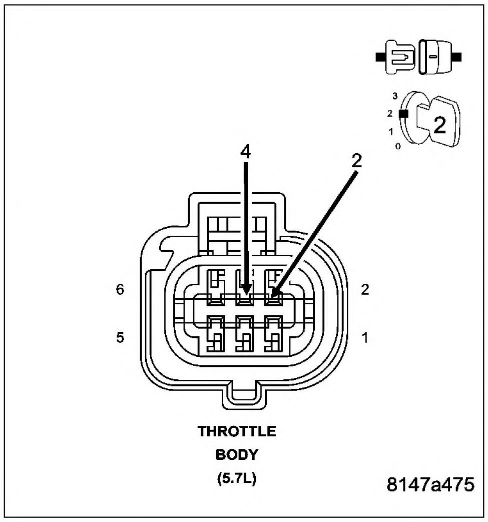
Yes >> Replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.





P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

4. EXCESSIVE RESISTANCE IN THE (K22) TP SENSOR NO.1 SIGNAL CIRCUIT AND (K122) TP SENSOR NO.2 SIGNAL CIRCUIT

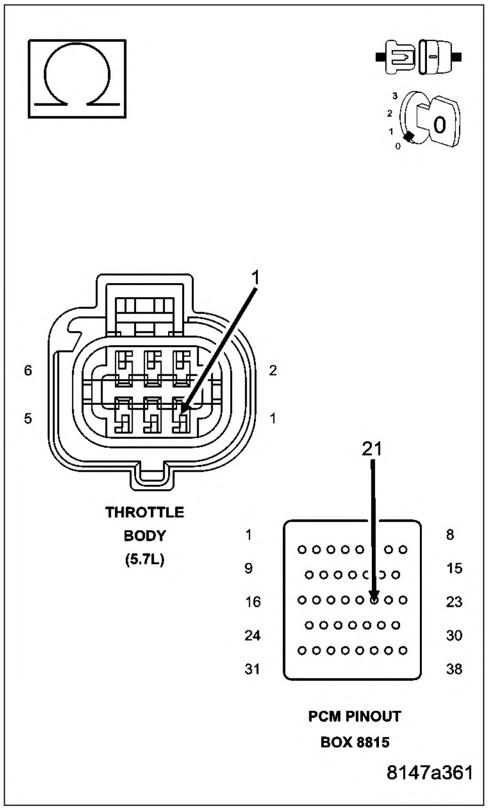
Turn the ignition off.

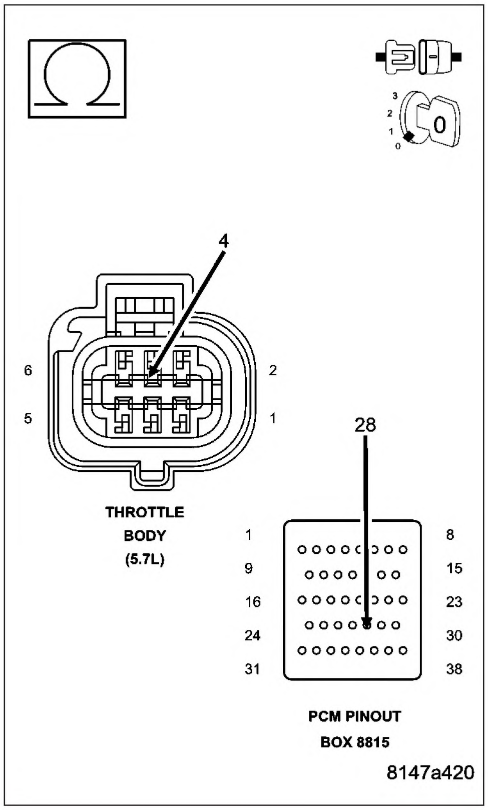
Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Measure the resistance of the (K122) TP Sensor No.2 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


1
6
2
5
1
21
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a361


4
6
2
5
1
28
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a420

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 5

No >> Repair the excessive resistance in the (K22) TP Sensor No.1 Signal circuit or the (K122) TP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

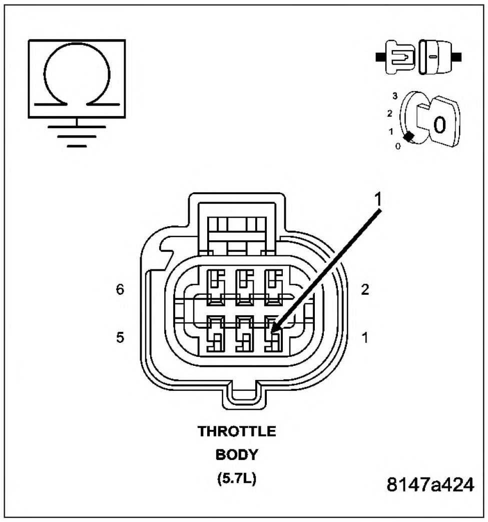
5. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

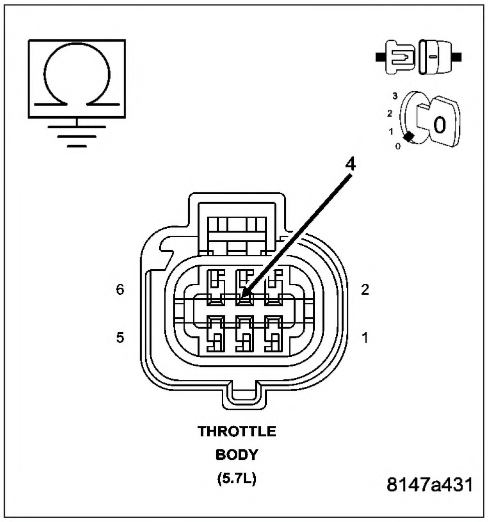
Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit and the (K122) TP Sensor No.2 Signal circuit in Throttle Body harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K22) TP Sensor No.1 Signal circuit or the (K122) TP Sensor No.2 Signal circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

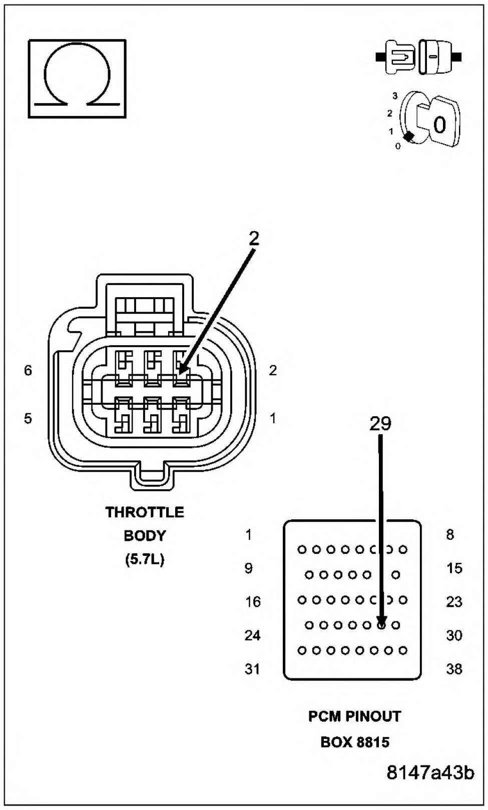

3
2
1
0
1
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a424


3
2
1
0
4
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a431

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

6. EXCESSIVE RESISTANCE IN THE (F855) 5–VOLT SUPPLY CIRCUIT

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
2
6
5
2
1
29
THROTTLE
BODY
(5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147a43b

Is the resistance below 5.0 ohms?

Yes >> Go To 7

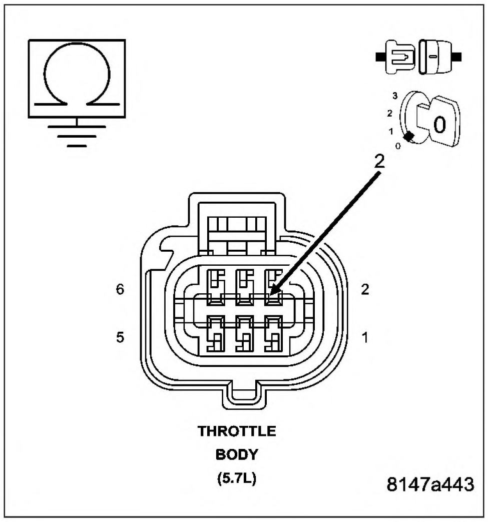
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (F855) 5-VOLT SUPPLY SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the Throttle Body harness connector.


3
2
1
0
2
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a443

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

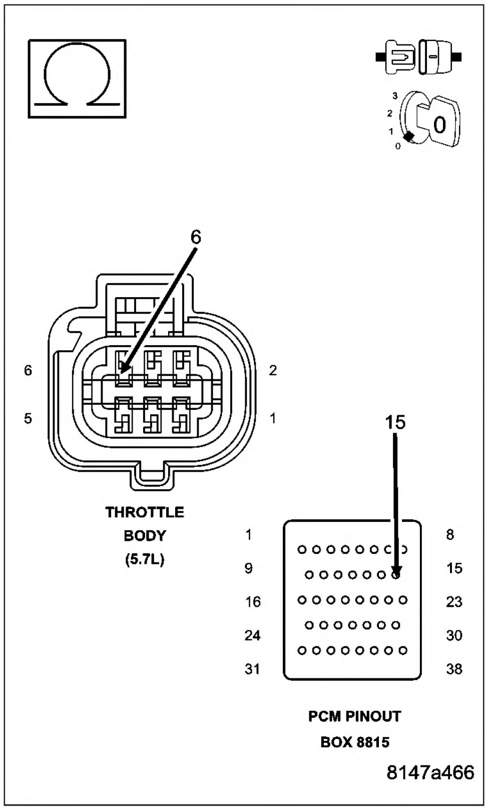
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

8. EXCESSIVE RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
6
6
2
5
1
15
THROTTLE
BODY
(5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147a466

Is the resistance below 5.0 ohms?

Yes >> Go To 9

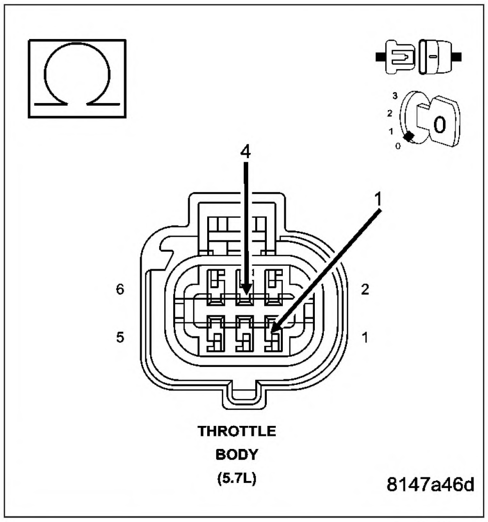
No >> Repair the excessive resistance in the (K922) Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K122) TP SENSOR NO.2 SIGNAL CIRCUIT

Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (K122) TP Sensor No.2 Signal circuit in the Throttle Body harness connector.


3
2
1
0
0
4
1
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a46d

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K122) TP Sensor No.2 Signal circuit and the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0121-THROTTLE POSITION SENSOR 1 PERFORMANCE (CONTINUED)

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. THROTTLE FOLLOWER TEST

Ignition on, engine not running.

With a scan tool, perform the Throttle Follower Test and monitor the TP Sensor No.1 or No.2 voltage.

Slowly press the throttle pedal down.

The voltage for TP Sensor No.1 should start at approximately 0.3 of a volt and increase to above 4.7 volts.

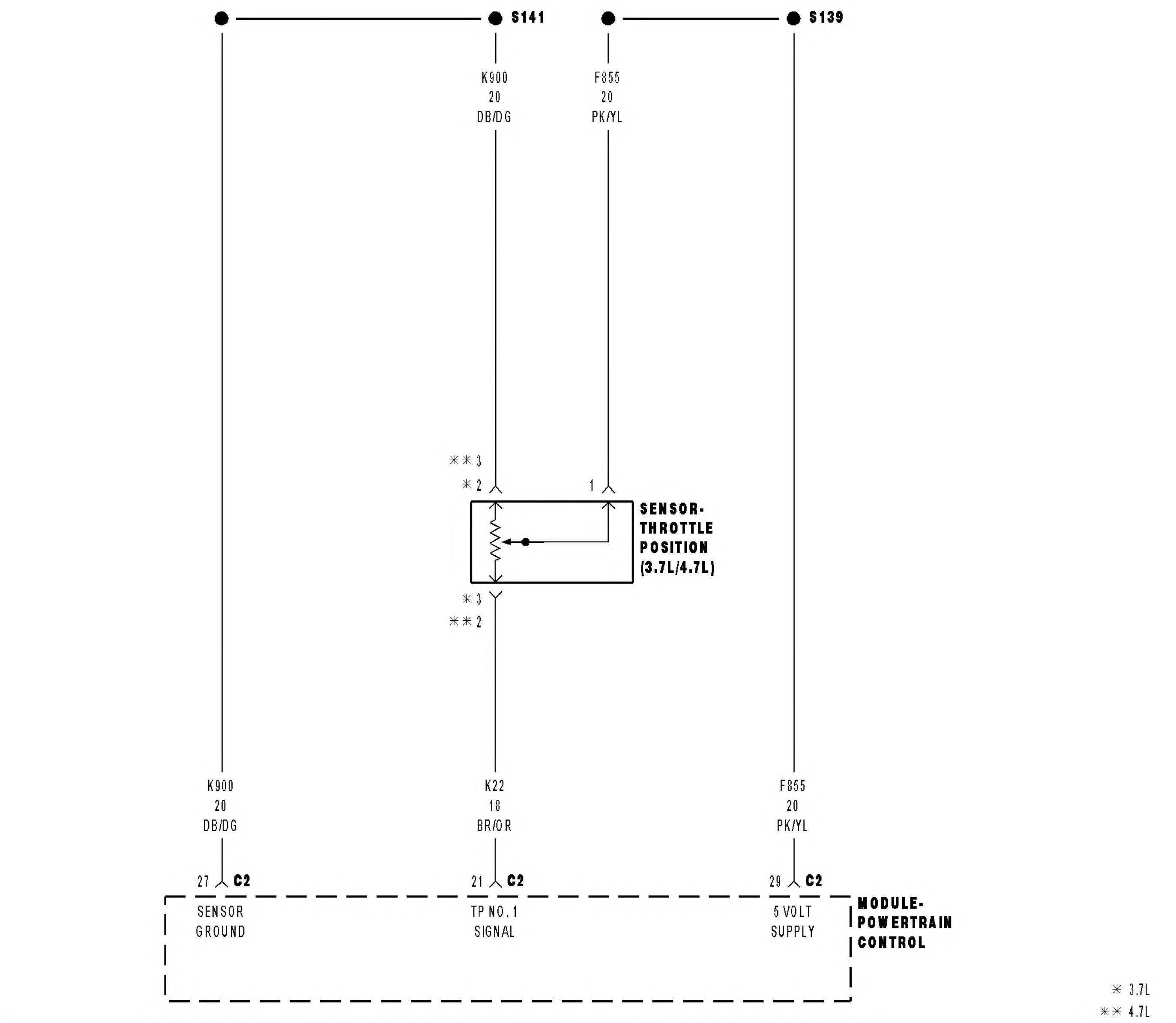
The voltage for TP Sensor No.2 should start at approximately 4.7 volts and decrease to approximately 0.3 of a volt.

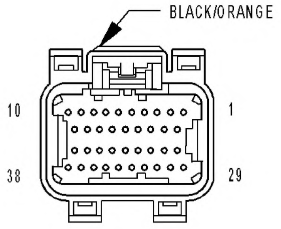
Is the voltage within the range of the listed specification for the appropriate Sensor?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

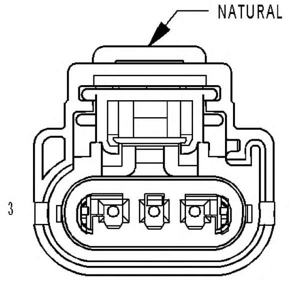
No >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (3.7L, 4.7L)

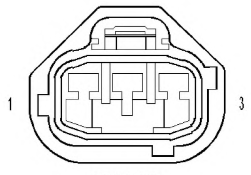

S141
S139
K900
20
DB/DG
F855
20
PK/YL
✳✳ 3
✳ 2
1
SENSOR-
THROTTLE
POSITION
(3.7L/4.7L)
✳ 3
✳✳ 2
K900
20
DB/DG
K22
18
BR/OR
F855
20
PK/YL
27 C2
21 C2
29 C2
SENSOR
GROUND
TP NO. 1
SIGNAL
5 VOLT
SUPPLY
MODULE-
POWERTRAIN
CONTROL
✳ 3.7L
✳✳ 4.7L


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**



**SENSOR-
THROTTLE
POSITION
(3.7L)**



**SENSOR-
THROTTLE
POSITION
(4.7L)**

814b1c1c

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (3.7L, 4.7L) (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts.
- **Set Condition:**
  Throttle Position Sensor voltage at the PCM is less than 0.0978 of a volt for 1.3 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
THROTTLE POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. THROTTLE POSITION SENSOR VOLTAGE BELOW 0.098 OF A VOLT

Ignition on, engine not running.

With a scan tool, read the TP Sensor voltage.

Is the voltage below 0.098 of a volt?

Yes >> Go To 2

No >> Go To 9

---

2. (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the TP Sensor harness connector.

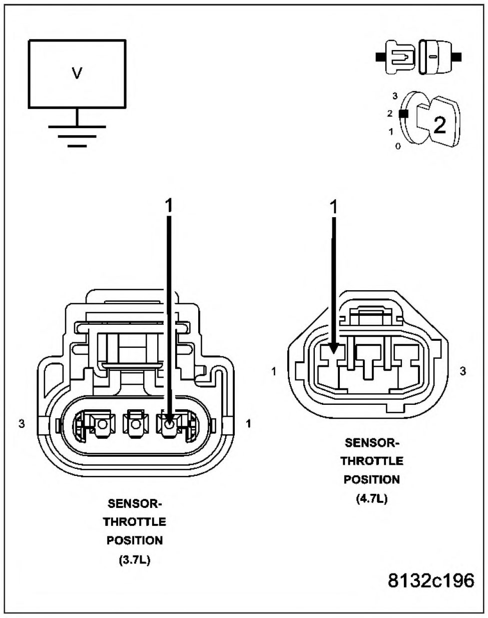
Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the TP Sensor harness connector.

Is the voltage between 4.5 to 5.2 volts?

Yes >> Go To 3

No >> Go To 6


V
3
2
1
0
2
1
1
3
1
1
3
SENSOR-THROTTLE POSITION (4.7L)
SENSOR-THROTTLE POSITION (3.7L)
8132c196

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (3.7L, 4.7L) (CONTINUED)

3. THROTTLE POSITION SENSOR

With the a scan tool, monitor the TP Sensor voltage with the Sensor harness connector disconnected.

Is the voltage above 4.5 volts?

Yes >> Replace the Throttle Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

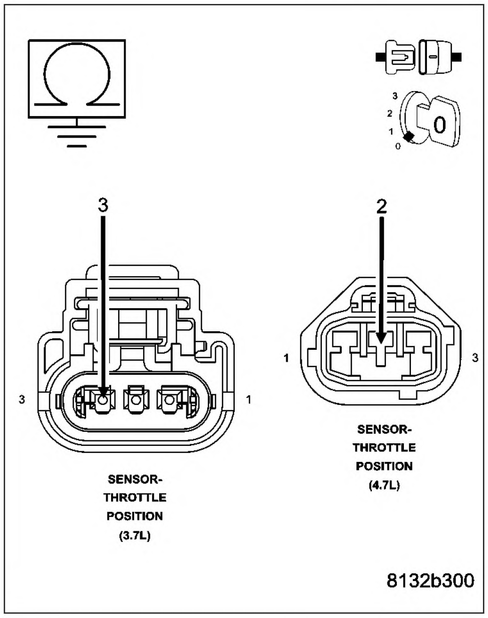
Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit in the TP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K22) TP Sensor No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5


3
2
1
0
3
2
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
8132b300

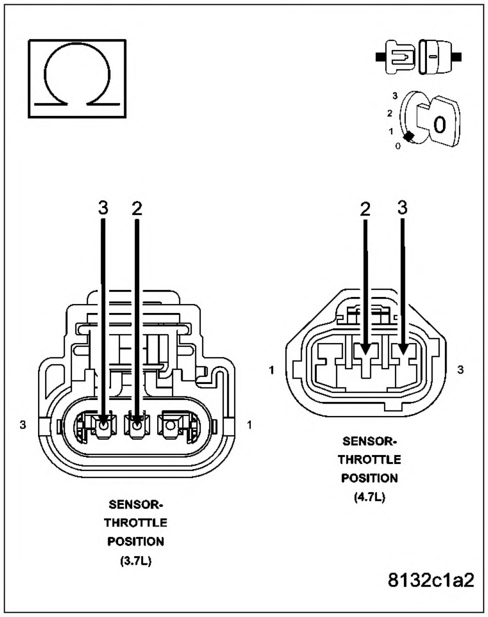
5. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (K900) Sensor ground circuit in the TP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K900) Sensor ground and the (K22) TP Sensor No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8


3
2
1
0
3 2
2 3
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
8132c1a2

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (3.7L, 4.7L) (CONTINUED)

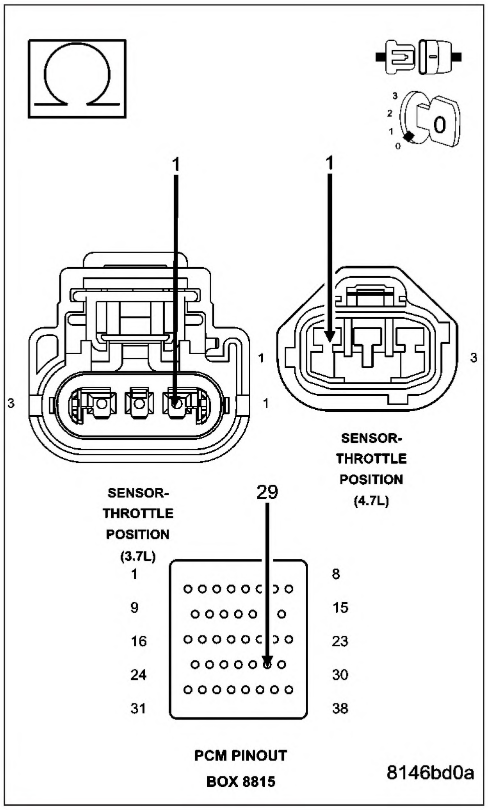
6. (F855) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.


1
1
3
1
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
29
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8146bd0a

Is the resistance below 5.0 ohms?

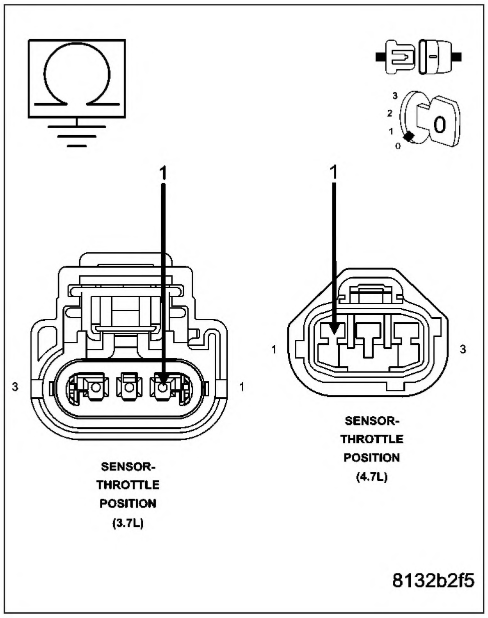
Yes >> Go To 7

No >> Repair the open in the (F855) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the TP Sensor harness connector.


1
1
3
1
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
8132b2f5

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (3.7L, 4.7L) (CONTINUED)

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. THROTTLE POSITION SENSOR SWEEP

With a scan tool, monitor the Throttle Position Sensor voltage.

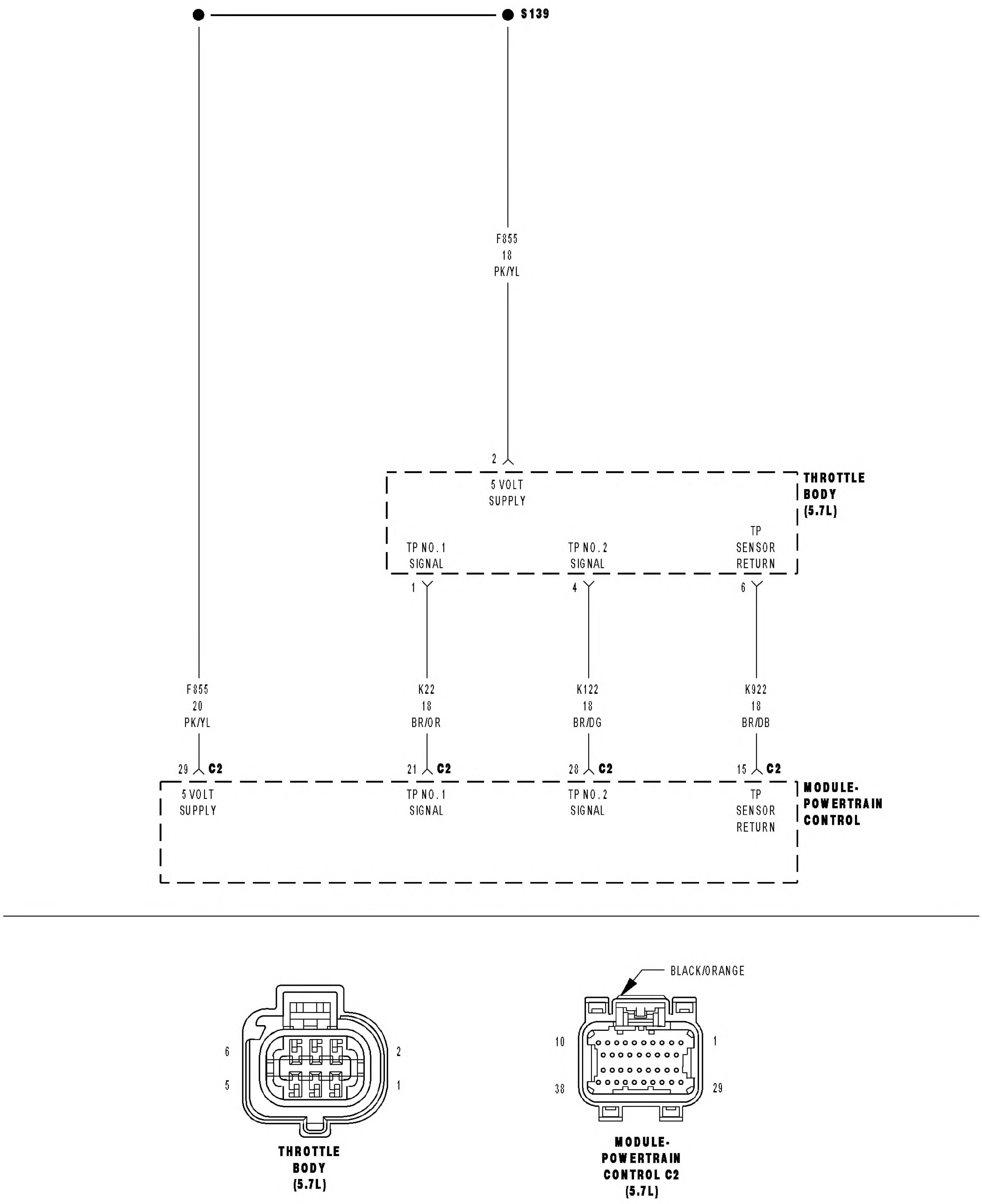
Slowly open the throttle from the idle position to the wide open throttle position.

Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Throttle Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (5.7L)


S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
1
4
6
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
29 C2
21 C2
28 C2
15 C2
5 VOLT SUPPLY
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
6
5
2
1
THROTTLE BODY (5.7L)
BLACK/ORANGE
10
38
1
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
814704b1

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (5.7L) (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  Throttle Position Sensor voltage at the PCM is less than 0.16 of a volt for 0.7 of a second. One Trip Fault. Three good trips to turn off the MIL. ETC light will illuminate.

Possible Causes
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K922) SENSOR RETURN CIRCUIT
THROTTLE POSITION SENSOR/THROTTLE BODY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: If a 5-Volt Supply DTC has also set, diagnose the 5-Volt DTC before continuing.

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.
Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2
No >> Go To 10

---

2. P0222 ALSO SET

Was the P0222-TP SENSOR NO.2 VOLTAGE LOW DTC set along with the P0122?

Yes >> Go To 3
No >> Go To 4

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (5.7L) (CONTINUED)

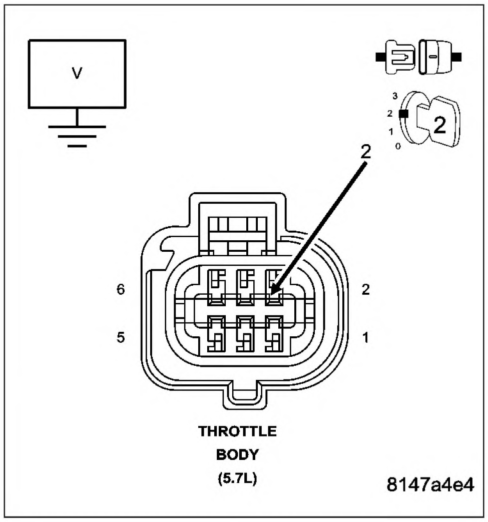
3. (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Throttle Body harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the Throttle Body harness connector.



Is the voltage between 4.8 to 5.2 volts?

Yes >> Go To 4

No >> Go To 7

---

4. THROTTLE POSITION SENSOR

With a scan tool, monitor the TP Sensor No.1 voltage with the Sensor harness connector disconnected.

Is the voltage above 4.5 volts?

Yes >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, using a scan tool select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

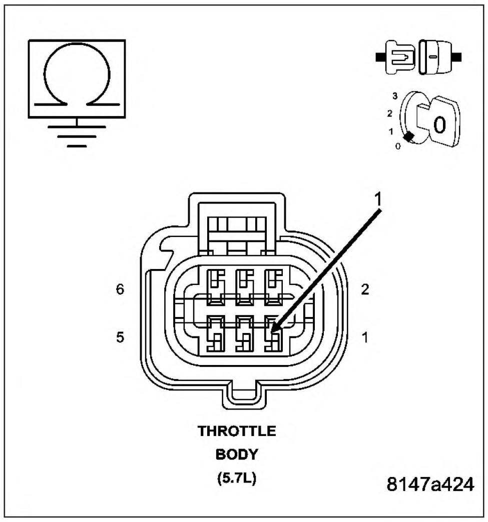
---

5. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit in the Throttle Body harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K22) TP Sensor No.1 Signal circuit.

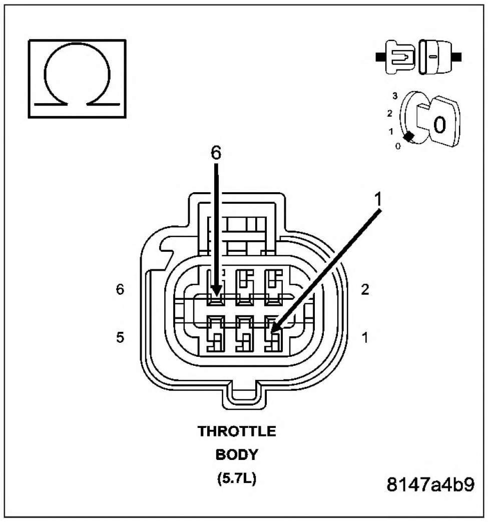
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (5.7L) (CONTINUED)

6. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K922) SENSOR RETURN CIRCUIT

Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (K922) Sensor Return circuit in the Throttle Body harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short between the (K922) Sensor Return circuit and the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

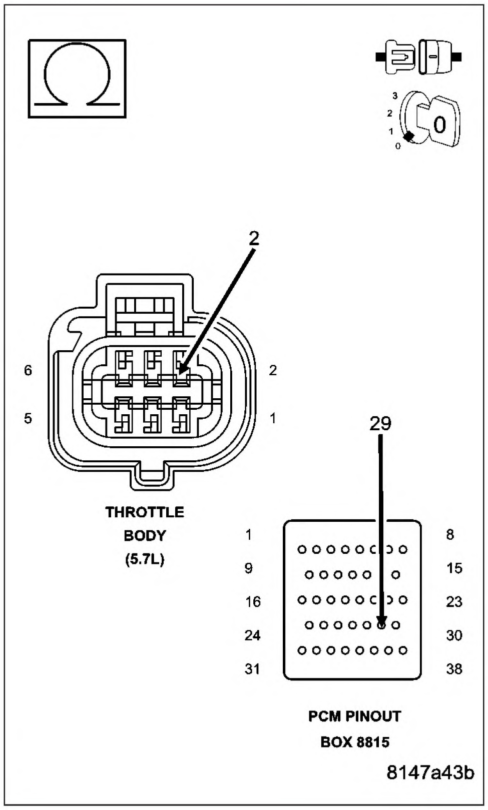
7. (F855) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnostics.

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 8

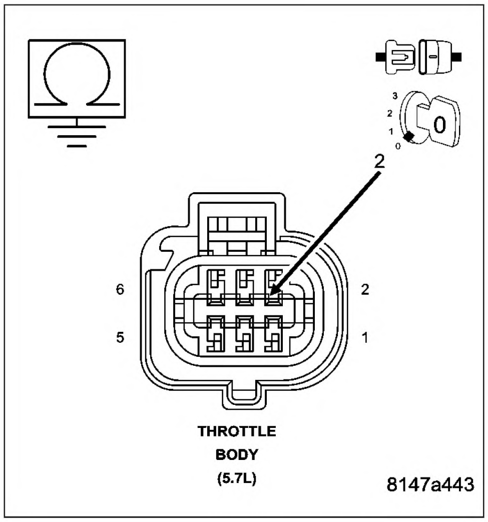
No >> Repair the open in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0122-THROTTLE POSITION SENSOR 1 CIRCUIT LOW (5.7L) (CONTINUED)

8. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the Throttle Body harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

10. THROTTLE FOLLOWER TEST

With a scan tool, perform the Throttle Follower Test.

Monitor the TP Sensor No.1 voltage.

Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition?

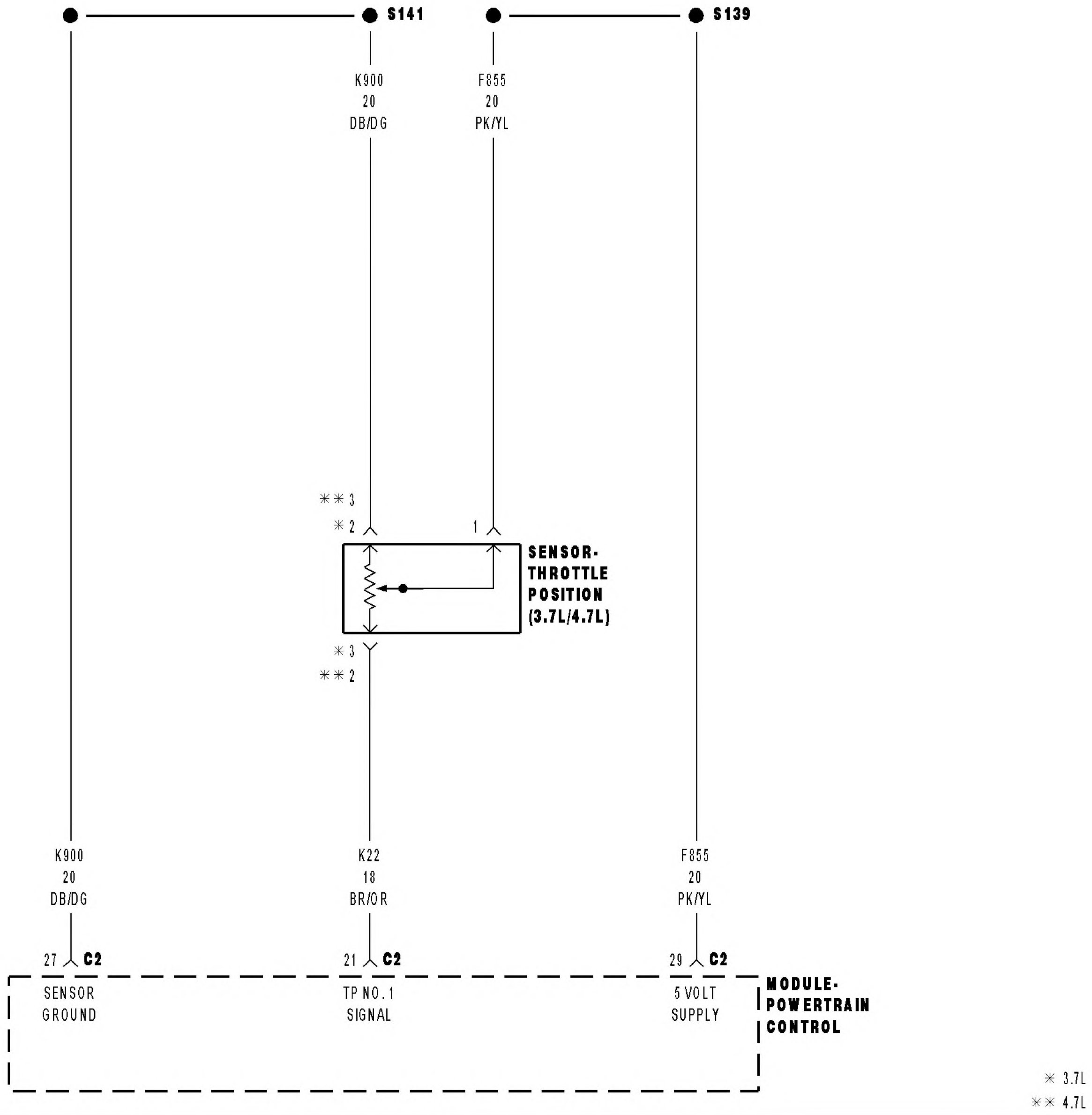
Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

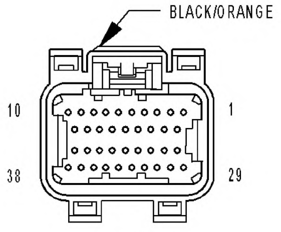
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, using a scan tool select ETC RELEARN function.

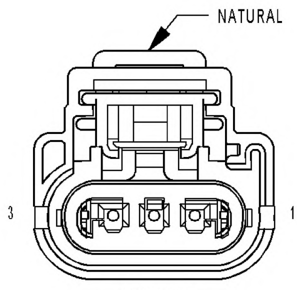
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (3.7L, 4.7L)

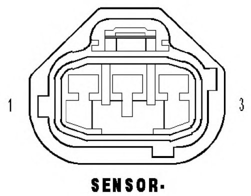

S141
S139
K900
20
DB/DG
F855
20
PK/YL
✱✱ 3
✱ 2
1
SENSOR-
THROTTLE
POSITION
(3.7L/4.7L)
✱ 3
✱✱ 2
K900
20
DB/DG
K22
18
BR/OR
F855
20
PK/YL
27 C2
21 C2
29 C2
SENSOR
GROUND
TP NO. 1
SIGNAL
5 VOLT
SUPPLY
MODULE-
POWERTRAIN
CONTROL
✱ 3.7L
✱✱ 4.7L


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**



**SENSOR-
THROTTLE
POSITION
(3.7L)**



**SENSOR-
THROTTLE
POSITION
(4.7L)**

814b1c1c

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (3.7L, 4.7L) (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts.
- **Set Condition:**
  Throttle Position Sensor voltage at the PCM is greater than 4.47 volts for 1.3 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT OPEN
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
THROTTLE POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. TP SENSOR VOLTAGE ABOVE 4.5 VOLTS

NOTE: Make sure the throttle is fully closed and free from binding or carbon build up.

Start the engine.

With a scan tool, read the TP Sensor voltage.

Is the voltage above 4.5 volts?

Yes >> Go To 2

No >> Go To 8

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (3.7L, 4.7L) (CONTINUED)

2. THROTTLE POSITION SENSOR

Turn the ignition off.

Disconnect the TP Sensor harness connector.

Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K900) Sensor ground circuit in the Sensor harness connector.

With a scan tool, monitor the TP Sensor voltage.

Ignition on, engine not running.

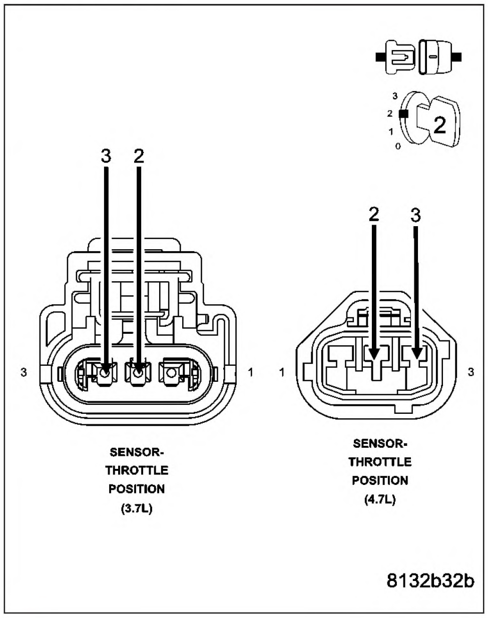
Is the voltage below 0.5 of a volt with the jumper wire installed?

Yes >> Replace the Throttle Position Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.


3
2
3 2
2 3
3
1
1
3
SENSOR-
THROTTLE
POSITION
(3.7L)
SENSOR-
THROTTLE
POSITION
(4.7L)
8132b32b

---

3. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

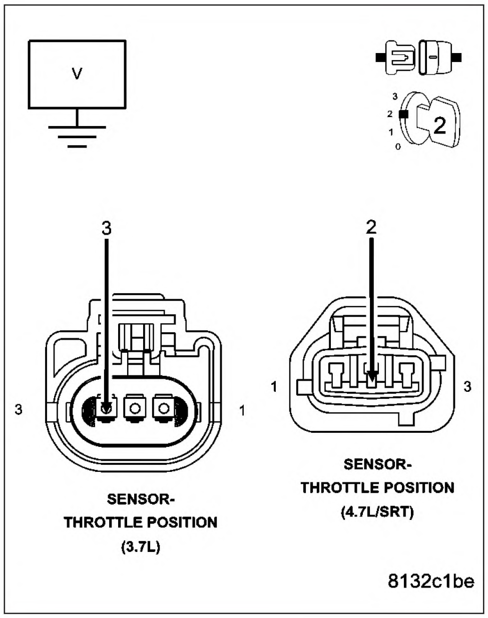
Measure the voltage on the (K22) TP Sensor No.1 Signal circuit in the TP Sensor harness connector.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4


V
2
3
2
3
1
1
3
SENSOR-
THROTTLE POSITION
(3.7L)
SENSOR-
THROTTLE POSITION
(4.7L/SRT)
8132c1be

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (3.7L, 4.7L) (CONTINUED)

4. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

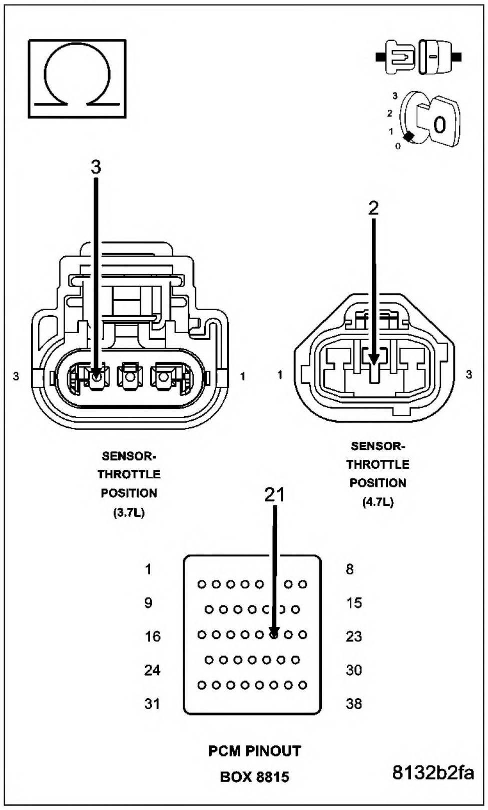
Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
3
2
3
1
1
3
SENSOR-
THROTTLE
POSITION
(3.7L)
SENSOR-
THROTTLE
POSITION
(4.7L)
21
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8132b2fa

---

5. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

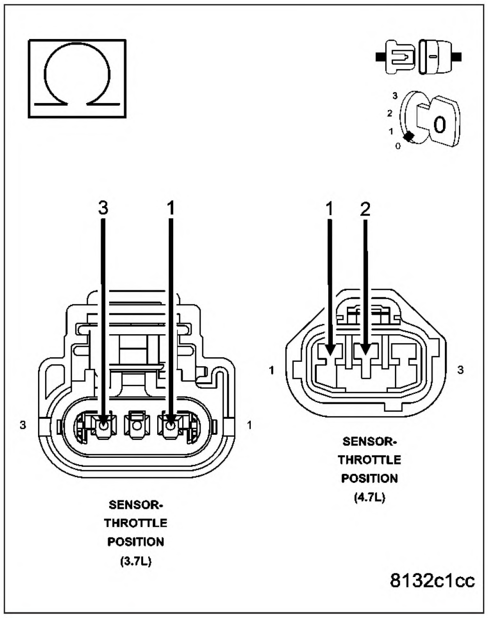
Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (F855) 5-volt Supply circuit in the TP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (F855) 5-volt Supply circuit and the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

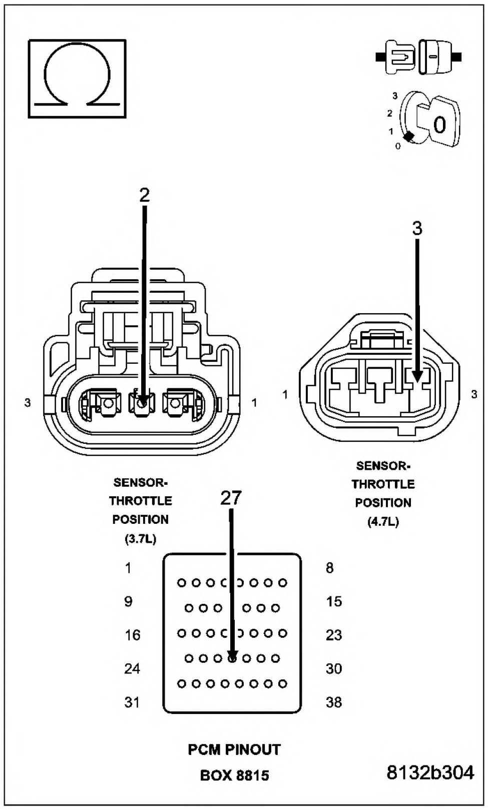
No >> Go To 6


3
2
1
0
0
3
1
1
2
1
3
3
1
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
8132c1cc

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (3.7L, 4.7L) (CONTINUED)

6. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
2
3
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
27
SENSOR-THROTTLE POSITION (4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8132b304

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. THROTTLE POSITION SENSOR SWEEP

With a scan tool, monitor the Throttle Position Sensor voltage.

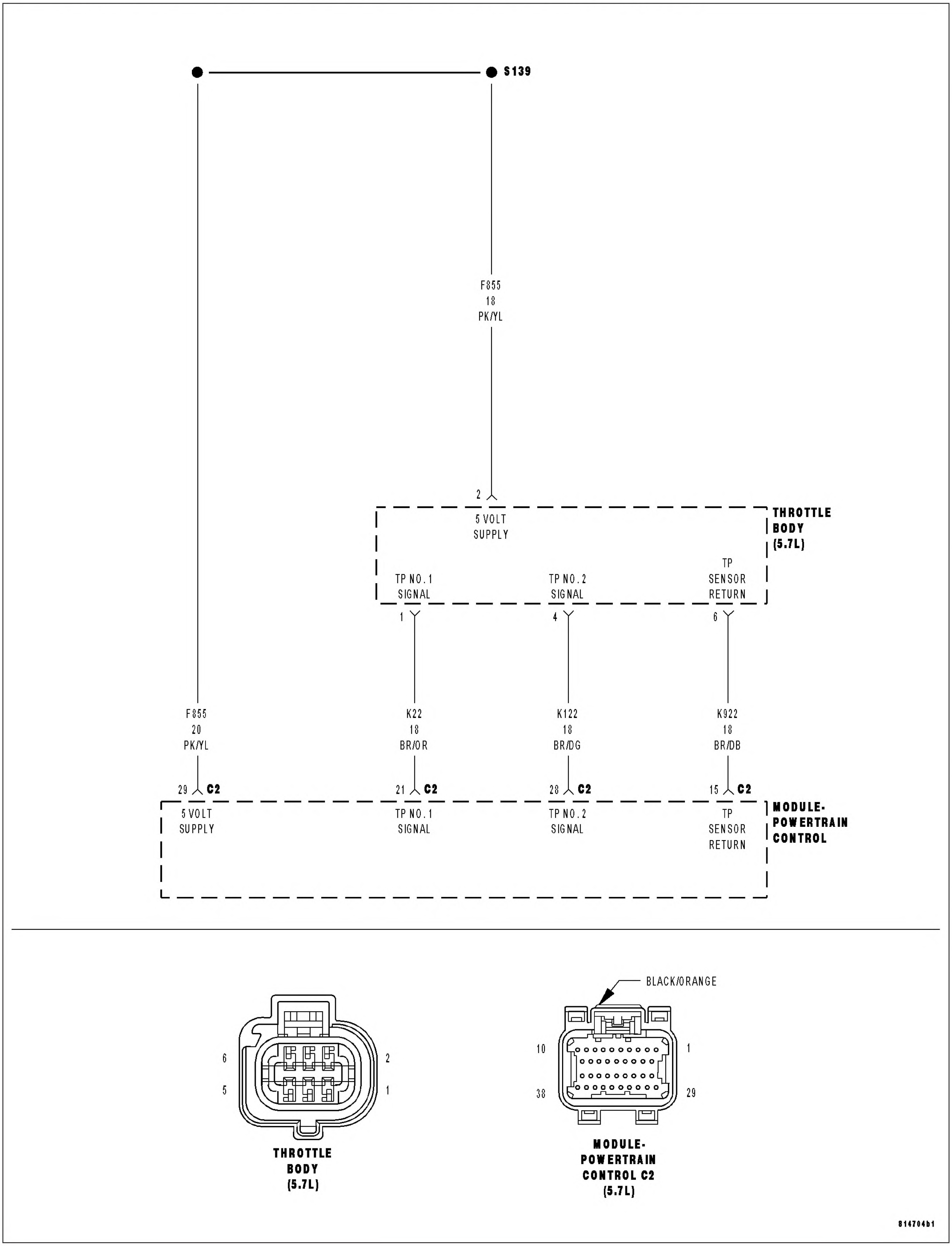
Slowly open the throttle from the idle position to the wide open throttle position.

Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Throttle Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (5.7L)


S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
1
4
6
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
29 C2
21 C2
28 C2
15 C2
5 VOLT SUPPLY
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
6
5
2
1
10
38
1
29
THROTTLE BODY (5.7L)
MODULE-POWERTRAIN CONTROL C2 (5.7L)
814704b1

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (5.7L) (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  Throttle Position Sensor No.1 voltage is greater than 4.8 volts for 25 ms. One Trip Fault. 5.7L ETC light will illuminate.

Possible Causes
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT OPEN
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K922) SENSOR RETURN CIRCUIT OPEN
THROTTLE POSITION SENSOR/THROTTLE BODY
THROTTLE PLATE JAMMED AGAINST THE MAXIMUM STOP
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. TP SENSOR NO.1 VOLTAGE ABOVE 4.8 VOLTS

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

NOTE: Make sure the throttle is fully closed and free from binding or carbon build up.

NOTE: If a 5-Volt Supply DTC has also set, diagnose the 5-Volt DTC before continuing.

NOTE: If P2101 is also set, then make sure that the blade moves freely and does not hang up near Wide Open Throttle before trying to repair P0123.

Start the engine.

With a scan tool, read the TP Sensor No.1 voltage.

Is the voltage above 4.8 volts?

Yes >> Go To 2

No >> Go To 8

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (5.7L) (CONTINUED)

2. THROTTLE POSITION SENSOR

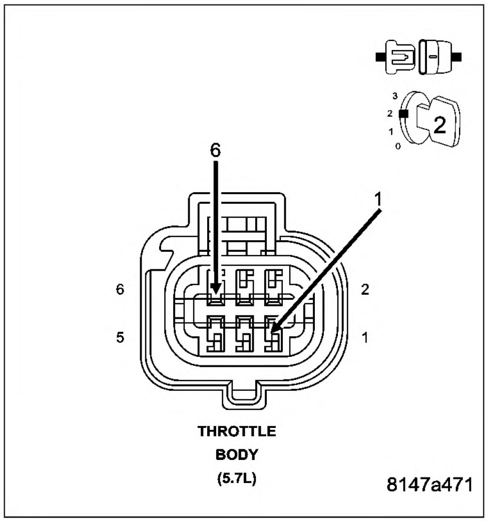
Turn the ignition off.

Disconnect the Throttle Body harness connector.

Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K922) Sensor Return circuit in the Throttle Body harness connector.

With a scan tool, monitor the TP Sensor No.1 voltage.

Ignition on, engine not running.



Is the voltage below 0.5 of a volt with the jumper wire installed?

Yes >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, using a scan tool, select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.

---

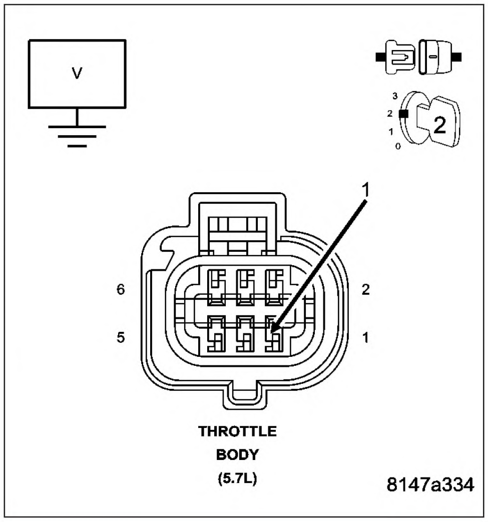
3. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K22) TP Sensor No.1 Signal circuit in the Throttle Body harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

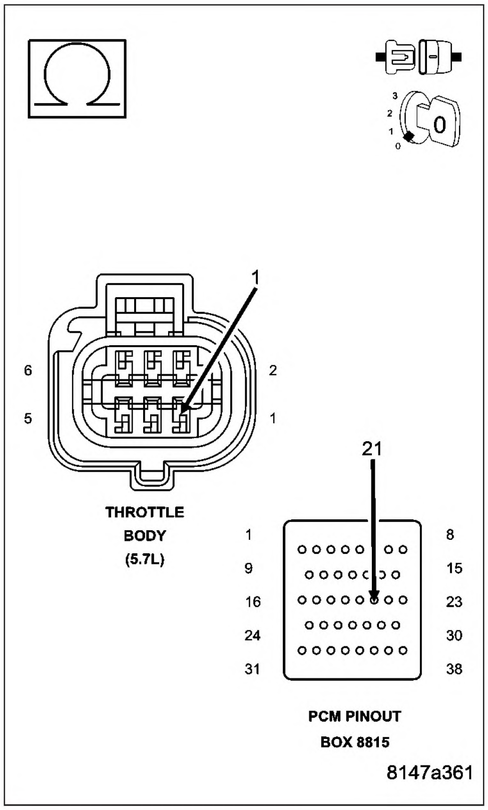
P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (5.7L) (CONTINUED)

4. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

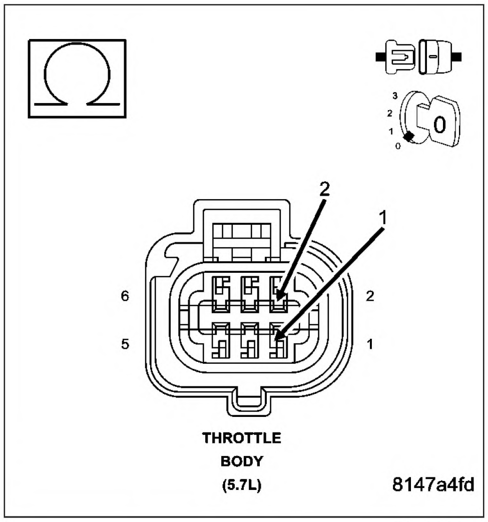
No >> Repair the open in the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (F855) 5-volt Supply circuit in the Throttle Body harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short between the (F855) 5-volt Supply circuit and the (K22) TP Sensor No.1 Signal circuit.

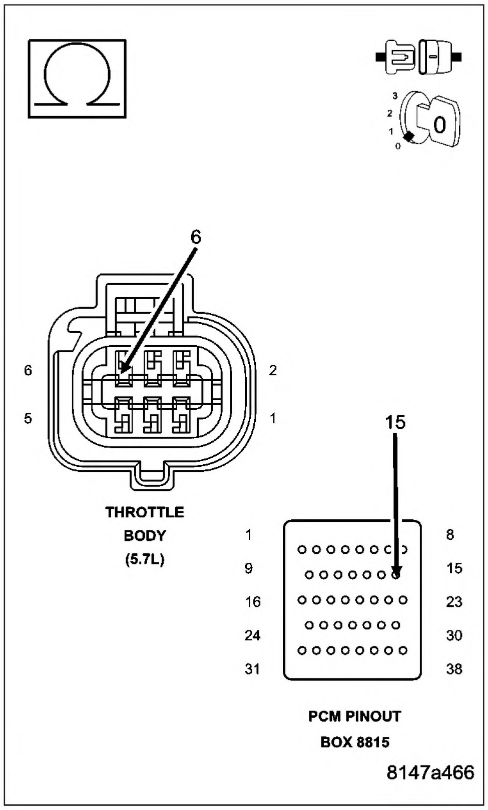
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0123-THROTTLE POSITION SENSOR 1 CIRCUIT HIGH (5.7L) (CONTINUED)

6. (K922) SENSOR RETURN CIRCUIT OPEN

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K922) Sensor Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. THROTTLE FOLLOWER TEST

With a scan tool, perform the Throttle Follower Test.

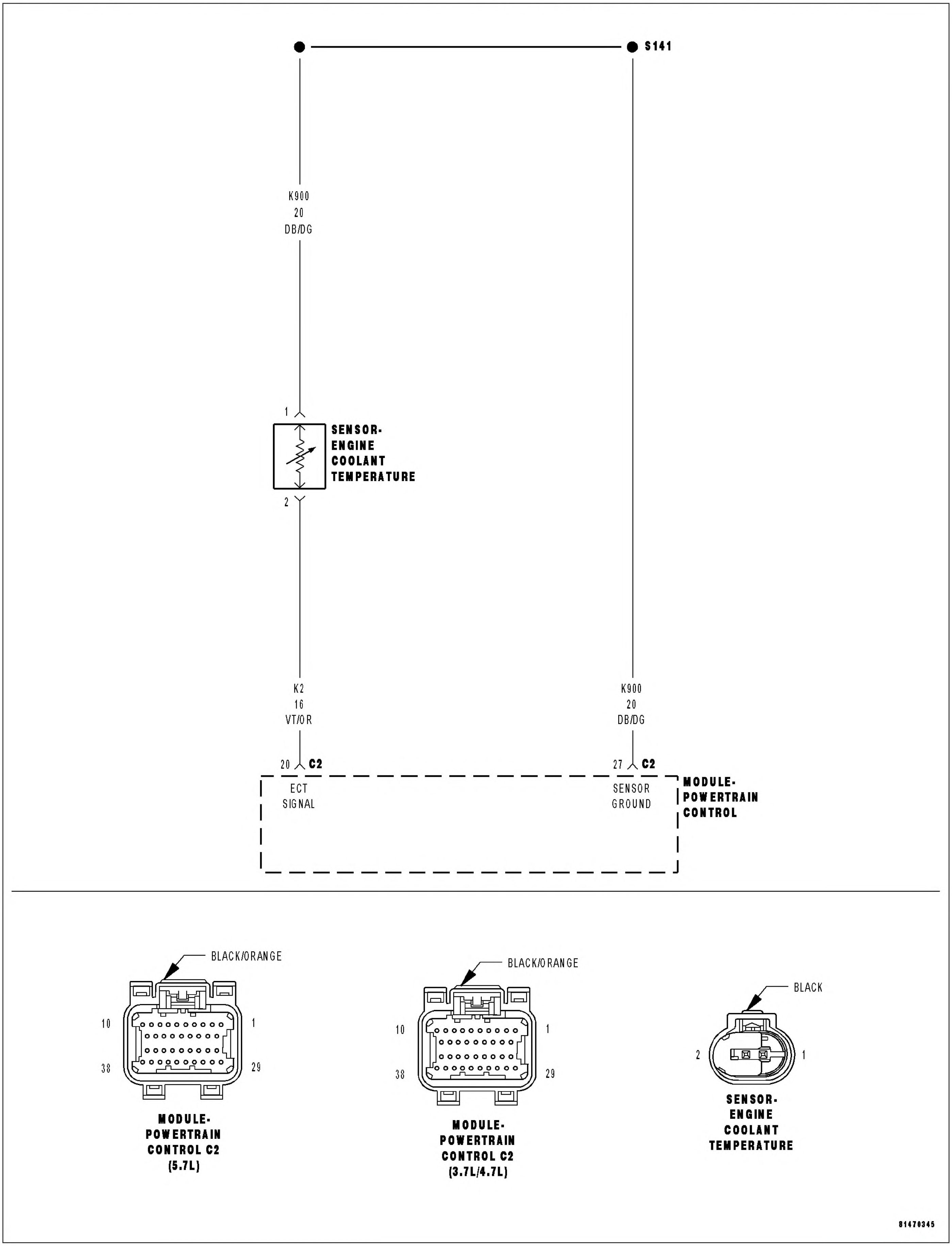
Monitor the TP Sensor No.1 voltage.

Does voltage start at approximately 0.3 of a volt and go above 4.7 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, using a scan tool select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL


S141
K900
20
DB/DG
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
2
K2
16
VT/OR
K900
20
DB/DG
20 C2
27 C2
ECT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
81470345

P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL (CONTINUED)

For the Engine System circuit diagrams Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The engine coolant temperature sensor is a negative temperature coefficient thermistor-type sensor whose resistance varies inversely with temperature. At cold temperatures the sensor resistance is high so the voltage is high. As the coolant temperature increases the resistance decreases and the voltage becomes low. The INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL determines if the engine coolant temperature will reach the closed loop fueling control temperature limit in a regulated time after start.

- **When Monitored:**
  With battery voltage greater than 10.4 volts and after engine is started.
- **Set Condition:**
  The engine temperature does not go above -10°C (15°F). Failure time depends on start-up coolant temperature and ambient temperature. (i.e. 2 minutes for a start temp of -10°C (15°F) or up to 10 minutes for a vehicle with a start-up temp of -28°C (5°F). Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
LOW COOLANT LEVEL
THERMOSTAT
ECT SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CHECKING COOLANT LEVEL AND CONDITION

Ignition on, engine not running.

With a scan tool, read DTCs.

NOTE: If an Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.

NOTE: Inspect the ECT terminals and related PCM terminals. Make sure the terminals are free from corrosion and damage.

NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.

NOTE: Extremely cold outside ambient temperatures may have caused this DTC to set.

WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Failure to follow these instructions can result in personal injury or death. Allow the engine to cool before opening the cooling system.

Inspect the coolant system for proper level and condition.

Is the coolant level and condition OK?

Yes >> Go To 2

No >> Inspect the vehicle for a coolant leak, make the appropriate repairs, and add the correct amount of coolant.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0125-INSUFFICIENT COOLANT TEMP FOR CLOSED-LOOP FUEL CONTROL (CONTINUED)

2. THERMOSTAT OPERATION

NOTE: This test works best if performed on a cold engine (cold soak)

Ignition on, engine not running.

With a scan tool, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer.

NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the scan tool Eng Coolant Tmp Deg values should stay relatively close to each other.

Using the appropriate service information, determine the proper opening temperature of the thermostat.

Did the thermostat open at the proper temperature?

Yes >> Go To 3

No >> Replace the thermostat.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. ECT SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer.

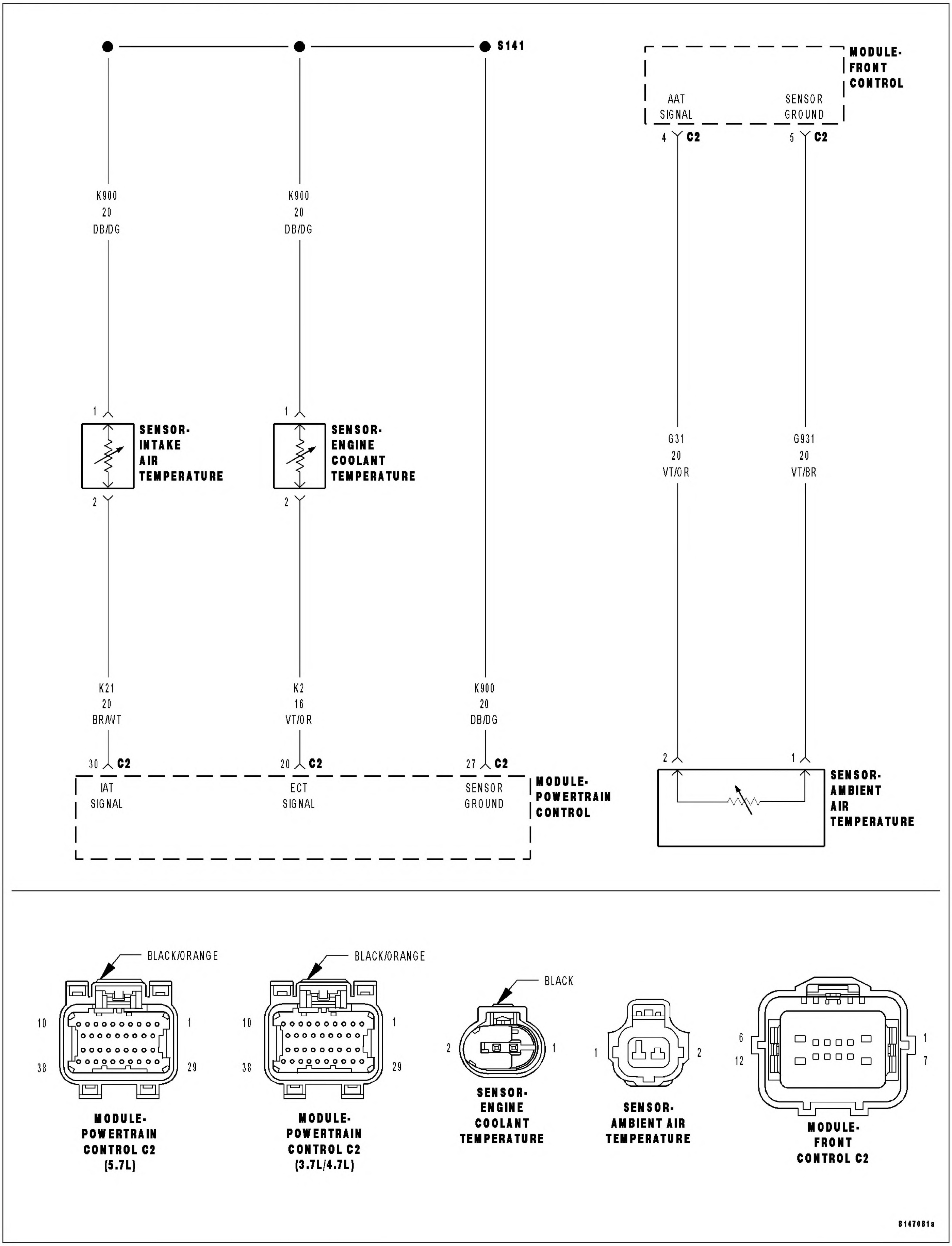
NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the scan tools Eng Coolant Tmp Deg value should stay relatively close to each other.

Is the thermometer reading relatively close to the scan tool ECT reading?

Yes >> Test Complete.

No >> Replace the Engine Coolant Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0128-THERMOSTAT RATIONALITY


S141
MODULE-FRONT CONTROL
AAT SIGNAL
SENSOR GROUND
4 C2
5 C2
K900 20 DB/DG
K900 20 DB/DG
1
SENSOR-INTAKE AIR TEMPERATURE
2
1
SENSOR-ENGINE COOLANT TEMPERATURE
2
G31 20 VT/OR
G931 20 VT/BR
K21 20 BR/WT
K2 16 VT/OR
K900 20 DB/DG
30 C2
20 C2
27 C2
2
1
IAT SIGNAL
ECT SIGNAL
SENSOR GROUND
MODULE-POWERTRAIN CONTROL
SENSOR-AMBIENT AIR TEMPERATURE
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK
2
1
SENSOR-ENGINE COOLANT TEMPERATURE
1
2
SENSOR-AMBIENT AIR TEMPERATURE
6
12
1
7
MODULE-FRONT CONTROL C2
8147081a

P0128-THERMOSTAT RATIONALITY (CONTINUED)

For the Engine circuit diagrams (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The PCM predicts what the engine coolant temperature should be, based on the engine coolant temperature at start-up, ambient temperature and how the vehicle is subsequently driven. The predicted engine coolant temperature is compared to the Engine Coolant Temperature Sensor reading. The error between the two is calculated and integrated with respect to time. When the Thermostat diagnostic runs, the integrated error is compared to a calibrated threshold and pass/fail is determined. Separate pass and fail thresholds are used in order to improve accuracy of the diagnostic.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  The PCM predicts a coolant temperature value that it will compare to the actual coolant temperature. A significant difference results in an error. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
LOW COOLANT LEVEL
THERMOSTAT OPERATION
SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
TEMPERATURE SENSOR
SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
SIGNAL CIRCUIT SHORTED TO GROUND
SIGNAL CIRCUIT SHORTED TO (K900), (G931) SENSOR GROUND
OTHER POSSIBLE CAUSES
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: If any ECT, AAT, CMP or CKP sensor DTCs have set along with P0128, diagnose them before continuing.

NOTE: Make sure that the Pinion Factor has been programmed correctly into the PCM.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0128-THERMOSTAT RATIONALITY (CONTINUED)

2. LOW COOLANT LEVEL

NOTE: If an Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.

NOTE: Inspect the ECT terminals and related PCM terminals. Make sure the terminals are free from corrosion and damage.

NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.

NOTE: Extremely cold outside ambient temperatures may have caused this DTC to set.

WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Failure to follow these instructions can result in personal injury including extreme burns, scalding, or death. Allow the engine to cool before opening the cooling system.

Check the coolant system to make sure that the coolant is in good condition and at the proper level.

Is the coolant level and condition OK?

Yes >> Go To 3

No >> Inspect the vehicle for a coolant leak and add the necessary amount of coolant.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. THERMOSTAT OPERATION

NOTE: This test works best if performed on a cold engine (cold soak).

Ignition on, engine not running.

With a scan tool, read the ECT Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up, monitor the ECT Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer.

NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the scan tool, ECT Temperature value should stay relatively close to each other.

Using the appropriate service information, determine the proper opening temperature of the thermostat.

Did the thermostat open at the proper temperature?

Yes >> Go To 4

No >> Replace the thermostat.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. AMBIENT AIR TEMP SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, read and record the AAT Sensor Temperature value.

Using the DRB Temperature Probe #CH7050, or an equivalent temperature measuring tool, measure the ambient air temperature near the AAT Sensor.

Is the AAT Sensor value with -15°C (5°F) of the temperature probe reading?

Yes >> Go To 5

No >> Go To 7

P0128-THERMOSTAT RATIONALITY (CONTINUED)

5. ECT SENSOR OPERATION

WARNING: Make sure the engine cooling system is cool before removing the pressure cap or any hose. The cooling system is pressurized when hot. Failure to follow these instructions can result in personal injury including extreme burns, scalding, or death.

With a scan tool, read and record the ECT Sensor Temperature value.

Use the DRB Temperature Probe #CH7050, or an equivalent temperature measuring tool, measure the engine coolant temperature.

Is the ECT Sensor value with -15°C (5°F) of the temperature probe reading?

Yes >> Go To 6

No >> Go To 7

---

6. OTHER POSSIBLE CAUSES

Inspect the Temperature Sensors for any physical damage.

Inspect the engine coolant. Make sure the coolant is at the proper level. Refer to the Service Information COOLING.

Make sure the Temperature Sensors are properly installed.

Make sure the CMP and CKP sensors are installed properly. Check the connectors for any signs of damage.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Refer to any Technical Service Bulletins (TSBs) that may apply.

With the engine running at normal operating temperature, monitor the Temperature sensor parameters while wiggling the wire harness. Look for parameter values to change.

Visually inspect the related wire harness. Look for any chafed, pierced, pinched, partially broken wires and broken, bent, pushed out, or corroded terminals.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Inspect and clean all PCM, engine, and chassis grounds.

Were any problems found during the above inspections?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete, the conditions that set this DTC are not present at this time.

P0128-THERMOSTAT RATIONALITY (CONTINUED)

7. SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

NOTE: Visually inspect both the component and the PCM connectors. Look for damage, partially broken wires and backed out or corroded terminals

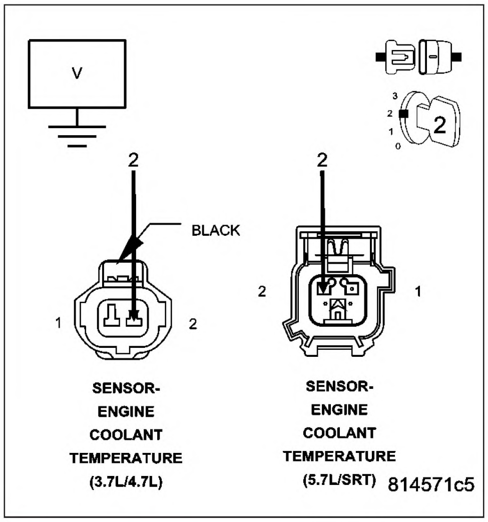
Turn the ignition off.

Disconnect the applicable Temperature Sensor harness connector.

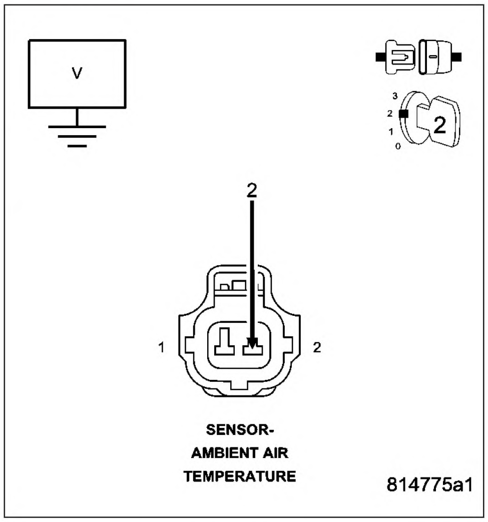
Disconnect the C2 FCM harness connector and the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K2) ECT Signal circuit and the (G31) AAT Signal circuit at the appropriate Temperature Sensor harness connector.


V
2
2
BLACK
1
2
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)

814571c5


V
2
2
1
2
SENSOR-
AMBIENT AIR
TEMPERATURE

814775a1

Is the voltage above 5.2 volts?

Yes >> Repair the short to battery voltage in the Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0128-THERMOSTAT RATIONALITY (CONTINUED)

8. TEMPERATURE SENSOR

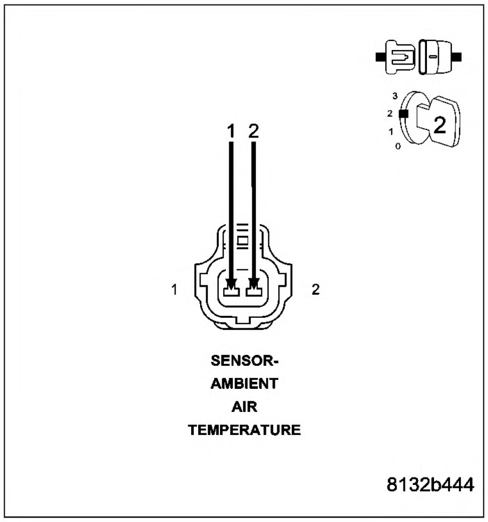
Turn the ignition off.

Connect the C2 FCM harness connector and the C2 PCM harness connector.

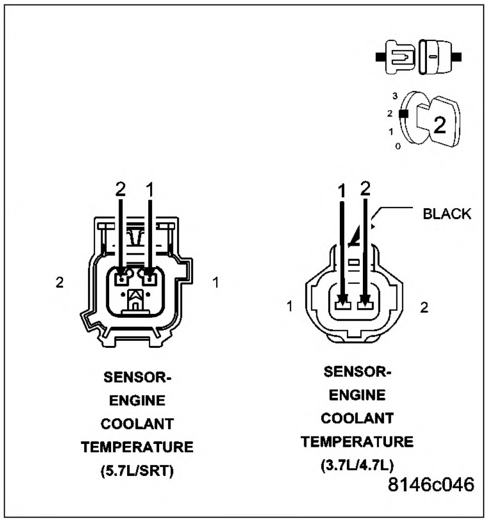
Connect a jumper wire across the ECT and AAT Sensor harness connectors.

Ignition on, engine not running.

With a scan tool, read the Temperature Sensor voltage.


1 2
1
2
SENSOR-
AMBIENT
AIR
TEMPERATURE
2
3
2
1
0

8132b444


2 1
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(5.7L/SRT)
1 2
BLACK
1
2
SENSOR-
ENGINE
COOLANT
TEMPERATURE
(3.7L/4.7L)
2

8146c046

Does the voltage start at 5.0 volts and drop below 1.0 volt when the jumper wire is installed?

Yes >> Replace the appropriate Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

NOTE: Disconnect the jumper wire before continuing.

P0128-THERMOSTAT RATIONALITY (CONTINUED)

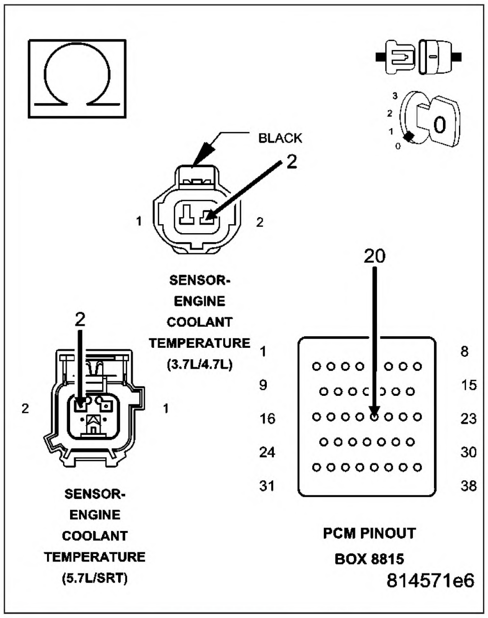
9. SIGNAL CIRCUIT OPEN

Turn the ignition off.

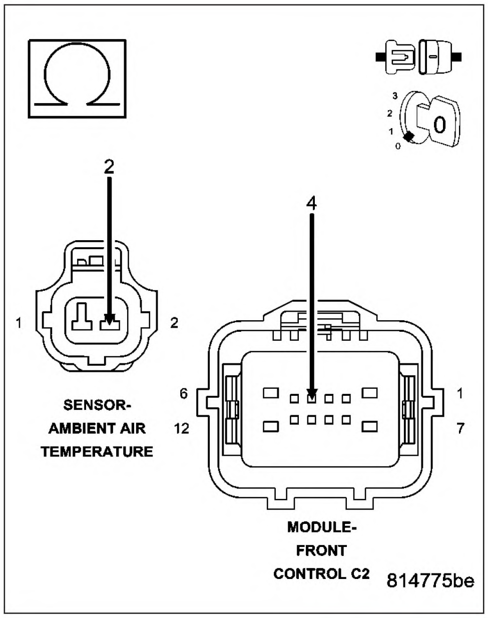
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K2) ECT Sensor Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.

Measure the resistance of the (G31) AAT Sensor Signal circuit from the AAT Sensor harness connector to the C2 FCM harness connector.



BLACK
2
1
2
20
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
2
2
1
1
9
16
24
31
8
15
23
30
38
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
PCM PINOUT BOX 8815
814571e6



2
4
1
2
6
12
1
7
SENSOR-AMBIENT AIR TEMPERATURE
MODULE-FRONT CONTROL C2
814775be

Is the resistance below 5.0 ohms?

Yes >> Go To 10

No >> Repair the open in the Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0128-THERMOSTAT RATIONALITY (CONTINUED)

10. SENSOR GROUND CIRCUIT OPEN

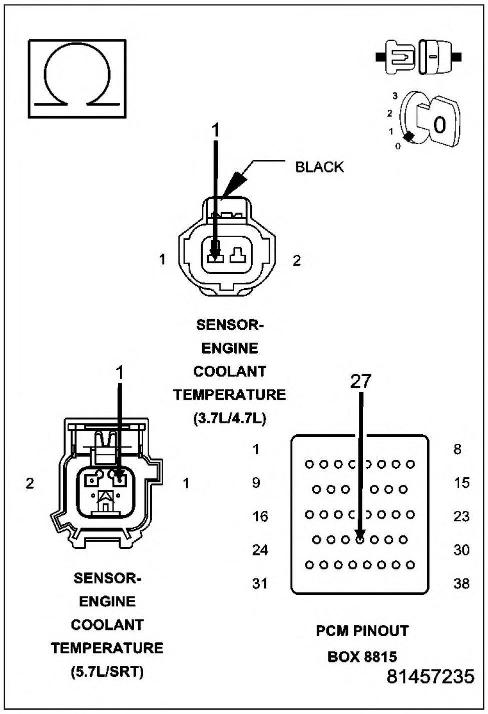
Measure the resistance of the (K900) Sensor ground circuit from the appropriate Temperature Sensor harness connector to the appropriate terminal of special tool #8815.

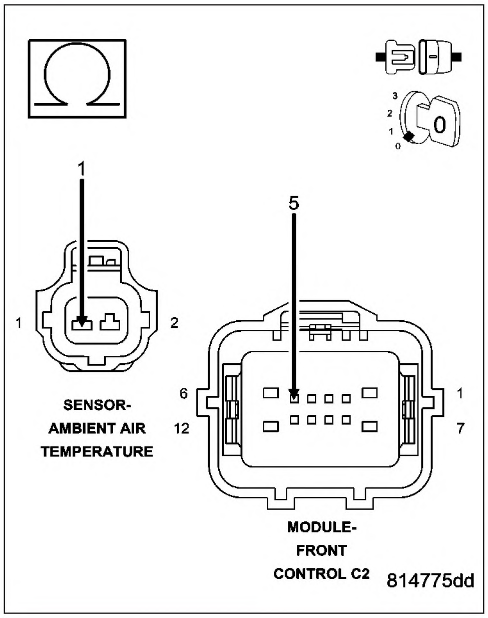
Measure the resistance of the (G931) Sensor ground circuit from the AAT Sensor harness connector to the C2 FCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 11

No >> Repair the open in the Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


1
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
1
2
1
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
27
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
81457235


1
1
2
SENSOR-AMBIENT AIR TEMPERATURE
5
6
12
1
7
MODULE-FRONT CONTROL C2
814775dd

P0128-THERMOSTAT RATIONALITY (CONTINUED)

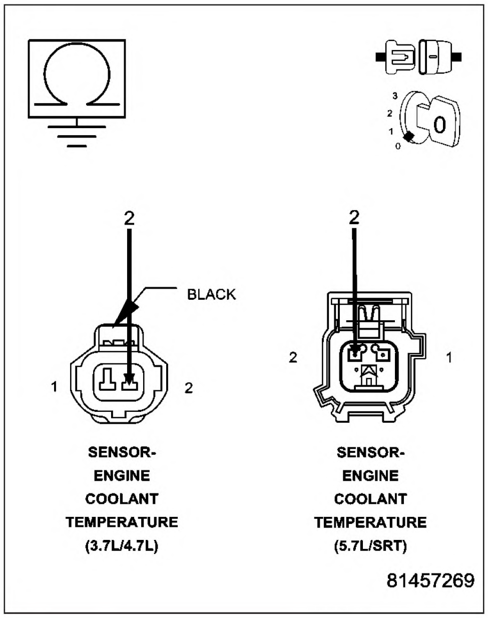
11. SIGNAL CIRCUIT SHORTED TO GROUND

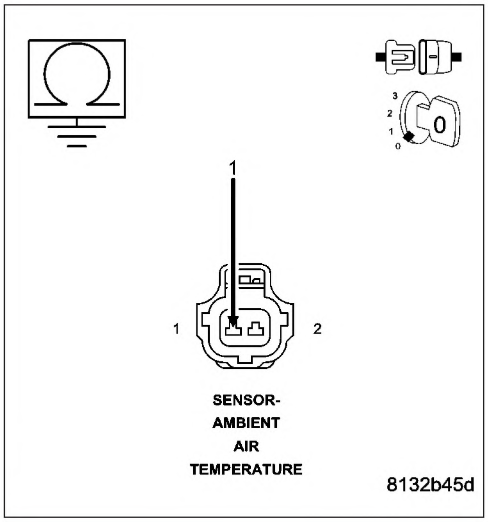
Measure the resistance between ground and the Sensor Signal circuit in the Temperature Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12


2
BLACK
1
2
2
2
1
3
2
1
0
0
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
81457269


1
1
2
3
2
1
0
0
SENSOR-AMBIENT AIR TEMPERATURE
8132b45d

P0128-THERMOSTAT RATIONALITY (CONTINUED)

12. SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT OR THE (G931) SENSOR GROUND CIRCUIT

Measure the resistance between the Signal circuit and the (K900) Sensor ground circuit in the (K2) ECT Sensor harness connector.

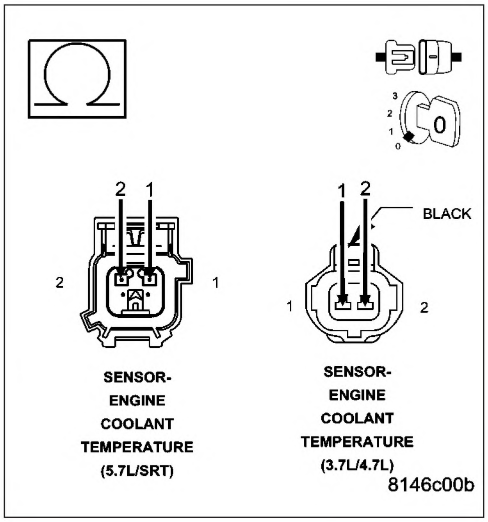
Measure the resistance between the Signal circuit and the (G931) Sensor ground circuit in the (G31) AAT Sensor harness connector.

Is the resistance below 100 ohms?

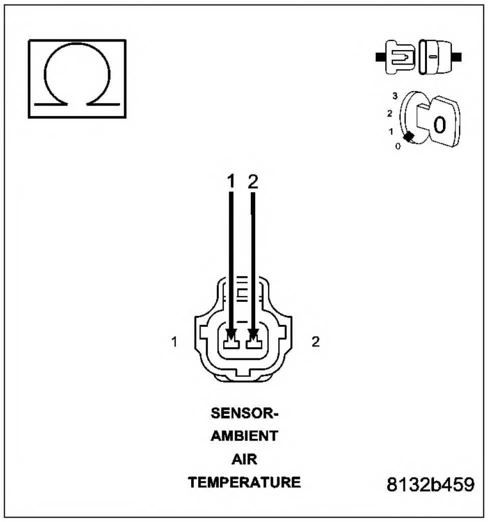
Yes >> Repair the short between the Sensor ground circuit and the Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13


Ω
3
2
1
0
O
2 1
2
1
1 2
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)

8146c00b


Ω
3
2
1
0
O
1 2
1
2
SENSOR-AMBIENT AIR TEMPERATURE

8132b459

---

13. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

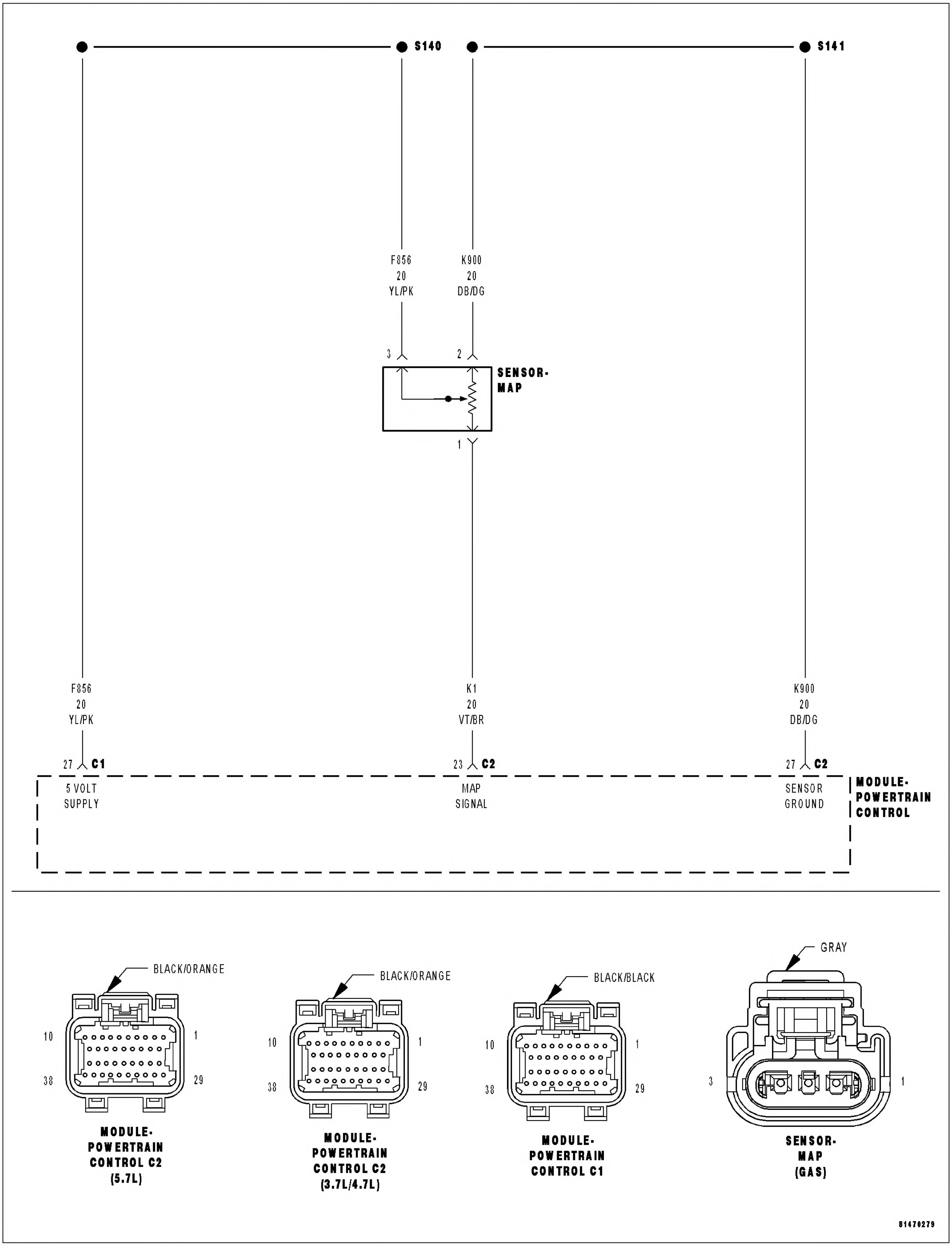
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW


S140
S141
F856
20
YL/PK
K900
20
DB/DG
3
2
SENSOR-
MAP
1
F856
20
YL/PK
K1
20
VT/BR
K900
20
DB/DG
27 C1
23 C2
27 C2
5 VOLT
SUPPLY
MAP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
GRAY
3
1
SENSOR-
MAP
(GAS)
81470279

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on. No Cam or Crank signal within 75 ms. Engine speed less than 250 RPM.
- **Set Condition:**
  The PCM senses the voltage from the MAP sensor to be less than 2.2 volts but above 0.04 of a volt for 300 milliseconds. One Trip Fault. Three good trips to turn off the MIL. (5.7L ETC lamp will flash)

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K1) MAP SIGNAL CIRCUIT OPEN
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
(K1) MAP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND
MAP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time.

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW (CONTINUED)

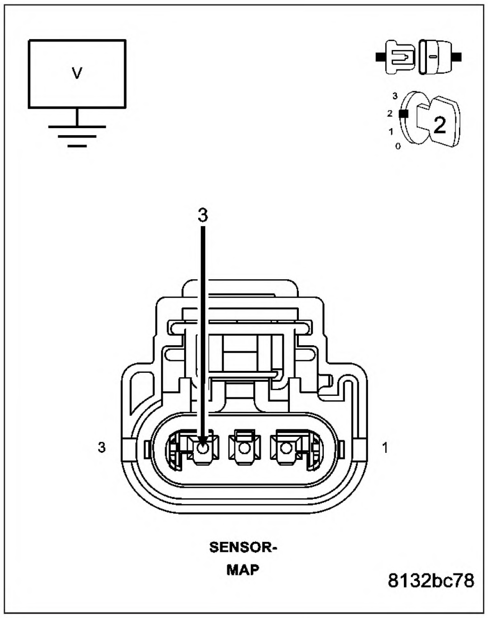
2. (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.



Is the voltage between 4.5 to 5.2 volts?

Yes >> Go To 3

No >> Go To 7

---

3. MAP SENSOR

With a scan tool, monitor the MAP Sensor voltage with the Sensor harness connector disconnected.

Is the voltage above 2.2 volts?

Yes >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

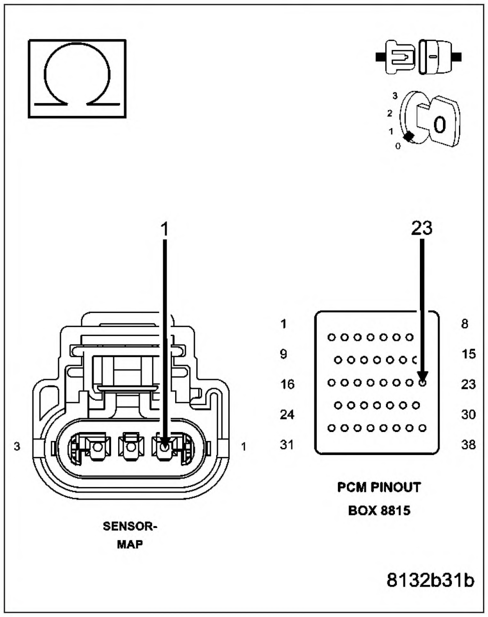
4. (K1) MAP SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

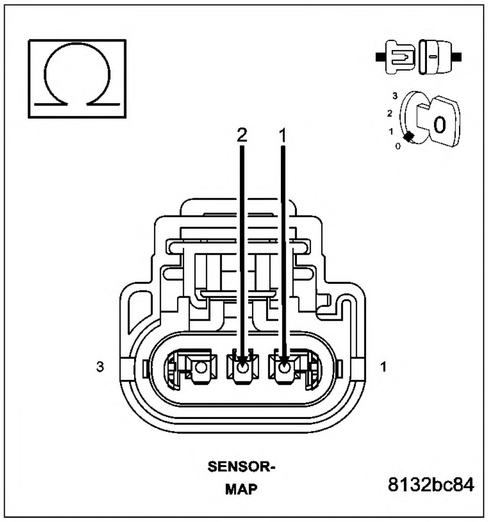
Yes >> Go To 5

No >> Repair the open in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW (CONTINUED)

5. (K1) MAP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K900) Sensor ground circuit and the (K1) MAP Signal circuit in the MAP Sensor harness connector.



Is the resistance below 5.0 ohms?

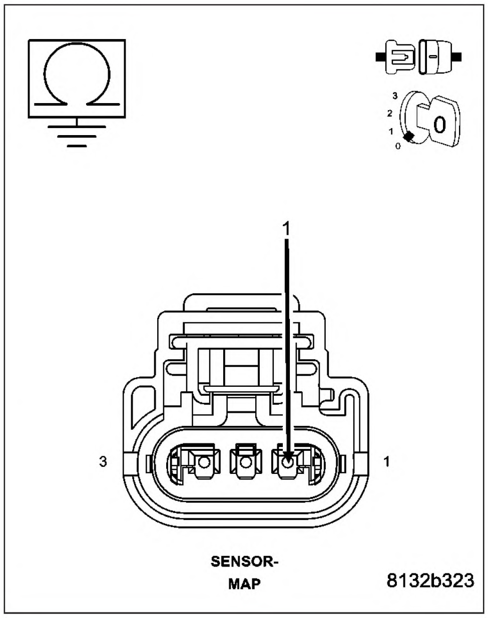
Yes >> Repair the short between the (K900) Sensor ground circuit and the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K1) MAP Signal circuit in the MAP Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW (CONTINUED)

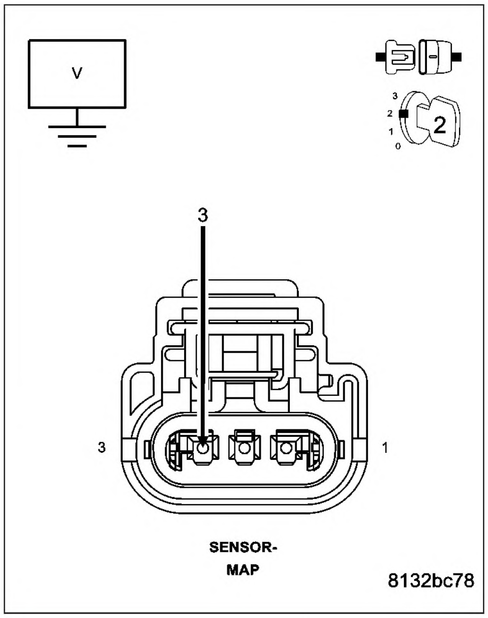
7. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.



8132bc78

Is the voltage above 5.2 volts?

Yes >> Repair the short to battery voltage in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

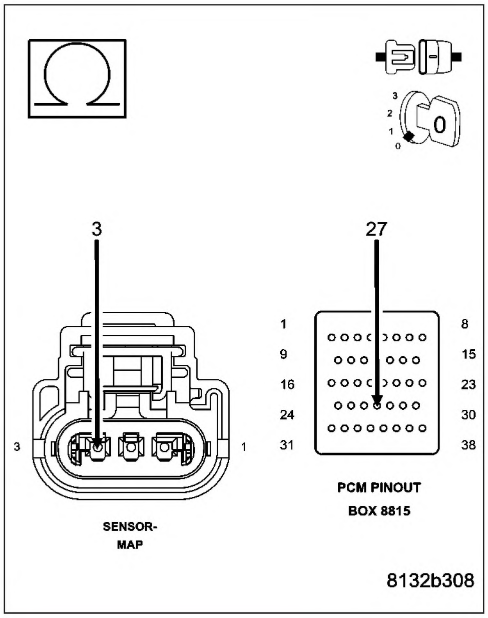
---

8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



8132b308

Is the resistance below 5.0 ohms?

Yes >> Go To 9

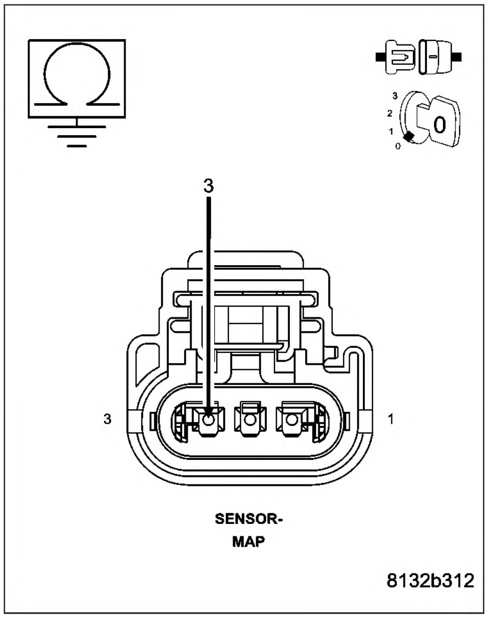
No >> Repair the open in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0129-BAROMETRIC PRESSURE OUT-OF-RANGE LOW (CONTINUED)

9. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

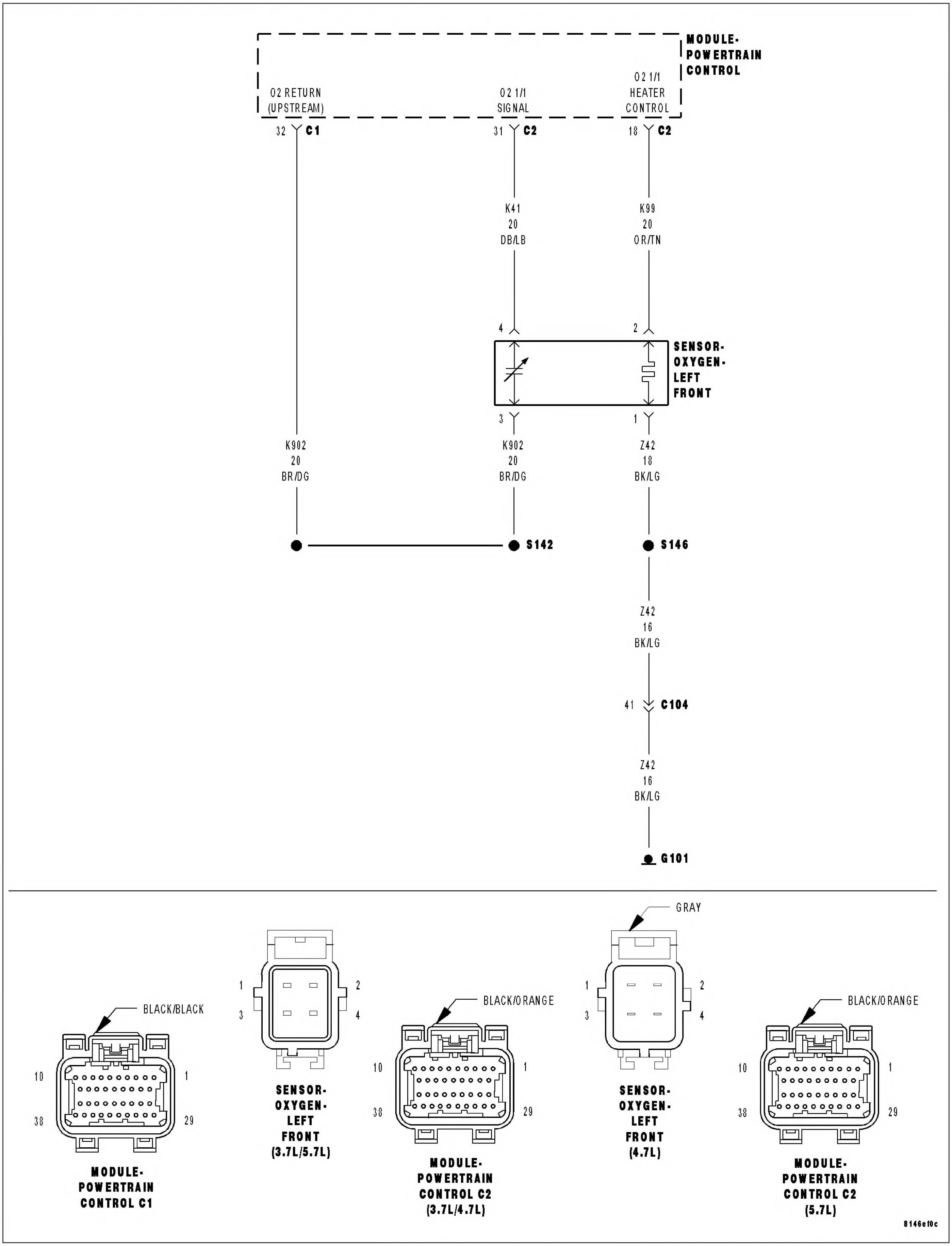
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0131-O2 SENSOR 1/1 CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
32 C1
31 C2
18 C2
K41
20
DB/LB
K99
20
OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146ef0c

P0131-O2 SENSOR 1/1 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagrams (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.4 volts.
- **Set Condition:**
  The oxygen sensor signal voltage is below 2.5196 volts for 6 seconds after starting engine. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO GROUND
(K41) O2 1/1 SIGNAL CIRCUIT SHORTED TO GROUND
(K41) O2 1/1 SIGNAL CIRCUIT SHORTED TO THE (K902) O2 RETURN UPSTREAM CIRCUIT
(K41) O2 1/1 SIGNAL CIRCUIT SHORTED TO THE (Z42) O2 1/1 HEATER GROUND CIRCUIT
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR BELOW 2.52 VOLTS

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 1/1 O2 Sensor voltage.

Is the voltage below 2.52 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (K41) O2 SENSOR 1/1 SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the 1/1 O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the O2 Sensor voltage.

Is the 1/1 O2 Sensor voltage above 4.8 volts?

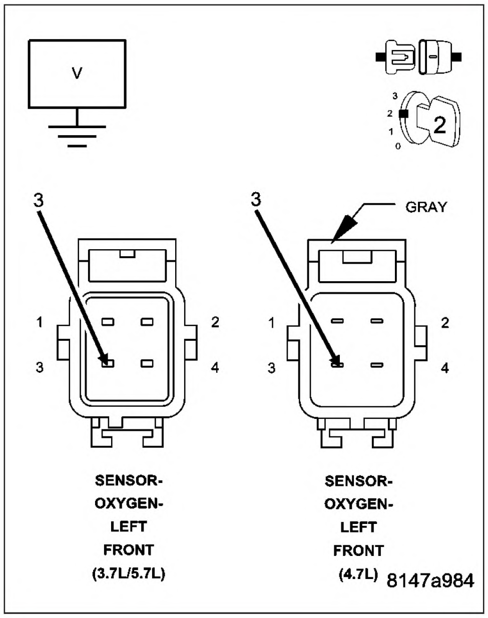
Yes >> Go To 3

No >> Go To 5

P0131-O2 SENSOR 1/1 CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Measure the voltage on the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147a984

Is the voltage at 2.5 volts?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

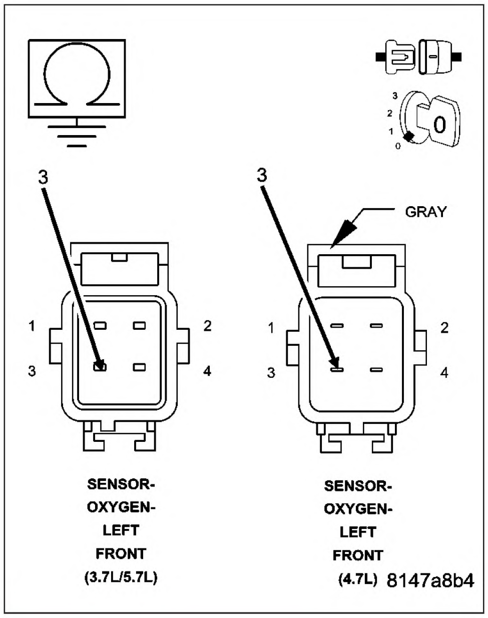
---

4. (K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


3
2
1
0
0
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147a8b4

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K902) O2 Return Upstream circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

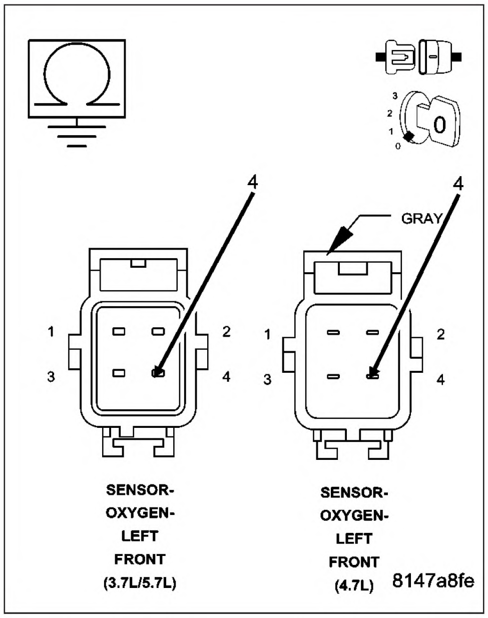
P0131-O2 SENSOR 1/1 CIRCUIT LOW (CONTINUED)

5. (K41) O2 SENSOR 1/1 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

Measure the resistance between ground and the (K41) O2 Sensor 1/1 Signal circuit in the O2 Sensor harness connector.


3
2
1
0
0
4
4
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147a8fe

Is the resistance below 100 ohms?

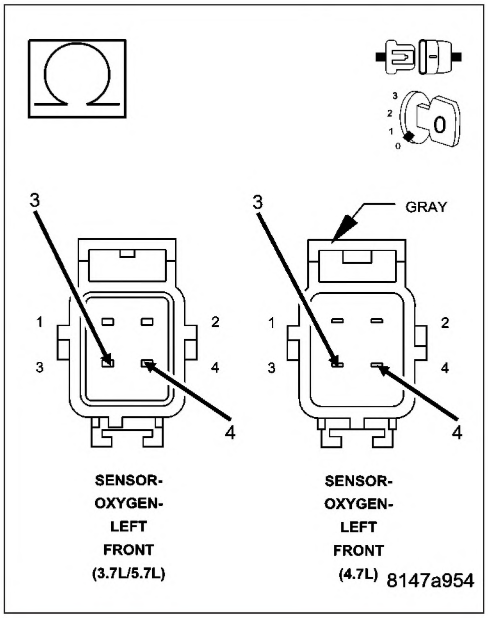
Yes >> Repair the short to ground in the (K41) O2 Sensor 1/1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. (K41) O2 SENSOR 1/1 SIGNAL CIRCUIT SHORTED TO THE (K902) O2 RETURN UPSTREAM CIRCUIT

Measure the resistance between the (K41) O2 Sensor 1/1 Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


3
2
1
0
0
3
3
GRAY
1
2
3
4
1
2
3
4
4
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147a954

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K902) O2 Return Upstream circuit and the (K41) O2 Sensor 1/1 Signal circuit.

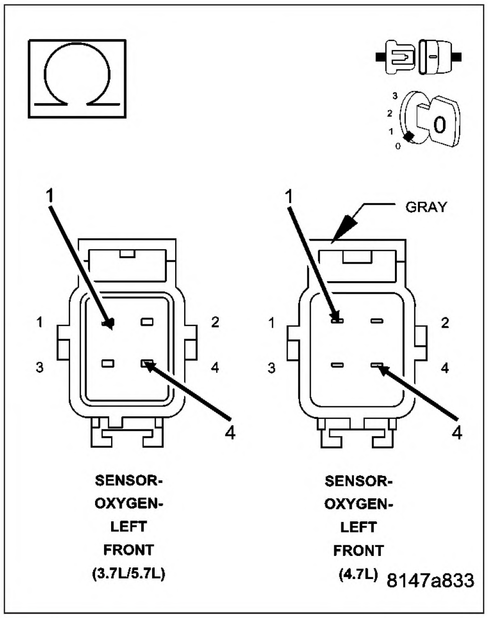
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0131-O2 SENSOR 1/1 CIRCUIT LOW (CONTINUED)

7. (K41) O2 SENSOR 1/1 SIGNAL CIRCUIT SHORTED TO THE (Z42) O2 1/1 HEATER GROUND CIRCUIT

Measure the resistance between the (K41) O2 Sensor 1/1 Signal circuit and the (Z42) O2 1/1 Heater ground circuit in the O2 Sensor harness connector.


GRAY
1
1
1
2
3
4
4
1
2
3
4
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
8147a833

Is the resistance below 100 ohms?

Yes >> Repair the short between the (Z42) O2 1/1 Heater ground circuit and the (K41) O2 Sensor 1/1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

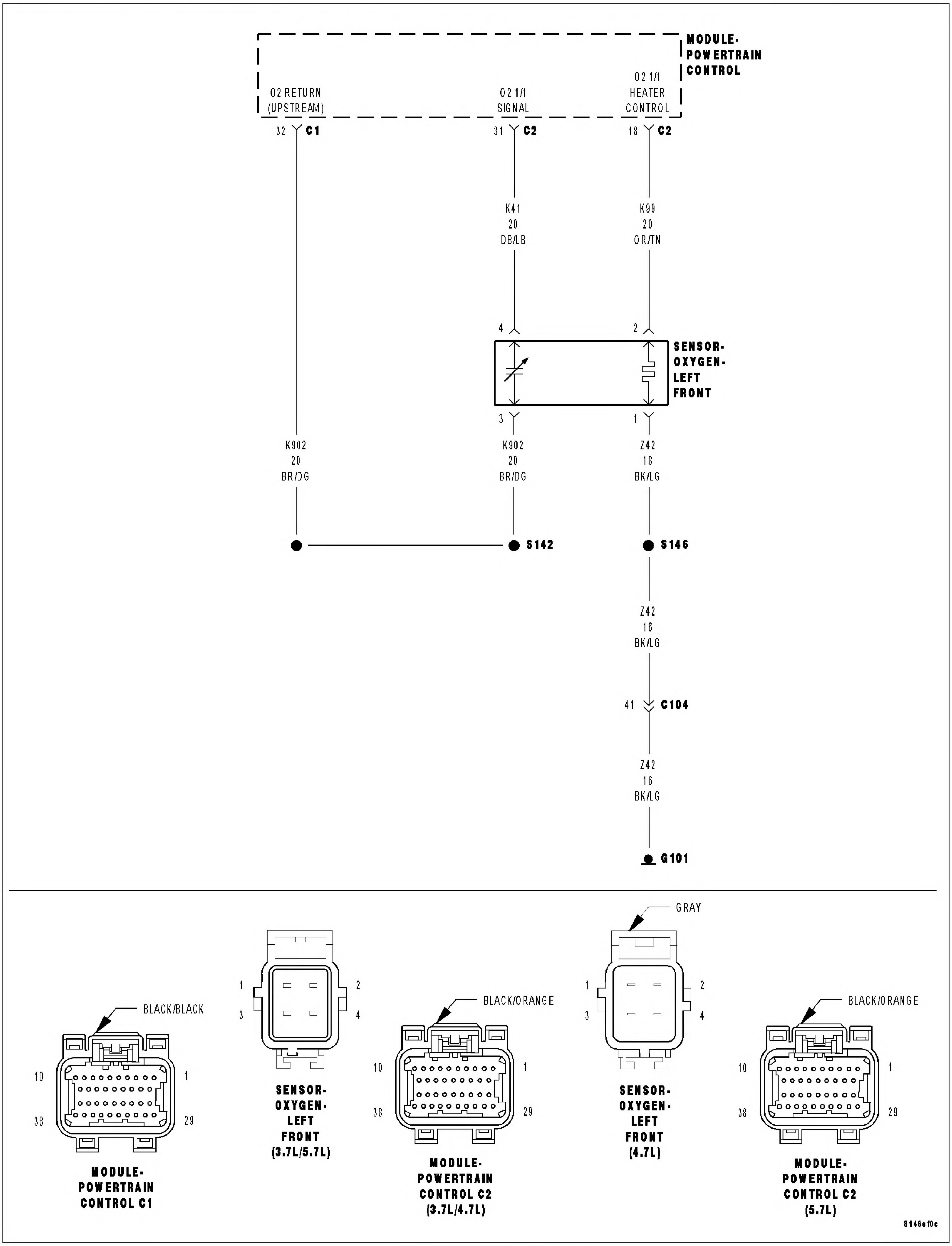
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0132-O2 SENSOR 1/1 CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
32 C1
31 C2
18 C2
K41
20
DB/LB
K99
20
OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
GRAY
BLACK/BLACK
1
2
3
4
BLACK/ORANGE
1
2
3
4
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146ef0c

P0132-O2 SENSOR 1/1 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagrams (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.4 volts.
- **Set Condition:**
  The Oxygen Sensor voltage is above 3.99 volts for 40 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K41) O2 1/1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE
(K41) O2 1/1 SIGNAL CIRCUIT OPEN
(K902) O2 RETURN UPSTREAM CIRCUIT OPEN
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR ABOVE 3.99 VOLTS

NOTE: When only one O2 Sensor is shorted to voltage, the scan tool will display all O2 Sensor voltage readings at approximately 5.0 volts. When diagnosing this DTC, only diagnose the O2 Sensor that set the DTC.

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 1/1 O2 Sensor voltage.

Is the voltage above 3.9 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0132-O2 SENSOR 1/1 CIRCUIT HIGH (CONTINUED)

2. (K41) O2 1/1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Start the engine and allow the engine to idle.

Disconnect the 1/1 O2 Sensor harness connector.

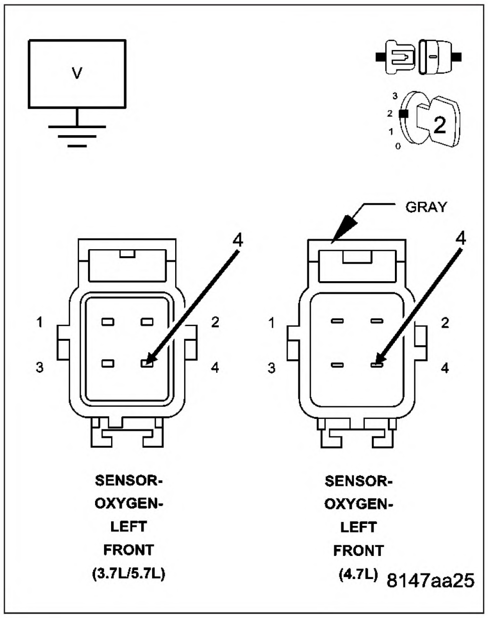
Measure the voltage on the (K41) O2 Sensor 1/1 Signal circuit in the 1/1 O2 Sensor harness connector.

NOTE: Measure the voltage in reference to ground, not the (K902) O2 Return Upstream circuit.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K41) O2 Sensor 1/1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3


V
3
2
1
0
2
GRAY
4
4
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147aa25

---

3. (K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 PCM harness connector.

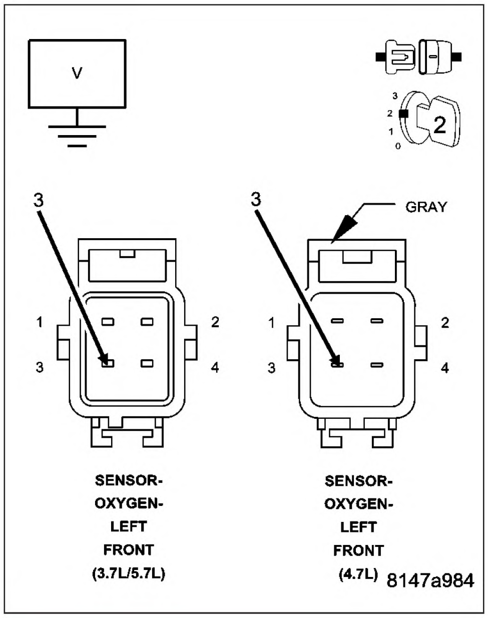
Ignition on, engine not running.

Measure the voltage on the (K902) O2 Return Upstream circuit in the 1/1 O2 Sensor harness connector.

Is there any voltage present?

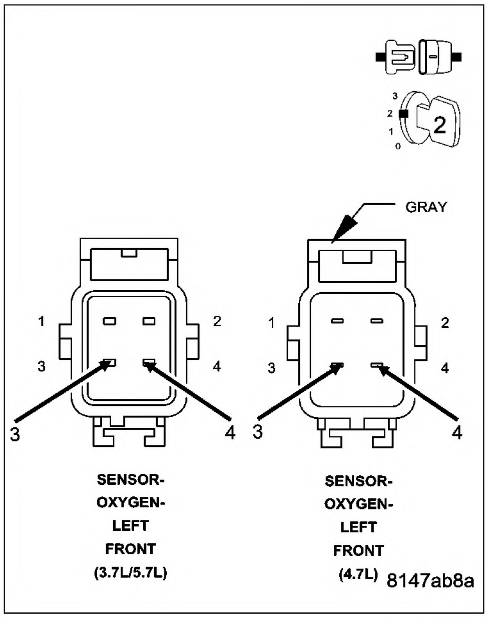
Yes >> Repair the short to battery voltage in the (K902) O2 Return Upstream circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4


V
3
2
1
0
2
GRAY
3
3
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147a984

P0132-O2 SENSOR 1/1 CIRCUIT HIGH (CONTINUED)

4. 1/1 O2 SENSOR


GRAY
1
2
3
4
3
4
1
2
3
4
3
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
8147ab8a

Turn the ignition off.

Connect the C1 PCM harness connector.

Connect a jumper wire between the (K41) O2 1/1 Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the 1/1 O2 Sensor voltage.

Is the voltage between 2.3 and 2.7 volts with the jumper wire installed?

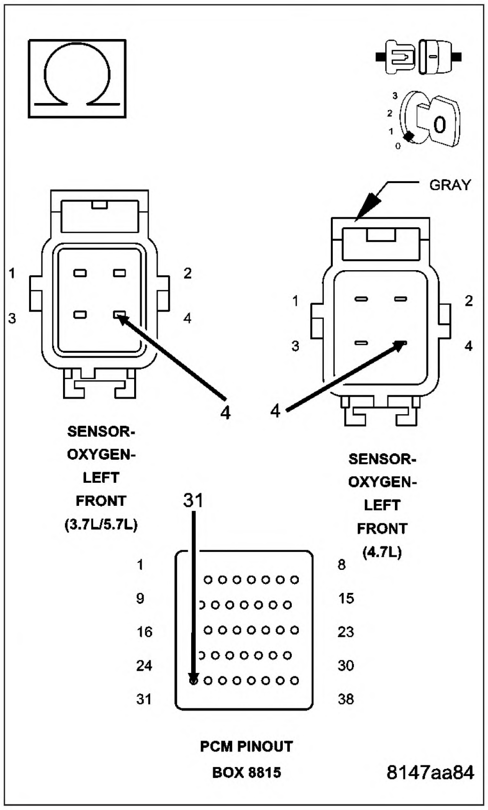
Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

---

5. (K41) O2 1/1 SIGNAL CIRCUIT OPEN


GRAY
1
2
3
4
1
2
3
4
4
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
31
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147aa84

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K41) O2 1/1 Signal circuit from the 1/1 O2 Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

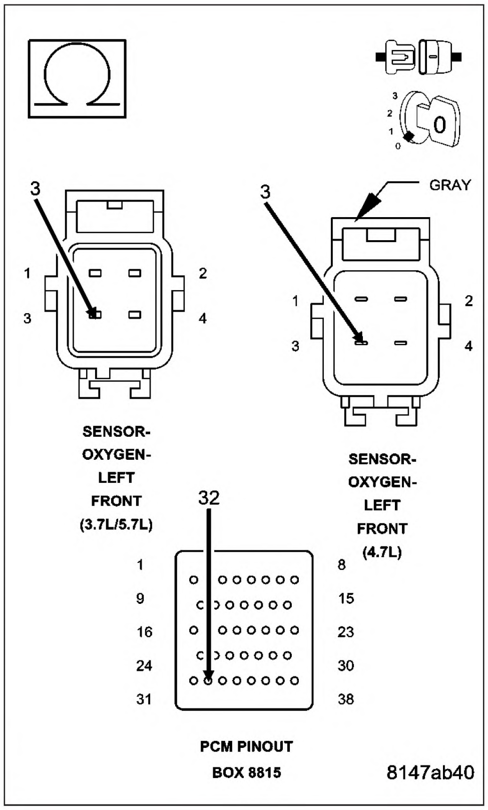
Yes >> Go To 6

No >> Repair the open in the (K41) O2 1/1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0132-O2 SENSOR 1/1 CIRCUIT HIGH (CONTINUED)

6. (K902) O2 RETURN UPSTREAM CIRCUIT OPEN

Measure the resistance of the (K902) O2 Return Upstream circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.



3
1
2
3
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
GRAY
3
1
2
3
4
SENSOR-OXYGEN-LEFT FRONT (4.7L)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147ab40

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K902) O2 Return Upstream circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

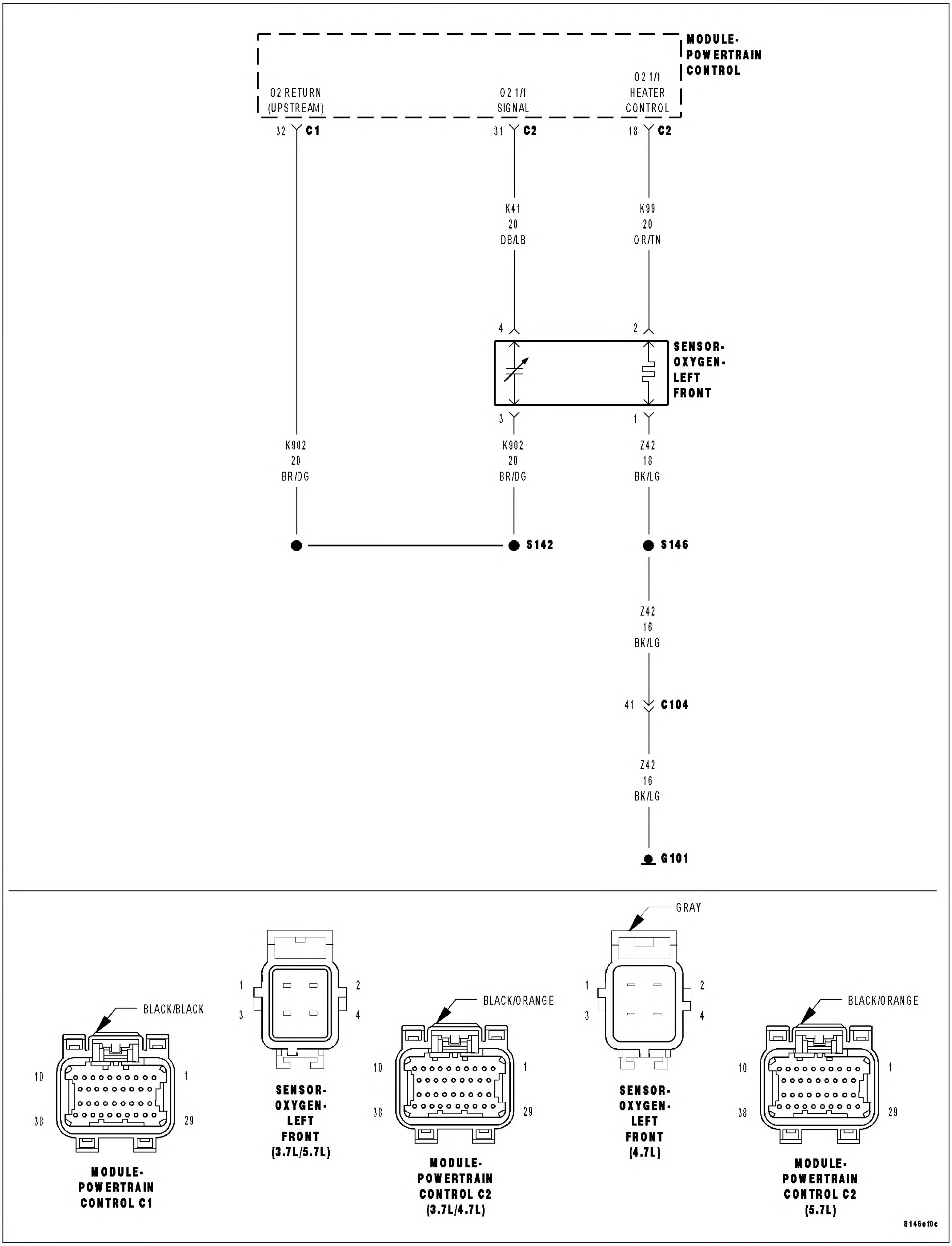
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0133-O2 SENSOR 1/1 SLOW RESPONSE


MODULE-
POWERTRAIN
CONTROL
O2 RETURN (UPSTREAM)
O2 1/1 SIGNAL
O2 1/1 HEATER CONTROL
32 C1
31 C2
18 C2
K41 20 DB/LB
K99 20 OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902 20 BR/DG
K902 20 BR/DG
Z42 18 BK/LG
S142
S146
Z42 16 BK/LG
41 C104
Z42 16 BK/LG
G101
BLACK/BLACK
10 1 38 29
MODULE-POWERTRAIN CONTROL C1
1 2 3 4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
BLACK/ORANGE
10 1 38 29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
GRAY
1 2 3 4
SENSOR-OXYGEN-LEFT FRONT (4.7L)
BLACK/ORANGE
10 1 38 29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
8146ef0c

P0133-O2 SENSOR 1/1 SLOW RESPONSE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active.
- **Set Condition:**
  The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
(K41) O2 1/1 SIGNAL CIRCUIT
(K902) O2 RETURN UPSTREAM CIRCUIT
O2 SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EXHAUST LEAK

Start the engine.

Inspect the exhaust system for leaks between the engine and the O2 Sensors.

Are there any exhaust leaks?

Yes >> Repair or replace the leaking exhaust parts as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0133-O2 SENSOR 1/1 SLOW RESPONSE (CONTINUED)

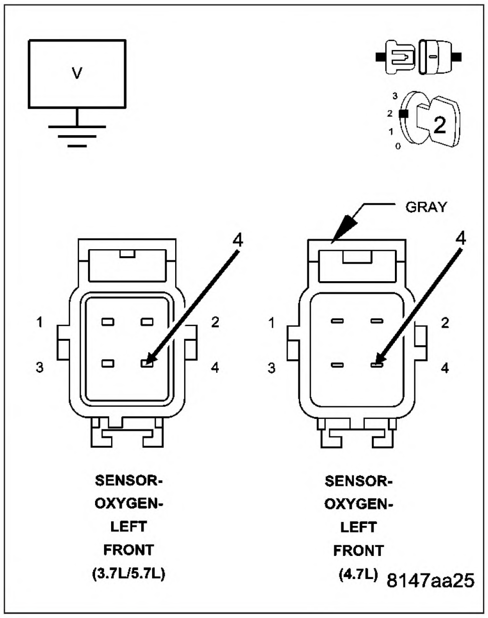
3. (K41) O2 1/1 SIGNAL CIRCUIT

Turn the ignition off

Disconnect the 1/1 O2 Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (K41) O2 1/1 Signal circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
GRAY
4
1
2
3
4
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147aa25

Is the voltage between 4.5 and 5.0 volts?

Yes >> Go To 4

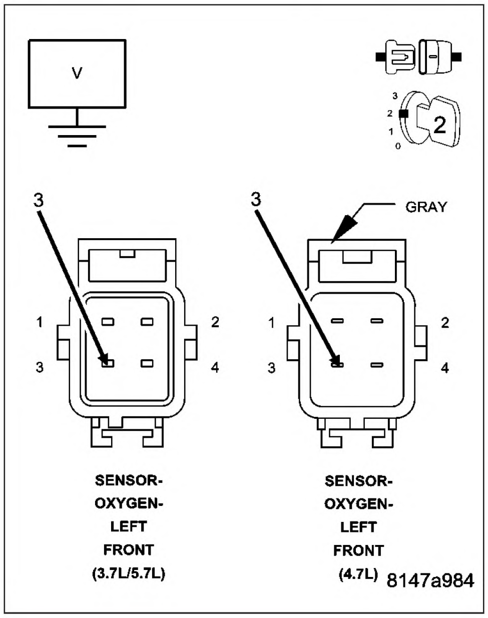
No >> Check the (K41) O2 1/1 Signal circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (K902) O2 RETURN UPSTREAM CIRCUIT

Measure the voltage on the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147a984

Is the voltage at 2.5 volts?

Yes >> Go To 5

No >> Check the (K902) O2 Return Upstream circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. O2 SENSOR

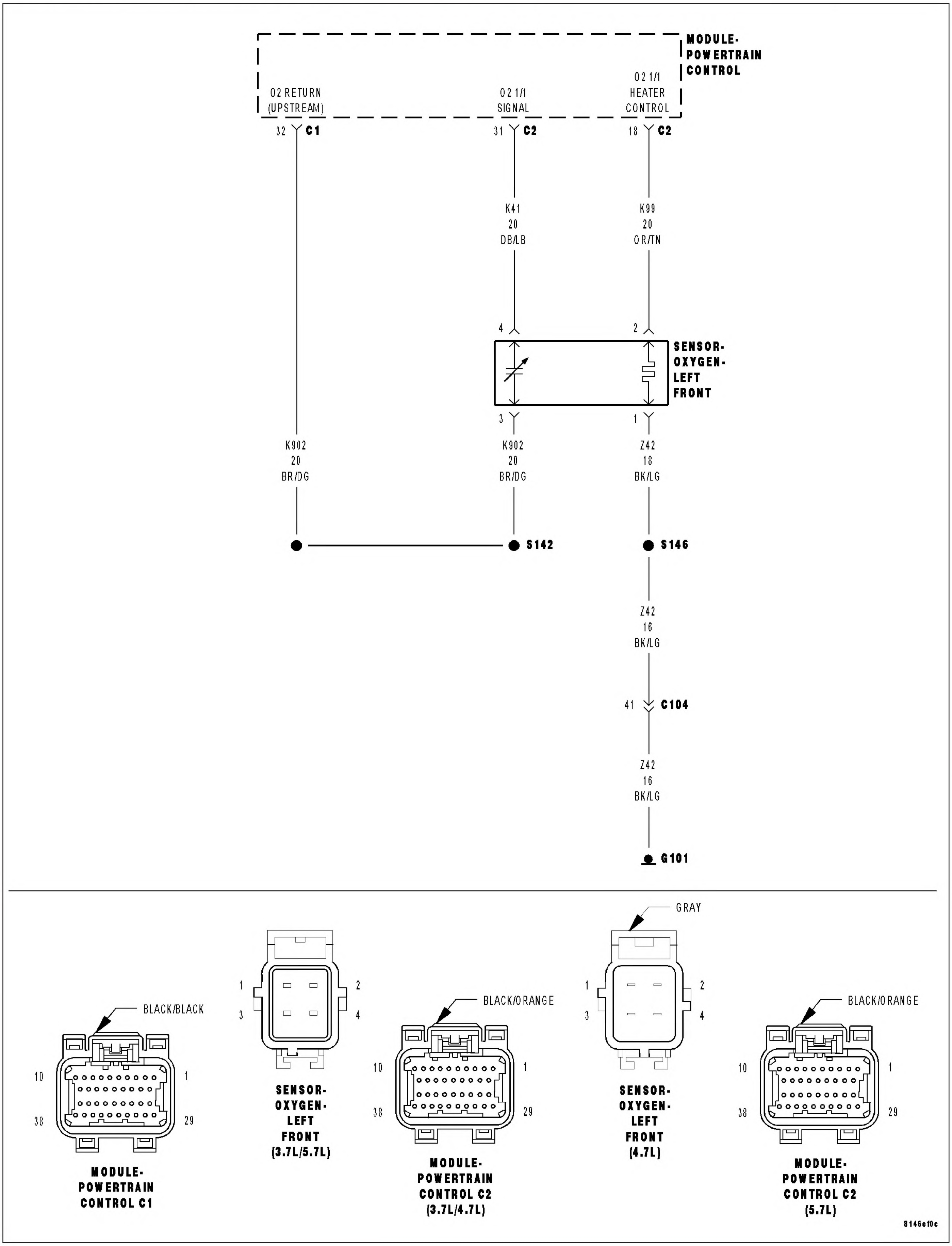
If there are no possible causes remaining, view repair.

Repair

Replace the O2 Sensor

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
32 C1
31 C2
18 C2
K41
20
DB/LB
K99
20
OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146ef0c

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

This diagnostic provides a continuous check of the O2 heater circuit during operation. The heater circuit is momentarily disabled to allow a resistance measurement to be taken to infer heater temperature. The current delivery to the heater is duty cycled to maintain a specific target temperature. The error from the target temperature is continuously monitored to assess heater performance.

- **When Monitored:**
  Engine running and heater duty cycle greater than 0%. Battery voltage greater than 11.0 volts.
- **Set Condition:**
  No sensor output is received when the PCM powers up the sensor heater. Two trip fault. Three good trips to turn off the MIL.

Possible Causes
(K99) O2 1/1 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 1/1 HEATER GROUND CIRCUIT OPEN
O2 SENSOR HEATER ELEMENT
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 4.6 and 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test.

With the scan tool, monitor 1/1 O2 Sensor voltage for at least 2 minutes.

Does the voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE (CONTINUED)

2. O2 SENSOR HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 sensor to cool down to room temperature.

Disconnect the O2 Sensor harness connector.

Measure the resistance of the O2 Heater Element across the 1/1 O2 Sensor connector between the O2 Heater Control terminal and the Heater ground terminal.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the resistance of the O2 Sensor Heater Element between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. (K99) O2 1/1 HEATER CONTROL CIRCUIT OPEN

Disconnect the C2 PCM harness connector.

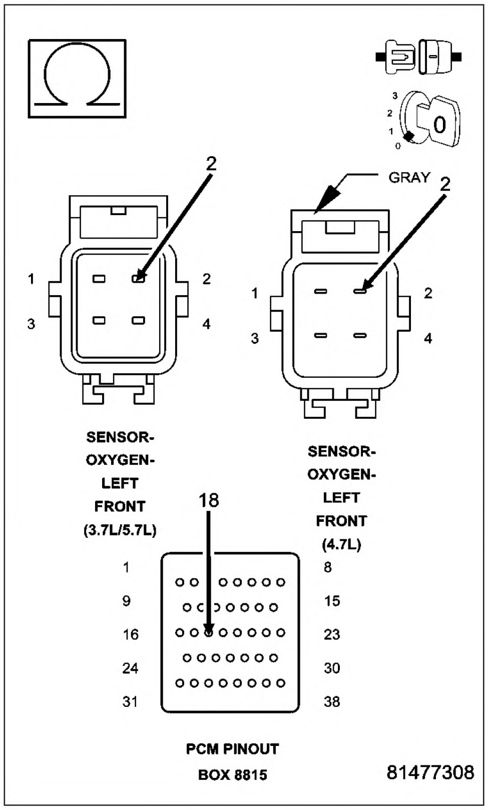
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K99) O2 1/1 Heater Control circuit from the O2 harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 0.5 of an ohm?

Yes >> Go To 4

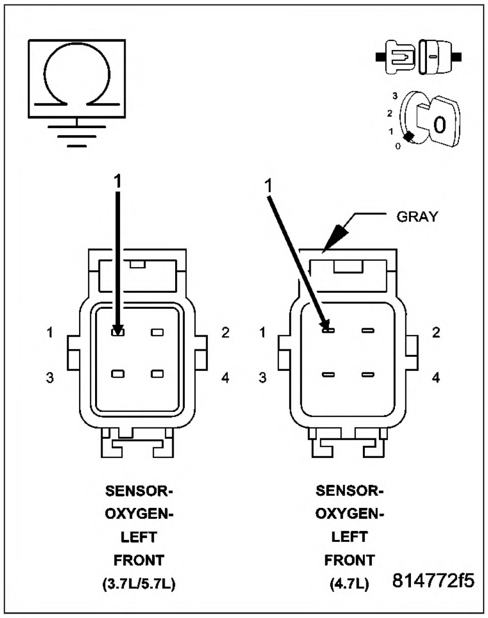
No >> Repair the excessive resistance in the (K99) O2 1/1 Heater Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
18
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
81477308

P0135-O2 SENSOR 1/1 HEATER PERFORMANCE (CONTINUED)

4. (Z42) O2 1/1 HEATER GROUND CIRCUIT OPEN

Measure the resistance between ground and the (Z42) O2 1/1 Heater ground circuit in the O2 Sensor harness connector.



Is the resistance below 0.5 of an ohm?

Yes >> Go To 5

No >> Repair the excessive resistance in the (Z42) O2 1/1 Heater ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

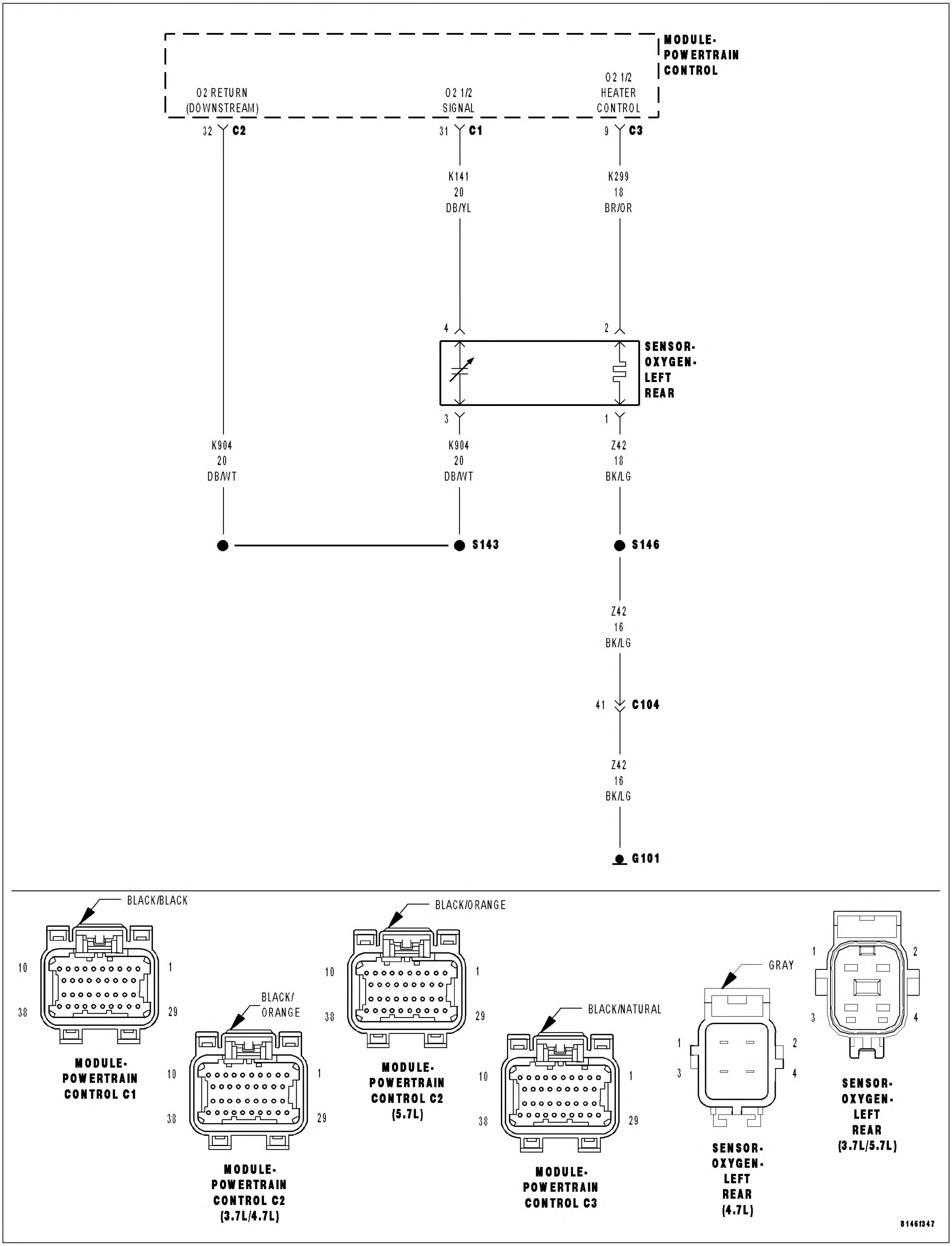
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0137-O2 SENSOR 1/2 CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32 C2
31 C1
9 C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
8146f347

P0137-O2 SENSOR 1/2 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.99 volts.
- **Set Condition:**
  The oxygen sensor signal voltage is below 2.5196 volts for 3 seconds after starting engine. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO GROUND
(K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO GROUND
(K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO THE (K904) O2 RETURN DOWNSTREAM CIRCUIT
(K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO THE (Z42) O2 1/2 HEATER GROUND CIRCUIT
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR BELOW 2.52 VOLTS

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 1/2 O2 Sensor voltage.

Is the voltage below 2.52 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (K141) O2 1/2 SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the 1/2 O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the 1/2 O2 Sensor voltage.

Is the O2 Sensor voltage above 4.8 volts?

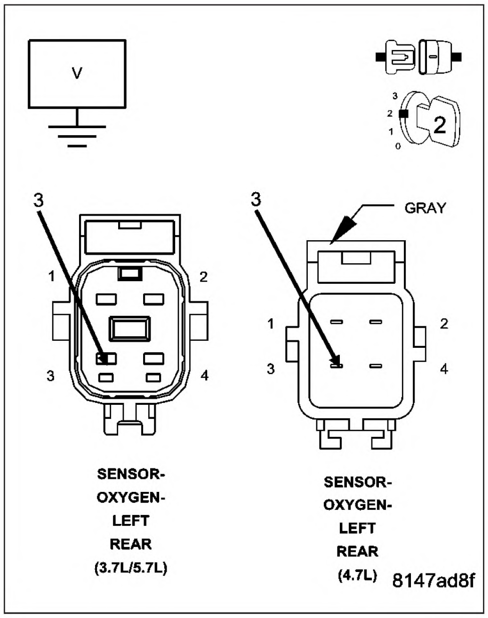
Yes >> Go To 3

No >> Go To 5

P0137-O2 SENSOR 1/2 CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147ad8f

Is the voltage at 2.5 volts?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

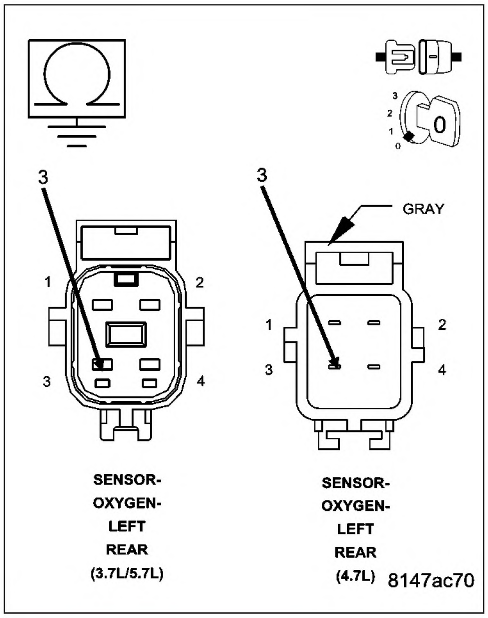
---

4. (K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


3
2
1
0
0
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147ac70

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K904) O2 Return Downstream circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

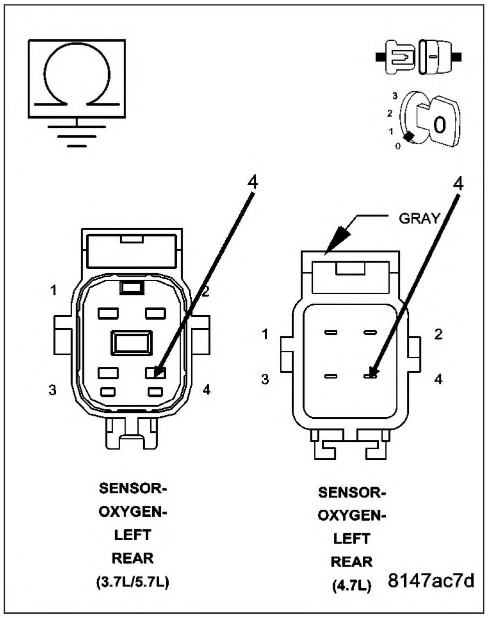
P0137-O2 SENSOR 1/2 CIRCUIT LOW (CONTINUED)

5. (K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

Measure the resistance between ground and the (K141) O2 1/2 Signal circuit in the O2 Sensor harness connector.


4
4
GRAY
1
2
3
4
1
2
3
4
3
2
1
0
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
8147ac7d

Is the resistance below 100 ohms?

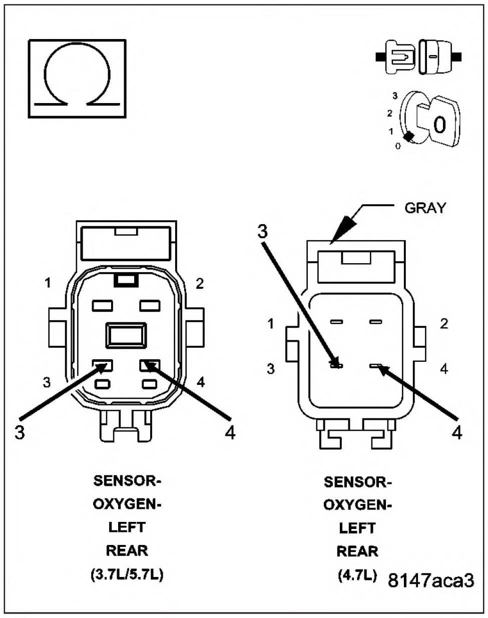
Yes >> Repair the short to ground in the (K141) O2 1/2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. (K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO THE (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the resistance between the (K141) O2 1/2 Signal circuit and the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


GRAY
3
1
2
3
4
3
4
1
2
3
4
4
3
2
1
0
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
8147aca3

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K904) O2 Return Downstream circuit and the (K141) O2 1/2 Signal circuit.

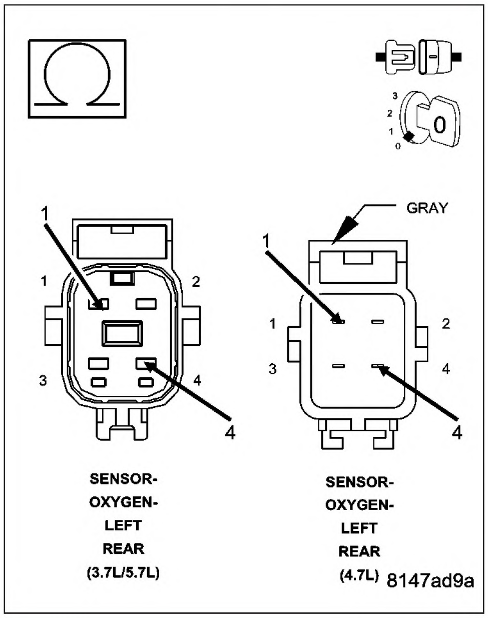
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0137-O2 SENSOR 1/2 CIRCUIT LOW (CONTINUED)

7. (K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO THE (Z42) O2 1/2 HEATER GROUND CIRCUIT

Measure the resistance between the (K141) O2 1/2 Signal circuit and the (Z42) O2 1/2 Heater ground circuit in the O2 Sensor harness connector.



GRAY
1
1
2
3
4
4
1
1
2
3
4
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
8147ad9a

Is the resistance below 100 ohms?

Yes >> Repair the short between the (Z42) O2 1/2 Heater ground circuit and the (K141) O2 1/2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

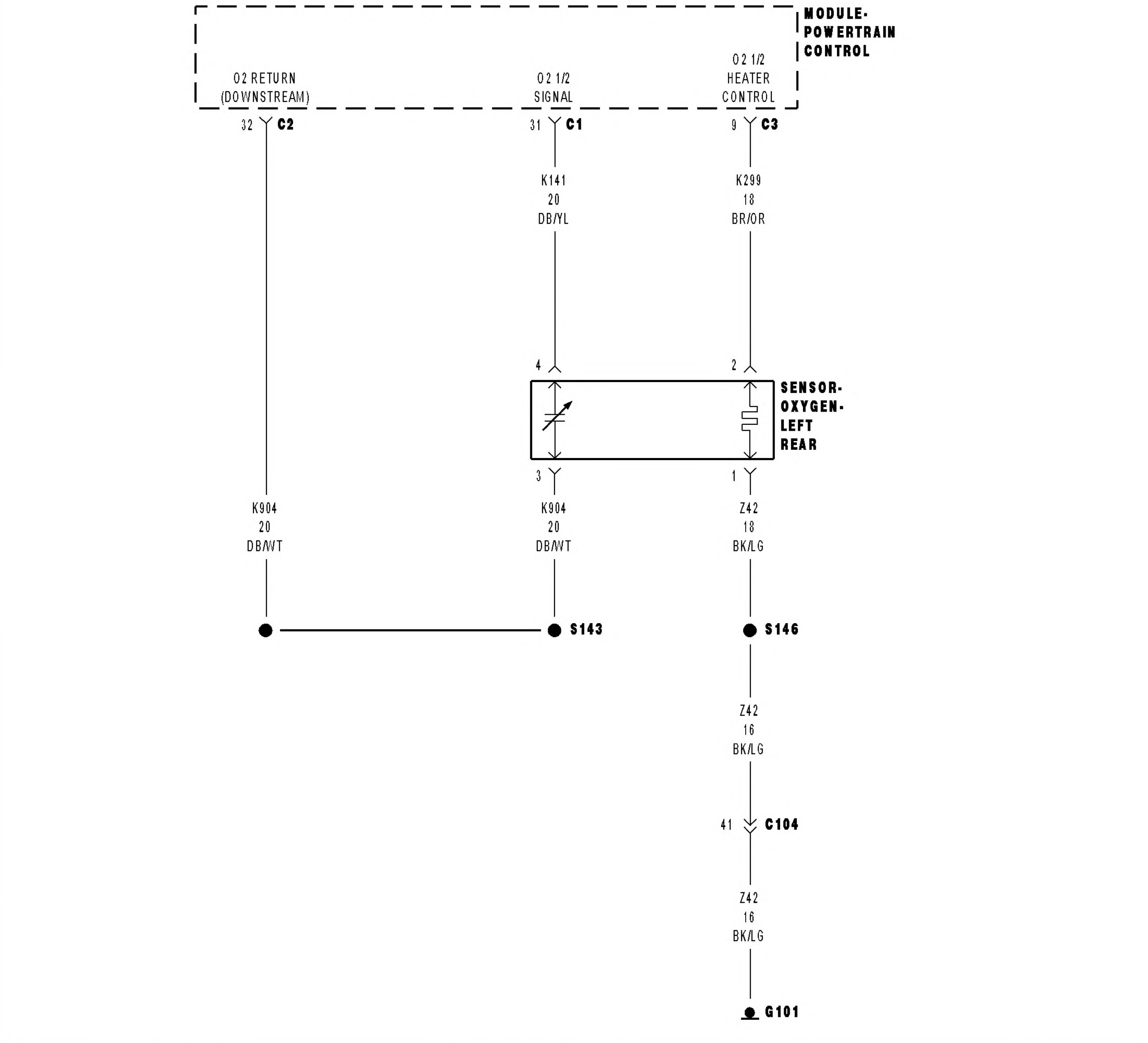
Yes >> Repair as necessary.

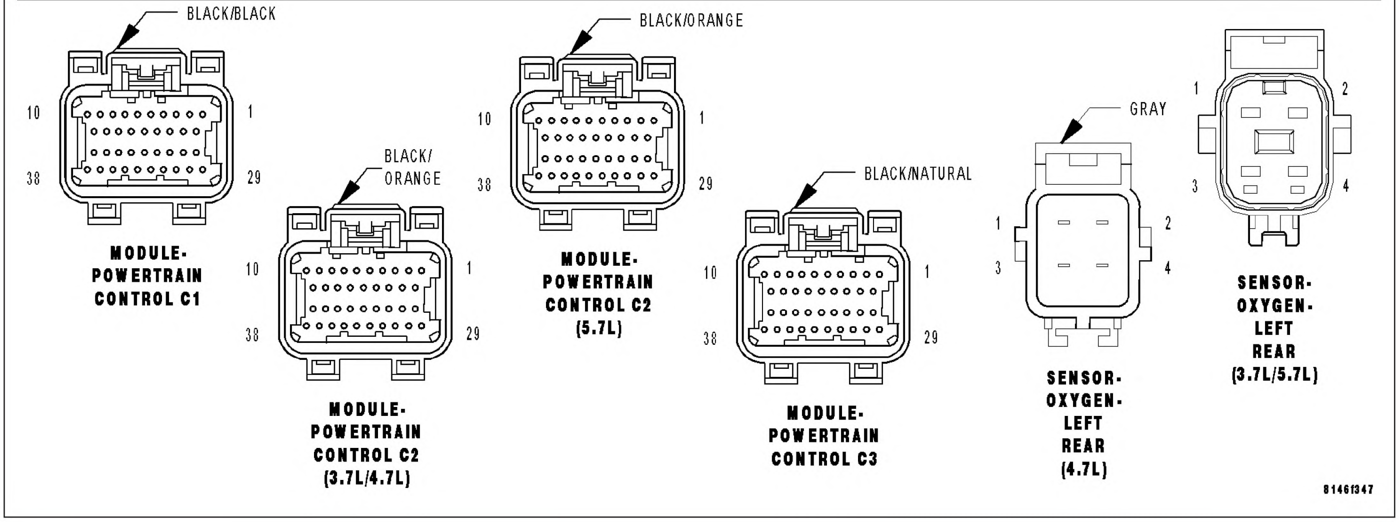
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0138-O2 SENSOR 1/2 CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32 C2
31 C1
9 C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
8146f347

P0138-O2 SENSOR 1/2 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.99 volts.
- **Set Condition:**
  The Oxygen Sensor voltage is above 3.99 volts for 30 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE
(K141) O2 1/2 SENSOR SIGNAL CIRCUIT OPEN
(K904) O2 RETURN DOWNSTREAM CIRCUIT OPEN
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR ABOVE 3.7 VOLTS

NOTE: When only one O2 Sensor is shorted to voltage, the scan tool will display all O2 Sensor voltage readings at approximately 5.0 volts. When diagnosing this DTC, only diagnose the O2 Sensor that set the DTC.

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 1/2 O2 Sensor voltage.

Is the voltage above 3.7 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0138-O2 SENSOR 1/2 CIRCUIT HIGH (CONTINUED)

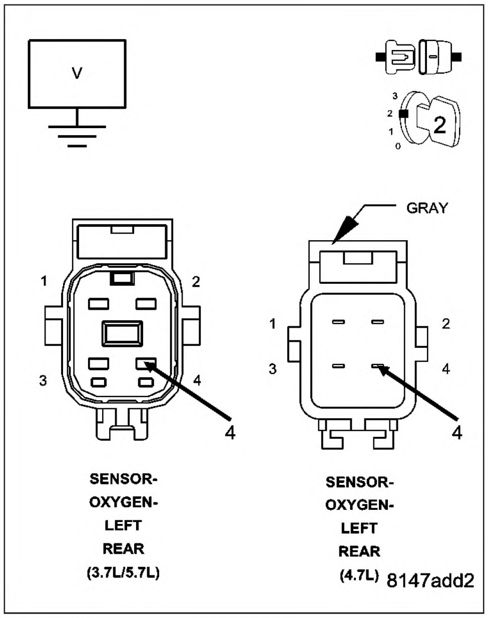
2. (K141) O2 1/2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Start the engine and allow the engine to idle.

Disconnect the 1/2 O2 Sensor harness connector.

Measure the voltage on the (K141) O2 Sensor 1/2 Signal circuit in the O2 Sensor harness connector.

NOTE: Measure the voltage in reference to ground, not the (K904) O2 Return Downstream circuit.


V
3
2
1
0
2
GRAY
1
2
3
4
4
1
2
3
4
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147add2

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K141) O2 Sensor 1/2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

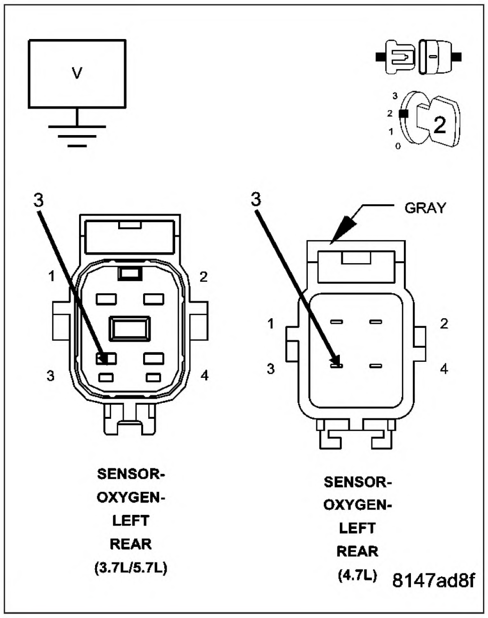
3. (K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147ad8f

Is there any voltage present?

Yes >> Repair the short to battery voltage in the (K904) O2 Return Downstream circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P0138-O2 SENSOR 1/2 CIRCUIT HIGH (CONTINUED)

4. O2 SENSOR

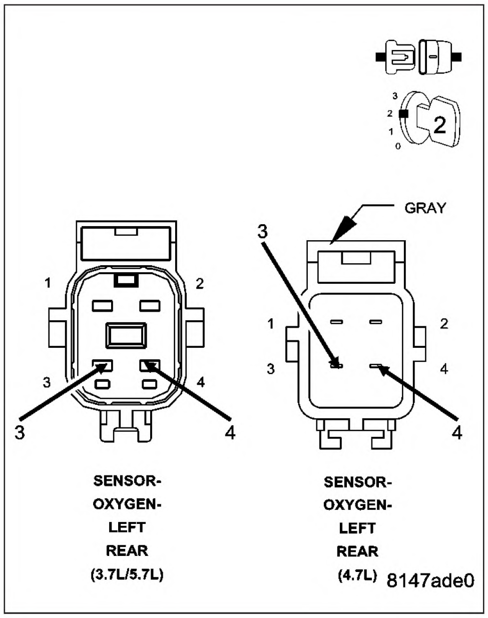
Turn the ignition off.

Connect the C2 PCM harness connector.

Connect a jumper wire between the (K141) O2 1/2 Signal circuit and the (K904) O2 Return Downstream circuit in the 1/2 O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the 1/2 O2 Sensor voltage.


GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147ade0

Is the voltage between 2.3 and 2.7 volts with the jumper wire installed?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

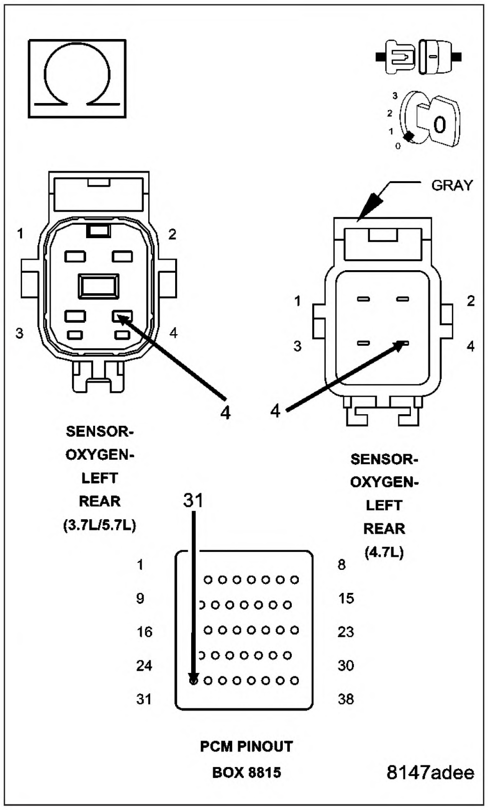
5. (K141) O2 1/2 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K141) O2 1/2 Signal circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
31
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147adee

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K141) O2 1/2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0138-O2 SENSOR 1/2 CIRCUIT HIGH (CONTINUED)

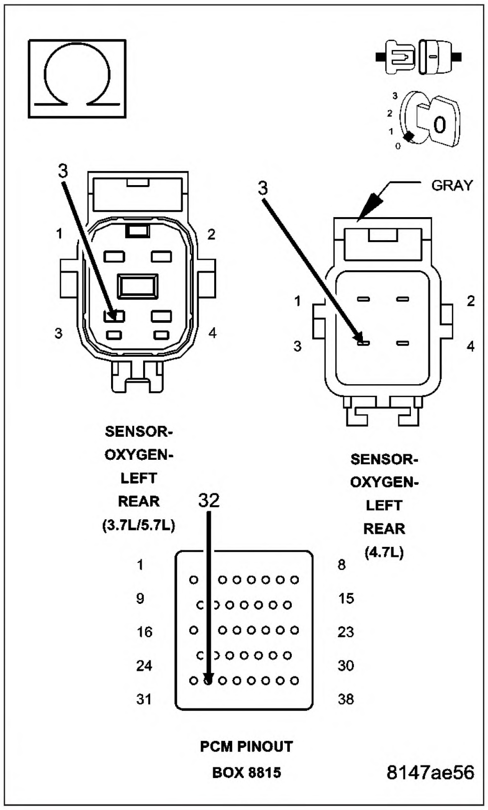
6. (K904) O2 RETURN DOWNSTREAM CIRCUIT OPEN

Measure the resistance of the (K904) O2 Return Downstream circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K904) O2 Downstream Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
1
2
3
4
3
GRAY
1
2
3
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
32
SENSOR-OXYGEN-LEFT REAR (4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147ae56

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

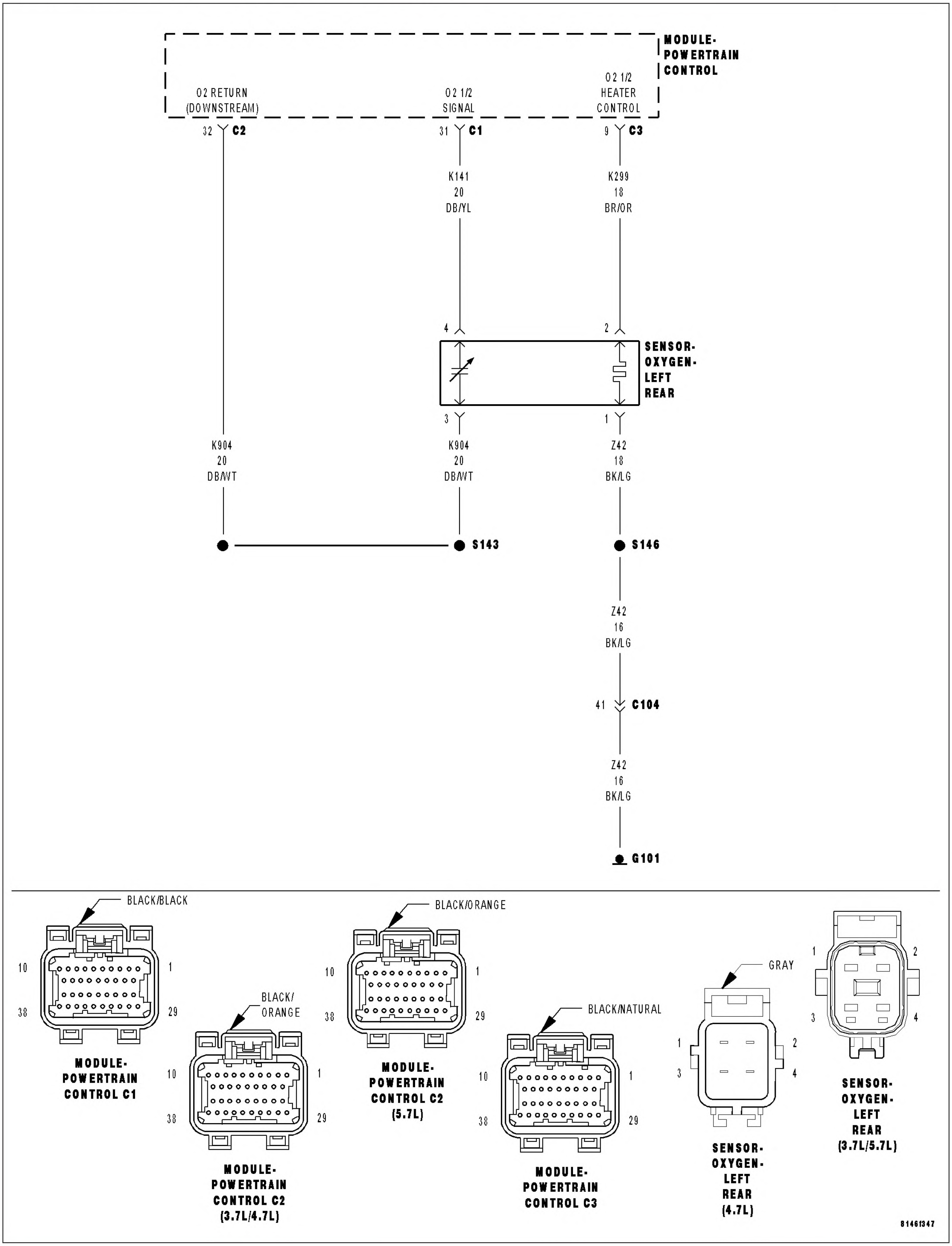
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0139-O2 SENSOR 1/2 SLOW RESPONSE


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32 C2
31 C1
9 C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
MODULE-
POWERTRAIN
CONTROL C3
GRAY
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
8146f347

P0139-O2 SENSOR 1/2 SLOW RESPONSE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The downstream O2 Sensor is located in the exhaust path behind the catalytic converter, is monitored for proper response to assure optimum catalytic converter efficiency. The downstream O2 response monitor is intended to diagnose a downstream O2 sensor that is not moving or stuck in a voltage window and to insure accurate information for catalyst monitor diagnosis.

- **When Monitored:**
  Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active.
- **Set Condition:**
  The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
(K141) O2 1/2 SIGNAL CIRCUIT
(K904) O2 RETURN DOWNSTREAM CIRCUIT
O2 SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.
Ignition on, engine not running.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EXHAUST LEAK

Start the engine.

Inspect the exhaust system for leaks between the engine and the O2 Sensors.

Are there any exhaust leaks?

Yes >> Repair or replace the leaking exhaust parts as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0139-O2 SENSOR 1/2 SLOW RESPONSE (CONTINUED)

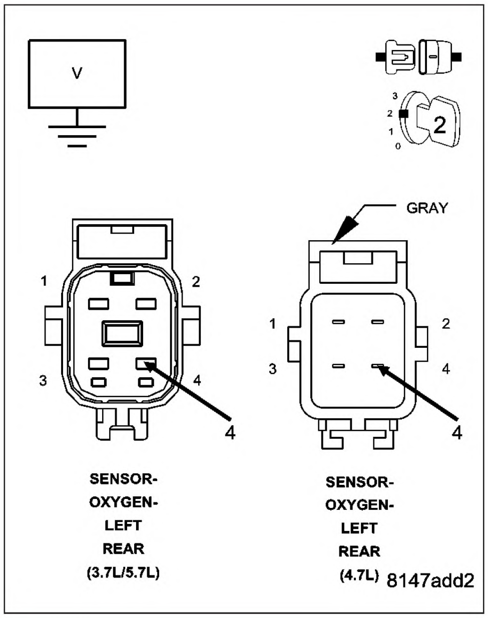
3. (K141) O2 1/2 SIGNAL CIRCUIT

Turn the ignition off

Disconnect the 1/2 O2 Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (K141) O2 1/2 Signal circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
GRAY
1
2
3
4
4
1
2
3
4
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147add2

Is the voltage between 4.5 and 5.0 volts?

Yes >> Go To 4

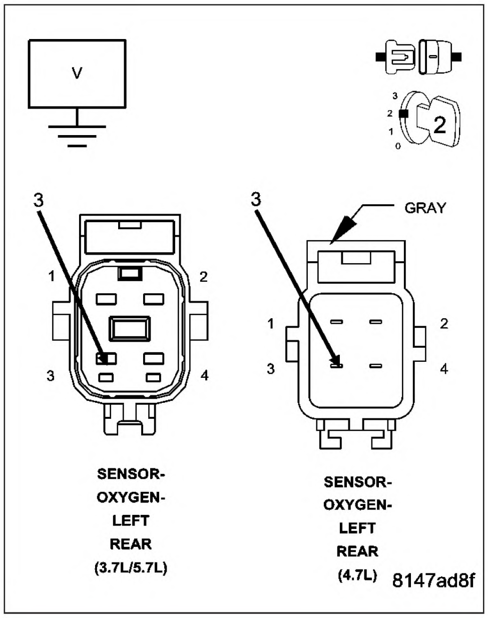
No >> Check the (K141) O2 1/2 Signal circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the voltage on the (K904) O2 Return Downstream circuit in the 1/2 O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147ad8f

Is the voltage at 2.5 volts?

Yes >> Go To 5

No >> Check the (K904) O2 Return Downstream circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. O2 SENSOR

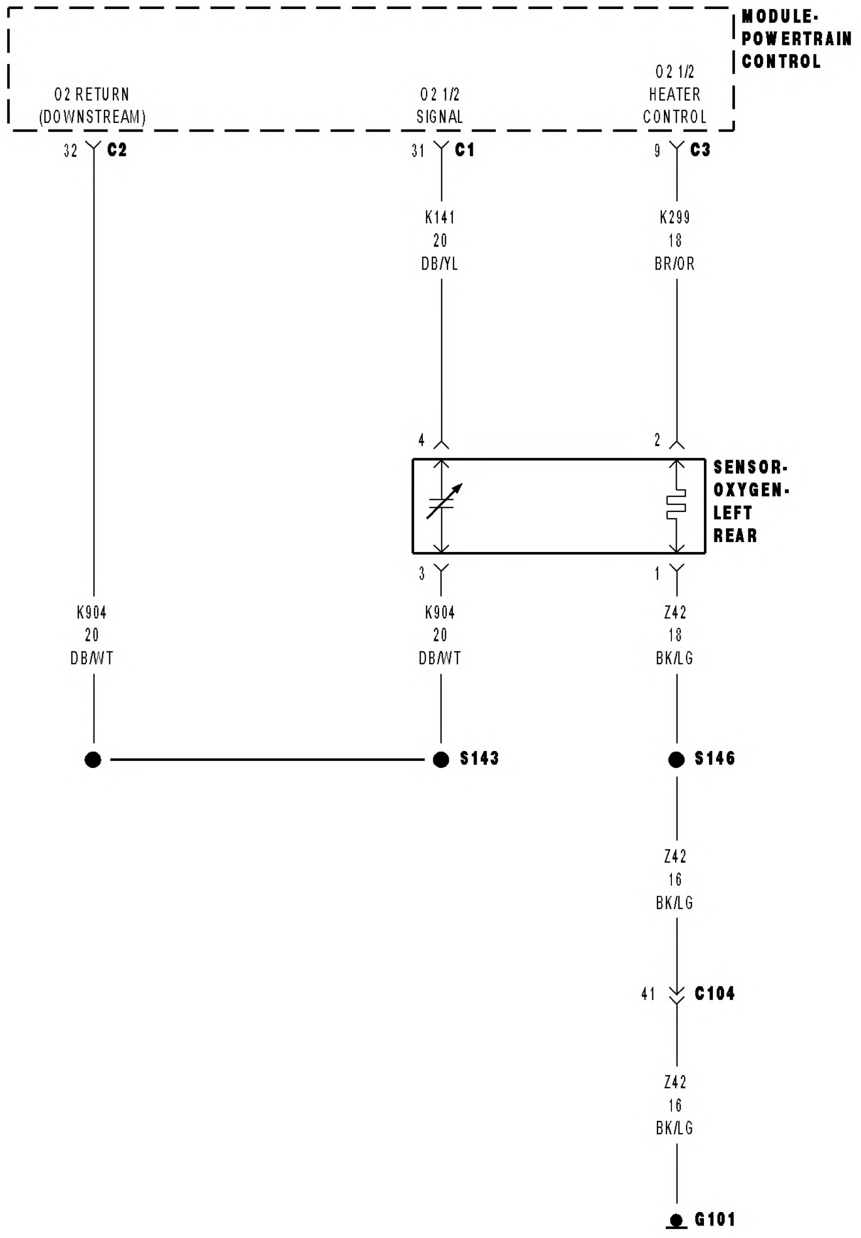
If there are no possible causes remaining, view repair.

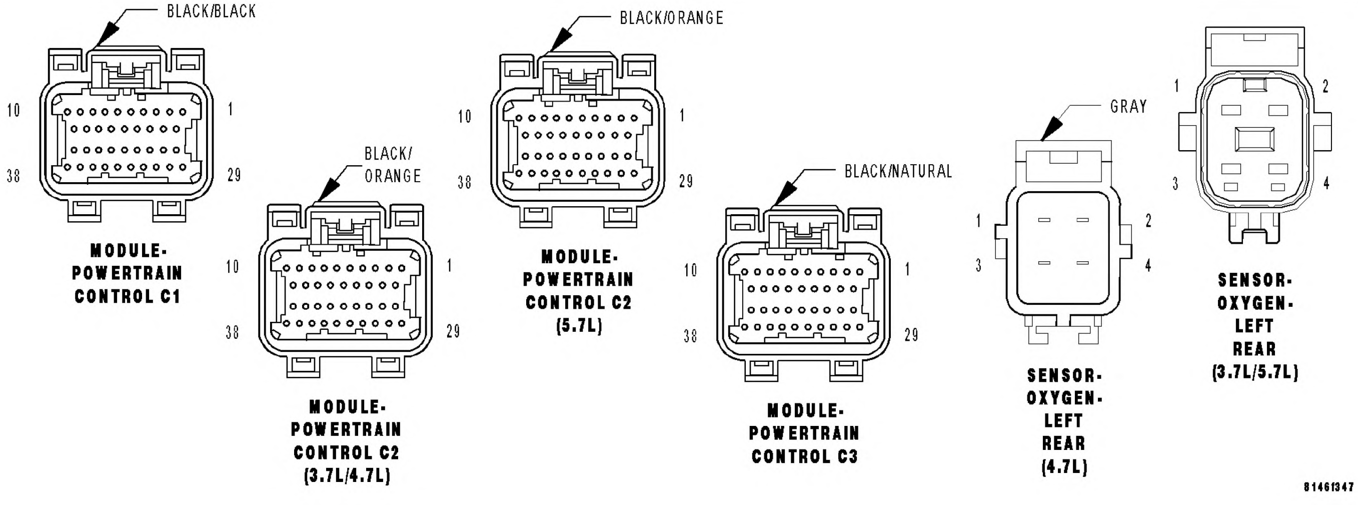
Repair

Replace the O2 Sensor

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0141-O2 SENSOR 1/2 HEATER PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32 C2
31 C1
9 C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
8146f347

P0141-O2 SENSOR 1/2 HEATER PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

This diagnostic provides a continuous check of the O2 heater circuit during operation. The heater circuit is momentarily disabled to allow a resistance measurement to be taken to infer heater temperature. The current delivery to the heater is duty cycled to maintain a specific target temperature. The error from the target temperature is continuously monitored to assess heater performance.

- **When Monitored:**
  Engine running and heater duty cycle greater than 0%. Battery voltage greater than 11.0 volts.
- **Set Condition:**
  No sensor output is received when the PCM powers up the sensor heater. Two trip fault. Three good trips to turn off the MIL.

Possible Causes
(K299) O2 1/2 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 HEATER GROUND CIRCUIT OPEN
O2 SENSOR HEATER ELEMENT
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 4.6 and 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test.

With the scan tool, monitor 1/2 O2 Sensor voltage for at least 2 minutes.

Does the voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0141-O2 SENSOR 1/2 HEATER PERFORMANCE (CONTINUED)

2. O2 SENSOR HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 sensor to cool down to room temperature.

Disconnect the O2 Sensor harness connector.

Measure the resistance of the O2 Heater Element across the O2 Sensor connector between the O2 Heater Control terminal and the Heater ground terminal.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the resistance of the O2 Sensor Heater Element between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. (K299) O2 1/2 HEATER CONTROL CIRCUIT OPEN

Disconnect the C3 PCM harness connector.

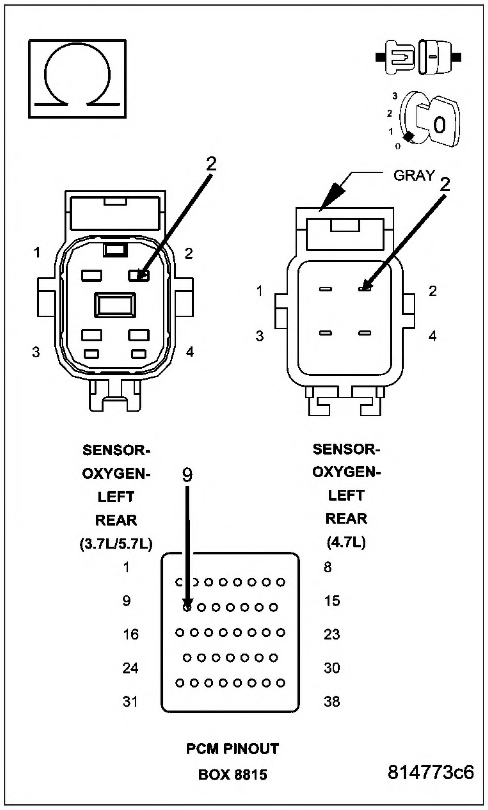
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K299) O2 1/2 Heater Control circuit from the O2 harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 0.5 of an ohm?

Yes >> Go To 4

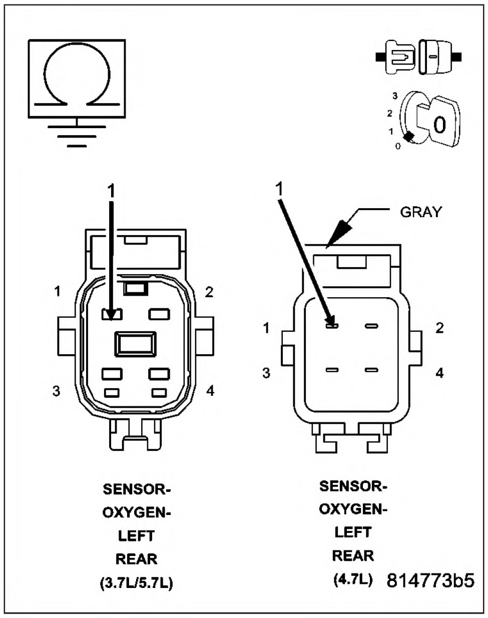
No >> Repair the excessive resistance in the (K299) O2 1/2 Heater Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
O
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
9
SENSOR-OXYGEN-LEFT REAR (4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
814773c6

P0141-O2 SENSOR 1/2 HEATER PERFORMANCE (CONTINUED)

4. (Z42) O2 1/2 HEATER GROUND CIRCUIT OPEN

Measure the resistance between ground and the (Z42) O2 1/2 Heater ground circuit in the O2 Sensor harness connector.


1
1
GRAY
1
2
3
4
1
2
3
4
3
2
1
0
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
814773b5

Is the resistance below 0.5 of an ohm?

Yes >> Go To 5

No >> Repair the excessive resistance in the (Z42) O2 1/2 Heater ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

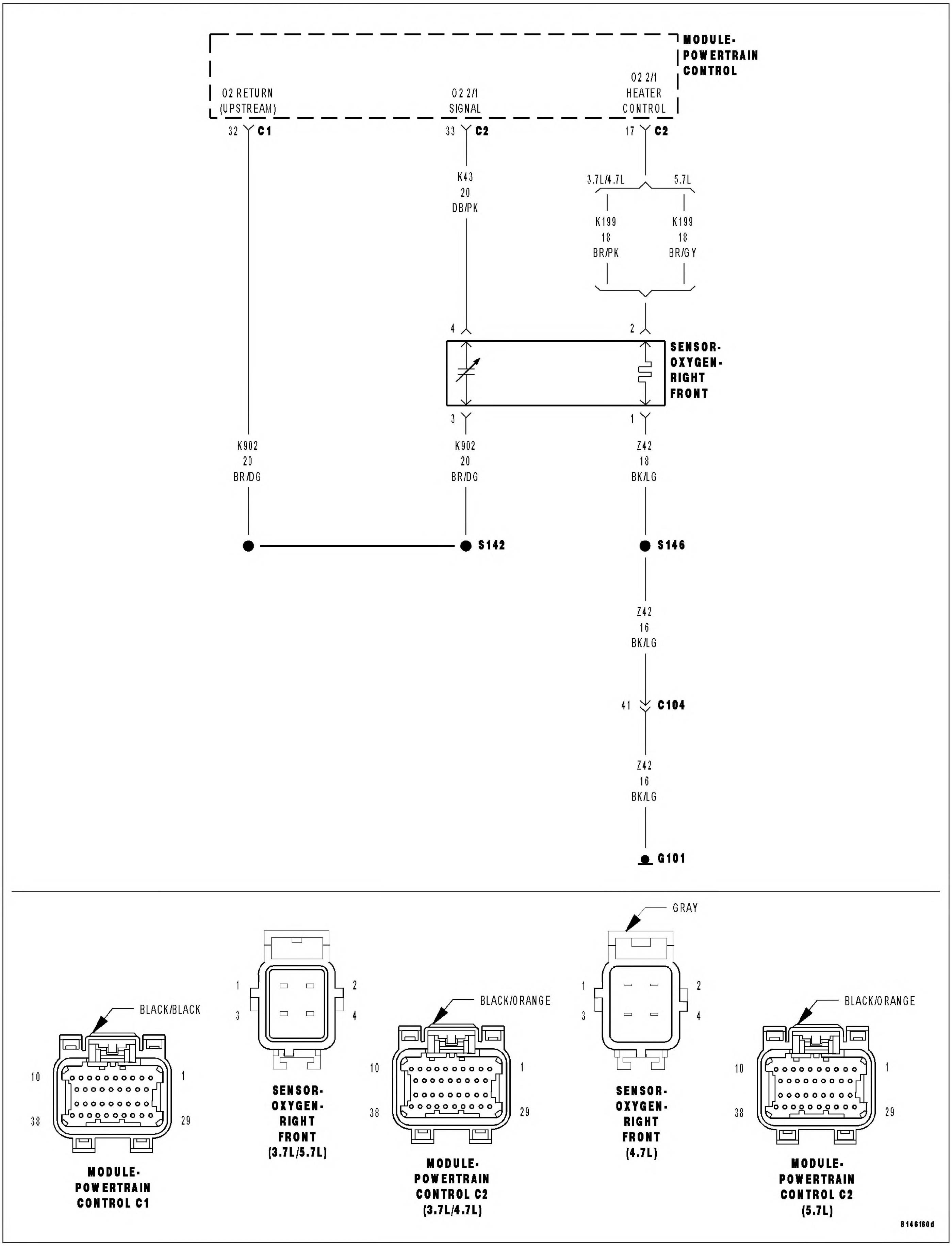
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0151-O2 SENSOR 2/1 CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0151-O2 SENSOR 2/1 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.99 volts.
- **Set Condition:**
  The oxygen sensor signal voltage is below 2.5196 volts for 3 seconds after starting engine. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO GROUND
(K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO GROUND
(K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO THE (K902) O2 RETURN UPSTREAM CIRCUIT
(K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO THE (Z42) HEATER GROUND CIRCUIT
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR BELOW 2.52 VOLTS

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 2/1 O2 Sensor voltage.

Is the voltage below 2.52 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (K43) O2 2/1 SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the 2/1 O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the 2/1 O2 Sensor voltage.

Is the O2 Sensor voltage above 4.8 volts?

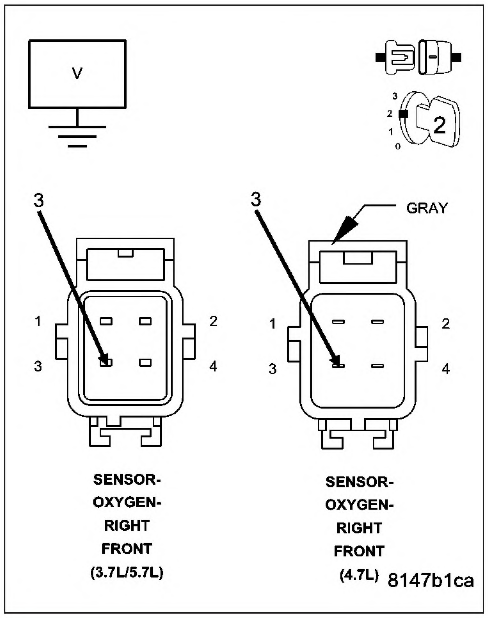
Yes >> Go To 3

No >> Go To 5

P0151-O2 SENSOR 2/1 CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Measure the voltage on the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b1ca

Is the voltage at 2.5 volts?

Yes >> Replace the 2/1 O2 Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

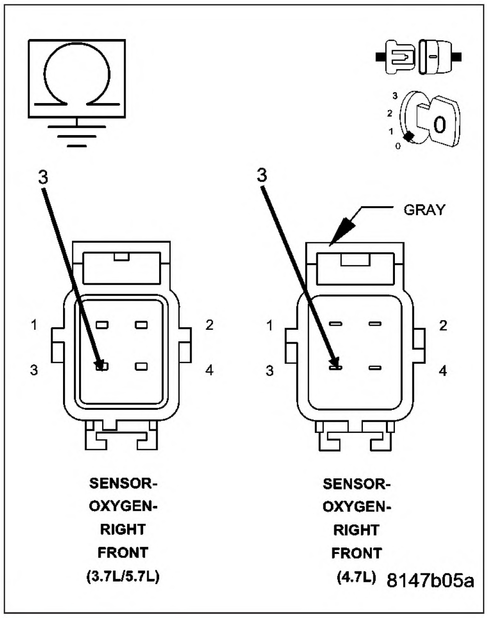
---

4. (K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


3
2
1
0
0
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b05a

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K902) O2 Return Upstream circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

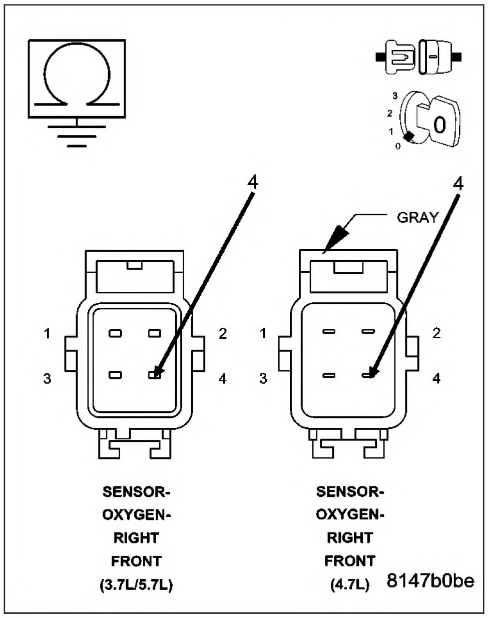
P0151-O2 SENSOR 2/1 CIRCUIT LOW (CONTINUED)

5. (K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

Measure the resistance between ground and the (K43) O2 2/1 Signal circuit in the O2 Sensor harness connector.


3
2
1
0
O
4
4
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b0be

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K43) O2 2/1 Signal circuit.

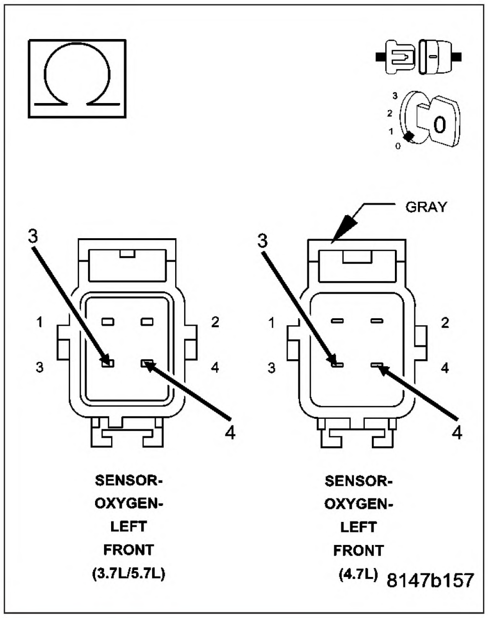
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. (K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO THE (K902) O2 RETURN UPSTREAM CIRCUIT

Measure the resistance between the (K43) O2 2/1 Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


3
2
1
0
O
GRAY
3
3
1
2
3
4
1
2
3
4
4
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147b157

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K902) O2 Return Upstream circuit and the (K43) O2 2/1 Signal circuit.

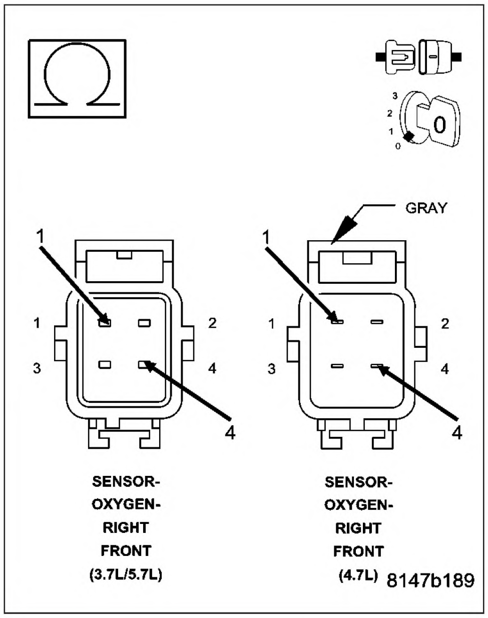
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0151-O2 SENSOR 2/1 CIRCUIT LOW (CONTINUED)

7. (K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO THE (Z42) HEATER GROUND CIRCUIT

Measure the resistance between the (K43) O2 2/1 Signal circuit and the (Z42) O2 Heater ground circuit in the O2 Sensor harness connector.


GRAY
1
1
2
3
4
4
1
1
2
3
4
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
8147b189

Is the resistance below 100 ohms?

Yes >> Repair the short between the (Z42) O2 Heater ground circuit and the (K43) O2 2/1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

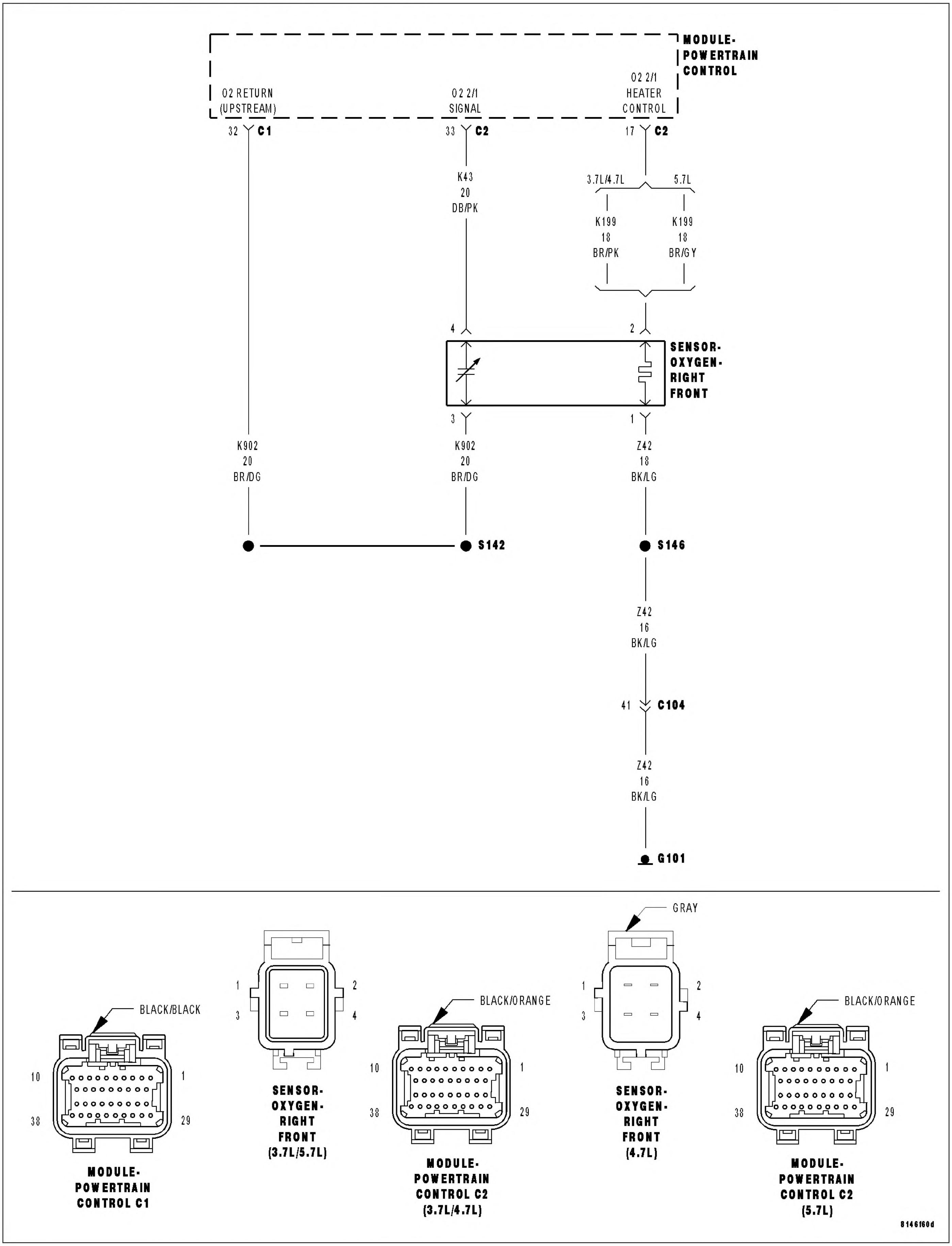
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0152-O2 SENSOR 2/1 CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0152-O2 SENSOR 2/1 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.99 volts.
- **Set Condition:**
  The Oxygen Sensor voltage is above 3.99 volts for 30 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE
(K43) O2 2/1 SIGNAL CIRCUIT OPEN
(K902) O2 RETURN UPSTREAM CIRCUIT OPEN
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR ABOVE 3.99 VOLTS

NOTE: When only one O2 Sensor is shorted to voltage, the scan tool will display all O2 Sensor voltage readings at approximately 5.0 volts. When diagnosing this DTC, only diagnose the O2 Sensor that set the DTC.

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 2/1 O2 Sensor voltage.

Is the voltage above 3.99 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0152-O2 SENSOR 2/1 CIRCUIT HIGH (CONTINUED)

2. (K43) O2 2/1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Start the engine and allow the engine to idle.

Disconnect the 2/1 O2 Sensor harness connector.

Measure the voltage on the (K43) O2 Sensor 2/1 Signal circuit in the 2/1 O2 Sensor harness connector.

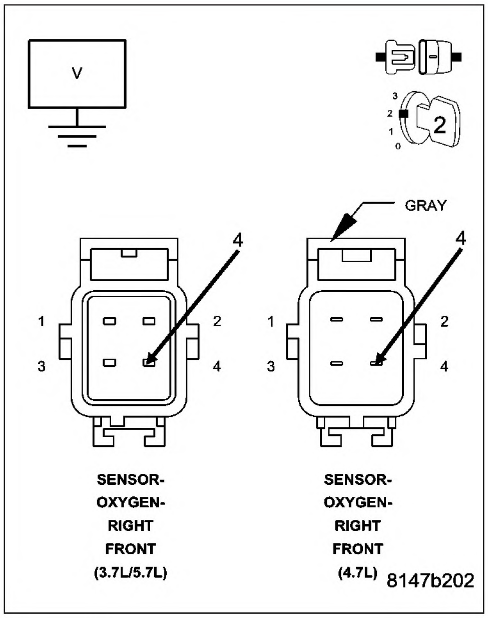
NOTE: Measure the voltage in reference to ground, not the (K902) O2 Return Upstream circuit.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K43) O2 Sensor 2/1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3


V
3
2
1
0
2
GRAY
4
1
2
3
4
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b202

---

3. (K902) O2 RETURN UPSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Ignition on, engine not running.

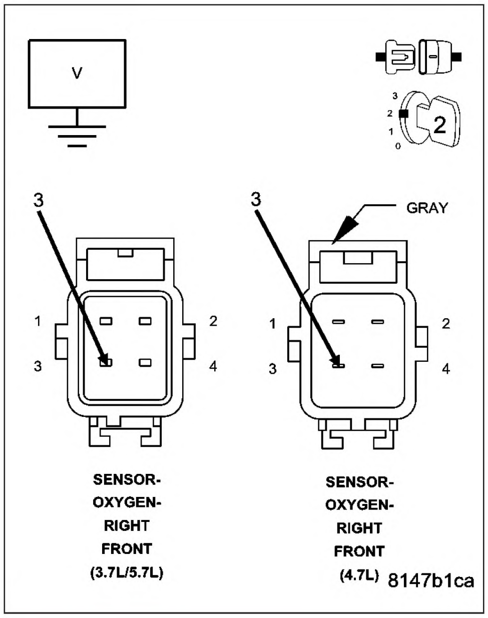
Measure the voltage on the (K902) O2 Return Upstream circuit in the 2/1 O2 Sensor harness connector.

Is there any voltage present?

Yes >> Repair the short to battery voltage in the (K902) O2 Return Upstream circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b1ca

P0152-O2 SENSOR 2/1 CIRCUIT HIGH (CONTINUED)

4. O2 SENSOR

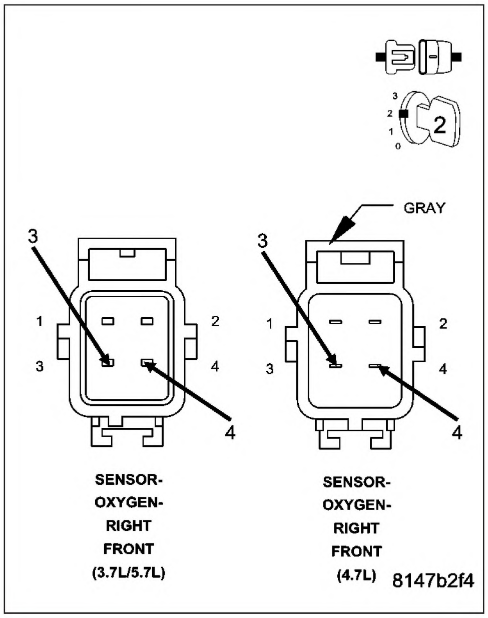
Turn the ignition off.

Connect the C1 PCM harness connector.

Connect a jumper wire between the (K43) O2 2/1 Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the 2/1 O2 Sensor voltage.


2
GRAY
3
1
2
3
4
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
3
1
2
3
4
4
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
8147b2f4

Is the voltage between 2.3 and 2.7 volts with the jumper wire in place?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

---

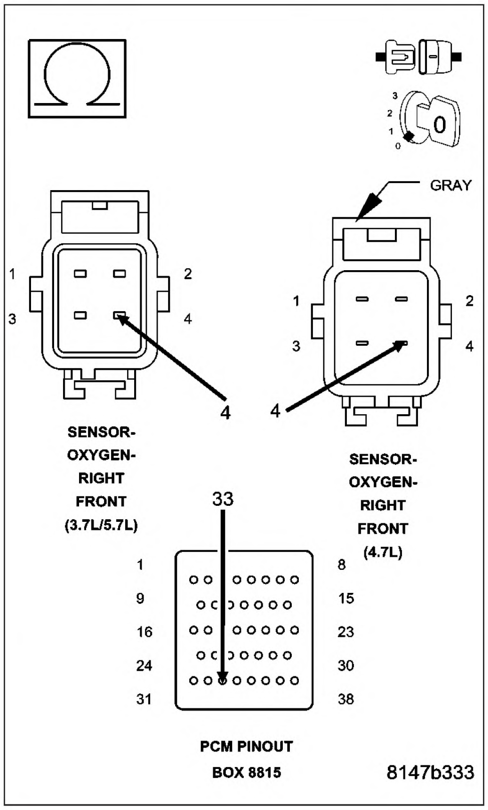
5. (K43) O2 2/1 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K43) O2 2/1 Signal circuit from the 2/1 O2 Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
0
GRAY
1
2
3
4
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
1
2
3
4
4
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
33
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147b333

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K43) O2 2/1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0152-O2 SENSOR 2/1 CIRCUIT HIGH (CONTINUED)

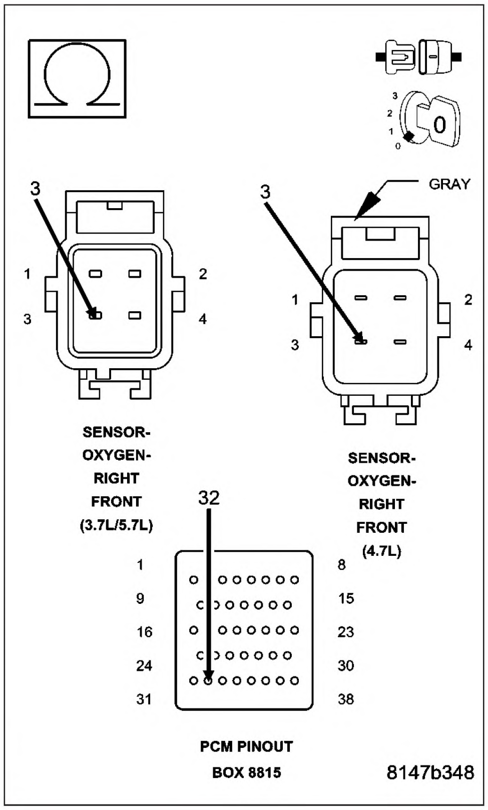
6. (K902) O2 RETURN UPSTREAM CIRCUIT OPEN

Measure the resistance of the (K902) O2 Return Upstream circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K902) O2 Return Upstream circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



3
1
2
3
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
3
GRAY
1
2
3
4
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147b348

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

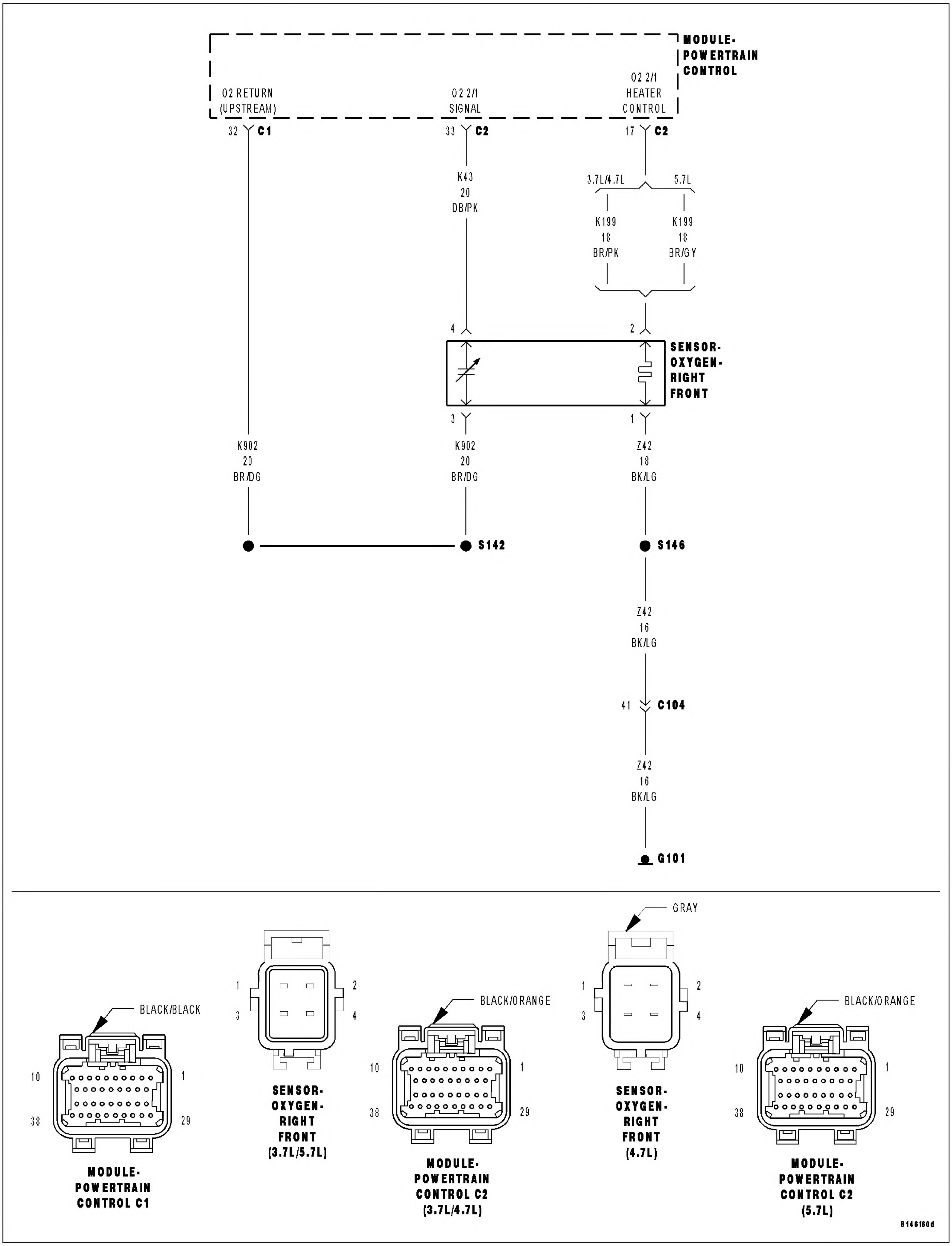
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0153-O2 SENSOR 2/1 SLOW RESPONSE


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0153-O2 SENSOR 2/1 SLOW RESPONSE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active.
- **Set Condition:**
  The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
(K43) O2 2/1 SIGNAL CIRCUIT
(K902) O2 RETURN UPSTREAM CIRCUIT
O2 SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.

With a scan tool, read DTCs and record the related Freeze Frame data.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EXHAUST LEAK

Start the engine.

Inspect the exhaust system for leaks between the engine and the O2 Sensors.

Are there any exhaust leaks?

Yes >> Repair or replace the leaking exhaust parts as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0153-O2 SENSOR 2/1 SLOW RESPONSE (CONTINUED)

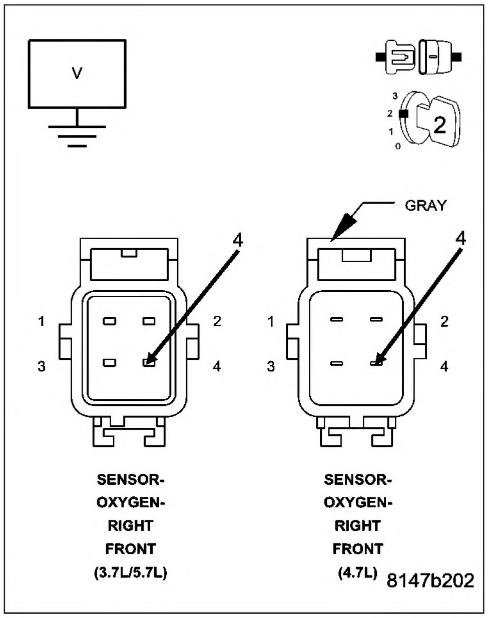
3. (K43) O2 2/1 SIGNAL CIRCUIT

Turn the ignition off

Disconnect the O2 Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (K43) O2 2/1 Signal circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
GRAY
4
4
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b202

Is the voltage between 4.5 and 5.0 volts?

Yes >> Go To 4

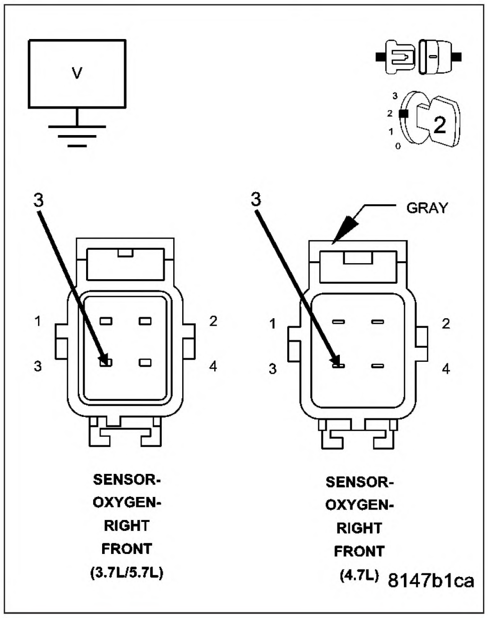
No >> Check the (K43) O2 2/1 Signal circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (K902) O2 RETURN UPSTREAM CIRCUIT

Measure the voltage on the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
GRAY
3
3
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b1ca

Is the voltage at 2.5 volts?

Yes >> Go To 5

No >> Check the (K902) O2 Return Upstream circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. O2 SENSOR

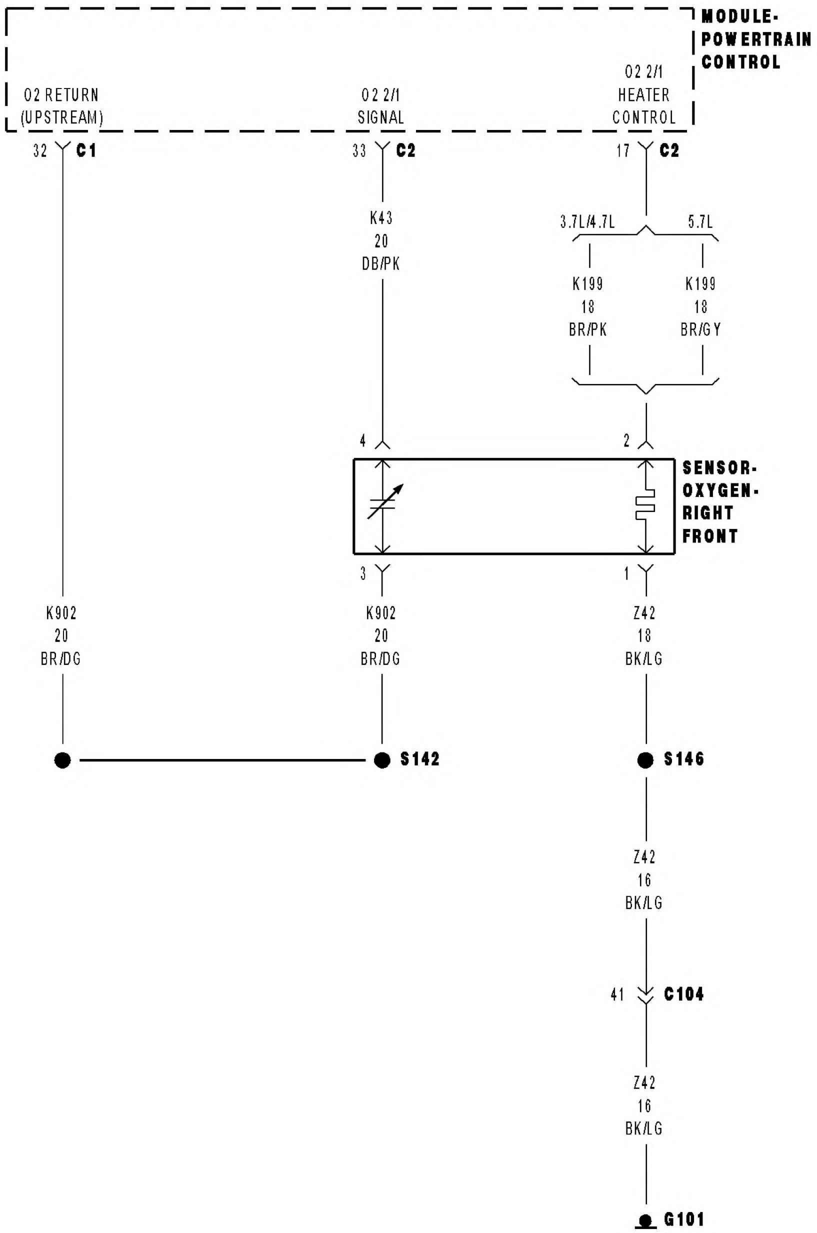
If there are no possible causes remaining, view repair.

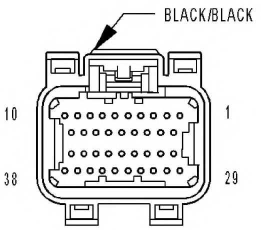
Repair

Replace the O2 Sensor

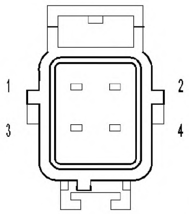
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0155-O2 SENSOR 2/1 HEATER PERFORMANCE

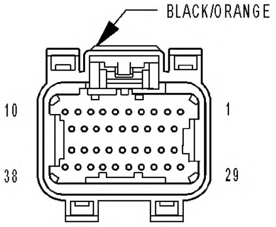

MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/BLACK
10
1
38
29

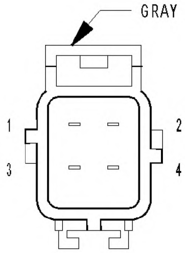
**MODULE-
POWERTRAIN
CONTROL C1**



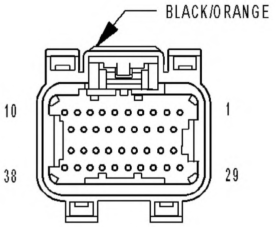
**SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**



**SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**

8146f60d

P0155-O2 SENSOR 2/1 HEATER PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

This diagnostic provides a continuous check of the O2 heater circuit during operation. The heater circuit is momentarily disabled to allow a resistance measurement to be taken to infer heater temperature. The current delivery to the heater is duty cycled to maintain a specific target temperature. The error from the target temperature is continuously monitored to assess heater performance.

- **When Monitored:**
  Engine running and heater duty cycle greater than 0%. Battery voltage greater than 11.0 volts.
- **Set Condition:**
  No sensor output is received when the PCM powers up the sensor heater. Two trip fault. Three good trips to turn off the MIL.

Possible Causes
(K199) O2 2/1 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 HEATER GROUND CIRCUIT OPEN
O2 SENSOR HEATER ELEMENT
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 4.6 and 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test.

With the scan tool, monitor 2/1 O2 Sensor voltage for at least 2 minutes.

Does the voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0155-O2 SENSOR 2/1 HEATER PERFORMANCE (CONTINUED)

2. O2 SENSOR HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 sensor to cool down to room temperature.

Disconnect the 2/1 O2 Sensor harness connector.

Measure the resistance of the O2 Heater Element across the O2 Sensor connector between the O2 Heater Control terminal and the O2 Heater ground terminal.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the resistance of the O2 Sensor Heater Element between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

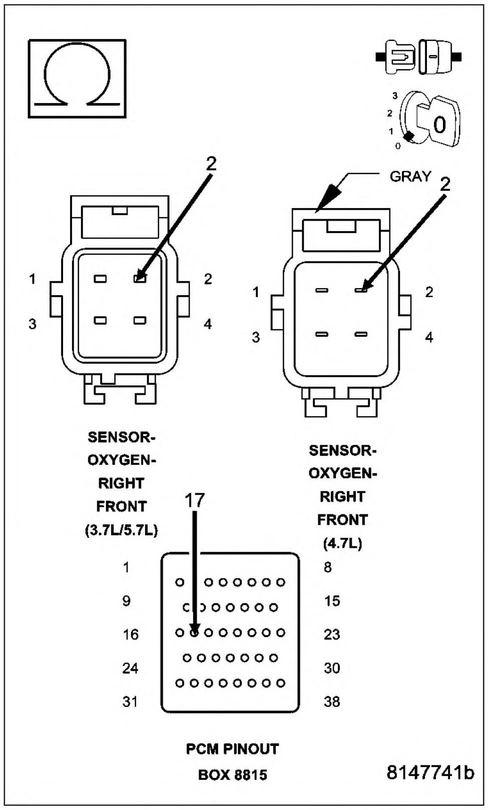
---

3. (K199) O2 2/1 HEATER CONTROL CIRCUIT OPEN

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K199) O2 2/1 Heater Control circuit from the O2 harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
17
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147741b

Is the resistance below 0.5 of an ohm?

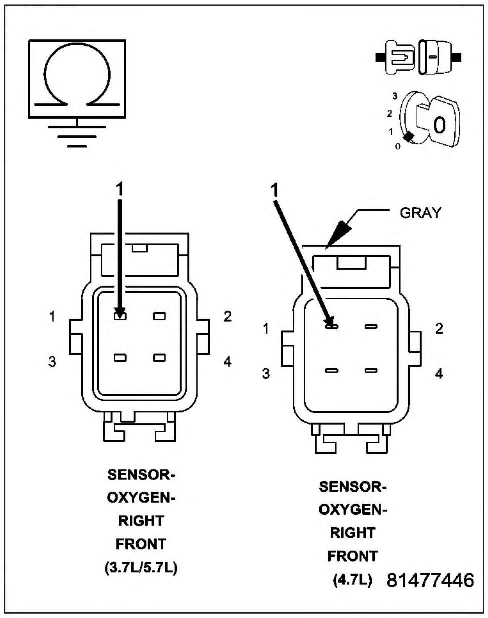
Yes >> Go To 4

No >> Repair the excessive resistance in the (K199) O2 2/1 Heater Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0155-O2 SENSOR 2/1 HEATER PERFORMANCE (CONTINUED)

4. (Z42) O2 SENSOR HEATER GROUND CIRCUIT OPEN

Measure the resistance between ground and the (Z42) O2 Heater ground circuit in the O2 Sensor harness connector.



Is the resistance below 0.5 of an ohm?

Yes >> Go To 5

No >> Repair the excessive resistance in the (Z42) O2 Heater ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

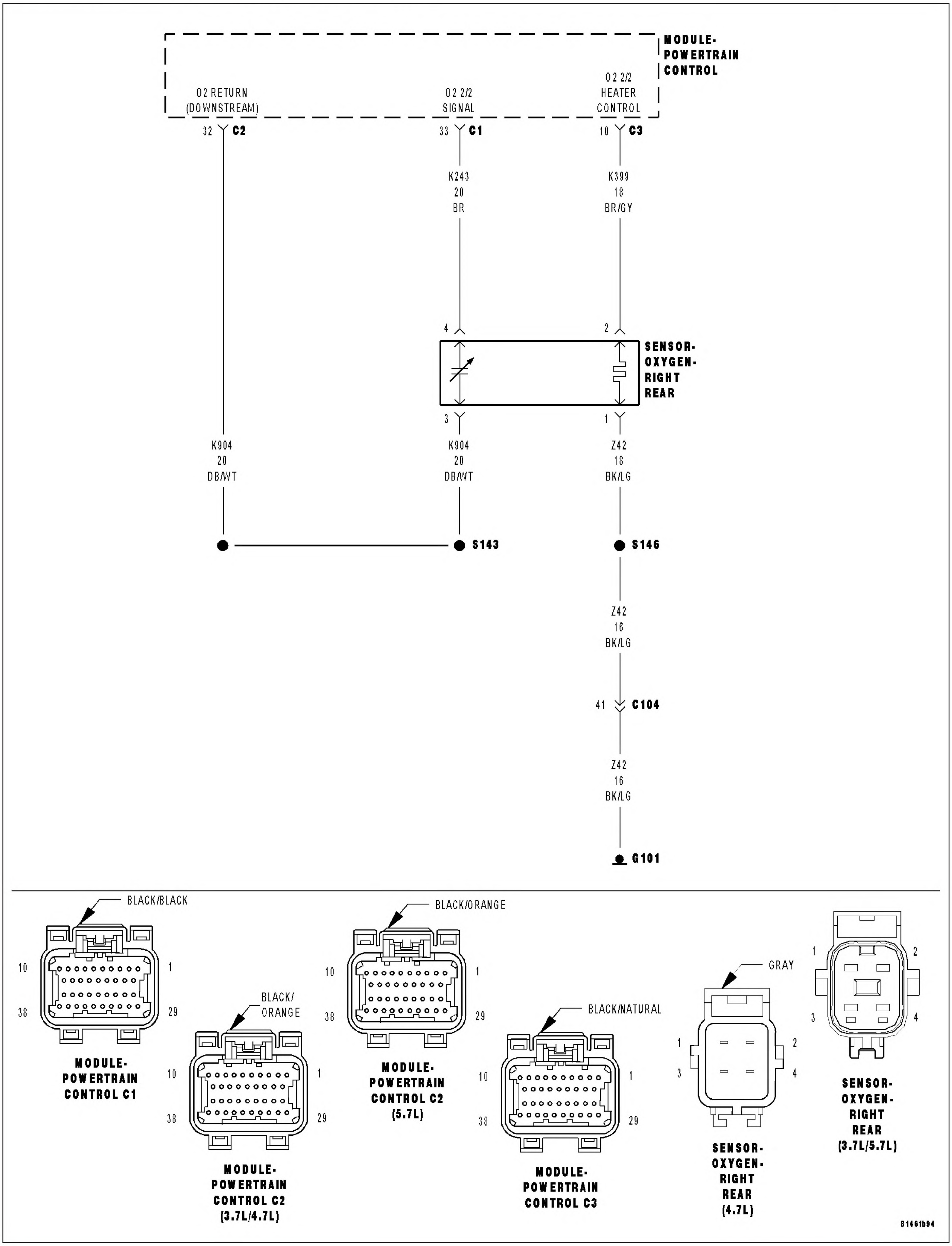
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0157-O2 SENSOR 2/2 CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32 C2
33 C1
10 C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P0157-O2 SENSOR 2/2 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running for less than 30 seconds and the O2 Sensor Heater Temperature is less than 251°C (484°F) with battery voltage greater 10.99 volts.
- **Set Condition:**
  The oxygen sensor signal voltage is below 2.5196 volts for 3 seconds after starting engine. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO GROUND
(K243) O2 2/2 SIGNAL CIRCUIT SHORTED TO GROUND
(K243) O2 SIGNAL CIRCUIT SHORTED TO THE (K904) O2 RETURN DOWNSTREAM CIRCUIT
(K243) O2 SIGNAL CIRCUIT SHORTED TO THE (Z42) O2 2/2 HEATER GROUND CIRCUIT
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR BELOW 2.52 VOLTS

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 2/2 O2 Sensor voltage.

Is the voltage below 2.52 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (K243) O2 2/2 SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the 2/2 O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the 2/2 O2 Sensor voltage.

Is the O2 Sensor voltage above 4.8 volts?

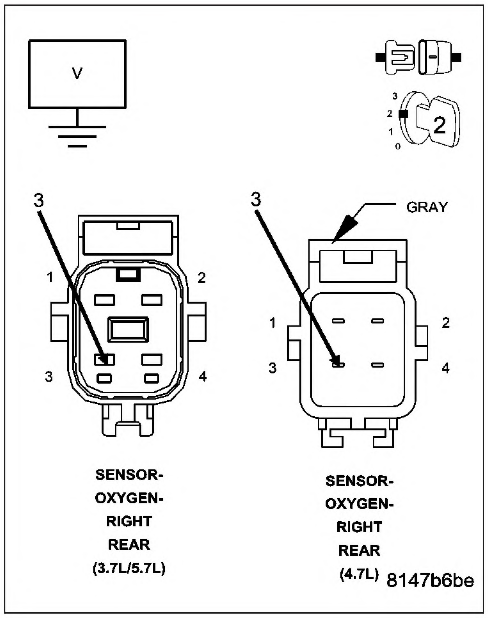
Yes >> Go To 3

No >> Go To 5

P0157-O2 SENSOR 2/2 CIRCUIT LOW (CONTINUED)

3. O2 SENSOR

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b6be

Is the voltage at 2.5 volts?

Yes >> Replace the O2 Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

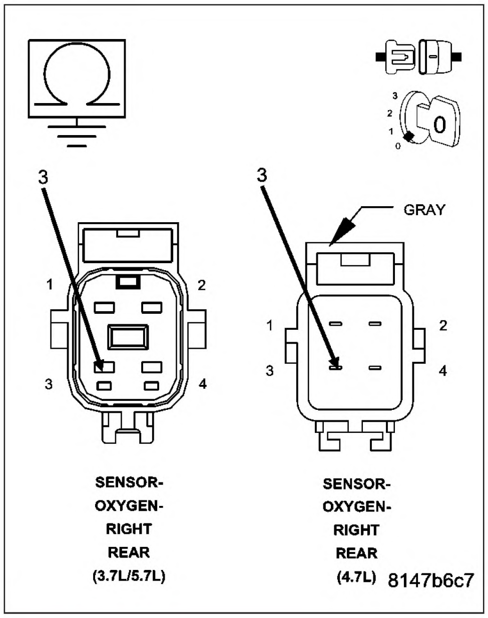
---

4. (K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


3
2
1
0
0
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b6c7

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K904) O2 Return Downstream circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

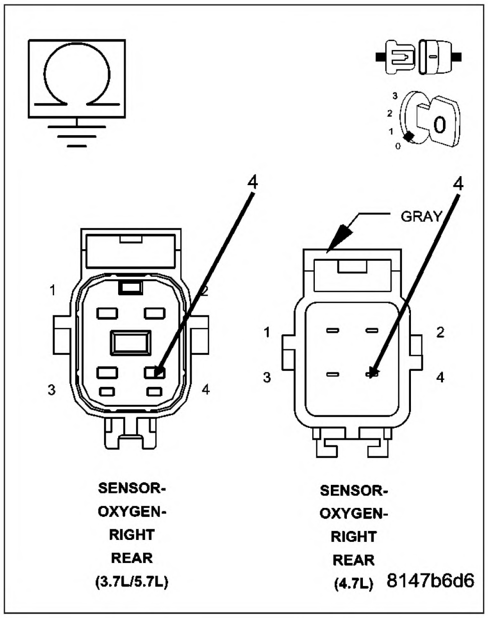
P0157-O2 SENSOR 2/2 CIRCUIT LOW (CONTINUED)

5. (K243) O2 2/2 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

Measure the resistance between ground and the (K243) O2 2/2 Signal circuit in the O2 Sensor harness connector.



3
2
1
0
0
4
4
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b6d6

Is the resistance below 100 ohms?

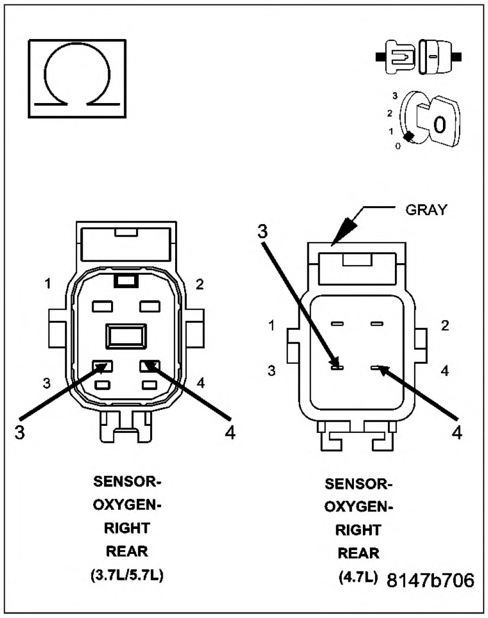
Yes >> Repair the short to ground in the (K243) O2 2/2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. (K243) O2 2/2 SIGNAL CIRCUIT SHORTED TO THE (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the resistance between the (K243) O2 2/2 Signal circuit and the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.



3
2
1
0
0
GRAY
3
1
2
3
4
3
4
1
2
3
4
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b706

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K904) O2 Return Downstream circuit and the (K243) O2 2/2 Signal circuit.

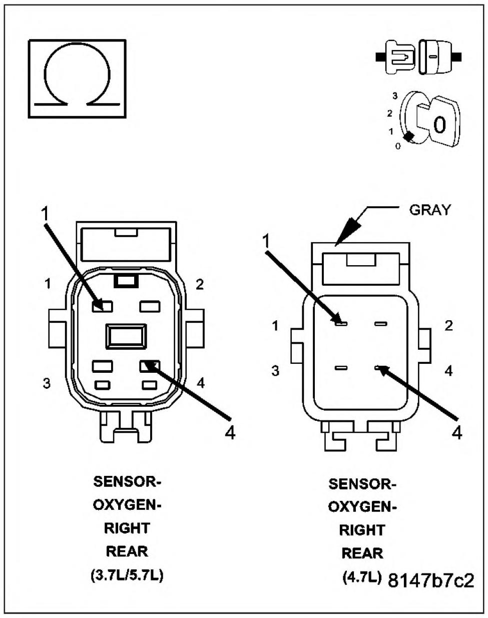
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0157-O2 SENSOR 2/2 CIRCUIT LOW (CONTINUED)

7. (K243) O2 2/2 SIGNAL CIRCUIT SHORTED TO THE (Z42) O2 2/2 HEATER GROUND CIRCUIT

Measure the resistance between the (K243) O2 2/2 Signal circuit and the (Z42) O2 2/2 Heater ground circuit in the O2 Sensor harness connector.


GRAY
1
1
2
3
4
4
1
1
2
3
4
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT REAR (4.7L)
8147b7c2

Is the resistance below 100 ohms?

Yes >> Repair the short between the (Z42) O2 2/2 Heater ground circuit and the (K243) O2 2/2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

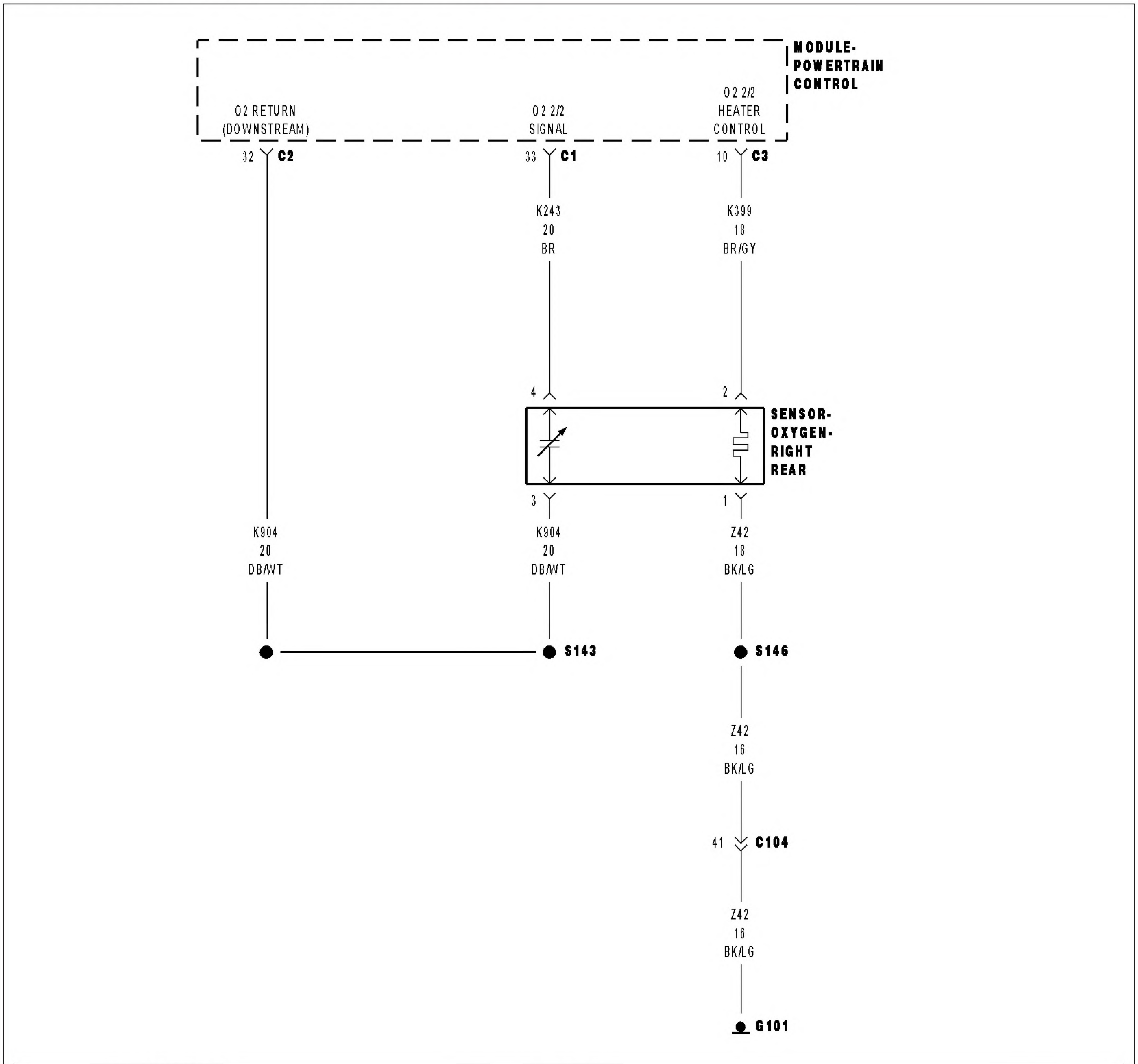
Yes >> Repair as necessary.

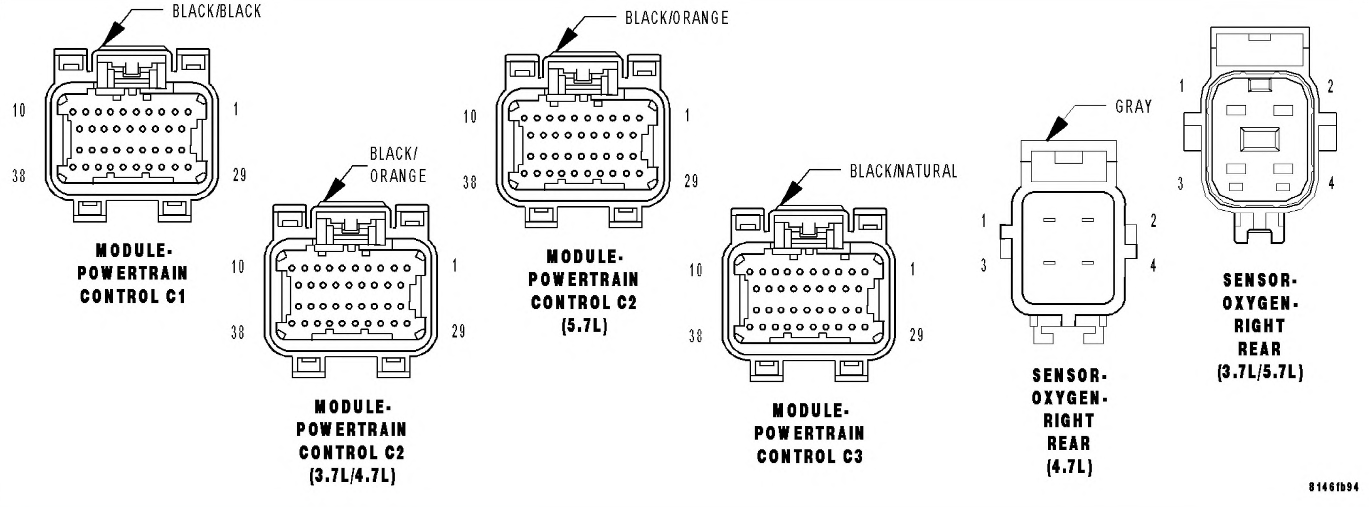
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0158-O2 SENSOR 2/2 CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32 C2
33 C1
10 C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P0158-O2 SENSOR 2/2 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  O2 Sensor Heater Temperature is greater than 496°C (925°F) and battery voltage greater than 10.99 volts.
- **Set Condition:**
  The Oxygen Sensor voltage is above 3.99 volts for 30 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K243) O2 2/2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE
(K243) O2 2/2 SIGNAL CIRCUIT OPEN
(K904) O2 RETURN DOWNSTREAM CIRCUIT OPEN
O2 SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. O2 SENSOR ABOVE 3.99 VOLTS

NOTE: When only one O2 Sensor is shorted to voltage, the scan tool will display all O2 Sensor voltage readings at approximately 5.0 volts. When diagnosing this DTC, only diagnose the O2 Sensor that set the DTC.

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read the 2/2 O2 Sensor voltage.

Is the voltage above 3.99 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0158-O2 SENSOR 2/2 CIRCUIT HIGH (CONTINUED)

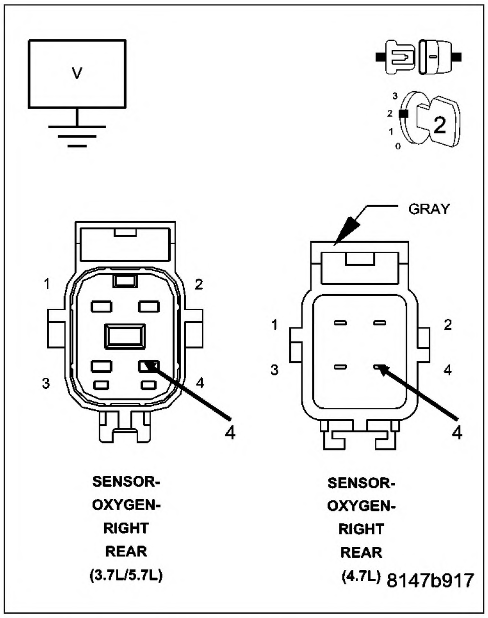
2. (K243) O2 2/2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Start the engine and allow the engine to idle.

Disconnect the 2/2 O2 Sensor harness connector.

Measure the voltage on the (K243) O2 Sensor 2/2 Signal circuit in the O2 Sensor harness connector.

NOTE: Measure the voltage in reference to ground, not the (K904) O2 Return Downstream circuit.


V
3
2
1
0
2
GRAY
1
2
3
4
4
1
2
3
4
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b917

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K243) O2 Sensor 2/2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

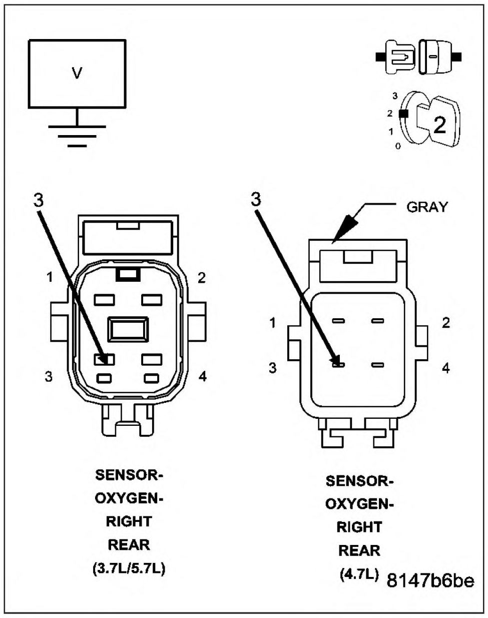
3. (K904) O2 RETURN DOWNSTREAM CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K904) O2 Return Downstream circuit in the 2/2 O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b6be

Is there any voltage present?

Yes >> Repair the short to battery voltage in the (K904) O2 Return Downstream circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P0158-O2 SENSOR 2/2 CIRCUIT HIGH (CONTINUED)

4. O2 SENSOR

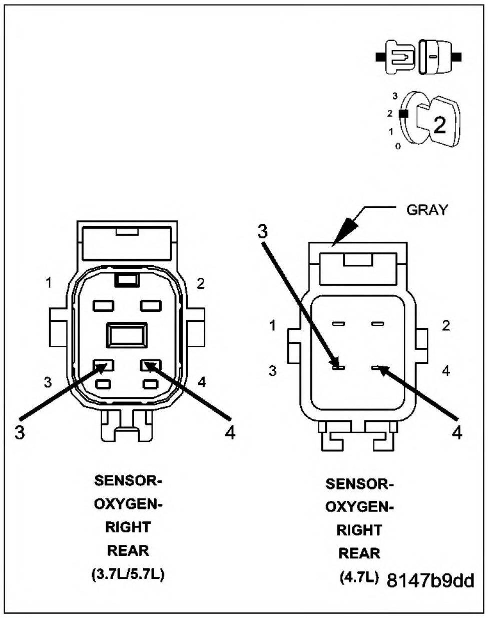
Turn the ignition off.

Connect the C2 PCM harness connector.

Connect a jumper wire between the (K243) O2 2/2 Signal circuit and the (K904) O2 Return Downstream circuit in the 2/2 O2 Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the 2/2 O2 Sensor voltage.


3
2
1
0
2
GRAY
3
1
2
3
4
3
4
1
2
3
4
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b9dd

Is the voltage between 2.3 and 2.7 volts with the jumper wire installed?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

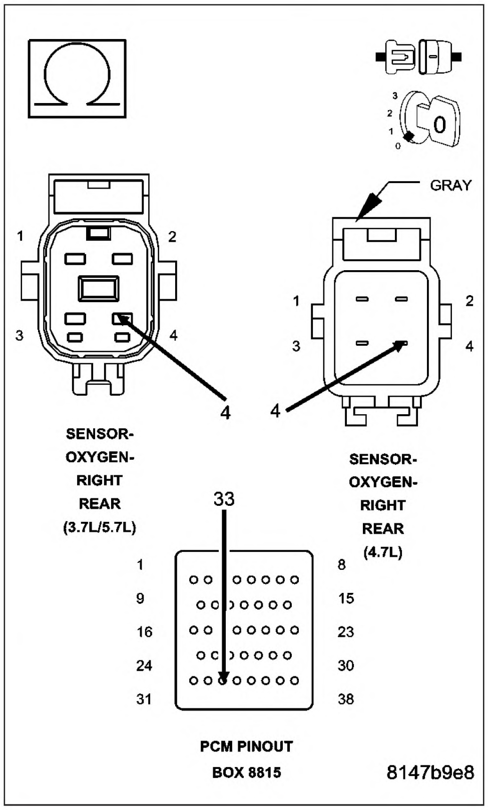
5. (K243) O2 2/2 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K243) O2 2/2 Signal circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
GRAY
1
2
3
4
4
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
33
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147b9e8

Is the resistance below 5.0 ohms?

Yes >> Go To 6

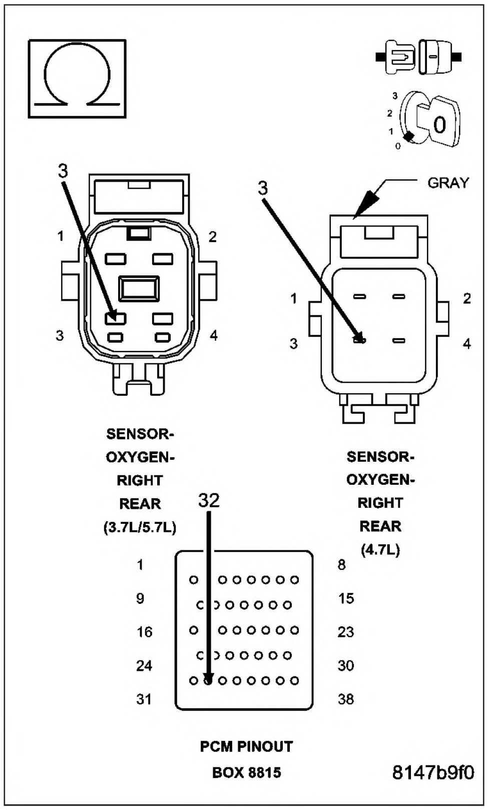
No >> Repair the open in the (K243) O2 2/2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0158-O2 SENSOR 2/2 CIRCUIT HIGH (CONTINUED)

6. (K904) O2 RETURN DOWNSTREAM CIRCUIT OPEN

Disconnect the C2 PCM harness connector.

Measure the resistance of the (K904) O2 Return Downstream circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


3
1
2
3
4
3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147b9f0

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K904) O2 Return Downstream circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE) z

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

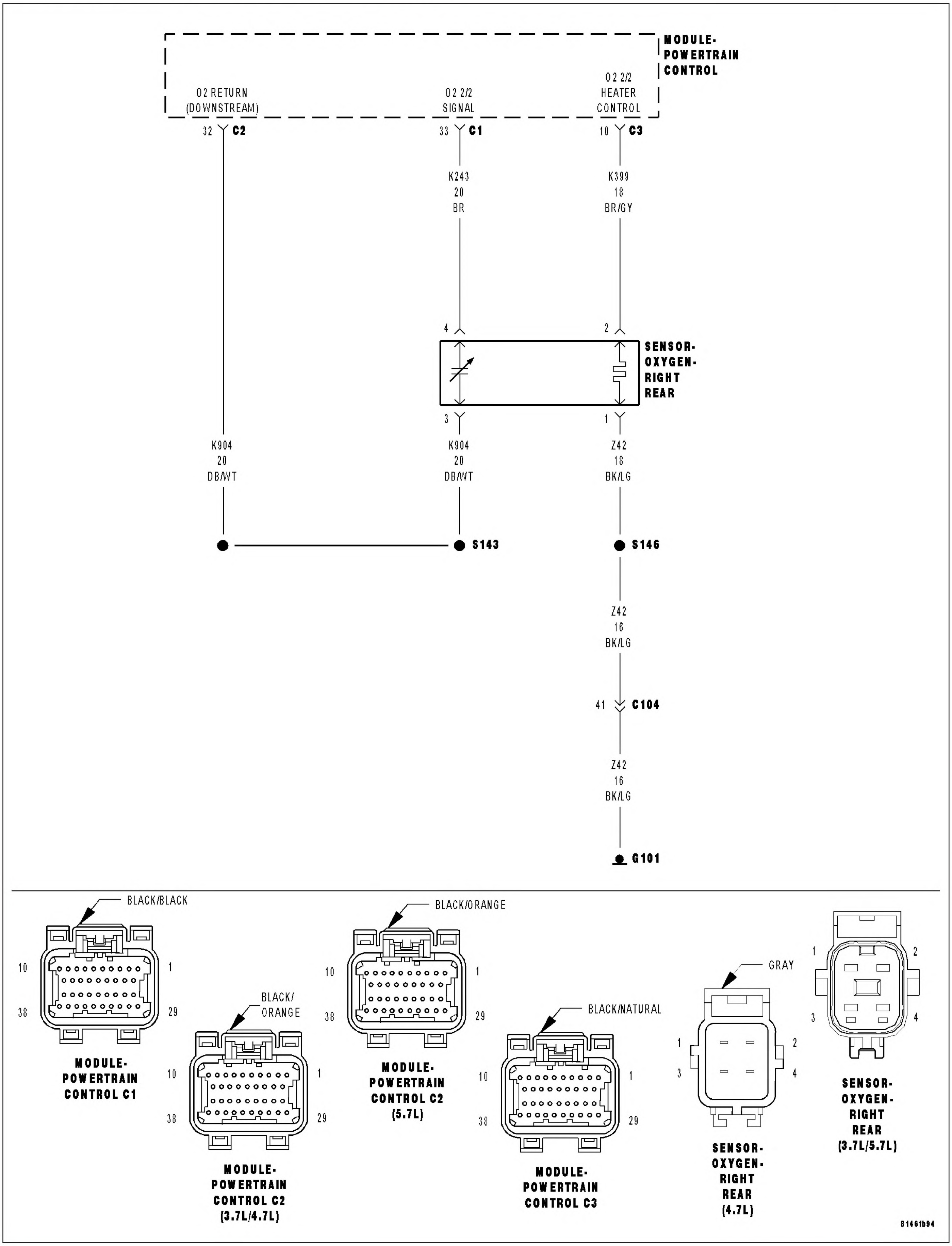
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0159-O2 SENSOR 2/2 SLOW RESPONSE


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32
C2
33
C1
10
C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P0159-O2 SENSOR 2/2 SLOW RESPONSE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The downstream O2 Sensor is located in the exhaust path behind the catalytic converter, is monitored for proper response to assure optimum catalytic converter efficiency. The downstream O2 response monitor is intended to diagnose a downstream O2 sensor that is not moving or stuck in a voltage window and to insure accurate information for catalyst monitor diagnosis.

- **When Monitored:**
  Vehicle is started and driven between 20 and 55 MPH with the Throttle open for a minimum of 120 seconds. Coolant greater than 70°C (158°F). Catalytic Converter Temp greater than 600°C (1112°F) and EVAP Purge is active.
- **Set Condition:**
  The oxygen sensor signal voltage switches less than 16 times from lean to rich within 20 seconds during monitoring. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
(K243) O2 2/2 SIGNAL CIRCUIT
(K904) O2 RETURN DOWNSTREAM CIRCUIT
O2 SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EXHAUST LEAK

Start the engine.

Inspect the exhaust system for leaks between the engine and the O2 Sensors.

Are there any exhaust leaks?

Yes >> Repair or replace the leaking exhaust parts as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0159-O2 SENSOR 2/2 SLOW RESPONSE (CONTINUED)

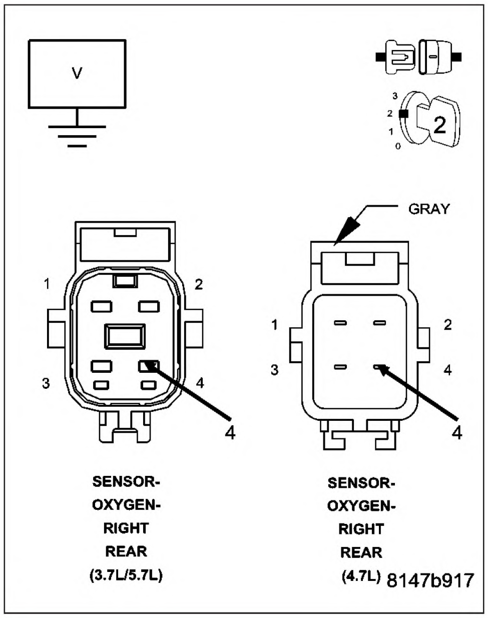
3. (K243) O2 2/2 SIGNAL CIRCUIT

Turn the ignition off

Disconnect the 2/2 O2 Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (K243) O2 2/2 Signal circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
GRAY
1
2
3
4
4
1
2
3
4
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b917

Is the voltage between 4.5 and 5.0 volts?

Yes >> Go To 4

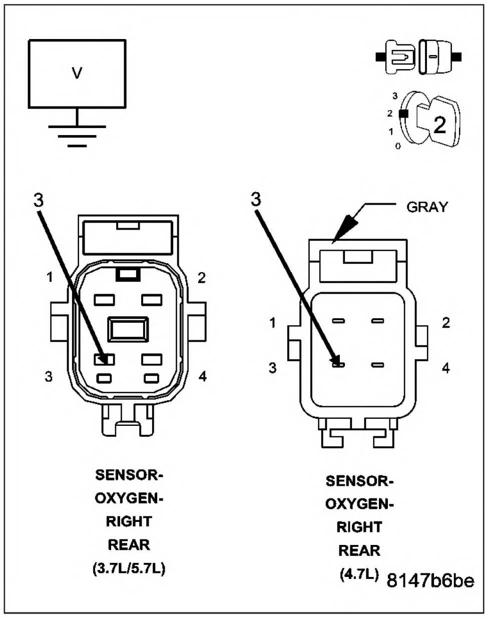
No >> Check the (K243) O2 2/2 Signal circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b6be

Is the voltage at 2.5 volts?

Yes >> Go To 5

No >> Check the (K904) O2 Return Downstream circuit for a short to ground, open, or short to voltage. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. O2 SENSOR

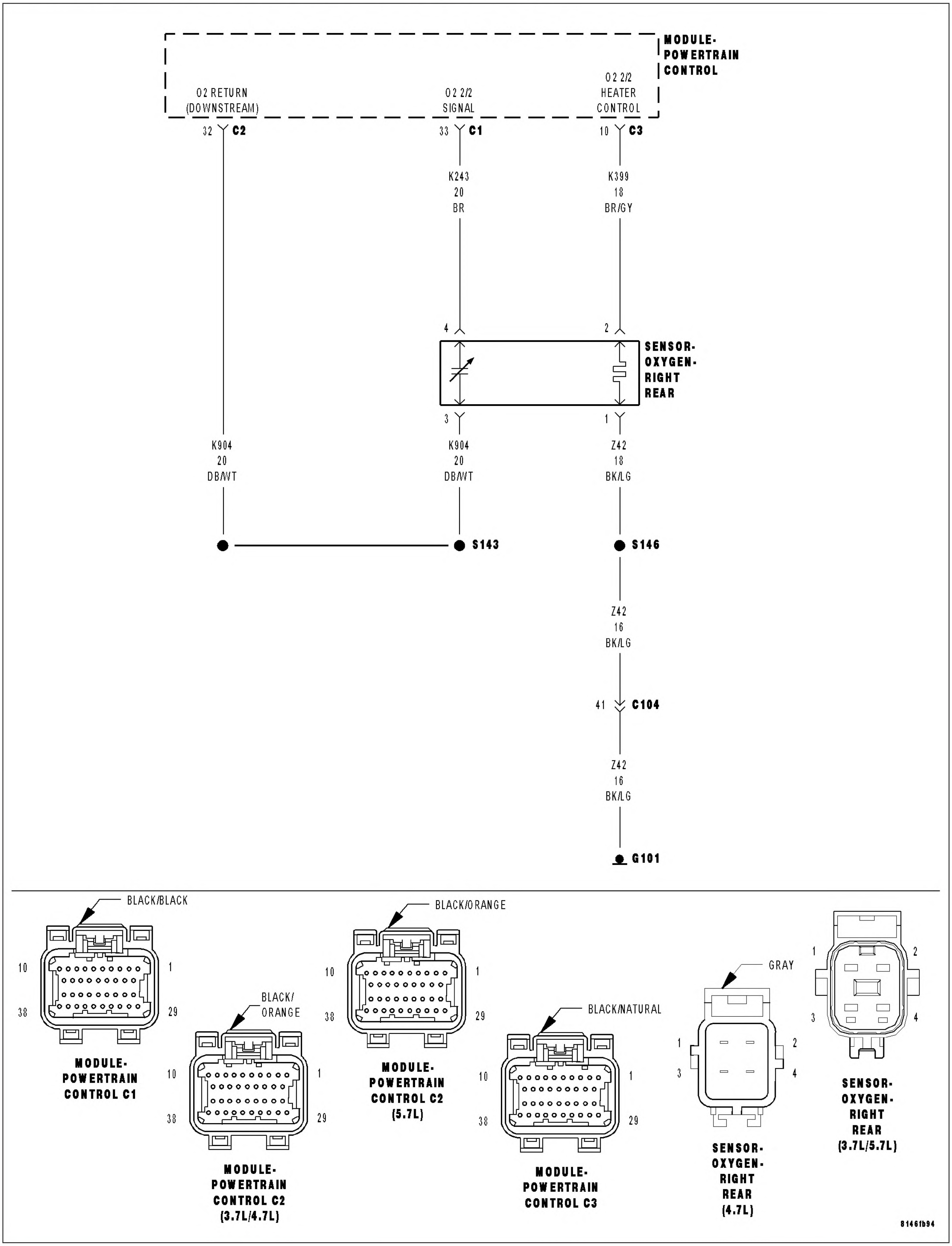
If there are no possible causes remaining, view repair.

Repair

Replace the O2 Sensor

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0161-O2 SENSOR 2/2 HEATER PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32 C2
33 C1
10 C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P0161-O2 SENSOR 2/2 HEATER PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

This diagnostic provides a continuous check of the O2 heater circuit during operation. The heater circuit is momentarily disabled to allow a resistance measurement to be taken to infer heater temperature. The current delivery to the heater is duty cycled to maintain a specific target temperature. The error from the target temperature is continuously monitored to assess heater performance.

- **When Monitored:**
  Engine running and heater duty cycle greater than 0%. Battery voltage greater than 11.0 volts.
- **Set Condition:**
  No sensor output is received when the PCM powers up the sensor heater. Two trip fault. Three good trips to turn off the MIL.

Possible Causes
(K399) O2 2/2 HEATER CONTROL CIRCUIT OPEN
(Z42) O2 2/2 HEATER GROUND CIRCUIT OPEN
O2 SENSOR HEATER ELEMENT
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING.

Diagnostic Test

1. O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 4.6 and 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the O2 Heater Test.

With a scan tool, monitor 2/2 O2 Sensor voltage for at least 2 minutes.

Does the voltage stay above 4.5 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0161-O2 SENSOR 2/2 HEATER PERFORMANCE (CONTINUED)

2. O2 SENSOR HEATER ELEMENT

Turn the ignition off.

NOTE: Allow the O2 sensor to cool down to room temperature.

Disconnect the O2 Sensor harness connector.

Measure the resistance of the 2/2 O2 Heater Element, between the O2 Heater Control terminal and the O2 Heater ground terminal in the O2 Sensor connector.

NOTE: O2 Heater Element resistance values should be measured at 70°F (21.1°C). The resistance value will vary with different temperature values.

Is the resistance of the O2 Sensor Heater Element between 2.0 and 30.0 ohms?

Yes >> Go To 3

No >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. (K399) O2 2/2 HEATER CONTROL CIRCUIT OPEN

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

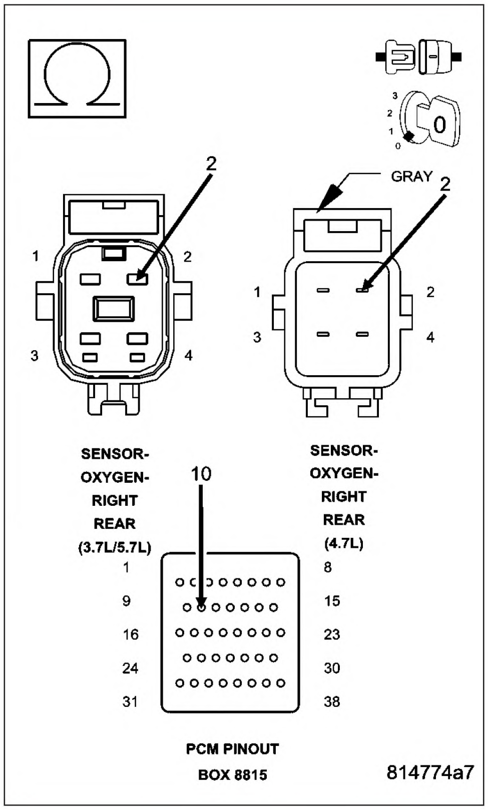
Measure the resistance of the (K399) O2 2/2 Heater Control circuit from the O2 harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 0.5 of an ohm?

Yes >> Go To 4

No >> Repair the excessive resistance in the (K399) O2 2/2 Heater Control circuit.

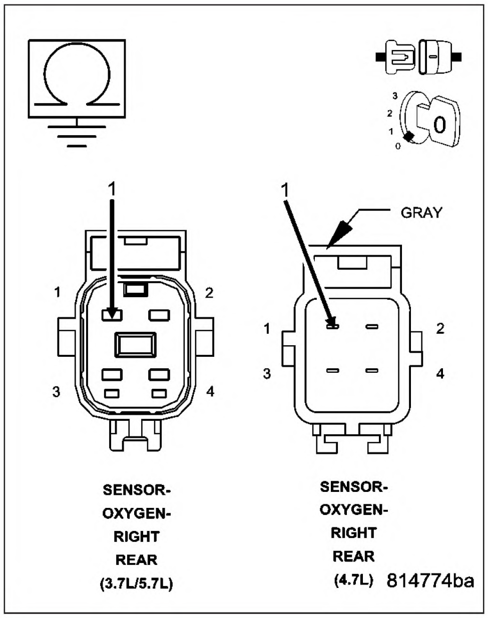
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
2
GRAY
2
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
10
SENSOR-OXYGEN-RIGHT REAR (4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
814774a7

P0161-O2 SENSOR 2/2 HEATER PERFORMANCE (CONTINUED)

4. (Z42) O2 2/2 HEATER GROUND CIRCUIT OPEN

Measure the resistance between ground and the (Z42) O2 2/2 Heater ground circuit in the O2 Sensor harness connector.



3
2
1
0
0
1
GRAY
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT REAR (4.7L)
814774ba

Is the resistance below 0.5 of an ohm?

Yes >> Go To 5

No >> Repair the excessive resistance in the (Z42) O2 2/2 Heater ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

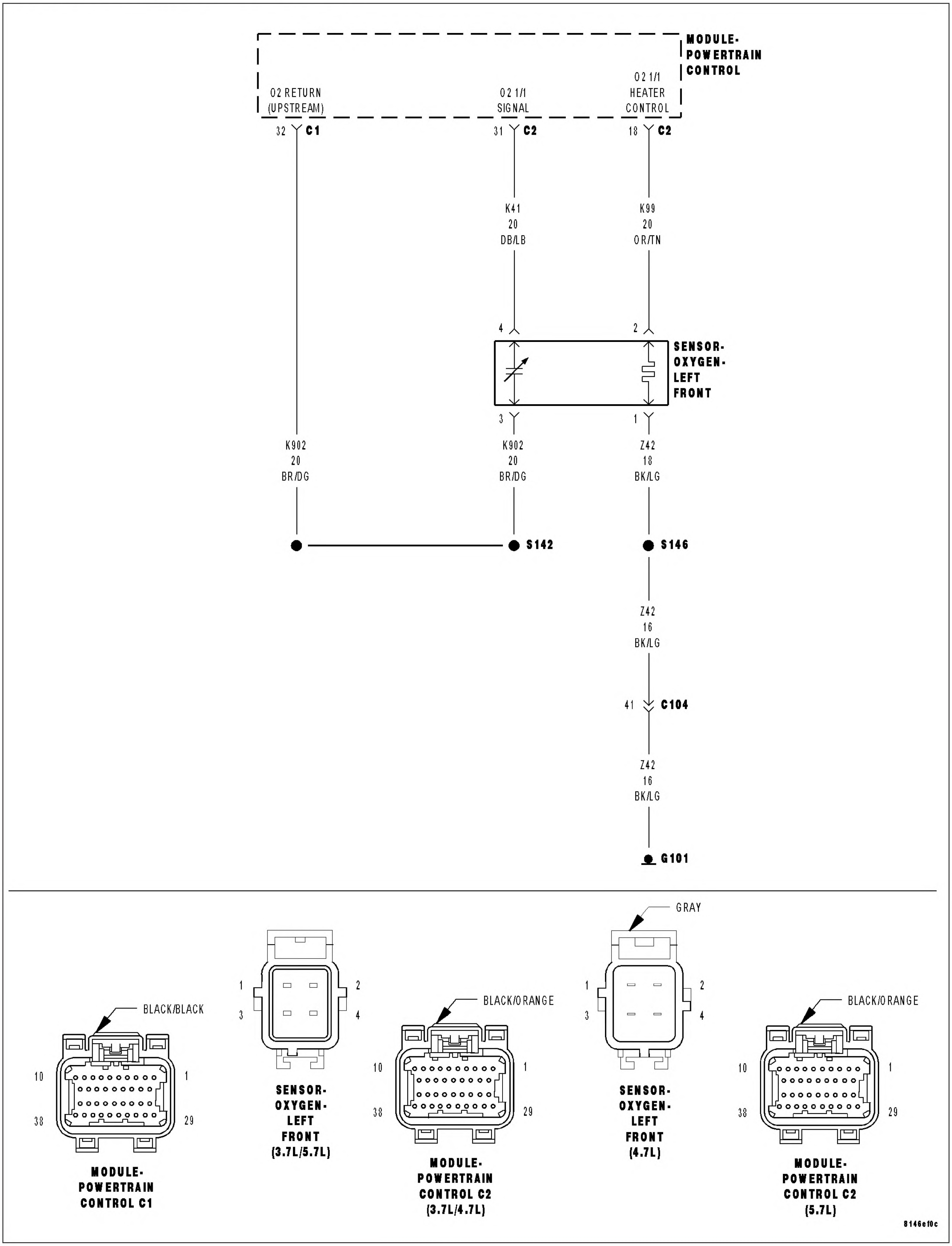
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0171-FUEL SYSTEM 1/1 LEAN


MODULE-
POWERTRAIN
CONTROL
O2 RETURN (UPSTREAM)
O2 1/1 SIGNAL
O2 1/1 HEATER CONTROL
32 C1
31 C2
18 C2
K41 20 DB/LB
K99 20 OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902 20 BR/DG
K902 20 BR/DG
Z42 18 BK/LG
S142
S146
Z42 16 BK/LG
41 C104
Z42 16 BK/LG
G101
BLACK/BLACK
10 1 38 29
MODULE-
POWERTRAIN
CONTROL C1
1 2 3 4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10 1 38 29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1 2 3 4
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
BLACK/ORANGE
10 1 38 29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146ef0c

P0171-FUEL SYSTEM 1/1 LEAN (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The fuel feedback system will maintain a stoiciometric fuel/air mixture, 14.7:1, by modifying the injector pulsewidth according to the oxygen content of the exhaust gas. The PCM makes short term and long term fuel corrections to maintain stoiciometric fuel/air ratio for best catalytic converter efficiency. Short term fuel correction is based on upstream O2 sensor output and is designed for quick engine response. The long term fuel correction compensated for variations in the engine specifications, sensor tolerances and component aging and is designed to correct rich and lean conditions over a longer period of time.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL

Possible Causes
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
O2 SENSOR HEATER OPERATION
O2 SENSOR
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Diagnose all other trouble codes before continuing.

NOTE: Check for contaminants that may have damaged an O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0171-FUEL SYSTEM 1/1 LEAN (CONTINUED)

2. CHECKING FUEL PRESSURE

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Ignition on, engine not running.

With a scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Turn the ignition off.

CAUTION: Stop All Actuations.

Choose a conclusion that best matches your fuel pressure reading.

Within Specification

Go To 3

Above Specification

Replace the fuel filter/pressure regulator.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

Below Specification

Go To 12

---

3. O2 SENSOR OPERATION

Start the engine.

Allow the engine to reach normal operating temperature.

NOTE: If one of the O2 Sensor's Signal or Return circuit is shorted to ground the scan tool will display all O2 Sensor voltage readings low. The O2 Sensor that is shorted to ground will display a voltage reading near or at 0 volts.

NOTE: If one of the O2 Sensor Signal or Return circuits are shorted to voltage, the scan tool will display all O2 Sensor voltage readings high.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.

With a scan tool, monitor all of the O2 Sensor voltage readings.

Is the voltage switching between 2.5 and 3.4 volts for all the O2 Sensors?

Yes >> Go To 4

No >> Go To 8

P0171-FUEL SYSTEM 1/1 LEAN (CONTINUED)

4. 1/1 O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

Ignition on, engine not running.

With a scan tool, actuate the 1/1 O2 Heater Test.

With the scan tool, monitor 1/1 O2 Sensor voltage for at least 2 minutes.

Does the voltage stay above 4.5 volts?

Yes >> Replace the 1/1 O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. MAP SENSOR OPERATION

Turn the ignition off.

Connect a Vacuum Gauge to a Manifold Vacuum source.

Start the engine.

Allow the engine to idle.

NOTE: If engine will not idle, maintain a constant RPM above idle.

With the scan tool, read the MAP Sensor vacuum value.

Is the scan tool reading within 1″ of the Vacuum Gauge reading?

Yes >> Go To 6

No >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. ECT SENSOR OPERATION

NOTE: For this test to be valid, the thermostat must be operating correctly.

NOTE: This test works best if performed on a cold engine (cold soak)

Ignition on, engine not running.

With a scan tool, read the Engine Coolant Temperature (ECT) Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up, monitor the ECT Sensor value. The temperature value change should be a smooth transition from start up to normal operating temperature 82°C (180°F). The value should reach at least 82°C (180°F).

Did the ECT value increase smoothly and did it reach at least 180°F (82°C)?

Yes >> Go To 7

No >> Replace the Engine Coolant Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0171-FUEL SYSTEM 1/1 LEAN (CONTINUED)

7. ENGINE MECHANICAL

Turn the ignition off.

Check for any of the following conditions/mechanical problems.

AIR INDUCTION SYSTEM - must be free from leaks.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

---

8. 1/1 O2 SENSOR

Ignition on, engine not running.

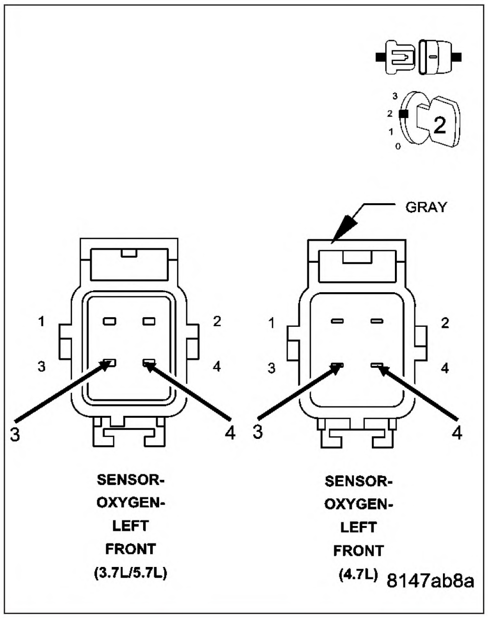
Disconnect the 1/1 O2 Sensor harness connector.

With a scan tool, monitor the 1/1 O2 Sensor voltage.

O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Connect a jumper wire between the (K41) Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.



Did the O2 Sensor voltage change from 5.0 volts to 2.5 volts with the jumper wire installed?

Yes >> Replace the O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

NOTE: Remove the jumper wire before continuing.

P0171-FUEL SYSTEM 1/1 LEAN (CONTINUED)

9. (K41) O2 SENSOR 1/1 SIGNAL CIRCUIT

With a scan tool, monitor the 1/1 O2 Sensor voltage reading with the jumper wire removed.

NOTE: The scan tool will display all O2 Sensor voltage readings approximately 5.0 volts when only one O2 Sensor's Signal circuit is shorted to voltage.

NOTE: The scan tool will display one O2 Sensor voltage close to zero and the others will read lower than normal when one O2 Sensor Signal circuit contains excessive resistance.

Is the voltage above 4.8 volts?

Yes >> Go To 10

No >> Check the (K41) O2 Sensor 1/1 Signal circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

10. (K902) O2 RETURN UPSTREAM CIRCUIT

Disconnect the 1/1 O2 Sensor harness connector.

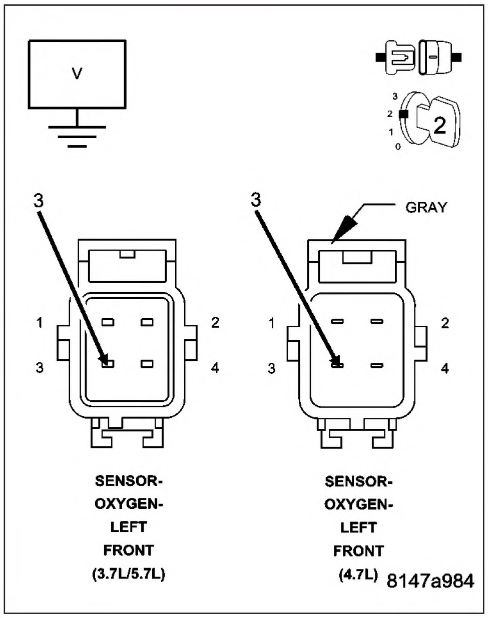
Measure the voltage on the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

Is the voltage at 2.5 volts?

Yes >> Go To 11

No >> Check the O2 Return circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertriain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
8147a984

---

11. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0171-FUEL SYSTEM 1/1 LEAN (CONTINUED)

12. RESTRICTED FUEL SUPPLY LINE

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special 5/16 fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module.

Attach a fuel pressure test gauge to the T fitting on tool #6539.

Ignition on, engine not running.

With a scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

CAUTION: Stop All Actuations.

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

---

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

---

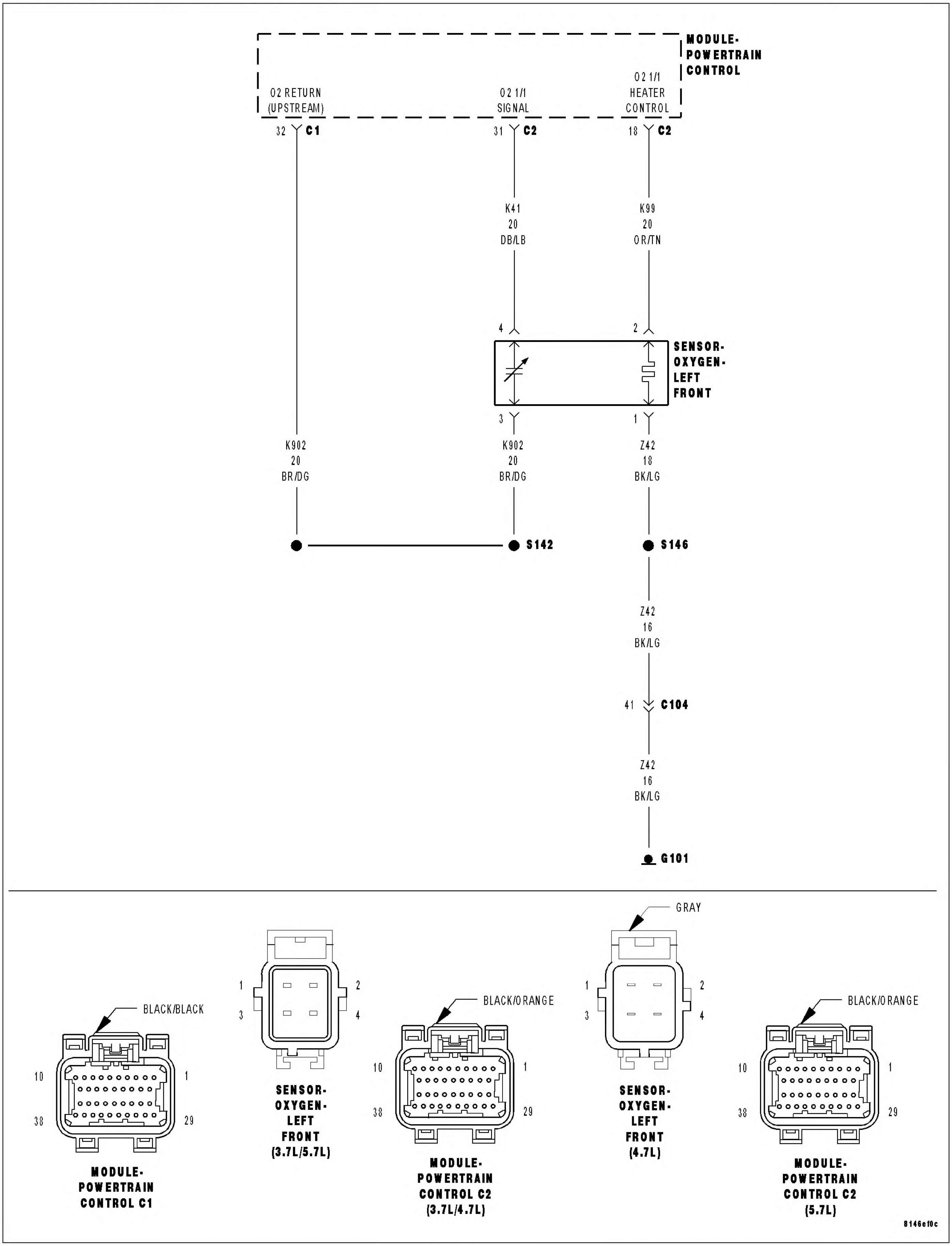
14. FUEL PUMP MODULE

If there are no possible causes remaining, view repair.

Repair

Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0172-FUEL SYSTEM 1/1 RICH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
32 C1
31 C2
18 C2
K41
20
DB/LB
K99
20
OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146ef0c

P0172-FUEL SYSTEM 1/1 RICH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The fuel feedback system will maintain a stoiciometric fuel/air mixture, 14.7:1, by modifying the injector pulsewidth according to the oxygen content of the exhaust gas. The PCM makes short term and long term fuel corrections to maintain stoiciometric fuel/air ratio for best catalytic converter efficiency. Short term fuel correction is based on upstream O2 sensor output and is designed for quick engine response. The long term fuel correction compensated for variations in the engine specifications, sensor tolerances and component aging and is designed to correct rich and lean conditions over a longer period of time.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive and a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
O2 SENSOR HEATER OPERATION
EVAP PURGE SOLENOID OPERATION
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
O2 SENSOR
MAP SENSOR
ECT SENSOR
ENGINE MECHANICAL
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check for contaminates that may have damaged an O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0172-FUEL SYSTEM 1/1 RICH (CONTINUED)

2. CHECKING FUEL PRESSURE

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Turn the ignition off.

CAUTION: Stop All Actuations.

Choose a conclusion that best matches your fuel pressure reading.

Within Specification

Go To 3

Above Specification

Replace the fuel filter/pressure regulator.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. O2 SENSOR OPERATION

Start the engine.

Allow the engine to reach normal operating temperature.

NOTE: If one of the O2 Sensors Signal or Return circuit is shorted to ground or voltage, all the other O2 Sensor voltage readings will be affected.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.

With the scan tool, monitor the 1/1 O2 Sensor voltage reading.

Is the voltage switching between 2.5 and 3.4 volts?

Yes >> Go To 4

No >> Go To 9

---

4. 1/1 O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

Ignition on, engine not running.

With the scan tool, perform the 1/1 O2 Heater Test.

With the scan tool, monitor the O2 Sensor voltage while performing the Heater test for at least 2 minutes.

Does the voltage stay above 4.5 volts during the Heater test?

Yes >> Replace the O2 Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0172-FUEL SYSTEM 1/1 RICH (CONTINUED)

5. MAP SENSOR OPERATION

Turn the ignition off.

Connect a Vacuum Gauge to a Manifold Vacuum source.

Start the engine.

Allow the engine to idle.

NOTE: If engine will not idle, maintain a constant RPM above idle.

With a scan tool, read the MAP Sensor vacuum value.

Is the scan tool reading within 1″ of the Vacuum Gauge reading?

Yes >> Go To 6

No >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Remove the vacuum gauge before continuing.

---

6. ECT SENSOR OPERATION

NOTE: For this test to be valid, the thermostat must be operating correctly.

NOTE: This test works best if performed on a cold engine (cold soak)

Ignition on, engine not running.

With a scan tool, read the Engine Coolant Temperature Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up, monitor the Engine Coolant Temperature value. The temp value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F).

Did the ECT value increase smoothly and reach at least 180°F (82°C)?

Yes >> Go To 7

No >> Replace the Engine Coolant Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. EVAP PURGE SOLENOID OPERATION

Turn the ignition off.

Disconnect the hoses at the Evap Purge Solenoid.

Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side.

Did the Evap Purge Solenoid hold vacuum?

Yes >> Go To 8

No >> Replace the EVAP Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Connect the vacuum hoses before continuing.

P0172-FUEL SYSTEM 1/1 RICH (CONTINUED)

8. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

AIR INDUCTION SYSTEM - must be free from restrictions.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

---

9. 1/1 O2 SENSOR

NOTE: Perform the following test on the O2 Sensors whose voltage was not switching properly in the previous step.

Ignition on, engine not running.

Disconnect the 1/1 O2 Sensor harness connector.

With a scan tool, monitor the 1/1 O2 Sensor voltage.

O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Connect a jumper wire between the (K41) O2 Sensor 1/1 Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

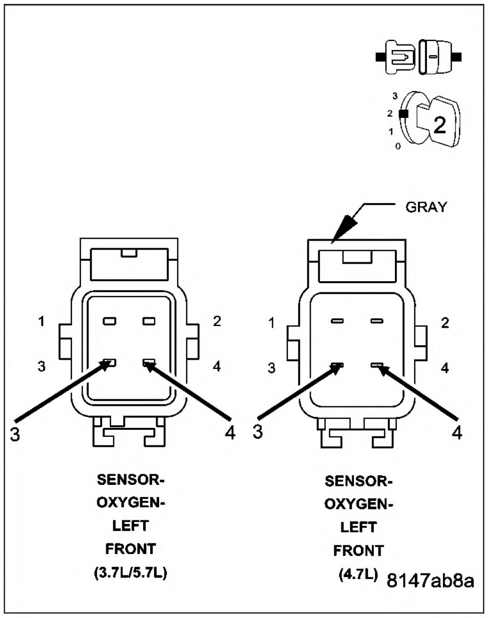
NOTE: The voltage should drop from 5.0 volts down to 2.5 volts with the jumper wire connected.

Did the O2 Sensor voltage drop from 5 volts to 2.5 volts when the jumper wire was installed?

Yes >> Replace the 1/1 O2 Sensor
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

NOTE: Remove the jumper wire before continuing.


3
2
1
0
2
GRAY
1
2
3
4
3
4
1
2
3
4
3
4
SENSOR-OXYGEN-LEFT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-LEFT FRONT (4.7L)
8147ab8a

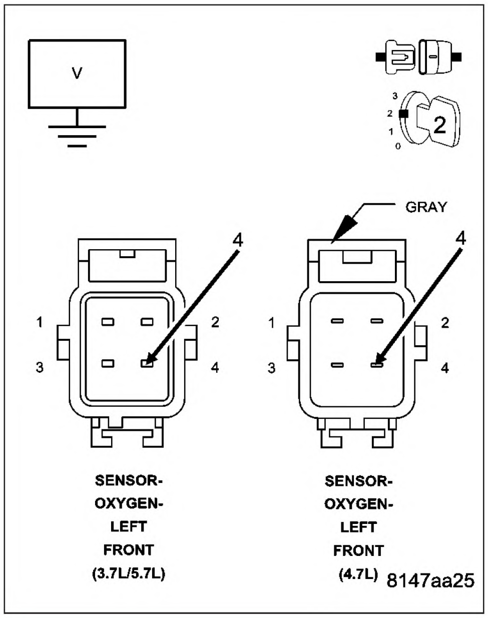
P0172-FUEL SYSTEM 1/1 RICH (CONTINUED)

10. (K41) O2 SENSOR 1/1 SIGNAL CIRCUIT

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Start the engine.

Measure the voltage on the (K41) O2 Sensor 1/1 Signal circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
GRAY
4
4
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147aa25

Is the voltage above 4.8 volts?

Yes >> Check the (K41) O2 Sensor 1/1 Signal circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

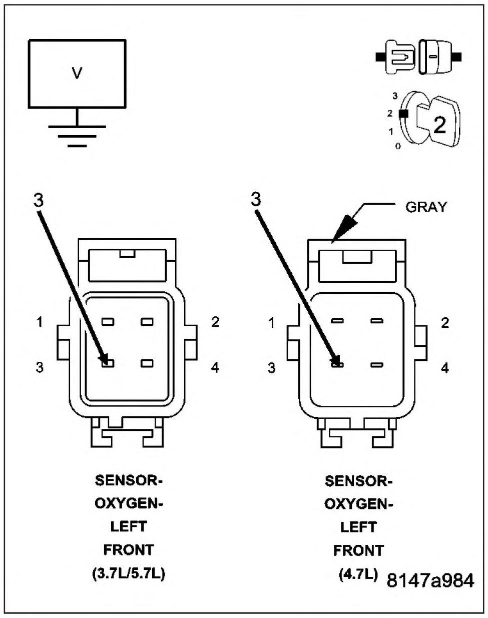
No >> Go To 11

---

11. (K902) O2 SENSOR RETURN UPSTREAM CIRCUIT

Engine still running.

Measure the voltage on the (K902) O2 Return Upstream circuit in the 1/1 O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
8147a984

Is the voltage at 2.5 volts?

Yes >> Go To 12

No >> Check the (K902) O2 Return Upstream circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Turn the ignition off before continuing.

P0172-FUEL SYSTEM 1/1 RICH (CONTINUED)

12. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

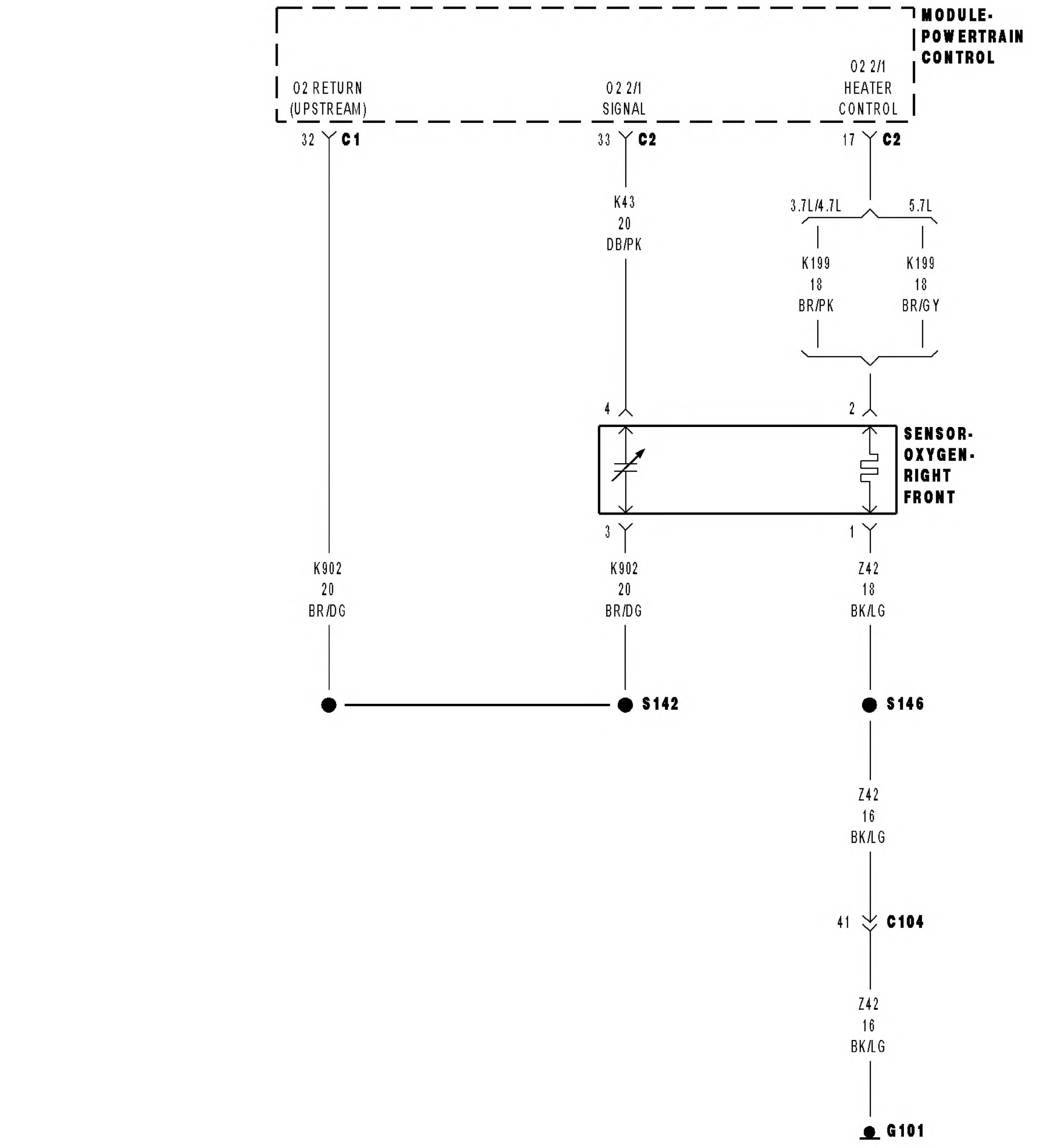
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

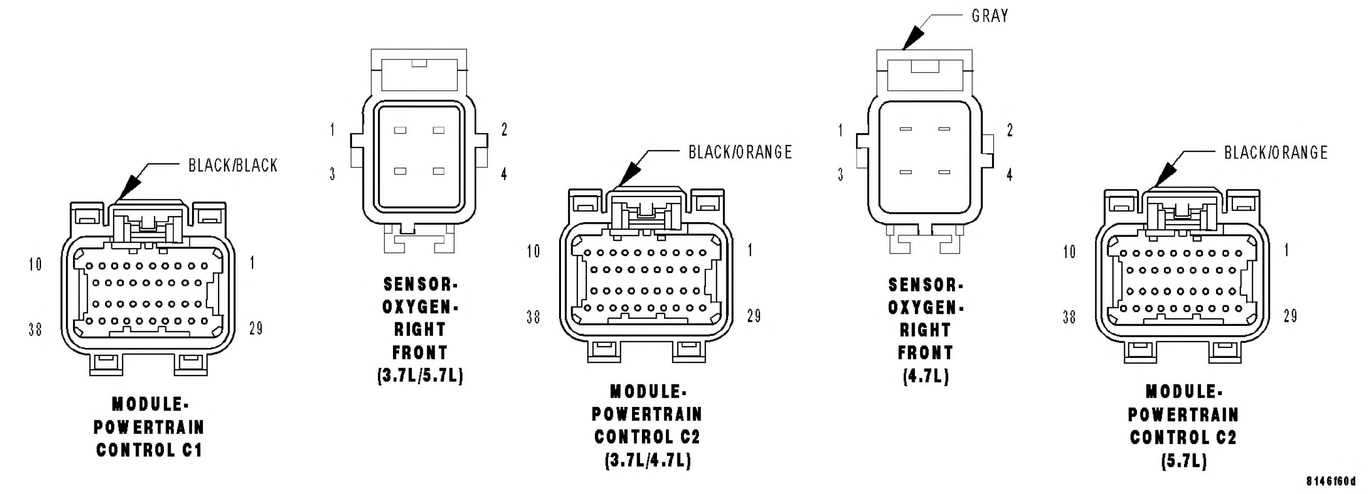
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0174-FUEL SYSTEM 2/1 LEAN


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0174-FUEL SYSTEM 2/1 LEAN (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The fuel feedback system will maintain a stoiciometric fuel/air mixture, 14.7:1, by modifying the injector pulsewidth according to the oxygen content of the exhaust gas. The PCM makes short term and long term fuel corrections to maintain stoiciometric fuel/air ratio for best catalytic converter efficiency. Short term fuel correction is based on upstream O2 sensor output and is designed for quick engine response. The long term fuel correction compensated for variations in the engine specifications, sensor tolerances and component aging and is designed to correct rich and lean conditions over a longer period of time.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
O2 SENSOR HEATER OPERATION
O2 SENSOR
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Diagnose all other trouble codes before continuing.

NOTE: Check for contaminants that may have damaged an O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0174-FUEL SYSTEM 2/1 LEAN (CONTINUED)

2. CHECKING FUEL PRESSURE

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Turn the ignition off.

CAUTION: Stop All Actuations.

Choose a conclusion that best matches your fuel pressure reading.

Within Specification

Go To 3

Above Specification

Replace the fuel filter/pressure regulator.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

Below Specification

Go To 12

---

3. O2 SENSOR OPERATION

Start the engine.

Allow the engine to reach normal operating temperature.

NOTE: If one of the O2 Sensor's Signal or Return circuit is shorted to ground the scan tool will display all O2 Sensor voltage readings low. The O2 Sensor that is shorted to ground will display a voltage reading near or at 0 volts.

NOTE: If one of the O2 Sensor Signal or Return circuits are shorted to voltage, the scan tool will display all O2 Sensor voltage readings high.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.

With the scan tool, monitor the 2/1 O2 Sensor voltage reading.

Is the voltage switching between 2.5 and 3.4 volts?

Yes >> Go To 4

No >> Go To 8

P0174-FUEL SYSTEM 2/1 LEAN (CONTINUED)

4. 2/1 O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

NOTE: Perform the following test on all O2 Sensors.

Ignition on, engine not running.

With a scan tool, actuate the 2/1 O2 Heater Test.

With the scan tool, monitor 2/1 O2 Sensor voltage for at least 2 minutes.

Does the voltage stay above 4.5 volts?

Yes >> Replace the 2/1 O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. MAP SENSOR OPERATION

Turn the ignition off.

Connect a Vacuum Gauge to a Manifold Vacuum source.

Start the engine.

Allow the engine to idle.

NOTE: If engine will not idle, maintain a constant RPM above idle.

With the scan tool, read the MAP Sensor vacuum value.

Is the scan tool reading within 1″ of the Vacuum Gauge reading?

Yes >> Go To 6

No >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. ECT SENSOR OPERATION

NOTE: For this test to be valid, the thermostat must be operating correctly.

NOTE: This test works best if performed on a cold engine (cold soak).

Ignition on, engine not running.

With the scan tool, read the Engine Coolant Temperature (ECT) Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up, monitor the ECT Sensor value. The temperature value change should be a smooth transition from start up to normal operating temperature 82°C (180°F). The value should reach at least 82°C (180°F).

Did the ECT value increase smoothly and did it reach at least 180°F (82°C)?

Yes >> Go To 7

No >> Replace the Engine Coolant Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0174-FUEL SYSTEM 2/1 LEAN (CONTINUED)

7. ENGINE MECHANICAL

Turn the ignition off.

Check for any of the following conditions/mechanical problems.

AIR INDUCTION SYSTEM - must be free from leaks.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

---

8. O2 SENSOR

Ignition on, engine not running.

Disconnect the 2/1 O2 Sensor harness connector.

With the scan tool, monitor the 2/1 O2 Sensor voltage.

O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Connect a jumper wire between the (K43) O2 Sensor 2/1 Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

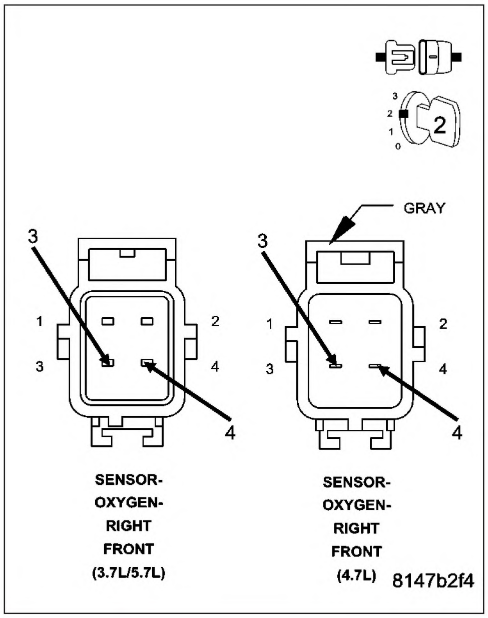
NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.

Did the O2 Sensor voltage change from 5.0 volts to 2.5 volts when the jumper wire was installed?

Yes >> Replace the 2/1 O2 Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

NOTE: Remove the jumper wire before continuing.



P0174-FUEL SYSTEM 2/1 LEAN (CONTINUED)

9. O2 SENSOR SIGNAL CIRCUIT

With the scan tool, monitor all the O2 Sensor voltage reading with the jumper wire removed.

NOTE: The scan tool will display all O2 Sensor voltage readings approximately 5.0 volts when only one O2 Sensor's Signal circuit is shorted to voltage.

NOTE: The scan tool will display one O2 Sensor voltage close to zero and the others will read lower than normal when one O2 Sensor Signal circuit contains excessive resistance.

Is the voltage above 4.8 volts?

Yes >> Go To 10

No >> Check all the O2 Signal circuits for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

10. (K902) O2 RETURN UPSTREAM CIRCUIT

Disconnect the 2/1 O2 Sensor harness connector.

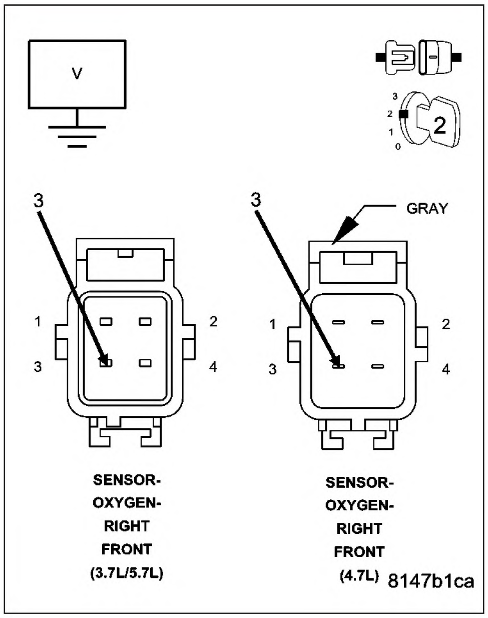
Measure the voltage on the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

Is the voltage at 2.5 volts?

Yes >> Go To 11

No >> Check the (K902) O2 Return Upstream circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-RIGHT FRONT (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT FRONT (4.7L)
8147b1ca

---

11. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0174-FUEL SYSTEM 2/1 LEAN (CONTINUED)

12. RESTRICTED FUEL SUPPLY LINE

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special 5/16 fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module.

Attach a fuel pressure test gauge to the T fitting on tool #6539.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

CAUTION: Stop All Actuations.

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

---

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

---

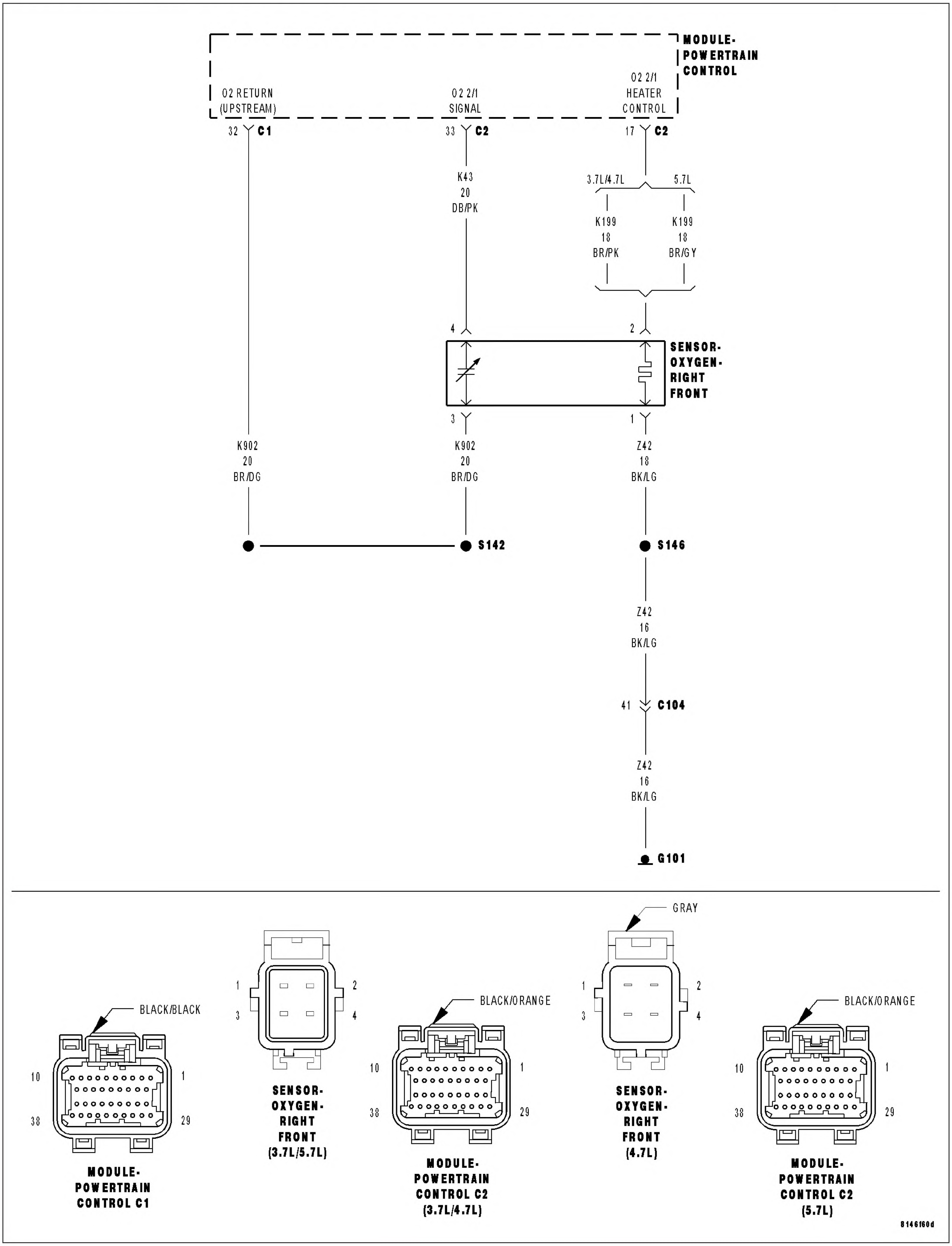
14. FUEL PUMP MODULE

If there are no possible causes remaining, view repair.

Repair

Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0175-FUEL SYSTEM 2/1 RICH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0175-FUEL SYSTEM 2/1 RICH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The fuel feedback system will maintain a stoiciometric fuel/air mixture, 14.7:1, by modifying the injector pulsewidth according to the oxygen content of the exhaust gas. The PCM makes short term and long term fuel corrections to maintain stoiciometric fuel/air ratio for best catalytic converter efficiency. Short term fuel correction is based on upstream O2 sensor output and is designed for quick engine response. The long term fuel correction compensated for variations in the engine specifications, sensor tolerances and component aging and is designed to correct rich and lean conditions over a longer period of time.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8500 ft.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive and a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
O2 SENSOR HEATER OPERATION
EVAP PURGE SOLENOID OPERATION
O2 SIGNAL CIRCUIT
O2 RETURN CIRCUIT
O2 SENSOR
MAP SENSOR
ECT SENSOR
ENGINE MECHANICAL
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check for contaminates that may have damaged an O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0175-FUEL SYSTEM 2/1 RICH (CONTINUED)

2. CHECKING FUEL PRESSURE

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Turn the ignition off.

CAUTION: Stop All Actuations.

Choose a conclusion that best matches your fuel pressure reading.

Within Specification

Go To 3

Above Specification

Replace the fuel filter/pressure regulator.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. O2 SENSOR OPERATION

Start the engine.

Allow the engine to reach normal operating temperature.

NOTE: If one of the O2 Sensors Signal or Return circuit is shorted to ground or voltage, all the other O2 Sensor voltage readings will be affected.

NOTE: After the repairs have been made, verify proper O2 Sensor operation. If all the O2 Sensor voltage readings have not returned to normal, follow the diagnostic procedure for the remaining O2 Sensors.

With the scan tool, monitor the 2/1 O2 Sensor voltage reading.

Is the voltage switching between 2.5 and 3.4 volts?

Yes >> Go To 4

No >> Go To 9

---

4. 2/1 O2 SENSOR HEATER OPERATION

Turn the ignition off.

NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize at 5.0 volts.

Ignition on, engine not running.

With the scan tool, perform the 2/1 O2 Heater Test for each O2 Sensor.

With the scan tool, monitor the 2/1 O2 Sensor voltage while performing the Heater test for at least 2 minutes.

Does the voltage stay above 4.5 volts for each Sensor?

Yes >> Replace the 2/1 O2 Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0175-FUEL SYSTEM 2/1 RICH (CONTINUED)

5. MAP SENSOR OPERATION

Turn the ignition off.

Connect a Vacuum Gauge to a Manifold Vacuum source.

Start the engine.

Allow the engine to idle.

NOTE: If engine will not idle, maintain a constant RPM above idle.

With the scan tool, read the MAP Sensor vacuum value.

Is the scan tool reading within 1″ of the Vacuum Gauge reading?

Yes >> Go To 6

No >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Remove the vacuum gauge before continuing.

---

6. ECT SENSOR OPERATION

NOTE: For this test to be valid, the thermostat must be operating correctly.

NOTE: This test works best if performed on a cold engine (cold soak).

Ignition on, engine not running.

With the scan tool, read the Engine Coolant Temperature Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up, monitor the Engine Coolant Temperature value. The temp value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F).

Did the ECT value increase smoothly and reach at least 180°F (82°C)?

Yes >> Go To 7

No >> Replace the Engine Coolant Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. EVAP PURGE SOLENOID OPERATION

Turn the ignition off.

Disconnect the hoses at the Evap Purge Solenoid.

Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side.

Did the Evap Purge Solenoid hold vacuum?

Yes >> Go To 8

No >> Replace the EVAP Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Connect the vacuum hoses before continuing.

P0175-FUEL SYSTEM 2/1 RICH (CONTINUED)

8. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

AIR INDUCTION SYSTEM - must be free from restrictions.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

---

9. 2/1 O2 SENSOR

Ignition on, engine not running.

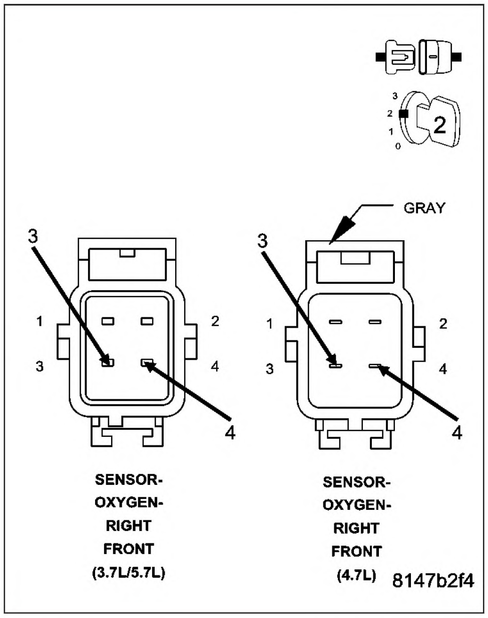
Disconnect the 2/1 O2 Sensor harness connector.

With the scan tool, monitor the 2/1 O2 Sensor voltage.

O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Connect a jumper wire between the (K43) O2 Sensor 2/1 Signal circuit and the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

NOTE: The voltage should drop from 5.0 volts down to 2.5 volts with the jumper wire connected.



Did the O2 Sensor voltage drop from 5 volts to 2.5 volts when the jumper wire was installed?

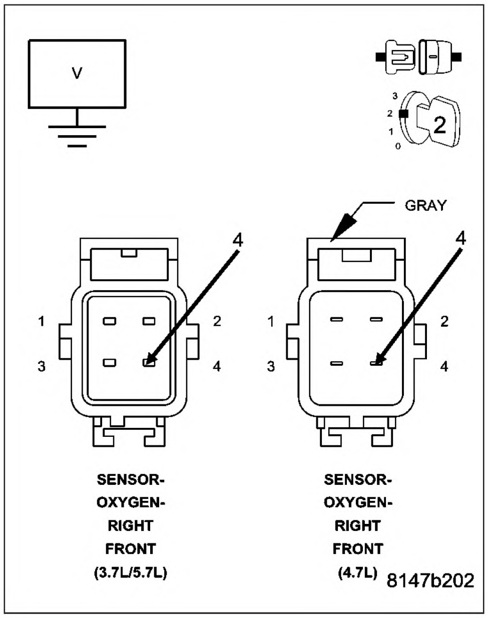
Yes >> Replace the O2 Sensor
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

NOTE: Remove the jumper wire before continuing.

P0175-FUEL SYSTEM 2/1 RICH (CONTINUED)

10. O2 SENSOR SIGNAL CIRCUIT


V
3
2
1
0
2
GRAY
4
4
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b202

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Start the engine.

Measure the voltage on the (K43) O2 Sensor 2/1 Signal circuit in the O2 Sensor harness connector.

Is the voltage above 4.8 volts?

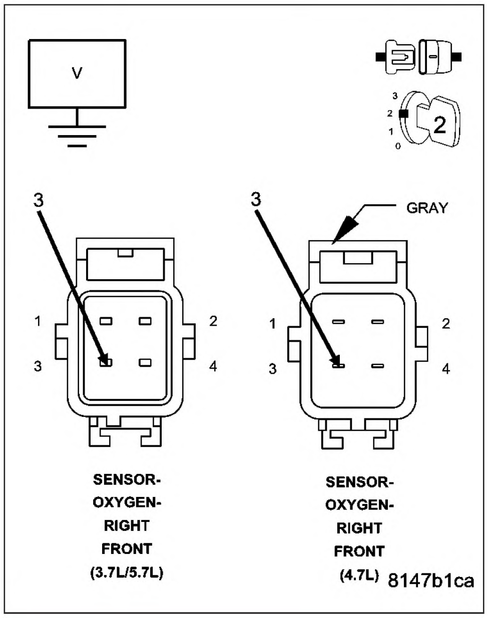
Yes >> Check the (K43) O2 Sensor 2/1 Signal circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

---

11. (K902) O2 SENSOR RETURN UPSTREAM CIRCUIT


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
8147b1ca

Engine still running.

Measure the voltage on the (K902) O2 Return Upstream circuit in the O2 Sensor harness connector.

Is the voltage at 2.5 volts?

Yes >> Go To 12

No >> Check the (K902) O2 Return Upstream circuit for damage, short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Turn the ignition off before continuing.

P0175-FUEL SYSTEM 2/1 RICH (CONTINUED)

12. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

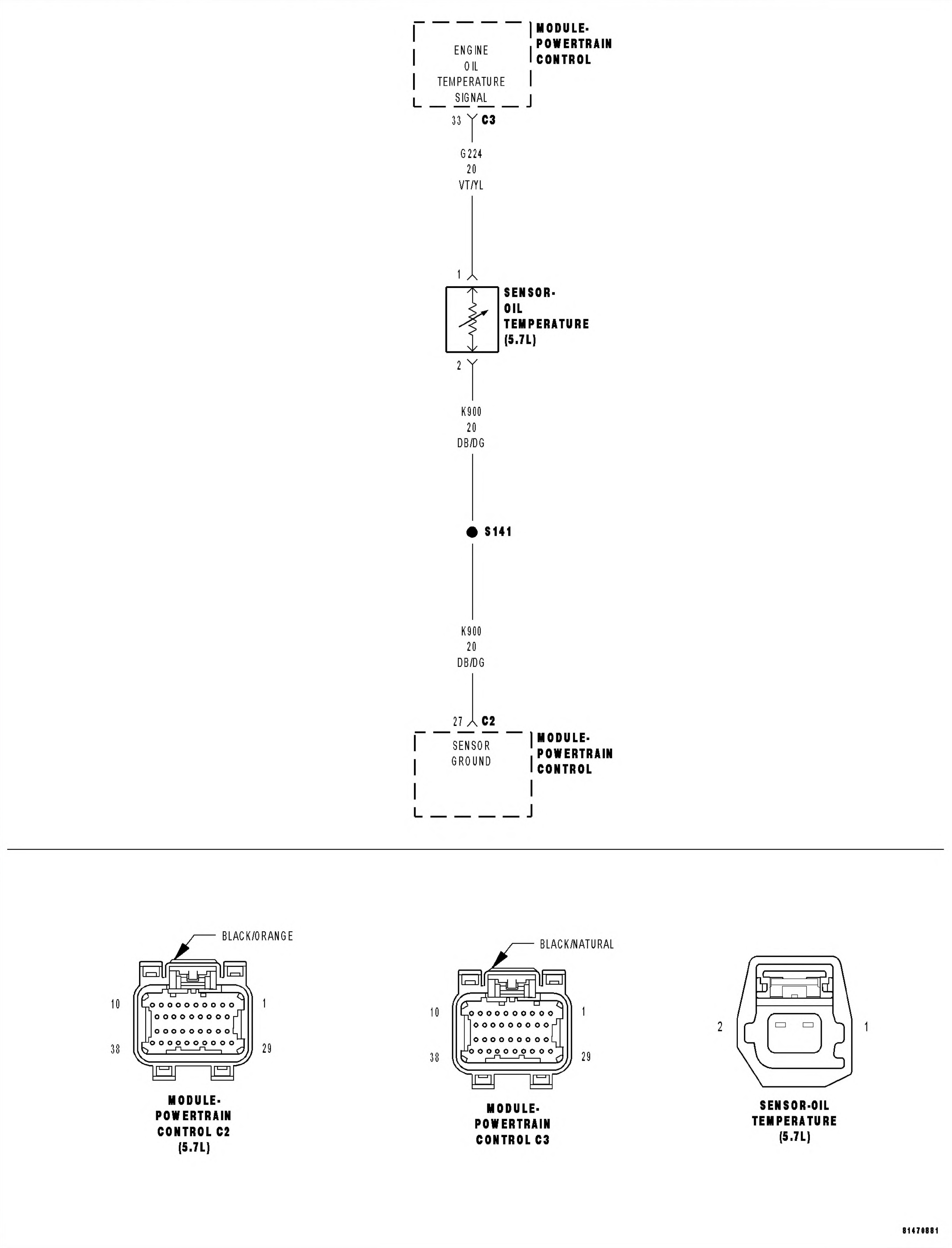
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0196–ENGINE OIL TEMPERATURE SENSOR CIRCUIT PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
ENGINE
OIL
TEMPERATURE
SIGNAL
33
C3
G224
20
VT/YL
1
SENSOR-
OIL
TEMPERATURE
(5.7L)
2
K900
20
DB/DG
S141
K900
20
DB/DG
27
C2
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
2
1
SENSOR-OIL
TEMPERATURE
(5.7L)
81470881

P0196–ENGINE OIL TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

For the Engine System Schematic circuit diagram. (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine off time is greater than 480 minutes. Ambient temperature is greater than 4 deg C (38 deg F).
- **Set Condition:**
  The PCM detects the Engine Oil Temp value is incorrect by comparing it with the other engine inputs. Three good trips to turn off the MIL.

Possible Causes
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO GROUND
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
ENGINE OIL TEMPERATURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

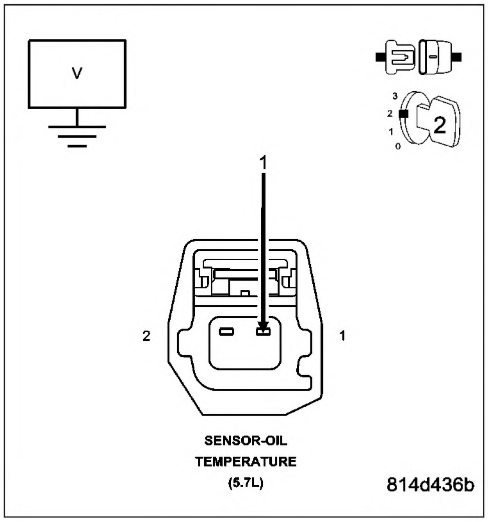
Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0196–ENGINE OIL TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

2. (G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE



Turn the ignition off.

Disconnect the C3 PCM harness connector.

Disconnect the Engine Oil Temp Sensor harness connector.

NOTE: Visually inspect both the component and the PCM connectors. Look for damaged, partially broken wires, and backed out or corroded terminals.

Ignition on, engine not running.

Measure the voltage on the (G224) Engine Oil Temp Signal circuit in the Engine Oil Temp Sensor harness connector.

Is the voltage above 5.2 volts?

Yes >> Repair the short to battery voltage in the (G224) Engine Oil Temp Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. ENGINE OIL TEMP SENSOR VOLTAGE ABOVE 4.6 VOLTS

Turn the ignition off.

Connect the C3 PCM harness connector.

Ignition on, engine not running.

With a scan tool, read the Engine Oil Temp voltage.

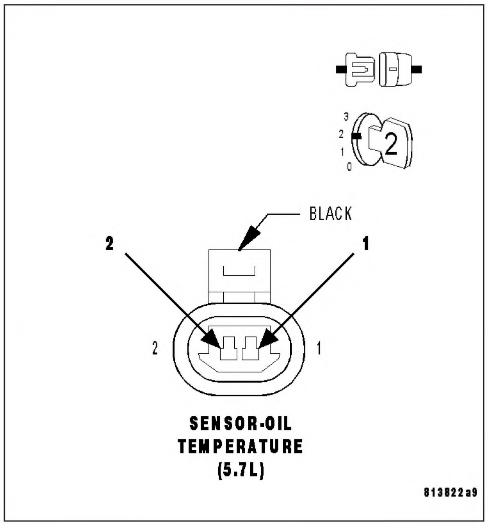
Is the voltage above 4.6 volts?

Yes >> Go To 4

No >> Go To 7

---

4. ENGINE OIL TEMP SENSOR



Connect a jumper wire between the (G224) Engine Oil Temp Signal circuit and the (K900) Sensor ground circuit in the Engine Oil Temp Sensor harness connector.

With a scan tool, read the Engine Oil Temp voltage.

Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the Engine Oil Temp Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

P0196–ENGINE OIL TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

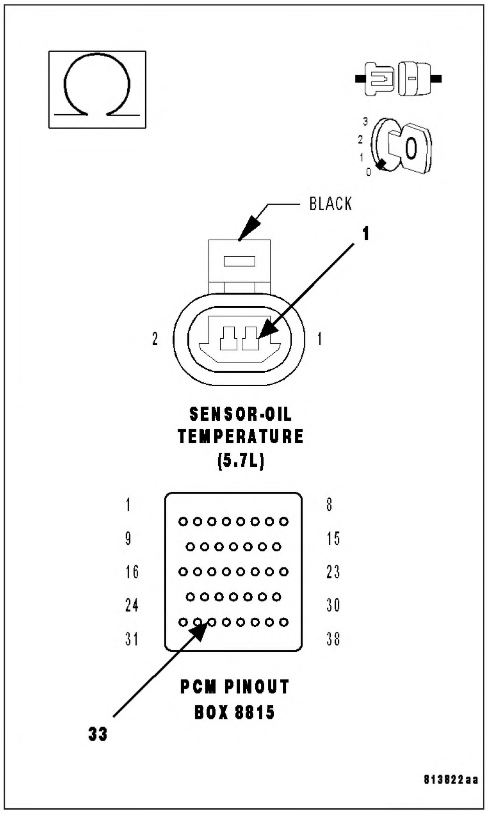
5. (G224) ENGINE OIL TEMP SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (G224) Engine Oil Temp Signal circuit from the Engine Oil Temp Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
BLACK
1
2
1
SENSOR-OIL TEMPERATURE (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
33
813822aa

Is the resistance below 5.0 ohms?

Yes >> Go To 6

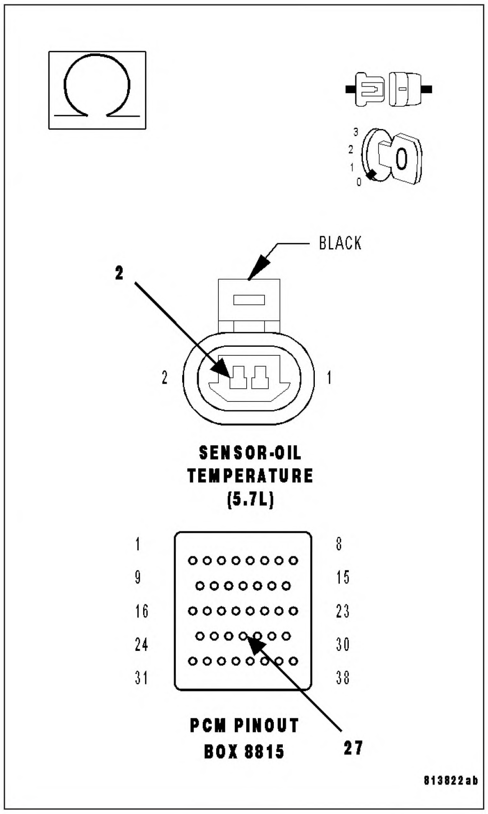
No >> Repair the open in the (G224) Engine Oil Temp Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the Engine Oil Temp Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
BLACK
2
2
1
SENSOR-OIL TEMPERATURE (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
27
813822ab

Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the open in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

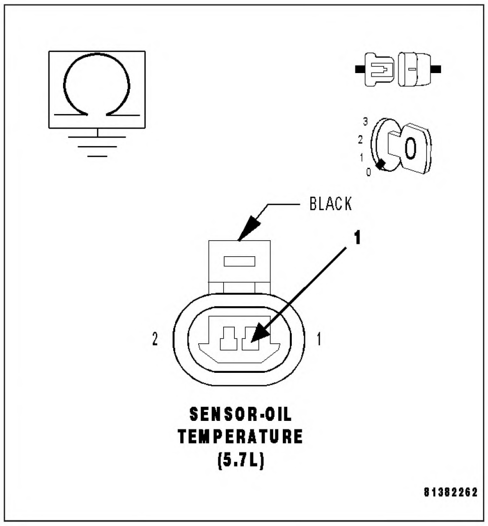
P0196–ENGINE OIL TEMPERATURE SENSOR CIRCUIT PERFORMANCE (CONTINUED)

7. (G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 and C3 PCM harness connectors.

Measure the resistance between ground and the (G224) Engine Oil Temp Signal circuit in the Engine Oil Temp Sensor harness connector.



Is the resistance below 100 ohms?

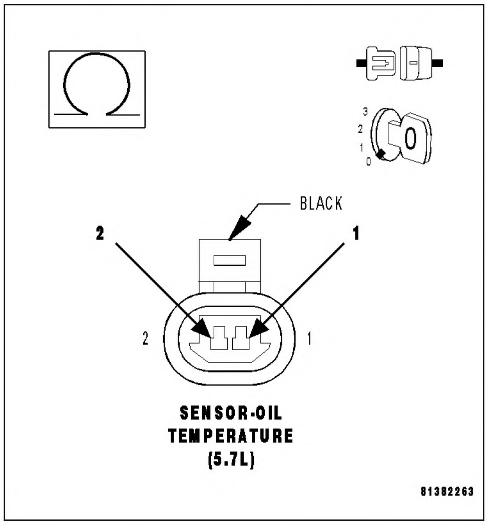
Yes >> Repair the short to ground in the (G224) Engine Oil Temp Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. (G224) ENGINE OIL TEMP SIGNAL SHORTED TO THE (K900) SENSOR GROUND

Measure the resistance between the (G224) Engine Oil Temp Signal circuit and the (K900) Sensor ground circuit in the Engine Oil Temp Sensor harness connector.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K900) Sensor ground and the (G224) Engine Oil Temp Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

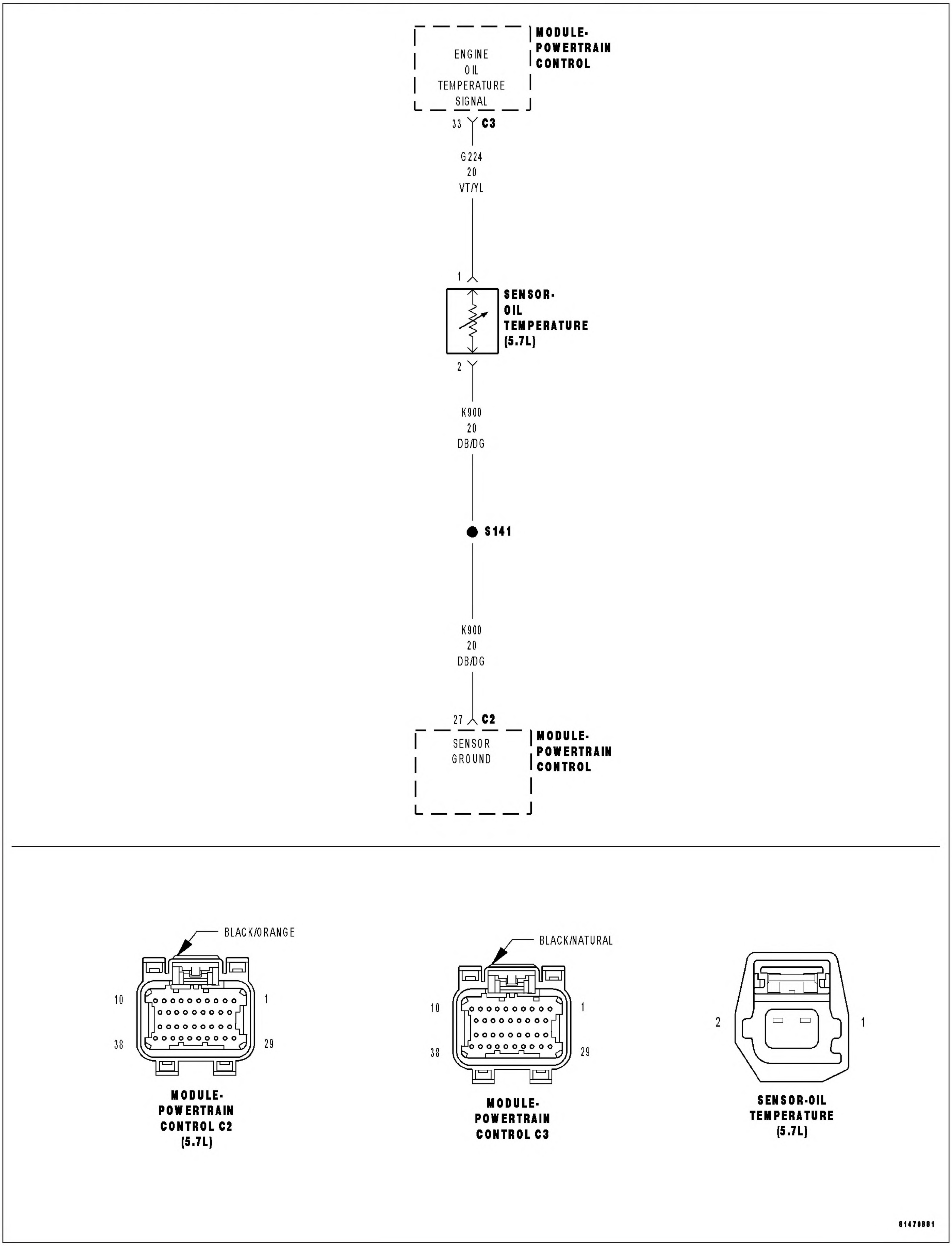
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0197-ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
ENGINE
OIL
TEMPERATURE
SIGNAL
33
C3
G224
20
VT/YL
1
SENSOR-
OIL
TEMPERATURE
(5.7L)
2
K900
20
DB/DG
S141
K900
20
DB/DG
27
C2
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
2
1
SENSOR-OIL
TEMPERATURE
(5.7L)
81470881

P0197-ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts.
- **Set Condition:**
  The Engine Oil Temperature sensor circuit voltage at the PCM is less than the calibrated amount. One Trip Fault. Three good trips to clear the MIL.

Possible Causes
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO GROUND
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
ENGINE OIL TEMPERATURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. ENGINE OIL TEMPERATURE SENSOR

Turn the ignition off.

Disconnect the Engine Oil Temp Sensor harness connector.

Ignition on, engine not running.

With a scan tool, read Engine Oil Temp voltage.

Is the voltage above 1.0 volt?

Yes >> Replace the Engine Oil Temp Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

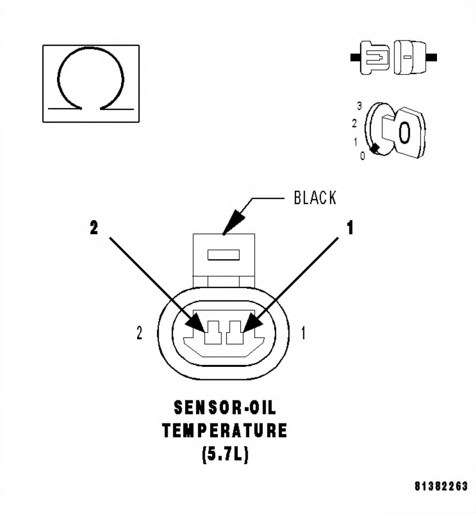
P0197-ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW (CONTINUED)

3. (G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the C2 and C3 PCM harness connectors.

Measure the resistance between the (K900) Sensor ground circuit and the (G224) Engine Oil Temp Signal circuit in the Engine Oil Temp Sensor harness connector.



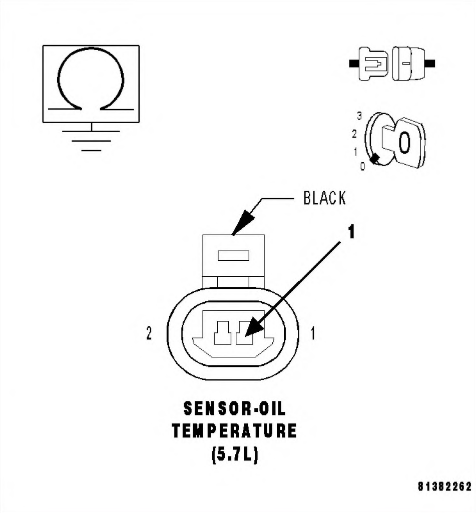
Is the resistance below 5.0 ohms?

Yes >> Repair the short to between the (K900) Sensor ground circuit and the (G224) Engine Oil Temp Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. (G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED GROUND

Measure the resistance between ground and the (G224) Engine Oil Temp Signal circuit in the Engine Oil Temp Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (G224) Engine Oil Temp Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

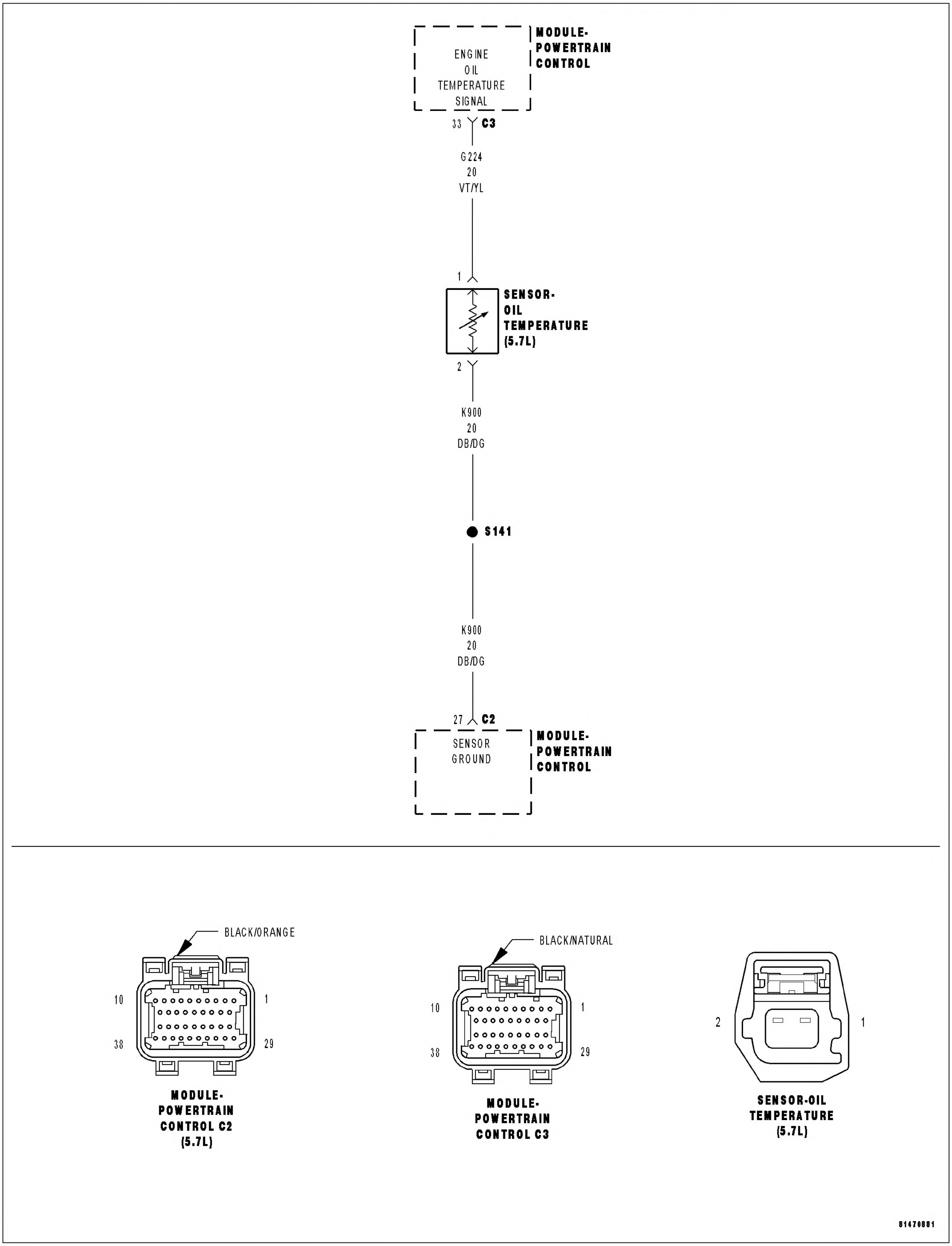
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0198-ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
ENGINE
OIL
TEMPERATURE
SIGNAL
33
C3
G224
20
VT/YL
1
SENSOR-
OIL
TEMPERATURE
(5.7L)
2
K900
20
DB/DG
S141
K900
20
DB/DG
27
C2
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
2
1
SENSOR-OIL
TEMPERATURE
(5.7L)
81470881

P0198-ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts.
- **Set Condition:**
  The Engine Oil Temperature sensor circuit voltage at the PCM is greater than the calibrated amount. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(G224) ENGINE OIL TEMP SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
ENGINE OIL TEMPERATURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

IS the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0198-ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

2. ENGINE OIL TEMP SENSOR

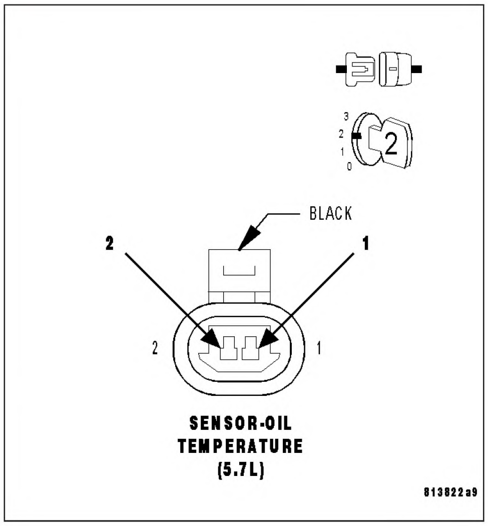
Turn the ignition off.

Disconnect the Engine Oil Temp Sensor harness connector.

Connect a jumper wire between the (G224) Engine Oil Temp Signal circuit and the (K900) Sensor ground circuit in the Engine Oil Temp Sensor harness connector.

Ignition on, engine not running.

With a scan tool, read Engine Oil Temp voltage.



Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the Engine Oil Temp Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.

---

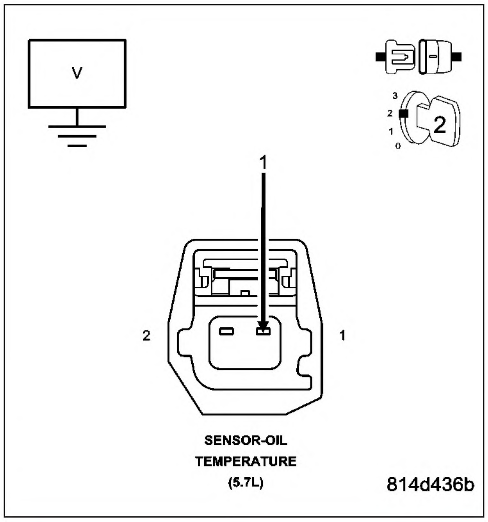
3. (G224) ENGINE OIL TEMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 and C3 PCM harness connectors.

Ignition on, engine not running.

Measure the voltage on the (G224) Engine Oil Temp Signal circuit in the Engine Oil Temp Sensor harness connector.



Is the voltage above 5.2 volts?

Yes >> Repair the short to battery voltage in the (G224) Engine Oil Temp Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P0198-ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

4. (G224) ENGINE OIL TEMP SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

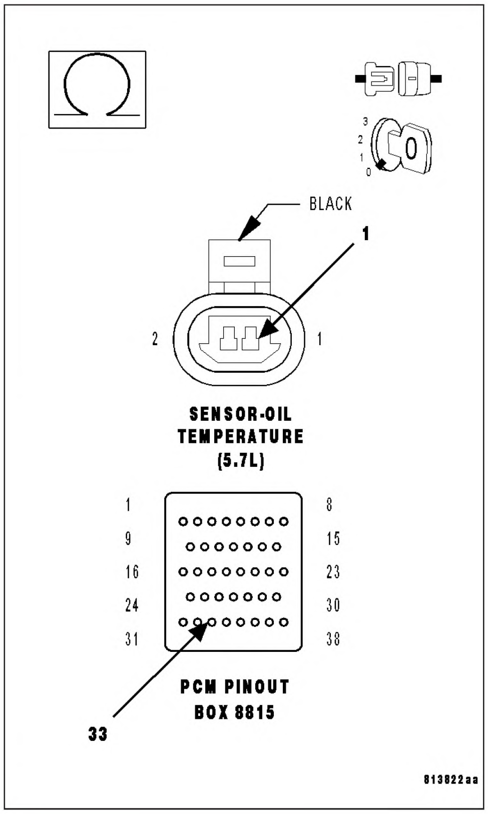
Measure the resistance of the (G224) Engine Oil Temp Signal circuit from the Engine Oil Temp Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (G224) Engine Oil Temp Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
BLACK
1
2
1
SENSOR-OIL TEMPERATURE (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
33
813822aa

---

5. (K900) SENSOR GROUND CIRCUIT OPEN

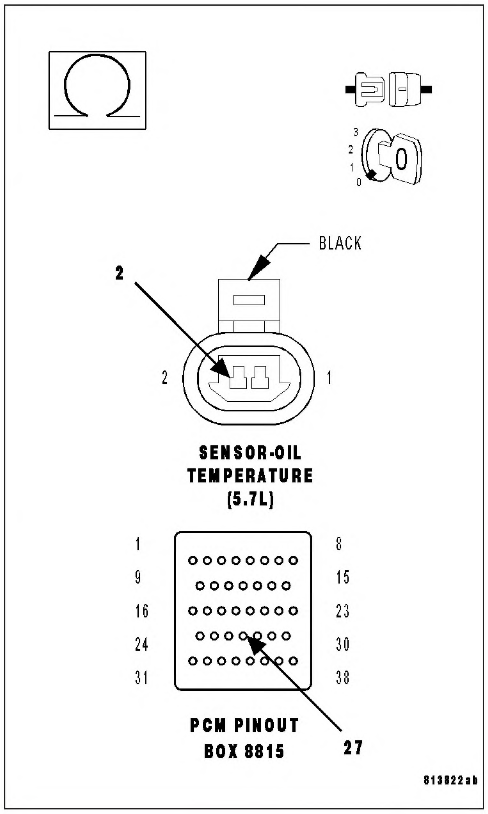
Measure the resistance of the (K900) Sensor ground circuit from the Engine Oil Temp Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
BLACK
2
2
1
SENSOR-OIL TEMPERATURE (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
27
813822ab

P0198-ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH (CONTINUED)

6. PCM

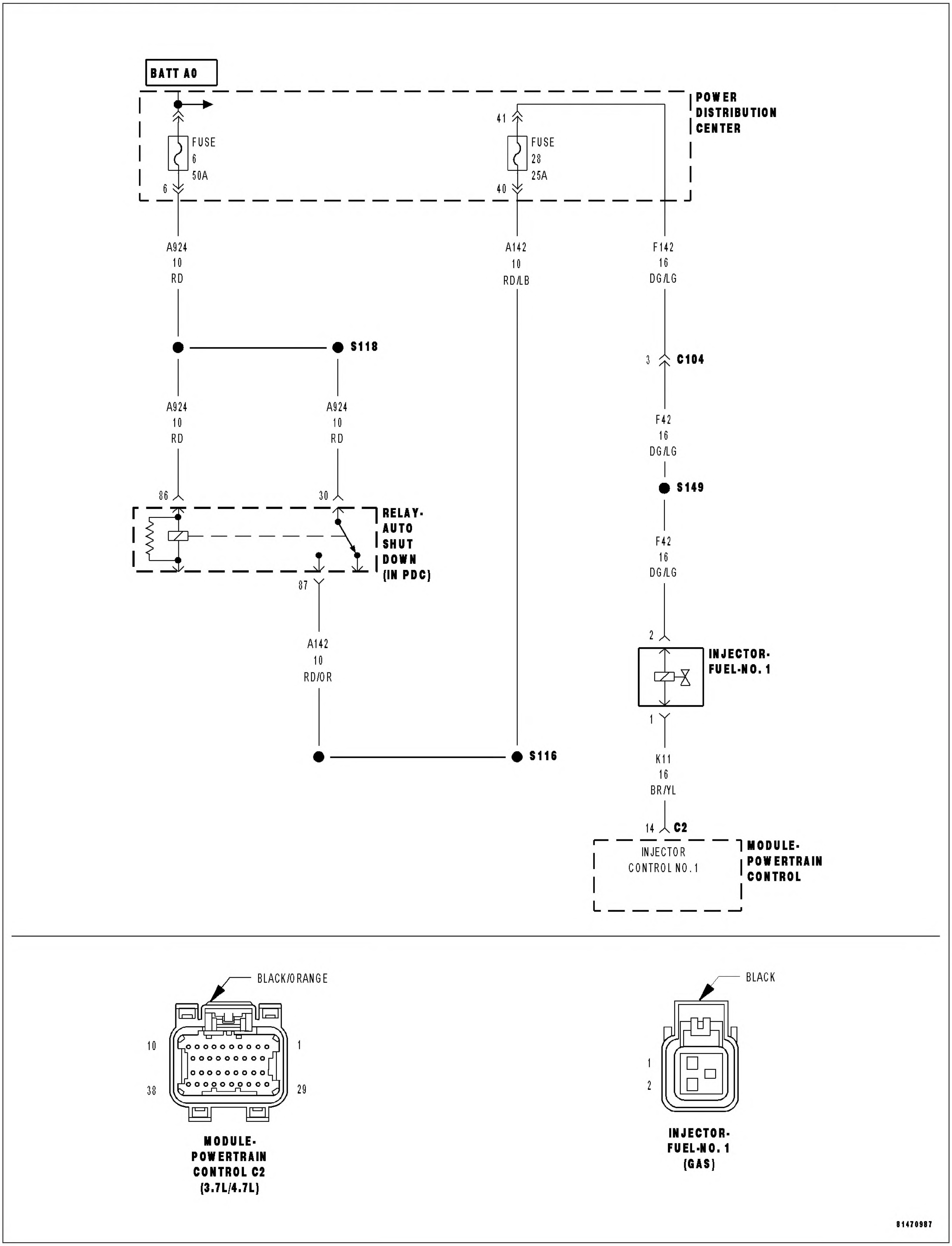
NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0201-FUEL INJECTOR 1 CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
F142 16 DG/LG
S118
3 C104
A924 10 RD
A924 10 RD
F42 16 DG/LG
S149
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
87
F42 16 DG/LG
2
INJECTOR-FUEL-NO. 1
1
A142 10 RD/OR
S116
K11 16 BR/YL
14 C2
INJECTOR CONTROL NO. 1
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK
1
2
INJECTOR-FUEL-NO. 1 (GAS)
81470987

P0201-FUEL INJECTOR 1 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K11) INJECTOR CONTROL NO.1 CIRCUIT OPEN
(K11) INJECTOR CONTROL NO.1 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

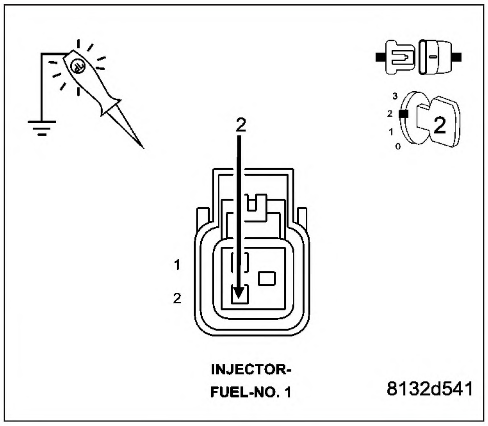
Turn the ignition off.

Disconnect the No.1 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the Fuel Injector harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

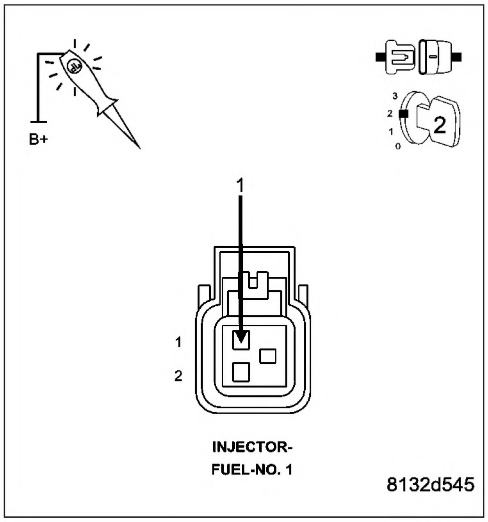
No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0201-FUEL INJECTOR 1 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K11) Injector Control No.1 circuit.

With the scan tool, actuate the Fuel Injector.



What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

Go To 5

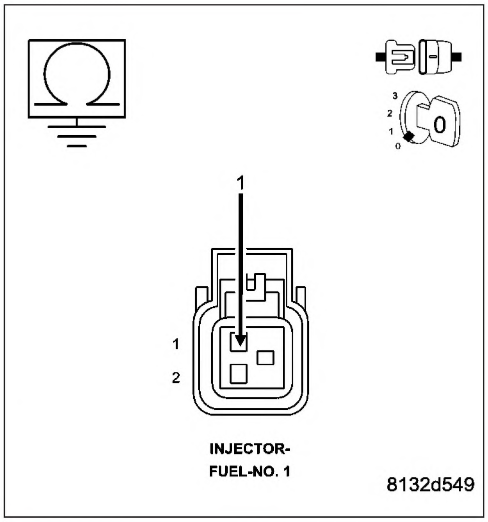
---

4. (K11) INJECTOR CONTROL NO.1 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K11) Injector Control No.1 circuit in the Injector harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K11) Injector Control No.1 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0201-FUEL INJECTOR 1 CIRCUIT (CONTINUED)

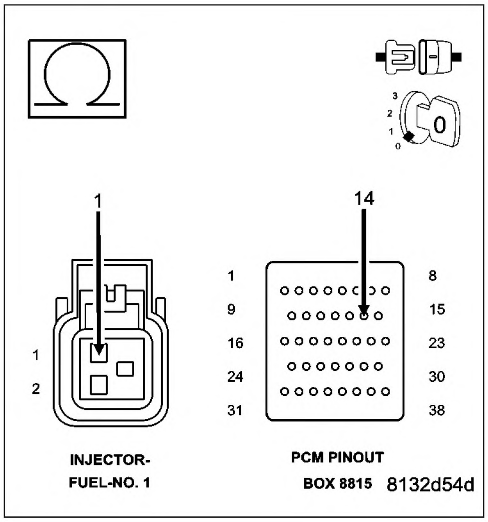
5. (K11) INJECTOR CONTROL NO.1 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K11) Injector Control No.1 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K11) Injector Control No.1 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

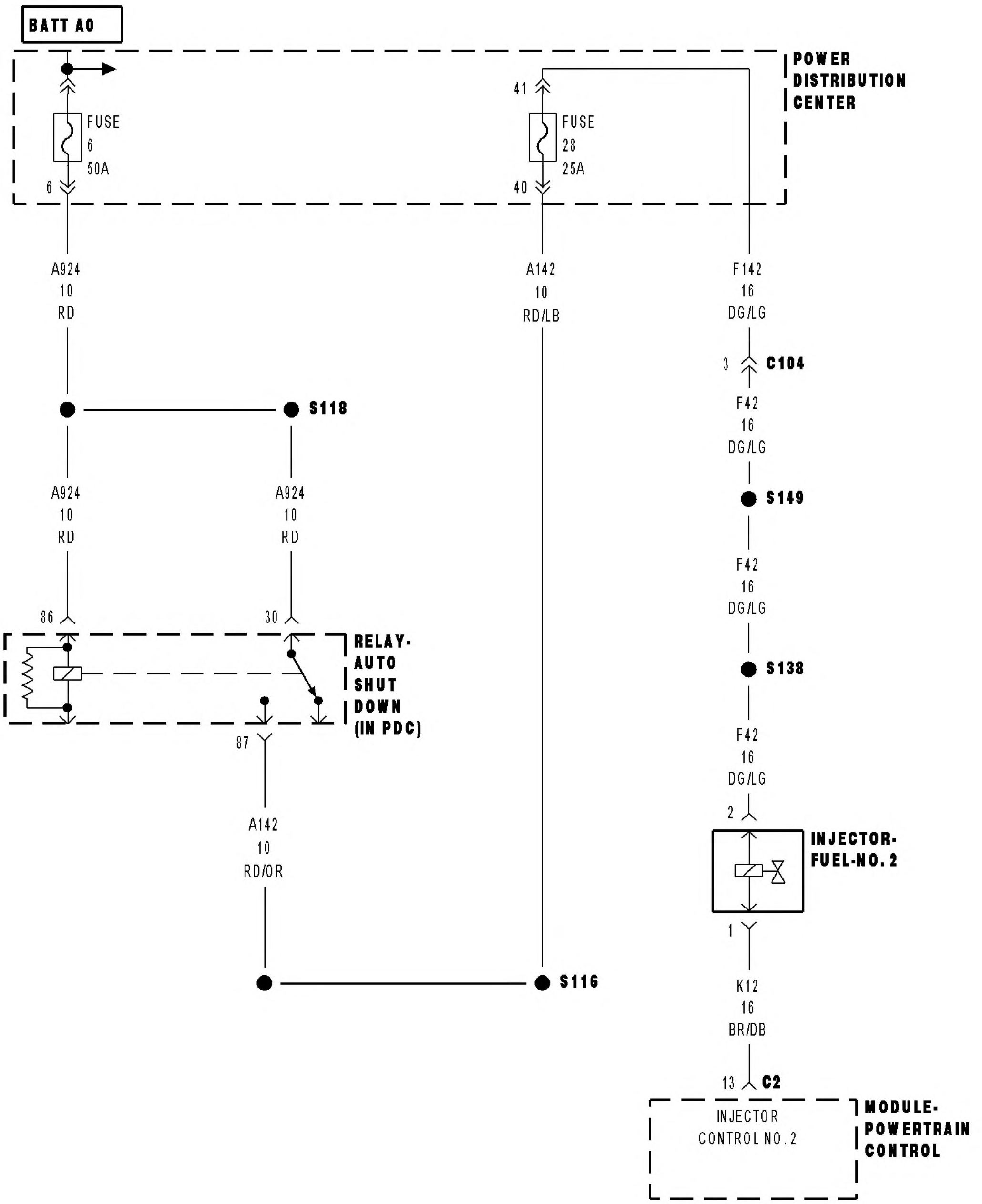
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

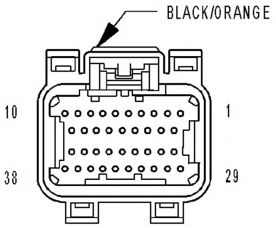
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

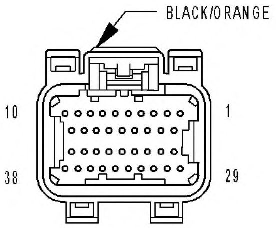
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0202-FUEL INJECTOR 2 CIRCUIT

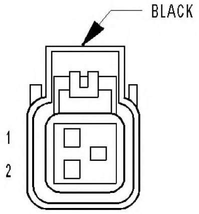

BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
F142 16 DG/LG
3 C104
F42 16 DG/LG
S118
S149
A924 10 RD
A924 10 RD
F42 16 DG/LG
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
S138
87
F42 16 DG/LG
2
A142 10 RD/OR
INJECTOR-FUEL-NO. 2
1
S116
K12 16 BR/DB
13 C2
INJECTOR CONTROL NO. 2
MODULE-POWERTRAIN CONTROL


BLACK/ORANGE
10
1
38
29

MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)


BLACK/ORANGE
10
1
38
29

MODULE-POWERTRAIN CONTROL C2 (5.7L)



INJECTOR-FUEL-NO. 2 (GAS)

81470ad5

P0202-FUEL INJECTOR 2 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K12) INJECTOR CONTROL NO.2 CIRCUIT OPEN
(K12) INJECTOR CONTROL NO.2 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

Disconnect the No.2 Fuel Injector harness connector.

Ignition on, engine not running.

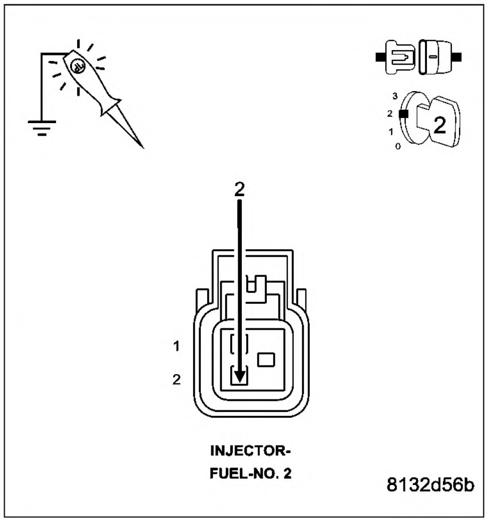
With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the No.2 Fuel Injector harness connector.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



P0202-FUEL INJECTOR 2 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K12) Injector Control No.2 circuit.

With the scan tool, actuate the No.2 Fuel Injector.

What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

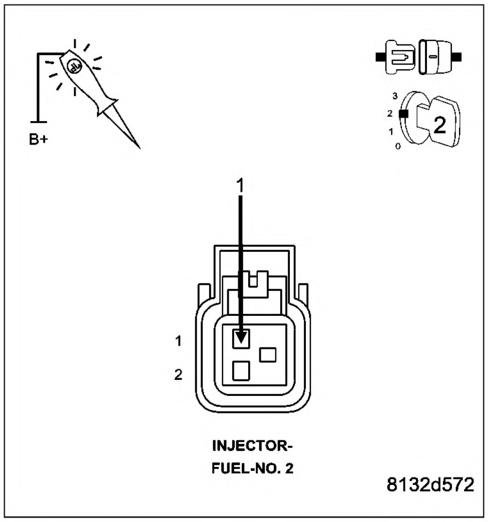
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

Go To 5



---

4. (K12) INJECTOR CONTROL NO.2 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

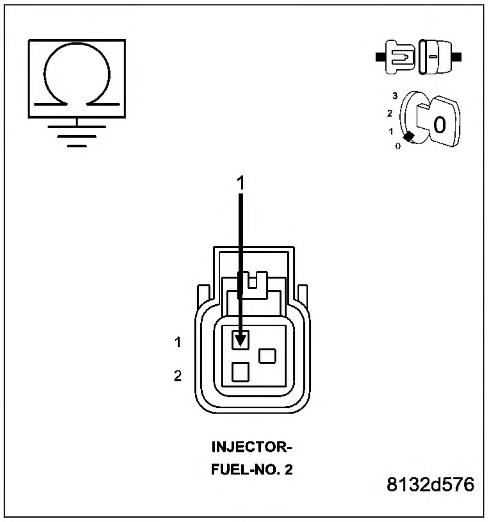
Measure the resistance between ground and the (K12) Injector Control No.2 circuit in the Injector harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K12) Injector Control No.2 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6



P0202-FUEL INJECTOR 2 CIRCUIT (CONTINUED)

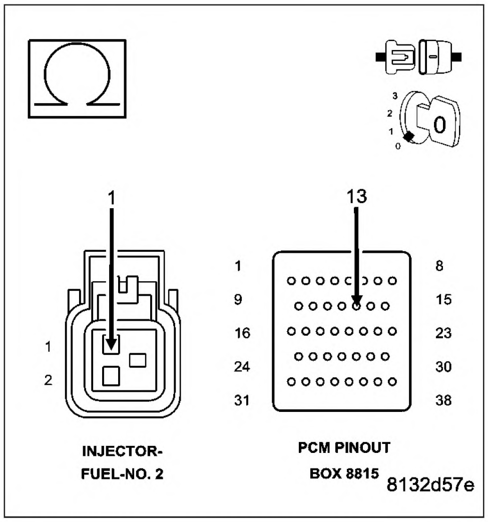
5. (K12) INJECTOR CONTROL NO.2 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K12) Injector Control No.2 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K12) Injector Control No.2 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

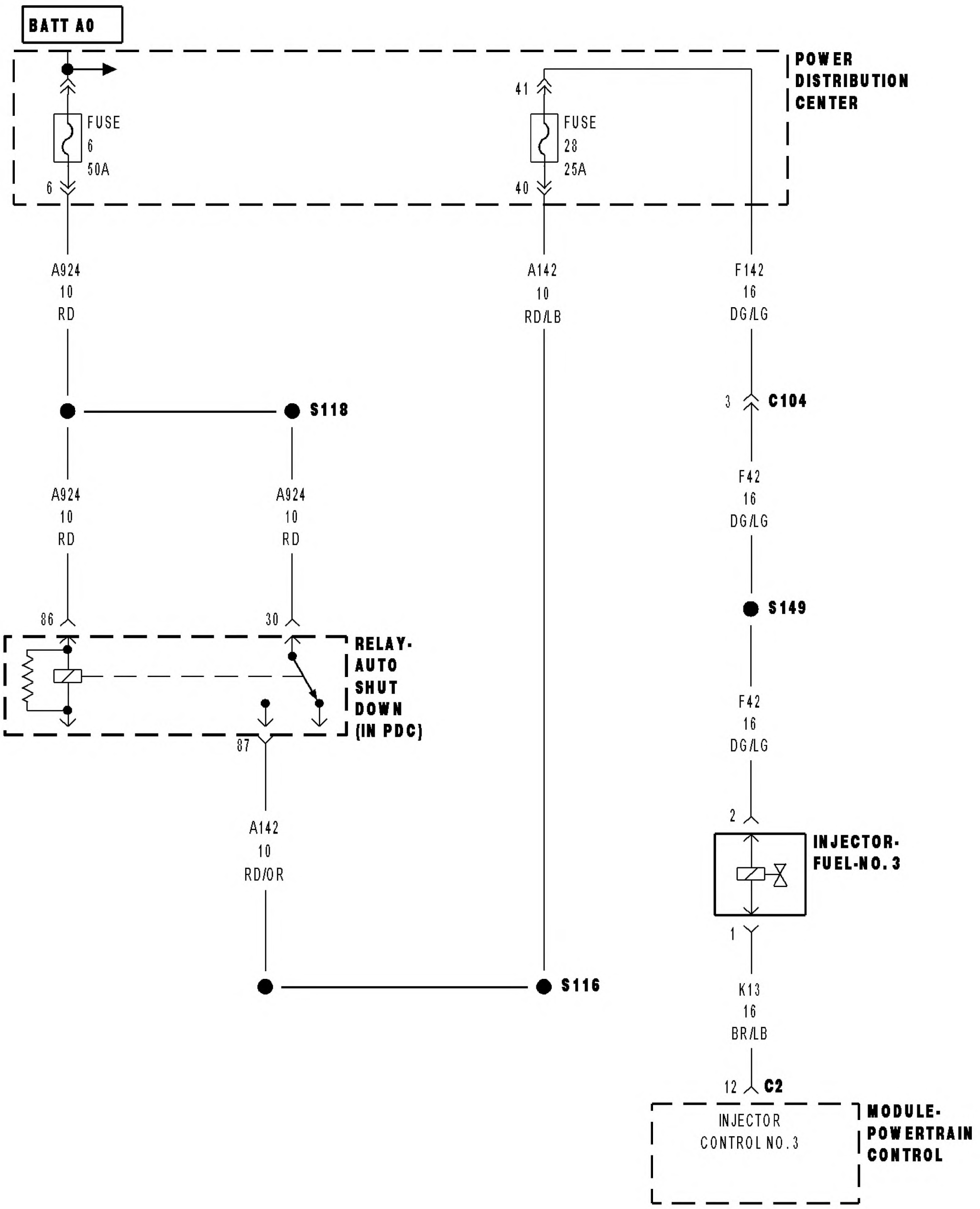
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

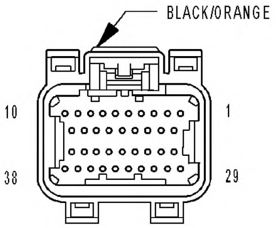
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

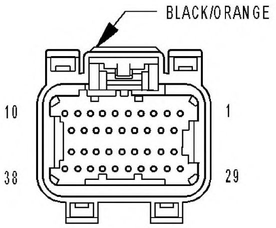
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0203-FUEL INJECTOR 3 CIRCUIT

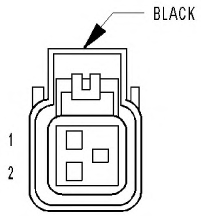

BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
F142 16 DG/LG
S118
3
C104
A924 10 RD
A924 10 RD
F42 16 DG/LG
S149
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
87
F42 16 DG/LG
2
INJECTOR-FUEL-NO. 3
1
A142 10 RD/OR
S116
K13 16 BR/LB
12
C2
INJECTOR CONTROL NO. 3
MODULE-POWERTRAIN CONTROL


BLACK/ORANGE
10
1
38
29

MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)


BLACK/ORANGE
10
1
38
29

MODULE-POWERTRAIN CONTROL C2 (5.7L)



INJECTOR-FUEL-NO. 3 (GAS)

81470a13

P0203-FUEL INJECTOR 3 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K13) INJECTOR CONTROL NO.3 CIRCUIT OPEN
(K13) INJECTOR CONTROL NO.3 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

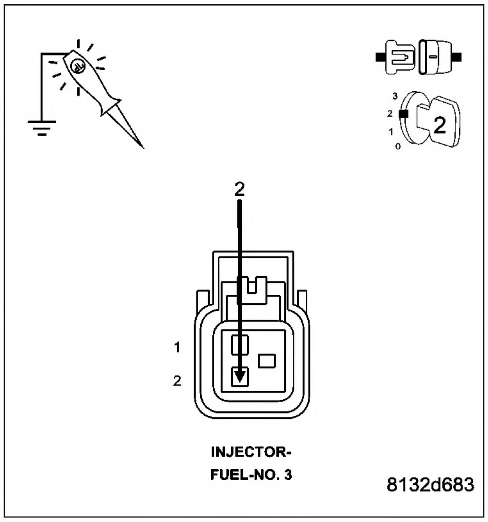
Turn the ignition off.

Disconnect the No.3 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the No.3 Fuel Injector harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

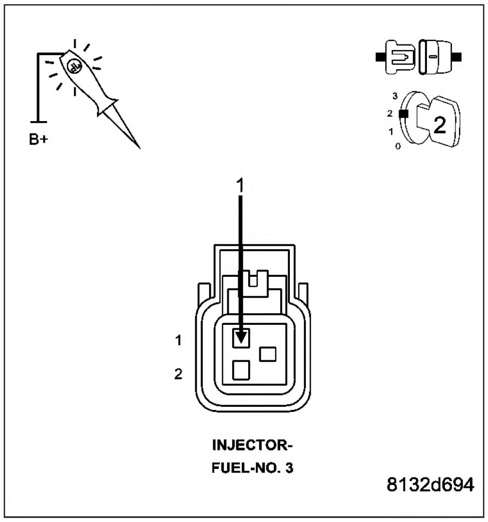
No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0203-FUEL INJECTOR 3 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K13) Injector Control No.3 circuit.

With the scan tool, actuate the No.3 Fuel Injector.



What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

Go To 5

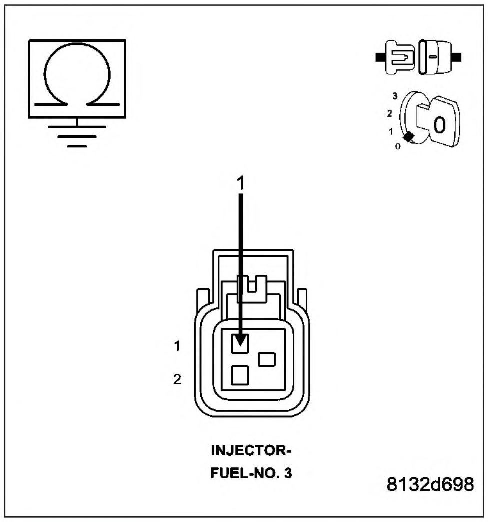
---

4. (K13) INJECTOR CONTROL NO.3 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K13) Injector Control No.3 circuit in the Injector harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K13) Injector Control No.3 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0203-FUEL INJECTOR 3 CIRCUIT (CONTINUED)

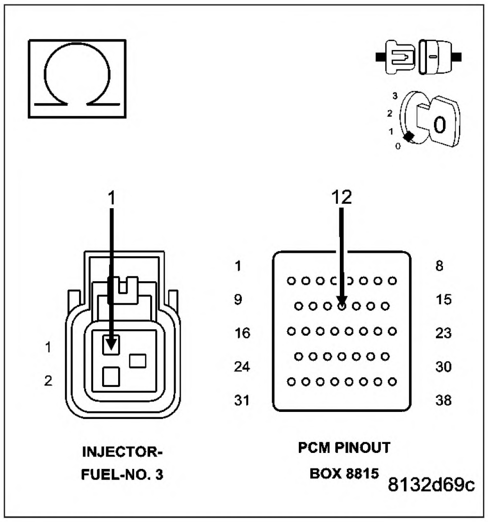
5. (K13) INJECTOR CONTROL NO.3 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K13) Injector Control No.3 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K13) Injector Control No.3 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

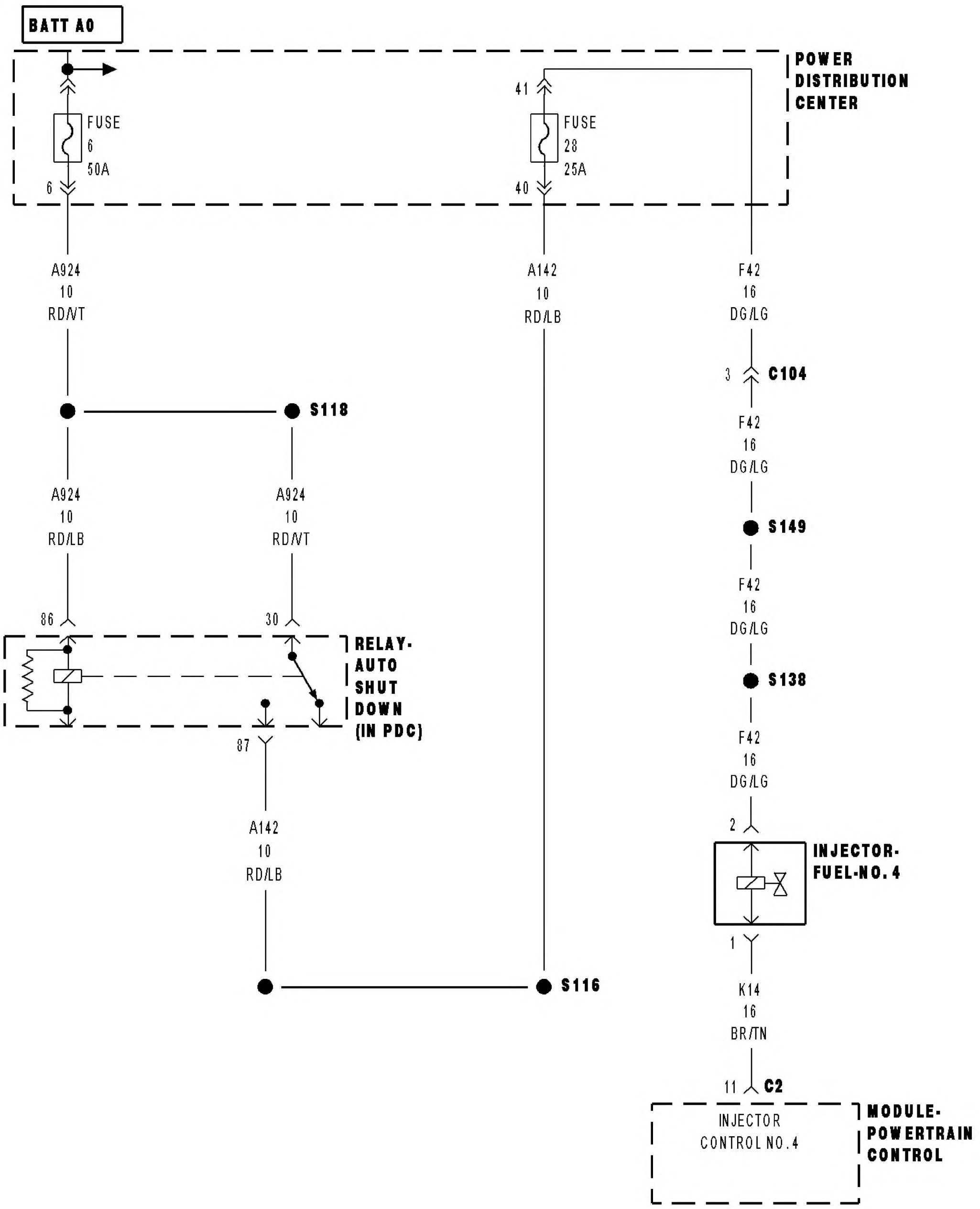
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

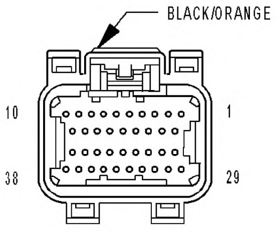
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

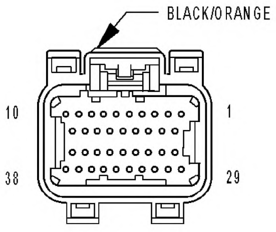
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0204-FUEL INJECTOR 4 CIRCUIT

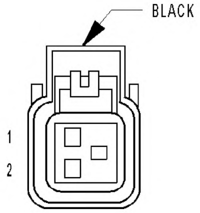

BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 28 25A
41
40
A924 10 RD/VT
A142 10 RD/LB
F42 16 DG/LG
3 C104
F42 16 DG/LG
S118
S149
A924 10 RD/LB
A924 10 RD/VT
F42 16 DG/LG
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
S138
87
F42 16 DG/LG
A142 10 RD/LB
2
INJECTOR-FUEL-NO. 4
1
S116
K14 16 BR/TN
11 C2
INJECTOR CONTROL NO. 4
MODULE-POWERTRAIN CONTROL


BLACK/ORANGE
10
1
38
29

MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)


BLACK/ORANGE
10
1
38
29

MODULE-POWERTRAIN CONTROL C2 (5.7L)



INJECTOR-FUEL-NO. 4 (GAS)

81470b25

P0204-FUEL INJECTOR 4 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K14) INJECTOR CONTROL NO.4 CIRCUIT OPEN
(K14) INJECTOR CONTROL NO.4 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

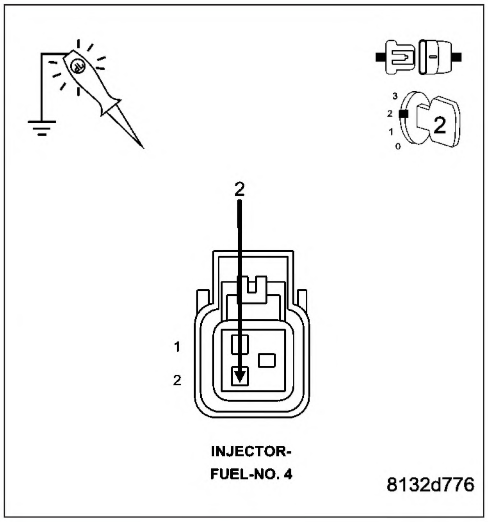
Turn the ignition off.

Disconnect the No.4 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the No.4 Fuel Injector harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

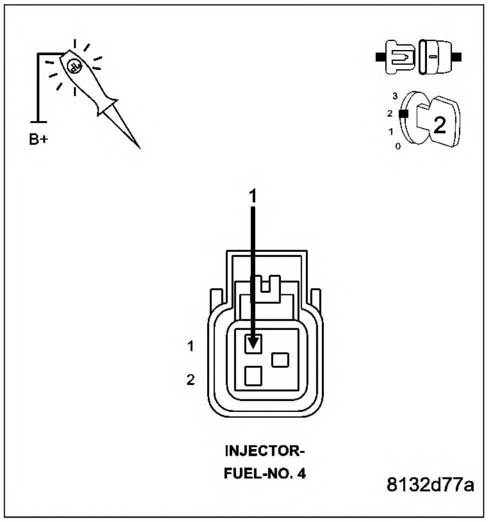
No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0204-FUEL INJECTOR 4 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K14) Injector Control No.4 circuit.

With the scan tool, actuate the No.4 Fuel Injector.



What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

Go To 5

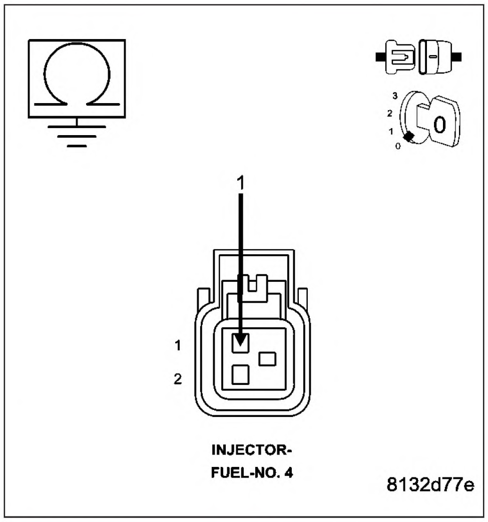
---

4. (K14) INJECTOR CONTROL NO.4 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K14) Injector Control No.4 circuit in the Injector harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K14) Injector Control No.4 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0204-FUEL INJECTOR 4 CIRCUIT (CONTINUED)

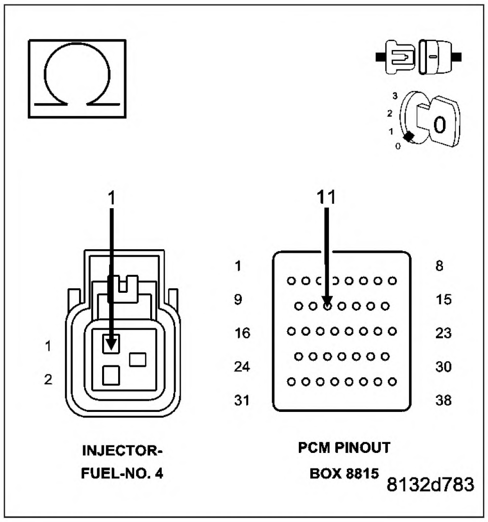
5. (K14) INJECTOR CONTROL NO.4 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K14) Injector Control No.4 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K14) Injector Control No.4 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

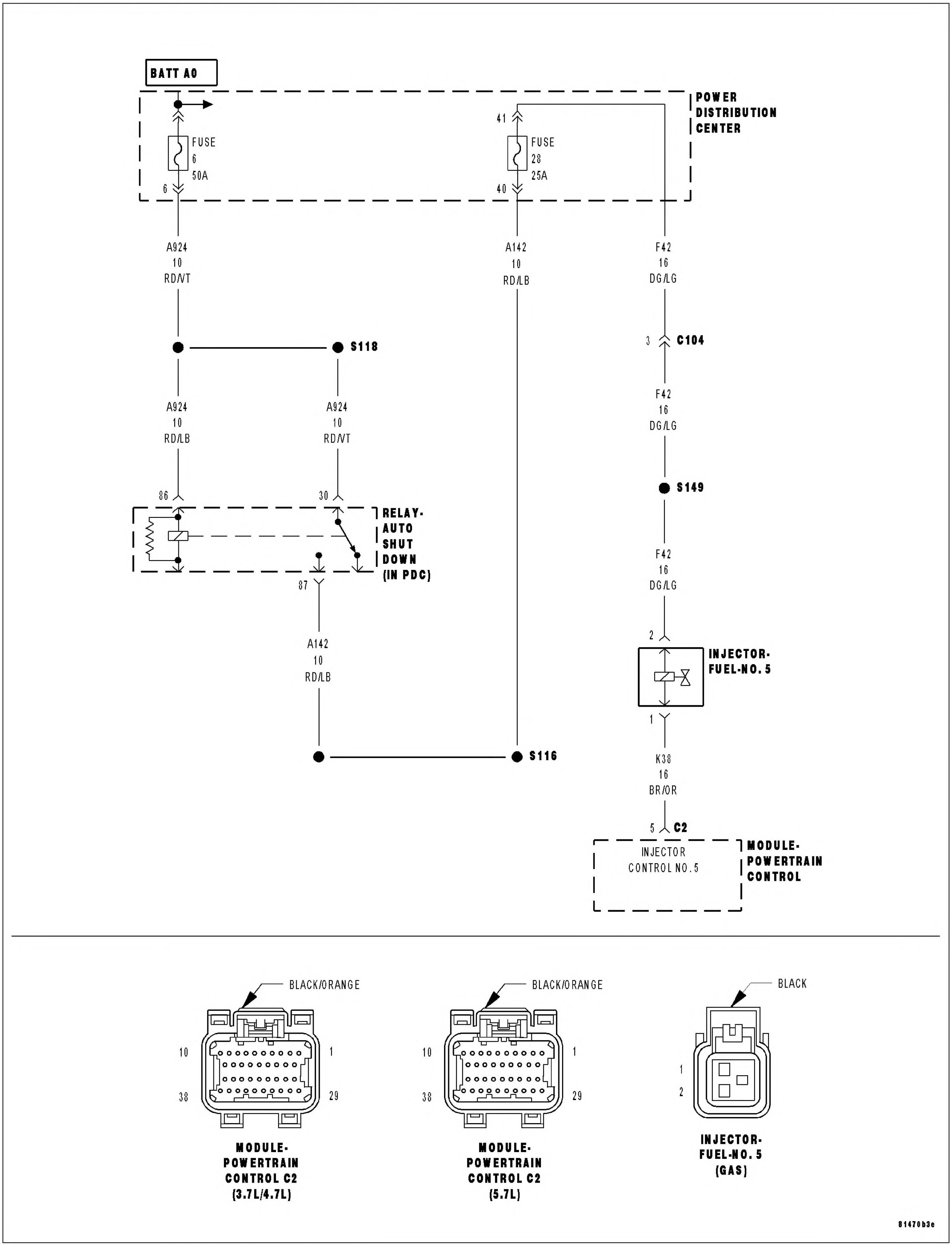
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0205-FUEL INJECTOR 5 CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
F42 16 DG/LG
S118
3 C104
F42 16 DG/LG
A924 10 RD/LB
A924 10 RD/VT
S149
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
87
F42 16 DG/LG
2
INJECTOR-FUEL-NO. 5
1
A142 10 RD/LB
S116
K38 16 BR/OR
5 C2
INJECTOR CONTROL NO. 5
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK
1
2
INJECTOR-FUEL-NO. 5 (GAS)
81470b3e

P0205-FUEL INJECTOR 5 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K38) INJECTOR CONTROL NO.5 CIRCUIT OPEN
(K38) INJECTOR CONTROL NO.5 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

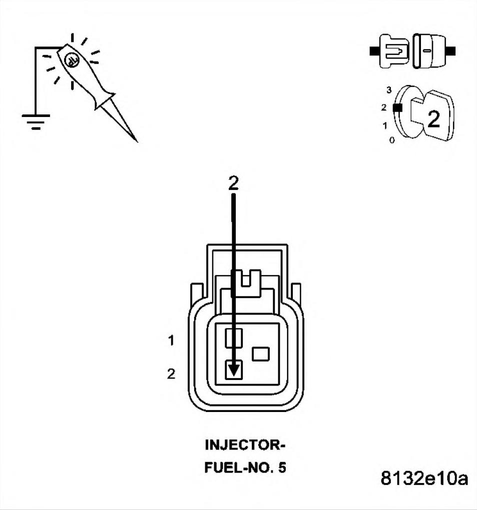
Turn the ignition off.

Disconnect the No.5 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the No.5 Fuel Injector harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

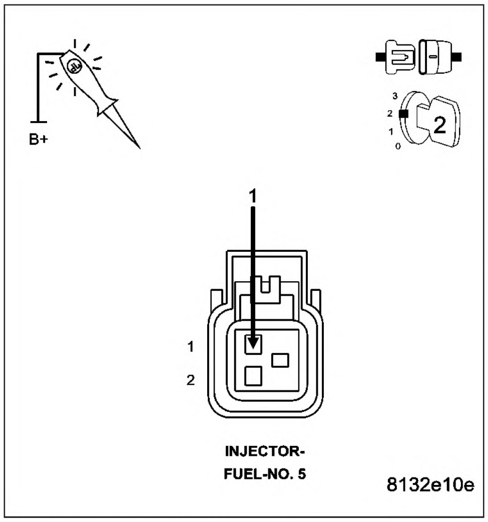
No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0205-FUEL INJECTOR 5 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K38) Injector Control No.5 circuit.

With the scan tool, actuate the No.5 Fuel Injector.



What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

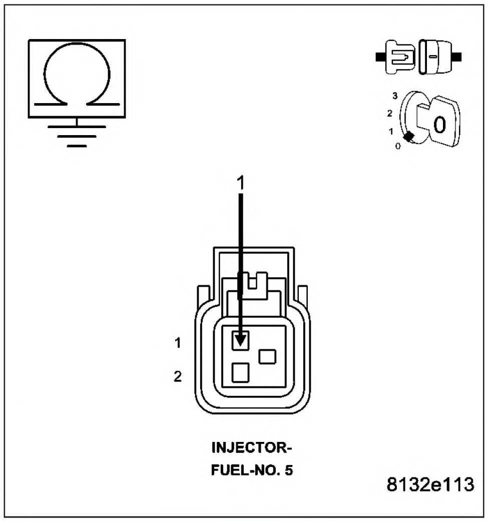
Go To 5

4. (K38) INJECTOR CONTROL NO.5 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K38) Injector Control No.5 circuit in the Injector harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K38) Injector Control No.5 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0205-FUEL INJECTOR 5 CIRCUIT (CONTINUED)

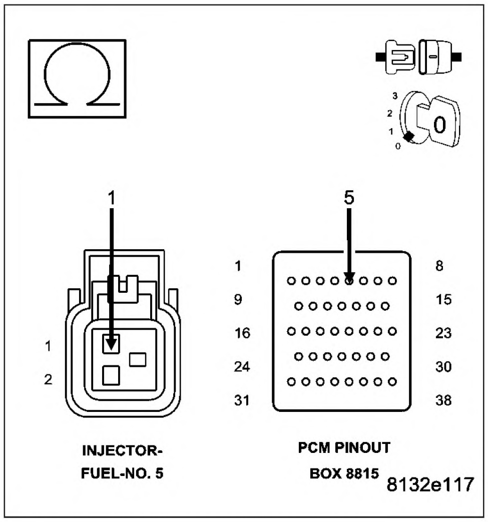
5. (K38) INJECTOR CONTROL NO.5 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K38) Injector Control No.5 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K38) Injector Control No.5 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

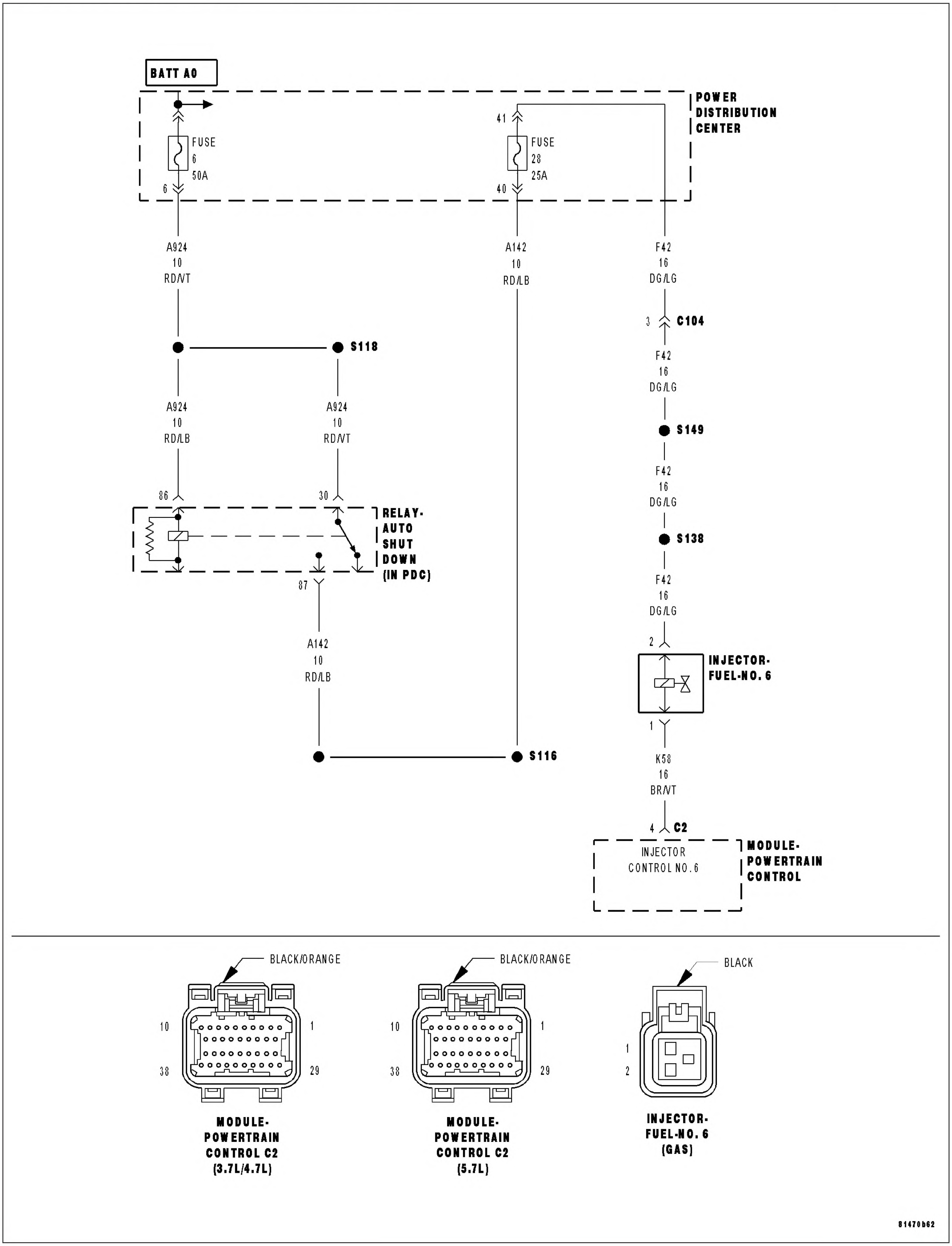
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0206-FUEL INJECTOR 6 CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 28 25A
41
40
A924 10 RD/VT
A142 10 RD/LB
F42 16 DG/LG
3 C104
S118
S149
S138
A924 10 RD/LB
A924 10 RD/VT
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
87
A142 10 RD/LB
2
INJECTOR-FUEL-NO. 6
1
S116
K58 16 BR/VT
4 C2
INJECTOR CONTROL NO.6
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK
1
2
INJECTOR-FUEL-NO. 6 (GAS)
81470b62

P0206-FUEL INJECTOR 6 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K58) INJECTOR CONTROL NO.6 CIRCUIT OPEN
(K58) INJECTOR CONTROL NO.6 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

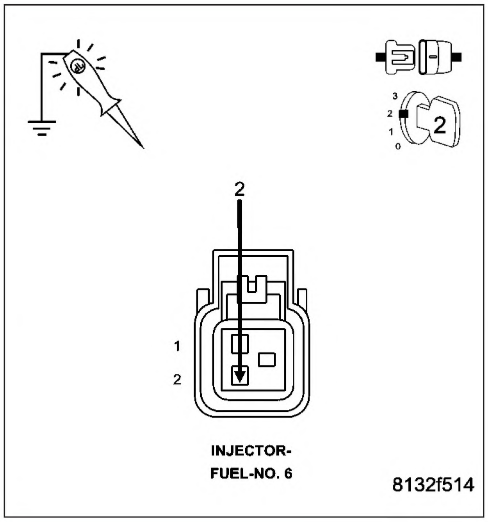
Turn the ignition off.

Disconnect the No.6 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the No.6 Fuel Injector harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0206-FUEL INJECTOR 6 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K58) Injector Control No.6 circuit.

With the scan tool, actuate the No.6 Fuel Injector.

What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

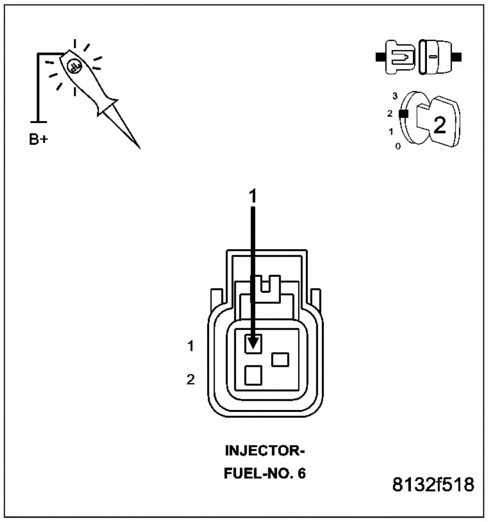
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

Go To 5



---

4. (K58) INJECTOR CONTROL NO.6 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

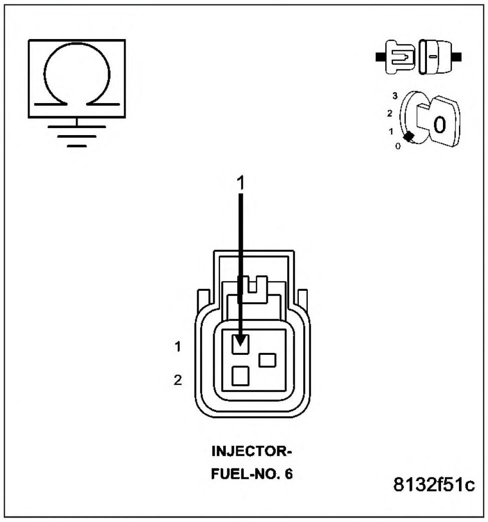
Measure the resistance between ground and the (K58) Injector Control No.6 circuit in the Injector harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K58) Injector Control No.6 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6



P0206-FUEL INJECTOR 6 CIRCUIT (CONTINUED)

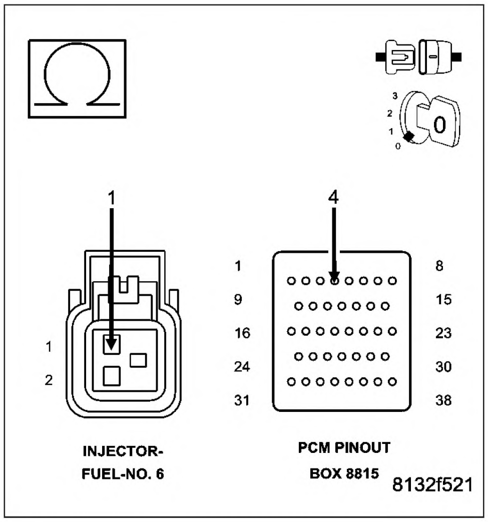
5. (K58) INJECTOR CONTROL NO.6 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K58) Injector Control No.6 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K58) Injector Control No.6 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

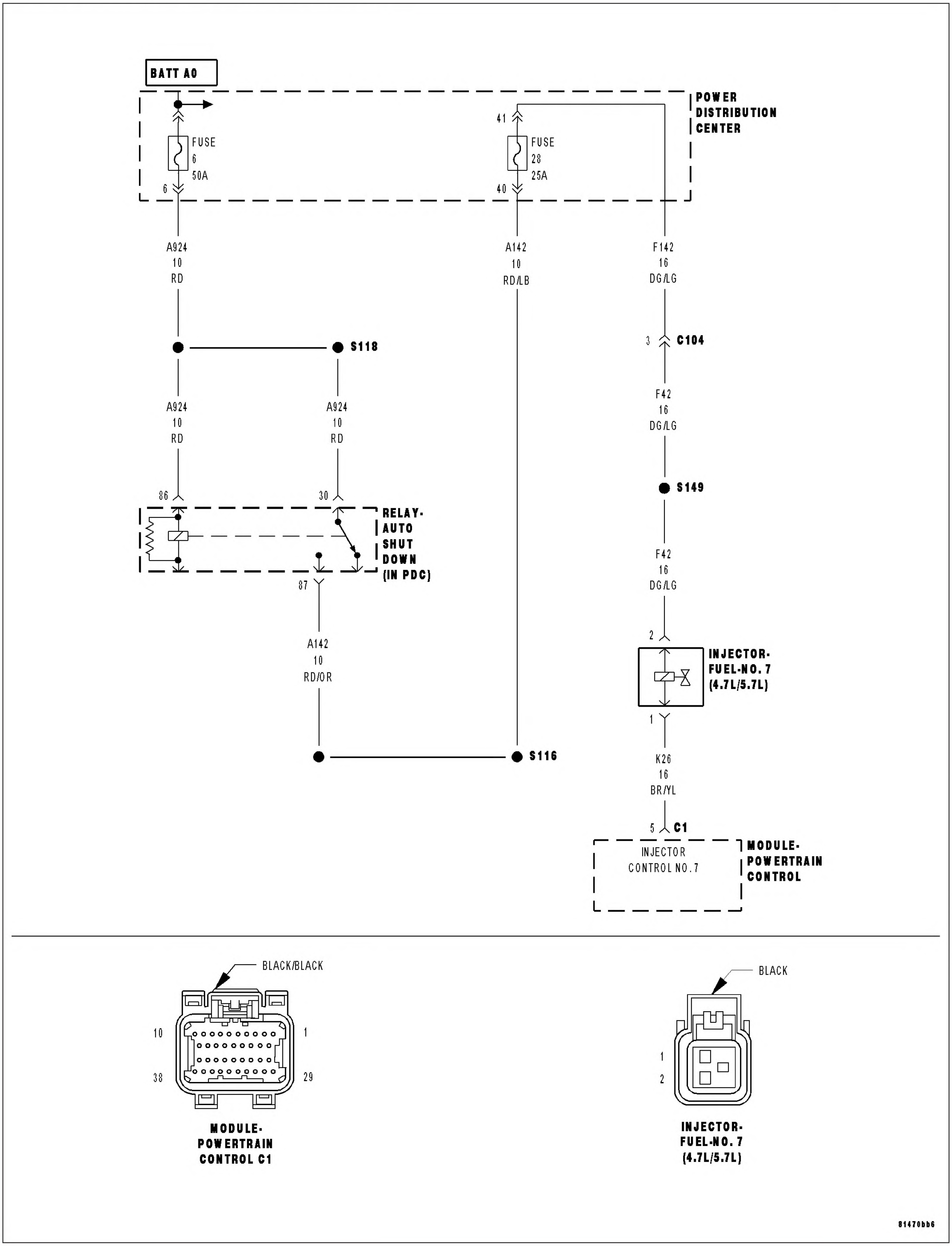
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0207-FUEL INJECTOR 7 CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 28 25A
41
40
A924 10 RD
A142 10 RD/LB
F142 16 DG/LG
S118
3 C104
A924 10 RD
A924 10 RD
F42 16 DG/LG
S149
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
87
F42 16 DG/LG
2
INJECTOR-FUEL-NO. 7 (4.7L/5.7L)
1
A142 10 RD/OR
S116
K26 16 BR/YL
5 C1
INJECTOR CONTROL NO.7
MODULE-POWERTRAIN CONTROL
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK
1
2
INJECTOR-FUEL-NO. 7 (4.7L/5.7L)
81470bb6

P0207-FUEL INJECTOR 7 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K26) INJECTOR CONTROL NO.7 CIRCUIT OPEN
(K26) INJECTOR CONTROL NO.7 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

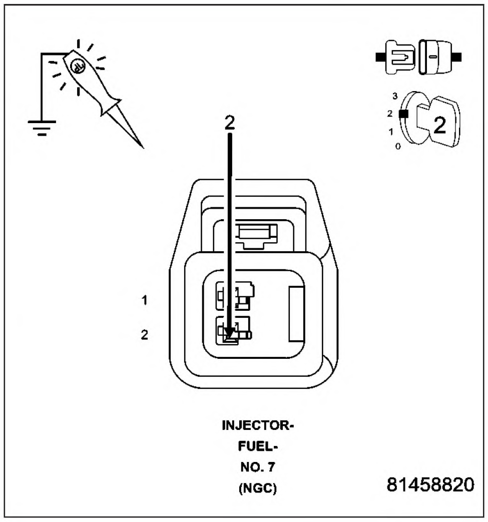
Turn the ignition off.

Disconnect the No.7 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the No.7 Fuel Injector harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

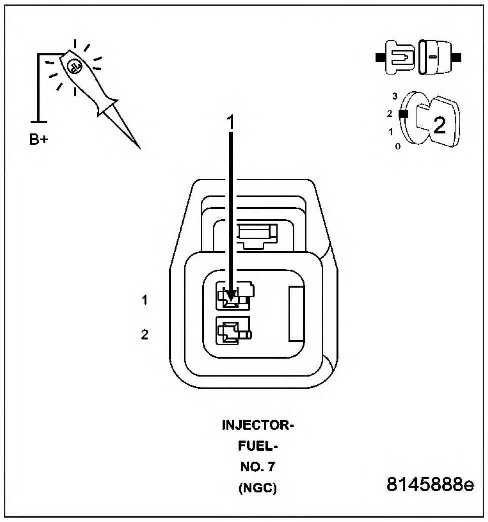
No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0207-FUEL INJECTOR 7 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K26) Injector Control No.7 circuit.

With the scan tool, actuate the No.7 Fuel Injector.



What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

Go To 5

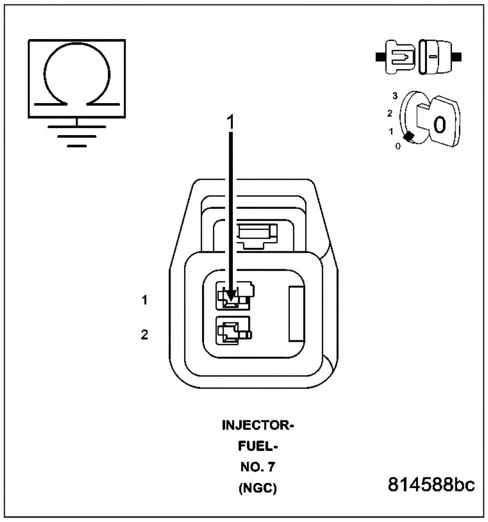
---

4. (K26) INJECTOR CONTROL NO.7 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (K26) Injector Control No.7 circuit in the Injector harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K26) Injector Control No.7 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0207-FUEL INJECTOR 7 CIRCUIT (CONTINUED)

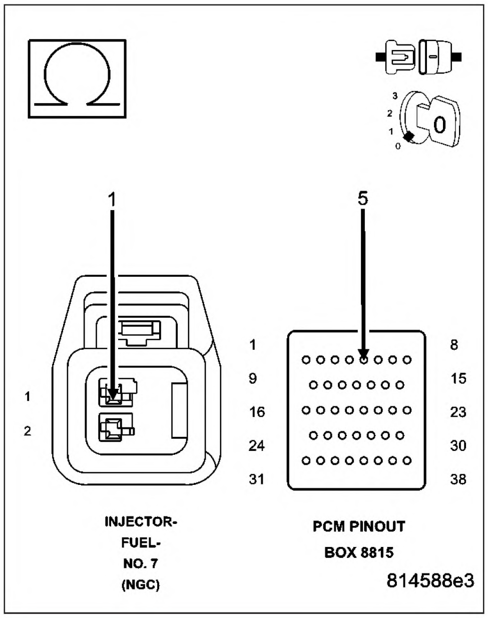
5. (K26) INJECTOR CONTROL NO.7 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K26) Injector Control No.7 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K26) Injector Control No.7 circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

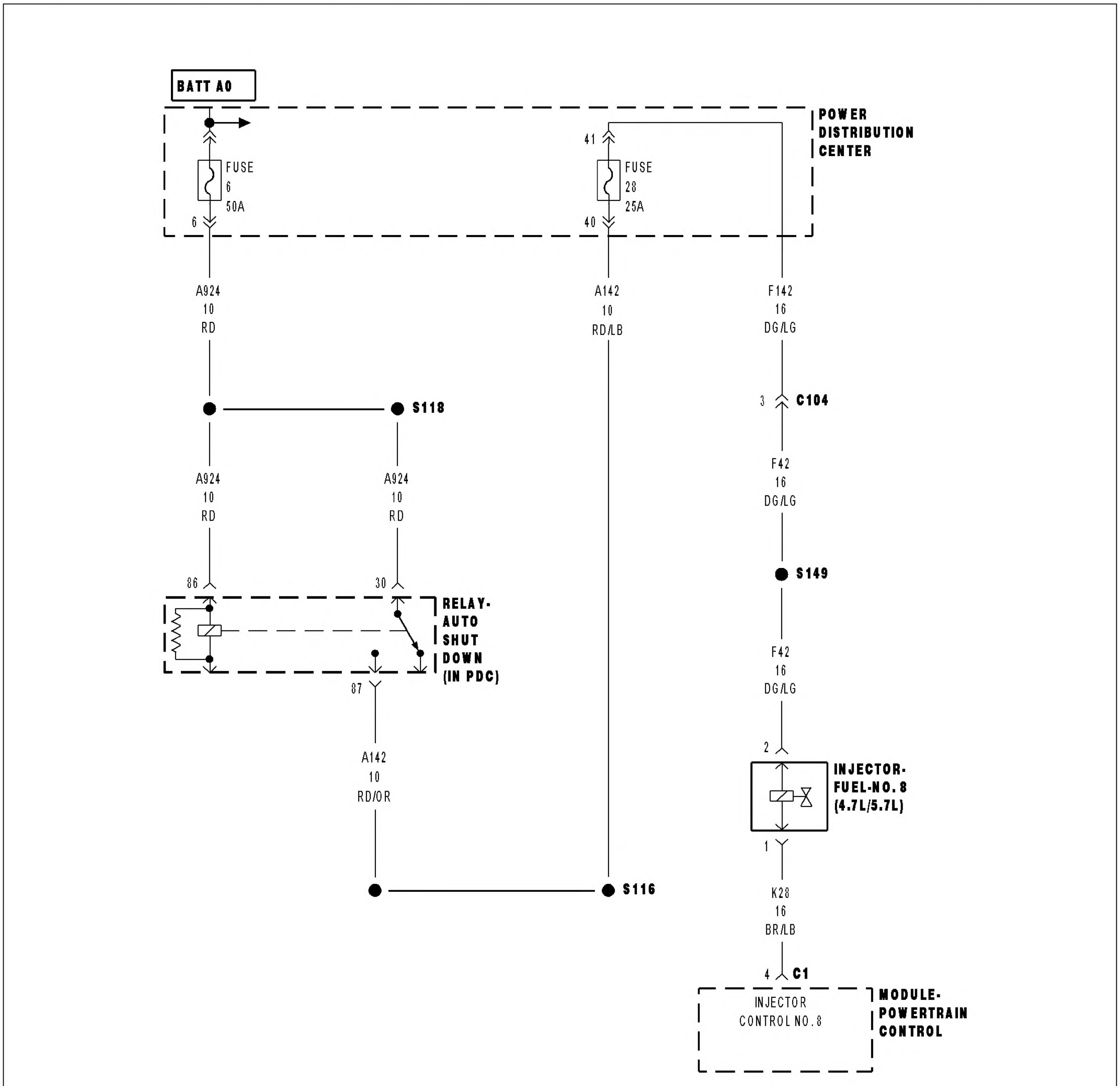
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

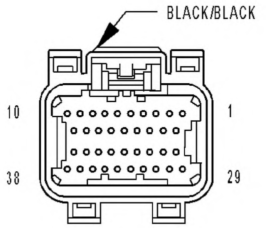
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

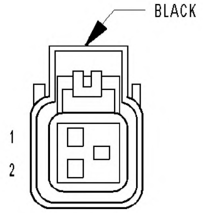
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0208-FUEL INJECTOR 8 CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 28 25A
41
40
A924 10 RD
A142 10 RD/LB
F142 16 DG/LG
3 C104
S118
A924 10 RD
A924 10 RD
F42 16 DG/LG
S149
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
87
F42 16 DG/LG
A142 10 RD/OR
2
INJECTOR-FUEL-NO. 8 (4.7L/5.7L)
1
S116
K28 16 BR/LB
4 C1
INJECTOR CONTROL NO. 8
MODULE-POWERTRAIN CONTROL


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1



INJECTOR-FUEL-NO. 8 (4.7L/5.7L)

81470bd8

P0208-FUEL INJECTOR 8 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With battery voltage greater than 10 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.
- **Set Condition:**
  No inductive spike is detected after injector turn off.

Possible Causes
(F42) ASD RELAY OUTPUT CIRCUIT
(K28) INJECTOR CONTROL NO.8 CIRCUIT OPEN
(K28) INJECTOR CONTROL NO.8 CIRCUIT SHORTED TO GROUND
FUEL INJECTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTC.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F42) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

Disconnect the No.8 Fuel Injector harness connector.

Ignition on, engine not running.

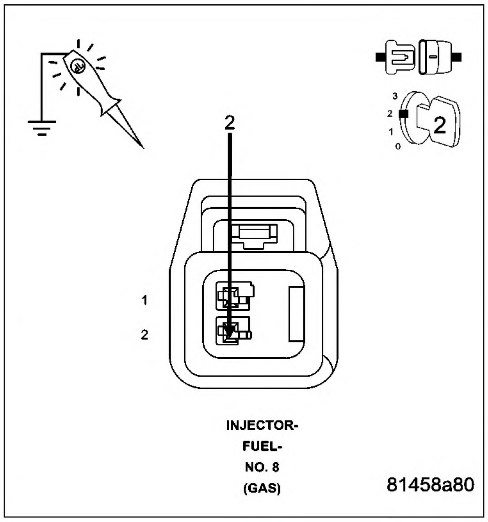
With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42) ASD Relay Output circuit in the No.8 Fuel Injector harness connector.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the excessive resistance or short to ground in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

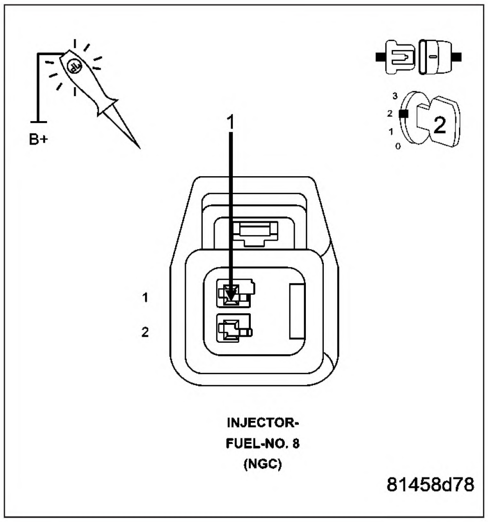


P0208-FUEL INJECTOR 8 CIRCUIT (CONTINUED)

3. FUEL INJECTOR

Using a 12-volt test light connected to 12-volts, probe the (K28) Injector Control No.8 circuit.

With the scan tool, actuate the No.8 Fuel Injector.



What is the state of the test light during the actuation?

Brightly Blinking.

Replace the Fuel Injector.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON Constantly.

Go To 4

OFF Constantly.

Go To 5

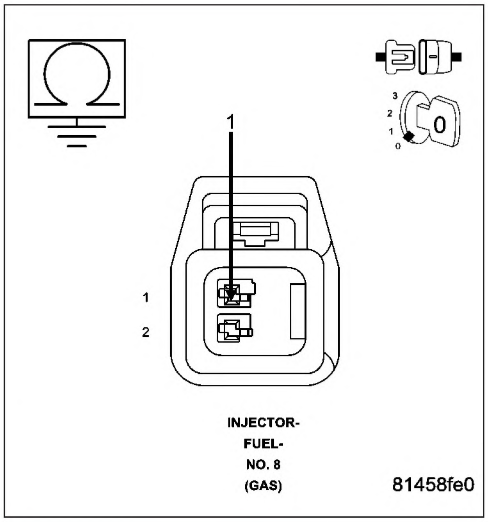
---

4. (K28) INJECTOR CONTROL NO.8 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (K28) Injector Control No.8 circuit in the Injector harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K28) Injector Control No.8 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0208-FUEL INJECTOR 8 CIRCUIT (CONTINUED)

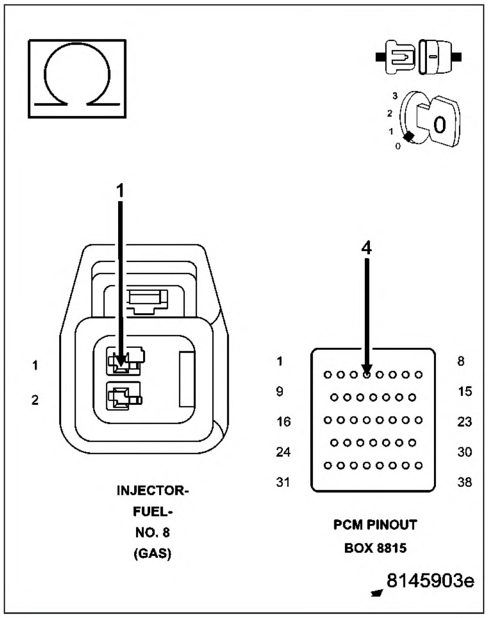
5. (K28) INJECTOR CONTROL NO.8 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K28) Injector Control No.8 circuit from the Fuel Injector harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K28) Injector Control No.8 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

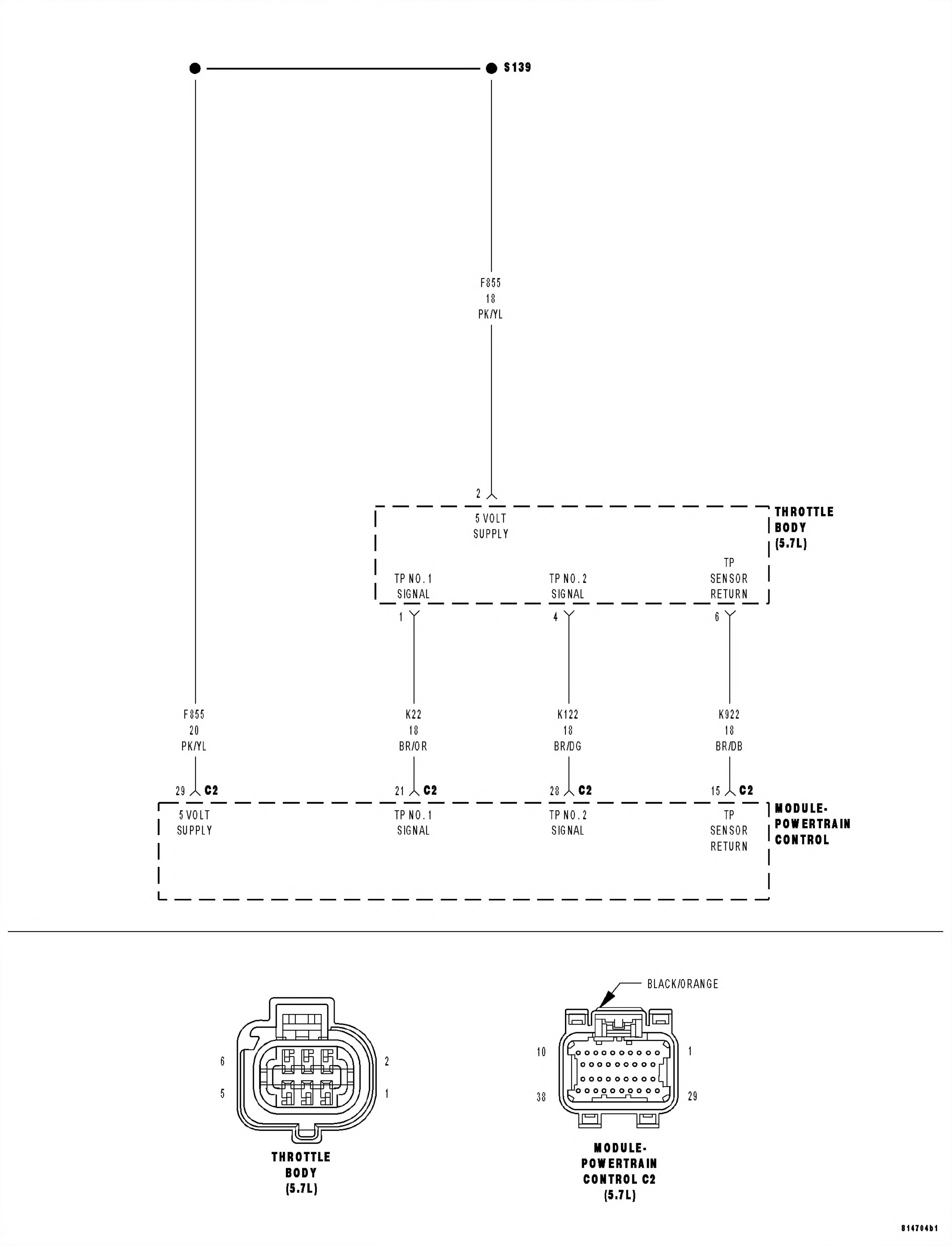
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE


S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
1
4
6
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
29 C2
21 C2
28 C2
15 C2
5 VOLT SUPPLY
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
6
5
2
1
10
38
1
29
THROTTLE BODY (5.7L)
MODULE-POWERTRAIN CONTROL C2 (5.7L)
814704b1

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and No MAP Sensor DTCs set.
- **Set Condition:**
  TP Sensor signals do not correlate to the MAP Sensor signal. One Trip Fault. ETC light will illuminate. P2135 should set with this code also.

Possible Causes
(K122) TP SENSOR NO.2 SIGNAL CIRCUIT OR (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
RESISTANCE IN THE (K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT
(K122) TP SENSOR NO.2 SIGNAL CIRCUIT OR (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K122) TP SENSOR NO.2 SIGNAL CIRCUIT
THROTTLE POSITION SENSOR/THROTTLE BODY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

NOTE: Diagnose any other TP Sensor DTC(s) before continuing.

NOTE: The throttle plate and linkage should be free from binding and carbon build up.

NOTE: Make sure the throttle plate is at the idle position.
Ignition on, engine not running.

NOTE: Inspect the engine for vacuum leaks.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 11

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

2. (K122) TP SENSOR NO.2 SIGNAL CIRCUIT OR (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

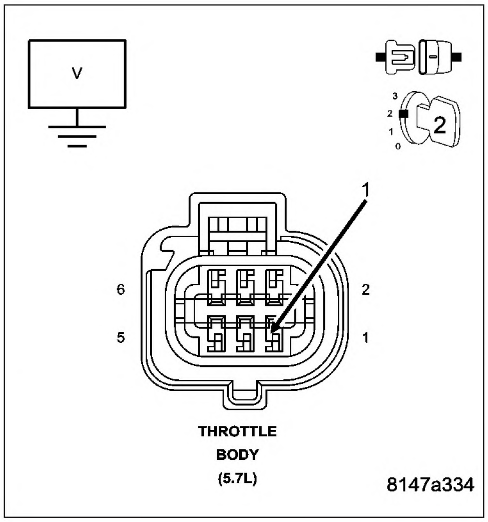
Disconnect the C2 PCM harness connector.

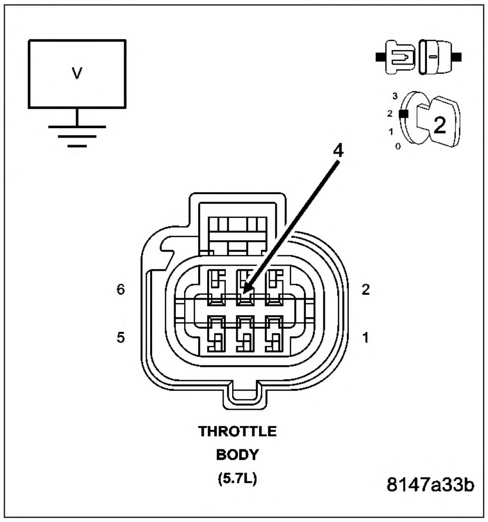
Disconnect the Throttle Body harness connector.

Ignition on, engine not running.

Measure the voltage on the (K122) TP No.2 Signal circuit in the Throttle Body harness connector.

Measure the voltage on the (K22) TP No.1 Signal circuit in the Throttle Body harness connector.





Is the voltage above 5.2 volts for either reading?

Yes >> Repair the short to battery voltage in the (K122) TP Sensor No.2 Signal circuit or the (K22) TP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

3. THROTTLE POSITION SENSOR

Turn the ignition off.

Connect the C2 PCM harness connector.

Ignition on, engine not running.

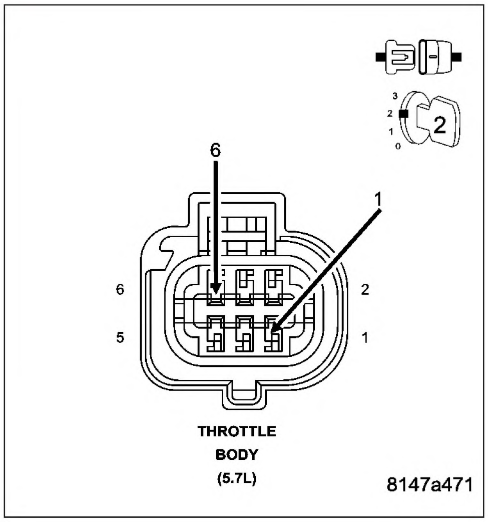
With the scan tool, monitor the TP Sensor No.1 and No.2 voltage.

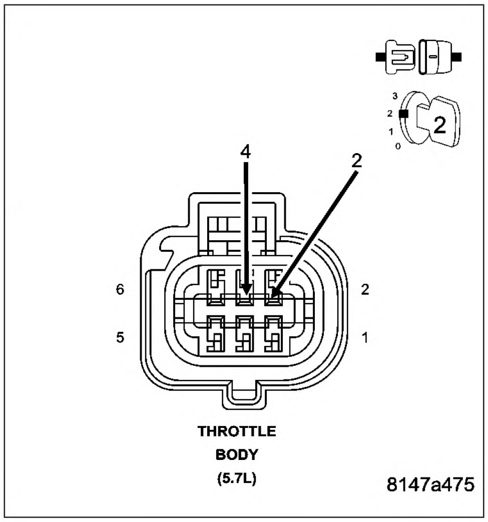
Connect a jumper wire between the (K922) Sensor Return circuit and the (K22) TP Sensor No.1 Signal circuit.

NOTE: TP Sensor No.1 voltage should change from approximately 4.7 volts to 0.3 of a volt.

For TP Sensor No.2, connect a jumper wire between (F855) 5-volt supply circuit and the (K122) TP Sensor No.2 Signal circuit.

NOTE: TP Sensor No.2 voltage should change from approximately 0 volts to 5.0 volts.





Is the voltage reading within the listed specification with the jumper wire installed?

Yes >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, using a scan tool, select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

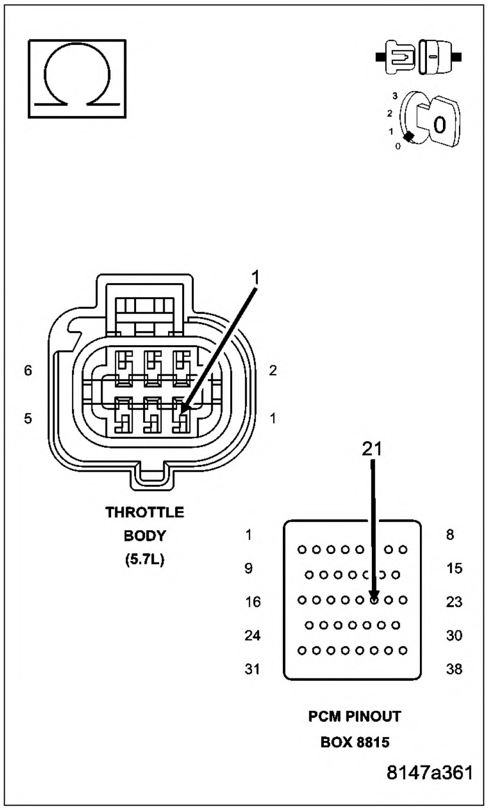
4. EXCESSIVE RESISTANCE IN THE (K22) TP SENSOR NO.1 OR THE (K122) TP SENSOR NO.2 SIGNAL CIRCUIT

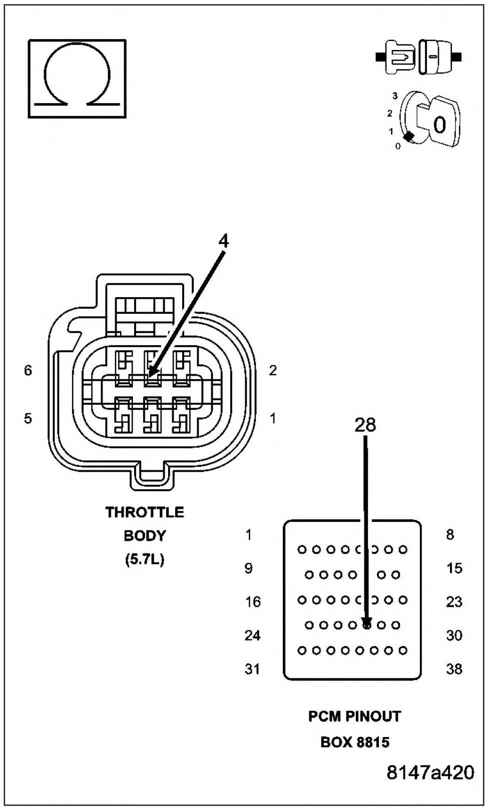
Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815. Measure the resistance of the (K122) TP Sensor No.2 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
1
6
2
5
1
21
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a361


3
2
1
0
4
6
2
5
1
28
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a420

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 5

No >> Repair the excessive resistance in the (K22) TP Sensor No.1 or (K122) TP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

5. (K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K122) TP Sensor No.2 Signal circuit at the Throttle Body harness connector.

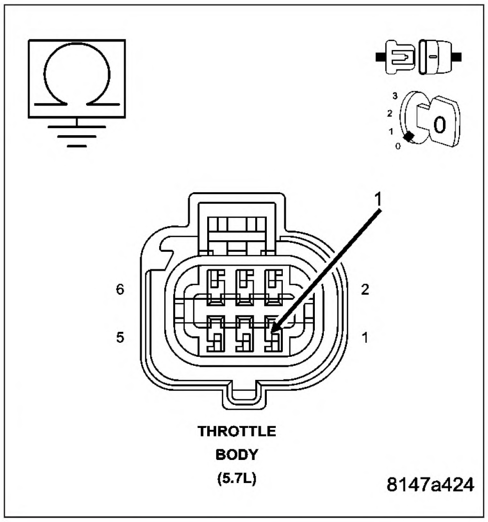
Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit at the Throttle Body harness connector.

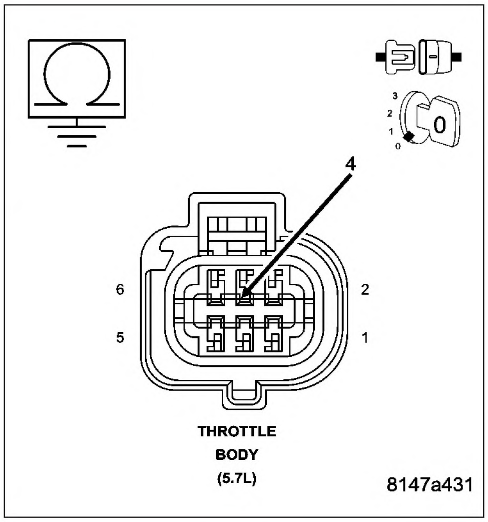
Is the resistance below 100 ohms for each circuit?

Yes >> Go To 6

No >> Repair the short to ground in the (K122), (K22) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

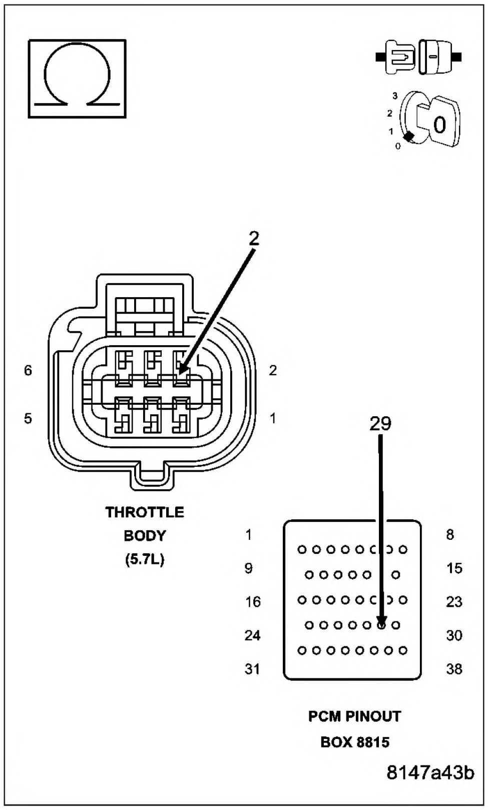

3
2
1
0
0
1
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a424


3
2
1
0
0
4
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a431

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

6. EXCESSIVE RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


2
6
2
5
1
29
THROTTLE
BODY
(5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147a43b

Is the resistance below 5.0 ohms?

Yes >> Go To 7

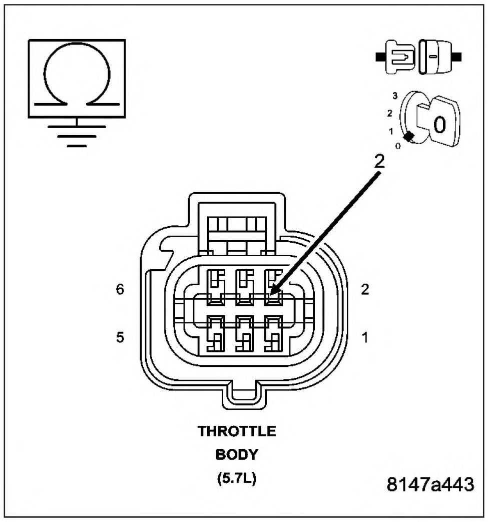
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (F855) 5-VOLT SUPPLY SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit at the Throttle Body harness connector.


2
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a443

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

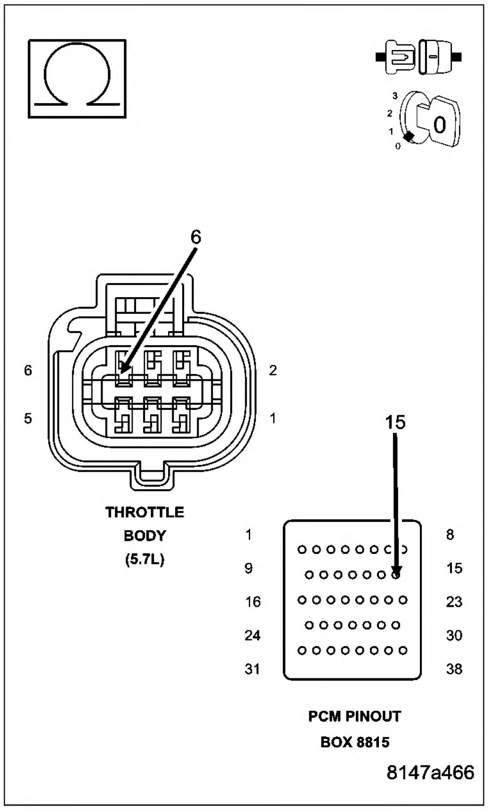
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

8. EXCESSIVE RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


6
6
2
5
1
15
THROTTLE
BODY
(5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147a466

Is the resistance below 5.0 ohms?

Yes >> Go To 9

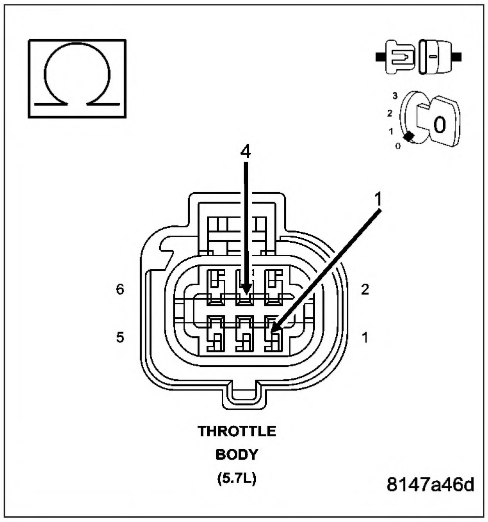
No >> Repair the excessive resistance in the (K922) Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K122) TP SENSOR NO.2 SIGNAL CIRCUIT

Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (K122) TP Sensor No.2 Signal circuit at the Throttle Body harness connector.


4
1
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a46d

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K122) TP Sensor No.2 Signal circuit and the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0221-THROTTLE POSITION SENSOR 2 PERFORMANCE (CONTINUED)

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. THROTTLE FOLLOWER TEST

Ignition on, engine not running.

With the scan tool, perform the Throttle Follower Test and monitor the TP Sensor No.1 or No.2 voltage.

Slowly press the throttle pedal down.

The voltage for TP Sensor No.1 should start at approximately 0.3 of a volt and increase to above 4.3 volts.

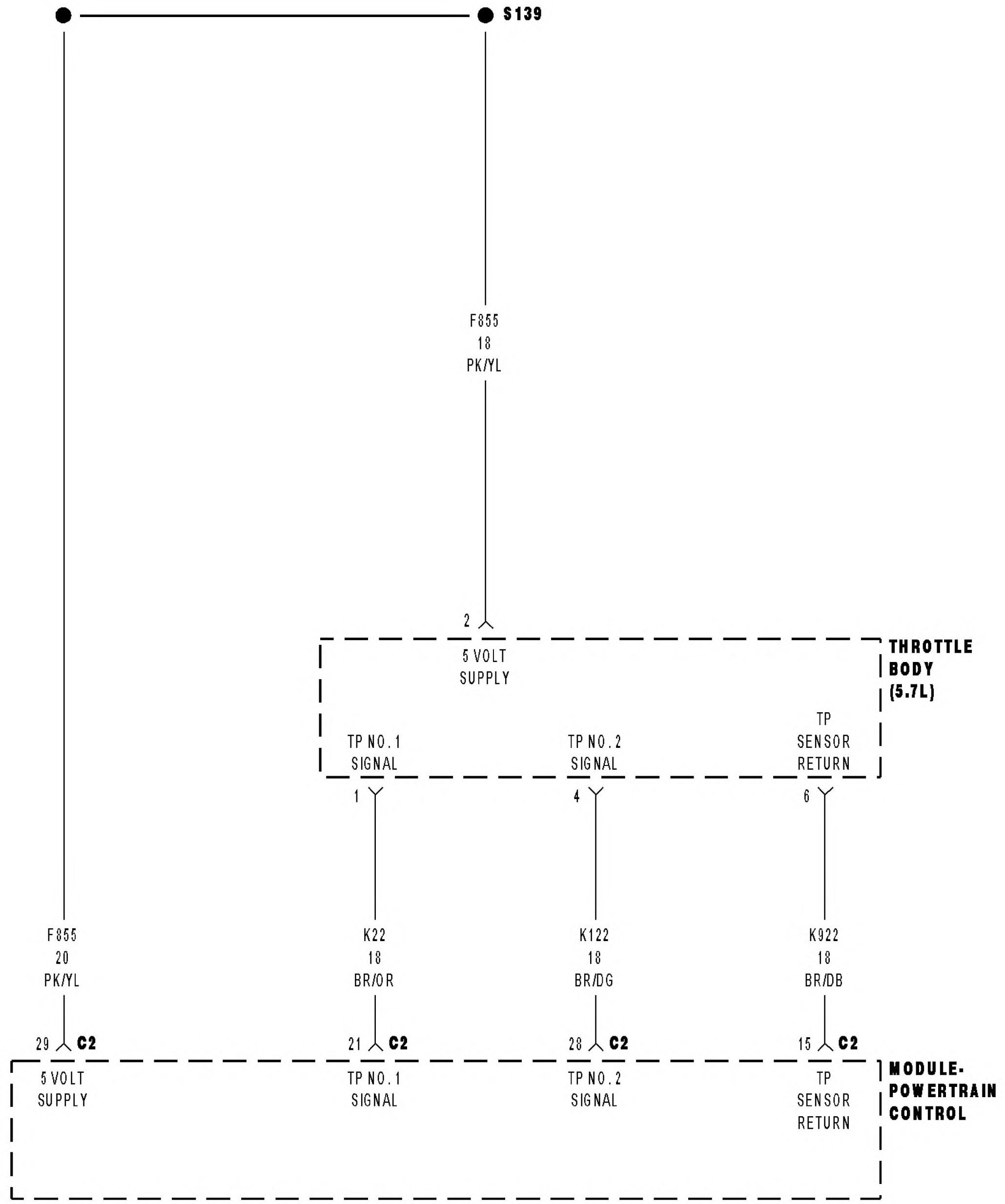
The voltage for TP Sensor No.2 should start at approximately 4.3 volts and decrease to approximately 0.3 of a volt.

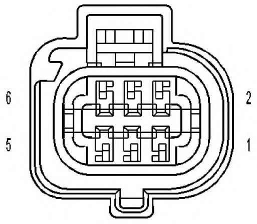
Is the voltage within the range of the listed specification for the appropriate Sensor?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

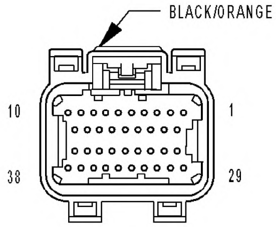
No >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, using a scan tool select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0222-THROTTLE POSITION SENSOR 2 CIRCUIT LOW


S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
1
4
6
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
29 C2
21 C2
28 C2
15 C2
5 VOLT SUPPLY
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL



THROTTLE BODY (5.7L)


BLACK/ORANGE
10
38
1
29

MODULE-POWERTRAIN CONTROL C2 (5.7L)

814704b1

P0222-THROTTLE POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete Engine wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  Throttle Position Sensor voltage at the PCM is less than 0.16 of a volt for 0.7 of a second. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K922) SENSOR RETURN CIRCUIT
THROTTLE POSITION SENSOR/THROTTLE BODY
THROTTLE PLATE JAMMED AGAINST THE MAXIMUM STOP
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. TP SENSOR NO.2 BELOW 0.35 OF A VOLT

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

NOTE: If a 5-Volt supply DTC has also set, diagnose the 5-Volt DTC before continuing.

NOTE: Make sure the throttle moves freely and does not hang up at Wide Open Throttle, by performing the Throttle Follower Test

NOTE: If P2101 is also set, then make sure that the blade moves freely and does not hang up near Wide Open Throttle before trying to repair P0222.

Ignition on, engine not running.

With the scan tool, read the TP Sensor voltage.

Is the voltage below 0.35 of a volt?

Yes >> Go To 2

No >> Go To 11

---

2. P0122 ALSO SET

Was the P0122-TP SENSOR NO.1 VOLTAGE LOW DTC set along with the P0222?

Yes >> Go To 3

No >> Go To 4

P0222-THROTTLE POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

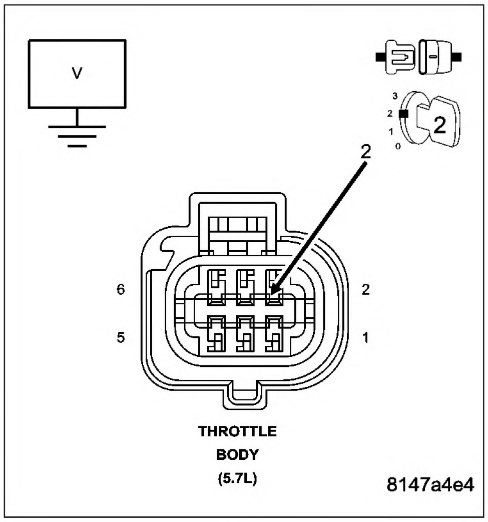
3. (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Throttle Body harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the Throttle Body harness connector.



Is the voltage between 4.5 to 5.2 volts?

Yes >> Go To 4

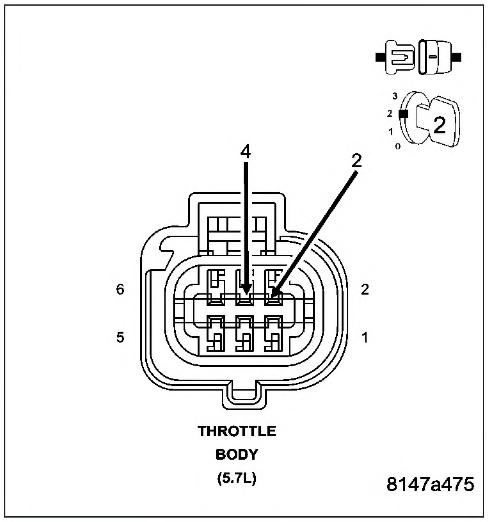
No >> Go To 8

---

4. THROTTLE POSITION SENSOR

Connect a jumper wire between the (F855) 5-volt Supply circuit and the (K122) TP Sensor No.2 Signal circuit in the Throttle Body harness connector.

With the scan tool, monitor the TP Sensor No.2 voltage.



Is the voltage between 4.8 and 5.2 volts with the jumper wire installed?

Yes >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, with a scan tool select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

P0222-THROTTLE POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

5. (K122) TP SENSOR NO.2 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

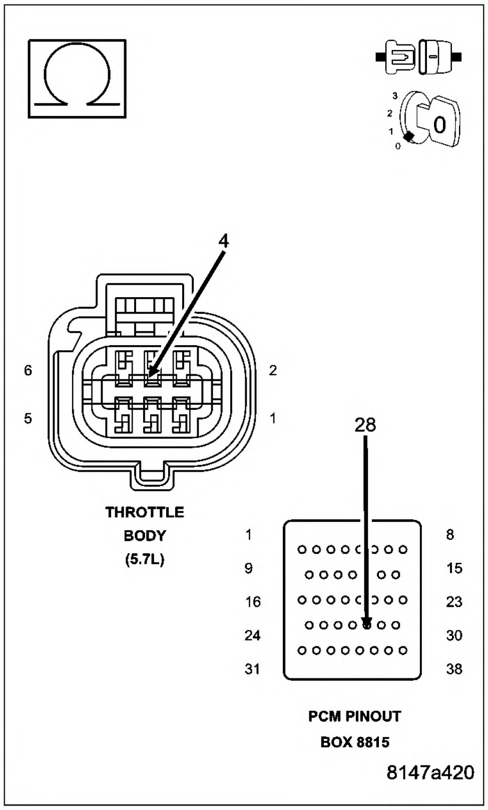
Measure the resistance of the (K122) TP Sensor No.2 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K122) TP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

6. (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

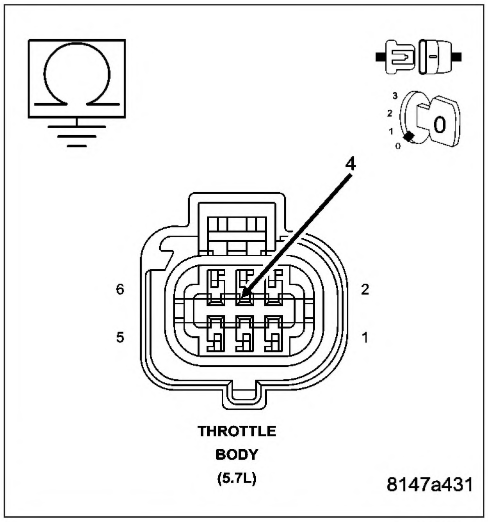
Measure the resistance between ground and the (K122) TP Sensor No.2 Signal circuit at the Throttle Body harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K122) TP Sensor No.2 Signal.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

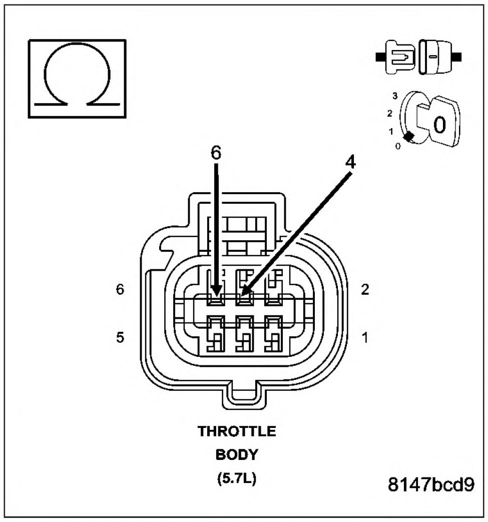
No >> Go To 7



P0222-THROTTLE POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

7. (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K922) SENSOR RETURN CIRCUIT

Measure the resistance between the (K122) TP Sensor No.2 Signal circuit and the (K922) TP Sensor Return circuit at the Throttle Body harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short between the (K922) Sensor Return circuit and the (K122) TP Sensor No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

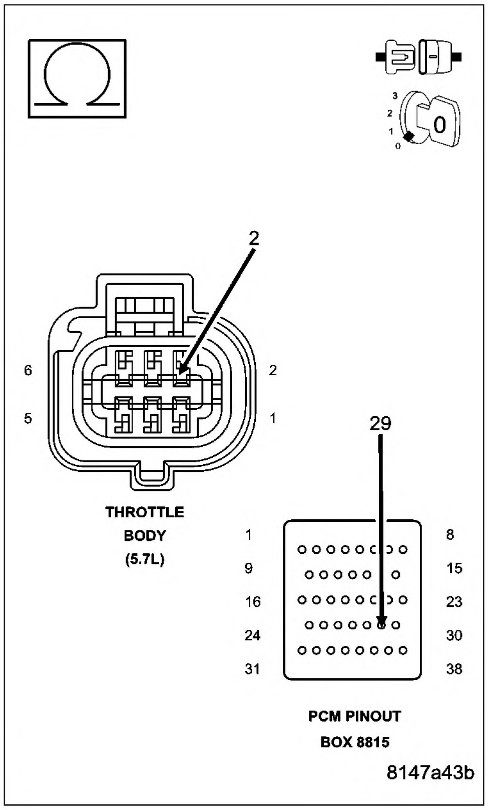
8. (F855) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

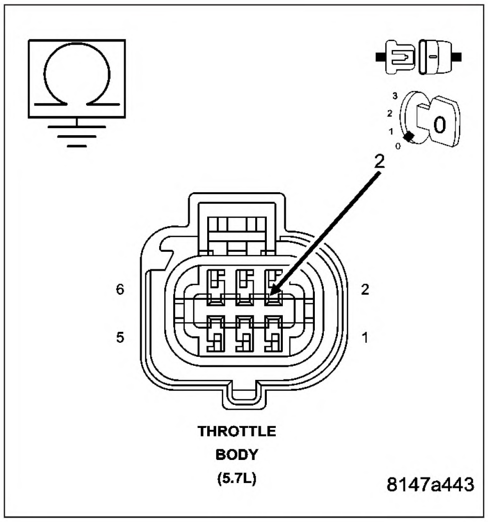
Yes >> Go To 9

No >> Repair the open in the (F855) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0222-THROTTLE POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

9. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit at the Throttle Body harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. THROTTLE FOLLOWER TEST

Ignition on, engine not running.

With the scan tool, perform the Throttle Follower Test.

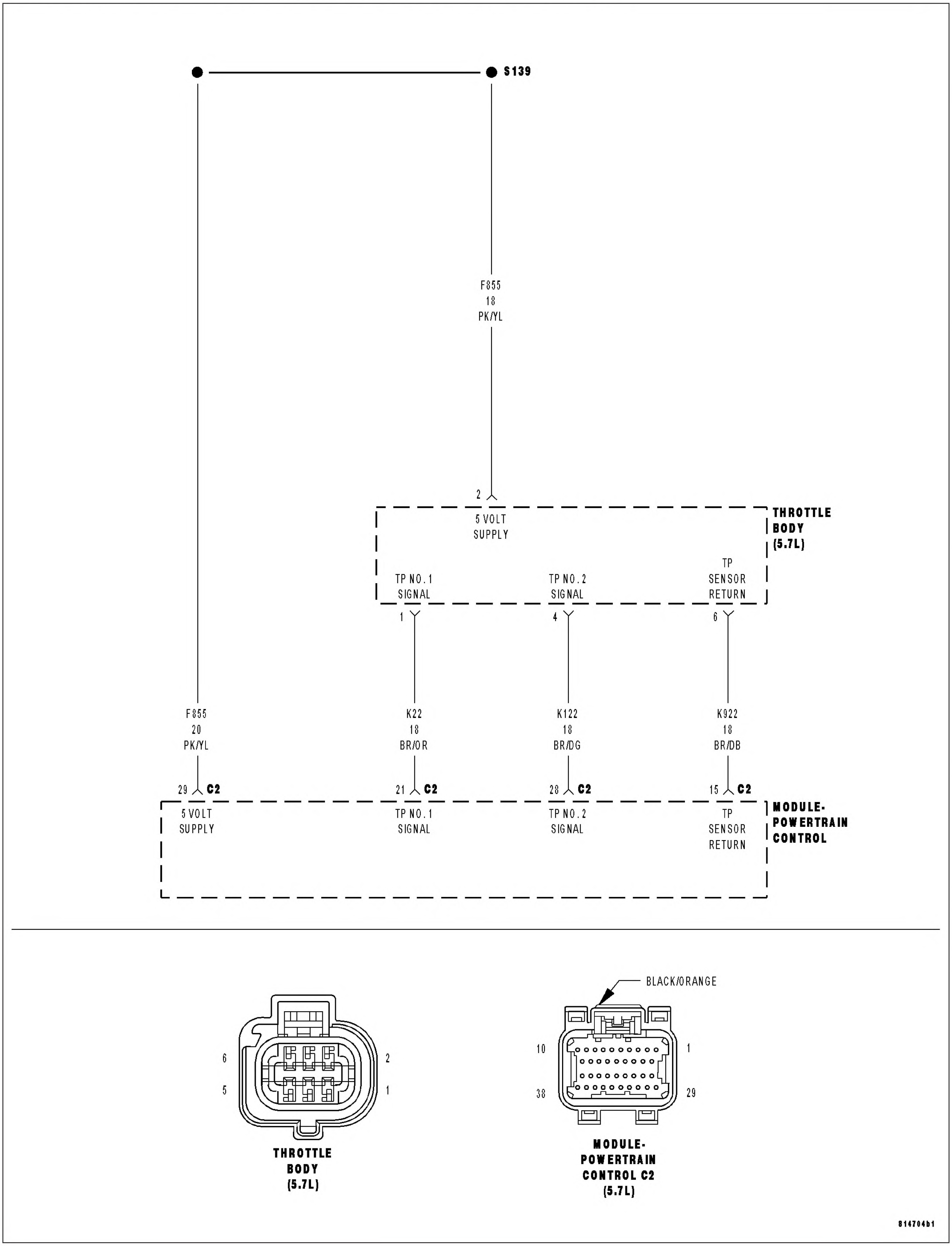
Monitor the TP Sensor No.2 voltage while slowly pressing the Throttle pedal down.

Is there a smooth voltage change from high to low?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, with a scan tool select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0223-THROTTLE POSITION SENSOR 2 CIRCUIT HIGH


S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
1
4
6
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
29 C2
21 C2
28 C2
15 C2
5 VOLT SUPPLY
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
6
5
2
1
THROTTLE BODY (5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
814704b1

P0223-THROTTLE POSITION SENSOR 2 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  Throttle Position Sensor No.2 Signal circuit voltage is greater than 4.9 volts for 25 ms. One Trip Fault. ETC light will illuminate.

Possible Causes
(K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K922) SENSOR RETURN CIRCUIT OPEN
THROTTLE POSITION SENSOR/THROTTLE BODY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

NOTE: If a 5-Volt supply DTC has also set, diagnose the 5-Volt DTC before continuing.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 7

---

2. THROTTLE POSITION SENSOR

Turn the ignition off.

Disconnect the Throttle Body Assembly harness connector.

Ignition on, engine not running.

With the scan tool monitor the TP Sensor No.2 voltage.

Is the voltage below 0.5 volt?

Yes >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, with the scan tool select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0223-THROTTLE POSITION SENSOR 2 CIRCUIT HIGH (CONTINUED)

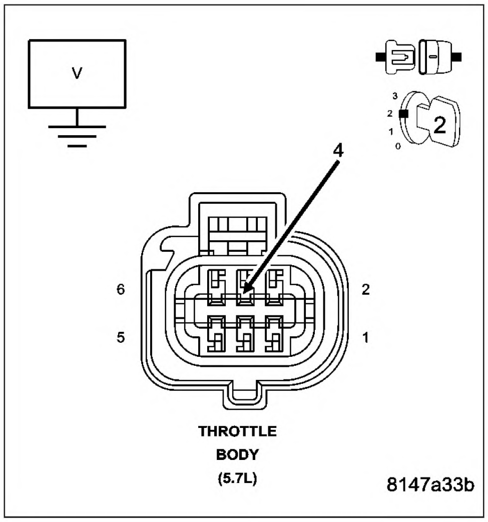
3. (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K122) TP Sensor No.2 Signal circuit at the Throttle Body harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K122) TP Sensor No.2 Signal circuit.

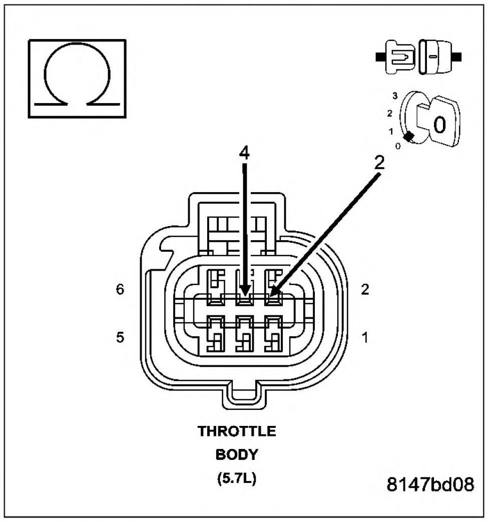
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (K122) TP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit at the Throttle Body harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short between the (K122) TP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0223-THROTTLE POSITION SENSOR 2 CIRCUIT HIGH (CONTINUED)

5. (K922) SENSOR RETURN CIRCUIT OPEN

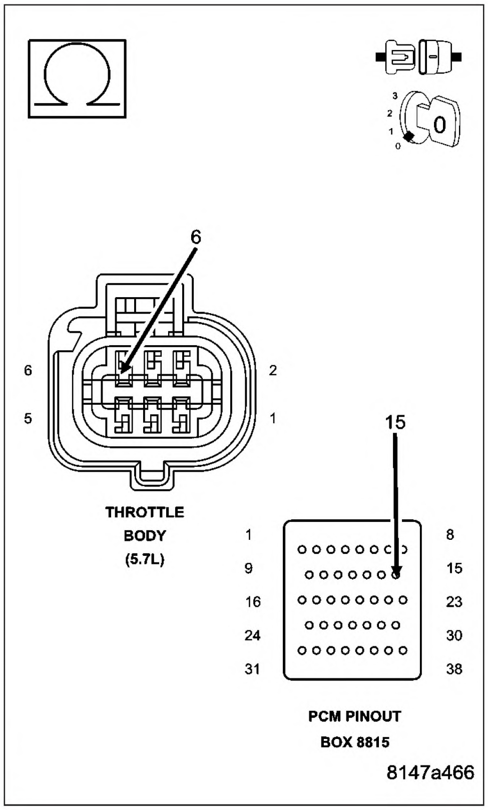
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K922) Sensor Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. THROTTLE FOLLOWER TEST

With the scan tool, perform the Throttle Follower Test.

Monitor the TP Sensor No.2 voltage while slowly pressing the Throttle pedal down.

Is there a smooth voltage change from high to low?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, with the scan tool select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0300-MULTIPLE CYLINDER MISFIRE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than a 2% (2.5% LEV) misfire rate is measured during two trips. Above 3000 RPM 1 trip less than 3000 RPM 2 trip. Three good trips to turn off the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
INJECTOR CONTROL CIRCUIT
COIL CONTROL CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

NOTE: Check for any TSB's that apply to a Misfire condition. Review the vehicle repair history for any misfire condition repairs that have been performed.

Star the engine.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute on the scan tool.

Is there a misfire present?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0300-MULTIPLE CYLINDER MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

Disconnect the Ignition Coil harness connector of the misfiring cylinders.

Disconnect the Fuel Injector harness connector of the misfiring cylinders.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0300-MULTIPLE CYLINDER MISFIRE (CONTINUED)

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil harness connectors.

Remove the Ignition Coils.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

---

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Does the Spark Plug have any problems?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0300-MULTIPLE CYLINDER MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi)

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using the scan tool, actuate the Fuel Injector for the cylinder that indicated the misfire.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0300-MULTIPLE CYLINDER MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral
ENGINE VALVE TIMING - must be within specifications
ENGINE COMPRESSION - must be within specifications
ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.
ENGINE PCV SYSTEM - must flow freely
TORQUE CONVERTER STALL SPEED - must be within specifications
POWER BRAKE BOOSTER - no internal vacuum leaks
FUEL - must be free of contamination
CAM LOBES - must not be worn excessively
CYLINDER LEAKAGE TEST - must be within specifications
VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the Fuel Injector harness connector of the misfiring cylinder.

Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the Injector Control circuit.

With the scan tool, actuate the Fuel Injector.

Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

---

11. INJECTOR CONTROL CIRCUIT

Turn the ignition off.

Disconnect the Fuel Injector harness connector.

Disconnect the PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the Injector Control circuit for an open, short to ground, and short to voltage.

Was a problem found with the Injector Control circuit?

Yes >> Repair the excessive resistance or short in the Injector Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

P0300-MULTIPLE CYLINDER MISFIRE (CONTINUED)

12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

---

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0300-MULTIPLE CYLINDER MISFIRE (CONTINUED)

15. IGNITION COIL

Disconnect the Ignition Coil harness connector.

Remove the Fuel Pump Relay or ASD Relay.

Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Control circuit.

Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 3.7L and 4.7L Ignition coil is 0.6 to 0.9 of an ohm and the resistance of a 5.7L Ignition coil is 0.558 to 0.682 of an ohm at 77°F (25°C).

Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16

---

16. COIL CONTROL CIRCUIT

Turn the ignition off.

Disconnect the Ignition Coil harness connector.

Disconnect the PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the Coil Control circuit for an open, short to ground, and short to voltage.

Was a problem found with the Coil Control circuit?

Yes >> Repair the Coil Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

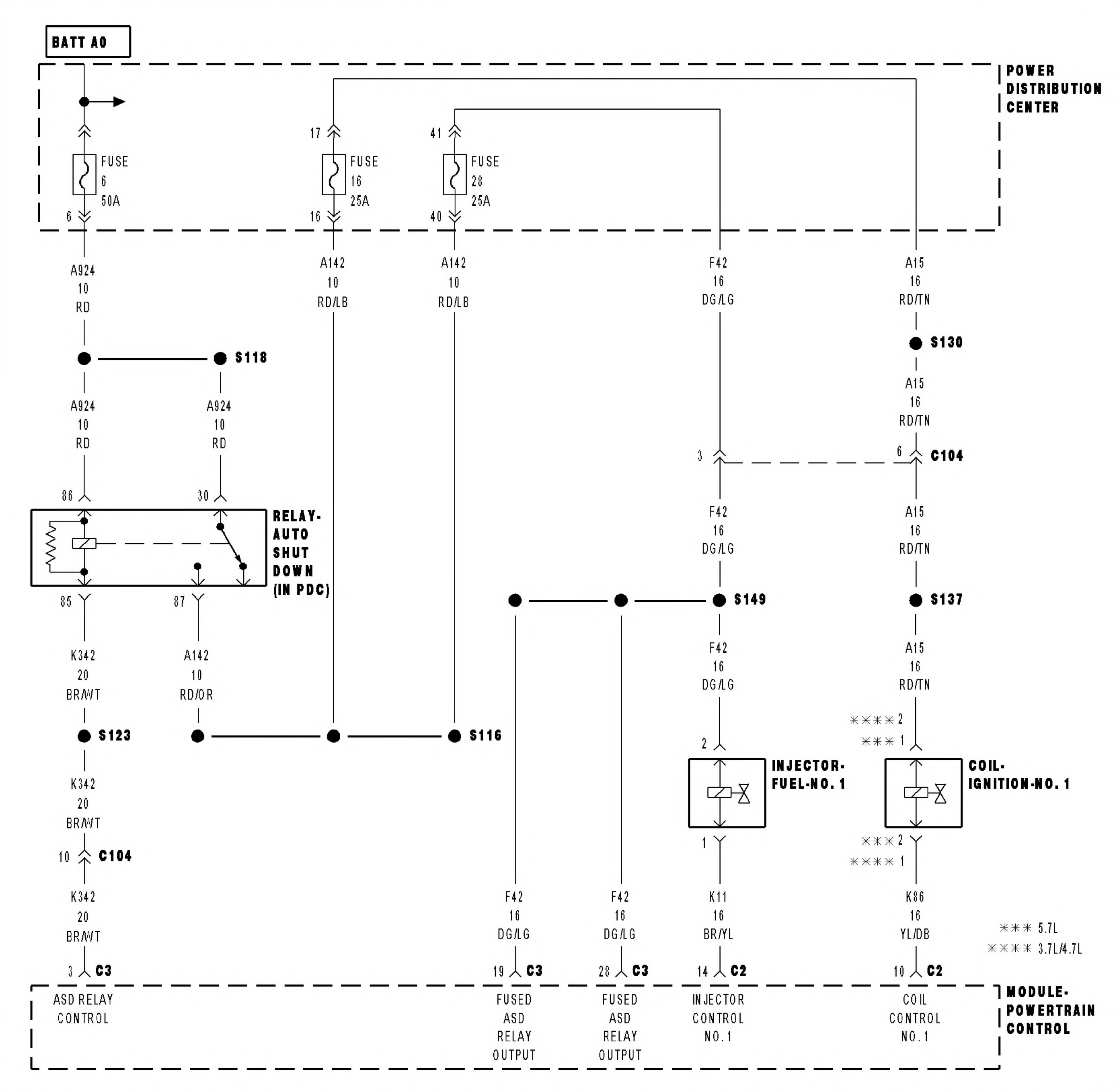
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

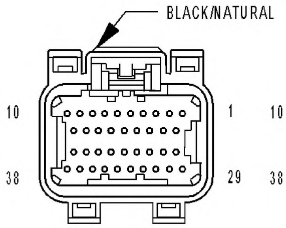
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0301-CYLINDER 1 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
S118
A924 10 RD
A924 10 RD
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
S149
S137
K342 20 BR/WT
A142 10 RD/OR
S123
S116
✱✱✱✱ 2
✱✱✱ 1
2
INJECTOR-FUEL-NO. 1
COIL-IGNITION-NO. 1
1
✱✱✱ 2
✱✱✱✱ 1
10
C104
K342 20 BR/WT
F42 16 DG/LG
K11 16 BR/YL
K86 16 YL/DB
✱✱✱ 5.7L
✱✱✱✱ 3.7L/4.7L
3 C3
19 C3
28 C3
14 C2
10 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 1
COIL CONTROL NO. 1
MODULE-POWERTRAIN CONTROL


BLACK/NATURAL
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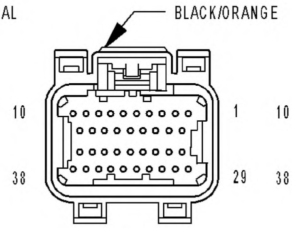
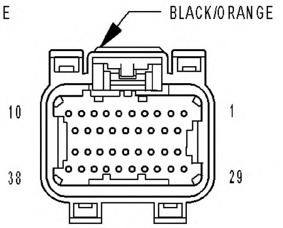
1
38
29

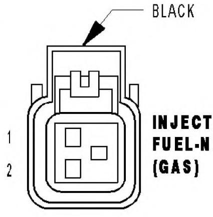
MODULE-POWERTRAIN CONTROL C3


BLACK/ORANGE
10
1
38
29

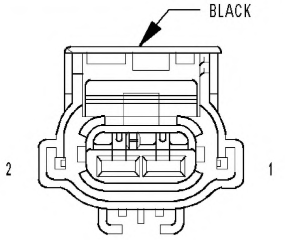
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)


BLACK/ORANGE
10
1
38
29

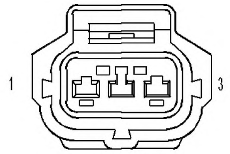
MODULE-POWERTRAIN CONTROL C2 (5.7L)



INJECTOR-FUEL-NO. 1 (GAS)



COIL-IGNITION-NO. 1 (5.7L)


1
3

COIL-IGNITION-NO. 1 (3.7L/4.7L)

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P0301-CYLINDER 1 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10% to 30% misfire rate during on trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K11) INJECTOR CONTROL NO.1 CIRCUIT
(K86) COIL CONTROL NO.1 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.
Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute on the scan tool.

Is there a misfire present at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0301-CYLINDER 1 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

Disconnect the Ignition Coil No.1 harness connector.

Disconnect the Fuel Injector No.1 harness connector.

Ignition on, engine not running.

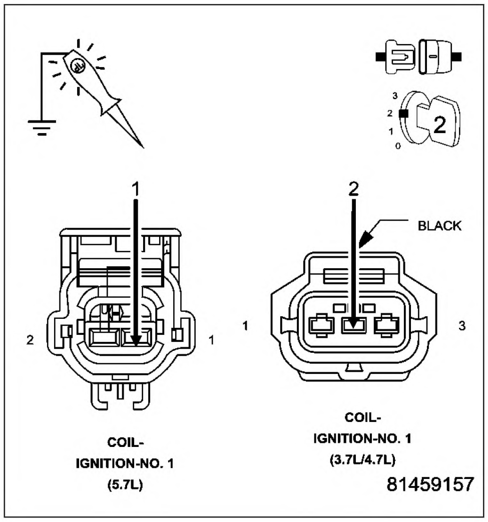
With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



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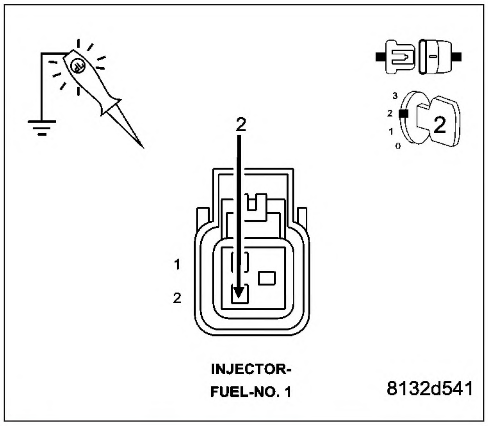

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P0301-CYLINDER 1 MISFIRE (CONTINUED)

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil No.1 harness connector.

Remove the Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0301-CYLINDER 1 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi).

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using the scan tool, actuate the No.1 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0301-CYLINDER 1 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

CAM LOBES - must not be worn excessively

CYLINDER LEAKAGE TEST - must be within specifications

VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.1 Fuel Injector harness connector.

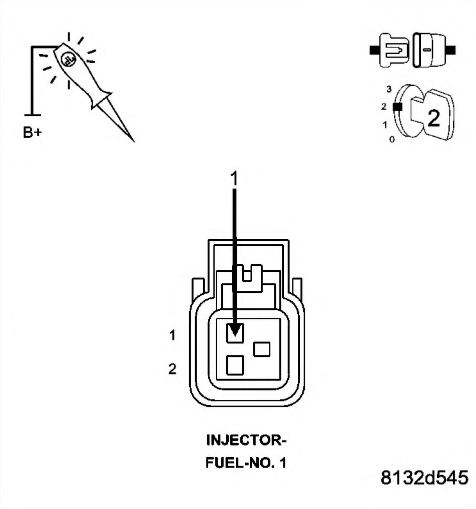
Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the (K11) Injector Control No.1 circuit.

With the scan tool, actuate the Fuel Injector.



Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0301-CYLINDER 1 MISFIRE (CONTINUED)

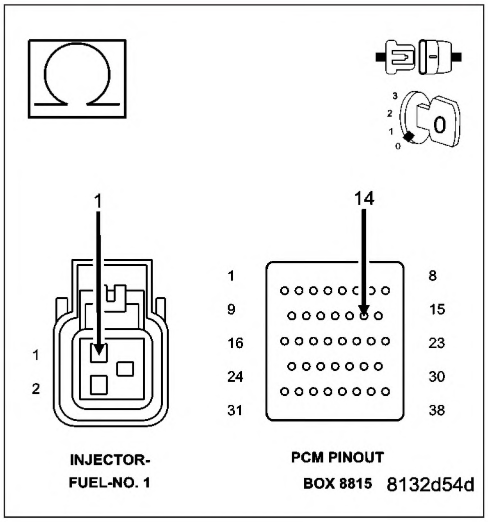
11. (K11) INJECTOR CONTROL NO.1 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K11) Injector Control No.1 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K11) Injector Control No.1 circuit?

Yes >> Repair the excessive resistance or short in the (K11) Injector Control No.1 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0301-CYLINDER 1 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

15. IGNITION COIL

Disconnect the Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K86) Coil Control No.1 circuit.

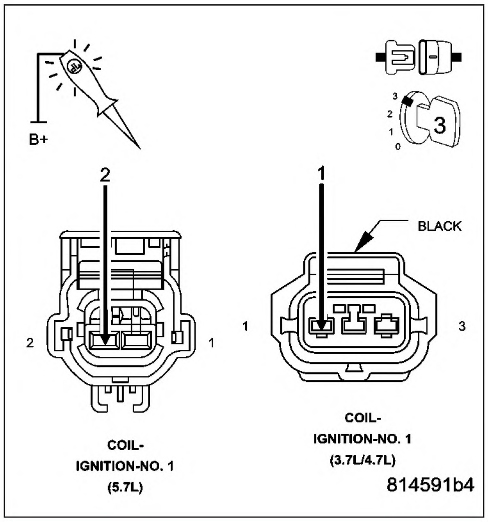
Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 3.7L and 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).

Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16



P0301-CYLINDER 1 MISFIRE (CONTINUED)

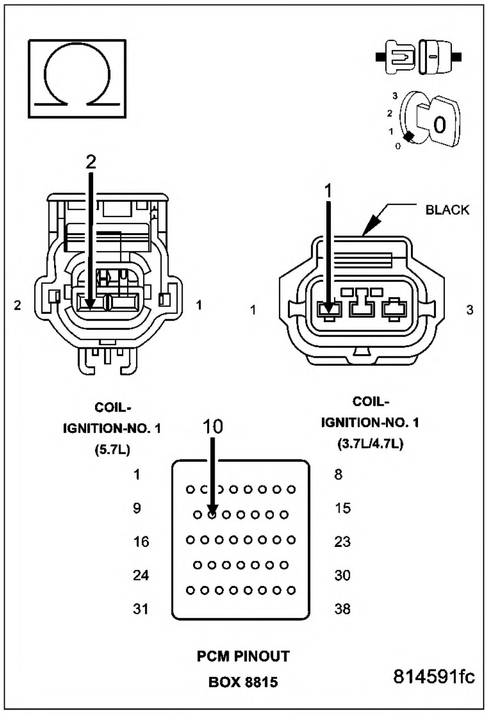
16. (K86) COIL CONTROL NO.1 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K86) Coil Control No.1 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K19) Coil Control No.1 circuit?

Yes >> Repair the (K86) Coil Control No.1 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

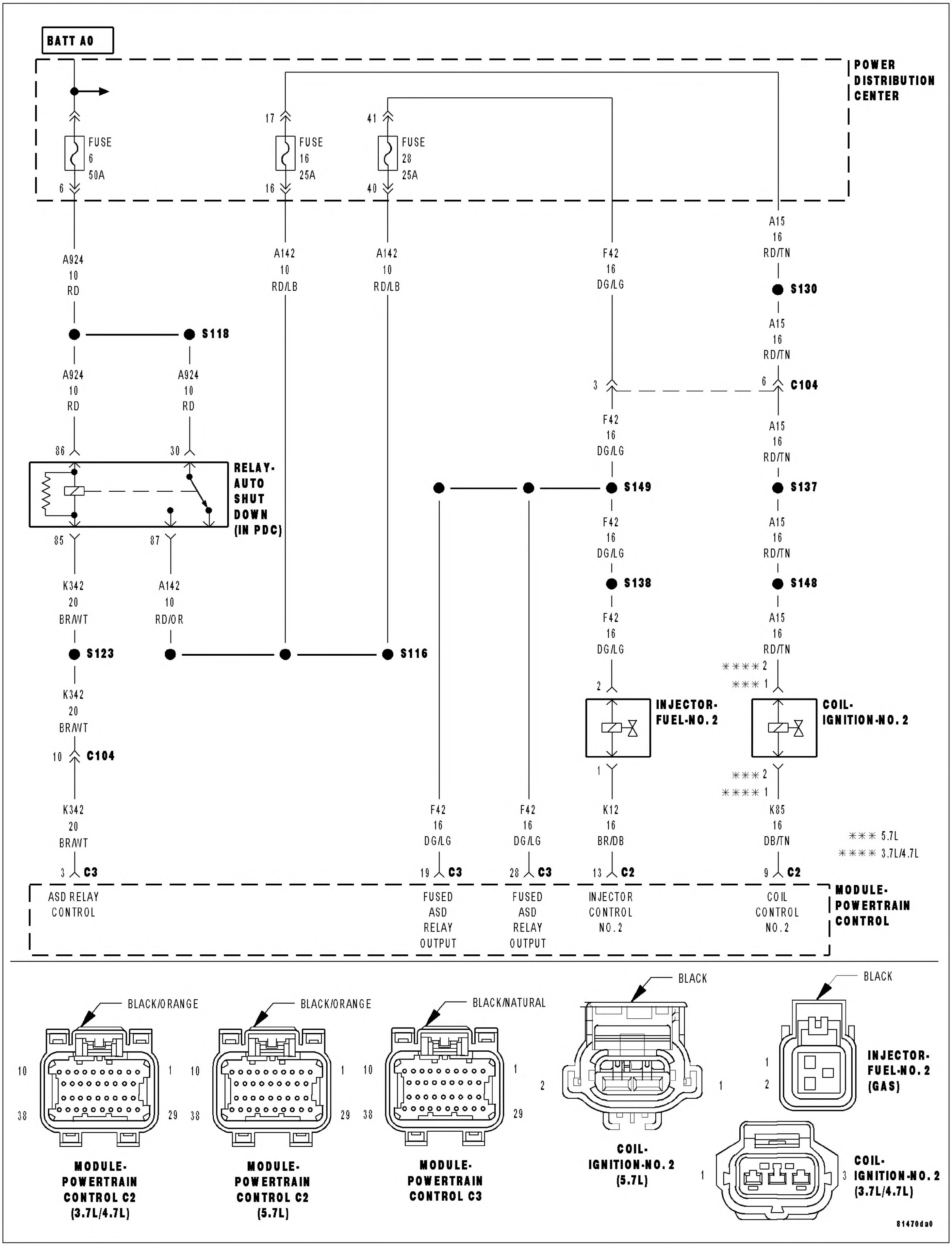
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0302-CYLINDER 2 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 16 25A
17
16
FUSE 28 25A
41
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
S118
A924 10 RD
A924 10 RD
3
6
C104
F42 16 DG/LG
A15 16 RD/TN
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
S149
S137
85
87
K342 20 BR/WT
A142 10 RD/OR
S138
S148
S123
S116
**** 2
*** 1
2
INJECTOR-FUEL-NO. 2
COIL-IGNITION-NO. 2
K342 20 BR/WT
10
C104
1
*** 2
**** 1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K12 16 BR/DB
K85 16 DB/TN
*** 5.7L
**** 3.7L/4.7L
3 C3
19 C3
28 C3
13 C2
9 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 2
COIL CONTROL NO. 2
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK
2
1
COIL-IGNITION-NO. 2 (5.7L)
BLACK
1
2
INJECTOR-FUEL-NO. 2 (GAS)
1
3
COIL-IGNITION-NO. 2 (3.7L/4.7L)
81470da0

P0302-CYLINDER 2 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10 % to 30 % misfire rate during one trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K12) INJECTOR CONTROL NO.2 CIRCUIT
(K85) COIL CONTROL NO.2 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute with the scan tool.

Is there a misfire present?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0302-CYLINDER 2 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0302-CYLINDER 2 MISFIRE (CONTINUED)

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

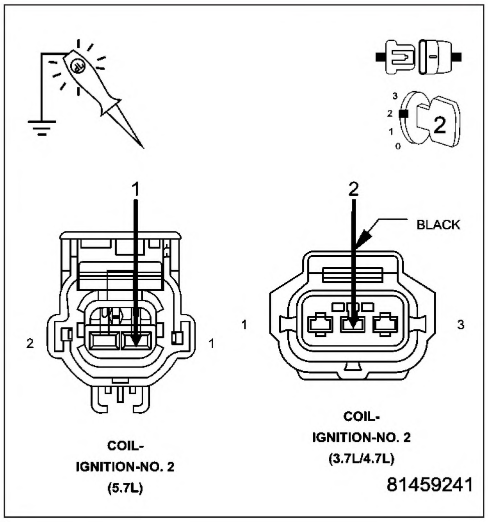
Disconnect the Ignition Coil No.2 harness connector.

Disconnect the Fuel Injector No.2 harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.



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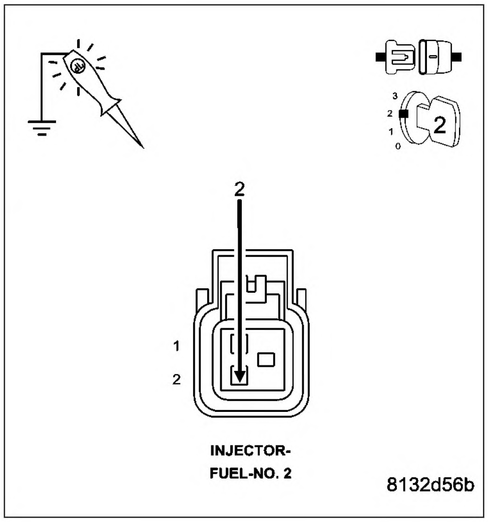

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Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil No.2 harness connector.

Remove the Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

P0302-CYLINDER 2 MISFIRE (CONTINUED)

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0302-CYLINDER 2 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi)

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using scan tool, actuate the No.2 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0302-CYLINDER 2 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

CAM LOBES - must not be worn excessively

CYLINDER LEAKAGE TEST - must be within specifications

VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.2 Fuel Injector harness connector.

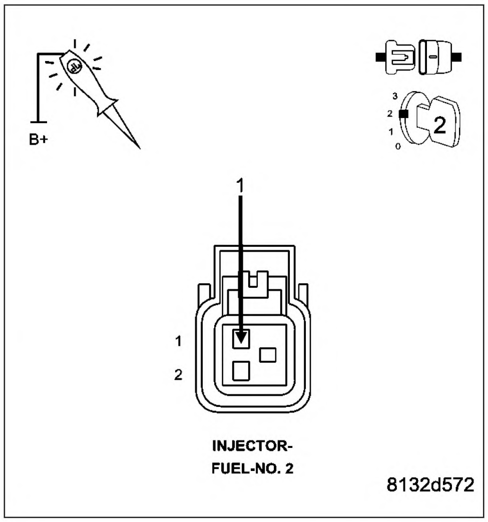
Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the (K12) Injector Control No.2 circuit.

With the scan tool, actuate the Fuel Injector.



Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0302-CYLINDER 2 MISFIRE (CONTINUED)

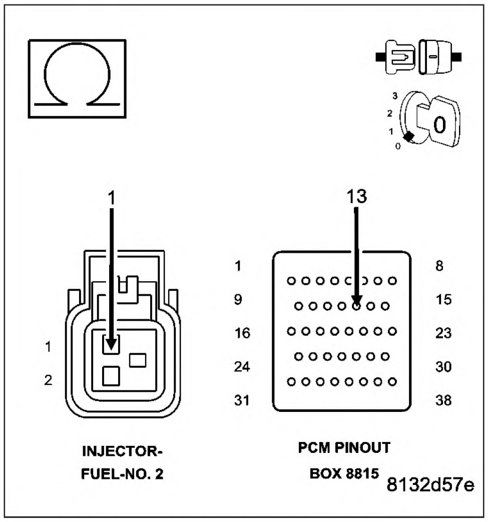
11. (K12) INJECTOR CONTROL NO.2 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K12) Injector Control No.2 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K12) Injector Control No.2 circuit?

Yes >> Repair the excessive resistance or short in the (K12) Injector Control No.2 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0302-CYLINDER 2 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. IGNITION COIL

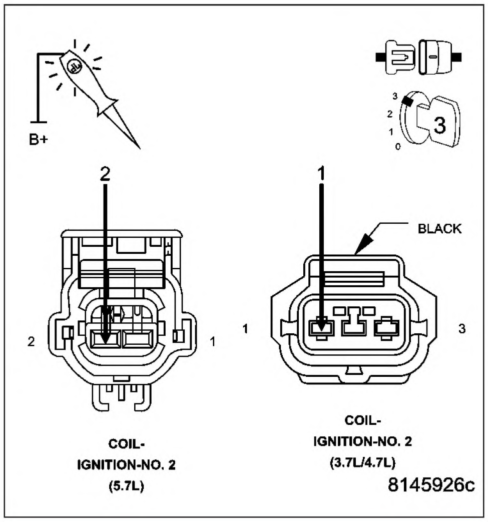
Disconnect the Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K85) Coil Control No.2 circuit.

Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 3.7L and 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).



Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16

P0302-CYLINDER 2 MISFIRE (CONTINUED)

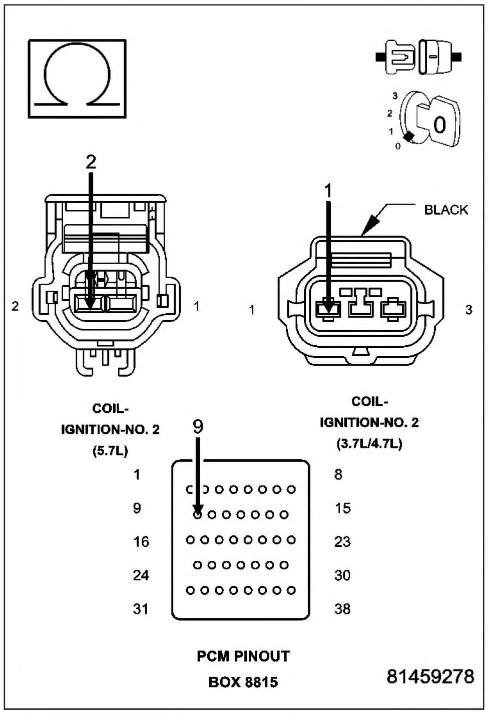
16. (K85) COIL CONTROL NO.2 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K85) Coil Control No.2 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K85) Coil Control No.2 circuit?

Yes >> Repair the (K85) Coil Control No.2 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

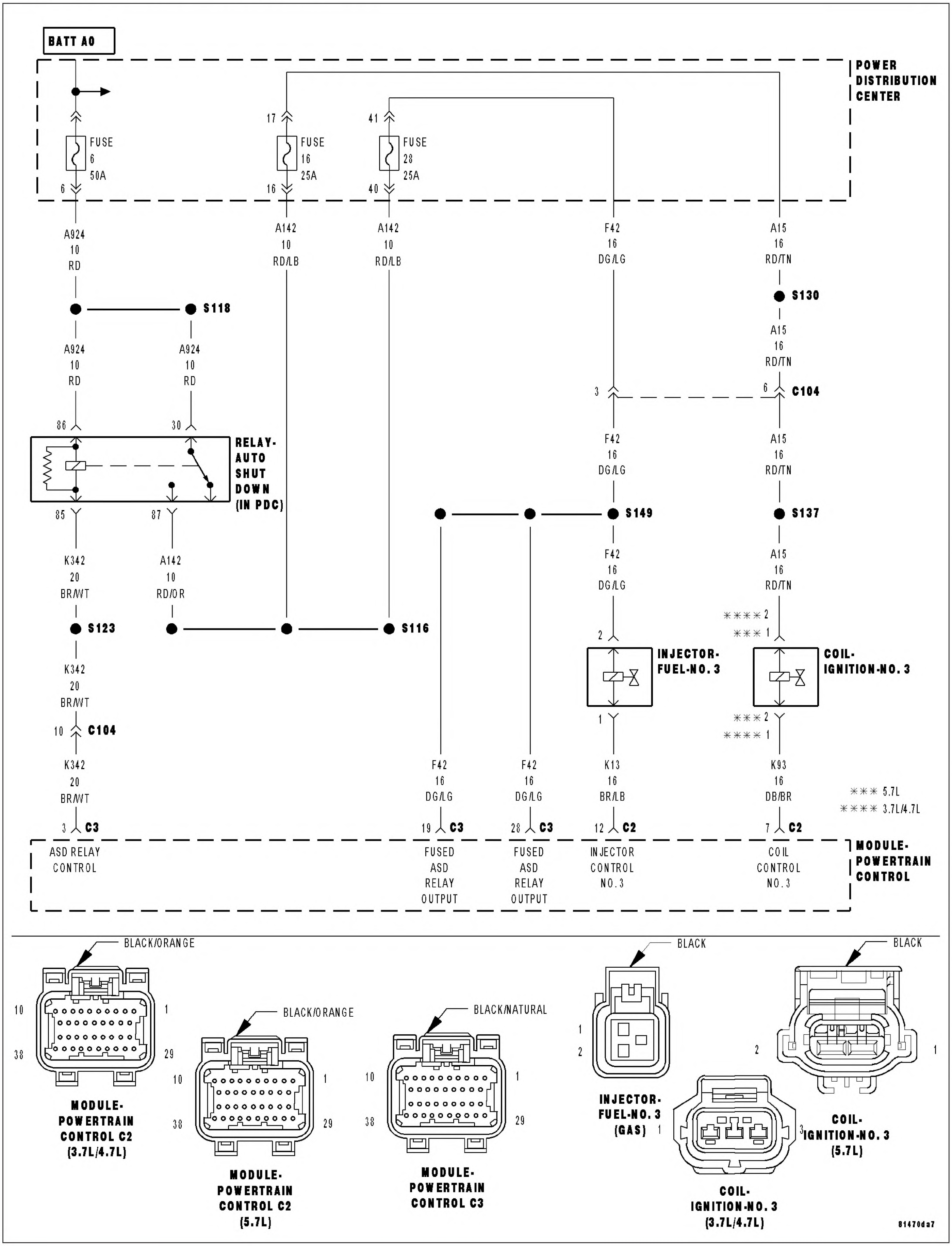
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0303-CYLINDER 3 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
A15 16 RD/TN
S118
A924 10 RD
A924 10 RD
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
F42 16 DG/LG
A15 16 RD/TN
85
87
S149
S137
K342 20 BR/WT
A142 10 RD/OR
F42 16 DG/LG
A15 16 RD/TN
S123
S116
✳✳✳✳ 2
✳✳✳ 1
2
INJECTOR-FUEL-NO. 3
COIL-IGNITION-NO. 3
K342 20 BR/WT
1
✳✳✳ 2
✳✳✳✳ 1
10
C104
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K13 16 BR/LB
K93 16 DB/BR
✳✳✳ 5.7L
✳✳✳✳ 3.7L/4.7L
3 C3
19 C3
28 C3
12 C2
7 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 3
COIL CONTROL NO. 3
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK
1
2
INJECTOR-FUEL-NO. 3 (GAS)
1
3
COIL-IGNITION-NO. 3 (3.7L/4.7L)
BLACK
2
1
COIL-IGNITION-NO. 3 (5.7L)
81470da7

P0303-CYLINDER 3 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10% to 30% misfire rate during on trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K13) INJECTOR CONTROL NO.3 CIRCUIT
(K93) COIL CONTROL NO.3 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute with the scan tool.

Is there a misfire present at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0303-CYLINDER 3 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys.
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0303-CYLINDER 3 MISFIRE (CONTINUED)

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

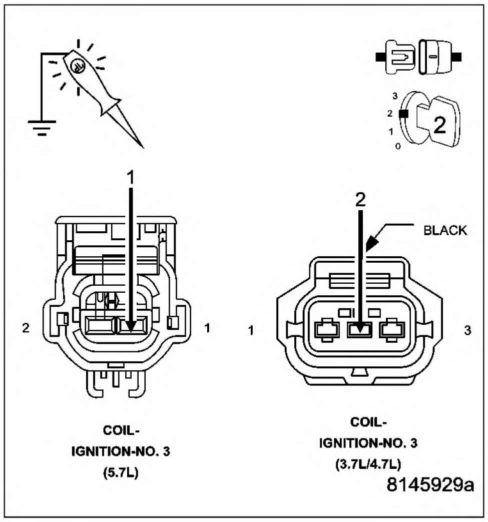
Disconnect the No.3 Ignition Coil harness connector.

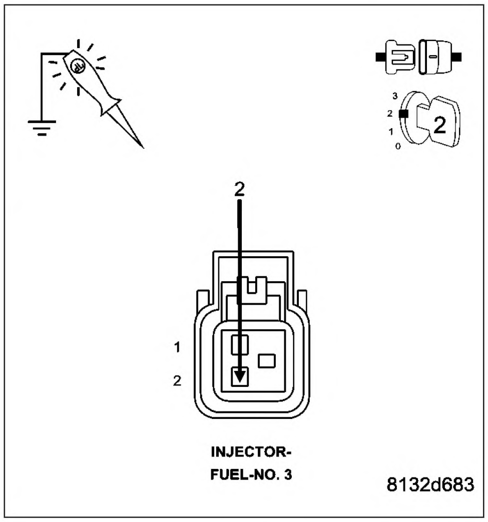
Disconnect the No.3 Fuel Injector harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.





Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil No.3 harness connector.

Remove the Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

P0303-CYLINDER 3 MISFIRE (CONTINUED)

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0303-CYLINDER 3 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi).

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using a scan tool, actuate the No.3 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0303-CYLINDER 3 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

CAM LOBES - must not be worn excessively

CYLINDER LEAKAGE TEST - must be within specifications

VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.3 Fuel Injector harness connector.

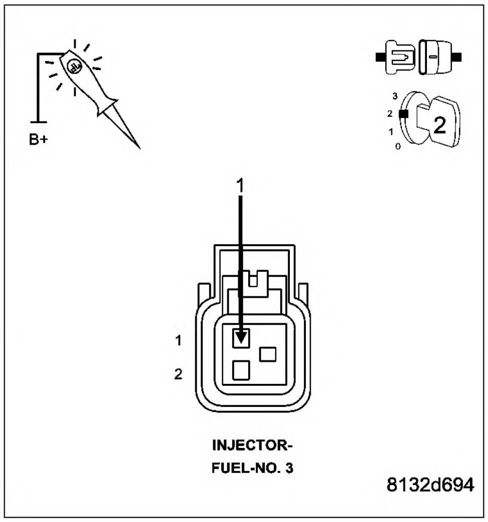
Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the (K13) Injector Control No.3 circuit.

With the scan tool, actuate the Fuel Injector.



Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0303-CYLINDER 3 MISFIRE (CONTINUED)

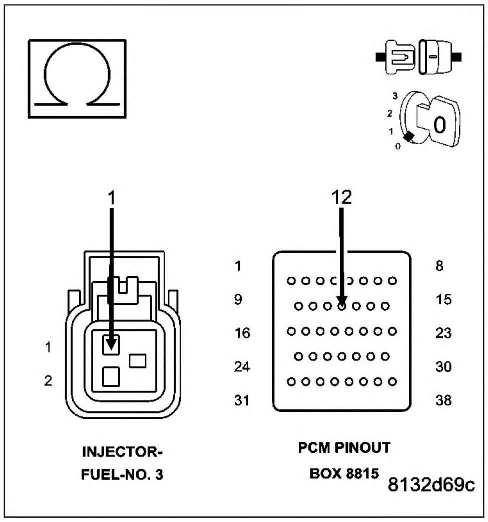
11. (K13) INJECTOR CONTROL NO.3 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K13) Injector Control No.3 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K13) Injector Control No.3 circuit?

Yes >> Repair the excessive resistance or short in the (K13) Injector Control No.3 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With a scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0303-CYLINDER 3 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. IGNITION COIL

Disconnect the No.3 Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K93) Coil Control No.3 circuit.

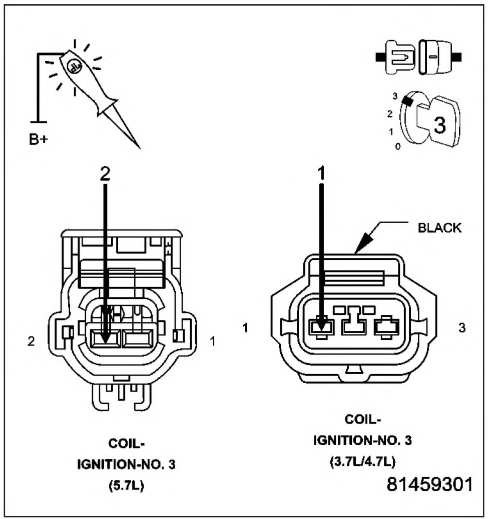
Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 3.7L and 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).

Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16



P0303-CYLINDER 3 MISFIRE (CONTINUED)

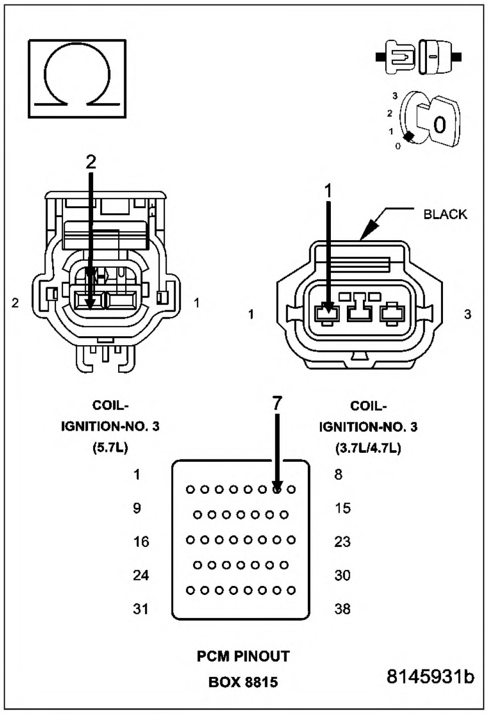
16. (K93) COIL CONTROL NO.3 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K93) Coil Control No.3 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K18) Coil Control No.3 circuit?

Yes >> Repair the (K93) Coil Control No.3 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

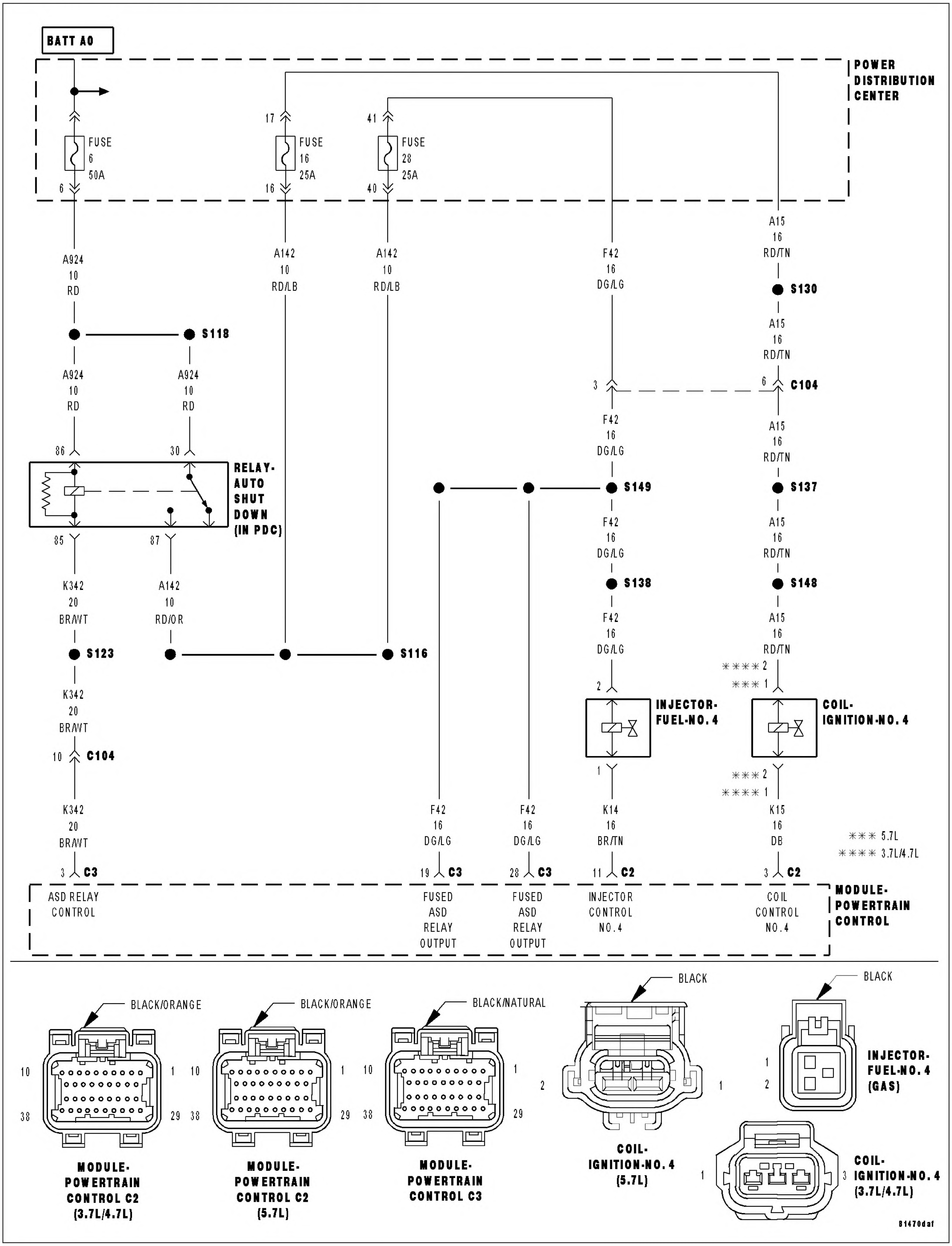
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0304-CYLINDER 4 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
A15 16 RD/TN
S118
A924 10 RD
A924 10 RD
3
6
C104
F42 16 DG/LG
A15 16 RD/TN
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
S149
S137
85
87
F42 16 DG/LG
A15 16 RD/TN
S138
S148
K342 20 BR/WT
A142 10 RD/OR
F42 16 DG/LG
A15 16 RD/TN
S123
S116
∗∗∗∗ 2
∗∗∗ 1
K342 20 BR/WT
2
INJECTOR-FUEL-NO. 4
COIL-IGNITION-NO. 4
10
C104
1
∗∗∗ 2
∗∗∗∗ 1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K14 16 BR/TN
K15 16 DB
∗∗∗ 5.7L
∗∗∗∗ 3.7L/4.7L
3 C3
19 C3
28 C3
11 C2
3 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 4
COIL CONTROL NO. 4
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
BLACK/ORANGE
BLACK/NATURAL
BLACK
BLACK
10
1
38
29
10
1
38
29
10
1
38
29
2
1
1
2
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
MODULE-POWERTRAIN CONTROL C2 (5.7L)
MODULE-POWERTRAIN CONTROL C3
COIL-IGNITION-NO. 4 (5.7L)
INJECTOR-FUEL-NO. 4 (GAS)
1
3
COIL-IGNITION-NO. 4 (3.7L/4.7L)
81470daf

P0304-CYLINDER 4 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10% to 30% misfire rate during on trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K14) INJECTOR CONTROL NO.4 CIRCUIT
(K15) COIL CONTROL NO.4 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute with the scan tool.

Is there a misfire present at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0304-CYLINDER 4 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0304-CYLINDER 4 MISFIRE (CONTINUED)

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

NOTE: The circuit id (K342) is used on vehicles equipped with a 5.7L engine and the (A955) circuit id is used with the 3.7L and 4.7L engines.

Turn the ignition off.

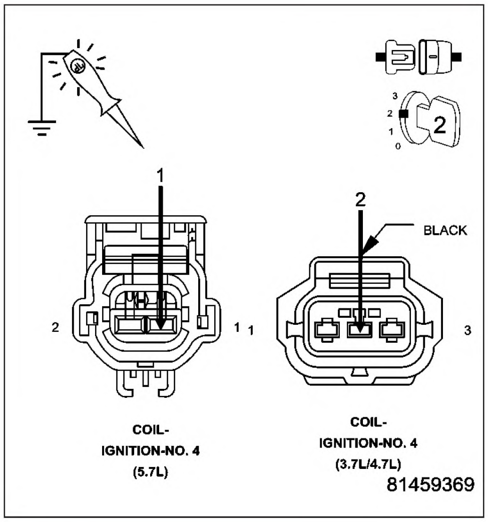
Disconnect the No.4 Ignition Coil harness connector.

Disconnect the No.4 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.



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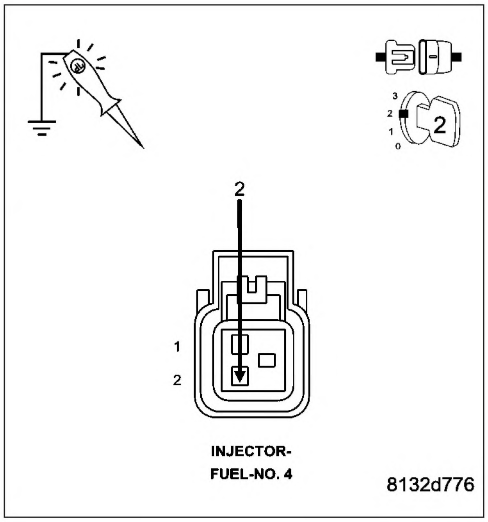

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Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the No.4 Ignition Coil harness connector.

Remove the No.4 Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

P0304-CYLINDER 4 MISFIRE (CONTINUED)

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0304-CYLINDER 4 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi)

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using the scan tool, actuate the No.4 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0304-CYLINDER 4 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

CAM LOBES - must not be worn excessively

CYLINDER LEAKAGE TEST - must be within specifications

VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.4 Fuel Injector harness connector.

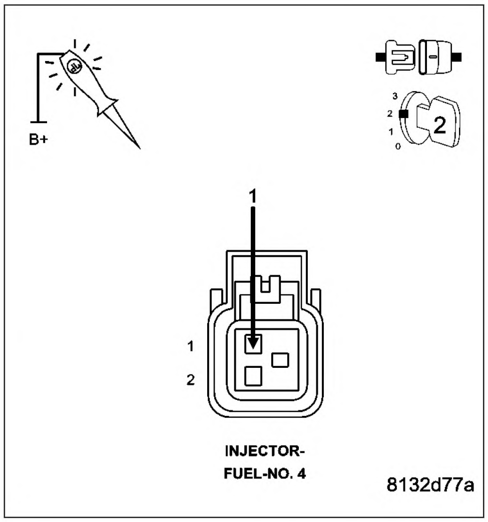
Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the (K14) Injector Control No.4 circuit.

With the scan tool, actuate the Fuel Injector.



Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0304-CYLINDER 4 MISFIRE (CONTINUED)

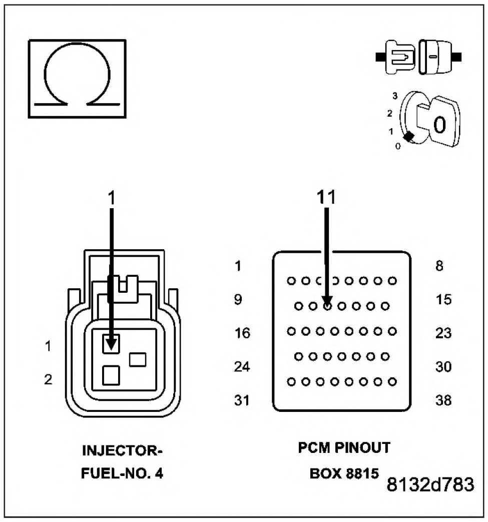
11. (K14) INJECTOR CONTROL NO.4 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K14) Injector Control No.4 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K14) Injector Control No.4 circuit?

Yes >> Repair the excessive resistance or short in the (K14) Injector Control No.4 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0304-CYLINDER 4 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. IGNITION COIL

Disconnect the No.4 Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K15) Coil Control No.4 circuit.

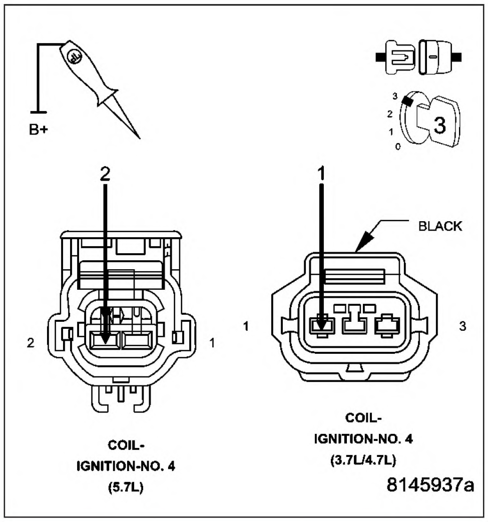
Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 3.7L and 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).

Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16



P0304-CYLINDER 4 MISFIRE (CONTINUED)

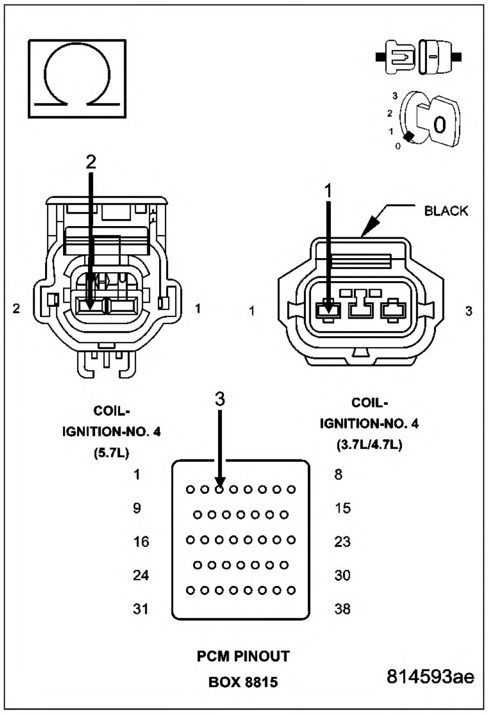
16. (K15) COIL CONTROL NO.4 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K15) Coil Control No.4 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K15) Coil Control No.4 circuit?

Yes >> Repair the (K15) Coil Control No.4 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

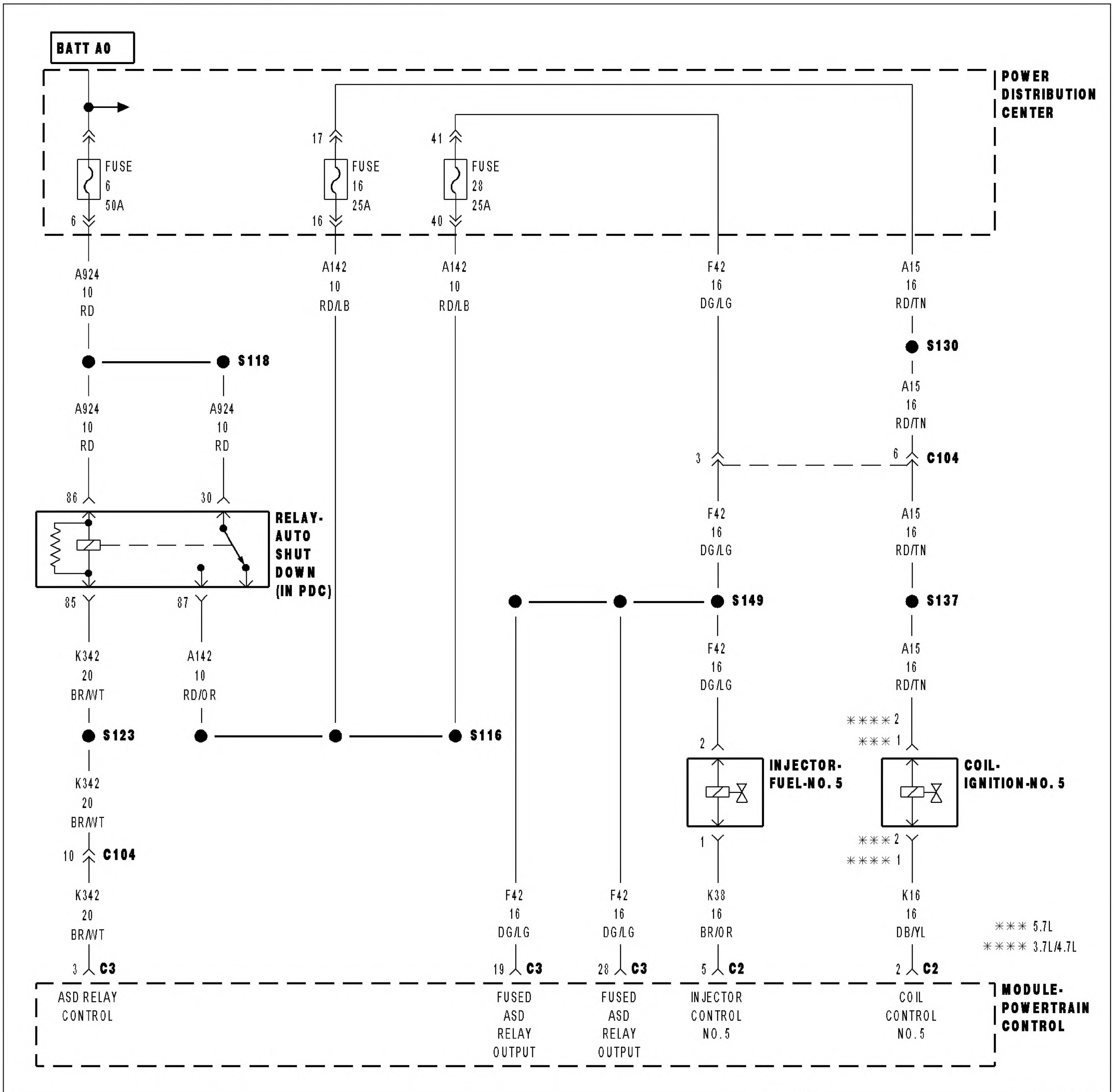
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

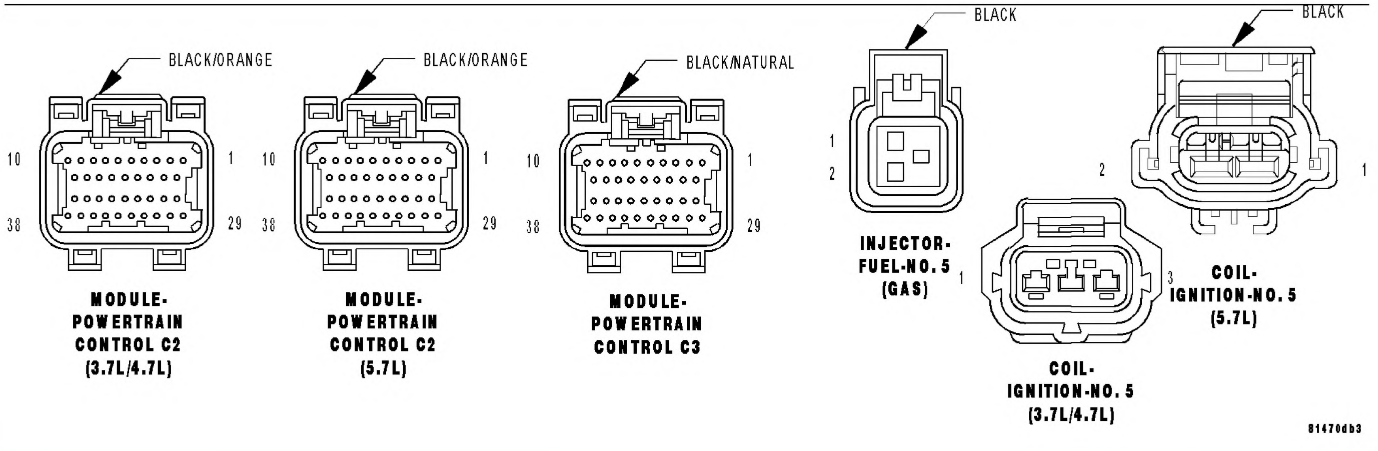
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0305-CYLINDER 5 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S118
S130
A924 10 RD
A924 10 RD
A15 16 RD/TN
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
F42 16 DG/LG
A15 16 RD/TN
85
87
S149
S137
K342 20 BR/WT
A142 10 RD/OR
F42 16 DG/LG
A15 16 RD/TN
S123
S116
∗∗∗∗ 2
∗∗∗ 1
2
INJECTOR-FUEL-NO. 5
COIL-IGNITION-NO. 5
K342 20 BR/WT
1
∗∗∗ 2
∗∗∗∗ 1
10
C104
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K38 16 BR/OR
K16 16 DB/YL
∗∗∗ 5.7L
∗∗∗∗ 3.7L/4.7L
3 C3
19 C3
28 C3
5 C2
2 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 5
COIL CONTROL NO. 5
MODULE-POWERTRAIN CONTROL


BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK
1
2
INJECTOR-FUEL-NO. 5 (GAS)
1
3
COIL-IGNITION-NO. 5 (3.7L/4.7L)
BLACK
2
1
COIL-IGNITION-NO. 5 (5.7L)
81470db3

P0305-CYLINDER 5 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10% to 30% misfire rate during on trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K38) INJECTOR CONTROL NO.5 CIRCUIT
(K16) COIL CONTROL NO.5 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute with a scan tool.

Is there a misfire present at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0305-CYLINDER 5 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0305-CYLINDER 5 MISFIRE (CONTINUED)

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

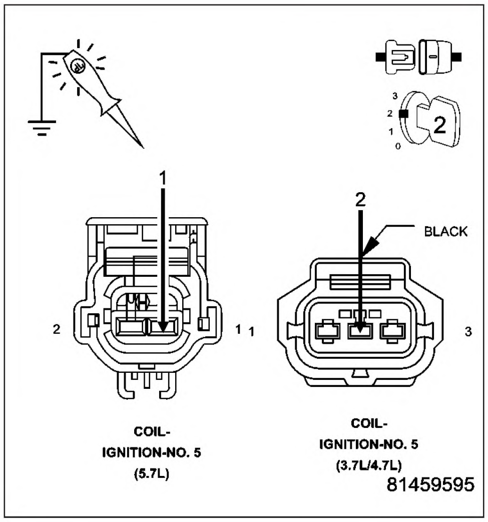
Disconnect the No.5 Ignition Coil harness connector.

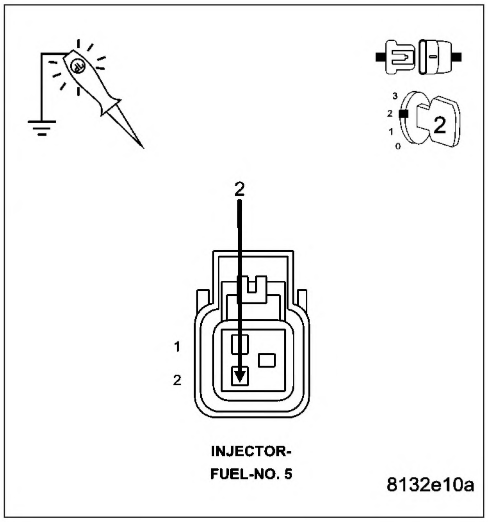
Disconnect the No.5 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.





Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil No.5 harness connector.

Remove the Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

P0305-CYLINDER 5 MISFIRE (CONTINUED)

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0305-CYLINDER 5 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi).

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using the scan tool, actuate the No.5 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0305-CYLINDER 5 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral
ENGINE VALVE TIMING - must be within specifications
ENGINE COMPRESSION - must be within specifications
ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.
ENGINE PCV SYSTEM - must flow freely
TORQUE CONVERTER STALL SPEED - must be within specifications
POWER BRAKE BOOSTER - no internal vacuum leaks
FUEL - must be free of contamination
CAM LOBES - must not be worn excessively
CYLINDER LEAKAGE TEST - must be within specifications
VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.5 Fuel Injector harness connector.

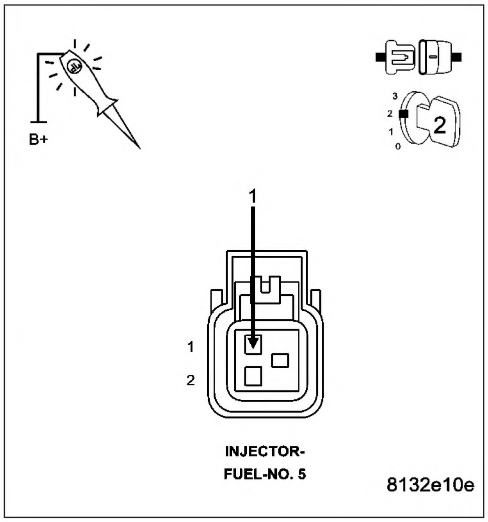
Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the (K38) Injector Control No.5 circuit.

With the scan tool, actuate the Fuel Injector.



Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0305-CYLINDER 5 MISFIRE (CONTINUED)

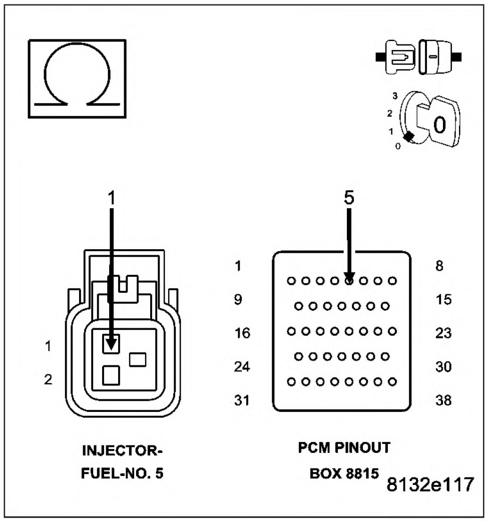
11. (K38) INJECTOR CONTROL NO.5 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K38) Injector Control No.5 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K38) Injector Control No.5 circuit?

Yes >> Repair the excessive resistance or short in the (K38) Injector Control No.5 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0305-CYLINDER 5 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. IGNITION COIL

Disconnect the No.5 Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K16) Coil Control No.5 circuit.

Crank the engine for 5 seconds while observing the test light.

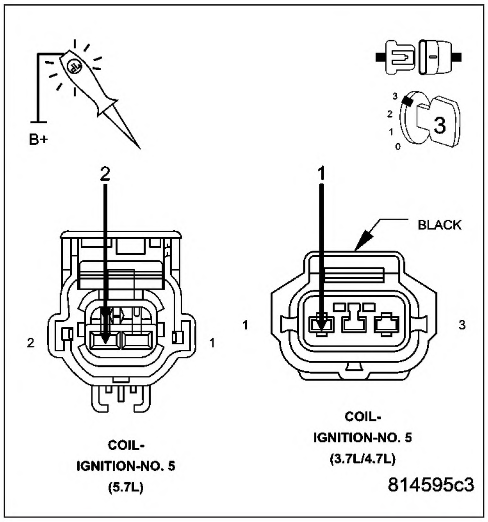
NOTE: The primary resistance of the 3.7L and 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).

Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.

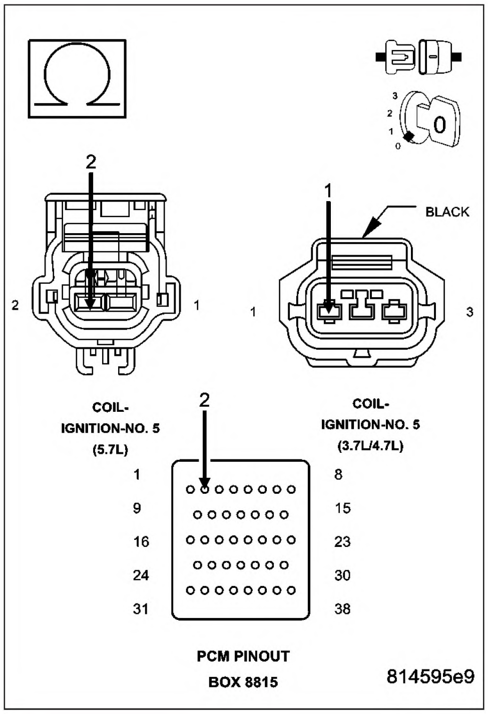
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16



P0305-CYLINDER 5 MISFIRE (CONTINUED)

16. (K16) COIL CONTROL NO.5 CIRCUIT



Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K16) Coil Control No.5 circuit for an open, short to ground, and short to voltage.

Was a problem found with the (K16) Coil Control No.5 circuit?

Yes >> Repair the (K16) Coil Control No.5 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

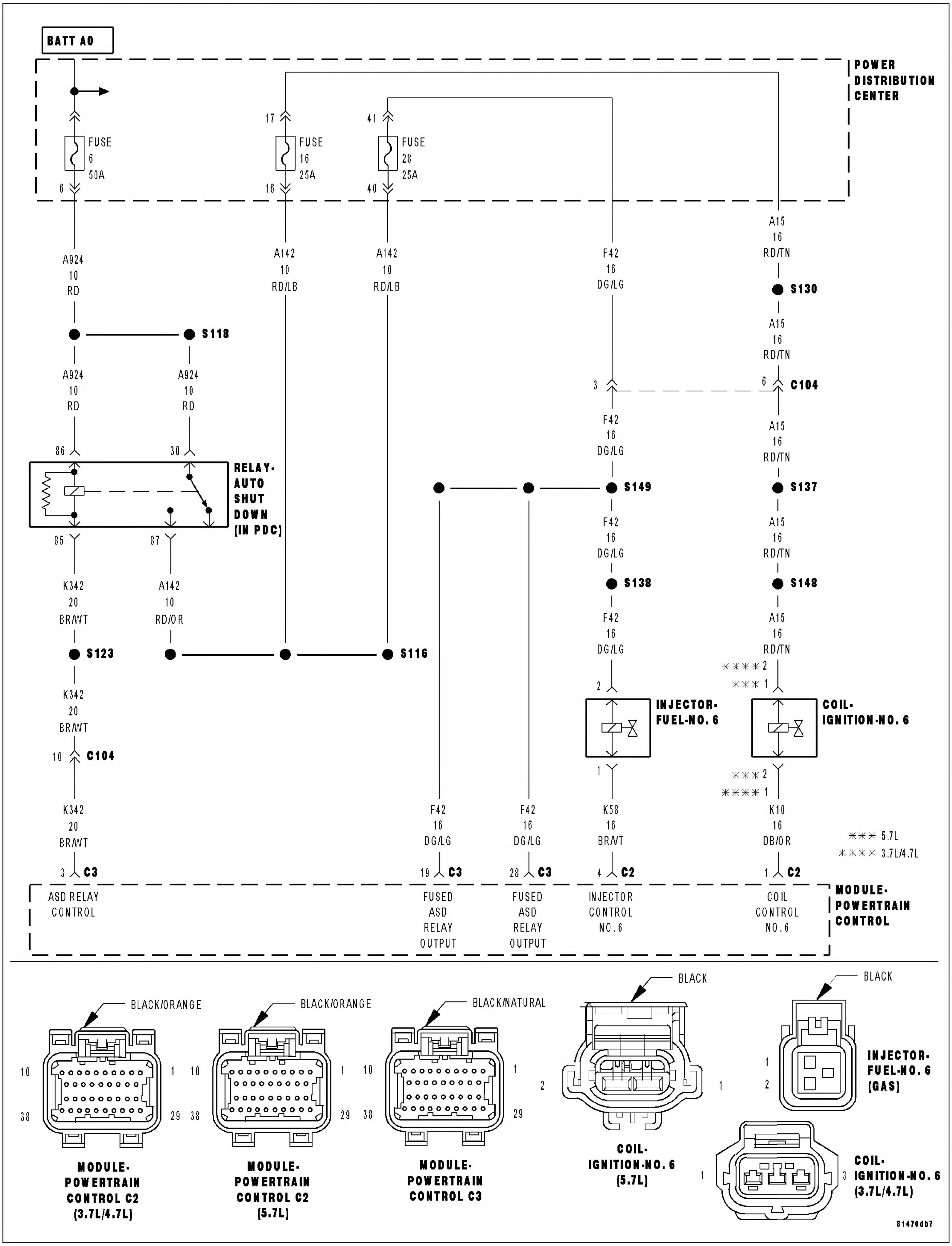
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0306-CYLINDER 6 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
A15 16 RD/TN
S118
A924 10 RD
A924 10 RD
3
6
C104
F42 16 DG/LG
A15 16 RD/TN
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
S149
S137
85
87
F42 16 DG/LG
A15 16 RD/TN
S138
S148
K342 20 BR/WT
A142 10 RD/OR
F42 16 DG/LG
A15 16 RD/TN
S123
S116
**** 2
*** 1
K342 20 BR/WT
2
INJECTOR-FUEL-NO. 6
COIL-IGNITION-NO. 6
10
C104
1
*** 2
**** 1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K58 16 BR/VT
K10 16 DB/OR
*** 5.7L
**** 3.7L/4.7L
3 C3
19 C3
28 C3
4 C2
1 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 6
COIL CONTROL NO. 6
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK
2
1
COIL-IGNITION-NO. 6 (5.7L)
BLACK
1
2
INJECTOR-FUEL-NO. 6 (GAS)
1
3
COIL-IGNITION-NO. 6 (3.7L/4.7L)
81470db7

P0306-CYLINDER 6 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10% to 30% misfire rate during on trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K58) INJECTOR CONTROL NO.6 CIRCUIT
(K10) COIL CONTROL NO.6 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute with a scan tool.

Is there a misfire present at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0306-CYLINDER 6 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0306-CYLINDER 6 MISFIRE (CONTINUED)

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

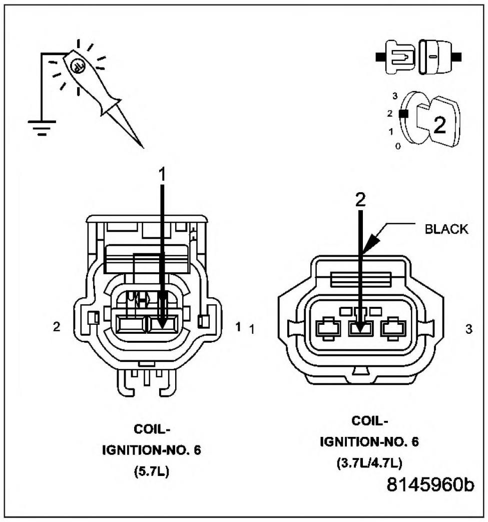
Disconnect the No.6 Ignition Coil harness connector.

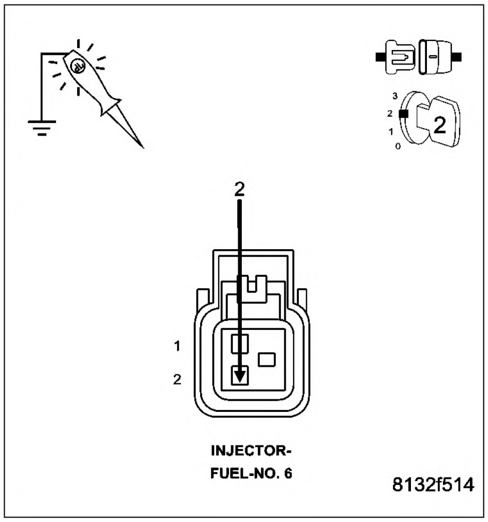
Disconnect the No.6 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.





Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil No.6 harness connector.

Remove the Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

P0306-CYLINDER 6 MISFIRE (CONTINUED)

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

P0306-CYLINDER 6 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi).

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using the scan tool, actuate the No.6 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0306-CYLINDER 6 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

CAM LOBES - must not be worn excessively

CYLINDER LEAKAGE TEST - must be within specifications

VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.6 Fuel Injector harness connector.

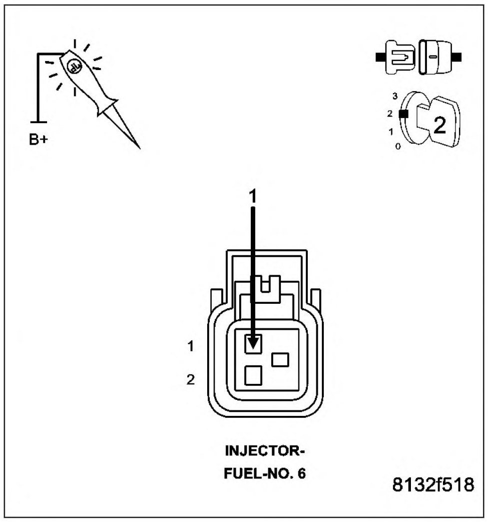
Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the (K58) Injector Control No.6 circuit.

With the scan tool, actuate the Fuel Injector.



Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0306-CYLINDER 6 MISFIRE (CONTINUED)

11. (K58) INJECTOR CONTROL NO.6 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

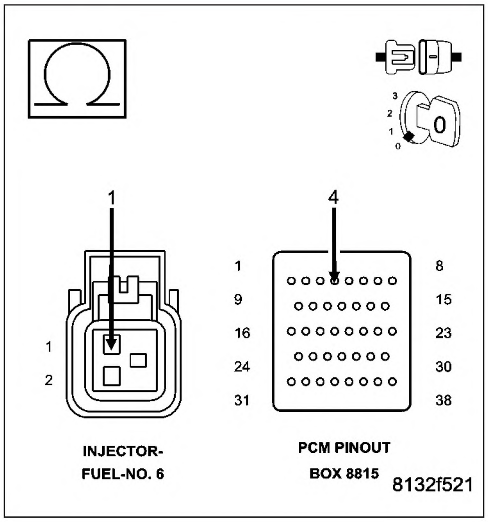
Check the (K58) Injector Control No.6 circuit for an open, short to ground, and short to voltage.

Was a problem found with the (K58) Injector Control No.6 circuit?

Yes >> Repair the excessive resistance or short in the (K58) Injector Control No.6 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17



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12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0306-CYLINDER 6 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. IGNITION COIL

Disconnect the No.6 Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K10) Coil Control No.6 circuit.

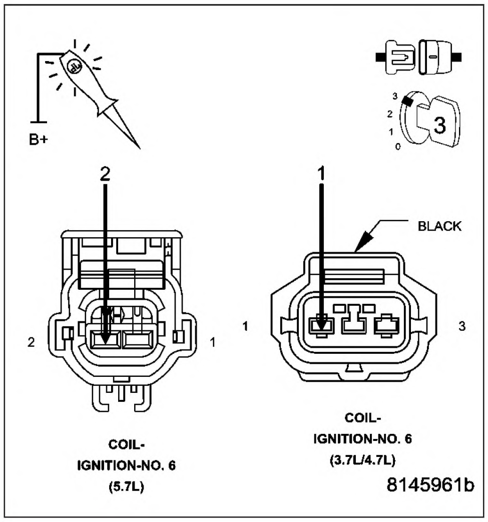
Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 3.7L and 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).

Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16



P0306-CYLINDER 6 MISFIRE (CONTINUED)

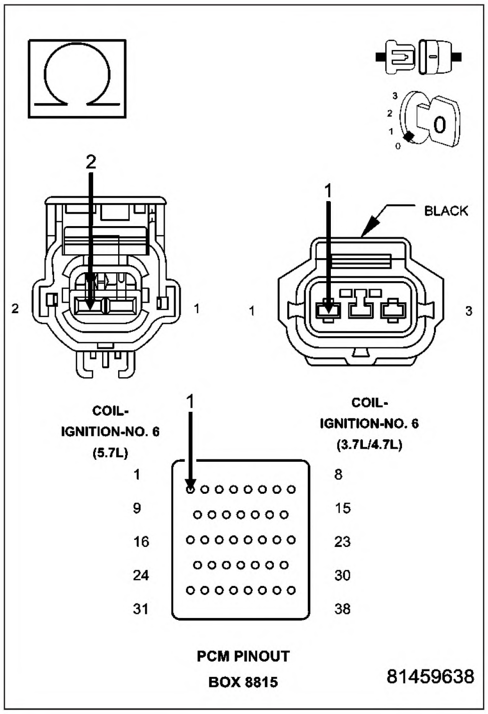
16. (K10) COIL CONTROL NO.6 CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K10) Coil Control No.6 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K10) Coil Control No.6 circuit?

Yes >> Repair the (K10) Coil Control No.6 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

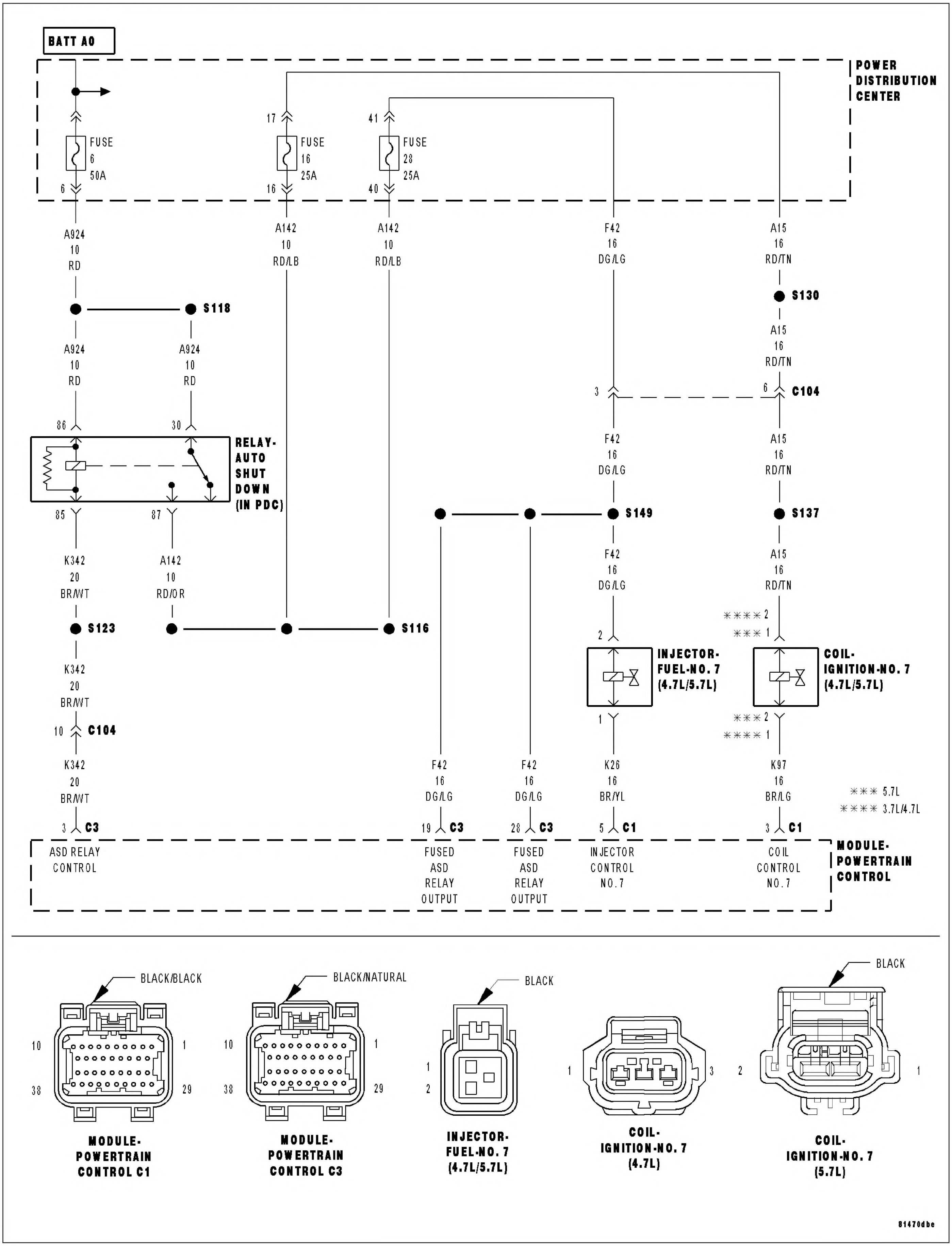
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0307-CYLINDER 7 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 16 25A
17
16
FUSE 28 25A
41
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
A15 16 RD/TN
S118
A924 10 RD
A924 10 RD
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
3
6
C104
F42 16 DG/LG
A15 16 RD/TN
S149
S137
K342 20 BR/WT
A142 10 RD/OR
F42 16 DG/LG
A15 16 RD/TN
S123
S116
✱✱✱✱ 2
✱✱✱ 1
2
INJECTOR-FUEL-NO. 7 (4.7L/5.7L)
COIL-IGNITION-NO. 7 (4.7L/5.7L)
K342 20 BR/WT
10
C104
1
✱✱✱ 2
✱✱✱✱ 1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K26 16 BR/YL
K97 16 BR/LG
✱✱✱ 5.7L
✱✱✱✱ 3.7L/4.7L
3 C3
19 C3
28 C3
5 C1
3 C1
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 7
COIL CONTROL NO. 7
MODULE-POWERTRAIN CONTROL
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK
1
2
INJECTOR-FUEL-NO. 7 (4.7L/5.7L)
1
3
COIL-IGNITION-NO. 7 (4.7L)
BLACK
2
1
COIL-IGNITION-NO. 7 (5.7L)
81470dbe

P0307-CYLINDER 7 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10% to 30% misfire rate during on trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K26) INJECTOR CONTROL NO.7 CIRCUIT
(K97) COIL CONTROL NO.7 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute with a scan tool.

Is there a misfire present at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0307-CYLINDER 7 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0307-CYLINDER 7 MISFIRE (CONTINUED)

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

Disconnect the No.7 Ignition Coil harness connector.

Disconnect the No.7 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

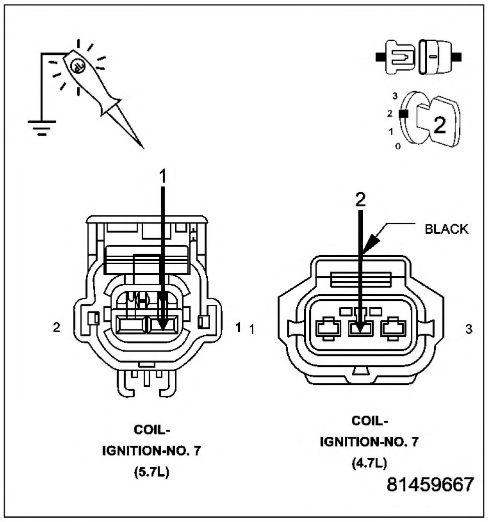
Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.

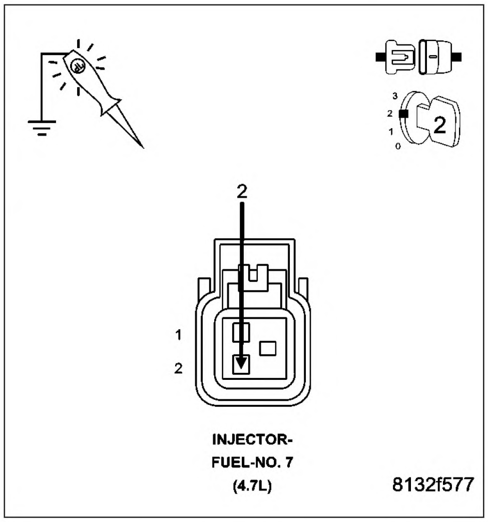
Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)





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4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil No.7 harness connector.

Remove the Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

P0307-CYLINDER 7 MISFIRE (CONTINUED)

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0307-CYLINDER 7 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi).

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using the scan tool, actuate the No.7 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0307-CYLINDER 7 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

CAM LOBES - must not be worn excessively

CYLINDER LEAKAGE TEST - must be within specifications

VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.7 Fuel Injector harness connector.

Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

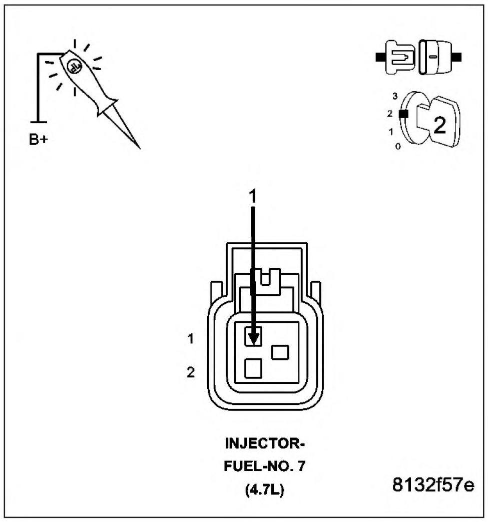
Using a 12-volt test light connected to 12-volts, probe the (K26) Injector Control No.7 circuit.

With the scan tool, actuate the Fuel Injector.

Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11



P0307-CYLINDER 7 MISFIRE (CONTINUED)

11. (K26) INJECTOR CONTROL NO.7 CIRCUIT

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

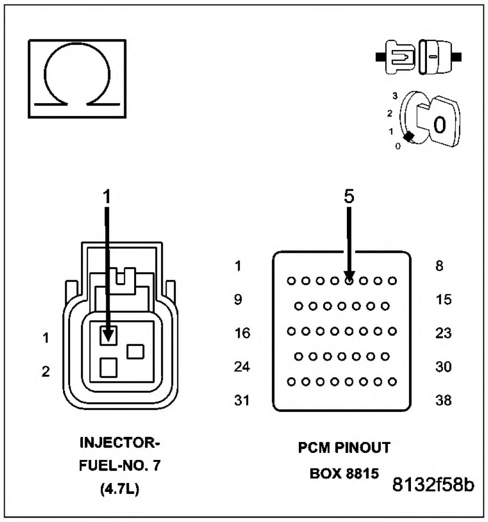
Check the (K26) Injector Control No.7 circuit for an open, short to ground, and short to voltage.

Was a problem found with the (K26) Injector Control No.7 circuit?

Yes >> Repair the excessive resistance or short in the (K26) Injector Control No.7 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17



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12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0307-CYLINDER 7 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

15. IGNITION COIL

Disconnect the No.7 Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K97) Coil Control No.7 circuit.

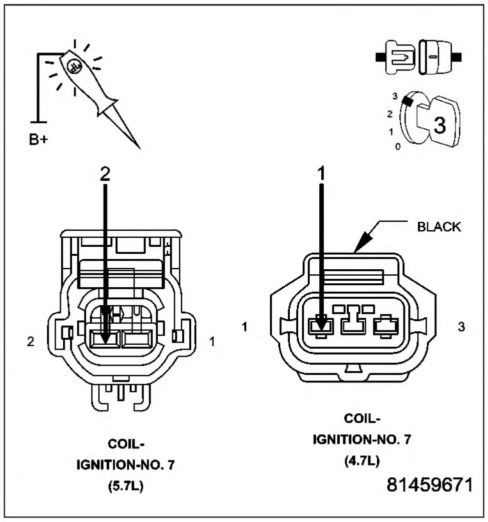
Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).

Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16



P0307-CYLINDER 7 MISFIRE (CONTINUED)

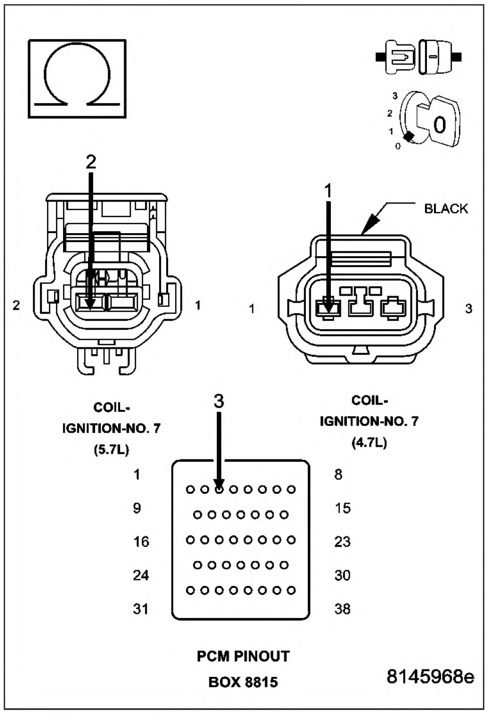
16. (K97) COIL CONTROL NO.7 CIRCUIT

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K97) Coil Control No.7 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K97) Coil Control No.7 circuit?

Yes >> Repair the (K97) Coil Control No.7 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

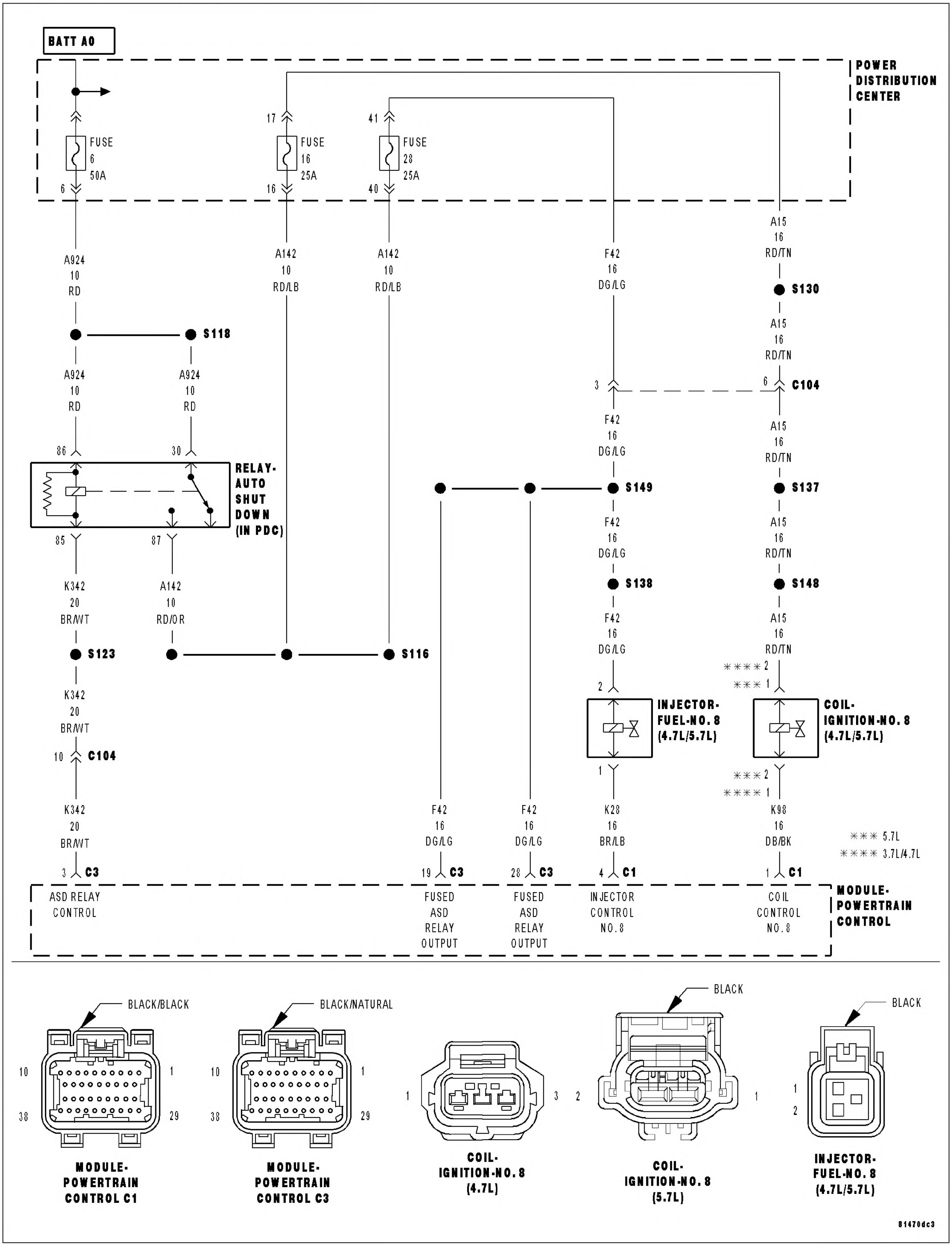
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0308-CYLINDER 8 MISFIRE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
FUSE 16 25A
FUSE 28 25A
17
16
41
40
6
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
S118
A924 10 RD
A924 10 RD
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
S149
S137
S138
S148
K342 20 BR/WT
A142 10 RD/OR
S123
S116
K342 20 BR/WT
10 C104
2
****2
***1
INJECTOR-FUEL-NO. 8 (4.7L/5.7L)
COIL-IGNITION-NO. 8 (4.7L/5.7L)
1
***2
****1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K28 16 BR/LB
K98 16 DB/BK
*** 5.7L
**** 3.7L/4.7L
3 C3
19 C3
28 C3
4 C1
1 C1
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
INJECTOR CONTROL NO. 8
COIL CONTROL NO. 8
MODULE-POWERTRAIN CONTROL
BLACK/BLACK
BLACK/NATURAL
BLACK
BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
MODULE-POWERTRAIN CONTROL C3
COIL-IGNITION-NO. 8 (4.7L)
COIL-IGNITION-NO. 8 (5.7L)
INJECTOR-FUEL-NO. 8 (4.7L/5.7L)
81470dc3

P0308-CYLINDER 8 MISFIRE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Any time the engine is running, and the adaptive numerator has been successfully updated.
- **Set Condition:**
  When more than 2% (2.5% LEV) misfire rate is measured during two trips, or with 10% to 30% misfire rate during on trip. Three good trips to clear the MIL.

Possible Causes
(F42), (A15) ASD RELAY OUTPUT CIRCUIT
(K28) INJECTOR CONTROL NO.8 CIRCUIT
(K98) COIL CONTROL NO.8 CIRCUIT
IGNITION WIRE
SPARK PLUG
IGNITION COIL
FUEL PUMP INLET STRAINER PLUGGED
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PRESSURE LEAK DOWN
FUEL INJECTOR
ENGINE MECHANICAL
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. CYLINDER MIS-FIRE CONDITION ACTIVE

Engine running.

Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute with a scan tool.

Is there a misfire present at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0308-CYLINDER 8 MISFIRE (CONTINUED)

2. VISUAL INSPECTION

NOTE: Anything that affects the speed of the crankshaft can cause a misfire DTC.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

- Visually inspect the engine for any of the following conditions.
- Worn serpentine belt
- Binding Engine-Driven accessories: A/C Compressor, P/S Pump, Water pump.
- Misalignment of the Water pump, P/S Pump and A/C Compressor pulleys
- Corroded PCM power and ground circuits.
- Improper CKP, CMP, MAP, and TP Sensor mounting
- Poor connector/terminal to component connection. i.e., CKP sensor, Fuel Injector, Ign coil, etc.
- Vacuum leaks
- Restricted Air Induction system or Exhaust system.
- Internal engine component failures.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0308-CYLINDER 8 MISFIRE (CONTINUED)

3. (F42), (A15) ASD RELAY OUTPUT CIRCUIT

Turn the ignition off.

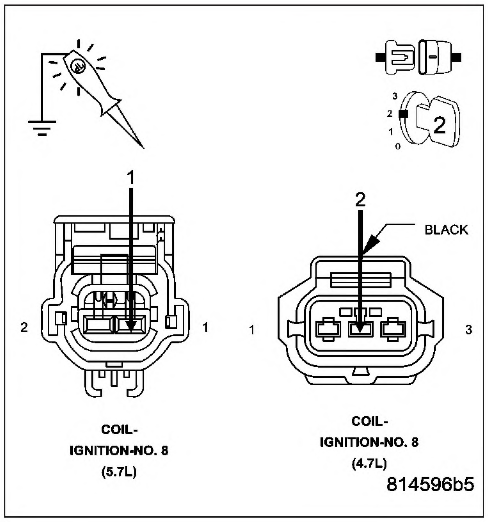
Disconnect the No.8 Ignition Coil harness connector.

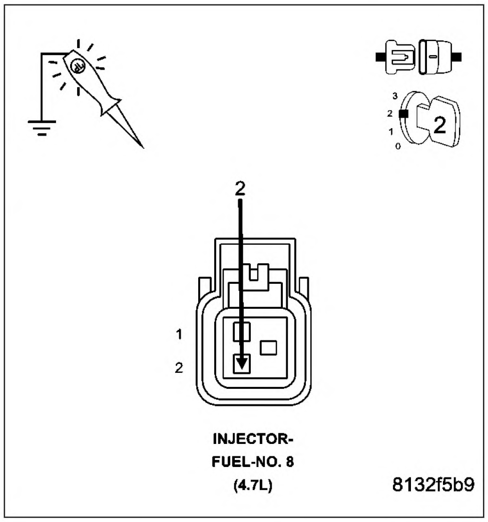
Disconnect the No.8 Fuel Injector harness connector.

Ignition on, engine not running.

With the scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (F42), (A15) ASD Relay Output circuit in the Ignition Coil harness connector and Fuel Injector harness connector while the relay is actuating.





Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the excessive resistance or short to ground in the (F42), (A15) ASD Relay Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION SYSTEM OPERATION

Turn the ignition off.

Connect the Ignition Coil No.8 harness connector.

Remove the Ignition Coil.

Leave the Fuel Injector harness connector of the cylinder being tested disconnected.

Install a spark tester on the Ignition Coil.

While cranking the engine observe the spark coming from the spark tester.

NOTE: A crisp blue spark that is able to jump the gap of the spark tester should be generated.

Is good spark present?

Yes >> Go To 5

No >> Go To 14

NOTE: Connect the Fuel Injector harness connector before continuing.

P0308-CYLINDER 8 MISFIRE (CONTINUED)

5. SPARK PLUG

Turn the ignition off.

Remove the Spark Plug.

Inspect the Spark Plug for the following conditions.

- Cracks
- Carbon Tracking
- Foreign Material
- Gap size out of specifications
- Loose or broke electrode

NOTE: Lightly tap the bottom of the spark plug on a solid surface. The electrode in the spark plug should not move.

Were any of the above conditions present?

Yes >> Replace the Spark Plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. FUEL PRESSURE CHECK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge to the fuel rail.

Start the engine and observe the fuel pressure reading.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Within Specification
Go To 7

Below Specification
Go To 12

Above Specification
Replace the fuel filter/pressure regulator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0308-CYLINDER 8 MISFIRE (CONTINUED)

7. FUEL PRESSURE LEAK DOWN

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi).

Does the pressure fall below the listed specification?

Yes >> Replace the leaking Fuel Injector(s).
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. FUEL INJECTOR OPERATION

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

CAUTION: After each Fuel Injector actuation, start the engine to clean the cylinder of fuel. Failure to do so could cause engine damage.

Remove special tool #C4390.

Start the engine and allow the fuel pressure to reach maximum pressure.

Ignition on, engine not running.

Using the scan tool, actuate the No.8 Fuel Injector.

Monitor the fuel pressure gauge.

Does the fuel pressure gauge indicate a drop in fuel pressure?

Yes >> Go To 9

No >> Go To 10

NOTE: Turn the ignition off, remove the Fuel Pressure gauge, and connect the fuel lines before continuing.

P0308-CYLINDER 8 MISFIRE (CONTINUED)

9. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

CAM LOBES - must not be worn excessively

CYLINDER LEAKAGE TEST - must be within specifications

VALVE SPRINGS - cannot be weak or broken

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

10. FUEL INJECTOR

Turn the ignition off.

Disconnect the No.8 Fuel Injector harness connector.

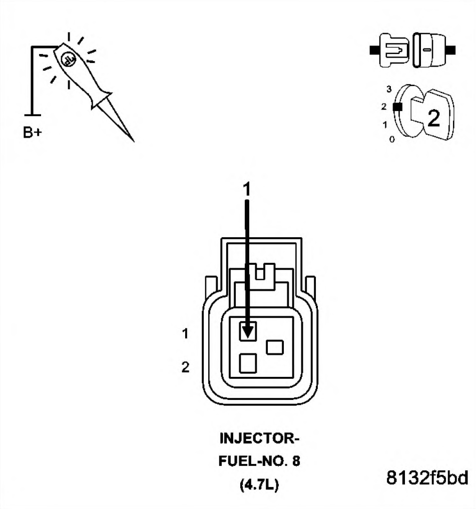
Ignition on, engine not running.

NOTE: When a Misfire is detected for a particular cylinder, the PCM will shut down that cylinders Injector Control circuit.

With the scan tool, erase DTCs.

Using a 12-volt test light connected to 12-volts, probe the (K28) Injector Control No.8 circuit.

With the scan tool, actuate the Fuel Injector.



Does the test light blink/flicker?

Yes >> Replace the Fuel Injector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0308-CYLINDER 8 MISFIRE (CONTINUED)

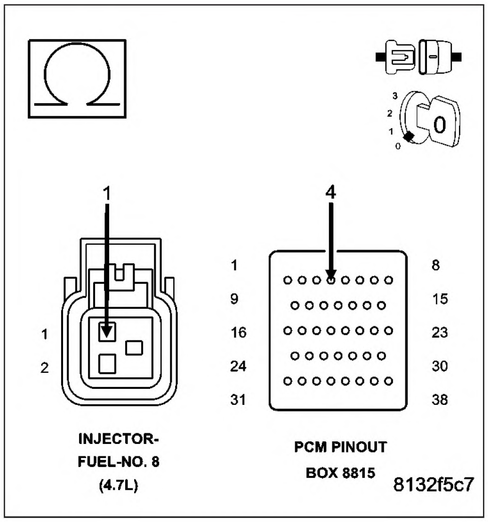
11. (K28) INJECTOR CONTROL NO.8 CIRCUIT

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K28) Injector Control No.8 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K28) Injector Control No.8 circuit?

Yes >> Repair the excessive resistance or short in the (K28) Injector Control No.8 circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

12. FUEL SUPPLY LINE RESTRICTED

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Repair or replace fuel supply line as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0308-CYLINDER 8 MISFIRE (CONTINUED)

13. FUEL PUMP INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Before continuing, check the Fuel Pump Module harness connector terminals for corrosion, damage, or terminal push out. Make sure the ground circuit is functional. Repair as necessary. Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. IGNITION WIRE

NOTE: If the vehicle being tested does not have an ignition wire answer YES to this test and continue.

Turn the ignition off.

Remove the ignition wire.

Measure the resistance of the ignition wire.

Is the resistance below 10K ohms?

Yes >> Go To 15

No >> Replace the Ignition Wire.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. IGNITION COIL

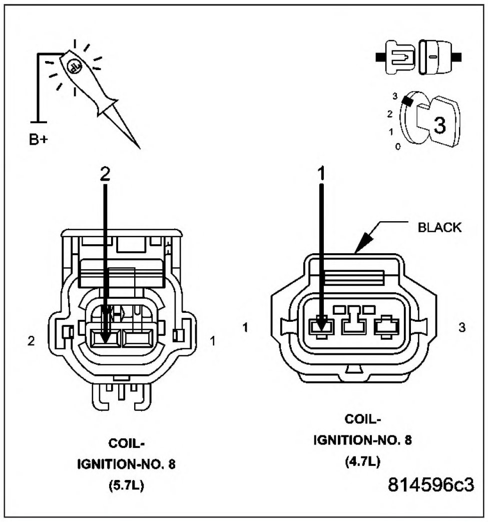
Disconnect the No.8 Ignition Coil harness connector.

Remove the Fuel Pump Relay.

Using a 12-volt test light connected to 12-volts, probe the (K98) Coil Control No.8 circuit.

Crank the engine for 5 seconds while observing the test light.

NOTE: The primary resistance of the 4.7L Ignition coil is 0.6 to 0.9 of an ohm at 77°F (25°C).



Does the test light brightly blink/flicker?

Yes >> Replace the Ignition Coil.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 16

P0308-CYLINDER 8 MISFIRE (CONTINUED)

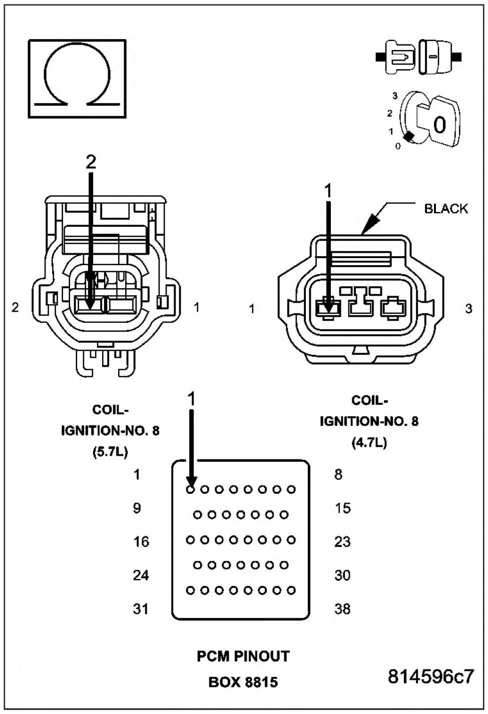
16. (K98) COIL CONTROL NO.8 CIRCUIT

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Check the (K98) Coil Control No.8 circuit for an open, short to ground, and short to voltage.



Was a problem found with the (K98) Coil Control No.8 circuit?

Yes >> Repair the (K98) Coil Control No.8 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 17

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

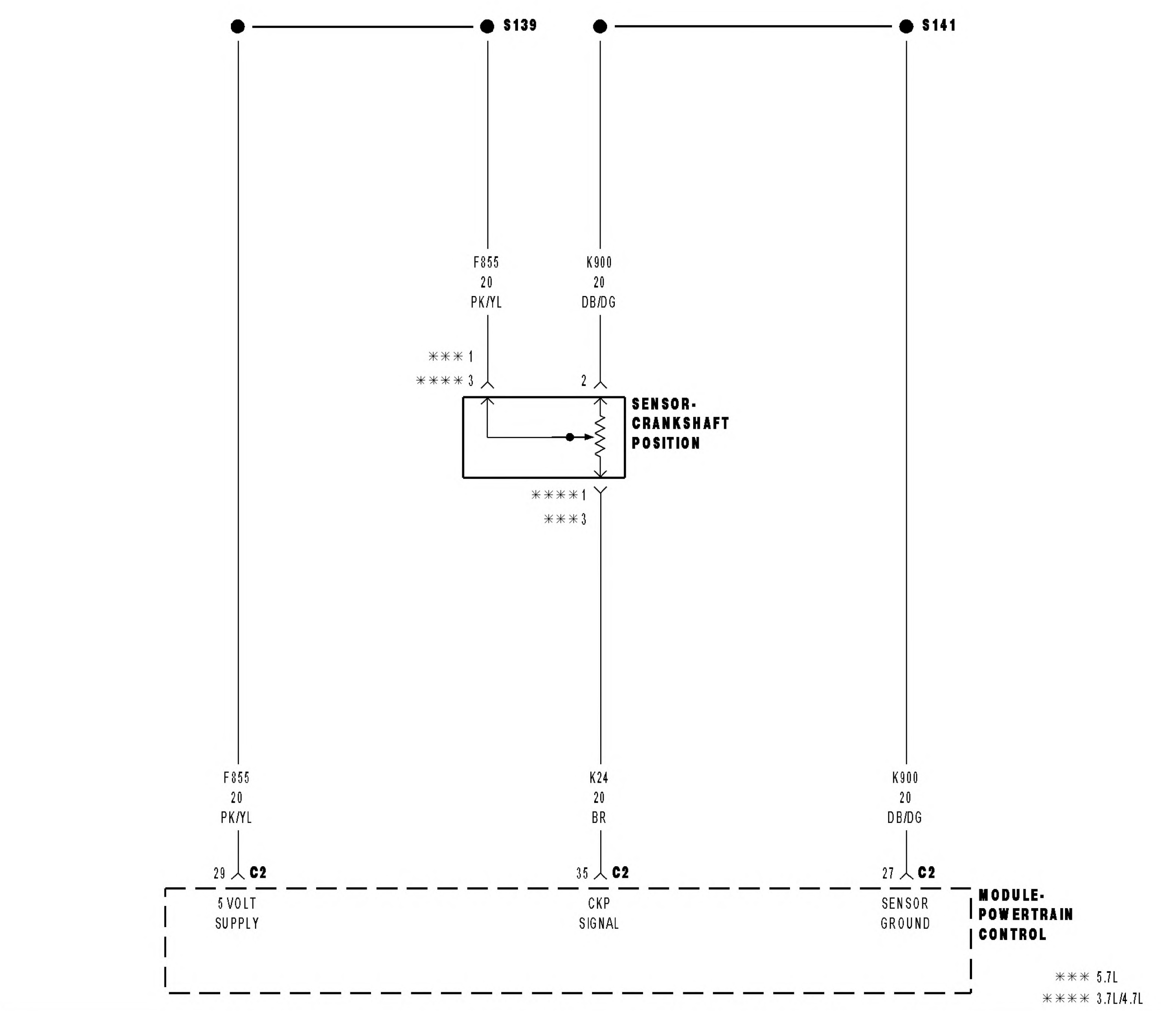
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

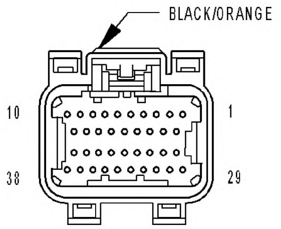
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

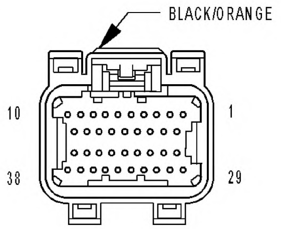
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0315-NO CRANK SENSOR LEARNED

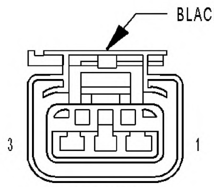

S139
S141
F855
20
PK/YL
K900
20
DB/DG
∗∗∗ 1
∗∗∗∗ 3
2
SENSOR-
CRANKSHAFT
POSITION
∗∗∗∗ 1
∗∗∗ 3
F855
20
PK/YL
K24
20
BR
K900
20
DB/DG
29 C2
35 C2
27 C2
5 VOLT
SUPPLY
CKP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
∗∗∗ 5.7L
∗∗∗∗ 3.7L/4.7L


BLACK/ORANGE
10
1
38
29

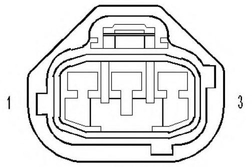
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)


BLACK/ORANGE
10
1
38
29

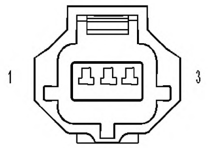
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)



SENSOR-
CRANKSHAFT
POSITION
(5.7L)



SENSOR-
CRANKSHAFT
POSITION
(4.7L)



SENSOR-
CRANKSHAFT
POSITION
(3.7L)

814710e7

P0315-NO CRANK SENSOR LEARNED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Under closed throttle decel and A/C off. ECT above 75°C (167°F). Engine start time is greater than 50 seconds.
- **Set Condition:**
  One of the CKP sensor target windows has more than 2.86% variance from the reference. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
TONE WHEEL/PULSE RING
WIRE HARNESS
CRANKSHAFT POSITION SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, clear DTCs, PCM battery disconnect to reset the PCM.

Start the engine.

If the MIL has not yet illuminated, test drive the vehicle to try to get the code to reset.

Does the code reset while cranking or during the test drive?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0315-NO CRANK SENSOR LEARNED (CONTINUED)

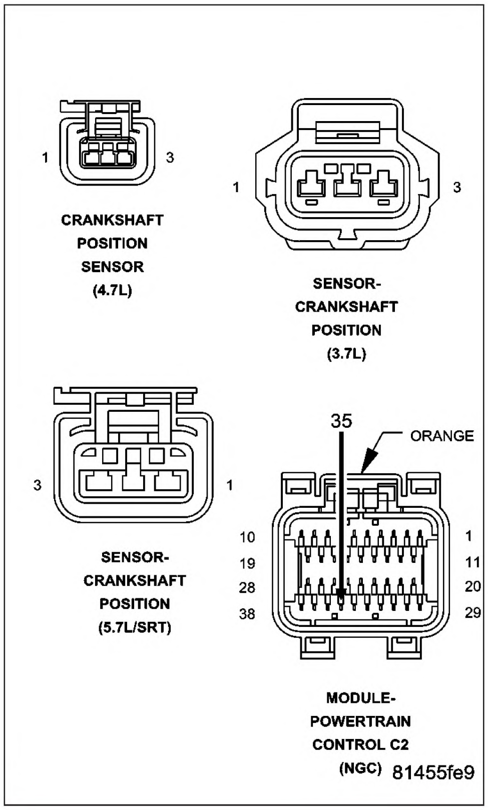
2. WIRE HARNESS INSPECTION

Turn the ignition off.

Visually inspect the CKP wire harness. Look for any chafed, pierced, pinched, or partially broken wires.

Visually inspect the CKP wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Make sure the Crankshaft Position Sensor is properly installed and the mounting bolt(s) are torqued to the proper specification.


1
3
CRANKSHAFT POSITION SENSOR (4.7L)
1
3
SENSOR-CRANKSHAFT POSITION (3.7L)
3
1
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
35
ORANGE
10
19
28
38
1
11
20
29
MODULE-POWERTRAIN CONTROL C2 (NGC)
81455fe9

Were any of the above conditions present?

Yes >> Repair as necessary
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. TONE WHEEL/FLEX PLATE INSPECTION

Remove the Crankshaft Position Sensor.

Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement.

Were any problems found?

Yes >> Repair or replace the Tone Wheel/Flex Plate as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

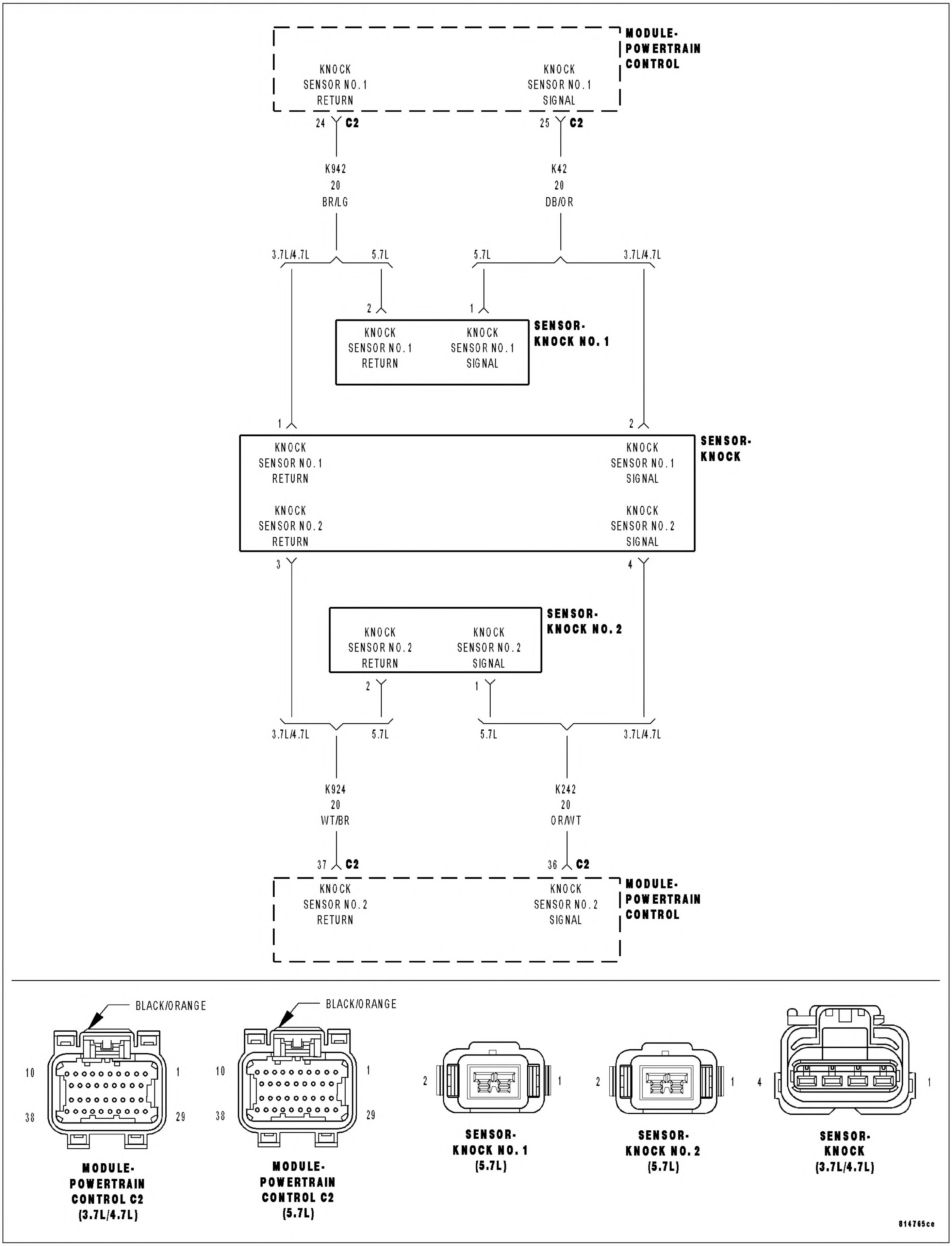
4. CRANKSHAFT POSITION SENSOR

If there are no possible causes remaining, view repair.

Repair

Replace the Crankshaft Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0325-KNOCK SENSOR 1 CIRCUIT


MODULE-
POWERTRAIN
CONTROL
KNOCK
SENSOR NO. 1
RETURN
KNOCK
SENSOR NO. 1
SIGNAL
24 C2
25 C2
K942
20
BR/LG
K42
20
DB/OR
3.7L/4.7L
5.7L
5.7L
3.7L/4.7L
2
1
SENSOR-
KNOCK NO. 1
KNOCK
SENSOR NO. 1
RETURN
KNOCK
SENSOR NO. 1
SIGNAL
1
2
SENSOR-
KNOCK
KNOCK
SENSOR NO. 1
RETURN
KNOCK
SENSOR NO. 1
SIGNAL
KNOCK
SENSOR NO. 2
RETURN
KNOCK
SENSOR NO. 2
SIGNAL
3
4
SENSOR-
KNOCK NO. 2
KNOCK
SENSOR NO. 2
RETURN
KNOCK
SENSOR NO. 2
SIGNAL
2
1
3.7L/4.7L
5.7L
5.7L
3.7L/4.7L
K924
20
WT/BR
K242
20
OR/WT
37 C2
36 C2
MODULE-
POWERTRAIN
CONTROL
KNOCK
SENSOR NO. 2
RETURN
KNOCK
SENSOR NO. 2
SIGNAL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
2
1
SENSOR-
KNOCK NO. 1
(5.7L)
2
1
SENSOR-
KNOCK NO. 2
(5.7L)
4
1
SENSOR-
KNOCK
(3.7L/4.7L)
814765ce

P0325-KNOCK SENSOR 1 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  The Knock Sensor circuit voltage falls below a minimum value at idle or deceleration. The minimum value is from a look-up table internal to the PCM and is based on engine RPM. DTC will also set if the sensor voltage goes above 5.0 volts. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT OPEN
(K942) KNOCK SENSOR NO.1 RETURN CIRCUIT OPEN
(K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K942) KNOCK SENSOR NO.1 RETURN CIRCUIT
(K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
KNOCK SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0325-KNOCK SENSOR 1 CIRCUIT (CONTINUED)

2. (K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

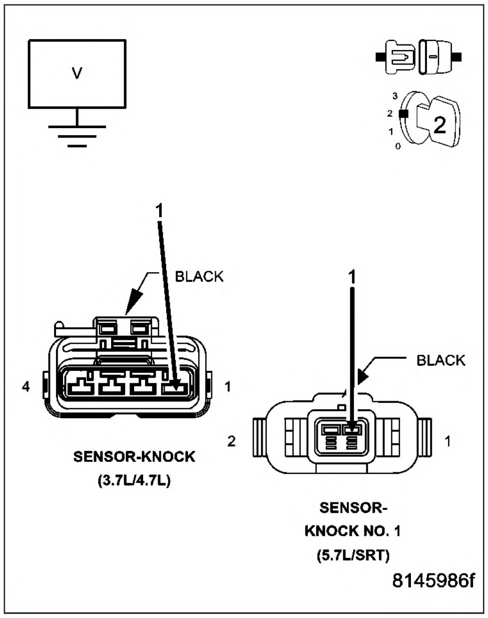
Turn the ignition off.

Disconnect the Knock Sensor harness connector.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K42) Knock Sensor No.1 Signal circuit in the Knock Sensor harness connector.


V
3
2
1
0
2
1
BLACK
1
BLACK
4
1
2
1
SENSOR-KNOCK (3.7L/4.7L)
SENSOR-KNOCK NO. 1 (5.7L/SRT)
8145986f

Is the voltage above 2.0 volts?

Yes >> Repair the short to battery voltage in the (K42) Knock Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

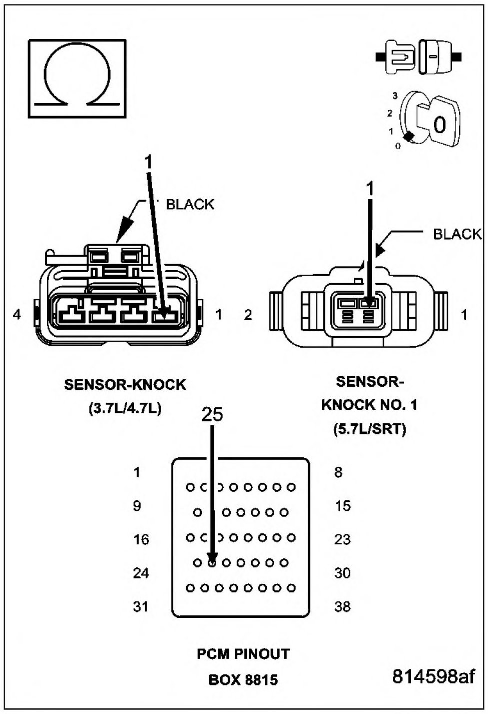
---

3. (K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K42) Knock Sensor No.1 Signal circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
1
BLACK
1
BLACK
4
1
2
1
SENSOR-KNOCK (3.7L/4.7L)
SENSOR-KNOCK NO. 1 (5.7L/SRT)
25
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
814598af

Is the resistance below 5.0 ohms?

Yes >> Go To 4

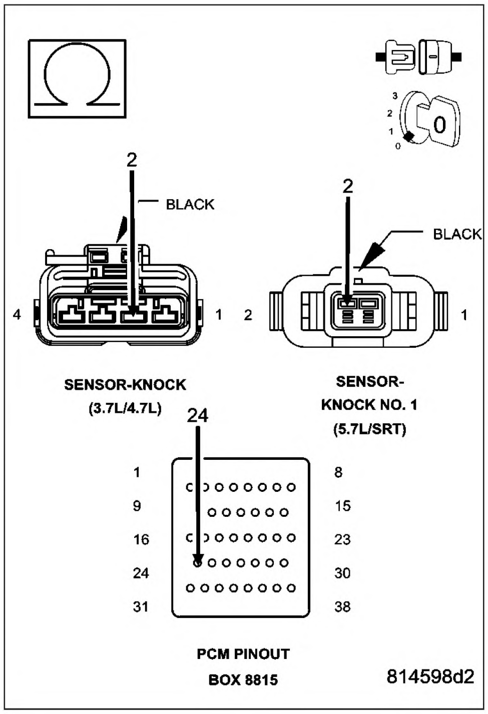
No >> Repair the open in the (K42) Knock Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0325-KNOCK SENSOR 1 CIRCUIT (CONTINUED)

4. (K942) KNOCK SENSOR NO.1 RETURN CIRCUIT OPEN

Measure the resistance of the (K942) Knock Sensor No.1 Return circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815.


2
BLACK
4
1
SENSOR-KNOCK
(3.7L/4.7L)
2
BLACK
2
1
SENSOR-
KNOCK NO. 1
(5.7L/SRT)
24
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
814598d2

Is the resistance below 5.0 ohms?

Yes >> Go To 5

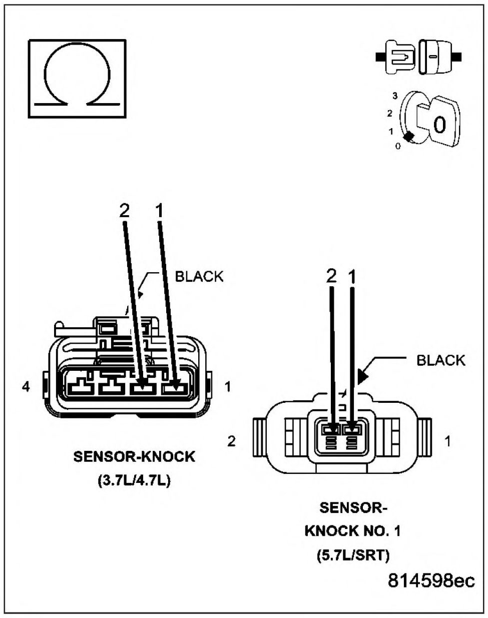
No >> Repair the open in the (K942) Knock Sensor No.1 Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K942) KNOCK SENSOR NO.1 RETURN CIRCUIT

Measure the resistance between the (K42) Knock Sensor No.1 Signal circuit and the (K942) Knock Sensor No.1 Return circuit in the Knock Sensor harness connector.


2 1
BLACK
4
1
SENSOR-KNOCK
(3.7L/4.7L)
2 1
BLACK
2
1
SENSOR-
KNOCK NO. 1
(5.7L/SRT)
814598ec

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K42) Knock Sensor No.1 Signal circuit and the (K942) Knock Sensor No.1 Return circuit.

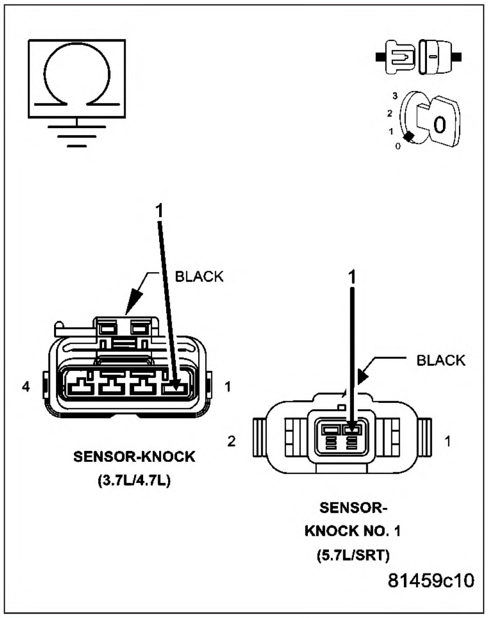
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0325-KNOCK SENSOR 1 CIRCUIT (CONTINUED)

6. (K42) KNOCK SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K42) Knock Sensor No.1 Signal circuit in the Knock Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K42) Knock Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. KNOCK SENSOR

Replace the Knock Sensor.

Ignition on, engine not running.

With the scan tool, erase DTC.

Attempt to operate the vehicle using the information noted in the Freeze Frame.

With the scan tool, read DTCs.

Does the scan tool display the DTC that was previously erased?

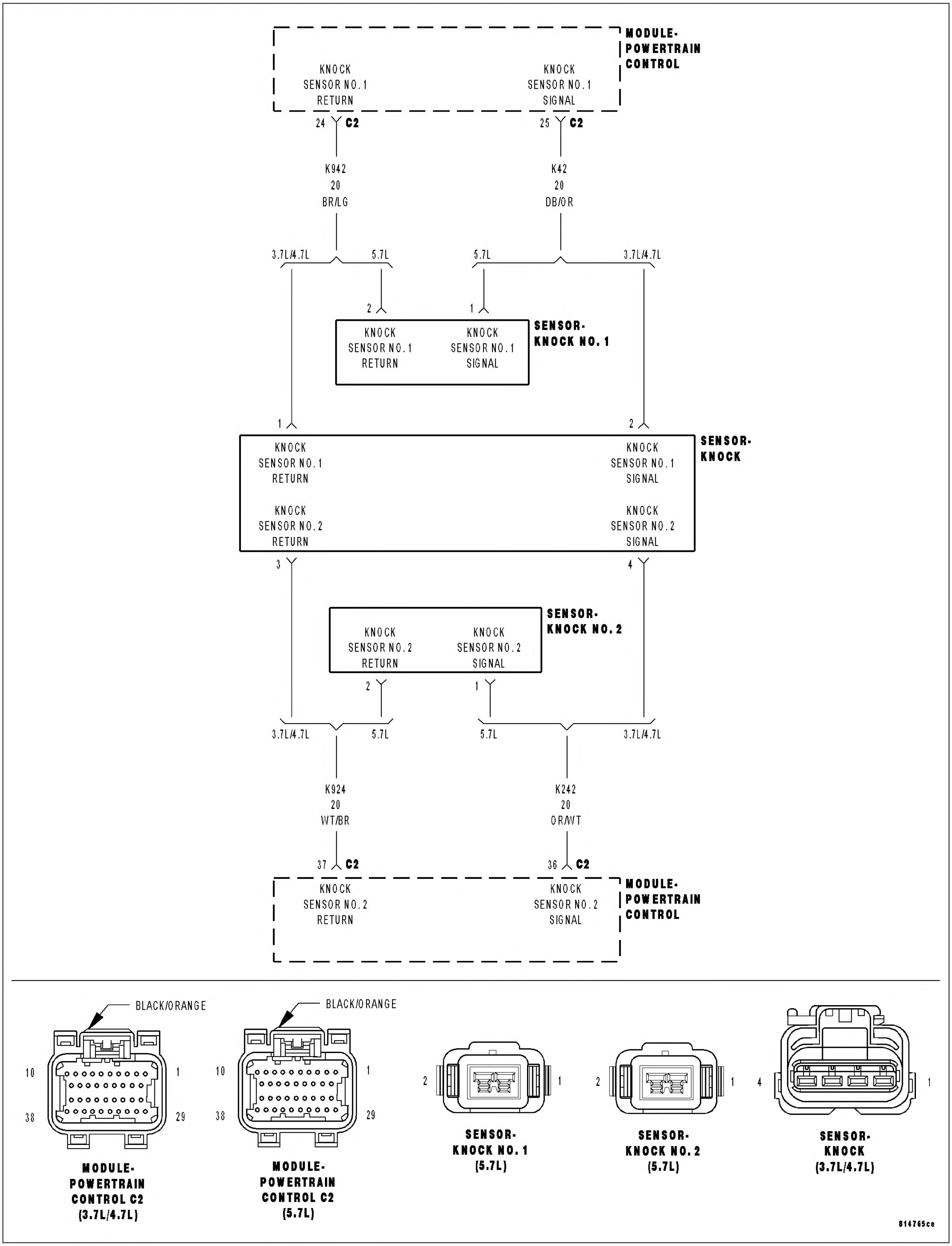
Yes >>

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P0330-KNOCK SENSOR 2 CIRCUIT


MODULE-
POWERTRAIN
CONTROL
KNOCK
SENSOR NO. 1
RETURN
KNOCK
SENSOR NO. 1
SIGNAL
24
C2
25
C2
K942
20
BR/LG
K42
20
DB/OR
3.7L/4.7L
5.7L
5.7L
3.7L/4.7L
2
1
KNOCK
SENSOR NO. 1
RETURN
KNOCK
SENSOR NO. 1
SIGNAL
SENSOR-
KNOCK NO. 1
1
2
KNOCK
SENSOR NO. 1
RETURN
KNOCK
SENSOR NO. 1
SIGNAL
KNOCK
SENSOR NO. 2
RETURN
KNOCK
SENSOR NO. 2
SIGNAL
SENSOR-
KNOCK
3
4
KNOCK
SENSOR NO. 2
RETURN
KNOCK
SENSOR NO. 2
SIGNAL
SENSOR-
KNOCK NO. 2
2
1
3.7L/4.7L
5.7L
5.7L
3.7L/4.7L
K924
20
WT/BR
K242
20
OR/WT
37
C2
36
C2
KNOCK
SENSOR NO. 2
RETURN
KNOCK
SENSOR NO. 2
SIGNAL
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
2
1
SENSOR-
KNOCK NO. 1
(5.7L)
2
1
SENSOR-
KNOCK NO. 2
(5.7L)
4
1
SENSOR-
KNOCK
(3.7L/4.7L)
814765ce

P0330-KNOCK SENSOR 2 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running
- **Set Condition:**
  The Knock Sensor circuit voltage falls below a minimum value at idle or deceleration. The minimum value is from a look-up table internal to the PCM and is based on engine RPM. DTC well also set if the sensor voltage goes above 5.0 volts. One Trip Fault. Three good trips to turn off the MIL. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT OPEN
(K924) KNOCK SENSOR NO.2 RETURN CIRCUIT OPEN
(K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K924) KNOCK SENSOR NO.2 RETURN CIRCUIT
(K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
KNOCK SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0330-KNOCK SENSOR 2 CIRCUIT (CONTINUED)

2. (K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

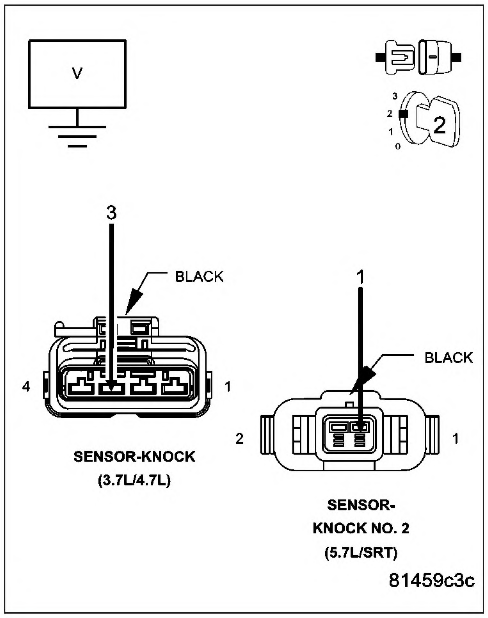
Turn the ignition off.

Disconnect the No.2 Knock Sensor harness connector.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K242) Knock Sensor No.2 Signal circuit in the Knock Sensor harness connector.


V
3
2
1
0
2
3
BLACK
1
BLACK
4
1
2
1
SENSOR-KNOCK
(3.7L/4.7L)
SENSOR-
KNOCK NO. 2
(5.7L/SRT)
81459c3c

Is the voltage above 2.0 volts?

Yes >> Repair the short to battery voltage in the (K242) Knock Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

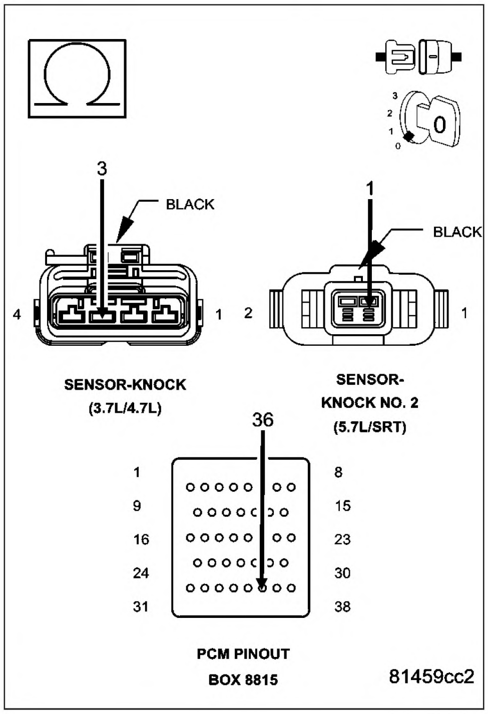
---

3. (K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K242) Knock Sensor No.2 Signal circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
3
BLACK
1
BLACK
4
1
2
1
SENSOR-KNOCK
(3.7L/4.7L)
SENSOR-
KNOCK NO. 2
(5.7L/SRT)
36
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
81459cc2

Is the resistance below 5.0 ohms?

Yes >> Go To 4

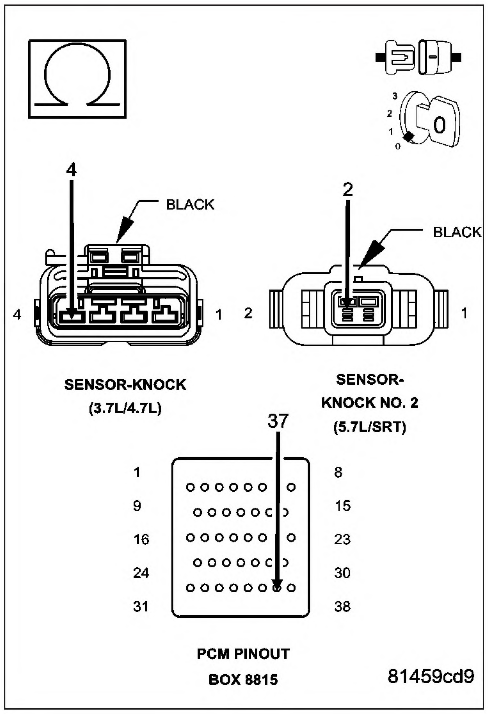
No >> Repair the open in the (K242) Knock Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0330-KNOCK SENSOR 2 CIRCUIT (CONTINUED)

4. (K924) KNOCK SENSOR NO.2 RETURN CIRCUIT OPEN

Measure the resistance of the (K924) Knock Sensor No.2 Return circuit from the Knock Sensor harness connector to the appropriate terminal of special tool #8815.


4
BLACK
4
1
SENSOR-KNOCK
(3.7L/4.7L)
2
BLACK
2
1
SENSOR-
KNOCK NO. 2
(5.7L/SRT)
37
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
81459cd9

Is the resistance below 5.0 ohms?

Yes >> Go To 5

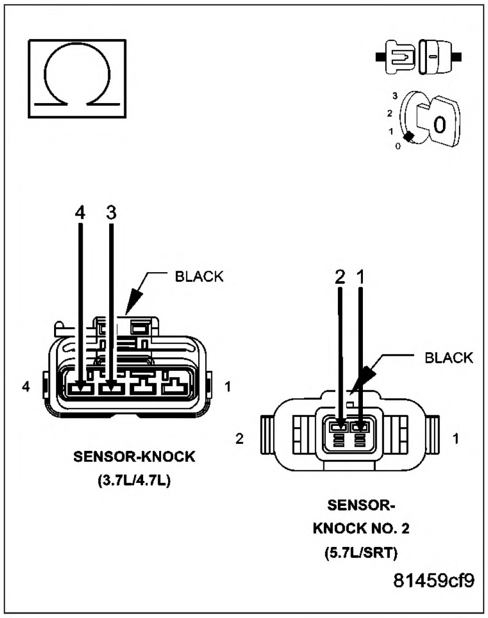
No >> Repair the open in the (K924) Knock Sensor No.2 Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K924) KNOCK SENSOR NO.2 RETURN CIRCUIT

Measure the resistance between the (K242) Knock Sensor No.2 Signal circuit and the (K924) Knock Sensor No.2 Return circuit in the Knock Sensor harness connector.


4 3
BLACK
4
1
SENSOR-KNOCK
(3.7L/4.7L)
2 1
BLACK
2
1
SENSOR-
KNOCK NO. 2
(5.7L/SRT)
81459cf9

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K242) Knock Sensor No.2 Signal circuit and the (K924) Knock Sensor No.2 Return circuit.

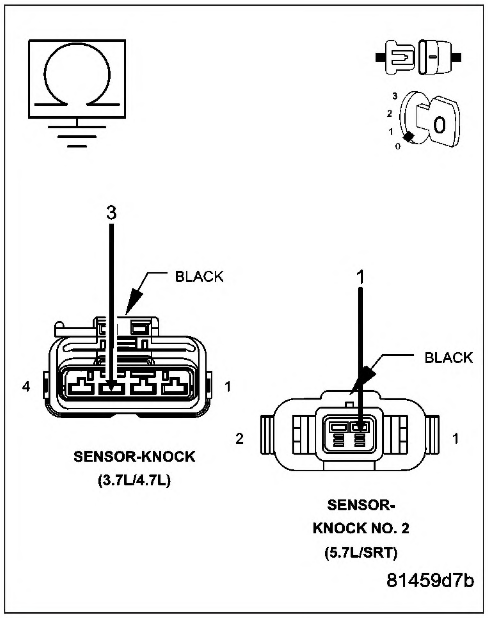
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0330-KNOCK SENSOR 2 CIRCUIT (CONTINUED)

6. (K242) KNOCK SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K242) Knock Sensor No.2 Signal circuit in the Knock Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K242) Knock Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. KNOCK SENSOR

Replace the Knock Sensor.

Ignition on, engine not running.

With the scan tool, erase DTC.

Attempt to operate the vehicle using the information noted in the Freeze Frame.

With the scan tool, read DTCs.

Does the scan tool display the DTC that was previously erased?

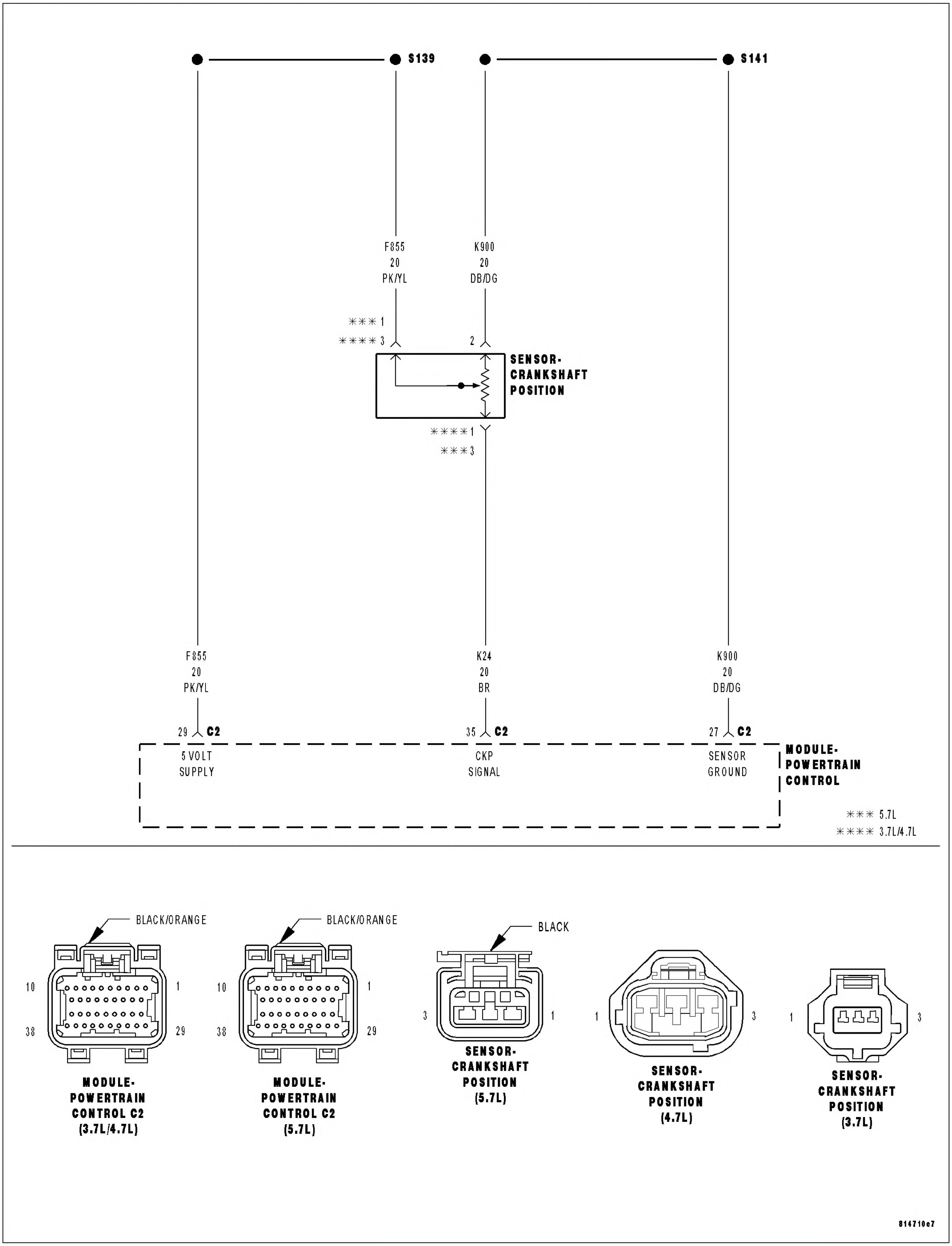
Yes >>

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT


S139
S141
F855
20
PK/YL
K900
20
DB/DG
✱✱✱ 1
✱✱✱✱ 3
2
SENSOR-
CRANKSHAFT
POSITION
✱✱✱✱ 1
✱✱✱ 3
F855
20
PK/YL
K24
20
BR
K900
20
DB/DG
29 C2
35 C2
27 C2
5 VOLT
SUPPLY
CKP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
✱✱✱ 5.7L
✱✱✱✱ 3.7L/4.7L
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(4.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
814710e7

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine cranking.
- **Set Condition:**
  No CKP signal is present during engine cranking, and at least 8 camshaft position sensor signals have occurred. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K24) CKP SIGNAL CIRCUIT OPEN
(K24) CKP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K24) CKP SIGNAL CIRCUIT SHORTED GROUND
(K24) CKP SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Crank the engine.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 14

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

2. (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the CKP Sensor harness connector.

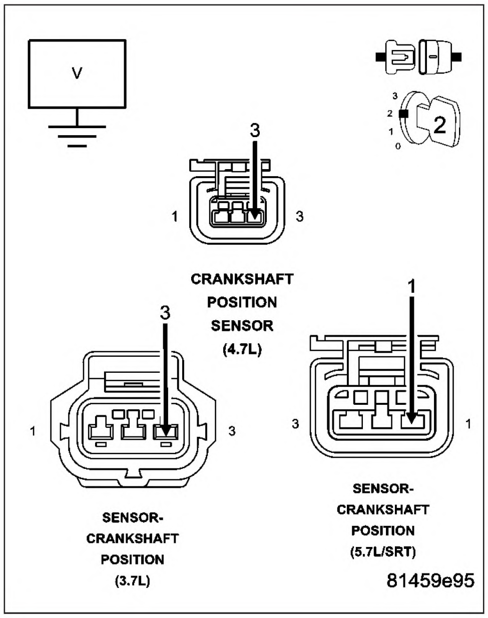
Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the CKP Sensor harness connector.

Is the voltage between 4.5 and 5.2 volts?

Yes >> Go To 3

No >> Go To 10


V
3
2
1
0
2
3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
3
1
1
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
81459e95

---

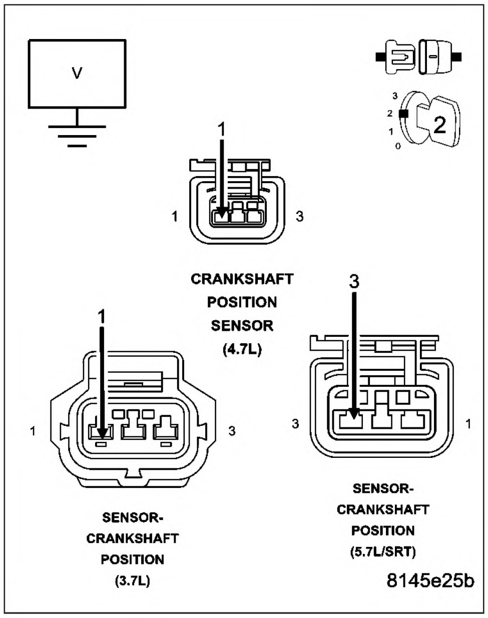
3. (K24) CKP SIGNAL CIRCUIT

Measure the voltage on the (K24) CKP Signal circuit in the CKP Sensor harness connector.

Is the voltage between 4.5 and 5.0 volts?

Yes >> Go To 4

No >> Go To 7


V
3
2
1
0
2
1
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
1
1
3
3
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
8145e25b

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

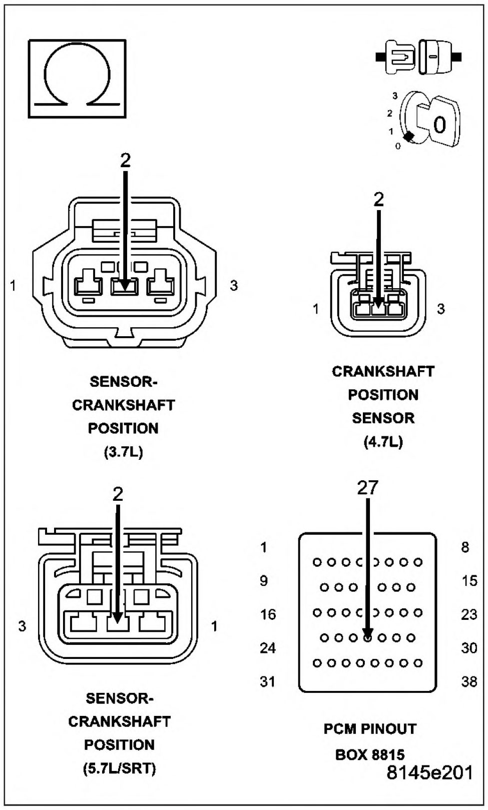
4. (K900) SENSOR GROUND CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor ground circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815.



3
2
1
0
0
2
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
2
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
2
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
27
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8145e201

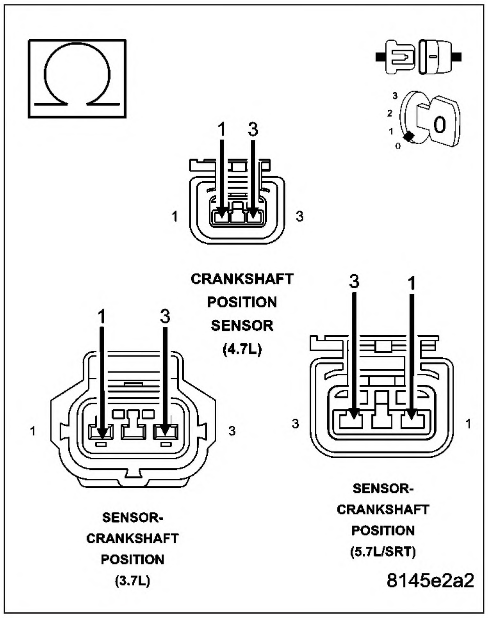
Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

5. (K24) CKP SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (K24) CKP Signal circuit and the (F855) 5-volt Supply circuit in the CKP Sensor harness connector.



3
2
1
0
0
1 3
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
1 3
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
3 1
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
8145e2a2

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K24) CKP Signal circuit and the (F855) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

6. CRANKSHAFT POSITION SENSOR

NOTE: Inspect the slots on the flywheel for damage. If a problem is found repair as necessary.

If there are no possible causes remaining, view repair.

Repair

Replace the Crankshaft Position Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

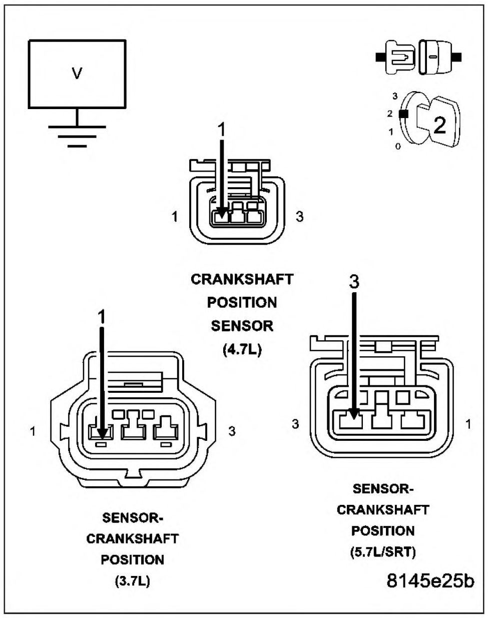
7. (K24) CKP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K24) CKP Signal circuit in the CKP Sensor harness connector.


V
3
2
1
0
2
1
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
1
3
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
8145e25b

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K24) CKP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

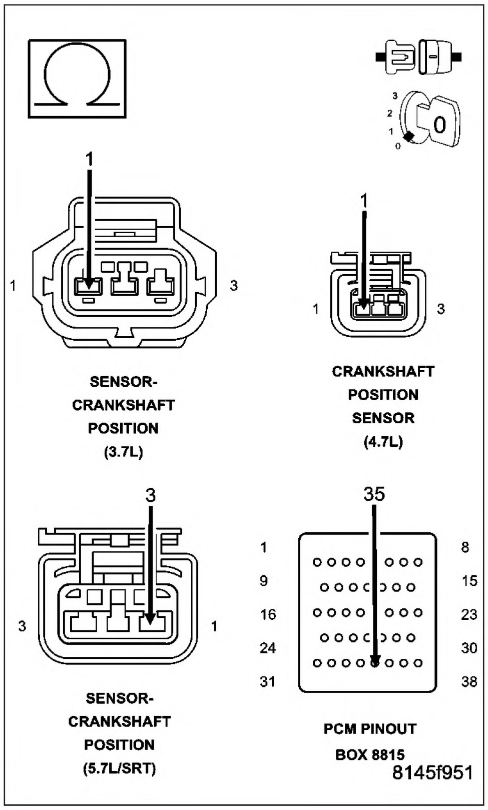
P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

8. (K24) CKP SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K24) CKP Signal circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815.


1
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
1
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
3
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
35
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8145f951

Is the resistance below 5.0 ohms?

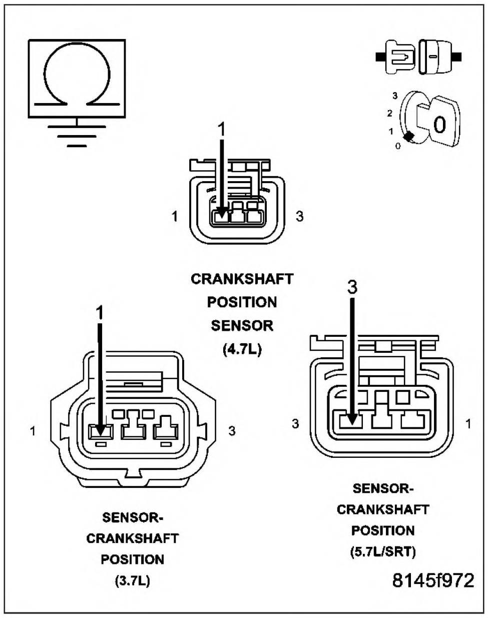
Yes >> Go To 9

No >> Repair the open in the (K24) CKP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. (K24) CKP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K24) CKP Signal circuit in the CKP Sensor harness connector.


1
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
1
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
3
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
8145f972

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K24) CKP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

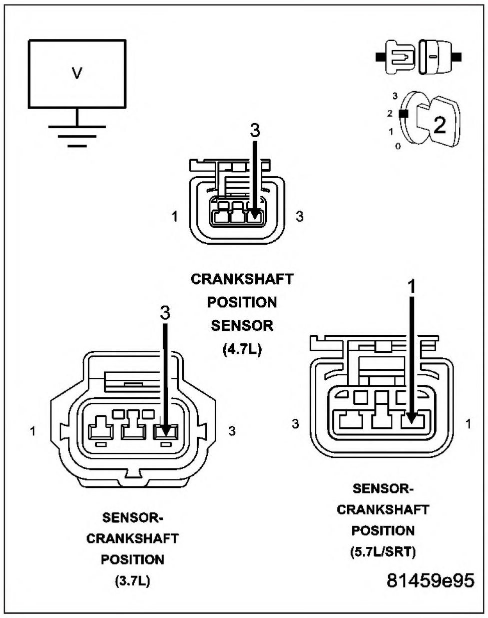
10. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the CKP Sensor harness connector.


V
3
1
3
2
3
1
0
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
3
1
3
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
81459e95

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

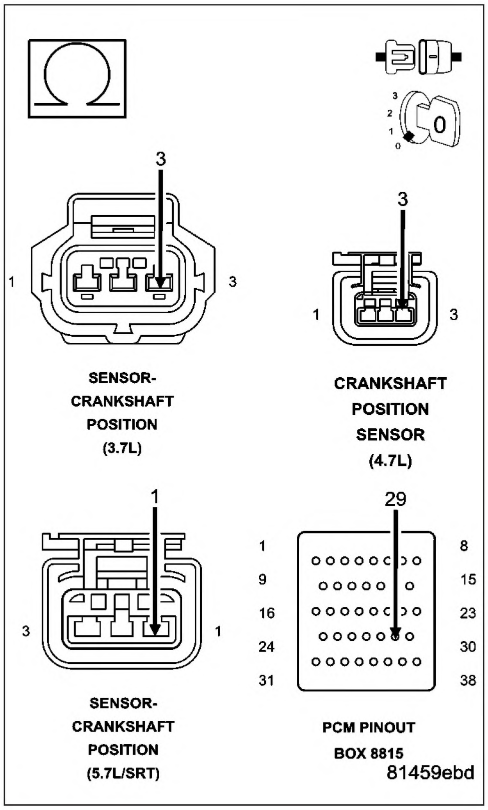
---

11. (F855) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the CKP Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
3
1
3
3
1
3
SENSOR-CRANKSHAFT POSITION (3.7L)
CRANKSHAFT POSITION SENSOR (4.7L)
1
29
3
1
1
9
16
24
31
8
15
23
30
38
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
PCM PINOUT BOX 8815
81459ebd

Is the resistance below 5.0 ohms?

Yes >> Go To 12

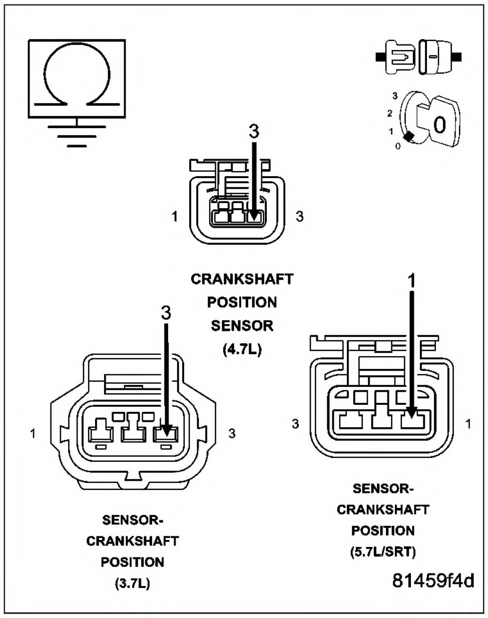
No >> Repair the open in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

12. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the CKP Sensor harness connector.


3
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
1
3
1
3
3
1
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
81459f4d

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

---

13. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0335-CRANKSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

14. ERRATIC CKP SENSOR SIGNAL

Turn the ignition off.

With a lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Wiggle the related wire harness and lightly tap on the Crank Position Sensor.

Observe the lab scope screen.

Look for any pulses generated by the CKP Sensor.

Allow the engine to idle.

Observe the lab scope screen.

Did the CKP Sensor generate any erratic pulses?

Yes >> Inspect the related wire harness and replace the Crankshaft Position Sensor if no wiring problems were found.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 15

---

15. ERRATIC CMP SIGNAL

Turn the ignition off.

With a lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Wiggle the related wire harness and lightly tap on the Cam Position Sensor.

Observe the lab scope screen.

Look for any pulses generated by the CMP Sensor.

Allow the engine to idle.

Observe the lab scope screen.

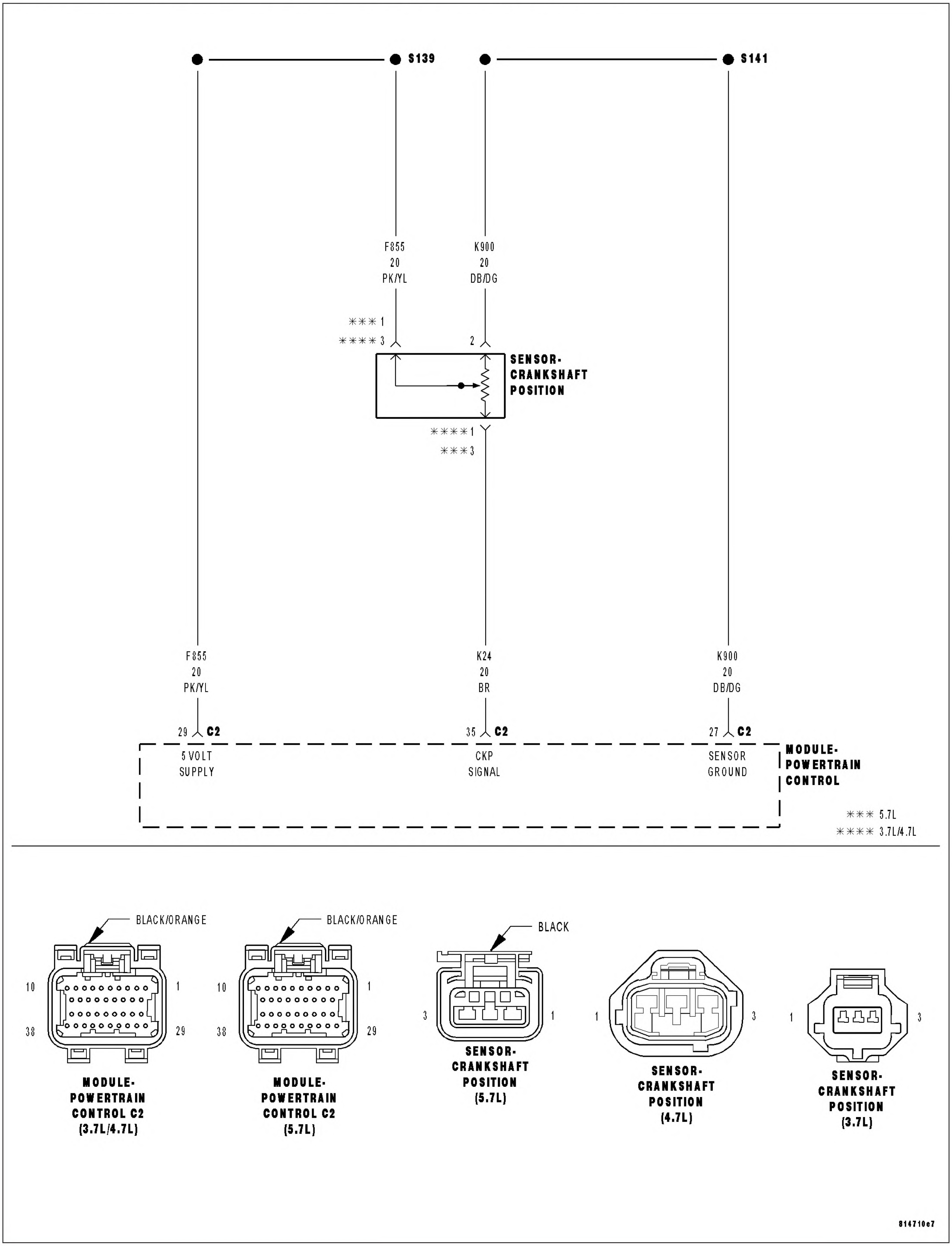
Did the CMP Sensor generate any pulses?

Yes >> Inspect the related wire harness and replace the Camshaft Position Sensor if no wiring problems were found.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test complete, the conditions that set this DTC are not present at this time.

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT


S139
S141
F855
20
PK/YL
K900
20
DB/DG
✻✻✻ 1
✻✻✻✻ 3
2
SENSOR-
CRANKSHAFT
POSITION
✻✻✻✻ 1
✻✻✻ 3
F855
20
PK/YL
K24
20
BR
K900
20
DB/DG
29 C2
35 C2
27 C2
5 VOLT
SUPPLY
CKP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
✻✻✻ 5.7L
✻✻✻✻ 3.7L/4.7L
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(4.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
814710e7

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While cranking the engine and with the engine running.
- **Set Condition:**
  When the CKP Sensor failure counter reaches 20. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K24) CKP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K24) CKP SIGNAL CIRCUIT OPEN
(K24) CKP SIGNAL CIRCUIT SHORTED TO GROUND
(K24) CKP SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
CRANKSHAFT POSITION SENSOR
TONE WHEEL/PULSE RING
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. CHECKING CRANKSHAFT POSITION SENSOR SIGNAL WITH A LAB SCOPE

Turn the ignition off.

With a lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the Sensor harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Observe the lab scope screen.

Start the engine.

Observe the lab scope screen.

Are there any irregular or missing signals?

Yes >> Go To 3

No >> Go To 8

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

3. WIRE HARNESS INSPECTION

Turn the ignition off.

Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires.

Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.

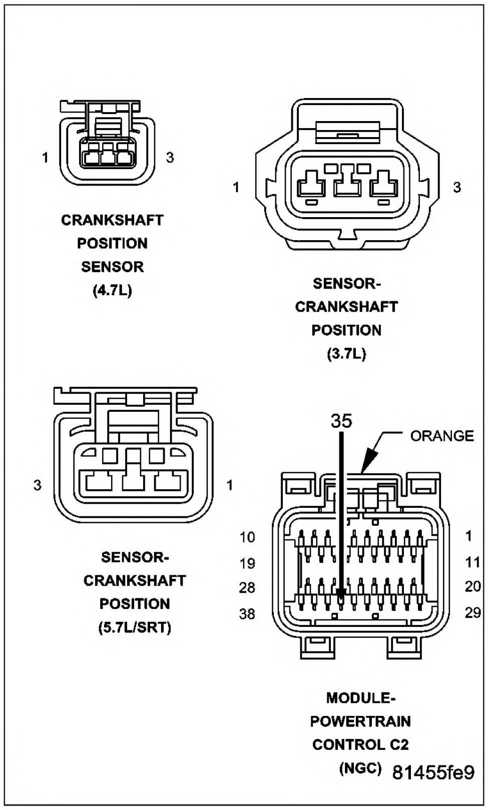
Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are torqued to the proper specification.

Refer to any TSBs that may apply.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4


1
3
CRANKSHAFT POSITION SENSOR (4.7L)
1
3
SENSOR-CRANKSHAFT POSITION (3.7L)
3
1
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
35
ORANGE
10
19
28
38
1
11
20
29
MODULE-POWERTRAIN CONTROL C2 (NGC)
81455fe9

4. (F855) 5-VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND

Disconnect the CKP Sensor connector.

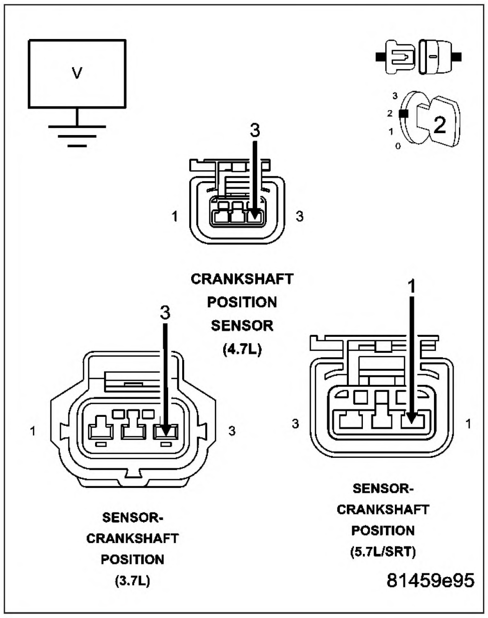
Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the Sensor harness connector.

Is the voltage between 4.5 and 5.2 volts?

Yes >> Go To 5

No >> Repair the open or short to ground in the (F855) 5-volt Supply circuit. Use Miller special tool #8815 when checking for an open circuit to prevent PCM harness connector terminal damage.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


V
3
2
1
0
2
3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
3
SENSOR-CRANKSHAFT POSITION (3.7L)
1
3
1
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
81459e95

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

5. TONE WHEEL/FLEX PLATE INSPECTION

Turn the ignition off.

Carefully disconnect the Negative Battery (Ground) cable.

Remove the Crankshaft Position Sensor.

Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement.

Were any problems found?

Yes >> Repair or replace the Tone Wheel/Flex Plate as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. CHECKING CAMSHAFT POSITION SENSOR SIGNAL WITH A LAB SCOPE

Install the CKP Sensor and connect the battery cable.

NOTE: An intermittent condition in the Cam Position Sensor can cause the P0339 to set.

With the a lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the Sensor harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Wiggle the related wire harness and lightly tap on the Cam Position Sensor.

Observe the lab scope screen.

Start the engine.

Observe the lab scope screen.

Are there any irregular or missing signals?

Yes >> Replace the Cam Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. CRANKSHAFT POSITION SENSOR

If there are no possible causes remaining, view repair.

Repair

Replace the Crankshaft Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

8. (K24) CKP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

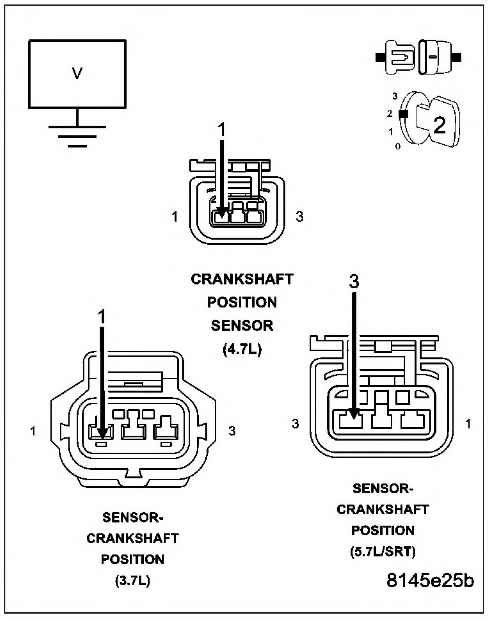
Disconnect the C2 PCM harness connector.

Disconnect the CKP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (K24) CKP Signal circuit in the Sensor harness connector.

Wiggle the related wire harness while taking this measurement.


V
3
2
1
0
2
1
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
1
1
3
3
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
8145e25b

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K24) CKP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

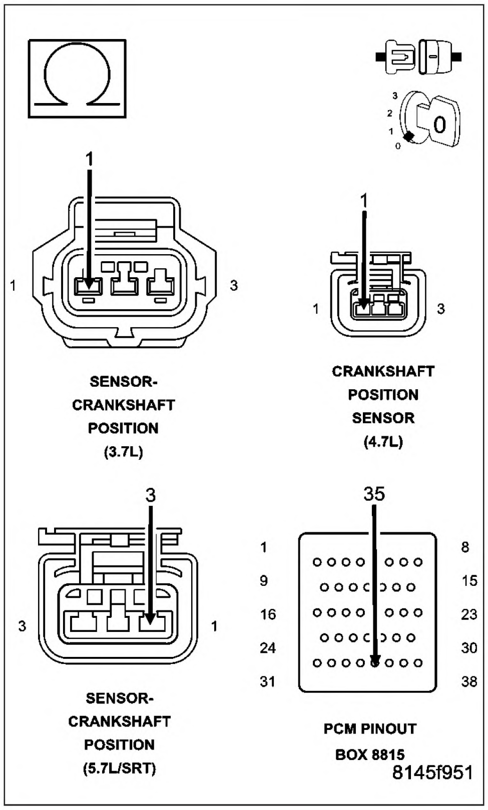
9. (K24) CKP SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance in the (K24) CKP Signal circuit from the CKP harness connector to the appropriate terminal of special tool #8815.

Wiggle the wire harness while taking this measurement.


Ω
3
2
1
0
0
1
1
3
SENSOR-CRANKSHAFT POSITION (3.7L)
1
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
3
1
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
35
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8145f951

Is the resistance below 1.0 ohm?

Yes >> Go To 10

No >> Repair the excessive resistance in the (K24) CKP Signal circuit.

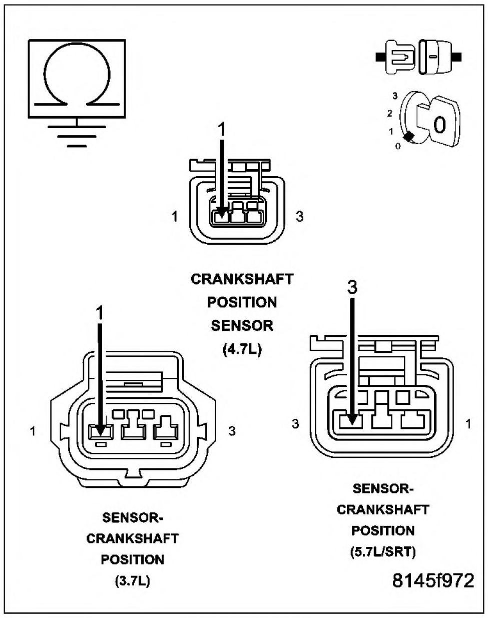
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

10. (K24) CKP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K24) CKP Signal circuit in the CKP Sensor harness connector.

Wiggle the related wire harness while monitoring the resistance value.


1
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
3
1
1
3
3
1
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
8145f972

Does the resistance ever go below 100 ohms?

Yes >> Repair the short to ground in the (K24) Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

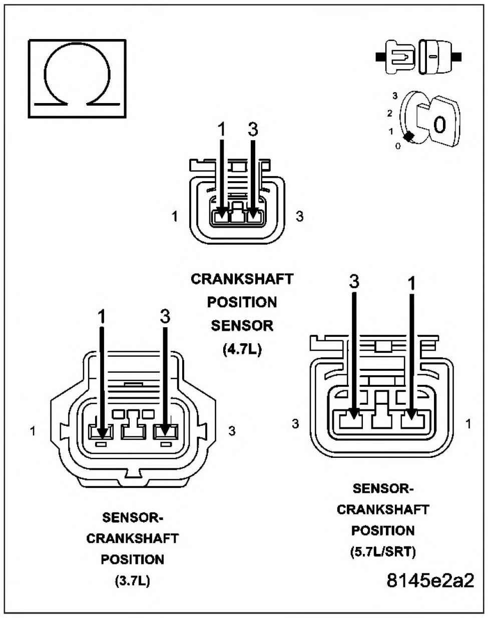
No >> Go To 11

---

11. (K24) CKP SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (F855) 5-volt Supply circuit and the (K24) CKP Signal circuit in the CKP harness connector.

Wiggle the related wire harness while taking this measurement.


1 3
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
1 3
3 1
1
3
3
1
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
8145e2a2

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (F855) 5-volt Supply circuit and the (K24) CKP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

P0339-CRANKSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

12. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

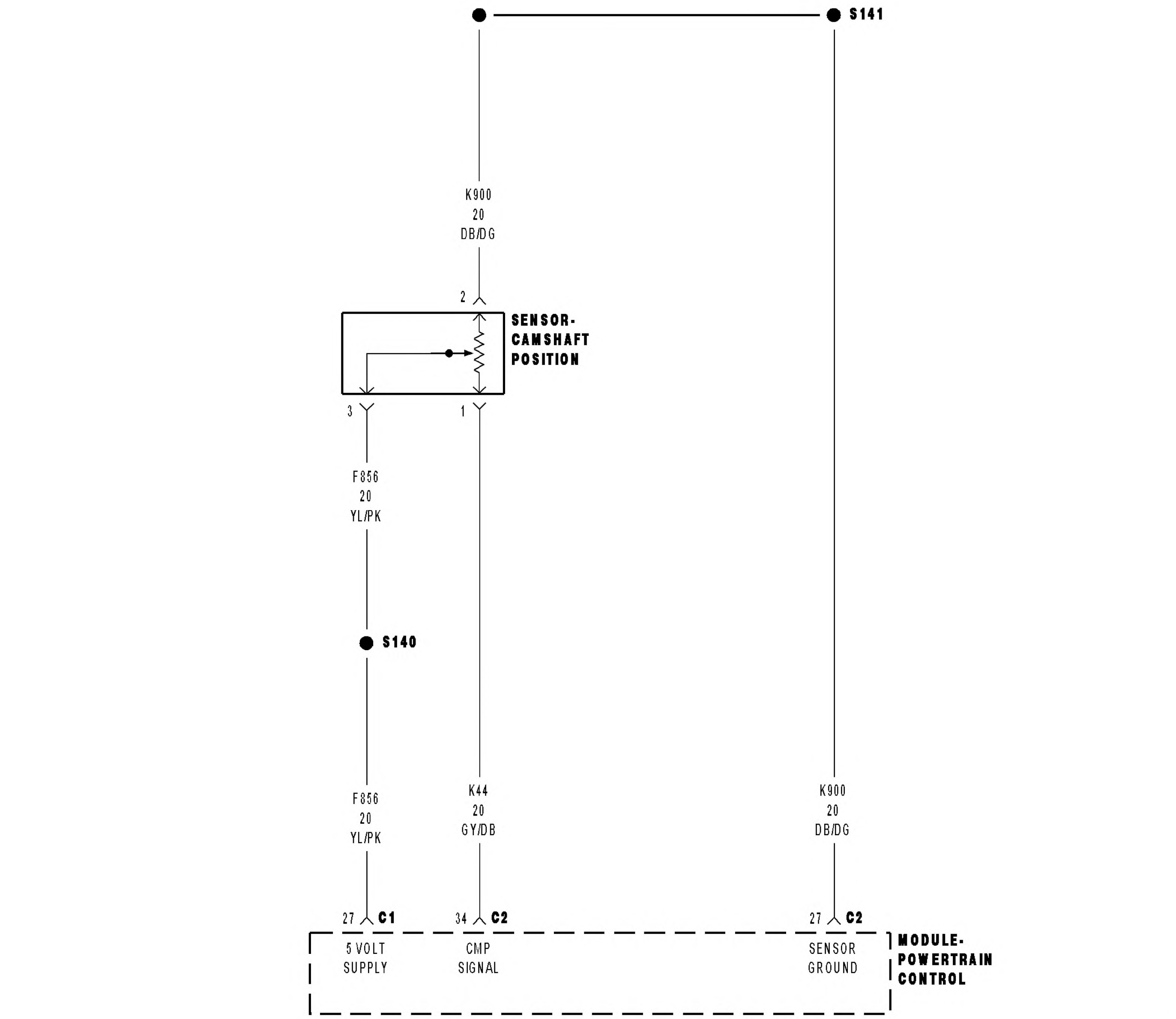
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

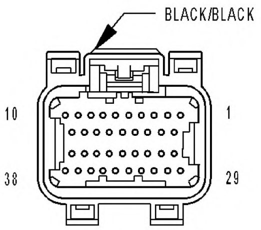
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

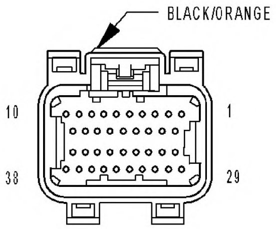
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0340-CAMSHAFT POSITION SENSOR CIRCUIT

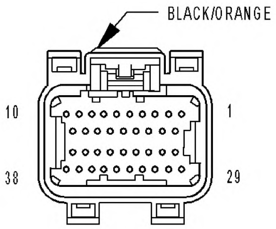

S141
K900
20
DB/DG
2
SENSOR-
CAMSHAFT
POSITION
3
1
F856
20
YL/PK
S140
F856
20
YL/PK
K44
20
GY/DB
K900
20
DB/DG
27 C1
34 C2
27 C2
5 VOLT
SUPPLY
CMP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL


BLACK/BLACK
10
1
38
29

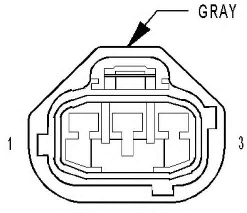
**MODULE-
POWERTRAIN
CONTROL C1**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**



**SENSOR-
CAMSHAFT
POSITION
(GAS)**

81471112

P0340-CAMSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  During engine cranking and with the engine running. Battery voltage greater than 10 volts.
- **Set Condition:**
  At least 5 seconds or 2.5 engine revolutions have elapsed with crankshaft position sensor signals present but no camshaft position sensor signal. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K44) CMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K44) CMP SIGNAL CIRCUIT OPEN
(K44) CMP SIGNAL CIRCUIT SHORTED GROUND
(K44) CMP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Crank the engine.

Ignition on, engine not running.

With a scan tool read the DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 14

P0340-CAMSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

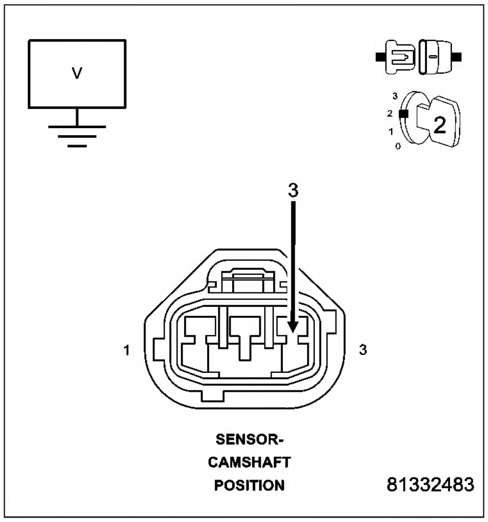
2. (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the CMP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) 5-volt Supply circuit in the CMP Sensor harness connector.


V
3
2
1
0
2
3
1
3
SENSOR-
CAMSHAFT
POSITION
81332483

Is the voltage between 4.5 and 5.2 volts?

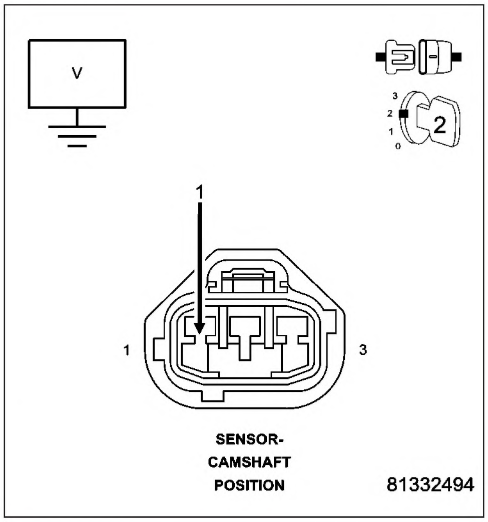
Yes >> Go To 3

No >> Go To 10

---

3. (K44) CMP SIGNAL CIRCUIT

Measure the voltage on the (K44) CMP Signal circuit in the CMP Sensor harness connector.


V
3
2
1
0
2
1
1
3
SENSOR-
CAMSHAFT
POSITION
81332494

Is the voltage between 4.5 and 5.0 volts?

Yes >> Go To 4

No >> Go To 7

P0340-CAMSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

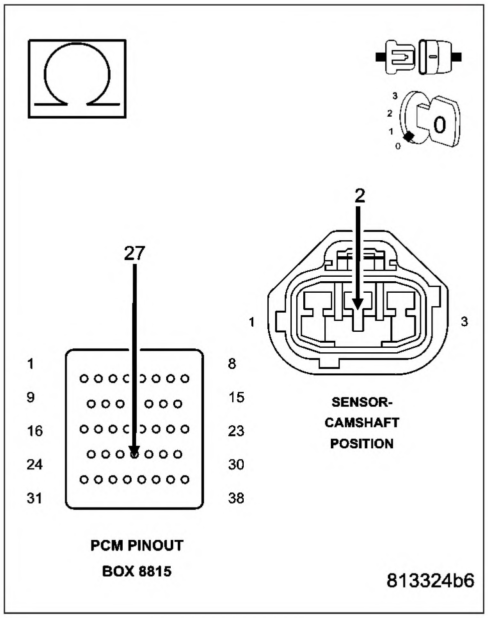
4. (K900) SENSOR GROUND CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor ground circuit from the CMP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

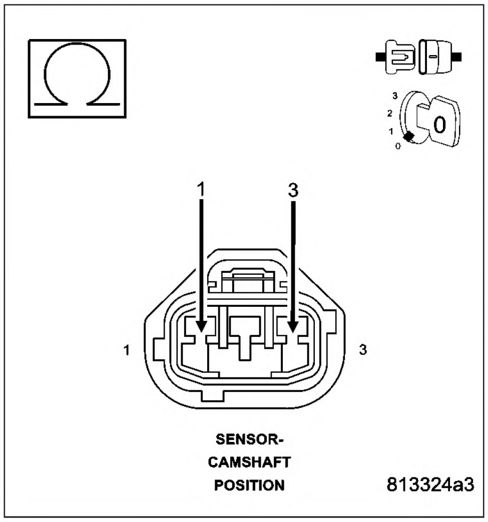
Yes >> Go To 5

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K44) CMP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (K44) CMP Signal circuit and the (F856) 5-volt Supply circuit in the CMP Sensor harness connector.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K44) CMP Signal circuit and the (F856) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. CAMSHAFT POSITION SENSOR

NOTE: Inspect the Camshaft sprocket for damage per the Service Information. If a problem is found repair as necessary.

If there are no possible causes remaining, view repair.

Repair

Replace the Camshaft Position Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0340-CAMSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

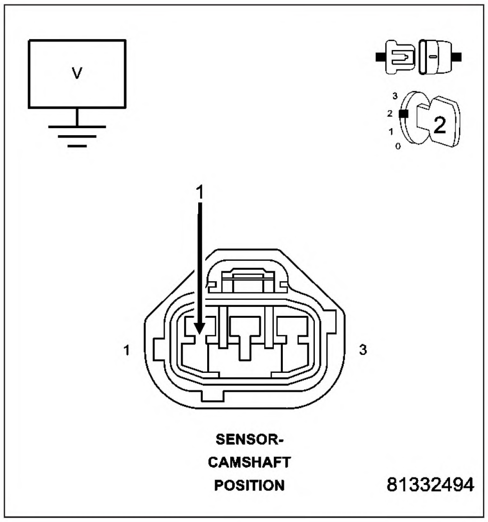
7. (K44) CMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K44) CMP Signal circuit in the CMP Sensor harness connector.


V
3
2
1
0
2
1
1
3
SENSOR-
CAMSHAFT
POSITION
81332494

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K44) CMP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

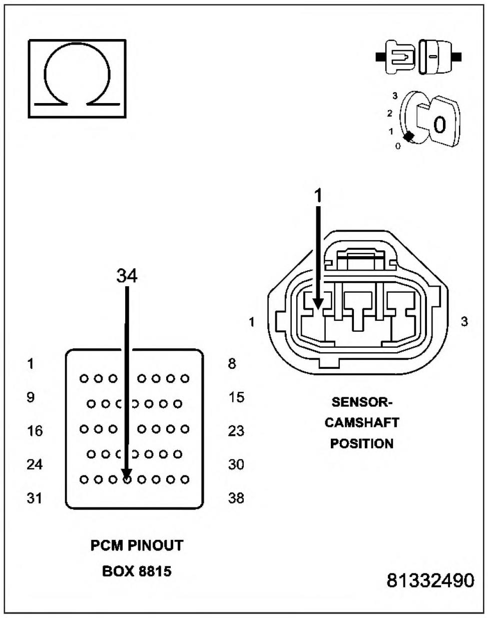
---

8. (K44) CMP SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K44) CMP Signal circuit from the CMP Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
1
34
1
3
1
8
9
15
16
23
24
30
31
38
SENSOR-
CAMSHAFT
POSITION
PCM PINOUT
BOX 8815
81332490

Is the resistance below 5.0 ohms?

Yes >> Go To 9

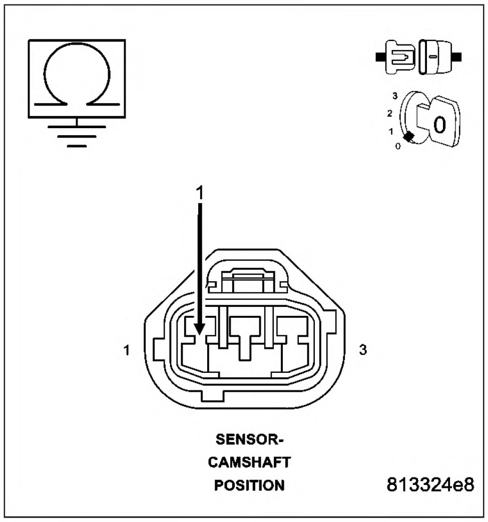
No >> Repair the open in the (K44) CMP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0340-CAMSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

9. (K44) CMP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K44) CMP Signal circuit in the CMP Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K44) CMP Signal circuit Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

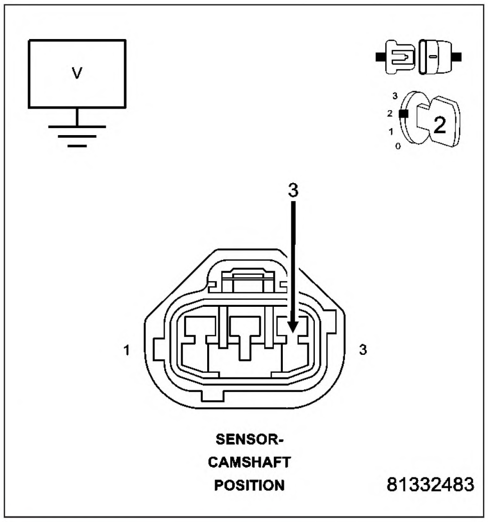
10. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) 5-volt Supply circuit in the CMP Sensor harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

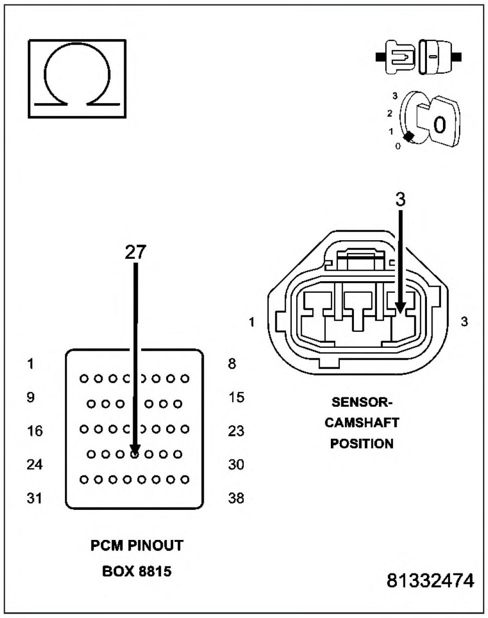
P0340-CAMSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

11. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit between the CMP Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
O
3
27
1
3
1
8
9
15
16
23
24
30
31
38
SENSOR-
CAMSHAFT
POSITION
PCM PINOUT
BOX 8815
81332474

Is the resistance below 5.0 ohms?

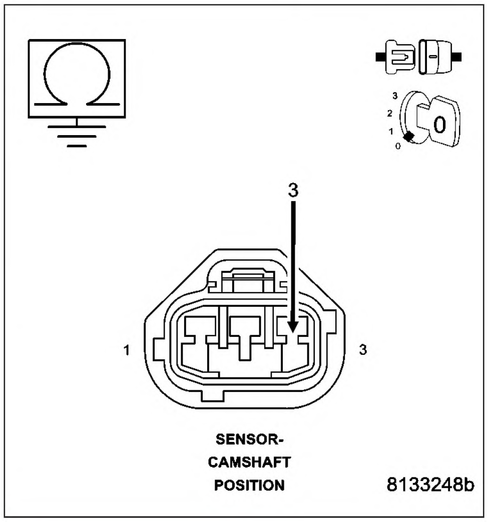
Yes >> Go To 12

No >> Repair the open in the (F856) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

12. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the CMP Sensor harness connector.


3
2
1
0
O
3
1
3
SENSOR-
CAMSHAFT
POSITION
8133248b

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

P0340-CAMSHAFT POSITION SENSOR CIRCUIT (CONTINUED)

13. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

14. ERRATIC CMP SIGNAL

With a lab scope probe and the Miller special tool #6801, back probe the (K44) CMP Signal circuit in the CMP harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Wiggle the related wire harness and lightly tap the Camshaft Position Sensor.

Observe the lab scope screen.

Allow the engine to idle.

Observe the lab scope screen.

Did the CMP Sensor generate any erratic pulses?

Yes >> Replace the Camshaft Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 15

---

15. ERRATIC CKP SIGNAL

Turn the ignition off.

With a lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Wiggle the related wire harness and lightly tap on the Crankshaft Position Sensor.

Observe the lab scope screen.

Allow the engine to idle.

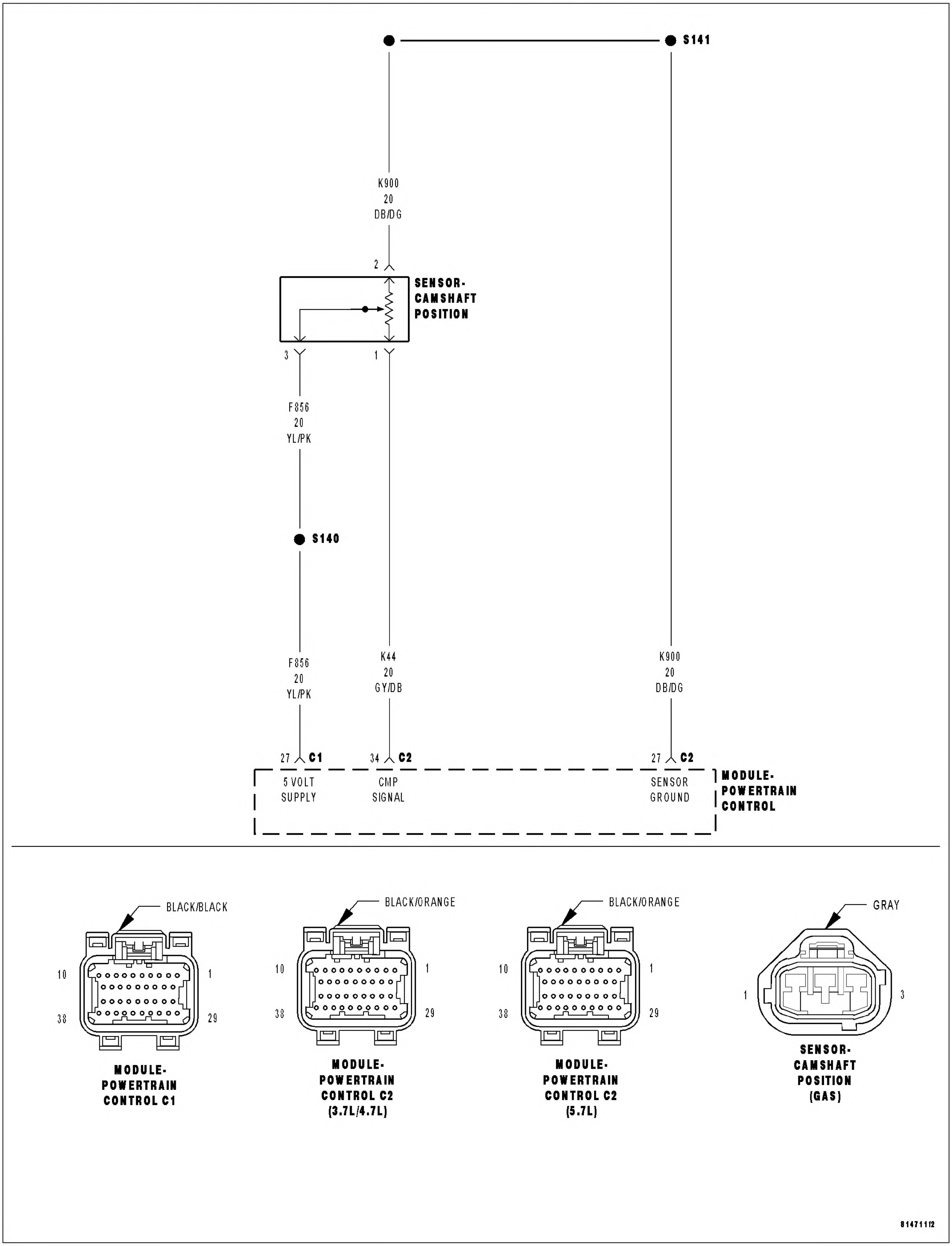
Observe the lab scope screen.

Did the CKP Sensor generate any erratic pulses?

Yes >> Replace the Crankshaft Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test complete, the conditions that set this DTC are not present at this time

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT


S141
K900
20
DB/DG
2
SENSOR-
CAMSHAFT
POSITION
3
1
F856
20
YL/PK
S140
F856
20
YL/PK
K44
20
GY/DB
K900
20
DB/DG
27 C1
34 C2
27 C2
5 VOLT
SUPPLY
CMP
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
GRAY
1
3
SENSOR-
CAMSHAFT
POSITION
(GAS)
81471112

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  While cranking the engine and engine running.
- **Set Condition:**
  When the failure counter reaches 20. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K44) CMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K44) CMP SIGNAL CIRCUIT OPEN
(K44) CMP SIGNAL CIRCUIT SHORTED TO GROUND
(K44) CMP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
TONE WHEEL/PULSE RING
CAMSHAFT POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. CHECKING CAMSHAFT POSITION SENSOR SIGNAL WITH A LAB SCOPE

Turn the ignition off.

With a lab scope probe and the Miller special tool #6801, backprobe the (K44) CMP Signal circuit in the CMP harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Observe the lab scope screen.

Start the engine.

Observe the lab scope screen.

Are there any irregular or missing signals?

Yes >> Go To 3

No >> Go To 8

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

3. WIRE HARNESS INSPECTION

Turn the ignition off.

Visually inspect the related wire harness including the ground circuit. Look for any chafed, pierced, pinched, or partially broken wires.

Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.

Make sure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are torqued to the proper specification.

Refer to any TSBs that may apply.

Were any of the above conditions present?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (F856) 5-VOLT SUPPLY CIRCUIT OPEN OR SHORTED TO GROUND

Disconnect the CMP Sensor connector.

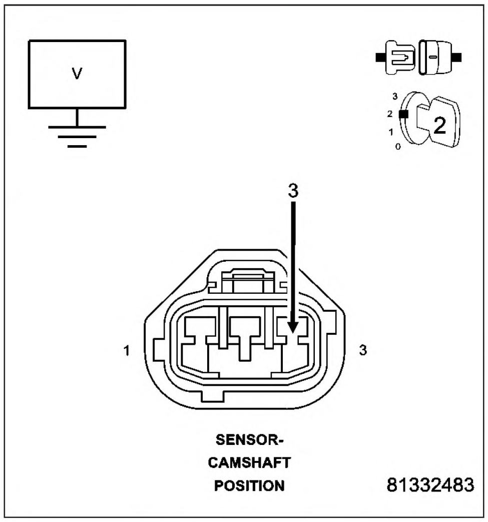
Ignition on, engine not running.

Measure the voltage on the (F856) 5-volt Supply circuit in the CMP harness connector.

Is the voltage between 4.5 and 5.2 volts?

Yes >> Go To 5

No >> Repair the open or short to ground in the (F856) 5-volt Supply circuit. Use Miller special tool #8815 when checking for an open circuit to prevent PCM harness connector terminal damage.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

5. TONE WHEEL/PULSE RING INSPECTION

Turn the ignition off.

Carefully disconnect the Battery Ground cable.

Remove the Camshaft Position Sensor.

Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement.

Were any problems found?

Yes >> Repair or replace the Tone Wheel/Pulse Ring as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

6. CHECKING CRANKSHAFT POSITION SENSOR SIGNAL WITH A LAB SCOPE

NOTE: An intermittent condition in the Crank Position Sensor can cause the P0344 to set.

Install the CMP Sensor and connect the Battery cable.

With a lab scope probe and the Miller special tool #6801, backprobe the (K24) CKP Signal circuit in the CKP harness connector.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

Wiggle the related wire harness and lightly tap on the Crank Position Sensor.

Observe the lab scope screen.

Start the engine.

Observe the lab scope screen.

Are there any irregular or missing signals?

Yes >> Replace the Crank Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

7. CAMSHAFT POSITION SENSOR

If there are no possible causes remaining, view repair.

Repair

Replace the Camshaft Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

8. (K44) CMP SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the CMP Sensor connector.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

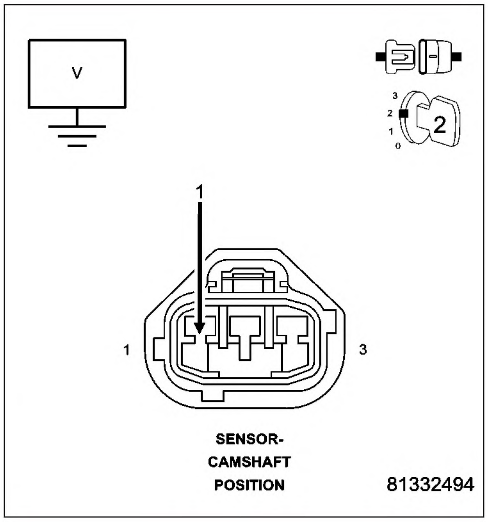
Measure the voltage on the (K44) CMP Signal circuit.

Wiggle the related wire harness while taking this measurement.

Does the voltage ever increase above 0 volts?

Yes >> Repair the short to battery voltage in the (K44) CMP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9



P0344-CAMSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

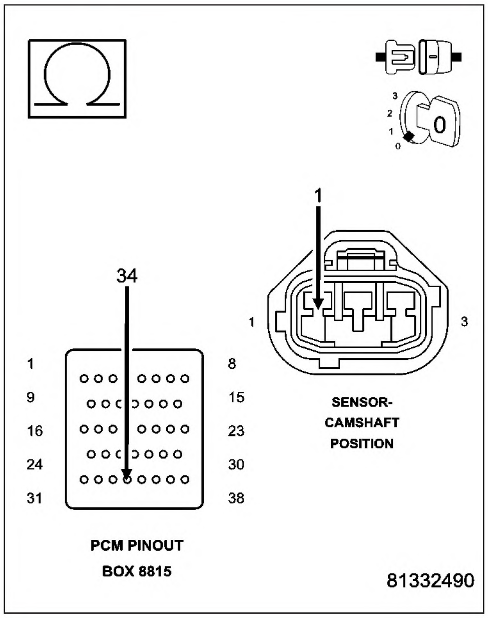
9. (K44) CMP SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance in the (K44) CMP Signal circuit from the CMP harness connector to the appropriate terminal of special tool #8815.

Wiggle the related wire harness while taking this measurement.


1
34
1
3
1
8
9
15
16
23
24
30
31
38
SENSOR-
CAMSHAFT
POSITION
PCM PINOUT
BOX 8815
3
2
1
0
0
81332490

Is the resistance below 5.0 ohms?

Yes >> Go To 10

No >> Repair the excessive resistance in the (K44) CMP Signal circuit.

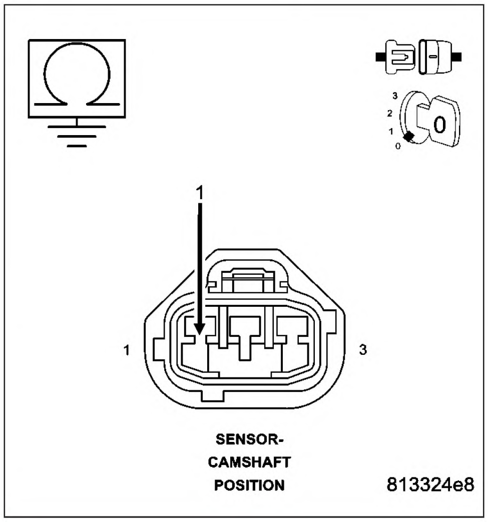
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

10. (K44) CMP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K44) CMP Signal circuit in the CMP Sensor harness connector.

Wiggle the related wire harness while monitoring the resistance value.


1
1
3
SENSOR-
CAMSHAFT
POSITION
3
2
1
0
0
813324e8

Does the resistance ever go below 100 ohms?

Yes >> Repair the short to ground in the (K44) CMP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

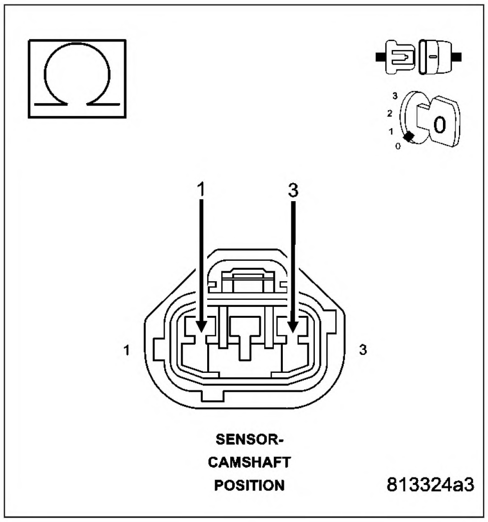
No >> Go To 11

P0344-CAMSHAFT POSITION SENSOR INTERMITTENT (CONTINUED)

11. (K44) CMP SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (F856) 5-volt Supply circuit and the (K44) CMP Signal circuit in the CMP harness connector.

Wiggle the related wire harness while taking this measurement.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (F856) 5-volt Supply circuit and the (K44) CMP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

---

12. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

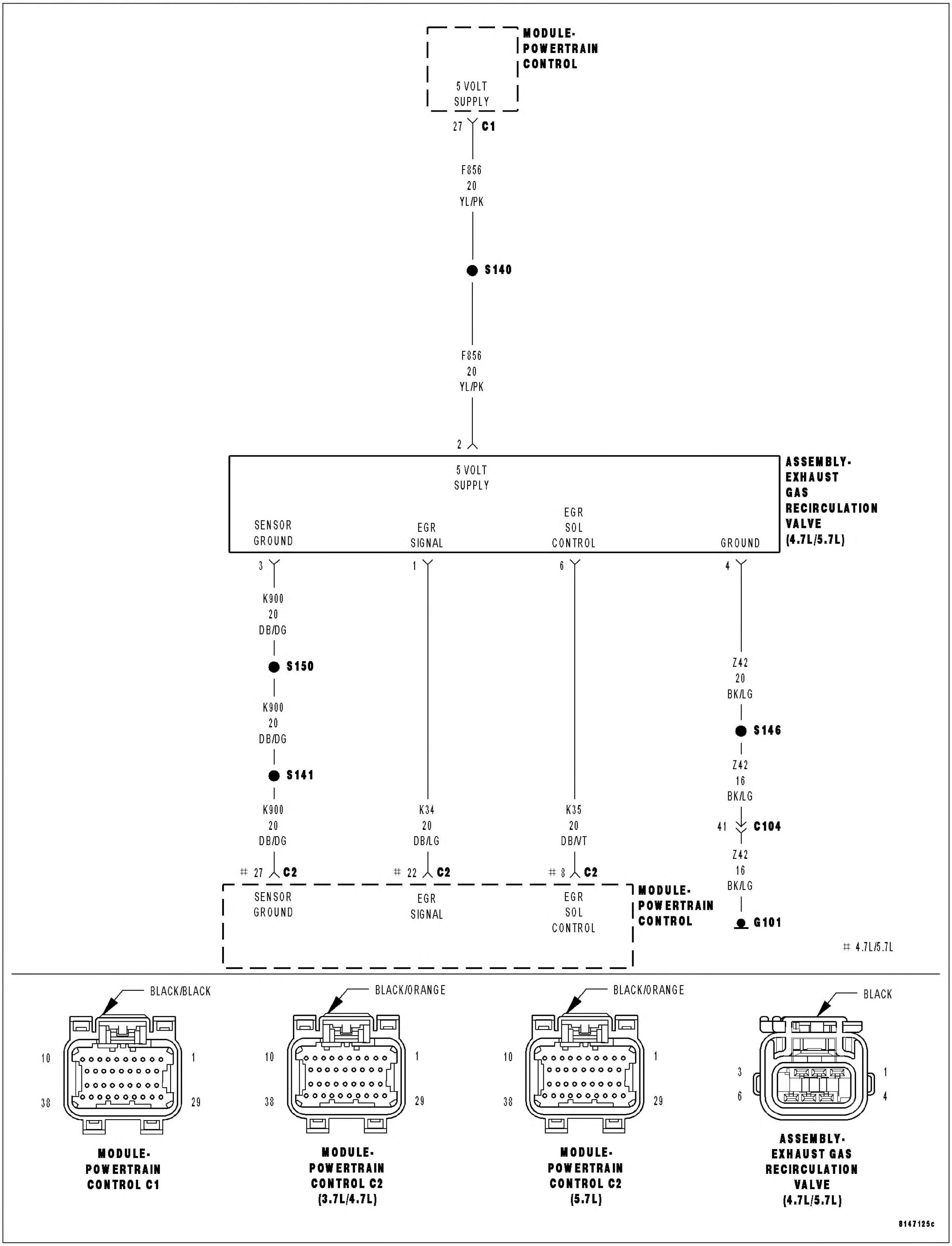
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0401-EGR SYSTEM PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27 C1
F856
20
YL/PK
S140
F856
20
YL/PK
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
GROUND
3
1
6
4
K900
20
DB/DG
S150
K900
20
DB/DG
S141
K900
20
DB/DG
K34
20
DB/LG
K35
20
DB/VT
Z42
20
BK/LG
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
# 27 C2
# 22 C2
# 8 C2
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
MODULE-
POWERTRAIN
CONTROL
# 4.7L/5.7L
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
8147125c

P0401-EGR SYSTEM PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

Exhaust gas recirculation is a method of reducing emissions of oxides of nitrogen. As the inert exhaust gas is recirculated, the mixture absorbs heat in the combustion chamber without interacting with the fuel/air mixture and reduces the formation of NOx emissions. After the EGR monitor conditions are met, the EGR valve is turned on and off momentarily. The EGR monitor calculated the difference in engine roughness from the EGR off condition to the EGR condition. This engine combustion stability difference as measured by engine roughness is the measure of a functional EGR system.

- **When Monitored:**
  Engine running for greater than two minutes with the Engine Coolant Temp greater than 70°C (158°F). EGR active. Less than 8500 feet. Ambient temperature greater than -6°C (20°F).
- **Set Condition:**
  The PCM closes the EGR valve while monitoring the O2 Sensor signal. Once a closed EGR fueling sample has been established the PCM then ramps in EGR and additional fueling while monitoring the O2 sensor signal in the open state. A fueling sample is again established. The PCM then compares the different O2 Sensor signal readings (fueling samples). If a larger than expected variation is detected, a soft failure is recorded. Three soft failures set a one trip failure. After two failed trips, a DTC is set and the MIL is illuminated.

Possible Causes
(Z42) EGR SOLENOID GROUND CIRCUIT OPEN
(K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
(K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K35) EGR SOLENOID CONTROL CIRCUIT OPEN
EGR SOLENOID ASSEMBLY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0401-EGR SYSTEM PERFORMANCE (CONTINUED)

2. EGR OPERATION

NOTE: If the vehicle is running rough at idle (scan tool not actuating) follow the yes path to continue.

Turn all accessories off.

Start the engine.

Allow the engine to reach normal operating temperature.

With the scan tool, enter Engine System Test, then EGR System Test.

Actuate the FLOW function in the EGR System Test.

Did the engine run rough or stall?

Yes >> Go To 3

No >> Go To 6

---

3. EGR VALVE OPEN AT IDLE

Turn the ignition off.

Disconnect the EGR Solenoid Assembly harness connector.

Start engine. Attempt to allow the engine to idle.

Does the engine run rough or stall?

Yes >> Inspect the EGR tube assembly. If OK, replace the EGR valve.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. EGR VALVE ASSEMBLY INSPECTION

Inspect the EGR Assembly for the following.

Gasket(s) for leaking

Damage and/or holes in the EGR tube(s)

Carbon build up on or near the EGR pintle and passage ways.

Obstruction in the EGR tubes.

Were any problem found?

Yes >> Repair or replace the EGR Assembly as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0401-EGR SYSTEM PERFORMANCE (CONTINUED)

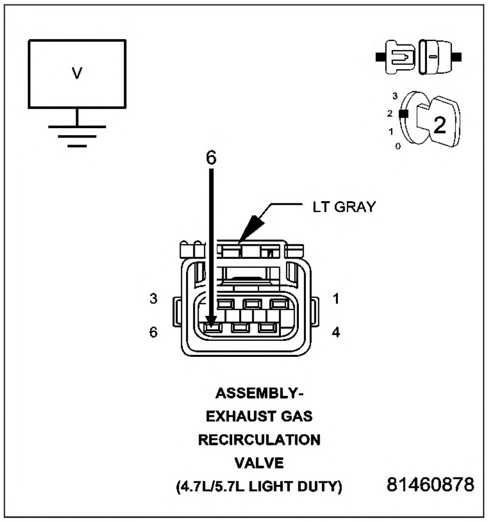
5. (K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the EGR Solenoid harness connector.

Ignition on, engine not running.

Measure the voltage on the (K35) EGR Solenoid Control circuit in the EGR Solenoid connector.


V
3
2
1
0
2
6
LT GRAY
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81460878

Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K35) EGR Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

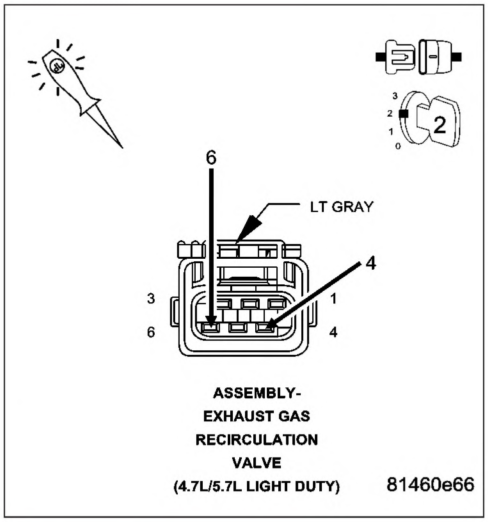
---

6. EGR SOLENOID ASSEMBLY

Disconnect the EGR Solenoid harness connector.

Using a 12-volt test light, jump across the (K35) EGR Solenoid Control terminal and the (Z42) Ground terminal in the EGR Solenoid harness connector.

With the scan tool, actuate the EGR solenoid.


3
2
1
0
2
6
LT GRAY
4
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81460e66

Does the 12-volt test light flash on and off?

Yes >> Inspect the tube(s) for obstructions and damage, repair as necessary. If OK, replace the EGR Solenoid Assembly.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0401-EGR SYSTEM PERFORMANCE (CONTINUED)

7. (Z42) EGR SOLENOID GROUND CIRCUIT OPEN

Turn the ignition off.

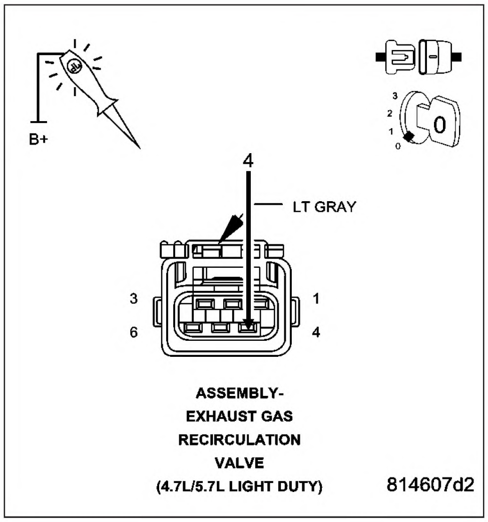
Using a 12-volt test light connected to battery voltage, probe the (Z42) EGR Solenoid ground circuit in the EGR Solenoid harness connector.

Does the 12-volt test light illuminate brightly?

Yes >> Go To 8

No >> Repair the open in the (Z42) EGR Solenoid ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


B+
4
LT GRAY
3
1
6
4
3
2
1
0
O
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
814607d2

---

8. (K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Disconnect the C2 PCM harness connector.

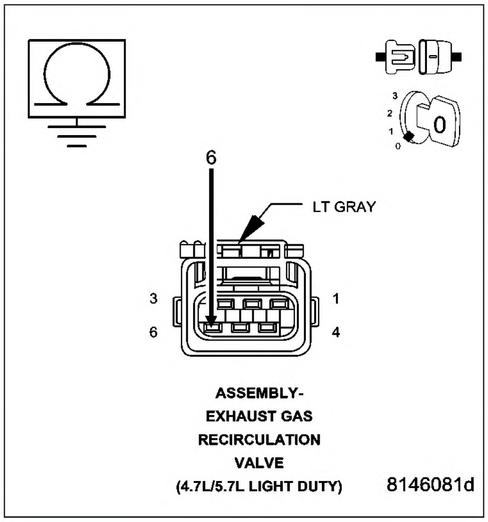
Measure the resistance between ground and the (K35) EGR Solenoid Control circuit in the EGR Solenoid harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K35) EGR Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

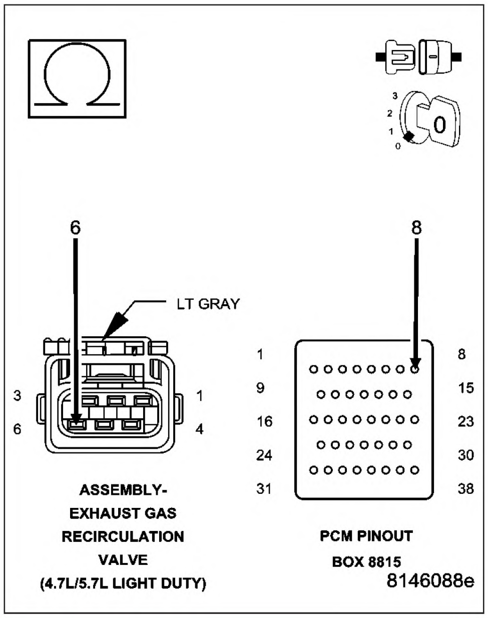

Ω
6
LT GRAY
3
1
6
4
3
2
1
0
O
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
8146081d

P0401-EGR SYSTEM PERFORMANCE (CONTINUED)

9. (K35) EGR SOLENOID CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K35) EGR Solenoid Control circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 10

No >> Repair the open in the (K35) EGR Solenoid Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

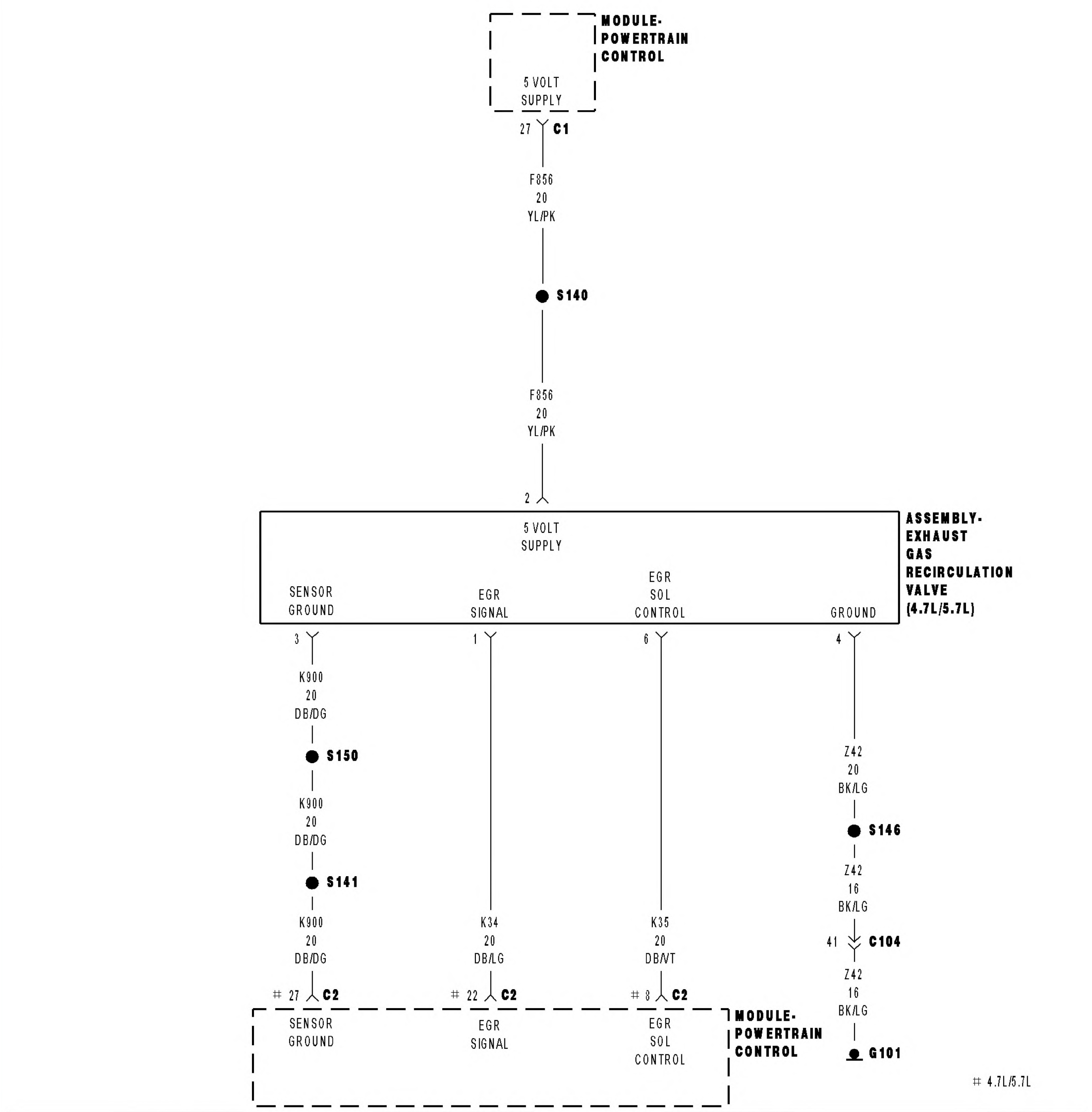
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

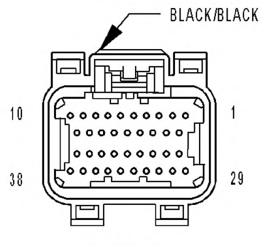
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

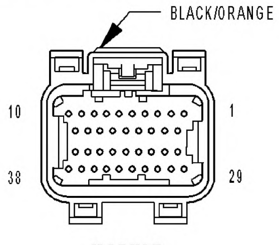
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0403-EGR SOLENOID CIRCUIT

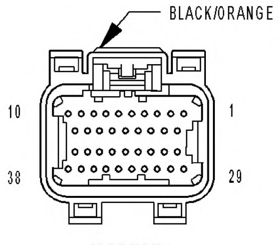

MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27
C1
F856
20
YL/PK
S140
F856
20
YL/PK
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
GROUND
3
1
6
4
K900
20
DB/DG
S150
K900
20
DB/DG
S141
K900
20
DB/DG
K34
20
DB/LG
K35
20
DB/VT
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
# 27 C2
# 22 C2
# 8 C2
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
MODULE-
POWERTRAIN
CONTROL
# 4.7L/5.7L


BLACK/BLACK
10
1
38
29

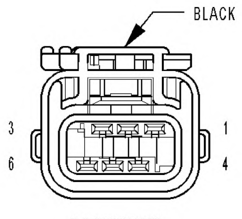
MODULE-
POWERTRAIN
CONTROL C1


BLACK/ORANGE
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)


BLACK/ORANGE
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C2
(5.7L)



ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)

8147125c

P0403-EGR SOLENOID CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running. Battery voltage greater than 10 volts.
- **Set Condition:**
  The EGR solenoid control circuit is not in the expected state when requested to operate by the PCM. One Trip Fault.

Possible Causes
(Z42) EGR SOLENOID GROUND CIRCUIT OPEN
(K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
(K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
(K35) EGR SOLENOID CONTROL CIRCUIT OPEN
EGR SOLENOID ASSEMBLY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EGR SOLENOID ASSEMBLY

Turn the ignition off.

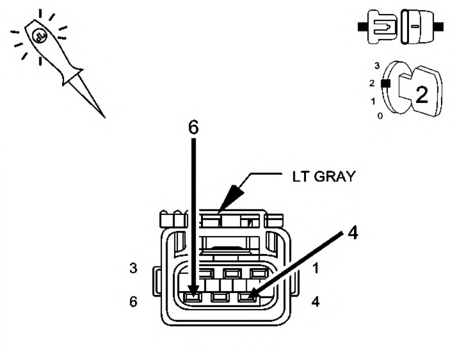
Disconnect the EGR Solenoid harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) EGR Solenoid ground circuit, probe the (K34) EGR Solenoid Control circuit.

With a scan tool, actuate the EGR solenoid.



ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)

81460e66

Does the 12-volt test light flash on and off?

Yes >> Replace the EGR Solenoid Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

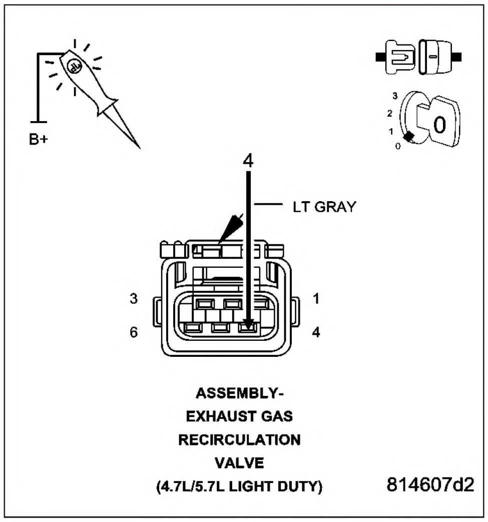
No >> Go To 3

P0403-EGR SOLENOID CIRCUIT (CONTINUED)

3. (Z42) EGR SOLENOID GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) EGR Solenoid ground circuit in the EGR Solenoid harness connector.


B+
3
2
1
0
0
4
LT GRAY
3
6
1
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
814607d2

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) EGR Solenoid ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

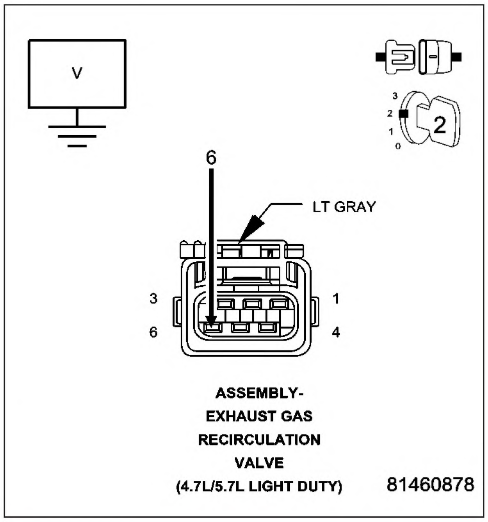
---

4. (K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Ignition on, engine not running.

Disconnect the C2 PCM harness connector.

Measure the voltage on the (K35) EGR Solenoid Control circuit in the EGR Solenoid connector.


V
3
2
1
0
2
6
LT GRAY
3
6
1
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81460878

Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K35) EGR Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

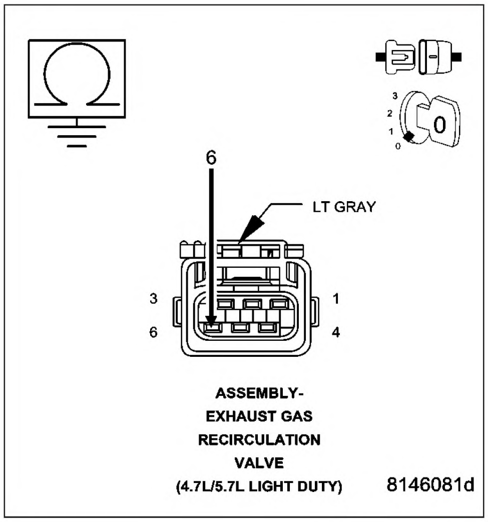
No >> Go To 5

P0403-EGR SOLENOID CIRCUIT (CONTINUED)

5. (K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (K35) EGR Solenoid Control circuit in the EGR Solenoid harness connector.


6
LT GRAY
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
8146081d
3
2
1
0
0

Is the resistance below 100 ohms?

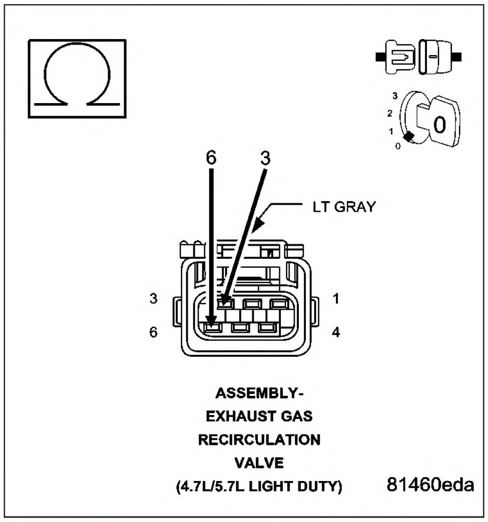
Yes >> Repair the short to ground in the (K35) EGR Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. (K35) EGR SOLENOID CONTROL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K35) EGR Solenoid Control circuit and the (K900) Sensor ground circuit in the EGR Solenoid connector.


6
3
LT GRAY
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81460eda
3
2
1
0
0

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K900) Sensor ground circuit and the (K35) EGR Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

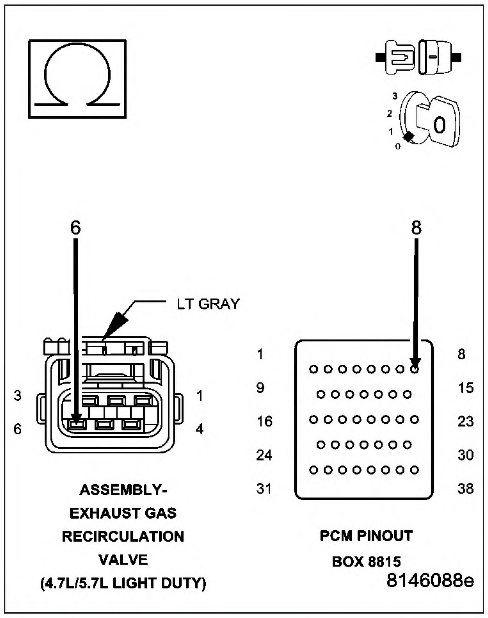
No >> Go To 7

P0403-EGR SOLENOID CIRCUIT (CONTINUED)

7. (K35) EGR SOLENOID CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K35) EGR Solenoid Control circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 8

No >> Repair the open in the (K35) EGR Solenoid Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

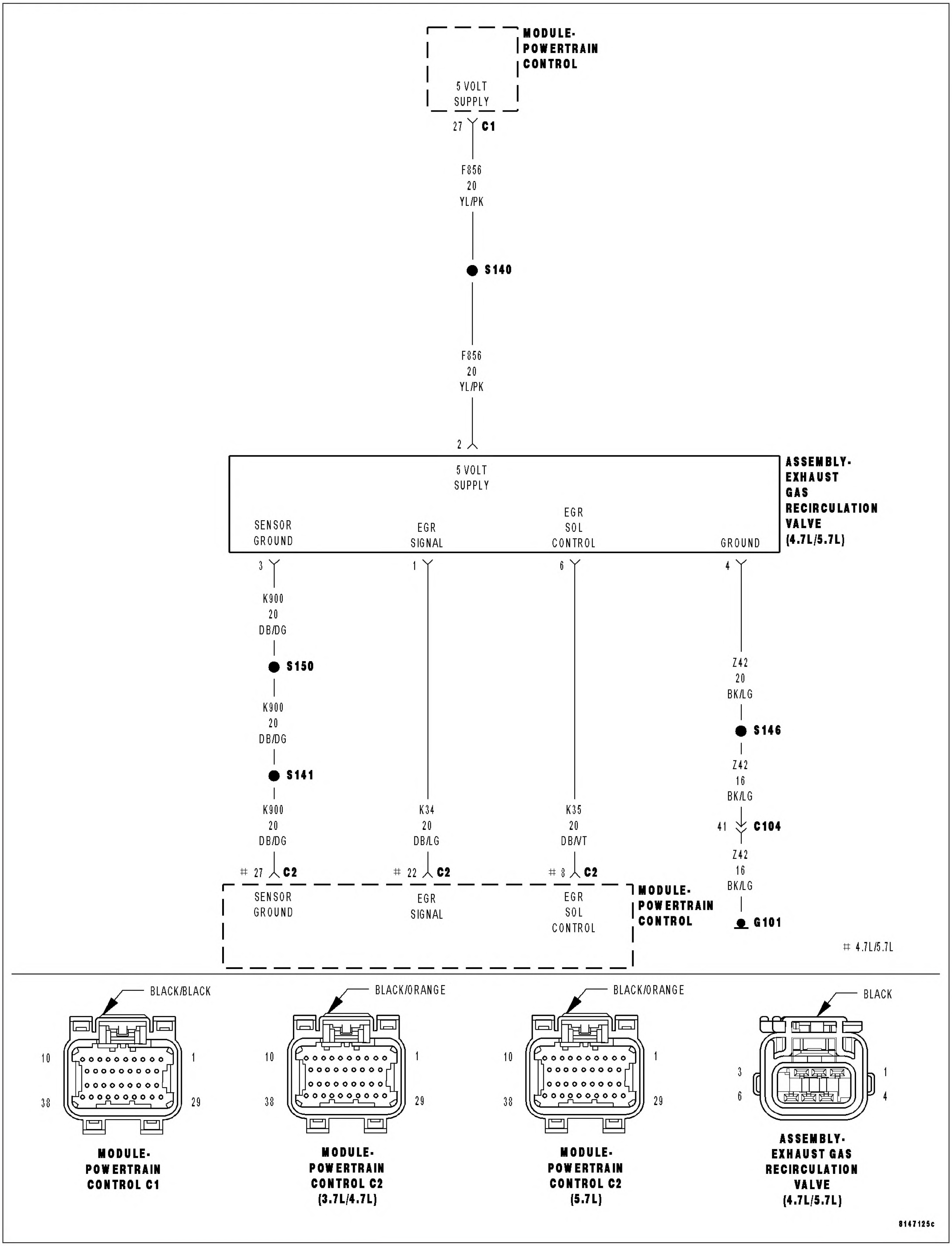
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0404-EGR POSITION SENSOR PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27 C1
F856
20
YL/PK
S140
F856
20
YL/PK
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
GROUND
3
1
6
4
K900
20
DB/DG
S150
K900
20
DB/DG
S141
K900
20
DB/DG
K34
20
DB/LG
K35
20
DB/VT
Z42
20
BK/LG
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
# 27 C2
# 22 C2
# 8 C2
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
MODULE-
POWERTRAIN
CONTROL
# 4.7L/5.7L
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
8147125c

P0404-EGR POSITION SENSOR PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The EGR valve has a position sensor and the EGR position rationality is designed to make sure that the valve moves freely within its operating range. Closed valve position reference check verifies that the valve is within its allowable upper and lower limits. The EGR position rationality test looks for a sustained error relative to commanded valve position.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  The EGR flow or valve movement is not what is expected.

Possible Causes
EXCESSIVE RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
(K35) EGR SOLENOID CONTROL CIRCUIT
(K34) EGR SENSOR SIGNAL CIRCUIT OPEN
(K34) EGR SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(K900) SENSOR GROUND CIRCUIT OPEN
EGR SOLENOID ASSEMBLY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EGR POSITION VOLTAGE

NOTE: Diagnose all other EGR DTC(s) before continuing.

Start the engine.

With a scan tool, read the EGR Position Sensor voltage.

Choose a conclusion that best matches the EGR voltage reading.

Below 3.5 volts
Go To 3

Between 3.5 volts to 4.3 volts
Go To 5

Above 4.3 volts
Go To 6

P0404-EGR POSITION SENSOR PERFORMANCE (CONTINUED)

3. EXCESSIVE RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

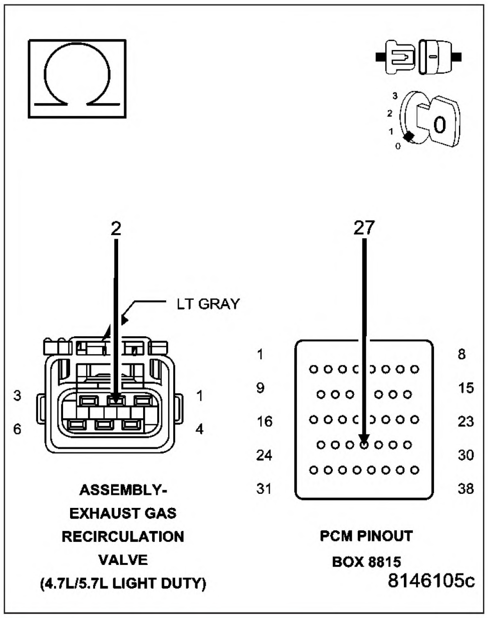
Turn the ignition off.

Disconnect the EGR Solenoid harness connector.

Disconnect the C1 and C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.


2
27
LT GRAY
3
6
1
4
1
9
16
24
31
8
15
23
30
38
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
PCM PINOUT
BOX 8815
8146105c

Is the resistance below 5.0 ohms?

Yes >> Go To 4

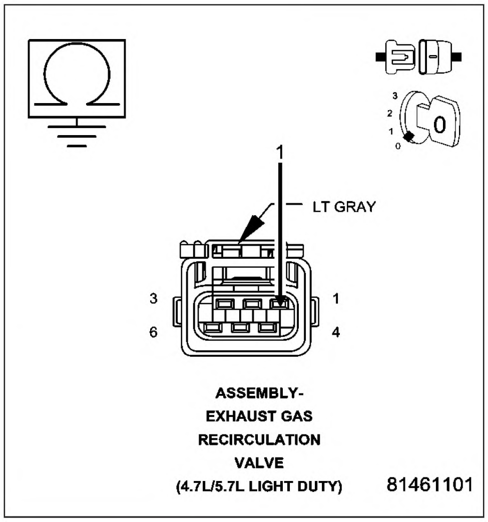
No >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (K34) EGR SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K34) EGR Sensor Signal circuit in the EGR Solenoid harness connector.


1
LT GRAY
3
6
1
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81461101

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K34) EGR Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the EGR Assembly.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0404-EGR POSITION SENSOR PERFORMANCE (CONTINUED)

5. (K35) EGR SOLENOID CONTROL CIRCUIT

Ignition on, engine not running.

With the scan tool, actuate the EGR Solenoid.

Allow the EGR Solenoid to actuate for at least 15 seconds.

Feel the EGR Solenoid for operation.

Stop actuation.

Does EGR Solenoid operate while actuating and then turn off when actuation test is stopped?

a. Yes

Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Refer to the P0403-EGR Control Circuit diagnostic procedure and continue.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

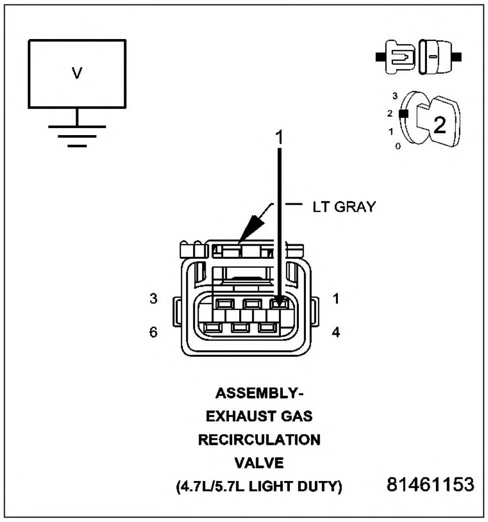
6. (K34) EGR SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the EGR Solenoid harness connector.

Ignition on, engine not running.

Measure the voltage of the (K34) EGR Sensor Signal circuit in the EGR Solenoid harness connector.



Is the voltage above 4.30 volts?

Yes >> Go To 7

No >> Go To 8

P0404-EGR POSITION SENSOR PERFORMANCE (CONTINUED)

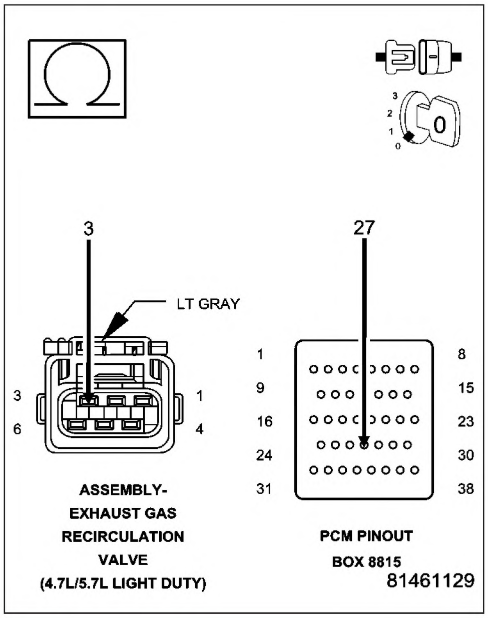
7. (K900) SENSOR GROUND CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor ground circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.


3
27
LT GRAY
3
1
6
4
1
8
9
15
16
23
24
30
31
38
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
PCM PINOUT
BOX 8815
81461129

Is the resistance below 5.0 ohms?

Yes >> Replace the EGR Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

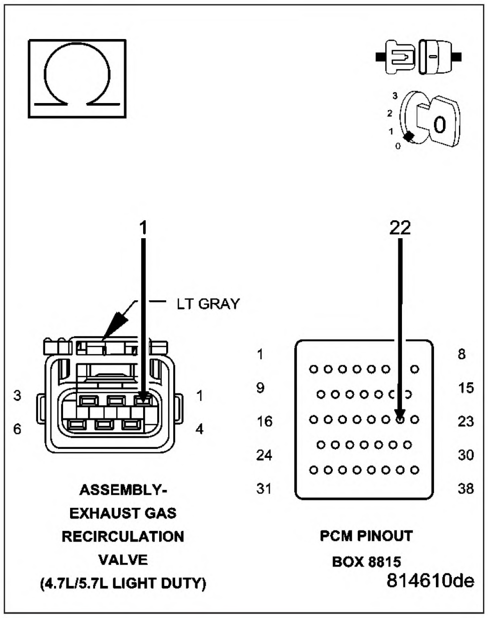
8. (K34) EGR SENSOR SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K34) EGR Sensor Signal circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.


1
22
LT GRAY
3
1
6
4
1
8
9
15
16
23
24
30
31
38
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
PCM PINOUT
BOX 8815
814610de

Is the resistance below 5.0 ohms?

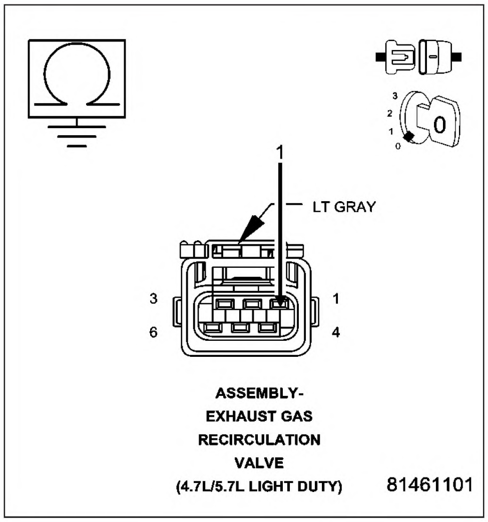
Yes >> Go To 9

No >> Repair the open in the (K34) EGR Sensor Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0404-EGR POSITION SENSOR PERFORMANCE (CONTINUED)

9. (K34) EGR SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K34) EGR Sensor Signal circuit in the EGR Solenoid harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K34) EGR Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

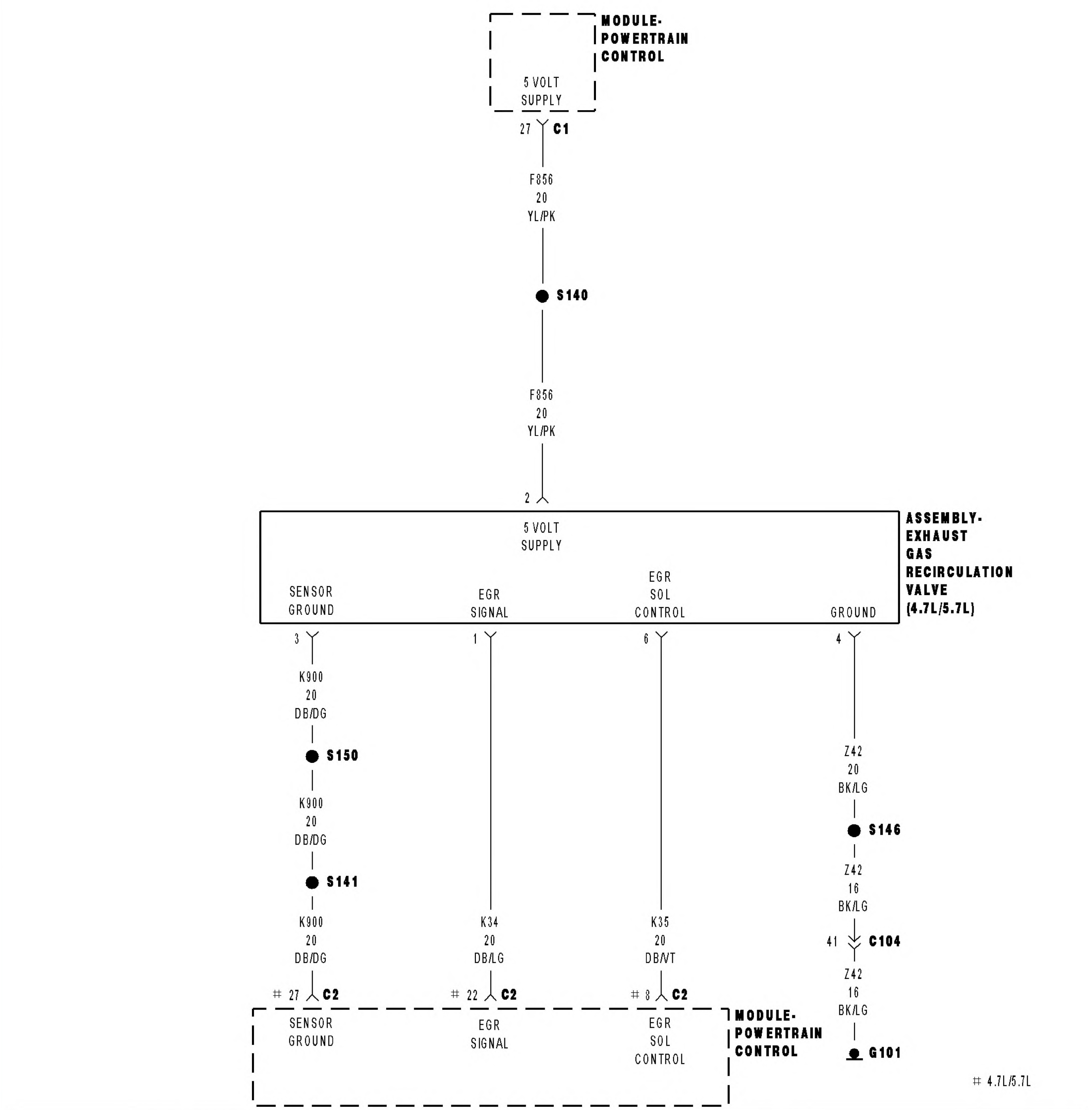
Yes >> Repair as necessary.

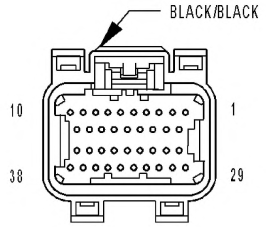
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

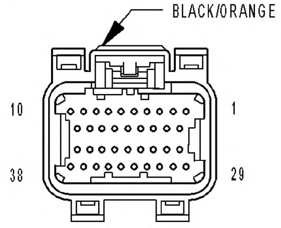
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0405-EGR POSITION SENSOR CIRCUIT LOW

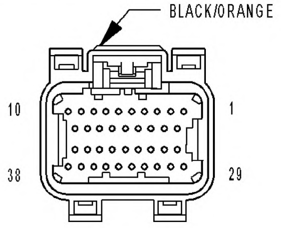

MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27 C1
F856
20
YL/PK
S140
F856
20
YL/PK
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
GROUND
3
1
6
4
K900
20
DB/DG
S150
K900
20
DB/DG
S141
K900
20
DB/DG
K34
20
DB/LG
K35
20
DB/VT
Z42
20
BK/LG
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
# 27 C2
# 22 C2
# 8 C2
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
MODULE-
POWERTRAIN
CONTROL
# 4.7L/5.7L


BLACK/BLACK
10
1
38
29

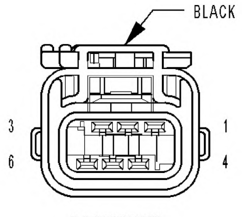
**MODULE-
POWERTRAIN
CONTROL C1**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**



**ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)**

8147125c

P0405-EGR POSITION SENSOR CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage above 10.0 volts.
- **Set Condition:**
  EGR Position Sensor Signal is less than 0.1 of a volt. One trip Fault.

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(K34) EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(K34) EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
EGR POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. EGR POSITION SENSOR BELOW 0.2 OF A VOLT

Ignition on, engine not running.

With a scan tool, read the EGR Position Sensor voltage.

Is the voltage below 0.2 of a volt?

Yes >> Go To 2

No >> Go To 9

---

2. (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the EGR Solenoid harness connector.

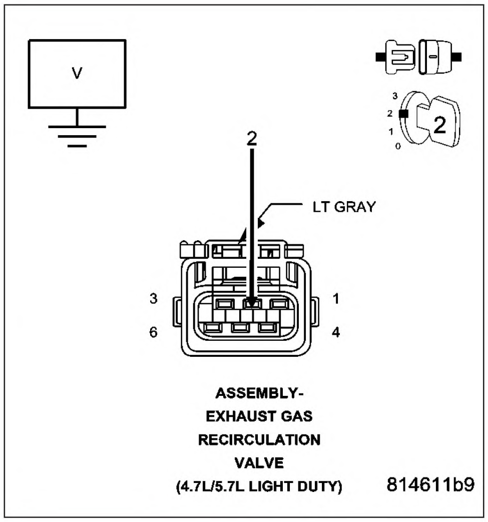
Ignition on, engine not running.

Measure the voltage of the (F856) 5-volt Supply circuit in the EGR Solenoid harness connector.

Is the voltage between 4.5 to 5.2 volts?

Yes >> Go To 3

No >> Go To 6



P0405-EGR POSITION SENSOR CIRCUIT LOW (CONTINUED)

3. EGR POSITION

With the scan tool, monitor the EGR Position Sensor voltage.

Is the voltage above 4.5 volts?

Yes >> Replace the EGR Solenoid Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (K34) EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

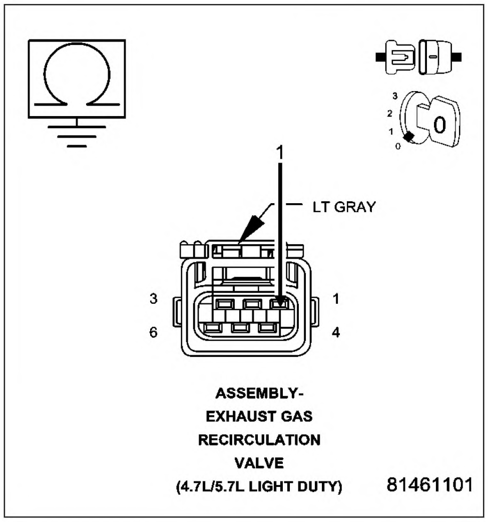
Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K34) EGR Position Sensor Signal circuit in the EGR Solenoid harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground circuit in the (K34) EGR Position Sensor Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5


1
LT GRAY
3
1
6
4
3
2
1
0
0
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81461101

---

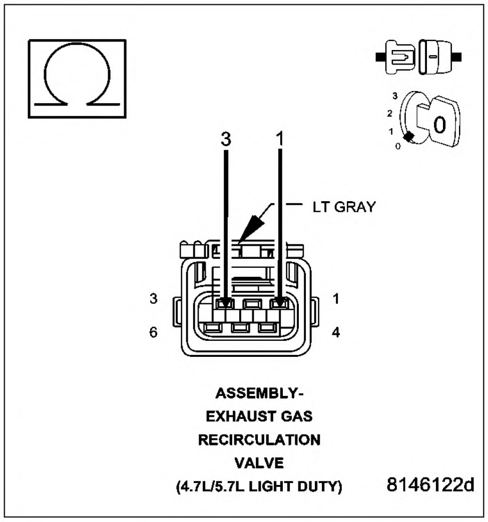
5. (K34) EGR SENSOR SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K34) EGR Position Sensor Signal circuit and (K900) Sensor ground circuit in the EGR Solenoid harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K900) Sensor ground and the (K34) EGR Position Sensor Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8


3
1
LT GRAY
3
1
6
4
3
2
1
0
0
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
8146122d

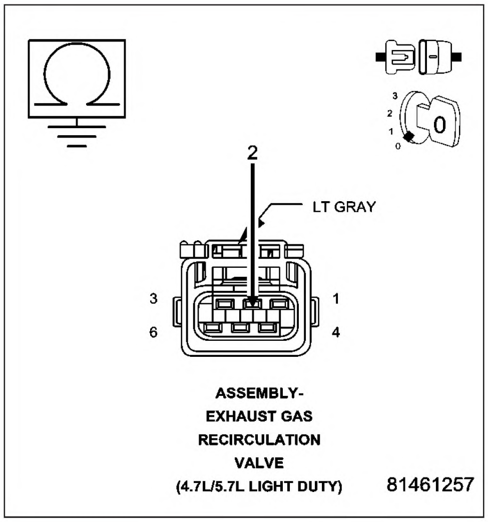
P0405-EGR POSITION SENSOR CIRCUIT LOW (CONTINUED)

6. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the EGR Solenoid harness connector.


2
LT GRAY
3
1
6
4
3
2
1
0
0
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81461257

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

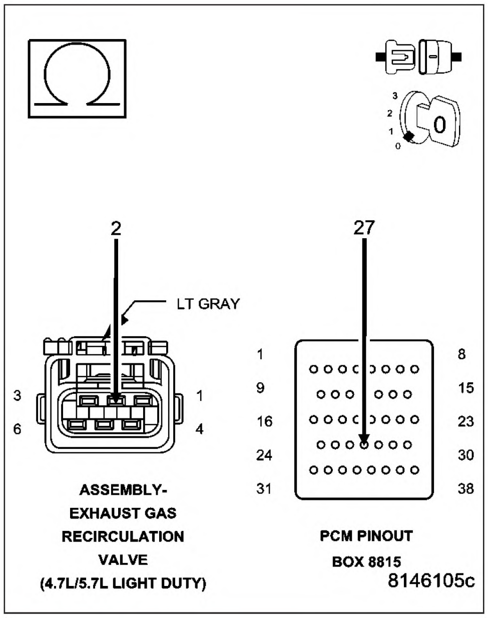
No >> Go To 7

---

7. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
2
27
LT GRAY
3
1
6
4
1
8
9
15
16
23
24
30
31
38
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
PCM PINOUT
BOX 8815
8146105c

Is the resistance below 5.0 ohms?

Yes >> Go To 8

No >> Repair the open in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0405-EGR POSITION SENSOR CIRCUIT LOW (CONTINUED)

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

9. EGR POSITION SENSOR SWEEP

NOTE: The engine will run rough and possibly stall in the following test. Feather the accelerator pedal to keep the engine from stalling.

Start the engine.

With the scan tool, enter System Test and then EGR System Test. Push the 4=VARIABLE function.

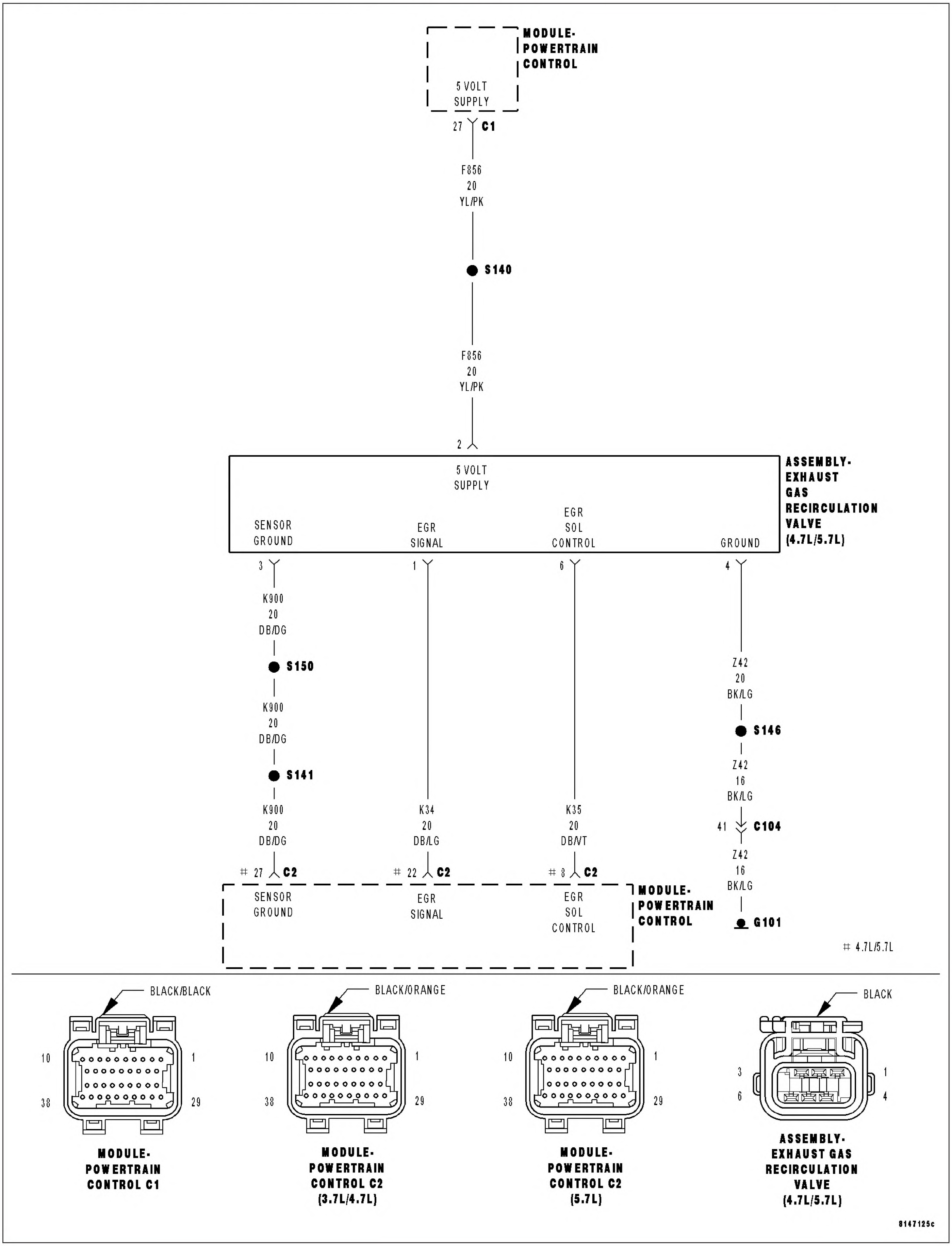
Monitor the EGR voltage while slowly pushing the up arrow.

Is the voltage change smooth?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the EGR Solenoid Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0406-EGR POSITION SENSOR CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27
C1
F856
20
YL/PK
S140
F856
20
YL/PK
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
GROUND
3
1
6
4
K900
20
DB/DG
S150
K900
20
DB/DG
S141
K900
20
DB/DG
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
K34
20
DB/LG
K35
20
DB/VT
# 27
C2
# 22
C2
# 8
C2
SENSOR
GROUND
EGR
SIGNAL
EGR
SOL
CONTROL
MODULE-
POWERTRAIN
CONTROL
# 4.7L/5.7L
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
8147125c

P0406-EGR POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  EGR position sensor signal is greater than 4.89. One trip Fault.

Possible Causes
(K34) EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
(K34) EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K34) EGR POSITION SENSOR SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
EGR SOLENOID ASSEMBLY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. EGR POSITION SENSOR VOLTAGE ABOVE 4.5 VOLTS

Start the engine.

With the scan tool, read the EGR Position Sensor voltage.

Is the voltage above 4.5 volts?

Yes >> Go To 2

No >> Go To 8

---

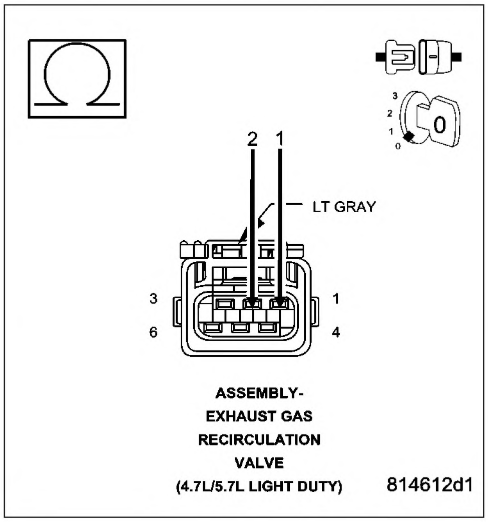
2. (K34) EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the EGR Solenoid harness connector.

Disconnect the C1 and C2 PCM harness connectors.

Measure the resistance between the (K34) EGR Position Sensor Signal circuit and the (F856) 5-volt Supply circuit in the EGR Solenoid harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short between the (K34) EGR Position Sensor Signal circuit and the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

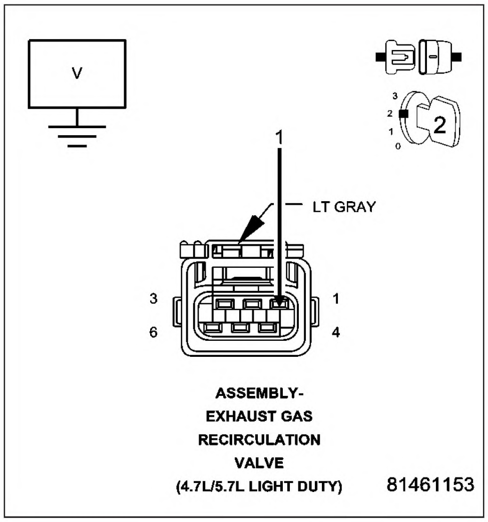
No >> Go To 3

P0406-EGR POSITION SENSOR CIRCUIT HIGH (CONTINUED)

3. (K34) EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Ignition on, engine not running.

Measure the voltage on the (K34) EGR Sensor Signal circuit in the EGR Solenoid harness connector.


V
1
LT GRAY
3
1
6
4
2
3
2
1
0
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
81461153

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K34) EGR Position Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. EGR SOLENOID ASSEMBLY

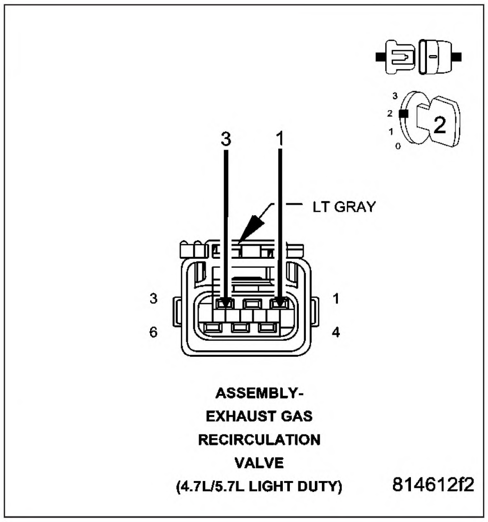
Turn the ignition off.

Connect the PCM harness connectors.

Connect a jumper wire between the (K34) EGR Position Sensor Signal circuit and the (K900) Sensor ground circuit.

With the scan tool, monitor the EGR Position Sensor voltage.

Ignition on, engine not running.


3
1
LT GRAY
3
1
6
4
2
3
2
1
0
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
814612f2

Is the voltage below 0.5 of a volt?

Yes >> Replace the EGR Solenoid Assembly.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.

P0406-EGR POSITION SENSOR CIRCUIT HIGH (CONTINUED)

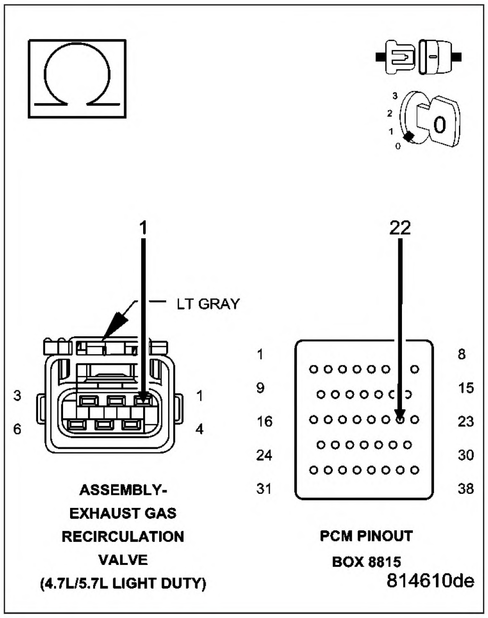
5. (K34) EGR POSITION SENSOR SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K34) EGR Position Sensor Signal circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.


1
22
LT GRAY
3
1
6
4
1
9
16
24
31
8
15
23
30
38
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
PCM PINOUT
BOX 8815
814610de

Is the resistance below 5.0 ohms?

Yes >> Go To 6

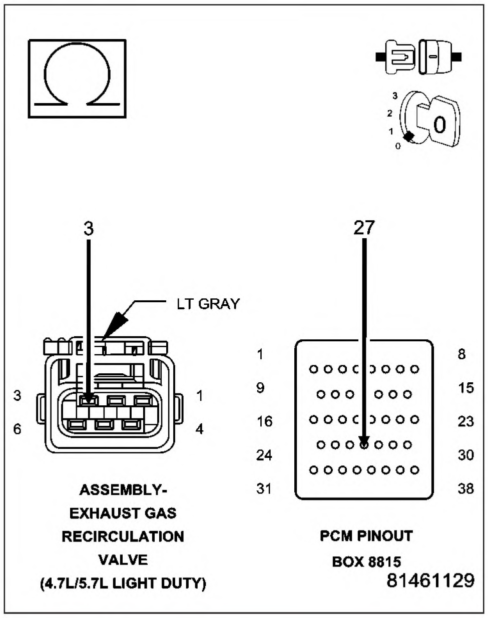
No >> Repair the open in the (K34) EGR Position Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the EGR Solenoid harness connector to the appropriate terminal of special tool #8815.


3
27
LT GRAY
3
1
6
4
1
9
16
24
31
8
15
23
30
38
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L LIGHT DUTY)
PCM PINOUT
BOX 8815
81461129

Is the resistance below 30 ohms?

Yes >> Go To 7

No >> Repair the open in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0406-EGR POSITION SENSOR CIRCUIT HIGH (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

8. EGR POSITION SENSOR SWEEP

NOTE: The engine will run rough and possibly stall in the following test. Feather the accelerator pedal to keep the engine from stalling.

Start the engine.

With the scan tool, enter System Test and then EGR System Test. Push the 4=VARIABLE function.

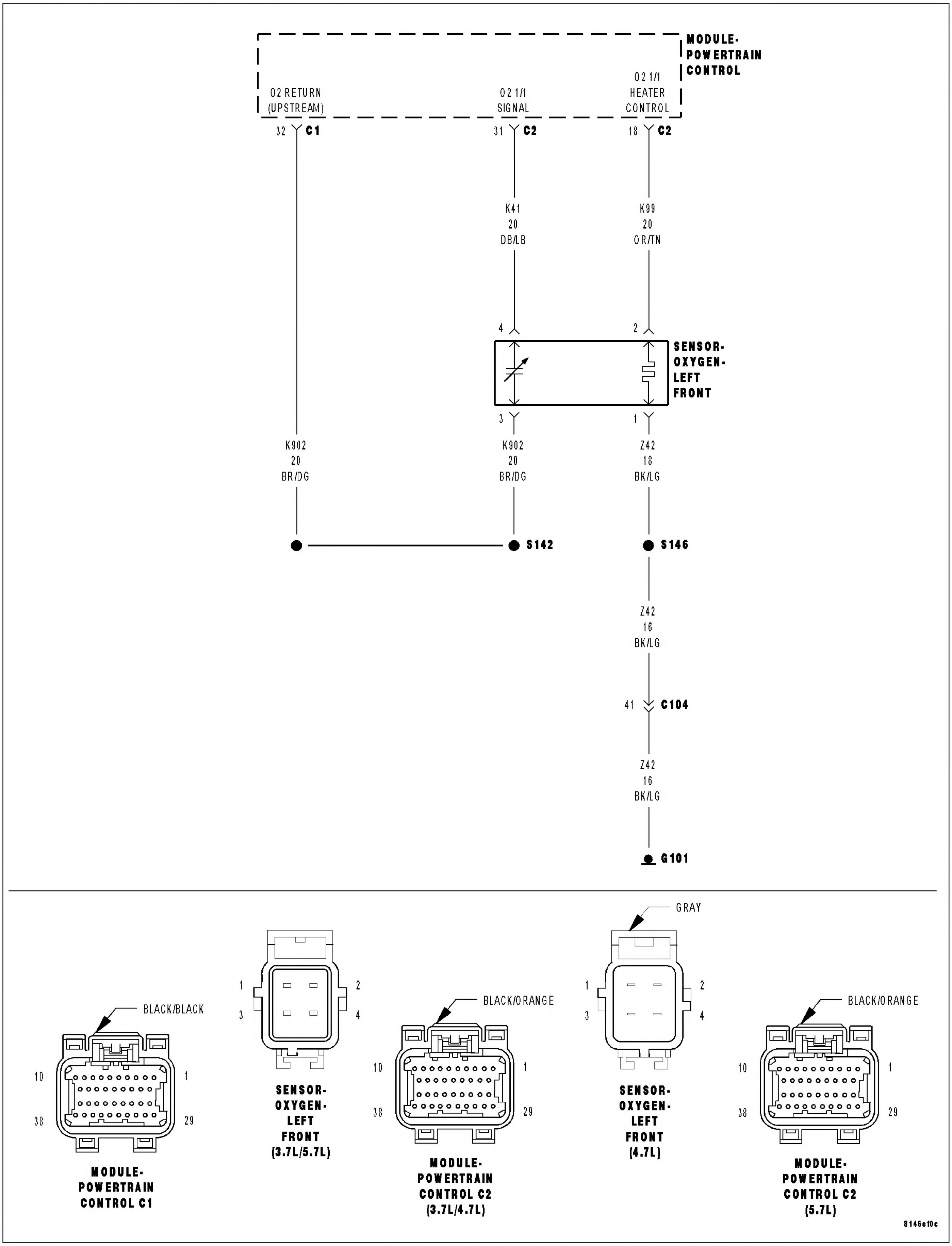
Monitor the EGR voltage while slowly pushing the up arrow.

Is the voltage change smooth?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the EGR Solenoid Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0420-CATALYST 1/1 EFFICIENCY


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 1/1
SIGNAL
O2 1/1
HEATER
CONTROL
32 C1
31 C2
18 C2
K41
20
DB/LB
K99
20
OR/TN
4
2
SENSOR-
OXYGEN-
LEFT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
FRONT
(4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146ef0c

P0420-CATALYST 1/1 EFFICIENCY (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The upstream O2 sensor is used to detect the amount of oxygen in the exhaust gas before the gas enters the catalytic converter. During the catalyst/O2 monitor test, the response rate (cycles/second) of the upstream O2 sensor determines the sensor's ability to achieve the tailpipe emissions limits. The response rate of the downstream O2 sensor relative to the upstream O2 sensor response rate measures the catalyst's ability to store oxygen and is used to infer the catalyst's ability to achieve the tailpipe emissions limits.

- **When Monitored:**
  After engine warm up to 70°C (158°F), 180 seconds of open throttle operation, at a speed greater than 18 mph and less than 55 mph, with the engine at 1200-1700 rpm and MAP vacuum between 15.0 and 21.0 inches of mercury (Hg).
- **Set Condition:**
  As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
ENGINE MECHANICAL
AGING O2 SENSOR
CATALYTIC CONVERTER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the repair history of the vehicle before continuing.

NOTE: If an O2 Sensor DTC set along with the Catalytic Converter Efficiency DTC diagnose the O2 Sensor DTC(s) before continuing.

NOTE: Check for contaminants that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0420-CATALYST 1/1 EFFICIENCY (CONTINUED)

2. VISUALLY INSPECT CATALYTIC CONVERTER

Inspect the Catalytic Converter for the following damage.

Damaged Catalytic Converter, dents or holes.

Severe discoloration caused by overheating the Catalytic Converter.

Catalytic Converter broken internally.

Leaking Catalytic Converter.

Were any problems found?

Yes >> Replace the Catalytic Converter. Repair the condition that may have caused the failure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. EXHAUST LEAK

Start the engine.

Inspect the exhaust for leaks between the engine and the 1/1 O2 Sensor.

Inspect the exhaust for leaks between the engine and the 1/2 O2 Sensor.

Are there any exhaust leaks?

Yes >> Repair or replace the leaking exhaust parts as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. ENGINE MECHANICAL

Check the exhaust for excessive smoke caused by an internal problem in the engine.

Is an engine mechanical condition present?

Yes >> Repair the engine mechanical condition as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. AGING O2 SENSOR

A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set.

Review the vehicles repair history.

Has the rear O2 Sensor been replaced without replacing the front O2 Sensor?

Yes >> Replace the Front O2 Sensor as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

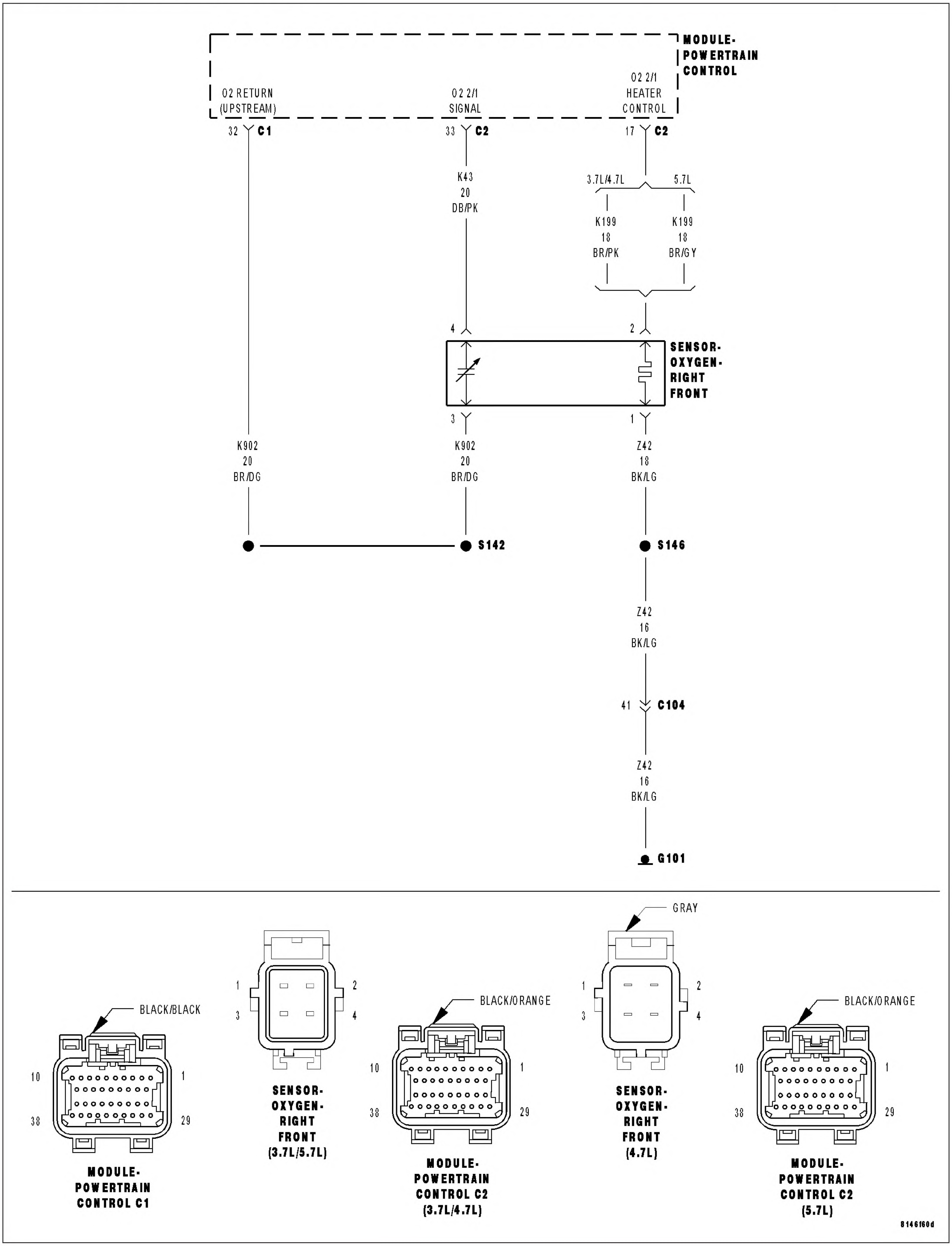
6. CATALYTIC CONVERTER

If there are no possible cause remaining, view repair.

Repair

Replace the Catalytic Converter.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0430-CATALYST 2/1 EFFICIENCY


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(UPSTREAM)
O2 2/1
SIGNAL
O2 2/1
HEATER
CONTROL
32 C1
33 C2
17 C2
K43
20
DB/PK
3.7L/4.7L
5.7L
K199
18
BR/PK
K199
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
FRONT
3
1
K902
20
BR/DG
K902
20
BR/DG
Z42
18
BK/LG
S142
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
FRONT
(3.7L/5.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
GRAY
SENSOR-
OXYGEN-
RIGHT
FRONT
(4.7L)
BLACK/ORANGE
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
8146f60d

P0430-CATALYST 2/1 EFFICIENCY (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The upstream O2 sensor is used to detect the amount of oxygen in the exhaust gas before the gas enters the catalytic converter. During the catalyst/O2 monitor test, the response rate (cycles/second) of the upstream O2 sensor determines the sensor's ability to achieve the tailpipe emissions limits. The response rate of the downstream O2 sensor relative to the upstream O2 sensor response rate measures the catalyst's ability to store oxygen and is used to infer the catalyst's ability to achieve the tailpipe emissions limits.

- **When Monitored:**
  After engine warm up to 147 deg. F, 180 seconds of open throttle operation, at a speed greater than 20 mph, with the engine at 1200-1700 rpm and MAP vacuum between 15.0 and 21.0 inches of mercury (Hg).
- **Set Condition:**
  As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
ENGINE MECHANICAL
AGING O2 SENSOR
CATALYTIC CONVERTER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the repair history of the vehicle before continuing.

NOTE: If an O2 Sensor DTC set along with the Catalytic Converter Efficiency DTC diagnose the O2 Sensor DTC(s) before continuing.

NOTE: Check for contaminants that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0430-CATALYST 2/1 EFFICIENCY (CONTINUED)

2. VISUALLY INSPECT CATALYTIC CONVERTER

Inspect the Catalytic Converter for the following damage.

Damaged Catalytic Converter, dents or holes.

Severe discoloration caused by overheating the Catalytic Converter.

Catalytic Converter broken internally.

Leaking Catalytic Converter.

Were any problems found?

Yes >> Replace the Catalytic Converter. Repair the condition that may have caused the failure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. EXHAUST LEAK

Start the engine.

Inspect the exhaust for leaks between the engine and the 2/1 O2 Sensor.

Inspect the exhaust for leaks between the engine and the 2/2 O2 Sensor.

Are there any exhaust leaks?

Yes >> Repair or replace the leaking exhaust parts as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. ENGINE MECHANICAL

Check the exhaust for excessive smoke caused by an internal problem in the engine.

Is an engine mechanical condition present?

Yes >> Repair the engine mechanical condition as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. AGING O2 SENSOR

A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set.

Review the vehicles repair history.

Has the rear O2 Sensor been replaced without replacing the front O2 Sensor?

Yes >> Replace the 2/1 O2 Sensor as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

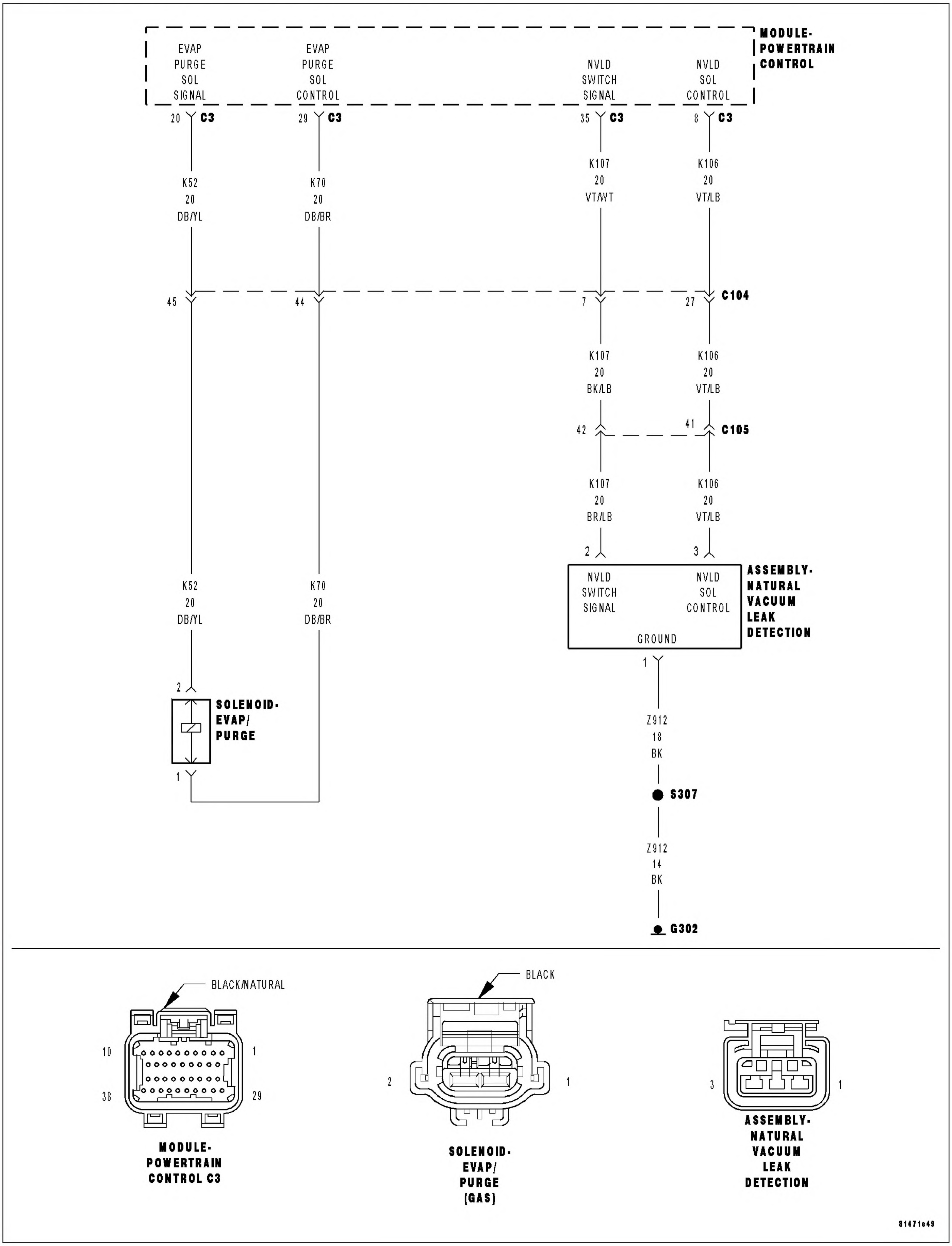
6. CATALYTIC CONVERTER

If there are no possible cause remaining, view repair.

Repair

Replace the Catalytic Converter.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0440-GENERAL EVAP SYSTEM FAILURE


MODULE-
POWERTRAIN
CONTROL
EVAP
PURGE
SOL
SIGNAL
EVAP
PURGE
SOL
CONTROL
NVLD
SWITCH
SIGNAL
NVLD
SOL
CONTROL
20 C3
29 C3
35 C3
8 C3
K52
20
DB/YL
K70
20
DB/BR
K107
20
VT/WT
K106
20
VT/LB
45
44
7
27
C104
K107
20
BK/LB
K106
20
VT/LB
42
41
C105
K107
20
BR/LB
K106
20
VT/LB
2
3
NVLD
SWITCH
SIGNAL
NVLD
SOL
CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
K52
20
DB/YL
K70
20
DB/BR
2
SOLENOID-
EVAP/
PURGE
1
1
Z912
18
BK
S307
Z912
14
BK
G302
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
BLACK
2
1
SOLENOID-
EVAP/
PURGE
(GAS)
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81471e49

P0440-GENERAL EVAP SYSTEM FAILURE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The theory behind the Natural Vacuum Leak Detection (NVLD) is adherence to the Ideal Gas Law. Pressure in a sealed vessel will change linearly as a function of the temperature of the gas in the vessel. Even small leaks will allow the pressure in the vessel to come to equilibrium with the atmospheric pressure. After key-off and a calibrated amount of time, cool down from operating temperatures or diurnal ambient temperature the system pressure will force the system to go negative or draw a vacuum if there is no leak. When the vacuum level reaches 1” H2O (0.25 KPA) the NVLD vacuum switch closes. This sends a signal to the NGC freezing a timer and registering a pass. If a switch closure is not detected an assessment of leak size will be made.

- **When Monitored:**
  Engine Running. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F).
- **Set Condition:**
  The PCM does not see the NVLD switch close during the medium/large leak test. The PCM then will increase the vacuum supply to the EVAP system by increasing flow through the EVAP Purge valve. If the switch does not close with an increase in vacuum an error is detected. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EVAP PURGE SOLENOID VACUUM SUPPLY
(Z42) GROUND CIRCUIT OPEN
(K107) NVLD SWITCH SIGNAL CIRCUIT OPEN
EVAPORATIVE EMISSION LEAK DETECTION
NVLD ASSEMBLY
EVAP PURGE SOLENOID
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0440.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0440-GENERAL EVAP SYSTEM FAILURE (CONTINUED)

2. VISUAL AND PHYSICAL INSPECTION

Turn the ignition off.

Perform a visual and physical inspection of the entire Evaporative Emission system.

Check for the following conditions:

- Hoses disconnected or left off
- Holes or cracks
- Loose seal points
- Evidence of damaged components
- Incorrect routing of hoses and tubes
- Fuel Cap left off or bad gasket seal

Were any of the above conditions found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. EVAP VACUUM SUPPLY HOSE INSPECTION

Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing.

Check for a pinched or plugged hose from the throttle body to the Purge Solenoid.

Make sure the vacuum port at the throttle body is free from any blockage.

Were any problems found?

Yes >> Repair the vacuum supply, hose/tube as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. CHECKING EVAP PURGE SOLENOID FUNCTIONALITY

Disconnect the vacuum supply hoses form the EVAP Purge Solenoid.

Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ side of the EVAP Purge Solenoid.

Ignition on, engine not running.

Observe the vacuum gauge.

With the scan tool, actuate the EVAP Purge Solenoid.

Does the vacuum drop when the solenoid is actuated?

Yes >> Go To 5

No >> Replace the Evap Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0440-GENERAL EVAP SYSTEM FAILURE (CONTINUED)

5. NVLD SWITCH OPERATION

Connect the previously disconnected vacuum hose.

Start the engine.

Allow the engine to idle.

Using the scan tool, perform the NVLD FORCED MONITOR TEST.

Monitor the NVLD Switch state.

NOTE: As the test runs, the NVLD Switch should go from an OPEN state to a CLOSED state and then return to OPEN when the test is complete.

Did the NVLD Switch operate as described above?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. VERIFY EVAPORATIVE EMISSION LEAK

To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD).

WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.

NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.

Connect the red power lead of EELD to the battery positive terminal and the black ground lead to battery negative terminal.

Block the vent hose of the EVAP Canister.

Connect shop air to the EELD.

Set the smoke/air control switch to AIR.

Insert the tester's AIR supply tip (clear hose) into the .040 orifice on the tester's control panel.

Press the remote smoke/air start button.

Position the red flag on the air flow meter so it is aligned with the indicator ball.

When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute.

Install the service port adapter #8404-14 on the vehicle's service port (if equipped) or install the #8404-ADP into the filter line.

Connect the Air supply hose from the EELD to the service port (if equipped) or to the #8404-ADP adapter.

Press the remote button to activate AIR flow.

Compare the flow meter indicator ball reading to the red flag.

ABOVE the red flag indicates a leak present.

BELOW the red flag indicates a sealed system.

Is the indicator ball above the red flag?

Yes >> Go To 7

No >> Go To 8

P0440-GENERAL EVAP SYSTEM FAILURE (CONTINUED)

7. EVAPORATIVE EMISSION LEAK DETECTION

NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.

To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD).

Remove the Air supply hose from the service port or the #8404-ADP adapter.

Connect the SMOKE supply tip (black hose) to the service port (if equipped) or to the #8404-ADP adapter.

Set the smoke/air control switch to SMOKE.

NOTE: The flow meter indicator ball will not move at this point.

Press the remote smoke/air start button.

NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.

NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.

While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke.

If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultra-violet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that are left behind by the smoke.

The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.

NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke or dye may or may not be visible. Introducing smoke into the filtered side of the canister may assist in locating the leak.

Was a leak found?

Yes >> Repair or replace the leaking component as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P0440-GENERAL EVAP SYSTEM FAILURE (CONTINUED)

8. NVLD ASSEMBLY

Turn the ignition off.

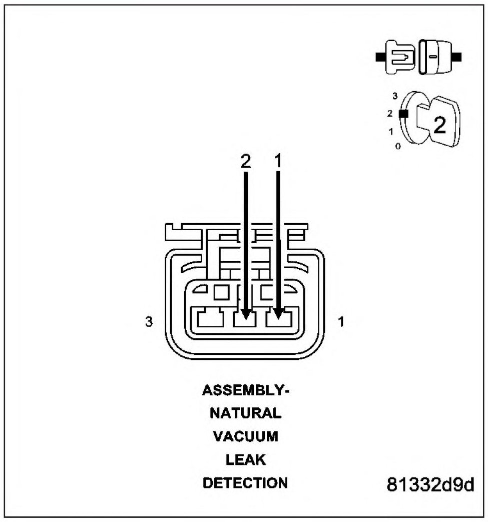
Disconnect the NVLD electrical harness connector.

Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

Connect a jumper wire between the (K107) NVLD Switch Signal circuit and the (Z42) Ground circuit in the NVLD electrical harness connector.

Monitor the NVLD Switch state on the scan tool.


3
2
1
0
2
2 1
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81332d9d

Does the Switch change from OPEN to CLOSED when the jumper wire is installed?

Yes >> Replace the NVLD Assembly.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ POWERTRAIN CONTROL MODULE - DIAGNOSIS AND TESTING)

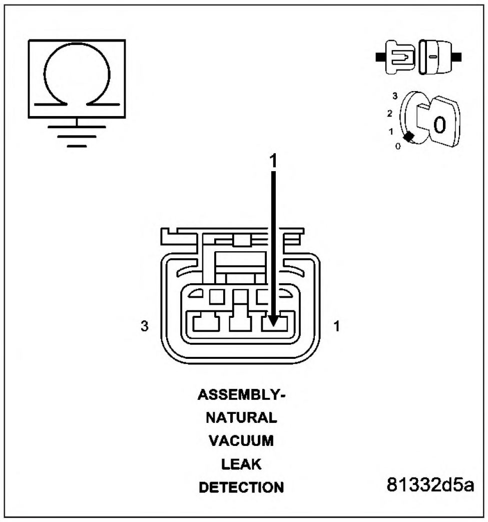
No >> Go To 9

NOTE: Remove the jumper wire before continuing.

9. (Z42) GROUND CIRCUIT OPEN

Turn the ignition off.

Measure the resistance between the (Z42) Ground circuit and ground.


Ω
3
2
1
0
0
1
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81332d5a

Is the resistance below 5.0 ohms?

Yes >> Go To 10

No >> Repair the open in the (Z42) Ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE).

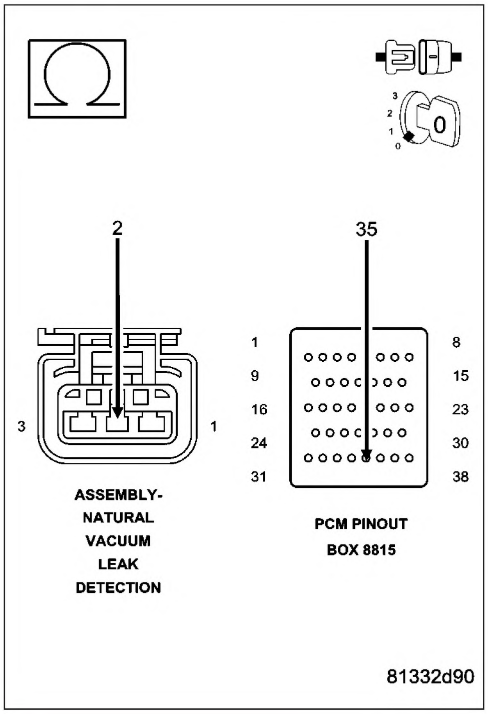
P0440-GENERAL EVAP SYSTEM FAILURE (CONTINUED)

10. (K107) NVLD SWITCH SIGNAL CIRCUIT OPEN

Disconnect the PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K107) NVLD Switch Signal circuit from the NVLD electrical harness connector to the appropriate terminal of the special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 11

No >> Repair the open in the (K107) Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

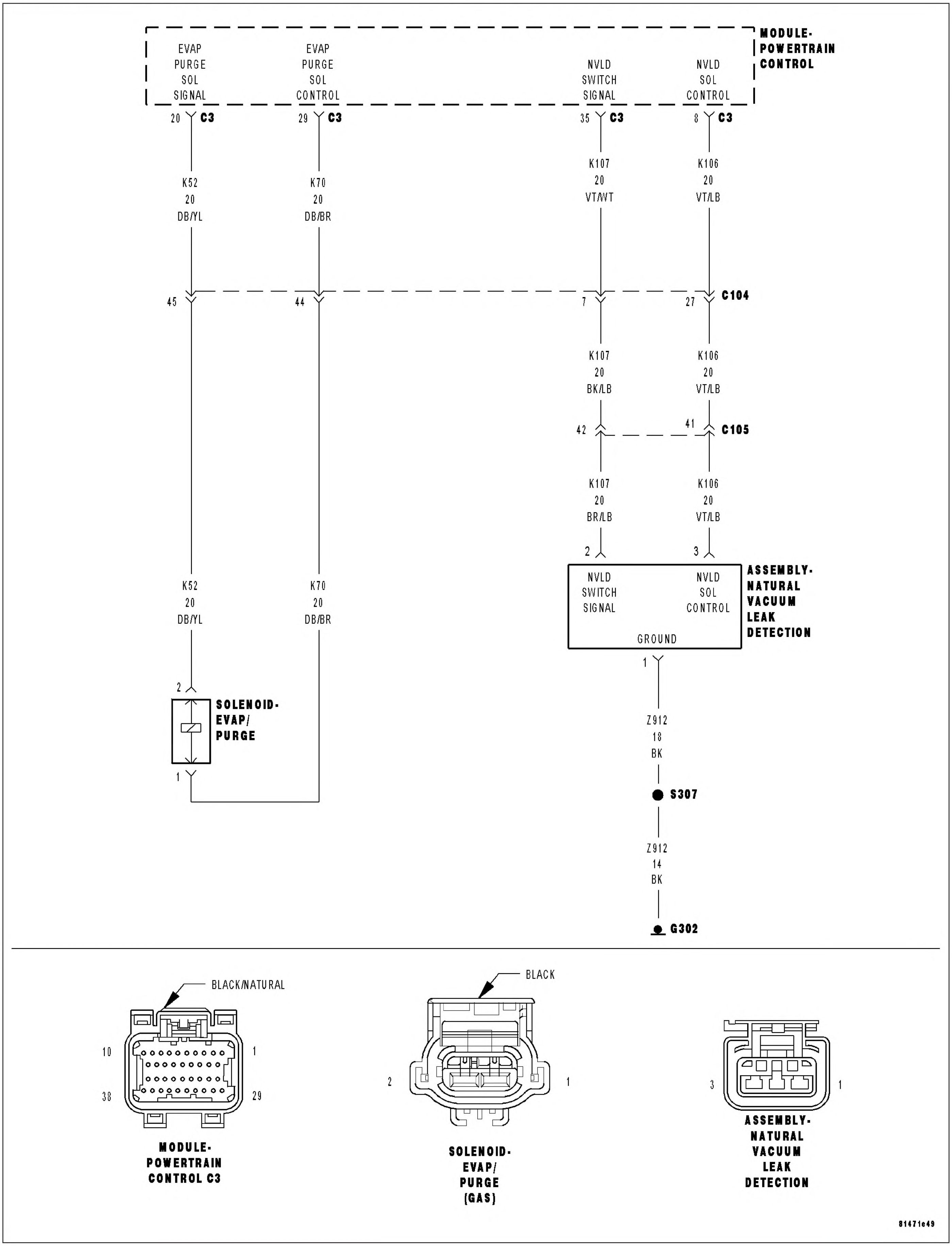
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0441-EVAP PURGE SYSTEM PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K52 20 DB/YL
K70 20 DB/BR
K107 20 VT/WT
K106 20 VT/LB
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
1
Z912 18 BK
S307
Z912 14 BK
G302
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
BLACK
2
1
SOLENOID-
EVAP/
PURGE
(GAS)
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81471e49

P0441-EVAP PURGE SYSTEM PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Cold start test. Engine Running. Small Leak Test Passed.
- **Set Condition:**
  The PCM activates the EVAP Purge solenoid gradually increases to maximum flow. During flow, the PCM looks for the NVLD switch to close. If the PCM does not see the NVLD switch close at maximum flow an error is detected. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EVAP PURGE SOLENOID VACUUM SUPPLY
EVAP PURGE SOLENOID

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: If any of the following DTCs are set (P0443, P0452, P0453, P0498 or P0499) diagnose them first before continuing with P0441.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. CHECKING EVAP PURGE SOLENOID FUNCTIONALITY

NOTE: After disconnecting the Evap Purge vacuum connections, inspect the lines and solenoid for any signs of contamination or foreign materials.

Using a hand vacuum pump, apply 10 in Hg to ″CAN″ side of the EVAP Purge Solenoid.

Ignition on, engine not running.

Observe the vacuum gauge.

With the scan tool, actuate the EVAP Purge Solenoid.

Does the vacuum drop when the solenoid is actuated?

Yes >> Go To 3

No >> Replace the Evap Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Remove the vacuum pump before continuing.

P0441-EVAP PURGE SYSTEM PERFORMANCE (CONTINUED)

3. EVAP VACUUM SUPPLY HOSE INSPECTION

Turn the ignition off.

Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing.

Check for a pinched or plugged hose from the throttle body to the Purge Solenoid.

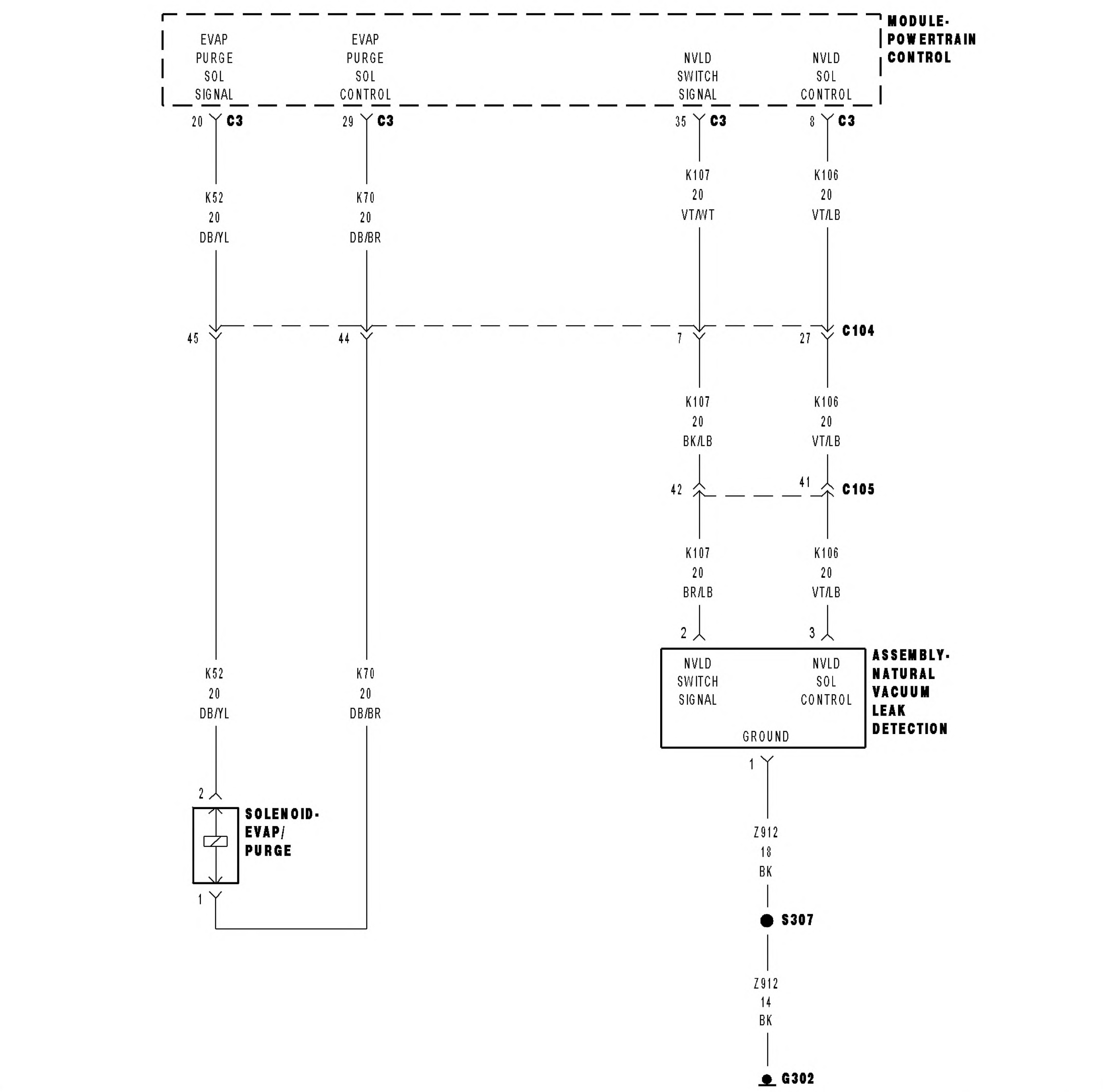
Inspect the vacuum port at the throttle body for any damage or plugging.

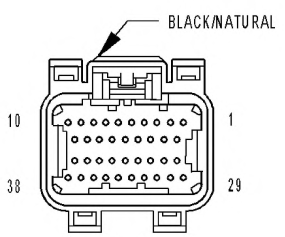
Were any problems found?

Yes >> Repair the vacuum supply hose/tube as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

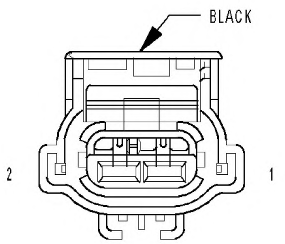
No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0443-EVAP PURGE SOLENOID CIRCUIT

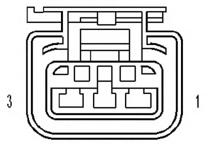

MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K52 20 DB/YL
K70 20 DB/BR
K107 20 VT/WT
K106 20 VT/LB
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
1
Z912 18 BK
S307
Z912 14 BK
G302
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1


BLACK/NATURAL
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C3



SOLENOID-
EVAP/
PURGE
(GAS)



ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION

81471e49

P0443-EVAP PURGE SOLENOID CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The ignition on or engine running. Battery voltage greater than 10 volts.
- **Set Condition:**
  The PCM will set a trouble code if the actual state of the solenoid does not match the intended state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K52) EVAP PURGE CONTROL CIRCUIT OPEN
(K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
(K70) EVAP PURGE SOLENOID SIGNAL CIRCUIT OPEN
(K70) EVAP PURGE SOLENOID SIGNAL CIRCUIT SHORTED TO GROUND
EVAP PURGE SOLENOID
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With the scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EVAP PURGE SOLENOID OPERATION

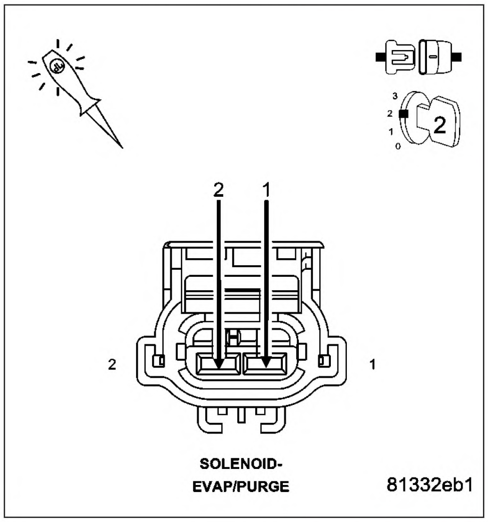
Turn the ignition off.

Disconnect the EVAP Purge Solenoid harness connector.

Ignition on, engine not running.

Using a 12-volt test light, jump across the (K52) Evap Purge Solenoid Control circuit and (K70) Evap Purge Solenoid Signal circuit in the EVAP Purge Solenoid harness connector.

With a scan tool, actuate the EVAP Purge Solenoid.



Does the test light flash on and off?

Yes >> Replace the EVAP Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0443-EVAP PURGE SOLENOID CIRCUIT (CONTINUED)

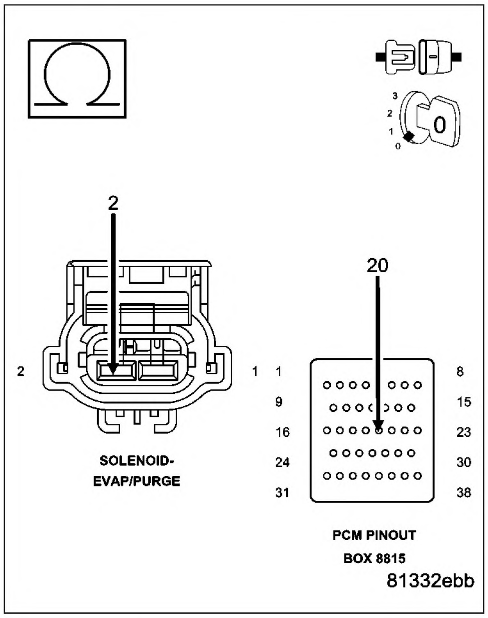
3. (K52) EVAP PURGE SOLENOID CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K52) Evap Purge Solenoid Control circuit from the Evap Purge Solenoid harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 4

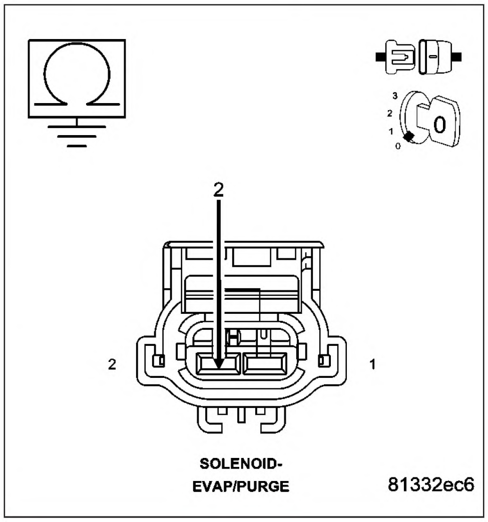
No >> Repair the open in the (K52) EVAP Purge Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K52) Evap Purge Solenoid Control circuit in the Evap Purge Solenoid harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K52) EVAP Purge Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

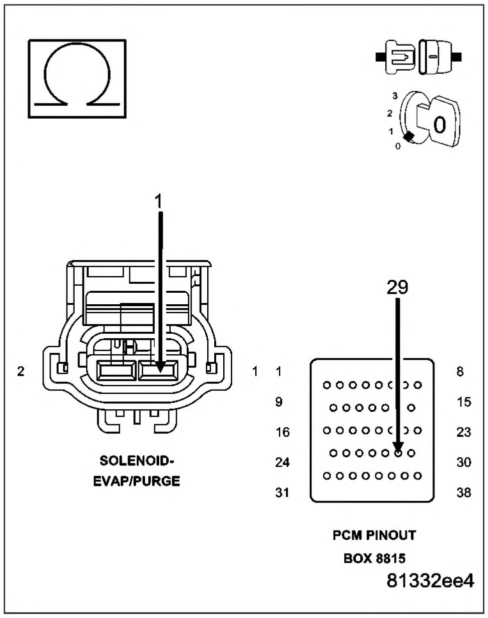
No >> Go To 5

P0443-EVAP PURGE SOLENOID CIRCUIT (CONTINUED)

5. (K70) EVAP PURGE SOLENOID SIGNAL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K70) Evap Purge Solenoid Signal circuit from the EVAP Purge Solenoid harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
1
29
2
1
1
8
9
15
16
23
24
30
31
38
SOLENOID-
EVAP/PURGE
PCM PINOUT
BOX 8815
81332ee4

Is the resistance below 5.0 ohms?

Yes >> Go To 6

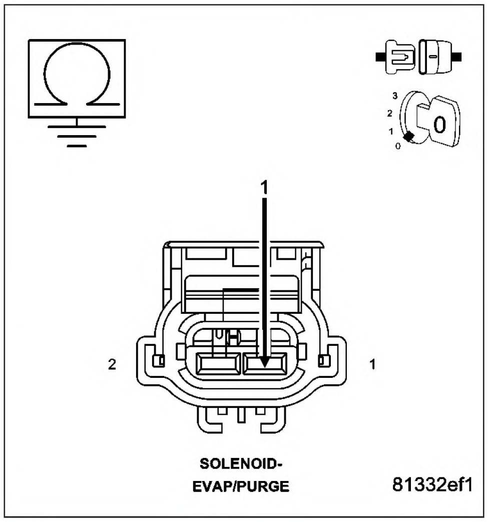
No >> Repair the open in the (K70) Evap Purge Solenoid Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (K70) EVAP PURGE SOLENOID SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K70) Evap Purge Solenoid Signal circuit in the Evap Purge Solenoid harness connector.


3
2
1
0
0
1
2
1
SOLENOID-
EVAP/PURGE
81332ef1

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K70) Evap Purge Solenoid Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0443-EVAP PURGE SOLENOID CIRCUIT (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

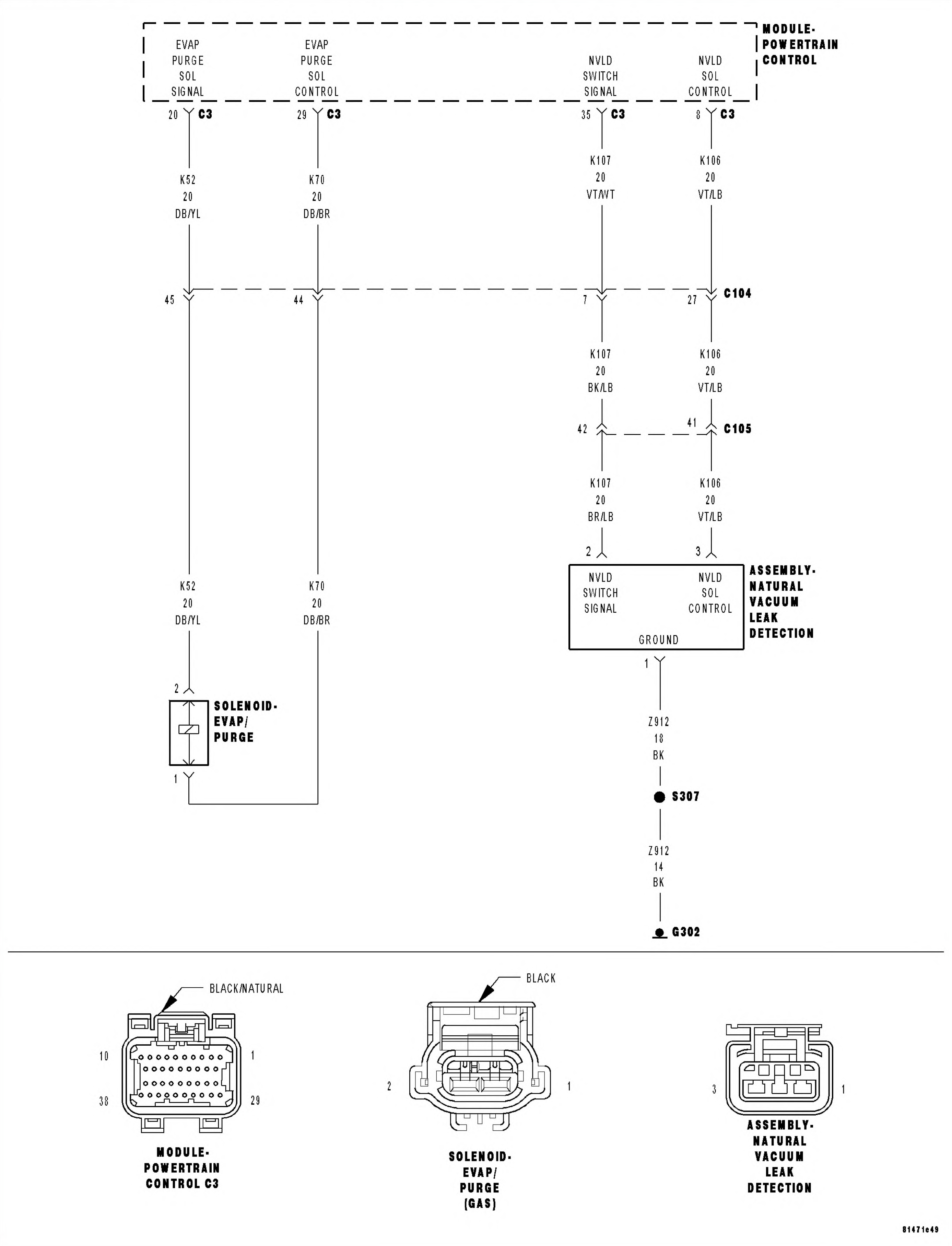
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0452-NVLD PRESSURE SWITCH STUCK CLOSED


MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K52 20 DB/YL
K70 20 DB/BR
K107 20 VT/WT
K106 20 VT/LB
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1
1
Z912 18 BK
S307
Z912 14 BK
G302
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
BLACK
2
1
SOLENOID-
EVAP/
PURGE
(GAS)
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81471e49

P0452-NVLD PRESSURE SWITCH STUCK CLOSED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Immediately after the engine has been started.
- **Set Condition:**
  The PCM activates the NLVD Solenoid. If PCM does not see NVLD switch open an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
NVLD ASSEMBLY
EVAP PURGE SOLENOID
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. EVAP PURGE SOLENOID OPERATION

Turn the ignition off.

Disconnect the EVAP Purge Solenoid harness connector.

Ignition on, engine not running.

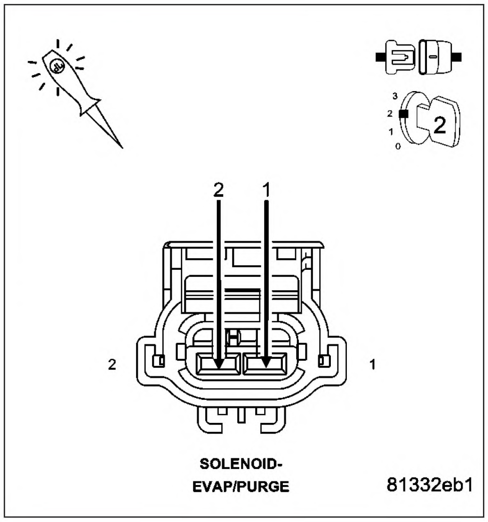
Using a 12-volt test light, jump across the Evap Purge Solenoid harness connector.

With the scan tool, actuate the EVAP Purge Solenoid.

Does the test light flash on and off?

Yes >> Go To 3

No >> Go To 7



P0452-NVLD PRESSURE SWITCH STUCK CLOSED (CONTINUED)

3. EVAP PURGE SOLENOID LEAKS/STUCK OPEN

Turn the ignition off.

Connect the Evap Purge Solenoid harness connector.

Disconnect the vacuum hoses at the Evap Purge Solenoid.

NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty check valve. Replace/repair as necessary.

Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ of the EVAP Purge Solenoid.

NOTE: Monitor the vacuum gauge for at least 15 seconds.

Does the EVAP Purge Solenoid hold vacuum?

Yes >> Go To 4

No >> Replace the Evap Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. NVLD SWITCH OPERATION

Ignition on, engine not running.

Using the scan tool, monitor the NVLD Switch State with the vacuum pump still installed and holding vacuum.

Does the scan tool display the NVLD state OPEN?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the vacuum pump and connect the vacuum hose before continuing.

---

5. NVLD ASSEMBLY

Disconnect the NVLD electrical connector.

Does the Switch change from CLOSED to OPEN?

Yes >> Replace the NVLD Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

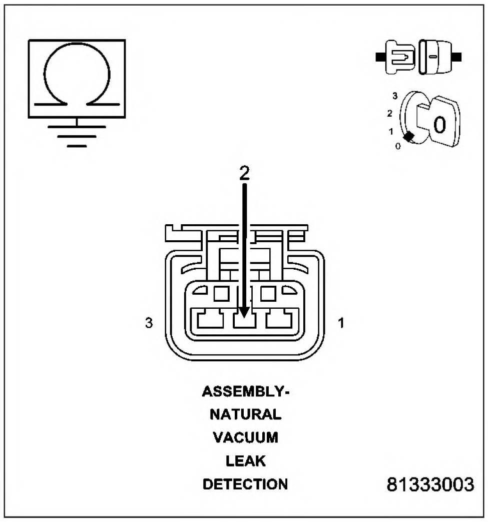
P0452-NVLD PRESSURE SWITCH STUCK CLOSED (CONTINUED)

6. (K107) SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K107) NVLD Switch Signal circuit in the NVLD Assembly harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K107) NVLD Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

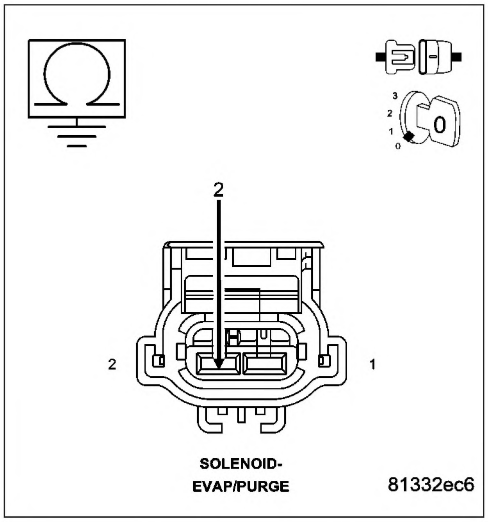
---

7. (K52) EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K52) Evap Purge Solenoid Control circuit in the EVAP Purge Solenoid harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K52) Evap Purge Sol Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

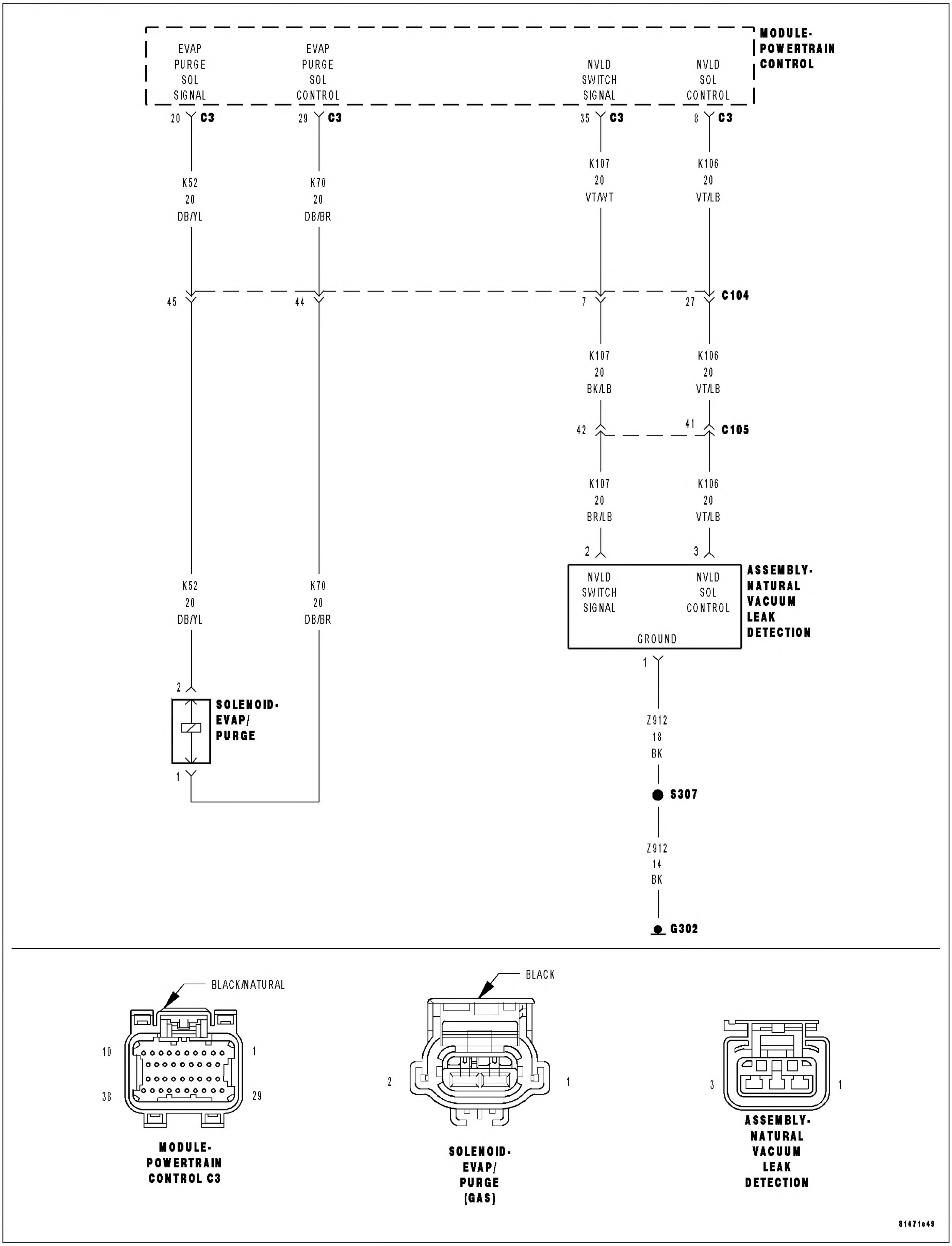
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0453-NVLD PRESSURE SWITCH STUCK OPEN


MODULE-
POWERTRAIN
CONTROL
EVAP
PURGE
SOL
SIGNAL
EVAP
PURGE
SOL
CONTROL
NVLD
SWITCH
SIGNAL
NVLD
SOL
CONTROL
20 C3
29 C3
35 C3
8 C3
K52
20
DB/YL
K70
20
DB/BR
K107
20
VT/WT
K106
20
VT/LB
45
44
7
27
C104
K107
20
BK/LB
K106
20
VT/LB
42
41
C105
K107
20
BR/LB
K106
20
VT/LB
2
3
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
NVLD
SWITCH
SIGNAL
NVLD
SOL
CONTROL
GROUND
1
Z912
18
BK
S307
Z912
14
BK
G302
K52
20
DB/YL
K70
20
DB/BR
2
SOLENOID-
EVAP/
PURGE
1
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
BLACK
2
1
SOLENOID-
EVAP/
PURGE
(GAS)
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81471e49

P0453-NVLD PRESSURE SWITCH STUCK OPEN (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  If the PCM does not see the NVLD switch close during test an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K107) NVLD SWITCH SIGNAL CIRCUIT OPEN
(K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO THE (K106) NVLD SOLENOID CONTROL CIRCUIT
(Z42) GROUND CIRCUIT OPEN
NVLD ASSEMBLY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. NVLD SWITCH OPERATION

Start the engine.

Allow the engine to idle.

Using a scan tool, perform the NVLD FORCED MONITOR TEST.

Monitor the NVLD Switch state.

NOTE: As the test runs, the NVLD Switch should go from an OPEN state to a CLOSED state and then return to OPEN when the test is complete.

Did the NVLD Switch operate as described above?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

P0453-NVLD PRESSURE SWITCH STUCK OPEN (CONTINUED)

2. NVLD ASSEMBLY

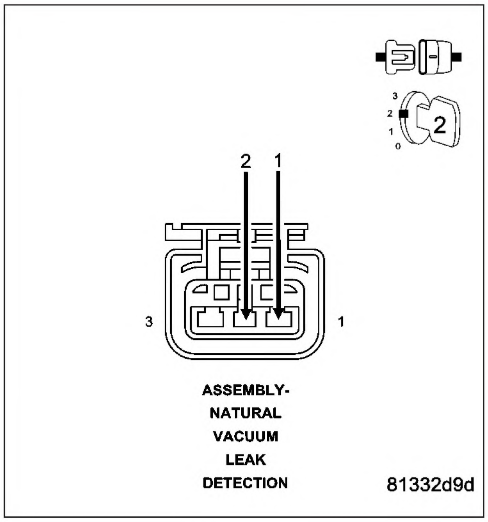
Turn the ignition off.

Disconnect the NVLD electrical harness connector.

Ignition on, engine not running.

Monitor the NVLD Switch state on the scan tool.

Connect a jumper wire between the (K107) NVLD Switch Signal circuit and the (Z42) Ground circuit in the NVLD harness connector.


2
1
3
1
3
2
1
0
2
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81332d9d

Does the Switch change from OPEN to CLOSED with the jumper wire installed?

Yes >> Replace the NVLD Assembly.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.

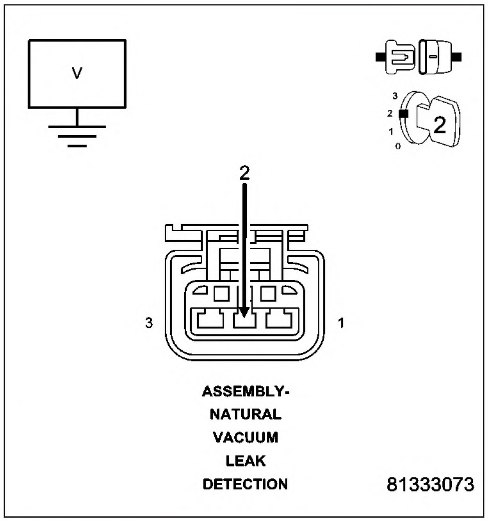
3. (K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K107) NVLD Switch Signal circuit in the NVLD electrical harness connector.


V
2
3
1
3
2
1
0
2
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81333073

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K107) NVLD Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P0453-NVLD PRESSURE SWITCH STUCK OPEN (CONTINUED)

4. (K107) NVLD SWITCH SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

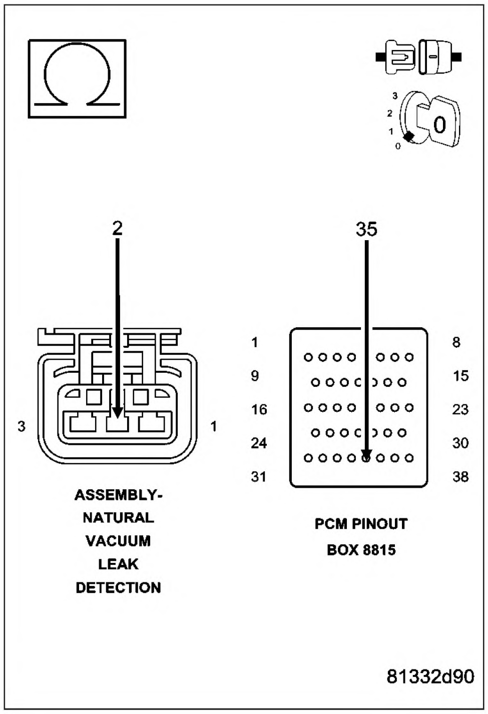
Measure the resistance of the (K107) NVLD Switch Signal circuit from the NVLD electrical harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (K107) NVLD Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


2
35
3
1
1
9
16
24
31
8
15
23
30
38
ASSEMBLY-NATURAL VACUUM LEAK DETECTION
PCM PINOUT BOX 8815
81332d90

---

5. (K107) NVLD SWITCH SIGNAL CIRCUIT SHORTED TO THE (K106) NVLD SOLENOID CONTROL CIRCUIT

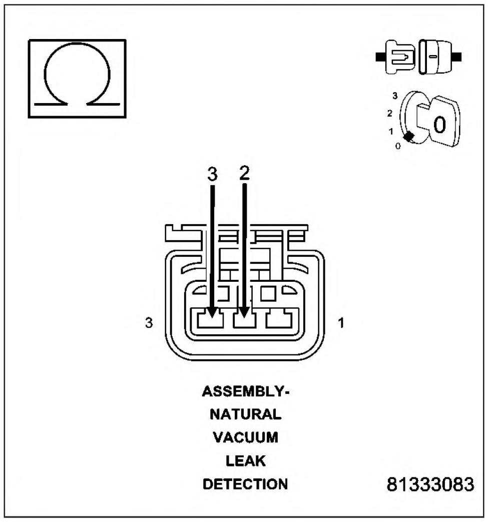
Measure the resistance between the (K107) NVLD Switch Signal circuit and the (K106) NVLD Solenoid Control circuit in the NVLD electrical harness connector.

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K107) NVLD Switch Signal circuit and the (K106) NVLD Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

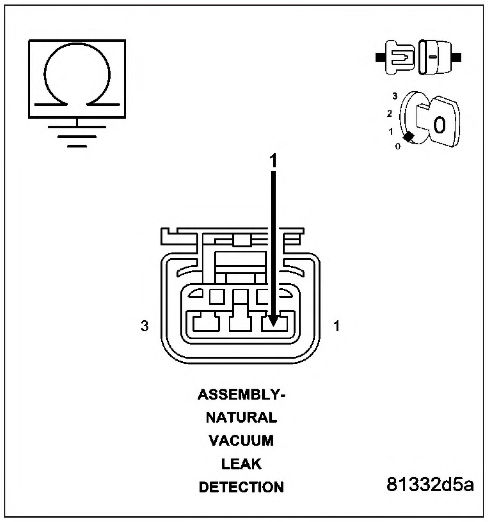
No >> Go To 6


3 2
3
1
ASSEMBLY-NATURAL VACUUM LEAK DETECTION
81333083

P0453-NVLD PRESSURE SWITCH STUCK OPEN (CONTINUED)

6. (Z42) GROUND CIRCUIT OPEN

Measure the resistance between the (Z42) Ground circuit and ground.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (Z42) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

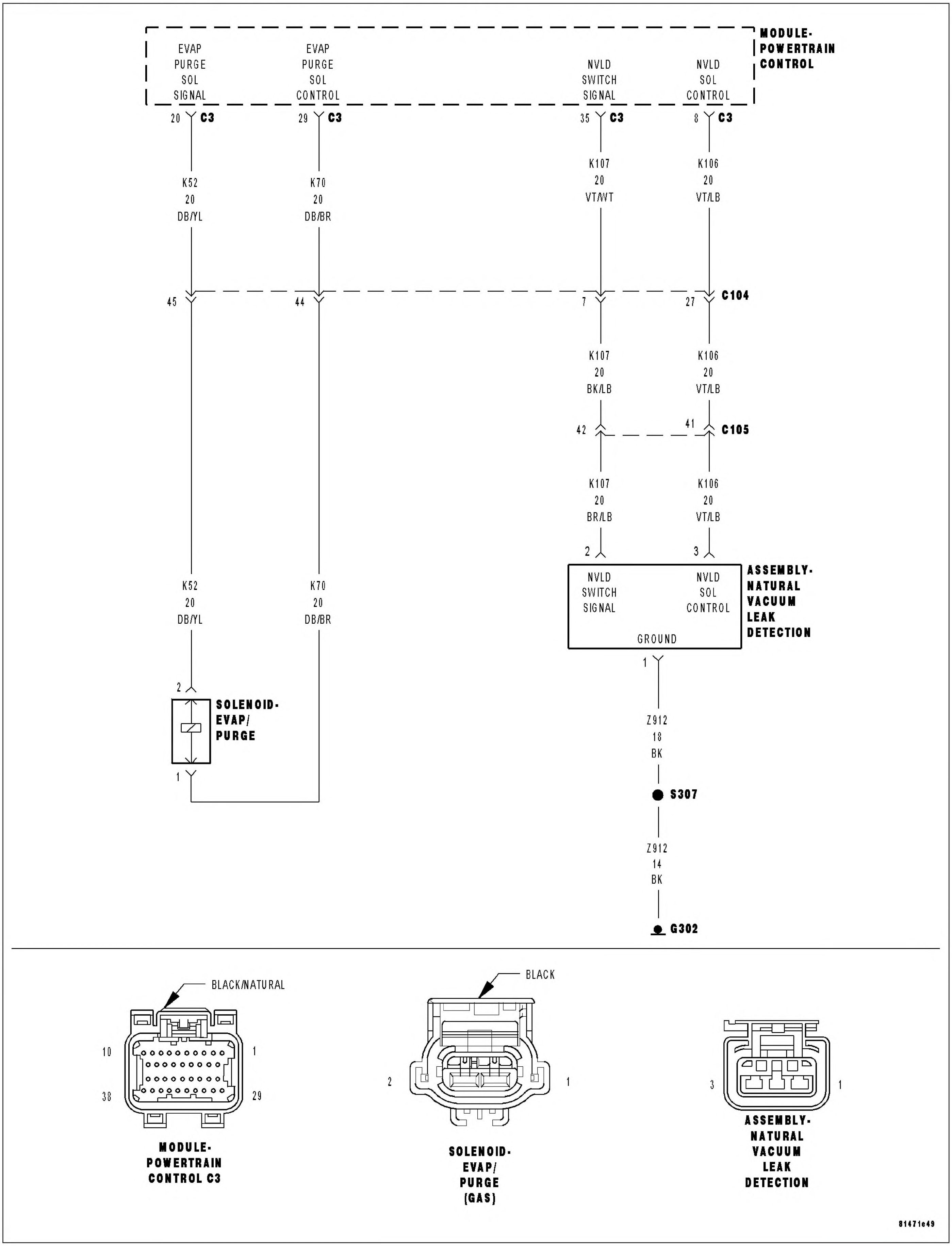
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0455-EVAP PURGE SYSTEM LARGE LEAK


MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K52 20 DB/YL
K70 20 DB/BR
K107 20 VT/WT
K106 20 VT/LB
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1
1
Z912 18 BK
S307
Z912 14 BK
G302
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
BLACK
2
1
SOLENOID-
EVAP/
PURGE
(GAS)
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81471e49

P0455-EVAP PURGE SYSTEM LARGE LEAK (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The theory behind the Natural Vacuum Leak Detection (NVLD) is adherence to the Ideal Gas Law. Pressure in a sealed vessel will change linearly as a function of the temperature of the gas in the vessel. Even small leaks will allow the pressure in the vessel to come to equilibrium with the atmospheric pressure. After key-off and a calibrated amount of time, cool down from operating temperatures or diurnal ambient temperature the system pressure will force the system to go negative or draw a vacuum if there is no leak. When the vacuum level reaches 1” H2O (0.25 KPA) the NVLD vacuum switch closes. This sends a signal to the NGC freezing a timer and registering a pass. If a switch closure is not detected an assessment of leak size will be made.

- **When Monitored:**
  Engine Running. Cold start test. Fuel Level greater than 12%. Ambient Temperature between 4°C and 32°C (39°F and 89°F) Close Loop fuel system. Test runs when small leak test is maturing.
- **Set Condition:**
  The PCM activates the EVAP Purge Solenoid to pull the EVAP system into a vacuum to close the NVLD switch. Once the NVLD switch is closed, the PCM turns the EVAP Purge solenoid off to seal the EVAP system. If the NVLD switch reopens before the calibrated amount of time for a Large leak an error is detected. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EVAP PURGE SYSTEM LEAK
EVAP PURGE SOLENOID
NVLD SWITCH

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Check for any related TSBs before continuing.

NOTE: Since a hot vehicle can conceal a leak, it is best to perform this test at room temperature.

NOTE: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Make sure the gas cap meets OEM specifications.

Ignition on, engine not running.

With a scan tool, read DTCs and record the related Freeze Frame data.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0455-EVAP PURGE SYSTEM LARGE LEAK (CONTINUED)

2. VISUAL AND PHYSICAL INSPECTION

Perform a visual and physical inspection of the entire Evaporative Emission system.

Check for the follow conditions:

- Holes or cracks
- Loose seal points
- Evidence of damaged components
- Incorrect routing of hoses and tubes
- Fuel Cap gasket seal

Were any of the above conditions found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. VERIFY EVAPORATIVE EMISSION LEAK

To continue testing you will need Miller Tool #8404A Evaporative Emission Leak Detector (EELD).

WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.

NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.

Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal.

Block the vent hose of the canister if using the service port.

Connect shop air to the EELD.

Set the smoke/air control switch to AIR.

Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size).

Press the remote smoke/air start button.

Position the red flag on the air flow meter so it is aligned with the indicator ball.

When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute to the size leak indicated by the DTC set in the PCM.

Install the service port adapter #8404-14 on the vehicle's service port and block the vent hose of the EVAP Canister (if equipped) or install the #8404-ADP service adaptor into the filter line.

Connect the Air supply hose from the EELD to the service port (if equipped) or to the #8404-ADP adapter.

Press the remote button to activate AIR flow.

NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill.

Compare the flow meter indicator ball reading to the red flag.

ABOVE the red flag indicates a leak present.

BELOW the red flag indicates a sealed system.

Is the indicator ball above the red flag?

Yes >> Go To 4

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0455-EVAP PURGE SYSTEM LARGE LEAK (CONTINUED)

4. EVAPORATIVE EMISSION LEAK DETECTION

NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.

To continue testing, you will need Miller Tool #8404A Evaporative Emissions Leak Detector (EELD).

Remove the Air supply hose from the service port (if equipped) or from the #8404-ADP adapter.

Connect the SMOKE supply tip (black hose) to the service port (if equipped) or to the #8404-ADP adapter.

Set the smoke/air control switch to SMOKE.

NOTE: The flow meter indicator ball will not move in the smoke mode.

Press the remote smoke/air start button.

NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.

NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.

While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke.

If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultra-violet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke.

The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.

NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke may not be as thick. Introducing smoke into the filtered side of the canister may assist in locating the leak.

Was a leak found?

Yes >> Repair or replace the leaking component as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. EVAP PURGE SOLENOID OPERATION

NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty check valve. Replace/repair as necessary.

Turn the ignition off.

Disconnect the vacuum hoses at the Evap Purge Solenoid.

Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ of the EVAP Purge Solenoid.

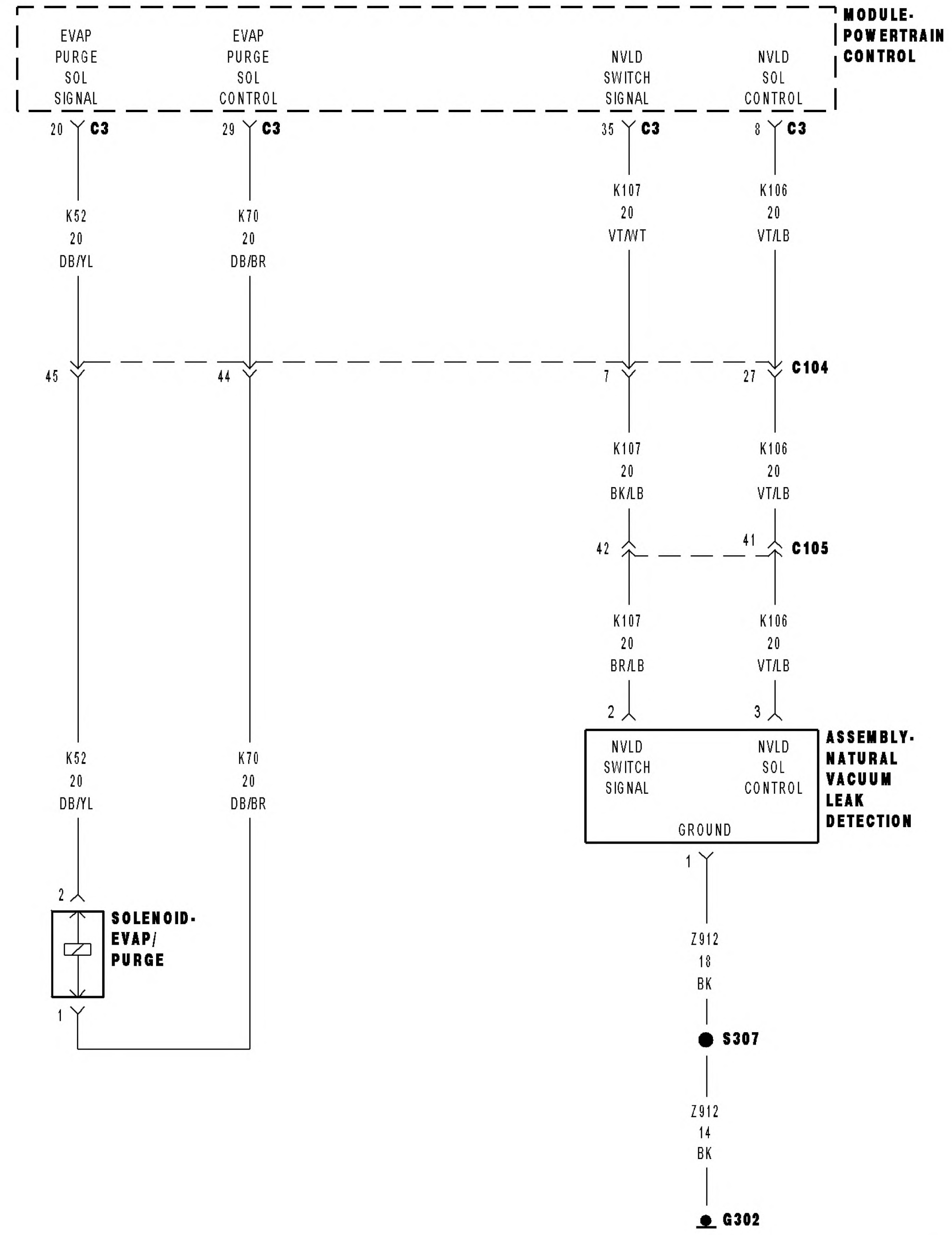
NOTE: Monitor the vacuum gauge for at least 15 seconds.

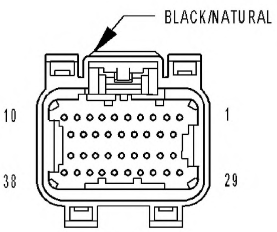
Does the EVAP Purge Solenoid hold vacuum?

Yes >> Test Complete.

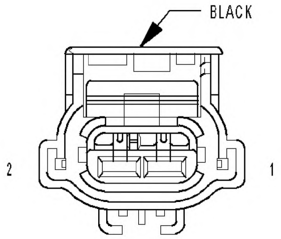
No >> Replace the Evap Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0456-EVAP PURGE SYSTEM SMALL LEAK

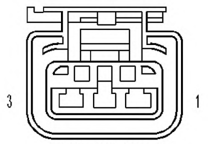

MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K52 20 DB/YL
K70 20 DB/BR
K107 20 VT/WT
K106 20 VT/LB
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1
1
Z912 18 BK
S307
Z912 14 BK
G302


BLACK/NATURAL
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C3**



**SOLENOID-
EVAP/
PURGE
(GAS)**



**ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION**

81471e49

P0456-EVAP PURGE SYSTEM SMALL LEAK (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The theory behind the Natural Vacuum Leak Detection (NVLD) is adherence to the Ideal Gas Law. Pressure in a sealed vessel will change linearly as a function of the temperature of the gas in the vessel. Even small leaks will allow the pressure in the vessel to come to equilibrium with the atmospheric pressure. After key-off and a calibrated amount of time, cool down from operating temperatures or diurnal ambient temperature the system pressure will force the system to go negative or draw a vacuum if there is no leak. When the vacuum level reaches 1” H2O (0.25 KPA) the NVLD vacuum switch closes. This sends a signal to the NGC freezing a timer and registering a pass. If a switch closure is not detected an assessment of leak size will be made.

- **When Monitored:**
  Ignition off. Fuel Level less than 88%. Ambient Temperature between 4°C and 43°C (39°F and 109°F) Close Loop fuel system.
- **Set Condition:**
  Due to temperature changes, a vacuum is created in the fuel tank and EVAP system. With the EVAP system sealed, the PCM monitors the NVLD switch. If the NVLD switch does not close within a calibrated time allowance, an error is detected by the PCM. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EVAP PURGE SYSTEM LEAK
EVAP PURGE SOLENOID

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Since a hot vehicle can conceal a leak, it is best to perform this test at room temperature.

NOTE: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Make sure the gas cap meets OEM specifications.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0456-EVAP PURGE SYSTEM SMALL LEAK (CONTINUED)

2. VISUAL AND PHYSICAL INSPECTION

Perform a visual and physical inspection of the entire Evaporative Emission system.

Check for the follow conditions:

- Holes or cracks
- Loose seal points
- Evidence of damaged components
- Incorrect routing of hoses and tubes
- Fuel Cap gasket seal

Were any of the above conditions found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. VERIFY EVAPORATIVE EMISSION LEAK

To continue testing you will need Miller Tool #8404A Evaporative Emission Leak Detector (EELD).

WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.

NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.

Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal.

Block the vent hose of the canister if using the service port.

Connect shop air to the EELD.

Set the smoke/air control switch to AIR.

Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size).

Press the remote smoke/air start button.

Position the red flag on the air flow meter so it is aligned with the indicator ball.

When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute to the size leak indicated by the DTC set in the PCM.

Install the service port adapter #8404-14 on the vehicle's service port and block the vent hose of the EVAP Canister (if equipped) or install the #8404-ADP service adaptor into the filter line.

Connect the Air supply hose from the EELD to the service port (if equipped) or to the #8404-ADP adapter.

Press the remote button to activate AIR flow.

NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill.

Compare the flow meter indicator ball reading to the red flag.

ABOVE the red flag indicates a leak present.

BELOW the red flag indicates a sealed system.

Is the indicator ball above the red flag?

Yes >> Go To 4

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0456-EVAP PURGE SYSTEM SMALL LEAK (CONTINUED)

4. EVAPORATIVE EMISSION LEAK DETECTION

NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may also aid diagnosis.

To continue testing, you will need Miller Tool #8404A Evaporative Emissions Leak Detector (EELD).

Remove the Air supply hose from the service port (if equipped) or from the #8404-ADP adapter.

Connect the SMOKE supply tip (black hose) to the service port (if equipped) or to the #8404-ADP adapter.

Set the smoke/air control switch to SMOKE.

NOTE: The flow meter indicator ball will not move in the smoke mode.

Press the remote smoke/air start button.

NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.

NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.

While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke.

If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke.

The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.

NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke may not be as thick. Introducing smoke into the filtered side of the canister may assist in locating the leak.

Was a leak found?

Yes >> Repair or replace the leaking component as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. EVAP PURGE SOLENOID OPERATION

NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty check valve. Replace/repair as necessary.

Turn the ignition off.

Disconnect the vacuum hoses at the Evap Purge Solenoid.

Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ of the EVAP Purge Solenoid.

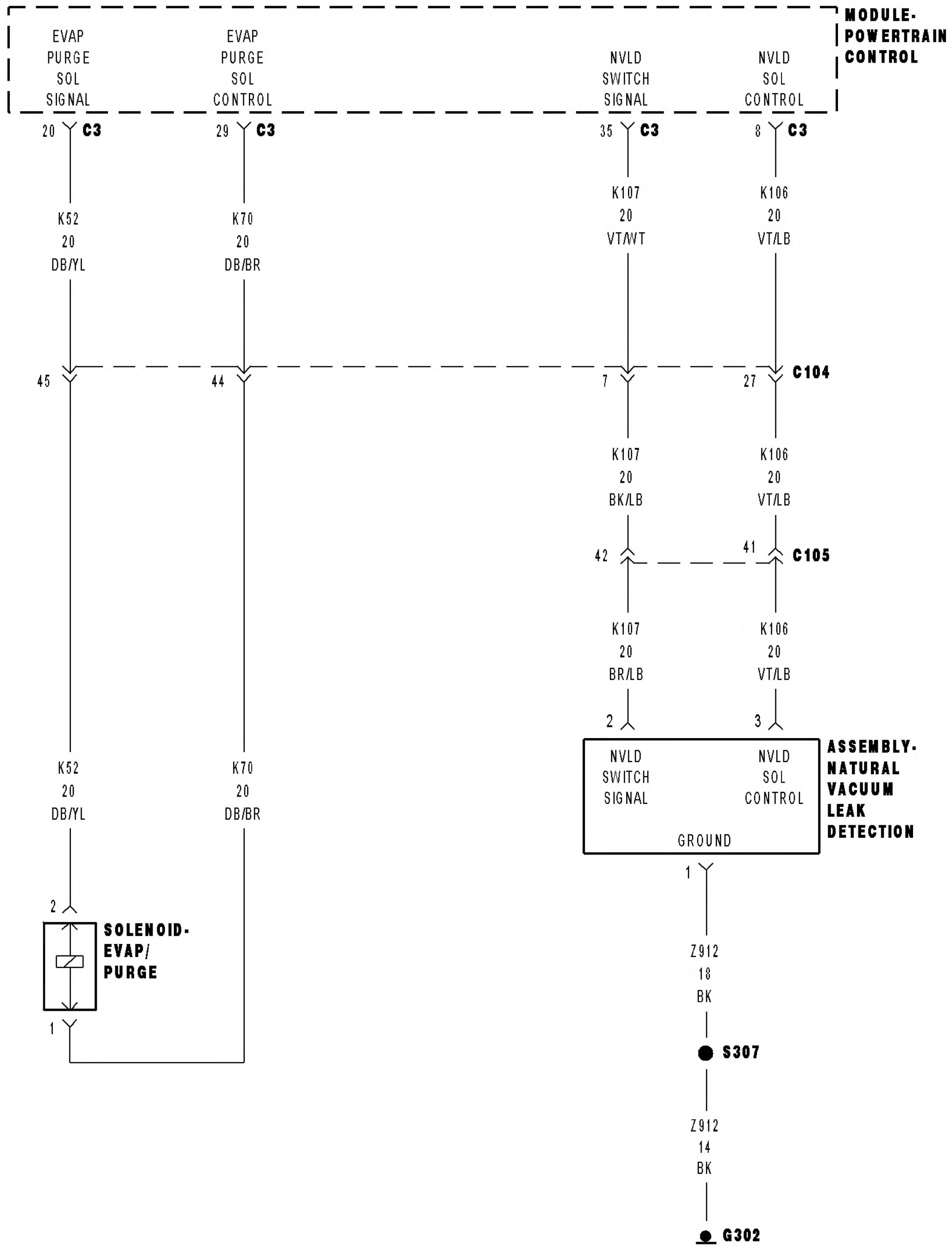
NOTE: Monitor the vacuum gauge for at least 15 seconds.

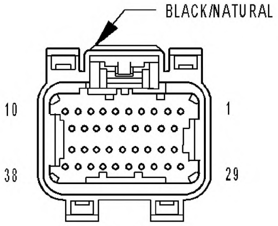
Does the EVAP Purge Solenoid hold vacuum?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

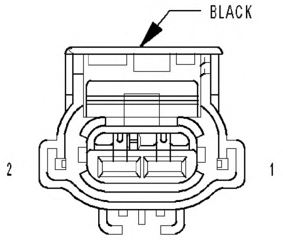
No >> Replace the Evap Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0457-LOOSE FUEL CAP

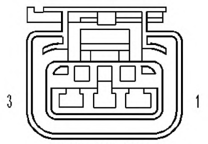

MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K52 20 DB/YL
K70 20 DB/BR
K107 20 VT/WT
K106 20 VT/LB
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1
1
Z912 18 BK
S307
Z912 14 BK
G302


BLACK/NATURAL
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C3



SOLENOID-
EVAP/
PURGE
(GAS)



ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION

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P0457-LOOSE FUEL CAP (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

Fuel level is recorded when the ignition key is turned off and is compared to the fuel level when the ignition key is turned back on. The PCM recognizes an increase in fuel level and will fail the Medium leak test because the fuel cap is broken or not installed properly. GAS CAP will be displayed in odometer to inform the owner that the cap is off of loose.

- **When Monitored:**
  Ignition on. Ambient Temperature between 4°C and 32°C (39°F and 89°F) Close Loop fuel system. Test runs after the medium leak test is inconclusive and the PCM has senses a fuel increase.
- **Set Condition:**
  The PCM activates the EVAP Purge Solenoid to pull the EVAP system into a vacuum to close the NVLD switch. Once the NVLD switch is closed, the PCM turns the EVAP Purge Solenoid off to seal the EVAP system. If the NVLD switch reopens before the calibrated amount of time after a fuel tank fill, an error is detected. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
LOOSE OR MISSING FUEL CAP
FUEL FILL CAP
EVAP PURGE SYSTEM MEDIUM LEAK

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) .

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. LOOSE OR MISSING FUEL FILL CAP

Inspect the fuel fill cap.

Inspect the cap for any abnormal defects.

Was the cap off, missing, or broken?

Yes >> Properly install the fuel fill cap and proceed to step 3.

No >> Go To 4

P0457-LOOSE FUEL CAP (CONTINUED)

3. NVLD SERVICE TEST

With the scan tool perform the NVLD Service Test.

Does the NVLD Service Test pass?

Yes >> Test complete.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. VERIFY EVAPORATIVE EMISSION LEAK

To continue testing you will need Miller Tool #8404A Evaporative Emission Leak Detector (EELD).

WARNING: Keep lit cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.

NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.

Connect the red power lead of the EELD to the battery positive terminal and the black ground lead to battery negative terminal.

Block the vent hose of the canister if using the service port.

Connect shop air to the EELD.

Set the smoke/air control switch to AIR.

Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size).

Press the remote smoke/air start button.

Position the red flag on the air flow meter so it is aligned with the indicator ball.

When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute to the size leak indicated by the DTC set in the PCM.

Install the service port adapter #8404-14 on the vehicle's service port and block the vent hose of the EVAP Canister (if equipped) or install the #8404-ADP service adaptor into the filter line.

Connect the Air supply hose from the EELD to the service port (if equipped) or to the #8404-ADP adapter.

Press the remote button to activate AIR flow.

NOTE: Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill.

Compare the flow meter indicator ball reading to the red flag.

ABOVE the red flag indicates a leak present.

BELOW the red flag indicates a sealed system.

Is the indicator ball above the red flag?

Yes >> Go To 5

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0457-LOOSE FUEL CAP (CONTINUED)

5. EVAPORATIVE EMISSION LEAK DETECTION

NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may also aid diagnosis.

To continue testing, you will need Miller Tool #8404A Evaporative Emissions Leak Detector (EELD).

Remove the Air supply hose from the service port (if equipped) or from the #8404-ADP adapter.

Connect the SMOKE supply tip (black hose) to the service port (if equipped) or to the #8404-ADP adapter.

Set the smoke/air control switch to SMOKE.

NOTE: The flow meter indicator ball will not move in the smoke mode.

Press the remote smoke/air start button.

NOTE: Make sure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.

NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.

While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke.

If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultra-violet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke.

The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light.

NOTE: Carefully inspect the vent side of the EVAP Canister. Due to the filtering system in the canister the smoke may not be as thick. Introducing smoke into the filtered side of the canister may assist in locating the leak.

Was a leak found?

Yes >> Repair or replace the leaking component as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. EVAP PURGE SOLENOID OPERATION

NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty check valve. Replace/repair as necessary.

Turn the ignition off.

Disconnect the vacuum hoses at the Evap Purge Solenoid.

Using a hand vacuum pump, apply 10 in Hg to the ″CAN″ of the EVAP Purge Solenoid.

NOTE: Monitor the vacuum gauge for at least 15 seconds.

Does the EVAP Purge Solenoid hold vacuum?

Yes >> Go To 7.

No >> Replace the Evap Purge Solenoid.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0457-LOOSE FUEL CAP (CONTINUED)

7. NVLD SWITCH OPERATION

Reconnect all vacuum hoses.

Start the engine.

Allow the engine to idle.

Using the scan tool, perform the NVLD FORCED MONITOR TEST.

Monitor the NVLD Switch.

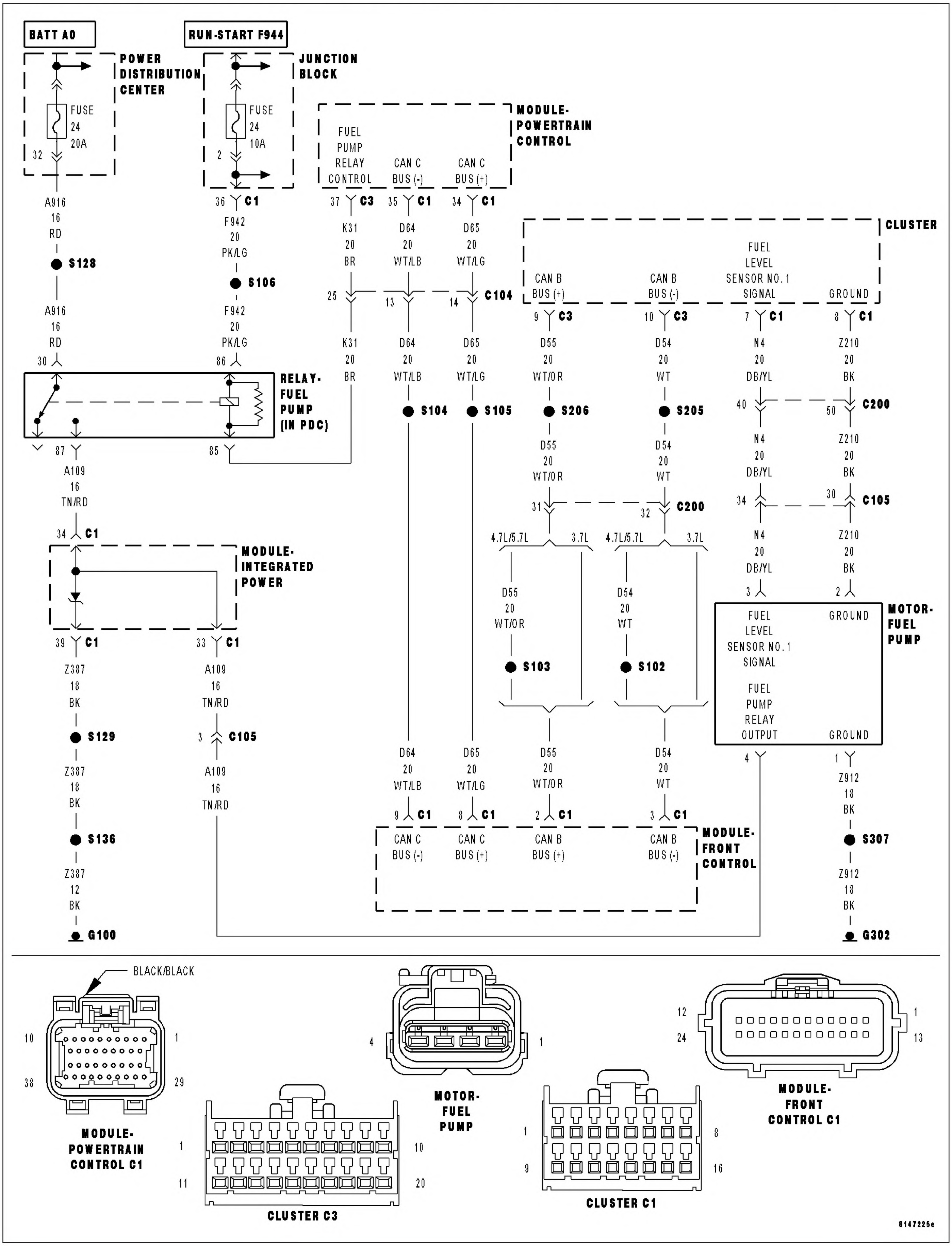
NOTE: As the test runs, the NVLD Switch should go from an OPEN state to CLOSED. After the vacuum is released form the EVAP system the Switch state will return to OPEN.

Did the NVLD Switch operate as described above?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)

No >> Replace the NVLD Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0461-FUEL LEVEL SENSOR 1 PERFORMANCE


BATT A0
RUN-START F944
POWER DISTRIBUTION CENTER
FUSE 24 20A
32
JUNCTION BLOCK
FUSE 24 10A
2
MODULE-POWERTRAIN CONTROL
FUEL PUMP RELAY CONTROL
CAN C BUS (-)
CAN C BUS (+)
A916 16 RD
36 C1
37 C3
35 C1
34 C1
F942 20 PK/LG
K31 20 BR
D64 20 WT/LB
D65 20 WT/LG
S128
S106
25
13
14
C104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
FUEL LEVEL SENSOR NO. 1 SIGNAL
GROUND
9 C3
10 C3
7 C1
8 C1
D55 20 WT/OR
D54 20 WT
N4 20 DB/YL
Z210 20 BK
30
86
RELAY-FUEL PUMP (IN PDC)
87
85
S104
S105
S206
S205
40
50
C200
A109 16 TN/RD
31
32
34
30
C105
34 C1
4.7L/5.7L
3.7L
MODULE-INTEGRATED POWER
3
2
MOTOR-FUEL PUMP
FUEL LEVEL SENSOR NO. 1 SIGNAL
GROUND
FUEL PUMP RELAY OUTPUT
GROUND
S103
S102
39 C1
33 C1
Z387 18 BK
S129
3 C105
4
1
Z912 18 BK
9 C1
8 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (-)
CAN C BUS (+)
CAN B BUS (+)
CAN B BUS (-)
S136
S307
Z387 12 BK
G100
G302
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
4
1
MOTOR-FUEL PUMP
12
1
24
13
MODULE-FRONT CONTROL C1
1
10
11
20
CLUSTER C3
1
8
9
16
CLUSTER C1
8147225e

P0461-FUEL LEVEL SENSOR 1 PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The fuel level rationality will set a fault for a fuel level reading that does not change over an accumulated mileage threshold to keep stuck high or stuck low fuel levels from disabling OBD monitors. If the vehicle is fitted with a saddle tank fuel system this feature includes diagnostics for both of the sending units and diagnostics for a siphon tube that has become disconnected or plugged. The power up test looks to see a large enough fuel level voltage change from the last key-off to the following engine run. The engine run test looks to see a fuel level voltage change over an accumulated mileage.

- **When Monitored:**
  TEST No.1: With the ignition on, the fuel level is compared to the previous key down after a 20 second delay. TEST No.2: The PCM monitors the fuel level at ignition on.
- **Set Condition:**
  TEST No.1: If the PCM does not see a difference in fuel level of greater than 0.1 volt the test will fail. TEST No.2: If the PCM does not see a change in the fuel level of .1765 over a set amount of miles the test will fail. Three good trips to turn off the MIL.

Possible Causes
(N4) FUEL LEVEL SIGNAL CIRCUIT OPEN
(N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO GROUND
GROUND CIRCUIT OPEN
(A109) FUSED B+ CIRCUIT
FUEL TANK
FUEL LEVEL SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Diagnose any CAN - C or CAN - B Communication DTCs before continuing.

NOTE: Diagnose P0462 or P0463 first, if set along with P0461.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. VISUALLY INSPECT FUEL TANK

Visually inspect the Fuel Tank for damage that may restrict the Fuel Sending Unit float from moving.

Is the Fuel Tank OK?

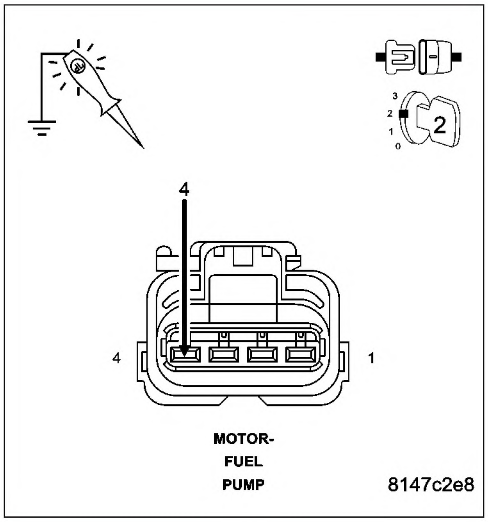
Yes >> Go To 3

No >> Replace the Fuel Tank as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0461-FUEL LEVEL SENSOR 1 PERFORMANCE (CONTINUED)

3. (A109) FUSED B+ CIRCUIT

Using a 12-volt test light connected to ground, probe the (A109) Fused B+ circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

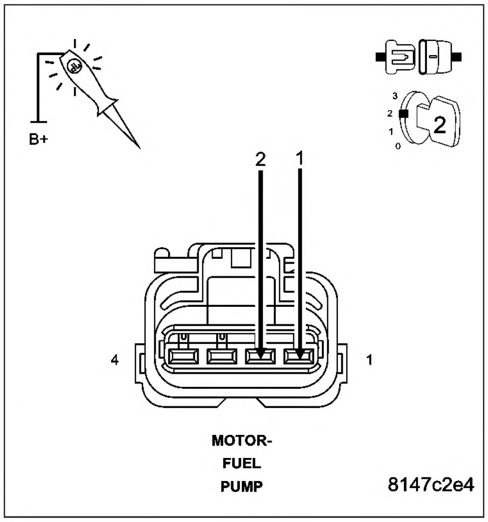
No >> Repair the open or short to ground in the (A109) Fused B+ circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (Z912), (Z210) GROUND CIRCUITS

Using a 12-volt test light connected to B+, probe the (Z912) and (Z210) Ground circuits.



Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the open in the (Z912) and (Z210) Ground circuits.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0461-FUEL LEVEL SENSOR 1 PERFORMANCE (CONTINUED)

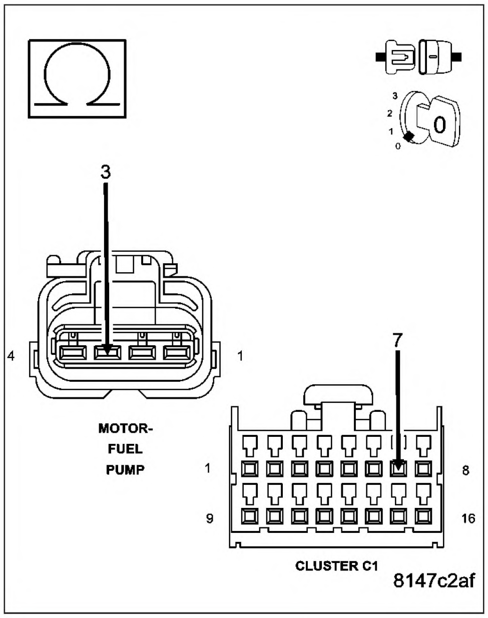
5. (N4) FUEL LEVEL SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the Fuel Pump Module harness connector.

Disconnect the C1 Cluster harness connector.

Measure the resistance of the (N4) Fuel Level Signal circuit from the Fuel Pump Module harness connector to the C1 Cluster harness connector.



Is the resistance below 5.0 ohms?

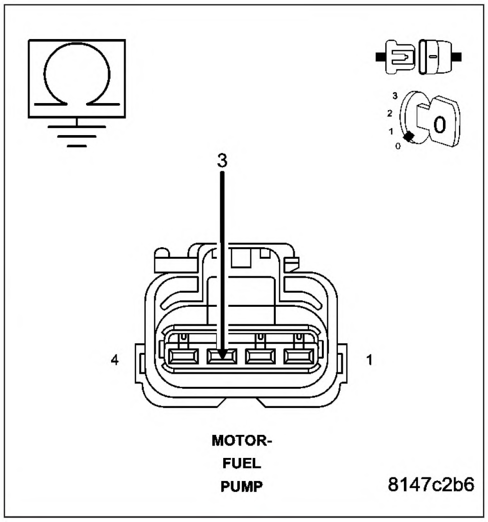
Yes >> Go To 6

No >> Repair the open in the (N4) Fuel Level Signal circuit.
Perform BODY VERIFICATION TEST-VER 1.

---

6. (N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (N4) Fuel Level Signal circuit in the Fuel Pump Module harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (N4) Fuel Level Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0461-FUEL LEVEL SENSOR 1 PERFORMANCE (CONTINUED)

7. INTERNAL INSPECTION OF THE FUEL TANK

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Tank per Service Information.

Remove the Fuel Pump Module.

Visually inspect the inside of the Fuel Tank for any obstructions or deformities.

Inspect the Fuel Pump Module Float arm for damage.

Were any problems found?

Yes >> Repair or replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

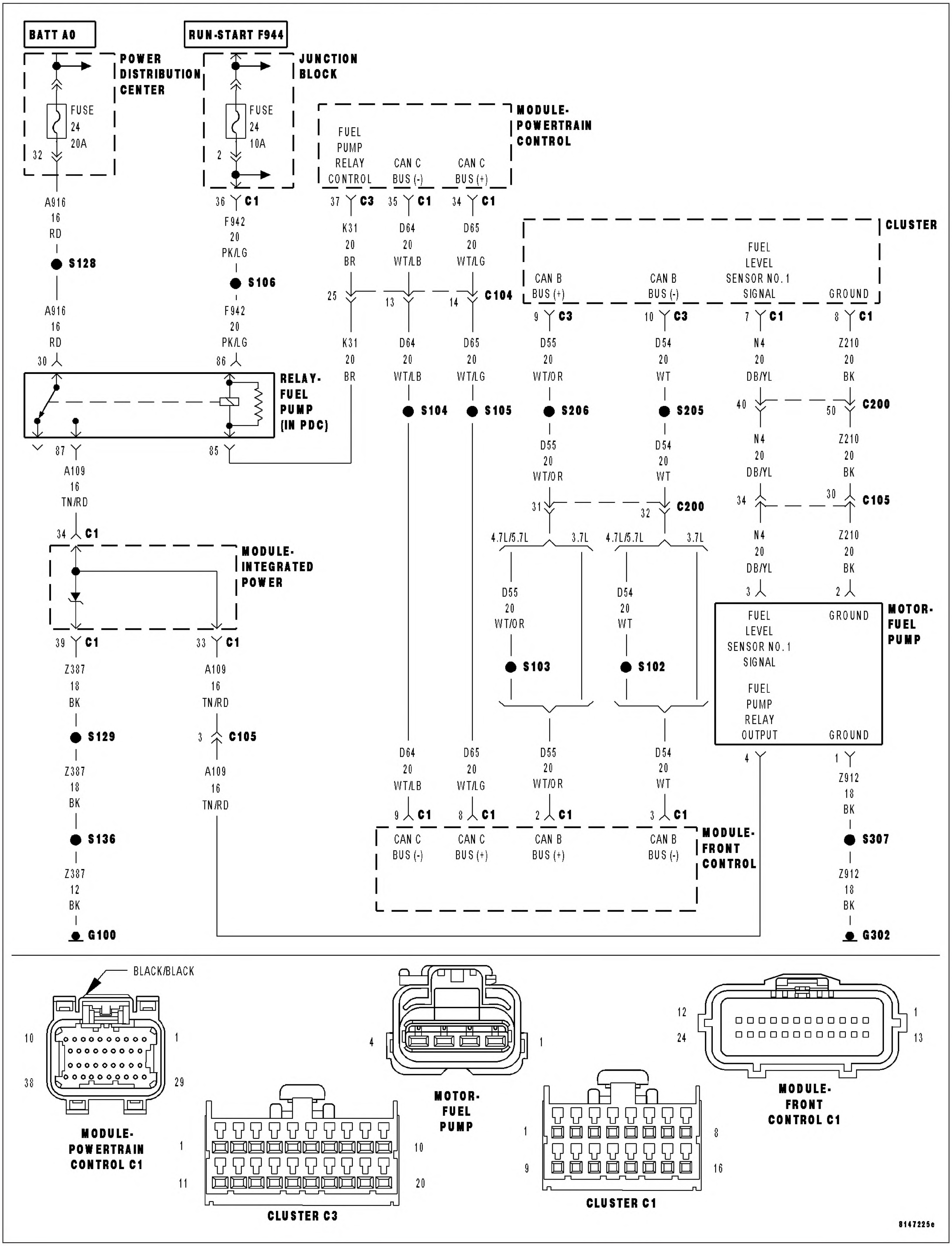
8. FUEL LEVEL SENSOR

If there are no possible causes remaining, view repair.

Repair

Replace the Fuel Level Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0462-FUEL LEVEL SENSOR 1 CIRCUIT LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 24 20A
32
RUN-START F944
JUNCTION BLOCK
FUSE 24 10A
2
MODULE-POWERTRAIN CONTROL
FUEL PUMP RELAY CONTROL
CAN C BUS (-)
CAN C BUS (+)
A916 16 RD
36 C1
37 C3
35 C1
34 C1
F942 20 PK/LG
K31 20 BR
D64 20 WT/LB
D65 20 WT/LG
S128
S106
25
13
14
C104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
FUEL LEVEL SENSOR NO. 1 SIGNAL
GROUND
9 C3
10 C3
7 C1
8 C1
A916 16 RD
F942 20 PK/LG
K31 20 BR
D64 20 WT/LB
D65 20 WT/LG
D55 20 WT/OR
D54 20 WT
N4 20 DB/YL
Z210 20 BK
30
86
RELAY-FUEL PUMP (IN PDC)
S104
S105
S206
S205
40
50
C200
87
85
A109 16 TN/RD
D55 20 WT/OR
D54 20 WT
N4 20 DB/YL
Z210 20 BK
31
32
C200
34
30
C105
34 C1
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
N4 20 DB/YL
Z210 20 BK
MODULE-INTEGRATED POWER
D55 20 WT/OR
D54 20 WT
3
2
MOTOR-FUEL PUMP
FUEL LEVEL SENSOR NO. 1 SIGNAL
GROUND
FUEL PUMP RELAY OUTPUT
GROUND
S103
S102
39 C1
33 C1
Z387 18 BK
A109 16 TN/RD
S129
3 C105
Z387 18 BK
A109 16 TN/RD
D64 20 WT/LB
D65 20 WT/LG
D55 20 WT/OR
D54 20 WT
4
1
Z912 18 BK
9 C1
8 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (-)
CAN C BUS (+)
CAN B BUS (+)
CAN B BUS (-)
S136
S307
Z387 12 BK
Z912 18 BK
G100
G302
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
4
1
MOTOR-FUEL PUMP
12
24
1
13
MODULE-FRONT CONTROL C1
1
10
11
20
CLUSTER C3
1
8
9
16
CLUSTER C1
8147225e

P0462-FUEL LEVEL SENSOR 1 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage above 10.4 volts.
- **Set Condition:**
  The fuel level sensor signal voltage goes below 0.4 of a volt for more than 90 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO GROUND
(N4) FUEL LEVEL SIGNAL CIRCUIT OPEN
(A109 FUSED B+ CIRCUIT
FUEL LEVEL SENSOR
INSTRUMENT CLUSTER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

Diagnostic Test

1. FUEL LEVEL SENSOR VOLTAGE BELOW 0.4 OF A VOLT

NOTE: Diagnose any CAN - B or CAN -C Communication DTCs before continuing.

Ignition on, engine not running.

With the scan tool, read the Fuel Level Sensor voltage.

Is the Fuel Level Sensor voltage below 0.4 of a volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

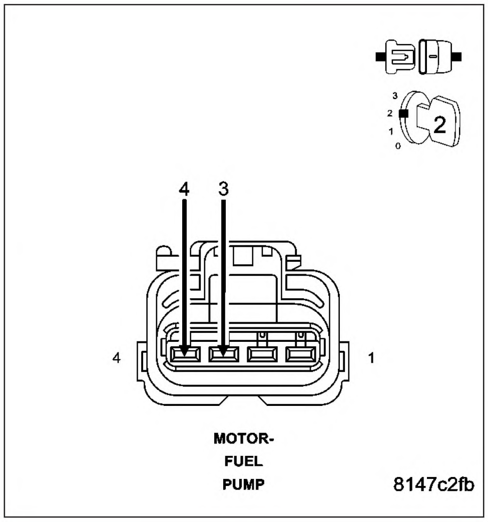
2. FUEL LEVEL SENSOR

Turn the ignition off.

Disconnect the Fuel Pump Module harness connector.

Ignition on, engine not running.

Using a fused jumper wire, jump the (A109) Fused B+ circuit to the (N4) Fuel Level Sensor No.1 Signal circuit in the Fuel Pump Motor harness connector.



Did the Fuel gauge level change from empty to full?

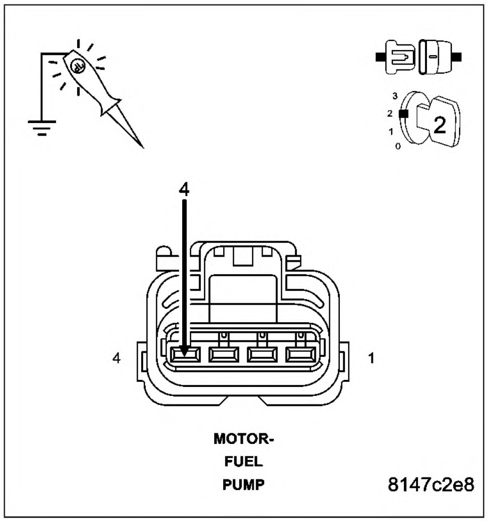
Yes >> Replace the Fuel Level Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0462-FUEL LEVEL SENSOR 1 CIRCUIT LOW (CONTINUED)

3. (A109) FUSED B+ CIRCUIT

Using a 12-volt test light connected to ground, probe the (A109) Fused B+ circuit.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open or short to ground in the (A109) Fused B+ circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

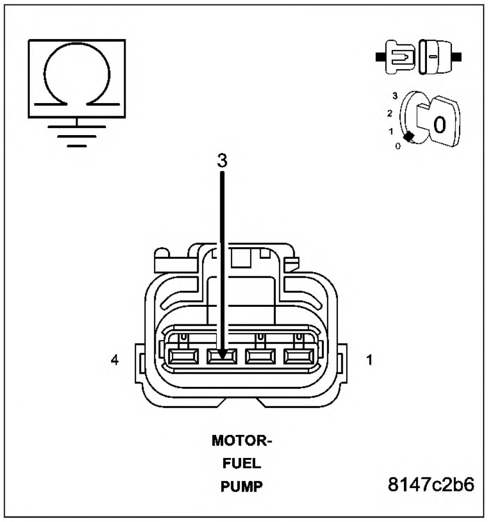
---

4. (N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 Cluster harness connector.

Measure the resistance between ground and the (N4) Fuel Level Signal circuit in the Fuel Pump Module harness connector.



Is the resistance below 100 ohms?

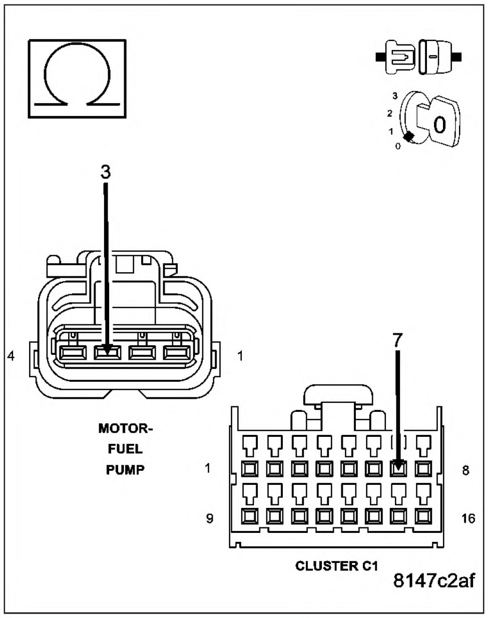
Yes >> Repair the short to ground in the (N4) Fuel Level Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0462-FUEL LEVEL SENSOR 1 CIRCUIT LOW (CONTINUED)

5. (N4) FUEL LEVEL SIGNAL CIRCUIT OPEN

Measure the resistance of the (N4) Fuel Level Signal circuit from the Fuel Pump Module harness connector to the C1 Cluster harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (N4) Fuel Level Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

6. INSTRUMENT CLUSTER

NOTE: Before continuing, check the Instrument Cluster harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

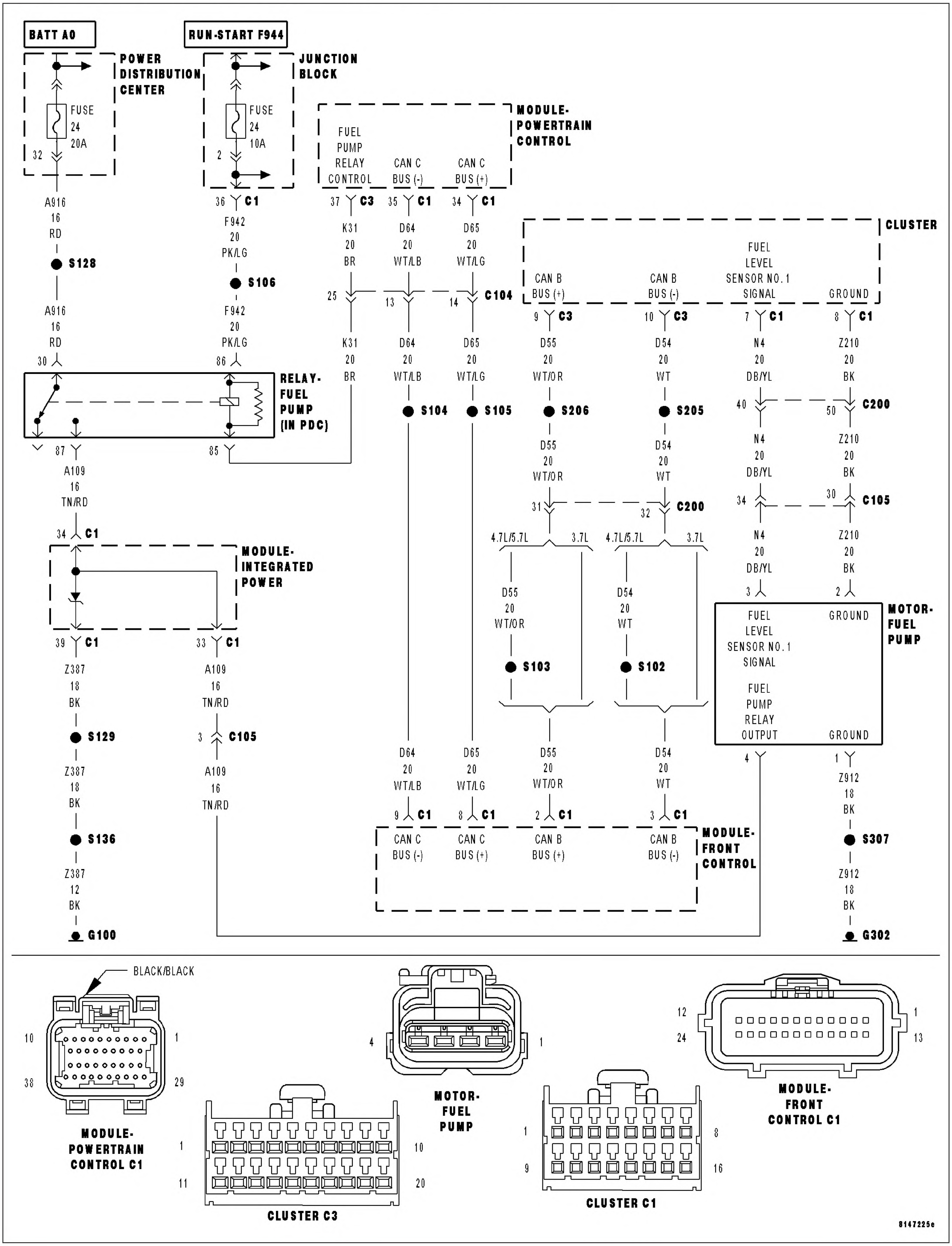
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

No >> Replace and program the Instrument Cluster per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0463-FUEL LEVEL SENSOR 1 CIRCUIT HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 24 20A
32
A916 16 RD
S128
A916 16 RD
30
RUN-START F944
JUNCTION BLOCK
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
86
RELAY-FUEL PUMP (IN PDC)
87
85
A109 16 TN/RD
34 C1
MODULE-INTEGRATED POWER
39 C1
33 C1
Z387 18 BK
S129
Z387 18 BK
S136
Z387 12 BK
G100
A109 16 TN/RD
3 C105
A109 16 TN/RD
MODULE-POWERTRAIN CONTROL
FUEL PUMP RELAY CONTROL
CAN C BUS (-)
CAN C BUS (+)
37 C3
35 C1
34 C1
K31 20 BR
D64 20 WT/LB
D65 20 WT/LG
25
13
14
C104
K31 20 BR
D64 20 WT/LB
D65 20 WT/LG
S104
S105
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
FUEL LEVEL SENSOR NO.1 SIGNAL
GROUND
9 C3
10 C3
7 C1
8 C1
D55 20 WT/OR
D54 20 WT
N4 20 DB/YL
Z210 20 BK
S206
S205
40
50
C200
D55 20 WT/OR
D54 20 WT
N4 20 DB/YL
Z210 20 BK
31
32
C200
34
30
C105
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
N4 20 DB/YL
Z210 20 BK
D55 20 WT/OR
D54 20 WT
S103
S102
3
2
MOTOR-FUEL PUMP
FUEL LEVEL SENSOR NO.1 SIGNAL
GROUND
FUEL PUMP RELAY OUTPUT
GROUND
4
1
Z912 18 BK
S307
Z912 18 BK
G302
D64 20 WT/LB
D65 20 WT/LG
D55 20 WT/OR
D54 20 WT
9 C1
8 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (-)
CAN C BUS (+)
CAN B BUS (+)
CAN B BUS (-)
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
10
11
20
CLUSTER C3
4
1
MOTOR-FUEL PUMP
1
8
9
16
CLUSTER C1
12
1
24
13
MODULE-FRONT CONTROL C1
8147225e

P0463-FUEL LEVEL SENSOR 1 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage above 10.4 volts.
- **Set Condition:**
  The fuel level sensor signal voltage at the PCM goes above 4.9 volts for more than 90 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(Z912), (Z210) GROUND CIRCUIT OPEN
FUEL LEVEL SENSOR
INSTRUMENT CLUSTER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. FUEL LEVEL SENSOR VOLTS ABOVE 4.9 VOLTS

NOTE: Diagnose any CAN - B and CAN - C Communication DTCs before continuing.

Ignition on, engine not running.

With a scan tool, read the Fuel Level Sensor voltage.

Is the Fuel Level Sensor voltage above 4.9 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. FUEL LEVEL SENSOR

Turn the ignition off.

Disconnect the Fuel Pump Module electrical harness connector.

Ignition on, engine not running.

Did the Fuel Level gauge change from full to empty?

Yes >> Replace the Fuel Level Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0463-FUEL LEVEL SENSOR 1 CIRCUIT HIGH (CONTINUED)

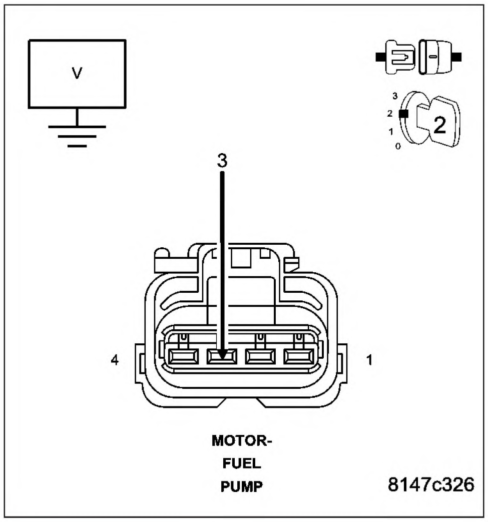
3. (N4) FUEL LEVEL SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 Cluster harness connector.

Ignition on, engine not running.

Measure the voltage on the (N4) Fuel Level Signal circuit in the Fuel Pump Module harness connector.



Is the voltage above 0 volts?

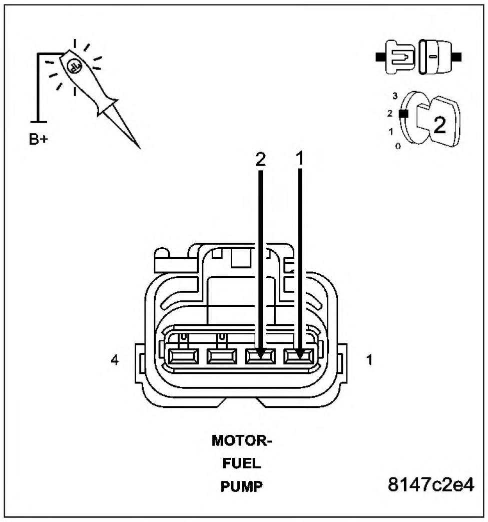
Yes >> Repair the short to battery voltage in the (N4) Fuel Level Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. (Z910), (Z210) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to B+, probe (Z910) and (Z210) Ground circuits at the Fuel Pump Module harness connector.



Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the open in the (N4) Fuel Level Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

5. INSTRUMENT CLUSTER

NOTE: Before continuing, check the Instrument Cluster harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

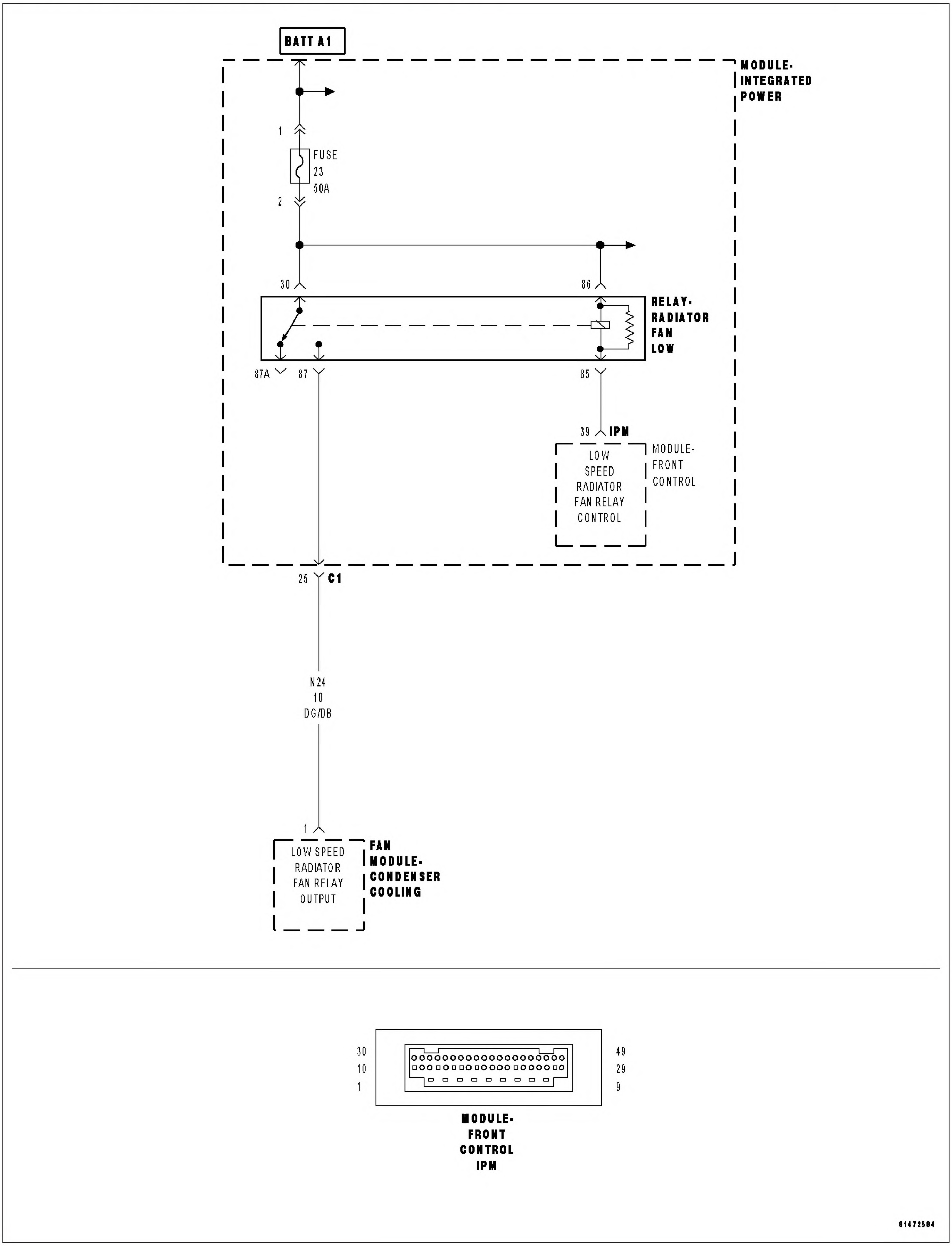
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

No >> Replace and program the Instrument Cluster per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0480-COOLING FAN 1 CONTROL CIRCUIT


BATT A1
MODULE-INTEGRATED POWER
1
FUSE
23
50A
2
30
86
RELAY-RADIATOR FAN LOW
87A
87
85
39
IPM
LOW SPEED RADIATOR FAN RELAY CONTROL
MODULE-FRONT CONTROL
25
C1
N24
10
DG/DB
1
LOW SPEED RADIATOR FAN RELAY OUTPUT
FAN MODULE-CONDENSER COOLING
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
81472584

P0480-COOLING FAN 1 CONTROL CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  An open or shorted circuit is detected in the radiator fan relay control circuit. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A16) FUSED B+ CIRCUITS
(N201) COOOLING FAN NO.1 RELAY CONTROL CIRCUIT OPEN
(N201) COOOLING FAN NO.1 RELAY CONTROL CIRCUIT SHORTED TO GROUND
LOW SPEED RADIATOR FAN RELAY
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. LOW SPEED RADIATOR FAN RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the Low Speed Radiator Fan Relay.

Is the Cooling Fan Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. (A16) FUSED B+ CIRCUITS

Turn the ignition off.

Remove the Low Speed Radiator Fan Relay.

Using a 12-volt test light connected to ground, probe the (A16) Fused B+ circuits.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A16) Fused B+ circuits. Inspect the related fuse and repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0480-COOLING FAN 1 CONTROL CIRCUIT (CONTINUED)

3. LOW SPEED RADIATOR FAN RELAY RESISTANCE

Measure the resistance of the Low Speed Radiator Fan Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 4

No >> Replace the Low Speed Radiator Fan Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (N201) COOLING FAN NO.1 CONTROL CIRCUIT OPEN

Disconnect the C3 FCM harness connector.

Measure the resistance of the (N201) Cooling Fan No.1 Relay Control circuit from the Relay to the C3 FCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (N201) Cooing Fan No.1 Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (N201) COOLING FAN NO.1 CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (N201) Cooling Fan No.1 Relay Control circuit at the Relay connection.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (N201) Cooling Fan No.1 Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

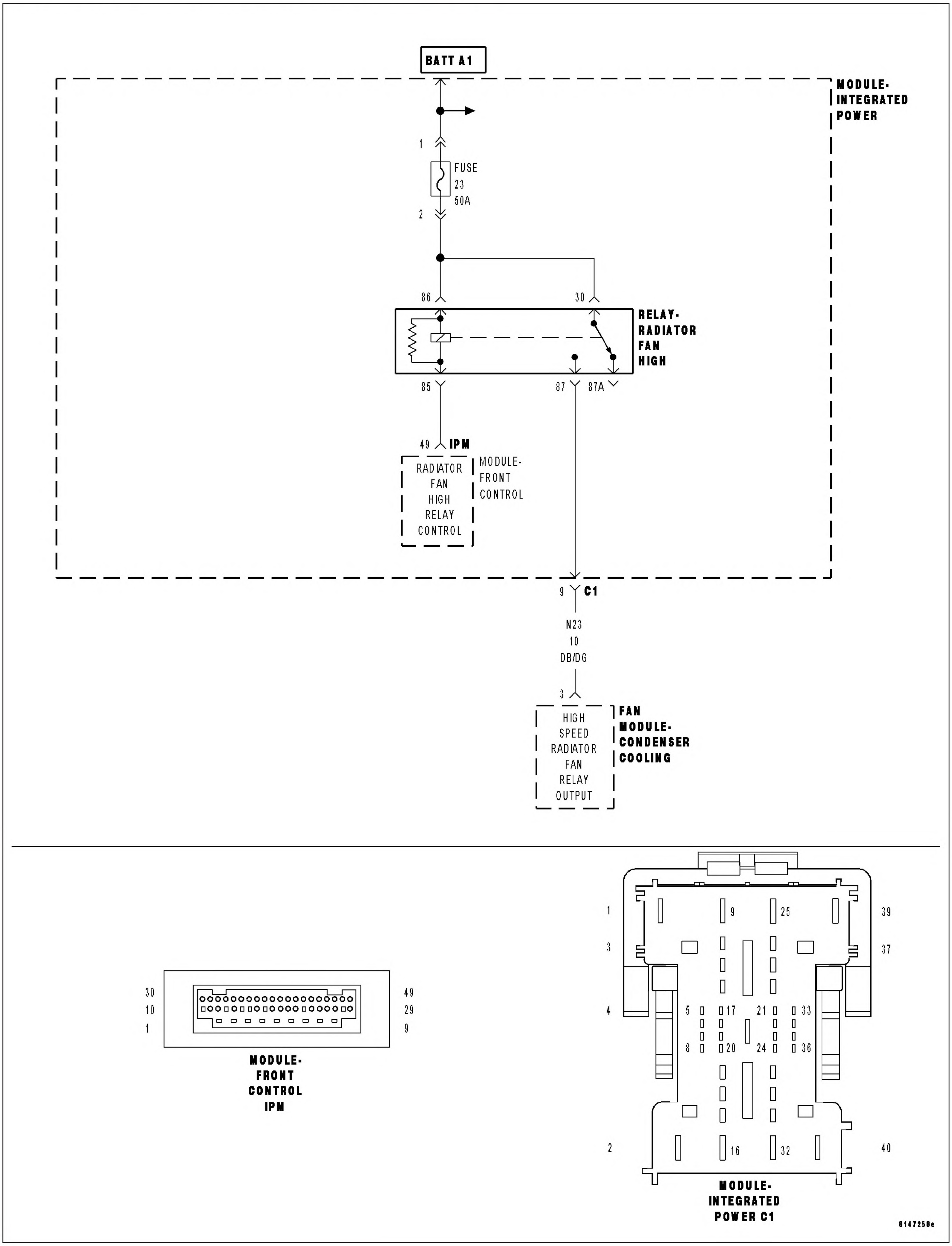
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

No >> Replace Front Control Module per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0481-COOLING FAN 2 CONTROL CIRCUIT


BATT A1
MODULE-
INTEGRATED
POWER
1
FUSE
23
50A
2
86
30
RELAY-
RADIATOR
FAN
HIGH
85
87
87A
49
IPM
RADIATOR
FAN
HIGH
RELAY
CONTROL
MODULE-
FRONT
CONTROL
9
C1
N23
10
DB/DG
3
HIGH
SPEED
RADIATOR
FAN
RELAY
OUTPUT
FAN
MODULE-
CONDENSER
COOLING
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
1
9
25
39
3
37
4
5
17
21
33
8
20
24
36
2
16
32
40
MODULE-
INTEGRATED
POWER C1
8147258e

P0481-COOLING FAN 2 CONTROL CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  An open or shorted circuit is detected in the radiator fan relay control circuit. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A16) FUSED B+ CIRCUITS
(N112) COOOLING FAN NO.2 RELAY CONTROL CIRCUIT OPEN
(N112) COOOLING FAN NO.2 RELAY CONTROL CIRCUIT SHORTED TO GROUND
HIGH SPEED RADIATOR FAN RELAY
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. HIGH SPEED RADIATOR FAN RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the High Speed Radiator Fan Relay.

Is the Cooling Fan Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. (A16) FUSED B+ CIRCUITS

Turn the ignition off.

Remove the High Speed Radiator Fan Relay.

Using a 12-volt test light connected to ground, probe the (A16) Fused B+ circuits in the Relay connection.

Is the voltage above 11.0 volts?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A16) Fused B+ circuits. Inspect the related fuse and repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0481-COOLING FAN 2 CONTROL CIRCUIT (CONTINUED)

3. HIGH SPEED RADIATOR FAN RELAY RESISTANCE

Measure the resistance of the High Speed Radiator Fan Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 4

No >> Replace the Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (N112) COOLING FAN NO.2 CONTROL CIRCUIT OPEN

Disconnect the C3 FCM harness connectors.

Measure the resistance of the (N112) Cooling Fan No.2 Relay Control circuit from the Relay connection to the C3 FCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (N112) Cooling Fan No.2 Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (N112) COOLING FAN NO.2 CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (N112) Cooling Fan No.2 Relay Control circuit at the Relay connection.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (N112) Cooling Fan No.2 Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

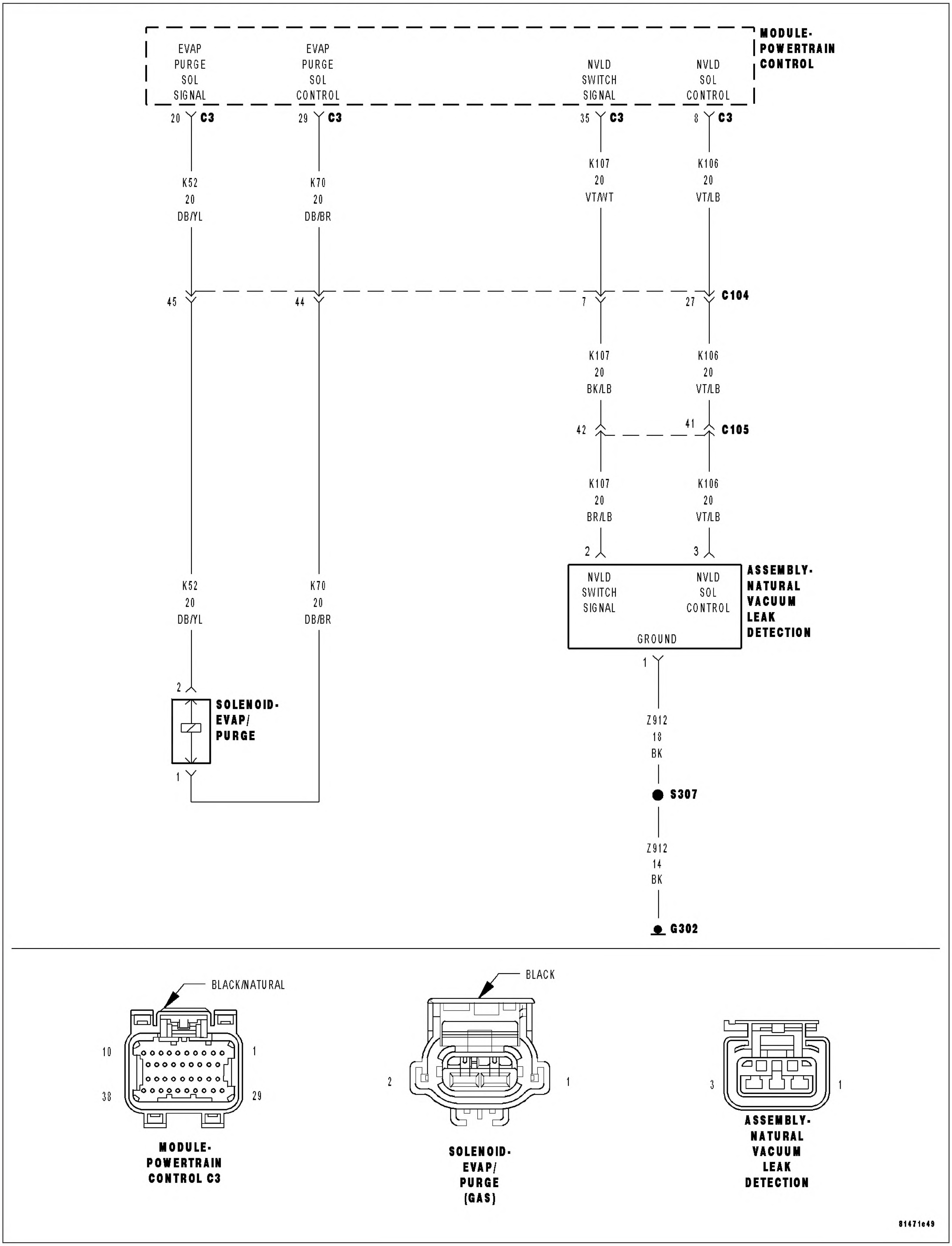
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

No >> Replace the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K52 20 DB/YL
K70 20 DB/BR
K107 20 VT/WT
K106 20 VT/LB
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
1
Z912 18 BK
S307
Z912 14 BK
G302
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
BLACK
2
1
SOLENOID-
EVAP/
PURGE
(GAS)
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81471e49

P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  The PCM detects a short in the NVLD Canister vent solenoid circuits. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K106) NVLD SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
NVLD ASSEMBLY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. NVLD SOLENOID

Turn the ignition off.

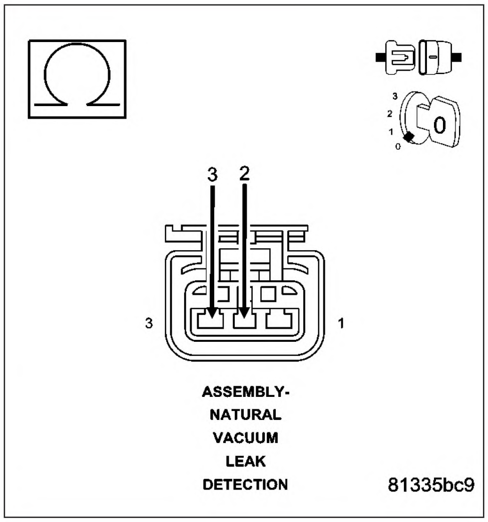
Disconnect the NVLD electrical harness connector.

Measure the resistance of the NVLD Solenoid Coil.

Is the resistance between 7.5 to 8.5 ohms?

Yes >> Go To 3

No >> Replace the NVLD Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

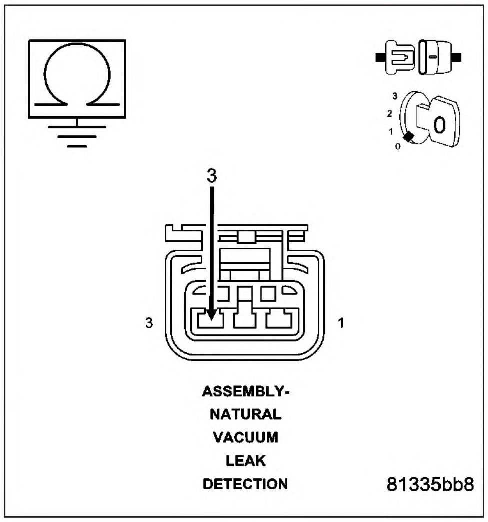


P0498-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT LOW (CONTINUED)

3. (K106) NVLD SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K106) NVLD Solenoid Control circuit in the NVLD electrical harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K106) NVLD Solenoid Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

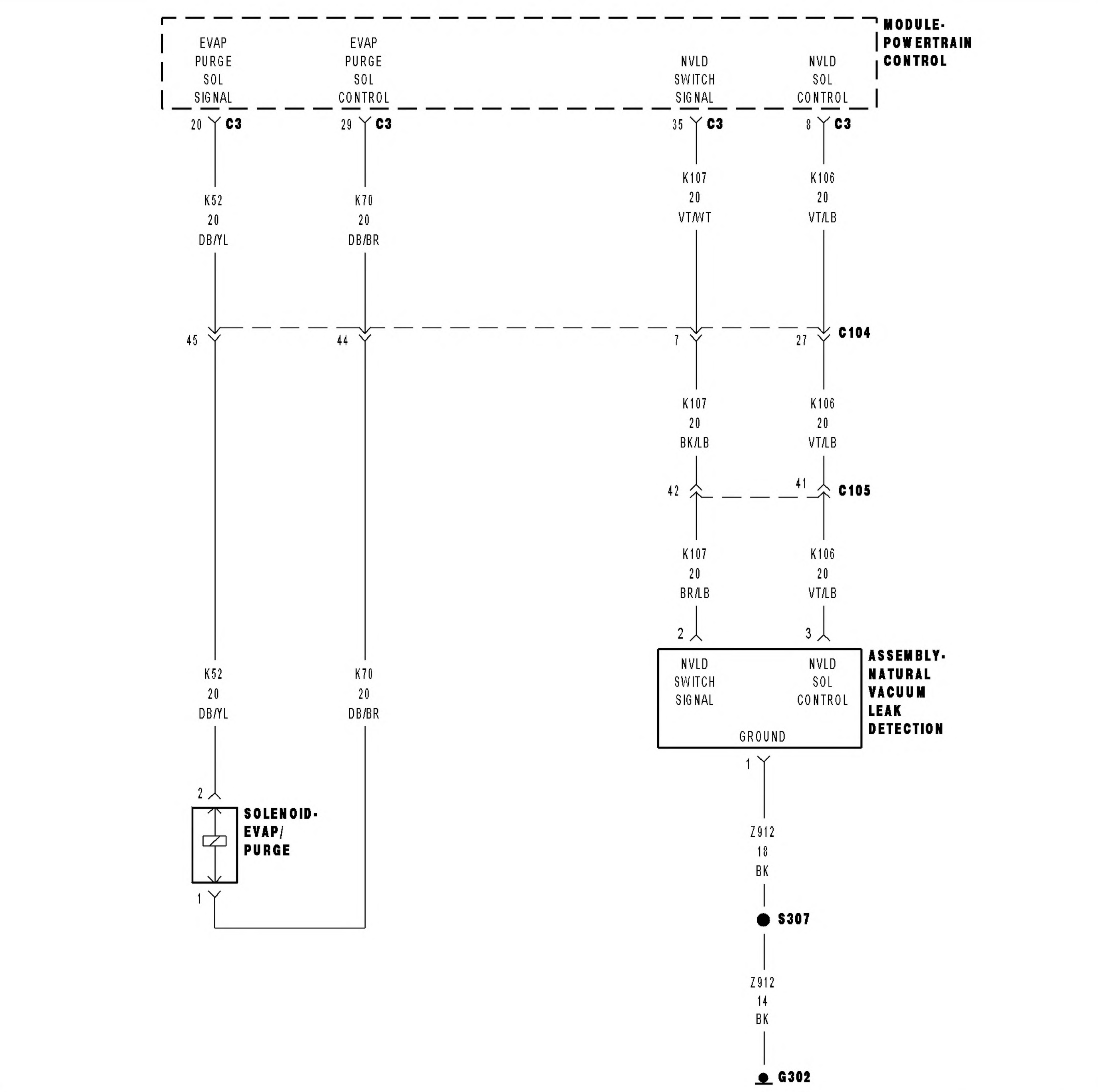
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

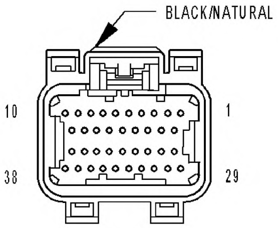
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

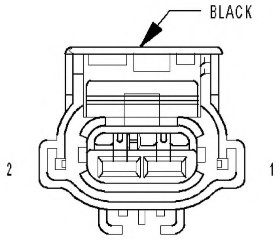
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH

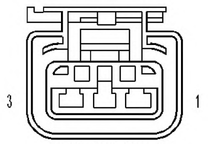

MODULE-
POWERTRAIN
CONTROL
EVAP PURGE SOL SIGNAL
EVAP PURGE SOL CONTROL
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
20 C3
29 C3
35 C3
8 C3
K107 20 VT/WT
K106 20 VT/LB
K52 20 DB/YL
K70 20 DB/BR
45
44
7
27
C104
K107 20 BK/LB
K106 20 VT/LB
42
41
C105
K107 20 BR/LB
K106 20 VT/LB
2
3
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
NVLD SWITCH SIGNAL
NVLD SOL CONTROL
GROUND
1
K52 20 DB/YL
K70 20 DB/BR
2
SOLENOID-
EVAP/
PURGE
1
Z912 18 BK
S307
Z912 14 BK
G302


BLACK/NATURAL
10
1
38
29

MODULE-POWERTRAIN CONTROL C3



SOLENOID-EVAP/PURGE (GAS)



ASSEMBLY-NATURAL VACUUM LEAK DETECTION

81471e49

P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  The PCM detects an open in the NVLD Canister vent solenoid circuits for more than 9.375 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K106) NVLD SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K106) NVLD SOLENOID CONTROL CIRCUIT OPEN
(Z42) GROUND CIRCUIT OPEN
NVLD SOLENOID
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. NVLD SOLENOID

Turn the ignition off.

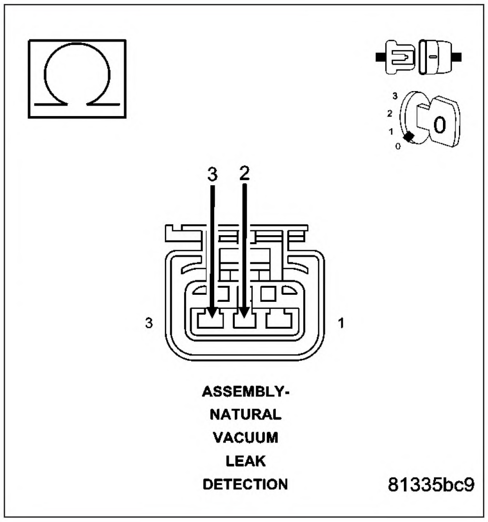
Disconnect the NVLD Assembly harness connector.

Measure the resistance of the NVLD Solenoid coil.

Is the resistance between 7.5 to 8.5 ohms?

Yes >> Go To 3

No >> Replace the NVLD Assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



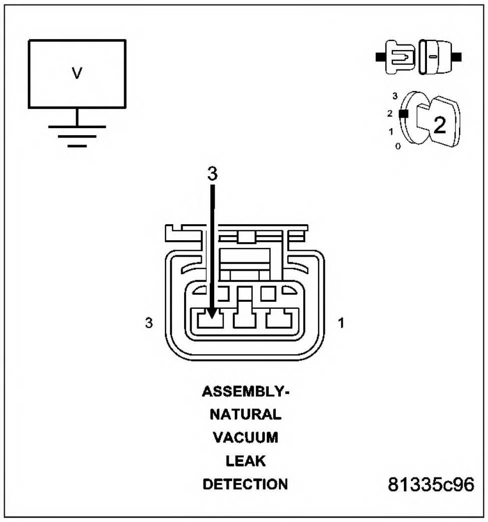
P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH (CONTINUED)

3. (K106) NVLD SOLENOID CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connectors.

Take this measurement with the Ignition in the off (lock) position and in the Ignition on, engine off position.

Measure the voltage on the (K106) NVLD Solenoid Control circuit in the NVLD Assembly harness connector.


V
3
2
1
0
2
3
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
81335c96

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K106) NVLD Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

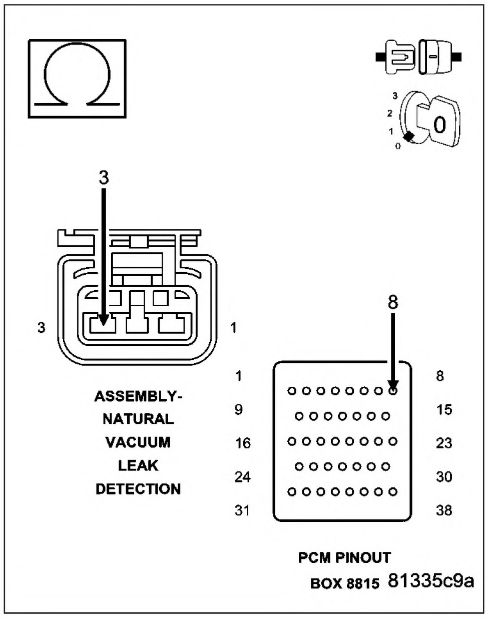
---

4. (K106) NVLD SOLENOID CONTROL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K106) NVLD Solenoid Control circuit from the NVLD Assembly harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
3
3
1
ASSEMBLY-
NATURAL
VACUUM
LEAK
DETECTION
8
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
81335c9a

Is the resistance below 5.0 ohms?

Yes >> Go To 5

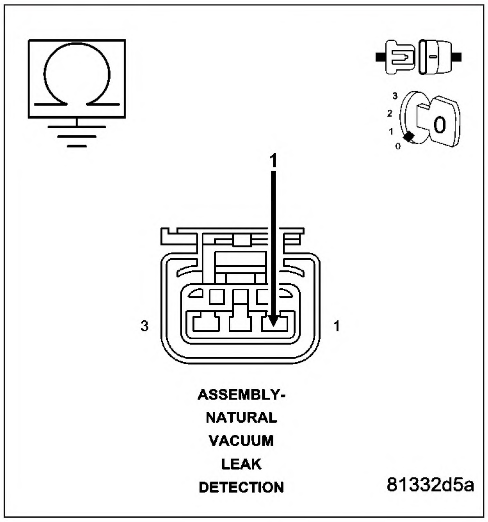
No >> Repair the open in the (K106) NVLD Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0499-NVLD CANISTER VENT VALVE SOLENOID CIRCUIT HIGH (CONTINUED)

5. (Z42) GROUND CIRCUIT OPEN

Measure the resistance between the (Z42) Ground circuit and ground.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (Z42) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

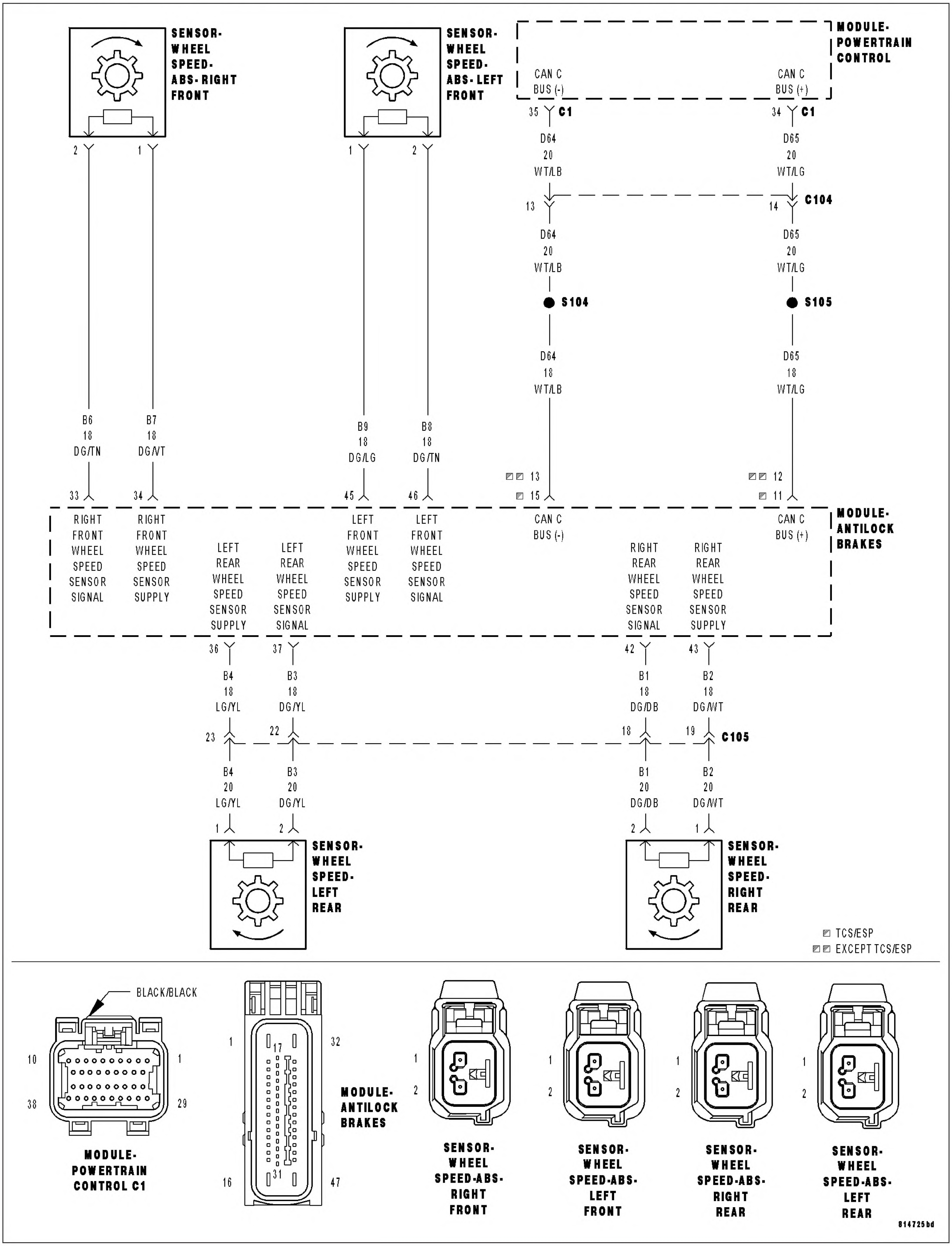
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0501-VEHICLE SPEED SENSOR 1 PERFORMANCE


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14 C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
2 1
1 2
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
33 34 45 46
▨▨ 13
▨ 15
▨▨ 12
▨ 11
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36 37 42 43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23 22 18 19 C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1 2 2 1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10 1 38 29
MODULE-POWERTRAIN CONTROL C1
1 32 17 31 16 47
MODULE-ANTILOCK BRAKES
1 2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

P0501-VEHICLE SPEED SENSOR 1 PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The vehicle speed sensor rationality is a continuous test that monitors the vehicle speed sensor for lack of activity. The rationality will not run if a limp-in exists for MAP, Throttle Position, and Engine Coolant Temperature. If vehicle speed sensor is below a minimum threshold for a period of time after the vehicle is operated at a sufficient load, a failure will be indicated.

- **When Monitored:**
  With the engine running, transmission not in park or neutral, brakes not applied, and engine rpm greater than 1500.
- **Set Condition:**
  This code will set if no vehicle speed signal is received from the ABS Module for more than 11 seconds for 2 consecutive trips. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
ACTIVE BUS OR COMMUNICATION DTCS
TIRE CIRCUMFERENCE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: Check for any Bus Communication DTCs. If no Bus or Communication DTCs are set, check for active DTCs stored in the Anti-Lock Brake Module. Any bus or communication DTCs or VSS DTCs in the Anti-Lock Brake Module must be properly diagnosed before continuing.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. VISUAL INSPECTION

NOTE: This code can set due to tire circumference differences and from the front or rear wheels being on a slippery surface while the opposite tires are not.

This code may also set on a hard acceleration on loose gravel or during other off road driving conditions.

Check tire pressure of all the tires.

Check tire wear on all the tires.

Ask the customer what the road and driving conditions were like when the fault set.

Were any problems found?

Yes >> Repair as necessary. If the code set during a front OR rear wheel spin condition, no repair is necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0501-VEHICLE SPEED SENSOR 1 PERFORMANCE (CONTINUED)

3. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

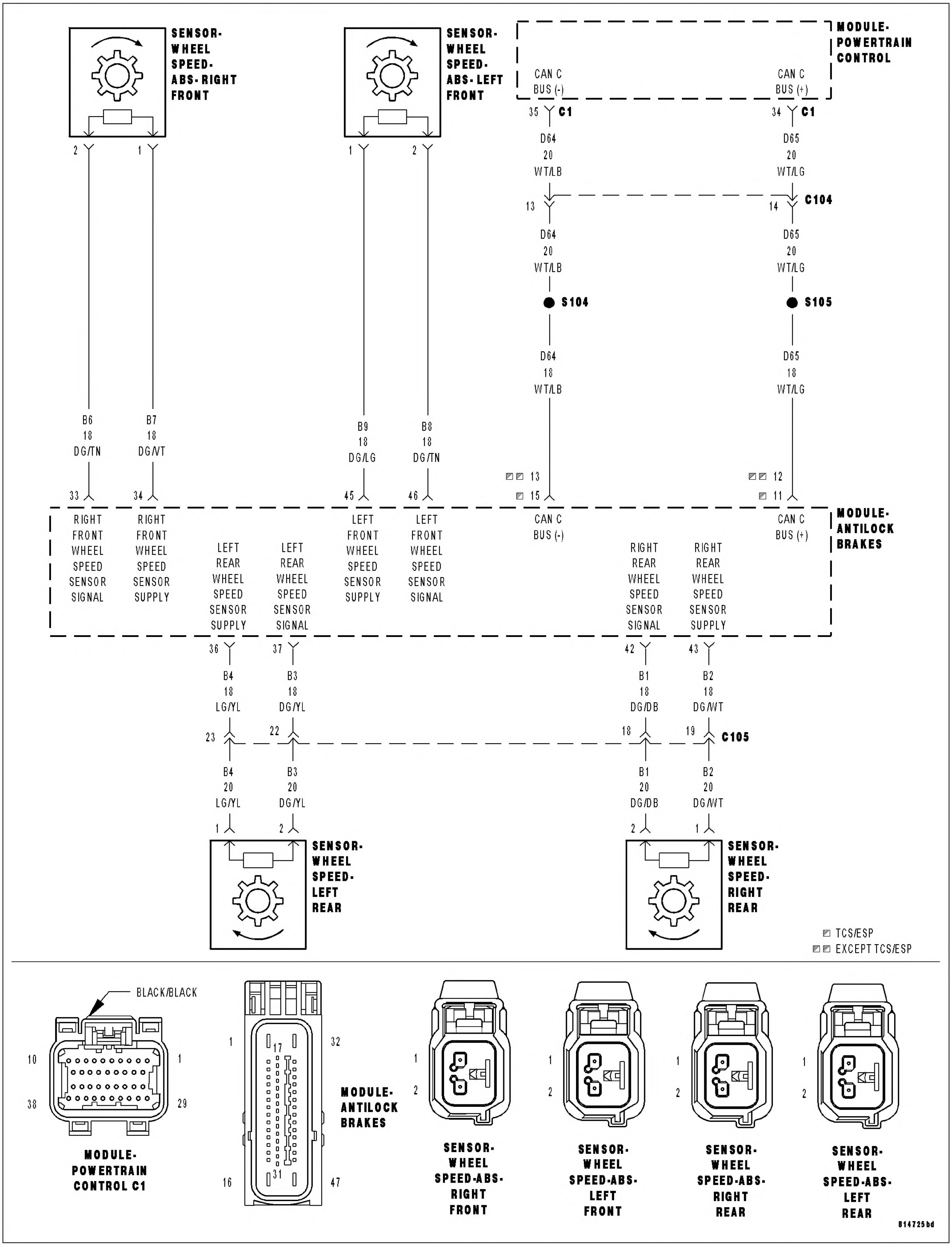
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0503-VEHICLE SPEED SENSOR 1 ERRATIC


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14
C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
2
1
1
2
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19
C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

P0503-VEHICLE SPEED SENSOR 1 ERRATIC (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The vehicle speed sensor rationality is a continuous test that monitors the vehicle speed sensor for lack of activity. The rationality will not run if a limp-in exists for MAP, Throttle Position, and Engine Coolant Temperature. If vehicle speed sensor is below a minimum threshold for a period of time after the vehicle is operated at a sufficient load, a failure will be indicated.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts. Transmission in Drive or Reverse.
- **Set Condition:**
  Vehicle speed signal is erratic during road load conditions. Two Trip Fault for non ETC vehicles and One Trip Fault for ETC vehicles. Three good trips to turn off the MIL.

Possible Causes
ACTIVE BUS OR COMMUNICATION DTCS
TIRE CIRCUMFERENCE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: Check for any Bus Communication DTCs. If no Bus or Communication DTCs are set, check for active DTCs stored in the Anti-Lock Brake Module. Any bus or communication DTCs or VSS DTCs in the Anti-Lock Brake Module must be properly diagnosed before continuing.

With a scan tool, read DTCs and record the related Freeze Frame data.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. VISUAL INSPECTION

NOTE: This code can set due to tire circumference differences and from the front or rear wheels being on a slippery surface while the opposite tires are not.

This code may also set on a hard acceleration on loose gravel or during other off road driving conditions.

Check tire pressure of all the tires.

Check tire wear on all the tires.

Ask the customer what the road and driving conditions were like when the fault set.

Were any problems found?

Yes >> Repair as necessary. If the code set during a front OR rear wheel spin condition, no repair is necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0503-VEHICLE SPEED SENSOR 1 ERRATIC (CONTINUED)

3. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0506-IDLE SPEED PERFORMANCE LOWER THAN EXCEPTED

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The objective of the Idle “Speed Rationality is to monitor the ability to achieve and maintain a steady idle condition. The monitor will judge the functionality of the idle speed control system by monitoring RPM during idle. If RPM does not come within a calibrated deadband of target idle speed, a timer is started. If the timer reaches its maximum threshold without any sign of the RPM trending towards control, a soft failure is generated.

- **When Monitored:**
  With the engine running at idle, MAF <250 mg/tdc, air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F), coolant temp >-7°C (19.4°F) <130°C (266°F), canister purge <100% duty cycle, and no VSS, MAF/MAP, ECT, TPS, ETC, CRK Sensor DTCs nor any fuel system or injector DTCs.
- **Set Condition:**
  Engine speed is 100 RPM or more below idle speed for 7 seconds. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
AIR INDUCTION SYSTEM
THROTTLE BODY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: If any other DTCs are present, they must be diagnosed and repaired before continuing this test.
Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. AIR INDUCTION SYSTEM

Inspect the Air Induction System for the following problems.
Restrictions: Dirty Air Cleaner, Foreign material trapped in the air intake tube, etc.
Leaks: Air Intake tube connection, Air Cleaner housing, etc.

Were any problems found?

Yes >> Repair or replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0506-IDLE SPEED PERFORMANCE LOWER THAN EXCEPTED (CONTINUED)

3. THROTTLE BODY OPERATION

Inspect the throttle body for carbon build up, other restrictions, and a bent throttle plate using a straight edge.

If the throttle plate does not close entirely it may be bent and needs to be replaced.

Verify that the throttle cable between the Accelerator Pedal and APPS is not binding.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

While the vehicle is running, lightly tap on ETC Motor, with your hand, and listen for idle to raise.

Were any problems found or did the idle fluctuate while tapping on the ETC Motor?

Yes >> Repair or replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXCEPTED

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The objective of the Idle “Speed Rationality is to monitor the ability to achieve and maintain a steady idle condition. The monitor will judge the functionality of the idle speed control system by monitoring RPM during idle. If RPM does not come within a calibrated deadband of target idle speed, a timer is started. If the timer reaches its maximum threshold without any sign of the RPM trending towards control, a soft failure is generated.

- **When Monitored:**
  With the engine running at idle, MAF <250 mg/tdc, air temp >-17.8°C (0°F) and <-7°C (19.4°F) enable after coolant temp >70°C (158°F) or air temp >-7°C (19.4°F), coolant temp >-7°C (19.4°F) <130°C (266°F), canister purge <100% duty cycle, and no VSS, MAF/MAP, ECT, TPS, ETC, CRK Sensor DTCs nor any fuel system or injector DTCs.
- **Set Condition:**
  Engine speed is 200 RPM or more above idle speed for 7 seconds. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
AIR INDUCTION SYSTEM
VACUUM LEAKS
THROTTLE BODY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: If any other DTCs are present, they must be diagnosed and repaired before continuing this test.
Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. AIR INDUCTION SYSTEM

Inspect the Air Induction System for the following problems.

Restrictions: Dirty Air Cleaner, Foreign material trapped in the air intake tube, etc.

Leaks: Air Intake tube connection, Air Cleaner housing, etc.

Were any problems found?

Yes >> Repair or replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0507-IDLE SPEED PERFORMANCE HIGHER THAN EXCEPTED (CONTINUED)

3. VACUUM LEAKS

Start the engine.

Inspect the vehicle for external vacuum leaks.

Inspect the engine for internal leaks.

Were any vacuum leaks found?

Yes >> Repair the vacuum leak as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. THROTTLE BODY OPERATION

Inspect the throttle body for carbon build up, other restrictions, and a bent throttle plate using a straight edge.

If the throttle plate does not close entirely it may be bent and needs to be replaced.

Verify that the throttle cable between the Accelerator Pedal and APPS is not binding.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

While the vehicle is running, lightly tap on ETC Motor, with your hand, and listen for idle to fluctuate.

Were any problems found or did the idle fluctuate while tapping on the ETC Motor?

Yes >> Repair or replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

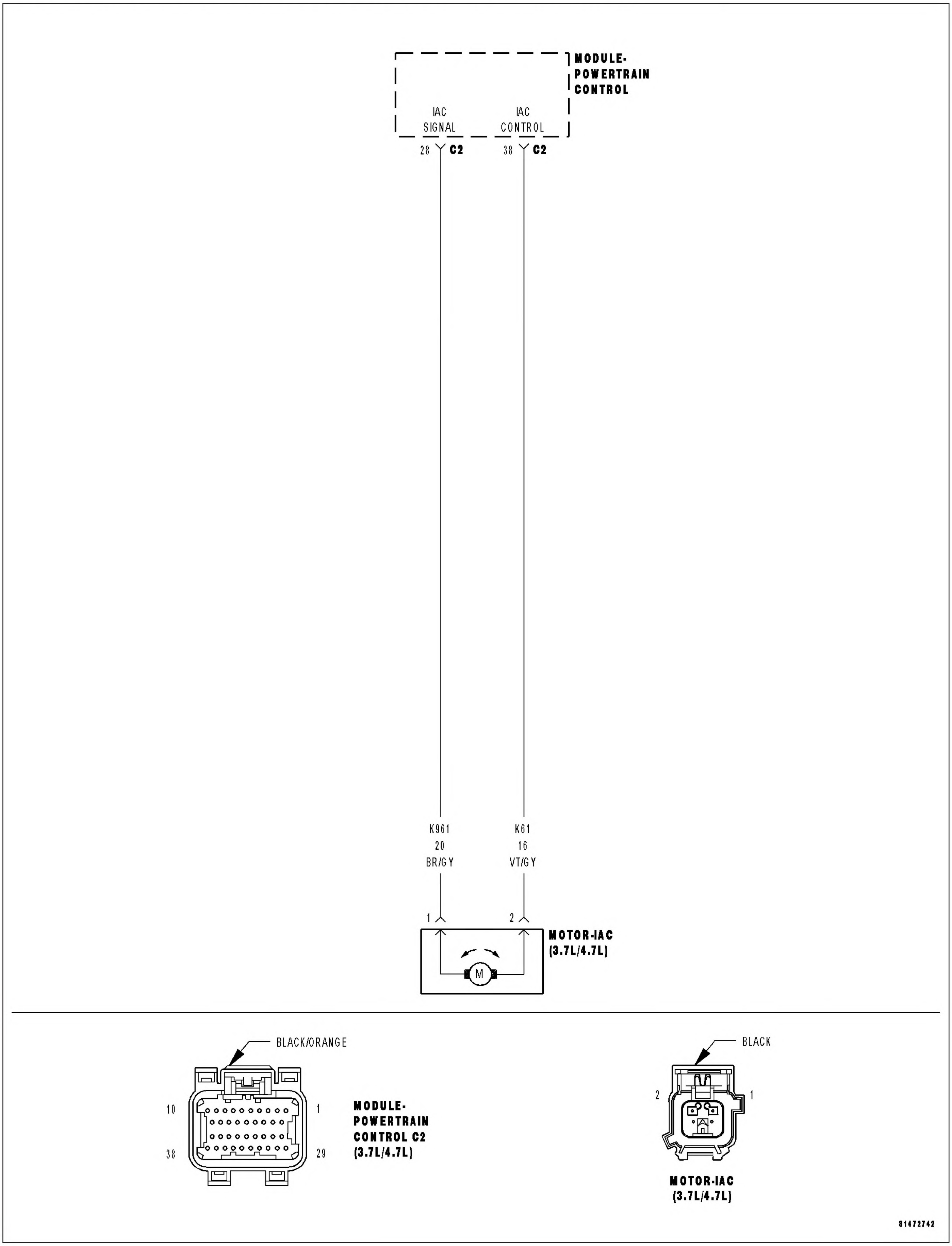
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0508-IDLE AIR CONTROL VALVE SENSE CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
IAC
SIGNAL
IAC
CONTROL
28
C2
38
C2
K961
20
BR/GY
K61
16
VT/GY
1
2
MOTOR-IAC
(3.7L/4.7L)
M
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK
2
1
MOTOR-IAC
(3.7L/4.7L)
81472742

P0508-IDLE AIR CONTROL VALVE SENSE CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running. Battery voltage greater than 10 volts. IAC motor operating.
- **Set Condition:**
  The PCM senses a short to ground or battery voltage on any of the Linear Idle Air Control (LIAC) control circuits for 2.75 seconds while the IAC motor is active. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K61) IAC CONTROL CIRCUIT SHORTED TO GROUND
(K961) IAC SIGNAL CIRCUIT OPEN
(K961) IAC SIGNAL CIRCUIT SHORTED TO GROUND
(K61) IAC CONTROL CIRCUIT OPEN
IAC MOTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. IAC MOTOR OPERATION

NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.

Start the engine.

Allow the engine to idle.

With a scan tool, read the IAC Current.

Is the IAC Current below 146 mA?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0508-IDLE AIR CONTROL VALVE SENSE CIRCUIT LOW (CONTINUED)

2. IAC MOTOR

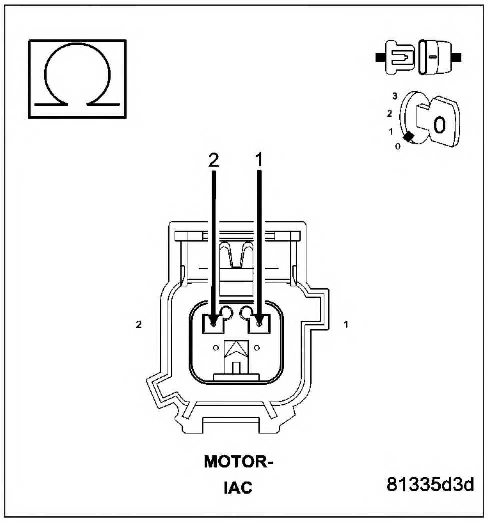
Turn the ignition off.

Disconnect the IAC Motor harness connector.

Remove the IAC Motor.

NOTE: Inspect the IAC air passages for restrictions and damage to the IAC valve.

Measure the resistance across the IAC Motor pin terminals (component).



Is the resistance 9.7 +/- 1.0 ohms?

Yes >> Go To 3

No >> Replace the IAC Motor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

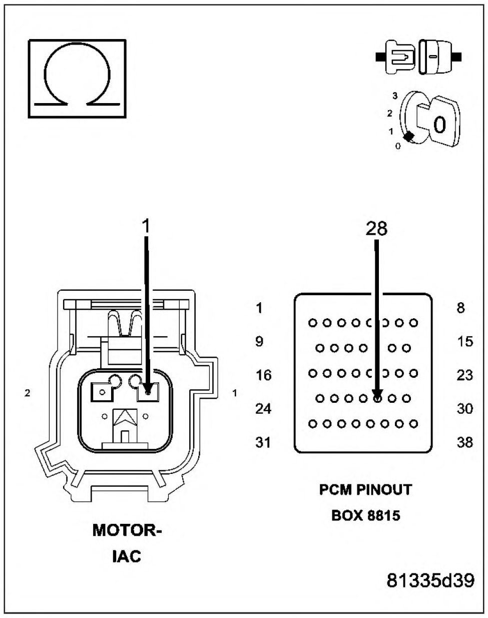
---

3. (K961) IAC SIGNAL CIRCUIT OPEN

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K961) IAC Signal circuit from the IAC Motor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

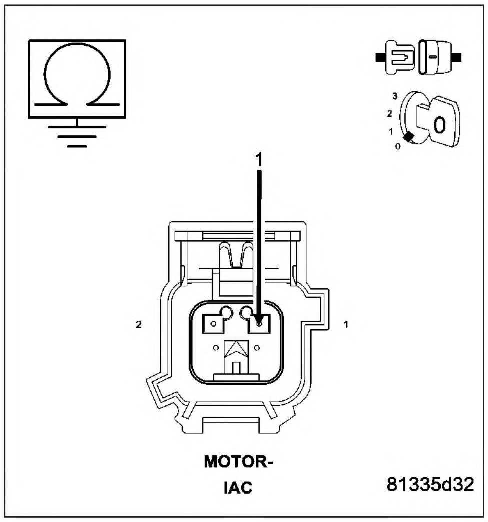
Yes >> Go To 4

No >> Repair the open in the (K961) IAC Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0508-IDLE AIR CONTROL VALVE SENSE CIRCUIT LOW (CONTINUED)

4. (K961) IAC SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K961) IAC Signal circuit in the IAC Motor harness connector.


1
2
1
MOTOR-
IAC
81335d32

Is the resistance below 100 ohms?

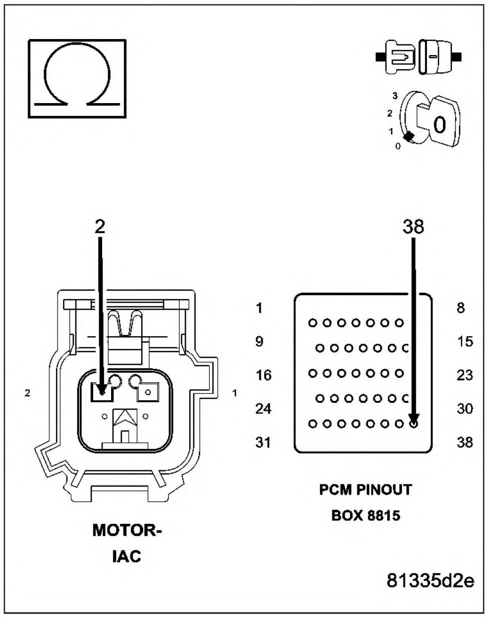
Yes >> Repair the short to ground in the (K961) IAC Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. (K61) IAC CONTROL CIRCUIT OPEN

Measure the resistance of the (K61) IAC Control circuit from the IAC Motor harness connector to the appropriate terminal of special tool #8815.


2
38
2
1
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
MOTOR-
IAC
81335d2e

Is the resistance below 5.0 ohms?

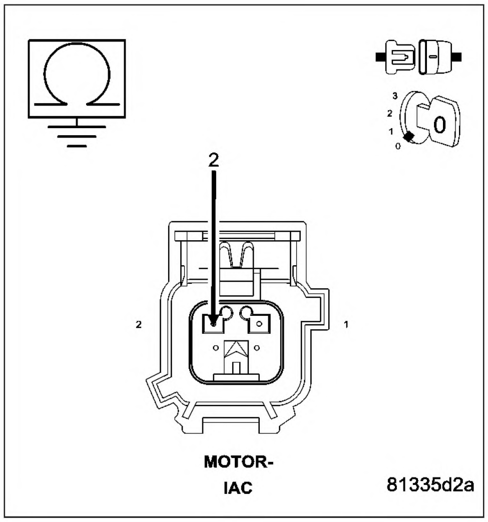
Yes >> Go To 6

No >> Repair the open in the (K61) IAC Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0508-IDLE AIR CONTROL VALVE SENSE CIRCUIT LOW (CONTINUED)

6. (K61) IAC CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K61) IAC Control circuit in the IAC Motor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K61) IAC Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

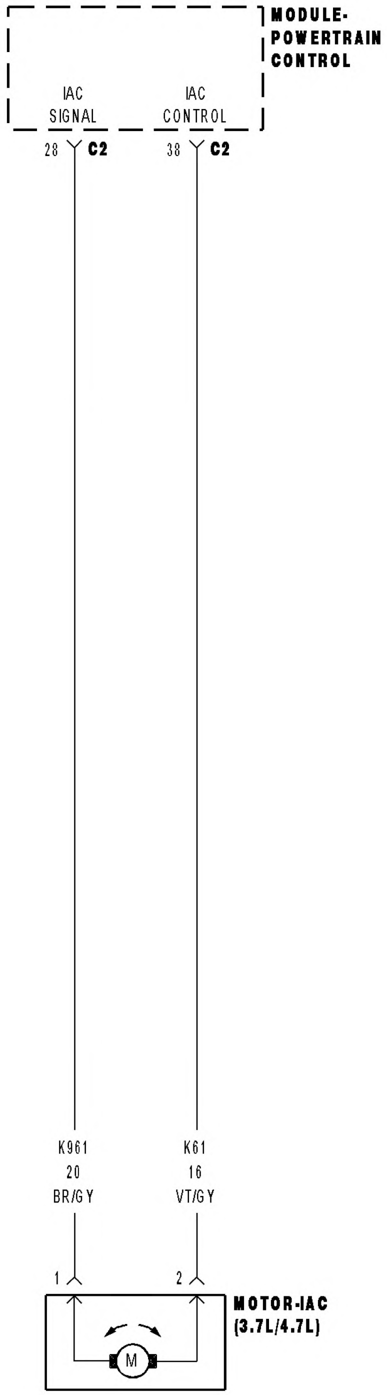
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

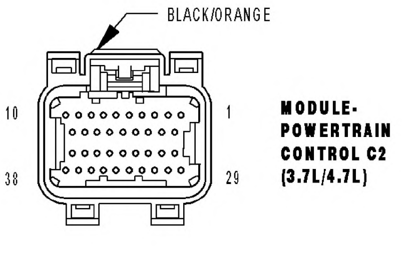
Were there any problems found?

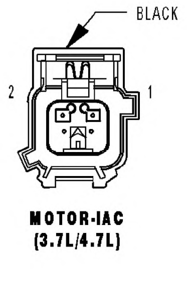
Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0509-IDLE AIR CONTROL VALVE SENSE CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
IAC
SIGNAL
IAC
CONTROL
28
C2
38
C2
K961
20
BR/GY
K61
16
VT/GY
1
2
M
MOTOR-IAC
(3.7L/4.7L)


BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)


BLACK
2
1
MOTOR-IAC
(3.7L/4.7L)

81472742

P0509-IDLE AIR CONTROL VALVE SENSE CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running. Battery voltage greater than 10 volts. IAC motor operating.
- **Set Condition:**
  The PCM senses a short to ground or battery voltage on any of the Linear Idle Air Control (LIAC) control circuits for 2.75 seconds while the IAC motor is active. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K961) IAC RETURN CIRCUIT SHORTED TO BATTERY VOLTAGE
(K61) IAC CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K61) IAC CONTROL CIRCUIT SHORTED TO THE (K961) IAC RETURN CIRCUIT
IAC MOTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. IAC MOTOR OPERATION

NOTE: If the engine will not idle, maintain an engine speed between 800 and 1500 RPM.

Start the engine.

Allow the engine to idle.

With a scan tool, read the IAC Current.

Is the IAC Current above 999 mA?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. IAC MOTOR

Turn the ignition off.

Disconnect the IAC Motor harness connector.

With the scan tool, monitor the IAC Current.

Ignition on, engine not running.

Does the scan tool display IAC Current at 0 mA?

Yes >> Replace the IAC Motor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0509-IDLE AIR CONTROL VALVE SENSE CIRCUIT HIGH (CONTINUED)

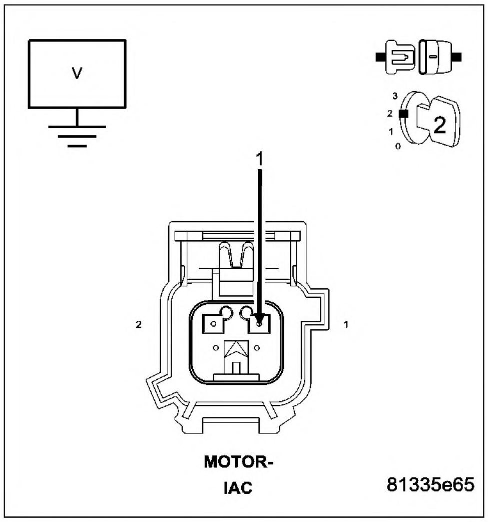
3. (K961) IAC SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K961) IAC Signal circuit in the IAC Motor harness connector.



Is the voltage above 0.5 of a volt?

Yes >> Repair the short to battery voltage in the (K961) IAC Signal circuit.

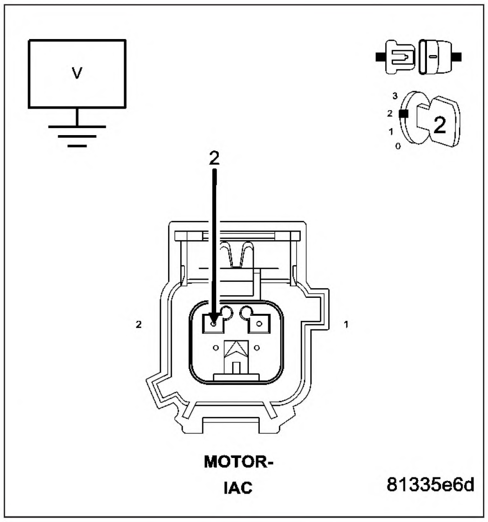
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (K61) IAC CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Measure the voltage on the (K61) IAC Control circuit in the IAC Motor harness connector.



Is the voltage above 0.5 of a volt?

Yes >> Repair the short to battery voltage in the (K61) IAC Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

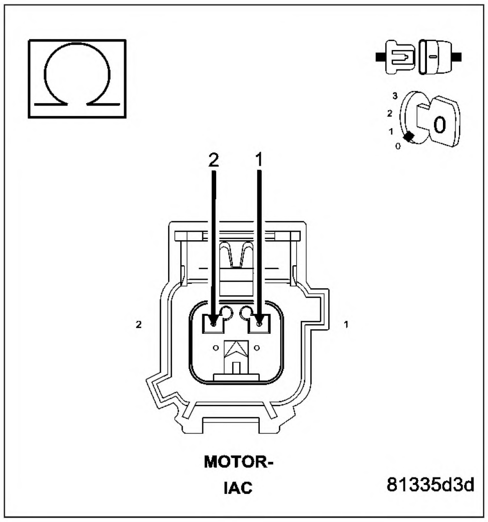
No >> Go To 5

P0509-IDLE AIR CONTROL VALVE SENSE CIRCUIT HIGH (CONTINUED)

5. (K61) IAC CONTROL CIRCUIT SHORTED TO THE (K961) IAC RETURN CIRCUIT

Turn the ignition off.

Measure the resistance across the (K961) IAC Signal circuit and the (K61) IAC Control circuit in the IAC Motor harness connector.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K961) IAC Signal circuit and the (K61) IAC Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

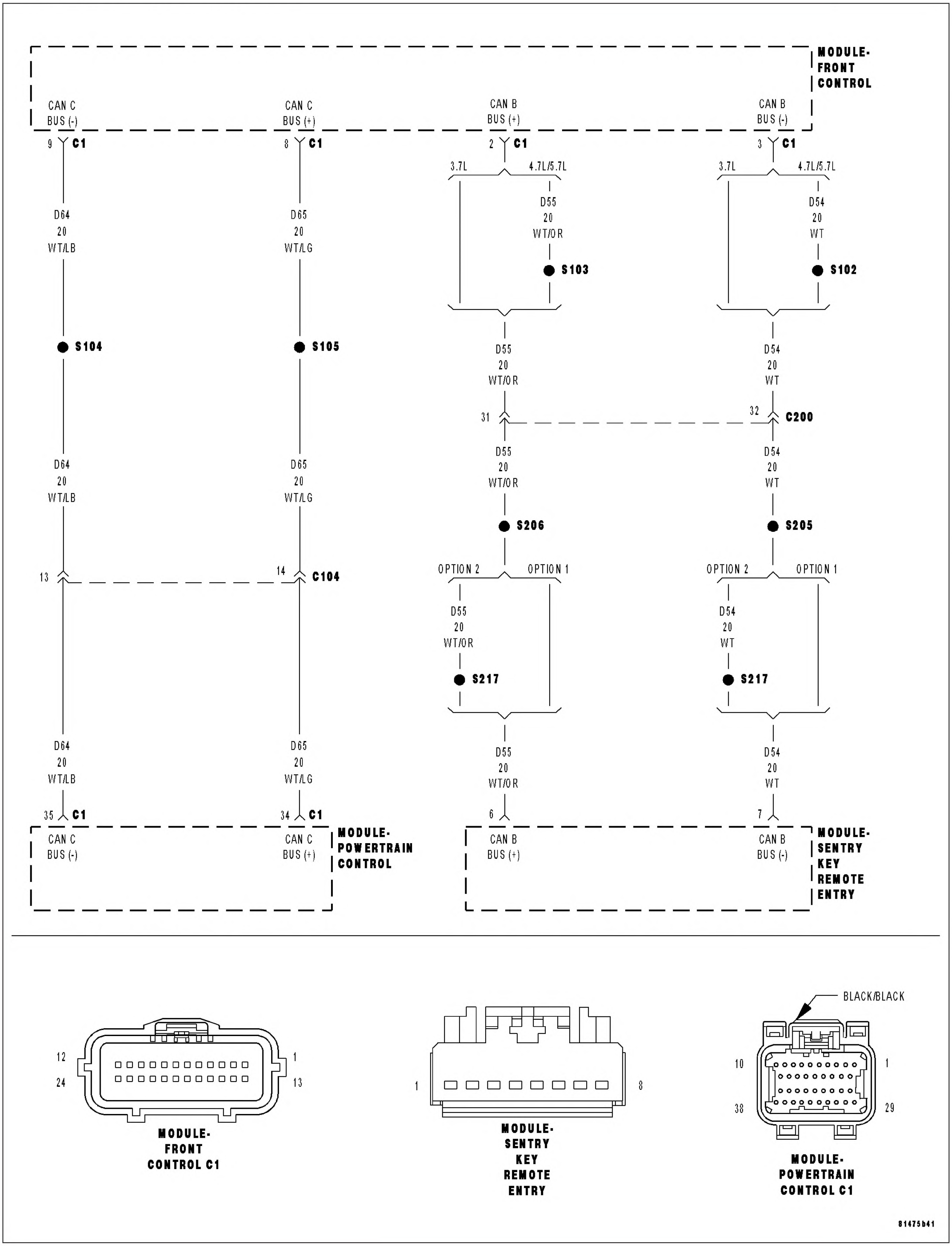
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0513-INVALID SKIM KEY


MODULE-
FRONT
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
CAN B
BUS (+)
CAN B
BUS (-)
9 C1
8 C1
2 C1
3 C1
3.7L
4.7L/5.7L
3.7L
4.7L/5.7L
D55
20
WT/OR
D54
20
WT
S103
S102
D64
20
WT/LB
D65
20
WT/LG
S104
S105
D55
20
WT/OR
D54
20
WT
31
32
C200
D55
20
WT/OR
D54
20
WT
D64
20
WT/LB
D65
20
WT/LG
S206
S205
13
14
C104
OPTION 2
OPTION 1
OPTION 2
OPTION 1
D55
20
WT/OR
D54
20
WT
S217
S217
D64
20
WT/LB
D65
20
WT/LG
D55
20
WT/OR
D54
20
WT
35 C1
34 C1
6
7
CAN C
BUS (-)
CAN C
BUS (+)
MODULE-
POWERTRAIN
CONTROL
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
SENTRY
KEY
REMOTE
ENTRY
12
24
1
13
MODULE-
FRONT
CONTROL C1
1
8
MODULE-
SENTRY
KEY
REMOTE
ENTRY
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
81475b41

P0513-INVALID SKIM KEY (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM detects an invalid SKREEM key. One Trip Fault.

Possible Causes
INCORRECT VIN PROGRAMMED IN THE PCM
NO COMMUNICATION WITH SKREEM
NO VIN PROGRAMMED IN THE PCM
IGNITION KEY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Diagnose any Can C or Can B failures before continuing.

Ignition on, engine not running.

With the scan tool, read the PCM DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 6

---

2. NO COMMUNICATION WITH SKREEM

With the scan tool, attempt to communicate with the SKREEM.

Can the scan tool communicate with the SKREEM?

Yes >> Go To 3

No >> Refer to Section 8 - Electrical VEHICLE THEFT SECURITY - ELECTRICAL DIAGNOSTICS and perform the appropriate Diagnostic Procedure.

Perform SKREEM VERIFICATION. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

3. SKREEM TROUBLE CODES SET

With the scan tool, check for SKREEM DTCs.

Are any DTCs present in the SKREEM?

Yes >> Refer to Section 8 - Electrical VEHICLE THEFT SECURITY - ELECTRICAL DIAGNOSTICS and perform the appropriate Diagnostic Procedure.

Perform SKREEM VERIFICATION. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Go To 4

P0513-INVALID SKIM KEY (CONTINUED)

4. VIN PROGRAMMED INTO PCM

With the scan tool, display the VIN that is programmed in the PCM.

Has a VIN been programmed into the PCM?

Yes >> Go To 5

No >> Program the correct VIN into the PCM and retest.

Perform SKREEM VERIFICATION. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

---

5. PCM

Turn the ignition off.

Replace and program the SKREEM per Service Information.

Ignition on, engine not running.

With the scan tool, erase all SKREEM and PCM DTCs.

Attempt to start and idle the engine.

With the scan tool, read the PCM DTCs.

Does the scan tool display this code?

Yes >> NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary. Replace and program the Powertrain Control Module per Service Information.

Perform SKREEM VERIFICATION. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

---

6. IGNITION KEY

NOTE: You must obtain the SKREEM pin number.

NOTE: This DTC could have been set if the SKREEM harness connector was disconnected, or if the SKREEM was replaced recently.

NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.

Ignition on, engine not running.

Verify the correct VIN is programmed into the PCM and SKREEM.

Turn the ignition off.

With each customer key turn the ignition key on and crank the engine to start.

With the scan tool, read the PCM DTCs. Look for P0513.

Is the DTC P0513 still active?

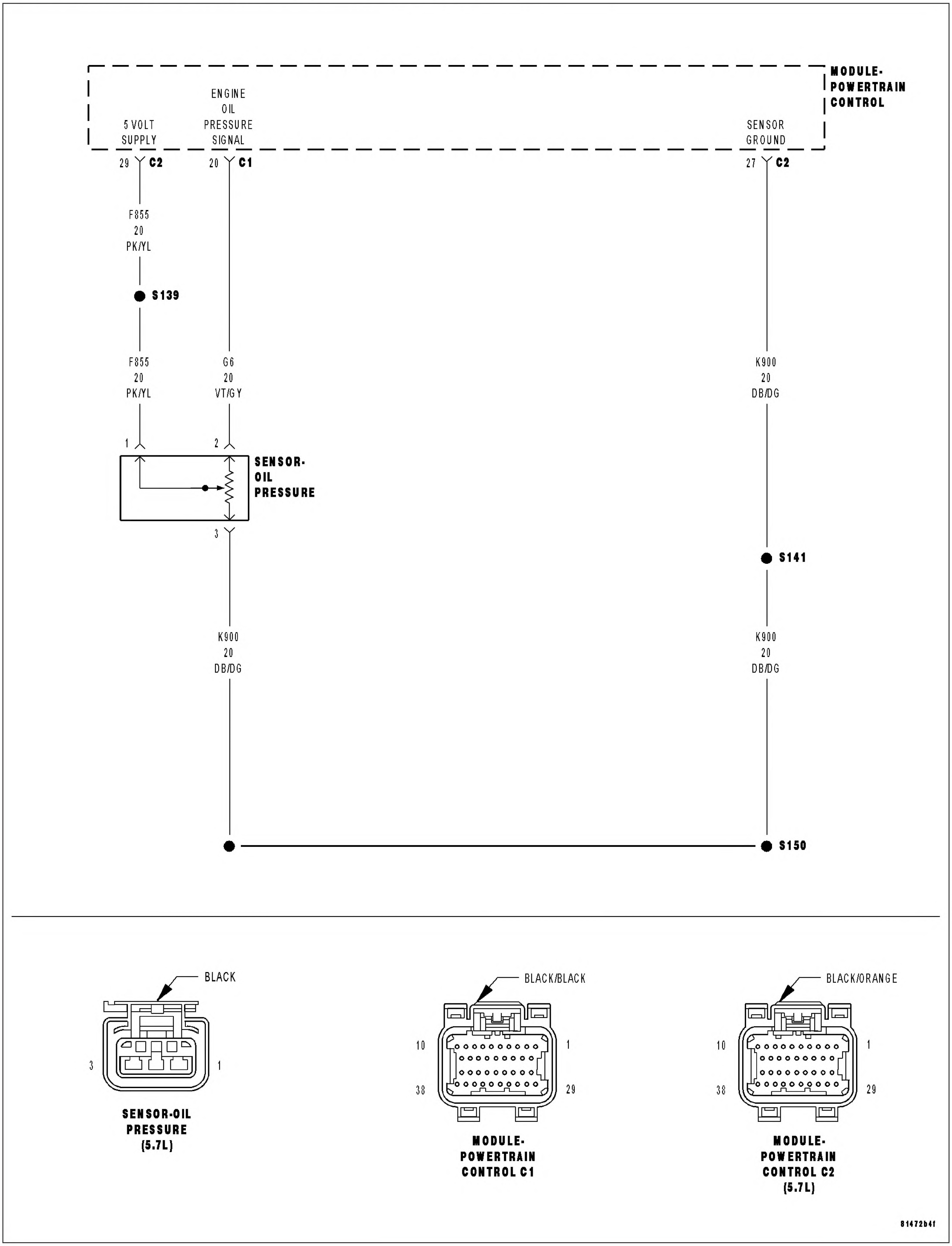
Yes >> Replace the Ignition Key.

Perform SKREEM VERIFICATION. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE)

No >> Test Complete.

NOTE: If this DTC cannot be reset, it could have been an actual theft attempt.

P0520-ENGINE OIL PRESSURE SENSOR CIRCUIT


MODULE-POWERTRAIN CONTROL
5 VOLT SUPPLY
ENGINE OIL PRESSURE SIGNAL
SENSOR GROUND
29 C2
20 C1
27 C2
F855 20 PK/YL
S139
F855 20 PK/YL
G6 20 VT/GY
K900 20 DB/DG
1
2
3
SENSOR-OIL PRESSURE
S141
K900 20 DB/DG
K900 20 DB/DG
S150
BLACK
3
1
SENSOR-OIL PRESSURE (5.7L)
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
81472b41

P0520-ENGINE OIL PRESSURE SENSOR CIRCUIT (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on, engine not running.
- **Set Condition:**
  The PCM senses the oil pressure is out of the calibrated range.

Possible Causes
(G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
RESISTANCE (G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT
(G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
ENGINE OIL PRESSURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure that the engine oil is at the proper level. Also, check the customers oil change history to ensure that the oil is being changed at the correct intervals and that the proper oil viscosity is being used.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0520-ENGINE OIL PRESSURE SENSOR CIRCUIT (CONTINUED)

2. (G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

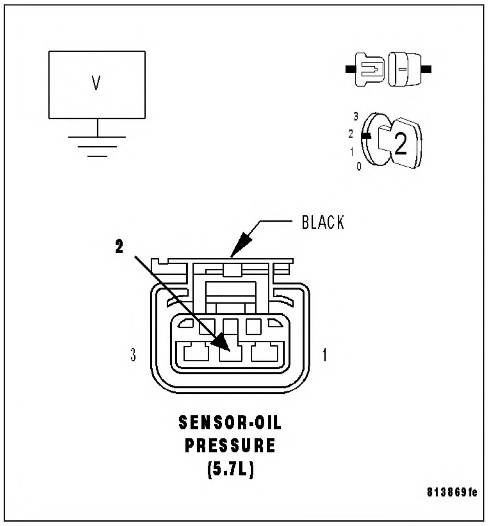
Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

Disconnect the Engine Oil Pressure Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (G6) Engine Oil Pressure Signal circuit in the Engine Oil Pressure Sensor harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (G6) Engine Oil Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. ENGINE OIL PRESSURE SENSOR

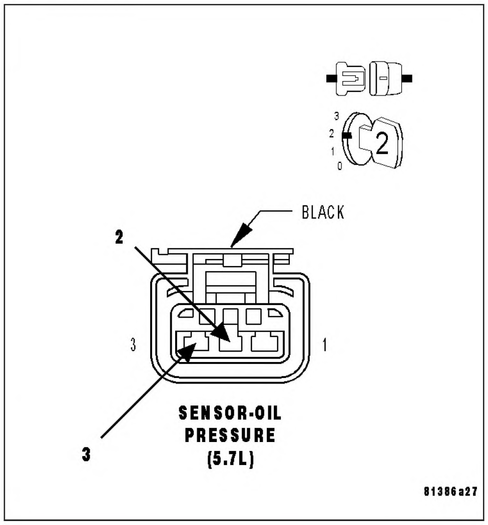
Turn the ignition off.

Connect the PCM harness connectors.

Ignition on, engine not running.

With a scan tool, monitor the Engine Oil Pressure Sensor voltage.

Connect a jumper wire between the (K900) Sensor Ground circuit and the (G6) Engine Oil Pressure Signal circuit.



NOTE: Engine Oil Pressure voltage should change from approximately 4.5 volts to less than 0.5 of a volt.

Is the voltage reading within the listed specification when the jumper wire is installed?

Yes >> Replace the Engine Oil Pressure Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.

P0520-ENGINE OIL PRESSURE SENSOR CIRCUIT (CONTINUED)

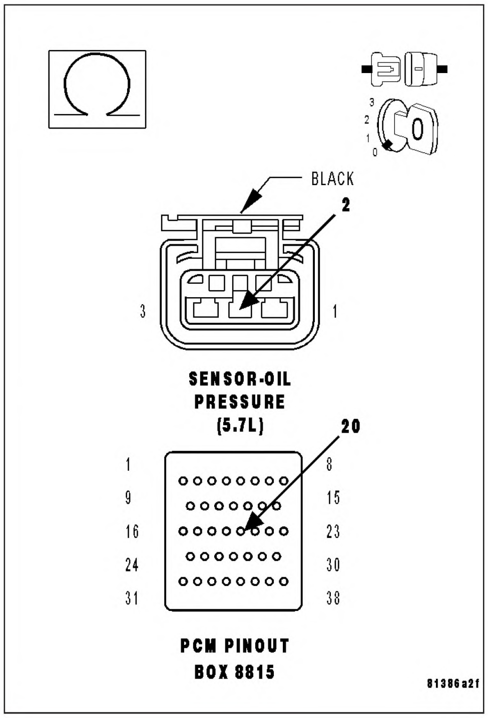
4. EXCESSIVE RESISTANCE IN THE (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (G6) Engine Oil Pressure Signal circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 5

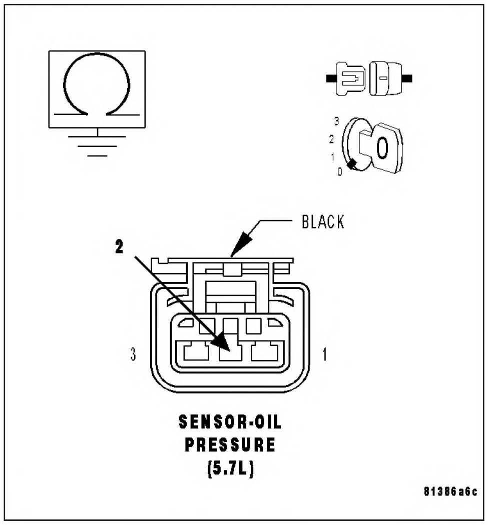
No >> Repair the excessive resistance in the (G6) Engine Oil Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (G6) Engine Oil Pressure Signal circuit Engine Oil Pressure Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (G6) Engine Oil Pressure Signal circuit.

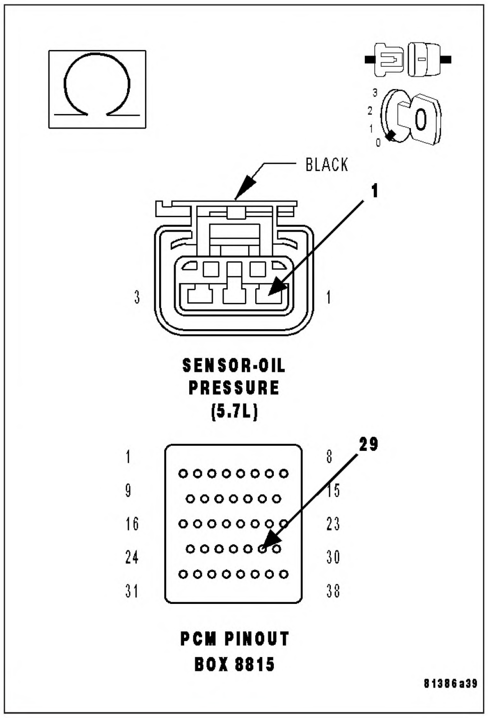
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0520-ENGINE OIL PRESSURE SENSOR CIRCUIT (CONTINUED)

6. EXCESSIVE RESISTANCE IN THE (F855) 5–VOLT SUPPLY CIRCUIT

Measure the resistance of the (F855) 5-volt Supply circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
BLACK
1
3
1
SENSOR-OIL PRESSURE (5.7L)
29
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
81386a39

Is the resistance below 5.0 ohms?

Yes >> Go To 7

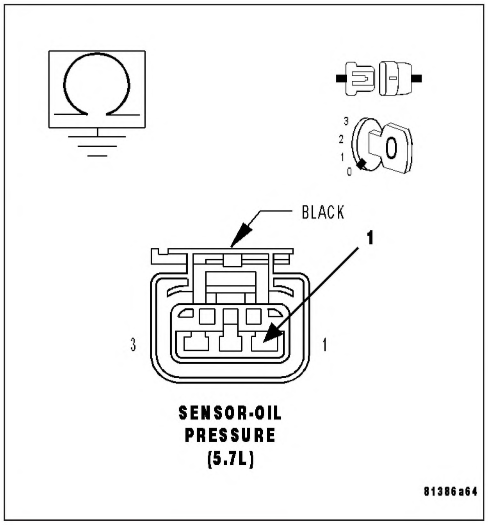
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (F855) 5-VOLT SUPPLY SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the Engine Oil Pressure Sensor harness connector.


3
2
1
0
0
BLACK
1
3
1
SENSOR-OIL PRESSURE (5.7L)
81386a64

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

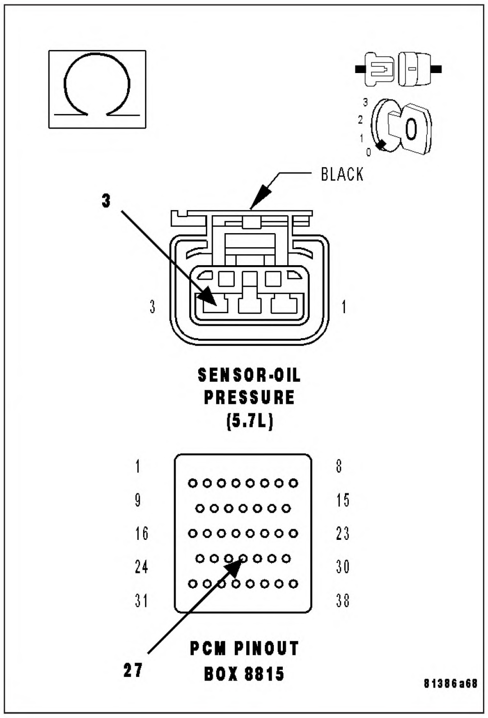
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0520-ENGINE OIL PRESSURE SENSOR CIRCUIT (CONTINUED)

8. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor Ground circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the excessive resistance in the (K900) Sensor Ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

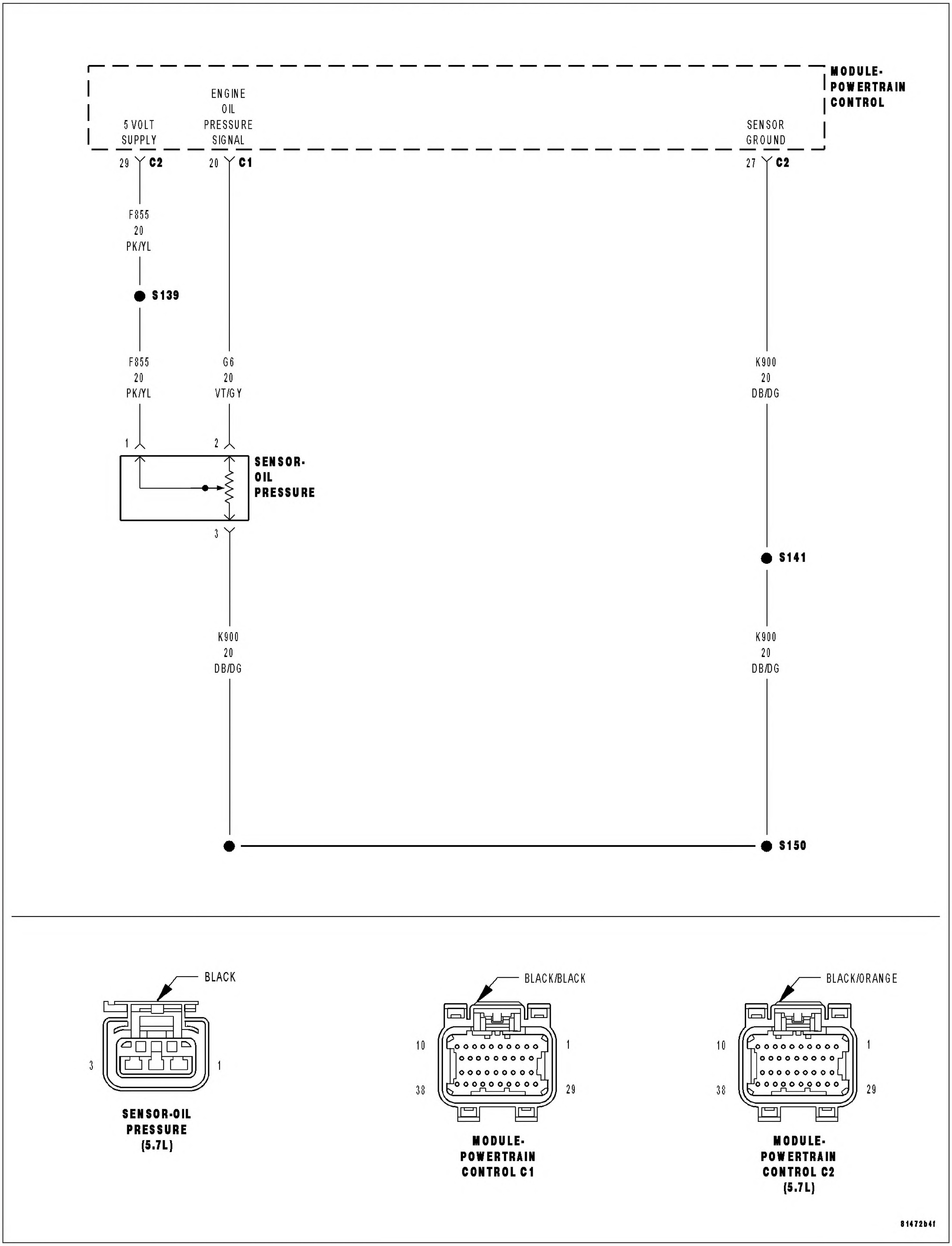
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0521-ENGINE OIL PRESSURE SENSOR PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
5 VOLT SUPPLY
ENGINE OIL PRESSURE SIGNAL
SENSOR GROUND
29 C2
20 C1
27 C2
F855 20 PK/YL
S139
F855 20 PK/YL
G6 20 VT/GY
K900 20 DB/DG
1
2
SENSOR-
OIL
PRESSURE
3
S141
K900 20 DB/DG
K900 20 DB/DG
S150
BLACK
3
1
SENSOR-OIL
PRESSURE
(5.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
81472b41

P0521-ENGINE OIL PRESSURE SENSOR PERFORMANCE (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  The engine oil pressure never reaches the calibrated specification with the engine RPM at 1250.

Possible Causes
ENGINE OIL/ENGINE MECHANICAL
(G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
RESISTANCE (G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT
(G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR RETURN CIRCUIT
ENGINE OIL PRESSURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure that the engine oil is at the proper level. Also, check the customers oil change history to ensure that the oil is being changed at the correct intervals and that the proper oil viscosity is being used.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0521-ENGINE OIL PRESSURE SENSOR PERFORMANCE (CONTINUED)

2. ENGINE OIL/ENGINE MECHANICAL

NOTE: The following items must be considered before determining the cause of this DTC. Failure to do so may lead to misdiagnosis.

- **ENGINE MECHANICAL TOLERANCES OUT OF SPECIFICATION**
- **ENGINE OIL PRESSURE OUT OF SPECIFICATION**
- **LOW ENGINE OIL**
- **OIL DIRTY OR DETERIORATED (Lack of scheduled oil changes)**
- **ENGINE OIL CONTAMINATED (i.e., coolant and/or fuel)**

If any of the above conditions are found, repair as necessary.

Were any of the above conditions present?

Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. (G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

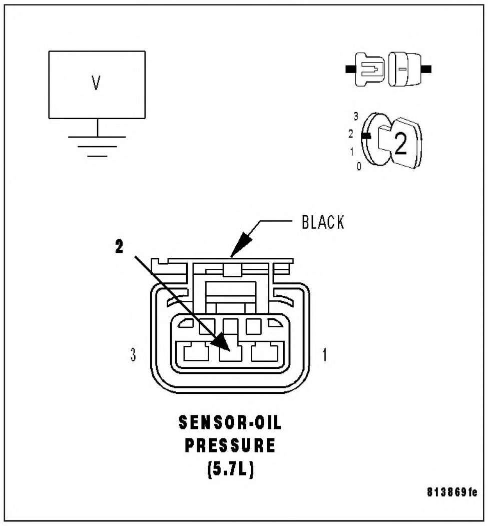
Turn the ignition off.

Disconnect the C1 PCM harness connector.

Disconnect the Engine Oil Pressure Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (G6) Engine Oil Pressure Signal circuit in the Engine Oil Pressure Sensor harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (G6) Engine Oil Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P0521-ENGINE OIL PRESSURE SENSOR PERFORMANCE (CONTINUED)

4. ENGINE OIL PRESSURE SENSOR

Turn the ignition off.

Connect the PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the Engine Oil Pressure Sensor voltage.

Connect a jumper wire between the (K900) Sensor Ground circuit and the (G6) Engine Oil Pressure Signal circuit.

NOTE: Engine Oil Pressure voltage should change from approximately 4.5 volts to less than 0.5 of a volt.

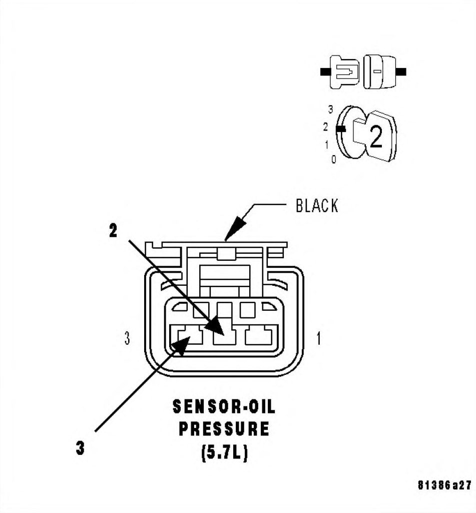
Is the voltage reading within the listed specification when the jumper wire is installed?

Yes >> Remove the Engine Oil Pressure sensor and ensure the oil passage/port is free from any blockage. If OK, replace the Engine Oil Pressure Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

NOTE: Remove the jumper wire before continuing.



---

5. EXCESSIVE RESISTANCE IN THE (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

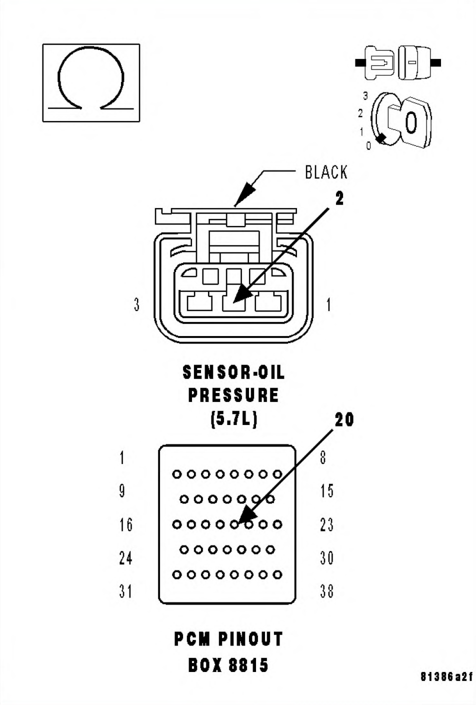
Measure the resistance of the (G6) Engine Oil Pressure Signal circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the excessive resistance in the (G6) Engine Oil Pressure Signal circuit.

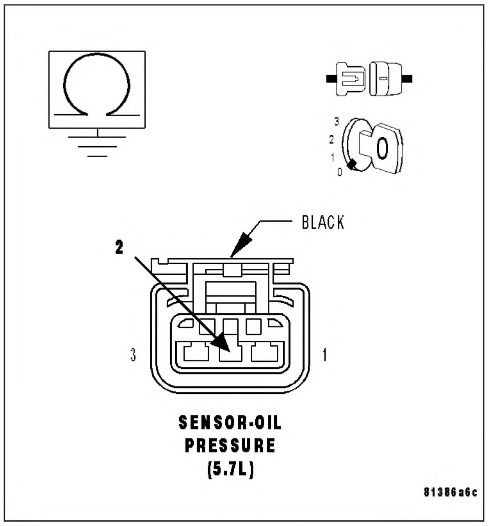
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



P0521-ENGINE OIL PRESSURE SENSOR PERFORMANCE (CONTINUED)

6. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (G6) Engine Oil Pressure Signal circuit Engine Oil Pressure Sensor harness connector.


BLACK
2
3
1
SENSOR-OIL PRESSURE (5.7L)
81386a6c

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (G6) Engine Oil Pressure Signal circuit.

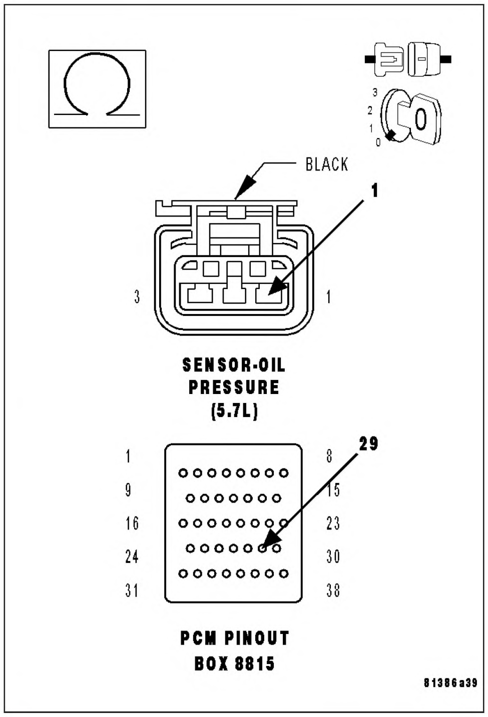
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. EXCESSIVE RESISTANCE IN THE (F855) 5–VOLT SUPPLY CIRCUIT

Measure the resistance of the (F855) 5-volt Supply circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.


BLACK
1
3
1
SENSOR-OIL PRESSURE (5.7L)
1
8
29
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
81386a39

Is the resistance below 5.0 ohms?

Yes >> Go To 8

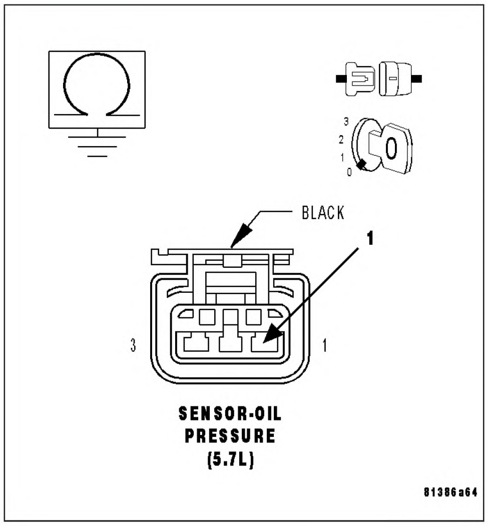
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0521-ENGINE OIL PRESSURE SENSOR PERFORMANCE (CONTINUED)

8. (F855) 5-VOLT SUPPLY SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the Engine Oil Pressure Sensor harness connector.


3
2
1
0
0
BLACK
1
3
1
SENSOR-OIL
PRESSURE
(5.7L)
81386a64

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

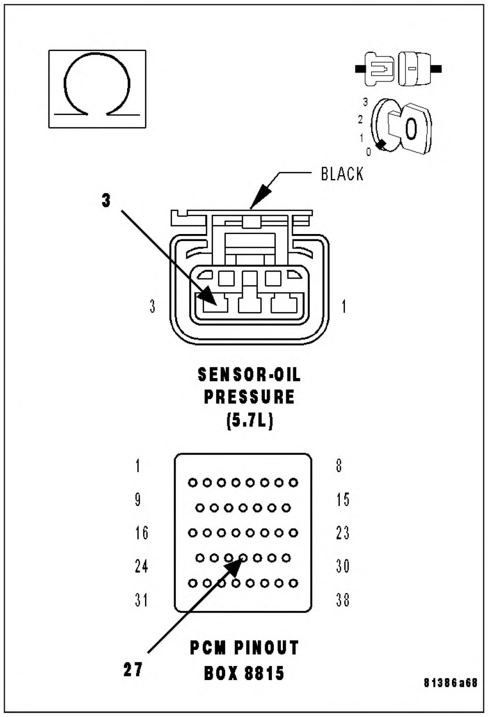
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor Ground circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
BLACK
3
3
1
SENSOR-OIL
PRESSURE
(5.7L)
1
8
9
15
16
23
24
30
31
38
27
PCM PINOUT
BOX 8815
81386a68

Is the resistance below 5.0 ohms?

Yes >> Go To 10

No >> Repair the excessive resistance in the (K900) Sensor Ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0521-ENGINE OIL PRESSURE SENSOR PERFORMANCE (CONTINUED)

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

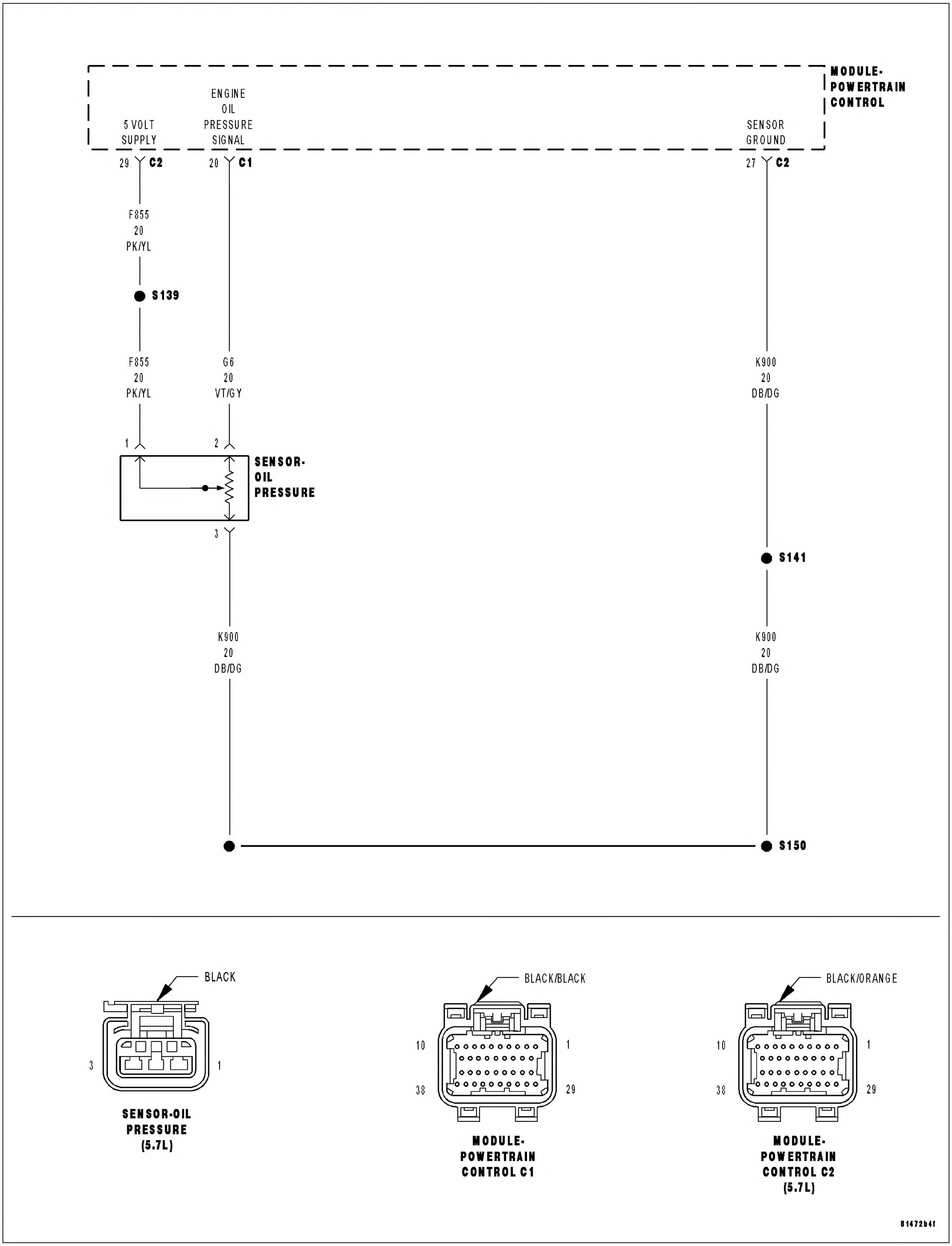
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0522-ENGINE OIL PRESSURE SENSOR CIRCUIT LOW 5.7L


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
ENGINE
OIL
PRESSURE
SIGNAL
SENSOR
GROUND
29 C2
20 C1
27 C2
F855
20
PK/YL
S139
F855
20
PK/YL
G6
20
VT/GY
K900
20
DB/DG
1
2
3
SENSOR-
OIL
PRESSURE
S141
K900
20
DB/DG
K900
20
DB/DG
S150
BLACK
3
1
SENSOR-OIL
PRESSURE
(5.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
81472b41

P0522-ENGINE OIL PRESSURE SENSOR CIRCUIT LOW 5.7L (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  The Oil pressure signal is below the calibrated amount. One Trip Fault. Three good trips to turn off the MIL. ETC light will illuminate.

Possible Causes
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND
(G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
ENGINE OIL PRESSURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure that the engine oil is at the proper level. Also, check the customers oil change history to ensure that the oil is being changed at the correct intervals and that the proper oil viscosity is being used.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Engine Oil Pressure Sensor harness connector.

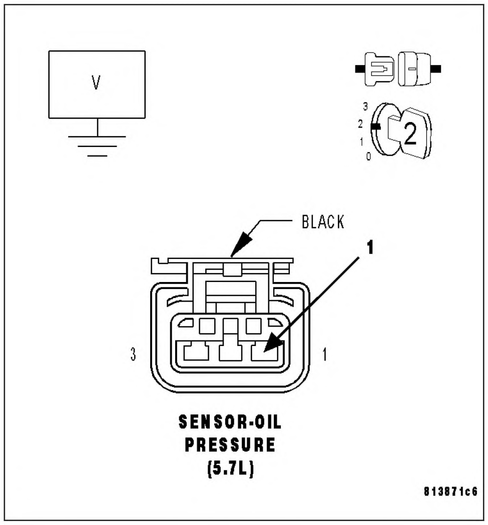
Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the Engine Oil Pressure Sensor harness connector.

Is the voltage between 4.8 to 5.2 volts?

Yes >> Go To 3

No >> Go To 6



P0522-ENGINE OIL PRESSURE SENSOR CIRCUIT LOW 5.7L (CONTINUED)

3. ENGINE OIL PRESSURE SENSOR

With a scan tool, monitor the Engine Oil Pressure Sensor voltage with the Sensor harness connector disconnected.

Is the voltage above 4.5 volts?

Yes >> Replace the Engine Oil Pressure Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

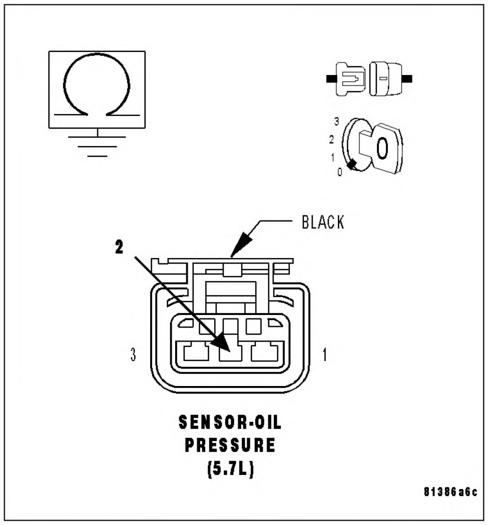
Disconnect the C1 and C2 PCM harness connectors.

Measure the resistance between ground and the (G6) Engine Oil Pressure Signal circuit in the Engine Oil Pressure Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (G6) Engine Oil Pressure Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5



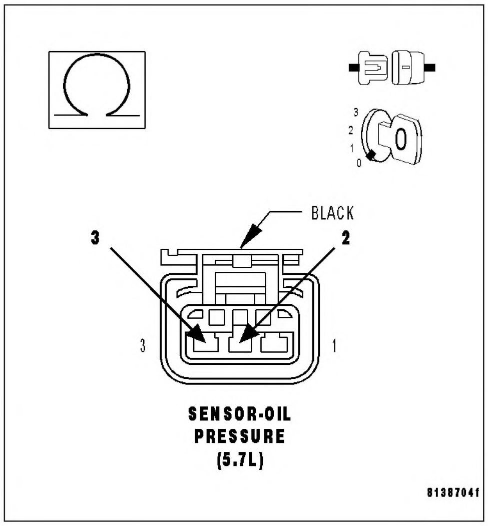
5. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (G6) Engine Oil Pressure Sensor Signal circuit and the (K900) Sensor Ground circuit in the Engine Oil Pressure Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K900) Sensor Ground circuit and the (G6) Engine Oil Pressure Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8



P0522-ENGINE OIL PRESSURE SENSOR CIRCUIT LOW 5.7L (CONTINUED)

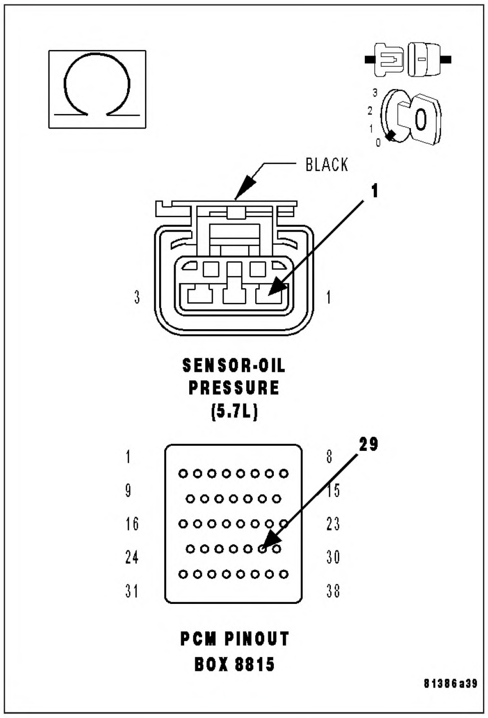
6. (F855) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnostics.

Measure the resistance of the (F855) 5-volt Supply circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.


BLACK
1
3
1
SENSOR-OIL PRESSURE (5.7L)
29
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
81386a39

Is the resistance below 5.0 ohms?

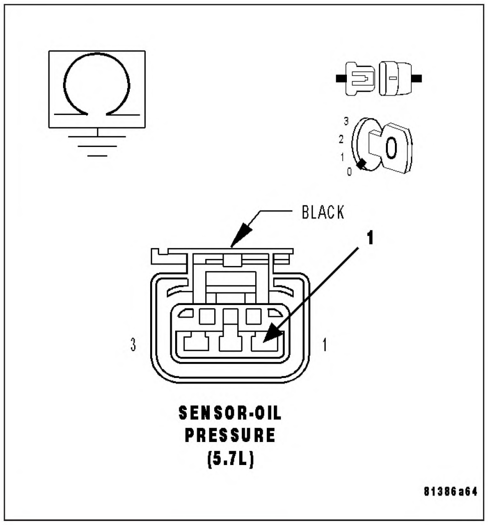
Yes >> Go To 7

No >> Repair the open in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

7. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the Engine Oil Pressure Sensor harness connector.


BLACK
1
3
1
SENSOR-OIL PRESSURE (5.7L)
81386a64

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0522-ENGINE OIL PRESSURE SENSOR CIRCUIT LOW 5.7L (CONTINUED)

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

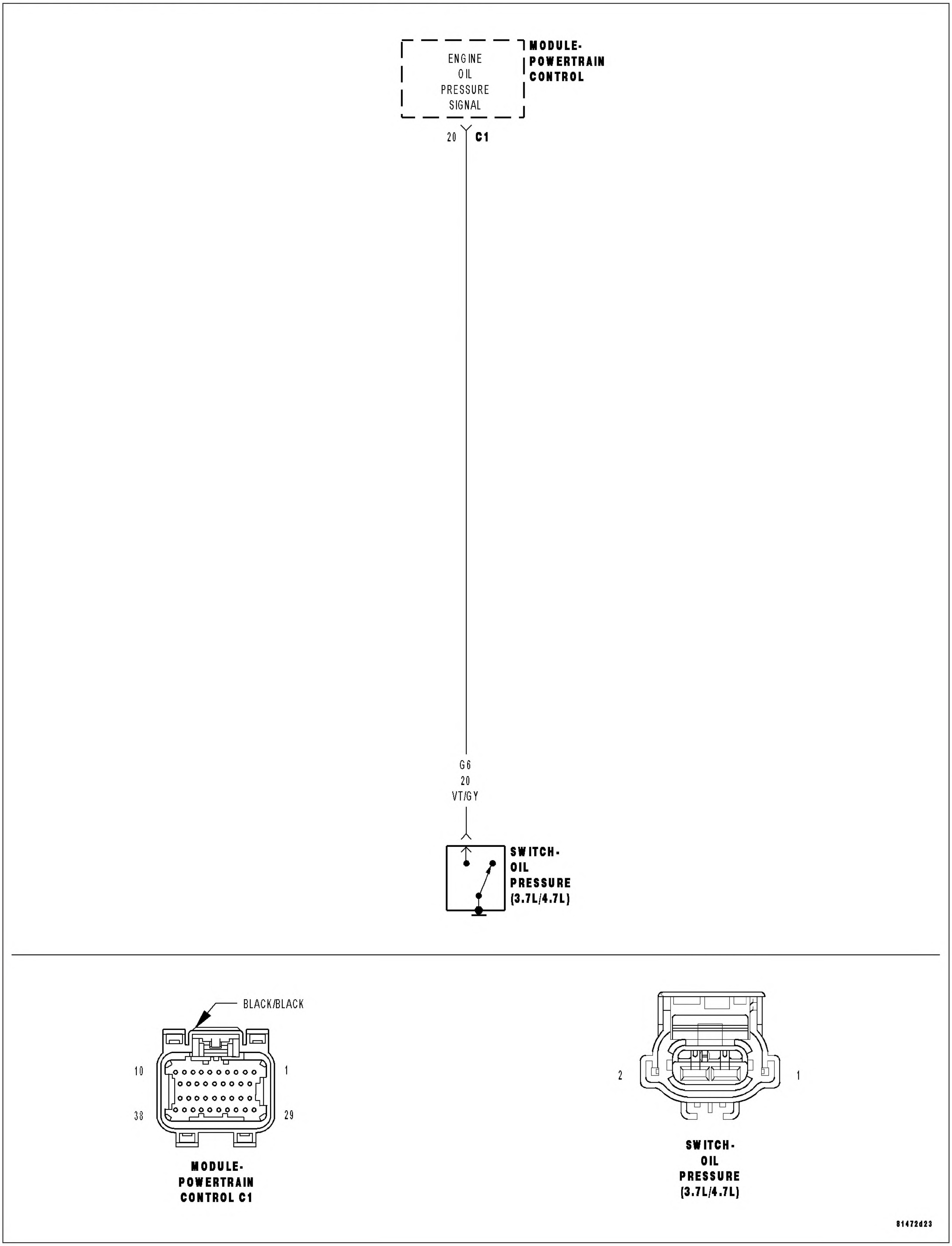
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0522-OIL PRESSURE TOO LOW 3.7L, 4.7L


ENGINE
OIL
PRESSURE
SIGNAL
MODULE-
POWERTRAIN
CONTROL
20
C1
G6
20
VT/GY
SWITCH-
OIL
PRESSURE
(3.7L/4.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
2
1
SWITCH-
OIL
PRESSURE
(3.7L/4.7L)
81472d23

P0522-OIL PRESSURE TOO LOW 3.7L, 4.7L (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on and battery voltage above 10.4 volts.
- **Set Condition:**
  The oil pressure sensor voltage at PCM goes below 0.1 of a volt for 0.5 of a second. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(G6) OIL PRESSURE SIGNAL CIRCUIT OPEN
(G6) OIL PRESSURE SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(G6) OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND
OIL PRESSURE SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0522-OIL PRESSURE TOO LOW 3.7L, 4.7L (CONTINUED)

2. OIL PRESSURE SWITCH

Turn the ignition off.

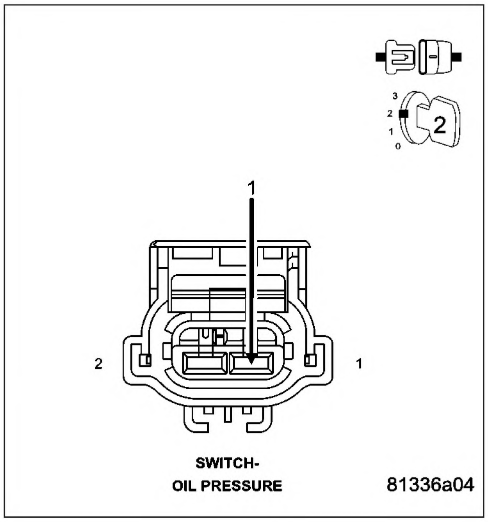
Disconnect the Oil Pressure Switch harness connector.

Ignition on, engine not running.

Connect a jumper wire to the (G6) Oil Pressure Signal circuit in the Sensor harness connector.

With the scan tool monitor the Oil Pressure Switch state.

Touch the other end of the jumper wire to a known good Ground several times.



Did the Oil Pressure Switch state change from High to Low when connecting and disconnecting the jumper wire to ground?

Yes >> Replace the Oil Pressure Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.

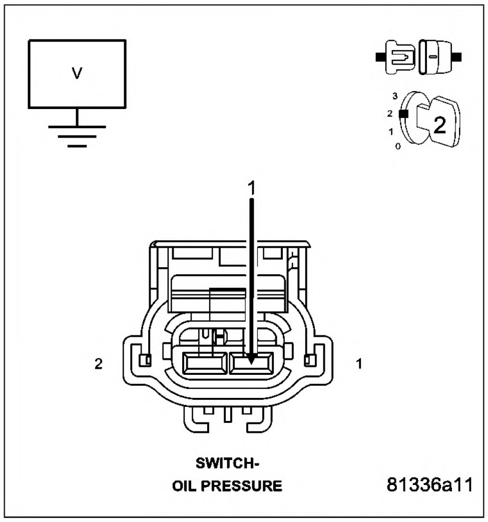
3. (G6) OIL PRESSURE SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (G6) Oil Pressure Signal circuit in the Switch harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage on the (G6) Oil Pressure Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

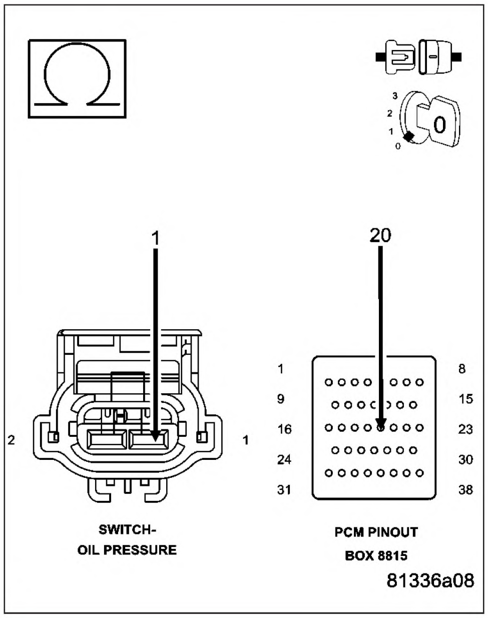
No >> Go To 4

P0522-OIL PRESSURE TOO LOW 3.7L, 4.7L (CONTINUED)

4. (G6) OIL PRESSURE SWITCH SIGNAL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (G6) Oil Pressure Signal circuit from the Oil Pressure Switch harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

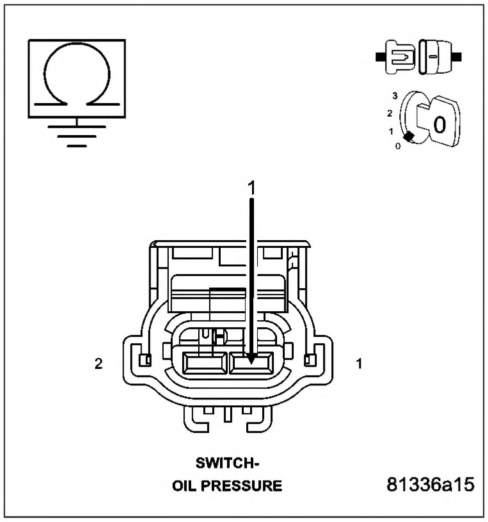
No >> Repair the open in the (G6) Oil Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (G6) SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between a known good ground and the (G6) Oil Pressure Signal circuit in the Switch connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (G6) Oil Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0522-OIL PRESSURE TOO LOW 3.7L, 4.7L (CONTINUED)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

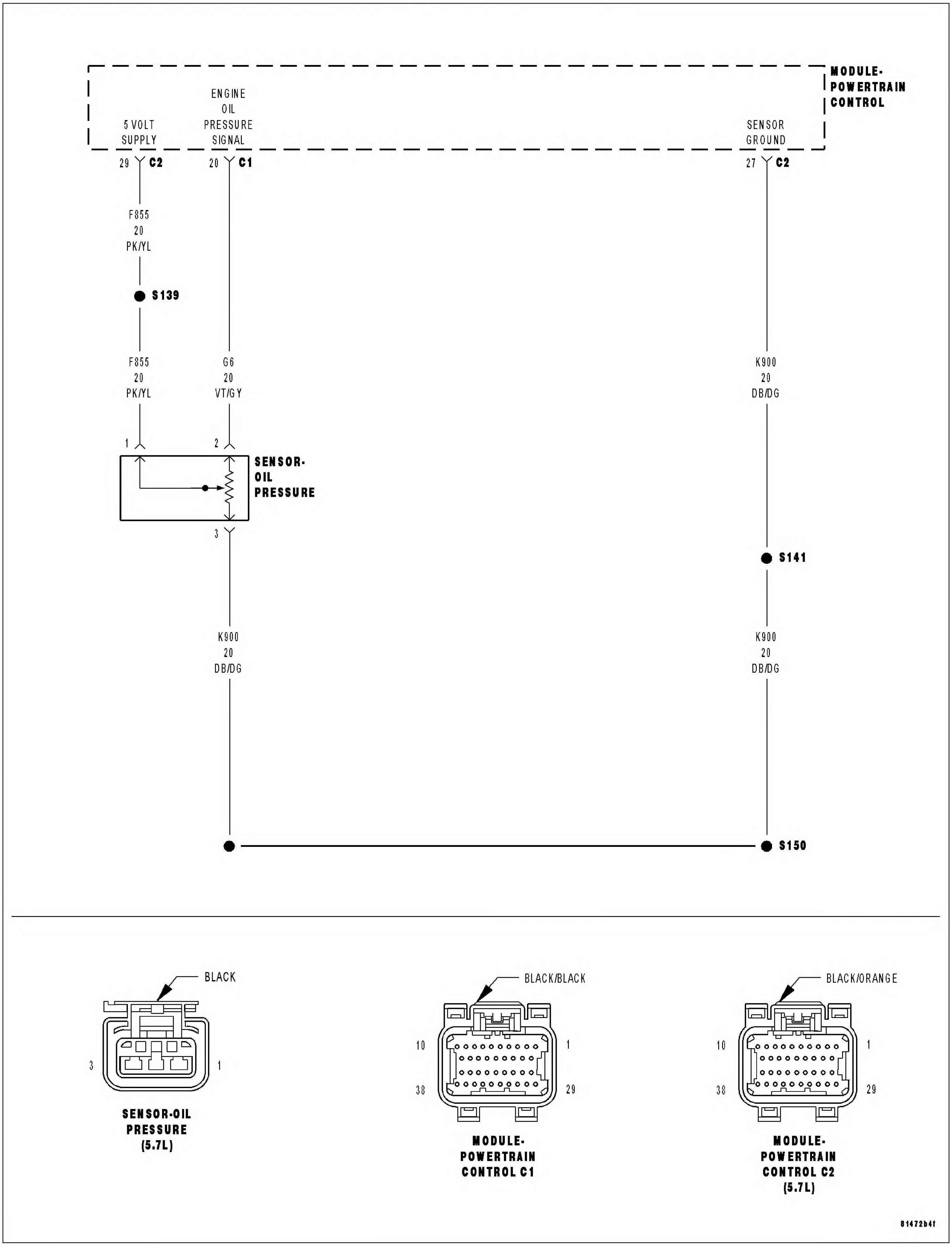
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0523-ENGINE OIL PRESSURE SENSOR CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
ENGINE
OIL
PRESSURE
SIGNAL
5 VOLT
SUPPLY
SENSOR
GROUND
29 C2
20 C1
27 C2
F855
20
PK/YL
S139
F855
20
PK/YL
G6
20
VT/GY
K900
20
DB/DG
1
2
SENSOR-
OIL
PRESSURE
3
S141
K900
20
DB/DG
K900
20
DB/DG
S150
BLACK
3
1
SENSOR-OIL
PRESSURE
(5.7L)
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
81472b41

P0523-ENGINE OIL PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts.
- **Set Condition:**
  The Engine Oil pressure signal is greater than the calibrated amount. One Trip Fault.

Possible Causes
(G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT OPEN
(G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K900) SENSOR GROUND CIRCUIT OPEN
ENGINE OIL PRESSURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure that the engine oil is at the proper level. Also, check the customers oil change history to make sure that the oil is being changed at the correct intervals and that the proper oil viscosity is being used.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0523-ENGINE OIL PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

2. ENGINE OIL PRESSURE SENSOR

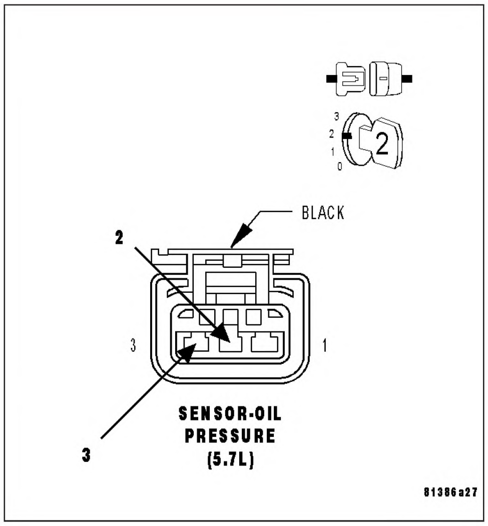
Turn the ignition off.

Disconnect the Engine Oil Pressure Sensor harness connector.

Connect a jumper wire between the (G6) Engine Oil Pressure Signal circuit and the (K900) Sensor Ground circuit in the Engine Oil Pressure Sensor harness connector.

With a scan tool, monitor the Engine Oil Pressure Sensor voltage.

Ignition on, engine not running.



Is the voltage below 0.5 of a volt with the jumper wire installed?

Yes >> Replace the Engine Oil Pressure Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.

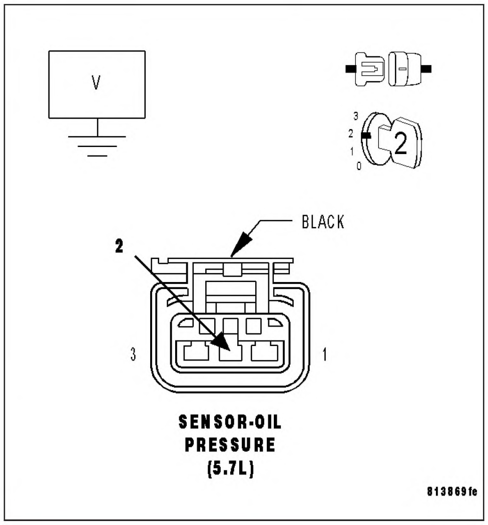
3. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 and C2 PCM harness connectors.

Ignition on, engine not running.

Measure the voltage on the (G6) Engine Oil Pressure Signal circuit in the Engine Oil Pressure Sensor harness connector.



Is there any voltage present?

Yes >> Repair the short to battery voltage in the (G6) Engine Oil Pressure Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

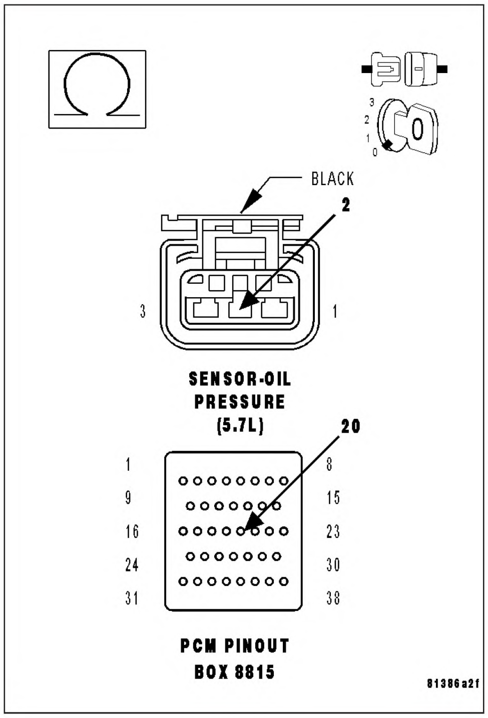
P0523-ENGINE OIL PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

4. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (G6) Engine Oil Pressure Signal circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.


BLACK
2
3
1
SENSOR-OIL PRESSURE (5.7L)
20
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
81386a21
3
2
1
0

Is the resistance below 5.0 ohms?

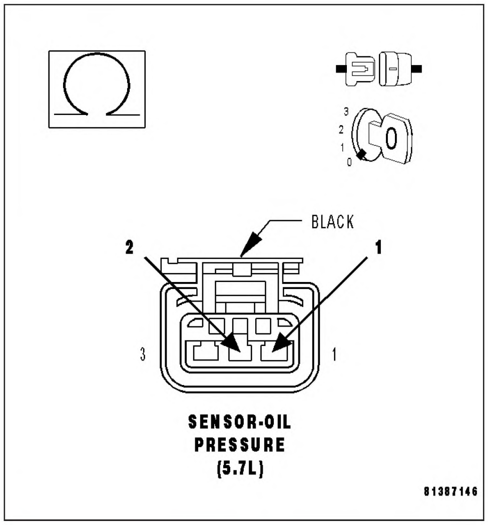
Yes >> Go To 5

No >> Repair the open in the (G6) Engine Oil Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

5. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (G6) Engine Oil Pressure Signal circuit and the (F855) 5-volt Supply circuit in the Engine Oil Pressure Sensor harness connector.


3
2
1
0
BLACK
2
1
3
1
SENSOR-OIL PRESSURE (5.7L)
81387146

Is the resistance below 100 ohms?

Yes >> Repair the short between the (F855) 5-volt Supply circuit and the (G6) Engine Oil Pressure Signal circuit.

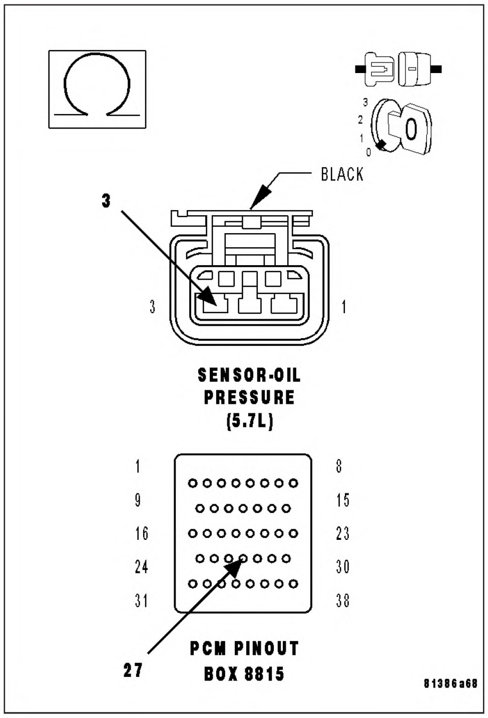
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0523-ENGINE OIL PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

6. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor Ground circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K900) Sensor Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

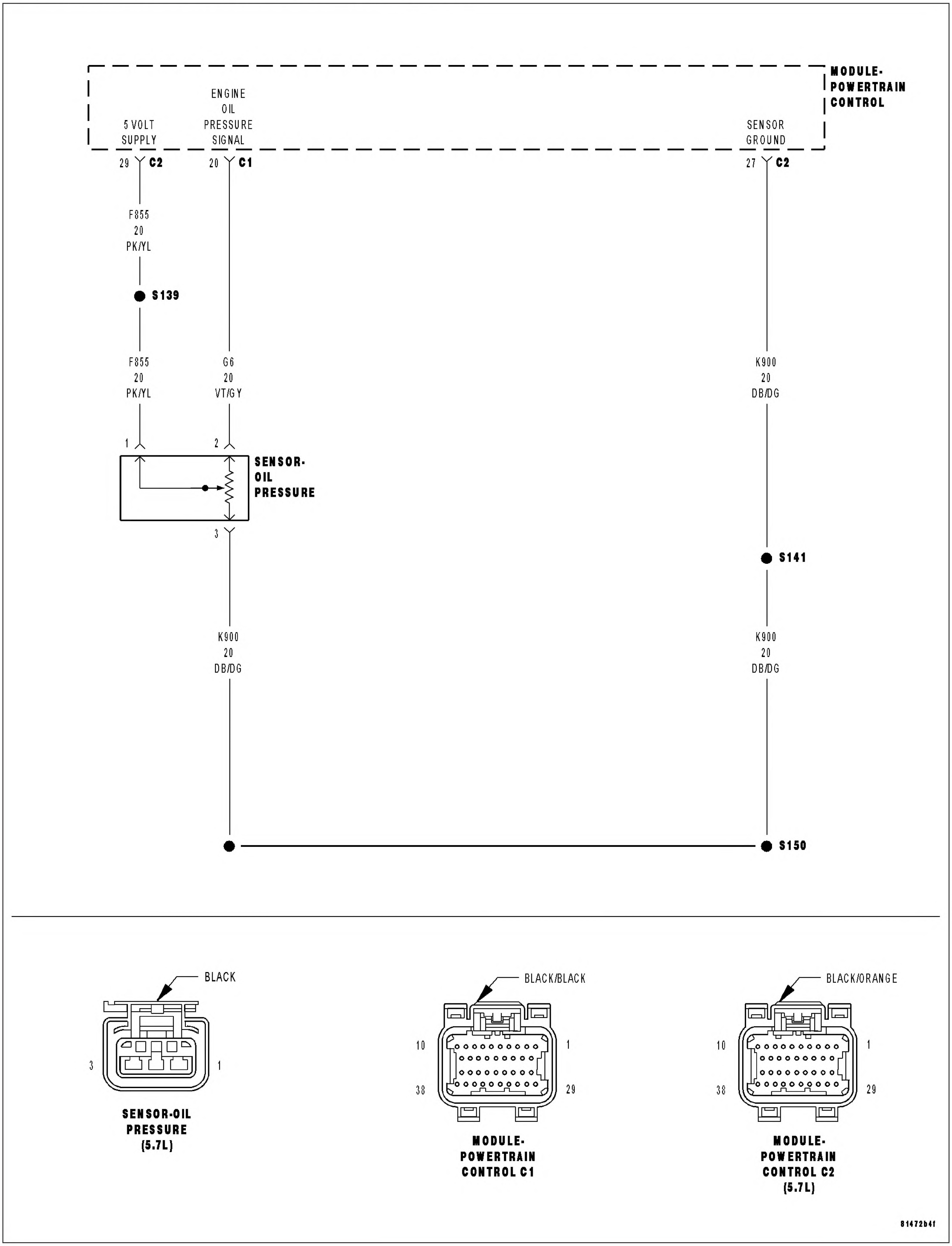
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0524-ENGINE OIL PRESSURE TOO LOW


MODULE-
POWERTRAIN
CONTROL
5 VOLT SUPPLY
ENGINE OIL PRESSURE SIGNAL
SENSOR GROUND
29 C2
20 C1
27 C2
F855
20
PK/YL
S139
F855
20
PK/YL
G6
20
VT/GY
K900
20
DB/DG
1
2
3
SENSOR-
OIL
PRESSURE
S141
K900
20
DB/DG
K900
20
DB/DG
S150
BLACK
3
1
SENSOR-OIL PRESSURE (5.7L)
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
81472b41

P0524-ENGINE OIL PRESSURE TOO LOW (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  The engine oil pressure never reaches the calibrated specification to allow the MDS activation.

Possible Causes
ENGINE OIL/ENGINE MECHANICAL
(G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
RESISTANCE (G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT
(G6) ENGINE OIL PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR RETURN CIRCUIT
ENGINE OIL PRESSURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure that the engine oil is at the proper level. Also, check the customers oil change history to make sure that the oil is being changed at the correct intervals and that the proper oil viscosity is being used.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0524-ENGINE OIL PRESSURE TOO LOW (CONTINUED)

2. ENGINE OIL/ENGINE MECHANICAL

NOTE: The following items must be considered before determining the cause of this DTC. Failure to do so may lead to misdiagnosis.

- **ENGINE MECHANICAL TOLERANCES OUT OF SPECIFICATION**
- **ENGINE OIL PRESSURE OUT OF SPECIFICATION**
- **LOW ENGINE OIL**
- **OIL DIRTY OR DETERIORATED (Lack of scheduled oil changes)**
- **CORRECT VISCOSITY**
- **ENGINE OIL CONTAMINATED (i.e., coolant and/or fuel)**

If any of the above conditions are found, repair as necessary.

Were any of the above conditions present?

Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. ENGINE OIL PRESSURE SENSOR

Turn the ignition off.

Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the Engine Oil Pressure Sensor voltage.

Connect a jumper wire between the (K900) Sensor Ground circuit and the (G6) Engine Oil Pressure Signal circuit.

NOTE: Engine Oil Pressure voltage should change from approximately 4.5 volts to less than 0.5 of a volt.

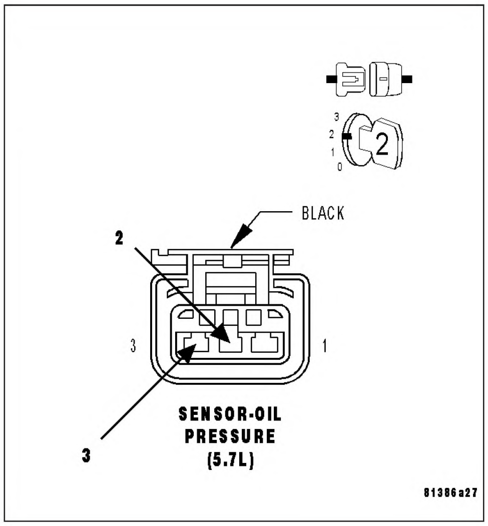
Is the voltage reading within the listed specification when the jumper wire is installed?

Yes >> Remove the Engine Oil Pressure sensor and ensure the oil passage/port is free from any blockage. If OK, replace the Engine Oil Pressure Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.



P0524-ENGINE OIL PRESSURE TOO LOW (CONTINUED)

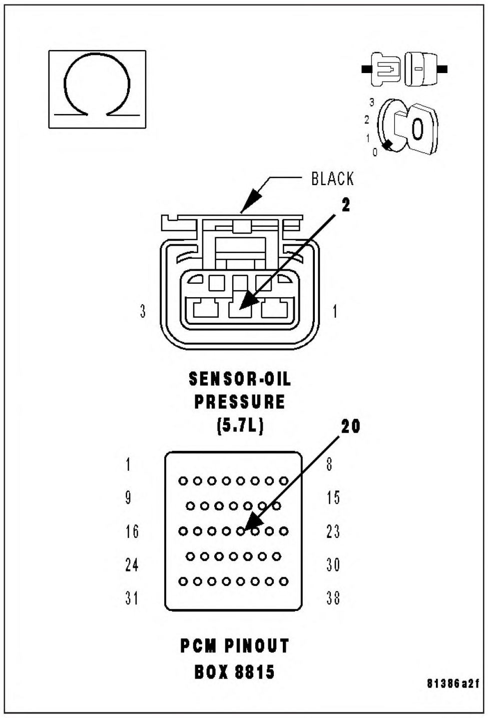
4. EXCESSIVE RESISTANCE IN THE (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (G6) Engine Oil Pressure Signal circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

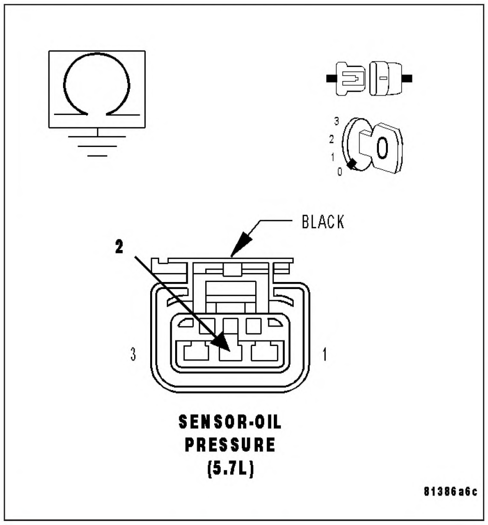
No >> Repair the excessive resistance in the (G6) Engine Oil Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (G6) ENGINE OIL PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (G6) Engine Oil Pressure Signal circuit in the Engine Oil Pressure Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (G6) Engine Oil Pressure Signal circuit.

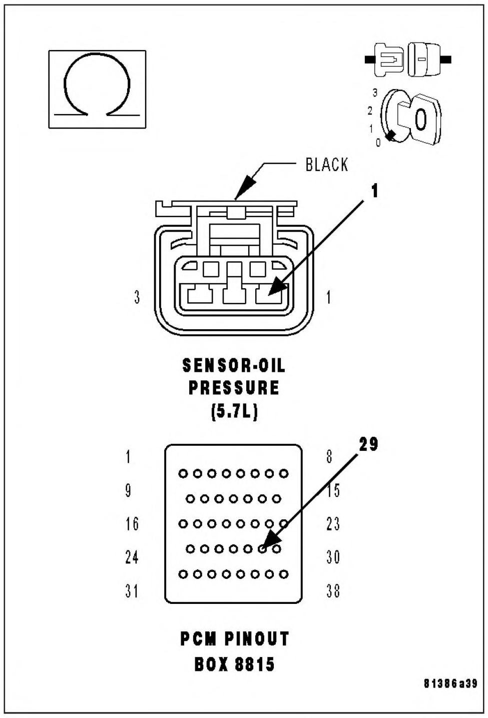
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0524-ENGINE OIL PRESSURE TOO LOW (CONTINUED)

6. EXCESSIVE RESISTANCE IN THE (F855) 5–VOLT SUPPLY CIRCUIT

Measure the resistance of the (F855) 5-volt Supply circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.


BLACK
1
3
1
SENSOR-OIL PRESSURE (5.7L)
29
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
81386a39

Is the resistance below 5.0 ohms?

Yes >> Go To 7

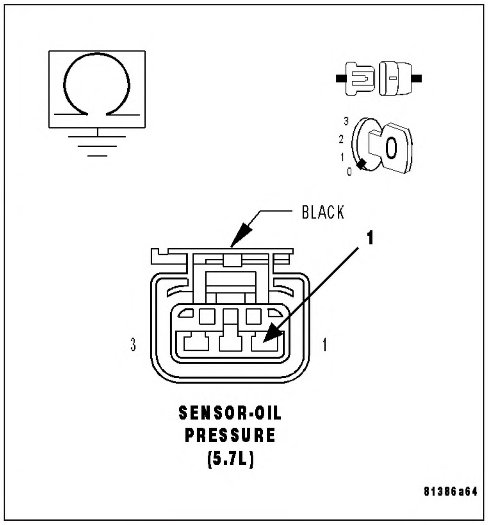
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (F855) 5-VOLT SUPPLY SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the Engine Oil Pressure Sensor harness connector.


BLACK
1
3
1
SENSOR-OIL PRESSURE (5.7L)
81386a64

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

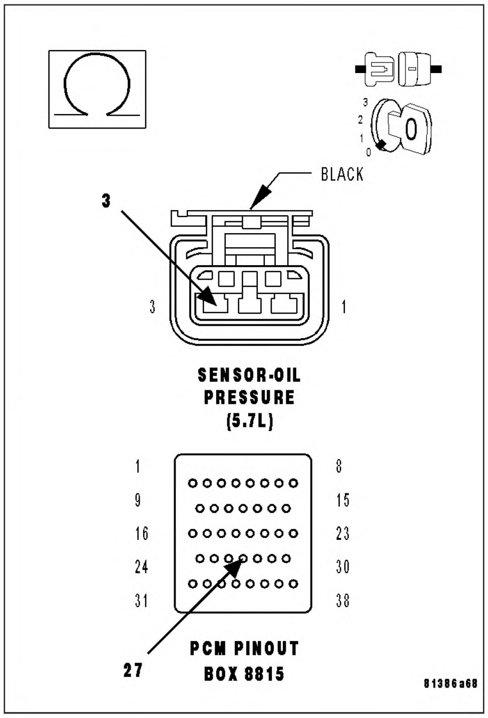
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0524-ENGINE OIL PRESSURE TOO LOW (CONTINUED)

8. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor Ground circuit from the Engine Oil Pressure Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the excessive resistance in the (K900) Sensor Ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

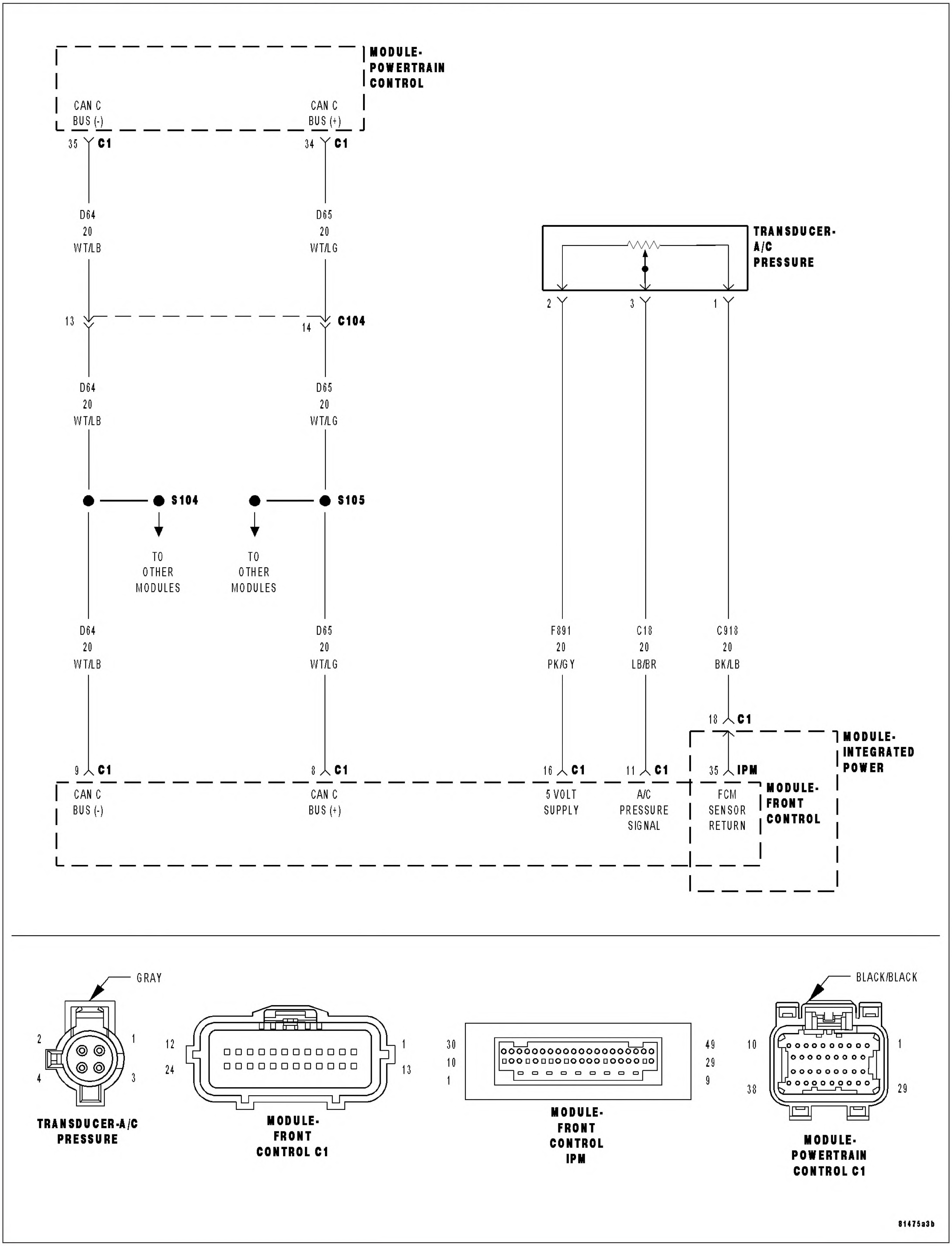
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0532-A/C PRESSURE SENSOR CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
D64
20
WT/LB
D65
20
WT/LG
TRANSDUCER-
A/C
PRESSURE
2
3
1
13
14 C104
D64
20
WT/LB
D65
20
WT/LG
S104
S105
TO
OTHER
MODULES
TO
OTHER
MODULES
D64
20
WT/LB
D65
20
WT/LG
F891
20
PK/GY
C18
20
LB/BR
C918
20
BK/LB
18 C1
MODULE-
INTEGRATED
POWER
9 C1
8 C1
16 C1
11 C1
35 IPM
MODULE-
FRONT
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
5 VOLT
SUPPLY
A/C
PRESSURE
SIGNAL
FCM
SENSOR
RETURN
GRAY
2
1
4
3
TRANSDUCER-A/C
PRESSURE
12
24
1
13
MODULE-
FRONT
CONTROL C1
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
81475a3b

P0532-A/C PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running, AC is learned, and AC Clutch Relay energized.
- **Set Condition:**
  The A/C pressure transducer signal voltage at the PCM goes below 0.58 of a volt for 2.6 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F891) 5-VOLT SUPPLY CIRCUIT OPEN
(F891) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
A/C PRESSURE TRANSDUCER
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO THE (C918) SENSOR RETURN CIRCUIT
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. A/C PRESSURE TRANSDUCER VOLTAGE BELOW 0.6 OF A VOLT

NOTE: Make sure the A/C refrigerant System is properly charged per Service Information.

Start the engine.

With a scan tool, read the A/C Pressure Sensor voltage.

Is the voltage below 0.6 of a volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F891) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the A/C Pressure Transducer harness connector.

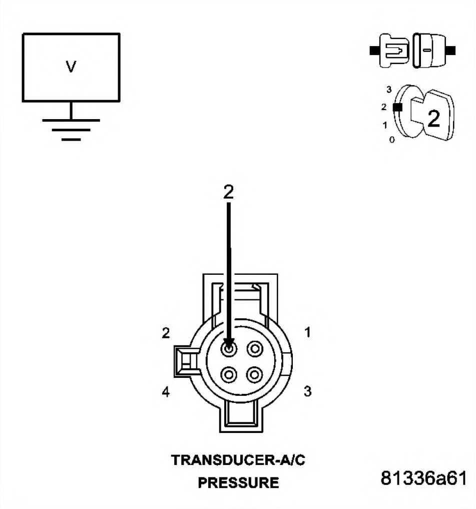
Ignition on, engine not running.

Measure the voltage on the (F891) 5-volt Supply circuit in the A/C Pressure Transducer harness connector.

Is the voltage between 4.5 to 5.2 volts?

Yes >> Go To 3

No >> Go To 6



P0532-A/C PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

3. A/C PRESSURE TRANSDUCER

With the scan tool, monitor the A/C Pressure Transducer voltage.

Is the voltage above 0.6 of a volt?

Yes >> Replace the A/C Pressure Transducer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

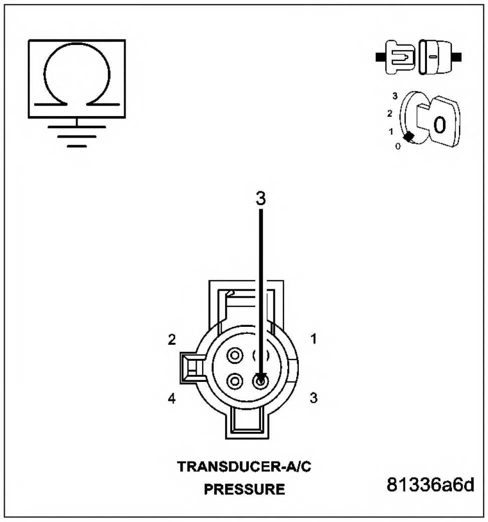
Disconnect the C1 FCM harness connector.

Measure the resistance between ground and the (C18) A/C Pressure Signal circuit in the A/C Pressure Transducer harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (C18) A/C Pressure Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5



---

5. (C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO THE (C918) SENSOR RETURN CIRCUIT

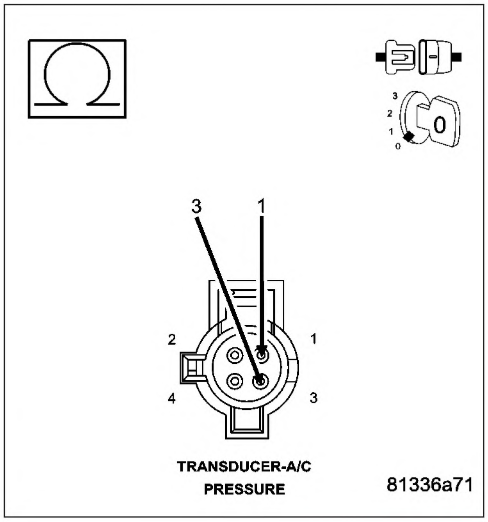
Disconnect the IPM FCM harness connector.

Measure the resistance between the (C18) A/C Pressure Signal circuit and the (C918) Sensor Return circuit in the A/C Pressure Transducer harness connector.

Is the resistance below 100 ohms?

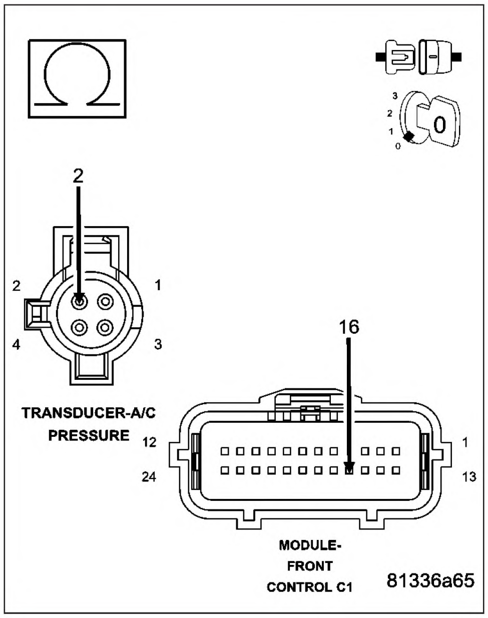
Yes >> Repair the short between the (C918) Sensor Return circuit and the (C18) A/C Pressure Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8



P0532-A/C PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

6. (F891) 5-VOLT SUPPLY CIRCUIT OPEN



2
2
1
4
3
TRANSDUCER-A/C PRESSURE
16
12
1
24
13
MODULE-FRONT CONTROL C1
81336a65

Turn the ignition off.

Disconnect the C1 FCM harness connector.

Measure the resistance of the (F891) 5-volt Supply circuit from the A/C Pressure Transducer harness connector to the C1 FCM harness connector.

Is the resistance below 5.0 ohms?

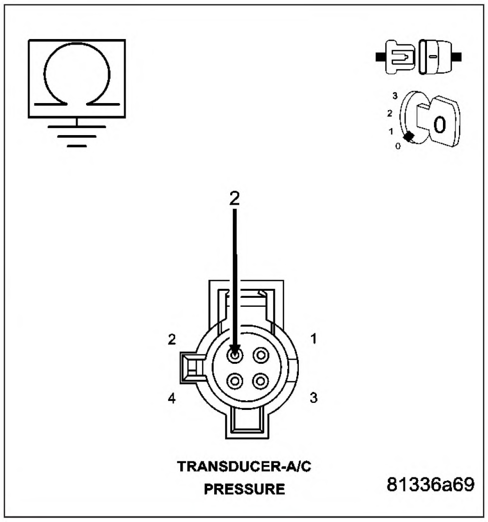
Yes >> Go To 7

No >> Repair the open in the (F891) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (F891) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND



2
2
1
4
3
TRANSDUCER-A/C PRESSURE
81336a69

Measure the resistance between ground and the (F891) 5-volt Supply circuit in the A/C Pressure Transducer harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F891) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0532-A/C PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

8. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

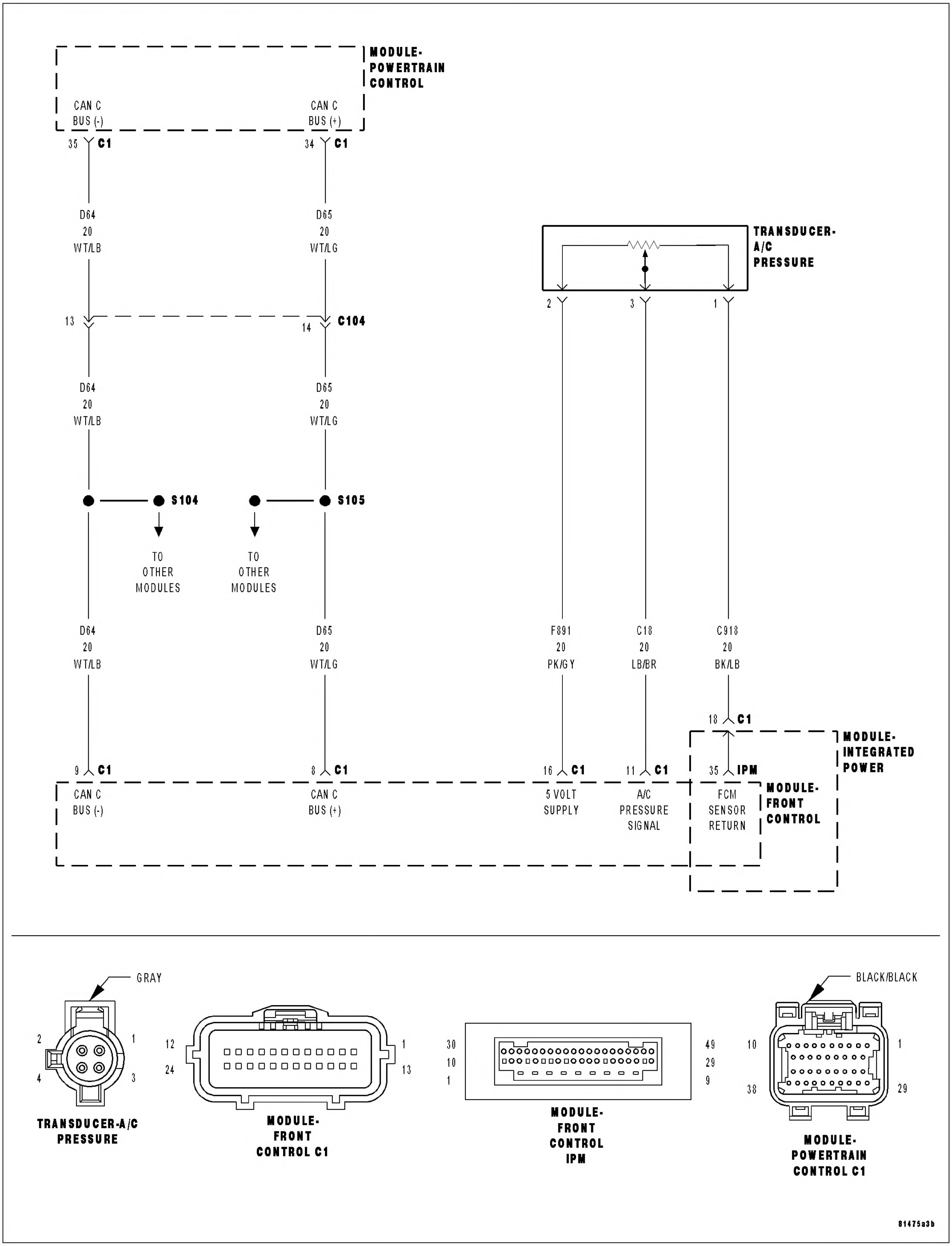
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

No >> Replace and program the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0533-A/C PRESSURE SENSOR CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
D64
20
WT/LB
D65
20
WT/LG
TRANSDUCER-
A/C
PRESSURE
2
3
1
13
14
C104
D64
20
WT/LB
D65
20
WT/LG
S104
S105
TO
OTHER
MODULES
TO
OTHER
MODULES
D64
20
WT/LB
D65
20
WT/LG
F891
20
PK/GY
C18
20
LB/BR
C918
20
BK/LB
18 C1
MODULE-
INTEGRATED
POWER
9 C1
8 C1
16 C1
11 C1
35 IPM
MODULE-
FRONT
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
5 VOLT
SUPPLY
A/C
PRESSURE
SIGNAL
FCM
SENSOR
RETURN
GRAY
2
1
4
3
TRANSDUCER-A/C
PRESSURE
12
24
1
13
MODULE-
FRONT
CONTROL C1
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
81475a3b

P0533-A/C PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and the A/C Clutch Relay energized.
- **Set Condition:**
  The A/C pressure transducer signal at the PCM goes above 4.92 volts. One trip Fault. Three good trips to turn off the MIL.

Possible Causes
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(C18) A/C PRESSURE SIGNAL CIRCUIT OPEN
(C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO THE (F891) 5-VOLT SUPPLY CIRCUIT
(C918) SENSOR RETURN CIRCUIT OPEN
A/C PRESSURE TRANSDUCER
FCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. A/C PRESSURE TRANSDUCER VOLTAGE ABOVE 4.9 VOLTS

NOTE: Make sure the A/C refrigerant System is properly charged per Service Information.

Start the engine.

With a scan tool, read the A/C Pressure Sensor voltage.

Is the voltage above 4.9 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0533-A/C PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

2. A/C PRESSURE TRANSDUCER

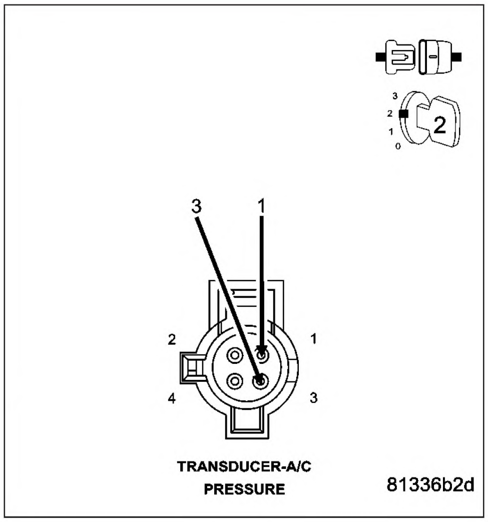
Turn the ignition off.

Disconnect the A/C Pressure Transducer harness connector.

Connect a jumper wire between the (C18) A/C Pressure Signal circuit and the (C918) Sensor Return circuit in the Transducer harness connector.

Ignition on, engine not running.

With the scan tool, monitor the A/C Pressure Transducer voltage.



Is the voltage below 1.0 volt with the jumper wire installed?

Yes >> Replace the A/C Pressure Transducer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

NOTE: Remove the jumper wire before continuing.

---

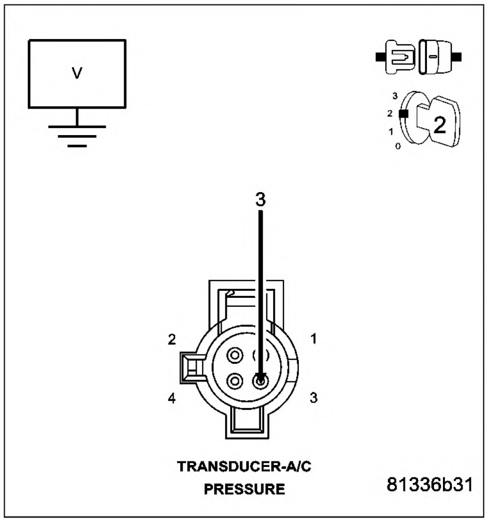
3. (C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1 FCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (C18) A/C Pressure Signal circuit in the A/C Pressure Transducer harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (C18) A/C Pressure Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

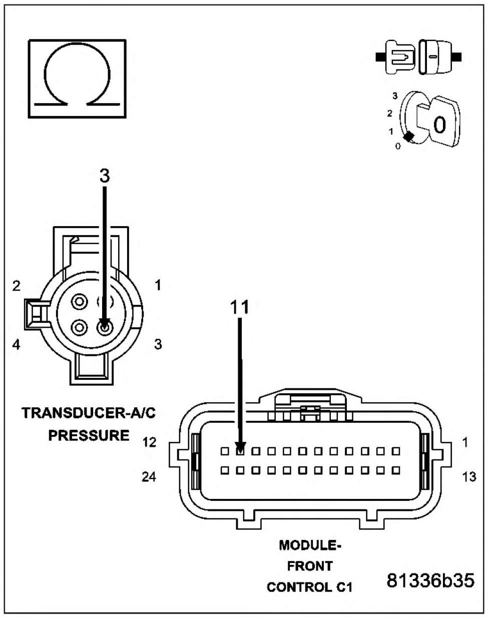
No >> Go To 4

P0533-A/C PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

4. (C18) A/C PRESSURE SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (C18) A/C Pressure Signal circuit from the A/C Pressure Transducer harness connector to the C1 FCM harness connector.


3
2
1
4
3
11
TRANSDUCER-A/C PRESSURE
12
24
1
13
MODULE-FRONT CONTROL C1
81336b35

Is the resistance below 5.0 ohms?

Yes >> Go To 5

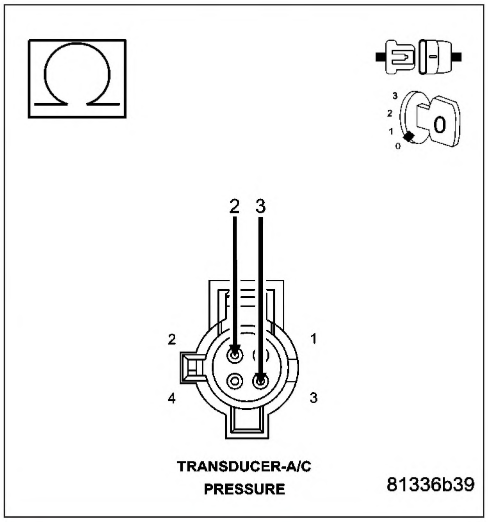
No >> Repair the open in the (C18) A/C Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (C18) A/C PRESSURE SIGNAL CIRCUIT SHORTED TO THE (F891) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (C18) A/C Pressure Signal circuit and the (F891) 5-volt Supply circuit in the A/C Pressure Transducer harness connector.


2 3
2
1
4
3
TRANSDUCER-A/C PRESSURE
81336b39

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (F891) 5-volt Supply circuit and the (C18) A/C Pressure Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

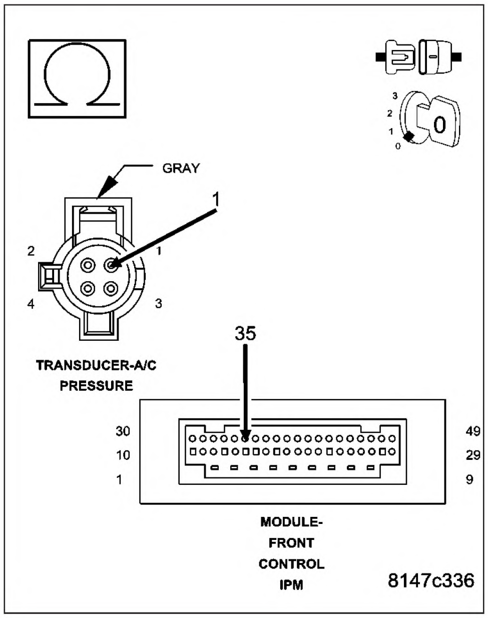
No >> Go To 6

P0533-A/C PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

6. (C918) SENSOR RETURN CIRCUIT OPEN

Disconnect the IPM FCM harness connector.

Measure the resistance of the (C918) Sensor Return circuit from the A/C Pressure Sensor harness connector to the IPM FCM harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (C918) Sensor Return circuit
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

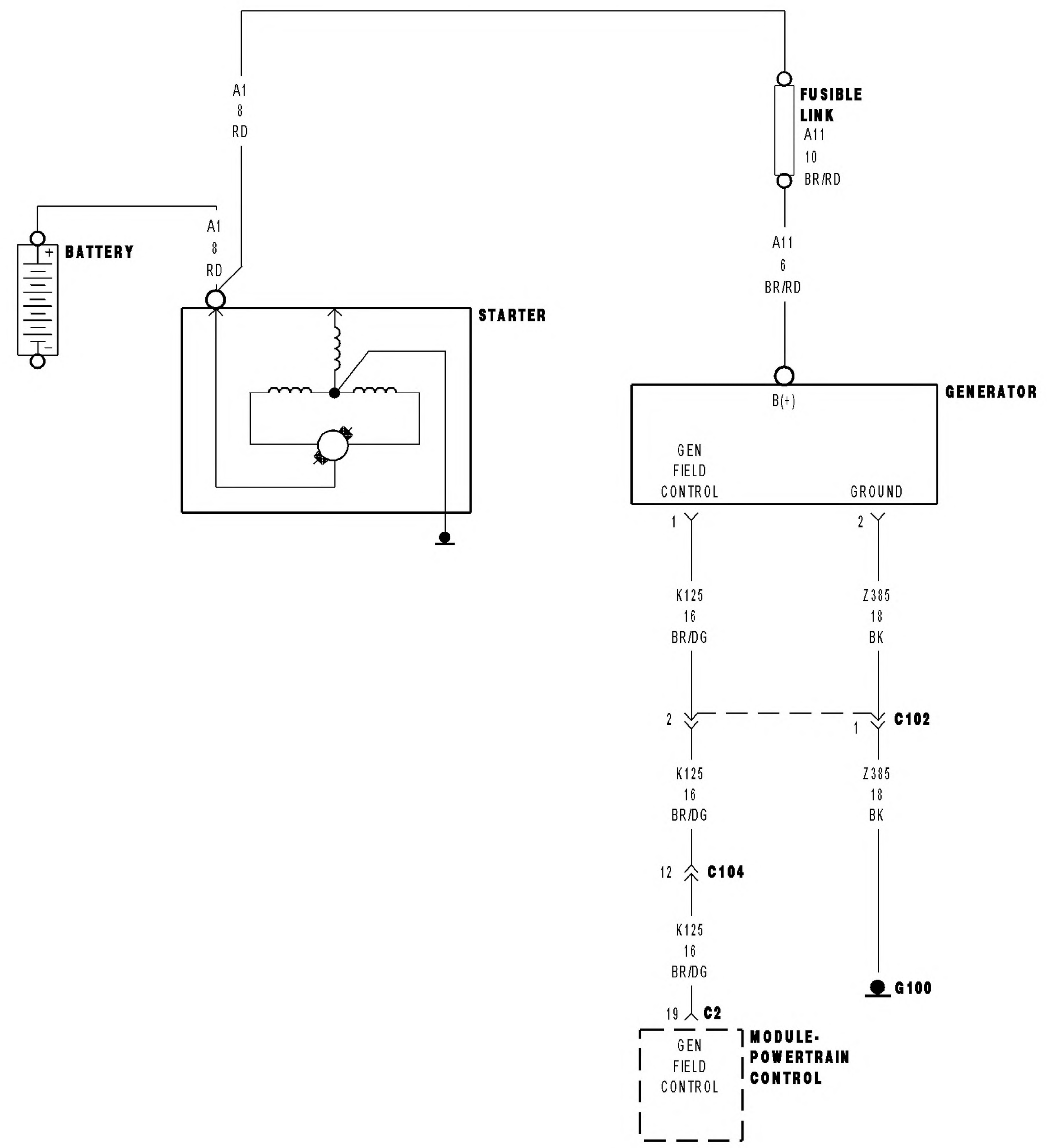
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

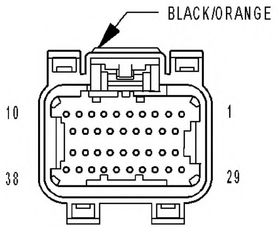
Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

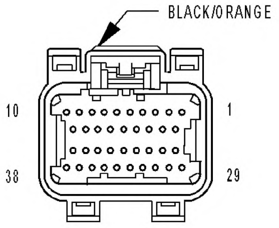
No >> Replace and program the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST - VER 1.

P0562-BATTERY VOLTAGE LOW

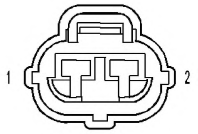

A1
8
RD
FUSIBLE
LINK
A11
10
BR/RD
BATTERY
A1
8
RD
A11
6
BR/RD
STARTER
GENERATOR
B(+)
GEN
FIELD
CONTROL
GROUND
1
2
K125
16
BR/DG
Z385
18
BK
2
1
C102
K125
16
BR/DG
Z385
18
BK
12
C104
K125
16
BR/DG
G100
19
C2
GEN
FIELD
CONTROL
MODULE-
POWERTRAIN
CONTROL


BLACK/ORANGE
10
1
38
29

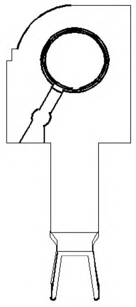
MODULE-POWERTRAIN CONTROL C2 (5.7L)


BLACK/ORANGE
10
1
38
29

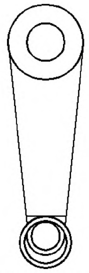
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)



GENERATOR (GAS)



BATTERY-POSITIVE (GAS)



GENERATOR EYELET (GAS)

81472f3e

P0562-BATTERY VOLTAGE LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The engine running. The engine speed greater than 1000 RPM.
- **Set Condition:**
  Battery voltage is 1 volt less than desired voltage for a set period of time. One Trip Fault. ETC light is flashing.

Possible Causes
RESISTANCE IN THE (A11) BATTERY POSITIVE CIRCUIT
RESISTANCE IN THE GENERATOR CASE GROUND
GENERATOR OPERATION
(K125) GENERATOR FIELD CONTROL CIRCUIT OPEN
(K125) GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND
(Z385) GROUND CIRCUIT OPEN
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.

NOTE: Inspect the vehicle for after market accessories that may exceed the Generator System output.
Turn the ignition off.

NOTE: Make sure the generator drive belt is in good operating condition.

NOTE: Inspect the fuses in the IPM. If an open fuse is found, use the wire diagram/schematic as a guide, inspect the wiring and connectors for damage.
Ignition on, engine not running.
With the scan tool, read DTCs.

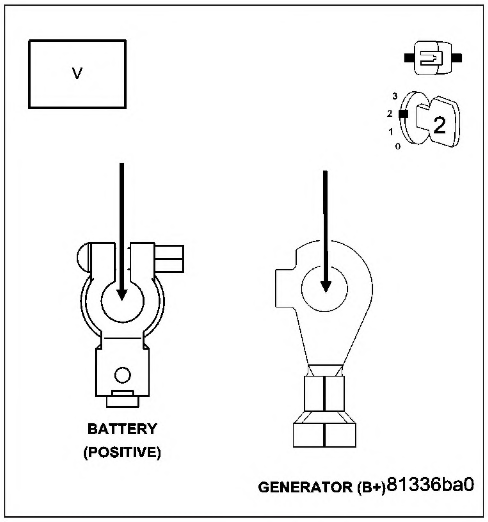
Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0562-BATTERY VOLTAGE LOW (CONTINUED)

2. (A11) B+ CIRCUIT HIGH RESISTANCE



81336ba0

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

NOTE: Make sure all wires are clear of the engine's moving parts.

Measure the voltage between the (A11) B+ Terminal at the Generator and the Battery + Post.

Start the engine.

Is the voltage above 0.4 of a volt?

Yes >> Repair the excessive resistance in the (A11) B+ circuit between the Generator and Battery.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

3. GENERATOR CASE GROUND HIGH RESISTANCE

Ignition on, engine not running.

Start the engine.

Allow the engine to reach normal operating temperature.

NOTE: Make sure all wires are clear of the engine's moving parts.

Measure the voltage between the Generator case and Battery ground post.

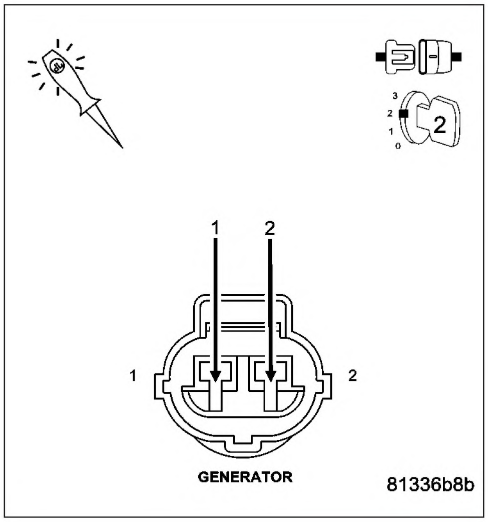
Is the voltage above 0.1 of a volt?

Yes >> Repair excessive resistance in the Generator Ground between the Generator Case and Battery ground side.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. GENERATOR OPERATION



81336b8b

Turn the ignition off.

Disconnect the Generator Field harness connector.

Using a 12-volt test light, jump it across the Generator Field harness connector.

Ignition on, engine not running.

With the scan tool, actuate the Gen Field Control circuit.

Does the test light illuminate brightly and flash on and off?

Yes >> Replace the Generator.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0562-BATTERY VOLTAGE LOW (CONTINUED)

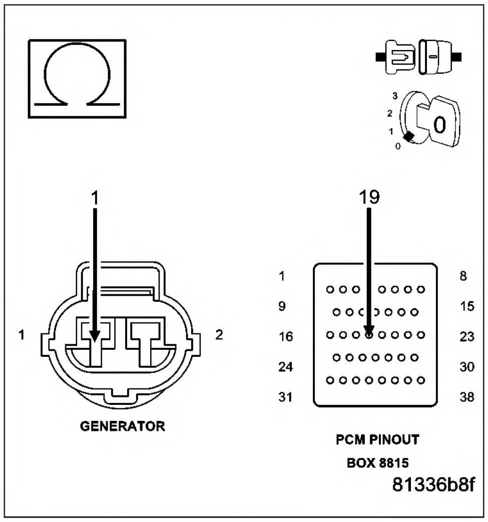
5. (K125) GENERATOR FIELD CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K125) Gen Field Control circuit from the Generator harness connector to the appropriate terminal of the special tool #8815.



81336b8f

Is the resistance below 5.0 ohms?

Yes >> Go To 6

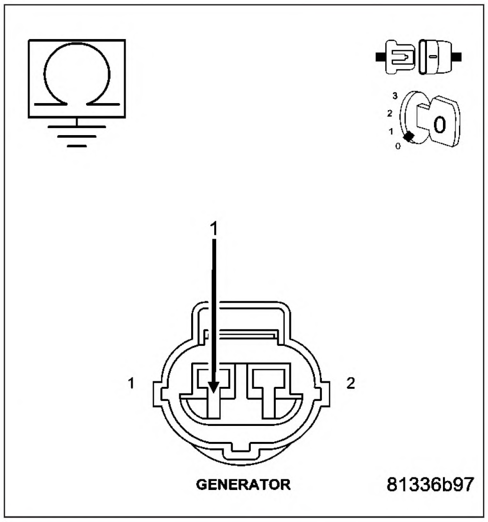
No >> Repair the open in the (K125) Gen Field Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (K125) GENERATOR FIELD CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K125) Gen Field Control circuit in the Generator Field harness connector.



81336b97

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K125) Gen Field Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0562-BATTERY VOLTAGE LOW (CONTINUED)

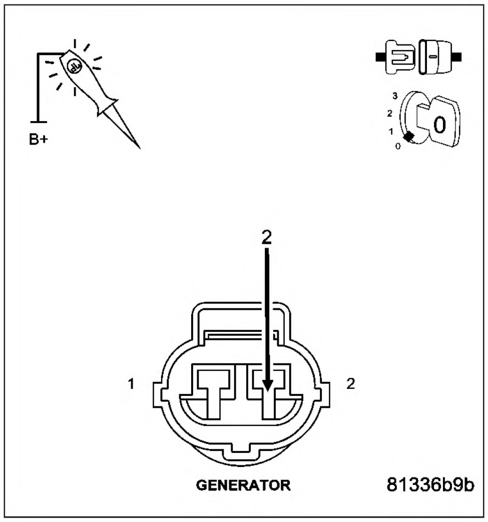
7. (Z385) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to 12-volts, probe the (Z385) Ground circuit in the Generator Field harness connector.

Does the test light illuminate brightly?

Yes >> Go To 8

No >> Repair the open in the (Z385) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

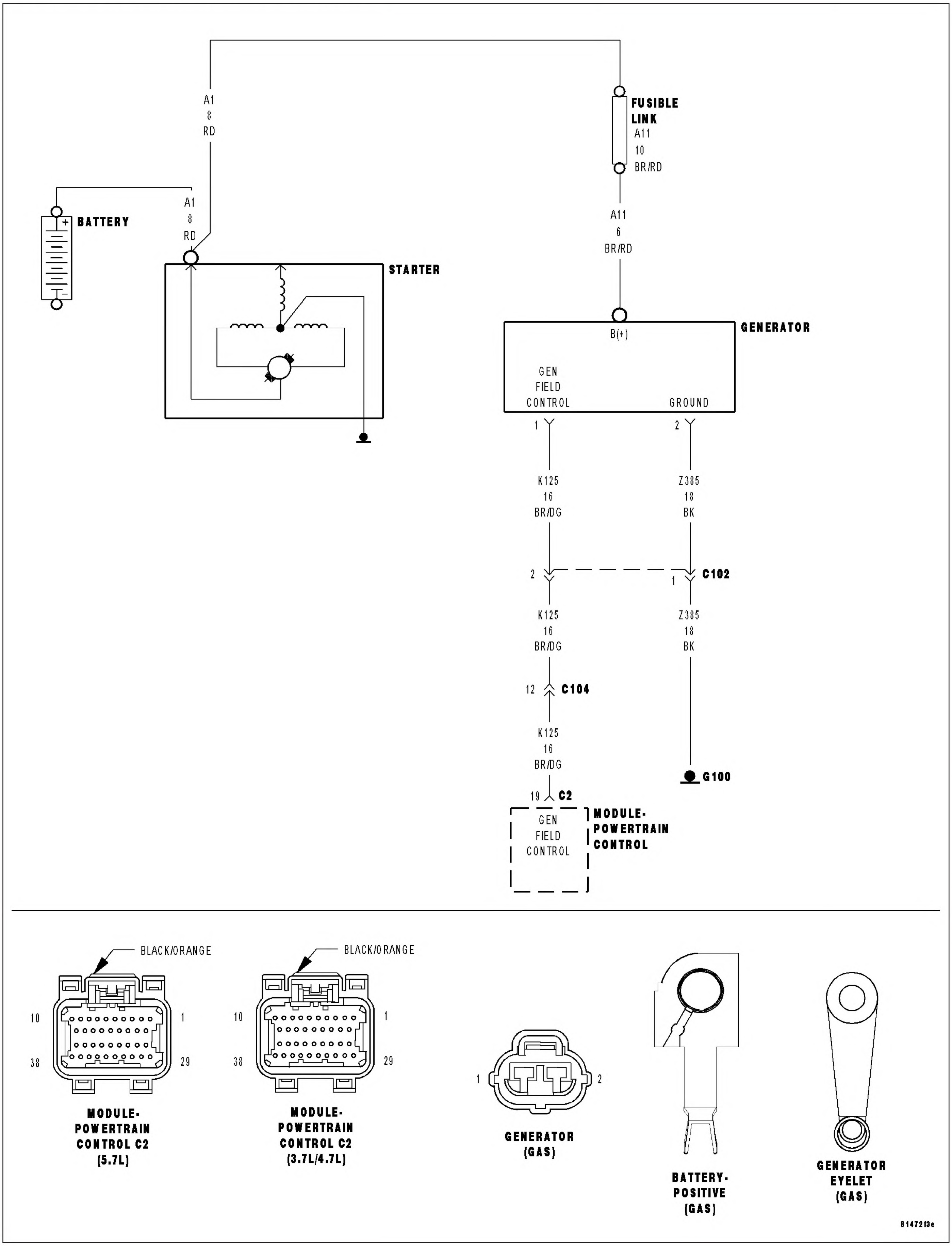
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0563-BATTERY VOLTAGE HIGH


A1
8
RD
FUSIBLE LINK
A11
10
BR/RD
BATTERY
A1
8
RD
A11
6
BR/RD
STARTER
GENERATOR
B(+)
GEN FIELD CONTROL
GROUND
1
2
K125
16
BR/DG
Z385
18
BK
2
1
C102
K125
16
BR/DG
Z385
18
BK
12
C104
K125
16
BR/DG
G100
19
C2
GEN FIELD CONTROL
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
1
2
GENERATOR (GAS)
BATTERY-POSITIVE (GAS)
GENERATOR EYELET (GAS)
81472f3e

P0563-BATTERY VOLTAGE HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Engine RPM greater than 1000 RPM. With no other charging system codes set.
- **Set Condition:**
  Battery voltage is 1 volt greater than desired voltage for more than 10 seconds. Battery voltage greater than 15.75 volts. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K125) GENERATOR FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
GENERATOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure the Battery is in good condition. Using the Midtronics Battery Tester, test the Battery before continuing.

NOTE: Inspect the vehicle for after market accessories that may exceed the Generator System output.

Turn the ignition off.

NOTE: Make sure the generator drive belt is in good operating condition.

NOTE: Inspect the fuses in the IPM. If a fuse is open use the wire diagram/schematic as a guide, inspect the wiring and connectors for damage.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0563-BATTERY VOLTAGE HIGH (CONTINUED)

2. GENERATOR OPERATION

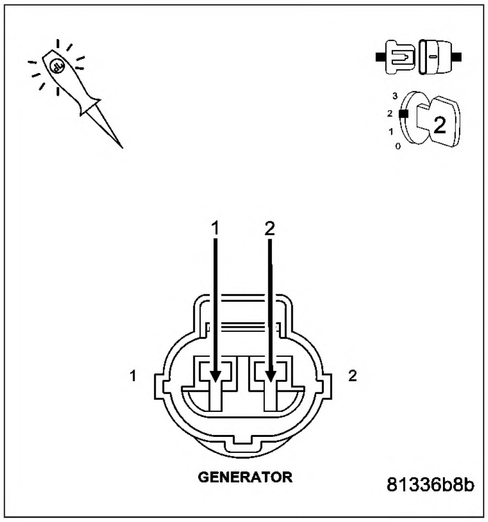
Turn the ignition off.

Disconnect the Generator Field harness connector.

Using a 12-volt test light, jump across the Generator Field harness connector.

Ignition on, engine not running.

With the scan tool, actuate the Generator Field Driver.



Does the test light illuminate brightly and flash on and off?

Yes >> Replace the Generator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

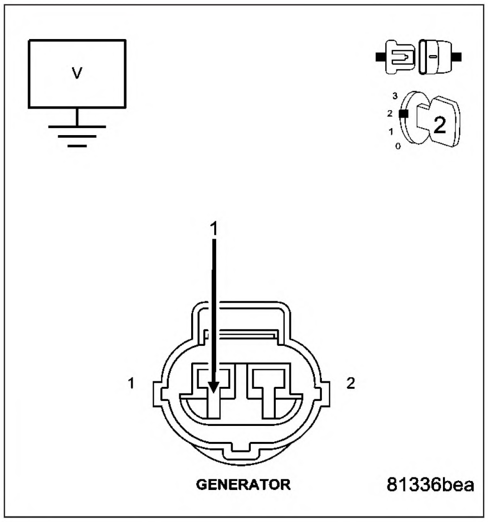
3. (K125) FIELD CIRCUIT SHORTED BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K125) Gen Field Control circuit at the Generator Field harness connector.



Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K125) Gen Field Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

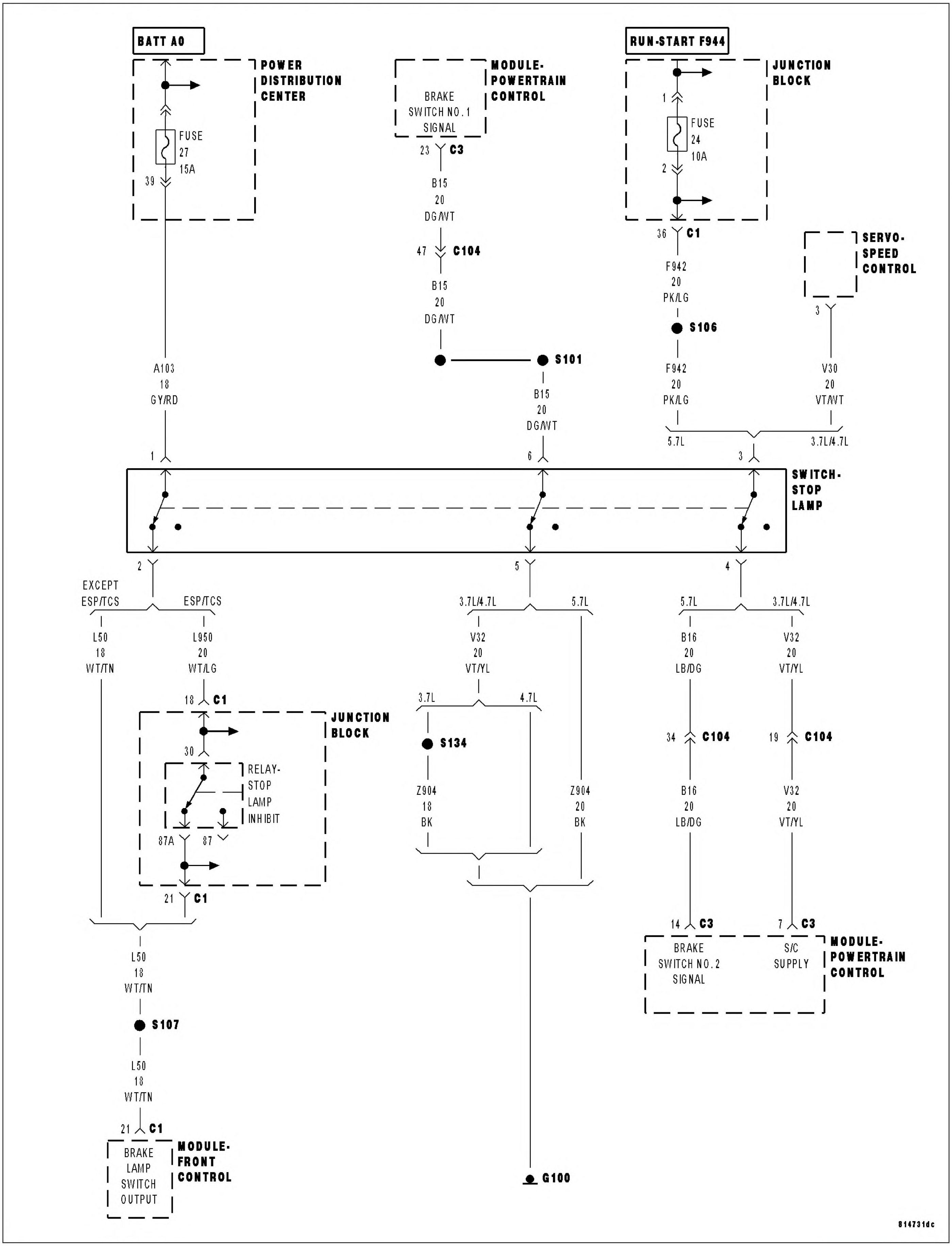
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0571-BRAKE SWITCH 1 PERFORMANCE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 27 15A
39
A103 18 GY/RD
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 1 SIGNAL
23 C3
B15 20 DG/WT
47 C104
B15 20 DG/WT
S101
B15 20 DG/WT
RUN-START F944
JUNCTION BLOCK
1
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
SERVO-SPEED CONTROL
3
V30 20 VT/WT
5.7L
3.7L/4.7L
1
6
3
SWITCH-STOP LAMP
2
5
4
EXCEPT ESP/TCS
ESP/TCS
L50 18 WT/TN
L950 20 WT/LG
18 C1
JUNCTION BLOCK
30
RELAY-STOP LAMP INHIBIT
87A
87
21 C1
L50 18 WT/TN
S107
L50 18 WT/TN
21 C1
BRAKE LAMP SWITCH OUTPUT
MODULE-FRONT CONTROL
3.7L/4.7L
5.7L
V32 20 VT/YL
3.7L
4.7L
S134
Z904 18 BK
Z904 20 BK
G100
5.7L
3.7L/4.7L
B16 20 LB/DG
V32 20 VT/YL
34 C104
19 C104
B16 20 LB/DG
V32 20 VT/YL
14 C3
7 C3
BRAKE SWITCH NO. 2 SIGNAL
S/C SUPPLY
MODULE-POWERTRAIN CONTROL
814731dc

P0571-BRAKE SWITCH 1 PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The brake switch rationality checks both failure modes of the brake switch. The brake switch stuck on test checks for a high vehicle speed condition where the brake switch is unexpectedly depressed. The brake switch stuck off test checks for repeated vehicle stop maneuvers without the brake switch depressed.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  If the output of Brake Switch No.1 to the PCM looks like it is not applied, while Brake Lamp Switch Output circuit is applied the fault will mature in 60ms. Two Trip Fault.

Possible Causes
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT OPEN
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(Z904) GROUND CIRCUIT OPEN
STOP LAMP SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure the Stop Lamp Switch is properly adjusted before continuing.

NOTE: Make sure the Stop Lamp Switch is properly wired, such as (B15) Brake Switch No.1 and (B16) Brake Switch No.2 Signal circuit are not switched at the harness connector.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0571-BRAKE SWITCH 1 PERFORMANCE (CONTINUED)

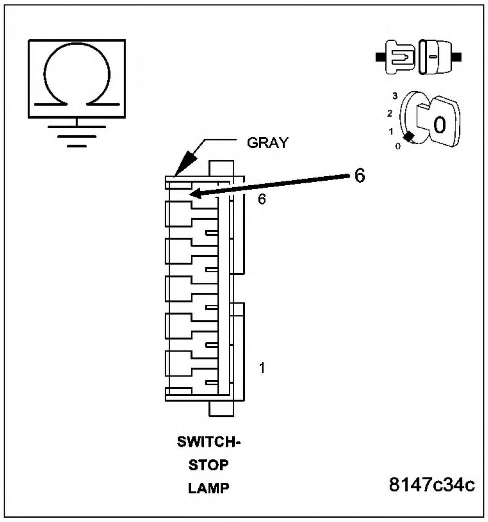
2. (B15) BRAKE SWITCH NO.1 SIGNAL SHORTED TO GROUND

Turn the ignition off.

Disconnect the Stop Lamp Switch harness connector.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (B15) Brake Switch No.1 Signal circuit in the Stop Lamp Switch harness connector.


GRAY
6
6
1
0
3
2
1
0
SWITCH-
STOP
LAMP
8147c34c

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (B15) Brake Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

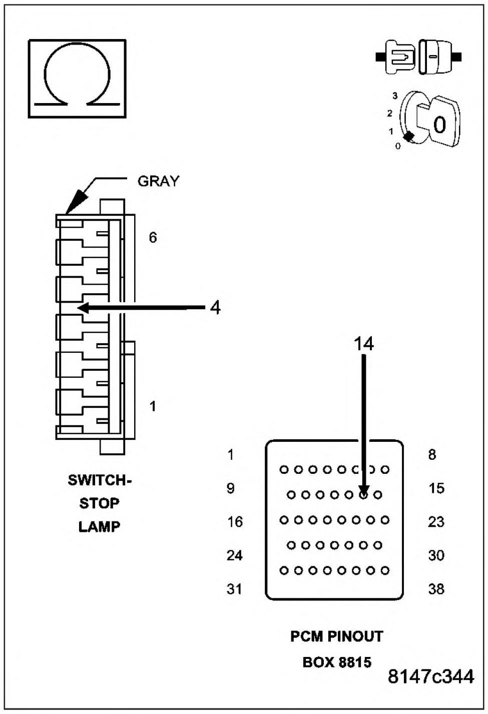
No >> Go To 3

---

3. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT OPEN

Disconnect the C3 PCM harness connector.

Measure the resistance of the (B16) Brake Switch No.2 Signal circuit from the Stop Lamp Switch harness connector to the C1 FCM harness connector.


GRAY
6
4
1
0
3
2
1
0
14
1
9
16
24
31
8
15
23
30
38
SWITCH-
STOP
LAMP
PCM PINOUT
BOX 8815
8147c344

Is the resistance below 5.0 ohms?

Yes >> Go To 4

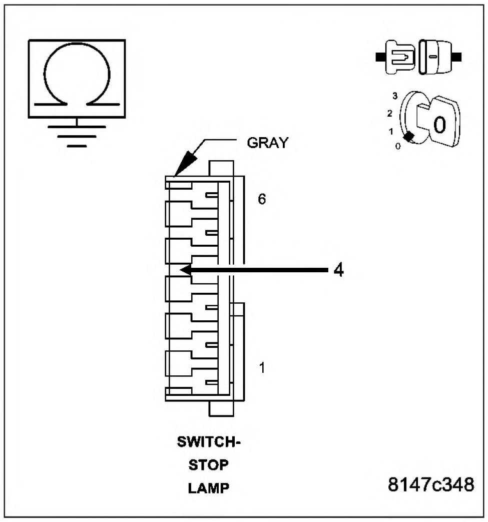
No >> Repair the open in the (B16) Brake Switch No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0571-BRAKE SWITCH 1 PERFORMANCE (CONTINUED)

4. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (B16) Brake Switch No.2 Signal circuit in the Stop Lamp Switch harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (B16) Brake Switch No.2 Signal circuit.

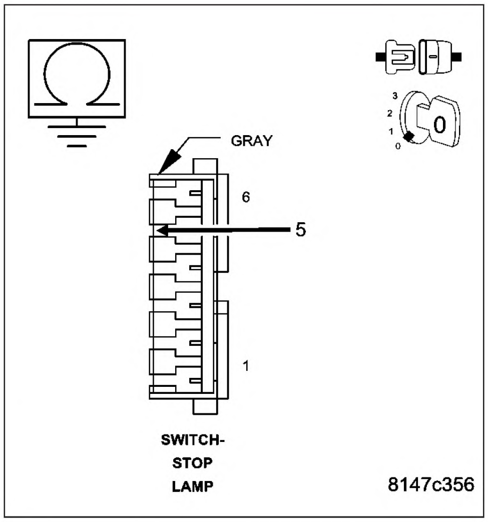
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. (Z904) GROUND CIRCUIT OPEN

Measure the resistance between ground and the (Z904) Ground circuit in the Stop Lamp Switch harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (Z904) Ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. STOP LAMP SWITCH

Measure the resistance between the (Z904) Ground circuit terminal and the (B15) Brake Switch No.1 Signal terminal in the Stop Lamp Switch.

Next, measure the resistance between the (F942) Fused Ignition Switch Output circuit terminal and the (B16) Brake Switch No.2 Signal circuit terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to an open circuit for one or both of the measurements taken?

Yes >> Go To 7

No >> Replace the Stop Lamp Switch.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0571-BRAKE SWITCH 1 PERFORMANCE (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

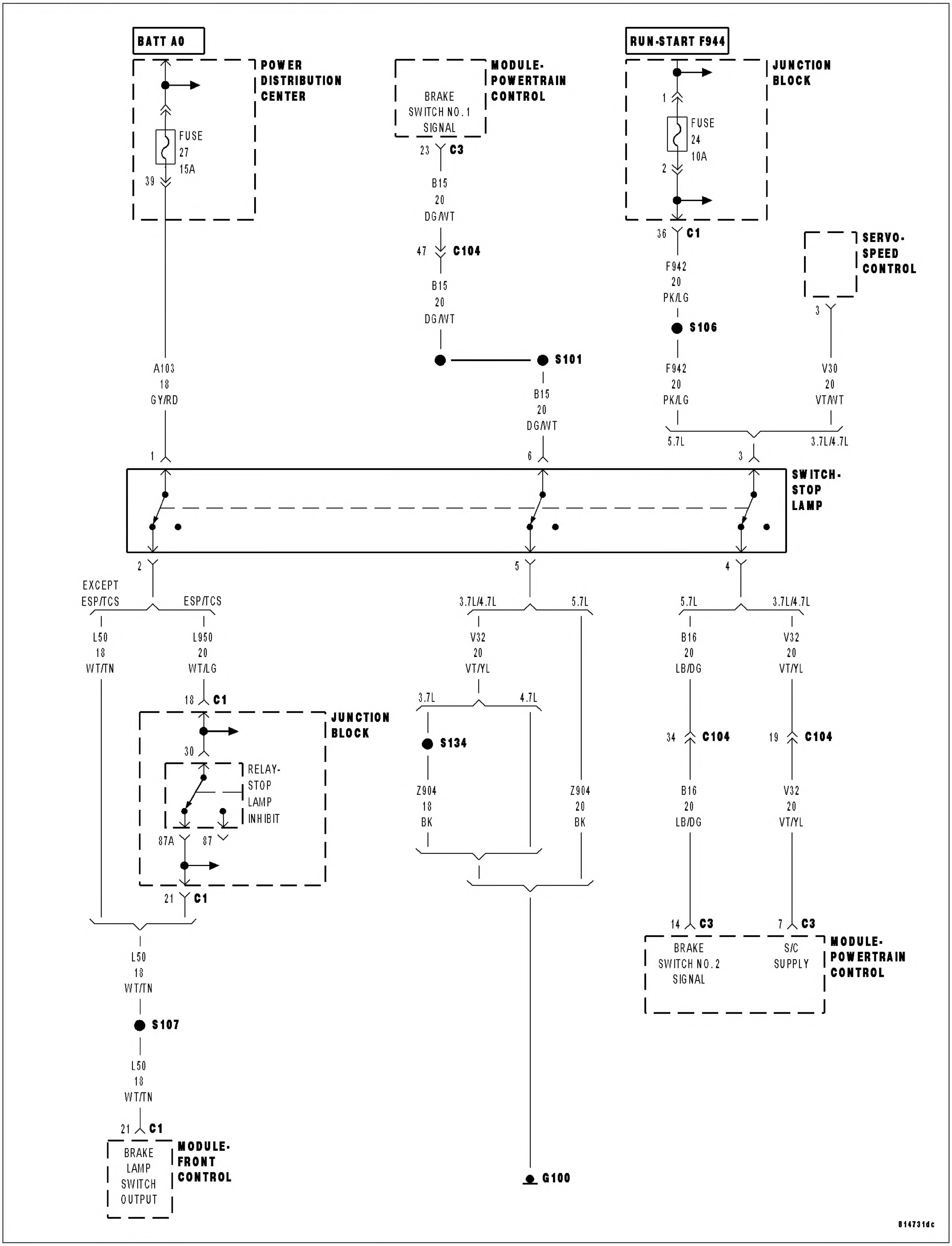
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0572-BRAKE SWITCH 1 STUCK ON


BATT A0
POWER DISTRIBUTION CENTER
FUSE 27 15A
39
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 1 SIGNAL
23 C3
B15 20 DG/WT
47 C104
B15 20 DG/WT
S101
RUN-START F944
JUNCTION BLOCK
1
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
SERVO-SPEED CONTROL
3
V30 20 VT/WT
5.7L
3.7L/4.7L
A103 18 GY/RD
B15 20 DG/WT
1
6
3
SWITCH-STOP LAMP
2
5
4
EXCEPT ESP/TCS
ESP/TCS
L50 18 WT/TN
L950 20 WT/LG
18 C1
JUNCTION BLOCK
30
RELAY-STOP LAMP INHIBIT
87A
87
21 C1
L50 18 WT/TN
S107
L50 18 WT/TN
21 C1
MODULE-FRONT CONTROL
BRAKE LAMP SWITCH OUTPUT
3.7L/4.7L
5.7L
V32 20 VT/YL
3.7L
4.7L
S134
Z904 18 BK
Z904 20 BK
G100
5.7L
3.7L/4.7L
B16 20 LB/DG
V32 20 VT/YL
34 C104
19 C104
B16 20 LB/DG
V32 20 VT/YL
14 C3
7 C3
BRAKE SWITCH NO. 2 SIGNAL
S/C SUPPLY
MODULE-POWERTRAIN CONTROL
814731dc

P0572-BRAKE SWITCH 1 STUCK ON (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes Brake Switch No.1 is mechanically stuck in the low/on position. Two Trip Fault. Three Global Good Trips to Clear.

Possible Causes
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT OPEN
STOP LAMP SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Verify battery voltage is greater than 10 volts.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. STOP LAMP SWITCH

Turn the ignition off.

Remove the Stop Lamp Switch and disconnect the harness connector.

Measure the resistance between the (Z940) Ground circuit terminal and the (B15) Brake Switch No.1 Signal terminal in the Stop Lamp Switch.

Measure the resistance between the (F942) Fused Ignition Switch Output circuit terminal and the (B16) Brake Switch No.2 Signal circuit terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch plunger while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to an open circuit?

Yes >> Go To 3

No >> Replace the Stop Lamp Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

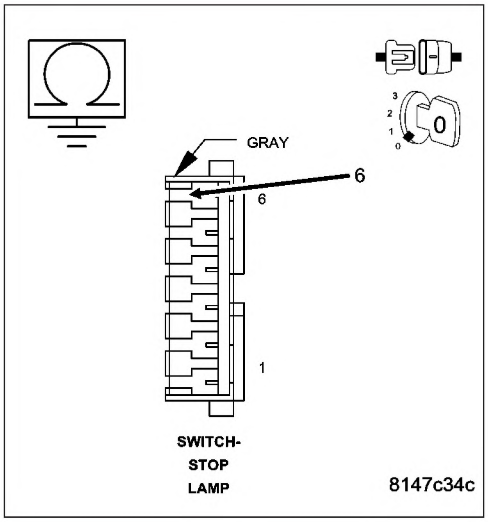
P0572-BRAKE SWITCH 1 STUCK ON (CONTINUED)

3. (B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (B15) Brake Switch No.1 Signal circuit in the Stop Lamp Switch harness connector.


GRAY
6
6
1
SWITCH-
STOP
LAMP
8147c34c

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (B15) Brake Switch No.1 Signal circuit.

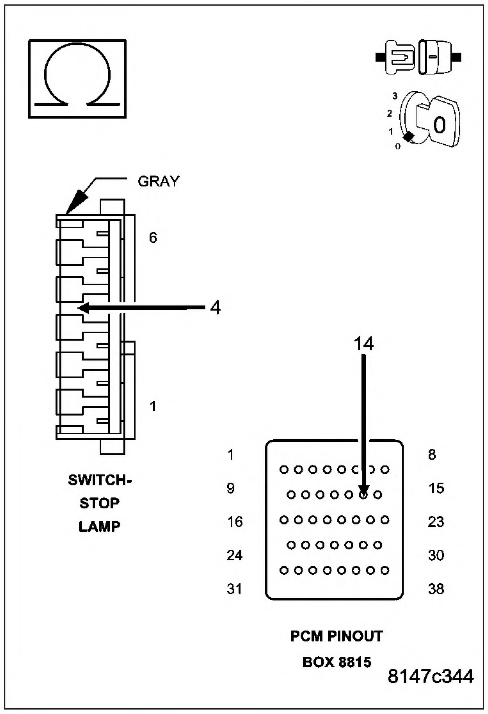
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT OPEN

Measure the resistance of the (B16) Brake Switch No.2 Signal circuit from the Stop Lamp Switch harness connector to the C1 FCM harness connector.


GRAY
6
4
1
SWITCH-
STOP
LAMP
14
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147c344

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (B16) Brake Switch No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0572-BRAKE SWITCH 1 STUCK ON (CONTINUED)

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

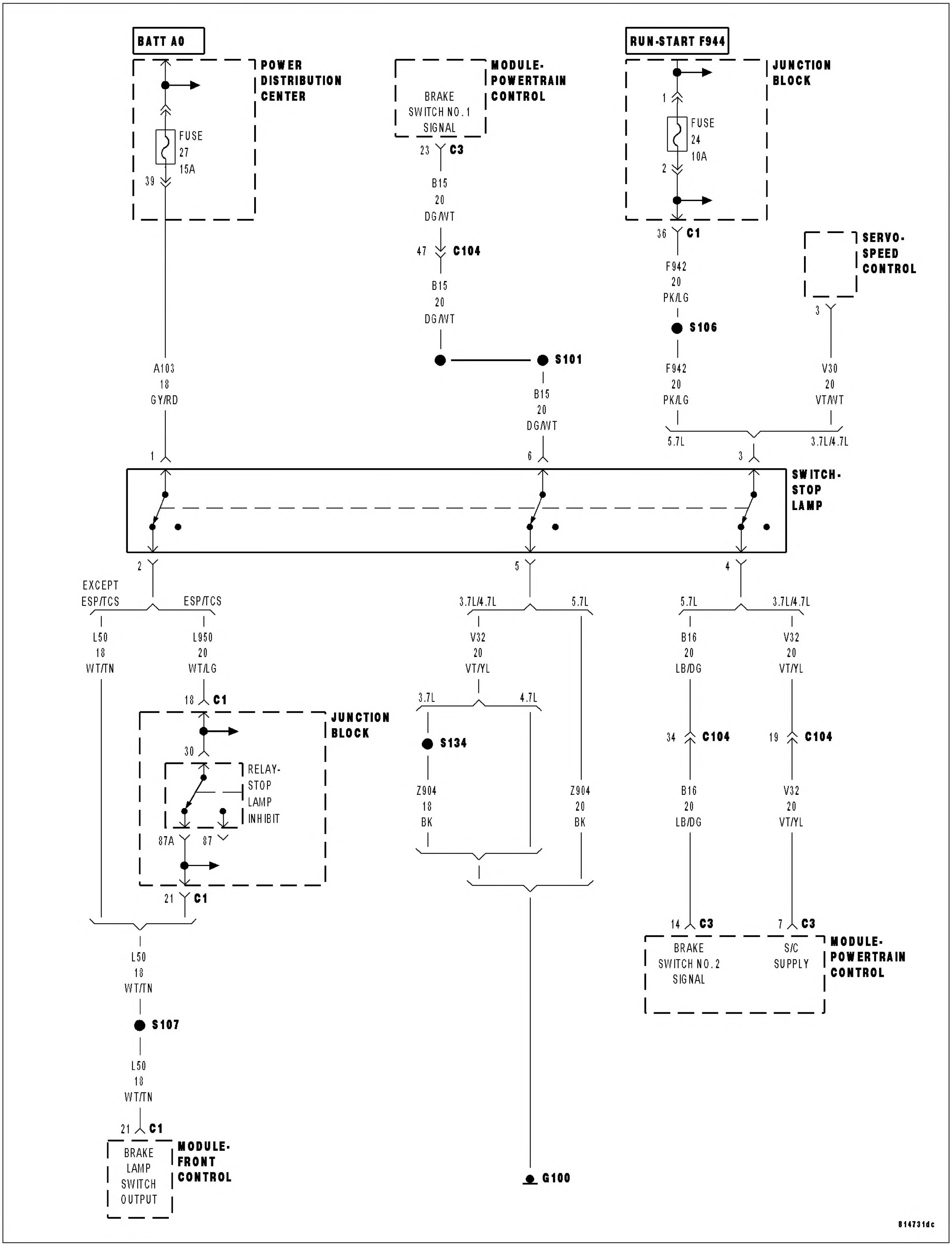
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0573-BRAKE SWITCH 1 STUCK OFF


BATT A0
POWER DISTRIBUTION CENTER
FUSE 27 15A
39
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 1 SIGNAL
23 C3
B15 20 DG/WT
47 C104
B15 20 DG/WT
S101
RUN-START F944
JUNCTION BLOCK
1
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
SERVO-SPEED CONTROL
3
V30 20 VT/WT
A103 18 GY/RD
B15 20 DG/WT
5.7L
3.7L/4.7L
1
6
3
SWITCH-STOP LAMP
2
5
4
EXCEPT ESP/TCS
ESP/TCS
L50 18 WT/TN
L950 20 WT/LG
18 C1
JUNCTION BLOCK
30
RELAY-STOP LAMP INHIBIT
87A
87
21 C1
L50 18 WT/TN
S107
L50 18 WT/TN
21 C1
MODULE-FRONT CONTROL
BRAKE LAMP SWITCH OUTPUT
3.7L/4.7L
5.7L
V32 20 VT/YL
3.7L
4.7L
S134
Z904 18 BK
Z904 20 BK
G100
5.7L
3.7L/4.7L
B16 20 LB/DG
V32 20 VT/YL
34 C104
19 C104
B16 20 LB/DG
V32 20 VT/YL
14 C3
7 C3
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 2 SIGNAL
S/C SUPPLY
814731dc

P0573-BRAKE SWITCH 1 STUCK OFF (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes Brake Switch No.1 is stuck in the high/off position. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT OPEN
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(Z904) GROUND CIRCUIT OPEN
STOP LAMP SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. STOP LAMP SWITCH

Turn the ignition off.

Disconnect the Stop Lamp Switch harness connector.

Measure the resistance between the (Z904) Ground circuit terminal and the (B15) Brake Switch No.1 Signal circuit terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to an open circuit?

Yes >> Go To 3

No >> Replace the Stop Lamp Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0573-BRAKE SWITCH 1 STUCK OFF (CONTINUED)

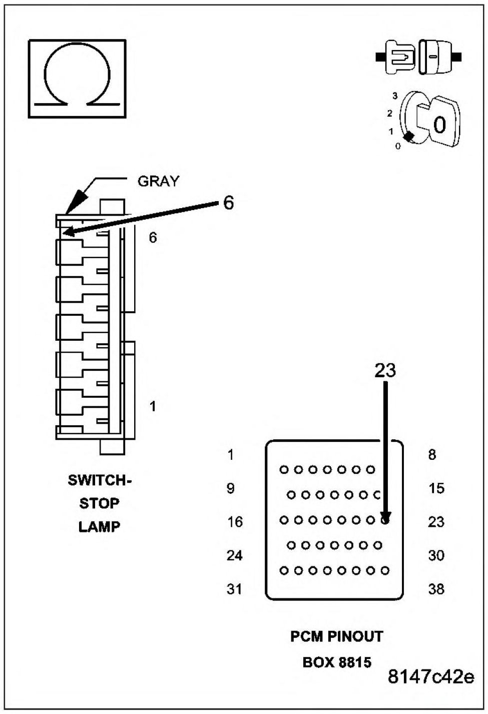
3. (B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (B15 Brake Switch No.1 Signal circuit from the Stop Lamp Switch harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 4

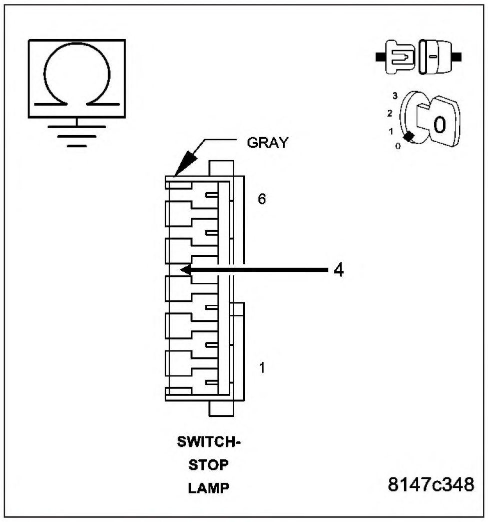
No >> Repair the open in the (B15) Brake Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (B16) BRAKE SWITCH NO.2 CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (B16) Brake Switch No.2 Signal circuit in the Stop Lamp Switch harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (B16) Brake Switch No.2 Signal circuit.

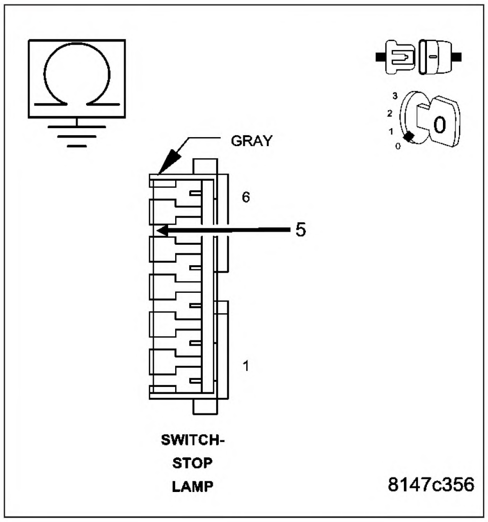
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0573-BRAKE SWITCH 1 STUCK OFF (CONTINUED)

5. (Z904) GROUND CIRCUIT OPEN

Measure the resistance between the (Z904) Ground circuit and ground in the Stop Lamp Switch harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (Z904) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

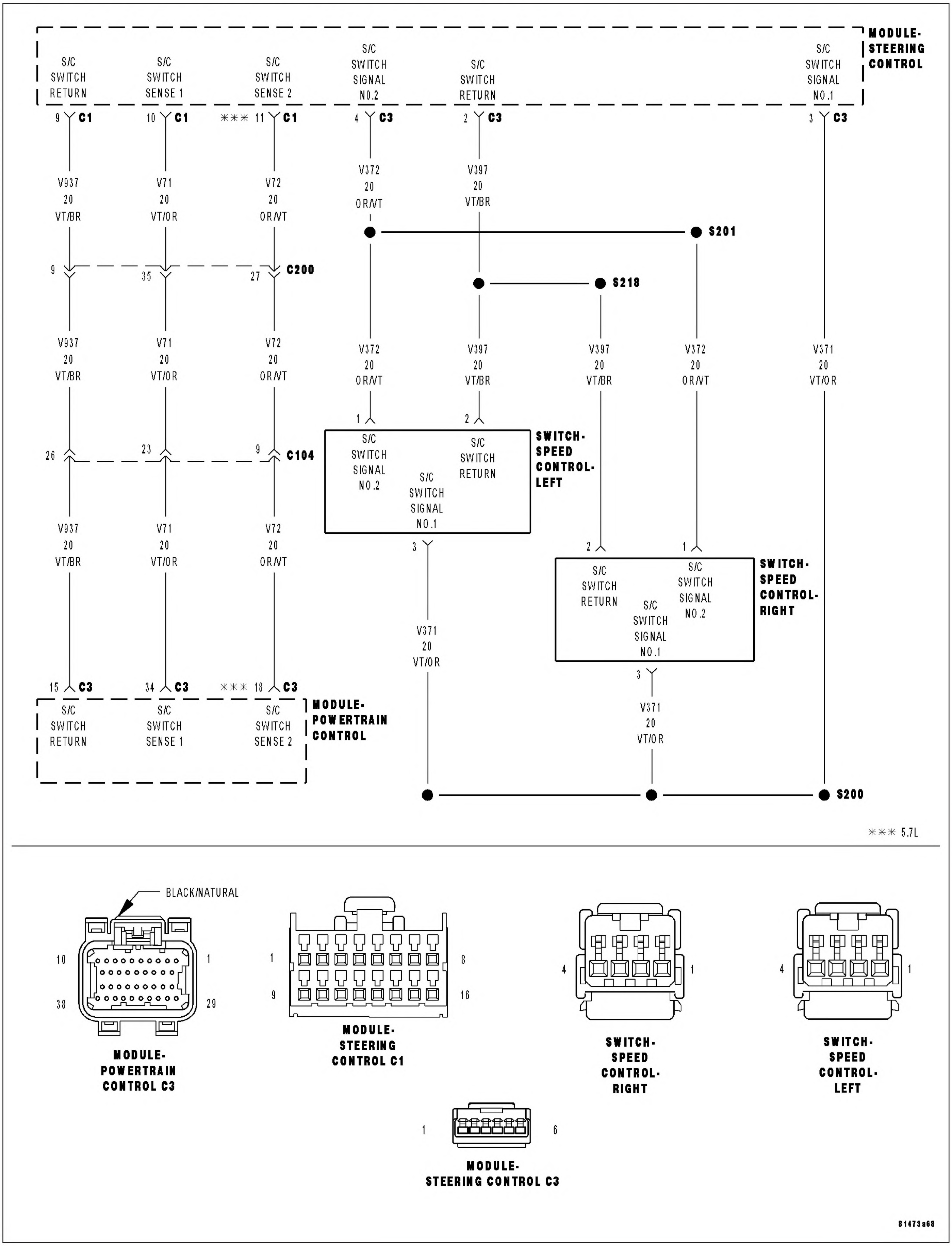
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE


MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
S218
9
35
27
C200
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1
2
SWITCH-SPEED CONTROL-LEFT
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
26
23
9
C104
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
3
2
1
SWITCH-SPEED CONTROL-RIGHT
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
MODULE-POWERTRAIN CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S200
*** 5.7L
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
1
8
9
16
MODULE-STEERING CONTROL C1
4
1
SWITCH-SPEED CONTROL-RIGHT
4
1
SWITCH-SPEED CONTROL-LEFT
1
6
MODULE-STEERING CONTROL C3
81473a68

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on.
- **Set Condition:**
  Cruise switch voltage output is not out of range but it does not equal any of the values for any of the button positions.

Possible Causes
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN
(V71) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN
(V397) SWITCH RETURN CIRCUIT OPEN
(V937) SWITCH RETURN CIRCUIT OPEN
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V397) SWITCH RETURN CIRCUIT
(V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V937) SWITCH RETURN CIRCUIT
STEERING COLUMN CONTROL MODULE
SPEED CONTROL SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL SWITCH STATUS

Start the engine.
With a scan tool, monitor each which function for the Speed Control Switches.
Notice the voltage reading when no buttons are pressed.
Press and release each Speed Control Button.
- Resume/Accel
- Cancel
- Decel (Coast)
- On/Off
- Set

Does each switch function change status when pressing and then depressing each switch?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

2. SPEED CONTROL SWITCH

Turn the ignition off.

Remove and disconnect the Speed Control Switches from the steering wheel per Service Information.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V371) S/C Switch No.1 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position

Not pressing any switch - 20.5 kohms

On/Off - 0.47 kohms

Set - 5.49 kohms

Coast - 2.94 kohms

Cancel - 1.24 kohms

Resume/Accel - 15.4 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 3

No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

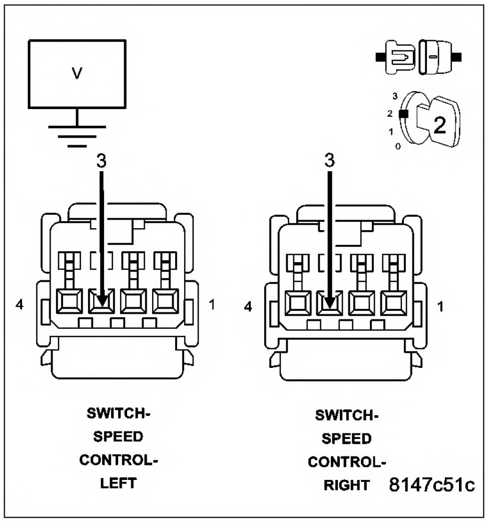
3. (V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

Disconnect the C3 Steering Column Control Module harness connector.

Ignition on, engine not running.

Measure the voltage on the (V371) S/C Switch No.1 Signal circuit in the S/C Switch harness connectors.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (V371) S/C Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

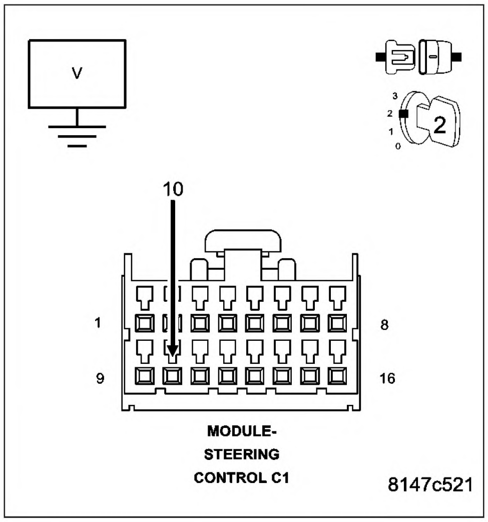
P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

4. (V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C1 Steering Column Control Module harness connector per Service Information.

Ignition on, engine not running.

Measure the voltage on the (V71) S/C Switch No.1 Signal circuit in the C1 SCCM harness connector.



8147c521

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (V71) S/C Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

5. STEERING COLUMN CONTROL MODULE

Turn the ignition off.

Measure the resistance of the (V371), (V71) S/C Switch No.1 Signal circuit between the C1 and C3 SCCM connections.

Measure the resistance of the (V397), (V937) Switch Return circuit between the C1 and C3 SCCM connections.

Is the resistance above 5.0 ohms for either reading?

Yes >> Replace the Steering Column Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

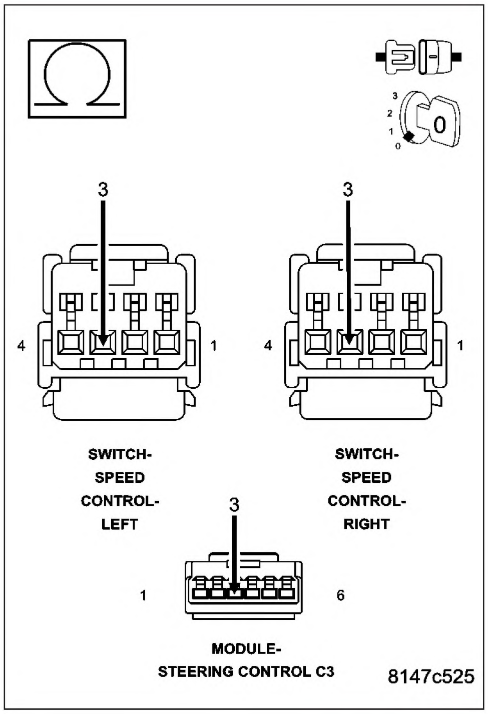
No >> Go To 6

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

6. (V371) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN

NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

Measure the resistance of the (V371) S/C Switch No.1 Signal circuit from the Speed Control Switches to the C3 SCCM harness connector.


3
3
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
3
1
6
MODULE-STEERING CONTROL C3
8147c525

Is the resistance below 5.0 ohms for each measurement?

Yes >> Go To 7

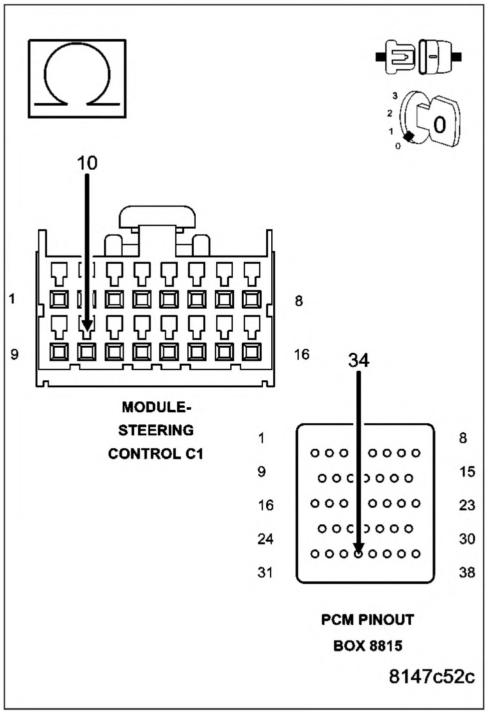
No >> Repair the open in the (V371) S/C Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

7. (V71) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V71) S/C Switch No.1 Signal circuit from the C1 SCCM harness connector to the appropriate terminal of special tool #8815.


10
1
8
9
16
MODULE-STEERING CONTROL C1
34
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147c52c

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 8

No >> Repair the open in the (V71) S/C Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

8. (V397) SWITCH RETURN CIRCUIT OPEN

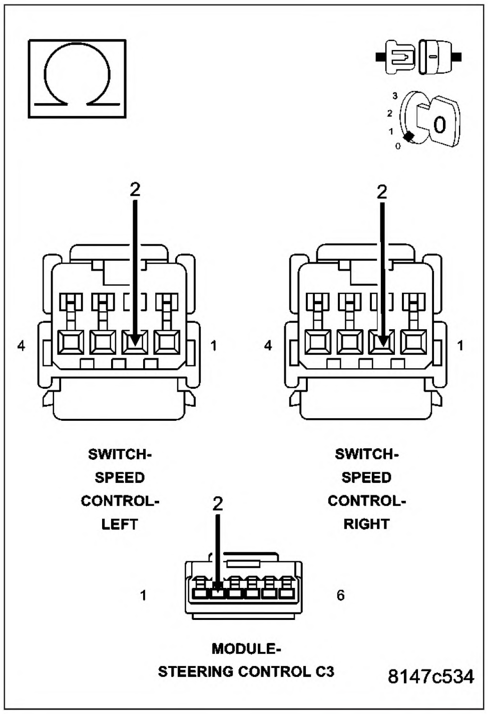
NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

Measure the resistance of the (V397) Switch Return circuit from the S/C Switch harness connectors to the C3 SCCM harness connector.

Is the resistance below 5.0 ohms for each measurement?

Yes >> Go To 9

No >> Repair the open in the (V397) Switch Return circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



3
2
1
0
0
2
2
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
2
SWITCH-
SPEED
CONTROL-
RIGHT
1
6
MODULE-
STEERING CONTROL C3
8147c534

---

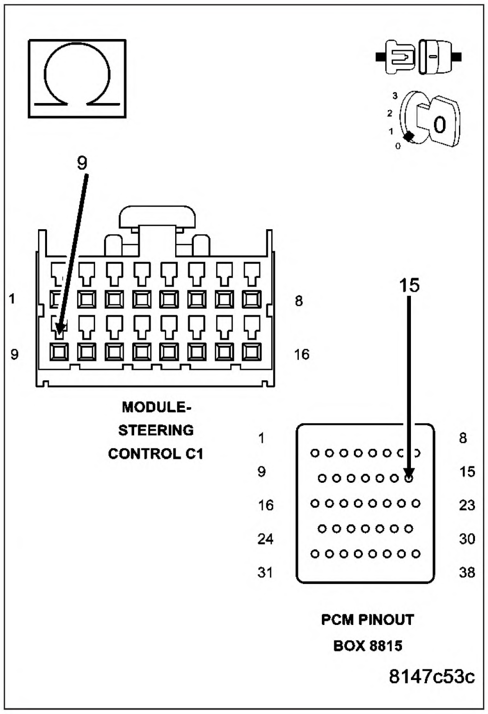
9. (V937) SWITCH RETURN CIRCUIT OPEN

Measure the resistance of the (V937) Switch Return circuit from the C1 SCCM harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 10

No >> Repair the open in the (V937) Switch Return circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

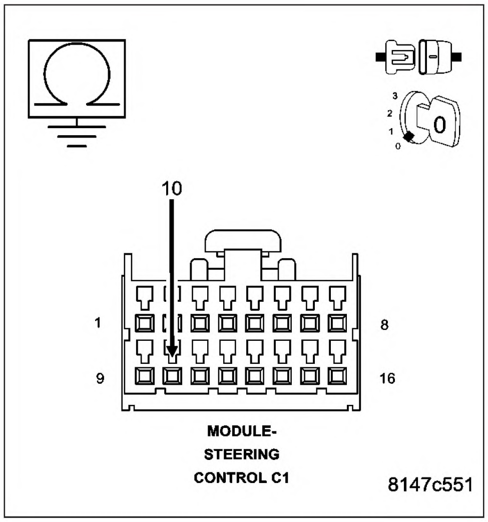


3
2
1
0
0
9
1
8
9
16
15
MODULE-
STEERING
CONTROL C1
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147c53c

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

10. (V71) S/C NO.1 SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V71) S/C Switch No.1 Signal circuit in the C1 SCCM harness connector.


10
1
8
9
16
MODULE-
STEERING
CONTROL C1
8147c551

Is the resistance below 100 ohms?

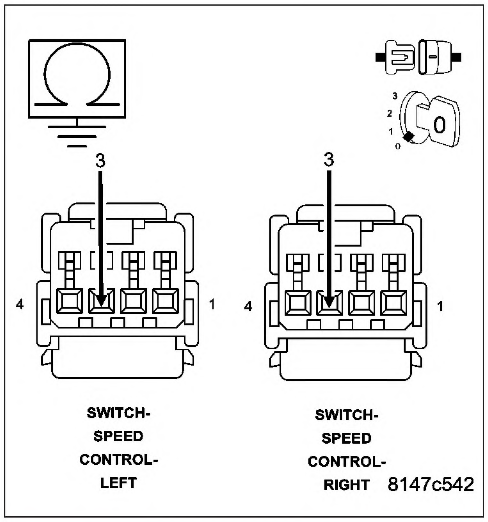
Yes >> Repair the short to ground in the (V71) S/C Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

---

11. (V371) S/C NO.1 SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V371) S/C Switch No.1 Signal circuit in the S/C Switch harness connectors.


3
3
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
SWITCH-
SPEED
CONTROL-
RIGHT
8147c542

Is the resistance below 100 ohms?

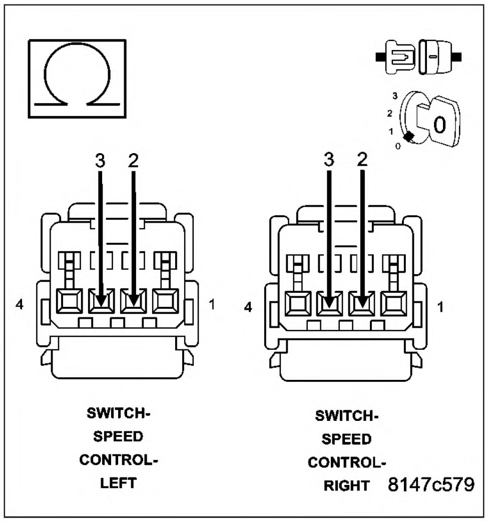
Yes >> Repair the short to ground in the (V371) S/C Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

12. (V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V397) S/C SWITCH RETURN CIRCUIT

Measure the resistance between the (V371) S/C Switch No.1 Signal circuit and the (V397) S/C Switch Return circuit in the S/C Switch harness connectors.


3
2
4
1
3
2
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c579

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V371) S/C Switch No.1 Signal circuit and the (V397) Switch Return circuit.

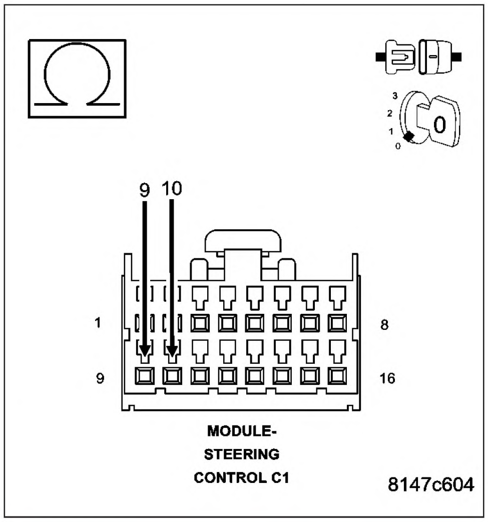
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

---

13. (V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V937) S/C SWITCH RETURN CIRCUIT

Measure the resistance between the (V71) S/C Switch No.1 Signal circuit and the (V937) S/C Switch Return circuit in the C1 SCCM harness connector.


9
10
1
8
9
16
MODULE-STEERING CONTROL C1
8147c604

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V71) S/C Switch No.1 Signal circuit and the (V937) Switch Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

P0579-SPEED CONTROL SWITCH 1 PERFORMANCE (CONTINUED)

14. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	SWITCH No.1 VOLTAGE VALUE	SWITCH No.2 VOLATGE VALUE
NO SWITCHES PRESSED	4.31 to 4.78 volts	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to 1.13 volts	3.53 to 3.92 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts	2.04 to 2.47 volts
SET PRESSED	3.16 to 3.56 volts	1.17 to 1.56 volts
COAST PRESSED	2.57 to 2.94 volts	0.77 to 1.09 volts
CANCEL PRESSED	1.59 to 1.99 volts	2.84 to 3.25 volts

Take these same voltage measurements with a voltmeter by back probing the (V371) S/C Switch No.1 Signal circuit and the (V372) S/C Switch No.2 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch value?

Yes >> Replace the Speed Control Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 15

---

15. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

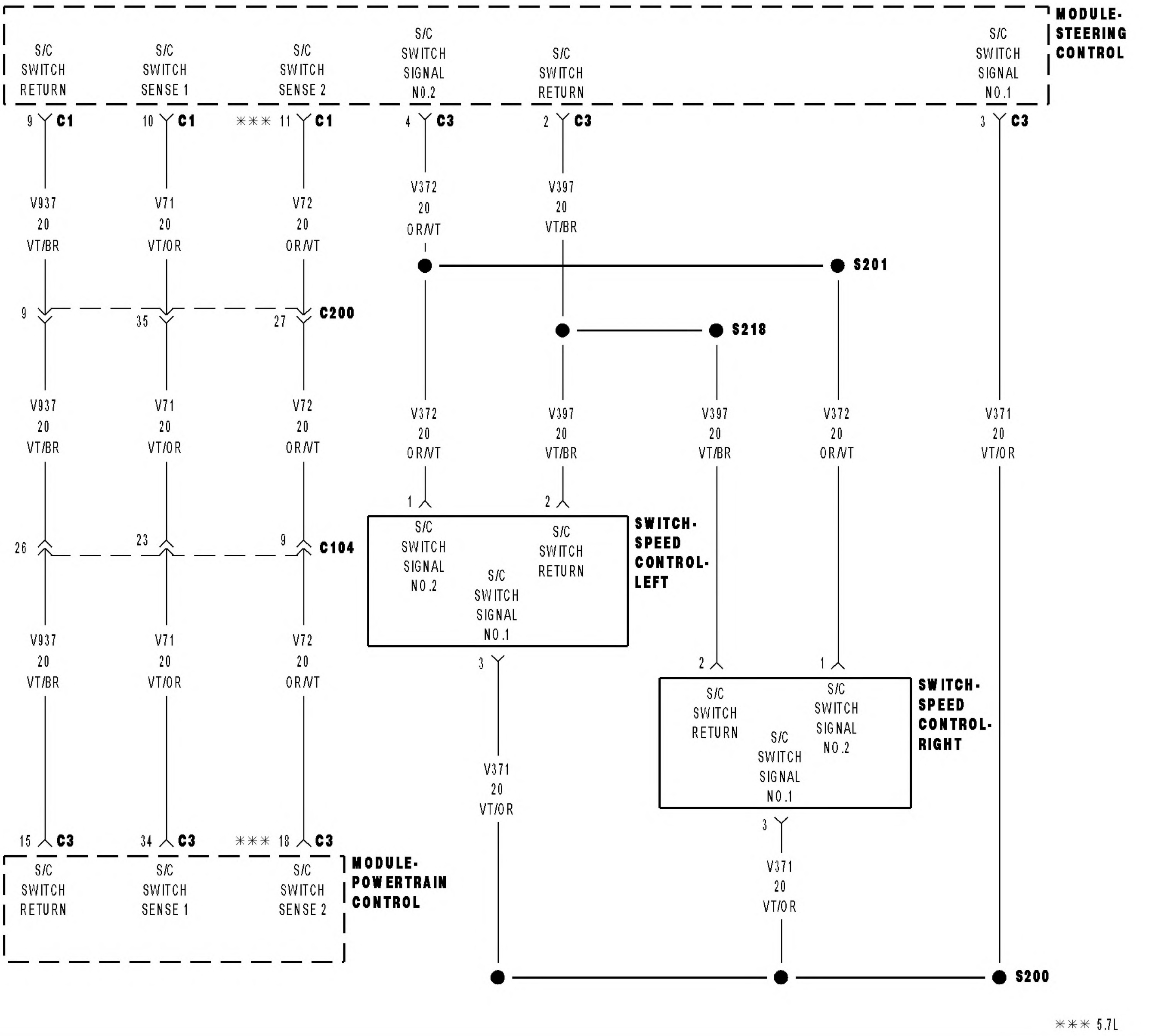
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

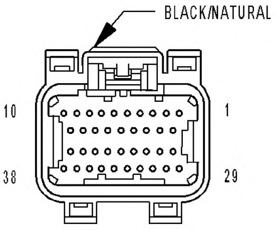
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

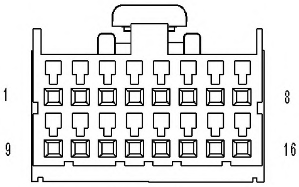
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0580-SPEED CONTROL SWITCH 1 CIRCUIT LOW

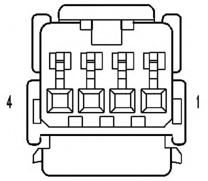

MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
9 35 27 C200
S218
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1 2
SWITCH-SPEED CONTROL-LEFT
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
26 23 9 C104
3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
2 1
SWITCH-SPEED CONTROL-RIGHT
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
MODULE-POWERTRAIN CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S200
*** 5.7L


BLACK/NATURAL
10
1
38
29

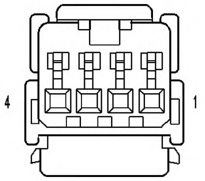
MODULE-POWERTRAIN CONTROL C3



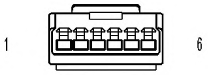
MODULE-STEERING CONTROL C1



SWITCH-SPEED CONTROL-RIGHT



SWITCH-SPEED CONTROL-LEFT



MODULE-STEERING CONTROL C3

81473a68

P0580-SPEED CONTROL SWITCH 1 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on.
- **Set Condition:**
  Speed control switch input No.1 is below the minimum acceptable voltage at the PCM. One trip fault.

Possible Causes
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V397) S/C SWITCH RETURN
(V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V937) S/C SWITCH RETURN
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
STEERING COLUMN CONTROL MODULE
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL SWITCH VOLTAGE LOW

NOTE: Do not press any of the Speed Control Switch buttons.

Ignition on, engine not running.

With a scan tool, read the Speed Control voltage.

Is the Speed Control voltage below 1.0 volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0580-SPEED CONTROL SWITCH 1 CIRCUIT LOW (CONTINUED)

2. SPEED CONTROL SWITCHES

Turn the ignition off.

Remove and disconnect the Speed Control Switches from the steering wheel per Service Information.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V371) S/C Switch No.1 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following positions.

Not pressing any switch - 20.5 kohms

On/Off - 0.47 kohms

Set - 5.49 kohms

Coast - 2.94 kohms

Cancel - 1.24 kohms

Resume/Accel - 15.4 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 3

No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

3. SPEED CONTROL ON/OFF SWITCH

Connect the Resume/Accel Switch.

Ignition on, engine not running.

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control On/Off Switch harness connector.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control On/Off Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. SPEED CONTROL RESUME/ACCEL SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control Resume/Accel Switch harness connector per Service Information.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control Resume/Accel Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P0580-SPEED CONTROL SWITCH 1 CIRCUIT LOW (CONTINUED)

5. STEERING COLUMN CONTROL MODULE

Turn the ignition off.

Disconnect the C1 SCCM harness connector per Service Information.

Ignition on, engine not running.

With the scan tool, read the S/C Switch voltage.

Did the S/C Switch volts change to 5.0 volts?

Yes >> Replace the Clockspring.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. (V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V397) S/C SWITCH RETURN CIRCUIT

Turn the ignition off.

Disconnect the C3 SCCM harness connector.

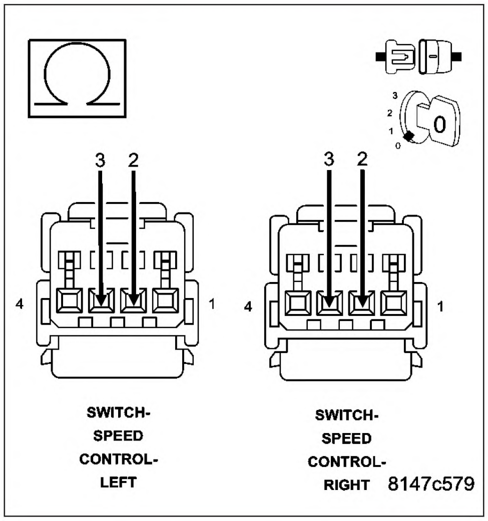
Disconnect the C3 PCM harness connector.

Measure the resistance between the (V397) S/C Switch Return circuit and the (V371) S/C Switch No.1 Signal circuit at the S/C Switch harness connectors.

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V371) S/C Switch No.1 Signal circuit and the (V397) S/C Switch Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7



---

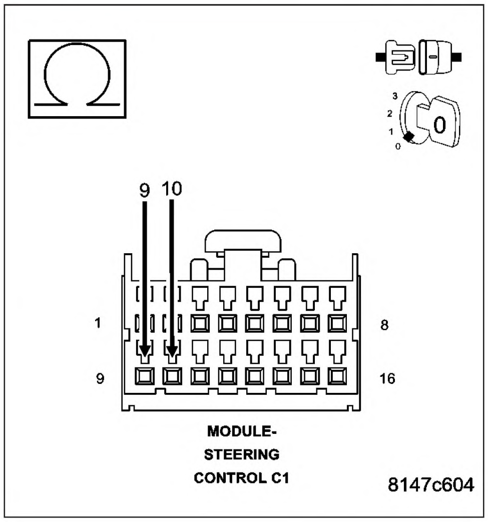
7. (V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V937) S/C SWITCH RETURN CIRCUIT

Measure the resistance between the (V71) S/C Switch No.1 Signal circuit and the (V937) S/C Switch Return circuit in the C1 SCCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V71) S/C Switch No.1 Signal circuit and the (V937) Switch Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

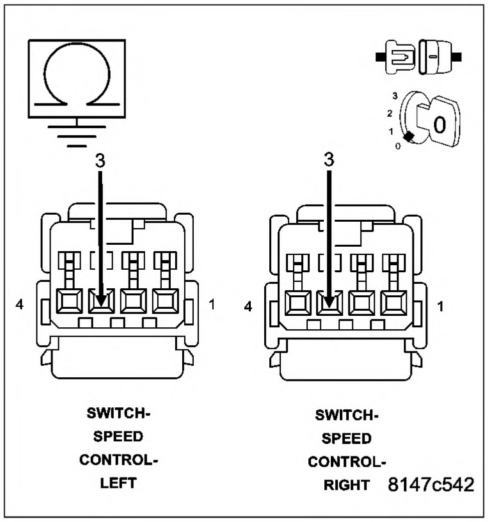
No >> Go To 8



P0580-SPEED CONTROL SWITCH 1 CIRCUIT LOW (CONTINUED)

8. (V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V371) S/C Switch No.1 Signal circuit in the S/C Switch harness connector.


3
3
4
1
4
1
3
2
1
0
0
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c542

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V371) S/C Switch No.1 Signal circuit.

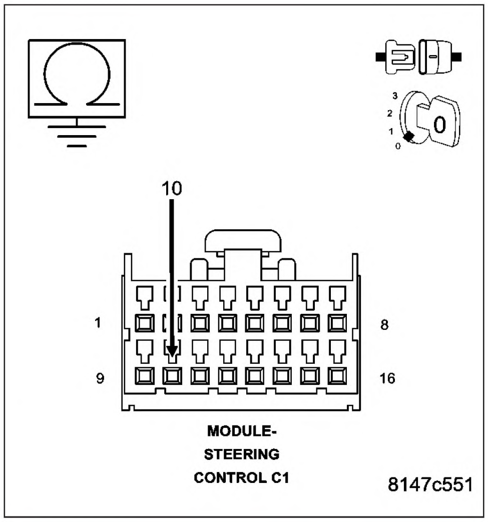
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. (V71) S/C NO.1 SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V71) S/C Switch No.1 Signal circuit in the C1 SCCM harness connector.


10
1
8
9
16
3
2
1
0
0
MODULE-STEERING CONTROL C1
8147c551

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V71) S/C Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0580-SPEED CONTROL SWITCH 1 CIRCUIT LOW (CONTINUED)

10. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	**SWITCH No.1 VOLTAGE VALUE**	**SWITCH No.2 VOLATGE VALUE**
NO SWITCHES PRESSED	4.31 to 4.78 volts	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to 1.13 volts	3.53 to 3.92 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts	2.04 to 2.47 volts
SET PRESSED	3.16 to 3.56 volts	1.17 to 1.56 volts
COAST PRESSED	2.57 to 2.94 volts	0.77 to 1.09 volts
CANCEL PRESSED	1.59 to 1.99 volts	2.84 to 3.25 volts

Take these same voltage measurements with a voltmeter by back probing the (V371) S/C Switch No.1 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch value?

Yes >> Replace the Speed Control Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

11. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

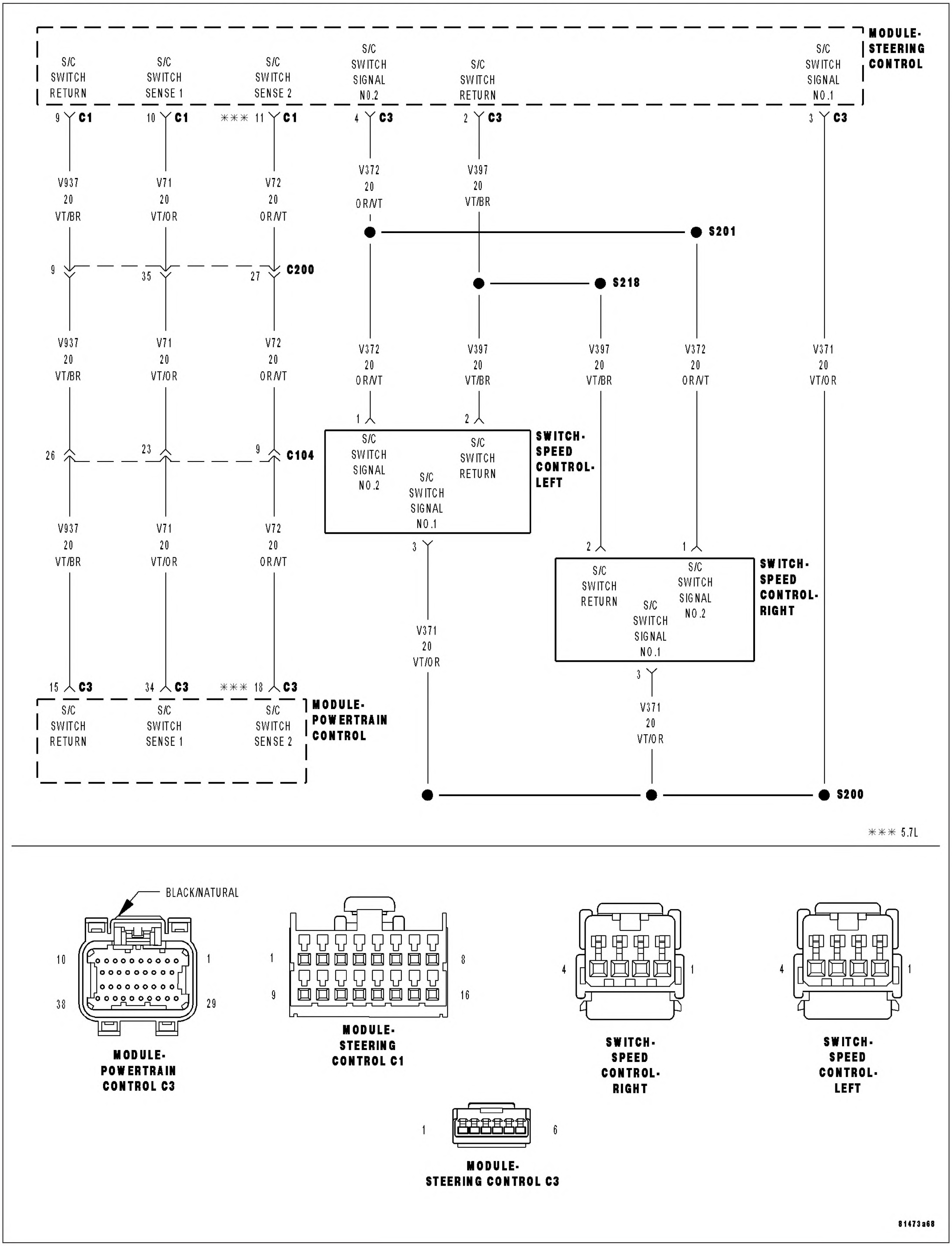
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0581-SPEED CONTROL SWITCH 1 CIRCUIT HIGH


MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
9
35
27
C200
S218
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1
2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-LEFT
26
23
9
C104
3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
2
1
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-RIGHT
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
MODULE-POWERTRAIN CONTROL
S200
*** 5.7L
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
1
8
9
16
MODULE-STEERING CONTROL C1
4
1
SWITCH-SPEED CONTROL-RIGHT
4
1
SWITCH-SPEED CONTROL-LEFT
1
6
MODULE-STEERING CONTROL C3
81473a68

P0581-SPEED CONTROL SWITCH 1 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on.
- **Set Condition:**
  Speed control switch input above the maximum acceptable voltage at the PCM. One trip fault.

Possible Causes
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(V371) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN
(V71) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN
(V397) SWITCH RETURN CIRCUIT OPEN
(V937) SWITCH RETURN CIRCUIT OPEN
SCCM
SPEED CONTROL SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL SWITCH VOLTAGE HIGH

NOTE: Do not press any of the Speed Control Switch buttons.

Ignition on, engine not running.

With a scan tool, read the Speed Control voltage.

Is the Speed Control voltage above 4.8 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0581-SPEED CONTROL SWITCH 1 CIRCUIT HIGH (CONTINUED)

2. SPEED CONTROL SWITCHES

Turn the ignition off.

Remove and disconnect the Speed Control Switches from the steering wheel.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V371) S/C Switch No.1 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position

Not pressing any switch - 20.5 kohms

On/Off - 0.47 kohms

Set - 5.49 kohms

Coast - 2.94 kohms

Cancel - 1.24 kohms

Resume/Accel - 15.4 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 3

No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

3. STEERING COLUMN CONTROL MODULE

Disconnect the C1 and C3 SCCM harness connector per Service Information.

Measure the resistance of the (V397) Switch Return circuit between the C1 and C3 SCCM harness connectors.

Measure the resistance of the (V371) S/C Switch No.1 Signal circuit between the C1 and C3 SCCM harness connectors.

Was the resistance above 5.0 ohms for either circuit?

Yes >> Replace the Steering Colum Control Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. (V371) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Connect the SCCM harness connectors per Service Information.

Disconnect the C3 PCM harness connector.

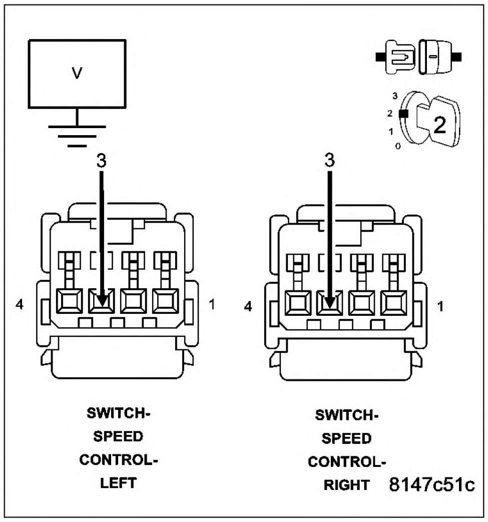
Ignition on, engine not running.

Measure the voltage on the (V371) S/C Switch No.1 Signal circuit in the Speed Control harness connector.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (V371) S/C Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5



P0581-SPEED CONTROL SWITCH 1 CIRCUIT HIGH (CONTINUED)

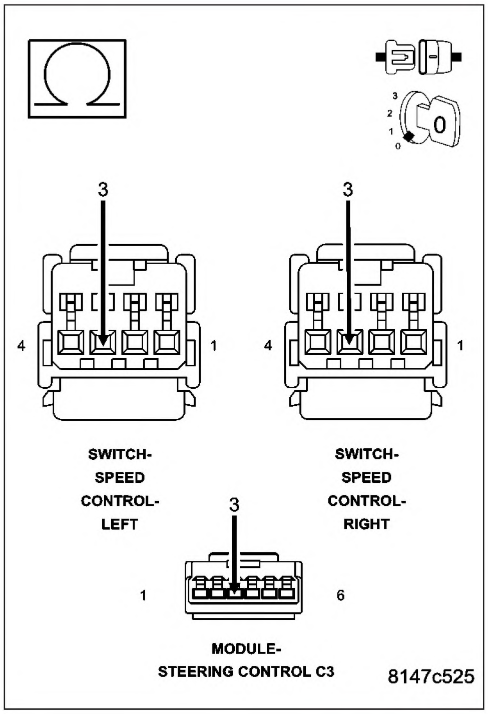
5. (V371) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN

NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

Turn the ignition off.

Disconnect the C3 SCCM harness connector.

Measure the resistance of the (V371) S/C Switch No.1 Signal circuit from the S/C Switch harness connectors to the C3 SCCM harness connector.


3
3
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
3
1
6
MODULE-STEERING CONTROL C3
8147c525

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (V371) S/C Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

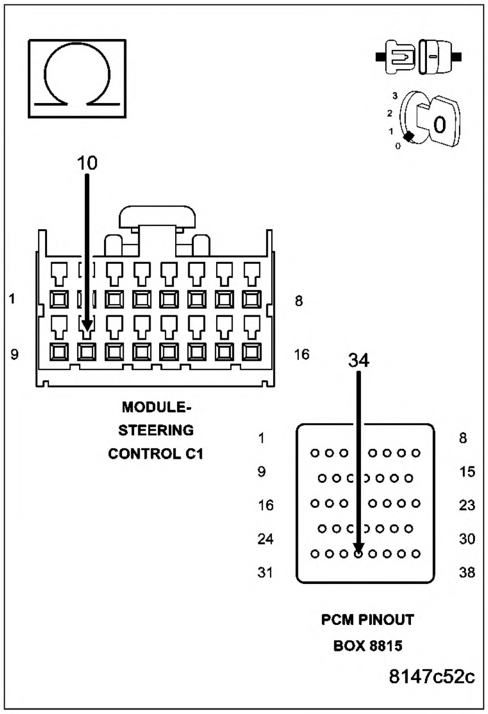
---

6. (V71) S/C SWITCH NO.1 SIGNAL CIRCUIT OPEN

Disconnect the C1 SCCM harness connector

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V71) S/C Switch No.1 Signal circuit from the C1 SCCM harness connector to the appropriate terminal of special tool #8815.


10
1
8
9
16
MODULE-STEERING CONTROL C1
34
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147c52c

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 7

No >> Repair the open in the (V71) S/C Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0581-SPEED CONTROL SWITCH 1 CIRCUIT HIGH (CONTINUED)

7. (V397) SWITCH RETURN CIRCUIT OPEN

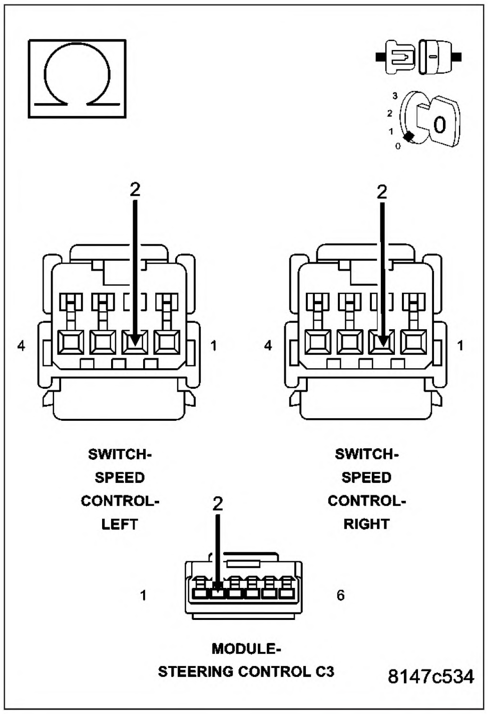
NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

Measure the resistance of the (V397) Switch Return circuit from the S/C Switch harness connector to the C3 SCCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 8

No >> Repair the open in the (V397) Switch Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


2
2
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
2
SWITCH-SPEED CONTROL-RIGHT
1
6
MODULE-STEERING CONTROL C3
8147c534

---

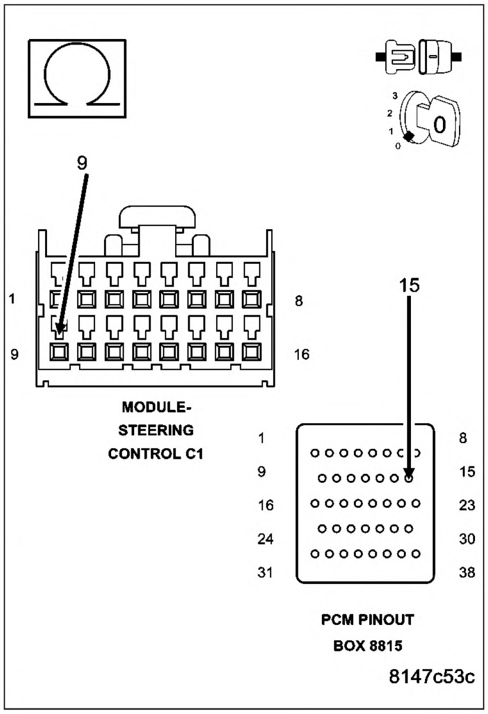
8. (V937) SWITCH RETURN CIRCUIT OPEN

Measure the resistance of the (V937) Switch Return circuit from the C1 SCCM harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 9

No >> Repair the open in the (V937) Switch Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


9
1
8
9
16
15
MODULE-STEERING CONTROL C1
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147c53c

P0581-SPEED CONTROL SWITCH 1 CIRCUIT HIGH (CONTINUED)

9. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	SWITCH No.1 VOLTAGE VALUE	SWITCH No.2 VOLATGE VALUE
NO SWITCHES PRESSED	4.31 to 4.78 volts	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to 1.13 volts	3.53 to 3.92 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts	2.04 to 2.47 volts
SET PRESSED	3.16 to 3.56 volts	1.17 to 1.56 volts
COAST PRESSED	2.57 to 2.94 volts	0.77 to 1.09 volts
CANCEL PRESSED	1.59 to 1.99 volts	2.84 to 3.25 volts

Take these same voltage measurements with a voltmeter by back probing the (V371) S/C Switch No.1 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch value?

Yes >> Replace the Speed Control Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

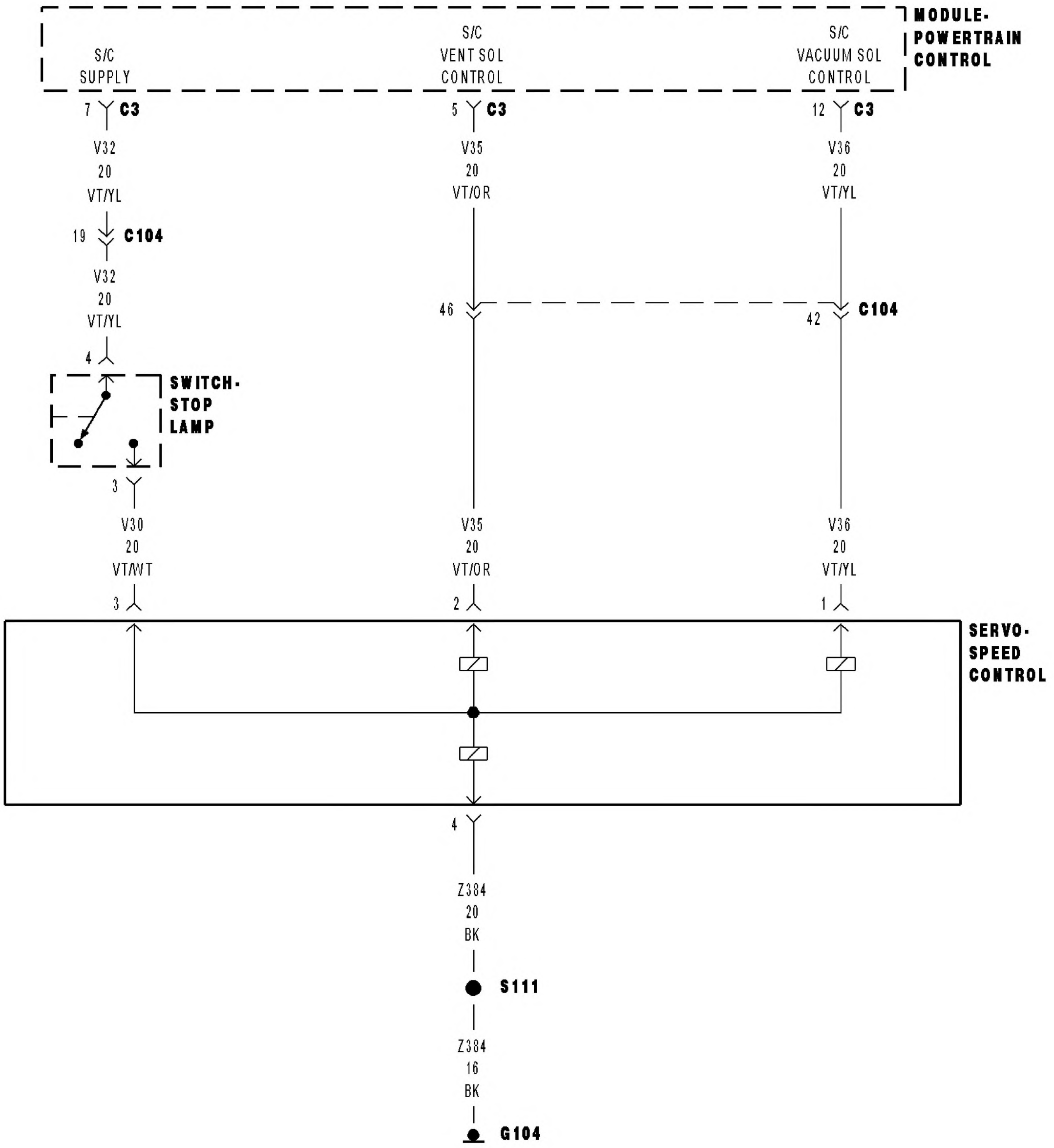
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

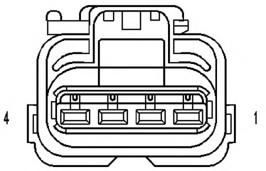
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

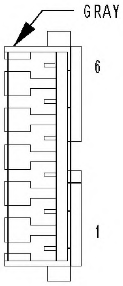
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0586-SPEED CONTROL VACUUM CONTROL CIRCUIT

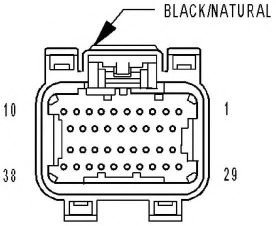

MODULE-
POWERTRAIN
CONTROL
S/C
SUPPLY
S/C
VENT SOL
CONTROL
S/C
VACUUM SOL
CONTROL
7 C3
5 C3
12 C3
V32
20
VT/YL
V35
20
VT/OR
V36
20
VT/YL
19 C104
V32
20
VT/YL
46
42 C104
4
SWITCH-
STOP
LAMP
3
V30
20
VT/WT
V35
20
VT/OR
V36
20
VT/YL
3
2
1
SERVO-
SPEED
CONTROL
4
Z384
20
BK
S111
Z384
16
BK
G104



SERVO-
SPEED
CONTROL
(3.7L/4.7L)



SWITCH-
STOP
LAMP


BLACK/NATURAL
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C3

81473ca4

P0586-SPEED CONTROL VACUUM CONTROL CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  An open or shorted condition detected in the Speed control vacuum solenoid control circuit. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(V32) S/C SUPPLY CIRCUIT OPEN
(V32) S/C SUPPLY SHORT TO GROUND
(V36) S/C VACUUM SOL CONTROL CIRCUIT SHORTED TO GROUND
(V36) S/C VACUUM SOL CONTROL CIRCUIT OPEN
(Z384) GROUND CIRCUIT OPEN
SPEED CONTROL VACUUM SOLENOID
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL VACUUM CONTROL

Ignition on, engine not running.
With the scan tool, read DTCs and record the related Freeze Frame data.
With the scan tool, actuate the Speed Control Vacuum Solenoid and note operation.

Does the Speed Control Vacuum Solenoid actuate properly?

Yes >> Refer to the INTERMITTENT CONDITION symptom in the Driveability category.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

P0586-SPEED CONTROL VACUUM CONTROL CIRCUIT (CONTINUED)

2. (V30) S/C BRAKE SWITCH OUTPUT CIRCUIT

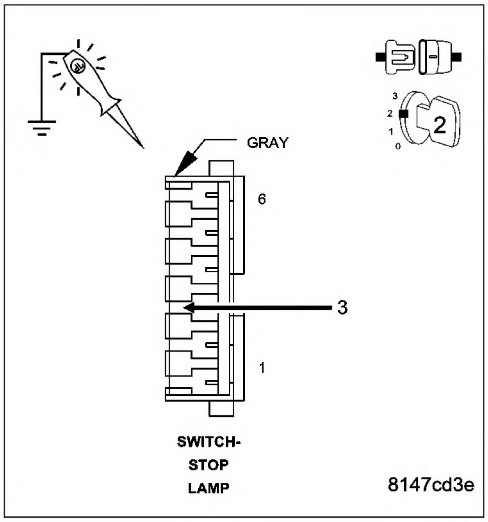
Turn the ignition off.

Disconnect the S/C Servo harness connector.

Ignition on, engine not running.

Using the scan tool, actuate the S/C Vacuum Solenoid.

Using a test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the S/C Servo harness connector.



Does the test light illuminate brightly and flash on and off?

Yes >> Go To 5

No >> Go To 3

---

3. (V32) S/C SUPPLY CIRCUIT

Turn the ignition off.

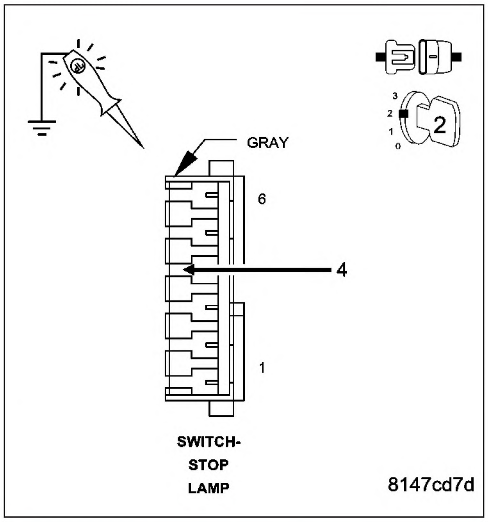
Connect the S/C Servo harness connector.

Disconnect the Stop Lamp Switch harness connector.

Ignition on, engine not running.

Using the scan tool, actuate the S/C Vacuum Solenoid.

Using a test light connected to ground, probe the (V32) S/C Supply circuit in the Stop Lamp Switch harness connector.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Go To 8

P0586-SPEED CONTROL VACUUM CONTROL CIRCUIT (CONTINUED)

4. (Z384) S/C GROUND CIRCUIT OPEN

Turn the ignition off.

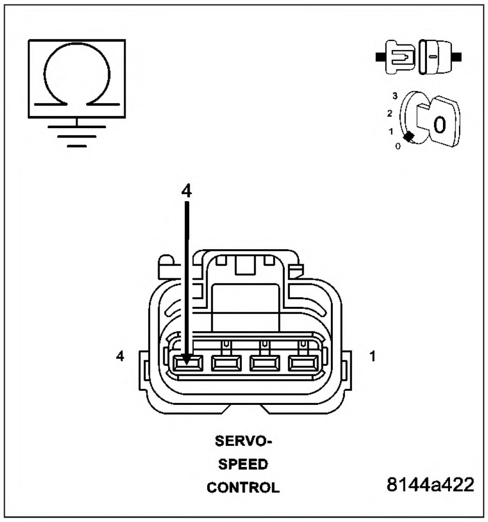
Disconnect the S/C Servo harness connector.

Measure the resistance of the (Z384) S/C Ground circuit at the S/C Servo harness connector to ground.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (Z384) S/C Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



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5. SPEED CONTROL VACUUM SOLENOID

Ignition on, engine not running.

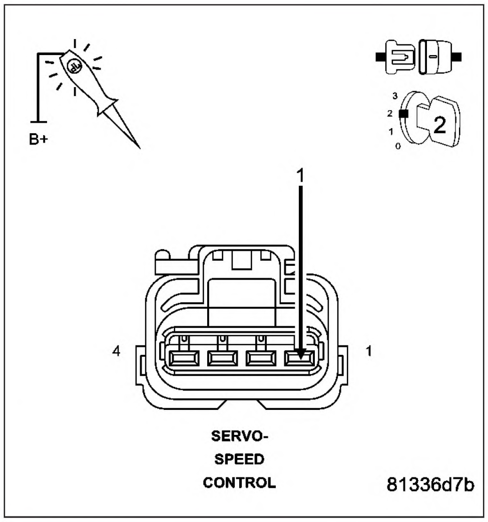
With the scan tool, actuate the Speed Control Vacuum Solenoid.

Using a 12-volt test light connected to battery voltage, probe the (V36) S/C Vacuum Control circuit.

Does the test light illuminate brightly and flash on and off?

Yes >> Replace the Speed Control Servo.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6



P0586-SPEED CONTROL VACUUM CONTROL CIRCUIT (CONTINUED)

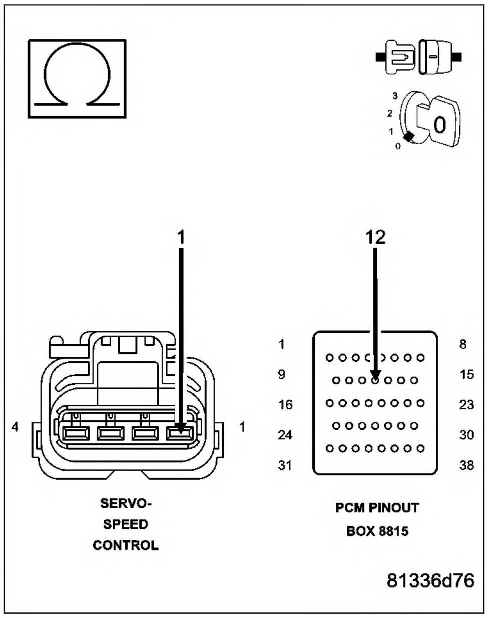
6. (V36) S/C VACUUM SOL CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V36) S/C Vacuum Sol Control circuit from the Speed Control Servo harness connector to the appropriate terminal of special tool # 8815.



81336d76

Is the resistance below 5.0 ohms?

Yes >> Go To 7

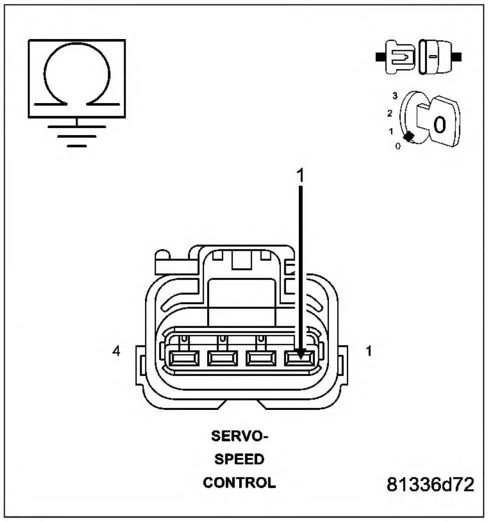
No >> Repair the open/high resistance in the (V36) S/C Vacuum Sol Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (V36) SPEED CONTROL VACUUM SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V36) S/C Vacuum Solenoid Control circuit at the Speed Control Servo harness connector.



81336d72

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V36) S/C Vacuum Sol Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0586-SPEED CONTROL VACUUM CONTROL CIRCUIT (CONTINUED)

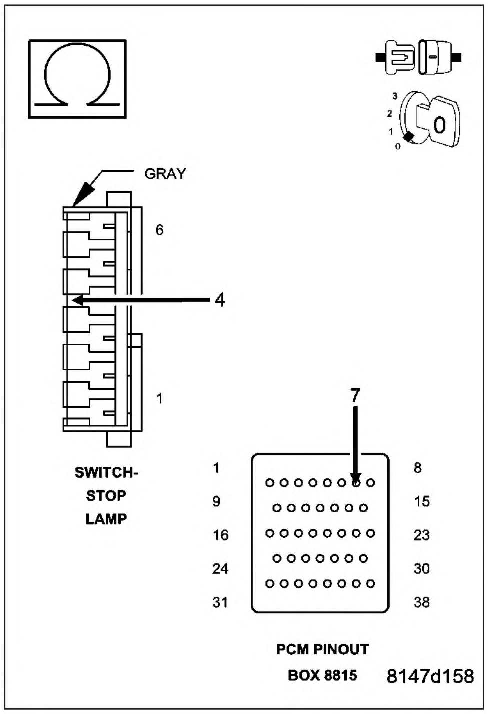
8. (V32) S/C SUPPLY OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V32) S/C Supply circuit from the Stop Lamp Switch harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 9

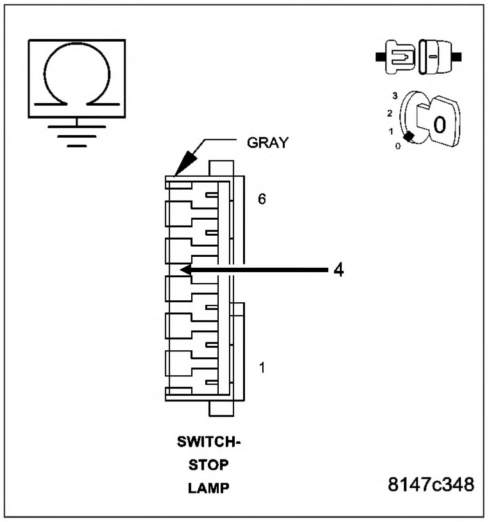
No >> Repair the open/high resistance in the (V32) S/C Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. (V32) S/C SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V32) S/C Supply circuit at the Speed Control Servo harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V32) S/C Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0586-SPEED CONTROL VACUUM CONTROL CIRCUIT (CONTINUED)

10. PCM

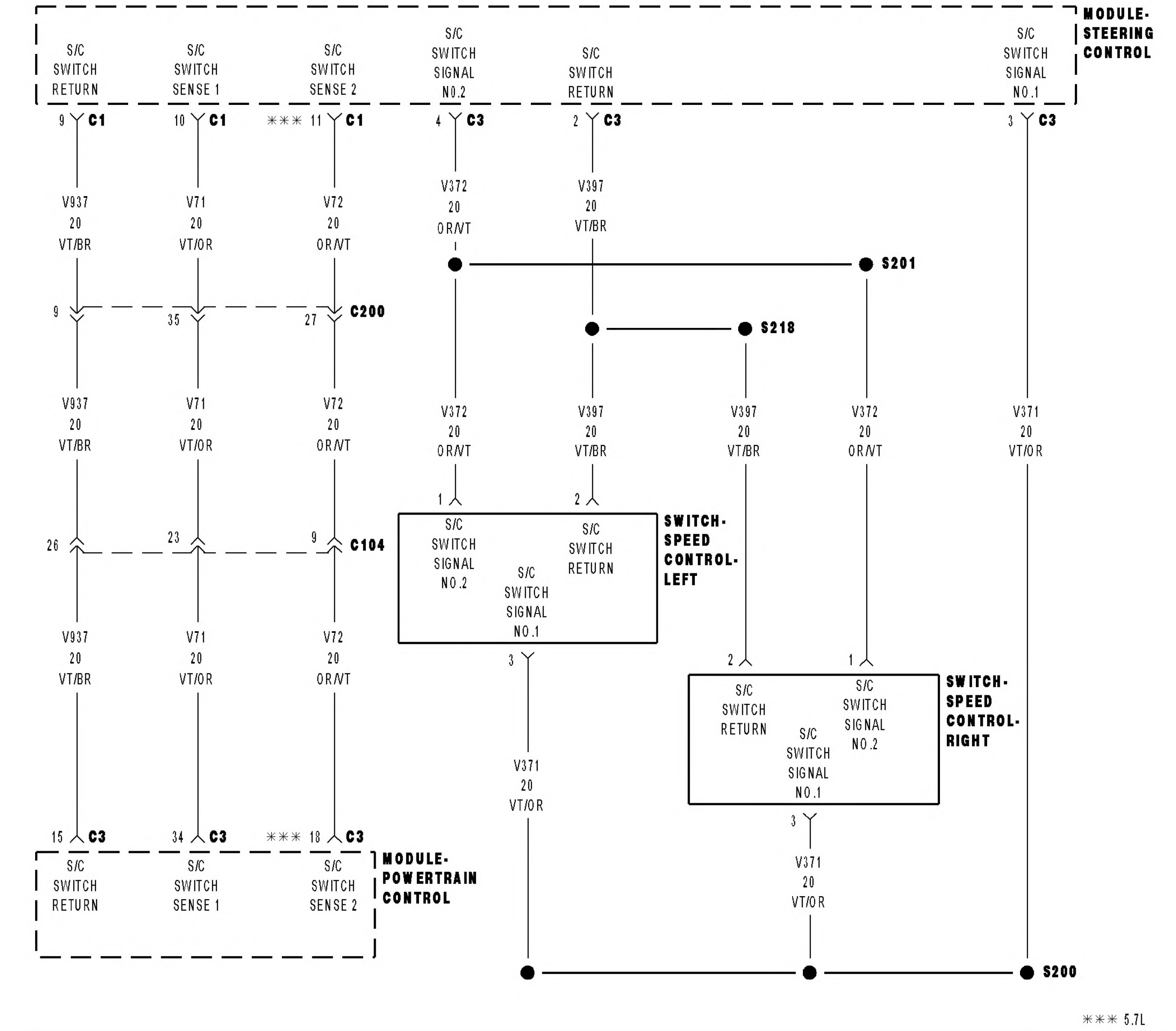
NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

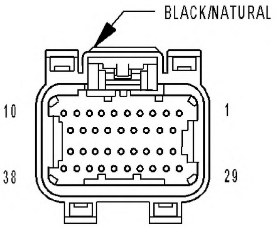
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

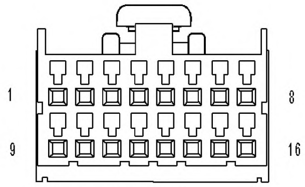
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION

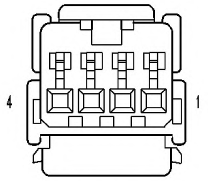

MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
9
35
27
C200
S218
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1
2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-LEFT
26
23
9
C104
3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
2
1
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-RIGHT
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
MODULE-POWERTRAIN CONTROL
S200
*** 5.7L


BLACK/NATURAL
10
1
38
29

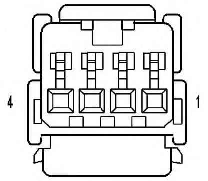
MODULE-POWERTRAIN CONTROL C3



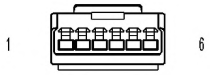
MODULE-STEERING CONTROL C1



SWITCH-SPEED CONTROL-RIGHT



SWITCH-SPEED CONTROL-LEFT



MODULE-STEERING CONTROL C3

81473a68

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  Cruise Switch inputs are not coherent with each other. Example: PCM is reading Switch No.1 as Accel and Switch No.2 as Coast at the same time. One trip fault.

Possible Causes
S/C SWITCH SIGNAL CIRCUITS SHORTED TO BATTERY VOLTAGE
RESISTANCE IN THE S/C SWITCH SIGNAL CIRCUITS
RESISTANCE IN THE (V397/V937) SWITCH RETURN CIRCUIT
S/C SWITCH SIGNAL CIRCUITS SHORTED TO THE (V397/V937) SWITCH RETURN CIRCUIT
(V371/V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V372/V72) S/C SWITCH NO.2 SIGNAL CIRCUIT
S/C SWITCH SIGNAL CIRCUITS SHORTED TO GROUND
STEERING COLUMN CONTROL MODULE
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: This DTC may be the result of pressing two Speed Control Switch buttons simultaneously for more than 450 msec.

Ask the customer if it is possible that two buttons were pressed at the same time before this DTC set. If this is the case, no repair is necessary.

Is the DTC active a this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. SPEED CONTROL ON/OFF SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control On/Off Switch harness connector.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control On/Off Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

3. SPEED CONTROL RESUME/ACCEL SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control Resume/Accel Switch harness connector.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control Resume/Accel Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. SPEED CONTROL SWITCHES

Turn the ignition off.

Remove and disconnect the Speed Control Switches from the steering wheel per Service Information.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V372) S/C Switch No.2 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position.

Not pressing any switch - 20.5 kohms
On/Off - 8.87 kohms
Set - 0.825 kohms
Coast - 0.47 kohms
Cancel - 3.92 kohms
Resume/Accel - 1.87 kohms

The following resistance specs are taken between terminals (V371) S/C Switch No.1 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position

Not pressing any switch - 20.5 kohms
On/Off - 0.47 kohms
Set - 5.49 kohms
Coast - 2.94 kohms
Cancel - 1.24 kohms
Resume/Accel - 15.4 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 5

No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

5. S/C SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

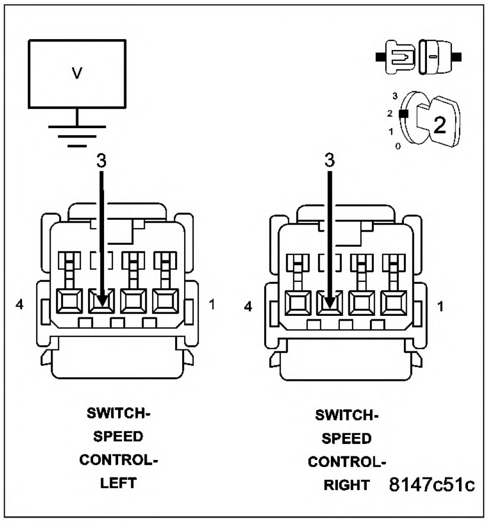
Measure the voltage on the (V371) and (V372) S/C Switch Signal circuits at both Speed Control harness connectors.

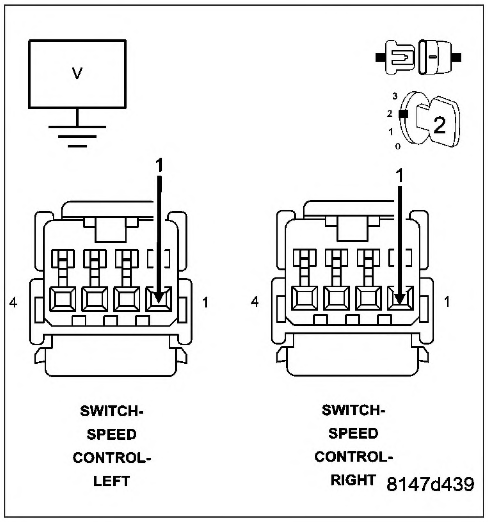
Is the voltage above 5.0 volts?

Yes >> Repair the short to battery voltage in the (V371) or (V372) S/C Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6


V
3
2
1
0
2
3
3
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c51c


V
3
2
1
0
2
1
1
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147d439

---

6. STEERING COLUMN CONTROL MODULE

Turn the ignition off.

Disconnect the C1 and C3 SCCM harness connectors per Service Information.

Measure the resistance of the (V371/V71) and (V372/V72) S/C Switch Signal circuits between the C1 and C3 SCCM connectors.

Measure the resistance of the (V397/V937) Switch Return circuit between the C1 and C3 SCCM harness connectors.

Is the resistance above 5.0 ohms for any one of the measurements?

Yes >> Replace the SCCM per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

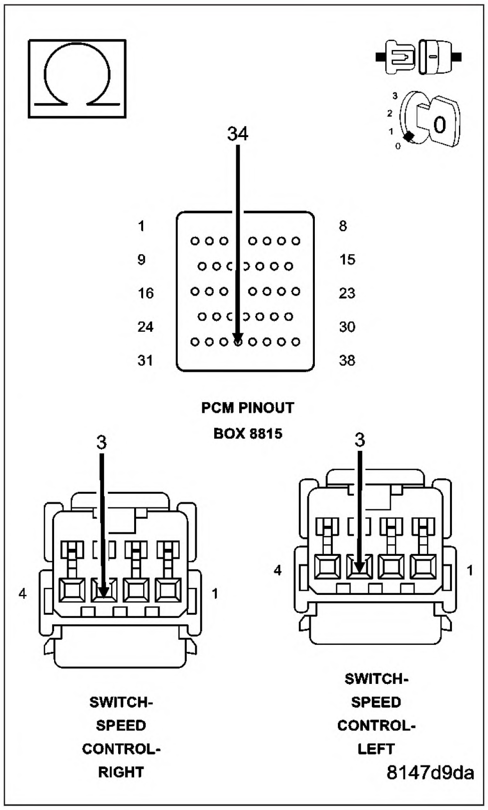
NOTE: Connect the Steering Column Control Module harness connectors per Service Information before continuing.

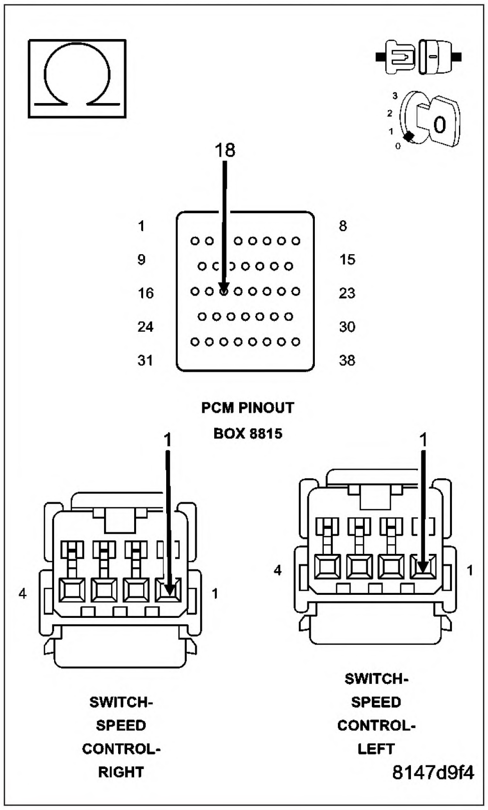
P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

7. S/C SWITCH SIGNAL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V371/V71) and (V372/V72) S/C Switch Signal circuits from both Speed Control harness connectors to the appropriate terminals of special tool #8815.


34
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
3
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147d9da


18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
1
1
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147d9f4

Is the resistance below 5.0 ohms for each measurement?

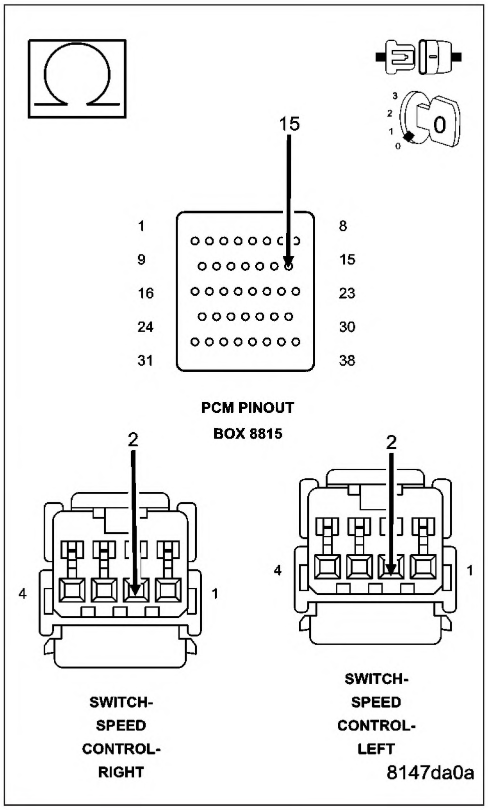
Yes >> Go To 8

No >> Repair the excessive resistance in the (V371/V71) or (V372/V72) S/C Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

8. (V397/V937) SWITCH RETURN CIRCUIT OPEN


15
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
2
2
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147da0a

NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

Measure the resistance of the (V397/V937) Switch Return circuit from both Speed Control harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 9

No >> Repair the excessive resistance in the (V397/V937) Switch Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

9. S/C SWITCH SIGNAL CIRCUITS SHORTED TO THE (V397/V937) SWITCH RETURN CIRCUIT

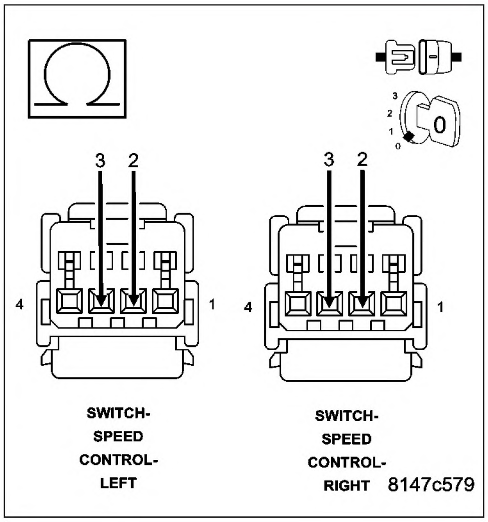
Measure the resistance between the (V397) Switch Return circuit and both of the (V371) and (V372) S/C Switch Signal circuits in the S/C Switch harness connector.

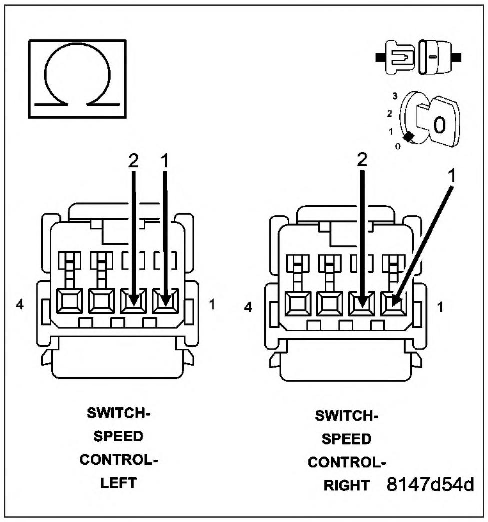
Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V397/V937) Switch Return circuit and the (V371/V71) or (V372/V72) S/C Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10


3
2
3
2
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c579


2
1
2
1
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147d54d

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

10. (V371/V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V372/V72) S/C SWITCH NO.2 SIGNAL CIRCUIT

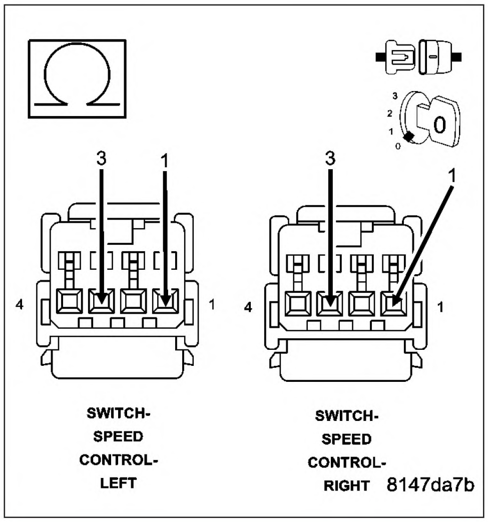
Measure the resistance between the (V371/V71) S/C Switch No.1 Signal circuit and the (V372/72) S/C Switch No.2 Signal circuit at both Speed Control harness connectors.

Is the resistance below 100 ohms for each circuit?

Yes >> Repair the short between the (V372/V72) S/C Switch No.2 Signal circuit and the (V371) S/C Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11


3
1
3
1
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
SWITCH-
SPEED
CONTROL-
RIGHT
8147da7b

---

11. S/C SWITCH SIGNAL CIRCUITS SHORTED TO GROUND

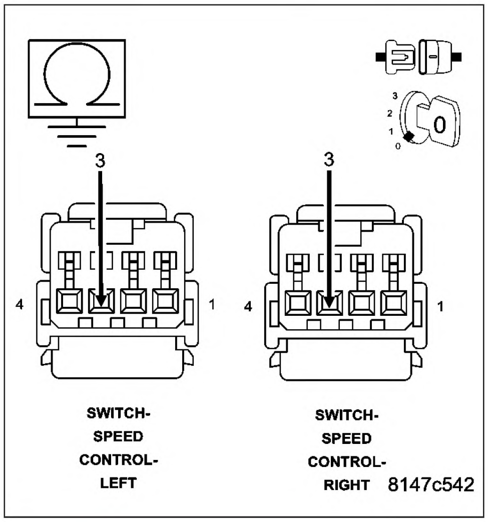
Measure the resistance between ground and the (V371/V71) and (V372/V72) S/C Switch Signal circuits at both S/C Switch harness connectors.

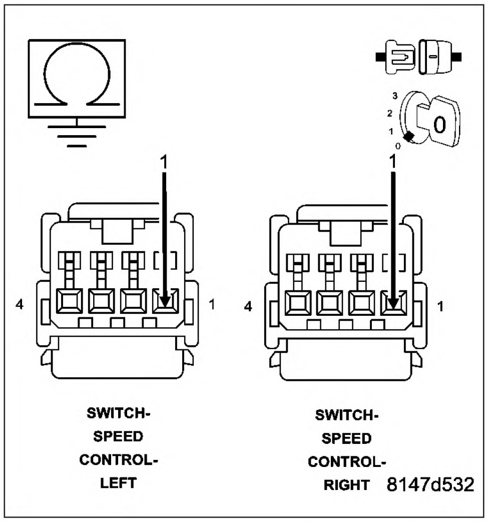
Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V371/V71) or (V372/V72) S/C Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12


3
3
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
SWITCH-
SPEED
CONTROL-
RIGHT
8147c542


1
1
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
SWITCH-
SPEED
CONTROL-
RIGHT
8147d532

P0585-SPEED CONTROL SWITCH 1/2 CORRELATION (CONTINUED)

12. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	SWITCH No.1 VOLTAGE VALUE	SWITCH No.2 VOLATGE VALUE
NO SWITCHES PRESSED	4.31 to 4.78 volts	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to 1.13 volts	3.53 to 3.92 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts	2.04 to 2.47 volts
SET PRESSED	3.16 to 3.56 volts	1.17 to 1.56 volts
COAST PRESSED	2.57 to 2.94 volts	0.77 to 1.09 volts
CANCEL PRESSED	1.59 to 1.99 volts	2.84 to 3.25 volts

Take these same voltage measurements with a voltmeter by back probing the (V371) S/C Switch No.1 Signal circuit and the (V372) S/C Switch No.2 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch values?

Yes >> Replace the Speed Control Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

13. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0586-SPEED CONTROL VENT CONTROL CIRCUIT

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  An open or shorted condition detected in the Speed control vent solenoid control circuit. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(V32) S/C SUPPLY CIRCUIT OPEN
(V32) S/C SUPPLY SHORT TO GROUND
(V35) S/C VENT SOL CONTROL CIRCUIT SHORTED TO GROUND
(V35) S/C VENT SOL CONTROL CIRCUIT OPEN
(Z384) GROUND CIRCUIT OPEN
SPEED CONTROL VENT SOLENOID
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL VENT CONTROL

Ignition on, engine not running.

With the scan tool, read DTCs and record the related Freeze Frame data.

With the scan tool, actuate the Speed Control Vent Solenoid and note operation.

Does the Speed Control Vacuum Solenoid actuate properly?

Yes >> Refer to the INTERMITTENT CONDITION symptom in the Driveability category.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

P0586-SPEED CONTROL VENT CONTROL CIRCUIT (CONTINUED)

2. (V30) S/C BRAKE SWITCH OUTPUT CIRCUIT

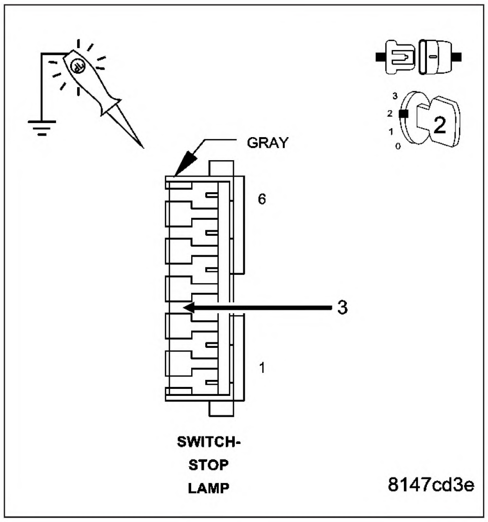
Turn the ignition off.

Disconnect the S/C Servo harness connector.

Ignition on, engine not running.

Using the scan tool, actuate the S/C Vent Solenoid.

Using a test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the S/C Servo harness connector.



Does the test light illuminate brightly and flash on and off?

Yes >> Go To 5

No >> Go To 3

---

3. (V32) S/C SUPPLY CIRCUIT

Turn the ignition off.

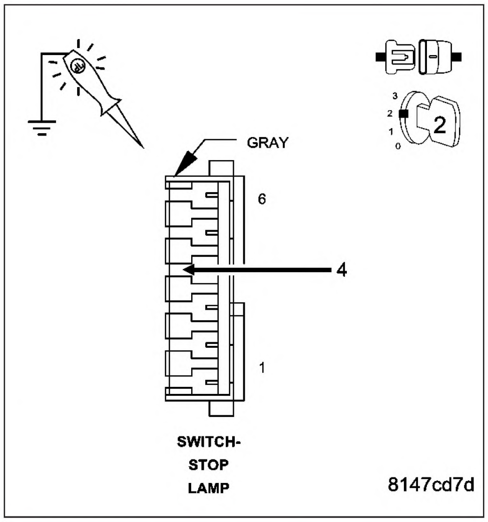
Connect the S/C Servo harness connector.

Disconnect the Stop Lamp Switch harness connector.

Ignition on, engine not running.

Using the scan tool, actuate the S/C Vent Solenoid.

Using a test light connected to ground, probe the (V32) S/C Supply circuit in the Stop Lamp Switch harness connector.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Go To 8

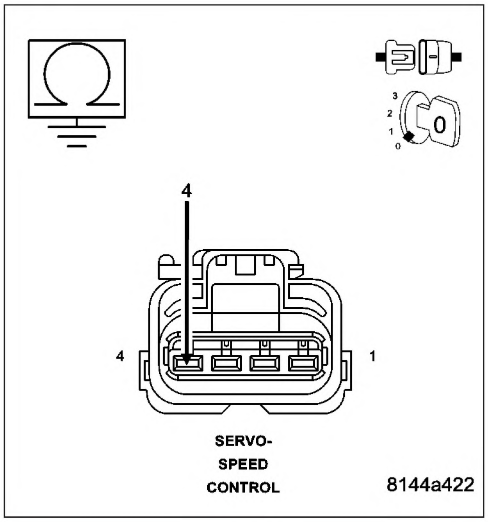
P0586-SPEED CONTROL VENT CONTROL CIRCUIT (CONTINUED)

4. (Z384) S/C GROUND CIRCUIT OPEN

Turn the ignition off.

Disconnect the S/C Servo harness connector.

Measure the resistance of the (Z384) S/C Ground circuit at the S/C Servo harness connector to ground.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (Z384) S/C Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

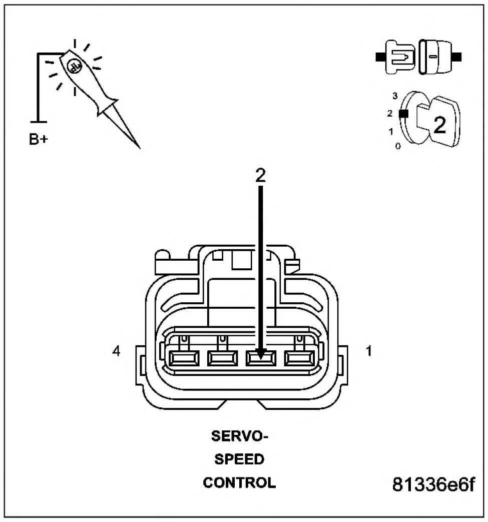
---

5. SPEED CONTROL VENT SOLENOID

Ignition on, engine not running.

With the scan tool, actuate the Speed Control Vent Solenoid.

Using a 12-volt test light connected to battery voltage, probe the (V36) S/C Vent Control circuit.



Does the test light illuminate brightly and flash on and off?

Yes >> Replace the Speed Control Servo.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0586-SPEED CONTROL VENT CONTROL CIRCUIT (CONTINUED)

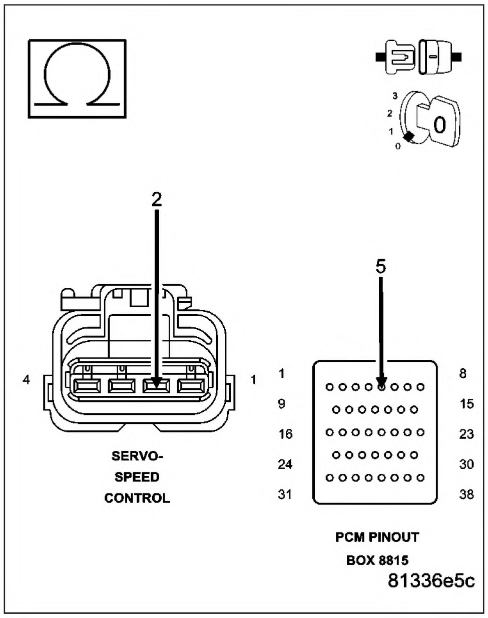
6. (V35) S/C VENT CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V35) S/C Vent Sol Control circuit from the Speed Control Servo harness connector to the appropriate terminal of special tool # 8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

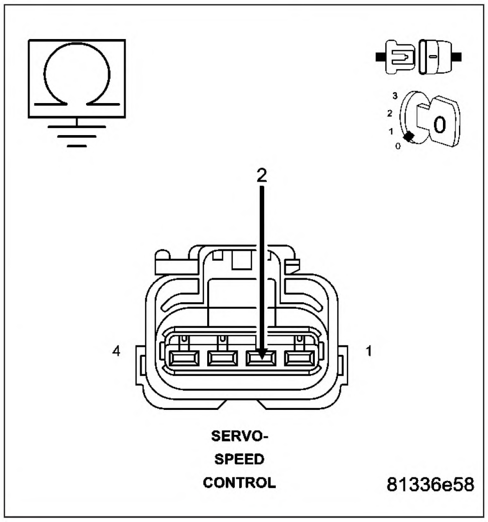
No >> Repair the open/high resistance in the (V35) S/C Vent Sol Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (V35) SPEED CONTROL VENT SOLENOID CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V35) S/C Vent Solenoid Control circuit at the Speed Control Servo harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V35) S/C Vent Sol Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0586-SPEED CONTROL VENT CONTROL CIRCUIT (CONTINUED)

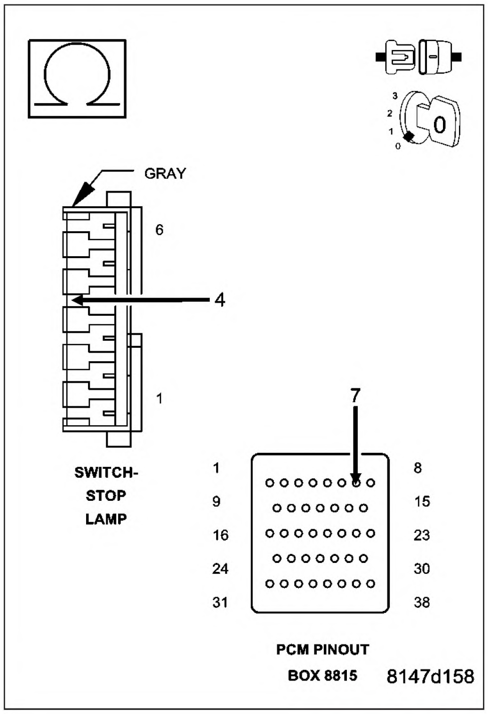
8. (V32) S/C SUPPLY OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V32) S/C Supply circuit from the Stop Lamp Switch harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 9

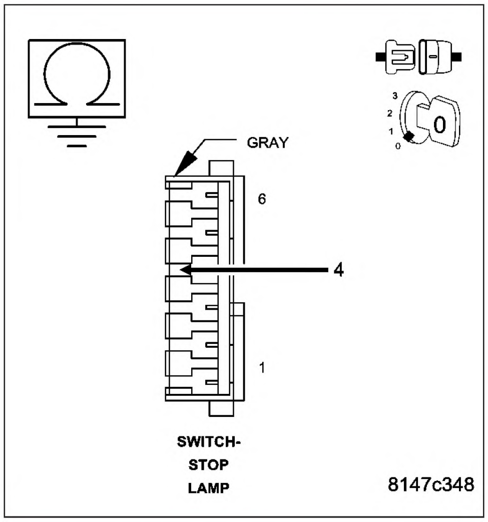
No >> Repair the open/high resistance in the (V32) S/C Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. (V32) S/C SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V32) S/C Supply circuit at the Speed Control Servo harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V32) S/C Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0586-SPEED CONTROL VENT CONTROL CIRCUIT (CONTINUED)

10. PCM

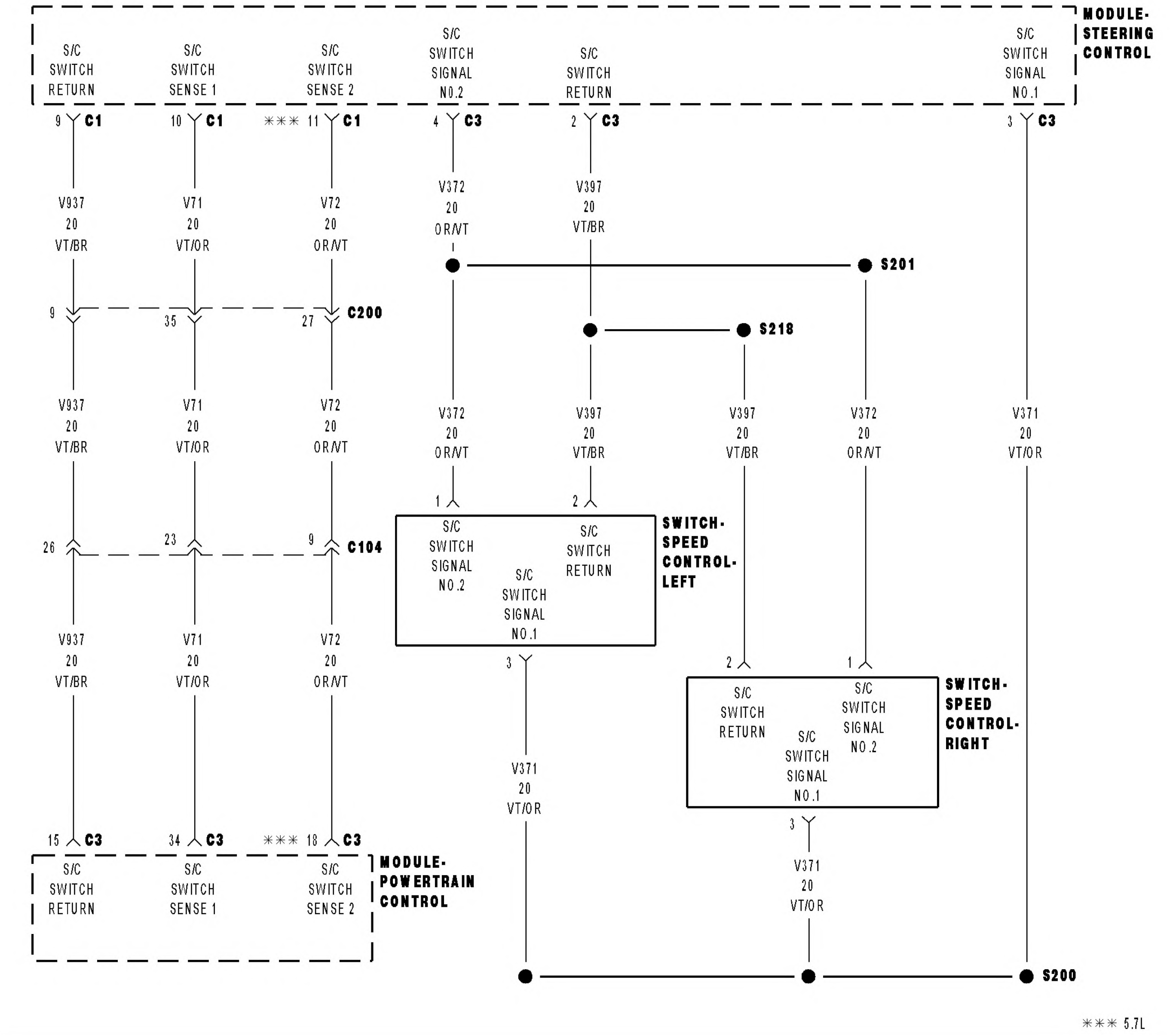
NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

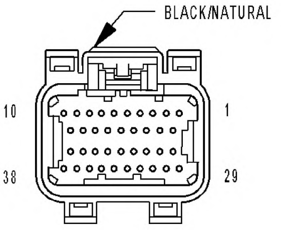
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

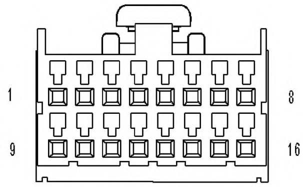
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE

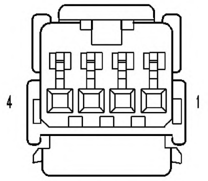

MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
9
35
27
C200
S218
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1
2
SWITCH-SPEED CONTROL-LEFT
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
26
23
9
C104
3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
2
1
SWITCH-SPEED CONTROL-RIGHT
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
MODULE-POWERTRAIN CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S200
*** 5.7L


BLACK/NATURAL
10
1
38
29

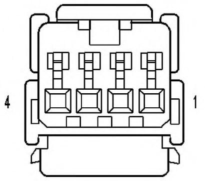
MODULE-POWERTRAIN CONTROL C3



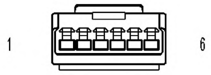
MODULE-STEERING CONTROL C1



SWITCH-SPEED CONTROL-RIGHT



SWITCH-SPEED CONTROL-LEFT


1
6

MODULE-STEERING CONTROL C3

81473a68

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on.
- **Set Condition:**
  Cruise switch voltage output is not out of range but it does not equal any of the values for any of the button positions.

Possible Causes
(V372) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN
(V72) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN
(V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(V397) SWITCH RETURN CIRCUIT OPEN
(V937) SWITCH RETURN CIRCUIT OPEN
(V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V397) SWITCH RETURN CIRCUIT
(V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V937) SWITCH RETURN CIRCUIT
SPEED CONTROL SWITCH
SCCM
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL SWITCH STATUS

Start the engine.

With a scan tool, monitor each which function for the Speed Control Switches.

Press and release each Speed Control Button.

- Resume/Accel
- Cancel
- Decel (Coast)
- On/Off
- Set

Does each switch function change status when pressing and then depressing each switch?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

2. SPEED CONTROL SWITCHES

Turn the ignition off.

Remove the Speed Control Switches from the steering wheel.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V372) S/C Switch No.2 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position.

Not pressing any switch - 20.5 kohms

On/Off - 8.87 kohms

Set - 0.825 kohms

Coast - 0.47 kohms

Cancel - 3.92 kohms

Resume/Accel - 1.87 kohms

The following resistance specs are taken between terminals (V371) S/C Switch No.1 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position

Not pressing any switch - 20.5 kohms

On/Off - 0.47 kohms

Set - 5.49 kohms

Coast - 2.94 kohms

Cancel - 1.24 kohms

Resume/Accel - 15.4 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 3

No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

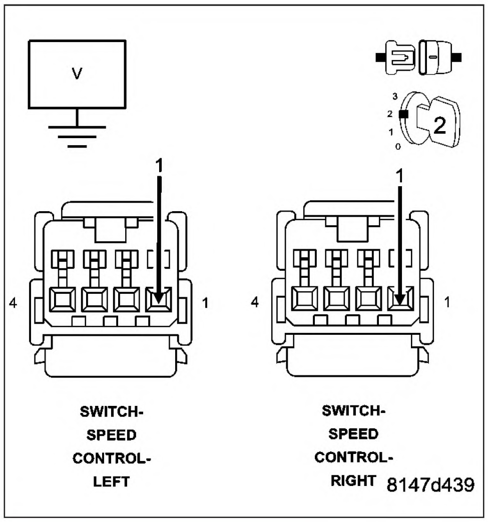
3. (V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

Disconnect the C3 Steering Column Control Module harness connector.

Ignition on, engine not running.

Measure the voltage of the (V372) S/C Switch No.2 Signal circuit in the S/C Switch harness connectors.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (V372) S/C Switch No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

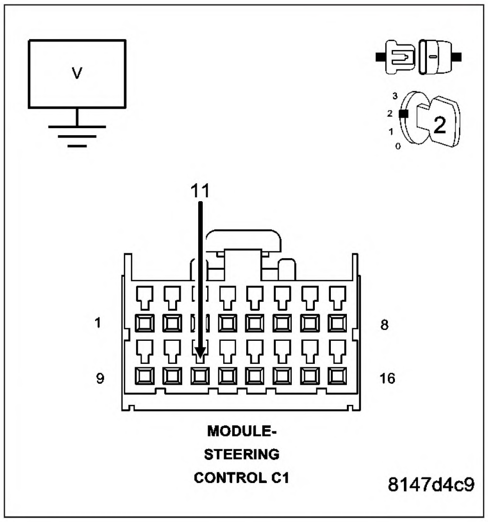
P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

4. (V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C1 Steering Column Control Module harness connector per Service Information.

Ignition on, engine not running.

Measure the voltage on the (V72) S/C Switch No.2 Signal circuit in the C1 SCCM harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (V72) S/C Switch No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

5. STEERING COLUMN CONTROL MODULE

Turn the ignition off.

Measure the resistance of the (V372) S/C Switch No.2 Signal circuit between the C1 and C3 SCCM connections.

Measure the resistance of the (V397) Switch Return circuit between the C1 and C3 SCCM connections.

Is the resistance above 5.0 ohms?

Yes >> Replace the Steering Column Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

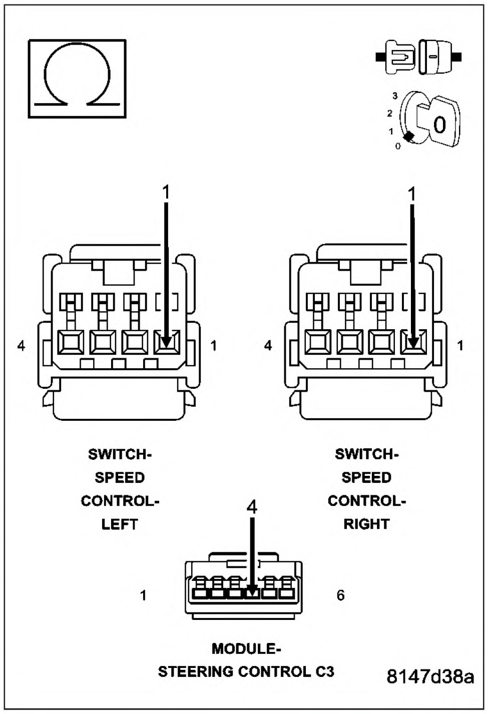
6. (V372) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN

NOTE: The measurement must be taken from both Speed Control Switch harness connectors.
Measure the resistance of the (V372) S/C Switch No.2 Signal circuit from both Speed Control harness connectors to the C3 SCCM harness connector.

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 7

No >> Repair the open in the (V372) S/C Switch No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


1
1
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
SWITCH-
SPEED
CONTROL-
RIGHT
4
1
6
MODULE-
STEERING CONTROL C3
8147d38a

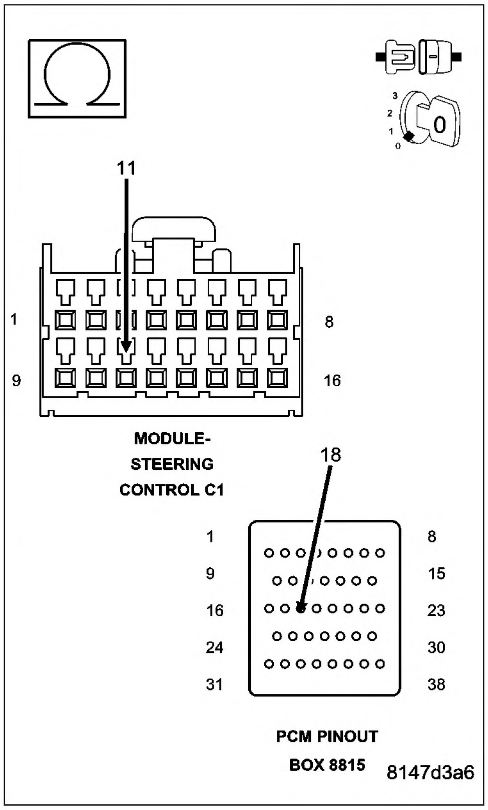
7. (V72) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.
Measure the resistance of the (V72) S/C Switch No.2 Signal circuit from the C1 SCCM harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 8

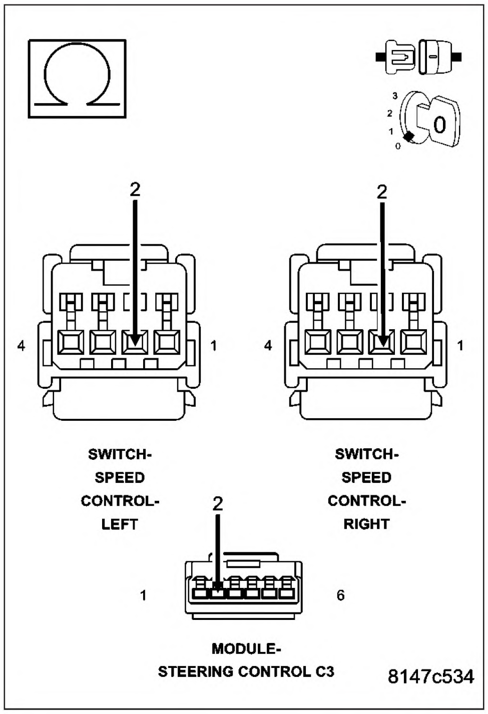
No >> Repair the open in the (V72) S/C Switch No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


11
1
8
9
16
MODULE-
STEERING
CONTROL C1
18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147d3a6

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

8. (V397) SWITCH RETURN CIRCUIT OPEN

Measure the resistance of the (V397) Switch Return circuit from the S/C Switch harness connectors to the C3 SCCM harness connector.


2
2
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
2
SWITCH-
SPEED
CONTROL-
RIGHT
1
6
MODULE-
STEERING CONTROL C3
8147c534

Is the resistance below 5.0 ohms for both measurements?

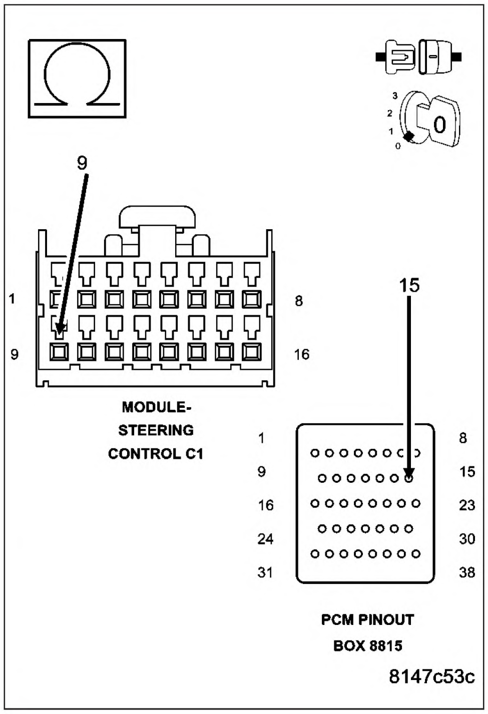
Yes >> Go To 9

No >> Repair the open in the (V397) Switch Return circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. (V937) SWITCH RETURN OPEN

Measure the resistance of the (V397) Switch Return circuit from the C1 SCCMl harness connector to the appropriate terminal of special tool #8815.


9
1
8
9
16
15
MODULE-
STEERING
CONTROL C1
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147c53c

Is the resistance below 5.0 ohms for both measurement?

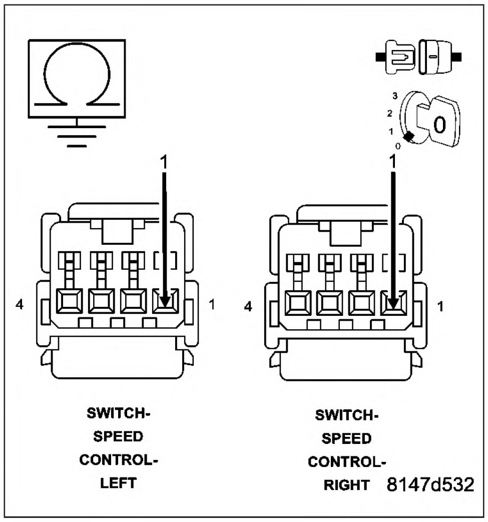
Yes >> Go To 10

No >> Repair the open in the (V937) Switch Return circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

10. (V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V372) S/C Switch No.2 Signal circuit in the Speed Control harness connectors.


1
1
4
1
4
1
3
2
1
0
0
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147d532

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V372) S/C Switch No.2 Signal circuit.

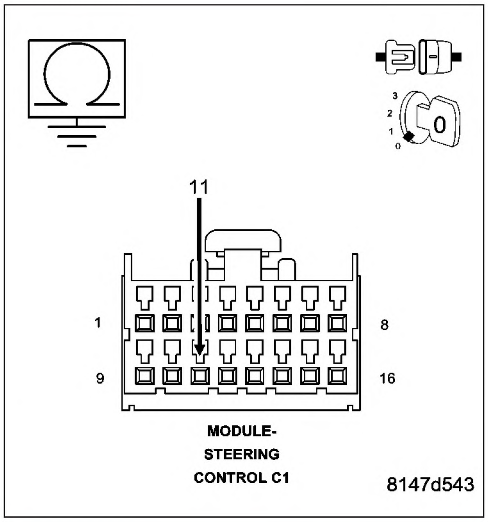
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

---

11. (V72) S/C NO.2 SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V72) S/C Switch No.2 Signal circuit in the C1 SCCM harness connector.


11
1
8
9
16
3
2
1
0
0
MODULE-STEERING CONTROL C1
8147d543

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V72) S/C Switch No.2 Signal circuit.

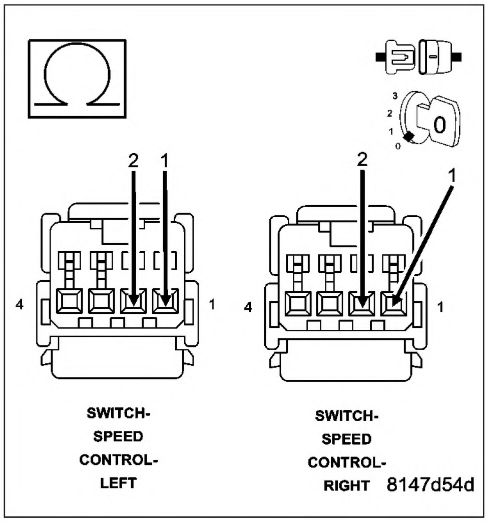
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

12. (V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V397) SWITCH RETURN CIRCUIT

Measure the resistance between the (V372) S/C Switch No.2 Signal circuit and the (V397) Switch Return circuit in the Speed Control harness connector.



2
1
2
1
4
1
4
1
3
2
1
0
0
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147d54d

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V372) S/C Switch No.2 Signal circuit and the (V397) Switch Return circuit.

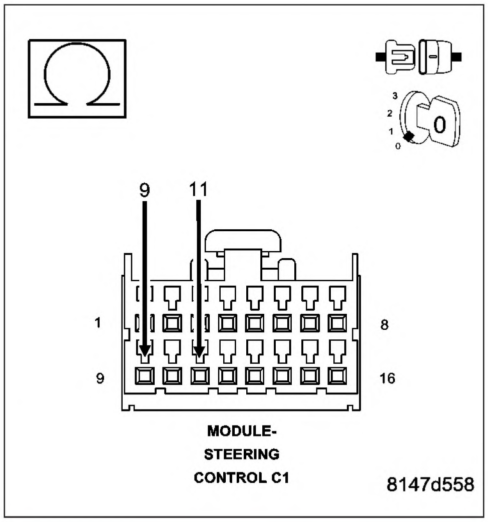
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

---

13. (V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V937) S/C SWITCH RETURN CIRCUIT

Measure the resistance between the (V72) S/C Switch No.2 Signal circuit and the (V937) S/C Switch Return circuit in the C1 SCCM harness connector.



3
2
1
0
0
9
11
1
8
9
16
MODULE-STEERING CONTROL C1
8147d558

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V72) S/C Switch No.2 Signal circuit and the (V937) Switch Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

P0591-SPEED CONTROL SWITCH 2 PERFORMANCE (CONTINUED)

14. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	SWITCH No.1 VOLTAGE VALUE	SWITCH No.2 VOLATGE VALUE
NO SWITCHES PRESSED	4.31 to 4.78 volts	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to 1.13 volts	3.53 to 3.92 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts	2.04 to 2.47 volts
SET PRESSED	3.16 to 3.56 volts	1.17 to 1.56 volts
COAST PRESSED	2.57 to 2.94 volts	0.77 to 1.09 volts
CANCEL PRESSED	1.59 to 1.99 volts	2.84 to 3.25 volts

Take these same voltage measurements with a voltmeter by back probing the (V371) S/C Switch No.1 Signal circuit and the (V372) S/C Switch No.2 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch values?

Yes >> Replace the Speed Control Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 15

15. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

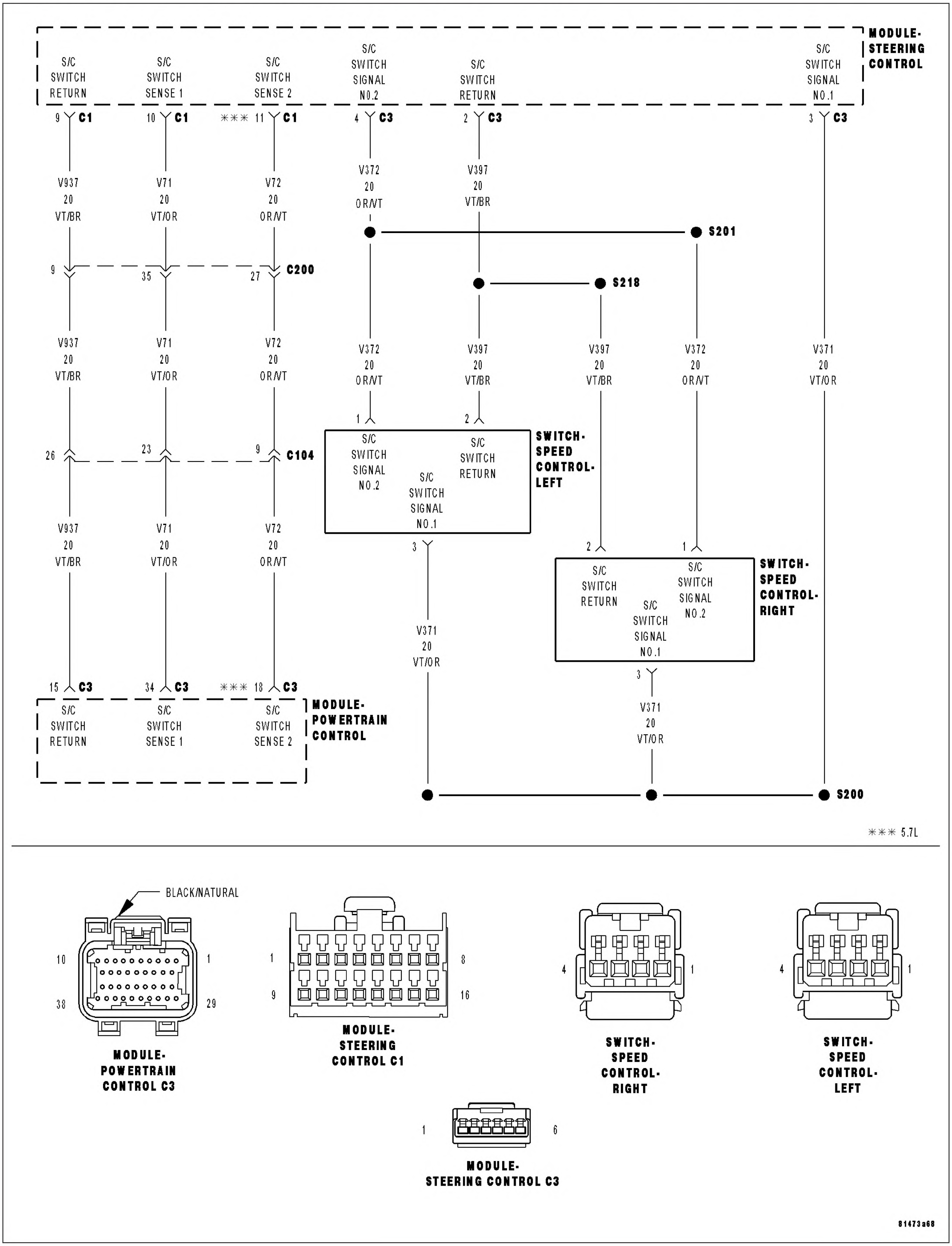
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0592-SPEED CONTROL SWITCH 2 CIRCUIT LOW


MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
9
35
27
C200
S218
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1
2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-LEFT
26
23
9
C104
3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
2
1
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-RIGHT
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
MODULE-POWERTRAIN CONTROL
S200
*** 5.7L
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
1
8
9
16
MODULE-STEERING CONTROL C1
4
1
SWITCH-SPEED CONTROL-RIGHT
4
1
SWITCH-SPEED CONTROL-LEFT
1
6
MODULE-STEERING CONTROL C3
81473a68

P0592-SPEED CONTROL SWITCH 2 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on.
- **Set Condition:**
  Speed control switch input No.2 is below the minimum acceptable voltage at the PCM. One trip fault.

Possible Causes
(V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V397) SWITCH RETURN CIRCUIT
(V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V937) SWITCH RETURN CIRCUIT
SCCM
SPEED CONTROL RESUME/ACCEL SWITCH
SPEED CONTROL ON/OFF SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL SWITCH VOLTAGE LOW

NOTE: Do not press any of the Speed Control Switch buttons.
Ignition on, engine not running.
With a scan tool, read the Speed Control voltage.

Is the Speed Control voltage below 1.0 volt?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. SPEED CONTROL ON/OFF SWITCH

With the scan tool, monitor the Speed Control Switch voltage.
Disconnect the Speed Control On/Off Switch harness connector.

Did the voltage change to above 4.7 volts?

Yes >> Replace the Speed Control On/Off Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0592-SPEED CONTROL SWITCH 2 CIRCUIT LOW (CONTINUED)

3. SPEED CONTROL RESUME/ACCEL SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control Resume/Accel Switch harness connector.

Did the voltage change to above 4.7 volts?

Yes >> Replace the Speed Control Resume/Accel Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. STEERING COLUMN CONTROL MODULE

Turn the ignition off.

Disconnect the C1 Steering Column Control Module harness connector (instrument panel wiring side) per Service Information.

Ignition on, engine not running.

With the scan tool, read the S/C Switch voltage.

Did the S/C Switch volts change to 5.0 volts?

Yes >> Replace the Steering Column Control Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

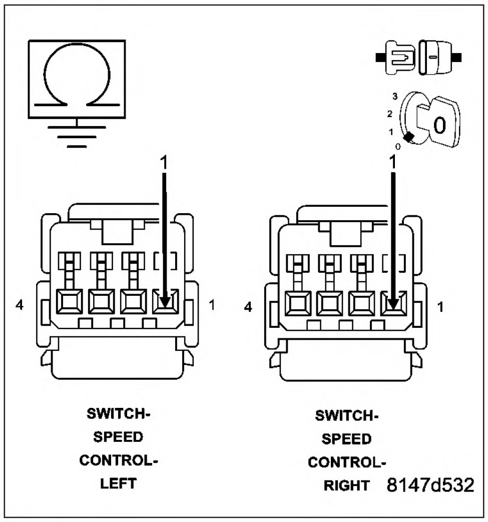
5. (V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Connect the C3 Steering Column Control Module harness connectors per Service Information.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (V372) S/C Switch No.2 Signal circuit in the S/C Switch harness connectors.



Is the resistance below 100 ohms?

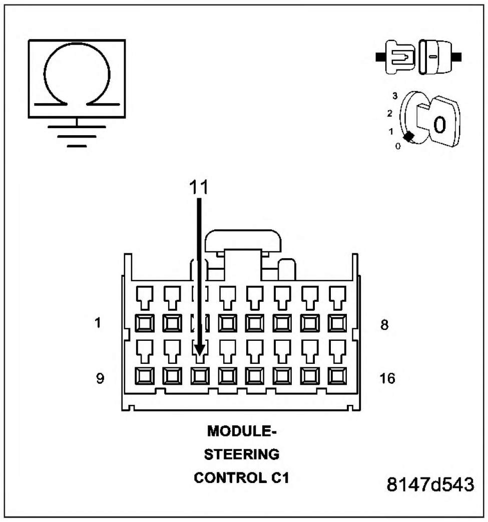
Yes >> Repair the short to ground in the (V372) S/C Switch No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P0592-SPEED CONTROL SWITCH 2 CIRCUIT LOW (CONTINUED)

6. (V72) S/C NO.2 SWITCH SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V72) S/C Switch No.2 Signal circuit in the C1 SCCM harness connector.


11
1
8
9
16
MODULE-
STEERING
CONTROL C1
8147d543

Is the resistance below 100 ohms?

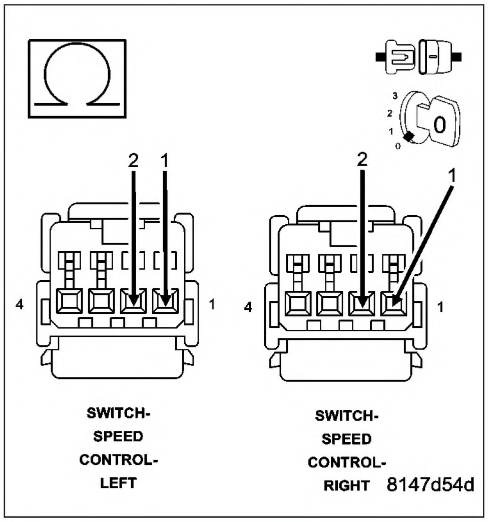
Yes >> Repair the short to ground in the (V72) S/C Switch No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. (V372) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V397) SWITCH RETURN CIRCUIT

Measure the resistance between the (V397) Switch Return circuit and the (V372) S/C Switch No.2 Signal circuit in the S/C Switch harness connectors.


2
1
4
1
2
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
SWITCH-
SPEED
CONTROL-
RIGHT
8147d54d

Is the resistance below 5.0 ohms?

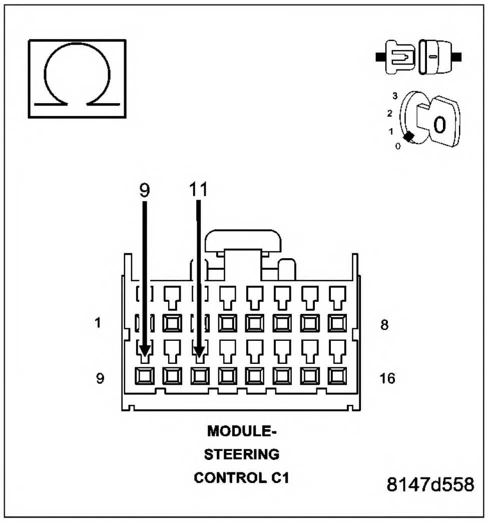
Yes >> Repair the short between the (V372) S/C Switch No.2 Signal circuit and the (V397) Switch Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P0592-SPEED CONTROL SWITCH 2 CIRCUIT LOW (CONTINUED)

8. (V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO THE (V937) S/C SWITCH RETURN CIRCUIT

Measure the resistance between the (V72) S/C Switch No.2 Signal circuit and the (V937) S/C Switch Return circuit in the C1 SCCM harness connector.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V72) S/C Switch No.2 Signal circuit and the (V937) Switch Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	SWITCH No.1 VOLTAGE VALUE	SWITCH No.2 VOLATGE VALUE
NO SWITCHES PRESSED	4.31 to 4.78 volts	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to1.13 volts	3.53 to 3.92 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts	2.04 to 2.47 volts
SET PRESSED	3.16 to 3.56 volts	1.17 to 1.56 volts
COAST PRESSED	2.57 to 2.94 volts	0.77 to 1.09 volts
CANCEL PRESSED	1.59 to 1.99 volts	2.84 to 3.25 volts

Take these same voltage measurements with a voltmeter by back probing the (V372) S/C Switch No.2 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch values?

Yes >> Replace the Speed Control Switch.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P0592-SPEED CONTROL SWITCH 2 CIRCUIT LOW (CONTINUED)

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

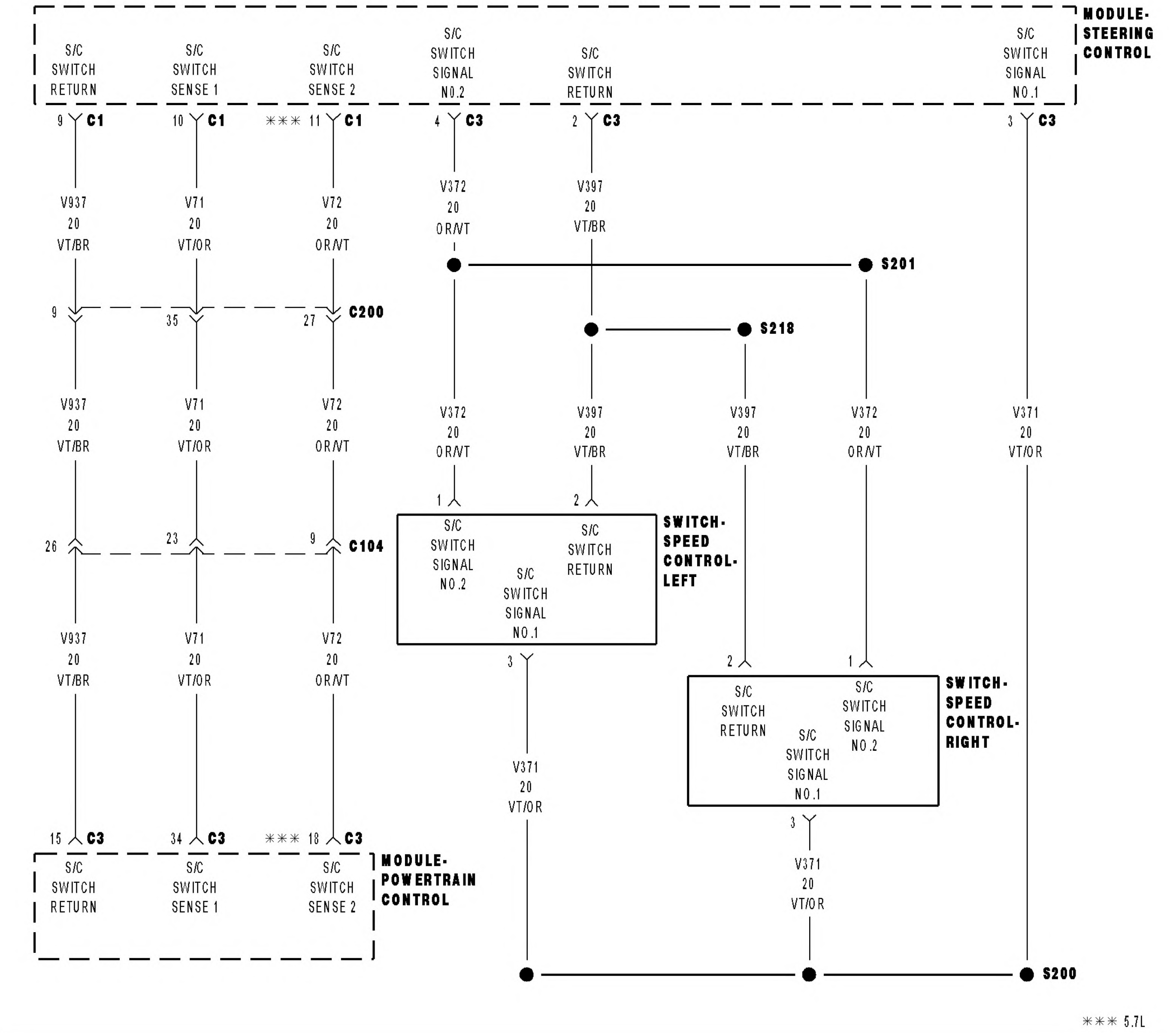
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

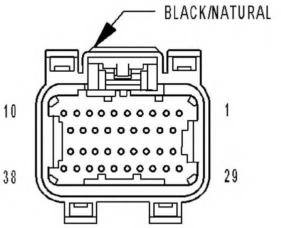
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

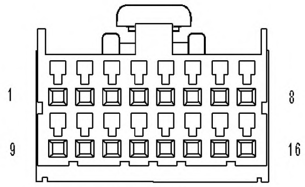
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0593-SPEED CONTROL SWITCH 2 CIRCUIT HIGH

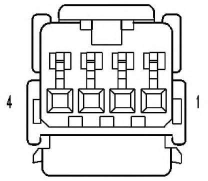

MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
S218
9
35
27
C200
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1
2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-LEFT
26
23
9
C104
3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
2
1
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
SWITCH-SPEED CONTROL-RIGHT
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
MODULE-POWERTRAIN CONTROL
S200
*** 5.7L


BLACK/NATURAL
10
1
38
29

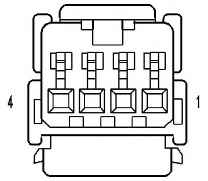
MODULE-POWERTRAIN CONTROL C3



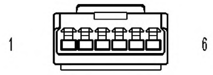
MODULE-STEERING CONTROL C1



SWITCH-SPEED CONTROL-RIGHT



SWITCH-SPEED CONTROL-LEFT



MODULE-STEERING CONTROL C3

81473a68

P0593-SPEED CONTROL SWITCH 2 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on.
- **Set Condition:**
  Speed Control Switch No.2 input above the maximum acceptable voltage at the PCM. One trip fault.

Possible Causes
(V372) S/C SIGNAL NO.2 CIRCUIT SHORTED TO VOLTAGE
(V72) S/C SIGNAL NO.2 CIRCUIT SHORTED TO VOLTAGE
(V372) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN
(V72) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN
(V397) SWITCH RETURN CIRCUIT OPEN
(V937) SWITCH RETURN CIRCUIT OPEN
STEERING COLUMN CONTROL MODULE
SPEED CONTROL SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SPEED CONTROL SWITCH VOLTAGE HIGH

NOTE: Do not press any of the Speed Control Switch buttons.

Ignition on, engine not running.

With a scan tool, read the Speed Control voltage.

Is the Speed Control voltage above 4.8 volts?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0593-SPEED CONTROL SWITCH 2 CIRCUIT HIGH (CONTINUED)

2. SPEED CONTROL SWITCHES

Disconnect and remove the Speed Control Switches from the steering wheel.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V372) S/C Switch No.2 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position.

Not pressing any switch - 20.5 kohms

On/Off - 8.87 kohms

Set - 0.825 kohms

Coast - 0.47 kohms

Cancel - 3.92 kohms

Resume/Accel - 1.87 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 3

No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. STEERING COLUMN CONTROL MODULE

Disconnect the C1 and C3 Steering Column Control Module harness connectors per Service Information.

Measure the resistance of the (V397) Switch Return circuit between the C1 and C3 SCCM connections.

Measure the resistance of the (V372) S/C Switch No.2 Signal circuit between the C1 and C3 SCCM connections.

Was the resistance above 5.0 ohms for either circuit?

Yes >> Replace the Steering Column Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (V372) SIGNAL NO.2 CIRCUIT SHORTED TO BATTERY VOLTAGE

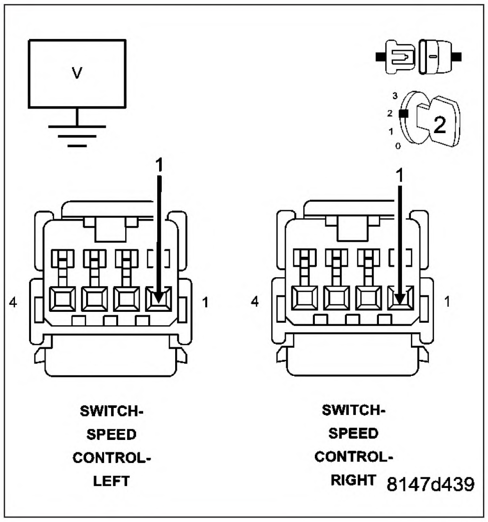
Measure the voltage on the (V372) S/C Signal No.2 circuit in the S/C Switch harness connector.

Ignition on, engine not running.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (V372) S/C Signal No.2 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5



P0593-SPEED CONTROL SWITCH 2 CIRCUIT HIGH (CONTINUED)

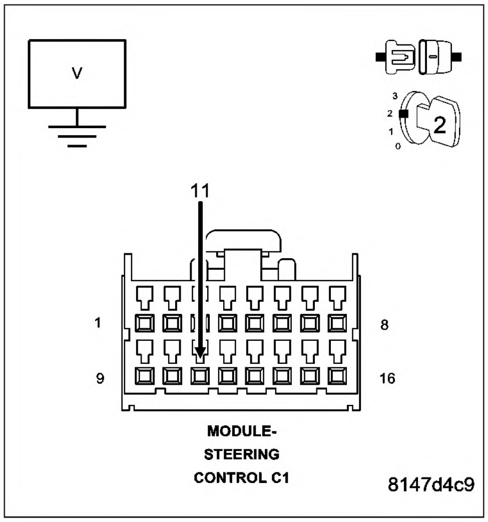
5. (V72) S/C SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (V72) S/C Switch No.2 Signal circuit in the C1 SCCM harness connector.


V
3
2
1
0
2
11
1
8
9
16
MODULE-
STEERING
CONTROL C1
8147d4c9

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (V72) S/C Switch No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

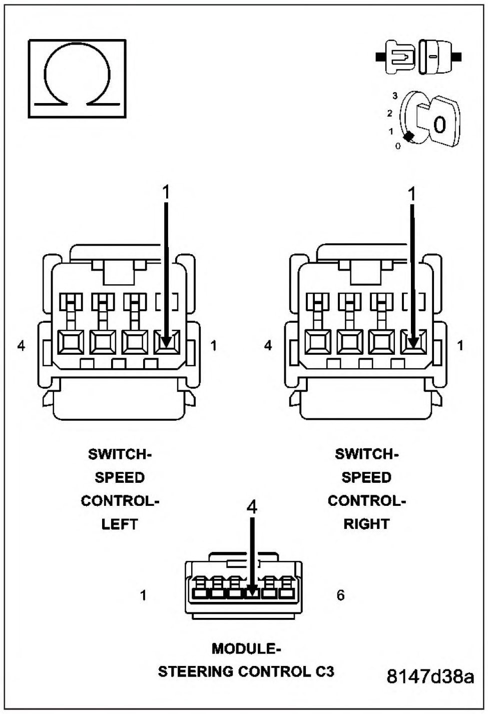
No >> Go To 6

---

6. (V372) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (V372) S/C Switch No.2 Signal circuit from the both Switch harness connectors to the C3 SCCM harness connector.


Ω
3
2
1
0
0
1
1
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
SWITCH-
SPEED
CONTROL-
RIGHT
4
1
6
MODULE-
STEERING CONTROL C3
8147d38a

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (V372) S/C Switch No.2 Signal circuit.

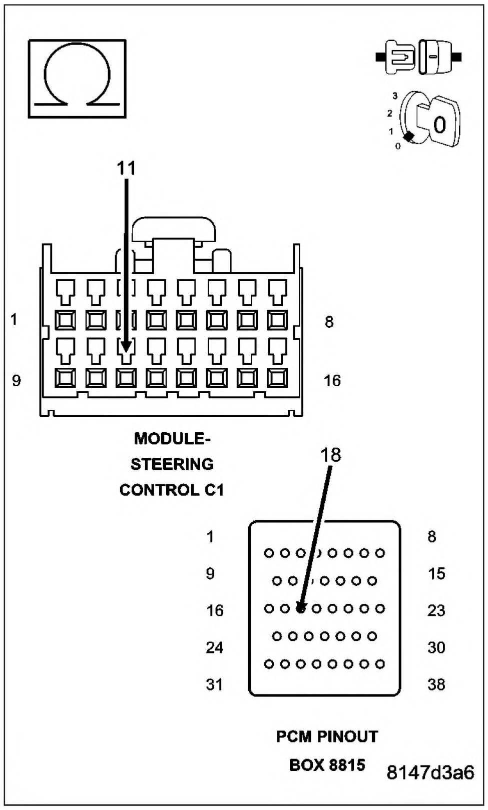
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0593-SPEED CONTROL SWITCH 2 CIRCUIT HIGH (CONTINUED)

7. (V72) S/C SWITCH NO.2 SIGNAL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V72) S/C Switch No.2 Signal circuit from the C1 SCCM harness connector to the appropriate terminal of special tool #8815.


11
1
8
9
16
MODULE-
STEERING
CONTROL C1
18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147d3a6

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 8

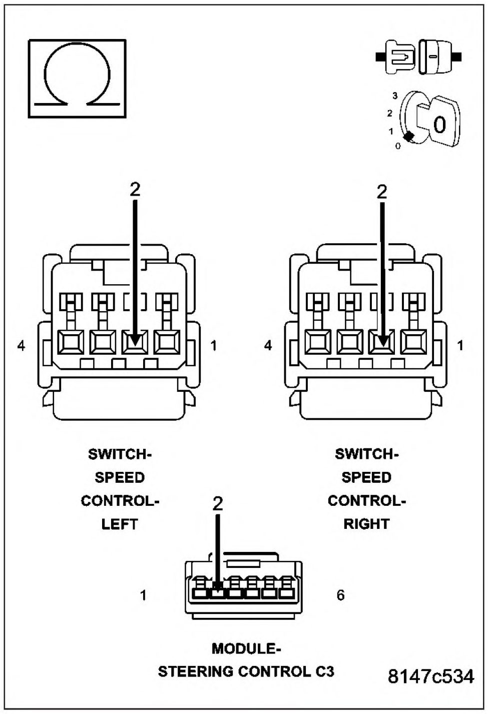
No >> Repair the open in the (V72) S/C Switch No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. (V397) SWITCH RETURN CIRCUIT OPEN

Measure the resistance of the (V397) Switch Return circuit from the both Switch harness connectors to the C3 SCCM harness connector.


2
2
4
1
4
1
SWITCH-
SPEED
CONTROL-
LEFT
2
SWITCH-
SPEED
CONTROL-
RIGHT
1
6
MODULE-
STEERING CONTROL C3
8147c534

Is the resistance below 5.0 ohms?

Yes >> Go To 9

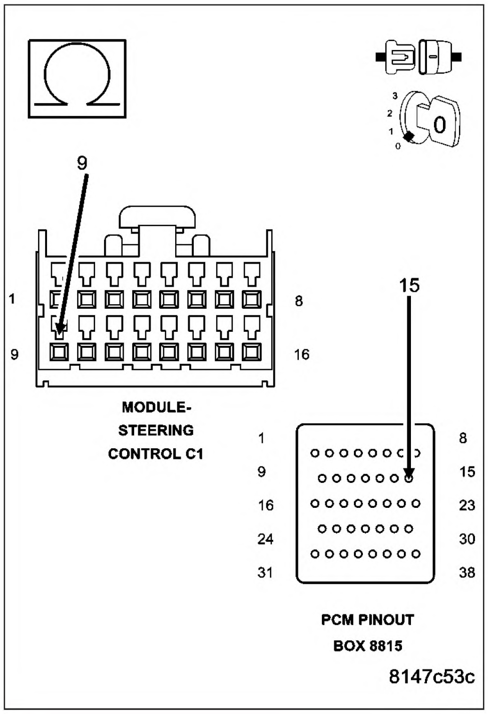
No >> Repair the open in the (V397) Switch Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0593-SPEED CONTROL SWITCH 2 CIRCUIT HIGH (CONTINUED)

9. (V937) SWITCH RETURN CIRCUIT OPEN

Measure the resistance of the (V937) Switch Return circuit from the C1 SCCM harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 10

No >> Repair the open in the (V937) Switch Return circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

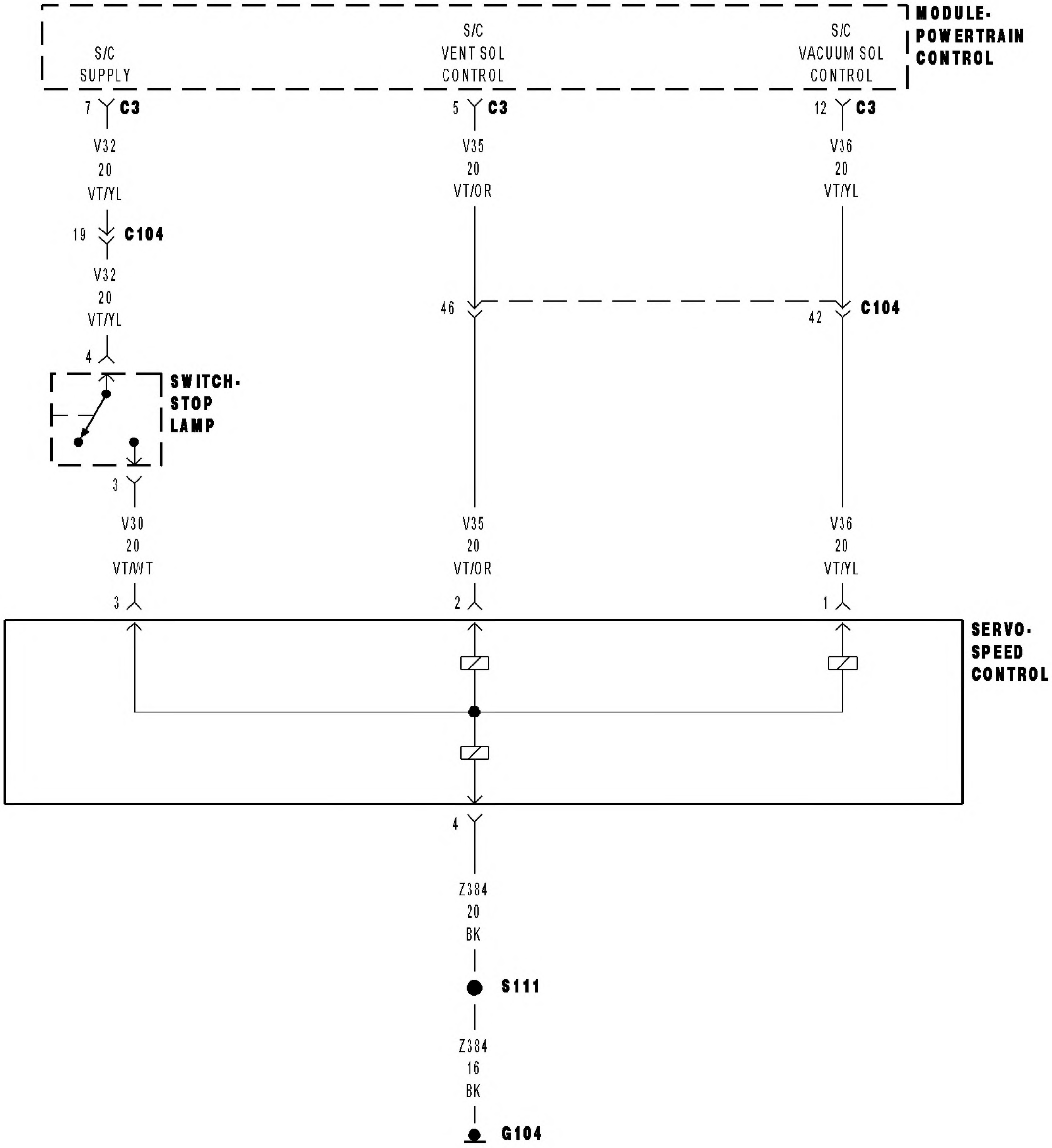
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

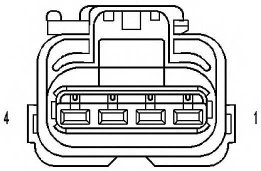
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

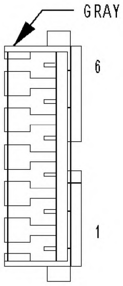
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0594-SPEED CONTROL SERVO POWER RELAY CIRCUIT

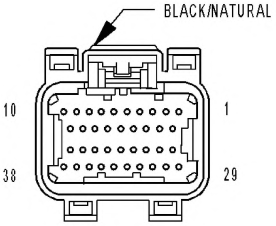

MODULE-
POWERTRAIN
CONTROL
S/C
SUPPLY
S/C
VENT SOL
CONTROL
S/C
VACUUM SOL
CONTROL
7 C3
5 C3
12 C3
V32
20
VT/YL
V35
20
VT/OR
V36
20
VT/YL
19 C104
V32
20
VT/YL
46
42 C104
4
SWITCH-
STOP
LAMP
3
V30
20
VT/WT
V35
20
VT/OR
V36
20
VT/YL
3
2
1
SERVO-
SPEED
CONTROL
4
Z384
20
BK
S111
Z384
16
BK
G104



SERVO-SPEED CONTROL (3.7L/4.7L)



SWITCH-STOP LAMP


BLACK/NATURAL
10
1
38
29

MODULE-POWERTRAIN CONTROL C3

81473ea4

P0594-SPEED CONTROL SERVO POWER RELAY CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition key on. The speed control switched on.
- **Set Condition:**
  The speed control power supply circuit is either open or shorted to ground for more than 2.6 seconds. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(V32) S/C SUPPLY CIRCUIT OPEN
(V32) S/C SUPPLY CIRCUIT SHORTED TO GROUND
(V30) S/C BRAKE SWITCH OUTPUT CIRCUIT OPEN
(V30) S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND
STOP LAMP SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: If this code is setting on a vehicle that doesn't have a S/C Servo, flash the correct code into the PCM or the wrong PCM may have previously been installed.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0594-SPEED CONTROL SERVO POWER RELAY CIRCUIT (CONTINUED)

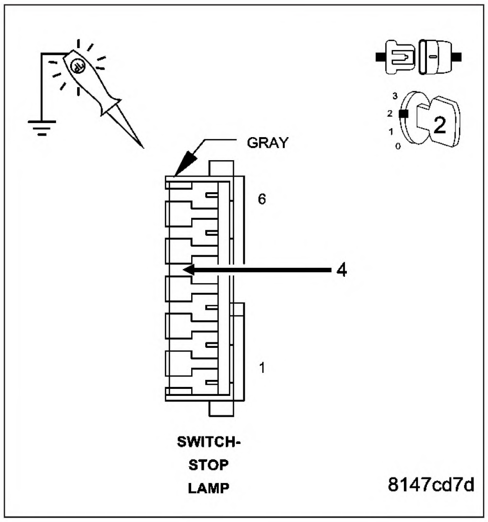
2. (V32) S/C SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the Stop Lamp Switch harness connector.

Ignition on, engine not running. (It may be necessary to start the engine.)

Using a 12-volt test light connected to ground, probe the (V32) S/C Supply circuit in the Switch harness connector while holding the Cruise Switch in the ON position.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Go To 7

---

3. STOP LAMP SWITCH

Disconnect and remove the Stop Lamp Switch.

Measure the resistance across the (V32) S/C Supply circuit terminal and the (V30) S/C Brake Switch Output circuit terminal in the Stop Lamp Switch.

Push the Plunger of the Switch in and let it out.

Does the resistance change from below 5.0 ohms to an open circuit?

Yes >> Go To 4

No >> Replace the Stop Lamp Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (V30) S/C BRAKE SWITCH OUTPUT

Turn the ignition off.

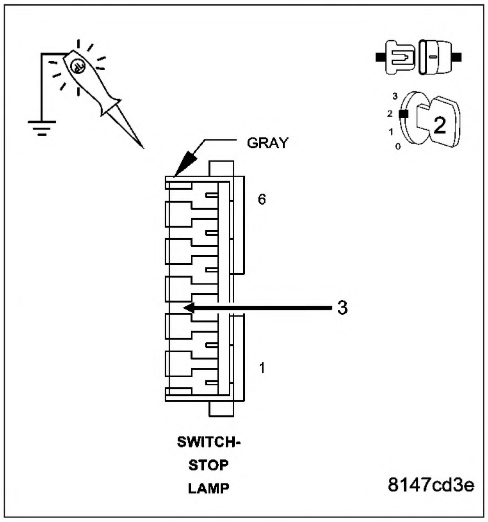
Connect the Stop Lamp Switch harness connector and install the Switch.

Disconnect the Speed Control Servo harness connector.

Ignition on, engine not running.

NOTE: It is necessary to PRESS and HOLD the Speed Control Switch in the ON position while checking for voltage.

Using a 12-volt test light connected to ground, probe the (V30) S/C Brake Switch Output circuit in the Servo Harness connector.



Does the test light illuminate brightly?

Yes >> Replace the S/C Servo.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

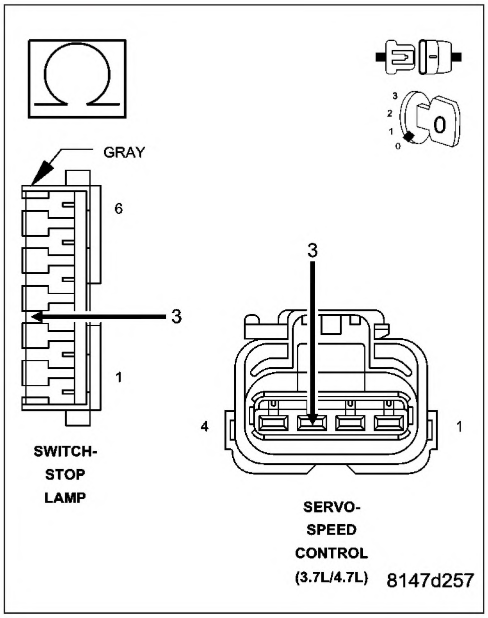
P0594-SPEED CONTROL SERVO POWER RELAY CIRCUIT (CONTINUED)

5. (V30) S/C BRAKE SWITCH OUTPUT CIRCUIT OPEN

Turn the ignition off.

Disconnect the Brake Lamp Switch harness connector.

Measure the resistance of the (V30) S/C Brake Switch Output circuit from the Stop Lamp Switch harness connector to the S/C Servo harness connector.


GRAY
6
3
1
SWITCH-
STOP
LAMP
3
4
1
SERVO-
SPEED
CONTROL
(3.7L/4.7L)
3
2
1
0
0
8147d257

Is the resistance below 5.0 ohms?

Yes >> Repair the excessive resistance in the (V30) S/C Brake Switch Output circuit.

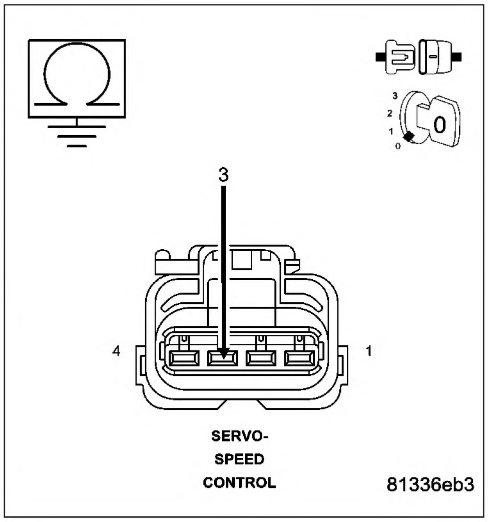
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. (V30) S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V30) S/C Brake Switch Output circuit in the Speed Control Servo harness connector.


3
4
1
SERVO-
SPEED
CONTROL
3
2
1
0
0
81336eb3

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V30) S/C Brake Switch Output circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

P0594-SPEED CONTROL SERVO POWER RELAY CIRCUIT (CONTINUED)

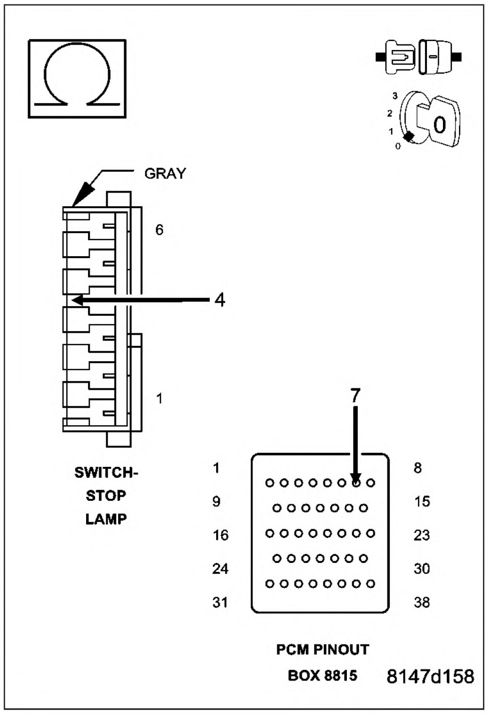
7. (V32) S/C SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V32) S/C Supply circuit from the Stop Lamp Switch harness connector to the appropriate terminal of special tool #8815.



8147d158

Is the resistance above 5.0 ohms?

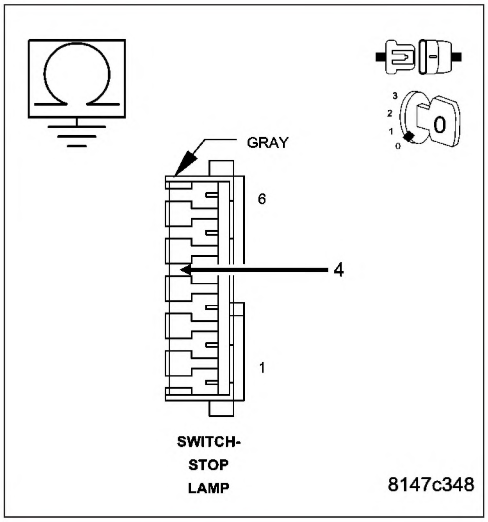
Yes >> Repair the open in the (V32) S/C Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. (V32) S/C SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V32) S/C Supply circuit in the Stop Lamp Switch harness connector.



8147c348

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V32) S/C Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

P0594-SPEED CONTROL SERVO POWER RELAY CIRCUIT (CONTINUED)

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0600-SERIAL COMMUNICATION LINK

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  Internal Bus communication failure between processors. One Trip Fault. Three Global Good Trips to Clear.

Possible Causes
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PCM

NOTE: Diagnose any CMP or CKP Sensor faults before continuing. Check for intermittent loose CMP or CKP connections.

The Powertrain Control Module is reporting internal errors, view repair to continue.

Repair

Replace and program the Powertrain Control Module per Service Information.

Perform (NGC) POWERTRAIN VERIFICATION TEST VER - 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DIAGNOSIS AND TESTING)

P0601-INTERNAL MEMORY CHECKSUM INVALID

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  Internal checksum for software failed, does not match calculated value. One Trip Fault, Three Good Trips to clear.

Possible Causes
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PCM

NOTE: Diagnose any CMP or CKP Sensor faults before continuing. Check for intermittent loose CMP or CKP connections.

The Powertrain Control Module is reporting internal errors, view repair to continue.

Repair

Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0606-INTERNAL ECM PROCESSOR

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running.
- **Set Condition:**
  When the PCM recognizes an internal failure to communicate with the ECM or the CMP and CKP Sensor count periods are too short. One trip fault. ETC light is flashing.

Possible Causes
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PCM

NOTE: Diagnose any CMP or CKP Sensor faults before continuing. Check for intermittent loose CMP or CKP connections.

The Powertrain Control Module is reporting internal errors, view repair to continue.

Repair

Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P060B-ETC A/D GROUND PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Throttle Motor is powered.
- **Set Condition:**
  When A2D reading does not return to ground within a set period of time of test activation, this fault sets. The test typically runs a couple of times per second, and is the reason why APP2 signal spikes to ground a couple of times per second in normal running. Reprogramming the module may not always fix this fault. ETC lamp will flash.

Possible Causes
PCM NEEDS TO BE PROGRAMMED
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAM THE POWERTRAIN CONTROL MODULE

Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.

NOTE: Diagnose any other DTCs that may have set with the P060B.

Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

With a scan tool, read DTCs.

Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P060D-ETC LEVEL 2 APP PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Throttle motor is powered and no matured faults related to APP Sensors.
- **Set Condition:**
  When secondary software determines that APPS 1 and APPS 2 signals do not match for a period of time. ETC lamp will flash

Possible Causes
PCM NEEDS TO BE PROGRAMMED
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAM THE POWERTRAIN CONTROL MODULE

Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.

Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

With a scan tool, read DTCs.

NOTE: Diagnose any other DTCs that may have set with the P060D.

Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P060E-ETC LEVEL 2 TPS PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Throttle motor is powered and no matured faults related to TP Sensors.
- **Set Condition:**
  When secondary software determines that TPS 1 and TPS 2 signals do not match for a period of time. ETC lamp will flash.

Possible Causes
PCM NEEDS TO BE PROGRAMMED
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAM THE POWERTRAIN CONTROL MODULE

Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.

Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

With a scan tool, read DTCs.

NOTE: Diagnose any other DTCs that may have set with the P060E.

Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P060F-ETC LEVEL 2 ECT PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Throttle motor is powered and no matured faults related to the Engine Coolant Temp Sensor.
- **Set Condition:**
  When secondary software determines that the Coolant Temperature is implausible for a period of time. ETC lamp will flash.

Possible Causes
PCM NEEDS TO BE PROGRAMMED
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAM THE POWERTRAIN CONTROL MODULE

NOTE: Diagnose any Engine Coolant Temperature Sensor DTCs before continuing.
Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.
Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

With a scan tool, read DTCs.

NOTE: Diagnose any other DTCs that may have set with the P060F.

Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P061A-ETC LEVEL 2 TORQUE PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Throttle motor is powered.
- **Set Condition:**
  When secondary software determines that the customer requested output is not being achieved by the engine for a period of time. ETC lamp will flash.

Possible Causes
PCM NEEDS TO BE PROGRAMMED
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAM THE POWERTRAIN CONTROL MODULE

NOTE: Check the engine for air/vacuum leaks and diagnose any Fuel System Lean/Rich as well as MAP Sensor DTCs before continuing.

Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.

Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

With a scan tool, read DTCS.

NOTE: Diagnose any other DTCs that may have set with the P061A.

Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P061C-ETC LEVEL 2 RPM PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Throttle motor is powered and no camshaft or crankshaft electrical signal related DTCs are set.
- **Set Condition:**
  When secondary software determines that the engine speed is implausible for a period of time. ETC lamp will flash.

Possible Causes
PCM NEEDS TO BE PROGRAMMED
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAM THE POWERTRAIN CONTROL MODULE

NOTE: Diagnose any Camshaft Position and Crankshaft Position Sensor DTCs before continuing.
Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.
Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

With a scan tool, read DTCs.

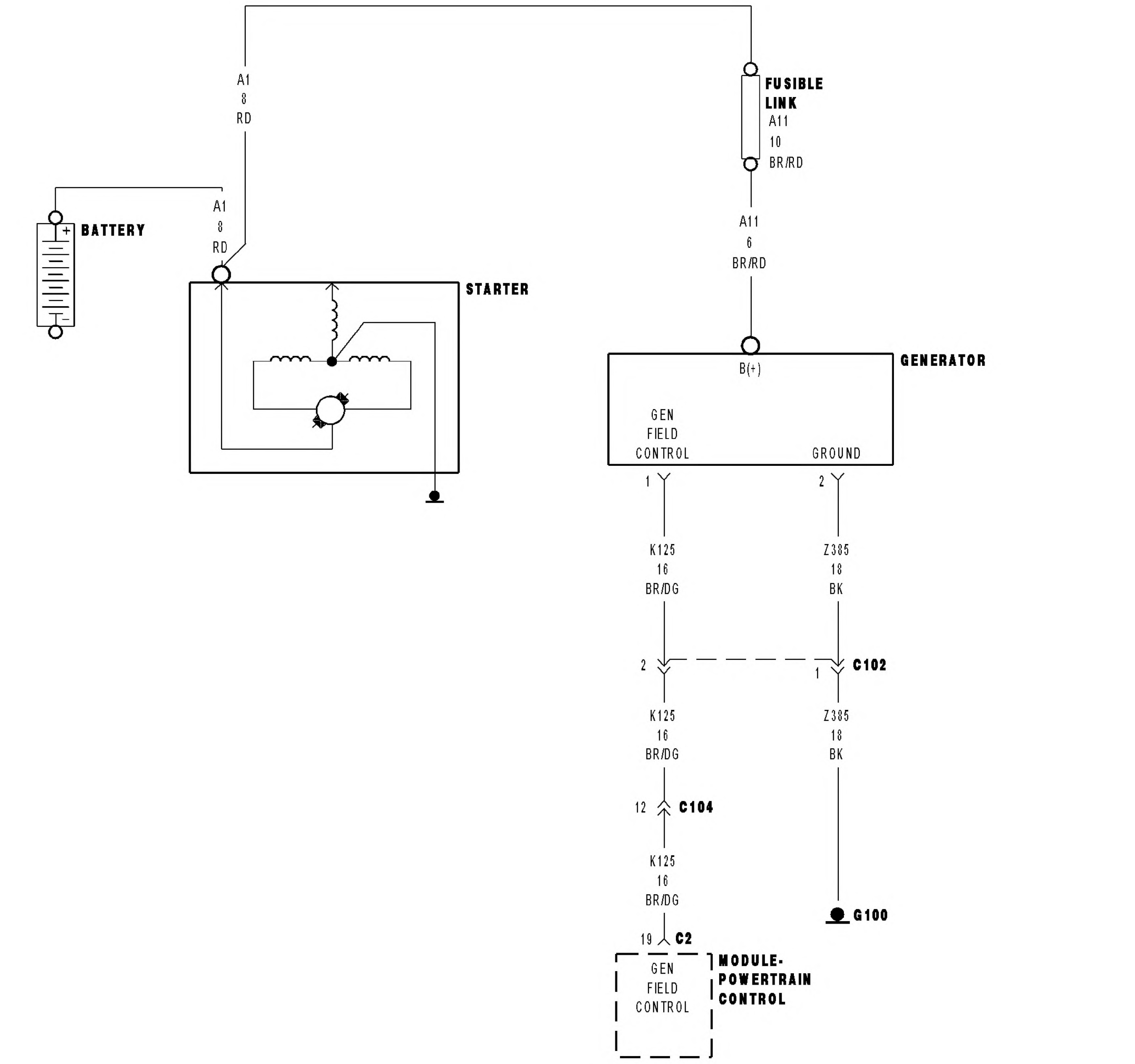
NOTE: Diagnose any other DTCs that may have set with the P061C.

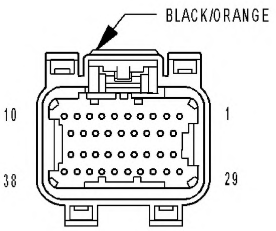
Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

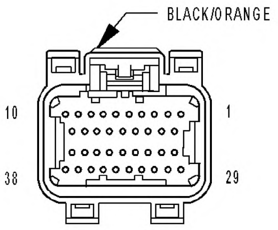
No >> Test Complete.

P0622-GENERATOR FIELD CONTROL CIRCUIT

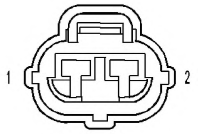

A1
8
RD
FUSIBLE
LINK
A11
10
BR/RD
BATTERY
A1
8
RD
A11
6
BR/RD
STARTER
GENERATOR
B(+)
GEN
FIELD
CONTROL
GROUND
1
2
K125
16
BR/DG
Z385
18
BK
2
1
C102
K125
16
BR/DG
Z385
18
BK
12
C104
K125
16
BR/DG
G100
19
C2
GEN
FIELD
CONTROL
MODULE-
POWERTRAIN
CONTROL


BLACK/ORANGE
10
1
38
29

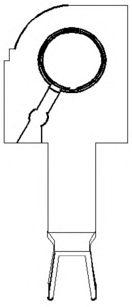
**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**


BLACK/ORANGE
10
1
38
29

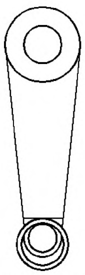
**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**



**GENERATOR
(GAS)**



**BATTERY-
POSITIVE
(GAS)**



**GENERATOR
EYELET
(GAS)**

81472f3e

P0622-GENERATOR FIELD CONTROL CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Engine running.
- **Set Condition:**
  When the PCM tries to regulate the generator field with no result during monitoring. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K125) GEN FIELD CONTROL CIRCUIT OPEN
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND
(Z385) GROUND CIRCUIT OPEN
GENERATOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. GENERATOR OPERATION

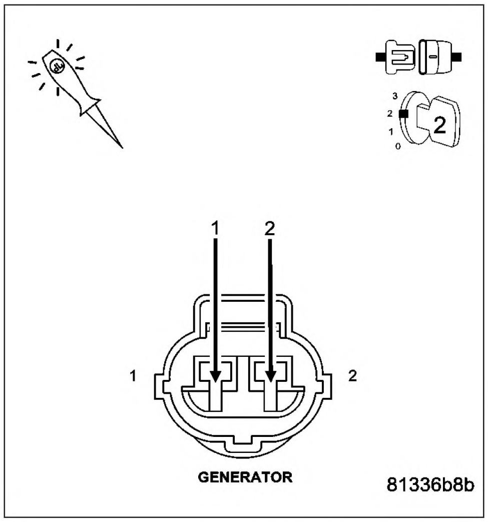
Turn the ignition off.

Disconnect the Generator Field harness connector.

Using a 12-volt test light, jump it across the Generator Field harness connector.

Ignition on, engine not running.

With the scan tool, actuate the Generator Field Control circuit.



Does the test light illuminate brightly and flash on and off?

Yes >> Replace the Generator.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0622-GENERATOR FIELD CONTROL CIRCUIT (CONTINUED)

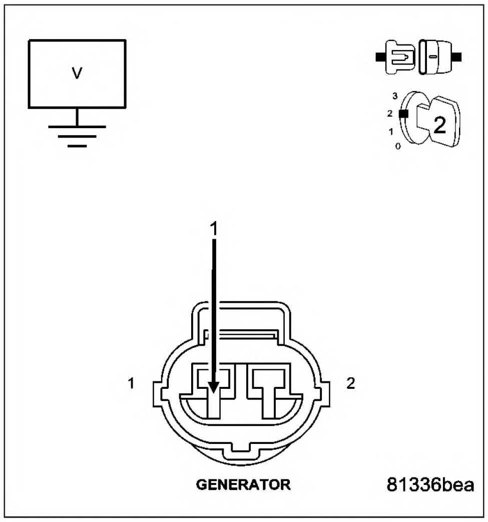
3. (K125) GEN FIELD CIRCUIT SHORTED BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K125) Gen Field Control circuit in the Generator Field harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K125) Gen Field Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

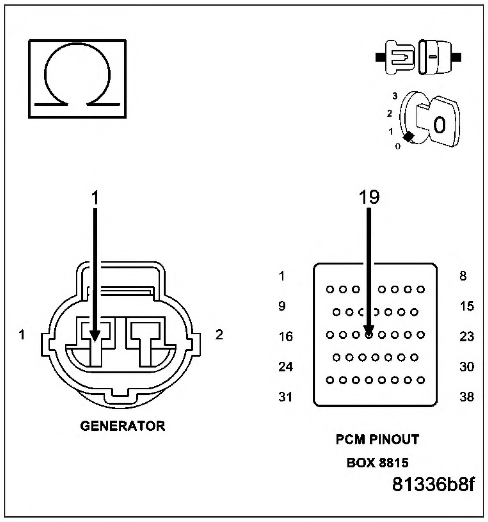
---

4. (K125) GEN FIELD CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K125) Gen Field Control circuit from the Generator Field harness connector to appropriate terminal of the special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 5

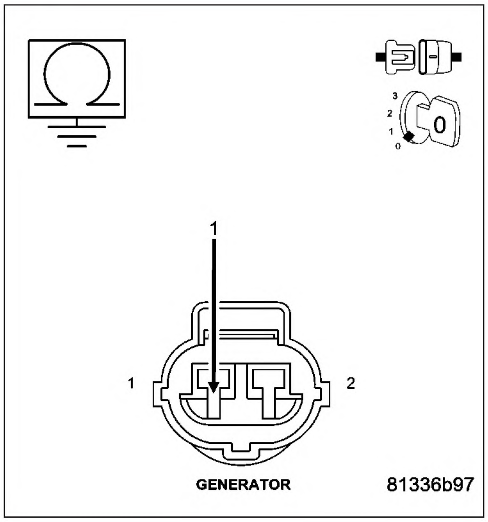
No >> Repair the open in the (K125) Gen Field Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0622-GENERATOR FIELD CONTROL CIRCUIT (CONTINUED)

5. (K125) GEN FIELD CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K125) Gen Field Control circuit in the Generator Field harness connector.



Is the resistance below 100 ohms?

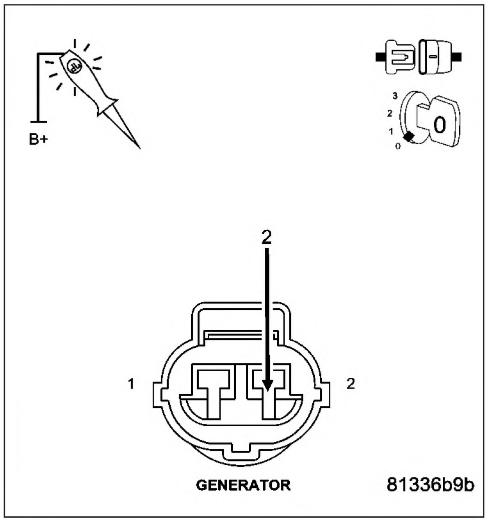
Yes >> Repair the short to ground in the (K125) Gen Field Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. (Z385) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to battery voltage, probe the (Z385) Ground circuit in the Gen Field harness connector.



Does the test light illuminate brightly?

Yes >> Go To 7

No >> Repair the open in the (Z385) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

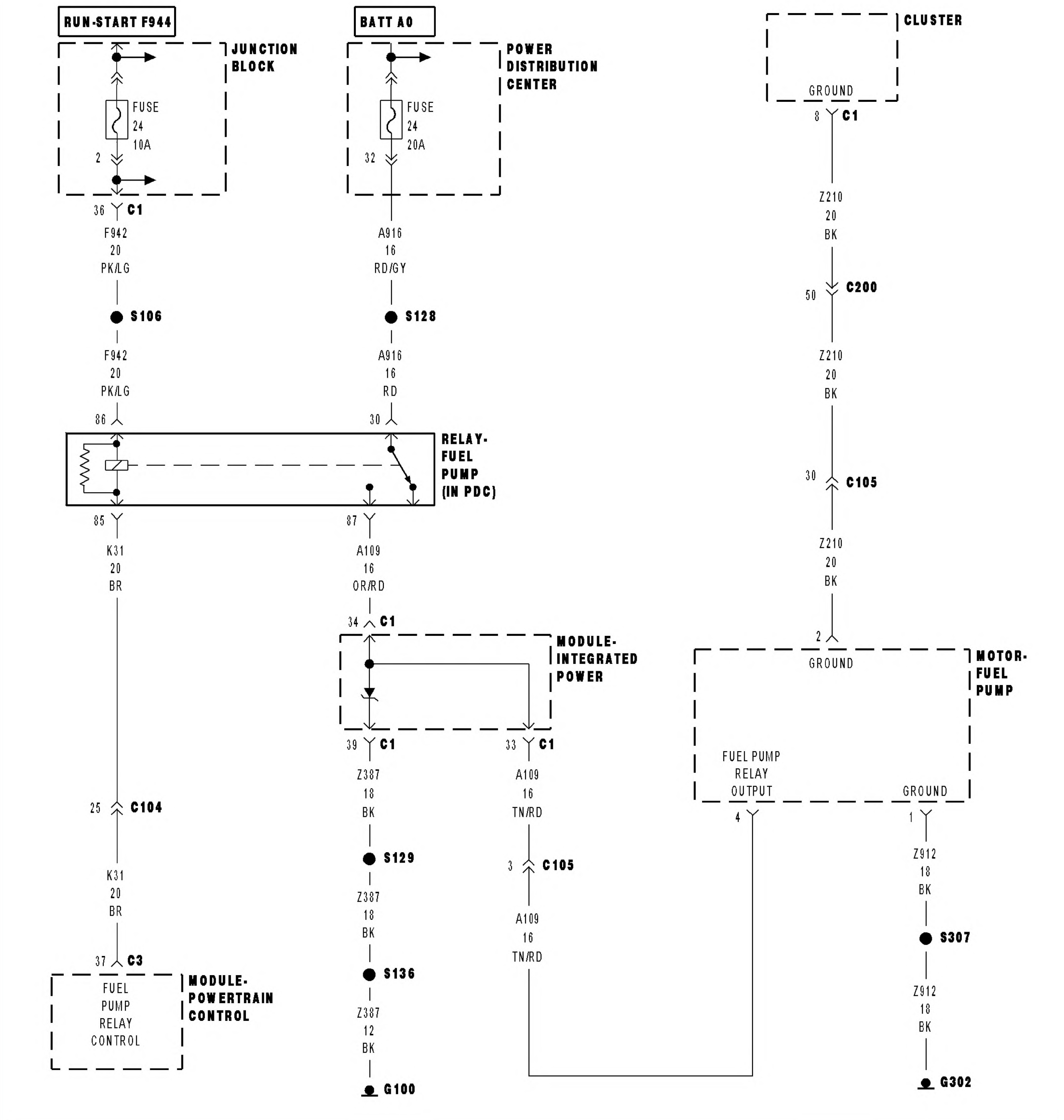
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

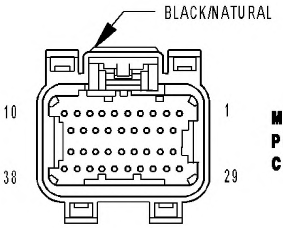
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

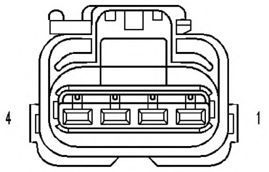
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0627-FUEL PUMP RELAY CIRCUIT


RUN-START F944
JUNCTION BLOCK
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
86
BATT A0
POWER DISTRIBUTION CENTER
FUSE 24 20A
32
A916 16 RD/GY
S128
A916 16 RD
30
RELAY-FUEL PUMP (IN PDC)
85
K31 20 BR
25 C104
K31 20 BR
37 C3
FUEL PUMP RELAY CONTROL
MODULE-POWERTRAIN CONTROL
87
A109 16 OR/RD
34 C1
MODULE-INTEGRATED POWER
39 C1
Z387 18 BK
S129
Z387 18 BK
S136
Z387 12 BK
G100
33 C1
A109 16 TN/RD
3 C105
A109 16 TN/RD
CLUSTER
GROUND
8 C1
Z210 20 BK
50 C200
Z210 20 BK
30 C105
Z210 20 BK
2
GROUND
MOTOR-FUEL PUMP
FUEL PUMP RELAY OUTPUT
GROUND
4
1
Z912 18 BK
S307
Z912 18 BK
G302


BLACK/NATURAL
10
1
38
29

MODULE-POWERTRAIN CONTROL C3



MOTOR-FUEL PUMP

81473fbb

P0627-FUEL PUMP RELAY CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10.4 volts and the ASD sense switch is on.
- **Set Condition:**
  Actual Fuel Pump Relay state is not equal to desired state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A916) FUSED B+ CIRCUIT
(F942) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(K31) FUEL PUMP RELAY CONTROL CIRCUIT
(K31) FUEL PUMP RELAY CONTROL CIRCUIT SHORTED TO GROUND
FUEL PUMP RELAY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. FUEL PUMP RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the Fuel Pump Relay.

Is the Fuel Pump Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. FUEL PUMP RELAY

Turn the ignition off.

Remove the Fuel Pump Relay from the IPM.

Measure the resistance of the Fuel Pump Relay Coil.

Is the resistance between 70 to 90 ohms?

Yes >> Go To 3

No >> Replace the Fuel Pump Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0627-FUEL PUMP RELAY CIRCUIT (CONTINUED)

3. (A916) FUSED B+ CIRCUIT

Ignition on, engine not running.

Using a 12-volt test light connected to ground, probe the (A916) Fused B+ circuit.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open or short to ground in the (A916) Fused B+ circuit. Inspect the related fuse and repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (F942) FUSED IGNITION SWITCH OUTPUT CIRCUIT

Ignition on, engine not running.

Using a 12-volt test light connected to ground, probe the (F942) Fused Ignition Switch Output circuit.

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the open or short to ground in the (F942) Fused Ignition Switch Output circuit. Inspect the related fuse and repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K31) CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K31) Fuel Pump Relay Control circuit from the IPM to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K31) Fuel Pump Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (K31) CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K31) Fuel Pump Relay Control circuit in the IPM.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K31) Fuel Pump Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0627-FUEL PUMP RELAY CIRCUIT (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P062C-ETC LEVEL 2 MPH PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Throttle motor is powered and no vehicle speed related DTCs have matured.
- **Set Condition:**
  When secondary software determines that the vehicle speed is implausible for a period of time. ETC lamp will flash.

Possible Causes
PCM NEEDS TO BE PROGRAMMED
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAM THE POWERTRAIN CONTROL MODULE

Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.

Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

With a scan tool, read DTCs.

NOTE: Diagnose any other DTCs that may have set with the P062C.

Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P0630-VIN NOT PROGRAMMED IN PCM

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  At initialization.
- **Set Condition:**
  The VIN has not been programmed into the PCM. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PROGRAMMING VIN INTO PCM
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAMMING VIN INTO THE PCM

Ignition on, engine not running.

Using the scan tool, program VIN into the PCM.

Start the engine.

NOTE: If the engine will not start, crank the engine over for 15 seconds. Crank at least 2 times with the ignition switch returning to the off position each time.

Allow the engine to reach normal operating temperature.

With the scan tool, read DTCs.

Does the DTC reset?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> The VIN has been successfully programmed into the PCM. Test is complete.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0632-ODOMETER NOT PROGRAMMED IN PCM

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  Odometer is not programed into the PCM. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PROGRAMMING MILEAGE INTO THE PCM
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAMMING MILEAGE INTO THE PCM

Ignition on, engine not running.

With the scan tool, erase DTCs.

Using a scan tool, program the mileage into the PCM.

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, read DTCs.

Does the DTC reset?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> The mileage has been successfully programmed into the PCM. Test is complete.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0633-SKIM KEY NOT PROGRAMMED IN PCM

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The SKIM Key information has not been programmed into the PCM. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PROGRAMMING SKIM KEY INTO THE PCM
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PROGRAMMING SKIM KEY INTO THE PCM

Ignition on, engine not running.

With a scan tool, erase DTCs.

Using the scan tool, program the SKIM Key information into the PCM.

Start the engine.

NOTE: If the engine will not start, crank the engine over for 15 seconds. Crank at least 2 times with the ignition switch returning to the off position each time.

Allow the engine to reach normal operating temperature.

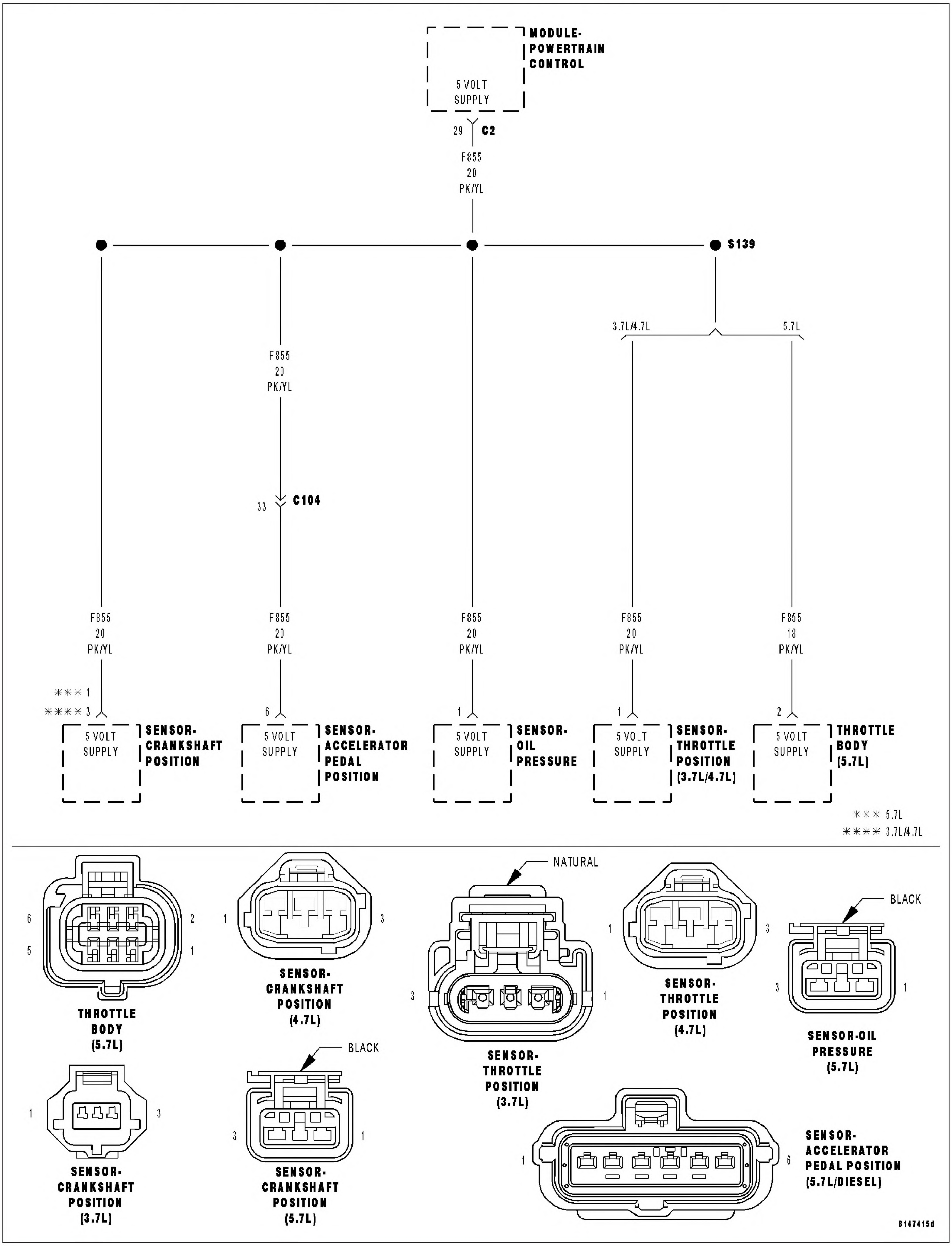
With the scan tool, read DTCs.

Does the DTC reset?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> The SKIM KEY information has been successfully programmed into the PCM. Test is complete.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0642-SENSOR REFERENCE VOLTAGE 1 CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
29
C2
F855
20
PK/YL
S139
3.7L/4.7L
5.7L
F855
20
PK/YL
33
C104
F855
20
PK/YL
F855
20
PK/YL
F855
20
PK/YL
F855
20
PK/YL
F855
18
PK/YL
*** 1
**** 3
6
1
1
2
5 VOLT
SUPPLY
SENSOR-
CRANKSHAFT
POSITION
5 VOLT
SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
5 VOLT
SUPPLY
SENSOR-
OIL
PRESSURE
5 VOLT
SUPPLY
SENSOR-
THROTTLE
POSITION
(3.7L/4.7L)
5 VOLT
SUPPLY
THROTTLE
BODY
(5.7L)
*** 5.7L
**** 3.7L/4.7L
6 2 5 1
THROTTLE
BODY
(5.7L)
1 3
SENSOR-
CRANKSHAFT
POSITION
(4.7L)
NATURAL
3 1
SENSOR-
THROTTLE
POSITION
(3.7L)
1 3
SENSOR-
THROTTLE
POSITION
(4.7L)
BLACK
3 1
SENSOR-OIL
PRESSURE
(5.7L)
1 3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
BLACK
3 1
SENSOR-
CRANKSHAFT
POSITION
(5.7L)
1 6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8147415d

P0642-SENSOR REFERENCE VOLTAGE 1 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes the Primary 5-volt Supply circuit voltage is too low. One Trip Fault. ETC light is flashing.

Possible Causes
(F855) PRIMARY 5-VOLT SUPPLY SHORTED TO GROUND
SENSOR SHORTED TO GROUND
5-VOLT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

NOTE: Improperly installed aftermarket accessories can cause this DTC to set. Check for wiring added by customer.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0642-SENSOR REFERENCE VOLTAGE 1 CIRCUIT LOW (CONTINUED)

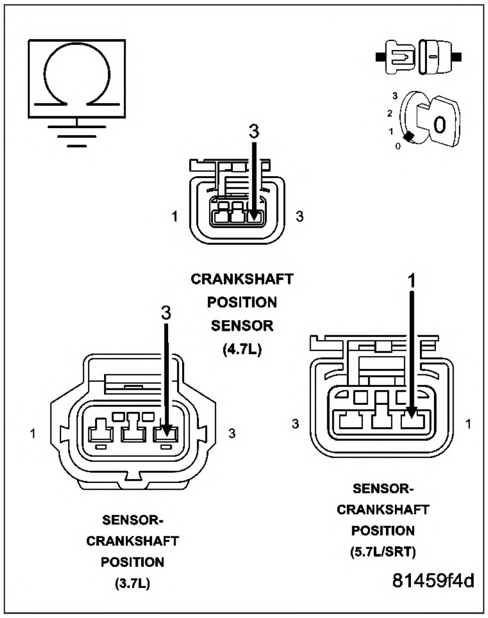
2. (F855) PRIMARY 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Disconnect all the Sensors that share the (F855) Primary 5-volt Supply circuit.

Measure the resistance between ground and the (F855) Primary 5-volt Supply circuit in the CKP Sensor harness connector.


3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
3
1
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
0
81459f4d

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) Primary 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

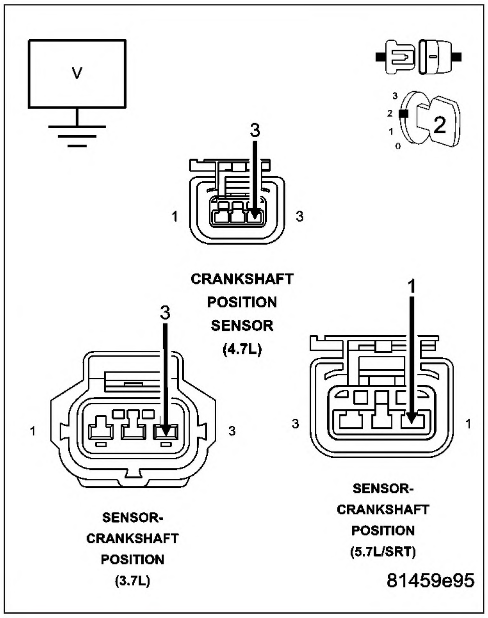
3. 5-VOLT SENSOR

Turn the ignition off.

Reconnect all the previously disconnected Sensors except for the CKP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) Primary 5-volt Supply circuit in the CKP Sensor harness connector.


V
3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
3
1
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
2
81459e95

Is the voltage below 4.5 volts?

Yes >> Go To 4

No >> Replace the CKP Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0642-SENSOR REFERENCE VOLTAGE 1 CIRCUIT LOW (CONTINUED)

4. 5-VOLT SENSOR SHORTED TO GROUND

Measure the voltage on the (F855) Primary 5-volt Supply circuit at the CKP Sensor harness connector.

CAUTION: You must Turn the Ignition OFF when disconnecting any of the Sensor harness connectors and Turn the Ignition On to check the voltage readings.

While monitoring the voltage, disconnect each Sensor harness connector that shares the (F855) Primary 5-volt Supply circuit, one at a time.

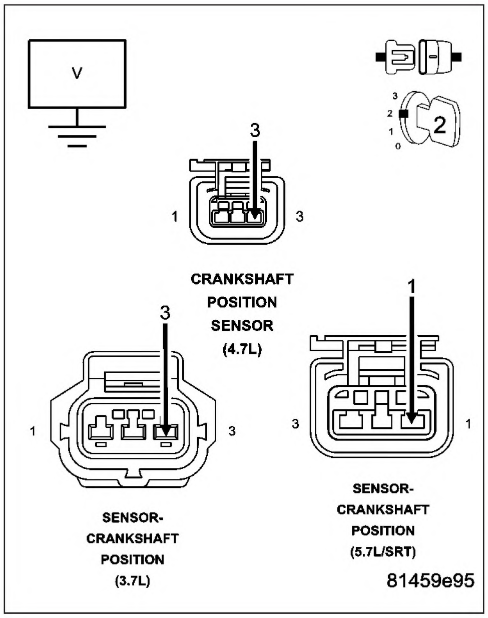
NOTE: Reconnect all the Sensors and clear all trouble codes before continuing.

Does the voltage increase above 4.5 volts when disconnecting any of the remaining Sensors?

Yes >> Replace the Sensor that causes the (F855) Primary 5-volt Supply circuit voltage to increase when disconnected.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5


V
3
2
1
0
2
3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
1
3
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
81459e95

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

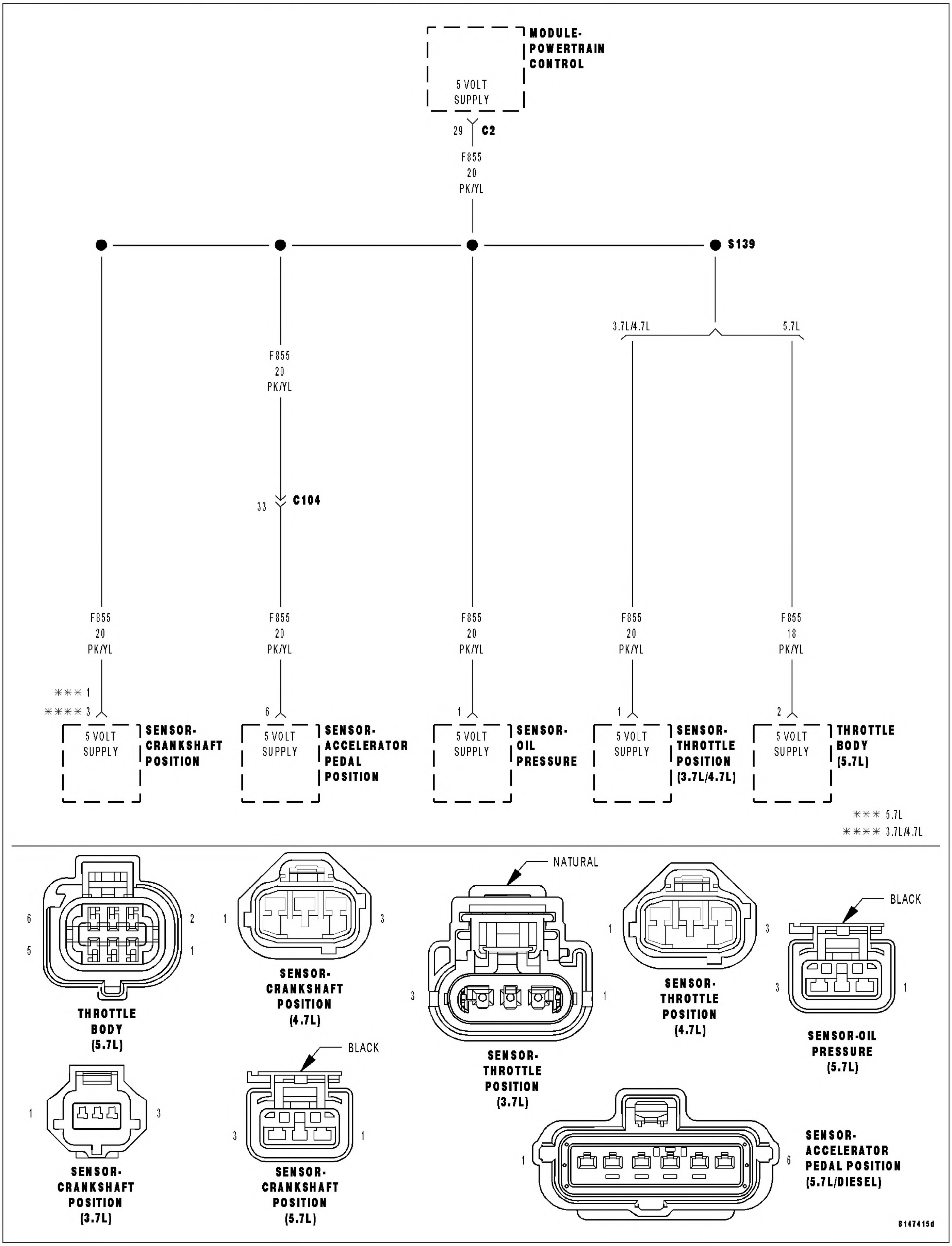
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0643-PRIMARY 5-VOLT SUPPLY CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
29
C2
F855
20
PK/YL
S139
3.7L/4.7L
5.7L
F855
20
PK/YL
33
C104
F855
20
PK/YL
F855
20
PK/YL
F855
20
PK/YL
F855
20
PK/YL
F855
18
PK/YL
∗∗∗ 1
∗∗∗∗ 3
6
1
1
2
5 VOLT
SUPPLY
SENSOR-
CRANKSHAFT
POSITION
5 VOLT
SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
5 VOLT
SUPPLY
SENSOR-
OIL
PRESSURE
5 VOLT
SUPPLY
SENSOR-
THROTTLE
POSITION
(3.7L/4.7L)
5 VOLT
SUPPLY
THROTTLE
BODY
(5.7L)
∗∗∗ 5.7L
∗∗∗∗ 3.7L/4.7L
6
5
2
1
THROTTLE
BODY
(5.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(4.7L)
NATURAL
3
1
SENSOR-
THROTTLE
POSITION
(3.7L)
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
BLACK
3
1
SENSOR-OIL
PRESSURE
(5.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
BLACK
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L)
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8147415d

P0643-PRIMARY 5-VOLT SUPPLY CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes the Primary 5-volt Supply circuit voltage is too high. One Trip Fault. ETC light is flashing.

Possible Causes
(F855) PRIMARY 5-VOLT SUPPLY SHORTED TO BATTERY VOLTAGE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F855) PRIMARY 5-VOLT SUPPLY SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

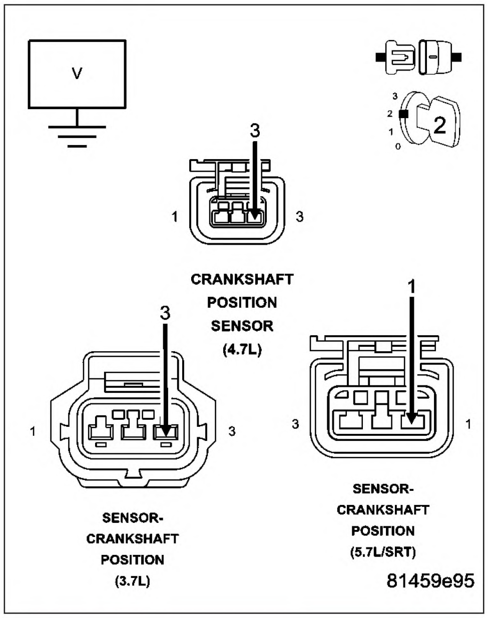
Disconnect the C2 PCM harness connector.

Disconnect all the Sensors that share the (F855) Primary 5-volt Supply circuit.

NOTE: Improperly installed aftermarket accessories can cause this DTC to set. Check for wiring added by customer.

Ignition on, engine not running.

Measure the voltage on the (F855) Primary 5-volt Supply circuit at the CKP Sensor harness connector.


V
3
2
1
0
2
3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
1
3
3
1
3
3
1
SENSOR- CRANKSHAFT POSITION (3.7L)
SENSOR- CRANKSHAFT POSITION (5.7L/SRT)
81459e95

Is the voltage above 5.2 volts?

Yes >> Repair the short to battery voltage in the (F855) Primary 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0643-PRIMARY 5-VOLT SUPPLY CIRCUIT HIGH (CONTINUED)

3. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

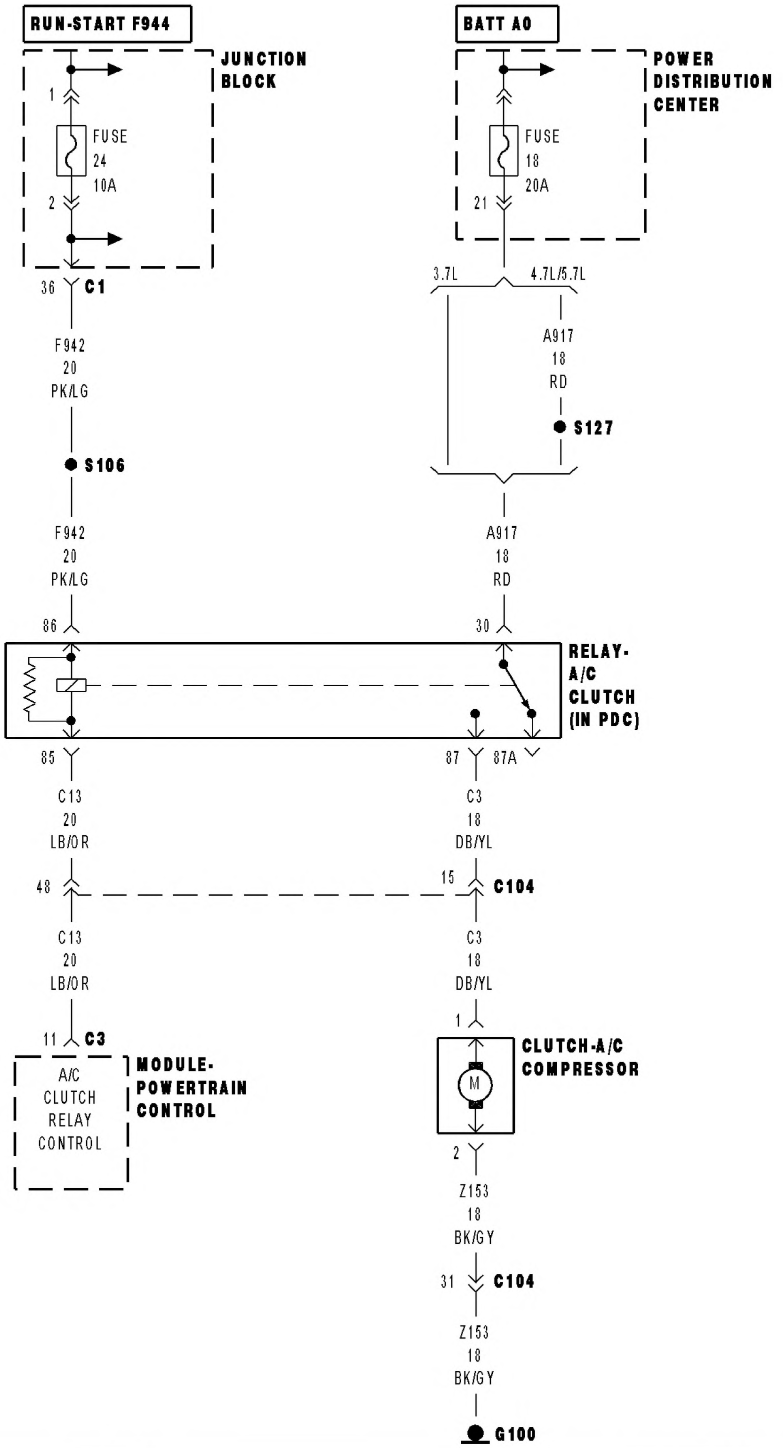
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

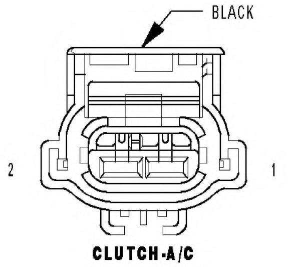
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

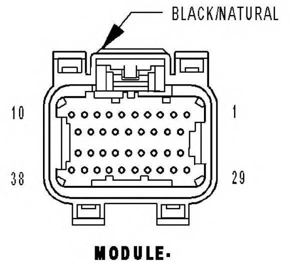
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0645-A/C CLUTCH RELAY CIRCUIT


RUN-START F944
JUNCTION BLOCK
1
FUSE
24
10A
2
36
C1
F942
20
PK/LG
S106
F942
20
PK/LG
BATT A0
POWER DISTRIBUTION CENTER
FUSE
18
20A
21
3.7L
4.7L/5.7L
A917
18
RD
S127
A917
18
RD
86
30
RELAY-A/C CLUTCH (IN PDC)
85
87
87A
C13
20
LB/OR
C3
18
DB/YL
48
15
C104
C13
20
LB/OR
C3
18
DB/YL
11
C3
A/C CLUTCH RELAY CONTROL
MODULE-POWERTRAIN CONTROL
1
M
CLUTCH-A/C COMPRESSOR
2
Z153
18
BK/GY
31
C104
Z153
18
BK/GY
G100



CLUTCH-A/C
COMPRESSOR
(GAS)


BLACK/NATURAL
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C3

81474245

P0645-A/C CLUTCH RELAY CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on. Battery voltage greater than 10 volts. A/C Switch on.
- **Set Condition:**
  An open or shorted condition is detected in the A/C clutch relay control circuit. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(F942) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(A917) FUSED B+ CIRCUIT
(C13) A/C CLUTCH RELAY CONTROL CIRCUIT OPEN
(C13) A/C CLUTCH RELAY CONTROL CIRCUIT SHORTED TO GROUND
A/C CLUTCH RELAY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. A/C CLUTCH RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the A/C Clutch Relay.

Is the A/C Clutch Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. A/C CLUTCH RELAY RESISTANCE

Turn the ignition off.

Remove the A/C Clutch Relay from the IPM.

Measure the resistance of the A/C Clutch Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 3

No >> Replace the A/C Clutch Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0645-A/C CLUTCH RELAY CIRCUIT (CONTINUED)

3. (F942) FUSED IGNITION SWITCH OUTPUT CIRCUIT

Ignition on, engine not running.

Using a 12-volt test light connected to ground, probe the (F942) Fused Ignition Switch Output circuit in the connection.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open or short to ground in the (F942) Fused Ignition Switch Output circuit. Check and replace any open fuses.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

4. (A917) FUSED B+ CIRCUIT

Using a 12-volt test light connected to ground, probe the (A917) Fused B+ circuit in the connection.

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the open or short to ground in the (A917) Fused B+ circuit. Check and replace any open fuses.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

5. (C13) A/C CLUTCH RELAY CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (C13) A/C Clutch Relay Control circuit from the relay connection to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (C13) A/C Clutch Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

6. (C13) A/C CLUTCH RELAY CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (C13) A/C Clutch Relay Control circuit at the IPM.

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (C13) A/C Relay Clutch Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0645-A/C CLUTCH RELAY CIRCUIT (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

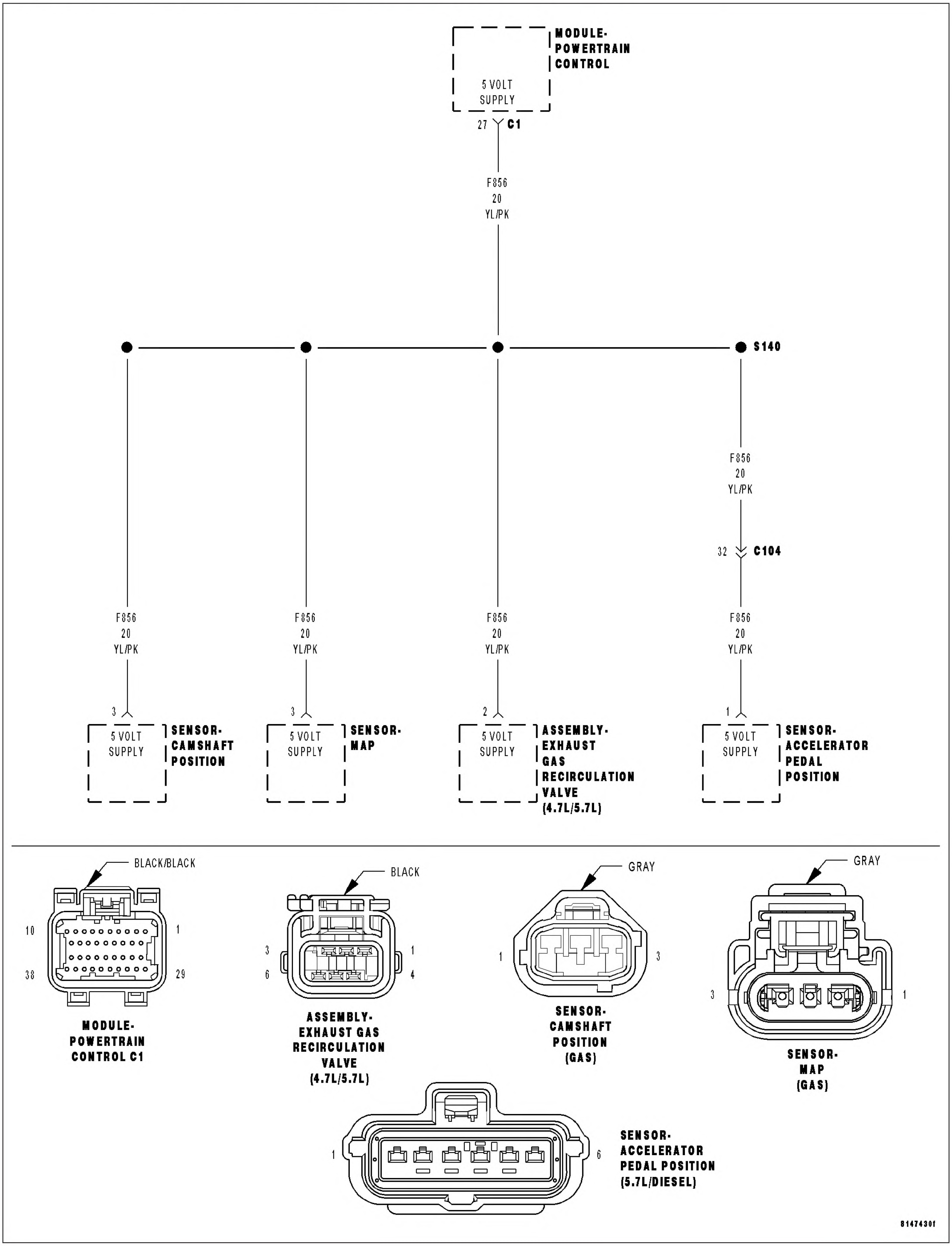
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0652-SENSOR REFERENCE VOLTAGE 2 CIRCUIT LOW


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27
C1
F856
20
YL/PK
S140
F856
20
YL/PK
32
C104
F856
20
YL/PK
3
5 VOLT
SUPPLY
SENSOR-
CAMSHAFT
POSITION
F856
20
YL/PK
3
5 VOLT
SUPPLY
SENSOR-
MAP
F856
20
YL/PK
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
F856
20
YL/PK
1
5 VOLT
SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
GRAY
1
3
SENSOR-
CAMSHAFT
POSITION
(GAS)
GRAY
3
1
SENSOR-
MAP
(GAS)
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81474301

P0652-SENSOR REFERENCE VOLTAGE 2 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes the Auxiliary 5-volt Supply circuit voltage is too low. One Trip Fault. ETC light is flashing.

Possible Causes
(F856) AUXILIARY 5-VOLT SUPPLY SHORTED TO GROUND
SENSOR SHORTED TO GROUND
CAM POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

NOTE: Improperly installed aftermarket accessories can cause this DTC to set. Check for wiring added by customer.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

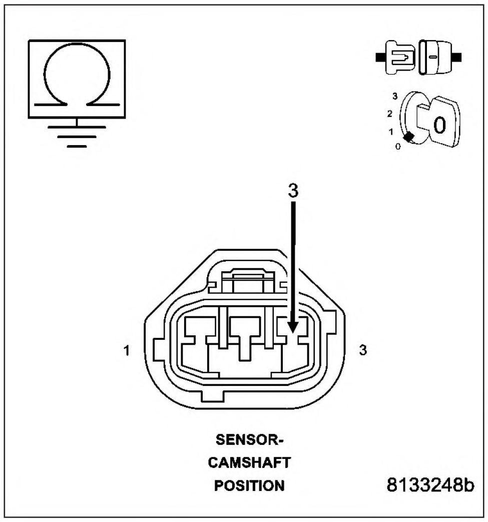
2. (F856) AUXILIARY 5-VOLT SUPPLY SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Disconnect all the Sensors that share the (F856) Auxiliary 5-volt Supply circuit.

Measure the resistance between ground and the (F856) Auxiliary 5-volt Supply circuit in the CMP Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) Auxiliary 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0652-SENSOR REFERENCE VOLTAGE 2 CIRCUIT LOW (CONTINUED)

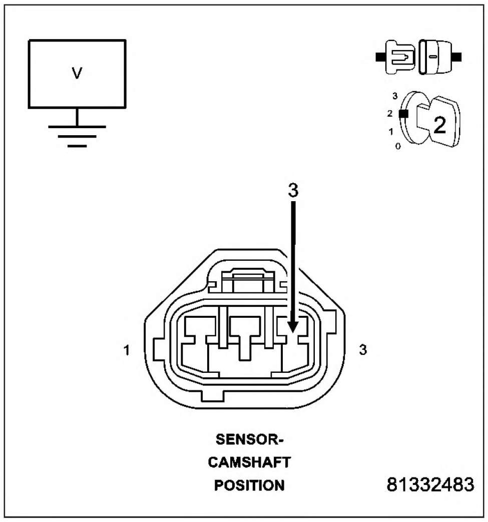
3. CMP SENSOR

Turn the ignition off.

Reconnect all the previously disconnected Sensors except for the CMP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) Auxiliary 5-volt Supply circuit in the CMP Sensor harness connector.



Is the voltage below 4.5 volts?

Yes >> Go To 4

No >> Replace the Cam Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

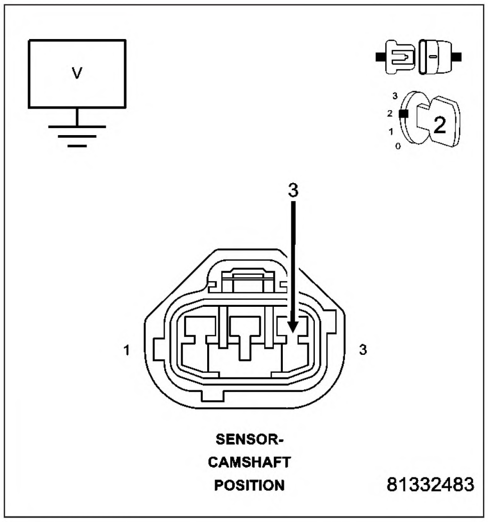
---

4. 5-VOLT SENSOR SHORTED TO GROUND

Measure the voltage on the (F856) Auxiliary 5-volt Supply circuit at the CMP Sensor harness connector.

CAUTION: You must Turn the Ignition OFF when disconnecting any of the Sensor harness connectors and Turn the Ignition On to check the voltage readings.

While monitoring the voltage, disconnect each Sensor harness connector that shares the (F856) Auxiliary 5-volt Supply circuit, one at a time.



Does the voltage increase above 4.5 volts when disconnecting any of the Sensor harness connectors?

Yes >> Replace the Sensor that causes the (F856) Auxiliary 5-volt Supply circuit voltage to increase when disconnected.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

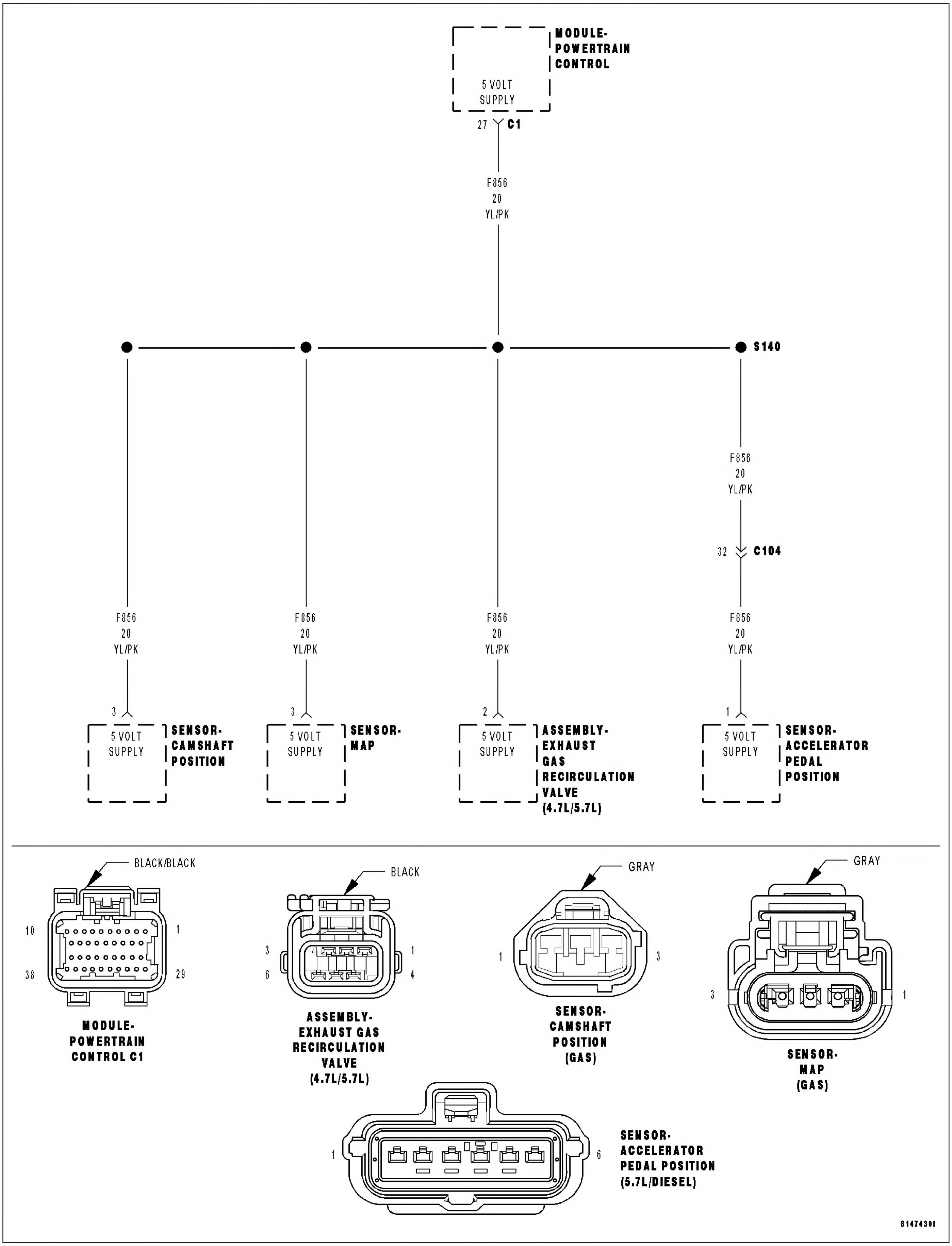
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0653-SENSOR REFERENCE VOLTAGE 2 CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27
C1
F856
20
YL/PK
S140
F856
20
YL/PK
32
C104
F856
20
YL/PK
F856
20
YL/PK
F856
20
YL/PK
F856
20
YL/PK
F856
20
YL/PK
3
5 VOLT
SUPPLY
SENSOR-
CAMSHAFT
POSITION
3
5 VOLT
SUPPLY
SENSOR-
MAP
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
1
5 VOLT
SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
GRAY
1
3
SENSOR-
CAMSHAFT
POSITION
(GAS)
GRAY
3
1
SENSOR-
MAP
(GAS)
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81474301

P0653-SENSOR REFERENCE VOLTAGE 2 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes the Auxiliary 5-volt Supply circuit voltage is too high. One Trip Fault. ETC light is flashing.

Possible Causes
(F856) AUXILIARY 5-VOLT SUPPLY SHORTED TO BATTERY VOLTAGE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F856) AUXILIARY 5-VOLT SUPPLY SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

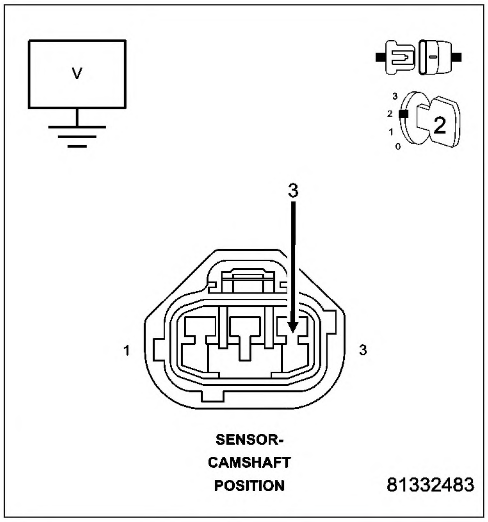
Disconnect the C1 PCM harness connector.

Disconnect all the Sensors that share the (F856) Auxiliary 5-volt Supply circuit.

NOTE: Improperly installed aftermarket accessories can cause this DTC to set. Check for wiring added by customer.

Ignition on, engine not running.

Measure the voltage on the (F856) Auxiliary 5-volt Supply circuit at the CMP Sensor harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (F856) Auxiliary 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P0653-SENSOR REFERENCE VOLTAGE 2 CIRCUIT HIGH (CONTINUED)

3. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

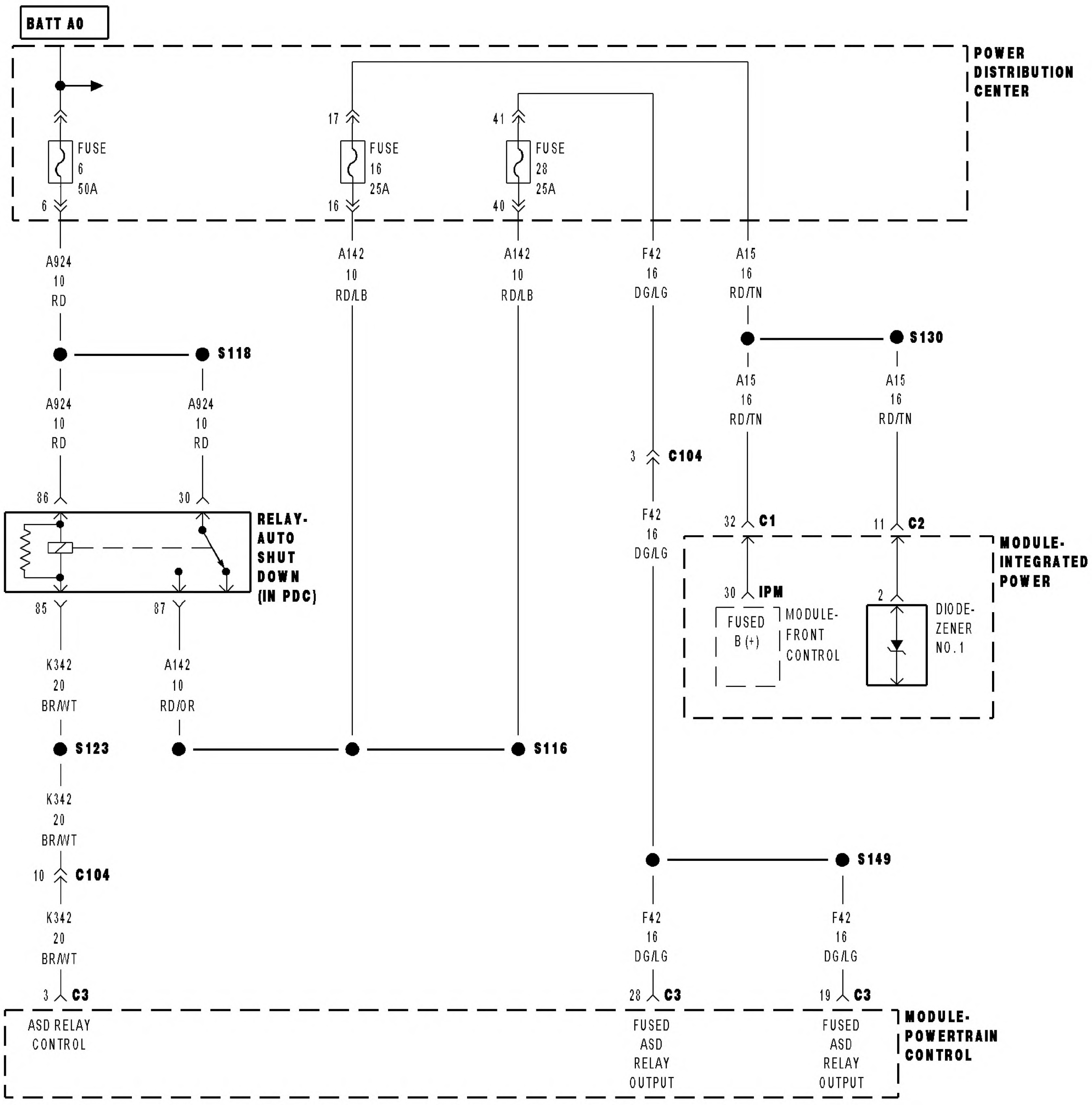
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

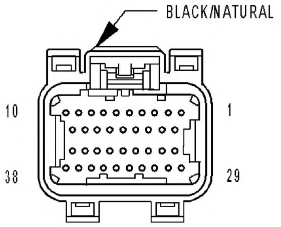
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

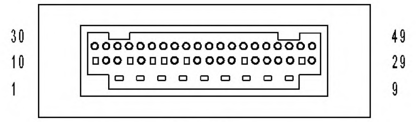
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0685-AUTO SHUTDOWN RELAY CONTROL CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S118
S130
A924 10 RD
A924 10 RD
A15 16 RD/TN
A15 16 RD/TN
3 C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
F42 16 DG/LG
32 C1
11 C2
MODULE-INTEGRATED POWER
30 IPM
FUSED B(+)
MODULE-FRONT CONTROL
2
DIODE-ZENER NO.1
K342 20 BR/WT
A142 10 RD/OR
S123
S116
K342 20 BR/WT
10 C104
S149
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
3 C3
28 C3
19 C3
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
MODULE-POWERTRAIN CONTROL


BLACK/NATURAL
10
1
38
29

MODULE-POWERTRAIN CONTROL C3


30
10
1
49
29
9

MODULE-FRONT CONTROL IPM

814745ae

P0685-AUTO SHUTDOWN RELAY CONTROL CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on. Battery voltage above 10 volts.
- **Set Condition:**
  The actual ASD state is not equal to the desired ASD state. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A924) FUSED B+ CIRCUITS
(K342) ASD RELAY CONTROL CIRCUIT OPEN
(K342) ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND
ASD RELAY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ASD RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Is the ASD Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. (A924) FUSED B+ CIRCUITS

Turn the ignition off.

Remove the ASD Relay from the IPM.

Using a 12-volt test light connected to ground, probe the (A924) Fused B+ circuits in the IPM.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A924) Fused B+ circuits. Inspect and replace any open fuses.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. ASD RELAY

Measure the resistance of the ASD Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 4

No >> Replace the ASD Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0685-AUTO SHUTDOWN RELAY CONTROL CIRCUIT (CONTINUED)

4. (K342) ASD RELAY CONTROL CIRCUIT OPEN

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K342) ASD Relay Control circuit from the IPM to the appropriate terminals of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (K342) ASD Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

5. (K342) ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K342) ASD Relay Control circuit in the IPM.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K342) ASD Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

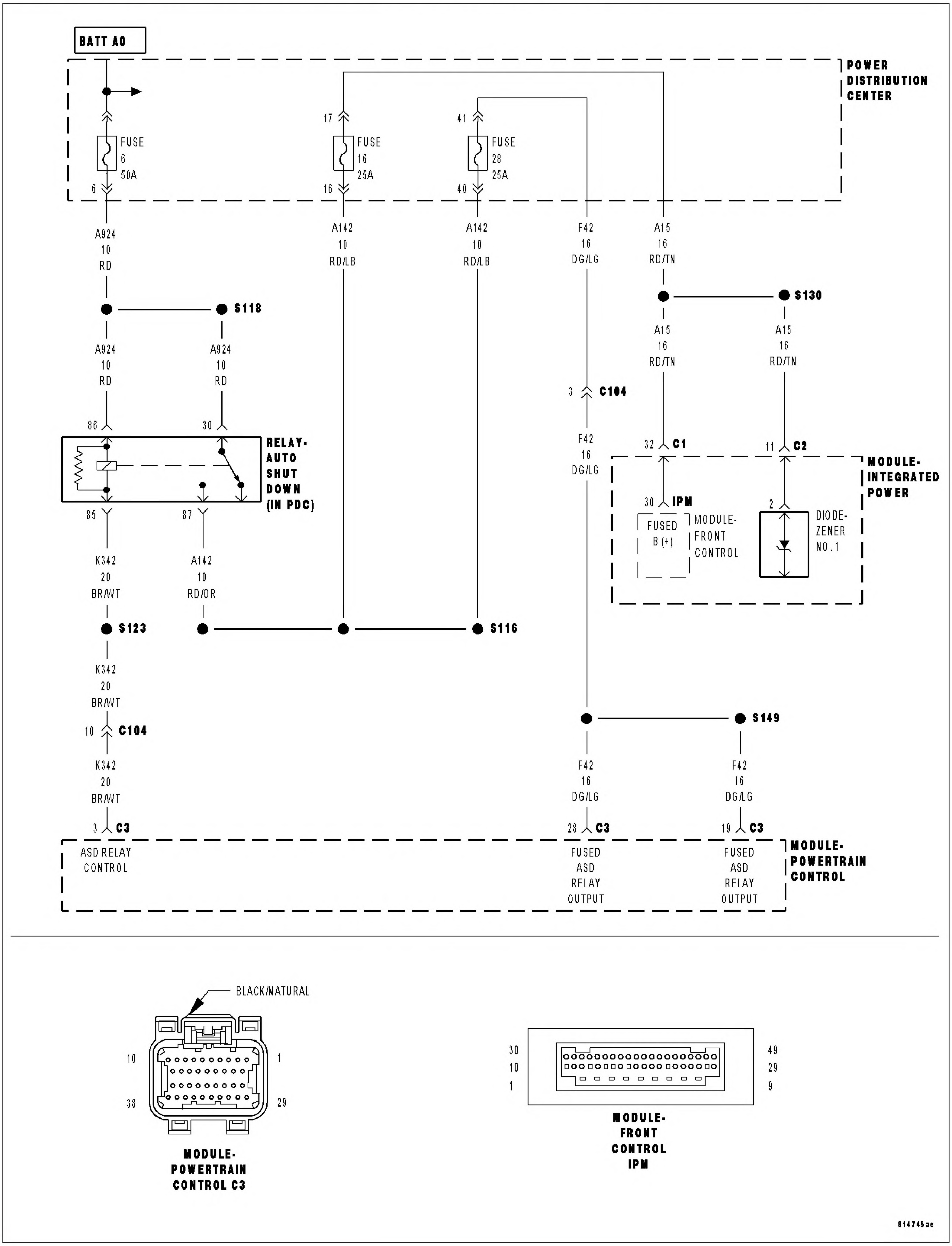
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0688-AUTO SHUTDOWN RELAY SENSE CIRCUIT LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 16 25A
17
16
FUSE 28 25A
41
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S118
S130
A924 10 RD
A924 10 RD
A15 16 RD/TN
A15 16 RD/TN
3 C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
F42 16 DG/LG
32 C1
11 C2
MODULE-INTEGRATED POWER
30 IPM
FUSED B(+)
MODULE-FRONT CONTROL
2
DIODE-ZENER NO.1
K342 20 BR/WT
A142 10 RD/OR
S123
S116
K342 20 BR/WT
10 C104
S149
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
3 C3
28 C3
19 C3
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
MODULE-POWERTRAIN CONTROL
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
814745ae

P0688-AUTO SHUTDOWN RELAY SENSE CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition key on. Battery voltage greater than 10 volts.
- **Set Condition:**
  No voltage sensed at the PCM when the ASD relay is energized. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A924) FUSED B+ CIRCUITS
(K342) ASD RELAY OUTPUT CIRCUIT OPEN
ASD RELAY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. VERIFY ASD DTC

NOTE: Diagnose P0685 - Auto Shutdown Relay Control Circuit first if it set along with this DTC.

With a scan tool, erase the DTC.

Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. It may be necessary to repeat several times.

Does the DTC reset?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. ENGINE OPERATION

Attempt to start the engine.

Does the engine start?

Yes >> Go To 3

No >> Go To 4

P0688-AUTO SHUTDOWN RELAY SENSE CIRCUIT LOW (CONTINUED)

3. (K342) ASD RELAY OUTPUT CIRCUIT OPEN

Turn the ignition off.

Remove the ASD Relay.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K342) ASD Relay Output circuit from the Relay connection to the appropriate terminals of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K342) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. ASD RELAY

Turn the ignition off.

Install a substitute relay in place of the ASD Relay.

Ignition on, engine not running.

With a scan tool, erase DTCs.

Attempt to start the engine.

With a scan tool, read DTCs.

Does the DTC reset?

Yes >> Go To 5

No >> Replace the ASD Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (A924) FUSED B+ CIRCUITS

Turn the ignition off.

Using a 12-volt test light connected to ground, probe the (A924) Fused B+ circuits at the Relay connection.

Does the test light illuminate brightly?

Yes >> Go To 6

No >> Repair the open or short to ground in the (A924) Fused B+ circuits. Inspect the related fuse and repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0688-AUTO SHUTDOWN RELAY SENSE CIRCUIT LOW (CONTINUED)

6. (K342/F42) ASD RELAY OUTPUT CIRCUIT OPEN

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K342/F42) ASD Relay Output circuit from the Relay connection to the appropriate terminals of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K342/F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

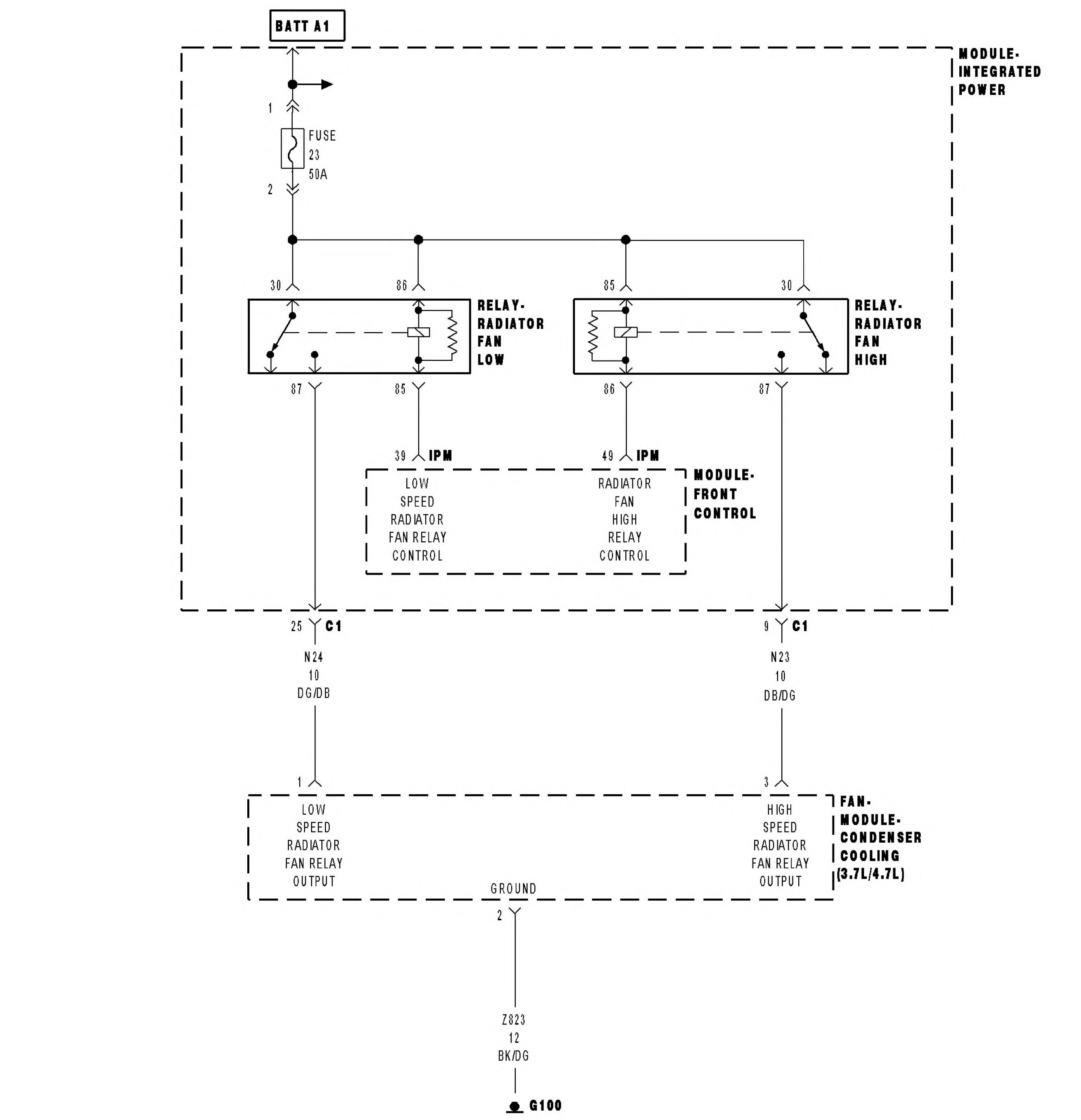
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

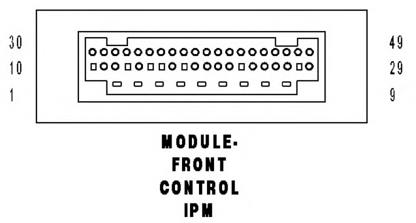
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

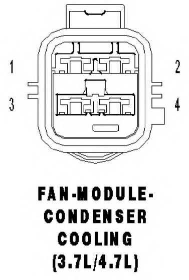
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0691-COOLING FAN 1 RELAY CONTROL CIRCUIT LOW


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 23 50A
2
30
86
85
30
RELAY-RADIATOR FAN LOW
RELAY-RADIATOR FAN HIGH
87
85
86
87
39 IPM
49 IPM
LOW SPEED RADIATOR FAN RELAY CONTROL
RADIATOR FAN HIGH RELAY CONTROL
MODULE-FRONT CONTROL
25 C1
9 C1
N24 10 DG/DB
N23 10 DB/DG
1
3
LOW SPEED RADIATOR FAN RELAY OUTPUT
HIGH SPEED RADIATOR FAN RELAY OUTPUT
GROUND
FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)
2
Z823 12 BK/DG
G100


30
10
1
49
29
9

MODULE-FRONT CONTROL IPM



FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)

814b20e3

P0691-COOLING FAN 1 RELAY CONTROL CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on with the Cooling fan No.1 Relay actuated.
- **Set Condition:**
  The FCM recognizes and open or short to ground in the Cooling Fan Relay No.1 Control circuit.

Possible Causes
(A16) FUSED B+ CIRCUIT
(N201) LOW SPEED FAN RELALY CONTROL CIRCUIT OPEN
(N201) LOW SPEED FAN RELALY CONTROL CIRCUIT SHORTED TO GROUND
LOW SPEED RADIATOR FAN RELAY
FCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. LOW SPEED RADIATOR FAN RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the Low Speed Radiator Fan Relay.

Is the Cooling Fan Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. (A16) FUSED B+ CIRCUITS

Turn the ignition off.

Remove the Low Speed Radiator Fan Relay.

Using a 12-volt test light connected to ground, probe the (A16) Fused B+ circuits.

Is the voltage above 11.0 volts?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A16) Fused B+ circuits. Inspect the related fuse and repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

---

3. LOW SPEED RADIATOR FAN RELAY RESISTANCE

Measure the resistance of the Low Speed Radiator Fan Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 4

No >> Replace the Low Speed Radiator Fan Relay.
Perform BODY VERIFICATION TEST-VER 1.

P0691-COOLING FAN 1 RELAY CONTROL CIRCUIT LOW (CONTINUED)

4. (N201) COOLING FAN NO.1 CONTROL CIRCUIT OPEN

Disconnect the IPM FCM 49 way harness connector.

Measure the resistance of the (N201) Cooling Fan No.1 Relay Control circuit from the Relay to the IPM FCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (N201) Cooing Fan No.1 Relay Control circuit.
Perform BODY VERIFICATION TEST-VER 1.

---

5. (N201) COOLING FAN NO.1 CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (N201) Cooling Fan No.1 Relay Control circuit at the Relay connection.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (N201) Cooling Fan No.1 Relay Control circuit.
Perform BODY VERIFICATION TEST-VER 1.

No >> Go To 6

---

6. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

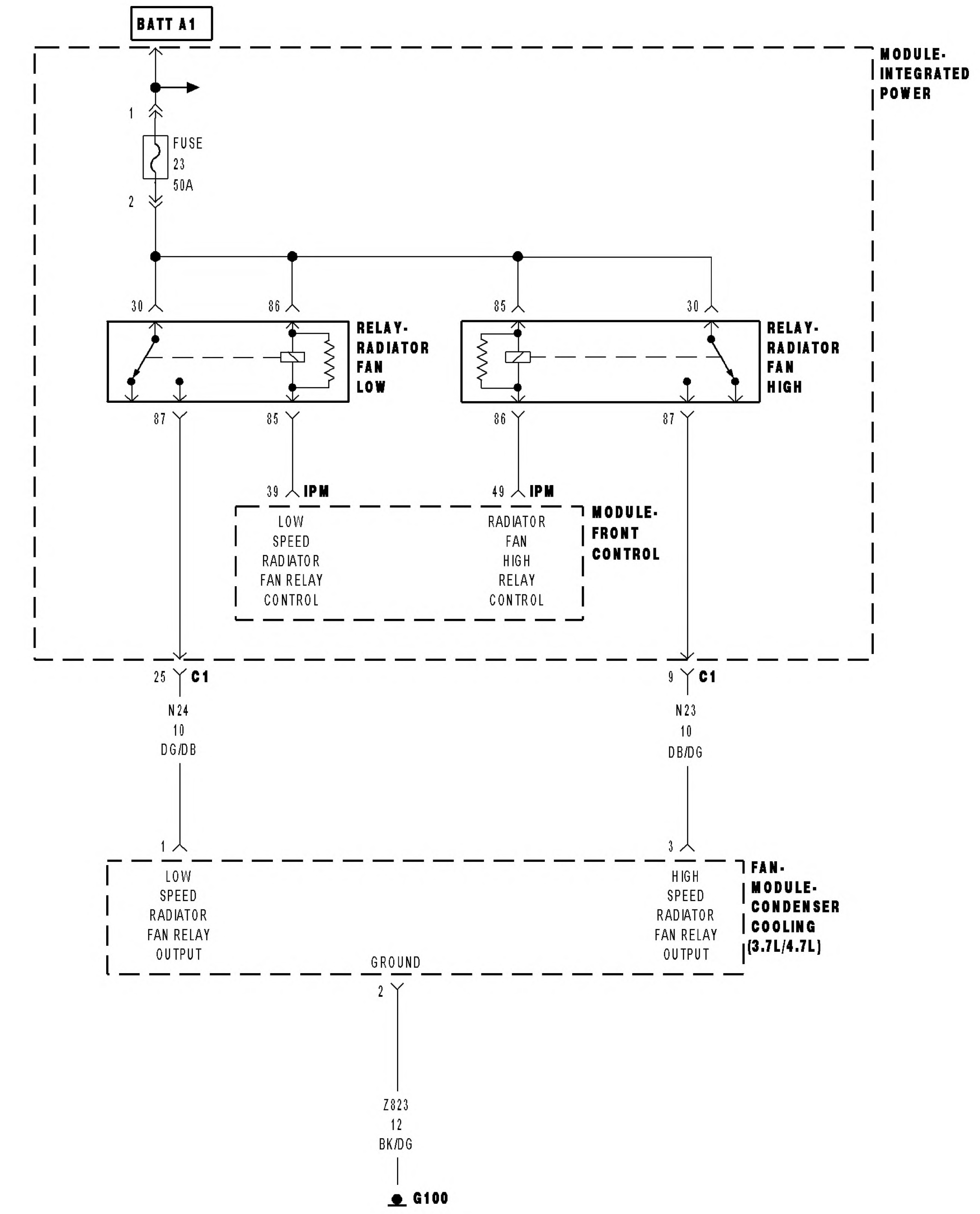
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

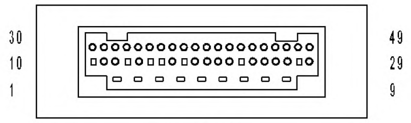
Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

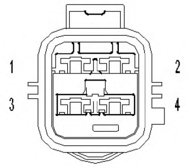
No >> Replace Front Control Module per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0692-COOLING FAN 1 RELAY CONTROL CIRCUIT HIGH


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 23 50A
2
30
86
85
30
RELAY-RADIATOR FAN LOW
RELAY-RADIATOR FAN HIGH
87
85
86
87
39 IPM
49 IPM
LOW SPEED RADIATOR FAN RELAY CONTROL
RADIATOR FAN HIGH RELAY CONTROL
MODULE-FRONT CONTROL
25 C1
9 C1
N24 10 DG/DB
N23 10 DB/DG
1
3
LOW SPEED RADIATOR FAN RELAY OUTPUT
HIGH SPEED RADIATOR FAN RELAY OUTPUT
FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)
GROUND
2
Z823 12 BK/DG
G100


30
10
1
49
29
9

MODULE-FRONT CONTROL IPM



FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)

814b20e3

P0692-COOLING FAN 1 RELAY CONTROL CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on with the Cooling Fan No.1 Relay powered on.
- **Set Condition:**
  The FCM detects the Cooling Fan No.1 Relay voltage above the acceptable voltage at the FCM. The circuit is continuously monitored.

Possible Causes
(N201) COOLING FAN NO.1 RELAY CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
LOW SPEED RADIATOR FAN RELAY
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. LOW SPEED RADIATOR FAN RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the Low Speed Radiator Fan Relay.

Is the Cooling Fan Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. (N201) COOLING FAN NO.1 RELAY CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Remove the Low Speed Radiator Fan Relay.

Disconnect the IPM FCM 49 way harness connector.

Ignition on, engine not running.

Measure the voltage on the (N201) Cooling Fan No.1 Relay Control Circuit at the Relay terminal.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (N201) Cooling Fan No.1 Relay Control circuit.
Perform BODY VERIFICATION TEST-VER 1.

No >> Go To 3

---

3. LOW SPEED RADIATOR FAN RELAY RESISTANCE

Measure the resistance of the Low Speed Radiator Fan Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 4

No >> Replace the Low Speed Radiator Fan Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0692-COOLING FAN 1 RELAY CONTROL CIRCUIT HIGH (CONTINUED)

4. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

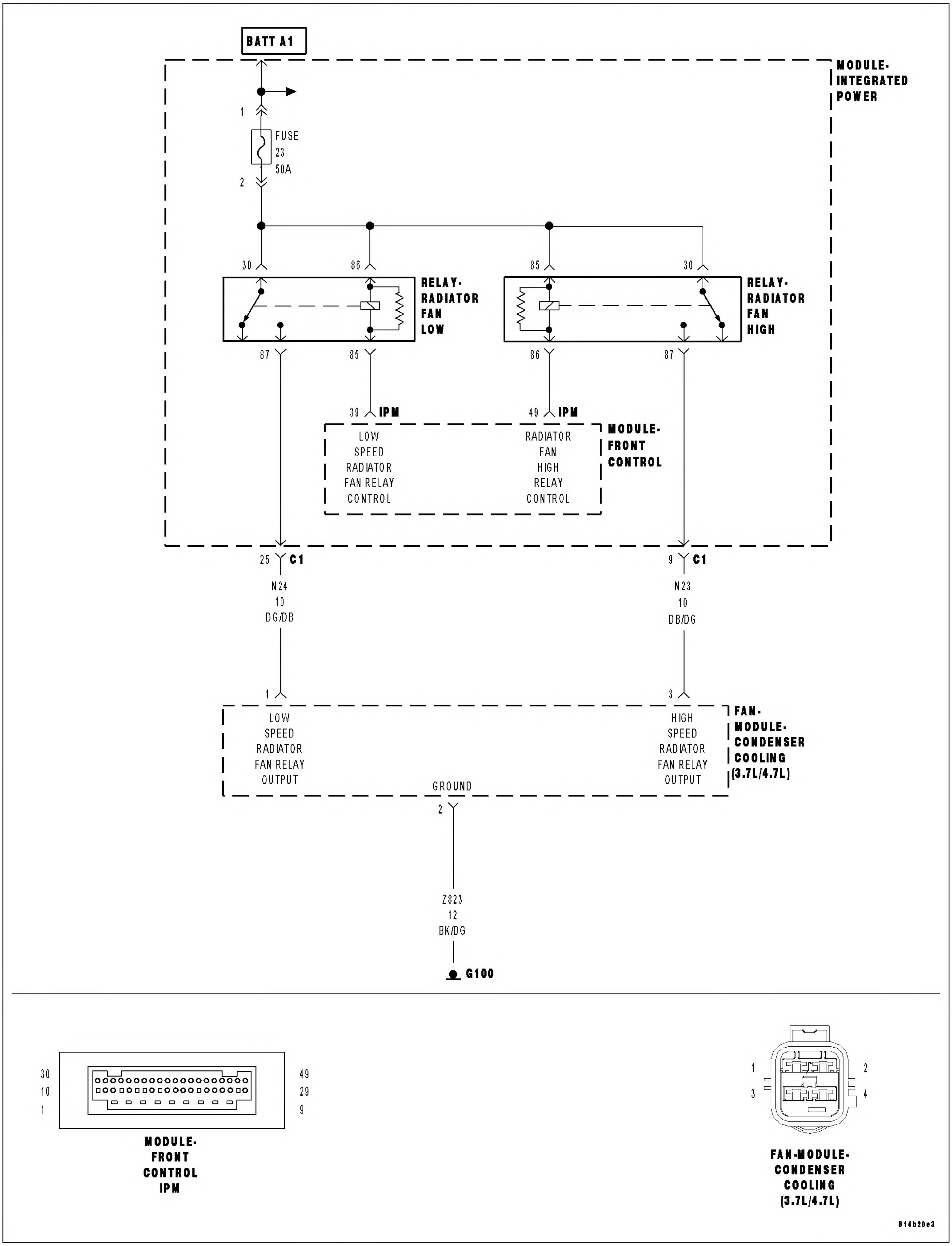
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

No >> Replace Front Control Module per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0693-COOLING FAN 2 RELAY CONTROL CIRCUIT LOW


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 23 50A
2
30
86
85
30
RELAY-RADIATOR FAN LOW
RELAY-RADIATOR FAN HIGH
87
85
86
87
39 IPM
49 IPM
LOW SPEED RADIATOR FAN RELAY CONTROL
RADIATOR FAN HIGH RELAY CONTROL
MODULE-FRONT CONTROL
25 C1
9 C1
N24 10 DG/DB
N23 10 DB/DG
1
3
LOW SPEED RADIATOR FAN RELAY OUTPUT
HIGH SPEED RADIATOR FAN RELAY OUTPUT
GROUND
FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)
2
Z823 12 BK/DG
G100
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
1
2
3
4
FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)
814b20e3

P0693-COOLING FAN 2 RELAY CONTROL CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and the High Speed Radiator Fan Relay is powered on.
- **Set Condition:**
  The FCM detects and open or short in the Cooling Fan No.2 Relay Control circuit. The circuit is continuously monitored.

Possible Causes
(A16) FUSED B+ CIRCUITS
(N112) COOOLING FAN NO.2 RELAY CONTROL CIRCUIT OPEN
(N112) COOOLING FAN NO.2 RELAY CONTROL CIRCUIT SHORTED TO GROUND
HIGH SPEED RADIATOR FAN RELAY
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. HIGH SPEED RADIATOR FAN RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the High Speed Radiator Fan Relay.

Is the Cooling Fan Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. (A16) FUSED B+ CIRCUITS

Turn the ignition off.

Remove the High Speed Radiator Fan Relay.

Using a 12-volt test light connected to ground, probe the (A16) Fused B+ circuits in the Relay connection.

Is the voltage above 11.0 volts?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A16) Fused B+ circuits. Inspect the related fuse and repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

P0693-COOLING FAN 2 RELAY CONTROL CIRCUIT LOW (CONTINUED)

3. HIGH SPEED RADIATOR FAN RELAY RESISTANCE

Measure the resistance of the High Speed Radiator Fan Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 4

No >> Replace the Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (N112) COOLING FAN NO.2 CONTROL CIRCUIT OPEN

Disconnect the IPM FCM 49 way harness connector.

Measure the resistance of the (N112) Cooling Fan No.2 Relay Control circuit from the Relay connection to the IPM FCM harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (N112) Cooling Fan No.2 Relay Control circuit.
Perform BODY VERIFICATION TEST-VER 1.

---

5. (N112) COOLING FAN NO.2 CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (N112) Cooling Fan No.2 Relay Control circuit at the Relay connection.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (N112) Cooling Fan No.2 Relay Control circuit.
Perform BODY VERIFICATION TEST-VER 1.

No >> Go To 6

---

6. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

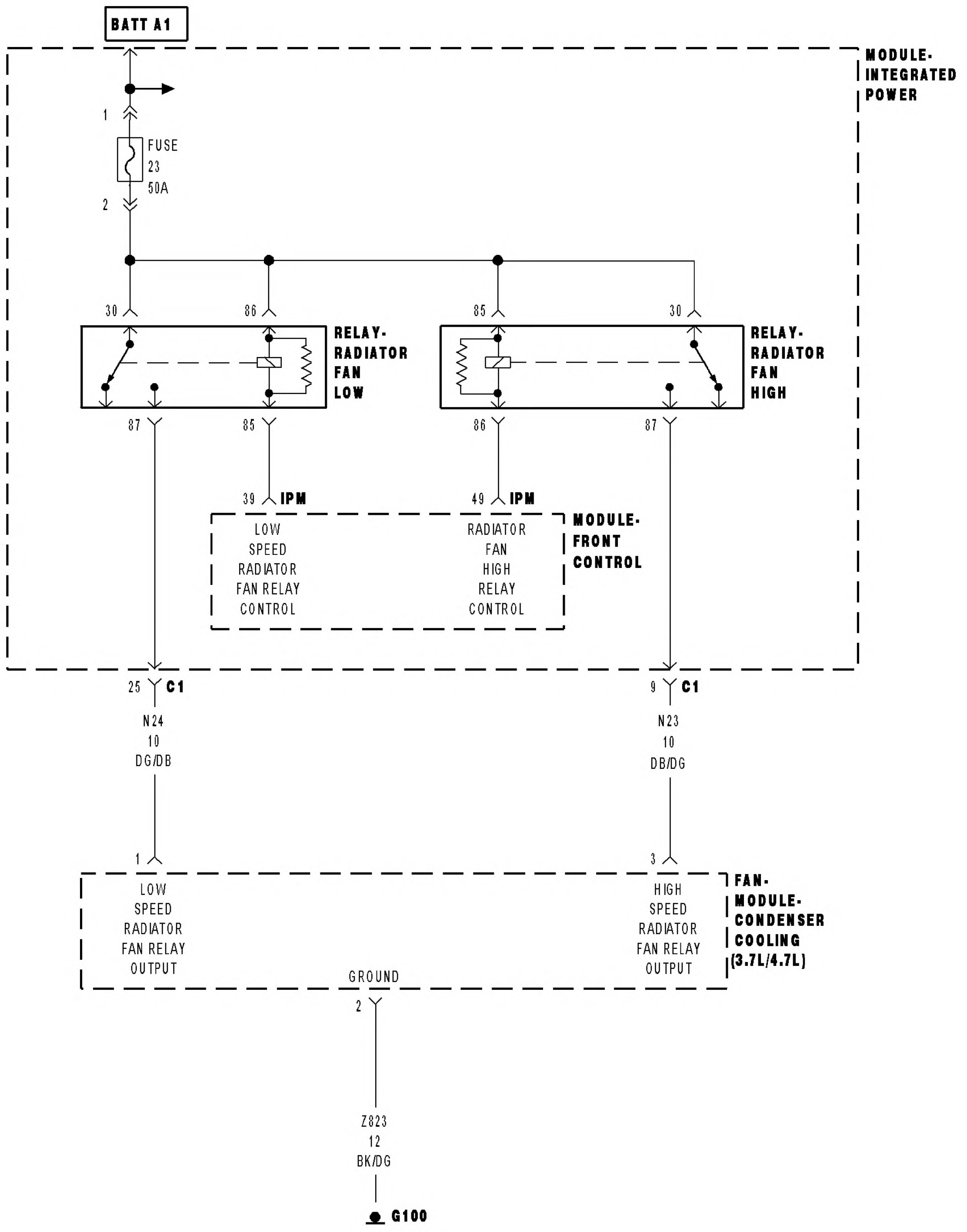
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

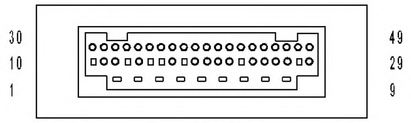
Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

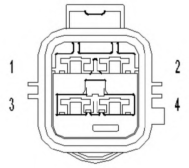
No >> Replace the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0694-COOLING FAN 2 RELAY CONTROL CIRCUIT HIGH


BATT A1
MODULE-INTEGRATED POWER
1
FUSE 23 50A
2
30
86
85
30
RELAY-RADIATOR FAN LOW
RELAY-RADIATOR FAN HIGH
87
85
86
87
39 IPM
49 IPM
LOW SPEED RADIATOR FAN RELAY CONTROL
RADIATOR FAN HIGH RELAY CONTROL
MODULE-FRONT CONTROL
25 C1
9 C1
N24 10 DG/DB
N23 10 DB/DG
1
3
LOW SPEED RADIATOR FAN RELAY OUTPUT
HIGH SPEED RADIATOR FAN RELAY OUTPUT
GROUND
FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)
2
Z823 12 BK/DG
G100


30
10
1
49
29
9

MODULE-FRONT CONTROL IPM



FAN-MODULE-CONDENSER COOLING (3.7L/4.7L)

814b20e3

P0694-COOLING FAN 2 RELAY CONTROL CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on with the Cooling Fan No.2 Relay powered on.
- **Set Condition:**
  The FCM detects the Cooling Fan No.2 Relay voltage above the acceptable voltage at the FCM. The circuit is continuously monitored.

Possible Causes
(N112) COOLING FAN NO.2 RELAY CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE
HIGH SPEED RADIATOR FAN RELAY
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. LOW SPEED RADIATOR FAN RELAY OPERATION

Ignition on, engine not running.

With a scan tool, actuate the High Speed Radiator Fan Relay.

Is the Cooling Fan Relay operating?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

2. (N112) COOLING FAN NO.2 RELAY CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Remove the High Speed Radiator Fan Relay.

Disconnect the IPM FCM 49 way harness connector.

Ignition on, engine not running.

Measure the voltage on the (N112) Cooling Fan No.2 Relay Control Circuit at the Relay terminal.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (N112) Cooling Fan No.2 Relay Control circuit.
Perform BODY VERIFICATION TEST-VER 1.

No >> Go To 3

3. HIGH SPEED RADIATOR FAN RELAY RESISTANCE

Measure the resistance of the High Speed Radiator Fan Relay Coil.

Is the resistance between 60 to 80 ohms?

Yes >> Go To 4

No >> Replace the High Speed Radiator Fan Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0694-COOLING FAN 2 RELAY CONTROL CIRCUIT HIGH (CONTINUED)

4. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST-VER 1.

No >> Replace Front Control Module per Service Information.
Perform BODY VERIFICATION TEST-VER 1.

P0700-TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  An active DTC is stored in the TCM. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
DTC PRESENT IN THE TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. DTC PRESENT IN EATX CONTROLLER

This is an informational DTC letting you know that a DTC(s) is stored in the Transmission Control Module.

Erase this DTC from the PCM after all Transmission DTC(s) have been repaired.

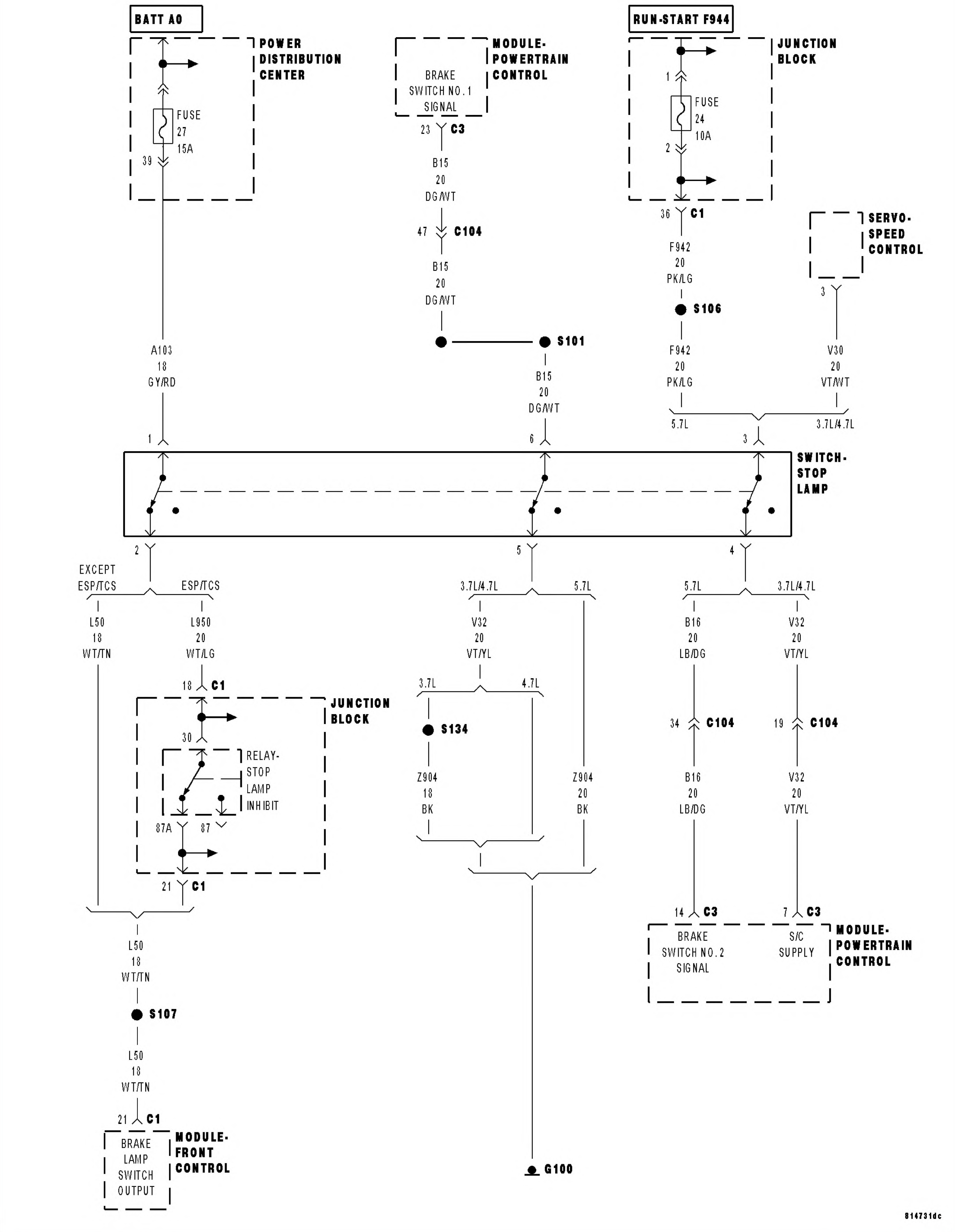
Using a scan tool, read the Transmission Controller DTC and refer to the Transmission Category and perform the appropriate symptom.

PCM Diagnostic Information complete.

Continue

Test Complete.

P0703-BRAKE SWITCH 2 PERFORMANCE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 27 15A
39
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 1 SIGNAL
23 C3
B15 20 DG/WT
47 C104
B15 20 DG/WT
S101
RUN-START F944
JUNCTION BLOCK
1
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
SERVO-SPEED CONTROL
3
V30 20 VT/WT
5.7L
3.7L/4.7L
A103 18 GY/RD
B15 20 DG/WT
1
6
3
SWITCH-STOP LAMP
2
5
4
EXCEPT ESP/TCS
ESP/TCS
L50 18 WT/TN
L950 20 WT/LG
18 C1
JUNCTION BLOCK
30
RELAY-STOP LAMP INHIBIT
87A
87
21 C1
L50 18 WT/TN
S107
L50 18 WT/TN
21 C1
BRAKE LAMP SWITCH OUTPUT
MODULE-FRONT CONTROL
3.7L/4.7L
5.7L
V32 20 VT/YL
3.7L
4.7L
S134
Z904 18 BK
Z904 20 BK
G100
5.7L
3.7L/4.7L
B16 20 LB/DG
V32 20 VT/YL
34 C104
19 C104
B16 20 LB/DG
V32 20 VT/YL
14 C3
7 C3
BRAKE SWITCH NO. 2 SIGNAL
S/C SUPPLY
MODULE-POWERTRAIN CONTROL
814731dc

P0703-BRAKE SWITCH 2 PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes Brake Switch No.2 voltage is not equal to the applied value at the PCM when Brake Switch No.1 is applied. This could be a normal condition. If this condition is seen repeatedly by the PCM the fault is set. Cruise will not work for the rest of the key cycle.

Possible Causes
(F942) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT OPEN
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUITSHORTED TO BATTERY VOLTAGE
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT OPEN
STOP LAMP SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure the Stop Lamp Switch is adjusted properly before continuing.

NOTE: Make sure the Stop Lamp Switch is properly wired, such as (B15) Brake Switch No.1 and (B16) Brake Switch No.2 Signal circuit are not switched at the harness connector.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

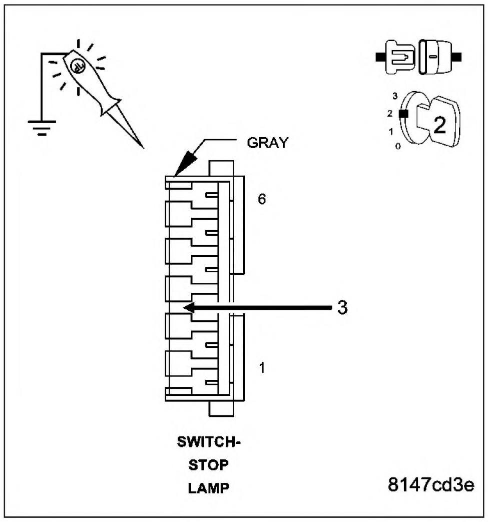
P0703-BRAKE SWITCH 2 PERFORMANCE (CONTINUED)

2. (F942) FUSED IGNITION SWITCH CIRCUIT

Turn the ignition off.

Disconnect the Stop Lamp Switch harness connector.

Using a 12-volt test light connected to ground, probe the (F942) Fused Ignition Switch Output circuit in the Stop Lamp Switch harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (F942) Fused Ignition Switch Output circuit. Inspect the related fuse and repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. STOP LAMP SWITCH

Turn the ignition off.

Measure the resistance between the (F942) Fused Ignition Switch Output circuit terminal and the (B16) Brake Switch No.2 Signal circuit terminal in the Stop Lamp Switch.

Measure the resistance between the (Z904) Ground circuit terminal and the (B15) Brake Switch No.1 Signal terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to open circuit for each circuit check?

Yes >> Go To 4

No >> Replace the Stop Lamp Switch.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

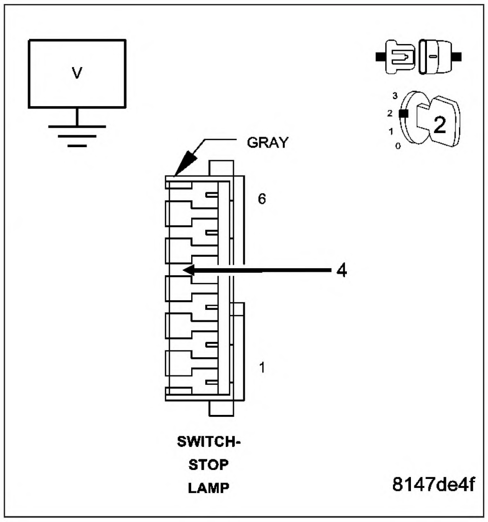
---

4. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

Measure the voltage on the (B16) Brake Switch No.2 Signal circuit in the Stop Lamp Switch harness connector.

Ignition on, engine not running.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (B16) Brake Switch No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

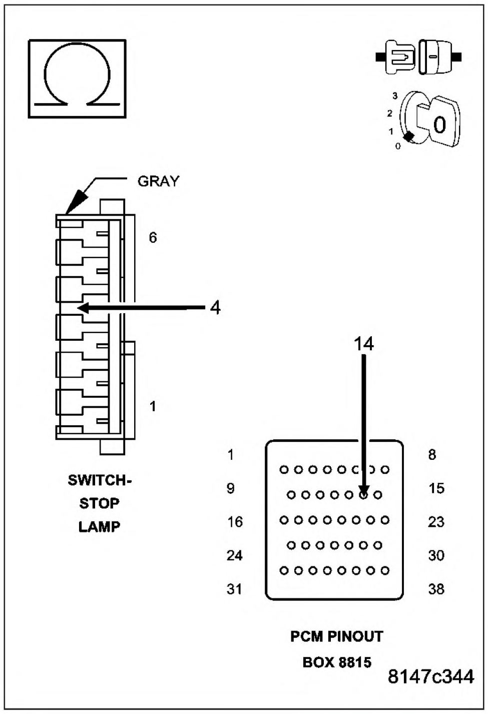
No >> Go To 5

P0703-BRAKE SWITCH 2 PERFORMANCE (CONTINUED)

5. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (B16) Brake Switch No.2 Signal circuit from the Stop Lamp Switch harness connector to the C1 FCM harness connector.


GRAY
6
4
1
SWITCH-
STOP
LAMP
14
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147c344

Is the resistance below 5.0 ohms?

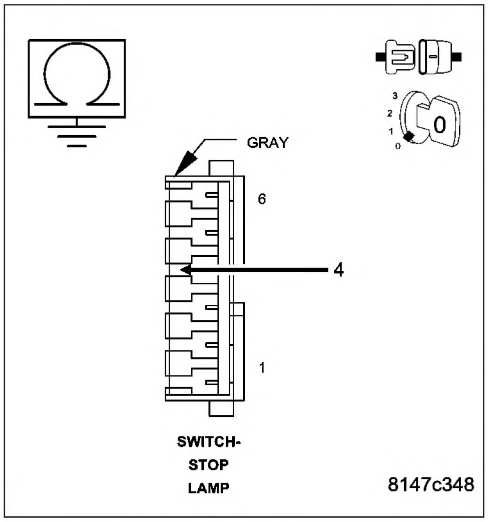
Yes >> Go To 6

No >> Repair the open in the (B16) Brake Switch No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

6. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (B16) Brake Switch No.2 Signal circuit in the Stop Lamp Switch harness connector.


GRAY
6
4
1
SWITCH-
STOP
LAMP
8147c348

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (B16) Brake Switch No.2 Signal circuit.

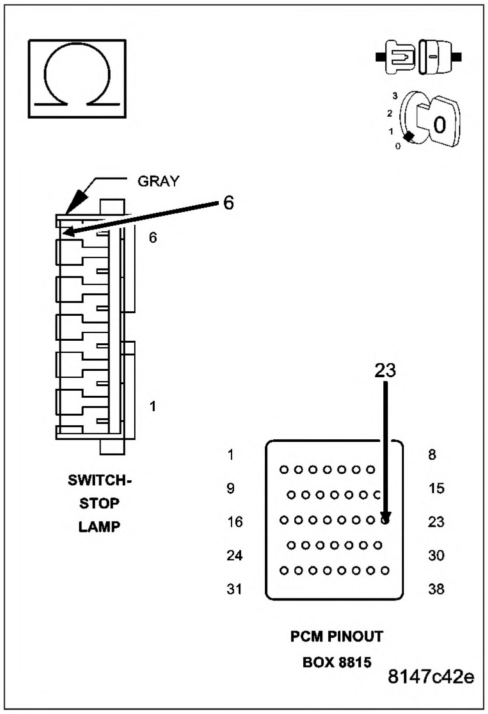
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P0703-BRAKE SWITCH 2 PERFORMANCE (CONTINUED)

7. (B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT OPEN

Measure the resistance of the (B15) Brake Switch No.1 Signal circuit from the Stop Lamp Switch harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 8

No >> Repair the open in the (B15) Brake Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

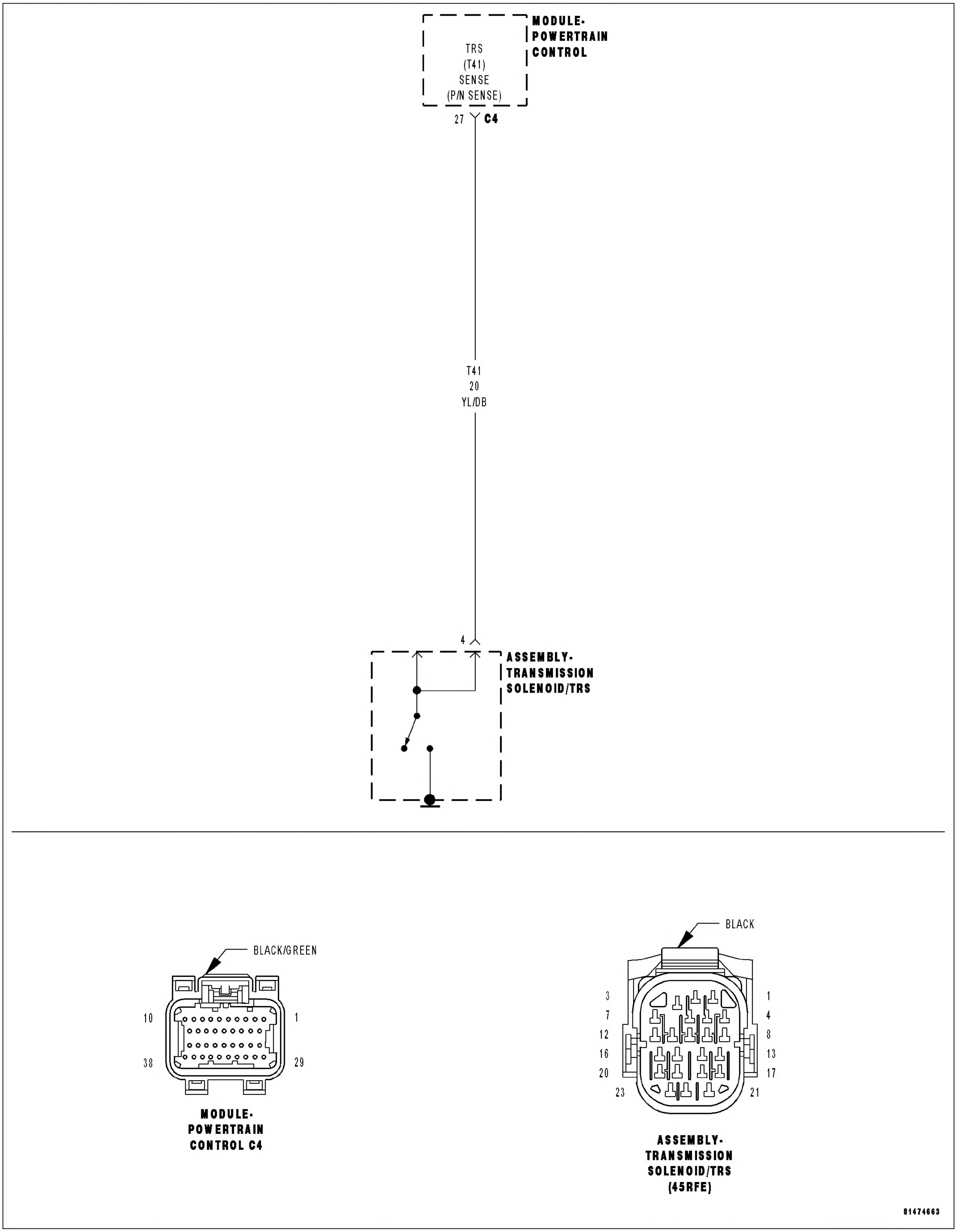
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0850-PARK/NEUTRAL SWITCH PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
TRS
(T41)
SENSE
(P/N SENSE)
27
C4
T41
20
YL/DB
4
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
BLACK/GREEN
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C4
BLACK
3
1
7
4
12
8
16
13
20
17
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(45RFE)
81474663

P0850-PARK/NEUTRAL SWITCH PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The Park Neutral switch rationality test is enabled only for vehicles equipped with a 4/5 speed automatic transmission. This diagnostic checks if the park/neutral switch is incorrectly stuck in the neutral position during driving conditions by comparing Vehicle Speed, Engine Speed, Throttle Position, and Pressure Ratio to the fail thresholds and by looking at the state of the Park/Neutral Switch. The stuck in drive condition is not explicitly checked as the starter relay does not energize and therefore render the vehicle inoperable.

- **When Monitored:**
  Continuously with the transmission in Park, Neutral, or Drive and NOT in Limp-in mode.
- **Set Condition:**
  This code will set if the PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation. One trip fault. Three good trips to turn off the MIL.

Possible Causes
TRS (T41) SENSE (P/N SENSE) CIRCUIT OPEN
TRS (T41) SENSE (P/N SENSE) CIRCUIT SHORTED TO GROUND
TRANSMISSION RANGE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. P/N & D/R NOT IN CORRECT POSITION

NOTE: Check the TCM for DTCs, if P0706 is set in the TCM diagnose the TCM code before continuing.
Ignition on, engine not running.

With the scan tool, read the Park/Neutral Position Switch input state.

While moving the gear selector through all gear positions (Park to 1 and back to Park), monitor the scan tool display.

Did the scan tool display show P/N and D/R in the correct gear positions?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

P0850-PARK/NEUTRAL SWITCH PERFORMANCE (CONTINUED)

2. TRS (T41) SENSE (P/N SENSE) CIRCUIT OPEN

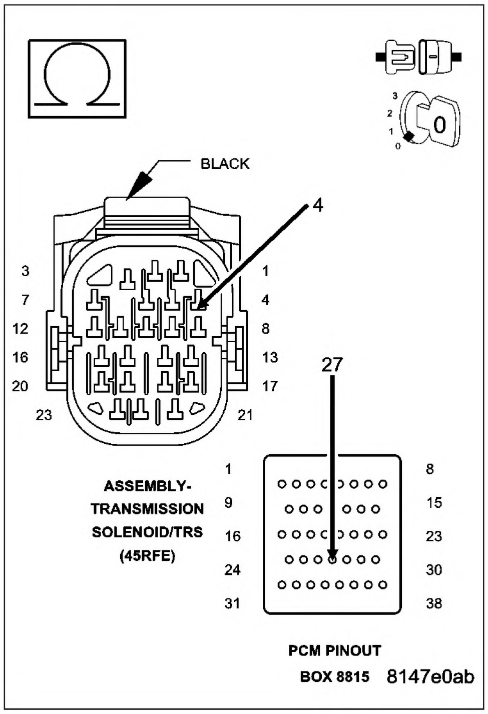
Turn the ignition off.

Disconnect the C3 PCM harness connector.

Disconnect the Transmission Range Sensor harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the TRS (T41) Sense (P/N Sense) circuit from the TRS harness connector to the appropriate terminal of special tool #8815.


BLACK
4
3
7
12
16
20
23
1
4
8
13
17
21
27
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147e0ab

Is the resistance below 5.0 ohms?

Yes >> Go To 3

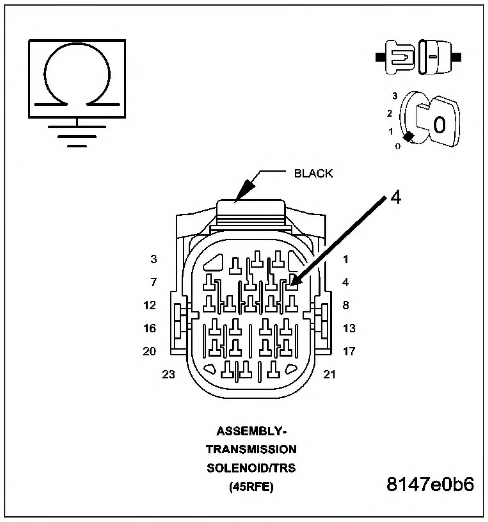
No >> Repair the open in the TRS (T41) Sense (P/N Sense) circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. TRS (T41) SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the TRS (T41) Sense (P/N Sense) circuit at the TRS harness connector.


BLACK
4
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
8147e0b6

Is the resistance above 100k ohms?

Yes >> Go To 4

No >> Repair the short to ground in the TRS (T41) Sense (P/N Sense) circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P0850-PARK/NEUTRAL SWITCH PERFORMANCE (CONTINUED)

4. TRANSMISSION RANGE SENSOR

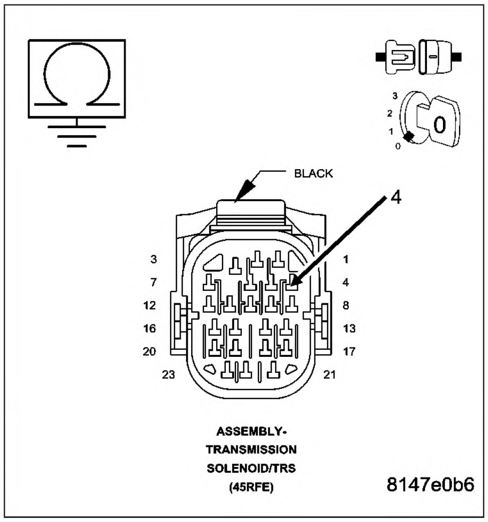
Measure the resistance between ground and the (T41) TRS Sense (P/N Sense) circuit while moving the gear selector through each gear in the TRS connector.

NOTE: The circuit is grounded in Park and Neutral and open in the other positions.

Did the resistance change from above 100 kohms (open) to below 10.0 ohms (grounded)?

Yes >> Go To 5

No >> Replace the Transmission Range Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

5. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

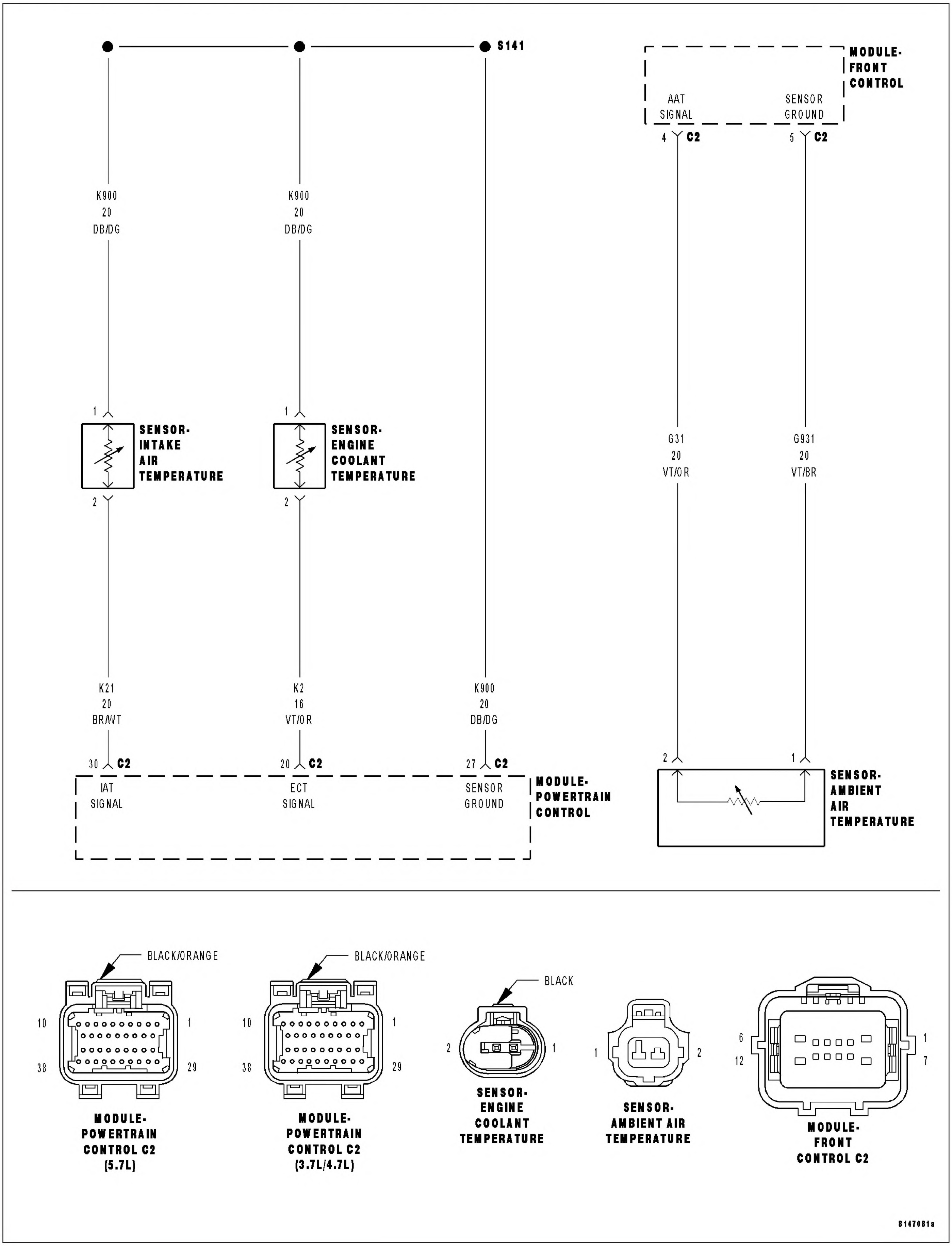
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1115-GENERAL TEMPERATURE RATIONALITY


S141
MODULE-
FRONT
CONTROL
AAT
SIGNAL
SENSOR
GROUND
4 C2
5 C2
K900
20
DB/DG
K900
20
DB/DG
1
SENSOR-
INTAKE
AIR
TEMPERATURE
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
2
G31
20
VT/OR
G931
20
VT/BR
K21
20
BR/WT
K2
16
VT/OR
K900
20
DB/DG
30 C2
20 C2
27 C2
IAT
SIGNAL
ECT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
2
1
SENSOR-
AMBIENT
AIR
TEMPERATURE
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
1
2
SENSOR-
AMBIENT AIR
TEMPERATURE
6
12
1
7
MODULE-
FRONT
CONTROL C2
8147081a

P1115-GENERAL TEMPERATURE RATIONALITY (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The General Temperature Rationality looks at the outputs of the three temperature sensors and compare them under cold start conditions. Following a start to run delay time, the outputs of the ambient, engine coolant, and intake air temperature sensors will be compared. If two sensors agree but not the third, the third sensor is declared as irrational. If all three sensors are irrational the General Temperature Sensor Rationality is failed.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  Ambient Air, Engine Coolant, and Intake Air Temp sensor inputs are compared under cold start conditions. After start up the temp readings are monitored. If two of the three readings agree and the third doesn't, a DTC is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXCESSIVE RESISTANCE IN THE SENSOR SIGNAL CIRCUIT
EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
TEMPERATURE SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read the DTCs.

NOTE: All ECT, Intake Air, and Ambient Air Temperature Sensor codes must be diagnosed and repaired before continuing.

NOTE: In cold weather, this DTC could be set by a high powered block heater and no repair would be required.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. TEMPERATURE SENSOR CIRCUIT

With a scan tool, read the ECT, Ambient Air Temp, and Intake Air Temp Sensor temp values.

Start the engine.

Allow the engine to reach normal operating temperature while monitoring the three Sensor temperature values.

Is the temperature for each of the Sensors increasing properly?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P1115-GENERAL TEMPERATURE RATIONALITY (CONTINUED)

3. TEMPERATURE SENSOR

Ignition on, engine not running.

Disconnect the suspected faulty sensor.

Connect a jumper wire between the Sensor Signal circuit and the (K900) Sensor ground circuit.

With the scan tool, read the voltage of the suspected Sensor.

Did the voltage reading start at 4.8 to 5.0 volts and decrease to 0 volts when the jumper wire was installed?

Yes >> Replace the Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.

---

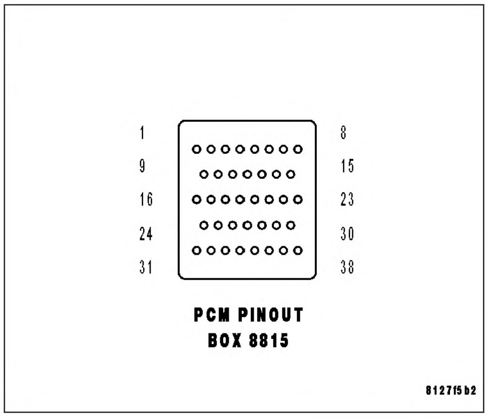
4. EXCESSIVE RESISTANCE IN THE TEMPERATURE SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the Sensor Signal circuit from the Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance above 5.0 ohms.

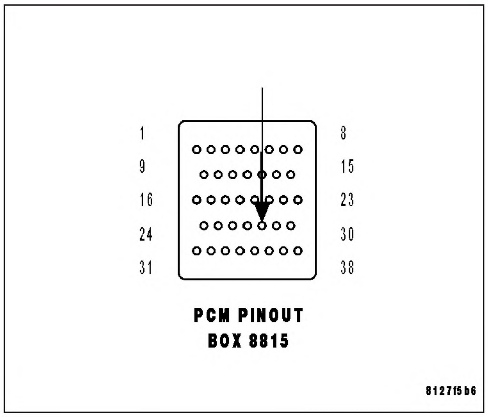
Yes >> Repair the excessive resistance in the Temperature Sensor Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor ground circuit from the Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance above 5.0 ohms.

Yes >> Repair the excessive resistance in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P1115-GENERAL TEMPERATURE RATIONALITY (CONTINUED)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

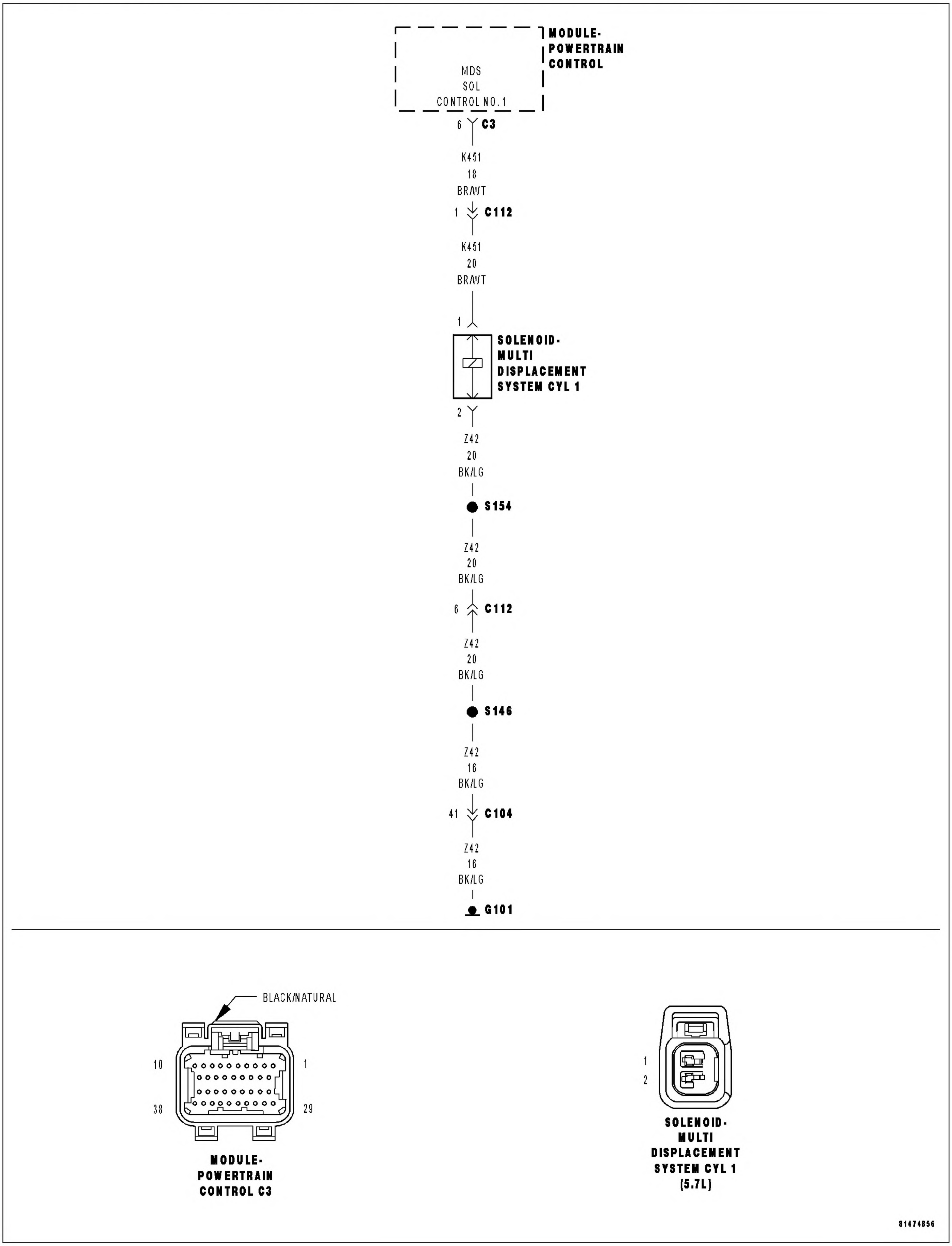
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1411–CYLINDER 1 REACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 1
6
C3
K451
18
BR/WT
1
C112
K451
20
BR/WT
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
(5.7L)
81474856

P1411–CYLINDER 1 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to active and take place for cylinder 1.

Possible Causes
(K451) MDS SOLENOID NO.1 CONTROL SHORT TO GROUND
(K451) MDS SOLENOID NO.1 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
INSUFFICENT OIL PRESSURE ACTING ON THE LIFTER LOCKING PINS
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.1
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1411–CYLINDER 1 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

2. MDS SOLENOID NO.1

Turn the ignition off.

Gain access to the MDS Solenoid No.1.

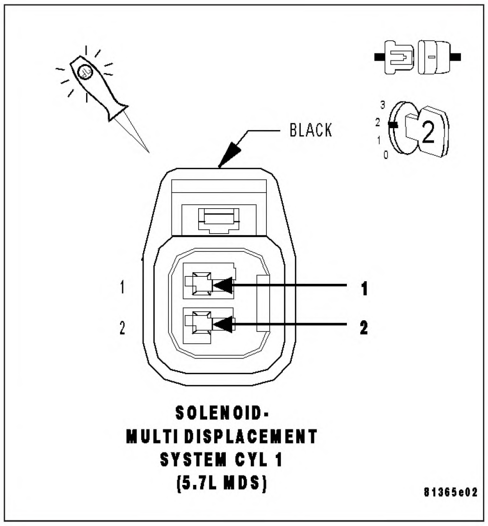
Disconnect the MDS Solenoid No.1 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) Ground circuit, probe the (K451) MDS Solenoid No.1 Control circuit.

With a scan tool, actuate the MDS Solenoid 1.


BLACK
3
2
1
0
2
1
2
1
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365e02

Does the 12-volt test light flash on and off?

Yes >> Go To 7

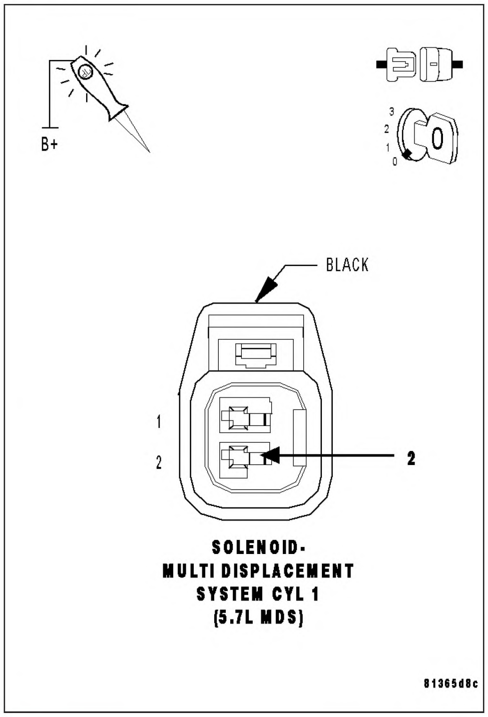
No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.1 harness connector.


B+
3
2
1
0
0
BLACK
1
2
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365d8c

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.

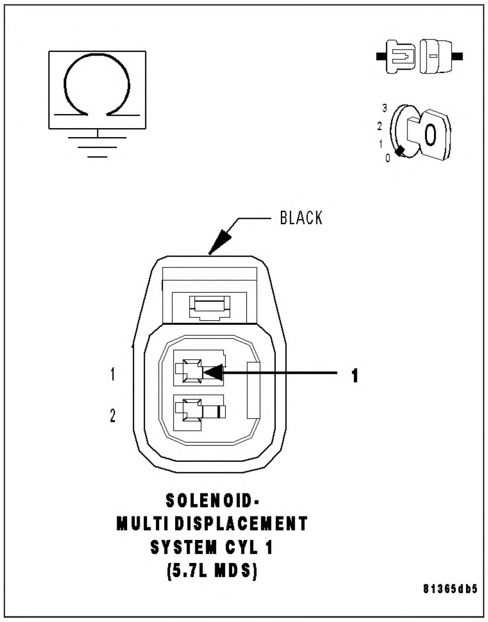
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1411–CYLINDER 1 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

4. (K451) MDS SOLENOID NO.1 CONTROL CIRCUIT SHORTED TO GROUND

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K451) MDS Solenoid No.1Control circuit in the MDS Solenoid No.1 harness connector.


BLACK
1
2
1
3
2
1
0
0
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365db5

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K451) MDS Solenoid No.1 Control circuit.

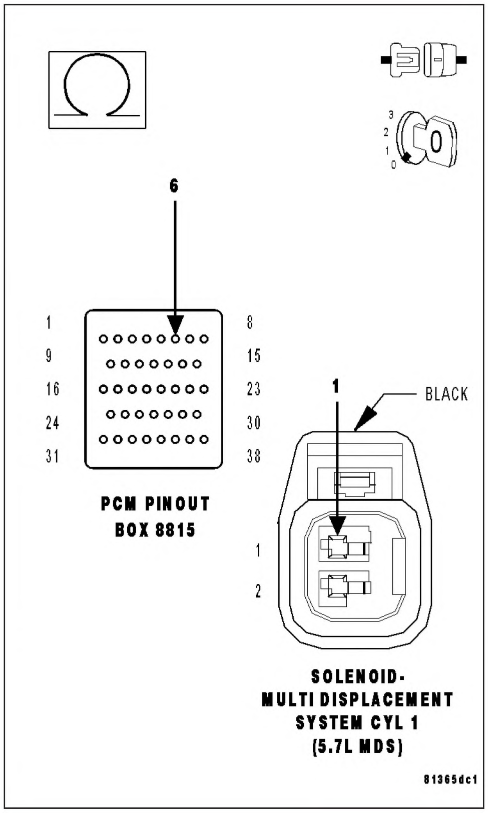
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

5. (K451) MDS SOLENOID NO.1 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K451) MDS Solenoid No.1 Control circuit from the MDS Solenoid No.1 harness connector to the appropriate terminal of special tool #8815.


6
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
1
BLACK
1
2
3
2
1
0
0
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365dc1

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K451) MDS Solenoid No.1 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1411–CYLINDER 1 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. MDS SOLENOID 1

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Reconnect the Solenoid connector.

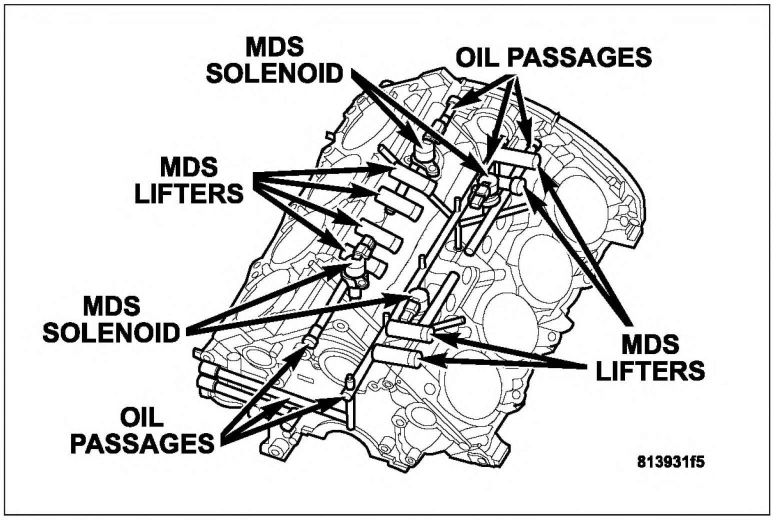
Turn the ignition on.

With the scan tool actuate the MDS Solenoid 1.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 8

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 1. If the passages are not clogged with debris, replace the MDS Solenoid 1.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

8. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 1 of the engine block.

Remove the Bank 1 Cylinder Head per Service Information.

Remove the Lifters from the left engine bank.

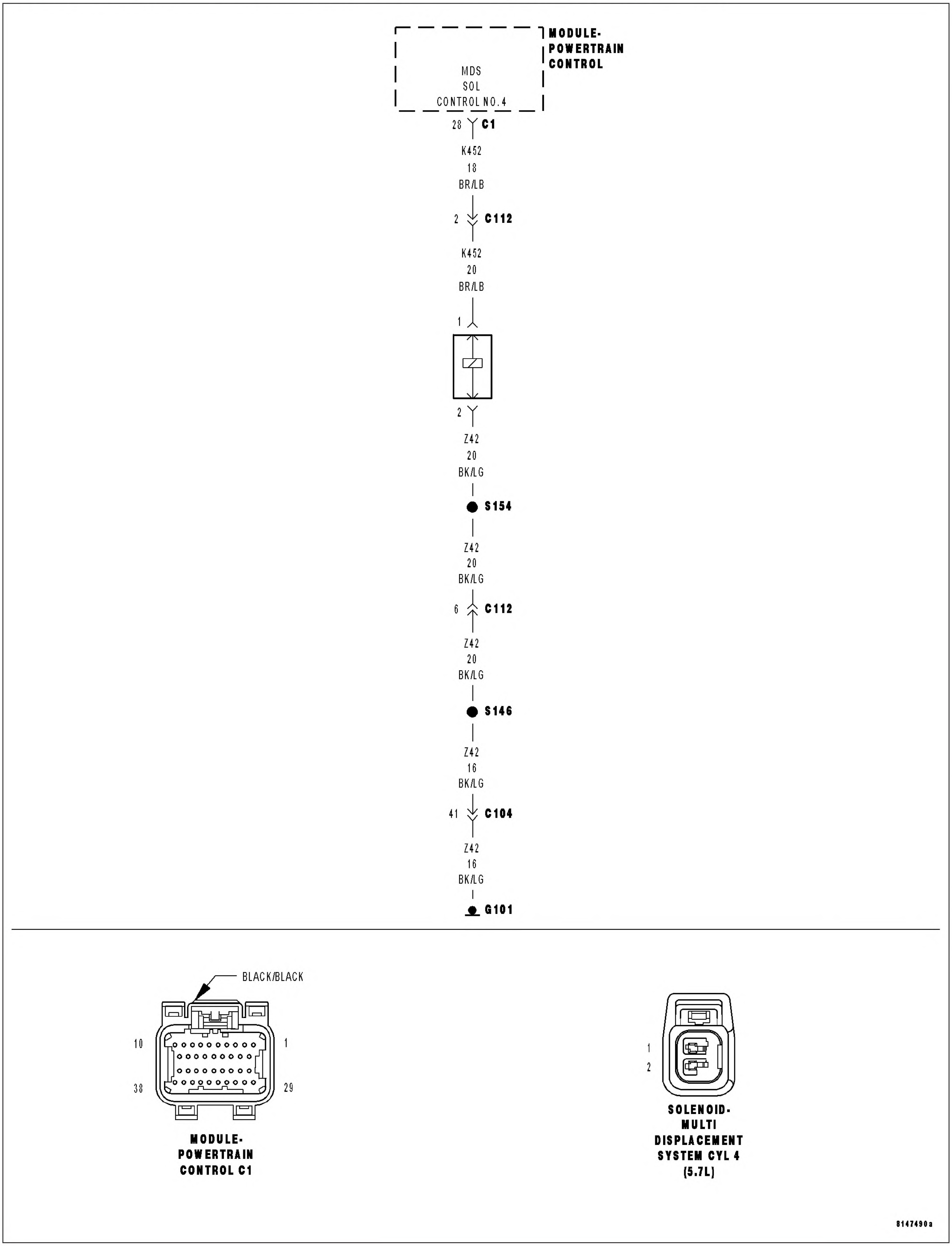
Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1414–CYLINDER 4 REACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO.4
28
C1
K452
18
BR/LB
2
C112
K452
20
BR/LB
1
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 4
(5.7L)
8147490a

P1414–CYLINDER 4 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to active and take place for cylinder 4.

Possible Causes
(K452) MDS SOLENOID NO.4 CONTROL SHORT TO GROUND
(K452) MDS SOLENOID NO.4 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
INSUFFICENT OIL PRESSURE ACTING ON THE LIFTER LOCKING PINS
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.4
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1414–CYLINDER 4 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

2. MDS SOLENOID NO.4

Turn the ignition off.

Gain access to the MDS Solenoid No.4.

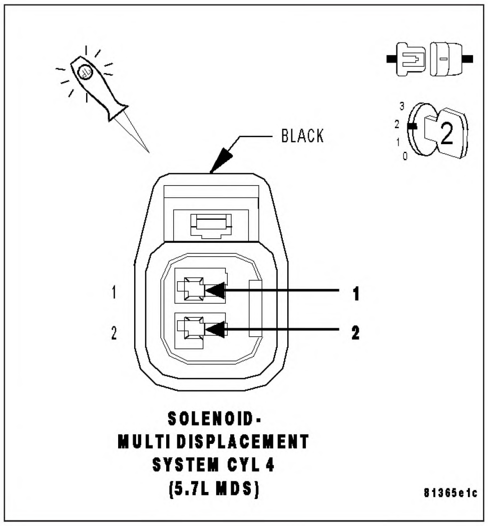
Disconnect the MDS Solenoid No.4 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) Ground circuit, probe the (K452) MDS Solenoid No.4 Control circuit.

With a scan tool, actuate the MDS Solenoid 4.


BLACK
3
2
1
0
2
1
2
1
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e1c

Does the 12-volt test light flash on and off?

Yes >> Go To 7

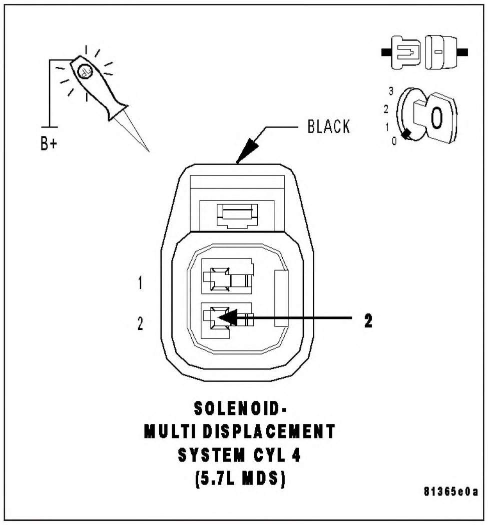
No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.4 harness connector.


B+
BLACK
3
2
1
0
0
1
2
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e0a

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

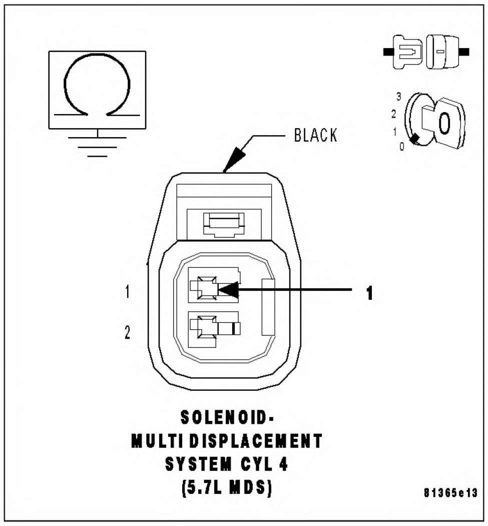
P1414–CYLINDER 4 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

4. (K452) MDS SOLENOID NO.4 CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (K452) MDS Solenoid No.4 Control circuit in the MDS Solenoid No.4 harness connector.


BLACK
1
2
1
3
2
1
0
0
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e13

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K452) MDS Solenoid No.4 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

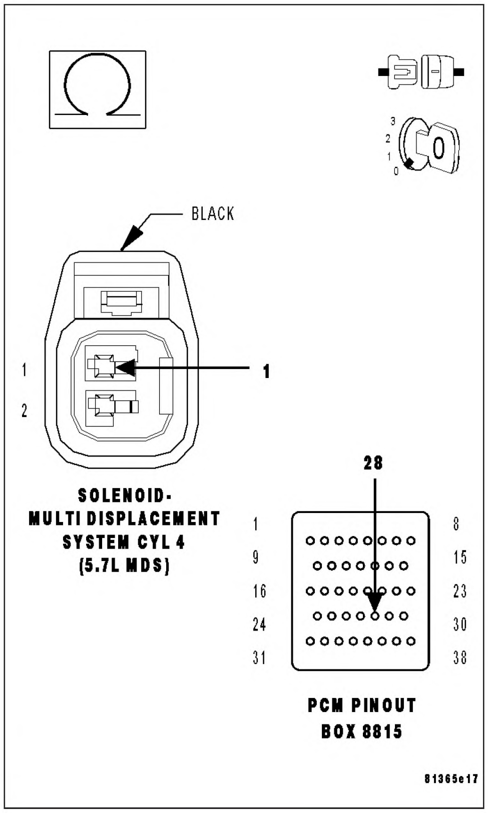
No >> Go To 5

---

5. (K452) MDS SOLENOID NO.4 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K452) MDS Solenoid No.4 Control circuit from the MDS Solenoid No.4 harness connector to the appropriate terminal of special tool #8815.


BLACK
1
2
1
3
2
1
0
0
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
28
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
81365e17

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K452) MDS Solenoid No.4 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1414–CYLINDER 4 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. MDS SOLENOID 4

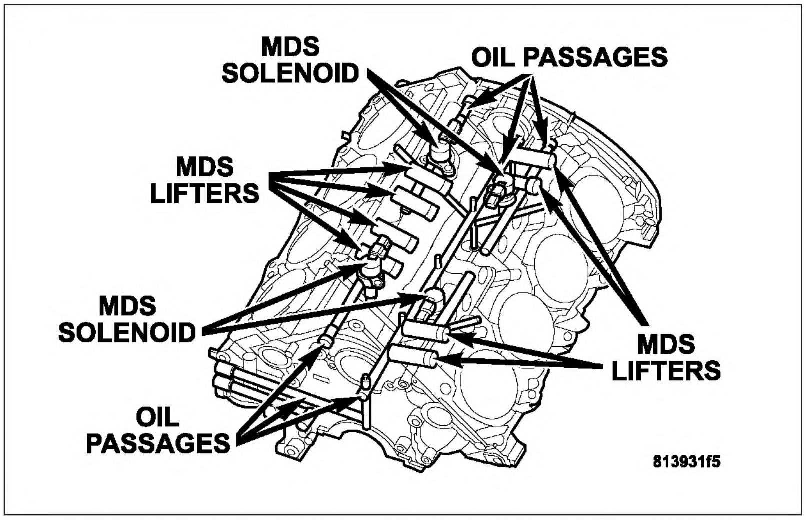
Turn the ignition off.

Remove the Intake Manifold per Service Information.

Reconnect the Solenoid harness connector.

Turn the ignition on.

With the scan tool actuate the MDS Solenoid 4.



Can you feel and hear the Solenoid Actuating?

Yes >> Go To 8

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 4. If the passages are not clogged with debris, replace the MDS Solenoid 4.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 2 of the engine block.

Remove the Bank 2 Cylinder Head per Service Information.

Remove the Lifters from the right engine bank.

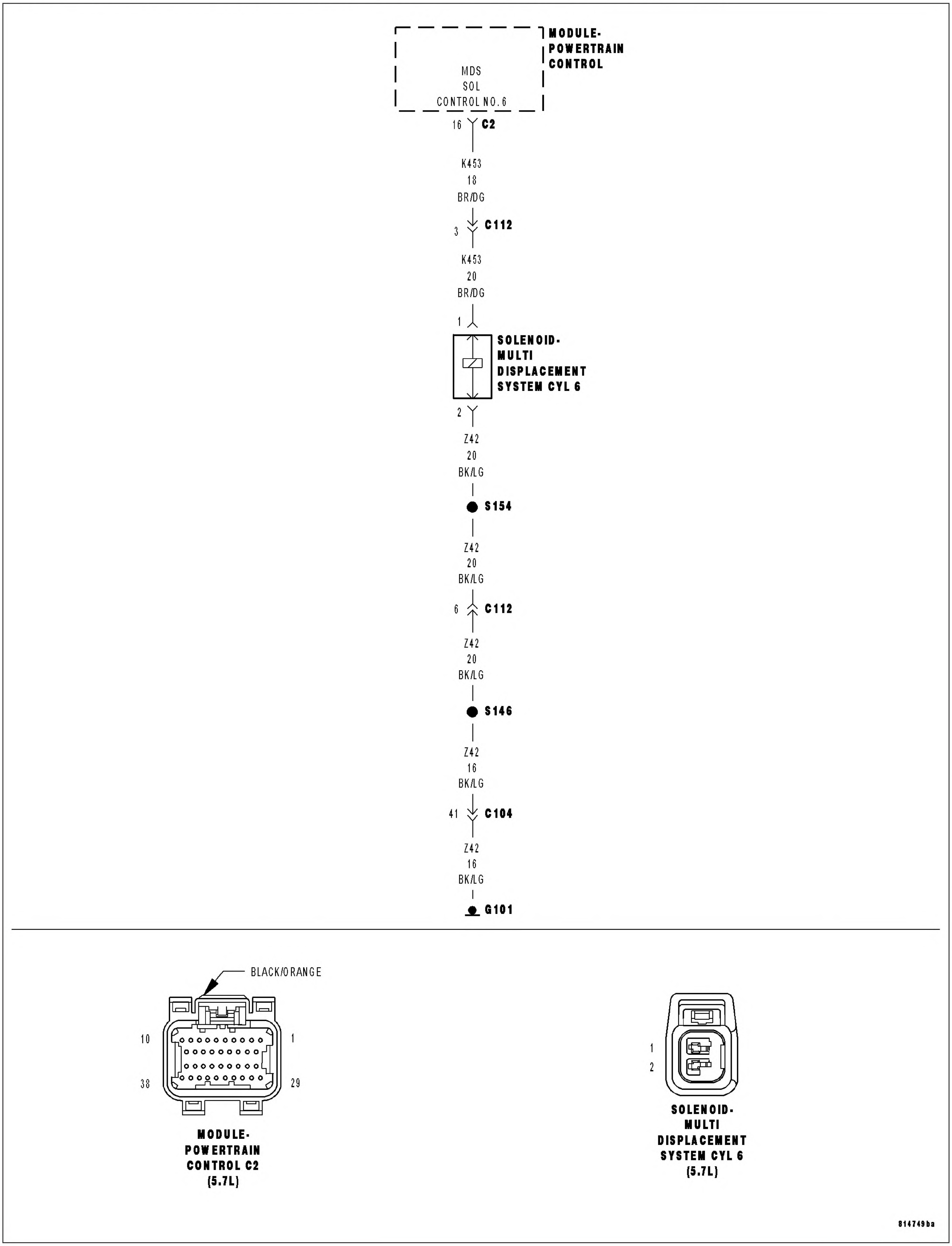
Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1416–CYLINDER 6 REACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 6
16
C2
K453
18
BR/DG
3
C112
K453
20
BR/DG
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
(5.7L)
814749ba

P1416–CYLINDER 6 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to active and take place for cylinder 6.

Possible Causes
(K453) MDS SOLENOID NO.6 CONTROL SHORT TO GROUND
(K453) MDS SOLENOID NO.6 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
INSUFFICENT OIL PRESSURE ACTING ON THE LIFTER LOCKING PINS
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.6
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1416–CYLINDER 6 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

2. MDS SOLENOID NO.6

Turn the ignition off.

Gain access to the MDS Solenoid No.6.

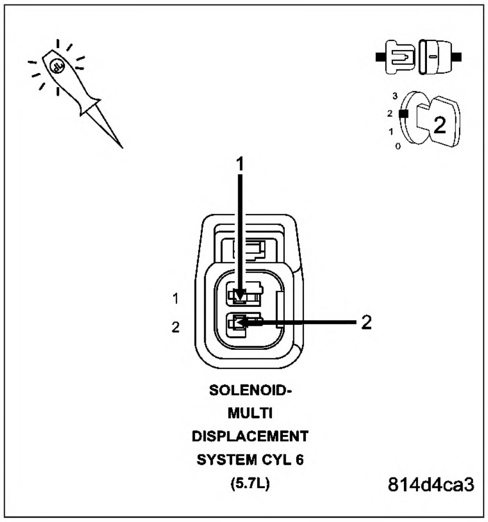
Disconnect the MDS Solenoid No.6 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) Ground circuit, probe the (K453) MDS Solenoid No.6 Control circuit.

With a scan tool, actuate the MDS Solenoid 6.


1
1
2
2
2
3
2
1
0
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
(5.7L)
814d4ca3

Does the 12-volt test light flash on and off?

Yes >> Go To 7

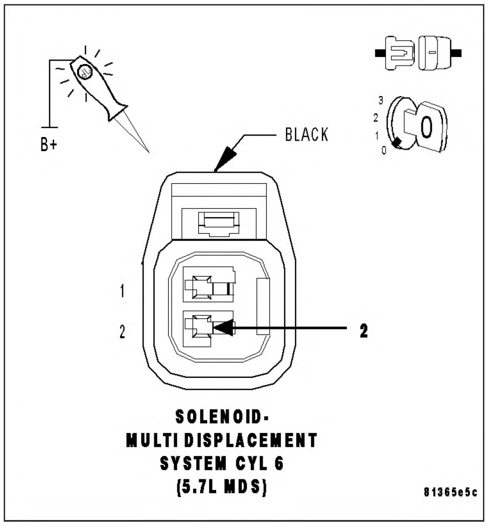
No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.6 harness connector.


B+
BLACK
3
2
1
0
0
1
2
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
81365e5c

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

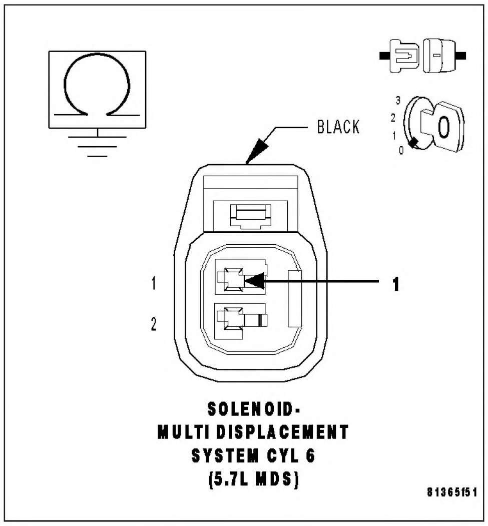
P1416–CYLINDER 6 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

4. (K453) MDS SOLENOID NO.6 CONTROL CIRCUIT SHORTED TO GROUND

Disconnect the C2 PCM harness connector.

Turn the ignition off.

Measure the resistance between ground and the (K453) MDS Solenoid No.6 Control circuit in the MDS Solenoid No.6 harness connector.


BLACK
3
2
1
0
0
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
81365f51

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K453) MDS Solenoid No.6 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

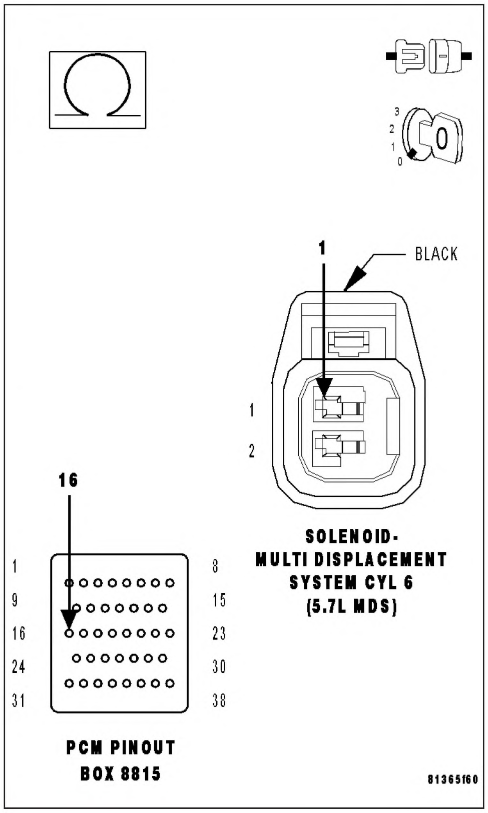
No >> Go To 5

---

5. (K453) MDS SOLENOID NO.6 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K453) MDS Solenoid No.6 Control circuit from the MDS Solenoid No.6 harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
1
BLACK
1
2
16
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
81365f60

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K453) MDS Solenoid No.6 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1416–CYLINDER 6 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. MDS SOLENOID 6

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Reconnect the Solenoid connector.

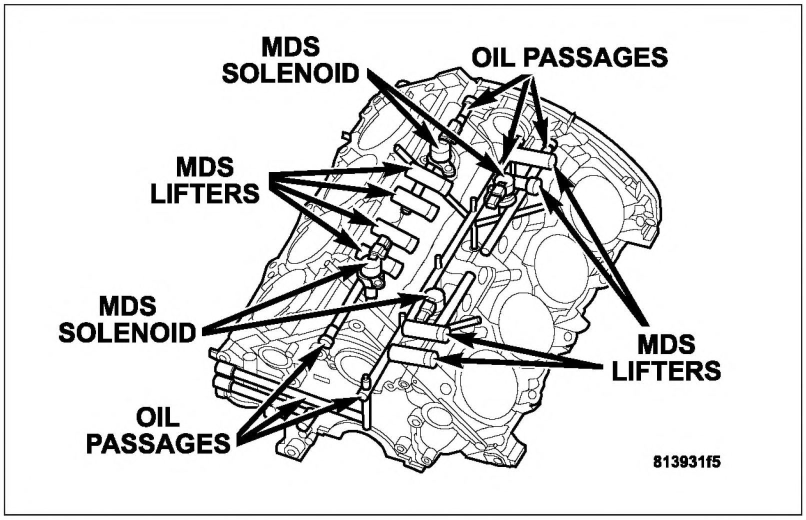
Turn the ignition on.

With the scan tool actuate the MDS Solenoid 6.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 8

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 6. If the passages are not clogged with debris, replace the MDS Solenoid 6.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

8. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 2 of the engine block.

Remove the Bank 2 Cylinder Head per Service Information.

Remove the Lifters from the right engine bank.

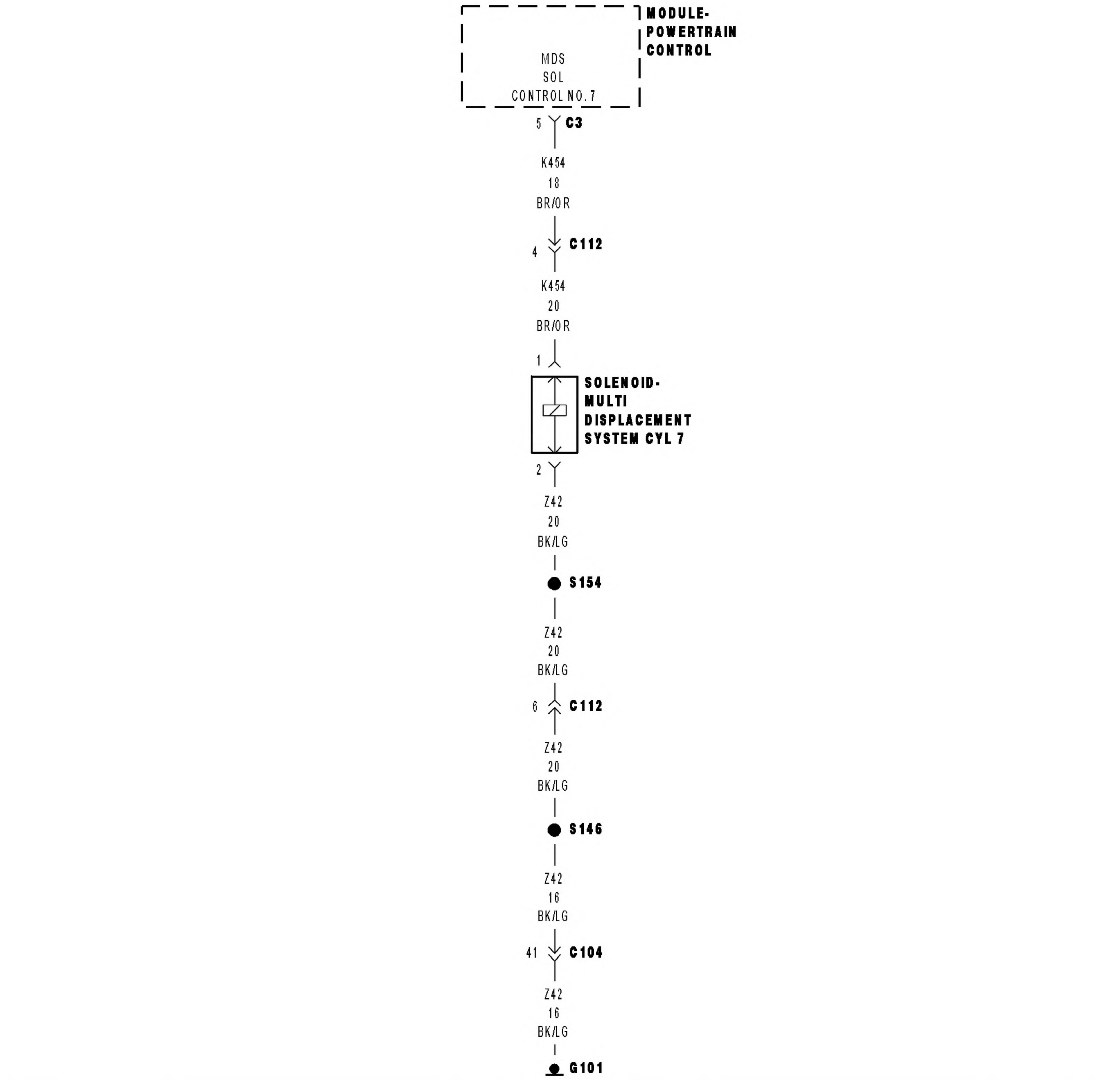
Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

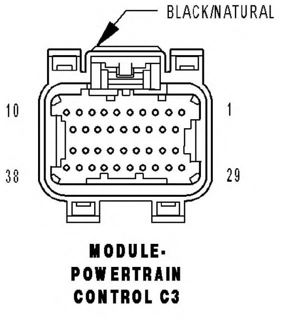
Are the passages blocked?

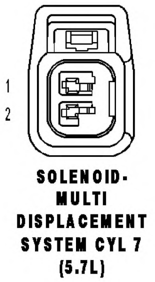
Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1417–CYLINDER 7 REACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO.7
5
C3
K454
18
BR/OR
4
C112
K454
20
BR/OR
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101


BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3


1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
(5.7L)

81474a35

P1417–CYLINDER 7 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to active and take place for cylinder 7.

Possible Causes
(K454) MDS SOLENOID NO.7 CONTROL SHORT TO GROUND
(K454) MDS SOLENOID NO.7 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
INSUFFICENT OIL PRESSURE ACTING ON THE LIFTER LOCKING PINS
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.7
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1417–CYLINDER 7 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

2. MDS SOLENOID NO.7

Turn the ignition off.

Gain access to the MDS Solenoid No.7.

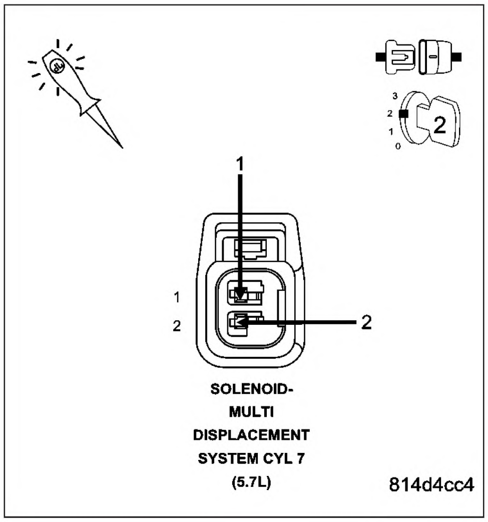
Disconnect the MDS Solenoid No.7 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z904) Ground circuit, probe the (K454) MDS Solenoid No.7 Control circuit.

With a scan tool, actuate the MDS Solenoid 7.


1
1
2
2
3
2
1
0
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
(5.7L)
814d4cc4

Does the 12-volt test light flash on and off?

Yes >> Go To 7

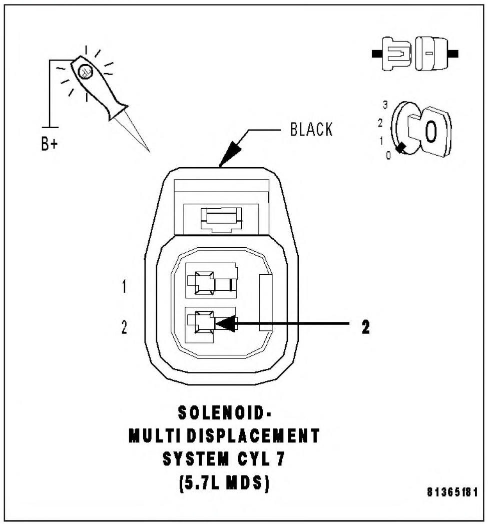
No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.7 harness connector.


B+
BLACK
3
2
1
0
0
1
2
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
81365f81

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

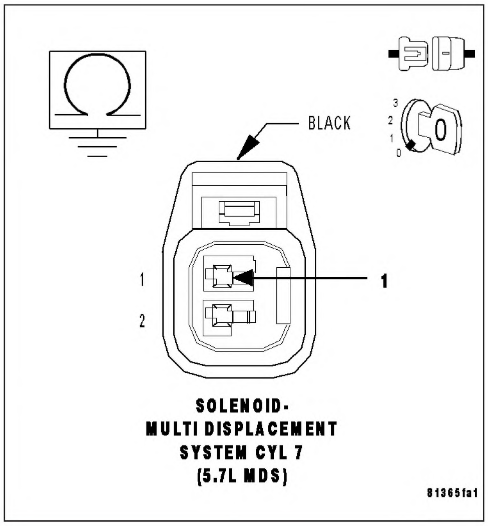
P1417–CYLINDER 7 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

4. (K454) MDS SOLENOID NO.7 CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K454) MDS Solenoid No.7 Control circuit in the MDS Solenoid No.7 harness connector.


BLACK
3
2
1
0
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
81365fa1

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K454) MDS Solenoid No.7 Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

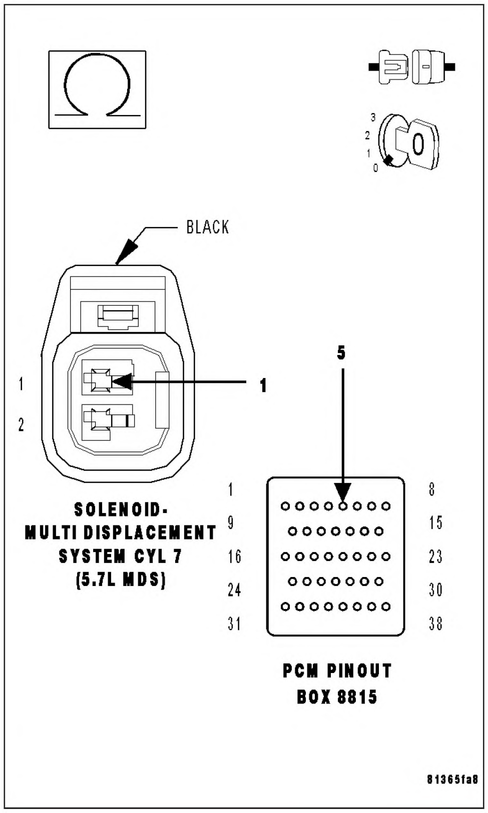
No >> Go To 5

---

5. (K454) MDS SOLENOID NO.7 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K454) MDS Solenoid No.7 Control circuit from the MDS Solenoid No.7 harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
BLACK
1
2
1
5
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
81365fa8

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K454) MDS Solenoid No.7 Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1417–CYLINDER 7 REACTIVATION CONTROL PERFORMANCE (CONTINUED)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. MDS SOLENOID 7

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Reconnect the Solenoid harness connector.

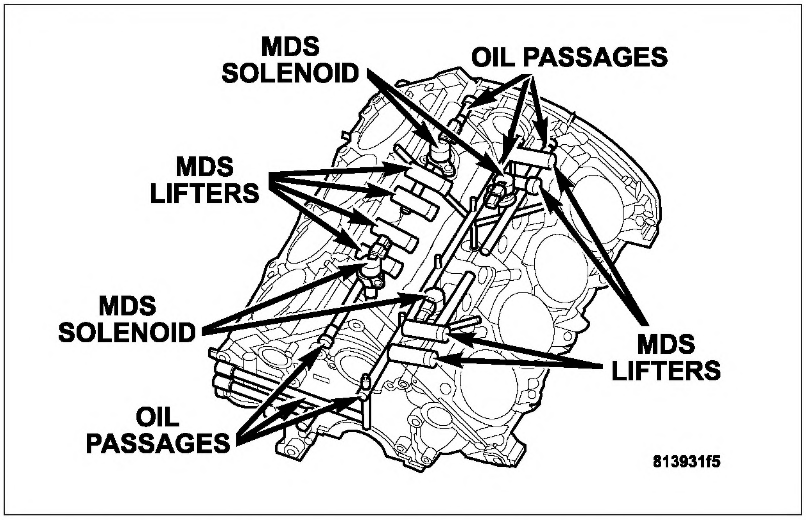
Turn the ignition on.

With the scan tool actuate the MDS Solenoid 7.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 8

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 7. If the passages are not clogged with debris, replace the MDS Solenoid 7.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

8. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 1 of the engine block.

Remove the Bank 1 Cylinder Head per Service Information.

Remove the Lifters from the left engine bank.

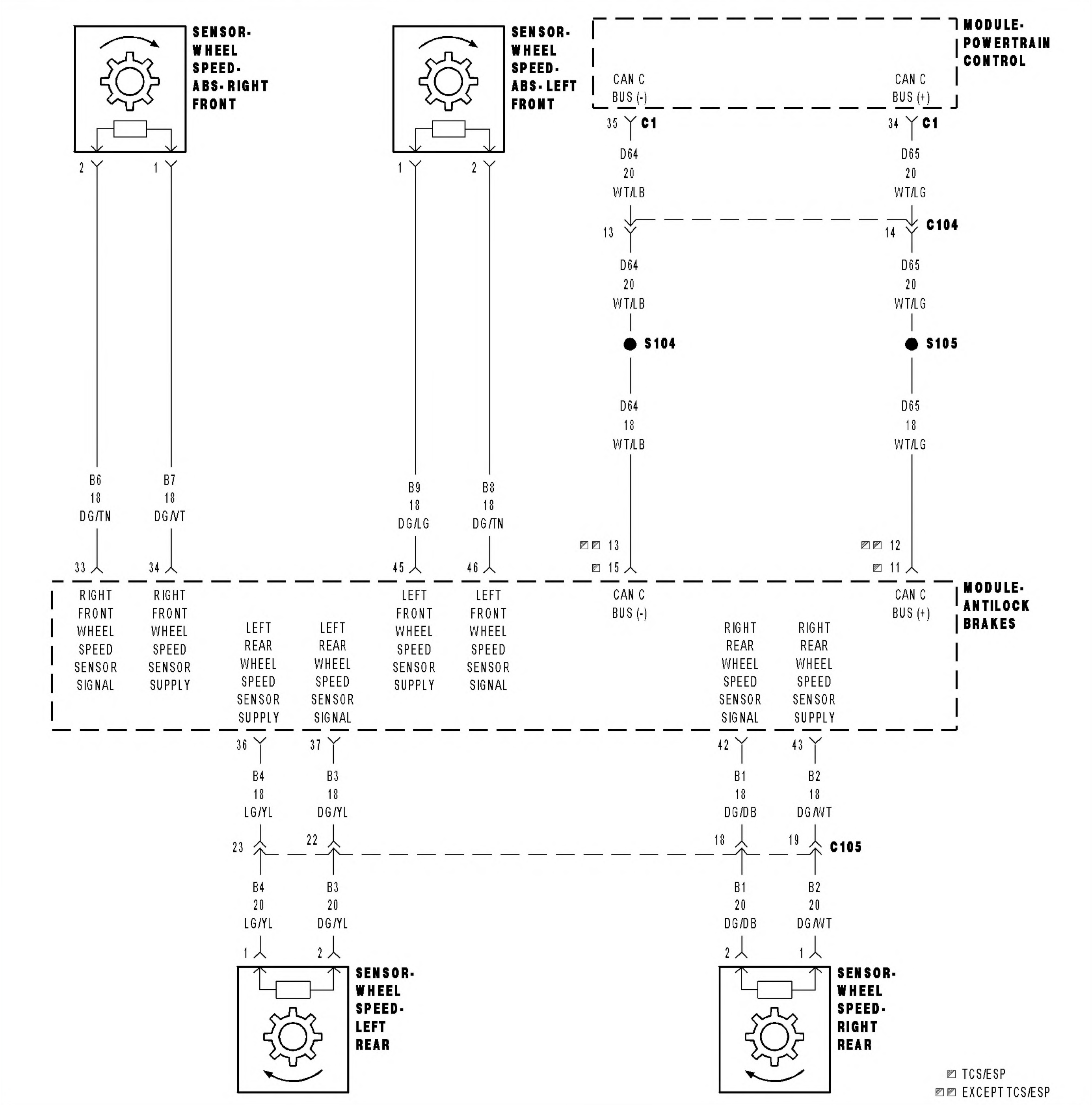
Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

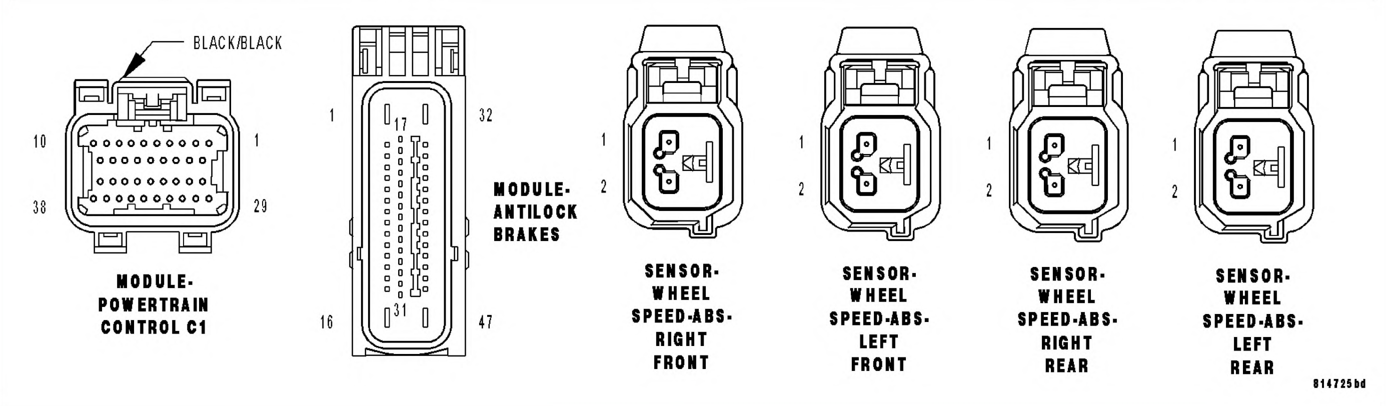
Are the passages blocked?

Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1501-VEHICLE SPEED SENSOR 1/2 CORRELATION - DRIVE WHEELS


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14 C104
S104
S105
D64 18 WT/LB
D65 18 WT/LG
2
1
1
2
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19 C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

P1501-VEHICLE SPEED SENSOR 1/2 CORRELATION - DRIVE WHEELS (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and vehicle moving. Cruise is learned and customer is trying to use the Cruise.
- **Set Condition:**
  The PCM recognizes rear wheel speed is greater than front wheel speed.

Possible Causes
ACTIVE BUS OR COMMUNICATION DTCS
TIRE CIRCUMFERENCE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: Check for any Bus Communication DTCs. If no Bus Communication DTCs are set, check for active DTCs stored in the Ant-Lock Brake Module. Any Bus Communication DTCs or VSS DTCs in the Ant-Lock Brake Module must be properly diagnosed before continuing.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. VISUAL INSPECTION

NOTE: This code can set due to tire circumference differences and from the front or rear wheels being on a slippery surface while the opposite tires are not.

This code may also set on a hard acceleration on loose gravel or during other off road driving conditions.

Check tire pressure of all the tires.

Check tire wear on all the tires.

Ask the customer what the road and driving conditions were like when the fault set.

Were any problems found?

Yes >> Repair as necessary. If the code set during a front OR rear wheel spin condition, no repair is necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P1501-VEHICLE SPEED SENSOR 1/2 CORRELATION - DRIVE WHEELS (CONTINUED)

3. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

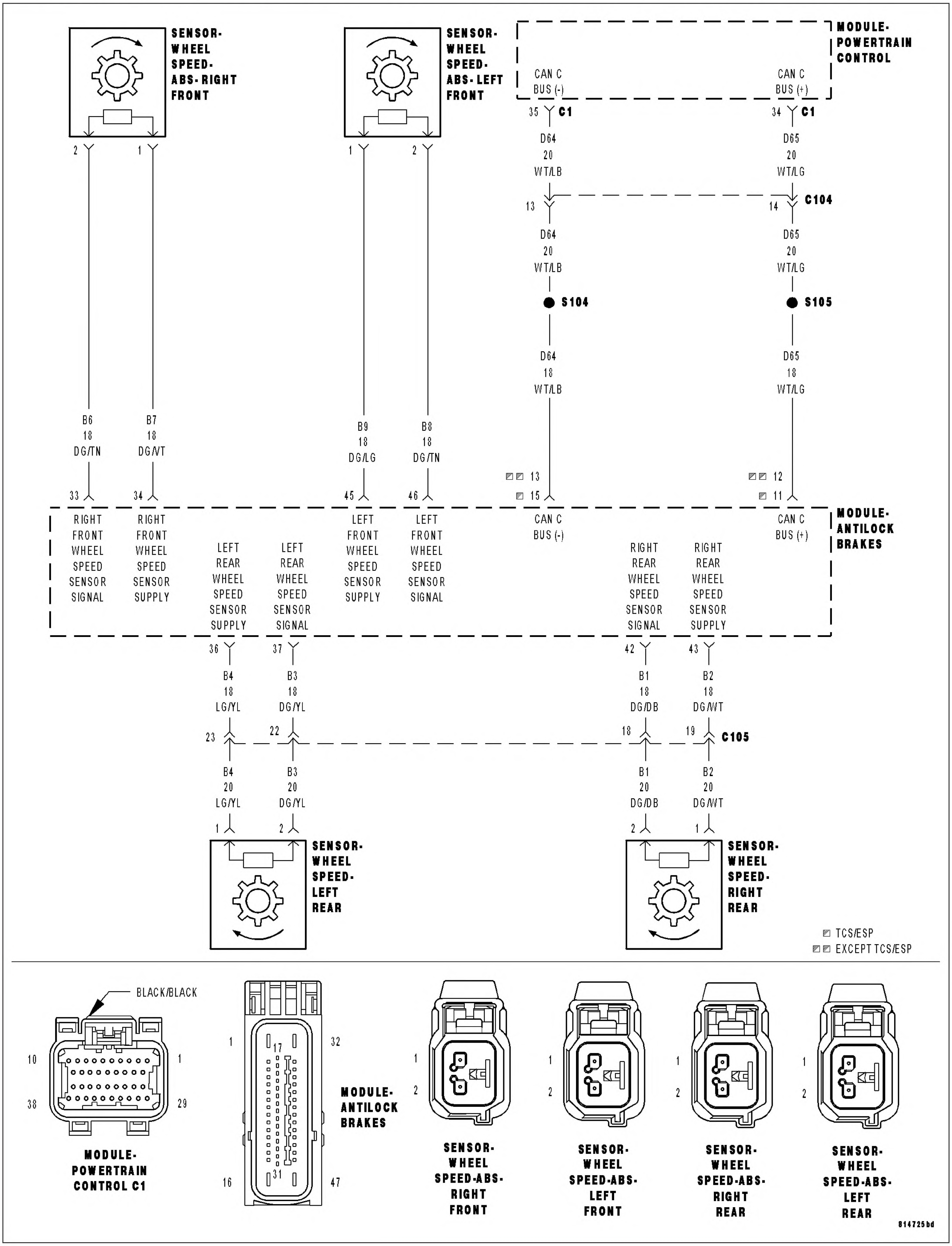
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1502-VEHICLE SPEED SENSOR 1/2 CORRELATION - NON DRIVE WHEELS


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14 C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
2
1
1
2
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19 C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

P1502-VEHICLE SPEED SENSOR 1/2 CORRELATION - NON DRIVE WHEELS (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and vehicle moving. Brake pedal must not be applied.
- **Set Condition:**
  The PCM recognizes front axle speed is greater than rear axle speed.

Possible Causes
ACTIVE BUS OR COMMUNICATION DTCS
TIRE CIRCUMFERENCE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: Check for any Bus Communication DTCs. If no Bus Communication DTCs are set, check for active DTCs stored in the Ant-Lock Brake Module. Any Bus Communication DTCs or VSS DTCs in the Ant-Lock Brake Module must be properly diagnosed before continuing.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. VISUAL INSPECTION

NOTE: This code can set due to tire circumference differences and from the front or rear wheels being on a slippery surface while the opposite tires are not.

This code may also set on a hard acceleration on loose gravel or during other off road driving conditions.

Check tire pressure of all the tires.

Check tire wear on all the tires.

Ask the customer what the road and driving conditions were like when the fault set.

Were any problems found?

Yes >> Repair as necessary. If the code set during a front OR rear wheel spin condition, no repair is necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P1502-VEHICLE SPEED SENSOR 1/2 CORRELATION - NON DRIVE WHEELS (CONTINUED)

3. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

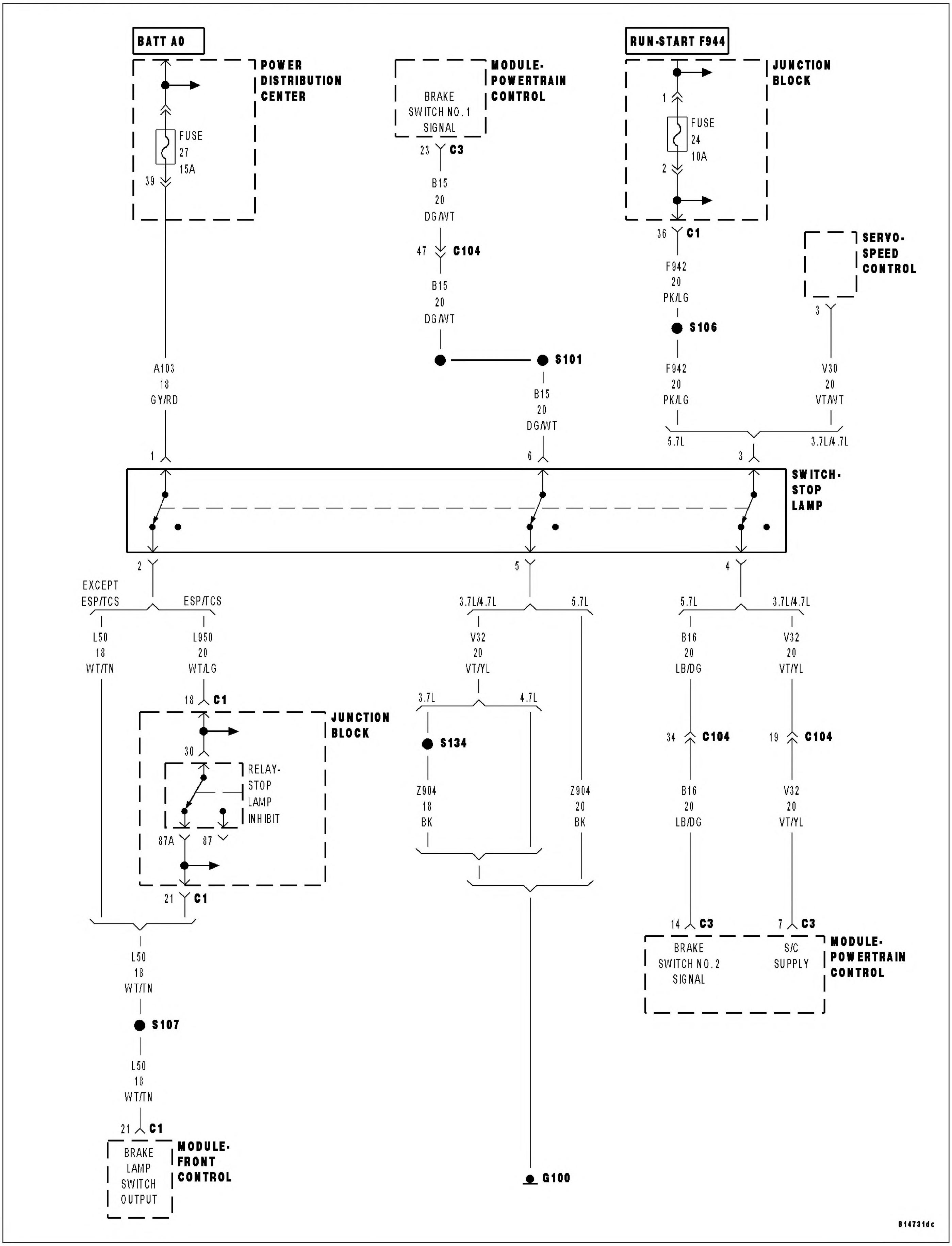
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1572-BRAKE PEDAL STUCK ON


BATT A0
POWER DISTRIBUTION CENTER
FUSE 27 15A
39
A103 18 GY/RD
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 1 SIGNAL
23 C3
B15 20 DG/WT
47 C104
B15 20 DG/WT
S101
B15 20 DG/WT
RUN-START F944
JUNCTION BLOCK
1
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
SERVO-SPEED CONTROL
3
V30 20 VT/WT
5.7L
3.7L/4.7L
1
6
3
SWITCH-STOP LAMP
2
5
4
EXCEPT ESP/TCS
ESP/TCS
L50 18 WT/TN
L950 20 WT/LG
18 C1
JUNCTION BLOCK
30
RELAY-STOP LAMP INHIBIT
87A
87
21 C1
L50 18 WT/TN
S107
L50 18 WT/TN
21 C1
BRAKE LAMP SWITCH OUTPUT
MODULE-FRONT CONTROL
3.7L/4.7L
5.7L
V32 20 VT/YL
3.7L
4.7L
S134
Z904 18 BK
Z904 20 BK
G100
5.7L
3.7L/4.7L
B16 20 LB/DG
V32 20 VT/YL
34 C104
19 C104
B16 20 LB/DG
V32 20 VT/YL
14 C3
7 C3
BRAKE SWITCH NO. 2 SIGNAL
S/C SUPPLY
MODULE-POWERTRAIN CONTROL
814731dc

P1572-BRAKE PEDAL STUCK ON (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on. In plant mode only.
- **Set Condition:**
  PCM recognizes the Brake Pedal could not electrically indicate the applied (On) position with both switch inputs. One trip fault.

Possible Causes
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT OPEN
(B16) BRAKE SWITCH NO.2 SIGANL CIRCUIT OPEN
STOP LAMP SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure the Stop Lamp Switch is adjusted properly before continuing.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. STOP LAMP SWITCH OPERATION

Turn the ignition off.

Disconnect the Stop Lamp Switch harness connector.

Measure the resistance between the (Z904) Ground circuit terminal and the (B15) Brake Switch No.1 Signal terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to open circuit when pressing and releasing the brake pedal switch?

Yes >> Go To 3

No >> Replace the Stop Lamp Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1572-BRAKE PEDAL STUCK ON (CONTINUED)

3. STOP LAMP SWITCH OPERATION

Measure the resistance between the (F942) Fused Igniton Switch terminal and the (B16) Brake Switch No.2 Signal circuit terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to open circuit when pressing and releasing the Stop Lamp switch?

Yes >> Go To 4

No >> Replace the Stop Lamp Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT OPEN

Disconnect the C3 PCM harness connector.

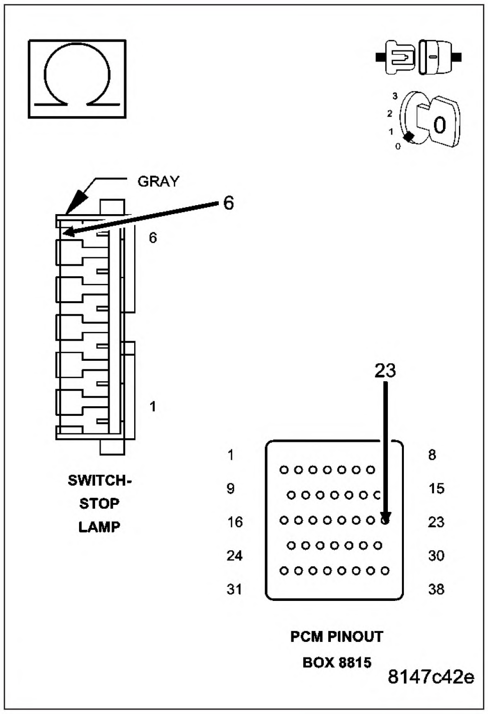
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (B15) Brake Switch No.1 Signal circuit from the Stop Lamp Switch harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

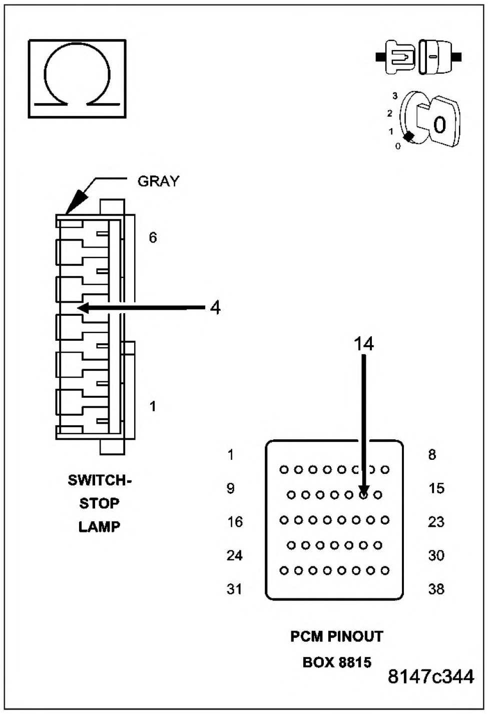
No >> Repair the open in the (B15) Brake Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



P1572-BRAKE PEDAL STUCK ON (CONTINUED)

5. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT OPEN

Measure the resistance of the (B16) Brake Switch No.2 Signal circuit from the Stop Lamp Switch harness connector to the C1 FCM harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (B16) Brake Switch No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

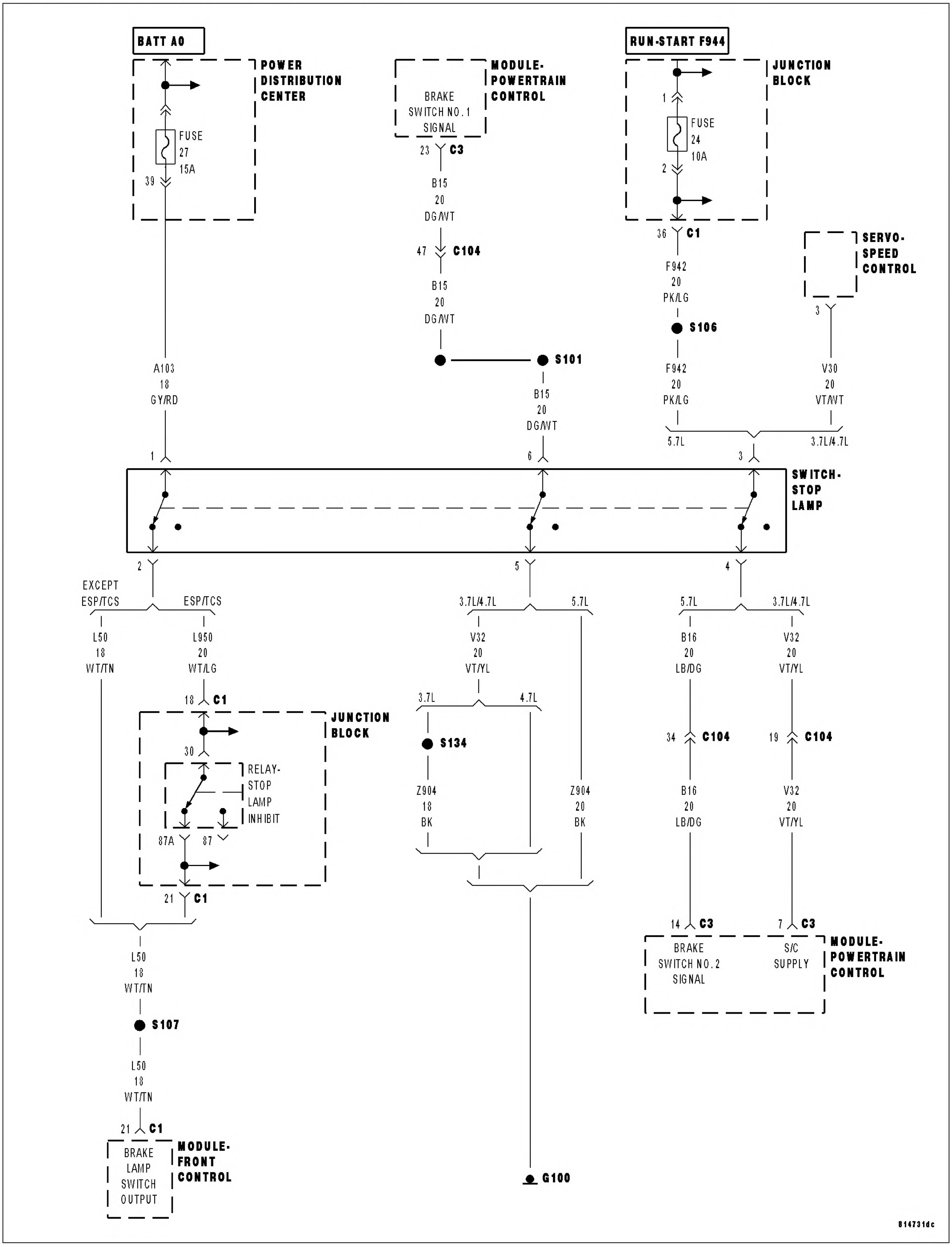
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1573-BRAKE PEDAL STUCK OFF


BATT A0
POWER DISTRIBUTION CENTER
FUSE 27 15A
39
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 1 SIGNAL
23 C3
B15 20 DG/WT
47 C104
B15 20 DG/WT
S101
RUN-START F944
JUNCTION BLOCK
1
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
SERVO-SPEED CONTROL
3
V30 20 VT/WT
5.7L
3.7L/4.7L
A103 18 GY/RD
B15 20 DG/WT
1
6
3
SWITCH-STOP LAMP
2
5
4
EXCEPT ESP/TCS
ESP/TCS
L50 18 WT/TN
L950 20 WT/LG
18 C1
JUNCTION BLOCK
30
RELAY-STOP LAMP INHIBIT
87A
87
21 C1
L50 18 WT/TN
S107
L50 18 WT/TN
21 C1
MODULE-FRONT CONTROL
BRAKE LAMP SWITCH OUTPUT
3.7L/4.7L
5.7L
V32 20 VT/YL
3.7L
4.7L
S134
Z904 18 BK
Z904 20 BK
G100
5.7L
3.7L/4.7L
B16 20 LB/DG
V32 20 VT/YL
34 C104
19 C104
B16 20 LB/DG
V32 20 VT/YL
14 C3
7 C3
MODULE-POWERTRAIN CONTROL
BRAKE SWITCH NO. 2 SIGNAL
S/C SUPPLY
814731dc

P1573-BRAKE PEDAL STUCK OFF (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on, In plant mode passed the Applied test.
- **Set Condition:**
  PCM recognizes the Brake Pedal could not electronically indicate the released (Off) position with both switches. If P1572 sets, P1573 will also set. One trip fault.

Possible Causes
(B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
STOP LAMP SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Make sure the Stop Lamp Switch is adjusted properly before continuing.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. STOP LAMP SWITCH OPERATION

Turn the ignition off.

Disconnect the Stop Lamp Switch harness connectors.

Measure the resistance between the (Z904) Ground circuit terminal and the (B15) Brake Switch No.1 Signal terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to an open circuit when pressing and releasing the brake switch?

Yes >> Go To 3

No >> Replace the Stop Lamp Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1573-BRAKE PEDAL STUCK OFF (CONTINUED)

3. STOP LAMP SWITCH OPERATION

Measure the resistance between the (F942) Fused Ignition Switch circuit terminal and the (B16) Brake Switch No.2 Signal circuit terminal in the Stop Lamp Switch.

Apply and release the Stop Lamp Switch while monitoring the ohmmeter.

Does the resistance change from below 5.0 ohms to an open circuit when pressing and releasing the Stop Lamp switch?

Yes >> Go To 4

No >> Replace the Stop Lamp Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. (B16) BRAKE SWITCH NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

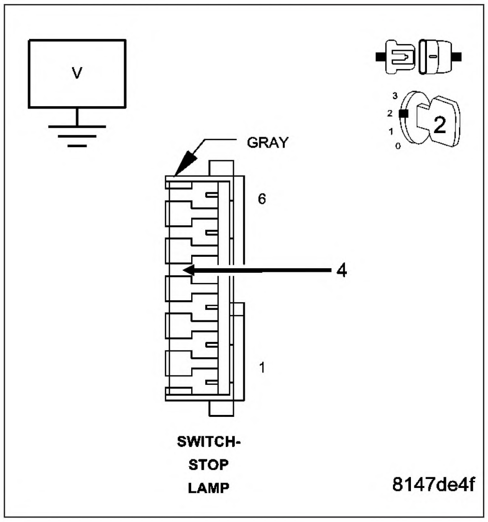
Ignition on, engine not running.

Measure the voltage on the (B16) Brake Switch No.2 Signal circuit in the Stop Lamp Switch harness connector.

Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (B16) Brake Switch No.2 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5



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5. (B15) BRAKE SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

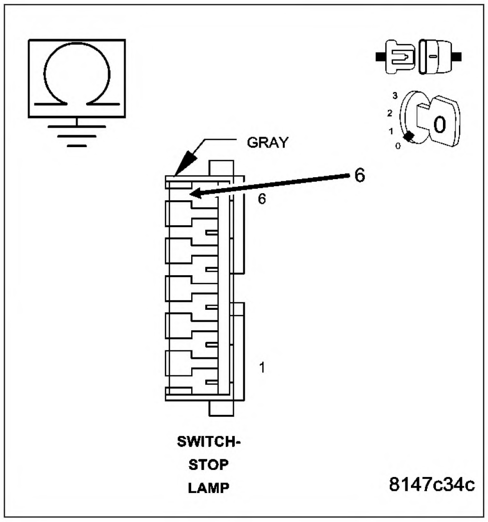
Turn the ignition off.

Measure the resistance between ground and the (B15) Brake Switch No.1 Signal circuit in the Stop Lamp Switch harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (B15) Brake Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6



P1573-BRAKE PEDAL STUCK OFF (CONTINUED)

6. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

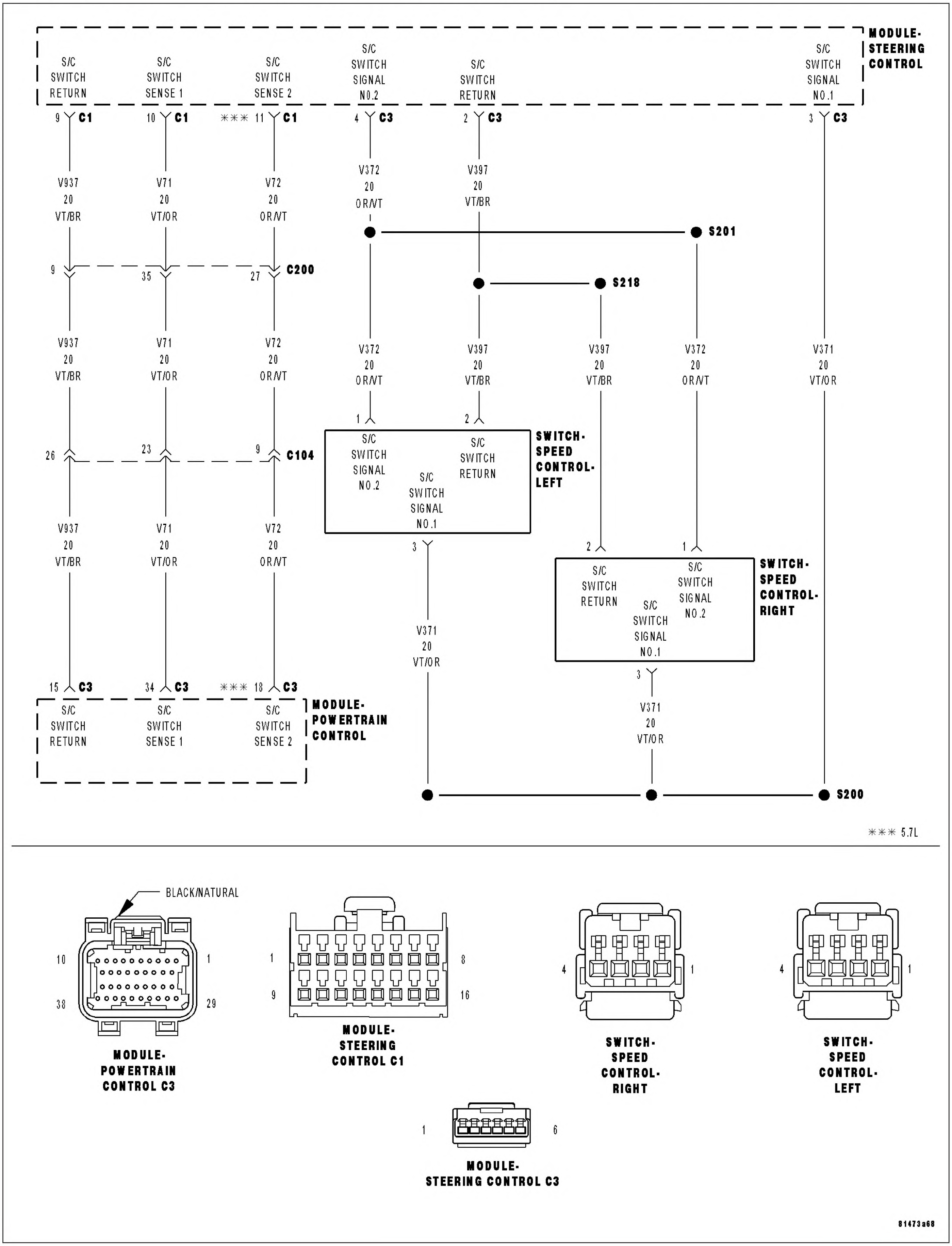
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L)


MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
9
35
27
C200
S218
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
V397 20 VT/BR
V372 20 OR/VT
V371 20 VT/OR
1
2
SWITCH-SPEED CONTROL-LEFT
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
S/C SWITCH RETURN
26
23
9
C104
3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
2
1
SWITCH-SPEED CONTROL-RIGHT
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
S/C SWITCH SIGNAL NO.2
V371 20 VT/OR
3
V371 20 VT/OR
15 C3
34 C3
*** 18 C3
MODULE-POWERTRAIN CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S200
*** 5.7L
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
1
8
9
16
MODULE-STEERING CONTROL C1
4
1
SWITCH-SPEED CONTROL-RIGHT
4
1
SWITCH-SPEED CONTROL-LEFT
1
6
MODULE-STEERING CONTROL C3
81473a68

P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  Cruise Switch inputs are not coherent with each other. Example: PCM is reading Switch No.1 as Accel and Switch No.2 as Coast at the same time. One trip fault.

Possible Causes
S/C SWITCH SIGNAL CIRCUITS SHORTED TO BATTERY VOLTAGE
RESISTANCE IN THE S/C SWITCH SIGNAL CIRCUITS
RESISTANCE IN THE (V397/V937) SWITCH RETURN CIRCUIT
S/C SWITCH SIGNAL CIRCUITS SHORTED TO THE (V397/V937) SWITCH RETURN CIRCUIT
(V371/V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V372/V72) S/C SWITCH NO.2 SIGNAL CIRCUIT
S/C SWITCH SIGNAL CIRCUITS SHORTED TO GROUND
STEERING COLUMN CONTROL MODULE
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: This DTC may be the result of pressing two Speed Control Switch buttons simultaneously for more than 450 msec.

Ask the customer if it is possible that two buttons were pressed at the same time before this DTC set. If this is the case, no repair is necessary.

Is the DTC active a this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. SPEED CONTROL ON/OFF SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control On/Off Switch harness connector.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control On/Off Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

3. SPEED CONTROL RESUME/ACCEL SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control Resume/Accel Switch harness connector.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control Resume/Accel Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. SPEED CONTROL SWITCHES

Turn the ignition off.

Remove and disconnect the Speed Control Switches from the steering wheel per Service Information.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V372) S/C Switch No.2 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position.

Not pressing any switch - 20.5 kohms

On/Off - 8.87 kohms

Set - 0.825 kohms

Coast - 0.47 kohms

Cancel - 3.92 kohms

Resume/Accel - 1.87 kohms

The following resistance specs are taken between terminals (V371) S/C Switch No.1 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position

Not pressing any switch - 20.5 kohms

On/Off - 0.47 kohms

Set - 5.49 kohms

Coast - 2.94 kohms

Cancel - 1.24 kohms

Resume/Accel - 15.4 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 5

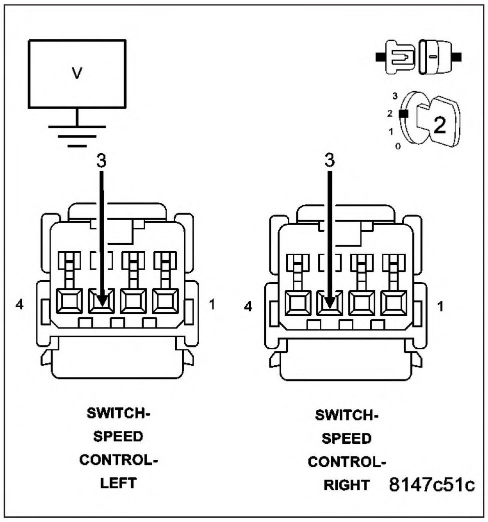
No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

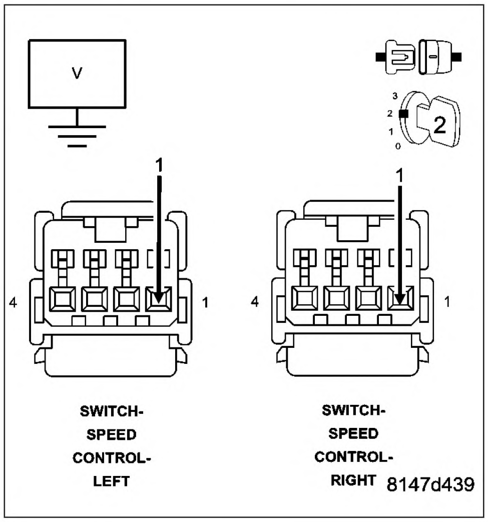
P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

5. S/C SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

Measure the voltage on the (V371) and (V372) S/C Switch Signal circuits at both Speed Control harness connectors.


V
3
2
1
0
2
3
3
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c51c


V
3
2
1
0
2
1
1
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147d439

Is the voltage above 5.0 volts?

Yes >> Repair the short to battery voltage in the (V371) or (V372) S/C Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. STEERING COLUMN CONTROL MODULE

Turn the ignition off.

Disconnect the C1 and C3 SCCM harness connectors per Service Information.

Measure the resistance of the (V371/V71) and (V372/V72) S/C Switch Signal circuits between the C1 and C3 SCCM connectors.

Measure the resistance of the (V397/V937) Switch Return circuit between the C1 and C3 SCCM connectors.

Is the resistance above 5.0 ohms?

Yes >> Replace the SCCM per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

NOTE: Connect the Steering Column Control Module harness connectors per Service Information before continuing.

P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

7. S/C SWITCH SIGNAL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

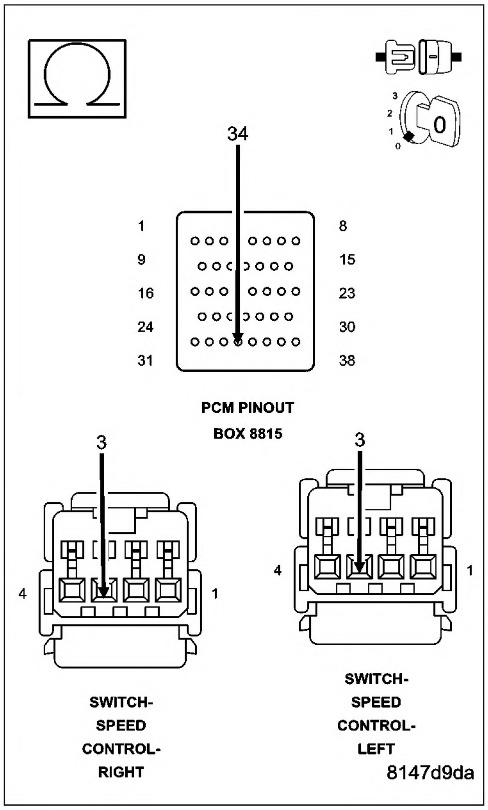
Measure the resistance of the (V371/V71) and (V372/V72) S/C Switch Signal circuits from both Speed Control harness connectors to the appropriate terminals of special tool #8815.

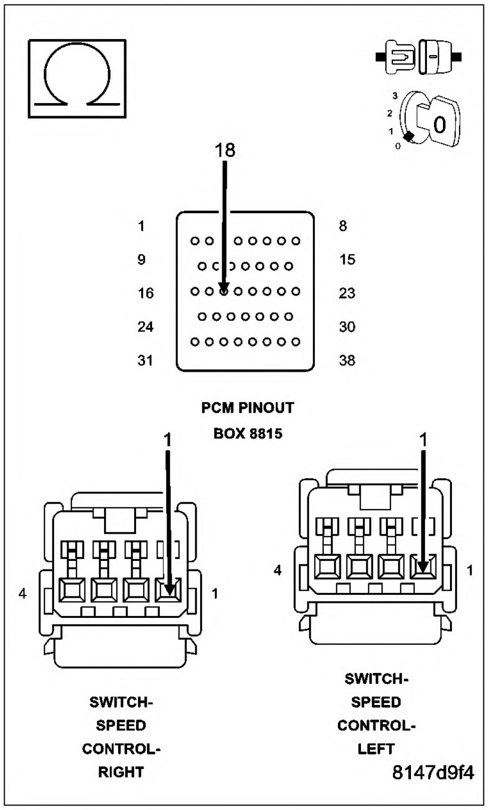
Is the resistance below 5.0 ohms for each measurement?

Yes >> Go To 8

No >> Repair the excessive resistance in the (V371/V71) or (V372/V72) S/C Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


34
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
3
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147d9da

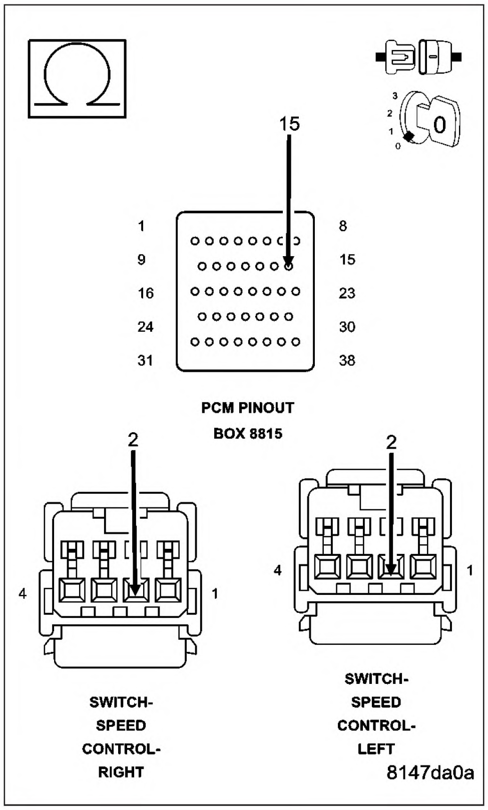

18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
1
1
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147d9f4

P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

8. (V397/V937) SWITCH RETURN CIRCUIT OPEN

NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

Measure the resistance of the (V397/V937) Switch Return circuit from both Speed Control harness connector to the appropriate terminal of special tool #8815.


15
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
2
2
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147da0a

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 9

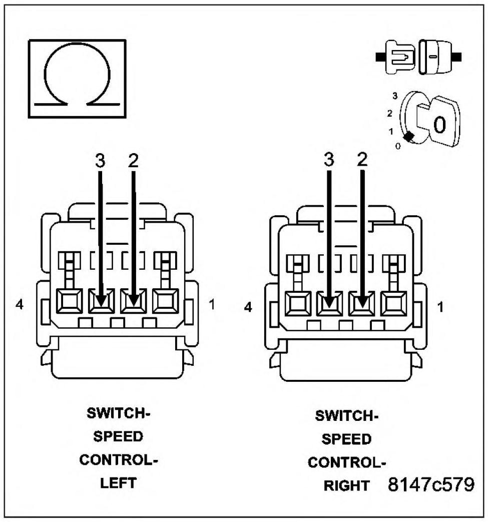
No >> Repair the excessive resistance in the (V397/V937) Switch Return circuit.

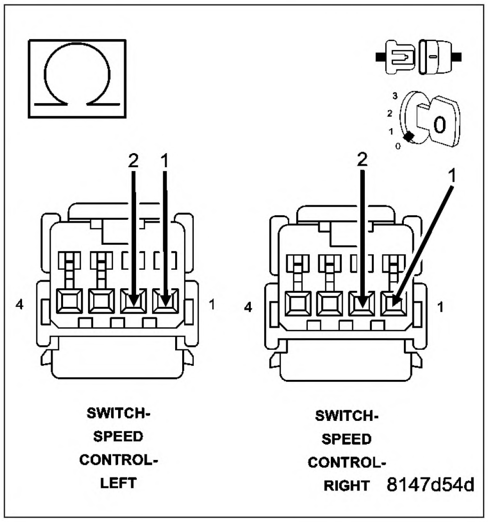
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

9. S/C SWITCH SIGNAL CIRCUITS SHORTED TO THE (V397/V937) SWITCH RETURN CIRCUIT

Measure the resistance between the (V397) Switch Return circuit and both of the (V371) and (V372) S/C Switch Signal circuits in the Speed Control harness connector.


3 2
3 2
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c579


2 1
2
1
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147d54d

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (V397/V937) Switch Return circuit and the (V371/V71) or (V372/V72) S/C Switch Signal circuit.

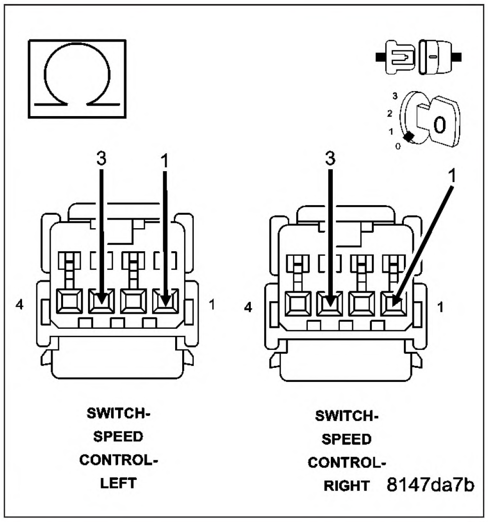
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

10. (V371/V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V372/V72) S/C SWITCH NO.2 SIGNAL CIRCUIT

Measure the resistance between the (V371/V71) S/C Switch No.1 Signal circuit and the (V372/72) S/C Switch No.2 Signal circuit at both Speed Control harness connectors.


3 1
3
1
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147da7b

Is the resistance below 100 ohms for each circuit?

Yes >> Repair the short between the (V372/V72) S/C Switch No.2 Signal circuit and the (V371) S/C Switch No.1 Signal circuit.

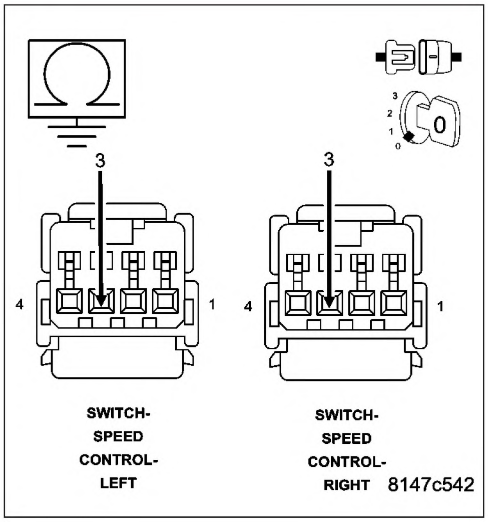
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

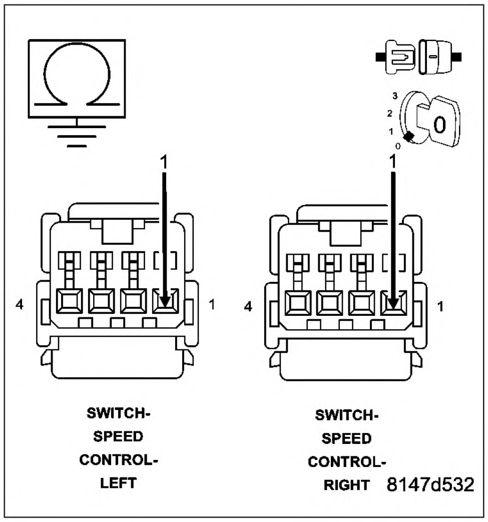
P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

11. S/C SWITCH SIGNAL CIRCUITS SHORTED TO GROUND

Measure the resistance between ground and the (V371/V71) and (V372/V72) S/C Switch Signal circuits at both Switch harness connectors.


3
3
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
3
2
1
0
0

8147c542


1
1
4
1
4
1
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
3
2
1
0
0

8147d532

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V371/V71) or (V372/V72) S/C Switch Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

P1593-SPEED CONTROL SWITCH 1 STUCK (5.7L) (CONTINUED)

12. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	SWITCH No.1 VOLTAGE VALUE	SWITCH No.2 VOLATGE VALUE
NO SWITCHES PRESSED	4.31 to 4.78 volts	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to 1.13 volts	3.53 to 3.92 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts	2.04 to 2.47 volts
SET PRESSED	3.16 to 3.56 volts	1.17 to 1.56 volts
COAST PRESSED	2.57 to 2.94 volts	0.77 to 1.09 volts
CANCEL PRESSED	1.59 to 1.99 volts	2.84 to 3.25 volts

Take these same voltage measurements with a voltmeter by back probing the (V371) S/C Switch No.1 Signal circuit and the (V372) S/C Switch No.2 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch values?

Yes >> Replace the Speed Control Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 13

13. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

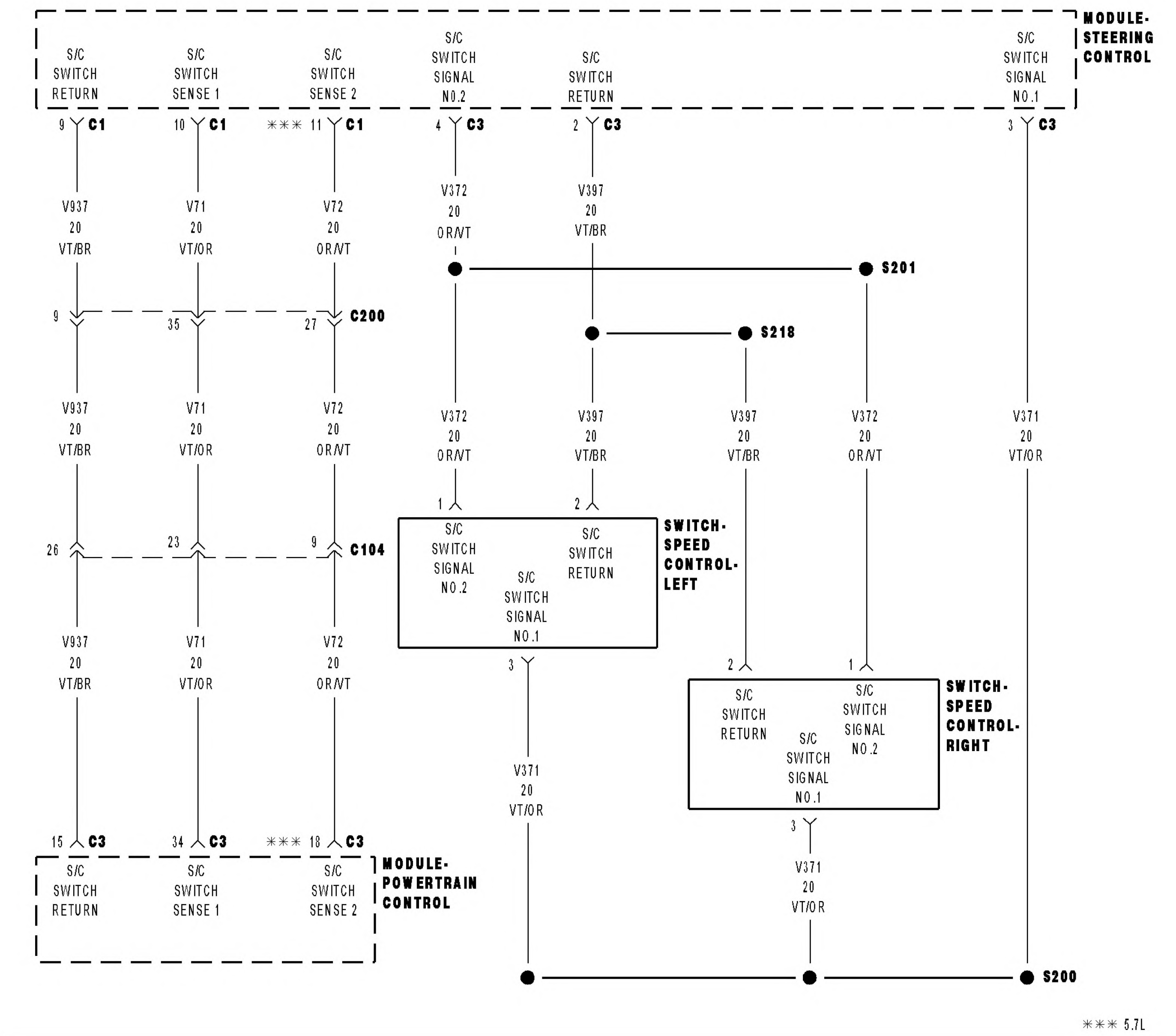
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

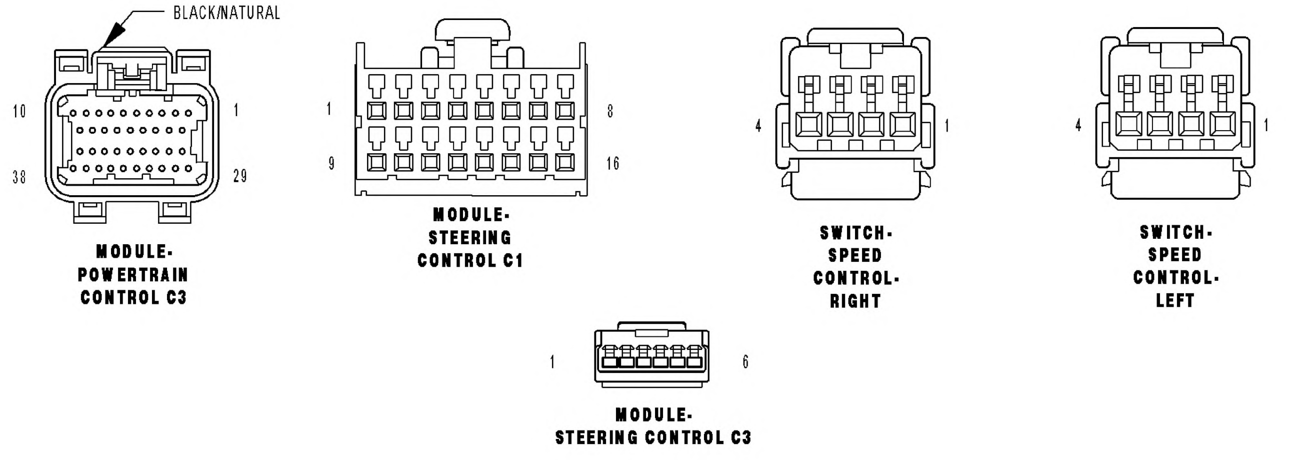
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1593-SPEED CONTROL SWITCH 1 STUCK (3.7L, 4.7L)


MODULE-STEERING CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
9 C1
10 C1
*** 11 C1
4 C3
2 C3
3 C3
V937 20 VT/BR
V71 20 VT/OR
V72 20 OR/VT
V372 20 OR/VT
V397 20 VT/BR
S201
9
35
27
C200
S218
V371 20 VT/OR
1
2
SWITCH-SPEED CONTROL-LEFT
S/C SWITCH SIGNAL NO.2
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.1
26
23
9
C104
3
SWITCH-SPEED CONTROL-RIGHT
S/C SWITCH RETURN
S/C SWITCH SIGNAL NO.2
S/C SWITCH SIGNAL NO.1
15 C3
34 C3
*** 18 C3
MODULE-POWERTRAIN CONTROL
S/C SWITCH RETURN
S/C SWITCH SENSE 1
S/C SWITCH SENSE 2
S200
*** 5.7L


BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
1
8
9
16
MODULE-STEERING CONTROL C1
4
1
SWITCH-SPEED CONTROL-RIGHT
4
1
SWITCH-SPEED CONTROL-LEFT
1
6
MODULE-STEERING CONTROL C3
81473a68

P1593-SPEED CONTROL SWITCH 1 STUCK (3.7L, 4.7L) (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  Cruise Switch input is not coherent. One trip fault.

Possible Causes
S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
RESISTANCE IN THE (V371/V71)S/C SWITCH NO.1 SIGNAL CIRCUIT
RESISTANCE IN THE (V397/V937) SWITCH RETURN CIRCUIT
S/C SWITCH SIGNAL CIRCUITS SHORTED TO THE (V397/V937) SWITCH RETURN CIRCUIT
S/C SWITCH SIGNAL CIRCUITS SHORTED TO GROUND
STEERING COLUMN CONTROL MODULE
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: This DTC may be the result of pressing two Speed Control Switch buttons simultaneously for more than 450 msec.

Ask the customer if it is possible that two buttons were pressed at the same time before this DTC set. If this is the case, no repair is necessary.

Is the DTC active a this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. SPEED CONTROL ON/OFF SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control On/Off Switch harness connector.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control On/Off Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P1593-SPEED CONTROL SWITCH 1 STUCK (3.7L, 4.7L) (CONTINUED)

3. SPEED CONTROL RESUME/ACCEL SWITCH

With the scan tool, monitor the Speed Control Switch voltage.

Disconnect the Speed Control Resume/Accel Switch harness connector.

Did the voltage change to above 4.8 volts?

Yes >> Replace the Speed Control Resume/Accel Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. SPEED CONTROL SWITCHES

Turn the ignition off.

Remove and disconnect the Speed Control Switches from the steering wheel per Service Information.

Measure the resistance across each Speed Control Switch.

Monitor the ohmmeter while pressing each function button on each switch.

The following resistance specs are taken between terminals (V372) S/C Switch No.2 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position.

Not pressing any switch - 20.5 kohms

On/Off - 8.87 kohms

Set - 0.825 kohms

Coast - 0.47 kohms

Cancel - 3.92 kohms

Resume/Accel - 1.87 kohms

The following resistance specs are taken between terminals (V371) S/C Switch No.1 Signal and (V397) S/C Switch Return circuits of the Switch when holding the switch button in the following position

Not pressing any switch - 20.5 kohms

On/Off - 0.47 kohms

Set - 5.49 kohms

Coast - 2.94 kohms

Cancel - 1.24 kohms

Resume/Accel - 15.4 kohms

Does the function on the Speed Control Switches have the correct resistance value?

Yes >> Go To 5

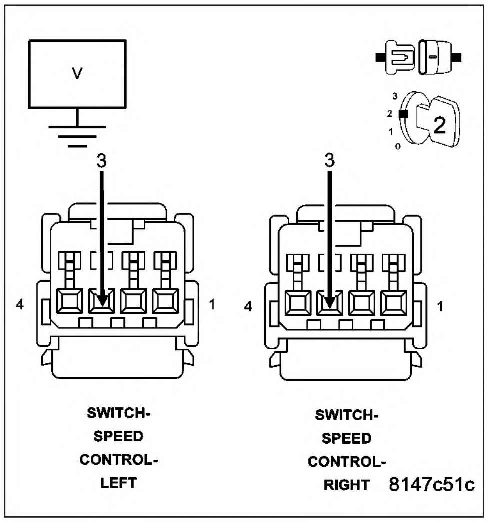
No >> Replace the Speed Control Switch that had the incorrect resistance value.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1593-SPEED CONTROL SWITCH 1 STUCK (3.7L, 4.7L) (CONTINUED)

5. S/C SWITCH SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

Measure the voltage on the (V371/V71) S/C Switch Signal circuit at both Speed Control harness connectors.



Is the voltage above 5.0 volts?

Yes >> Repair the short to battery voltage in the (V371/V71) S/C Switch Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

---

6. STEERING COLUMN CONTROL MODULE

Turn the ignition off.

Disconnect the C1 and C3 SCCM harness connectors per Service Information.

Measure the resistance of the (V371/V71) S/C Switch Signal circuit between the C1 and C3 SCCM connections.

Measure the resistance of the (V397/V937) Switch Return circuit between the C1 and C3 SCCM connections.

Is the resistance above 5.0 ohms?

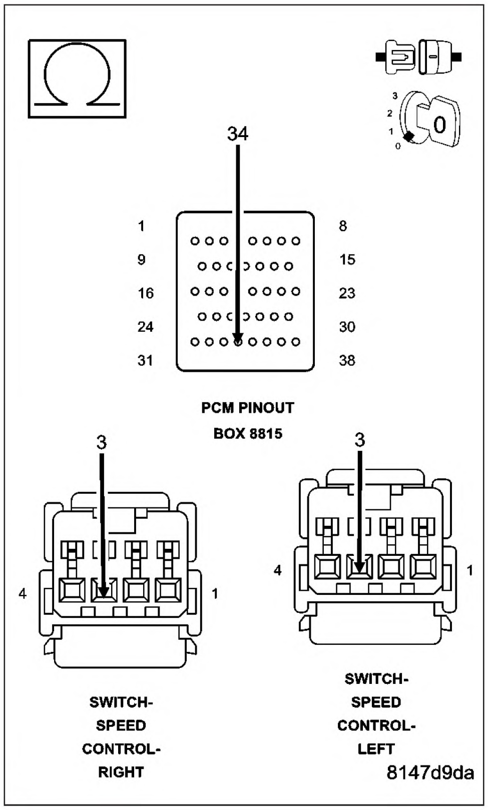
Yes >> Replace the SCCM per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

NOTE: Connect the Steering Column Control Module harness connectors per Service Information before continuing.

P1593-SPEED CONTROL SWITCH 1 STUCK (3.7L, 4.7L) (CONTINUED)

7. S/C SWITCH SIGNAL CIRCUIT OPEN


34
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
3
3
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147d9da

NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (V371/V71) S/C Switch No.1 Signal circuits from both Speed Control harness connectors to the appropriate terminals of special tool #8815.

Is the resistance below 5.0 ohms for each measurement?

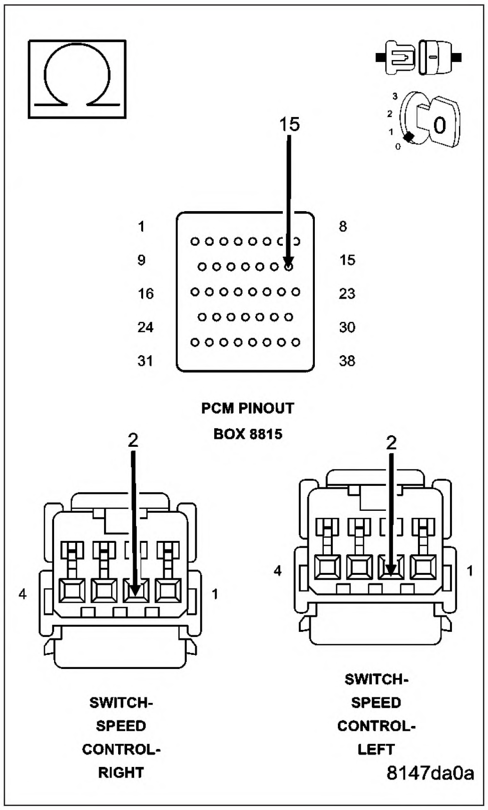
Yes >> Go To 8

No >> Repair the excessive resistance in the (V371/V71) S/C Switch No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. (V397/V937) SWITCH RETURN CIRCUIT OPEN


15
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
2
2
4
1
4
1
SWITCH-
SPEED
CONTROL-
RIGHT
SWITCH-
SPEED
CONTROL-
LEFT
8147da0a

NOTE: The measurement must be taken from both Speed Control Switch harness connectors.

Measure the resistance of the (V397/V937) Switch Return circuit from both Speed Control harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms for both measurements?

Yes >> Go To 9

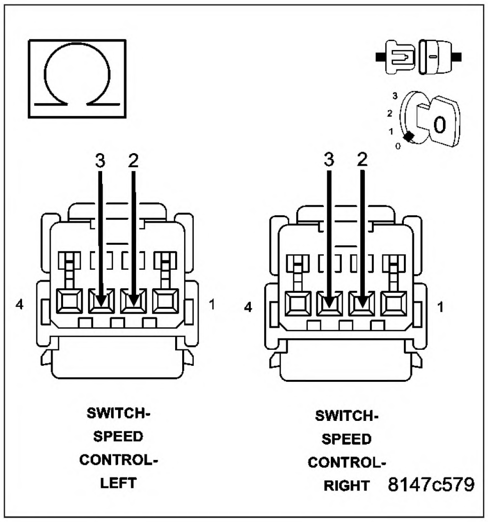
No >> Repair the excessive resistance in the (V397/V937) Switch Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1593-SPEED CONTROL SWITCH 1 STUCK (3.7L, 4.7L) (CONTINUED)

9. S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO THE (V397/V937) SWITCH RETURN CIRCUIT

Measure the resistance between the (V397/V937) Switch Return circuits and the (V371/V71)S/C Switch No.1 Signal circuits in the S/C Switch harness connector.


3
2
3
2
4
1
4
1
3
2
1
0
0
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c579

Is the resistance below 5.0 ohms?

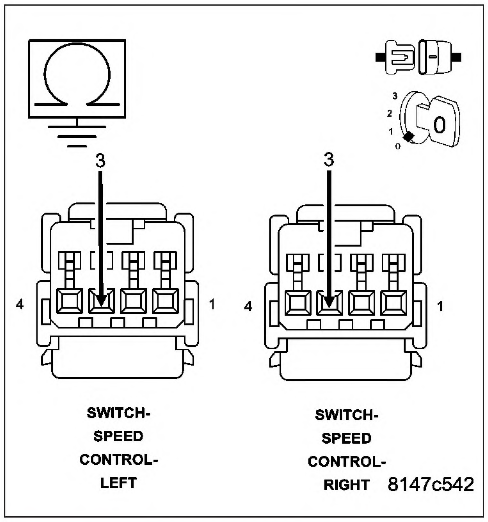
Yes >> Repair the short between the (V397/V937) Switch Return circuit and the (V371/V71) S/C Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

10. (V371), (V71) S/C SWITCH NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (V371/V71) S/C Switch No.1 Signal circuit at both Switch harness connectors.


3
3
4
1
4
1
3
2
1
0
0
SWITCH-SPEED CONTROL-LEFT
SWITCH-SPEED CONTROL-RIGHT
8147c542

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (V371/V71) S/C Switch No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 11

P1593-SPEED CONTROL SWITCH 1 STUCK (3.7L, 4.7L) (CONTINUED)

11. SPEED CONTROL SWITCH VOLTAGE VALUES

Allow the engine to idle.

With a scan tool, monitor the S/C Switch voltage readings.

SWITCH POSITION	SWITCH No.1 VOLTAGE VALUE
NO SWITCHES PRESSED	4.31 to 4.78 volts
ON/OFF PRESSED	0.59 to 1.13 volts
RES/ACCEL PRESSED	3.88 to 4.17 volts
SET PRESSED	3.16 to 3.56 volts
COAST PRESSED	2.57 to 2.94 volts
CANCEL PRESSED	1.59 to 1.99 volts

Take these same voltage measurements with a voltmeter by back probing the (V371) S/C Switch No.1 Signal circuit at the switches.

Compare the voltage readings on the voltmeter to what the scan tool displayed.

Are the voltage readings out of the listed specification and is there less than a 0.2 of a volt difference between the voltmeter switch values and the scan tool switch values?

Yes >> Replace the Speed Control Switch.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 12

---

12. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1602–PCM NOT PROGRAMMED

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  The PCM has not been programmed.

Possible Causes
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PCM PROGRAMMED

Ignition on, engine not running.
With a scan tool, erase DTCs.
With a scan tool program the PCM.
Start the engine.
Allow the engine to reach normal operating temperature.
With a scan tool, read DTCs.

Does the DTC reset?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> The PCM has been successfully programmed. Test is complete.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION FAILURE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  Internal PCM failure detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PCM FUSED IGNITION SWITCH CIRCUIT
PCM INTERNAL

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PCM IGNITION CIRCUITS

Turn the ignition off.

Disconnect the C1 PCM harness connector.

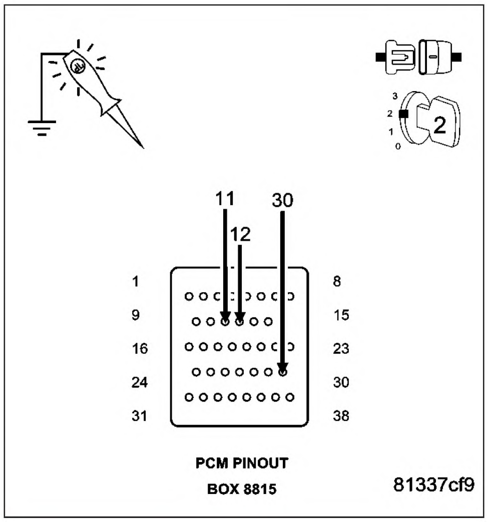
Ignition on, engine not running.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

With a 12-volt test light connected to ground and with special tool #8815 installed, probe the (F202) and (F924) Fused Ignition Switch circuits.

Perform the above check with the Ignition key in the off lock position, Ignition on, engine not running position, and during cranking.

Wiggle the related wire harness while probing the special tool with the test light to try to interrupt the circuit.



Does the test light illuminate brightly?

Yes >> Go To 2

No >> Repair the open or excessive resistance in the (F202) and (F924) Fused Ignition Switch (Off, Run, Start) circuits. Inspect the related fuse, if the fuse is open check the circuits for a short to ground.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1603-PCM INTERNAL DUAL-PORT RAM COMMUNICATION FAILURE (CONTINUED)

2. PCM

The Powertrain Control Module is reporting internal errors.

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1604-PCM INTERNAL DUAL-PORT RAM READ/WRITE INTEGRITY FAILURE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  Internal PCM failure detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PCM FUSED IGNITION SWITCH CIRCUIT
PCM INTERNAL

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PCM IGNITION CIRCUITS

Turn the ignition off.

Disconnect the C1 PCM harness connector.

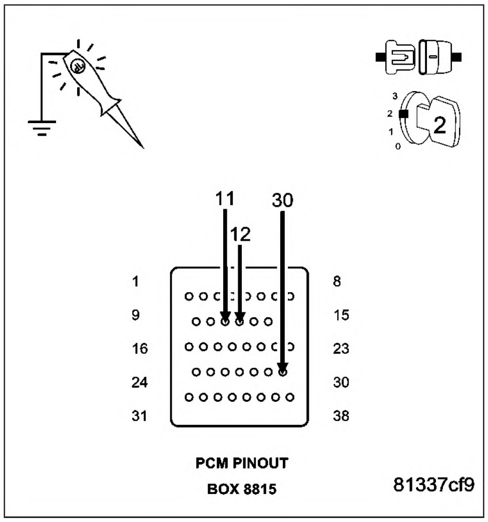
Ignition on, engine not running.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

With a 12-volt test light connected to ground and with special tool #8815 installed, probe the (F202) and (F924) Fused Ignition Switch circuits.

Perform the above check with the Ignition key in the off lock position, Ignition on, engine not running position, and during cranking.

Wiggle the related wire harness while probing the special tool with the test light to try to interrupt the circuit.



Does the test light illuminate brightly?

Yes >> Go To 2

No >> Repair the open or excessive resistance in the (F202) and (F924) Fused Ignition Switch (Off, Run, Start) circuits. Inspect the related fuse, if the fuse is open check the circuits for a short to ground.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1604-PCM INTERNAL DUAL-PORT RAM READ/WRITE INTEGRITY FAILURE (CONTINUED)

2. PCM

The Powertrain Control Module is reporting internal errors.

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1607-PCM INTERNAL SHUTDOWN TIMER RATIONALITY

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  Internal PCM failure detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PCM FUSED IGNITION SWITCH CIRCUIT
PCM INTERNAL

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. PCM IGNITION CIRCUITS

Turn the ignition off.

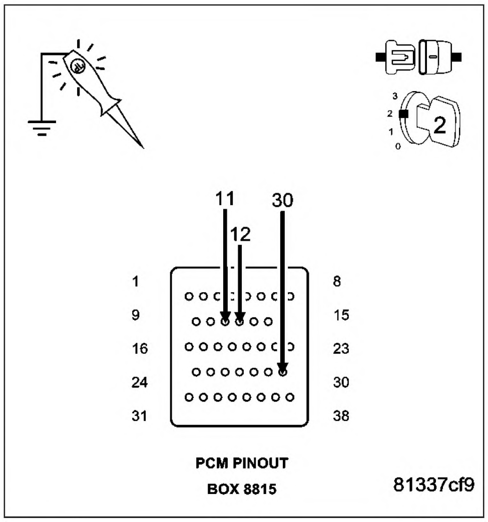
Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

With a 12-volt test light connected to ground and with special tool #8815 installed, probe the (F202) and (F924) Fused Ignition Switch circuits.

Perform the above check with the Ignition key in the off lock position, Ignition on, engine not running position, and during cranking.

Wiggle the related wire harness while probing the special tool with the test light to try to interrupt the circuit.



Does the test light illuminate brightly?

Yes >> Go To 2

No >> Repair the open or excessive resistance in the (F202) and (F924) Fused Ignition Switch (Off, Run, Start) circuits. Inspect the related fuse, if the fuse is open check the circuits for a short to ground.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. PCM

The Powertrain Control Module is reporting internal errors.

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

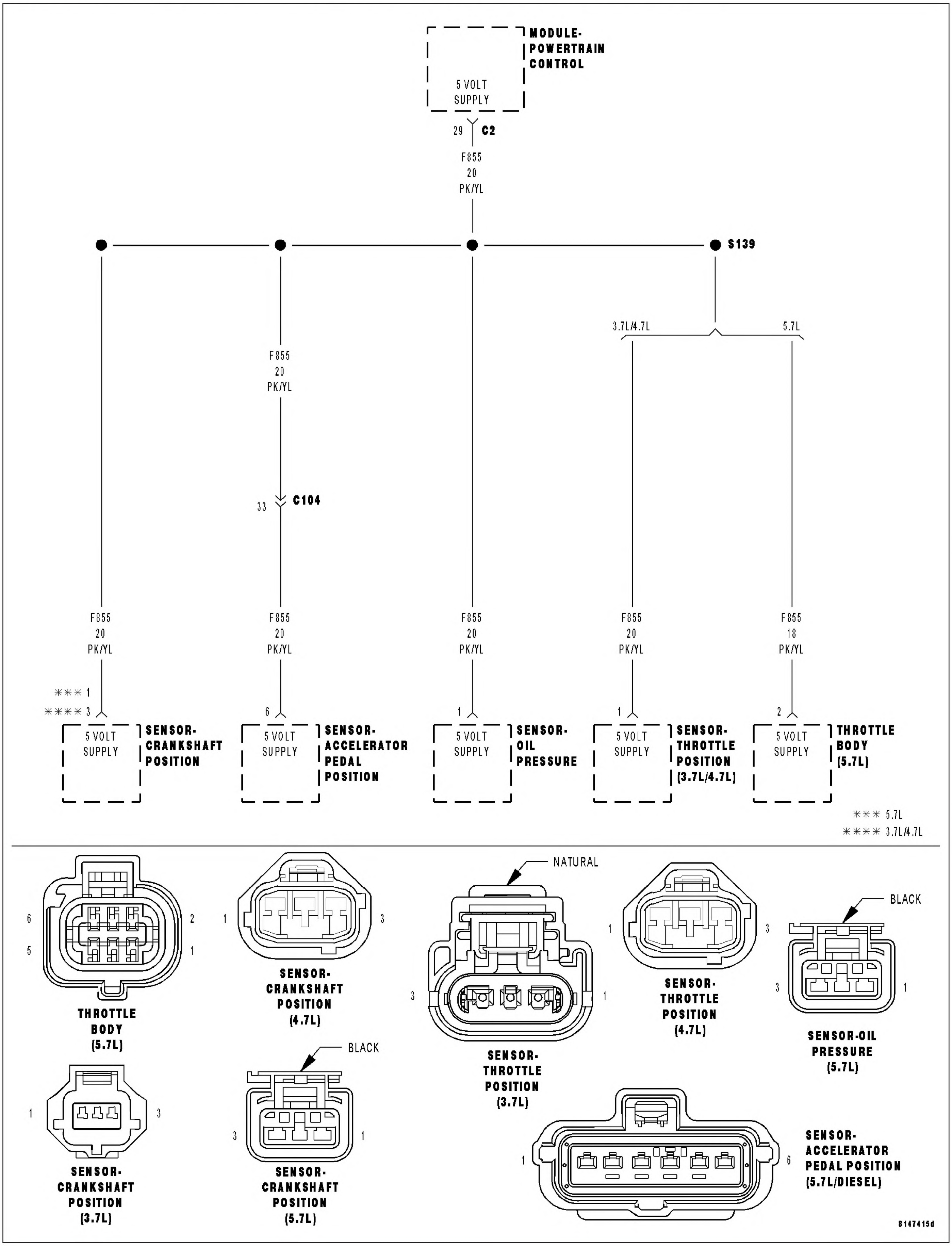
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1618-SENSOR REFERENCE VOLTAGE 1 CIRCUIT ERRATIC


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
29
C2
F855
20
PK/YL
S139
3.7L/4.7L
5.7L
F855
20
PK/YL
33
C104
F855
20
PK/YL
F855
20
PK/YL
F855
20
PK/YL
F855
20
PK/YL
F855
18
PK/YL
∗∗∗ 1
∗∗∗∗ 3
6
1
1
2
5 VOLT
SUPPLY
SENSOR-
CRANKSHAFT
POSITION
5 VOLT
SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
5 VOLT
SUPPLY
SENSOR-
OIL
PRESSURE
5 VOLT
SUPPLY
SENSOR-
THROTTLE
POSITION
(3.7L/4.7L)
5 VOLT
SUPPLY
THROTTLE
BODY
(5.7L)
∗∗∗ 5.7L
∗∗∗∗ 3.7L/4.7L
6
5
2
1
THROTTLE
BODY
(5.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(4.7L)
NATURAL
3
1
SENSOR-
THROTTLE
POSITION
(3.7L)
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
BLACK
3
1
SENSOR-OIL
PRESSURE
(5.7L)
1
3
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
BLACK
3
1
SENSOR-
CRANKSHAFT
POSITION
(5.7L)
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8147415d

P1618-SENSOR REFERENCE VOLTAGE 1 CIRCUIT ERRATIC (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes the Primary 5-volt Supply circuit voltage is varying too much too quickly. One Trip Fault. ETC light is flashing.

Possible Causes
(F855) PRIMARY 5-VOLT SUPPLY SHORTED TO GROUND
(F855) PRIMARY 5-VOLT SUPPLY SHORTED TO BATTERY VOLTAGE
(F855) PRIMARY 5-VOLT SUPPLY CIRCUIT OPEN
5-VOLT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1618-SENSOR REFERENCE VOLTAGE 1 CIRCUIT ERRATIC (CONTINUED)

2. (F855) PRIMARY 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

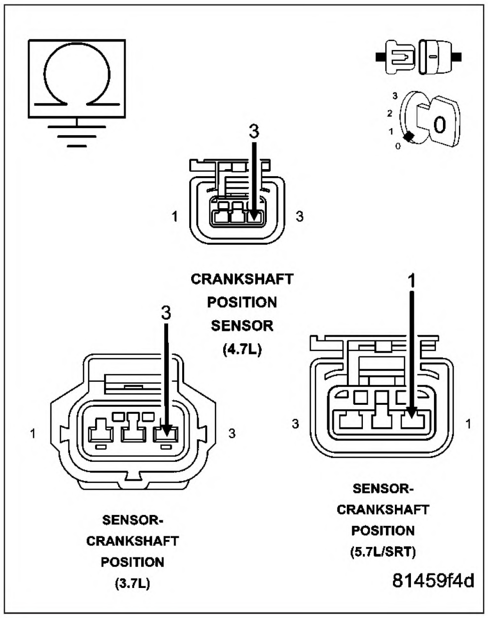
Turn the ignition off.

Disconnect the C2 PCM harness connector.

Disconnect all the Sensors that share the (F855) Primary 5-volt Supply circuit.

NOTE: This code can be caused by the improper installation of after market accessories that may be causing excessive noise on the (F855) 5-volt Supply circuit.

Measure the resistance between ground and the (F855) Primary 5-volt Supply circuit in the CKP Sensor harness connector.


3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
1
3
1
3
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
3
2
1
0
0
81459f4d

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) Primary 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. SENSOR SHORTED TO GROUND

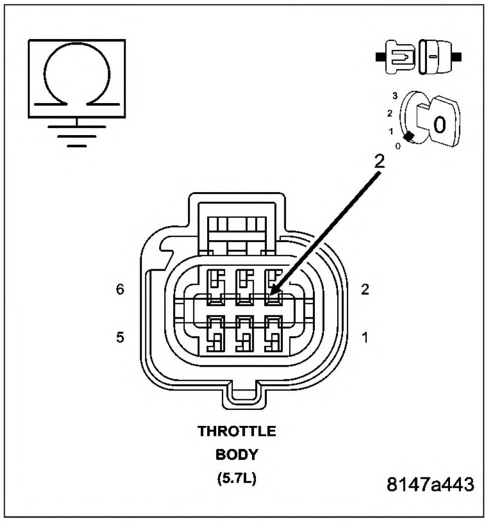
Connect the C2 PCM harness connector and all the previously disconnected Sensor except for the CKP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) Primary 5-volt Supply circuit at the Throttle Body harness connector.

CAUTION: You must Turn the Ignition Off when disconnecting any of the Sensor harness connectors and Turn the Ignition On to check the voltage readings.

While monitoring the voltage, disconnect each Sensor harness connector that shares the (F855) Primary 5-volt Supply circuit, one at a time.



Does the voltage increase above 4.5 volts when disconnecting any of the Sensor harness connectors?

Yes >> Replace the Sensor that causes the (F855) Primary 5-volt Supply circuit voltage to increase when disconnected.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P1618-SENSOR REFERENCE VOLTAGE 1 CIRCUIT ERRATIC (CONTINUED)

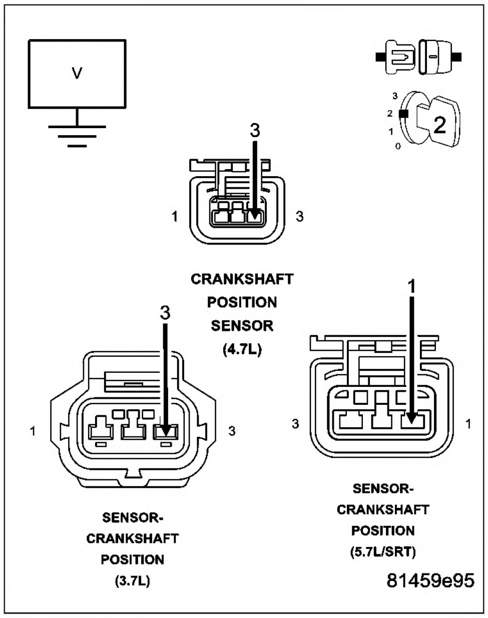
4. 5-VOLT SENSOR

Turn the ignition off.

Connect all the previously disconnected Sensors except for the CKP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) Primary 5-volt Supply circuit at the CKP Sensor harness connector.


V
3
2
1
0
2
3
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
3
1
1
3
3
1
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
81459e95

Is the voltage between 4.8 and 5.2 volts?

Yes >> Replace the Crank Position Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. (F855) PRIMARY 5-VOLT SUPPLY SHORTED TO BATTERY VOLTAGE

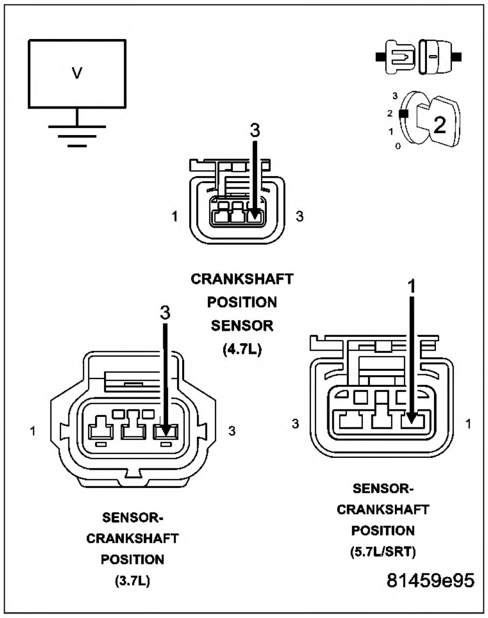
Turn the ignition off.

Disconnect the C2 PCM harness connector.

Disconnect all the Sensors that share the (F855) Primary 5-volt Supply circuit.

Ignition on, engine not running.

Measure the voltage on the (F855) Primary 5-volt Supply circuit in the CKP Sensor harness connector.


V
3
2
1
0
2
3
1
3
CRANKSHAFT
POSITION
SENSOR
(4.7L)
3
1
1
3
3
1
SENSOR-
CRANKSHAFT
POSITION
(3.7L)
SENSOR-
CRANKSHAFT
POSITION
(5.7L/SRT)
81459e95

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (F855) Primary 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P1618-SENSOR REFERENCE VOLTAGE 1 CIRCUIT ERRATIC (CONTINUED)

6. (F855) PRIMARY 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Reconnect all the sensors that were disconnected in the previous step except for the CKP Sensor harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance in the (F855) Primary 5-volt Supply circuit from the Sensor harness connector to the appropriate terminal of special tool #8815.

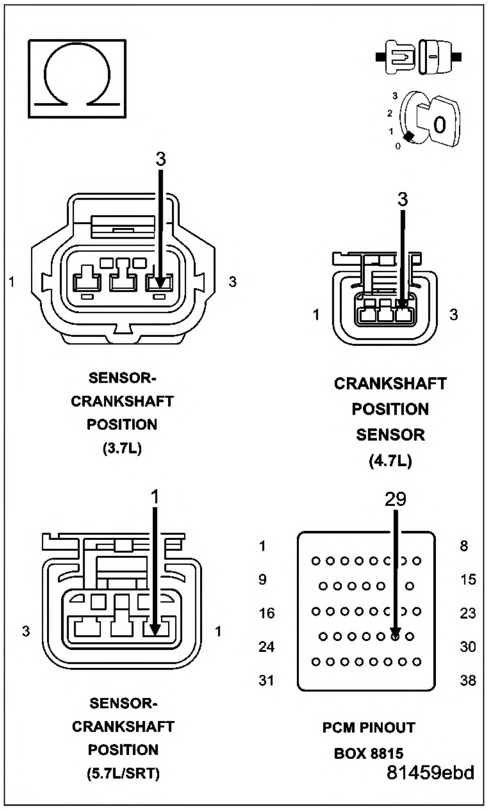
It may be necessary to perform this test from every sensor that uses the (F855) Primary 5-volt Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (F855) Primary 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

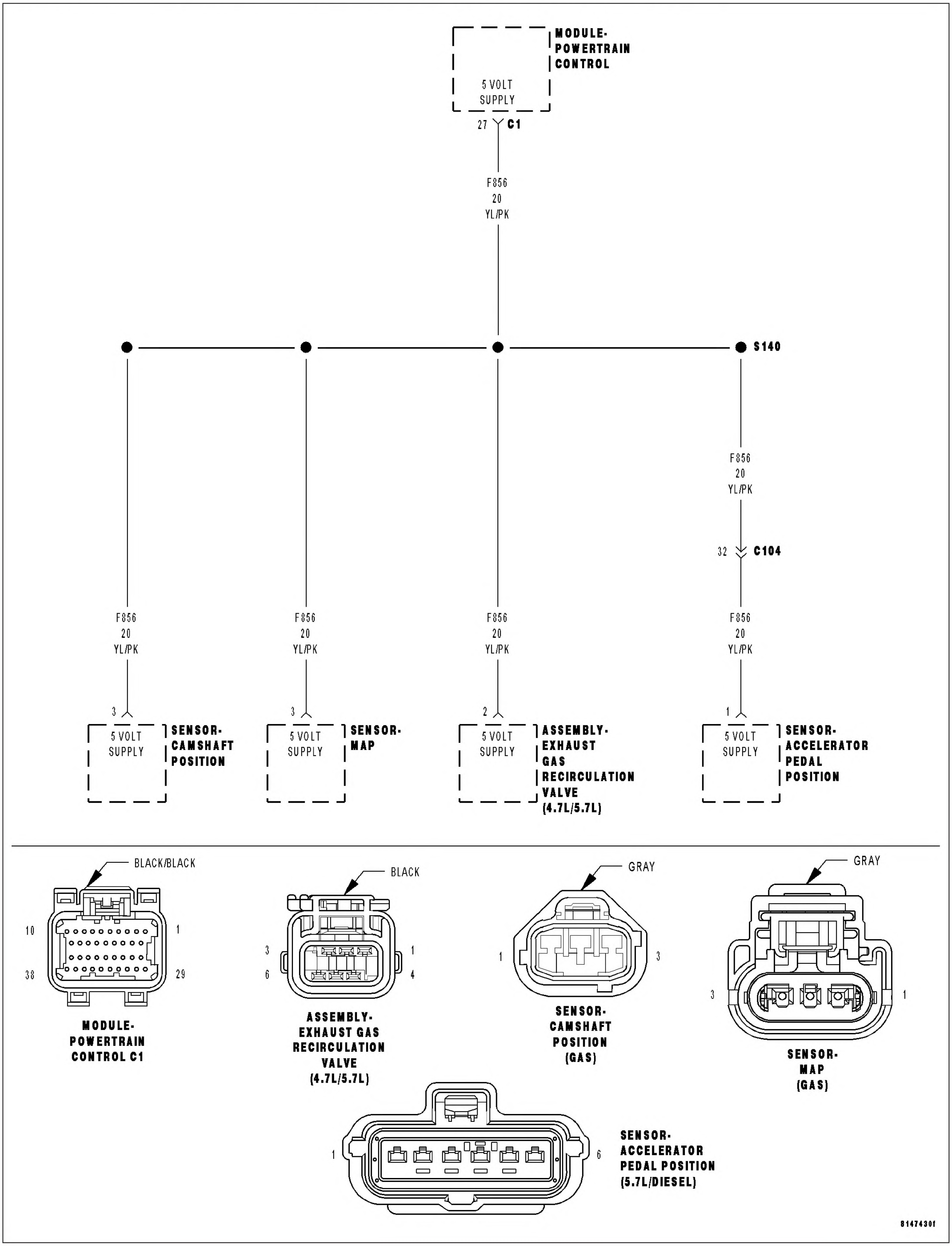
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1628-SENSOR REFERENCE VOLTAGE 2 CIRCUIT ERRATIC


MODULE-
POWERTRAIN
CONTROL
5 VOLT
SUPPLY
27
C1
F856
20
YL/PK
S140
F856
20
YL/PK
32
C104
F856
20
YL/PK
F856
20
YL/PK
F856
20
YL/PK
F856
20
YL/PK
3
5 VOLT
SUPPLY
SENSOR-
CAMSHAFT
POSITION
3
5 VOLT
SUPPLY
SENSOR-
MAP
2
5 VOLT
SUPPLY
ASSEMBLY-
EXHAUST
GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
1
5 VOLT
SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK
3
1
6
4
ASSEMBLY-
EXHAUST GAS
RECIRCULATION
VALVE
(4.7L/5.7L)
GRAY
1
3
SENSOR-
CAMSHAFT
POSITION
(GAS)
GRAY
3
1
SENSOR-
MAP
(GAS)
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81474301

P1628-SENSOR REFERENCE VOLTAGE 2 CIRCUIT ERRATIC (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM recognizes the Auxiliary 5-volt Supply circuit voltage is varying too much to quickly. One Trip Fault. ETC light is flashing.

Possible Causes
(F856) AUXILIARY 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(F856) AUXILIARY 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE
(F856) AUXILIARY 5-VOLT SUPPLY CIRCUIT OPEN
5-VOLT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (F856) AUXILIARY 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

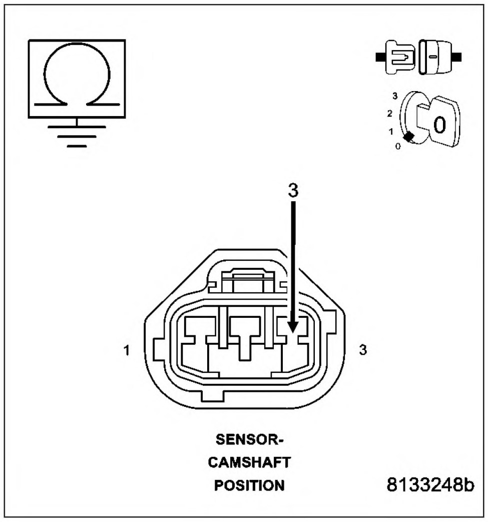
Turn the ignition off.

Disconnect the C1 PCM harness connector.

Disconnect all the Sensors that share the (F856) Auxiliary 5-volt Supply circuit.

NOTE: This code can be caused by the improper installation of after market accessories that may be causing excessive noise on the (F856) 5-volt Supply circuit.

Measure the resistance between ground and the (F856) Auxiliary 5-volt Supply circuit at the CMP Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) Auxiliary 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P1628-SENSOR REFERENCE VOLTAGE 2 CIRCUIT ERRATIC (CONTINUED)

3. SENSOR SHORTED TO GROUND

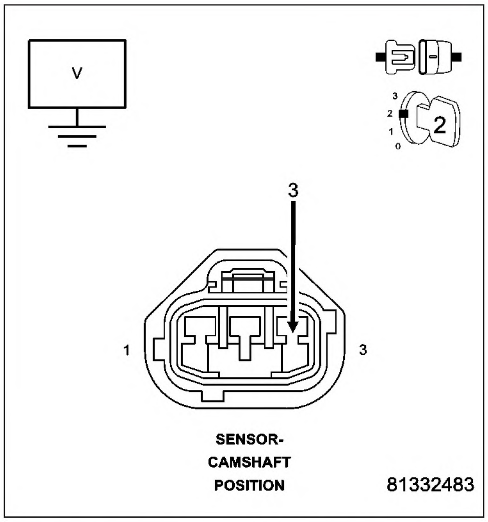
Connect the C1 PCM harness connector and all the previously disconnected Sensor except for the CMP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) Auxiliary 5-volt Supply circuit in the CMP Sensor harness connector.

CAUTION: You must Turn the Ignition OFF when disconnecting any of the Sensor harness connectors and Turn the Ignition On to check the voltage readings.

While monitoring the voltage, disconnect each Sensor harness connector that shares the (F856) Auxiliary 5-volt Supply circuit, one at a time.



Does the voltage increase above 4.5 volts when disconnecting any of the Sensor harness connectors?

Yes >> Replace the Sensor that causes the (F856) Auxiliary 5-volt Supply circuit voltage to increase when disconnected.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

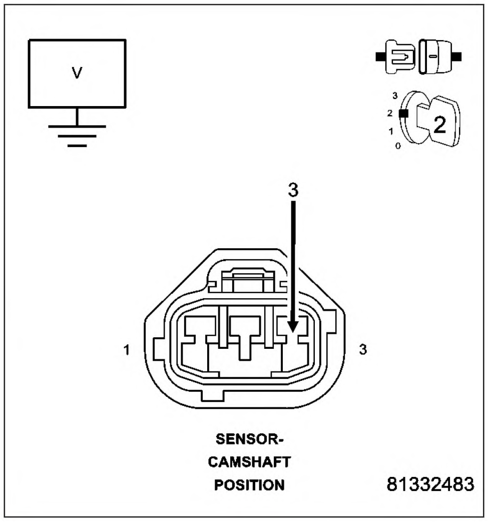
4. 5-VOLT SENSOR

Turn the ignition off.

Connect all the previously disconnected Sensors except for the CMP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) Auxiliary 5-volt Supply circuit in the CMP Sensor harness connector.



Is the voltage below 4.5 volts?

Yes >> Go To 5

No >> Replace the Cam Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1628-SENSOR REFERENCE VOLTAGE 2 CIRCUIT ERRATIC (CONTINUED)

5. (F856) AUXILIARY 5-VOLT SUPPLY CIRCUIT SHORTED TO BATTERY VOLTAGE

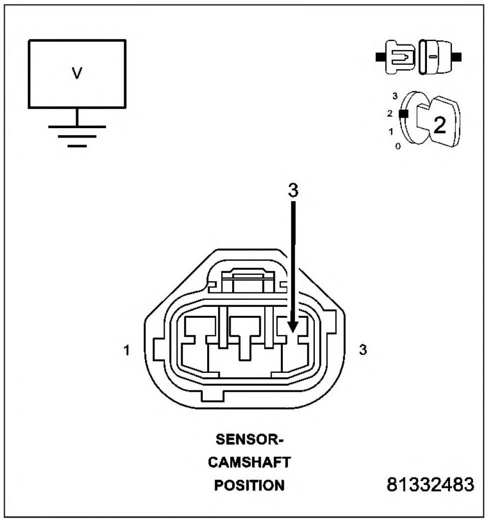
Turn the ignition off.

Disconnect the C1 PCM harness connector.

Disconnect all the Sensors that share the (F856) Auxiliary 5-volt Supply circuit.

Ignition on, engine not running.

Measure the voltage on the (F856) Auxiliary 5-volt Supply circuit at the CMP Sensor harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (F856) Auxiliary 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

6. (F856) AUXILIARY 5-VOLT SUPPLY CIRCUIT OPEN

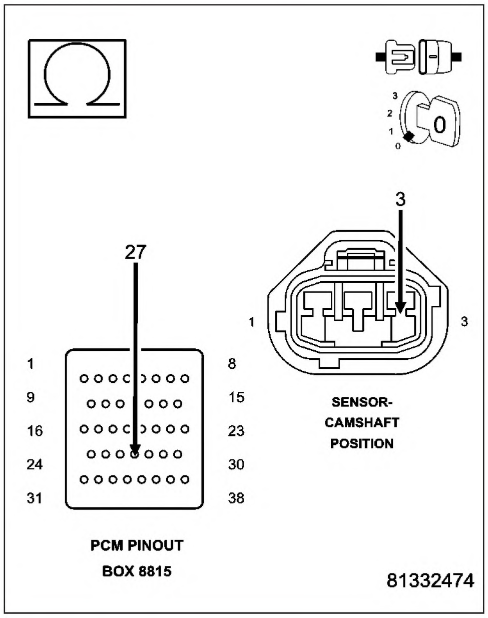
Turn the ignition off.

Reconnect all the sensors that were disconnected in the previous step except the CMP Sensor harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance in the (F856) Auxiliary 5-volt Supply circuit from the Sensor harness connector to the appropriate terminal of special tool #8815.

It may be necessary to perform this test from every sensor that uses the (F856) Auxiliary 5-volt Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (F856) Auxiliary 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1628-SENSOR REFERENCE VOLTAGE 2 CIRCUIT ERRATIC (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

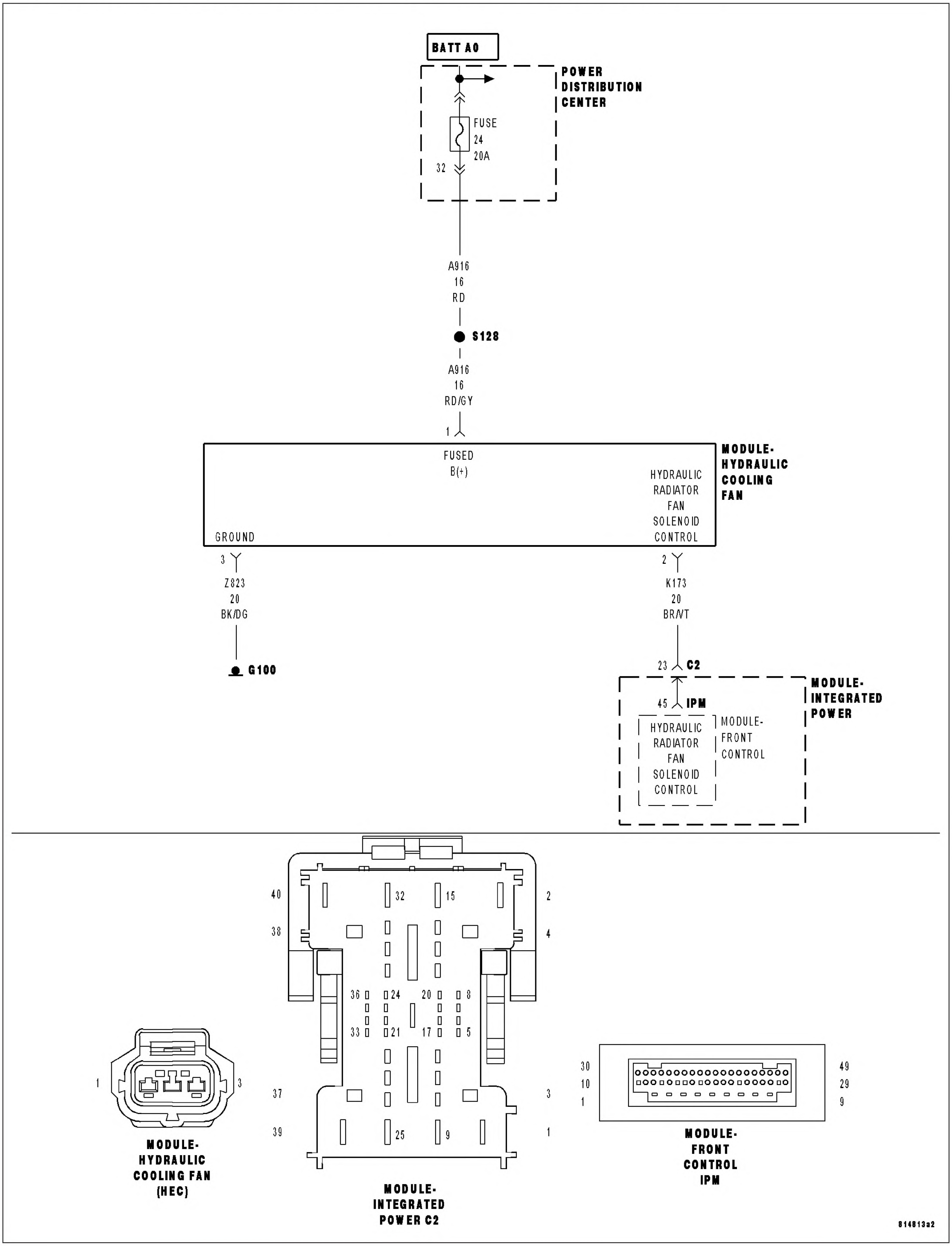
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1646-HYDRAULIC COOLING FAN CONTROL CIRCUIT LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 24 20A
32
A916 16 RD
S128
A916 16 RD/GY
1
FUSED B(+)
MODULE-HYDRAULIC COOLING FAN
HYDRAULIC RADIATOR FAN SOLENOID CONTROL
GROUND
3
Z823 20 BK/DG
G100
2
K173 20 BR/VT
23 C2
MODULE-INTEGRATED POWER
45 IPM
HYDRAULIC RADIATOR FAN SOLENOID CONTROL
MODULE-FRONT CONTROL
1
3
MODULE-HYDRAULIC COOLING FAN (HEC)
40 32 15 2
38 4
36 24 20 8
33 21 17 5
37 3
39 25 9 1
MODULE-INTEGRATED POWER C2
30 10 1
49 29 9
MODULE-FRONT CONTROL IPM
814813a2

P1646-HYDRAULIC COOLING FAN CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and engine running.
- **Set Condition:**
  An open or shorted condition in the Hydraulic Fan Solenoid Control circuit is detected by the Front Control Module.

Possible Causes
(A916) FUSED B+ CIRCUIT
(K173) HYDRAULID RADIATOR FAN SOLENOID CONTROL CIRCUIT OPEN
(K173) HYDRAULID RADIATOR FAN SOLENOID CONTROL CIRCUIT SHORTED GROUND
INTEGRATED POWER MODULE
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) .

Diagnostic Test

1. HYRDRAULIC COOLING FAN OPERATION

Ignition on, engine not running.

Using the scan tool, perform the Hydraulic Fan Solenoid Test.

Does the Hydraulic Cooling Fan operate properly?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

No >> Go To 2

---

2. (A916) FUSED B+ CIRCUIT CHECK

Turn the ignition off.

Disconnect the Hydraulic Cooling Fan Module harness connector.

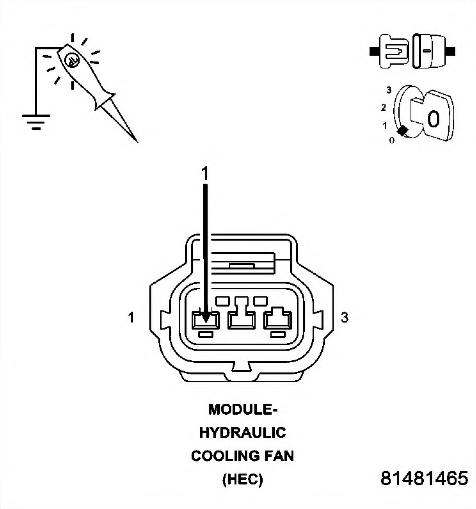
Using a 12-volt test light connected to ground, probe the (A916) Fused B+ circuit in the Hydraulic Cooling Fan Module harness connector.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A916) Fused B+ circuit

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



P1646-HYDRAULIC COOLING FAN CONTROL CIRCUIT LOW (CONTINUED)

3. (K173) HYDRAULIC RADIATOR FAN SOLENOID CONTROL CIRCUIT OPEN BETWEEN THE FAN AND IPM C2 HARNESS CONNECTOR

Disconnect the IPM C2 40 way connector.

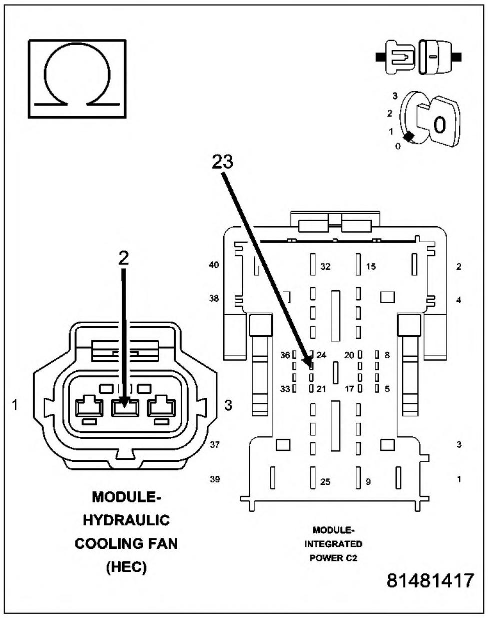
Measure the resistance of the (K173) Hydraulic Radiator Fan Solenoid control circuit from Fan Module harness connector to the IPM C2 40 way harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the excessive resistance in the (K173) Hydraulic Radiator Fan Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


Ω
3
2
1
0
23
2
1
3
40
38
32
15
2
4
36
24
20
8
33
21
17
5
37
39
25
9
3
1
MODULE-
HYDRAULIC
COOLING FAN
(HEC)
MODULE-
INTEGRATED
POWER C2
81481417

---

4. (K173) HYDRAULIC RADIATOR FAN SOLENOID CONTROL CIRCUIT SHORTED TO GROUND BETWEEN THE FAN AND IPM C2 HARNESS CONNECTOR

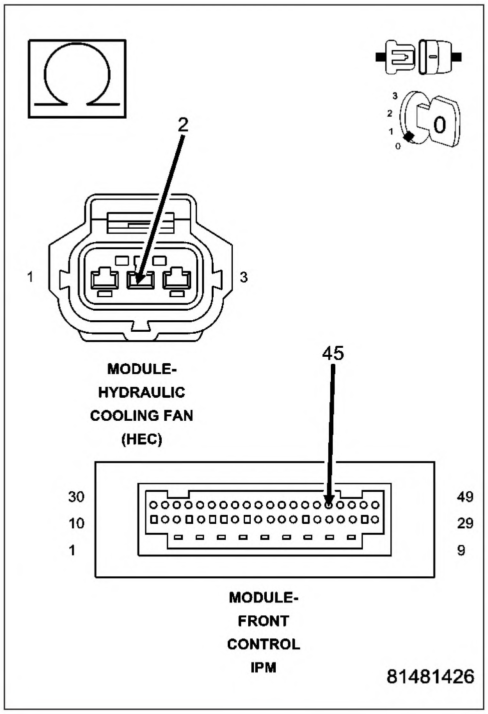
Measure the resistance between ground and the (K173) Hydraulic Radiator Fan Solenoid Control circuit in the Fan Module harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K173) Hydraulic Radiator Fan Solenoid Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5


Ω
3
2
1
0
2
1
3
MODULE-
HYDRAULIC
COOLING FAN
(HEC)
45
30
10
1
49
29
9
MODULE-
FRONT
CONTROL
IPM
81481426

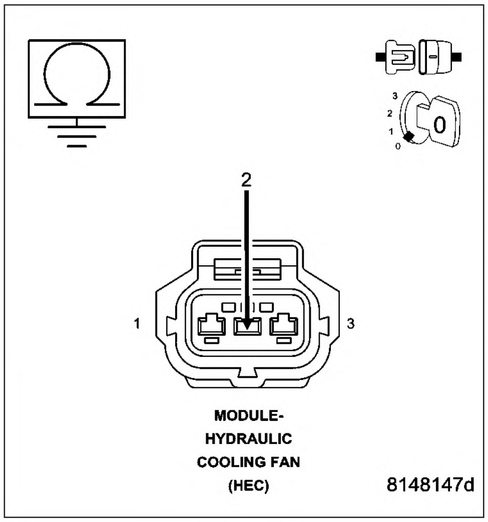
P1646-HYDRAULIC COOLING FAN CONTROL CIRCUIT LOW (CONTINUED)

5. (K173) HYDRAULIC RADIATOR FAN SOLENOID CONTROL CIRCUIT OPEN BETWEEN THE FAN AND IPM FCM 49 WAY HARNESS CONNECTOR

Connect the IPM C2 40 way connector.

Disconnect the IPM FCM 49 way harness connector.

Measure the resistance of the (K173) Hydraulic Radiator Fan Solenoid control circuit from Fan Module harness connector to the IPM FCM 49 way harness connector.



Is the resistance below 5.0 ohms?

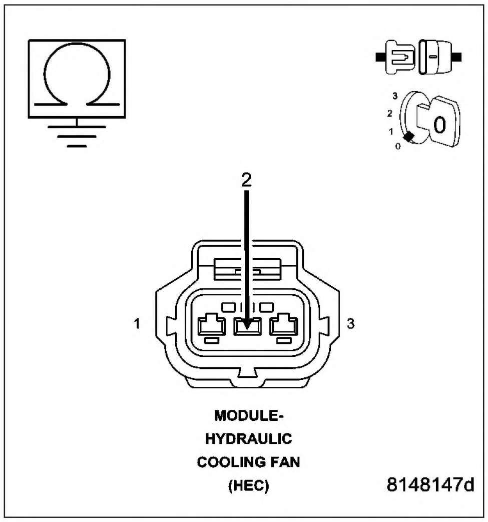
Yes >> Go To 6

No >> Repair the excessive resistance in the (K173) Hydraulic Radiator Fan Solenoid Control circuit in the IPM.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (K173) HYDRAULIC RADIATOR FAN SOLENOID CONTROL CIRCUIT SHORTED TO GROUND BETWEEN THE FAN AND IPM FCM 49 WAY HARNESS CONNECTOR

Measure the resistance between ground and the (K173) Hydraulic Radiator Fan Solenoid Control circuit in the Fan Module harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K173) Hydraulic Radiator Fan Solenoid Control circuit in the IPM.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

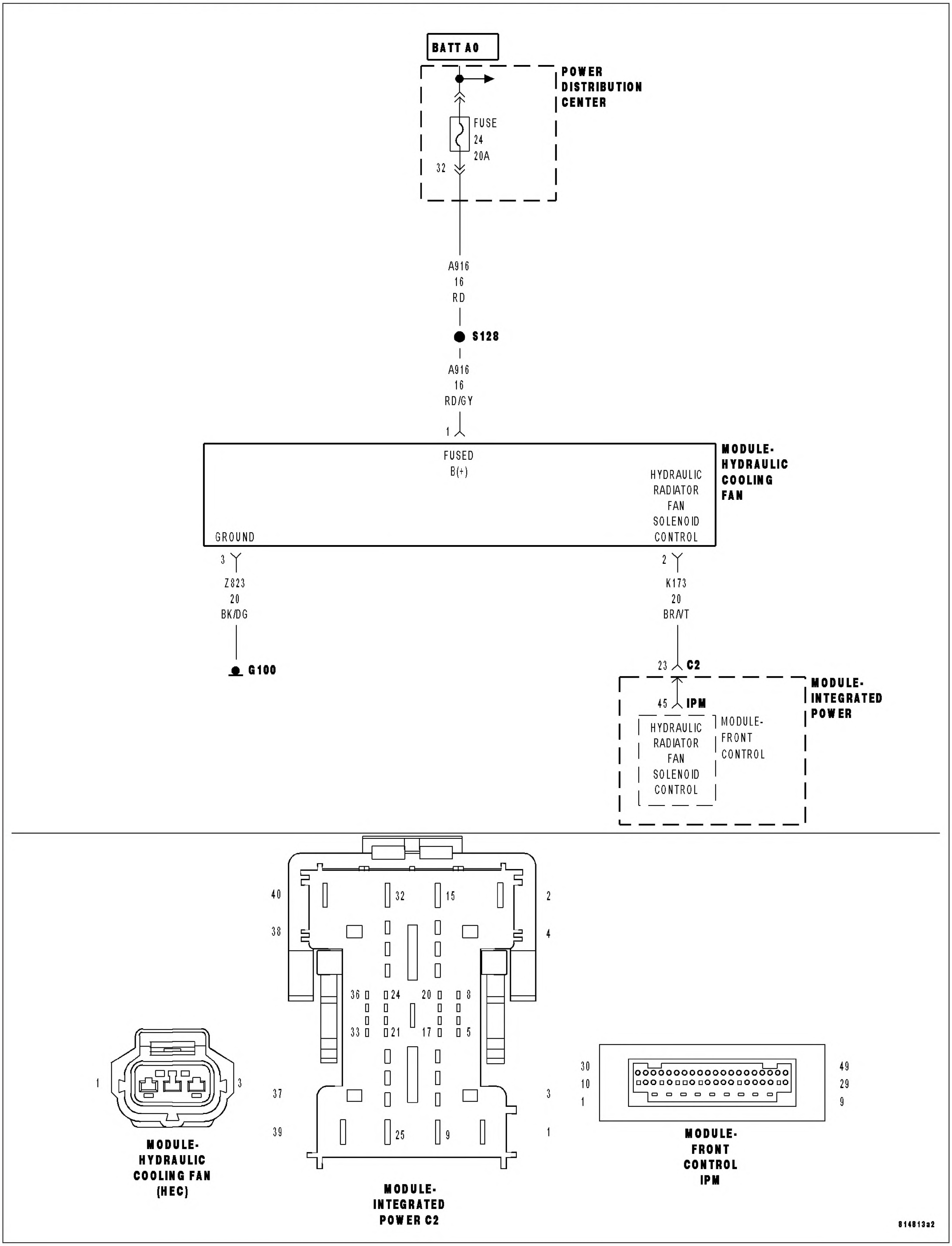
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST VER - 1.

No >> Replace and program the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST VER - 1.

P1647-HYDRAULIC COOLING FAN CONTROL CIRCUIT HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 24 20A
32
A916 16 RD
S128
A916 16 RD/GY
1
FUSED B(+)
HYDRAULIC RADIATOR FAN SOLENOID CONTROL
MODULE-HYDRAULIC COOLING FAN
GROUND
3
Z823 20 BK/DG
G100
2
K173 20 BR/VT
23 C2
45 IPM
HYDRAULIC RADIATOR FAN SOLENOID CONTROL
MODULE-FRONT CONTROL
MODULE-INTEGRATED POWER
1
3
MODULE-HYDRAULIC COOLING FAN (HEC)
40 32 15 2
38 4
36 24 20 8
33 21 17 5
37 3
39 25 9 1
MODULE-INTEGRATED POWER C2
30 10 1
49 29 9
MODULE-FRONT CONTROL IPM
814813a2

P1647-HYDRAULIC COOLING FAN CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and engine running.
- **Set Condition:**
  An open or shorted condition in the Hydraulic Fan Solenoid Control circuit is detected by the Front Control Module.

Possible Causes
(Z823) GROUND CIRCUIT OPEN
(K173) HYDRAULID RADIATOR FAN SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE
INTEGRATED POWER MODULE
FRONT CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) .

Diagnostic Test

1. HYRDRAULIC COOLING FAN OPERATION

Ignition on, engine not running.

Using the scan tool, perform the Hydraulic Fan Solenoid Test.

Does the Hydraulic Cooling Fan operate properly?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

No >> Go To 2

---

2. (Z823) GROUND CIRCUIT CHECK

Turn the ignition off.

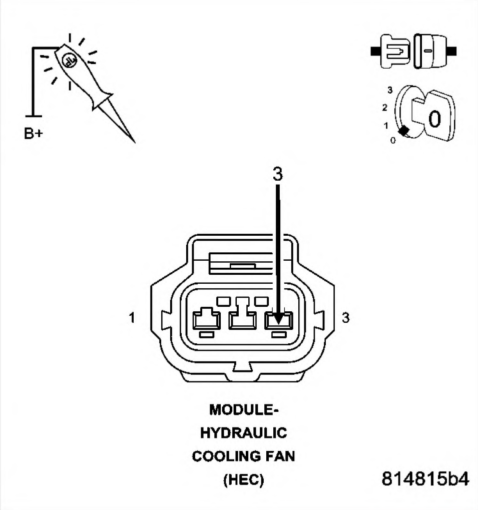
Disconnect the Hydraulic Cooling Fan Module harness connector.

Using a 12-volt test light connected to B+, probe the (Z823) Ground circuit in the Hydraulic Cooling Fan Module harness connector.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open in the (Z823) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



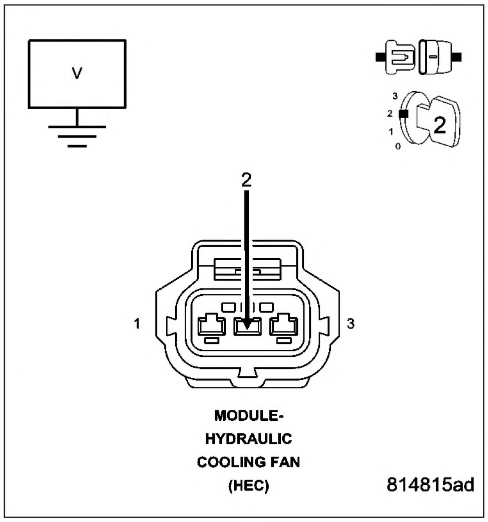
P1647-HYDRAULIC COOLING FAN CONTROL CIRCUIT HIGH (CONTINUED)

3. (K173) HYDRAULIC RADIATOR FAN SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE BETWEEN THE FAN AND IPM FCM 49 WAY HARNESS CONNECTOR

Disconnect the IPM FCM 49 way connector.

Ignition on, engine not running.

Measure the voltage on the (K173) Hydraulic Radiator Fan Solenoid control circuit at the Hydraulic Fan Module harness connector.



Is the voltage above 0 volts?

Yes >> Go To 4

No >> Go To 5

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

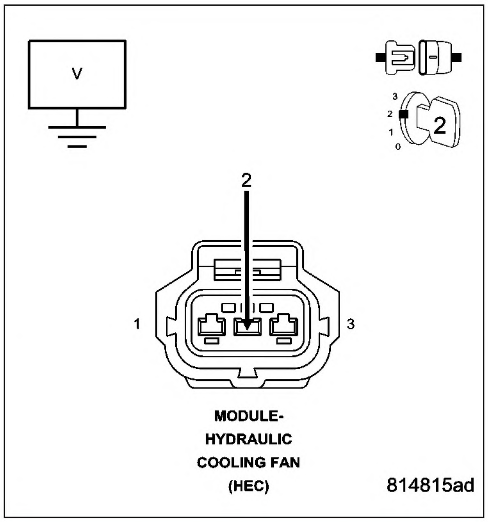
4. (K173) HYDRAULIC RADIATOR FAN SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE IN THE IPM

Turn the ignition off.

Disconnect the C2 IPM 40 way harness connector.

Ignition on, engine not running.

Measure the voltage on the (K173) Hydraulic Radiator Fan Solenoid control circuit at the Hydraulic Fan Module harness connector.



Is the voltage above 0 volts?

Yes >> Repair the short to voltage in the (K173) Hydraulic Radiator Fan Solenoid control circuit between the Hydraulic Cooling Fan Module harness connector and the C2 IPM harness connector.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Integrated Power Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1647-HYDRAULIC COOLING FAN CONTROL CIRCUIT HIGH (CONTINUED)

5. FRONT CONTROL MODULE

NOTE: Before continuing, check the FCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST VER - 1.

No >> Replace and program the Front Control Module per Service Information.
Perform BODY VERIFICATION TEST VER - 1.

P1696-EEPROM MEMORY WRITE DENIED/INVALID

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  An attempt to program/write to the internal EEPROM failed, Also checks at power down. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SCAN TOOL DISPLAYS A WRITE FAILURE

With a scan tool, perform the SRI Memory Test.

Does scan tool display Write Failure?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. SCAN TOOL DISPLAYS A WRITE REFUSED

With the a scan tool, perform the SRI Memory Test.

Does the scan tool display Write Refused?

Yes >> Go To 3

No >> Go To 4

---

3. PCM REFUSED 2ND TEST

With a scan tool, perform the SRI Memory Test a third time.

NOTE: Retest the SRI Memory two more times.

Does the scan tool display Write Refused again?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

---

4. SCAN TOOL DISPLAYS SRI MILEAGE INVALID

With a scan tool, perform the SRI Memory Test.

Does the scan tool display SRI Mileage Invalid?

Yes >> Update the mileage and retest the SRI Memory.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P1696-EEPROM MEMORY WRITE DENIED/INVALID (CONTINUED)

5. COMPARE SRI MILEAGE WITH ODOMETER

Compare the SRI Mileage stored with the Instrument Panel Odometer.

Is the mileage within the specified range displayed on the scan tool?

Yes >> Test Complete.

No >> Update the mileage and retest the SRI Memory.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P1697-EMR (SRI) MILEAGE NOT STORED

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  An attempt to program/write to the internal EEPROM failed, Also checks at powerdown. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. SCAN TOOL DISPLAYS A WRITE FAILURE

With a scan tool, perform the SRI Memory Test.

Does scan tool display Write Failure?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. SCAN TOOL DISPLAYS A WRITE REFUSED

With the a scan tool, perform the SRI Memory Test.

Does the scan tool display Write Refused?

Yes >> Go To 3

No >> Go To 4

---

3. PCM REFUSED 2ND TEST

With a scan tool, perform the SRI Memory Test a third time.

NOTE: Retest the SRI Memory two more times.

Does the scan tool display Write Refused again?

Yes >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

---

4. SCAN TOOL DISPLAYS SRI MILEAGE INVALID

With a scan tool, perform the SRI Memory Test.

Does the scan tool display SRI Mileage Invalid?

Yes >> Update the mileage and retest the SRI Memory.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P1697-EMR (SRI) MILEAGE NOT STORED (CONTINUED)

5. COMPARE SRI MILEAGE WITH ODOMETER

Compare the SRI Mileage stored with the Instrument Panel Odometer.

Is the mileage within the specified range displayed on the scan tool?

Yes >> Test Complete.

No >> Update the mileage and retest the SRI Memory.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2072-ELECTRONIC THROTTLE CONTROL SYSTEM - ICE BLOCKAGE

For the Engine circuit diagram (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM recognizes the Throttle plate is stuck during extremely cold Ambient Temperature operation. The throttle plate goes through a de-icing procedure. If the throttle blade still doesn’t move this fault sets. The MIL will not illuminate. The vehicle will be in Limp home condition, limiting rpm and vehicle speed.

Possible Causes
THROTTLE PLATE FROZEN

Diagnostic Test

1. THROTTLE BODY INSPECTION

Ignition on, engine not running.

With a scan tool, read DTCs and record the related Freeze Frame data.

NOTE: This DTC sets in extreme cold Ambient Temperatures with the throttle plate stuck by the time the vehicle gets to the dealership the condition may be corrected.

NOTE: Diagnose any other DTCs that may also be set before continuing.

Turn the ignition off.

Remove the Air Cleaner Assembly from the Throttle Body.

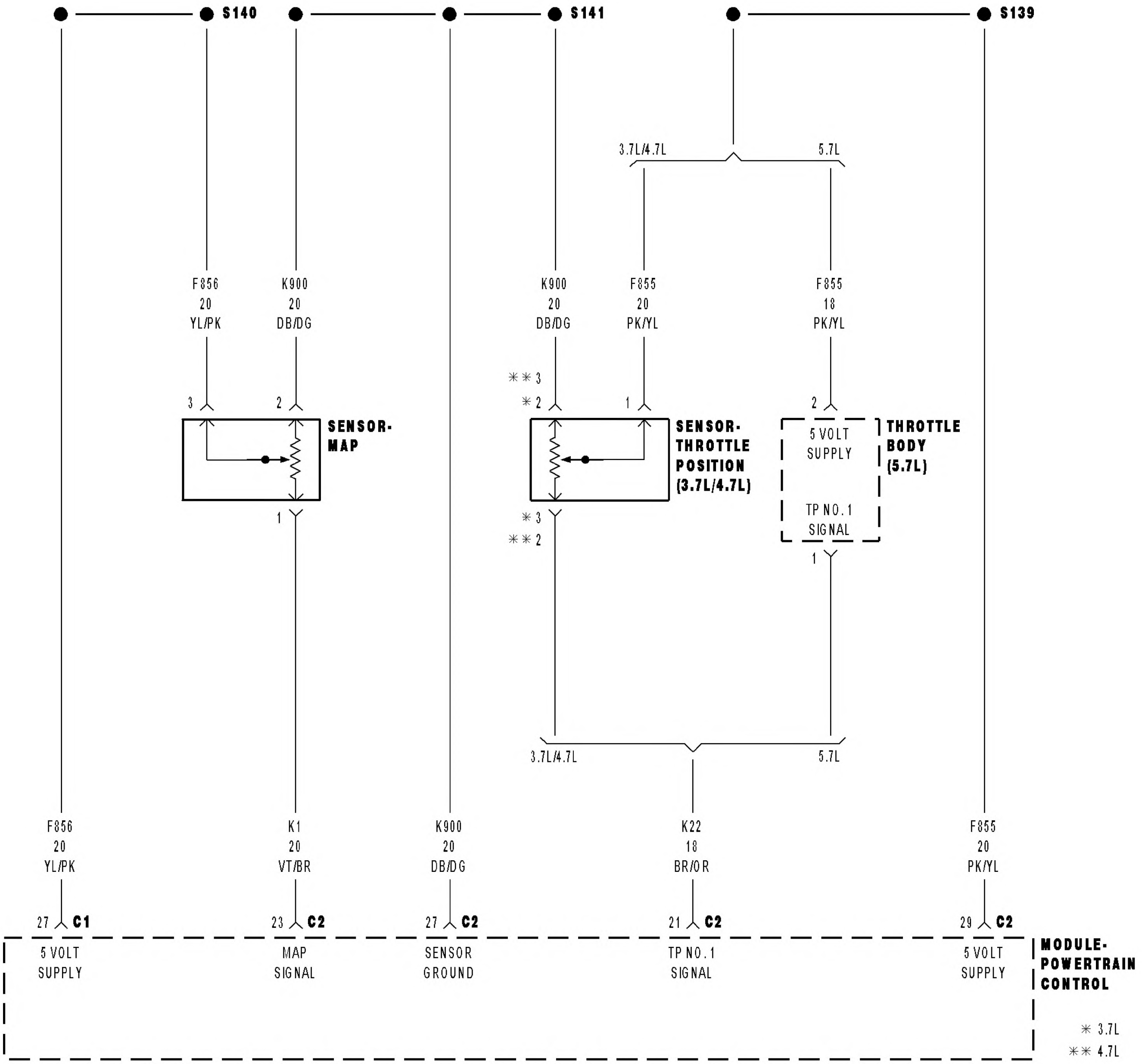
Check for any signs of a foreign material (ice or dirt) on the Throttle Plate or in the bore causing the Throttle Plate to stick.

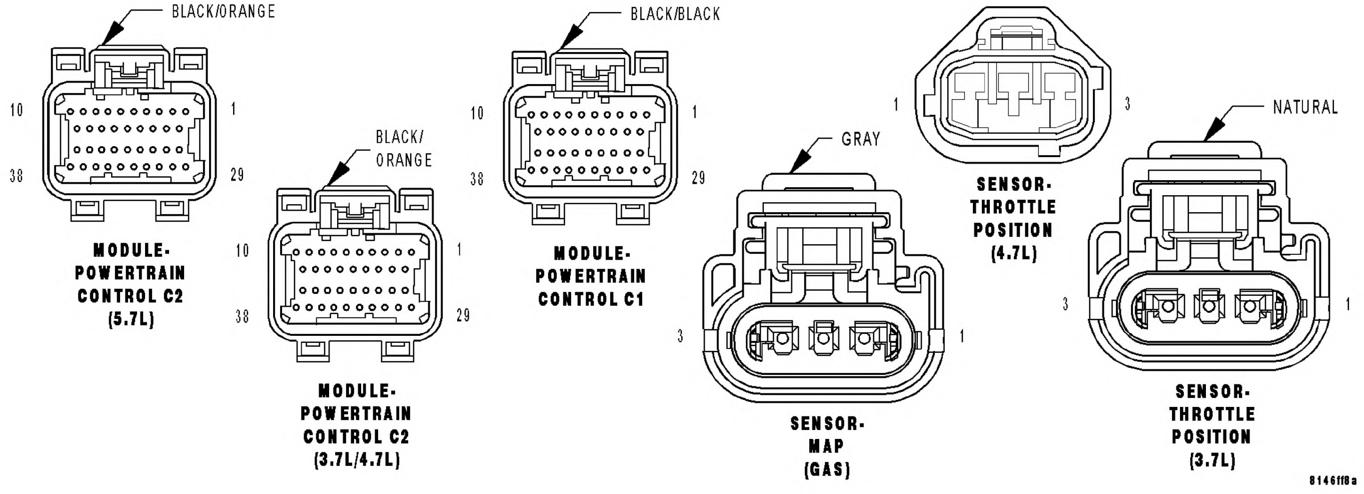
Is the throttle blade still stuck because it is frozen?

Yes >> Allow the Throttle Body to thaw naturally in a room temperature climate.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED


S140
S141
S139
3.7L/4.7L
5.7L
F856 20 YL/PK
K900 20 DB/DG
K900 20 DB/DG
F855 20 PK/YL
F855 18 PK/YL
3
2
1
✻✻3
✻2
1
2
✻3
✻✻2
1
SENSOR-MAP
SENSOR-THROTTLE POSITION (3.7L/4.7L)
5 VOLT SUPPLY
TP NO.1 SIGNAL
THROTTLE BODY (5.7L)
3.7L/4.7L
5.7L
F856 20 YL/PK
K1 20 VT/BR
K900 20 DB/DG
K22 18 BR/OR
F855 20 PK/YL
27 C1
23 C2
27 C2
21 C2
29 C2
5 VOLT SUPPLY
MAP SIGNAL
SENSOR GROUND
TP NO.1 SIGNAL
5 VOLT SUPPLY
MODULE-POWERTRAIN CONTROL
✻ 3.7L
✻✻ 4.7L


BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/ ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
GRAY
3
1
SENSOR-MAP (GAS)
1
3
SENSOR-THROTTLE POSITION (4.7L)
NATURAL
3
1
SENSOR-THROTTLE POSITION (3.7L)
8146ff8a

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

This DTC sets when an unexpected high intake manifold air flow condition exists that can lead to increased engine speed and puts the NGC into a High Air flow Protection limiting mode. The High Air flow Protection feature includes RPM limits for when a Throttle and/or MAP sensor limp-in fault is present.

- **When Monitored:**
  During all drive modes
- **Set Condition:**
  If vacuum drops below 1.5″Hg with engine RPM greater than 2000 RPM and closed throttle. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
VACUUM LEAK
RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K22) TP SENSOR NO.1 SIGNAL CIRCUIT
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
MAP SENSOR
THROTTLE POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Diagnose any TP Sensor or MAP Sensor component DTCs before continuing.

NOTE: If the P0501 - No Vehicle Speed Signal is set long with this DTC, refer to the P0501 diagnostics before continuing.

NOTE: The throttle plate and linkage should be free from binding and carbon build up.

NOTE: Make sure the throttle plate is at the idle position.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

2. VACUUM LEAK

NOTE: This code is enabled on engines with a plastic intake manifold and is intended to shut down the engine if a large crack occurs.

NOTE: A large vacuum leak is most likely the cause of this DTC.

Inspect the Intake Manifold for leaks and cracks.

Inspect the Power Brake Booster for any vacuum leaks.

Inspect the PCV system for proper operation and vacuum leaks.

Inspect the throttle plate to see if it is bent and will close entirely, if it is bent it may need to be replaced.

Inspect the MAP Sensor for proper installation.

Verify the engine is free from any mechanical failures.

Were any vacuum leaks found?

Yes >> Repair the vacuum leak as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

3. MAP SENSOR OPERATION

Start the engine.

With a scan tool, monitor the MAP Sensor voltage.

Snap the throttle.

Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at wide open throttle?

Yes >> Go To 4

No >> Go To 11

4. TP SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor voltage while slowly pressing the throttle pedal from closed to wide open throttle.

Does voltage start at approximately 0.8 of a volt and go above 3.5 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

5. EXCESSIVE RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the TP Sensor harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

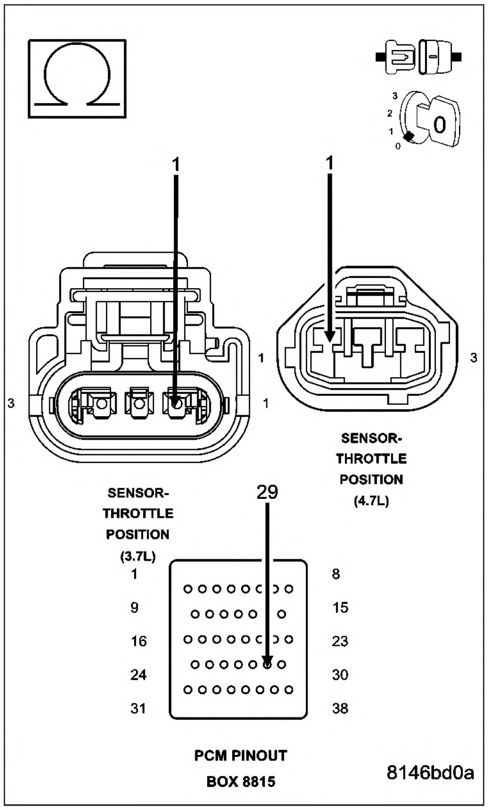
Measure the resistance of the (F855) 5-volt Supply circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


1
1
3
1
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
29
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8146bd0a

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6. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

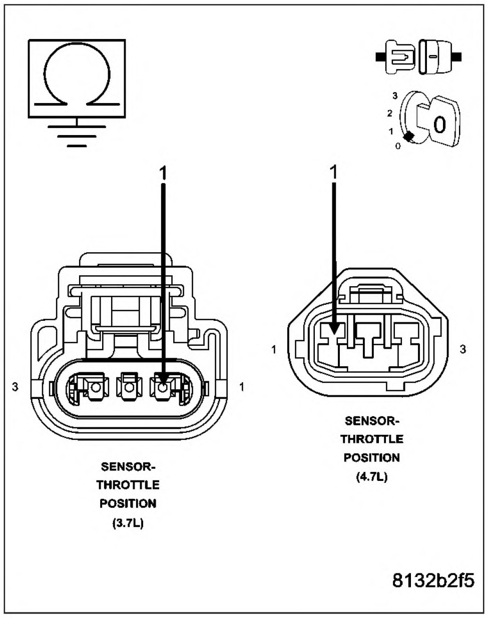
Measure the resistance between ground and (F855) 5-volt Supply circuit in the TP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7


1
1
3
1
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
8132b2f5

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

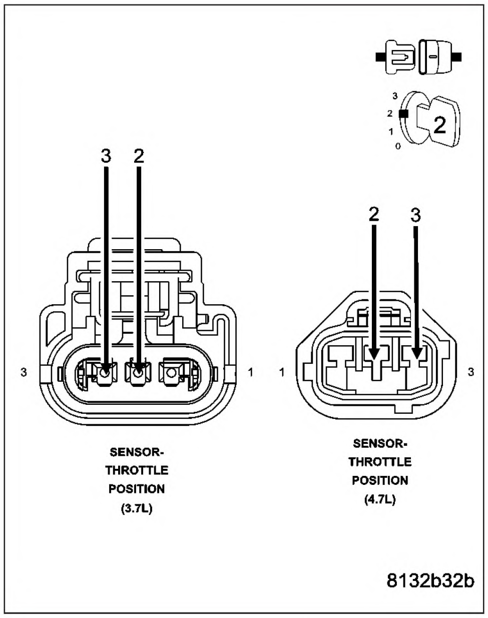
7. THROTTLE POSITION SENSOR

Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor voltage.

Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K900) Sensor ground circuit in the Sensor harness connector.


3
2
2
3
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
8132b32b

Does the TP Sensor voltage change from approximately 4.9 volts to below 0.5 of a volt with the jumper wire installed?

Yes >> Replace the Throttle Position Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

NOTE: Remove the jumper wire before continuing.

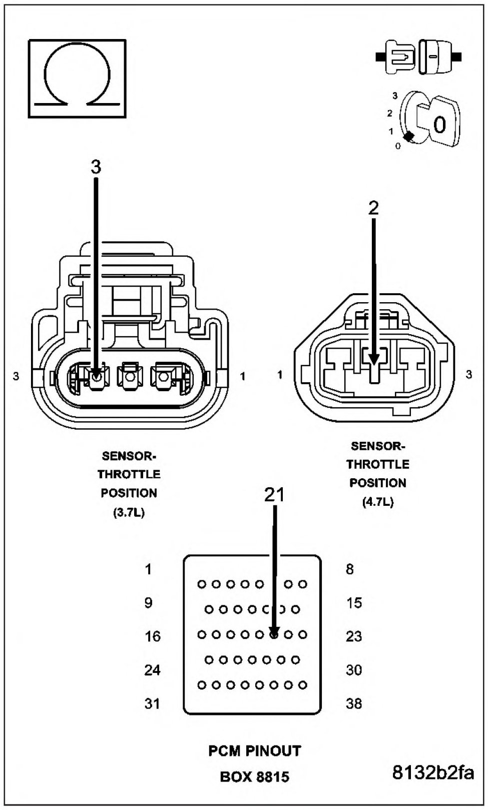
8. EXCESSIVE RESISTANCE IN THE (K22) TP NO.1 SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
0
3
2
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
21
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8132b2fa

Is the resistance below 5.0 ohms?

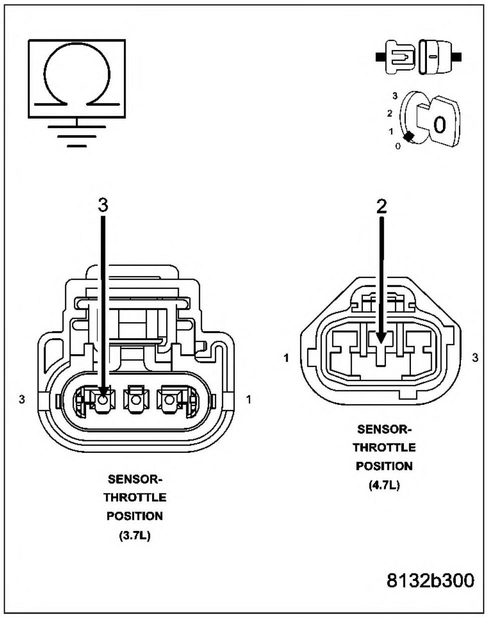
Yes >> Go To 9

No >> Repair the excessive resistance in the (K22) TP Sensor No.1 Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

9. (K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit in the TP Sensor harness connector.


3
2
3
1
1
3
SENSOR-
THROTTLE
POSITION
(4.7L)
SENSOR-
THROTTLE
POSITION
(3.7L)
3
2
1
0
0
8132b300

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

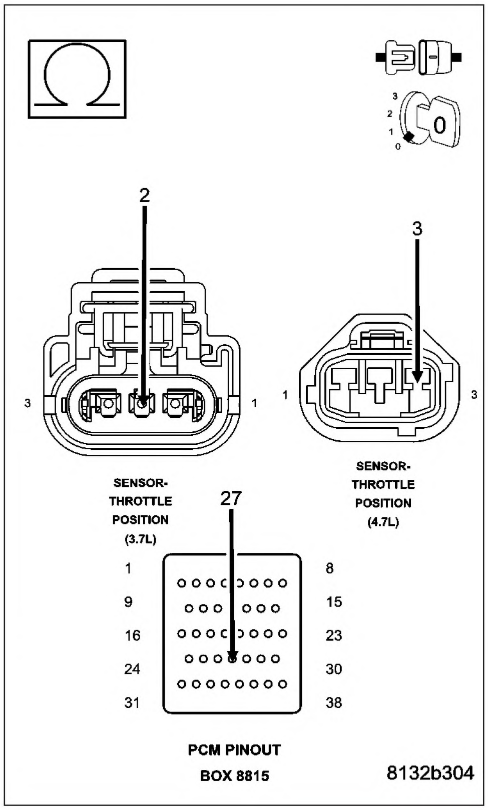
No >> Go To 10

---

10. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor ground circuit from the TP Sensor harness connector to the appropriate terminal of special tool #8815.


2
3
3
1
1
3
SENSOR-
THROTTLE
POSITION
(3.7L)
27
SENSOR-
THROTTLE
POSITION
(4.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
2
1
0
0
8132b304

Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

11. EXCESSIVE RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

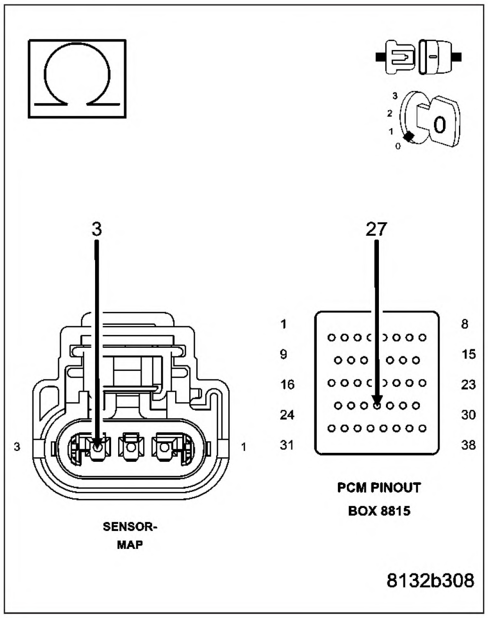
Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 12

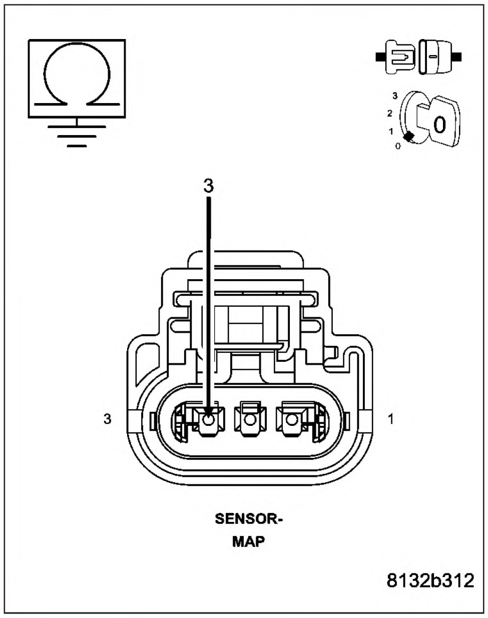
No >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

12. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.



Is the resistance above 100k ohms?

Yes >> Go To 13

No >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

13. MAP SENSOR

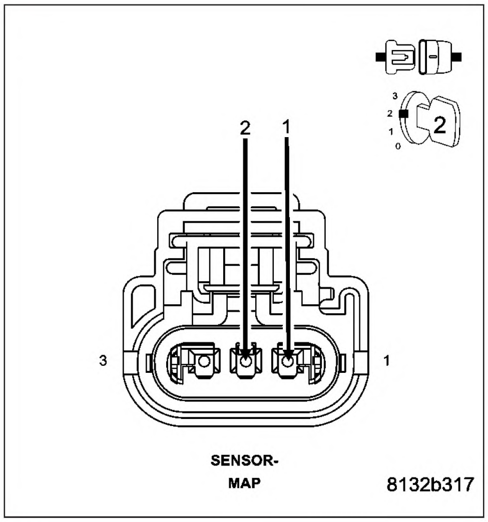
Turn the ignition off.

Connect the C1 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the MAP Sensor voltage.

Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit.



Does the scan tool display MAP voltage from approximately 4.9 volts to below 0.5 of a volt with the jumper wire installed?

Yes >> Replace the MAP Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

NOTE: Remove the jumper wire before continuing.

---

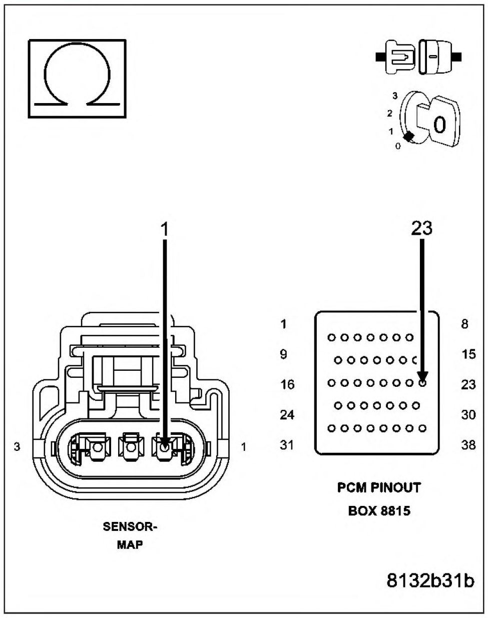
14. EXCESSIVE RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

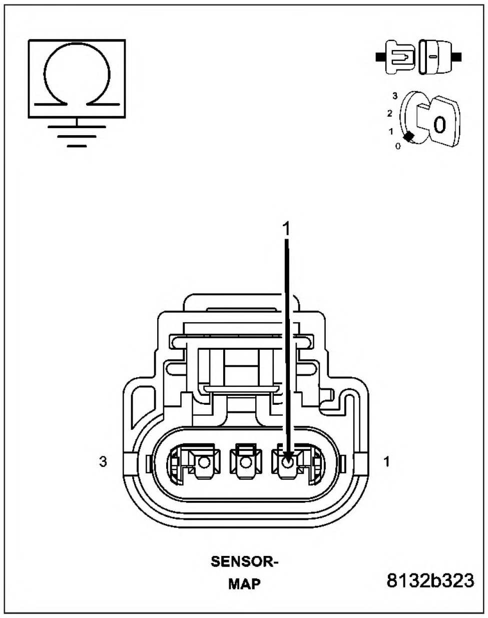
Yes >> Go To 15

No >> Repair the excessive resistance in the (K1) MAP Signal circuit
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

15. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K1) MAP Signal circuit in the MAP Sensor harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

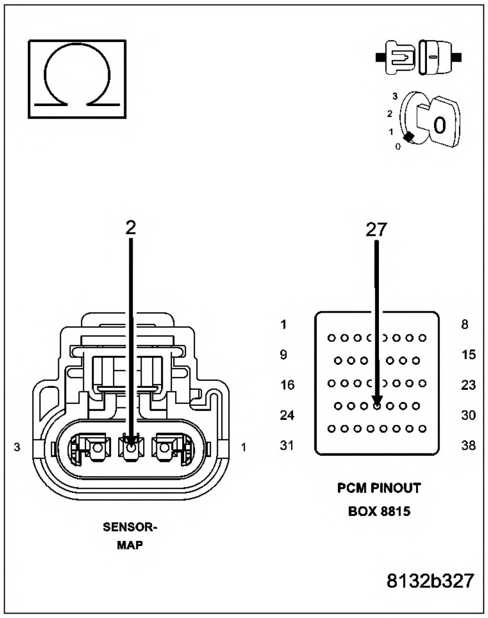
No >> Go To 16

---

16. EXCESSIVE RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2074-MAP/TPS CORRELLATION - HIGH AIRFLOW/VACUUM LEAK DETECTED (CONTINUED)

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

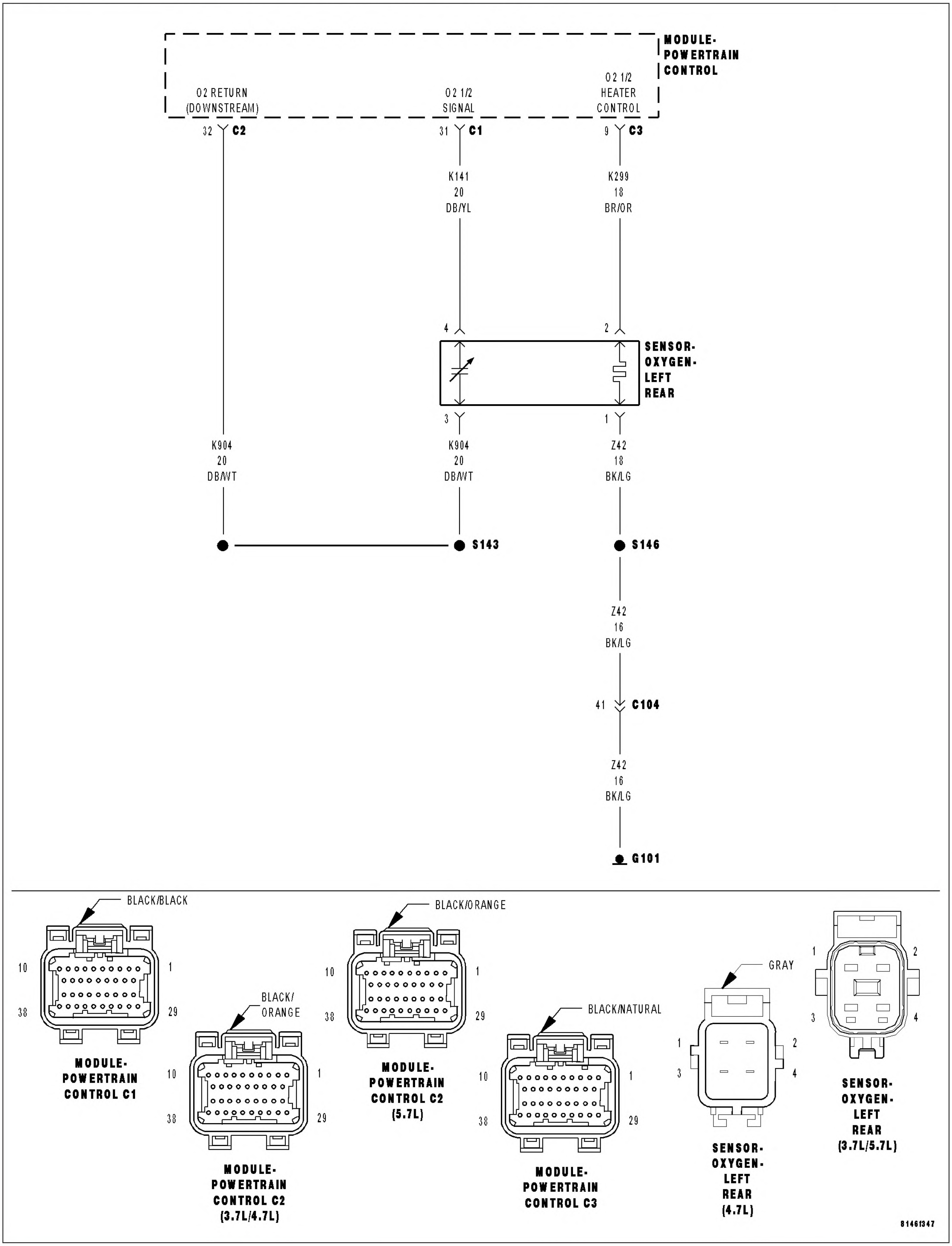
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2096-DOWNSTREAM FUEL TRIM SYSTEM 1 LEAN


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32
C2
31
C1
9
C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
8146f347

P2096-DOWNSTREAM FUEL TRIM SYSTEM 1 LEAN (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above (-7°C) 20°F, altitude below 8500 ft.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive as well as a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
ENGINE MECHANICAL
1/2 O2 SENSOR
(K141) O2 SENSOR 1/2 SIGNAL CIRCUIT
(K299) O2 1/2 HEATER CONTROL CIRCUIT
(K904) O2 RETURN DOWNSTREAM CIRCUIT
FUEL CONTAMINATION

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check the vehicle repair history. If the 1/2 O2 Sensor has been replaced make sure that the O2 sensor was properly installed and meets OEM specification.

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2096-DOWNSTREAM FUEL TRIM SYSTEM 1 LEAN (CONTINUED)

2. EXHAUST LEAK

Turn the ignition off.

WARNING: To avoid personal injury from the exhaust system being hot, allow the exhaust to cool down to a safe temperature before performing a physical inspection. Failure to follow these instructions can result in personal injury or death.

Visually and Physically inspect the exhaust system for holes, cracks, and blockage in the exhaust system.

Is the exhaust system is good condition?

Yes >> Go To 3

No >> Repair or Replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

AIR INDUCTION SYSTEM - must be free from leaks
ENGINE VACUUM - must be at least 13 inches in neutral
ENGINE VALVE TIMING - must be within specifications
ENGINE COMPRESSION - must be within specifications
ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks
ENGINE PCV SYSTEM - must flow freely
TORQUE CONVERTER STALL SPEED - must be within specifications
POWER BRAKE BOOSTER - no internal vacuum leaks
FUEL - must be free of contamination
FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P2096-DOWNSTREAM FUEL TRIM SYSTEM 1 LEAN (CONTINUED)

4. O2 SENSOR

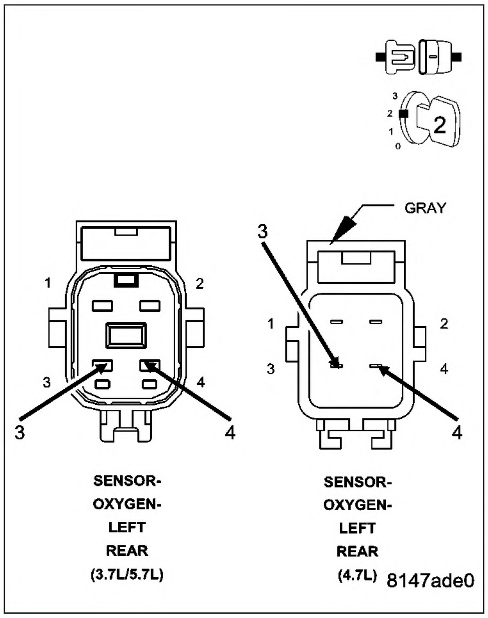
Ignition on, engine not running.

Disconnect the 1/2 O2 Sensor harness connector.

With the scan tool, monitor the 1/2 O2 Sensor voltage.

The O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Using a jumper wire, jump the (K141) O2 Sensor 1/2 Signal circuit to the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


2
3
2
1
0
GRAY
1
2
3
4
3
4
1
2
3
4
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147ade0

NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.

Did the O2 Sensor volts change from 5.0 volts to 2.5 volts?

Yes >> Replace the O2 Sensor
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2096-DOWNSTREAM FUEL TRIM SYSTEM 1 LEAN (CONTINUED)

5. (K141) O2 SENSOR 1/2 SIGNAL CIRCUIT

Remove the jump wire.

Ignition on, engine not running.

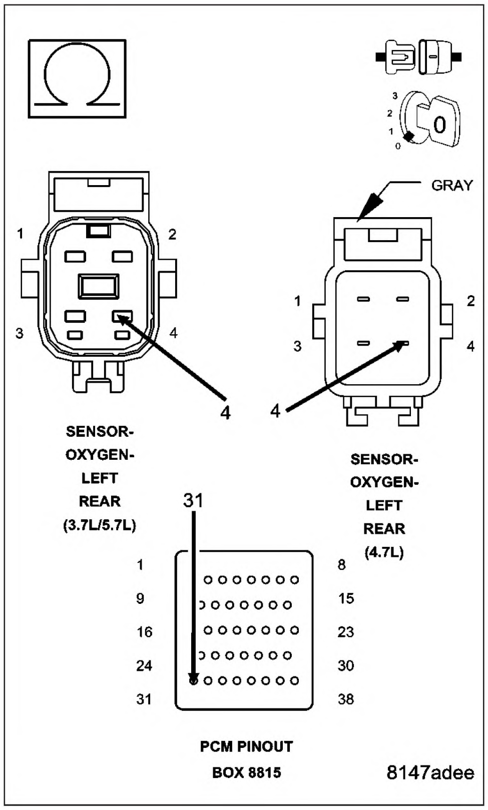
With the scan tool, monitor the 1/2 O2 Sensor voltage.

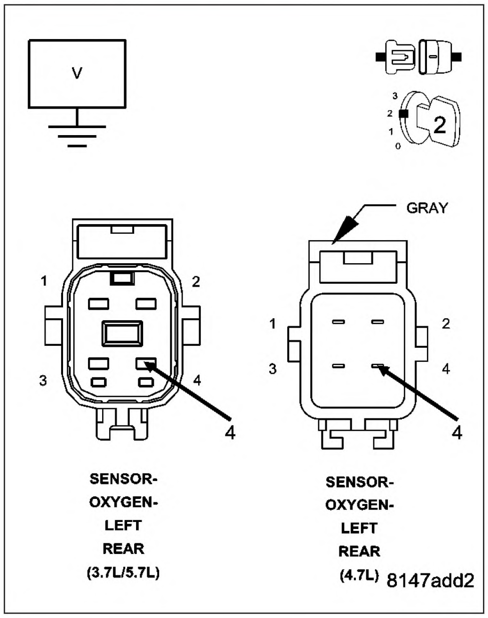
Is the voltage above 4.8 volts?

Yes >> Go To 6

No >> Check the (K141) O2 Sensor 1/2 Signal circuit for an open or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


0
3
2
1
0
GRAY
1
2
3
4
1
2
3
4
4
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
31
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147adee


V
3
2
1
0
2
GRAY
1
2
3
4
1
2
3
4
4
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147add2

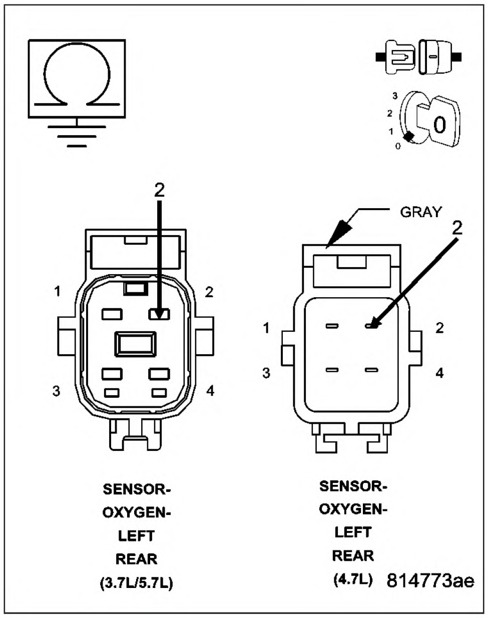
P2096-DOWNSTREAM FUEL TRIM SYSTEM 1 LEAN (CONTINUED)

6. (K299) O2 SENSOR 1/2 HEATER CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K299) O2 Sensor 1/2 Heater Control circuit from the O2 Sensor harness connector.


2
1
2
3
4
GRAY
2
1
2
3
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
814773ae

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K299) O2 Sensor 1/2 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P2096-DOWNSTREAM FUEL TRIM SYSTEM 1 LEAN (CONTINUED)

7. (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.

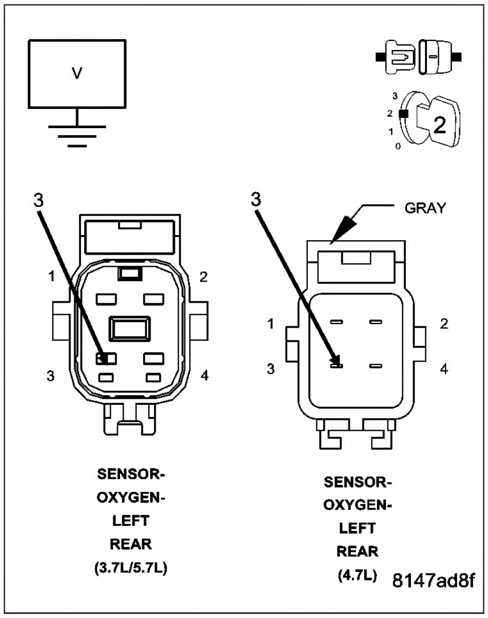
Is the voltage at 2.5 volts?

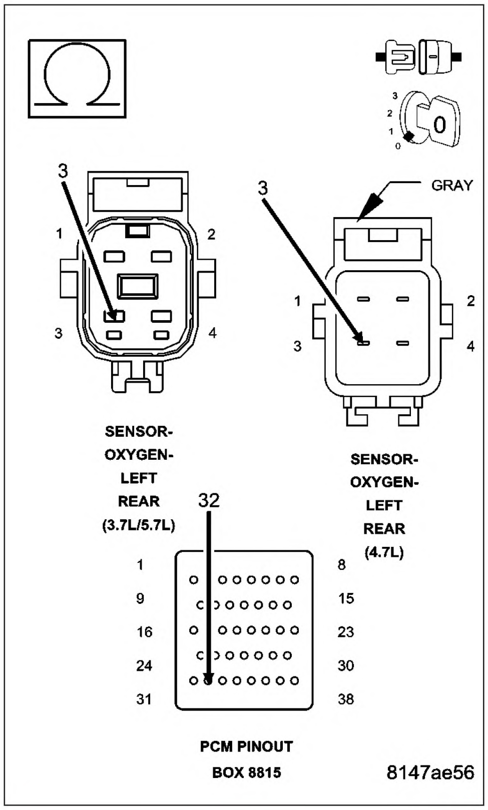
Yes >> Check the fuel system for contaminants.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

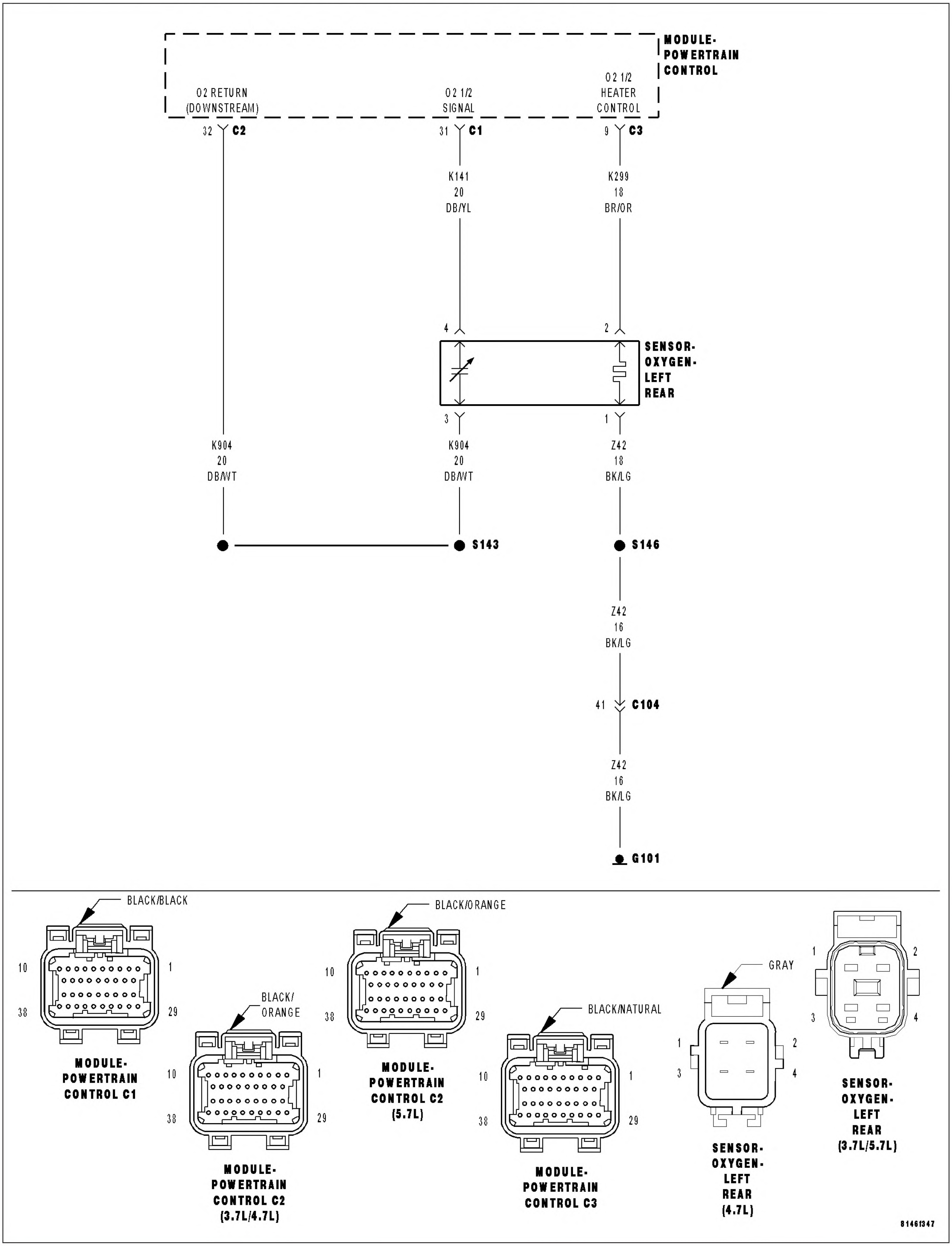
No >> Check the (K904) O2 Return Downstream circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


V
3
2
1
0
2
3
1
2
3
4
3
GRAY
1
2
3
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
8147ad8f


Ω
3
2
1
0
0
3
1
2
3
4
3
GRAY
1
2
3
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147ae56

P2097-DOWNSTREAM FUEL TRIM SYSTEM 1 RICH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 1/2
SIGNAL
O2 1/2
HEATER
CONTROL
32 C2
31 C1
9 C3
K141
20
DB/YL
K299
18
BR/OR
4
2
SENSOR-
OXYGEN-
LEFT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
81461347

P2097-DOWNSTREAM FUEL TRIM SYSTEM 1 RICH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above (-7°) 20°F, altitude below 8500 ft.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive as well as a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
ENGINE MECHANICAL
1/2 O2 SENSOR
(K141) O2 SENSOR 1/2 SIGNAL CIRCUIT
(K299) O2 HEATER 1/2 CONTROL CIRCUIT
(K904) O2 RETURN DOWNSTREAM CIRCUIT
FUEL CONTAMINATION

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check the vehicle repair history. If the 1/2 O2 has been replaced make sure that the O2 sensor was properly installed and meets OEM specification.

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2097-DOWNSTREAM FUEL TRIM SYSTEM 1 RICH (CONTINUED)

2. EXHAUST LEAK

Turn the ignition off.

WARNING: To avoid personal injury from the exhaust system being hot, allow the exhaust to cool down to a safe temperature before performing a physical inspection. Failure to follow these instructions can result in personal injury or death.

Visually and Physically inspect the exhaust system for holes, cracks and blockage in the exhaust system.

Is the exhaust system is good condition?

Yes >> Go To 3

No >> Repair or Replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems

AIR INDUCTION SYSTEM - must be free from leaks.

ENGINE VACUUM - must be at least 13 inches in neutral

ENGINE VALVE TIMING - must be within specifications

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks

ENGINE PCV SYSTEM - must flow freely

TORQUE CONVERTER STALL SPEED - must be within specifications

POWER BRAKE BOOSTER - no internal vacuum leaks

FUEL - must be free of contamination

FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P2097-DOWNSTREAM FUEL TRIM SYSTEM 1 RICH (CONTINUED)

4. O2 SENSOR

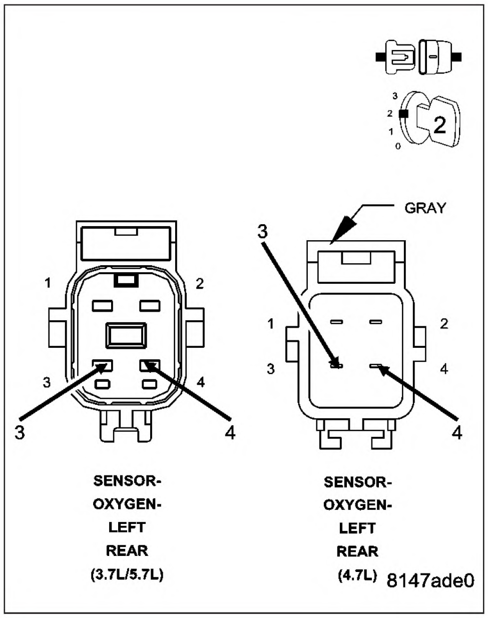
Ignition on, engine not running.

Disconnect the 1/2 O2 Sensor harness connector.

With the scan tool, monitor the 1/2 O2 Sensor voltage.

The O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Using a jumper wire, jump the (K141) O2 Sensor 1/2 Signal circuit to the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


2
GRAY
1
2
3
4
3
4
1
2
3
4
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147ade0

NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.

Did the O2 Sensor volts change from 5.0 volts to 2.5 volts?

Yes >> Replace the O2 Sensor
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2097-DOWNSTREAM FUEL TRIM SYSTEM 1 RICH (CONTINUED)

5. (K141) O2 SENSOR 1/2 SIGNAL CIRCUIT

Remove the jump wire.

Ignition on, engine not running.

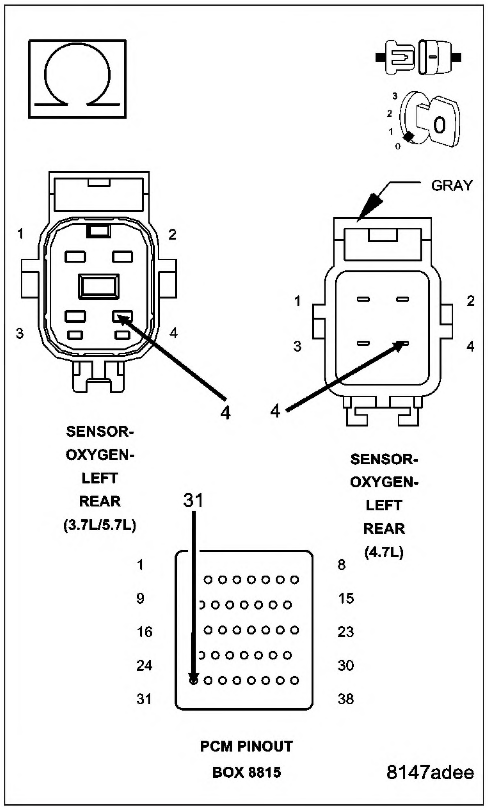
With the scan tool, monitor the 1/2 O2 Sensor voltage.

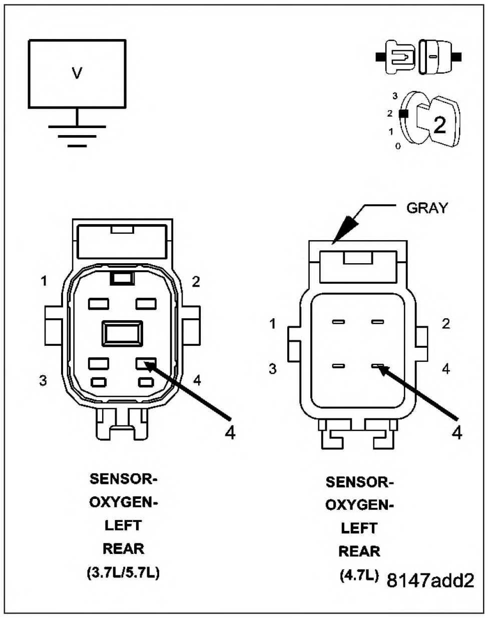
Is the voltage above 4.8 volts?

Yes >> Go To 6

No >> Check the (K141) O2 Sensor 1/2 Signal circuit for an open or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


Ω
0
3
2
1
0
GRAY
1
2
3
4
1
2
3
4
4
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
31
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147adee


V
2
3
2
1
0
GRAY
1
2
3
4
1
2
3
4
4
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
8147add2

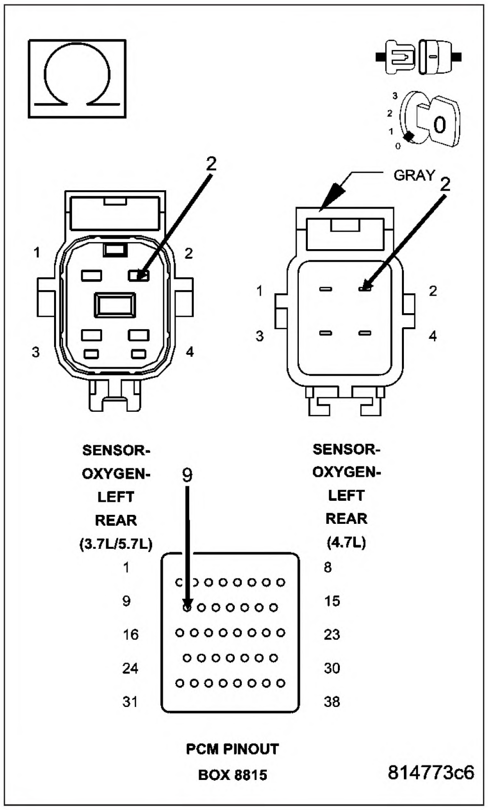
P2097-DOWNSTREAM FUEL TRIM SYSTEM 1 RICH (CONTINUED)

6. (K299) O2 SENSOR 1/2 HEATER CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance of the (K299) O2 Sensor 1/2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


2
1
2
3
4
GRAY
2
1
2
3
4
SENSOR-
OXYGEN-
LEFT
REAR
(3.7L/5.7L)
9
SENSOR-
OXYGEN-
LEFT
REAR
(4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
814773c6

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K299) O2 Sensor 1/2 Heater Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2097-DOWNSTREAM FUEL TRIM SYSTEM 1 RICH (CONTINUED)

7. (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.

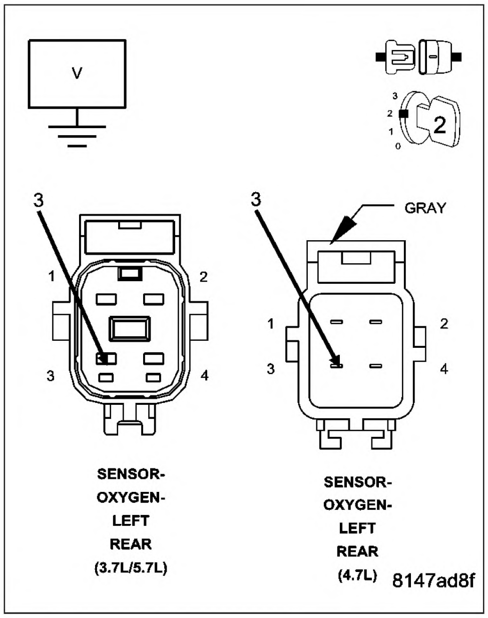
Is the voltage at 2.5 volts?

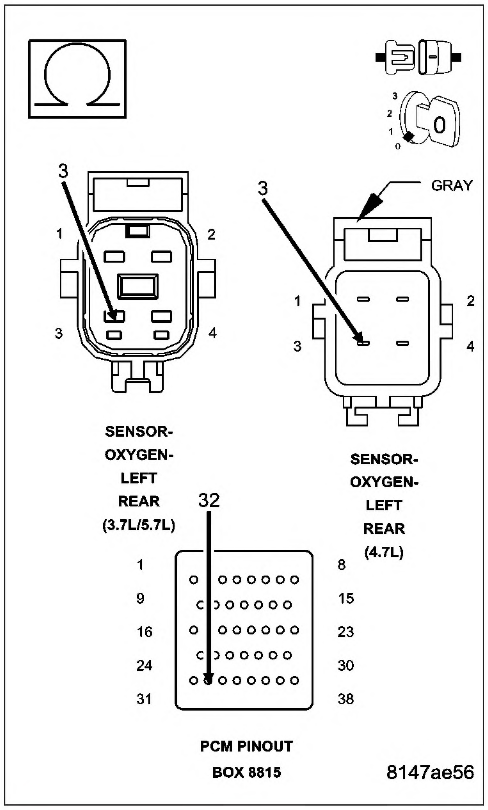
Yes >> Check the fuel system for contaminants.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

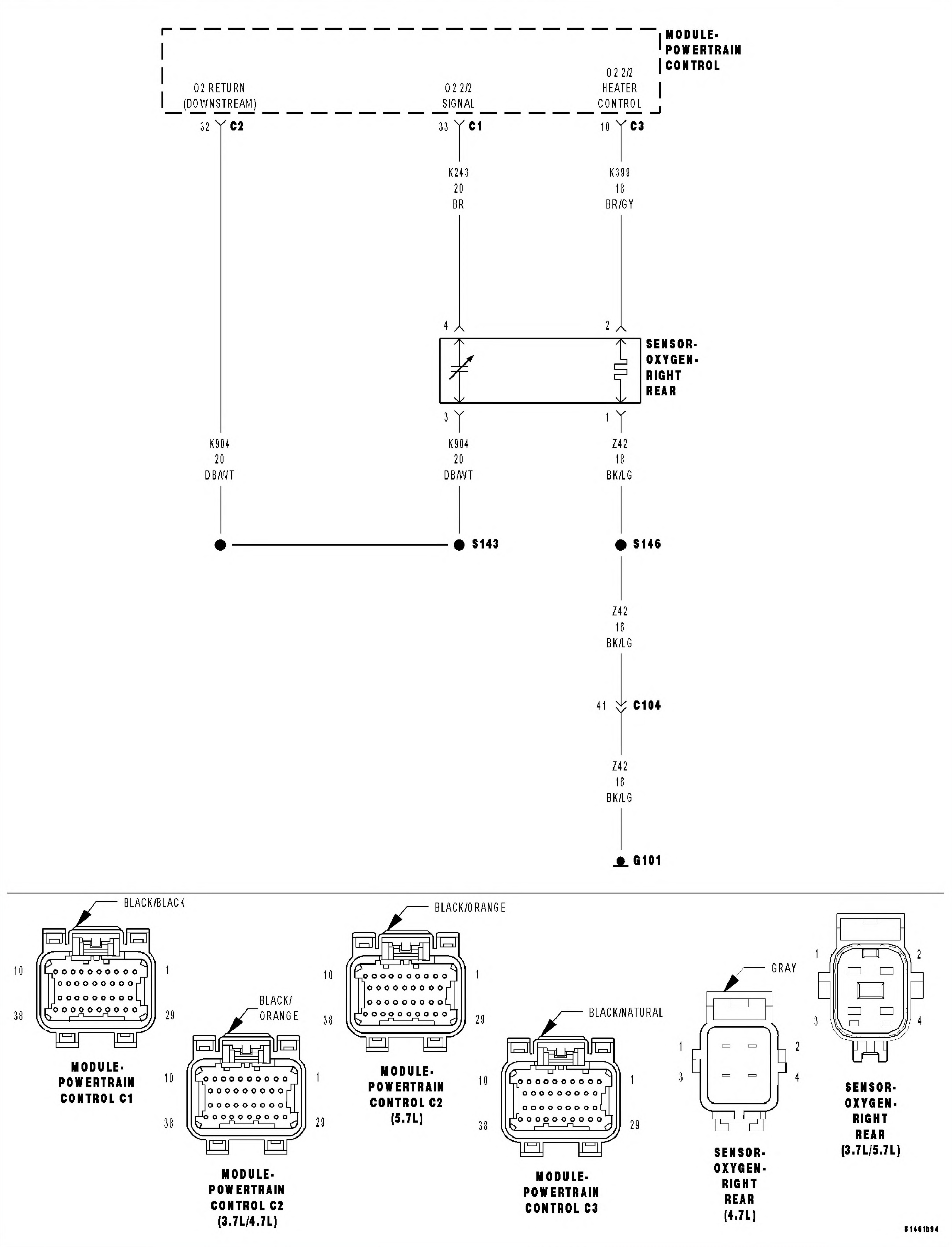
No >> Check the (K904) O2 Return Downstream circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
8147ad8f


3
2
1
0
0
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-OXYGEN-LEFT REAR (3.7L/5.7L)
SENSOR-OXYGEN-LEFT REAR (4.7L)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147ae56

P2098-DOWNSTREAM FUEL TRIM SYSTEM 2 LEAN


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32 C2
33 C1
10 C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P2098-DOWNSTREAM FUEL TRIM SYSTEM 2 LEAN (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above (-7°C) 20°F, altitude below 8500 ft and fuel level greater than 15%.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
ENGINE MECHANICAL
2/2 O2 SENSOR
(K243) O2 2/2 SIGNAL CIRCUIT
(K399) O2 HEATER 2/2 CONTROL CIRCUIT
(K904) O2 RETURN DOWNSTREAM CIRCUIT
FUEL CONTAMINATION

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check the vehicle repair history. If the 2/2 O2 has been replaced make sure that the O2 sensor was properly installed and meets OEM specification.

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2098-DOWNSTREAM FUEL TRIM SYSTEM 2 LEAN (CONTINUED)

2. EXHAUST LEAK

Turn the ignition off.

WARNING: To avoid personal injury from the exhaust system being hot, allow the exhaust to cool down to a safe temperature before performing a physical inspection. Failure to follow these instructions can result in personal injury or death.

Visually and Physically inspect the exhaust system for holes, cracks and blockage in the exhaust system.

Is the exhaust system is good condition?

Yes >> Go To 3

No >> Repair or Replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

AIR INDUCTION SYSTEM - must be free from leaks
ENGINE VACUUM - must be at least 13 inches in neutral
ENGINE VALVE TIMING - must be within specifications
ENGINE COMPRESSION - must be within specifications
ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks
ENGINE PCV SYSTEM - must flow freely
TORQUE CONVERTER STALL SPEED - must be within specifications
POWER BRAKE BOOSTER - no internal vacuum leaks
FUEL - must be free of contamination
FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

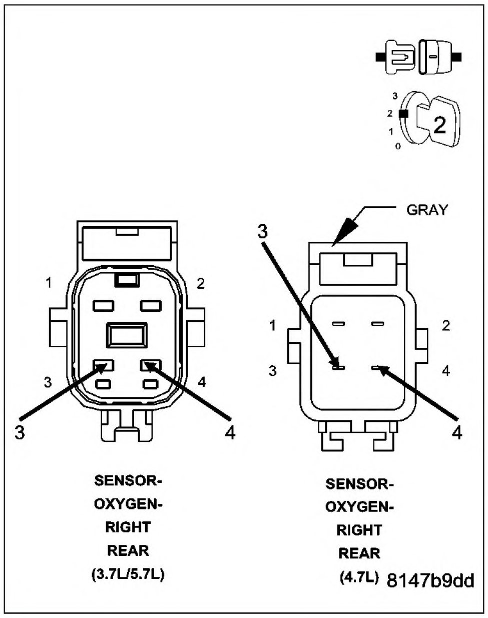
Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P2098-DOWNSTREAM FUEL TRIM SYSTEM 2 LEAN (CONTINUED)

4. O2 SENSOR


GRAY
1
2
3
4
3
4
1
2
3
4
3
4
3
2
1
0
2
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b9dd

Ignition on, engine not running.

Disconnect the 2/2 O2 Sensor harness connector.

With the scan tool, monitor the 2/2 O2 Sensor voltage.

The O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Using a jumper wire, jump the (K243) O2 Sensor 2/2 Signal circuit to the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.

NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.

Did the O2 Sensor volts change from 5.0 volts to 2.5 volts?

Yes >> Replace the O2 Sensor

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2098-DOWNSTREAM FUEL TRIM SYSTEM 2 LEAN (CONTINUED)

5. (K243) O2 SENSOR 2/2 SIGNAL CIRCUIT

Remove the jump wire.

Ignition on, engine not running.

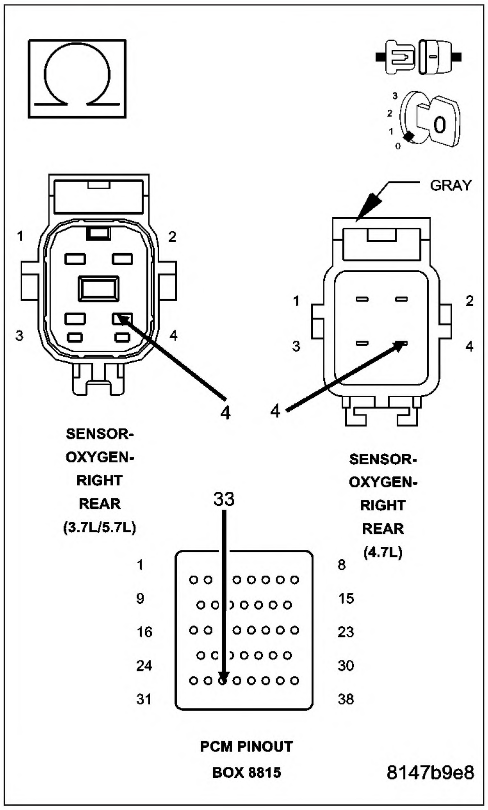
With the scan tool, monitor the O2 Sensor voltage.

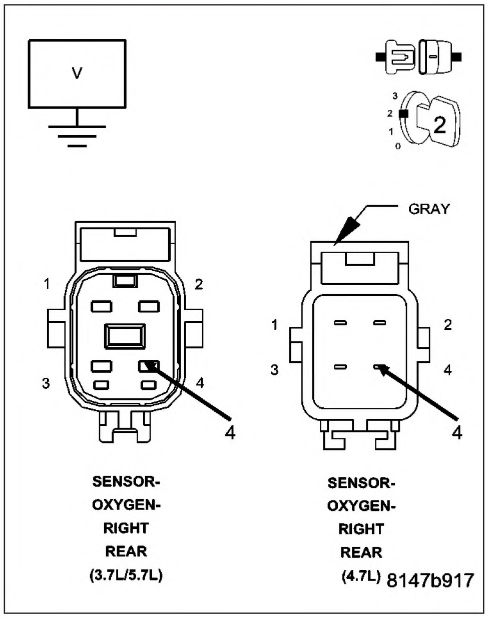
Is the voltage above 4.8 volts?

Yes >> Go To 6

No >> Check the (K243) O2 Sensor 2/2 Signal circuit for a open or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


0
GRAY
1
2
3
4
4
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT REAR (4.7L)
33
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147b9e8


V
2
GRAY
1
2
3
4
4
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT REAR (4.7L)
8147b917

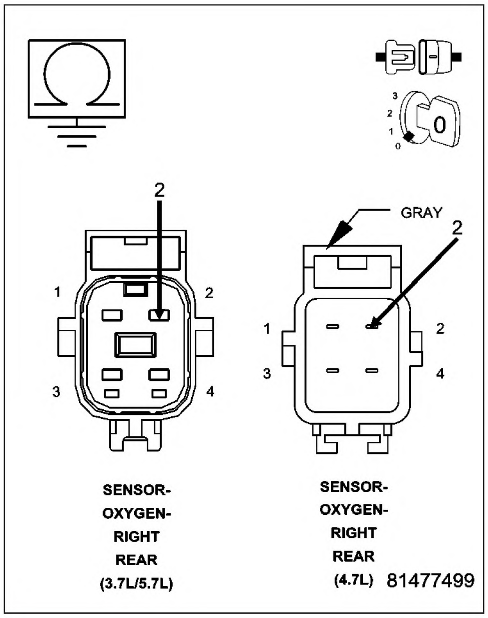
P2098-DOWNSTREAM FUEL TRIM SYSTEM 2 LEAN (CONTINUED)

6. (K399) O2 SENSOR 2/2 HEATER CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance between ground and the (K399) O2 Sensor 2/2 Heater Control circuit in the O2 Sensor harness connector.


2
1
2
3
4
GRAY
2
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
81477499

Is the resistance below 5.0 ohms?

Yes >> Repair the short to ground in the (K399) O2 Sensor 2/2 Heater Control circuit.

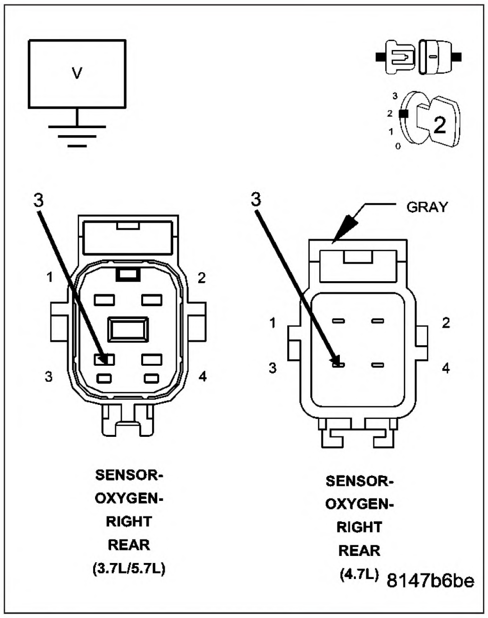
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

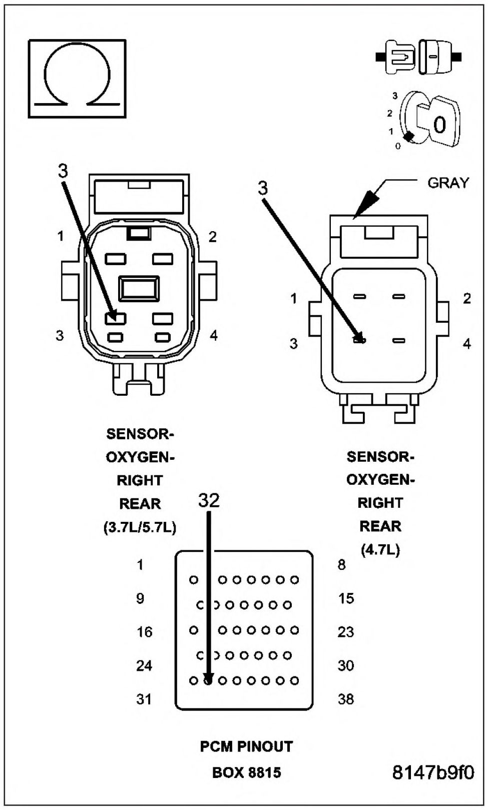
P2098-DOWNSTREAM FUEL TRIM SYSTEM 2 LEAN (CONTINUED)

7. (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)

8147b6be


3
2
1
0
0
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815

8147b9f0

Is the voltage at 2.5 volts?

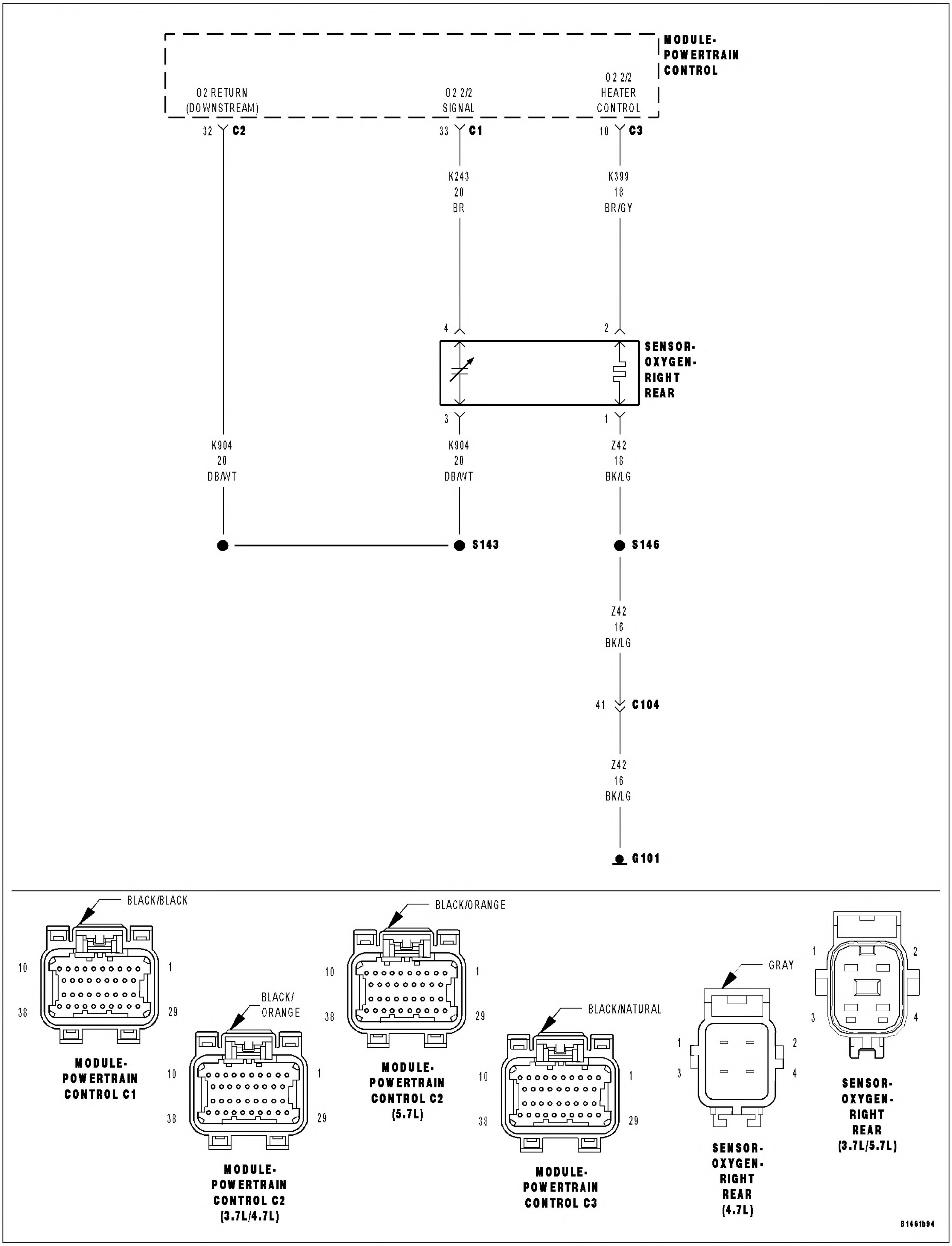
Yes >> Check the fuel system for contaminants.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Check the (K904) O2 Return Downstream circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2099-DOWNSTREAM FUEL TRIM SYSTEM 2 RICH


MODULE-
POWERTRAIN
CONTROL
O2 RETURN
(DOWNSTREAM)
O2 2/2
SIGNAL
O2 2/2
HEATER
CONTROL
32 C2
33 C1
10 C3
K243
20
BR
K399
18
BR/GY
4
2
SENSOR-
OXYGEN-
RIGHT
REAR
3
1
K904
20
DB/WT
K904
20
DB/WT
Z42
18
BK/LG
S143
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/
ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
GRAY
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
8146fb94

P2099-DOWNSTREAM FUEL TRIM SYSTEM 2 RICH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the engine running in closed loop mode, the ambient/battery temperature above (-7°C) 20°F, altitude below 8500 ft.
- **Set Condition:**
  If the PCM multiplies short term compensation by long term adaptive as well as a purge fuel multiplier and the result is below a certain value for 30 seconds over two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored. Two Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXHAUST LEAK
ENGINE MECHANICAL
2/2 O2 SENSOR
(K342) O2 SENSOR 2/2 SIGNAL CIRCUIT
(K399) O2 SENSOR 2/2 HEATER CONTROL CIRCUIT
(K904) O2 RETURN DOWNSTREAM CIRCUIT
FUEL CONTAMINATION

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Check the vehicle repair history. If the 2/2 O2 has been replaced make sure that the O2 sensor was properly installed and meets OEM specification.

NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2099-DOWNSTREAM FUEL TRIM SYSTEM 2 RICH (CONTINUED)

2. EXHAUST LEAK

Turn the ignition off.

WARNING: To avoid personal injury from the exhaust system being hot, allow the exhaust to cool down to a safe temperature before performing a physical inspection. Failure to follow these instructions can result in personal injury or death.

Visually and Physically inspect the exhaust system for holes, cracks and blockage in the exhaust system.

Is the exhaust system is good condition?

Yes >> Go To 3

No >> Repair or Replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

AIR INDUCTION SYSTEM - must be free from leaks
ENGINE VACUUM - must be at least 13 inches in neutral
ENGINE VALVE TIMING - must be within specifications
ENGINE COMPRESSION - must be within specifications
ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks
ENGINE PCV SYSTEM - must flow freely
TORQUE CONVERTER STALL SPEED - must be within specifications
POWER BRAKE BOOSTER - no internal vacuum leaks
FUEL - must be free of contamination
FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector

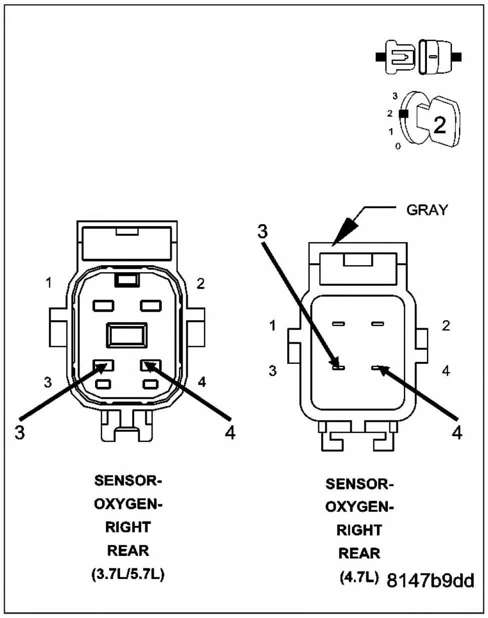
Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P2099-DOWNSTREAM FUEL TRIM SYSTEM 2 RICH (CONTINUED)

4. O2 SENSOR


GRAY
1
2
3
4
3
4
1
2
3
4
3
4
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
SENSOR-OXYGEN-RIGHT REAR (4.7L)
8147b9dd

Ignition on, engine not running.

Disconnect the 2/2 O2 Sensor harness connector.

With the scan tool, monitor the 2/2 O2 Sensor voltage.

The O2 Sensor voltage should read 5.0 volts on the scan tool with the connector disconnected.

Using a jumper wire, jump the (K243) O2 Signal 2/2 circuit to the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.

NOTE: The voltage should drop from 5.0 volts to 2.5 volts with the jumper wire in place.

Did the O2 Sensor volts change from 5.0 volts to 2.5 volts?

Yes >> Replace the O2 Sensor
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

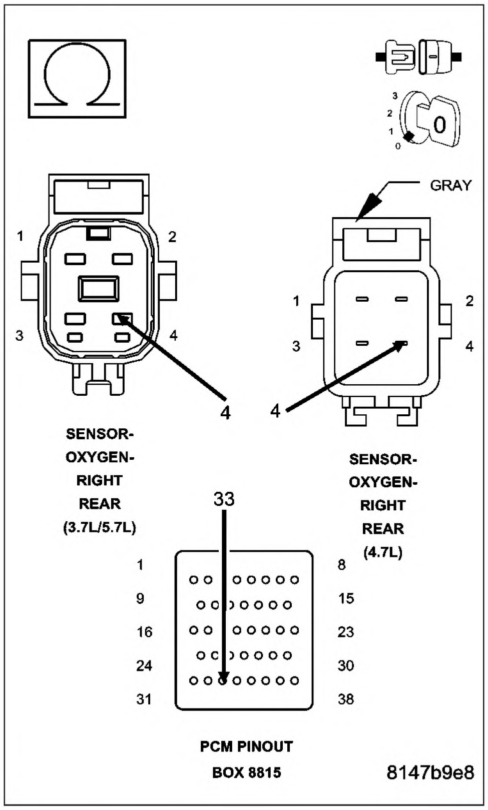
P2099-DOWNSTREAM FUEL TRIM SYSTEM 2 RICH (CONTINUED)

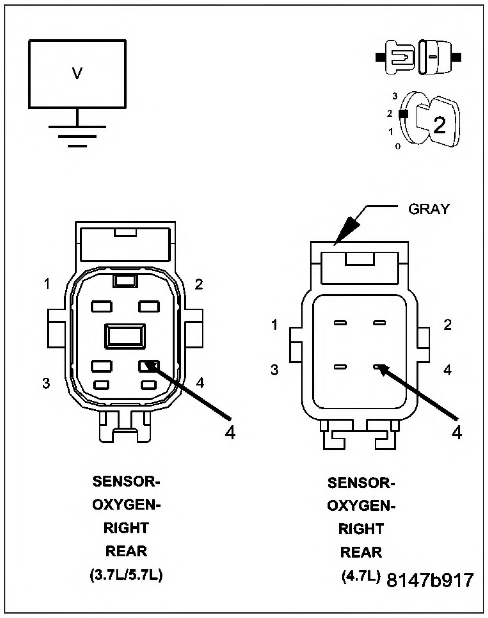
5. (K243) O2 SENSOR 2/2 SIGNAL CIRCUIT

Remove the jump wire.

Ignition on, engine not running.

With the scan tool, monitor the 2/2 O2 Sensor voltage.


GRAY
1
2
3
4
4
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
33
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147b9e8


V
GRAY
1
2
3
4
4
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b917

Is the voltage above 4.8 volts?

Yes >> Check the (K243) O2 Sensor 2/2 Signal circuit for an open or short to battery voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

No >> Go To 6

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

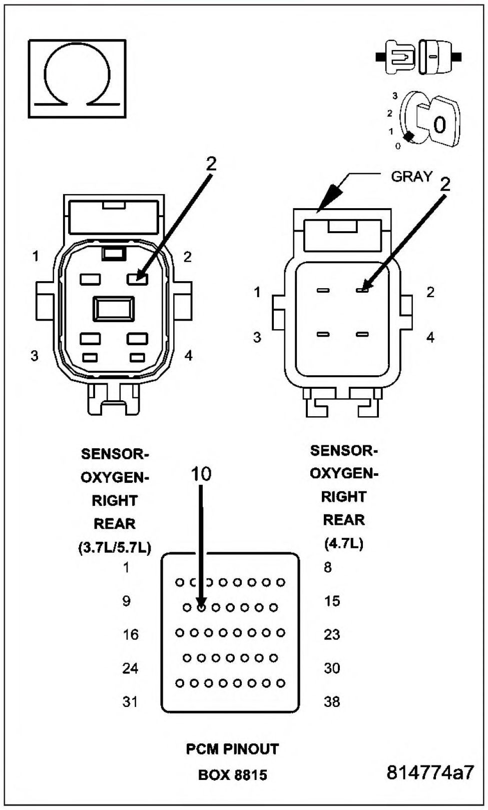
P2099-DOWNSTREAM FUEL TRIM SYSTEM 2 RICH (CONTINUED)

6. (K399) O2 SENSOR 2/2 HEATER CONTROL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Measure the resistance of the (K399) O2 Sensor 2/2 Heater Control circuit from the O2 Sensor harness connector to the appropriate terminal of special tool #8815.


2
GRAY
2
1
2
3
4
1
2
3
4
3
2
1
0
SENSOR-OXYGEN-RIGHT REAR (3.7L/5.7L)
10
SENSOR-OXYGEN-RIGHT REAR (4.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
814774a7

Is the resistance below 5.0 ohms?

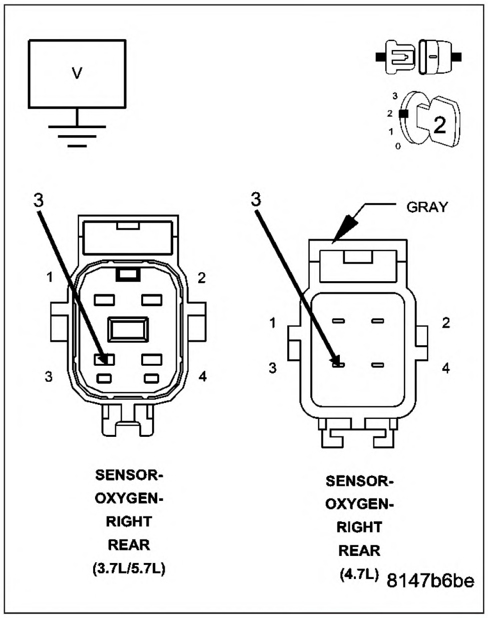
Yes >> Go To 7
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

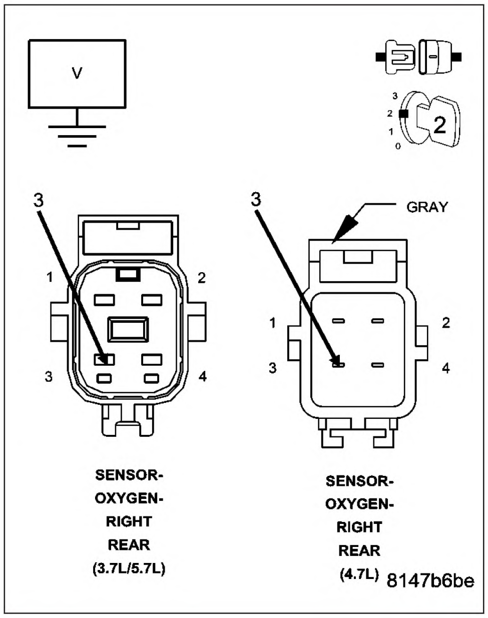
No >> Repair the open in the (K399) O2 Sensor 2/2 Heater Control circuit.

P2099-DOWNSTREAM FUEL TRIM SYSTEM 2 RICH (CONTINUED)

7. (K904) O2 RETURN DOWNSTREAM CIRCUIT

Measure the voltage on the (K904) O2 Return Downstream circuit in the O2 Sensor harness connector.


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b6be


V
3
2
1
0
2
3
3
GRAY
1
2
3
4
1
2
3
4
SENSOR-
OXYGEN-
RIGHT
REAR
(3.7L/5.7L)
SENSOR-
OXYGEN-
RIGHT
REAR
(4.7L)
8147b6be

Is the voltage at 2.5 volts?

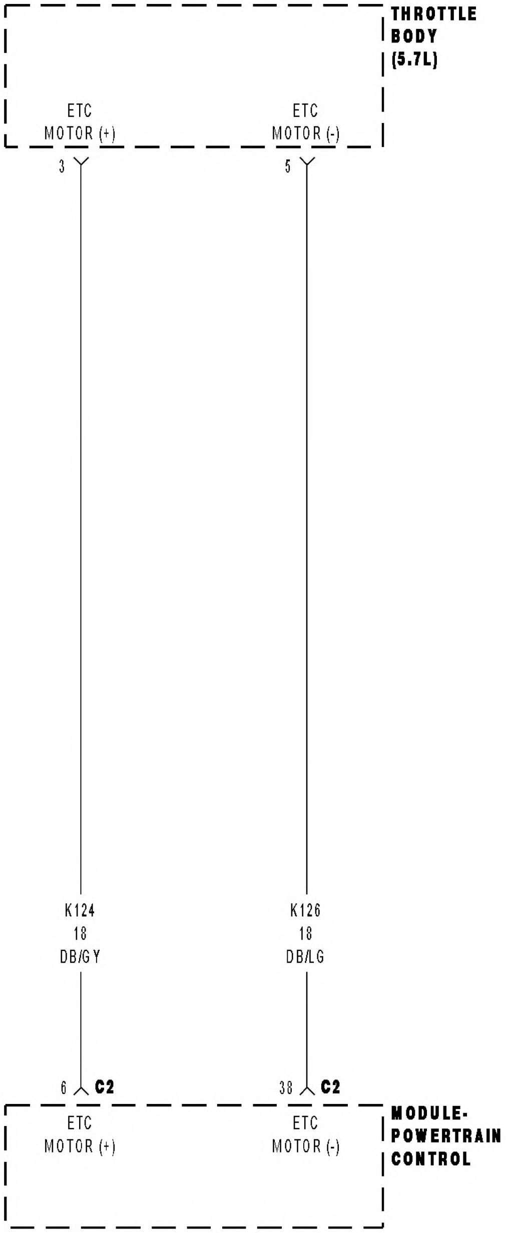
Yes >> Check the fuel system for contaminants.

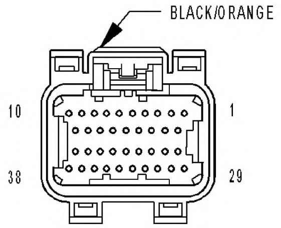
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Check the (K904) O2 Return Downstream circuit for a short to ground, open, or short to voltage. Inspect the O2 Sensor connector and the PCM harness connector. If OK, replace and program the Powertrain Control Module per Service Information.

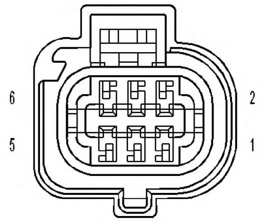
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT


THROTTLE
BODY
(5.7L)
ETC
MOTOR (+)
ETC
MOTOR (-)
3
5
K124
18
DB/GY
K126
18
DB/LG
6 C2
38 C2
ETC
MOTOR (+)
ETC
MOTOR (-)
MODULE-
POWERTRAIN
CONTROL


BLACK/ORANGE
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C2
(5.7L)



THROTTLE
BODY
(5.7L)

81474b19

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and the ETC Motor is not in Limp Home mode.
- **Set Condition:**
  When the PCM detects an internal error or a short between the ETC Motor- and ETC Motor + circuits in the ETC Motor Driver. One trip fault. ETC light is flashing.

Possible Causes
THROTTLE PLATE / BORE INSPECTION
(K124) ETC POSITIVE CIRCUIT SHORTED TO BATTERY VOLTAGE
(K126) ETC NEGATIVE CIRCUIT SHORTED TO BATTERY VOLTAGE
(K124) ETC POSITIVE CIRCUIT SHORTED TO THE (K126) ETC NEGATIVE CIRCUIT
(K124) ETC POSITIVE CIRCUIT OPEN
(K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND
(K126) ETC NEGATIVE CIRCUIT OPEN
(K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND
LOW BATTERY VOLTAGE
ETC MOTOR/THROTTLE BODY
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

NOTE: If the P2100 is intermittent, it is possible that the controller is overheating in extreme hot temperatures, and this is considered a normal protection operation. No repair is necessary.

NOTE: Low battery voltage can also cause excessive current draw, in very hot and very cold ambient temperatures. Make sure the battery can pass a load test before continuing.
With a scan tool, read DTCs.
Look closely at the temperatures at which this DTC set.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

2. THROTTLE PLATE INSPECTION

Turn the ignition off.

Remove the Air Cleaner Assembly from the Throttle Body.

Check for any signs of a foreign material (ice or dirt) on the Throttle Plate or in the bore causing the Throttle Plate to stick.

Were any signs of foreign material or scoring of the throttle plate or bore found?

Yes >> Remove the debris if possible or replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. (K124) ETC POSITIVE CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

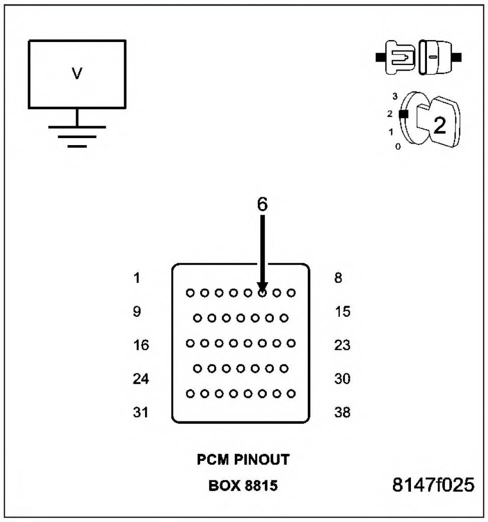
Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform the diagnostics.

With a 12-volt test light connected to ground, probe the (K124) ETC Positive circuit at the appropriate terminal of special tool #8815.



Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage on the (K124) ETC Positive circuit.

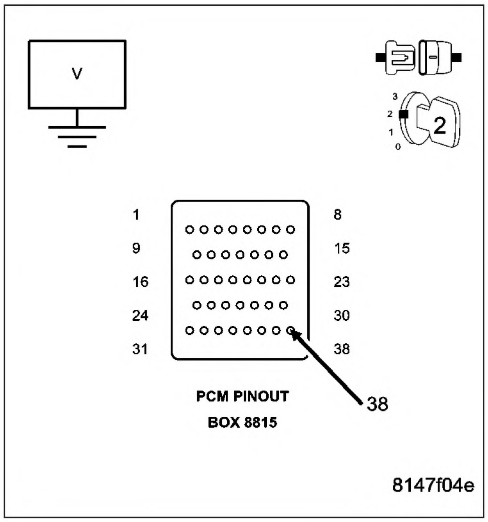
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (K126) ETC NEGATIVE CIRCUIT SHORTED TO BATTERY VOLTAGE

Using a 12-volt test light connected to ground, probe the (K126) ETC Negative circuit at the appropriate terminal of special tool #8815.



Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage in the (K126) ETC Negative circuit.

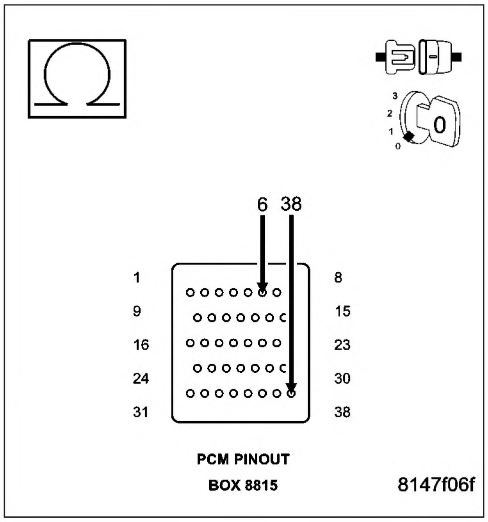
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

5. (K124) ETC POSITIVE CIRCUIT SHORTED TO THE (K126) ETC NEGATIVE CIRCUIT

Measure the resistance between the (K124) ETC Positive circuit and the (K126) ETC Negative circuit at the appropriate terminals of special tool #8815.


6
38
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147f06f

Is the resistance below 100 ohms?

Yes >> Repair the short to between the (K124) ETC Positive circuit and the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

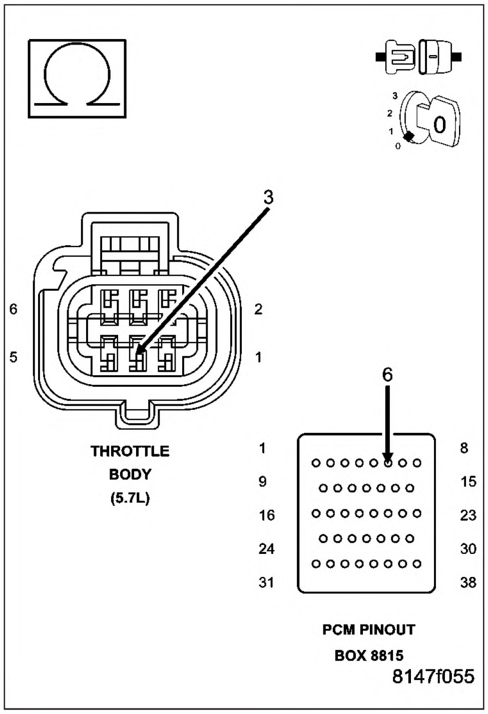
No >> Go To 6

---

6. (K124) ETC POSITIVE CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (K124) ETC Positive circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
6
2
5
1
6
THROTTLE
BODY
(5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147f055

Is the resistance below 5.0 ohms?

Yes >> Go To 7

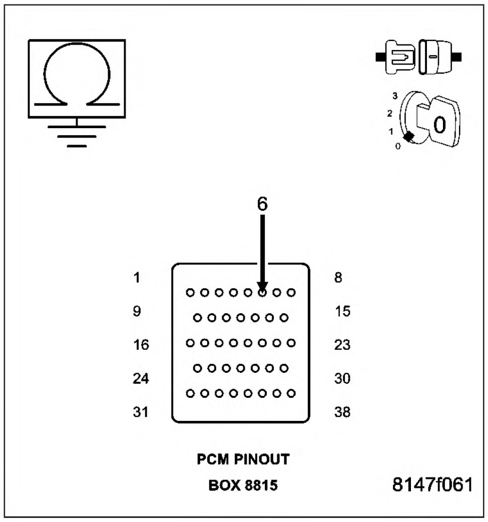
No >> Repair the open in the (K124) ETC Positive circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

7. (K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K124) ETC Positive circuit between the appropriate terminals of special tool #8815.


3
2
1
0
0
6
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147f061

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K124) ETC Positive circuit.

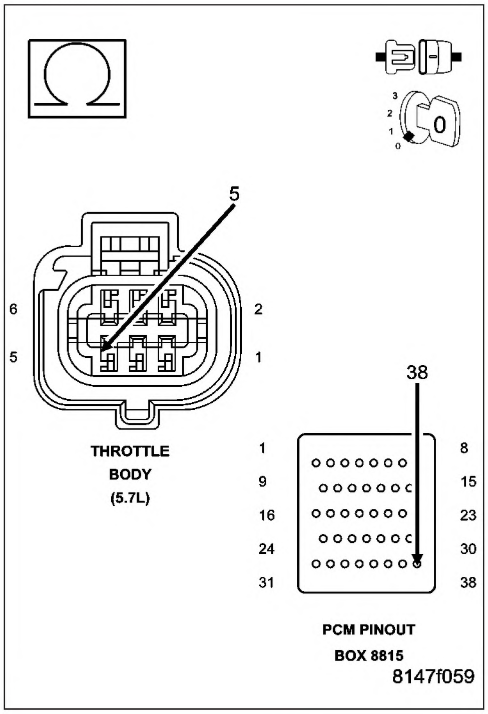
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. (K126) ETC NEGATIVE CIRCUIT OPEN

Measure the resistance of the (K126) ETC Negative circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
5
6
2
5
1
38
THROTTLE
BODY
(5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147f059

Is the resistance below 5.0 ohms?

Yes >> Go To 9

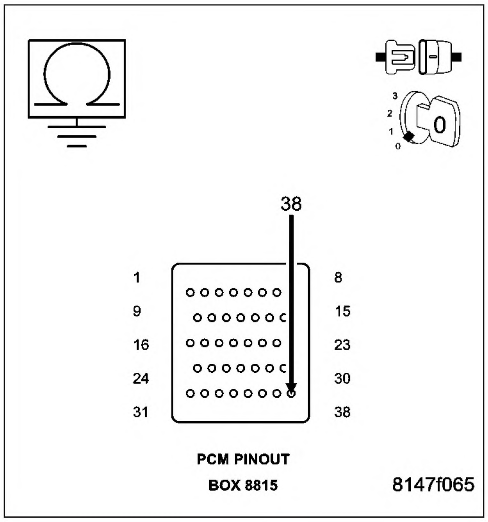
No >> Repair the open in the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2100-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

9. (K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K126) ETC Negative circuit using the appropriate terminal of special tool #8815.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

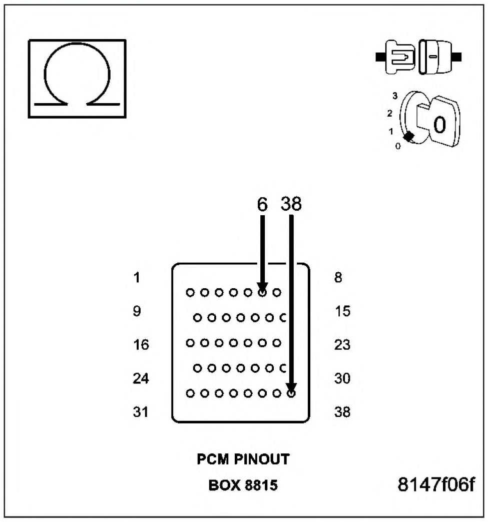
No >> Go To 10

---

10. ETC MOTOR

NOTE: Take the following measurement using special tool #8815 to avoid possible damage to the Throttle Body harness connector.

Measure the resistance of the ETC Motor between the (K124) ETC Positive circuit and the (K126) ETC Negative circuit at the appropriate terminals of special tool #8815.



Is the resistance between 2.5 and 25 ohms at closed throttle?

Yes >> Go To 11

No >> Replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2101-ELECTRONIC THROTTLE CONTROL MOTOR PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the vehicle running, ETC Motor not in Limp Home mode, and the TPS adaptation is complete.
- **Set Condition:**
  The PCM recognizes too large of an error between the actual position of the Throttle Plate and the Set Point position. One trip fault and the code will set within 5 seconds. Three good trips to turn off the MIL ETC light is flashing.

Possible Causes
THROTTLE BODY ASSEMBLY
LOW BATTERY VOLTAGE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

NOTE: Before continuing visually inspect the throttle blade and bore for any obstructions. Icing of the throttle body may have caused this code to set.

NOTE: Low battery voltage can also cause excessive current draw, in very hot and very cold ambient temperature. Make sure the battery can pass a load test before continuing.

NOTE: Diagnose any 5-Volt Supply, Battery, and TP Sensor DTCs before continuing.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. THROTTLE PLATE INSPECTION

Turn the ignition off.

Remove the Air Cleaner Assembly from the Throttle Body.

Check for any signs of a foreign material (ice or dirt) on the Throttle Plate or in the bore causing the Throttle Plate to stick.

Manually open and close the throttle plate using your hands.

Does the Throttle Plate move?

Yes >> Go To 3

No >> Remove the debris if possible or replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2101-ELECTRONIC THROTTLE CONTROL MOTOR PERFORMANCE (CONTINUED)

3. THROTTLE POSITION WITHIN 2° DEGREES OF DESIRED THROTTLE POSITION

Start the engine.

Allow the engine to reach normal operating temperature.

With a scan tool, monitor the Actual Throttle Position and Desired Throttle Position.

Compare the Actual Throttle Position and the Set Point Throttle Position.

Is the Actual Throttle Position within 2° degrees of the Desired Throttle Position?

Yes >> Go To 4

No >> Replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. ETC OPERATION

Ignition on, engine not running.

With a scan tool, actuate the Electronic Throttle Control Motor.

NOTE: It may be necessary to use a mirror to see the throttle blade.

Observe the throttle blade.

NOTE: Make sure the motion of the throttle blade is smooth and that it opens and closes.

Did the ETC motor operate properly?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2106-ELECTRONIC THROTTLE CONTROL SYSTEM - FORCED LIMITED POWER

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  This DTC sets for OBDII MIL illumination purposes. This DTC will always have associated DTCs indicating a system failure. Engine speed is being limited and/or throttle motor is power free.

Possible Causes
OTHER DTCS RELATED TO ETC HAVE SET

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

NOTE: This is only an informational DTC. This code should set along with other DTCs. The other DTC(s) may be in history or active at the same the P2106 sets. All other DTCs must be properly diagnosed before continuing.

The RPM or power are limited when P2106 sets for safety reasons because other ETC related DTCs have set.

After repairing the DTC(s), did the P2106 return?

Yes >> Check the PCM power and ground circuits if they are OK, replace and program the Powertrain Control Module per Service Information.

No >> Test Complete.

P2107-ELECTRONIC THROTTLE CONTROL MODULE PROCESSOR

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  Internal PCM failure. Module will attempt to reset, so you will be able to hear the throttle relearning. If the condition is continuous, the vehicle may not be driveable. One trip fault. ETC light is flashing.

Possible Causes
POWERTRAIN CONTROL MODULE NEEDS TO BE REPROGRAMMED

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) .

Diagnostic Test

1. REPROGRAM THE POWERTRAIN CONTROL MODULE

Check for any related TSBs.

Verify the PCM is at the latest calibration (flash level).

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.

Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

Test drive the vehicle for 10 miles on a flat road surface.

Does this DTC reset?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P2108-ELECTRONIC THROTTLE CONTROL MODULE PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  Internal PCM failure. Customer may experience an extended cranking condition with limited driving and a rough idle. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
POWERTRAIN CONTROL MODULE NEEDS TO BE REPROGRAMMED

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. REPROGRAM THE POWERTRAIN CONTROL MODULE

Check for any related TSBs.

Verify the PCM is at the latest calibration (flash level).

NOTE: Inspect the Intake Manifold components for vacuum leaks, repair as necessary

NOTE: An intermittent loss of power to the PCM without performing an ETC Relearn procedure may cause this DTC to set.

NOTE: Diagnose any other DTCs that may have set with the P2108.

Flash the Powertrain Control Module per Service Information if any updates are available.

Start the engine.

Allow the engine to reach normal operating temperature.

Operate the accelerator pedal. (do not exceed 3500 rpm)

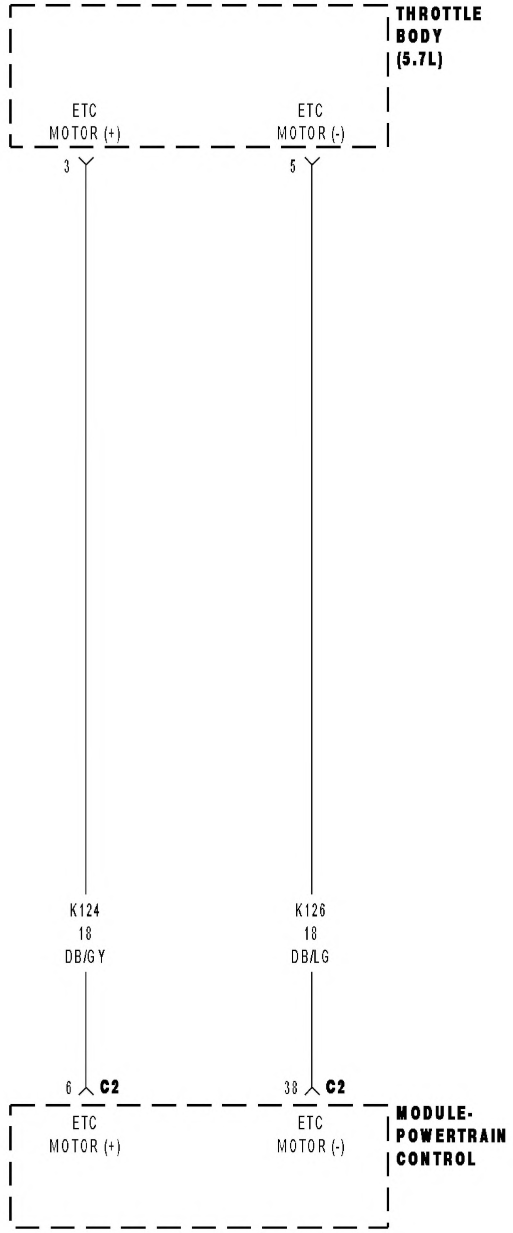
Test drive the vehicle for 10 miles on a flat road surface.

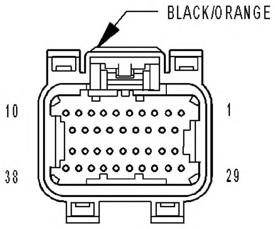
Does this DTC reset by itself?

Yes >> Replace and reprogram the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

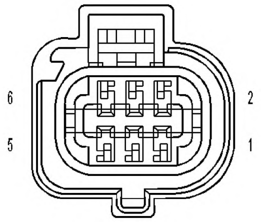
No >> Test Complete.

P2110-ELECTRONIC THROTTLE CONTROL - FORCED LIMITED RPM


THROTTLE
BODY
(5.7L)
ETC
MOTOR (+)
ETC
MOTOR (-)
3
5
K124
18
DB/GY
K126
18
DB/LG
6
C2
38
C2
ETC
MOTOR (+)
ETC
MOTOR (-)
MODULE-
POWERTRAIN
CONTROL


BLACK/ORANGE
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C2
(5.7L)



THROTTLE
BODY
(5.7L)

81474b19

P2110-ELECTRONIC THROTTLE CONTROL - FORCED LIMITED RPM (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and ETC motor is working.
- **Set Condition:**
  When the PCM requests to limit engine speed if PWM is too high for 20.5 seconds and before P2118 sets. One trip fault and the code will set within 5 seconds. ETC light is illuminated.

Possible Causes
THROTTLE PLATE STUCK
(K124) ETC POSITIVE CIRCUIT OPEN
(K126) ETC NEGATIVE CIRCUIT OPEN
(K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND
(K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND
ETC MOTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.
Ignition on, engine not running.

With a scan tool read DTCs.

In the Freeze Frame data, look at the temperature at which the fault occurred. If it occurred in extreme cold temperatures, Icing of the throttle body may have caused this code to set.

NOTE: Diagnose any TP Sensor faults, 5-Volt Supply faults, and Battery Voltage High or Low DTCs before continuing.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2110-ELECTRONIC THROTTLE CONTROL - FORCED LIMITED RPM (CONTINUED)

2. THROTTLE PLATE STUCK

Turn the ignition off.

Remove the Air Cleaner Assembly from the Throttle Body.

Check for any signs of a foreign material (ice or dirt) causing the Throttle to stick.

Manually open and close the throttle plate using your hands.

Does the Throttle Plate move?

Yes >> Go To 3

No >> Remove the debris if possible or replace the Throttle Body Assembly if signs of physical damage are present. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. (K124) ETC POSITIVE CIRCUIT OPEN

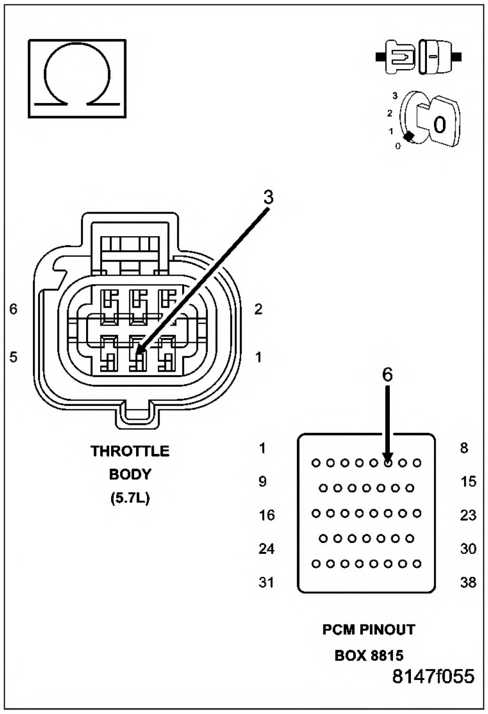
Turn the ignition off.

Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K124) ETC Positive circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 4

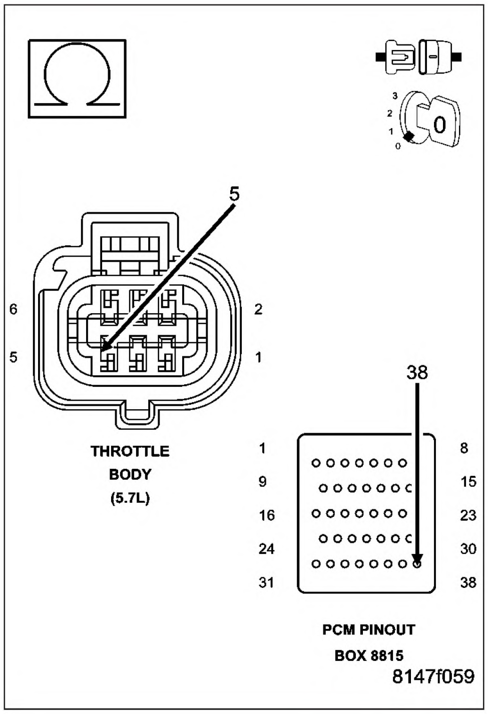
No >> Repair the open in the (K124) ETC Positive circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2110-ELECTRONIC THROTTLE CONTROL - FORCED LIMITED RPM (CONTINUED)

4. (K126) ETC NEGATIVE CIRCUIT OPEN

Measure the resistance of the (K126) ETC Negative circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
5
6
5
2
1
38
THROTTLE
BODY
(5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147f059

Is the resistance below 5.0 ohms?

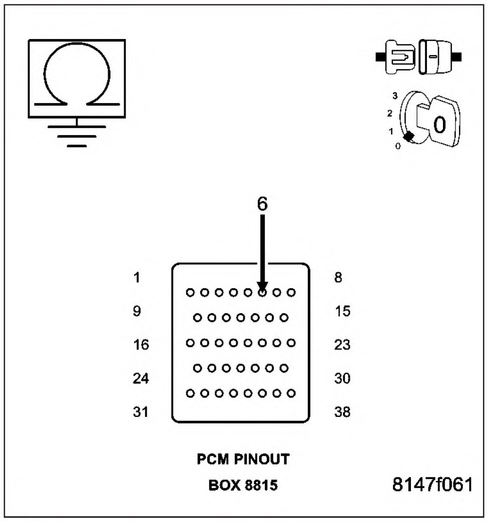
Yes >> Go To 5

No >> Repair the open in the (K126) ETC Negative circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between a known good ground and the (K124) ETC Positive circuit at the appropriate terminal of special tool #8815.


3
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6
1
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16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147f061

Is the resistance below 100 ohms?

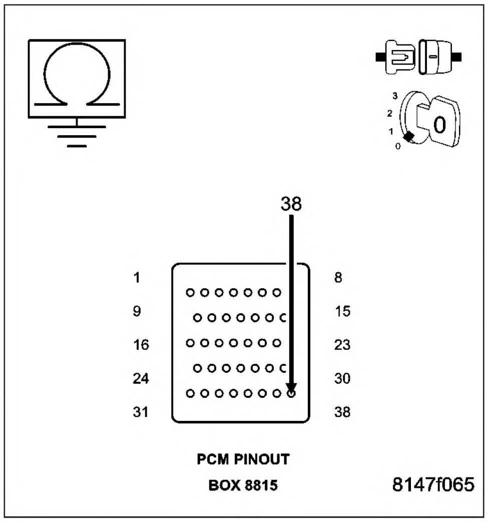
Yes >> Repair the short to ground in the (K124) ETC Positive circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P2110-ELECTRONIC THROTTLE CONTROL - FORCED LIMITED RPM (CONTINUED)

6. (K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between a known good ground and the (K126) ETC Negative circuit at the appropriate terminal of special tool #8815.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

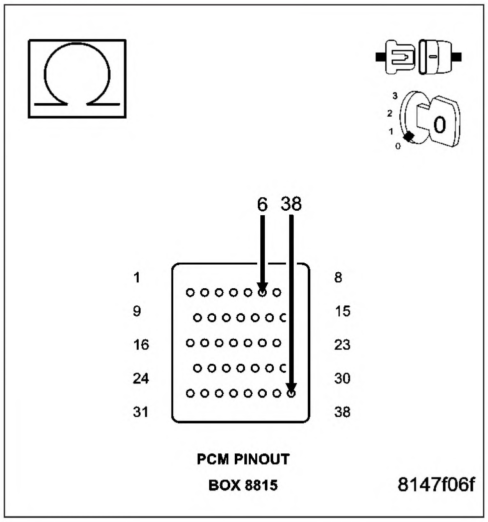
No >> Go To 7

---

7. ETC MOTOR

NOTE: Take the following measurement using special tool #8815 to avoid possible damage to the Throttle Body harness connector.

Measure the resistance of the ETC Motor between the (K124) ETC Positive circuit and the (K126) ETC Negative circuit at the appropriate terminals of special tool #8815.



Is the resistance between 2.5 and 25 ohms at closed throttle?

Yes >> Go To 8

No >> Replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

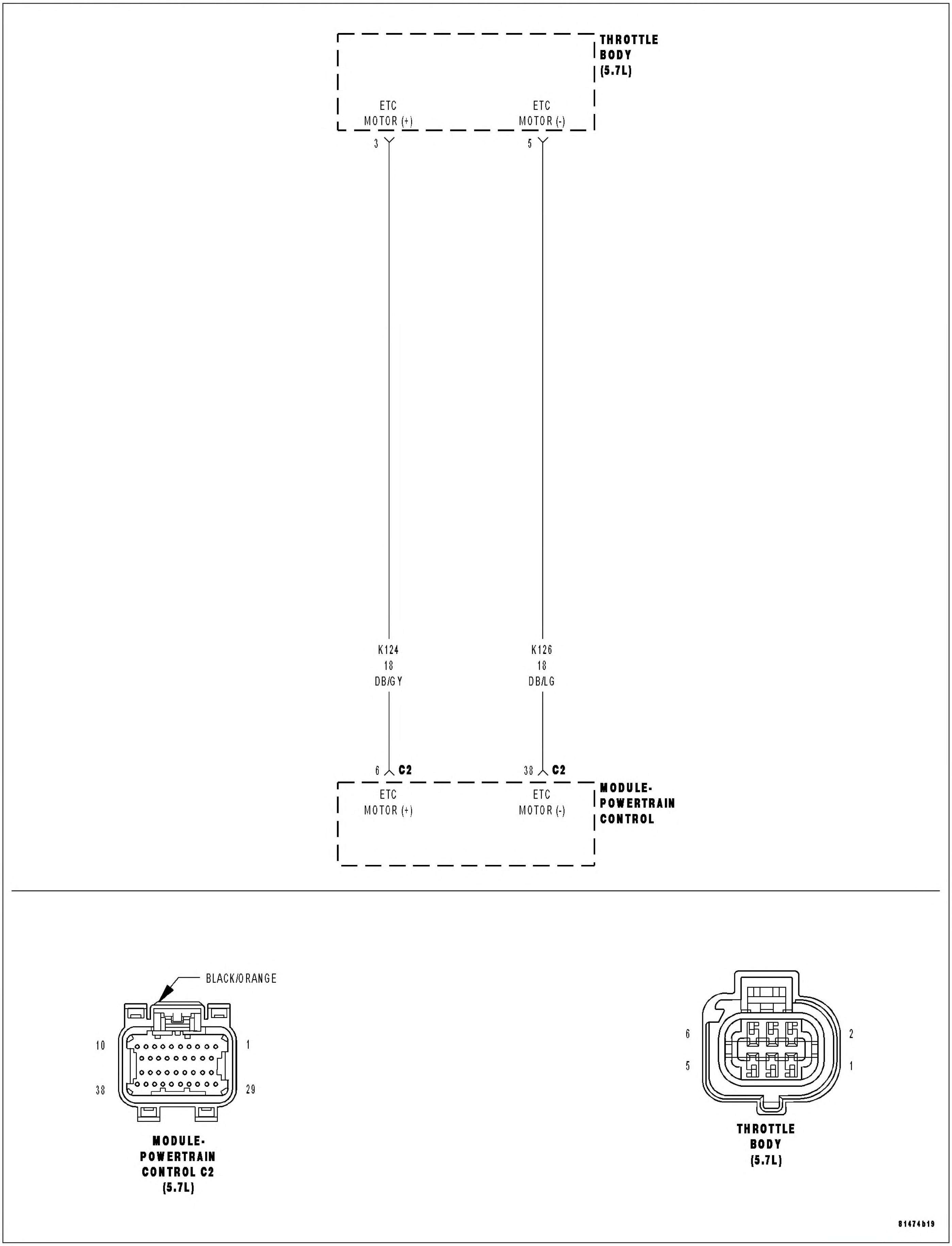
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2111-ELECTRONIC THROTTLE CONTROL - UNABLE TO CLOSE


THROTTLE BODY (5.7L)
ETC MOTOR (+)
ETC MOTOR (-)
3
5
K124
18
DB/GY
K126
18
DB/LG
6 C2
38 C2
ETC MOTOR (+)
ETC MOTOR (-)
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
6
2
5
1
THROTTLE BODY (5.7L)
81474b19

P2111-ELECTRONIC THROTTLE CONTROL - UNABLE TO CLOSE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  Just after key on, the throttle is opened and closed to test the system. If the TP Sensor does not return to Limp Home Position at the end of this test, this DTC will set. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
THROTTLE PLATE STUCK ABOVE LIMP HOME POSITION
TP SENSOR NO.1 AND TP SENSOR NO.2 BOTH READ 2.5 VOLTS
(K124) ETC POSITIVE CIRCUIT SHORTED TO BATTERY VOLTAGE
(K124) ETC POSITIVE CIRCUIT OPEN
(K126) ETC NEGATIVE CIRCUIT OPEN
(K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND
(K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Maximum engine speed could be reduced while this fault is active, it just depends where the throttle gets stuck.

Ignition on, engine not running.

NOTE: The PCM tests the ETC Motor by opening and closing the Throttle Plate before starting the engine. If during this test the Throttle plate does not return to the closed position this DTC sets.

With a scan tool read DTCs.

NOTE: Diagnose any TP Sensor or 5-Volt Supply DTCs before continuing.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2111-ELECTRONIC THROTTLE CONTROL - UNABLE TO CLOSE (CONTINUED)

2. THROTTLE PLATE STUCK OPEN

Turn the ignition off.

NOTE: The PCM tests the ETC Motor by opening and closing the Throttle Plate before starting the engine. If during this test the Throttle plate does not return to the closed position this DTC sets.

Remove the Air Cleaner Assembly from the Throttle Body.

Check for any signs of a foreign material causing the Throttle to remain open.

Using a scan tool actuate the ETC Motor.

Does the Throttle Plate move?

Yes >> Go To 3

No >> Remove the debris if possible or replace the Throttle Body Assembly if signs of physical damage are present. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and perform the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. TP SENSOR NO.1 AND TP SENSOR NO.2 BOTH EQUAL 2.5 VOLTS

With a scan tool, perform the Throttle Follower test while reading both TP Sensor voltage readings.

Are both TP Sensor readings stuck at 2.5 volts?

Yes >> Check the TP Sensor Signal circuits for excessive resistance, being shorted to each other, or shorted to the Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. (K124) ETC POSITIVE CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

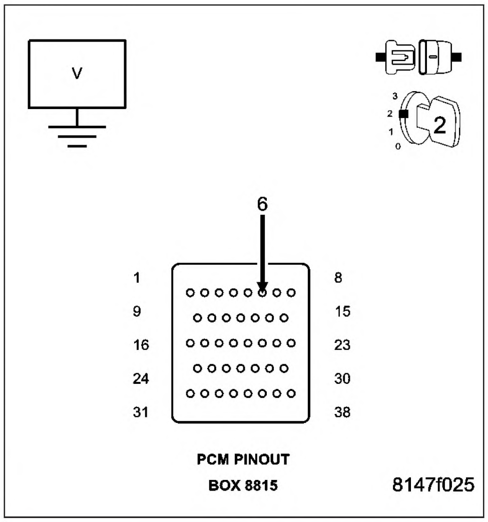
Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform the diagnostics.

Ignition on, engine not running.

With a 12-volt test light connected to ground, probe the (K124) ETC Positive circuit at the appropriate terminal of special tool #8815.



Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage on the (K124) ETC Positive circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2111-ELECTRONIC THROTTLE CONTROL - UNABLE TO CLOSE (CONTINUED)

5. (K124) ETC POSITIVE CIRCUIT OPEN

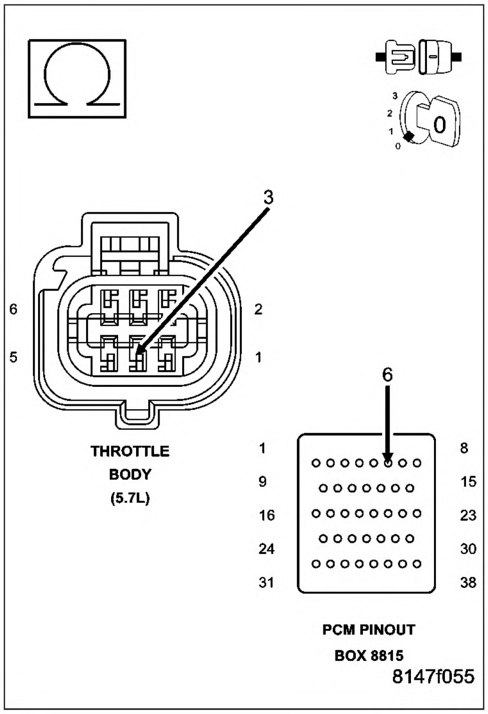
Turn the ignition off.

Measure the resistance of the (K124) ETC Positive circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K124) ETC Positive circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
3
6
2
5
1
6
THROTTLE BODY (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147f055

---

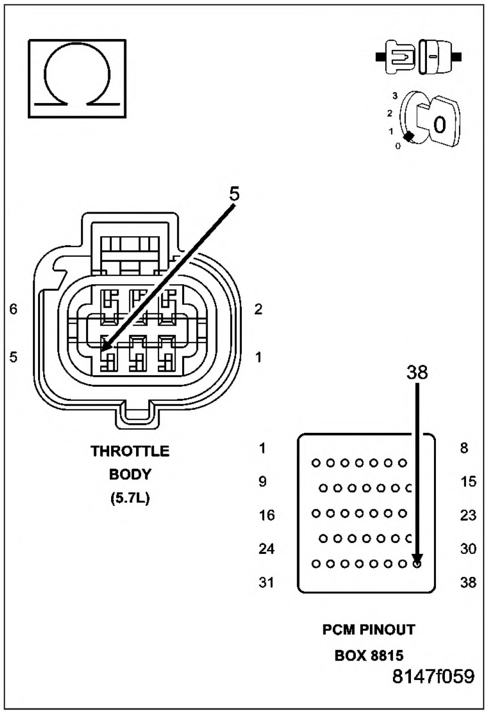
6. (K126) ETC NEGATIVE CIRCUIT OPEN

Measure the resistance of the (K126) ETC Negative circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

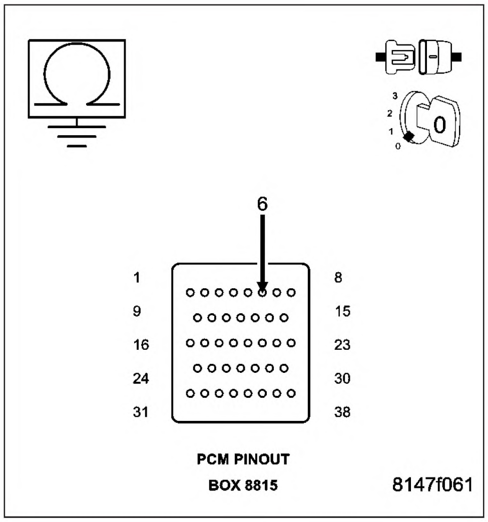
No >> Repair the open in the (K126) ETC Negative circuit. Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
5
6
2
5
1
38
THROTTLE BODY (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147f059

P2111-ELECTRONIC THROTTLE CONTROL - UNABLE TO CLOSE (CONTINUED)

7. (K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between a known good ground and the (K124) ETC Positive circuit at the appropriate terminal of special tool #8815.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K124) ETC Positive circuit.

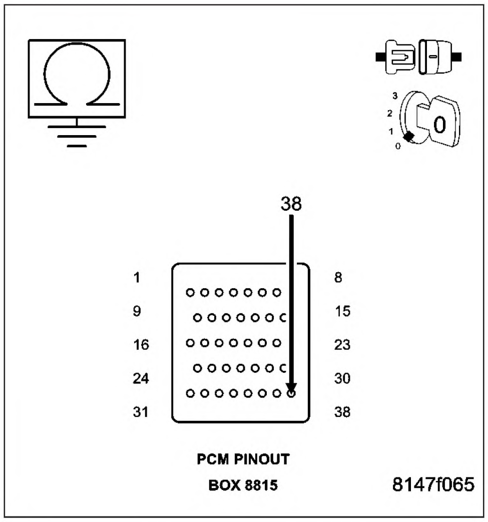
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. (K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between a known good ground and the (K126) ETC Negative circuit at the appropriate terminal of special tool #8815.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

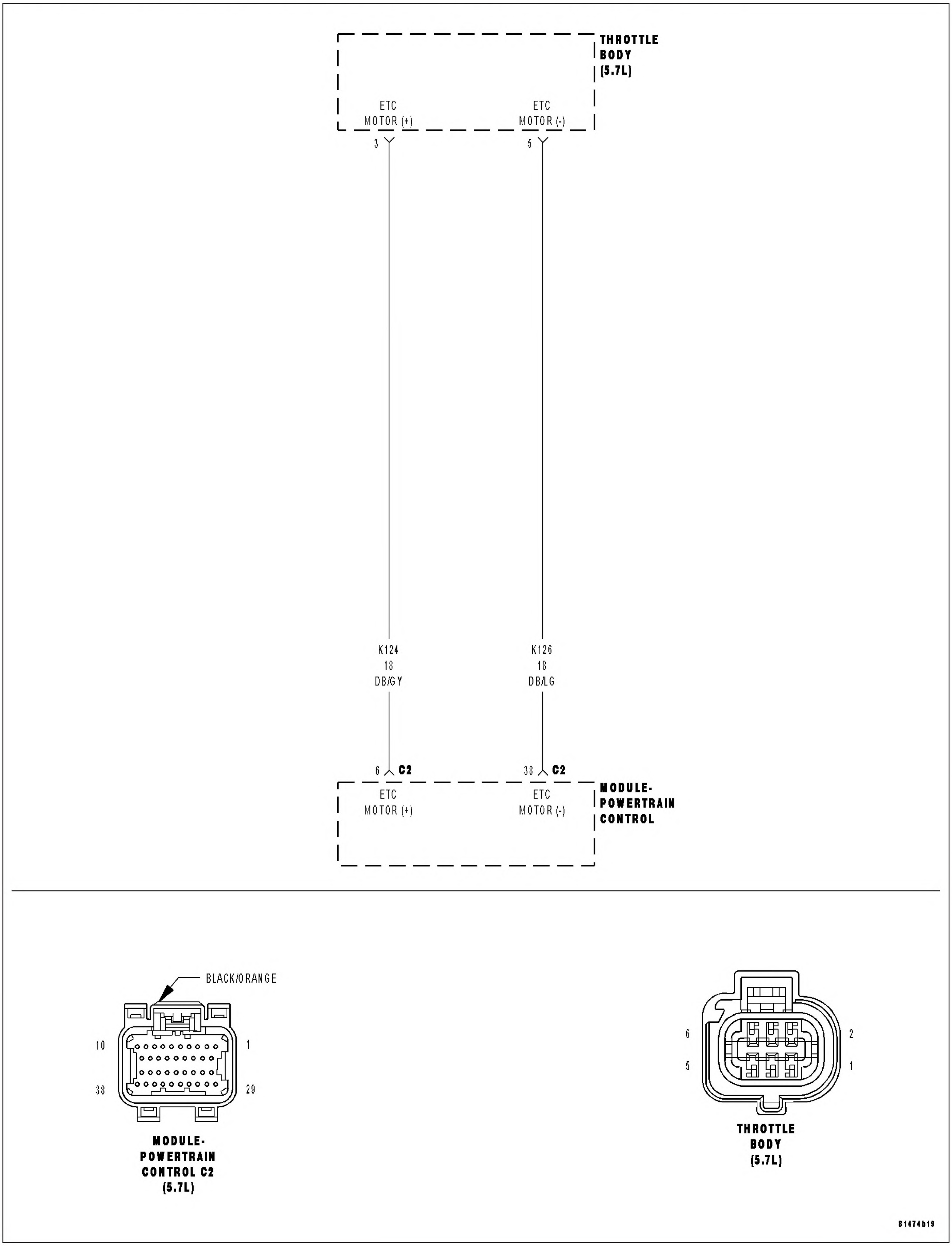
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2112-ELECTRONIC THROTTLE CONTROL - UNABLE TO OPEN


THROTTLE BODY (5.7L)
ETC MOTOR (+)
ETC MOTOR (-)
3
5
K124
18
DB/GY
K126
18
DB/LG
6
C2
38
C2
ETC MOTOR (+)
ETC MOTOR (-)
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
6
2
5
1
THROTTLE BODY (5.7L)
81474b19

P2112-ELECTRONIC THROTTLE CONTROL - UNABLE TO OPEN (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and battery voltage greater than 10 volts.
- **Set Condition:**
  Just after key on, the throttle is opened and closed to test the system. If the TP Sensor does not return to Limp Home Position at the end of this test, this DTC will set. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
THROTTLE PLATE STUCK AT OR BELOW LIMP HOME POSITION
(K126) ETC NEGATIVE CIRCUIT SHORTED TO BATTERY VOLTAGE
(K124) ETC POSITIVE CIRCUIT OPEN
(K126) ETC NEGATIVE CIRCUIT OPEN
(K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND
(K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: The PCM tests the ETC Motor by opening and closing the Throttle Plate before starting the engine. If during this test the Throttle plate does not return to the closed position this DTC sets.

With a scan tool read DTCs.

NOTE: Diagnose any TP Sensor, Battery Voltage, and 5-Volt Supply DTCs before continuing.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2112-ELECTRONIC THROTTLE CONTROL - UNABLE TO OPEN (CONTINUED)

2. THROTTLE PLATE STUCK OPEN

Turn the ignition off.

NOTE: The PCM tests the ETC Motor by opening and closing the Throttle Plate before starting the engine. If during this test the Throttle plate does not open this DTC sets.

Remove the Air Cleaner Assembly from the Throttle Body.

Check for any signs of a foreign material causing the Throttle to remain open.

Using a scan tool actuate the ETC Motor.

Does the Throttle Plate move?

Yes >> Go To 3

No >> Remove the debris if possible or replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. (K126) ETC NEGATIVE CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

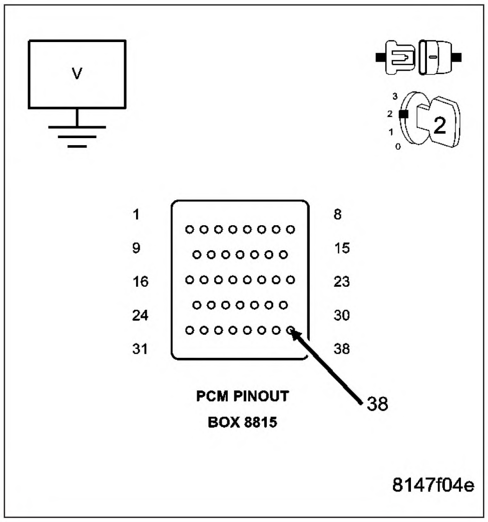
Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Ignition on, engine not running.

With a 12-volt test light connected to ground, probe the (K126) ETC Negative circuit at the appropriate terminal of special tool #8815.



Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage on the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

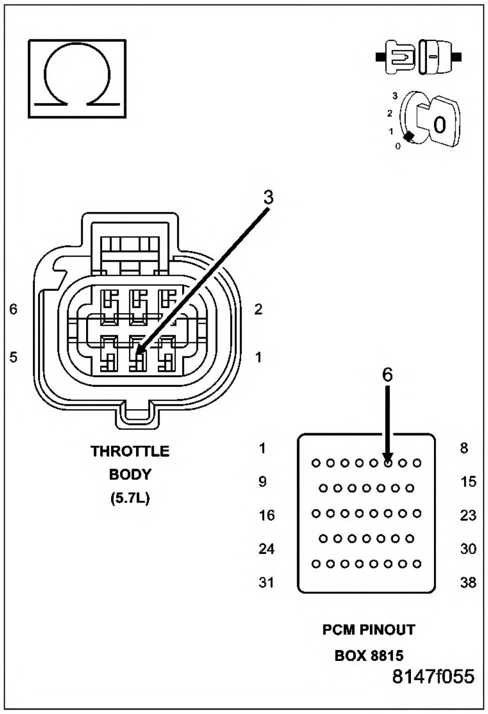
No >> Go To 4

P2112-ELECTRONIC THROTTLE CONTROL - UNABLE TO OPEN (CONTINUED)

4. (K124) ETC POSITIVE CIRCUIT OPEN

Turn the ignition off.

Measure the resistance of the (K124) ETC Positive circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
3
6
2
5
1
THROTTLE
BODY
(5.7L)
6
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147f055

Is the resistance below 5.0 ohms?

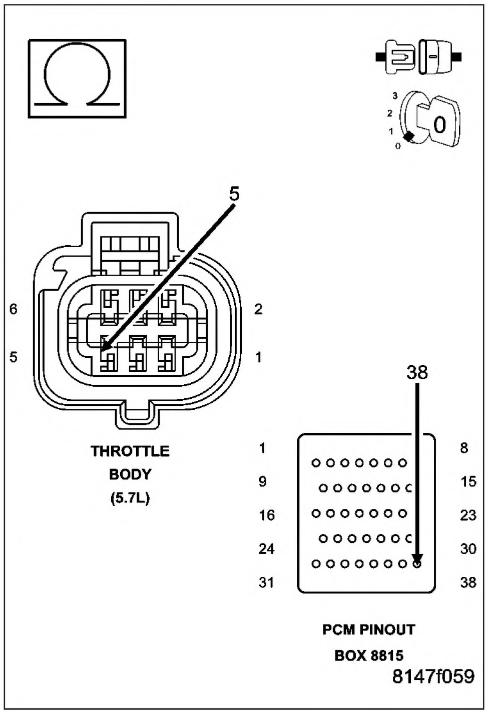
Yes >> Go To 5

No >> Repair the open in the (K124) ETC Positive circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K126) ETC NEGATIVE CIRCUIT OPEN

Measure the resistance of the (K126) ETC Negative circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
5
6
2
5
1
THROTTLE
BODY
(5.7L)
38
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147f059

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (K126) ETC Negative circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2112-ELECTRONIC THROTTLE CONTROL - UNABLE TO OPEN (CONTINUED)

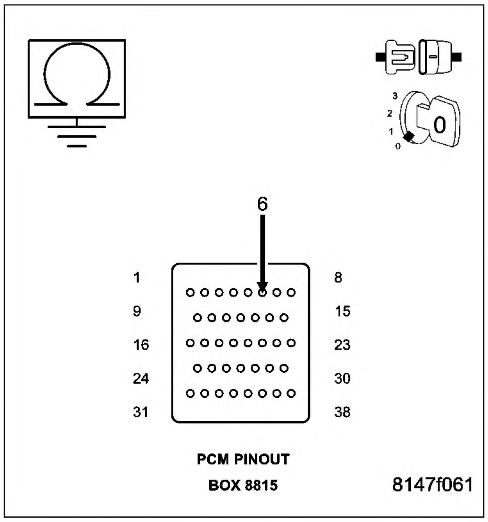
6. (K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between a known good ground and the (K124) ETC Positive circuit at the appropriate terminal of special tool #8815.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K124) ETC Positive circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7



---

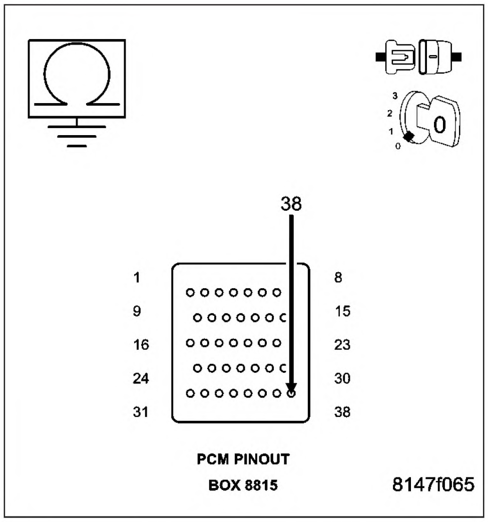
7. (K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between a known good ground and the (K126) ETC Negative circuit at the appropriate terminal of special tool #8815.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K126) ETC Negative circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8



---

8. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2115-ACCELERATOR PEDAL POSITION SENSOR 1 MINIMUM STOP PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on. During in plant mode the APP Sensors need to be checked to make sure that idle and full pedal travel can be reached on both sensors. The test for P2115 is only enabled once test for P2166 has passed.
- **Set Condition:**
  APPS No.1 has failed to achieve the required minimum value during In Plant testing. One trip fault and the code will set within 5 seconds. Engine will only idle.

Possible Causes
IN PLANT TEST FAILURE
APPS RELEARN

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. IN PLANT TEST FAILURE

Ignition on, engine not running.

NOTE: This DTC is set when the APP Sensors are learned in plant but do not reach the Minimum or Maximum voltage range.

With a scan tool read DTCs.

With the scan tool, erase DTCs.

Start the engine.

With the scan tool, read DTCs.

NOTE: Diagnose any APPS out of Range and 5-Volt Supply DTCs before continuing.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

2. APPS RELEARN

With a scan tool select the ETC RELEARN function.

Next, erase DTCs.

Start the engine.

Does the DTC return?

Yes >> Replace the APPS Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P2116-ACCELERATOR PEDAL POSITION SENSOR 2 MINIMUM STOP PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on. During in plant mode the APP Sensors need to be checked to make sure that idle and full pedal travel can be reached on both sensors. The test for P2116 is only enabled once test for P2167 has passed.
- **Set Condition:**
  APPS No.2 has failed to achieve the required minimum value during In Plant testing. One trip fault and the code will be stored within 5 seconds. Engine will only idle.

Possible Causes
IN PLANT TEST FAILURE
APPS RELEARN

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. IN PLANT TEST FAILURE

Ignition on, engine not running.

NOTE: This DTC is set when the APP Sensors are learned in plant but do not reach the Minimum or Maximum voltage range.

With a scan tool read DTCs and record the related Freeze Frame data.

With a scan tool, erase DTCs.

Start the engine.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. APPS RELEARN

With a scan tool select the ETC RELEARN function.

Next, erase DTCs.

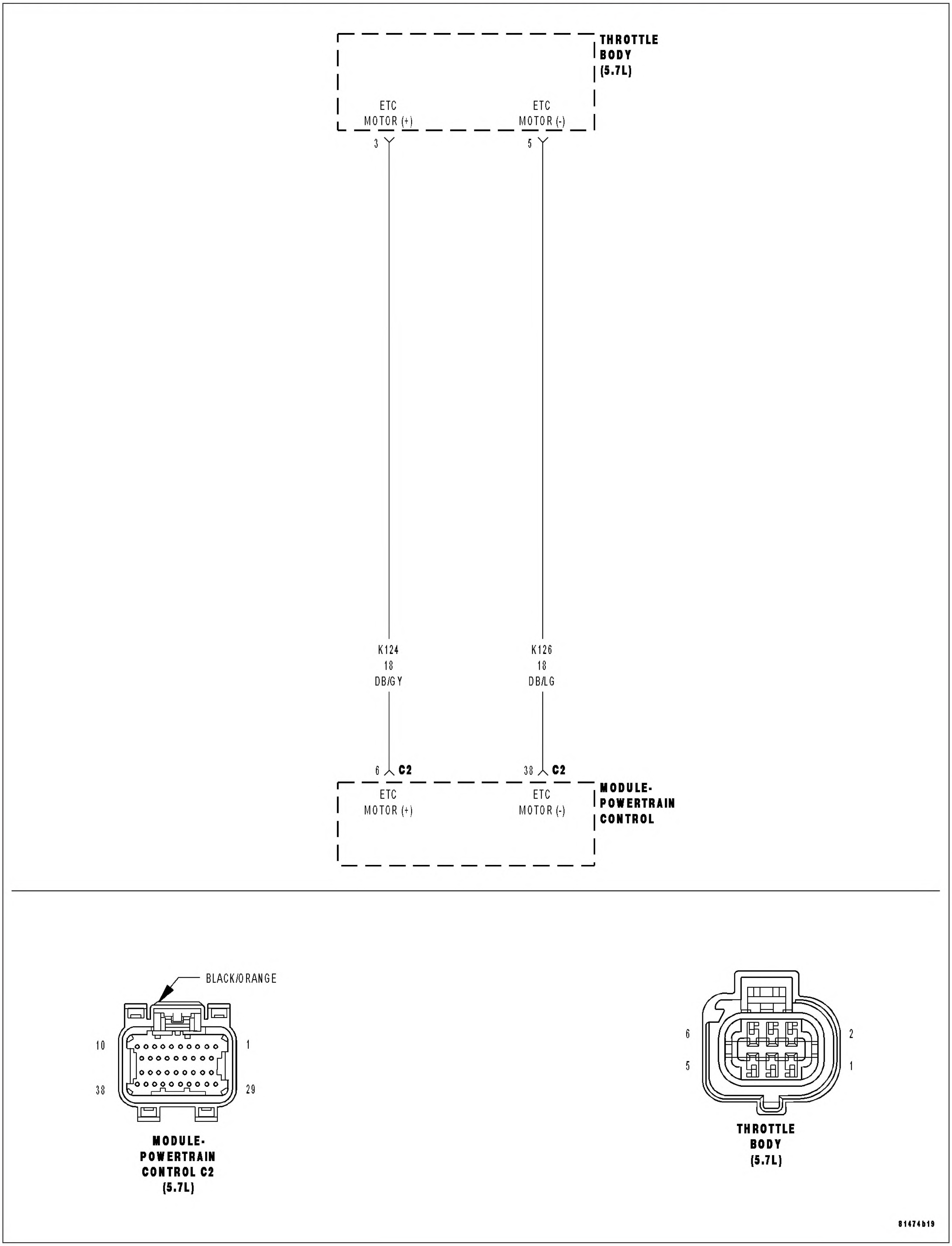
Start the engine.

Does the DTC return?

Yes >> Replace the APPS Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P2118-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT


THROTTLE BODY (5.7L)
ETC MOTOR (+)
ETC MOTOR (-)
3
5
K124
18
DB/GY
K126
18
DB/LG
6
C2
38
C2
ETC MOTOR (+)
ETC MOTOR (-)
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
6
2
5
1
THROTTLE BODY (5.7L)
81474b19

P2118-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and the ETC Motor is not in Limp Home mode.
- **Set Condition:**
  When the PCM detects an internal error or a short between the ETC Motor- and ETC Motor + circuits in the ETC Motor Driver. One trip fault. ETC light is flashing.

Possible Causes
THROTTLE PLATE / BORE INSPECTION
(K124) ETC POSITIVE CIRCUIT SHORTED TO BATTERY VOLTAGE
(K126) ETC NEGATIVE CIRCUIT SHORTED TO BATTERY VOLTAGE
(K124) ETC POSITIVE CIRCUIT SHORTED TO THE (K126) ETC NEGATIVE CIRCUIT
(K124) ETC POSITIVE CIRCUIT OPEN
(K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND
(K126) ETC NEGATIVE CIRCUIT OPEN
(K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND
ETC MOTOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.
Ignition on, engine not running.

NOTE: If the P2118 is intermittent, it is possible that the controller is overheating in extreme hot temperatures, and this is considered a normal protection operation. No repair is necessary.
With a scan tool, read DTCs.
Look closely at the temperatures at which this DTC set.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2118-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

2. THROTTLE PLATE INSPECTION

Turn the ignition off.

Remove the Air Cleaner Assembly from the Throttle Body.

Check for any signs of a foreign material (ice or dirt) on the Throttle Plate or in the bore causing the Throttle Plate to stick.

Were any signs of foreign material or scoring of the throttle plate or bore found?

Yes >> Remove the debris if possible or replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. (K124) ETC POSITIVE CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

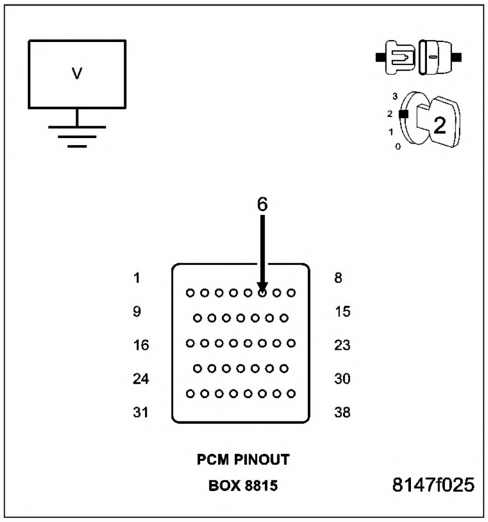
Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

With a 12-volt test light connected to ground, probe the (K124) ETC Positive circuit at the appropriate terminal of special tool #8815.



Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage on the (K124) ETC Positive circuit.

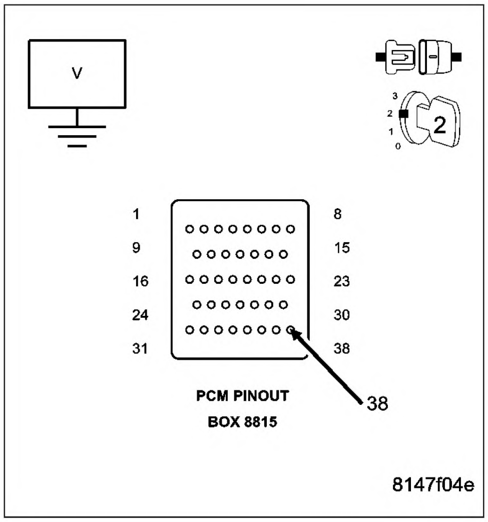
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

P2118-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

4. (K126) ETC NEGATIVE CIRCUIT SHORTED TO BATTERY VOLTAGE

Using a 12-volt test light connected to ground, probe the (K126) ETC Negative circuit at the appropriate terminal of special tool #8815.


V
3
2
1
0
2
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
38
8147f04e

Does the test light illuminate brightly?

Yes >> Repair the short to battery voltage in the (K126) ETC Negative circuit.

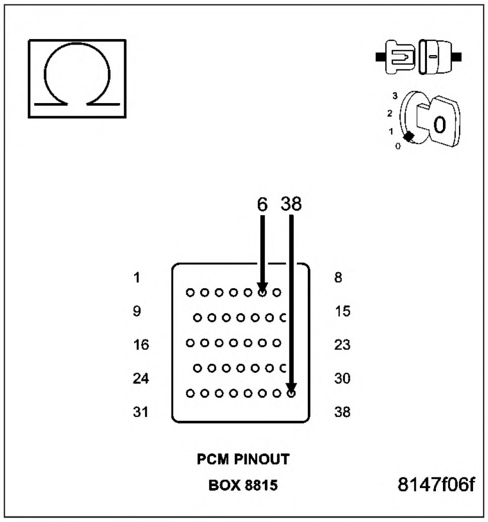
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. (K124) ETC POSITIVE CIRCUIT SHORTED TO THE (K126) ETC NEGATIVE CIRCUIT

Measure the resistance between the (K124) ETC Positive circuit and the (K126) ETC Negative circuit at the appropriate terminals of special tool #8815.


Ω
3
2
1
0
0
6 38
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147f06f

Is the resistance below 100 ohms?

Yes >> Repair the short to between the (K124) ETC Positive circuit and the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P2118-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

6. (K124) ETC POSITIVE CIRCUIT OPEN

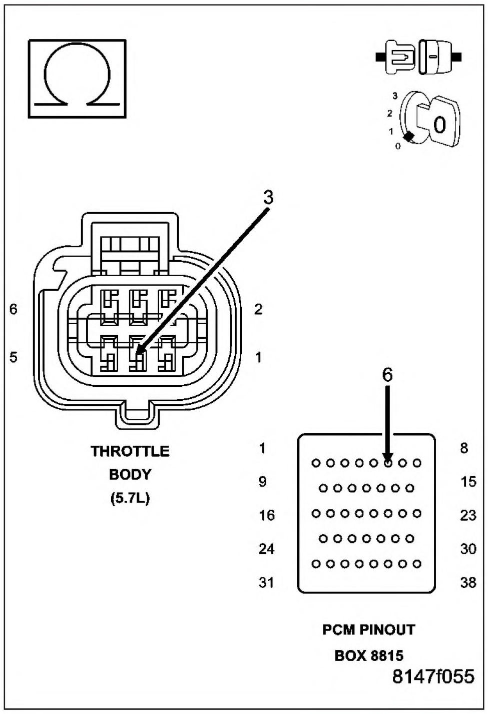
Turn the ignition off.

Measure the resistance of the (K124) ETC Positive circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K124) ETC Positive circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
3
6
2
5
1
6
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147f055

---

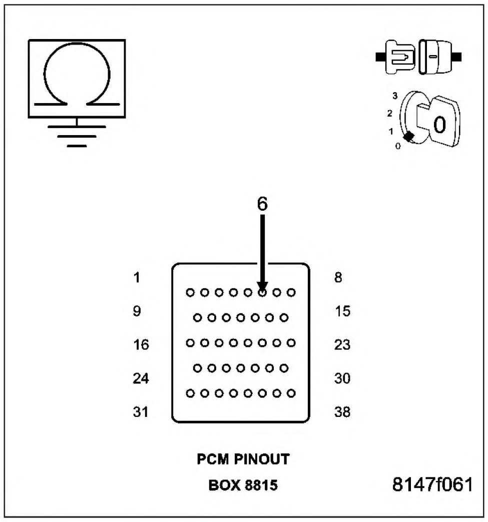
7. (K124) ETC POSITIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K124) ETC Positive circuit between the appropriate terminals of special tool #8815.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K124) ETC Positive circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

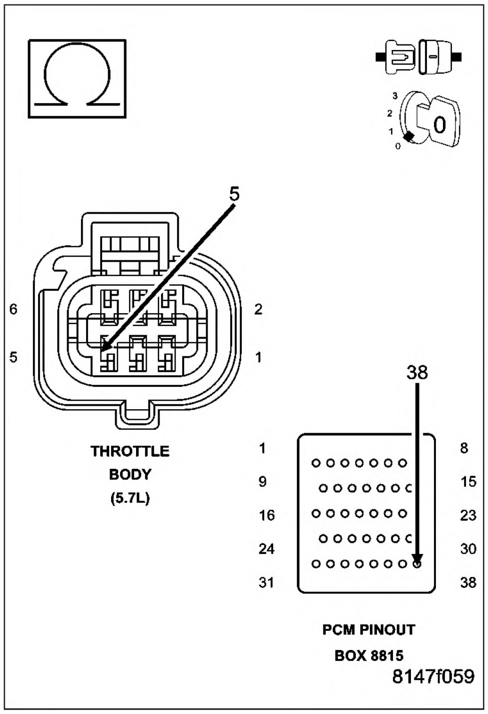
No >> Go To 8


3
2
1
0
0
6
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147f061

P2118-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

8. (K126) ETC NEGATIVE CIRCUIT OPEN

Measure the resistance of the (K126) ETC Negative circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
5
6
2
5
1
38
THROTTLE
BODY
(5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147f059

Is the resistance below 5.0 ohms?

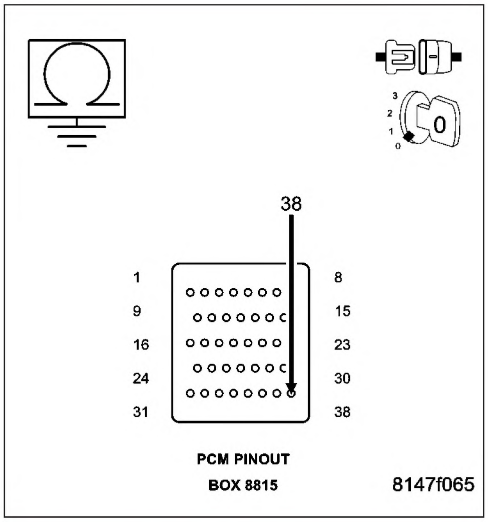
Yes >> Go To 9

No >> Repair the open in the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

9. (K126) ETC NEGATIVE CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K126) ETC Negative circuit between the appropriate terminals of special tool #8815.


3
2
1
0
0
38
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147f065

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K126) ETC Negative circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

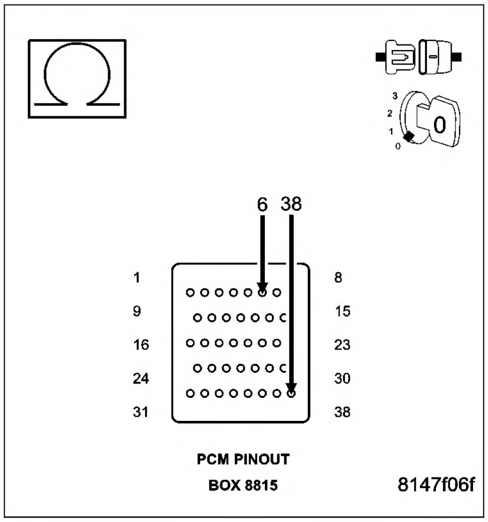
No >> Go To 10

P2118-ELECTRONIC THROTTLE CONTROL MOTOR CIRCUIT (CONTINUED)

10. ETC MOTOR

NOTE: Take the following measurement using special tool #8815 to avoid possible damage to the Throttle Body harness connector.

Measure the resistance of the ETC Motor between the (K124) ETC Positive circuit and the (K126) ETC Negative circuit at the appropriate terminals of special tool #8815.



Is the resistance between 2.5 and 25 ohms at closed throttle?

Yes >> Go To 11

No >> Replace the Throttle Body Assembly. Disconnect the Battery when replacing the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

11. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

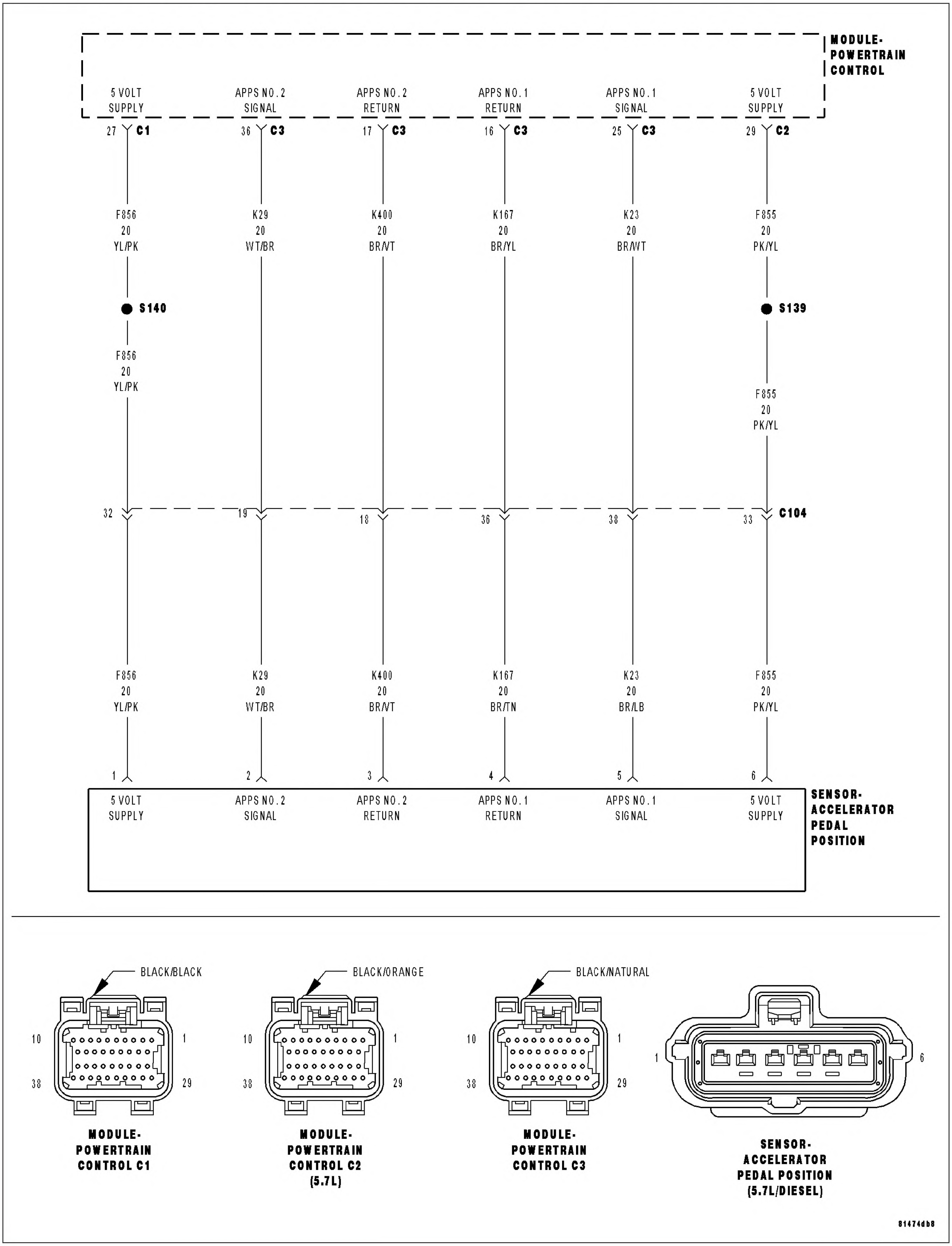
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2122-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT LOW


MODULE-POWERTRAIN CONTROL
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
27 C1
36 C3
17 C3
16 C3
25 C3
29 C2
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/YL
K23 20 BR/WT
F855 20 PK/YL
S140
S139
F856 20 YL/PK
F855 20 PK/YL
32
19
18
36
38
33
C104
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/TN
K23 20 BR/LB
F855 20 PK/YL
1
2
3
4
5
6
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
SENSOR-ACCELERATOR PEDAL POSITION
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
1
6
SENSOR-ACCELERATOR PEDAL POSITION (5.7L/DIESEL)
81474db8

P2122-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and no other APPS No.1 DTCs present.
- **Set Condition:**
  When the APP Sensor No.1 voltage is too low. Engine will additionally idle if the brake pedal is pressed or has failed. Acceleration rate and Engine output are limited. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
(F855) 5-VOLT SUPPLY CIRCUIT OPEN
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K23) APP SENSOR NO.1 SIGNAL CIRCUIT OPEN
(K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND
(K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K167) APP SENSOR NO.1 RETURN CIRCUIT
(K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K400) APP SENSOR NO.2 RETURN CIRCUIT
APP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. APP SENSOR BELOW 0.25 OF A VOLT

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.
Ignition on, engine not running.
With a scan tool, read the APP Sensor No.1 voltage.

Is the voltage below 0.25 of a volt?

Yes >> Go To 2

No >> Go To 11

P2122-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT LOW (CONTINUED)

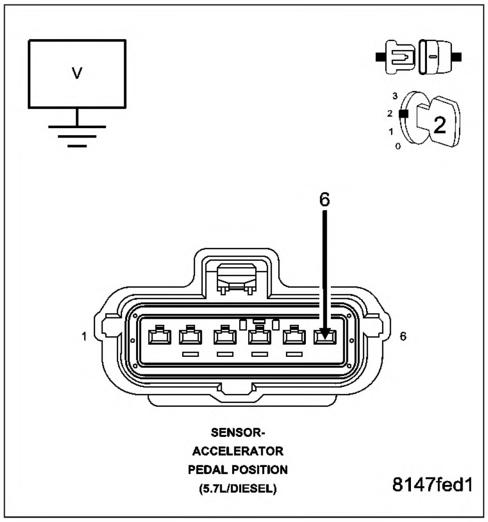
2. (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the APP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the APP Sensor harness connector.


V
3
2
1
0
2
6
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8147fed1

Is the voltage between 4.5 and 5.2 volts?

Yes >> Go To 3

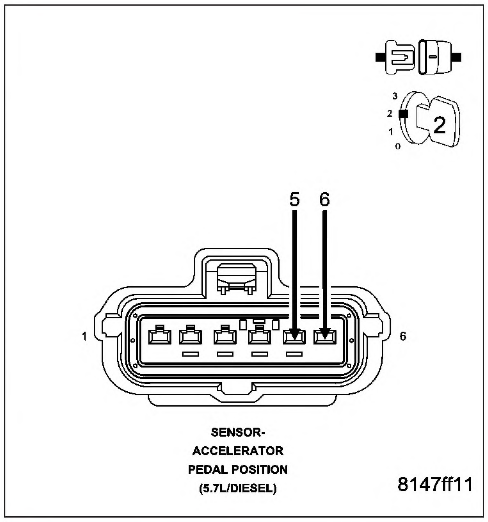
No >> Go To 8

---

3. ACCELERATOR PEDAL POSITION SENSOR

Connect a jumper wire between the (F855) 5-volt Supply circuit and the (K23) APP Sensor No.1 Signal circuit in the Sensor harness connector.

With a scan tool, monitor the APP Sensor No.1 voltage.


3
2
1
0
2
5 6
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8147ff11

Is the voltage above 4.5 volts?

Yes >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.

P2122-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT LOW (CONTINUED)

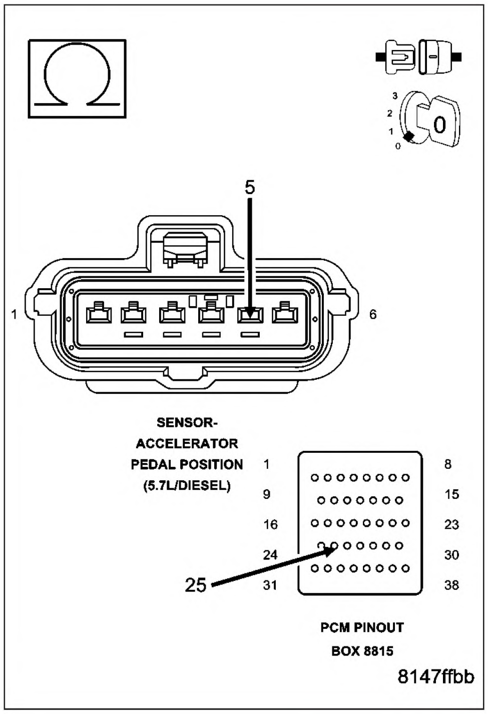
4. (K23) APP SENSOR NO.1 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K23) APP Sensor No.1 Signal circuit from the APP Sensor harness connector to the appropriate terminal of special tool #8815.


5
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
25
31
38
PCM PINOUT
BOX 8815
8147ffbb

Is the resistance below 5.0 ohms?

Yes >> Go To 5

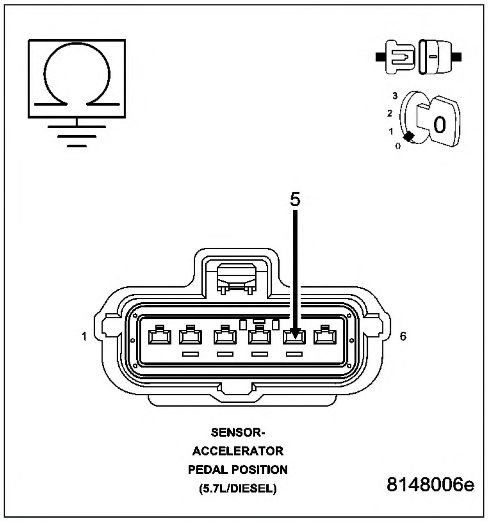
No >> Repair the open in the (K23) APP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K23) APP Sensor No.1 Signal circuit in the APP Sensor harness connector.


5
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8148006e

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K23) APP Sensor No.1 Signal circuit.

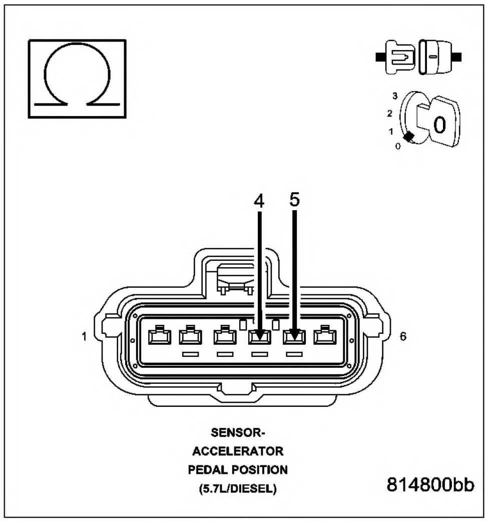
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P2122-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT LOW (CONTINUED)

6. (K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K167) APP SENSOR NO.1 RETURN CIRCUIT

Measure the resistance between the (K23) APP Sensor No.1 Signal circuit and the (K167) Sensor No.1 Return circuit at the APP Sensor harness connector.


4
5
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
814800bb

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K167) App Sensor No.1 Return circuit and the (K23) APP Sensor No.1 Signal circuit.

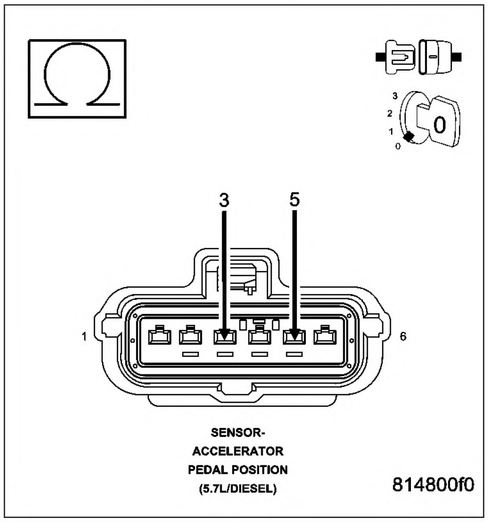
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. (K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K400) APP SENSOR NO.2 RETURN CIRCUIT

Measure the resistance between the (K23) APP Sensor No.1 Signal circuit and the (K400) Sensor No.2 Return circuit in the APP Sensor harness connector.


3
5
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
814800f0

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K400) App Sensor No.2 Return circuit and the (K23) APP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P2122-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT LOW (CONTINUED)

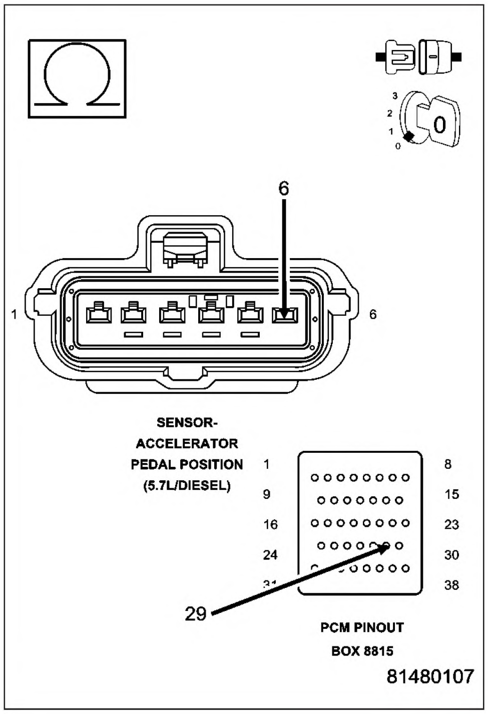
8. (F855) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the Sensor harness connector to the appropriate terminal of special tool #8815.


6
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
31
38
29
PCM PINOUT
BOX 8815
81480107

Is the resistance below 5.0 ohms?

Yes >> Go To 9

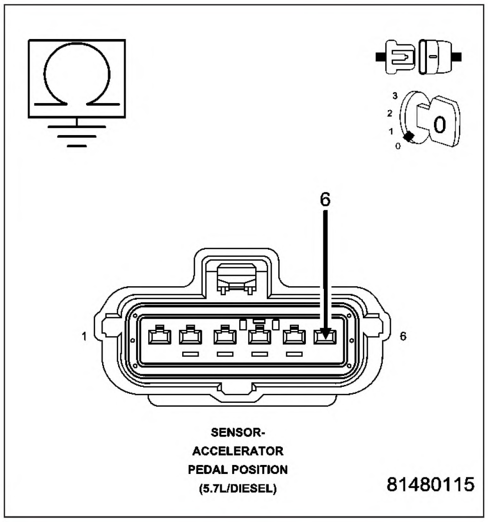
No >> Repair the open in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit in the APP Sensor harness connector.


6
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81480115

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P2122-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT LOW (CONTINUED)

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. APP SENSOR SWEEP

Ignition on, engine not running.

With a scan tool, monitor the APP Sensor No.1 voltage.

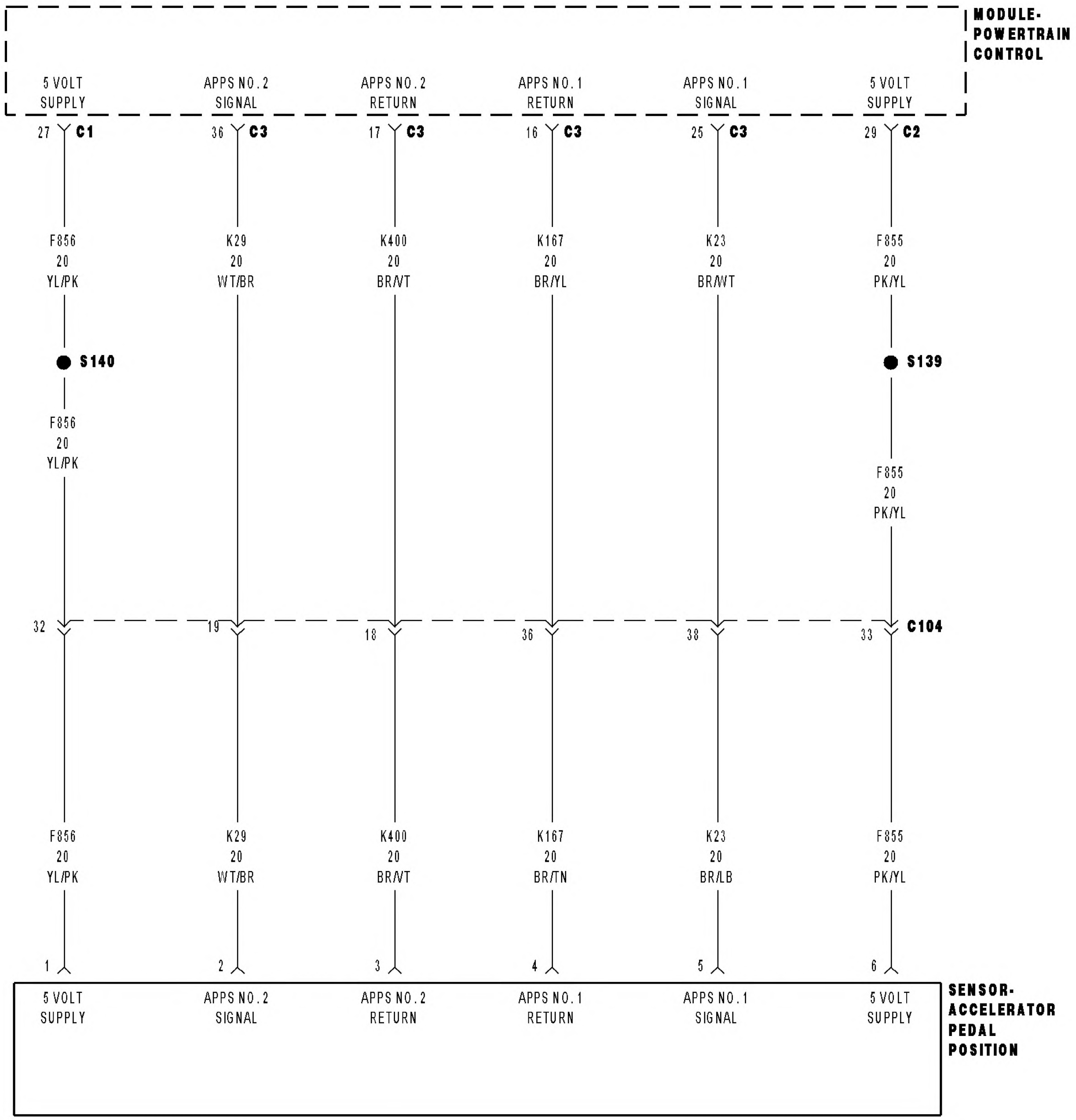
Slowly press the Accelerator pedal down.

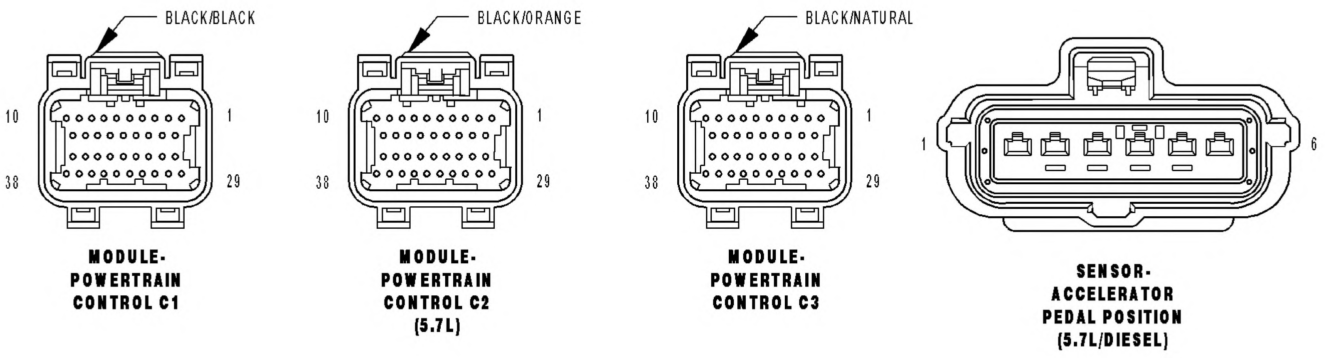
Does voltage start at approximately 0.45 of a volt and go above 4.6 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2123-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
5 VOLT SUPPLY
APPS NO. 2 SIGNAL
APPS NO. 2 RETURN
APPS NO. 1 RETURN
APPS NO. 1 SIGNAL
5 VOLT SUPPLY
27 C1
36 C3
17 C3
16 C3
25 C3
29 C2
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/YL
K23 20 BR/WT
F855 20 PK/YL
S140
S139
F856 20 YL/PK
F855 20 PK/YL
32
19
18
36
38
33
C104
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/TN
K23 20 BR/LB
F855 20 PK/YL
1
2
3
4
5
6
5 VOLT SUPPLY
APPS NO. 2 SIGNAL
APPS NO. 2 RETURN
APPS NO. 1 RETURN
APPS NO. 1 SIGNAL
5 VOLT SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION


BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81474db8

P2123-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and no other APPS No.1 DTCs present.
- **Set Condition:**
  When APP Sensor No.1 voltage is too high. Engine will additionally idle if the brake pedal is pressed or has failed. Acceleration rate and Engine output are limited. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
(K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K23) APP SENSOR NO.1 SIGNAL SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K23) APP SENSOR NO.1 SIGNAL SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
(K167) APP SENSOR NO.1 RETURN CIRCUIT OPEN
APP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. APPS NO.1 VOLTAGE ABOVE 4.8 VOLTS

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

Ignition on, engine not running.

With a scan tool, read the APP Sensor No.1 voltage.

Is the voltage above 4.8 volts?

Yes >> Go To 2

No >> Go To 8

---

2. ACCELERATOR PEDAL POSITION SENSOR

Turn the Ignition off.

Disconnect the APP Sensor harness connector.

Ignition on, engine not running.

With a scan tool, monitor the Accelerator Pedal Position Sensor voltage.

Is the voltage above 0 volts?

Yes >> Go To 3

No >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2123-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT HIGH (CONTINUED)

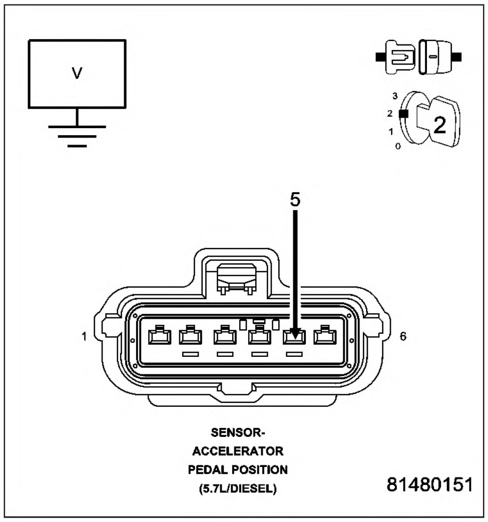
3. (K23) APP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C1, C2, and C3 PCM harness connectors.

Ignition on, engine not running.

Measure the voltage on the (K23) APP Sensor No.1 Signal circuit in the APP Sensor harness connector.


V
3
2
1
0
2
5
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81480151

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K23) APP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

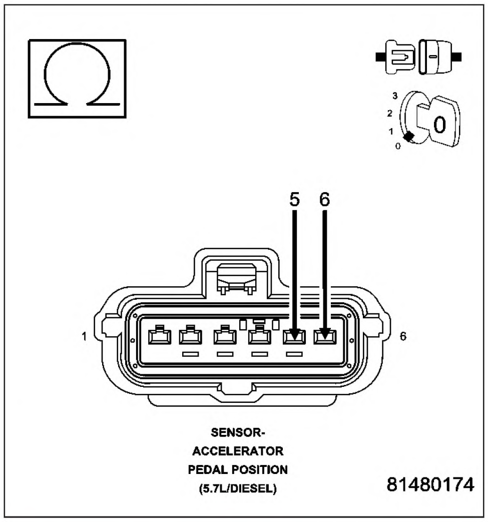
No >> Go To 4

---

4. (K23) APPS NO.1 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Measure the resistance between the (K23) APP Sensor No.1 Signal circuit and the (F855) 5-volt Supply circuit in the APP Sensor harness connector.


Ω
3
2
1
0
0
5
6
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81480174

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K23) APP Sensor No.1 Signal circuit and the (F855) 5-volt Supply circuit.

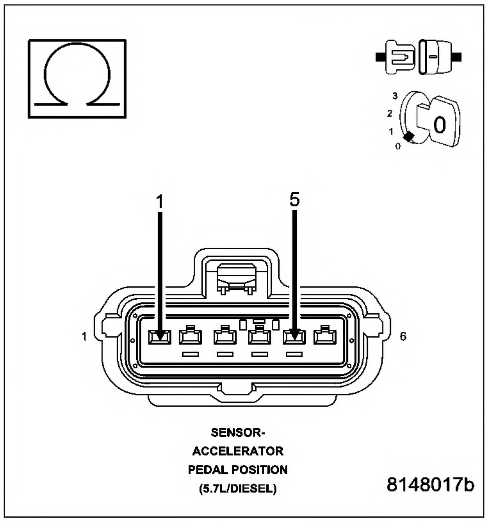
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2123-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT HIGH (CONTINUED)

5. (K23) APPS NO.1 SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (K23) APP Sensor No.1 Signal circuit and the (F856) 5-volt Supply circuit in the APP Sensor harness connector.


1
5
1
6
3
2
1
0
0
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8148017b

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K23) APP Sensor No.1 Signal circuit and the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

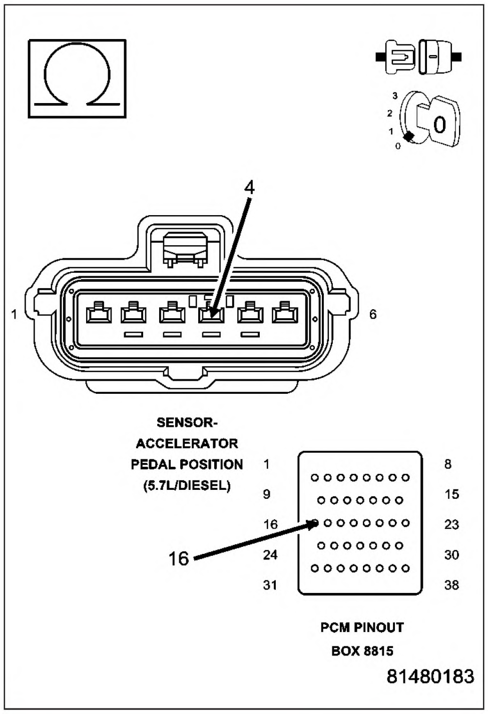
No >> Go To 6

---

6. (K167) APP SENSOR NO.1 RETURN CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K167) APP Sensor No.1 Return circuit from the APP Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
4
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
9
16
24
31
8
15
23
30
38
16
PCM PINOUT
BOX 8815
81480183

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K167) APP Sensor No.1 Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2123-ACCELERATOR PEDAL POSITION SENSOR 1 CIRCUIT HIGH (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. APP SENSOR NO.1 SWEEP

Ignition on, engine not running.

With a scan tool, monitor the Accelerator Pedal Position Sensor voltage.

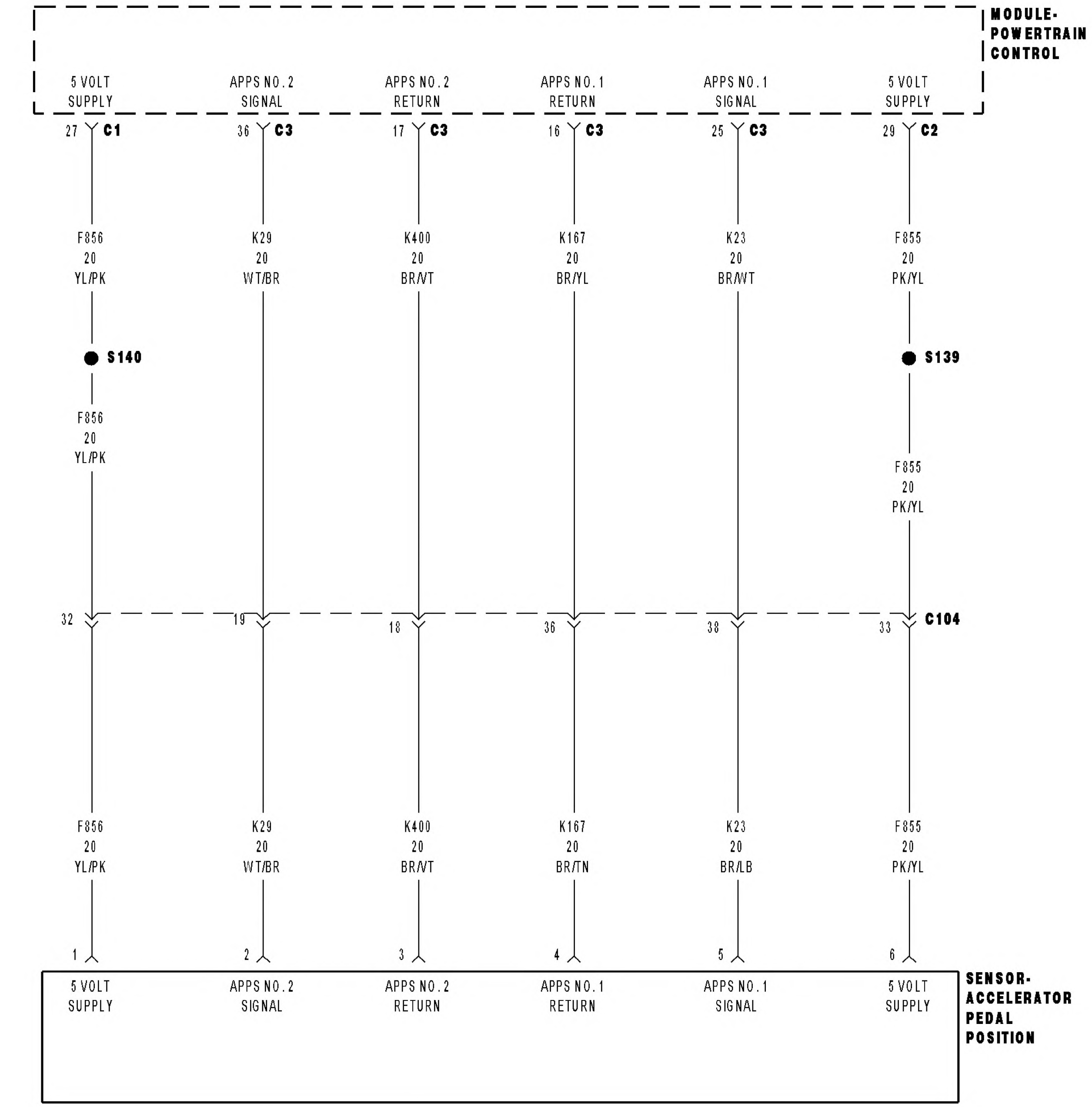
Slowly press the Accelerator Pedal down.

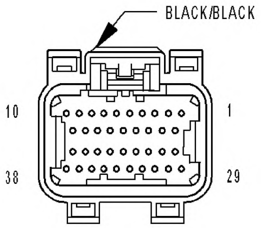
Does voltage start at approximately 0.45 of a volt and go above 4.6 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

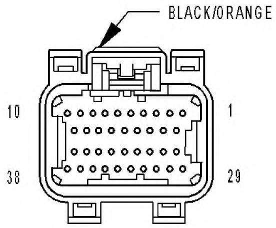
No >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2127-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT LOW

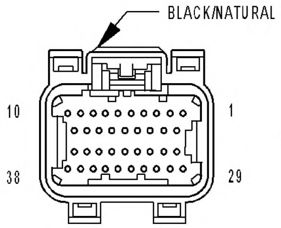

MODULE-
POWERTRAIN
CONTROL
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
27 C1
36 C3
17 C3
16 C3
25 C3
29 C2
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/YL
K23 20 BR/WT
F855 20 PK/YL
S140
S139
F856 20 YL/PK
F855 20 PK/YL
32
19
18
36
38
33
C104
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/TN
K23 20 BR/LB
F855 20 PK/YL
1
2
3
4
5
6
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION


BLACK/BLACK
10
1
38
29

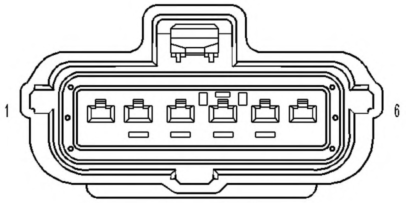
**MODULE-
POWERTRAIN
CONTROL C1**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**


BLACK/NATURAL
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C3**



**SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)**

81474db8

P2127-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and no other APPS No.2 DTCs present.
- **Set Condition:**
  When the APP Sensor No.2 voltage is too low. Engine will only idle if the Brake pedal is Pressed or has failed. Acceleration rate and Engine output are limited. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K29) APP SENSOR NO.2 SIGNAL CIRCUIT OPEN
(K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
(K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K167) APP SENSOR NO.1 RETURN CIRCUIT
(K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K400) APP SENSOR NO.2 RETURN CIRCUIT
APP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. APP SENSOR BELOW 0.25 OF A VOLT

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.
Ignition on, engine not running.
With a scan tool, read the APP Sensor No.1 voltage.

NOTE: Sensor No. 2 is pulled low by the PCM as part of its system testing. This test happens a couple of times a second. So you can expect to see voltages close to zero occasionally with a normal sensor.

Is the voltage consistently below 0.25 of a volt?

Yes >> Go To 2
No >> Go To 11

P2127-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

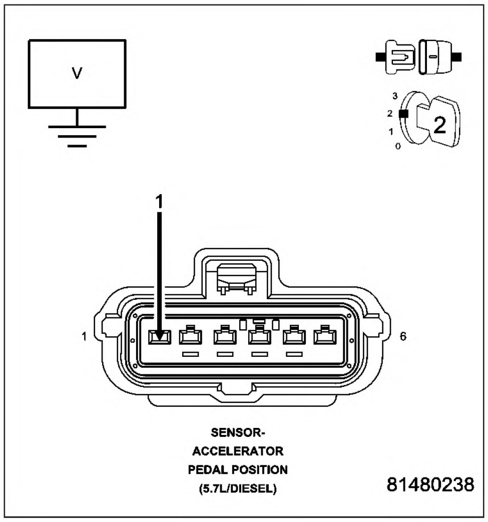
2. (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the APP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F856) 5-volt Supply circuit in the APP Sensor harness connector.


V
3
2
1
0
2
1
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81480238

Is the voltage between 4.5 and 5.2 volts?

Yes >> Go To 3

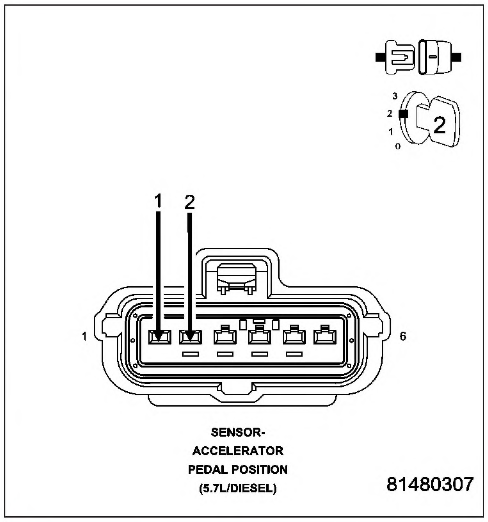
No >> Go To 8

---

3. ACCELERATOR PEDAL POSITION SENSOR

Connect a jumper wire between the (F856) 5-volt Supply circuit and the (K29) APP Sensor No.2 Signal circuit in the Sensor harness connector.

With a scan tool, monitor the APP Sensor No.2 voltage.


3
2
1
0
2
1
2
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81480307

Is the voltage above 4.5 volts with the jumper wire installed?

Yes >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.

P2127-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

4. (K29) APP SENSOR NO.2 SIGNAL CIRCUIT OPEN

Turn the ignition off.

Disconnect the C3 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

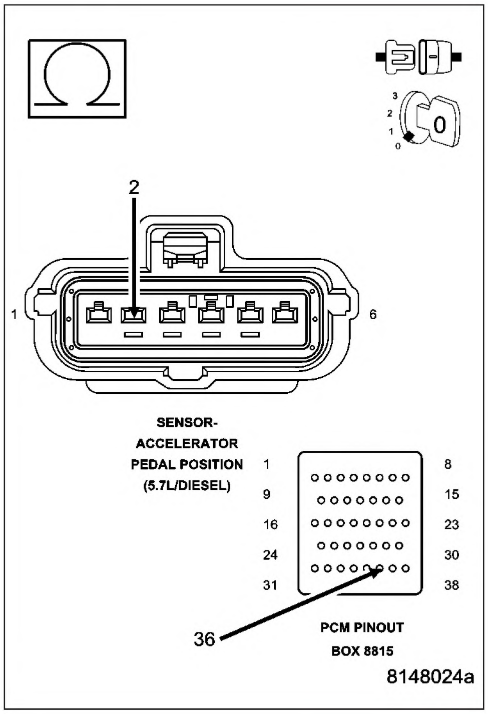
Measure the resistance of the (K29) APP Sensor No.2 Signal circuit from the APP Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 5

No >> Repair the open in the (K29) APP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


2
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
31
38
36
PCM PINOUT
BOX 8815
8148024a

---

5. (K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND

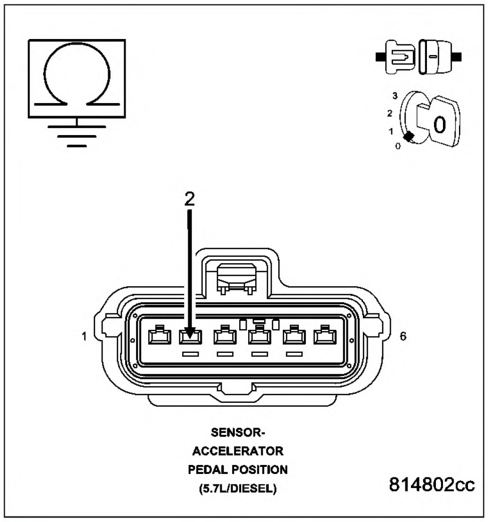
Measure the resistance between ground and the (K29) APP Sensor No.2 Signal circuit in the APP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K29) APP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6


2
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
814802cc

P2127-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

6. (K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K400) APP SENSOR NO.2 RETURN CIRCUIT

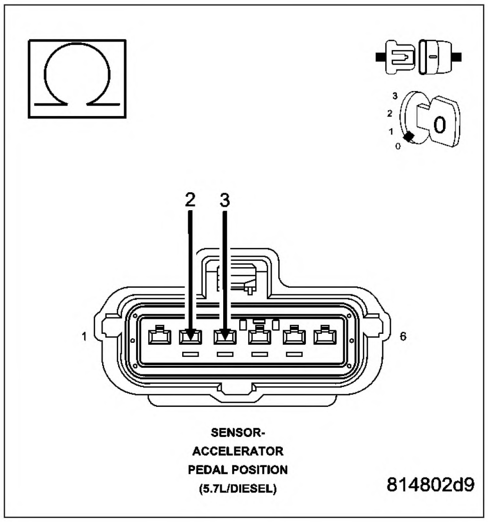
Measure the resistance between the (K29) APP Sensor No.2 Signal circuit and the (K400) Sensor No.2 Return circuit in the APP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K400) App Sensor No.2 Return circuit and the (K29) APP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7


3
2
1
0
O
2
3
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
814802d9

---

7. (K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO THE (K167) APP SENSOR NO.1 RETURN CIRCUIT

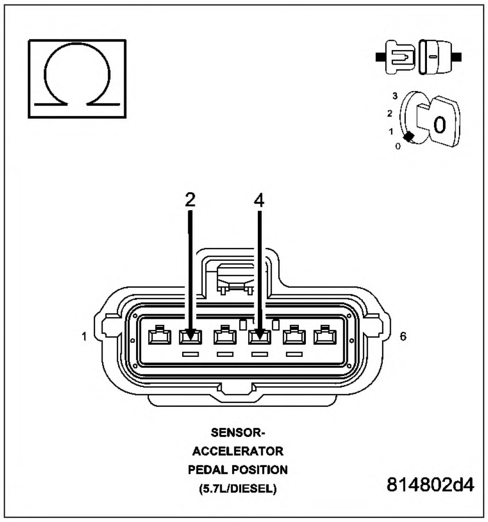
Measure the resistance between the (K29) APP Sensor No.2 Signal circuit and the (K167) Sensor No.1 Return circuit in the APP Sensor harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short between the (K167) App Sensor No.1 Return circuit and the (K29) APP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10


3
2
1
0
O
2
4
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
814802d4

P2127-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

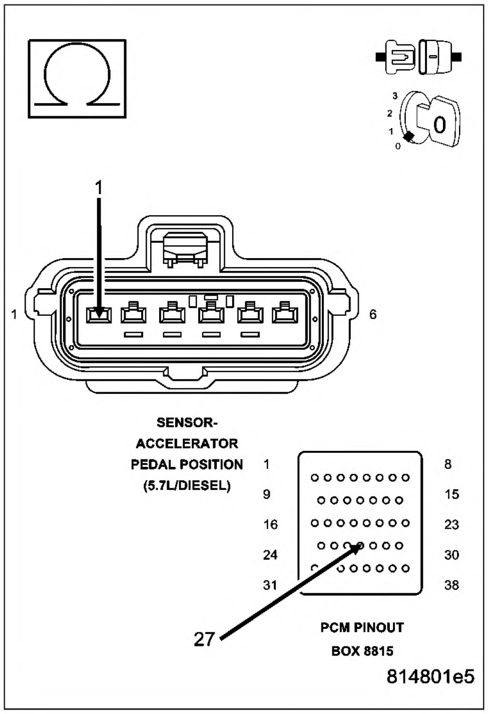
8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the Sensor harness connector to the appropriate terminal of special tool #8815.



1
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
31
38
27
PCM PINOUT
BOX 8815
814801e5

Is the resistance below 5.0 ohms?

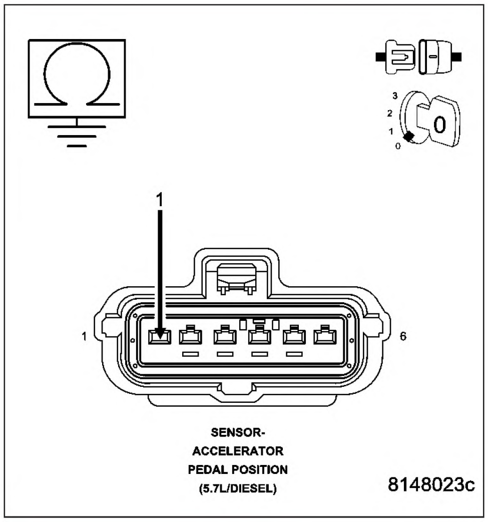
Yes >> Go To 9

No >> Repair the open in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

9. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the APP Sensor harness connector.



1
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8148023c

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P2127-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT LOW (CONTINUED)

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. APP SENSOR SWEEP

Ignition on, engine not running.

With a scan tool, monitor the APP Sensor No.2 voltage.

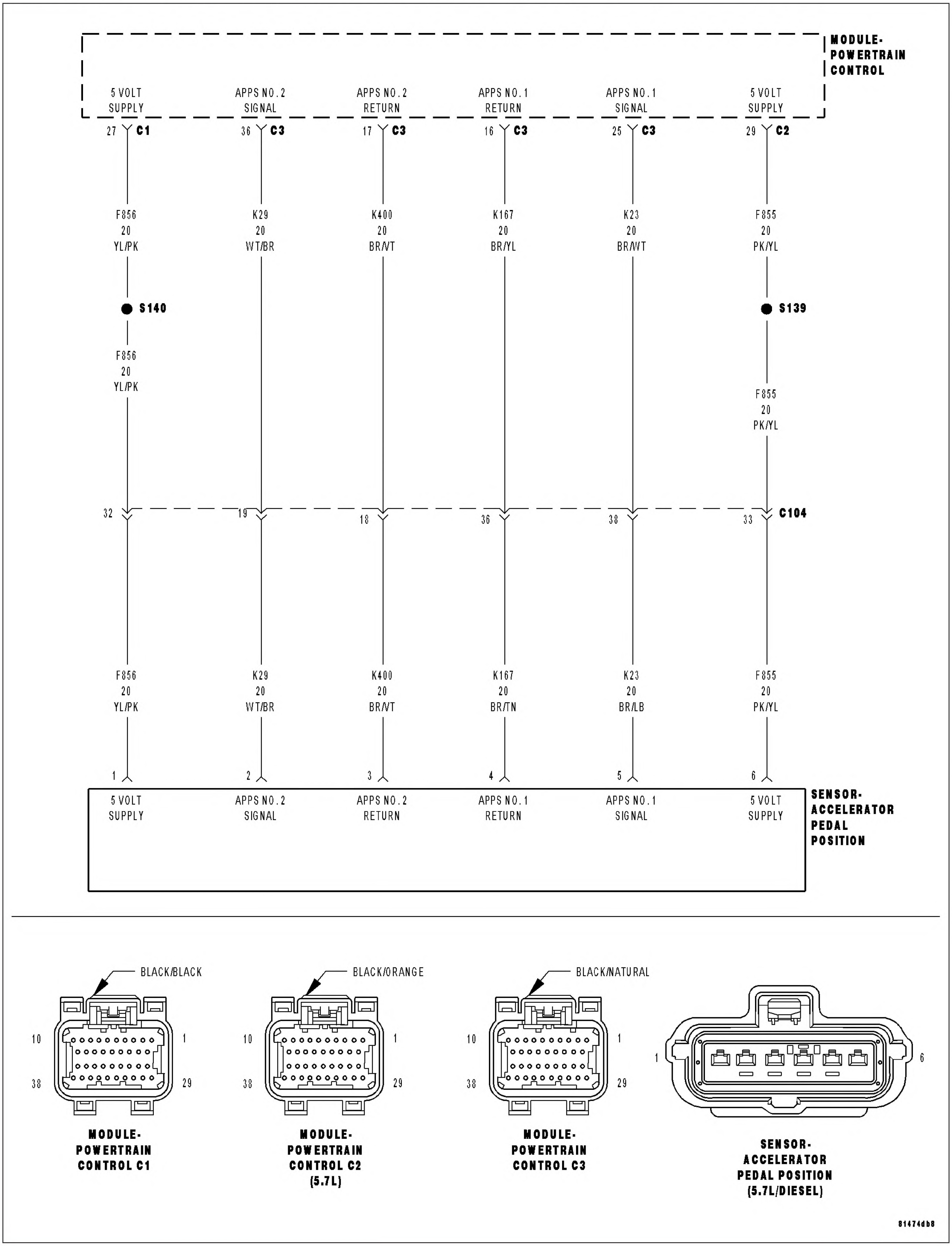
Slowly press the Accelerator pedal down.

Does voltage start at approximately 0.22 of a volt and go above 2.31 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2128-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT HIGH


MODULE-
POWERTRAIN
CONTROL
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
27 C1
36 C3
17 C3
16 C3
25 C3
29 C2
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/YL
K23 20 BR/WT
F855 20 PK/YL
S140
S139
F856 20 YL/PK
F855 20 PK/YL
32
19
18
36
38
33
C104
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/TN
K23 20 BR/LB
F855 20 PK/YL
1
2
3
4
5
6
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81474db8

P2128-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT HIGH (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and no other APPS No.2 DTCs present.
- **Set Condition:**
  When APP Sensor No.2 voltage is too high. Idle is additionally forced any time the brake is applied or failed. Acceleration rate and Engine output are limited. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
(K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K29) APP SENSOR NO.2 SIGNAL SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT
(K29) APP SENSOR NO.2 SIGNAL SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT
(K400) APP SENSOR NO.2 RETURN CIRCUIT OPEN
APP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. APPS NO.2 VOLTAGE ABOVE 3.0 VOLTS

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.
Ignition on, engine not running.

With a scan tool, read the APP Sensor No.2 voltage.

NOTE: Diagnose any 5-Volt Supply DTCs before continuing.

Is the voltage above 3.0 volts?

Yes >> Go To 2

No >> Go To 8

---

2. ACCELERATOR PEDAL POSITION SENSOR

Turn the ignition off.

Disconnect the APPS harnesss connector.

Ignition on, engine not running.

With a scan tool, monitor the Accelerator Pedal Position Sensor voltage.

Is the voltage above 0 volts?

Yes >> Go To 3

No >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2128-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT HIGH (CONTINUED)

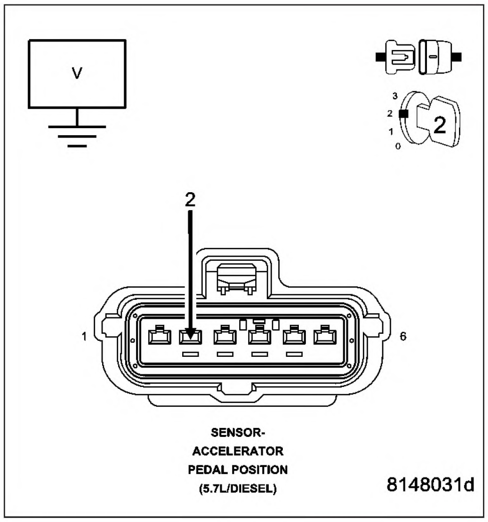
3. (K29) APP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K29) APP Sensor No.2 Signal circuit in the APP Sensor harness connector.


V
3
2
1
0
2
2
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8148031d

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K29) APP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

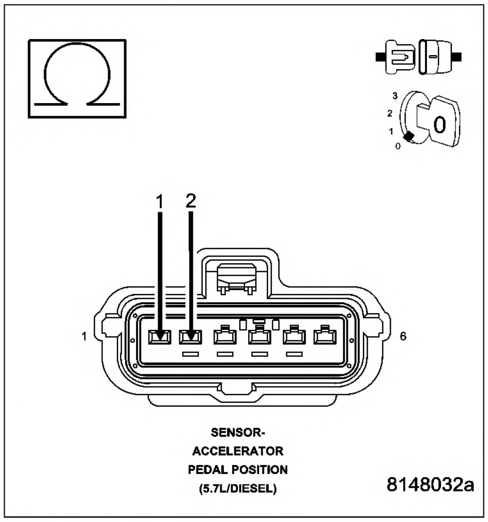
No >> Go To 4

---

4. (K29) APPS NO.2 SIGNAL CIRCUIT SHORTED TO THE (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Measure the resistance between the (K29) APP Sensor No.2 Signal circuit and the (F856) 5-volt Supply circuit in the APP Sensor harness connector.


Ω
3
2
1
0
0
1 2
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8148032a

Is the resistance below 10 ohms?

Yes >> Repair the short between the (K29) APP Sensor No.2 Signal circuit and the (F856) 5-volt Supply circuit.

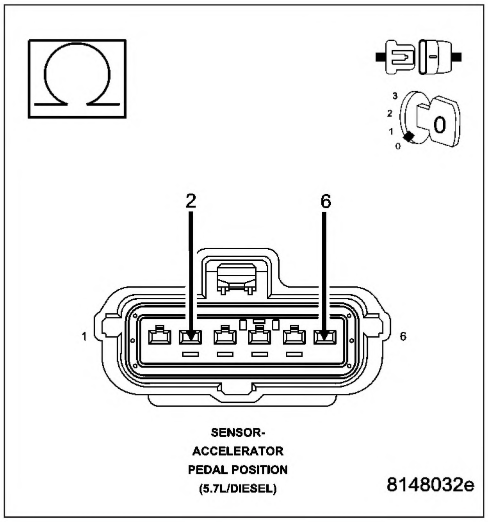
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2128-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT HIGH (CONTINUED)

5. (K29) APPS NO.2 SIGNAL CIRCUIT SHORTED TO THE (F855) 5-VOLT SUPPLY CIRCUIT

Measure the resistance between the (K29) APP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit in the APP Sensor harness connector.


3
2
1
0
0
2
6
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
8148032e

Is the resistance below 10 ohms?

Yes >> Repair the short between the (K29) APP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

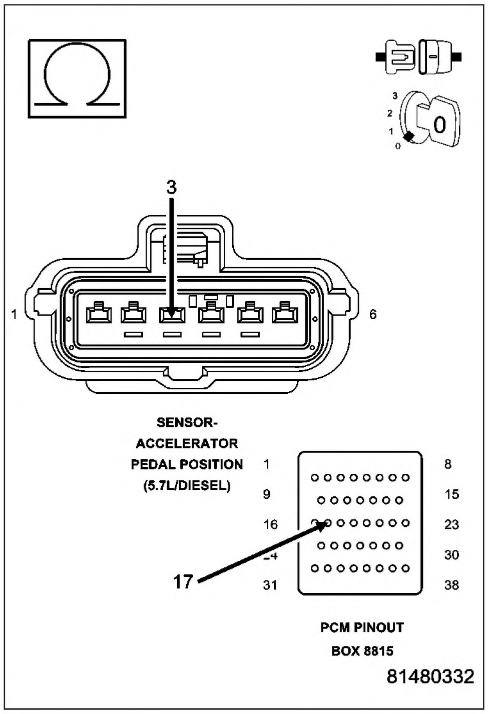
No >> Go To 6

---

6. (K400) APP SENSOR NO.2 RETURN CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K400) APP Sensor No.2 Return circuit from the APP Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
3
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
17
31
38
PCM PINOUT
BOX 8815
81480332

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K400) APP Sensor No.2 Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2128-ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT HIGH (CONTINUED)

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. APP SENSOR NO.2 SWEEP

Ignition on, engine not running.

With a scan tool, monitor the Accelerator Pedal Position Sensor voltage.

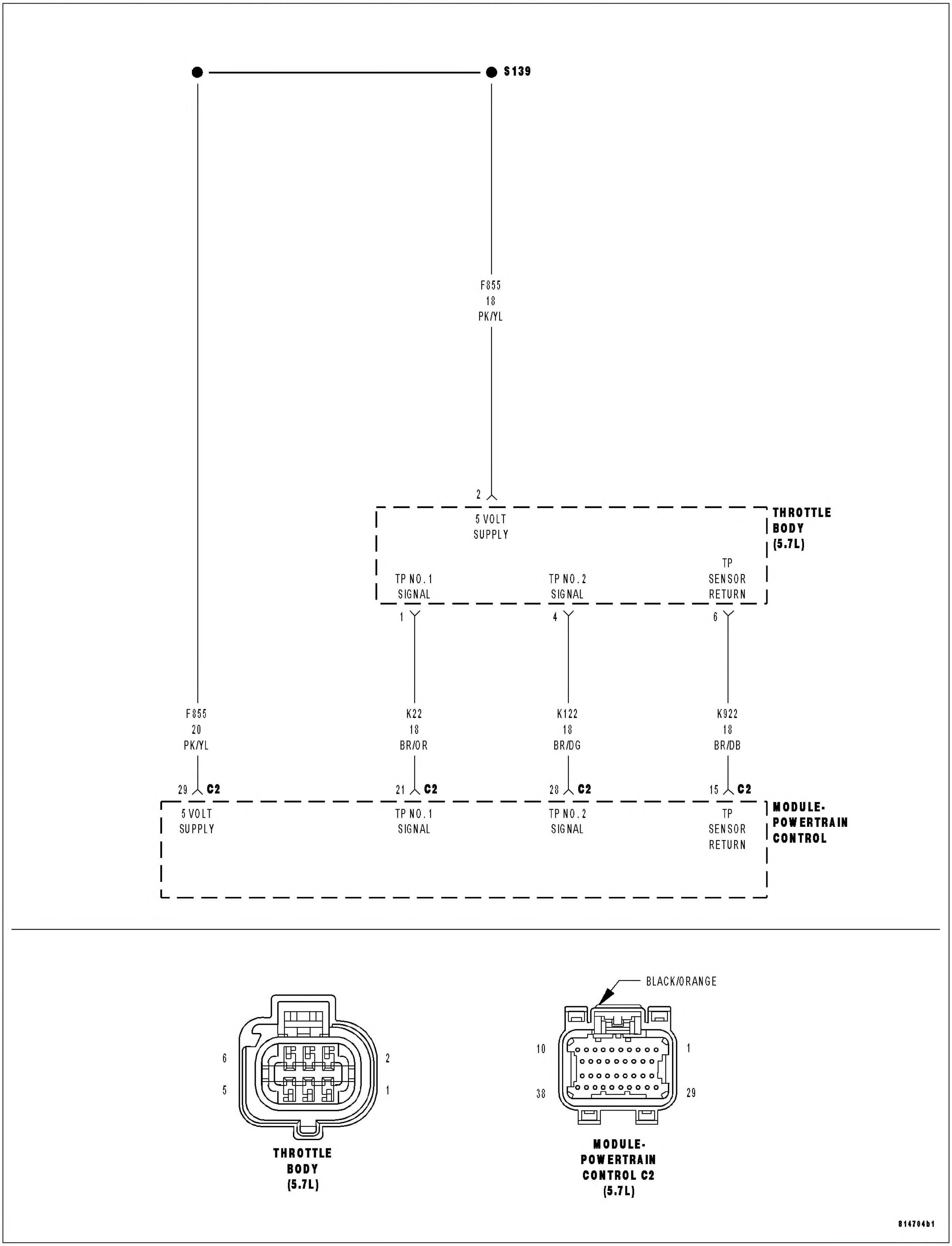
Slowly press the Accelerator Pedal down.

Does voltage start at approximately 0.22 of a volt and go above 2.31 volts with a smooth transition?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION


S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
1
4
6
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
29 C2
21 C2
28 C2
15 C2
5 VOLT SUPPLY
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
6
2
5
1
THROTTLE BODY (5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
814704b1

P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION (CONTINUED)

For the Engine System Schematic circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and no other DTCs present for TP Sensor No.1 or No.2.
- **Set Condition:**
  PCM recognizes TP Sensors No.1 and No.2 are not coherent. One trip fault and the code will set within 5 seconds. ETC light is illuminated.

Possible Causes
(K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
RESISTANCE IN THE (K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT
(K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K922) SENSOR GROUND CIRCUIT
(K22) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO THE (K122) TP SENSOR NO.2 SIGNAL CIRCUIT
THROTTLE POSITION SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: The throttle plate and linkage should be free from binding and carbon build up.

NOTE: Make sure the throttle plate is at the idle position.

Ignition on, engine not running.

NOTE: Inspect the engine for vacuum leaks.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Go To 11

P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION (CONTINUED)

2. (K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE

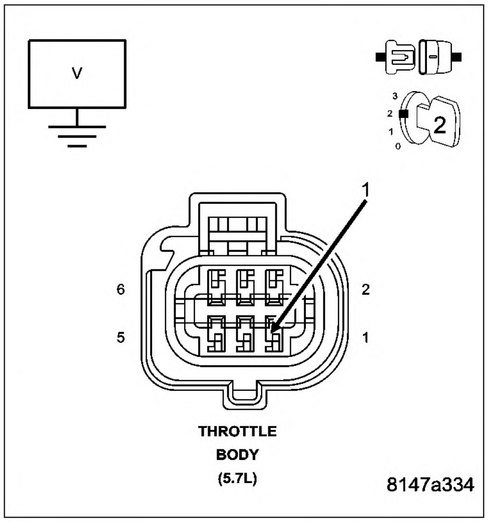
Turn the ignition off.

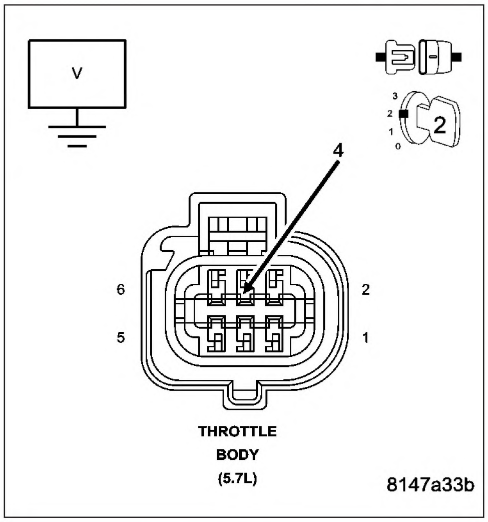
Disconnect the C2 PCM harness connector.

Disconnect the Throttle Body harness connector.

Ignition on, engine not running.

Measure the voltage on the (K22) TP No.1 Signal and the (K122) TP No.2 Signal circuits in the Throttle Body harness connector.


V
3
2
1
0
2
1
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a334


V
3
2
1
0
2
4
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a33b

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K22) TP Sensor No.1 or (K122) TP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION (CONTINUED)

3. THROTTLE POSITION SENSOR

Turn the ignition off.

Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor No.1 and No.2 voltage.

Connect a jumper wire between the (K922) Sensor Return circuit and the (K22) TP Sensor No.1 Signal circuit.

TP Sensor No.1 voltage should change from approximately 4.5 volts to 0.5 of a volt?

For TP Sensor No.2, connect a jumper wire between (F855) 5-volt supply circuit and the (K122) TP Sensor No.2 signal circuit.

TP Sensor No.2 voltage should change from approximately 0 volts to 5.0 volts?

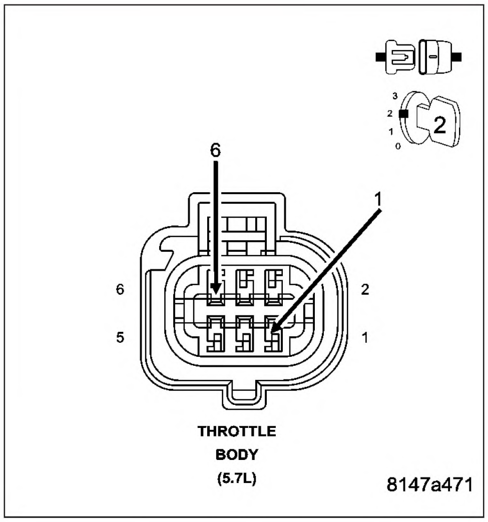
Is the voltage reading within the listed specification with the jumper wire installed?

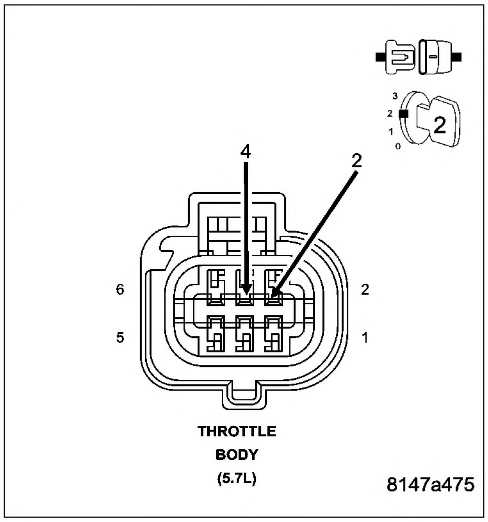
Yes >> Replace the Throttle Body Assembly.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

NOTE: Remove the jumper wire before continuing.





P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION (CONTINUED)

4. EXCESSIVE RESISTANCE IN THE (K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.2 SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

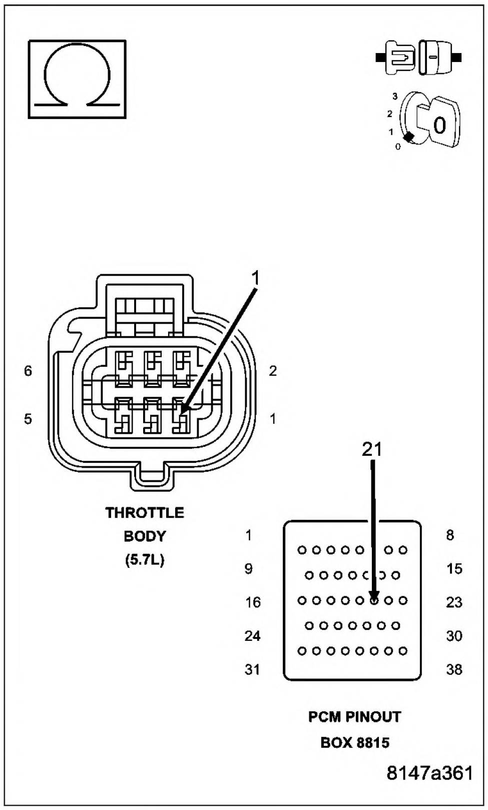
Measure the resistance of the (K22) TP Sensor No.1 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.Measure the resistance of the (K122) TP Sensor No.2 Signal circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

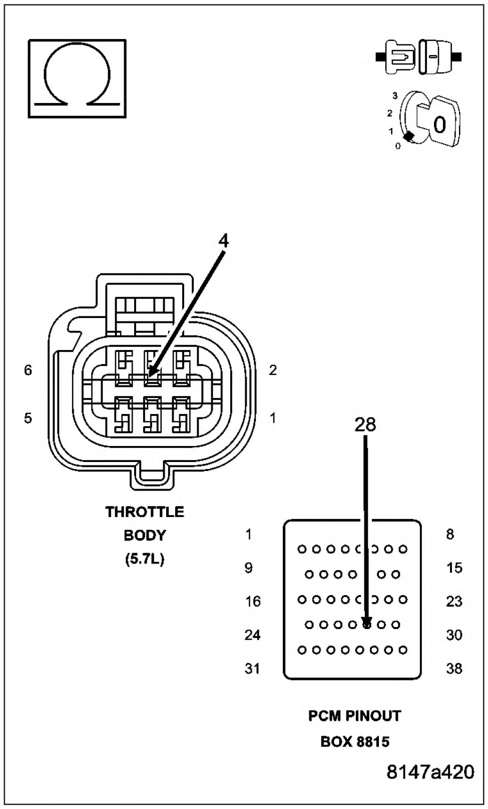
Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 5

No >> Repair the excessive resistance in the (K22) TP Sensor No.1 or (K122) TP Sensor No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


Ω
3
2
1
0
0
1
6
2
5
1
21
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a361


Ω
3
2
1
0
0
4
6
2
5
1
28
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a420

P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION (CONTINUED)

5. (K22) TP SENSOR NO.1 OR (K122) TP SENSOR NO.1 SIGNAL CIRCUIT SHORTED TO GROUND

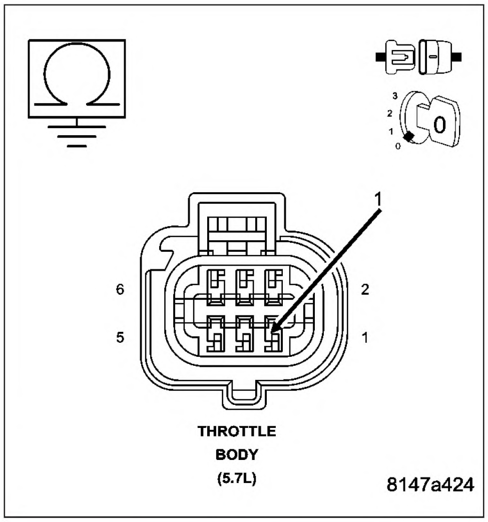
Measure the resistance between ground and the (K22) TP Sensor No.1 Signal circuit and the (K122) TP Sensor No.2 Signal circuit at the appropriate terminals of special tool #8815.

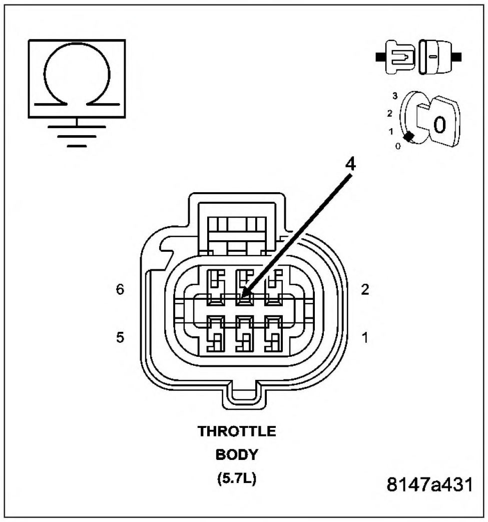
Is the resistance below 100 ohms for each circuit?

Yes >> Repair the short to ground in the (K22) TP No.1 Signal or (K122) TP No.2 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6





---

6. EXCESSIVE RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

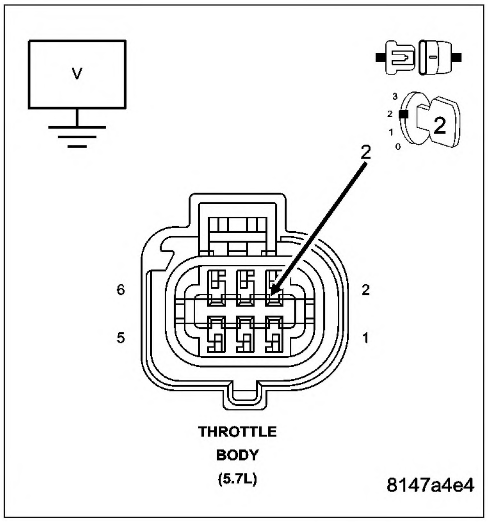
Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

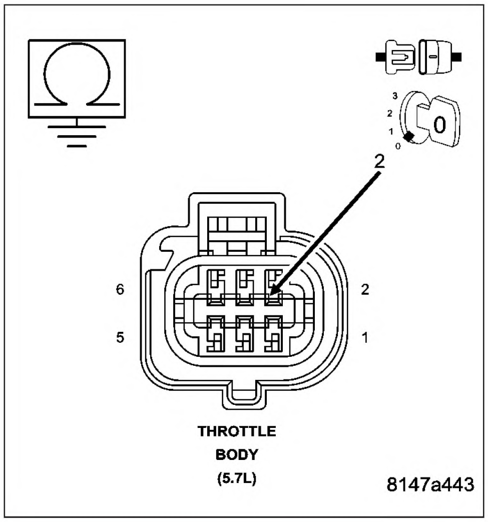
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION (CONTINUED)

7. (F855) 5-VOLT SUPPLY SHORTED TO GROUND

Measure the resistance between ground and the (F855) 5-volt Supply circuit at the appropriate terminals of special tool #8815.


2
6
5
2
1
3
2
1
0
0
THROTTLE
BODY
(5.7L)
8147a443

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

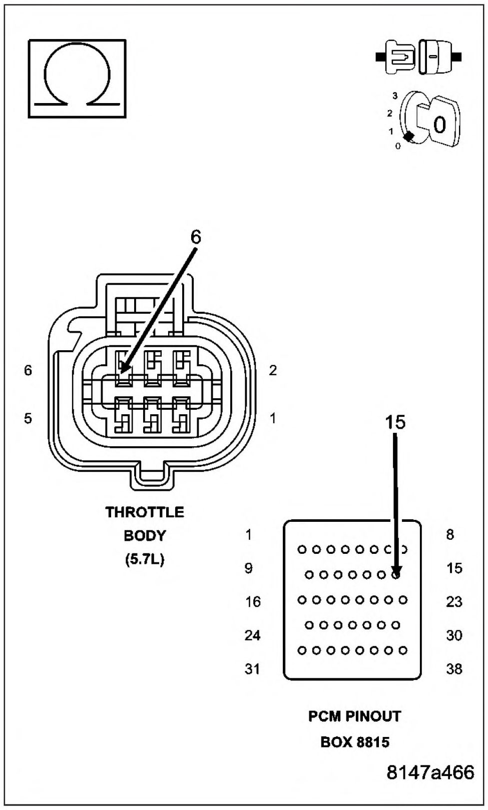
No >> Go To 8

---

8. EXCESSIVE RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
6
6
5
2
1
15
THROTTLE
BODY
(5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147a466

Is the resistance below 5.0 ohms?

Yes >> Go To 9

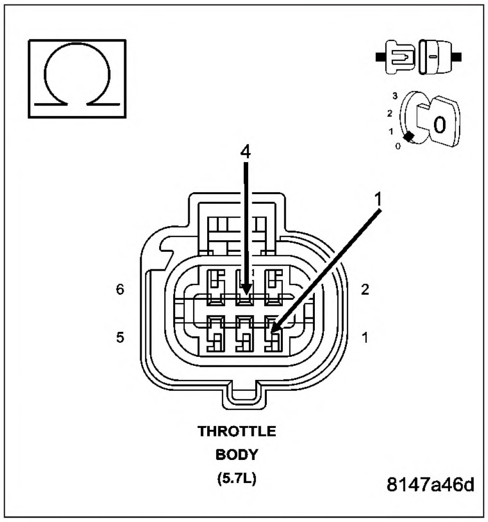
No >> Repair the excessive resistance in the (K922) Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2135-THROTTLE POSITION SENSOR 1/2 CORRELATION (CONTINUED)

9. (K22) TP SENSOR NO.1 SIGNAL SHORTED TO (K122) TP SENSOR NO.2 SIGNAL

Measure the resistance between the (K22) TP Sensor No.1 Signal circuit and the (K122) TP Sensor No.2 Signal circuit between the appropriate terminals of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K122) TP Sensor No.2 Signal circuit and the (K22) TP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

---

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. THROTTLE FOLLOWER TEST

Ignition on, engine not running.

With a scan tool, perform the Throttle Follower Test and monitor the TP Sensor No.1 or No.2 voltage.

Slowly press the throttle pedal down.

The voltage for TP Sensor No.1 should start at approximately 0.8 of a volt and increase to above 4.2 volts.

The voltage for TP Sensor No.2 should start at approximately 4.2 volts and decrease to approximately 0.8 of a volt.

Is the voltage within the range of the listed specification for the appropriate Sensor?

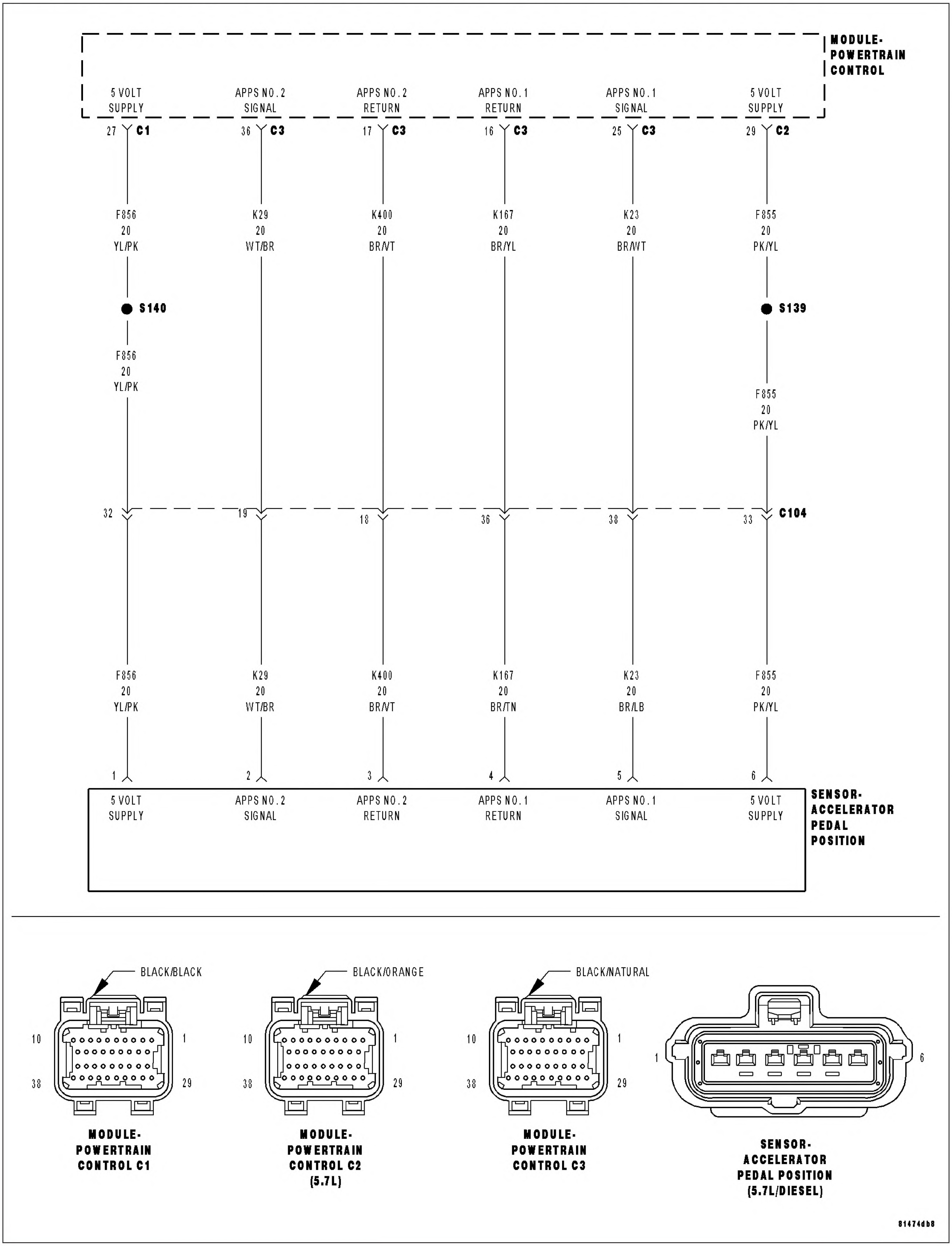
Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Disconnect the Battery when replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2138-ACCELERATOR PEDAL POSITION SENSOR 1/2 CORRELATION


MODULE-
POWERTRAIN
CONTROL
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
27 C1
36 C3
17 C3
16 C3
25 C3
29 C2
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/YL
K23 20 BR/WT
F855 20 PK/YL
S140
S139
F856 20 YL/PK
F855 20 PK/YL
32
19
18
36
38
33
C104
F856 20 YL/PK
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/TN
K23 20 BR/LB
F855 20 PK/YL
1
2
3
4
5
6
5 VOLT SUPPLY
APPS NO.2 SIGNAL
APPS NO.2 RETURN
APPS NO.1 RETURN
APPS NO.1 SIGNAL
5 VOLT SUPPLY
SENSOR-
ACCELERATOR
PEDAL
POSITION
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
81474db8

P2138-ACCELERATOR PEDAL POSITION SENSOR 1/2 CORRELATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on and no APPS No.1 and APPS No.2 DTC present.
- **Set Condition:**
  APPS values No.1 and No.2 are not coherent. Idle is additionally forced when the brake pedal is pressed or failed. Acceleration rate and Engine output are limited. One trip fault and the code will set within 5 seconds. ETC light is flashing.

Possible Causes
EXCESSIVE RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
EXCESSIVE RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
EXCESSIVE RESISTANCE IN THE (K167) SENSOR NO.1 RETURN CIRCUIT
EXCESSIVE RESISTANCE IN THE (K400) SENSOR NO.2 RETURN CIRCUIT
EXCESSIVE RESISTANCE IN THE (K23) APP SENSOR NO.1 SIGNAL CIRCUIT
EXCESSIVE RESISTANCE IN THE (K29) APP SENSOR NO.2 SIGNAL CIRCUIT
APP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: When this DTC is Active the engine speed, torque, and vehicle speed are limited to a Limp in mode.

Ignition on, engine not running.

With a scan tool, read DTCs.

NOTE: Repair any other 5-Volt Supply or APPS High and Low DTCs before diagnosing P2138.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2138-ACCELERATOR PEDAL POSITION SENSOR 1/2 CORRELATION (CONTINUED)

2. EXCESSIVE RESISTANCE IN THE (K23) APPS NO.1 SIGNAL CIRCUIT

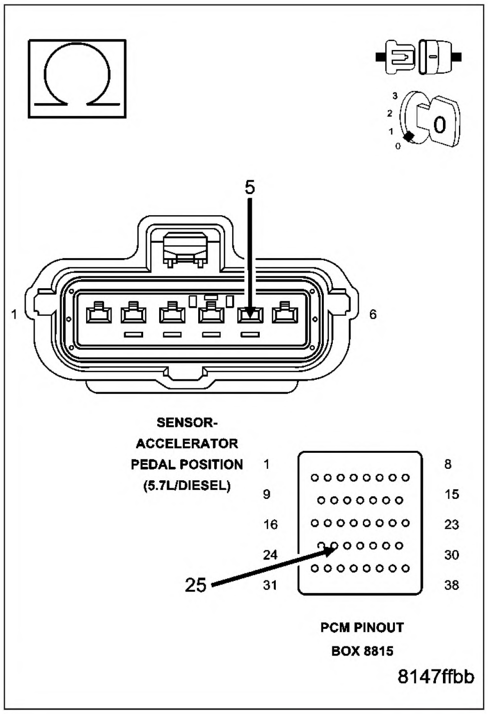
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Turn the ignition off.

Disconnect the APP Sensor harness connector.

Disconnect the C3 PCM harness connector.

Measure the resistance of (K23) APP Sensor No.1 Signal circuit from the APP Sensor harness connector to the appropriate terminals of special tool #8815.


5
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
25
31
38
PCM PINOUT
BOX 8815
8147ffbb

Is the resistance below 5.0 ohms?

Yes >> Go To 3

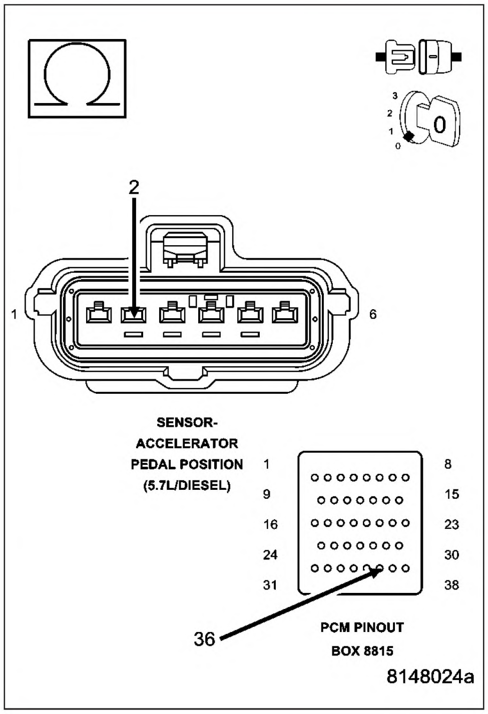
No >> Repair the excessive resistance in the (K23) APP Sensor No.1 Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. EXCESSIVE RESISTANCE IN THE (K29) APPS NO.2 SIGNAL CIRCUIT

Measure the resistance of (K29) APPS No.2 Signal circuit from the APP Sensor harness connector to the appropriate terminals of special tool #8815.


2
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
31
38
36
PCM PINOUT
BOX 8815
8148024a

Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the excessive resistance in the (K29) APP Sensor No.2 Signal circuit.

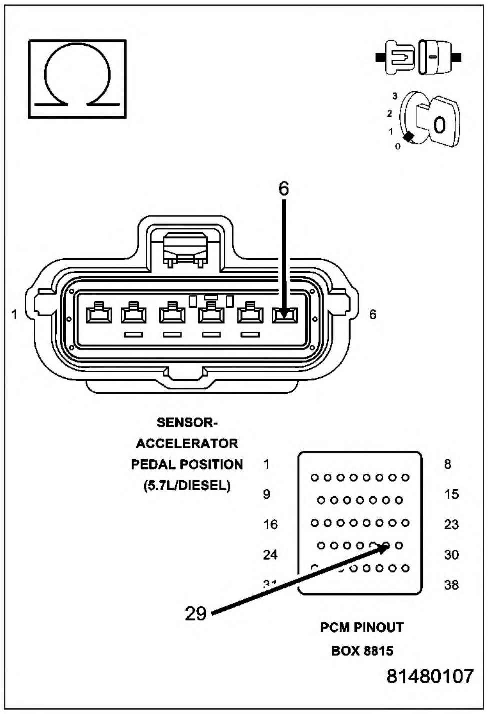
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2138-ACCELERATOR PEDAL POSITION SENSOR 1/2 CORRELATION (CONTINUED)

4. EXCESSIVE RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

Disconnect the C2 PCM harness connector.

Measure the resistance of the (F855) 5-volt Supply circuit from the APP Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
6
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
9
16
24
31
8
15
23
30
38
29
PCM PINOUT
BOX 8815

81480107

Is the resistance above 5.0 ohms?

Yes >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

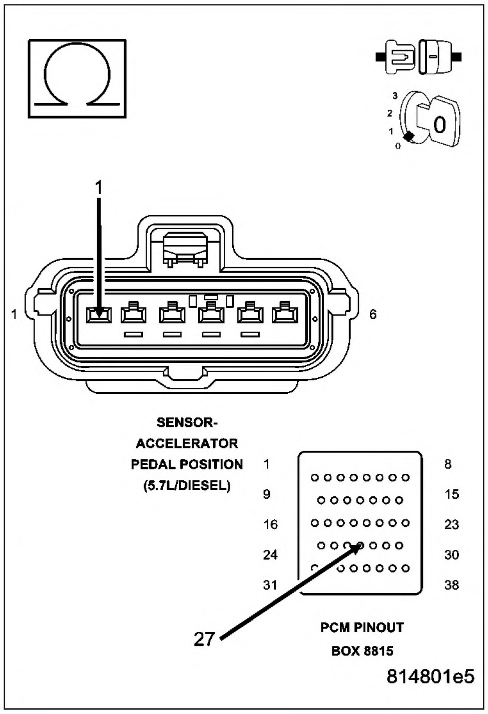
No >> Go To 5

---

5. EXCESSIVE RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

Disconnect the C1 PCM harness connector.

Measure the resistance of the (F856) 5-volt Supply circuit from the APP Sensor harness connector to the appropriate terminal of special tool #8815.


3
2
1
0
0
1
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
9
16
24
31
8
15
23
30
38
27
PCM PINOUT
BOX 8815

814801e5

Is the resistance above 5.0 ohms?

Yes >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

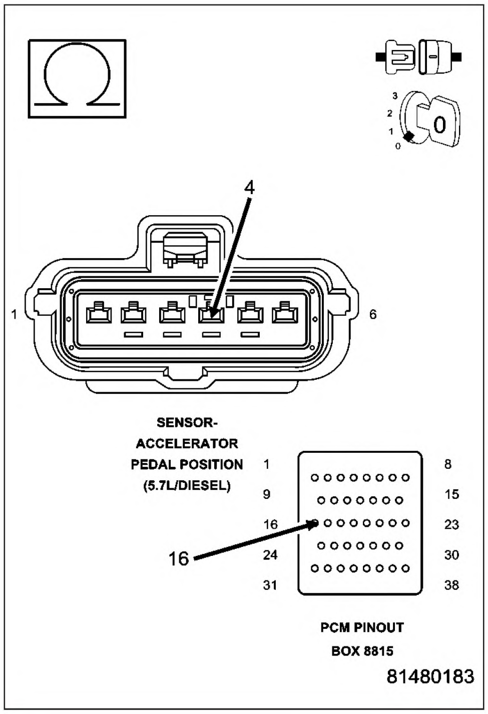
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

P2138-ACCELERATOR PEDAL POSITION SENSOR 1/2 CORRELATION (CONTINUED)

6. EXCESSIVE RESISTANCE IN THE (K167) SENSOR NO.1 RETURN CIRCUIT

Measure the resistance of the (K167) APP Sensor No.1 Return circuit from the APP Sensor harness connector to the appropriate terminal of special tool #8815.


4
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
31
38
16
PCM PINOUT
BOX 8815
81480183

Is the resistance above 5.0 ohms?

Yes >> Repair the excessive resistance in the (K167) Sensor No.1 Return circuit.

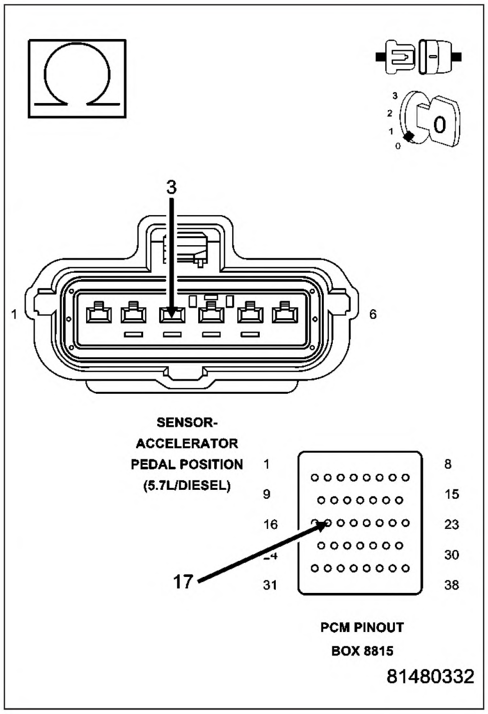
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

---

7. EXCESSIVE RESISTANCE IN THE (K400) SENSOR NO.2 RETURN CIRCUIT

Measure the resistance of the (K400) APP Sensor No.2 Return circuit from the APP Sensor harness connector to the appropriate terminal special tool #8815.


3
1
6
SENSOR-
ACCELERATOR
PEDAL POSITION
(5.7L/DIESEL)
1
8
9
15
16
23
24
30
31
38
17
PCM PINOUT
BOX 8815
81480332

Is the resistance above 5.0 ohms?

Yes >> Repair the excessive resistance in the (K400) Sensor No.2 Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P2138-ACCELERATOR PEDAL POSITION SENSOR 1/2 CORRELATION (CONTINUED)

8. CHECKING APPS NO.1 AND NO.2 WITH A LAB SCOPE

Ignition on, engine not running.

Set up a lab scope in a way that you can view two graphs simultaneously.

Backprobe (K23) APP Sensor No.1 Signal circuit using Channel 1 at the APP Sensor harness connector.

Backprobe (K29) APP Sensor No.2 Signal circuit using Channel 2 at the APP Sensor harness connector.

Slowly press and release the Accelerator Pedal while monitoring the lab scope screen.

Does the scope pattern show any missing or erratic signals?

Yes >> Replace the APP Sensor Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function to relearn the APPS values.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

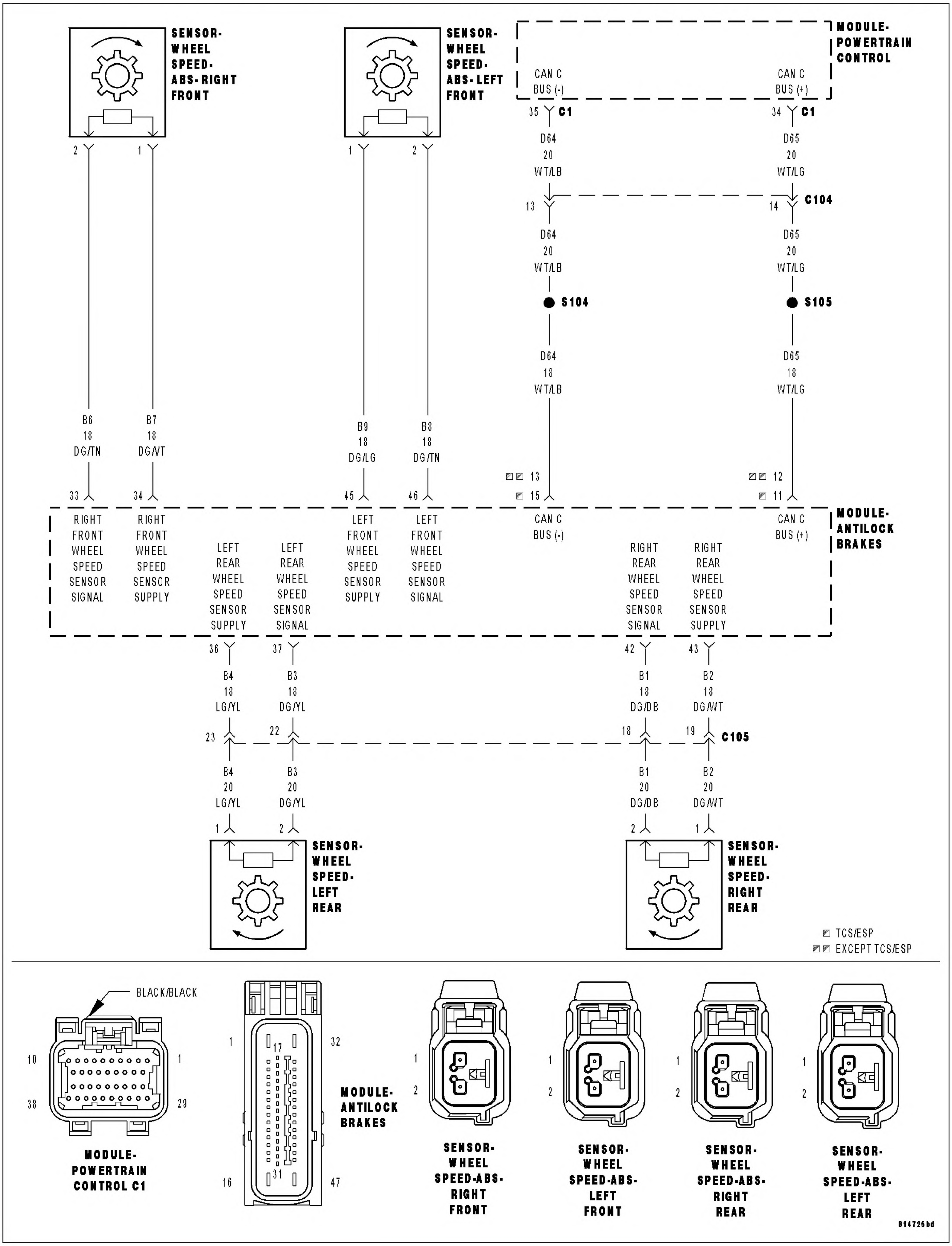
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2161-VEHICLE SPEED SENSOR 2 ERRATIC


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14 C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19 C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

P2161-VEHICLE SPEED SENSOR 2 ERRATIC (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  PCM recognizes Vehicle speed input No.2 erratic or high. VSS No.2 is based on the average of the Front Wheel Speeds. One trip fault and the code will set within 5 seconds. No MIL and No ETC light. Cruise is disabled.

Possible Causes
ACTIVE BUS OR COMMUNICATION DTCS
TIRE CIRCUMFERENCE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: Check for any Bus Communication DTCs. If no Bus or Communication DTCs are set, check for active DTCs stored in the Ant-Lock Brake Module. Any bus or communication DTCs or VSS DTCs in the Ant-Lock Brake Module must be properly diagnosed before continuing.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. VISUAL INSPECTION

NOTE: This code can set due to tire circumference differences and from the front or rear wheels being on a slippery surface while the opposite tires are not.

This code may also set on a hard acceleration on loose gravel or during other off road driving conditions.

Check tire pressure of all the tires.

Check tire wear on all the tires.

Ask the customer what the road and driving conditions were like when the fault set.

Were any problems found?

Yes >> Repair as necessary. If the code set during a front OR rear wheel spin condition, no repair is necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

P2161-VEHICLE SPEED SENSOR 2 ERRATIC (CONTINUED)

3. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2166-ACCELERATOR PEDAL POSITION SENSOR 1 MAXIMUM STOP PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on. During in plant mode the APP Sensors need to be checked to make sure that idle and full pedal travel can be reached on both sensors.
- **Set Condition:**
  APPS No.1 has failed to achieve the required maximum value during In Plant testing. One trip fault and the code will set within 5 seconds. Engine will only idle.

Possible Causes
IN PLANT TEST FAILURE
APPS RELEARN

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. IN PLANT TEST FAILURE

Ignition on, engine not running.

NOTE: This DTC is set when the APP Sensors are learned in plant but do not reach the Minimum or Maximum voltage range.

With a scan tool read DTCs.

With the scan tool, erase DTCs.

Start the engine.

With the scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. APPS RELEARN

With a scan tool select the ETC RELEARN function.

Next, erase DTCs.

Start the engine.

Does the DTC return?

Yes >> Replace the APPS Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P2167-ACCELERATOR PEDAL POSITION SENSOR 2 MAXIMUM STOP PERFORMANCE

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on. During in plant mode the APP Sensors need to be checked to make sure that idle and full pedal travel can be reached on both sensors.
- **Set Condition:**
  APPS No.2 has failed to achieve the required maximum value during In Plant testing. One trip fault and the code will set within 5 seconds. Engine will only idle.

Possible Causes
IN PLANT TEST FAILURE
APPS RELEARN

Diagnostic Test

1. IN PLANT TEST FAILURE

Ignition on, engine not running.

NOTE: This DTC is set when the APP Sensors are learned in plant but do not reach the Minimum or Maximum voltage range.

With a scan tool read DTCs.

With the scan tool, erase DTCs.

Start the engine.

With the scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. APPS RELEARN

With a scan tool select the ETC RELEARN function.

Next, erase DTCs.

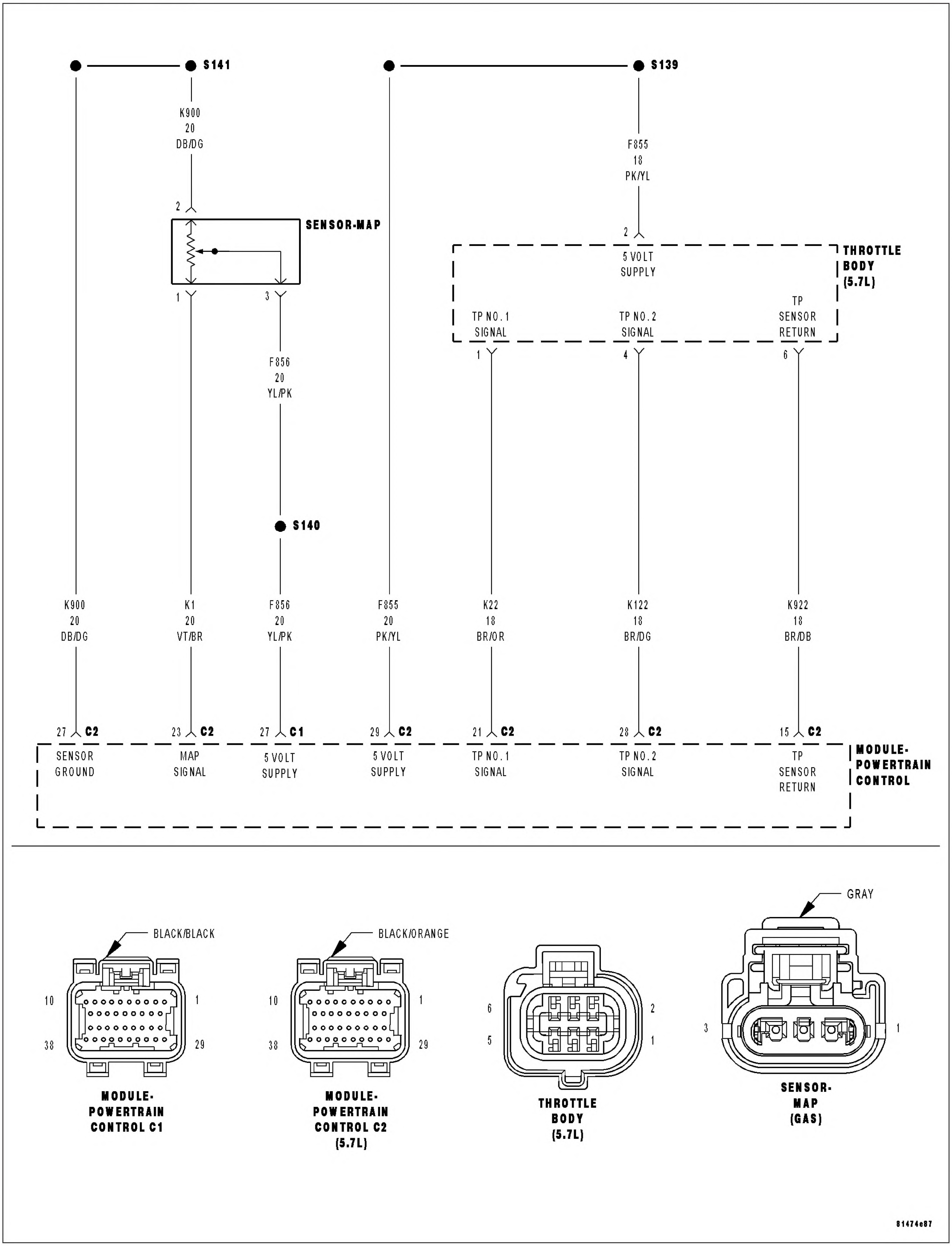
Start the engine.

Does the DTC return?

Yes >> Replace the APPS Assembly per Service Information. After installation is complete, use a scan tool and select the ETC RELEARN function.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION)


S141
K900
20
DB/DG
2
SENSOR-MAP
1
3
F856
20
YL/PK
S140
S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
1
4
6
K900 20 DB/DG
K1 20 VT/BR
F856 20 YL/PK
F855 20 PK/YL
K22 18 BR/OR
K122 18 BR/DG
K922 18 BR/DB
27 C2
23 C2
27 C1
29 C2
21 C2
28 C2
15 C2
SENSOR GROUND
MAP SIGNAL
5 VOLT SUPPLY
5 VOLT SUPPLY
TP NO. 1 SIGNAL
TP NO. 2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
6
2
5
1
THROTTLE BODY (5.7L)
GRAY
3
1
SENSOR-MAP (GAS)
81474e87

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and engine running with no MAP Sensor DTCs.
- **Set Condition:**
  A large vacuum leak has been detected or both of the TP Sensors have failed based on their position being 2.5 volts and the calculated MAP value is less than the actual MAP minus an Offset value. One trip fault and the code will set within 5 seconds. ETC light will flash.

Possible Causes
VACUUM LEAK
RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT
TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K922) TP SENSOR RETURN CIRCUIT
MAP SENSOR
TP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: The most likely cause of this DTC is a vacuum leak.

NOTE: Diagnose any 5-Volt Supply, TP Sensor, Fuel System Lean or Rich, or MAP Sensor DTCs before continuing.

NOTE: The throttle plate should be free from binding and carbon build up.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

2. VACUUM LEAK

NOTE: This code is enabled on engines with a plastic intake manifold and is intended to limit the maximum engine speed if a large crack occurs.

NOTE: A large vacuum leak is most likely the cause of this DTC.

Inspect the Intake Manifold and Throttle body for leaks and cracks.

Inspect the Power Brake Booster for any vacuum leaks.

Inspect the PCV system for proper operation or any vacuum leaks.

Inspect the MAP Sensor for proper installation.

Were any vacuum leaks found?

Yes >> Repair the vacuum leak as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. MAP SENSOR OPERATION

Start the engine.

With a scan tool, monitor the MAP Sensor voltage.

Snap the Accelerator pedal.

Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at Wide Open Throttle?

Yes >> Go To 4

No >> Go To 11

---

4. TP SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, perform the Throttle Follower Test.

TP Sensor No.1 should start at approximately 0.8 of a volt and increase to 4.2 volts.

TP Sensor No.2 should start at approximately 4.2 volts and decrease to 0.8 of a volt.

Is the voltage transition smooth between the appropriate values?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

5. RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

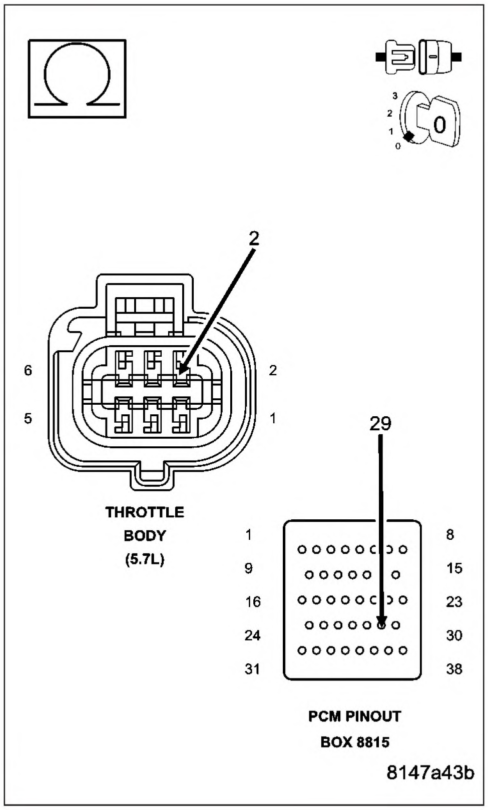
Turn the ignition off.

Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance above 100 ohms?

Yes >> Go To 6

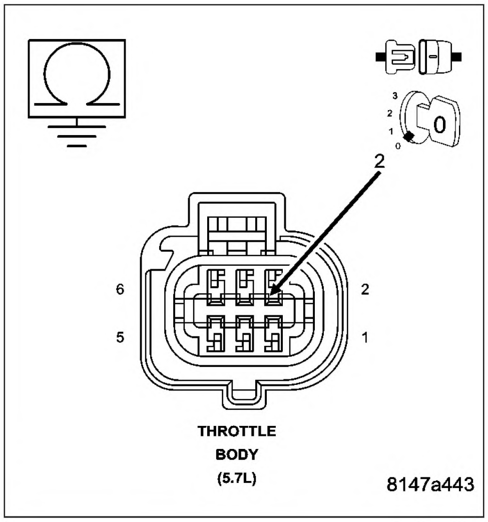
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and (F855) 5-volt Supply circuit between the appropriate terminals of special tool #8815.



Is the resistance above 100 ohms?

Yes >> Go To 7

No >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

7. TP SENSOR

Connect the C2 PCM harness connector.

Ignition on, engine not running.

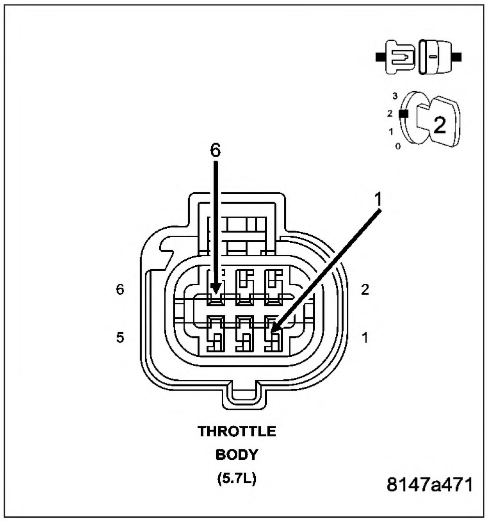
With a scan tool, monitor the TP Sensor voltage.

Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K922) Sensor Return circuit in the Throttle Body harness connector.

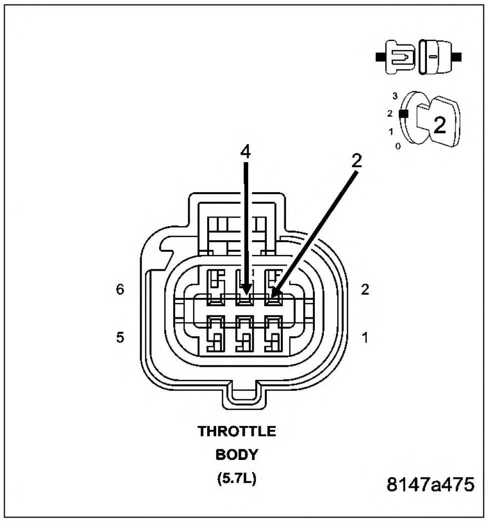
TP Sensor No.1 voltage should start at approximately 4.8 volts and decrease to 0.2 of a volt.

Connect a jumper wire between the (K122) TP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit in the Throttle Body harness connector.

TP Sensor No.2 voltage should start at approximately 0 volts and increase to 4.8 to 5.2 volts.



8147a471



8147a475

Does the TP Sensor voltage change to the appropriate voltage with the jumper wire installed?

Yes >> Disconnect the Battery before replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

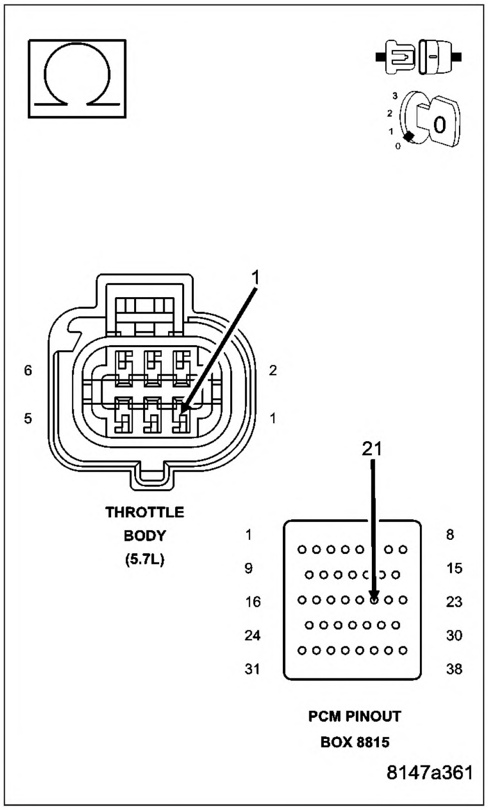
P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

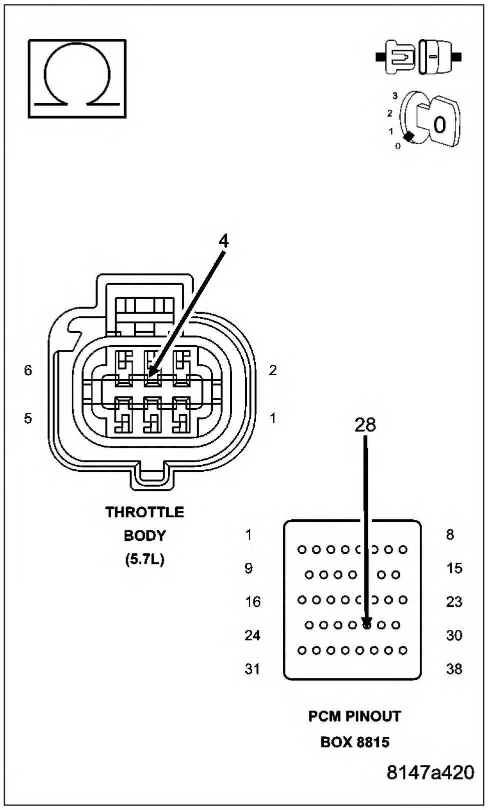
8. RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance of the (K22) and (K122) TP Signal circuits from the Throttle Body harness connector to the appropriate terminals of special tool #8815.


1
6
2
5
1
21
THROTTLE BODY (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147a361


4
6
2
5
1
28
THROTTLE BODY (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147a420

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 9

No >> Repair the excessive resistance in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

9. TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

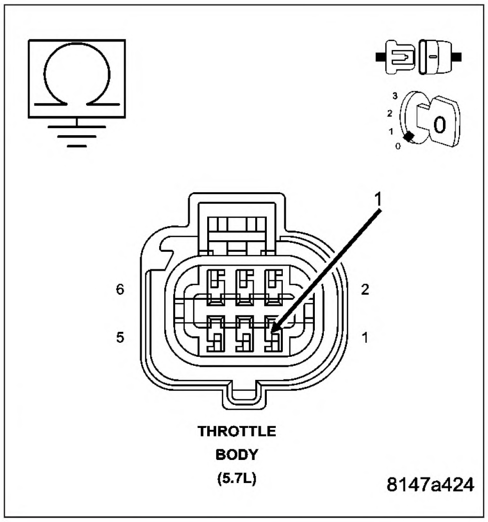
Measure the resistance between ground and the (K22) and (K122) TP Signal circuits at the appropriate terminals of special tool #8815.

Is the resistance above 100 ohms for each circuit?

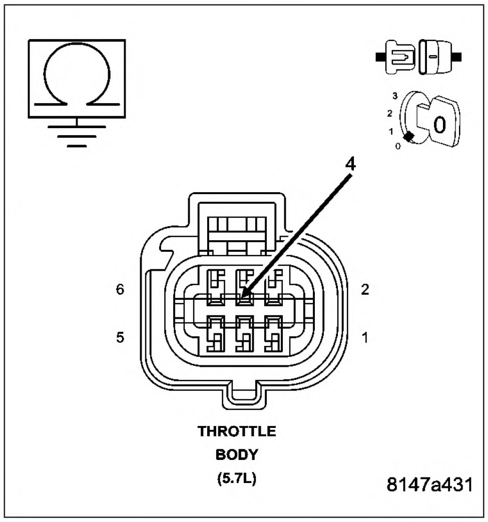
Yes >> Go To 10

No >> Repair the short to ground in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
O
1
6
2
5
1
THROTTLE
BODY
(5.7L)

8147a424


3
2
1
0
O
4
6
2
5
1
THROTTLE
BODY
(5.7L)

8147a431

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

10. RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT

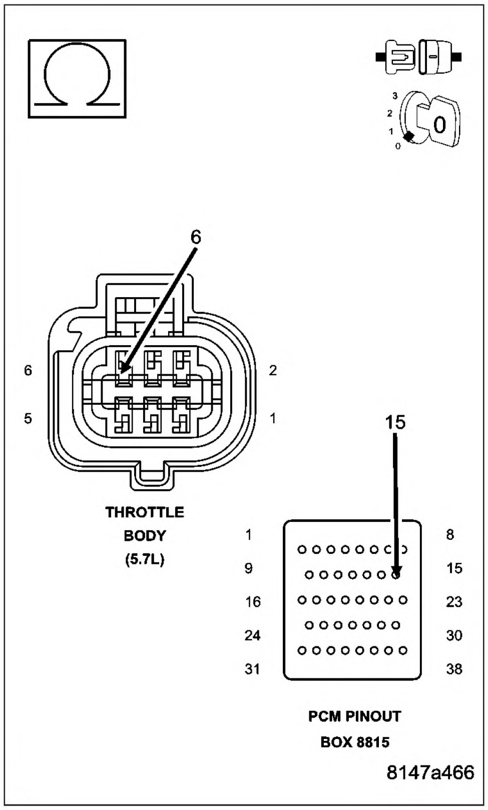
Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K922) Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
6
6
2
5
1
15
THROTTLE BODY (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147a466

---

11. RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

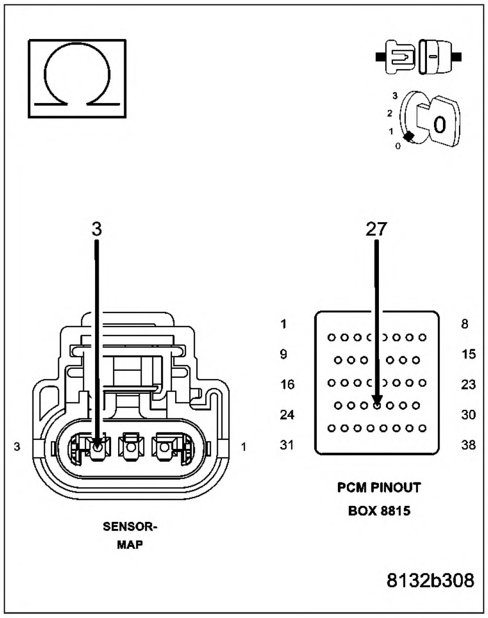
Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 12

No >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
3
27
1
9
16
24
31
8
15
23
30
38
3
1
PCM PINOUT BOX 8815
SENSOR-MAP
8132b308

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

12. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

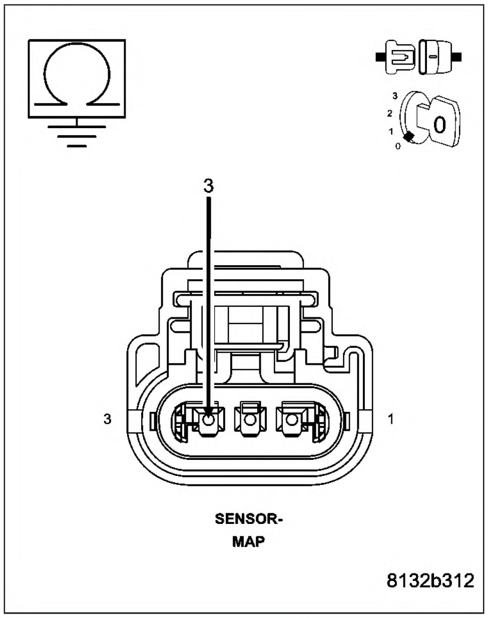
Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.

Is the resistance above 100k ohms?

Yes >> Go To 13

No >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



---

13. MAP SENSOR

Connect the C1 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the MAP Sensor voltage.

Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit in the MAP Sensor harness connector.

Cycle the ignition switch from off to on.

With a scan tool, monitor the MAP Sensor voltage.

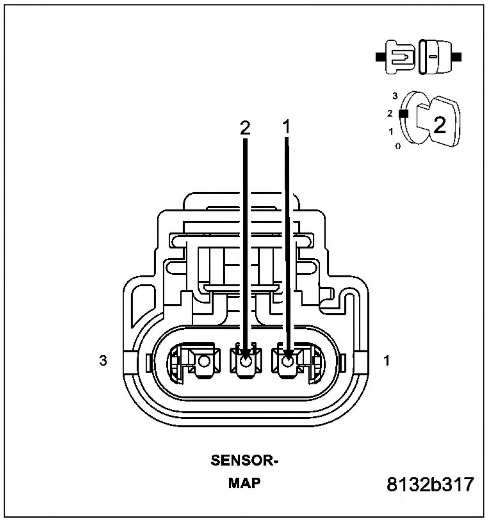
Does the scan tool display MAP voltage from approximately 4.9 volts to below 0.5 volt with the jumper wire installed?

Yes >> Replace the MAP Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

NOTE: Remove the jumper wire before continuing.



P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

14. RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

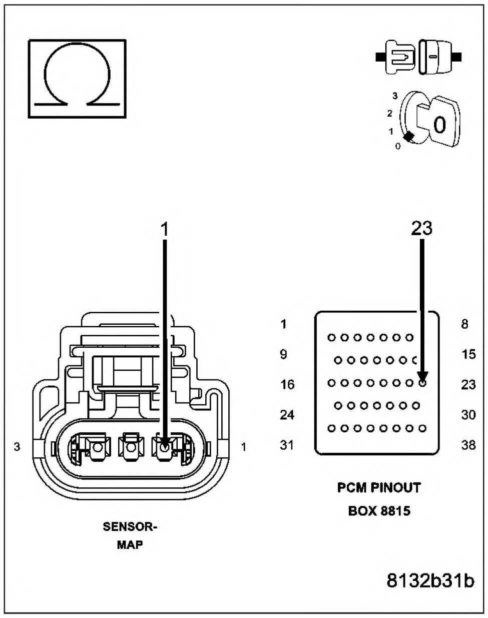
Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Go To 15

No >> Repair the excessive resistance in the (K1) MAP Signal circuit

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


Ω
3
2
1
0
0
1
23
3
1
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
SENSOR-
MAP
8132b31b

---

15. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

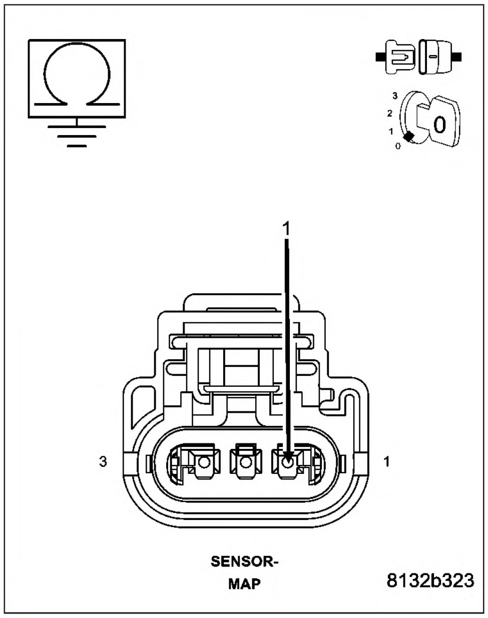
Measure the resistance between ground and the (K1) MAP Signal circuit in the MAP Sensor harness connector.

Is the resistance above 100k ohms?

Yes >> Go To 16

No >> Repair the short to ground in the (K1) MAP Signal circuit.

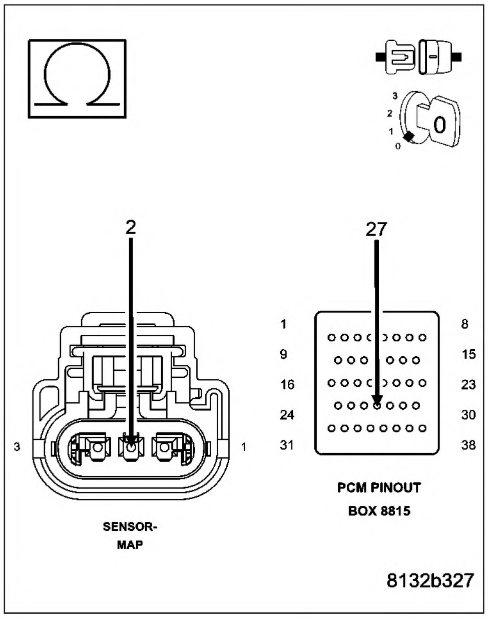
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


Ω
3
2
1
0
0
1
3
1
SENSOR-
MAP
8132b323

P2172-HIGH AIRFLOW/VACUUM LEAK DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

16. RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

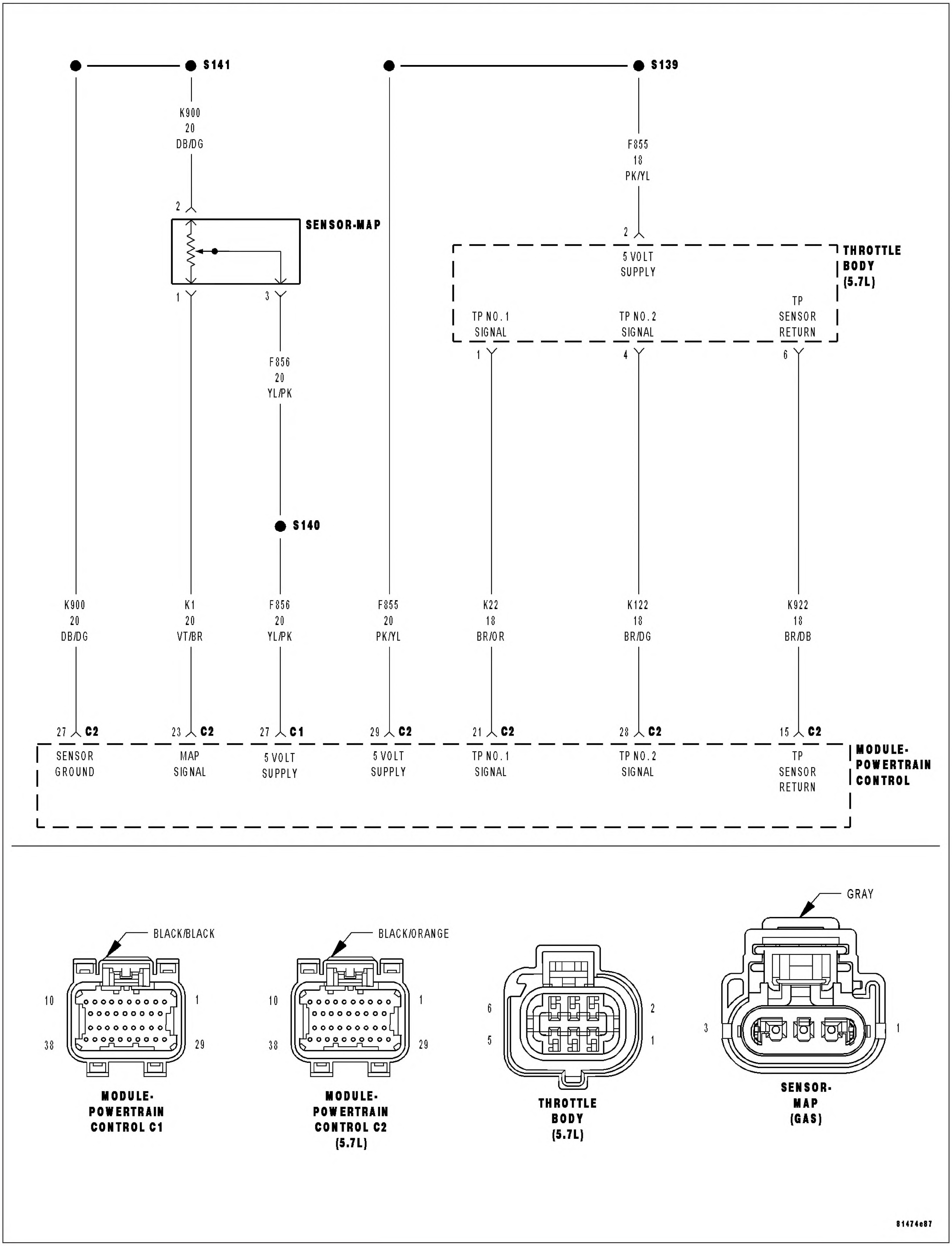
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION)


S141
K900
20
DB/DG
2
SENSOR-MAP
1
3
F856
20
YL/PK
S140
S139
F855
18
PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
1
4
6
K900 20 DB/DG
K1 20 VT/BR
F856 20 YL/PK
F855 20 PK/YL
K22 18 BR/OR
K122 18 BR/DG
K922 18 BR/DB
27 C2
23 C2
27 C1
29 C2
21 C2
28 C2
15 C2
SENSOR GROUND
MAP SIGNAL
5 VOLT SUPPLY
5 VOLT SUPPLY
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
6
5
2
1
THROTTLE BODY (5.7L)
GRAY
3
1
SENSOR-MAP (GAS)
81474e87

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and engine running with no MAP Sensor DTCs.
- **Set Condition:**
  A large vacuum leak has been detected or both of the TP Sensors have failed based on their position being 2.5 volts and the calculated MAP value is less than the Gas Flow Adaptation value is too high. One trip fault the code will set within 5 seconds. ETC light will flash.

Possible Causes
VACUUM LEAK
RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT
TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K922) TP SENSOR RETURN CIRCUIT
MAP SENSOR
TP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: The most likely cause of this DTC is a vacuum leak.

NOTE: Diagnose any 5-Volt Supply, TP Sensor, Oxygen Sensor, Fuel related, or MAP Sensor DTCs before continuing.

NOTE: The throttle plate should be free from binding and carbon build up.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

2. VACUUM LEAK

NOTE: This code is enabled on engines with a plastic intake manifold and is intended to limit the maximum engine speed if a large crack occurs.

NOTE: A large vacuum leak is most likely the cause of this DTC.

Inspect the Intake Manifold and Throttle body for leaks and cracks.

Inspect the Power Brake Booster for any vacuum leaks.

Inspect the PCV system for proper operation or any vacuum leaks.

Inspect the MAP Sensor for proper installation.

Were any vacuum leaks found?

Yes >> Repair the vacuum leak as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. MAP SENSOR OPERATION

Start the engine.

With a scan tool, monitor the MAP Sensor voltage.

Snap the Accelerator pedal.

Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at Wide Open Throttle?

Yes >> Go To 4

No >> Go To 11

---

4. TP SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, perform the Throttle Follower Test.

TP Sensor No.1 should start at approximately 0.8 of a volt and increase to 4.2 volts.

TP Sensor No.2 should start at approximately 4.2 volts and decrease to 0.8 of a volt.

Is the voltage transition smooth between the appropriate values?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

5. RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

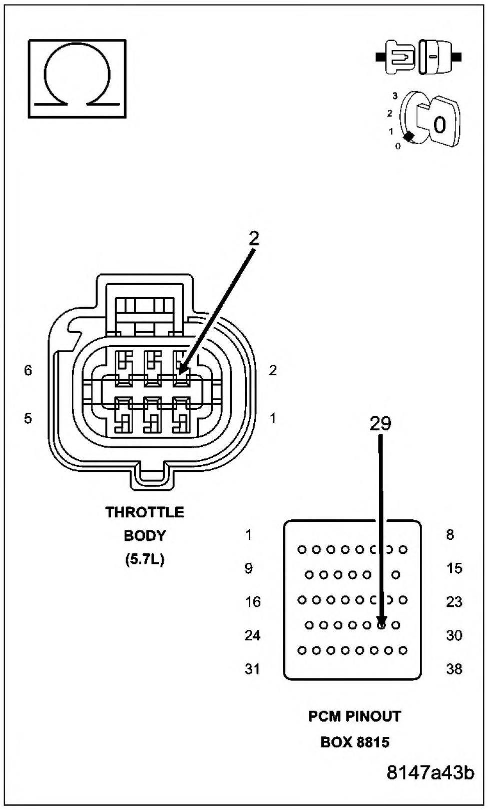
Turn the ignition off.

Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



8147a43b

Is the resistance below 100 ohms?

Yes >> Go To 6

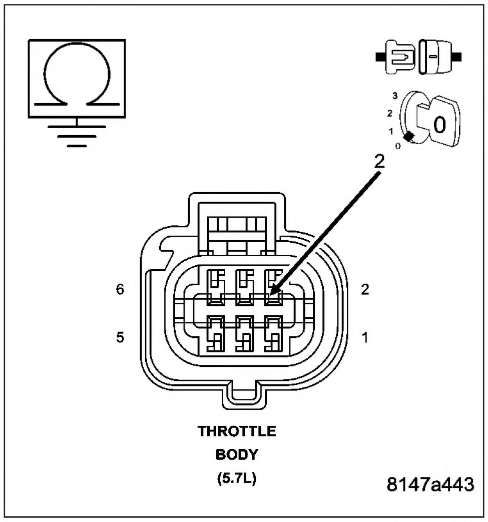
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and (F855) 5-volt Supply circuit between the appropriate terminals of special tool #8815.



8147a443

Is the resistance above 100 ohms?

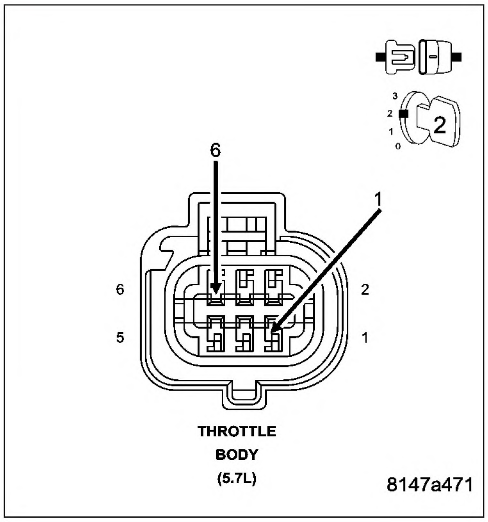
Yes >> Go To 7

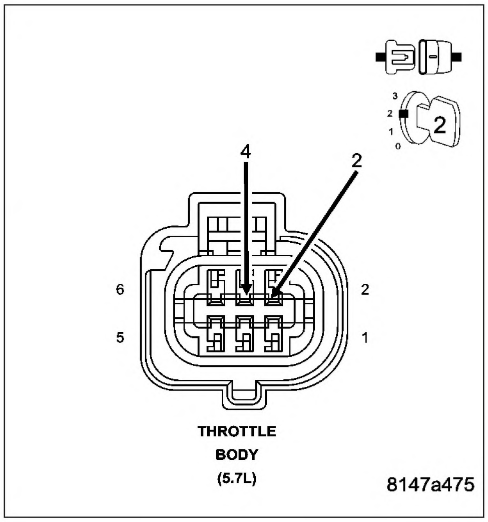
No >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

7. TP SENSOR





Connect the C2 PCM harness connector.

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor voltage.

Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K922) Sensor Return circuit in the Throttle Body harness connector.

TP Sensor No.1 voltage should start at approximately 4.8 volts and decrease to 0.2 of a volt.

Connect a jumper wire between the (K122) TP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit in the Throttle Body harness connector.

TP Sensor No.2 voltage should start at approximately 0 volts and increase to 4.8 to 5.2 volts.

Does the TP Sensor voltage change to the appropriate voltage with the jumper wire installed?

Yes >> Disconnect the Battery before replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

8. RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

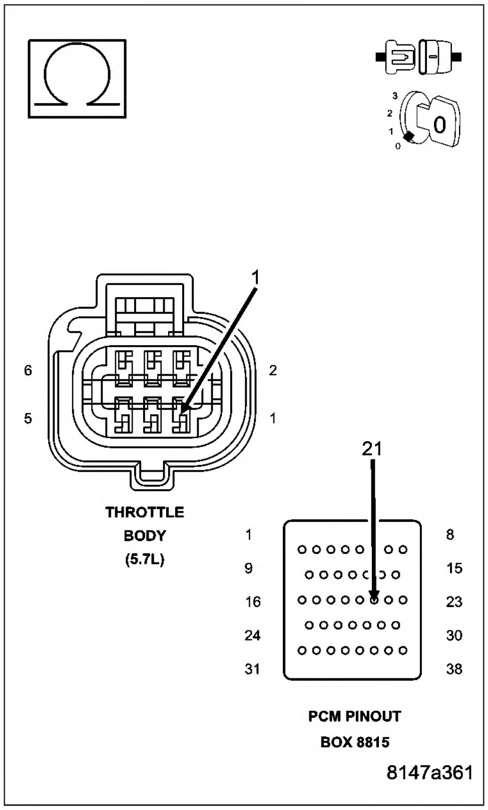
Measure the resistance of the (K22) and (K122) TP Signal circuits from the Throttle Body harness connector to the appropriate terminals of special tool #8815.

Is the resistance below 5.0 ohms for each circuit?

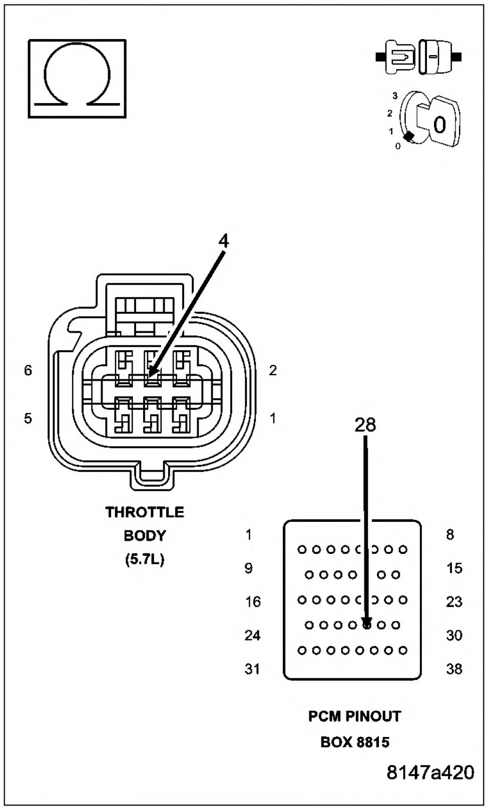
Yes >> Go To 9

No >> Repair the excessive resistance in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)


3
2
1
0
0
1
6
2
5
1
21
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815

8147a361


3
2
1
0
0
4
6
2
5
1
28
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815

8147a420

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

9. TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

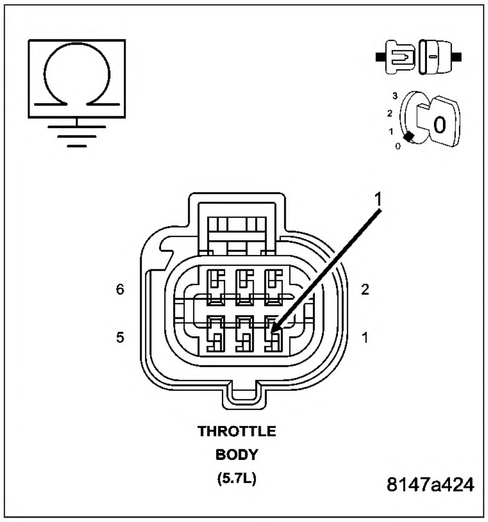
Measure the resistance between ground and the (K22) and (K122) TP Signal circuits at the appropriate terminals of special tool #8815.

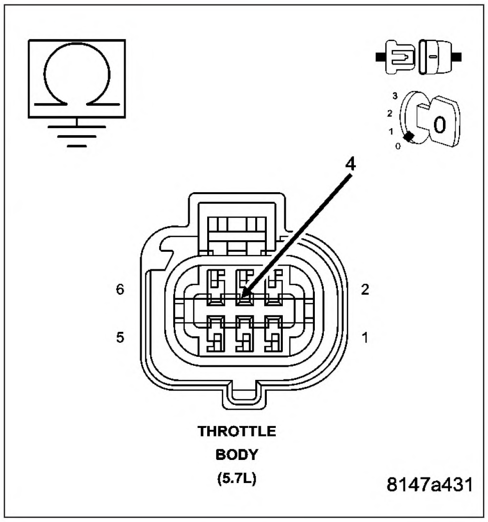
Is the resistance above 100k ohms for each circuit?

Yes >> Go To 10

No >> Repair the short to ground in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

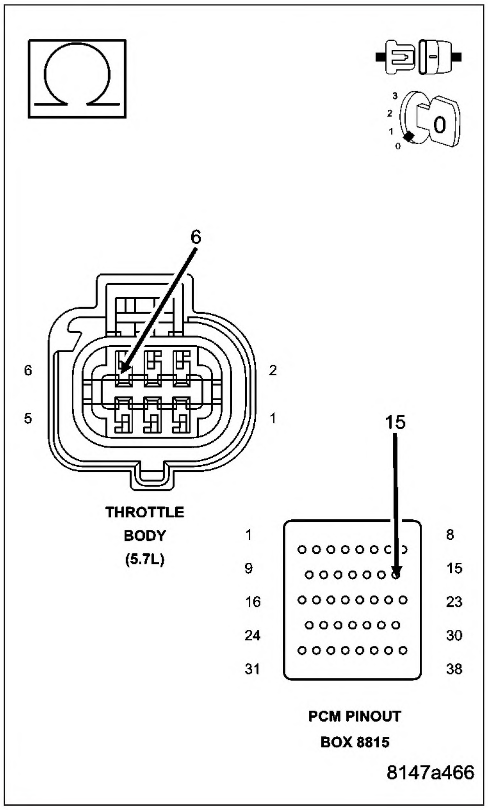

3
2
1
0
0
1
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a424


3
2
1
0
0
4
6
2
5
1
THROTTLE
BODY
(5.7L)
8147a431

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

10. RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
6
6
2
5
1
15
THROTTLE BODY (5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
8147a466

Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K922) Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

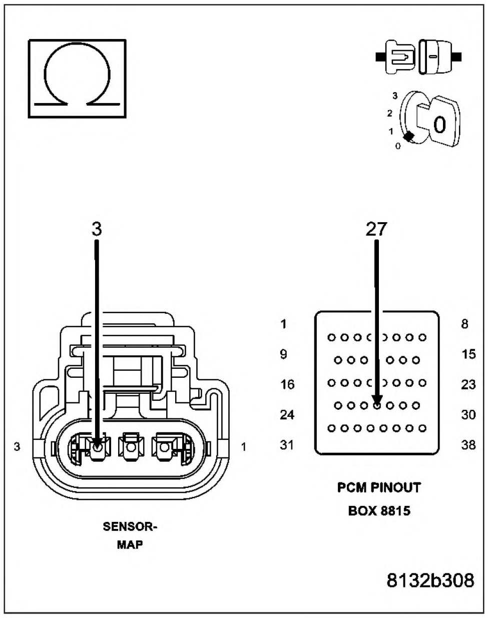
Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.


Ω
3
2
1
0
0
3
27
3
1
1
9
16
24
31
8
15
23
30
38
PCM PINOUT BOX 8815
SENSOR-MAP
8132b308

Is the resistance below 5.0 ohms?

Yes >> Go To 12

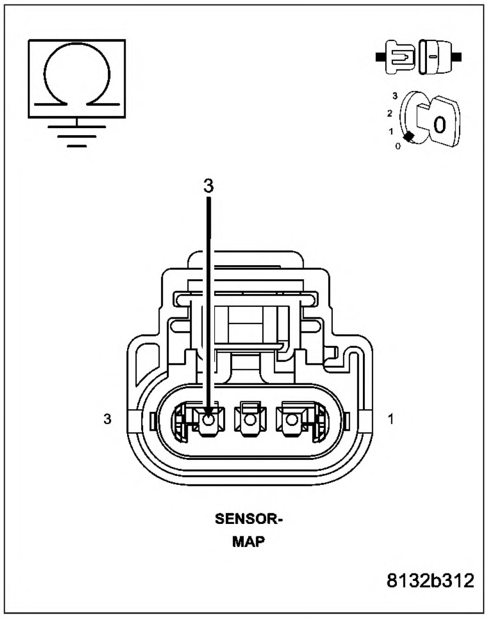
No >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

12. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.



Is the resistance above 100k ohms?

Yes >> Go To 13

No >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

13. MAP SENSOR

Connect the C1 PCM harness connector.

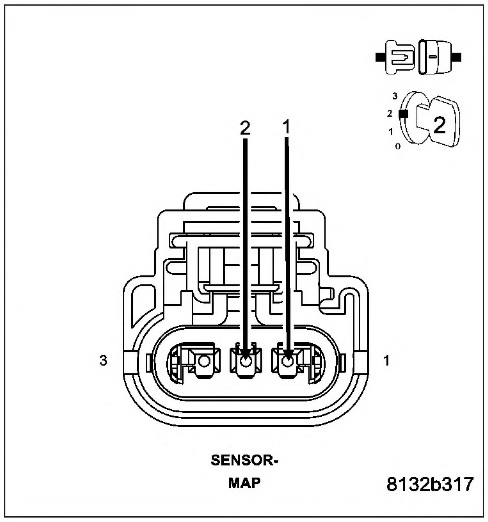
Ignition on, engine not running.

With a scan tool, monitor the MAP Sensor voltage.

Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit in the MAP Sensor harness connector.

Cycle the ignition switch from off to on.

With a scan tool, monitor the MAP Sensor voltage.



Does the scan tool display MAP voltage from approximately 4.9 volts to below 0.5 volt with the jumper wire installed?

Yes >> Replace the MAP Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

NOTE: Remove the jumper wire before continuing.

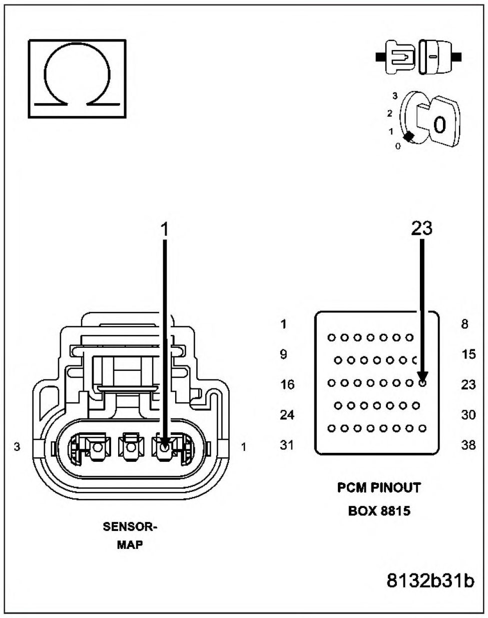
P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

14. RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 15

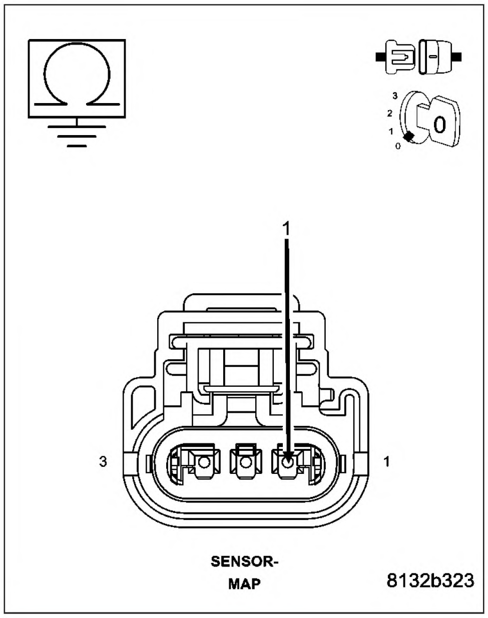
No >> Repair the excessive resistance in the (K1) MAP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K1) MAP Signal circuit at the MAP Sensor harness connector.



Is the resistance above 100k ohms?

Yes >> Go To 16

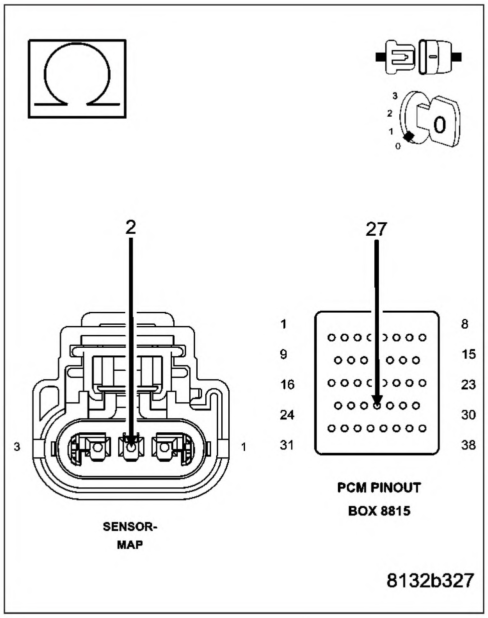
No >> Repair the short to ground in the (K1) MAP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2173-HIGH AIRFLOW/VACUUM LEAK DETECTED (SLOW ACCUMULATION) (CONTINUED)

16. RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

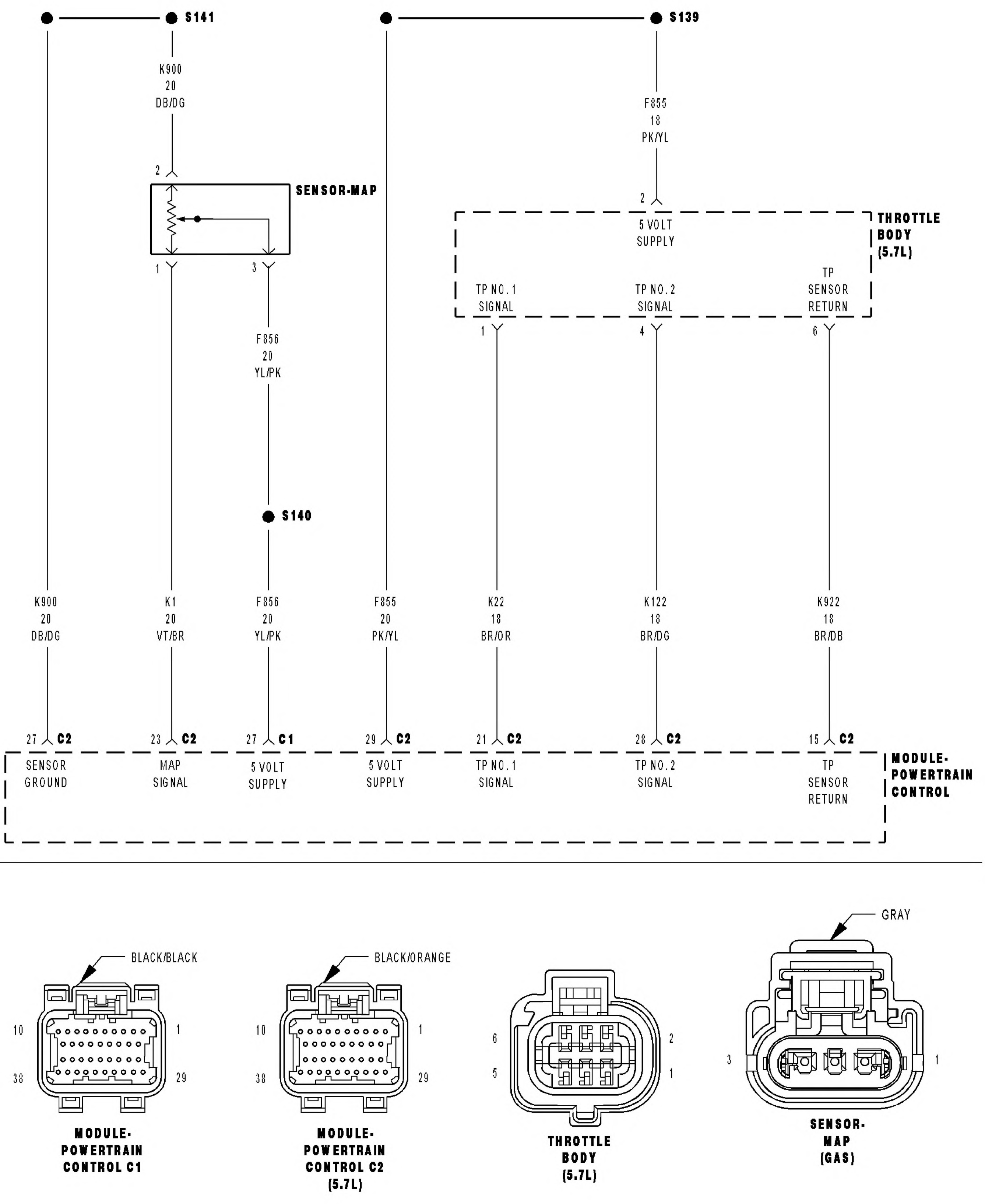
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION)


S141
K900 20 DB/DG
2
SENSOR-MAP
1
3
F856 20 YL/PK
S140
S139
F855 18 PK/YL
2
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
1
4
6
K900 20 DB/DG
K1 20 VT/BR
F856 20 YL/PK
F855 20 PK/YL
K22 18 BR/OR
K122 18 BR/DG
K922 18 BR/DB
27 C2
23 C2
27 C1
29 C2
21 C2
28 C2
15 C2
SENSOR GROUND
MAP SIGNAL
5 VOLT SUPPLY
5 VOLT SUPPLY
TP NO.1 SIGNAL
TP NO.2 SIGNAL
TP SENSOR RETURN
MODULE-POWERTRAIN CONTROL
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
6
2
5
1
THROTTLE BODY (5.7L)
GRAY
3
1
SENSOR-MAP (GAS)

81474e87

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and engine running with no MAP Sensor DTCs.
- **Set Condition:**
  PCM calculated MAP value is greater than actual MAP value plus an offset value. One trip fault. Three good trips to turn of the mil. ETC light will flash.

Possible Causes
RESTRICTED AIR INLET SYSTEM
RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT
TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K922) TP SENSOR RETURN CIRCUIT
MAP SENSOR
TP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: The most likely cause of this DTC is a plugged intake air system or dirty Throttle Body. Check for any TSB's before continuing.

NOTE: Diagnose any 5-Volt Supply, TP Sensor, Fuel System Lean or Rich, or MAP Sensor DTCs before continuing.

NOTE: The throttle plate should be free from binding and carbon build up.

NOTE: Question the customer about weather conditions, as ICE build up on the blade can cause this fault when ambient is around +4 to -10 Celsius range.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

2. RESTRICTED AIR INLET SYSTEM

Turn the ignition off.

Remove the Air Cleaner Assembly.

Remove the Air Filter.

Inspect the Throttle Body opening for signs of any foreign materials.

Check the intake tube / aircleaner for obstructions - include snow packing questions to customer.

Were any restrictions found?

Yes >> Repair the restriction as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. MAP SENSOR OPERATION

Start the engine.

With a scan tool, monitor the MAP Sensor voltage.

Snap the Accelerator pedal.

Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at Wide Open Throttle?

Yes >> Go To 4

No >> Go To 11

---

4. TP SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, perform the Throttle Follower Test.

TP Sensor No.1 should start at approximately 0.8 of a volt and increase to 4.2 volts.

TP Sensor No.2 should start at approximately 4.2 volts and decrease to 0.8 of a volt.

Is the voltage transition smooth between the appropriate values?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

5. RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

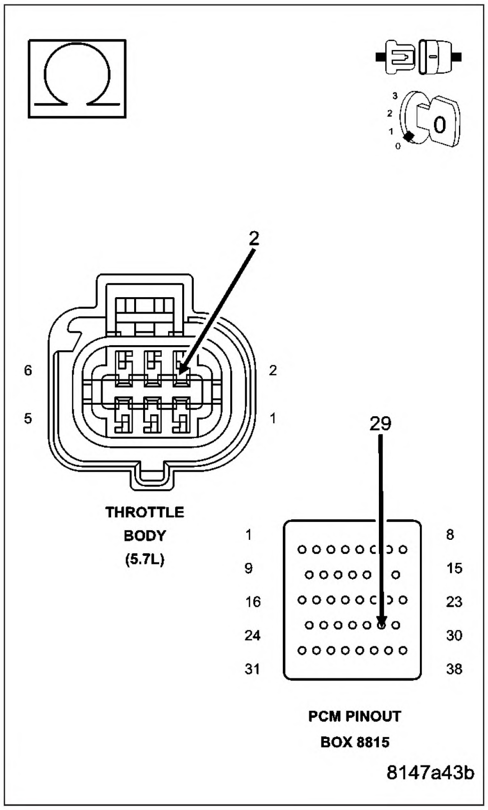
Turn the ignition off.

Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 100 ohms?

Yes >> Go To 6

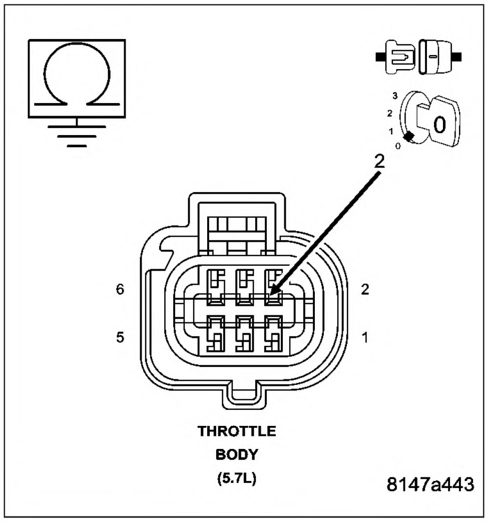
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and (F855) 5-volt Supply circuit between the appropriate terminals of special tool #8815.



Is the resistance above 100k ohms?

Yes >> Go To 7

No >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

7. TP SENSOR

Connect the PCM harness connectors.

Ignition on, engine not running.

With a scan tool, monitor the TP Sensor voltage.

Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K922) Sensor Return circuit in the Throttle Body harness connector.

TP Sensor No.1 voltage should start at approximately 4.8 volts and decrease to 0.2 of a volt.

Connect a jumper wire between the (K122) TP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit in the Throttle Body harness connector.

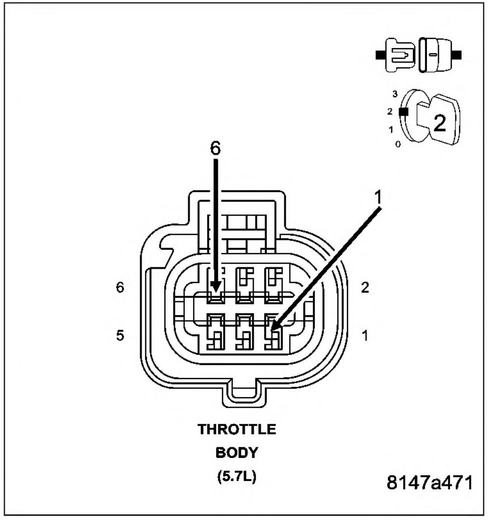
TP Sensor No.2 voltage should start at approximately 0 volts and increase to 4.8 to 5.2 volts.

Does the TP Sensor voltage change to the appropriate voltage with the jumper wire installed?

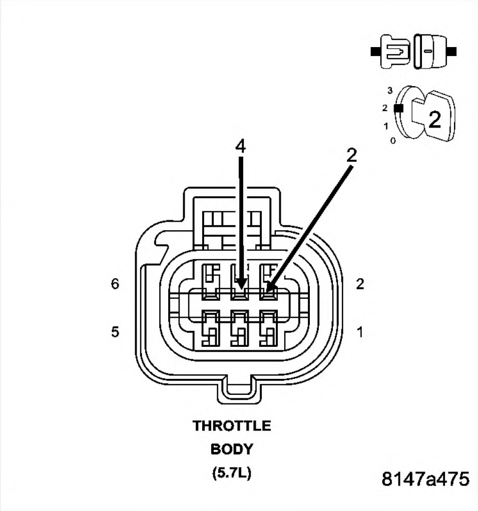
Yes >> Disconnect the Battery before replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8



8147a471



8147a475

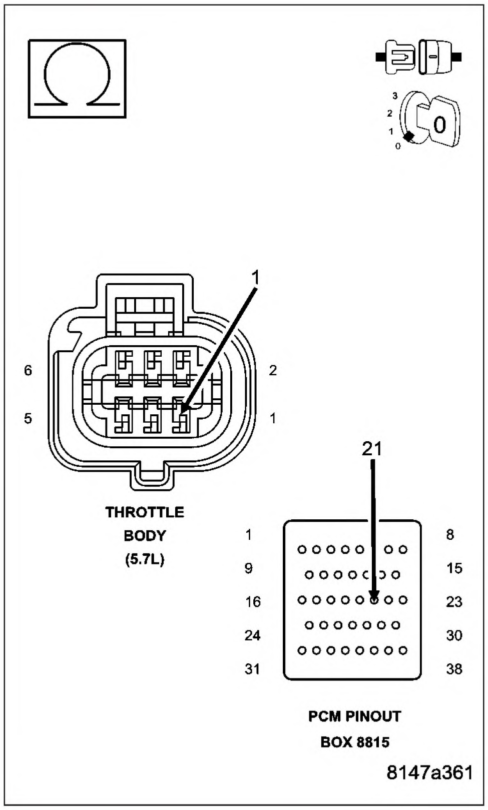
P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

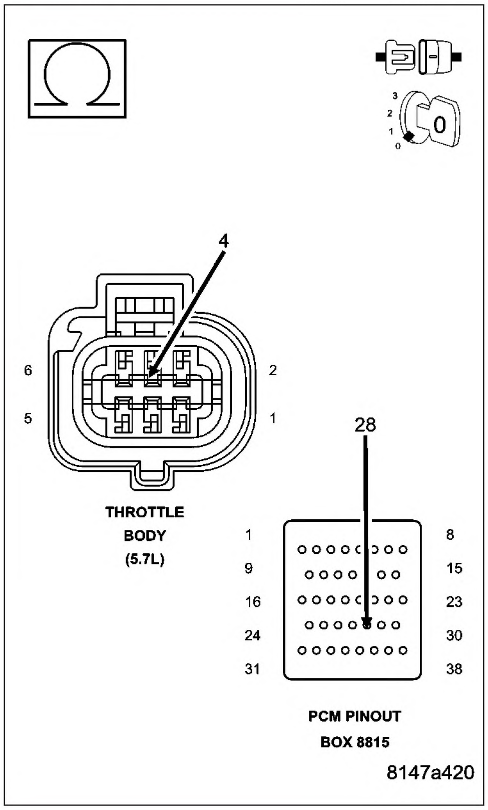
8. RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance of the (K22) and (K122) TP Signal circuits from the Throttle Body harness connector to the appropriate terminals of special tool #8815.


1
6
2
5
1
21
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a361


4
6
2
5
1
28
THROTTLE BODY (5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8147a420

Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 9

No >> Repair the excessive resistance in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

9. TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

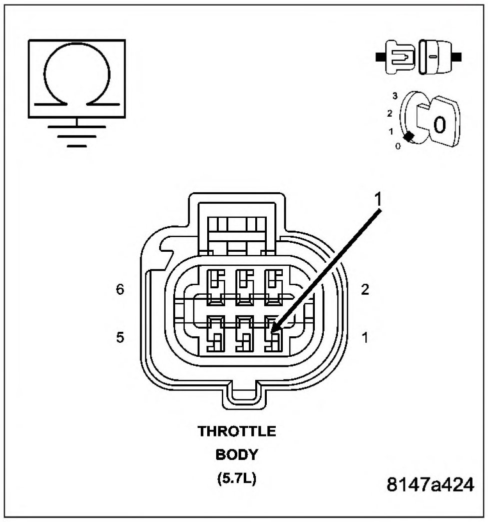
Measure the resistance between ground and the (K22) and (K122) TP Signal circuits at the appropriate terminals of special tool #8815.

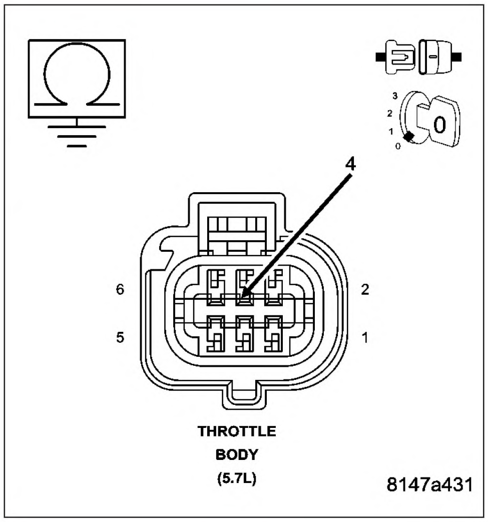
Is the resistance above 100k ohms for each circuit?

Yes >> Go To 10

No >> Repair the short to ground in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

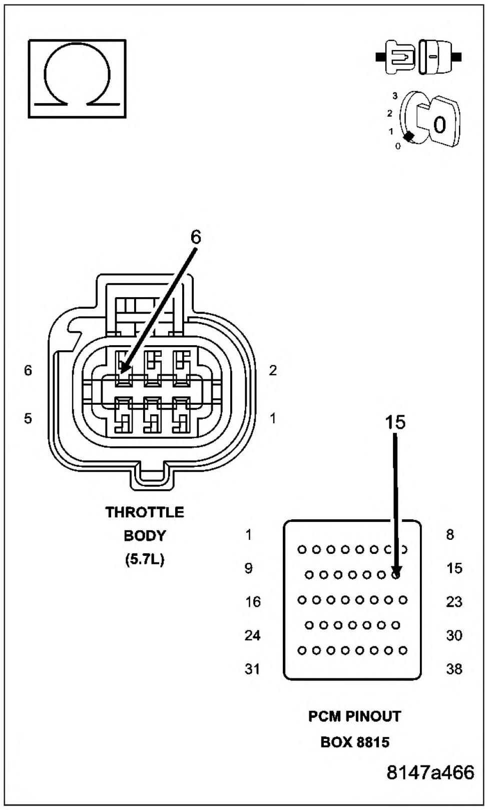

1
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a424


4
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a431

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

10. RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



6
6
2
5
1
15
THROTTLE
BODY
(5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147a466

Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K922) Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

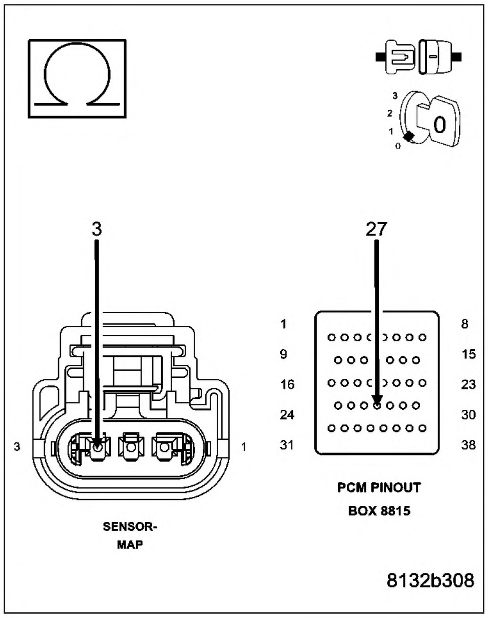
Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



3
27
3
1
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
SENSOR-
MAP
8132b308

Is the resistance below 5.0 ohms?

Yes >> Go To 12

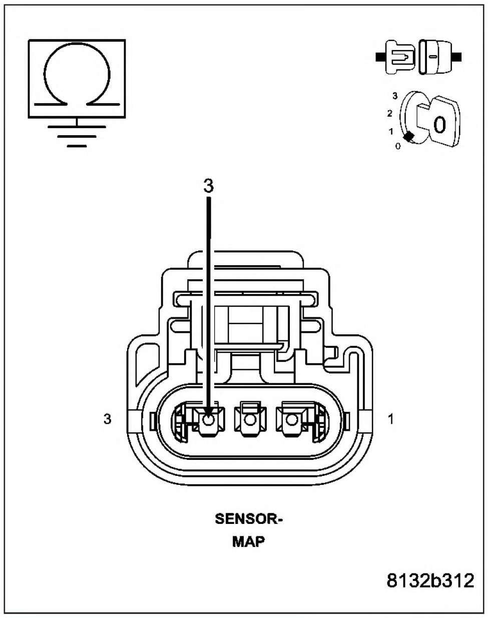
No >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

12. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.



Is the resistance above 100k ohms?

Yes >> Go To 13

No >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

13. MAP SENSOR

Connect the PCM harness connectors.

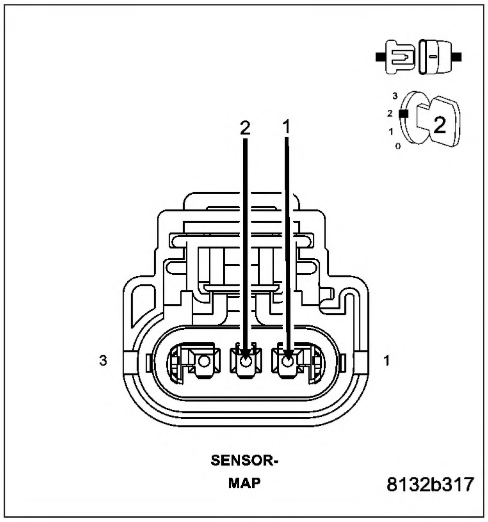
Ignition on, engine not running.

With a scan tool, monitor the MAP Sensor voltage.

Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit.

Cycle the ignition switch from off to on.

With a scan tool, monitor the MAP Sensor voltage.



Does the scan tool display MAP voltage from approximately 4.9 volts to below 0.5 volt with the jumper wire installed?

Yes >> Replace the MAP Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

NOTE: Remove the jumper wire before continuing.

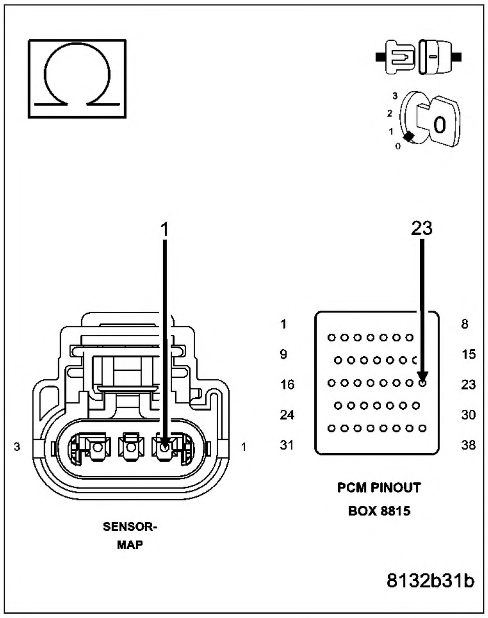
P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

14. RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

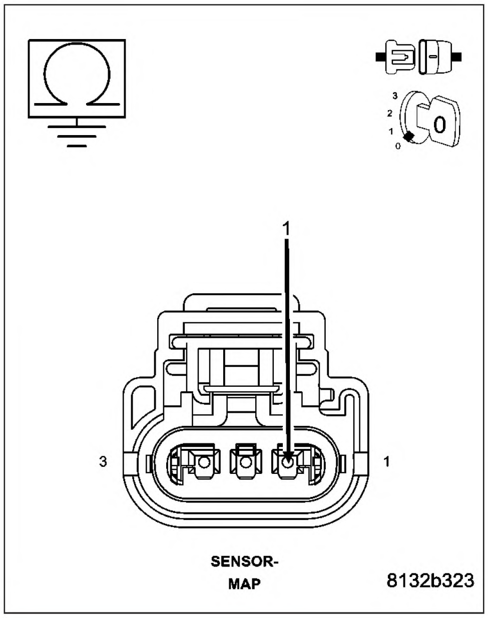
Yes >> Go To 15

No >> Repair the excessive resistance in the (K1) MAP Signal circuit
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K1) MAP Signal circuit in the MAP Sensor harness connector.



Is the resistance above 100k ohms?

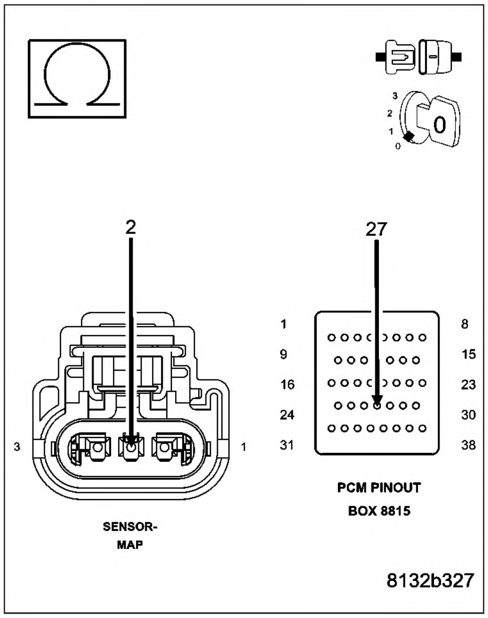
Yes >> Go To 16

No >> Repair the short to ground in the (K1) MAP Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2174-LOW AIRFLOW/RESTRICTION DETECTED (INSTANTANEOUS ACCUMULATION) (CONTINUED)

16. RESISTANCE IN (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

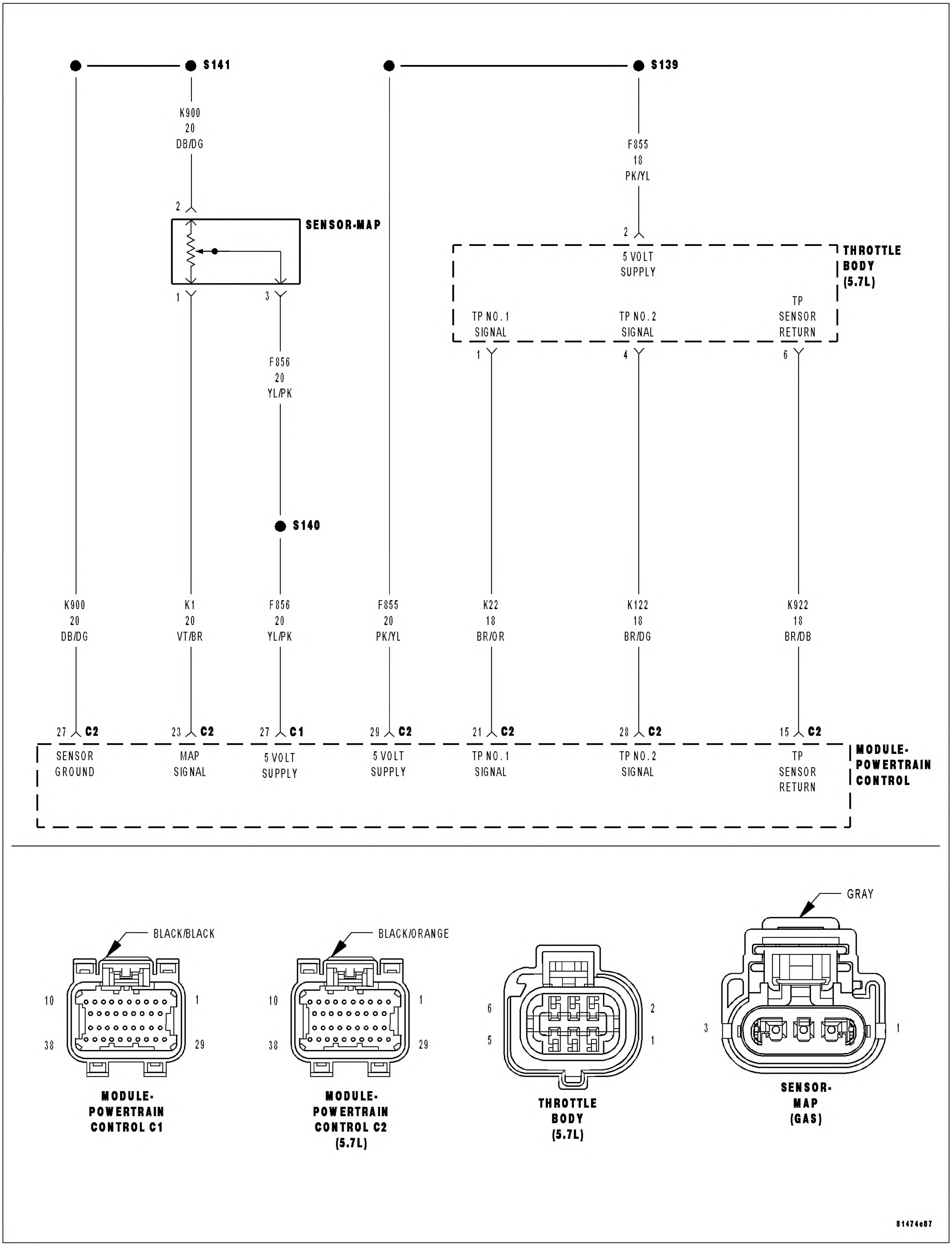
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION)


S141
K900
20
DB/DG
2
SENSOR-MAP
1
3
F856
20
YL/PK
S140
S139
F855
18
PK/YL
2
5 VOLT
SUPPLY
THROTTLE
BODY
(5.7L)
TP NO.1
SIGNAL
TP NO.2
SIGNAL
TP
SENSOR
RETURN
1
4
6
K900
20
DB/DG
K1
20
VT/BR
F856
20
YL/PK
F855
20
PK/YL
K22
18
BR/OR
K122
18
BR/DG
K922
18
BR/DB
27 C2
23 C2
27 C1
29 C2
21 C2
28 C2
15 C2
SENSOR
GROUND
MAP
SIGNAL
5 VOLT
SUPPLY
5 VOLT
SUPPLY
TP NO.1
SIGNAL
TP NO.2
SIGNAL
TP
SENSOR
RETURN
MODULE-
POWERTRAIN
CONTROL
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
6
2
5
1
THROTTLE
BODY
(5.7L)
GRAY
3
1
SENSOR-
MAP
(GAS)
81474e87

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on and engine running with no MAP Sensor DTCs.
- **Set Condition:**
  PCM calculated MAP value is greater than actual MAP value plus an offset value. One trip fault and the code will set within 5 seconds. Three good trips to turn of the mil. ETC light will flash.

Possible Causes
RESTRICTED AIR INLET SYSTEM
RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT
(K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT
RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT
TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
RESISTANCE IN THE (K922) TP SENSOR RETURN CIRCUIT
MAP SENSOR
TP SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: The most likely cause of this DTC is a plugged intake air system or dirty Throttle Body. Check for any TSB's before continuing.

NOTE: Diagnose any 5-Volt Supply, TP Sensor, Oxygen Sensor, Fuel related or MAP Sensor DTCs before continuing.

NOTE: The throttle plate should be free from binding and carbon build up.

NOTE: Question the customer about weather conditions, as ICE build up on the blade can cause this fault when ambient is around +4 to -10 Celsius range.

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

2. RESTRICTED AIR INLET SYSTEM

Turn the ignition off.

Remove the Air Cleaner Assembly.

Remove the Air Filter.

Inspect the Throttle Body opening for signs of any foreign materials.

Check the intake tube / air cleaner for obstructions - include snow packing questions to customer.

Were any restrictions found?

Yes >> Repair the restriction as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. MAP SENSOR OPERATION

Start the engine.

With a scan tool, monitor the MAP Sensor voltage.

Snap the Accelerator pedal.

Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts at Wide Open Throttle?

Yes >> Go To 4

No >> Go To 11

---

4. TP SENSOR OPERATION

Ignition on, engine not running.

With a scan tool, perform the Throttle Follower Test.

TP Sensor No.1 should start at approximately 0.8 of a volt and increase to 4.2 volts.

TP Sensor No.2 should start at approximately 4.2 volts and decrease to 0.8 of a volt.

Is the voltage transition smooth between the appropriate values?

Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

5. RESISTANCE IN THE (F855) 5-VOLT SUPPLY CIRCUIT

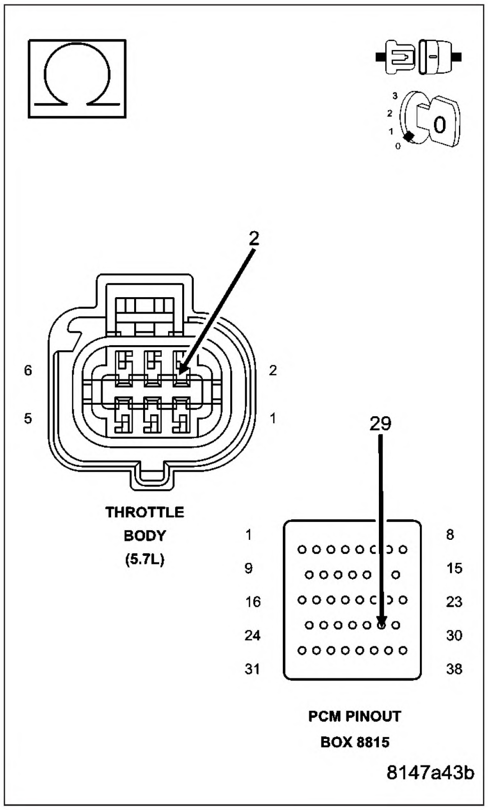
Turn the ignition off.

Disconnect the Throttle Body harness connector.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F855) 5-volt Supply circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 100 ohms?

Yes >> Go To 6

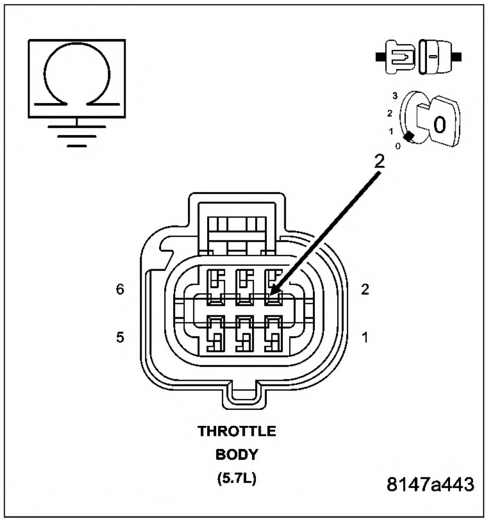
No >> Repair the excessive resistance in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

6. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and (F855) 5-volt Supply circuit between the appropriate terminals of special tool #8815.



Is the resistance above 100k ohms?

Yes >> Go To 7

No >> Repair the short to ground in the (F855) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

7. TP SENSOR

Connect the PCM harness connector.

Ignition on, engine not running.

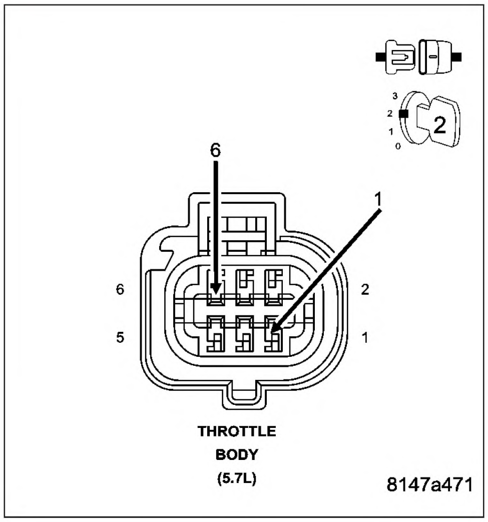
With a scan tool, monitor the TP Sensor voltage.

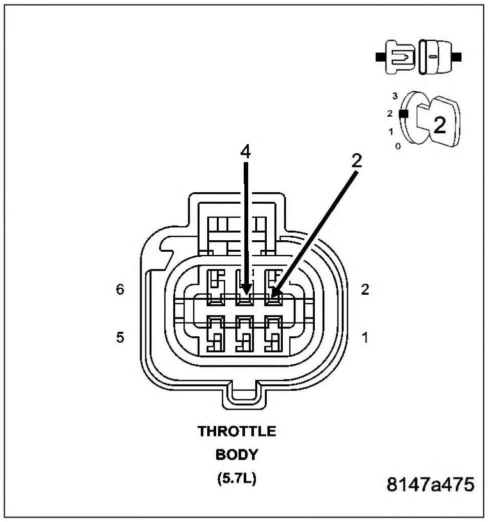
Connect a jumper wire between the (K22) TP Sensor No.1 Signal circuit and the (K922) Sensor Return circuit in the Throttle Body harness connector.

TP Sensor No.1 voltage should start at approximately 4.8 volts and decrease to 0.2 of a volt.

Connect a jumper wire between the (K122) TP Sensor No.2 Signal circuit and the (F855) 5-volt Supply circuit in the Throttle Body harness connector.

TP Sensor No.2 voltage should start at approximately 0 volts and increase to 4.8 to 5.2 volts.





Does the TP Sensor voltage change to the appropriate voltage with the jumper wire installed?

Yes >> Disconnect the Battery before replacing the Throttle Body Assembly. Replace the Throttle Body Assembly. After installation is complete, use a scan tool and select the ETC RELEARN function

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

8. RESISTANCE IN THE TP SENSOR SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

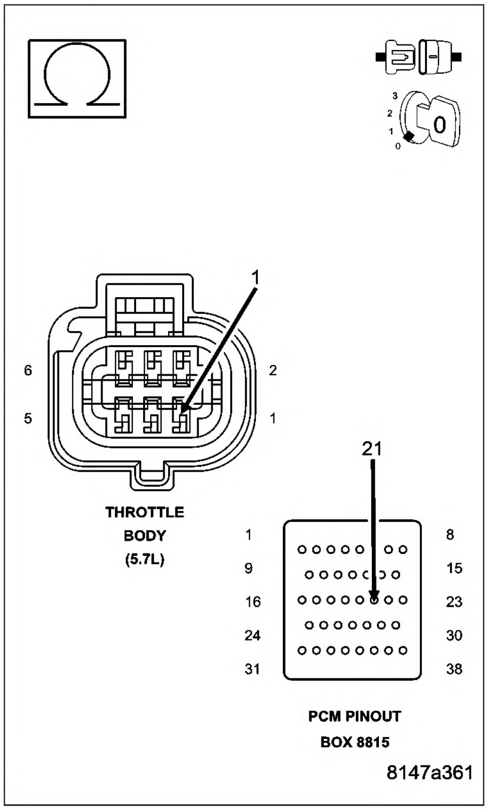
Measure the resistance of the (K22) and (K122) TP Signal circuits from the Throttle Body harness connector to the appropriate terminals of special tool #8815.

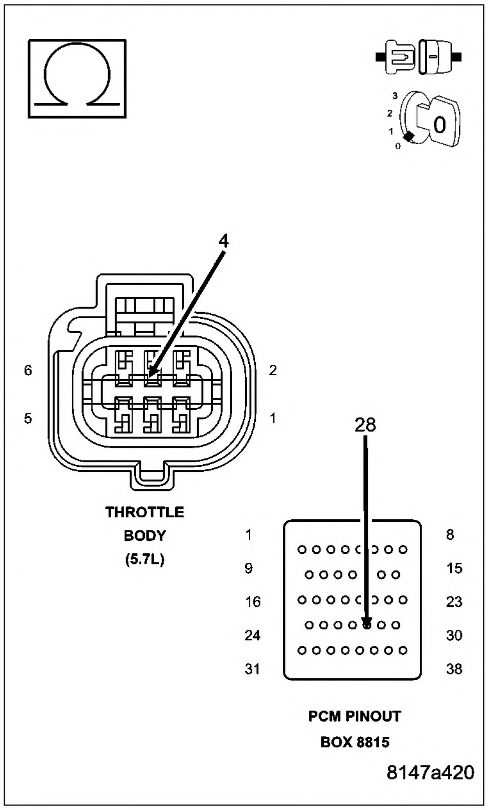
Is the resistance below 5.0 ohms for each circuit?

Yes >> Go To 9

No >> Repair the excessive resistance in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

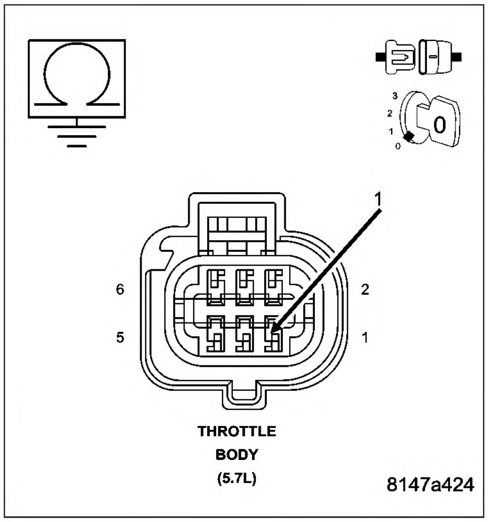

3
2
1
0
0
1
6
2
5
1
21
THROTTLE
BODY
(5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147a361

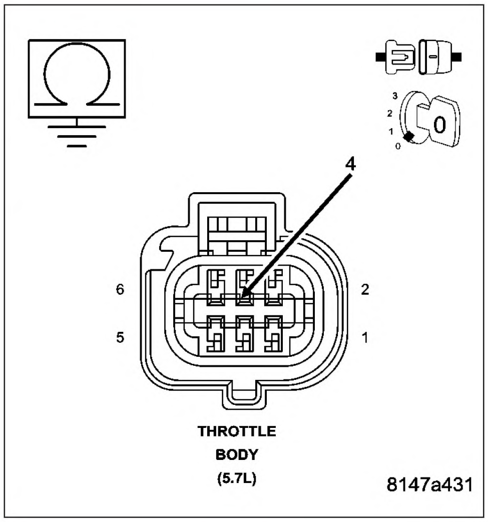

3
2
1
0
0
4
6
2
5
1
28
THROTTLE
BODY
(5.7L)
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8147a420

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

9. TP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K22) and (K122) TP Signal circuits at the appropriate terminals of special tool #8815.


1
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a424


4
6
5
2
1
THROTTLE
BODY
(5.7L)
8147a431

Is the resistance above 100k ohms for each circuit?

Yes >> Go To 10

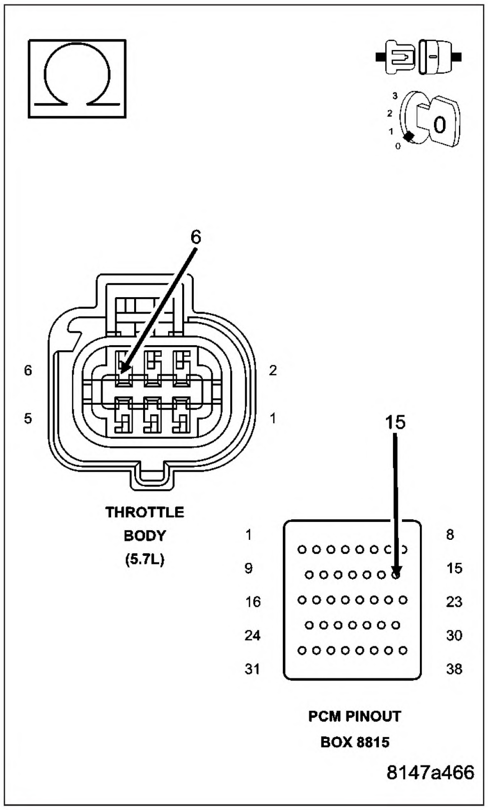
No >> Repair the short to ground in the (K22) or (K122) TP Sensor Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

10. RESISTANCE IN THE (K922) SENSOR RETURN CIRCUIT

Measure the resistance of the (K922) Sensor Return circuit from the Throttle Body harness connector to the appropriate terminal of special tool #8815.


6
6
2
5
1
15
THROTTLE
BODY
(5.7L)
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8147a466

Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K922) Sensor Return circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

11. RESISTANCE IN THE (F856) 5-VOLT SUPPLY CIRCUIT

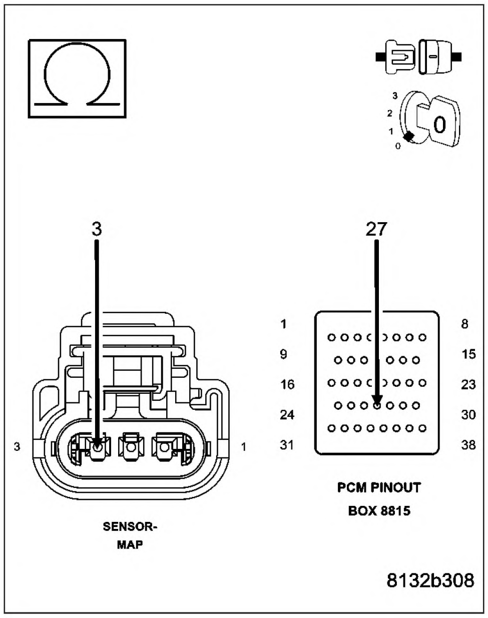
Turn the ignition off.

Disconnect the MAP Sensor harness connector.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.


3
27
1
8
9
15
16
23
24
30
31
38
3
1
PCM PINOUT
BOX 8815
SENSOR-
MAP
8132b308

Is the resistance below 5.0 ohms?

Yes >> Go To 12

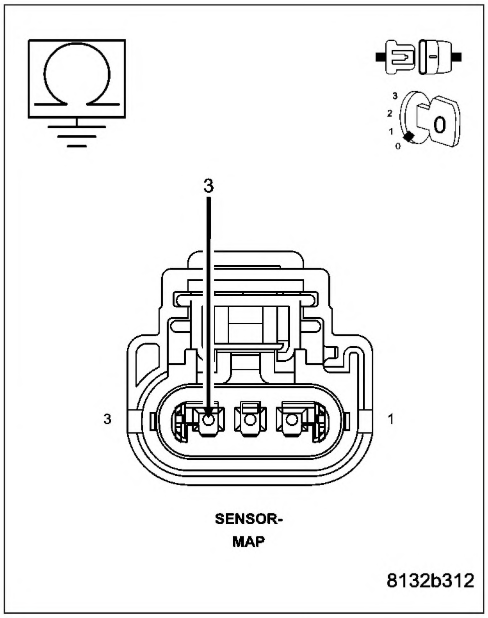
No >> Repair the excessive resistance in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

12. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit in the MAP Sensor harness connector.



Is the resistance above 100k ohms?

Yes >> Go To 13

No >> Repair the short to ground in the (F856) 5-volt Supply circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

13. MAP SENSOR

Connect the C1 PCM harness connector.

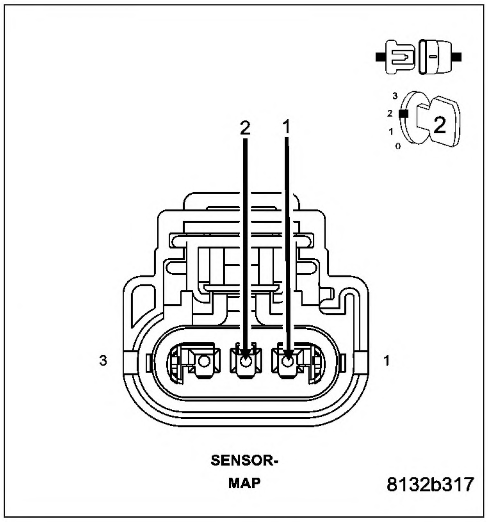
Ignition on, engine not running.

With a scan tool, monitor the MAP Sensor voltage.

Connect a jumper wire between the (K1) MAP Signal circuit and the (K900) Sensor ground circuit.

Cycle the ignition switch from off to on.

With a scan tool, monitor the MAP Sensor voltage.



Does the scan tool display MAP voltage from approximately 4.9 volts to below 0.5 volt with the jumper wire installed?

Yes >> Replace the MAP Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 14

NOTE: Remove the jumper wire before continuing.

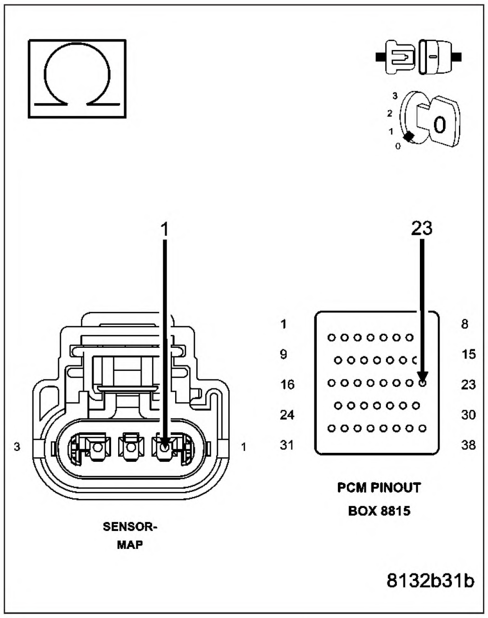
P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

14. RESISTANCE IN THE (K1) MAP SIGNAL CIRCUIT

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance of the (K1) MAP Signal circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 15

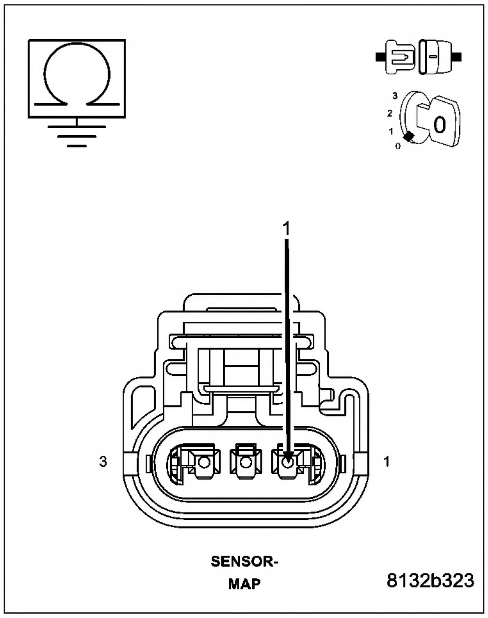
No >> Repair the excessive resistance in the (K1) MAP Signal circuit

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

15. (K1) MAP SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K1) MAP Signal circuit in the MAP Sensor harness connector.



Is the resistance above 100k ohms?

Yes >> Go To 16

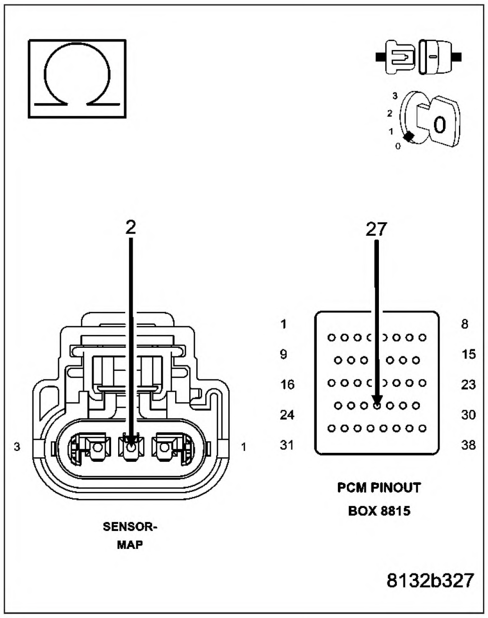
No >> Repair the short to ground in the (K1) MAP Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2175-LOW AIRFLOW/RESTRICTION DETECTED (SLOW ACCUMULATION) (CONTINUED)

16. RESISTANCE IN THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance of the (K900) Sensor ground circuit from the MAP Sensor harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 17

No >> Repair the excessive resistance in the (K900) Sensor ground circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

17. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

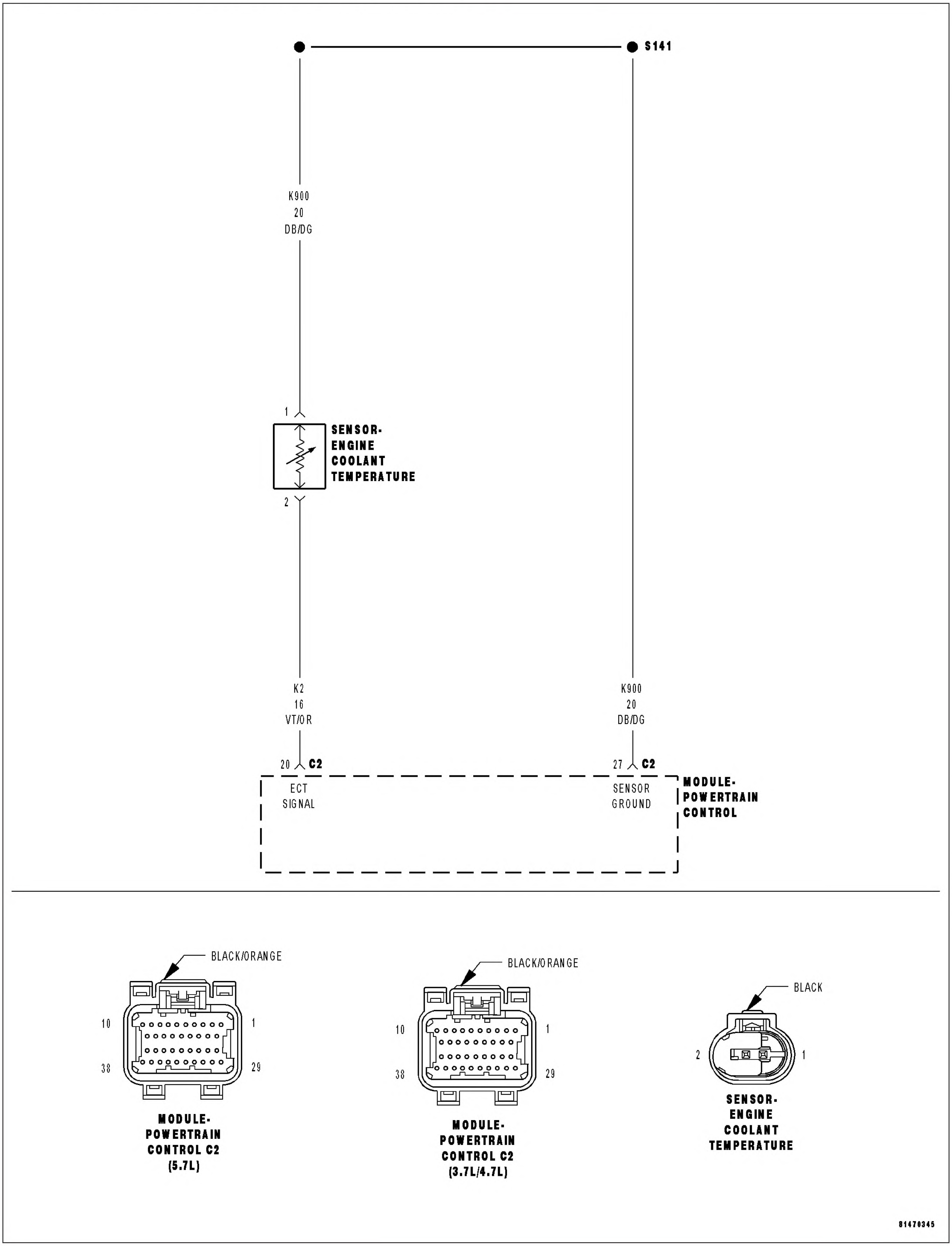
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2181-COOLING SYSTEM PERFORMANCE


S141
K900
20
DB/DG
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
2
K2
16
VT/OR
K900
20
DB/DG
20 C2
27 C2
ECT
SIGNAL
SENSOR
GROUND
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK
2
1
SENSOR-
ENGINE
COOLANT
TEMPERATURE
81470345

P2181-COOLING SYSTEM PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on, Engine running, and no ECT DTCs present.
- **Set Condition:**
  PCM recognizes that the ECT has failed its self coherence test. The coolant temp should only change at a certain rate, if this rate is too slow or too fast this fault will set. Two trip fault. Three good trips to clear MIL. ETC light will illuminate on first trip failure.

Possible Causes
LOW COOLANT LEVEL
(K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
(K2) ECT SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND
(K2) ECT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT
THERMOSTAT
ECT SENSOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

NOTE: If this code sets during extreme ambient temperatures, improper installation of a block heater could be the cause of this DTC.

With a scan tool, read DTCs.

Diagnose all other ECT and Cooling System codes before continuing.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2181-COOLING SYSTEM PERFORMANCE (CONTINUED)

2. LOW COOLANT LEVEL

NOTE: If an Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.

NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.

NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.

NOTE: Extremely cold outside ambient temperatures may have caused this DTC to set.

NOTE: Need to make sure that no Cooling System DTCs are set or changes that would make the warm up much slower or much faster: broken water pump can set this, addition of aftermarket auxiliary cooler can set this DTC.

WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Failure to follow these instructions can result in personal injury or death. Allow the engine to cool before opening the cooling system.

Inspect the coolant system for proper level and condition.

Is the coolant level and condition OK?

Yes >> Go To 3

No >> Inspect the vehicle for a coolant leak and add the necessary amount of coolant.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. THERMOSTAT

NOTE: This test works best if performed on a cold engine (cold soak).

Ignition on, engine not running.

With a scan tool, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature.

NOTE: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.

Start the Engine.

During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). Also monitor the actual coolant temperature with a thermometer.

NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg on the scan tool should stay relatively close to each other.

Using the appropriate service information, determine the proper opening temperature of the thermostat.

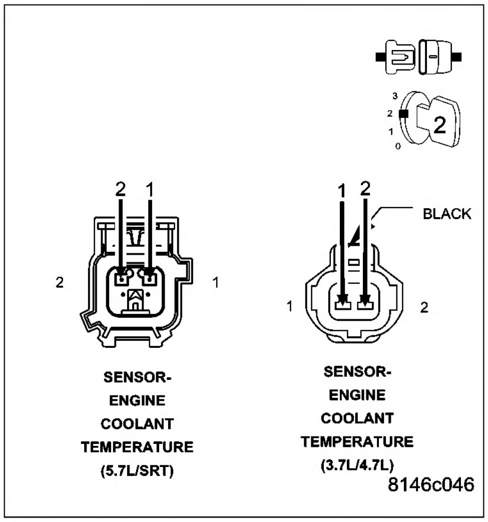
Did the thermostat open at the proper temperature?

Yes >> Go To 4

No >> Replace the thermostat.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2181-COOLING SYSTEM PERFORMANCE (CONTINUED)

4. ECT SENSOR


2 1
2
1
1 2
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
8146c046

Connect a jumper between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit in the ECT Sensor harness connector.

Turn the ignition off.

Disconnect the ECT Sensor harness connector.

With a scan tool, read the ECT voltage.

Is the voltage below 1.0 volt?

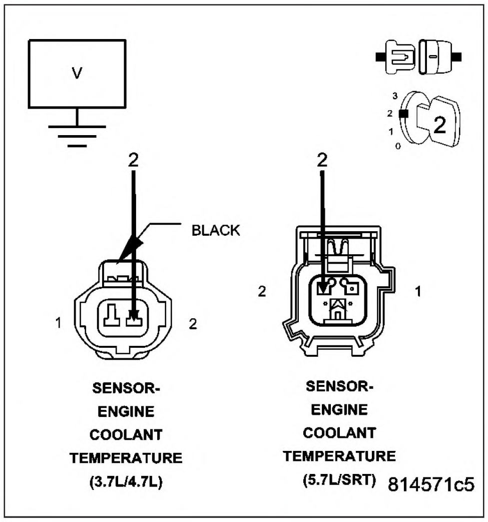
Yes >> Replace the ECT Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. (K2) ECT SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE


V
2
2
BLACK
1
2
2
1
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
814571c5

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K2) ECT Signal circuit in the ECT Sensor harness connector.

Is the voltage above 0 volts?

Yes >> Repair the short to battery voltage in the (K2) ECT Signal circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

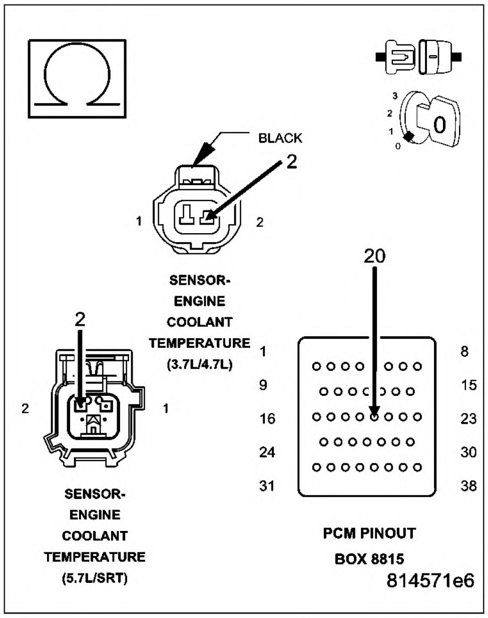
P2181-COOLING SYSTEM PERFORMANCE (CONTINUED)

6. (K2) ECT SIGNAL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K2) ECT Signal circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.


BLACK
2
1
2
20
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
2
2
1
1
8
9
15
16
23
24
30
31
38
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
PCM PINOUT BOX 8815
3
2
1
0
0

814571e6

Is the resistance below 5.0 ohms?

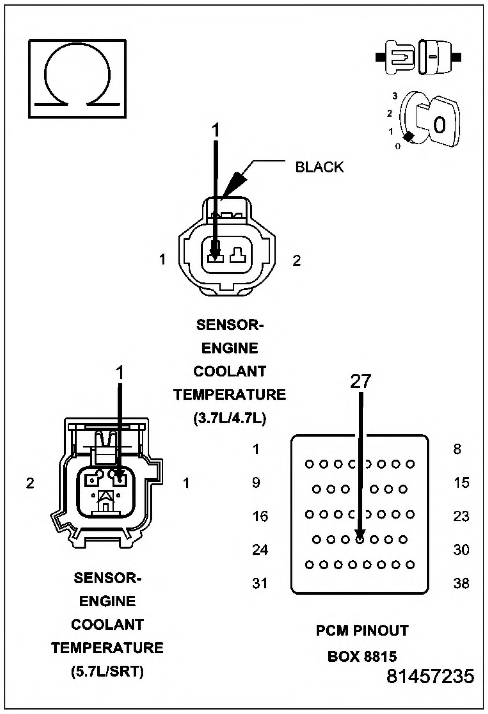
Yes >> Go To 7

No >> Repair the open in the (K2) ECT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. (K900) SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (K900) Sensor ground circuit from the ECT Sensor harness connector to the appropriate terminal of special tool #8815.


1
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
1
27
2
1
1
8
9
15
16
23
24
30
31
38
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
PCM PINOUT BOX 8815
3
2
1
0
0

81457235

Is the resistance below 5.0 ohms?

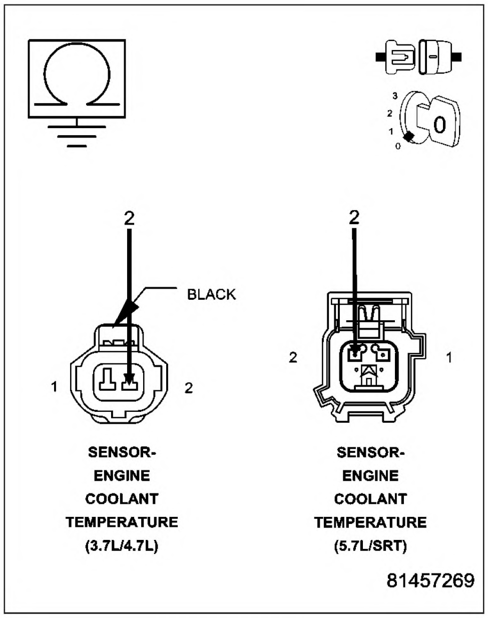
Yes >> Go To 8

No >> Repair the open in the (K900) Sensor ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2181-COOLING SYSTEM PERFORMANCE (CONTINUED)

8. (K2) ECT SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K2) ECT Signal circuit in the ECT Sensor harness connector.


2
BLACK
1
2
2
2
1
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
81457269

Is the resistance below 100 ohms?

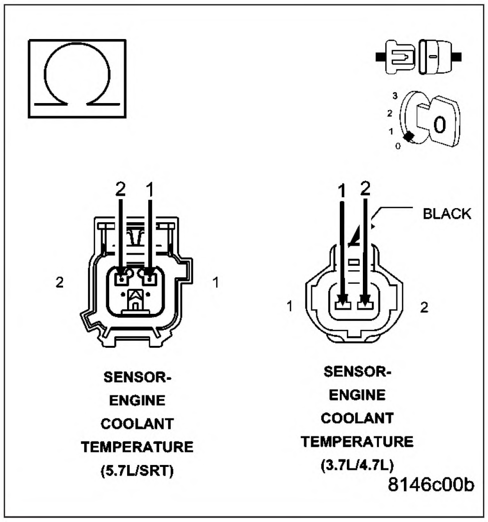
Yes >> Repair the short to ground in the (K2) ECT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

---

9. (K2) ECT SIGNAL CIRCUIT SHORTED TO THE (K900) SENSOR GROUND CIRCUIT

Measure the resistance between the (K2) ECT Signal circuit and the (K900) Sensor ground circuit in the ECT Sensor harness connector.


2 1
2
1
1 2
BLACK
1
2
SENSOR-ENGINE COOLANT TEMPERATURE (5.7L/SRT)
SENSOR-ENGINE COOLANT TEMPERATURE (3.7L/4.7L)
8146c00b

Is the resistance below 5.0 ohms?

Yes >> Repair the short between the (K900) Sensor ground and the (K2) ECT Signal circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 10

P2181-COOLING SYSTEM PERFORMANCE (CONTINUED)

10. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

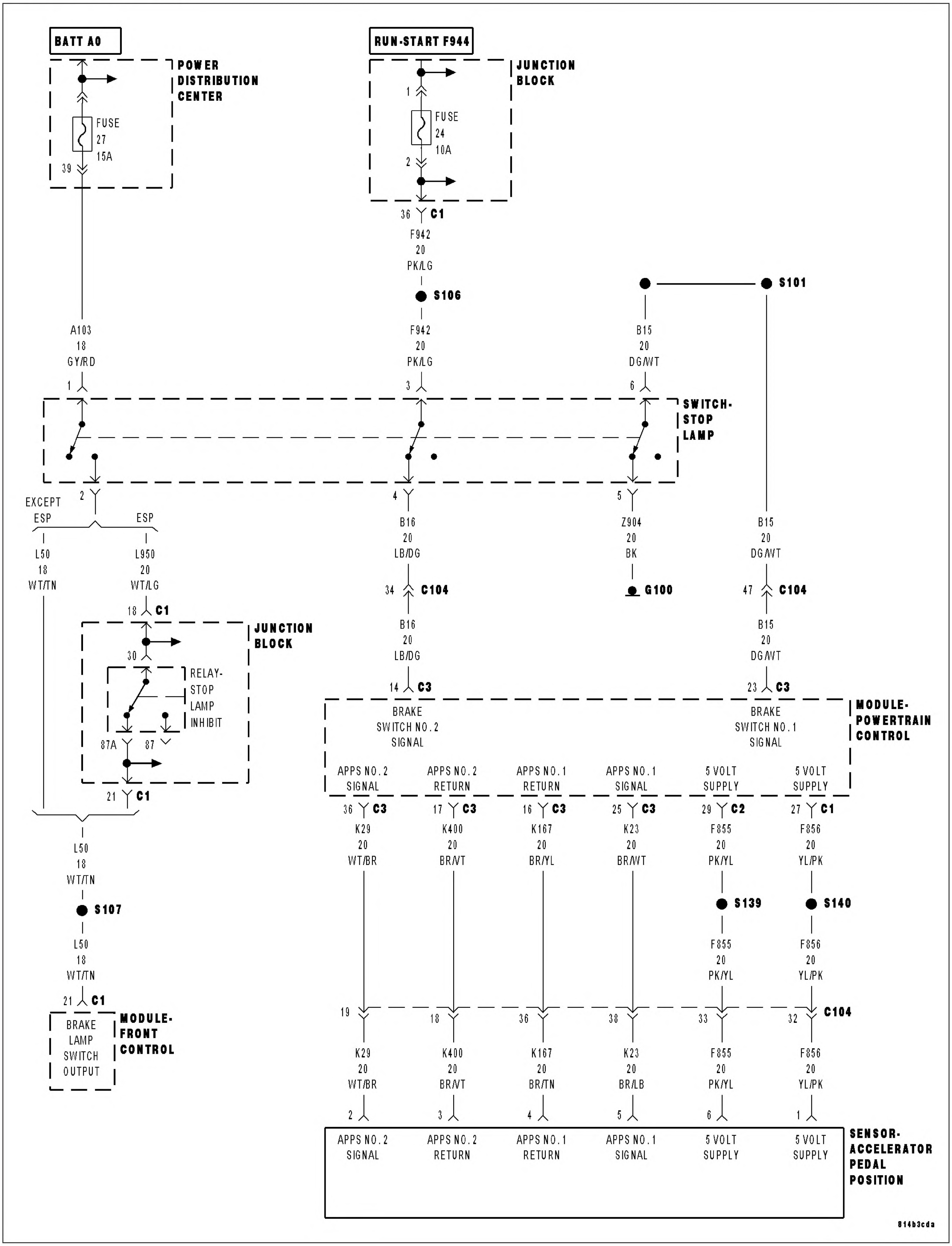
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2299-BRAKE PEDAL POSITION / ACCELERATOR PEDAL POSITION INCOMPATIBLE


BATT A0
POWER DISTRIBUTION CENTER
FUSE 27 15A
39
RUN-START F944
JUNCTION BLOCK
1
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
S101
A103 18 GY/RD
B15 20 DG/WT
1
3
6
SWITCH-STOP LAMP
2
4
5
EXCEPT ESP
ESP
L50 18 WT/TN
L950 20 WT/LG
B16 20 LB/DG
Z904 20 BK
B15 20 DG/WT
18 C1
34 C104
G100
47 C104
JUNCTION BLOCK
30
RELAY-STOP LAMP INHIBIT
87A
87
21 C1
B16 20 LB/DG
B15 20 DG/WT
14 C3
23 C3
BRAKE SWITCH NO. 2 SIGNAL
BRAKE SWITCH NO. 1 SIGNAL
MODULE-POWERTRAIN CONTROL
APPS NO. 2 SIGNAL
APPS NO. 2 RETURN
APPS NO. 1 RETURN
APPS NO. 1 SIGNAL
5 VOLT SUPPLY
5 VOLT SUPPLY
36 C3
17 C3
16 C3
25 C3
29 C2
27 C1
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/YL
K23 20 BR/WT
F855 20 PK/YL
F856 20 YL/PK
L50 18 WT/TN
S107
S139
S140
L50 18 WT/TN
F855 20 PK/YL
F856 20 YL/PK
21 C1
MODULE-FRONT CONTROL
BRAKE LAMP SWITCH OUTPUT
19
18
36
38
33
32
C104
K29 20 WT/BR
K400 20 BR/VT
K167 20 BR/TN
K23 20 BR/LB
F855 20 PK/YL
F856 20 YL/PK
2
3
4
5
6
1
APPS NO. 2 SIGNAL
APPS NO. 2 RETURN
APPS NO. 1 RETURN
APPS NO. 1 SIGNAL
5 VOLT SUPPLY
5 VOLT SUPPLY
SENSOR-ACCELERATOR PEDAL POSITION
814b3cda

P2299-BRAKE PEDAL POSITION / ACCELERATOR PEDAL POSITION INCOMPATIBLE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on. No Break or APPS faults present.
- **Set Condition:**
  The PCM recognizes a brake application following the APPS showing a fixed pedal opening. Temporary or permanent. Internally the PCM will reduce throttle opening below driver demand. One trip fault and the code will be set within 5 seconds. ETC light will illuminate, the light will only stay illuminated while DTC is active.

Possible Causes
CUSTOMER PRESSING ACCLERATOR PEDAL, THEN PRESSING BRAKE PEDAL, AND CONTINUES HOLDING THEM DOWN SIMULTANEOUSLY
STOP LAMP SWITCH
APP SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. DTC INFORMATION

NOTE: If a pedal assembly becomes mechanically stuck the voltage output will stay fixed, if this is also Followed by a long application of the brakes this code will set.

NOTE: When this code sets the pedal position in the PCM software will ramp to idle. If the Pedal voltage changes OR the brake pedal is released, the pedal position in the PCM software will ramp up to the pedal position and the ETC light will go out.

With a scan tool, read DTCs and record the related Freeze Frame data.

Diagnose all other Stop Lamp Switch and APP Sensor codes before continuing.

This code can be set by a driver who uses both feet while driving, one for the Accelerator Pedal and the other for the Brake Pedal.

NOTE: The most likely cause of this DTC is caused by the customer Brake Torquing the engine by pressing the Accelerator pedal and the pressing the Brake Pedal.

Ask the driver of the vehicle if these conditions apply to their driving habits.

Are the listed conditions part of the customers driving habits?

Yes >> Advise the customer of what caused the DTC. This is normal operation of a ETC equipped vehicle because of safety issues.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. STOP LAMP SWITCH OPERATION

With a scan tool, read both Stop Lamp Switch statuses while pressing and releasing the Brake Pedal.

Does the scan tool display the Pressed and Released while pressing and releasing the Pedal?

Yes >> Go To 3

No >> Check the Stop Lamp Switch for proper installation and check the related circuits for opens and shorts using the appropriate wiring diagram. If OK, replace the Stop Lamp Switch assembly.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2299-BRAKE PEDAL POSITION / ACCELERATOR PEDAL POSITION INCOMPATIBLE (CONTINUED)

3. APP SENSOR SWEEP

Ignition on, engine not running.

With a scan tool, monitor both APP Sensor voltage readings.

Slowly press the accelerator pedal from idle until it reaches the end stop near the floor.

APPS No.1 voltage should start at approximately 0.45 of a volt and increase to approximately 4.6 volts with a smooth transition.

APPS No.2 voltage should start at approximately 0.22 of a volt and increase to approximately 2.31 volts with a smooth transition.

Does the voltage for the appropriate sensor follow the list specification?

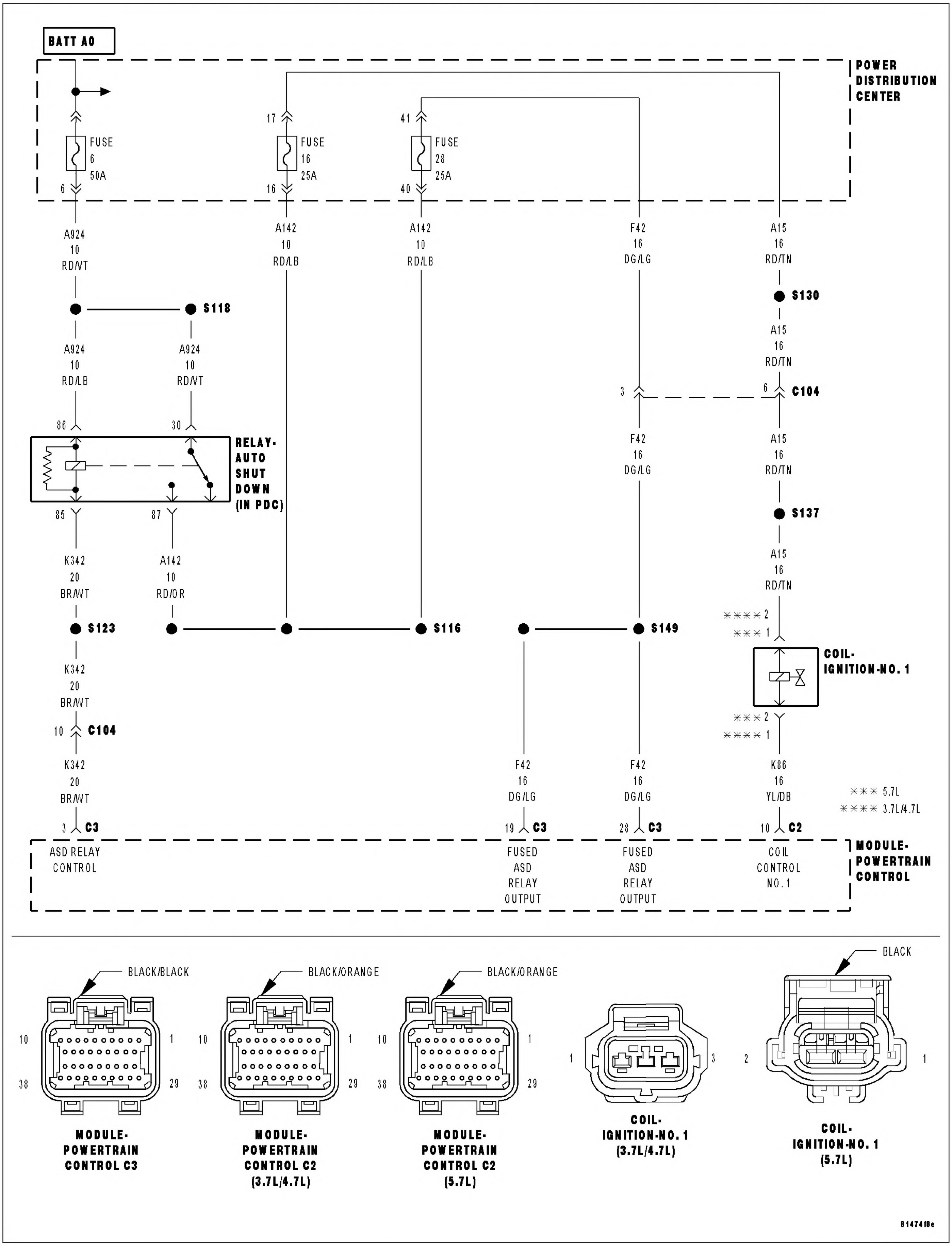
Yes >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Check the Signal and Return circuits for opens and shorts. If OK, Replace the APP Sensor Assembly per Service Information. After installation is complete, with a scan tool select the ETC RELEARN function to relearn the APPS values.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2302-IGNITION COIL 1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
S118
A924 10 RD/LB
A924 10 RD/VT
A15 16 RD/TN
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
F42 16 DG/LG
A15 16 RD/TN
85
87
S137
K342 20 BR/WT
A142 10 RD/OR
A15 16 RD/TN
✱✱✱✱ 2
✱✱✱ 1
S123
S116
S149
COIL-IGNITION-NO. 1
K342 20 BR/WT
✱✱✱ 2
✱✱✱✱ 1
10
C104
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K86 16 YL/DB
✱✱✱ 5.7L
✱✱✱✱ 3.7L/4.7L
3 C3
19 C3
28 C3
10 C2
MODULE-POWERTRAIN CONTROL
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO.1
BLACK/BLACK
BLACK/ORANGE
BLACK/ORANGE
BLACK
10
1
38
29
10
1
38
29
10
1
38
29
1
3
2
1
MODULE-POWERTRAIN CONTROL C3
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
MODULE-POWERTRAIN CONTROL C2 (5.7L)
COIL-IGNITION-NO. 1 (3.7L/4.7L)
COIL-IGNITION-NO. 1 (5.7L)
81474f8e

P2302-IGNITION COIL 1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K86) COIL CONTROL NO.1 CIRCUIT OPEN
(K86) COIL CONTROL NO.1 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (A15) ASD RELAY OUTPUT CIRCUIT

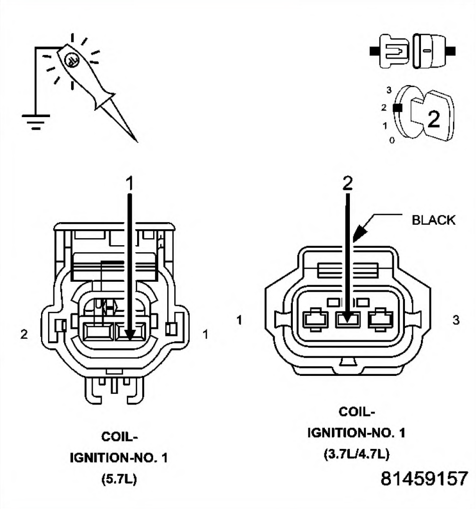
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2302-IGNITION COIL 1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L and 3.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

Yes >> Go To 4

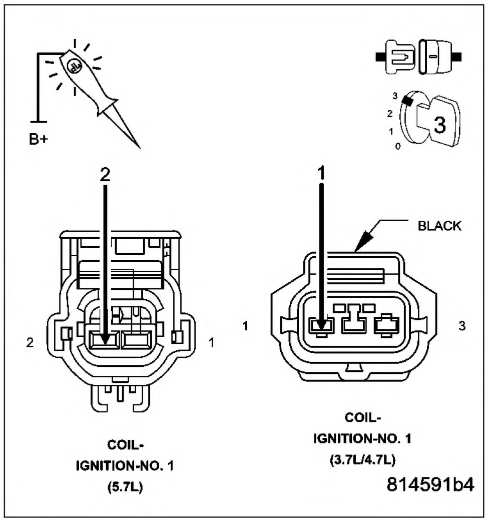
No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K86) Coil Control No.1 circuit.

Crank the engine for 5 seconds while observing the test light.



What is the condition of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

OFF constantly.
Go To 6

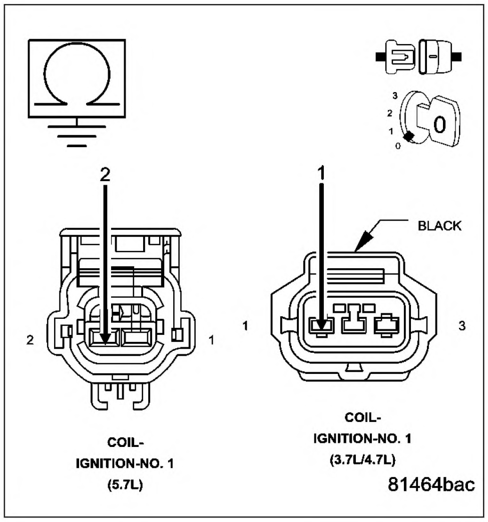
---

5. (K86) COIL CONTROL NO.1 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K86) Coil Control No.1 circuit in the Coil on Plug harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K86) Coil Control No.1 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P2302-IGNITION COIL 1 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

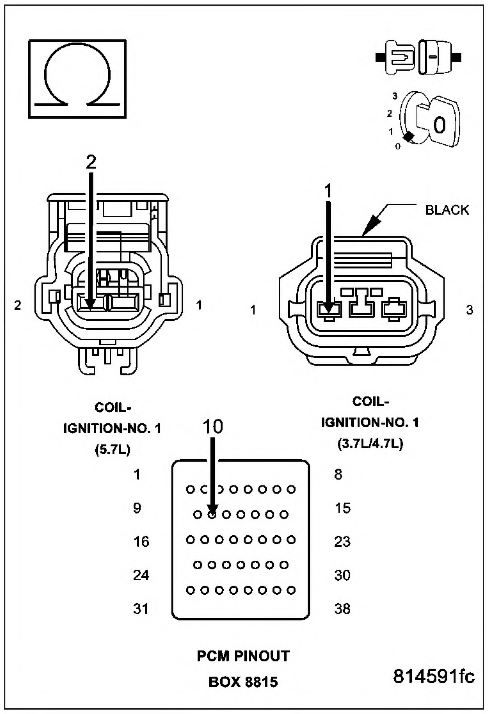
6. (K86) COIL CONTROL NO.1 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K86) Coil Control No.1 circuit from the Coil on Plug harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K86) Coil Control No.1 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

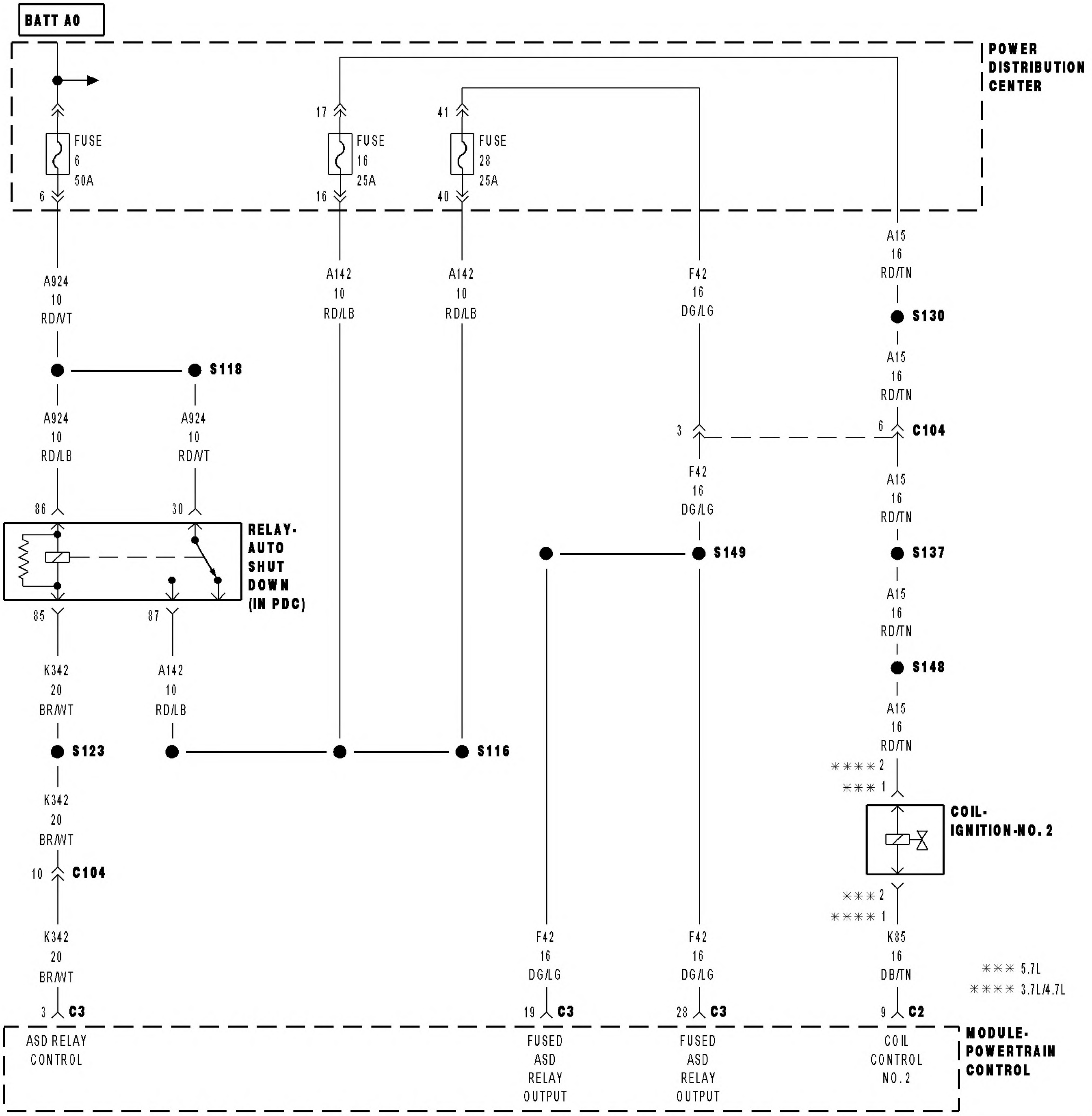
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

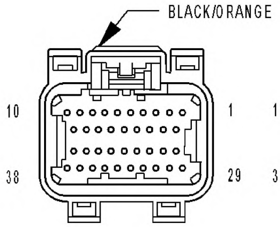
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

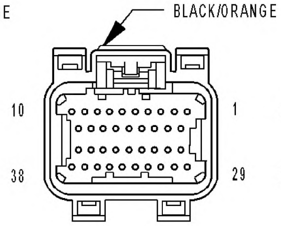
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2305-IGNITION COIL 2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

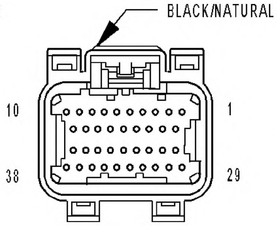

BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
A15 16 RD/TN
S118
A924 10 RD/LB
A924 10 RD/VT
3
6
C104
F42 16 DG/LG
A15 16 RD/TN
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
S149
S137
A15 16 RD/TN
S148
A15 16 RD/TN
K342 20 BR/WT
A142 10 RD/LB
S123
S116
✱✱✱✱ 2
✱✱✱ 1
K342 20 BR/WT
COIL-IGNITION-NO. 2
10
C104
✱✱✱ 2
✱✱✱✱ 1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K85 16 DB/TN
✱✱✱ 5.7L
✱✱✱✱ 3.7L/4.7L
3 C3
19 C3
28 C3
9 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO. 2
MODULE-POWERTRAIN CONTROL


BLACK/ORANGE
10
1
38
29

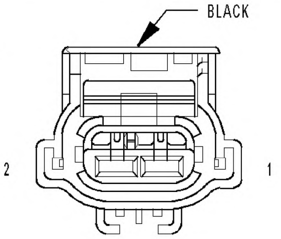
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)


BLACK/ORANGE
10
1
38
29

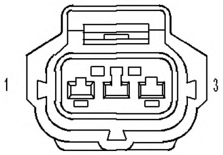
MODULE-POWERTRAIN CONTROL C2 (5.7L)


BLACK/NATURAL
10
1
38
29

MODULE-POWERTRAIN CONTROL C3



COIL-IGNITION-NO. 2 (5.7L)



COIL-IGNITION-NO. 2 (3.7L/4.7L)

81474f92

P2305-IGNITION COIL 2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K85) COIL CONTROL NO.2 CIRCUIT OPEN
(K85) COIL CONTROL NO.2 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (A15) ASD RELAY OUTPUT CIRCUIT

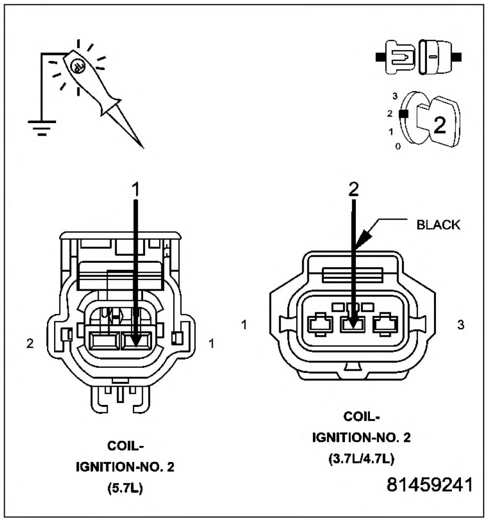
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2305-IGNITION COIL 2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L and 3.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

Yes >> Go To 4

No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K85) Coil Control No.2 circuit.

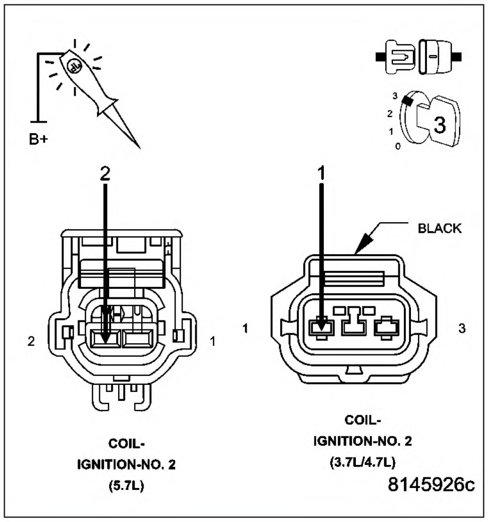
Crank the engine for 5 seconds while observing the test light.

What is the state of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

OFF constantly.
Go To 6



---

5. (K85) COIL CONTROL NO.2 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

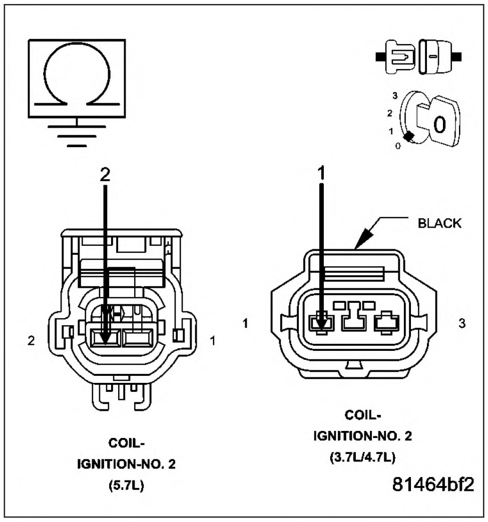
Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K85) Coil Control No.2 circuit in the Coil on Plug harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K85) Coil Control No.2 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7



P2305-IGNITION COIL 2 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

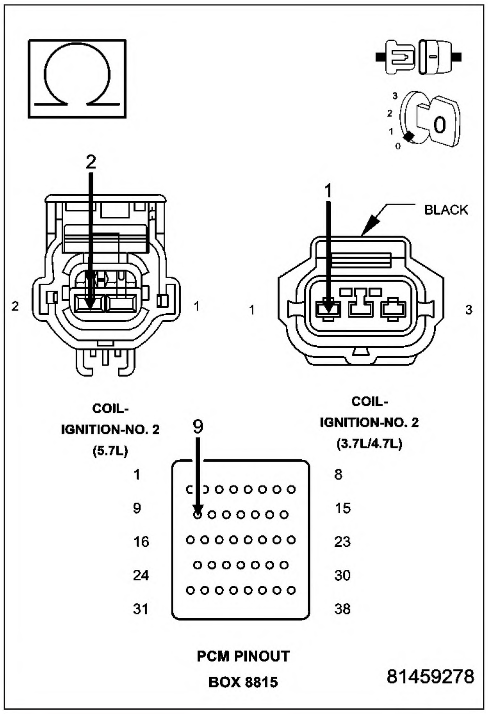
6. (K85) COIL CONTROL NO.2 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K85) Coil Control No.2 circuit from the Coil on Plug harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K85) Coil Control No.2 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

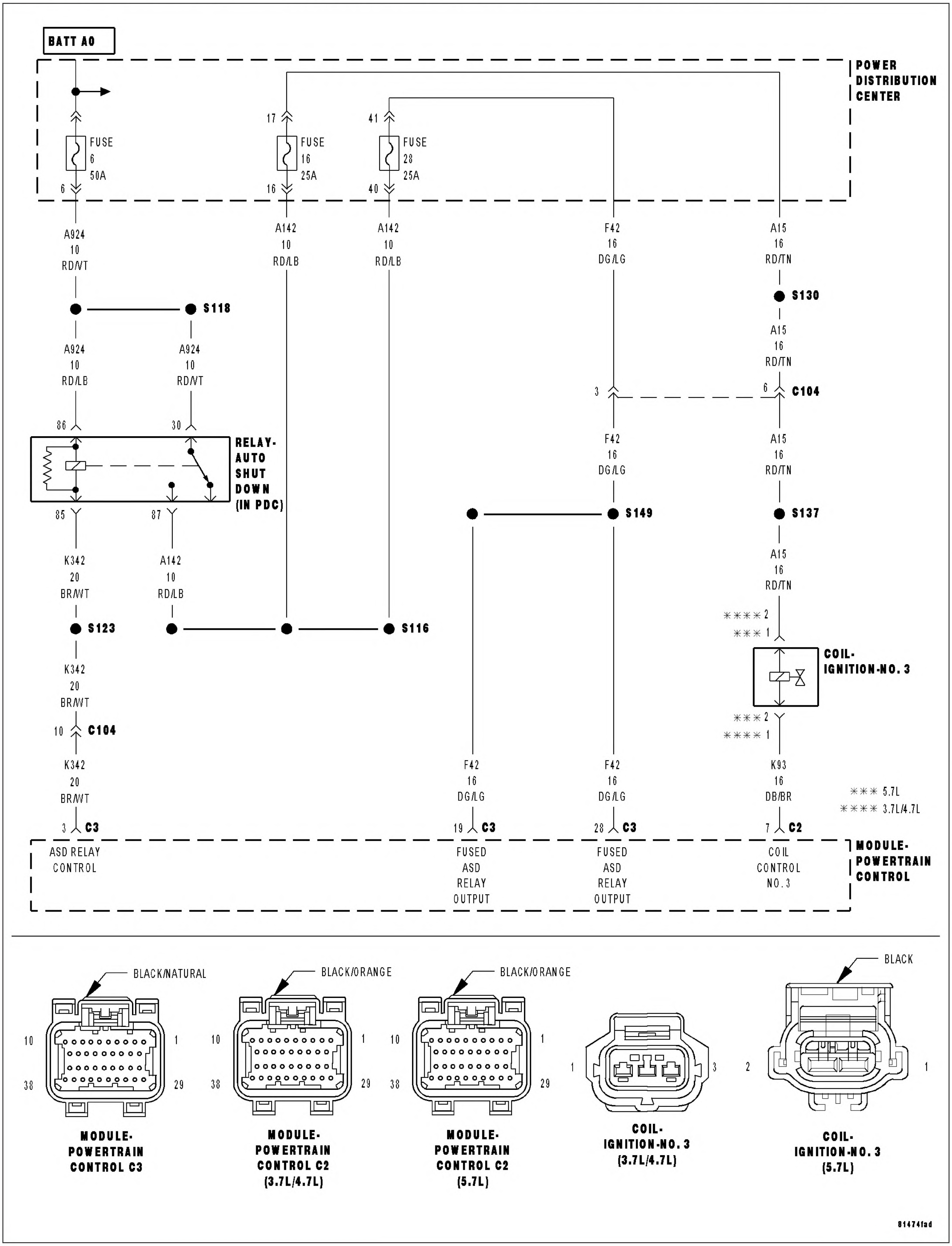
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2308-IGNITION COIL 3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/WT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
S118
A924 10 RD/LB
A924 10 RD/WT
A15 16 RD/TN
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
F42 16 DG/LG
A15 16 RD/TN
85
87
S149
S137
K342 20 BR/WT
A142 10 RD/LB
A15 16 RD/TN
S123
S116
✻✻✻✻ 2
✻✻✻ 1
COIL-IGNITION-NO. 3
K342 20 BR/WT
✻✻✻ 2
✻✻✻✻ 1
10
C104
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K93 16 DB/BR
✻✻✻ 5.7L
✻✻✻✻ 3.7L/4.7L
3 C3
19 C3
28 C3
7 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO. 3
MODULE-POWERTRAIN CONTROL
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
1
3
COIL-IGNITION-NO. 3 (3.7L/4.7L)
BLACK
2
1
COIL-IGNITION-NO. 3 (5.7L)
81474fad

P2308-IGNITION COIL 3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K93) COIL CONTROL NO.3 CIRCUIT OPEN
(K93) COIL CONTROL NO.3 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (A15) ASD RELAY OUTPUT CIRCUIT

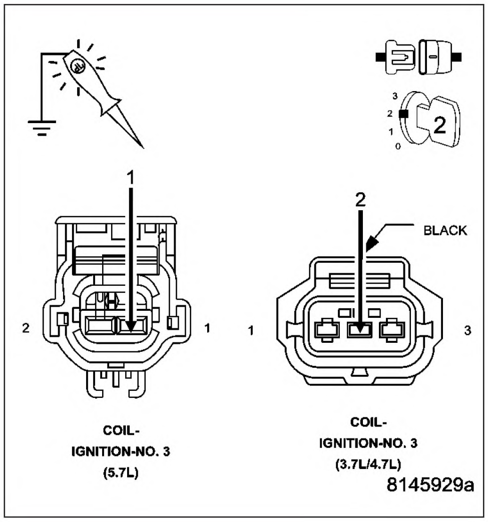
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2308-IGNITION COIL 3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L and 3.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

Yes >> Go To 4

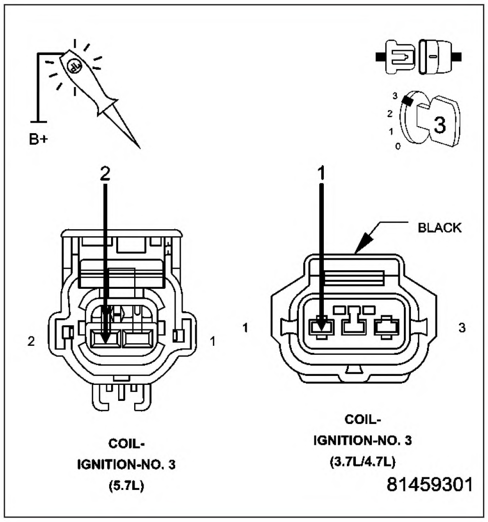
No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K93) Coil Control No.3 circuit.

Crank the engine for 5 seconds while observing the test light.



What is the state of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

OFF constantly.
Go To 6

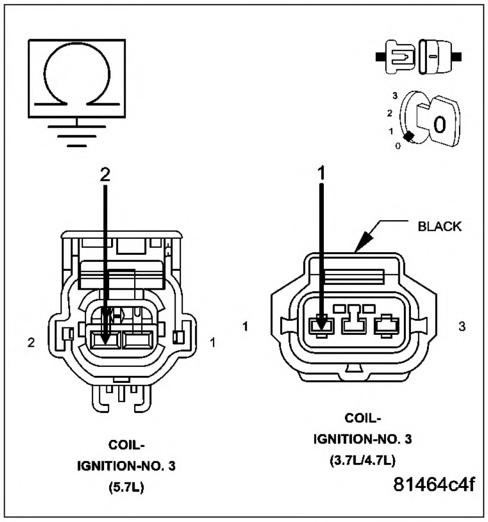
---

5. (K93) COIL CONTROL NO.3 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K93) Coil Control No.3 circuit in the Coil on Plug harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K93) Coil Control No.3 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P2308-IGNITION COIL 3 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

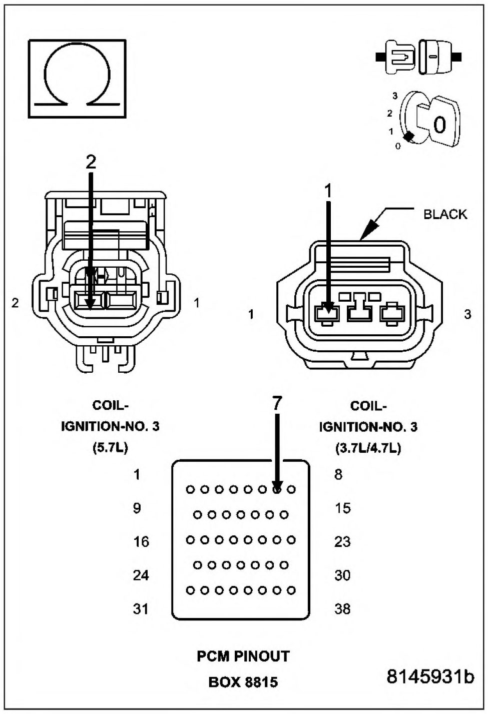
6. (K93) COIL CONTROL NO.3 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K93) Coil Control No.3 circuit from the Coil on Plug harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K93) Coil Control No.3 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

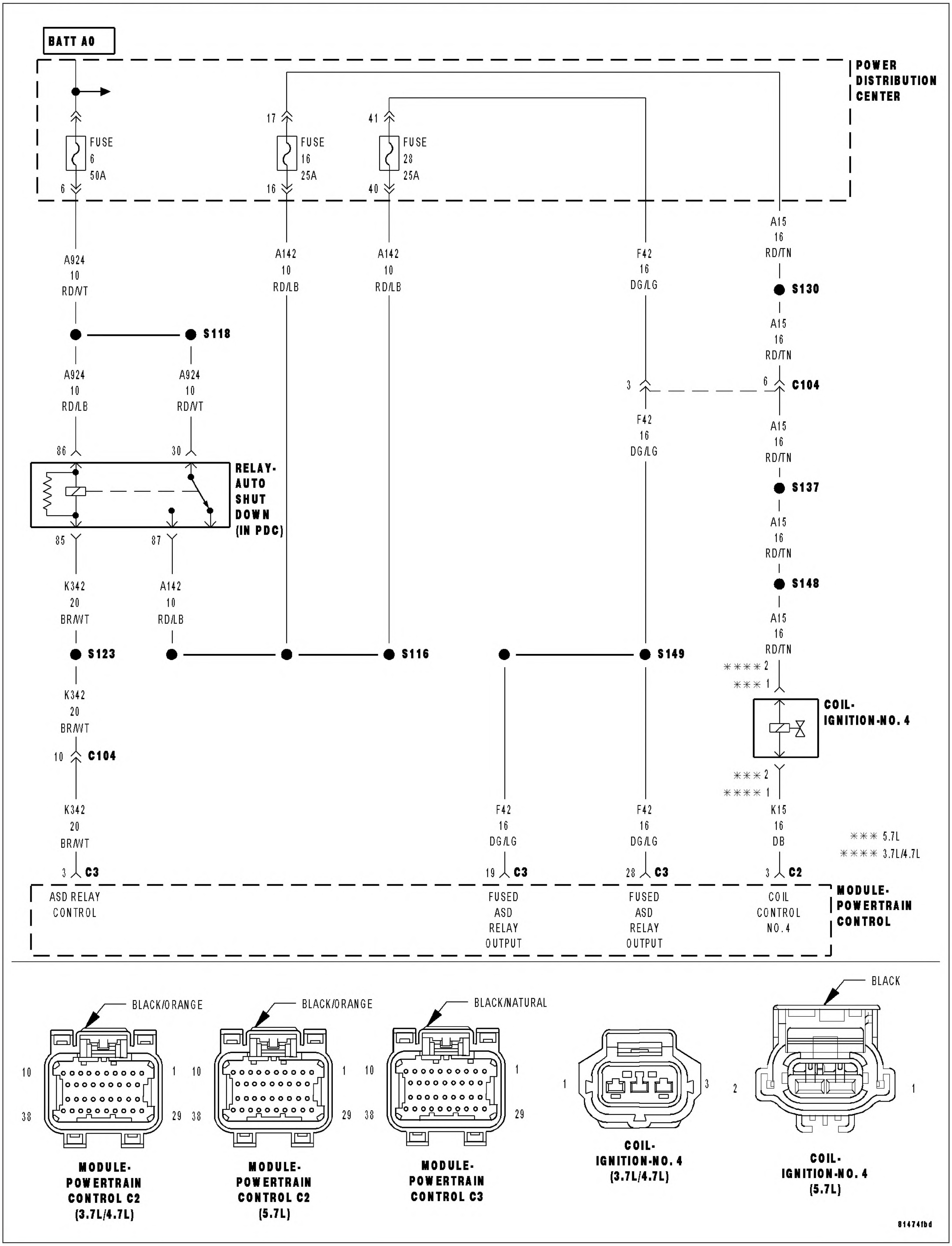
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2311-IGNITION COIL 4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
A15 16 RD/TN
S118
A924 10 RD/LB
A924 10 RD/VT
3
6
C104
F42 16 DG/LG
A15 16 RD/TN
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
S137
A15 16 RD/TN
85
87
S148
K342 20 BR/WT
A142 10 RD/LB
A15 16 RD/TN
S123
S116
S149
****2
***1
COIL-IGNITION-NO. 4
K342 20 BR/WT
10
C104
***2
****1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K15 16 DB
*** 5.7L
**** 3.7L/4.7L
3 C3
19 C3
28 C3
3 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO.4
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
10
1
38
29
BLACK/ORANGE
10
1
38
29
BLACK/NATURAL
10
1
38
29
1
3
BLACK
2
1
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
MODULE-POWERTRAIN CONTROL C2 (5.7L)
MODULE-POWERTRAIN CONTROL C3
COIL-IGNITION-NO. 4 (3.7L/4.7L)
COIL-IGNITION-NO. 4 (5.7L)
81474fbd

P2311-IGNITION COIL 4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K15) COIL CONTROL NO.4 CIRCUIT OPEN
(K15) COIL CONTROL NO.4 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

2. (A15) ASD RELAY OUTPUT CIRCUIT

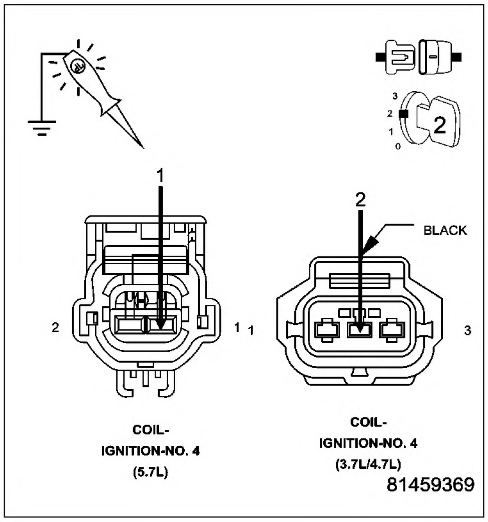
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2311-IGNITION COIL 4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L and 3.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

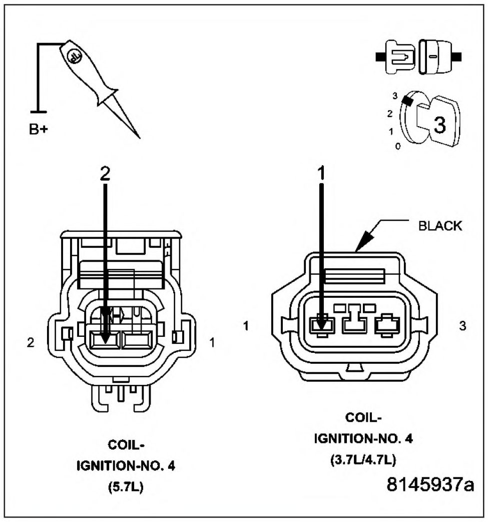
Yes >> Go To 4

No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K15) Coil Control No.4 circuit.

Crank the engine for 5 seconds while observing the test light.



What is the state of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

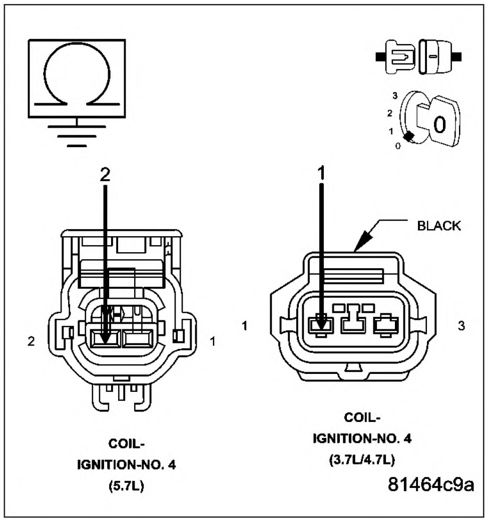
OFF constantly.
Go To 6

5. (K15) COIL CONTROL NO.4 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K15) Coil Control No.4 circuit in the Coil on Plug harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K15) Coil Control No.4 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P2311-IGNITION COIL 4 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

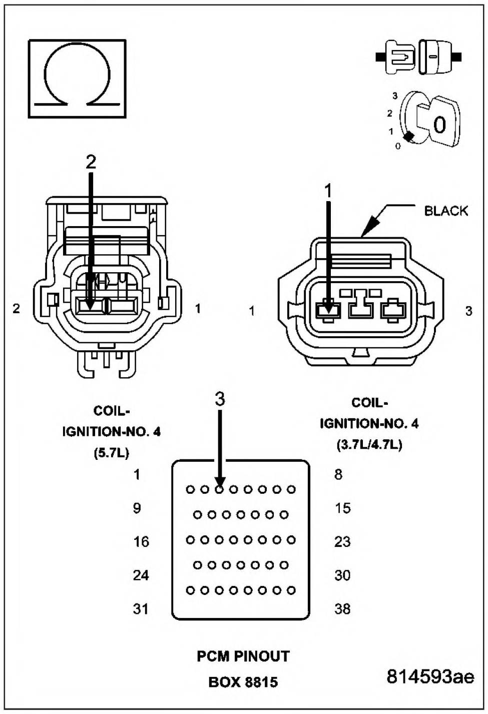
6. (K15) COIL CONTROL NO.4 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K15) Coil Control No.4 circuit from the Coil on Plug harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K15) Coil Control No.4 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

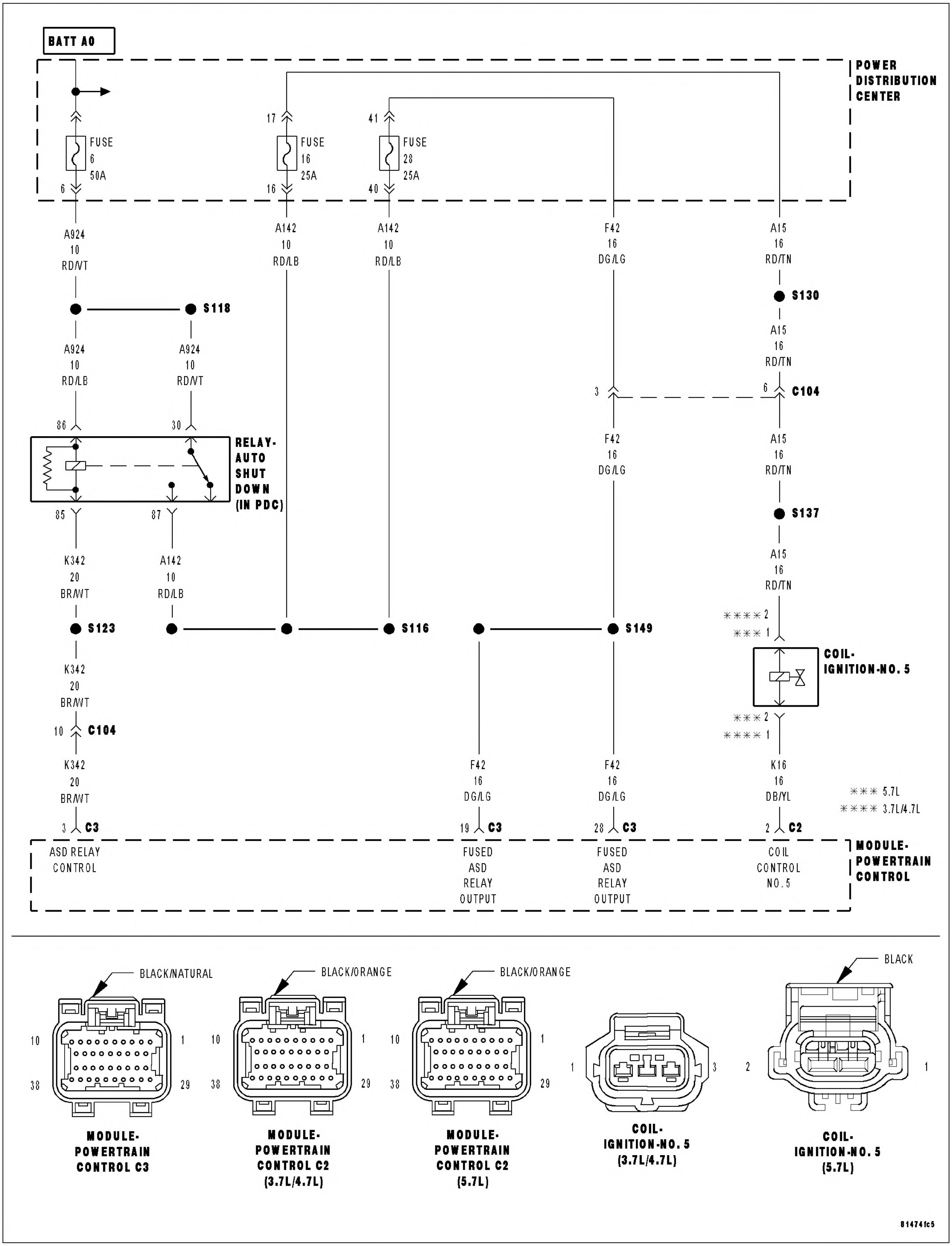
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2314-IGNITION COIL 5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S118
S130
A924 10 RD/LB
A924 10 RD/VT
A15 16 RD/TN
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
F42 16 DG/LG
A15 16 RD/TN
85
87
S137
K342 20 BR/WT
A142 10 RD/LB
A15 16 RD/TN
S123
S116
S149
∗∗∗∗ 2
∗∗∗ 1
COIL-IGNITION-NO. 5
K342 20 BR/WT
∗∗∗ 2
∗∗∗∗ 1
10
C104
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K16 16 DB/YL
∗∗∗ 5.7L
∗∗∗∗ 3.7L/4.7L
3 C3
19 C3
28 C3
2 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO. 5
MODULE-POWERTRAIN CONTROL
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
BLACK/ORANGE
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (5.7L)
1
3
COIL-IGNITION-NO. 5 (3.7L/4.7L)
BLACK
2
1
COIL-IGNITION-NO. 5 (5.7L)
81474fc5

P2314-IGNITION COIL 5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K16) COIL CONTROL NO.5 CIRCUIT OPEN
(K16) COIL CONTROL NO.5 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (A15) ASD RELAY OUTPUT CIRCUIT

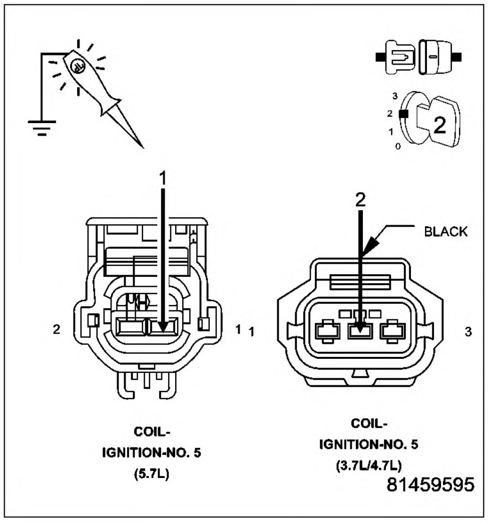
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2314-IGNITION COIL 5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L and 3.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

Yes >> Go To 4

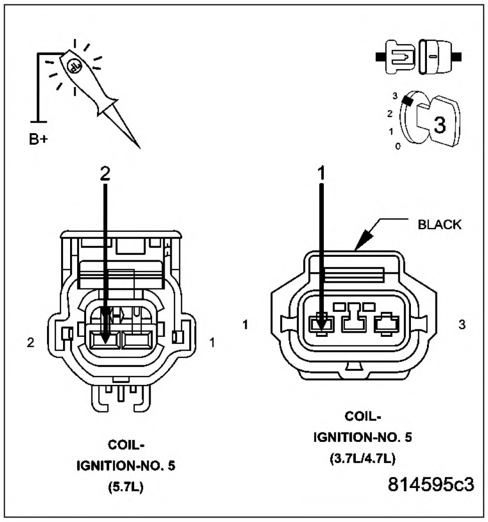
No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K16) Coil Control No.5 circuit.

Crank the engine for 5 seconds while observing the test light.



What is the state of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

OFF constantly.
Go To 6

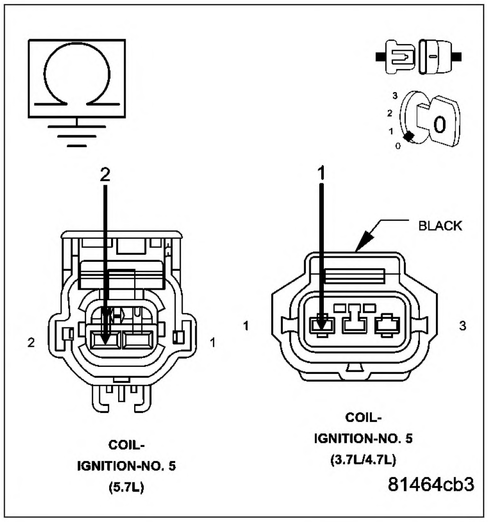
---

5. (K16) COIL CONTROL NO.5 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K16) Coil Control No.5 circuit in the Coil on Plug harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K16) Coil Control No.5 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P2314-IGNITION COIL 5 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

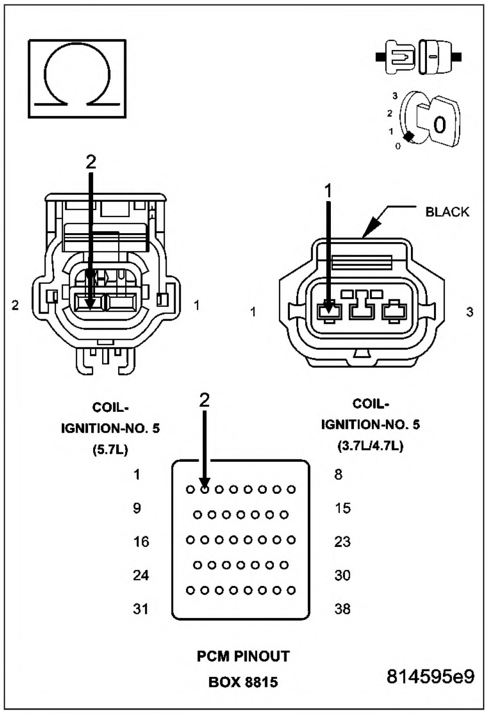
6. (K16) COIL CONTROL NO.5 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K16) Coil Control No.5 circuit from the Coil on Plug harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K16) Coil Control No.5 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

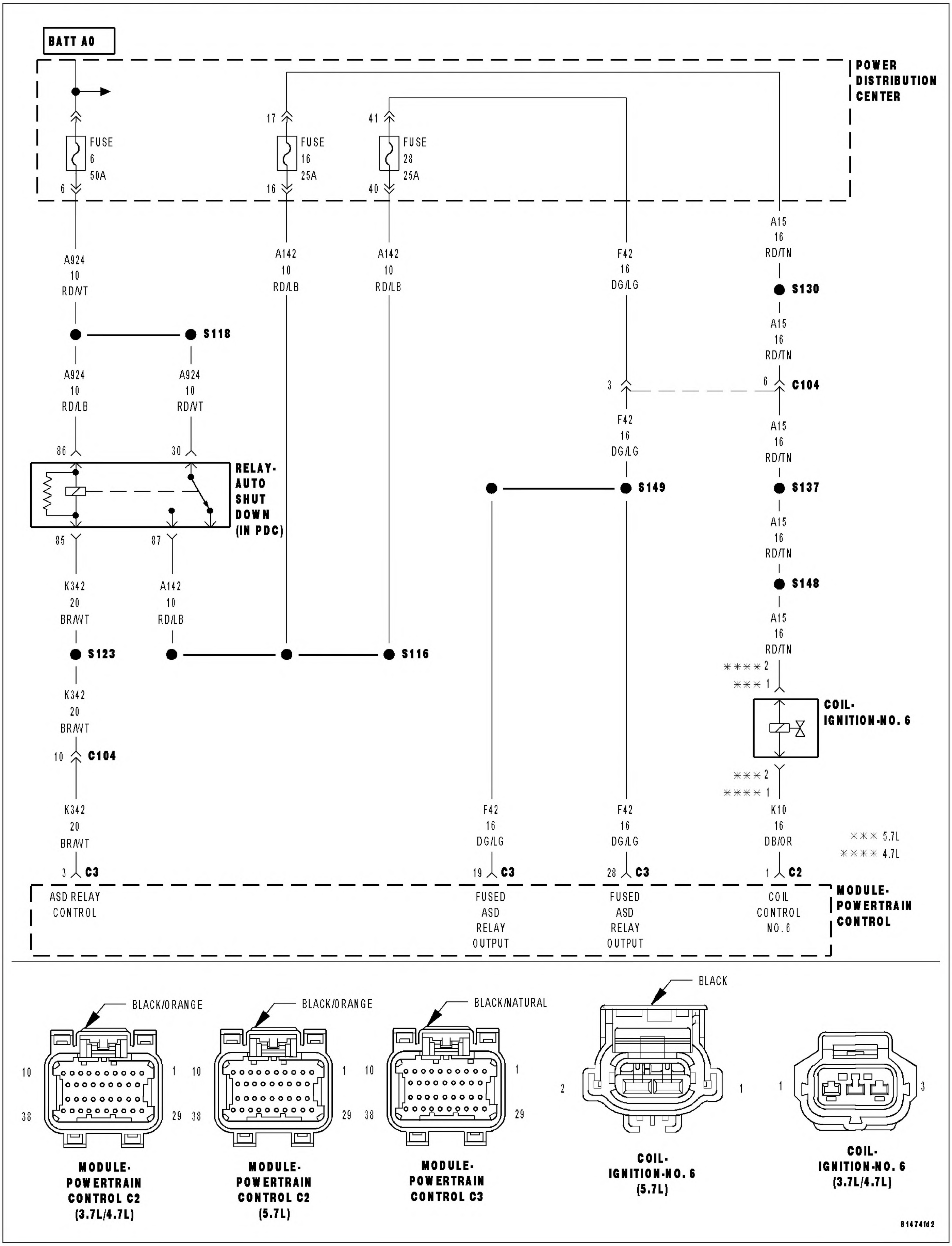
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2317-IGNITION COIL 6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
S118
A924 10 RD/LB
A924 10 RD/VT
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
S149
S137
K342 20 BR/WT
A142 10 RD/LB
S148
S123
S116
∗∗∗∗ 2
∗∗∗ 1
COIL-IGNITION-NO. 6
10
C104
∗∗∗ 2
∗∗∗∗ 1
K342 20 BR/WT
F42 16 DG/LG
K10 16 DB/OR
∗∗∗ 5.7L
∗∗∗∗ 4.7L
3 C3
19 C3
28 C3
1 C2
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO. 6
MODULE-POWERTRAIN CONTROL
BLACK/ORANGE
BLACK/ORANGE
BLACK/NATURAL
BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)
MODULE-POWERTRAIN CONTROL C2 (5.7L)
MODULE-POWERTRAIN CONTROL C3
2
COIL-IGNITION-NO. 6 (5.7L)
3
COIL-IGNITION-NO. 6 (3.7L/4.7L)
81474fd2

P2317-IGNITION COIL 6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K10) COIL CONTROL NO.6 CIRCUIT OPEN
(K10) COIL CONTROL NO.6 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (A15) ASD RELAY OUTPUT CIRCUIT

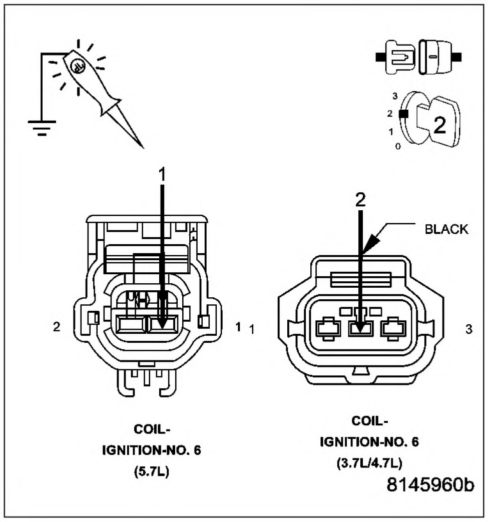
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2317-IGNITION COIL 6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L and 3.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

Yes >> Go To 4

No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K10) Coil Control No.6 circuit.

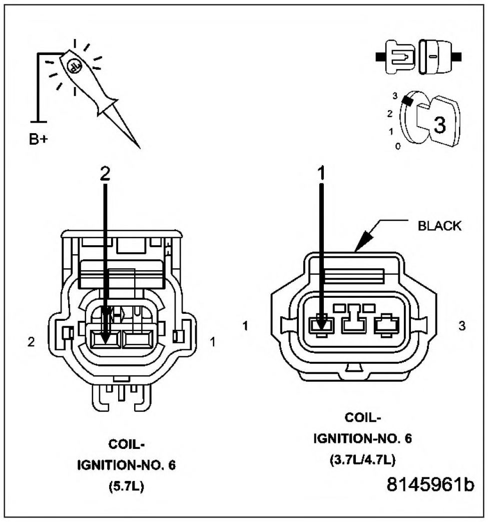
Crank the engine for 5 seconds while observing the test light.

What is the state of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

OFF constantly.
Go To 6



---

5. (K10) COIL CONTROL NO.6 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

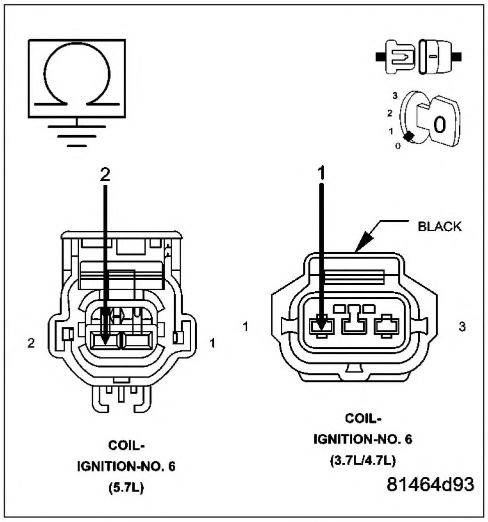
Disconnect the C2 PCM harness connector.

Measure the resistance between ground and the (K10) Coil Control No.6 circuit in the Coil on Plug harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K10) Coil Control No.6 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7



P2317-IGNITION COIL 6 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

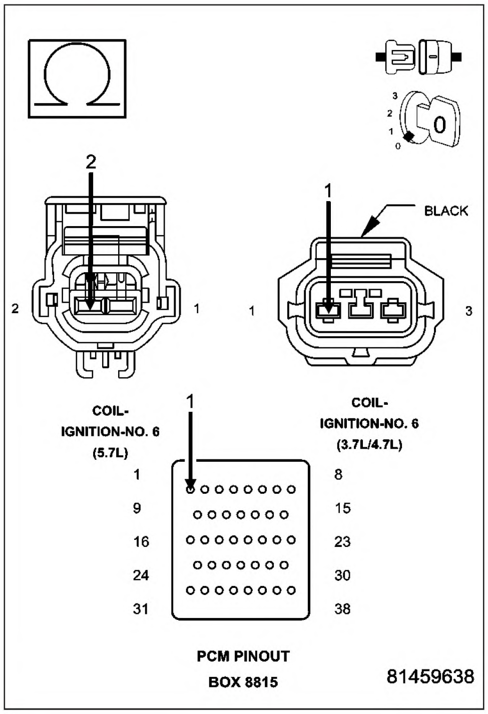
6. (K10) COIL CONTROL NO.6 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C2 PCM harness connectors.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K10) Coil Control No.6 circuit from the Coil on Plug harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K10) Coil Control No.6 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

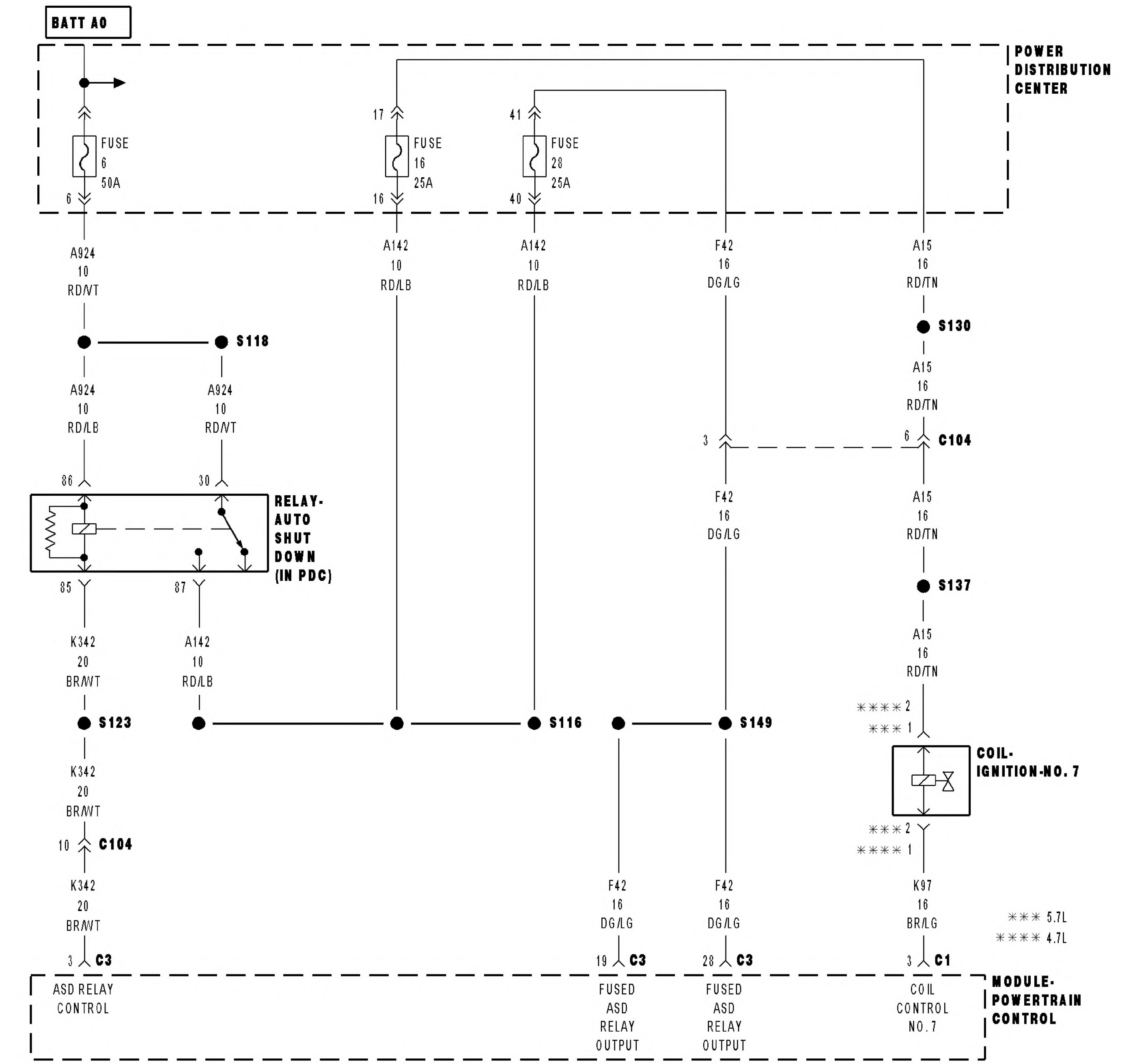
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

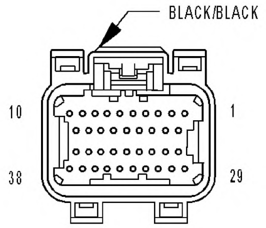
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

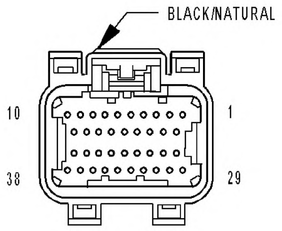
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2320-IGNITION COIL 7 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION

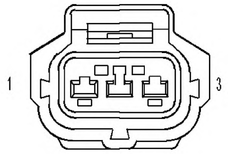

BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S118
S130
A924 10 RD/LB
A924 10 RD/VT
A15 16 RD/TN
3
6
C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
F42 16 DG/LG
A15 16 RD/TN
85
87
S137
K342 20 BR/WT
A142 10 RD/LB
A15 16 RD/TN
S123
S116
S149
∗∗∗∗ 2
∗∗∗ 1
COIL-IGNITION-NO. 7
K342 20 BR/WT
∗∗∗ 2
∗∗∗∗ 1
10
C104
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K97 16 BR/LG
∗∗∗ 5.7L
∗∗∗∗ 4.7L
3 C3
19 C3
28 C3
3 C1
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO. 7
MODULE-POWERTRAIN CONTROL


BLACK/BLACK
10
1
38
29

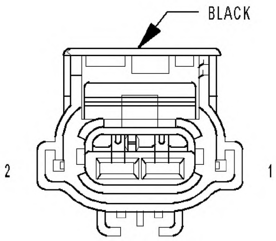
MODULE-POWERTRAIN CONTROL C1


BLACK/NATURAL
10
1
38
29

MODULE-POWERTRAIN CONTROL C3



COIL-IGNITION-NO. 7 (4.7L)



COIL-IGNITION-NO. 7 (5.7L)

8147502d

P2320-IGNITION COIL 7 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K97) COIL CONTROL NO.7 CIRCUIT OPEN
(K97) COIL CONTROL NO.7 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (A15) ASD RELAY OUTPUT CIRCUIT

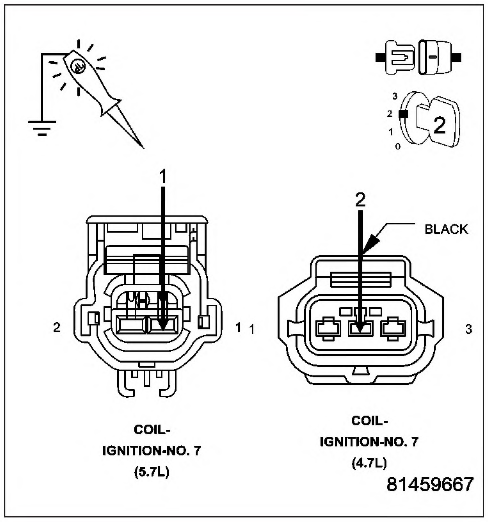
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2320-IGNITION COIL 7 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

Yes >> Go To 4

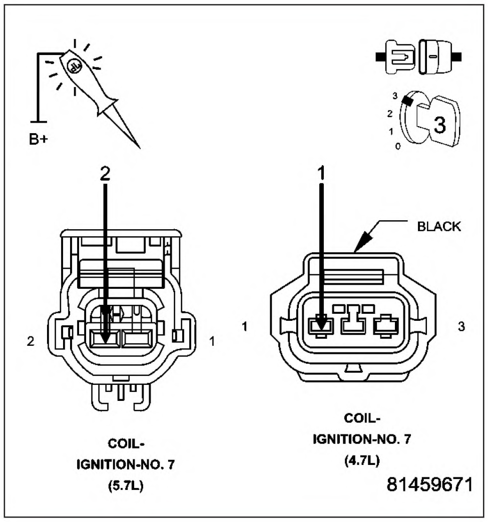
No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K97) Coil Control No.7 circuit.

Crank the engine for 5 seconds while observing the test light.



What is the state of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

OFF constantly.
Go To 6

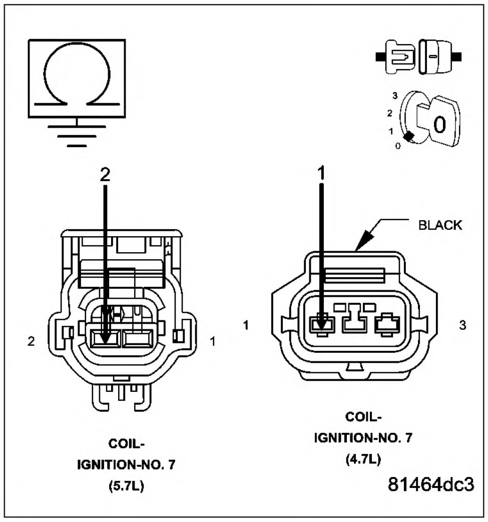
---

5. (K97) COIL CONTROL NO.7 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (K97) Coil Control No.7 circuit in the Coil on Plug harness connector.



Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K97) Coil Control No.7 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

P2320-IGNITION COIL 7 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

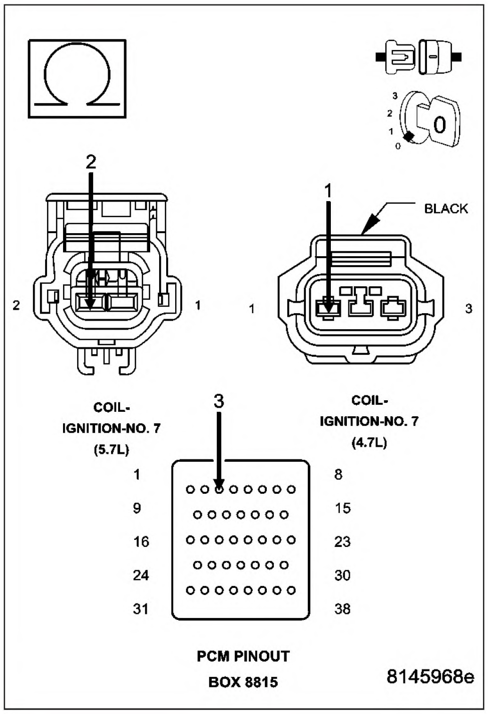
6. (K97) COIL CONTROL NO.7 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K97) Coil Control No.7 circuit from the Coil on Plug connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K97) Coil Control No.7 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

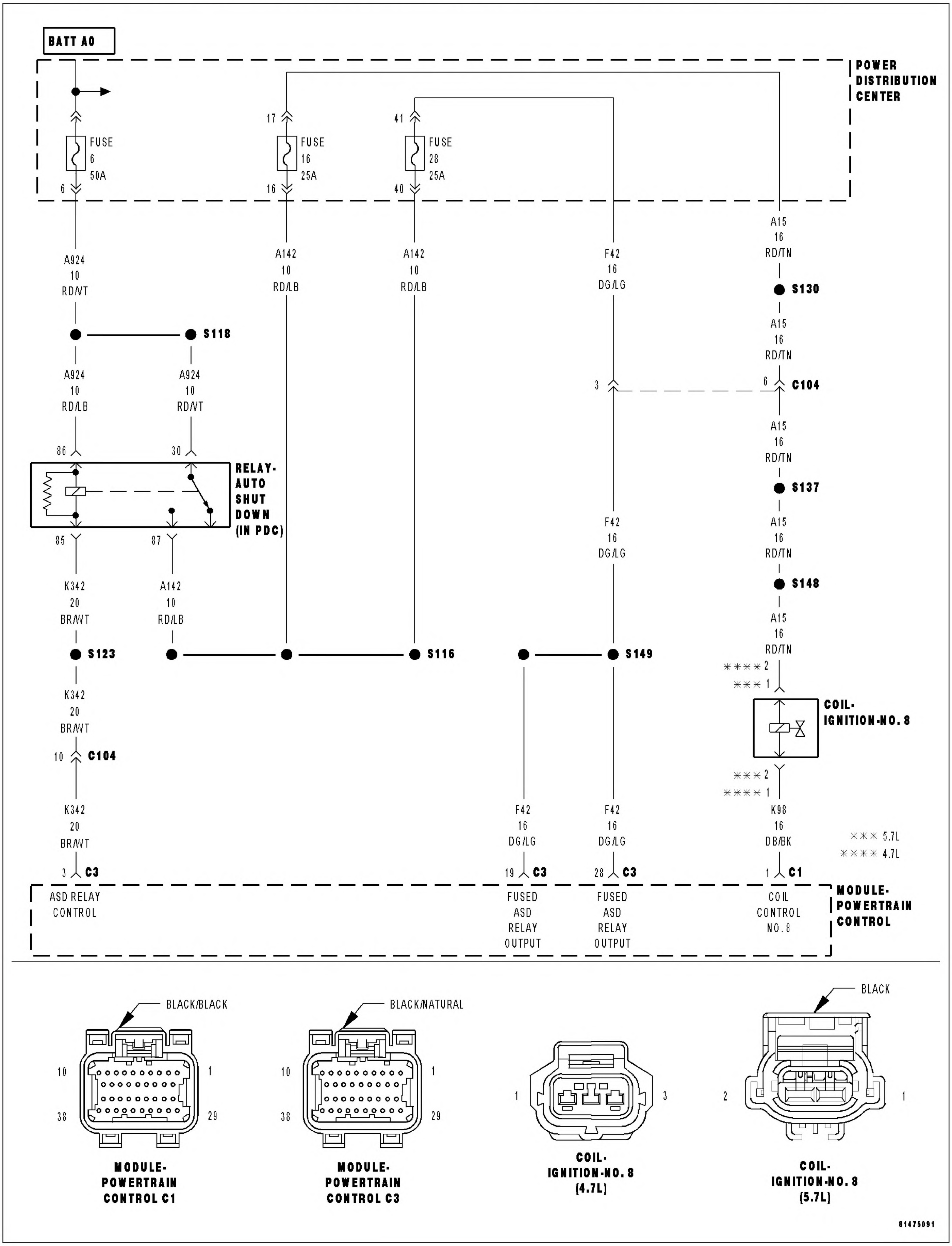
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2323-IGNITION COIL 8 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
17
FUSE 16 25A
16
41
FUSE 28 25A
40
A924 10 RD/VT
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S130
A15 16 RD/TN
S118
A924 10 RD/LB
A924 10 RD/VT
3
6
C104
A15 16 RD/TN
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
S137
A15 16 RD/TN
F42 16 DG/LG
85
87
S148
K342 20 BR/WT
A142 10 RD/LB
A15 16 RD/TN
S123
S116
S149
****2
***1
COIL-IGNITION-NO. 8
K342 20 BR/WT
10
C104
***2
****1
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
K98 16 DB/BK
*** 5.7L
**** 4.7L
3 C3
19 C3
28 C3
1 C1
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
COIL CONTROL NO. 8
MODULE-POWERTRAIN CONTROL
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
1
3
COIL-IGNITION-NO. 8 (4.7L)
BLACK
2
1
COIL-IGNITION-NO. 8 (5.7L)
81475091

P2323-IGNITION COIL 8 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Engine running and battery voltage greater than 10 volts.
- **Set Condition:**
  If PCM detects that the secondary ignition burn time is incorrect, too short, or not present, an error is detected. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
(A15) ASD RELAY OUTPUT CIRCUIT
(K98) COIL CONTROL NO.8 CIRCUIT OPEN
(K98) COIL CONTROL NO.8 CIRCUIT SHORTED TO GROUND
COIL ON PLUG
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. (A15) ASD RELAY OUTPUT CIRCUIT

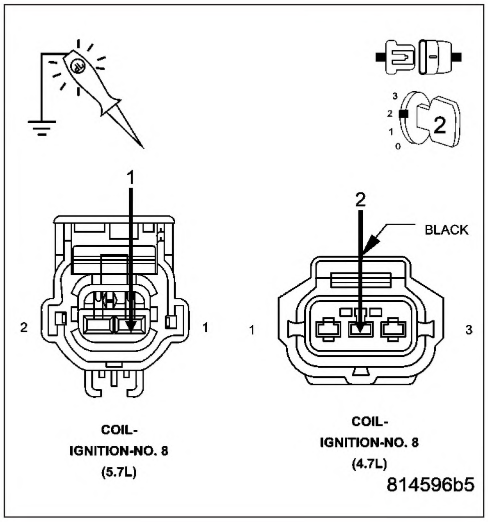
Turn the ignition off.

Disconnect the Coil on Plug harness connector.

Ignition on, engine not running.

With a scan tool, actuate the ASD Relay.

Using a 12-volt test light connected to ground, probe the (A15) ASD Relay Output circuit in the Coil on Plug harness connector.



Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the open or short to ground in the (A15) ASD Relay Output circuit between the IPM and Coil harness connector.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

NOTE: Stop All Actuations.

P2323-IGNITION COIL 8 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

3. COIL ON PLUG RESISTANCE

Turn the ignition off.

NOTE: The following resistance measurement should be taken at 70°-80° F.

Measure the resistance of the Coil on Plug.

4.7L Primary Ignition Coil resistance is 0.6 to 0.9 of an ohm at 77°F (25°C).

5.7L Primary Ignition Coil resistance is 0.558 to 0.682 of an ohm at 77°F (25°C).

Is the resistance within the given specification for the Ignition Coil being tested?

Yes >> Go To 4

No >> Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. IGNITION COIL

Using a 12-volt test light connected to a 12-volt source, probe the (K98) Coil Control No.8 circuit.

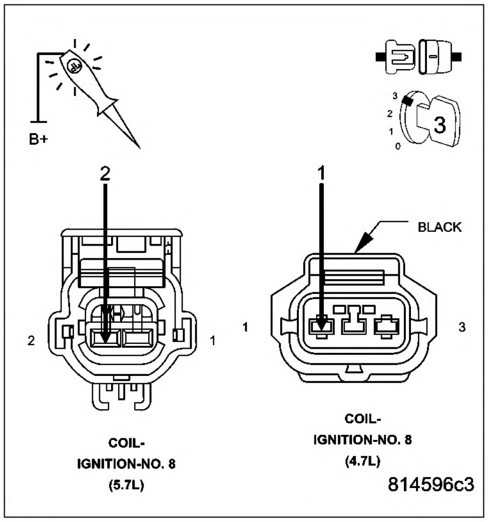
Crank the engine for 5 seconds while observing the test light.

What is the state of the test light while cranking the engine?

Brightly blinking.
Replace the Coil on plug.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

ON constantly.
Go To 5

OFF constantly.
Go To 6



---

5. (K98) COIL CONTROL NO.8 CIRCUIT SHORTED TO GROUND

Turn the ignition off.

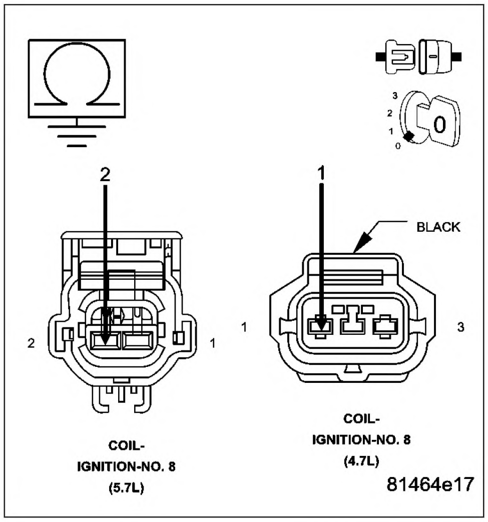
Disconnect the C1 PCM harness connector.

Measure the resistance between ground and the (K98) Coil Control No.8 circuit in the Coil on Plug harness connector.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K98) Coil Control No.8 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7



P2323-IGNITION COIL 8 SECONDARY CIRCUIT- INSUFFICIENT IONIZATION (CONTINUED)

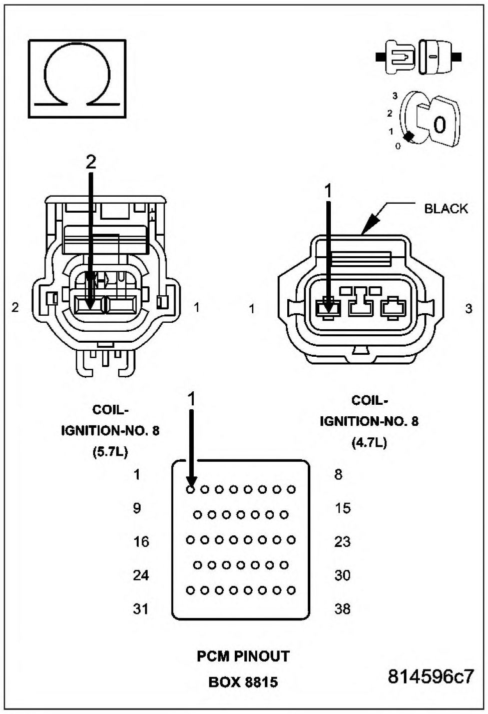
6. (K98) COIL CONTROL NO.8 CIRCUIT OPEN

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K98) Coil Control No.8 circuit from the Coil on Plug harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K98) Coil Control No.8 circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

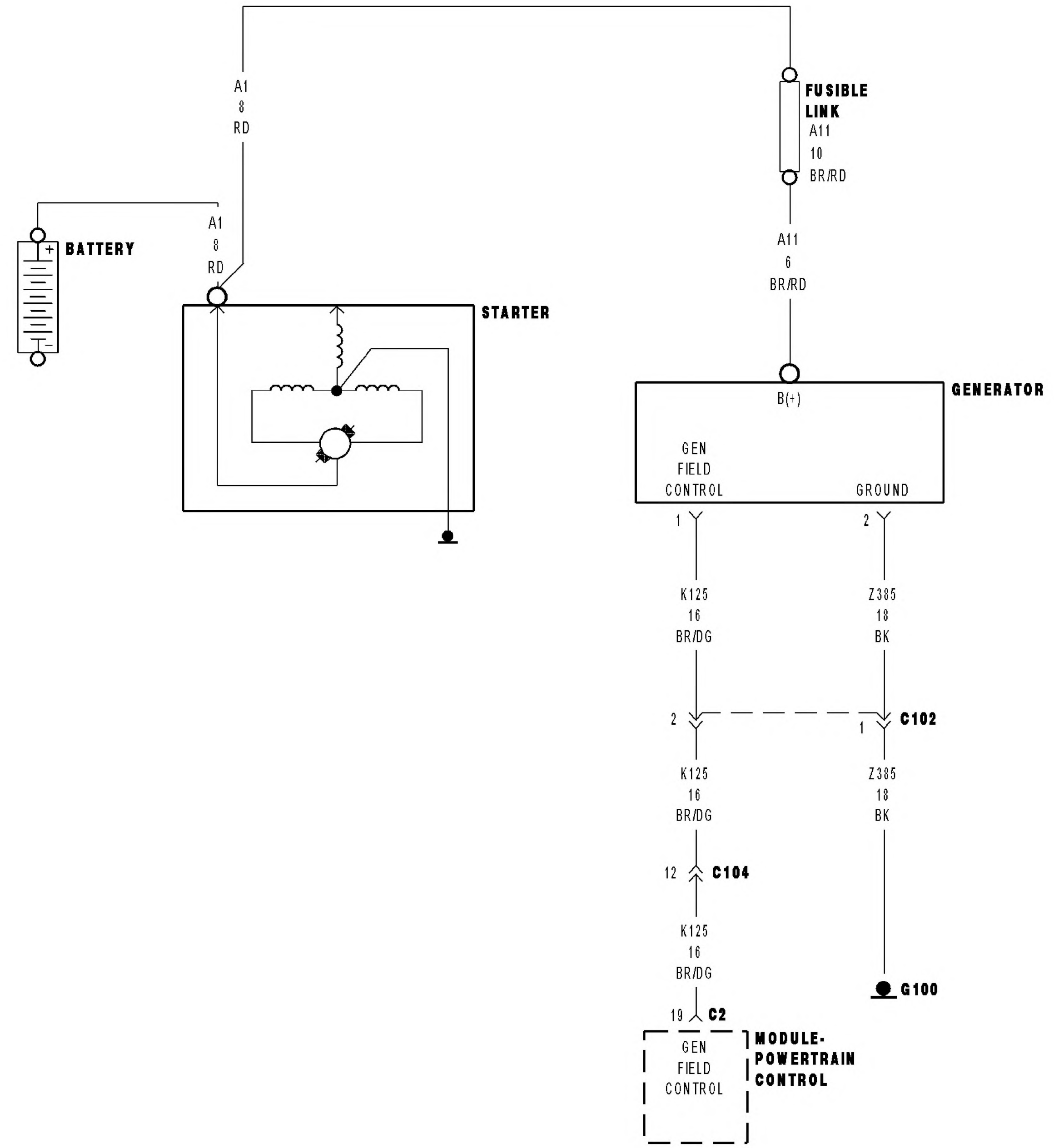
Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

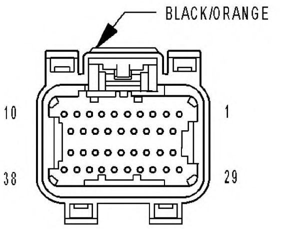
Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

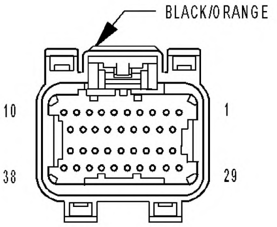
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2503-CHARGING SYSTEM OUTPUT LOW

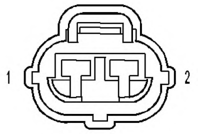

A1
8
RD
FUSIBLE
LINK
A11
10
BR/RD
BATTERY
A1
8
RD
A11
6
BR/RD
STARTER
B(+)
GENERATOR
GEN
FIELD
CONTROL
GROUND
1
2
K125
16
BR/DG
Z385
18
BK
2
1
C102
K125
16
BR/DG
Z385
18
BK
12
C104
K125
16
BR/DG
G100
19
C2
GEN
FIELD
CONTROL
MODULE-
POWERTRAIN
CONTROL


BLACK/ORANGE
10
1
38
29

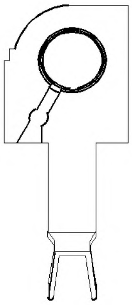
MODULE-POWERTRAIN CONTROL C2 (5.7L)


BLACK/ORANGE
10
1
38
29

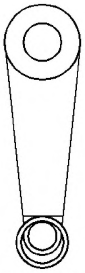
MODULE-POWERTRAIN CONTROL C2 (3.7L/4.7L)



GENERATOR (GAS)



BATTERY-POSITIVE (GAS)



GENERATOR EYELET (GAS)

81472f3e

P2503-CHARGING SYSTEM OUTPUT LOW (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The engine running. The engine speed greater than 1157 RPM.
- **Set Condition:**
  The battery sensed voltage is 1 volt below the charging goal for 13.47 seconds. The PCM senses the battery voltage turns off the field driver and senses the battery voltage again. If the voltages are the same, the code is set. One Trip Fault. Three good trips to turn off the MIL.

Possible Causes
EXCESSIVE RESISTANCE IN THE BATTERY POSITIVE CIRCUIT
EXCESSIVE RESISTANCE IN THE CASE GROUND
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO VOLTAGE
(K125) GEN FIELD CONTROL CIRCUIT OPEN
(K125) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND
(Z385) GEN GROUND CIRCUIT OPEN
GENERATOR
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.

Ignition on, engine not running.

NOTE: The battery must be fully charged.

NOTE: The Generator belt tension and condition must be checked before continuing.

With a scan tool, read DTCs.

With a scan tool, erase DTCs.

Start the engine.

Allow the idle to stabilize.

Ignition on, engine not running.

With the scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2503-CHARGING SYSTEM OUTPUT LOW (CONTINUED)

2. (A11) FUSED B+ CIRCUIT HIGH RESISTANCE

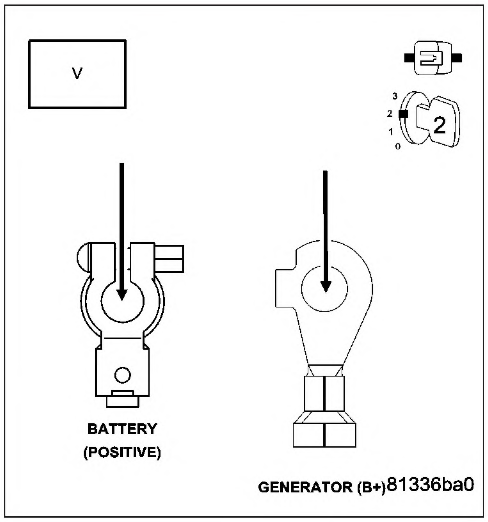
WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Ignition on, engine not running.

NOTE: Make sure all wires are clear of the engine's moving parts.

Measure the voltage between the (A11) Generator B+ Output Terminal and the Battery+ Post.

Start the engine.



Is the voltage above 0.4 of a volt?

Yes >> Repair the excessive resistance in the (A11) Battery positive circuit between the Generator and Battery.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. EXCESSIVE RESISTANCE IN THE CASE GROUND

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Start the engine.

Warm the engine to operating temperature.

NOTE: Make sure all wires are clear of the engine's moving parts.

Measure the voltage between the Generator Case and Battery ground post.

Is the voltage above 0.1 of a volt?

Yes >> Repair the excessive resistance in the Generator Case Ground.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. GENERATOR OPERATION

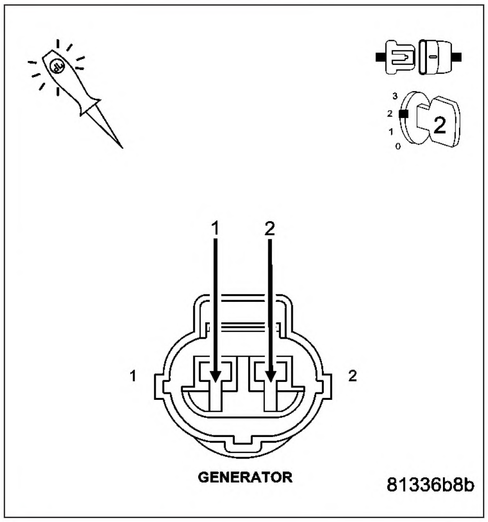
Turn the ignition off.

Disconnect the Generator Field harness connector.

Using a 12-volt test light, jump across the Generator Field harness connector.

Ignition on, engine not running.

With a scan tool, actuate the Generator Field Driver.



Does the test light illuminate brightly and flash on and off?

Yes >> Replace the Generator.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

P2503-CHARGING SYSTEM OUTPUT LOW (CONTINUED)

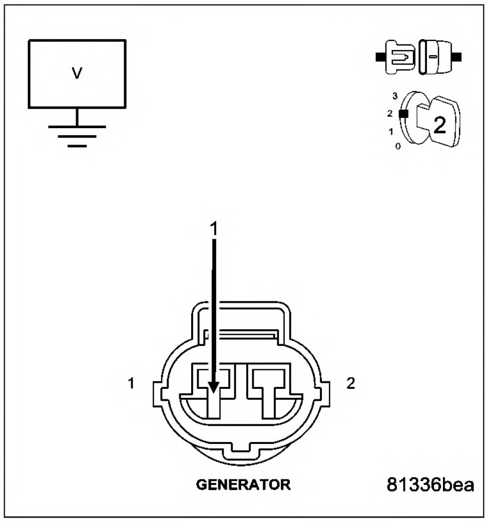
5. (K125) GEN FIELD CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K125) Gen Field Control circuit in the Generator Field harness connector.



Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K125) Gen Field Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 6

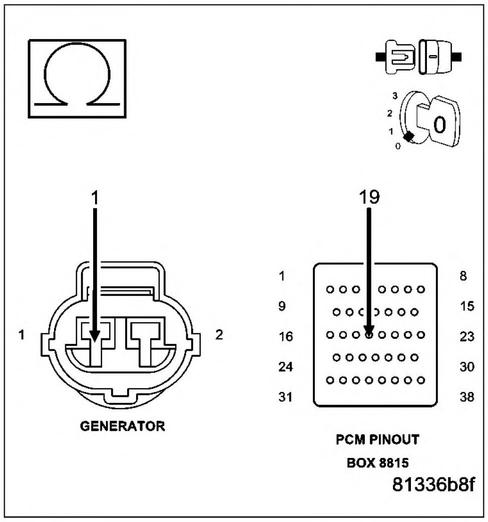
---

6. (K125) FIELD CONTROL CIRCUIT OPEN

Turn the ignition off.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K125) Gen Field Control circuit from the Generator Field harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

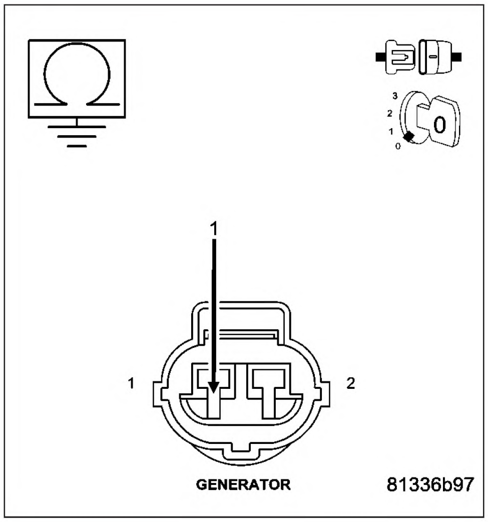
No >> Repair the open in the (K125) Gen Field Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P2503-CHARGING SYSTEM OUTPUT LOW (CONTINUED)

7. (K125) GEN FIELD CONTROL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K125) Gen Field Control circuit in the Generator Field harness connector.



Is the resistance below 100 ohms?

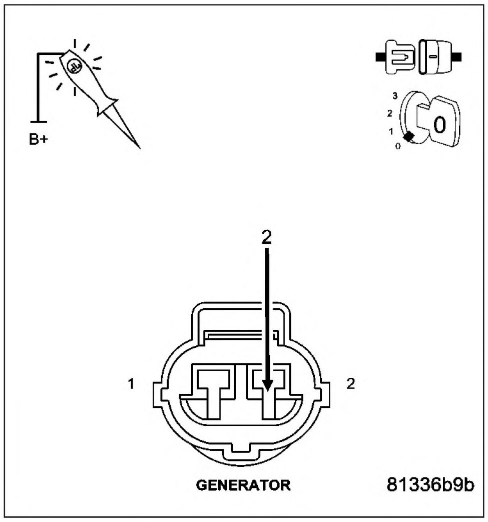
Yes >> Repair the short to ground in the (K125) Gen Field Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

---

8. (Z385) GROUND CIRCUIT OPEN

Using a 12-volt test light connected to battery voltage, probe the (Z385) Ground circuit in the Generator Field harness connector.



Does the test light illuminate brightly?

Yes >> Go To 9

No >> Repair the open in the (Z385) Generator Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3400-MDS RATIONALITY BANK 1

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  O2 sensor readings on Bank 1 side indicate a lean condition while in 4 cylinder mode.

Possible Causes
INSUFFICIENT OIL PRESSURE ACTING ON THE LIFTER LOCKING PINS
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

NOTE: Diagnose any Oil Pressure DTCs before continuing.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. MDS SOLENOID 1

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Turn the ignition on.

With the scan tool actuate the MDS Solenoid 1.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 3

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 1. If the passages are not clogged with debris, replace the MDS Solenoid 1.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3400-MDS RATIONALITY BANK 1 (CONTINUED)

3. MDS SOLENOID 7

With the scan tool actuate the MDS Solenoid 7.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 4

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are restricted, clean the passages and replace the MDS Solenoid 7. If the passages are not clogged with debris, replace the MDS Solenoid 7.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 1 of the engine block.

Remove the Bank 1 Cylinder Head per Service Information.

Remove the Lifters from the left engine bank.

Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

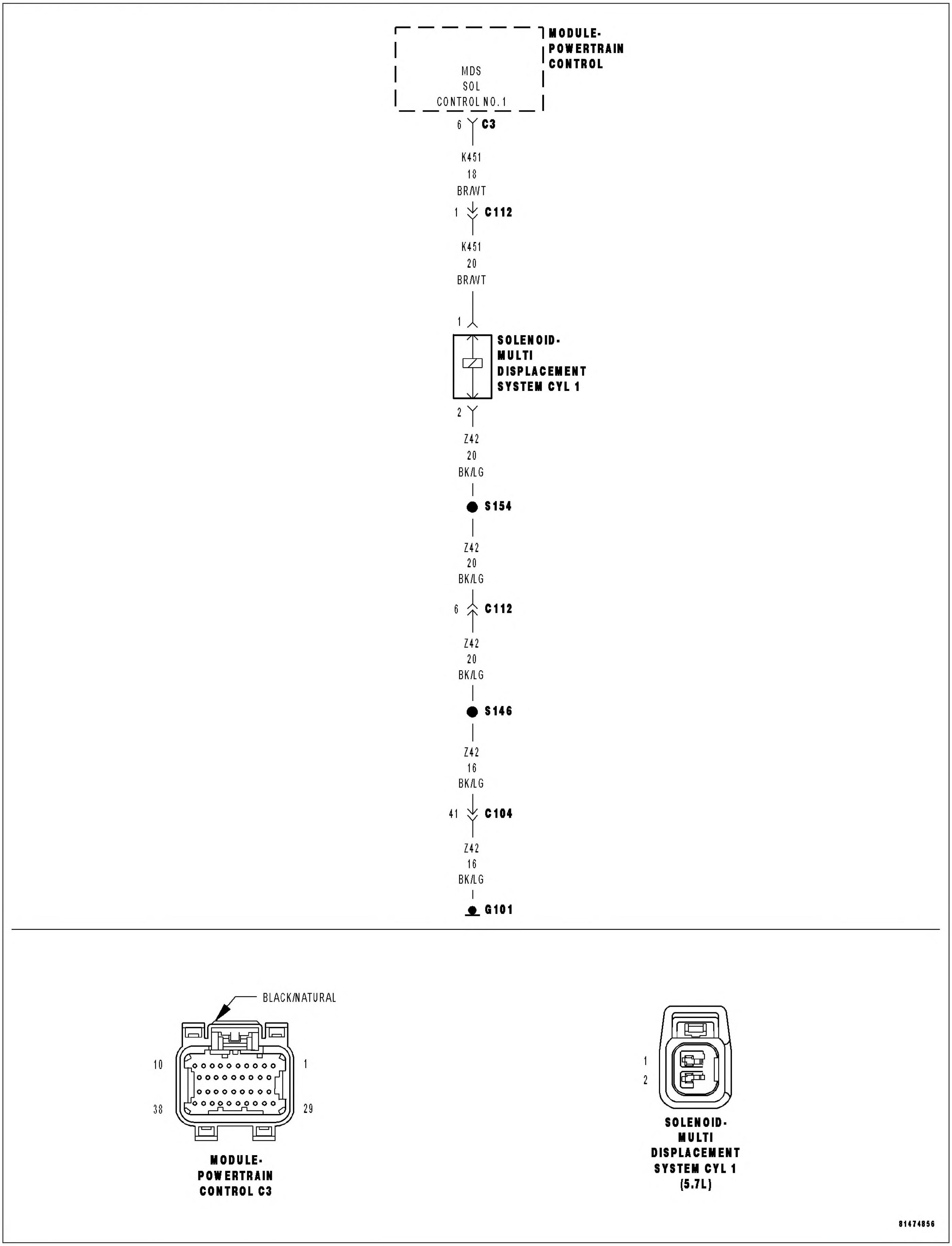
Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3401-MDS SOLENOID 1 CIRCUIT


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 1
6
C3
K451
18
BR/WT
1
C112
K451
20
BR/WT
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
(5.7L)
81474856

P3401-MDS SOLENOID 1 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  When the PCM recognizes a problem with the Solenoid Control circuit.

Possible Causes
(K451) MDS SOLENOID NO.1 CONTROL SHORT TO BATTERY VOLTAGE
(K451) MDS SOLENOID NO.1 CONTROL SHORT TO GROUND
(K451) MDS SOLENOID NO.1 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
MDS SOLENOID NO.1
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

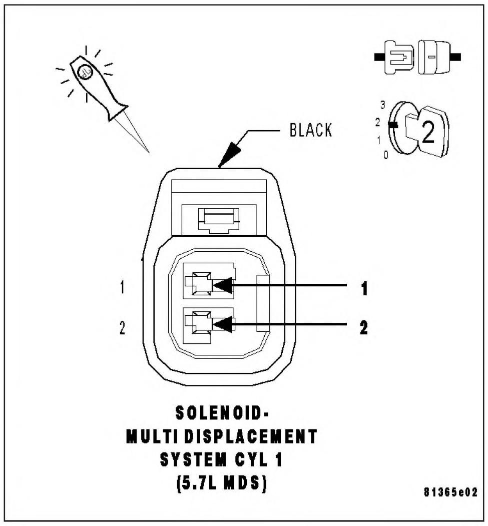
Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3401-MDS SOLENOID 1 CIRCUIT (CONTINUED)

2. MDS SOLENOID NO.1


BLACK
3
2
1
0
2
1
2
1
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365e02

Turn the ignition off.

Gain access to the MDS Solenoid No.1.

Disconnect the MDS Solenoid No.1 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) Ground circuit, probe the (K451) MDS Solenoid No.1 Control circuit.

With a scan tool, actuate the MDS Solenoid 1.

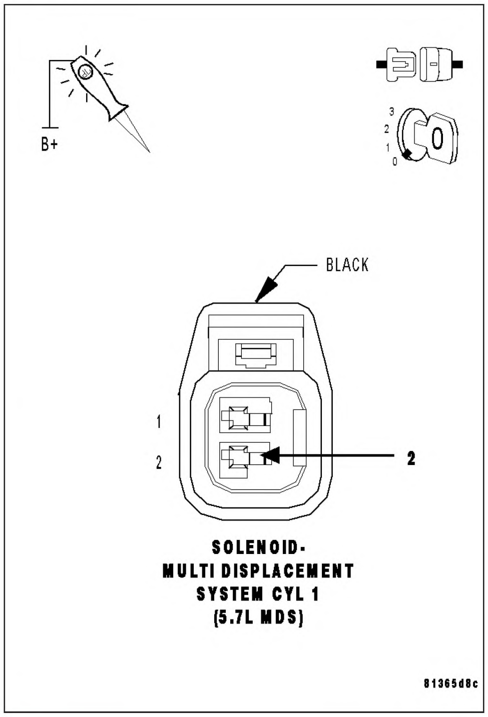
Does the 12-volt test light flash on and off?

Yes >> Replace the MDS Solenoid No.1.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN


B+
3
2
1
0
0
BLACK
1
2
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365d8c

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.1 harness connector.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

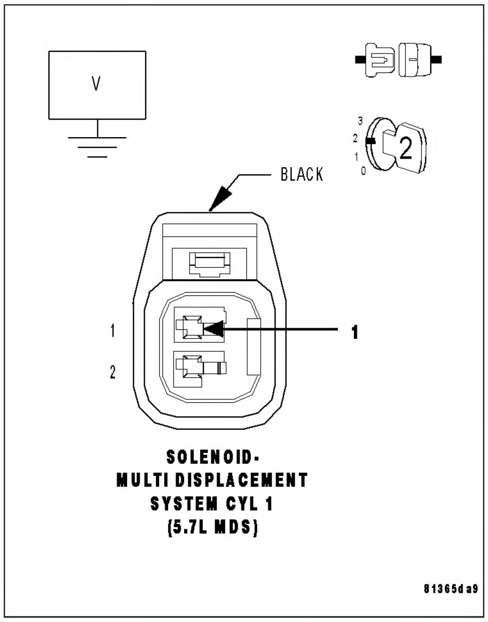
P3401-MDS SOLENOID 1 CIRCUIT (CONTINUED)

4. (K451) MDS SOLENOID NO.1 CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K451) MDS Solenoid No.1 Control circuit in the MDS Solenoid No.1 connector.


V
3
2
1
0
2
BLACK
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365da9

Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K451) MDS Solenoid No.1 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

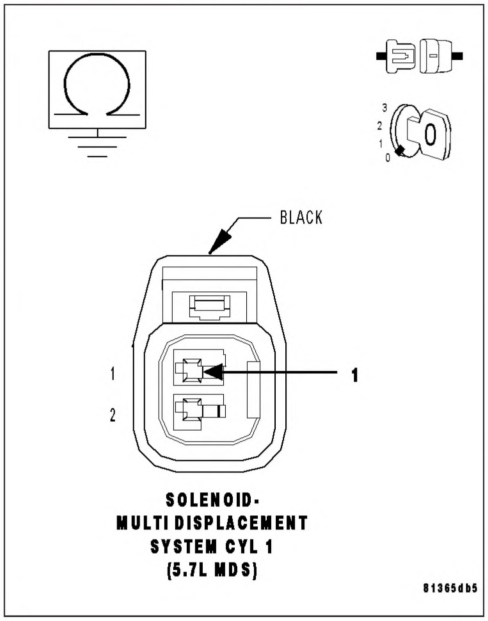
No >> Go To 5

---

5. (K451) MDS SOLENOID NO.1 CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (K451) MDS Solenoid No.1Control circuit in the MDS Solenoid No.1 harness connector.


3
2
1
0
0
BLACK
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365db5

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K451) MDS Solenoid No.1 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

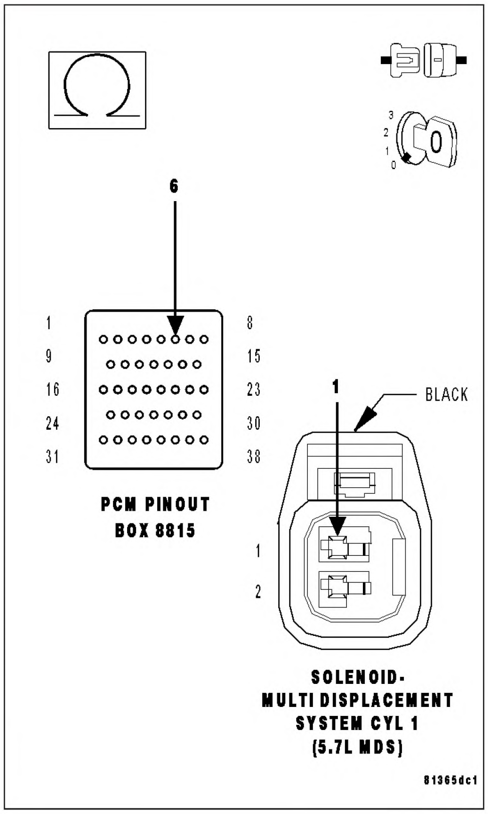
No >> Go To 6

P3401-MDS SOLENOID 1 CIRCUIT (CONTINUED)

6. (K451) MDS SOLENOID NO.1 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K451) MDS Solenoid No.1 Control circuit from the MDS Solenoid No.1 harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K451) MDS Solenoid No.1 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

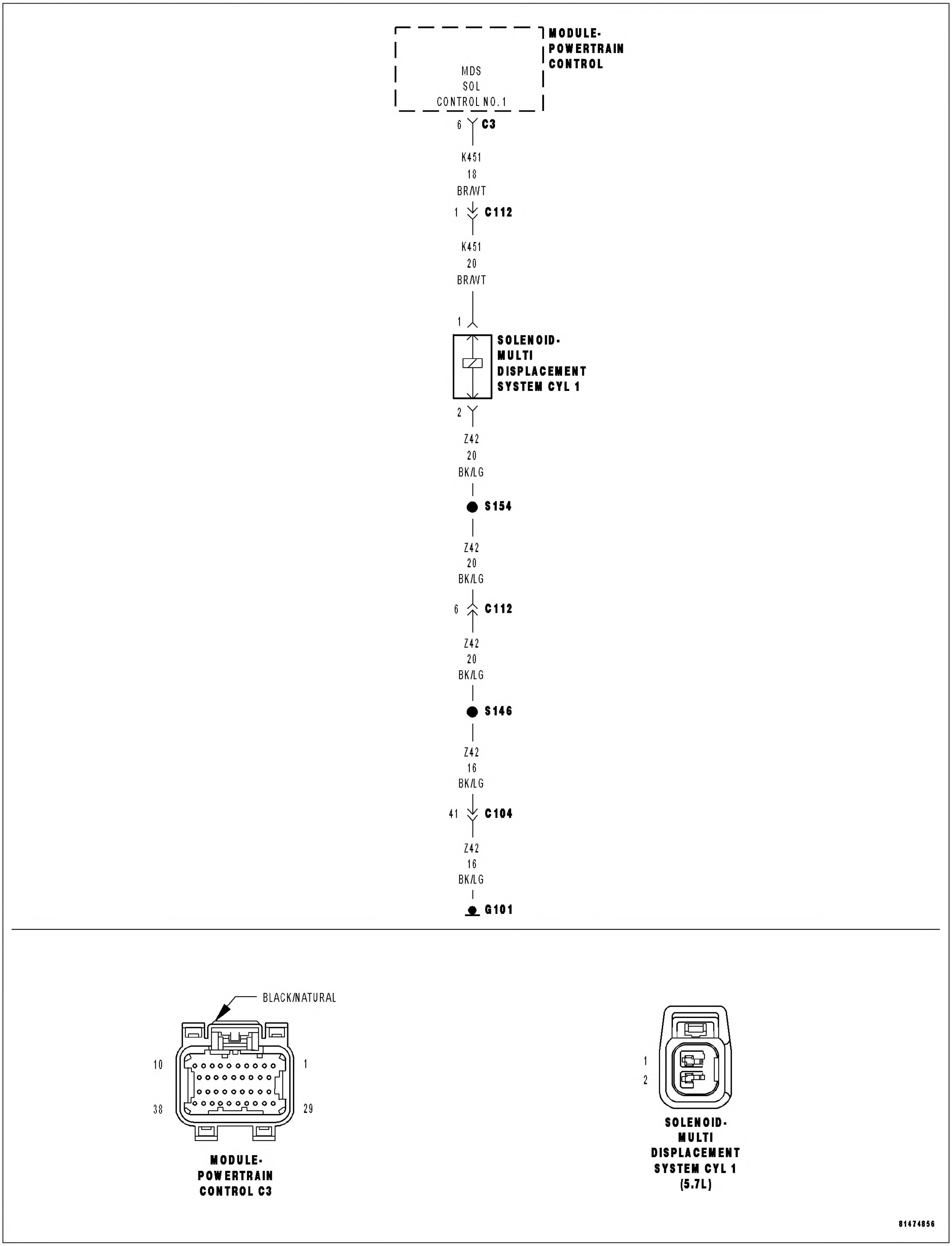
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3402–CYLINDER 1 DEACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 1
6
C3
K451
18
BR/WT
1
C112
K451
20
BR/WT
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 1
(5.7L)
81474856

P3402–CYLINDER 1 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to disengage for cylinder 1.

Possible Causes
(K451) MDS SOLENOID NO.1 CONTROL SHORT TO VOLTAGE
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.1
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. MDS SOLENOID NO.1 CONTROL CIRCUIT

Turn the ignition off.

Disconnect the MDS Solenoid No.1 harness connector.

Ignition on, engine not running.

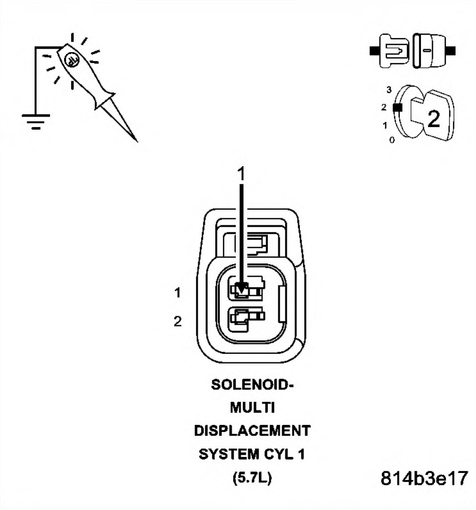
Turn off all accessories.

Using a 12-volt test light connected to ground, probe the (K451) MDS Solenoid No.1 Control circuit.

Does the 12-volt test light illuminate?

Yes >> Go To 3

No >> Go To 4



P3402–CYLINDER 1 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

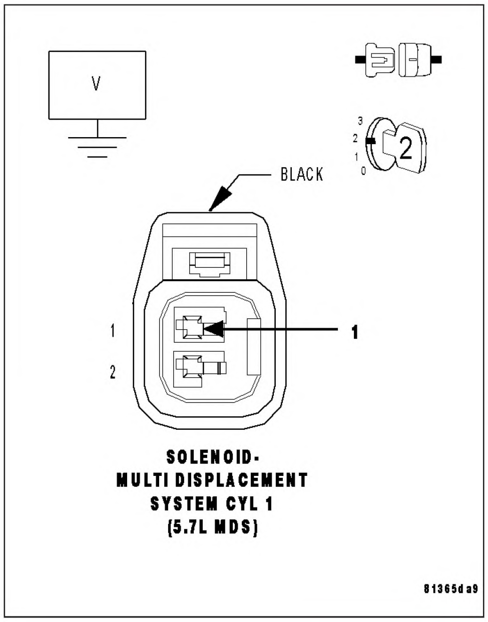
3. (K451) MDS SOLENOID NO.1 CONTROL CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Turn the ignition on.

Measure the volage on (K451) MDS Solenoid No.1 Control circuit in the MDS Solenoid No.1 harness connector.


V
BLACK
3
2
1
0
2
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 1
(5.7L MDS)
81365da9

Is voltage present?

Yes >> Repair the short to voltage in the (K451) MDS Solenoid No.1 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >>

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

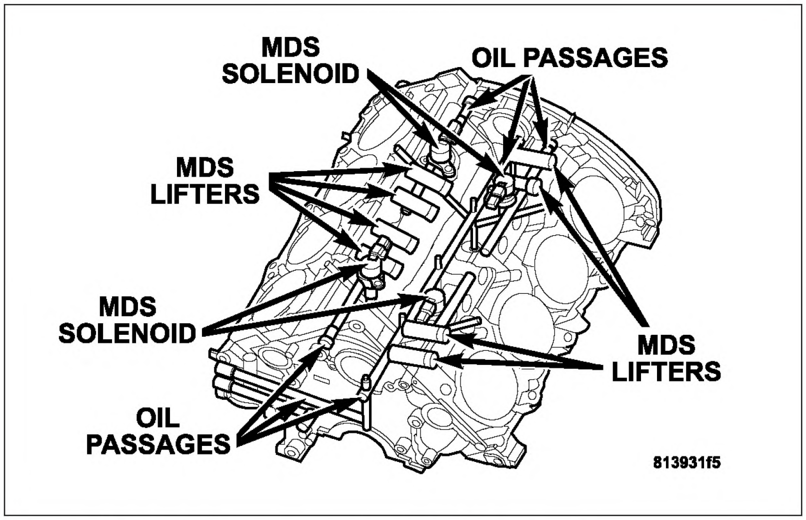
4. MDS SOLENOID 1

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Turn the ignition on.

With the scan tool actuate the MDS Solenoid 1.


MDS SOLENOID
OIL PASSAGES
MDS LIFTERS
MDS SOLENOID
MDS LIFTERS
OIL PASSAGES
813931f5

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 5

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 1. If the passages are not clogged with debris, replace the MDS Solenoid 1.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3402–CYLINDER 1 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

5. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 1 of the engine block.

Remove the Bank 1 Cylinder Head per Service Information.

Remove the Lifters from the left engine bank.

Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

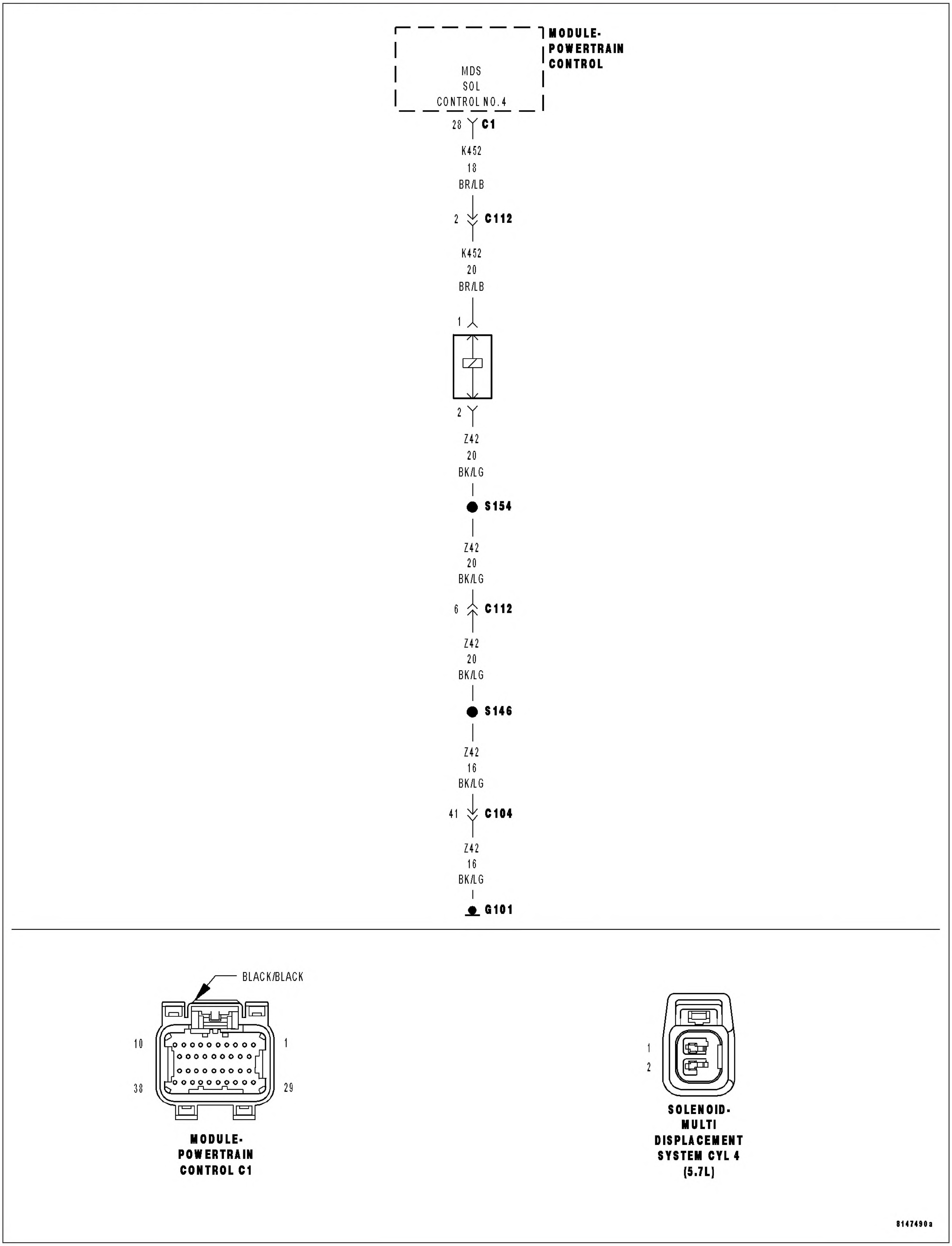
Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3425-MDS SOLENOID 4 CIRCUIT


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO.4
28
C1
K452
18
BR/LB
2
C112
K452
20
BR/LB
1
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 4
(5.7L)
8147490a

P3425-MDS SOLENOID 4 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  When the PCM recognizes a problem with the Solenoid Control circuit.

Possible Causes
(K452) MDS SOLENOID NO.4 CONTROL SHORT TO BATTERY VOLTAGE
(K452) MDS SOLENOID NO.4 CONTROL SHORT TO GROUND
(K452) MDS SOLENOID NO.4 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
MDS SOLENOID NO.4
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3425-MDS SOLENOID 4 CIRCUIT (CONTINUED)

2. MDS SOLENOID NO.4

Turn the ignition off.

Gain access to the MDS Solenoid No. 4.

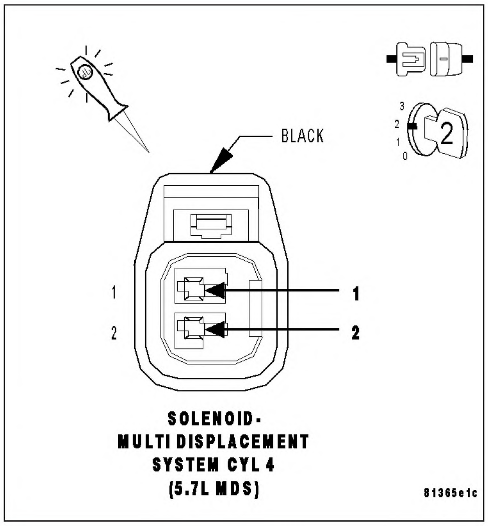
Disconnect the MDS Solenoid No.4 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) Ground circuit, probe the (K452) MDS Solenoid No.4 Control circuit.

With a scan tool, actuate the MDS Solenoid 4.


BLACK
3
2
1
0
2
1
2
1
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e1c

Does the 12-volt test light flash on and off?

Yes >> Replace the MDS Solenoid No.4.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

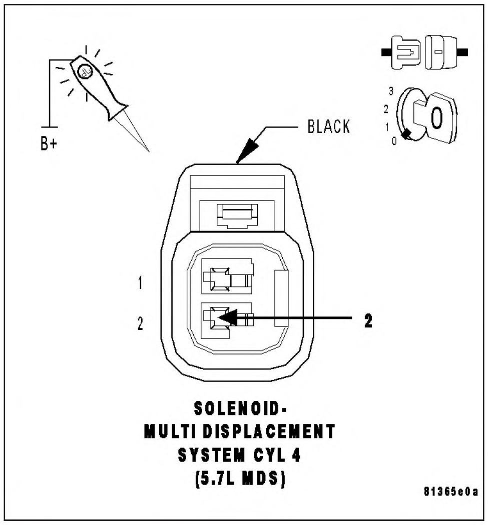
No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.4 harness connector.


B+
BLACK
3
2
1
0
0
1
2
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e0a

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

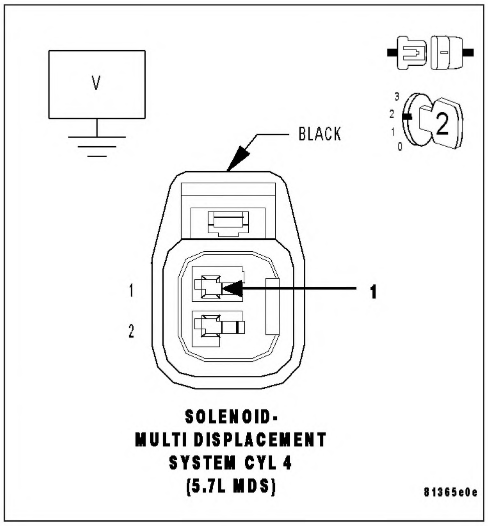
P3425-MDS SOLENOID 4 CIRCUIT (CONTINUED)

4. (K452) MDS SOLENOID NO.4 CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C1 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K452) MDS Solenoid No.4 Control circuit in the MDS Solenoid No.4 harness connector.


V
BLACK
3
2
1
0
2
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e0e

Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K452) MDS Solenoid No.4 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

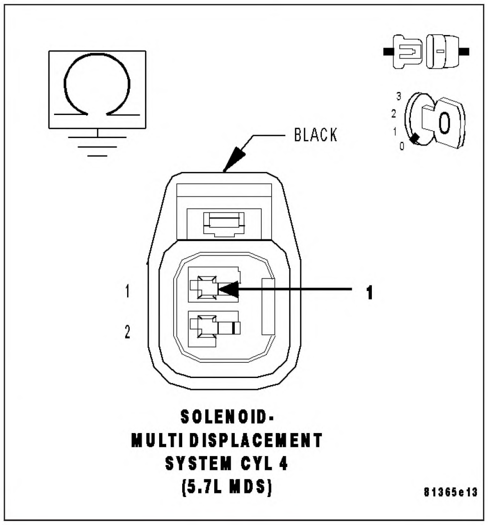
No >> Go To 5

---

5. (K452) MDS SOLENOID NO.4 CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (K452) MDS Solenoid No.4 Control circuit in the MDS Solenoid No.4 harness connector.


BLACK
3
2
1
0
0
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e13

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K452) MDS Solenoid No.4 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

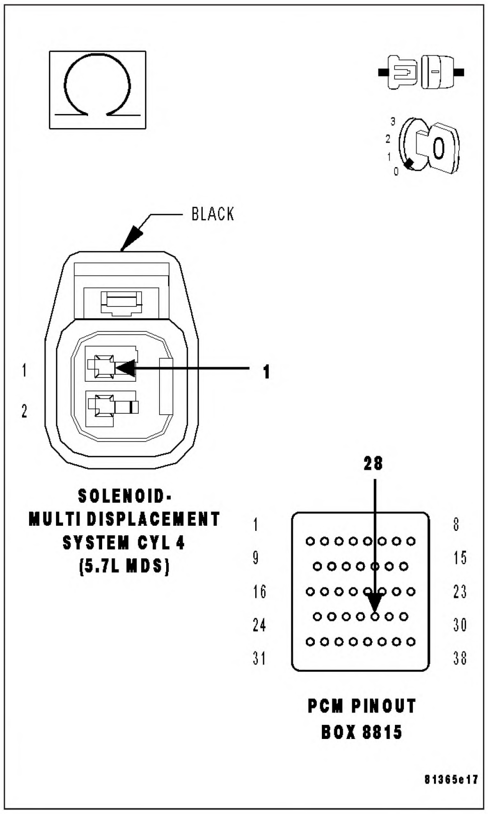
No >> Go To 6

P3425-MDS SOLENOID 4 CIRCUIT (CONTINUED)

6. (K452) MDS SOLENOID NO.4 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K452) MDS Solenoid No.4 Control circuit from the MDS Solenoid No.4 harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K452) MDS Solenoid No.4 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

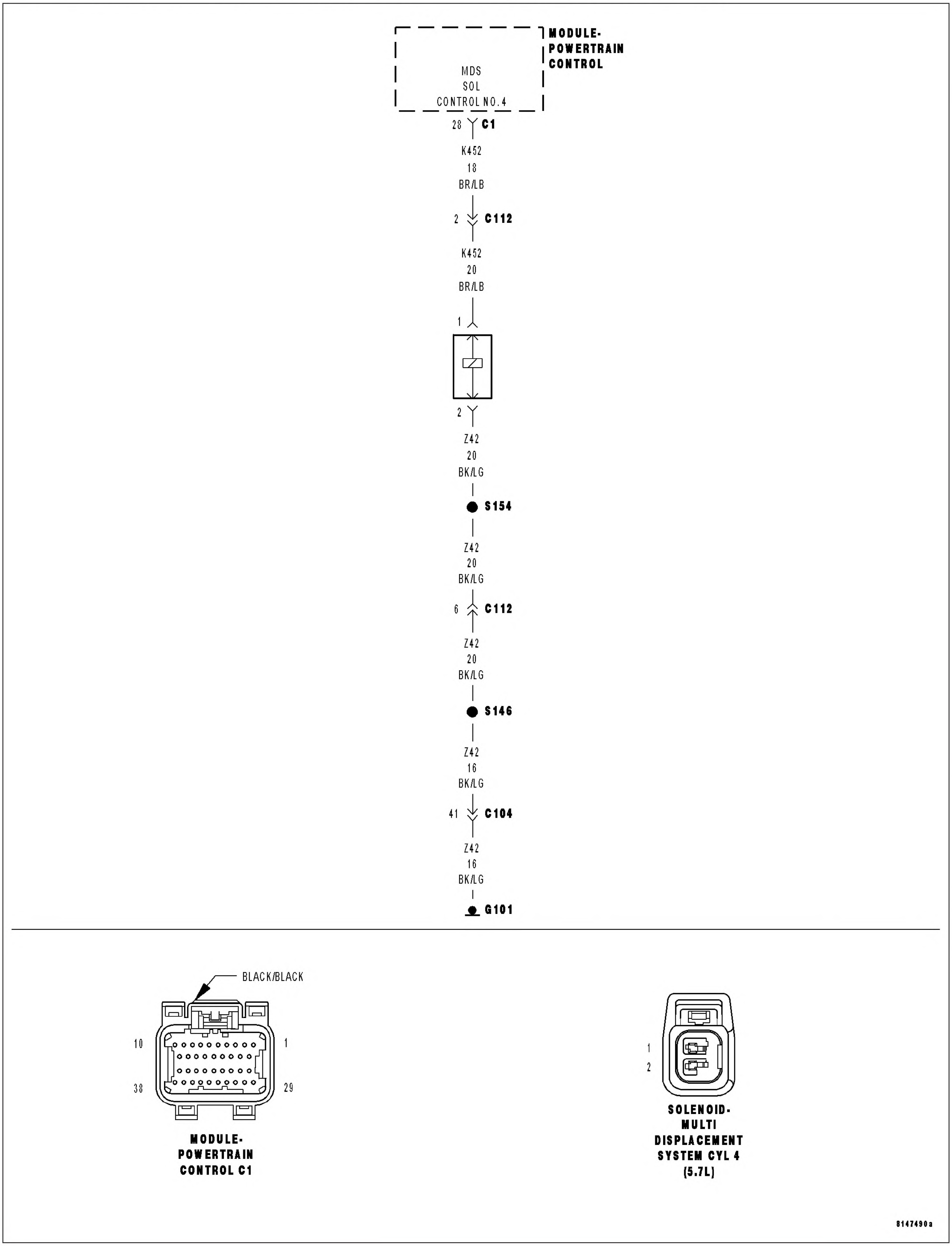
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3426–CYLINDER 4 DEACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO.4
28
C1
K452
18
BR/LB
2
C112
K452
20
BR/LB
1
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 4
(5.7L)
8147490a

P3426–CYLINDER 4 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to disengage for cylinder 4.

Possible Causes
(K452) MDS SOLENOID NO.4 CONTROL SHORT TO VOLTAGE
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.4
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. MDS SOLENOID NO.4 CONTROL CIRCUIT

Turn the ignition off.

Disconnect the MDS Solenoid No.4 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to ground, probe the (K452) MDS Solenoid No.4 Control circuit.

Does the 12-volt test light illuminate?

Yes >> Go To 3

No >> Go To 4

P3426–CYLINDER 4 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

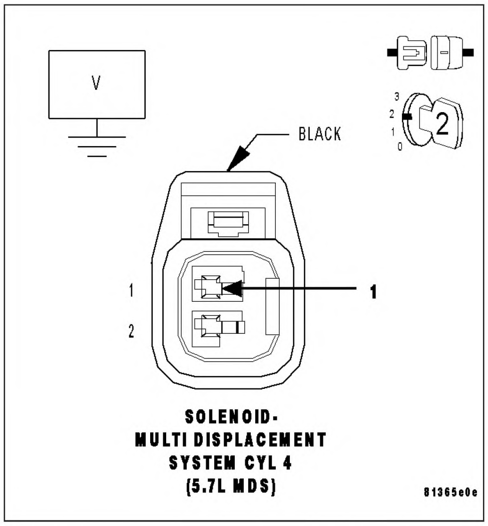
3. (K452) MDS SOLENOID NO.4 CONTROL CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the C1 PCM harness connector.

Turn the ignition on.

Measure the voltage of the (K452) MDS Solenoid No.4 Control circuit in the MDS Solenoid No.4 harness connector.


V
BLACK
3
2
1
0
2
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 4
(5.7L MDS)
81365e0e

Is voltage present?

Yes >> Repair the short to voltage in the (K452) MDS Solenoid No.4 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >>

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

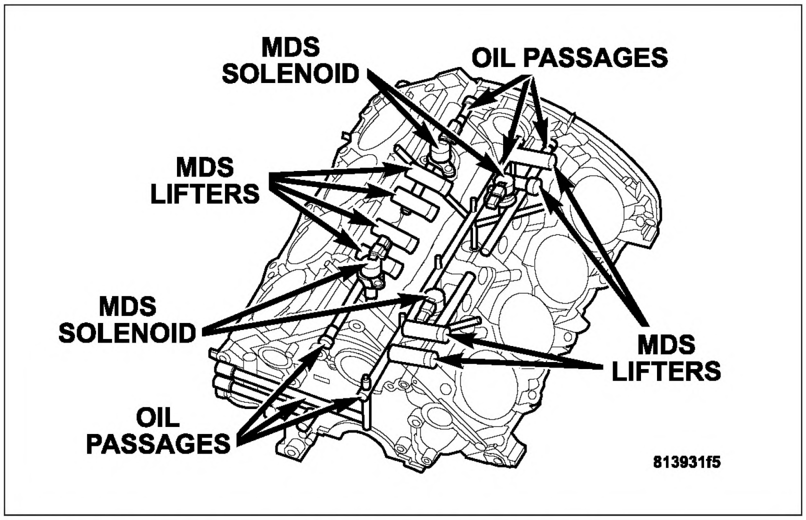
4. MDS SOLENOID 4

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Turn the ignition on.

With the scan tool actuate the MDS Solenoid 4.


MDS SOLENOID
OIL PASSAGES
MDS LIFTERS
MDS SOLENOID
MDS LIFTERS
OIL PASSAGES
813931f5

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 5

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 4. If the passages are not clogged with debris, replace the MDS Solenoid 4.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3426–CYLINDER 4 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

5. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 2 of the engine block.

Remove the Bank 2 Cylinder Head per Service Information.

Remove the Lifters from the left engine bank.

Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

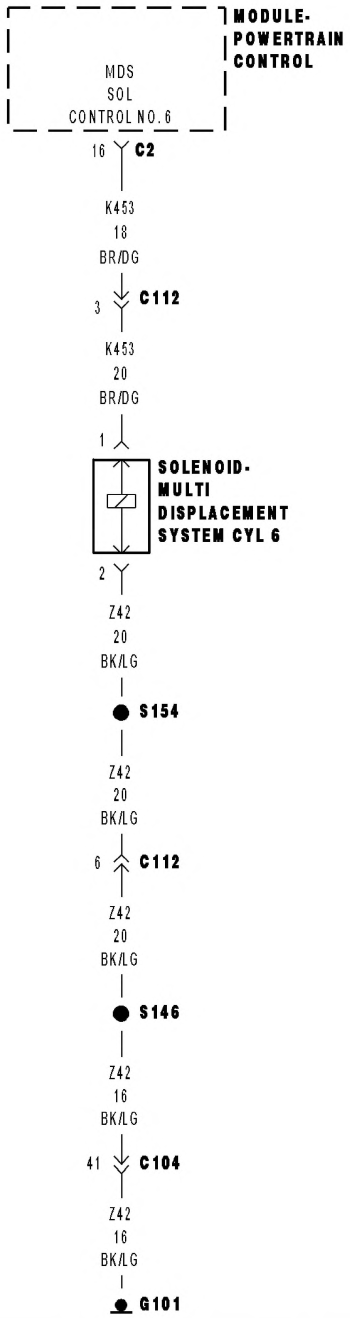
Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.

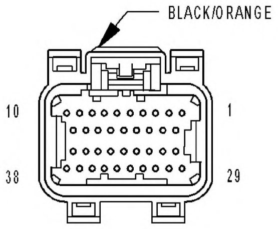
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.

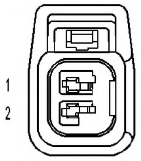
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3441-MDS SOLENOID 6 CIRCUIT


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 6
16
C2
K453
18
BR/DG
3
C112
K453
20
BR/DG
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**



**SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
(5.7L)**

814749ba

P3441-MDS SOLENOID 6 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  When the PCM recognizes a problem with the Solenoid Control circuit.

Possible Causes
(K453) MDS SOLENOID NO.6 CONTROL SHORT TO BATTERY VOLTAGE
(K453) MDS SOLENOID NO.6 CONTROL SHORT TO GROUND
(K453) MDS SOLENOID NO.6 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
MDS SOLENOID NO.6
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

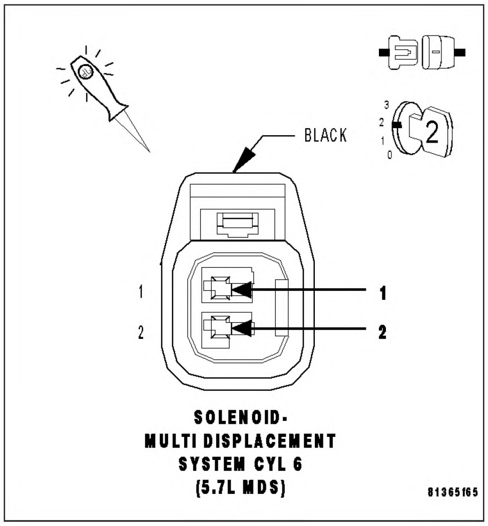
Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3441-MDS SOLENOID 6 CIRCUIT (CONTINUED)

2. MDS SOLENOID NO.6


BLACK
1
2
1
2
3
2
1
0
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
81365f65

Turn the ignition off.

Gain access to the MDS Solenoid No.6.

Disconnect the MDS Solenoid No.6 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) Ground circuit, probe the (K453) MDS Solenoid No.6 Control circuit.

With a scan tool, actuate the MDS Solenoid No.6.

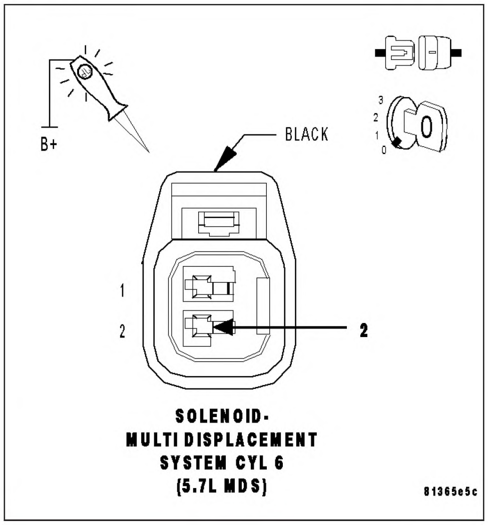
Does the 12-volt test light flash on and off?

Yes >> Replace the MDS Solenoid No.6.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN


B+
BLACK
1
2
2
3
2
1
0
0
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
81365e5c

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.6 harness connector.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

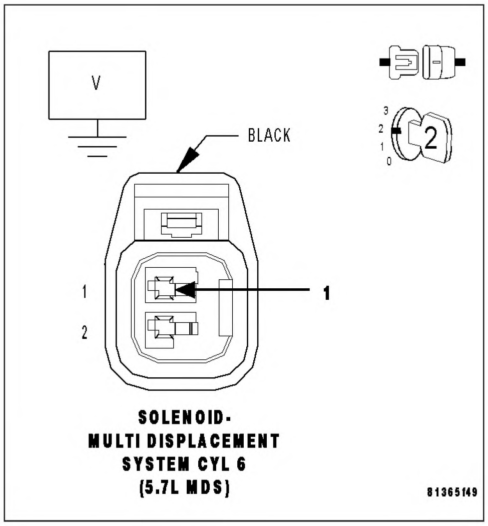
P3441-MDS SOLENOID 6 CIRCUIT (CONTINUED)

4. (K453) MDS SOLENOID CONTROL NO.6 CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C2 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K453) MDS Solenoid No.6 Control circuit in the MDS Solenoid No.6 connector.


V
BLACK
3
2
1
0
2
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
81365149

Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K453) MDS Solenoid No.6 Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

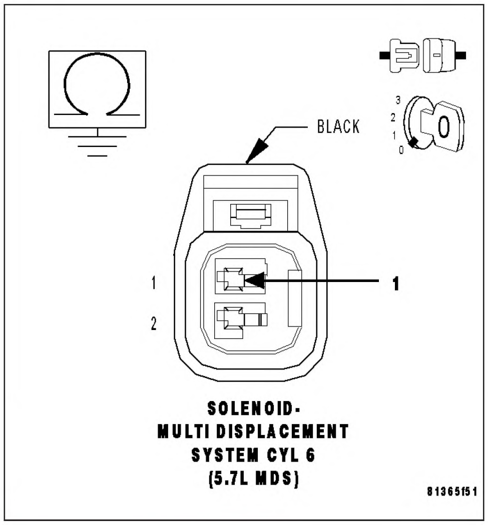
No >> Go To 5

---

5. (K453) MDS SOLENOID NO.6 CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (K453) MDS Solenoid No.6 Control circuit in the MDS Solenoid No.6 harness connector.


Ω
BLACK
3
2
1
0
0
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
81365151

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K453) MDS Solenoid No.6 Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

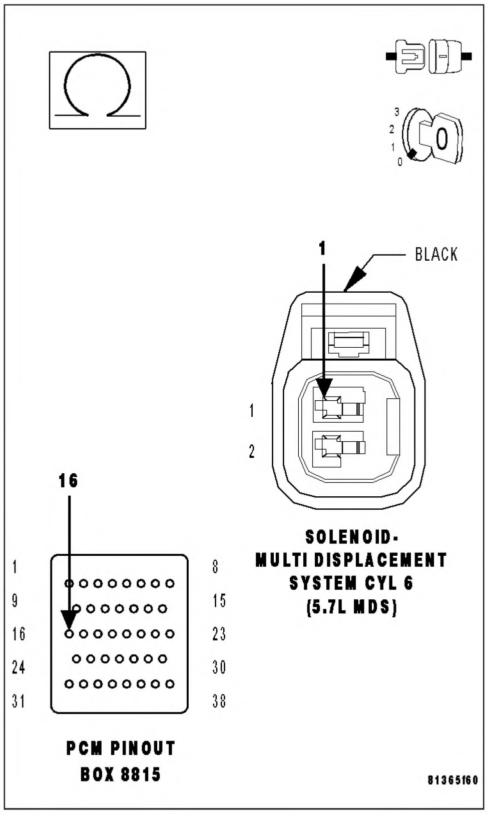
No >> Go To 6

P3441-MDS SOLENOID 6 CIRCUIT (CONTINUED)

6. (K453) MDS SOLENOID NO.6 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K453) MDS Solenoid No.6 Control circuit from the MDS Solenoid No.6 harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K453) MDS Solenoid No.6 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

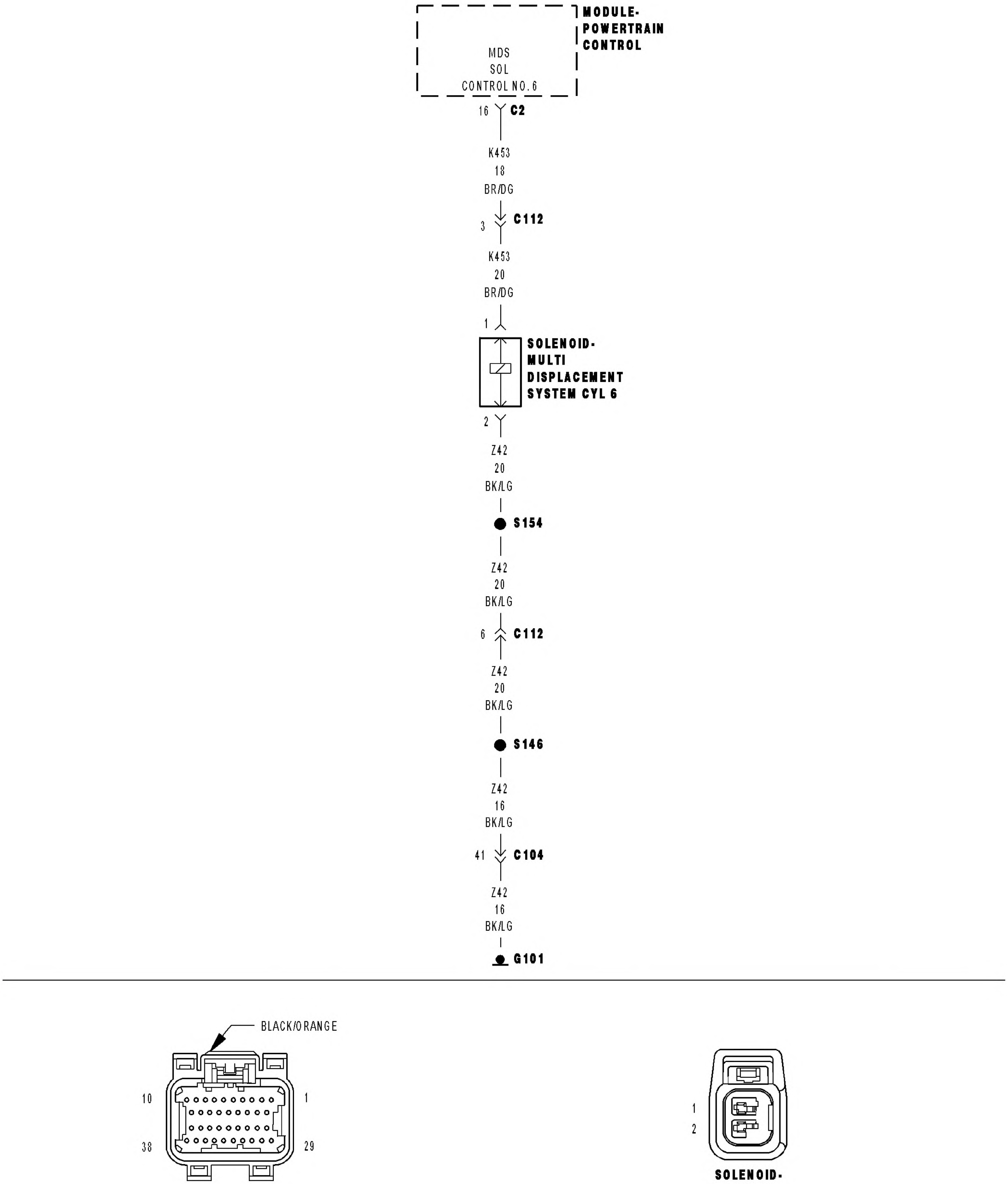
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3442–CYLINDER 6 DEACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO.6
16
C2
K453
18
BR/DG
3
C112
K453
20
BR/DG
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 6
(5.7L)
814749ba

P3442–CYLINDER 6 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to disengage for cylinder 6.

Possible Causes
(K452) MDS SOLENOID NO.4 CONTROL SHORT TO VOLTAGE
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.4
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

2. MDS SOLENOID NO.6 CONTROL CIRCUIT

Turn the ignition off.

Disconnect the MDS Solenoid No.6 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to ground, probe the (K453) MDS Solenoid No.6 Control circuit.

Does the 12-volt test light illuminate?

Yes >> Go To 3

No >> Go To 4

P3442–CYLINDER 6 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

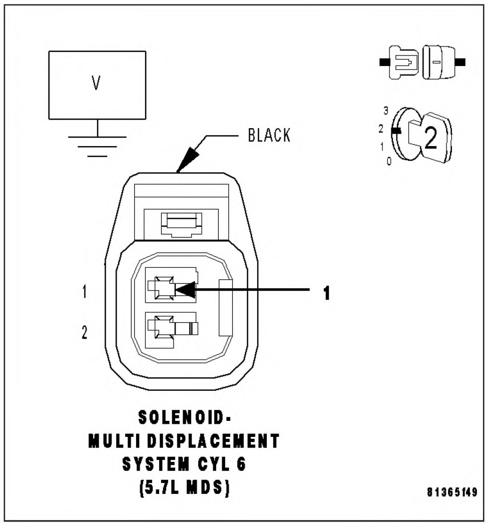
3. (K453) MDS SOLENOID NO.6 CONTROL CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the C2 PCM harness connector.

Turn the ignition on.

Measure the volage of the (K453) MDS Solenoid No.6 Control circuit in the MDS Solenoid No.6 harness connector.


V
BLACK
3
2
1
0
2
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 6
(5.7L MDS)
81365149

Is voltage present?

Yes >> Repair the short to voltage in the (K453) MDS Solenoid No.6 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >>

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

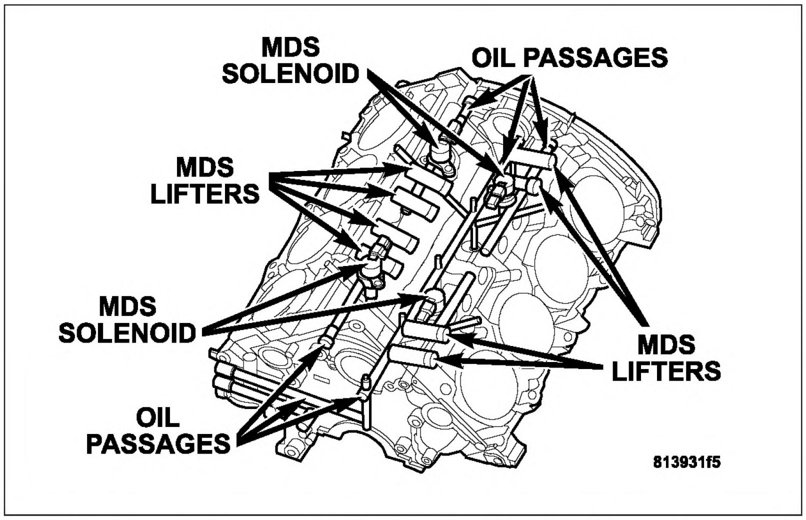
4. MDS SOLENOID 6

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Turn the ignition on.

With the scan tool actuate the MDS Solenoid 6.


MDS SOLENOID
OIL PASSAGES
MDS LIFTERS
MDS SOLENOID
MDS LIFTERS
OIL PASSAGES
813931f5

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 5

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 6. If the passages are not clogged with debris, replace the MDS Solenoid 6.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3442–CYLINDER 6 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

5. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 2 of the engine block.

Remove the Bank 2 Cylinder Head per Service Information.

Remove the Lifters from the left engine bank.

Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

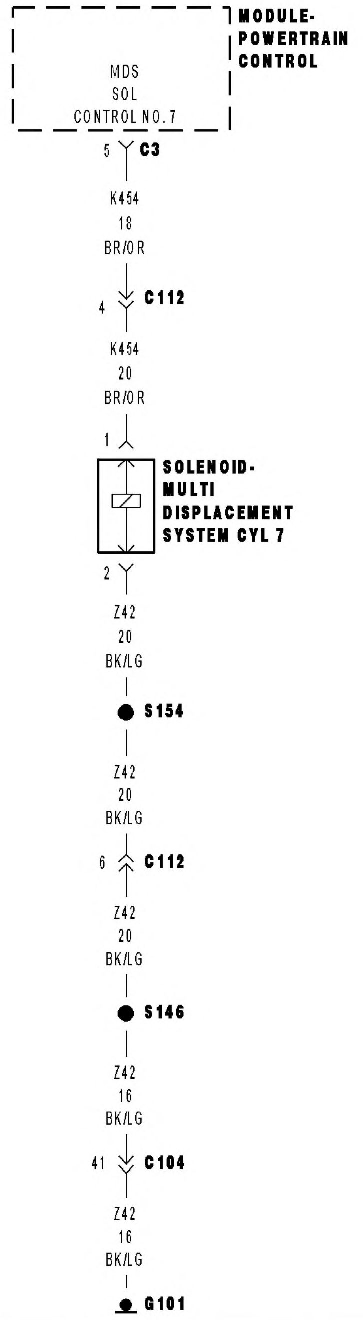
Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.

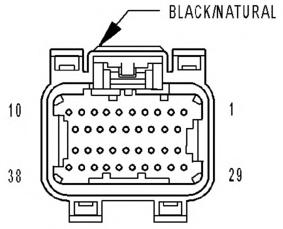
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.

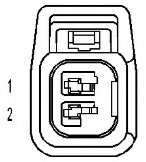
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3449-MDS SOLENOID 7 CIRCUIT


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 7
5 C3
K454
18
BR/OR
4 C112
K454
20
BR/OR
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6 C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41 C104
Z42
16
BK/LG
G101


BLACK/NATURAL
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C3**



**SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
(5.7L)**

81474a35

P3449-MDS SOLENOID 7 CIRCUIT (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  When the PCM recognizes a problem with the Solenoid Control circuit.

Possible Causes
(K454) MDS SOLENOID NO.7 CONTROL SHORT TO BATTERY VOLTAGE
(K454) MDS SOLENOID NO.7 CONTROL SHORT TO GROUND
(K454) MDS SOLENOID NO.7 CONTROL OPEN
(Z42) GROUND CIRCUIT OPEN
MDS SOLENOID NO.7
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3449-MDS SOLENOID 7 CIRCUIT (CONTINUED)

2. MDS SOLENOID NO.7

Turn the ignition off.

Gain access to the MDS Solenoid No.7.

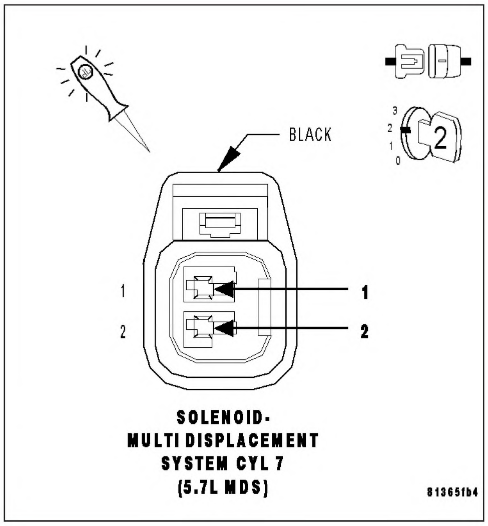
Disconnect the MDS Solenoid No.7 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to the (Z42) Ground circuit, probe the (K454) MDS Solenoid No.7 Control circuit.

With a scan tool, actuate the MDS Solenoid No.7.


BLACK
3
2
1
0
2
1
2
1
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
81365fb4

Does the 12-volt test light flash on and off?

Yes >> Replace the MDS Solenoid No.7.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

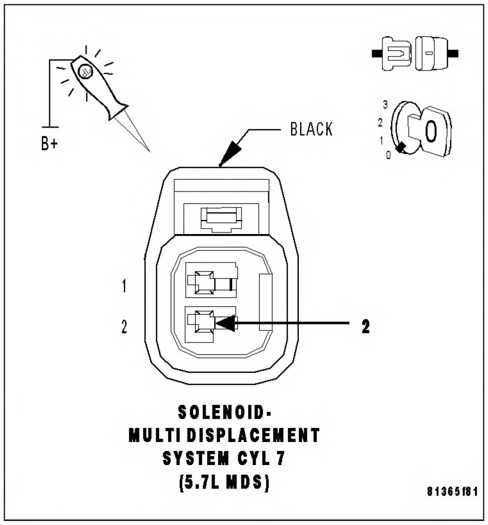
No >> Go To 3

---

3. (Z42) GROUND CIRCUIT OPEN

Turn the ignition off.

Using a 12-volt test light connected to the 12-volts, probe the (Z42) Ground circuit in the MDS Solenoid No.7 harness connector.


B+
BLACK
3
2
1
0
0
1
2
2
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
81365f81

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the open in the (Z42) Ground circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

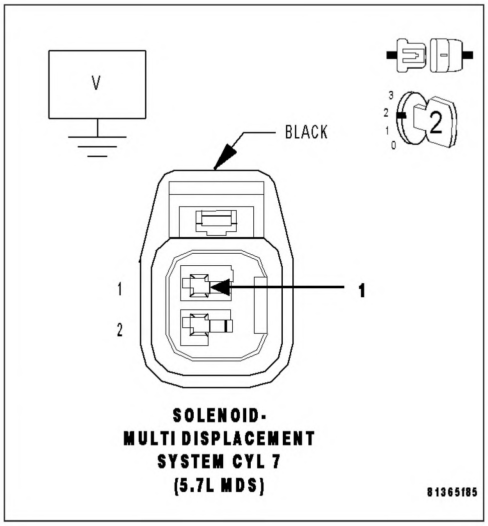
P3449-MDS SOLENOID 7 CIRCUIT (CONTINUED)

4. (K454) MDS SOLENOID NO.7 CONTROL CIRCUIT SHORTED TO BATTERY VOLTAGE

Disconnect the C3 PCM harness connector.

Ignition on, engine not running.

Measure the voltage on the (K454) MDS Solenoid No.7 Control circuit in the MDS Solenoid No.7 harness connector.


V
BLACK
3
2
1
0
2
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
81365f85

Is the voltage above 1.0 volt?

Yes >> Repair the short to battery voltage in the (K454) MDS Solenoid No.7 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

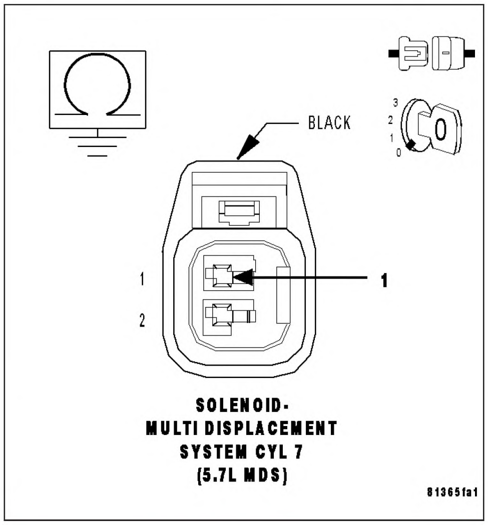
No >> Go To 5

---

5. (K454) MDS SOLENOID NO.7 CONTROL CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (K454) MDS Solenoid No.7 Control circuit in the MDS Solenoid No.7 harness connector.


BLACK
3
2
1
0
0
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
81365fa1

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (K454) MDS Solenoid No.7 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

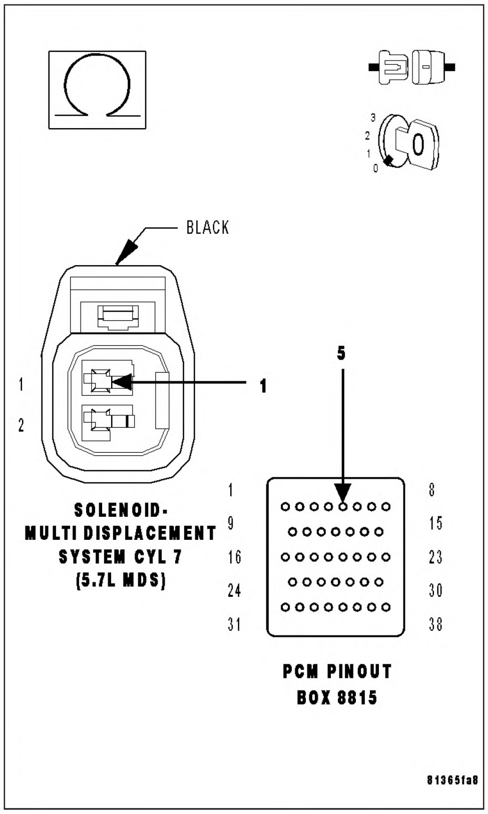
No >> Go To 6

P3449-MDS SOLENOID 7 CIRCUIT (CONTINUED)

6. (K454) MDS SOLENOID NO.7 CONTROL CIRCUIT OPEN

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the (K454) MDS Solenoid No.7 Control circuit from the MDS Solenoid No.7 harness connector to the appropriate terminal of special tool #8815.



Is the resistance below 5.0 ohms?

Yes >> Go To 7

No >> Repair the open in the (K454) MDS Solenoid No.7 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

7. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

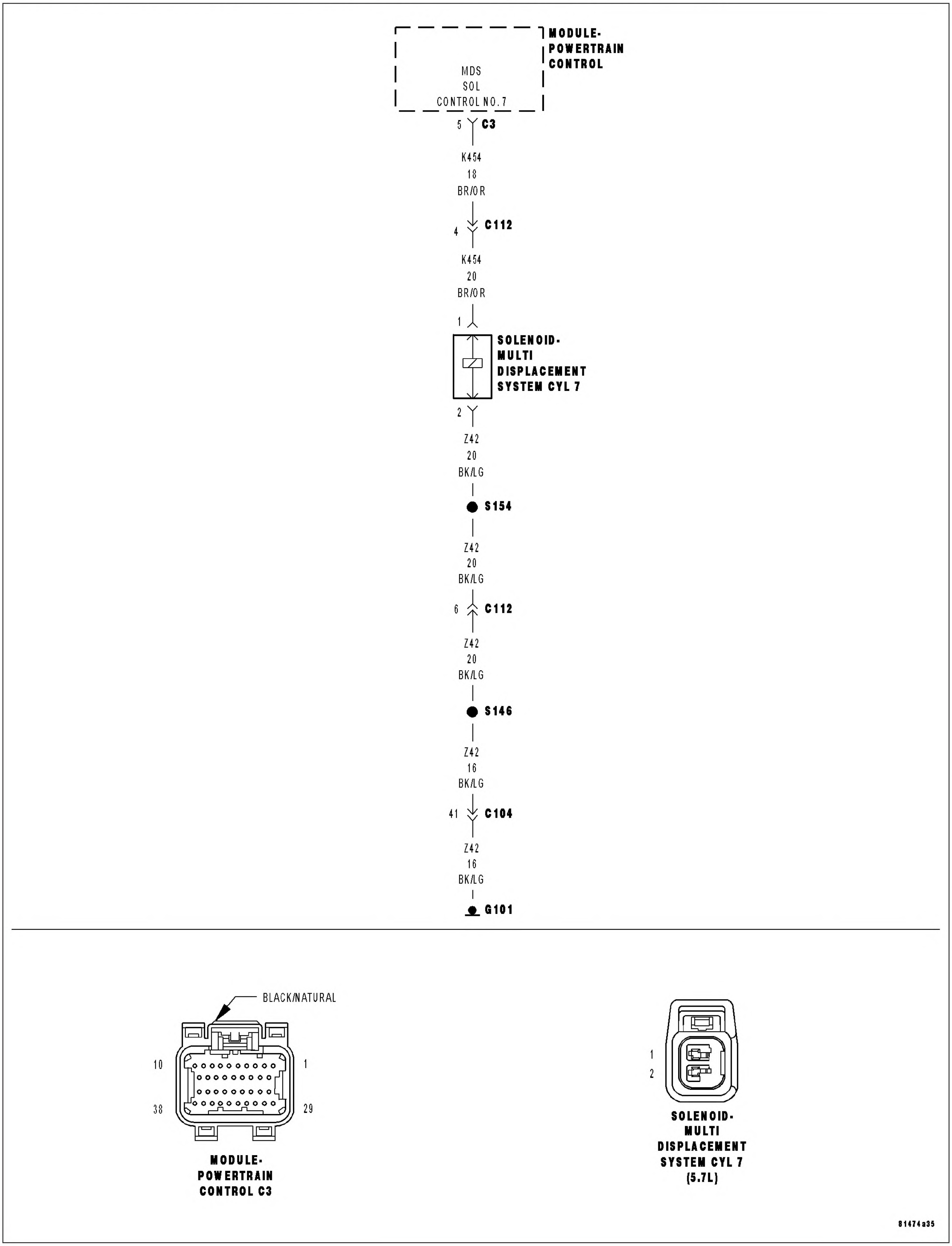
Yes >> Repair as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3450–CYLINDER 7 DEACTIVATION CONTROL PERFORMANCE


MODULE-
POWERTRAIN
CONTROL
MDS
SOL
CONTROL NO. 7
5
C3
K454
18
BR/OR
4
C112
K454
20
BR/OR
1
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
2
Z42
20
BK/LG
S154
Z42
20
BK/LG
6
C112
Z42
20
BK/LG
S146
Z42
16
BK/LG
41
C104
Z42
16
BK/LG
G101
BLACK/NATURAL
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C3
1
2
SOLENOID-
MULTI
DISPLACEMENT
SYSTEM CYL 7
(5.7L)
81474a35

P3450–CYLINDER 7 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  The MDS fails to disengage for cylinder 7.

Possible Causes
(K454) MDS SOLENOID NO.7 CONTROL SHORT TO VOLTAGE
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID NO.1
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

2. MDS SOLENOID NO.7 CONTROL CIRCUIT

Turn the ignition off.

Disconnect the MDS Solenoid No.7 harness connector.

Ignition on, engine not running.

Turn off all accessories.

Using a 12-volt test light connected to ground, probe the (K454) MDS Solenoid No.7 Control circuit.

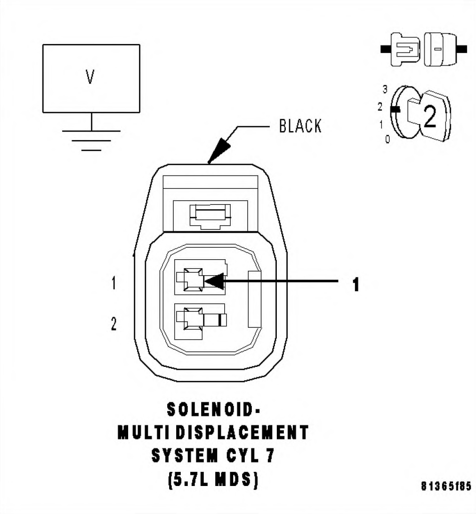
Does the 12-volt test light illuminate?

Yes >> Go To 3

No >> Go To 4

P3450–CYLINDER 7 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

3. (K454) MDS SOLENOID NO.7 CONTROL CIRCUIT SHORTED TO VOLTAGE


V
BLACK
3
2
1
0
2
1
2
1
SOLENOID-
MULTI DISPLACEMENT
SYSTEM CYL 7
(5.7L MDS)
81365f85

Turn the ignition off.

Disconnect the C3 PCM harness connector.

Turn the ignition on.

Measure the voltage of the (K454) MDS Solenoid No.7 Control circuit in the MDS Solenoid No.7 harness connector.

Is volage present?

Yes >> Repair the short to volage in the (K454) MDS Solenoid No.7 Control circuit.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

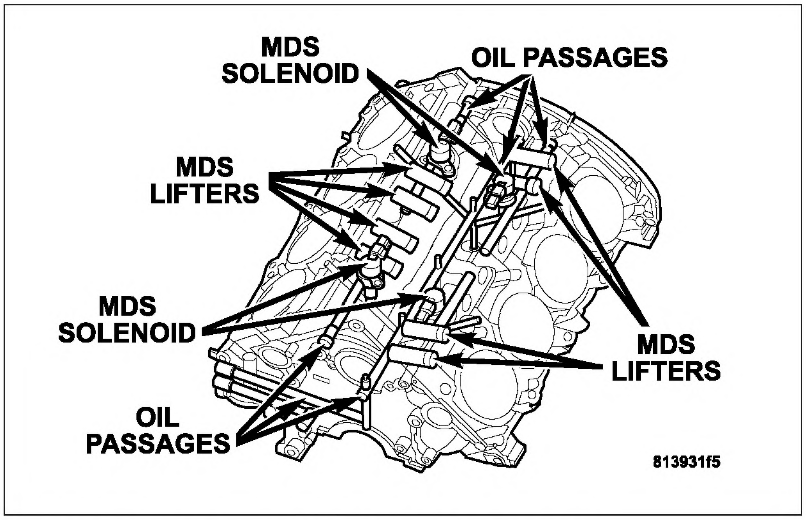
No >>

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.Replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. MDS SOLENOID 7


MDS SOLENOID
OIL PASSAGES
MDS LIFTERS
MDS SOLENOID
MDS LIFTERS
OIL PASSAGES
813931f5

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Turn the ignition on.

With the scan tool actuate the MDS Solenoid 7.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 5

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 7. If the passages are not clogged with debris, replace the MDS Solenoid 7.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3450–CYLINDER 7 DEACTIVATION CONTROL PERFORMANCE (CONTINUED)

5. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 1 of the engine block.

Remove the Bank 1 Cylinder Head per Service Information.

Remove the Lifters from the left engine bank.

Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3497-MDS RATIONALITY BANK 2

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

When all criteria has been met, power is supplied to each MDS Solenoid when the engine is making a transition from 8 cylinder mode to 4 cylinder mode. By actuating the solenoid, oil pressure is raised to the pair of lifters that coincide with each particular solenoid. The oil pressure pushes in the locking pins that allows the lifter to collapse, decoupling the valves and camshaft.

- **When Monitored:**
  Transition from 8 to 4 cylinder mode.
- **Set Condition:**
  O2 sensor readings on Bank 2 side indicate a lean condition while in 4 cylinder mode.

Possible Causes
INSUFFICIENT OIL PRESSURE ACTING ON THE LIFTER LOCKING PINS
OIL PASSAGES RESTRICTED
LIFTER
MDS SOLENOID

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

NOTE: Diagnose any Oil Pressure DTCs before continuing.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. MDS SOLENOID 4

Turn the ignition off.

Remove the Intake Manifold per Service Information.

Turn the ignition on.

With the scan tool actuate the MDS Solenoid 4.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 3

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are clogged, clean the passages and replace the MDS Solenoid 4. If the passages are not clogged with debris, replace the MDS Solenoid 4.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

P3497-MDS RATIONALITY BANK 2 (CONTINUED)

3. MDS SOLENOID 6

With the scan tool actuate the MDS Solenoid 6.

Can you feel and hear the Solenoid Actuating?

Yes >> Go To 4

No >> Remove the Solenoid and check for any debris that may be blocking the oil passages to the Solenoid. If the passages are restricted, clean the passages and replace the MDS Solenoid 6. If the passages are unable to be cleaned out, replacing the engine block may be necessary. If the passages are not clogged with debris, replace the MDS Solenoid 6.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. OIL PASSAGES RESTRICTED

Turn the ignition off.

Remove both Solenoids on Bank 2 of the engine block.

Remove the Bank 2 Cylinder Head per Service Information.

Remove the each pair of lifters for Cylinders 4 and 6.

Inspect the oil passages to the Solenoids and from the Solenoids to the lifters.

Are the passages blocked?

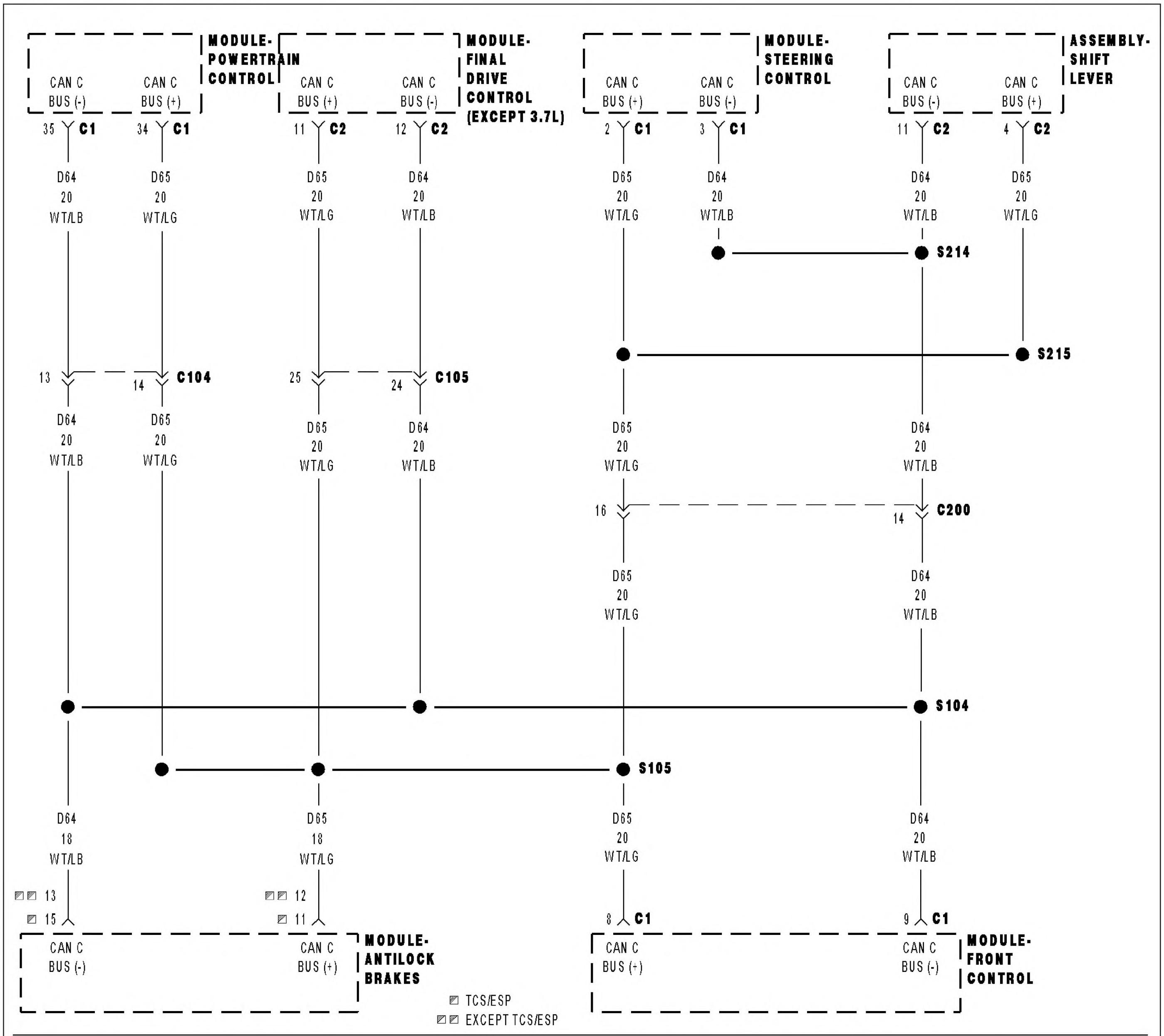
Yes >> Clean the oil passages as necessary. If the entire engine is restricted disassembly of the entire engine block may be necessary.

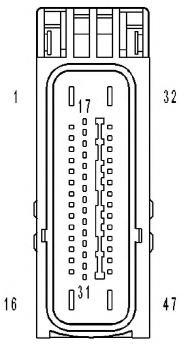
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace both sets of lifters if no other possible causes remain.

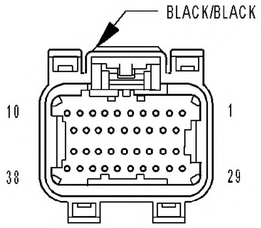
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U0001-CAN C BUS

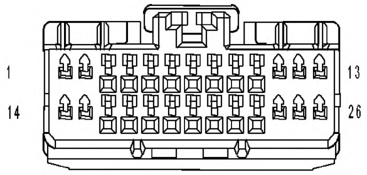

MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
CAN C BUS (+)
CAN C BUS (-)
11 C2
12 C2
MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
ASSEMBLY-SHIFT LEVER
CAN C BUS (-)
CAN C BUS (+)
11 C2
4 C2
D64 20 WT/LB
D65 20 WT/LG
S214
S215
13
14
C104
25
24
C105
16
14
C200
S104
S105
D64 18 WT/LB
D65 18 WT/LG
▨▨ 13
▨ 15
▨▨ 12
▨ 11
8 C1
9 C1
MODULE-ANTILOCK BRAKES
CAN C BUS (-)
CAN C BUS (+)
MODULE-FRONT CONTROL
CAN C BUS (+)
CAN C BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47

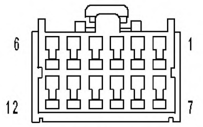
MODULE-ANTILOCK BRAKES


BLACK/BLACK
10
1
38
29

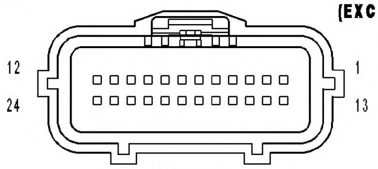
MODULE-POWERTRAIN CONTROL C1



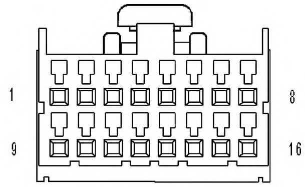
MODULE-FINAL DRIVE CONTROL C1 (EXCEPT 3.7L)



ASSEMBLY-SHIFT LEVER



MODULE-FRONT CONTROL C1



MODULE-STEERING CONTROL C1

814ce83b

U0001-CAN C BUS (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition run time is greater than 1 second. Battery voltage between 9 and 16 volts. Engine run time greater than 3 seconds.
- **Set Condition:**
  The PCM loses communication over the CAN C Bus circuit. The circuit is continuously monitored.

Possible Causes
CAN C BUS OPEN OR SHORTED CONDITION
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read FCM DTCs.

Is the DTC active at this time?

Yes >> Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U0101-LOST COMMUNICATION WITH TCM

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition run time is greater than 1 second. Battery voltage between 9 and 16 volts. Engine run time greater than 3 seconds.
- **Set Condition:**
  The PCM doesn't receive a Bus Message from the Transmission Control Module for 7 consecutive seconds. The circuit is continuously monitored.

Possible Causes
CAN C BUS OPEN OR SHORTED CONDITION
PCM

Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

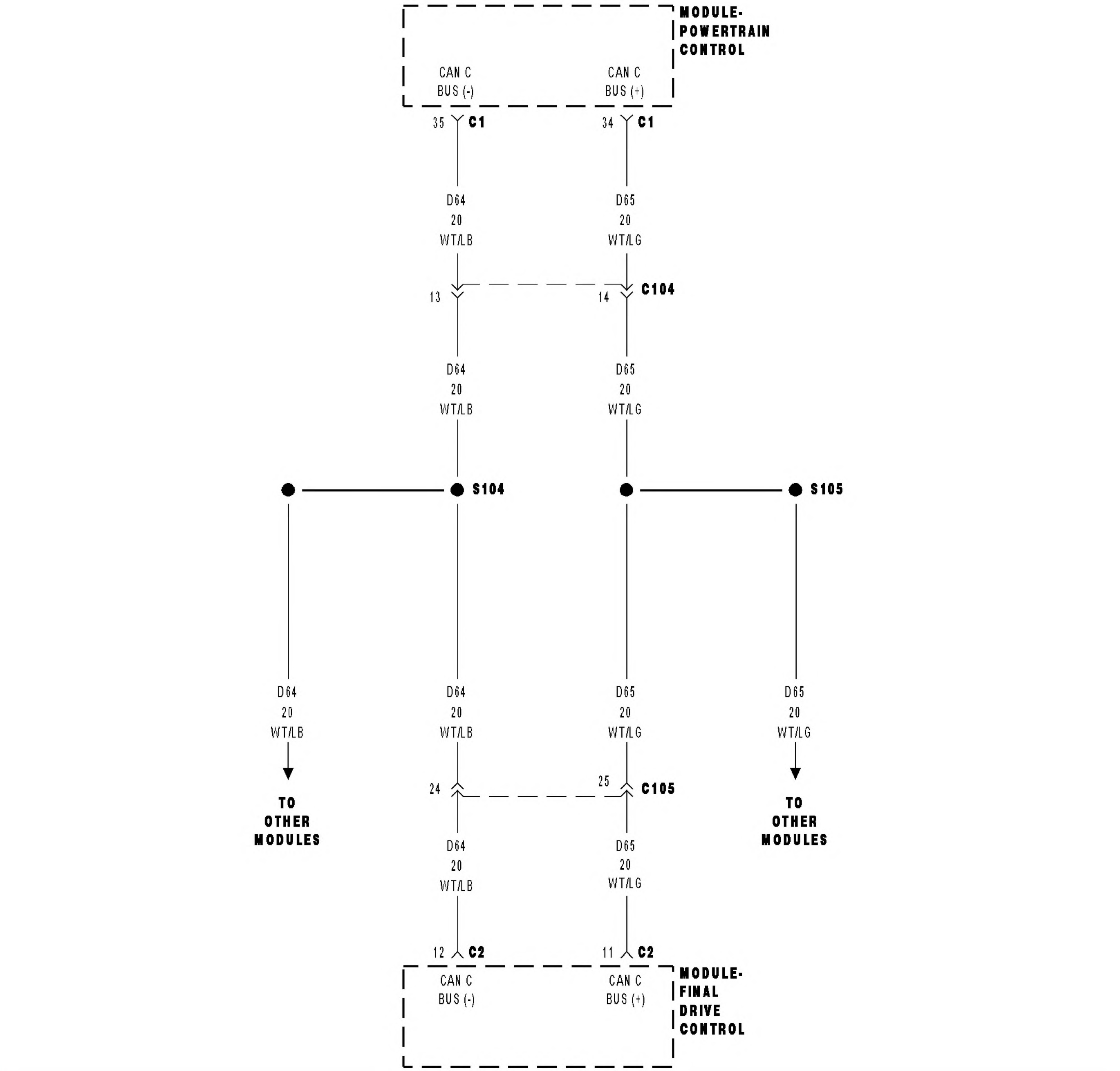
With a scan tool, read PCM DTCs.

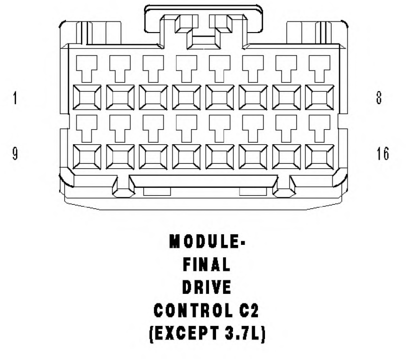
Is the DTC active at this time?

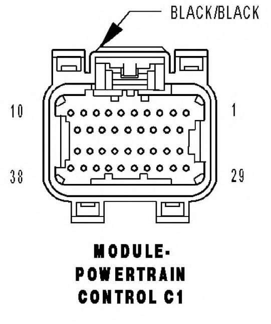
Yes >> Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE


MODULE-
POWERTRAIN
CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14
C104
S104
S105
TO OTHER MODULES
24
25
C105
12 C2
11 C2
MODULE-
FINAL
DRIVE
CONTROL


1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)


BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1

81475948

U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE (CONTINUED)

For a complete wiring diagram**Refer to Section 8W**.

- **When Monitored:**
  Ignition run time is greater than 1 second. Battery voltage between 9 and 16 volts. Engine run time greater than 3 seconds.
- **Set Condition:**
  The PCM doesn't receive a FDCM message over the CAN C circuit for 7 consecutive seconds. The circuit is continuously monitored.

Possible Causes
CAN C BUS OPEN OR SHORTED CONDITION
FINAL DRIVE CONTROL MODULE
FCM
PCM

Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

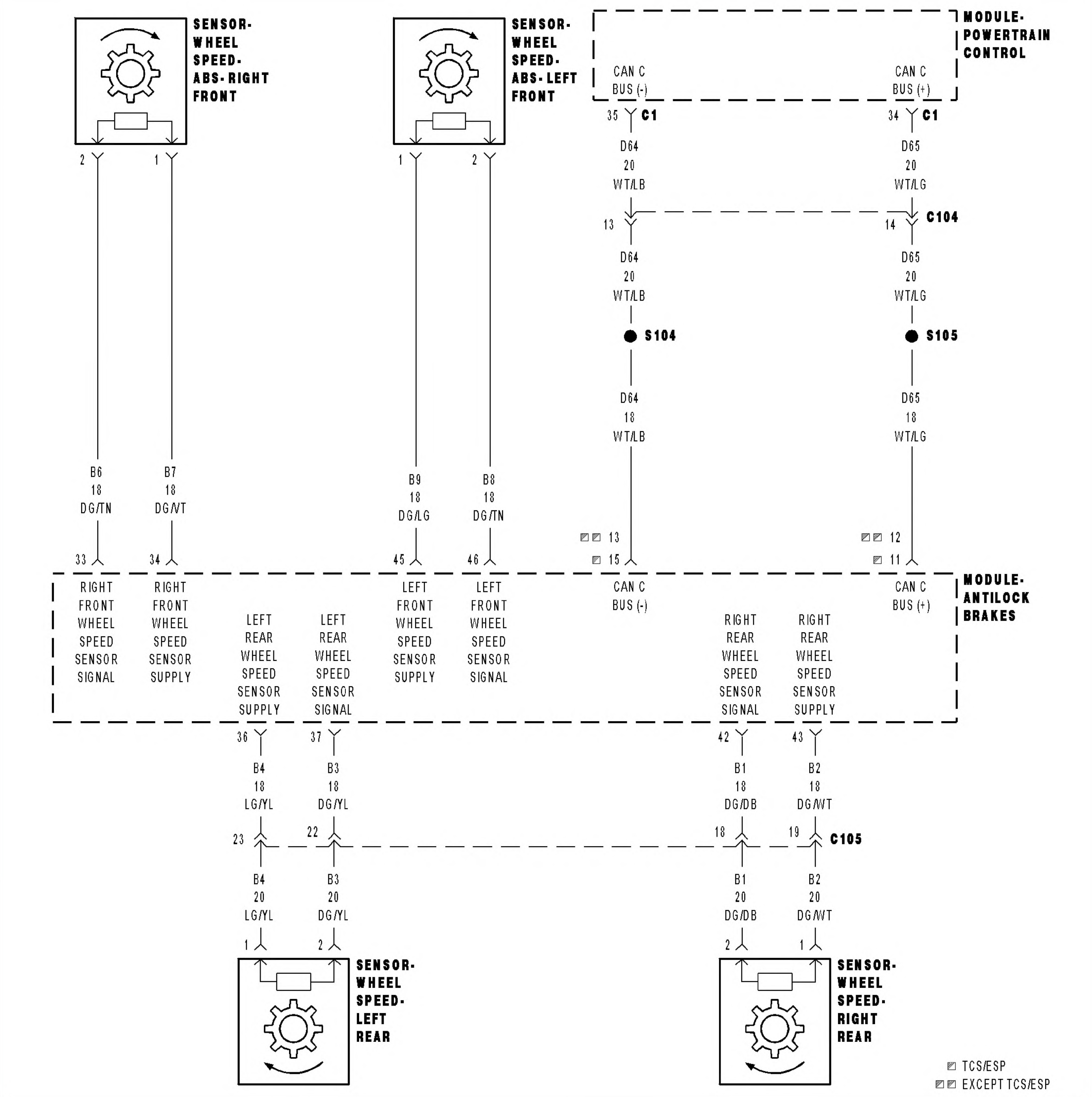
With a scan tool, read PCM DTCs.

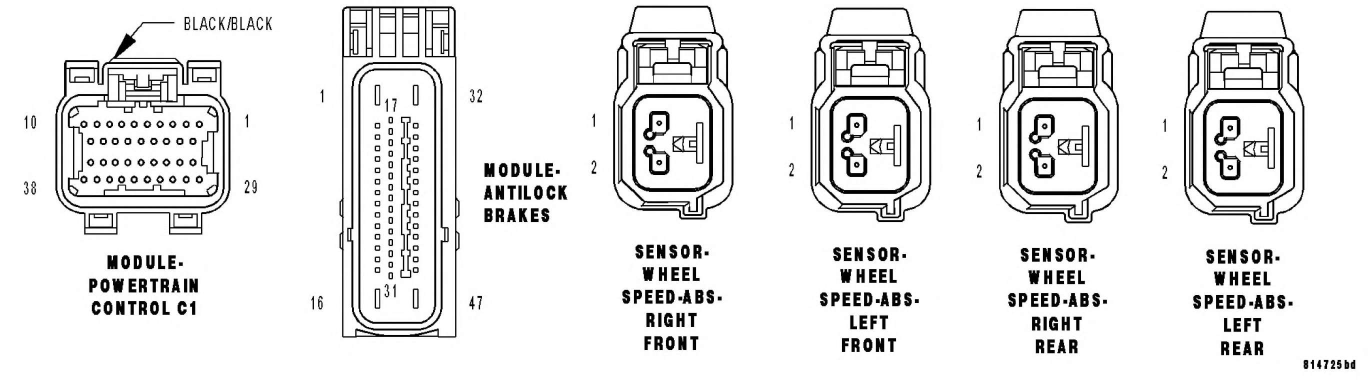
Is the DTC active at this time?

Yes >> Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14
C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19
C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE (CONTINUED)

For a complete wiring diagram**Refer to Section 8W**.

- **When Monitored:**
  Ignition run time is greater than 1 second. Battery voltage between 9 and 16 volts. Engine run time greater than 3 seconds.
- **Set Condition:**
  The PCM doesn’t receive an ABS message over the CAN C circuit for 7 consecutive seconds. The circuit is continuously monitored.

Possible Causes
CAN C BUS OPEN OR SHORTED CONDITION
ABS MODULE
FCM
PCM

Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

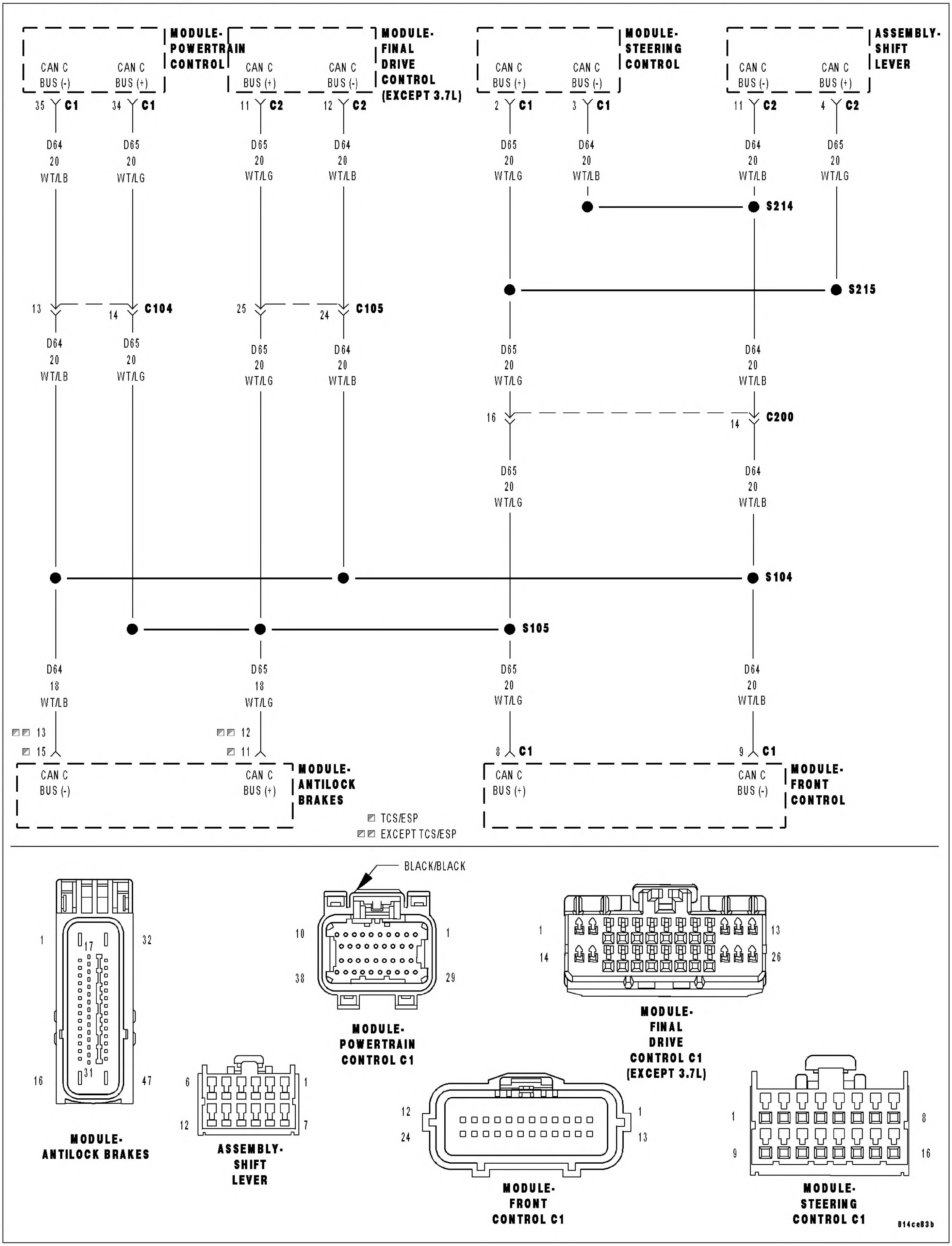
With a scan tool, read PCM DTCs.

Is the DTC active at this time?

Yes >> Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE


MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
MODULE-FINAL DRIVE CONTROL (EXCEPT 3.7L)
CAN C BUS (+)
CAN C BUS (-)
11 C2
12 C2
MODULE-STEERING CONTROL
CAN C BUS (+)
CAN C BUS (-)
2 C1
3 C1
ASSEMBLY-SHIFT LEVER
CAN C BUS (-)
CAN C BUS (+)
11 C2
4 C2
D64 20 WT/LB
D65 20 WT/LG
S214
S215
13 14 C104
25 24 C105
16 14 C200
S104
S105
D64 18 WT/LB
D65 18 WT/LG
▨▨ 13
▨ 15
▨▨ 12
▨ 11
8 C1
9 C1
MODULE-ANTILOCK BRAKES
CAN C BUS (-)
CAN C BUS (+)
MODULE-FRONT CONTROL
CAN C BUS (+)
CAN C BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
1 32 17 31 16 47
MODULE-ANTILOCK BRAKES
6 1 12 7
ASSEMBLY-SHIFT LEVER
10 1 38 29
MODULE-POWERTRAIN CONTROL C1
12 1 24 13
MODULE-FRONT CONTROL C1
1 13 14 26
MODULE-FINAL DRIVE CONTROL C1 (EXCEPT 3.7L)
1 8 9 16
MODULE-STEERING CONTROL C1
814ce83b

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition run time is greater than 1 second. Battery voltage between 9 and 16 volts.
- **Set Condition:**
  The PCM doesn't receive a FCM message over the CAN C circuit for 7 consecutive seconds. The circuit is continuously monitored.

Possible Causes
CAN C BUS OPEN OR SHORTED CONDITION
FRONT CONTROL MODULE
PCM

Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

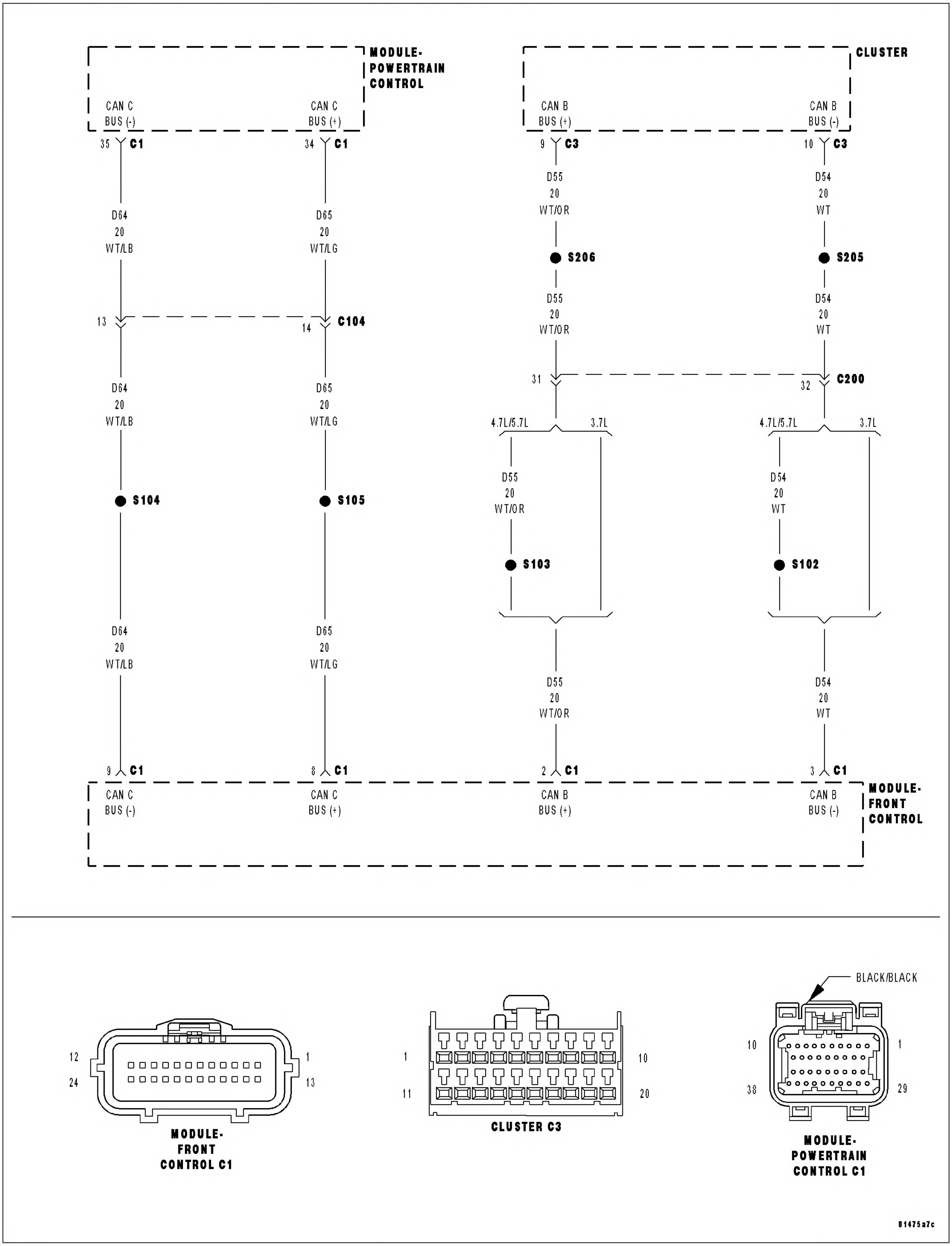
With a scan tool, read PCM DTCs.

Is the DTC active at this time?

Yes >> Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U0155-LOST COMMUNICATION WITH CLUSTER


MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D64 20 WT/LB
D65 20 WT/LG
D55 20 WT/OR
D54 20 WT
S206
S205
13
14 C104
31
32 C200
4.7L/5.7L
3.7L
S104
S105
S103
S102
9 C1
8 C1
2 C1
3 C1
MODULE-FRONT CONTROL
12
24
1
13
MODULE-FRONT CONTROL C1
10
11
20
CLUSTER C3
BLACK/BLACK
38
29
MODULE-POWERTRAIN CONTROL C1
81475a7c

U0155-LOST COMMUNICATION WITH CLUSTER (CONTINUED)

For a complete wiring diagram**Refer to Section 8W**.

- **When Monitored:**
  Ignition run time is greater than 1 second. Battery voltage between 9 and 16 volts. Engine run time greater than 3 seconds.
- **Set Condition:**
  The PCM doesn't receive a Cluster message over the CAN C circuit for 7 consecutive seconds. The circuit is continuously monitored.

Possible Causes
CAN C BUS OPEN OR SHORTED CONDITION
CLUSTER
FCM
PCM

Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

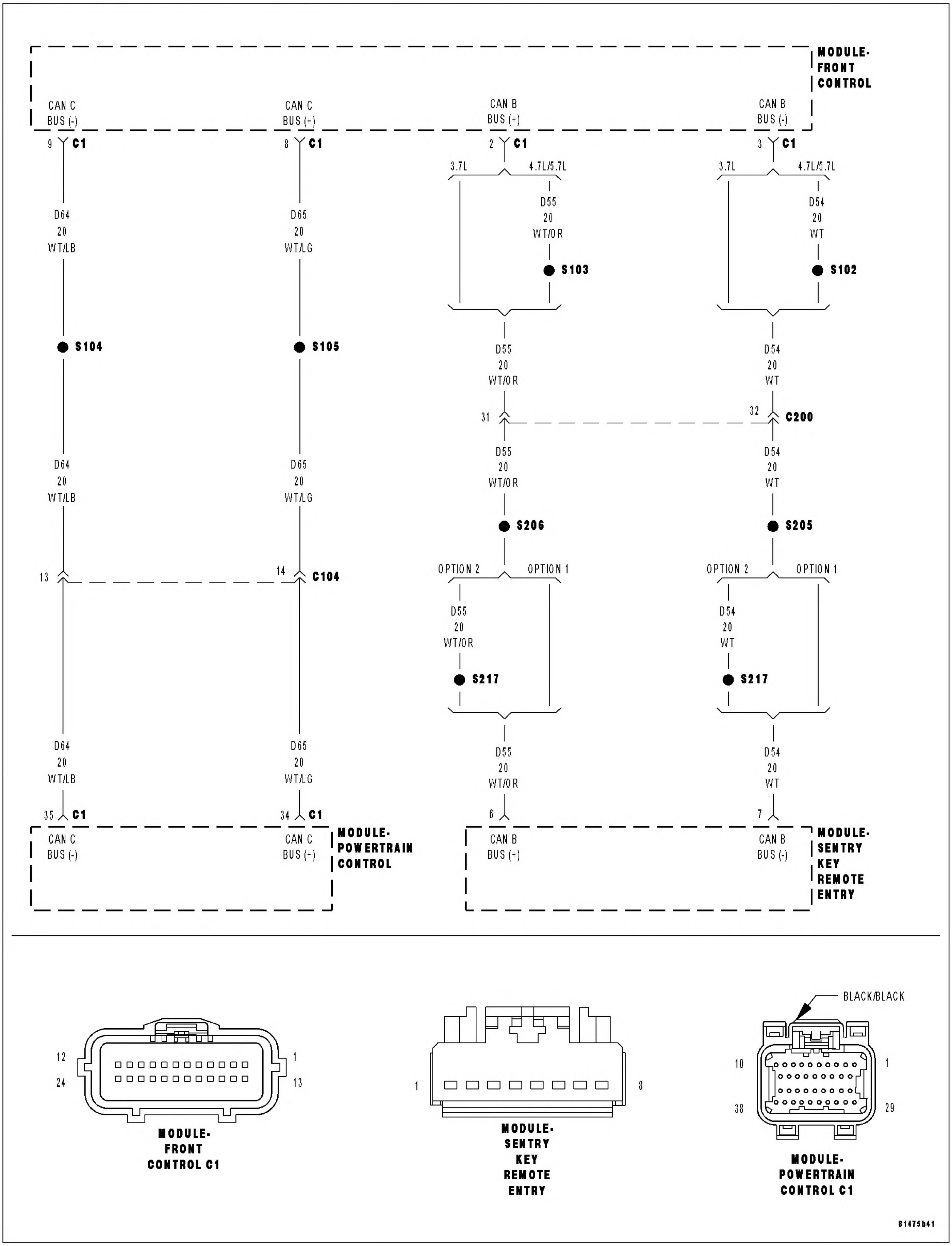
With a scan tool, read PCM DTCs.

Is the DTC active at this time?

Yes >> Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U0168-LOST COMMUNICATION WITH SKREEM


MODULE-FRONT CONTROL
CAN C BUS (-)
CAN C BUS (+)
CAN B BUS (+)
CAN B BUS (-)
9 C1
8 C1
2 C1
3 C1
3.7L
4.7L/5.7L
3.7L
4.7L/5.7L
D64 20 WT/LB
D65 20 WT/LG
D55 20 WT/OR
D54 20 WT
S103
S102
S104
S105
D55 20 WT/OR
D54 20 WT
31
32
C200
D64 20 WT/LB
D65 20 WT/LG
D55 20 WT/OR
D54 20 WT
S206
S205
13
14
C104
OPTION 2
OPTION 1
OPTION 2
OPTION 1
D55 20 WT/OR
D54 20 WT
S217
S217
D64 20 WT/LB
D65 20 WT/LG
D55 20 WT/OR
D54 20 WT
35 C1
34 C1
6
7
CAN C BUS (-)
CAN C BUS (+)
MODULE-POWERTRAIN CONTROL
CAN B BUS (+)
CAN B BUS (-)
MODULE-SENTRY KEY REMOTE ENTRY
12
24
1
13
MODULE-FRONT CONTROL C1
1
8
MODULE-SENTRY KEY REMOTE ENTRY
BLACK/BLACK
10
38
1
29
MODULE-POWERTRAIN CONTROL C1
81475b41

U0168-LOST COMMUNICATION WITH SKREEM (CONTINUED)

For a complete wiring diagram**Refer to Section 8W**.

- **When Monitored:**
  Ignition run time is greater than 1 second. Battery voltage between 9 and 16 volts. Engine run time greater than 3 seconds.
- **Set Condition:**
  The PCM doesn't receive a SKREEM message over the CAN C circuit for 7 consecutive seconds. The circuit is continuously monitored.

Possible Causes
CAN C BUS OPEN OR SHORTED CONDITION
SKREEM
FCM
PCM

Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

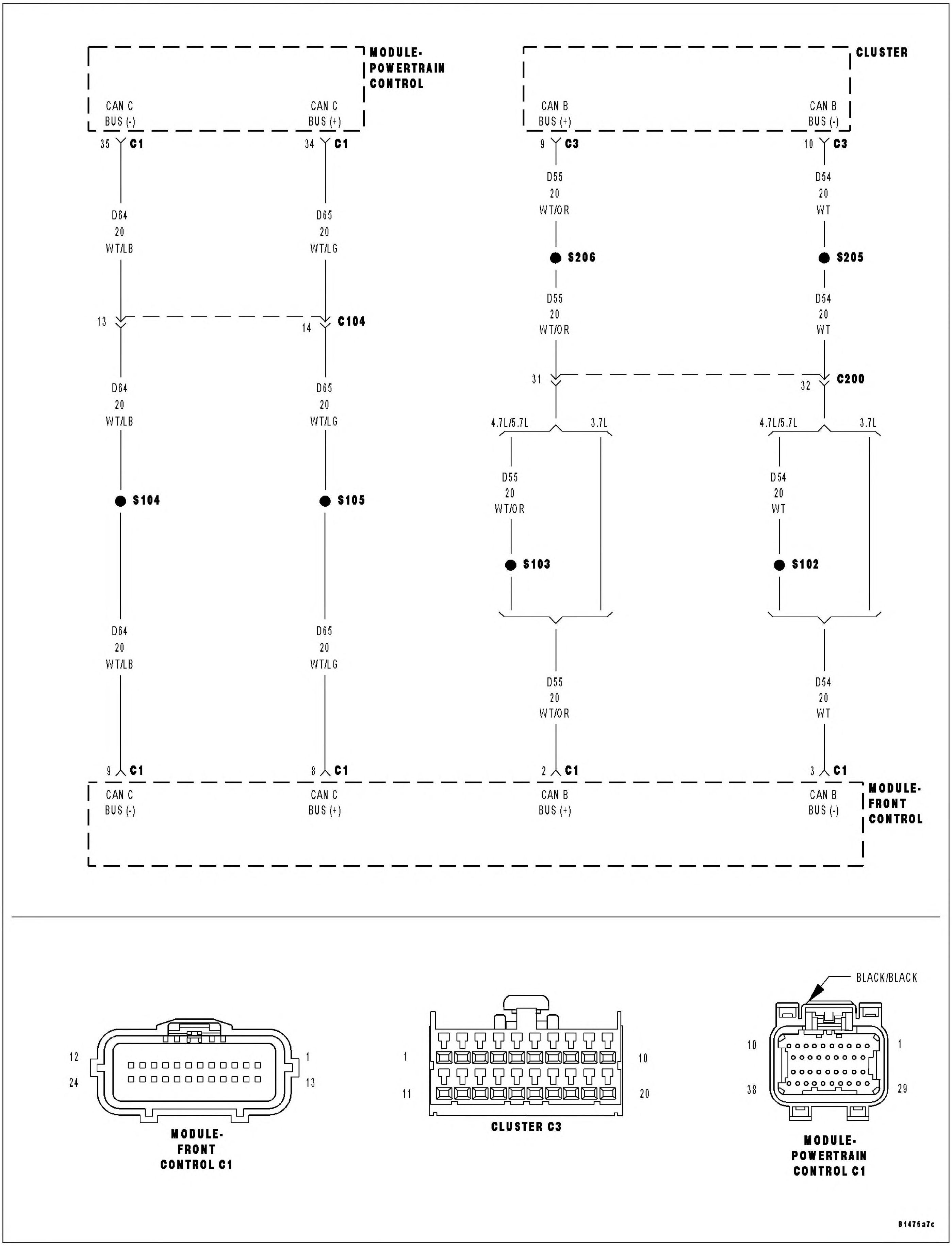
With a scan tool, read PCM DTCs.

Is the DTC active at this time?

Yes >> Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U110C-NO FUEL LEVEL BUS MESSAGE RECEIVED


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
D64
20
WT/LB
D65
20
WT/LG
13
14 C104
D64
20
WT/LB
D65
20
WT/LG
S104
S105
D64
20
WT/LB
D65
20
WT/LG
CLUSTER
CAN B
BUS (+)
CAN B
BUS (-)
9 C3
10 C3
D55
20
WT/OR
D54
20
WT
S206
S205
D55
20
WT/OR
D54
20
WT
31
32 C200
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D55
20
WT/OR
D54
20
WT
S103
S102
D55
20
WT/OR
D54
20
WT
9 C1
8 C1
2 C1
3 C1
CAN C
BUS (-)
CAN C
BUS (+)
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
FRONT
CONTROL
12
24
1
13
MODULE-
FRONT
CONTROL C1
1
11
10
20
CLUSTER C3
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
81475a7c

U110C-NO FUEL LEVEL BUS MESSAGE RECEIVED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  When the PCM does not receive a fuel level signal from the FCM over the CAN C circuit. The circuit is constantly monitored.

Possible Causes
CAN C BUS CIRCUIT OPEN OR SHORTED
FRONT CONTROL MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) .

Theory of Operation

The fuel level signal is a direct input to the Cluster. The fuel level signal is sent to the FCM over the CAN B bus circuit. The NGC receives the fuel level signal from the FCM over the CAN C bus circuit.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With the scan tool read Powertrain DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE ALSO ACTIVE

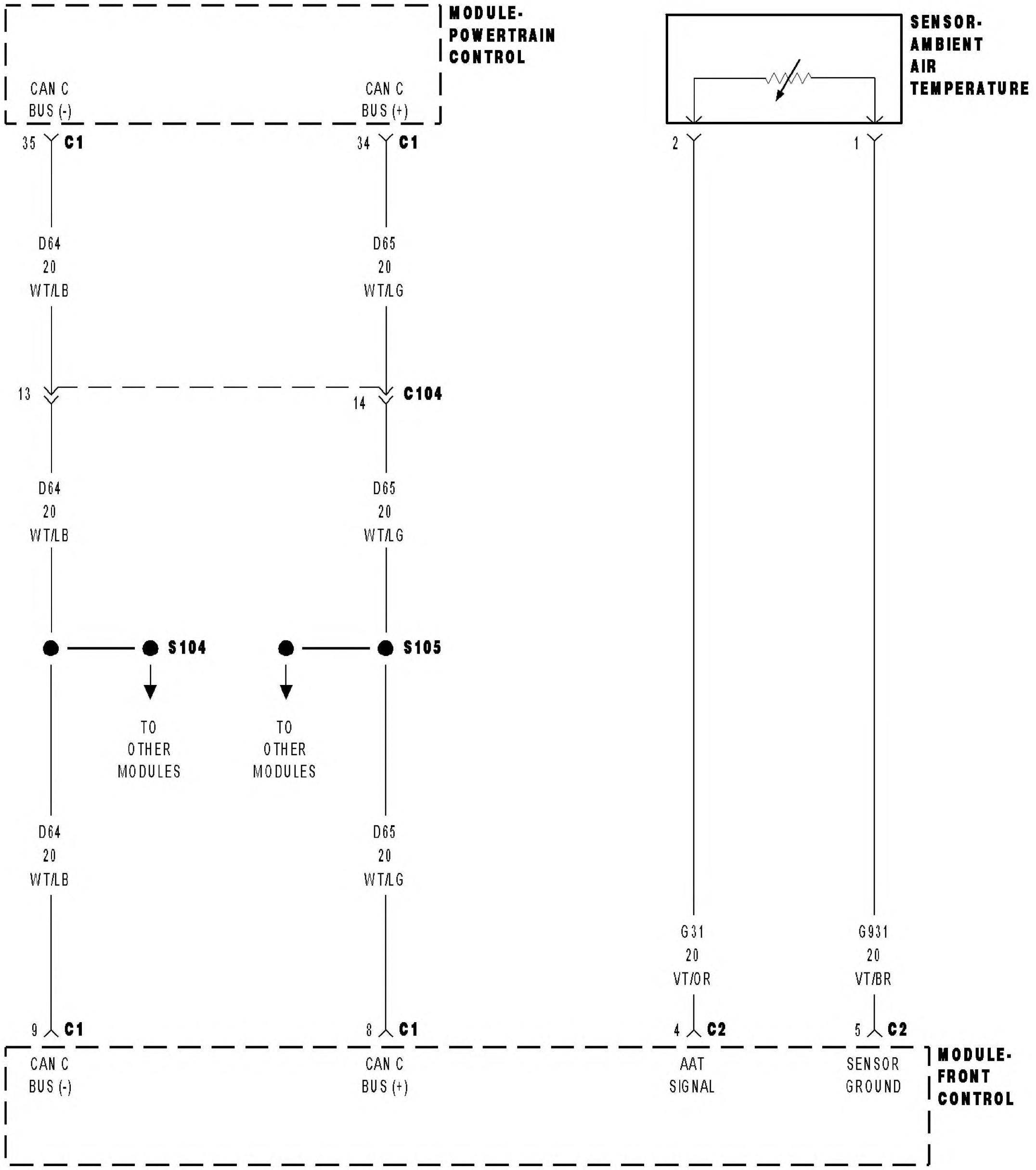
With the scan tool read DTCs.

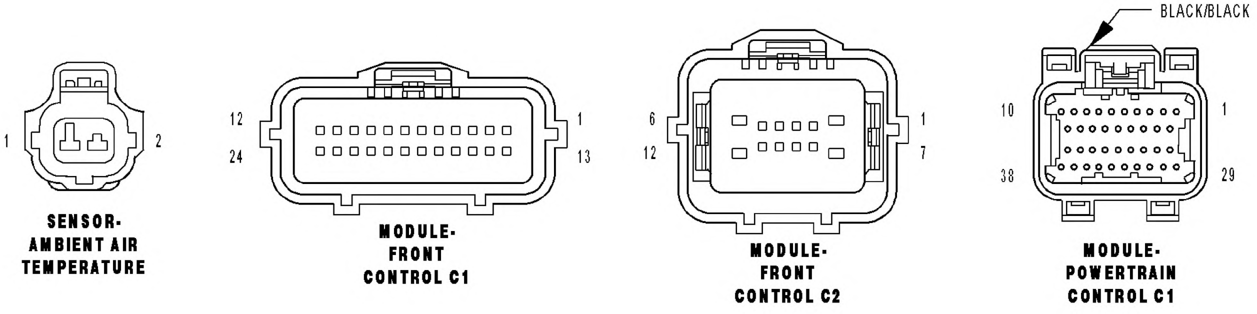
Is the U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE also set?

Yes >> Follow the diagnostics for U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U110E-LOST AMBIENT TEMPERATURE MESSAGE


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35
C1
34
C1
SENSOR-
AMBIENT
AIR
TEMPERATURE
2
1
D64
20
WT/LB
D65
20
WT/LG
13
14
C104
S104
S105
TO
OTHER
MODULES
TO
OTHER
MODULES
G31
20
VT/OR
G931
20
VT/BR
9
C1
8
C1
4
C2
5
C2
MODULE-
FRONT
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
AAT
SIGNAL
SENSOR
GROUND


1
2
SENSOR-
AMBIENT AIR
TEMPERATURE
12
24
1
13
MODULE-
FRONT
CONTROL C1
6
12
1
7
MODULE-
FRONT
CONTROL C2
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1

81475ba7

U110E-LOST AMBIENT TEMPERATURE MESSAGE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM doesn't receive the ambient temperature signal over the CAN C bus from the FCM. The circuit is continuously monitored.

Possible Causes
CAN C BUS CIRCUIT OPEN OR SHORTED
FRONT CONTROL MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The ambient temperature sensor signal is a direct input to the FCM. The FCM sends the PCM the ambient temperature signal over the CAN C bus.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With the scan tool read Powertrain DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

2. U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE ALSO ACTIVE

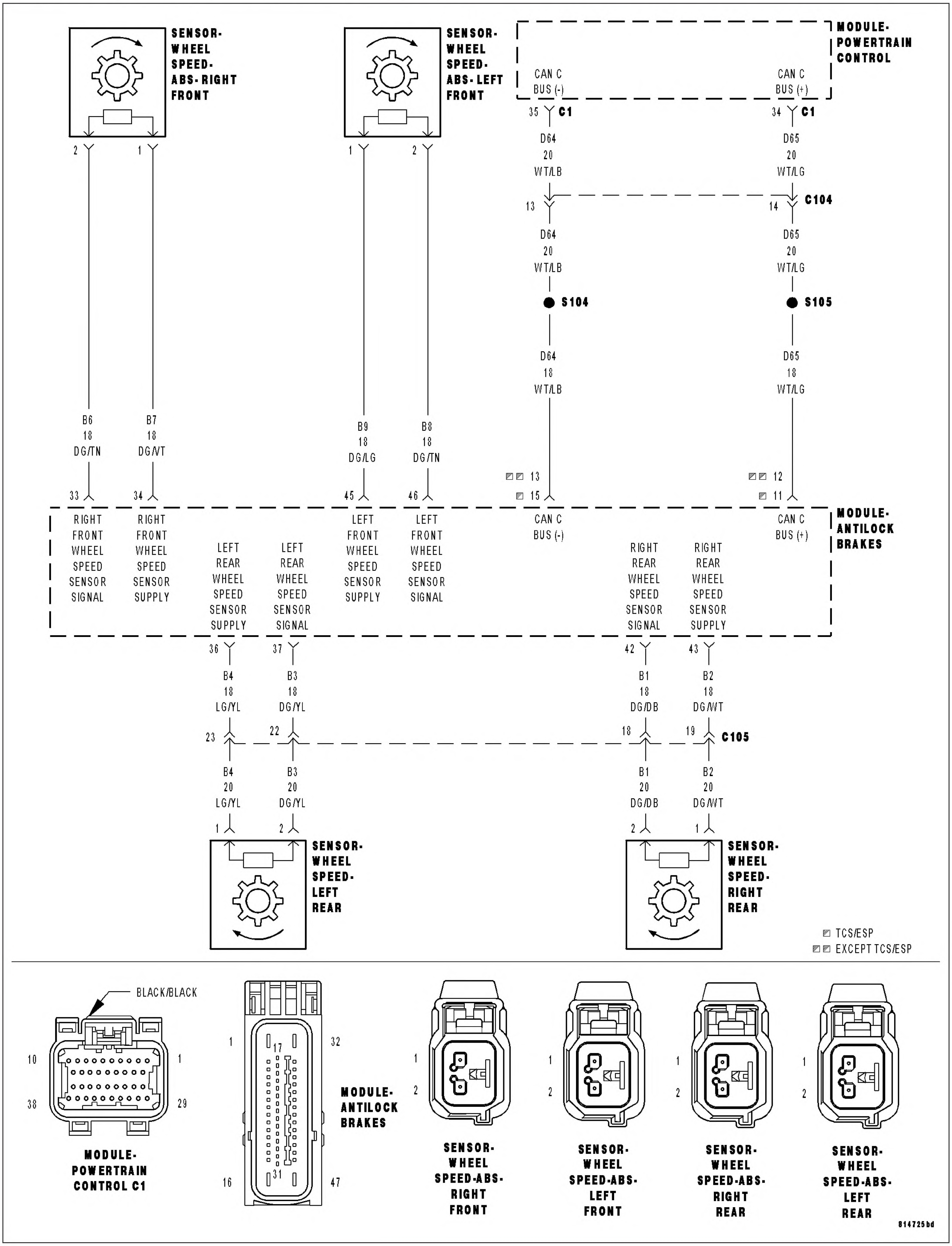
With the scan tool read DTCs.

Is the U0141-NO BUS MESSAGE RECEIVED FROM THE FCM also set?

Yes >> Follow the diagnostics for U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1110-LOST VEHICLE SPEED MESSAGE


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14 C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19 C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

U1110-LOST VEHICLE SPEED MESSAGE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM doesn't receive a vehicle speed signal from the Anti-lock brake Module over the CAN C bus.

Possible Causes
CAN C BUS CIRCUIT OPEN OR SHORTED
ANTI-LOCK BRAKE MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) .

Theory of Operation

The PCM receives the vehicle speed signal over the CAN C bus from the Anti-lock Brake Module.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With the scan tool read Powertrain DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. U0121-LOST COMMUNICATION WITH ABS MODULE ALSO SET

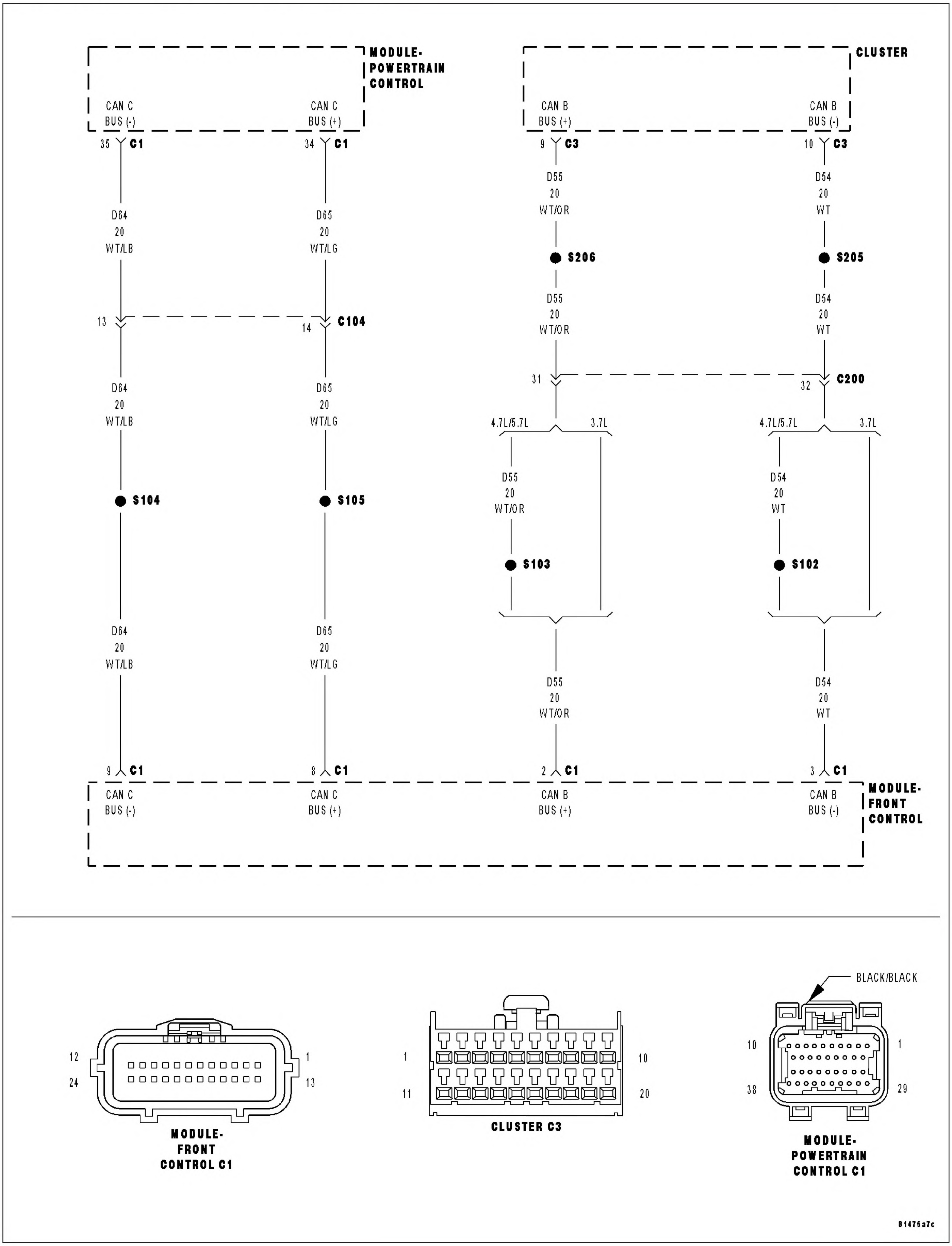
With the scan tool continue reading DTCs.

Is the U0121-LOST COMMUNICATION WITH ABS MODULE also set?

Yes >> Follow the diagnostics for U0121-LOST COMMUNICATION WITH ABS MODULE
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1111-LOST ODOMETER MESSAGE


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
D64
20
WT/LB
D65
20
WT/LG
13
14 C104
S104
S105
CLUSTER
CAN B
BUS (+)
CAN B
BUS (-)
9 C3
10 C3
D55
20
WT/OR
D54
20
WT
S206
S205
31
32 C200
4.7L/5.7L
3.7L
S103
S102
9 C1
8 C1
2 C1
3 C1
MODULE-
FRONT
CONTROL
12
24
1
13
MODULE-
FRONT
CONTROL C1
1
11
10
20
CLUSTER C3
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
81475a7c

U1111-LOST ODOMETER MESSAGE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM doesn’t receive an odometer reading from the cluster through the FCM over CAN C.

Possible Causes
CAN C OPEN OR SHORTED
FRONT CONTROL MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The PCM receives odometer readings from the Front Control Module over CAN C. The FCM gets the odometer readings from the Cluster Module over CAN B. U0001-CAN C BUS, and U0141-LOST COMMUNICATION WITH FCM may also set.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With the scan tool read Powertrain DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE ALSO ACTIVE

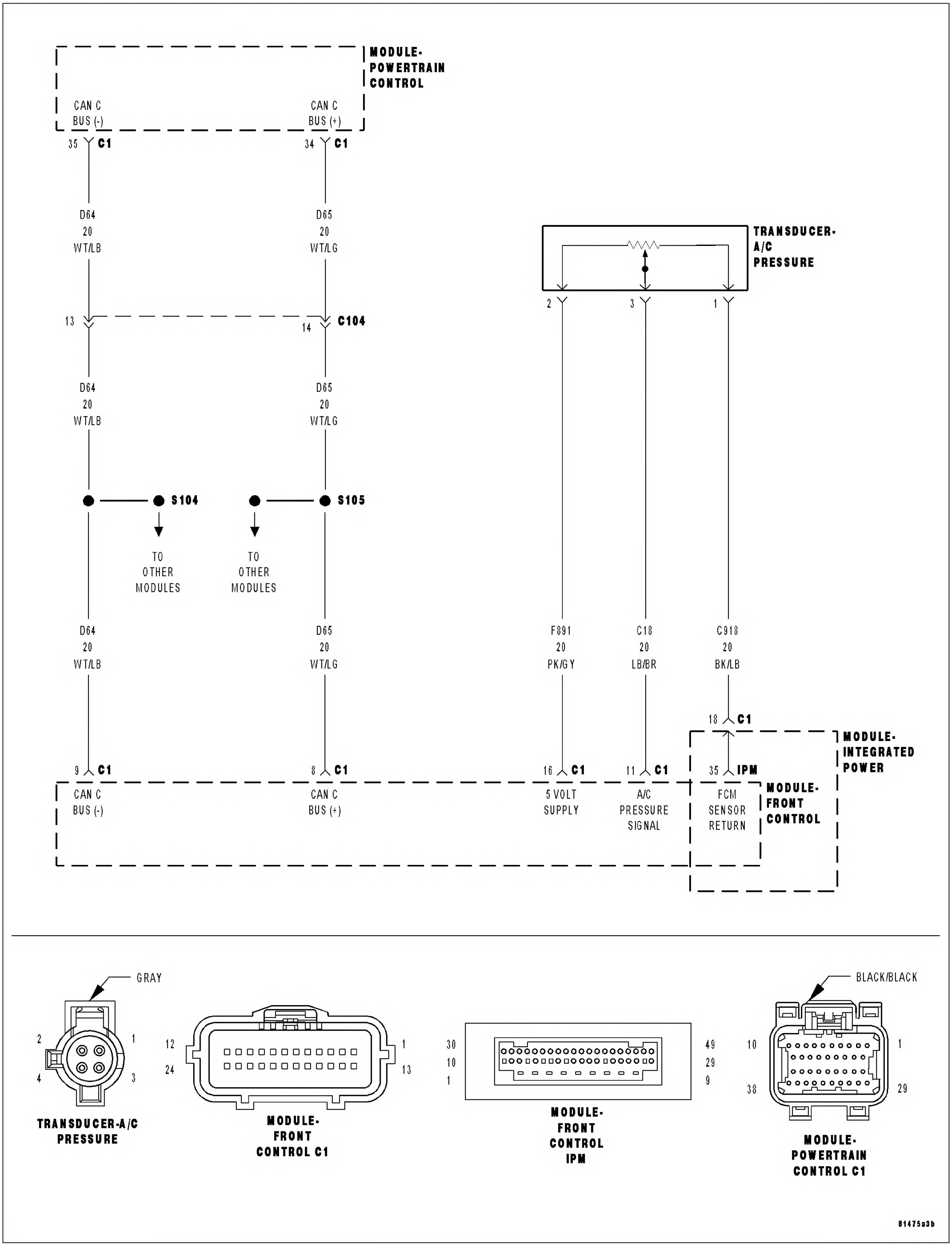
With the scan tool read DTCs.

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE also set?

Yes >> Follow the diagnostics for U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1113-LOST A/C PRESSURE MESSAGE


MODULE-
POWERTRAIN
CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
TRANSDUCER-
A/C
PRESSURE
2
3
1
13
14 C104
S104
S105
TO OTHER MODULES
TO OTHER MODULES
F891 20 PK/GY
C18 20 LB/BR
C918 20 BK/LB
18 C1
MODULE-
INTEGRATED
POWER
9 C1
8 C1
16 C1
11 C1
35 IPM
CAN C BUS (-)
CAN C BUS (+)
5 VOLT SUPPLY
A/C PRESSURE SIGNAL
FCM SENSOR RETURN
MODULE-
FRONT
CONTROL
GRAY
2 1 4 3
TRANSDUCER-A/C PRESSURE
12 1 24 13
MODULE-FRONT CONTROL C1
30 10 1 49 29 9
MODULE-FRONT CONTROL IPM
BLACK/BLACK
10 1 38 29
MODULE-POWERTRAIN CONTROL C1
81475a3b

U1113-LOST A/C PRESSURE MESSAGE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM doesn't receive the A/C Pressure signal over the CAN C bus from the FCM. The circuit is continuously monitored.

Possible Causes
CAN C BUS CIRCUIT OPEN OR SHORTED
FRONT CONTROL MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The A/C Pressure Transducer signal is a direct input to the FCM. The FCM sends the PCM the A/C pressure signal over the CAN C bus.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With the scan tool read Powertrain DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE ALSO ACTIVE

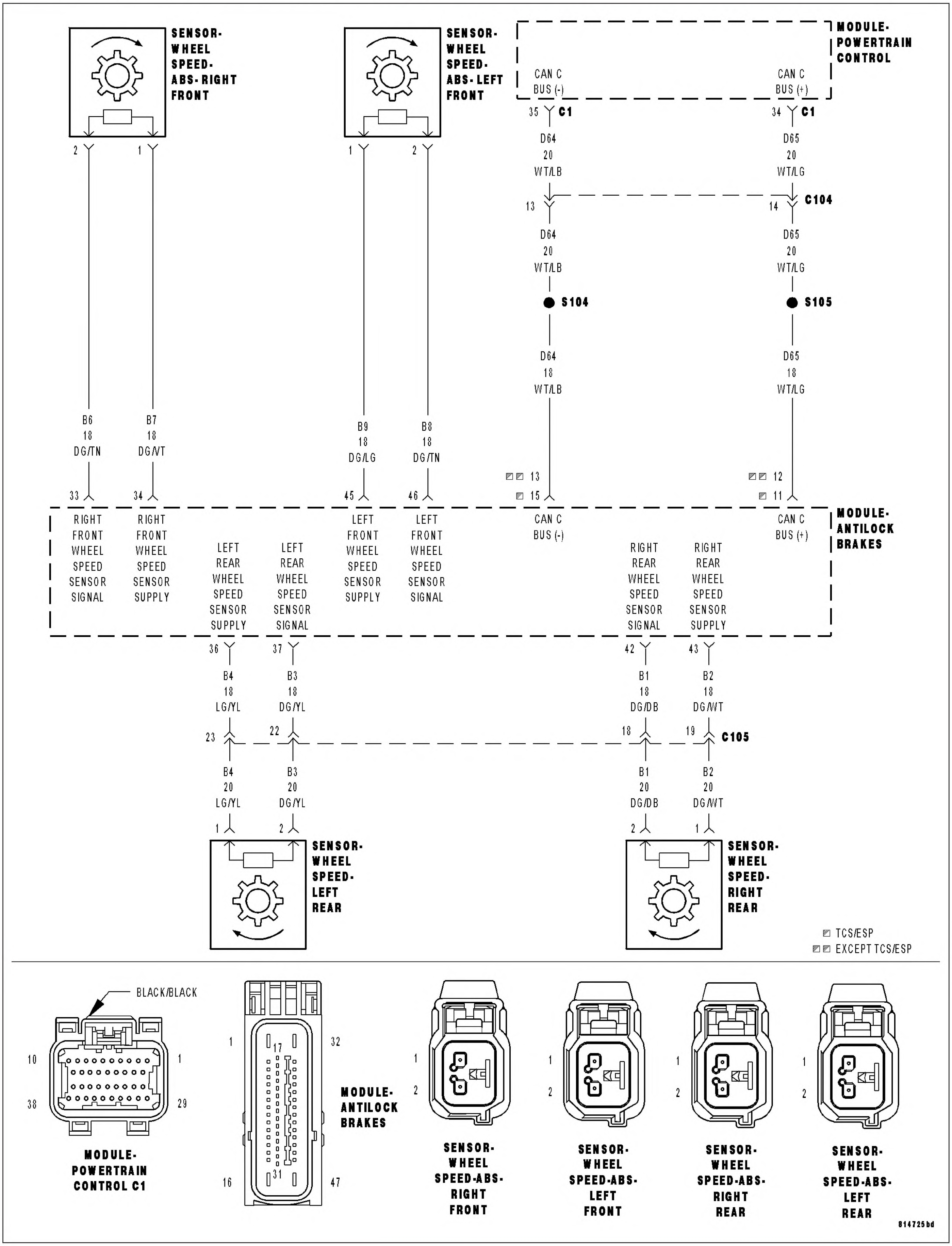
With the scan tool read DTCs.

Is the U0141-NO BUS MESSAGE RECEIVED FROM THE FCM also set?

Yes >> Follow the diagnostics for U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1120-LOST WHEEL DISTANCE MESSAGE


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14
C104
S104
S105
D64 18 WT/LB
D65 18 WT/LG
2
1
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
33
34
45
46
▨▨ 13
▨ 15
▨▨ 12
▨ 11
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19
C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

U1120-LOST WHEEL DISTANCE MESSAGE (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM doesn't receive a vehicle speed signal from the Anti-lock brake Module over the CAN C bus.

Possible Causes
CAN C BUS CIRCUIT OPEN OR SHORTED
ANTI-LOCK BRAKE MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) .

Theory of Operation

The PCM receives the vehicle speed signal over the CAN C bus from the Anti-lock Brake Module.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With the scan tool read Powertrain DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. U0121-LOST COMMUNICATION WITH ABS MODULE ALSO SET

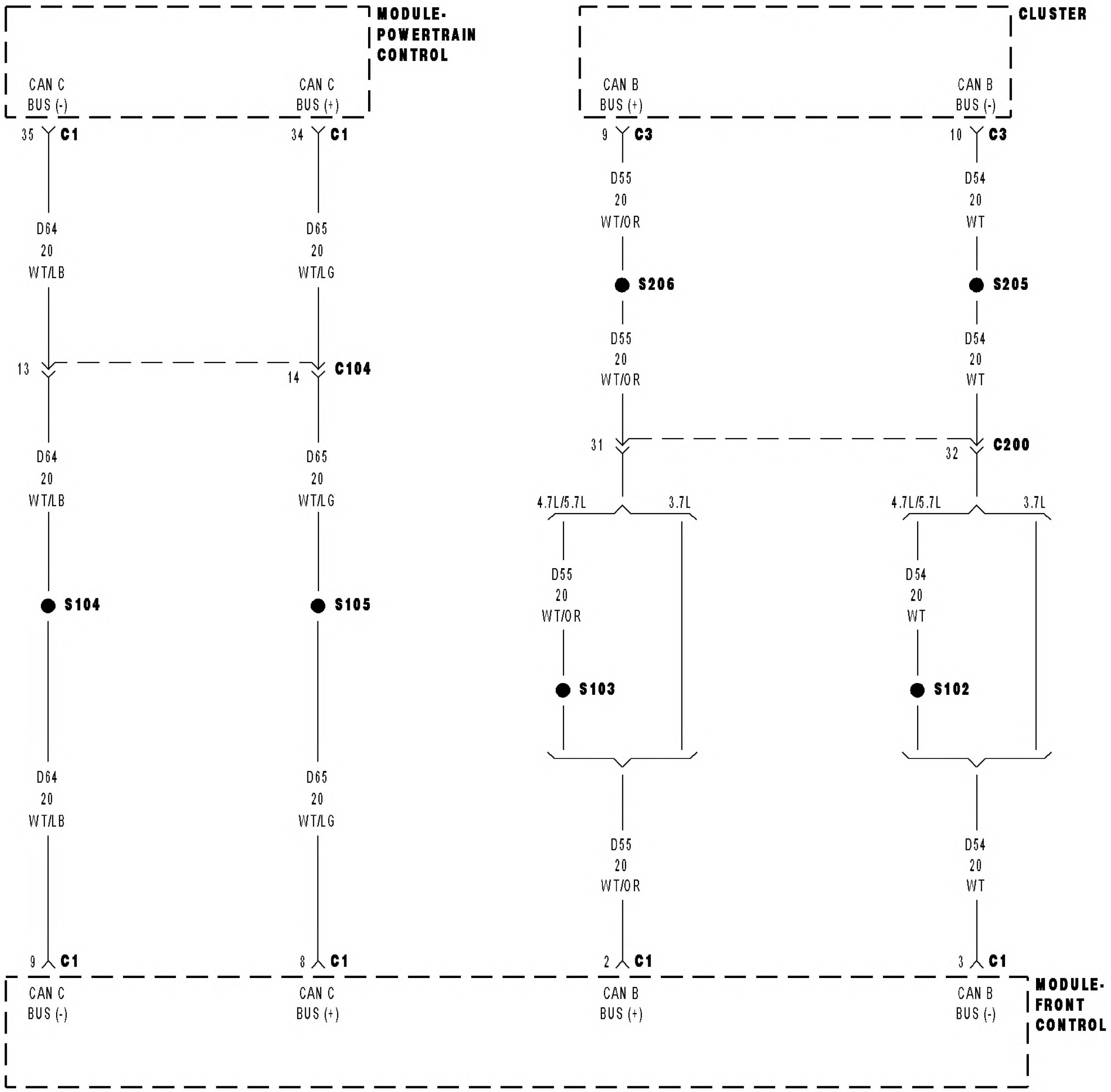
With the scan tool continue reading DTCs.

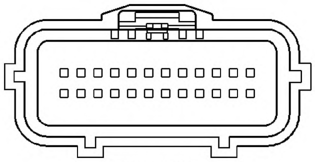
Is the U0121-LOST COMMUNICATION WITH ABS MODULE also set?

Yes >> Follow the diagnostics for U0121-LOST COMMUNICATION WITH ABS MODULE
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

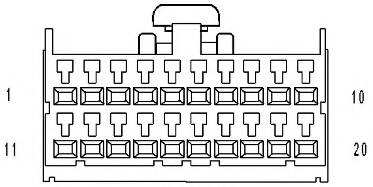
No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1411-IMPLAUSIBLE FUEL VOLUME SIGNAL RECEIVED

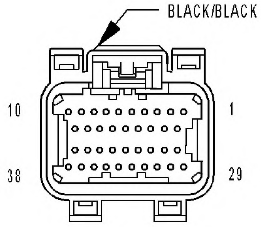

MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
D64
20
WT/LB
D65
20
WT/LG
13
14 C104
S104
S105
CLUSTER
CAN B
BUS (+)
CAN B
BUS (-)
9 C3
10 C3
D55
20
WT/OR
D54
20
WT
S206
S205
31
32 C200
4.7L/5.7L
3.7L
S103
S102
9 C1
8 C1
2 C1
3 C1
CAN C
BUS (-)
CAN C
BUS (+)
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
FRONT
CONTROL



MODULE-
FRONT
CONTROL C1



CLUSTER C3


BLACK/BLACK
10
38
1
29

MODULE-
POWERTRAIN
CONTROL C1

81475a7c

U1411-IMPLAUSIBLE FUEL VOLUME SIGNAL RECEIVED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The fuel volume message the PCM is receiving is implausible. The circuit is continuously monitored.

Possible Causes
CAN B OPEN OR SHORTED
CLUSTER MODULE
FRONT CONTROL MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The Front Control Module isn't receiving a fuel volume signal over CAN B from the Cluster Module. The FCM has to send the PCM a fuel volume signal over CAN C. The signal the FCM sends over CAN C is implausible.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. CAN B BUS HARDWARE DTCS ALSO ACTIVE

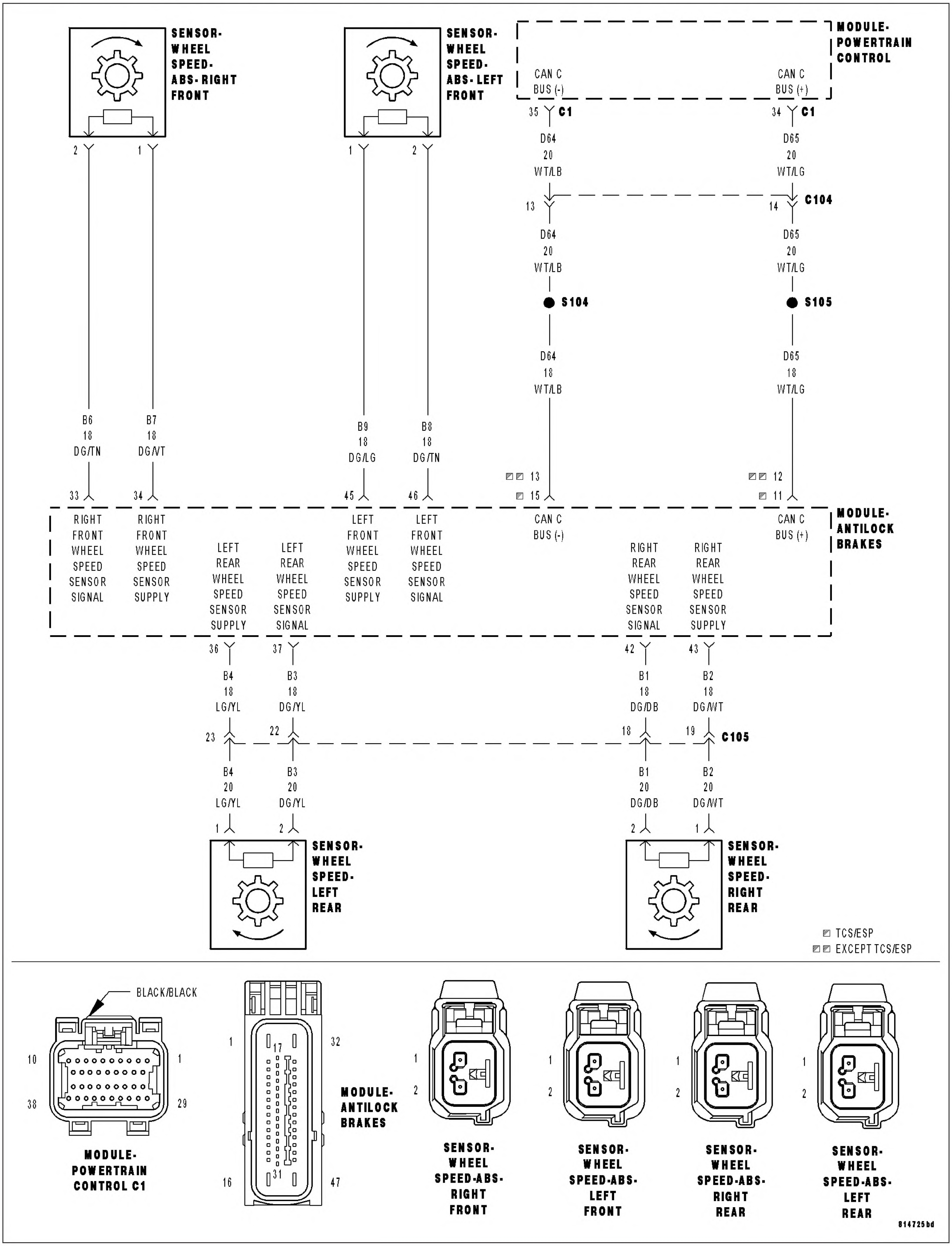
With a scan tool check for DTCs in the FCM.

Are any CAN B Hardware related DTCs active at this time?

Yes >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the appropriate diagnostic procedures.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1412-IMPLAUSIBLE VEHICLE SPEED SIGNAL RECEIVED


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14 C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
2
1
1
2
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19 C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

U1412-IMPLAUSIBLE VEHICLE SPEED SIGNAL RECEIVED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM gets an implausible signal over the CAN C circuit from the ABS Module. The circuit is continuously monitored.

Possible Causes
CAN C BUS CIRCUIT SHORTED
CAN C BUS CIRCUIT OPEN
ABS MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The ABS Module sends vehicle speed information over the CAN C Bus circuit to the PCM.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the U1412-IMPLAUSIBLE VEHICLE SPEED SIGNAL RECEIVED active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. U0001-NO COMMUNICATION ON THE CAN C BUS CIRCUIT IS ACTIVE

Continue reading DTCs.

Is the U0001-NO COMMUNICATION ON THE CAN C BUS CIRCUIT ACTIVE at this time?

Yes >> Refer to the Diagnostic Procedure for the U0001-NO COMMUNICATION ON THE CAN C BUS CIRCUIT.

No >> Go To 3

U1412-IMPLAUSIBLE VEHICLE SPEED SIGNAL RECEIVED (CONTINUED)

3. ABS MODULE IS ACTIVE ON THE CAN C BUS

With the scan tool, select ECU View.

Verify that the ABS Module active on the bus.

Is the ABS Module active on the bus?

Yes >> Go To 4

No >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for No Response diagnostic procedures.
Perform BODY VERIFICATION TEST – VER 1.

4. ACTIVE DTCS IN THE FCM

With the scan tool, select ECU View and select FCM.

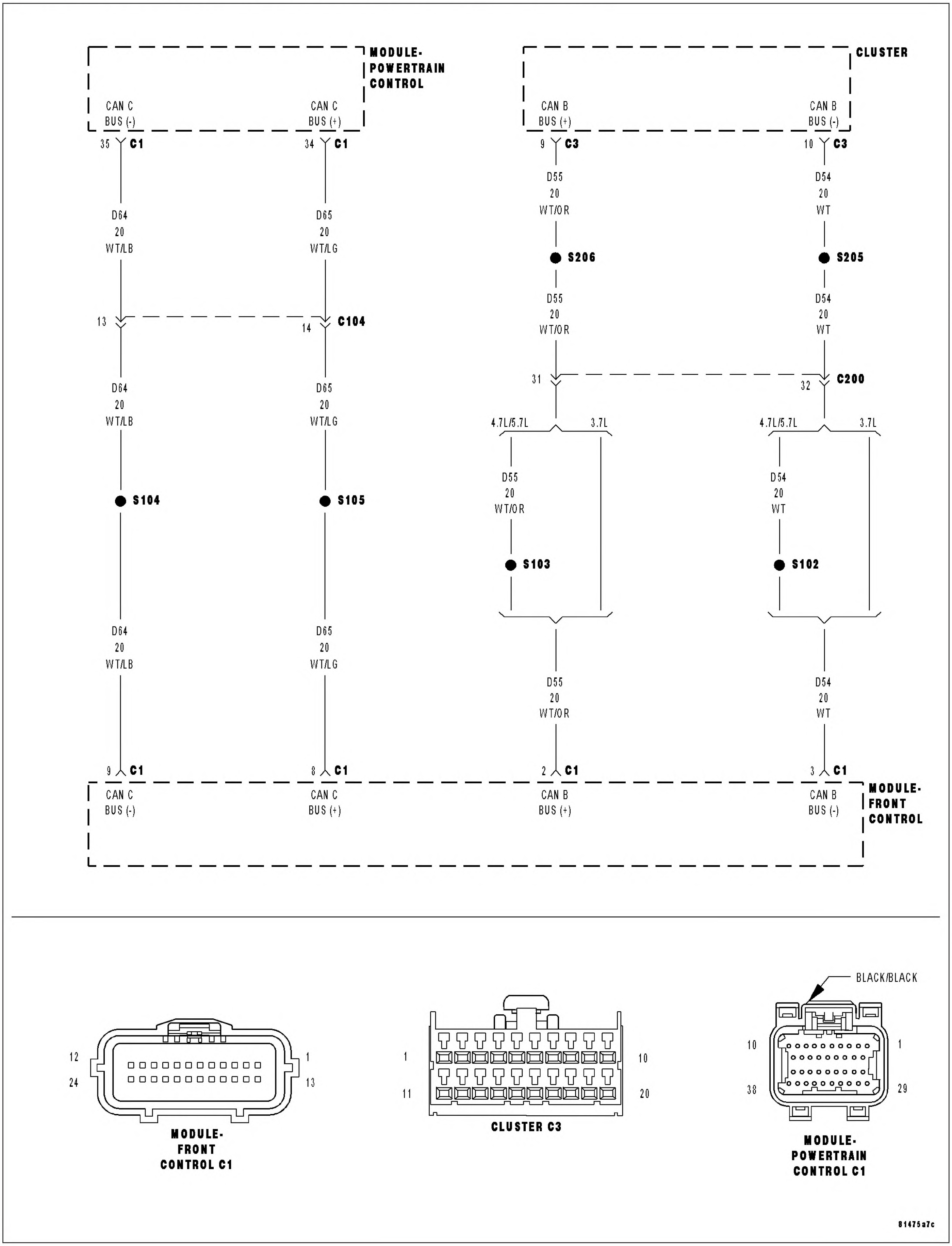
With the scan tool, read active DTCs.

Is the U0001-NO COMMUNICATION ON THE CAN C BUS CIRCUIT ACTIVE in the FCM at this time?

Yes >> Replace the ABS Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1413-IMPLAUSIBLE ODOMETER SIGNAL RECEIVED


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (-)
CAN C
BUS (+)
35 C1
34 C1
D64
20
WT/LB
D65
20
WT/LG
13
14 C104
S104
S105
CLUSTER
CAN B
BUS (+)
CAN B
BUS (-)
9 C3
10 C3
D55
20
WT/OR
D54
20
WT
S206
S205
31
32 C200
4.7L/5.7L
3.7L
S103
S102
9 C1
8 C1
2 C1
3 C1
MODULE-
FRONT
CONTROL
12
24
1
13
MODULE-
FRONT
CONTROL C1
1
11
10
20
CLUSTER C3
BLACK/BLACK
10
38
1
29
MODULE-
POWERTRAIN
CONTROL C1
81475a7c

U1413-IMPLAUSIBLE ODOMETER SIGNAL RECEIVED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The odometer message the PCM is receiving is implausible. The circuit is continuously monitored.

Possible Causes
CAN B OPEN OR SHORTED
CLUSTER MODULE
FRONT CONTROL MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The Front Control Module isn't receiving an odometer signal over CAN B from the Cluster Module. The FCM has to send the PCM an odometer signal over CAN C. The signal the FCM is sending over CAN C is implausible.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool read DTCs.

Is the DTC active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. CAN B BUS HARDWARE DTCS ALSO ACTIVE

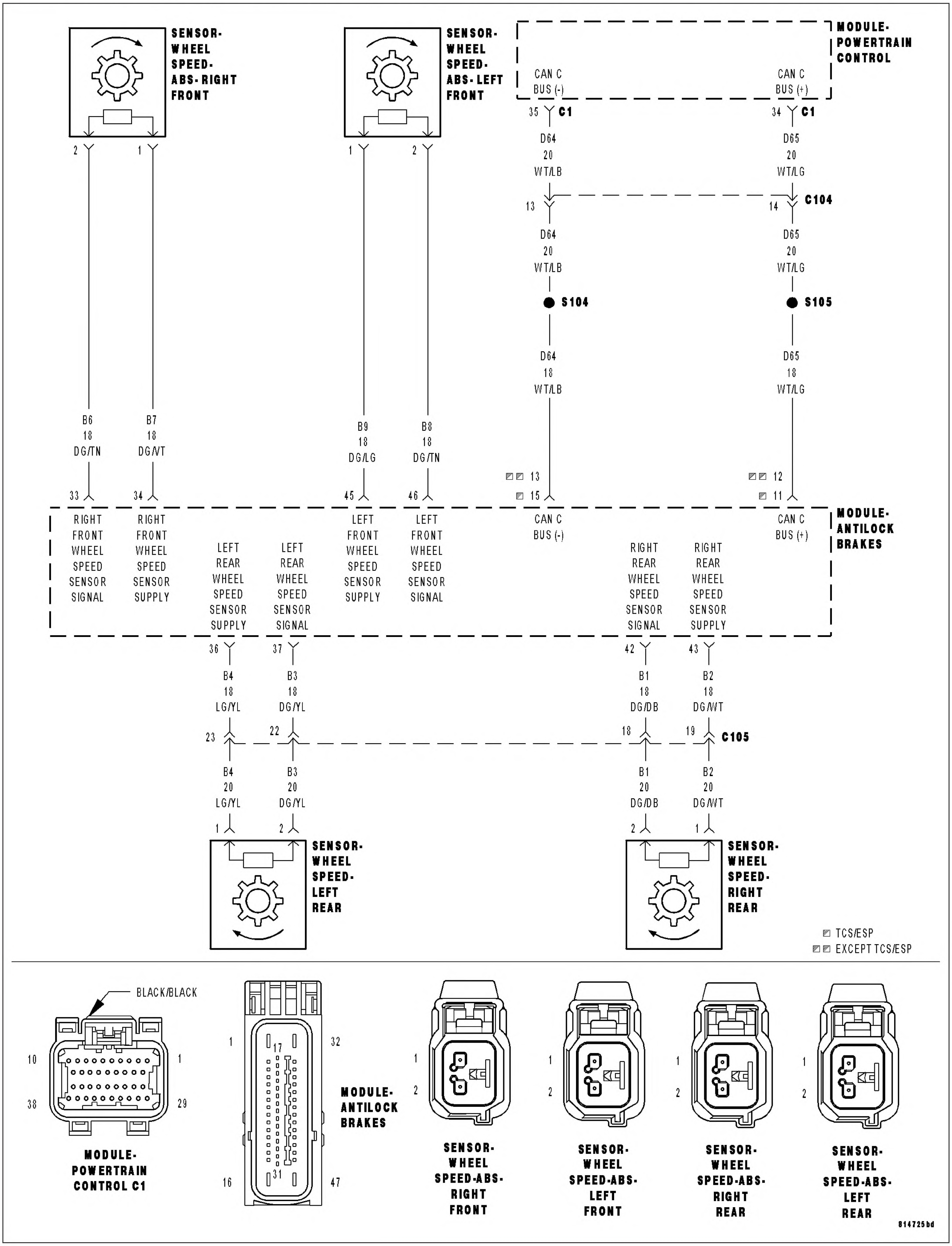
With a scan tool check for DTCs in the FCM.

Are any CAN B Hardware related DTCs active at this time?

Yes >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the appropriate diagnostic procedures.
Perform BODY VERIFICATION TEST – VER 1.

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1417-IMPLAUSIBLE LEFT WHEEL DISTANCE SIGNAL RECEIVED


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14
C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19
C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

U1417-IMPLAUSIBLE LEFT WHEEL DISTANCE SIGNAL RECEIVED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM gets an implausible signal over the CAN C circuit from the ABS Module. The circuit is continuously monitored.

Possible Causes
VEHICLE SPEED SENSOR FAULT ACTIVE IN ANTI-LOCK BRAKE MODULE
CAN C BUS CIRCUIT SHORTED
CAN C BUS CIRCUIT OPEN
ABS MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The ABS Module sends an implausible distance signal over the CAN C Bus circuit to the PCM.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.

With a scan tool, read DTCs.

Is the U1417-IMPLAUSIBLE LEFT WHEEL DISTANCE SIGNAL RECEIVED active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. ABS MODULE IS ACTIVE ON THE CAN C BUS

With the scan tool, select ECU View.

Verify that the ABS Module active on the bus.

Is the ABS Module active on the bus?

Yes >> Go To 3

No >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for No Response diagnostic procedures.
Perform BODY VERIFICATION TEST – VER 1.

U1417-IMPLAUSIBLE LEFT WHEEL DISTANCE SIGNAL RECEIVED (CONTINUED)

3. DTCS STORED OR ACTIVE IN THE ABS MODULE

Check for DTCs in the ABS Module.

Are any DTCs active or stored in the ABS Module?

Yes >> Refer to section 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS and perform the diagnostics for the DTCs in the ABS Module.
Perform ABS VERIFICATION TEST – VER 1

No >> Go to 4

---

4. ACTIVE DTCS IN THE FCM

With the scan tool, select ECU View and select FCM.

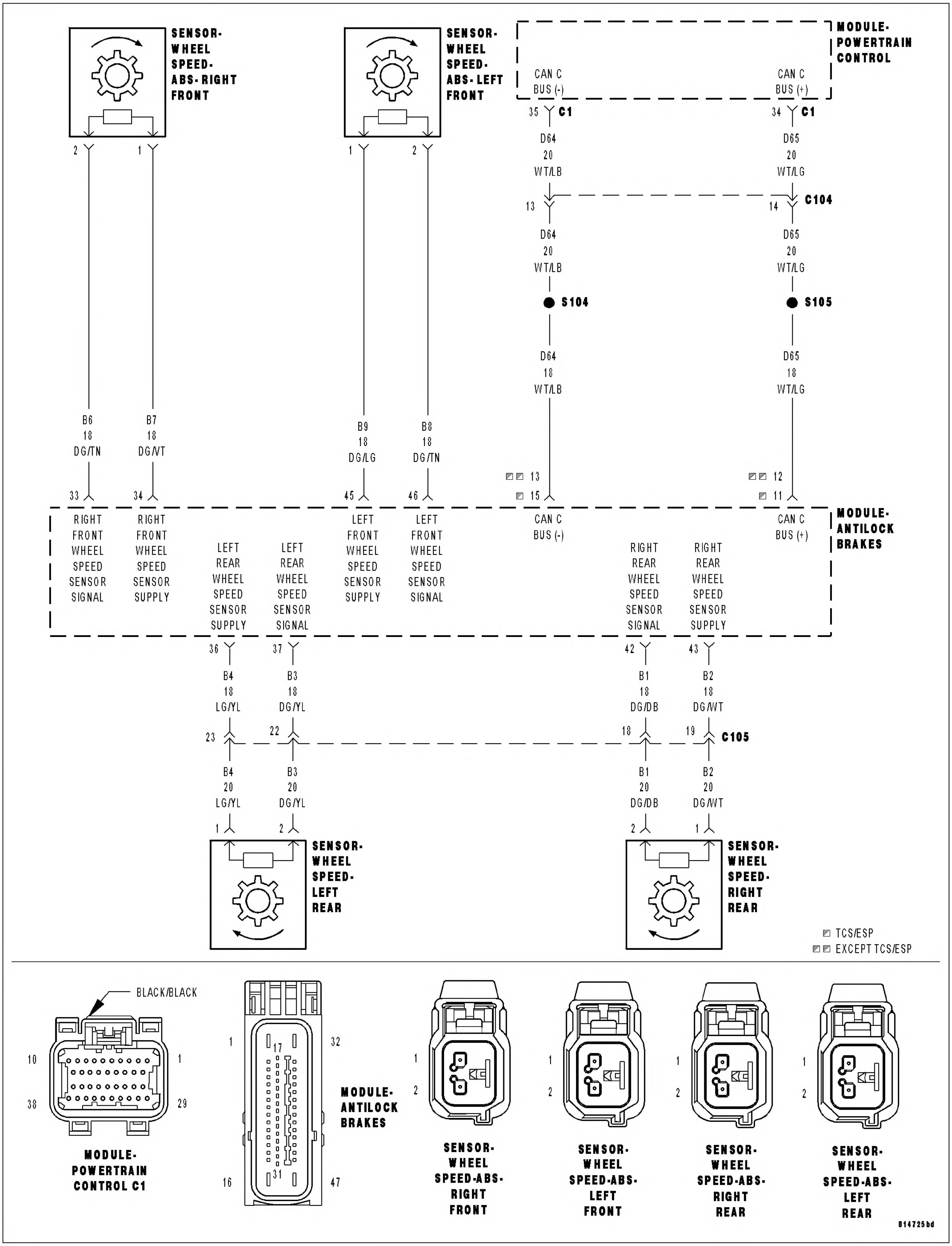
With the scan tool, read active DTCs.

Are any Communication DTCs active in the FCM relating to the ABS System?

Yes >> Replace the ABS Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

U1418-IMPLAUSIBLE RIGHT WHEEL DISTANCE SIGNAL RECEIVED


SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
2
1
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
MODULE-POWERTRAIN CONTROL
CAN C BUS (-)
CAN C BUS (+)
35 C1
34 C1
D64 20 WT/LB
D65 20 WT/LG
13
14
C104
D64 20 WT/LB
D65 20 WT/LG
S104
S105
D64 18 WT/LB
D65 18 WT/LG
B6 18 DG/TN
B7 18 DG/VT
B9 18 DG/LG
B8 18 DG/TN
▨▨ 13
▨ 15
▨▨ 12
▨ 11
33
34
45
46
MODULE-ANTILOCK BRAKES
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
CAN C BUS (-)
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR SUPPLY
CAN C BUS (+)
36
37
42
43
B4 18 LG/YL
B3 18 DG/YL
B1 18 DG/DB
B2 18 DG/WT
23
22
18
19
C105
B4 20 LG/YL
B3 20 DG/YL
B1 20 DG/DB
B2 20 DG/WT
1
2
2
1
SENSOR-WHEEL SPEED-LEFT REAR
SENSOR-WHEEL SPEED-RIGHT REAR
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-LEFT FRONT
1
2
SENSOR-WHEEL SPEED-ABS-RIGHT REAR
1
2
SENSOR-WHEEL SPEED-ABS-LEFT REAR
814725bd

U1418-IMPLAUSIBLE RIGHT WHEEL DISTANCE SIGNAL RECEIVED (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Ignition on.
- **Set Condition:**
  The PCM gets an implausible signal over the CAN C circuit from the ABS Module. The circuit is continuously monitored.

Possible Causes
VEHICLE SPEED SENSOR FAULT ACTIVE IN ANTI-LOCK BRAKE MODULE
CAN C BUS CIRCUIT SHORTED
CAN C BUS CIRCUIT OPEN
ABS MODULE
PCM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).

Theory of Operation

The ABS Module sends an implausible distance signal over the CAN C Bus circuit to the PCM.

Diagnostic Test

1. ACTIVE DTC

Ignition on, engine not running.
With a scan tool, read DTCs.

Is the U1418-IMPLAUSIBLE RIGHT WHEEL DISTANCE SIGNAL RECEIVED active at this time?

Yes >> Go To 2

No >> Refer to the INTERMITTENT CONDITION Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

2. ABS MODULE IS ACTIVE ON THE CAN C BUS

With the scan tool, select ECU View.
Verify that the ABS Module active on the bus.

Is the ABS Module active on the bus?

Yes >> Go To 3

No >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for No Response diagnostic procedures.
Perform BODY VERIFICATION TEST – VER 1.

U1418-IMPLAUSIBLE RIGHT WHEEL DISTANCE SIGNAL RECEIVED (CONTINUED)

3. DTCS STORED OR ACTIVE IN THE ABS MODULE

Check for DTCs in the ABS Module.

Are any DTCs active or stored in the ABS Module?

Yes >> Refer to section 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS and perform the diagnostics for the DTCs in the ABS Module.
Perform ABS VERIFICATION TEST – VER 1

No >> Go to 4

---

4. ACTIVE DTCS IN THE FCM

With the scan tool, select ECU View and select FCM.

With the scan tool, read active DTCs.

Are any Communication DTCs active in the FCM relating to the ABS System?

Yes >> Replace the ABS Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*5.7L INTERMITTENT NO CRANK CONDITION

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
ETC STARTER INHIBIT

Diagnostic Test

1. ETC STARTER INHIBIT

NOTE: This 5.7L engine will try to relearn ETC position when the key is left in the on position for an extended period of time and will not allow the starter to crank during this procedure. This procedure can take up to 2.5 seconds.

To verify the cause of the no crank condition or delayed crank use the scan tool, and read the ETC Starter Inhibit mileage.

The controller will store the mileage at which the no start condition occurred because of the ETC testing procedure.

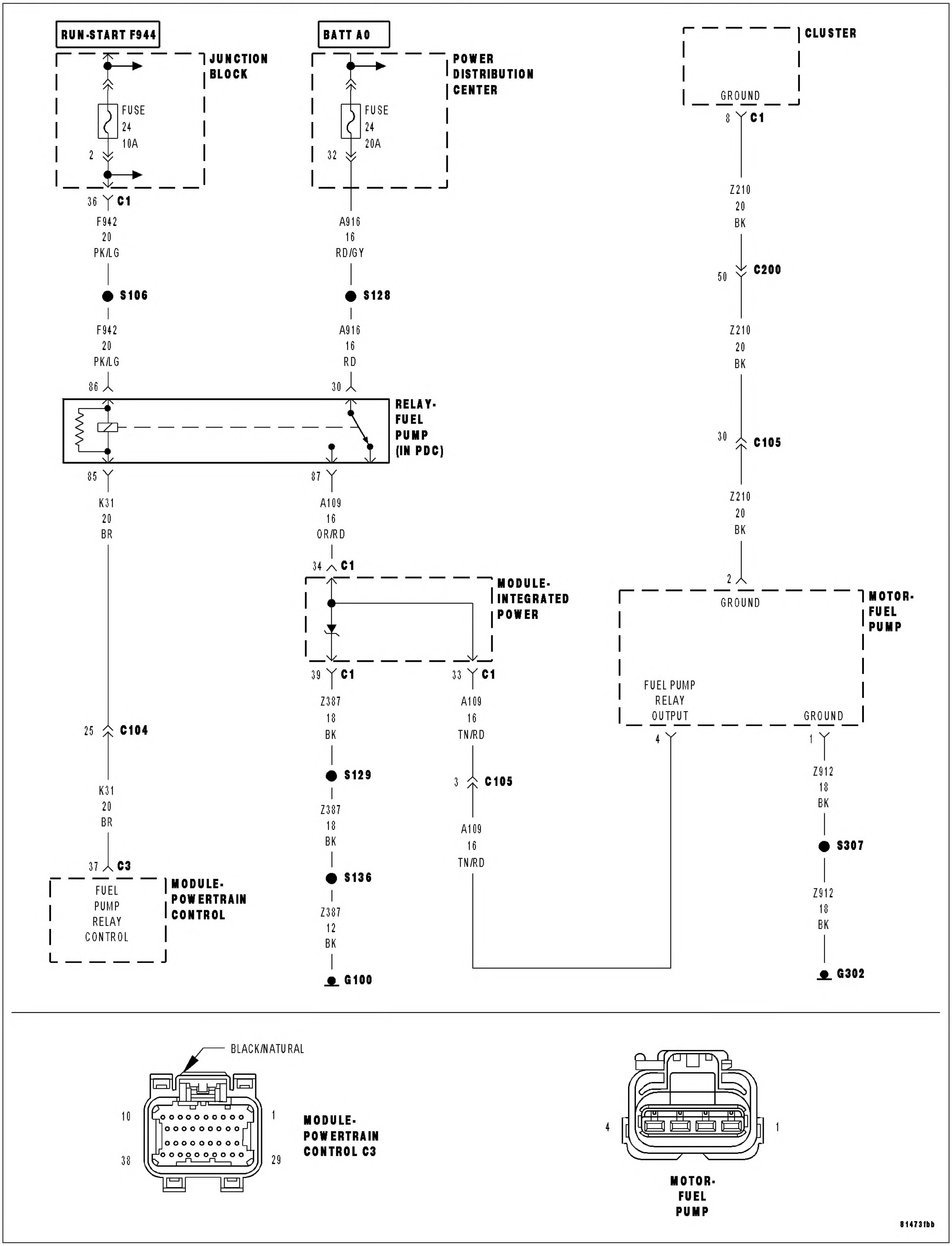
This is considered normal operation for a vehicle equipped with an Electronic Throttle Control System and no repairs are necessary.

Is a mileage stored under the ETC Starter Inhibit?

Yes >> Test Complete.

No >> Refer to the appropriate diagnostic procedure for further assistance if any other DTC's are set.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*CHECKING THE FUEL DELIVERY SYSTEM


RUN-START F944
JUNCTION BLOCK
FUSE 24 10A
2
36 C1
F942 20 PK/LG
S106
F942 20 PK/LG
86
BATT A0
POWER DISTRIBUTION CENTER
FUSE 24 20A
32
A916 16 RD/GY
S128
A916 16 RD
30
RELAY-FUEL PUMP (IN PDC)
85
K31 20 BR
25 C104
K31 20 BR
37 C3
MODULE-POWERTRAIN CONTROL
FUEL PUMP RELAY CONTROL
87
A109 16 OR/RD
34 C1
MODULE-INTEGRATED POWER
39 C1
Z387 18 BK
S129
Z387 18 BK
S136
Z387 12 BK
G100
33 C1
A109 16 TN/RD
3 C105
A109 16 TN/RD
CLUSTER
GROUND
8 C1
Z210 20 BK
50 C200
Z210 20 BK
30 C105
Z210 20 BK
2
MOTOR-FUEL PUMP
GROUND
FUEL PUMP RELAY OUTPUT
GROUND
4
1
Z912 18 BK
S307
Z912 18 BK
G302
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
4
1
MOTOR-FUEL PUMP
81473fbb

*CHECKING THE FUEL DELIVERY SYSTEM (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
(A109) FUSED B+ CIRCUIT
FUEL PUMP RELAY
FUEL PUMP

Diagnostic Test

1. FUEL PUMP OPERATION

Ignition on, engine not running.

With a scan tool, actuate the Fuel System test.

NOTE: It may be necessary to use a mechanics stethoscope in the next step.

Listen for fuel pump operation at the fuel tank.

CAUTION: Stop All Actuations.

Does the Fuel Pump operate?

Yes >> Go To 2

No >> Go To 5

---

2. FUEL PRESSURE

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge at the engine.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

CAUTION: Stop All Actuations.

Choose a conclusion that best matches your fuel pressure reading.

Below Specification

Go To 3

Within Specification

Test Complete.

Above Specification

Replace the fuel filter/fuel pressure regulator.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

*CHECKING THE FUEL DELIVERY SYSTEM (CONTINUED)

3. RESTRICTED FUEL SUPPLY LINE

Turn the ignition off.

WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.

Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module.

Install special tool #6539 (5/16″) or #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

CAUTION: Stop All Actuations.

Is the fuel pressure within specification now?

Yes >> Repair/replace fuel supply line as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. CHECKING FUEL INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. (A109) FUSED B+ CIRCUIT OPEN

Turn the ignition off.

Remove the Fuel Pump Relay from the IPM.

Disconnect the Fuel Pump Module harness connector.

Measure the resistance of the (A109) Fused B+ circuit from the relay connector to the fuel pump module connector.

Is the resistance below 5.0 ohms?

Yes >> Replace the Fuel Pump Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Repair the open in the (N1) Fuel Pump Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

*HARD START FUEL SYSTEM

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
FUEL CONTAMINATION
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
FUEL INJECTOR(S)

Diagnostic Test

1. CHECKING FUEL PRESSURE

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install a fuel pressure gauge at the engine.

Ignition on, engine not running.

With a scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Choose a conclusion that best matches your fuel pressure reading.

Below Specification
Go To 2

Within Specification
Go To 4

---

2. RESTRICTED FUEL SUPPLY LINE

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Raise vehicle on hoist, and disconnect the fuel supply line at the fuel pump module.

Install special tool #6539 (5/16″) #6631(3/8″) fuel line adapter and the fuel pressure gauge between the fuel supply line and the fuel pump module.

Ignition on, engine not running.

With the scan tool, actuate the ASD Fuel System test and observe the fuel pressure gauge.

NOTE: Fuel pressure specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Is the fuel pressure within specification?

Yes >> Visually and physically inspect the fuel supply lines between the fuel tank and the fuel rail. Repair/replace as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

*HARD START FUEL SYSTEM (CONTINUED)

3. CHECKING THE FUEL INLET STRAINER

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer.

Is the Fuel Inlet Strainer plugged?

Yes >> Replace the Fuel Pump Inlet Strainer.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

4. FUEL PUMP MODULE

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi)

Does the fuel pressure drop?

Yes >> Replace Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

*HARD START FUEL SYSTEM (CONTINUED)

5. FUEL INJECTOR(S)

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove special tool #C4390.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Move special tool #C4390, Hose Clamp Pliers, from between the fuel pressure gauge and the engine to between the fuel pressure gauge and fuel pump module.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

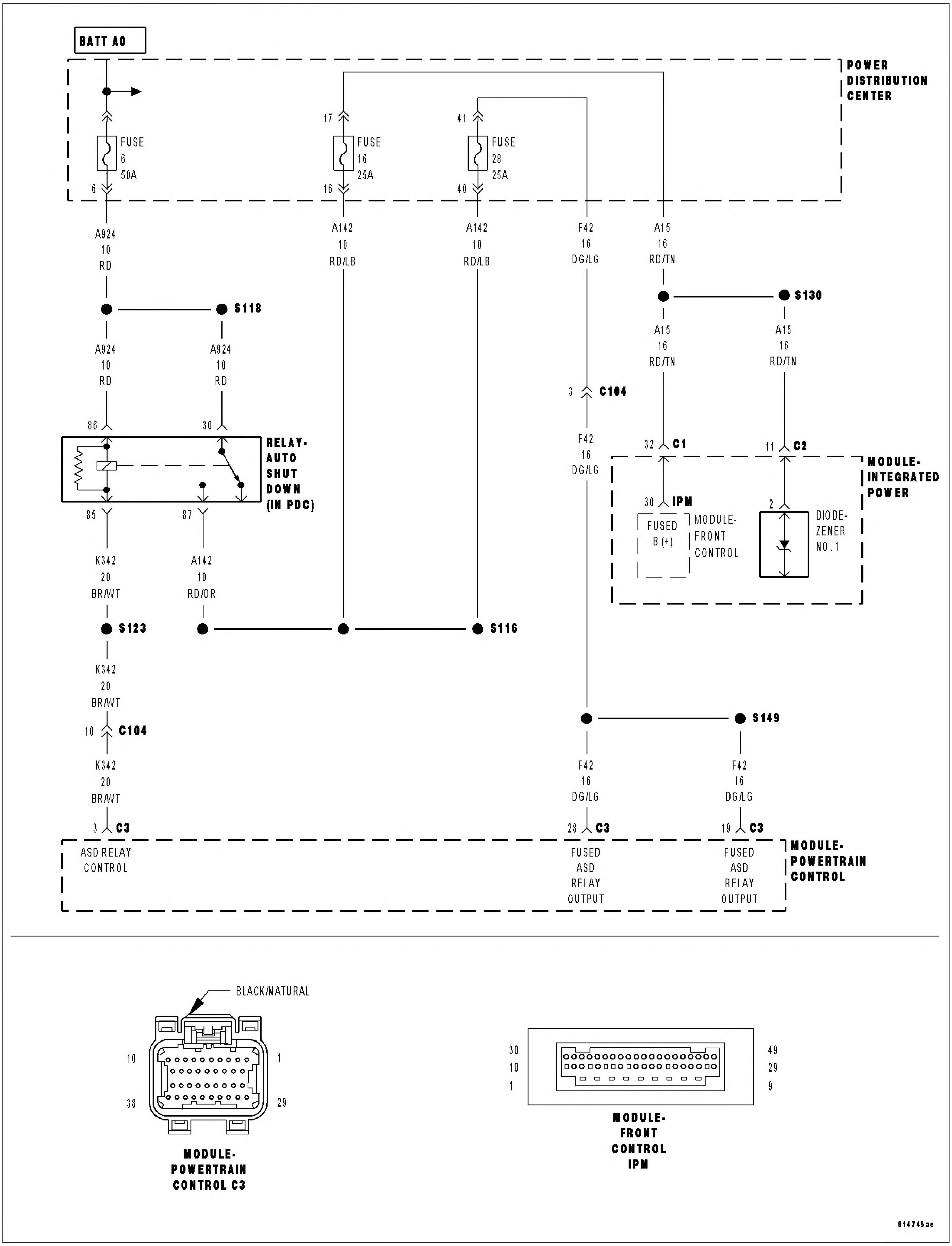
NOTE: The pressure should not fall below 241 KPa (35 psi)

Does the fuel pressure drop?

Yes >> Replace the leaking fuel injectors.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Check the fuel for contaminants.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*ENGINE CRANKS BUT DOES NOT START


BATT A0
POWER DISTRIBUTION CENTER
FUSE 6 50A
6
FUSE 16 25A
17
16
FUSE 28 25A
41
40
A924 10 RD
A142 10 RD/LB
A142 10 RD/LB
F42 16 DG/LG
A15 16 RD/TN
S118
S130
A924 10 RD
A924 10 RD
A15 16 RD/TN
A15 16 RD/TN
3 C104
86
30
RELAY-AUTO SHUT DOWN (IN PDC)
85
87
F42 16 DG/LG
32 C1
11 C2
MODULE-INTEGRATED POWER
30 IPM
FUSED B(+)
MODULE-FRONT CONTROL
2
DIODE-ZENER NO.1
K342 20 BR/WT
A142 10 RD/OR
S123
S116
K342 20 BR/WT
10 C104
S149
K342 20 BR/WT
F42 16 DG/LG
F42 16 DG/LG
3 C3
28 C3
19 C3
ASD RELAY CONTROL
FUSED ASD RELAY OUTPUT
FUSED ASD RELAY OUTPUT
MODULE-POWERTRAIN CONTROL
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
30
10
1
49
29
9
MODULE-FRONT CONTROL IPM
814745ae

*ENGINE CRANKS BUT DOES NOT START (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
NO START PRE-TEST
POWERTRAIN FUSES OPEN
SECONDARY INDICATORS PRESENT
ENGINE MECHANICAL
(F42) ASD RELAY OUTPUT CIRCUIT OPEN
FUEL CONTAMINATION

Diagnostic Test

1. NO START PRE-TEST

NOTE: The following list of items must be checked before continuing with any no start tests.

The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times.

This will allow any DTCs to set that may have been erased due to a dead battery.

Try to communicate with PCM if not able to communicate check fuses.

Make sure the Powers and Ground to the PCM are OK.

Make sure the PCM communicates with the scan tool and that there are no DTCs stored in the PCM memory. If the PCM reports a No Response condition, refer to section 8 Electrical Electronic Control Module Electrical Diagnostics for the proper tests.

Read the PCM DTCs with the scan tool. If any DTCs are present, they must be repaired before continuing with any other No Start diagnostic tests. Refer to the Table of Contents for the related P-code that is reported by the PCM.

Make sure that the Bus is functional. Attempt to communicate with the Instrument Cluster and VTSS, If you are unable to establish communications refer to 8 Electrical Electronic Control Module Electrical Diagnostics for the proper Diagnostic procedures.

The Sentry Key Immobilizer System must be operating properly. Check for proper communication with the scan tool and check for DTCs that may be stored in the Sentry Key Immobilizer Module (SKREEM). Repair the DTC(s) before continuing.

If no DTCs are found, using the scan tool, select Clear PCM (BATT Disconnect).

Crank the engine several times. Using the scan tool, read DTCs. If a DTC is present perform the DTC diagnostics before continuing.

Were any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

*ENGINE CRANKS BUT DOES NOT START (CONTINUED)

2. OPEN FUSE

Check for any open fuses in the IPM or Junction Block that may be related to the No Start condition.

Are any of the fuses open?

Yes >> Replace the open fuse and check the related circuit(s) for a short to ground.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. SECONDARY INDICATORS PRESENT

Ignition on, engine not running.

With the scan tool, under DTCs & Related Functions, read the Secondary Indicators while cranking the engine.

Are there any Secondary Indicators present while cranking the engine?

Yes >> Refer to the Engine Electrical Diagnostics group and perform the tests related to the secondary indicator that is reported by the scan tool.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

---

4. ENGINE MECHANICAL

Check for any of the following conditions/mechanical problems.

ENGINE VALVE TIMING - must be within specifications, check for broken timing components

ENGINE COMPRESSION - must be within specifications

ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks.

Are there any engine mechanical problems?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 5

---

5. (A955) ASD RELAY OUTPUT CIRCUIT OPEN

Turn the ignition off.

Remove the ASD relay from the IPM.

Disconnect the C3 PCM harness connector.

Verify the ASD Relay is getting voltage on the Fused B+ circuits before continuing.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Measure the resistance of the ASD Relay Output circuit from the ASD Relay connector to the appropriate terminals of special tool #8815, Ignition coil, and the fuel injectors.

Is the resistance below 5.0 ohms?

Yes >> Go To 6

No >> Repair the open in the (F42) ASD Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*ENGINE CRANKS BUT DOES NOT START (CONTINUED)

6. FUEL PUMP DELIVERY

Verify that the Fuel tank is not empty before continuing.

Follow the diagnostics for Checking Fuel Delivery in the Driveability section of this manual.

Was the No Start condition solved after following the above diagnostic test?

Yes >> Test Complete.

No >> Check for contamination/water in the fuel. Make sure the fuel being used in this vehicle meets manufactures Fuel Requirement, refer to the service manual.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*FUEL PRESSURE LEAK DOWN

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
FUEL PUMP MODULE
FUEL INJECTOR(S)

Diagnostic Test

1. FUEL PUMP MODULE

NOTE: Before continuing visually and physically inspect the fuel delivery system for external leaks or damage. Repair / replace as necessary.

Turn the ignition off.

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Install special tool #6539 (5/16″) or #6631 (3/8″) fuel line adapter.

Install the fuel pressure gauge.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Using special tool #C4390, Hose Clamp Pliers, pinch the rubber fuel line between the fuel pressure gauge and the engine.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

NOTE: The pressure should not fall below 241 KPa (35 psi)

Does the fuel pressure drop?

Yes >> Replace Fuel Pump Module.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

*FUEL PRESSURE LEAK DOWN (CONTINUED)

2. FUEL INJECTOR(S)

WARNING: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released. Failure to follow these instructions can result in personal injury or death.

Remove special tool #C4390.

Start the engine and allow the fuel system to reach maximum pressure.

Turn the ignition off.

NOTE: NOTE: Fuel specification is 407 KPa +/- 34 KPa (59 psi +/- 5 psi).

Move special tool #C4390, Hose Clamp Pliers, from between the fuel pressure gauge and the engine to between the fuel pressure gauge and fuel pump module.

Monitor the fuel pressure gauge for a minimum of 5 minutes.

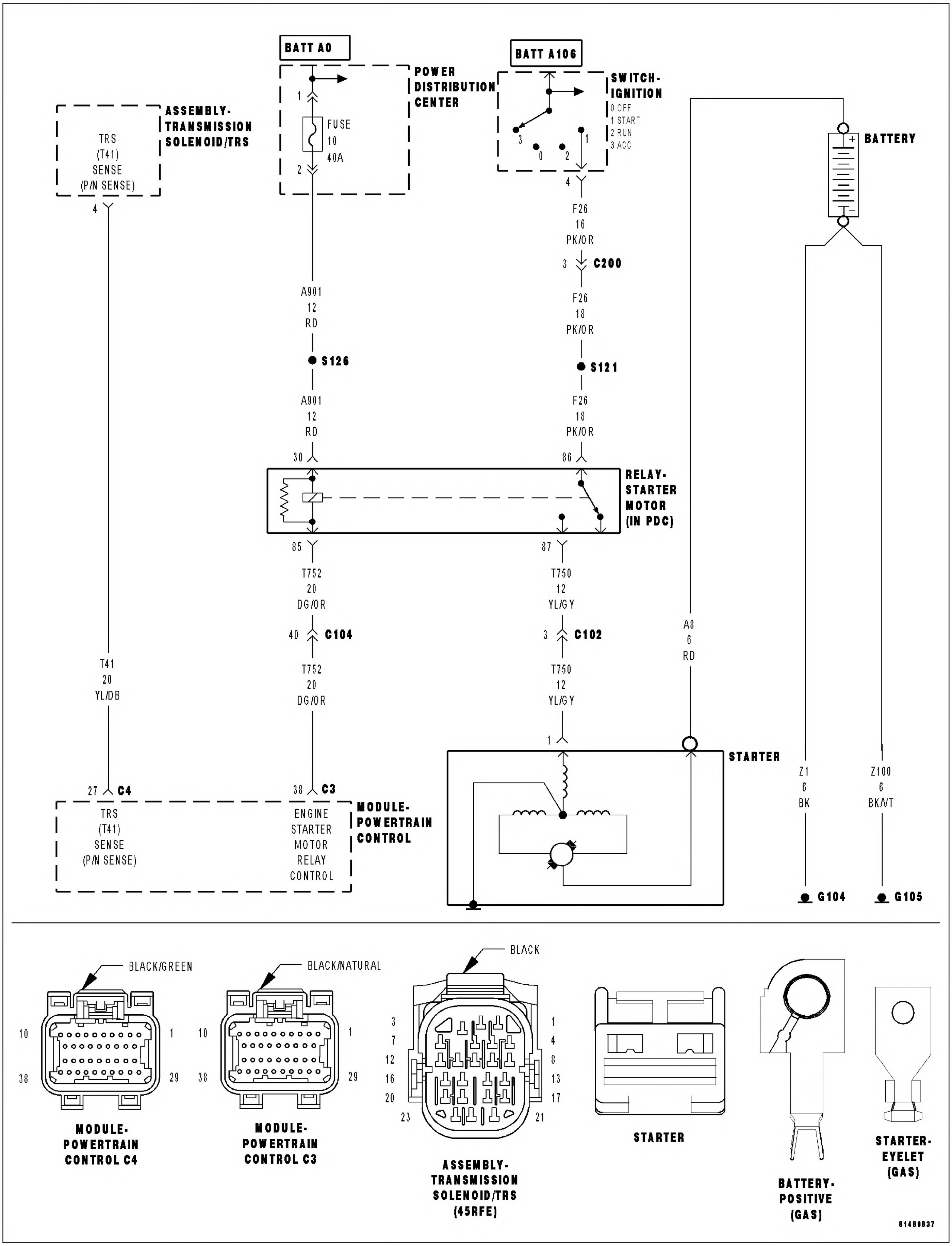
NOTE: The pressure should not fall below 241 KPa (35 psi)

Does the fuel pressure drop?

Yes >> Replace the leaking fuel injectors.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Test Complete.

*NO CRANK CONDITION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 10 40A
1
2
BATT A106
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 ACC
3
0
2
1
4
ASSEMBLY-TRANSMISSION SOLENOID/TRS
TRS (T41) SENSE (P/N SENSE)
4
BATTERY
+
−
F26 16 PK/OR
3 C200
F26 18 PK/OR
S121
F26 18 PK/OR
A901 12 RD
S126
A901 12 RD
30
86
RELAY-STARTER MOTOR (IN PDC)
85
87
T752 20 DG/OR
40 C104
T752 20 DG/OR
T750 12 YL/GY
3 C102
T750 12 YL/GY
A8 6 RD
T41 20 YL/DB
1
STARTER
Z1 6 BK
Z100 6 BK/VT
27 C4
38 C3
MODULE-POWERTRAIN CONTROL
TRS (T41) SENSE (P/N SENSE)
ENGINE STARTER MOTOR RELAY CONTROL
G104
G105
BLACK/GREEN
10
1
38
29
MODULE-POWERTRAIN CONTROL C4
BLACK/NATURAL
10
1
38
29
MODULE-POWERTRAIN CONTROL C3
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
STARTER
BATTERY-POSITIVE (GAS)
STARTER-EYELET (GAS)
81480837

*NO CRANK CONDITION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
MECHANICAL CONDITION
BATTERY CIRCUIT RESISTANCE TOO HIGH
(F26) FUSED IGNITION SWITCH OUTPUT CIRCUIT
(A901) FUSED B+ CIRCUIT OPEN
(T752) STARTER RELAY CONTROL CIRCUIT OPEN
(T750) STARTER RELAY OUTPUT CIRCUIT OPEN
TRANSMISSION RANGE SENSOR
STARTER RELAY
STARTER

Diagnostic Test

1. MECHANICAL CONDITION

NOTE: Verify the battery is fully charged and capable of passing a load test before continuing.

WARNING: Make sure the battery is disconnected, then wait two minutes before proceeding. Failure to do so may result in personal injury or possible death.

Turn the engine over by hand to make sure the engine is not seized.

Is the engine able to turn over?

Yes >> Go To 2

No >> Repair the mechanical condition preventing the starter motor from cranking.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

2. TRANSMISSION RANGE SENSOR

Turn the ignition off.

Disconnect the TRS harness connectors.

Move the Gear selector through all gear positions, from Park to 1st and back.

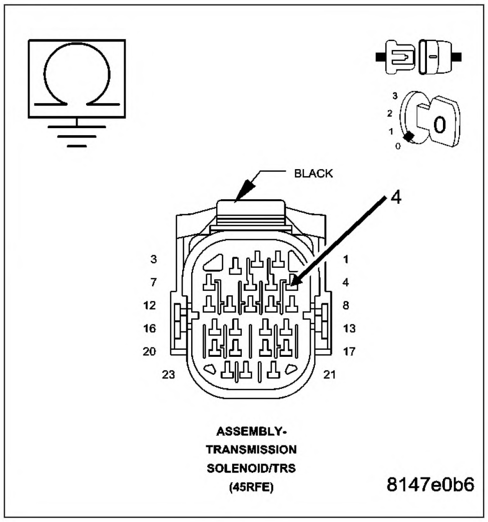
While moving the gear selector through each gear, measure the resistance between ground and the TRS (T41) Sense (P/N Sense) circuit at the TRS connector.

NOTE: The circuit is grounded in Park and Neutral and open in the other positions.

Did the resistance change from above 100 kohms (open) to below 10.0 ohms (grounded) ?

Yes >> Go To 3

No >> Replace the Transmission Range Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)



*NO CRANK CONDITION (CONTINUED)

3. EXCESSIVE RESISTANCE IN THE BATTERY CIRCUIT

Turn the ignition off.

Check the Battery Cables for excessive resistance using the service information procedure.

Did either Battery Cable have a voltage drop greater than 0.2 of a volt?

Yes >> Repair the excessive resistance in the Battery circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 4

4. STARTER RELAY

Turn ignition off.

Remove the Starter Relay from IPM.

CAUTION: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission.

WARNING: When the engine is operating, do not stand in direct line with the fan. Do not put your hands near the pulleys, belts, or fan. Do not wear loose clothing. Failure to follow these instructions can result in personal injury or death.

Briefly connect a jumper wire between (A901) Fused B+ circuit and the (T750) Starter Relay Output circuit.

Did the Starter Motor crank the engine?

Yes >> Go To 5

No >> Go To 7

5. (F26) FUSED IGNITION SWITCH OUTPUT CIRCUIT

Ignition on, engine not running.

Using a 12-volt test light, probe the (F26) Fused Ignition Switch Output circuit in the Starter Relay connector.

While observing 12-volt test light, hold ignition key in the start position.

Does the test light illuminate brightly?

Yes >> Go To 6

No >> Repair the excessive resistance in the (F26) Fused Ignition Switch Output circuit. Inspect related fuses and repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

6. (T752) STARTER RELAY CONTROL CIRCUIT OPEN

Turn the ignition off.

Remove the Starter Relay from the IPM.

Disconnect the C3 PCM harness connector.

Measure the resistance in the (T752) Starter Relay Control circuit from the Relay terminal to the appropriate terminal of special tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Replace the Starter Motor Relay.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Repair the open in the (T752) Starter Relay Control circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*NO CRANK CONDITION (CONTINUED)

7. (A901) FUSED B+ CIRCUIT

Turn the ignition off.

Using a 12-volt test light connected to ground, probe the (A901) Fused B+ circuit at the Starter Relay terminal.

Does the test light illuminate brightly?

Yes >> Go To 8

No >> Repair the excessive resistance or short to ground in the (A901) Fused B+ circuit. Inspect related fuses and repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

8. (T750) STARTER RELAY OUTPUT CIRCUIT OPEN

Disconnect the Starter Relay Output connector from the Starter Solenoid.

Measure the resistance of the (T750) Starter Relay Output circuit between the Relay and the Solenoid harness connector.

Is the resistance below 5.0 ohms?

Yes >> Go To 9

No >> Repair the open in the Starter Relay Output circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

9. STARTER

If there are no other possible causes remaining, review repair.

Repair

Replace the Starter.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

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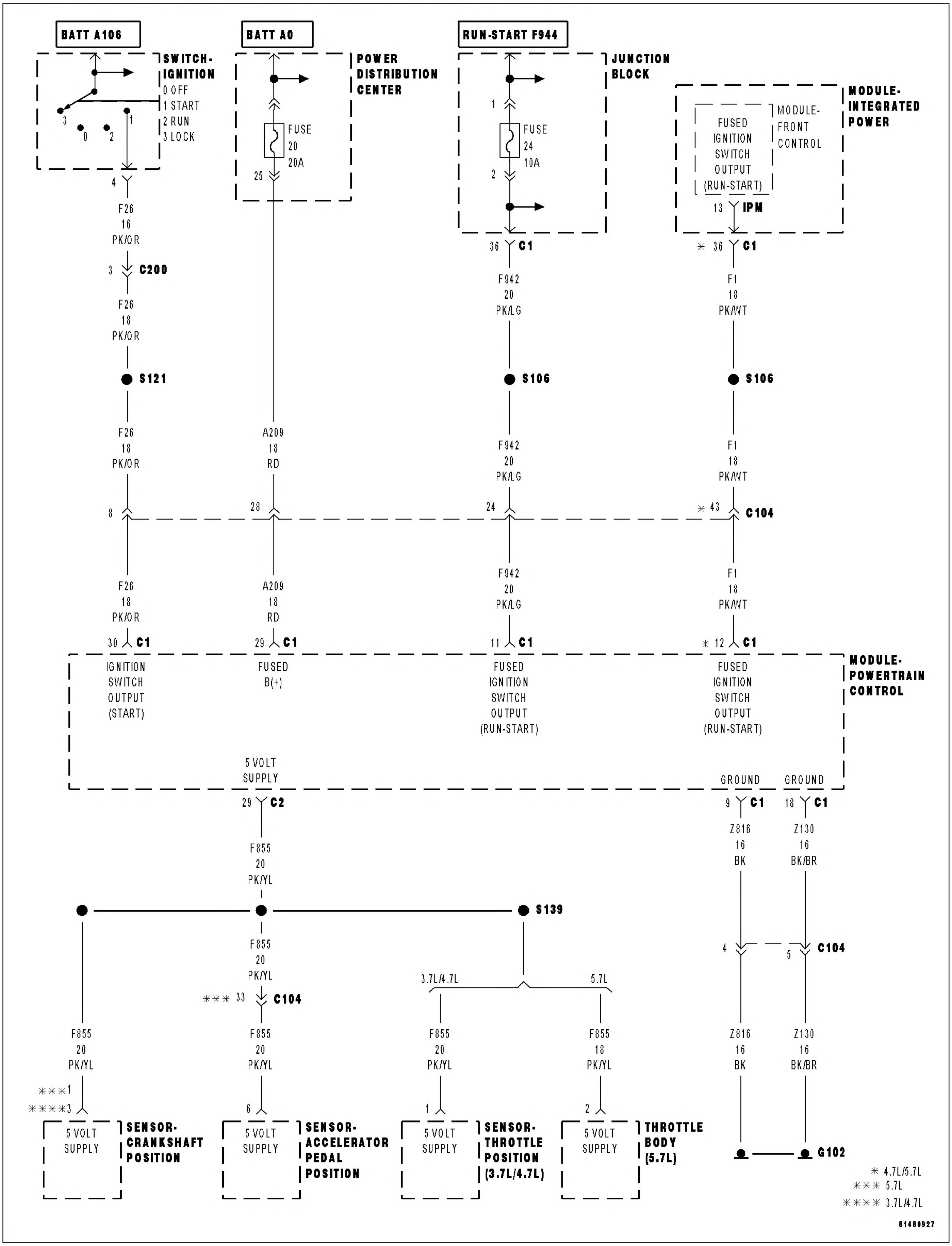
*NO RESPONSE WITH A NO START CONDITION


BATT A106
BATT A0
RUN-START F944
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 LOCK
3
0
2
1
4
POWER DISTRIBUTION CENTER
FUSE 20 20A
25
JUNCTION BLOCK
1
FUSE 24 10A
2
MODULE-INTEGRATED POWER
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-FRONT CONTROL
13 IPM
36 C1
✳ 36 C1
F26 16 PK/OR
3 C200
F26 18 PK/OR
S121
F942 20 PK/LG
S106
F1 18 PK/WT
S106
F26 18 PK/OR
A209 18 RD
F942 20 PK/LG
F1 18 PK/WT
8
28
24
✳ 43
C104
F26 18 PK/OR
A209 18 RD
F942 20 PK/LG
F1 18 PK/WT
30 C1
29 C1
11 C1
✳ 12 C1
IGNITION SWITCH OUTPUT (START)
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
MODULE-POWERTRAIN CONTROL
5 VOLT SUPPLY
GROUND
GROUND
29 C2
9 C1
18 C1
F855 20 PK/YL
Z816 16 BK
Z130 16 BK/BR
S139
F855 20 PK/YL
✳✳✳ 33 C104
4
5
C104
3.7L/4.7L
5.7L
F855 20 PK/YL
F855 20 PK/YL
F855 20 PK/YL
F855 18 PK/YL
Z816 16 BK
Z130 16 BK/BR
✳✳✳1
✳✳✳✳3
6
1
2
5 VOLT SUPPLY
SENSOR-CRANKSHAFT POSITION
5 VOLT SUPPLY
SENSOR-ACCELERATOR PEDAL POSITION
5 VOLT SUPPLY
SENSOR-THROTTLE POSITION (3.7L/4.7L)
5 VOLT SUPPLY
THROTTLE BODY (5.7L)
G102
✳ 4.7L/5.7L
✳✳✳ 5.7L
✳✳✳✳ 3.7L/4.7L
81480927

*NO RESPONSE WITH A NO START CONDITION (CONTINUED)

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
(A209) PCM FUSED B+ CIRCUIT
PCM NO RESPONSE
(F1) (F942) (F26) PCM FUSED IGNITION SWITCH OUTPUT CIRCUITS
(Z816) (Z130) PCM GROUND CIRCUITS
CRANKSHAFT POSITION SENSOR
(F855) 5-VOLT SENSOR OPEN/SHORTED
(F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
PCM

Diagnostic Test

1. (A209) PCM FUSED B+ CIRCUIT

NOTE: The scan tool and cable must be operating properly for the results of this test to be valid.

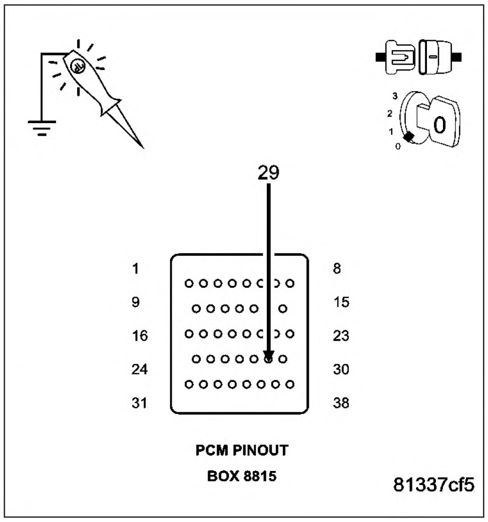
NOTE: Make sure the ignition switch was on while trying to communicate with the PCM.

Turn the ignition off.

Disconnect the C1 PCM harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller Special Tool #8815 to perform diagnosis.

Using a 12-volt test light connected to ground probe the appropriate terminal of special tool #8815.



Does the test light illuminate brightly?

Yes >> Go To 2

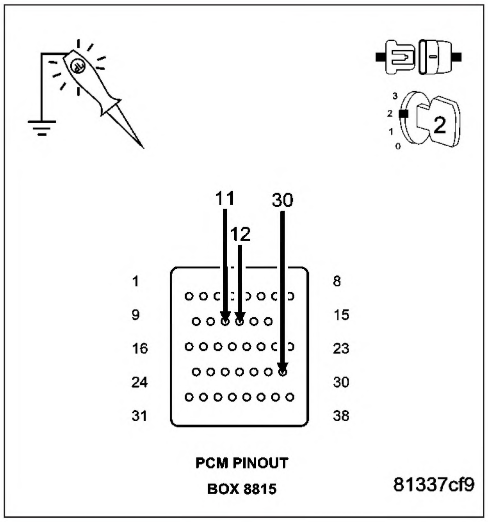
No >> Repair the open or short to ground in the (A209) Fused B+ circuit. Inspect and replace fuses as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*NO RESPONSE WITH A NO START CONDITION (CONTINUED)

2. (F942), (F1), (F26) PCM FUSED IGNITION SWITCH CIRCUITS

Using a 12-volt test light connected to ground, probe the (F942), (F1), (F26) PCM Fused Ignition Switch Output circuit in the appropriate terminals of special tool #8815.


2
11
30
12
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81337cf9

Does the test light illuminate brightly?

Yes >> Go To 3

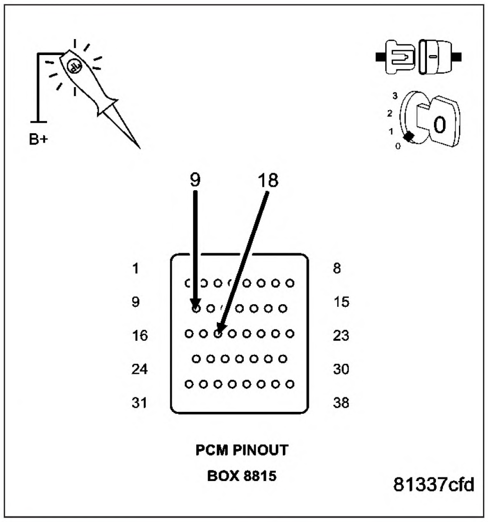
No >> Repair the (F942), (F1), (F26) Ignition Switch Output circuit. Inspect and replace fuses as necessary.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

3. (Z130), (Z816) PCM GROUND CIRCUITS

Using a 12-volt test light connected to battery voltage, probe the (Z130), (Z816) PCM ground circuits in the appropriate terminals of special tool #8815.


B+
0
9
18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81337cfd

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z130), (Z816) PCM ground circuits.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*NO RESPONSE WITH A NO START CONDITION (CONTINUED)

4. (F855) 5-VOLT SUPPLY CIRCUIT

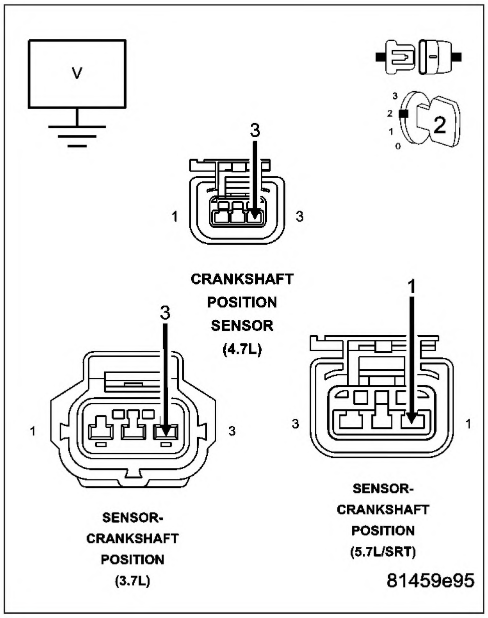
Turn the ignition off.

Connect the PCM harness connectors.

Disconnect the Crankshaft Position Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit.


V
3
2
1
0
2
3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
3
1
1
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
81459e95

Is the voltage between 4.5 and 5.2 volts?

Yes >> Go To 5

No >> Go To 6

---

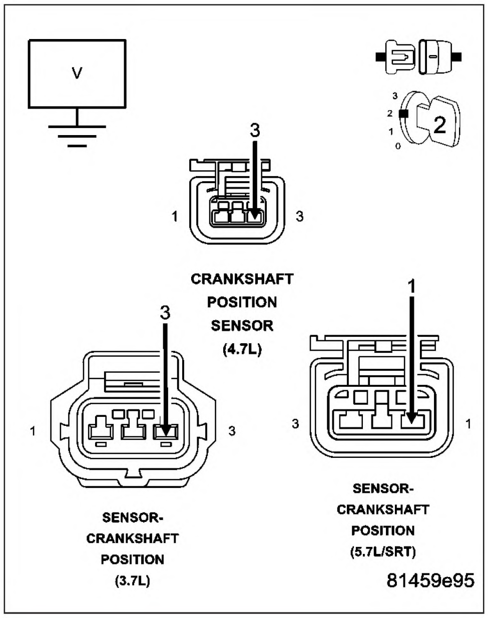
5. CKP SENSOR

Turn the ignition off.

Disconnect the TP Sensor harness connector.

Ignition on, engine not running.

Measure the voltage on the (F855) 5-volt Supply circuit in the TP Sensor harness connector.


V
3
2
1
0
2
3
1
3
CRANKSHAFT POSITION SENSOR (4.7L)
3
1
3
1
1
3
1
SENSOR-CRANKSHAFT POSITION (3.7L)
SENSOR-CRANKSHAFT POSITION (5.7L/SRT)
81459e95

Is the voltage between 4.5 and 5.2 volts?

Yes >> If communication is available with a PCM on a like vehicle, replace and program the Powertrain Control Module per Service Information.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace the Crankshaft Position Sensor.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*NO RESPONSE WITH A NO START CONDITION (CONTINUED)

6. (F855) 5-VOLT SENSOR OPEN/SHORTED

Turn the ignition off.

Disconnect the TP Sensor/Throttle Body harness connector.

Ignition on, engine not running.

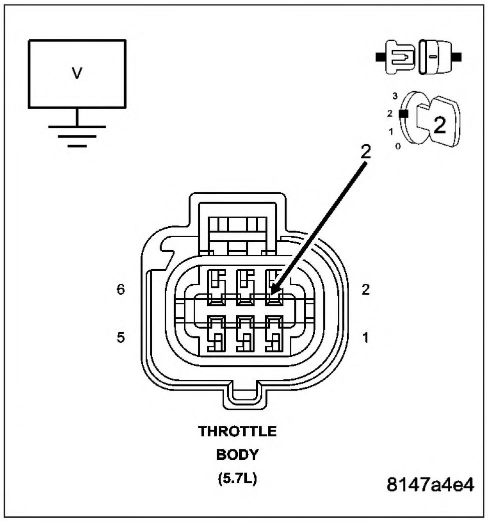
Measure the voltage on the (F855) 5-volt Supply circuit.

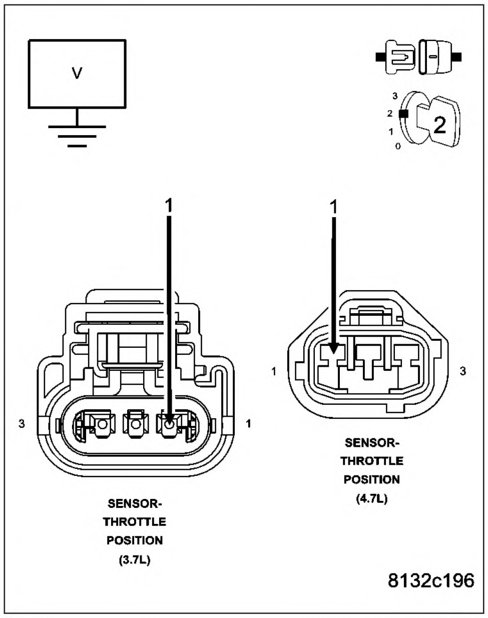
Disconnect all the sensors that use the (F855) 5-volt Supply circuit.

Did the voltage return to 4.5 to 5.2 volts when disconnecting any of the sensors.

Yes >> Replace the sensor that is pulling down the (F855) 5-volt supply.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7


V
3
2
1
0
2
2
6
5
2
1
THROTTLE BODY (5.7L)
8147a4e4


V
3
2
1
0
2
1
1
3
1
1
3
SENSOR-THROTTLE POSITION (3.7L)
SENSOR-THROTTLE POSITION (4.7L)
8132c196

---

7. (F855) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect PCM harness connectors.

Disconnect all the sensors that share the (F855) 5-volt Supply circuit.

Measure the resistance between ground and the (F855) 5-volt Supply circuit at one of the sensor harness connectors.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F855) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 8

*NO RESPONSE WITH A NO START CONDITION (CONTINUED)

8. (F856) 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Disconnect all the sensors that share the (F856) 5-volt Supply circuit.

Measure the resistance between ground and the (F856) 5-volt Supply circuit at one of the sensor harness connectors.

Is the resistance below 100 ohms?

Yes >> Repair the short to ground in the (F856) 5-volt Supply circuit.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 9

9. PCM

NOTE: Before continuing, check the PCM harness connector terminals for corrosion, damage, or terminal push out. Repair as necessary.

Using the schematics as a guide, inspect the wire harness and connectors. Pay particular attention to all Power and Ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Replace and program the Powertrain Control Module per Service Information.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

*START AND STALL CONDITION

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Possible Causes
CURRENT PCM DTCS
CURRENT SKIM DTCS
THROTTLE POSITION SENSOR SWEEP
TP SENSOR NO.1 VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
ECT SENSOR
OTHER POSSIBLE CAUSES FOR START AND STALL CONDITON
FUEL CONTAMINATION

Diagnostic Test

1. CHECKING DTCS

Ignition on, engine not running.

With a scan tool, read DTCs.

Are any DTCs present?

Yes >> Refer to the appropriate Diagnostic Procedure.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 2

---

2. CHECKING SKREEM DTCS

NOTE: If you are unable to communicate with the SKIM/SKREEM, refer to the VEHICLE THEFT AND SECURITY ELECTRICAL DIAGNOSTICS in Section 8 and perform the appropriate diagnostics.

With the scan tool, read the SKIM codes.

Are there any SKIM DTCs?

Yes >> Refer to the Sentry Key Vehicle Theft Security Electrical Diagnostics in Section 8.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 3

---

3. TP SENSOR SWEEP

Ignition on, engine not running.

With the scan tool read TP Sensor voltage.

While monitoring the scan tool, slowly open and close the Throttle on vehicles equipped with a 3.7L or 4.7L engine.

On vehicles equipped with a 5.7L engine, using a scan tool perform the pedal follower test and monitor both TP Sensor voltage readings.

Was the voltage change smooth?

Yes >> Go To 4

No >> Replace the Throttle Position Sensor on a 3.7L and 4.7L engines or the Throttle Body Assembly on a 5.7L engine.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

*START AND STALL CONDITION (CONTINUED)

4. TP SENSOR NO.1 VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED

With the scan tool, read Throttle Position Sensor No.1 voltage.

Throttle must be against its stop.

Is the voltage 0.92 or less with the Throttle closed?

Yes >> Go To 5

No >> Check for a binding throttle condition. If OK, replace the Throttle Position Sensor or the Throttle Body Assembly on a 5.7L.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

---

5. ECT SENSOR OPERATION

NOTE: For this test to be valid, the thermostat must be operating correctly.

NOTE: This test works best if performed on a cold engine (cold soaked).

NOTE: If the vehicle was allowed to sit over night with no engine start, coolant temperature should be near ambient temperatures.

Ignition on, engine not running.

With the scan tool, read the ECT value.

NOTE: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.

Start the engine.

During engine warm-up, monitor the Engine Coolant Temperature value. The temperature value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F).

Did the Engine Temperature value increase smoothly and did it reach at least 82° C (180° F)?

Yes >> Go To 6

No >> Replace the Engine Coolant Temperature Sensor.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

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6. OTHER POSSIBLE CAUSES OF START AND STALL CONDITION

The following additional items should be checked as a possible cause for a start and stall condition.

Refer to any Technical Service Bulletins (TSBs) that may apply to the symptom.

The exhaust system must be free of any restrictions.

The engine compression must be within specifications.

The engine valve timing must be within specifications.

The engine must be free from vacuum leaks.

The throttle body must be free of carbon buildup and dirt.

Do any of the above conditions exist?

Yes >> Repair as necessary.
Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

No >> Go To 7

*START AND STALL CONDITION (CONTINUED)

7. FUEL PUMP DELIVERY

Verify that the Fuel tank is not empty before continuing.

Follow the diagnostics for Checking Fuel Delivery in this manual.

Was the No Start condition solved after following the above diagnostic test?

Yes >> Test Complete.

No >> Check for contamination/water in the fuel. Ensure the fuel being used in this vehicle meets manufactures Fuel Requirement, refer to the service manual.

Perform the POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

STANDARD PROCEDURE

POWERTRAIN VERIFICATION TEST

For the Engine circuit diagram (Refer to 9 - ENGINE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

Diagnostic Test

1. **SELECTING THE PROPER VERIFICATION TEST**

The following verification test are for different repairs. Select the appropriate Verification test for the repair that has been completed.

Speed Control repair
Go To 2

Charging System repair
Go To 3

NVLD System repair
Go To 4

All other repairs
Go To 5

POWERTRAIN VERIFICATION TEST (CONTINUED)

2. POWERTRAIN VERIFICATION TEST 1

NOTE: If this vehicle is equipped with an Electronic Throttle Control system, and the APP Sensors, PCM, or Throttle Body Assembly have been replaced, use the scan tool to perform the ETC RELEARN function.

NOTE: 2. After completing the Powertrain Verification Test the Transmission Verification Test must be performed.

NOTE: 3. If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will set in the ABS Module, Airbag Module and the SKIM/SKREEM.

NOTE: 4. If the vehicle is equipped with a Sentry Key Remote Entry, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM/SKREEM and the Transponder (ignition key) for programming information.

5. Inspect the vehicle to make sure that all engine components are properly installed and connected.
6. Connect the scan tool to the data link connector and erase all codes.
7. Turn the speed control ON (if equipped, cruise light will be on).
8. Depress and release the SET Switch when the vehicle speed is greater than 35 MPH. The speed control should engage and hold the selected speed.
9. Press and hold the RESUME/ACCEL Switch. The vehicle speed should increase by at least 2 MPH.
10. Press and hold the COAST switch. The vehicle speed should decrease.
11. Using caution, press and release the brake pedal. The speed control should disengage.
12. Bring the vehicle speed back up to 35 MPH.
13. Press the RESUME/ACCEL switch. The speed control should resume the previously set speed.
14. Hold down the SET switch. The vehicle should decelerate.
15. Make sure vehicle speed is greater than 35 mph and release the SET Switch. The vehicle should adjust and set a new vehicle speed.
16. Press and release the CANCEL switch. The speed control should disengage.
17. Bring the vehicle speed back up above 35 mph and engage speed control.
18. Turn the Speed Control Off. (Cruise light will be off). The speed control should disengage.

NOTE: OVERSHOOT/UNDERSHOOT FOLLOWING SPEED CONTROL SET.

20. If the vehicle operator repeatedly presses and releases the SET button with their foot off of the accelerator (referred to as ″lift foot set″), the vehicle may accelerate and exceed the desired set speed by up to 5 mph (8 km/h).
21. It may also decelerate to less than the desired set speed, before finally achieving the desired set speed.
22. The Speed Control System has an adaptive strategy that compensates for vehicle-to-vehicle variations in speed control cable lengths.
23. When the speed control is set with the vehicles operators foot off of the accelerator pedal, the speed control thinks there is excessive speed control cable slack and adapts accordingly.
24. If the ″lift foot sets″ are continually used, a speed control overshoot/undershoot condition will develop.
25. To ″unlearn″ the overshoot/undershoot condition, the vehicle operator has to press and release the set button while maintaining the desired set speed using the accelerator pedal (not decelerating or accelerating).
26. Then turn the cruise control switch to the OFF position (or press the CANCEL button if equipped) after waiting 10 seconds.
27. This procedure must be performed approximately 10-15 times to completely unlearn the overshoot/undershoot condition.

Did the Speed Control pass the above test?

Yes >> Repair is complete.

No >> Check for any related Technical Service Bulletins and/or refer to the appropriate Diagnostic Procedure.

POWERTRAIN VERIFICATION TEST (CONTINUED)

3. POWERTRAIN VERIFICATION TEST 2

1. If this vehicle is equipped with an Electronic Throttle Control system, and the APP Sensors, PCM, or Throttle Body Assembly has been replaced use a scan tool to perform the ETC RELEARN function.

NOTE: 2. After completing the Powertrain Verification Test the Transmission Verification Test must be performed.

NOTE: 3. If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will set in the ABS Module, Airbag Module and the SKIM/SKREEM.

NOTE: 4. If the vehicle is equipped with a Sentry Key Remote Entry, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM/SKREEM and the Transponder (ignition key) for programming information.

5. Inspect the vehicle to make sure that all components related to the repair are properly installed and connected.
6. With the scan tool, clear DTCs.
7. Perform generator output test. Refer to the appropriate service information as necessary.
8. Start the engine and set engine speed to 2000 RPM for at least thirty seconds.
9. Cycle the ignition key off and on.
10. With the scan tool, read the DTCs.

Are any DTCs or symptoms remaining?

Yes >> Check for any Technical Service Bulletins and/or refer to the appropriate Diagnostic Procedure.

No >> Repair is complete.

---

4. POWERTRAIN VERIFICATION TEST 3

1. Install the Miller Tool #8404 Evaporative Emission Leak Detector (EELD) according to the instructions in the previous DTC table.
2. Set the smoke/air control switch to AIR.
3. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size).
4. Press the remote smoke/air start button.
5. Position the red flag on the air flow meter so it is aligned with the indicator ball.
6. When the calibration is complete, release the remote button. The EELD flow meter is now calibrated in liters per minute to the size of leak indicated by the DTC set in the PCM.
7. Install the service port adapter #8404-14 on the vehicle's service port.
8. Connect the Air supply hose from the EELD to the vehicle.
9. Press the remote button to activate AIR flow.

NOTE: 10. Larger volume fuel tanks, lower fuel levels or if the vehicle is equipped with a Flow Management Valve may indicate high flow and will require 4 to 5 minutes to fill.

11. Compare the flow meter indicator ball reading to the red flag.
12. ABOVE the red flag indicates a leak present.
13. BELOW the red flag indicates a sealed system.

NOTE: If this vehicle is equipped with an Electronic Throttle Control system, and the APP Sensors, PCM, or Throttle Body Assembly have been replaced, use the scan tool to perform the ETC RELEARN function.

15. If the indicator ball shows a leak present, perform the smoke test indicated in the previous test and identify the leak and repair. Perform this verification test when the repair is complete.

Did the indicator ball indicate the a leak is present?

Yes >> Repeat the DTC test to identify the leak and repair.

No >> Repair is complete.

POWERTRAIN VERIFICATION TEST (CONTINUED)

5. POWERTRAIN VERIFICATION TEST 4

NOTE: 1. After completing the Powertrain Verification Test the Transmission Verification Test must be performed.

NOTE: 2. If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will set in the ABS Module, Airbag Module and the SKIM/SKREEM.

NOTE: 3. If the vehicle is equipped with a Sentry Key Remote Entry, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM/SKREEM and the Transponder (ignition key) for programming information.

NOTE: 4. If this vehicle is equipped with an Electronic Throttle Control system, and the APP Sensors, PCM, or Throttle Body Assembly have been replaced, use the scan tool to perform the ETC RELEARN function.

NOTE: 5. When replacing an O2 Sensor, the PCM RAM memory must be cleared, either by disconnecting the PCM C1 connector or momentarily disconnecting the Battery negative terminal.

6. The NGC learns the characteristics of each O2 heater element and these old values should be cleared when installing a new O2 sensor. The customer may experience driveability issues if this is not performed.

7. Inspect the vehicle to make sure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary.

8. Connect the scan tool to the data link connector.

9. Make sure the fuel tank has at least a quarter tank of fuel. Turn off all accessories.

10. If the Catalyst was replaced, with the scan tool go to the Miscellaneous Menu Option ″Catalyst Replaced″ and press enter.

11. If a Comprehensive Component DTC was repaired, perform steps 12 - 14. If a Major OBDII Monitor DTC was repaired skip those steps and continue verification.

12. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes.

13. With the scan tool, monitor the appropriate pre-test enabling conditions until all conditions have been met. Once the conditions have been met, switch screen to the appropriate OBDII monitor, (Audible beeps when the monitor is running).

14. If the repaired OBDII trouble code has reset or was seen in the monitor while on the road test, the repair is not complete. Check for any related technical service bulletins or flash updates and return to Engine Electrical Diagnostic List.

15. If the conditions cannot be duplicated, erase all DTCs with the Scan tool.

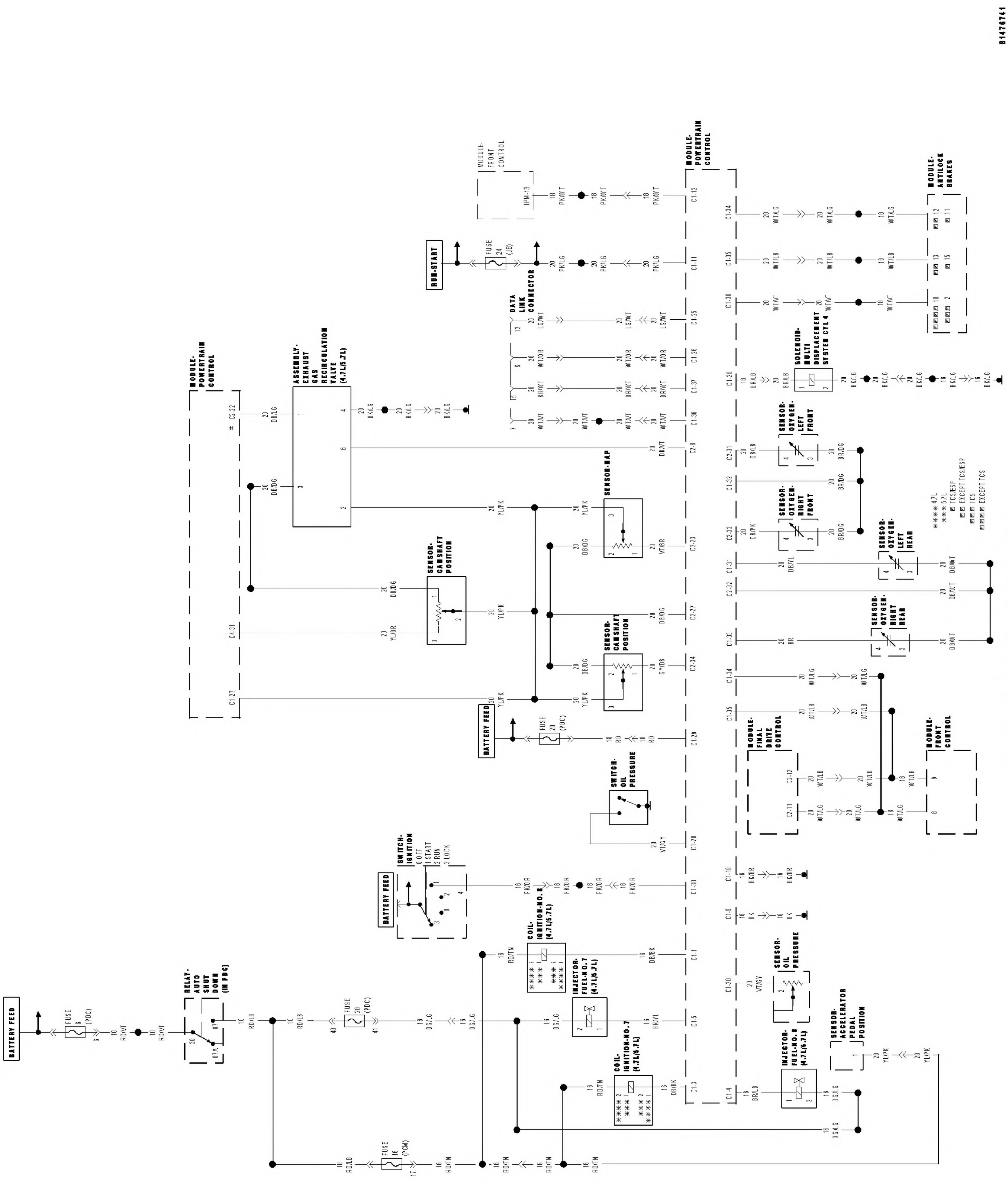
16. If another DTC has set, return to the Engine Electrical Diagnostic List and follow the path specified for that DTC.

Did the OBDII Monitor run successfully and has the Good Trip Counter changed to one or more?

Yes >> Repair is complete.

No >> Check for any related Technical Service Bulletins and/or refer to the appropriate Diagnostic Procedure.

SCHEMATICS AND DIAGRAMS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BATTERY FEED
FUSE 6 (PDC)
RELAY-AUTO SHUT DOWN (IN PDC)
FUSE 28 (PDC)
FUSE 16 (PCM)
MODULE-POWERTRAIN CONTROL
ASSEMBLY-EXHAUST GAS RECIRCULATION VALVE (4.7L/5.7L)
SENSOR-CAMSHAFT POSITION
SENSOR-MAP
RUN-START
FUSE 24 (JB)
DATA LINK CONNECTOR
MODULE-FRONT CONTROL
SWITCH-IGNITION
0 OFF
1 START
2 RUN
3 LOCK
SWITCH-OIL PRESSURE
FUSE 20 (PDC)
COIL-IGNITION-NO. 8 (4.7L/5.7L)
INJECTOR-FUEL-NO. 7 (4.7L/5.7L)
COIL-IGNITION-NO. 7 (4.7L/5.7L)
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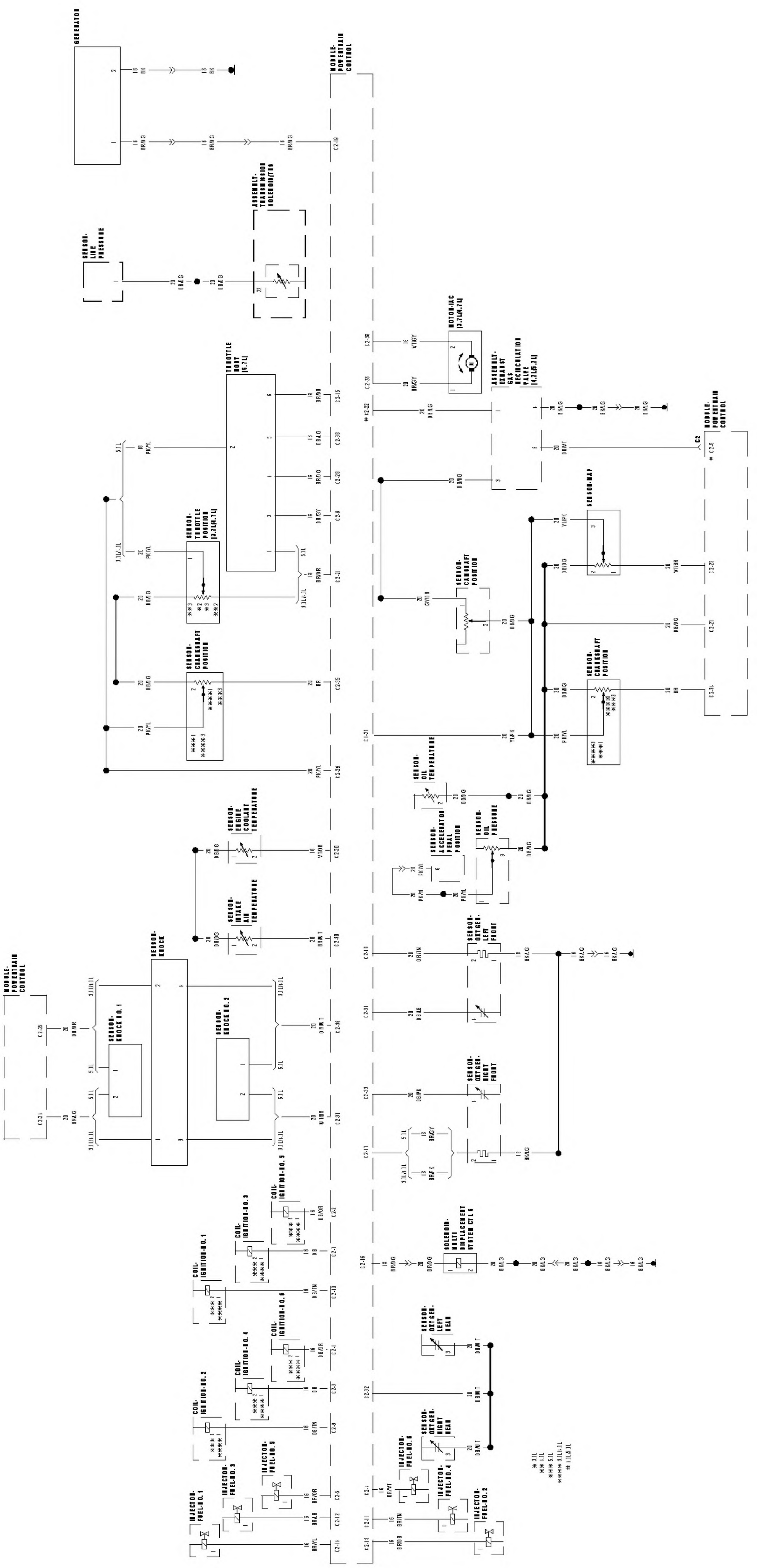
SENSOR-OIL PRESSURE
SENSOR-ACCELERATOR PEDAL POSITION
SOLENOID-MULTI DISPLACEMENT SYSTEM CYL 4
SENSOR-OXYGEN-LEFT FRONT
SENSOR-OXYGEN-RIGHT FRONT
SENSOR-OXYGEN-LEFT REAR
SENSOR-OXYGEN-RIGHT REAR
MODULE-FINAL DRIVE CONTROL
MODULE-ANTILOCK BRAKES
**** 4.7L
*** 5.7L
TCS/ESP
EXCEPT TCS/ESP
TCS
EXCEPT TCS

PCM C1 SYSTEM SCHEMATIC



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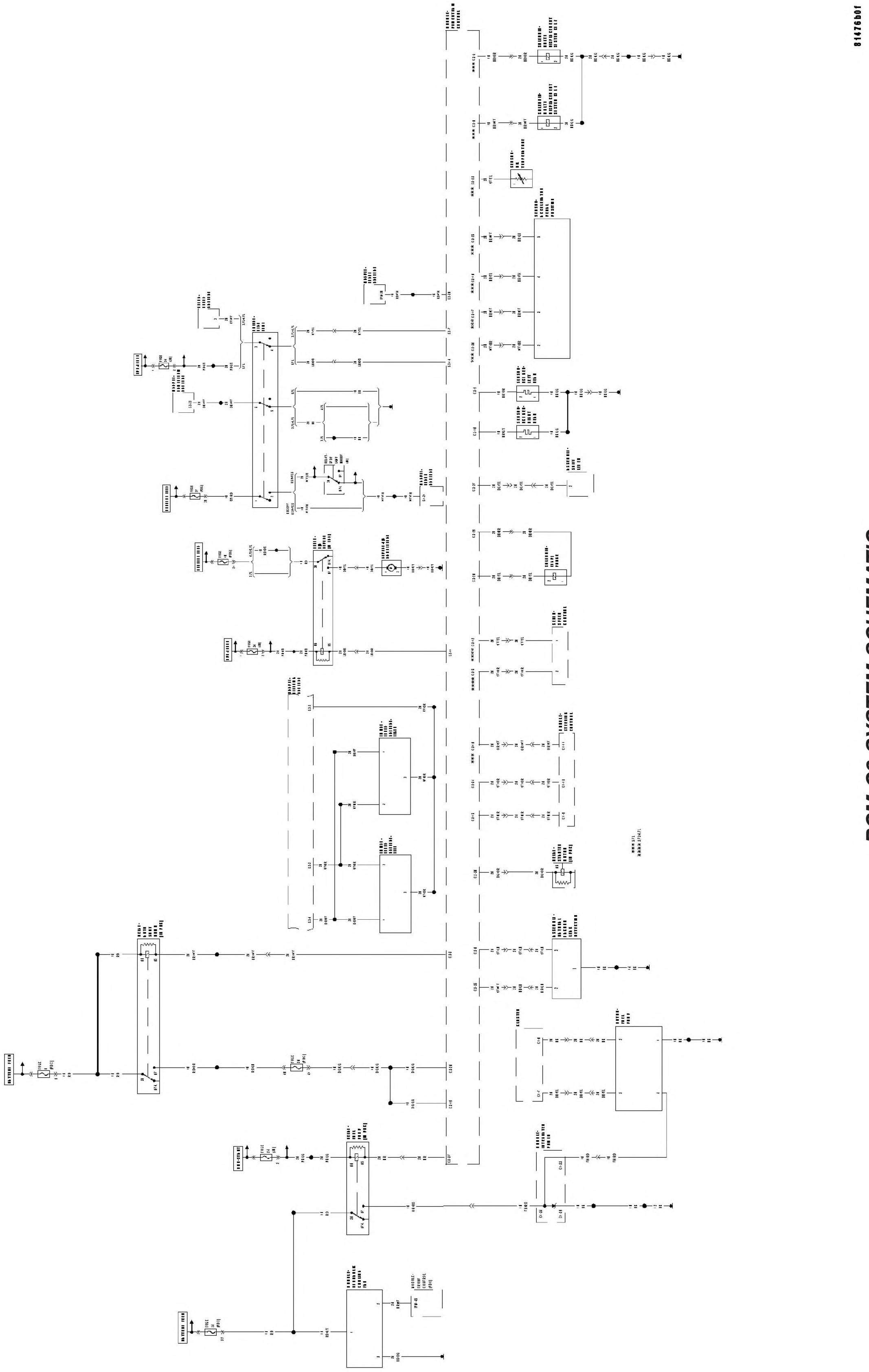
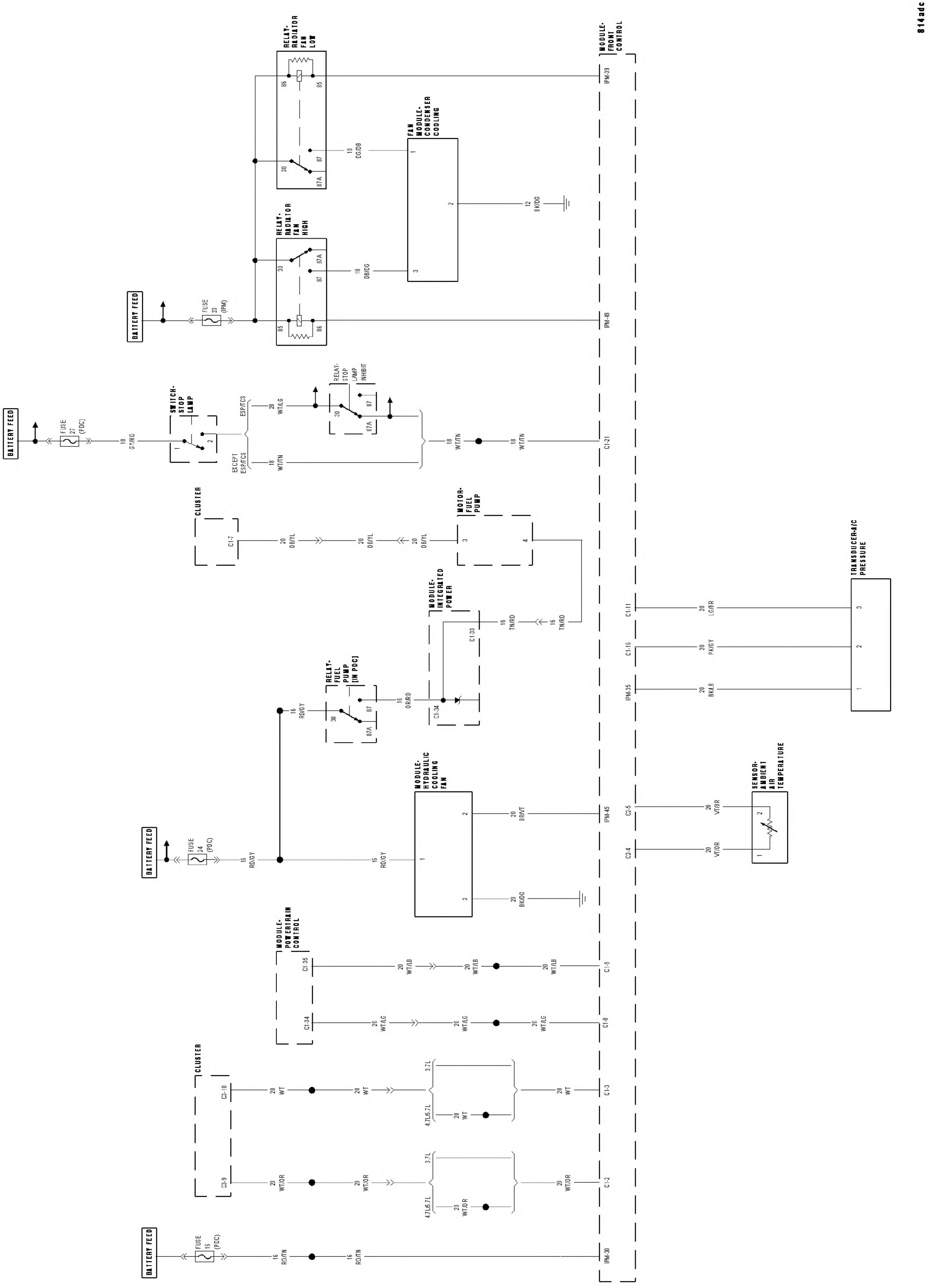
PCM C2 SYSTEM SCHEMATIC



PCM C3 SYSTEM SCHEMATIC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MODULE-FRONT CONTROL
RELAY-RADIATOR FAN LOW
RELAY-RADIATOR FAN HIGH
FAN MODULE-CONDENSER COOLING
BATTERY FEED
FUSE 23 (IPM)
BATTERY FEED
FUSE 27 (PDC)
SWITCH-STOP LAMP
ESP/TCS
EXCEPT ESP/TCS
RELAY-STOP LAMP INHIBIT
CLUSTER
MOTOR-FUEL PUMP
MODULE-INTEGRATED POWER
RELAY-FUEL PUMP (IN PDC)
TRANSDUCER-A/C PRESSURE
MODULE-HYDRAULIC COOLING FAN
SENSOR-AMBIENT AIR TEMPERATURE
BATTERY FEED
FUSE 24 (PDC)
MODULE-POWERTRAIN CONTROL
CLUSTER
3.7L
4.7L/5.7L
BATTERY FEED
FUSE 15 (PDC)
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IPM-49
C1-21
C1-11
C1-16
IPM-25
IPM-45
C2-5
C2-4
C1-5
C1-8
C1-3
C1-2
IPM-30
10 DG/DB
10 DB/DG
12 BK/DG
18 GY/RD
20 WT/LG
18 WT/TN
20 DB/YL
16 TN/RD
16 RD/GY
16 OR/RD
20 LG/BR
20 PK/GY
20 BK/LB
20 BR/VT
20 VT/BR
20 VT/DR
20 BK/DG
20 WT/LB
20 WT/LG
20 WT
20 WT/OR
16 RD/TN

FCM SYSTEM SCHEMATIC

ENGINE - 3.7L SERVICE INFORMATION

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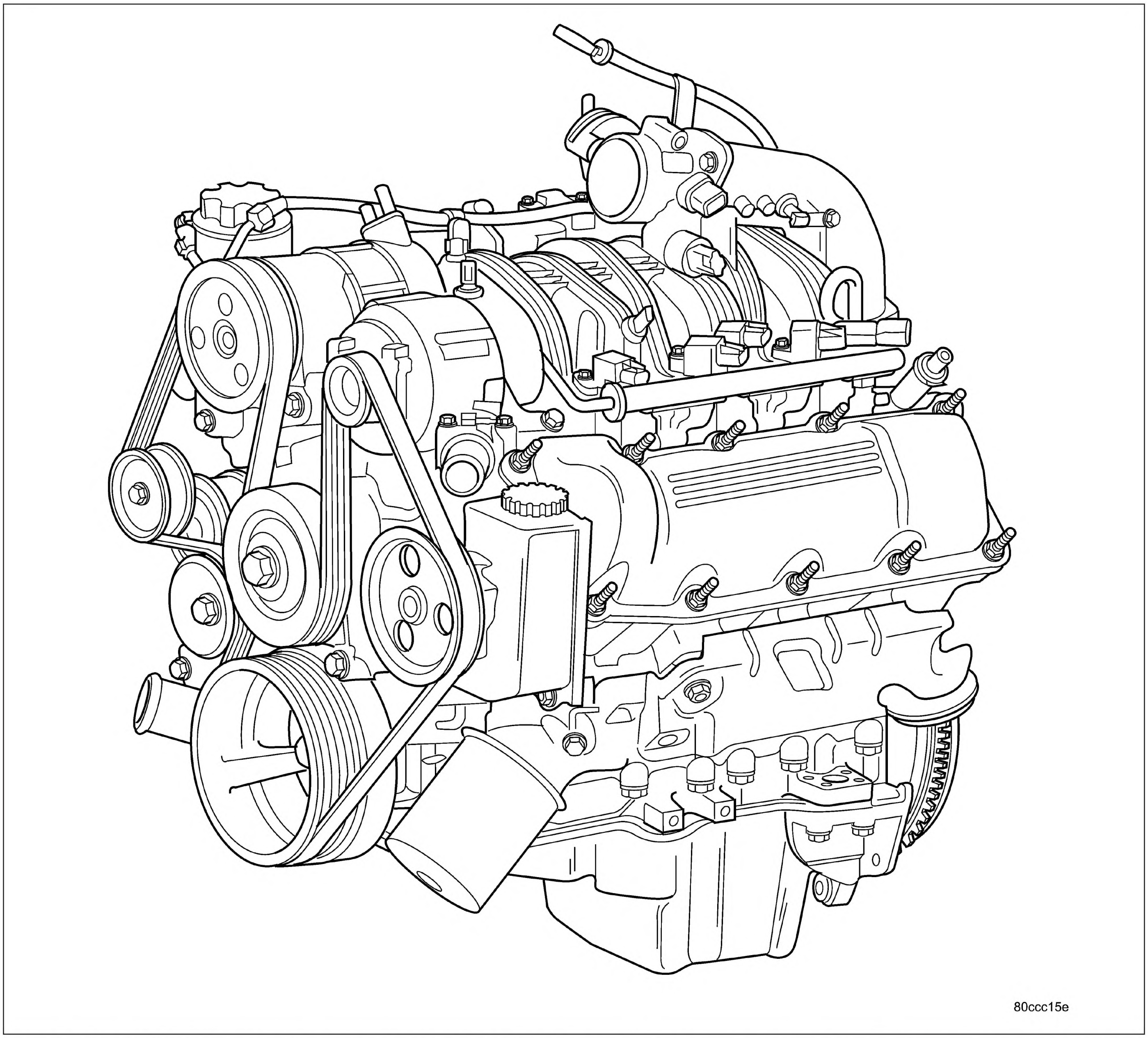
ENGINE - 3.7L SERVICE INFORMATION

DESCRIPTION



The 3.7 liter (226 CID) six-cylinder engine is an 90° single overhead camshaft engine. The cast iron cylinder block is made up of two different components; the first component is the cylinder bore and upper block, the second component is the bedplate that comprises the lower portion of the cylinder block and houses the lower half of the crankshaft main bearings. The cylinders are numbered from front to rear with the left bank being numbered 1,3, and 5 and the right bank being numbered 2,4, and 6. The firing order is 1–6–5–4–3–2. The engine serial number is located at the right front side of the engine block

DIAGNOSIS AND TESTING

ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either performance (e.g., engine idles rough and stalls) or mechanical (e.g., a strange noise).

(Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) - PERFORMANCE and (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) - MECHANICAL for possible causes and corrections of malfunctions. Refer to 14 - FUEL SYSTEM for the fuel system diagnosis.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following diagnosis:

- Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)
- Cylinder Combustion Pressure Leakage Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
- Engine Cylinder Head Gasket Failure Diagnosis (Refer to 9 - ENGINE/CYLINDER HEAD - DIAGNOSIS AND TESTING).
- Intake Manifold Leakage Diagnosis (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - DIAGNOSIS AND TESTING).

ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery	1. Charge or replace as necessary.
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to the terminals.
	3. Faulty starter.	3. (Refer to 8 - ELECTRICAL/ STARTING - DIAGNOSIS AND TESTING).
	4. Faulty coil or control unit.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
	5. Incorrect spark plug gap.	5. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	6. Incorrect right bank cam timing.	6. Refer to engine timing in this section.
	7. Dirt or water in fuel system.	7. Clean system and replace fuel filter.
	8.Faulty fuel pump, relay or wiring.	8.Repair or replace as necessary.
	9. Faulty cam or crank sensor	9. Refer to Ignition system.
ENGINE STALLS OR ROUGH IDLE		
	1. Vacuum leak.	1. Inspect intake manifold and vacuum hoses, repair or replace as necessary.
	2. Faulty crank position sensor	Replace crank position sensor
	3. Faulty coil.	3. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL)
	4. Incorrect cam timing.	4. (Refer to 9 - ENGINE/VALVE TIMING - STANDARD PROCEDURE)

CONDITION	POSSIBLE CAUSE	CORRECTION
1. ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped spark plugs.	1. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	2. Dirt or water in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. (Refer to 14 - FUEL SYSTEM/ FUEL DELIVERY/FUEL PUMP - DIAGNOSIS AND TESTING).
	4. Blown cylinder head gasket.	4. Replace cylinder head gasket.
	5. Low compression.	5. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING), repair as necessary.
	6. Burned, warped or pitted valves.	6. Replace as necessary.
	7. Plugged or restricted exhaust system.	7. Inspect and replace as necessary.
	8. Faulty coil.	8. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
	9. Incorrect cam timing.	9. Refer to Engine Timing in this section.
1. ENGINE MISSES ON ACCELERATION	1. Spark plugs dirty or incorrectly gapped.	1. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	2. Dirt in fuel system.	2. Clean fuel system.
	3. Burned, warped or pitted valves.	3. Replace as necessary.
	4. Faulty coil.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
1. ENGINE MISSES AT HIGH SPEED	1. Spark plugs dirty or incorrectly gapped.	1. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	2. Faulty coil.	2. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
	3. Dirt or water in fuel system.	3. Clean system and replace fuel filter.

ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTIONS
NOISY VALVES	1. High or low oil level in crankcase.	1. (Refer to 9 - ENGINE/LUBRICATION/OIL - STANDARD PROCEDURE)
	2. Thin or diluted oil.	2. Change oil and filter.
	3. Low oil pressure.	3. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	4. Dirt in lash adjusters.	4. Replace as necessary.
	5. Worn rocker arms.	5. Replace as necessary.
	6. Worn lash adjusters	6. Replace as necessary.
	7. Worn valve guides.	7. (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - STANDARD PROCEDURE)
	8. Excessive runout of valve seats on valve faces.	8. (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - STANDARD PROCEDURE)
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. (Refer to 9 - ENGINE/LUBRICATION/OIL - STANDARD PROCEDURE)
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Connecting rod journal out-of-round.	5. Service or replace crankshaft.
	6. Misaligned connecting rods.	6. Replace bent connecting rods.
MAIN BEARING NOISE	1. Insufficient oil supply.	1. (Refer to 9 - ENGINE/LUBRICATION/OIL - STANDARD PROCEDURE)
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Excessive end play.	5. Check thrust washers for wear.
	6. Crankshaft journal out-of round.	6. Service or replace crankshaft.
	7. Loose flywheel or torque converter.	7. Tighten to correct torque

ENGINE DIAGNOSIS - LUBRICATION

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS	1. Gaskets and O-Rings.	1.
	(a) Misaligned or damaged.	(a) Replace as necessary.
	(b) Loose fasteners, broken or porous metal parts.	(b) Tighten fasteners, Repair or replace metal parts.
	2. Crankshaft rear seal	2. Replace as necessary (Refer to 9 - ENGINE/ENGINE BLOCK/ CRANKSHAFT OIL SEAL - REAR - REMOVAL)
	3. Crankshaft seal flange. Scratched, nicked or grooved.	3. Polish or replace crankshaft.
	4. Oil pan flange cracked.	4. Replace oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
	5. Timing chain cover seal, damaged or misaligned.	5. Replace seal (Refer to 9 - ENGINE/ENGINE BLOCK/ CRANKSHAFT OIL SEAL - FRONT - REMOVAL)
	6. Scratched or damaged vibration damper hub.	6. Polish or replace damper.
OIL PRESSURE DROP	1. Low oil level.	1. Check and correct oil level.
	2. Faulty oil pressure sending unit.	2. Replace sending unit (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - REMOVAL)
	3. Low oil pressure.	3. Check oil pump and bearing clearance.
	4. Clogged oil filter.	4. Replace oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL)
	5. Worn oil pump.	5. Replace oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL)
	6. Thin or diluted oil.	6. Change oil and filter.
	7. Excessive bearing clearance.	7. Replace as necessary.
	8. Oil pump relief valve stuck.	8. Replace oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL)
	9. Oil pick up tube loose, damaged or clogged.	9. Replace as necessary.

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL PUMPING AT RINGS; SPARK PLUGS FOULING	1. Worn or damaged rings.	1. Hone cylinder bores and replace rings.
	2. Carbon in oil ring slots.	2. Replace rings (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE)
	3. Incorrect ring size installed.	3. Replace rings (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE)
	4. Worn valve guides.	4. Ream guides and replace valves (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - REMOVAL)
	5. Leaking valve guide seals.	5. Replace valve guide seals.

CYLINDER COMPRESSION PRESSURE

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

1. Clean the spark plug recesses with compressed air.
2. Remove the spark plugs.
3. Secure the throttle in the wide-open position.
4. Disable the fuel system (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DESCRIPTION).
5. Remove the Automatic Shutdown (ASD) relay (Refer to 8 - ELECTRICAL/IGNITION CONTROL/AUTO SHUT DOWN RELAY - REMOVAL).
6. Insert a compression pressure gauge and rotate the engine with the engine starter motor for three revolutions.
7. Record the compression pressure on the 3rd revolution. Continue the test for the remaining cylinders.
8. Refer (Refer to 9 - ENGINE - SPECIFICATIONS) for the correct engine compression pressures.

CYLINDER COMBUSTION PRESSURE LEAKAGE

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

1. Check the coolant level and fill as required. DO NOT install the radiator cap.
2. Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.
3. Remove the spark plugs.
4. Remove the oil filler cap.
5. Remove the air cleaner hose.
6. Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum and 552 kPa (80 psi) recommended.
7. Perform the test procedures on each cylinder according to the tester manufacturer's instructions. Set piston of cylinder to be tested at TDC compression,While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

All gauge pressure indications should be equal, with no more than 25% leakage.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

Refer to CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART .

CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
AIR ESCAPES THROUGH THROTTLE BODY	Intake valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH TAILPIPE	Exhaust valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH RADIATOR	Head gasket leaking or cracked cylinder head or block	Remove cylinder head and inspect. Replace defective part
MORE THAN 50% LEAKAGE FROM ADJACENT CYLINDERS	Head gasket leaking or crack in cylinder head or block between adjacent cylinders	Remove cylinder head and inspect. Replace gasket, head, or block as necessary
MORE THAN 25% LEAKAGE AND AIR ESCAPES THROUGH OIL FILLER CAP OPENING ONLY	Stuck or broken piston rings; cracked piston; worn rings and/or cylinder wall	Inspect for broken rings or piston. Measure ring gap and cylinder diameter, taper and out-of-round. Replace defective part as necessary

STANDARD PROCEDURE

REPAIR DAMAGED OR WORN THREADS

CAUTION: Be sure that the tapped holes maintain the original center line.

Damaged or worn threads can be repaired. Essentially, this repair consists of:

- Drilling out worn or damaged threads.
- Tapping the hole with a special Heli-Coil Tap, or equivalent.
- Installing an insert into the tapped hole to bring the hole back to its original thread size.

FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II

Mopar® Engine RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV

Mopar® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER

Mopar® Gasket Maker is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® GASKET SEALANT

Mopar® Gasket Sealant is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

FORM-IN-PLACE GASKET AND SEALER APPLICATION

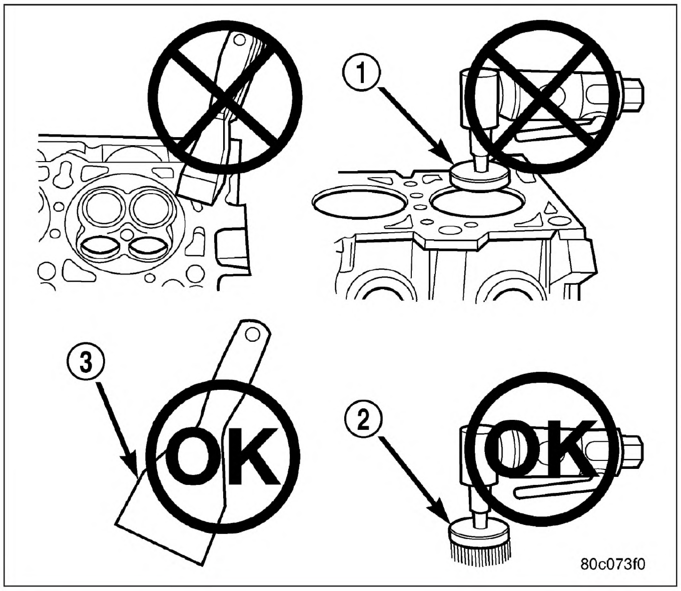
Assembling parts using a form-in-place gasket requires care but it's easier than using precut gaskets.

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

ENGINE GASKET SURFACE PREPARATION



To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper.
- Abrasive pad or paper to clean cylinder block and head.
- High speed power tool with an abrasive pad or a wire brush (1).

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

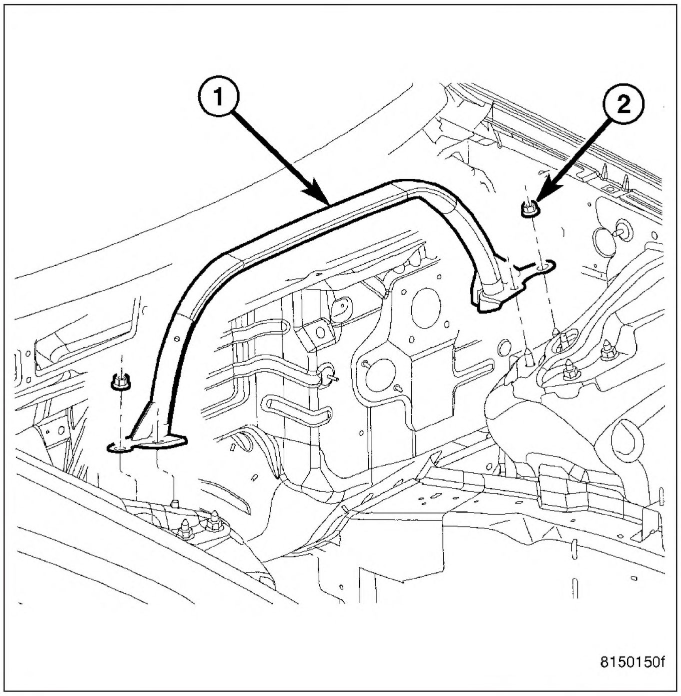
Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (3).
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (2).

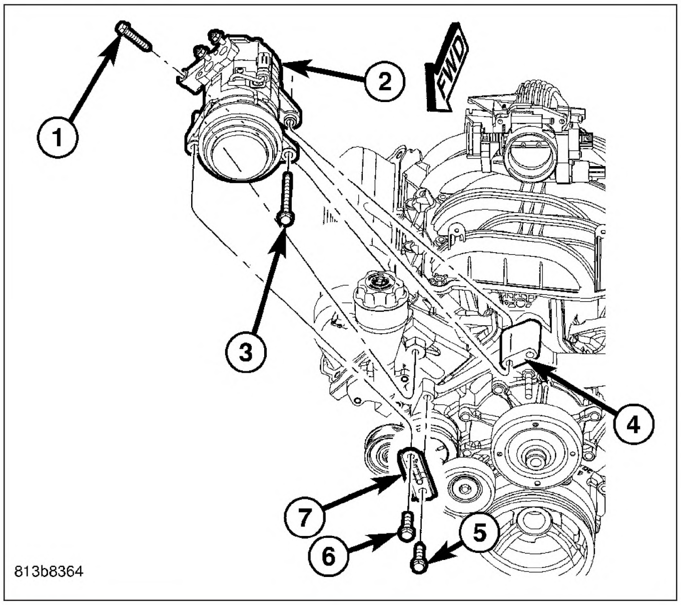
CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

REMOVAL - ENGINE

1. Release fuel rail pressure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE) then disconnect the fuel supply quick connect fitting at the fuel rail (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE).
2. Remove the strut tower support (1).

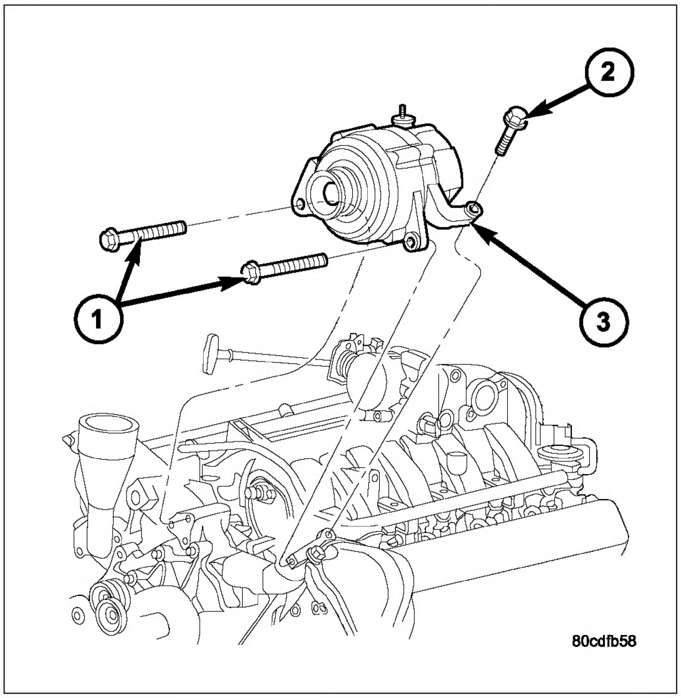


3. Disconnect the battery negative cable.
4. Remove air cleaner assembly.
5. Remove fan shroud with viscous fan assembly.
6. Remove drive belt.
7. Remove A/C compressor (2) and secure away from engine.

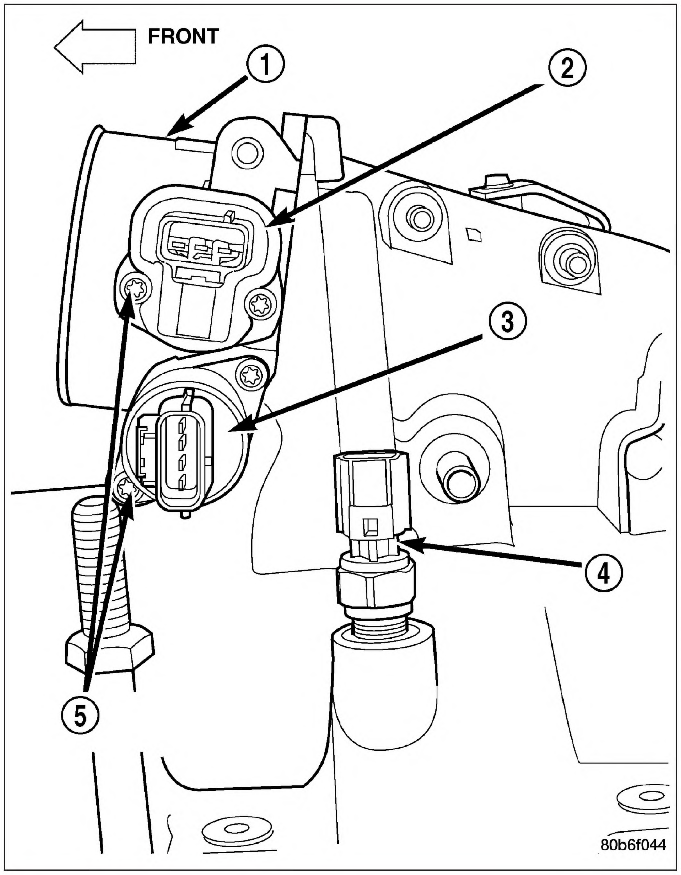


8. Remove generator (3) and secure away from engine.

NOTE: Do NOT remove the phenolic pulley from the P/S pump. It is not required for P/S pump removal.



9. Remove power steering pump with lines attached and secure away from engine.
10. Drain cooling system.
11. Disconnect the heater hoses from the engine.
12. Disconnect heater hoses from heater core and remove hose assembly.
13. Disconnect throttle and speed control cables.
14. Remove upper radiator hose from engine.
15. Remove lower radiator hose from engine.
16. Remove radiator/cooling module assembly.
17. Disconnect the engine to body ground straps at the left side of cowl.



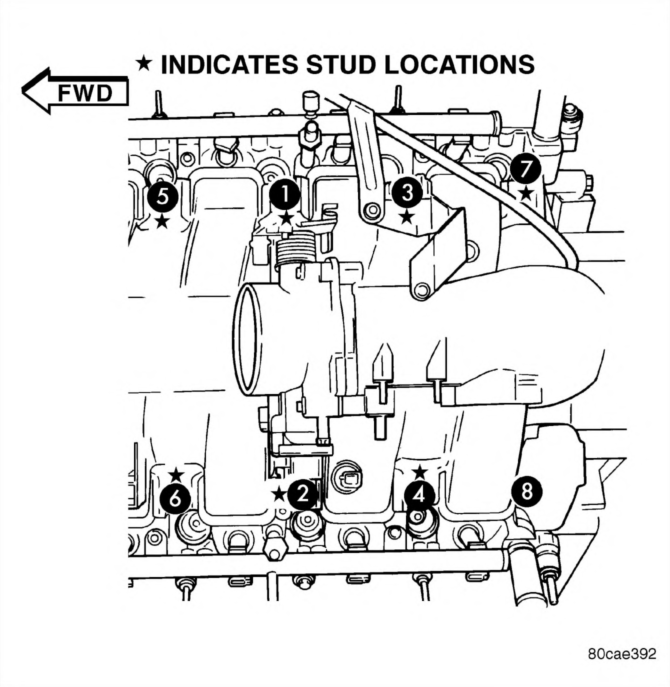
18. Disconnect the engine wiring harness at the following points:
    - Intake air temperature (IAT) sensor (4)
    - Fuel Injectors
    - Throttle Position (TPS) Switch (2)
    - Idle Air Control (IAC) Motor (3)
    - Engine Oil Pressure Switch
    - Engine Coolant Temperature (ECT) Sensor
    - Manifold Absolute Pressure MAP) Sensor
    - Camshaft Position (CMP) Sensor
    - Coil Over Plugs
    - Crankshaft Position Sensor
19. Remove coil over plugs.

20. Remove fuel rail and secure away from engine.

NOTE: It is not necessary to release the quick connect fitting from the fuel supply line for engine removal.

21. Remove the PCV hose.
22. Remove the breather hoses.
23. Remove the vacuum hose for the power brake booster.
24. Disconnect knock sensors.
25. Remove engine oil dipstick tube.
26. Remove intake manifold.
27. Install engine lifting fixture,special tool#8247, using original fasteners from the removed intake manifold, and fuel rail. Torque to factory specifications.

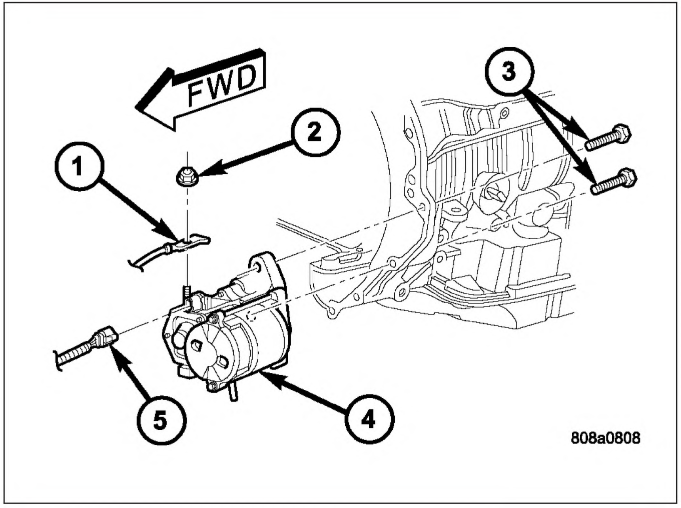
NOTE: Recheck bolt torque for engine lift plate before removing engine.



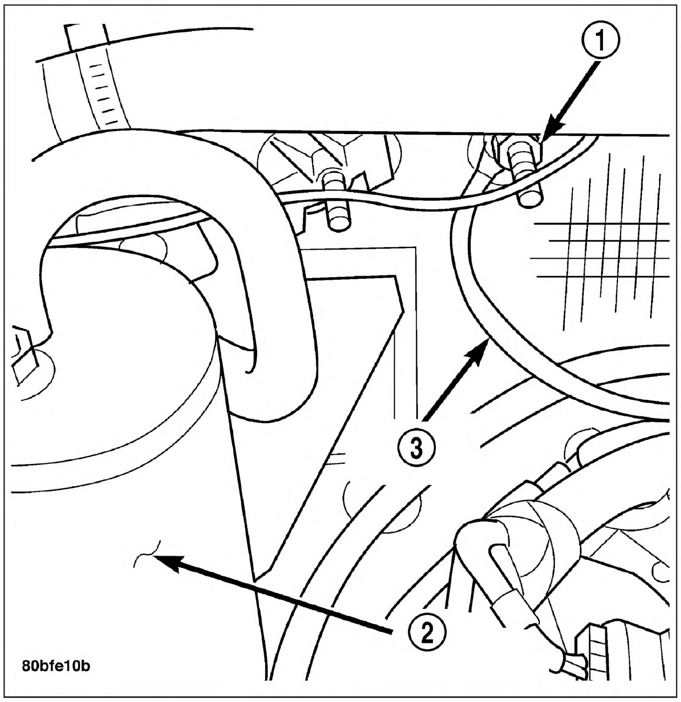
28. Disconnect oxygen sensor wiring.
29. Disconnect crankshaft postion sensor.
30. Disconnect the engine block heater power cable, if equipped.
31. Disconnect the front propshaft at the front differential and secure out of way.

NOTE: It is necessary to disconnect the front propshaft for access to the starter and left side exhaust flange.

32. Remove the starter (4).



33. Remove the ground straps from the left (2) and right (3) side of the block.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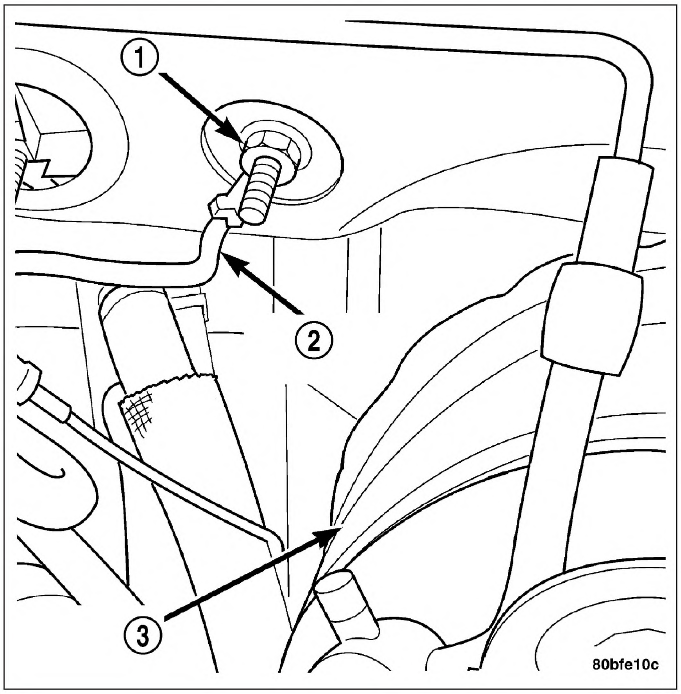
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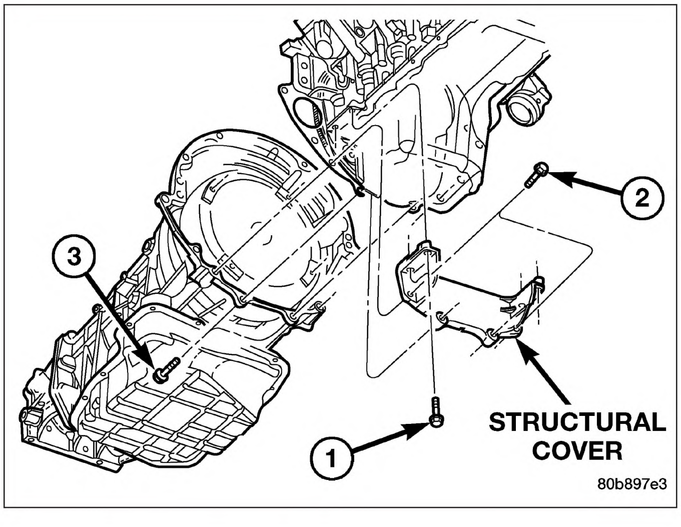
34. Remove the structural cover.
35. Disconnect the right and left exhaust pipes at the manifolds and from the crossover, and remove from the vehicle.

NOTE: The exhaust clamps at the manifolds cannot be reused. New clamps must be used or leaks may occur.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STRUCTURAL COVER
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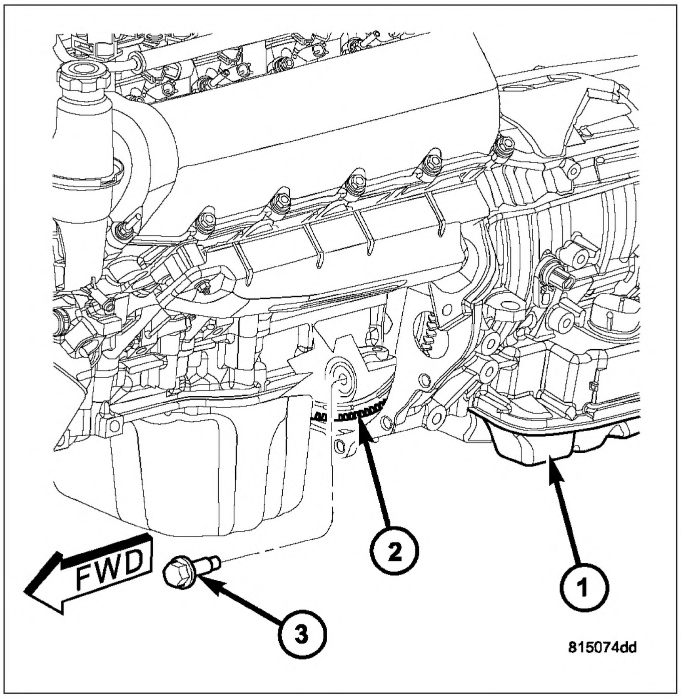
36. Remove torque convertor bolts (3), and mark location for reassembly.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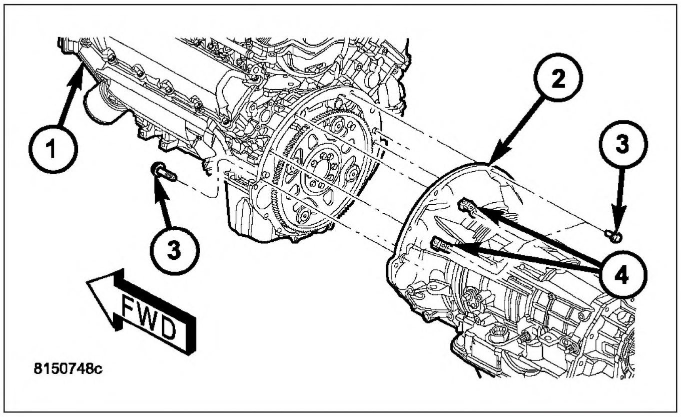
37. Remove transmission bellhousing to engine bolts (3).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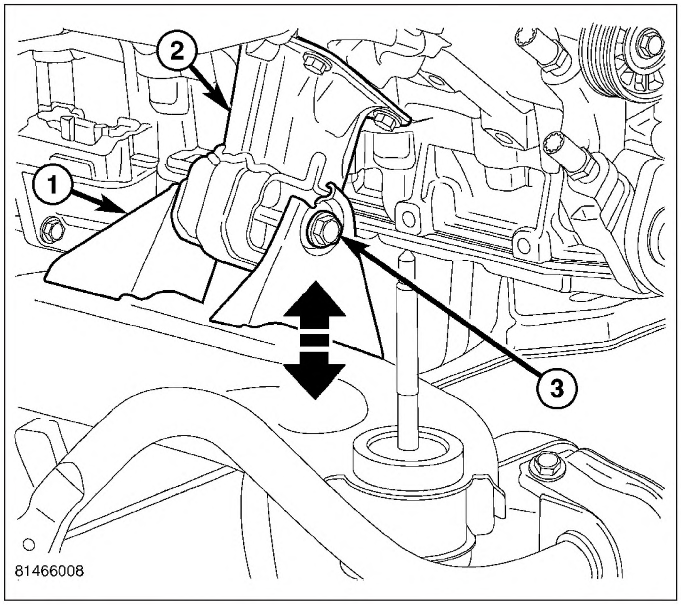
38. Remove left and right engine mount thru bolts (3).
39. Lower the vehicle.
40. Support the transmission with a suitable jack.
41. Connect a suitable engine hoist to the engine lift plate.
42. Remove engine from vehicle.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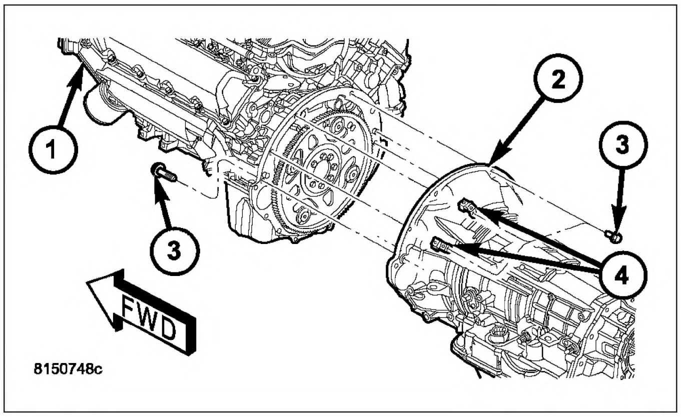
INSTALLATION - ENGINE

1. Position the engine in the vehicle.
2. Install the transmission bellhousing to engine mounting bolts (3). Tighten the bolts to 41 N·m (30ft. lbs.)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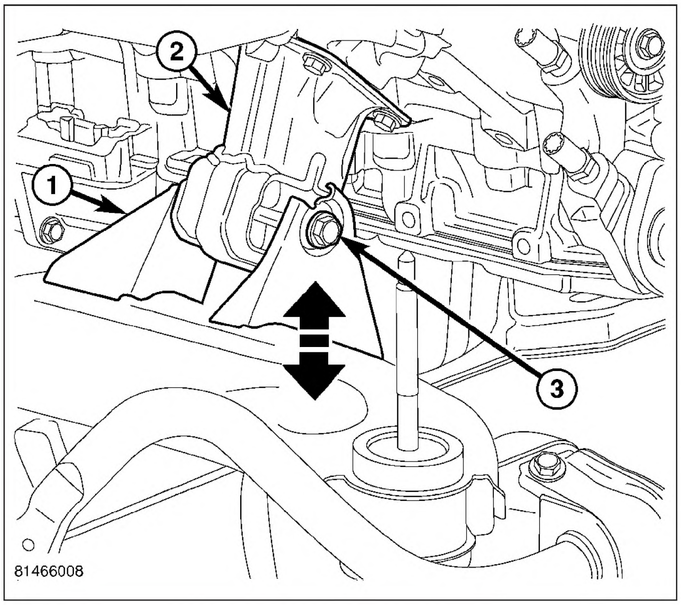
3. Install the engine mount thru bolts (3).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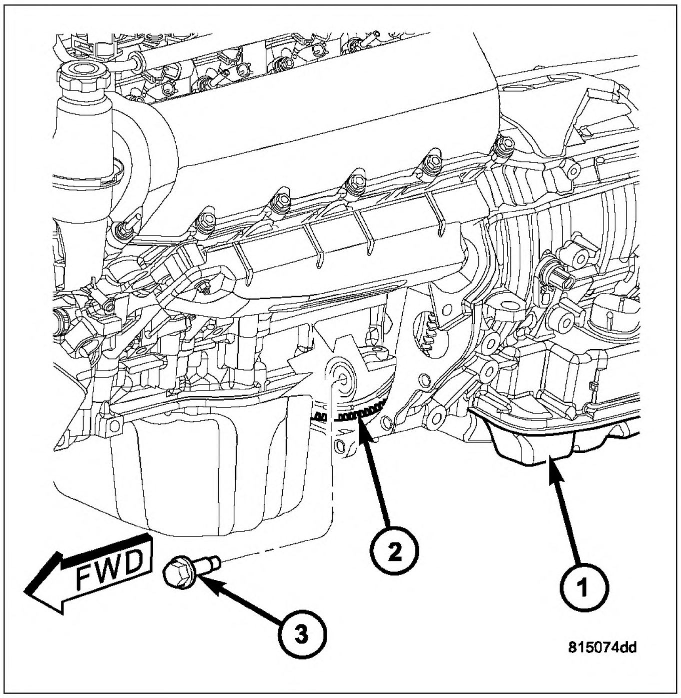
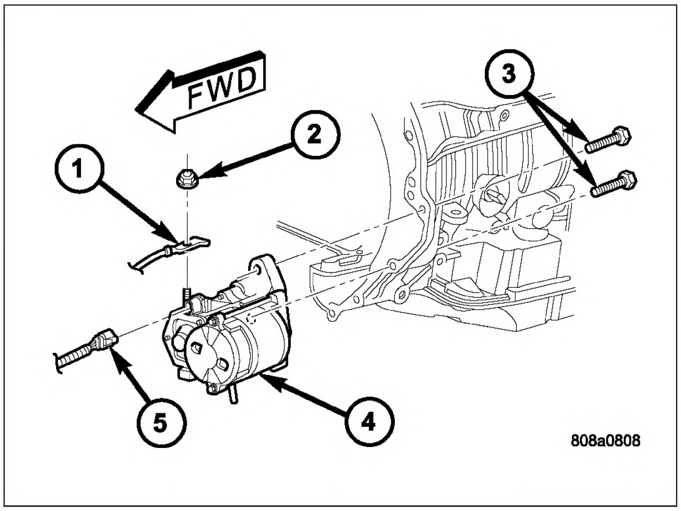
4. Install the torque convertor bolts (3).



5. Install the starter(4).
6. Connect the crankshaft position sensor.
7. Install the engine block heater power cable, if equipped.

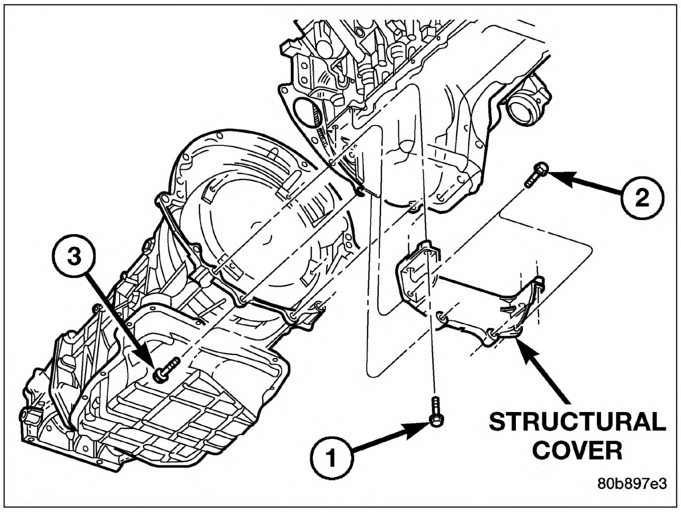


CAUTION: The structural cover requires a specific torque sequence. Failure to follow this sequence may cause severe damage to the cover.

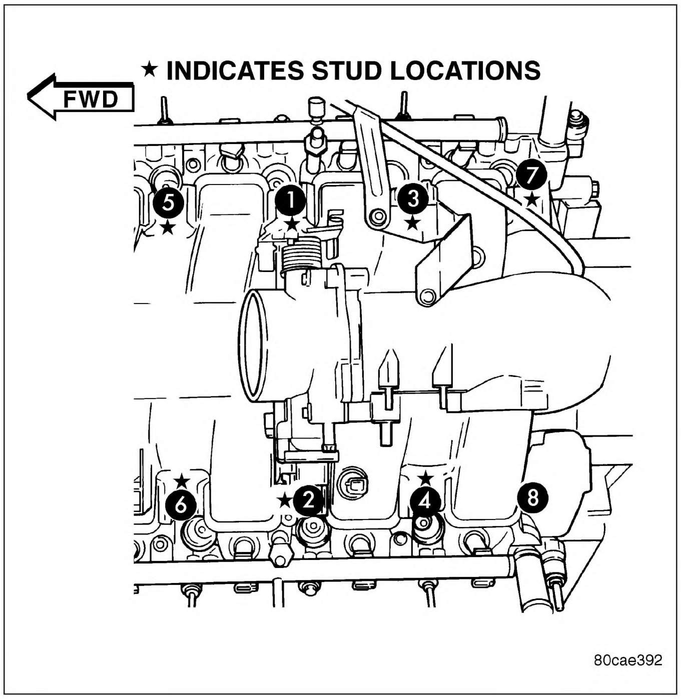
8. Install the structural cover.

NOTE: New clamps must be used on exhaust manifold flanges. Failure to use new clamps may result in exhaust leaks.

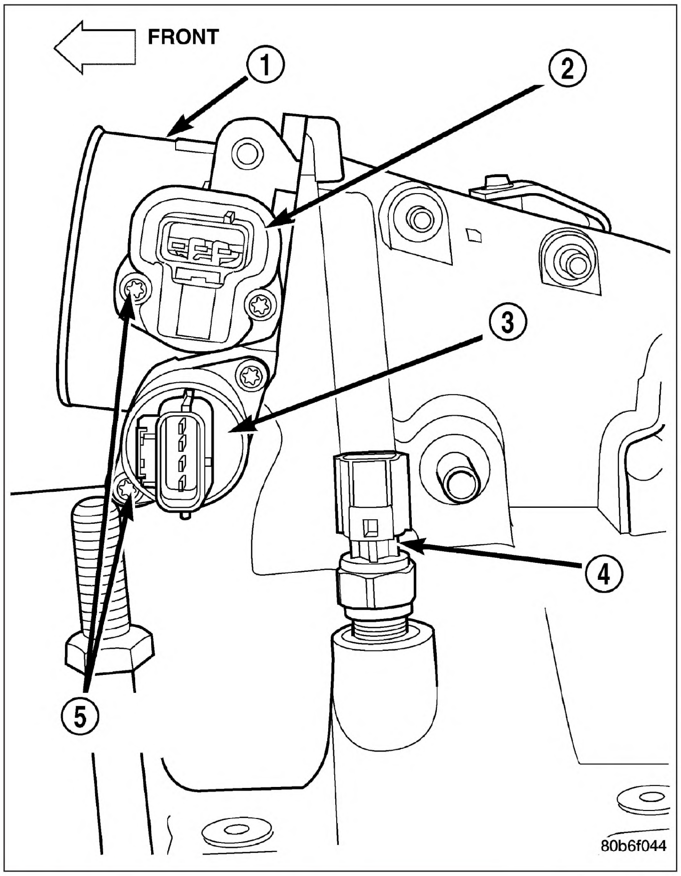
9. Install the left and right exhaust pipes.
10. Connect the left and right oxygen sensors.
11. Remove the engine lift plate.
12. Connect the knock sensors.



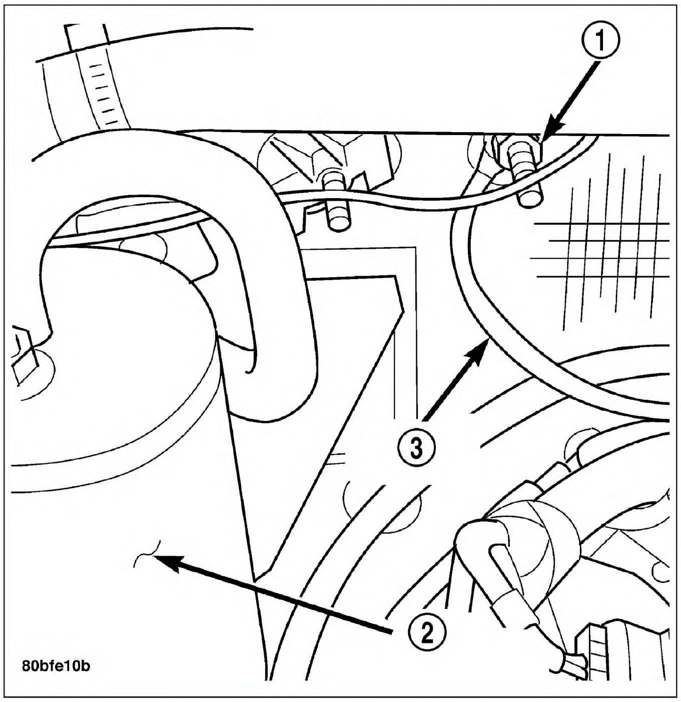
13. Connect the engine to body ground straps at the left side of the cowl.
14. Install the intake manifold using the sequence provided.
15. Install the engine oil dipstick tube.
16. Install the power brake booster vacuum hose.
17. Install the breather hoses.
18. Install the PCV hose.
19. Install the fuel rail.
20. Install the coil over plugs.



21. Connect the engine wiring harness at the following points:
    - Intake air temperature (IAT) sensor (4)
    - Fuel Injectors
    - Throttle Position (TPS) Switch (2)
    - Idle Air Control (IAC) Motor (3)
    - Engine Oil Pressure Switch
    - Engine Coolant Temperature (ECT) Sensor
    - Manifold Absolute Pressure MAP) Sensor
    - Camshaft Position (CMP) Sensor
    - Coil Over Plugs
    - Crankshaft Position Sensor



22. Connect the ground straps on the right (3)side of the engine.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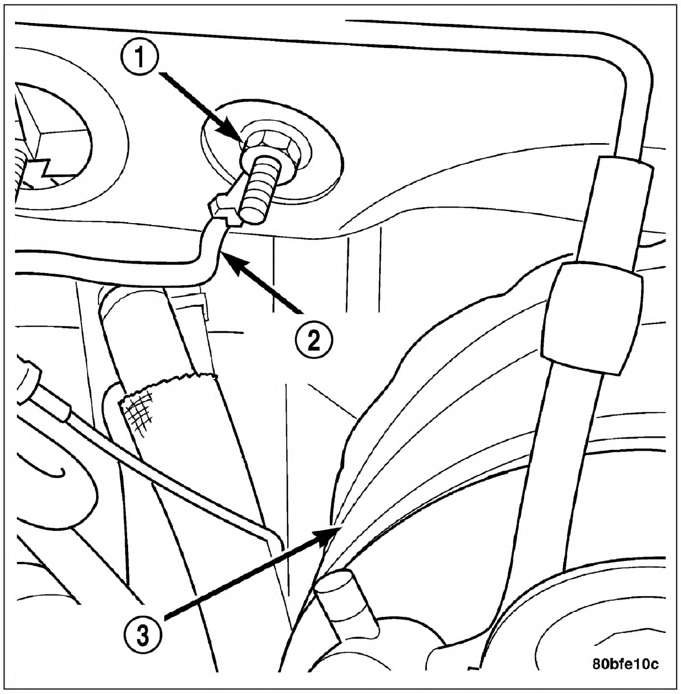
23. Connect the ground straps on the left (2) side of the engine.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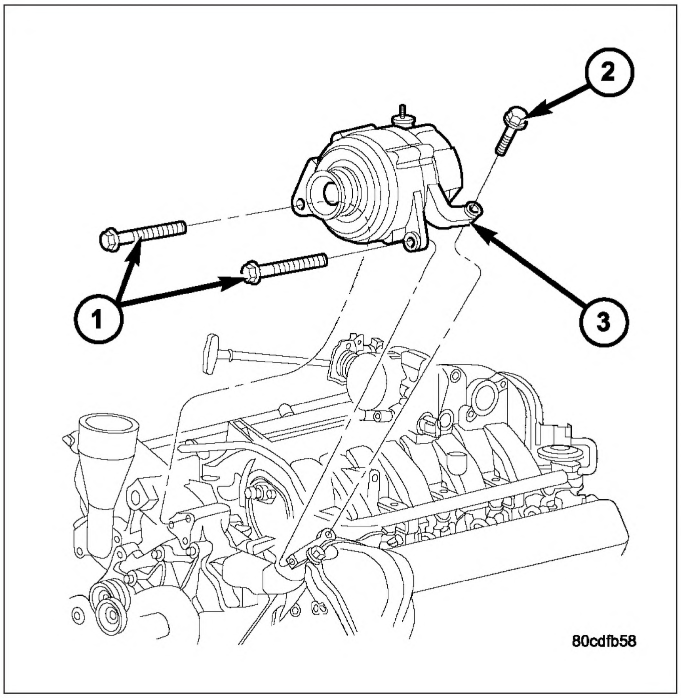
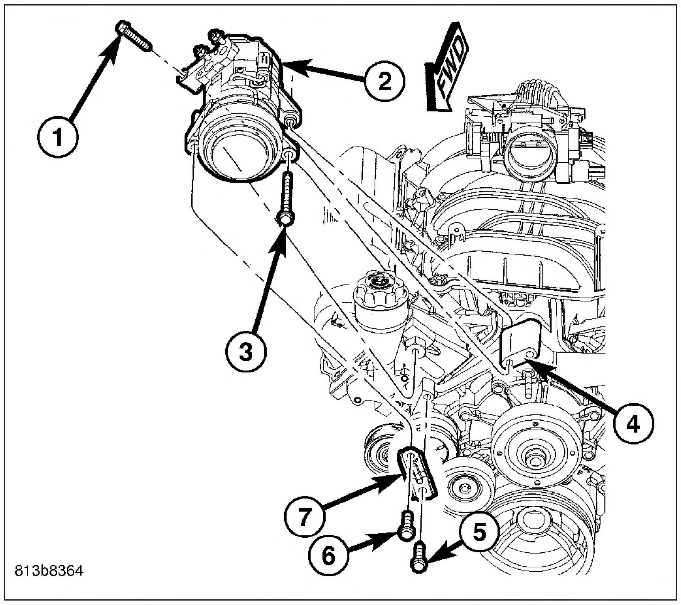
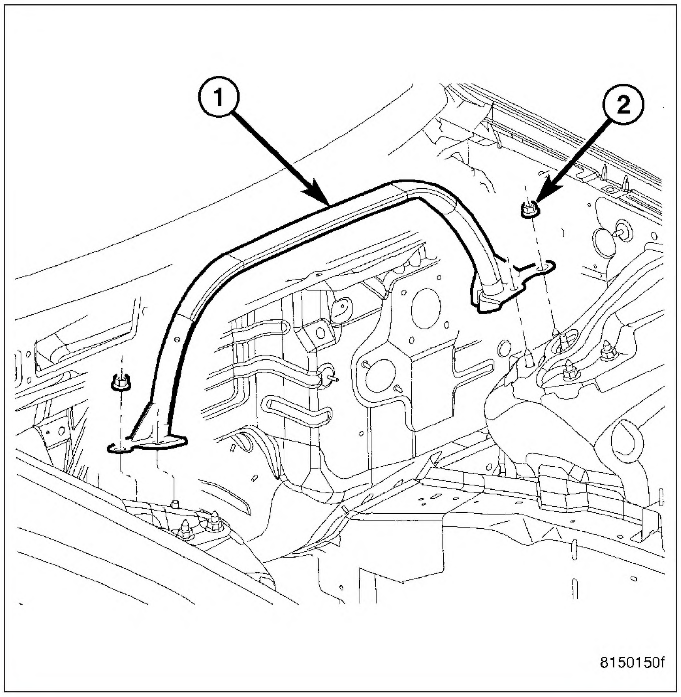
24. Reinstall the radiator/cooling module assembly.
25. Connect lower radiator hose.
26. Connect upper radiator hose.
27. Connect throttle and speed control cables.
28. Install the heater hose assembly.
29. Install coolant recovery bottle.
30. Install the power steering pump.
31. Install the generator (3).



32. Install the A/C compressor (2).
33. Install the drive belt.
34. Install the fan shroud with the viscous fan assembly.
35. Install the radiator core support bracket.
36. Recharge the A/C system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).



37. Install the strut tower support (1).
38. Install the air cleaner assembly.
39. Refill the engine cooling system.
40. Check and fill engine oil.
41. Connect the battery negative cable.
42. Start the engine and check for leaks.



SPECIFICATIONS

SPECIFICATIONS - 3.7L ENGINE

GENERAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION	
Type	90° SOHC V6 12 Valve	
Number of Cylinders	6	
Firing Order	1-6-5-4-3-2	
Lead Cylinder	No. 1 Left Bank	
Compression Ratio	9.6:1	
Max. Variation Between Cylinders	25%	
	Metric	**Standard**
Displacement	3.7 Liters	226 Cubic Inches
Bore	93.0 mm	3.66 in.
Stroke	90.8 mm	3.40 in.
Horsepower	211 @ 5200 RPM	
Torque	236ft. lbs.@4000 PRM	
Compression Pressure	1172-1551 kPa	170-225 psi

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	**Standard**
Bore Diameter	93.013 ± .0075 mm	3.6619 ± 0.0003 in.
Out of Round (MAX)	0.076 mm	0.003 in.
Taper (MAX)	0.051 mm	0.002 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Diameter	92.975 mm	3.6605 in.
Weight	365.0 grams	12.87 oz
Ring Groove Diameter		
No. 1	85.37 - 83.13 mm	3.282 - 3.273 in
No. 2	82.833 - 83.033 mm	3.261 - 3.310 in.
No. 3	83.88 - 84.08 mm	3.302 - 3.310 in.

PISTON PINS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Clearance In Piston	0.006 - 0.015 mm	0.0002 - 0.0005 in.
Diameter	24.017 - 24.020 mm	0.9455 - 0.9456 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Ring Gap		
Top Compression Ring	0.20 - 0.36 mm	0.0079 - 0.0142 in.
Second Compression Ring	0.37 - 0.63 mm	0.0146 - 0.0249 in.
Oil Control (Steel Rails)	0.25 - 0.76 mm	0.0099 - 0.30 in.
Side Clearance		
Top Compression Ring	.051 - .094 mm	0.0020 - 0.0037 in.
Second Compression Ring	0.040 - 0.080 mm	0.0016 - 0.0031 in.
Oil Ring (Steel Ring)	.019 - .229 mm	.0007 - .0091 in.
Ring Width		
Top Compression Ring	1.472 - 1.490 mm	0.057 - 0.058 in.
Second Compression Ring	1.472 - 1.490 mm	0.057 - 0.058 in.
Oil Ring (Steel Rails)	0.445 - 0.470 mm	0.017 - 0.018 in.

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Clearance	0.006 - 0.044 mm	0.0002 - 0.0017 in.
Side Clearance	0.10 - 0.35 mm	0.004 - 0.0138 in.
Piston Pin Clearance	.015 - .028 mm	0.0006 - 0.0011 in.
Bearing Bore Out of Round (MAX)	0.004 mm	0.0002 in.
Total Weight (Less Bearing)	612 grams	21.588 ounces

CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Main Bearing Journal Diameter	63.488 - 63.512 mm	2.4996 - 2.5005 in.
Bearing Clearance	0.002 - 0.046 mm	0.00008 - 0.0018 in.
Out of Round (MAX)	0.005 mm	0.0002 in.
Taper (MAX)	0.006 mm	0.0004 in.
End Play	0.052 - 0.282 mm	0.0021 - 0.0112 in.
End Play (MAX)	0.282 mm	0.0112 in.
Connecting Rod Journal Diameter	57.908 - 57.892 mm	2.2798 - 2.2792 in.
Bearing Clearance	0.006 - 0.044	0.0002 - 0.0011 in.
Out of Round (MAX)	0.005 mm	0.0002 in.
Taper (MAX)	0.006 mm	0.0002 in.

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bore Diameter	26.02 - 26.04 mm	1.0245 - 1.0252 in.
Bearing Journal Diameter	25.975 - 25.995 mm	1.0227 - 1.0235 in.
Bearing Clearance	0.025 - 0.065 mm	0.001 - 0.0026 in.
Bearing Clearance (MAX)	0.065 mm	0.0026 in.
End Play	.075 - .200 mm	0.003 - 0.0079 in.
End Play (MAX)	.200 mm	0.0079 in.

VALVE TIMING

DESCRIPTION	SPECIFICATION
Intake	
Opens (BTDC)	5.6°
Closes (ATDC)	240.1°
Duration	245.7°
Exhaust	
Opens (BTDC)	241.5°
Closes (ATDC)	20.1°
Duration	261.6°
Valve Overlap	25.7°

VALVES

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Face Angle	45° - 45.5°	
Head Diameter		
Intake	48.52 - 48.78 mm	1.9103 - 1.9205 in.
Exhaust	36.87 - 37.13 mm	1.4516 - 1.4618 in.
Length (Overall)		
Intake	113.45 - 114.21 mm	4.4666 - 4.4965 in.
Exhaust	114.92 - 115.68 mm	4.5244 - 4.5543 in.
Stem Diameter		
Intake	6.931 - 6.957 mm	0.2729 - 0.2739 in.
Exhaust	6.902 - 6.928 mm	0.2717 - 0.2728 in.
Stem-to-Guide Clearance		
Intake	0.018 - 0.069 mm	0.0008 - 0.0028 in.
Exhaust	0.047 - 0.098 mm	0.0019 - 0.0039 in.
Max. Allowable Stem-to-Guide Clearance (Rocking Method)		
Intake	0.069 mm	0.0028 in.
Exhaust	0.098 mm	0.0039 in.
Valve Lift (Zero Lash)		
Intake	12.00 mm	0.472 in.
Exhaust	12.00 mm	0.472 in.

VALVE SPRING

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Free Length (Approx)		
Intake	48.18 mm	1.896 in.
Exhaust - w/damper	48.2 mm	1.897 in.
Spring Force (Valve Closed)		
Intake	332.0 - 368.0 N @ 40.12 mm	74.63 - 82.72 lbs. @ 1.5795 in.
Exhaust - (without damper)	356 - 394 N @ 39.12 mm	80.031 - 88.57 lbs. @ 1.54 in.
Spring Force (Valve Open)		
Intake	948.0 - 1038.0 N @ 28.12 mm	213.2 - 233.8 lbs. @ 1.107 in.
Exhaust - without damper	974 - 956 N @ 27.12 mm	218.8 - 215.1 lbs. @ 1.067 in.
Number of Coils		
Intake	7.30	
Exhaust	7.15	
Wire Diameter		

Intake	4.77 × 3.80mm	0.1878 × 0.1496 in.
Exhaust	4.66 × 3.72mm	0.1843 × .1464 in.
Installed Height (Spring Seat to Bottom of Retainer)		
Nominal		
Intake	40.12 mm	1.579 in.
Exhaust - w/damper	40.12 mm	1.579 in.

CYLINDER HEAD

DESCRIPTION	**SPECIFICATION**	
	Metric	**Standard**
Gasket Thickness (Compressed)	0.7 mm	(0.0276 in.)
Valve Seat Angle	44.5° - 45.0°	
Valve Seat Runout (MAX)	0.051 mm	0.002 in.
Valve Seat Width		
Intake	1.75 - 2.36 mm	0.0698 - 0.0928 in.
Exhaust	1.71 - 2.32 mm	0.0673 - 0.0911 in.
Guide Bore Diameter (Std.)	6.975 - 7.00 mm	0.2747 - 0.2756 in.
Cylinder Head Warpage (Flatness)	0.0508 mm	0.002 in.

OIL PUMP

DESCRIPTION	**SPECIFICATION**	
	Metric	**Standard**
Clearance Over Rotors/End Face (MAX)	0.095 mm	0.0038 in.
Cover Out - of -Flat (MAX)	0.025 mm	0.001 in.
Inner and Outer Rotor Thickness	12.02 mm	0.4731 in.
Outer Rotor to pocket (Diametral) clearance (MAX)	.235 mm	.0093 in.
Outer Rotor Diameter (MIN)	85.925 mm	0.400 in.
Tip Clearance Between Rotors (MAX)	0.150 mm	0.006 in.

OIL PRESSURE

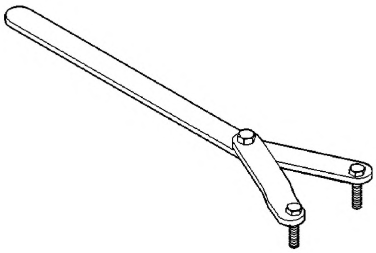
SPECIFICATION	**SPECIFICATION**	
	Metric	**Standard**
At Curb Idle Speed (MIN)*	25 kPa	4 psi
@ 3000 rpm	170 - 758 kPa	25 - 110 psi
*** CAUTION: If pressure is zero at curb idle, DO NOT run engine at 3000 rpm.**		

TORQUE

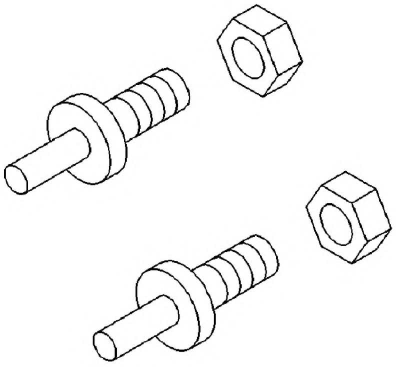
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Camshaft			
Non - Oiled Sprocket Bolt	122	90	-
Bearing Cap Bolts	11	-	100
Counterbalance Shaft Retaining Bbolt	28	-	250
Timing Chain Cover Bolts	58	43	-
Connecting Rod Cap Bolts	27	20	-
	PLUS 90° TURN		
Bed Plate Bolts	Refer to Procedure		
Crankshaft Damper Bolt	175	130	-
Cylinder Head Bolts			
M11 Bolts	Refer To Procedure		
M8 Bolts	Refer To Procedure		
Cylinder Head Cover Bolts	12	-	105
Exhaust Manifold Bolts	25	18	-
Exhaust Manifold Heat Shield Nuts	8	-	72
	Then loosen 45°		
Flexplate Bolts	95	70	-
Engine Mount Bracket to Block Bolts	61	45	-
Rear Mount to Transmission Bolts	46	34	-
Generator Mounting Bolts			
M10 Bolts	54	40	-
M8 Bolts	28	-	250
Intake Manifold Bolts	12	-	105
	Refer to Procedure for Tightening Sequence		
Oil Pan Bolts	15	-	130
Oil Pan Drain Plug	34	25	-
Oil Pump Bolts	28	-	250
Oil Pump Cover Bolts	12	-	105
Oil Pickup Tube Bolt and Nut	28	-	250
Oil Dipstick Tube to Engine Block Bolt	15	-	130
Oil Fill Tube Bolts	12	-	105
Timing Chain Guide Bolts	28	-	250
Timing Chain Tensioner Arm	28	-	250
Hydraulic Tensioner Bolts	28	-	250
Timing Chain Primary Tensioner Bolts	28	-	250
Timing Drive Idler Sprocket Bolt	34	25	-
Thermostat Housing Bolts	12	-	105
Water Pump Bolts	58	43	-

SPECIAL TOOLS

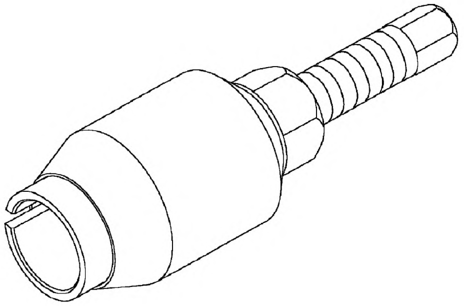
3.7L ENGINE



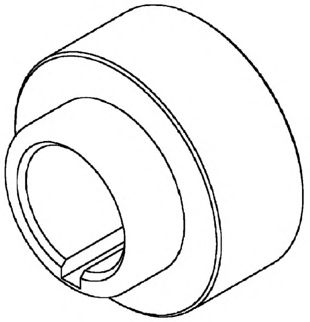
Spanner Wrench - 6958



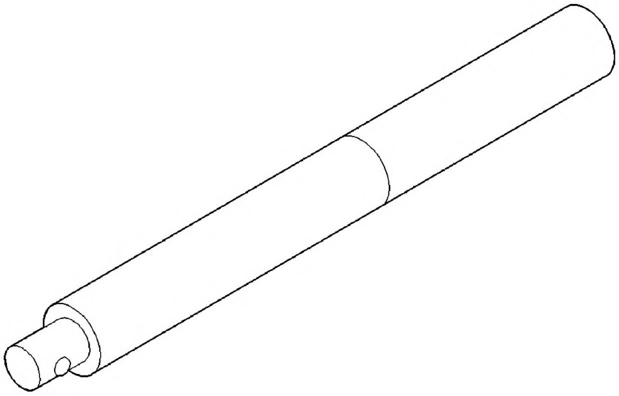
Adapter Pins 8346



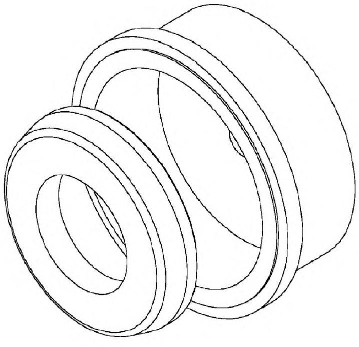
Front Crankshaft Seal Remover 8511



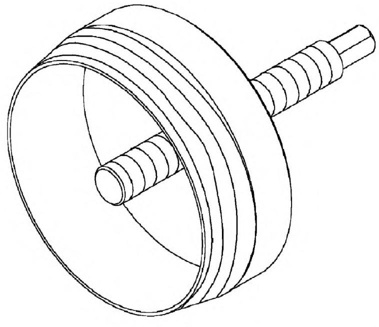
Front Crankshaft Seal Installer 8348



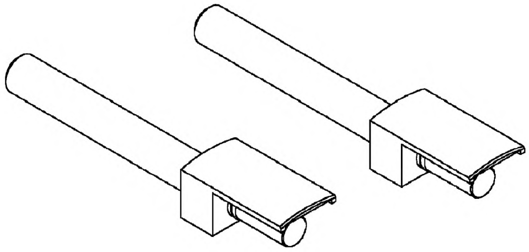
HANDLE C-4171



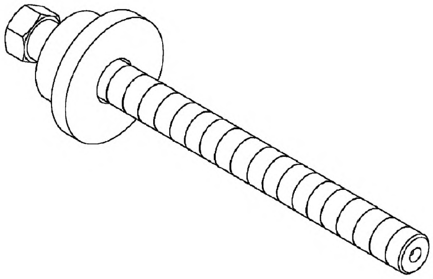
Rear Crankshaft Seal Installer 8349



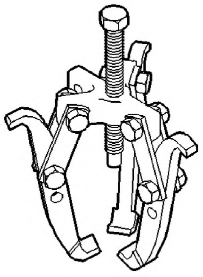
Rear Crankshaft Seal Remover 8506



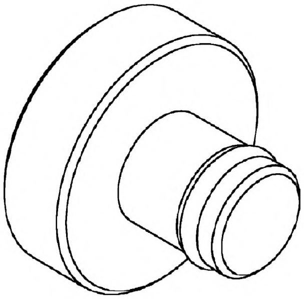
Connecting Rod Guides 8507



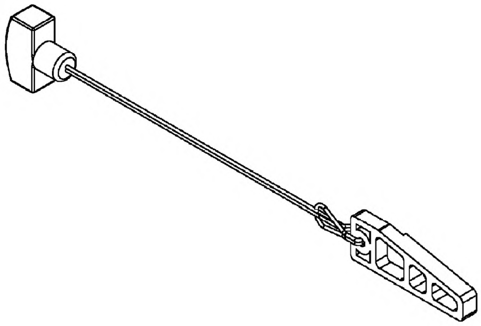
Crankshaft Damper Installer 8512



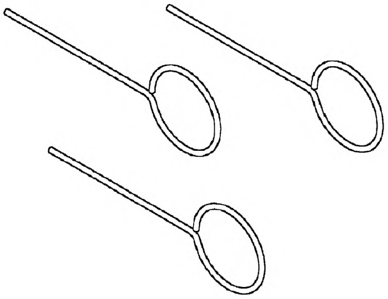
Puller 1026



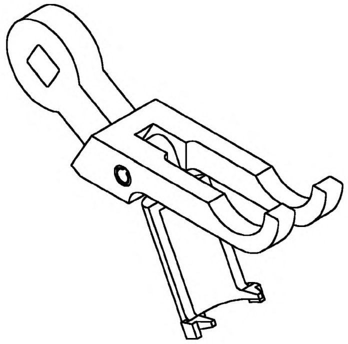
Crankshaft Damper Removal Insert 8513 - A



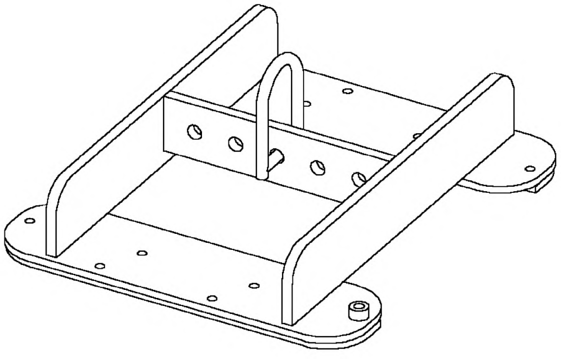
Chain Tensioner



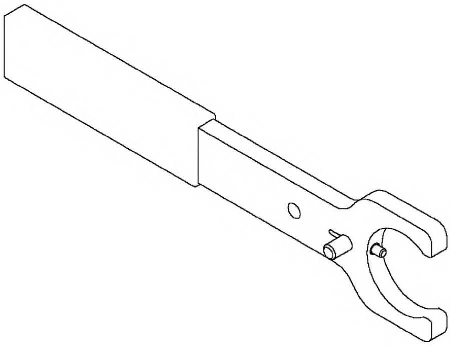
Chain Tensioner Pins 8514



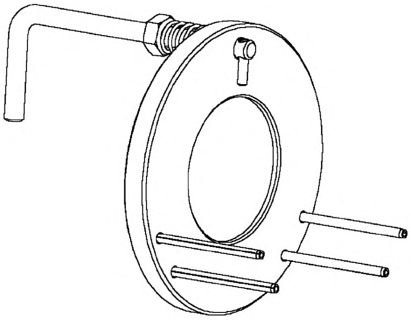
VALVE SPRING COMPRESSOR 8426



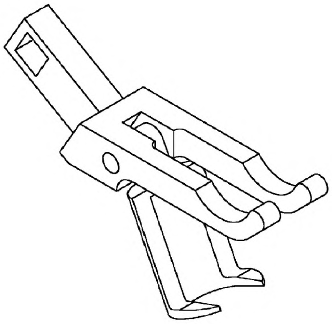
ENGINE LIFTING FIXTURE 8427



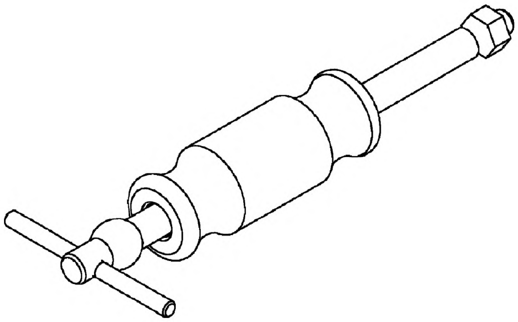
CAMSHAFT HOLDER 8428



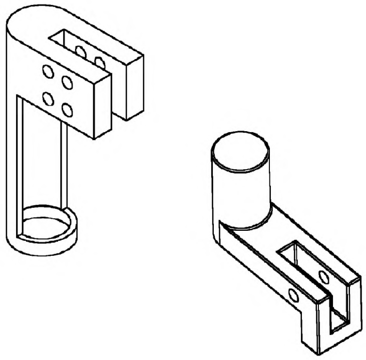
HOLDER SECONDARY CAMSHAFT CHAIN 8429



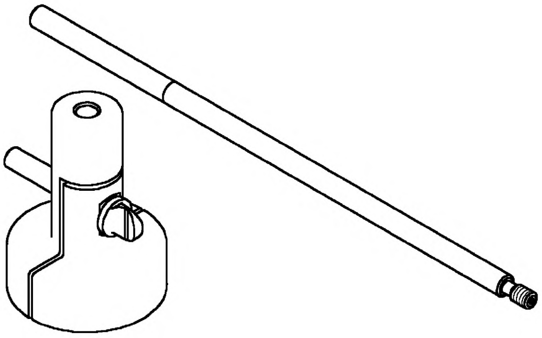
Remover, Rocker Arm 8516



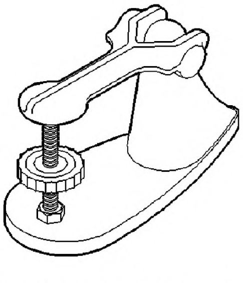
Idler Shaft Remover 8517



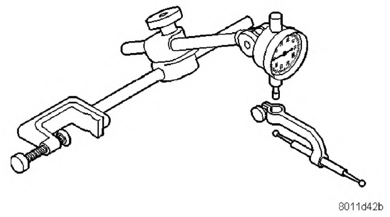
Valve Spring Compressor Adapters 8519



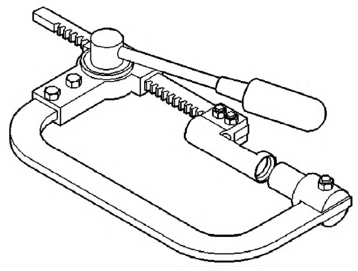
INSTALLER COUNTER BALANCE SHAFT 8641



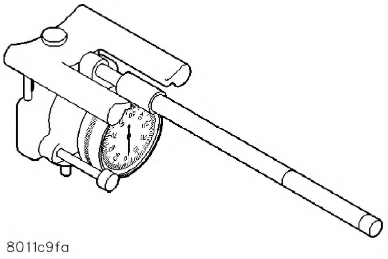
Valve Spring Tester C-647



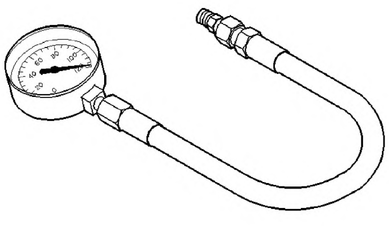
Dial Indicator C-3339



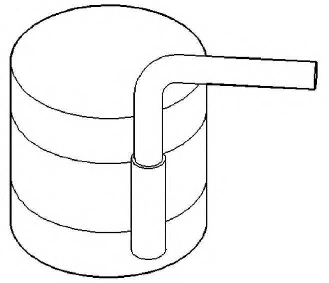
Valve Spring Compressor C-3422-B



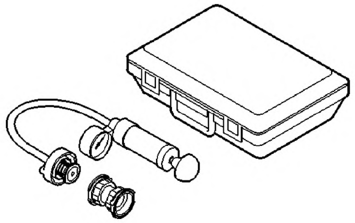
Indicator, Cylinder Bore C-119



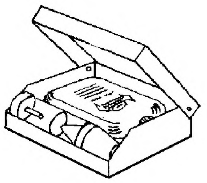
Oil Pressure Gauge C-3292



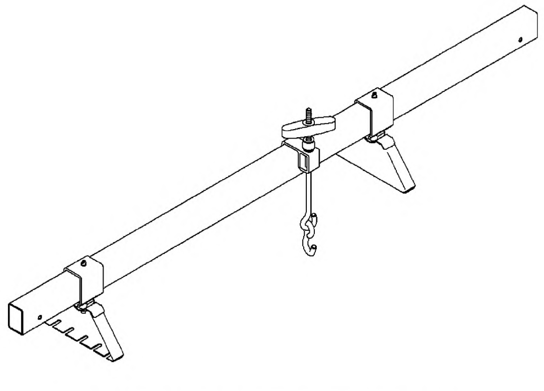
Piston Ring Compressor C-385



Pressure Tester Kit 7700



Bloc–Chek–Kit C-3685–A



ENGINE SUPPORT FIXTURE 8534

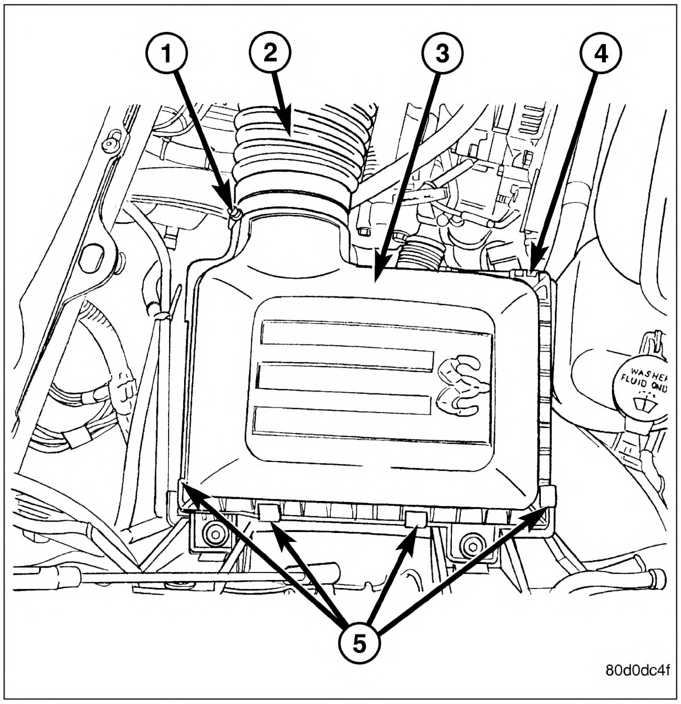
CLEANER-AIR ELEMENT

REMOVAL

Filter Element Only

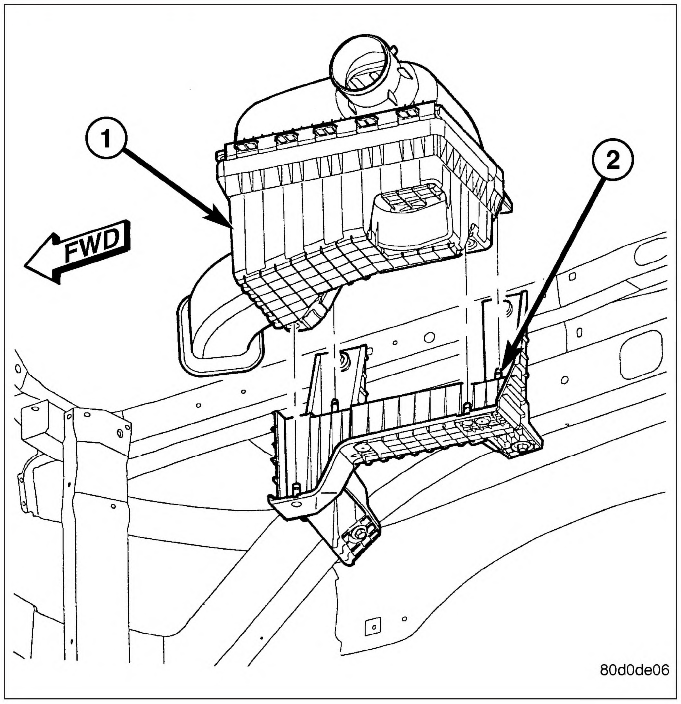
Housing removal is not necessary for element (filter) replacement.

1. Loosen clamp (1) and disconnect air duct at air cleaner cover (3).
2. Pry over 4 spring clips (5) from housing cover (spring clips retain cover to housing).
3. Release housing cover (3) from locating tabs on housing and remove cover (3).
4. Remove air cleaner element (filter) from housing.
5. Clean inside of housing before replacing element.



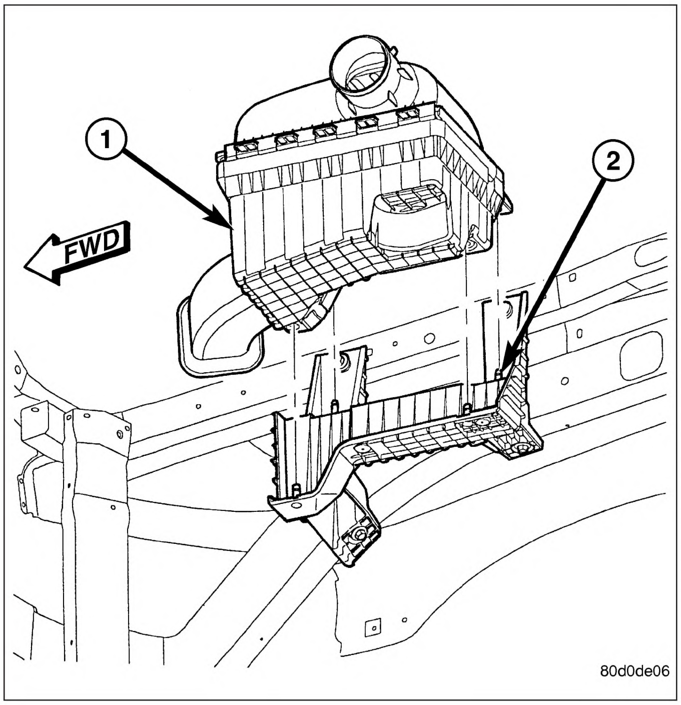
Housing Assembly

1. Loosen clamp and disconnect air duct at air cleaner cover.
2. Lift entire housing assembly (1) from 4 locating pins (2).



INSTALLATION

1. Install filter element into housing (1).
2. Position housing cover into housing locating tabs.
3. Pry up 4 spring clips and lock cover to housing.
4. Install air duct to air cleaner cover and tighten hose clamp to 3 N·m (30 in. lbs.) torque.
5. If any other hose clamps were removed from air intake system, tighten them to 3.4 N·m (30 in. lbs.) torque.
6. If any bolts were removed from air resonator housing or air intake tubing, tighten them to 4.5 N·m (40 in. lbs.) torque.



CYLINDER HEAD

DESCRIPTION

CYLINDER HEAD

The cylinder heads are made of an aluminum alloy. The cylinder head features two valves per cylinder with pressed in powdered metal valve guides. The cylinder heads also provide enclosures for the timing chain drain, necessitating unique left and right cylinder heads.

VALVE GUIDE SEALS

The valve guide seals are made of rubber and incorporate an integral steel valve spring seat. The integral garter spring maintains consistent lubrication control to the valve stems.

DIAGNOSIS AND TESTING

CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50 - 70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

DIAGNOSIS AND TESTING - HYDRAULIC LASH ADJUSTER

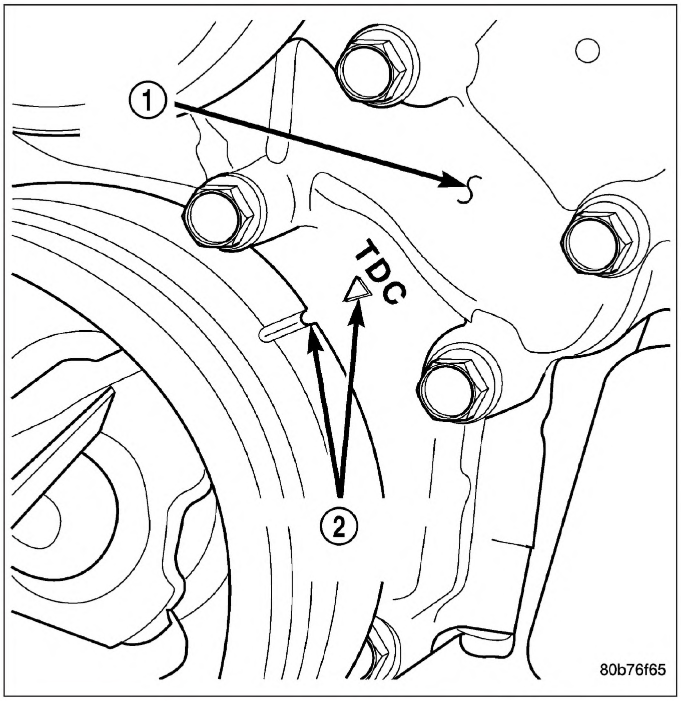
A tappet-like noise may be produced from several items. Check the following items.

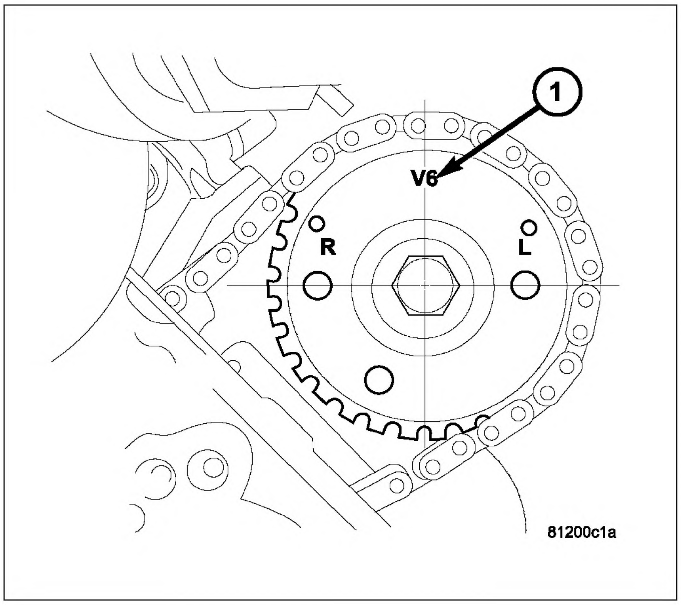
1. Engine oil level too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.
2. Insufficient running time after rebuilding cylinder head. Low speed running up to 1 hour may be required.
3. Turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
4. Low oil pressure.
5. The oil restrictor in cylinder head gasket or the oil passage to the cylinder head is plugged with debris.
6. Air ingested into oil due to broken or cracked oil pump pick up.
7. Worn valve guides.
8. Rocker arm ears contacting valve spring retainer.
9. Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.
10. Oil leak or excessive cam bore wear in cylinder head.
11. Faulty lash adjuster.
    a. Check lash adjusters for sponginess while installed in cylinder head and cam on camshaft at base circle. Depress part of rocker arm over adjuster. Normal adjusters should feel firm when pressed quickly. When pressed very slowly, lash adjusters should collapse.
    b. Remove suspected lash adjusters, and replace.
    c. Before installation, make sure adjusters are full of oil. This can be verified by little plunger travel when lash adjuster is depressed quickly.

REMOVAL

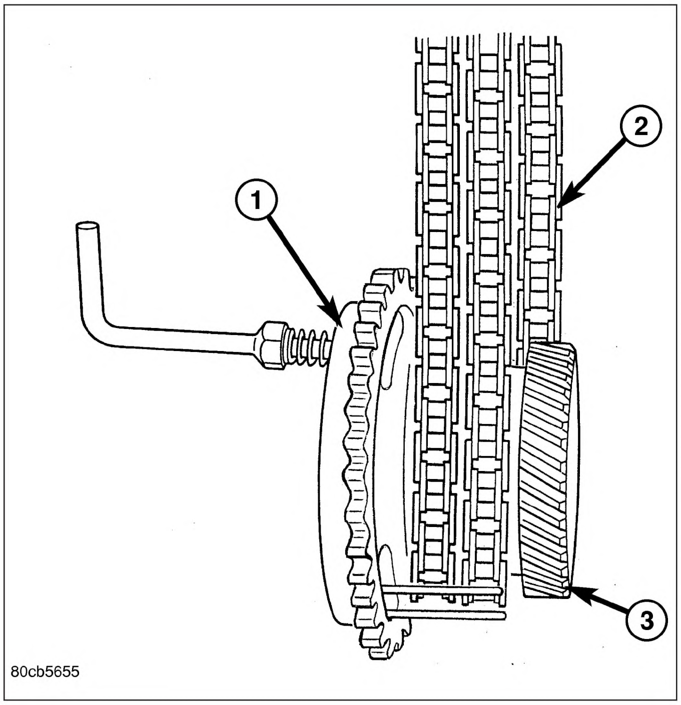
CYLINDER HEAD - LEFT

1. Disconnect the negative cable from the battery.
2. Raise the vehicle on a hoist.
3. Disconnect the exhaust pipe at the left side exhaust manifold.
4. Drain the engine coolant (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Lower the vehicle.
6. Remove the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
7. Remove the master cylinder and booster assembly (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - REMOVAL).
8. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
9. Remove the fan shroud and fan blade assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
10. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
11. Remove the power steering pump and set aside.
12. Rotate the crankshaft until the damper timing mark is aligned with TDC indicator mark (2).





13. Verify the V6 mark (1) on the camshaft sprocket is at the 12 o'clock position, with the No. 1 cylinder at TDC on the exhaust stroke.. Rotate the crankshaft one turn if necessary.
14. Remove the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
15. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

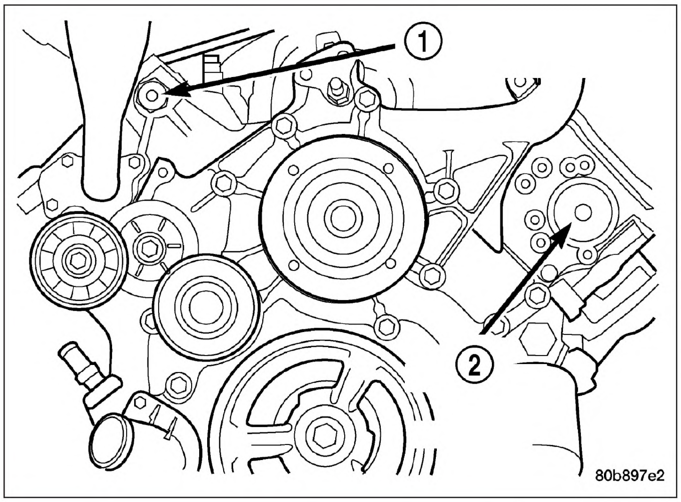


16. Lock the secondary timing chains (2) to the idler sprocket using Special Tool 8429 Timing Chain Holding Fixture (1).

NOTE: Mark the secondary timing chain prior to removal to aid in installation.

17. Mark the secondary timing chain (2), one link on each side of the V6 mark on the camshaft drive gear.
18. Remove the left side secondary chain tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

19. Remove the cylinder head access plug (1) and (2).
20. Remove the left side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).



21. Remove the retaining bolt and the camshaft drive gear.

CAUTION: Do not allow the engine to rotate. Severe damage to the valve train can occur.

CAUTION: Do not overlook the four smaller bolts at the front of the cylinder head. Do not attempt to remove the cylinder head without removing these four bolts.

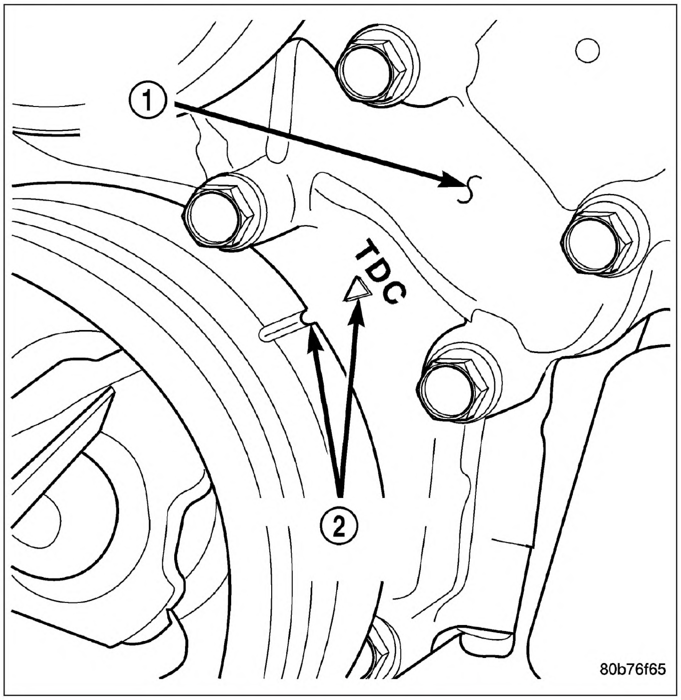
NOTE: The cylinder head is attached to the cylinder block with twelve bolts.

22. Remove the cylinder head retaining bolts.
23. Remove the cylinder head and gasket. Discard the gasket.

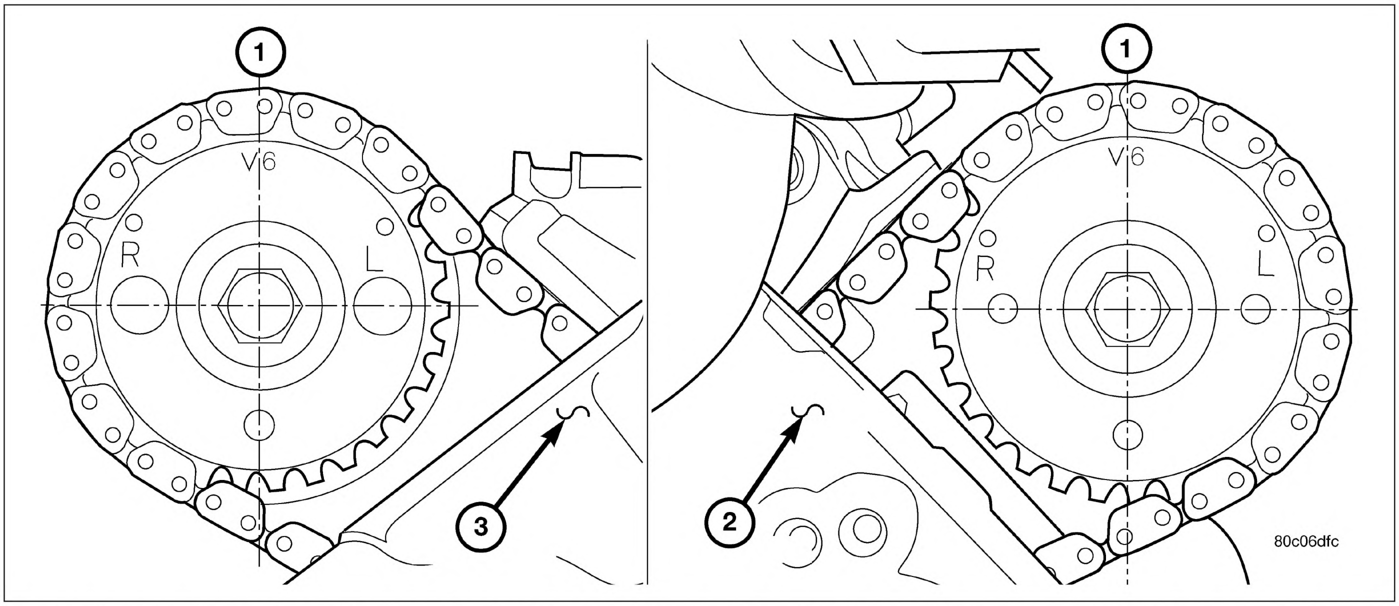
CAUTION: Do not lay the cylinder head on its gasket sealing surface, due to the design of the cylinder head gasket any distortion to the cylinder head sealing surface may prevent the gasket from properly sealing resulting in leaks.

REMOVAL

1. Disconnect battery negative cable.
2. Raise the vehicle on a hoist.
3. Disconnect the exhaust pipe at the right side exhaust manifold.
4. Drain the engine coolant (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Lower the vehicle.
6. Remove the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
7. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).
8. Remove the fan shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
9. Remove oil fill housing from cylinder head.
10. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).



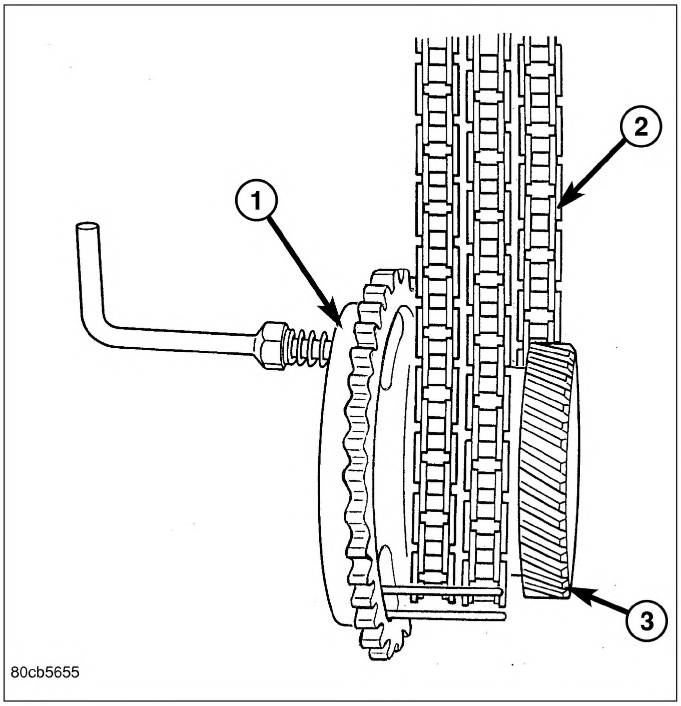
11. Rotate the crankshaft until the damper timing mark is aligned with TDC indicator mark (2).



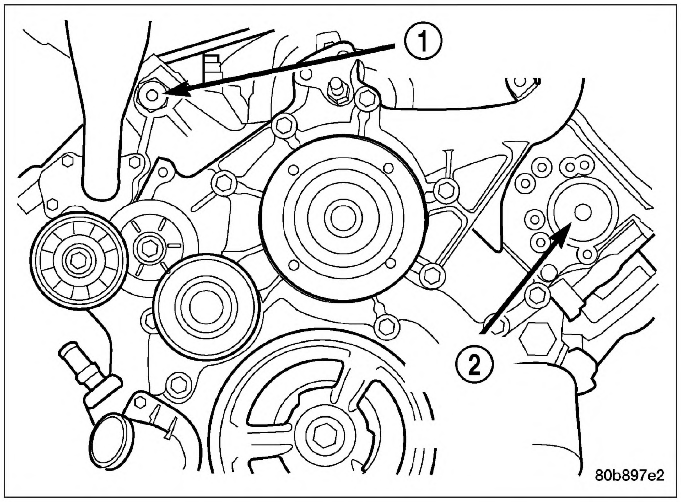
12. Verify the V6 mark on the camshaft sprocket is at the 12 o'clock position. Rotate the crankshaft one turn if necessary.
13. Remove the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
14. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
15. Lock the secondary timing chains to the idler sprocket using Special Tool 8429 Timing Chain Holding Fixture (1).

NOTE: Mark the secondary timing chain prior to removal to aid in installation.

16. Mark the secondary timing chain, one link on each side of the V6 mark on the camshaft drive gear.
17. Remove the right side secondary chain tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).



18. Remove the cylinder head access plug (1,2).
19. Remove the right side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).



CAUTION: The nut on the right side camshaft sprocket should not be removed for any reason, as the sprocket and camshaft sensor target wheel is serviced as an assembly. If the nut was removed, torque nut to 5 N·m (44 in. lbs.).

20. Remove the retaining bolt and the camshaft drive gear.

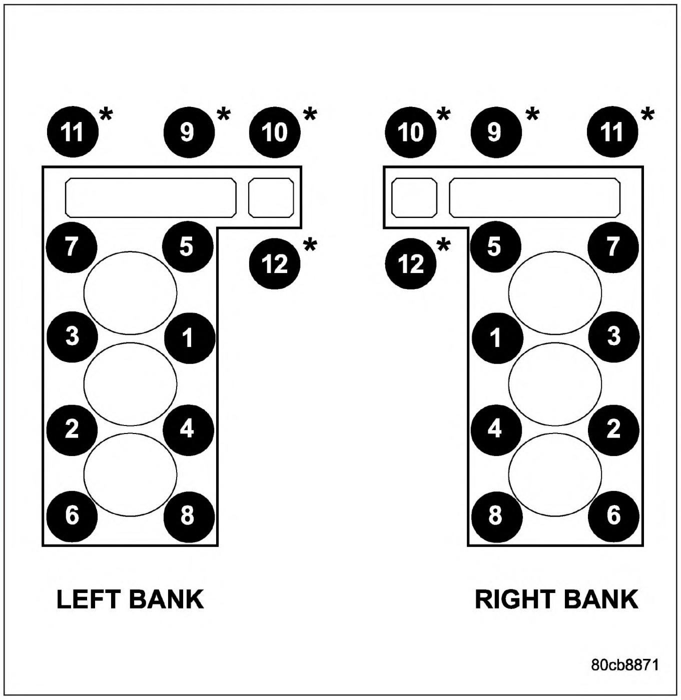
CAUTION: Do not allow the engine to rotate. severe damage to the valve train can occur.

CAUTION: Do not overlook the four smaller bolts at the front of the cylinder head. Do not attempt to remove the cylinder head without removing these four bolts.

CAUTION: Do not hold or pry on the camshaft target wheel for any reason. A damaged target wheel can result in a vehicle no start condition.

NOTE: The cylinder head is attached to the cylinder block with twelve bolts.

21. Remove the cylinder head retaining bolts.
22. Remove the cylinder head and gasket. Discard the gasket.



CAUTION: Do not lay the cylinder head on its gasket sealing surface, do to the design of the cylinder head gasket any distortion to the cylinder head sealing surface may prevent the gasket from properly sealing resulting in leaks.

INSPECTION

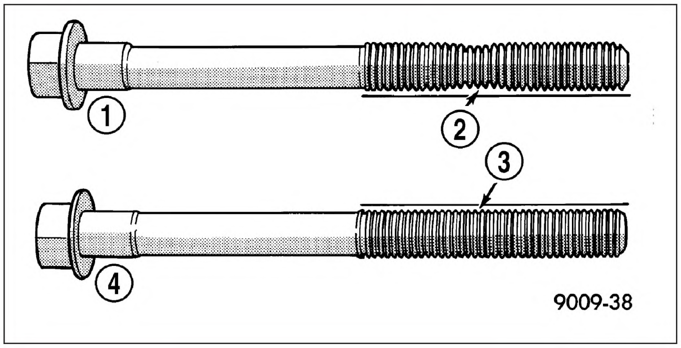
1. Inspect the cylinder head for out-of-flatness, using a straightedge and a feeler gauge. If tolerances exceed 0.0508 mm (0.002 in.) replace the cylinder head.
2. Inspect the valve seats for damage. Service the valve seats as necessary.
3. Inspect the valve guides for wear, cracks or looseness. If either condition exist, replace the cylinder head.

INSTALLATION

CYLINDER HEAD - LEFT

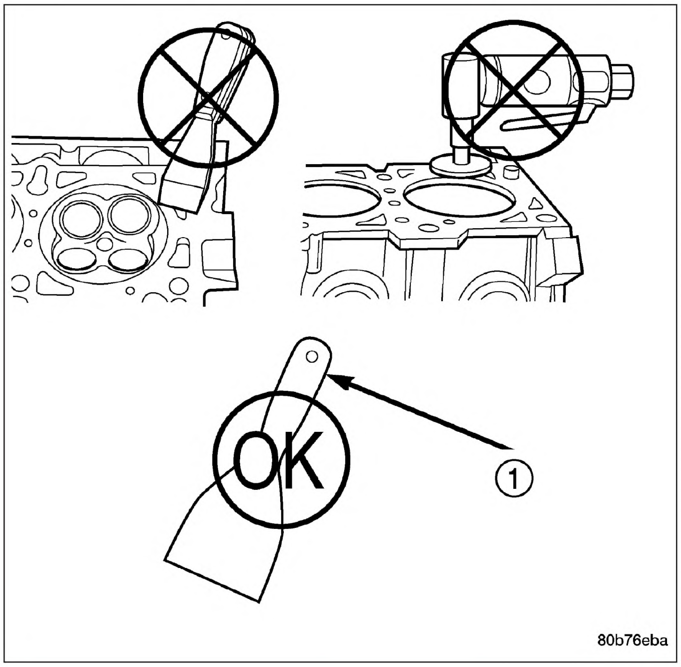
NOTE: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down the bolts should be replaced.

Necking can be checked by holding a straight edge against the threads (2). If all the threads do not contact the scale, the bolt should be replaced.



CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use only a wooden or plastic scraper (1).

1. Clean the cylinder head and cylinder block mating surfaces.



2. Position the new cylinder head gasket on the locating dowels.

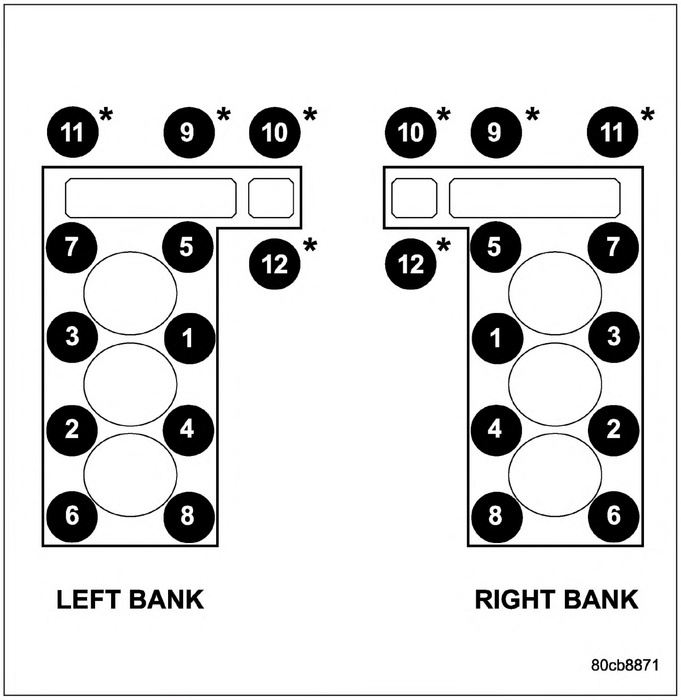
CAUTION: When installing cylinder head, use care not damage the tensioner arm or the guide arm.

3. Position the cylinder head onto the cylinder block. Make sure the cylinder head seats fully over the locating dowels.

NOTE: The four smaller cylinder head mounting bolts require sealant to be added to them before installing. Failure to do so may cause leaks. The locations are identified wit *.

4. Lubricate the cylinder head bolt threads with clean engine oil and install the eight M11 bolts.
5. Coat the four M8 cylinder head bolts with **Mopar® Lock and Seal Adhesive** then install the bolts.

NOTE: The cylinder head bolts are tightened using an angle torque procedure, however, the bolts are not a torque-to-yield design.



6. Tighten the bolts in sequence using the following steps and torque values:
   - Step 1: Tighten bolts 1-8, 27 N·m (20 ft. lbs.).
   - Step 2: Verify that bolts 1-8, all reached 27 N·m (20 ft. lbs.), by repeating step 1 without loosening the bolts. Tighten bolts 9 thru 12 to 14 N·m (10 ft. lbs.).
   - Step 3: Tighten bolts 1-8, 90 degrees.
   - Step 4: Tighten bolts 1-8, 90 degrees, again. Tighten bolts 9-12, 26 N·m (19 ft. lbs.)
7. Position the secondary chain onto the camshaft drive gear, making sure one marked chain link is on either side of the V6 mark on the gear then using Special Tool 8428 Camshaft Wrench, position the gear onto the camshaft.

CAUTION: Remove excess oil from camshaft sprocket retaining bolt before reinstalling bolt. Failure to do so may cause over-torqueing of bolt resulting in bolt failure.

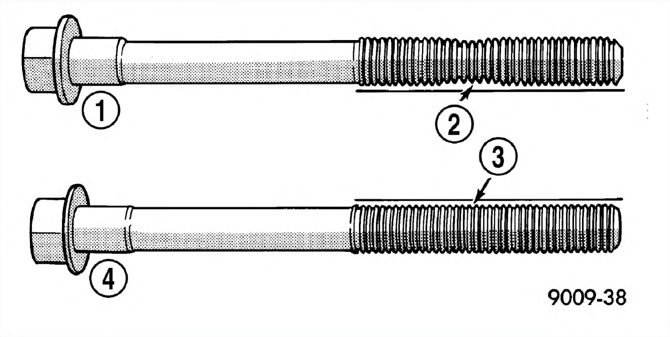
8. Install the camshaft drive gear retaining bolt.
9. Install the left side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).
10. Install the cylinder head access plug.
11. Re-set and install the left side secondary chain tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)
12. Remove Special Tool 8429.
13. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)
14. Install the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION). Tighten damper bolt 175 N·m (130 Ft. Lbs.).
15. Install the power steering pump.
16. Install the fan blade assembly and fan shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
17. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
18. Install the master cylinder and booster assembly (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - INSTALLATION).

19. Install the intake manifold (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
20. Refill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
21. Raise the vehicle.
22. Install the exhaust pipe onto the left exhaust manifold (Refer to 11 - EXHAUST SYSTEM/EXHAUST PIPE - INSTALLATION).
23. Lower the vehicle.
24. Connect the negative cable to the battery.
25. Start the engine and check for leaks.

INSTALLATION

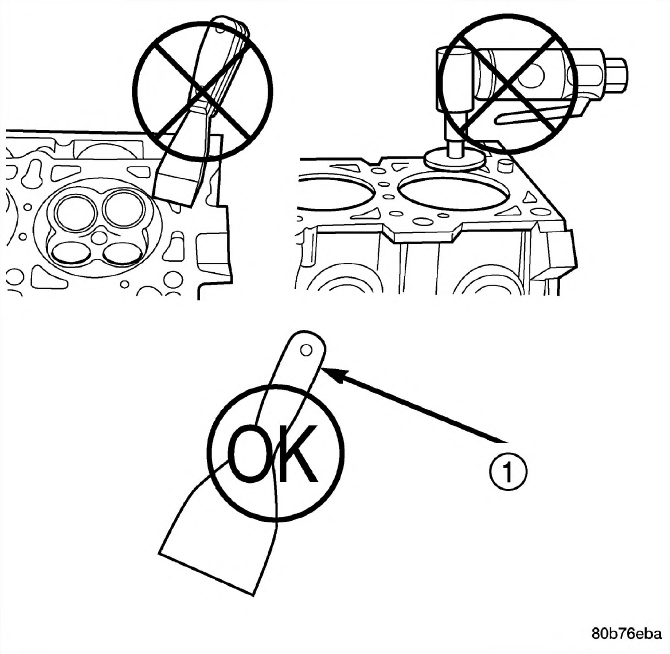
NOTE: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down (1) the bolts should be replaced.

Necking can be checked by holding a straight edge against the threads. If all the threads do not contact the scale, the bolt should be replaced.



CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use only a wooden or plastic scraper (1).

1. Clean the cylinder head and cylinder block mating surfaces.



2. Position the new cylinder head gasket on the locating dowels.

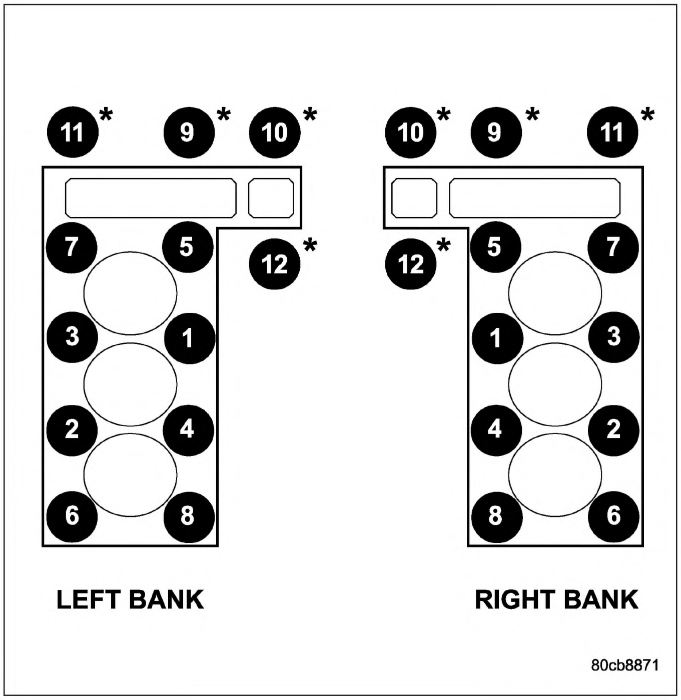
CAUTION: When installing cylinder head, use care not damage the tensioner arm or the guide arm.

3. Position the cylinder head onto the cylinder block. Make sure the cylinder head seats fully over the locating dowels.

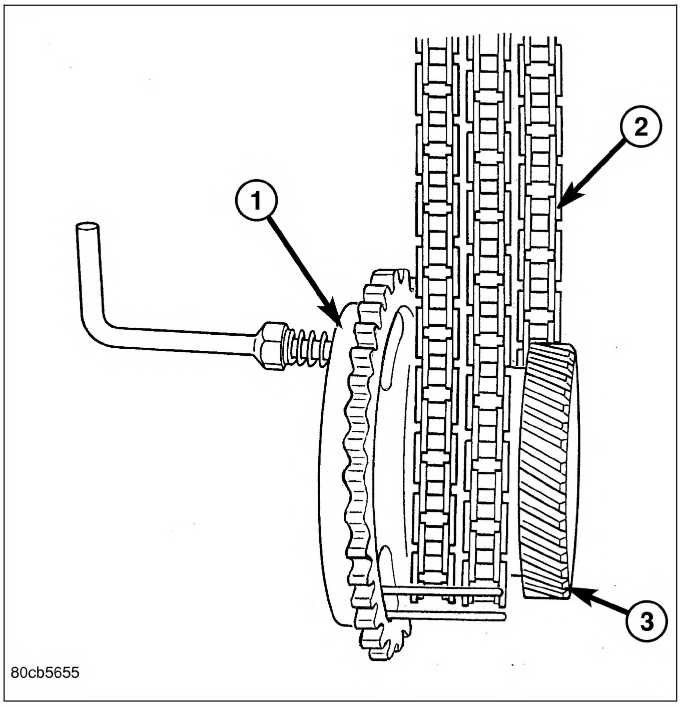
NOTE: The four M8 cylinder head mounting bolts (1) require sealant to be added to them before installing. Failure to do so may cause leaks.

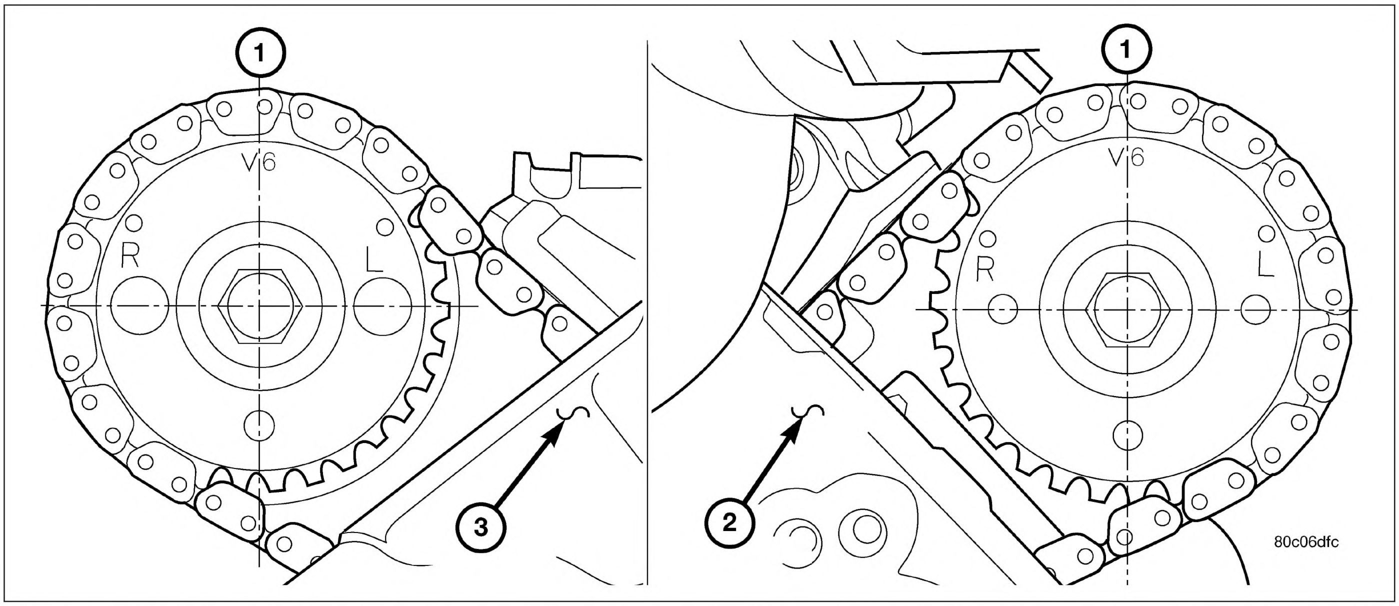
4. Lubricate the cylinder head bolt threads with clean engine oil and install the eight M10 bolts.
5. Coat the four M8 cylinder head bolts with **Mopar Lock and Seal Adhesive** then install the bolts.

NOTE: The cylinder head bolts are tightened using an angle torque procedure, however, the bolts are not a torque-to-yield design.



6. Tighten the bolts in sequence using the following steps and torque values:
   - Step 1: Tighten bolts 1-8, 27 N·m (20 ft. lbs.).
   - Step 2: Verify that bolts 1-8, all reached 27 N·m (20 ft. lbs.), by repeating step 1 without loosening the bolts. Tighten bolts 9 thru 12 to 14 N·m (10 ft. lbs.).
   - Step 3: Tighten bolts 1-8, 90 °.
   - Step 4: Tighten bolts 1-8, 90 °, again. Tighten bolts 9-12, 26 N·m (19 ft. lbs.)





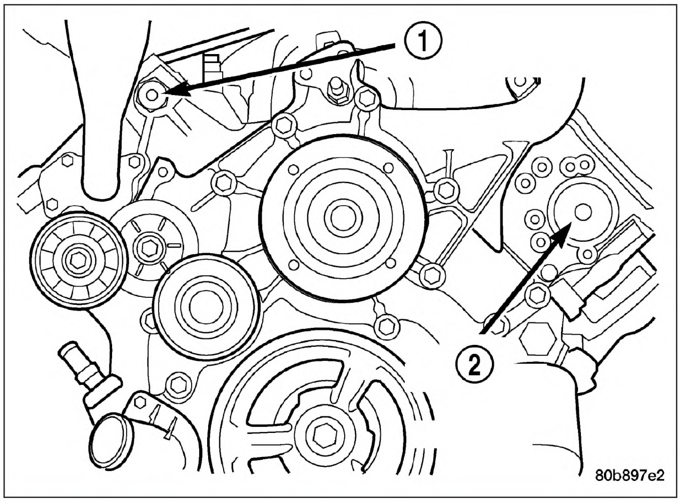
CAUTION: The nut on the right side camshaft sprocket should not be removed for any reason, as the sprocket and camshaft sensor target wheel is serviced as an assembly. If the nut was removed, torque nut to 5 NM (60 in. lbs.).

7. Position the secondary chain (2) onto the camshaft drive gear, making sure one marked chain link is on either side of the V6 mark (1) on the gear then using Special Tool 8428 Camshaft Wrench, position the gear onto the camshaft.

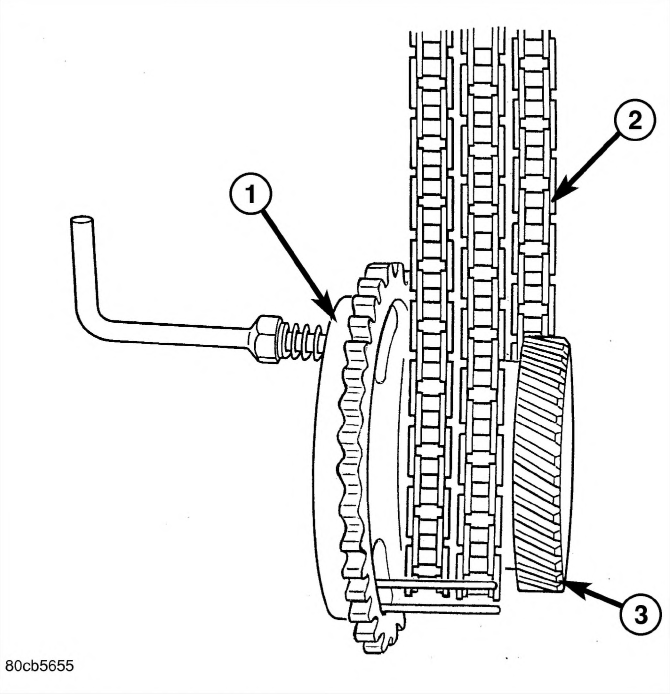
CAUTION: Remove excess oil from camshaft sprocket retaining bolt before reinstalling bolt. Failure to do so may cause over-torquing of bolt resulting in bolt failure.

8. Install the camshaft drive gear retaining bolt.
9. Install the right side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

10. Install the cylinder head access plug (1,2).
11. Re-set and install the right side secondary chain tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).



12. Remove Special Tool 8429 (1).
13. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
14. Install the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION). Tighten damper bolt 175 N·m (130 Ft. Lbs.).
15. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
16. Install the fan shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
17. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
18. Install the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
19. Install oil fill housing onto cylinder head.
20. Refill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
21. Raise the vehicle.
22. Install the exhaust pipe onto the right exhaust manifold.
23. Lower the vehicle.
24. Reconnect battery negative cable.
25. Start the engine and check for leaks.



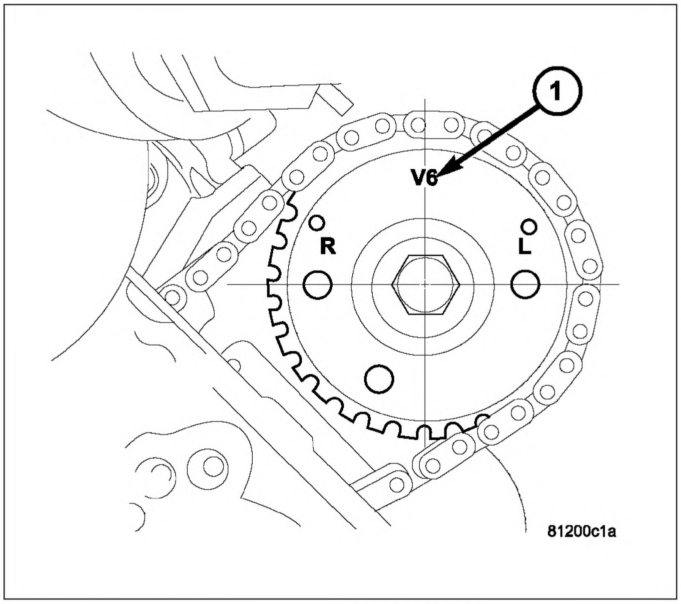
CAMSHAFT(S)

DESCRIPTION

The camshafts consist of powdered metal steel lobes which are sinter-bonded to a steel tube. Four bearing journals are machined into the camshaft. Camshaft end play is controlled by two thrust walls that border the nose piece journal.

REMOVAL

REMOVAL - LEFT



CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT forcefully rotate the camshafts or crankshaft independently of each other. Severe valve and/or piston damage can occur.

CAUTION: When removing the cam sprocket, timing chains or camshaft, Failure to use Special Tool 8379 will result in hydraulic tensioner ratchet over extension, requiring timing chain cover removal to reset the tensioner ratchet.

1. Remove cylinder head cover (Refer to 9 - ENGINE/ CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
2. Set engine to TDC cylinder No. 1, camshaft sprocket V6 marks (1) at the 12 o'clock position.
3. Mark one link on the secondary timing chain on both sides of the V6 mark on the camshaft sprocket to aid in installation.

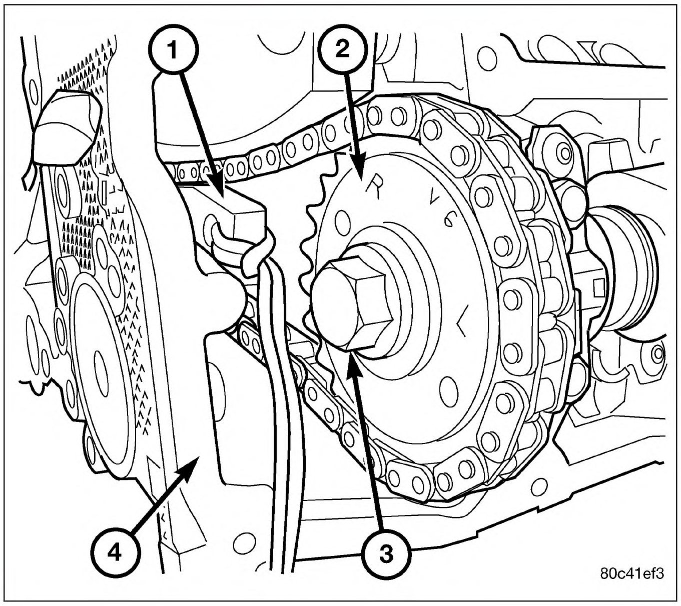
CAUTION: Do not hold or pry on the camshaft target wheel (Located on the right side camshaft sprocket) for any reason, Severe damage will occur to the target wheel resulting in a vehicle no start condition.

4. Loosen but **DO NOT** remove the camshaft sprocket retaining bolt. Leave the bolt snug against the sprocket.

NOTE: The timing chain tensioners must be secured prior to removing the camshaft sprockets. Failure to secure tensioners will allow the tensioners to extend, requiring timing chain cover removal in order to reset tensioners.

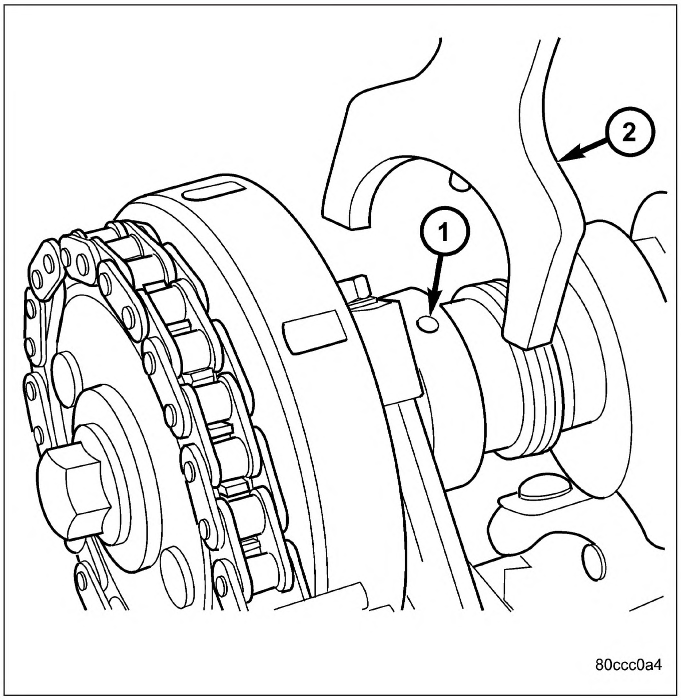
CAUTION: Do not force wedge past the narrowest point between the chain strands. Damage to the tensioners may occur.

5. Position Special Tool 8379 timing chain wedge (1) between the timing chain strands, tap the tool to securely wedge the timing chain against the ten-



sioner arm and guide.

6. Hold the camshaft with Special Tool 8428 Camshaft Wrench (2), while removing the camshaft sprocket bolt and sprocket.
7. Using Special Tool 8428 Camshaft Wrench (2), gently allow the camshaft to rotate 5° clockwise until the camshaft is in the neutral position (no valve load).
8. Starting at the outside working inward, loosen the camshaft bearing cap retaining bolts 1/2 turn at a time. Repeat until all load is off the bearing caps.

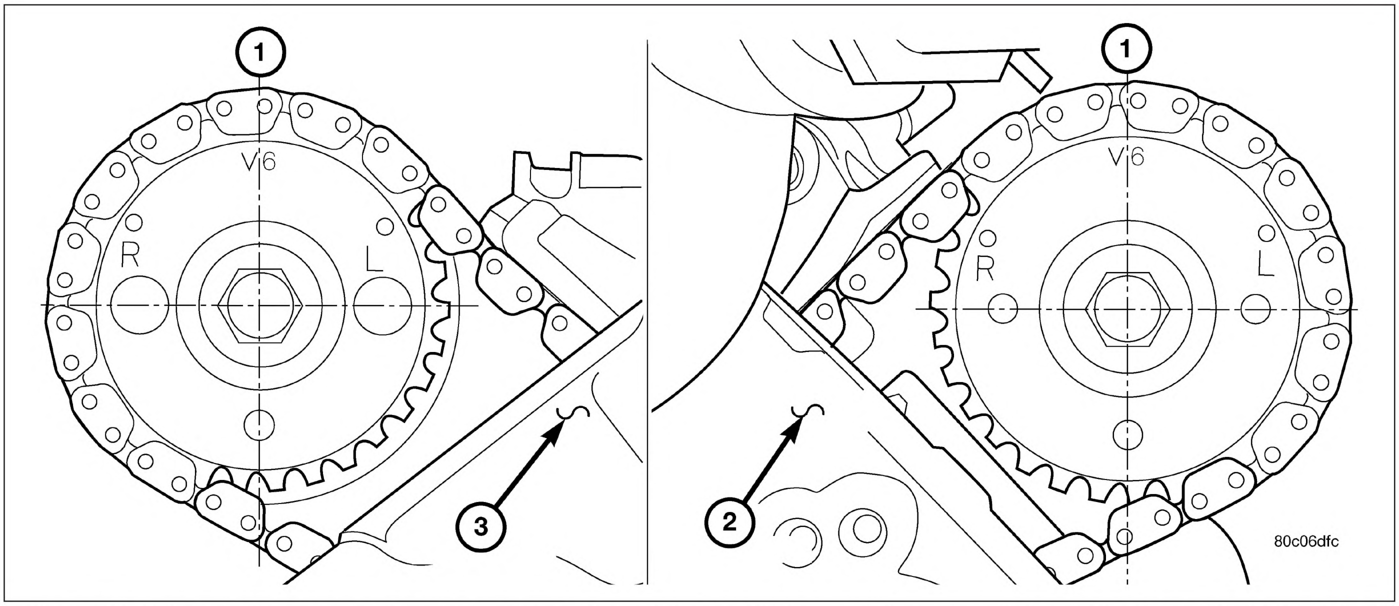


CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS. SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.

NOTE: When the camshaft is removed the rocker arms may slide downward, mark the rocker arms before removing camshaft.

9. Remove the camshaft bearing caps and the camshaft.

REMOVAL - RIGHT



CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT forcefully rotate the camshafts or crankshaft independently of each other. Severe valve and/or piston damage can occur.

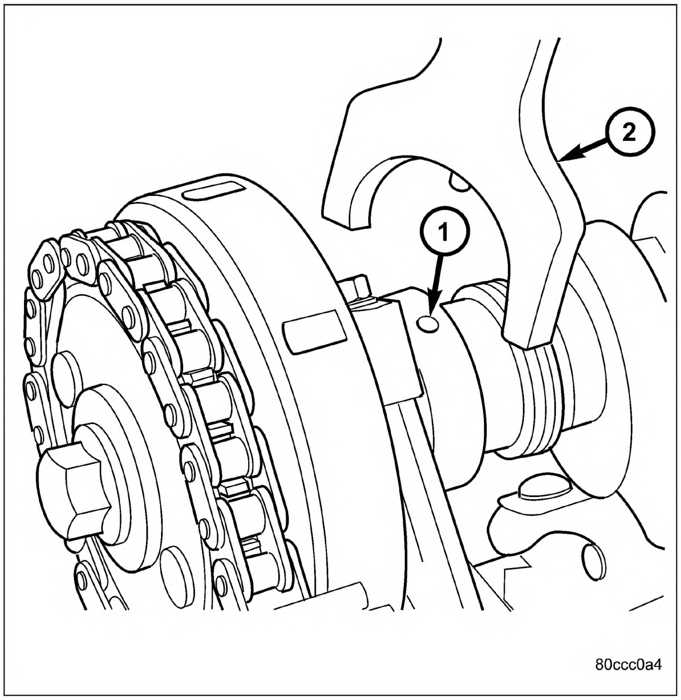
CAUTION: When removing the cam sprocket, timing chains or camshaft, Failure to use special tool 8379 will result in hydraulic tensioner ratchet over extension, Requiring timing chain cover removal to re-set the tensioner ratchet.

1. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

2. Set engine to TDC cylinder No. 1, camshaft sprocket V6 marks at the 12 o'clock position (1).
3. Mark one link on the secondary timing chain on both sides of the V6 mark on the camshaft sprocket to aid in installation.

CAUTION: Do not hold or pry on the camshaft target wheel for any reason, Severe damage will occur to the target wheel. A damaged target wheel could cause a vehicle no start condition.

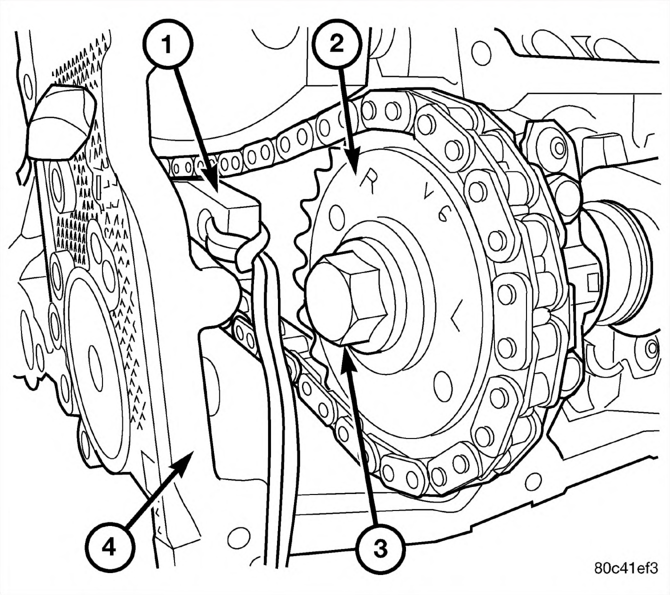
4. Loosen but **DO NOT** remove the camshaft sprocket retaining bolt. Leave bolt snug against sprocket.



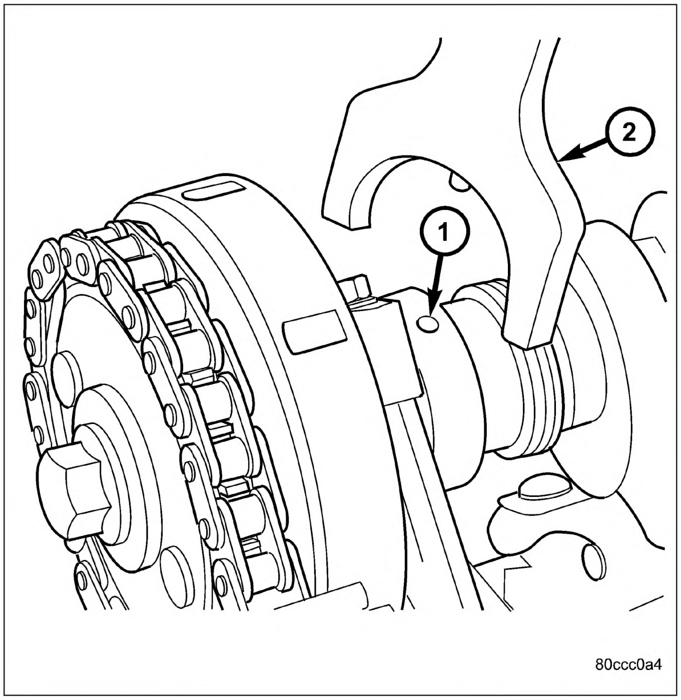
NOTE: The timing chain tensioners must be secured prior to removing the camshaft sprockets. Failure to secure tensioners will allow the tensioners to extend, requiring timing chain cover removal in order to reset tensioners.

CAUTION: Do not force wedge past the narrowest point between the chain strands. Damage to the tensioners may occur.

5. Position Special Tool 8379 timing chain wedge (1) between the timing chain strands. Tap the tool to securely wedge the timing chain against the tensioner arm and guide.



6. Remove the camshaft position sensor.
7. Hold the camshaft with Special Tool 8428 Camshaft Wrench (2), while removing the camshaft sprocket bolt and sprocket.

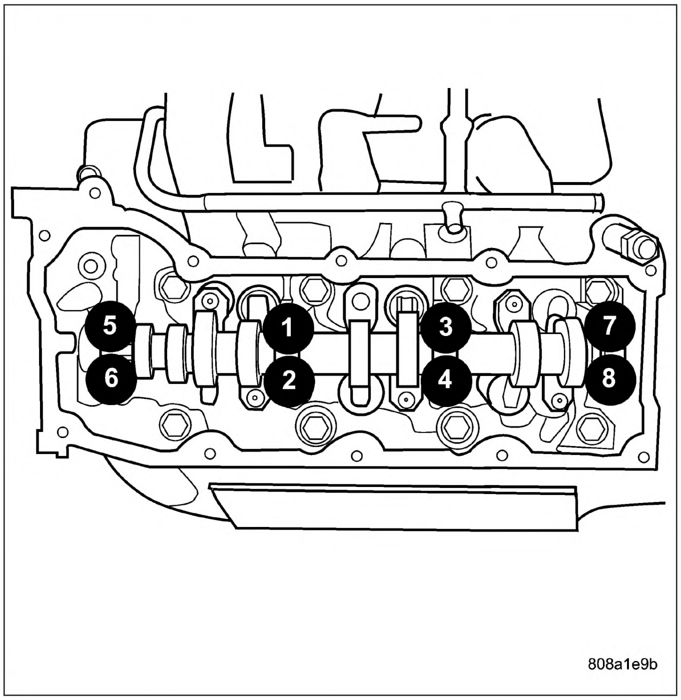


8. Starting at the outside working inward, loosen the camshaft bearing cap retaining bolts 1/2 turn at a time. Repeat until all load is off the bearing caps.

CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS. SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.

NOTE: When the camshaft is removed the rocker arms may slide downward, mark the rocker arms before removing camshaft.

9. Remove the camshaft bearing caps and the camshaft.



INSTALLATION

INSTALLATION - LEFT

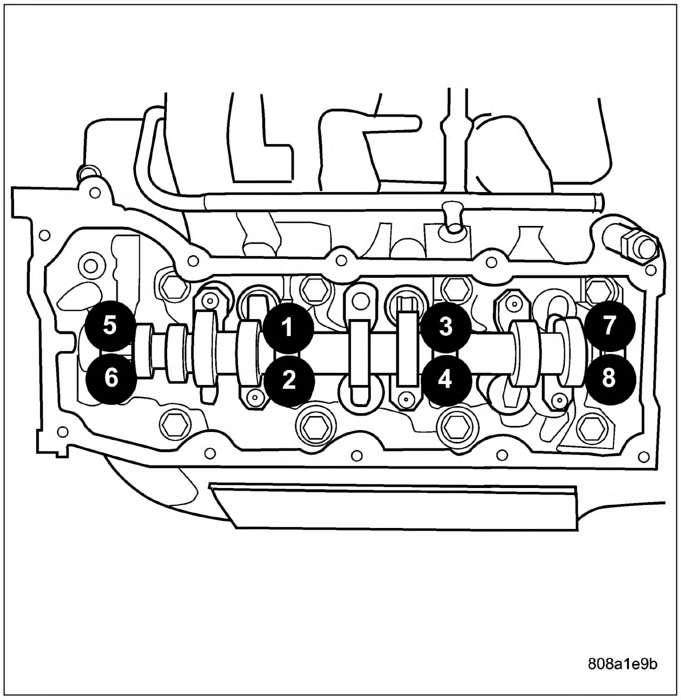
1. Lubricate camshaft journals with clean engine oil.

NOTE: Position the left side camshaft so that the camshaft sprocket dowel is near the 1 o'clock position, This will place the camshaft at the neutral position easing the installation of the camshaft bearing caps.

2. Position the camshaft into the cylinder head.
3. Install the camshaft bearing caps, hand tighten the retaining bolts.

NOTE: Caps should be installed so that the stamped numbers on the caps are in numerical order, (1 thru 4) from the front to the rear of the engine. All caps should be installed so that the stamped arrows on the caps point toward the front of the engine.

4. Working in 1/2 turn increments, tighten the bearing cap retaining bolts starting with the middle cap working outward.
5. Torque the camshaft bearing cap retaining bolts to 11 N·m (100 in. lbs.).



6. Position the camshaft drive gear into the timing chain aligning the V6 mark between the two marked chain links (Two links marked during removal).
7. Using Tool 8428 Camshaft Wrench, rotate the camshaft until the camshaft sprocket dowel is aligned with the slot in the camshaft sprocket. Install the sprocket onto the camshaft.

CAUTION: Remove excess oil from camshaft sprocket bolt. Failure to do so can cause bolt over-torque resulting in bolt failure.

8. Remove excess oil from bolt, then install the camshaft sprocket retaining bolt and hand tighten.
9. Remove Special Tool 8379 timing chain wedge.
10. Using Special Tool 6958 spanner wrench with adapter pins 8346, torque the camshaft sprocket retaining bolt to 122 N·m (90 ft. lbs.).
11. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

INSTALLATION - RIGHT

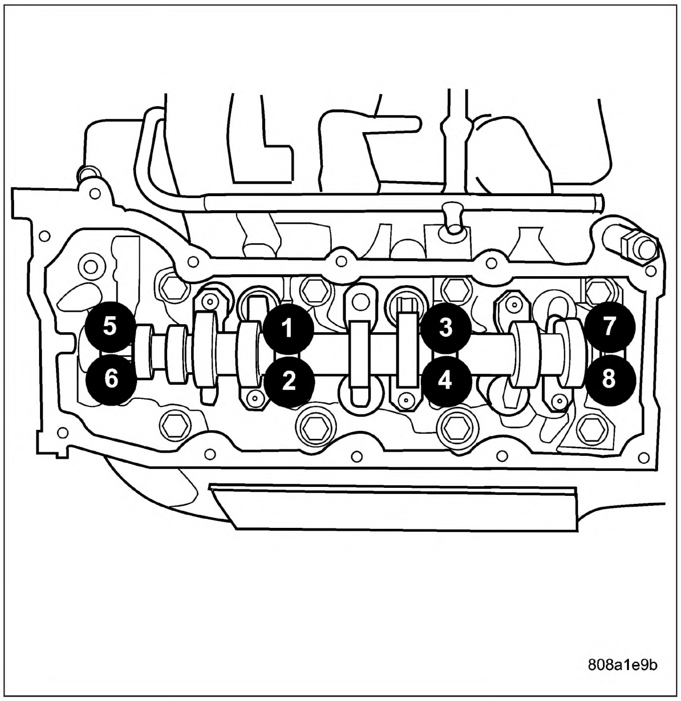
1. Lubricate camshaft journals with clean engine oil.

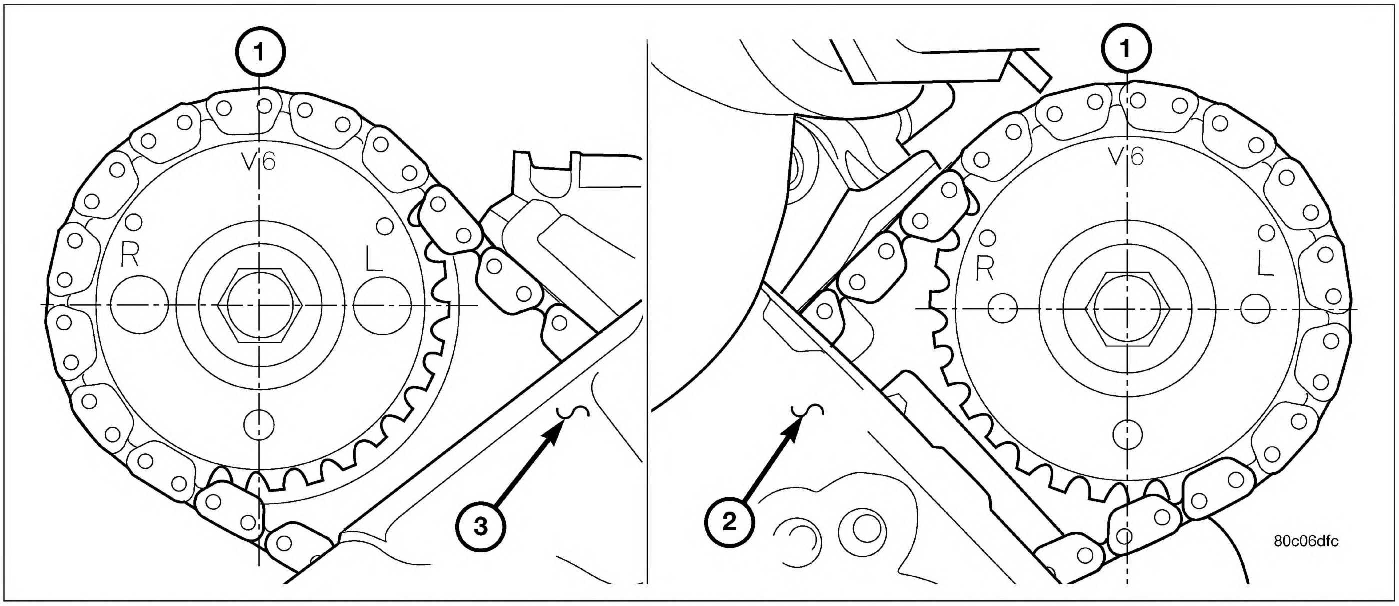
NOTE: Position the right side camshaft so that the camshaft sprocket dowel is near the 10 o'clock position, This will place the camshaft at the neutral position easing the installation of the camshaft bearing caps.

2. Position the camshaft into the cylinder head.
3. Install the camshaft bearing caps, hand tighten the retaining bolts.

NOTE: Caps should be installed so that the stamped numbers on the caps are in numerical order, (1 thru 4) from the front to the rear of the engine. All caps should be installed so that the stamped arrows on the caps point toward the front of the engine.

4. Working in 1/2 turn increments, tighten the bearing cap retaining bolts starting with the middle cap working outward.
5. Torque the camshaft bearing cap retaining bolts to 11 N·m (100 in. lbs.).



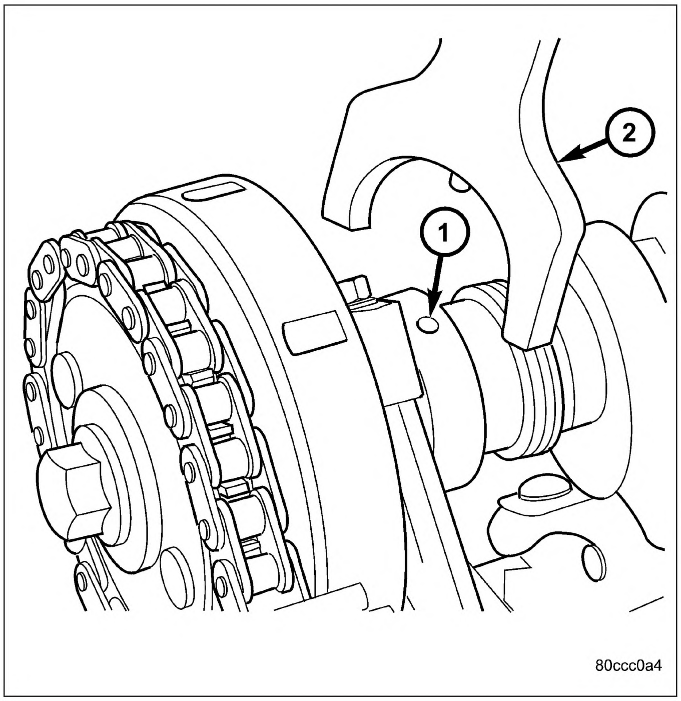


6. Position the camshaft drive gear into the timing chain aligning the V6 mark between the two marked chain links (Two links marked during removal).

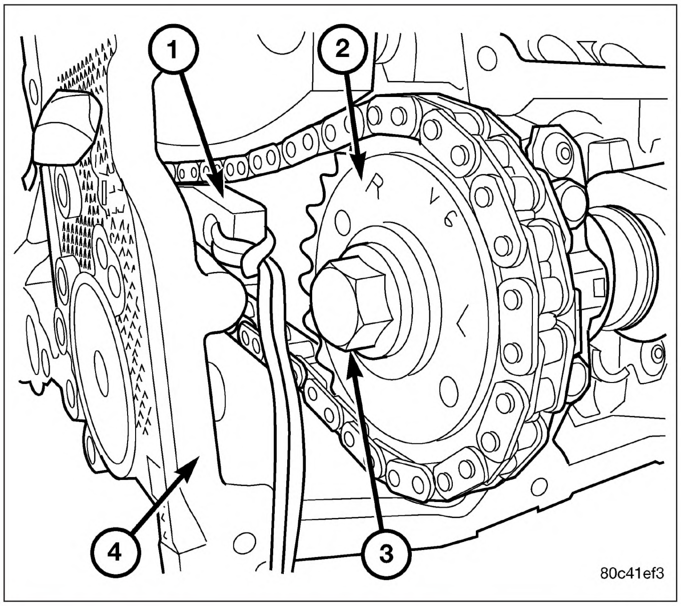
7. Using Special Tool 8428 Camshaft Wrench (2), rotate the camshaft until the camshaft sprocket dowel is aligned with the slot in the camshaft sprocket. Install the sprocket onto the camshaft.

CAUTION: Remove excess oil from camshaft sprocket bolt. Failure to do so can cause bolt over-torque resulting in bolt failure.

8. Remove excess oil from camshaft sprocket bolt, then install the camshaft sprocket retaining bolt and hand tighten.



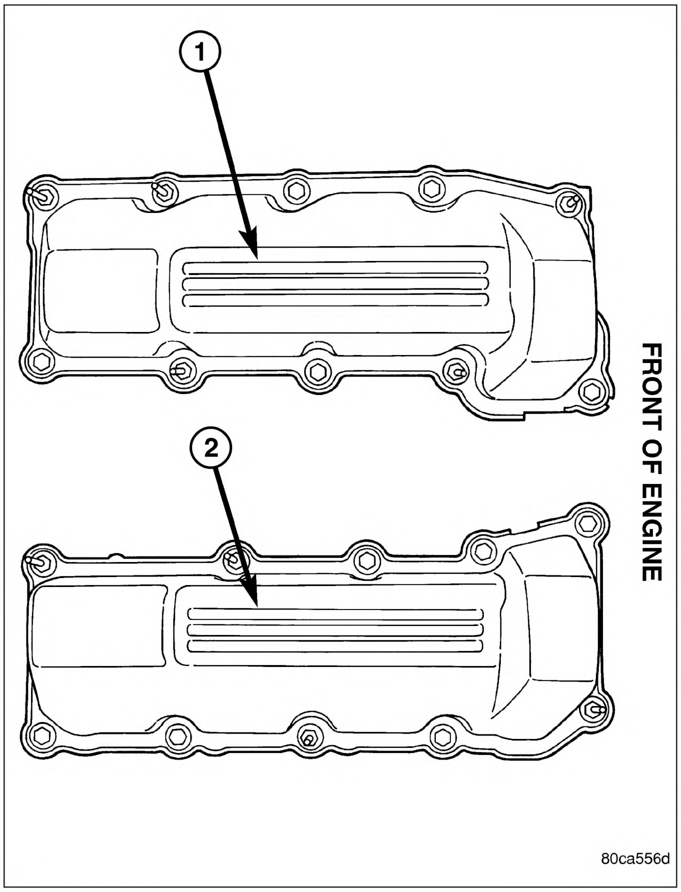
9. Remove timing chain wedge special tool 8379 (1).
10. Using Special Tool 6958 spanner wrench with adapter pins 8346, torque the camshaft sprocket retaining bolt to 122 N·m (90 ft. lbs.).
11. Install the camshaft position sensor.
12. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).



COVER(S)-CYLINDER HEAD

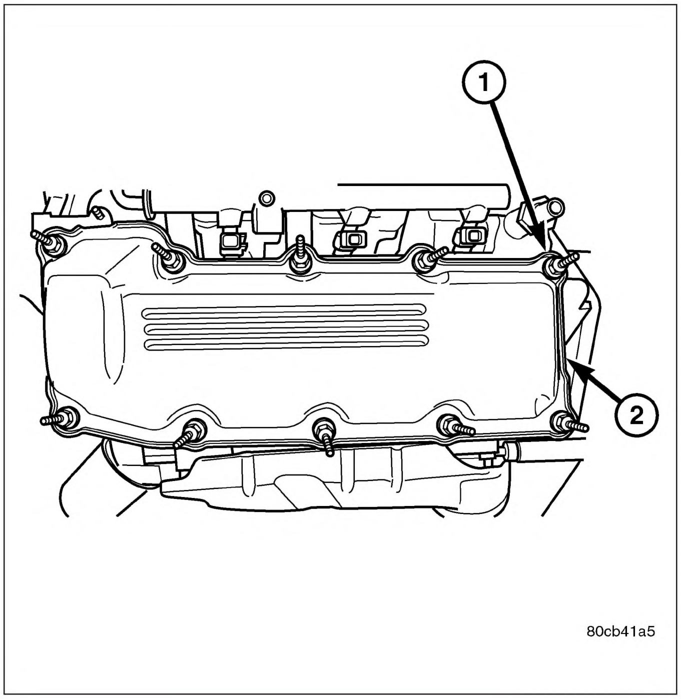
DESCRIPTION

The cylinder head covers (1,2) are made of glass re-enforced thermoset plastic, and are not interchangable from side-to-side.



REMOVAL

1. Disconnect negative cable from battery.
2. Remove the resonator assemble and air inlet hose.
3. Disconnect injector connectors and un-clip the injector harness.
4. Route injector harness in front of cylinder head cover (2).
5. Disconnect the left side breather tube and remove the breather tube.
6. Remove the cylinder head cover mounting bolts (1).
7. Remove cylinder head cover and gasket.



NOTE: The gasket may be used again, providing no cuts, tears, or deformation has occurred.

INSTALLATION

CAUTION: Do not use harsh cleaners to clean the cylinder head covers. Severe damage to covers may occur.

NOTE: The gasket may be used again, provided no cuts, tears, or deformation has occurred.

1. Clean cylinder head cover and both sealing surfaces. Inspect and replace gasket as necessary.
2. Tighten cylinder head cover bolts and double ended studs to 12 N·m (105 in. lbs.).
3. Install left side breather and connect breather tube.
4. Connect injector electrical connectors and injector harness retaining clips.
5. Install the resonator and air inlet hose.
6. Connect negative cable to battery.

VALVES & SEATS - INTAKE/EXHAUST

DESCRIPTION

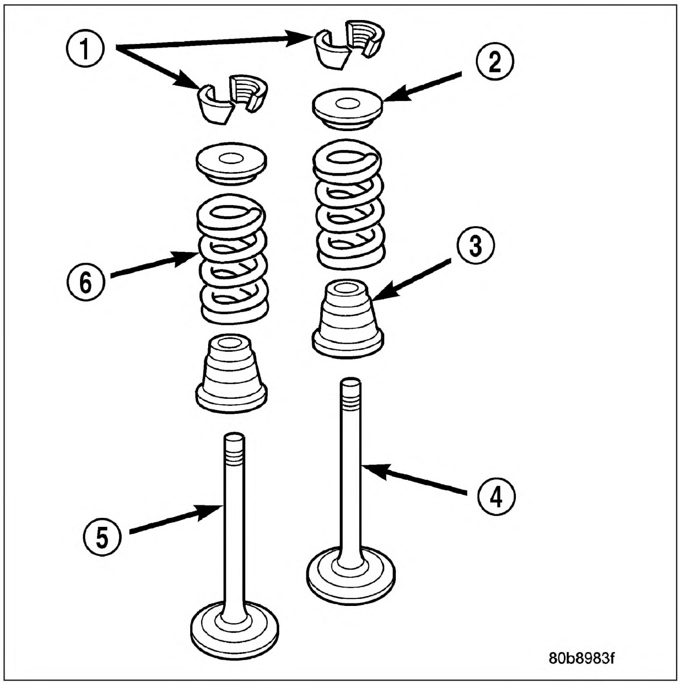
The valves are made of heat resistant steel and have chrome plated stems to prevent scuffing. Each valve is actuated by a roller rocker arm which pivots on a stationary lash adjuster. All valves use three bead lock keepers to retain the springs and promote valve rotation.

STANDARD PROCEDURE

REFACING

NOTE: Valve seats that are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise the cylinder head must be replaced.

NOTE: When refacing valves and valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.



1. Using a suitable dial indicator measure the center of the valve seat Total run out must not exceed 0.051 mm (0.002 in).
2. Apply a small amount of Prussian blue to the valve seat, insert the valve (4) or (5) into the cylinder head, while applying light pressure on the valve rotate the valve. Remove the valve and examine the valve face. If the blue is transferred below the top edge of the valve face, lower the valve seat using a 15 degree stone. If the blue is transferred to the bottom edge of the valve face, raise the valve seat using a 65 degree stone.
3. When the seat is properly positioned the width of the intake seat must be 1.75 - 2.36 mm (0.0689 - 0.0928 in.) and the exhaust seat must be 1.71 - 2.32 mm (0.0673 - 0.0911 in.).
4. Check the valve spring installed height after refacing the valve (4) and (5) and seat. The installed height for both intake and exhaust valve springs must not exceed 40.74 mm (1.6039 in.).

5. The valve seat and valve face must maintain a face angle of 44.5 - 45 ° angle.

REMOVAL

NOTE: The cylinder heads must be removed in order to perform this procedure.

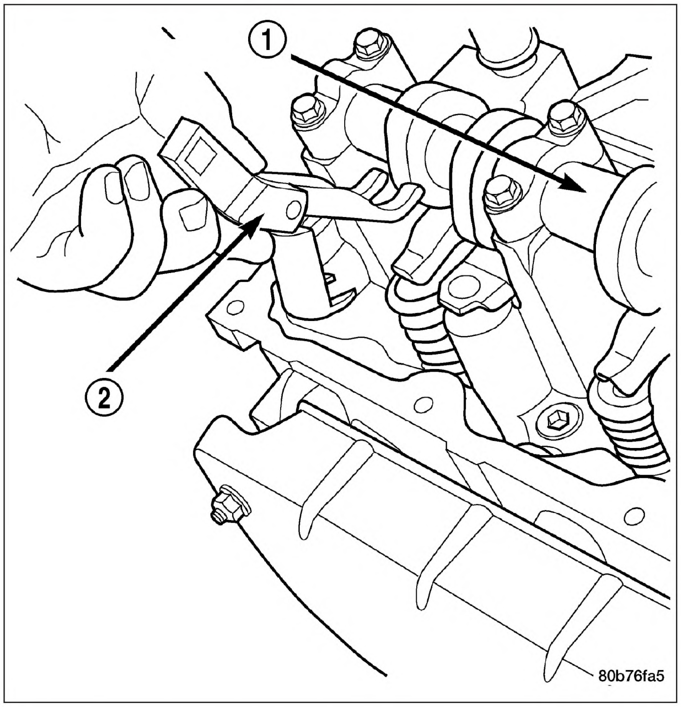
1. Remove rocker arms and lash adjusters (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL).
2. Remove the camshaft bearing caps and the camshaft.

NOTE: All six valve springs and valves are removed in the same manner; this procedure only covers one valve and valve spring.

3. Using Tool C-3422–B or C-3422–C Valve Spring Compressor and Tool 8519 Adapter (2), compress the valve spring.

NOTE: It may be necessary to tap the top of the valve spring to loosen the spring retainers locks enough to be removed.

4. Remove the two spring retainer lock halves.



NOTE: the valve spring is under tension use care when releasing the valve spring compressor.

5. Remove the valve spring compressor (2).
6. Remove the spring retainer, and the spring.

NOTE: Check for sharp edges on the keeper grooves. Remove any burrs from the valve stem before removing the valve from the cylinder head.

7. Remove the valve from the cylinder head.

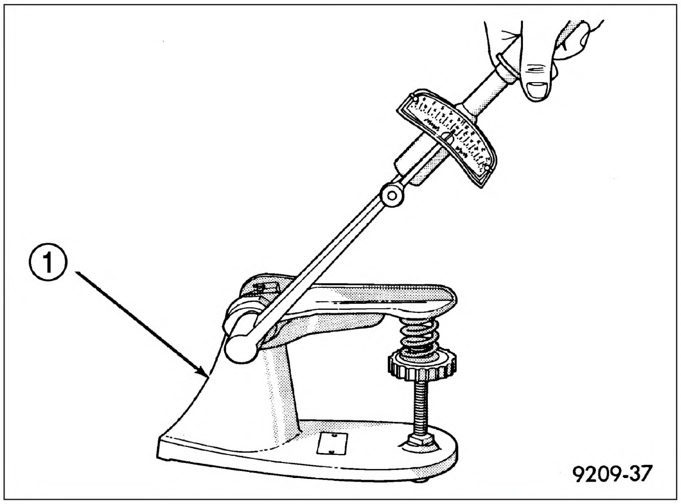
NOTE: The valve stem seals are common between intake and exhaust.

8. Remove the valve stem seal. Mark the valve for proper installation.

TESTING VALVE SPRINGS

NOTE: Whenever the valves are removed from the cylinder head it is recommended that the valve springs be inspected and tested for reuse.

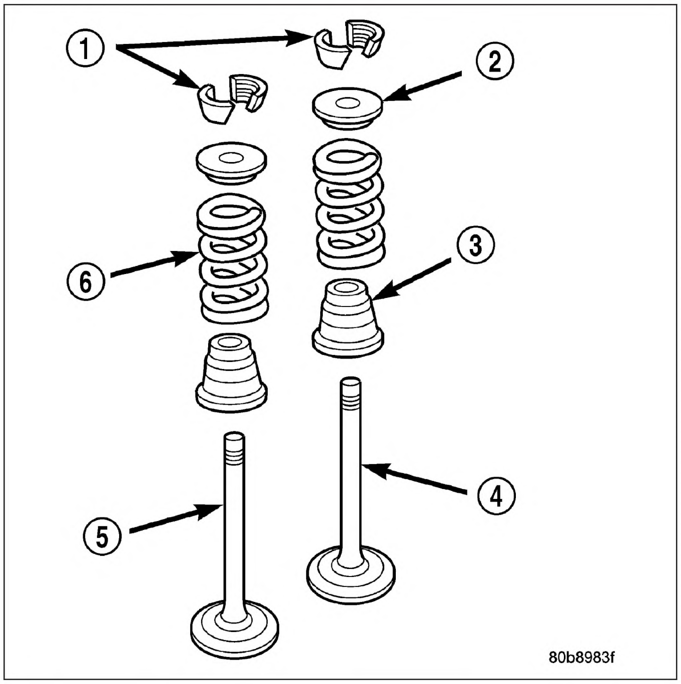
Inspect the valve springs for physical signs of wear or damage. Turn table of Tool C-647 (1) until surface is in line with the 40.12 mm (1.579 in.) mark on the threaded stud and the zero mark on the front. Place spring over the stud on the table and lift compressing lever to set tone device. Pull on torque wrench until a Ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer



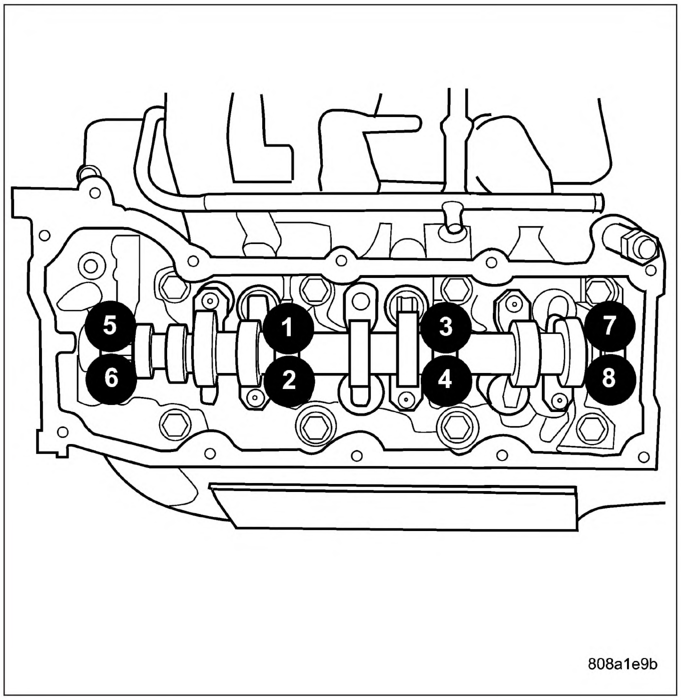
to Specifications Section to obtain specified height and allowable tensions. Replace any springs that do not meet specifications.

INSTALLATION

1. Coat the valve stem with clean engine oil and insert it into the cylinder head.
2. Install the valve stem seal (3). Make sure the seal is fully seated and that the garter spring at the top of the seal is intact.
3. Install the spring and the spring retainer (2).
4. Using the valve spring compressor, compress the spring (6) and install the two valve spring retainer halves (1).
5. Release the valve spring compressor and make sure the two spring retainer halves (1) and the spring retainer (2) are fully seated.
6. Lubricate the camshaft journal with clean engine oil then position the camshaft, with the sprocket dowel on the left camshaft at 11 o'clock and the right camshaft at 12 o'clock, then position the camshaft bearing caps.



7. Install the camshaft bearing cap retaining bolts. Tighten the bolts 9-13 N·m (100 in. lbs.) in 1/2 turn increments in the sequence shown.
8. Position the hydraulic lash adjusters and rocker arms (Refer to 9 - ENGINE/CYLINDER HEAD/ ROCKER ARM / ADJUSTER ASSY - INSTALLATION).



ROCKER ARM - VALVE

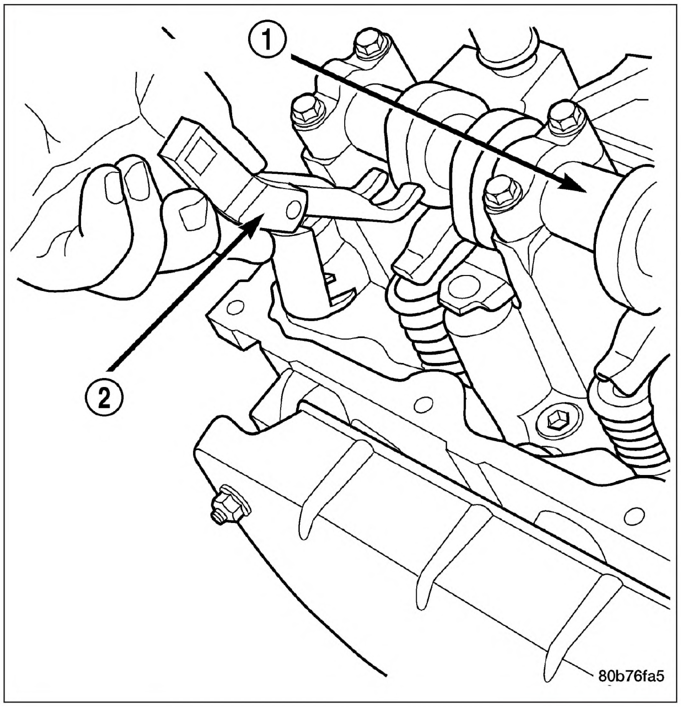
DESCRIPTION

The rocker arms are steel stampings with an integral roller bearing. The rocker arms incorporate a 0.5 mm oil hole in the lash adjuster socket for roller and camshaft lubrication.

REMOVAL

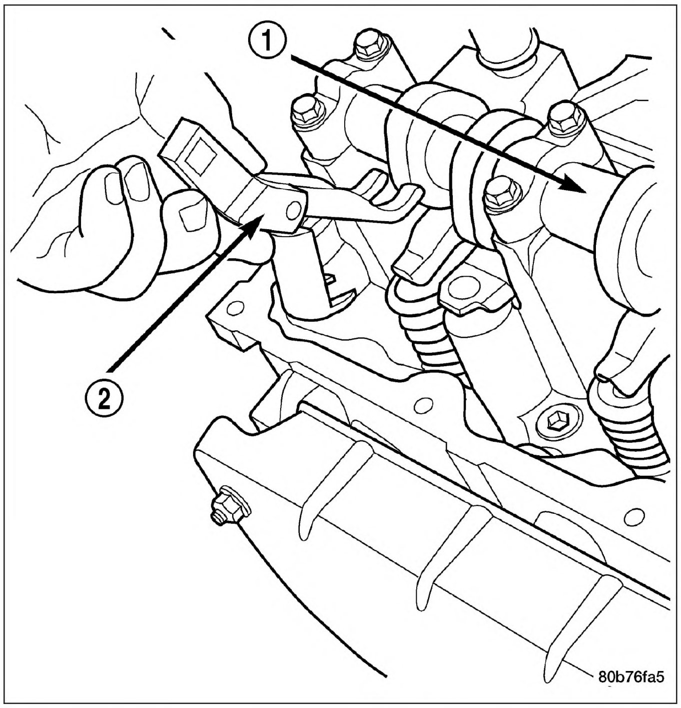
NOTE: Disconnect the battery negative cable to prevent accidental starter engagement.

1. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
2. For rocker arm removal on cylinder No. 4, Rotate the crankshaft until cylinder No. 1 is at BDC intake stroke.
3. For rocker arm removal on cylinder No. 1, Rotate the crankshaft until cylinder No. 1 is at BDC combustion stroke.
4. For rocker arm removal on cylinders No. 3 and No. 5, Rotate the crankshaft until cylinder No. 1 is at TDC exhaust stroke.
5. For rocker arm removal on cylinders No. 2 and No. 6, Rotate the crankshaft until cylinder No. 1 is at TDC ignition stroke.
6. Using special Tool 8516 Rocker Arm Remover (2), press downward on the valve spring, remove rocker arm.



INSTALLATION

1. Using Tool 8516 (2) press downward on the valve spring, install rocker arm.



CAUTION: Make sure the rocker arms are installed with the concave pocket over the lash adjusters. Failure to do so may cause severe damage to the rocker arms and/or lash adjusters.

NOTE: Coat the rocker arms with clean engine oil prior to installation.

2. For rocker arm installation on cylinders No. 4, Rotate the crankshaft until cylinder No. 1 is at BDC intake stroke.
3. For rocker arm installation on cylinder No. 1, Rotate the crankshaft until cylinder No. 1 is at BDC combustion stroke.
4. For rocker arm installation on cylinders No. 3 and No. 5, Rotate the crankshaft until cylinder No. 1 is at TDC exhaust stroke.
5. For rocker arm installation on cylinders No. 2 and No. 6, Rotate the crankshaft until cylinder No. 1 is at TDC ignition stroke.
6. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

SEALS-VALVE GUIDE

DESCRIPTION

The valve guide seals are made of rubber and incorporate an integral steel valve spring seat. The integral garter spring maintains consistent lubrication control to the valve stems.

SPRINGS-VALVE

DESCRIPTION

The valve springs are made from high strength chrome silicon steel. The springs are NOT common for intake and exhaust applications. The valve spring seat is integral with the valve stem seal, which is a positive type seal to control lubrication.

REMOVAL

1. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
2. Using Special Tool 8516 Valve Spring Compressor, remove the rocker arms and the hydraulic lash adjusters.
3. Remove the spark plug for the cylinder the valve spring and seal are to be removed from.
4. Apply shop air to the cylinder to hold the valves in place when the spring is removed.

NOTE: All six valve springs and seals are removed in the same manner; this procedure only covers one valve seal and valve spring.

5. Using Special Tool 8387 Valve Spring Compressor, compress the valve spring.

NOTE: It may be necessary to tap the top of the valve spring to loosen the spring retainers locks enough to be removed.

6. Remove the two spring retainer lock halves.

NOTE: the valve spring is under tension use care when releasing the valve spring compressor.

7. Remove the valve spring compressor.

NOTE: The valve springs are NOT common between intake and exhaust.

8. Remove the spring retainer, and the spring.
9. Remove the valve stem seal.

NOTE: The valve stem seals are common between intake and exhaust.

INSTALLATION

NOTE: All six valve springs and seals are removed in the same manner; this procedure only covers one valve seal and valve spring.

1. Apply shop air to the cylinder to hold the valves in place while the spring is installed.

NOTE: The valve stem seals are common between intake and exhaust.

2. Install the valve stem seal.

NOTE: The valve springs are NOT common between intake and exhaust.

3. Install the spring retainer, and the spring.
4. Using Special Tool 8387 Valve Spring Compressor, compress the valve spring.
5. Install the two spring retainer lock halves.

NOTE: the valve spring is under tension use care when releasing the valve spring compressor.

6. Remove the valve spring compressor.
7. Disconnect the shop air to the cylinder.
8. Install the spark plug for the cylinder the valve spring and seal was installed on.
9. Using Special Tool 8516 Valve Spring Compressor, install the rocker arms and the hydraulic lash adjusters.
10. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

ENGINE BLOCK

DESCRIPTION

The cylinder block is made of cast iron. The block is a closed deck design with the left bank forward. To provide high rigidity and improved NVH an enhanced compacted graphite bedplate is bolted to the block. The block design allows coolant flow between the cylinders bores, and an internal coolant bypass to a single poppet inlet thermostat is included in the cast aluminum front cover.

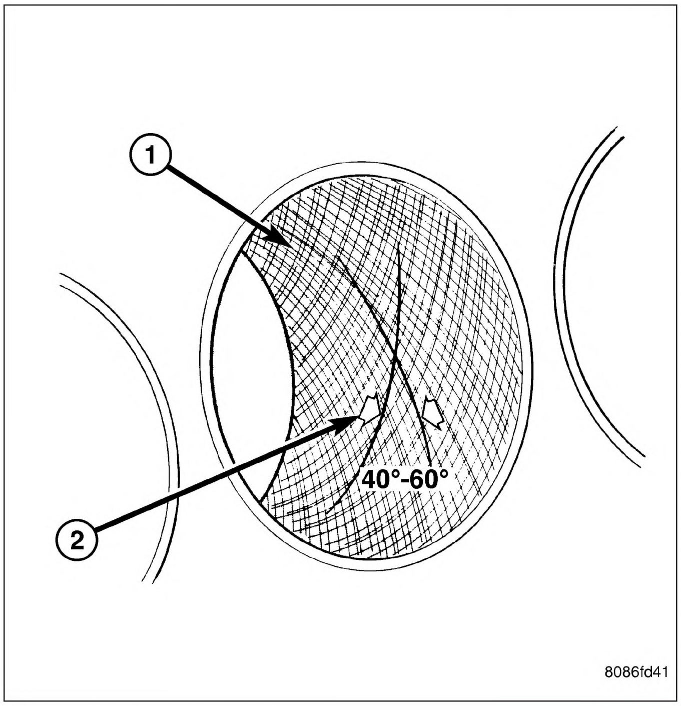
STANDARD PROCEDURE - CYLINDER BORE HONING

Before honing, stuff plenty of clean shop towels under the bores and over the crankshaft to keep abrasive materials from entering the crankshaft area.

1. Used carefully, the Cylinder Bore Sizing Hone C-823, equipped with 220 grit stones, is the best tool for this job. In addition to deglazing, it will reduce taper and out-of-round, as well as removing light scuffing, scoring and scratches. Usually, a few strokes will clean up a bore and maintain the required limits.

CAUTION: DO NOT use rigid type hones to remove cylinder wall glaze.

2. Deglazing of the cylinder walls may be done if the cylinder bore is straight and round. Use a cylinder surfacing hone, Honing Tool C-3501, equipped with 280 grit stones (C-3501-3810). about 20-60 strokes, depending on the bore condition, will be sufficient to provide a satisfactory surface. Using honing oil C-3501-3880, or a light honing oil, available from major oil distributors.



CAUTION: DO NOT use engine or transmission oil, mineral spirits, or kerosene.

3. Honing should be done by moving the hone up and down fast enough to get a crosshatch pattern. The hone marks should INTERSECT at 50° to 60° for proper seating of rings.
4. A controlled hone motor speed between 200 and 300 RPM is necessary to obtain the proper crosshatch angle (1). The number of up and down strokes per minute can be regulated to get the desired 50° to 60° angle (2). Faster up and down strokes increase the crosshatch angle.
5. After honing, it is necessary that the block be cleaned to remove all traces of abrasive. Use a brush to wash parts with a solution of hot water and detergent. Dry parts thoroughly. Use a clean, white, lint-free cloth to check that the bore is clean. Oil the bores after cleaning to prevent rusting.

CLEANING

Thoroughly clean the oil pan and engine block gasket surfaces.

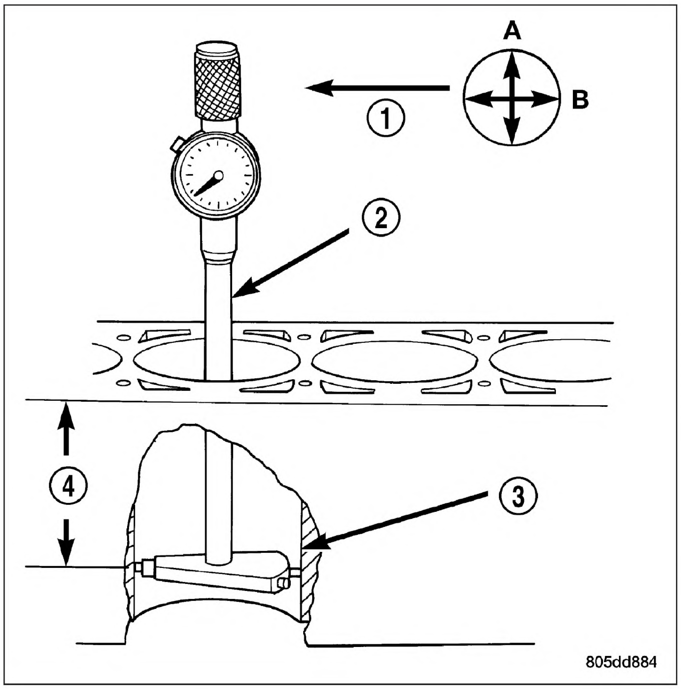
Use compressed air to clean out:

- The galley at the oil filter adaptor hole.
- The front and rear oil galley holes.
- The feed holes for the crankshaft main bearings.

Once the block has been completely cleaned, apply Loctite PST pipe sealant with Teflon 592 to the threads of the front and rear oil galley plugs. Tighten the 1/4 inch NPT plugs to 20 N·m (177 in. lbs.) torque. Tighten the 3/8 inch NPT plugs to 27 N·m (240 in. lbs.) torque.

INSPECTION

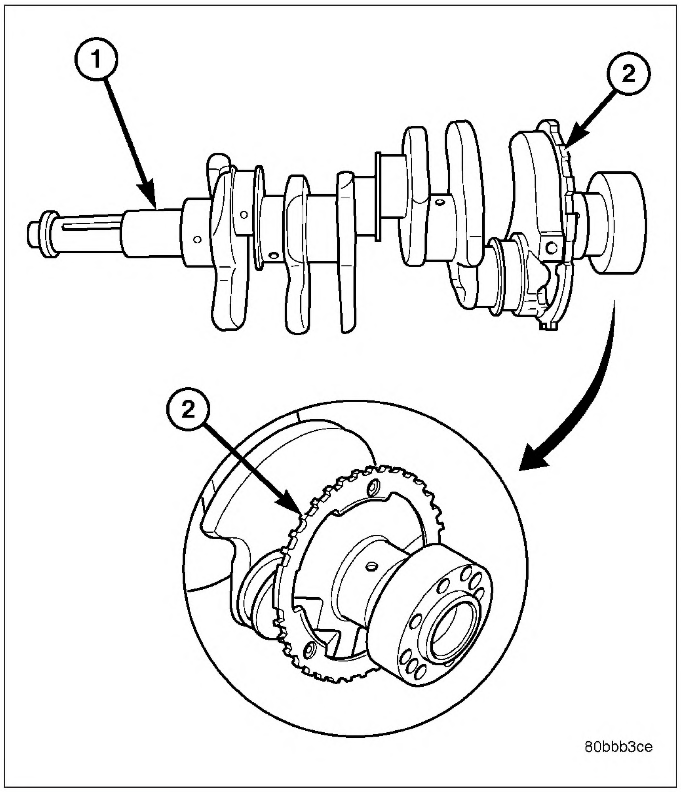
1. It is mandatory to use a dial bore gauge (2) to measure each cylinder bore diameter. To correctly select the proper size piston, a cylinder bore gauge, capable of reading in 0.003 mm (.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at three levels below top of bore. Start perpendicular (across or at 90 degrees) to the axis of the crankshaft and then take two additional reading.
3. Measure the cylinder bore diameter crosswise to the cylinder block near the top of the bore. Repeat the measurement near the middle of the bore, then repeat the measurement near the bottom of the bore.
4. Determine taper by subtracting the smaller diameter from the larger diameter.
5. Rotate measuring device 90° and repeat steps above.
6. Determine out-of-roundness by comparing the difference between each measurement.
7. If cylinder bore taper does not exceed 0.025 mm (0.001 inch) and out-of-roundness does not exceed 0.025 mm (0.001 inch), the cylinder bore can be honed. If the cylinder bore taper or out- of-round condition exceeds these maximum limits, the cylinder block must be replaced. A slight amount of taper always exists in the cylinder bore after the engine has been in use for a period of time.



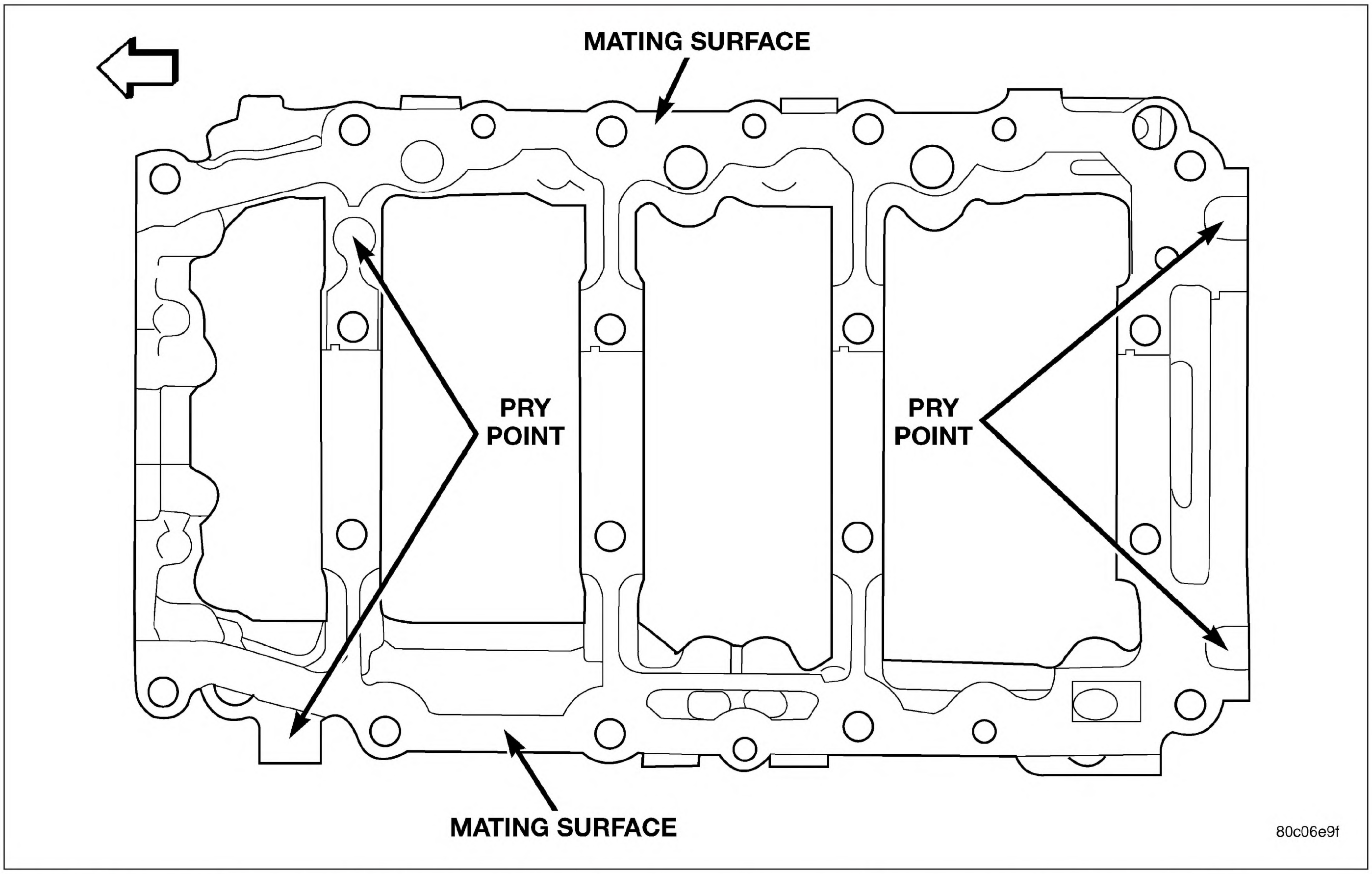
CRANKSHAFT

DESCRIPTION

The crankshaft (1) is constructed of nodular cast iron. The crankshaft is a three throw split pin design with six counterweights for balancing purposes. The crankshaft is supported by four select fit main bearings with the No. 2 serving as the thrust washer location. The main journals of the crankshaft are cross drilled to improve rod bearing lubrication. The No. 6 counterweight has provisions for crankshaft position sensor target wheel mounting. The select fit main bearing markings are located on the rear side of the target wheel (2). The crankshaft oil seals are one piece design. The front oil seal is retained in the timing chain cover, and the rear seal is pressed in to a bore formed by the cylinder block and the bedplate assembly.



REMOVAL



NOTE: To remove the crankshaft from the engine, the engine must be removed from the vehicle.

1. Remove the engine (Refer to 9 - ENGINE - REMOVAL).
2. Remove the engine oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

CAUTION: DO NOT pry on the oil pan gasket when removing the oil pan, The oil pan gasket is mounted to the cylinder block in three locations and will remain attached to block when removing oil pan. Gasket can not be removed with oil pan.

3. Remove the bedplate mounting bolts. Note the location of the two stud bolts for installation.
4. Remove the connecting rods from the crankshaft.

CAUTION: The bedplate to cylinder block mating surface is a critical sealing surface. Do not pry on or damage this surface in anyway.

NOTE: The bedplate contains the lower main bearing halves. Use care when handling bedplate as not to drop or damage bearing halves. Installing main bearing halves in the wrong position will cause severe damage to the crankshaft.

NOTE: The bedplate has pry points (1) cast into it. Use these points only.

5. Carefully pry on the pry points (1) to loosen the bedplate then remove the bedplate.

CAUTION: When removing the crankshaft, use care not to damage bearing surfaces on the crankshaft.

6. Remove the crankshaft.

7. Remove the crankshaft tone wheel.

INSPECTION

NOTE: Thoroughly inspect the connecting rod bearing bores and main bearing bores for scoring, blueing or severe scratches. Further disassembly may be required.

If connecting rod bearing bores show damage, the cylinder heads must be removed to service the piston and rod assemblies. If the bedplate or the cylinder block main bearing bores show damage the engine must be replaced.

1. If required, remove the main bearing halves from the cylinder block and bedplate.
2. Thoroughly clean the bedplate to cylinder block sealing surfaces and main bearing bores. Remove all oil and sealant residue.
3. Inspect the bedplate main bearing bores for cracks, scoring or severe blueing. If either condition exists the engine must be replaced.
4. Inspect the crankshaft thrust washers for scoring, scratches, wear or blueing. If either condition exist replace the thrust washers.
5. Inspect the oil pan gasket/windage tray for splits, tears or cracks in the gasket sealing surfaces. Replace gasket as necessary.

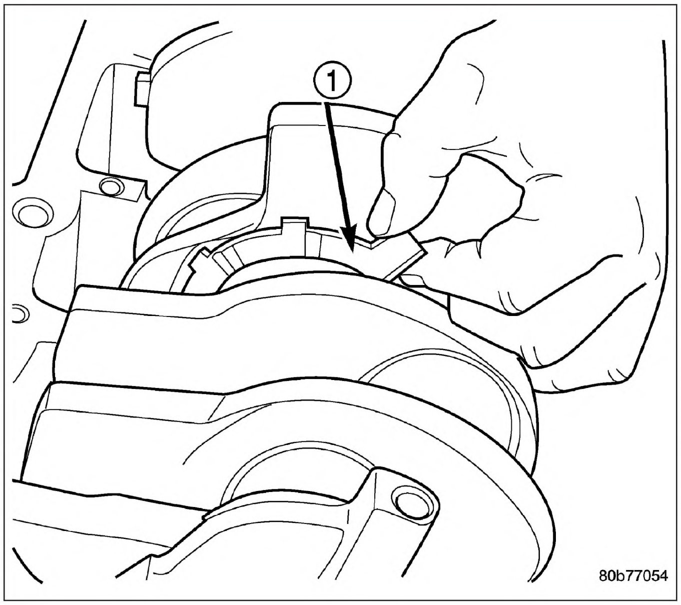
INSTALLATION

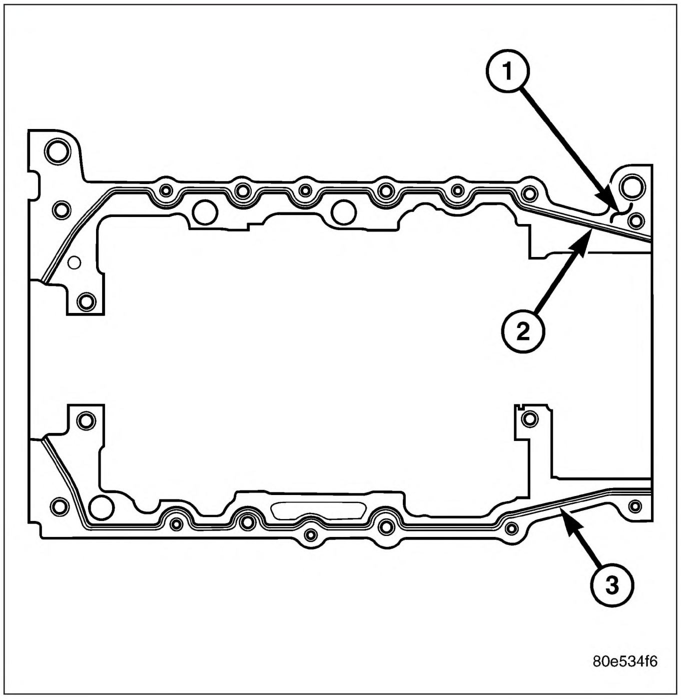
CAUTION: Main bearings are select fit. Refer to Crankshaft Main Bearings in this section for proper bearing selections.

CAUTION: When installing crankshaft, use care not to damage bearing surfaces on the crankshaft.

NOTE: Apply sealant to the tone wheel retaining screws prior to installation.

1. Lubricate upper main bearing halves with clean engine oil.
2. Install the crankshaft tone wheel. Torque the mounting screws to 15 N·m (11 ft. lbs.).
3. Position crankshaft in cylinder block.
4. Install the thrust washers (1).



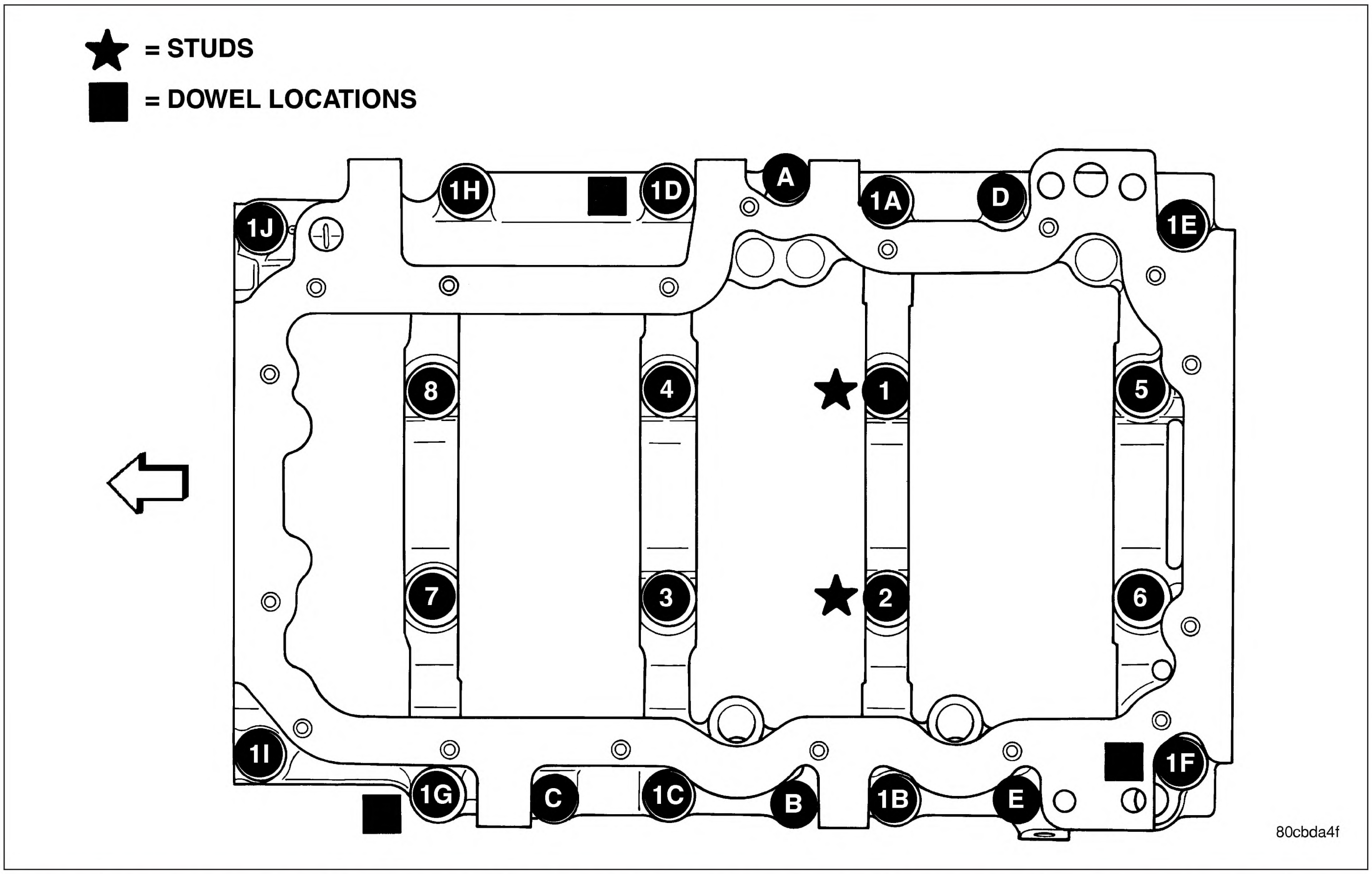


CAUTION: The bedplate to cylinder block mating surface must be coated with Mopar® Engine RTV sealant prior to installation. Failure to do so will cause severe oil leaks.

NOTE: Make sure that the bedplate and cylinder block sealing surfaces are clean and free of oil or other contaminants. Contaminants on the sealing surfaces may cause main bearing distortion and/or oil leaks.

5. Apply a 2.5mm (0.100 inch) bead of Mopar® Engine RTV sealant to the cylinder block-to-bedplate mating surface (1) and (2).
6. Coat the crankshaft main bearing journals with clean engine oil and position the bedplate onto the cylinder block.

NOTE: Lubricate the bedplate retaining bolts with clean engine oil prior to installation.



7. Install the bedplate retaining bolts, making sure to place the stud bolts in the correct location, Torque the bolts in the sequence shown.
   - Hand tighten bolts **1D,1G and 1F** until the bedplate contacts the block.
   - Tighten bolts **1A - 1J** to 54 N·m (40 ft. lbs.)
   - Tighten bolts **1 - 8** to 7 N·m (5 ft. lbs.)
   - Turn bolts **1 - 8** an additional 90°.

- Tighten bolts **A - E** 27 N·m (20 ft. lbs.).

8. Measure crankshaft end play.
9. Install the connecting rods and measure side clearance (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - STANDARD PROCEDURE).
10. Install oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).
11. Install the engine (Refer to 9 - ENGINE - INSTALLATION).

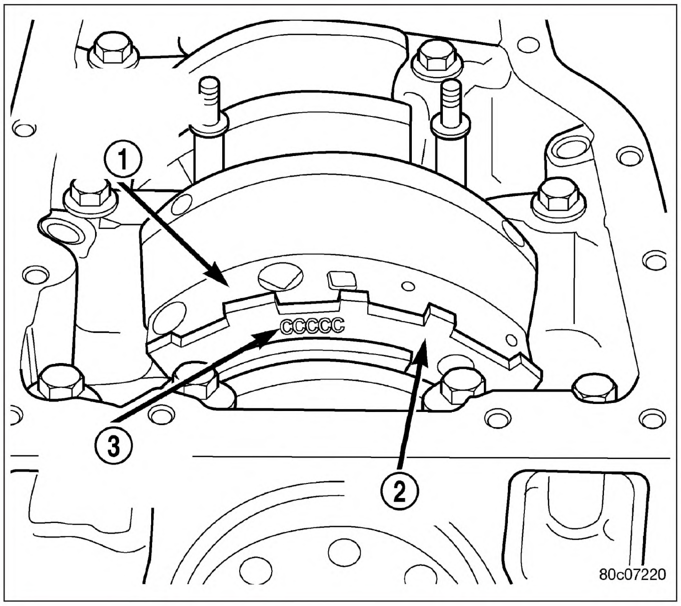
BEARINGS-CRANKSHAFT MAIN

STANDARD PROCEDURE

MAIN BEARING FITTING

SELECT FIT IDENTIFICATION

The main bearings are “select fit” to achieve proper oil clearances. For main bearing selection, the crankshaft position sensor target wheel (2) has grade identification marks (3) stamped into it. These marks are read from left to right, corresponding with journal number 1, 2, 3, 4. The crankshaft position sensor target wheel (2) is mounted to the number 6 counter weight (1) on the crankshaft.



INSPECTION

Wipe the inserts clean and inspect for abnormal wear patterns and for metal or other foreign material imbedded in the lining. Normal main bearing insert wear patterns are illustrated.

Inspect the back of the inserts for fractures, scrapings or irregular wear patterns.

Inspect the upper insert locking tabs for damage.

Replace all damaged or worn bearing inserts.

MAIN BEARING JOURNAL DIAMETER (CRANKSHAFT REMOVED)

Remove the crankshaft from the cylinder block (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - REMOVAL).

Clean the oil off the main bearing journal.

Determine the maximum diameter of the journal with a micrometer. Measure at two locations 90° apart at each end of the journal.

The maximum allowable taper is 0.008mm (0.0004 inch.) and maximum out of round is 0.005mm (0.002 inch). Compare the measured diameter with the journal diameter specification (Main Bearing Fitting Chart). Select inserts required to obtain the specified bearing-to-journal clearance.

Install the crankshaft into the cylinder block (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - INSTALLATION).

Check crankshaft end play.

CRANKSHAFT MAIN BEARING SELECTION

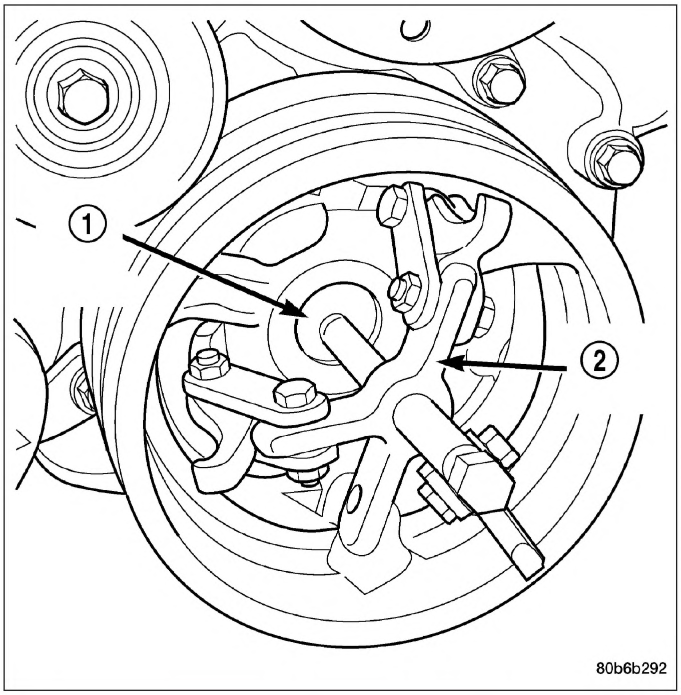
1. Service main bearings are available in four grades. The chart below identifies the four service grades available.

Crankshaft Marking	JOURNAL SIZE SIZE mm (in.)	
″R″ Size	63.488 - 63.496 mm (2.4995 - 2.4998 in.)	
″S″ Size	63.496 - 63.500 mm (2.4998 - 2.4999 in.)	
″T″ Size	63.500 - 63.504 mm (2.4999 - 2.501 in.)	
″U″ Size	63.504 - 63.512 mm (2.5001 - 2.5004 in.)	
Bearing size		
Bearing Code	Size	Application
Upper Bearing		
A	.2.443 - 2.447 mm (.0961 - .0963 in.)	Use with crankshaft size ″R″
B	2.439 - 2.443 mm (0.960 - .0961 in.)	Use with crankshaft ″S, T″
C	2.435 - 2.439 mm (.0958 - .0960 in.)	Use with crankshaft ″U″
Lower Bearing Main ″1″ and ″4″		
″1″	2.441 - 2.447 mm (.0961 -.0963 in.)	Use with crankshaft ″R, S″
″2″	2.435 - 2.441 mm (.0958 - .0962 in.)	Use with crankshaft ″T, U″
Lower Main Bearing ″2″ and ″3″		
″3″	2.429 - 2.435 mm (.0956 - .0958 in.)	Use with crankshaft ″R, S″
″4″	2.423 - 2.429 mm (.0953 - .0956 in.)	Use with crankshaft ″T, U″
Bearing Clearances		
Main ″1, 4″		
Crankshaft ″R″	.004 - .034 mm (.00015 - .0013 in.)	
Crankshaft ″S″	.004 - .030 mm (.00015 - .0011 in.)	
Crankshaft ″T″	.006 - .032 mm (.0002 - .0012 in.)	
Crankshaft ″U″	.002 - .032 mm (.00007 -. 0012 in.)	
Main ″2, 3″		
Crankshaft ″R″	.016 - .046 mm (.0006 - .0018 in.)	
Crankshaft ″S″	.016 - .042 mm (.00062 - .016 in.)	
Crankshaft ″T″	.018 - .044 mm (.0007 - .0017 in.)	
Crankshaft ″U″	.014 - .044 mm (.0005 - .0017 in.)	

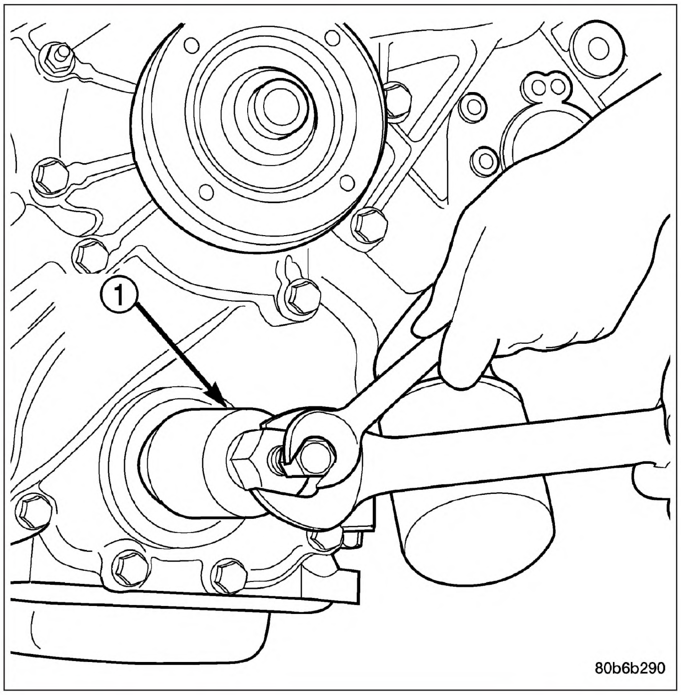
SEAL-CRANKSHAFT OIL - FRONT

REMOVAL

1. Disconnect negative cable from battery.
2. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
3. Remove A/C compressor mouning fasteners and set aside.
4. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Remove upper radiator hose.
6. Disconnect electrical connector for fan mounted inside radiator shroud.
7. Remove radiator cooling fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
8. Remove crankshaft damper bolt.
9. Remove damper using Special Tools 8513 Insert (1) and Tool 1026 Three Jaw Puller (2).



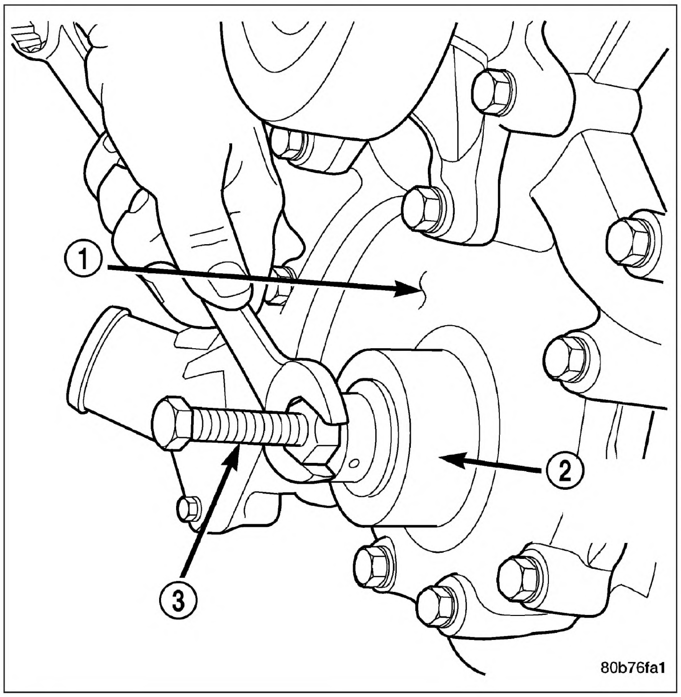
10. Using Special Tool 8511 (1), remove crankshaft front seal.



INSTALLATION

CAUTION: To prevent severe damage to the Crankshaft, Damper or Special Tool 8512, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

1. Using Special Tool 8348 (2) and 8512 (3) , install crankshaft front seal.
2. Install vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
3. Install radiator cooling fan and shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
4. Install upper radiator hose.
5. Install A/C compressor and tighten fasteners to 54 N·m (40 ft. lbs.).
6. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
7. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
8. Connect negative cable to battery.



CRANKSHAFT OIL SEAL - REAR

DIAGNOSIS AND TESTING - REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
    a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
    b. Where leakage tends to run straight down, possible causes are a porous block, distributor seal, camshaft bore cup plugs, oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces. See Engine, for proper repair procedures of these items.
4. If no leaks are detected, pressurized the crankcase as outlined in the section, Inspection (Engine oil Leaks in general)

CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks or scratches. The crankshaft seal flange is specially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING), under the Oil Leak row, for components inspections on possible causes and corrections.
7. After the oil leak root cause and appropriate corrective action have been identified, (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL).

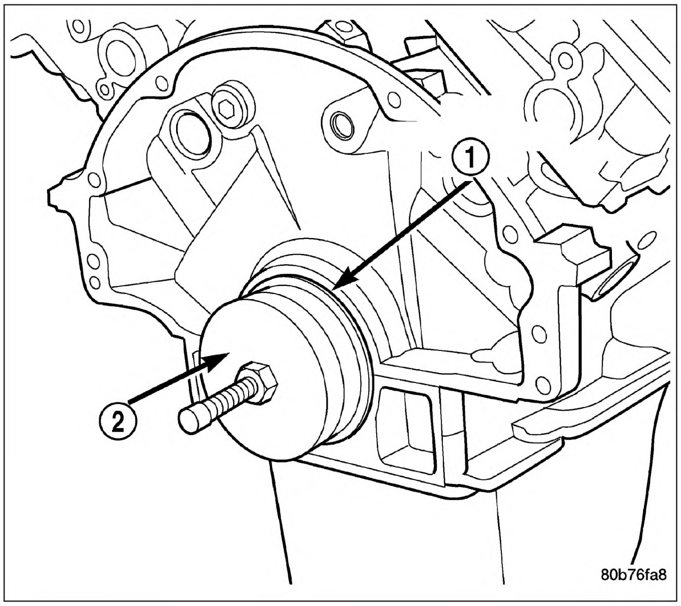
REMOVAL

NOTE: This procedure can be performed in vehicle.

1. If being preformed in vehicle, remove the transmission.
2. Remove the flexplate (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - REMOVAL).

NOTE: The crankshaft oil seal (1) CAN NOT be reused after removal.

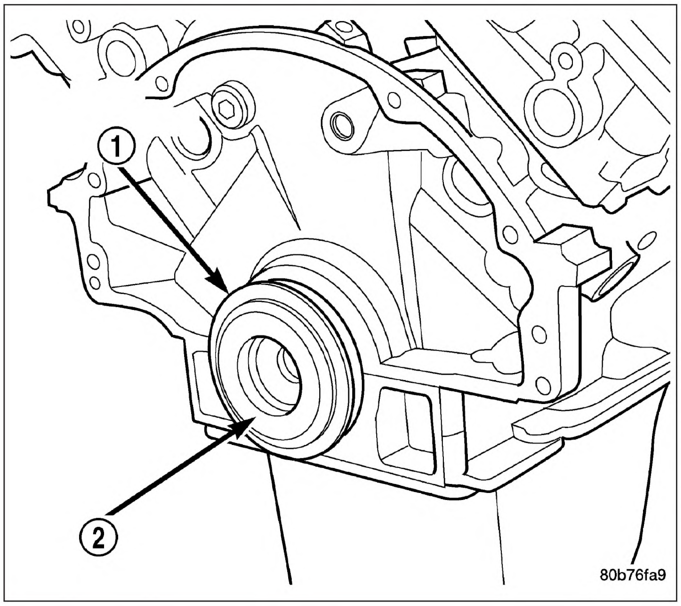
NOTE: The crankshaft rear oil seal remover Special Tool 8506 (2) must be installed deeply into the seal. Continue to tighten the removal tool into the seal until the tool can not be turned farther. Failure to install tool correctly the first time will cause tool to pull free of seal without removing seal from engine.



3. Using Special Tool 8506 (2) , remove the crankshaft rear oil seal (1).

INSTALLATION

1. Lubricate the crankshaft flange with engine oil.
2. Position the magnetic seal guide Special Tool 8349-2 (2) onto the crankshaft rear face. Then position the crankshaft rear oil seal (1) onto the guide.



3. Using Special Tools 8349 Crankshaft Rear Oil Seal Installer (2) and C-4171 Driver Handle (3), with a hammer, tap the seal (1) into place. Continue to tap on the driver handle until the seal installer seats against the cylinder block crankshaft bore.
4. Install the flexplate (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - INSTALLATION).
5. Install the transmission.

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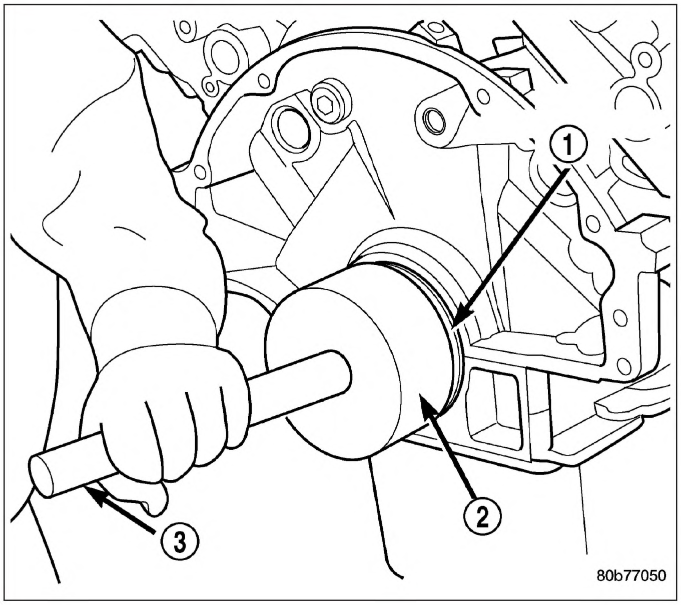
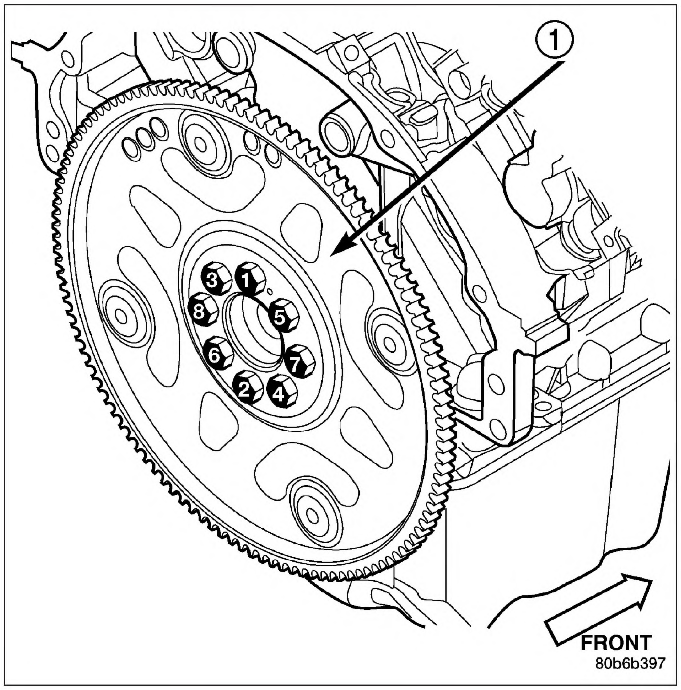


FLEX PLATE

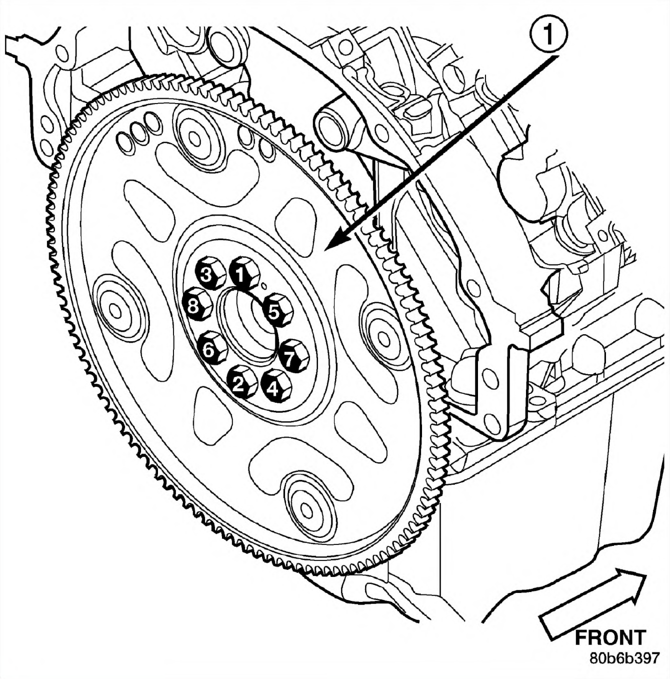
REMOVAL

1. Remove the transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42RLE - REMOVAL).
2. Remove the bolts using the sequence provided.
3. Remove the flexplate.



INSTALLATION

1. Position the flexplate onto the crankshaft and install the bolts hand tight.
2. Tighten the flexplate retaining bolts to 95 N·m (70 ft. lbs.) in the sequence shown.
3. Install the transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42RLE - INSTALLATION).

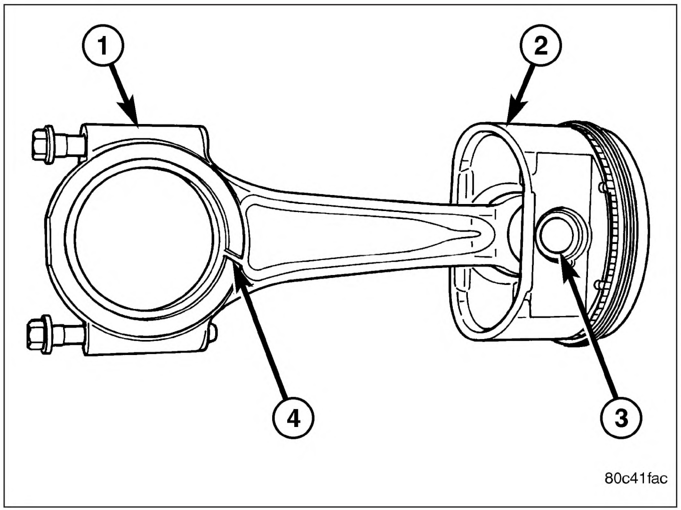


ROD-PISTON & CONNECTING

DESCRIPTION

CAUTION: Do not use a metal stamp to mark connecting rods as damage may result, instead use ink or a scratch awl.

The pistons (2) are made of a high strength aluminum alloy. The connecting rods are made of forged powdered metal, with a “fractured cap” design (1). A full floating piston pin (3) is used to attach the piston to the connecting rod.



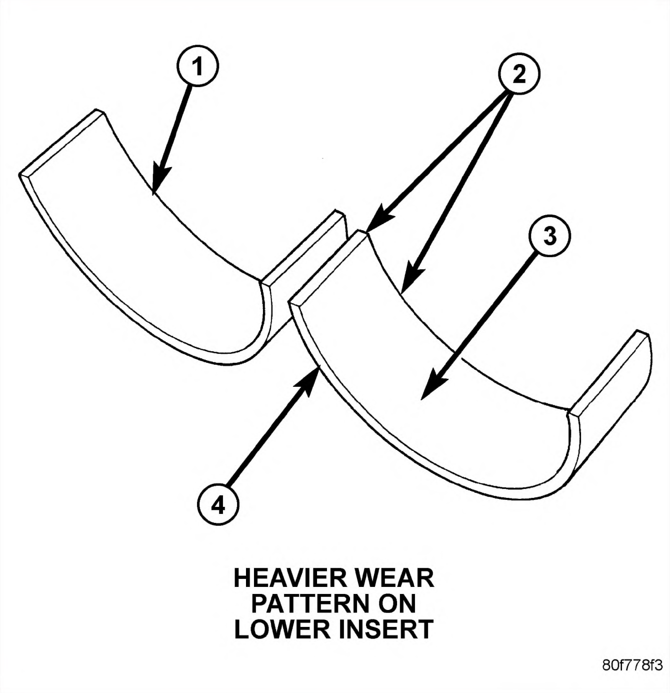
STANDARD PROCEDURE

CONNECTING ROD BEARING FITTING

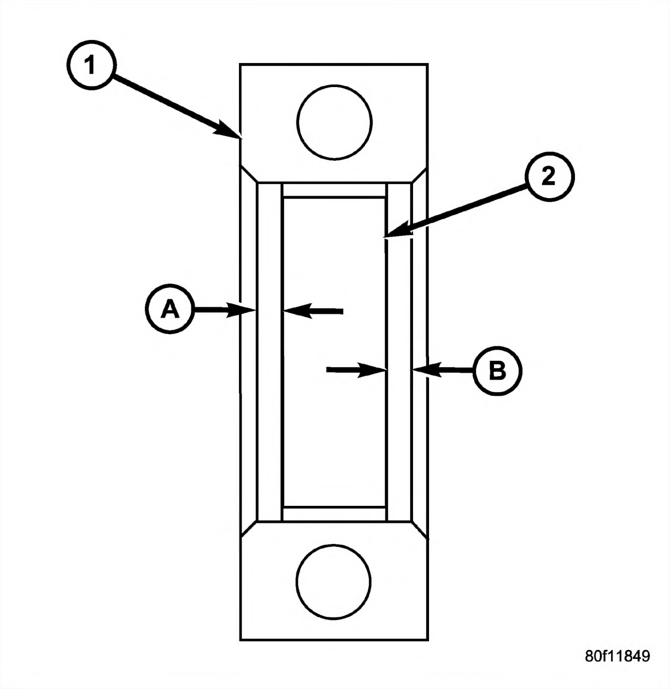
Inspect the connecting rod bearings for scoring (10 and (3). Check the bearings for normal wear patterns, scoring, grooving, fatigue and pitting. Replace any bearing that shows abnormal wear.

Inspect the connecting rod journals for signs of scoring, nicks and burrs.

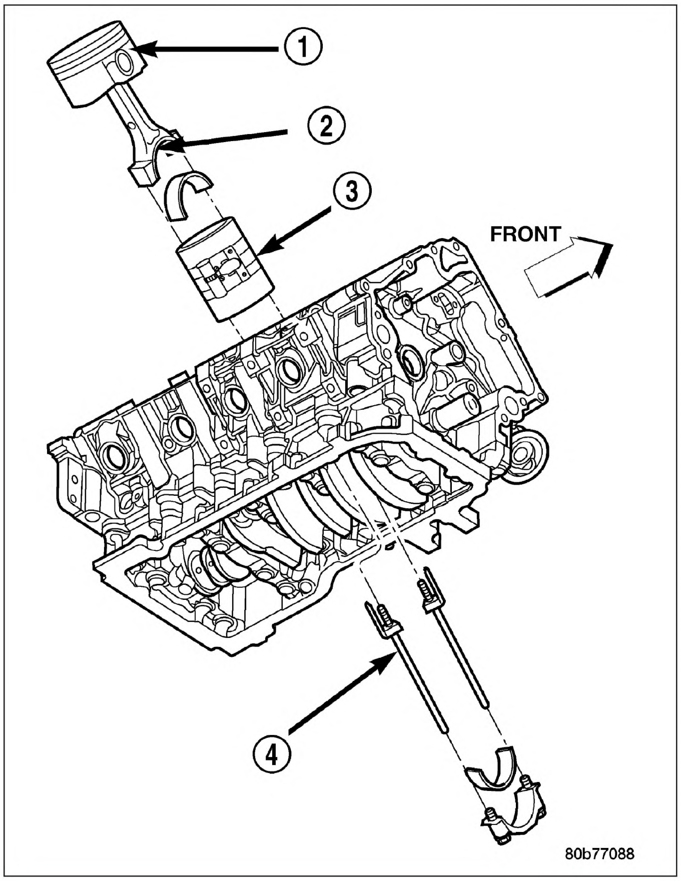
Misaligned or bent connecting rods can cause abnormal wear on pistons, piston rings, cylinder walls, connecting rod bearings and crankshaft connecting rod journals. If wear patterns or damage to any of these components indicate the probability of a misaligned connecting rod, inspect it for correct rod alignment. Replace misaligned, bent or twisted connecting rods.



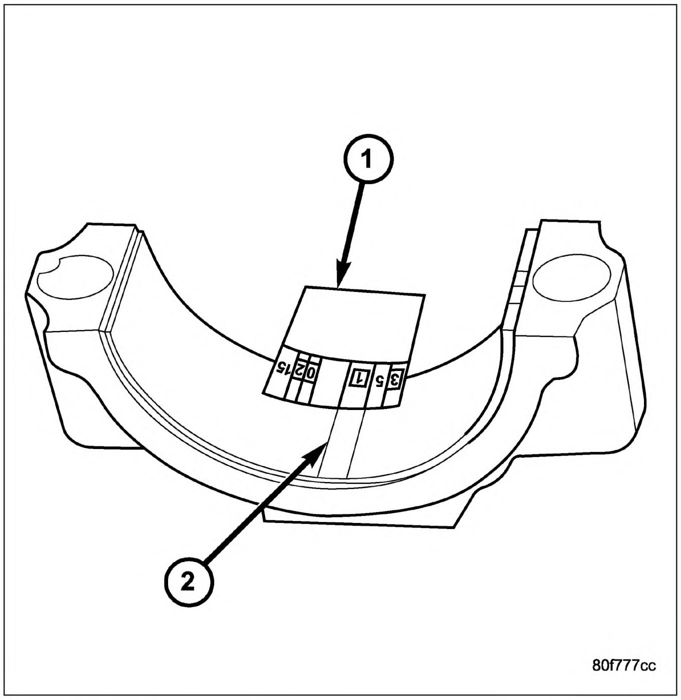
1. Wipe the oil from the connecting rod journal.
2. Lubricate the upper bearing insert (2) and position in connecting rod (1). Center bearing insert in connecting rod
3. Measure at point A and point B. Measurement should be less then .50mm (.0196 in.).



4. Use piston ring compressor (3) and Guide Pins Special Tool 8507 (4) to install the rod and piston assemblies. The oil slinger slots in the rods must face front of the engine. The "F"'s (1) near the piston wrist pin bore should point to the front of the engine.



5. Install the lower bearing insert in the bearing cap. Center bearing insert in connecting rod. The lower insert must be dry. Place strip of Plastigage (1) across full width of the lower insert at the center of bearing cap. Plastigage must not crumble in use. If brittle, obtain fresh stock.
6. Install bearing cap and connecting rod on the journal and tighten bolts to 27 N·m (20 ft. lbs.) plus a 90° turn. DO NOT rotate crankshaft. Plastigage will smear, resulting in inaccurate indication.
7. Remove the bearing cap and determine amount of bearing-to-journal clearance by measuring the width of compressed Plastigage (2). Refer to Engine Specifications for the proper clearance. **Plastigage should indicate the same clearance across the entire width of the insert. If the clearance varies, it may be caused by either a tapered journal, bent connecting rod or foreign material trapped between the insert and cap or rod.**
8. If the correct clearance is indicated, replacement of the bearing inserts is not necessary. Remove the Plastigage from crankshaft journal and bearing insert. Proceed with installation.
9. If bearing-to-journal clearance exceeds the specification, determin which services bearing set to use the bearing sizes are as follows:

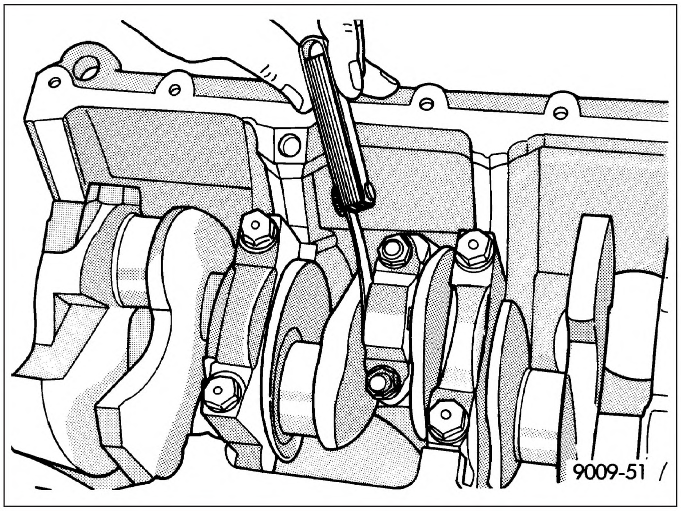


Bearing Mark	SIZE	USED WITH JOURNAL SIZE
.025 US	.025 mm (.001 in.)	57.883-57.867 mm (2.2788-2.2783 in.)
Std.	STANDARD	57.908-57.892 mm (2.2798-2.2792 in.)
.250 US	.250 mm (.010 in.)	57.658-57.646 mm (2.2700-2.2695 in.)

CAUTION: Connecting Rod Bolts are Torque to Yield Bolts and Must Not Be Reused. Always replace the Rod Bolts whenever they are loosened or removed.

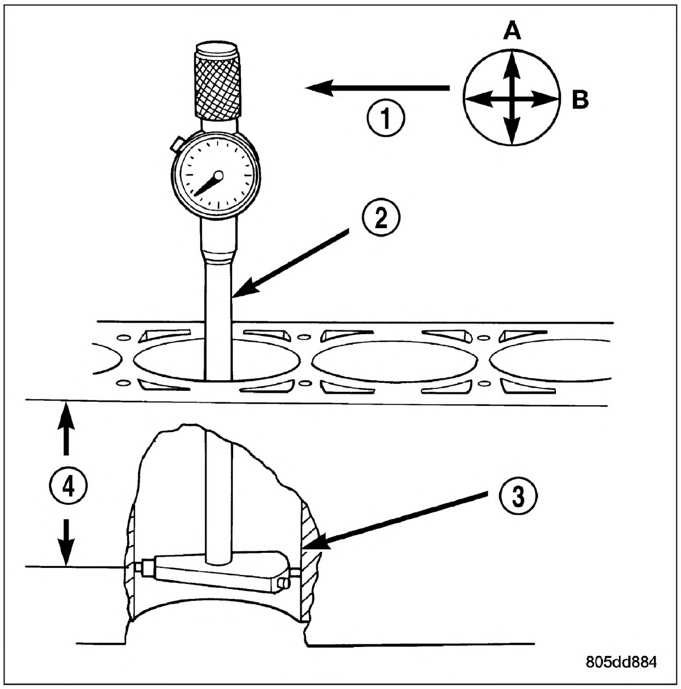
10. Repeat the Plastigage measurement to verify your bearing selection prior to final assembly.
11. Once you have selected the proper insert, install the insert and cap. Tighten the connecting rod bolts to 27 N·m (20 ft. lbs.) plus a 90° turn.

Slide snug-fitting feeler gauge between the connecting rod and crankshaft journal flange. Refer to Engine Specifications for the proper clearance. Replace the connecting rod if the side clearance is not within specification.

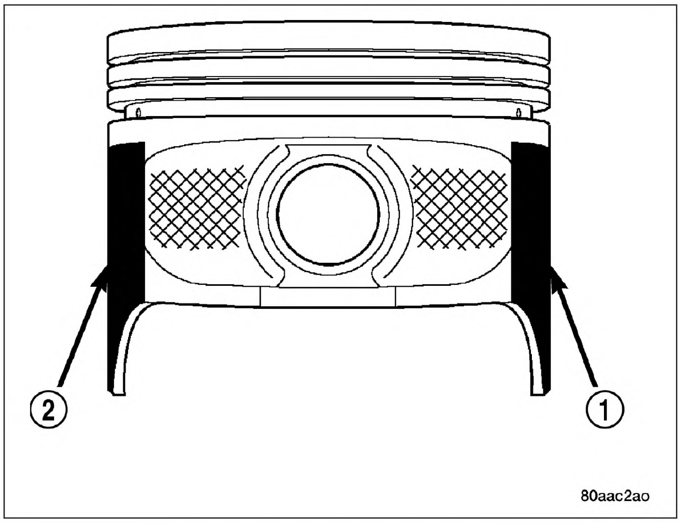


PISTON FITTING

1. To correctly select the proper size piston, a cylinder bore gauge (2), capable of reading in 0.003 mm (.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at a point 38.0 mm (1.5 inches) below top of bore (4). Start perpendicular (across or at 90 degrees) to the axis of the crankshaft at point A and then take an additional bore reading 90 degrees to that at point B.



3. The coated pistons will be serviced with the piston pin and connecting rod pre-assembled.
4. The coating material (1) and (2) is applied to the piston after the final piston machining process. Measuring the outside diameter of a coated piston will not provide accurate results. Therefore measuring the inside diameter of the cylinder bore with a dial Bore Gauge is **MANDATORY**. To correctly select the proper size piston, a cylinder bore gauge capable of reading in 0.003 mm (.0001 in.) increments is required.
5. Piston installation into the cylinder bore requires slightly more pressure than that required for non-coated pistons. The bonded coating on the piston will give the appearance of a line-to-line fit with the cylinder bore.



REMOVAL

1. Disconnect negative cable from battery.
2. Remove the following components:
   - Oil pan and gasket/windage tray (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
   - Cylinder head(s) (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL) and (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).
3. If necessary, remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation.** Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so the each connecting rod is centered in cylinder bore.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

4. Mark connecting rod and bearing cap positions using a permanent ink marker or scribe tool.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

5. Remove connecting rod cap. Install Special Tool 8507 Connecting Rod Guides into the connecting rod being removed. Remove piston from cylinder bore. Repeat this procedure for each piston being removed.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur

6. Immediately after piston and connecting rod removal, install bearing cap on the mating connecting rod to prevent damage to the fractured cap and rod surfaces.

CLEANING

CAUTION: DO NOT use a wire wheel or other abrasive cleaning devise to clean the pistons or connecting rods. The pistons have a Moly coating, this coating must not be damaged.

1. Using a suitable cleaning solvent clean the pistons in warm water and towel dry.
2. Use a wood or plastic scraper to clean the ring land grooves.

CAUTION: DO NOT remove the piston pin from the piston and connecting rod assembly.

INSPECTION

Check the connecting rod journal for excessive wear, taper and scoring (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - STANDARD PROCEDURE)

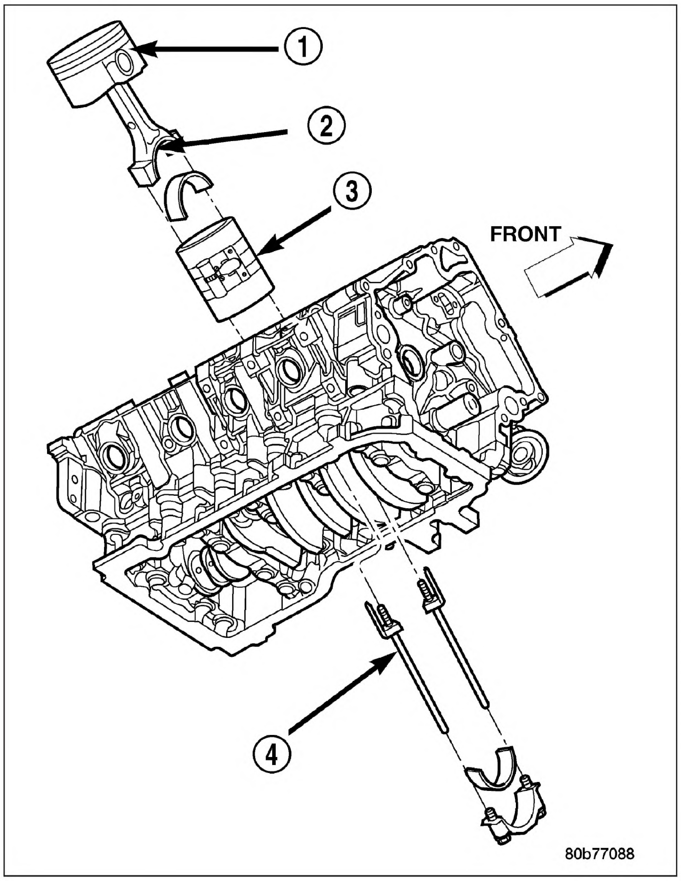
Check the connecting rod for signs of twist or bending.

Check the piston for taper and elliptical shape before it is fitted into the cylinder bore (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - STANDARD PROCEDURE).

Check the piston for scoring, or scraping marks in the piston skirts. Check the ring lands for cracks and/or deterioration.

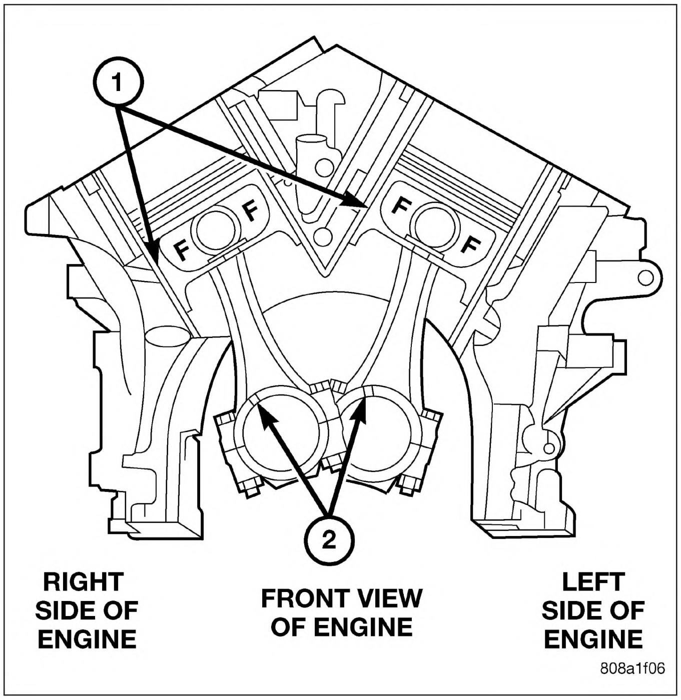
INSTALLATION

1. Before installing piston and connecting rod assemblies into the bore, install the piston rings.
2. Immerse the piston head and rings in clean engine oil. Position a ring compressor (3) over the piston and rings. Tighten ring compressor (3). **Ensure position of rings do not change during this operation.**
3. Position bearing onto connecting rod. Ensure that hole in bearing shell aligns with hole in connecting rod. Lubricate bearing surface with clean engine oil.
4. Install Special Tool 8507 Connecting Rod Guides (4) into connecting rod bolt threads.



5. The pistons are marked on the piston pin bore surface with an raised “F” (1) indicating installation position. This mark must be pointing toward the front of engine on both cylinder banks. The connecting rod oil slinger slot faces the front of the engine.
6. Wipe cylinder bore clean and lubricate with engine oil.
7. Rotate crankshaft until connecting rod journal is on the center of cylinder bore. Insert rod and piston into cylinder bore and carefully position connecting rod guides over crankshaft journal.
8. Tap piston down in cylinder bore using a hammer handle. While at the same time, guide connecting rod into position on rod journal.

CAUTION: Connecting Rod Bolts are Torque to Yield Bolts and Must Not Be Reused. Always replace the Rod Bolts whenever they are loosened or removed.



9. Lubricate rod bolts and bearing surfaces with engine oil. Install connecting rod cap and bearing. Tighten bolts to 27 N·m (20 ft. lbs.) plus 90°.
10. Install the following components:

- Cylinder head(s) (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).
- Timing chain and cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).
- Cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
- Oil pan and gasket/windage tray. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

11. Fill crankcase with proper engine oil to correct level.
12. Connect negative cable to battery.

RINGS-PISTON

STANDARD PROCEDURE

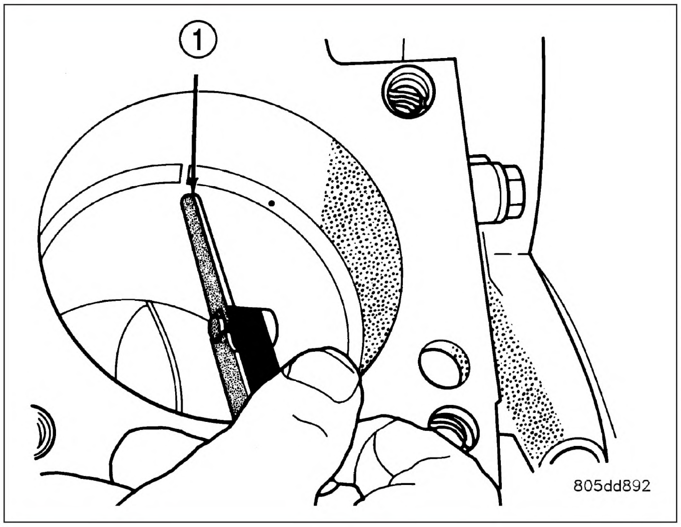
PISTON RING FITTING

Before reinstalling used rings or installing new rings, the ring clearances must be checked.

1. Wipe the cylinder bore clean.
2. Insert the ring in the cylinder bore.

NOTE: The ring gap measurement must be made with the ring positioned at least 12mm (0.50 inch.) from bottom of cylinder bore.

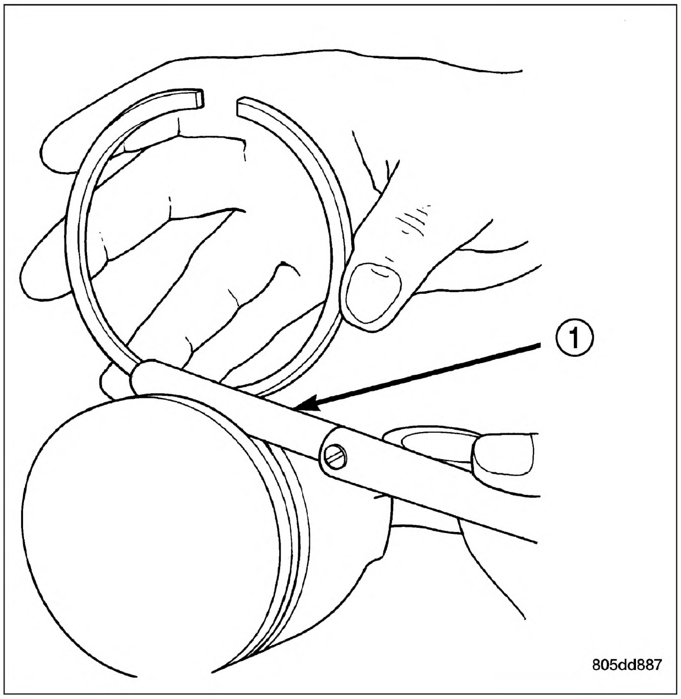
3. Using a piston, to ensure that the ring is squared in the cylinder bore, slide the ring downward into the cylinder.
4. Using a feeler gauge (1), check the ring end gap. Replace any rings not within specification.



PISTON RING SIDE CLEARANCE

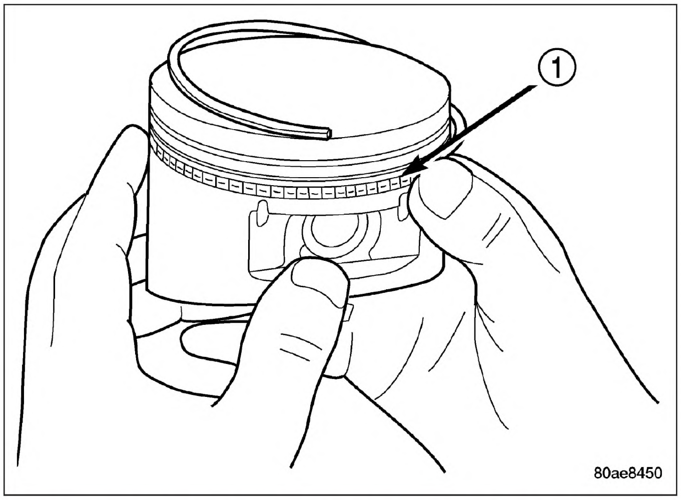
NOTE: Make sure the piston ring grooves are clean and free of nicks and burrs.

PISTON RING SPECIFICATION CHART



Ring Position	Groove Clearance	Maximum Clearance
Upper Ring	.051-.094 mm (0.0020-.0037 in.)	0.11 mm (0.004 in.)
Intermediate Ring	0.04-0.08 mm (0.0016-0.0031 in.)	0.10 mm (0.004 in.)
Oil Control Ring (Steel Rails)	.019-.229 mm (.0007-.0090 in.)	.25 mm (0.010 in.)
Ring Position	**Ring Gap**	**Wear Limit**
Upper Ring	0.20-0.36 mm (0.0079-0.0142 in.)	0.43 mm (0.0017 in.)
Intermediate Ring	0.37-0.63 mm (0.0146-0.0249 in.)	0.74 mm (0.029 in.)
Oil Control Ring (Steel Rail)	0.025-0.76 mm (0.0099- 0.03 in.)	1.55 mm (0.061 in.)

5. Measure the ring side clearance as shown make sure the feeler gauge (1) fits snugly between the ring land and the ring. Replace any ring not within specification.

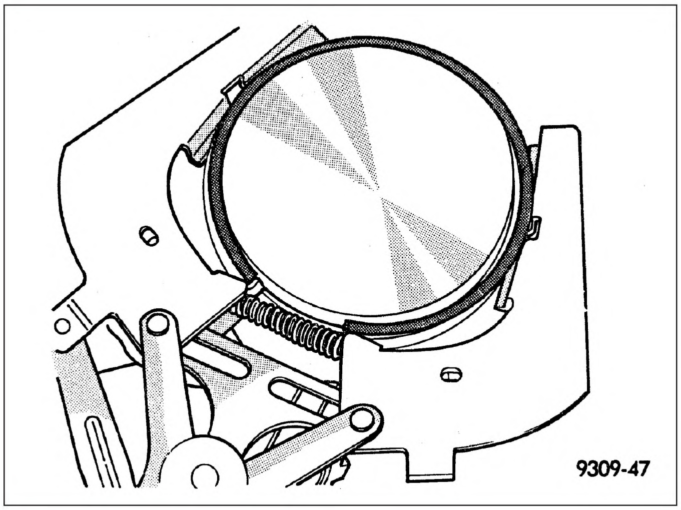


6. Rotate the ring around the piston, the ring must rotate in the groove with out binding.
7. The No. 1 and No. 2 piston rings have a different cross section. Ensure No. 2 ring is installed with manufacturers I.D. mark (Dot) facing up, towards top of the piston.

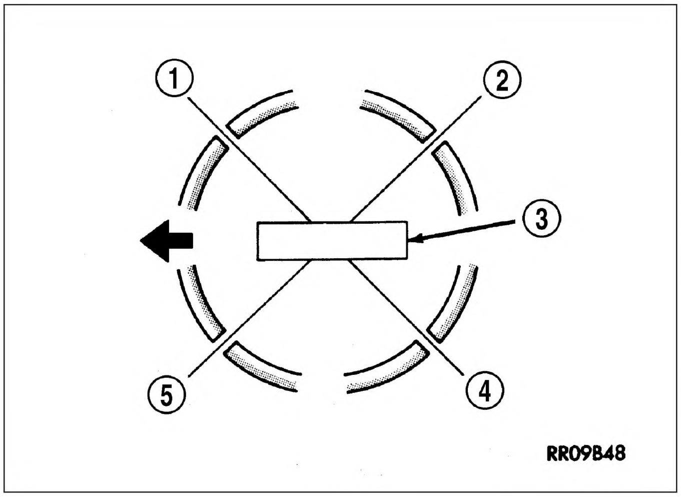
NOTE: Piston rings are installed in the following order:
- **Oil ring expander.**
- **Upper oil ring side rail (1).**
- **Lower oil ring side rail.**
- **No. 2 Intermediate piston ring.**
- **No. 1 Upper piston ring.**

8. Install the oil ring expander.
9. Install upper side rail by placing one end between the piston ring groove and the expander ring. Hold end firmly and press down the portion to be installed until side rail is in position. Repeat this step for the lower side rail.

10. Install No. 2 intermediate piston ring using a piston ring installer.
11. Install No. 1 upper piston ring using a piston ring installer.



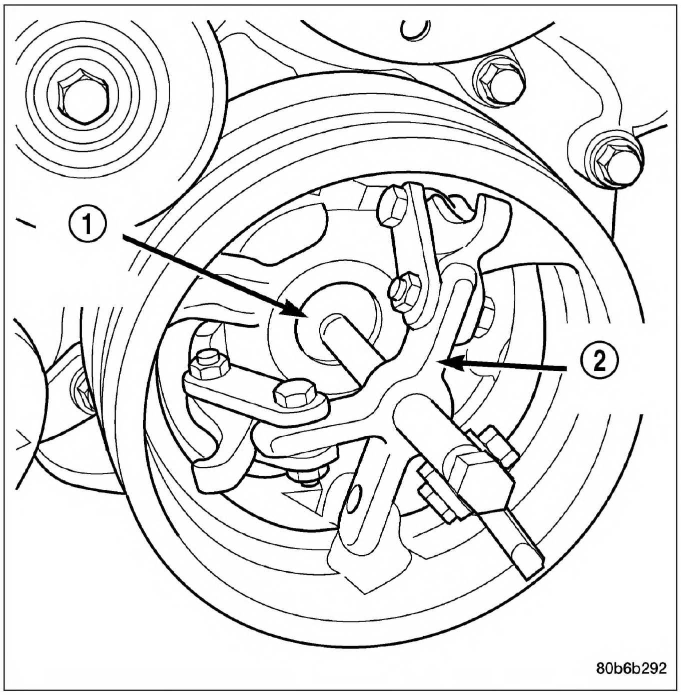
12. Position piston ring end gaps as shown in. It is important that expander ring gap is at least 45° from the side rail gaps, but not on the piston pin center or on the thrust direction.



DAMPER-CRANKSHAFT

REMOVAL

1. Disconnect negative cable from battery.
2. Remove radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
3. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
4. Remove crankshaft damper bolt.
5. Remove damper using Special Tools 8513 Insert (1) and 1026 Three Jaw Puller (2).

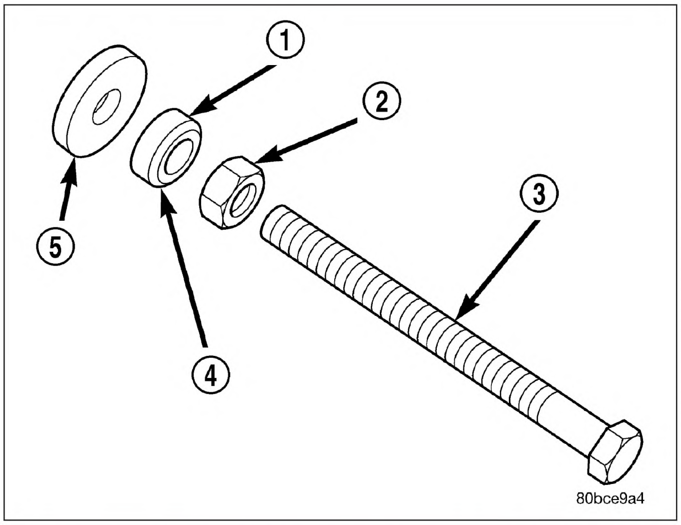


INSTALLATION

CAUTION: To prevent severe damage to the Crankshaft, Damper or Special Tool 8512–A, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

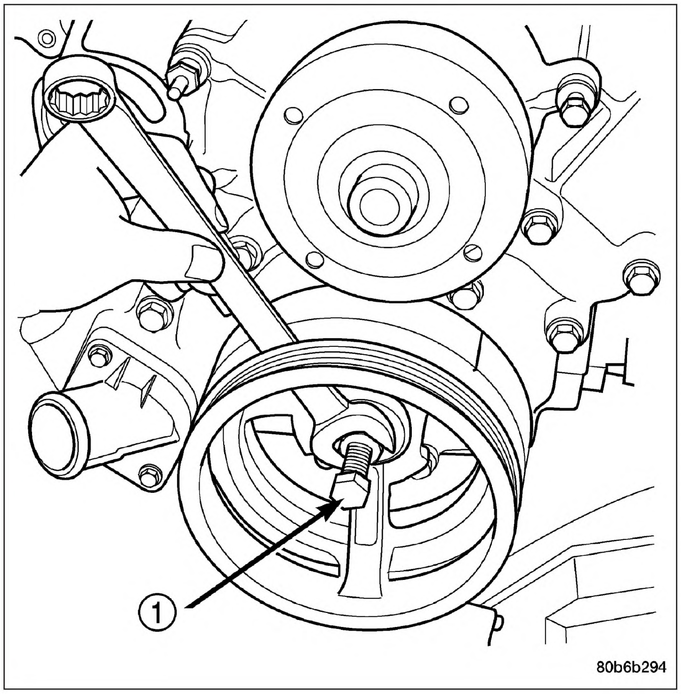
1. Align crankshaft damper slot with key in crankshaft. Slide damper onto crankshaft slightly.

CAUTION: Special Tool 8512–A, is assembled in a specific sequence. Failure to assemble this tool in this sequence can result in tool failure and severe damage to either the tool or the crankshaft.



2. Assemble Special Tool 8512–A as follows, The nut (2) is threaded onto the threaded rod (3) first. Then the roller bearing (1) is placed onto the threaded rod (The hardened bearing surface of the bearing **MUST**face the nut (4)). Then the hardened washer (5) slides onto the threaded rod. Once assembled coat the threaded rod's threads with Mopar® Nickel Anti-Seize or equivalent.

3. Using Special Tool 8512–A, press damper onto crankshaft.
4. Install then tighten crankshaft damper bolt to 175 N·m (130 ft. lbs.).
5. Install radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
6. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
7. Connect negative cable to battery.



COVER-STRUCTURAL

DESCRIPTION

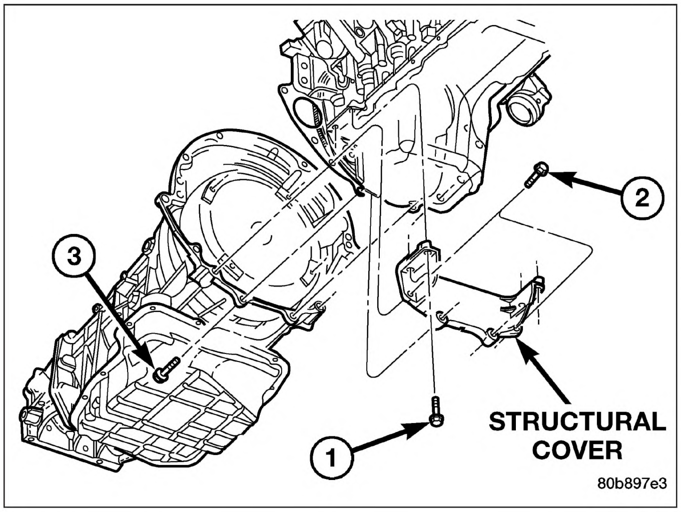
The structural dust cover is made of die cast aluminum and joins the lower half of the transmission bell housing to the engine bedplate.

OPERATION

The structural cover provides additional powertrain stiffness and reduces noise and vibration.

REMOVAL

1. Raise vehicle on hoist.
2. Remove the left hand exhaust pipe from exhaust manifold.
3. Loosen the right hand exhaust manifold-to-exhaust pipe retaining bolts.
4. Remove the eight bolts (1,2,3) retaining structural cover in the sequence shown.
5. Pivot the exhaust pipe downward and remove the structural cover.

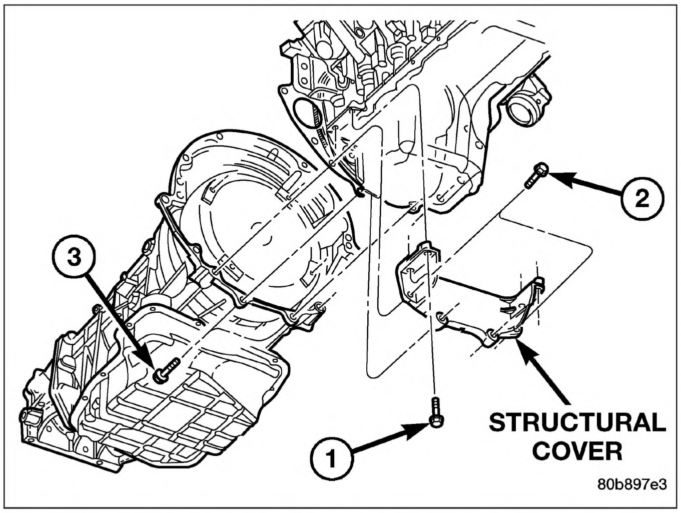


INSTALLATION

CAUTION: The structural cover must be installed as described in the following steps. Failure to do so will cause severe damage to the cover.

1. Position the structural cover in the vehicle.
2. Install all bolts (1,2,3) retaining the cover-to-engine. DO NOT tighten the bolts at this time.
3. Install the four cover-to-transmission bolts. Do NOT tighten at this time.

CAUTION: The structural cover must be held tightly against both the engine and the transmission bell housing during tightening sequence. Failure to do so may cause damage to the cover.

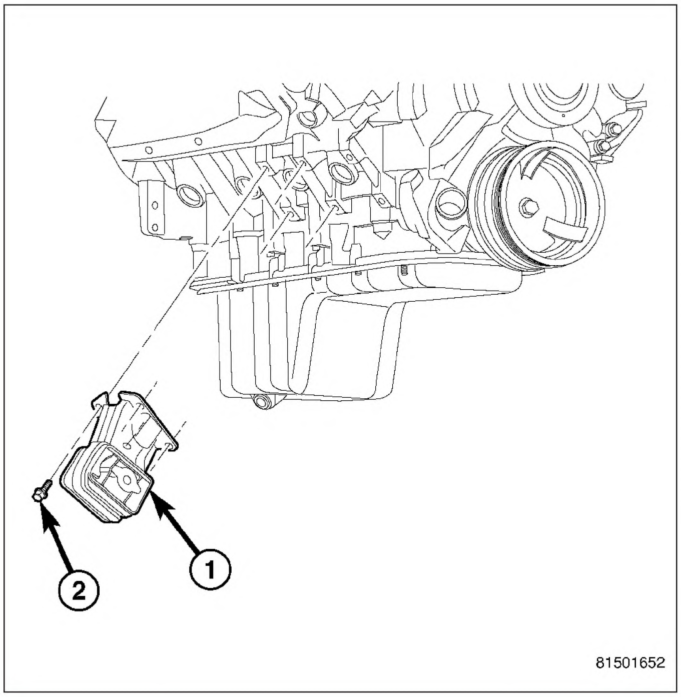


4. Starting with the two rear cover-to-engine bolts, tighten bolts (1) to 54 N·m (40 ft. lbs.), then tighten bolts (2) and (3) to 54 N·m (40 ft. lbs.) in the sequence shown.
5. Install the exhaust pipe on left hand exhaust manifold.
6. Tighten exhaust manifold-to-exhaust pipe retaining bolts to 20 - 26 N·m (15-20 ft. lbs.).

MOUNT-ENGINE FRONT

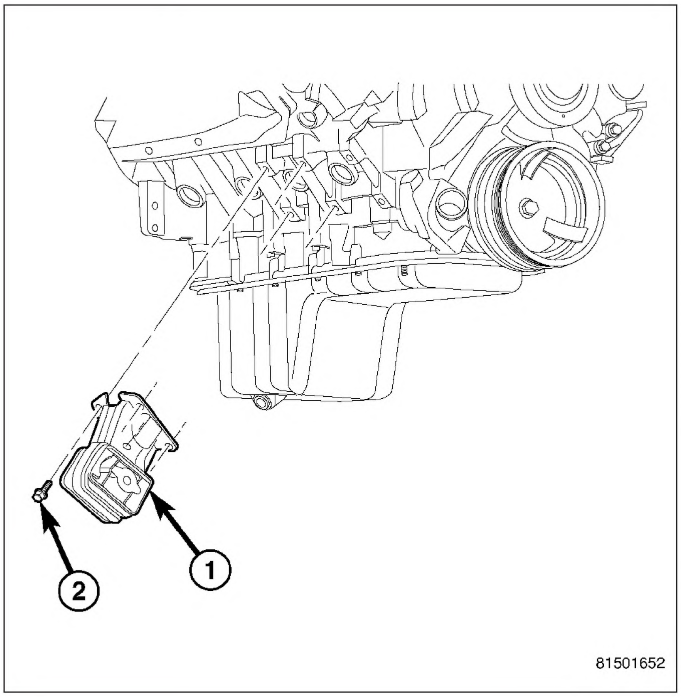
REMOVAL

1. Disconnect negative battery cable.
2. Raise vehicle.
3. Remove engine mount thru bolts.
4. Raise engine using suitable jack.
5. Remove engine mount bolts (2).
6. Remove mount (1) from engine.



INSTALLATION

1. Install the engine mount (1).
2. Lower the engine.
3. Install the thru bolts and nuts
4. Lower vehicle.
5. Connect negative battery cable.

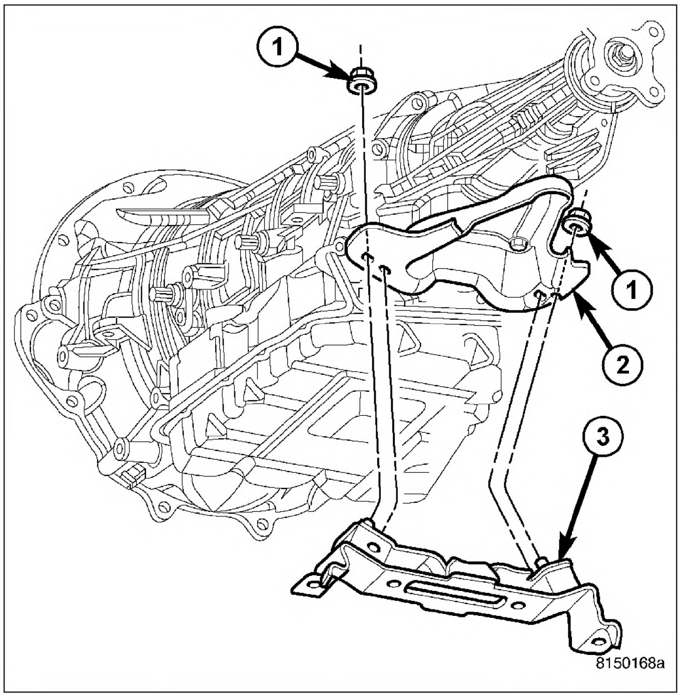


MOUNT-ENGINE REAR

REMOVAL

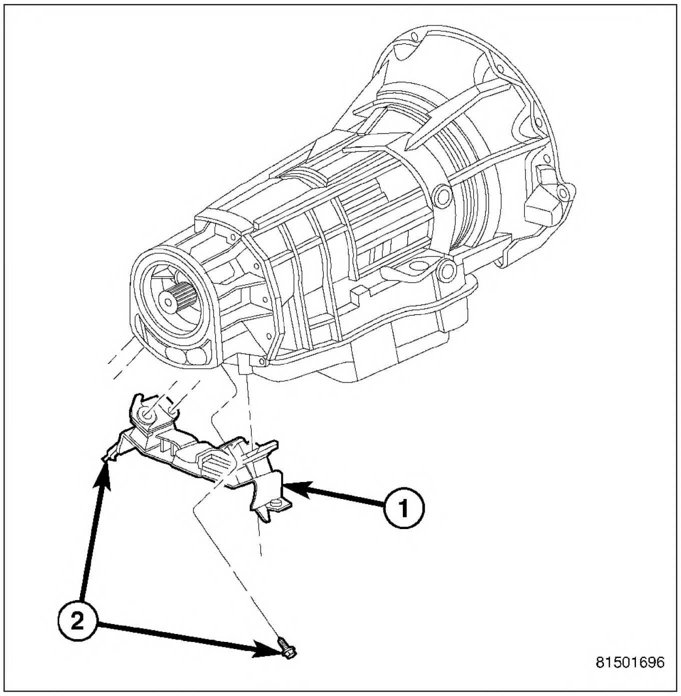
4X2

1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (1) from the transmission mount to transmission.
5. Remove the mount (3).
6. Remove the transmission mount bracket (2), if required.



4X4

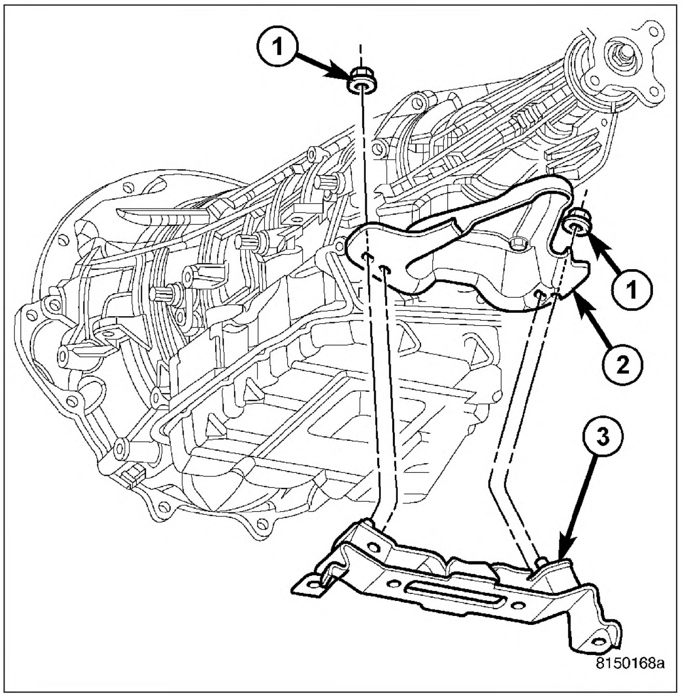
1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (2) from the transmission mount (1) to transmission.
5. Remove the mount.



INSTALLATION

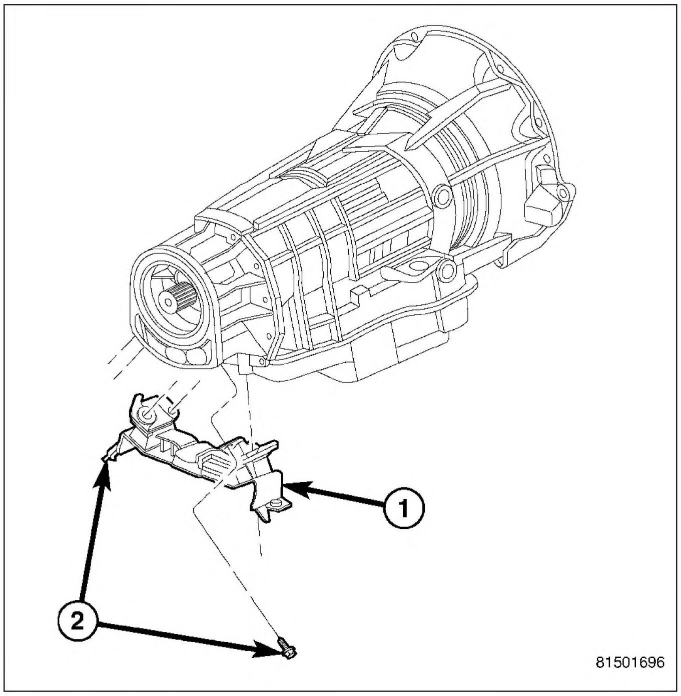
4X2

1. Install the transmission mount bracket (2), if removed.
2. Position the transmission mount (3) on the transmission mount bracket (2). Install the fasteners (1)that attach the transmission mount to the bracket.
3. Torque the bolts to N·m (ft.lbs.) torque.
4. Install the crossmember.



4X4

1. Position the transmission mount (1) on the transmission. Install the bolts (2) that attach the transmission mount to the transmission.
2. Torque the bolts to N·m (ft.lbs.) torque.
3. Install the crossmember.

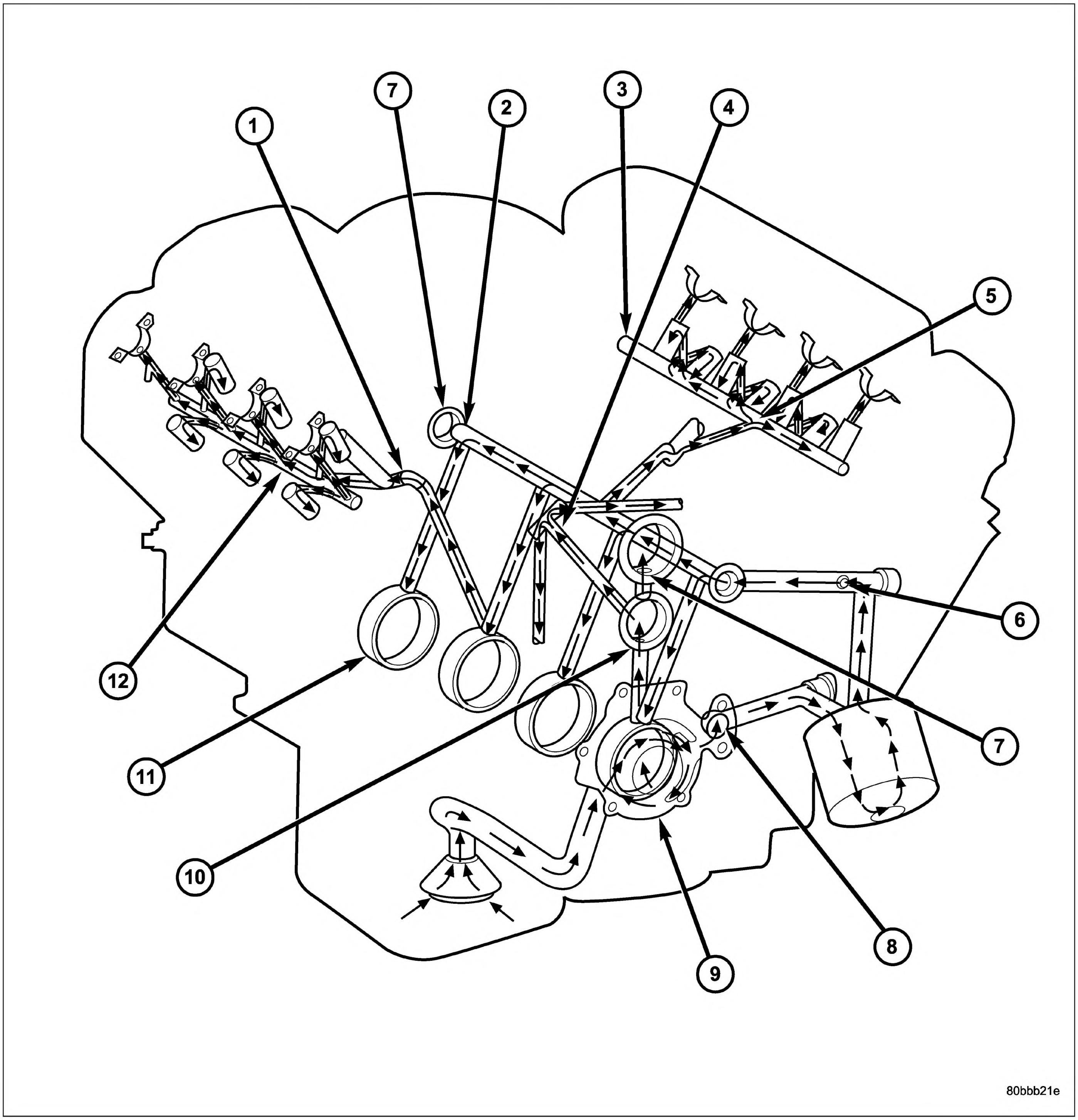


LUBRICATION

DESCRIPTION

The lubrication system is a full flow filtration pressure feed type.

OPERATION



1 - OIL FLOW TO RIGHT CYLINDER HEAD	7 - OIL FLOW TO COUNTER BALANCE SHAFT
2 - CYLINDER BLOCK MAIN OIL GALLERY	8 - OIL PUMP OUTLET TO CYLINDER BLOCK
3 - LEFT CYLINDER HEAD OIL GALLERY	9 - OIL PUMP
4 - OIL FLOW TO BOTH SECONDARY TENSIONERS	10 - OIL FLOW TO CRANKSHAFT MAIN JOURNALS
5 - OIL FLOW TO LEFT CYLINDER HEAD	11 - CRANKSHAFT MAIN BEARING JOURNALS
6 - OIL PRESSURE SENSOR LOCATION	12 - RIGHT CYLINDER HEAD OIL GALLERY

Oil from the oil pan is pumped by a gerotor type oil pump directly mounted to the crankshaft nose. Oil pressure is controlled by a relief valve mounted inside the oil pump housing.

The camshaft exhaust valve lobes and rocker arms are lubricated through a small hole in the rocker arm; oil flows through the lash adjuster then through the rocker arm and onto the camshaft lobe. Due to the orientation of the rocker arm, the camshaft intake lobes are not lubed in the same manner as the exhaust lobes. The intake lobes are lubed through internal passages in the camshaft. Oil flows through a bore in the No. 3 camshaft bearing bore, and as the camshaft turns, a hole in the camshaft aligns with the hole in the camshaft bore allowing engine oil to enter the camshaft tube. The oil then exits through 1.6mm (0.063 in.) holes drilled into the intake lobes, lubricating the lobes and the rocker arms.

Engine Lubrication Flow Chart - Block: Table 1

FROM	TO
Oil Pickup Tube	Oil Pump
Oil Pump	Oil Filter
Oil Filter	Block Main Oil Gallery
Block Main Oil Gallery	1. Crankshaft Main Journal 2. Left Cylinder Head* 3. Right Cylinder Head* 4. Counterbalance Shaft Rear Journal
Crankshaft Main Journals	Crankshaft Rod Journals
Crankshaft Number One Main Journal	1. Front Timing Chain Idler Shaft 2. Counterbalance Shaft - Front Journal 3. Both Secondary Chain Tensioners
Left Cylinder Head	Refer to Engine Lubrication Flow Chart - Cylinder Heads: Table 2
Right Cylinder Head	Refer to Engine Lubrication Flow Chart - Cylinder Heads: Table 2
* The cylinder head gaskets have an oil restricter to control oil flow to the cylinder heads	

Engine Lubrication Flow Chart - Cylinder Heads: Table 2

FROM	TO
Cylinder Head Oil Port (in bolt hole)	Diagonal Cross Drilling to Main Oil Gallery
Main Oil Gallery (drilled through head from rear to front)	1. Base of Camshaft Towers 2. Lash Adjuster Towers
Base of Camshaft Towers	Vertical Drilling Through Tower to Camshaft Bearings**
Lash Adjuster Towers	Diagonal Drillings to Hydraulic Lash Adjuster Pockets
** The number three camshaft bearing journal feeds oil into the hollow camshaft tubes. Oil is routed to the intake lobes, which have oil passages drilled into them to lubricate the rocker arms.	

DIAGNOSIS AND TESTING

ENGINE OIL LEAK

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

1. Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.
2. Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

3. Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair per service manual instructions.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.If the oil leak source is not positively identified at this time, proceed with the air leak detection test method.

Air Leak Detection Test Method

1. Disconnect the breather cap to air cleaner hose at the breather cap end. Cap or plug breather cap nipple.
2. Remove the PCV valve from the cylinder head cover. Cap or plug the PCV valve grommet.
3. Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

4. Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provide the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
5. If the leakage occurs at the rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.
6. If no leaks are detected, turn off the air supply and remove the air hose and all plugs and caps. Install the PCV valve and breather cap hose.
7. Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
    a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
    b. Where leakage tends to run straight down, possible causes are a porous block, distributor seal, camshaft bore cup plugs oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces.
4. If no leaks are detected, pressurize the crankcase as outlined in the, Inspection (Engine oil Leaks in general)

CAUTION: Do not exceed 20.6 kPa (3 psi).

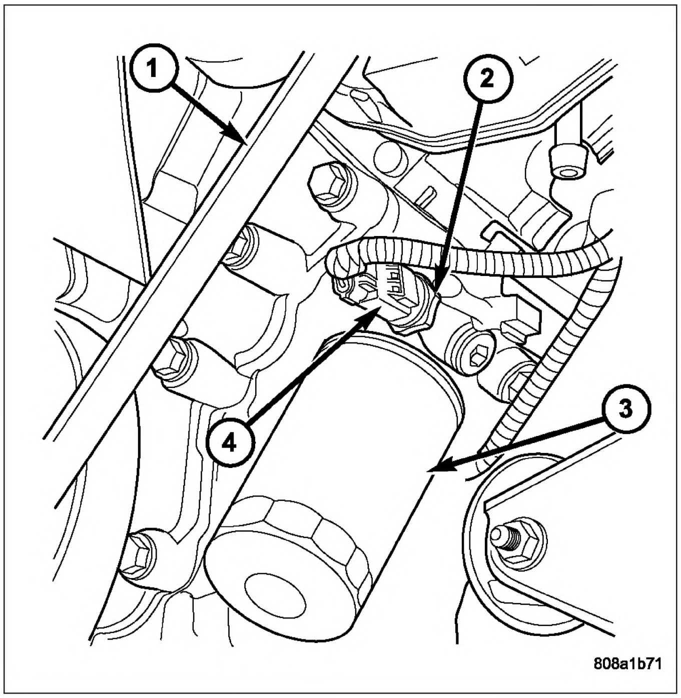
5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

CHECKING ENGINE OIL PRESSURE

1. Remove oil pressure sending unit (2) and install gauge assembly C-3292.
2. Run engine until thermostat opens.
3. Oil Pressure:
   - Curb Idle - 25 kPa (4 psi) minimum
   - 3000 rpm - 170 - 758 kPa (25 - 110 psi)
4. If oil pressure is 0 at idle, shut off engine. Check for a clogged oil pick-up screen or a pressure relief valve stuck open.



REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
   a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
   b. Where leakage tends to run straight down, possible causes are a porous block, camshaft bore cup plugs, oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces. See Engine, for proper repair procedures of these items.
4. If no leaks are detected, pressurized the crankcase as outlined in the section, Inspection (Engine oil Leaks in general)

CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

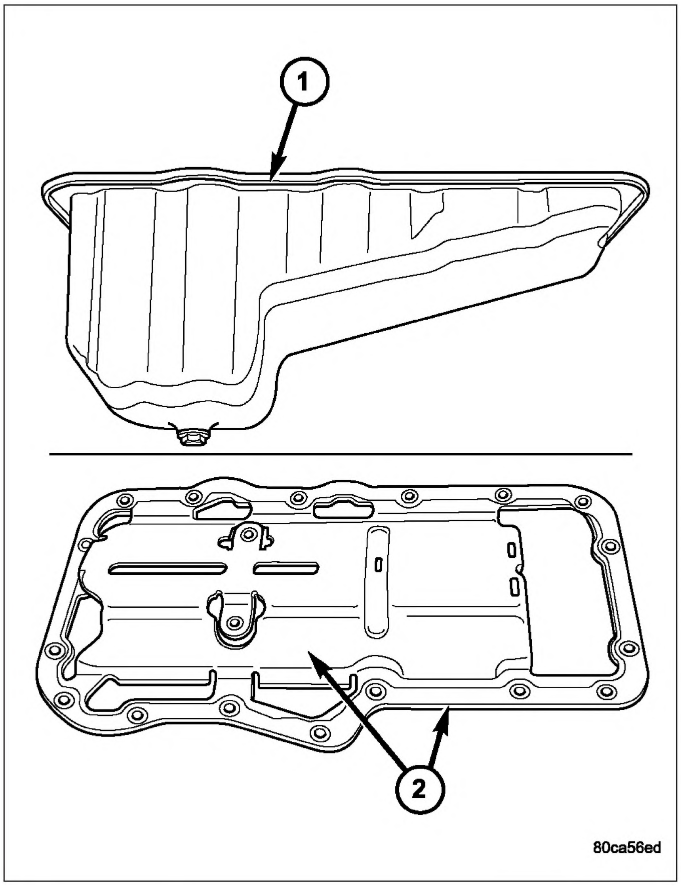
CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks or scratches. The crankshaft seal flange is specially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) , under the Oil Leak, for components inspections on possible causes and corrections.
7. After the oil leak root cause and appropriate corrective action have been identified, (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL).

PAN-ENGINE OIL

DESCRIPTION

The engine oil pan (1) is made of laminated steel and has a single plane sealing surface. The sandwich style oil pan gasket has an integrated windage tray (2) and steel carrier. The sealing area of the gasket is molded with rubber and is designed to be reused as long as the gasket is not cut, torn or ripped.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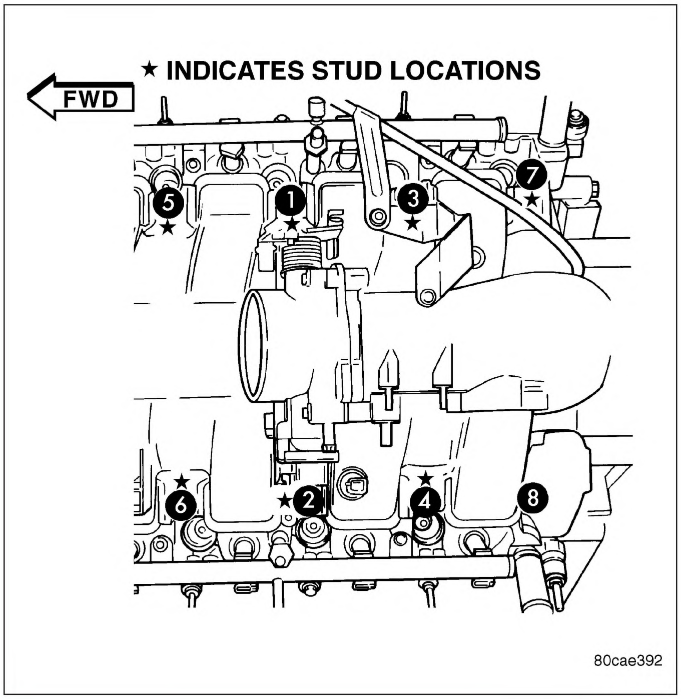
2
80ca56ed

REMOVAL

1. Disconnect negative battery cable.
2. Remove the radiator fan (Refer to 7 - COOLING/ ENGINE/RADIATOR FAN - REMOVAL).


★ INDICATES STUD LOCATIONS
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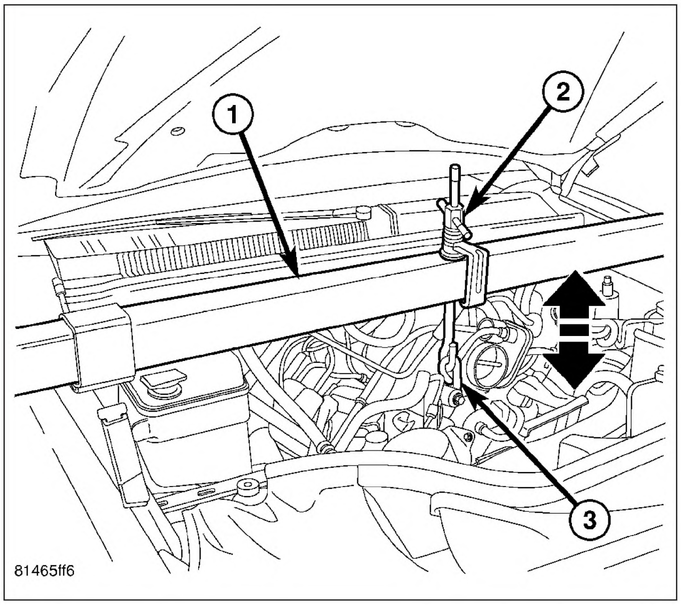
80cae392

3. Remove the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

4. Install Special Tool #8534 **Do not raise engine at this time.**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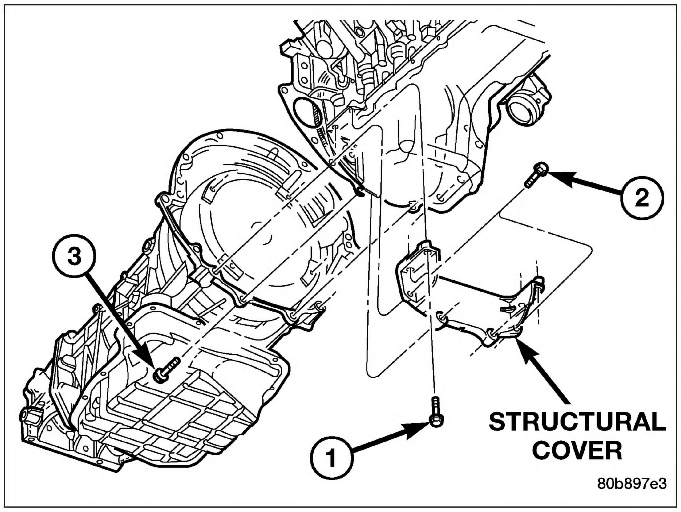
2
3
81465ff6

5. Remove the structural cover (Refer to 9 - ENGINE/ ENGINE BLOCK/STRUCTURAL COVER - REMOVAL). using sequence shown.


2
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STRUCTURAL COVER
1
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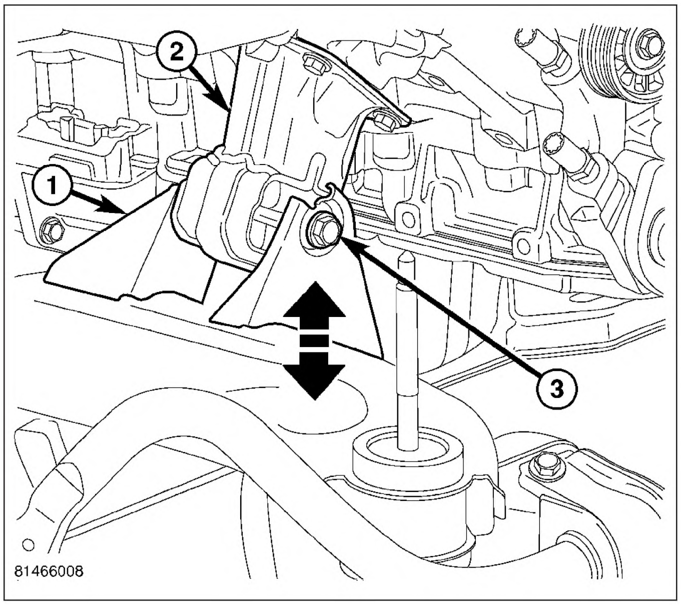
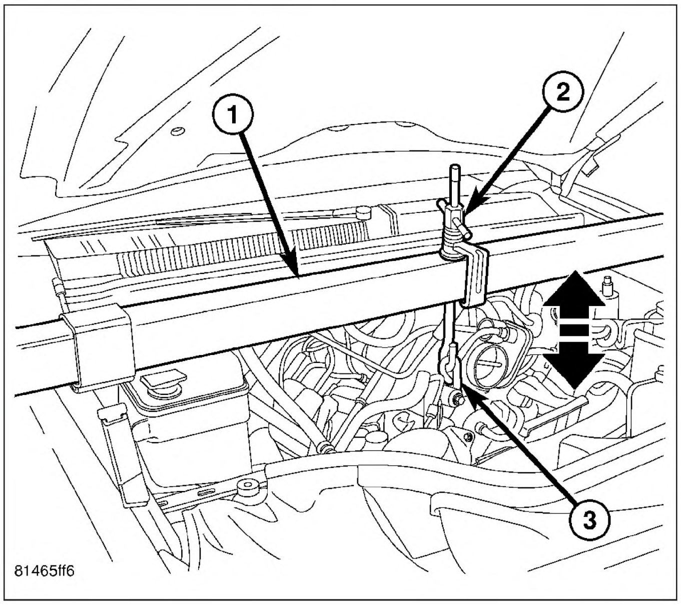
6. Remove both left and right side engine mount through bolts (3).


2
1
3
81466008

7. Raise engine using special tool # 8534 (1), to provide clearance to remove oil pan.
8. Drain engine oil and remove oil filter.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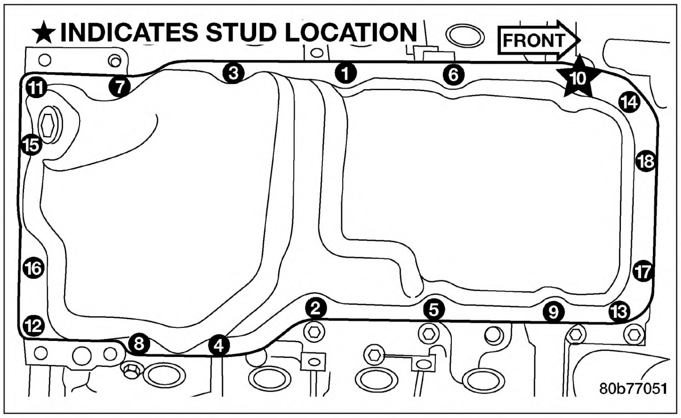
NOTE: Do not pry on oil pan or oil pan gasket. Gasket is mounted to engine and does not come out with oil pan.

9. Remove the oil pan mounting bolts and oil pan.
10. Unbolt oil pump pickup tube and remove tube and oil pan gasket from engine.


★INDICATES STUD LOCATION
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CLEANING

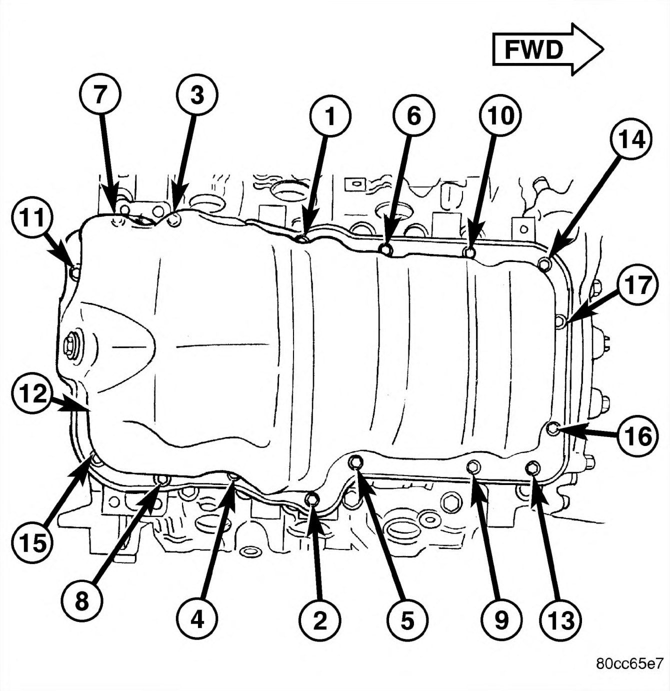
1. Clean oil pan in solvent and wipe dry with a clean cloth.
2. Clean the oil pan gasket surface. **DO NOT** use a grinder wheel or other abrasive tool to clean sealing surface.
3. Clean oil screen and tube thoroughly in clean solvent.

INSPECTION

1. Inspect oil drain plug and plug hole for stripped or damaged threads. Repair as necessary.
2. Inspect the oil pan mounting flange for bends or distortion. Straighten flange, if necessary.

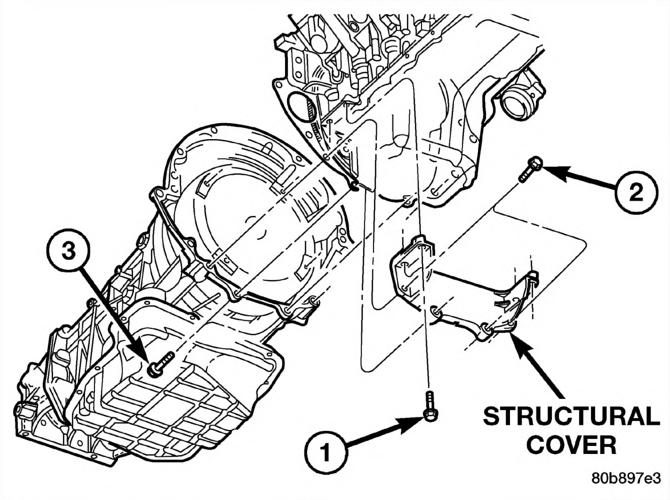
INSTALLATION

1. Clean the oil pan gasket mating surface of the bedplate and oil pan.
2. Inspect integrated oil pan gasket, and replace as necessary.
3. Position the integrated oil pan gasket/windage tray assembly.
4. Install the oil pickup tube
5. If removed, install stud at position No. 9.
6. Install the mounting bolt and nuts. Tighten nuts to 28 N·m (20 ft. lbs.).
7. Position the oil pan and install the mounting bolts. Tighten the mounting bolts to 15 N·m (11 ft. lbs.) in the sequence shown.

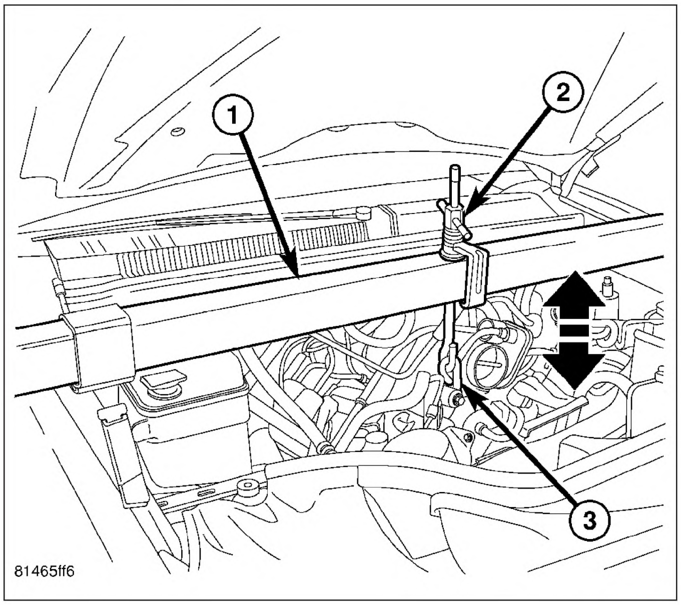


8. Install structural dust cover

.



9. Lower the engine into mounts using Special Tool 8534 (1).
10. Remove Special Tool 8534.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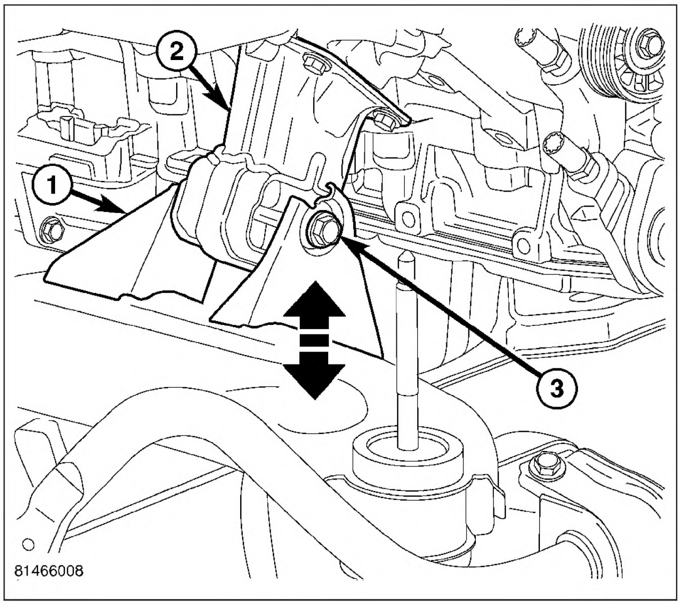
11. Install both the left and right side engine mount through bolts (3). Tighten the nuts to 68 N·m (50 ft. lbs.).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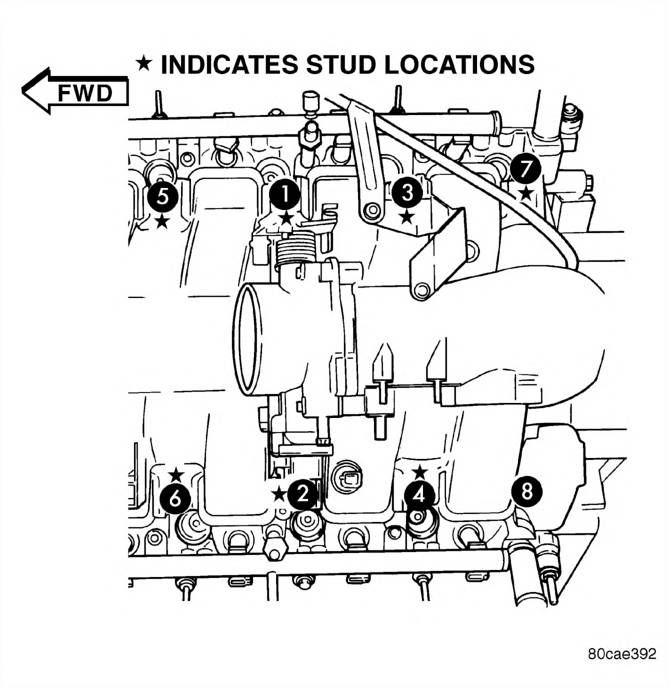
12. Install the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
13. Fill engine oil.
14. Reconnect the negative battery cable.
15. Start engine and check for leaks.



SENSOR/SWITCH-OIL PRESSURE

DESCRIPTION

The 3 wire, solid-state engine oil pressure sensor (sending unit) is located in an engine oil pressure gallery.

OPERATION

The oil pressure sensor uses three circuits. They are:

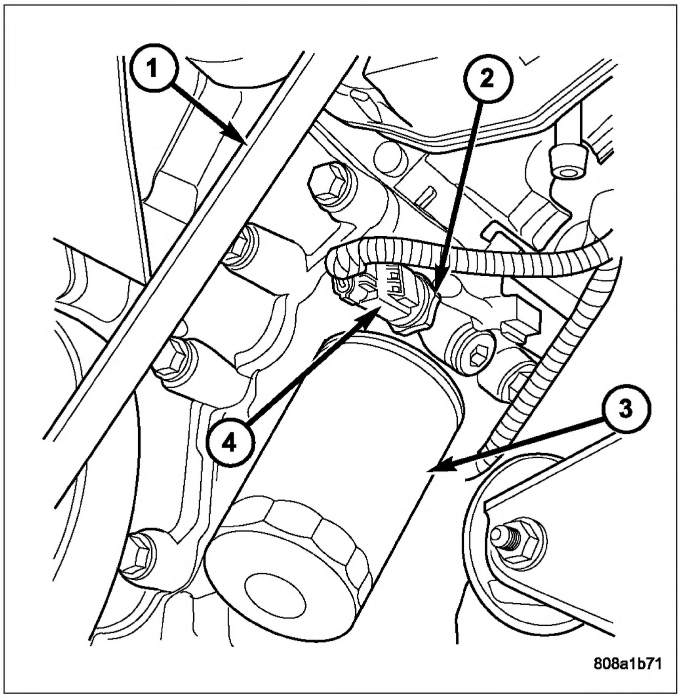
- A 5 volt power supply from the Powertrain Control Module (PCM)
- A sensor ground through the PCM's sensor return
- A signal to the PCM relating to engine oil pressure

The oil pressure sensor has a 3 wire electrical function very much like the Manifold Absolute Pressure (MAP) sensor. Meaning different pressures relate to different output voltages.

A 5 volt supply is sent to the sensor from the PCM to power up the sensor. The sensor returns a voltage signal back to the PCM relating to engine oil pressure. This signal is then transferred (bussed) to the instrument panel on either a CCD or PCI bus circuit (depending on vehicle line) to operate the oil pressure gauge and the check gauges lamp. Ground for the sensor is provided by the PCM through a low-noise sensor return.

REMOVAL

1. Disconnect the negative cable from the battery.
2. Raise vehicle on hoist.
3. Remove front splash shield.
4. Disconnect oil pressure sender connector (4).
5. Remove the pressure sender (2).



INSTALLATION

1. Install oil pressure sender.
2. Connect oil pressure sender wire.
3. Install front splash shield.
4. Lower vehicle.
5. Connect the negative battery cable.

PUMP-ENGINE OIL

REMOVAL

1. Remove the oil pan and pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
2. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
3. Remove the timing chains and tensioners (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
4. Remove the four bolts, primary timing chain tensioner and the oil pump.

DISASSEMBLY

1. Remove oil pump cover screws and lift off cover plate.
2. Remove pump inner and outer rotors.

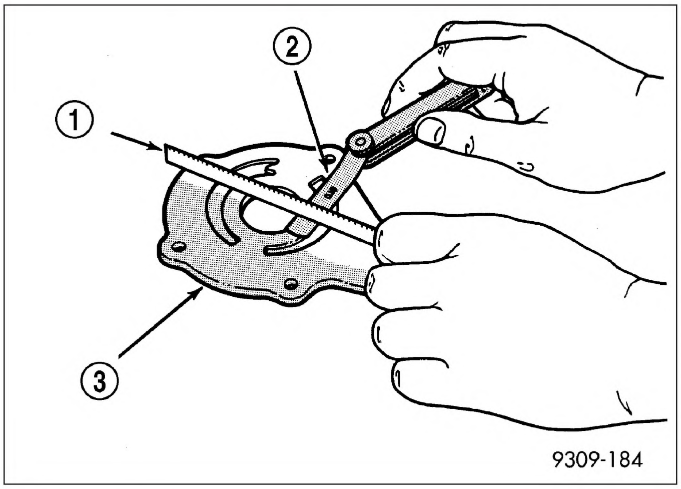
NOTE: Once the oil pressure relief valve, cup plug, and pin are removed, the pump assembly must be replaced.

3. If it is necessary to remove the pressure relief valve, drive the roll pin from pump housing and remove cup plug, spring and valve.

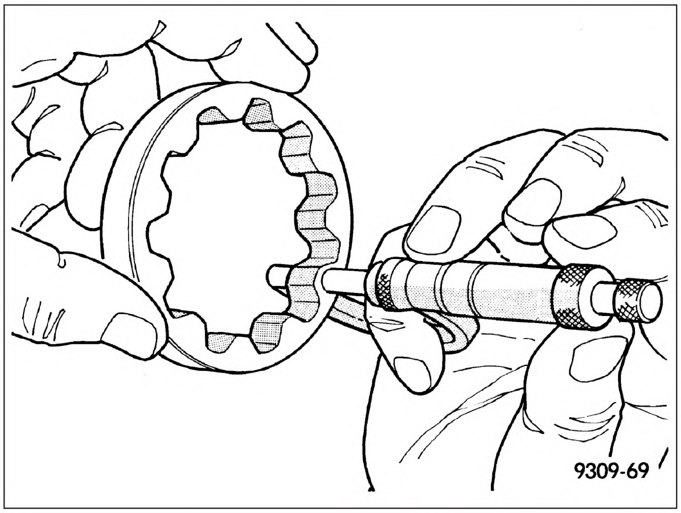
INSPECTION

CAUTION: Oil pump pressure relief valve and spring should not be removed from the oil pump. If these components are disassembled and or removed from the pump the entire oil pump assembly must be replaced.

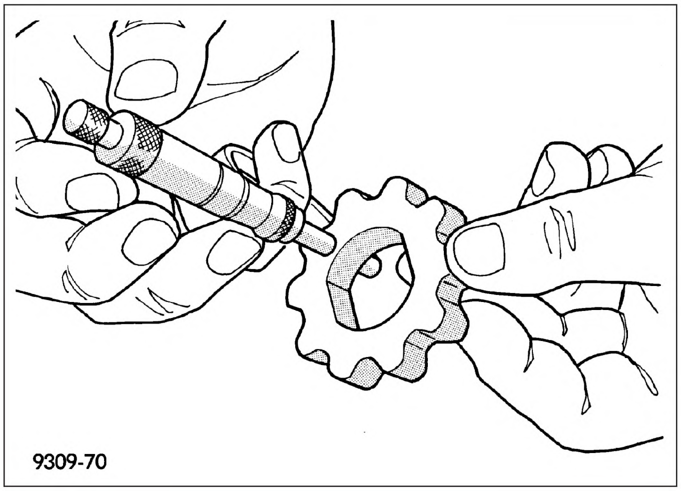
1. Clean all parts thoroughly. Mating surface of the oil pump housing should be smooth. If the pump cover is scratched or grooved the oil pump assembly should be replaced.
2. Lay a straight edge (1) across the pump cover surface. If a 0.025 mm (0.001 in.) feeler gauge (2) can be inserted between the cover and the straight edge the oil pump assembly should be replaced.



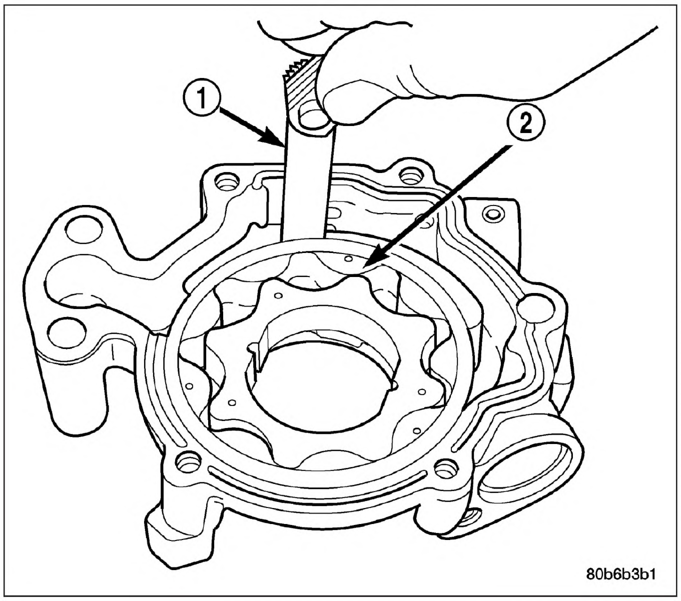
3. Measure the thickness of the outer rotor. If the outer rotor thickness measures at 12.005 mm (0.472 in.) or less the oil pump assembly must be replaced.



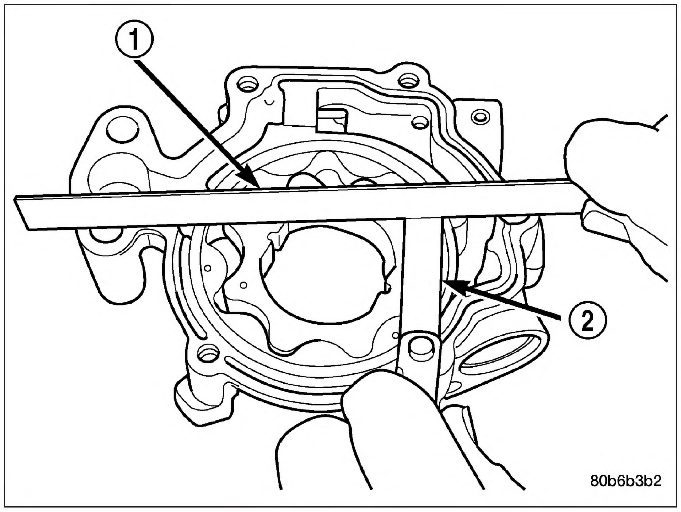
4. Measure the diameter of the outer rotor. If the outer rotor diameter measures at 85.925 mm (3.382 in.) or less the oil pump assembly must be replaced.
5. Measure the thickness of the inner rotor. If the inner rotor thickness measures at 12.005 mm (0.472 in.) or less then the oil pump assembly must be replaced.



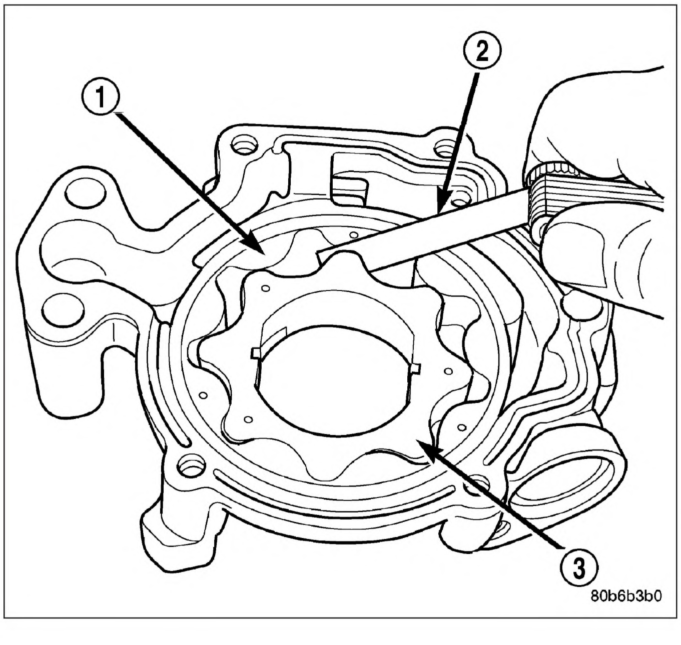
6. Slide outer rotor (1) into the body of the oil pump. Press the outer rotor to one side of the oil pump body and measure clearance between the outer rotor and the body. If the measurement is 0.235mm (0.009 in.) or more the oil pump assembly must be replaced.



7. Install the inner rotor in the into the oil pump body. Measure the clearance between the inner and outer rotors. If the clearance between the rotors is .150 mm (0.006 in.) or more the oil pump assembly must be replaced.



8. Place a straight edge (1) across the body of the oil pump (between the bolt holes), if a feeler gauge (2) of .095 mm (0.0038 in.) or greater can be inserted between the straightedge and the rotors, the pump must be replaced.



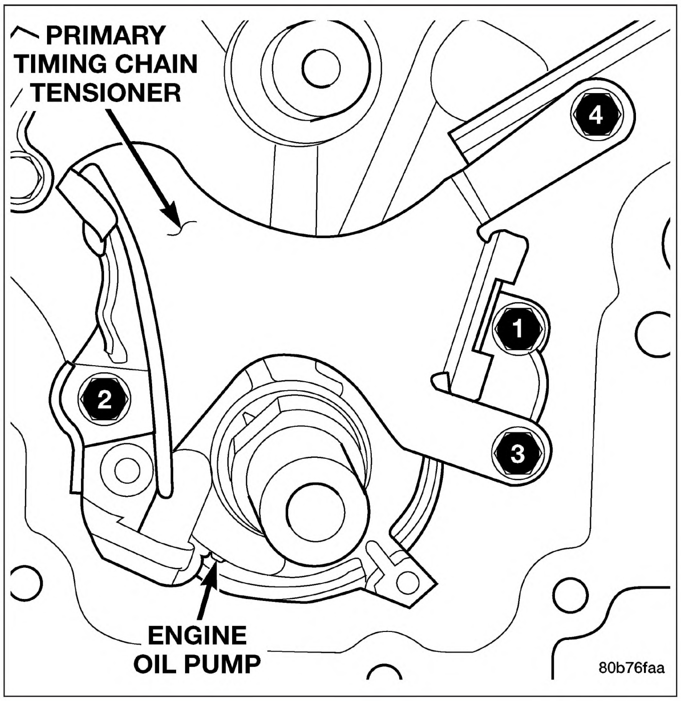
NOTE: The 3.7 Oil pump is released as an assembly. There are no DaimlerChrysler part numbers for Sub-Assembly components. In the event the oil pump is not functioning or out of specification it must be replaced as an assembly.

ASSEMBLY

1. Wash all parts in a suitable solvent and inspect carefully for damage or wear.
2. Install inner and outer rotors
3. Install oil pump cover plate and install cover bolts and tighten them to 12 N·m (105 in. lbs.).
4. Prime oil pump before installation by filling rotor cavity with engine oil.
5. If oil pressure is low and pump is within specifications, inspect for worn engine bearings or other causes for oil pressure loss.

INSTALLATION

1. Position the oil pump onto the crankshaft and install one oil pump retaining bolts.
2. Position the primary timing chain tensioner and install three retaining bolts.
3. Tighten the oil pump and primary timing chain tensioner retaining bolts to 28 N·m (250 in. lbs.) in the sequence shown.
4. Install the secondary timing chain tensioners and timing chains (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).
5. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
6. Install the pick-up tube and oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

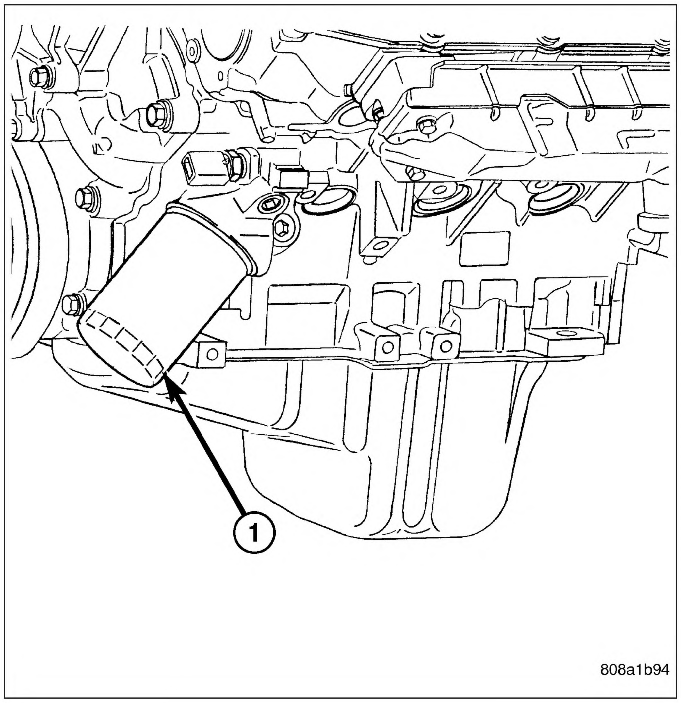


FILTER-ENGINE OIL

REMOVAL

All engines are equipped with a high quality full-flow, disposable type oil filter (1). DaimlerChrysler Corporation recommends a Mopar® or equivalent oil filter be used.

1. Position a drain pan under the oil filter.
2. Using a suitable oil filter wrench loosen filter.
3. Rotate the oil filter (1) counterclockwise to remove it from the cylinder block oil filter boss.
4. When filter separates from cylinder block oil filter boss, tip gasket end upward to minimize oil spill. Remove filter from vehicle.

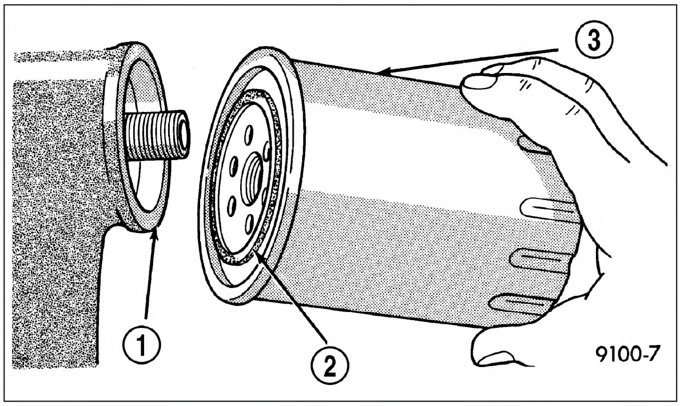


NOTE: Make sure filter gasket was removed with filter.

5. With a wiping cloth, clean the gasket sealing surface of oil and grime.

INSTALLATION

1. Lightly lubricate oil filter gasket (2) with engine oil.
2. Thread filter onto adapter nipple. When gasket makes contact with sealing surface (1), hand tighten filter (2) one full turn, do not over tighten.
3. Add oil, verify crankcase oil level and start engine. Inspect for oil leaks.

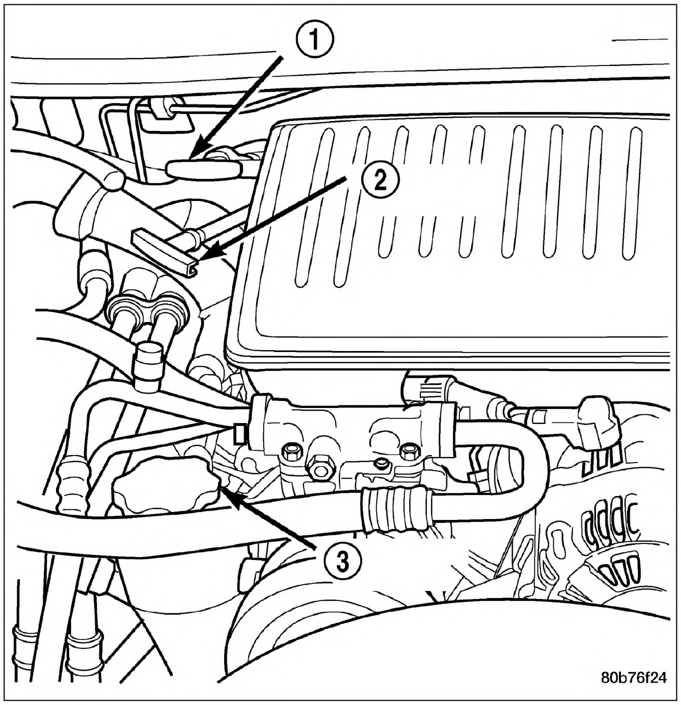


OIL

STANDARD PROCEDURE

ENGINE OIL SERVICE

The engine oil level indicator (2) is located at the right rear of the engine on the 3.7L engines..



CRANKCASE OIL LEVEL INSPECTION

CAUTION: Do not overfill crankcase with engine oil, pressure loss or oil foaming can result.

Inspect engine oil level approximately every 800 kilometers (500 miles). Unless the engine has exhibited loss of oil pressure, run the engine for about five minutes before checking oil level. Checking engine oil level on a cold engine is not accurate.

To ensure proper lubrication of an engine, the engine oil must be maintained at an acceptable level. The acceptable levels are indicated between the ADD and SAFE marks on the engine oil dipstick.

1. Position vehicle on level surface.
2. With engine OFF, allow approximately ten minutes for oil to settle to bottom of crankcase, remove engine oil dipstick.
3. Wipe dipstick clean.
4. Install dipstick and verify it is seated in the tube.
5. Remove dipstick, with handle held above the tip, take oil level reading.
6. Add oil only if level is below the ADD mark on dipstick.

ENGINE OIL CHANGE

Change engine oil at mileage and time intervals described in Maintenance Schedules.

Run engine until achieving normal operating temperature.

1. Position the vehicle on a level surface and turn engine off.
2. Hoist and support vehicle on safety stands.
3. Remove oil fill cap.
4. Place a suitable drain pan under crankcase drain.

5. Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug if damaged.
6. Install drain plug in crankcase.
7. Lower vehicle and fill crankcase with specified type and amount of engine oil described in this section.
8. Install oil fill cap.
9. Start engine and inspect for leaks.
10. Stop engine and inspect oil level.

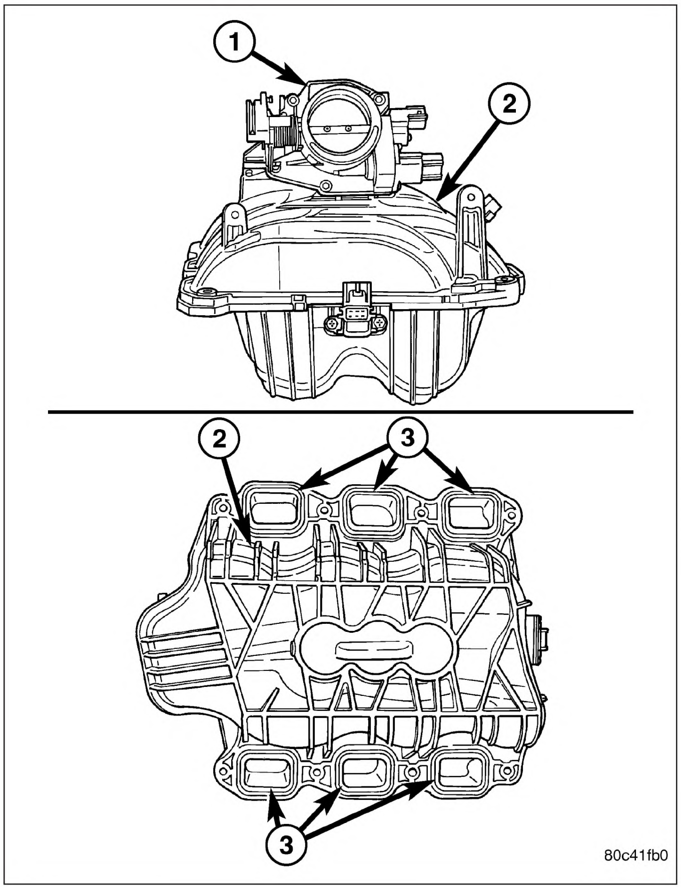
USED ENGINE OIL DISPOSAL

Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING at beginning of this section.

MANIFOLD-INTAKE

DESCRIPTION

The intake manifold (2) is made of a composite material and features 300 mm (11.811 in.) long runners which maximizes low end torque. The intake manifold (2) uses single plane sealing which consist of six individual press in place port gaskets to prevent leaks. The throttle body (1) attaches directly to the intake manifold (2). Eight studs and two bolts are used to fasten the intake to the head.



DIAGNOSIS AND TESTING

INTAKE MANIFOLD LEAKS

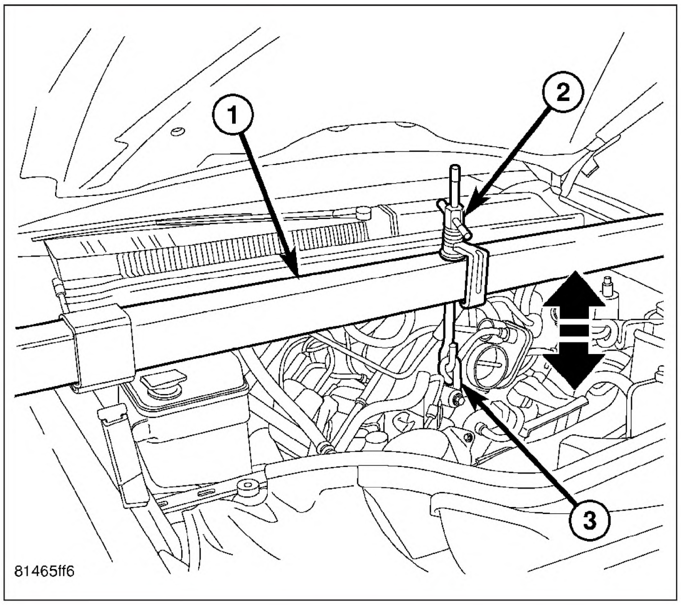
An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

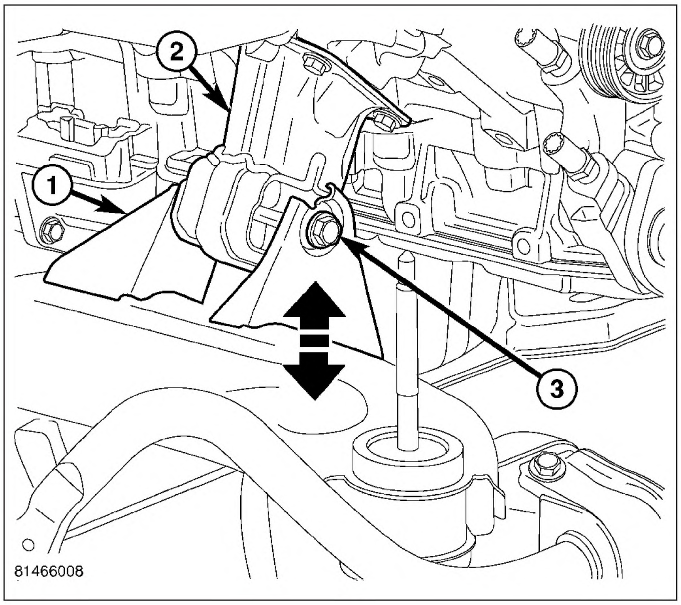
1. Start the engine.
2. Spray a small stream of water (spray bottle) at the suspected leak area.
3. If engine RPM'S change, the area of the suspected leak has been found.
4. Repair as required.

REMOVAL

1. Perform the Fuel System Pressure Release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).
2. Disconnect negative cable from battery.
3. Remove resonator assembly and air inlet hose.
4. Disconnect throttle and speed control cables.
5. Disconnect electrical connectors for the following components: Refer to FUEL SYSTEM for component locations.
    - Manifold Absolute Pressure (MAP) Sensor
    - Intake Air Temperature (IAT) Sensor
    - Throttle Position (TPS) Sensor
    - Coolant Temperature (CTS) Sensor
    - Idle Air Control (IAC) Motor
6. Disconnect vapor purge hose, brake booster hose, speed control servo hose, positive crankcase ventilation (PCV) hose.
7. Remove the generator.
8. Remove the air conditioning compressor.
9. Disconnect left and right radio suppressor straps.
10. Disconnect and remove ignition coil towers.
11. Remove top oil dipstick tube retaining bolt and ground strap.
12. Remove fuel rail.
13. Remove throttle body assembly and mounting bracket.
14. Drain cooling system below coolant temperature level (Refer to 7 - COOLING - STANDARD PROCEDURE).
15. Remove the heater hoses from the engine front cover and the heater core.
16. Unclip and remove heater hoses and tubes from intake manifold.
17. Support engine using engine support fixture (1), special tool # 8534.



18. Remove the right side engine mount to frame bolt (3).
19. With the bolt removed, lower engine until engine mount rests in frame mount.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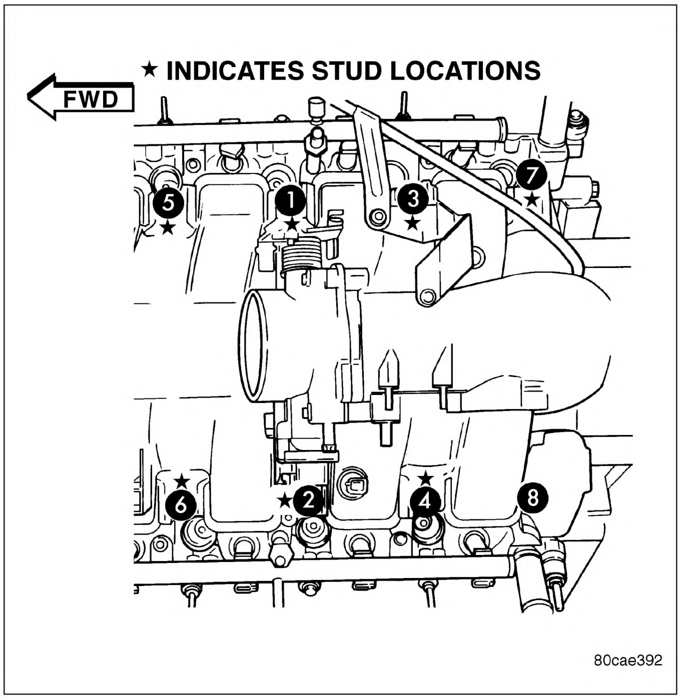
20. Remove intake manifold retaining fasteners in reverse order of tightening sequence.
21. Remove intake manifold.


★ INDICATES STUD LOCATIONS
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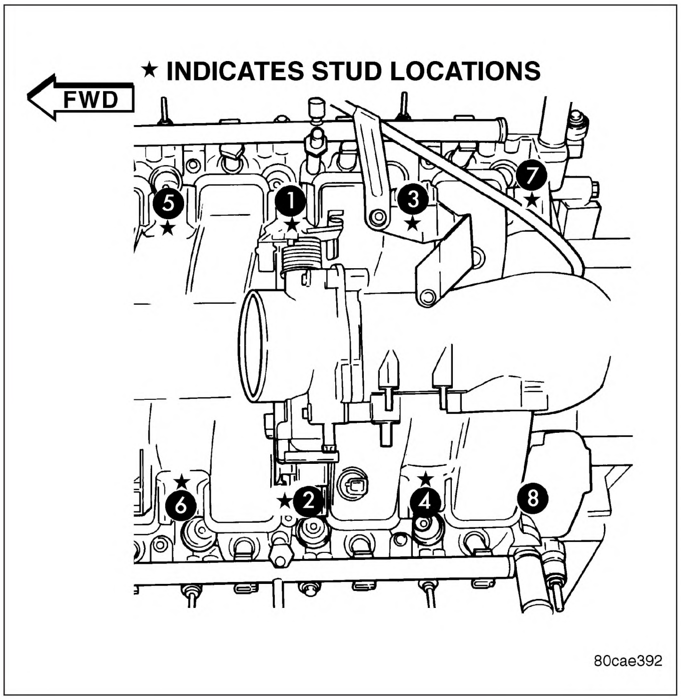
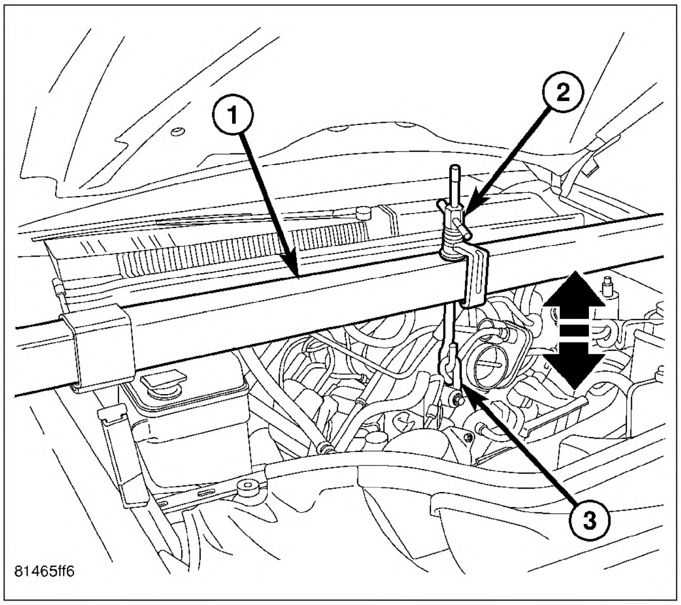
INSTALLATION

1. Install intake manifold gaskets.
2. Install intake manifold.
3. Install intake manifold retaining bolts and tighten in sequence shown in to 12 N·m (105 in. lbs.).

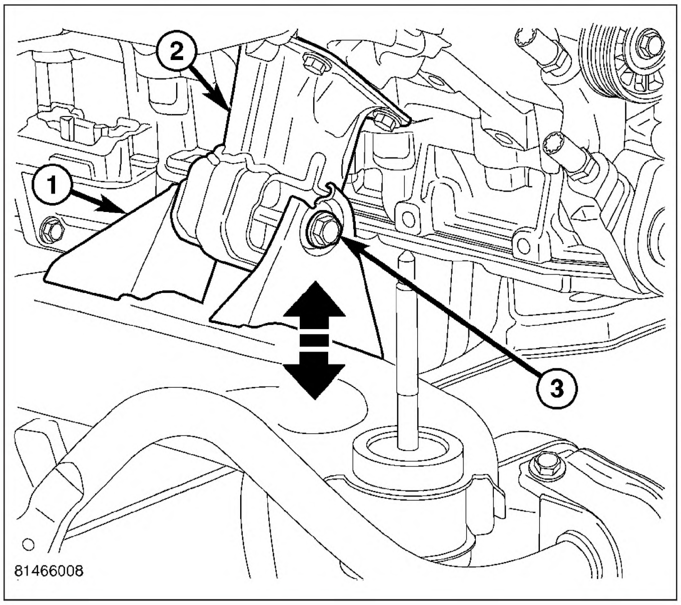


4. Install left and right radio suppressor straps.
5. Install throttle body assembly.
6. Connect throttle cable and speed control cable to throttle body.
7. Install fuel rail.
8. Install ignition coil towers.
9. Position and install heater hoses and tubes onto intake manifold.
10. Install the heater hoses to the heater core and engine front cover.
11. Connect electrical connectors for the following components:
    - Manifold Absolute Pressure (MAP) Sensor
    - Intake Air Temperature (IAT) Sensor
    - Throttle Position (TPS) Sensor
    - Coolant Temperature (CTS) Sensor
    - Idle Air Control (IAC) Motor
    - Ignition coil towers
    - Fuel injectors

12. Install top oil dipstick tube retaining bolt and ground strap.
13. Install generator.
14. Install the air conditioning compressor.
15. Connect Vapor purge hose, Brake booster hose, Speed control servo hose, Positive crankcase ventilation (PCV) hose.
16. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
17. Raise engine using engine support fixture (1), special tool # 8534.



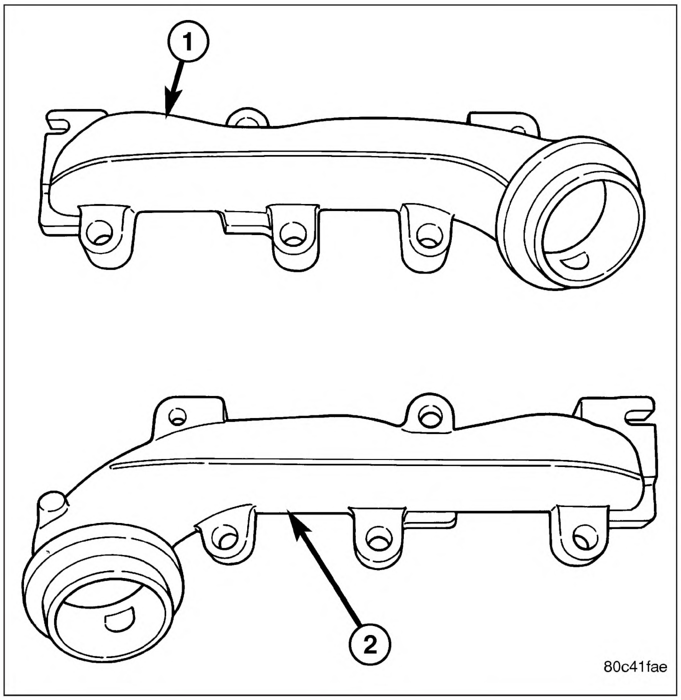
18. Install the right side engine mount to frame bolt (3).
19. Remove engine support fixture, special tool # 8534.
20. Install resonator assembly and air inlet hose.
21. Connect negative cable to battery.



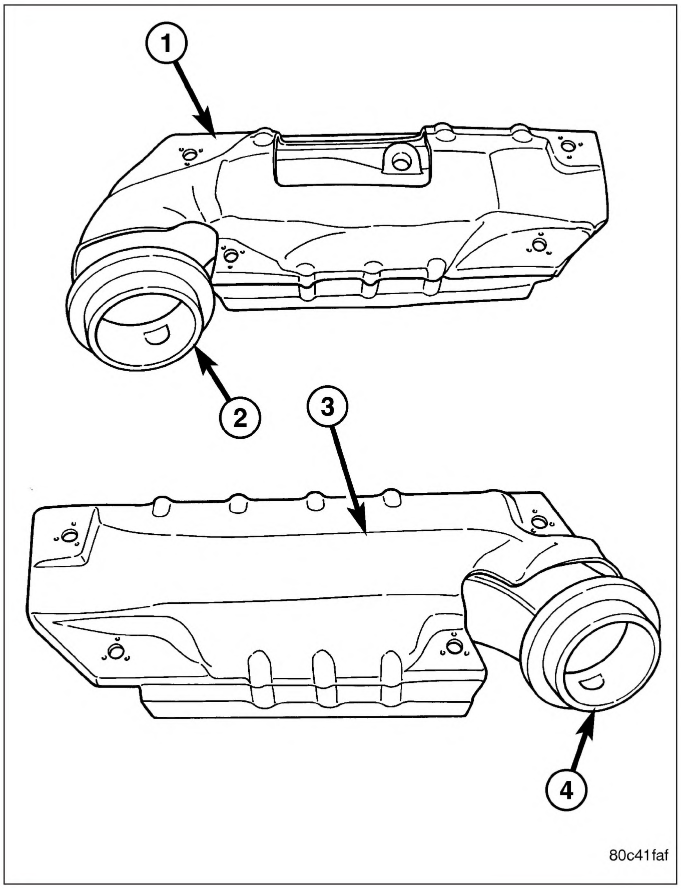
MANIFOLD-EXHAUST

DESCRIPTION

The exhaust manifolds(1 and 2) are log style with a patented flow enhancing design to maximize performance. The exhaust manifolds are made of high silicon molybdenum cast iron. A perforated core graphite exhaust manifold gasket is used to improve sealing to the cylinder head.



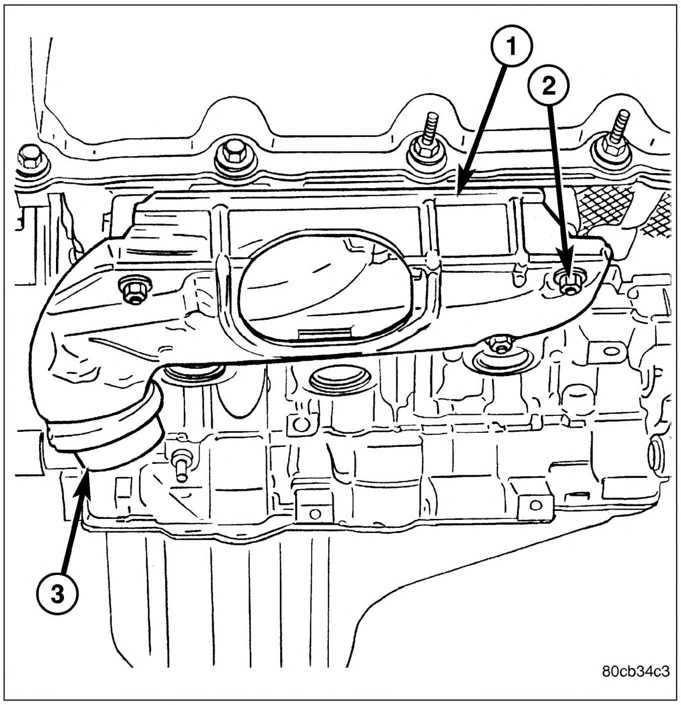
The exhaust manifolds are covered by a three layer laminated heat shield (1 and 3) for thermal protection and noise reduction. The heat shields(1 and 3) are fastened with a torque prevailing nut that is backed off slightly to allow for the thermal expansion of the exhaust manifold.



REMOVAL

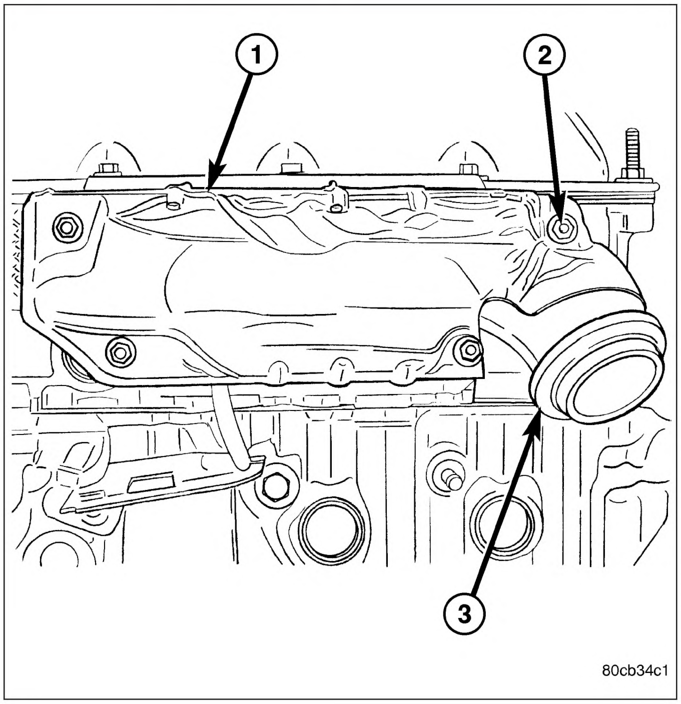
RIGHT EXHAUST MANIFOLD

1. Disconnect the negative cable from the battery.
2. Raise and support the vehicle.
3. Remove the bolts and nuts attaching the exhaust pipe to the engine exhaust manifold.
4. Lower the vehicle.
5. Remove the exhaust heat shield (1).
6. Remove bolts, nuts (2) and washers attaching manifold to cylinder head.
7. Remove manifold and gasket from the cylinder head.



LEFT EXHAUST MANIFOLD

1. Disconnect the negative cable from the battery.
2. Raise and support the vehicle.
3. Remove the bolts and nuts attaching the exhaust pipe to the engine exhaust manifold.
4. Lower the vehicle.
5. Remove the exhaust heat shields (1).
6. Remove bolts, nuts (2) and washers attaching manifold to cylinder head.
7. Remove manifold and gasket from the cylinder head.



INSTALLATION

RIGHT EXHAUST MANIFOLD

CAUTION: If the studs came out with the nuts when removing the engine exhaust manifold, install new studs. Apply sealer on the coarse thread ends. Water leaks may develop at the studs if this precaution is not taken.

1. Position the engine exhaust manifold and gasket on the two studs located on the cylinder head. Install conical washers and nuts on these studs.
2. Install remaining conical washers. Starting at the center arm and working outward, tighten the bolts and nuts to 25 N·m (18 ft. lbs.) torque.
3. Install the exhaust heat shields.
4. Raise and support the vehicle.

CAUTION: Over tightening heat shield fasteners, may cause shield to distort and/or crack.

5. Assemble exhaust pipe to manifold and secure with bolts, nuts and retainers. Tighten the bolts and nuts to 34 N·m (25 ft. lbs.) torque.

LEFT EXHAUST MANIFOLD

CAUTION: If the studs came out with the nuts when removing the engine exhaust manifold, install new studs. Apply sealer on the coarse thread ends. Water leaks may develop at the studs if this precaution is not taken.

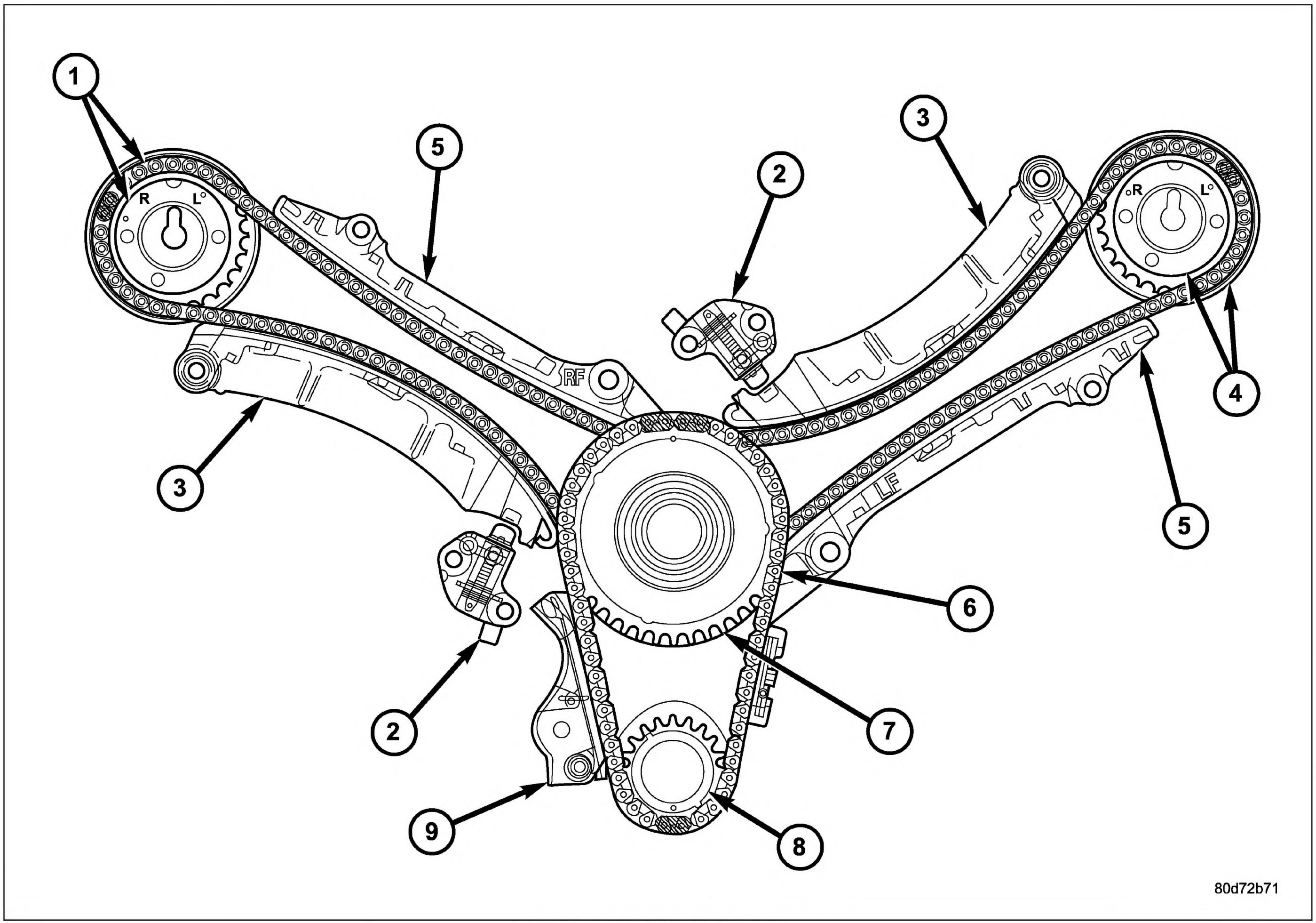
1. Position the engine exhaust manifold and gasket on the two studs located on the cylinder head. Install conical washers and nuts on these studs.
2. Install remaining conical washers. Starting at the center arm and working outward, tighten the bolts and nuts to 25 N·m (18 ft. lbs.) torque.
3. Install the exhaust heat shields.
4. Raise and support the vehicle.

CAUTION: Over tightening heat shield fasteners, may cause shield to distort and/or crack.

5. Assemble exhaust pipe to manifold and secure with bolts, nuts and retainers. Tighten the bolts and nuts to 34 N·m (25 ft. lbs.) torque.

VALVE TIMING

DESCRIPTION



Timing Drive System

1 - RIGHT CAMSHAFT SPROCKET AND SECONDARY CHAIN	6 - PRIMARY CHAIN
2 - SECONDARY TIMING CHAIN TENSIONER (LEFT AND RIGHT SIDE NOT INTERCHANGEABLE)	7 - IDLER SPROCKET
3 - SECONDARY TENSIONER ARM	8 - CRANKSHAFT SPROCKET
4 - LEFT CAMSHAFT SPROCKET AND SECONDARY CHAIN	9 - PRIMARY CHAIN TENSIONER
5 - CHAIN GUIDE (LEFT AND RIGHT SIDE ARE NOT INTERCHANGEABLE)	

The timing drive system has been designed to provide quiet performance and reliability to support a **non-free wheeling** engine. Specifically the intake valves are non-free wheeling and can be easily damaged with forceful engine rotation if camshaft-to-crankshaft timing is incorrect. The timing drive system consists of a primary chain, two secondary timing chain drives and a counterbalance shaft drive.

OPERATION

The primary timing chain is a single inverted tooth chain type. The primary chain drives the large 50 tooth idler sprocket directly from a 25 tooth crankshaft sprocket. Primary chain motion is controlled by a pivoting leaf spring tensioner arm and a fixed guide. The arm and the guide both use nylon plastic wear faces for low friction and long wear. The primary chain receives oil splash lubrication from the secondary chain drive and designed oil pump leakage. The idler sprocket assembly connects the primary chain drive, secondary chain drives, and the counterbalance shaft. The idler sprocket assembly consists of two integral 26 tooth sprockets a 50 tooth sprocket and a helical gear that is press-fit to the assembly. The spline joint for the 50 tooth sprocket is a non serviceable press fit anti rattle type. A spiral ring is installed on the outboard side of the 50 tooth sprocket to prevent spline disengagement. The idler sprocket assembly spins on a stationary idler shaft. The idler shaft is a light press-fit into the cylinder block. A large washer on the idler shaft bolt and the rear flange of the idler shaft are used to control sprocket thrust movement. Pressurized oil is routed through the center of the idler shaft to provide lubrication for the two bushings used in the idler sprocket assembly.

There are two secondary drive chains, both are roller type, one to drive the camshaft in each SOHC cylinder head. There are no shaft speed changes in the secondary chain drive system. Each secondary chain drives a 26 tooth cam sprocket directly from the 26 tooth sprocket on the idler sprocket assembly. A fixed chain guide and a hydraulic oil damped tensioner are used to maintain tension in each secondary chain system. The hydraulic tensioners for the secondary chain systems are fed pressurized oil from oil reservoir pockets in the block. Each tensioner incorporates a controlled leak path through a device known as a vent disc located in the nose of the piston to manage chain loads. Each tensioner also has a mechanical ratchet system that limits chain slack if the tensioner piston bleeds down after engine shut down. The tensioner arms and guides also utilize nylon wear faces for low friction and long wear. The secondary timing chains receive lubrication from a small orifice in the tensioners. This orifice is protected from clogging by a fine mesh screen which is located on the back of the hydraulic tensioners.

STANDARD PROCEDURE

MEASURING TIMING CHAIN WEAR

NOTE: This procedure must be performed with the timing chain cover removed.

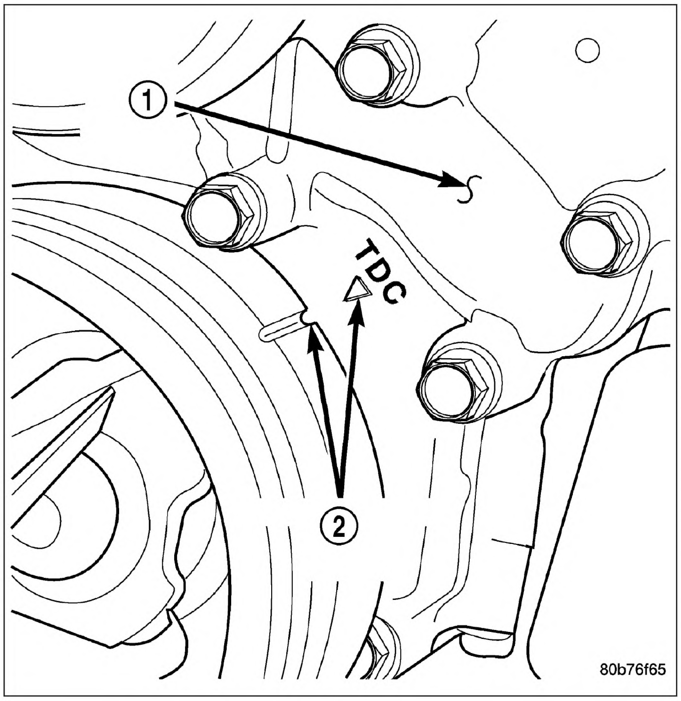
1. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
2. To determine if the secondary timing chains are worn, rotate the engine clockwise until maximum tensioner piston extension is obtained. Measure the distance between the secondary timing chain tensioner housing and the step ledge on the piston. The measurement at point (A) must be less than 15mm (.5906 inches).
3. If the measurement exceeds the specification the secondary timing chains are worn and require replacement (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

SERVICE PROCEDURE - TIMING VERIFICATION

CAUTION: The 3.7L is a non free-wheeling design engine. Therefore, correct engine timing is critical.

NOTE: Components referred to as left hand or right hand are as viewed from the drivers position inside the vehicle.

NOTE: The blue link plates on the chains and the dots on the camshaft drive sprockets may not line up during the timing verification procedure. The blue link plates are lined up with the sprocket dots only when re-timing the complete timing drive. Once the timing drive is rotated blue link-to-dot alignment is no longer valid.

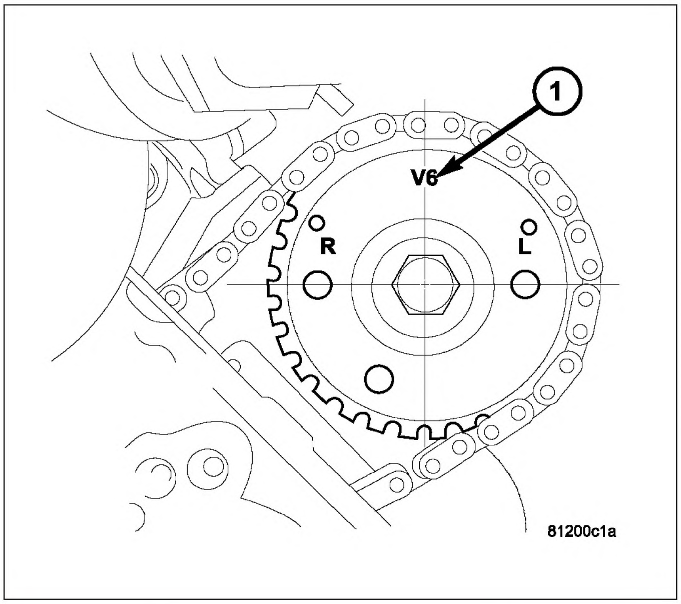


Engine base timing can be verified by the following procedure:

1. Remove the cylinder head covers. Refer to the procedure in this section.
2. Using a mirror, locate the TDC arrow (2) on the front cover (1). Rotate the crankshaft until the mark

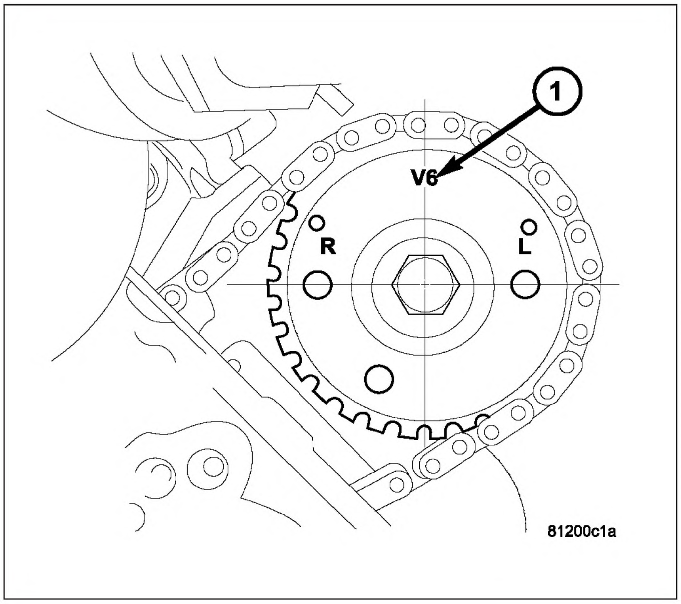
on the crankshaft damper is aligned with the TDC arrow on the front cover. The engine is now at TDC.

3. Note the location of the V6 mark (1) stamped into the camshaft drive gears. If the V6 mark on each camshaft drive gear is at the twelve o'clock position, the engine is at TDC on the exhaust stroke. If the V6 mark on each gear is at the six o'clock position, the engine is at TDC on the compression stroke.
4. If both of the camshaft drive gears are off in the same or opposite directions, the primary chain or both secondary chains are at fault. Refer to Timing Chain and Sprockets procedure in this section.
5. If only one of the camshaft drive gears is off and the other is correct, the problem is confined to one secondary chain. Refer to Single camshaft timing, in this procedure.
6. If both camshaft drive gear V6 marks are at the twelve o'clock or the six o'clock position the engine base timing is correct. Reinstall the cylinder head covers.

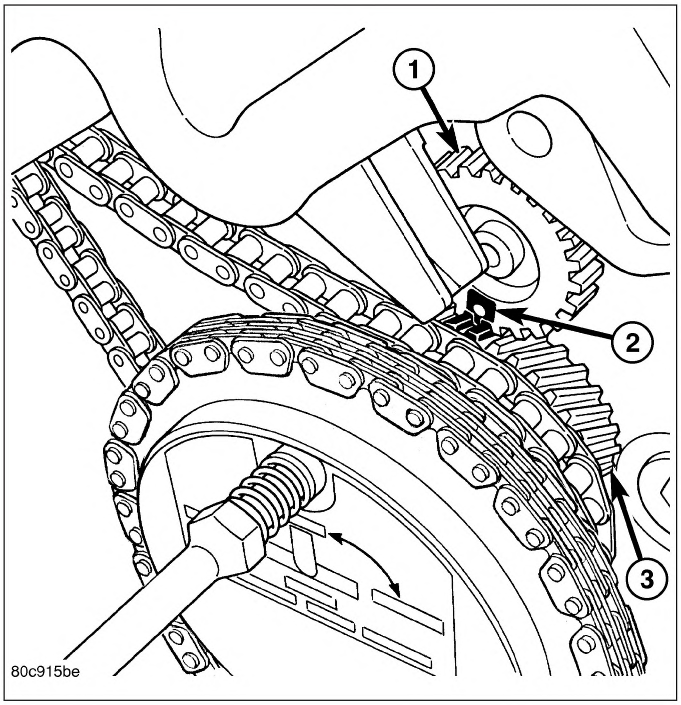


COUNTER BALANCE SHAFT TIMING

1. Ensure that the engine is at TDC with both camshaft sprocket V6 marks (1) in the 12 o'clock position.



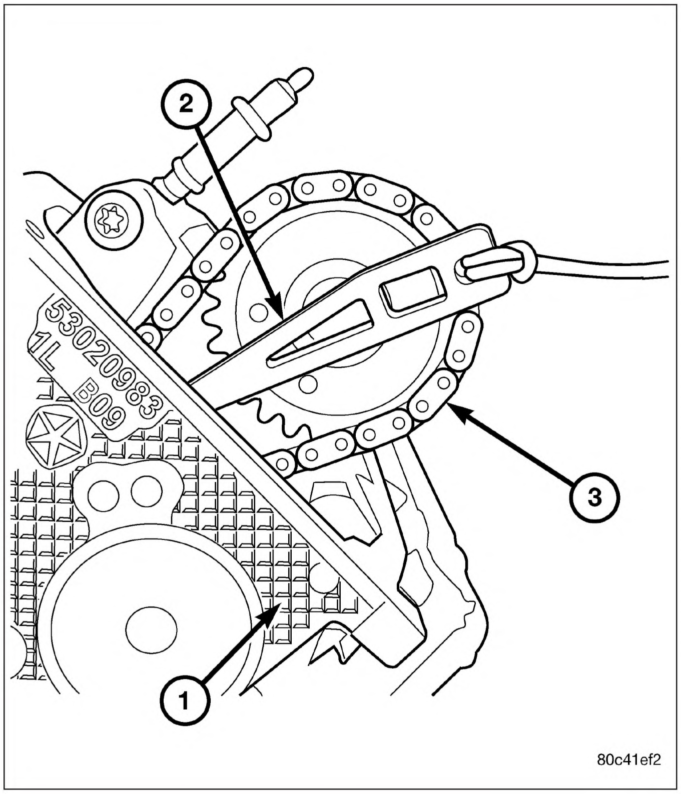
2. Look down the left cylinder head chain cavity. The timing dot on the counter balance shaft drive gear should be in the 6 o'clock position (2).



TIMING - SINGLE CAMSHAFT

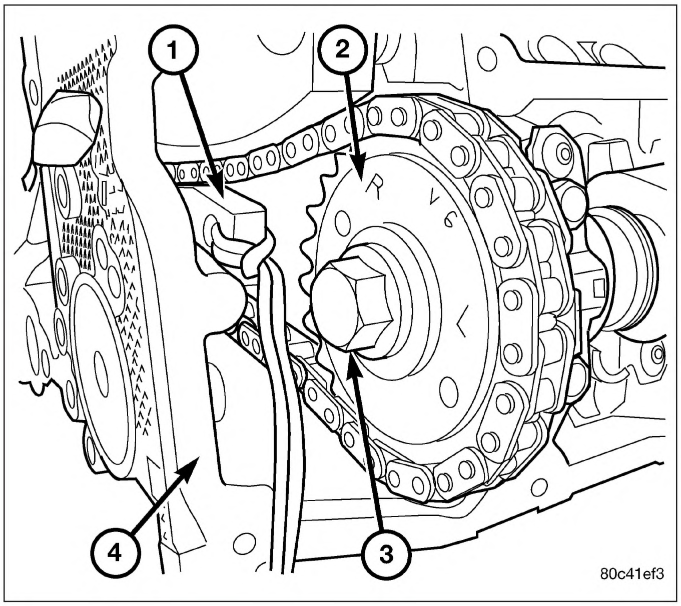
NOTE: to adjust the timing on one camshaft, preform the following procedure.

1. Using Chain Tensioner Wedge, Special Tool 8379 (2), stabilize the secondary chain drive (3). For reference purposes, mark the chain-to-sprocket position.



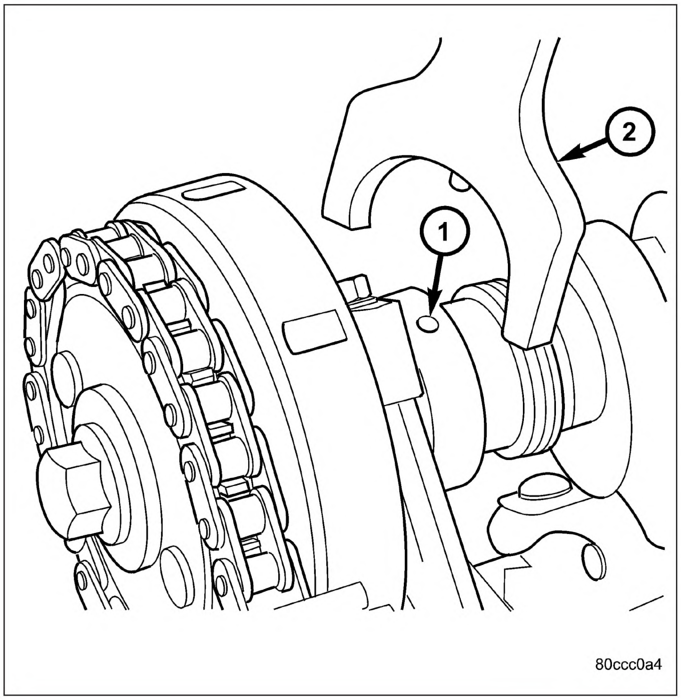
2. Remove the camshaft drive gear retaining bolt.

3. Carefully remove the camshaft drive gear (2) from the camshaft.
4. Re-index the camshaft drive gear in the chain until the V6 mark is at the same position as the V6 mark on the opposite camshaft drive gear.

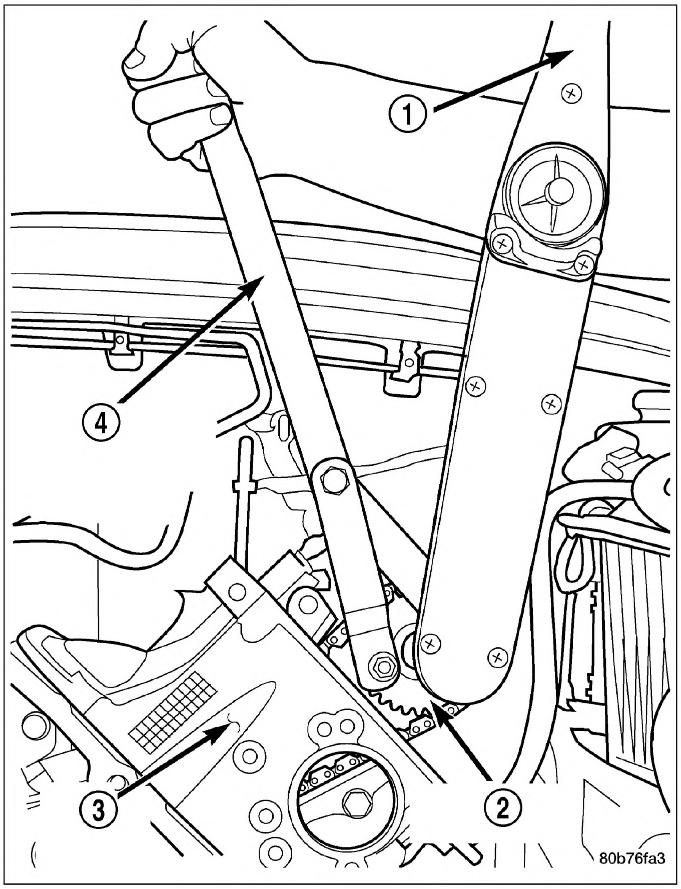


5. Using Special Tool 8428 Camshaft Wrench (2), rotate the camshaft until the alignment dowel on the camshaft is aligned with the slot in the camshaft drive gear.

CAUTION: Remove excess oil from camshaft sprocket retaining bolt before reinstalling bolt. Failure to do so may cause over-torqueing of bolt resulting in bolt failure.



6. Position the camshaft drive gear onto the camshaft, remove oil from bolt then install the retaining bolt. Using Special Tools, Spanner Wrench 6958 with Adapter Pins 8346 (4) and a suitable torque wrench (1), tighten retaining bolt to 122 N·m (90 ft. Lbs.).
7. Remove Special Tool 8379.
8. Rotate the crankshaft two full revolutions, then verify that the camshaft drive gear V6 marks are in fact aligned.
9. Install the cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

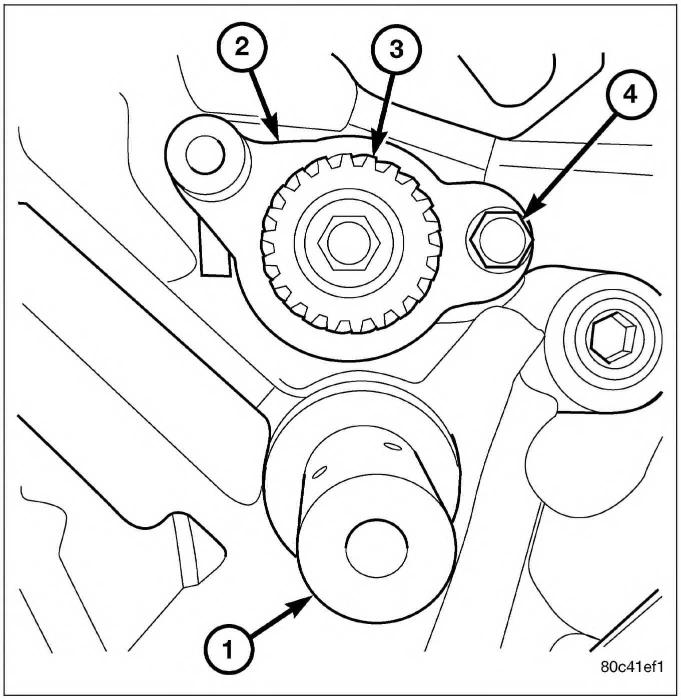


SHAFT-BALANCE

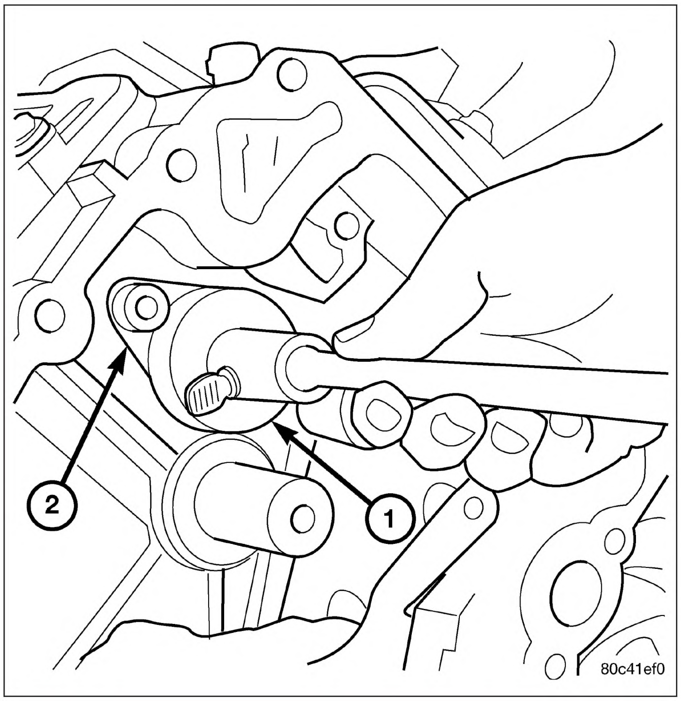
REMOVAL

1. Remove the primary and secondary timing chains. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

NOTE: The balance shaft and gear are serviced as an assembly. Do not attempt to remove the gear from the balance shaft.Remove the retaining bolt (4) from the counterbalance shaft thrust plate (2).



2. Using Special Tool 8641 Counterbalance shaft remover/installer tool (1), remove the counterbalance shaft from the engine.



INSTALLATION

NOTE: The balance shaft and gear are serviced as an assembly. Do not attempt to remove the gear from the balance shaft.

1. Coat counterbalance shaft bearing journals with clean engine oil.

NOTE: The balance shaft is heavy, and care should be used when installing shaft, so bearings are not damaged.

2. Using Special Tool 8641 Counterbalance shaft remover/installer tool, carefully install counterbalance shaft into engine.
3. Install Counterbalance shaft thrust plate retaining bolt finger tight.Do not tighten bolt at this time.
4. Position the right side of the thrust plate with the right chain guide bolt, install bolt finger tight.
5. Torque the thrust plate retaining bolt to 28 N·m (250 in. lbs.).
6. Remove the chain guide bolt so that guide can be installed.

IDLER SHAFT

REMOVAL

1. Remove the primary and secondary timing chains and sprockets. Refer to procedure in this section.

NOTE: To remove the idler shaft, it is necessary to tap threads into the shaft, to install the removal tool.

2. Using a 12 mm X 1.75 tap, cut threads in the idler shaft center bore.
3. Cover the radiator core with a suitable cover.

CAUTION: Use care when removing the idler shaft, Do not strike the radiator cooling fins with the slide hammer.

4. Using Special Tool 8517 Slide Hammer, remove the idler shaft.

INSTALLATION

1. Thoroughly clean the idler shaft bore.
2. Position the idler shaft in the bore.

NOTE: The two lubrication holes in the idler shaft do not require any special alignment.

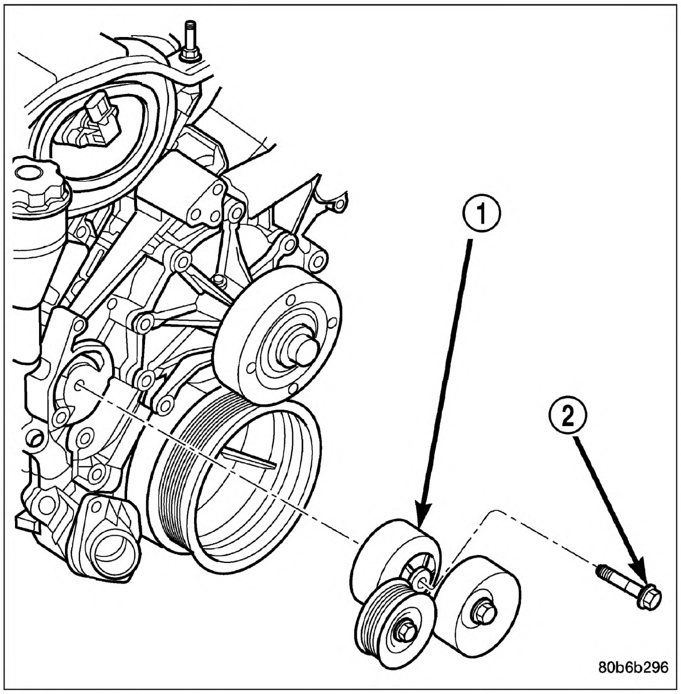
NOTE: Before using the retaining bolt to install the idler shaft, coat the threads and the pilot on the idler shaft, with clean engine oil.

3. Using the primary idler sprocket retaining bolt and washer, carefully draw the idler shaft into the bore until fully seated.
4. Coat the idler shaft with clean engine oil.
5. Install the timing chains and sprockets. Refer to procedure in this section.

COVER - TIMING

REMOVAL

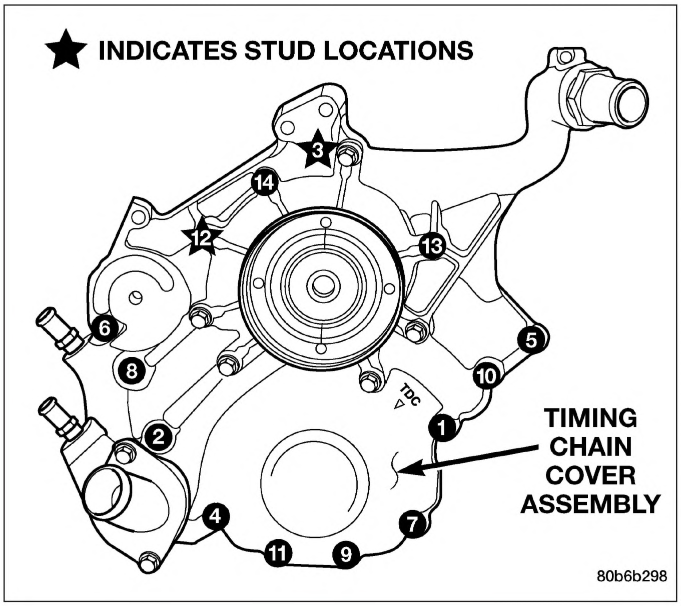
1. Disconnect the battery negative cable.
2. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
3. Remove electric cooling fan and fan shroud assembly.
4. Remove radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
5. Disconnect both heater hoses at timing cover.
6. Disconnect lower radiator hose at engine.
7. Remove accessory drive belt tensioner assembly (1).
8. Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
9. Remove the generator (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - REMOVAL).
10. Remove A/C compressor (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - REMOVAL).



CAUTION: The 3.7L engine uses an anerobic sealer instead of a gasket to seal the front cover to the engine block, from the factory. For service, Mopar® Grey Engine RTV sealant must be substituted.

NOTE: It is not necessary to remove the water pump for timing cover removal.

11. Remove the bolts holding the timing cover to engine block.
12. Remove the timing cover.


★ INDICATES STUD LOCATIONS
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TIMING CHAIN COVER ASSEMBLY
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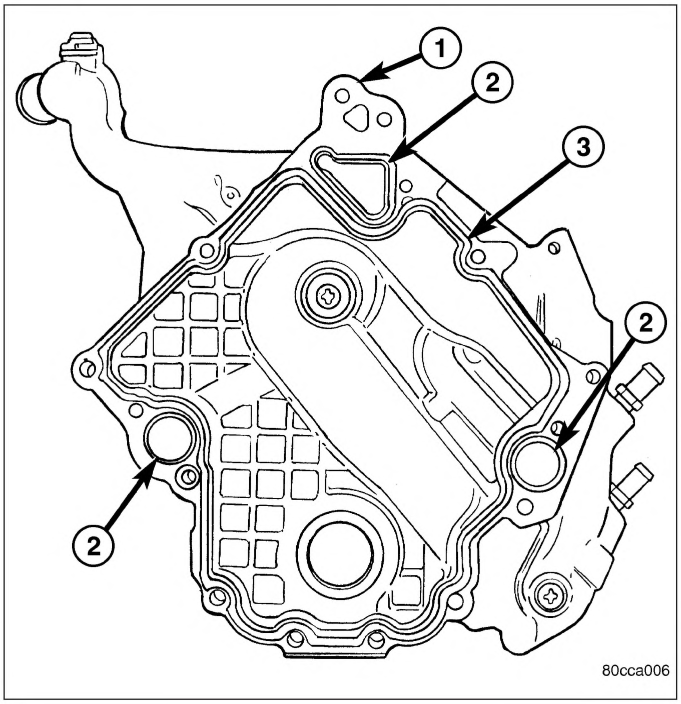
INSTALLATION

CAUTION: Do not use oil based liquids to clean timing cover or block surfaces. Use only rubbing alcohol, along with plastic or wooden scrapers. Use no wire brushes or abrasive wheels or metal scrapers, or damage to surfaces could result.

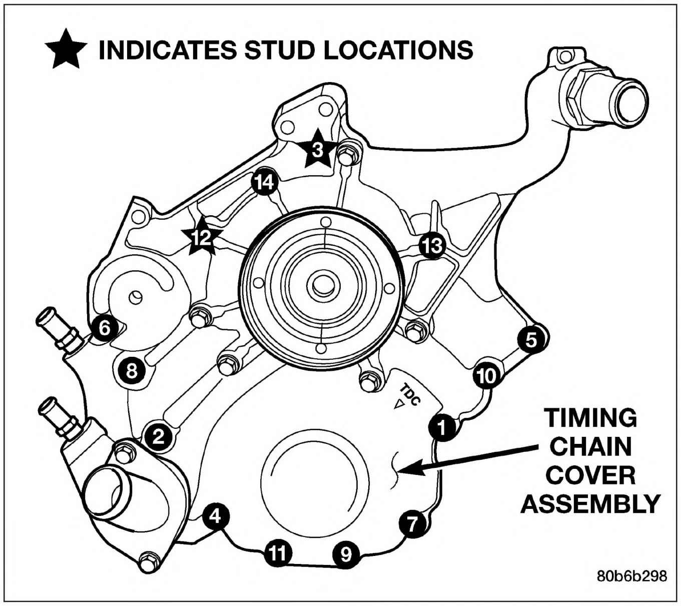
1. Clean timing chain cover and block surface using rubbing alcohol.

CAUTION: The 3.7L uses a special anerobic sealer instead of a gasket to seal the timing cover to the engine block, from the factory. For service repairs, Mopar® Engine RTV must be used as a substitute.

2. Inspect the water passage o-rings (2) for any damage, and replace as necessary.
3. Apply Mopar® Engine RTV sealer to front cover as shown (3) using a 3 to 4mm thick bead.


1
2
3
2
2
80cca006

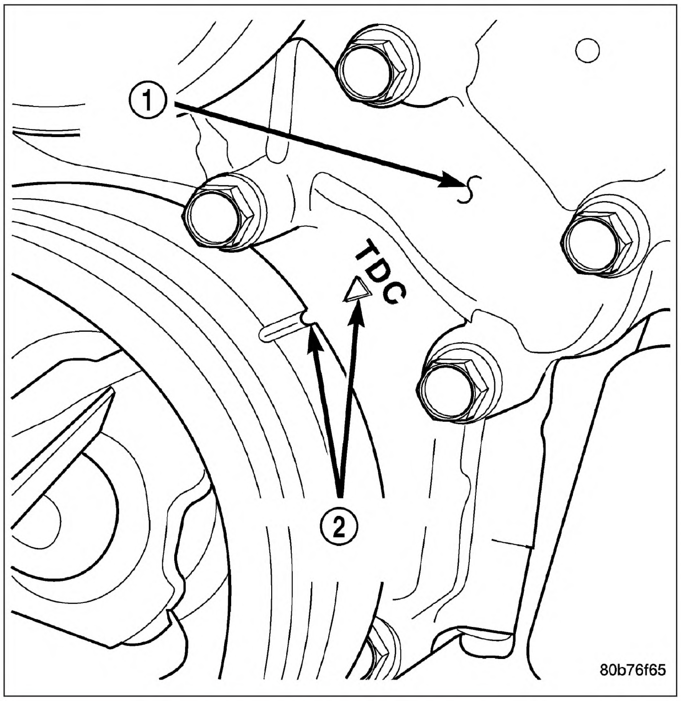
4. Install cover. Tighten fasteners in sequence as shown in to 58 N·m (43 ft. lbs.).
5. Install crankshaft damper (Refer to 9 - ENGINE/ ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
6. Install the A/C compressor (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - INSTALLATION).
7. Install the generator (Refer to 8 - ELECTRICAL/ CHARGING/GENERATOR - INSTALLATION).
8. Install accessory drive belt tensioner (Refer to 7 - COOLING/ACCESSORY DRIVE/BELT TENSIONERS - INSTALLATION).
9. Install radiator upper and lower hoses.
10. Install both heater hoses.
11. Install radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
12. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
13. Connect the battery negative cable.



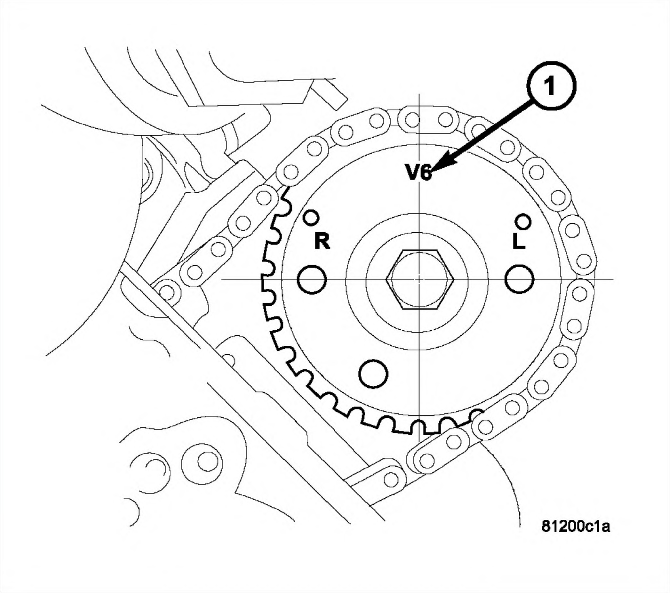
TIMING CHAIN & SPROCKETS

REMOVAL

1. Disconnect negative cable from battery.
2. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
3. Remove right and left cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
4. Remove radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
5. Rotate engine until timing mark (2) on crankshaft damper aligns with TDC mark on timing chain cover (1).



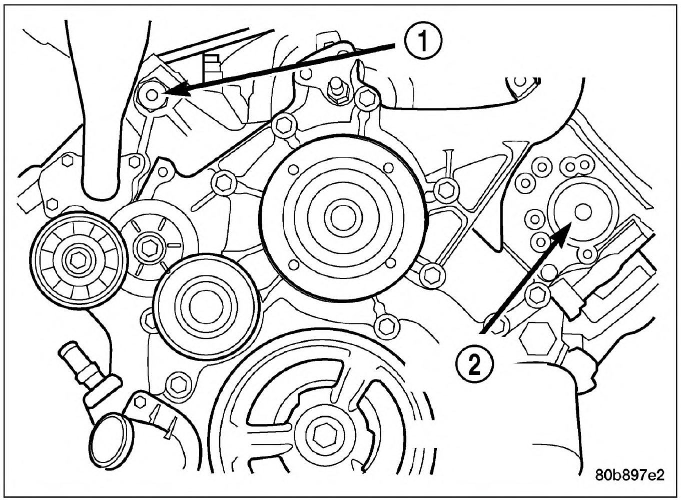
6. Make sure the camshaft sprocket “V6” marks (1) are at the 12 o’clock position (No. 1 TDC exhaust stroke).
7. Remove power steering pump (Refer to 19 - STEERING/PUMP - REMOVAL).



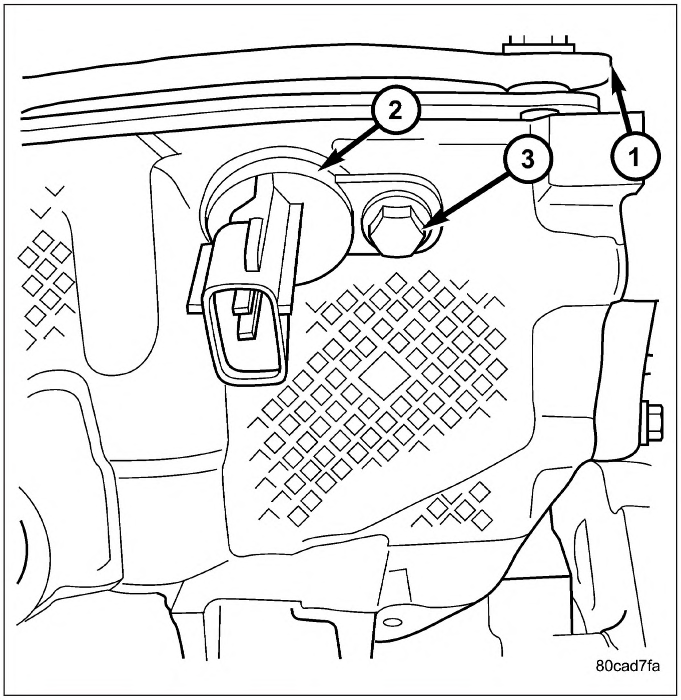
8. Remove access plugs (1 and 2) from left and right cylinder heads for access to chain guide fasteners.
9. Remove the oil fill housing to gain access to the right side tensioner arm fastener.
10. Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL) and timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
11. Collapse and pin primary chain tensioner.

CAUTION: Plate behind left secondary chain tensioner could fall into oil pan. Therefore, cover pan opening.

12. Remove secondary chain tensioners.

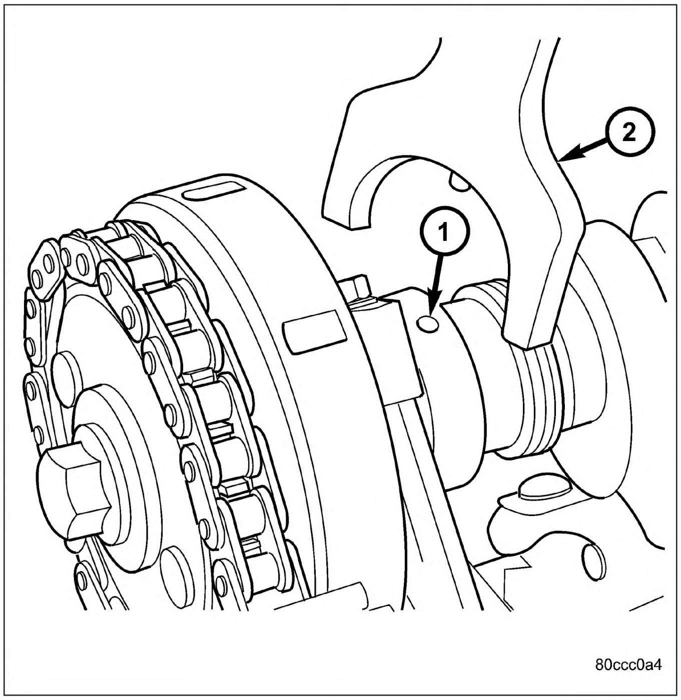


13. Remove camshaft position sensor (2).



CAUTION: Care should be taken not to damage camshaft target wheel. Do not hold target wheel while loosening or tightening camshaft sprocket. Do not place the target wheel near a magnetic source of any kind. A damaged or magnetized target wheel could cause a vehicle no start condition.

CAUTION: Do not forcefully rotate the camshafts or crankshaft independently of each other. Damaging intake valve to piston contact will occur. Ensure negative battery cable is disconnected to guard against accidental starter engagement.



14. Remove left and right camshaft sprocket bolts.
15. While holding the left camshaft steel tube with Special Tool 8428 Camshaft Wrench (2) , remove the left camshaft sprocket. Slowly rotate the camshaft approximately 5 degrees clockwise to a neutral position.
16. While holding the right camshaft steel tube with Special Tool 8428 Camshaft Wrench (2), remove the right camshaft sprocket.
17. Remove idler sprocket assembly bolt.
18. Slide the idler sprocket assembly and crank sprocket forward simultaneously to remove the primary and secondary chains.
19. Remove both pivoting tensioner arms and chain guides.
20. Remove primary chain tensioner.

INSPECTION

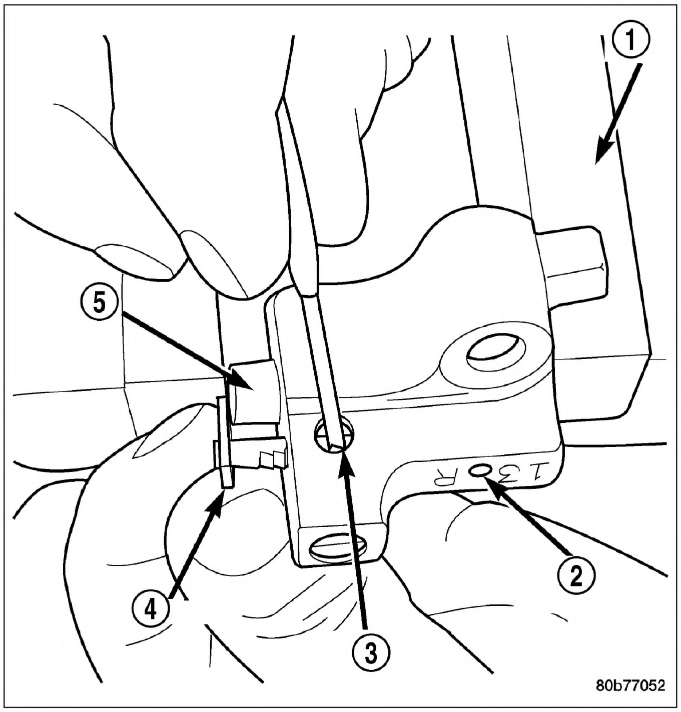
Inspect the following components:

- Sprockets for excessive tooth wear. Some tooth markings are normal and not a cause for sprocket replacement.

- Idler sprocket assembly bushing and shaft for excessive wear.
- Idler sprocket assembly spline joint. The joint should be tight with no backlash or axial movement.
- Chain guides and tensioner arms. Replace these parts if grooving in plastic face is more than 1 mm (0.039 in.) deep. If plastic face is severely grooved or melted, the tensioner lube jet may be clogged. The tensioner should be replaced.
- Secondary chain tensioner piston and ratcheting device. Inspect for evidence of heavy contact between tensioner piston and tensioner arm. If this condition exist the tensioner tensioner arm and chain should be replaced.
- Primary chain tensioner plastic faces. Replace as required.

INSTALLATION

1. Using a vise, lightly compress the secondary chain tensioner piston until the piston step (5) is flush with the tensioner body. Using a pin or suitable tool, release ratchet pawl (4) by pulling pawl back against spring force through access hole on side of tensioner. While continuing to hold pawl back, Push ratchet device to approximately 2 mm from the tensioner body. Install Special Tool 8514 lock pin (2) into hole on front of tensioner. Slowly open vise to transfer piston spring force to lock pin.



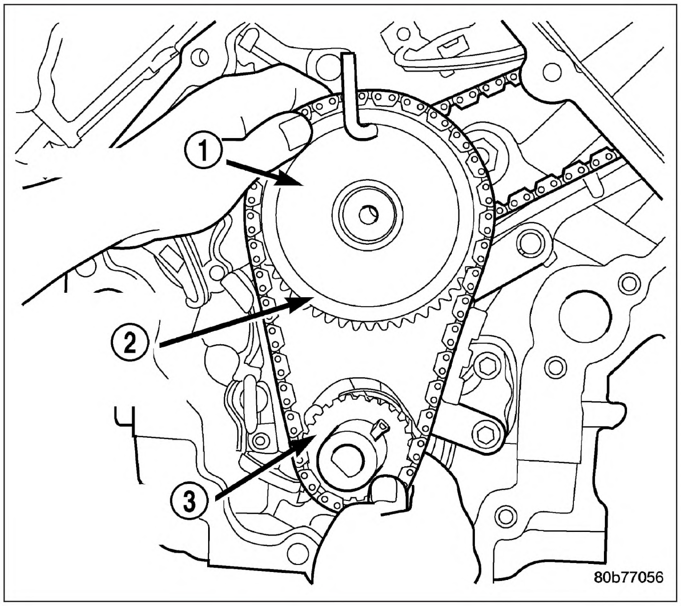
2. Position primary chain tensioner over oil pump and insert bolts into lower two holes on tensioner bracket. Tighten bolts to 28 N·m (250 in. lbs.).
3. Install right side chain tensioner arm. Install Torx® bolt. Tighten Torx® bolt to 28 N·m (250 in. lbs.).

CAUTION: The silver bolts retain the guides to the cylinder heads and the black bolts retain the guides to the engine block.

4. Install the left side chain guide. Tighten the bolts to 28 N·m (250 in. lbs.).
5. Install left side chain tensioner arm, and Torx® bolt. Tighten Torx® bolt to 28 N·m (250 in. lbs.).
6. Install the right side chain guide. Tighten the bolts to 28 N·m (250 in. lbs.).

7. Install both secondary chains onto the idler sprocket (2). Align two plated links on the secondary chains to be visible through the two lower openings on the idler sprocket (4 o'clock and 8 o'clock). Once the secondary timing chains are installed, position special tool 8429 (1) to hold chains in place for installation.
8. Align primary chain double plated links with the timing mark at 12 o'clock on the idler sprocket. Align the primary chain single plated link with the timing mark at 6 o'clock on the crankshaft sprocket.
9. Lubricate idler shaft and bushings with clean engine oil.

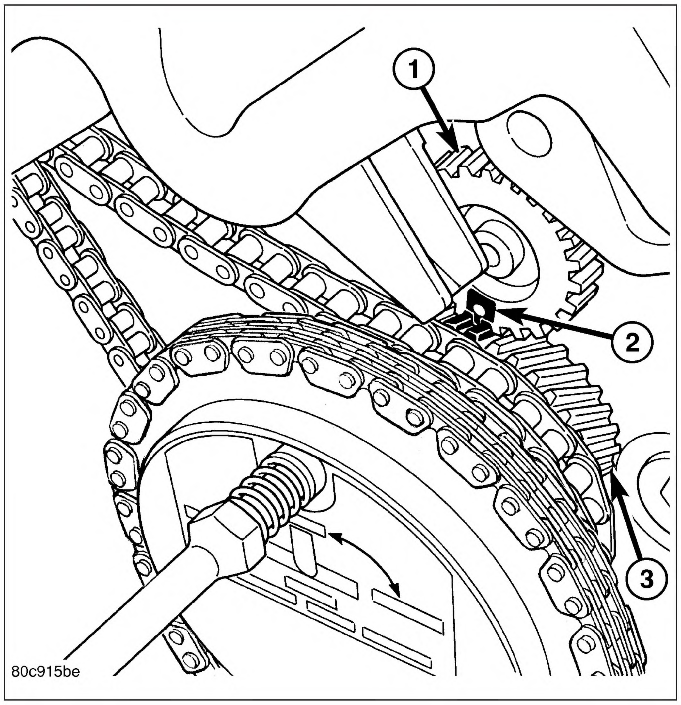
NOTE: The idler sprocket must be timed to the counterbalance shaft drive gear before the idler sprocket is fully seated.



10. Install all chains, crankshaft sprocket, and idler sprocket as an assembly. After guiding both secondary chains through the block and cylinder head openings, affix chains with a elastic strap or equivalent. This will maintain tension on chains to aid in installation. Align the timing mark (2) on the idler sprocket gear (3) to the timing mark on the counterbalance shaft drive gear (1), then seat idler sprocket fully. Before installing idler sprocket bolt, lubricate washer with oil, and tighten idler sprocket assembly retaining bolt to 34 N·m (25 ft. lbs.).

NOTE: It will be necessary to slightly rotate camshafts for sprocket installation.

11. Align left camshaft sprocket "L" dot to plated link on chain.
12. Align right camshaft sprocket "R" dot to plated link on chain.



CAUTION: Remove excess oil from the camshaft sprocket bolt. Failure to do so can result in overtorque of bolt resulting in bolt failure.

13. Remove Special Tool 8429, then attach both sprockets to camshafts. Remove excess oil from bolts, then Install sprocket bolts, but do not tighten at this time.
14. Verify that all plated links are aligned with the marks on all sprockets and the "V6" marks on camshaft sprockets are at the 12 o'clock position.

CAUTION: Ensure the plate between the left secondary chain tensioner and block is correctly installed.

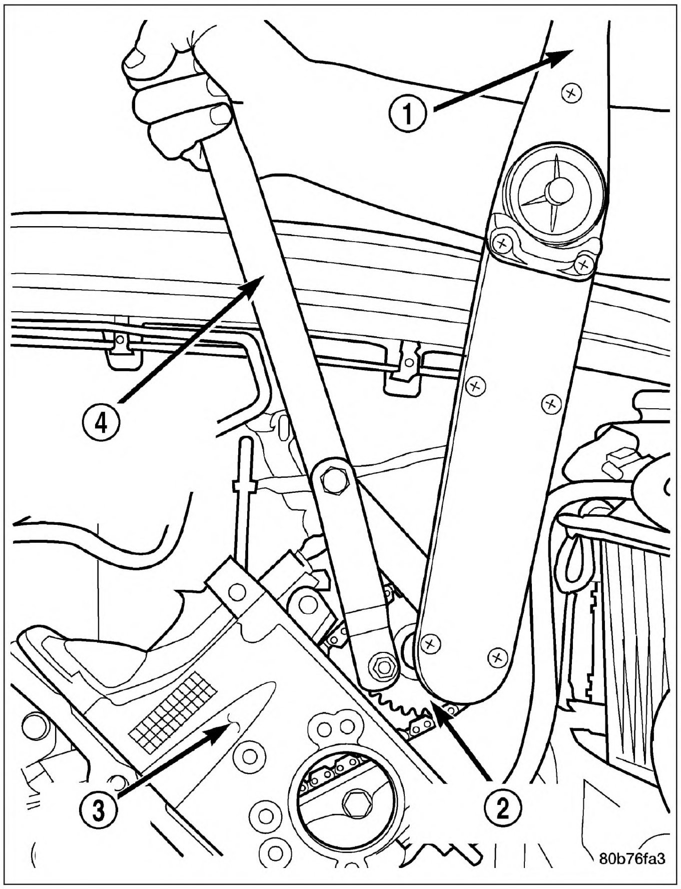
15. Install both secondary chain tensioners. Tighten bolts to 28 N·m (250 in. lbs.).

NOTE: Left and right secondary chain tensioners are not common.

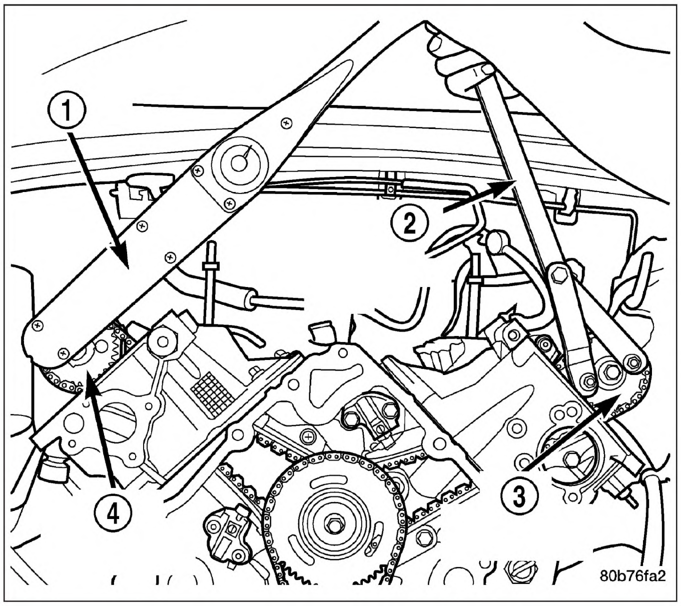
16. Remove all locking pins (3) from tensioners.

CAUTION: After pulling locking pins out of each tensioner, DO NOT manually extend the tensioner(s) ratchet. Doing so will over tension the chains, resulting in noise and/or high timing chain loads.

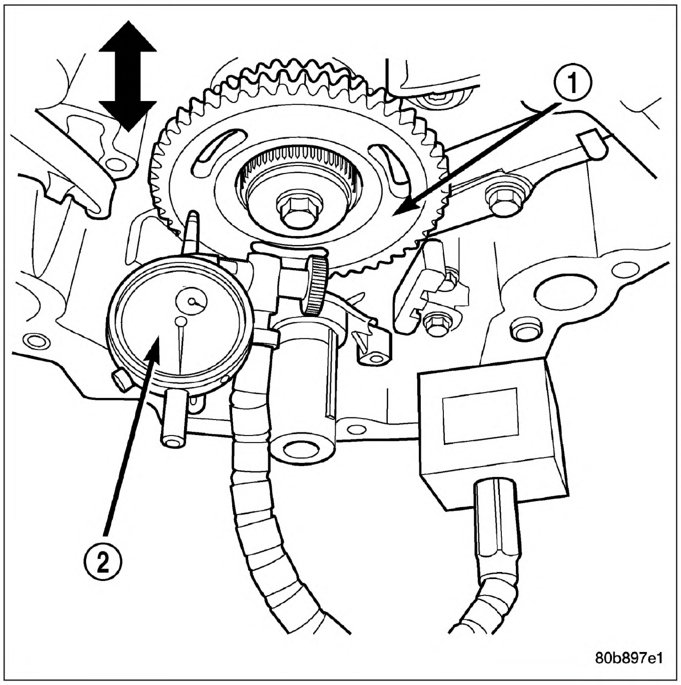
17. Using Special Tool 6958, Spanner with Adaptor Pins 8346 (4) , tighten left. camshaft sprocket bolts to 122 N·m (90 ft. lbs.).



18. Using Special Tool 6958, Spanner with Adaptor Pins 8346 (2) , tighten right camshaft sprocket bolts to 122 N·m (90 ft. lbs.).
19. Rotate engine two full revolutions. Verify timing marks are at the follow locations:
    - primary chain idler sprocket dot is at 12 o'clock
    - primary chain crankshaft sprocket dot is at 6 o'clock
    - secondary chain camshaft sprockets "V6" marks are at 12 o'clock
    - counterbalancer shaft drive gear dot is aligned to the idler sprocket gear dot
20. Lubricate all three chains with engine oil.

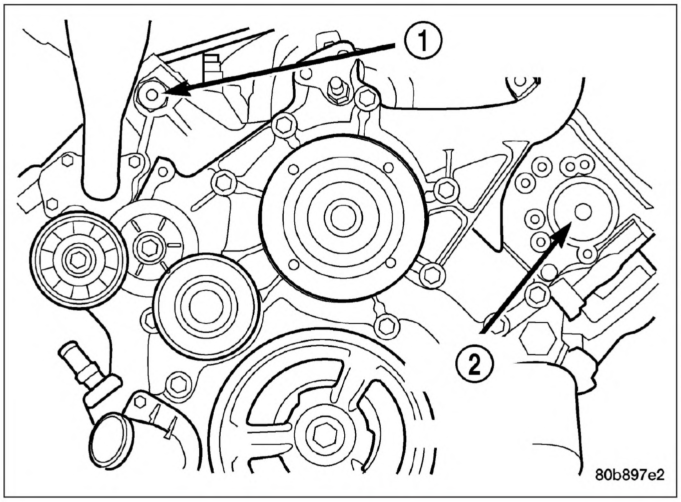


21. After installing all chains, it is recommended that the idler gear end play be checked. The end play must be within 0.10 -0.25 mm (0.004 - 0.010 in.). If not within specification, the idler gear (1) must be replaced.
22. Install timing chain cover and crankshaft damper (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION) and (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
23. Install cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).



NOTE: Before installing threaded plug in right cylinder head, the plug must be coated with sealant to prevent leaks.

24. Coat the large threaded access plug (2) with **Mopar® Thread Sealant with Teflon**, then install into the right cylinder head and tighten to 81 N·m (60 ft. lbs.).
25. Install the oil fill housing.
26. Install access plug (1) in left cylinder head.
27. Install power steering pump (Refer to 19 - STEERING/PUMP - INSTALLATION).
28. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
29. Connect negative cable to battery.



ENGINE - 4.7L SERVICE INFORMATION

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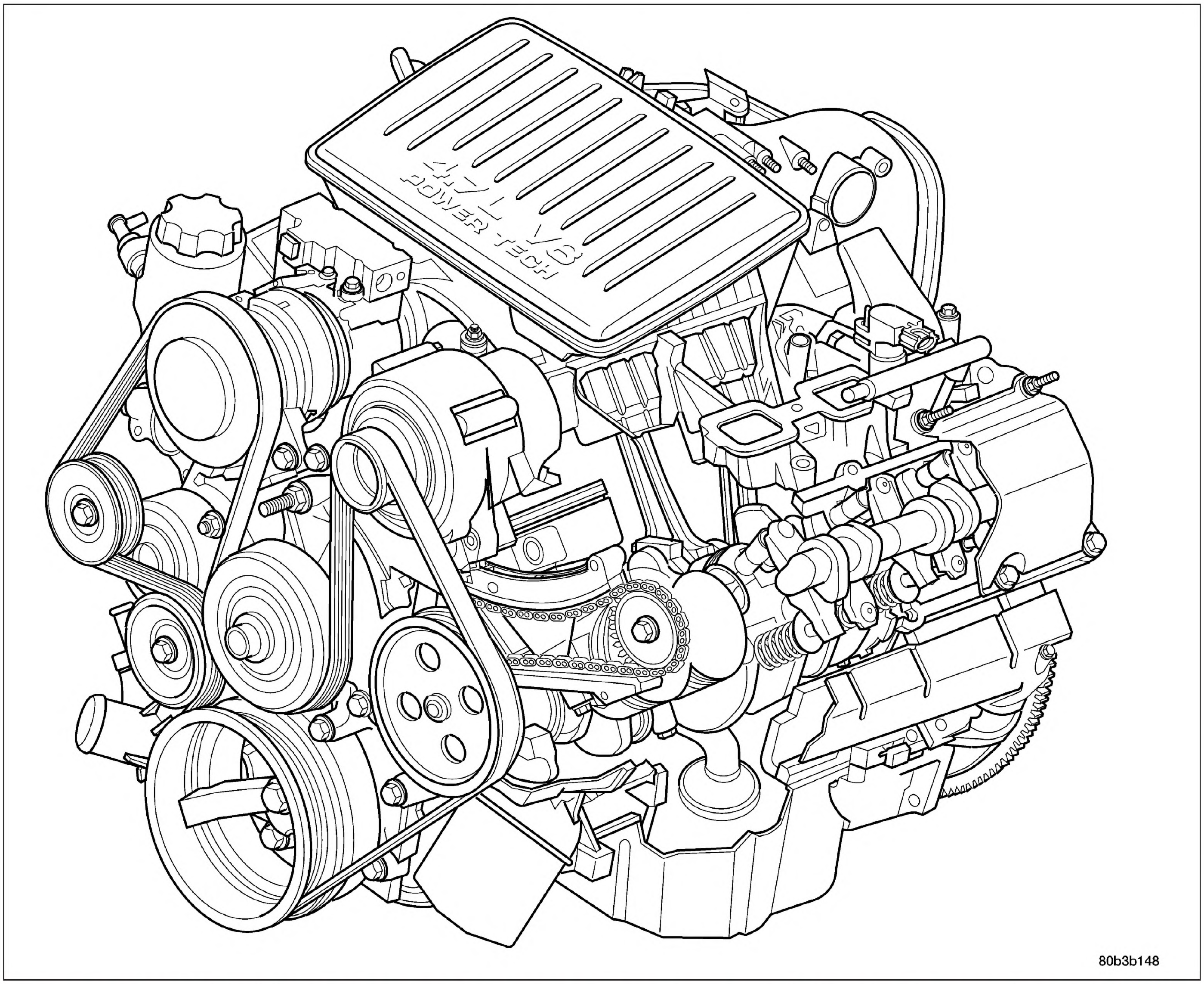
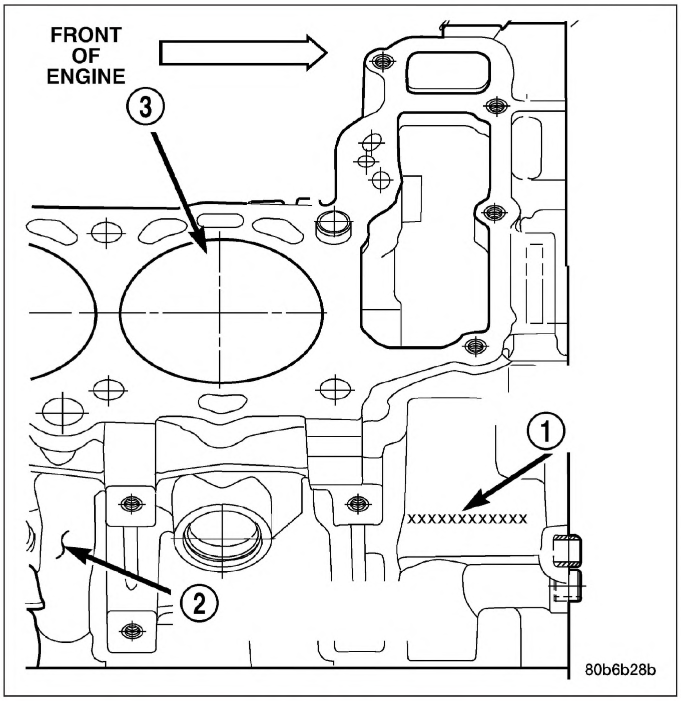
ENGINE - 4.7L SERVICE INFORMATION

DESCRIPTION - 4.7L ENGINE



The 4.7 liter (287 CID) eight-cylinder engine is an 90° single overhead camshaft engine. The cast iron cylinder block is made up of two different components; the first component is the cylinder bore and upper block, the second component is the bedplate that comprises the lower portion of the cylinder block and houses the lower half of the crankshaft main bearings. The cylinders are numbered from front to rear with the left bank being numbered 1,3,5 and 7, and the right bank being numbered 2,4,6 and 8. The firing order is 1–8–4–3–6–5–7–2.

The engine serial number (1) is located at the right front side of the engine block.



DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either performance (e.g., engine idles rough and stalls) or mechanical (e.g., a strange noise).

(Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) - PERFORMANCE and (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)—MECHANICAL for possible causes and corrections of malfunctions. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DIAGNOSIS AND TESTING) and (Refer to 14 - FUEL SYSTEM/FUEL INJECTION - DIAGNOSIS AND TESTING) for the fuel system diagnosis.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following diagnosis:

- Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
- Cylinder Combustion Pressure Leakage Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
- Engine Cylinder Head Gasket Failure Diagnosis (Refer to 9 - ENGINE/CYLINDER HEAD - DIAGNOSIS AND TESTING).
- Intake Manifold Leakage Diagnosis (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery	1. Charge or replace as necessary.
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to the terminals.
	3. Faulty starter.	3. (Refer to 8 - ELECTRICAL/ STARTING - DIAGNOSIS AND TESTING).
	4. Faulty coil or control unit.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
	5. Incorrect spark plug gap.	5. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	6. Dirt or water in fuel system.	6. Clean system and replace fuel filter.
	7. Faulty fuel pump, relay or wiring.	7. Repair or replace as necessary.
ENGINE STALLS OR ROUGH IDLE	1. Idle speed set to low.	1. (Refer to 14 - FUEL SYSTEM/ FUEL INJECTION/IDLE AIR CONTROL MOTOR - REMOVAL).
	2. Idle mixture too lean or too rich.	2. Refer to Powertrain Diagnosis Information.
	3. Vacuum leak.	3. Inspect intake manifold and vacuum hoses, repair or replace as necessary.
	4. Faulty coil.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
	5. Incorrect engine timing.	5. (Refer to 9 - ENGINE/VALVE TIMING - STANDARD PROCEDURE).
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped spark plugs.	1. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	2. Dirt or water in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. Refer to the Appropriate Diagnostic Information
	4. Blown cylinder head gasket.	4. Replace cylinder head gasket.
	5. Low compression.	5. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
	6. Burned, warped or pitted valves.	6. Replace as necessary.
	7. Plugged or restricted exhaust system.	7. Inspect and replace as necessary.
	8. Faulty coil.	8. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE MISSES ON ACCELERATION	1. Spark plugs dirty or incorrectly gapped.	1. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	2. Dirt in fuel system.	2. Clean fuel system.
	3. Burned, warped or pitted valves.	3. Replcae as necessary.
	4. Faulty coil.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
ENGINE MISSES AT HIGH SPEED	1. Spark plugs dirty or incorrectly gapped.	1. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	2. Faulty coil.	2. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/IGNITION COIL - REMOVAL).
	3. Dirt or water in fuel system.	3. Clean system and replace fuel filter.

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTIONS
NOISY VALVES	1. High or low oil level in crankcase.	1. (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
	2. Thin or diluted oil.	2. Change oil and filter.
	3. Low oil pressure.	3. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	4. Dirt in lash adjusters.	4. Replace as necessary.
	5. Worn rocker arms.	5. Replace as necessary.
	6. Worn lash adjusters	6. Replace as necessary.
	7. Worn valve guides.	7. (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - STANDARD PROCEDURE)
	8. Excessive runout of valve seats on valve faces.	8. (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - STANDARD PROCEDURE)

CONDITION	POSSIBLE CAUSES	CORRECTIONS
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Connecting rod journal out-of-round.	5. Service or replace crankshaft.
	6. Misaligned connecting rods.	6. Replace bent connecting rods.
MAIN BEARING NOISE	1. Insufficient oil supply.	1. (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Excessive end play.	5. Check thrust washers for wear.
	6. Crankshaft journal out-of round.	6. Service or replace crankshaft.
	7. Loose flywheel or torque converter.	7. Tighten to correct torque

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - LUBRICATION

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS	1. Gaskets and O-Rings.	1.
	(a) Misaligned or damaged.	(a) Replace as necessary.
	(b) Loose fasteners, broken or porous metal parts.	(b) Tighten fasteners, Repair or replace metal parts.
	2. Crankshaft rear seal	2. Replace as necessary (Refer to 9 - ENGINE/ENGINE BLOCK/ CRANKSHAFT OIL SEAL - REAR - REMOVAL).
	3. Crankshaft seal flange. Scratched, nicked or grooved.	3. Polish or replace crankshaft.
	4. Oil pan flange cracked.	4. Replace oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
	5. Timing chain cover seal, damaged or misaligned.	5. Replace seal (Refer to 9 - ENGINE/ENGINE BLOCK/ CRANKSHAFT OIL SEAL - FRONT - REMOVAL).
	6. Scratched or damaged vibration damper hub.	6. Polish or replace damper.

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL PRESSURE DROP	1. Low oil level.	1. Check and correct oil level.
	2. Faulty oil pressure sending unit.	2. Replace sending unit (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - REMOVAL).
	3. Low oil pressure.	3. Check oil pump and bearing clearance.
	4. Clogged oil filter.	4. Replace oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL).
	5. Worn oil pump.	5. Replace oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).
	6. Thin or diluted oil.	6. Change oil and filter.
	7. Excessive bearing clearance.	7. Replace as necessary.
	8. Oil pump relief valve stuck.	8. Replace oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).
	9. Oil pick up tube loose, damaged or clogged.	9. Replace as necessary.
OIL PUMPING AT RINGS; SPARK PLUGS FOULING	1. Worn or damaged rings.	1. Hone cylinder bores and replace rings.
	2. Carbon in oil ring slots.	2. Replace rings (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE).
	3. Incorrect ring size installed.	3. Replace rings (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE).
	4. Worn valve guides.	4. Ream guides and replace valves (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - STANDARD PROCEDURE).
	5. Leaking valve guide seals.	5. Replace valve guide seals.

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

1. Clean the spark plug recesses with compressed air.
2. Remove the spark plugs.
3. Secure the throttle in the wide-open position.
4. Disable the fuel system (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DESCRIPTION).
5. Remove the ASD relay (Refer to 8 - ELECTRICAL/IGNITION CONTROL/AUTO SHUT DOWN RELAY - REMOVAL).
6. Insert a compression pressure gauge and rotate the engine with the engine starter motor for three revolutions.
7. Record the compression pressure on the 3rd revolution. Continue the test for the remaining cylinders.

8. (Refer to 9 - ENGINE - SPECIFICATIONS) for the correct engine compression pressures.

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

1. Check the coolant level and fill as required. DO NOT install the radiator cap.
2. Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.
3. Remove the spark plugs.
4. Remove the oil filler cap.
5. Remove the air cleaner hose.
6. Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum and 552 kPa (80 psi) recommended.
7. Perform the test procedures on each cylinder according to the tester manufacturer's instructions. Set piston of cylinder to be tested at TDC compression,While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

All gauge pressure indications should be equal, with no more than 25% leakage.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

Refer to CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART .

CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
AIR ESCAPES THROUGH THROTTLE BODY	Intake valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH TAILPIPE	Exhaust valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH RADIATOR	Head gasket leaking or cracked cylinder head or block	Remove cylinder head and inspect. Replace defective part
MORE THAN 50% LEAKAGE FROM ADJACENT CYLINDERS	Head gasket leaking or crack in cylinder head or block between adjacent cylinders	Remove cylinder head and inspect. Replace gasket, head, or block as necessary
MORE THAN 25% LEAKAGE AND AIR ESCAPES THROUGH OIL FILLER CAP OPENING ONLY	Stuck or broken piston rings; cracked piston; worn rings and/or cylinder wall	Inspect for broken rings or piston. Measure ring gap and cylinder diameter, taper and out-of-round. Replace defective part as necessary

STANDARD PROCEDURE

STANDARD PROCEDURE - REPAIR DAMAGED OR WORN THREADS

CAUTION: Be sure that the tapped holes maintain the original center line.

Damaged or worn threads can be repaired. Essentially, this repair consists of:

- Drilling out worn or damaged threads.

- Tapping the hole with a special Heli-Coil Tap, or equivalent.
- Installing an insert into the tapped hole to bring the hole back to its original thread size.

STANDARD PROCEDURE - FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II

Mopar® Engine RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV

Mopar® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER

Mopar® Gasket Maker is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® GASKET SEALANT

Mopar® Gasket Sealant is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

FORM-IN-PLACE GASKET AND SEALER APPLICATION

Assembling parts using a form-in-place gasket requires care but it's easier than using precut gaskets.

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

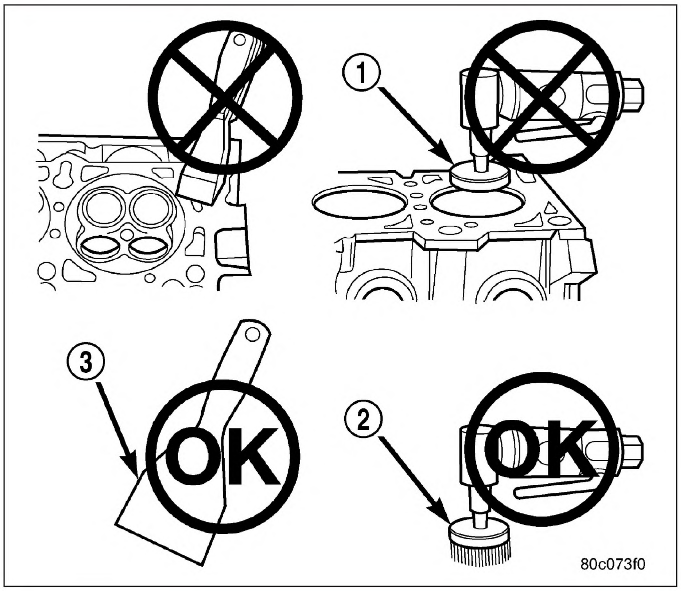
- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.



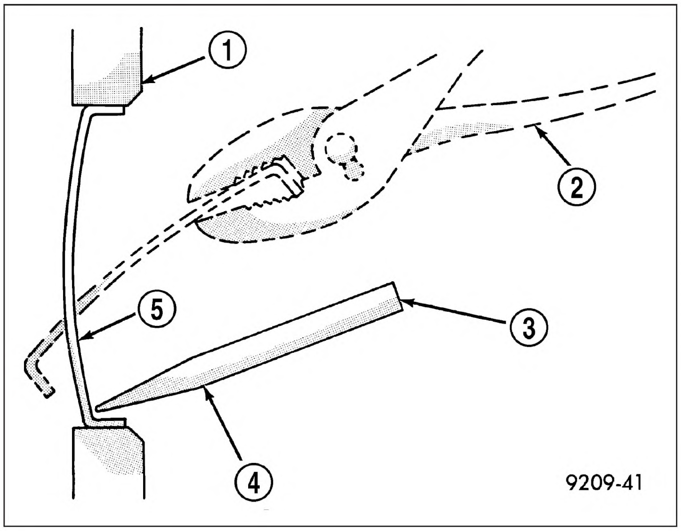
ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug.

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

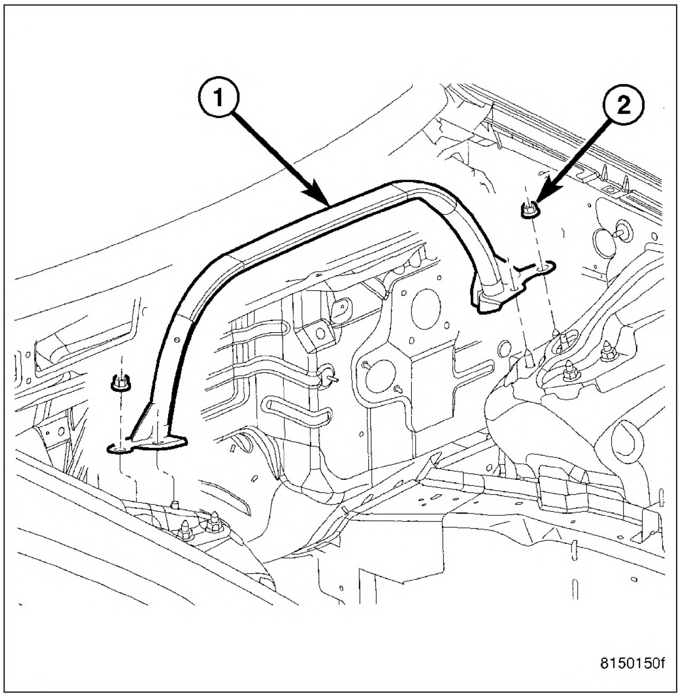
Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately.

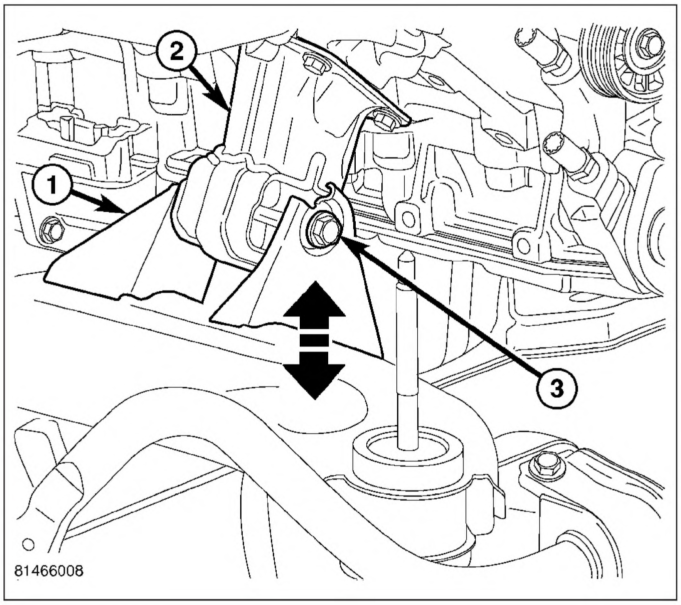


REMOVAL - ENGINE

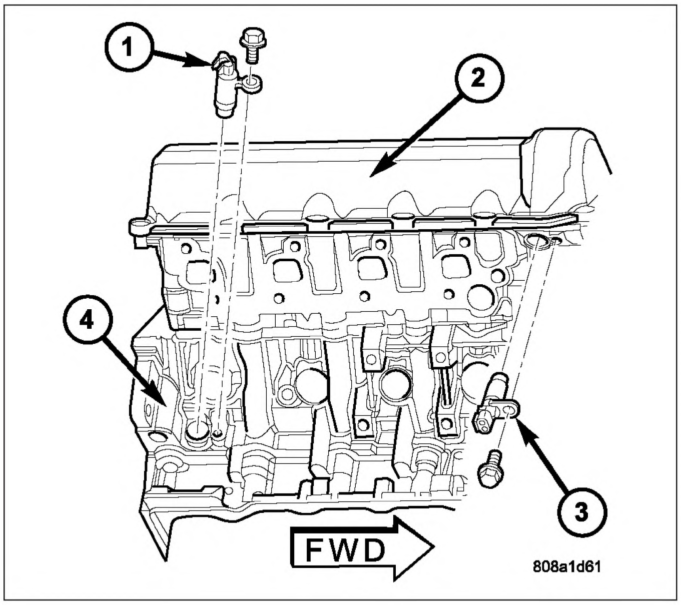
1. Remove the strut tower support (1).
2. Release fuel rail pressure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE) then disconnect the fuel supply quick connect fitting at the fuel rail (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE).
3. Disconnect the battery negative and positive cables.
4. Disconnect two ground straps from the lower left hand side and one ground strap from the lower right hand side of the engine.



5. Remove the through bolt retaining nut and bolt (3) from both the left and right side engine mounts.



6. Disconnect crankshaft position sensor (1).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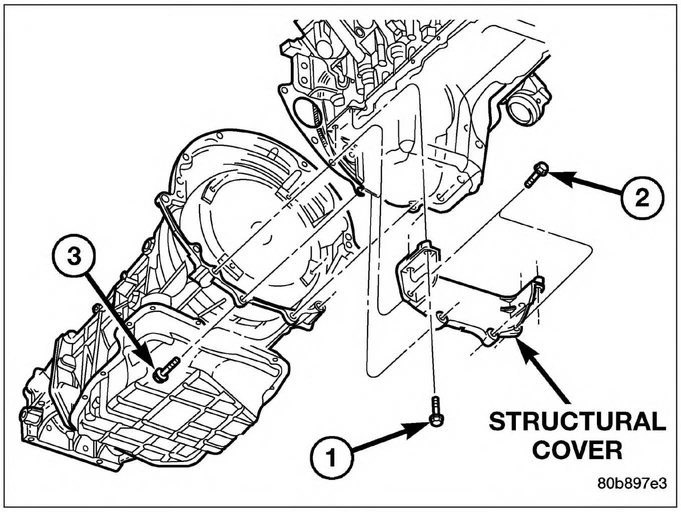
7. Remove exhaust crossover pipe from exhaust manifolds.
8. Remove structural cover (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL).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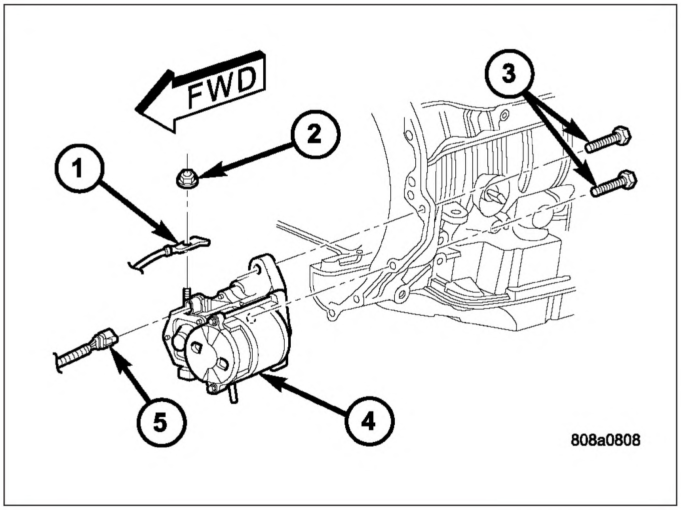
9. Remove starter (4) (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL).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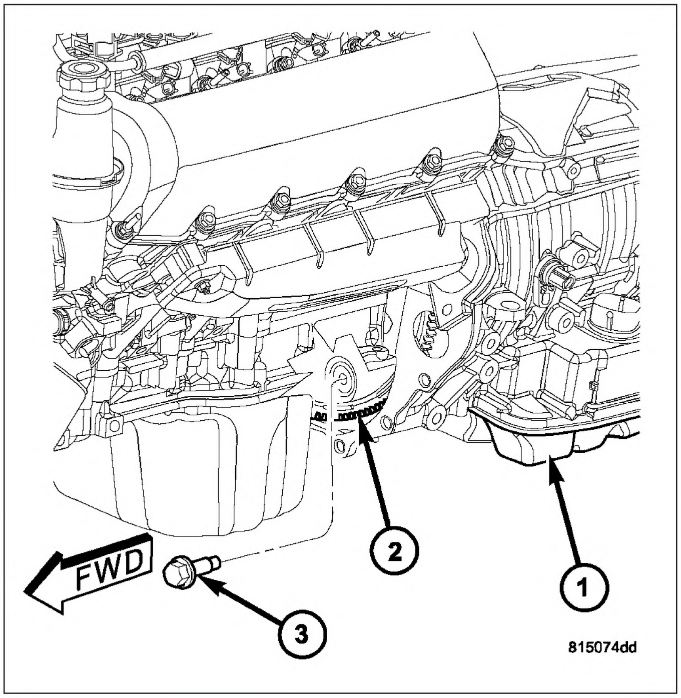
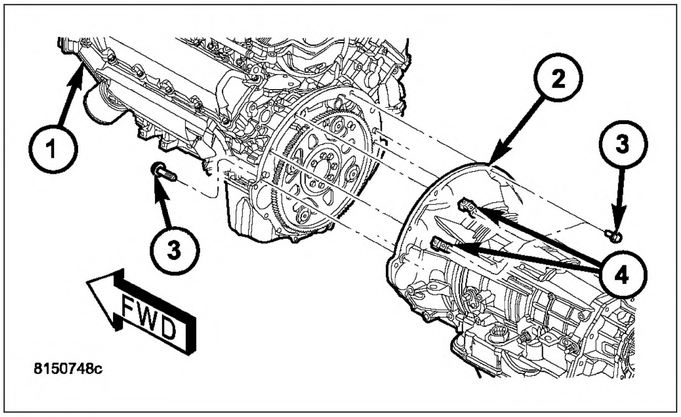
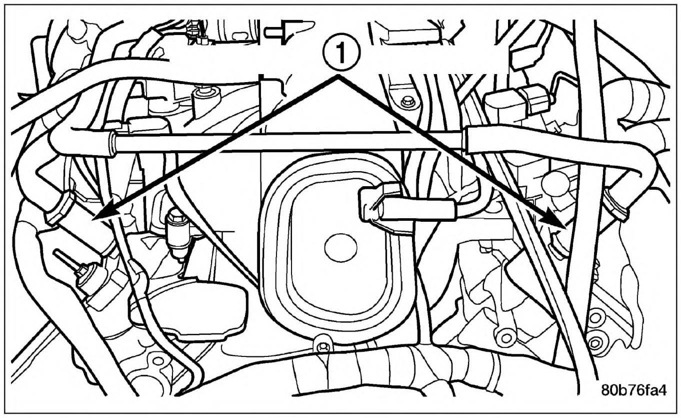
10. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
11. Remove torque converter bolts (3) (Automatic Transmission Only).



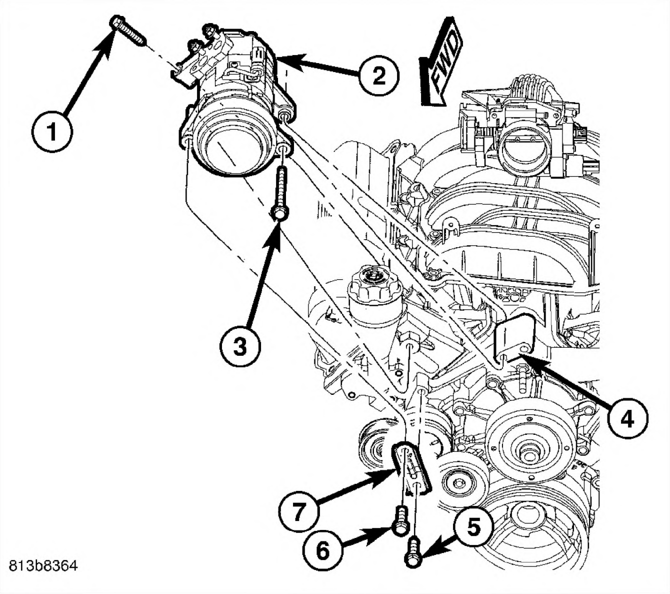
12. Remove transmission to engine mounting bolts (3).
13. Disconnect the engine block heater power cable from the block heater, if equipped.
14. Lower vehicle.
15. Remove throttle body resonator assembly and air inlet hose.
16. Disconnect throttle and speed control cables.



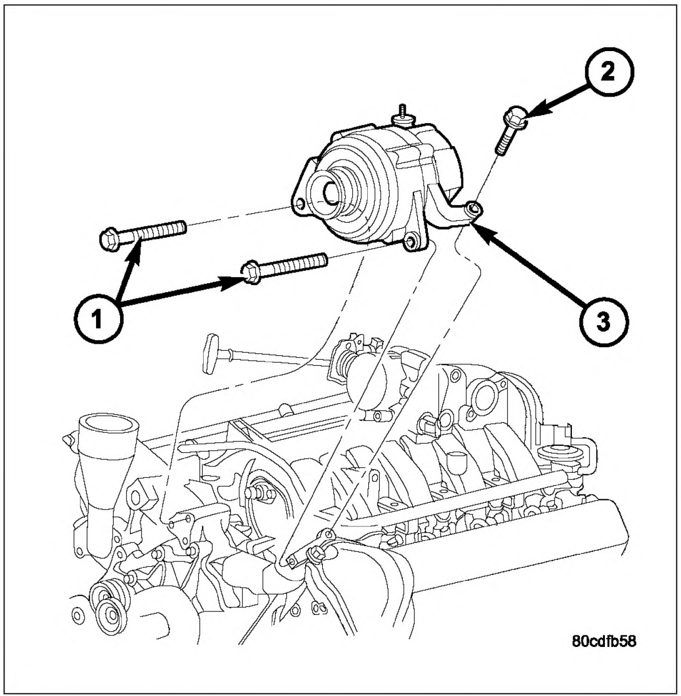
17. Disconnect tube from both the left and right side crankcase breathers (1). Remove breathers.



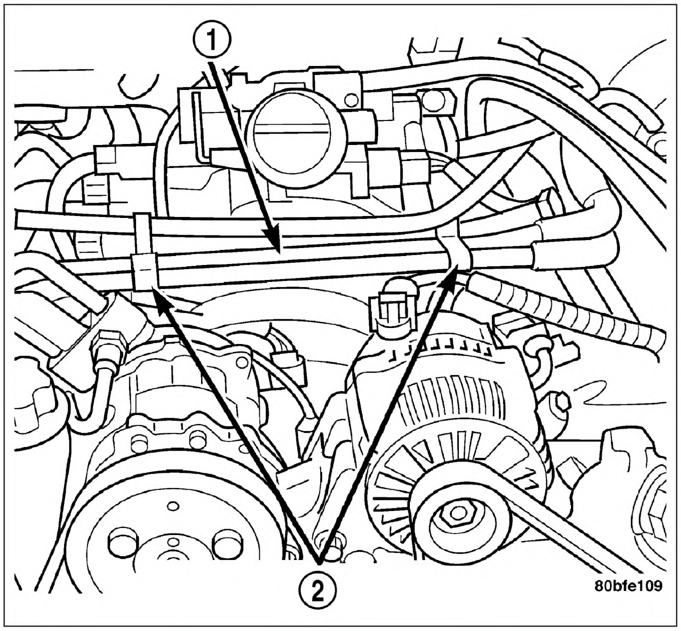
18. Discharge A/C system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).
19. Remove A/C compressor (2) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - REMOVAL).



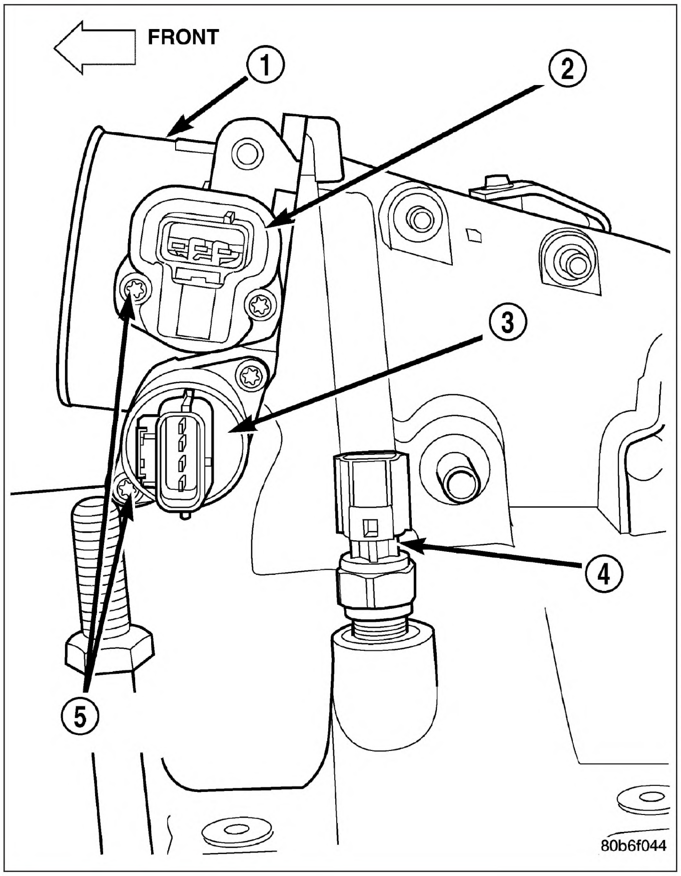
20. Remove shroud, fan assembly (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - REMOVAL) and accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
21. Disconnect transmission oil cooler lines at the radiator.
22. Disconnect radiator upper and lower hoses.
23. Remove radiator (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL), A/C condenser (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C CONDENSER - REMOVAL) and transmission oil cooler.
24. Remove generator (3) (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - REMOVAL).



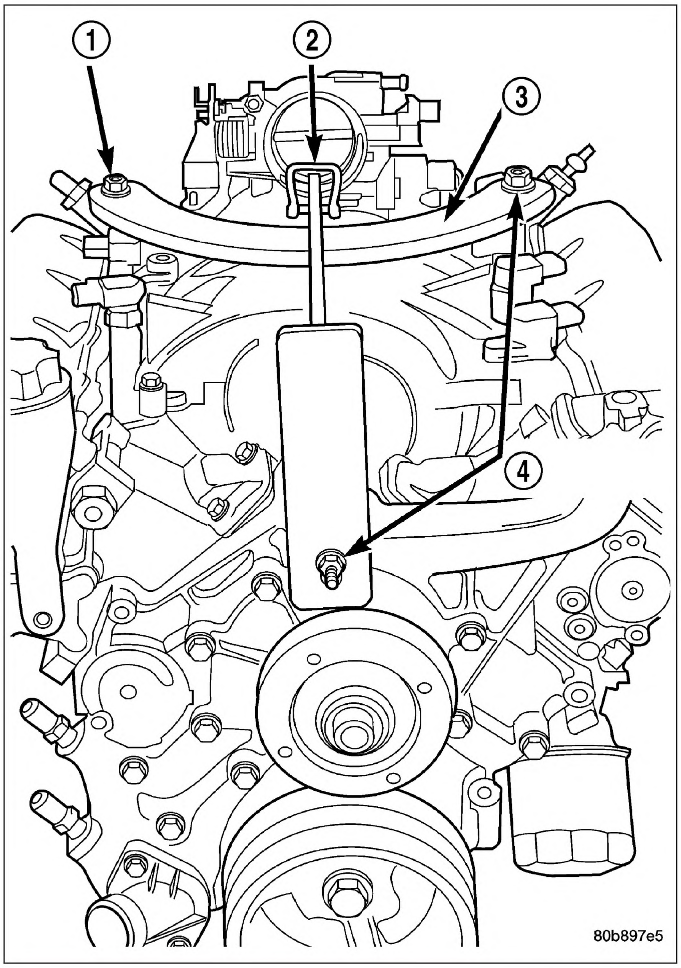
25. Disconnect the two heater hoses from the timing chain cover and heater core.
26. Unclip (2) and remove heater hoses (1) and tubes from the intake manifold.



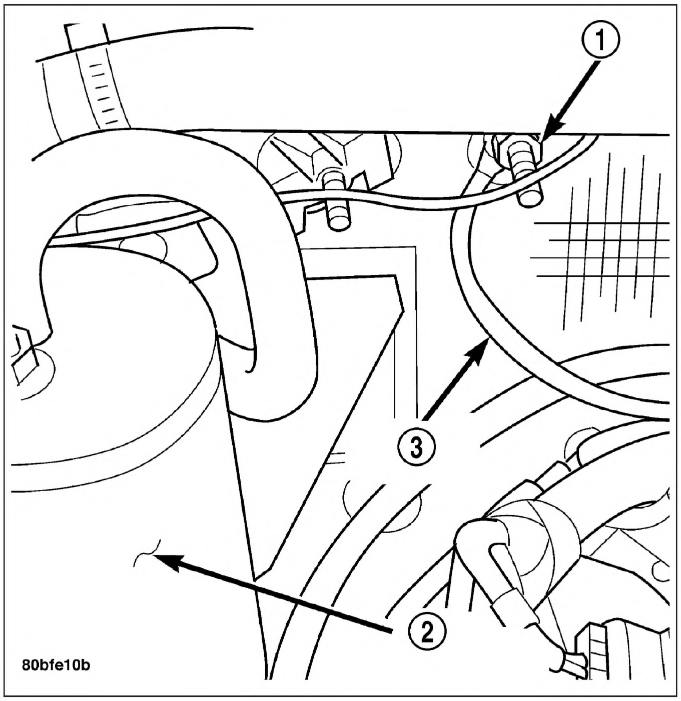
27. Disconnect engine harness at the following points :
    - Intake air temperature (IAT) sensor (4)
    - Fuel Injectors
    - Throttle Position (TPS) Switch (2)
    - Idle Air Control (IAC) Motor (3)
    - Engine Oil Pressure Switch
    - Engine Coolant Temperature (ECT) Sensor
    - Manifold absolute pressure (MAP) Sensor
    - Camshaft Position (CMP) Sensor
    - Coil Over Plugs
28. Disconnect the vacuum lines at the throttle body and intake manifold.
29. Remove power steering pump and position out of the way.



30. Install Special Tools 8400 Lifting Studs, into the cylinder heads.
31. Install Engine Lifting Fixture Special Tool 8347 (3) following these steps.
    - Holding the lifting fixture at a slight angle, slide the large bore in the front plate over the hex portion of the lifting stud.
    - Position the two remaining fixture arms onto the two Special Tools 8400 Lifting Studs, in the cylinder heads.
    - Pull foward and upward on the lifting fixture so that the lifting stud rest in the slotted area below the large bore.
    - Secure the lifting fixture to the three studs using three 7/16 – 14 N/C locknuts.
    - Make sure the lifting loop in the lifting fixture is in the last hole (closest to the throttle body) to minimize the angle of engine during removal.



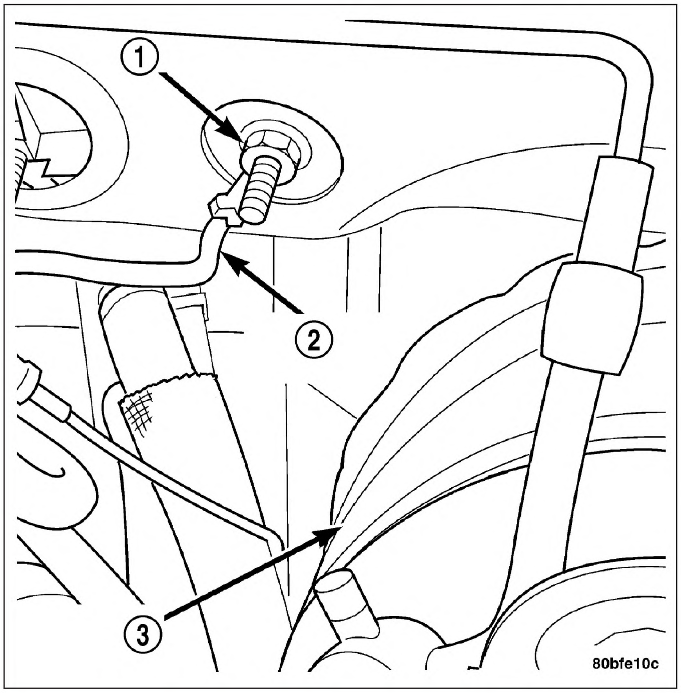
32. Disconnect body ground strap (3) at the right side cowl.



33. Disconnect body ground strap (2) at the left side cowl.

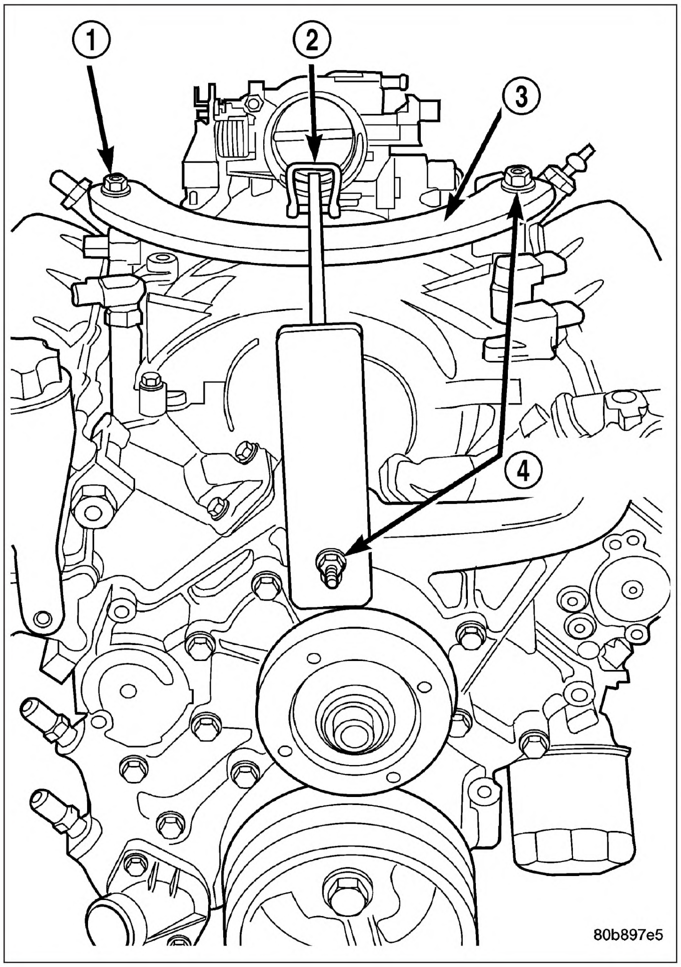
NOTE: It will be necessary to support the transmission in order to remove the engine.

34. Position a suitable jack under the transmission.
35. Remove engine from the vehicle.

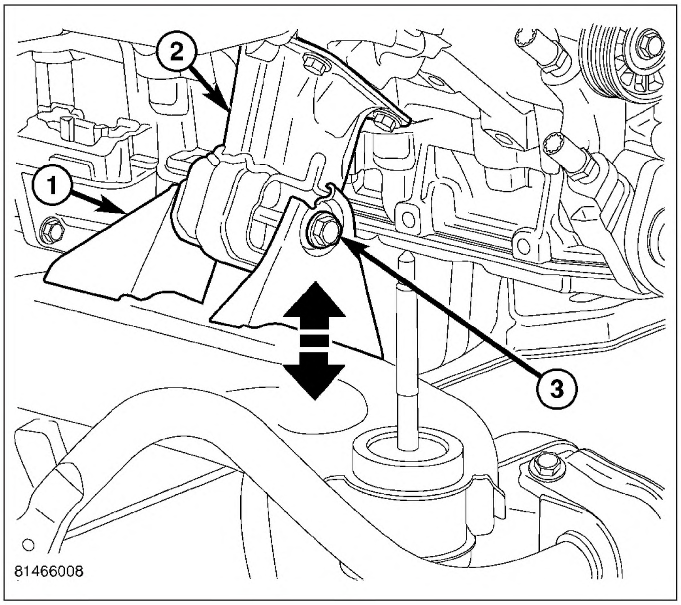


INSTALLATION - ENGINE

1. Position engine in the vehicle.
2. Remove jack from under the transmission.
3. Remove Engine Lifting Fixture Special Tool 8347 (3).
4. Remove Special Tools 8400 Lifting Studs.



5. Position both the left and right side engine mount brackets and install the through bolts (3) and nuts. Tighten to 95 N·m (70 ft. lbs.)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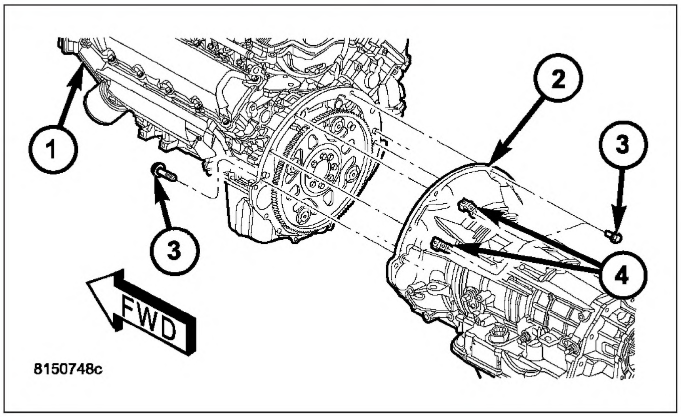
6. Install transmission to engine mounting bolts (3). Tighten the bolts to 41 N·m (30 ft. lbs.).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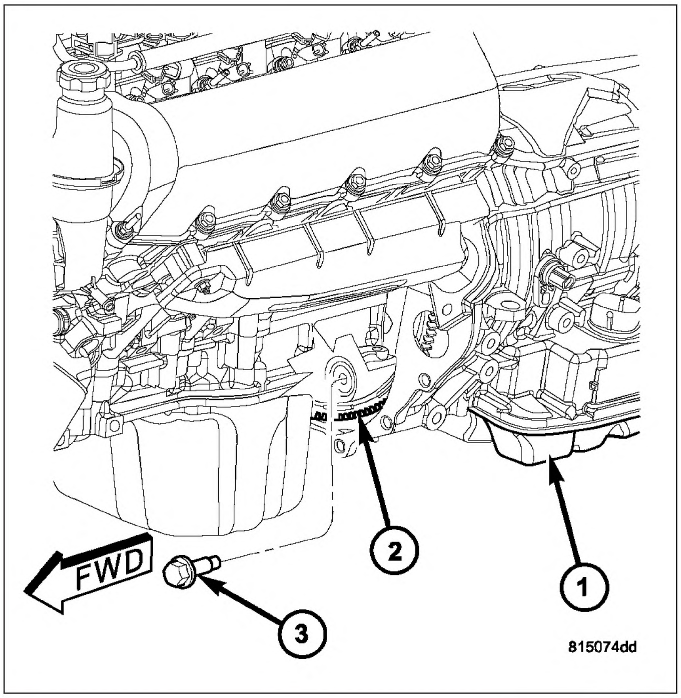
7. Install torque converter bolts (3).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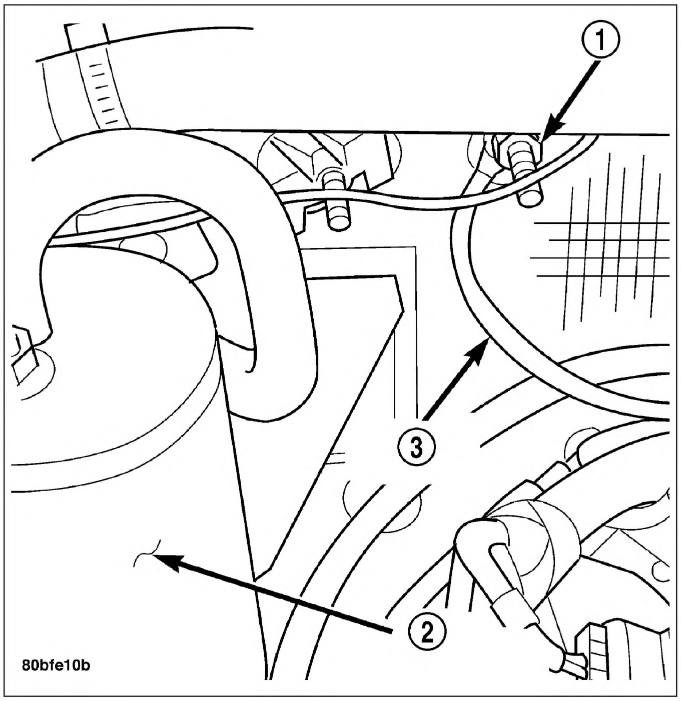
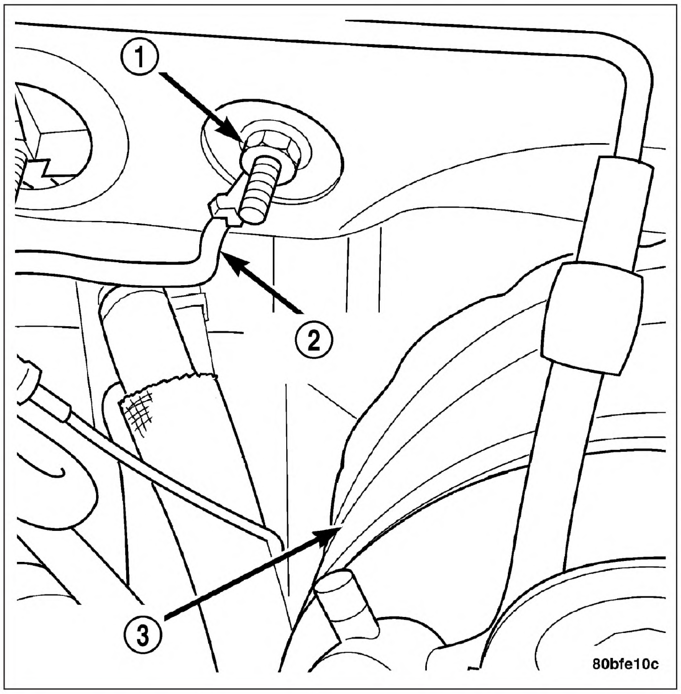
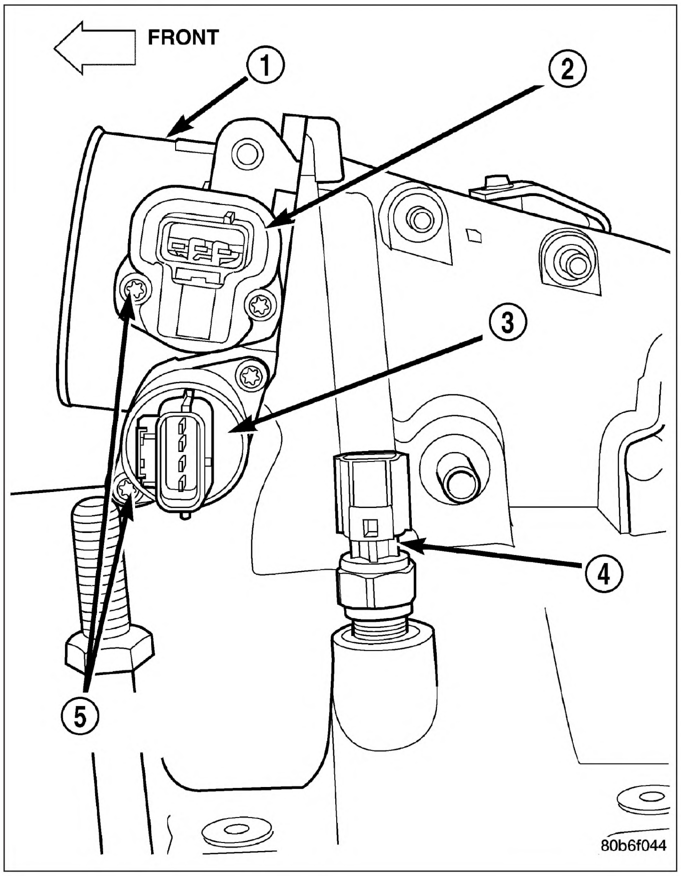
8. Connect both left (2) and right (3) side body ground straps.
9. Position generator wiring behind the oil dipstick tube, then install the oil dipstick tube upper mounting bolt.
10. Install power steering pump.
11. Connect fuel supply line quick connect fitting (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/ QUICK CONNECT FITTING - STANDARD PROCEDURE).
12. Connect the vacuum lines at the throttle body and intake manifold.

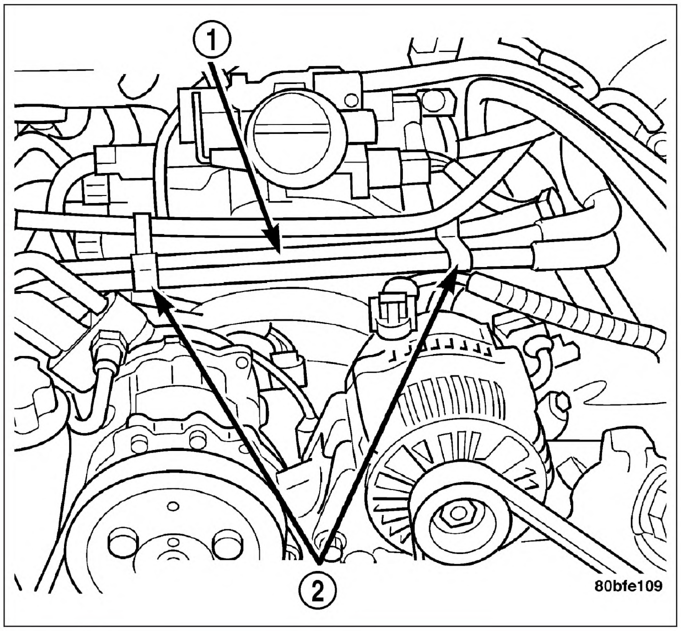




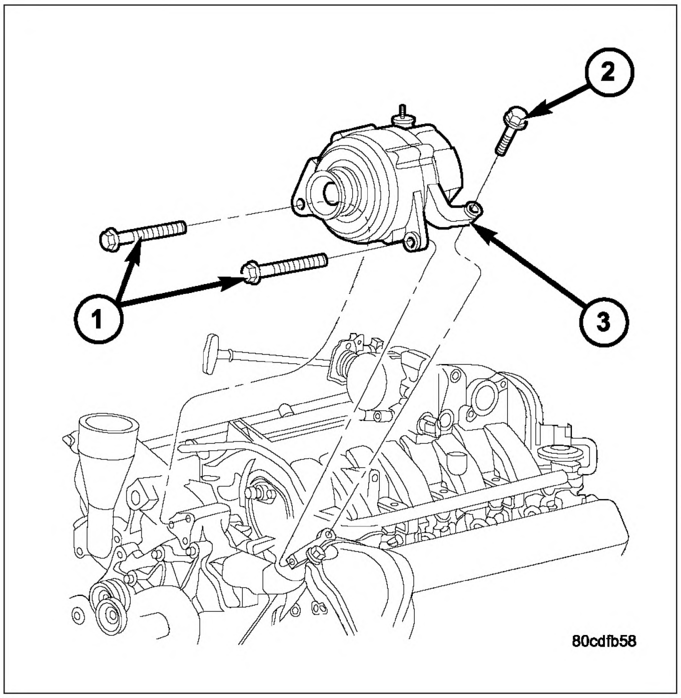
13. Connect engine harness at the following points:
    - Intake Air Temperature (IAT) Sensor (4)
    - Idle Air Control (IAC) Motor (3)
    - Fuel Injectors
    - Throttle Position (TPS) Switch (2)
    - Engine Oil Pressure Switch
    - Engine Coolant Temperature (ECT) Sensor
    - Manifold Absolute Pressure (MAP) Sensor
    - Camshaft Position (CMP) Sensor
    - Coil Over Plugs



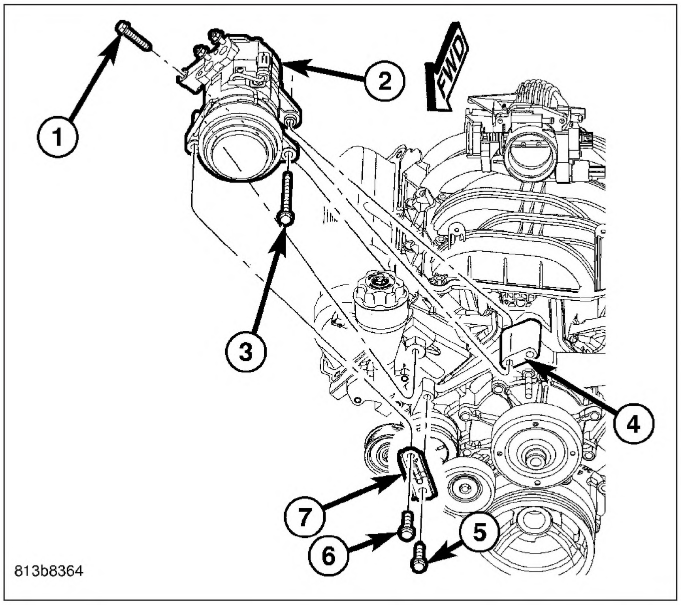
14. Position and install heater hoses (1) and tubes onto intake manifold.
15. Install the heater hoses onto the heater core and the engine front cover, and install clips (2).



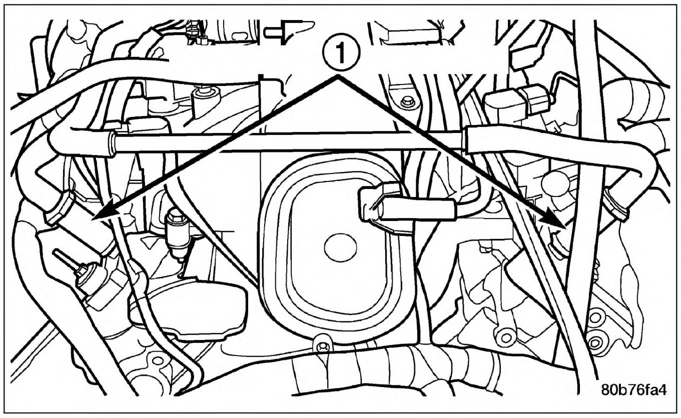
16. Install generator (3) (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - INSTALLATION).
17. Install A/C condenser (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C CONDENSER - INSTALLATION), radiator (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION) and transmission oil cooler.
18. Connect radiator upper and lower hoses.
19. Connect the transmission oil cooler lines to the radiator.
20. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION), fan assembly and shroud (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - INSTALLATION).



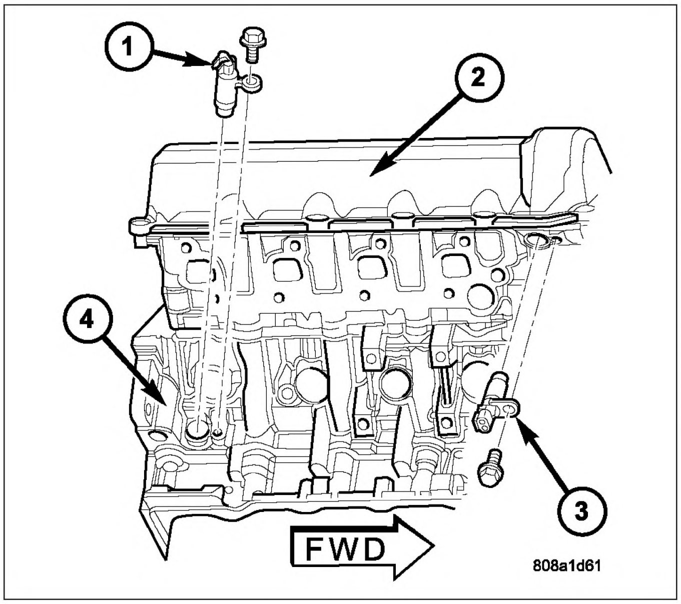
21. Install A/C compressor (2) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - INSTALLATION).



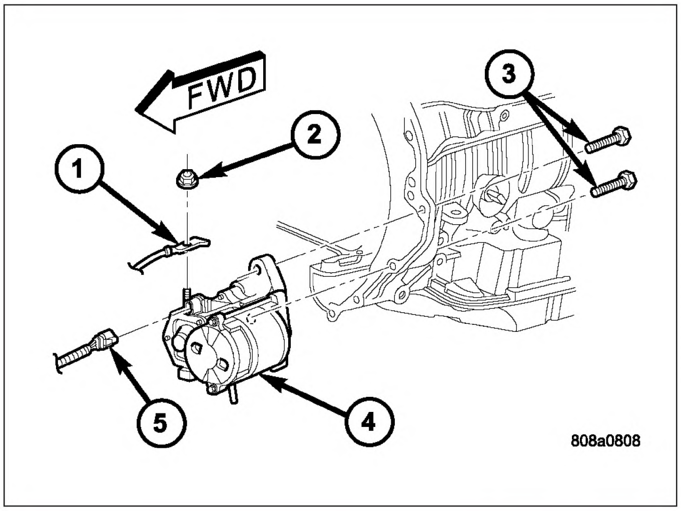
22. Install both breathers (1). Connect tube to both crankcase breathers.
23. Connect throttle and speed control cables.
24. Install throttle body resonator assembly and air inlet hose. Tighten clamps 4 N·m (35 in. lbs.).



25. Raise vehicle.
26. Connect crankshaft position sensor (1).

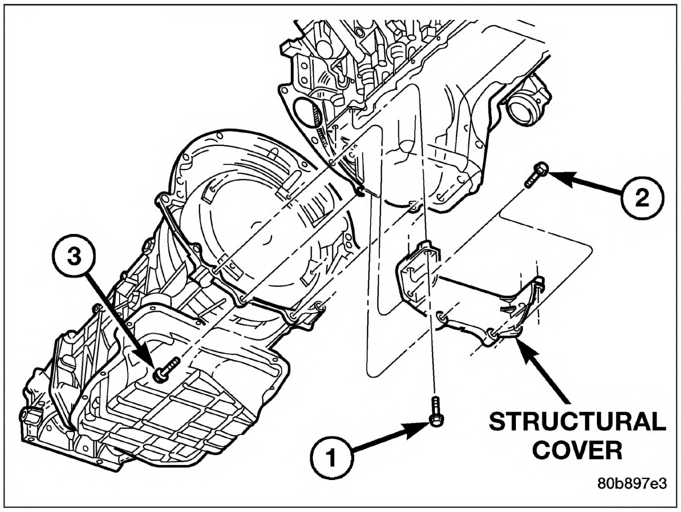

1
2
4
3
FWD
808a1d61

27. Install starter (4) (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION).

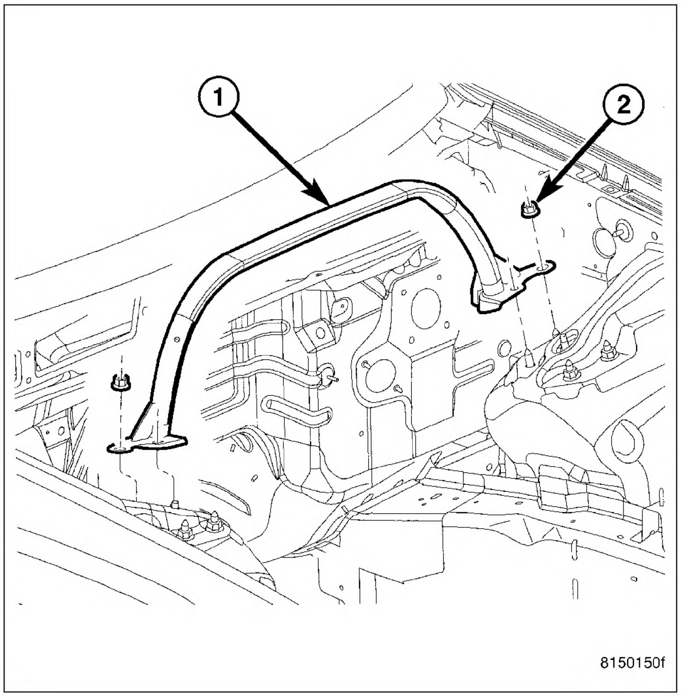

FWD
3
2
1
5
4
808a0808

CAUTION: The structural cover requires a specific torque sequence. Failure to follow this sequence may cause severe damage to the cover.

28. Install structural cover (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION).
29. Install exhaust crossover pipe.


2
3
STRUCTURAL COVER
1
80b897e3

30. Install engine block heater power cable, If equipped.
31. Install the strut tower support (1).
32. Check and fill engine oil.
33. Recharge the A/C system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).
34. Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
35. Connect the battery positive and negative cables.
36. Start the engine and check for leaks.



SPECIFICATIONS

SPECIFICATIONS - 4.7L ENGINE

GENERAL DESCRIPTION

DESCRIPTION	SPECIFICATION
Engine Type	90° SOHC V-8 16-Valve
Displacement	4.7 Liters / 4701 cc 287 (Cubic Inches)
Bore	93.0 mm (3.66 in.)
Stroke	86.5 mm (3.40 in.)
Compression Ratio	9.0:1
Horsepower	235 BHP @ 4800 RPM
Torque	295 LB-FT @ 3200 RPM
Lead Cylinder	#1 Left Bank
Firing Order	1-8-4-3-6-5-7-2

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bore Diameter	93.010 ± .0075 mm	3.6619 ± 0.0003 in.
Out of Round (MAX)	0.076 mm	0.003 in.
Taper (MAX)	0.051 mm	0.002 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Diameter	92.975 mm	3.6605 in.
Weight	366 grams	12.9 oz
Ring Groove Diameter		
No. 1	83.37 - 83.13 mm	3.282 - 3.273 in
No. 2	82.833 - 83.033 mm	3.261 - 3.310 in.
No. 3	83.88 - 84.08 mm	3.302 - 3.310 in.

PISTON PINS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Clearance In Piston	0.010 - 0.019 mm	0.0004 - 0.0008 in.
Diameter	24.013 - 24.016 mm	0.9454 - 0.9455 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Ring Gap		
Top Compression Ring	0.20 - 0.36 mm	0.0079 - 0.0142 in.
Second Compression Ring	0.37 - 0.63 mm	0.0146 - 0.0249 in.
Oil Control (Steel Rails)	0.25 - 0.76 mm	0.0099 - 0.30 in.
Side Clearance		
Top Compression Ring	.051 - .094 mm	0.0020 - 0.0037 in.
Second Compression Ring	0.040 - 0.080 mm	0.0016 - 0.0031 in.
Oil Ring (Steel Ring)	.019 - .229 mm	.0007 - .0091 in.
Ring Width		
Top Compression Ring	1.472 - 1.490 mm	0.057 - 0.058 in.
Second Compression Ring	1.472 - 1.490 mm	0.057 - 0.058 in.
Oil Ring (Steel Rails)	0.445 - 0.470 mm	0.017 - 0.018 in.

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Clearance	0.015 - 0.055 mm	0.0006 - 0.0022 in.
Side Clearance	0.10 - 0.35 mm	0.004 - 0.0138 in.
Piston Pin Bore Diameter (Interference Fit)	.025 - .048 mm	0.001 - 0.0019 in.
Bearing Bore Out of Round (MAX)	0.004 mm	0.0002 in.
Total Weight (Less Bearing)	555 grams	19.5771 ounces

CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	**Standard**
Main Bearing Journal Diameter	63.488 - 63.512 mm	2.4996 - 2.5005 in.
Bearing Clearance	0.004 - 0.034 mm	0.0002 - 0.0013 in.
Out of Round (MAX)	0.005 mm	0.0004 in.
Taper (MAX)	0.008 mm	0.0004 in.
End Play	0.052 - 0.282 mm	0.0021 - 0.0112 in.
End Play (MAX)	0.282 mm	0.0112 in.
Connecting Rod Journal Diameter	50.992 - 51.008 mm	2.0076 - 2.0082 in.
Bearing Clearance	0.010 - 0.048	0.0004 - 0.0019 in.
Out of Round (MAX)	0.005 mm	0.0002 in.
Taper (MAX)	0.008 mm	0.0004 in.

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	**Standard**
Bore Diameter	26.02 - 26.04 mm	1.0245 - 1.0252 in.
Bearing Journal Diameter	25.975 - 25.995 mm	1.0227 - 1.0235 in.
Bearing Clearance	0.025 - 0.065 mm	0.001 - 0.0026 in.
Bearing Clearance (MAX)	0.065 mm	0.0026 in.
End Play	.075 - .200 mm	0.003 - 0.0079 in.
End Play (MAX)	.200 mm	0.0079 in.

VALVE TIMING

DESCRIPTION	SPECIFICATION
Intake	
Opens (BTDC)	4.4°
Closes (ATDC)	239.1°
Duration	243.5°
Exhaust	
Opens (BTDC)	240.5°
Closes (ATDC)	13.2°
Duration	253.70°
Valve Overlap	17.6°

VALVES

DESCRIPTION	SPECIFICATION
Face Angle	45° - 45.5°
Head Diameter	
Intake	48.52 - 48.78 mm (1.9103 - 1.9205 in.)
Exhaust	36.87 - 37.13 mm (1.4516 - 1.4618 in.)
Length (Overall)	
Intake	113.45 - 114.21 mm (4.4666 - 4.4965)
Exhaust	114.92 - 115.68 mm (4.5244 - 4.5543 in.)
Stem Diameter	
Intake	6.931 - 6.957 mm (0.2729 - 0.2739 in.)
Exhaust	6.902 - 6.928 mm (0.2717 - 0.2728 in.)
Stem - to - Guide Clearance	
Intake	0.018 - 0.069 mm (0.0008 - 0.0028 in.)
Exhaust	0.047 - 0.098 mm (0.0019 - 0.0039 in.)
Max. Allowable Stem - to - Guide Clearance (Rocking Method)	
Intake	0.069 mm (0.0028 in.)
Exhaust	0.098 mm (0.0039 in.)
Valve Lift (Zero Lash)	
Intake	11.25 mm (0.443 in.)
Exhaust	10.90 mm (0.4292 in.)

VALVE SPRING

DESCRIPTION	SPECIFICATION
Free Length (Approx)	
Intake	49.0 mm (1.9291 in.)
Exhaust	49.0 mm (1.9291 in.)
Spring Force (Valve Closed)	
Intake and Exhaust	313.0 - 354.0 N @ 40.12 mm (70.365 - 79.582 lbs. @ 1.5795 in.)
Spring Force (Valve Open)	
Intake and Exhaust	776.0 - 870.0 N @ 28.88 mm (174.451 - 195.583 lbs. @ 1.137 in.)

DESCRIPTION	SPECIFICATION
Number of Coils	
Intake	7.3
Exhaust	7.3
Wire Diameter	
Intake and Exhaust	4.6 × 3.67mm (0.1811 - 0.1445 in.)
Installed Height (Spring Seat to Bottom of Retainer) Nominal	
Intake	40.12 mm (1.579 in.)
Exhaust	40.12 mm (1.579 in.)

CYLINDER HEAD

DESCRIPTION	SPECIFICATION
Gasket Thickness (Compressed)	0.7 mm (0.0276 in.)
Valve Seat Angle	44.5° - 45.0°
Valve Seat Runout (MAX)	0.051 mm (0.002 in.)
Valve Seat Width	
Intake	1.75 - 2.36 mm (0.0698 - 0.0928 in.)
Exhaust	1.71 - 2.32 mm (0.0673 - 0.0911 in.)
Guide Bore Diameter (Std.)	6.975 - 7.00 mm (0.2747 - 0.2756 in.)
Cylinder Head Warpage (Flatness)	0.0508 mm (0.002 in.)

OIL PUMP

DESCRIPTION	SPECIFICATION
Clearance Over Rotors/End Face (MAX)	0.095 mm (0.0038 in.)
Cover Out - of -Flat (MAX)	0.025 mm (0.001 in.)
Inner and Outer Rotor Thickness	12.02 mm (0.4731 in.)
Outer Rotor to pocket (Diametral) clearance (MAX)	.235 mm (.0093 in.)
Outer Rotor Diameter (MIN)	85.925 mm (0.400 in.)
Tip Clearance Between Rotors (MAX)	0.150 mm (0.006 in.)

OIL PRESSURE

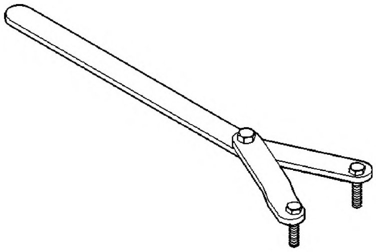
SPECIFICATION	SPECIFICATION
At Curb Idle Speed (MIN)*	48 kPa (7 psi)
@ 3000 rpm	240 - 725 kPa (35 - 105 psi)
*** CAUTION: If pressure is zero at curb idle, DO NOT run engine at 3000 rpm.**	

TORQUE

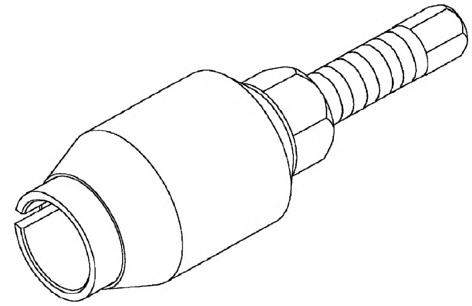
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Camshaft			
Non - Oiled Sprocket Bolt	122	90	—
Bearing Cap Bolts	11	—	100
Timing Chain Cover—Bolts	58	43	—
Connecting Rod Cap—Bolts	27	20	—
	PLUS 90° TURN		
Bed Plate—Bolts	Refer to Procedure		
Cylinder Head—Bolts	Refer to Procedure		
Crankshaft Damper—Bolt	175	130	—
Cylinder Head Cover—Bolts	12	—	105
Exhaust Manifold—Bolts	25	18	—
Exhaust Manifold Heat Shield—Nuts	8	—	72
	Then loosen 45°		
Flexplate—Bolts	60	45	—
Engine Mount Bracket to Block—Bolts	61	45	—
Rear Mount to Transmission—Bolts	46	34	—
Generator Mounting—Bolts			
M10 Bolts	54	40	—
M8 Bolts	28	—	250
Intake Manifold—Bolts	12	—	105
	Refer to Procedure for Tightening Sequence		
Oil Pan—Bolts	15	—	130
Oil Pan—Drain Plug	34	25	—
Oil Pump—Bolts	28	—	250
Oil Pump Cover—Bolts	12	—	105
Oil Pickup Tube—Bolt and Nut	28	—	250
Oil Dipstick Tube to Engine Block—Bolt	15	—	130
Oil Fill Tube—Bolts	12	—	105
Timing Chain Guide—Bolts	28	—	250
Timing Chain Tensioner Arm—Special Pin Bolt	17	—	150
Hydraulic Tensioner—Bolts	28	—	250
Timing Chain Primary Tensioner—Bolts	28	—	250
Timing Drive Idler Sprocket—Bolt	34	25	—
Thermostat Housing—Bolts	13	—	115
Water Pump—Bolts	58	43	—

SPECIAL TOOLS

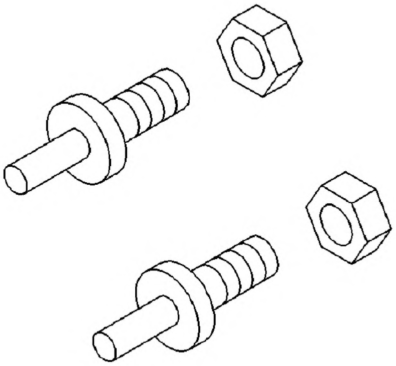
4.7L ENGINE



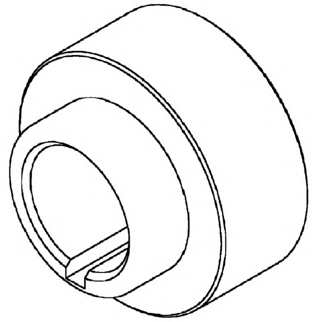
Spanner Wrench 6958



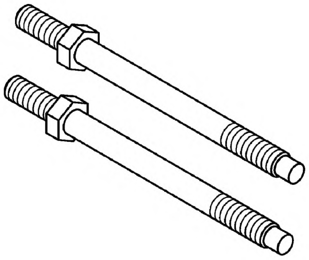
Front Crankshaft Seal Remover 8511



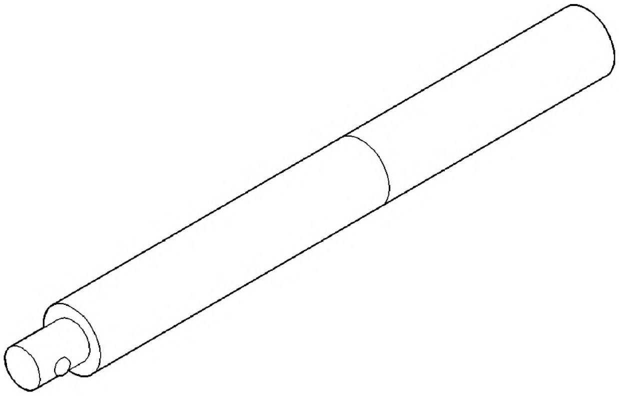
Adapter Pins 8346



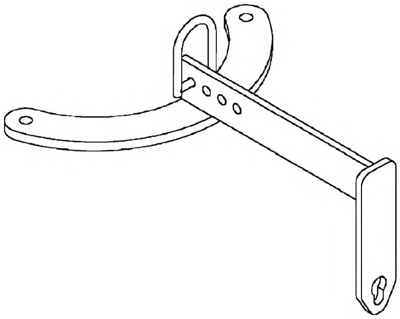
Front Crankshaft Seal Installer 8348



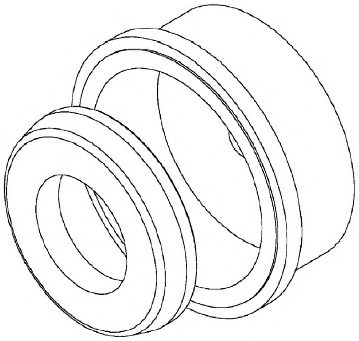
Engine Lifting Studs 8400



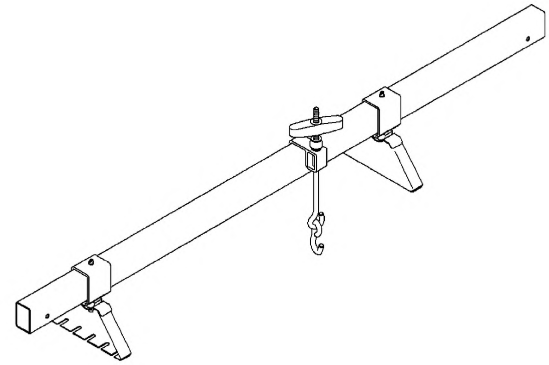
Handle C-4171



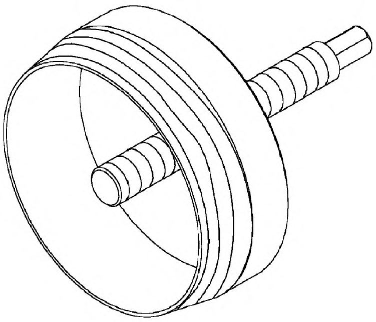
Engine Lift Fixture 8347



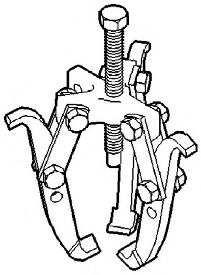
Rear Crankshaft Seal Installer 8349



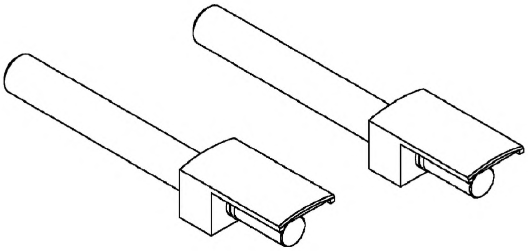
ENGINE SUPPORT FIXTURE 8534



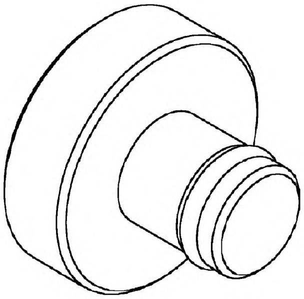
Rear Crankshaft Seal Remover 8506



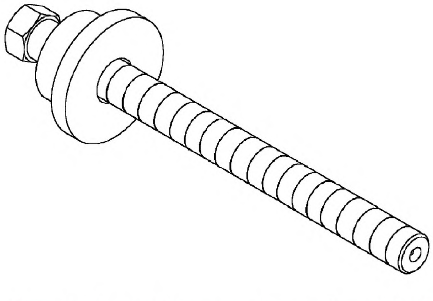
Puller 1026



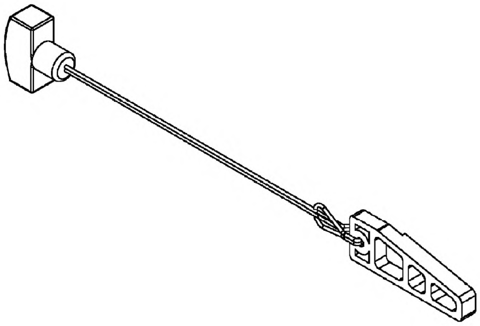
Connecting Rod Guides 8507



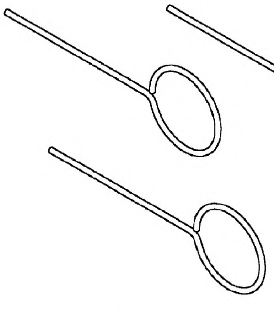
Crankshaft Damper Removal Insert 8513



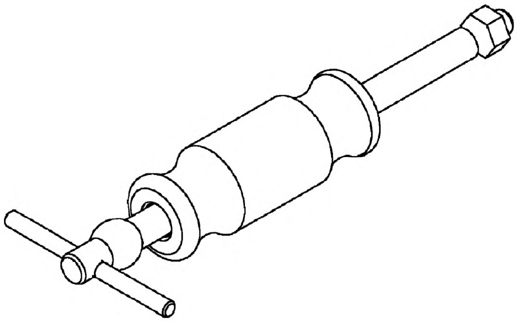
Crankshaft Damper Installer 8512



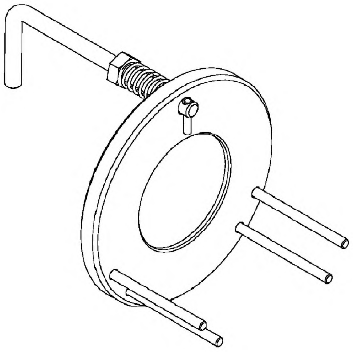
Chain Tensioner Wedge 8379



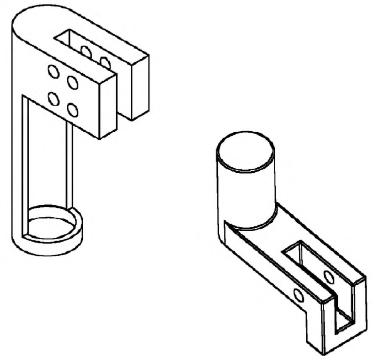
Chain Tensioner Pins 8514



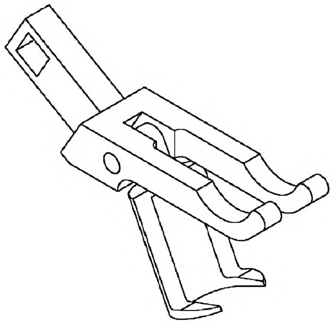
Idler Shaft Remover 8517



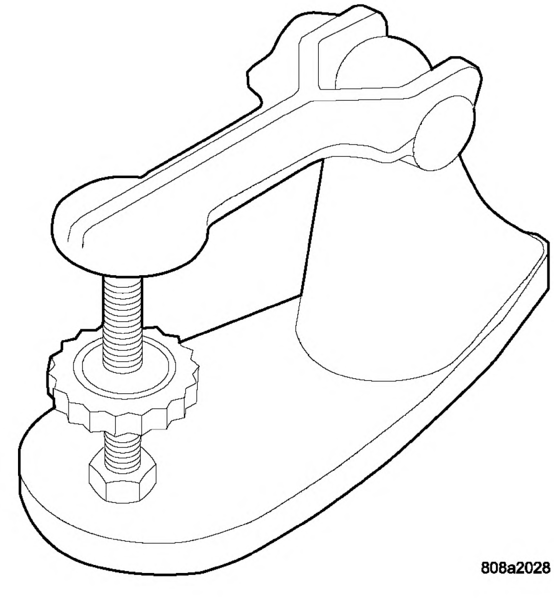
Secondary Chain Holder 8515



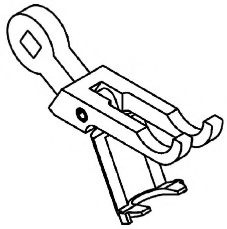
Valve Spring Compressor Adapters 8519



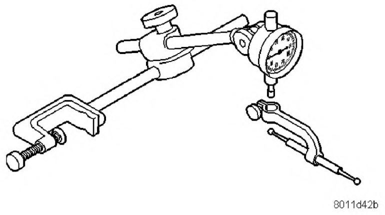
Remover, Rocker Arm 8516



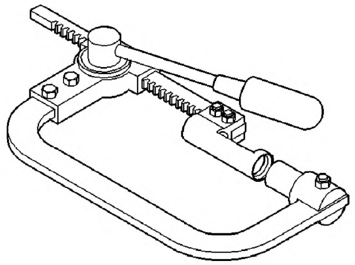
Valve Spring Tester C-647



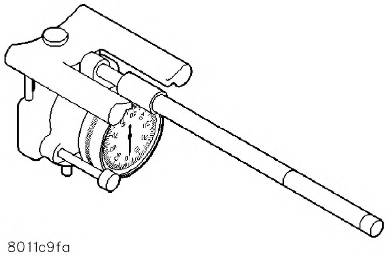
Valve Spring Compressor 8387



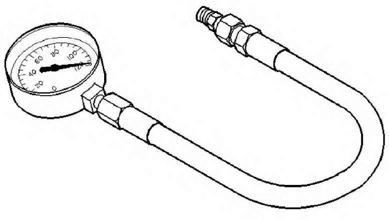
Dial Indicator C-3339



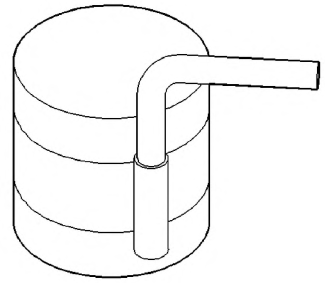
COMPRESSOR VALVE SPRING C-3422-C



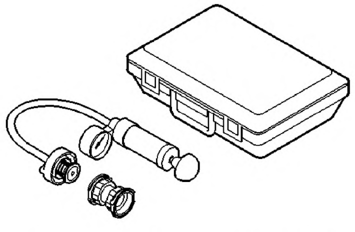
INDICATOR CYLINDER BORE C-119



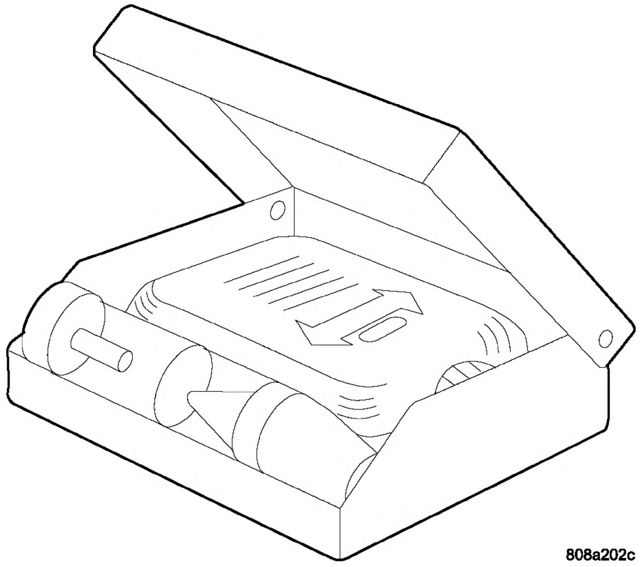
GAUGE OIL PRESSURE - C-3292



Piston Ring Compressor C-385



Pressure Tester Kit 7700



BLOC-CHEK KIT C-3685

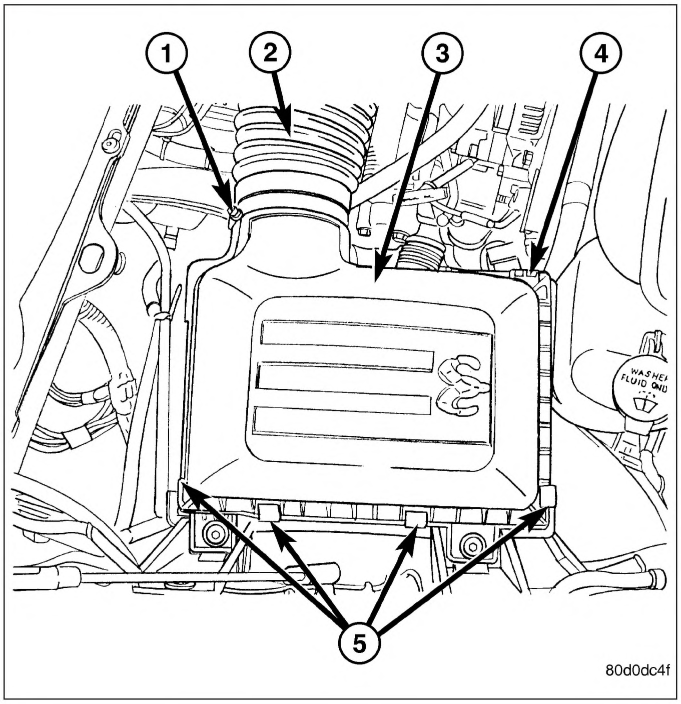
CLEANER-AIR ELEMENT

REMOVAL

Filter Element Only

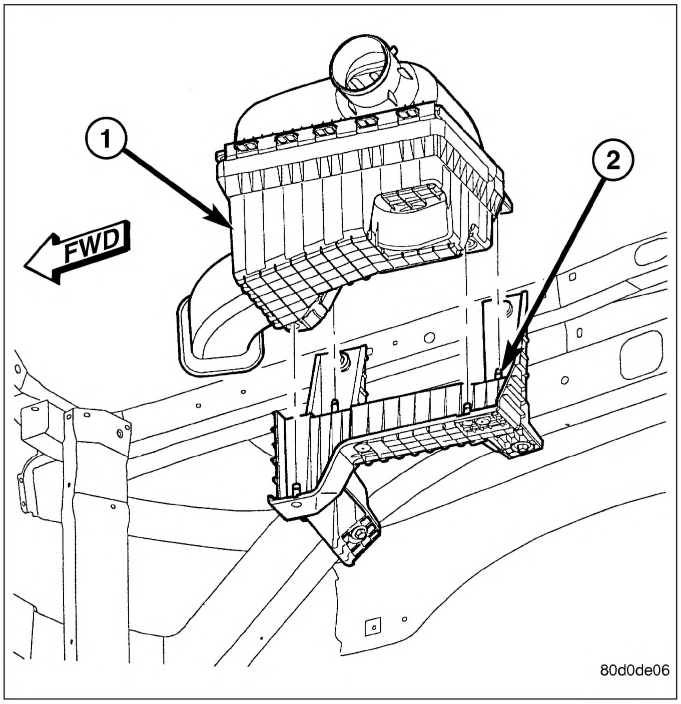
Housing removal is not necessary for element (filter) replacement.

1. Loosen clamp (1) and disconnect air duct at air cleaner cover (3).
2. Pry over 4 spring clips (5) from housing cover (spring clips retain cover to housing).
3. Release housing cover (3) from locating tabs on housing and remove cover (3).
4. Remove air cleaner element (filter) from housing.
5. Clean inside of housing before replacing element.



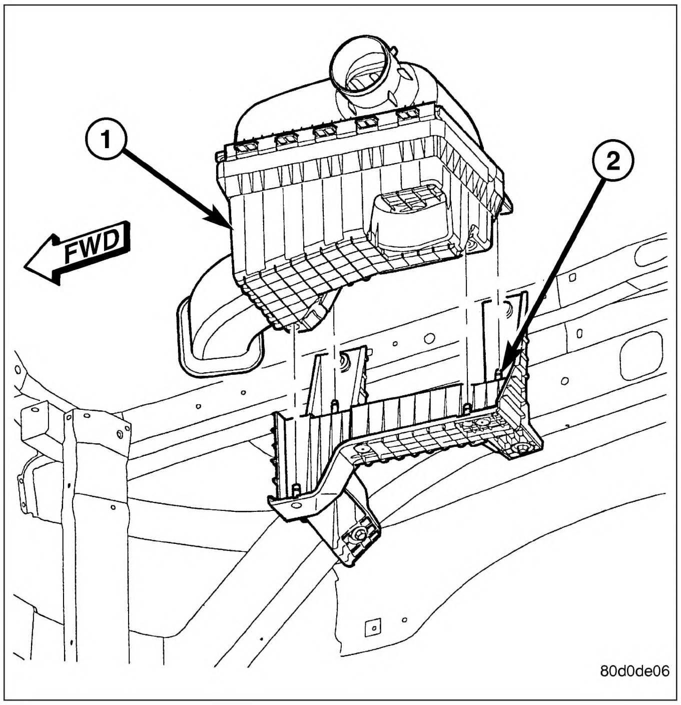
Housing Assembly

1. Loosen clamp and disconnect air duct at air cleaner cover.
2. Lift entire housing assembly (1) from 4 locating pins (2).



INSTALLATION

1. Install filter element into housing (1).
2. Position housing cover into housing locating tabs.
3. Pry up 4 spring clips and lock cover to housing.
4. Install air duct to air cleaner cover and tighten hose clamp to 3 N·m (30 in. lbs.) torque.
5. If any other hose clamps were removed from air intake system, tighten them to 3.4 N·m (30 in. lbs.) torque.
6. If any bolts were removed from air resonator housing or air intake tubing, tighten them to 4.5 N·m (40 in. lbs.) torque.



CYLINDER HEAD - LEFT

DESCRIPTION

DESCRIPTION - CYLINDER HEAD

The cylinder heads are made of an aluminum alloy. The cylinder head features two valves per cylinder with pressed in powdered metal valve guides. The cylinder heads also provide enclosures for the timing chain drain, necessitating unique left and right cylinder heads.

DESCRIPTION - VALVE GUIDES

The valve guides are made of powered metal and are pressed into the cylinder head. The guides are not replaceable or serviceable, and valve guide reaming is not recommended. If the guides are worn beyond acceptable limits, replace the cylinder heads.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HYDRAULIC LASH ADJUSTER

A tappet-like noise may be produced from several items. Check the following items.

1. Engine oil level too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.
2. Insufficient running time after rebuilding cylinder head. Low speed running up to 1 hour may be required.
3. Turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
4. Low oil pressure.
5. The oil restrictor in cylinder head gasket or the oil passage to the cylinder head is plugged with debris.
6. Air ingested into oil due to broken or cracked oil pump pick up.
7. Worn valve guides.
8. Rocker arm ears contacting valve spring retainer.

9. Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.
10. Oil leak or excessive cam bore wear in cylinder head.
11. Faulty lash adjuster.
    a. Check lash adjusters for sponginess while installed in cylinder head and cam on camshaft at base circle. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Spongy adjusters can be bottomed out easily.
    b. Remove suspected lash adjusters, and replace.
    c. Before installation, make sure adjusters are at least partially full of oil. This can be verified by little or no plunger travel when lash adjuster is depressed.

CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

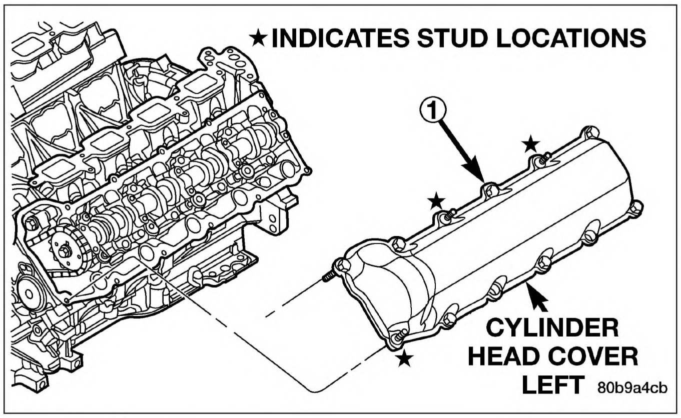
WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester’s pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

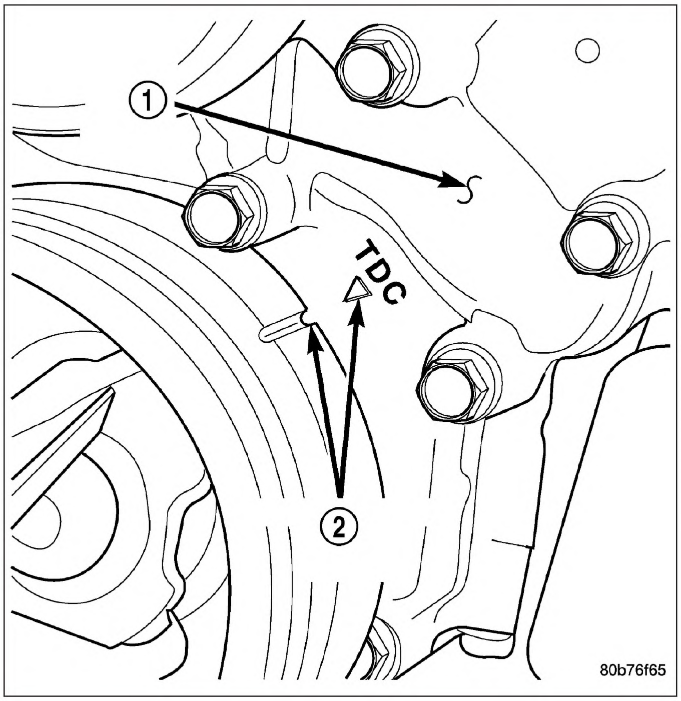
CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

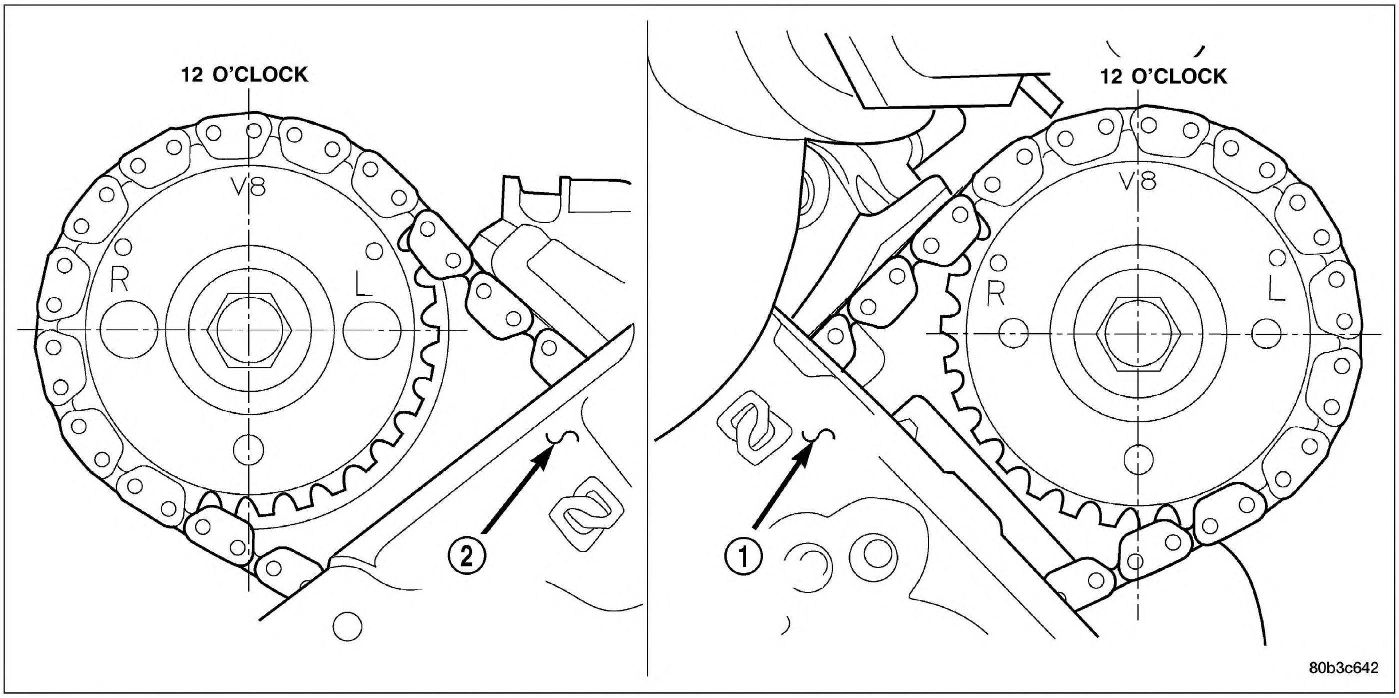
REMOVAL - LEFT CYLINDER HEAD



1. Disconnect the negative cable from the battery.
2. Raise the vehicle on a hoist.
3. Disconnect the exhaust pipe at the left side exhaust manifold.
4. Drain the engine coolant. Refer to COOLING SYSTEM.
5. Lower the vehicle.
6. Remove the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
7. Remove the master cylinder and booster assembly. Refer to section 5 brakes.
8. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).



9. Remove the fan shroud and fan blade assembly (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - REMOVAL).
10. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
11. Remove the power steering pump and set aside.
12. Rotate the crankshaft until the damper timing mark is aligned with TDC indicator mark.


12 O'CLOCK
V8
R
L
2
12 O'CLOCK
V8
R
L
1
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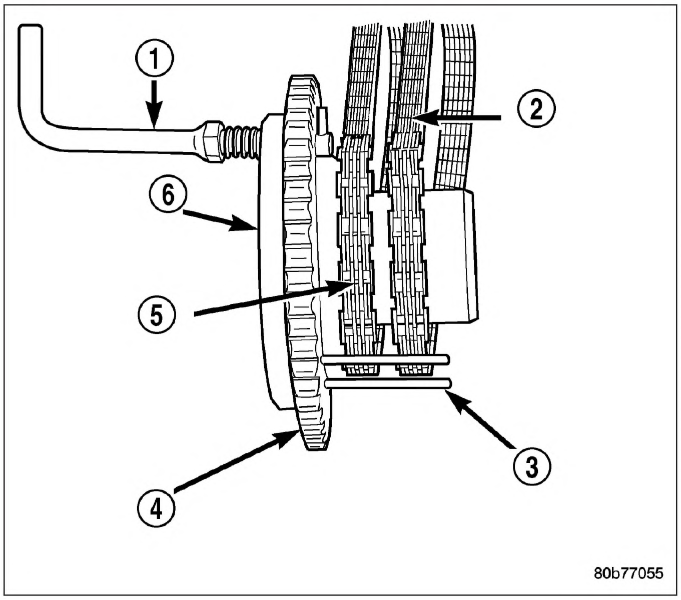
13. Verify the V8 mark on the camshaft sprocket is at the 12 o'clock position. Rotate the crankshaft one turn if necessary.
14. Remove the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
15. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

16. Lock the secondary timing chains to the idler sprocket using Special Tool 8515.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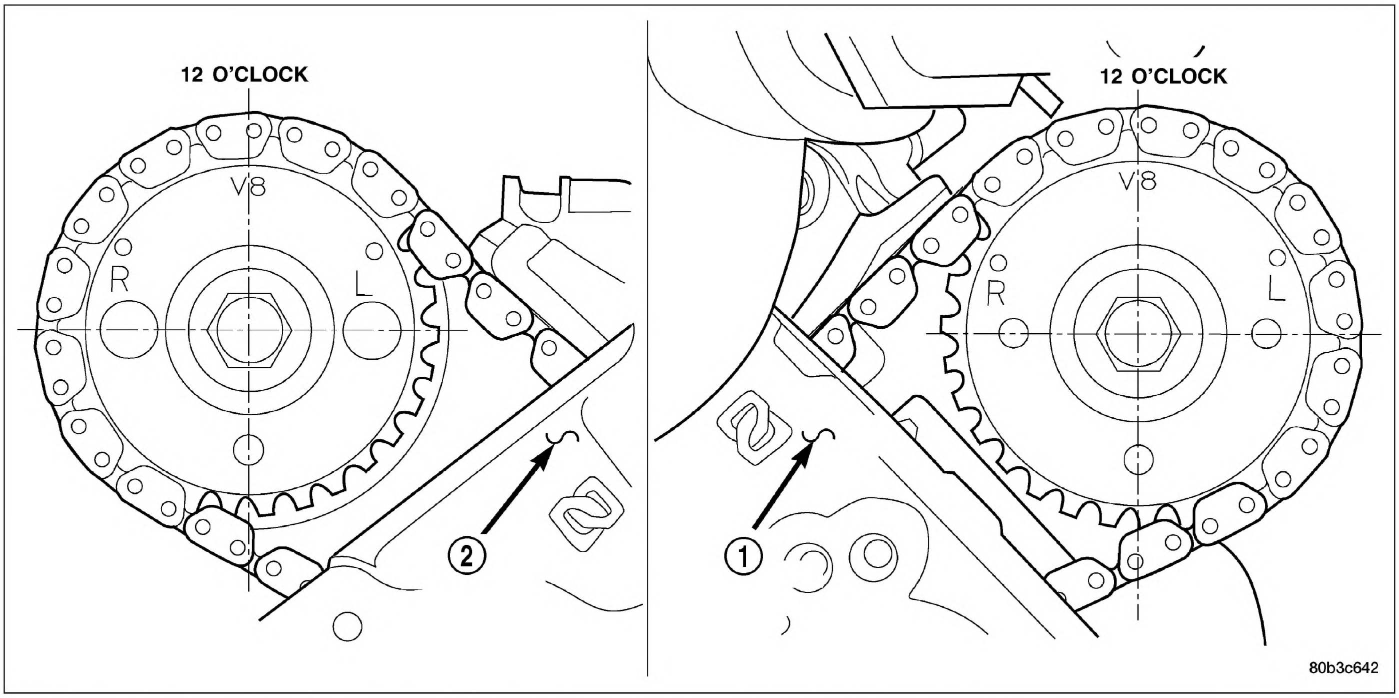
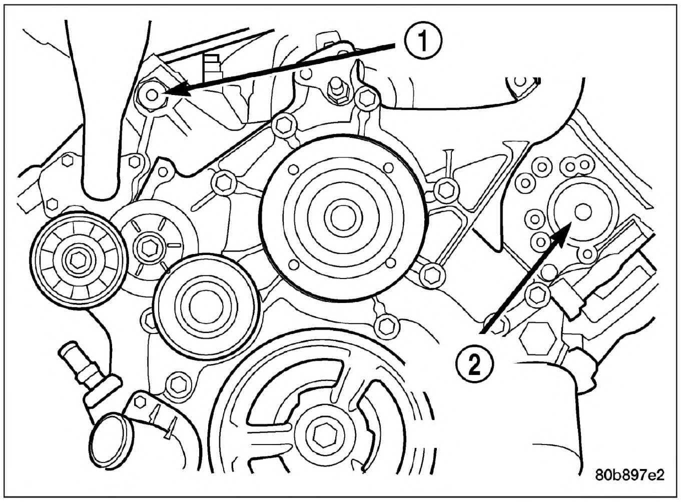


NOTE: Mark the secondary timing chain prior to removal to aid in installation.

17. Mark the secondary timing chain, one link on each side of the V8 mark on the camshaft drive gear.
18. Remove the left side secondary chain tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

19. Remove the cylinder head access plug (2).
20. Remove the left side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
21. Remove the retaining bolt and the camshaft drive gear.

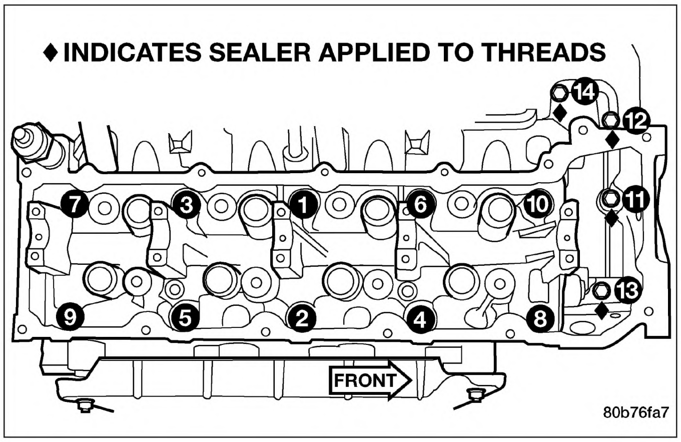
CAUTION: Do not allow the engine to rotate. Severe damage to the valve train can occur.



CAUTION: Do not overlook the four smaller bolts at the front of the cylinder head. Do not attempt to remove the cylinder head without removing these four bolts.

NOTE: The cylinder head is attached to the cylinder block with fourteen bolts.

22. Remove the cylinder head retaining bolts using the sequence provided.
23. Remove the cylinder head and gasket. Discard the gasket.



CAUTION: Do not lay the cylinder head on its gasket sealing surface, due to the design of the cylinder head gasket any distortion to the cylinder head sealing surface may prevent the gasket from properly sealing resulting in leaks.

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

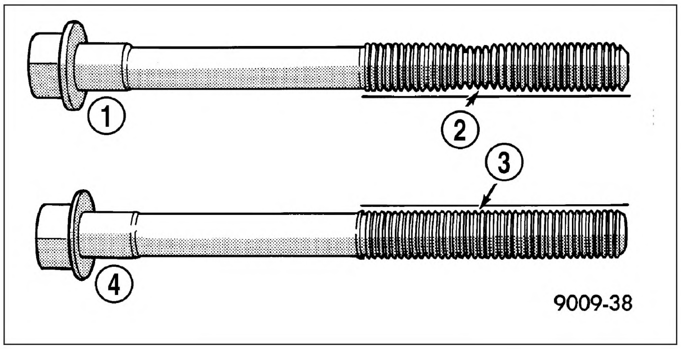
INSPECTION

1. Inspect the cylinder head for out-of-flatness, using a straightedge and a feeler gauge. If tolerances exceed 0.0508 mm (0.002 in.) replace the cylinder head.
2. Inspect the valve seats for damage. Service the valve seats as necessary.
3. Inspect the valve guides for wear, cracks or looseness. If either condition exist, replace the cylinder head.

INSTALLATION - LEFT CYLINDER HEAD

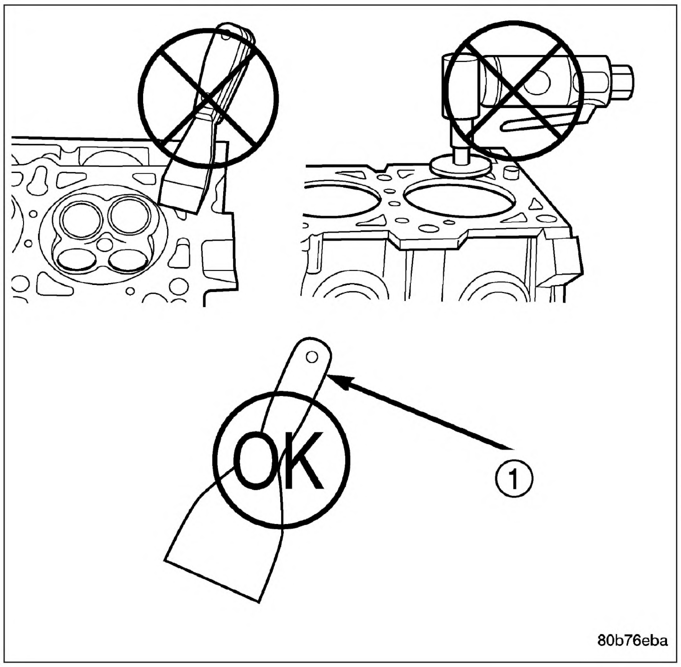
NOTE: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down (2) the bolts should be replaced.

Necking can be checked by holding a straight edge against the threads. If all the threads do not contact the scale, the bolt should be replaced.



CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use only a wooden or plastic scraper (1).

1. Clean the cylinder head and cylinder block mating surfaces.

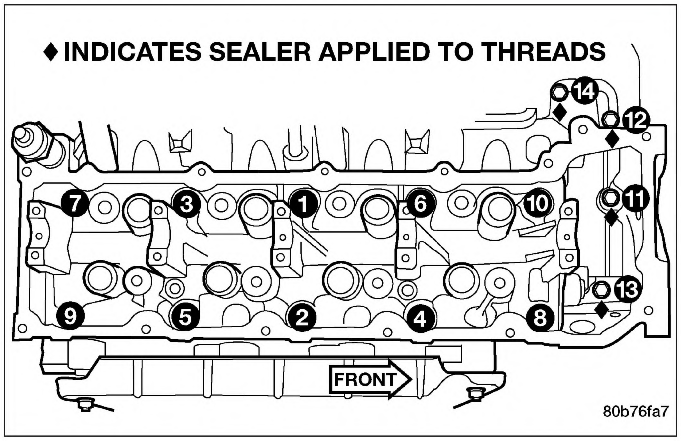


2. Position the new cylinder head gasket on the locating dowels.

CAUTION: When installing cylinder head, use care not damage the tensioner arm or the guide arm.

3. Position the cylinder head onto the cylinder block. Make sure the cylinder head seats fully over the locating dowels.

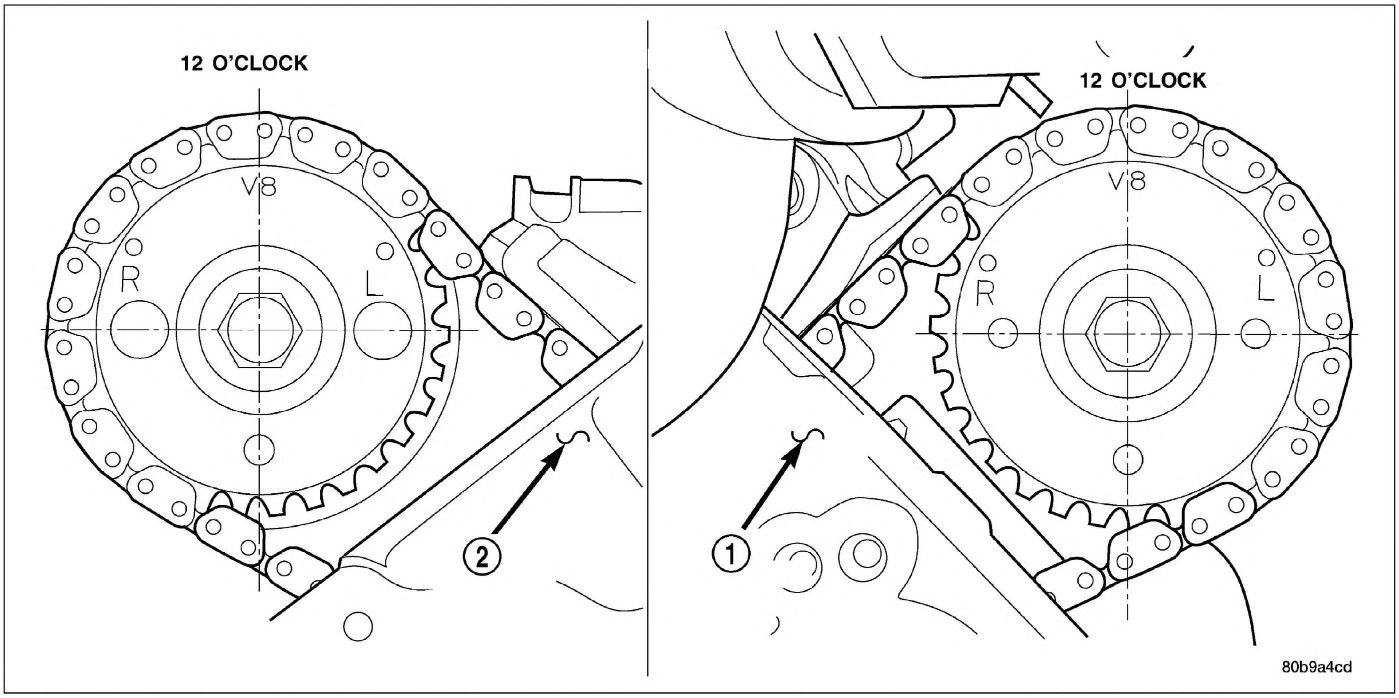
NOTE: The four smaller cylinder head mounting bolts require sealant to be added to them before installing. Failure to do so may cause leaks.



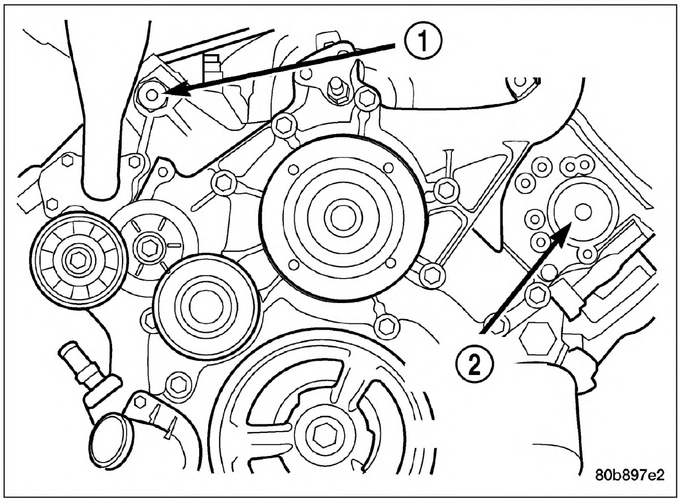
4. Lubricate the cylinder head bolt threads with clean engine oil and install the ten M11 bolts.
5. Coat the four M8 cylinder head bolts with **Mopar® Lock and Seal Adhesive** then install the bolts.

NOTE: The cylinder head bolts are tightened using an angle torque procedure, however, the bolts are not a torque-to-yield design.

6. Tighten the bolts in sequence using the following steps and torque values:
   - Step 1: Tighten bolts 1–10, 20 N·m (15 ft. lbs.).
   - Step 2: Tighten bolts 1–10, 47 N·m (35 ft. lbs.). Tighten bolts 11–14, 25 N·m (18 ft. lbs.).
   - Step 3: Tighten bolts 1–10, 90 degrees. Tighten bolts 11–14, 30 N·m (22 ft. lbs.).

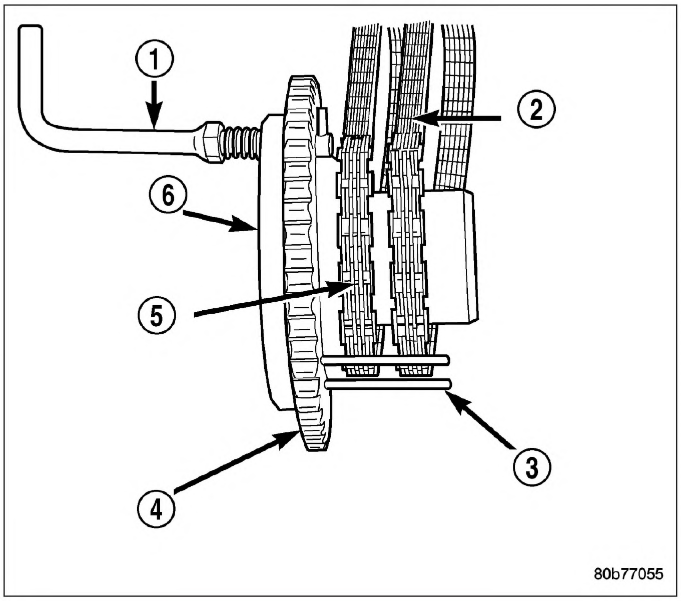


7. Position the secondary chain onto the camshaft drive gear, making sure one marked chain link is on either side of the V8 mark on the gear and position the gear onto the camshaft.
8. Install the camshaft drive gear retaining bolt.
9. Install the left side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

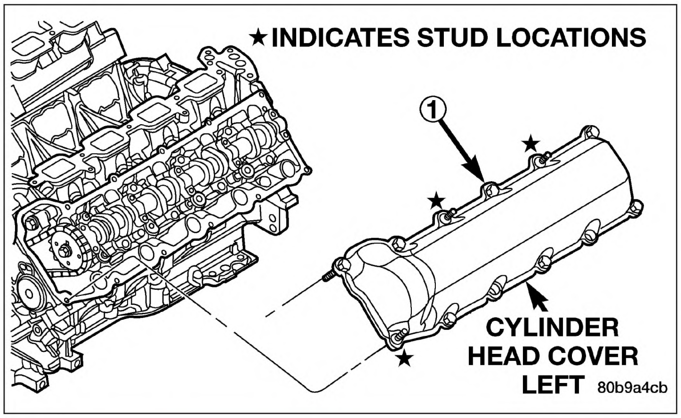


10. Install the cylinder head access plug (2).
11. Re-set and Install the left side secondary chain tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

12. Remove Special Tool 8515 (6).
13. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
14. Install the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
15. Install the power steering pump.
16. Install the fan blade assembly and fan shroud (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - INSTALLATION).



17. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
18. Reinstall the master cylinder and booster assembly. Refer to section 5 brakes.
19. Install the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
20. Refill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
21. Raise the vehicle.
22. Install the exhaust pipe onto the left exhaust manifold.
23. Lower the vehicle.
24. Connect the negative cable to the battery.
25. Start the engine and check for leaks.



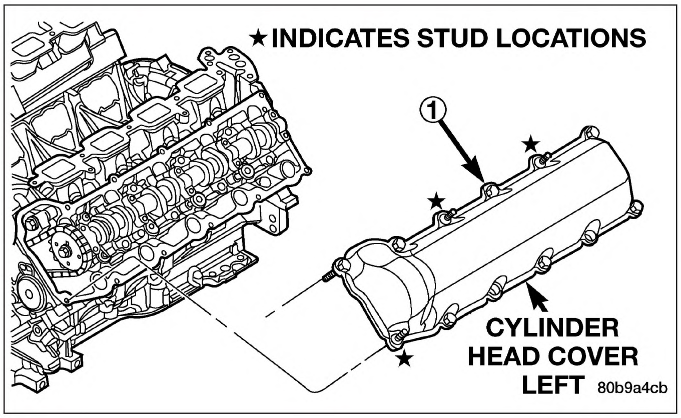
CAMSHAFT - LEFT

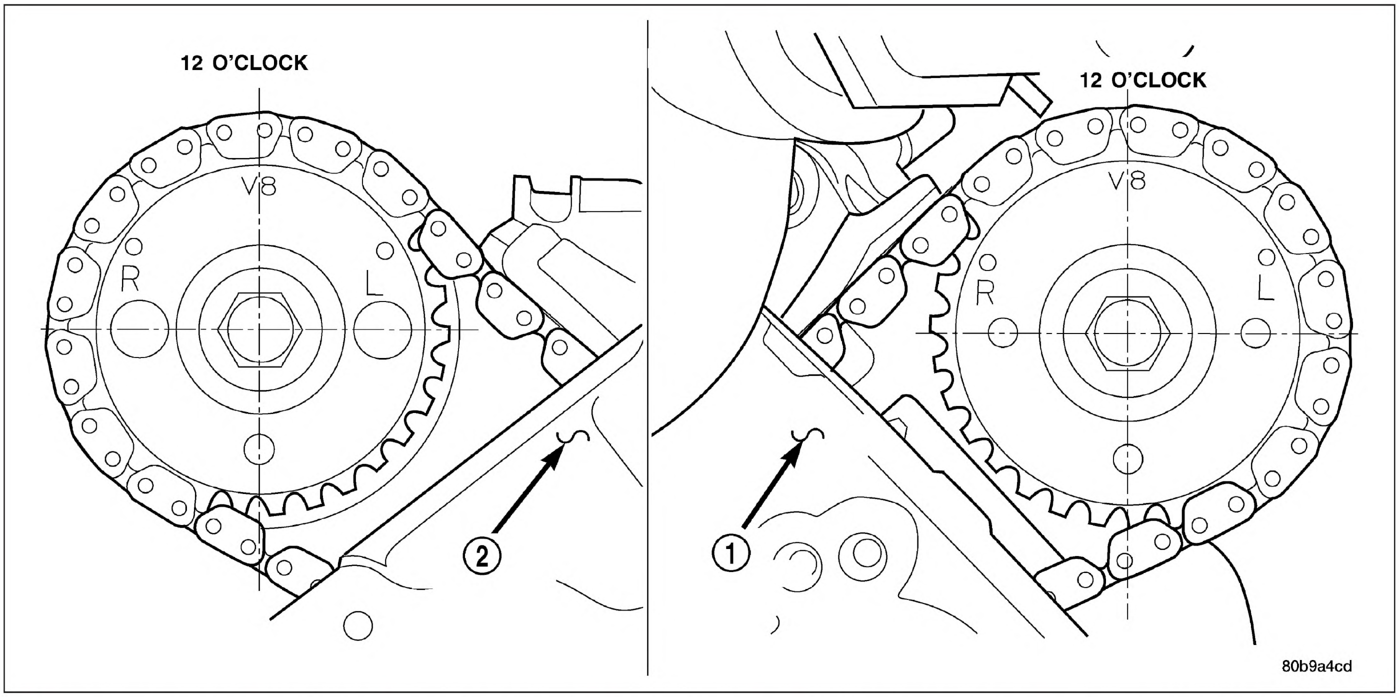
DESCRIPTION

The camshafts consist of powdered metal steel lobes which are sinter-bonded to a steel tube. A steel post or nose piece is friction-welded to the steel camshaft tube. Five bearing journals are machined into the camshaft, four on the steel tube and one on the steel nose piece. Camshaft end play is controlled by two thrust walls that border the nose piece journal. Engine oil enters the hollow camshafts at the third journal and lubricates every intake lobe rocker through a drilled passage in the intake lobe.

REMOVAL

1. Remove cylinder head cover (1) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).





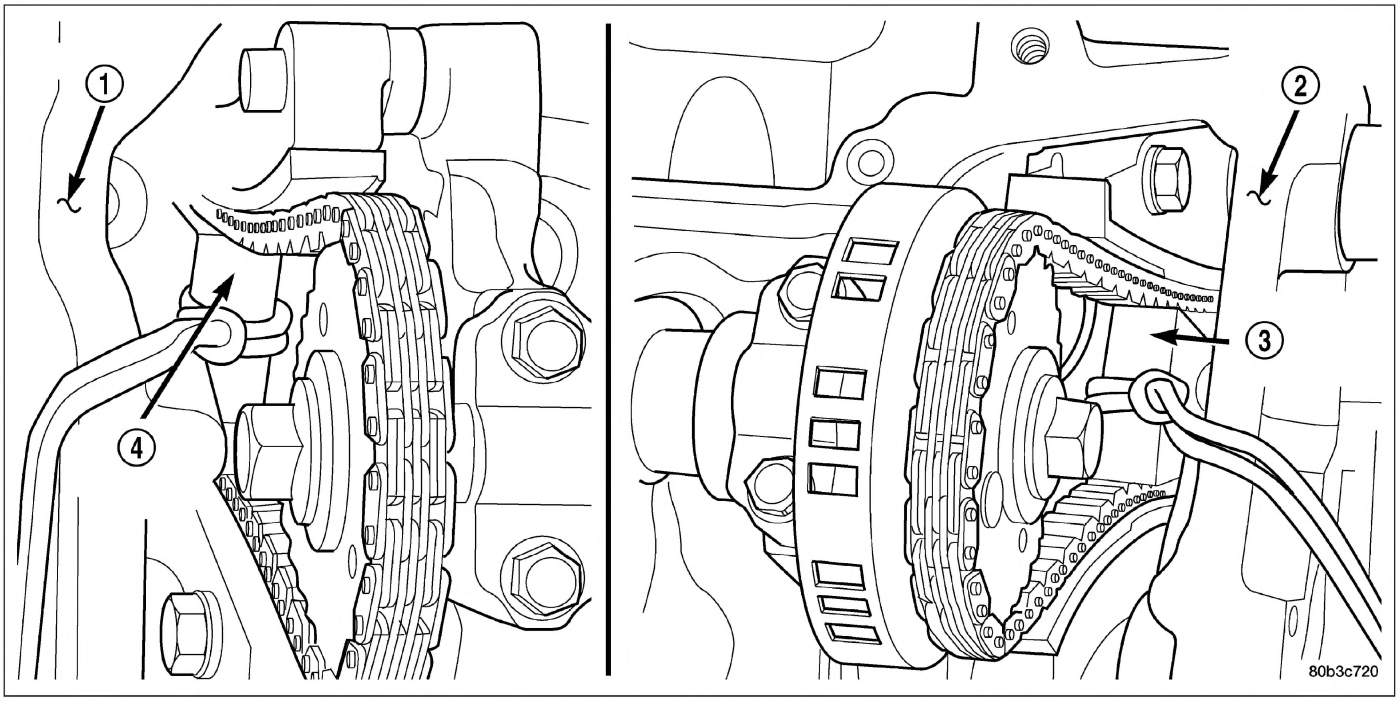
CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT forcefully rotate the camshafts or crankshaft independently of each other. Severe valve and/or piston damage can occur.

CAUTION: When removing the cam sprocket, timing chains or camshaft, Failure to use Special Tool 8350 will result in hydraulic tensioner ratchet over extension, requiring timing chain cover removal to reset the tensioner ratchet.

2. Set engine to TDC cylinder #1, camshaft sprocket V8 marks at the 12 o'clock position (1).
3. Mark one link on the secondary timing chain on both sides of the V8 mark on the camshaft sprocket to aid in installation.

CAUTION: Do not hold or pry on the camshaft target wheel (Located on the right side camshaft sprocket) for any reason, Severe damage will occur to the target wheel resulting in a vehicle no start condition.

4. Loosen but **DO NOT** remove the camshaft sprocket retaining bolt. Leave the bolt snug against the sprocket.



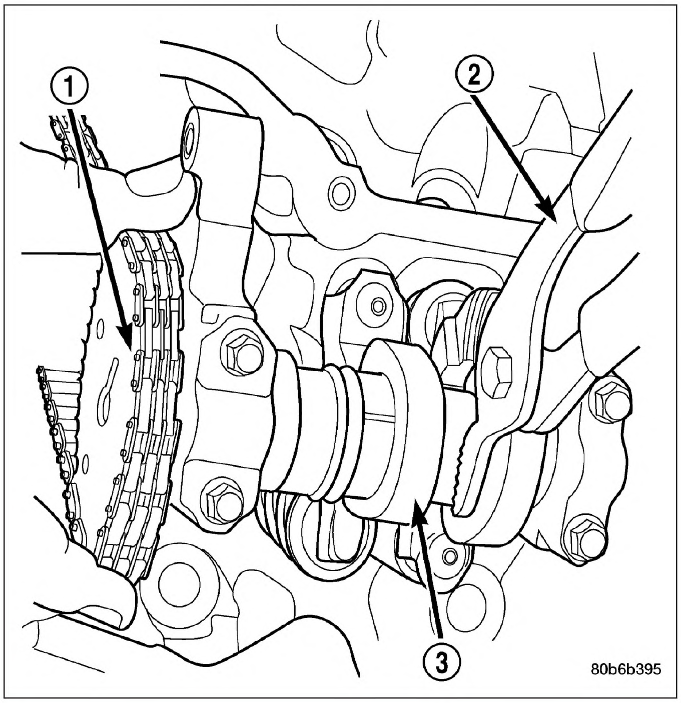
NOTE: The timing chain tensioners must be secured prior to removing the camshaft sprockets. Failure to secure tensioners will allow the tensioners to extend, requiring timing chain cover removal in order to reset tensioners.

CAUTION: Do not force wedge past the narrowest point between the chain strands. Damage to the tensioners may occur.

5. Position Special Tool 8350 (4) timing chain wedge between the timing chain strands, tap the tool to securely wedge the timing chain against the tensioner arm and guide.

NOTE: When gripping the camshaft, place the pliers on the tube portion of the camshaft only. Do not grip the lobes or the sprocket areas.

6. Hold the camshaft (3) with adjustable pliers (2) while removing the camshaft sprocket bolt and sprocket (1).
7. Using the pliers, gently allow the camshaft to rotate 15° clockwise until the camshaft is in the neutral position (no valve load).

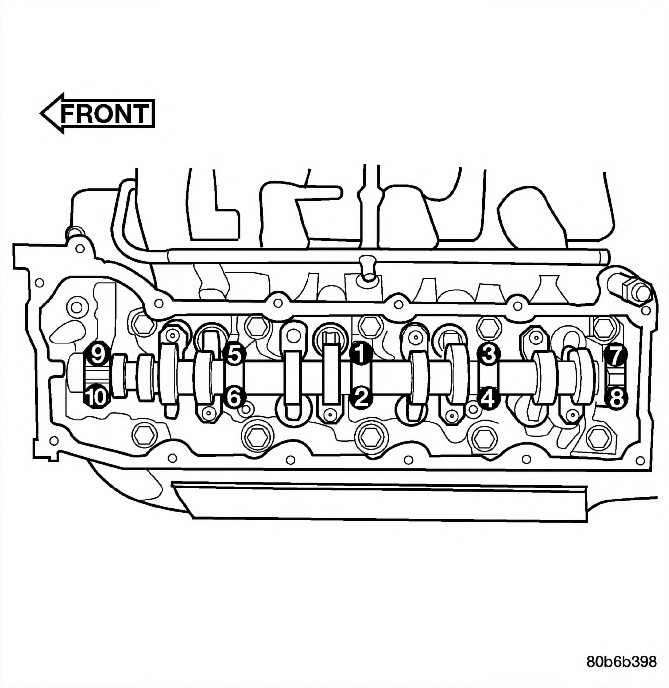


8. Starting at the outside working inward, loosen the camshaft bearing cap retaining bolts 1/2 turn at a time. Repeat until all load is off the bearing caps.

CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS. SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.

NOTE: When the camshaft is removed the rocker arms may slide downward, mark the rocker arms before removing camshaft.

9. Remove the camshaft bearing caps and the camshaft.

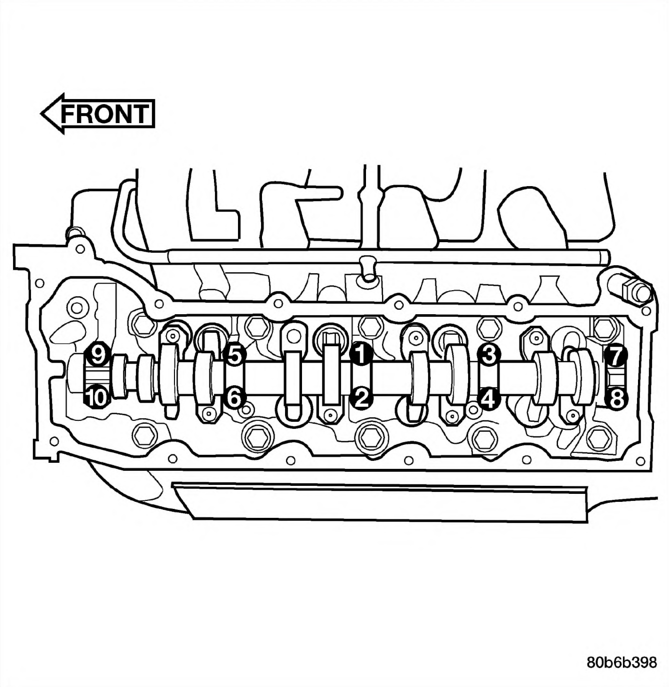


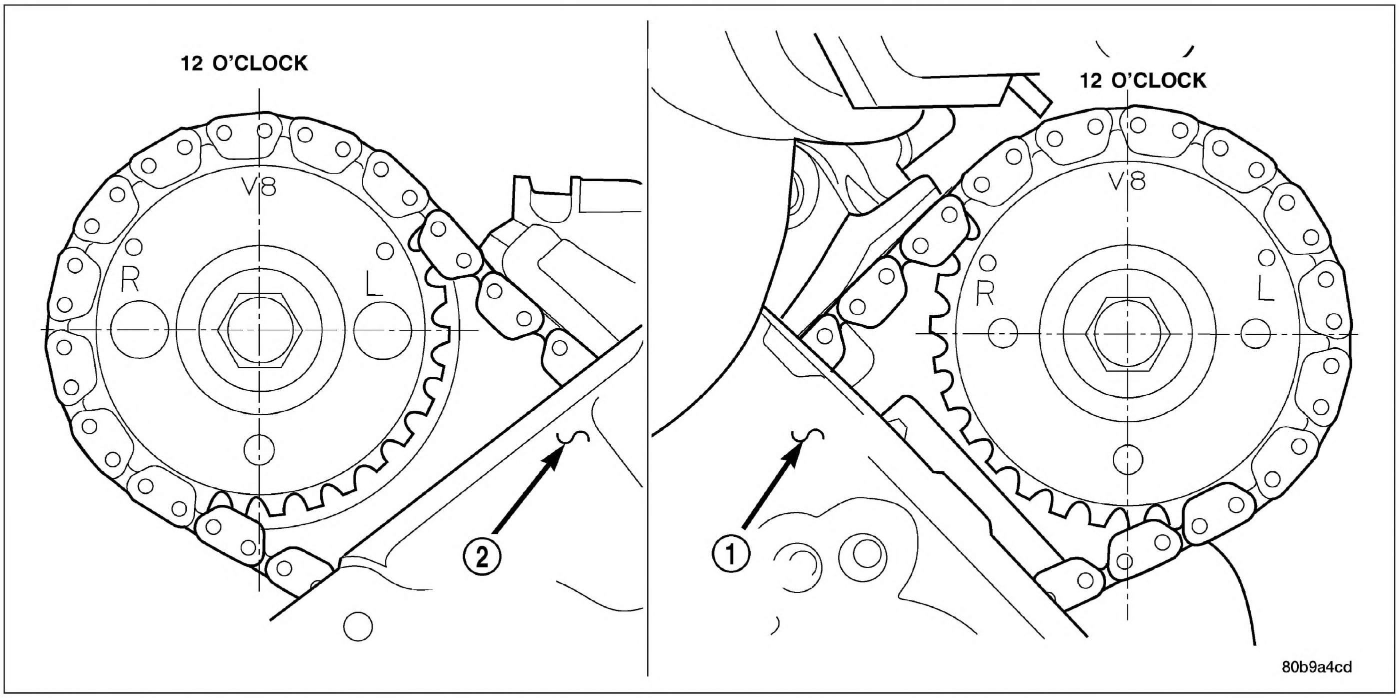
INSTALLATION

1. Lubricate camshaft journals with clean engine oil.

NOTE: Position the left side camshaft so that the camshaft sprocket dowel is near the 1 o'clock position, This will place the camshaft at the neutral position easing the installation of the camshaft bearing caps.

2. Position the camshaft into the cylinder head.
3. Install the camshaft bearing caps, hand tighten the retaining bolts.
4. Working in ½ turn increments, tighten the bearing cap retaining bolts starting with the middle cap working outward.
5. Torque the camshaft bearing cap retaining bolts to 11 N·m (100 in. lbs.).





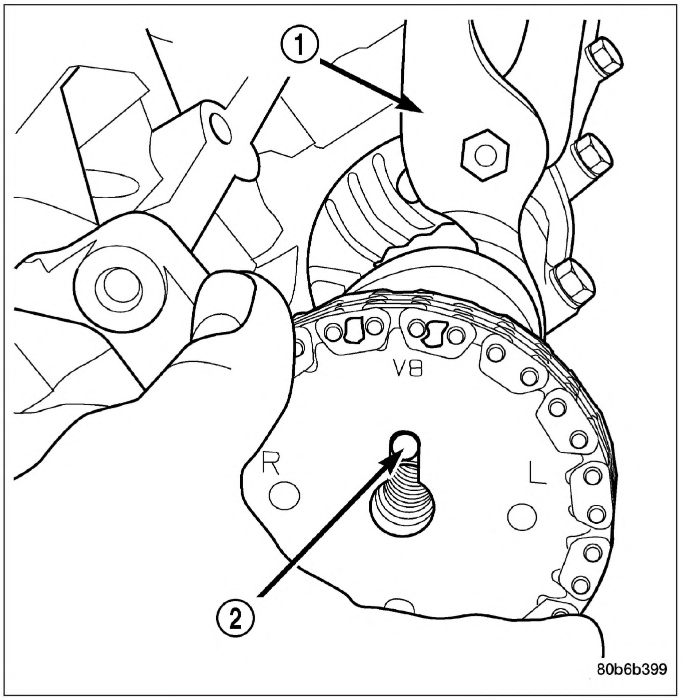
6. Position the camshaft drive gear into the timing chain aligning the V8 mark between the two marked chain links (Two links marked during removal) (1).

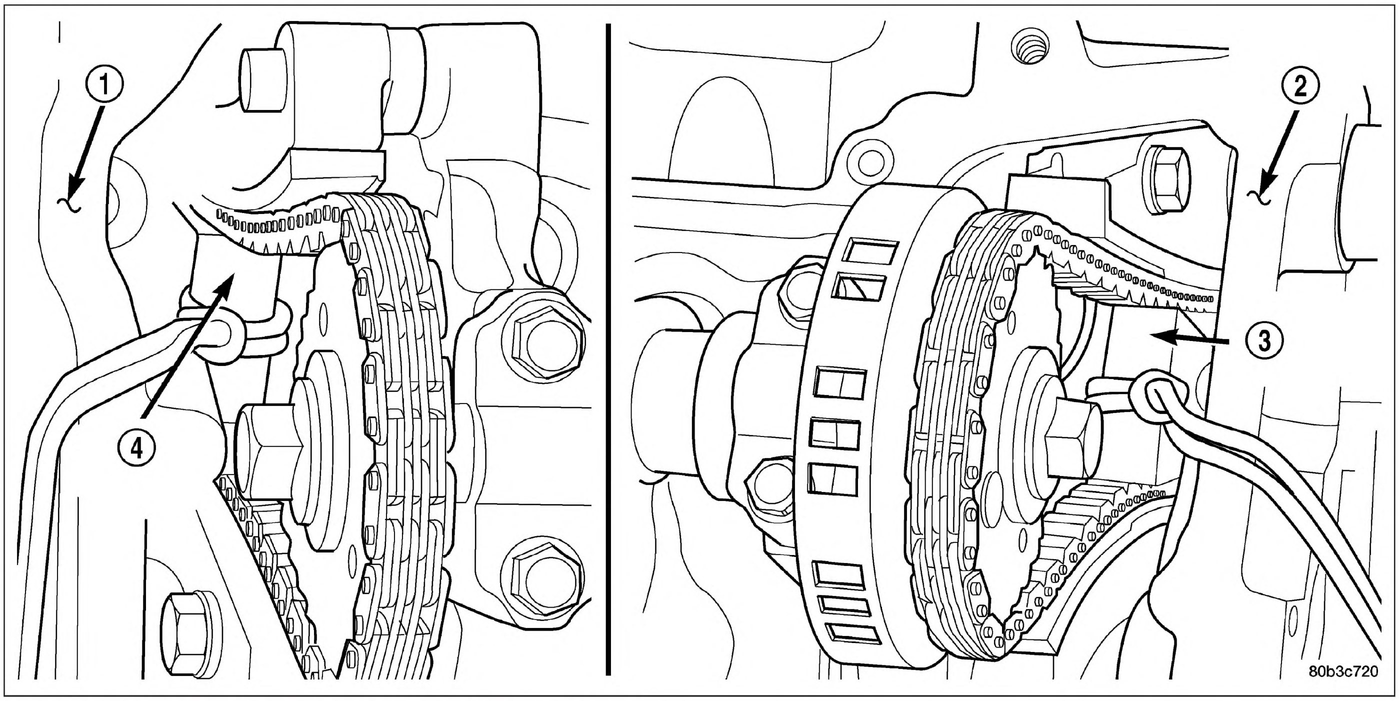
NOTE: When gripping the camshaft, place the pliers on the tube portion of the camshaft only. Do not grip the lobes or the sprocket areas.

7. Using the adjustable pliers (1), rotate the camshaft until the camshaft sprocket dowel (2) is aligned with the slot in the camshaft sprocket. Install the sprocket onto the camshaft.

CAUTION: Remove excess oil from camshaft sprocket bolt. Failure to do so can cause bolt over-torque resulting in bolt failure.

8. Remove excess oil from bolt, then install the camshaft sprocket retaining bolt and hand tighten.

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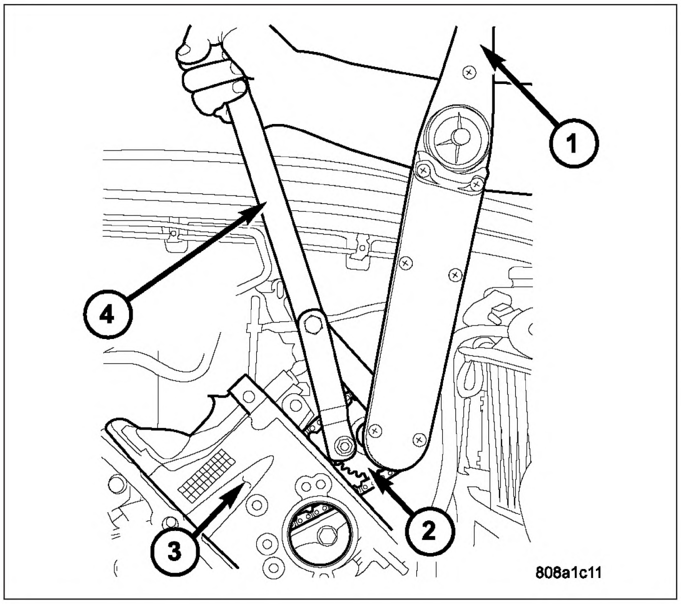
9. Remove Special Tool 8350 timing chain wedge (4).

10. Using Special Tool 6958 spanner wrench (4)with adapter pins 8346, torque the camshaft sprocket retaining bolt (2) to 122 N·m (90 ft. lbs.).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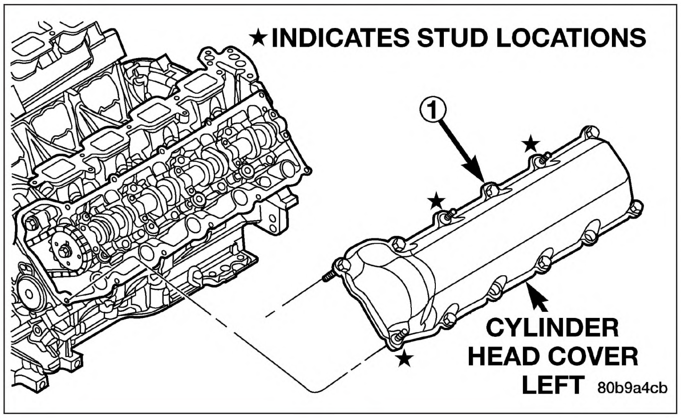
11. Install the cylinder head cover (1).


★INDICATES STUD LOCATIONS
1
CYLINDER HEAD COVER LEFT
80b9a4cb

COVER - CYLINDER HEAD - LEFT

DESCRIPTION

The cylinder head covers are made of injection molded thermo-set plastic, and are not interchangeable from side-to-side. It is imperative that nothing rest on the cylinder head covers. Prolonged contact with other items may wear a hole in the cylinder head cover.

REMOVAL - LEFT SIDE

1. Disconnect negative cable from battery.
2. Remove the resonator assemble and air inlet hose.
3. Disconnect injector connectors and un-clip the injector harness.
4. Route injector harness in front of cylinder head cover.
5. Disconnect the left side breather tube and remove the breather tube.
6. Remove the cylinder head cover mounting bolts.
7. Remove cylinder head cover and gasket.

NOTE: The gasket may be used again, provided no cuts, tears, or deformation has occurred.

CLEANING

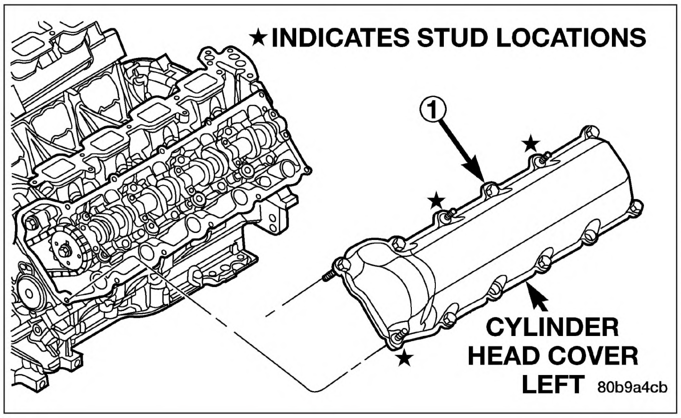
Clean cylinder head cover gasket surface.

Clean head rail, if necessary.

INSTALLATION - LEFT SIDE

CAUTION: Do not use harsh cleaners to clean the cylinder head covers. Severe damage to covers may occur.

1. Clean cylinder head cover and both sealing surfaces. Inspect and replace gasket as necessary.
2. Install cylinder head cover and hand start all fasteners. Verify that all studs are in the correct location shown in.
3. Tighten cylinder head cover bolts (1) and double ended studs to 12 N·m (105 in. lbs.).
4. Install left side breather and connect breather tube.
5. Connect injector electrical connectors and injector harness retaining clips.
6. Install the resonator and air inlet hose.
7. Connect negative cable to battery.



VALVES & SEATS - INTAKE/EXHAUST

DESCRIPTION

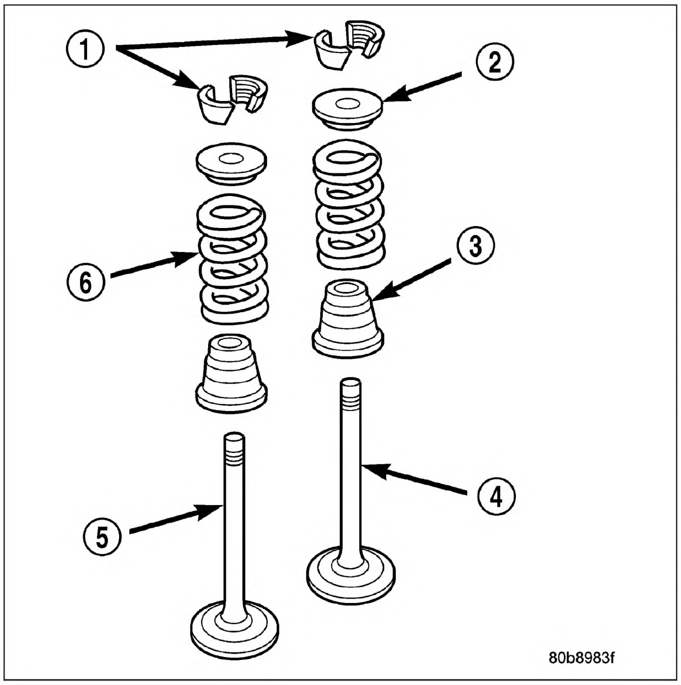
The valves are made of heat resistant steel and have chrome plated stems to prevent scuffing. Each valve is actuated by a roller rocker arm which pivots on a stationary lash adjuster. All valves use three bead lock keepers to retain the springs and promote valve rotation.

STANDARD PROCEDURE - REFACING

NOTE: Valve seats that are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise the cylinder head must be replaced.

NOTE: When refacing valves (4) and valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

1. Using a suitable dial indicator measure the center of the valve seat Total run out must not exceed 0.051 mm (0.002 in).
2. Apply a small amount of Prussian blue to the valve seat, insert the valve into the cylinder head, while applying light pressure on the valve rotate the valve. Remove the valve and examine the valve face. If the blue is transferred below the top edge of the valve face, lower the valve seat using a 15 degree stone. If the blue is transferred to the bottom edge of the valve face, raise the valve seat using a 65 degree stone.



3. When the seat is properly positioned the width of the intake seat must be 1.75 - 2.36 mm (0.0689 - 0.0928 in.) and the exhaust seat must be 1.71 - 2.32 mm (0.0673 - 0.0911 in.).
4. Check the valve spring (6) installed height after refacing the valve and seat. The installed height for both intake and exhaust valve springs must not exceed 40.74 mm (1.6039 in.).
5. The valve seat and valve face must maintain a face angle of 44.5 - 45 ° angle .

REMOVAL

NOTE: The cylinder heads must be removed in order to preform this procedure.

1. Remove rocker arms and lash adjusters. Refer to procedures in this section.

2. Remove the camshaft bearing caps and the camshaft.

NOTE: All eight valve springs and valves are removed in the same manner; this procedure only covers one valve and valve spring.

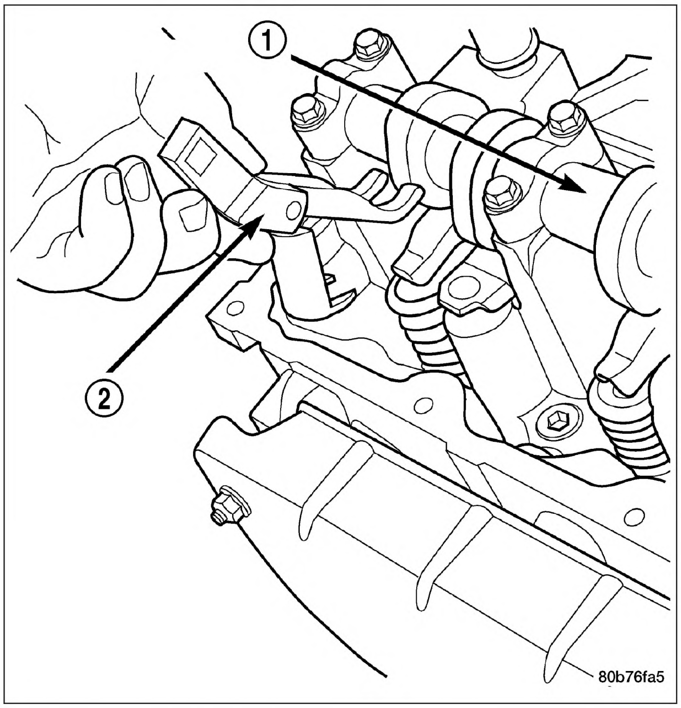
3. Using Special Tool C-3422–B or C-3422–C Valve Spring Compressor and Special tool 8519 Adapter, compress the valve spring.

NOTE: It may be necessary to tap the top of the valve spring to loosen the spring retainers locks enough to be removed.

4. Remove the two spring retainer lock halves.

NOTE: the valve spring is under tension use care when releasing the valve spring compressor.

5. Remove the valve spring compressor.
6. Remove the spring retainer, and the spring.



NOTE: Check for sharp edges on the keeper grooves. Remove any burrs from the valve stem before removing the valve from the cylinder head.

7. Remove the valve from the cylinder head.

NOTE: The valve stem seals are common between intake and exhaust.

8. Remove the valve stem seal. Mark the valve for proper installation.

TESTING VALVE SPRINGS

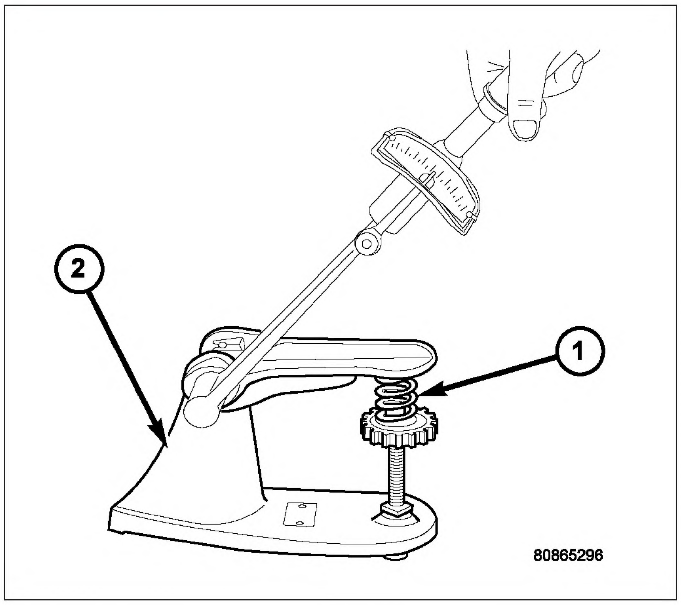
NOTE: Whenever the valves are removed from the cylinder head it is recommended that the valve springs be inspected and tested for reuse.

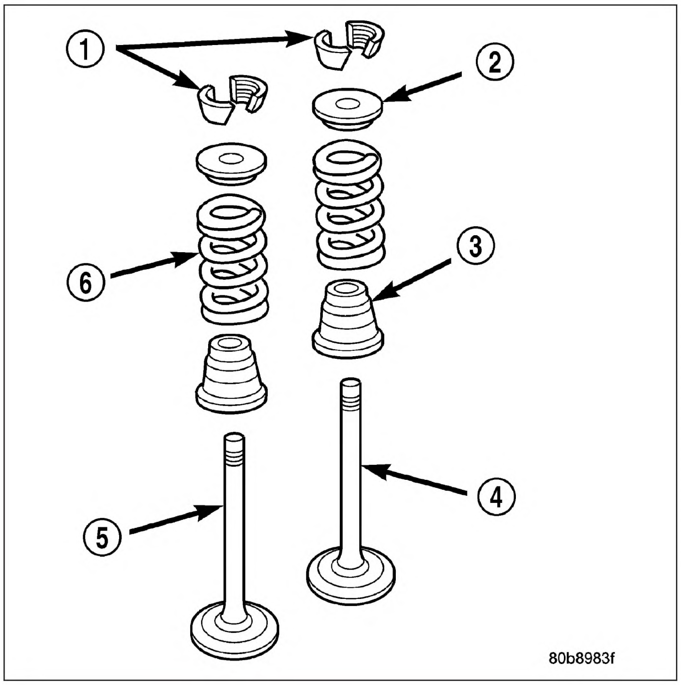
Inspect the valve springs for physical signs of wear or damage. Turn table of tool C-647 until surface is in line with the 40.12 mm (1.579 in.) mark on the threaded stud and the zero mark on the front. Place spring over the stud on the table and lift compressing lever to set tone device. Pull on torque wrench until Ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Specifications Section to obtain specified height and allowable tensions. Replace any springs that do not meet specifications.

INSTALLATION

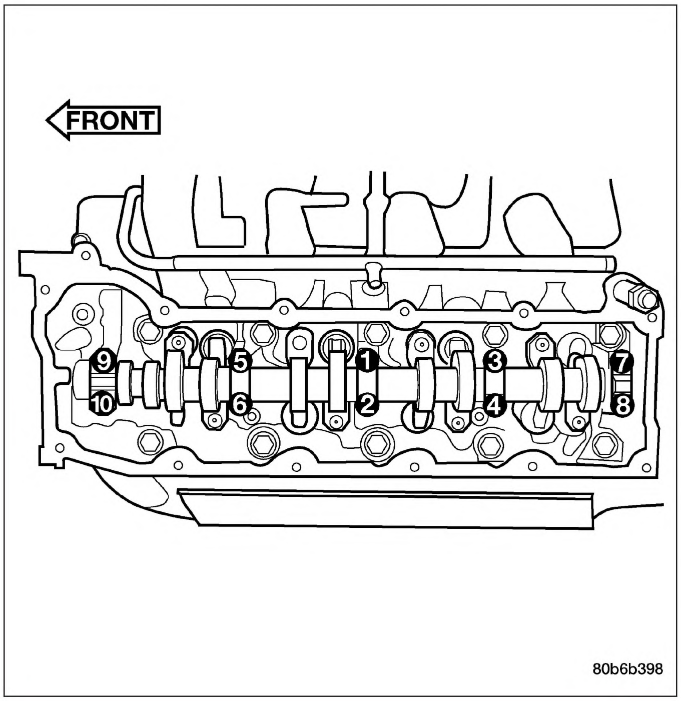
1. coat the valve stem with clean engine oil and insert it into the cylinder head.
2. Install the valve stem seal. make sure the seal is fully seated and that the garter spring at the top of the seal is intact.
3. Install the spring and the spring retainer.
4. Using the valve spring compressor, compress the spring and install the two valve spring retainer halves.
5. Release the valve spring compressor and make sure the two spring retainer halves and the spring retainer are fully seated.

6. lubricate the camshaft journal with clean engine oil then Position the camshaft (with the sprocket dowel on the left camshaft at 11 o'clock and the right camshaft at 12 o'clock), then position the camshaft bearing caps.
7. Install the camshaft bearing cap retaining bolts. Tighten the bolts 9–13 N·m (100 in. lbs.) in ½ turn increments in the sequence shown.





8. Position the hydraulic lash adjusters and rocker arms.



ROCKER ARM - VALVE

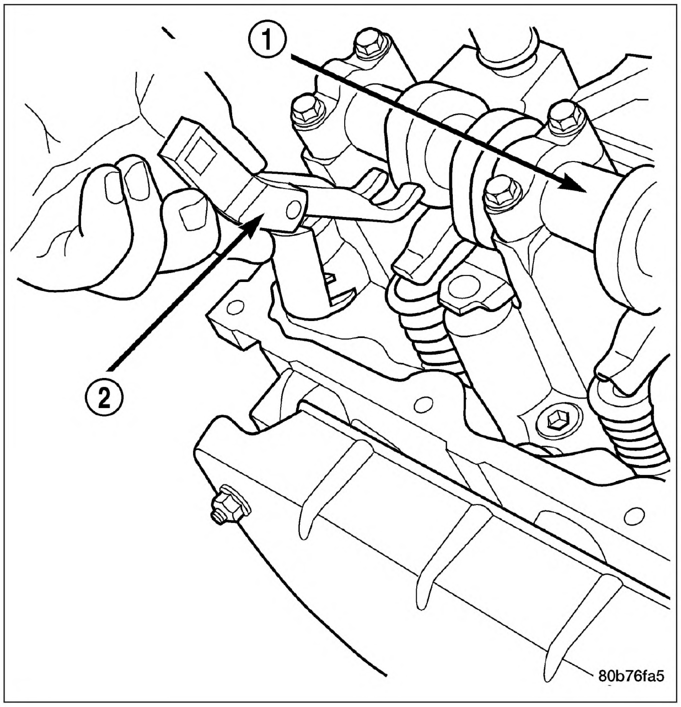
DESCRIPTION

The rocker arms are steel stampings with an integral roller bearing. The rocker arms incorporate a 2.8 mm (0.11 inch) oil hole in the lash adjuster socket for roller and camshaft lubrication.

REMOVAL

NOTE: Disconnect the battery negative cable to prevent accidental starter engagement.

1. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
2. For rocker arm removal on cylinders 3 and 5 Rotate the crankshaft until cylinder #1 is at TDC exhaust stroke.
3. For rocker arm removal on cylinders 2 and 8 Rotate the crankshaft until cylinder #1 is at TDC compression stroke.
4. For rocker arm removal on cylinders 4 and 6 Rotate the crankshaft until cylinder #3 is at TDC compression stroke.
5. For rocker arm removal on cylinders 1 and 7 Rotate the crankshaft until cylinder #2 is at TDC compression stroke.
6. Using special tool 8516 Rocker Arm Remover (2), press downward on the valve spring, remove rocker arm.



INSTALLATION

CAUTION: Make sure the rocker arms are installed with the concave pocket over the lash adjusters. Failure to do so may cause severe damage to the rocker arms and/or lash adjusters.

NOTE: Coat the rocker arms with clean engine oil prior to installation.

1. For rocker arm installation on cylinders 3 and 5 Rotate the crankshaft until cylinder #1 is at TDC exhaust stroke.
2. For rocker arm installation on cylinders 2 and 8 Rotate the crankshaft until cylinder #1 is at TDC compression stroke.
3. For rocker arm installation on cylinders 4 and 6 Rotate the crankshaft until cylinder #3 is at TDC compression stroke.
4. For rocker arm installation on cylinders 1 and 7 Rotate the crankshaft until cylinder #2 is at TDC compression stroke.
5. Using special tool 8516 press downward on the valve spring, install rocker arm.
6. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

SPRINGS - VALVE

DESCRIPTION

The valve springs are made from high strength chrome silicon steel. The springs are common for intake and exhaust applications,**except for the 4.7L H.O. which has unique intake and exhaust springs**. The valve spring seat is integral with the valve stem seal, which is a positive type seal to control lubrication.

SEALS-VALVE GUIDE

DESCRIPTION

The valve stem seals are made of rubber and incorporate an integral steel valve spring seat. The integral garter spring maintains consistent lubrication control to the valve stems.

CYLINDER HEAD - RIGHT

DESCRIPTION

DESCRIPTION - CYLINDER HEAD

The cylinder heads are made of an aluminum alloy. The cylinder head features two valves per cylinder with pressed in powdered metal valve guides. The cylinder heads also provide enclosures for the timing chain drain, necessitating unique left and right cylinder heads.

DESCRIPTION - VALVE GUIDES

The valve guides are made of powered metal and are pressed into the cylinder head. The guides are not replaceable or serviceable, and valve guide reaming is not recommended. If the guides are worn beyond acceptable limits, replace the cylinder heads.

DIAGNOSIS AND TESTING

CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester’s pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

DIAGNOSIS AND TESTING - HYDRAULIC LASH ADJUSTER

A tappet-like noise may be produced from several items. Check the following items.

1. Engine oil level too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.
2. Insufficient running time after rebuilding cylinder head. Low speed running up to 1 hour may be required.
3. Turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
4. Low oil pressure.
5. The oil restrictor in cylinder head gasket or the oil passage to the cylinder head is plugged with debris.
6. Air ingested into oil due to broken or cracked oil pump pick up.
7. Worn valve guides.
8. Rocker arm ears contacting valve spring retainer.
9. Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.
10. Oil leak or excessive cam bore wear in cylinder head.
11. Faulty lash adjuster.

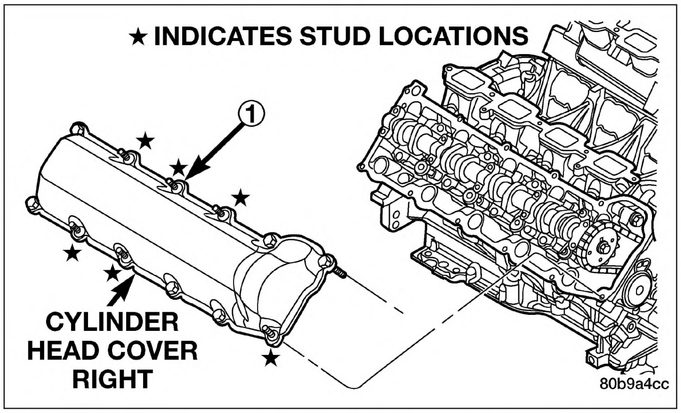
a. Check lash adjusters for sponginess while installed in cylinder head and cam on camshaft at base circle. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Spongy adjusters can be bottomed out easily.

b. Remove suspected lash adjusters, and replace.

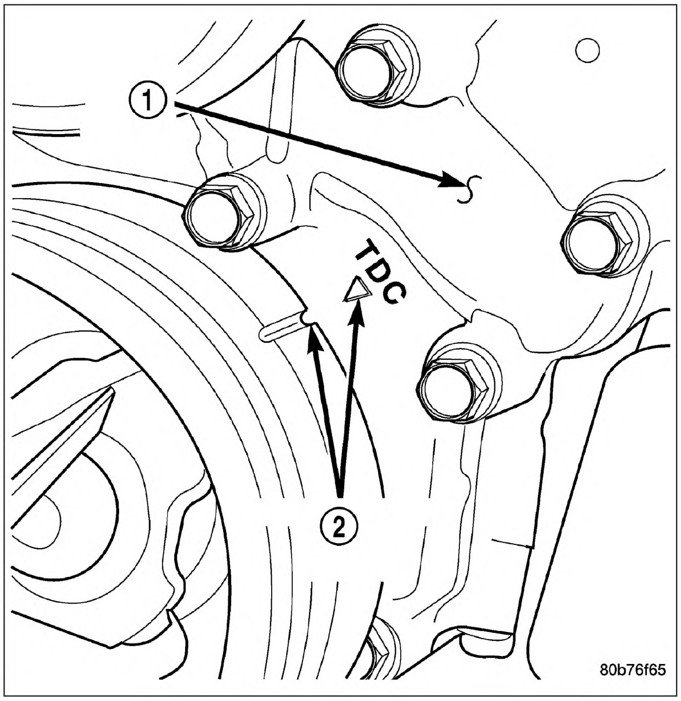
c. Before installation, make sure adjusters are at least partially full of oil. This can be verified by little or no plunger travel when lash adjuster is depressed.

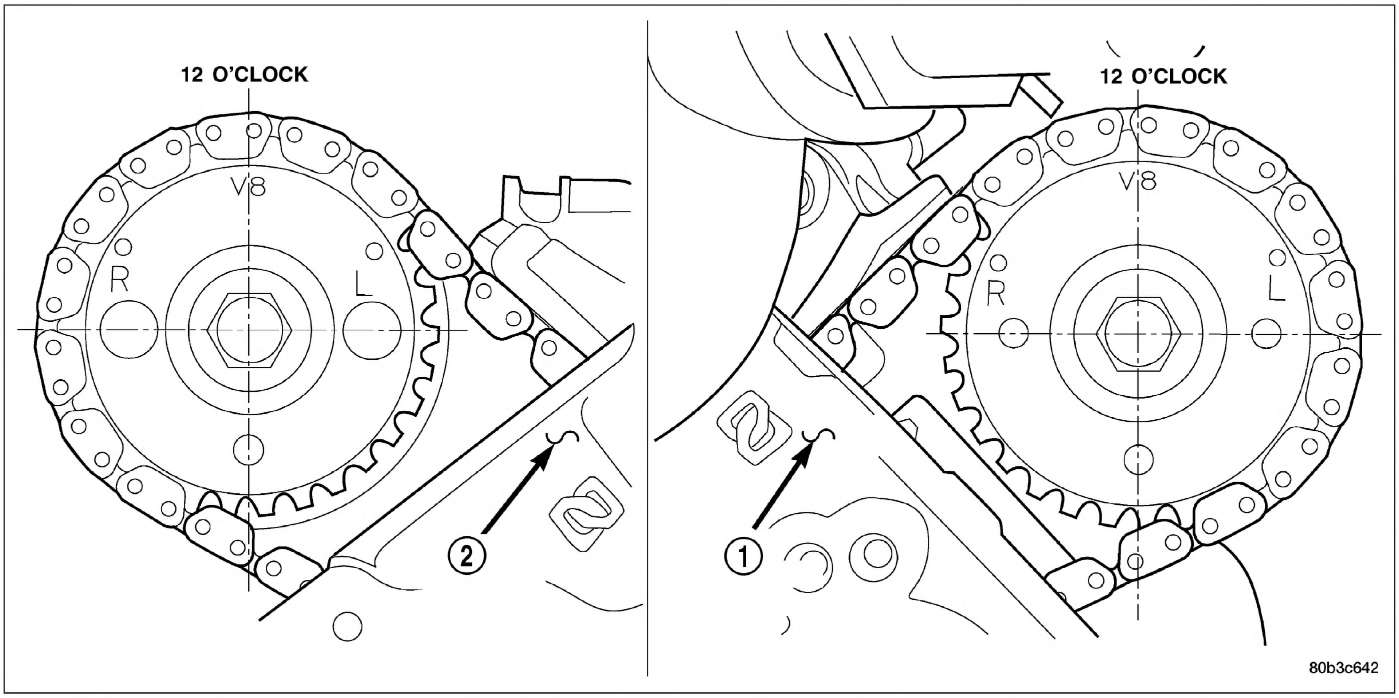
REMOVAL - RIGHT CYLINDER HEAD

1. Disconnect battery negitive cable.
2. Raise the vehicle on a hoist.
3. Disconnect the exhaust pipe at the right side exhaust manifold.
4. Drain the engine coolant (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Lower the vehicle.
6. Remove the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
7. Remove the cylinder head cover (1) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).



8. Remove the fan shroud (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - REMOVAL).
9. Remove oil fill housing from cylinder head.
10. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
11. Rotate the crankshaft until the damper timing mark is aligned with TDC indicator mark (2).



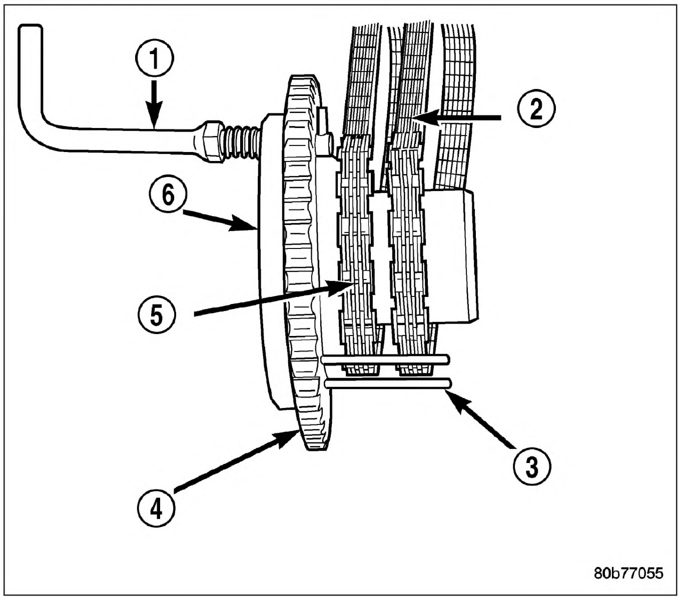


12. Verify the V8 mark on the camshaft sprocket is at the 12 o'clock position (2). Rotate the crankshaft one turn if necessary.
13. Remove the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
14. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

15. Lock the secondary timing chains to the idler sprocket using Special Tool 8515 (6).

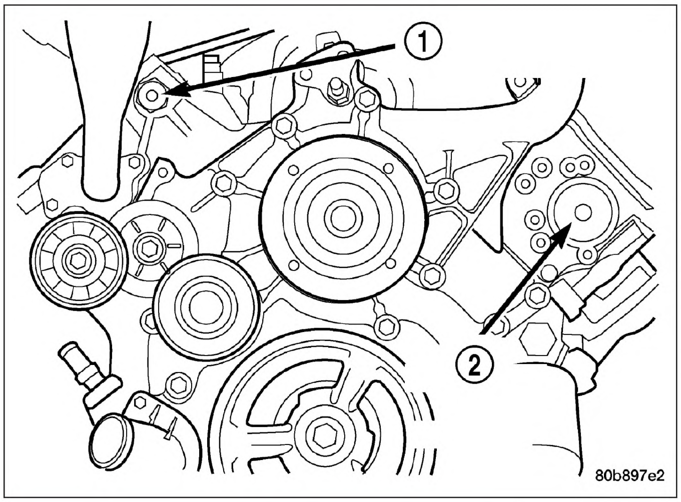
NOTE: Mark the secondary timing chain prior to removal to aid in installation.

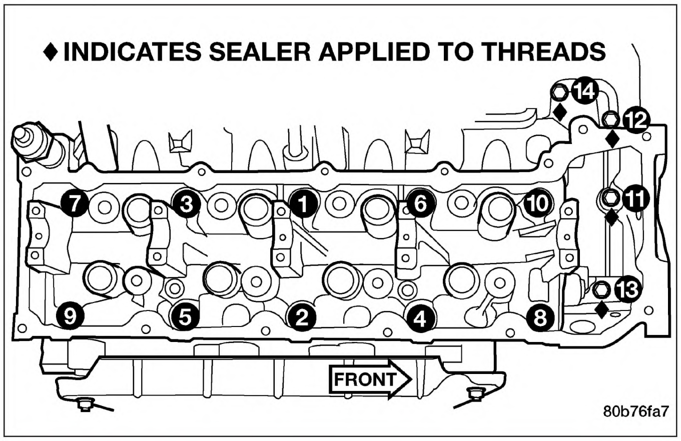
16. Mark the secondary timing chain, one link on each side of the V8 mark on the camshaft drive gear.
17. Remove the right side secondary chain tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).



18. Remove the cylinder head access plug (1).
19. Remove the right side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
20. Remove the retaining bolt and the camshaft drive gear.

CAUTION: Do not allow the engine to rotate. severe damage to the valve train can occur.





CAUTION: Do not overlook the four smaller bolts at the front of the cylinder head. Do not attempt to remove the cylinder head without removing these four bolts.

CAUTION: Do not hold or pry on the camshaft target wheel for any reason. A damaged target wheel can result in a vehicle no start condition.

NOTE: The cylinder head is attached to the cylinder block with fourteen bolts.

21. Remove the cylinder head retaining bolts using the sequence provided.
22. Remove the cylinder head and gasket. Discard the gasket.

CAUTION: Do not lay the cylinder head on its gasket sealing surface, do to the design of the cylinder head gasket any distortion to the cylinder head sealing surface may prevent the gasket from properly sealing resulting in leaks.

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

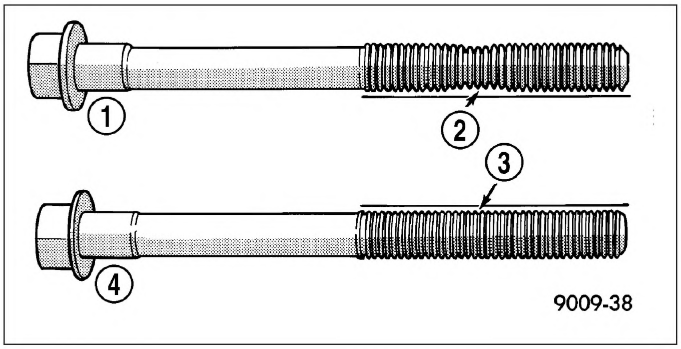
INSPECTION

1. Inspect the cylinder head for out-of-flatness, using a straightedge and a feeler gauge. If tolerances exceed 0.0508 mm (0.002 in.) replace the cylinder head.
2. Inspect the valve seats for damage. Service the valve seats as necessary.
3. Inspect the valve guides for wear, cracks or looseness. If either condition exist, replace the cylinder head.

INSTALLATION - RIGHT CYLINDER HEAD

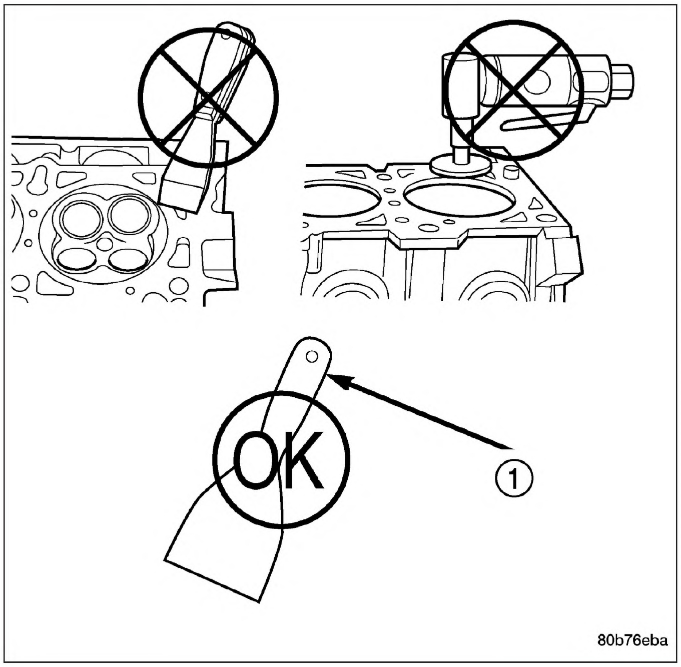
NOTE: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down (2) the bolts should be replaced.

Necking (2) can be checked by holding a straight edge against the threads. If all the threads do not contact the scale (2), the bolt should be replaced.



CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use only a wooden or plastic scraper (1).

1. Clean the cylinder head and cylinder block mating surfaces.

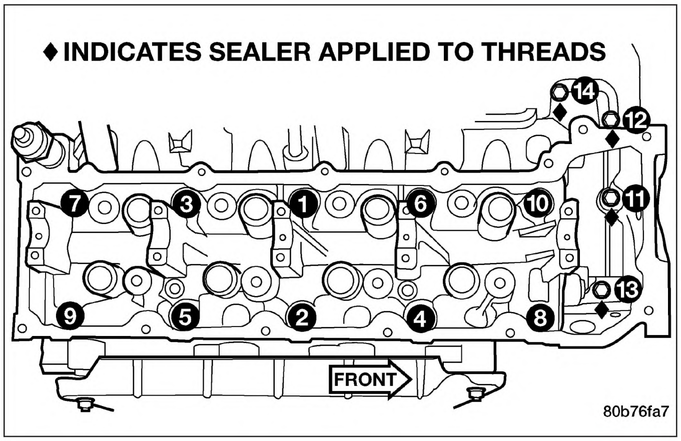


2. Position the new cylinder head gasket on the locating dowels.

CAUTION: When installing cylinder head, use care not damage the tensioner arm or the guide arm.

3. Position the cylinder head onto the cylinder block. Make sure the cylinder head seats fully over the locating dowels.

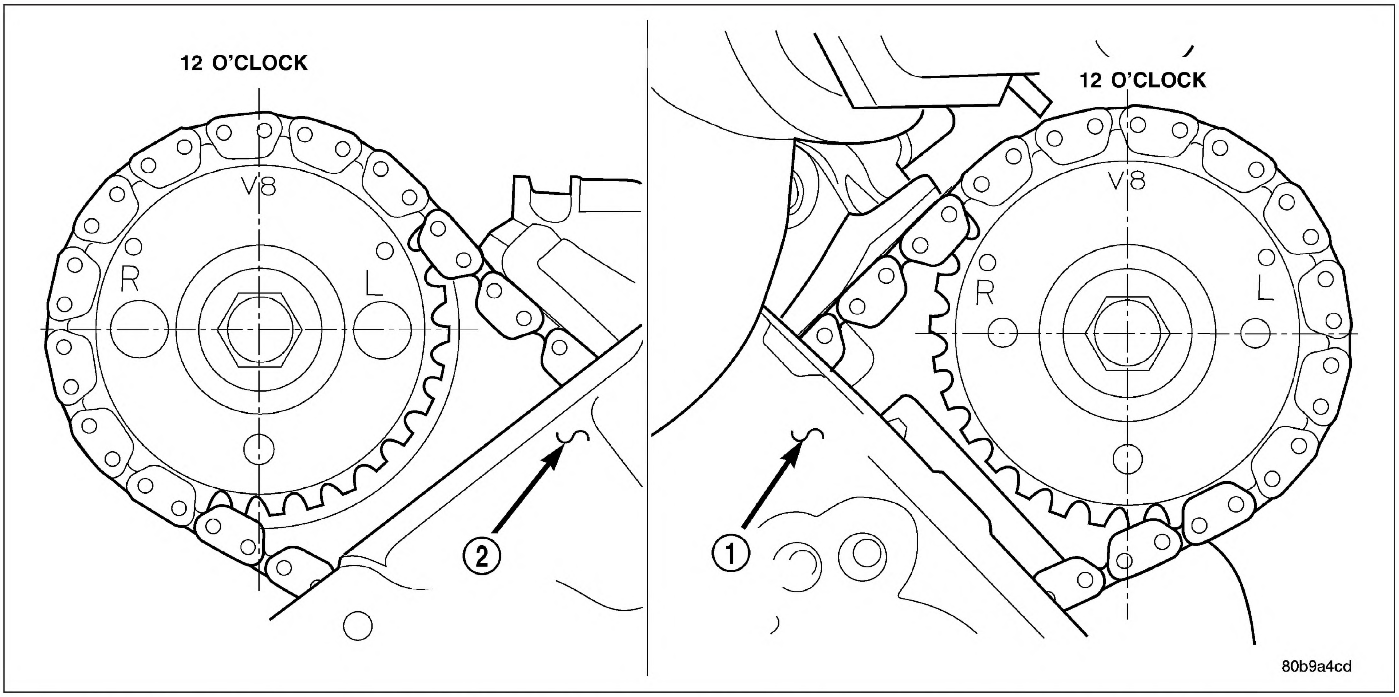
NOTE: The four smaller cylinder head mounting bolts require sealant to be added to them before installing. Failure to do so may cause leaks.



4. Lubricate the cylinder head bolt threads with clean engine oil and install the ten M10 bolts.
5. Coat the four M8 cylinder head bolts with **Mopar® Lock and Seal Adhesive** then install the bolts.

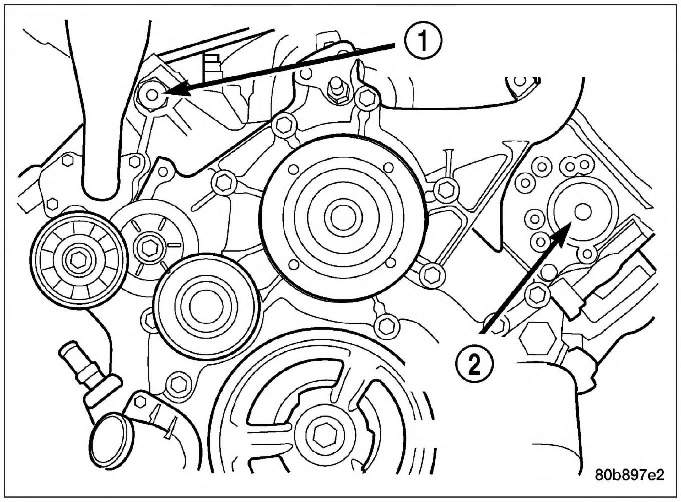
NOTE: The cylinder head bolts are tightened using an angle torque procedure, however, the bolts are not a torque-to-yield design.

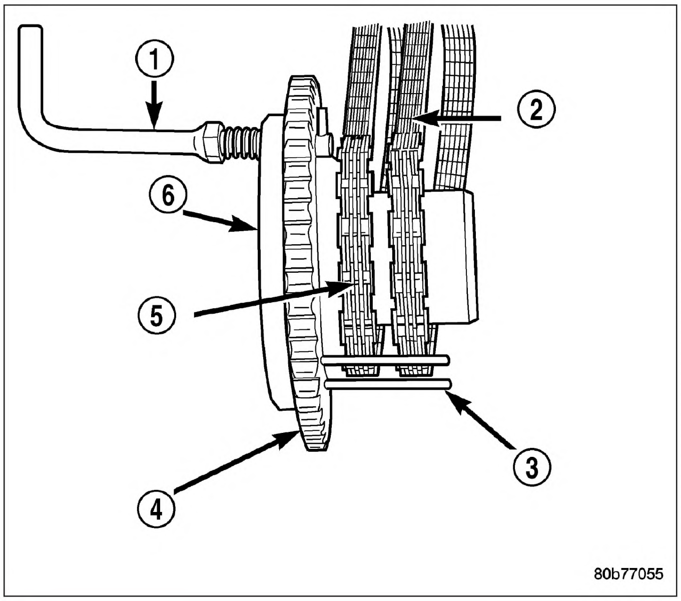
6. Tighten the bolts in sequence using the following steps and torque values:
   - Step 1: Tighten bolts 1–10, 20 N·m (15 ft. lbs.).
   - Step 2: Tighten bolts 1–10, 47 N·m (35 ft. lbs.). Tighten bolts 11–14, 25 N·m (18 ft. lbs.).
   - Step 3: Tighten bolts 1–10, 90 degrees. Tighten bolts 11–14, 30 N·m (22 ft. lbs.).



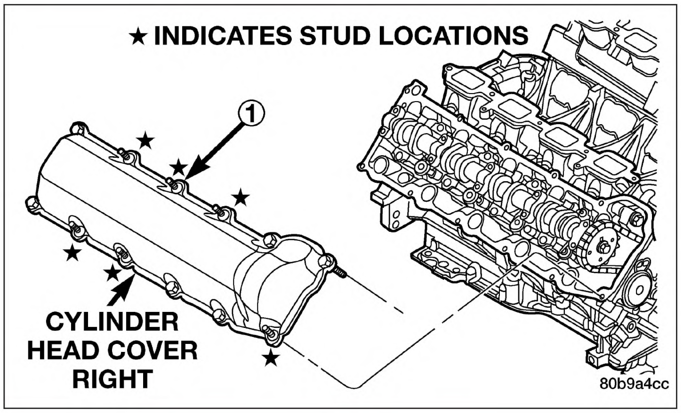
7. Position the secondary chain onto the camshaft drive gear, making sure one marked chain link is on either side of the V8 mark on the gear (2) and position the gear onto the camshaft.
8. Install the camshaft drive gear retaining bolt.
9. Install the right side secondary chain guide (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

10. Install the right side cylinder head access plug (1).
11. Re-set and install the right side secondary chain tensioner.





12. Remove Special Tool 8515 (6).
13. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
14. Install the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
15. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
16. Install the fan shroud.



17. Install the cylinder head cover (1) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
18. Install the intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
19. Install oil fill housing onto cylinder head.
20. Refill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
21. Raise the vehicle.
22. Install the exhaust pipe onto the right exhaust manifold.
23. Lower the vehicle.
24. Reconnect battery negitive cable.

25. Start the engine and check for leaks.

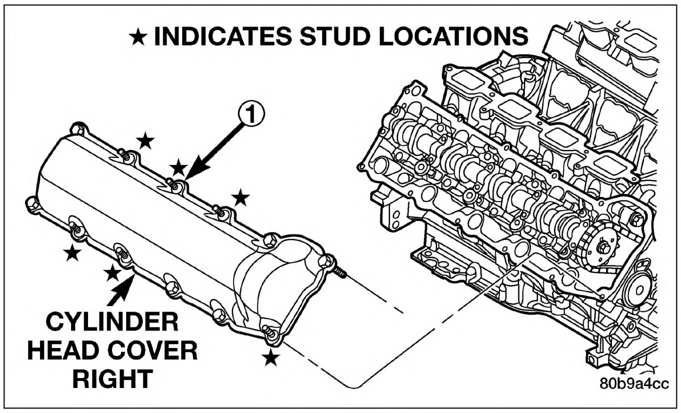
CAMSHAFT - RIGHT

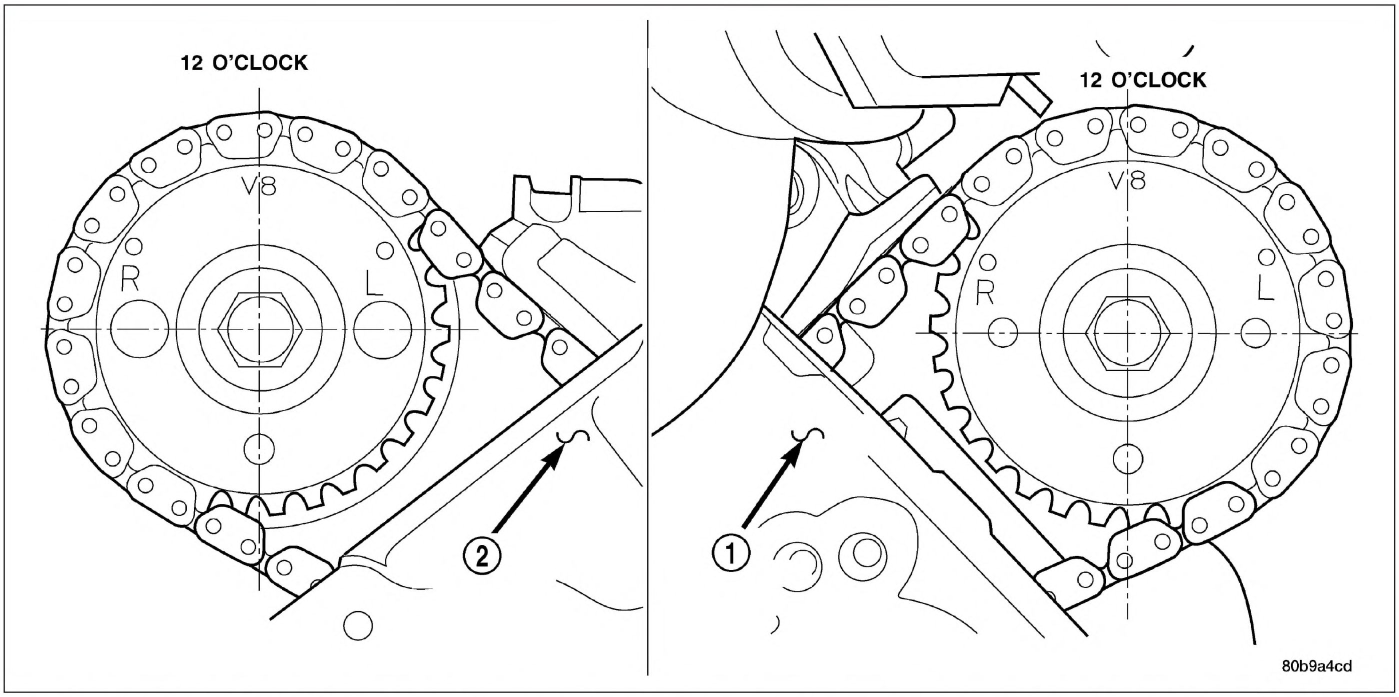
DESCRIPTION

The camshafts consist of powdered metal steel lobes which are sinter-bonded to a steel tube. A steel post or nose piece is friction-welded to the steel camshaft tube. Five bearing journals are machined into the camshaft, four on the steel tube and one on the steel nose piece. Camshaft end play is controlled by two thrust walls that border the nose piece journal. Engine oil enters the hollow camshafts at the third journal and lubricates every intake lobe rocker through a drilled passage in the intake lobe.

REMOVAL

1. Remove the cylinder head covers (1) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).


★ INDICATES STUD LOCATIONS
1
CYLINDER HEAD COVER RIGHT
80b9a4cc


12 O'CLOCK
V8
R
L
2
12 O'CLOCK
V8
R
L
1
80b9a4cd

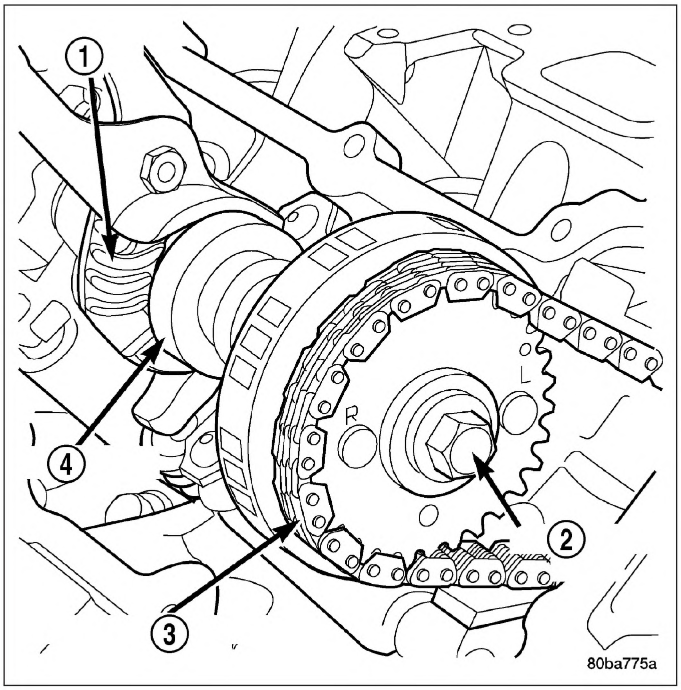
CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT forcefully rotate the camshafts or crankshaft independently of each other. Severe valve and/or piston damage can occur.

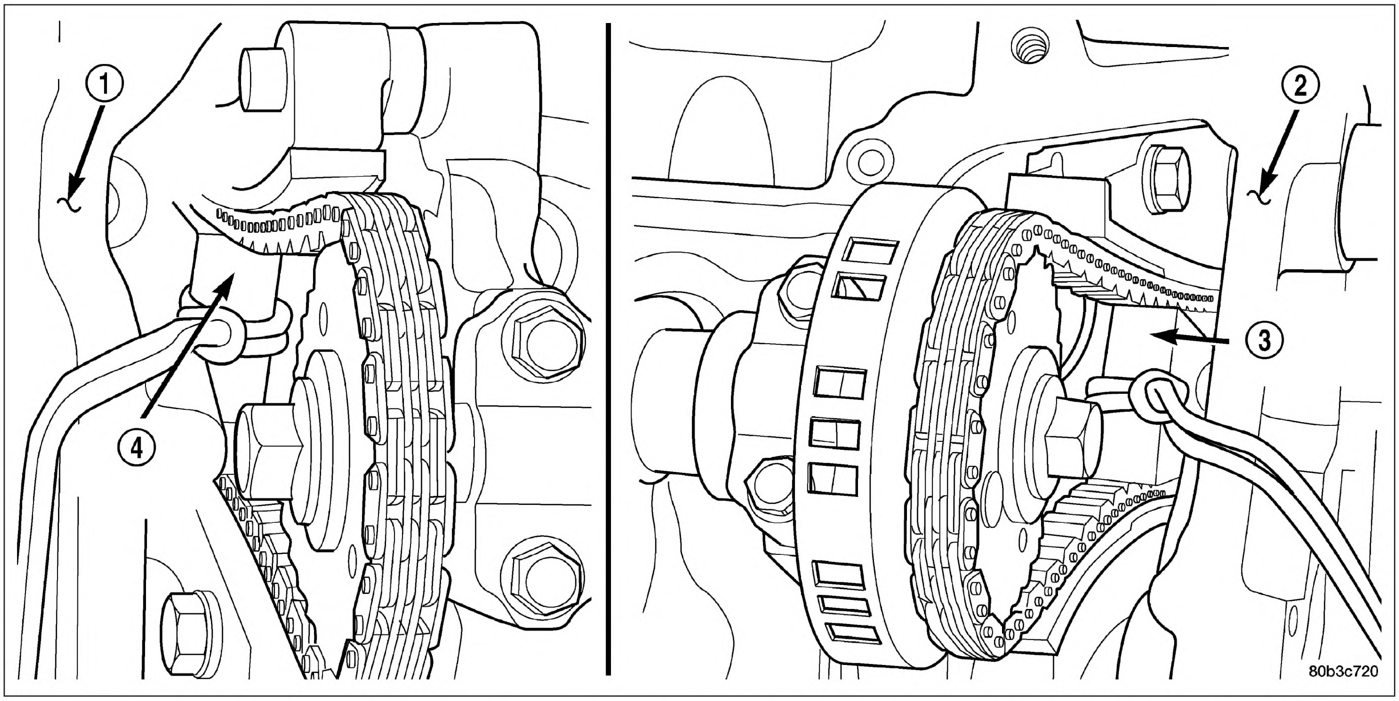
CAUTION: When removing the cam sprocket, timing chains or camshaft, Failure to use special tool 8350 will result in hydraulic tensioner ratchet over extension, Requiring timing chain cover removal to re-set the tensioner ratchet.

2. Set engine to TDC cylinder #1, camshaft sprocket V8 marks at the 12 o'clock position.
3. Mark one link on the secondary timing chain on both sides of the V8 mark on the camshaft sprocket (2) to aid in installation.

CAUTION: Do not hold or pry on the camshaft target wheel for any reason, Severe damage will occur to the target wheel. A damaged target wheel could cause a vehicle no start condition.

4. Loosen but **DO NOT** remove the camshaft sprocket retaining bolt (2). Leave bolt snug against sprocket (3).



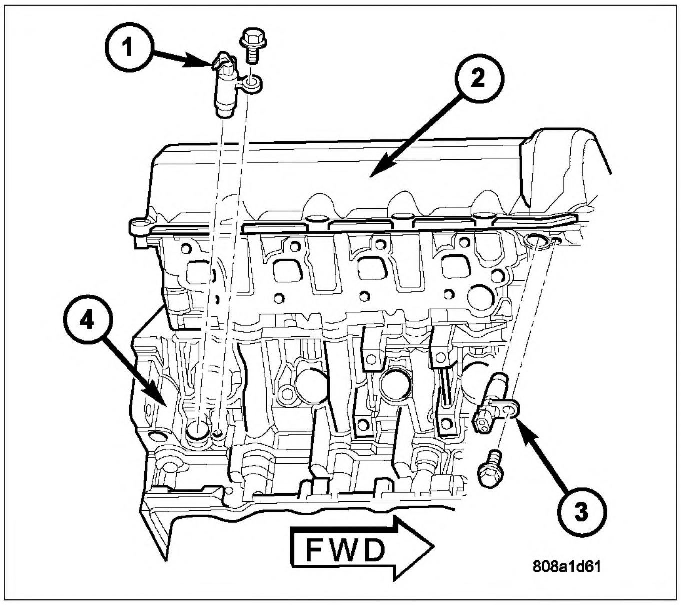


NOTE: The timing chain tensioners must be secured prior to removing the camshaft sprockets. Failure to secure tensioners will allow the tensioners to extend, requiring timing chain cover removal in order to reset tensioners.

CAUTION: Do not force wedge (3) past the narrowest point between the chain strands. Damage to the tensioners may occur.

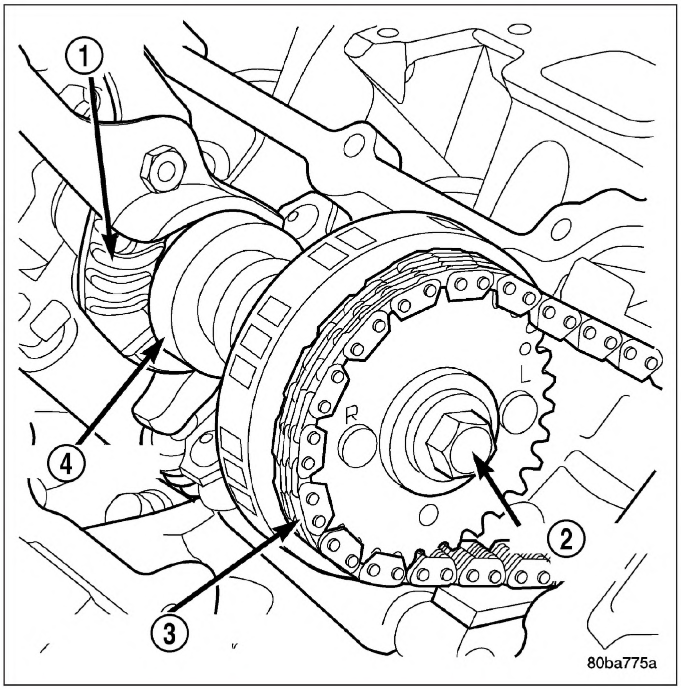
5. Position Special Tool 8350 timing chain wedge (3) between the timing chain strands. Tap the tool to securely wedge the timing chain against the tensioner arm and guide.

6. Remove the camshaft position sensor (1).



NOTE: When gripping the camshaft, place the pliers (1) on the tube portion of the camshaft only. Do not grip the lobes or the sprocket areas.

7. Hold the camshaft with adjustable pliers (1) while removing the camshaft sprocket bolt (2)and sprocket (3).
8. Using the pliers (1), gently allow the camshaft to rotate 45° counter-clockwise until the camshaft is in the neutral position (no valve load).

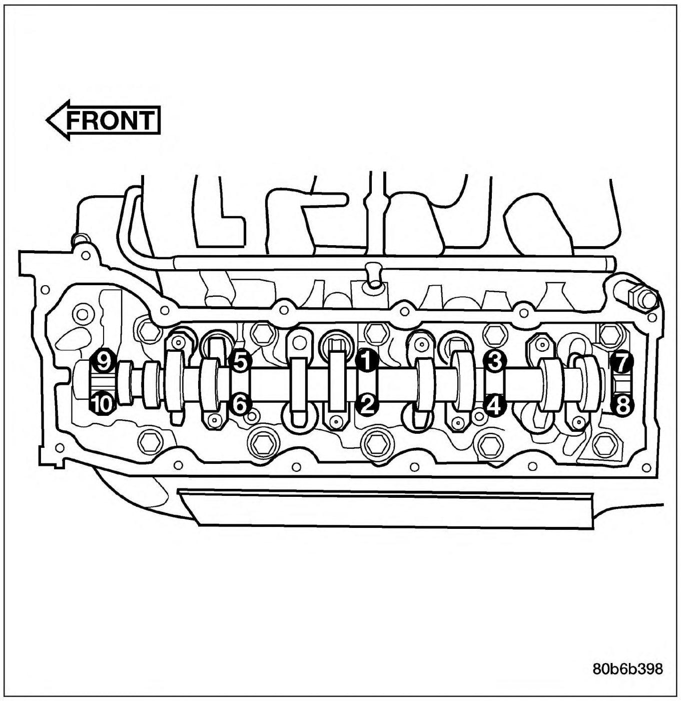


9. Starting at the outside working inward, loosen the camshaft bearing cap retaining bolts 1/2 turn at a time. Repeat until all load is off the bearing caps.

CAUTION: DO NOT STAMP OR STRIKE THE CAMSHAFT BEARING CAPS. SEVERE DAMAGE WILL OCCUR TO THE BEARING CAPS.

NOTE: When the camshaft is removed the rocker arms may slide downward, mark the rocker arms before removing camshaft.

10. Remove the camshaft bearing caps and the camshaft.

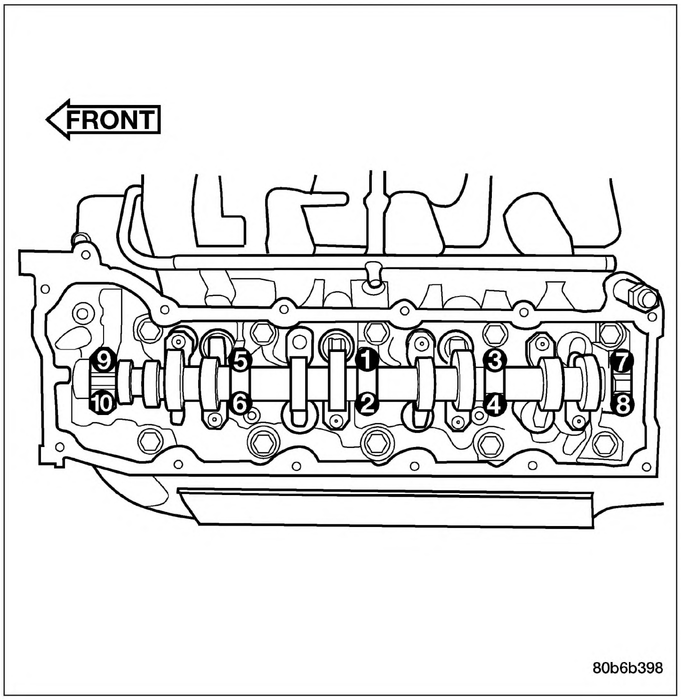


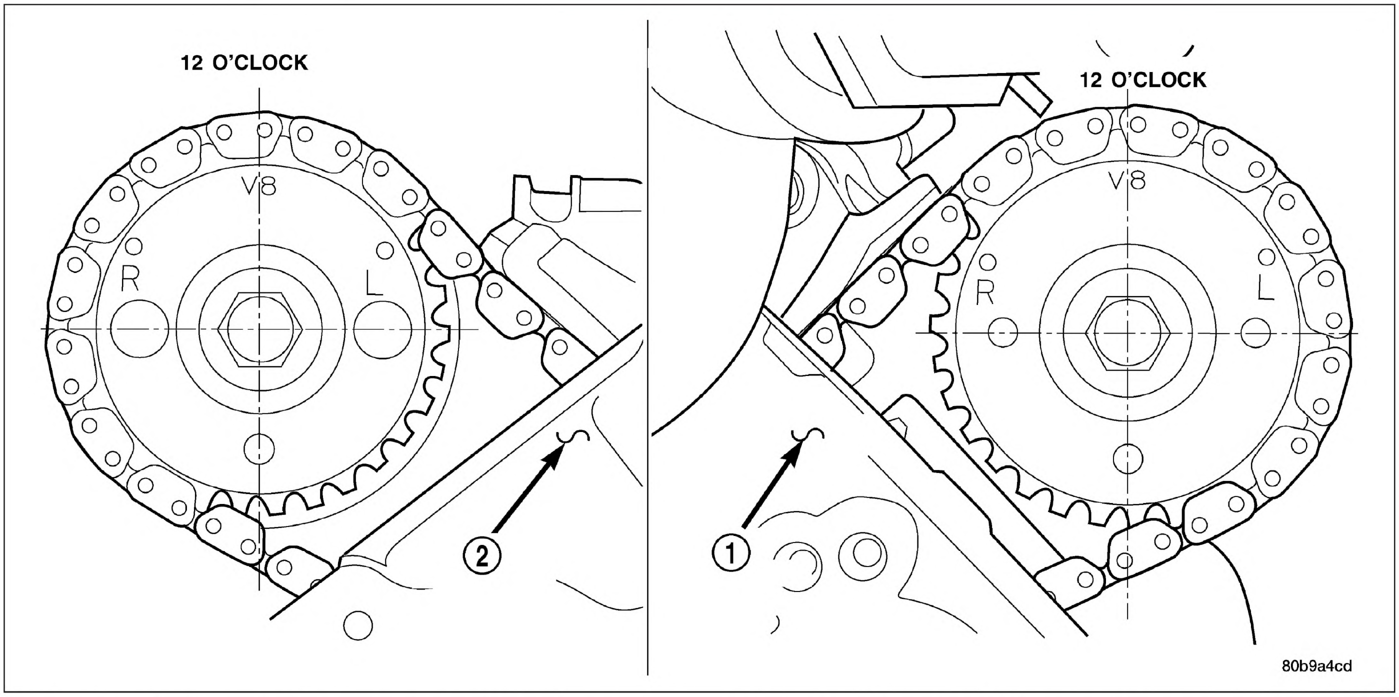
INSTALLATION

1. Lubricate camshaft journals with clean engine oil.

NOTE: Position the right side camshaft so that the camshaft sprocket dowel is near the 10 o'clock position, This will place the camshaft at the neutral position easing the installation of the camshaft bearing caps.

2. Position the camshaft into the cylinder head.
3. Install the camshaft bearing caps, hand tighten the retaining bolts.
4. Working in 1/2 turn increments, tighten the bearing cap retaining bolts starting with the middle cap working outward.
5. Torque the camshaft bearing cap retaining bolts to 11 N·m (100 in. lbs.).





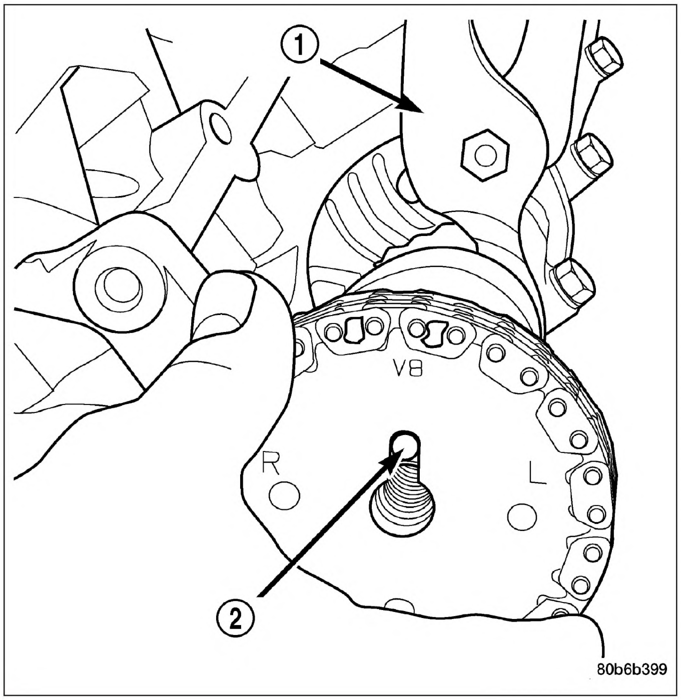
6. Position the camshaft drive gear into the timing chain aligning the V8 mark (2) between the two marked chain links (Two links marked during removal).

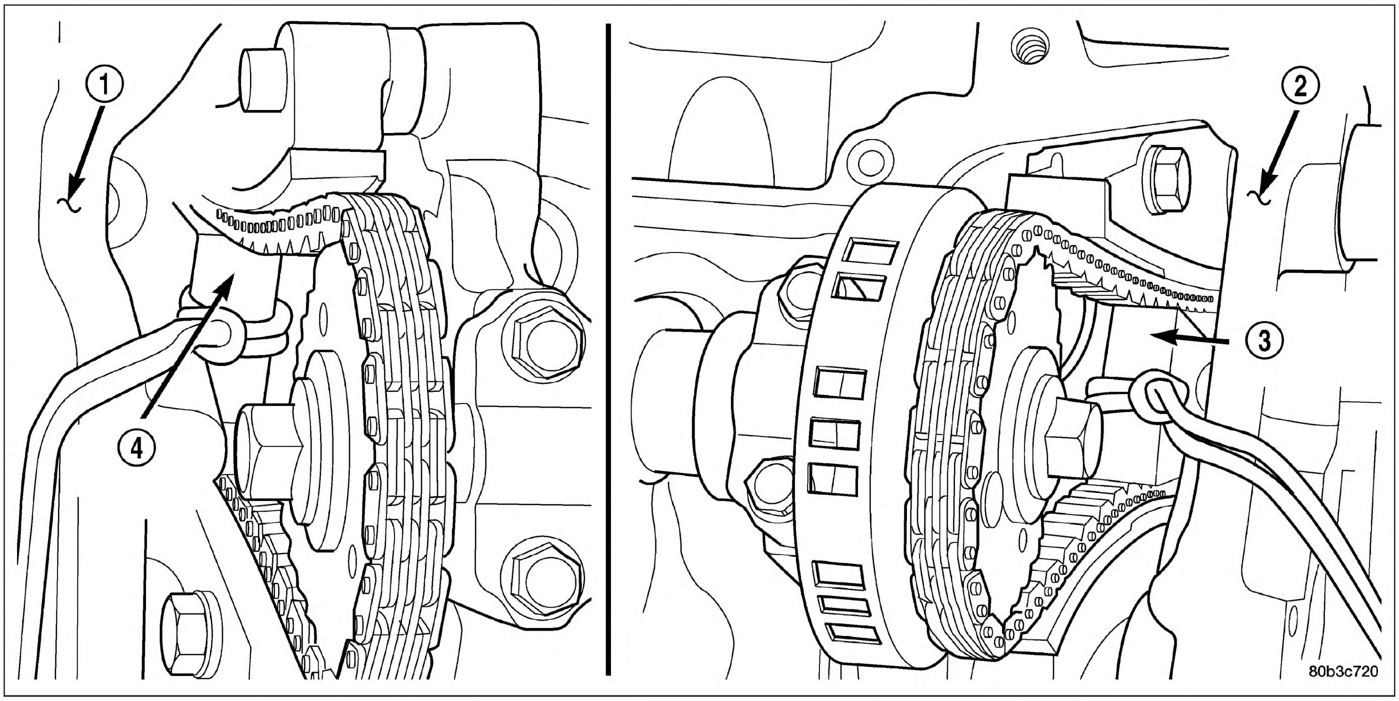
NOTE: When gripping the camshaft, place the pliers on the tube portion of the camshaft only. Do not grip the lobes or the sprocket areas.

7. Using the adjustable pliers (1), rotate the camshaft until the camshaft sprocket dowel (2) is aligned with the slot in the camshaft sprocket (2). Install the sprocket onto the camshaft.

CAUTION: Remove excess oil from camshaft sprocket bolt. Failure to do so can cause bolt over-torque resulting in bolt failure.

8. Remove excess oil from camshaft sprocket bolt, then install the camshaft sprocket retaining bolt and hand tighten.

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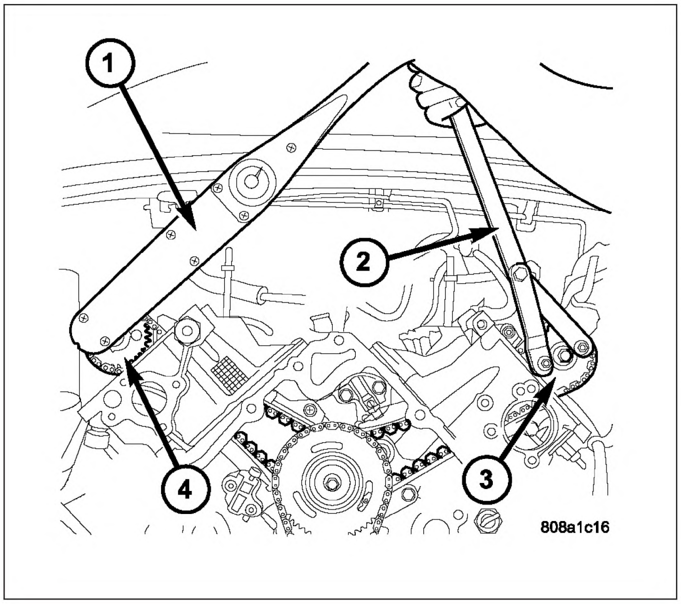
9. Remove timing chain wedge special tool 8350 (3).

10. Using Special Tool 6958 spanner wrench with adapter pins 8346 (2), torque the camshaft sprocket retaining bolt (4) to 122 N·m (90 ft. lbs.).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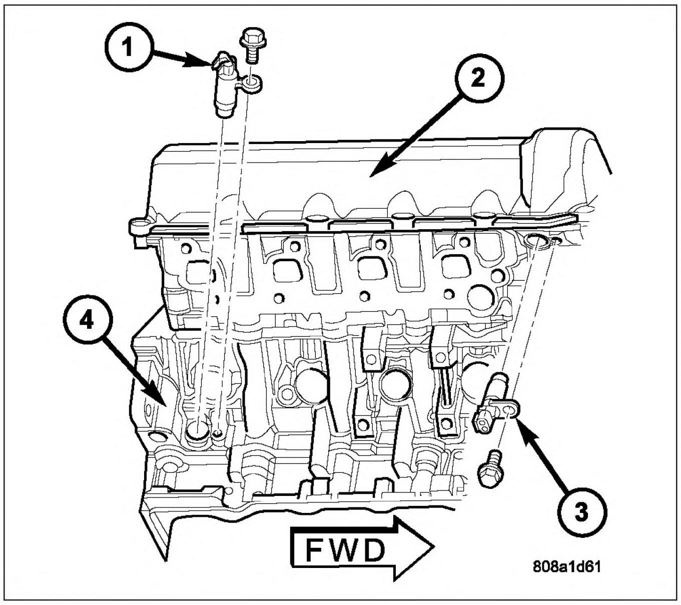
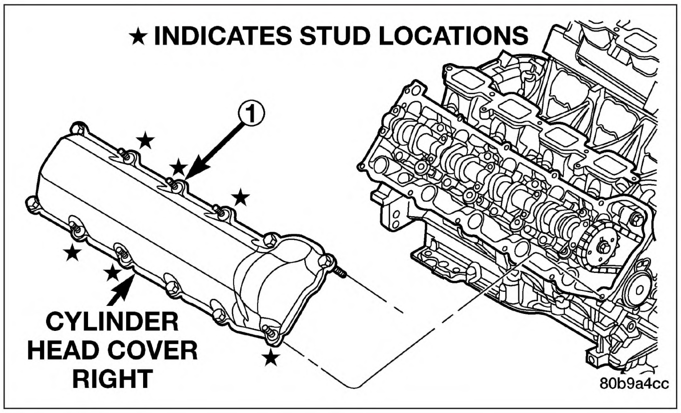
11. Install the camshaft position sensor.



12. Install the cylinder head cover (1) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).



COVER - CYLINDER HEAD - RIGHT

DESCRIPTION

The cylinder head covers are made of injection molded thermo-set plastic, and are not interchangeable from side-to-side. It is imperative that nothing rest on the cylinder head covers. Prolonged contact with other items may wear a hole in the cylinder head cover.

REMOVAL - RIGHT SIDE

1. Disconnect battery negative cable.
2. Disconnect battery positive cable.
3. Remove the battery tray.
4. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
6. Remove air conditioning compressor retaining bolts and move compressor to the left.
7. Remove heater hoses.
8. Disconnect injector and ignition coil connectors.
9. Disconnect and remove positive crankcase ventilation (PCV) hose.
10. Remove oil fill tube.
11. Un-clip injector and ignition coil harness and move away from cylinder head cover.
12. Remove right rear breather tube and filter assembly.

13. Remove cylinder head cover retaining bolts.
14. Remove cylinder head cover.

NOTE: The gasket may be used again, provided no cuts, tears, or deformation has occurred.

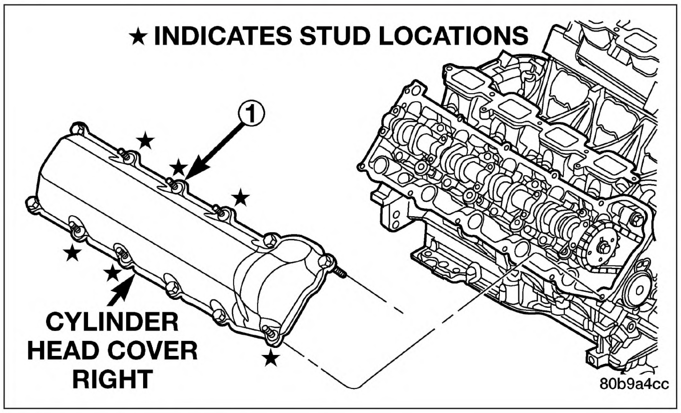
CLEANING

Clean cylinder head cover gasket surface.

Clean head rail, if necessary.

INSTALLATION - RIGHT SIDE

CAUTION: Do not use harsh cleaners to clean the cylinder head covers. Severe damage to covers may occur.



1. Clean cylinder head cover and both sealing surfaces. Inspect and replace gasket as necessary.
2. Install cylinder head cover and hand start all fasteners (1). Verify that all double ended studs are in the correct location shown in.
3. Tighten cylinder head cover bolts and double ended studs to 12 N·m (105 in. lbs).
4. Install right rear breather tube and filter assembly.
5. Connect injector, ignition coil electrical connectors and harness retaining clips.
6. Install the oil fill tube.
7. Install PCV hose.
8. Install heater hoses.
9. Install air conditioning compressor retaining bolts.
10. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
11. Fill Cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
12. Install air cleaner assembly, resonator assembly and air inlet hose.
13. Connect battery negative cable.

VALVES & SEATS - INTAKE/EXHAUST

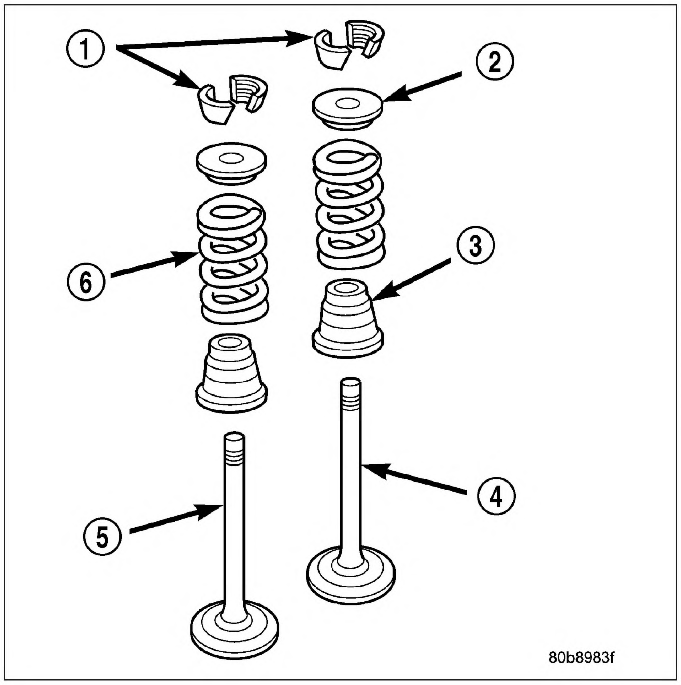
DESCRIPTION

The valves are made of heat resistant steel and have chrome plated stems to prevent scuffing. Each valve is actuated by a roller rocker arm which pivots on a stationary lash adjuster. All valves use three bead lock keepers to retain the springs and promote valve rotation.

STANDARD PROCEDURE - REFACING

NOTE: Valve seats that are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise the cylinder head must be replaced.

NOTE: When refacing valves (4) and valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.



1. Using a suitable dial indicator measure the center of the valve seat Total run out must not exceed 0.051 mm (0.002 in).
2. Apply a small amount of Prussian blue to the valve seat, insert the valve into the cylinder head, while applying light pressure on the valve rotate the valve. Remove the valve and examine the valve face. If the blue is transferred below the top edge of the valve face, lower the valve seat using a 15 degree stone. If the blue is transferred to the bottom edge of the valve face, raise the valve seat using a 65 degree stone.
3. When the seat is properly positioned the width of the intake seat must be 1.75 - 2.36 mm (0.0689 - 0.0928 in.) and the exhaust seat must be 1.71 - 2.32 mm (0.0673 - 0.0911 in.).
4. Check the valve spring (6) installed height after refacing the valve and seat. The installed height for both intake and exhaust valve springs must not exceed 40.74 mm (1.6039 in.).
5. The valve seat and valve face must maintain a face angle of 44.5 - 45 ° angle .

REMOVAL

NOTE: The cylinder heads must be removed in order to preform this procedure.

1. Remove rocker arms and lash adjusters. Refer to procedures in this section.

2. Remove the camshaft bearing caps and the camshaft.

NOTE: All eight valve springs and valves are removed in the same manner; this procedure only covers one valve and valve spring.

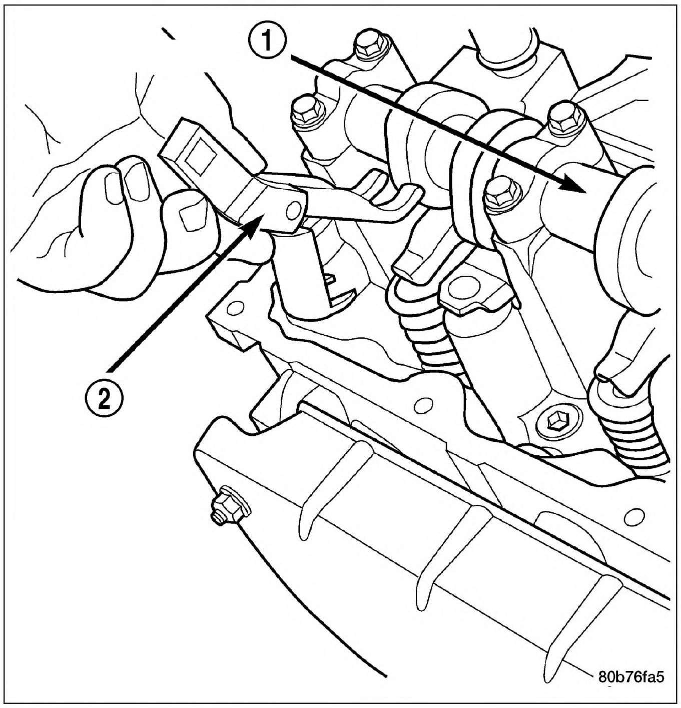
3. Using Special Tool C-3422–B or C-3422–C Valve Spring Compressor and Special tool 8519 Adapter, compress the valve spring.

NOTE: It may be necessary to tap the top of the valve spring to loosen the spring retainers locks enough to be removed.

4. Remove the two spring retainer lock halves.

NOTE: the valve spring is under tension use care when releasing the valve spring compressor.

5. Remove the valve spring compressor.
6. Remove the spring retainer, and the spring.



NOTE: Check for sharp edges on the keeper grooves. Remove any burrs from the valve stem before removing the valve from the cylinder head.

7. Remove the valve from the cylinder head.

NOTE: The valve stem seals are common between intake and exhaust.

8. Remove the valve stem seal. Mark the valve for proper installation.

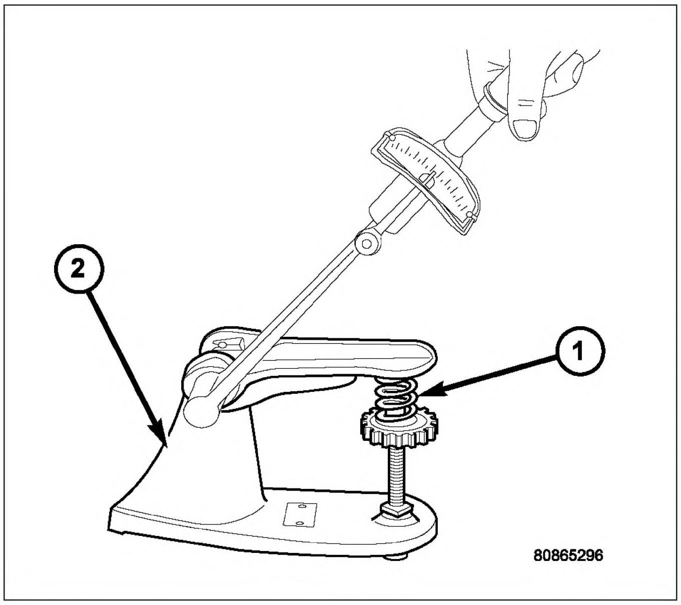
TESTING VALVE SPRINGS

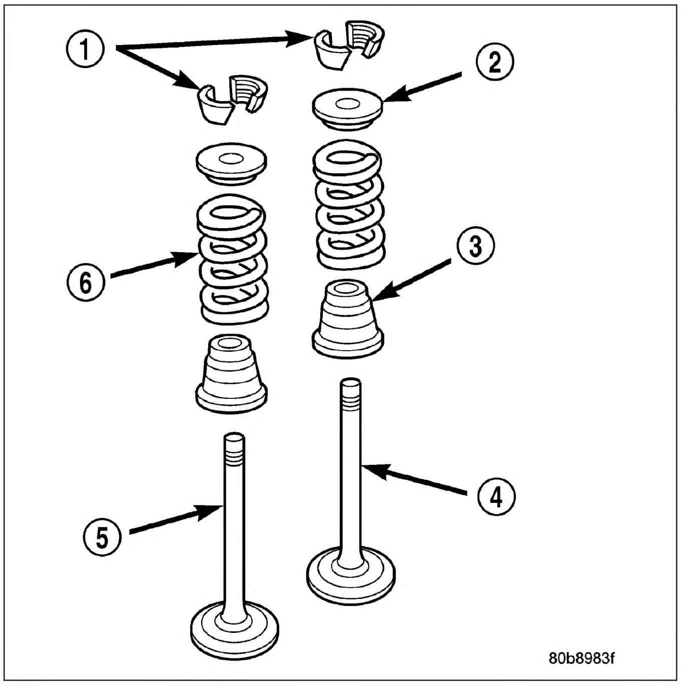
NOTE: Whenever the valves are removed from the cylinder head it is recommended that the valve springs be inspected and tested for reuse.

Inspect the valve springs for physical signs of wear or damage. Turn table of tool C-647 until surface is in line with the 40.12 mm (1.579 in.) mark on the threaded stud and the zero mark on the front. Place spring over the stud on the table and lift compressing lever to set tone device. Pull on torque wrench until Ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Specifications Section to obtain specified height and allowable tensions. Replace any springs that do not meet specifications.

INSTALLATION

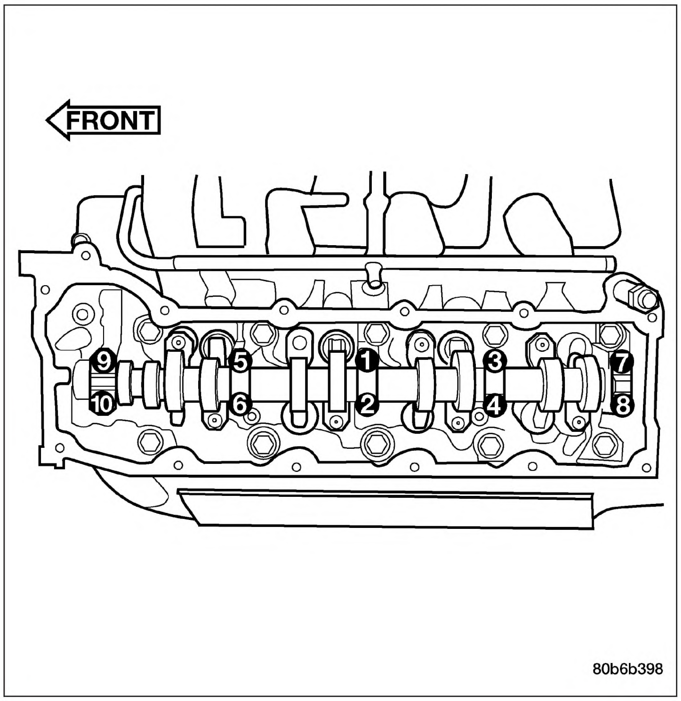
1. coat the valve stem with clean engine oil and insert it into the cylinder head.
2. Install the valve stem seal. make sure the seal is fully seated and that the garter spring at the top of the seal is intact.
3. Install the spring and the spring retainer.
4. Using the valve spring compressor, compress the spring and install the two valve spring retainer halves.
5. Release the valve spring compressor and make sure the two spring retainer halves and the spring retainer are fully seated.





6. lubricate the camshaft journal with clean engine oil then Position the camshaft (with the sprocket dowel on the left camshaft at 11 o'clock and the right camshaft at 12 o'clock), then position the camshaft bearing caps.
7. Install the camshaft bearing cap retaining bolts. Tighten the bolts 9–13 N·m (100 in. lbs.) in ½ turn increments in the sequence shown.

8. Position the hydraulic lash adjusters and rocker arms.



ROCKER ARM - VALVE

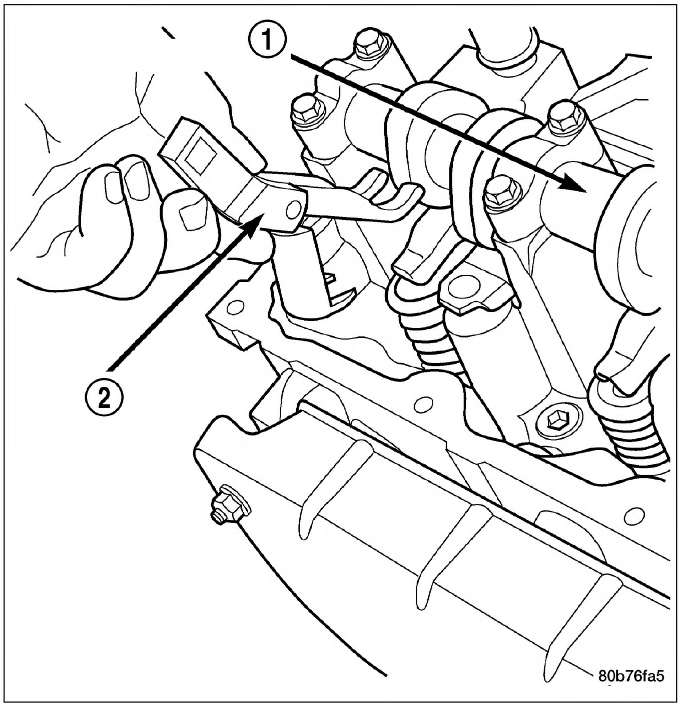
DESCRIPTION

The rocker arms are steel stampings with an integral roller bearing. The rocker arms incorporate a 2.8 mm (0.11 inch) oil hole in the lash adjuster socket for roller and camshaft lubrication.

REMOVAL

NOTE: Disconnect the battery negative cable to prevent accidental starter engagement.

1. Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
2. For rocker arm removal on cylinders 3 and 5 Rotate the crankshaft until cylinder #1 is at TDC exhaust stroke.
3. For rocker arm removal on cylinders 2 and 8 Rotate the crankshaft until cylinder #1 is at TDC compression stroke.
4. For rocker arm removal on cylinders 4 and 6 Rotate the crankshaft until cylinder #3 is at TDC compression stroke.
5. For rocker arm removal on cylinders 1 and 7 Rotate the crankshaft until cylinder #2 is at TDC compression stroke.
6. Using special tool 8516 Rocker Arm Remover (2), press downward on the valve spring, remove rocker arm.



INSTALLATION

CAUTION: Make sure the rocker arms are installed with the concave pocket over the lash adjusters. Failure to do so may cause severe damage to the rocker arms and/or lash adjusters.

NOTE: Coat the rocker arms with clean engine oil prior to installation.

1. For rocker arm installation on cylinders 3 and 5 Rotate the crankshaft until cylinder #1 is at TDC exhaust stroke.
2. For rocker arm installation on cylinders 2 and 8 Rotate the crankshaft until cylinder #1 is at TDC compression stroke.
3. For rocker arm installation on cylinders 4 and 6 Rotate the crankshaft until cylinder #3 is at TDC compression stroke.
4. For rocker arm installation on cylinders 1 and 7 Rotate the crankshaft until cylinder #2 is at TDC compression stroke.
5. Using special tool 8516 press downward on the valve spring, install rocker arm.
6. Install the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

SPRINGS - VALVE

DESCRIPTION

The valve springs are made from high strength chrome silicon steel. The springs are common for intake and exhaust applications,**except for the 4.7L H.O. which has unique intake and exhaust springs**. The valve spring seat is integral with the valve stem seal, which is a positive type seal to control lubrication.

SEALS - VALVE GUIDE

DESCRIPTION

The valve stem seals are made of rubber and incorporate an integral steel valve spring seat. The integral garter spring maintains consistent lubrication control to the valve stems.

ENGINE BLOCK

DESCRIPTION

The cylinder block is made of cast iron. The block is a closed deck design with the left bank forward. To provide high rigidity and improved NVH an enhanced compacted graphite bedplate is bolted to the block. The block design allows coolant flow between the cylinders bores, and an internal coolant bypass to a single poppet inlet thermostat is included in the cast aluminum front cover.

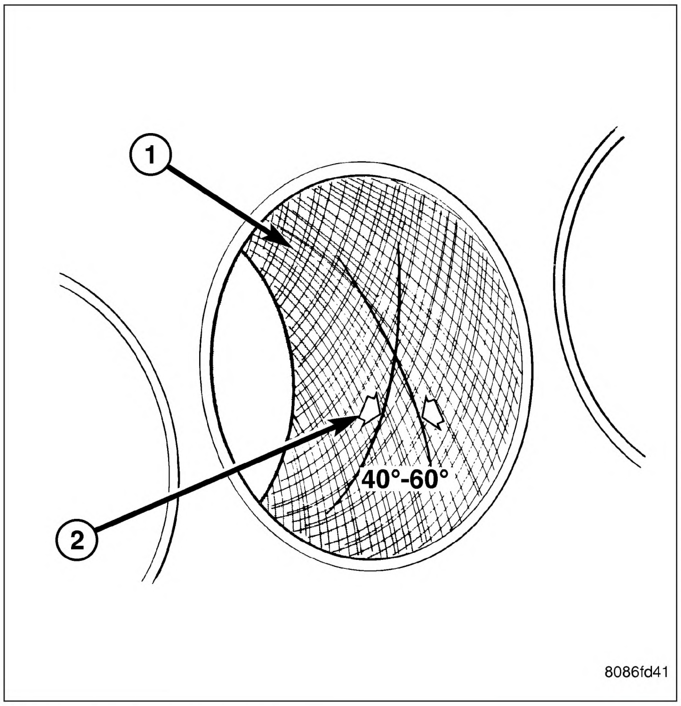
STANDARD PROCEDURE - CYLINDER BORE HONING

Before honing, stuff plenty of clean shop towels under the bores and over the crankshaft to keep abrasive materials from entering the crankshaft area.

1. Used carefully, the Cylinder Bore Sizing Hone C-823, equipped with 220 grit stones, is the best tool for this job. In addition to deglazing, it will reduce taper and out-of-round, as well as removing light scuffing, scoring and scratches. Usually, a few strokes will clean up a bore and maintain the required limits.

CAUTION: DO NOT use rigid type hones to remove cylinder wall glaze.

2. Deglazing of the cylinder walls may be done if the cylinder bore is straight and round. Use a cylinder surfacing hone, Honing Tool C-3501, equipped with 280 grit stones (C-3501-3810). about 20-60 strokes, depending on the bore condition, will be sufficient to provide a satisfactory surface. Using honing oil C-3501-3880, or a light honing oil, available from major oil distributors.



CAUTION: DO NOT use engine or transmission oil, mineral spirits, or kerosene.

3. Honing should be done by moving the hone up and down fast enough to get a crosshatch pattern (1). The hone marks should INTERSECT at 50° to 60° for proper seating of rings (2).
4. A controlled hone motor speed between 200 and 300 RPM is necessary to obtain the proper crosshatch angle. The number of up and down strokes per minute can be regulated to get the desired 50° to 60° angle. Faster up and down strokes increase the crosshatch angle.
5. After honing, it is necessary that the block be cleaned to remove all traces of abrasive. Use a brush to wash parts with a solution of hot water and detergent. Dry parts thoroughly. Use a clean, white, lint-free cloth to check that the bore is clean. Oil the bores after cleaning to prevent rusting.

CLEANING

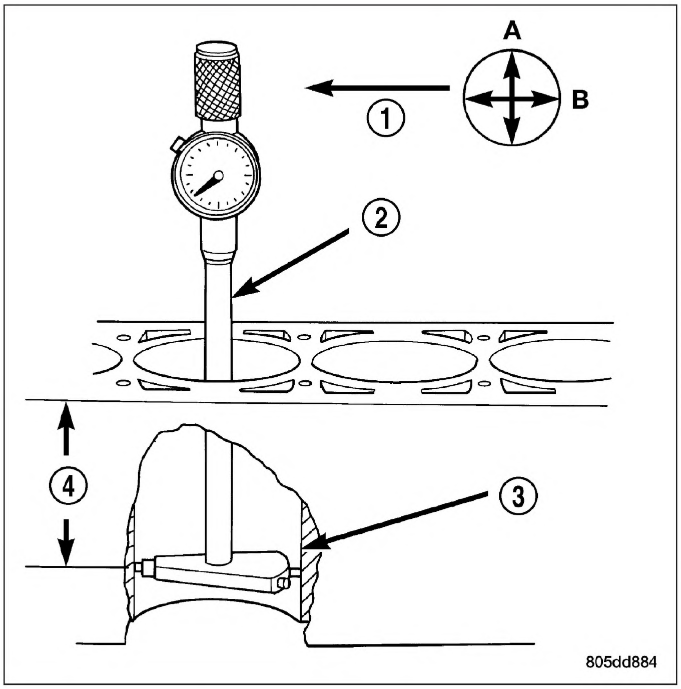
Thoroughly clean the oil pan and engine block gasket surfaces.

Use compressed air to clean out:

- The galley at the oil filter adaptor hole.
- The front and rear oil galley holes.
- The feed holes for the crankshaft main bearings.

Once the block has been completely cleaned, apply Loctite PST pipe sealant with Teflon 592 to the threads of the front and rear oil galley plugs. Tighten the plugs to 34 N·m (25 ft. lbs.) torque.

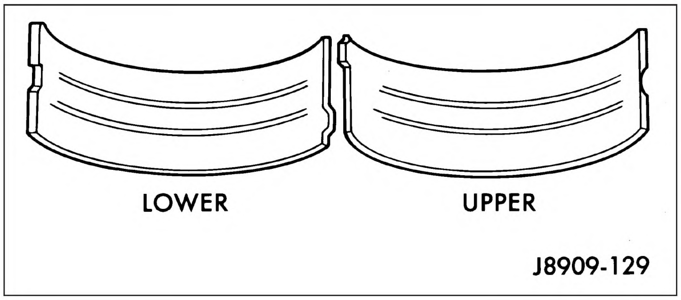
INSPECTION



1. It is mandatory to use a dial bore gauge (2) to measure each cylinder bore (3) diameter. To correctly select the proper size piston, a cylinder bore gauge, capable of reading in 0.003 mm (.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at three levels below top of bore. Start perpendicular (across or at 90 degrees) to the axis of the crankshaft and then take two additional reading.
3. Measure the cylinder bore diameter crosswise to the cylinder block near the top of the bore. Repeat the measurement near the middle of the bore, then repeat the measurement near the bottom of the bore.
4. Determine taper by subtracting the smaller diameter from the larger diameter.
5. Rotate measuring device 90° and repeat steps above.
6. Determine out-of-roundness by comparing the difference between each measurement.
7. If cylinder bore taper does not exceed 0.025 mm (0.001 inch) and out-of-roundness does not exceed 0.025 mm (0.001 inch), the cylinder bore can be honed. If the cylinder bore taper or out- of-round condition exceeds these maximum limits, the cylinder block must be replaced. A slight amount of taper always exists in the cylinder bore after the engine has been in use for a period of time.

BEARINGS-CONNECTING ROD

STANDARD PROCEDURE - CONNECTING ROD BEARING FITTING



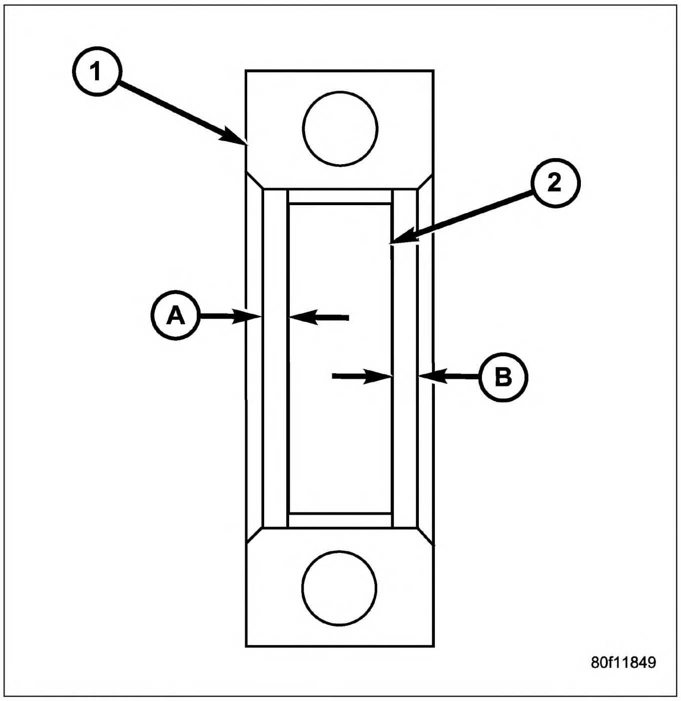
Inspect the connecting rod bearings for scoring. Check the bearings for normal wear patterns, scoring, grooving, fatigue and pitting. Replace any bearing that shows abnormal wear.

Inspect the connecting rod journals for signs of scoring, nicks and burrs.

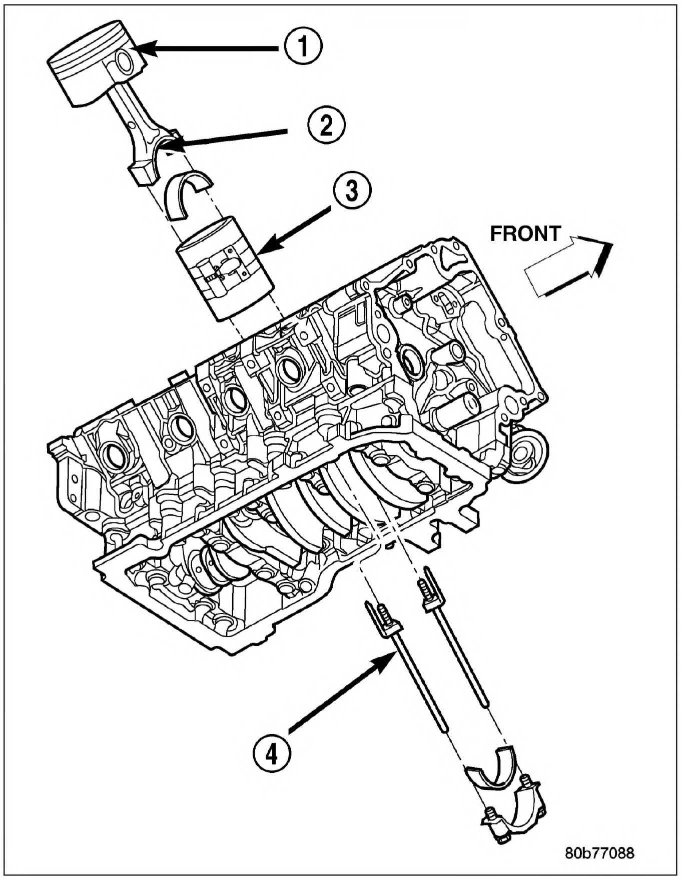
Misaligned or bent connecting rods can cause abnormal wear on pistons, piston rings, cylinder walls, connecting rod bearings and crankshaft connecting rod journals. If wear patterns or damage to any of these components indicate the probability of a misaligned connecting rod, inspect it for correct rod alignment. Replace misaligned, bent or twisted connecting rods.

1. Wipe the oil from the connecting rod journal.

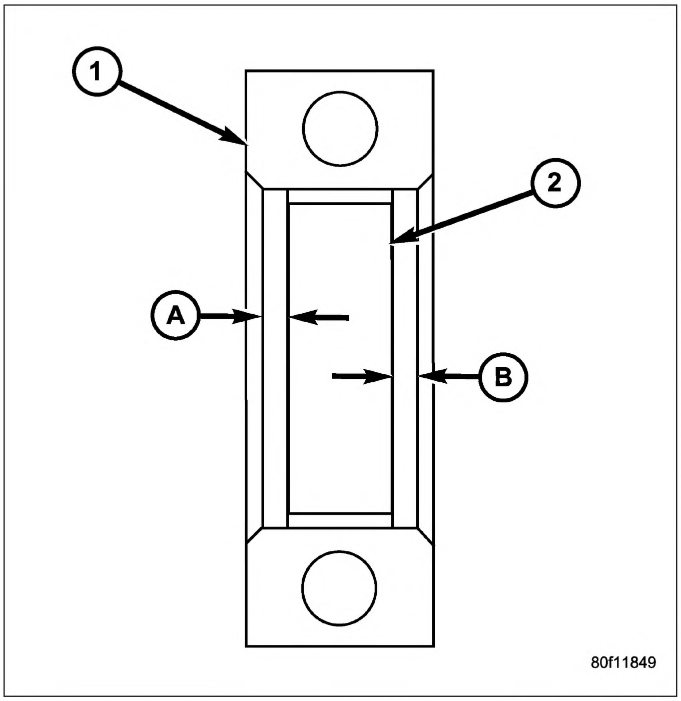
2. Lubricate the upper bearing insert (2) and install in connecting rod (1). **Center bearing insert (2) in connecting rod.**



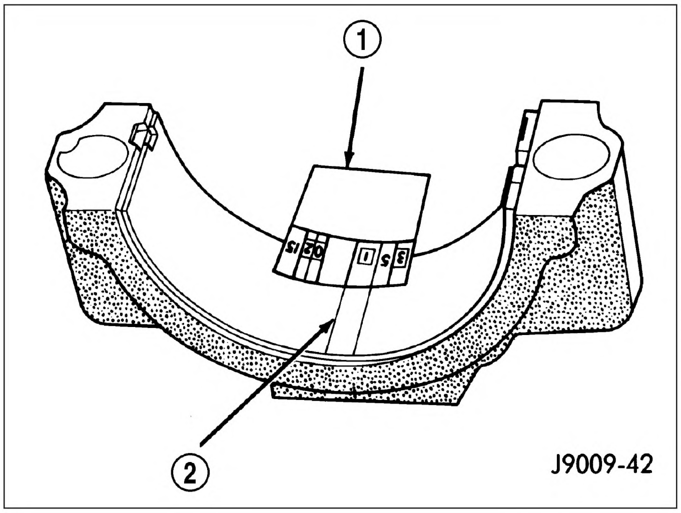
3. Use piston ring compressor (3) and Guide Pins Special Tool 8507 (4) to install the rod and piston assemblies. The oil slinger slots in the rods must face front of the engine. The “F”’s near the piston wrist pin bore should point to the front of the engine.



4. Install the lower bearing insert in the bearing cap **Center bearing insert (2) in connecting rod (1).**. The lower insert must be dry. Place strip of Plastigage across full width of the lower insert at the center of bearing cap. Plastigage must not crumble in use. If brittle, obtain fresh stock.



5. Install bearing cap and connecting rod on the journal and tighten bolts to 27 N·m (20 ft. lbs.) plus a 90° turn. DO NOT rotate crankshaft. Plastigage will smear, resulting in inaccurate indication.
6. Remove the bearing cap and determine amount of bearing-to-journal clearance by measuring the width of compressed Plastigage (2). Refer to Engine Specifications for the proper clearance. **Plastigage should indicate the same clearance across the entire width of the insert. If the clearance varies, it may be caused by either a tapered journal, bent connecting rod or foreign material trapped between the insert and cap or rod.**
7. If the correct clearance is indicated, replacement of the bearing inserts is not necessary. Remove the Plastigage (2) from crankshaft journal and bearing insert. Proceed with installation.



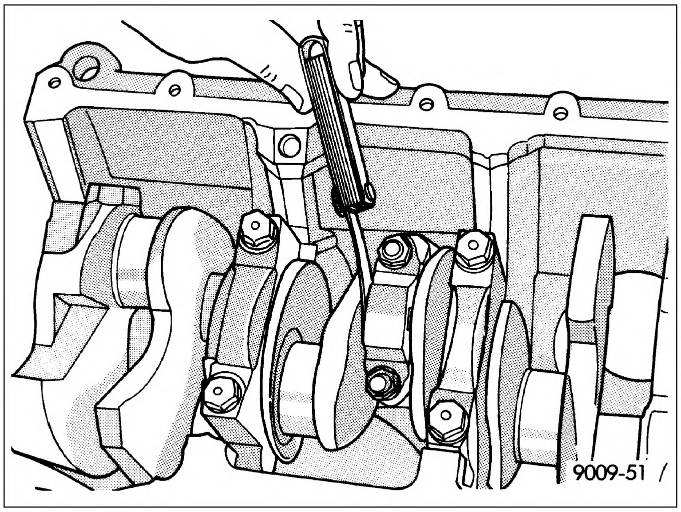
Bearing Mark	SIZE	USED WITH JOURNAL SIZE
.025 US	.025 mm (.001 in.)	50.983-50.967 mm (2.0073-2.0066 in.)
Std.	STANDARD	50.992-51.008 mm (2.0076-2.0082 in.)
.250 US	.250 mm (.010 in.)	50.758-50.742 mm (1.9984-1.9978 in.)

8. If bearing-to-journal clearance exceeds the specification, determine which service bearing set to use, using the following bearing sizes:

CAUTION: Connecting Rod Bolts are Torque to Yield Bolts and Must Not Be Reused. Always replace the Rod Bolts whenever they are loosened or removed.

9. Repeat the Plastigage measurement to verify your bearing selection prior to final assembly.
10. Once you have selected the proper insert, install the insert and cap. Tighten the connecting rod bolts to 27 N·m (20 ft. lbs.) plus a 90° turn.

Slide snug-fitting feeler gauge between the connecting rod and crankshaft journal flange. Refer to Engine Specifications for the proper clearance. Replace the connecting rod if the side clearance is not within specification.



CRANKSHAFT

DESCRIPTION

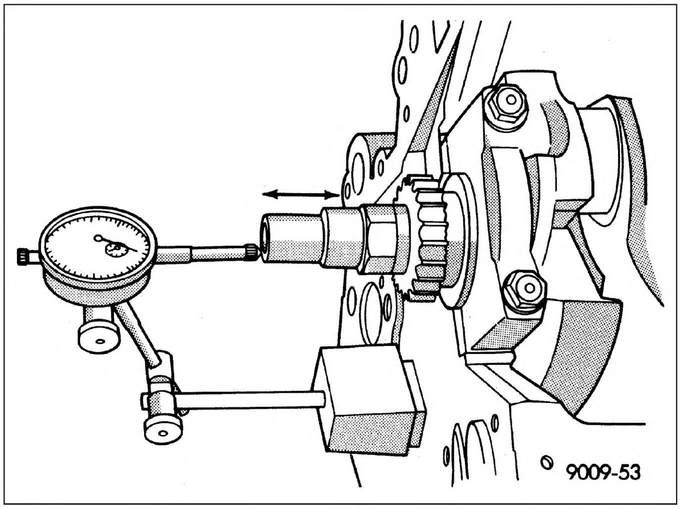
The 4.7L crankshaft is constructed of nodular cast iron. The crankshaft is a cross shaped four throw design with eight counterweights for balancing purposes. The crankshaft is supported by five select fit main bearings with the number three serving as the thrust washer location. The main journals of the crankshaft are cross drilled to improve rod bearing lubrication. The number eight counterweight has provisions for crankshaft position sensor target wheel mounting. The select fit main bearing markings are located on the rear side of the target wheel. The crankshaft oil seals are one piece design. The front oil seal is retained in the timing chain cover, and the rear seal is pressed in to a bore formed by the cylinder block and the bedplate assembly.

STANDARD PROCEDURE

MEASURING CRANKSHAFT END PLAY

1. Mount a dial indicator to front of engine with the locating probe on nose of crankshaft.
2. Move crankshaft all the way to the rear of its travel.
3. Zero the dial indicator.
4. Move crankshaft all the way to the front and read the dial indicator. (Refer to 9 - ENGINE - SPECIFICATIONS) for end play specification.

REMOVAL

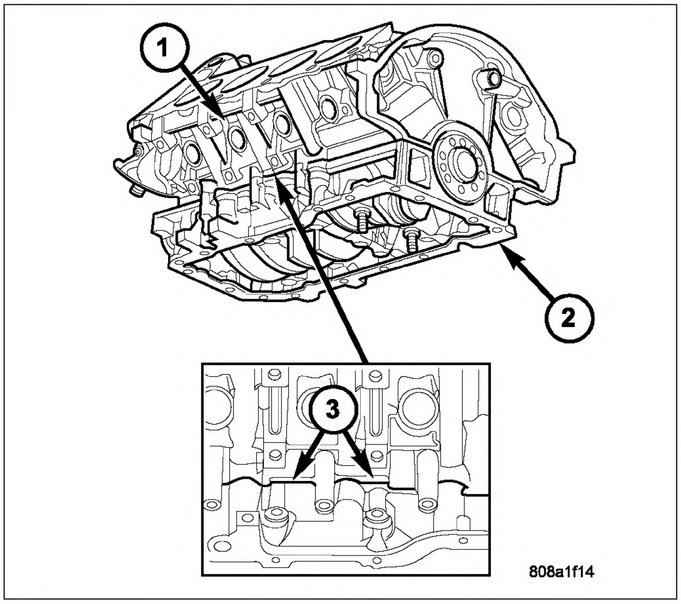


NOTE: To remove the crankshaft from the engine, the engine must be removed from the vehicle.

1. Remove the engine. (Refer to 9 - ENGINE - REMOVAL).
2. Remove the engine oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

CAUTION: DO NOT pry on the oil pan gasket when removing the oil pan, The oil pan gasket is mounted to the cylinder block in three locations and will remain attached to block when removing oil pan. Gasket can not be removed with oil pan.

3. Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
4. Remove the oil pump pickup tube and oil pan gasket /windage tray.
5. Remove the bedplate mounting bolts. Note the location of the three stud bolts for installation.
6. Remove the connecting rods from the crankshaft.



CAUTION: The bedplate to cylinder block mating surface is a critical sealing surface. Do not pry on or damage this surface in anyway.

NOTE: The bedplate contains the lower main bearing halves. Use care when handling bedplate as not to drop or damage bearing halves. Installing main bearing halves in the wrong position will cause sever damage to the crankshaft.

NOTE: The bedplate has pry points cast into it. Use these points only. The pry points are on both the left and right sides, only the left side is shown.

7. Carefully pry on the pry points to loosen the bedplate then remove the bedplate.

CAUTION: When removing the crankshaft, use care not to damage bearing surfaces on the crankshaft.

8. Remove the crankshaft.
9. Remove the crankshaft target wheel.

INSPECTION

NOTE: Thoroughly inspect the connecting rod bearing bores and main bearing bores for scoring, blueing or severe scratches. Further disassembly may be required.

If connecting rod bearing bores show damage, the cylinder heads must be removed to service the piston and rod assemblies. If the bedplate or the cylinder block main bearing bores show damage the engine must be replaced.

1. If required, remove the main bearing halves from the cylinder block and bedplate.
2. Thoroughly clean the bedplate to cylinder block sealing surfaces and main bearing bores. Remove all oil and sealant residue.

3. Inspect the bedplate main bearing bores for cracks, scoring or severe blueing. If either condition exists the engine must be replaced.
4. Inspect the crankshaft thrust washers for scoring, scratches, wear or blueing. If either condition exist replace the thrust washer.
5. Inspect the oil pan gasket/windage tray for splits, tears or cracks in the gasket sealing surfaces. Replace gasket as necessary.

INSTALLATION

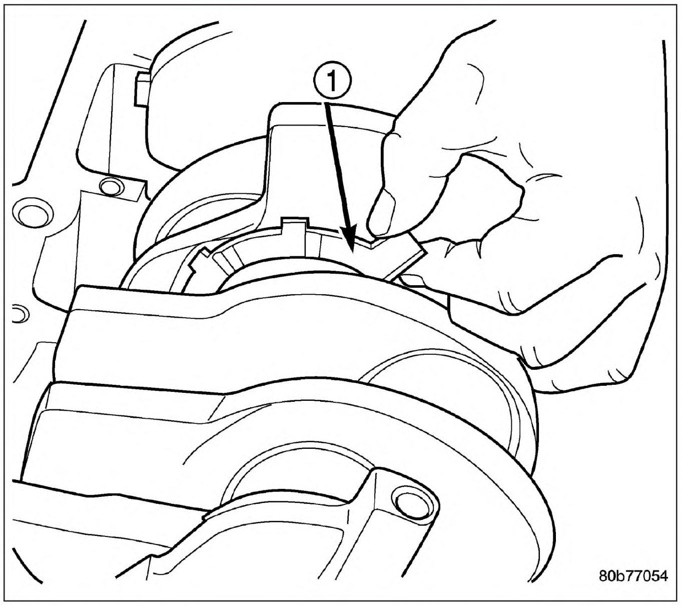
CAUTION: Main bearings are select fit. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE) for proper bearing selections.

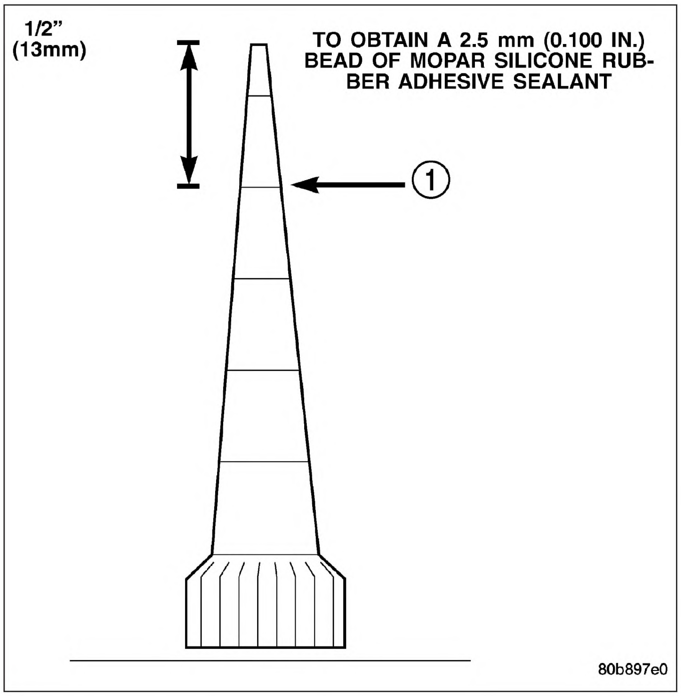
1. Lubricate upper main bearing halves with clean engine oil.

CAUTION: When installing crankshaft, use care not to damage bearing surfaces on the crankshaft.

NOTE: Apply sealant to the target wheel retaining screws prior to installation.

2. Install the crankshaft target wheel. Torque the mounting screws to 15 N·m (12 ft. lbs.).
3. Position crankshaft in cylinder block.
4. Install the thrust washers (1).




1/2”
(13mm)
TO OBTAIN A 2.5 mm (0.100 IN.) BEAD OF MOPAR SILICONE RUBBER ADHESIVE SEALANT
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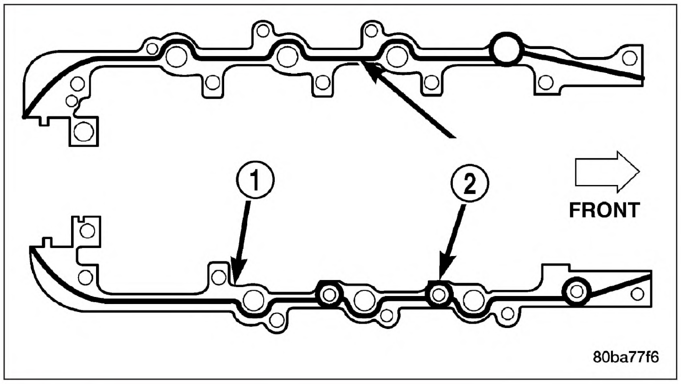
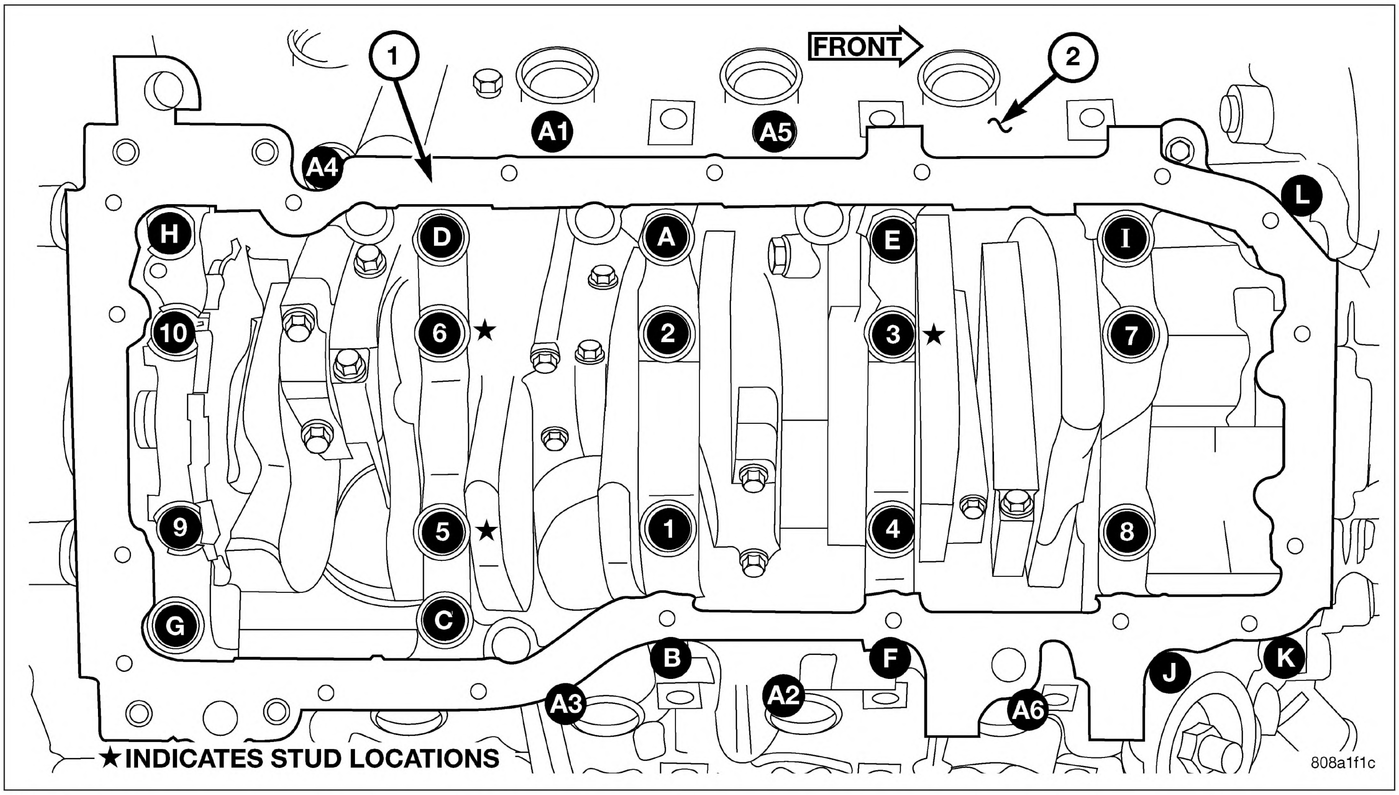


CAUTION: The bedplate to cylinder block mateing surface must be coated with sealant prior to installation. Failure to do so will cause severe oil leaks.

NOTE: The installation time to install the bedplate after the sealant has been applied is critical.

NOTE: Make sure that the bedplate and cylinder block sealing surfaces are clean and free of oil or other contaminants. Contaminants on the sealing surfaces may cause main bearing distortion and/or oil leaks.

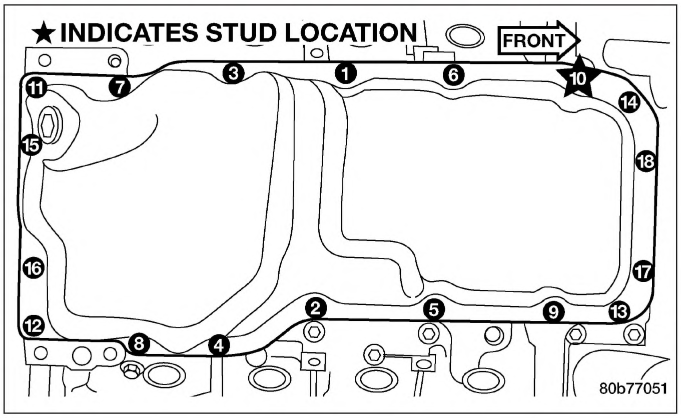
5. Apply a 2.5mm (0.100 inch) bead of Mopar® Gen II Silicone Rubber Adhesive sealant (2) to the cylinder block-to-bedplate mating surface (1) as shown.
6. Coat the crankshaft main bearing journals with clean engine oil and position the bedplate onto the cylinder block.



NOTE: Lubricate the bedplate retaining bolts with clean engine oil prior to installation.

7. Install the bedplate retaining bolts, making sure to place the stud bolts in the correct location, Torque the bolts in the sequence shown.
   - Tighten bolts **A – L** to 54 N·m (40 ft. lbs.)
   - Tighten bolts **1–10** to 2.8 N·m (25 in. lbs.)
   - Turn bolts **1–10** an additional 90°.
   - Tighten bolts **A1– A6** to 27 N·m (20 ft. lbs.)
8. Measure crankshaft end play. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE).

9. Install the connecting rods and measure side clearance. (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE).
10. Position the oil pan gasket/windage tray, using a new o-ring, install the oil pickup tube. Torque the bolt to 28N·n (20 ft. lbs.) torque the nuts to 28N·m (20 ft. lbs.).
11. Install the oil pan. Torque the retaining bolts to 15 N·m (11 ft. lbs.) in the sequence shown.
12. Install the engine (Refer to 9 - ENGINE - INSTALLATION).



BEARINGS - CRANKSHAFT MAIN

STANDARD PROCEDURE - CRANKSHAFT MAIN BEARING - FITTING

MAIN BEARING JOURNAL DIAMETER (CRANKSHAFT REMOVED)

Crankshaft removed from the cylinder block.

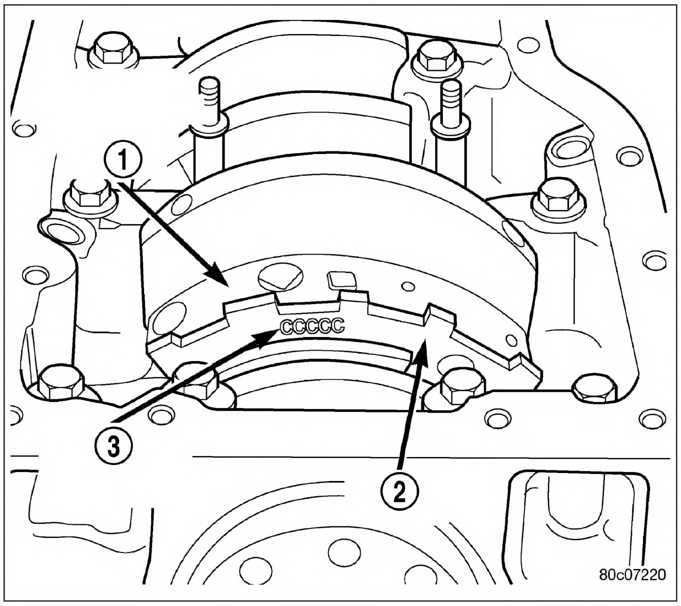
Clean the oil off the main bearing journal.

Determine the maximum diameter of the journal with a micrometer. Measure at two locations 90° apart at each end of the journal.

The maximum allowable taper is 0.008mm (0.0004 inch.) and maximum out of round is 0.005mm (0.002 inch). Compare the measured diameter with the journal diameter specification (Main Bearing Fitting Chart). Select inserts required to obtain the specified bearing-to-journal clearance.

CRANKSHAFT MAIN BEARING SELECTION

The main bearings are “select fit” to achieve proper oil clearances. For main bearing selection, the crankshaft position sensor target wheel has grade identification marks stamped into it (2). These marks are read from left to right, corresponding with journal number 1, 2, 3, 4 and 5. The crankshaft position sensor target wheel (2) is mounted to the number 8 counter weight (1) on the crankshaft.



NOTE: Service main bearings are coded. These codes identify what size (grade) the bearing is.

MAIN BEARING SELECTION CHART - 4.7L

GRADE MARKING	SIZE mm (in.)	FOR USE WITH JOURNAL SIZE
A	0.008 mm U/S (0.0004 in.) U/S	63.488–63.496 mm (2.4996–2.4999 in.)
B	NOMINAL	63.496–63.504 mm (2.4999–2.5002 in.)
C	0.008 mm O/S (0.0004 in.) O/S	63.504–63.512 mm (2.5002–2.5005 in.)

INSPECTION

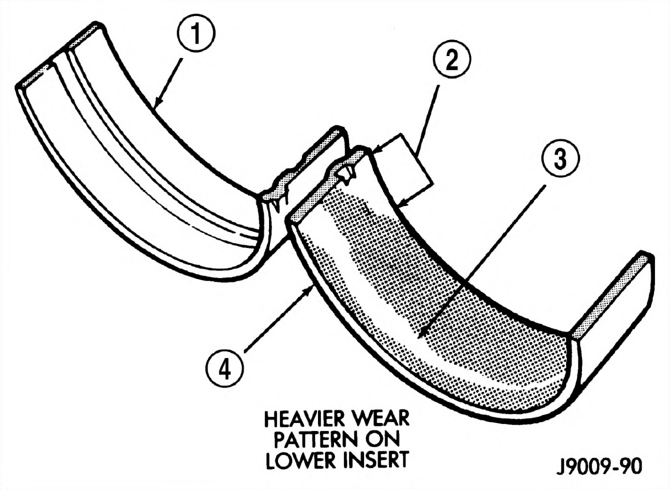
Wipe the inserts clean and inspect for abnormal wear patterns and for metal or other foreign material imbedded in the lining. Normal main bearing insert wear patterns are illustrated.

NOTE: If any of the crankshaft journals are scored, the crankshaft must be repaired or replaced.

Inspect the back of the inserts for fractures, scrapings or irregular wear patterns.

Inspect the upper insert locking tabs for damage.

Replace all damaged or worn bearing inserts.



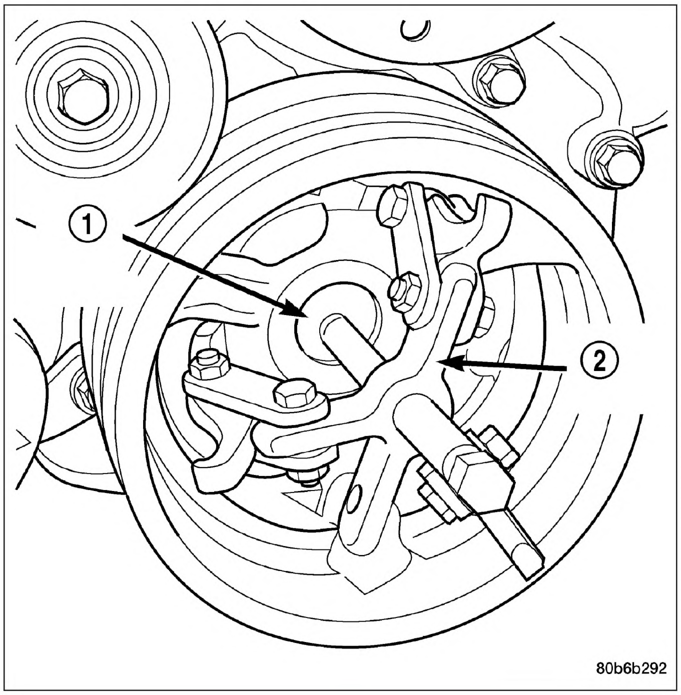
SEAL - CRANKSHAFT OIL - FRONT

REMOVAL

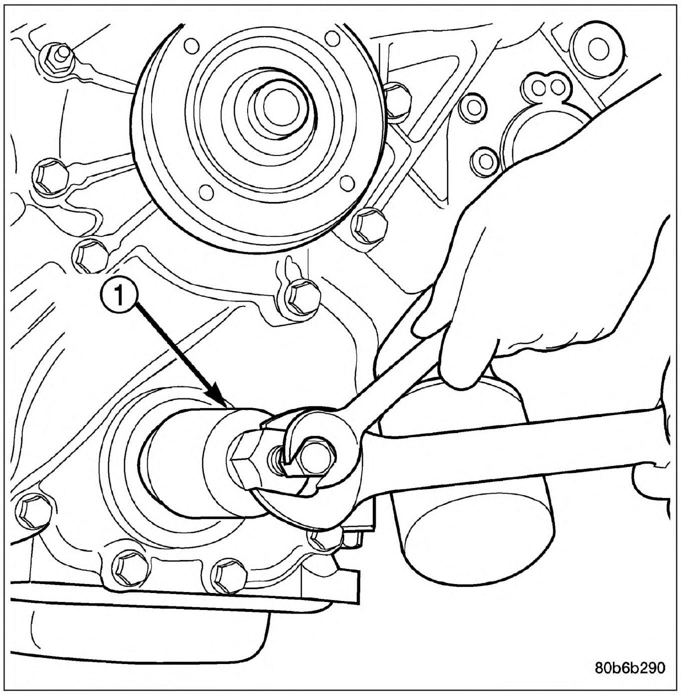
1. Disconnect negative cable from battery.
2. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
3. Remove A/C compressor mouning fasteners and set aside.
4. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
5. Remove upper radiator hose.
6. Disconnect electrical connector for fan mounted inside radiator shroud.
7. Remove radiator shroud attaching fasteners.

NOTE: Transmission cooler line snaps into shroud lower right hand corner.

8. Remove radiator cooling fan and shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
9. Remove crankshaft damper bolt.
10. Remove damper using Special Tools 8513 Insert and 1026 Three Jaw Puller (2).

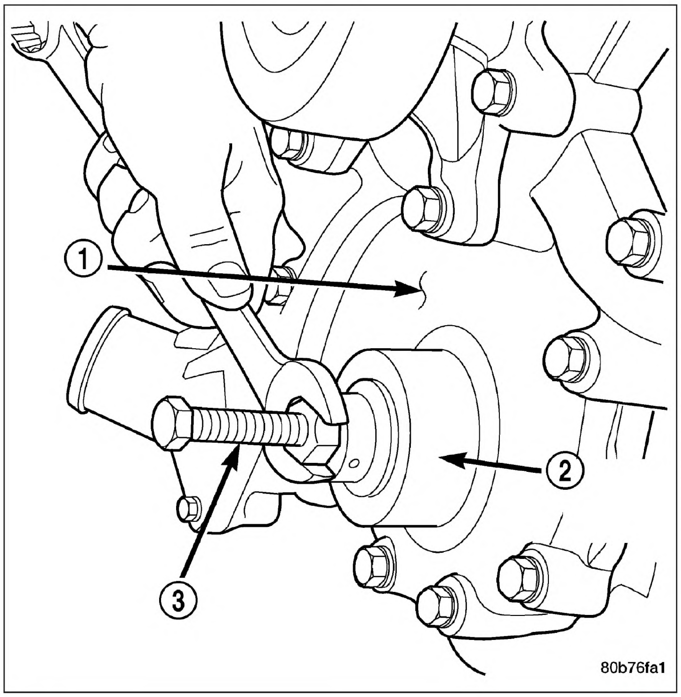


11. Using Special Tool 8511 (1), remove crankshaft front seal.



INSTALLATION

CAUTION: To prevent severe damage to the Crankshaft, Damper or Special Tool 8512, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

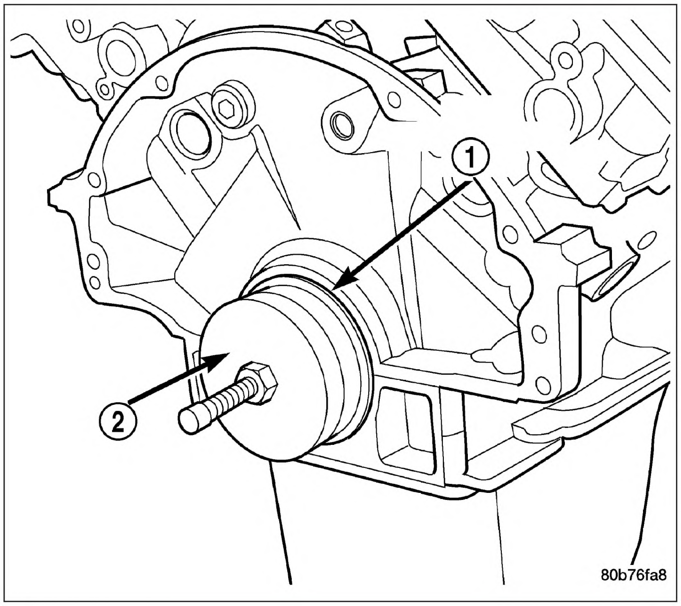


1. Using Special Tool 8348 and 8512 (2,3), install crankshaft front seal.
2. Install vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
3. Install radiator cooling fan and shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
4. Install upper radiator hose.
5. Install A/C compressor and tighten fasteners to 54 N·m (40 ft. lbs.).
6. Install accessory drive belt refer (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
7. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
8. Connect negative cable to battery.

CRANKSHAFT OIL SEAL - REAR

REMOVAL

NOTE: This procedure can be performed in vehicle.



1. If being performed in vehicle, remove the transmission.
2. Remove the flexplate (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - REMOVAL).

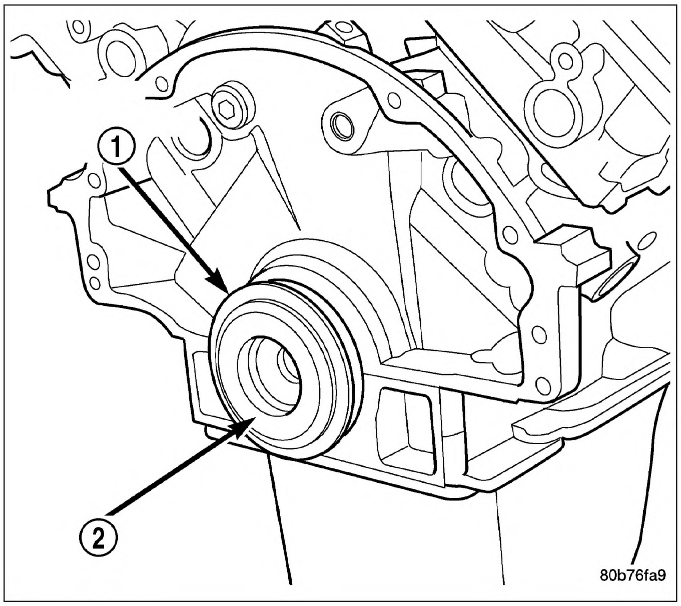
NOTE: The crankshaft oil seal CAN NOT be reused after removal.

NOTE: The crankshaft rear oil seal remover Special Tool 8506 must be installed deeply into the seal. Continue to tighten the removal tool into the seal until the tool can not be turned farther. Failure to install tool correctly the first time will cause tool to pull free of seal without removing seal from engine.

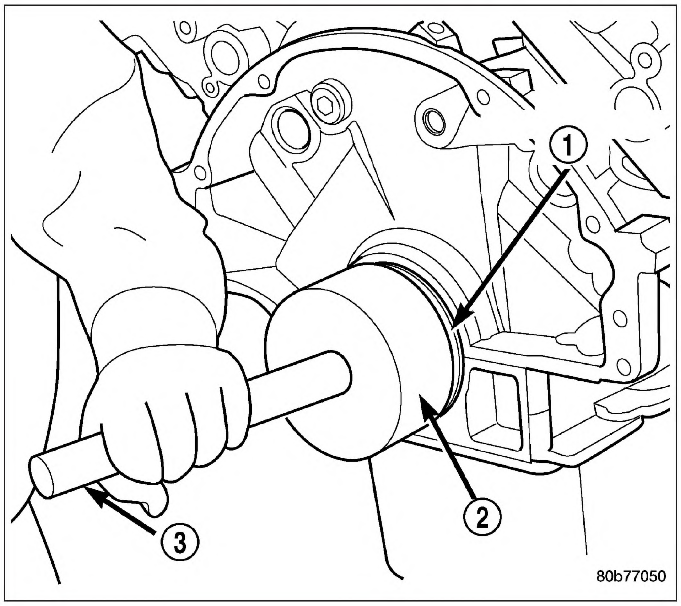
3. Using Special Tool 8506 (2), remove the crankshaft rear oil seal (1)

INSTALLATION

1. Lubricate the crankshaft flange with engine oil.
2. Position the magnetic seal guide Special Tool 8349-2 onto the crankshaft rear face. Then position the crankshaft rear oil seal (1) onto the guide (2).



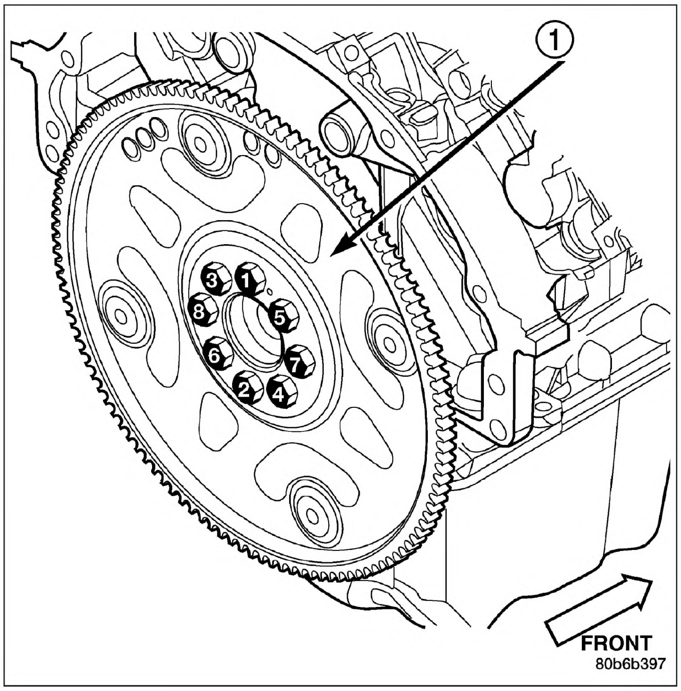
3. Using Special Tools 8349 Crankshaft Rear Oil Seal Installer (2) and C-4171 Driver Handle (3), with a hammer, tap the seal (1) into place. Continue to tap on the driver handle until the seal installer seats against the cylinder block crankshaft bore.
4. Install the flexplate.
5. Install the transmission.



FLEX PLATE

REMOVAL

1. Remove the transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - REMOVAL).
2. Remove the bolts and flexplate (1).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3
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8
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7
2
4
FRONT
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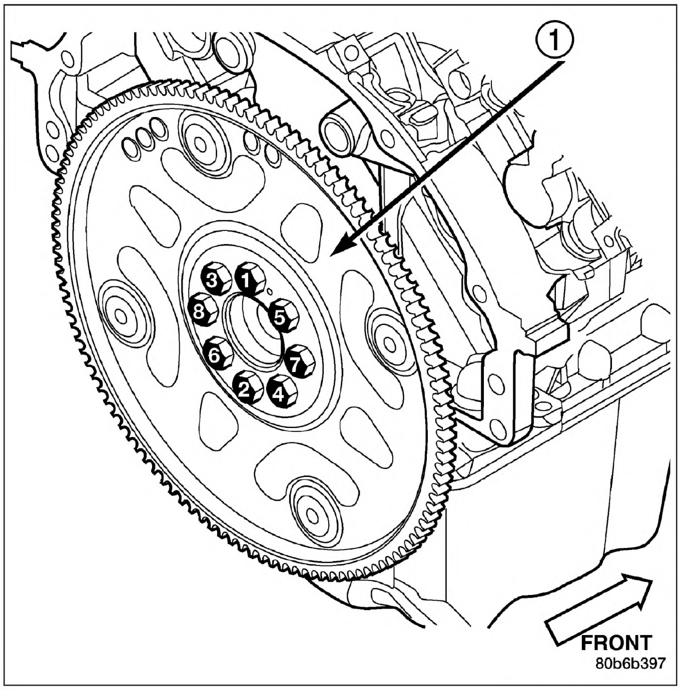
INSTALLATION

1. Position the flexplate onto the crankshaft and install the bolts hand tight.
2. Tighten the flexplate retaining bolts to 60 N·m (45 ft. lbs.) in the sequence shown.
3. Install the transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - INSTALLATION).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ROD - PISTON & CONNECTING

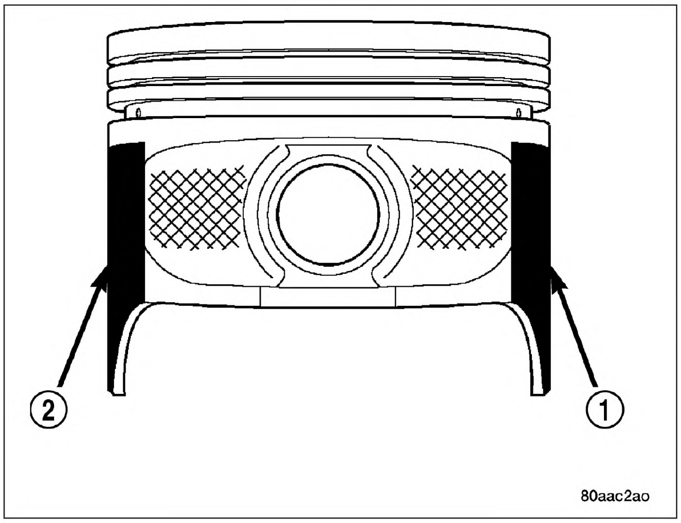
DESCRIPTION

CAUTION: Do not use a metal stamp to mark connecting rods as damage may result, instead use ink or a scratch awl.

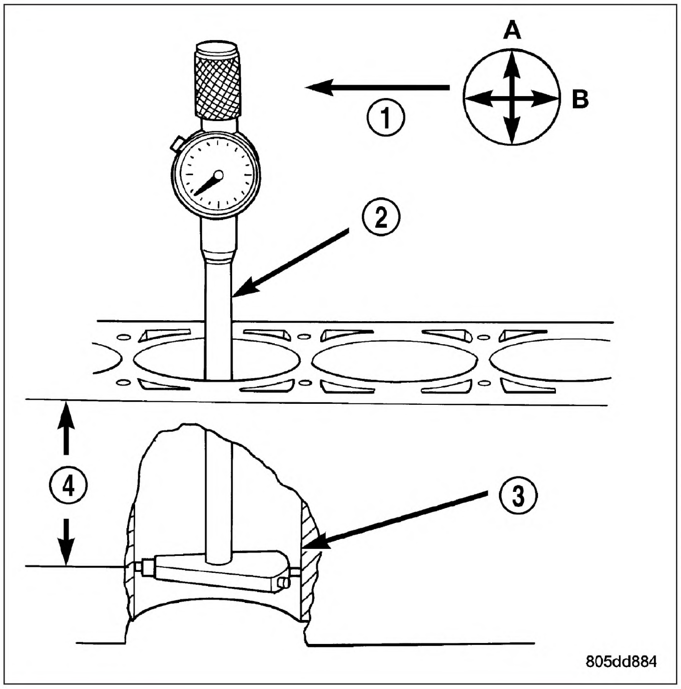
The pistons are made of a high strength aluminum alloy. The anodized top ring groove and crown has been replaced with a coated top ring that is blue in color on the bottom surface. Piston skirts are coated with a solid lubricant (Molykote) to reduce friction and provide scuff resistance. The connecting rods are made of forged powdered metal, with a “fractured cap” design. A pressed fit piston pin is used to attach the piston and connecting rod on the 4.7L.

STANDARD PROCEDURE - PISTON FITTING

1. To correctly select the proper size piston, a cylinder bore gauge, capable of reading in 0.003 mm (.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at a point 38.0 mm (1.5 inches) below top of bore. Start perpendicular (across or at 90 degrees) to the axis of the crankshaft at point A and then take an additional bore reading 90 degrees to that at point B.



3. The coated pistons will be serviced with the piston pin and connecting rod pre-assembled.
4. The coating material is applied to the piston after the final piston machining process. Measuring the outside diameter of a coated piston will not provide accurate results. Therefore measuring the inside diameter of the cylinder bore with a dial Bore Gauge is **MANDATORY**. To correctly select the proper size piston, a cylinder bore gauge capable of reading in 0.003 mm (.0001 in.) increments is required.
5. Piston installation into the cylinder bore requires slightly more pressure than that required for non-coated pistons. The bonded coating on the piston will give the appearance of a line-to-line fit with the cylinder bore.



REMOVAL

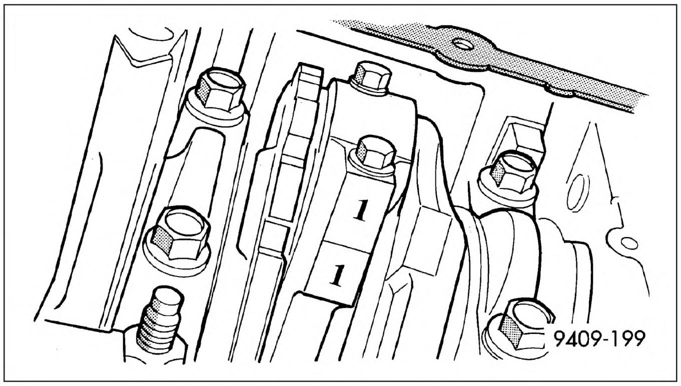
1. Disconnect negative cable from battery.
2. Remove the following components:
   - Oil pan and gasket/windage tray (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
   - Cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL) and (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
   - Timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
   - Cylinder head(s) (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL) and (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).
3. If necessary, remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation.** Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so the each connecting rod is centered in cylinder bore.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

4. Mark connecting rod and bearing cap positions using a permanent ink marker or scribe tool.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.



5. Remove connecting rod cap. Install Special Tool 8507 Connecting Rod Guides into the connecting rod being removed. Remove piston from cylinder bore. Repeat this procedure for each piston being removed.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur

6. Immediately after piston and connecting rod removal, install bearing cap on the mating connecting rod to prevent damage to the fractured cap and rod surfaces.
7. Carefully remove piston rings from piston(s), starting from the top ring down.

CLEANING

CAUTION: DO NOT use a wire wheel or other abrasive cleaning devise to clean the pistons or connecting rods. The pistons have a Moly coating, this coating must not be damaged.

1. Using a suitable cleaning solvent clean the pistons in warm water and towel dry.
2. Use a wood or plastic scraper to clean the ring land grooves.

CAUTION: DO NOT remove the piston pin from the piston and connecting rod assembly.

INSPECTION

Check the connecting rod journal for excessive wear, taper and scoring (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE).

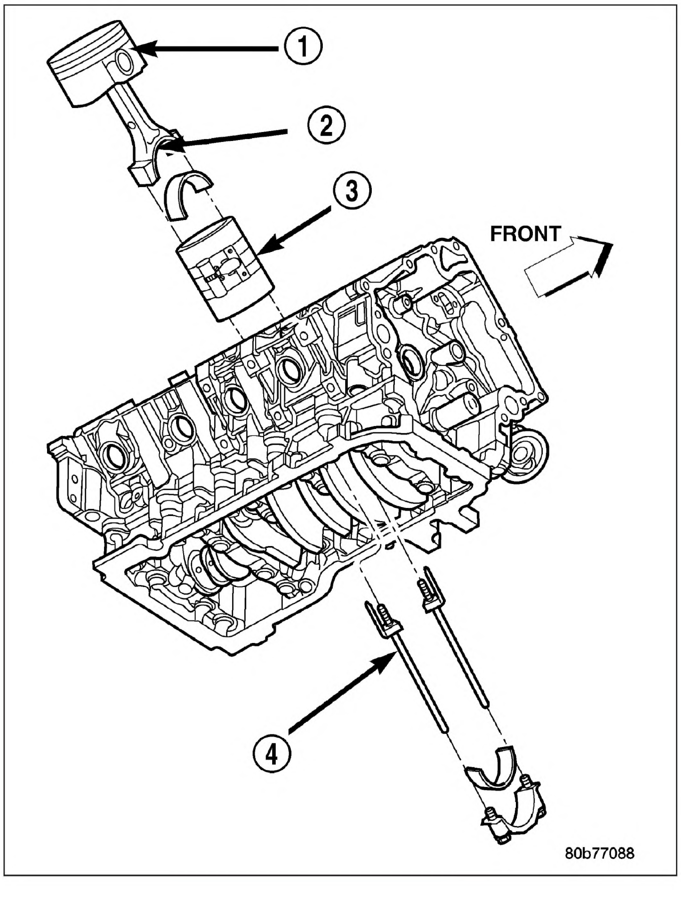
Check the connecting rod for signs of twist or bending.

Check the piston for taper and elliptical shape before it is fitted into the cylinder bore (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - STANDARD PROCEDURE).

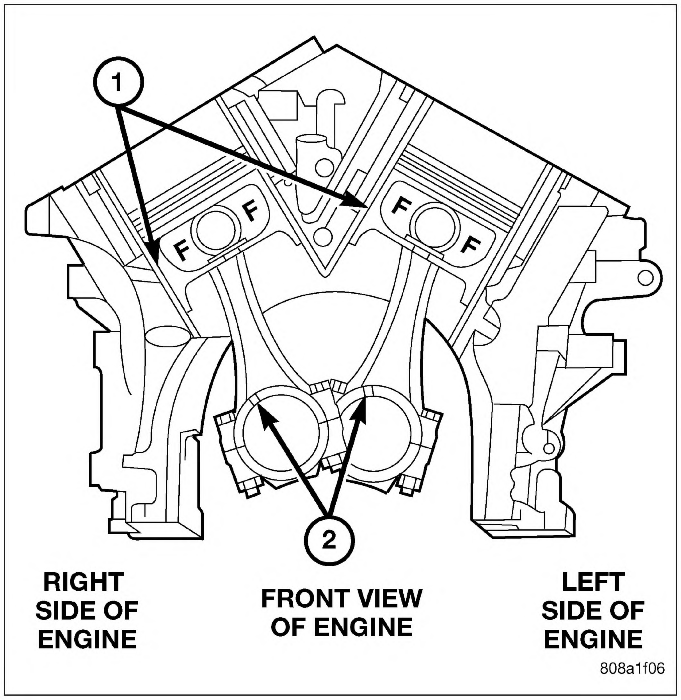
Check the piston for scoring, or scraping marks in the piston skirts. Check the ring lands for cracks and/or deterioration.

INSTALLATION

1. Before installing piston and connecting rod assemblies into the bore, install the piston rings.
2. Immerse the piston head and rings in clean engine oil. Position a ring compressor (3) over the piston and rings. Tighten ring compressor. **Ensure position of rings do not change during this operation.**
3. Position bearing onto connecting rod. Ensure that hole in bearing shell aligns with hole in connecting rod. Lubricate bearing surface with clean engine oil.



4. Install Special Tool 8507 Connecting Rod Guides (4) into connecting rod bolt threads.



5. The pistons are marked on the piston pin bore surface with an raised “F” indicating installation position (1). This mark must be pointing toward the front of engine on both cylinder banks. The connecting rod oil slinger slot faces the front of the engine.
6. Wipe cylinder bore clean and lubricate with engine oil.
7. Rotate crankshaft until connecting rod journal is on the center of cylinder bore. Insert rod and piston into cylinder bore and carefully position connecting rod guides over crankshaft journal.
8. Tap piston down in cylinder bore using a hammer handle. While at the same time, guide connecting rod into position on rod journal.

CAUTION: Connecting Rod Bolts are Torque to Yield Bolts and Must Not Be Reused. Always replace the Rod Bolts whenever they are loosened or removed.

9. Lubricate rod bolts and bearing surfaces with engine oil. Install connecting rod cap and bearing. Tighten bolts to 27 N·m (20 ft. lbs.) plus 90°.
10. Install the following components:
    - Cylinder head(s). (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).
    - Timing chain and cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
    - Cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
    - Oil pan and gasket/windage tray. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).
11. Fill crankcase with proper engine oil to correct level.
12. Connect negative cable to battery.

RINGS - PISTON

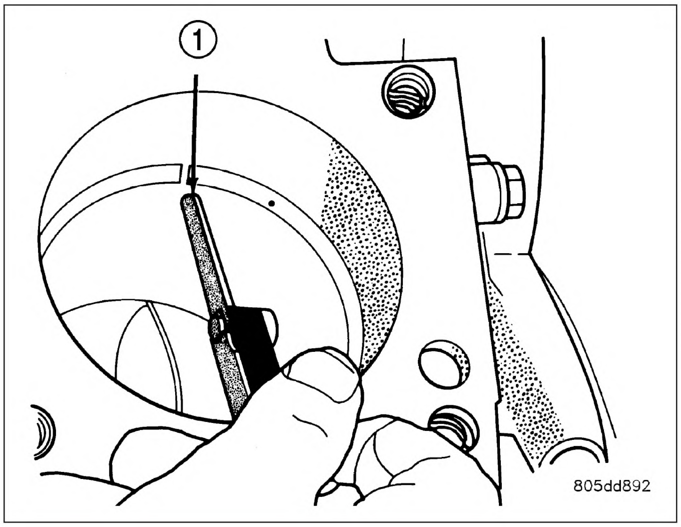
STANDARD PROCEDURE - PISTON RING FITTING

Before reinstalling used rings or installing new rings, the ring clearances must be checked.

1. Wipe the cylinder bore clean.
2. Insert the ring in the cylinder bore.

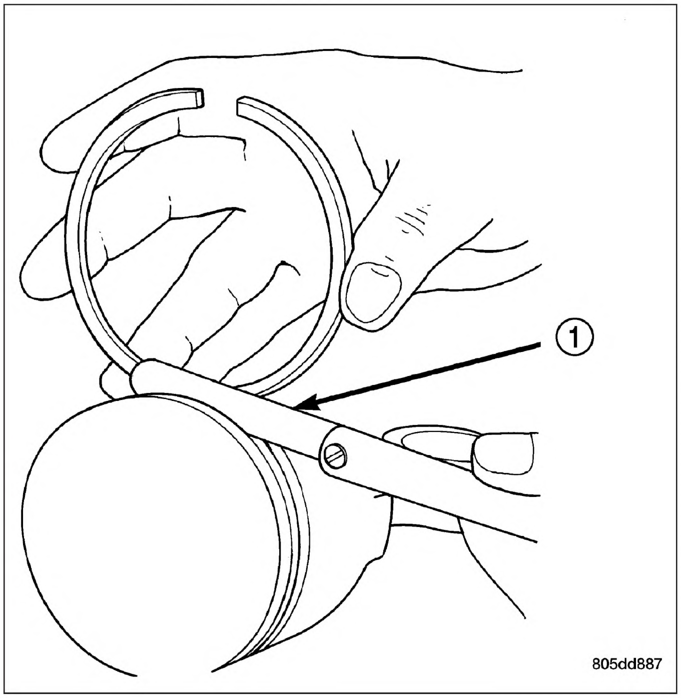
NOTE: The ring gap measurement must be made with the ring positioned at least 12mm (0.50 inch.) from bottom of cylinder bore.

3. Using a piston, to ensure that the ring is squared in the cylinder bore, slide the ring downward into the cylinder.
4. Using a feeler gauge (1) check the ring end gap. Replace any rings not within specification.



PISTON RING SIDE CLEARANCE

NOTE: Make sure the piston ring grooves are clean and free of nicks and burrs.



5. Measure the ring side clearance as shown make sure the feeler gauge (1) fits snugly between the ring land and the ring. Replace any ring not within specification.
6. Rotate the ring around the piston, the ring must rotate in the groove with out binding.

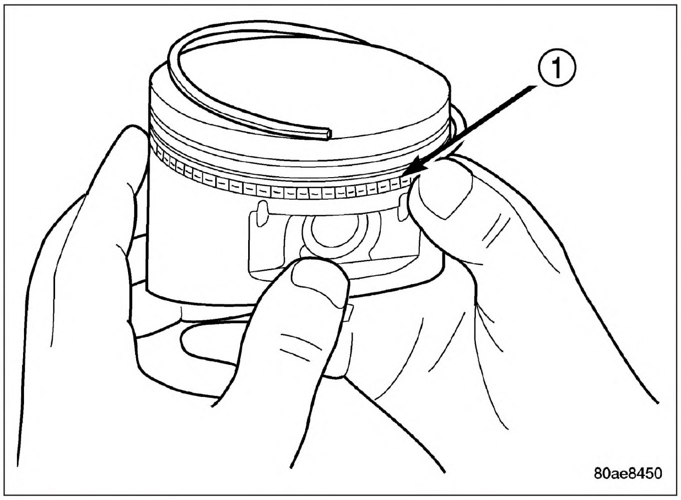
PISTON RING SPECIFICATION CHART

Ring Position	Groove Clearance	Maximum Clearance
Upper Ring	.051-.094 mm (0.0020-.0037 in.)	0.11 mm (0.004 in.)
Intermediate Ring	0.04-0.08 mm (0.0016-0.0031 in.)	0.10 mm (0.004 in.)
Oil Control Ring (Steel Rails)	.019-.229 mm (.0007-.0090 in.)	.25 mm (0.010 in.)
Ring Position	**Ring Gap**	**Wear Limit**
Upper Ring	0.20-0.36 mm (0.0079-0.0142 in.)	0.43 mm (0.0017 in.)
Intermediate Ring	0.37-0.63 mm (0.0146-0.0249 in.)	0.74 mm (0.029 in.)
Oil Control Ring (Steel Rail)	0.025-0.76 mm (0.0099- 0.03 in.)	1.55 mm (0.061 in.)

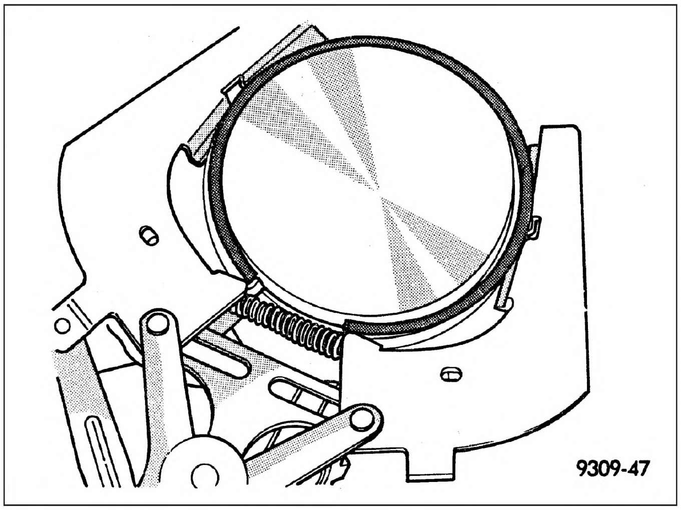
7. The No. 1 and No. 2 piston rings have a different cross section. Ensure No. 2 ring is installed with manufacturers I.D. mark (Dot) facing up, towards top of the piston.

NOTE: Piston rings are installed in the following order:
- **Oil ring expander.**
- **Upper oil ring side rail.**
- **Lower oil ring side rail.**
- **No. 2 Intermediate piston ring.**
- **No. 1 Upper piston ring.**

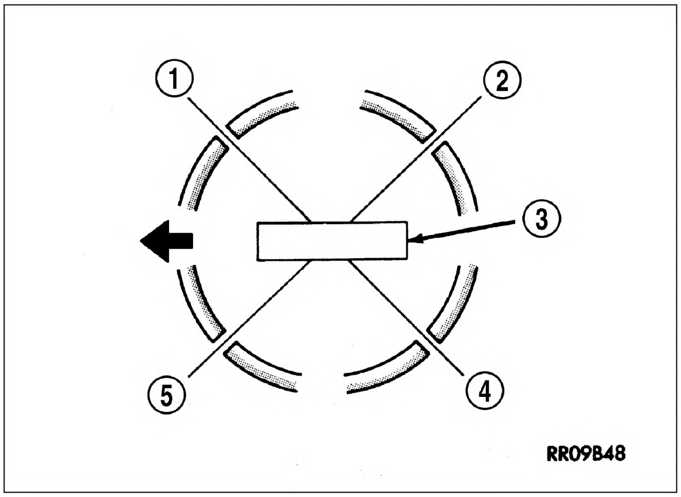
8. Install the oil ring expander.
9. Install upper side rail (1) by placing one end between the piston ring groove and the expander ring. Hold end firmly and press down the portion to be installed until side rail is in position. Repeat this step for the lower side rail.



10. Install No. 2 intermediate piston ring using a piston ring installer.



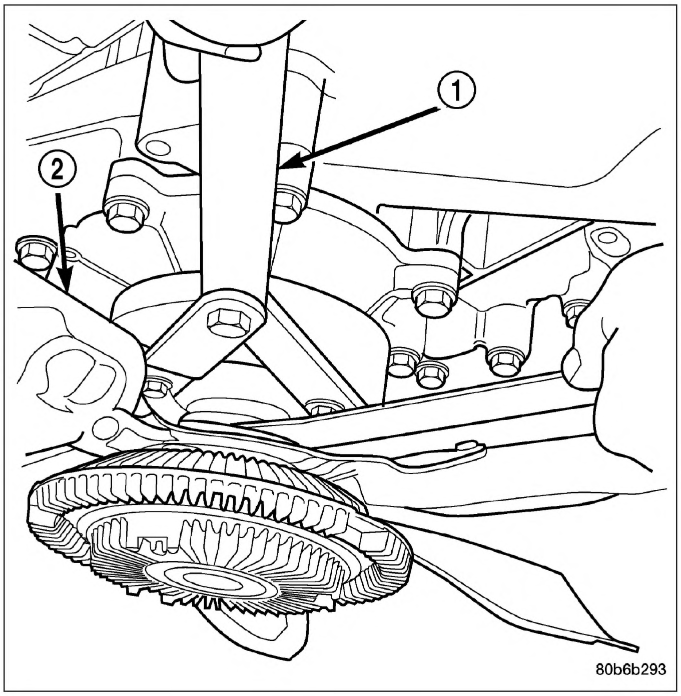
11. Install No. 1 upper piston ring using a piston ring installer.
12. Position piston ring end gaps as shown in. It is important that expander ring gap (5) is at least 45° from the side rail gaps, but not on the piston pin center or on the thrust direction.



DAMPER - CRANKSHAFT

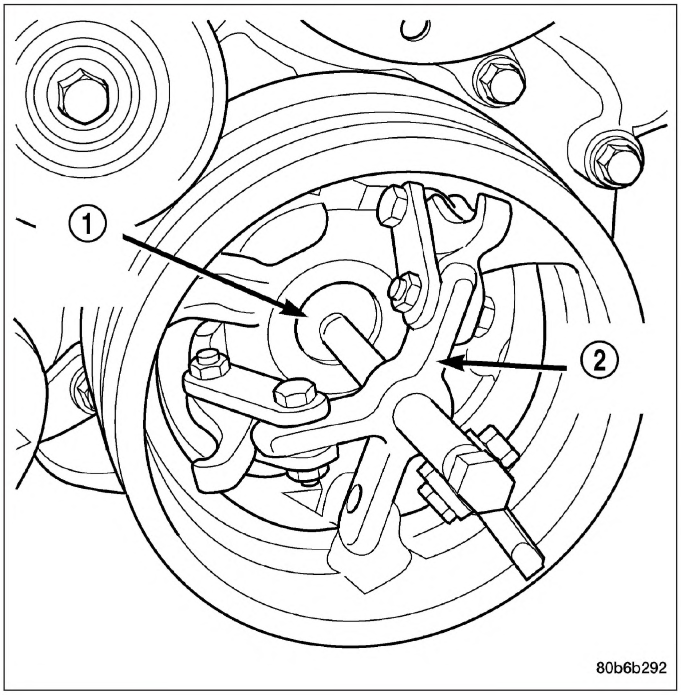
REMOVAL

1. Disconnect negative cable from battery.
2. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
3. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
4. Remove radiator upper hose.
5. Remove upper fan shroud.
6. Using Special Tools 6958 Spanner with Adapter Pins 8346 (1), loosen fan and viscous assembly from water pump.
7. Remove fan and viscous assembly.
8. Disconnect electrical connector for fan mounted inside radiator shroud.



NOTE: Transmission cooler line snaps into shroud lower right hand corner.

9. Remove crankshaft damper bolt.
10. Remove damper using Special Tools 8513 Insert and 1026 Three Jaw Puller (2).

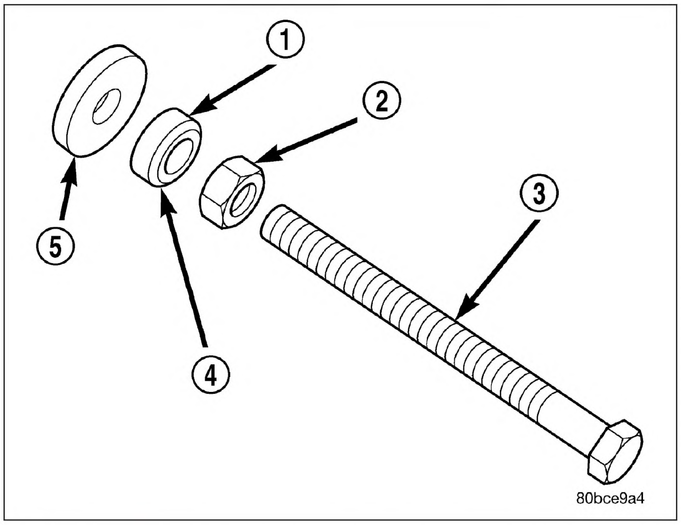


INSTALLATION

CAUTION: To prevent severe damage to the Crankshaft, Damper or Special Tool 8512–A, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

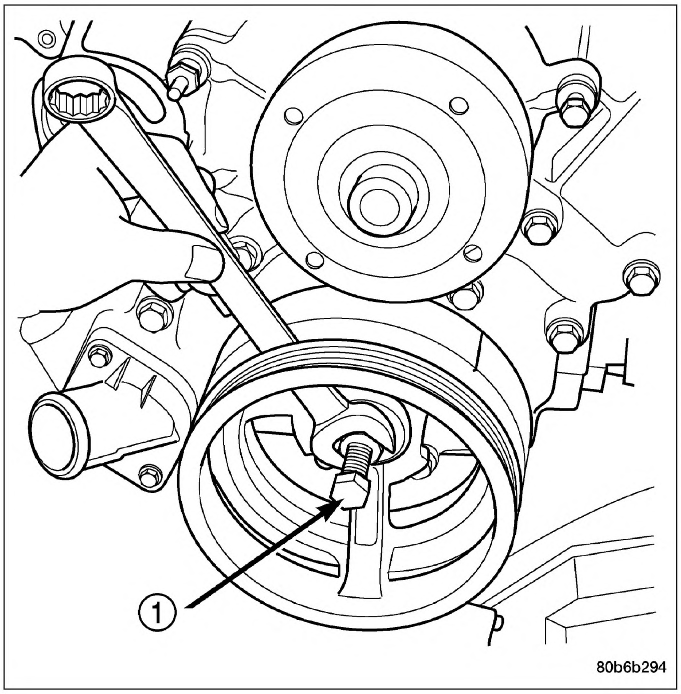
1. Align crankshaft damper slot with key in crankshaft. Slide damper onto crankshaft slightly.

CAUTION: Special Tool 8512–A, is assembled in a specific sequence. Failure to assemble this tool in this sequence can result in tool failure and severe damage to either the tool or the crankshaft.



2. Assemble Special Tool 8512–A as follows, The nut (2) is threaded onto the shaft first. Then the roller bearing (1) is placed onto the threaded rod (3) (The hardened bearing surface of the bearing (1) **MUST**face the nut (2). Then the hardened washer (5)slides onto the threaded rod. Once assembled coat the threaded rod's threads with Mopar® Nickel Anti-Seize or equivalent.

3. Using Special Tool 8512–A, press damper onto crankshaft (1).
4. Install then tighten crankshaft damper bolt to 175 N·m (130 ft. lbs.).
5. Install fan blade assembly (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - INSTALLATION).
6. Install radiator upper shroud and tighten fasteners to 11 N·m (95 in. lbs.).
7. Connect electrical connector for shroud fan.
8. Install radiator upper hose.
9. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
10. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
11. Connect negative cable to battery.



STRUCTURAL COVER

DESCRIPTION

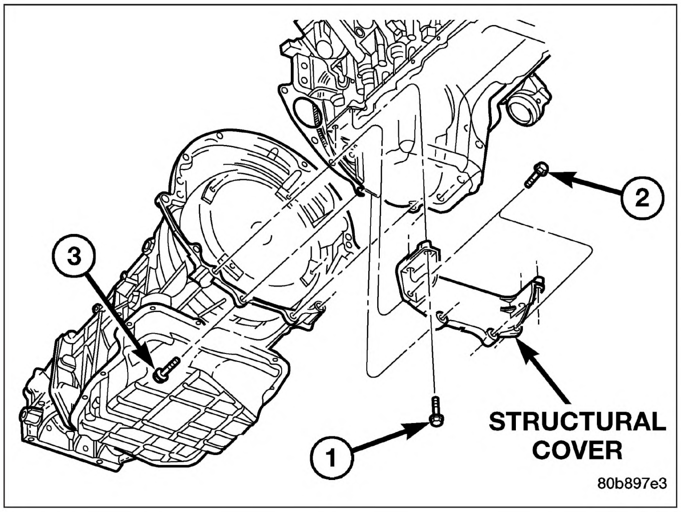
The structural dust cover is made of die cast aluminum and joins the lower half of the transmission bell housing to the engine bedplate.

OPERATION

The structural cover provides additional powertrain stiffness and reduces noise and vibration.

REMOVAL

1. Raise vehicle on hoist.
2. Remove the left hand exhaust pipe from exhaust manifold.
3. Loosen the right hand exhaust manifold-to-exhaust pipe retaining bolts.
4. Remove the eight bolts (1,2,3) retaining structural cover in the sequence shown.
5. Pivot the exhaust pipe downward and remove the structural cover.

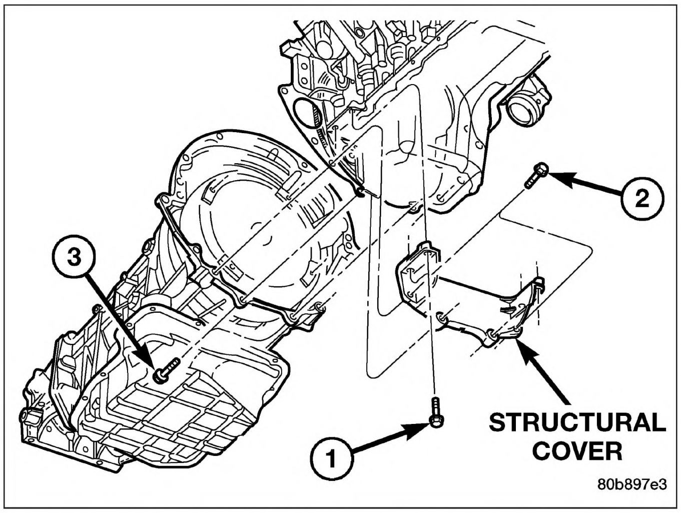


INSTALLATION

CAUTION: The structural cover must be installed as described in the following steps. Failure to do so will cause severe damage to the cover.

1. Position the structural cover in the vehicle.
2. Install all four bolts (1,2,3)retaining the cover-to-engine. DO NOT tighten the bolts at this time.
3. Install the four cover-to-transmission bolts (1,2,3). Do NOT tighten at this time.

CAUTION: The structural cover must be held tightly against both the engine and the transmission bell housing during tightening sequence. Failure to do so may cause damage to the cover.

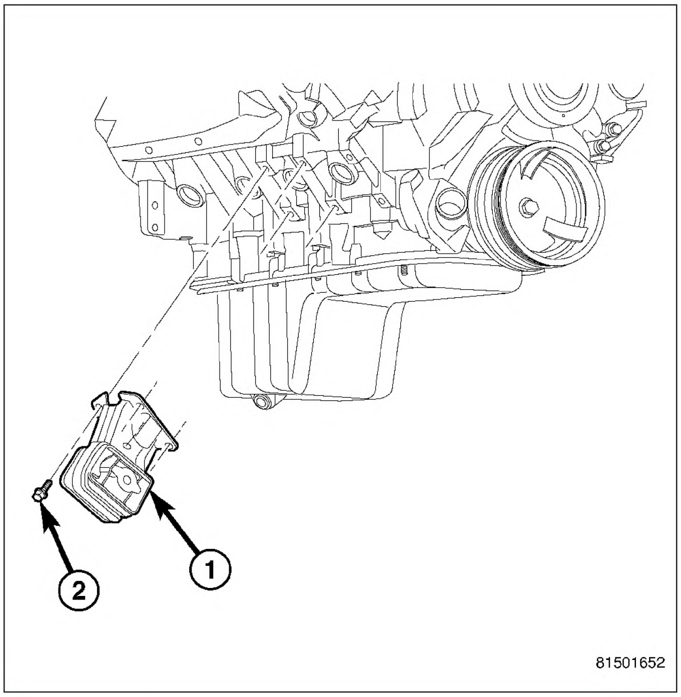


4. Starting with the two rear cover-to-engine bolts, tighten bolts (1) to 54 N·m (40 ft. lbs.), then tighten bolts (2) and (3) to 54 N·m (40 ft. lbs.) in the sequence shown.
5. Install the exhaust pipe on left hand exhaust manifold.
6. Tighten exhaust manifold-to-exhaust pipe retaining bolts to 20–26 N·m (15–20 ft. lbs.).

MOUNT-ENGINE FRONT

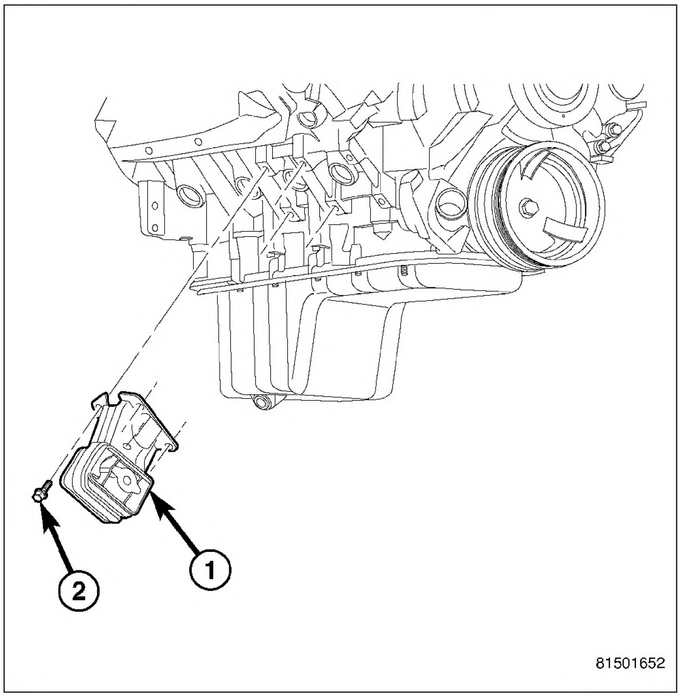
REMOVAL

1. Disconnect negative battery cable.
2. Raise vehicle.
3. Remove engine mount thru bolts.
4. Raise engine using suitable jack.
5. Remove engine mount bolts (2).
6. Remove mount (1) from engine.



INSTALLATION

1. Install the engine mount (1).
2. Lower the engine.
3. Install the thru bolts and nuts
4. Lower vehicle.
5. Connect negative battery cable.

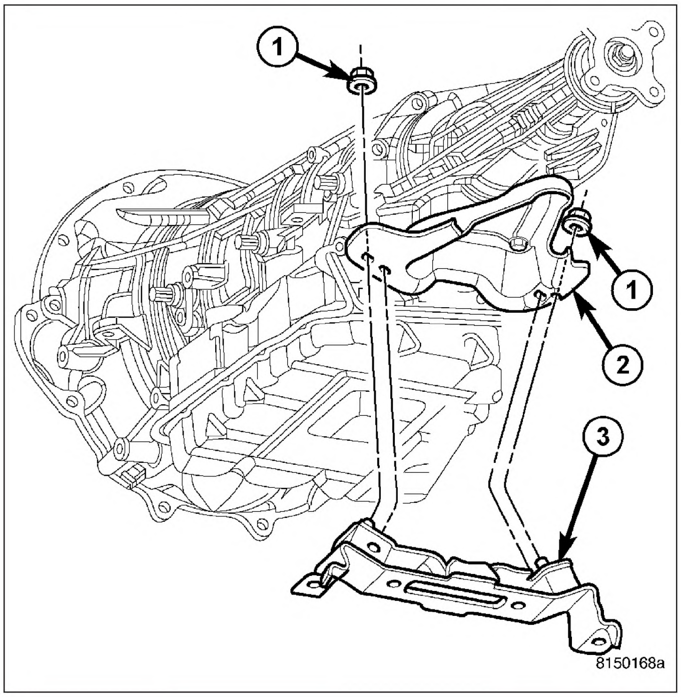


MOUNT-ENGINE REAR

REMOVAL

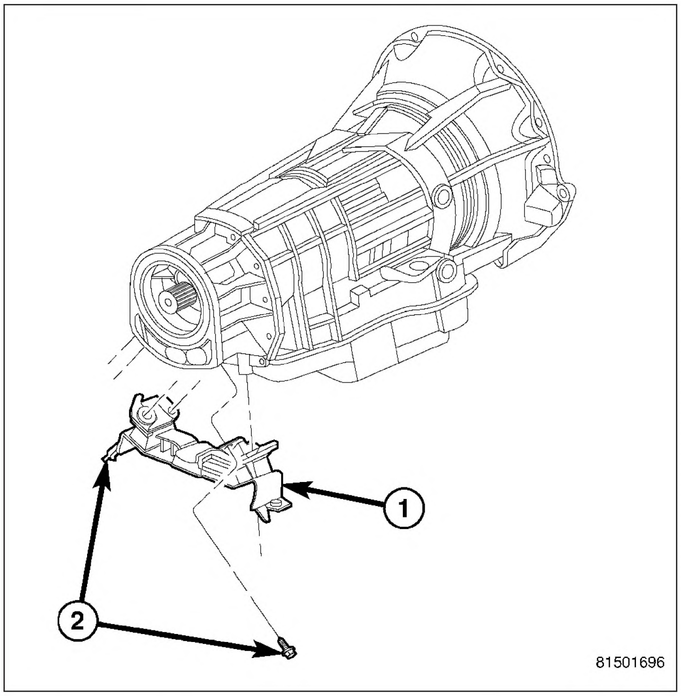
4X2

1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (1) from the transmission mount to transmission.
5. Remove the mount (3).
6. Remove the transmission mount bracket (2), if required.



4X4

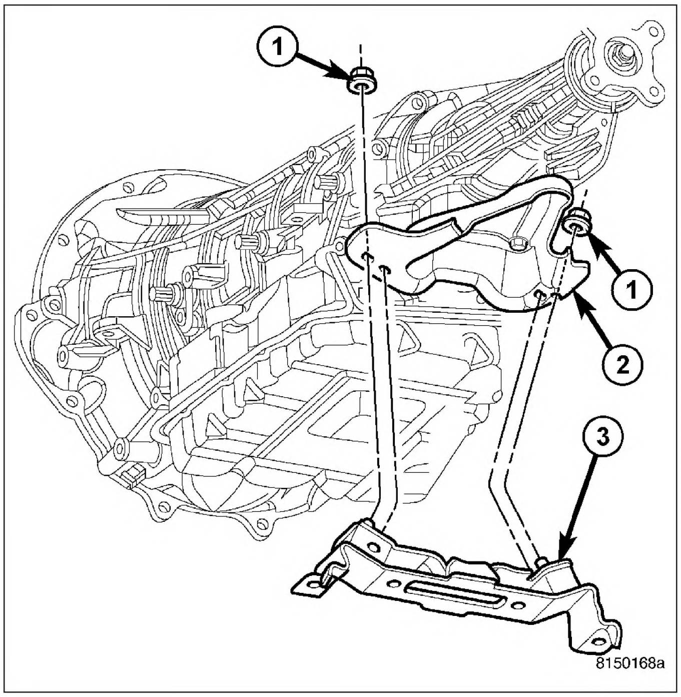
1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (2) from the transmission mount (1) to transmission.
5. Remove the mount.



INSTALLATION

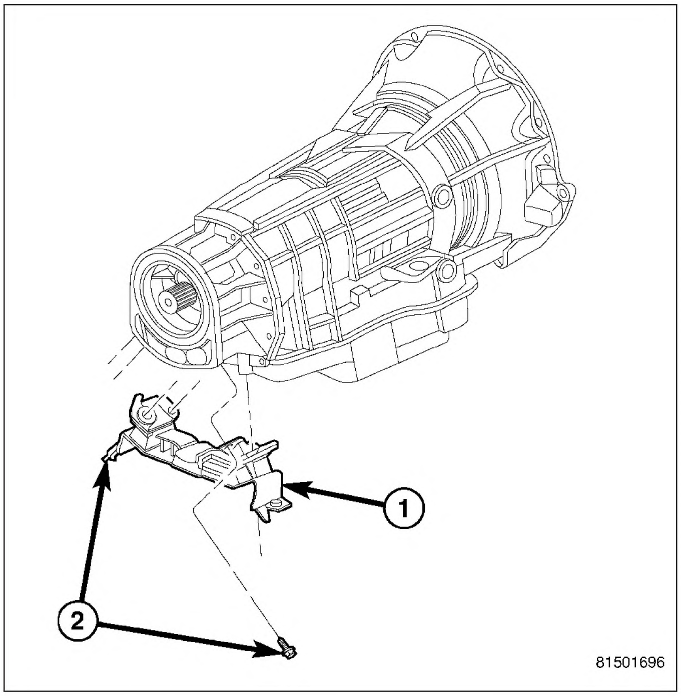
4X2

1. Install the transmission mount bracket (2), if removed.
2. Position the transmission mount (3) on the transmission mount bracket (2). Install the fasteners (1)that attach the transmission mount to the bracket.
3. Torque the bolts to N·m (ft.lbs.) torque.
4. Install the crossmember.



4X4

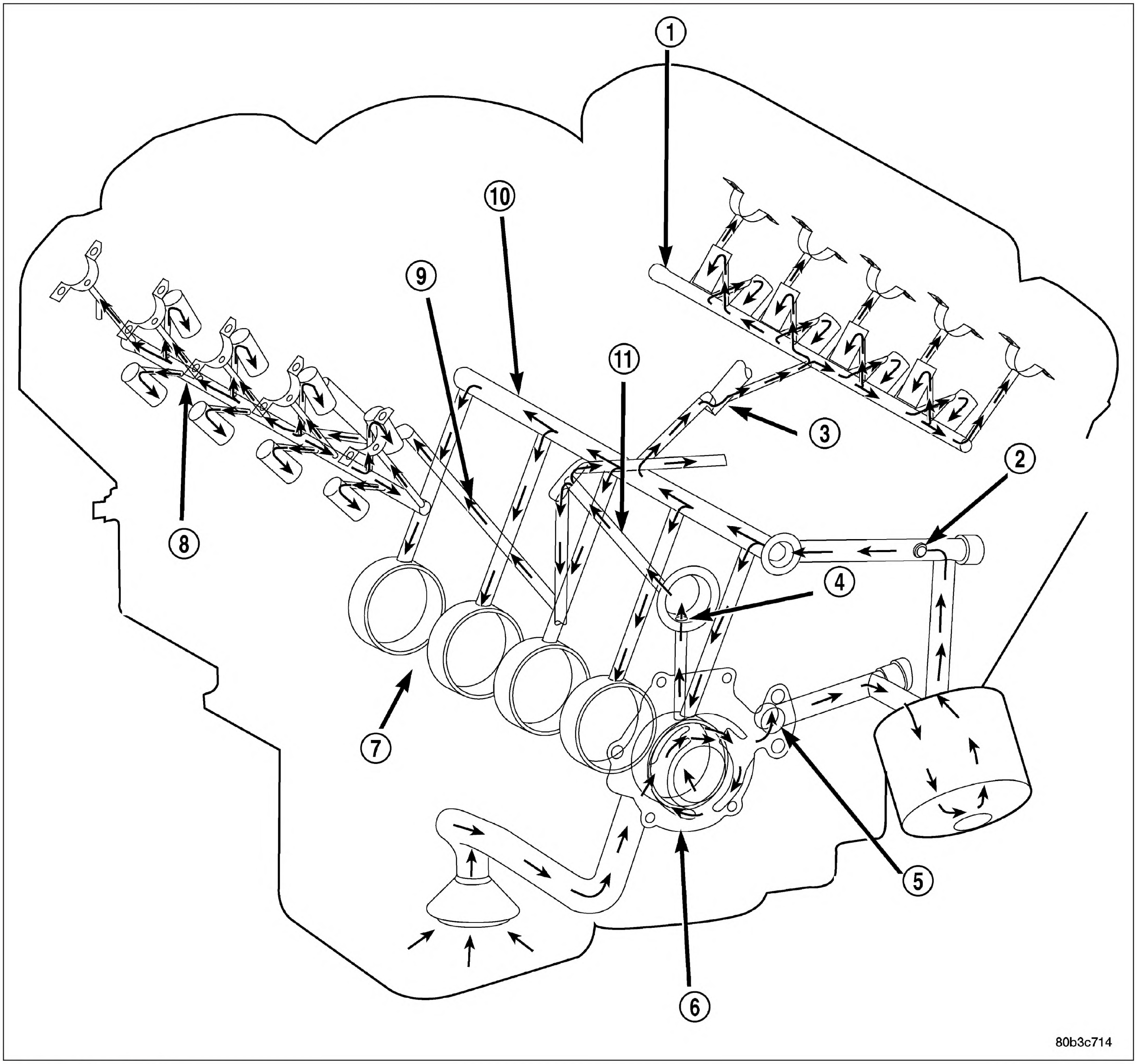
1. Position the transmission mount (1) on the transmission. Install the bolts (2) that attach the transmission mount to the transmission.
2. Torque the bolts to N·m (ft.lbs.) torque.
3. Install the crossmember.



LUBRICATION

DESCRIPTION

The lubrication system is a full flow filtration pressure feed type.



OPERATION

Oil from the oil pan is pumped by a gerotor type oil pump directly mounted to the crankshaft nose. Oil pressure is controlled by a relief valve mounted inside the oil pump housing.

The camshaft exhaust valve lobes and rocker arms are lubricated through a small hole in the rocker arm; oil flows through the lash adjuster then through the rocker arm and onto the camshaft lobe. Due to the orentation of the rocker arm, the camshaft intake lobes are not lubed in the same manner as the exhaust lobes. The intake lobes are lubed through internal passages in the camshaft. Oil flows through a bore in the number 3 camshaft bearing bore, and as the camshaft turns, a hole in the camshaft aligns with the hole in the camshaft bore allowing engine oil to enter the camshaft tube. The oil then exits through 1.6mm (0.063 in.) holes drilled into the intake lobes, lubricating the lobes and the rocker arms.

Engine Lubrication Flow Chart—Block: Table 1

FROM	TO
Oil Pickup Tube	Oil Pump
Oil Pump	Oil Filter
Oil Filter	Block Main Oil Gallery
Block Main Oil Gallery	1. Crankshaft Main Journal 2. Left Cylinder Head* 3. Right Cylinder Head*
Crankshaft Main Journals	Crankshaft Rod Journals
Crankshaft Number One Main Journal	1.Front Timing Chain Idler Shaft 2.Both Secondary Chain Tensioners
Left Cylinder Head	See Table 2
Right Cylinder Head	See Table 2
* The cylinder head gaskets have an oil restricter to control oil flow to the cylinder heads.	

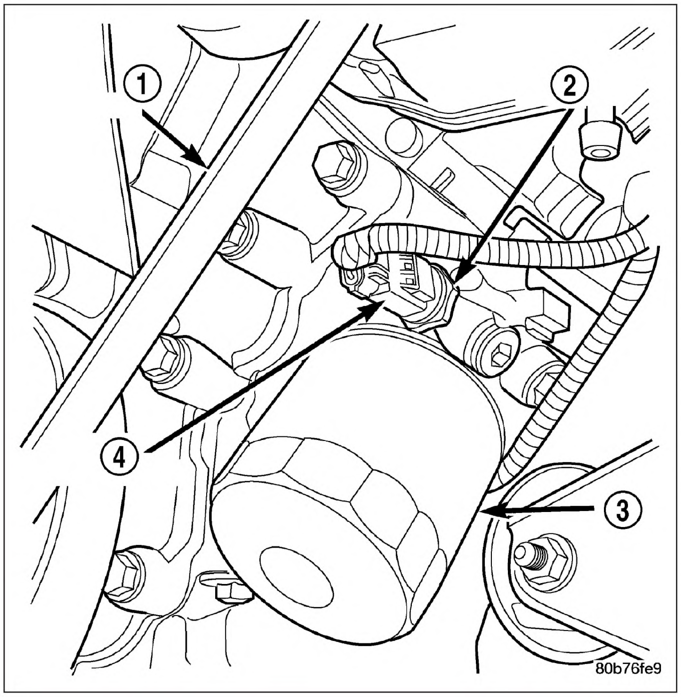
Engine Lubrication Flow Chart—Cylinder Heads: Table 2

FROM	TO
Cylinder Head Oil Port (in bolt hole)	Diagonal Cross Drilling to Main Oil Gallery
Main Oil Gallery (drilled through head from rear to front)	1. Base of Camshaft Towers 2. Lash Adjuster Towers
Base of Camshaft Towers	Vertical Drilling Through Tower to Camshaft Bearings**
Lash Adjuster Towers	Diagonal Drillings to Hydraulic Lash Adjuster Pockets
** The number three camshaft bearing journal feeds oil into the hollow camshaft tubes. Oil is routed to the intake lobes, which have oil passages drilled into them to lubricate the rocker arms.	

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE OIL PRESSURE

1. Remove oil pressure sending unit and install gauge assembly C-3292.
2. Run engine until thermostat opens.
3. Oil Pressure:
   - Curb Idle—25 Kpa (4 psi) minimum
   - 3000 rpm—170 - 550 KPa (25 - 80 psi)
4. If oil pressure is 0 at idle, shut off engine. Check for a clogged oil pick-up screen or a pressure relief valve stuck open.



DIAGNOSIS AND TESTING - REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
   a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
   b. Where leakage tends to run straight down, possible causes are a porous block, distributor seal, camshaft bore cup plugs, oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces. See Engine, for proper repair procedures of these items.
4. If no leaks are detected, pressurized the crankcase as outlined in the section, Inspection (Engine oil Leaks in general)

CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks or scratches. The crankshaft seal flange is specially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING), under the Oil Leak row, for components inspections on possible causes and corrections.

7. After the oil leak root cause and appropriate corrective action have been identified, (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL).

DIAGNOSIS AND TESTING - ENGINE OIL LEAK

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

1. Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.
2. Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.
3. Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair per service manual instructions.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.If the oil leak source is not positively identified at this time, proceed with the air leak detection test method.

Air Leak Detection Test Method

1. Disconnect the breather cap to air cleaner hose at the breather cap end. Cap or plug breather cap nipple.
2. Remove the PCV valve from the cylinder head cover. Cap or plug the PCV valve grommet.
3. Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

4. Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provide the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
5. If the leakage occurs at the rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.
6. If no leaks are detected, turn off the air supply and remove the air hose and all plugs and caps. Install the PCV valve and breather cap hose.
7. Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
    a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
    b. Where leakage tends to run straight down, possible causes are a porous block, distributor seal, camshaft bore cup plugs oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces.
4. If no leaks are detected, pressurize the crankcase as outlined in the, Inspection (Engine oil Leaks in general)

CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

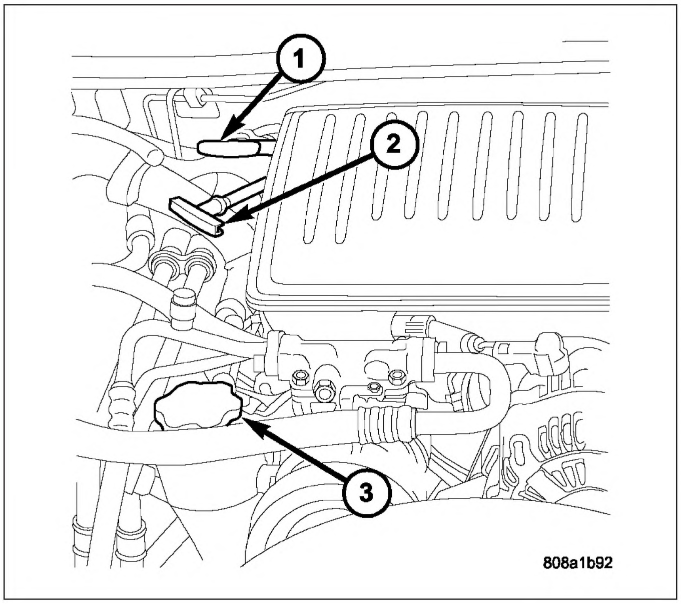
CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

OIL

STANDARD PROCEDURE - ENGINE OIL SERVICE

The engine oil level indicator (2) is located at the right rear of the engine on the 4.7L engines.



CRANKCASE OIL LEVEL INSPECTION

CAUTION: Do not overfill crankcase with engine oil, pressure loss or oil foaming can result.

Inspect engine oil level approximately every 800 kilometers (500 miles). Unless the engine has exhibited loss of oil pressure, run the engine for about five minutes before checking oil level. Checking engine oil level on a cold engine is not accurate.

To ensure proper lubrication of an engine, the engine oil must be maintained at an acceptable level. The acceptable levels are indicated between the ADD and SAFE marks on the engine oil dipstick.

1. Position vehicle on level surface.
2. With engine OFF, allow approximately ten minutes for oil to settle to bottom of crankcase, remove engine oil dipstick.
3. Wipe dipstick clean.
4. Install dipstick and verify it is seated in the tube.
5. Remove dipstick, with handle held above the tip, take oil level reading.
6. Add oil only if level is below the ADD mark on dipstick.

ENGINE OIL CHANGE

Change engine oil at mileage and time intervals described in Maintenance Schedules.

Run engine until achieving normal operating temperature.

1. Position the vehicle on a level surface and turn engine off.
2. Hoist and support vehicle on safety stands.
3. Remove oil fill cap.
4. Place a suitable drain pan under crankcase drain.

5. Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug if damaged.
6. Install drain plug in crankcase.
7. Lower vehicle and fill crankcase with specified type and amount of engine oil described in this section.
8. Install oil fill cap.
9. Start engine and inspect for leaks.
10. Stop engine and inspect oil level.

NOTE: Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING at beginning of this section.

FILTER - ENGINE OIL

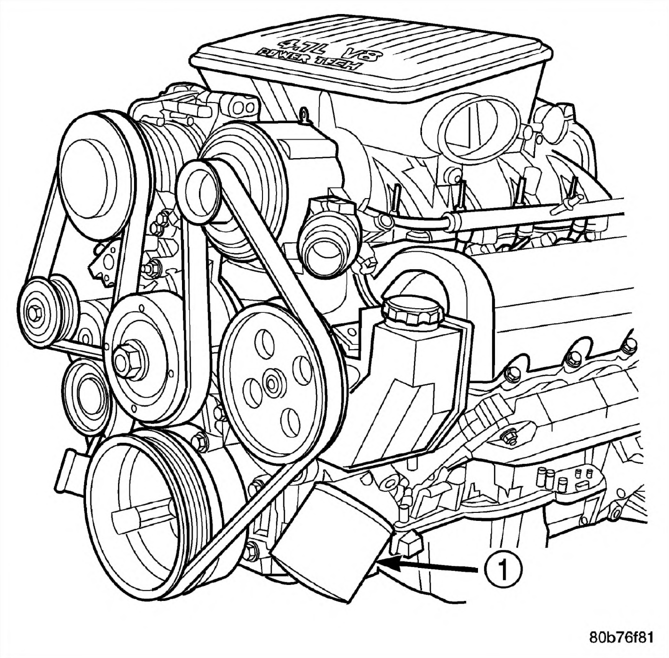
REMOVAL

All engines are equipped with a high quality full-flow, disposable type oil filter. DaimlerChrysler Corporation recommends a Mopar® or equivalent oil filter be used.

1. Position a drain pan under the oil filter.
2. Using a suitable oil filter wrench loosen filter.
3. Rotate the oil filter counterclockwise to remove it from the cylinder block oil filter boss.
4. When filter separates from cylinder block oil filter boss, tip gasket end upward to minimize oil spill. Remove filter from vehicle.

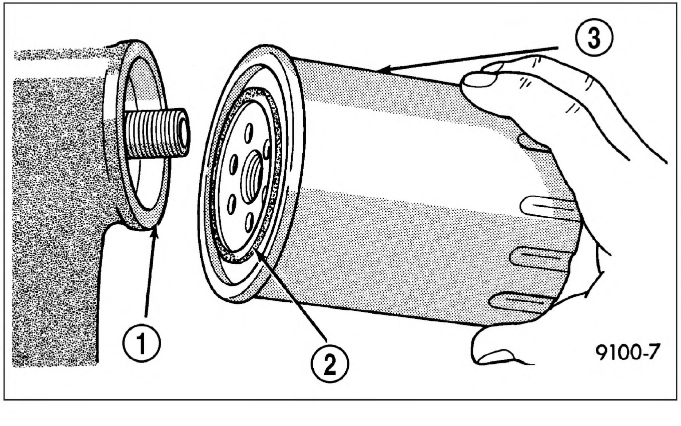
NOTE: Make sure filter gasket was removed with filter.

5. With a wiping cloth, clean the gasket sealing surface of oil and grime.



INSTALLATION

1. Lightly lubricate oil filter gasket (2) with engine oil.
2. Thread filter (3) onto adapter nipple. When gasket makes contact with sealing surface, hand tighten filter one full turn, do not over tighten.
3. Add oil, verify crankcase oil level and start engine. Inspect for oil leaks.



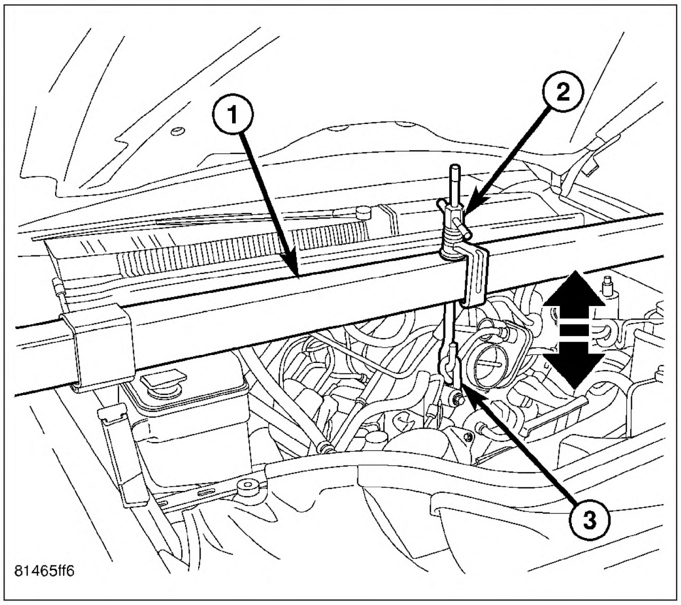
PAN - ENGINE OIL

DESCRIPTION

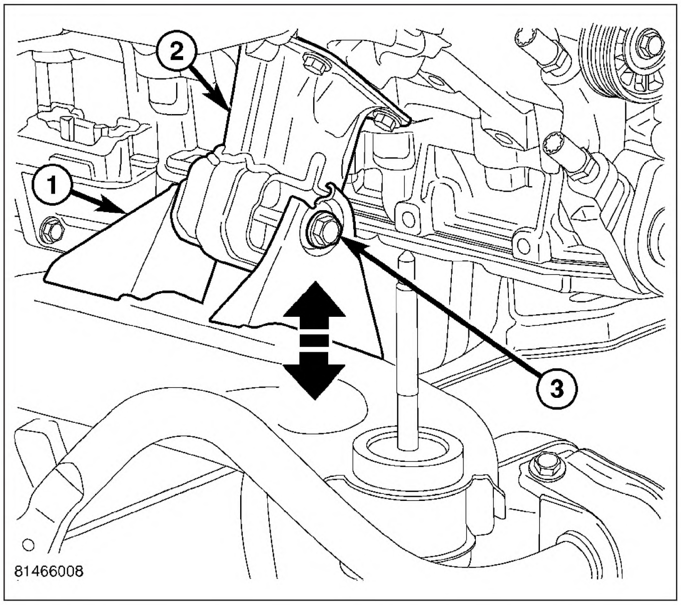
The engine oil pan is made of laminated steel and has a single plane sealing surface. The sandwich style oil pan gasket has an integrated windage tray and steel carrier. The sealing area of the gasket is molded with rubber and is designed to be reused as long as the gasket is not cut, torn or ripped.

REMOVAL

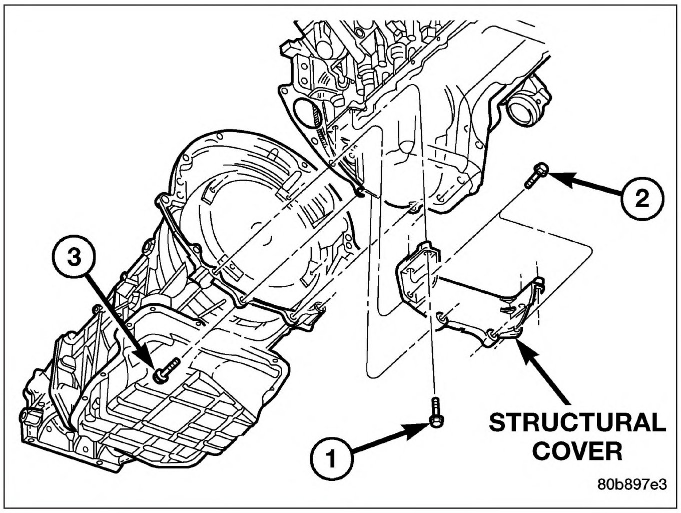
1. Disconnect the negative battery cable.
2. Install engine support fixture (1) special tool # 8534. **Do not raise engine at this time.**



3. Loosen both left and right side engine mount through bolts (3). Do not remove bolts.



4. Remove the structural dust cover.
5. Drain engine oil.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2
STRUCTURAL COVER
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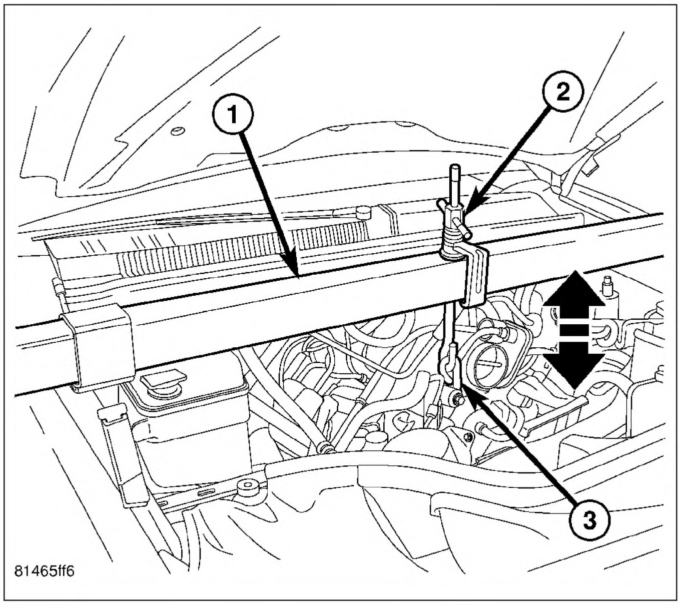
CAUTION: Only raise the engine enough to provide clearance for oil pan removal. Check for proper clearance at fan shroud to fan and cowl to intake manifold.

6. Raise engine using special tool (1) # 8534 to provide clearance to remove oil pan.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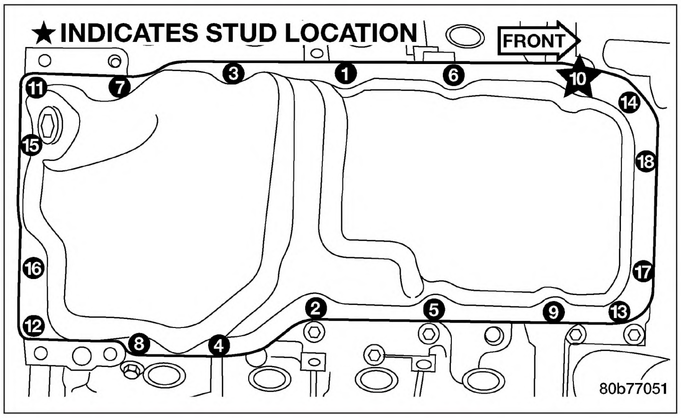
NOTE: Do not pry on oil pan or oil pan gasket. Gasket is integral to engine windage tray and does not come out with oil pan.

7. Remove the oil pan mounting bolts and oil pan.
8. Unbolt oil pump pickup tube and remove tube.
9. Inspect the integral windage tray and gasket and replace as needed.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CLEANING

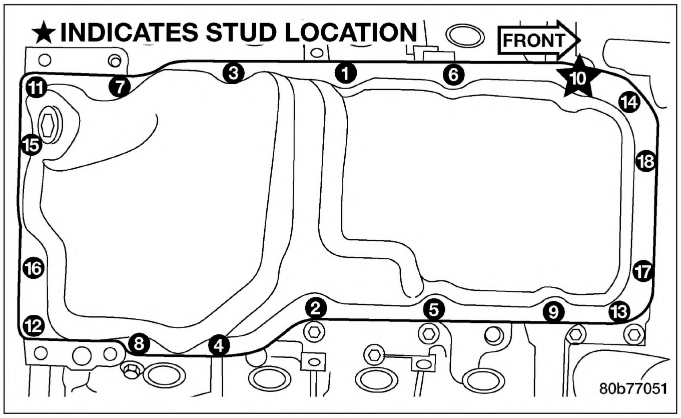
1. Clean oil pan in solvent and wipe dry with a clean cloth.
2. Clean the oil pan gasket surface. **DO NOT** use a grinder wheel or other abrasive tool to clean sealing surface.
3. Clean oil screen and tube thoroughly in clean solvent.

INSPECTION

1. Inspect oil drain plug and plug hole for stripped or damaged threads. Repair as necessary.
2. Inspect the oil pan mounting flange for bends or distortion. Straighten flange, if necessary.

INSTALLATION

1. Clean the oil pan gasket mating surface of the bedplate and oil pan.
2. Position the oil pan gasket and pickup tube with new o-ring. Install the mounting bolt and nuts. Tighten bolt and nuts to 28 N·m (20 ft. lbs.).
3. Position the oil pan and install the mounting bolts. Tighten the mounting bolts to 15 N·m (11 ft. lbs.) in the sequence shown.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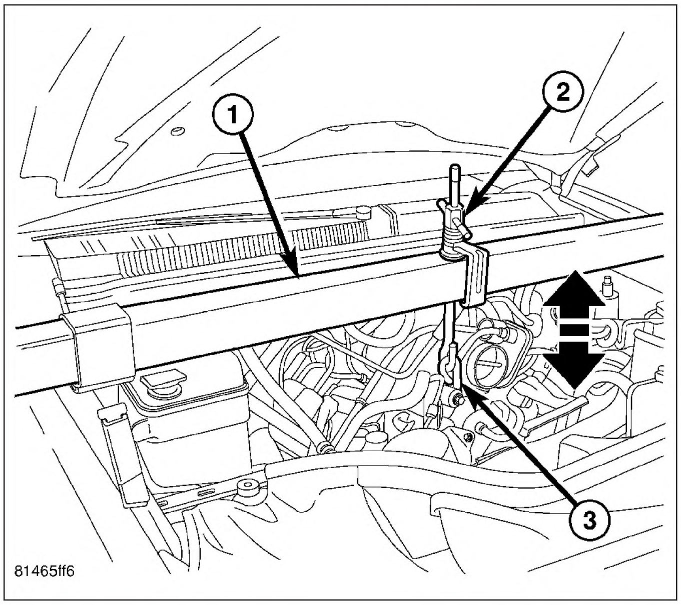
4. Lower the engine into mounts using special tool (1) # 8534.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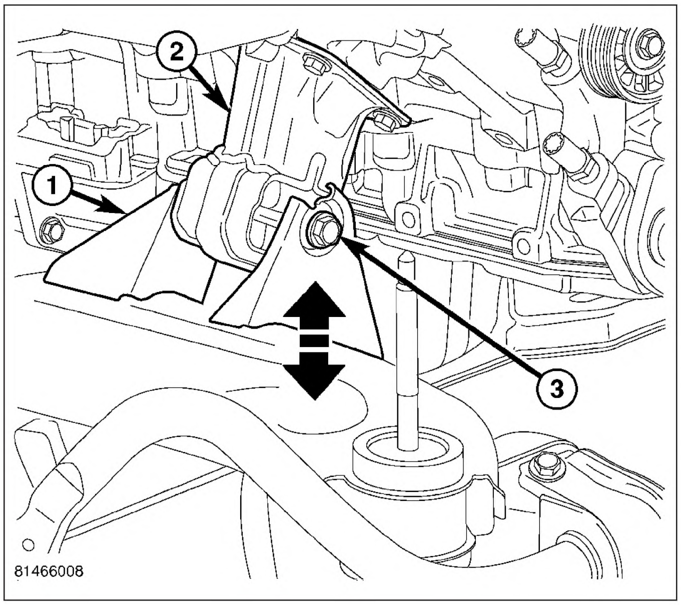
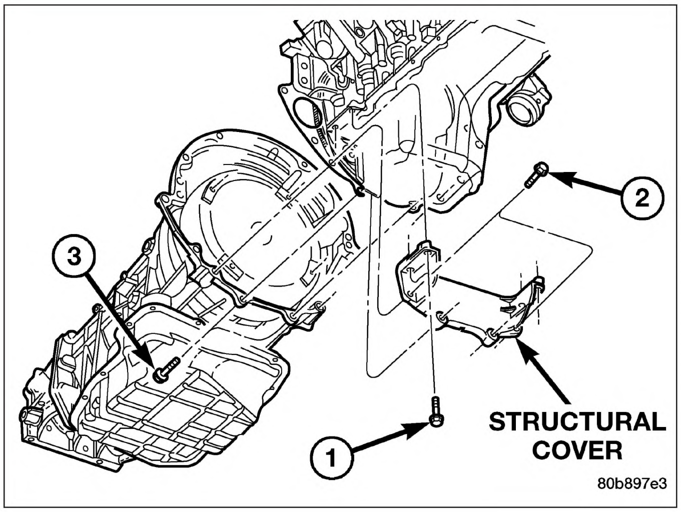
5. Install both the left and right side engine mount through bolts (3). Tighten the nuts to 68 N·m (50 ft. lbs.).
6. Remove special tool # 8534.



7. Install structural dust cover.
8. Fill engine oil.
9. Reconnect the negative battery cable.
10. Start engine and check for leaks.



SWITCH - OIL PRESSURE

DESCRIPTION

The 1 wire, solid-state engine oil pressure sensor (sending unit) is located in an engine oil pressure gallery.

OPERATION

The oil pressure sensor uses three circuits. They are:

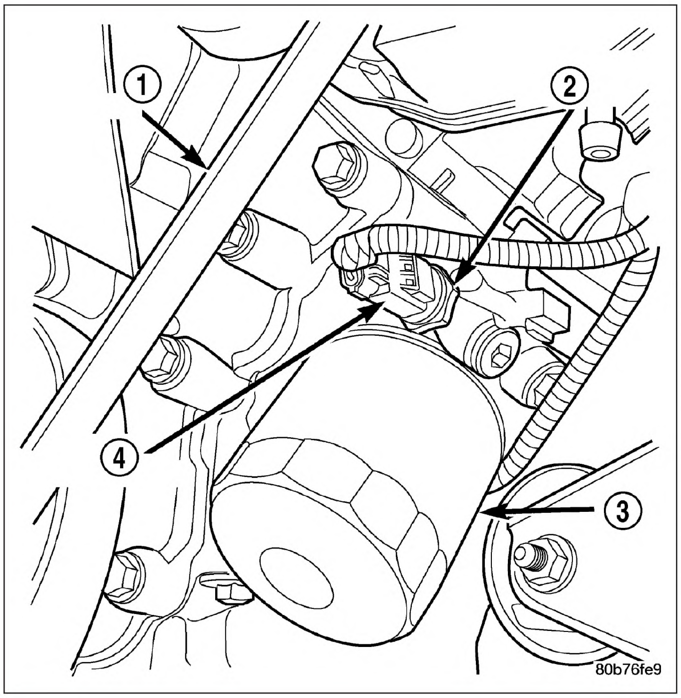
- A 5 volt power supply from the Powertrain Control Module (PCM)
- A sensor ground through the PCM's sensor return
- A signal to the PCM relating to engine oil pressure

The oil pressure sensor has a 3 wire electrical function very much like the Manifold Absolute Pressure (MAP) sensor. Meaning different pressures relate to different output voltages.

A 5 volt supply is sent to the sensor from the PCM to power up the sensor. The sensor returns a voltage signal back to the PCM relating to engine oil pressure. This signal is then transferred (bussed) to the instrument panel on either a CCD or PCI bus circuit (depending on vehicle line) to operate the oil pressure gauge and the check gauges lamp. Ground for the sensor is provided by the PCM through a low-noise sensor return.

REMOVAL

1. Disconnect the negative cable from the battery.
2. Raise vehicle on hoist.
3. Remove front splash shield.
4. Disconnect oil pressure sender wire (4).
5. Remove the pressure sender (2).



INSTALLATION

1. Install oil pressure sender.
2. Connect oil pressure sender wire.
3. Install front splash shield.
4. Lower vehicle.
5. Connect the negative battery cable.

PUMP - ENGINE OIL

REMOVAL

1. Remove the oil pan and pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
2. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
3. Remove the timing chains and tensioners (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
4. Remove the four bolts, primary timing chain tensioner and the oil pump.

DISASSEMBLY

1. Remove oil pump cover screws and lift off cover plate.
2. Remove pump inner and outer rotors.

NOTE: Once the oil pressure relief valve, cup plug, and pin are removed, the pump assembly must be replaced.

3. If it is necessary to remove the pressure relief valve, drive the roll pin from pump housing and remove cup plug, spring and valve.

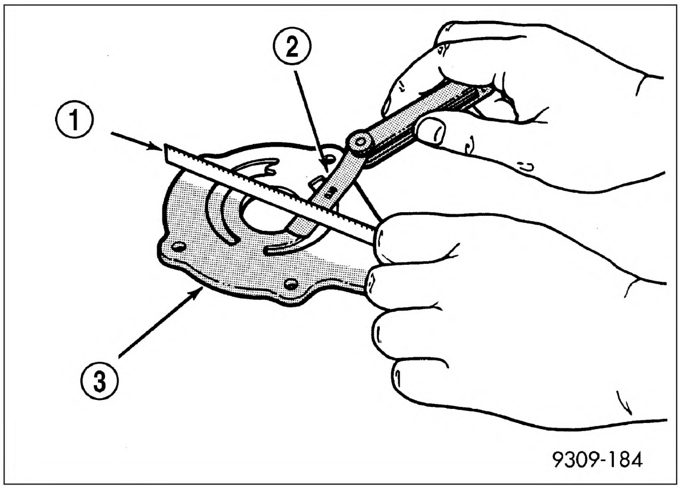
CLEANING

1. Wash all parts in a suitable solvent.

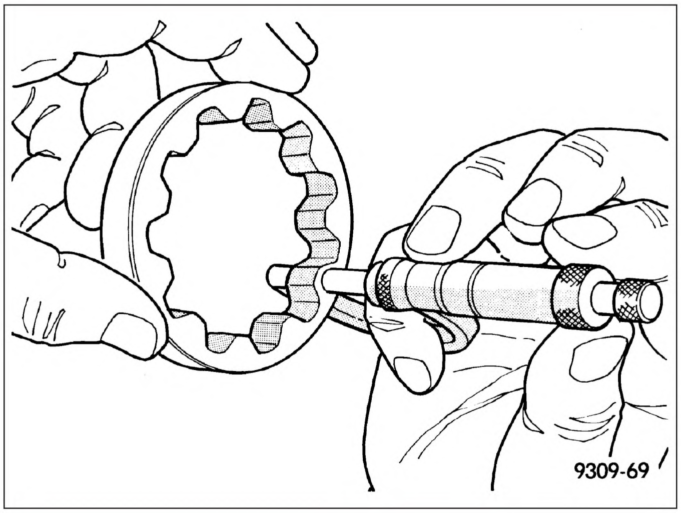
INSPECTION

CAUTION: Oil pump pressure relief valve and spring should not be removed from the oil pump. If these components are disassembled and or removed from the pump the entire oil pump assembly must be replaced.

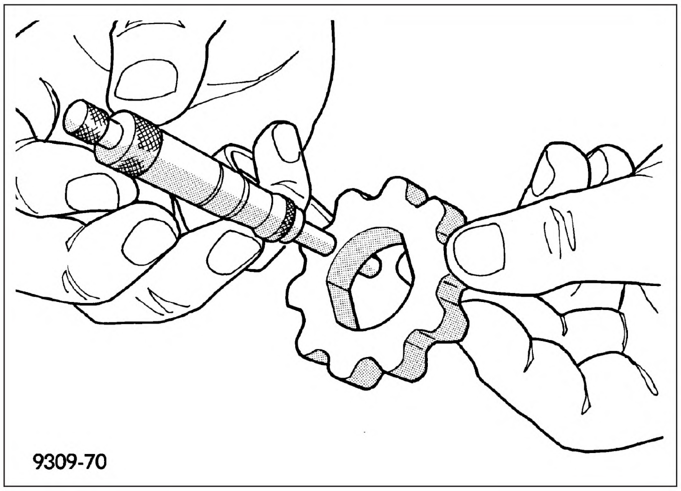
1. Clean all parts thoroughly. Mating surface of the oil pump housing should be smooth. If the pump cover is scratched or grooved the oil pump assembly should be replaced.
2. Lay a straight edge across the pump cover surface (3). If a 0.025 mm (0.001 in.) feeler gauge (2) can be inserted between the cover and the straight edge the oil pump assembly should be replaced.



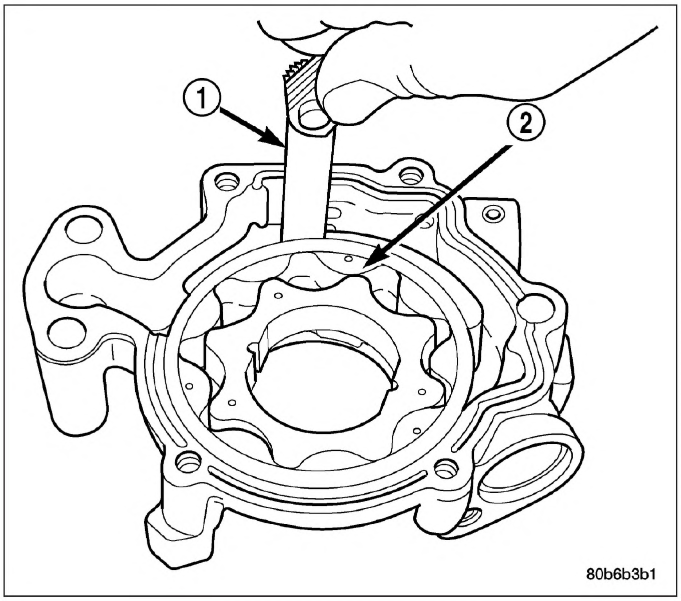
3. Measure the thickness of the outer rotor. If the outer rotor thickness measures at 12.005 mm (0.472 in.) or less the oil pump assembly must be replaced.
4. Measure the diameter of the outer rotor. If the outer rotor diameter measures at 85.925 mm (3.382 in.) or less the oil pump assembly must be replaced.



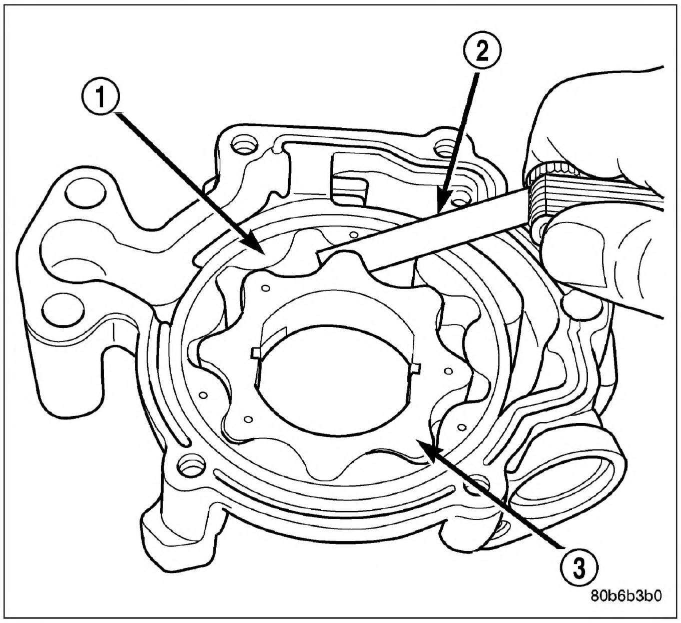
5. Measure the thickness of the inner rotor. If the inner rotor thickness measures at 12.005 mm (0.472 in.) or less then the oil pump assembly must be replaced.



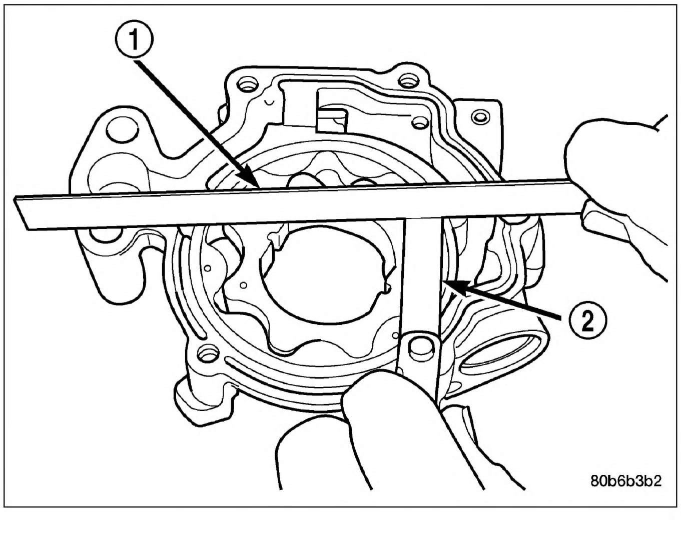
6. Slide outer rotor (2) into the body of the oil pump. Press the outer rotor to one side of the oil pump body and measure clearance between the outer rotor and the body. If the measurement is 0.235mm (0.009 in.) or more the oil pump assembly must be replaced.



7. Install the inner rotor in the into the oil pump body. Measure the clearance between the inner (3) and outer (1) rotors. If the clearance between the rotors is .150 mm (0.006 in.) or more the oil pump assembly must be replaced.



8. Place a straight edge (1) across the body of the oil pump (between the bolt holes), if a feeler gauge (2) of .095 mm (0.0038 in.) or greater can be inserted between the straightedge and the rotors, the pump must be replaced.



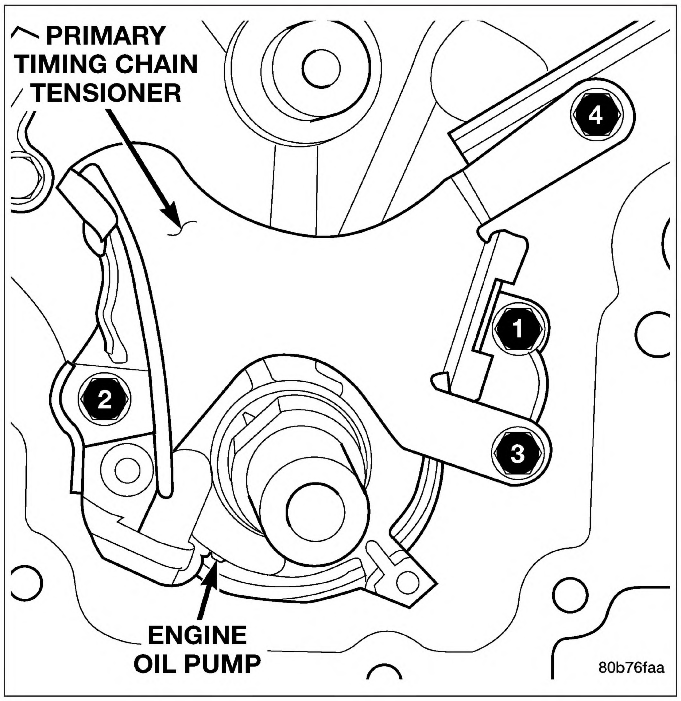
NOTE: The 3.7L/4.7L Oil pump is released as an assembly. There are no DaimlerChrysler part numbers for Sub-Assembly components. In the event the oil pump is not functioning or out of specification it must be replaced as an assembly.

ASSEMBLY

1. Wash all parts in a suitable solvent and inspect carefully for damage or wear.
2. Install inner and outer rotors
3. Install oil pump cover plate and install cover bolts and tighten them to 12 N·m (105 in. lbs.).
4. Prime oil pump before installation by filling rotor cavity with engine oil.
5. If oil pressure is low and pump is within specifications, inspect for worn engine bearings or other causes for oil pressure loss.

INSTALLATION

1. Position the oil pump onto the crankshaft and install one oil pump retaining bolts.
2. Position the primary timing chain tensioner and install three retaining bolts.
3. Tighten the oil pump and primary timing chain tensioner retaining bolts to 28 N·m (250 in. lbs.) in the sequence shown.
4. Install the secondary timing chain tensioners and timing chains (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).
5. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
6. Install the pick-up tube and oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).



MANIFOLD - INTAKE

DESCRIPTION

The intake manifold is made of a composite material and features long runners which maximizes low end torque. The intake manifold uses single plane sealing which consist of eight individual press in place port gaskets to prevent leaks. Eight studs and two bolts are used to fasten the intake to the head.

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKAGE

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

1. Start the engine.
2. Spray a small stream of water at the suspected leak area.

3. If a change in RPM is observed the area of the suspected leak has been found.
4. Repair as required.

REMOVAL

1. Perform the Fuel System Pressure Release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).
2. Disconnect negative cable from battery.
3. Remove air cleaner housing and throttle body resonator.
4. Disconnect throttle and speed control cables.
5. Disconnect electrical connectors for the following components:
    - Manifold Absolute Pressure (MAP) Sensor
    - Intake Air Temperature (IAT) Sensor
    - Throttle Position (TPS) Sensor
    - Coolant Temperature (CTS) Sensor
    - Idle Air Control (IAC) Motor
6. Disconnect vapor purge hose, brake booster hose, speed control servo hose, positive crankcase ventilation (PCV) hose.
7. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
8. Disconnect generator electrical connections.
9. Unbolt the generator and move it away from the intake manifold for clearance.
10. Disconnect air conditioning compressor electrical connections.
11. Unbolt the air conditioning compressor and move it away from the intake manifold for clearance.
12. Disconnect left and right radio suppressor straps.
13. Disconnect and remove ignition coil towers (Refer to 8 - ELECTRICAL/IGNITION CONTROL/IGNITION COIL - REMOVAL).
14. Remove top oil dipstick tube retaining bolt and ground strap.
15. Remove fuel rail (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL RAIL - REMOVAL).
16. Remove throttle body assembly and mounting bracket.
17. Drain cooling system below coolant temperature level (Refer to 7 - COOLING - STANDARD PROCEDURE).
18. Remove intake manifold retaining fasteners, in reverse order of tightening sequence.

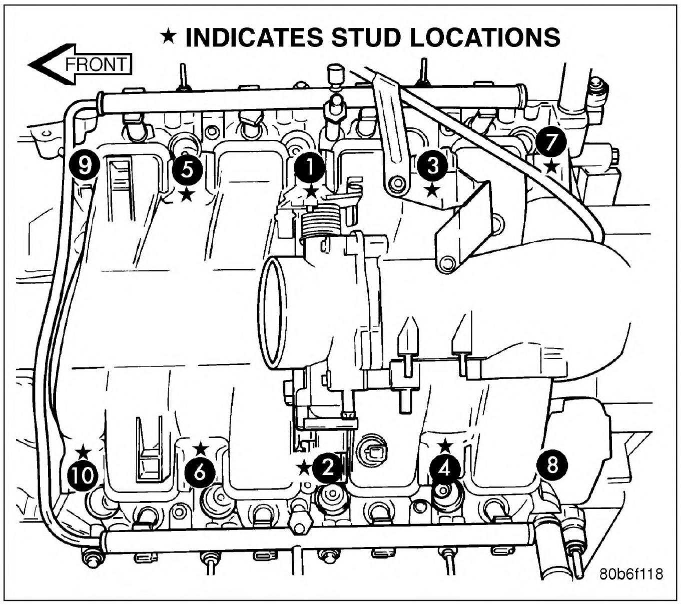
NOTE: Intake must be lifted upward and level in the front and rear to clear the cowl. Interference with the cowl will occur during removal.

19. Remove intake manifold.

CLEANING

NOTE: There is NO approved repair procedure for the intake manifold. If severe damage is found during inspection, the intake manifold must be replaced.

Before installing the intake manifold thoroughly clean the mating surfaces. Use a suitable cleaning solvent, then air dry.

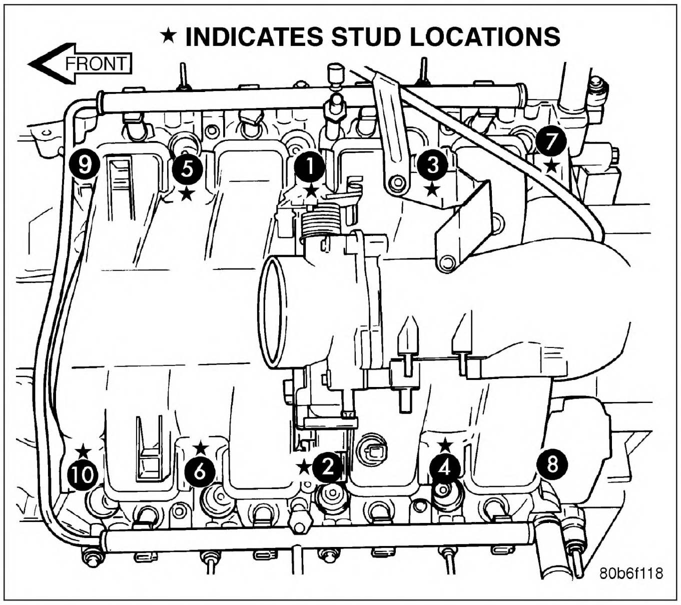


INSPECTION

1. Inspect the intake sealing surface for cracks, nicks and distortion.
2. Inspect the intake manifold vacuum hose fittings for looseness or blockage.
3. Inspect the manifold to throttle body mating surface for cracks, nicks and distortion.

INSTALLATION

1. Install intake manifold gaskets.
2. Install intake manifold.
3. Install intake manifold retaining bolts and tighten in sequence shown in to 12 N·m (105 in. lbs.).



4. Install left and right radio suppressor straps.
5. Install throttle body assembly.
6. Install throttle cable bracket.
7. Connect throttle cable and speed control cable to throttle body.
8. Install fuel rail (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL RAIL - INSTALLATION).
9. Install ignition coil towers (Refer to 8 - ELECTRICAL/IGNITION CONTROL/IGNITION COIL - INSTALLATION).
10. Install coolant temperature sensor (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT TEMP SENSOR - INSTALLATION).
11. Connect electrical connectors for the following components:
    - Manifold Absolute Pressure (MAP) Sensor
    - Intake Air Temperature (IAT) Sensor
    - Throttle Position (TPS) Sensor
    - Coolant Temperature (CTS) Sensor
    - Idle Air Control (IAC) Motor
    - Ignition coil towers
    - Fuel injectors
12. Install top oil dipstick tube retaining bolt and ground strap.

13. Install generator including electrical connections (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - INSTALLATION).
14. Connect Vapor purge hose, Brake booster hose, Speed control servo hose, Positive crankcase ventilation (PCV) hose.
15. Install air conditioning compressor including electrical connections.
16. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
17. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
18. Install air cleaner housing and throttle body resonator. Tighten resonator bolts 4.5 N·m (40 in. lbs.).
19. Connect negative cable to battery.

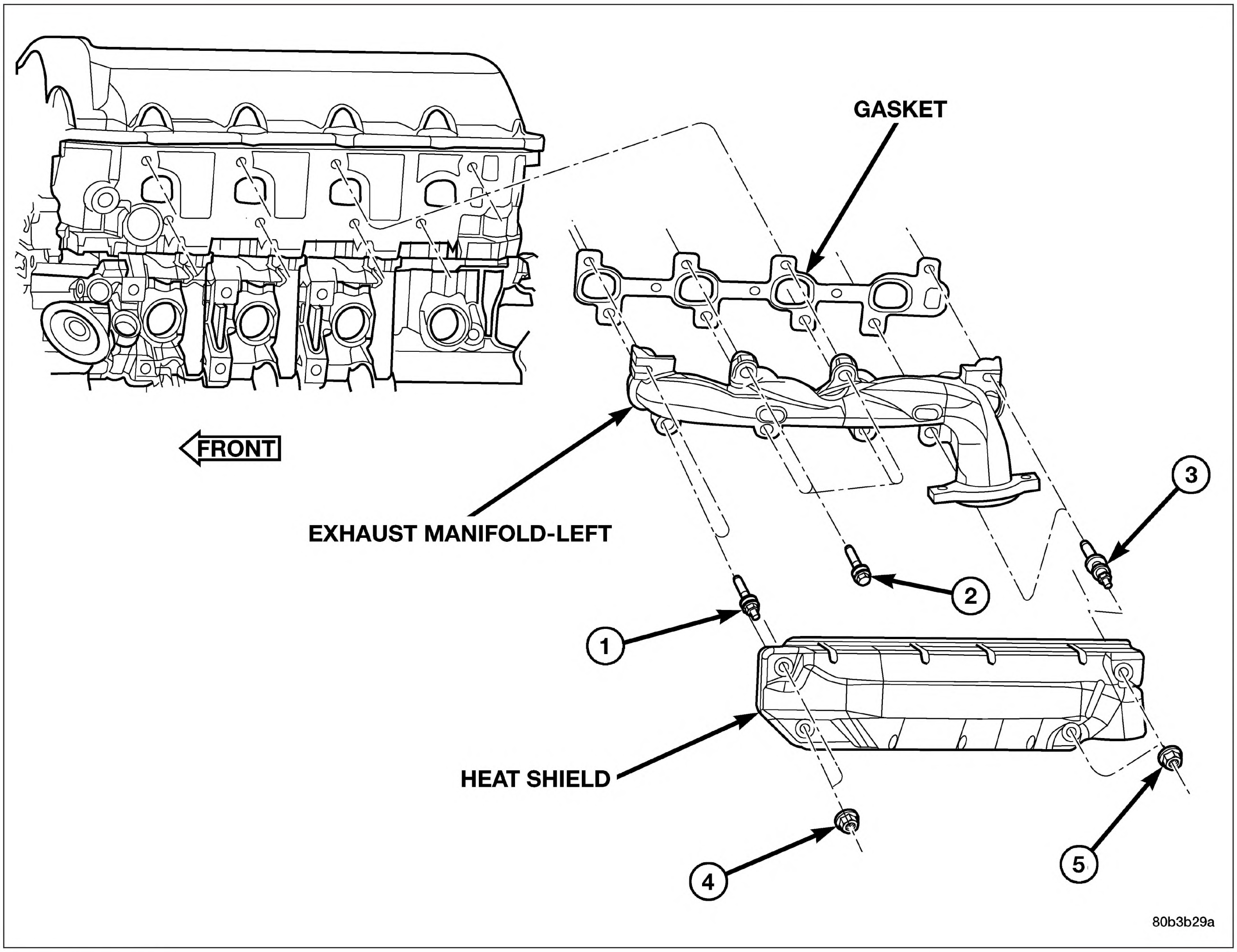
MANIFOLD - EXHAUST LEFT

DESCRIPTION

The exhaust manifolds are log style with a patented flow enhancing design to maximize performance. The exhaust manifolds are made of high silicon molybdenum cast iron. A perforated core graphite exhaust manifold gasket is used to improve sealing to the cylinder head. The exhaust manifolds are covered by a three layer laminated heat shield for thermal protection and noise reduction. The heat shields are fastened with a torque prevailing nut that is backed off slightly to allow for the thermal expansion of the exhaust manifold.

REMOVAL

1. Disconnect negative cable for battery.
2. Hoist vehicle.
3. Disconnect exhaust pipe at manifold.
4. Lower vehicle.
5. Remove air cleaner housing and tube.
6. Remove the front two exhaust heat shield retaining fasteners. Raise vehicle and remove the fasteners at rear of heat shield.
7. Remove heat shield.
8. Lower vehicle and remove the upper exhaust manifold retaining bolts.
9. Raise vehicle and remove the lower exhaust manifold retaining bolts.
10. Remove exhaust manifold and gasket. Manifold is removed from below the engine compartment.



CLEANING

1. Clean the exhaust manifold using a suitable cleaning solvent, then allow to air dry.
2. Clean all gasket residue from the manifold mating surface.

INSPECTION

1. Inspect the exhaust manifold for cracks in the mating surface and at every mounting bolt hole.
2. Using a straight edge and a feeler gauge, check the mating surface for warp and twist.
3. Inspect the manifold to exhaust pipe mating surface for cracks, gouges, or other damage that would prevent sealing.

INSTALLATION

1. Install exhaust manifold and gasket from below engine compartment.
2. Install lower exhaust manifold fasteners. DO NOT tighten until all fasteners are in place.
3. Lower vehicle and install upper exhaust manifold fasteners. Tighten all manifold bolts starting at center and working outward to 25 N·m (18 ft. lbs.).

CAUTION: Over tightening heat shield fasteners, may cause shield to distort and/or crack.

4. Install exhaust manifold heat shield. Tighten fasteners to 8 N·m (72 in. lbs.), then loosen 45 degrees.
5. Install air cleaner housing and tube.
6. Connect exhaust pipe to manifold.
7. Connect negative cable to battery.

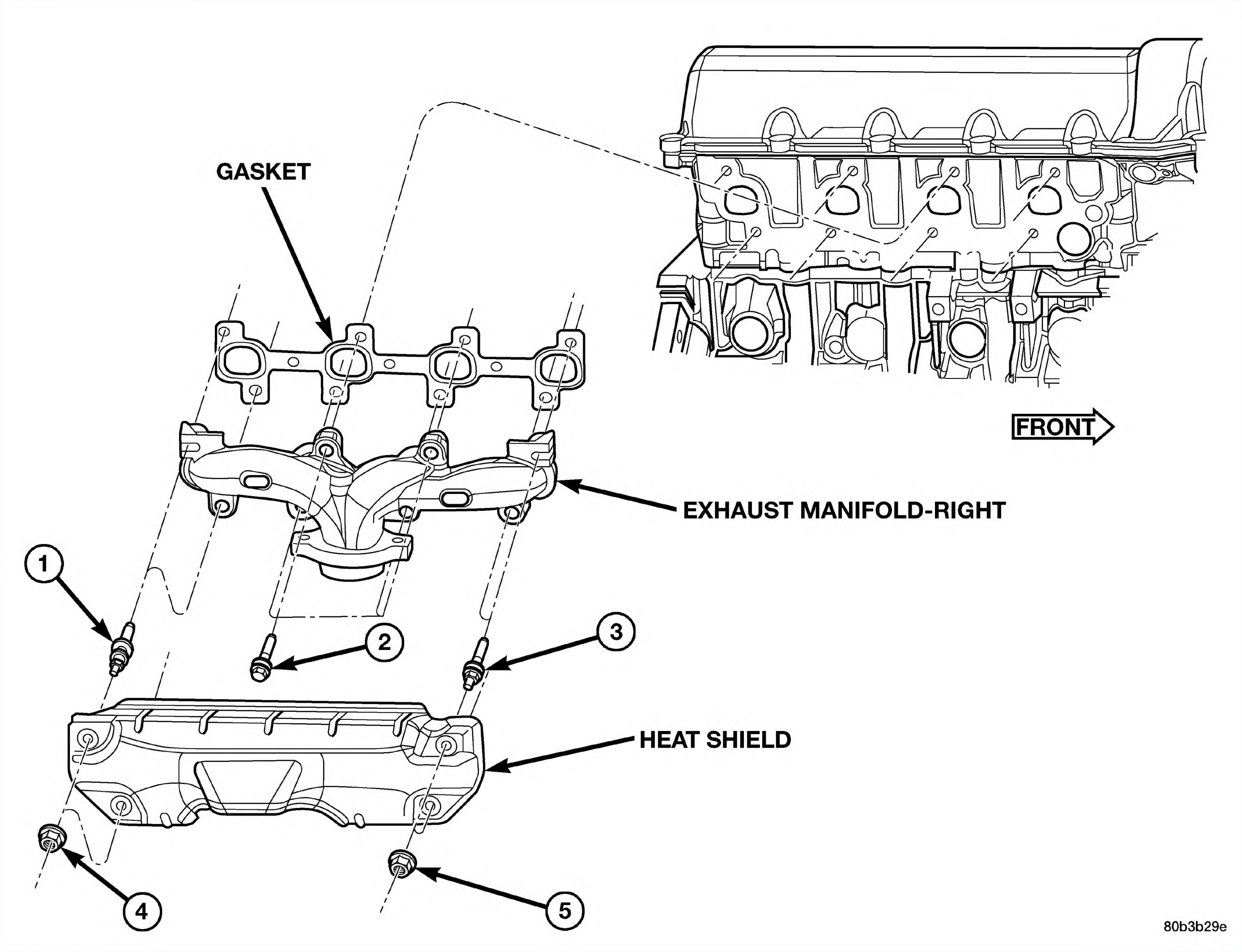
MANIFOLD - EXHAUST RIGHT

DESCRIPTION

The exhaust manifolds are log style with a patented flow enhancing design to maximize performance. The exhaust manifolds are made of high silicon molybdenum cast iron. A perforated core graphite exhaust manifold gasket is used to improve sealing to the cylinder head. The exhaust manifolds are covered by a three layer laminated heat shield for thermal protection and noise reduction. The heat shields are fastened with a torque prevailing nut that is backed off slightly to allow for the thermal expansion of the exhaust manifold.

REMOVAL

1. Disconnect negative cable for battery.
2. Remove battery from vehicle.
3. Remove Power Distribution Center (PDC) fasteners and set aside.
4. Remove battery tray assembly.
5. Remove washer bottle assembly
6. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
7. Remove A/C compressor from mounting and set aside.
8. Remove A/C accumulator support bracket fastener.
9. Drain coolant (Refer to 7 - COOLING - STANDARD PROCEDURE).
10. Remove heater hoses at engine.
11. Remove fasteners attaching exhaust manifold heat shield.
12. Remove heat shield.
13. Remove upper exhaust manifold attaching fasteners.
14. Raise vehicle on hoist.
15. Disconnect exhaust pipe from manifold.
16. Remove fasteners attaching starter. Move starter aside.
17. Remove lower exhaust manifold attaching fasteners.
18. Remove exhaust manifold and gasket. Manifold is removed from below the engine compartment.



CLEANING

1. Clean the exhaust manifold using a suitable cleaning solvent, then allow to air dry.
2. Clean all gasket residue from the manifold mating surface.

INSPECTION

1. Inspect the exhaust manifold for cracks in the mating surface and at every mounting bolt hole.
2. Using a straight edge and a feeler gauge, check the mating surface for warp and twist.
3. Inspect the manifold to exhaust pipe mating surface for cracks, gouges, or other damage that would prevent sealing.

INSTALLATION

1. Install exhaust manifold and gasket from below engine compartment.
2. Install lower exhaust manifold fasteners. DO NOT tighten until all fasteners are in place.
3. Lower vehicle and install upper exhaust manifold fasteners. Tighten all manifold bolts starting at center and working outward to 25 N·m (18 ft. lbs.).

CAUTION: Over tightening heat shield fasteners, may cause shield to distort and/or crack.

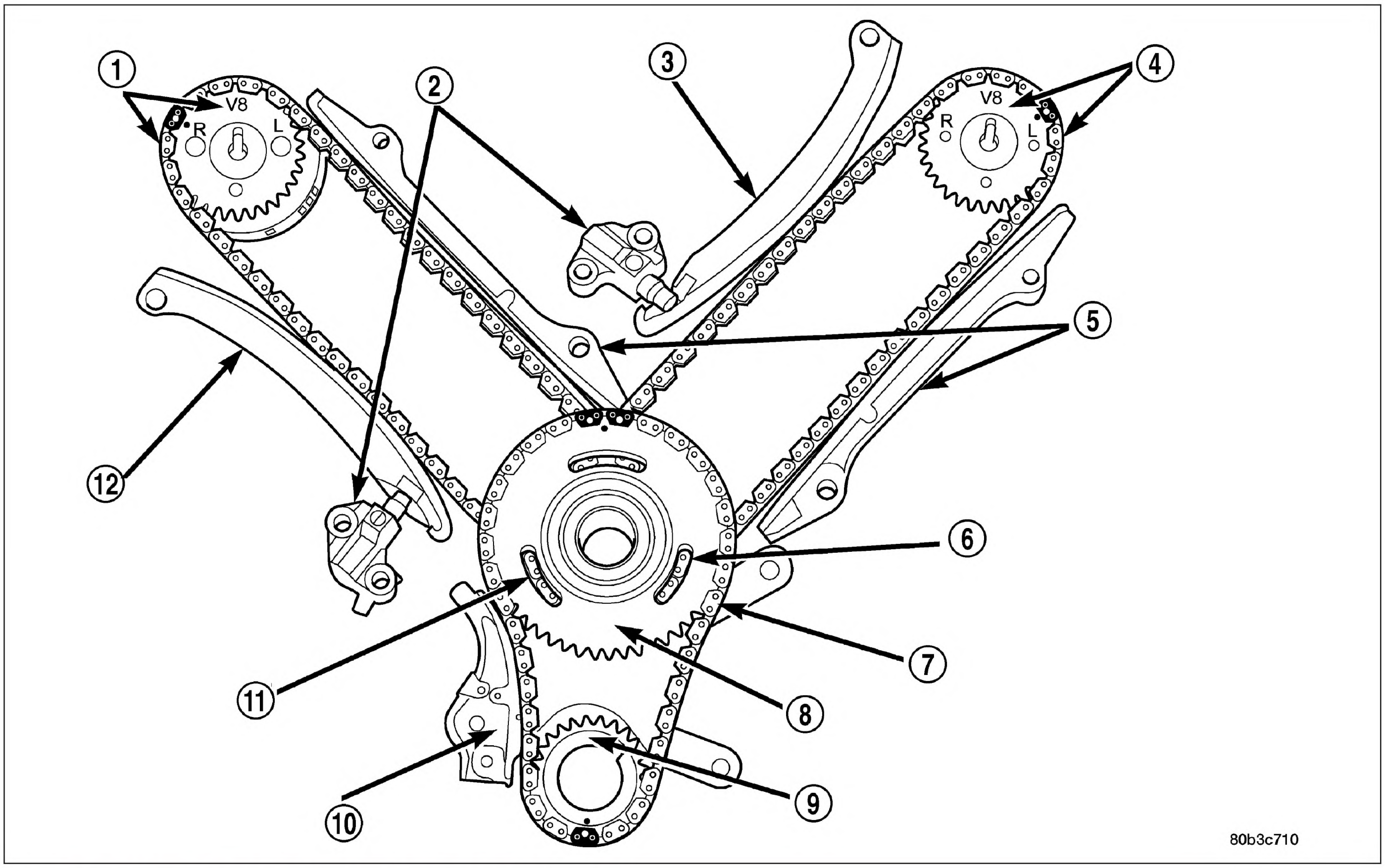
4. Install exhaust manifold heat shield. Tighten fasteners to 8 N·m (72 in. lbs.), then loosen 45 degrees.
5. Install starter and fasteners.
6. Connect exhaust pipe to manifold.
7. Connect heater hoses at engine.

8. Install fastener attaching A/C accumulator.
9. Install A/C compressor and fasteners.
10. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
11. Install washer bottle and battery tray assembly.
12. Install PDC.
13. Install battery and connect cables.
14. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

VALVE TIMING

DESCRIPTION - TIMING DRIVE SYSTEM

The timing drive system has been designed to provide quiet performance and reliability to support a **non-free wheeling** engine. Specifically the intake valves are non-free wheeling and can be easily damaged with forceful engine rotation if camshaft-to-crankshaft timing is incorrect. The timing drive system consists of a primary chain and two secondary timing chain drives.



OPERATION - TIMING DRIVE SYSTEM

The primary timing chain is a single inverted tooth type. The primary chain drives the large fifty tooth idler sprocket directly from a 25 tooth crankshaft sprocket. Primary chain motion is controlled by a pivoting leaf spring tensioner arm and a fixed guide. The arm and the guide both use nylon plastic wear faces for low friction and long wear. The primary chain receives oil splash lubrication from the secondary chain drive and oil pump leakage. The idler sprocket assembly connects the primary and secondary chain drives. The idler sprocket assembly consists of two integral thirty tooth sprockets and a fifty tooth sprocket that is splined to the assembly. The spline joint is a non – serviceable press fit anti rattle type. The idler sprocket assembly spins on a stationary idler shaft. The idler shaft is press-fit into the cylinder block. A large washer on the idler shaft bolt and the rear flange of the idler shaft are used to control sprocket thrust movement. Pressurized oil is routed through the center of the idler shaft to provide lubrication for the two bushings used in the idler sprocket assembly.

There are two secondary drive chains, both are inverted tooth type, one to drive the camshaft in each SOHC cylinder head. There are no shaft speed changes in the secondary chain drive system. Each secondary chain drives a thirty tooth cam sprocket directly from the thirty tooth sprocket on the idler sprocket assembly. A fixed chain guide and a hydraulic oil damped tensioner are used to maintain tension in each secondary chain system. The hydraulic tensioners for the secondary chain systems are fed pressurized oil from oil reservoir pockets in the block. Each tensioner also has a mechanical ratchet system that limits chain slack if the tensioner piston bleeds down after engine shut down. The tensioner arms and guides also utilize nylon wear faces for low friction and long wear. The secondary timing chains receive lubrication from a small orifice in the tensioners. This orifice is protected from clogging by a fine mesh screen which is located on the back of the hydraulic tensioners.

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE TIMING - VERIFICATION

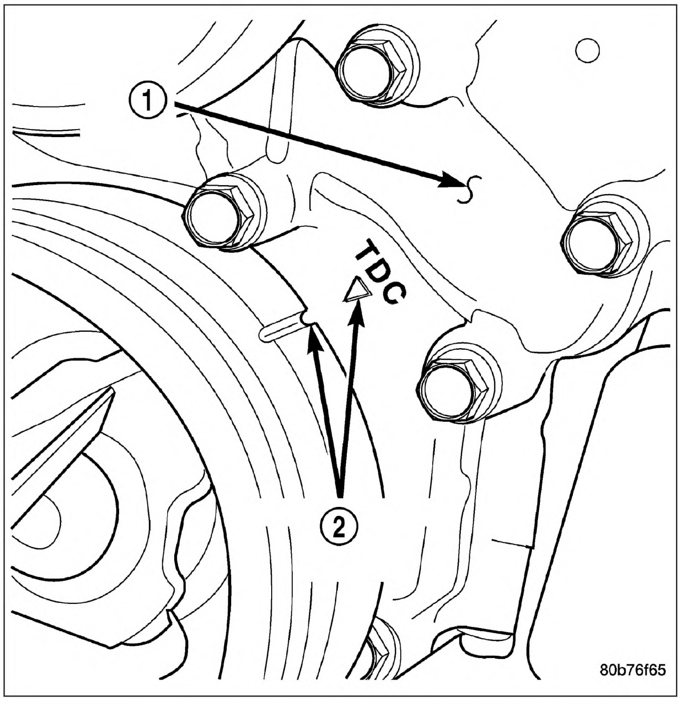
CAUTION: The 4.7L is a non free-wheeling design engine. Therefore, correct engine timing is critical.

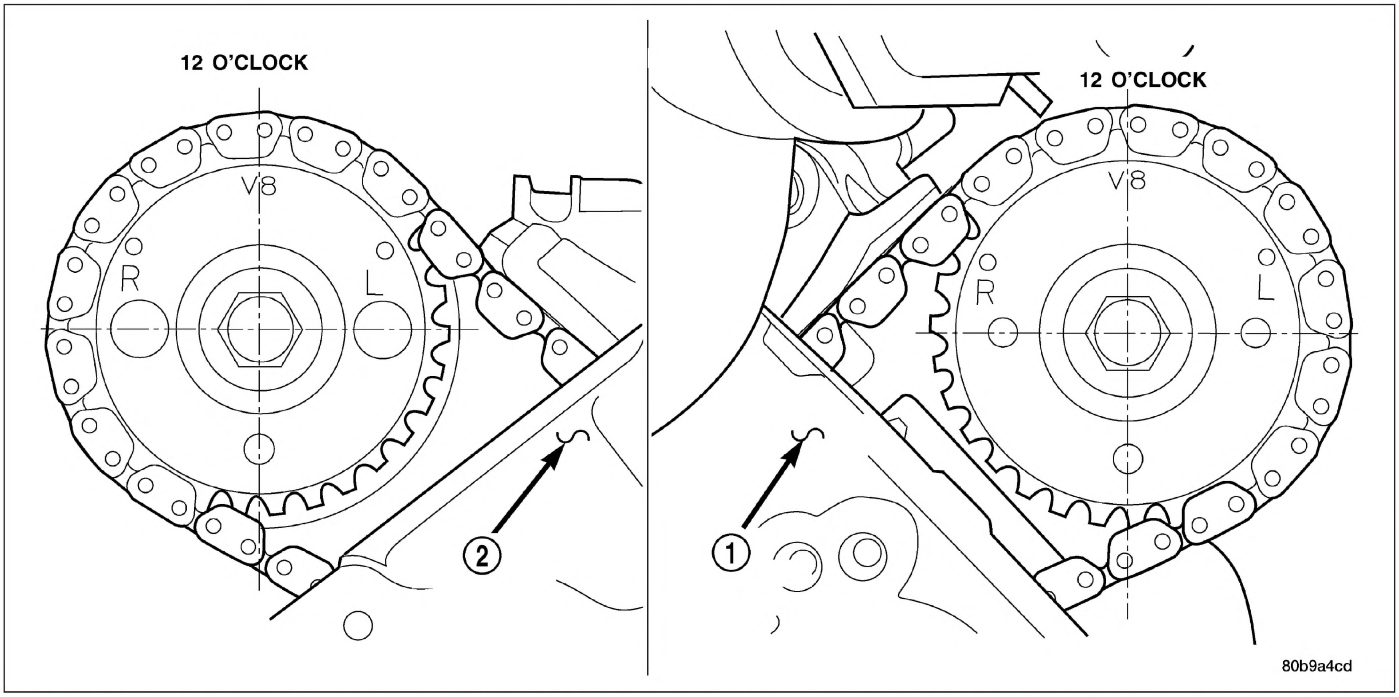
NOTE: Components referred to as left hand or right hand are as viewed from the drivers position inside the vehicle.

NOTE: The blue link plates on the chains and the dots on the camshaft drive sprockets may not line up during the timing verification procedure. The blue link plates are lined up with the sprocket dots only when re-timing the complete timing drive. Once the timing drive is rotated blue link-to-dot alignment is no longer valid.

Engine base timing can be verified by the following procedure:

1. Remove the cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
2. Using a mirror, locate the TDC arrow on the front cover. Rotate the crankshaft until the mark on the crankshaft damper is aligned with the TDC arrow on the front cover. The engine is now at TDC.

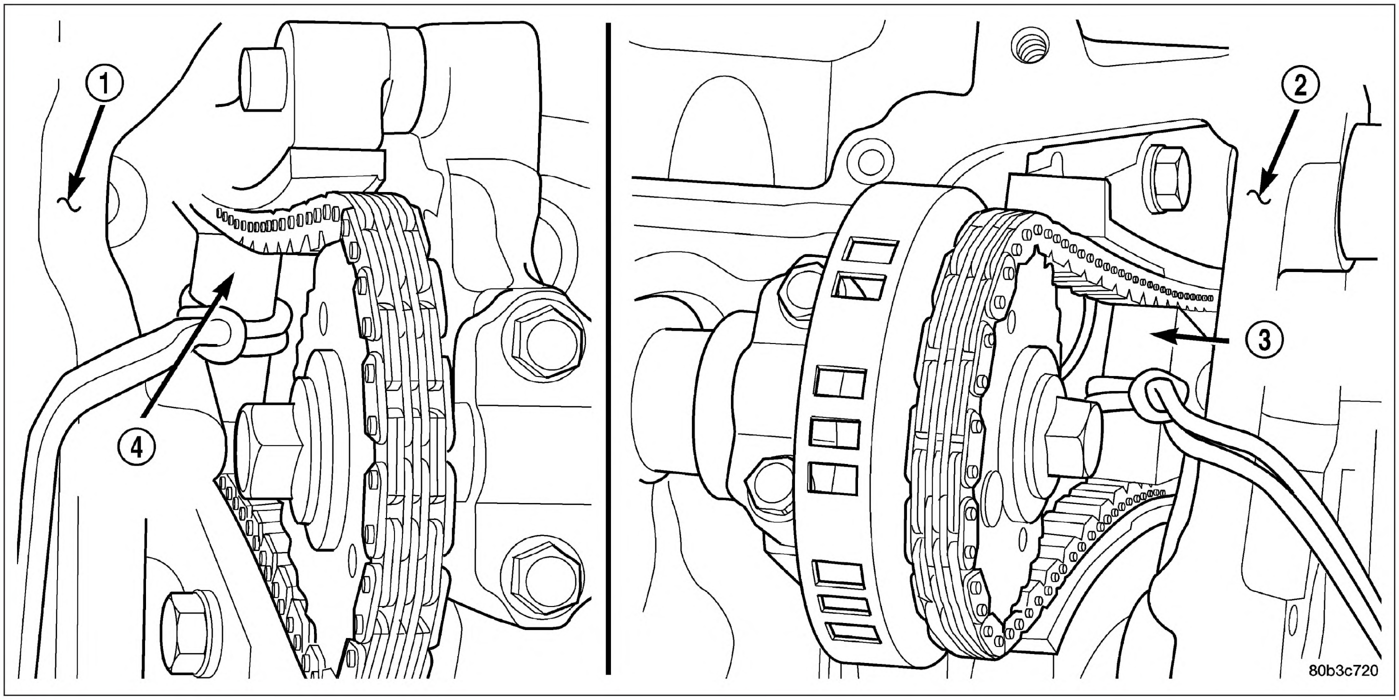




3. Note the location of the V8 mark stamped into the camshaft drive gears. If the V8 mark on each camshaft drive gear is at the twelve o'clock position, the engine is at TDC (cylinder #1) on the exhaust stroke. If the V8 mark on each gear is at the six o'clock position, the engine is at TDC (cylinder #1) on the compression stroke.
4. If both of the camshaft drive gears are off in the same or opposite directions, the primary chain or both secondary chains are at fault. Refer to Timing Chain and Sprockets procedure in this section.
5. If only one of the camshaft drive gears is off and the other is correct, the problem is confined to one secondary chain. Refer to Single camshaft timing, in this procedure.
6. If both camshaft drive gear V8 marks are at the twelve o'clock or the six o' clock position the engine base timing is correct. Reinstall the cylinder head covers.

SINGLE CAMSHAFT TIMING

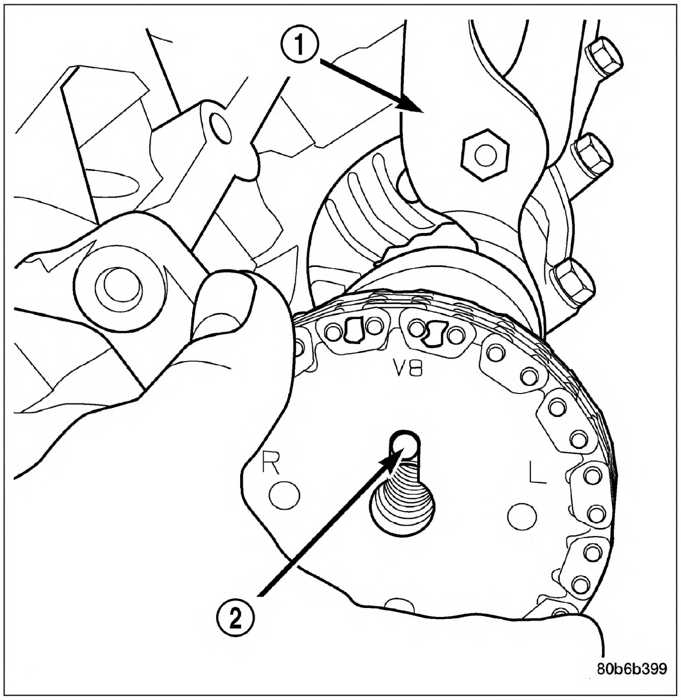
NOTE: to adjust the timing on one camshaft, peform the following procedure.

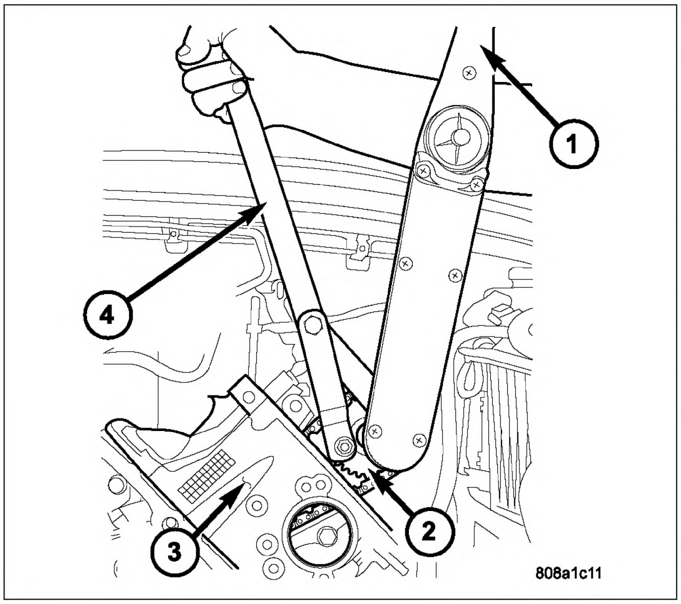


1. Using Chain Tensioner Wedge, special tool 8350 (3), stabilize the secondary chain drive. For reference purposes, mark the chain-to-sprocket position.
2. Remove the camshaft drive gear retaining bolt.
3. Carefully remove the camshaft drive gear from the camshaft.
4. Re-index the camshaft drive gear in the chain until the V8 mark is at the same position as the V8 mark on the opposite camshaft drive gear.

NOTE: When gripping the camshaft, place the pliers on the tube portion of the camshaft only. Do not grip the lobes or the sprocket areas.

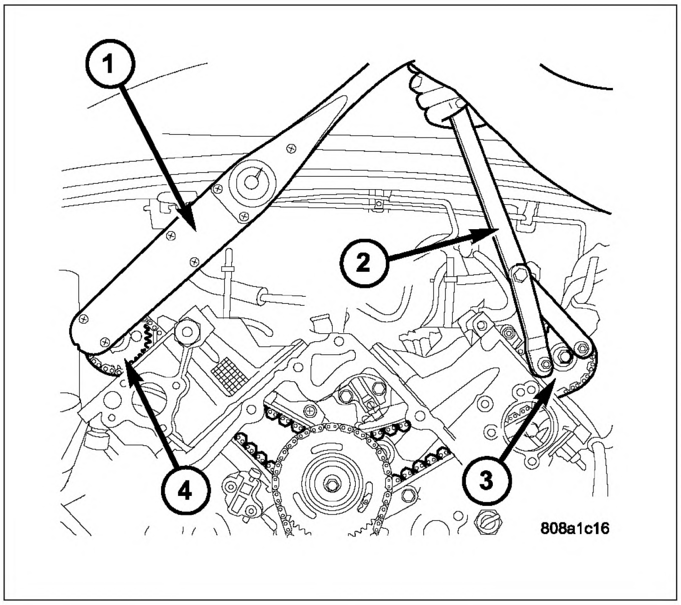
5. Using a suitable pair of adjustable pliers (1), rotate the camshaft until the alignment dowel (2) on the camshaft is aligned with the slot in the camshaft drive gear.

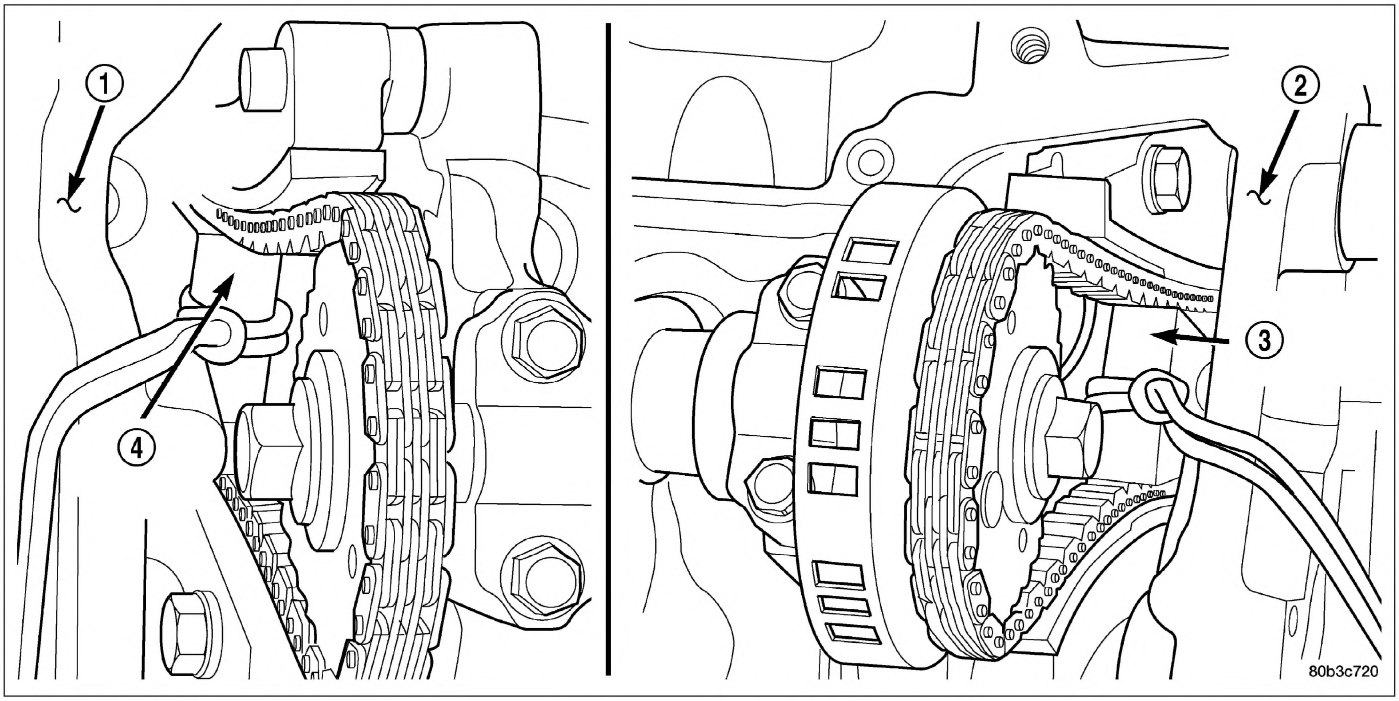




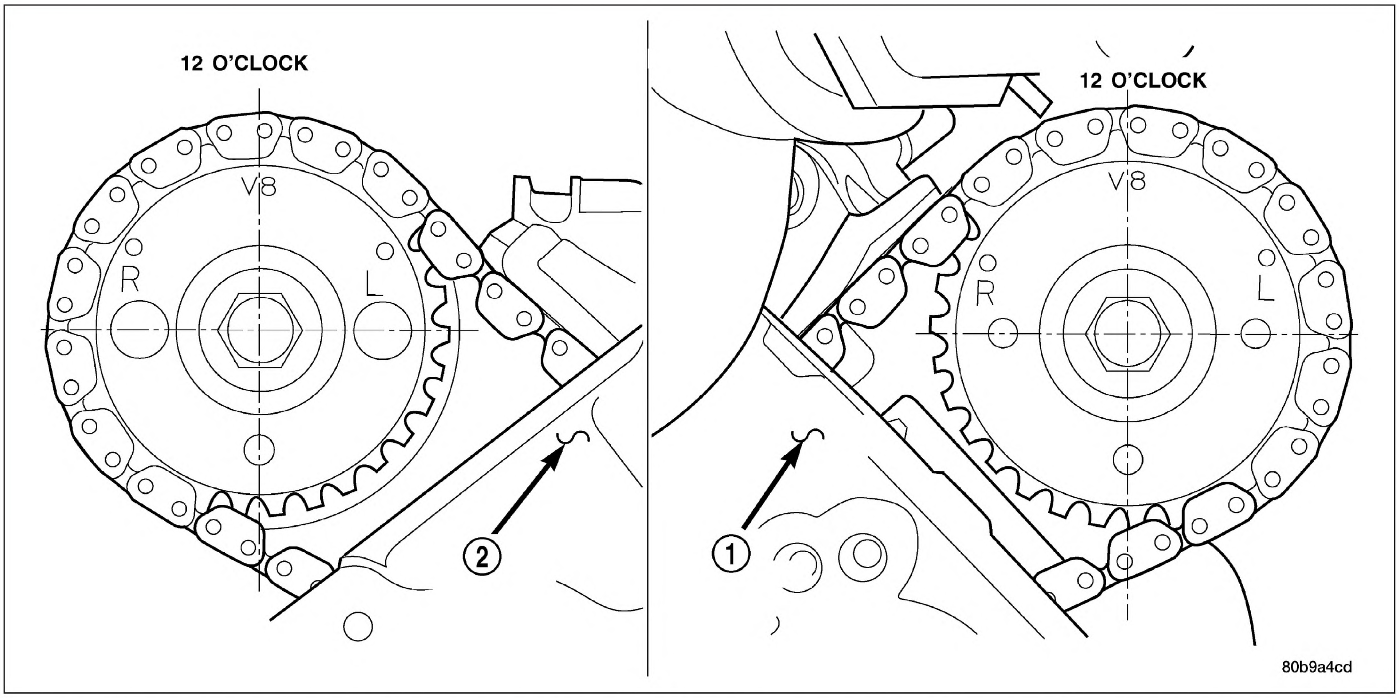
CAUTION: Remove excess oil from camshaft sprocket retaining bolt before reinstalling bolt. Failure to do so may cause over-torqueing of bolt resulting in bolt failure.

6. Position the camshaft drive gear onto the camshaft, remove oil from bolt then install the retaining bolt. Using Special Tools, Spanner Wrench 6958 with Adapter Pins 8346 and a suitable torque wrench (1), Tighten retaining bolt to 122N·m (90 ft. Lbs.).





7. Remove special tool 8350 (3,4).



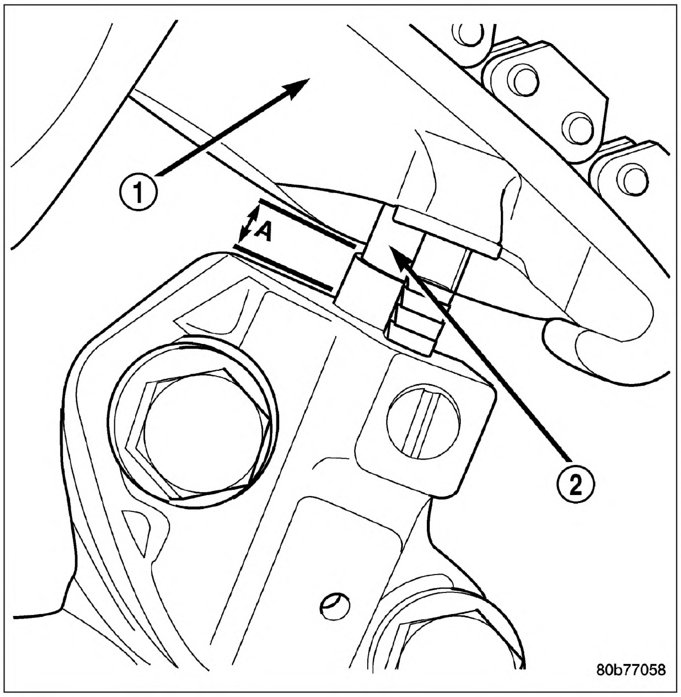
8. Rotate the crankshaft two full revolutions, then reverify that the camshaft drive gear V8 marks are in fact aligned.
9. Install the cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

STANDARD PROCEDURE - MEASURING TIMING CHAIN WEAR

NOTE: This procedure must be performed with the timing chain cover removed.

1. Remove the timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
2. To determine if the secondary timing chains are worn, rotate the engine clockwise until maximum tensioner piston (2) extension is obtained. Measure the distance between the secondary timing chain tensioner housing and the step ledge on the piston. The measurement at point (A) must be less than 15mm (0.5906 inches).
3. If the measurement exceeds the specification the secondary timing chains are worn and require replacement. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

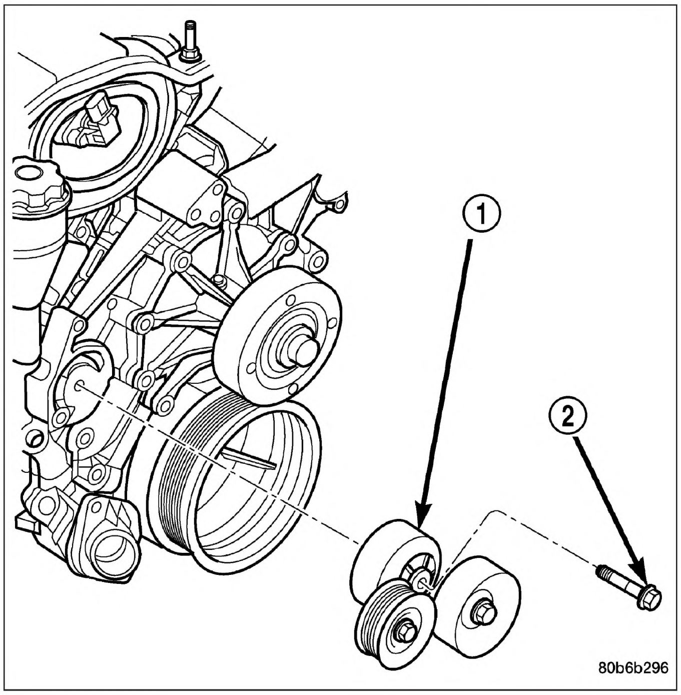
NOTE: If the secondary chains are to be replaced the primary chain must also be replaced.



COVER - TIMING

REMOVAL

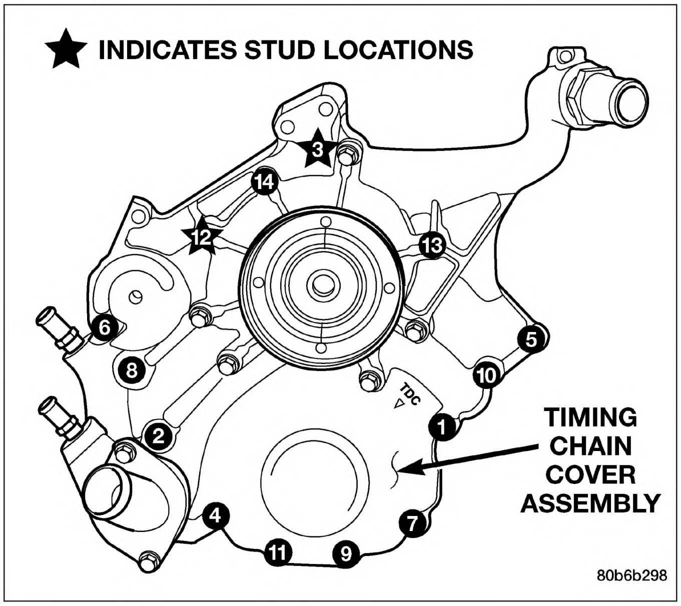
1. Disconnect the battery negative cable.
2. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
3. Disconnect both heater hoses at timing cover.
4. Disconnect lower radiator hose at engine.
5. Remove crankshaft damper (Refer to 9 - ENGINE/ ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
6. Remove accessory drive belt tensioner assembly (1).
7. Remove the generator and A/C compressor.


1
2
80b6b296

CAUTION: The 4.7L engine uses an RTV sealer instead of a gasket to seal the front cover to the engine block, from the factory. For service, Mopar® Grey Engine RTV sealant must be substituted.

NOTE: It is not necessary to remove the water pump for timing cover removal.

8. Remove the bolts holding the timing cover to engine block.
9. Remove cover.


★ INDICATES STUD LOCATIONS
3
14
12
13
6
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8
10
TDC
2
1
TIMING CHAIN COVER ASSEMBLY
4
7
11
9
80b6b298

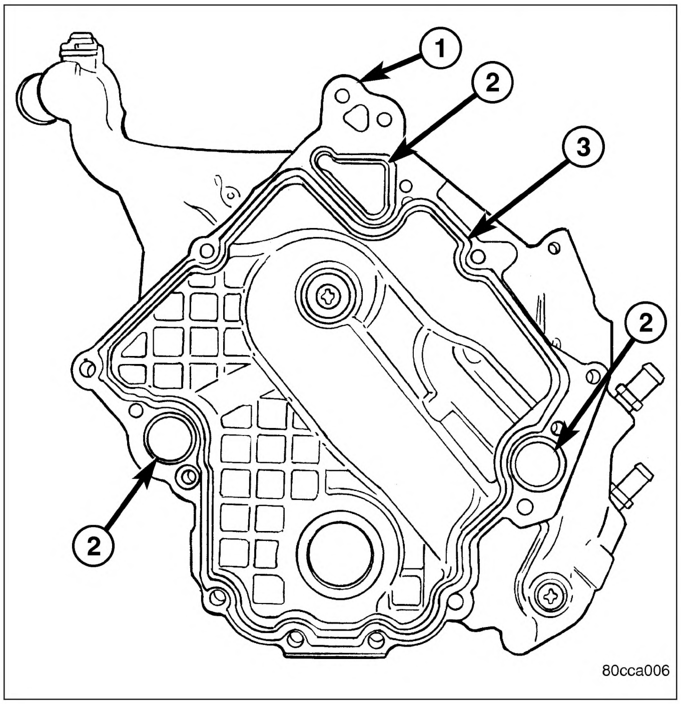
INSTALLATION

CAUTION: Do not use oil based liquids to clean timing cover or block surfaces. Use only rubbing alcohol, along with plastic or wooden scrapers. Use no wire brushes or abrasive wheels or metal scrapers, or damage to surfaces could result.

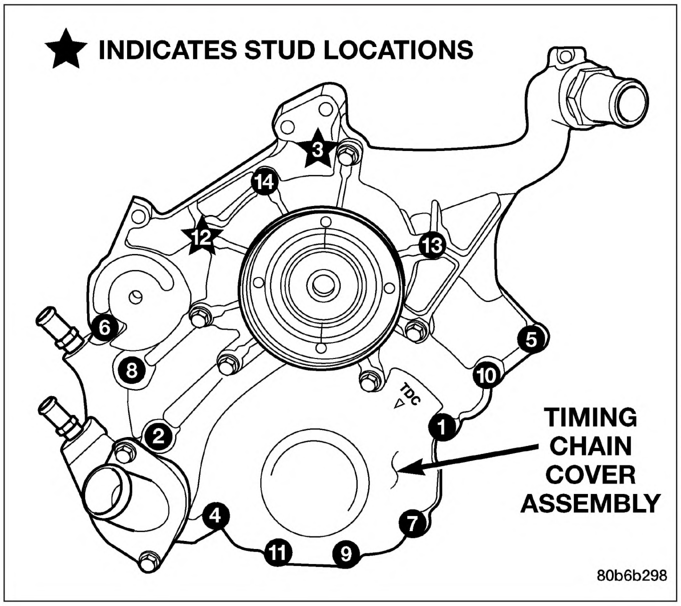
1. Clean timing chain cover and block surface using rubbing alcohol.

CAUTION: The 4.7L can use a special RTV sealer instead of a carrier gasket to seal the timing cover to the engine block, from the factory. For service repairs, Mopar® Grey Engine RTV must be used as a substitute, if RTV is present. If the front cover being used has no provisions for the water passage o-rings, then Mopar® Grey Engine RTV must be applied around the water passages.

2. Inspect the water passage o-rings, if equipped for any damage, and replace as necessary.
3. Apply Mopar® Grey Engine RTV sealer to the front cover following the path above, using a 3 to 4mm thick bead.



4. Install cover. Tighten flange head fasteners in sequence as shown in to 58 N·m (43 ft. lbs.).
5. Install the A/C compressor and generator.
6. Install crankshaft damper (Refer to 9 - ENGINE/ ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
7. Install accessory drive belt tensioner assembly. Tighten fastener to 54 N·m (40 ft. lbs.).
8. Install lower radiator hose.
9. Install both heater hoses.
10. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
11. Connect the battery negative cable.

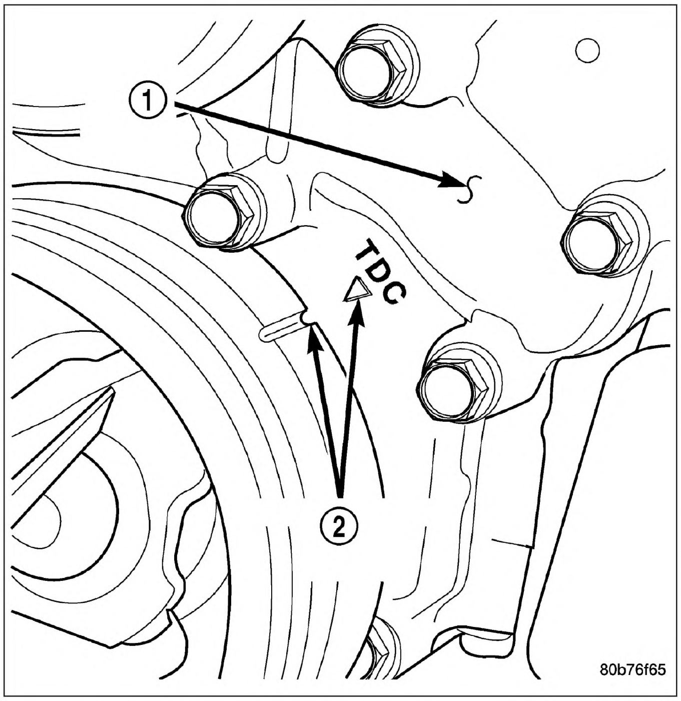


TIMING CHAIN & SPROCKETS

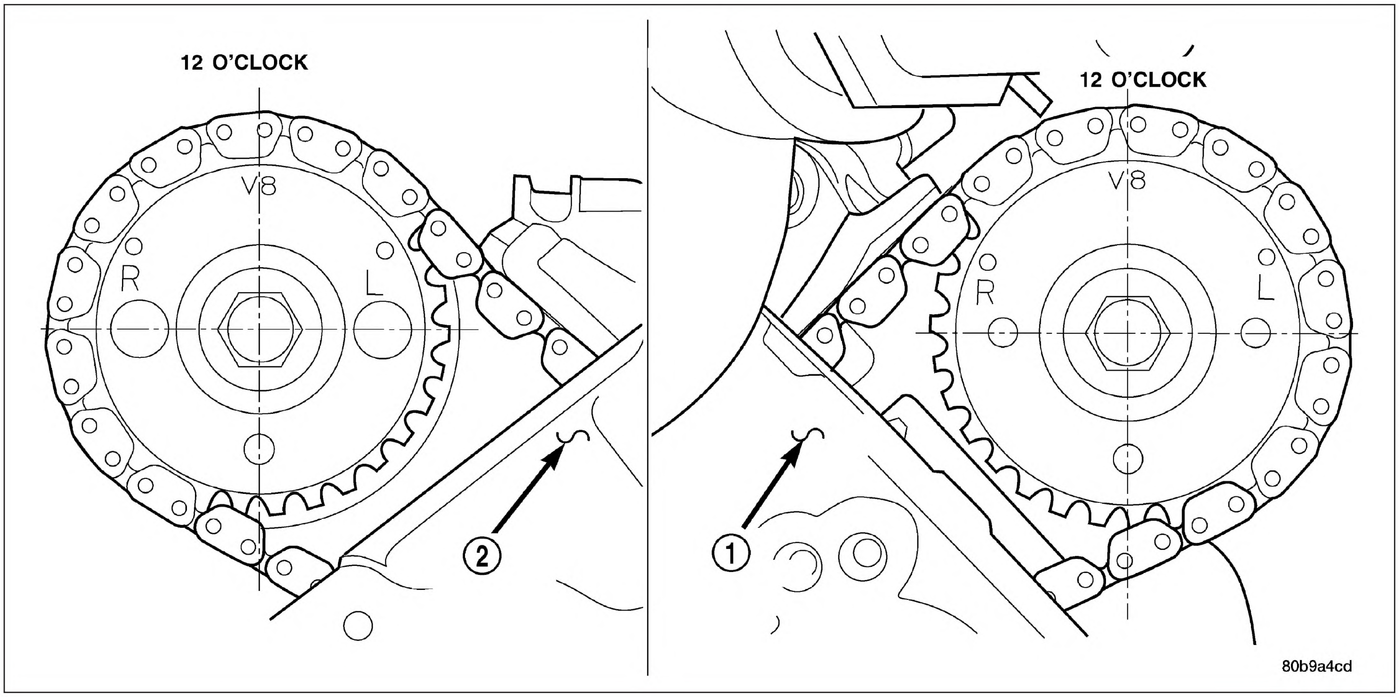
REMOVAL

1. Disconnect negative cable from battery.
2. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
3. Remove right and left cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
4. Remove radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).

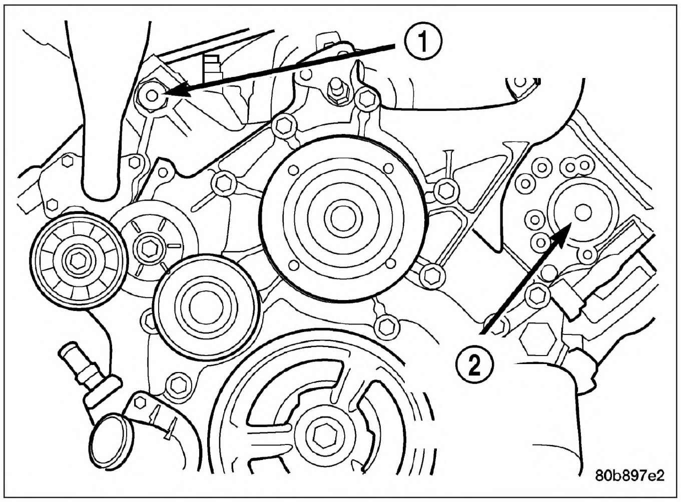
5. Rotate engine until timing mark on crankshaft damper aligns with TDC mark on timing chain cover (#1 cylinder exhaust stroke) and the camshaft sprocket “V8” marks are at the 12 o’clock position.


1
TDC
2
80b76f65

6. Remove power steering pump.
7. Remove access plugs (2) from left and right cylinder heads for access to chain guide fasteners.
8. Remove the oil fill housing to gain access to the right side tensioner arm fastener.

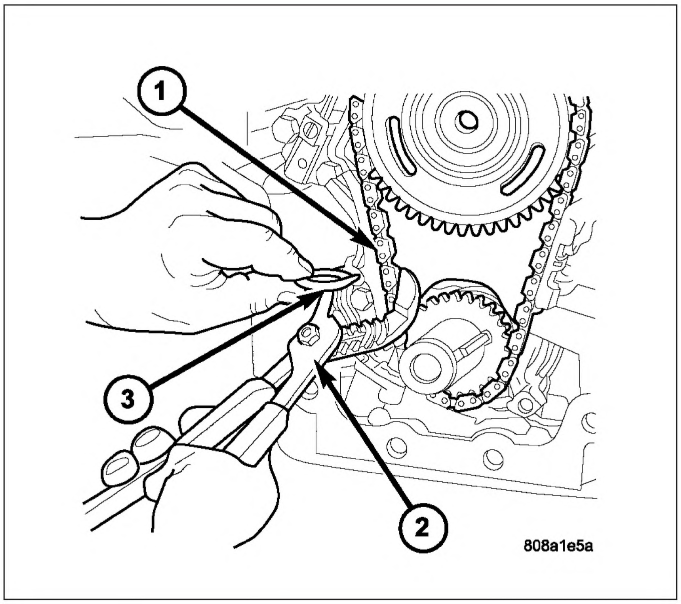

12 O’CLOCK
V8
R
L
2
12 O’CLOCK
V8
R
L
1
80b9a4cd

9. Remove crankshaft damper (Refer to 9 - ENGINE/ ENGINE BLOCK/VIBRATION DAMPER - REMOVAL) and timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
10. Collapse and pin primary chain tensioner.



CAUTION: Plate behind left secondary chain tensioner could fall into oil pan. Therefore, cover pan opening.

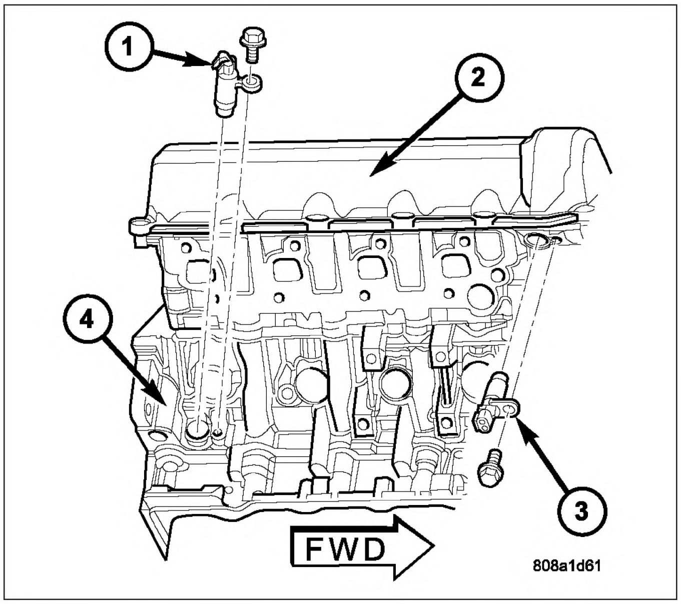
11. Remove secondary chain tensioners.
12. Remove camshaft position sensor from right cylinder head.



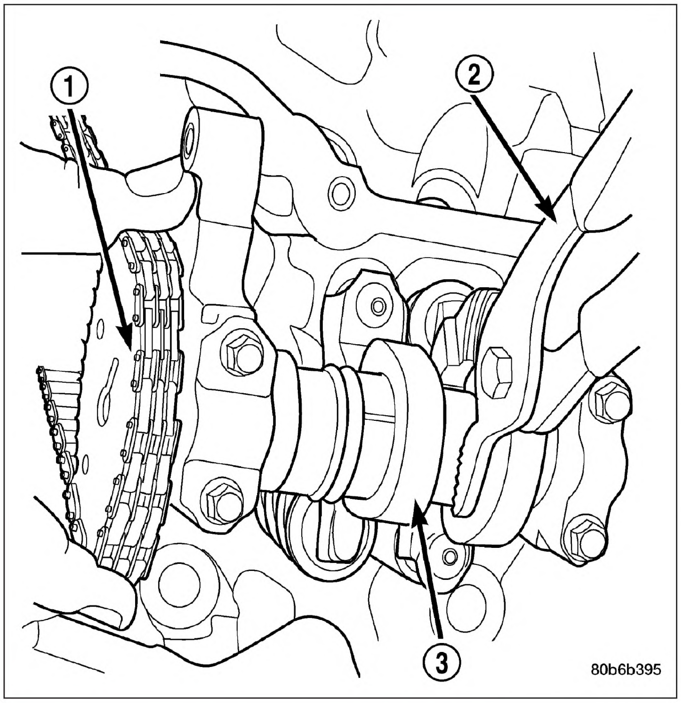
CAUTION: Care should be taken not to damage camshaft target wheel. Do not hold target wheel while loosening or tightening camshaft sprocket. Do not place the target wheel near a magnetic source of any kind. A damaged or magnetized target wheel could cause a vehicle no start condition.

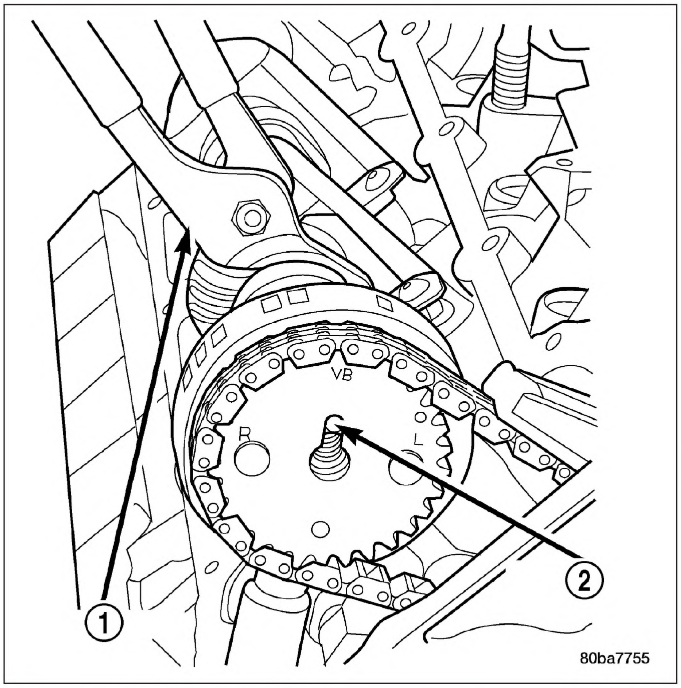
CAUTION: Do not forcefully rotate the camshafts or crankshaft independently of each other. Damaging intake valve to piston contact will occur. Ensure negative battery cable is disconnected to guard against accidental starter engagement.

13. Remove left and right camshaft sprocket bolts.
14. While holding the left camshaft steel tube with adjustable pliers, remove the left camshaft sprocket. Slowly rotate the camshaft approximately 15 degrees clockwise to a neutral position.

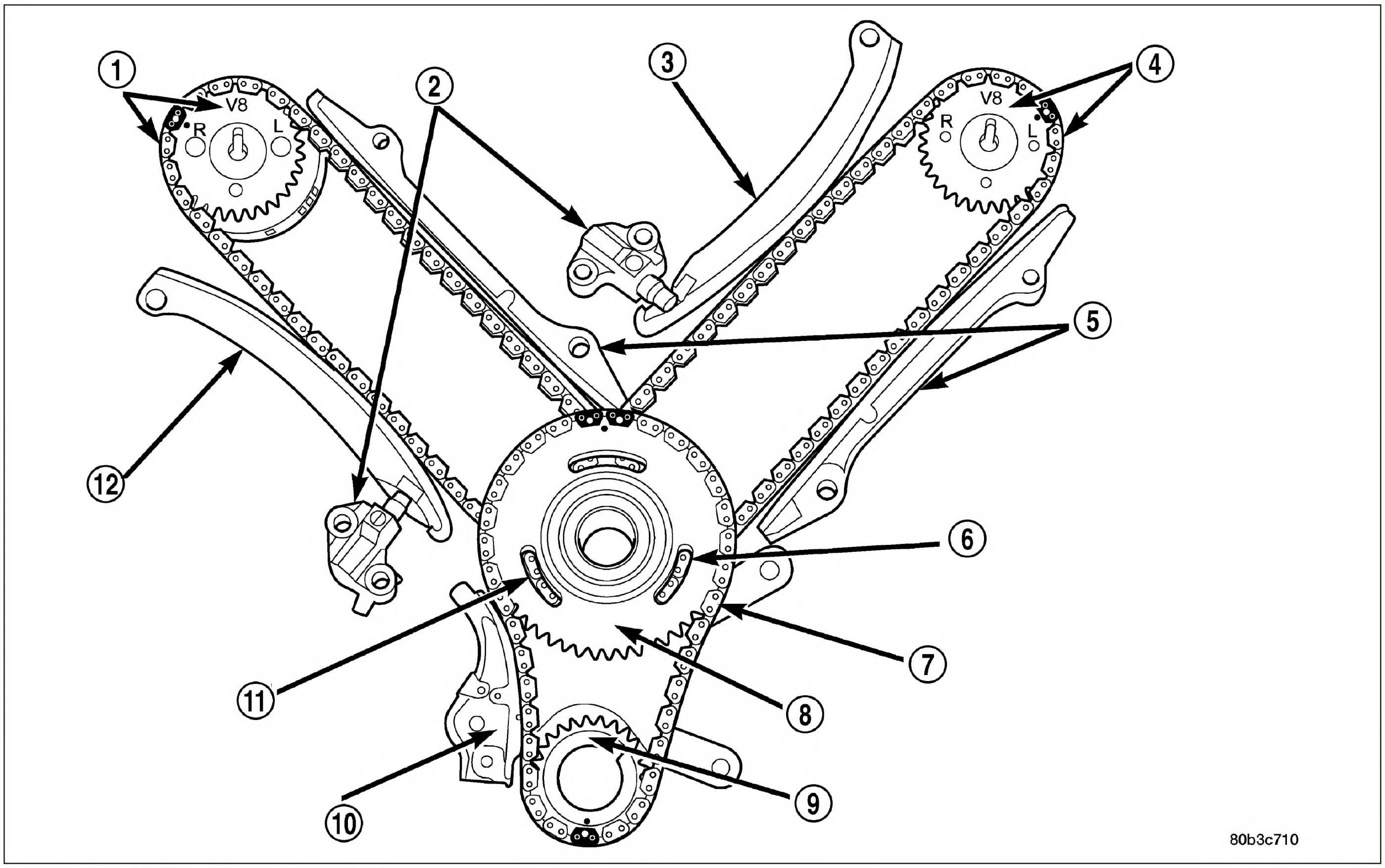


15. While holding the right camshaft steel tube with adjustable pliers, remove the right camshaft sprocket. Slowly rotate the camshaft approximately 45 degrees counterclockwise to a neutral position.
16. Remove idler sprocket assembly bolt.
17. Slide the idler sprocket assembly and crank sprocket forward simultaneously to remove the primary and secondary chains.
18. Remove both pivoting tensioner arms and chain guides.
19. Remove chain tensioner.





INSPECTION



Inspect the following components:

- Sprockets for excessive tooth wear. Some tooth markings are normal and not a cause for sprocket replacement.
- Idler sprocket assembly bushing and shaft for excessive wear.
- Idler sprocket assembly spline joint. The joint should be tight with no backlash or axial movement.
- Chain guides and tensioner arms. Replace these parts if grooving in plastic face is more than 1 mm (0.039 in.) deep. If plastic face is severely grooved or melted, the tensioner lube jet may be clogged. The tensioner should be replaced.
- Secondary chain tensioner piston and ratcheting device. Inspect for evidence of heavy contact between tensioner piston and tensioner arm. If this condition exist the tensioner and tensioner arm should be replaced.
- Primary chain tensioner plastic faces. Replace as required.

INSTALLATION

1. Using a vise, lightly compress the secondary chain tensioner piston until the piston step is flush with the tensioner body. Using a pin or suitable tool, release ratchet pawl by pulling pawl back against spring force through access hole on side of tensioner. While continuing to hold pawl back, Push ratchet device to approximately 2 mm from the tensioner body. Install Special Tool 8514 lock pin into hole on front of tensioner. Slowly open vise to transfer piston spring force to lock pin.

2. Position primary chain tensioner over oil pump and insert bolts into lower two holes on tensioner bracket. Tighten bolts to 28 N·m (250 in. lbs.).

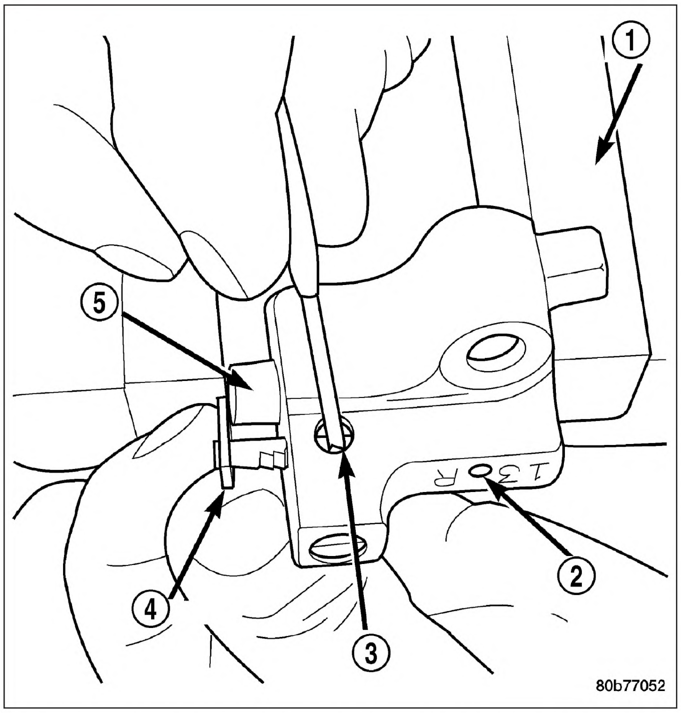
CAUTION: Overtightening the tensioner arm torx® bolt can cause severe damage to the cylinder head. Tighten torx® bolt to specified torque only.

3. Install right side chain tensioner arm. Apply Mopar® Lock N, Seal to torx® bolt, tighten bolt to 17 N·m (150 in. lbs.).

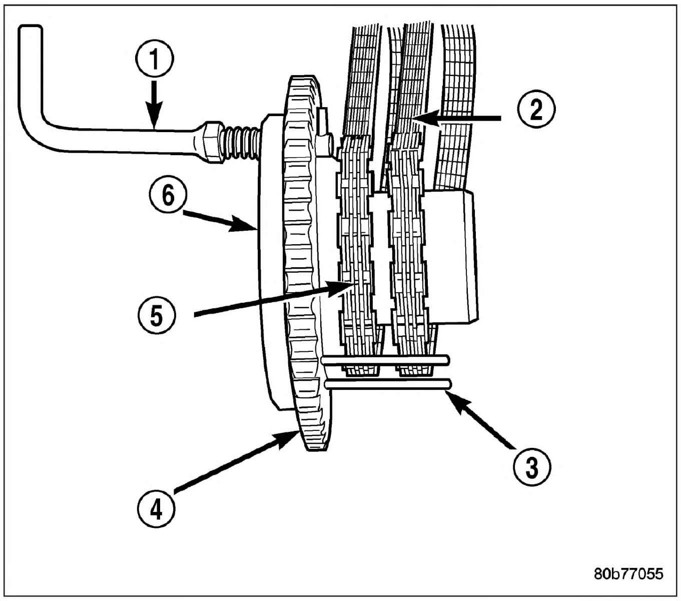
NOTE: The silver bolts retain the guides to the cylinder heads and the black bolts retain the guides to the engine block.

4. Install the left side chain guide. Tighten the bolts to 28 N·m (250 in. lbs.).

CAUTION: Overtightening the tensioner arm torx® bolt can cause severe damage to the cylinder head. Tighten torx® bolt to specified torque only.



5. Install left side chain tensioner arm. Apply Mopar® Lock N, Seal to torx® bolt, tighten bolt to 17 N·m (150 in. lbs.).
6. Install the right side chain guide. Tighten the bolts to 28 N·m (250 in. lbs.).
7. Install both secondary chains onto the idler sprocket. Align two plated links on the secondary chains to be visible through the two lower openings on the idler sprocket (4 o'clock and 8 o'clock). Once the secondary timing chains are installed, position special tool 8515 to hold chains in place for installation.
8. Align primary chain double plated links with the timing mark at 12 o'clock on the idler sprocket. Align the primary chain single plated link with the timing mark at 6 o'clock on the crankshaft sprocket.
9. Lubricate idler shaft and bushings with clean engine oil.
10. Install all chains, crankshaft sprocket, and idler sprocket as an assembly. After guiding both secondary chains through the block and cylinder head openings, affix chains with a elastic strap or the equivalent, This will maintain tension on chains to aid in installation.

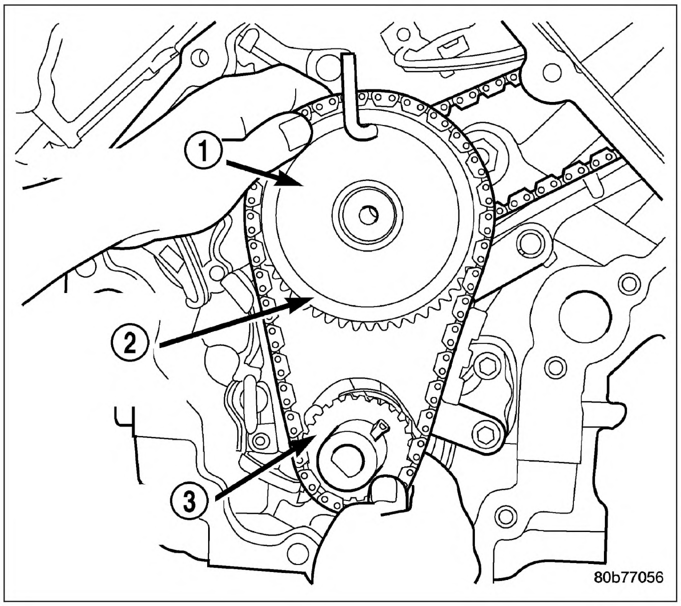


NOTE: It will be necessary to slightly rotate camshafts for sprocket installation.

11. Align left camshaft sprocket “L” dot to plated link on chain.
12. Align right camshaft sprocket “R” dot to plated link on chain.

CAUTION: Remove excess oil from the camshaft sprocket bolt. Failure to do so can result in over-torque of bolt resulting in bolt failure.

13. Remove Special Tool 8515, then attach both sprockets to camshafts. Remove excess oil from bolts, then Install sprocket bolts, but do not tighten at this time.
14. Verify that all plated links are aligned with the marks on all sprockets and the “V8” marks on camshaft sprockets are at the 12 o’clock position.



CAUTION: Ensure the plate between the left secondary chain tensioner and block is correctly installed.

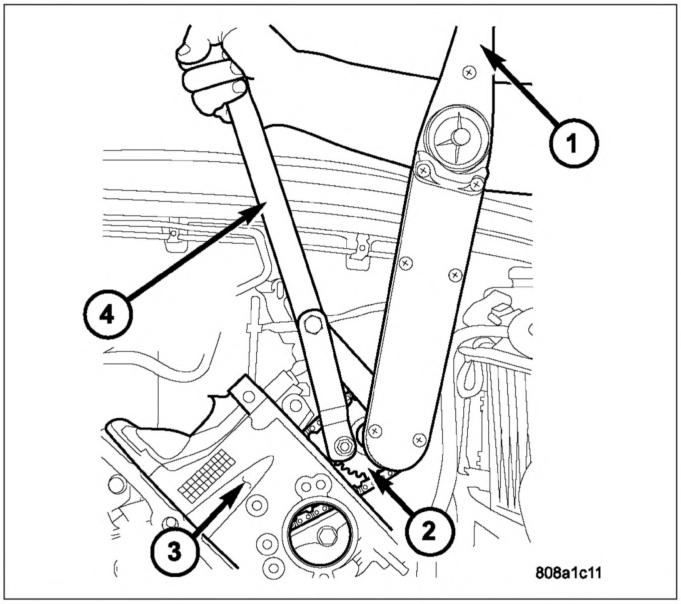
15. Install both secondary chain tensioners. Tighten bolts to 28 N·m (250 in. lbs.).

NOTE: Left and right secondary chain tensioners are not common.

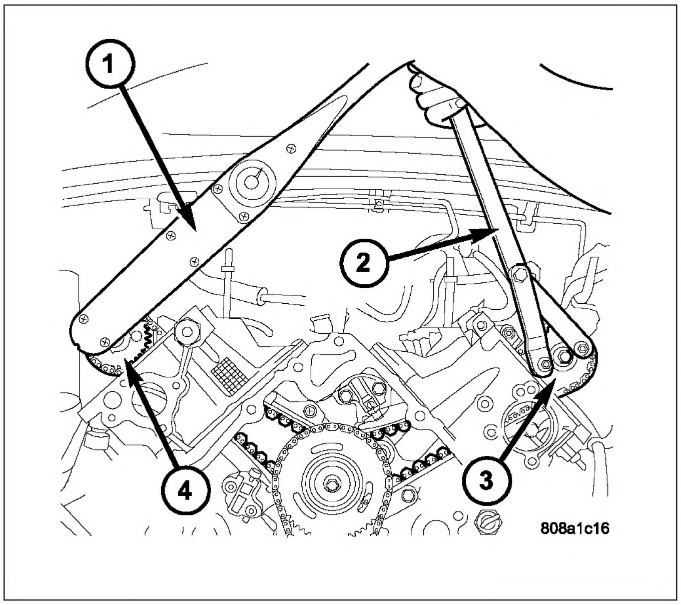
16. Before installing idler sprocket bolt, lubricate washer with oil, and tighten idler sprocket assembly retaining bolt to 34 N·m (25 ft. lbs.).
17. Remove all locking pins (3) from tensioners.

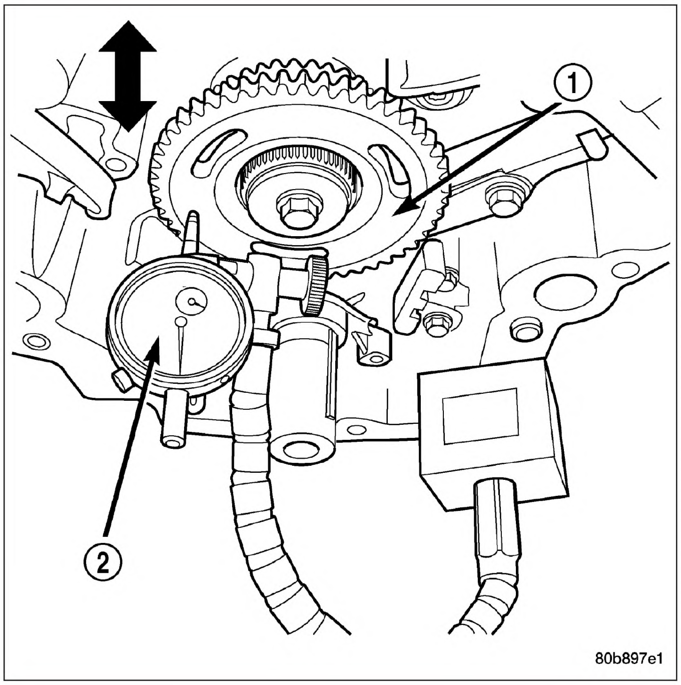
CAUTION: After pulling locking pins out of each tensioner, DO NOT manually extend the tensioner(s) ratchet. Doing so will over tension the chains, resulting in noise and/or high timing chain loads.

18. Using Special Tool 6958, Spanner with Adaptor Pins 8346, tighten left and right. camshaft sprocket bolts to 122 N·m (90 ft. lbs.).



19. Rotate engine two full revolutions. Verify timing marks are at the following locations:
    - primary chain idler sprocket dot is at 12 o'clock
    - primary chain crankshaft sprocket dot is at 6 o'clock
    - secondary chain camshaft sprockets "V8" marks are at 12 o'clock
20. Lubricate all three chains with engine oil.
21. After installing all chains, it is recommended that the idler gear end play be checked. The end play must be within 0.10–0.25 mm (0.004–0.010 in.). If not within specification, the idler gear and idler shaft must be replaced.





22. Install timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION) and crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
23. Install cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

NOTE: Before installing threaded plug in right cylinder head, the plug must be coated with sealant to prevent leaks.

24. Coat the large threaded access plug with **Mopar® Thread Sealant with Teflon**, then install into the right cylinder head and tighten to 81 N·m (60 ft. lbs.).
25. Install the oil fill housing.
26. Install access plug in left cylinder head.
27. Install power steering pump.
28. Install radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
29. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
30. Connect negative cable to battery.

SHAFT - IDLER

REMOVAL

1. Remove the primary and secondary timing chains and sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL) .

NOTE: To remove the idler shaft, it is necessary to tap threads into the shaft, to install the removal tool.

2. Using a 12 mm X 1.75 tap, cut threads in the idler shaft center bore.
3. Cover the radiator core with a suitable cover.

CAUTION: Use care when removing the idler shaft, Do not strike the radiator cooling fins with the slide hammer.

4. Using Special Tool 8517 Slide Hammer, remove the idler shaft.

INSTALLATION

1. Thoroughly clean the idler shaft bore.
2. Position the idler shaft in the bore.

NOTE: The two lubrication holes in the idler shaft do not require any special alignment.

NOTE: Before using the retaining bolt to install the idler shaft, coat the threads and the pilot on the idler shaft, with clean engine oil.

3. Using the primary idler sprocket retaining bolt and washer, carefully draw the idler shaft into the bore until fully seated.
4. Coat the idler shaft with clean engine oil.
5. Install the timing chains and sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION) .

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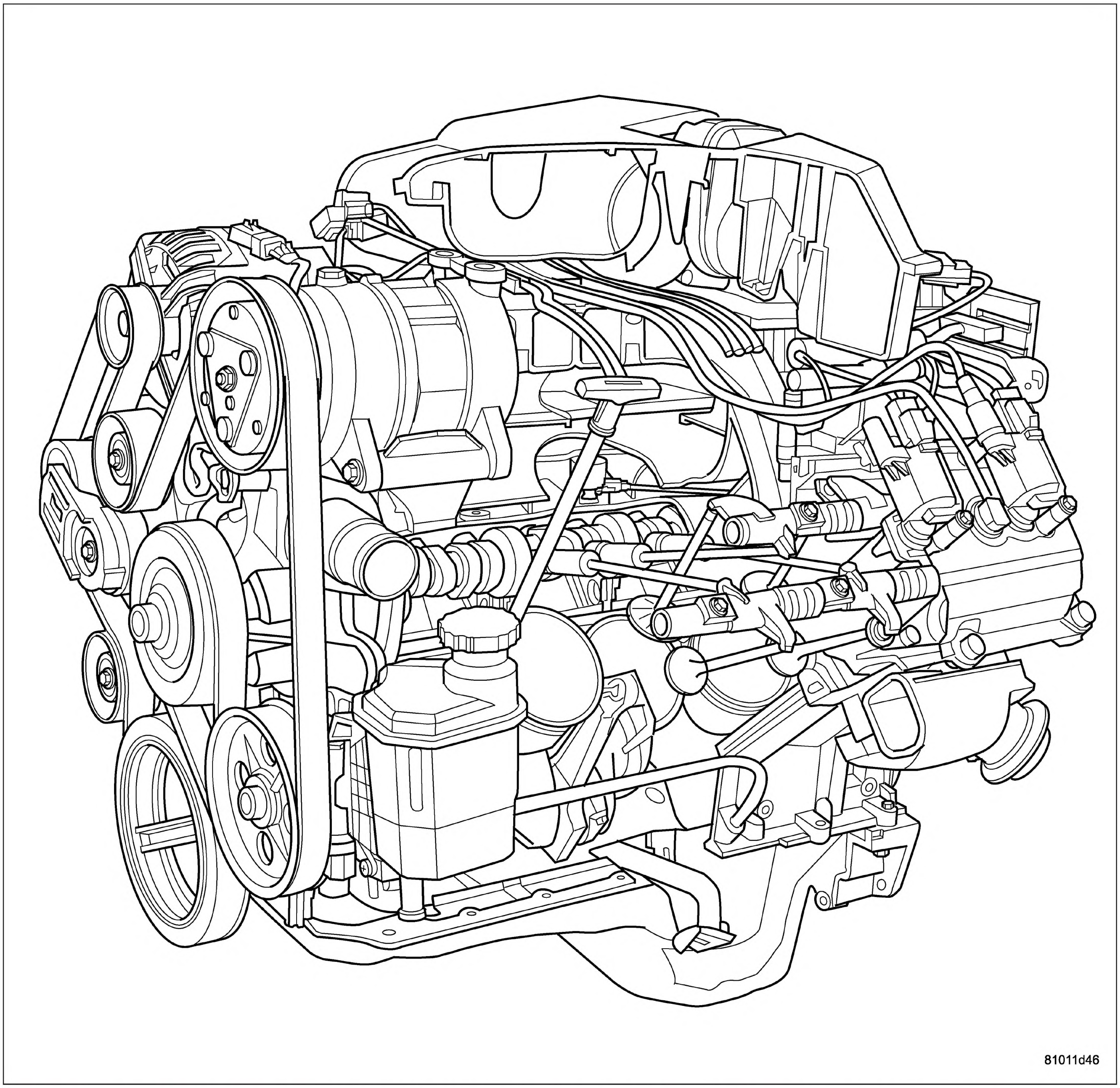
ENGINE - 5.7L SERVICE INFORMATION

DESCRIPTION



The 5.7L engine (345 CID) eight-cylinder engine is a 90° V-Type lightweight, deep skirt cast iron block, aluminum heads, single cam, overhead valve engine with hydraulic roller tappets. The heads incorporate splayed valves with a hemispherical style combustion chamber and dual spark plugs. The cylinders are numbered from front to rear; 1, 3, 5, 7 on the left bank and 2, 4, 6, 8 on the right bank. The firing order is 1-8-4-3-6-5-7-2.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either performance (e.g., engine idles rough and stalls) or mechanical (e.g., a strange noise).

(Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) - PERFORMANCE and (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)—MECHANICAL for possible causes and corrections of malfunctions. (Refer to 14 - FUEL SYSTEM/ FUEL DELIVERY - DIAGNOSIS AND TESTING) and (Refer to 14 - FUEL SYSTEM/FUEL INJECTION - DIAGNOSIS AND TESTING) for the fuel system diagnosis.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that can not be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following diagnosis:

- Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
- Cylinder Combustion Pressure Leakage Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
- Engine Cylinder Head Gasket Failure Diagnosis (Refer to 9 - ENGINE/CYLINDER HEAD - DIAGNOSIS AND TESTING).
- Intake Manifold Leakage Diagnosis (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery	1. Charge or replace as necessary.
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to the terminals.
	3. Faulty starter.	3. (Refer to 8 - ELECTRICAL/ STARTING - DIAGNOSIS AND TESTING).
	4. Incorrect spark plug gap.	4. (Refer to 8 - ELECTRICAL/ IGNITION CONTROL/SPARK PLUG - CLEANING).
	5. Dirt or water in fuel system.	5. Clean system and replace fuel filter.
	6. Faulty fuel pump, relay or wiring.	6. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)
ENGINE STALLS OR ROUGH IDLE	1. Idle speed set to low.	1. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING)
	2. Vacuum leak.	2. Inspect intake manifold and vacuum hoses, repair or replace as necessary.
	3. Incorrect engine timing.	3. (Refer to 9 - ENGINE/VALVE TIMING - STANDARD PROCEDURE).

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped spark plugs.	1. Replace spark plugs.
	2. Dirt or water in fuel system.	2. Clean system and replace fuel filter.
	3. Blown cylinder head gasket.	3. Replace cylinder head gasket.
	4. Low compression.	4. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING).
	5. Burned, warped or pitted valves.	5. Replace as necessary.
	6. Plugged or restricted exhaust system.	6. Inspect and replace as necessary.

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTIONS
NOISY VALVES	1. High or low oil level in crankcase.	1. (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
	2. Thin or diluted oil.	2. Change oil and filter.
	3. Low oil pressure.	3. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	4. Dirt in lash adjusters.	4. Replace as necessary.
	5. Worn rocker arms.	5. Replace as necessary.
	6. Worn lash adjusters	6. Replace as necessary.
	7. Worn valve guides.	7. (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - STANDARD PROCEDURE)
	8. Excessive runout of valve seats on valve faces.	8. (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - STANDARD PROCEDURE)
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Connecting rod journal out-of-round.	5. Service or replace crankshaft.
	6. Misaligned connecting rods.	6. Replace bent connecting rods.

CONDITION	POSSIBLE CAUSES	CORRECTIONS
MAIN BEARING NOISE	1. Insufficient oil supply.	1. (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
	2. Low oil pressure.	2. Check oil pump, if Ok, check rod and main bearings for excessive wear.
	3. Thin or diluted oil.	3. Change oil and filter.
	4. Excessive bearing clearance.	4. Replace as necessary.
	5. Excessive end play.	5. Check thrust washers for wear.
	6. Crankshaft journal out-of round.	6. Service or replace crankshaft.
	7. Loose flywheel or torque converter.	7. Tighten to correct torque

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

1. Clean the spark plug recesses with compressed air.
2. Remove the spark plugs.
3. Disable the fuel system (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DESCRIPTION).
4. Remove the ASD relay (Refer to 8 - ELECTRICAL/IGNITION CONTROL/AUTO SHUT DOWN RELAY - REMOVAL).
5. Insert a compression pressure gauge and rotate the engine with the engine starter motor for three revolutions.
6. Record the compression pressure on the 3rd revolution. Continue the test for the remaining cylinders.
7. (Refer to 9 - ENGINE - SPECIFICATIONS) for the correct engine compression pressures.

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

1. Check the coolant level and fill as required. DO NOT install the radiator cap.
2. Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.
3. Remove the spark plugs.
4. Remove the oil filler cap.
5. Remove the air cleaner hose.
6. Calibrate the tester according to the manufacturer’s instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum and 552 kPa (80 psi) recommended.
7. Perform the test procedures on each cylinder according to the tester manufacturer’s instructions. Set piston of cylinder to be tested at TDC compression,While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the radiator coolant.

All gauge pressure indications should be equal, with no more than 25% leakage.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

Refer to CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART .

CYLINDER COMBUSTION PRESSURE LEAKAGE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
AIR ESCAPES THROUGH THROTTLE BODY	Intake valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH TAILPIPE	Exhaust valve bent, burnt, or not seated properly	Inspect valve and valve seat. Reface or replace, as necessary. Inspect valve springs. Replace as necessary.
AIR ESCAPES THROUGH RADIATOR	Head gasket leaking or cracked cylinder head or block	Remove cylinder head and inspect. Replace defective part
MORE THAN 50% LEAKAGE FROM ADJACENT CYLINDERS	Head gasket leaking or crack in cylinder head or block between adjacent cylinders	Remove cylinder head and inspect. Replace gasket, head, or block as necessary
MORE THAN 25% LEAKAGE AND AIR ESCAPES THROUGH OIL FILLER CAP OPENING ONLY	Stuck or broken piston rings; cracked piston; worn rings and/or cylinder wall	Inspect for broken rings or piston. Measure ring gap and cylinder diameter, taper and out-of-round. Replace defective part as necessary

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - LUBRICATION

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS	1. Gaskets and O-Rings.	1.
	(a) Misaligned or damaged.	(a) Replace as necessary.
	(b) Loose fasteners, broken or porous metal parts.	(b) Tighten fasteners, Repair or replace metal parts.
	2. Crankshaft rear seal	2. Replace as necessary.
	3. Crankshaft seal flange. Scratched, nicked or grooved.	3. Polish or replace crankshaft.
	4. Oil pan flange cracked.	4. Replace oil pan.
	5.Front cover seal, damaged or misaligned.	5. Replace seal.
	6. Scratched or damaged vibration damper hub.	6. Polish or replace damper.
	7. Crankshaft Rear Flange Microporosity	7. Replace Crankshaft
OIL PRESSURE DROP	1. Low oil level.	1. Check and correct oil level.
	2. Faulty oil pressure sending unit.	2. Replace sending unit.
	3. Low oil pressure.	3. Check pump and bearing clearance.
	4. Clogged oil filter.	4. Replace oil filter.
	5. Worn oil pump.	5. Replace as necessary.
	6. Thin or diluted oil.	6. Change oil and filter.
	7. Excessive bearing clearance.	7. Replace as necessary.
	8. Oil pump relief valve stuck.	8. Replace oil pump.
	9. Oil pickup tube loose or damaged.	9. Replace as necessary.

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL PUMPING AT RINGS; SPARK PLUGS FOULING	1. Worn or damaged rings.	1. Hone cylinder bores and replace rings.
	2. Carbon in oil ring slots.	2. Replace rings.
	3. Incorrect ring size installed.	3. Replace rings.
	4. Worn valve guides.	4. Ream guides and replace valves.
	5. Leaking intake gasket.	5. Replace intake gaskets.
	6. Leaking valve guide seals.	6. Replace valve guide seals.

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

ENGINE MECHANICAL DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES/LIFTERS	1. High or low oil level in crankcase	1. Check for correct oil level. Adjust oil level by draining or adding as needed
	2. Thin or diluted oil	2. Change oil. (Refer to 9 - ENGINE/LUBRICATION/OIL - STANDARD PROCEDURE)
	3. Low oil pressure	3. Check engine oil level. If ok, Perform oil pressure test. (Refer to 9 - ENGINE/LUBRICATION - DIAGNOSIS AND TESTING) for engine oil pressure test/ specifications
	4. Dirt in tappets/lash adjusters	4. Clean/replace hydraulic tappets/lash adjusters
	5. Bent push rod(s)	5. Install new push rods
	6. Worn rocker arms	6. Inspect oil supply to rocker arms and replace worn arms as needed
	7. Worn tappets/lash adjusters	7. Install new hydraulic tappets/lash adjusters
	8. Worn valve guides	8. Inspect all valve guides and replace as necessary
	9. Excessive runout of valve seats or valve faces	9. Grind valves and seats

CONDITION	POSSIBLE CAUSES	CORRECTION
CONNECTING ROD NOISE	1. Insufficient oil supply	1. Check engine oil level.
	2. Low oil pressure	2. Check engine oil level. If ok, Perform oil pressure test. (Refer to 9 - ENGINE/LUBRICATION - DIAGNOSIS AND TESTING) engine oil pressure test/specifications
	3. Thin or diluted oil	3. Change oil to correct viscosity. (Refer to 9 - ENGINE/ LUBRICATION/OIL - STANDARD PROCEDURE) for correct procedure/engine oil specifications
	4. Excessive connecting rod bearing clearance	4. Measure bearings for correct clearance with plasti-gage. Repair as necessary
	5. Connecting rod journal out of round	5. Replace crankshaft or grind journals
	6. Misaligned connecting rods	6. Replace bent connecting rods
MAIN BEARING NOISE	1. Insufficient oil supply	1. Check engine oil level.
	2. Low oil pressure	2. Check engine oil level. If ok, Perform oil pressure test. (Refer to 9 - ENGINE/LUBRICATION - DIAGNOSIS AND TESTING)
	3. Thin or diluted oil	3. Change oil to correct viscosity.
	4. Excessive main bearing clearance	4. Measure bearings for correct clearance. Repair as necessary
	5. Excessive end play	5. Check crankshaft thrust bearing for excessive wear on flanges
	6. Crankshaft main journal out of round or worn	6. Grind journals or replace crankshaft
	7. Loose flywheel or torque converter	7. Inspect crankshaft, flexplate/ flywheel and bolts for damage. Tighten to correct torque
LOW OIL PRESSURE	1. Low oil level	1. Check oil level and fill if necessary
	2. Faulty oil pressure sending unit	2. Install new sending unit
	3. Clogged oil filter	3. Install new oil filter
	4. Worn oil pump	4. Replace oil pump assembly.
	5. Thin or diluted oil	5. Change oil to correct viscosity.
	6. Excessive bearing clearance	6. Measure bearings for correct clearance
	7. Oil pump relief valve stuck	7. Remove valve to inspect, clean and reinstall
	8. Oil pickup tube loose, broken, bent or clogged	8. Inspect oil pickup tube and pump, and clean or replace if necessary
	9. Oil pump cover warped or cracked	9. Install new oil pump

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS	1. Misaligned or deteriorated gaskets	1. Replace gasket
	2. Loose fastener, broken or porous metal part	2. Tighten, repair or replace the part
	3. Front or rear crankshaft oil seal leaking	3. Replace seal
	4. Leaking oil gallery plug or cup plug	4. Remove and reseal threaded plug. Replace cup style plug
EXCESSIVE OIL CONSUMPTION OR SPARK PLUGS OIL FOULED	1. CCV System malfunction	1. (Refer to 25 - EMISSIONS CONTROL/EVAPORATIVE EMISSIONS - DESCRIPTION) for correct operation
	2. Defective valve stem seal(s)	2. Repair or replace seal(s)
	3. Worn or broken piston rings	3. Hone cylinder bores. Install new rings
	4. Scuffed pistons/cylinder walls	4. Hone cylinder bores and replace pistons as required
	5. Carbon in oil control ring groove	5. Remove rings and de-carbon piston
	6. Worn valve guides	6. Inspect/replace valve guides as necessary
	7. Piston rings fitted too tightly in grooves	7. Remove rings and check ring end gap and side clearance. Replace if necessary

STANDARD PROCEDURE

STANDARD PROCEDURE - REPAIR DAMAGED OR WORN THREADS

CAUTION: Be sure that the tapped holes maintain the original center line.

Damaged or worn threads can be repaired. Essentially, this repair consists of:

- Drilling out worn or damaged threads.
- Tapping the hole with a special Heli-Coil Tap, or equivalent.
- Installing an insert into the tapped hole to bring the hole back to its original thread size.

STANDARD PROCEDURE - HYDROSTATIC LOCK

CAUTION: DO NOT use the starter motor to rotate the crankshaft. Severe damage could occur.

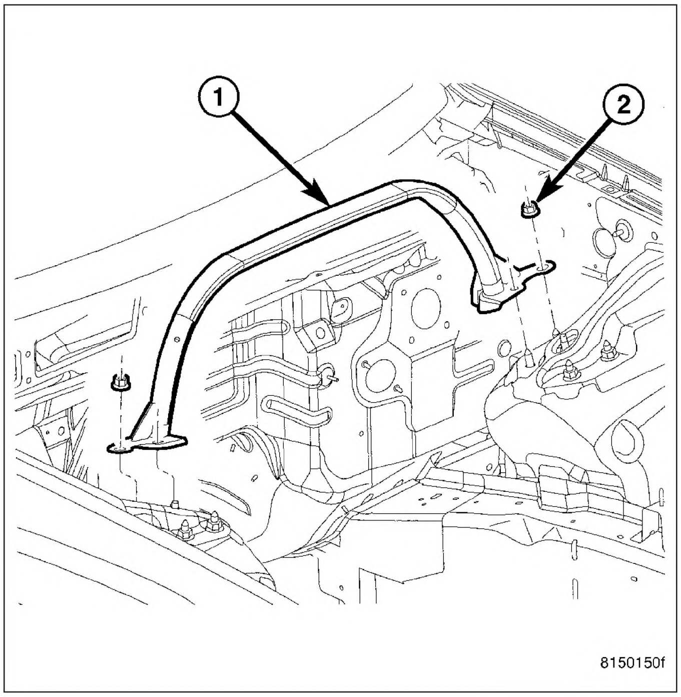
When an engine is suspected of hydrostatic lock (regardless of what caused the problem), follow the steps below.

1. Perform the Fuel Pressure Release Procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).
2. Disconnect the negative cable(s) from the battery.
3. Inspect air cleaner, induction system, and intake manifold to ensure system is dry and clear of foreign material.
4. Place a shop towel around the spark plugs to catch any fluid that may possibly be under pressure in the cylinder head. Remove the spark plugs.
5. With all spark plugs removed, rotate the crankshaft using a breaker bar and socket.
6. Identify the fluid in the cylinders (coolant, fuel, oil, etc.).
7. Be sure all fluid has been removed from the cylinders.

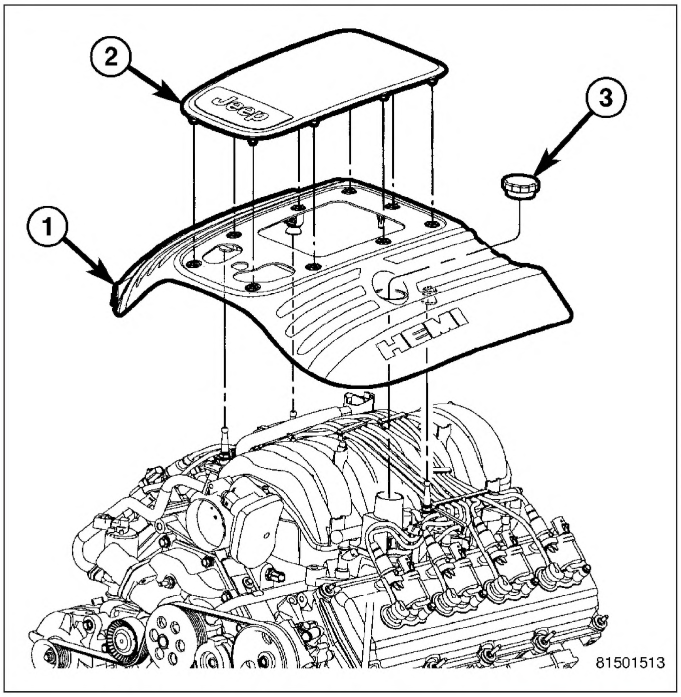
8. Repair engine or components as necessary to prevent this problem from occurring again.
9. Squirt a small amount of engine oil into the cylinders to lubricate the walls. This will prevent damage on restart.
10. Install new spark plugs. Tighten the spark plugs to 41 N·m (30 ft. lbs.) torque.
11. Drain engine oil. Remove and discard the oil filter.
12. Install the drain plug. Tighten the plug to 34 N·m (25 ft. lbs.) torque.
13. Install a new oil filter.
14. Fill engine crankcase with the specified amount and grade of oil. (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS).
15. Connect the negative cable(s) to the battery.
16. Start the engine and check for any leaks.

REMOVAL - ENGINE

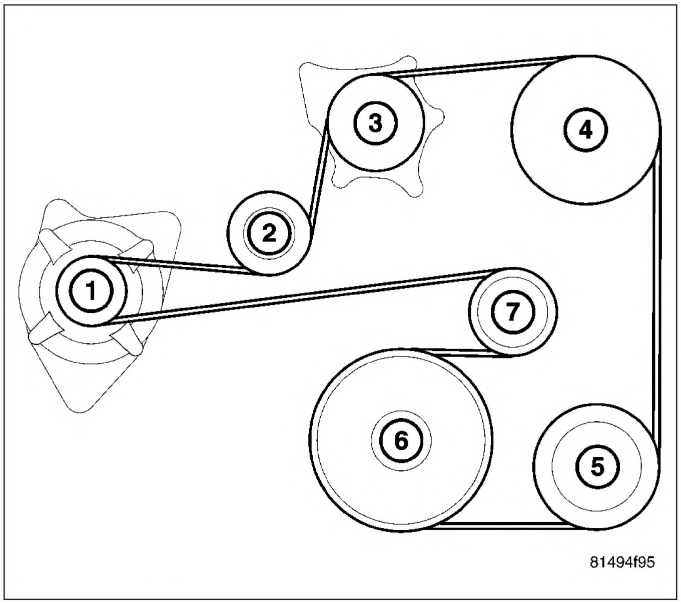
1. Remove the strut tower support (1).



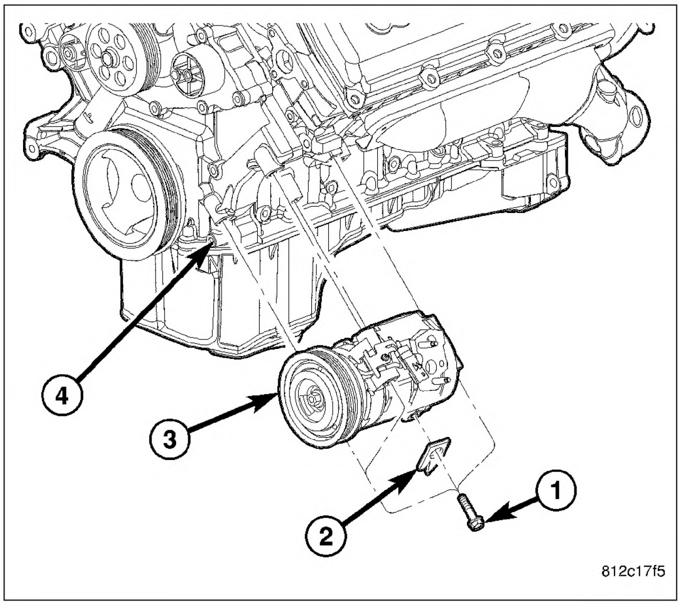
2. Remove the engine cover (1).



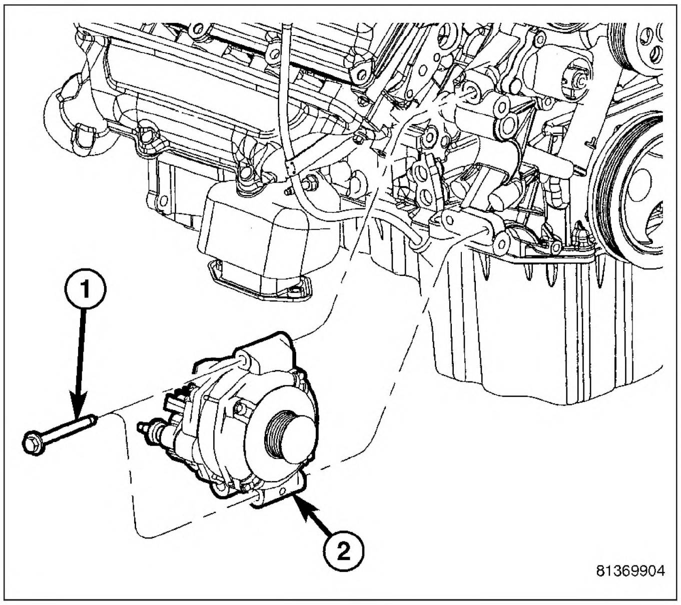
3. Perform the Fuel System Pressure Release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).
4. Disconnect the battery negative cable.
5. Remove the air cleaner resonator and duct work as an assembly.
6. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
7. Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
8. Remove radiator fan shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).



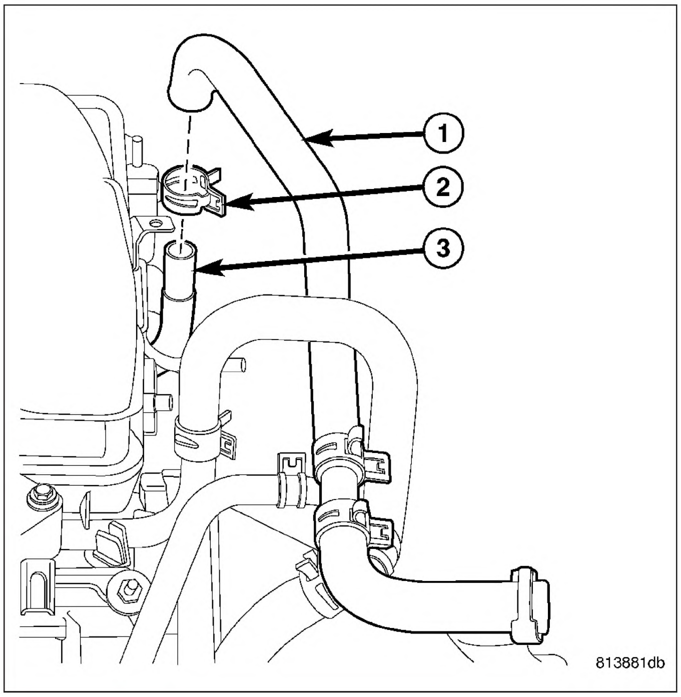
9. Remove the A/C compressor with the lines attached. Secure compressor out of the way.



10. Remove generator assembly (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - REMOVAL).
11. Remove the intake manifold and IAFM as an assembly (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
12. Remove the ground wires from the rear of each cylinder head.



13. Disconnect the heater hoses (1).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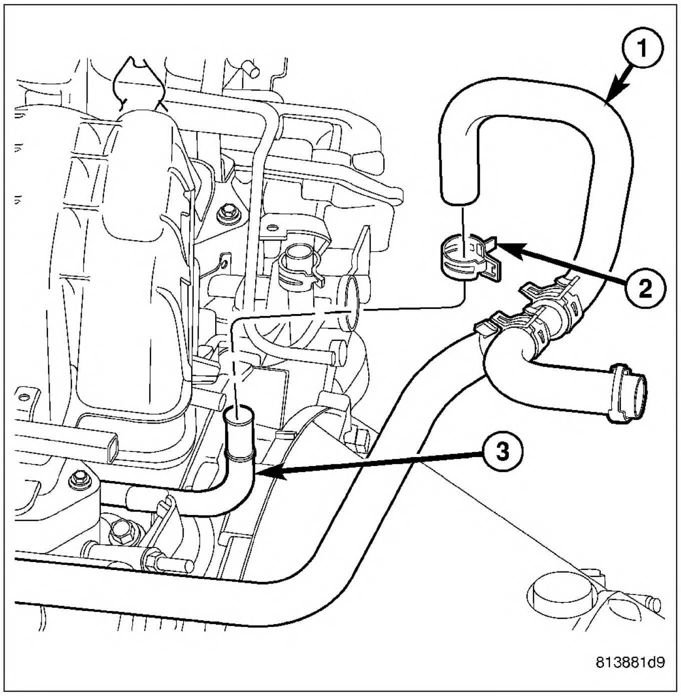
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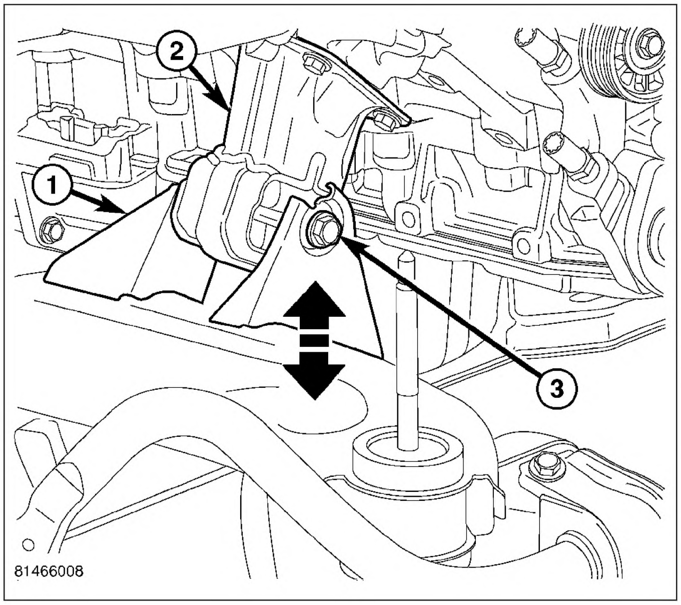
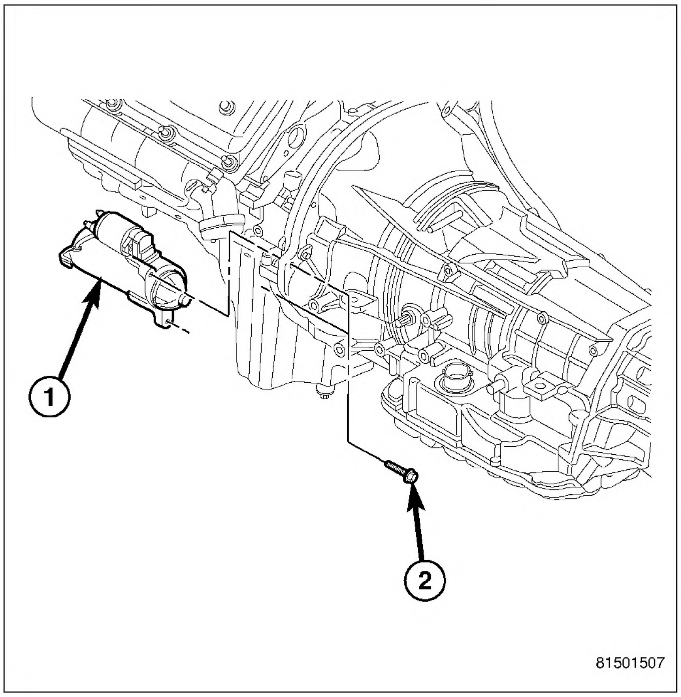
NOTE: It is not necessary to disconnect P/S hoses from pump, for P/S pump removal.

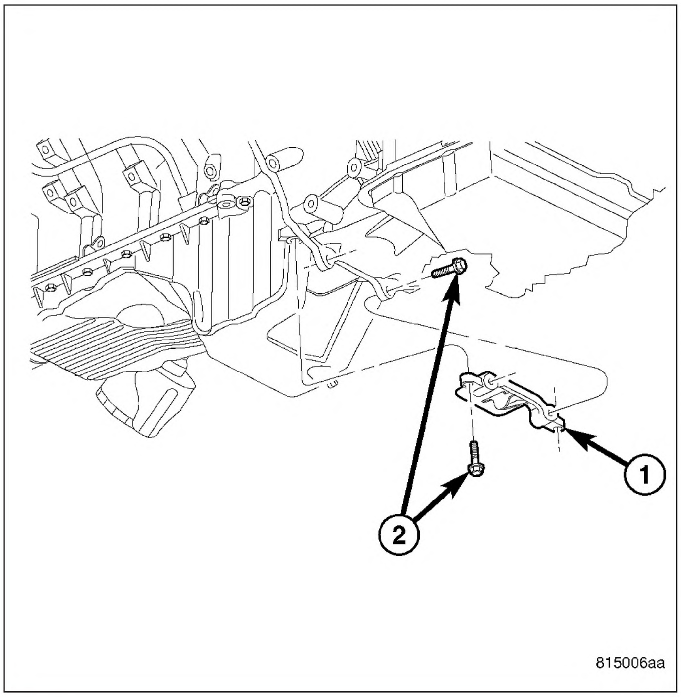
14. Remove the power steering pump and set aside.
15. Disconnect the fuel supply line (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE).
16. Raise and support the vehicle on a hoist and drain the engine oil.
17. Remove engine front mount to frame bolts (3) and nuts.
18. Disconnect the transmission oil cooler lines from their retainers at the oil pan bolts.



19. Disconnect exhaust pipe at manifolds.
20. Disconnect the starter wires. Remove starter motor (1) (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL).



21. Remove the structural dust cover (1).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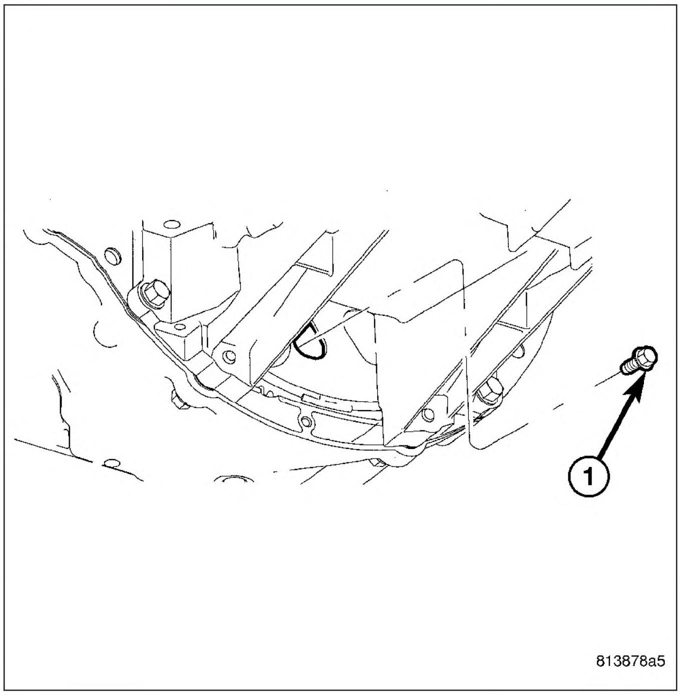
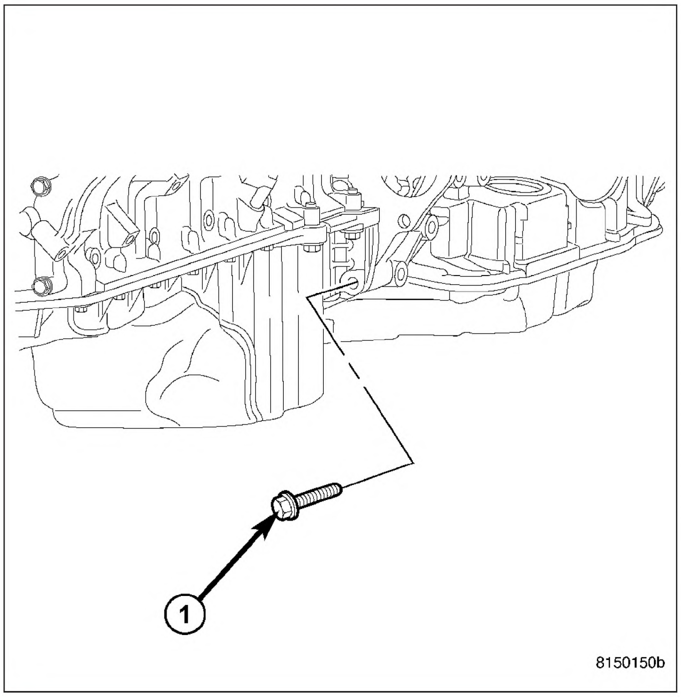
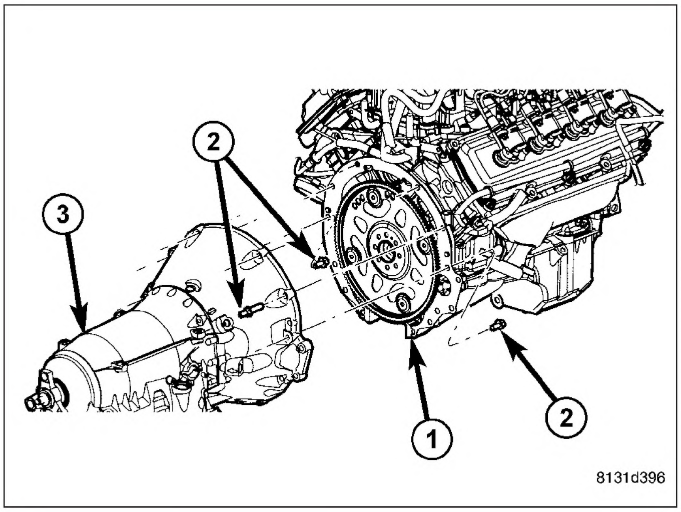
22. Remove drive plate to converter bolts.



23. Remove the oil pan to transmission bolts (1).



24. Remove transmission bell housing to engine block bolts (2).
25. Lower the vehicle.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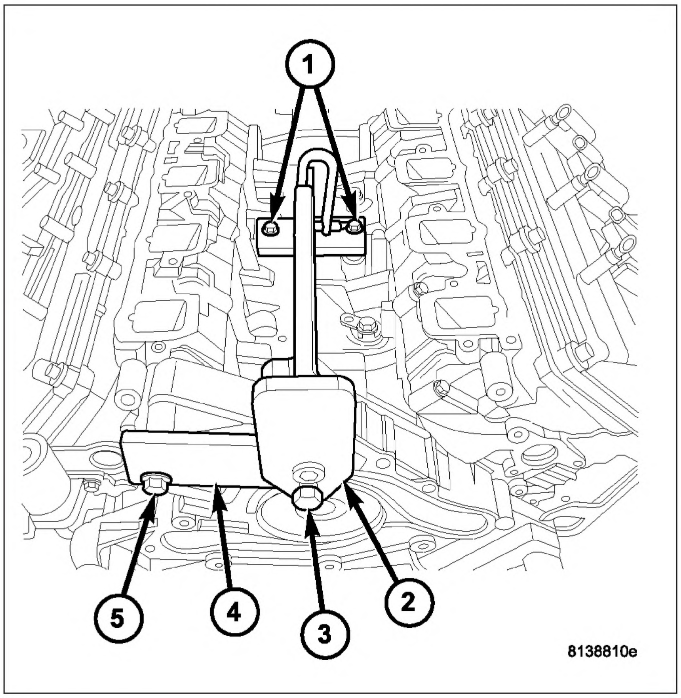
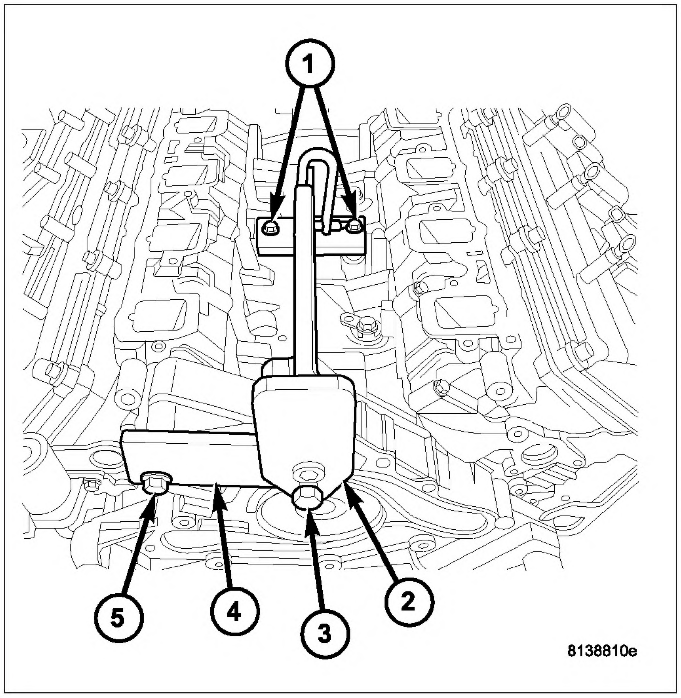
26. Install engine lift fixture, special tool # 8984 and 8984–UPD.
27. Separate engine from transmission, remove engine from vehicle, and install engine assembly on a repair stand.

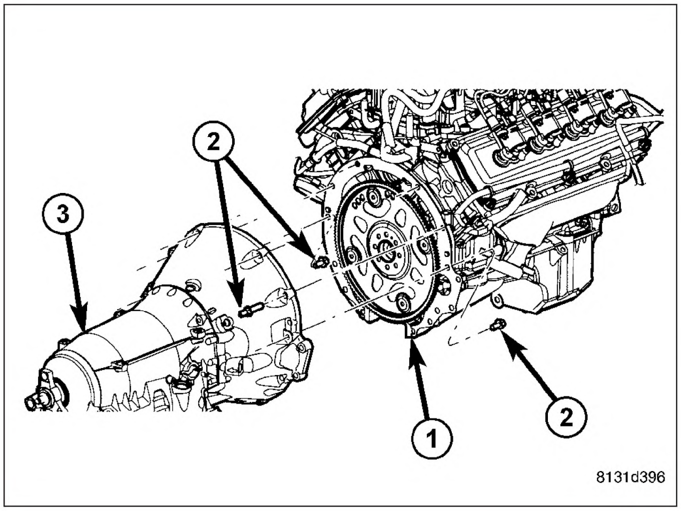


INSTALLATION - ENGINE

1. Install engine lift fixture Special tool # 8984 and 8984–UPD.
2. Position the engine in the engine compartment.
3. Lower engine into compartment and align engine with transmission.



4. Mate engine (1) and transmission (3) and install two transmission to engine block mounting bolts (2) finger tight.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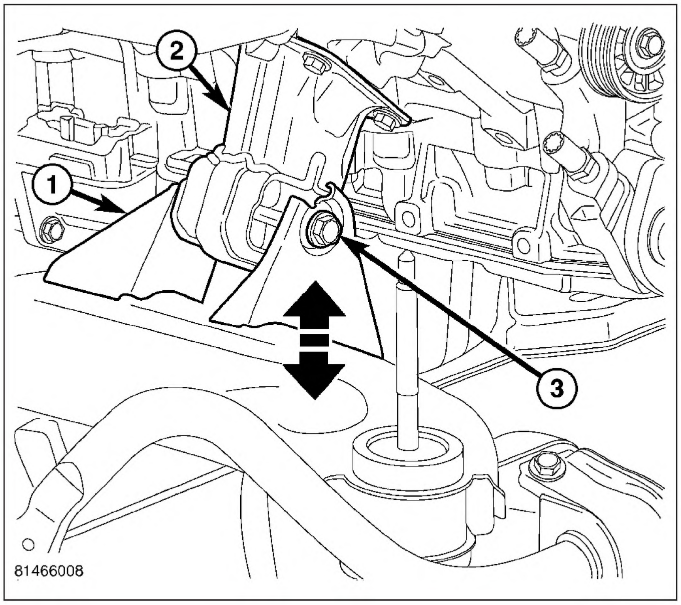
5. Lower engine assembly until the engine mounts (2) rests in frame perches (1).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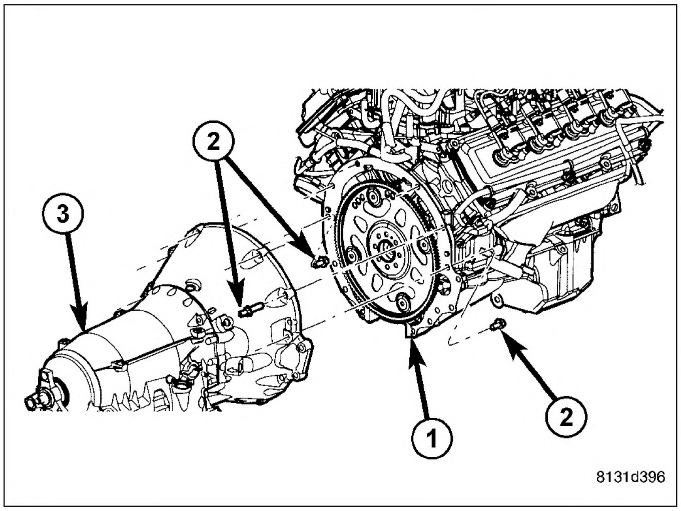
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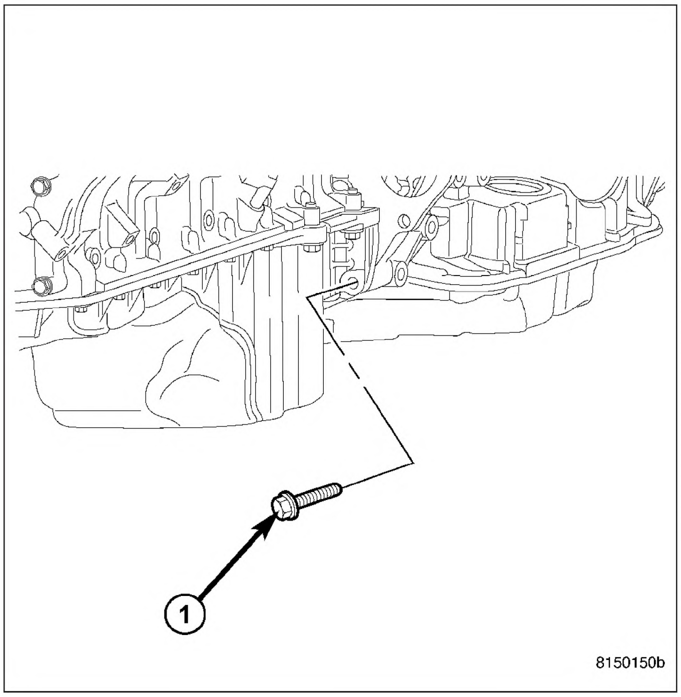
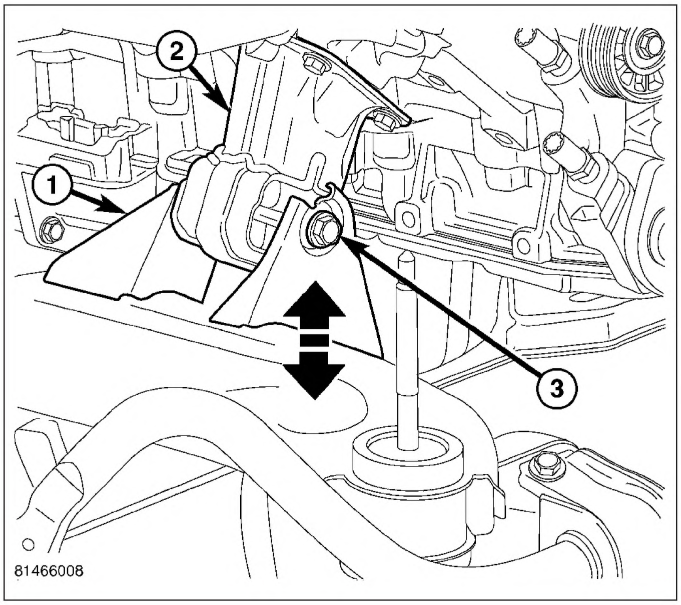
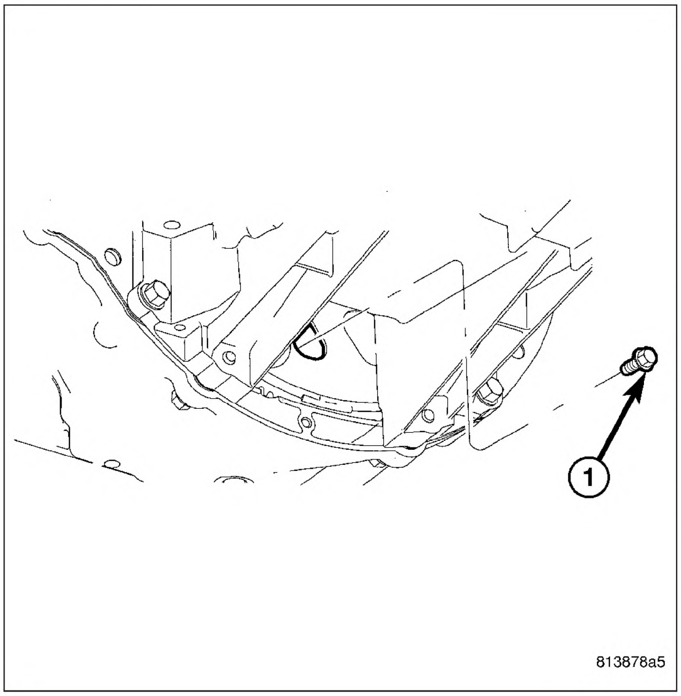
6. Install remaining transmission to engine block mounting bolts (2) and the oil pan to transmission bolts (1) and tighten.



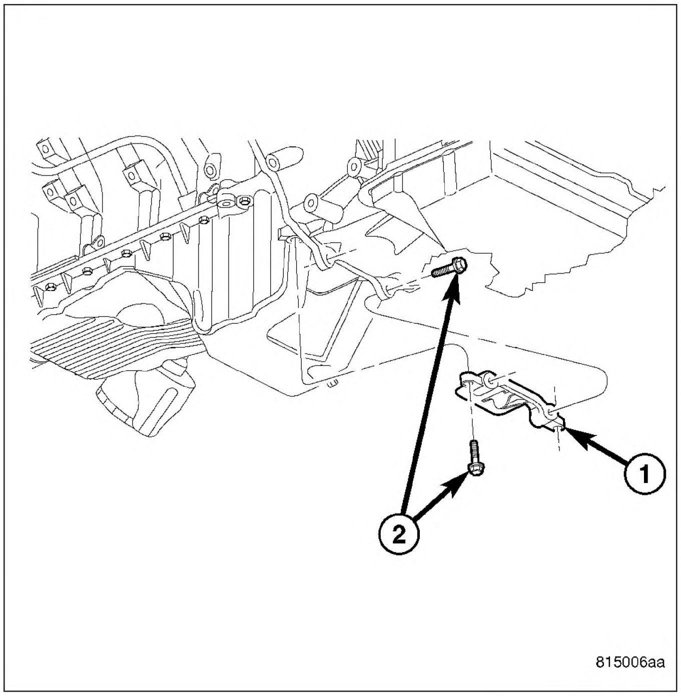
7. Install and tighten engine mount to frame bolts (3) and nuts.



8. Install drive plate to torque converter bolts (1).



9. Install the structural dust cover (1).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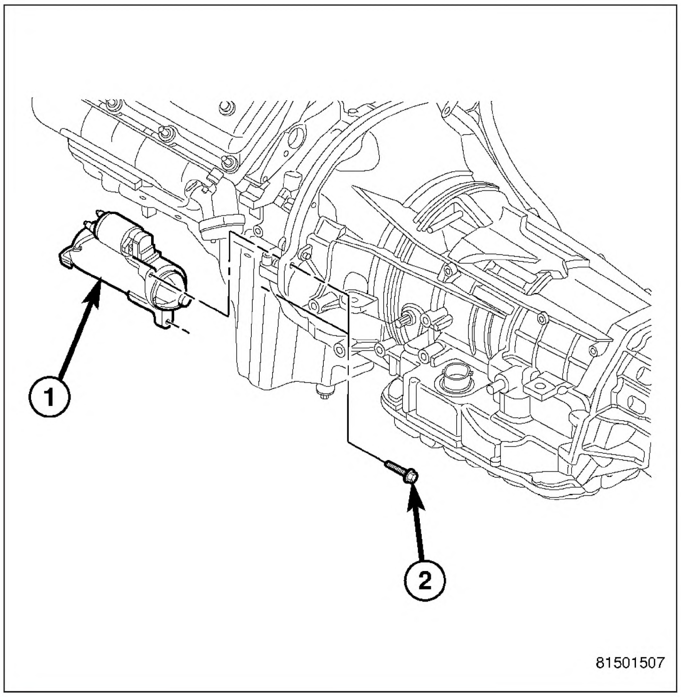
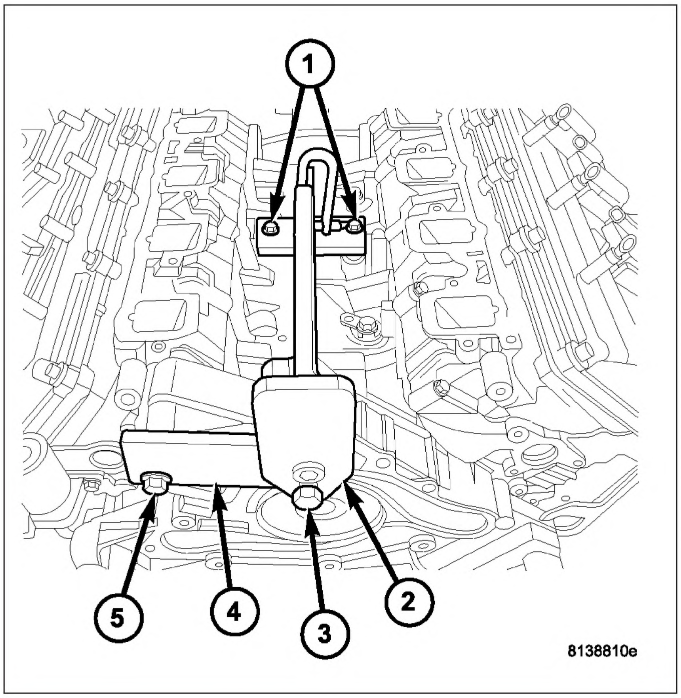
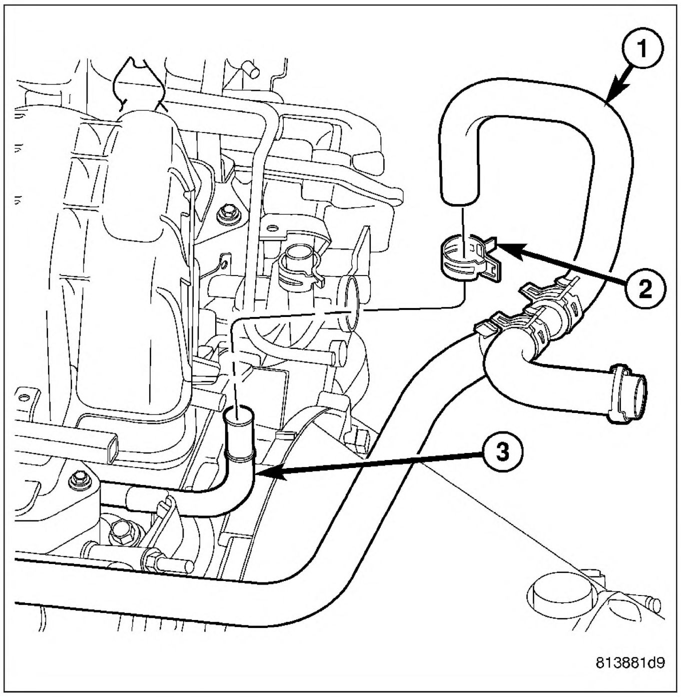
10. Install the starter (1) and connect the starter wires (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION).
11. Install exhaust pipe to manifold.
12. Lower the vehicle.



13. Remove engine lift fixture (2), special tool # 8984 and 8984–UPD.



14. Connect the fuel supply line (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE).
15. Reinstall the power steering pump.
16. Connect the heater hoses (1).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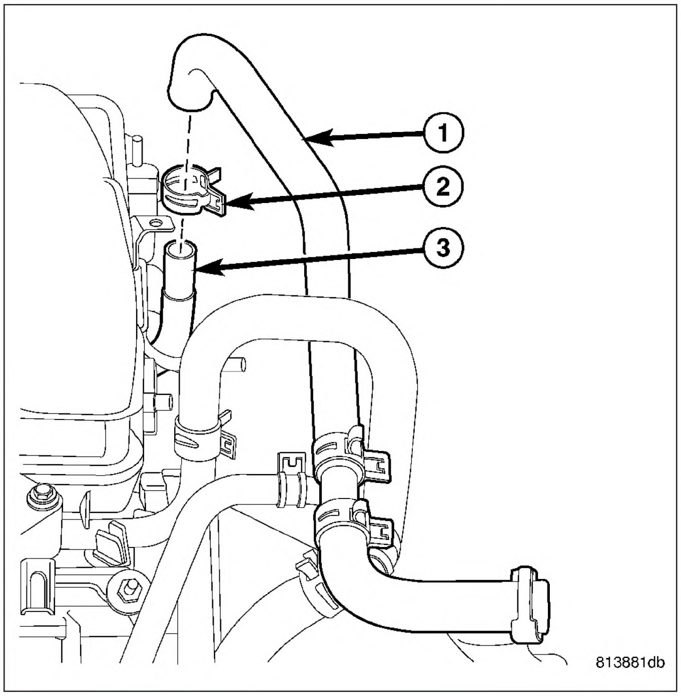
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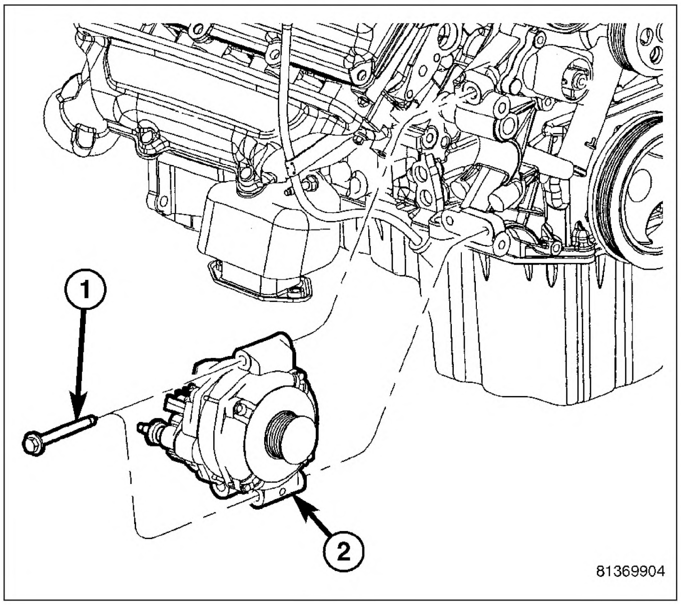
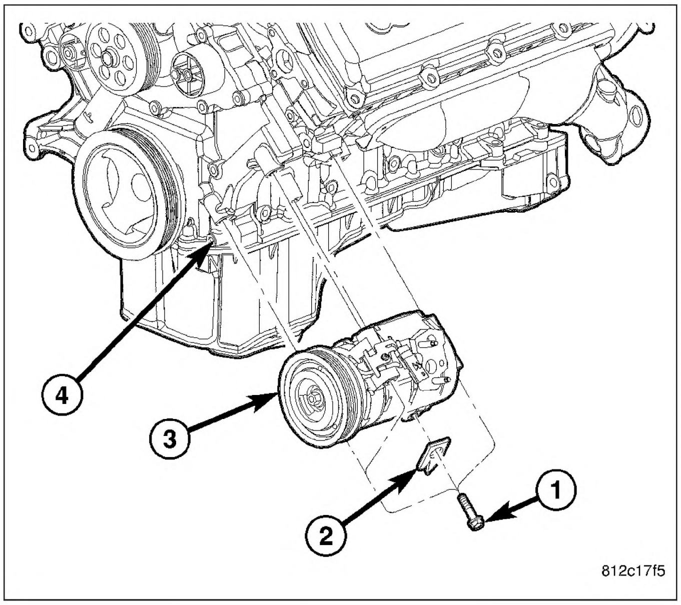
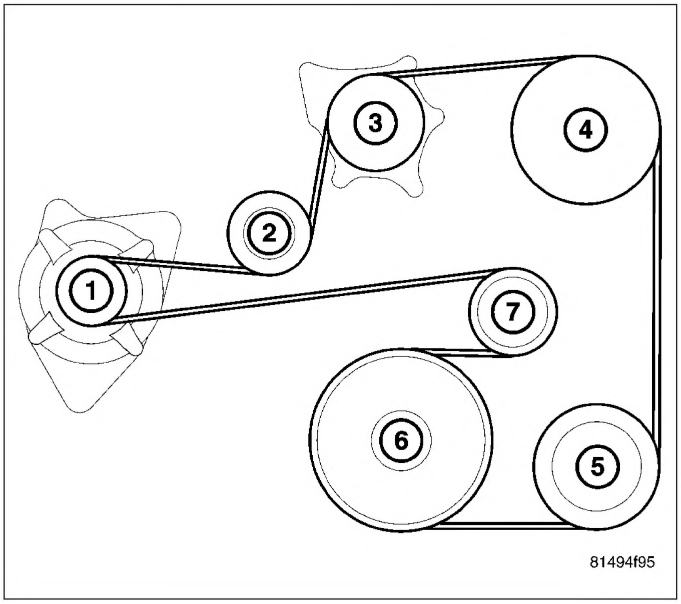
17. Reconnect the ground wires to the rear of each cylinder head.
18. Install the intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)
19. Install the generator (2), and wire connections (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - INSTALLATION).



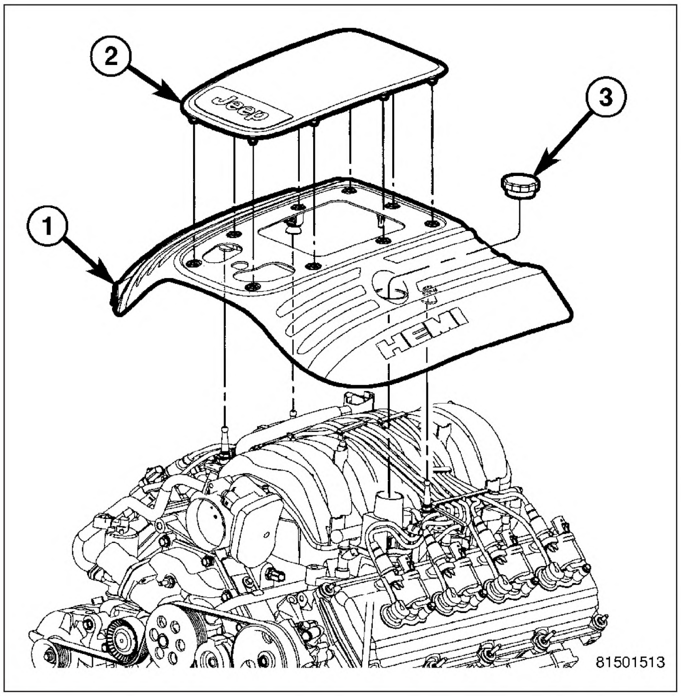
20. Install a/c compressor (3) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - INSTALLATION).



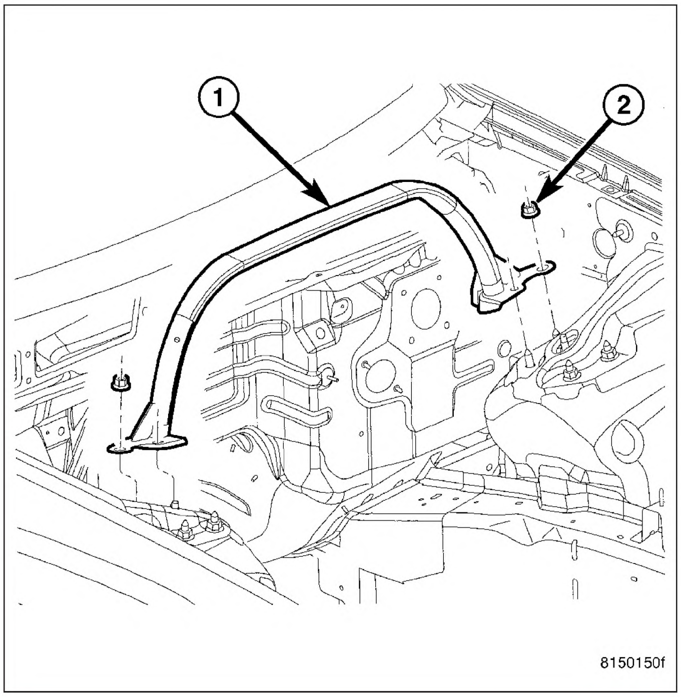
21. Install the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
22. Install the radiator fan shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
23. Connect the radiator lower hose.
24. Connect the transmission oil cooler lines to the radiator.
25. Connect the radiator upper hose.



26. Install the air cleaner resonator and duct work..
27. Add engine oil to crankcase (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - SPECIFICATIONS).
28. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
29. Install the engine cover (1).



30. Install the strut tower support (1).
31. Connect battery negative cable.
32. Start engine and inspect for leaks.
33. Road test vehicle.



SPECIFICATIONS

5.7L ENGINE

GENERAL DESCRIPTION

DESCRIPTION	SPECIFICATION
Engine Type	90° V-8 OHV
Displacement	5.7 Liters 345 (Cubic Inches)
Bore	99.5 mm (3.91 in.)
Stroke	90.9 mm (3.58 in.)
Compression Ratio	9.6:1
Firing Order	1-8-4-3-6-5-7-2
Lubrication	Pressure Feed - Full Flow Filtration
Cooling System	Liquid Cooled - Forced Circulation
Cylinder Block	Cast Iron
Cylinder Head	Aluminum
Crankshaft	Nodular Iron
Camshaft	Hollow Assembled Camshaft
Pistons	Aluminum Alloy
Connecting Rods	Powdered Metal

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Cylinder Bore Diameter	99.50 mm	3.917 in.
Out of Round (MAX)	0.0076 mm	0003 in.
Taper (MAX)	0.0127 mm	0.0005 in.
Lifter Bore Diameter	21.45 - 21.425 mm	0.8444 - 0.8435 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Clearance Measured at 38.0 mm (1.5 in.) Below Deck	0.0215 - 0.0485 mm	0.0008 - 0.0019 in.
Ring Groove Diameter		
Groove #1	89.6 - 89.8 mm	3.527 - 3.535 in.
Groove #2	88.1 - 88.3 mm	3.468 - 3.476 in.
Weight	413 grams	14.56 oz
Piston Length	54.70 - 55.30	2.153 - 2.177 in.
Ring Groove Width		
No. 1	1.51 - 1.54 mm	0.0594 - 0.0606 in
No. 2	1.51 - 1.53 mm	0.0594 - 0.0602 in.
No. 3	3.030 - 3.055 mm	0.1192 - 0.1202 in.

PISTON PINS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Clearance In Piston	0.009 - 0.018 mm	0.00035 - 0.0007 in.
Diameter	24.0 - 24.003 mm	0.9448 - 0.9449 in.
Length	70.53 - 71.03 mm	2.78 - 2.80 in.

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Ring Gap		
Top Compression Ring	0.23 - 0.38 mm	0.0090 - 0.0149 in.
Second Compression Ring	0.35 - 0.60 mm	0.0137 - 0.0236 in.
Oil Control (Steel Rails)	0.15 - 0.66 mm	0.0059 - 0.0259 in.
Side Clearance		
Top Compression Ring	.02 - .068 mm	0.0007 - 0.0026 in.
Second Compression Ring	0.02 - 0.058 mm	0.0007 - 0.0022 in.
Oil Ring (Steel Ring)	.019 - .229 mm	.0007 - .0091 in.

Ring Width		
Top Compression Ring	1.472 - 1.490 mm	0.0579 - 0.0586 in.
Second Compression Ring	1.472 - 1.490 mm	0.0579 - 0.0586 in.
Oil Ring (Steel Rails)	0.447 - 0.473 mm	0.0175 - 0.0186 in.

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Piston Pin Bore Diameter	23.955 - 23.975 mm	0.9431 - 0.9438 in.
Side Clearance	0.10 - 0.35 mm	0.003 - 0.0137 in.

CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Main Bearing Journal Diameter	64.988 - 65.012 mm	2.5585 - 2.5595 in.
Bearing Clearance	0.023 - 0.051 mm	0.0009 - 0.002 in.
Out of Round (MAX)	0.005 mm	0.0002 in.
Taper (MAX)	0.003 mm	0.0001 in.
End Play	0.052 - 0.282 mm	0.002 - 0.011 in.
End Play (MAX)	0.282 mm	0.011 in.
Connecting Rod Journal Diameter	53.992 - 54.008 mm	2.125 - 2.126 in.
Bearing Clearance	0.020 - 0.060 mm	0.0007 - 0.0023 in.
Out of Round (MAX)	0.005 mm	0.0002 in.
Taper (MAX)	0.003 mm	0.0001 in.

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Journal Diameter		
No. 1	58.2 mm	2.29 in.
No. 2	57.8 mm	2.27 in.
No. 3	57.4 mm	2.26 in.
No. 4	57.0 mm	2.24 in.
No. 5	43.633 mm	1.72 in.
Bearing To Journal Clearance Standard		
No. 1	0.040 - 0.080 mm	.0015 - .003 in.
No. 2	0.050 -0.090 mm	0.0019 - .0035 in.
No. 3	0.040 - 0.080 mm	.0015 - .003 in.
No. 4	0.050 - 0.090 mm	0.0019 - .0035 in.
No. 5	0.040 - 0.080 mm	.0015 - .003 in.
Camshaft End Play	.080 - 0.290mm	0.0031 - 0.0114 in.

VALVE TIMING

DESCRIPTION	SPECIFICATION
Intake	
Opens (BTDC)	7.0°
Closes (ATDC)	253.0°
Exhaust	
Opens (BTDC)	233°
Closes (ATDC)	27°
Duration	253.70°
Valve Overlap	34°

CYLINDER HEAD

DESCRIPTION	SPECIFICATION
Valve Seat Angle	44.5° - 45.0°
Valve Seat Runout (MAX)	0.05 mm (0.0019 in.)
Valve Seat Width (Finish)	
Intake	1.018 - 1.62 mm (0.0464 - 0.0637 in.)
Exhaust	1.48 - 1.92 mm (0.0582 - 0.0755 in.)
Guide Bore Diameter (Std.)	7.975 - 8.00 mm (0.313 - 0.314 in.)

HYDRAULIC TAPPETS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Body Diameter	21.387 - 21.405 mm	0.8420 - 0.8427 in.
Clearance (To Bore)	0.020 - 0.063 mm	0.0007 - 0.0024 in.
Dry Lash	3.0 mm (at the valve)	0.1181 in.

VALVES

DESCRIPTION	SPECIFICATION
Face Angle	45.0° - 45.5°
Head Diameter	
Intake	50.67 - 50.93 mm (1.99 - 2.00 in.)
Exhaust	39.27 - 39.53 mm (1.54 - 1.55 in.)
Length (Overall)	
Intake	123.38 - 123.76 mm

DESCRIPTION	SPECIFICATION
	(4.857 - 4.872 in.)
Exhaust	120.475 - 120.855 mm (4.743 - 4.758 in.)
Stem Diameter	
Intake	7.935 - 7.953 mm (0.312 - 0.313 in.)
Exhaust	7.905 - 7.925 mm (0.311 - 0.312 in.)
Stem - to - Guide Clearance	
Intake	0.022 - 0.065 mm (0.0008 - 0.0025 in.)
Exhaust	0.050 - 0.095 mm (0.0019 - 0.0037 in.)
Valve Lift (@ Zero Lash)	
Intake	12.0 mm (0.472 in.)
Exhaust	11.70 mm (0.460 in.)

VALVE SPRING

DESCRIPTION	SPECIFICATION
Spring Force (Valve Closed)	
Intake and Exhaust	418.0 N +/- 30.0 N @ 46 mm (93.0 lbs +/- 7.0 lbs. @ 1.811 in.)
Spring Force (Valve Open) Intake and Exhaust	1077.0 N +/- 47.0 N @ 33.6 mm. (242.0 lbs. +/- 11 lbs. @ 1.322 in.)
Free Length (approx)	57.3 mm (2.256 in.)
Number of Coils	
Intake and Exhaust	7.4
Wire Diameter	
Intake and Exhaust	5.39 × 4.52 mm (0.212 - 0.177 in.)
Installed Height (Spring Seat to Bottom of Retainer)	
Intake and Exhaust	46.0 mm (1.81 in.)

OIL PUMP

DESCRIPTION	SPECIFICATION
Clearance Over Rotors (MAX)	0.095 mm (0.0038 in.)
Outer Rotor to Pump Body Clearance (MAX)	.235 mm (.009 in.)
Tip Clearance Between Rotors (MAX)	0.150 mm (0.006 in.)

OIL PRESSURE

SPECIFICATION	SPECIFICATION
At Curb Idle Speed (MIN)*	25 kPa (4 psi)
@ 3000 rpm	170 - 758 kPa (25 - 110 psi)
*** CAUTION: If pressure is zero at curb idle, DO NOT run engine**	

TORQUE

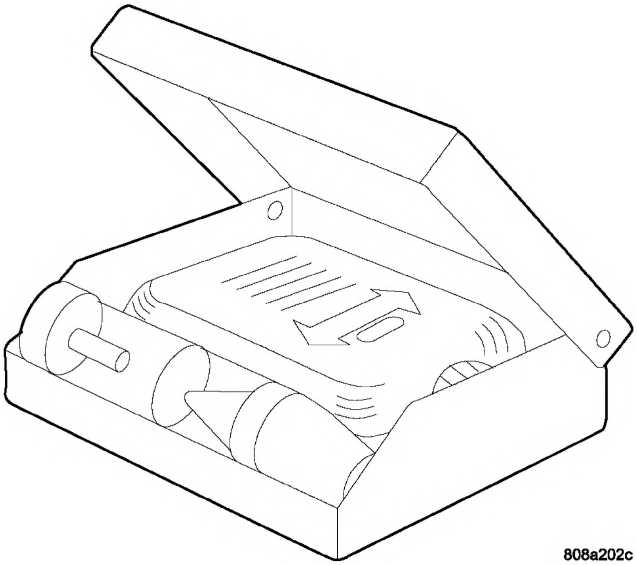
TORQUE CHART 5.7L ENGINE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Block Pipe Plugs (1/4 NPT)	20	—	177
(3/8 NPT)	27	—	240
Camshaft Sprocket—Bolt	122	90	—
Camshaft Tensioner Plate—Bolts	28	—	250
Timing Chain Case Cover—Bolts	28	—	250
Lifting Stud	55	40	—
Connecting Rod Cap—Bolts	21 plus 90° Turn	15 plus 90° Turn	—
Main Bearing Cap—Bolts M-12	27 plus 90° Turn	—	—
Crossbolts M-8	28	—	—
Cylinder Head—Bolts M-12 Bolts			
Step 1	34	25	—
Step 2	54	40	—
Step 3	Turn 90°	Turn 90°	—
M-8 Bolts			—
Step 1	20	15	—
Step 2	34	25	—
Cylinder Head Cover—Bolts	8	—	70
Exhaust Manifold to Cylinder Head	25	—	220
Flexplate to crankshaft—Bolts	95	70	—
Flywheel to crankshaft—Bolts	75	55	—
Front Insulator—Through bolt/nut	95	70	—
Front Insulator to Block—Bolts	95	70	—
Generator—Mounting Bolt	55	40	—
Intake Manifold—Bolts	Refer to Procedure		
Lifter Guide Holder	12	—	106
Oil Pan Bolts	12	-	105
Oil Dipstick Tube	12	—	105
Oil Pan—Drain Plug	27	20	—
Oil Pump—Attaching Bolts	28	—	250

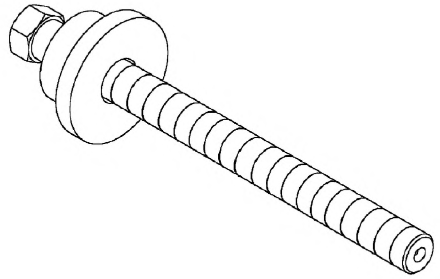
DESCRIPTION	N·m	Ft.	In.
Oil Pump Pickup Tube – Bolt and Nut	28	—	250
Rear Seal Retainer Attaching Bolts	15	—	132
Rear Insulator to Bracket—	68	50	—
Rear Insulator to Crossmember	41	30	—
Rear Insulator to Transmission—	68	50	—
Rear Insulator Bracket—Bolts	68	50	—
Rocker Arm—Bolts	22	—	195
Spark Plugs	—	—	—
Thermostat Housing—Bolts	28	—	250
Throttle Body—Bolts	12	—	105
Vibration Damper—Bolt	176	129	—
Water Pump to Timing Chain Case Cover—Bolts	28	—	250

SPECIAL TOOLS

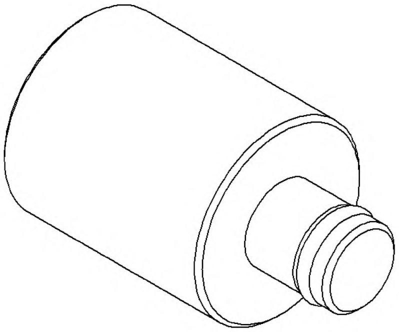
5.7L ENGINE



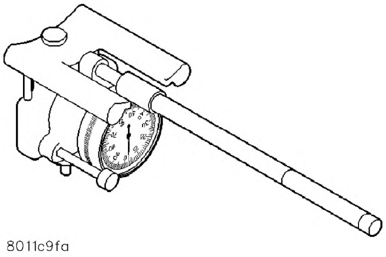
BLOC-CHEK KIT C-3685



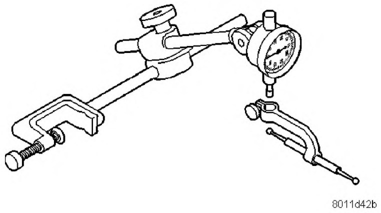
Crankshaft Damper Installer 8512



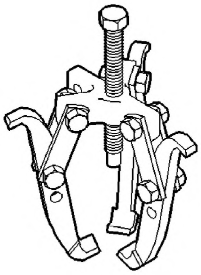
CRANKSHAFT DAMPER REMOVER INSERT - 8513-A



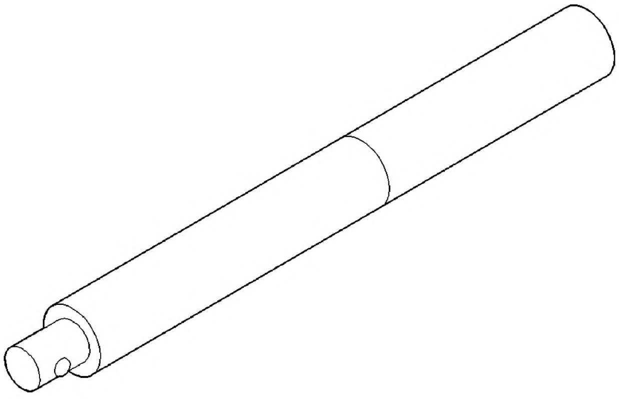
Bore Size Indicator C-119



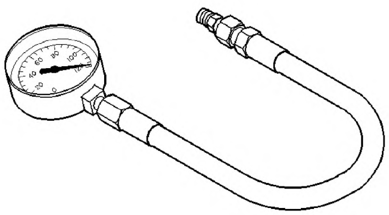
Dial Indicator C-3339



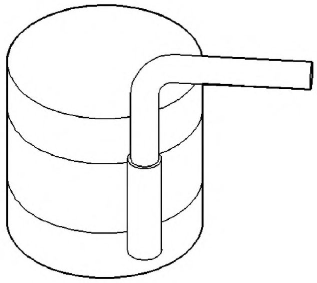
Puller 1023



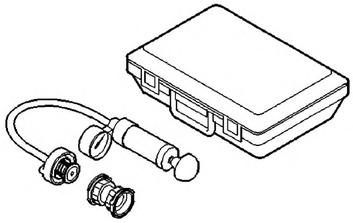
Handle C-4171



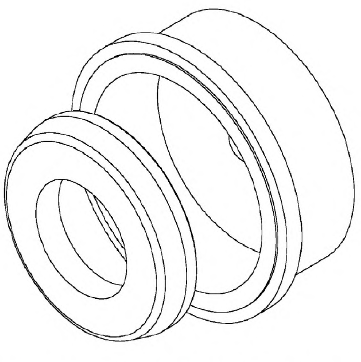
Oil Pressure Gauge C-3292



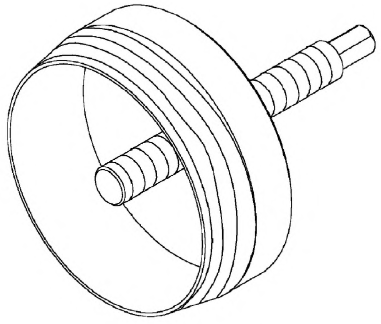
Piston Ring Compressor C-385



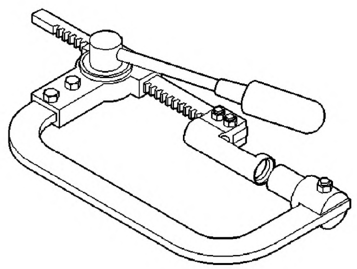
Pressure Tester Kit 7700



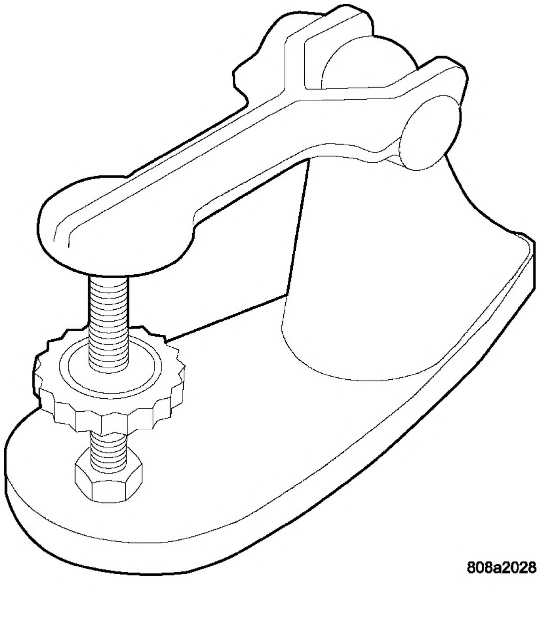
Rear Crankshaft Seal Installer 8349



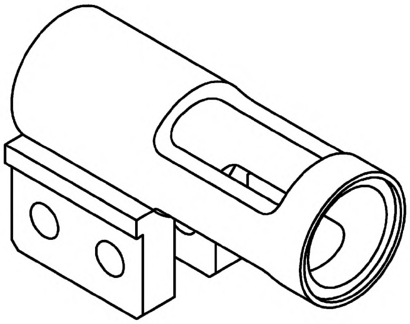
Rear Crankshaft Seal Remover 8506



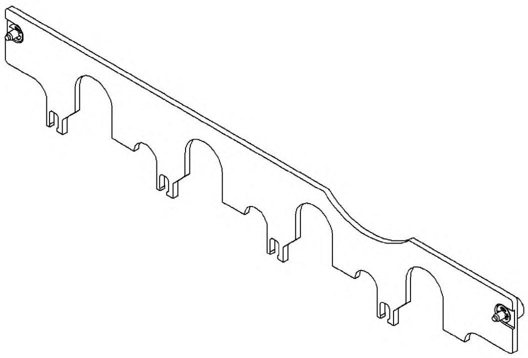
Valve Spring Compressor C-3422-B



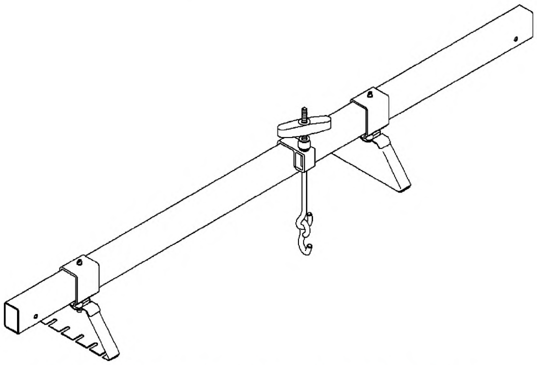
Valve Spring Tester C-647



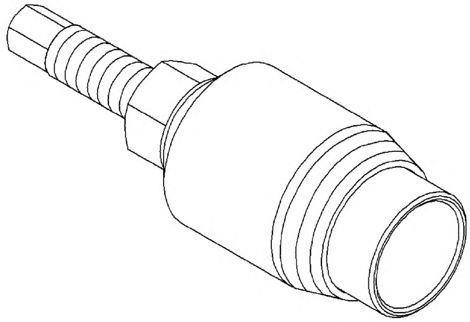
Adapter, Valve Spring Compressor Off-vehicle 8464



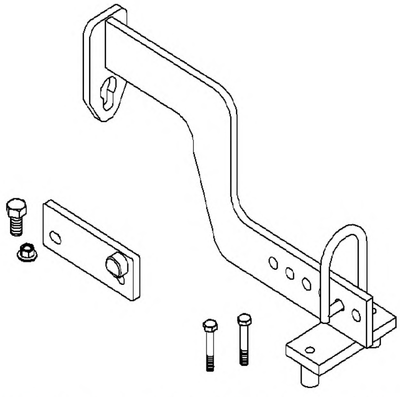
PUSHROD RETAINING PLATE - 9070



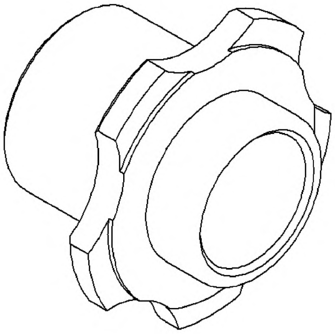
ENGINE SUPPORT FIXTURE 8534



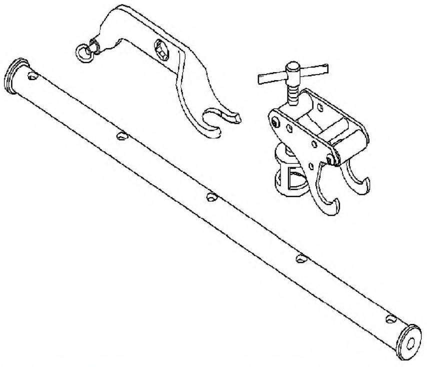
FRONT CRANK SEAL REMOVER - 9071



ENGINE LIFT FIXTURE AND ADAPTER



FRONT CRANK SEAL INSTALLER 9072



VALVE SPRING COMPRESSOR 9065A

AIR INTAKE SYSTEM

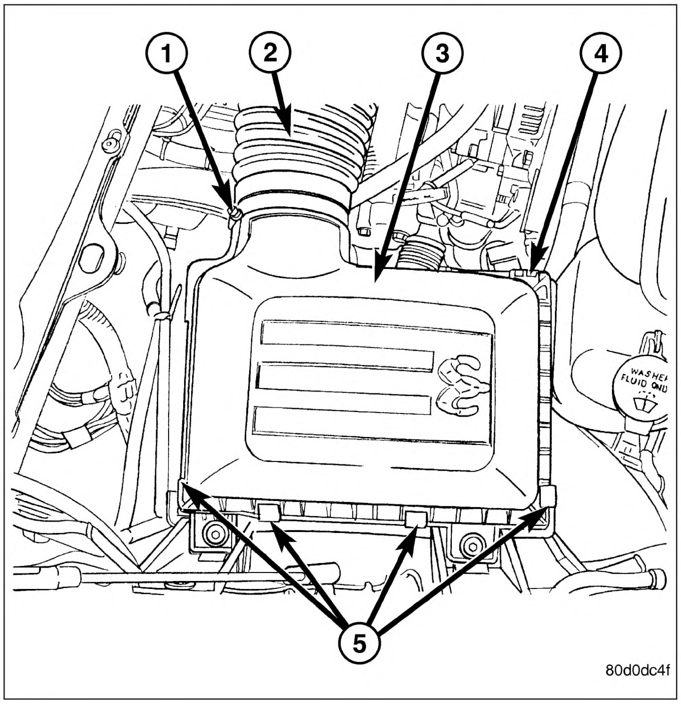
REMOVAL

Filter Element Only

NOTE: Always unplug the Charge Air Temperature sensor before removing the resonater.

Housing removal is not necessary for element (filter) replacement.

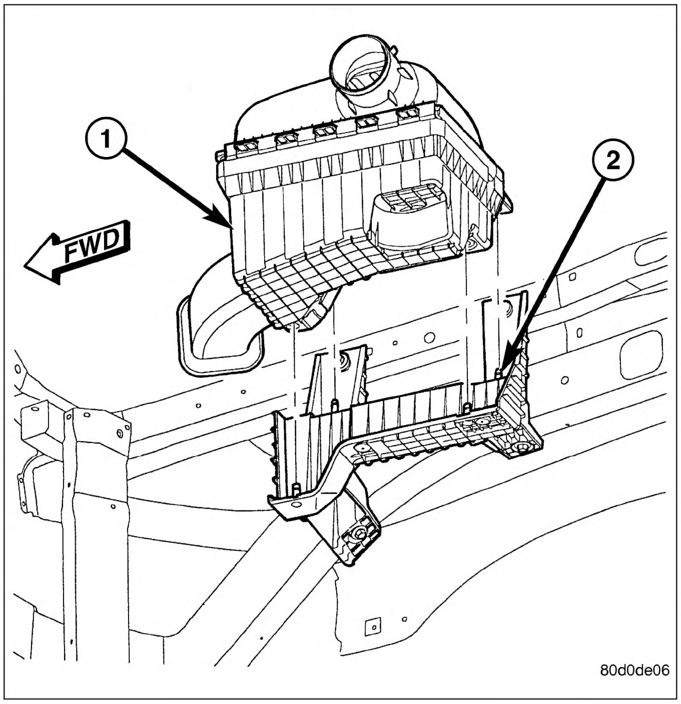
1. Loosen clamp (1) and disconnect air duct (2) at air cleaner cover.
2. Pry over 4 spring clips (5) from housing cover (3) (spring clips retain cover to housing).
3. Release housing cover from locating tabs on housing and remove cover.
4. Remove air cleaner element (filter) from housing.
5. Clean inside of housing before replacing element.



Housing Assembly

NOTE: Always unplug the Charge Air Temperature sensor before removing the resonater.

1. Loosen clamp and disconnect air duct at air cleaner cover.
2. Lift entire housing assembly (1)from 4 locating pins (2).



INSTALLATION

1. Install filter element into housing.
2. Position housing cover into housing locating tabs.
3. Pry up 4 spring clips and lock cover to housing.
4. Install air duct to air cleaner cover and tighten hose clamp to 3 N·m (30 in. lbs.) torque.
5. If any other hose clamps were removed from air intake system, tighten them to 3.4 N·m (30 in. lbs.) torque.
6. If any bolts were removed from air resonator housing or air intake tubing, tighten them to 4.5 N·m (40 in. lbs.) torque.

CYLINDER HEAD

OPERATION—CYLINDER HEAD

The cylinder head closes the combustion chamber allowing the pistons to compress the air fuel mixture to the correct ratio for ignition. The valves located in the cylinder head open and close to either allow clean air into the combustion chamber or to allow the exhaust gases out, depending on the stroke of the engine.

DIAGNOSIS AND TESTING - CYLINDER HEAD GASKET FAILURE

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

- Possible indications of the cylinder head gasket leaking between adjacent cylinders are:
  - Loss of engine power
  - Engine misfiring
  - Poor fuel economy
- Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:
  - Engine overheating
  - Loss of coolant
  - Excessive steam (white smoke) emitting from exhaust
  - Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test in this section. An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

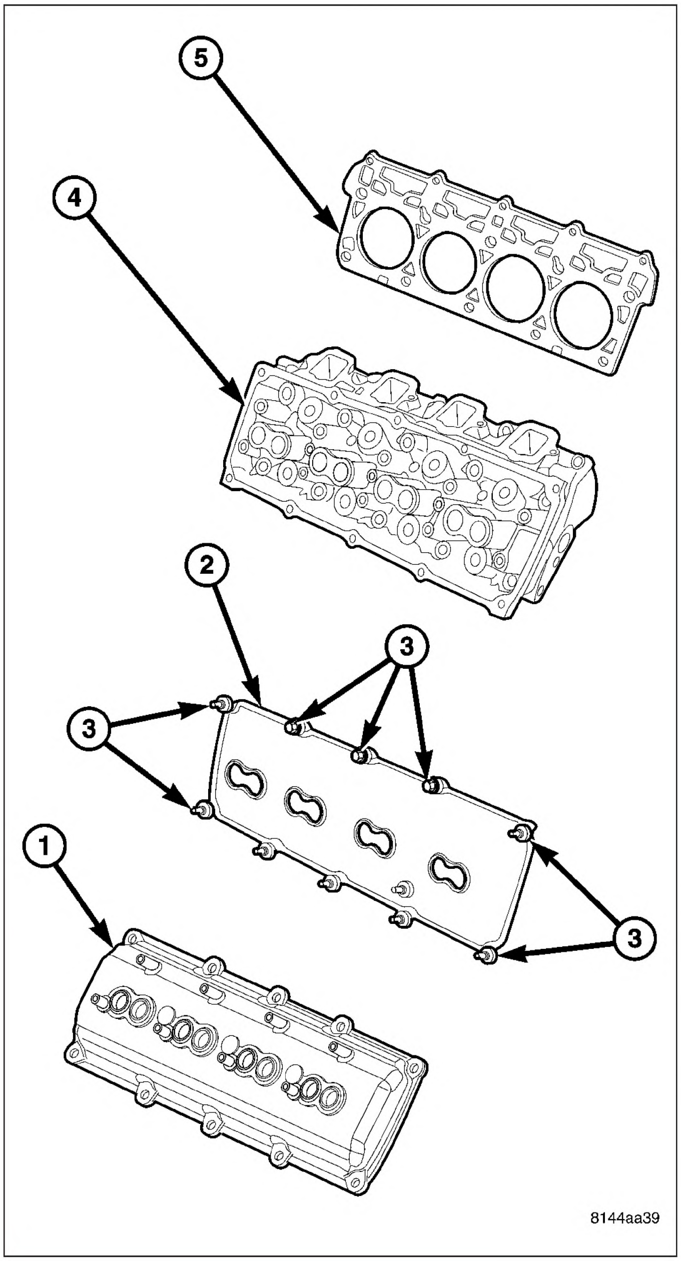
WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

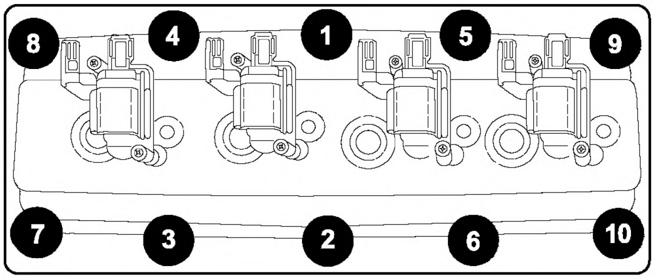
CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL



1. Perform the Fuel System Pressure Release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE). Disconnect the fuel supply line (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE).
2. Disconnect the battery negative cable.
3. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
4. Remove the air cleaner resonator and duct work (Refer to 9 - ENGINE/AIR INTAKE SYSTEM - REMOVAL).
5. Remove closed crankcase ventilation system.
6. Disconnect the exhaust at the exhaust manifolds.
7. Disconnect the evaporation control system.
8. Disconnect heater hoses.
9. Remove the power steering pump.
10. Remove cylinder head covers (1), using the sequence provided, and gaskets (2). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)
    .



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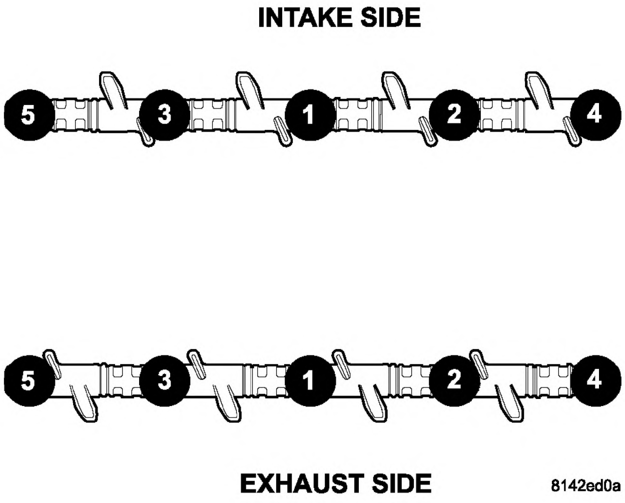
11. Remove intake manifold and throttle body as an assembly. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
12. Remove rocker arm assemblies and push rods. Identify to ensure installation in original locations. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL).



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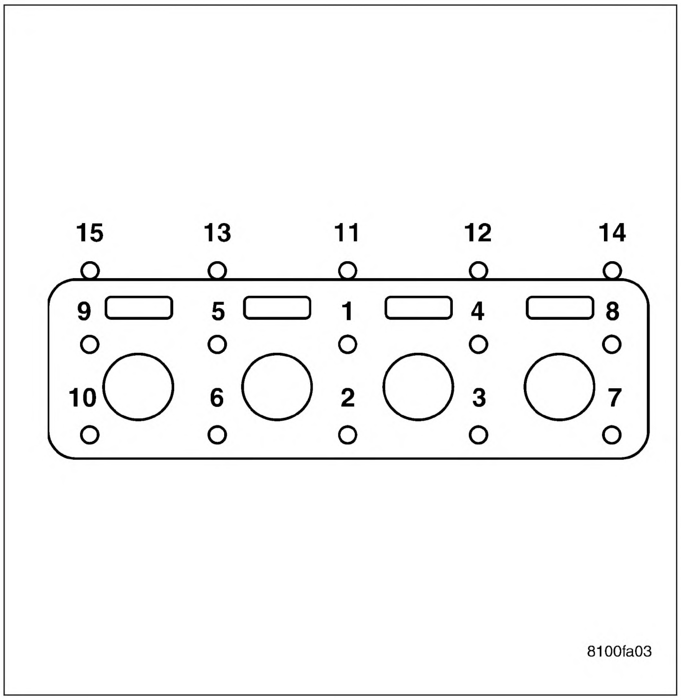
13. Remove the head bolts from each cylinder head, using the sequence provided, and remove cylinder heads. Discard the cylinder head gasket.



CLEANING

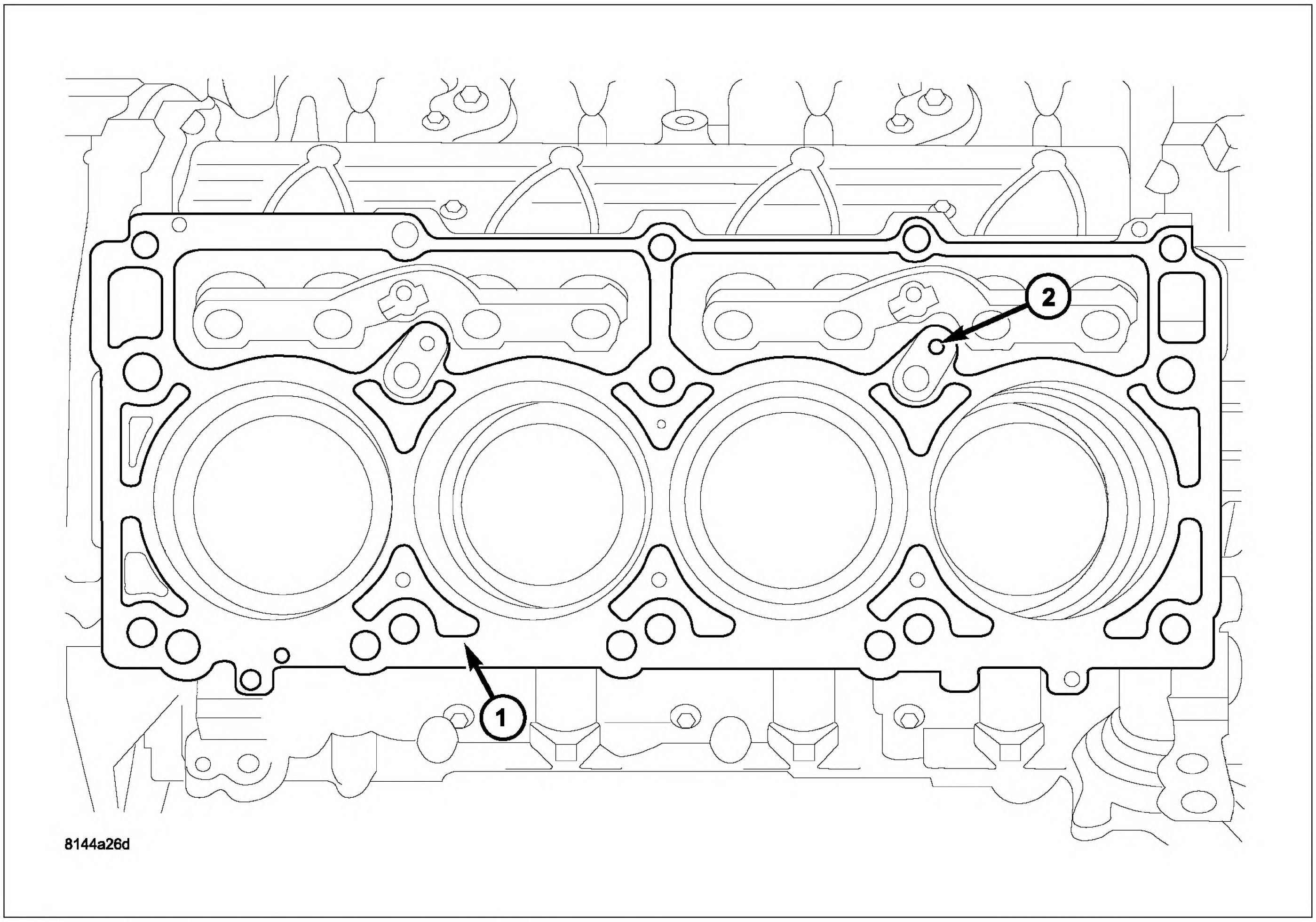
Clean all surfaces of cylinder block and cylinder heads.

Clean cylinder block front and rear gasket surfaces using a suitable solvent.

INSPECTION

1. Inspect the cylinder head for out-of-flatness, using a straightedge and a feeler gauge. If tolerances exceed 0.0508 mm (0.002 in.) replace the cylinder head.
2. Inspect the valve seats for damage. Service the valve seats as necessary.
3. Inspect the valve guides for wear, cracks or looseness. If either condition exist, replace the cylinder head.
4. Inspect pushrods. Replace worn or bent pushrods.

INSTALLATION

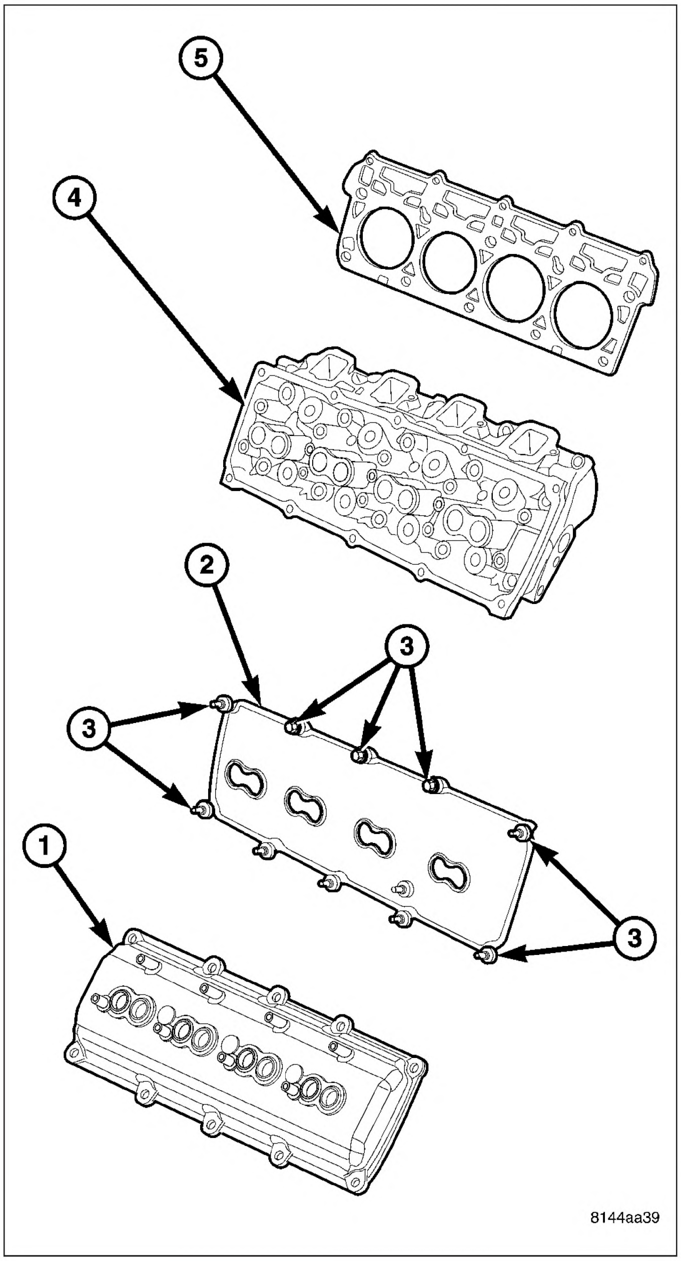


1. Clean all surfaces of cylinder block and cylinder heads.
2. Clean cylinder block front and rear gasket surfaces using a suitable solvent.

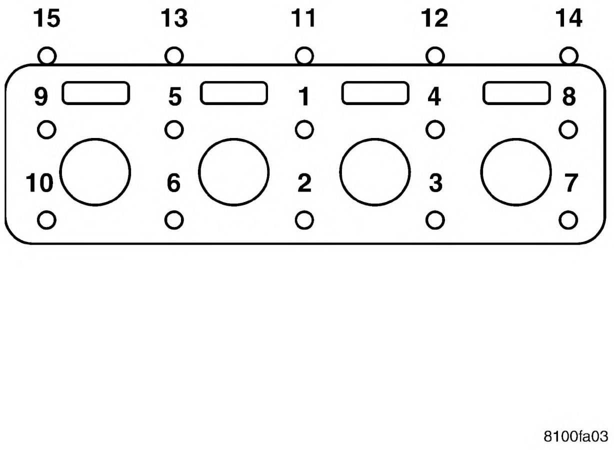
CAUTION: The head gaskets (1) are not interchangeable between left and right sides. They are marked "L" and "R" to indicate left and right sides.

CAUTION: The head gaskets (1) are marked "TOP" to indicate which side goes up.

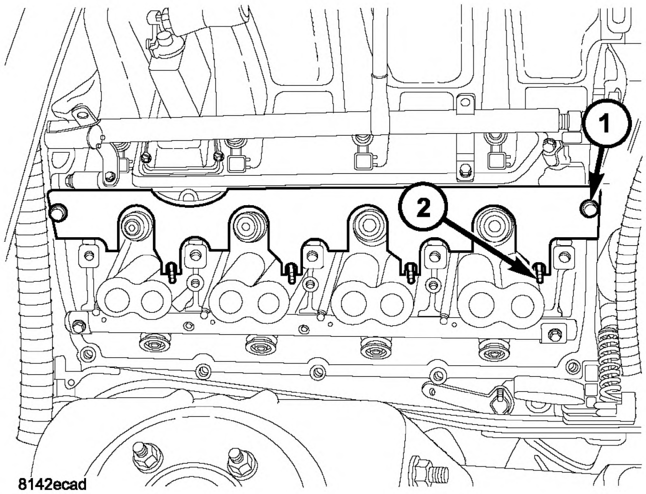
3. Position new cylinder head gaskets (5) onto the cylinder block.
4. Position cylinder heads (4) onto head gaskets (5) and cylinder block.

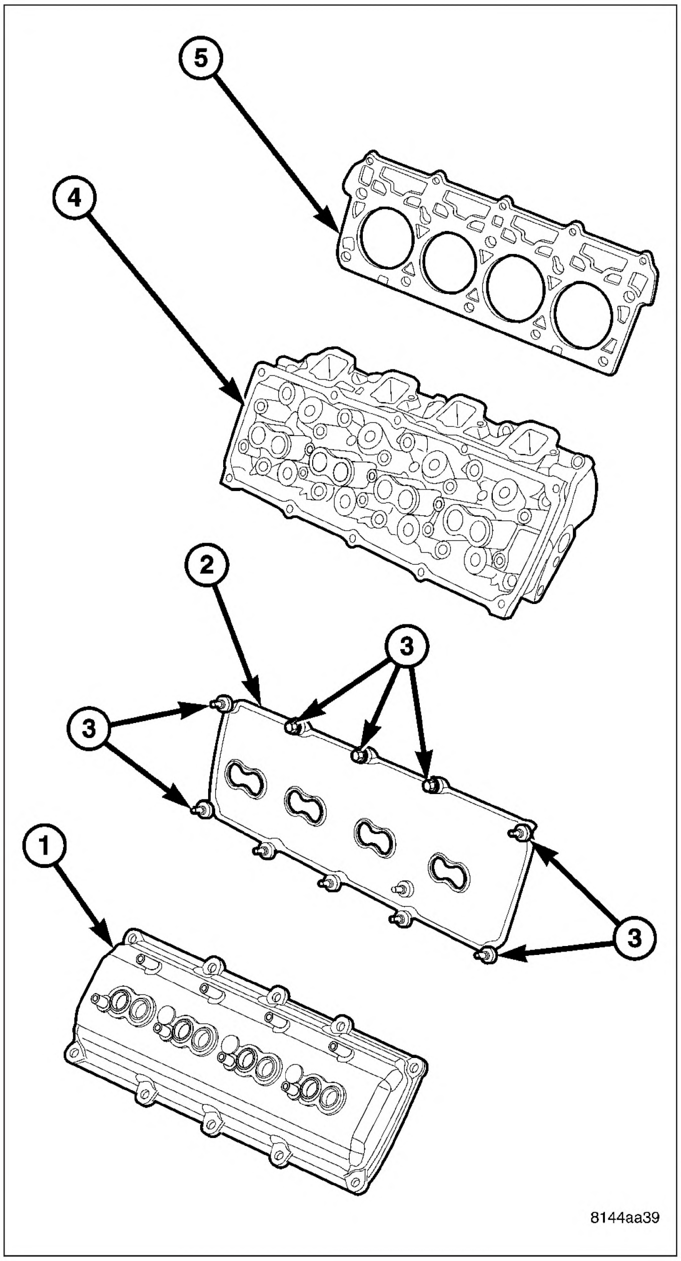


5. Tighten the cylinder head bolts in three steps using the sequence provided :
   - Step 1— Snug tighten M12 cylinder head bolts, in sequence, to 34 N·m (25 ft. lbs.) and M8 bolts to 20 N·m (15 ft. lbs.) torque.
   - Step 2— Tighten M12 cylinder head bolts, in sequence, to 54 N·m (40 ft. lbs.) and verify M8 bolts to 20 N·m (15 ft. lbs.) torque..
   - Step 3— Turn M12 cylinder head bolts, in sequence, 90 degrees and tighten M8 bolts to 34 N·m (25 ft. lbs.) torque.



6. Install push rods and rocker arm assemblies in their original position, using pushrod retaining plate (1) special tool# 9070. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION).
7. Install the intake manifold and throttle body assembly (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
8. If required, adjust spark plugs to specifications. Install the plugs.
9. Connect the heater hoses.
10. Install the fuel supply line.
11. Install the power steering pump.
12. Install the drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

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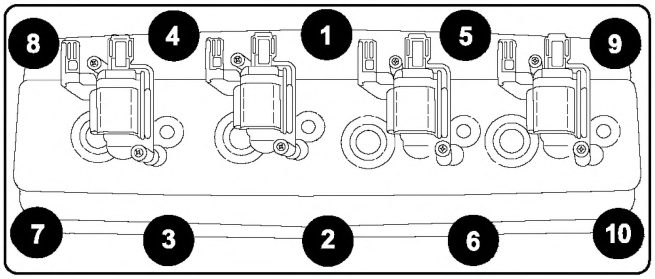
13. Install cylinder head covers (1) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
14. Connect the evaporation control system.
15. Install the air cleaner (Refer to 9 - ENGINE/AIR INTAKE SYSTEM - INSTALLATION).
16. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
17. Connect the negative cable to the battery.
18. Start engine check for leaks.



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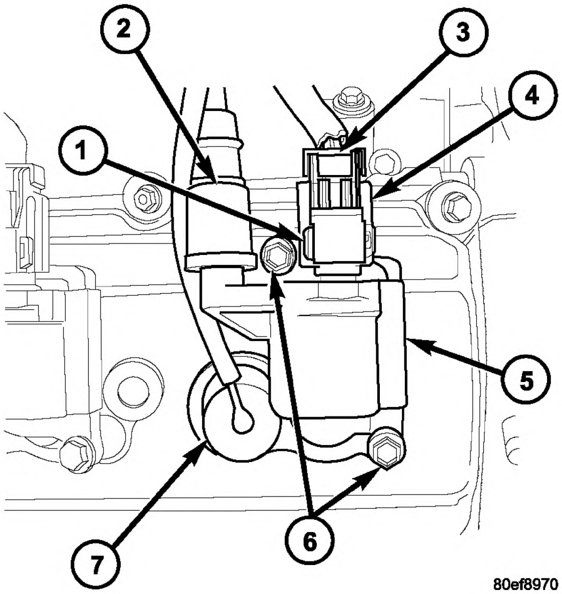
COVER-CYLINDER HEAD

REMOVAL

1. Disconnect battery negative cable.
2. Disconnect coil on plug connectors (4).



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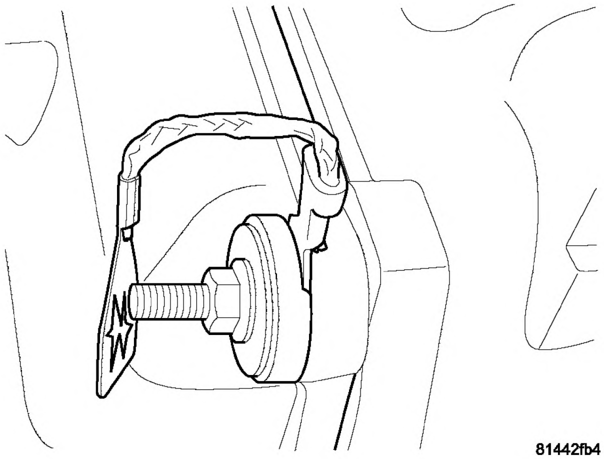
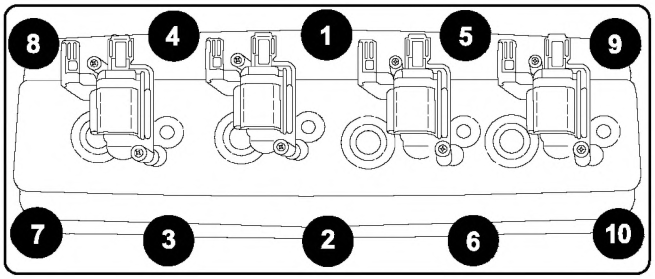
CAUTION: The ground straps must be installed in the same location as removed. The covers are machined to accept the ground straps in those locations only.



3. Remove cylinder head cover retaining bolts, and ground straps.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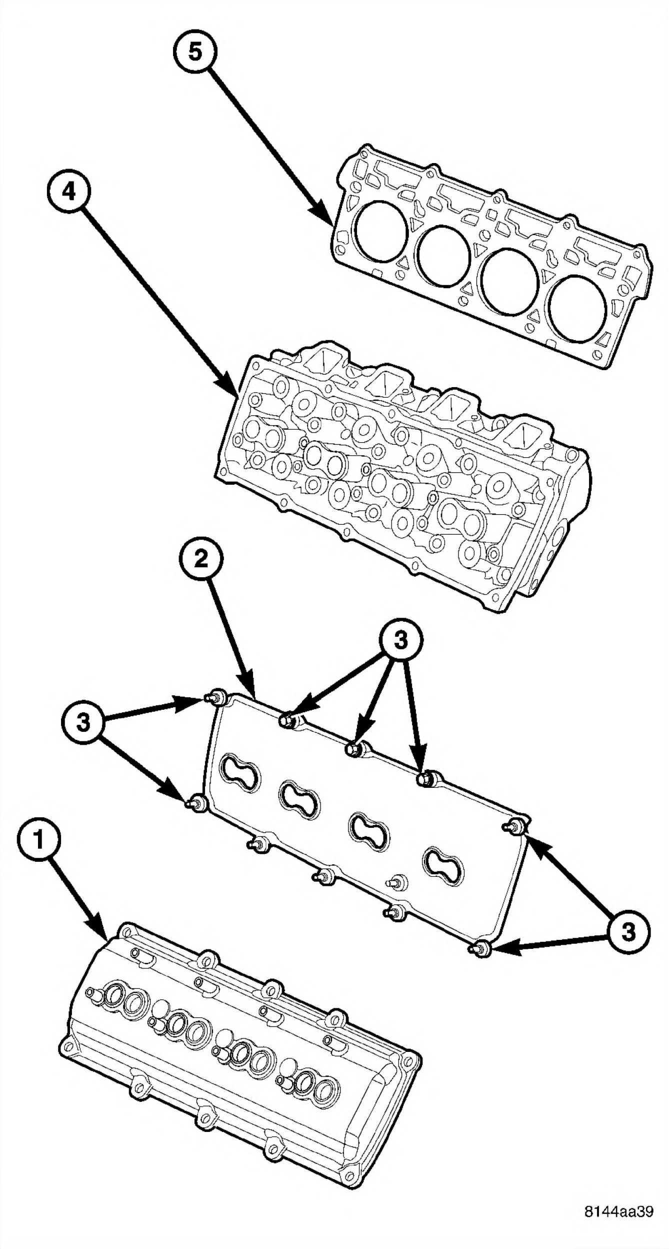
4. Remove cylinder head cover (1).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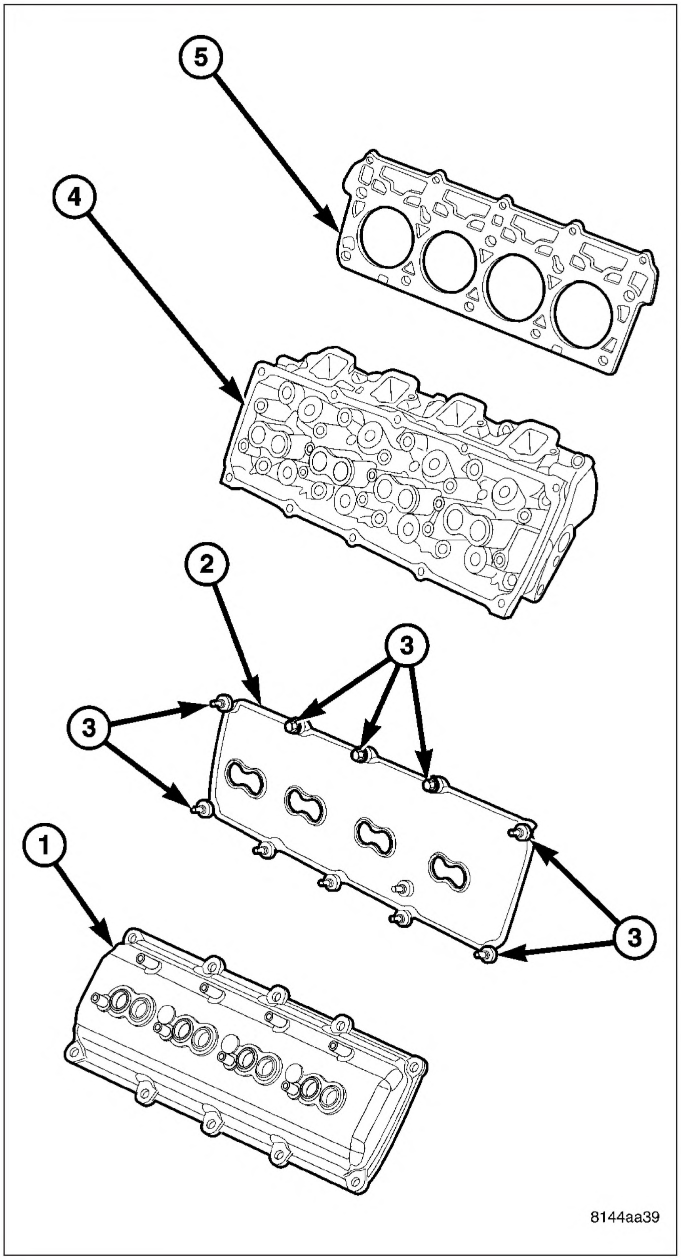
NOTE: The gasket (2) may be used again, provided no cuts, tears, or deformation has occurred.

INSTALLATION

CAUTION: Do not use harsh cleaners to clean the cylinder head covers. Severe damage to covers may occur.

CAUTION: DO NOT allow other components including the wire harness to rest on or against the engine cylinder head cover. Prolonged contact with other objects may wear a hole in the cylinder head cover.

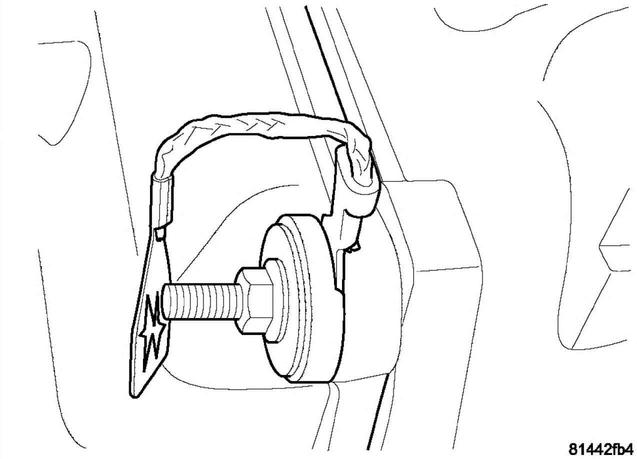
1. Clean cylinder head cover (1) and both sealing surfaces (1,4,). Inspect and replace gasket (2) as necessary.



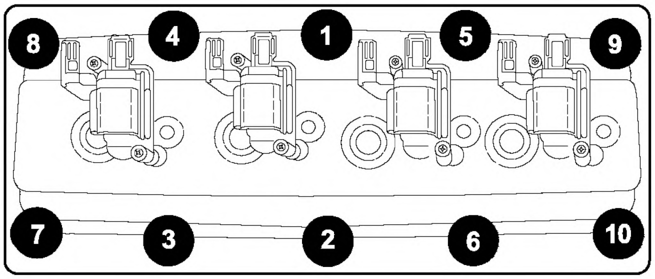
2. Install cylinder head cover and hand start all fasteners. Verify that all double ended studs are in the correct location and install left and right ground straps.

CAUTION: The ground straps must be installed in the same location as removed. The covers are machined to accept the ground straps in those locations only.

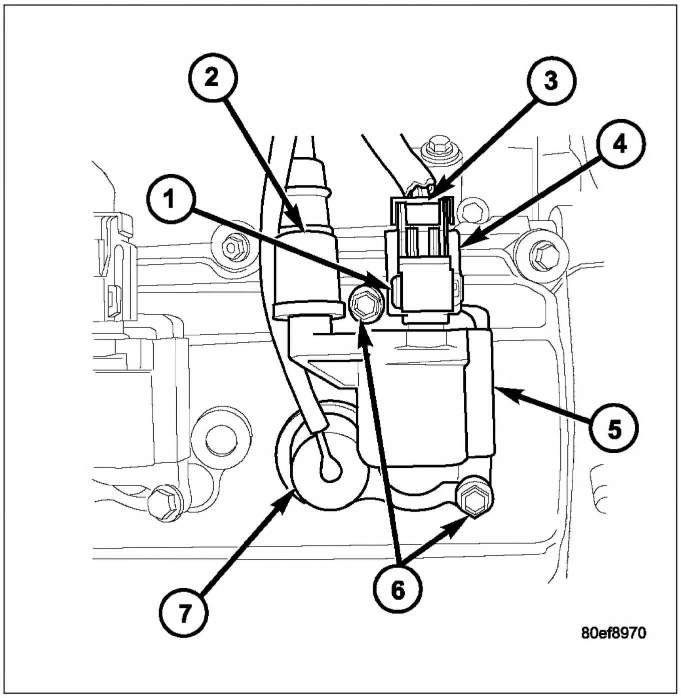
NOTE: The right hand ground strap is located on the front inboard stud. The left hand ground strap is located on the rear inboard stud.



3. Tighten cylinder head cover bolts and double ended studs to 8 N·m (70 in. lbs). Begin torque sequence in the middle of head cover and torque bolts moving outward in a crisscross pattern from top to bottom.



4. Install ignition coil on plug (5) , and torque fasteners (6) to 12 N·m (105 in. lbs)
5. Connect, ignition coil electrical connectors (4).
6. Install PCV hose.
7. Connect battery negative cable.



VALVES & SEATS - INTAKE/EXHAUST

DESCRIPTION

DESCRIPTION - VALVE GUIDES

The valve guides are made of powered metal and are pressed into the cylinder head. The guides are not replaceable or serviceable, and valve guide reaming is not recommended. If the guides are worn beyond acceptable limits, replace the cylinder heads.

DESCRIPTION

Both the intake and exhaust valves are made of steel. The intake valve is 50.93 mm (2.00 inches) in diameter and the exhaust valve is 39.53 mm (1.55 inches) in diameter. All valves use three bead lock keepers to retain the springs and promote valve rotation.

STANDARD PROCEDURE - REFACING

NOTE: Valve seats that are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise the cylinder head must be replaced.

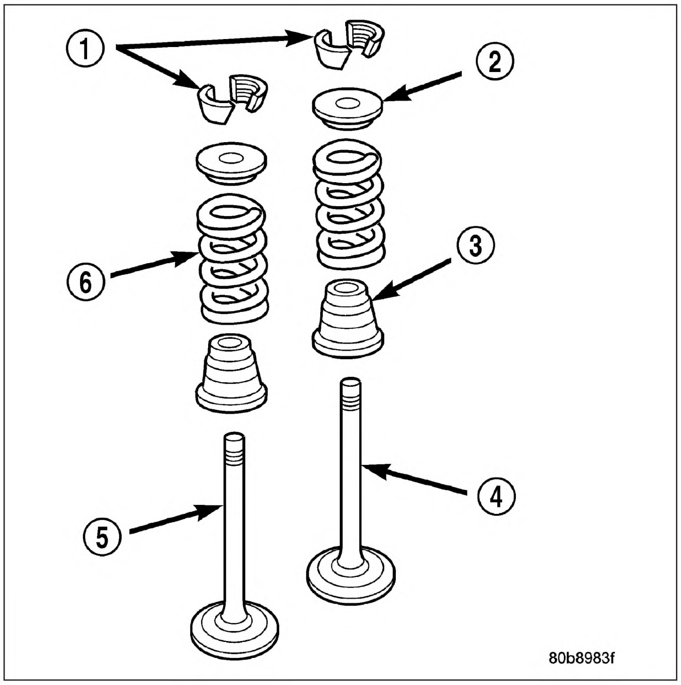
NOTE: When refacing valves and valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

1. Using a suitable dial indicator measure the center of the valve seat Total run out must not exceed 0.051 mm (0.002 in).
2. Apply a small amount of Prussian blue to the valve seat, insert the valve into the cylinder head, while applying light pressure on the valve rotate the valve. Remove the valve and examine the valve face. If the blue is transferred below the top edge of the valve face, lower the valve seat using a 15 degree stone. If the blue is transferred to the bottom edge of the valve face, raise the valve seat using a 65 degree stone.
3. When the seat is properly positioned the width of the intake seat must be 1.018 - 1.62 mm (0.0464 - 0.0637 in.) and the exhaust seat must be 1.48 - 1.92 mm (0.058 - 0.075 in.).
4. Check the valve spring installed height after refacing the valve and seat. The installed height for both intake and exhaust valve springs must not exceed 46.0 mm (1.81 in.).

VALVE FACE AND VALVE SEAT ANGLE CHART

DESCRIPTION	SPECIFICATION
SEAT WIDTH	
INTAKE	1.018 - 1.62 mm (0.0464 - 0.0637 in.)
EXHAUST	1.48 - 1.92 mm (0.058 - 0.075 in.)
FACE ANGLE (INT. AND EXT.)	45° - 45½°
SEAT ANGLE (INT. AND EXT.)	44½° - 45°

5. The valve seat must maintain an angle of 44.5 – 45.0 degrees angle.
6. The valve face must maintain a face angle of 45.0 – 45.5 degrees angle.



REMOVAL

1. Remove the cylinder head (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).
2. Compress valve springs using Valve Spring Compressor Tool special tool # C-3422and adapter 8464.
3. Remove valve retaining locks, valve spring retainers, valve stem seals and valve springs.
4. Before removing valves, remove any burrs from valve stem lock grooves to prevent damage to the valve guides. Identify valves to ensure installation in original location.

INSTALLATION

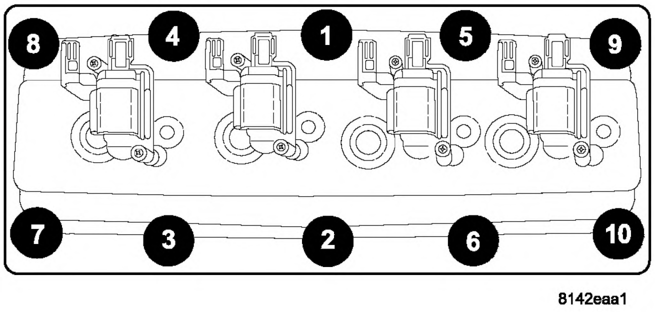
1. Clean valves thoroughly. Discard burned, warped and cracked valves.
2. Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.
3. Measure valve stems for wear. If wear exceeds 0.051 mm (0.002 inch), replace the valve.
4. Coat valve stems with lubrication oil and insert them in cylinder head.
5. If valves or seats are reground, check valve stem height. If valve is too long, replace cylinder head.
6. Install new seals on all valve guides. Install valve springs and valve retainers.

7. Compress valve springs with Valve Spring Compressor Tool special tool # C- 3422and adapter 8464, install locks and release tool. If valves and/or seats are ground, measure the installed height of springs. Make sure the measurement is taken from bottom of spring seat in cylinder head to the bottom surface of spring retainer.
8. Install cylinder head (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).

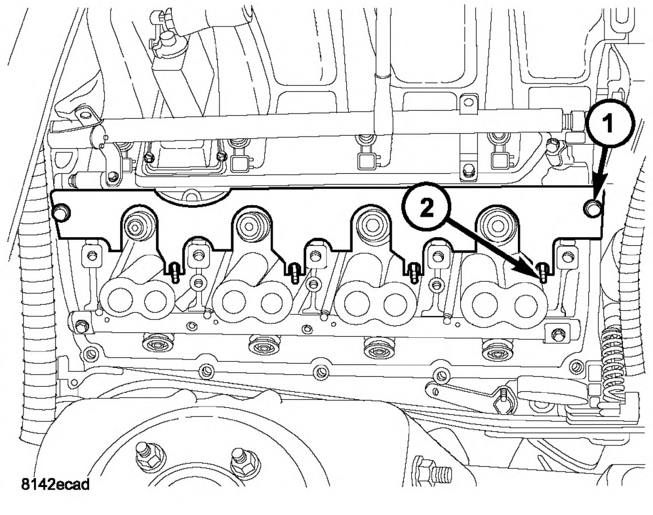
ROCKER ARM

REMOVAL

1. Remove cylinder head cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).



2. Install pushrod retaining plate (1)special tool 9070.



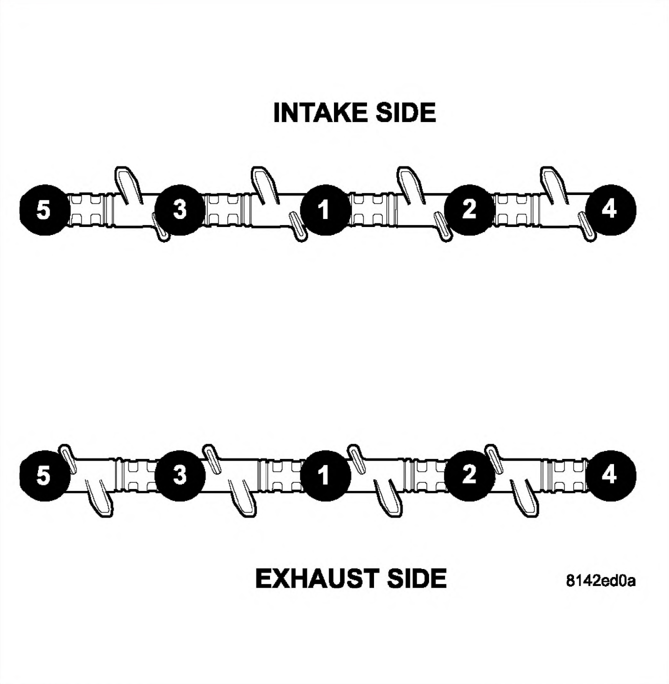
3. Loosen the rocker shafts using the sequence provided.

CAUTION: The rocker shaft assemblies are not interchangeable between intake and exhaust. The intake rocker arms are marked with an “I”.

4. Remove the rocker shafts. Note location for reassembly.

CAUTION: The longer push rods are for the exhaust side, and the shorter push rods are for intake side.

5. Remove the pushrods. Note pushrod location for reassembly.


INTAKE SIDE
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EXHAUST SIDE
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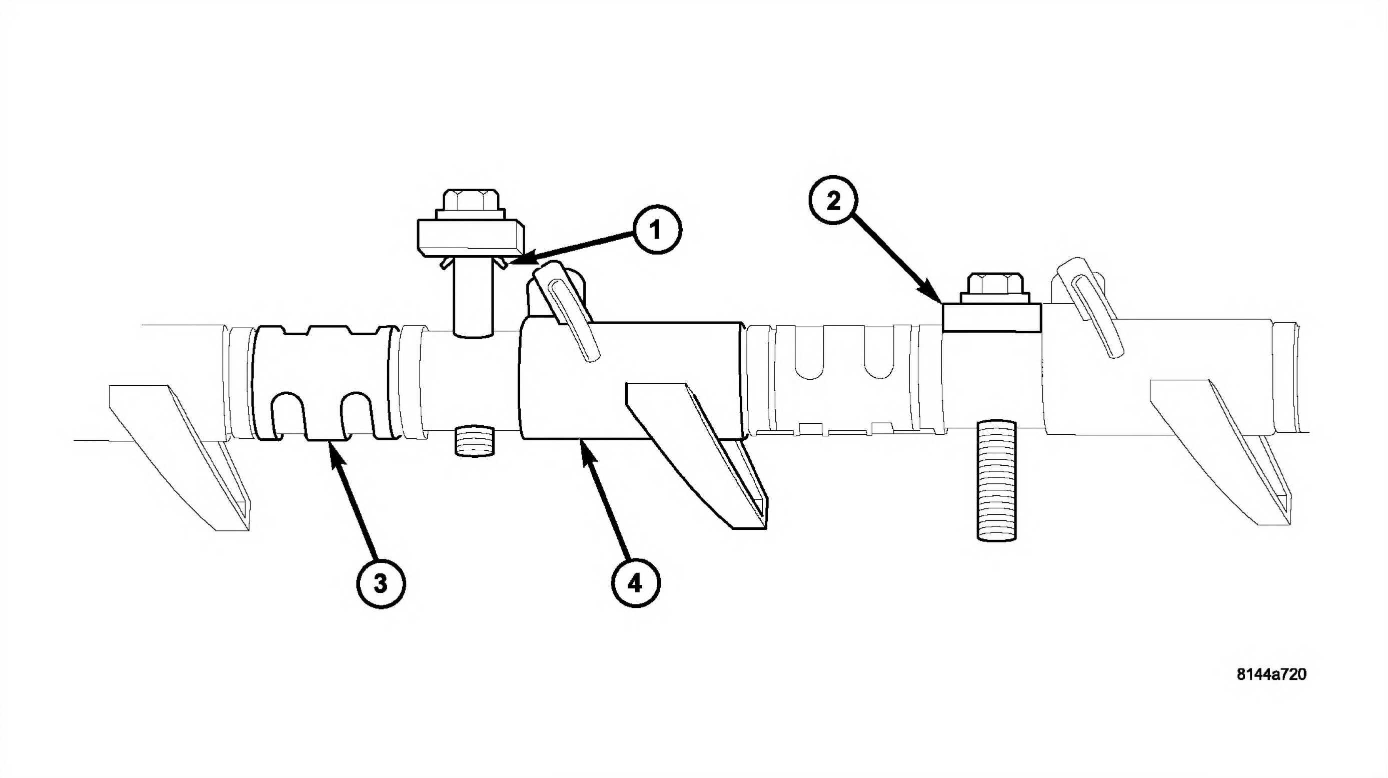
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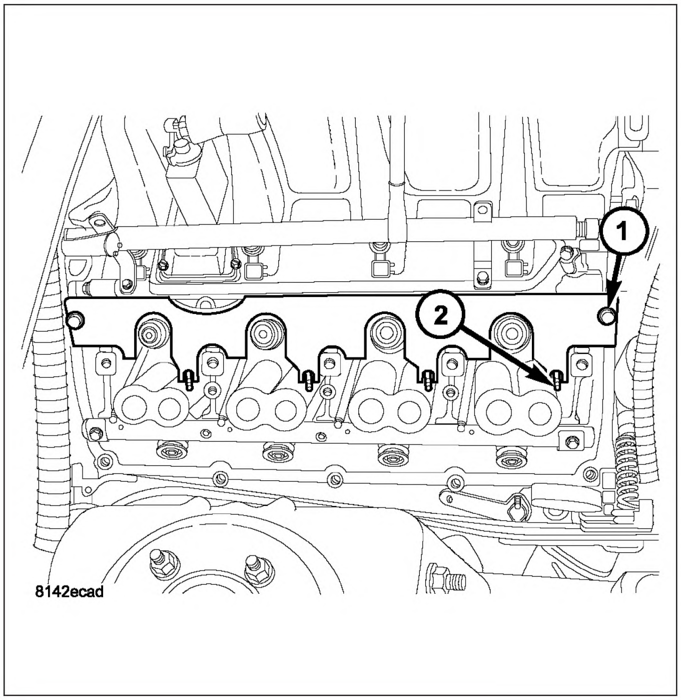
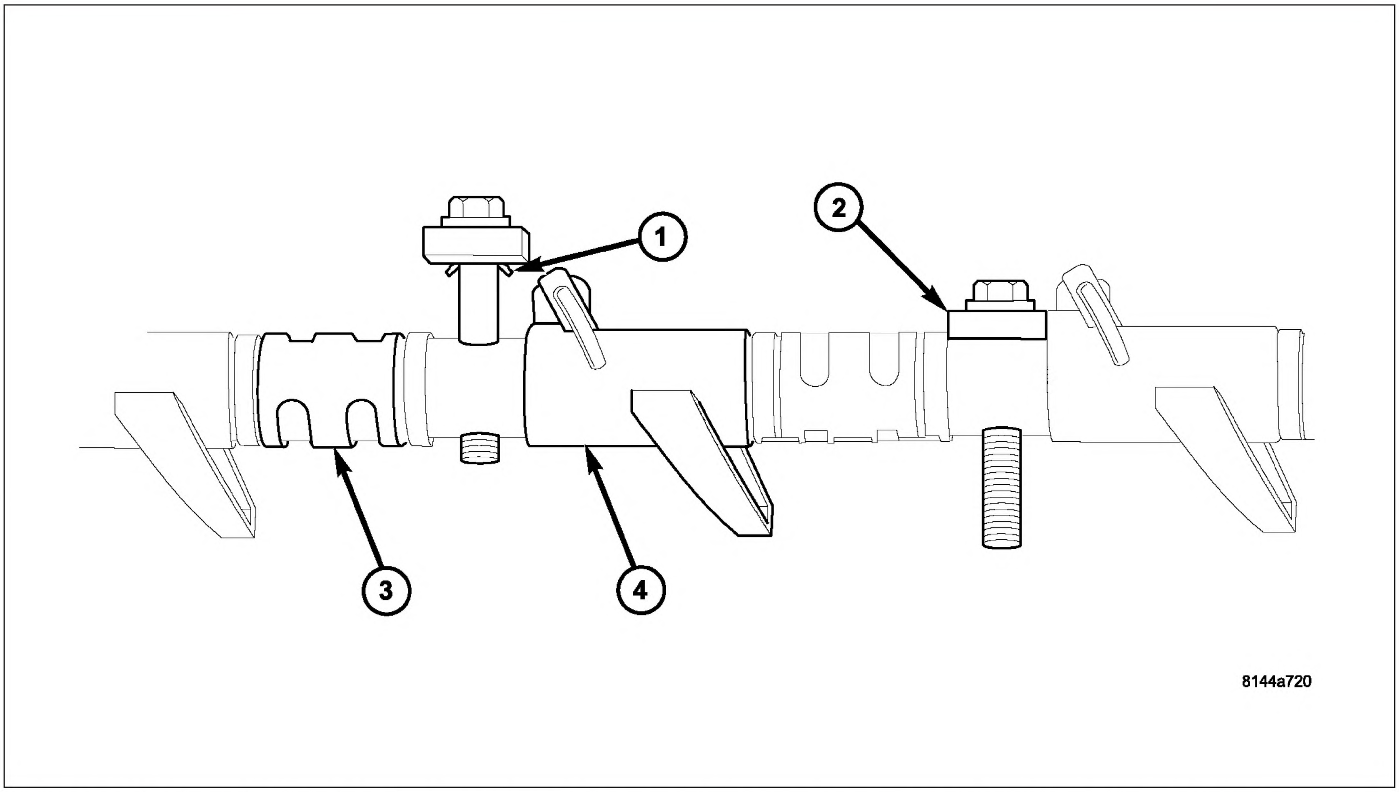
CAUTION: Do not remove the retainers from the rocker shaft. The assembly tangs (1) at the bottom of the retainers (2) can be damaged, causing the assembly tangs to break off, and get into the engine.

INSTALLATION

CAUTION: The longer push rods are for the exhaust side, and the shorter push rods are for intake side.

1. Install the push rods in the same order as removed.
2. Install the pushrod retaining plate (1) special tool 9070.





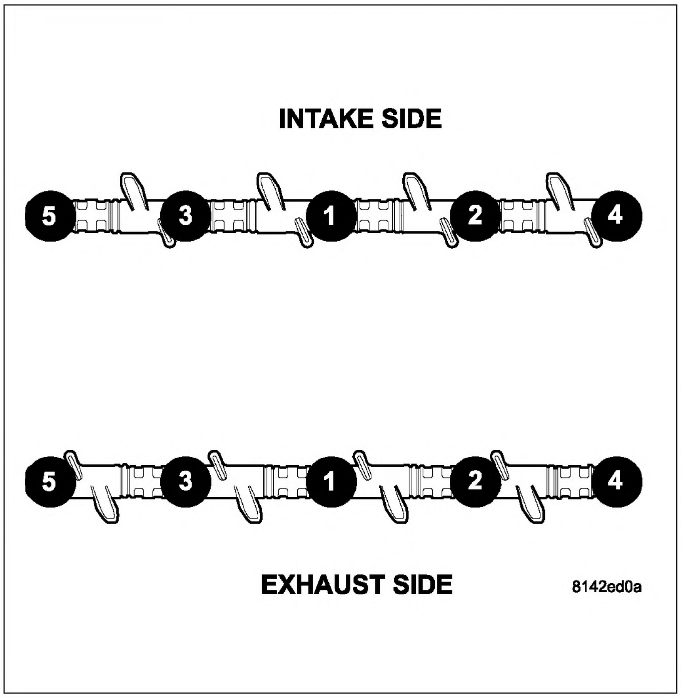
CAUTION: Ensure that retainers (2) and rocker arms (4) are not overlapped when torquing bolts.

CAUTION: Verify that pushrod is installed into rocker arm (4) and tappet correctly while installing rocker shaft assembly. Recheck after rocker shaft has been torqued to specification.

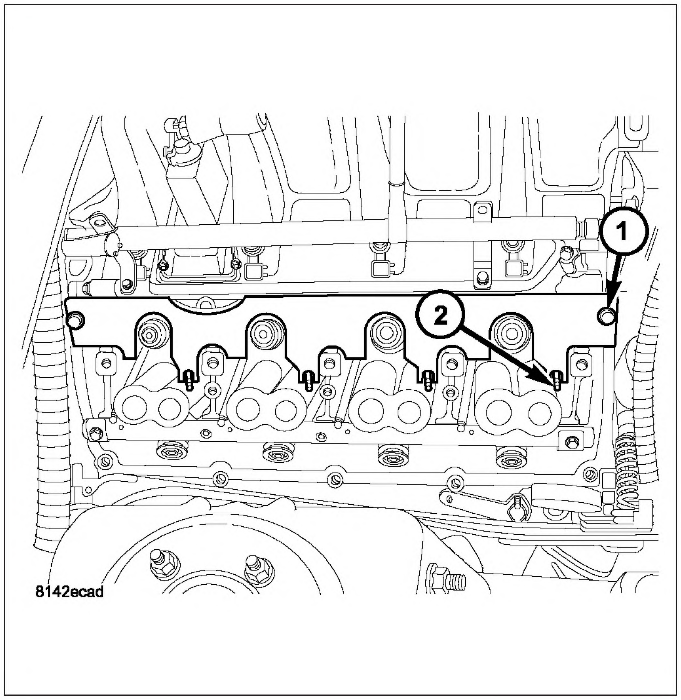
CAUTION: The rocker shaft assemblies are not interchangeable between intake and exhaust. The intake rocker arms are marked with the letter "I".

3. Install rocker shaft assemblies in the same order as removed.
4. Tighten the rocker shaft bolts to 22 N·m (195 in. lbs.) torque,using the sequence provided.

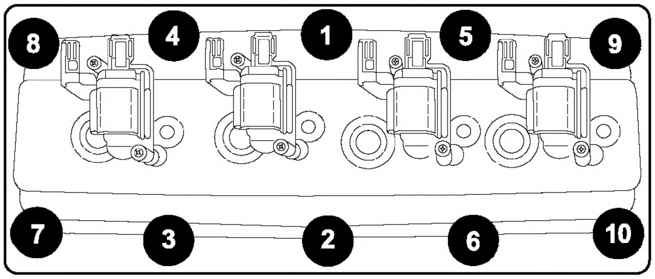
CAUTION: DO NOT rotate or crank the engine during or immediately after rocker arm installation. Allow the hydraulic roller tappets adequate time to bleed down (about 5 minutes).



5. Remove pushrod retaining plate (1) special tool 9070.



6. Install cylinder head cover (Refer to 9 - ENGINE/ CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).



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SEALS-VALVE GUIDE

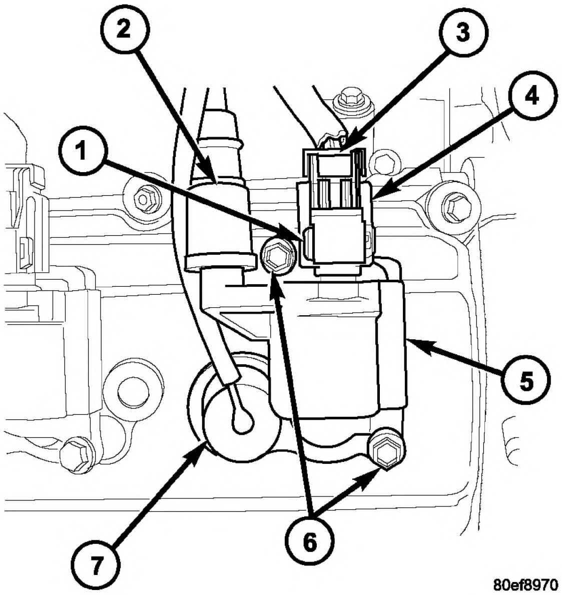
DESCRIPTION

The valve guide seals are made of rubber and incorporate an integral steel valve spring seat. The integral garter spring maintains consistent lubrication control to the valve stems.

SPRINGS-VALVE

REMOVAL

1. Disconnect negative battery cable.
2. Remove air cleaner assembly.
3. Remove air intake resonator.
4. Remove spark plug cables.
5. Remove ignition coil connectors (4).
6. Remove ignition coils (5).
7. Remove one spark plug.



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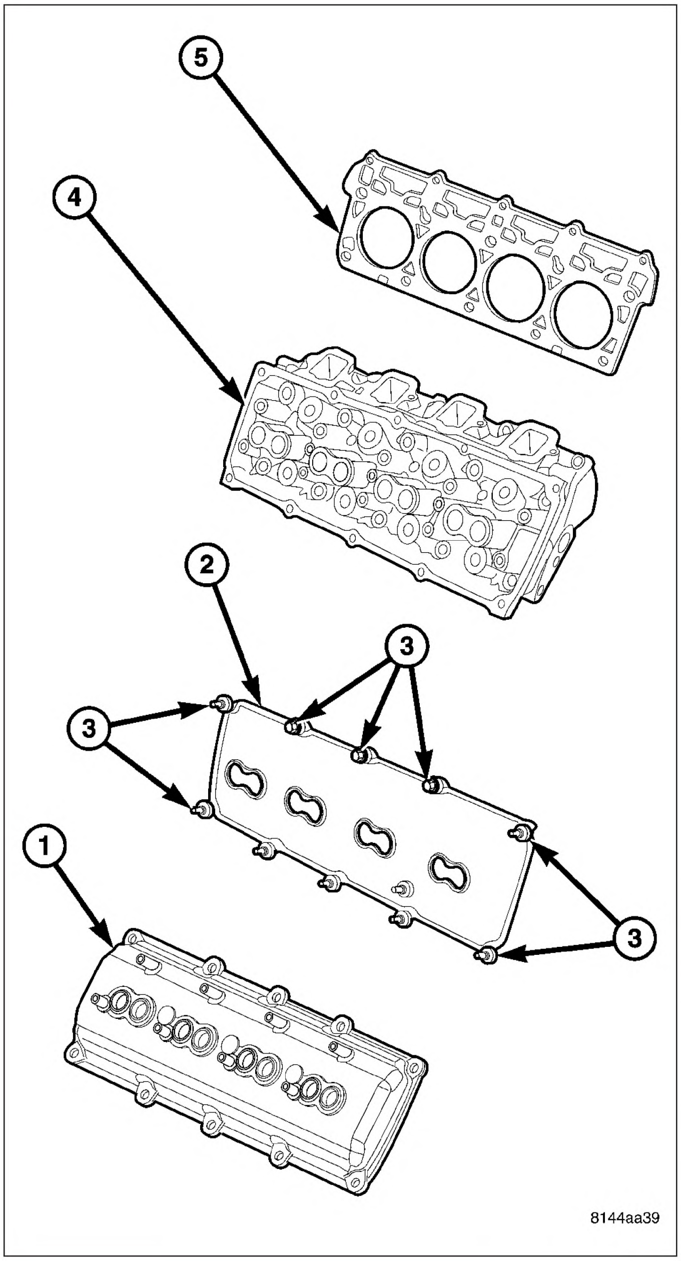
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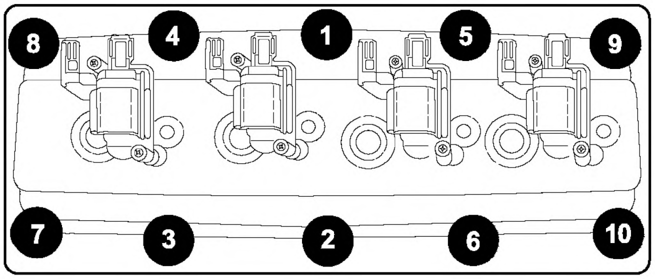
8. Remove cylinder head cover (1) using the sequence shown (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).



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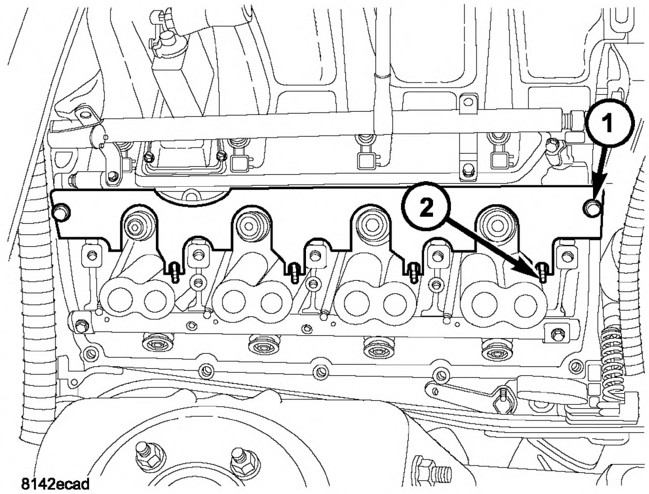
CAUTION: The piston must be at TDC, and both valves closed on the cylinder to be serviced.

NOTE: If removing intake valve spring, install special tool# 9070, pushrod retaining plate (1), to retain the intake pushrods (2).



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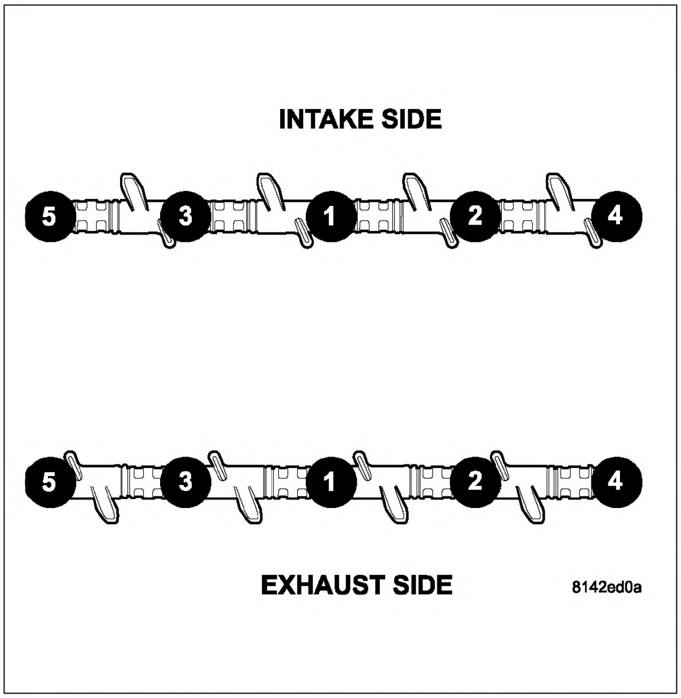
9. Remove exhaust/intake rocker arm shafts using the sequence shown.


INTAKE SIDE
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EXHAUST SIDE
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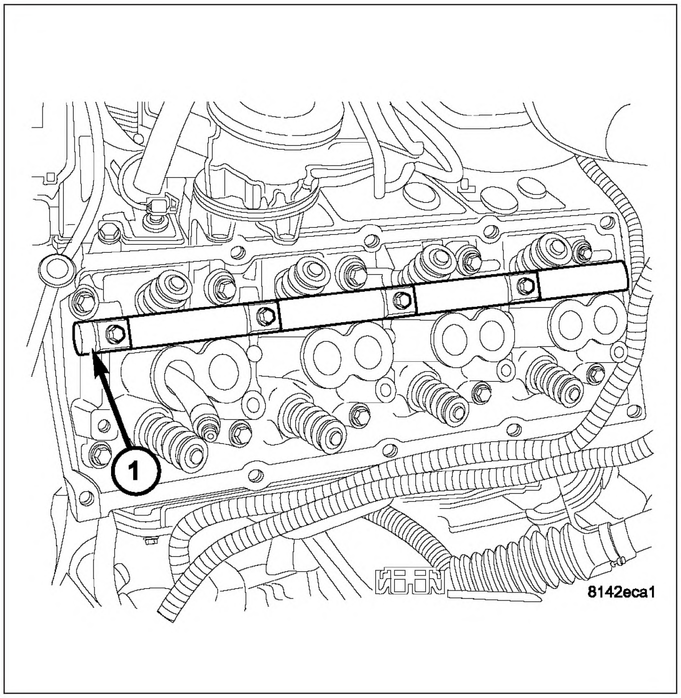
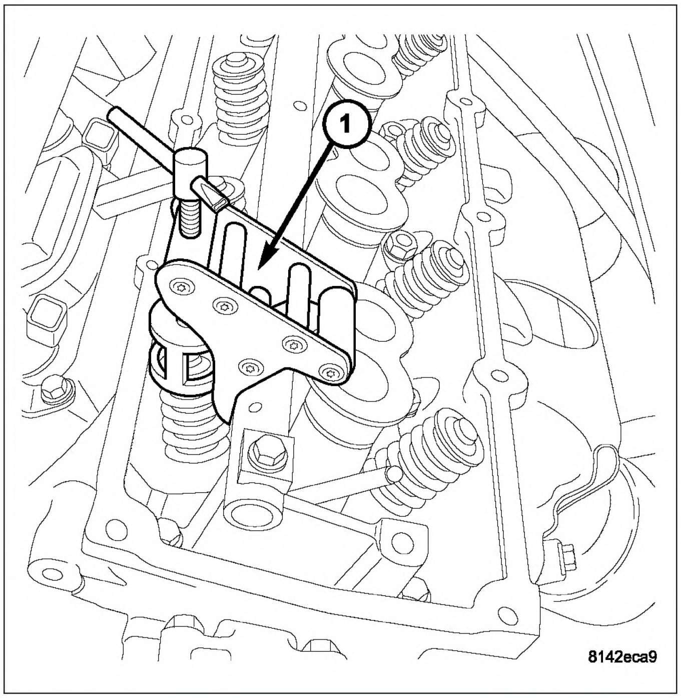
10. Install rocker arm shaft (1) special tool# 9065.

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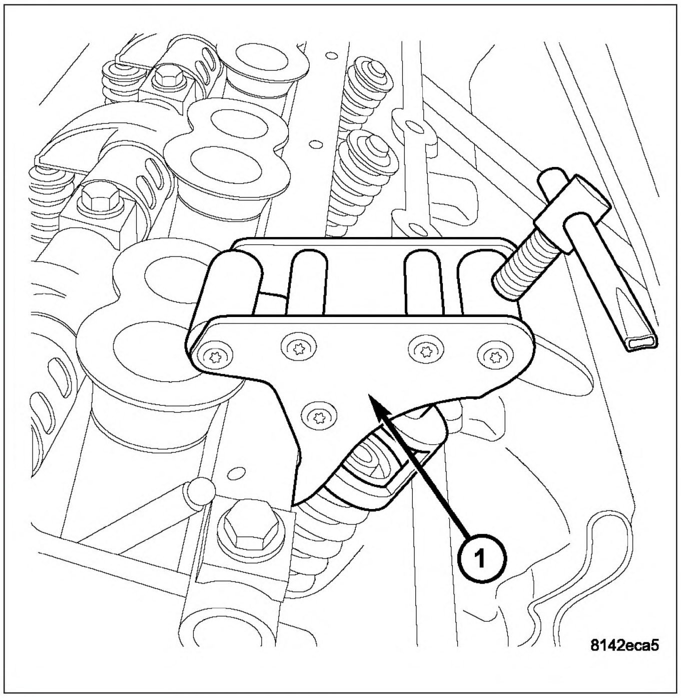
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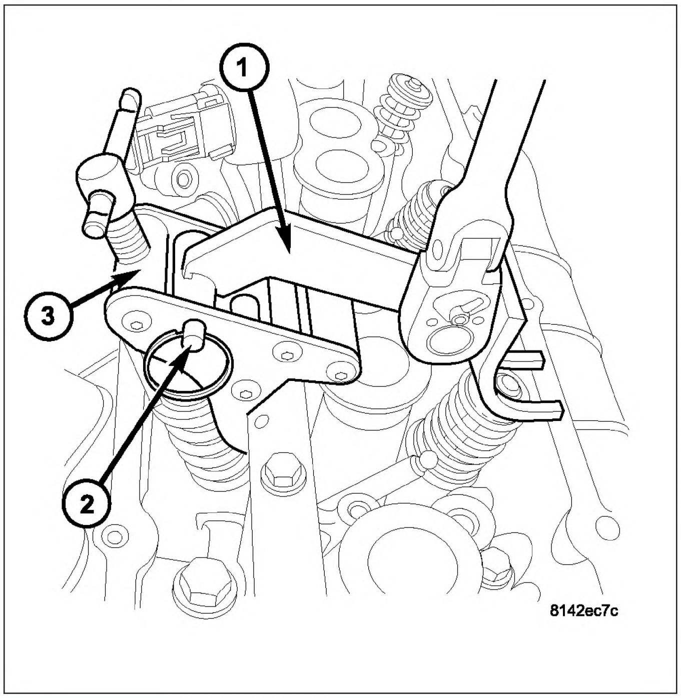
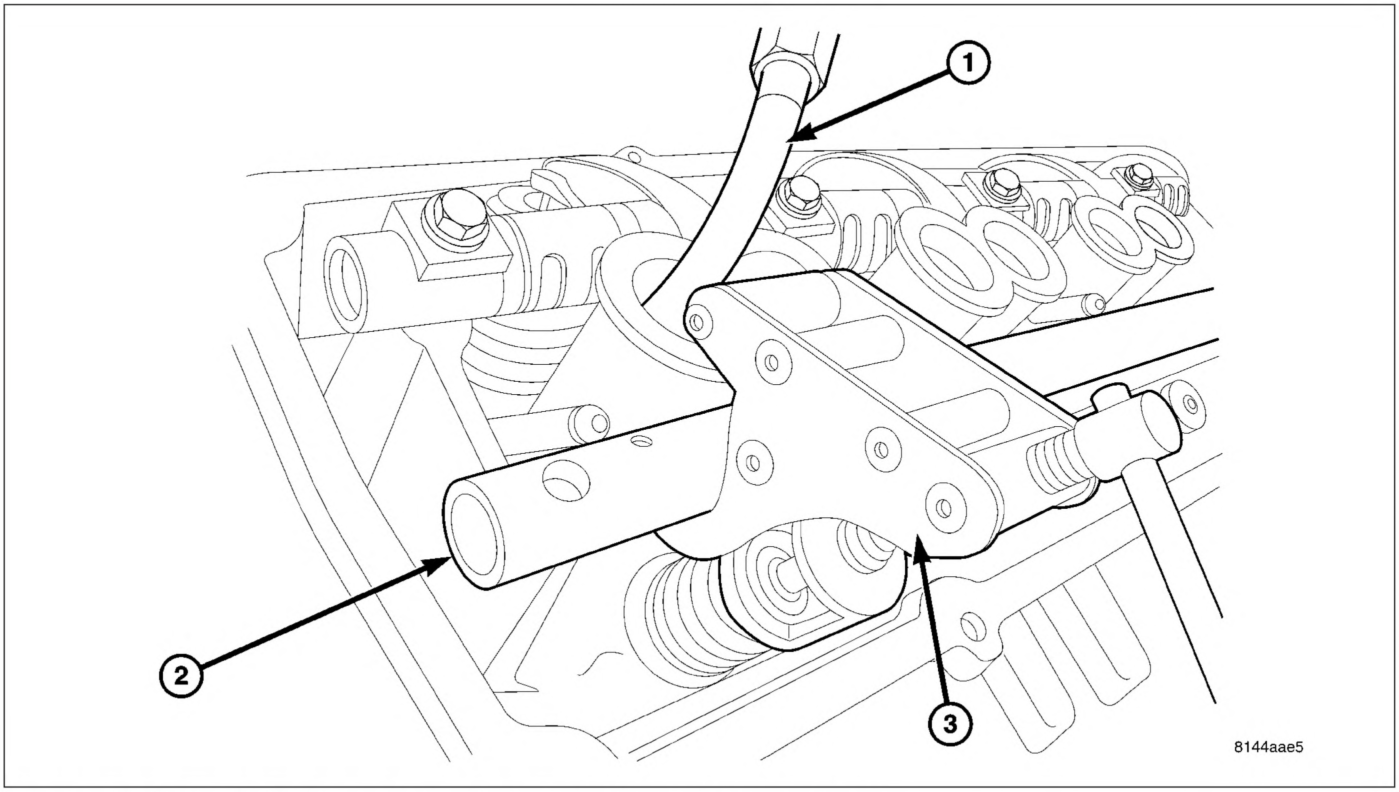
11. Install spring compressor (1,3,), special tool# 9065, and exhaust adapter arm (1) tool # 9065if needed.

NOTE: All valve springs and seals are removed in the same manner.





12. Insert air hose (1) into spark plug hole and charge cylinder with air.

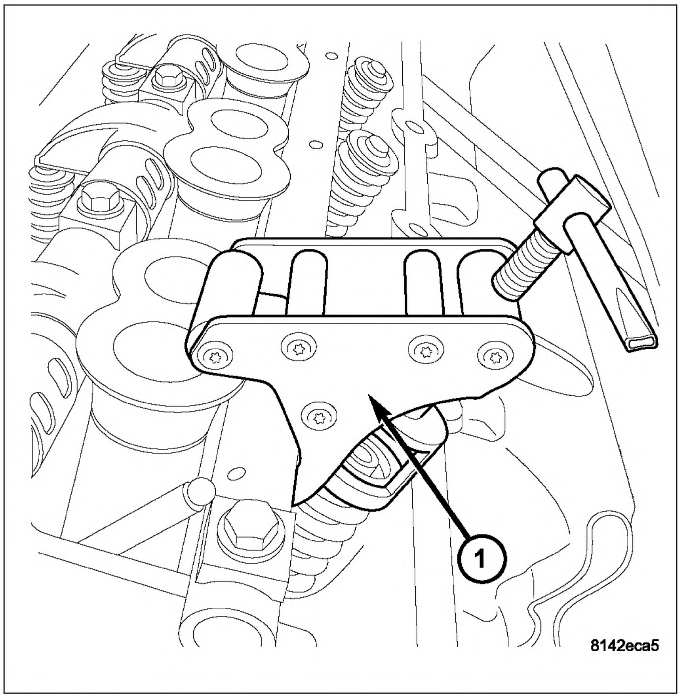
NOTE: Tap the top of the valve spring retainer to loosen the spring retainers locks.

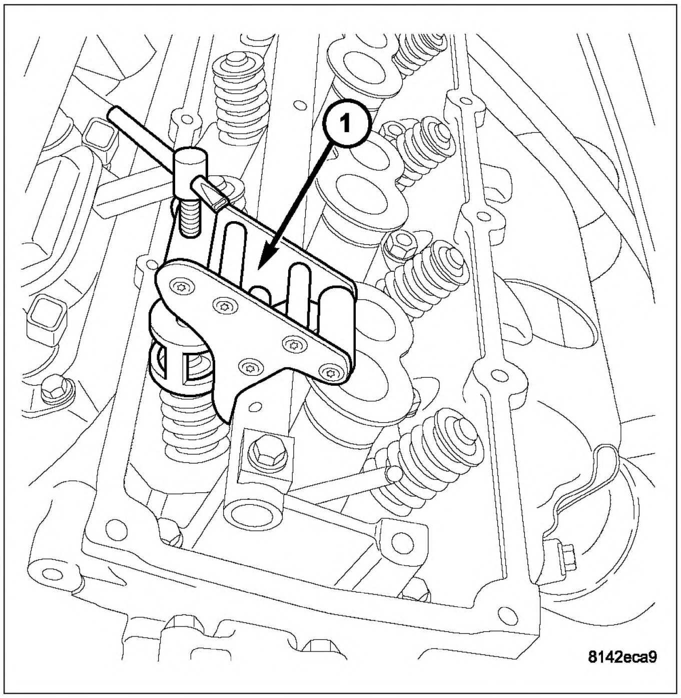
13. Compress valve spring with valve spring compessor (3) tool # 9065and remove valve retainer locks.
14. Release spring compressor (3) and remove valve spring.

NOTE: The valve springs are interchangeable between intake and exhaust.

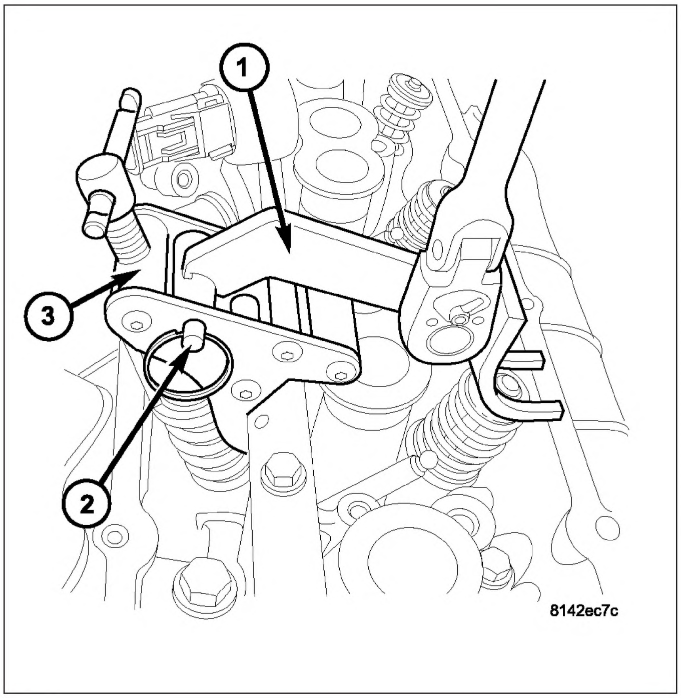
15. Remove valve seal.

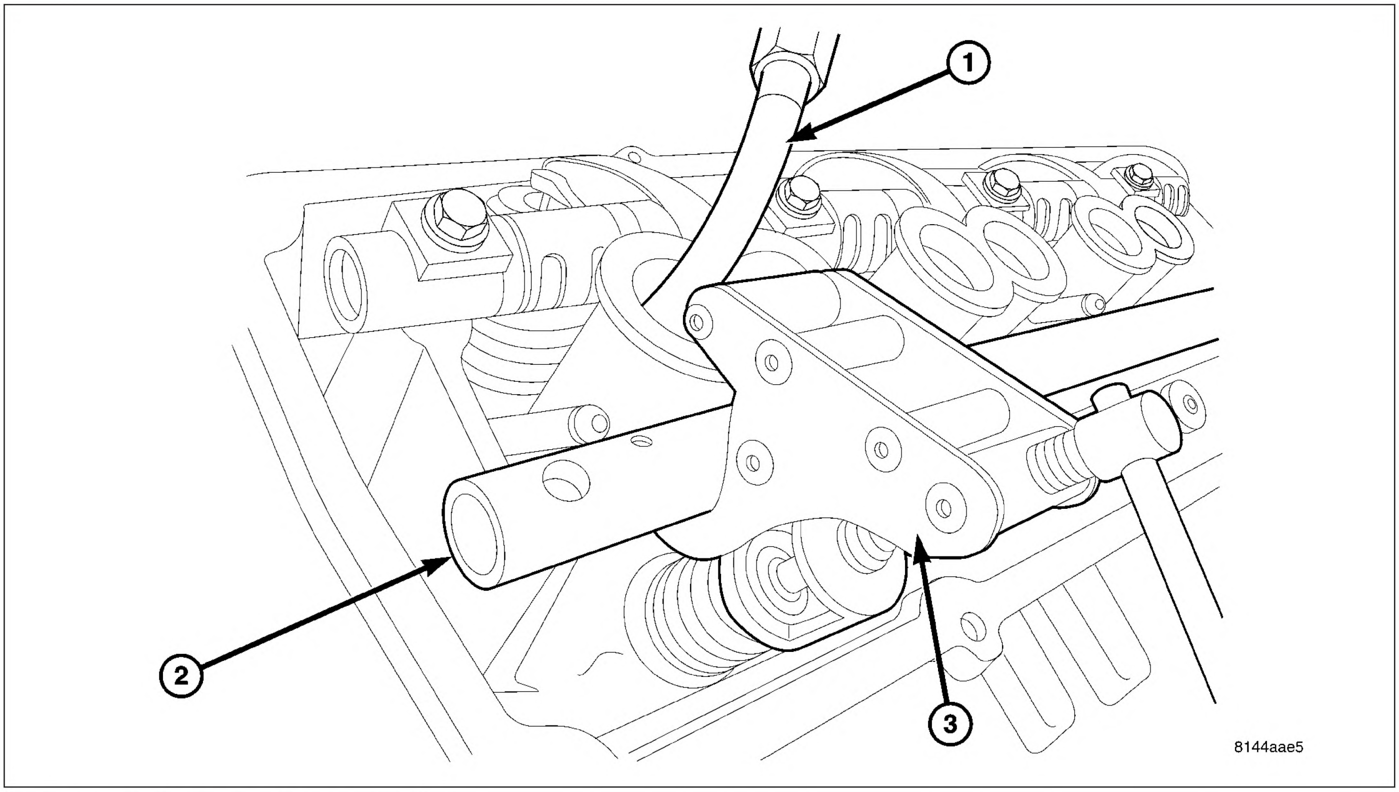
INSTALLATION





1. Install valve seal.
2. Install valve spring.
3. Using special tool# 9065 (1,3,), compress valve spring and install valve spring retainer and locks.

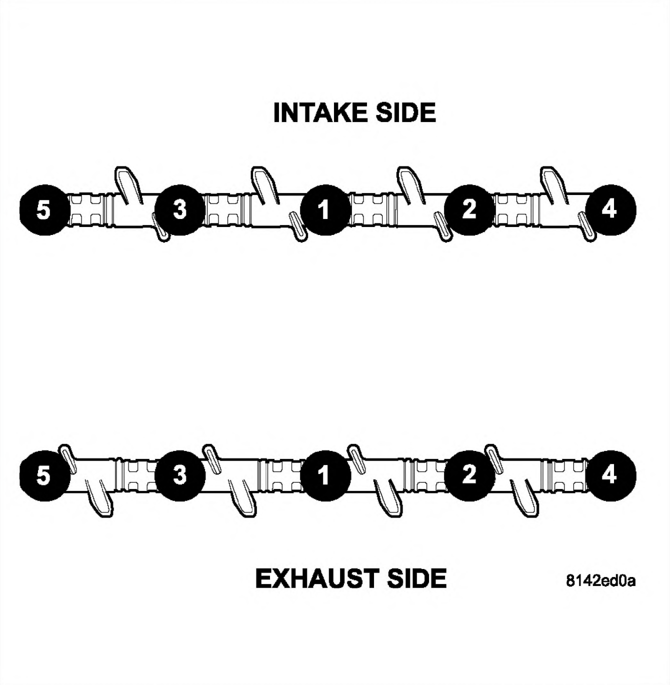




4. Release air charge in cylinder (1).
5. Remove spring compressor tool # 9065 (3).

CAUTION: Verify that the pushrods are fully seated into lifter and rocker arm. Recheck after rocker arm shaft has been torqued to specification.

6. Install rocker arm shaft and pushrods (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION).
7. Tighten the rocker shaft bolts to 22 N·m (195 in. lbs.) torque, using the rocker shaft torque sequence.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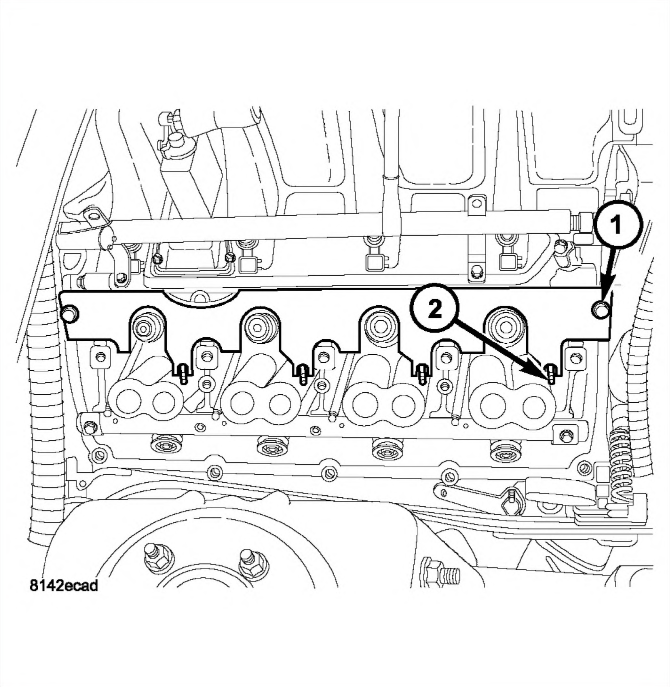
8. Remove special tool# 9070, pushrod retaining plate (1), if used.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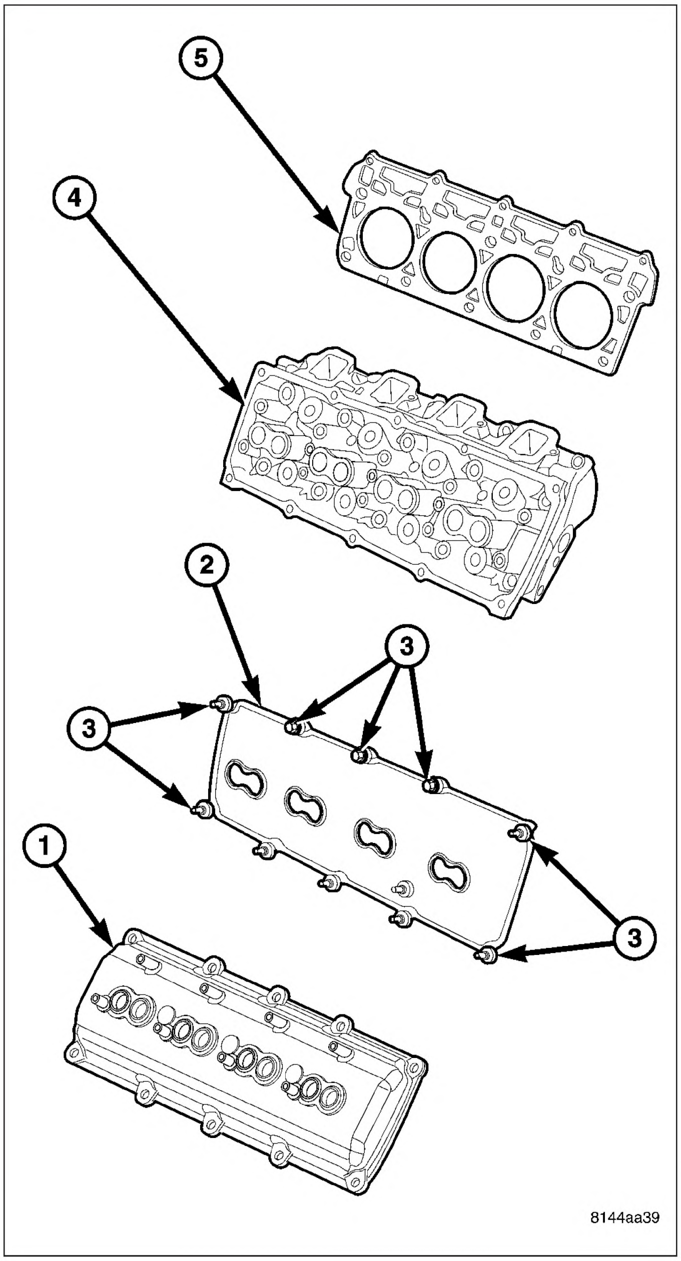
9. Install cylinder head cover (1).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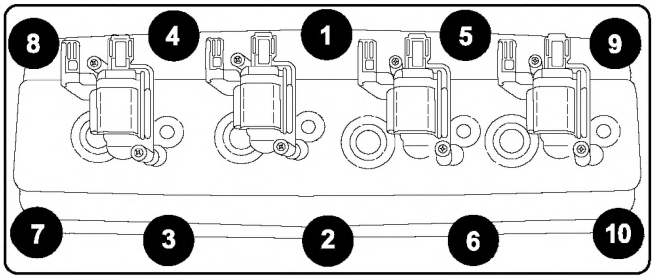
10. Tighten cylinder head cover bolts and double ended studs (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION) .
11. Install spark plugs.



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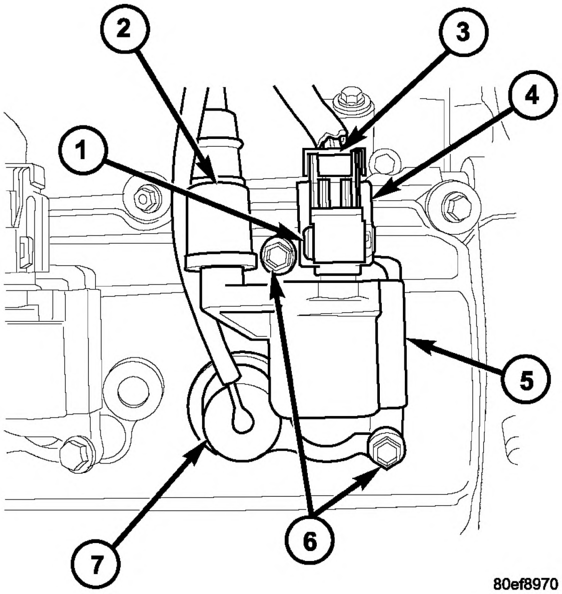
12. Install ignition coil on plug (5), and torque fasteners (6) to 12 N·m (105 in. lbs)
13. Install ignition coil connectors (4).
14. Install spark plug cables.
15. Install air intake resonator.
16. Install air cleaner assembly.
17. Connect negative battery cable.



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ENGINE BLOCK

CLEANING

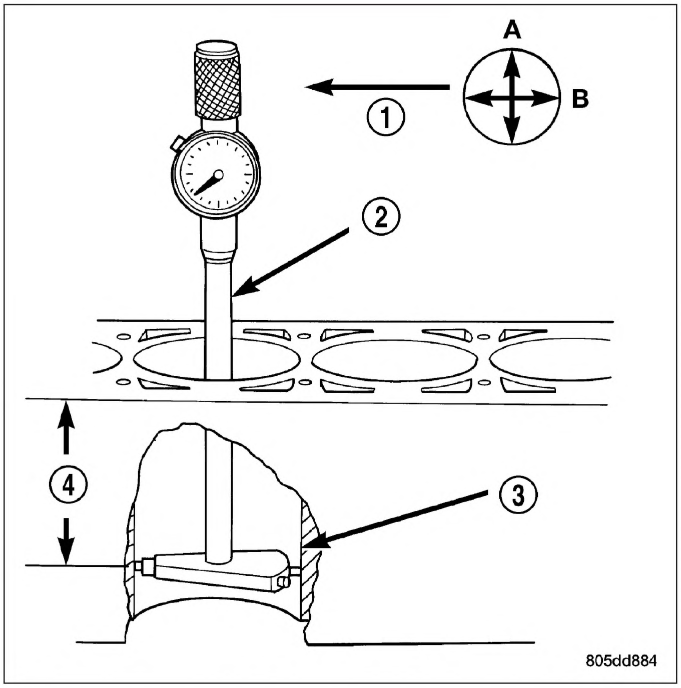
Thoroughly clean the oil pan and engine block gasket surfaces.

Use compressed air to clean out:

- The galley at the oil filter adaptor hole.
- The front and rear oil galley holes.
- The feed holes for the crankshaft main bearings.

Once the block has been completely cleaned, apply Loctite PST pipe sealant with Teflon 592 to the threads of the front and rear oil galley plugs. Tighten the 1/4 inch NPT plugs to 20 N·m (177 in. lbs.) torque. Tighten the 3/8 inch NPT plugs to 27 N·m (240 in. lbs.) torque.

INSPECTION



1. It is mandatory to use a dial bore gauge to measure each cylinder bore diameter. To correctly select the proper size piston, a cylinder bore gauge, capable of reading in 0.003 mm (.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at three levels below top of bore. Start perpendicular (across or at 90 degrees) to the axis of the crankshaft and then take two additional reading.
3. Measure the cylinder bore diameter crosswise to the cylinder block near the top of the bore. Repeat the measurement near the middle of the bore, then repeat the measurement near the bottom of the bore.
4. Determine taper by subtracting the smaller diameter from the larger diameter.
5. Rotate measuring device 90° and repeat steps above.
6. Determine out-of-roundness by comparing the difference between each measurement.
7. If cylinder bore taper does not exceed 0.025 mm (0.001 inch) and out-of-roundness does not exceed 0.025 mm (0.001 inch), the cylinder bore can be honed. If the cylinder bore taper or out- of-round condition exceeds these maximum limits, the cylinder block must be replaced. A slight amount of taper always exists in the cylinder bore after the engine has been in use for a period of time.

CAMSHAFT

REMOVAL

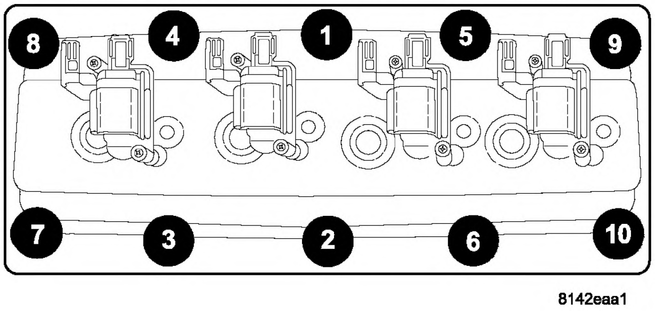
REMOVAL - CAMSHAFT CORE HOLE PLUG

CAUTION: Do not damage the rear surface of the camshaft or the core plug sealing surface, when removing the core plug.

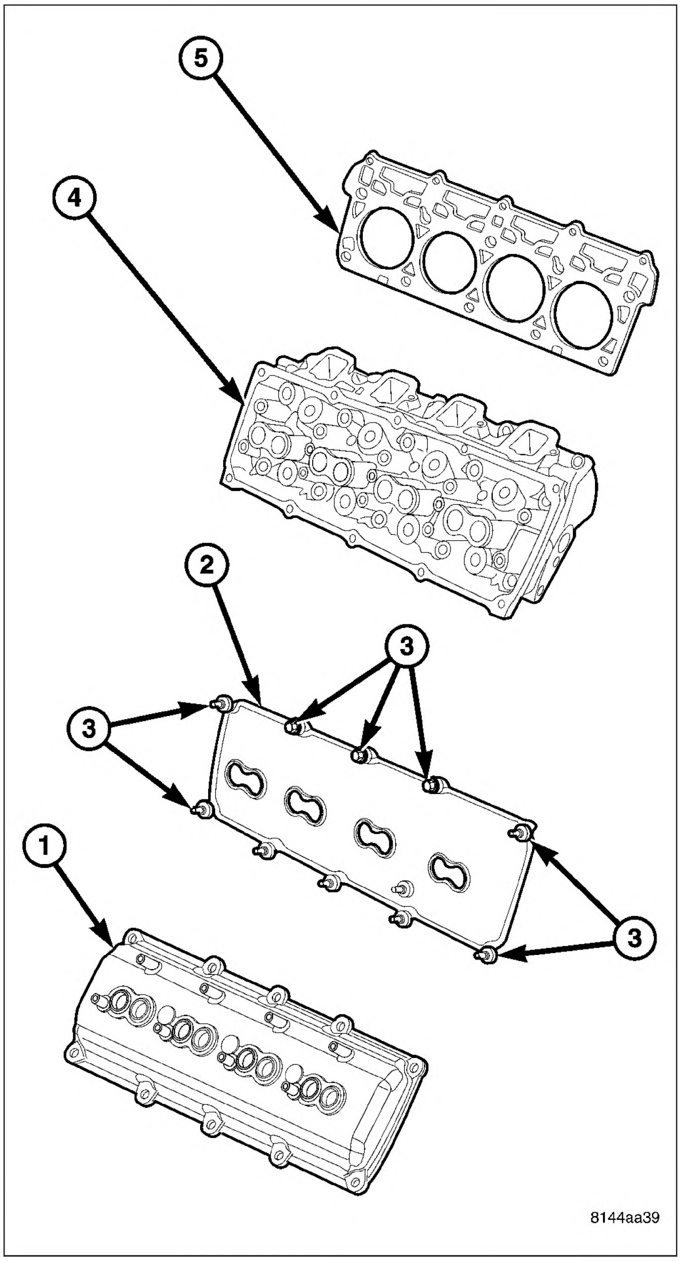
1. Remove the rear cam bearing core plug.

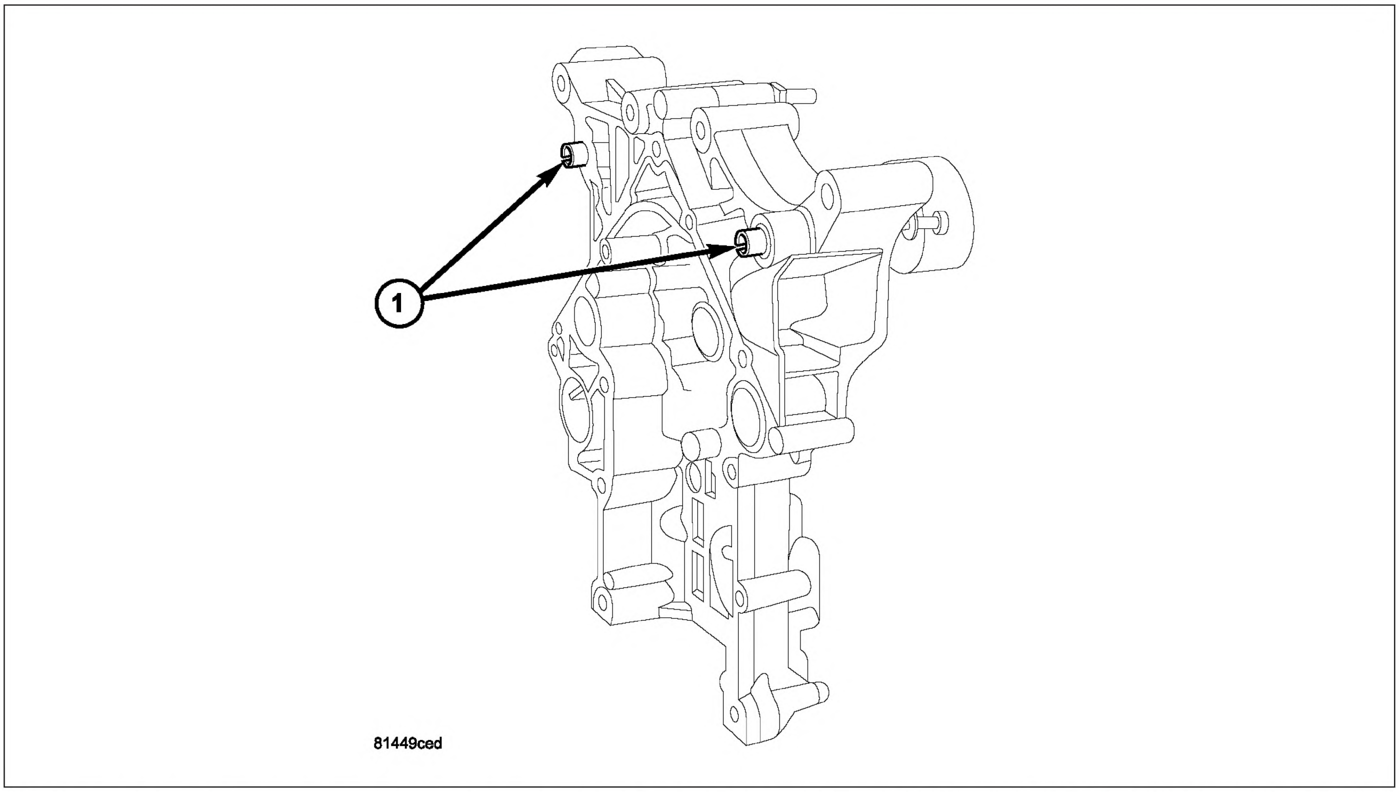
REMOVAL - CAMSHAFT

1. Remove the battery negative cable.
2. Remove the air cleaner assembly. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM - REMOVAL)
3. Drain coolant. (Refer to 7 - COOLING - STANDARD PROCEDURE)
4. Remove the accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)
5. Remove the generator.
6. Remove the A/C compressor, and set aside.
7. Remove the radiator (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL).
8. Remove intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
9. Remove cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).



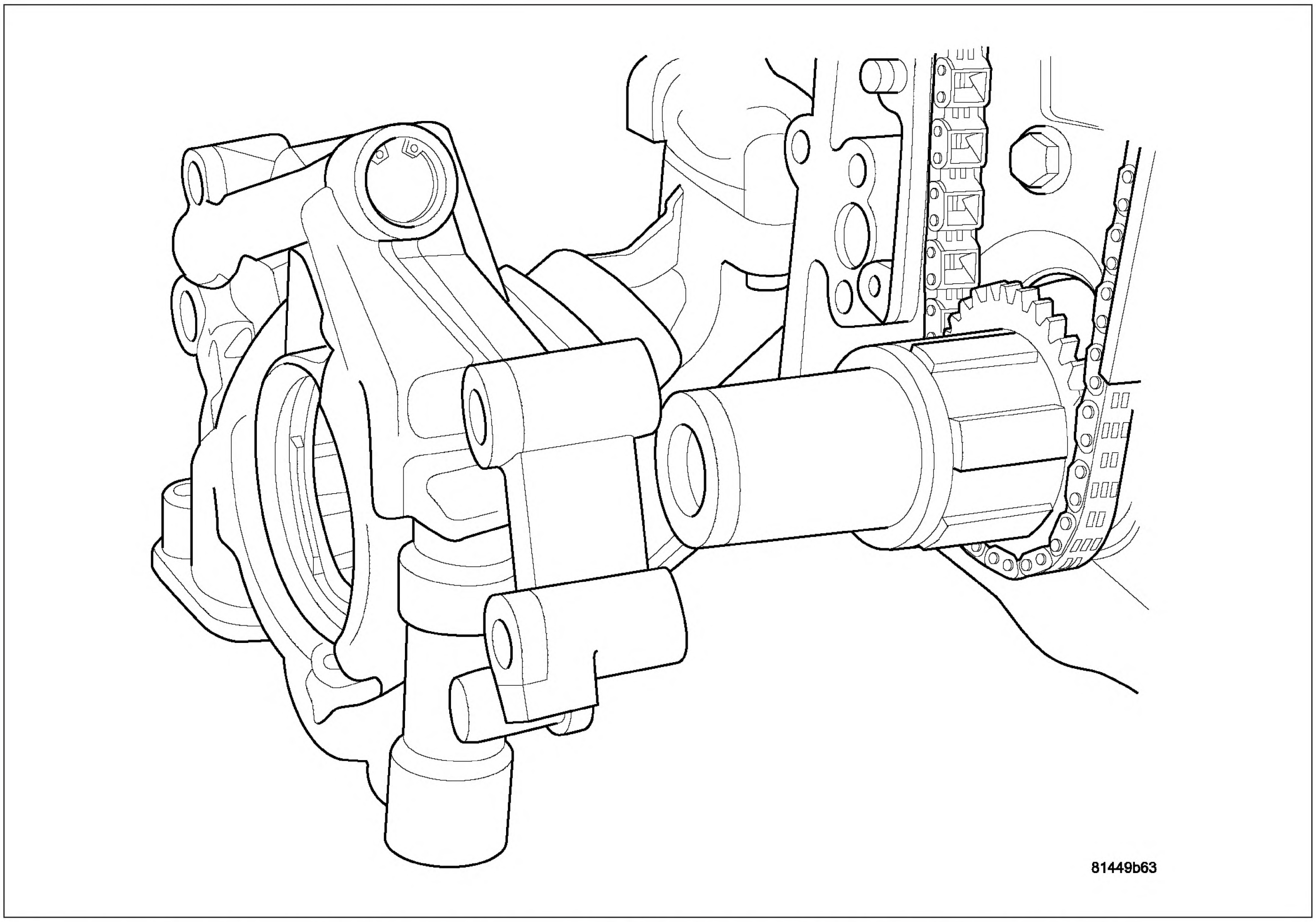
10. Remove both left and right cylinder heads (4) (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).
11. Remove the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).





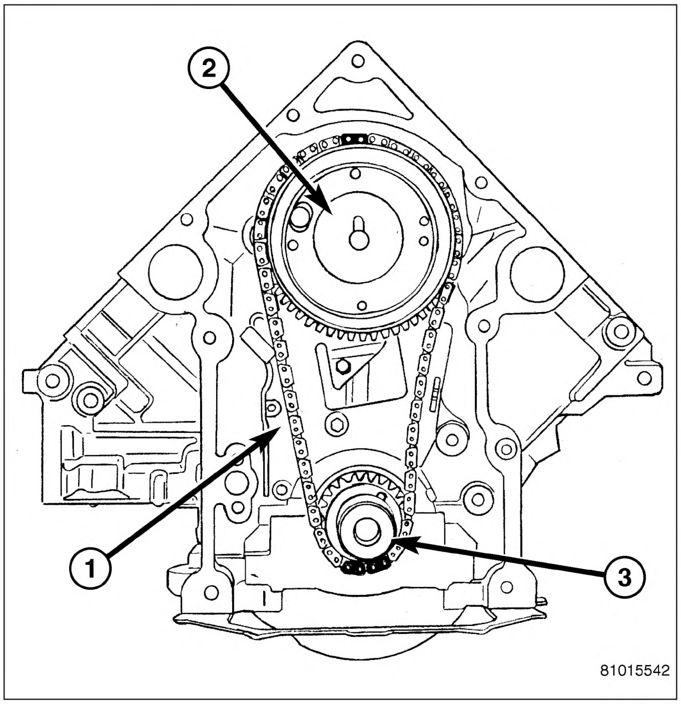
12. Remove timing case cover (1) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

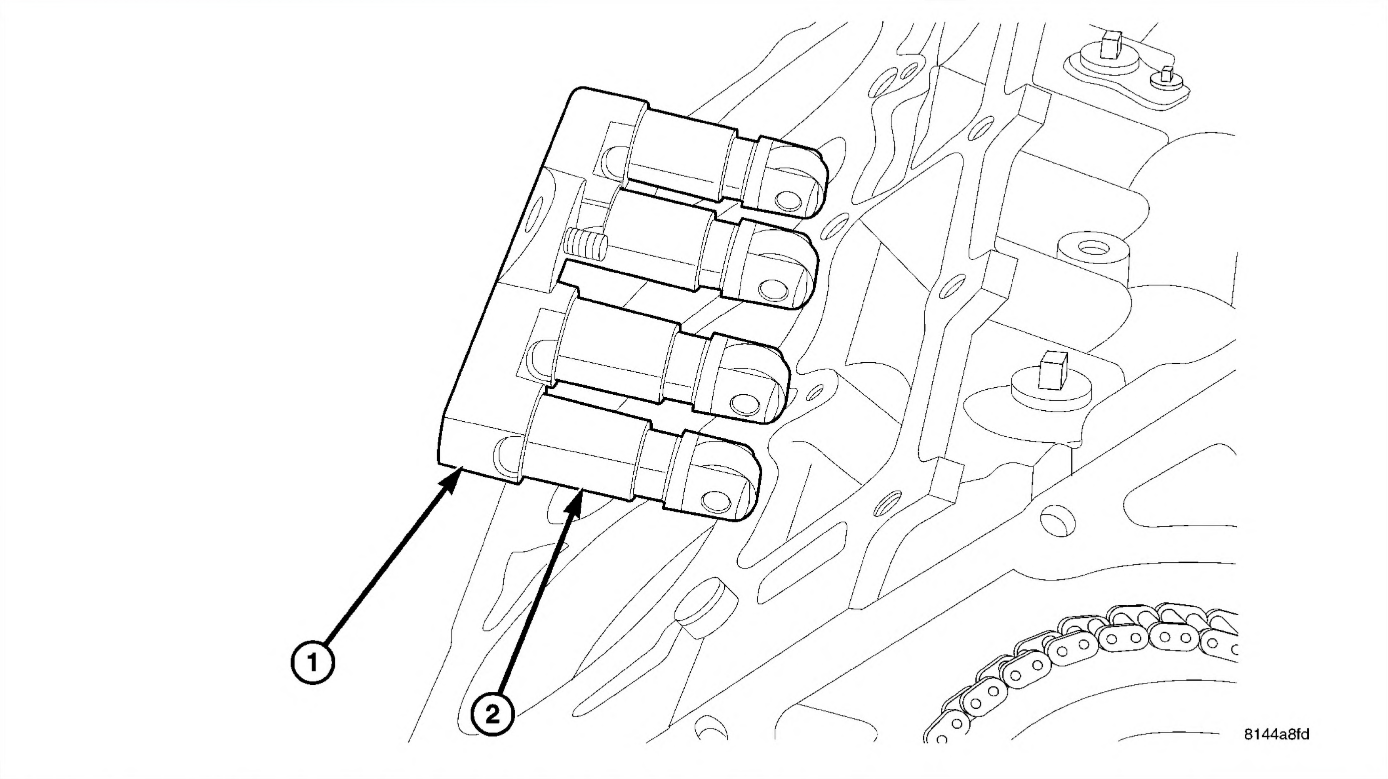
13. Remove the oil pick up tube.



14. Remove the oil pump (figure 2) (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

15. Remove timing chain (2) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
16. Remove camshaft tensioner/thrust plate assembly.

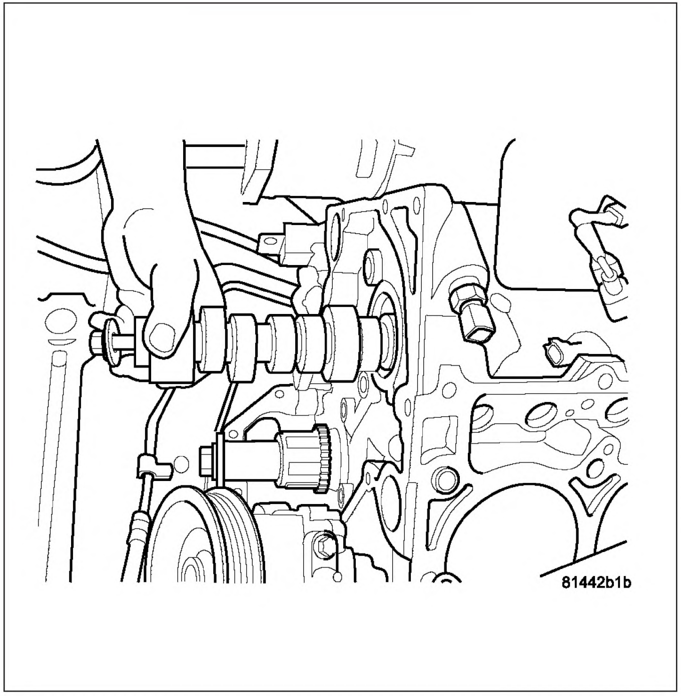




NOTE: Identify lifters to ensure installation in original location.

17. Remove the tappets (2) and retainer (1) assembly.

18. Install a long bolt into front of camshaft to aid in removal of the camshaft. Remove camshaft, being careful not to damage cam bearings with the cam lobes (figure 5).



INSPECTION

1. The cam bearings are not serviceable. Do not attempt to replace cam bearings for any reason.

INSTALLATION

INSTALLATION - CAMSHAFT CORE HOLE PLUG

1. Clean core hole in block.

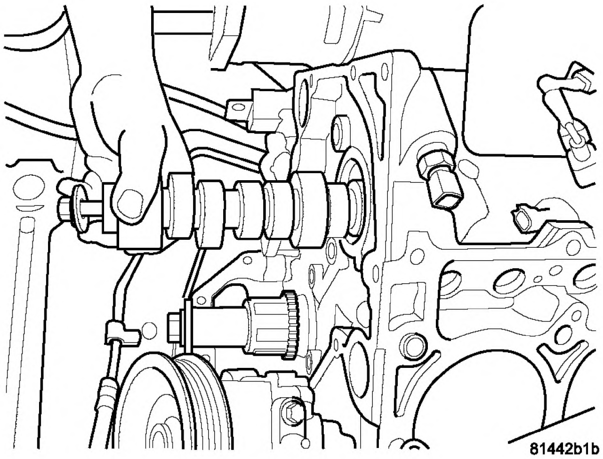
NOTE: Do not apply adhesive to the new core hole plug. A new plug will have adhesive pre-applied.

2. Install a new core hole plug at the rear of camshaft, using suitable flat faced tool. The plug must be fully seated on the cylinder block shoulder.

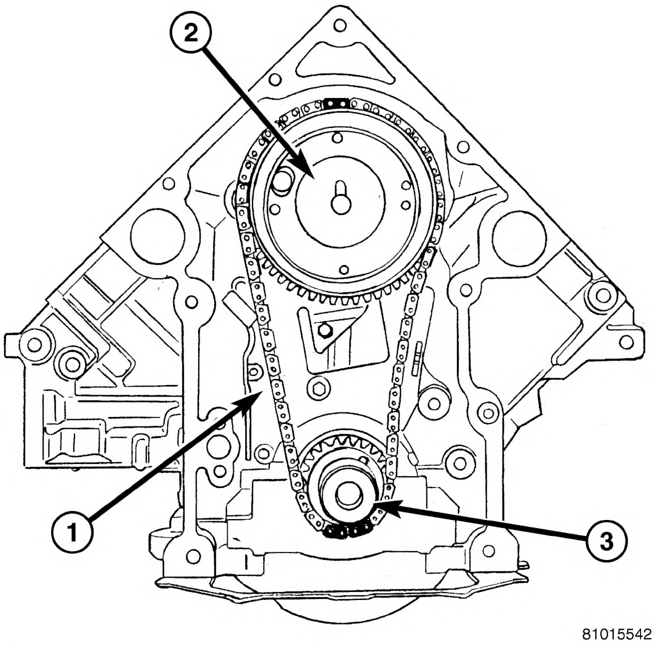
INSTALLATION - CAMSHAFT

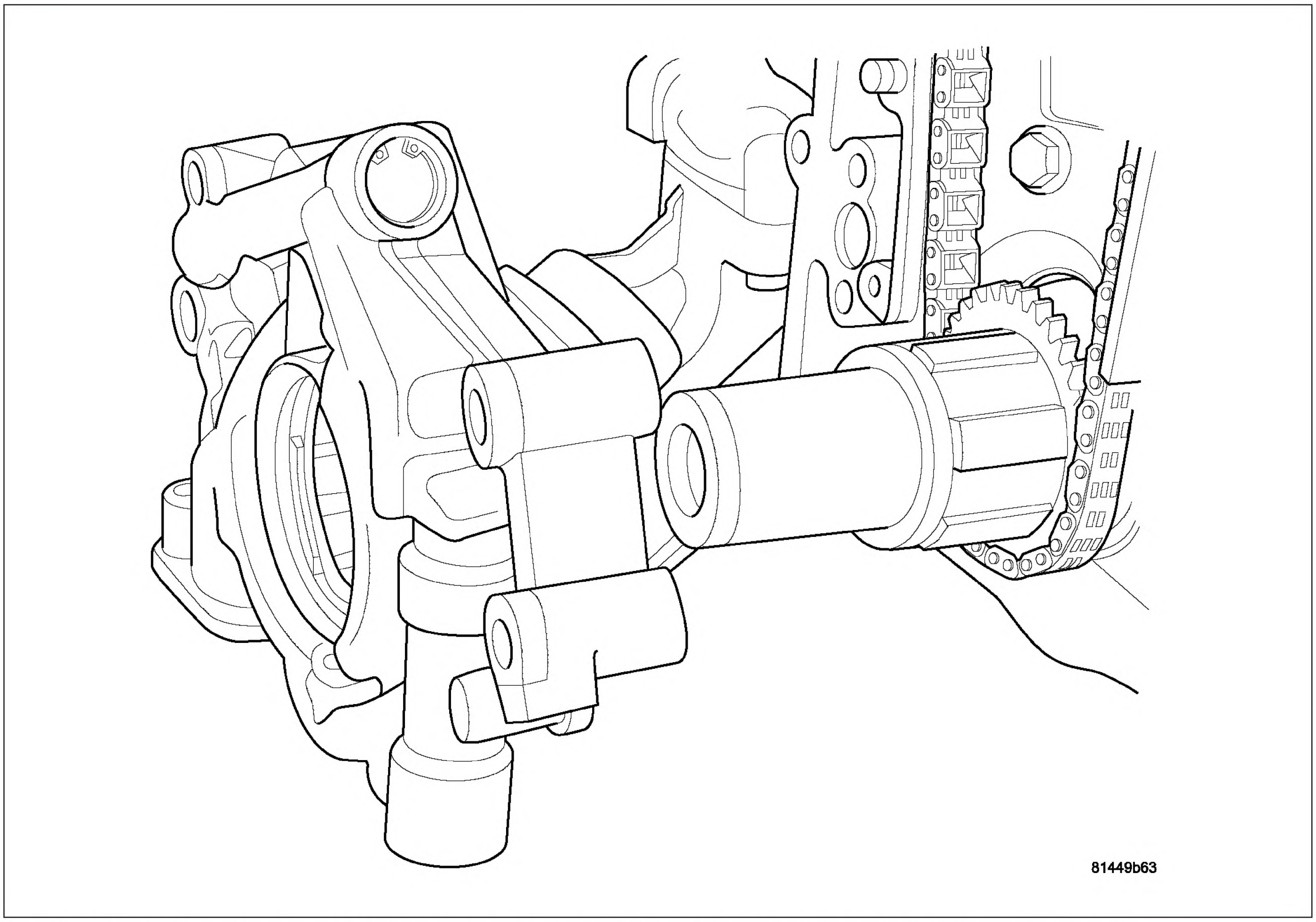
CAUTION: The 5.7L LX engine uses a unique camshaft for use with the Multi Displacement System. When installing a new camshaft, the replacement camshaft must be compatible with the Multi Displacement System.

1. Lubricate camshaft lobes and camshaft bearing journals and insert the camshaft (figure1).

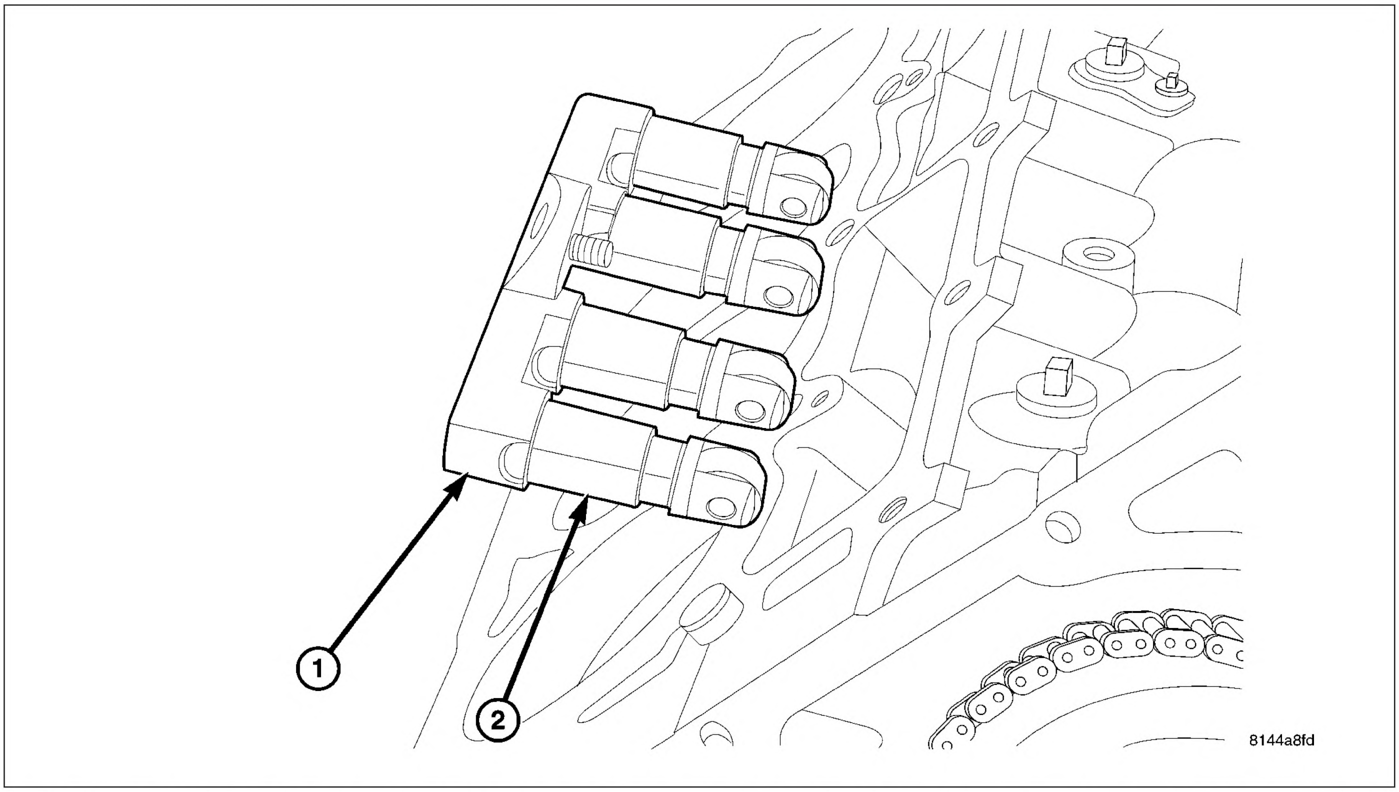


2. Install camshaft Tensioner plate assembly. Tighten bolts to 28 N·m (250 in. lbs.) torque.
3. Install timing chain and sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).
4. Measure camshaft end play (Refer to 9 - ENGINE - SPECIFICATIONS). If not within limits install a new thrust plate.





5. Install the oil pump (figure2) (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).
6. Install the oil pick up tube.

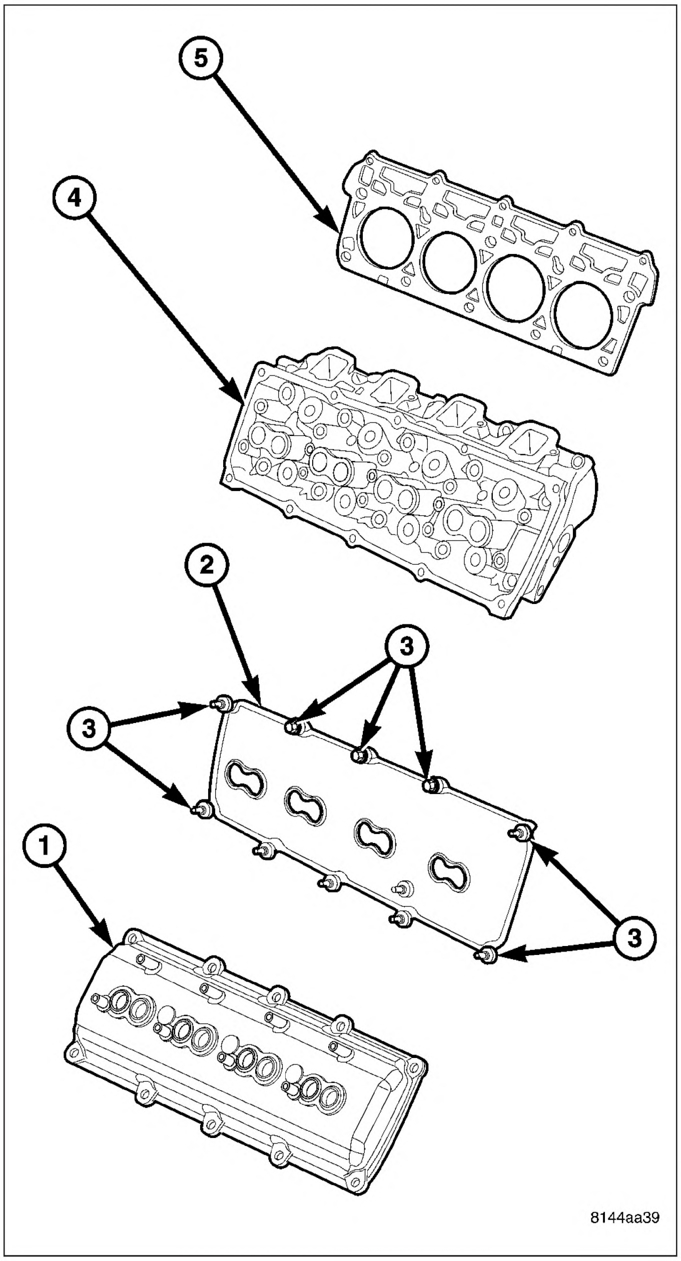


7. Each tappet reused must be installed in the same position from which it was removed. **When camshaft is replaced, all of the tappets must be replaced.**

CAUTION: The 5.7L LX engine uses both standard roller tappets and deactivating roller tappets, for use with the Multi Displacement System. The deactivating roller tappets must be used in cylinders 1,4,6,7. The deactivating tappets can be identified by the two holes in the side of the tappet body, for the latching pins.

8. Install tappets (2) and retaining yoke assembly (1). (Refer to 9 - ENGINE/ENGINE BLOCK/HYDRAULIC LIFTERS (CAM IN BLOCK) - INSTALLATION).

9. Install both left and right cylinder heads (4) (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).
10. Install pushrods.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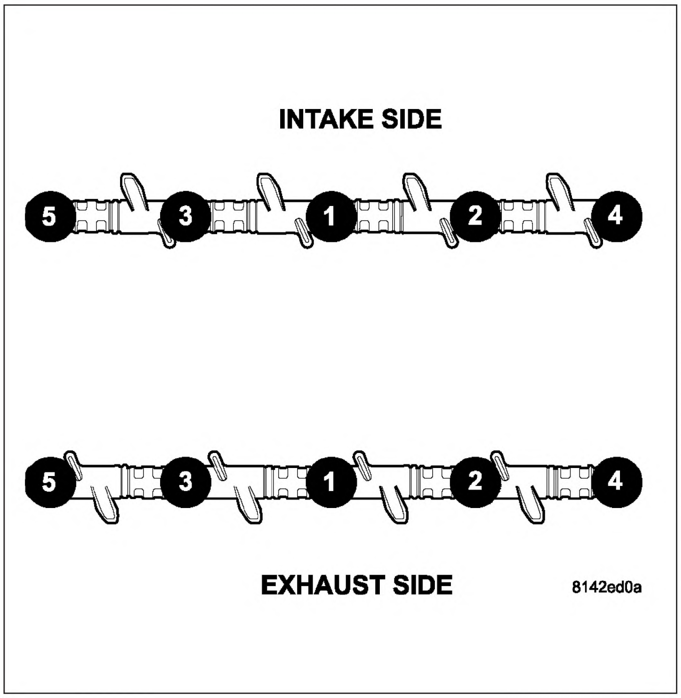
11. Install rocker arms (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION).


INTAKE SIDE
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EXHAUST SIDE
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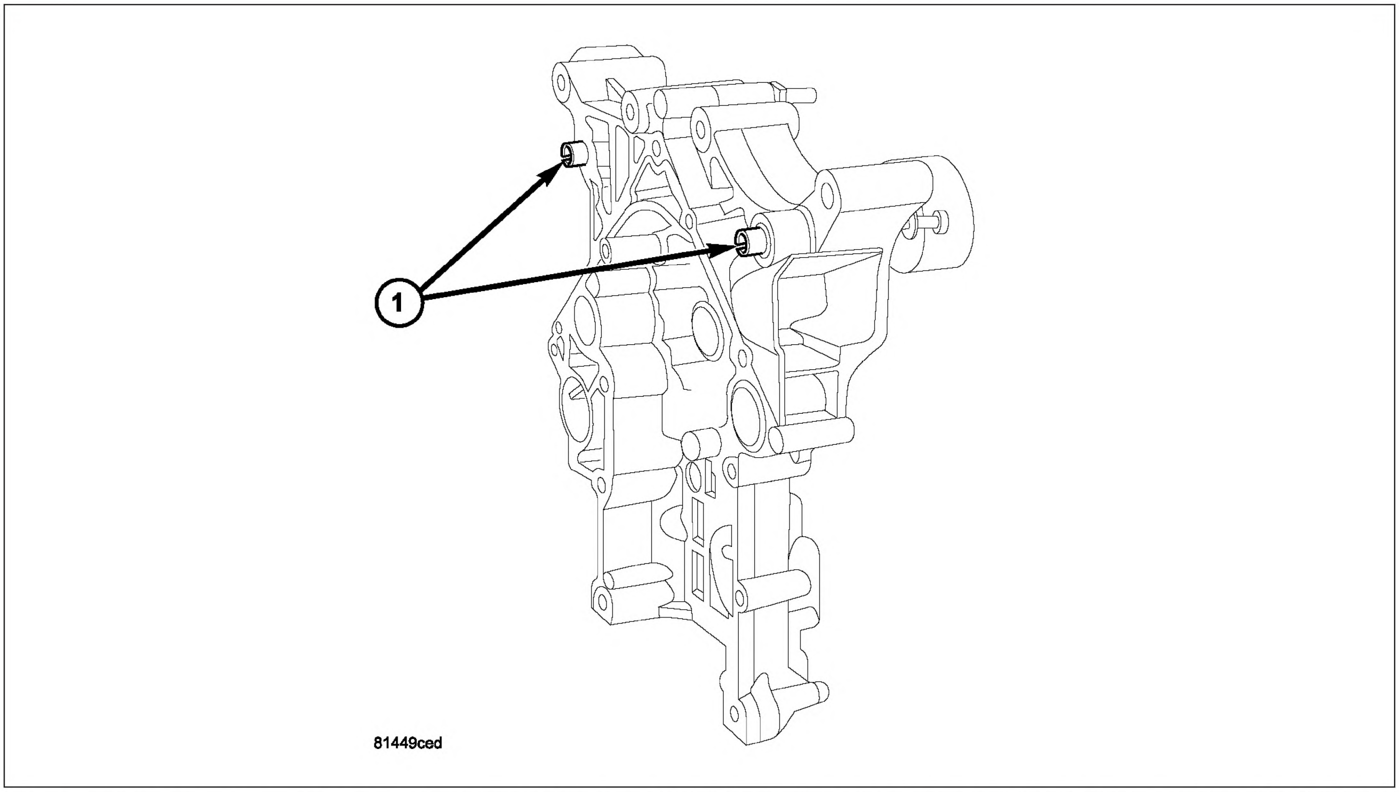
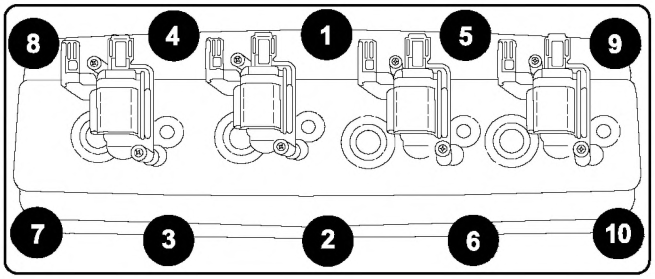


12. Install timing case cover (figure4) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
13. Install the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

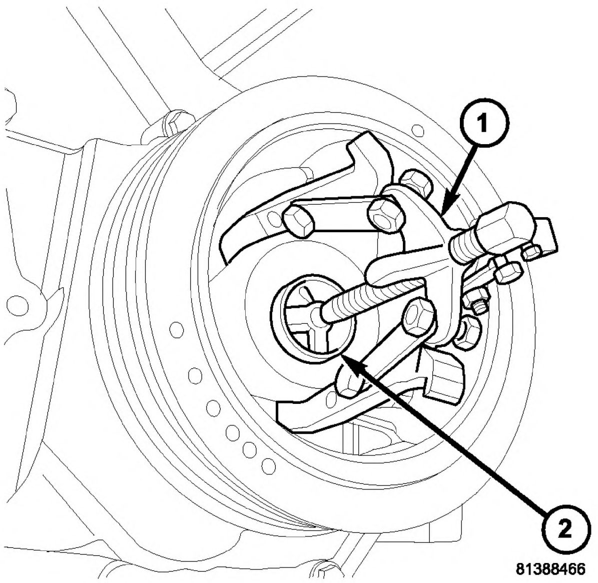
14. Install cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
15. Install intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
16. Install the A/C compressor.
17. Install the generator.
18. Install the accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
19. Install the radiator (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION).
20. Install the air cleaner assembly. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM - INSTALLATION)
21. Install the battery negative cable.
22. Refill coolant. (Refer to 7 - COOLING - STANDARD PROCEDURE)
23. Refill engine oil.
24. Start engine and check for leaks.



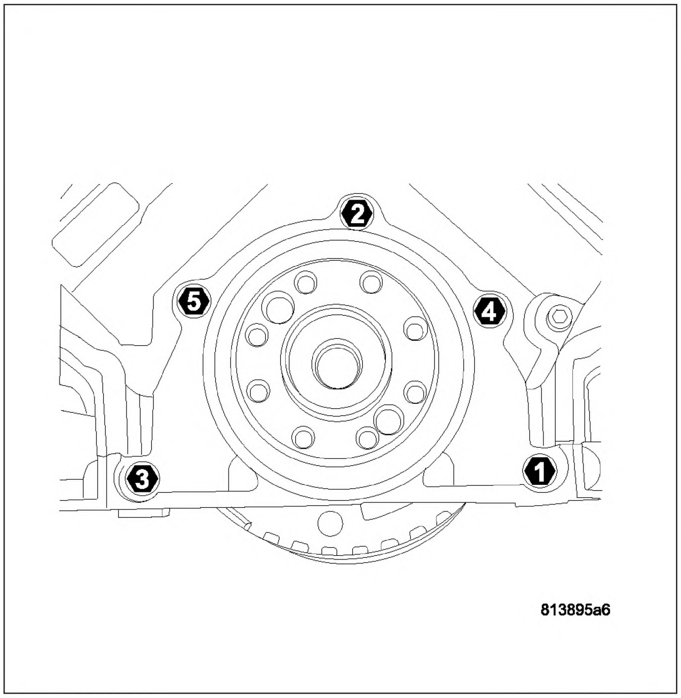
CRANKSHAFT

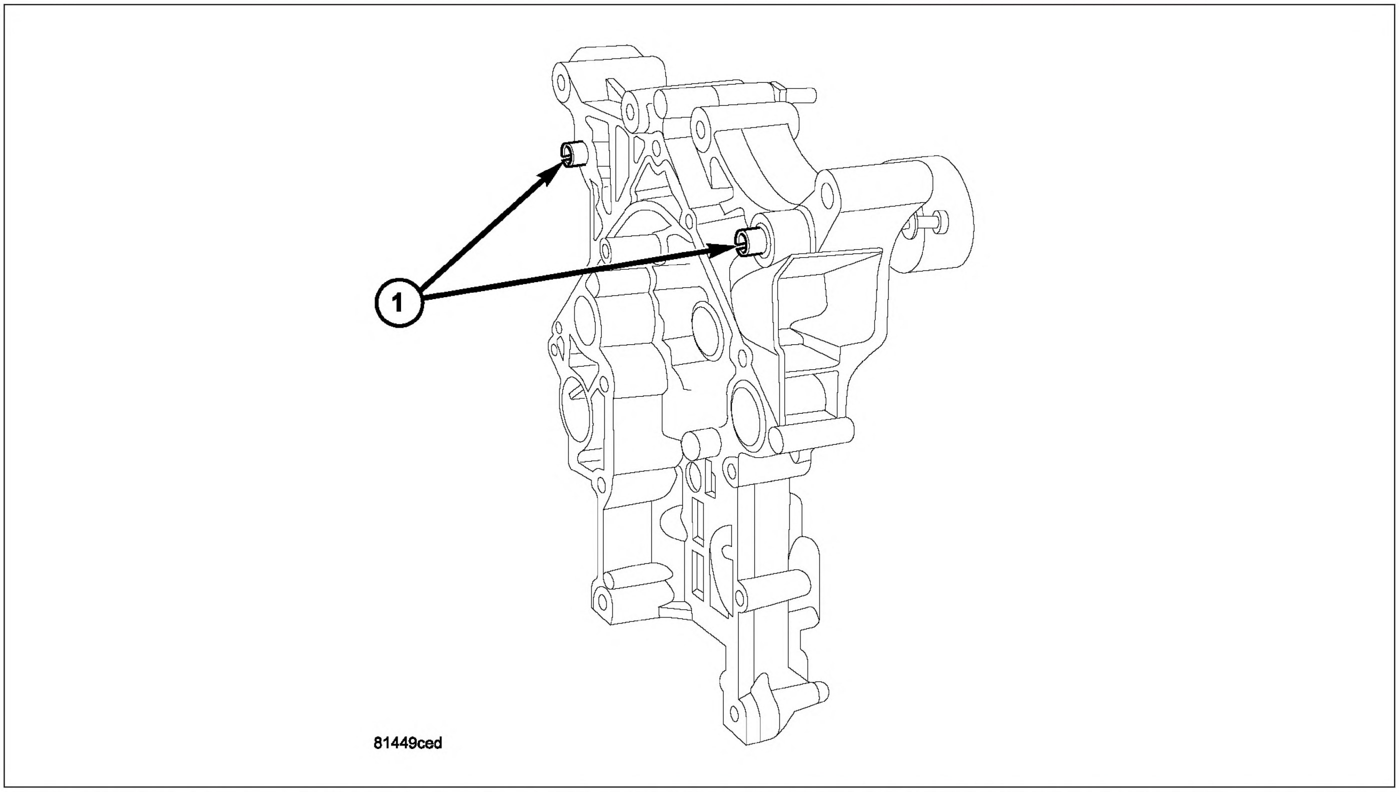
REMOVAL

1. Remove the vibration damper (1) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

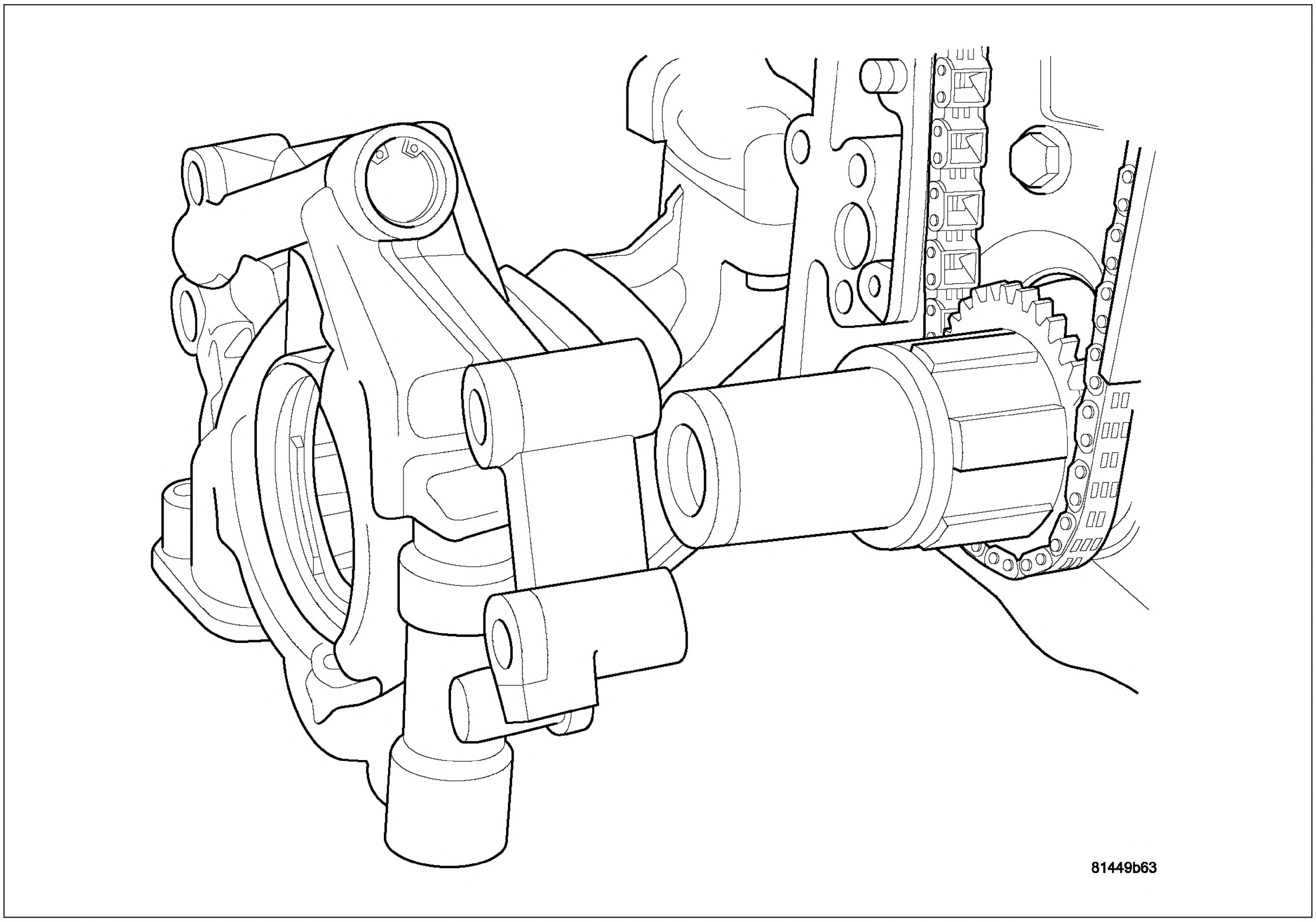


2. Remove the rear oil seal retainer (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINE - REMOVAL).
3. Remove the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
4. Remove the oil pump pickup.
5. Remove the windage tray/oil pan gasket.



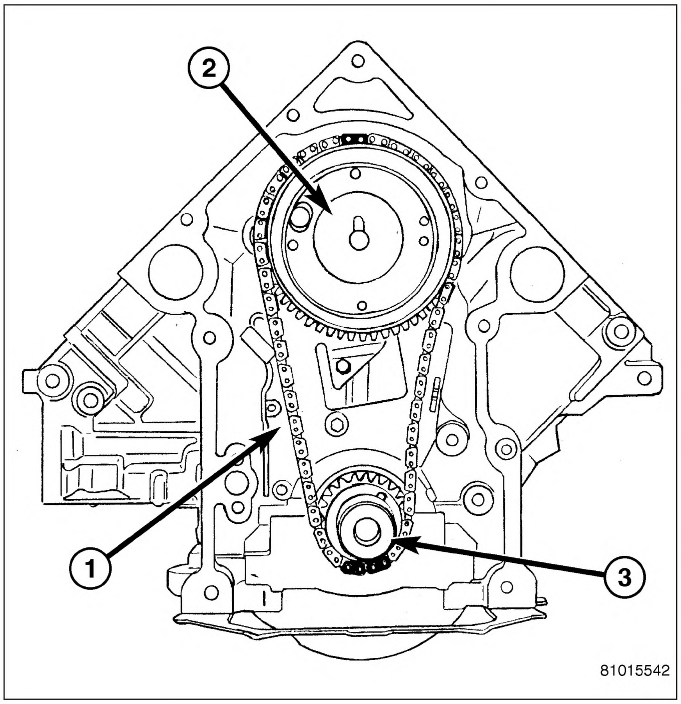


6. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).



7. Remove the oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

8. Remove the timing drive (2) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).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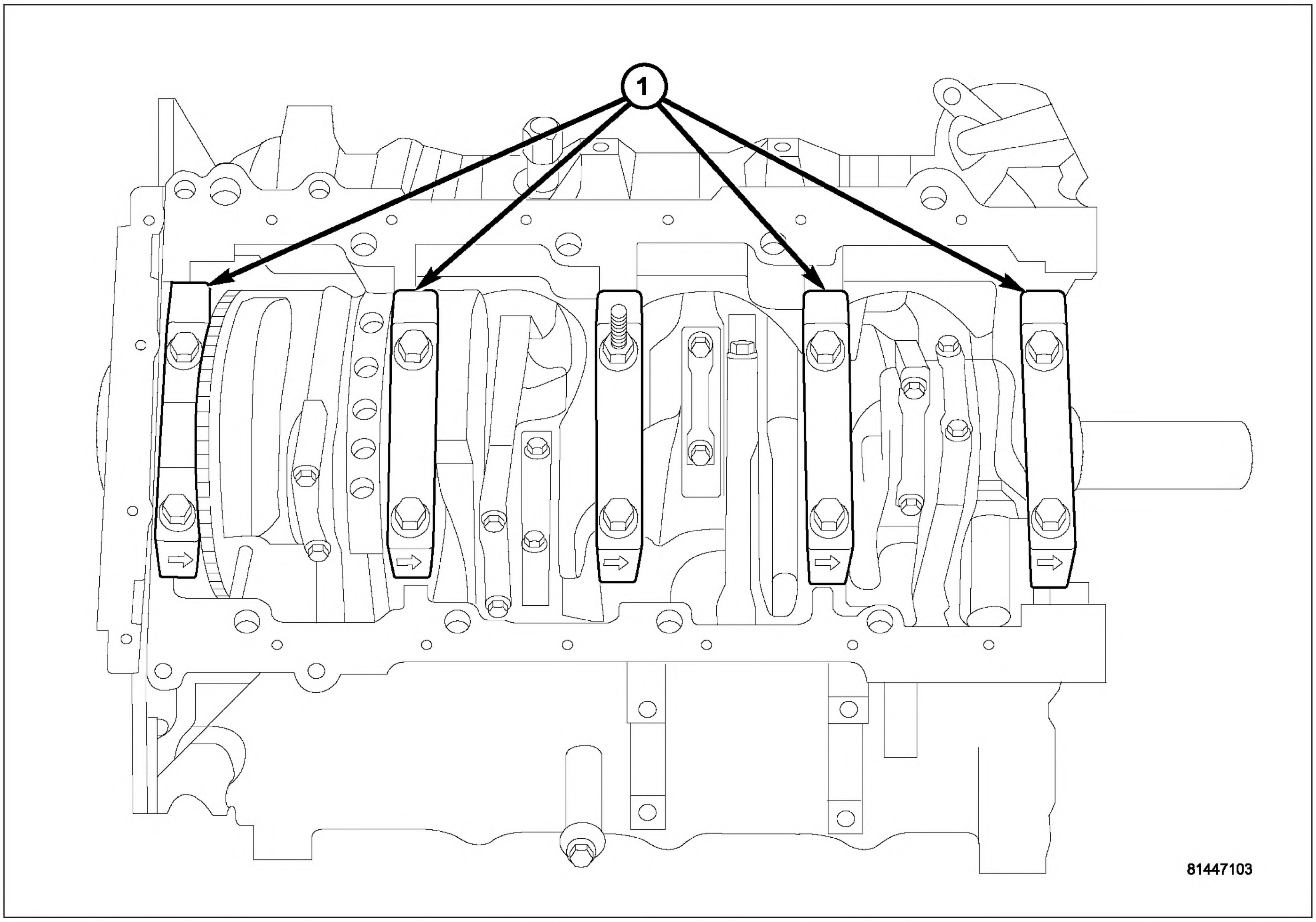
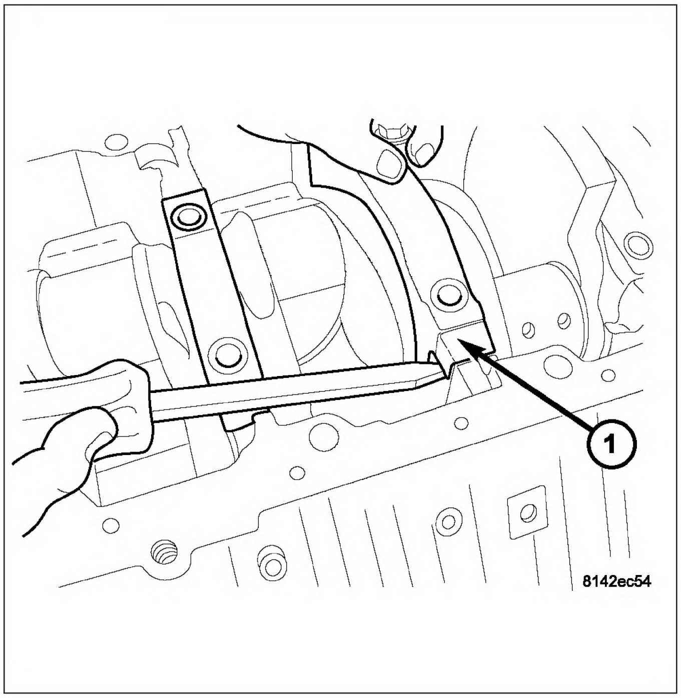
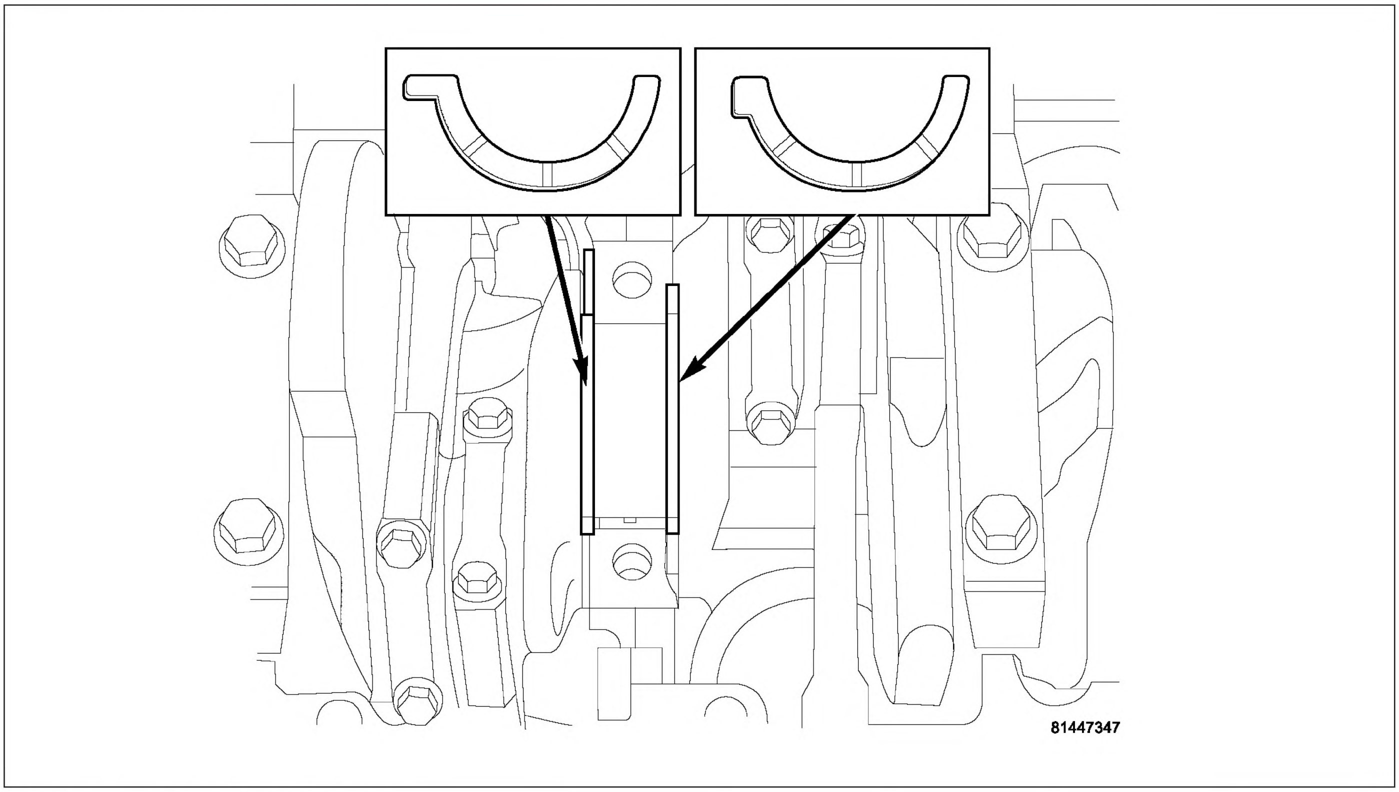


9. Identify rod bearing caps before removal. Remove rod bearing caps with bearings.
10. Identify main bearing caps (1) before removal.

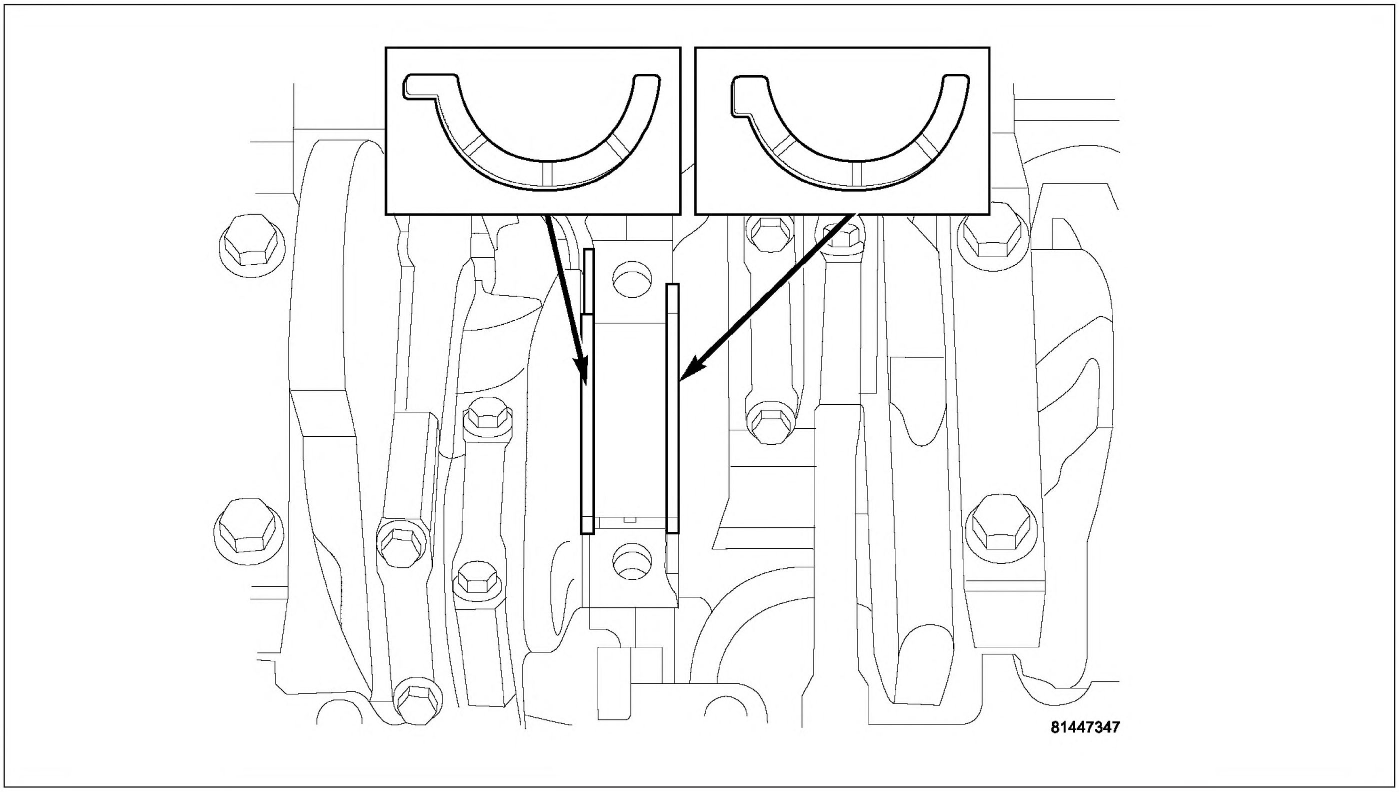
11. Remove main bearing caps (1) and bearings one at a time.



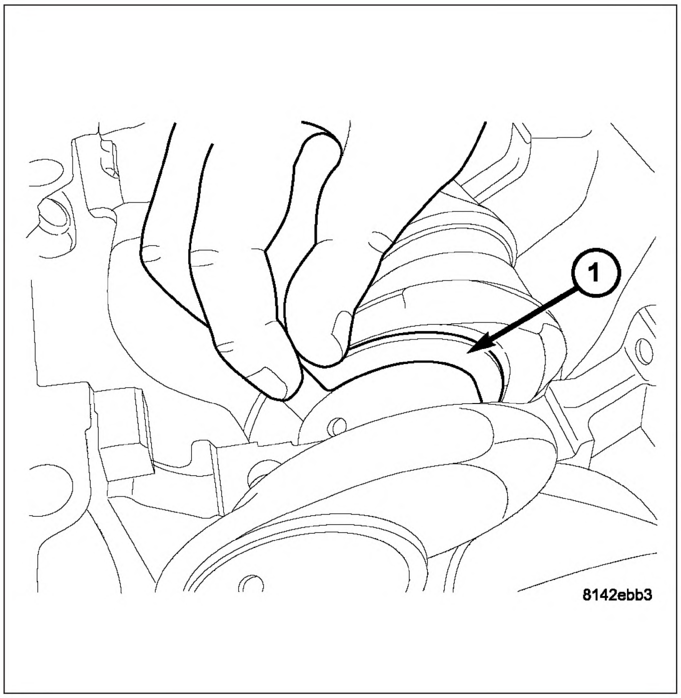


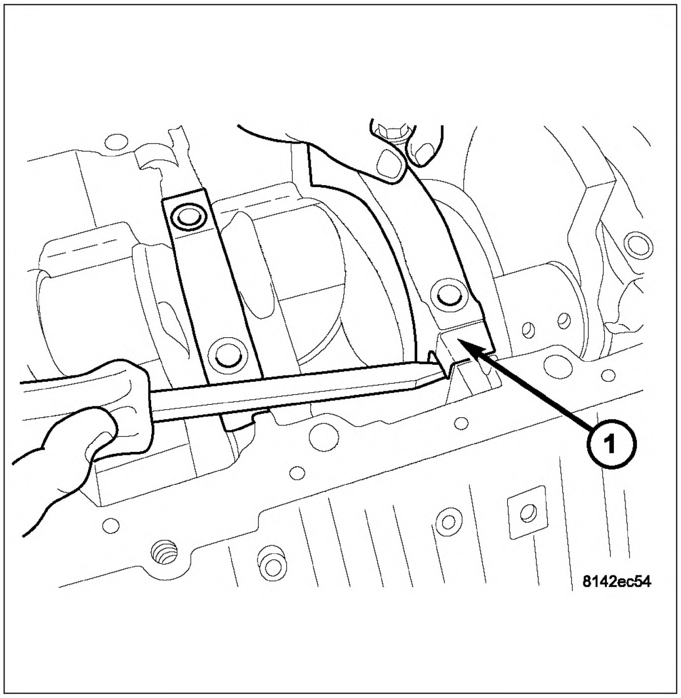
12. Remove the thrust washers.
13. Remove the crankshaft out of the block.

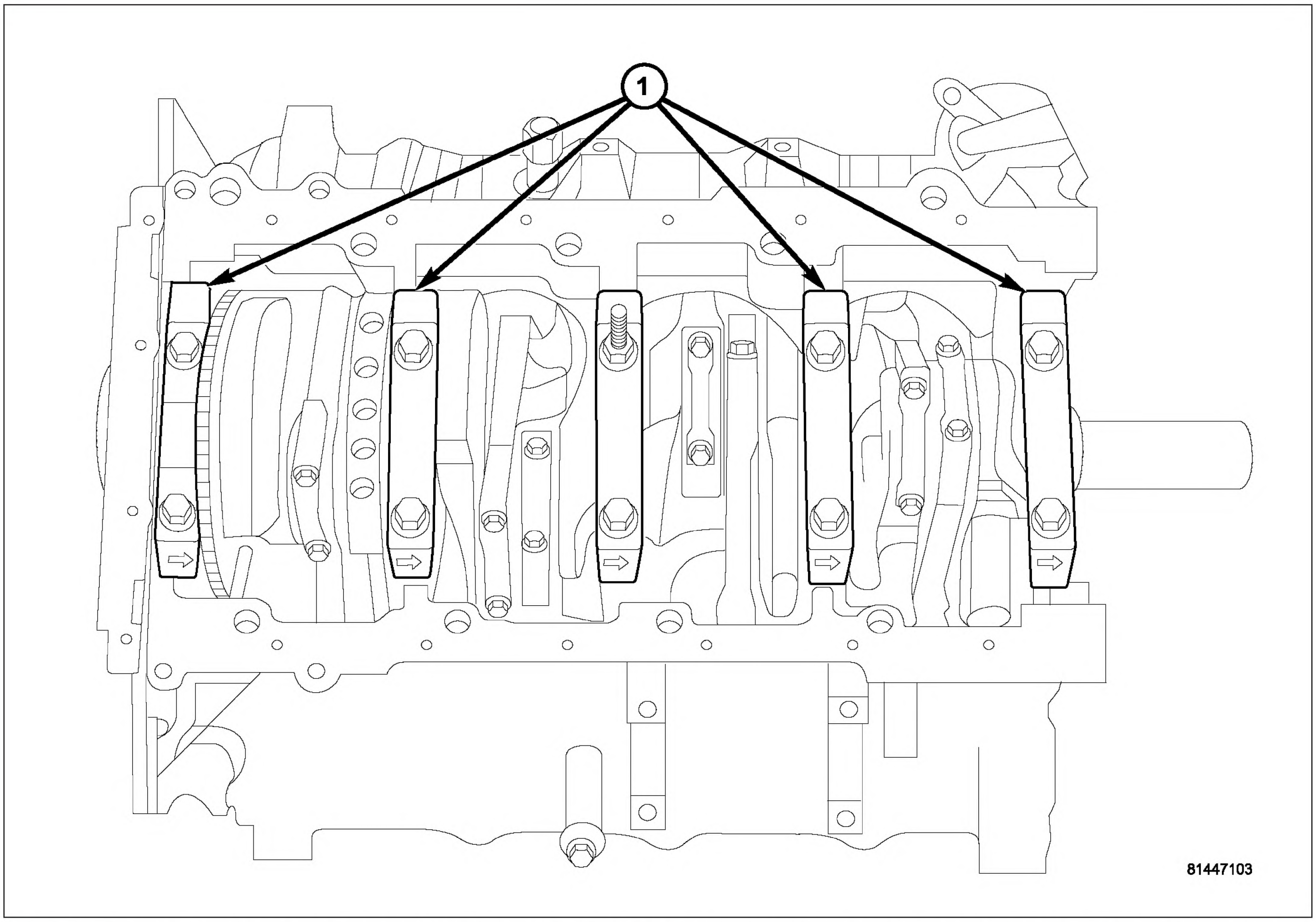
INSTALLATION



1. Select the proper main bearings (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE).
2. Install main bearings in block and caps, and lubricate bearings.
3. Position the crankshaft into the cylinder block.
4. Install the thrust washers (1).



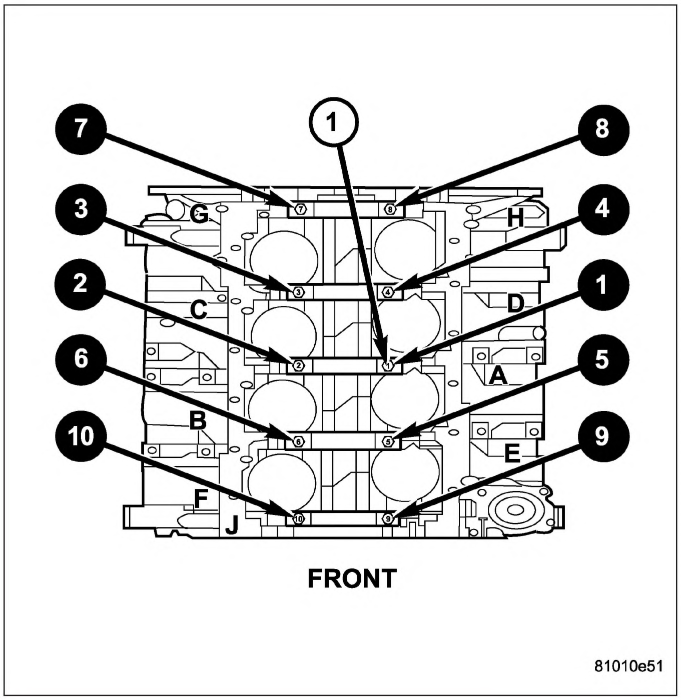




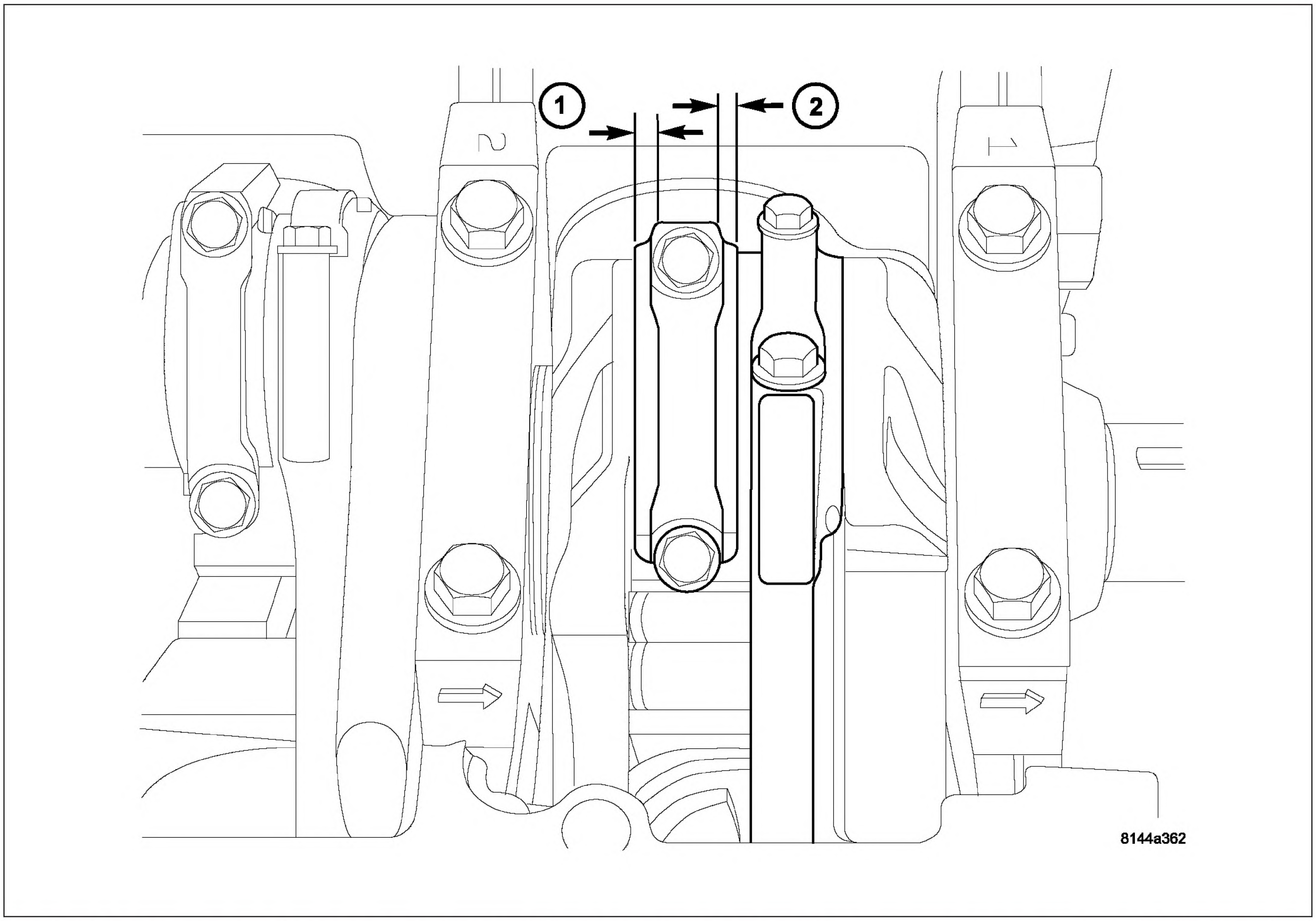
NOTE: The main cap crossbolts are torqued after final torque of the main cap bolts. Always use a new washer/seal on crossbolts.

5. Clean and oil all cap bolts. Install all main bearing caps (1). Install all cap bolts and alternately tighten in two steps using the following sequence.

6. • Step 1 – 27 N·m (20ft. lbs.) torque.
7. • Step 2 – Turn main cap bolts an additional 90°.
8. Install the crossbolts with new washer/gasket. Starting with crossbolt A torque each crossbolt to 28 N·m (21ft. lbs.)torque.
9. Repeat crossbolt torque procedure.
10. Measure crankshaft end play (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN

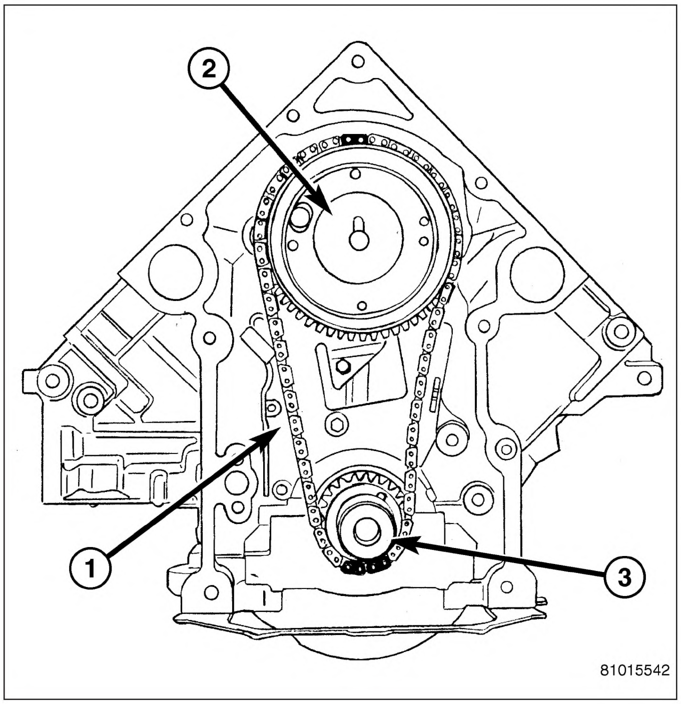


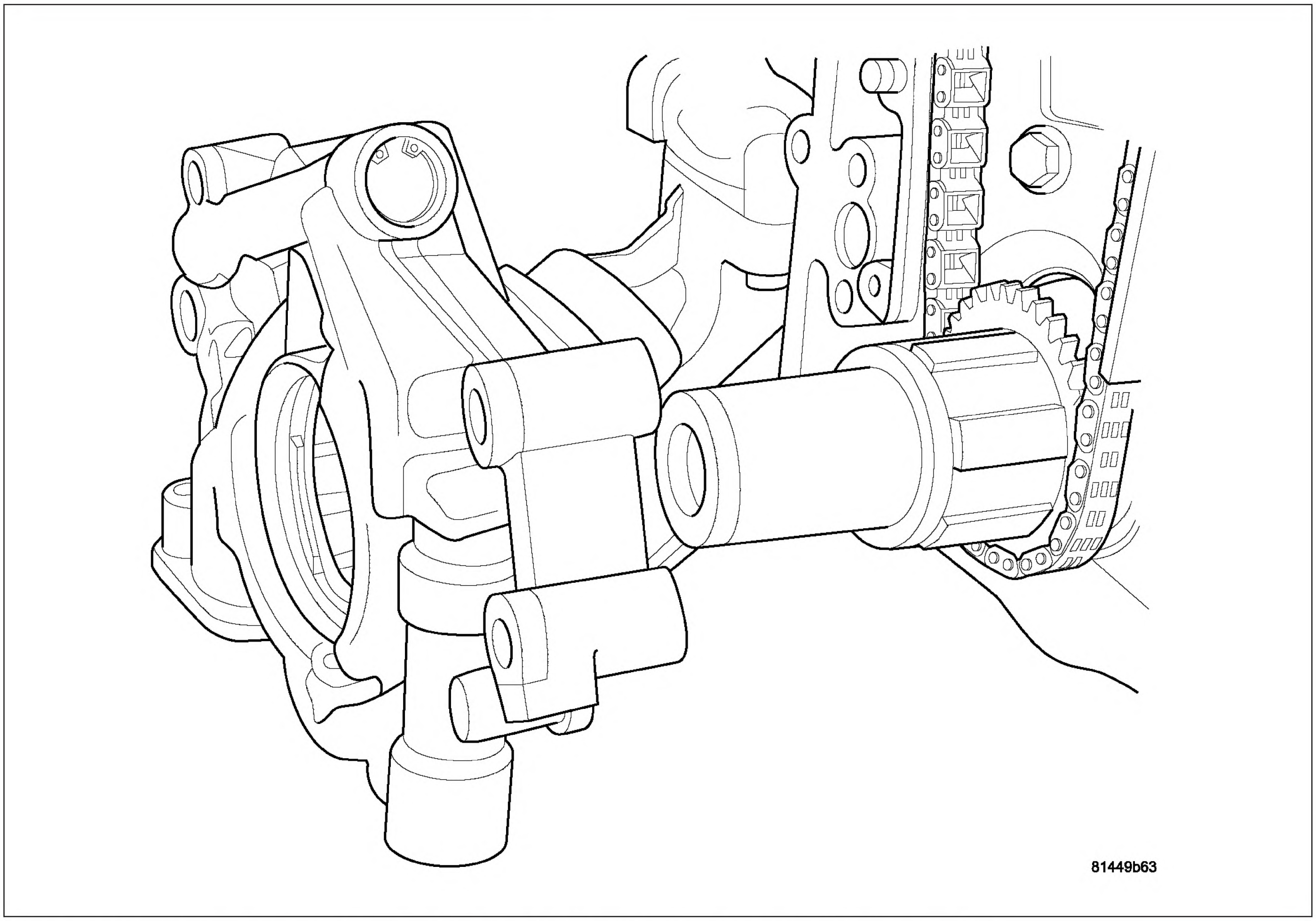
BEARINGS - STANDARD PROCEDURE).



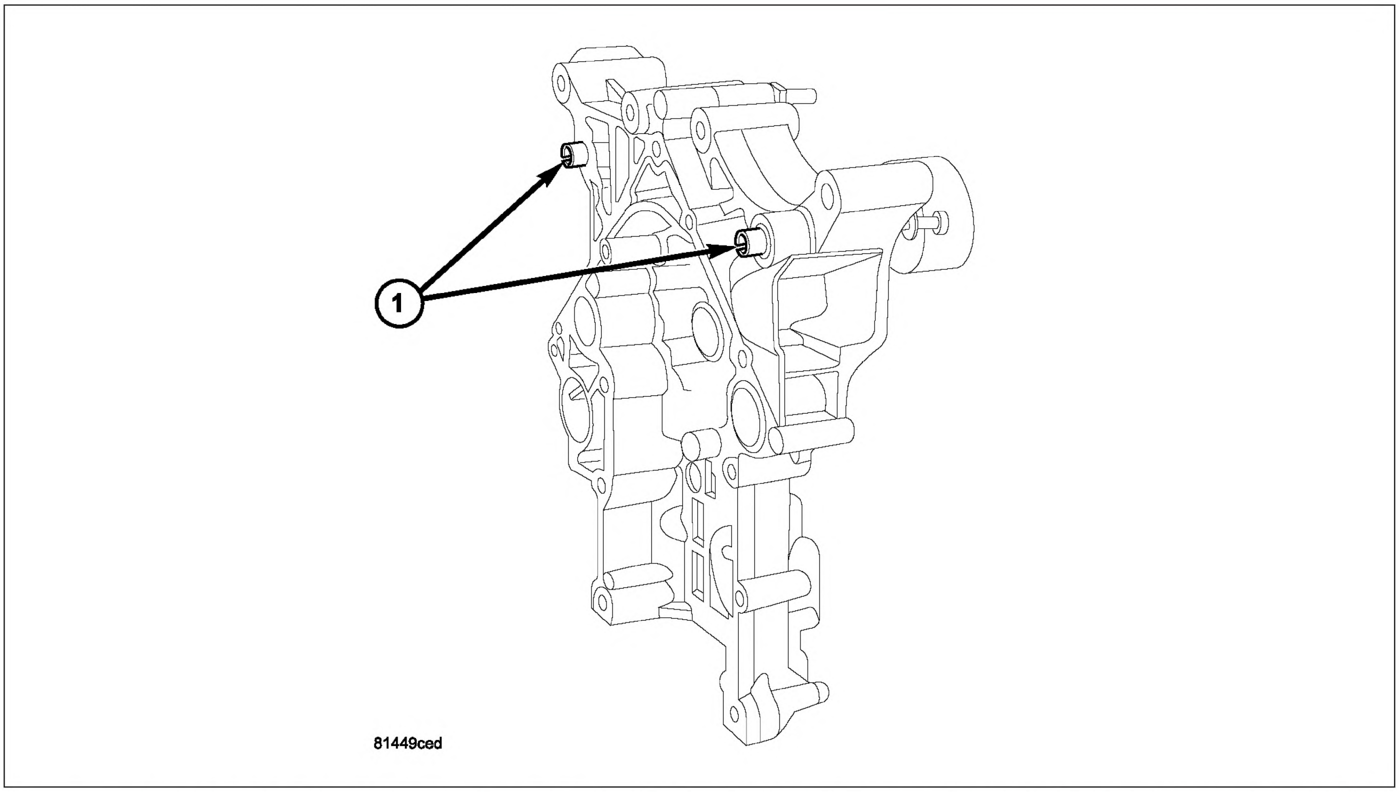
11. Position the connecting rods onto the crankshaft and install the rod bearing caps (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - INSTALLATION).

12. Install timing drive (2) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).



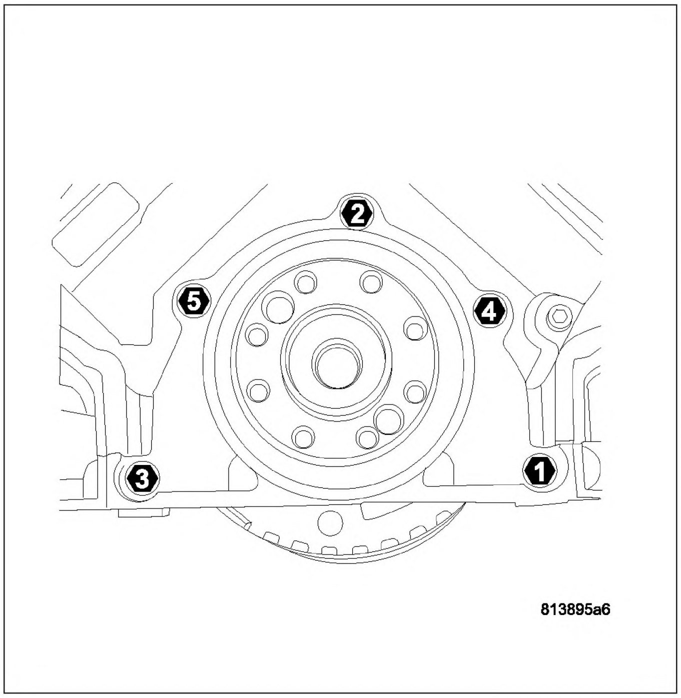


13. Install oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).



14. Install the timing chain cover (1) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

15. Install the rear main seal and retainer (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINE - INSTALLATION).
16. Install the windage tray/oil pan gasket.
17. Install the oil pick up tube.
18. Install the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).
19. Install the vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
20. Install the engine (Refer to 9 - ENGINE - INSTALLATION).



BEARINGS-CRANKSHAFT MAIN

STANDARD PROCEDURE - CRANKSHAFT MAIN BEARING - FITTING

MAIN BEARING JOURNAL DIAMETER (CRANKSHAFT REMOVED)

Crankshaft removed from the cylinder block.

Clean the oil off the main bearing journal.

Determine the maximum diameter of the journal with a micrometer. Measure at two locations 90° apart at each end of the journal.

The maximum allowable taper is 0.008mm (0.0004 inch.) and maximum out of round is 0.005mm (0.0002 inch). Compare the measured diameter with the journal diameter specification (Main Bearing Fitting Chart). Select inserts required to obtain the specified bearing-to-journal clearance.

CRANKSHAFT MAIN BEARING SELECTION

The main bearings are "select fit" to achieve proper oil clearances. For main bearing selection, the crankshaft counterweight has grade identification marks stamped into it. These marks are read from left to right, corresponding with journal number 1, 2, 3, 4 and 5.

NOTE: Service main bearings are coded. These codes identify what size (grade) the bearing is.

MAIN BEARING SELECTION CHART - 5.7L

GRADE MARKING	SIZE mm (in.)	FOR USE WITH JOURNAL SIZE
A	0.008 mm U/S (0.0004 in.) U/S	64.988–64.995 mm (2.5585– 2.5588in.)
B	NOMINAL	64.996–65.004 mm (2.5588–2.5592 in.)
C	0.008 mm O/S (0.0004 in.) O/S	65.005–65.012 mm (2.5592–2.5595 in.)

INSPECTION

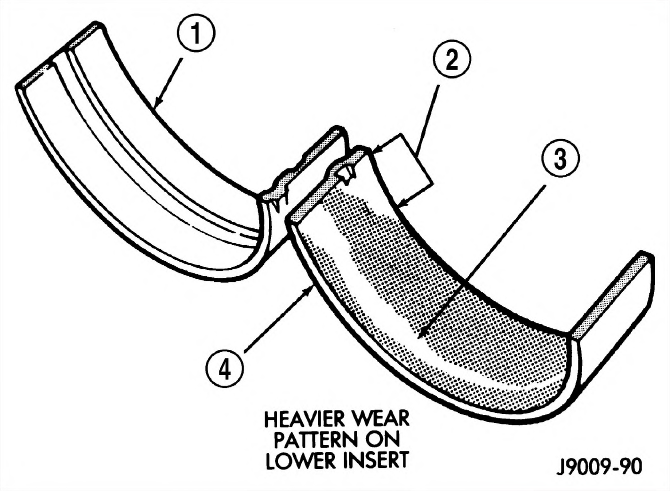
Wipe the inserts clean and inspect for abnormal wear patterns and for metal or other foreign material imbedded in the lining. Normal main bearing insert wear patterns are illustrated.

NOTE: If any of the crankshaft journals are scored, the crankshaft must be repaired or replaced.

Inspect the back of the inserts for fractures, scrapings or irregular wear patterns.

Inspect the upper insert locking tabs for damage.

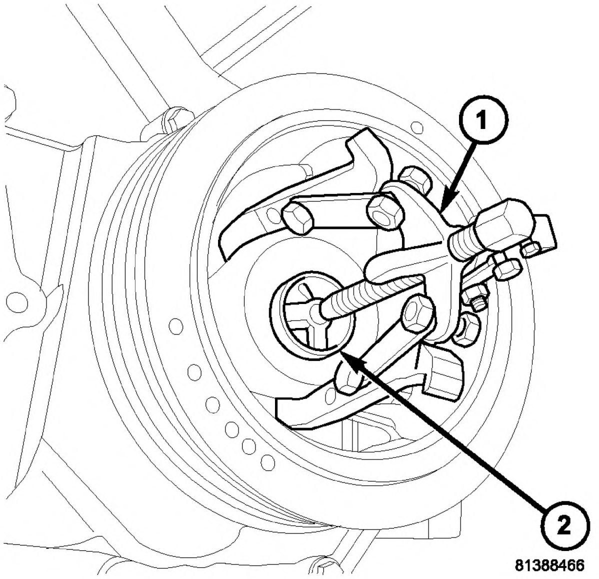
Replace all damaged or worn bearing inserts.



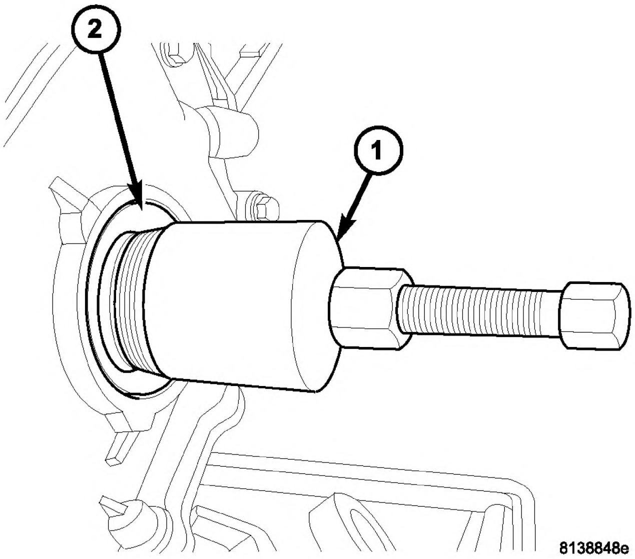
SEAL-CRANKSHAFT OIL-FRONT

REMOVAL

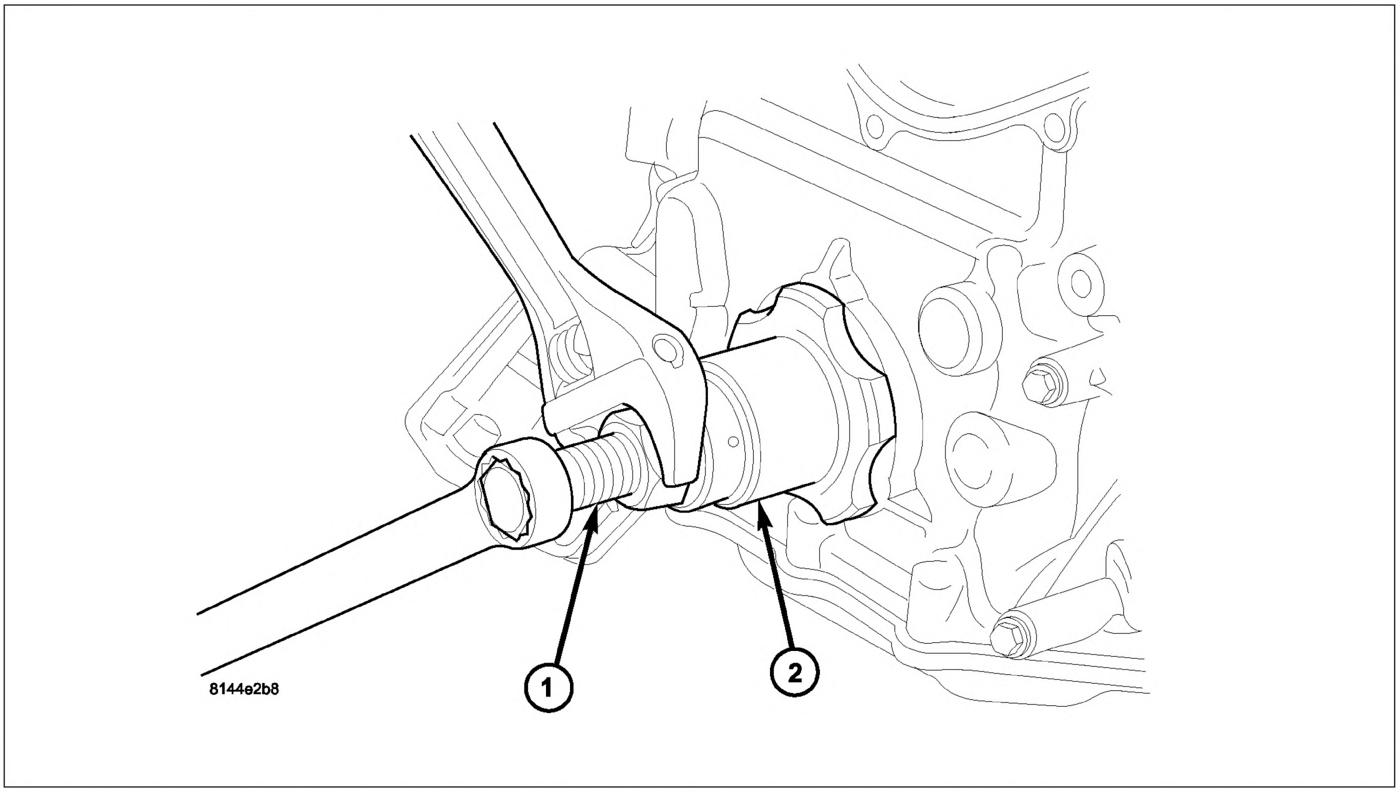
1. Disconnect negative cable from battery.
2. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
3. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
4. Remove upper radiator hose.
5. Remove radiator shroud attaching fasteners.
6. Remove radiator cooling fan and shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
7. Remove crankshaft damper bolt.
8. Remove damper using Special Tools 8513A Insert (2) and 1023 Three Jaw Puller (1) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).



9. Using Special Tool 9071 (1), remove crankshaft front seal (2).



INSTALLATION



CAUTION: The front crankshaft seal must be installed dry. Do not apply lubricant to sealing lip or to outer edge.

1. Using Special Tool 8348 and 8512A, install crankshaft front seal.

CAUTION: To prevent severe damage to the Crankshaft or Damper, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

2. Install vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).
3. Install radiator cooling fan and shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
4. Install upper radiator hose.
5. Install accessory drive belt refer (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
6. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
7. Connect negative cable to battery.

SEAL-CRANKSHAFT OIL-REAR

DIAGNOSIS AND TESTING - REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
    a. Circular spray pattern generally indicates seal leakage or crankshaft damage.

   b. Where leakage tends to run straight down, possible causes are a porous block, camshaft bore cup plugs, oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces. See Engine, for proper repair procedures of these items.

4. If no leaks are detected, pressurized the crankcase as outlined in the section, Inspection (Engine oil Leaks in general)

CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks or scratches. The crankshaft seal flange is specially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled. (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING), under the Oil Leak row, for components inspections on possible causes and corrections.
7. After the oil leak root cause and appropriate corrective action have been identified, (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL).

REMOVAL

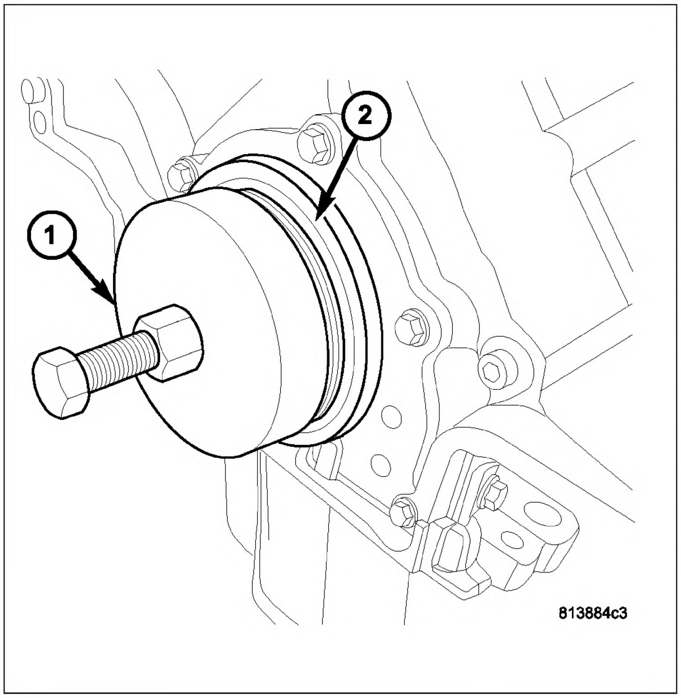
NOTE: This procedure can be performed in vehicle.

1. If being performed in vehicle, remove the transmission.
2. Remove the flexplate (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - REMOVAL).

NOTE: The crankshaft oil seal CAN NOT be reused after removal.

NOTE: The crankshaft rear oil seal remover Special Tool 8506 must be installed deeply into the seal. Continue to tighten the removal tool into the seal until the tool can not be turned farther. Failure to install tool correctly the first time will cause tool to pull free of seal without removing seal from engine.

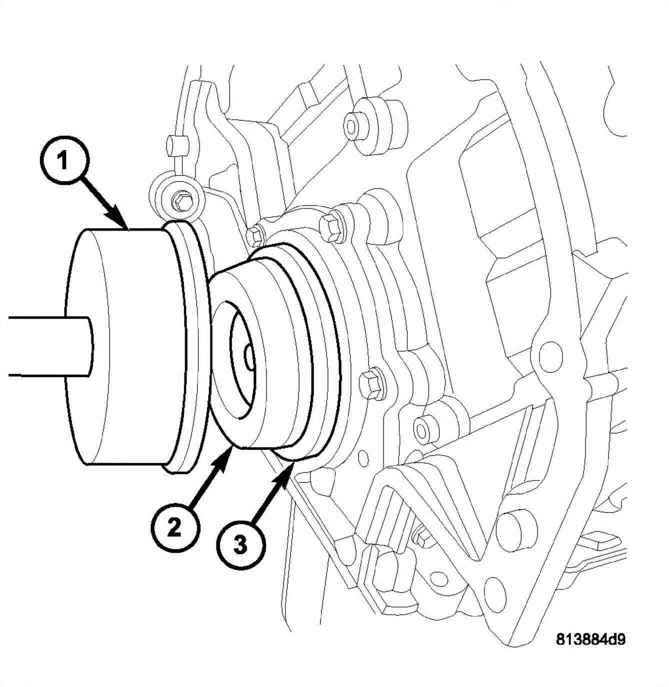
3. Using Special Tool 8506 (1), remove the crankshaft rear oil seal (2).



INSTALLATION

CAUTION: The rear seal must be installed dry for proper operation. Do not lubricate the seal lip or outer edge.

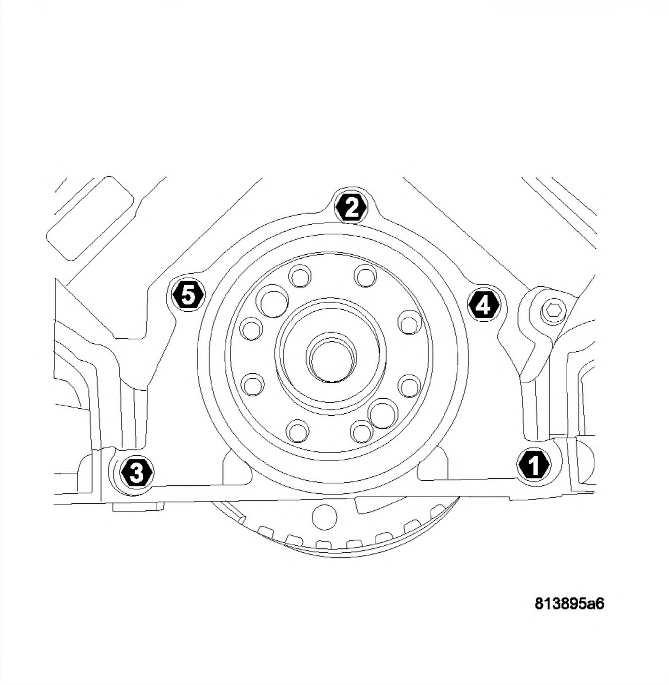
1. Position the plastic seal guide (2) onto the crankshaft rear face. Then position the crankshaft rear oil seal (3) onto the guide.
2. Using Special Tools 8349 Crankshaft Rear Oil Seal Installer (1) and C-4171 Driver Handle, with a hammer, tap the seal (3) into place. Continue to tap on the driver handle until the seal installer seats against the cylinder block crankshaft bore.
3. Install the flexplate. (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - INSTALLATION).
4. Install the transmission.



RETAINER-CRANK REAR OIL - SEAL

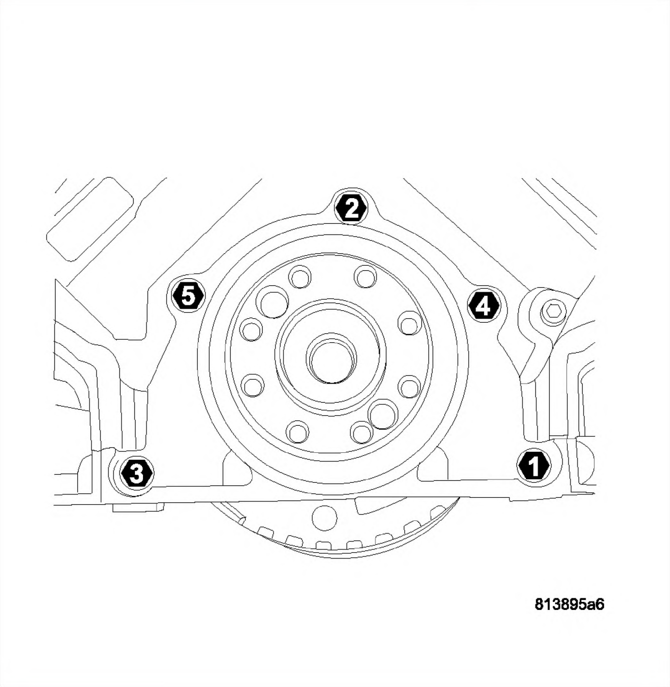
REMOVAL

1. Disconnect negative cable from battery.
2. Remove the transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - REMOVAL).
3. Remove the flexplate. (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - REMOVAL).
4. Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
5. Remove the rear oil seal retainer mounting bolts.
6. Carefully remove the retainer from the engine block.



INSTALLATION

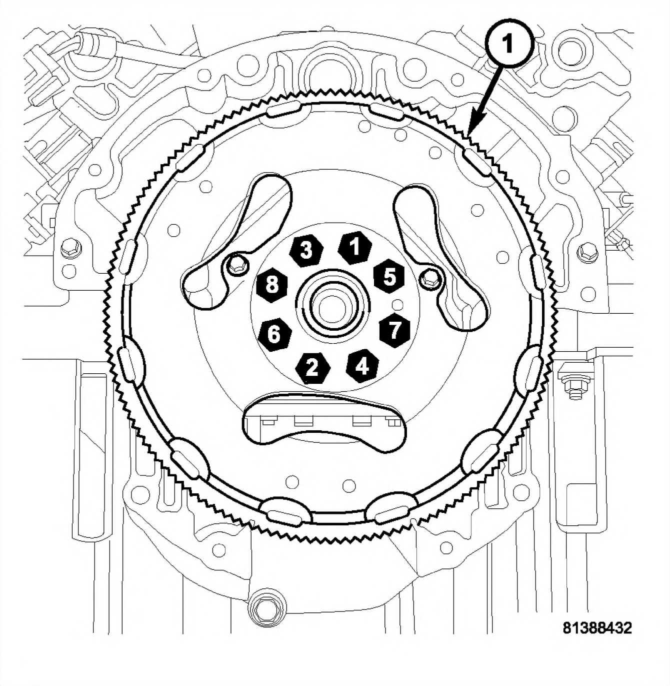
1. Throughly clean all gasket resdue from the engine block.
2. Use extream care and clean all gasket resdue from the retainer.
3. Position the gasket onto the retainer.
4. Position the retainer onto the engine block.
5. Install the retainer mounting bolts. Tighten the bolts to 15 N·m (132 in. lbs.) using the procedure shown.
6. Install the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).
7. Install the flexplate (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - INSTALLATION).
8. Install the transmission (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - INSTALLATION).
9. Check and verify engine oil level.
10. Start engine and check for leaks.



FLEX PLATE

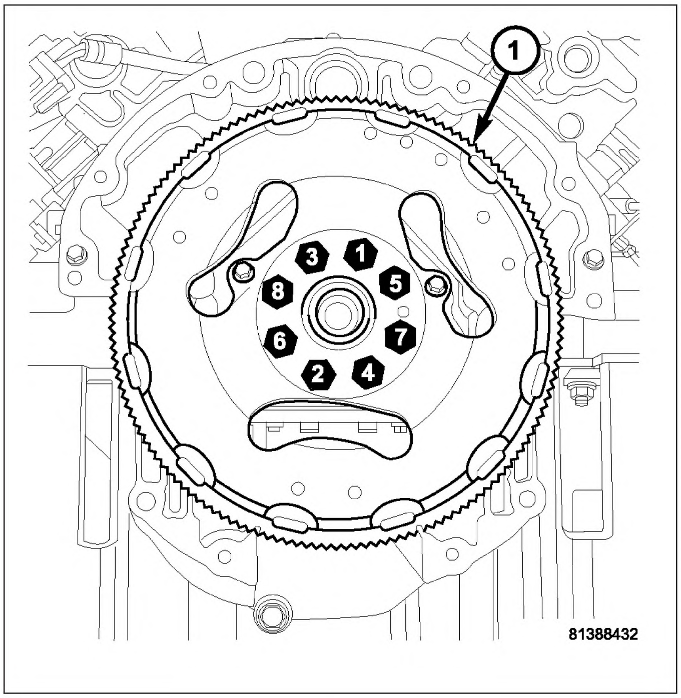
REMOVAL

1. Remove the transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - REMOVAL).
2. Remove the bolts and flexplate (1).



INSTALLATION

1. Position the flexplate or flywheel onto the crankshaft and install the bolts hand tight.
2. **For automatic transmissions:** Tighten the flexplate retaining bolts to 95 N·m (70 ft. lbs.).



3. Install the transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - INSTALLATION).

TAPPETS-HYDRAULIC ROLLER

DIAGNOSIS AND TESTING - HYDRAULIC TAPPETS

Before disassembling any part of the engine to correct tappet noise, check the oil pressure. If vehicle has no oil pressure gauge, install a reliable gauge at the pressure sending-unit. The pressure should be between 207-552 kPa (30-70 psi) at 3,000 RPM.

Check the oil level after the engine reaches normal operating temperature. Allow 5 minutes to stabilize oil level, check dipstick. The oil level in the pan should never be above the FULL mark or below the ADD OIL mark on dipstick. Either of these two conditions could be responsible for noisy tappets.

OIL LEVEL

HIGH

If oil level is above the FULL mark, it is possible for the connecting rods to dip into the oil. With the engine running, this condition could create foam in the oil pan. Foam in oil pan would be fed to the hydraulic tappets by the oil pump causing them to lose length and allow valves to seat noisily.

LOW

Low oil level may allow oil pump to take in air. When air is fed to the tappets, they lose length, which allows valves to seat noisily. Any leaks on intake side of oil pump through which air can be drawn will create the same tappet action. Check the lubrication system from the intake strainer to the pump cover, including the relief valve retainer cap. When tappet noise is due to aeration, it may be intermittent or constant, and usually more than one tappet will be noisy. When oil level and leaks have been corrected, operate the engine at fast idle. Run engine for a sufficient time to allow all of the air inside the tappets to be bled out.

TAPPET NOISE DIAGNOSIS

1. To determine source of tappet noise, crank over engine with cylinder head covers removed.

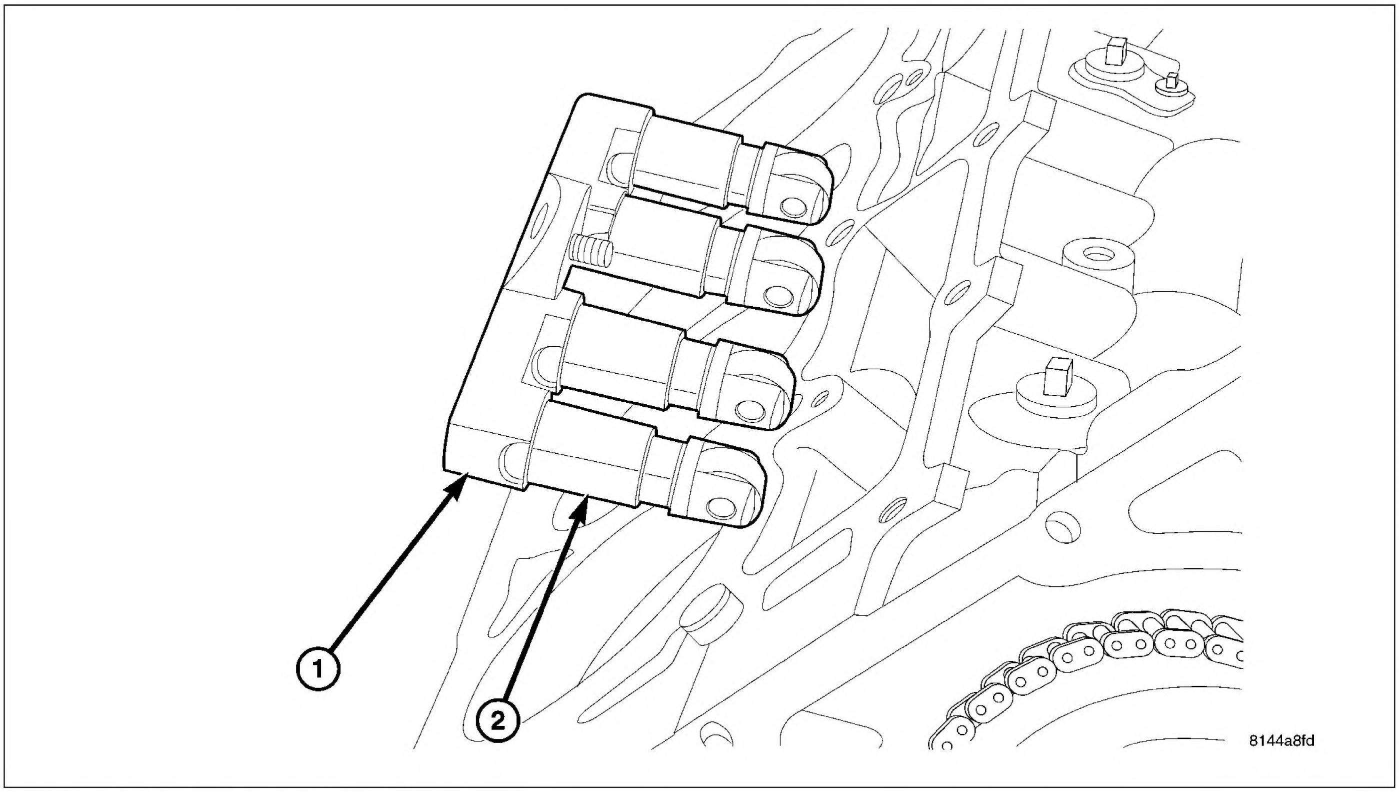
2. Feel each valve spring or rocker arm to detect noisy tappet. The noisy tappet will cause the affected spring and/or rocker arm to vibrate or feel rough in operation.

NOTE: Worn valve guides or cocked springs are sometimes mistaken for noisy tappets. If such is the case, noise may be dampened by applying side thrust on the valve spring. If noise is not appreciably reduced, it can be assumed the noise is in the tappet. Inspect the rocker arm push rod sockets and push rod ends for wear.

3. Valve tappet noise ranges from light noise to a heavy click. A light noise is usually caused by excessive leak-down around the unit plunger, or by the plunger partially sticking in the tappet body cylinder. The tappet should be replaced. A heavy click is caused by a tappet check valve not seating, or by foreign particles wedged between the plunger and the tappet body. This will cause the plunger to stick in the down position. This heavy click will be accompanied by excessive clearance between the valve stem and rocker arm as valve closes. In either case, tappet assembly should be removed for inspection and cleaning.
4. The valve train generates a noise very much like a light tappet noise during normal operation. Care must be taken to ensure that tappets are making the noise. If more than one tappet seems to be noisy, it's probably not the tappets.

REMOVAL

1. Disconnect the negative cable from the battery.
2. Remove the air cleaner (Refer to 9 - ENGINE/AIR INTAKE SYSTEM - REMOVAL).
3. Remove intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
4. Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
5. Remove rocker arm assembly and push rods (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL). Identify push rods to ensure installation in original location.
6. Remove the cylinder head (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).

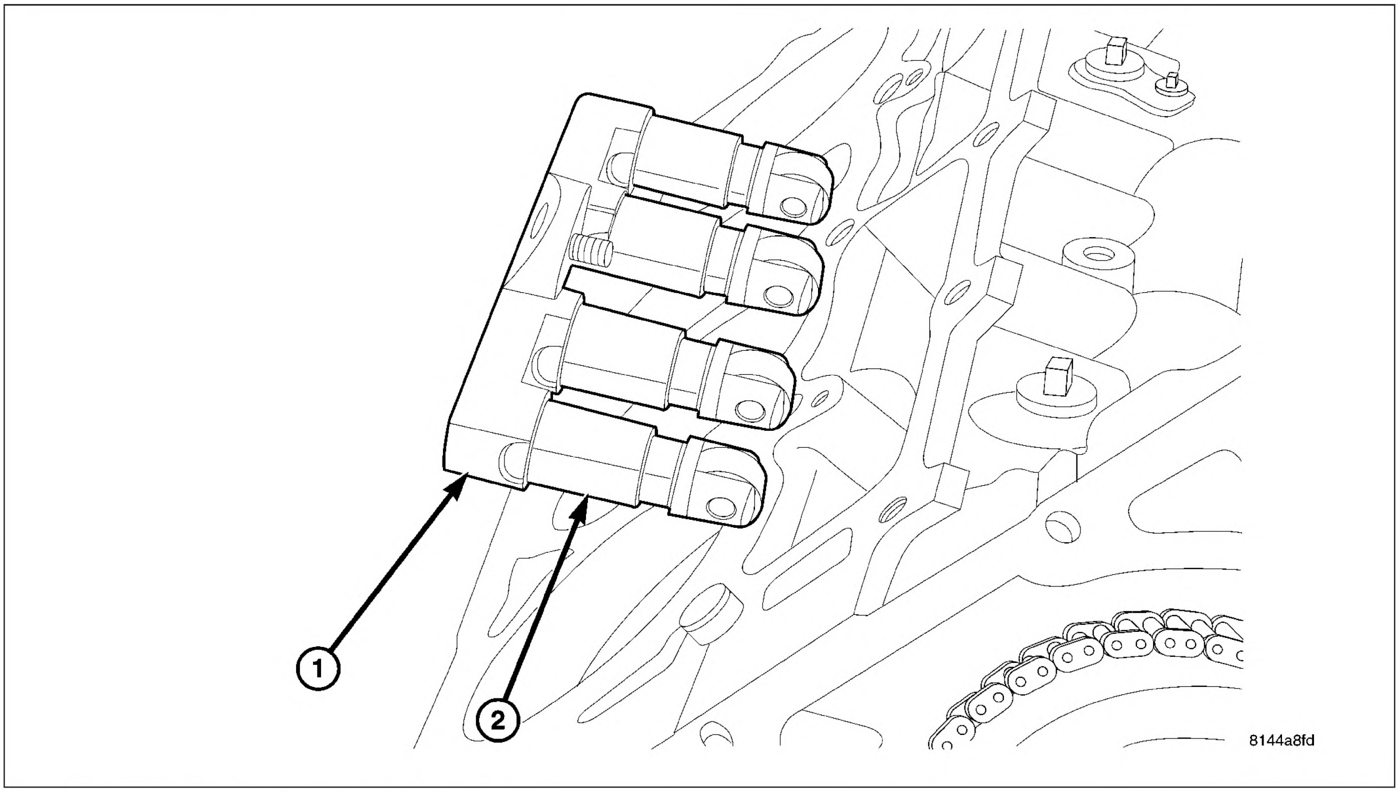


7. Remove bolt from tappet guide holder.
8. Remove tappet guide holder.

9. Pull tappet out of bore with a twisting motion. **If all tappets are to be removed and reused, identify tappets to ensure installation in original location.**
10. Check camshaft lobes for abnormal wear.

INSTALLATION

1. Lubricate tappets.



2. Install tappets in their original positions.

CAUTION: The 5.7L LX engine uses both standard roller tappets and deactivating roller tappets, for use with the Multi Displacement System. The deactivating roller tappets must be used in cylinders 1,4,6,7. The deactivating tappets can be identified by the two holes in the side of the tappet body, for the latching pins.

3. Install tappet guide yoke. Install the tappet guide yoke bolt and tighten to 12 N·m (106 in. lbs.) torque.
4. Install cylinder head (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).
5. Install pushrods and rocker arm assembly (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION).
6. Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
7. Install intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
8. Install the air cleaner (Refer to 9 - ENGINE/AIR INTAKE SYSTEM - INSTALLATION).
9. Connect the negative cable to the battery.

CAUTION: To prevent damage to valve mechanism, engine must not be run above fast idle until all hydraulic tappets have filled with oil and have become quiet.

10. Road test vehicle and check for leaks.

PISTON & CONNECTING ROD

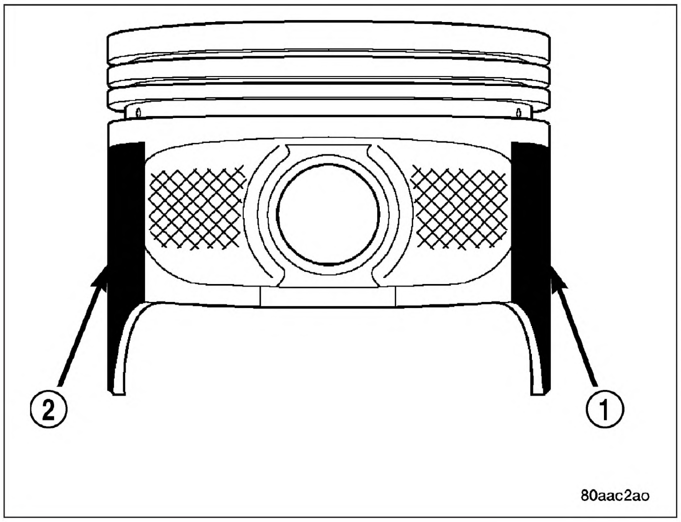
DESCRIPTION

CAUTION: Do not use a metal stamp to mark connecting rods as damage may result, instead use ink or a scratch awl.

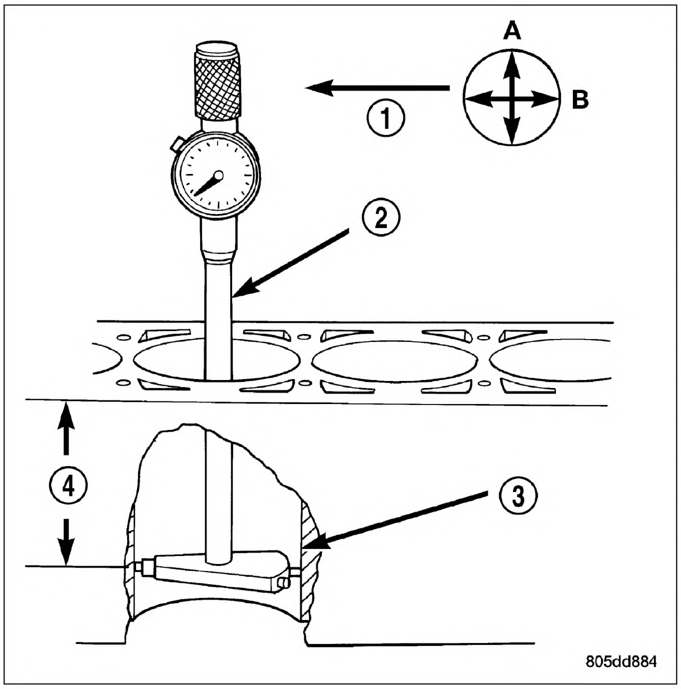
The pistons are made of a high strength aluminum alloy. Piston skirts are coated with a solid lubricant (Molykote) to reduce friction and provide scuff resistance. The piston top ring groove and land is anodized. The connecting rods are made of forged powdered metal, with a "fractured cap" design. A pressed fit piston pin is used to attach the piston and connecting rod.

STANDARD PROCEDURE - PISTON FITTING

1. To correctly select the proper size piston, a cylinder bore gauge, capable of reading in 0.003 mm (.0001 in.) INCREMENTS is required. If a bore gauge is not available, do not use an inside micrometer.
2. Measure the inside diameter of the cylinder bore at a point 38.0 mm (1.5 inches) below top of bore. Start perpendicular (across or at 90 degrees) to the axis of the crankshaft at point A and then take an additional bore reading 90 degrees to that at point B.
3. The coated pistons will be serviced with the piston pin and connecting rod pre-assembled. The piston-rod assembly is specific for the left cylinder bank (odd numbered) and the right cylinder bank (even numbered) and must not be interchanged.



4. The coating material is applied to the piston after the final piston machining process. Measuring the outside diameter of a coated piston will not provide accurate results. Therefore measuring the inside diameter of the cylinder bore with a dial Bore Gauge is **MANDATORY**. To correctly select the proper size piston, a cylinder bore gauge capable of reading in 0.003 mm (.0001 in.) increments is required.
5. Piston installation into the cylinder bore requires slightly more pressure than that required for non-coated pistons. The bonded coating on the piston will give the appearance of a line-to-line fit with the cylinder bore.



REMOVAL

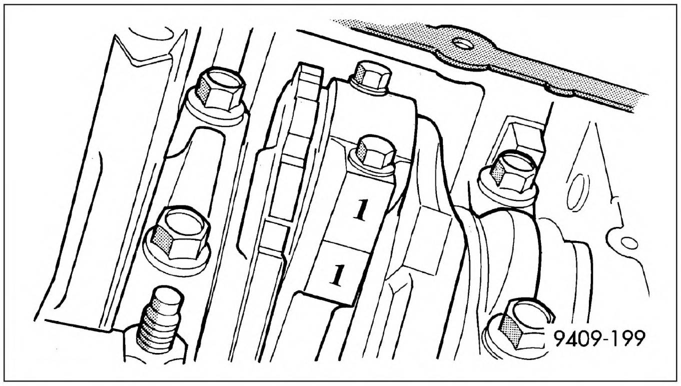
1. Disconnect negative cable from battery.
2. Remove the following components:
   - Oil pan and gasket/windage tray (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
   - Cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL) and (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
   - Timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
   - Cylinder head(s) (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL) and (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).
3. If necessary, remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation.** Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so the each connecting rod is centered in cylinder bore.

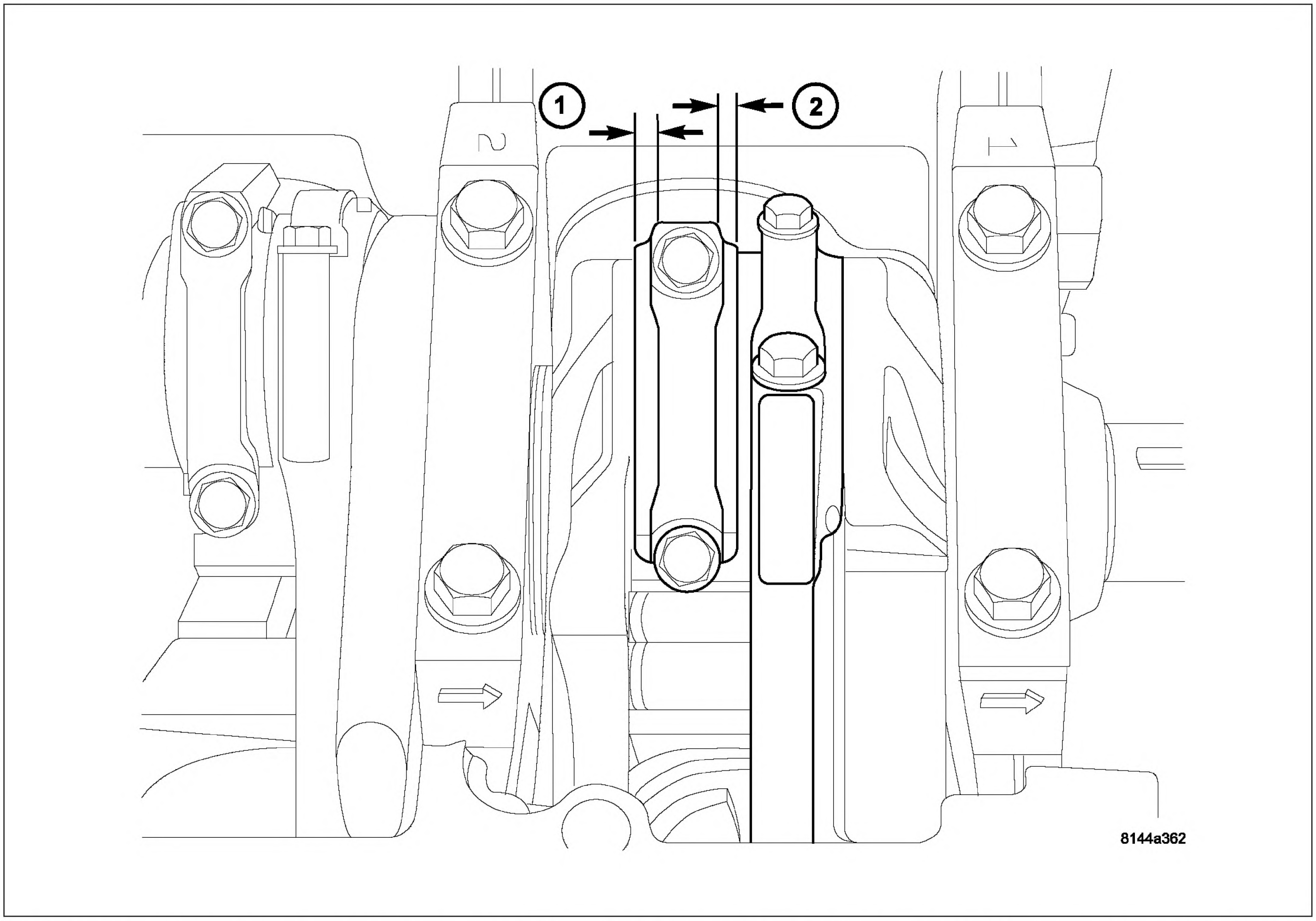
CAUTION: DO NOT use a number stamp or a punch to mark connecting rods or caps, as damage to connecting rods could occur

NOTE: Connecting rods and bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

4. Mark connecting rod and bearing cap positions using a permanent ink marker or scribe tool.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.





5. Remove connecting rod cap. Install Special Tool 8507 Connecting Rod Guides into the connecting rod being removed. Remove piston from cylinder bore. Repeat this procedure for each piston being removed.

CAUTION: Care must be taken not to nick crankshaft journals, as engine damage may occur

6. Immediately after piston and connecting rod removal, install bearing cap on the mating connecting rod to prevent damage to the fractured cap and rod surfaces.

7. Carefully remove piston rings from piston(s), starting from the top ring down.

CLEANING

CAUTION: DO NOT use a wire wheel or other abrasive cleaning devise to clean the pistons or connecting rods. The pistons have a Moly coating, this coating must not be damaged.

1. Using a suitable cleaning solvent clean the pistons in warm water and towel dry.
2. Use a wood or plastic scraper to clean the ring land grooves.

CAUTION: DO NOT remove the piston pin from the piston and connecting rod assembly.

INSPECTION

Check the connecting rod journal for excessive wear, taper and scoring (Refer to 9 - ENGINE/ENGINE BLOCK/ CONNECTING ROD BEARINGS - STANDARD PROCEDURE).

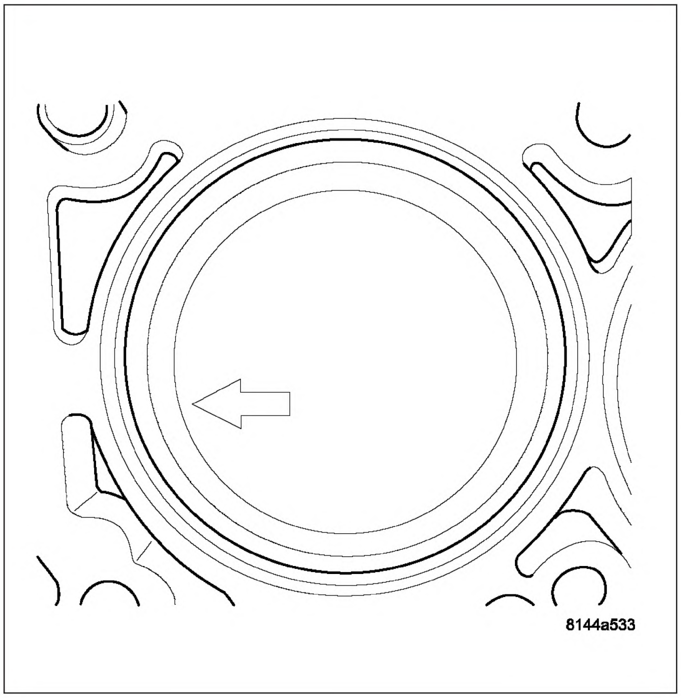
Check the connecting rod for signs of twist or bending.

Check the piston for taper and elliptical shape before it is fitted into the cylinder bore (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - STANDARD PROCEDURE).

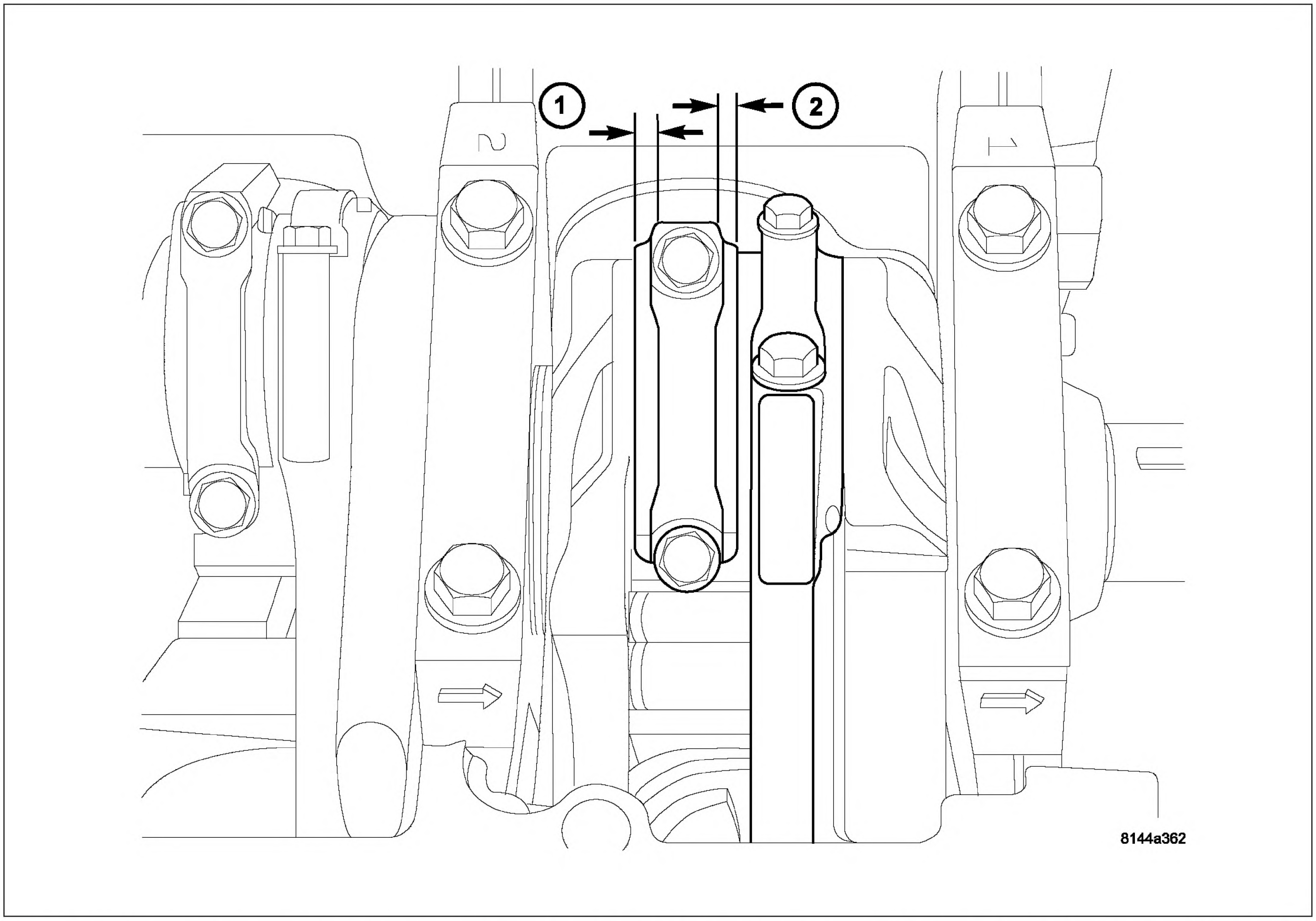
Check the piston for scoring, or scraping marks in the piston skirts. Check the ring lands for cracks and/or deterioration.

INSTALLATION

1. Before installing piston and connecting rod assemblies into the bore, install the piston rings (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE).
2. Immerse the piston head and rings in clean engine oil. Position a ring compressor over the piston and rings. Tighten ring compressor. **Ensure position of rings do not change during this operation.**
3. Position bearing onto connecting rod. Lubricate bearing surface with clean engine oil.
4. Install Special Tool 8507 Connecting Rod Guides into connecting rod bolt threads.
5. The pistons are marked on the piston pin bore surface with an raised “F” or arrow on top of piston indicating installation position. This mark must be pointing toward the front of engine on both cylinder banks.
6. Wipe cylinder bore clean and lubricate with engine oil.



7. Rotate crankshaft until connecting rod journal is on the center of cylinder bore. Insert rod and piston into cylinder bore and carefully position connecting rod guides over crankshaft journal.
8. Tap piston down in cylinder bore using a hammer handle. While at the same time, guide connecting rod into position on rod journal.



CAUTION: Connecting Rod Bolts are Torque to Yield Bolts and Must Not Be Reused. Always replace the Rod Bolts whenever they are loosened or removed.

9. Lubricate rod bolts and bearing surfaces with engine oil. Install connecting rod cap and bearing. Tighten bolts to 21 N·m (15 ft. lbs.) plus a 90° turn.

10. Install the following components:
    - Cylinder head(s). (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).
    - Cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).
    - Install the intake manifold.
    - Oil pan and gasket/windage tray. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).
11. Fill crankcase with proper engine oil to correct level.
12. Connect negative cable to battery.

RINGS-PISTON

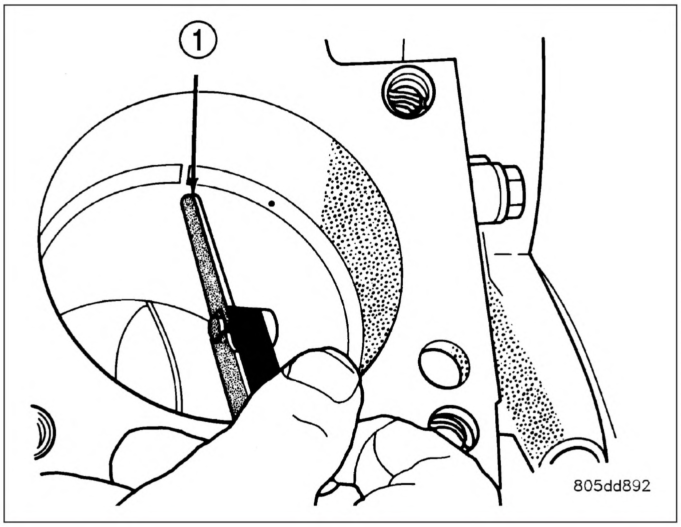
STANDARD PROCEDURE - PISTON RING FITTING

Before reinstalling used rings or installing new rings, the ring clearances must be checked.

1. Wipe the cylinder bore clean.
2. Insert the ring in the cylinder bore.

NOTE: The ring gap measurement must be made with the ring positioned at least 12mm (0.50 inch.) from bottom of cylinder bore.

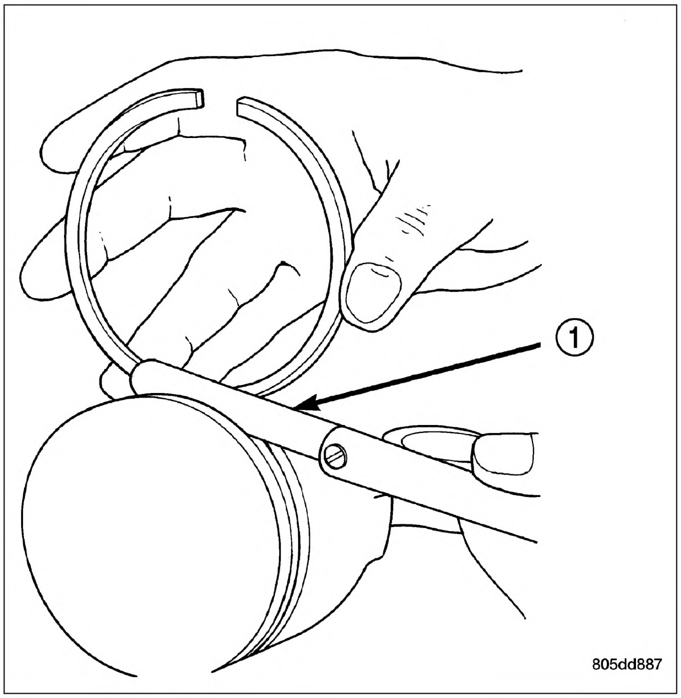
3. Using a piston, to ensure that the ring is squared in the cylinder bore, slide the ring downward into the cylinder.
4. Using a feeler gauge check the ring end gap. Replace any rings not within specification.



PISTON RING SIDE CLEARANCE

NOTE: Make sure the piston ring grooves are clean and free of nicks and burrs.

5. Measure the ring side clearance as shown make sure the feeler gauge fits snugly between the ring land and the ring. Replace any ring not within specification.
6. Rotate the ring around the piston, the ring must rotate in the groove with out binding.



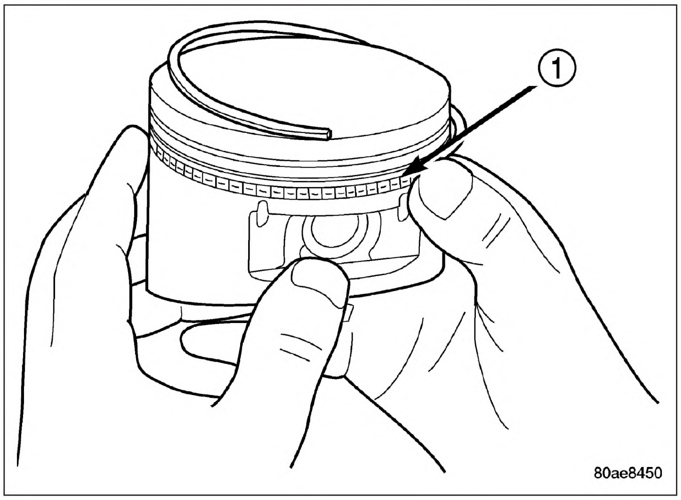
PISTON RING SPECIFICATION CHART

Ring Position	Ring/Groove Side Clearance	Maximum Clearance
Upper Ring	0.02-0.07mm (0.0008- 0.0028 in.)	0.11mm (0.004 in.)
Intermediate Ring	0.02-0.06 mm (0.0008-0.0023 in.)	0.10mm (0.004 in.)
Ring Position	**Ring Gap**	**Wear Limit**
Upper Ring	0.23-0.38mm (0.0090-0.0149 in.)	0.43mm (0.017 in.)
Intermediate Ring	0.35-0.60mm (0.0137-0.0236 in.)	0.74mm (0.029 in.)
Oil Control Ring (Steel Rail)	0.015-0.66mm (0.0059- 0.0259 in.)	0.76mm (0.030 in.)

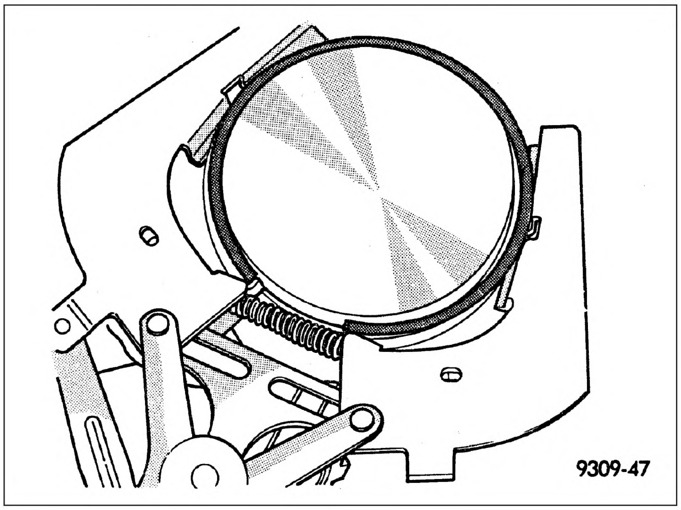
7. The No. 1 and No. 2 piston rings have a different cross section. Ensure No. 2 ring is installed with manufacturers I.D. mark (Dot) facing up, towards top of the piston.

NOTE: Piston rings are installed in the following order:
- **Oil ring expander.**
- **Lower oil ring side rail.**
- **Upper oil ring side rail.**
- **No. 2 Intermediate piston ring.**
- **No. 1 Upper piston ring.**

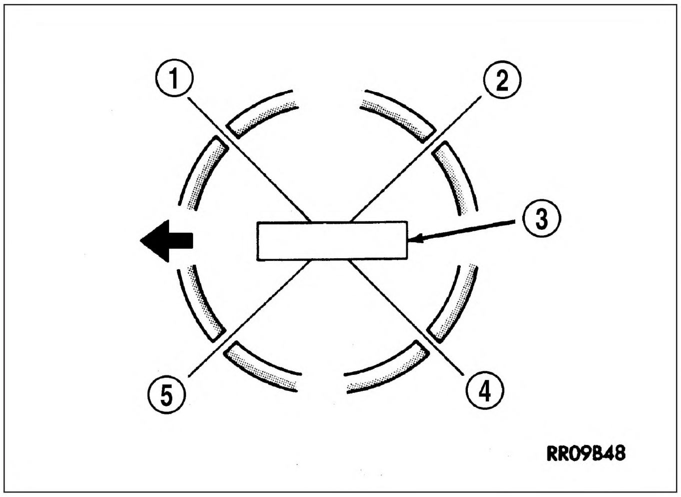
8. Install the oil ring expander.
9. Install upper side rail by placing one end between the piston ring groove and the expander ring. Hold end firmly and press down the portion to be installed until side rail is in position. Repeat this step for the lower side rail.



10. Install No. 2 intermediate piston ring using a piston ring installer.
11. Install No. 1 upper piston ring using a piston ring installer.



12. Position piston ring end gaps as shown in. It is important that expander ring gap is at least 45° from the side rail gaps, but not on the piston pin center or on the thrust direction.

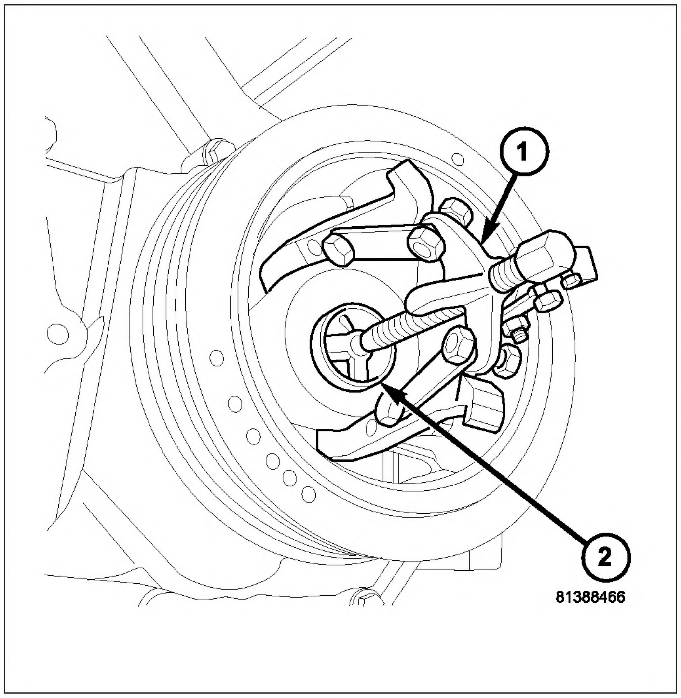


DAMPER-CRANKSHAFT

REMOVAL

1. Disconnect negative cable from battery.
2. Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
3. Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
4. Remove radiator upper hose.
5. Remove fan shroud (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
6. Remove crankshaft damper bolt.

7. Remove damper using Special Tools 8513A Insert and 1023 Three Jaw Puller.

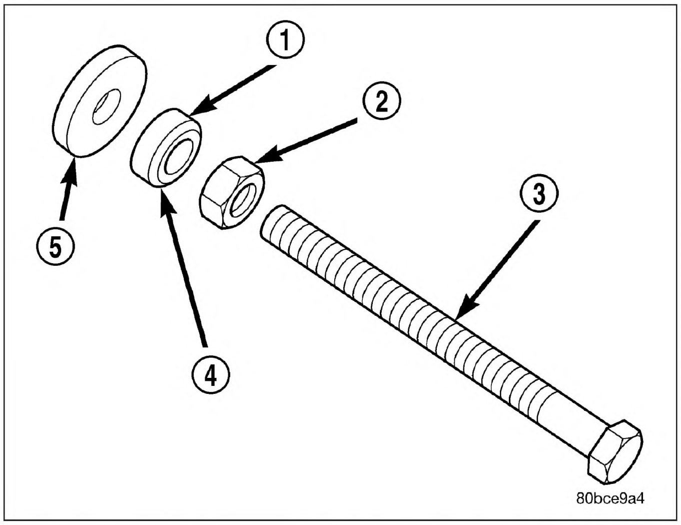


INSTALLATION

CAUTION: To prevent severe damage to the Crankshaft, Damper or Special Tool 8512–A, thoroughly clean the damper bore and the crankshaft nose before installing Damper.

1. Slide damper onto crankshaft slightly.

CAUTION: Special Tool 8512–A, is assembled in a specific sequence. Failure to assemble this tool in this sequence can result in tool failure and severe damage to either the tool or the crankshaft.

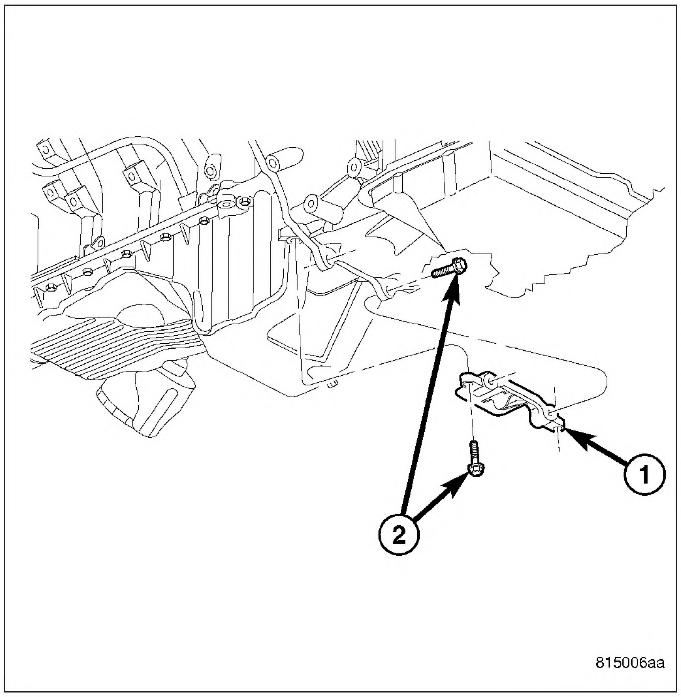


2. Assemble Special Tool 8512–A as follows, The nut is threaded onto the shaft first (2). Then the roller bearing (1) is placed onto the threaded rod (3) The hardened bearing surface of the bearing (1) **MUST** face the nut (2). Then the hardened washer (5) slides onto the threaded rod (3). Once assembled coat the threaded rod's threads with Mopar® Nickel Anti-Seize or (Loctite No. 771).
3. Using Special Tool 8512–A, press damper onto crankshaft.
4. Install then tighten crankshaft damper bolt to 176 N·m (129 ft. lbs.).
5. Install radiator upper hose.
6. Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
7. Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
8. Connect negative cable to battery.

COVER-STRUCTURAL

DESCRIPTION

The structural dust cover (1) is made of die cast aluminum and joins the lower half of the transmission bell housing to the engine oil pan.

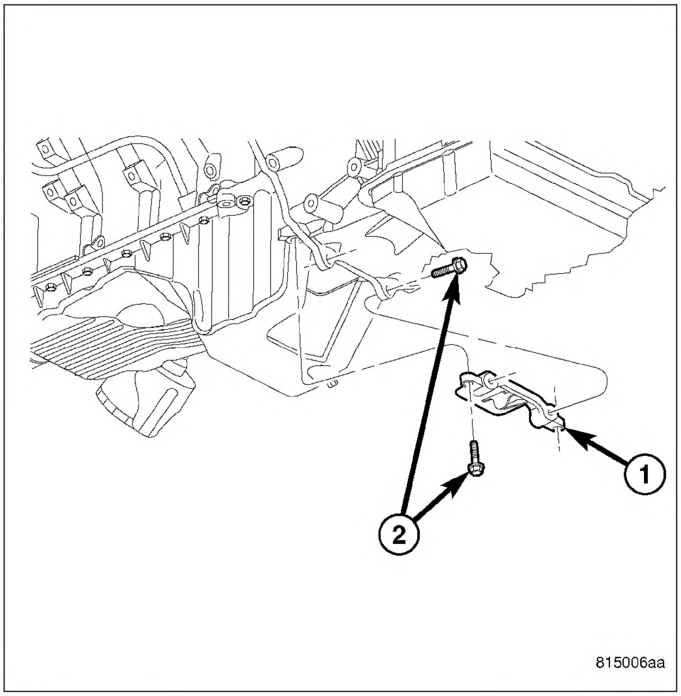


OPERATION

The structural cover provides additional powertrain stiffness and reduces noise and vibration.

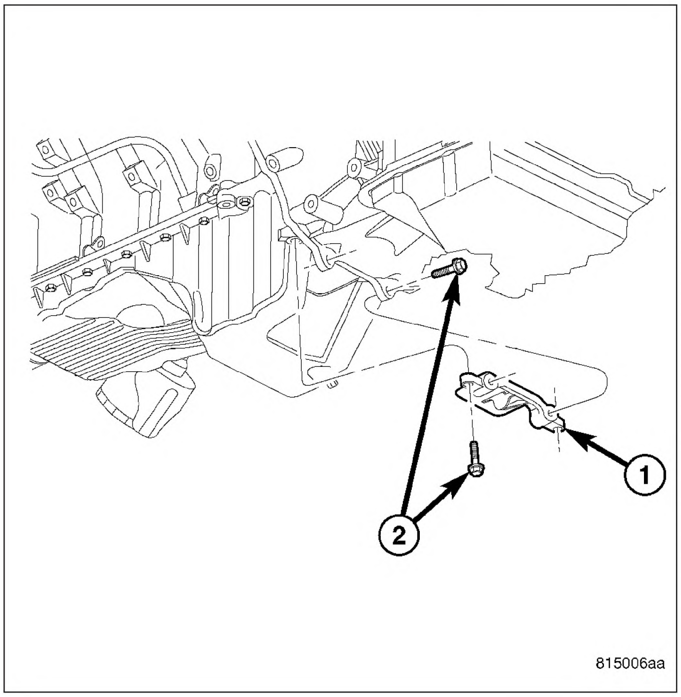
REMOVAL

1. Remove the 4 bolts (2) attaching the structural dust cover (1) to the transmission and the oil pan.
2. Remove the structural dust cover from the vehicle.



INSTALLATION

1. Position the structural dust cover (1) onto the oil pan and transmission.
2. Install the 4 bolts (2) and torque to 54N·m (39 ft. lbs).



SOLENOID-MDS

DESCRIPTION

The Multi Displacement System selectively deactivates cylinders 1,4,6, and 7, to improve fuel economy. It has two modes of operation :

- 8 cylinders for acceleraton and heavy loads.
- 4 cylinders for cruising and city traffic.

The main components of the Multi Displacement System are :

- Unique MDS camshaft.
- Deactivating roller tappets.
- 4 control valves/solenoids.
- control valve/solenoid wiring harness.
- oil temp sensor.

OPERATION

Cylinder Deactivation

- Trap an exhaust charge
- Normal combustion event
- Don't open exhaust valve
- Don't open intake valve
- Piston is an air spring
- Cylinders deactivated in firing sequence

Cylinder Reactivation

- Empty the cylinder
- Open exhaust valve
- Open intake valve
- Normal combustion event
- Cylinders reactivated in firing sequence

DIAGNOSIS AND TESTING

The Multi Displacement System has the following detectible issues:

- Solenoid circuit
- Fail to deactivate a cylinder(s)
- Fail to reactivate a cylinder(s)
- Low oil pressure

CONDITION	POSSIBLE CAUSES	CORRECTION
MDS does not activate	1. Low oil pressure 2. Bad oil temp sensor 3. Malfunctioning MDS Solenoid 4. Malfunctioning MDS Tappet	1. Check for proper oil pressure 2. Replace oil temp sensor 3. Replace Solenoid 4. Replace Tappet
MDS Does Not Deactivate	1. Low oil pressure 2. Bad oil temp sensor 3. Malfunctioning MDS Solenoid 4. Malfunctioning MDS Tappet	1. Check for proper oil pressure 2. Replace oil temp sensor 3. Replace Solenoid 4. Replace Tappet

REMOVAL

1. Disconnect the negative battery cable.
2. Remove the intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
3. Remove wiring harness connectors from the MDS solenoids.
4. Remove hold down bolt from MDS solenoid.
5. Remove MDS solenoid.

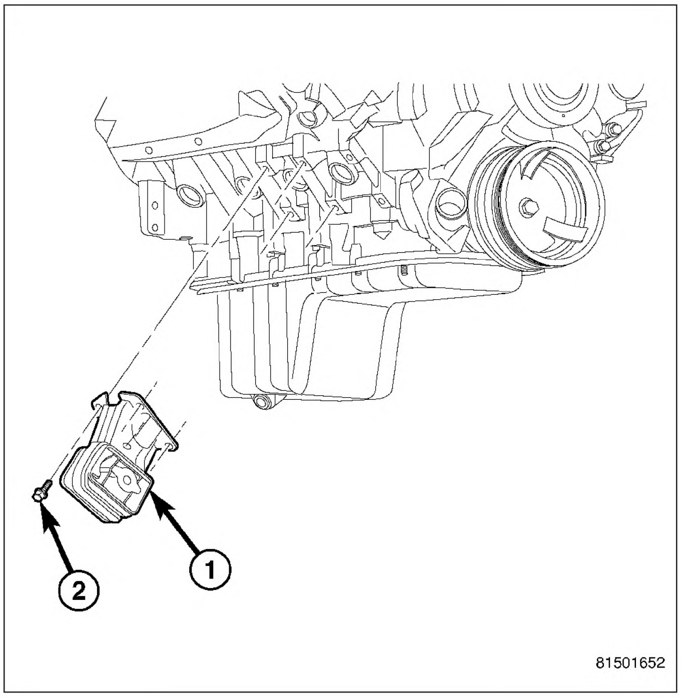
INSTALLATION

1. Install MDS solenoid fully into block.
2. Install hold down bolt and torque to 11 N·m (97 in. lbs.).
3. Reconnect the MDS wiring harness to the solenoids.
4. Install the intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

MOUNT - FRONT

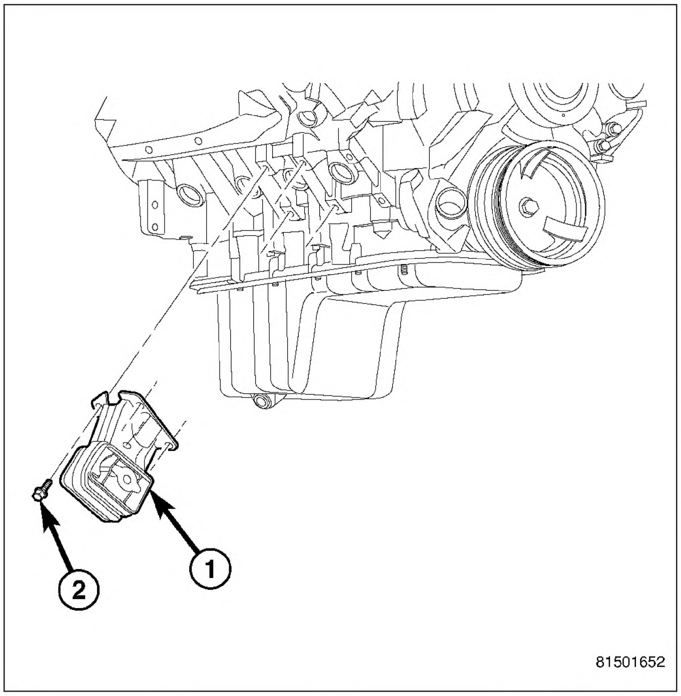
REMOVAL

1. Disconnect negative battery cable.
2. Raise vehicle.
3. Remove engine mount thru bolts.
4. Raise engine using suitable jack.
5. Remove engine mount bolts (2).
6. Remove mount (1) from engine.



INSTALLATION

1. Install the engine mount (1).
2. Lower the engine.
3. Install the thru bolts and nuts
4. Lower vehicle.
5. Connect negative battery cable.

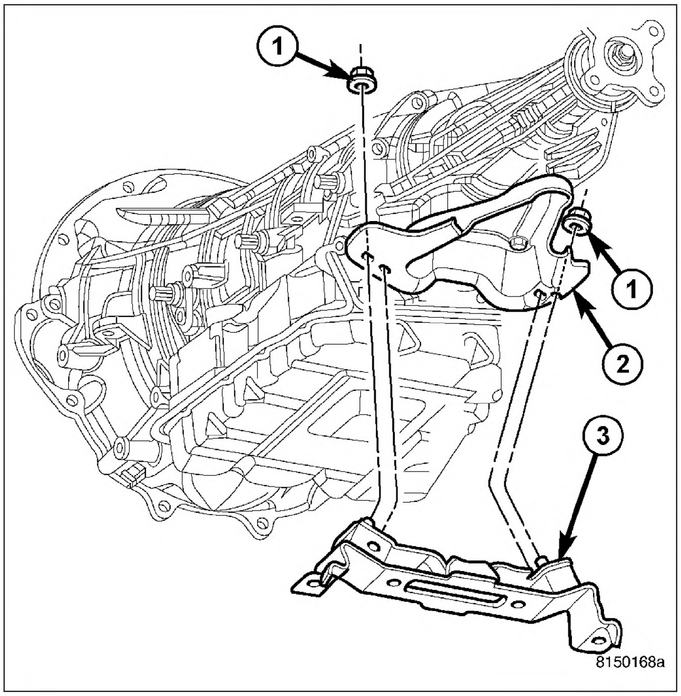


MOUNT - REAR

REMOVAL

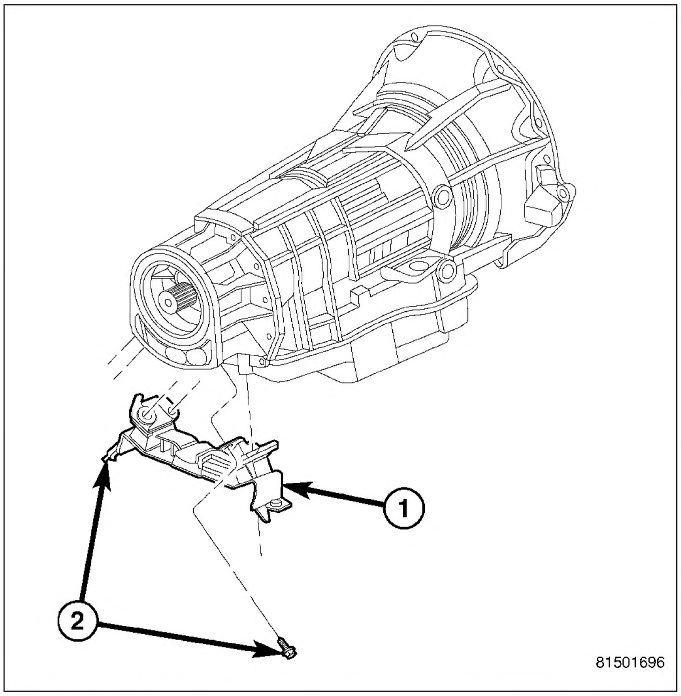
4X2

1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (1) from the transmission mount to transmission.
5. Remove the mount (3).
6. Remove the transmission mount bracket (2), if required.



4X4

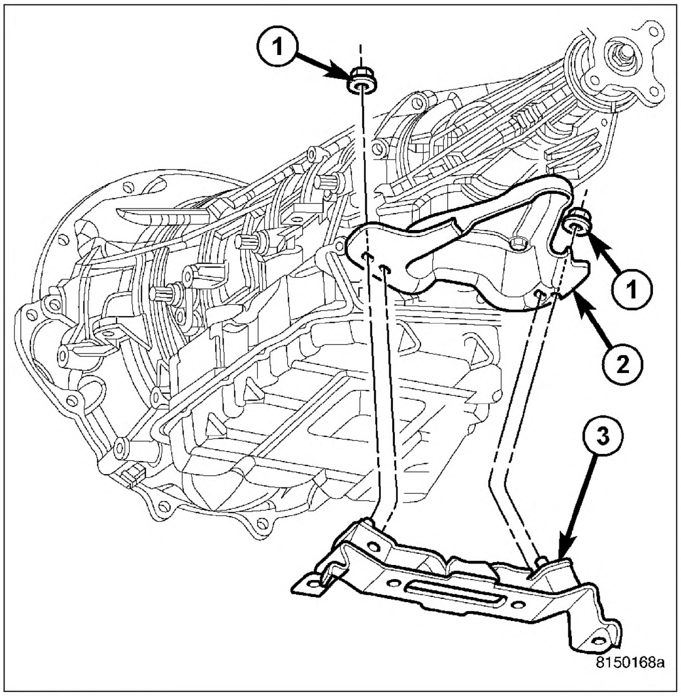
1. Raise the vehicle on a hoist.
2. Using a suitable jack, support transmission.
3. Remove the crossmember.
4. Remove the fasteners (2) from the transmission mount (1) to transmission.
5. Remove the mount.



INSTALLATION

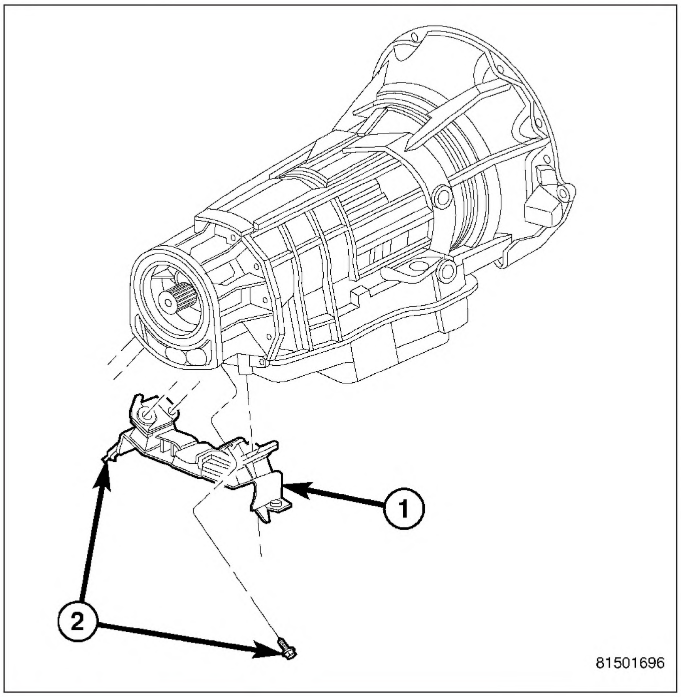
4X2

1. Install the transmission mount bracket (2), if removed.
2. Position the transmission mount (3) on the transmission mount bracket (2). Install the fasteners (1)that attach the transmission mount to the bracket.
3. Torque the bolts to N·m (ft.lbs.) torque.
4. Install the crossmember.



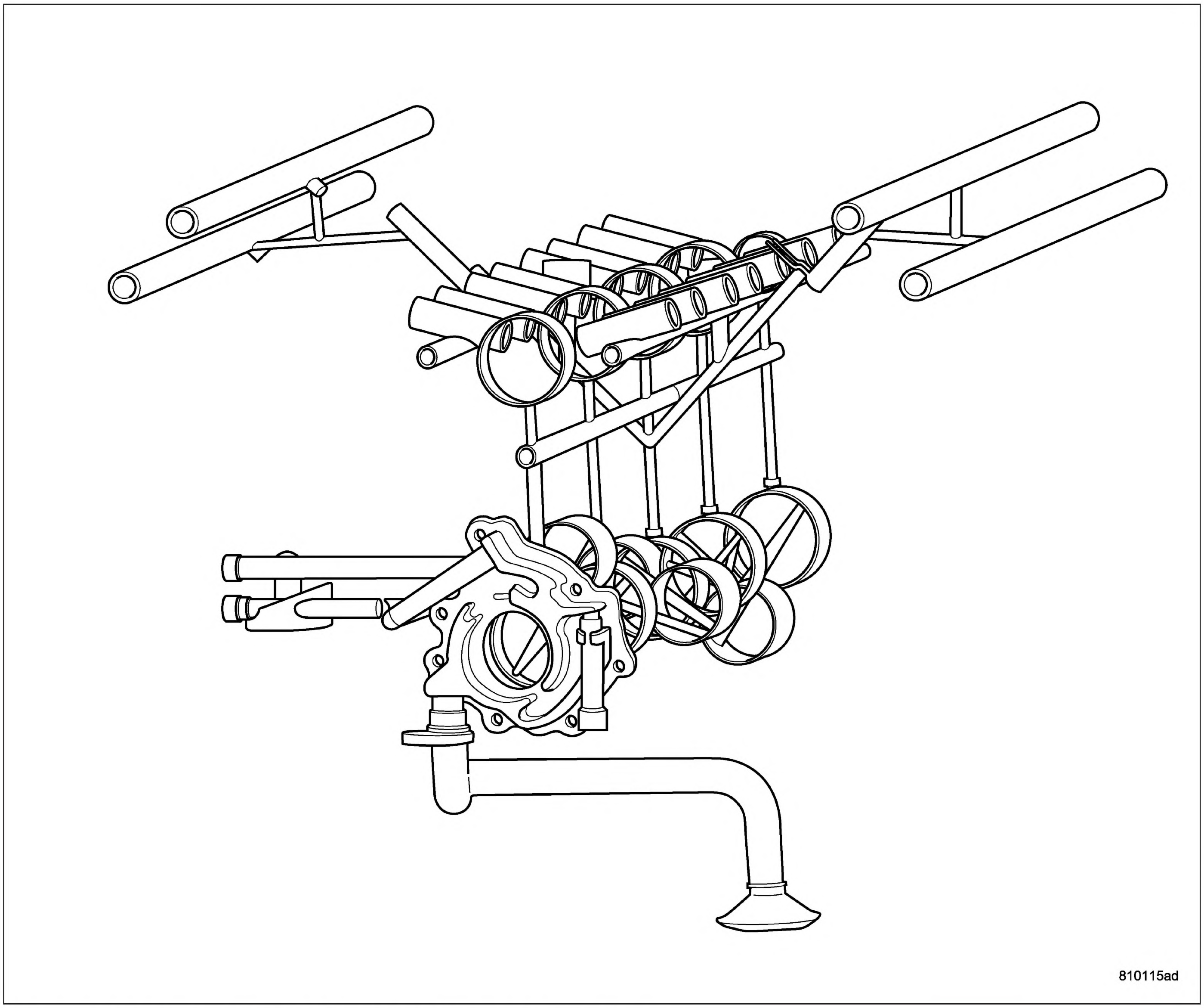
4X4

1. Position the transmission mount (1) on the transmission. Install the bolts (2) that attach the transmission mount to the transmission.
2. Torque the bolts to N·m (ft.lbs.) torque.
3. Install the crossmember.



LUBRICATION

DESCRIPTION



The lubrication system is a full flow filtration pressure feed type.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CHECKING ENGINE OIL PRESSURE

1. Remove oil pressure sending unit and install gauge assembly C-3292.
2. Run engine until thermostat opens.
3. Oil Pressure:
    - Curb Idle–25 kPa (4 psi) minimum
    - 3000 rpm–170 - 758 kPa (25 - 110 psi)
4. If oil pressure is 0 at idle, shut off engine. Check for a clogged oil pick-up screen or a pressure relief valve stuck open.

DIAGNOSIS AND TESTING - ENGINE OIL LEAK

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

1. Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.
2. Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.
3. Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair per service manual instructions.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.**If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method.

Air Leak Detection Test Method

1. Remove the PCV valve from the IAFM. Cap or plug the PCV valve grommet.
2. Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

3. Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provide the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
4. If the leakage occurs at the rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.
5. If no leaks are detected, turn off the air supply and remove the air hose and all plugs and caps. Install the PCV valve.
6. Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

1. Disconnect the battery.
2. Raise the vehicle.
3. Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak:
    a. Circular spray pattern generally indicates seal leakage or crankshaft damage.
    b. Where leakage tends to run straight down, possible causes are a porous block, distributor seal, camshaft bore cup plugs oil galley pipe plugs, oil filter runoff, and main bearing cap to cylinder block mating surfaces.
4. If no leaks are detected, pressurize the crankcase as outlined in the, Inspection (Engine oil Leaks in general)

CAUTION: Do not exceed 20.6 kPa (3 psi).

5. If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

6. For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

OIL

STANDARD PROCEDURE - ENGINE OIL SERVICE

The engine oil level indicator is located at the right hand of the engine on the 5.7L engines.

CRANKCASE OIL LEVEL INSPECTION

CAUTION: Do not overfill crankcase with engine oil, pressure loss or oil foaming can result.

Inspect engine oil level approximately every 800 kilometers (500 miles). Unless the engine has exhibited loss of oil pressure, run the engine for about ten minutes before checking oil level. Checking engine oil level on a cold engine is not accurate.

To ensure proper lubrication of an engine, the engine oil must be maintained at an acceptable level. The acceptable levels are indicated between the ADD and SAFE marks on the engine oil dipstick.

1. Position vehicle on level surface.
2. With engine OFF, allow approximately five minutes for oil to settle to bottom of crankcase, remove engine oil dipstick.
3. Wipe dipstick clean.
4. Install dipstick and verify it is seated in the tube.
5. Remove dipstick, with handle held above the tip, take oil level reading.
6. Add oil only if level is below the ADD mark on dipstick.

ENGINE OIL CHANGE

Change engine oil at mileage and time intervals described in Maintenance Schedules (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION).

Run engine until achieving normal operating temperature.

1. Position the vehicle on a level surface and turn engine off.
2. Remove oil fill cap.
3. Hoist and support vehicle on safety stands.
4. Place a suitable drain pan under crankcase drain.
5. Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug if damaged.
6. Install drain plug in crankcase. Torque to 27 N·m (20 ft. lbs.).
7. Lower vehicle and fill crankcase with specified type and amount of engine oil described in this section.
8. Install oil fill cap.
9. Start engine and inspect for leaks.
10. Stop engine and inspect oil level.

NOTE: Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING at beginning of this section.

FILTER-ENGINE OIL

REMOVAL

All engines are equipped with a high quality full-flow, disposable type oil filter. DaimlerChrysler Corporation recommends a Mopar® or equivalent oil filter be used.

1. Position a drain pan under the oil filter.
2. Using a suitable oil filter wrench loosen filter.
3. Rotate the oil filter counterclockwise to remove it from the cylinder block oil filter boss.

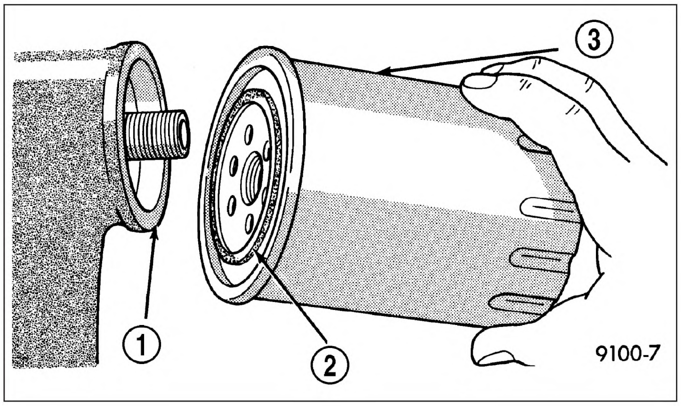
4. When filter separates from cylinder block oil filter boss, tip gasket end upward to minimize oil spill. Remove filter from vehicle.

NOTE: Make sure filter gasket was removed with filter.

5. With a wiping cloth, clean the gasket sealing surface of oil and grime.

INSTALLATION

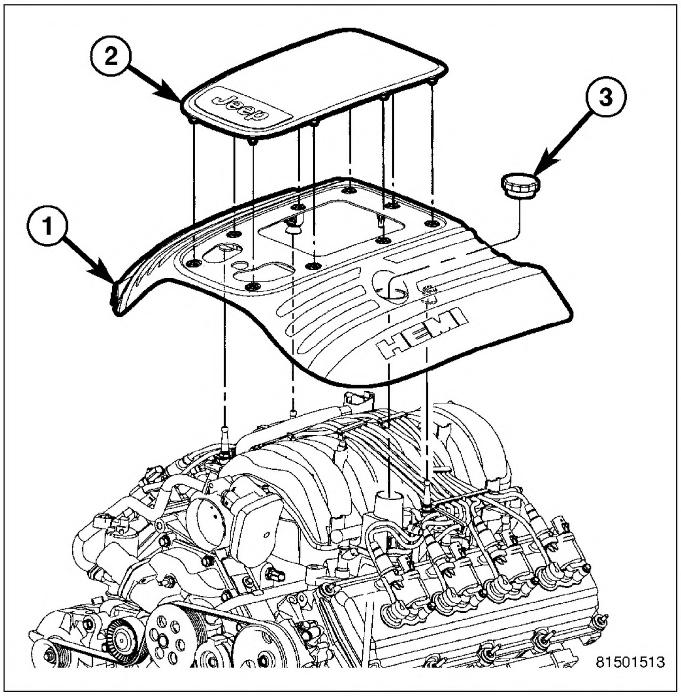
1. Lightly lubricate oil filter gasket (2) with engine oil.
2. Thread filter onto adapter nipple. When gasket makes contact with sealing surface, hand tighten filter one half turn, or 180°,do not over tighten.
3. Add oil, verify crankcase oil level and start engine. Inspect for oil leaks.



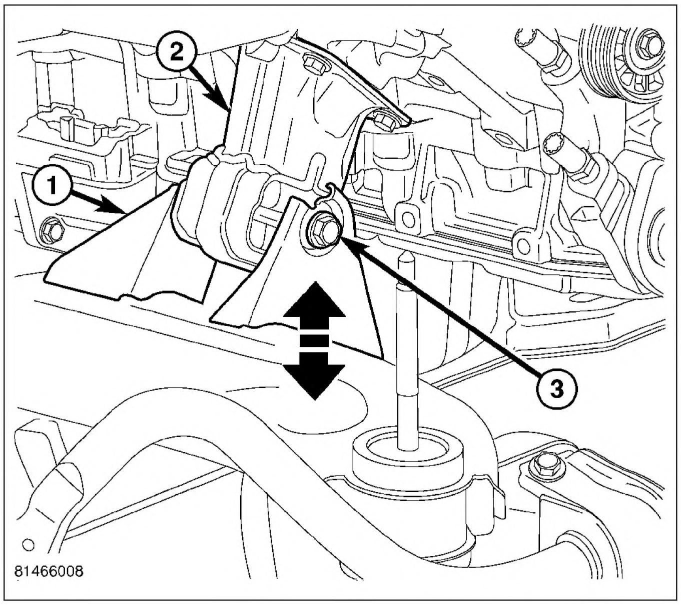
PAN-ENGINE OIL

REMOVAL

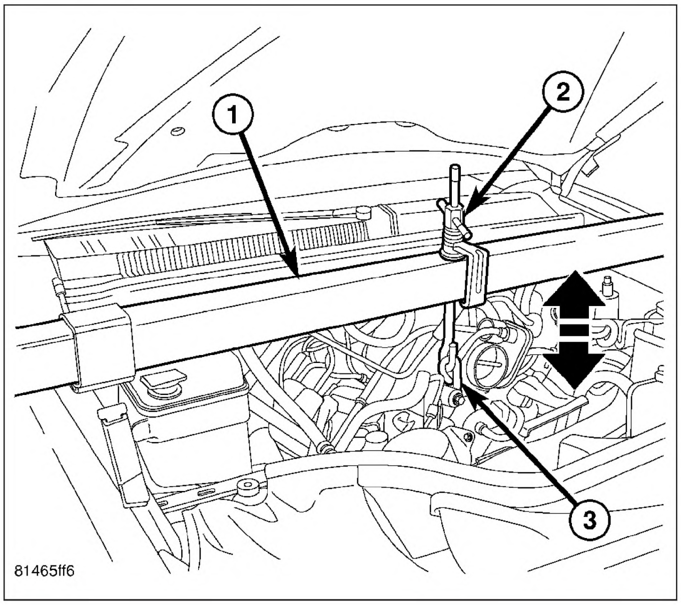
1. Disconnect the negative battery cable.
2. Remove the engine cover (1).



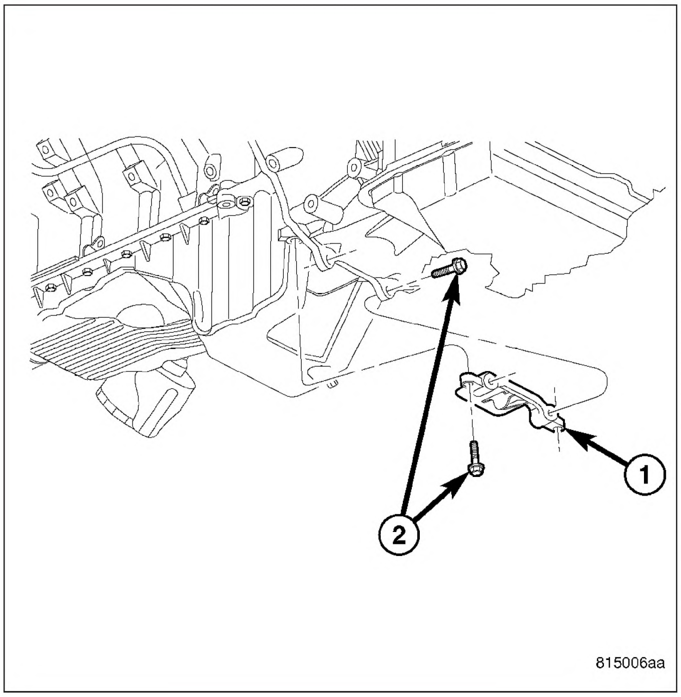
3. Remove the intake manifold. (Refer to 9 - ENGINE/ MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
4. Raise vehicle.
5. Remove both left and right side engine mount to frame bolts (3).
6. Drain engine oil and remove the oil filter.
7. Remove the engine oil dipstick and tube from the oil pan.
8. Lower the vehicle.



9. Install engine support fixture special tool # 8534 (1). **Do not use the third leg.**
10. Raise engine using special tool # 8534 to provide clearance to remove oil pan.
11. Raise the vehicle.
12. Remove the front axle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/FRONT AXLE - C200FE - REMOVAL).



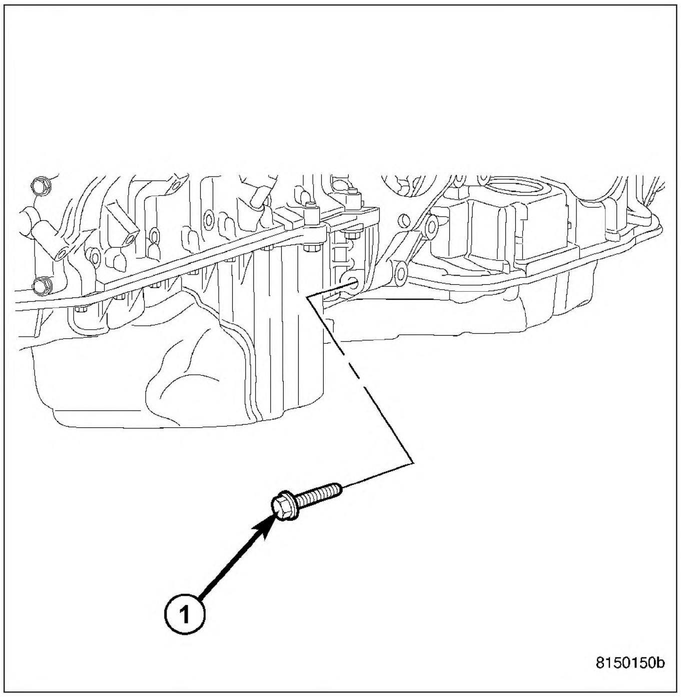
13. Remove the structural dust cover (1). (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL).



NOTE: Do not pry on oil pan or oil pan gasket. Gasket is integral to engine windage tray and does not come out with oil pan.

NOTE: The horizontal M10 fasteners are 5 mm longer in length, and must be reinstalled in original locations.

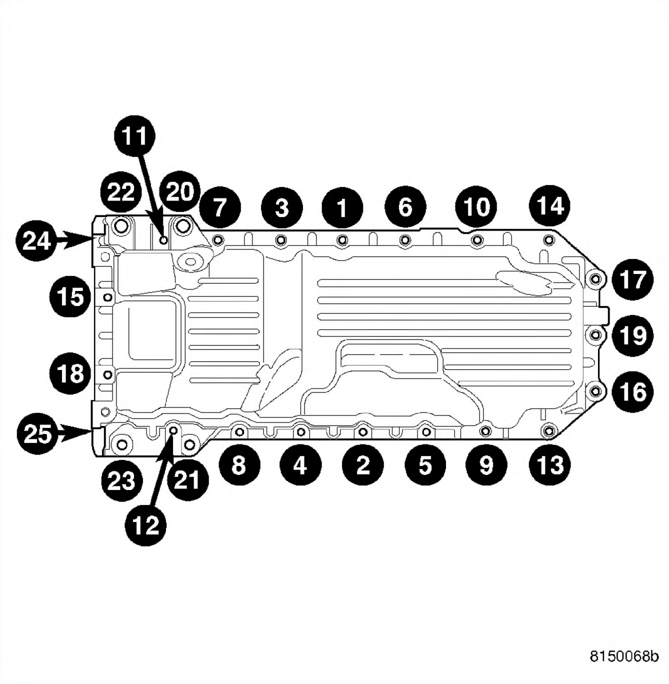
14. Remove the M10 fasteners (1) (vertical and horizontal) from the rear of the oil pan to the transmission and engine.



15. Remove the oil pan mounting bolts using the sequence provided, and oil pan.

NOTE: When the oil pan is removed, a new oil pan gasket/windage tray assembly must be installed. The old gasket cannot be reused.

16. Discard the integral windage tray and gasket and replace.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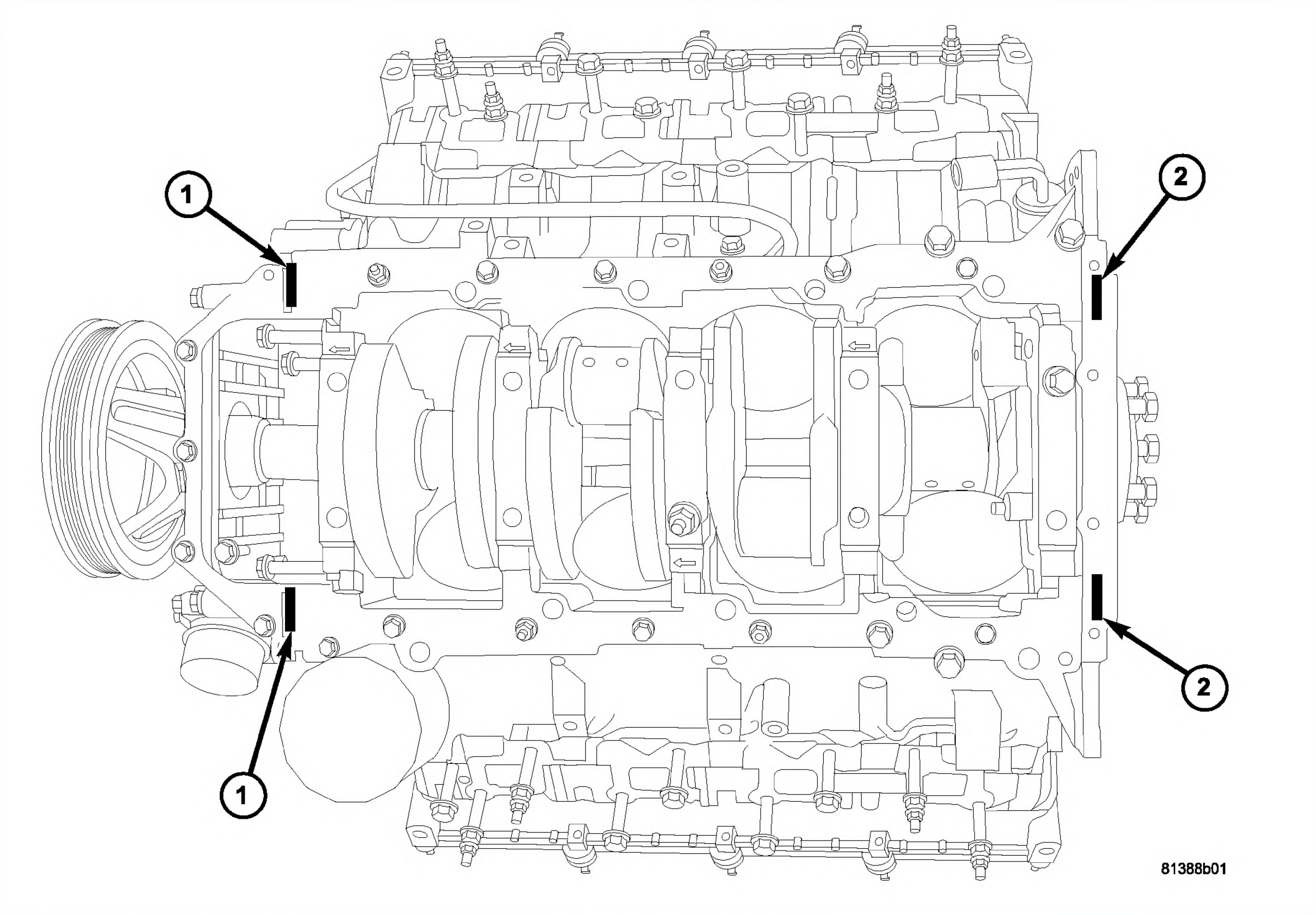
INSTALLATION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1. Clean the oil pan gasket mating surface of the block and oil pan.

NOTE: Mopar® Engine RTV must be applied to the 4 T-joints, (area where front cover, rear retainer, block, and oil pan gasket meet). The bead of RTV should cover the bottom of the gasket. This area is approximately 4.5 mm x 25 mm in each of the 4 T-joint locations.

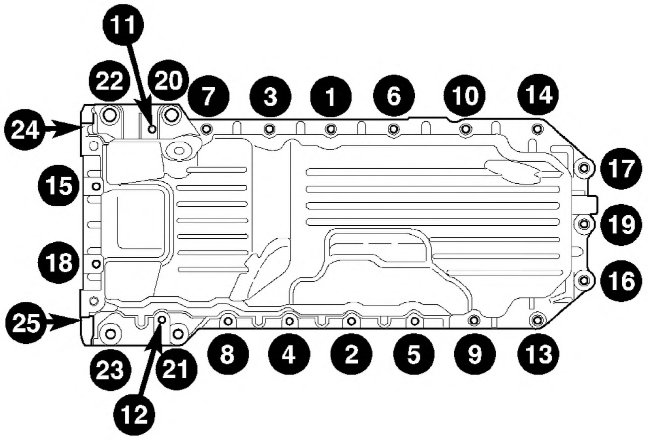
2. Apply Mopar ® Engine RTV at the 4 T- joints.

NOTE: When the oil pan is removed, a new oil pan gasket/windage tray assembly must be installed. The old gasket cannot be reused.

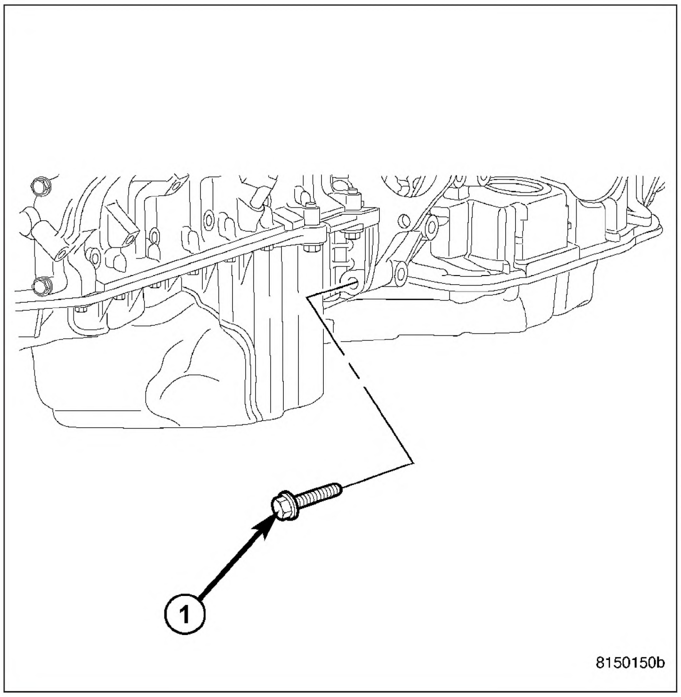
3. Install a new oil pan gasket/windage tray assembly.
4. If removed, reinstall the oil pump pickup tube with new o-ring. Tighten tube to pump fasteners to 28 N·m (250 in. lbs.).

NOTE: The horizontal M10 fasteners are 5 mm longer in length, and must be reinstalled in original locations.

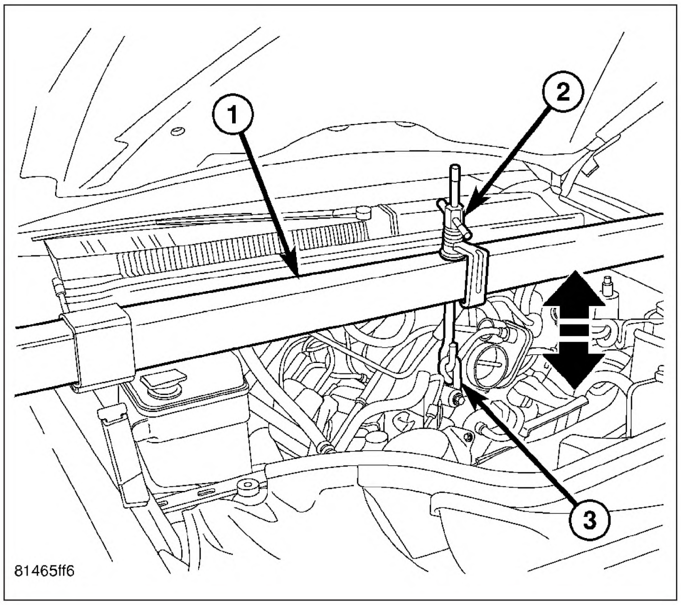
5. Align the rear of the oil pan with the rear face of the engine block, and install the M10 and M6 oil pan fasteners finger tight. Using the following torque sequence, torque the M6 mounting bolts to 5 N·m (44 in.lbs.).
6. Using the following torque sequence, torque the M10 oil pan fasteners to 54 N·m (39 ft.lbs.).
7. Using the following torque sequence, torque the M6 oil pan fasteners to 12 N·m (106 in.lbs.).



8. Install both the left and right side oil pan to transmission bolts (1). Torque the bolts to 54 N·m (39 ft. lbs.).



9. Lower the engine into mounts using special tool # 8534 (1).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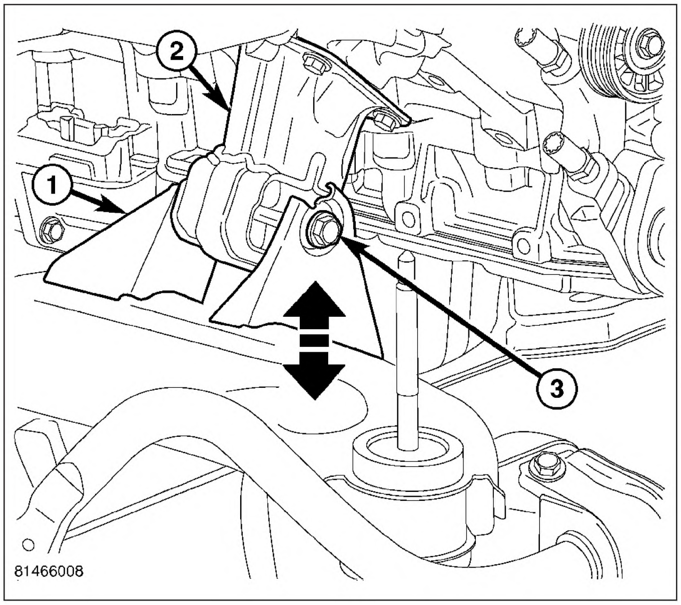
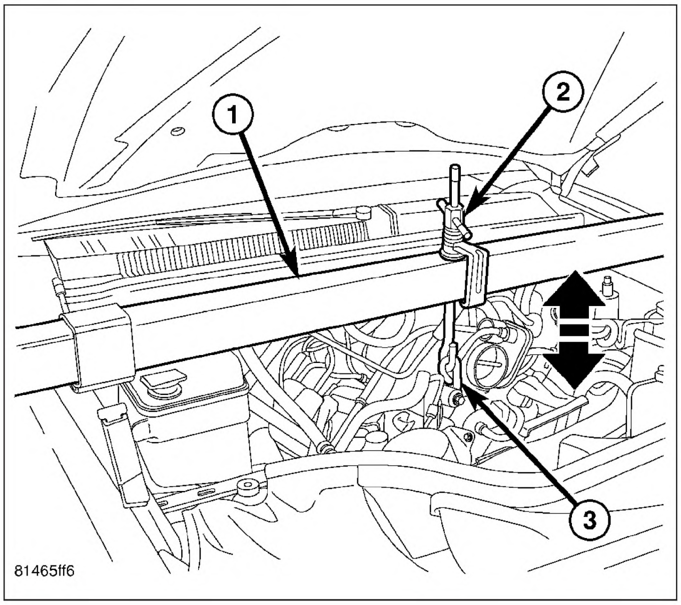
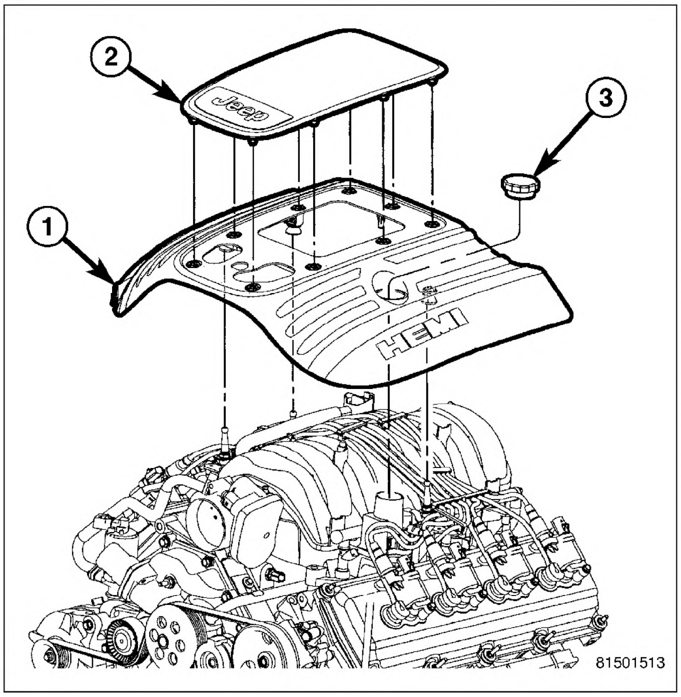
10. Install both the left and right side engine mount bolts (3) and nuts. Torque the studs and nuts to 54 N·m (39 ft. lbs.).
11. Install the engine oil dipstick and tube.



12. Remove special tool # 8534 (1).
13. Install the intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
14. Install the front axle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/FRONT AXLE - C200FE - INSTALLATION).



15. Install the engine cover (1).
16. Fill engine oil.
17. Install oil filter, if removed.
18. Reconnect the negative battery cable.
19. Start engine and check for leaks.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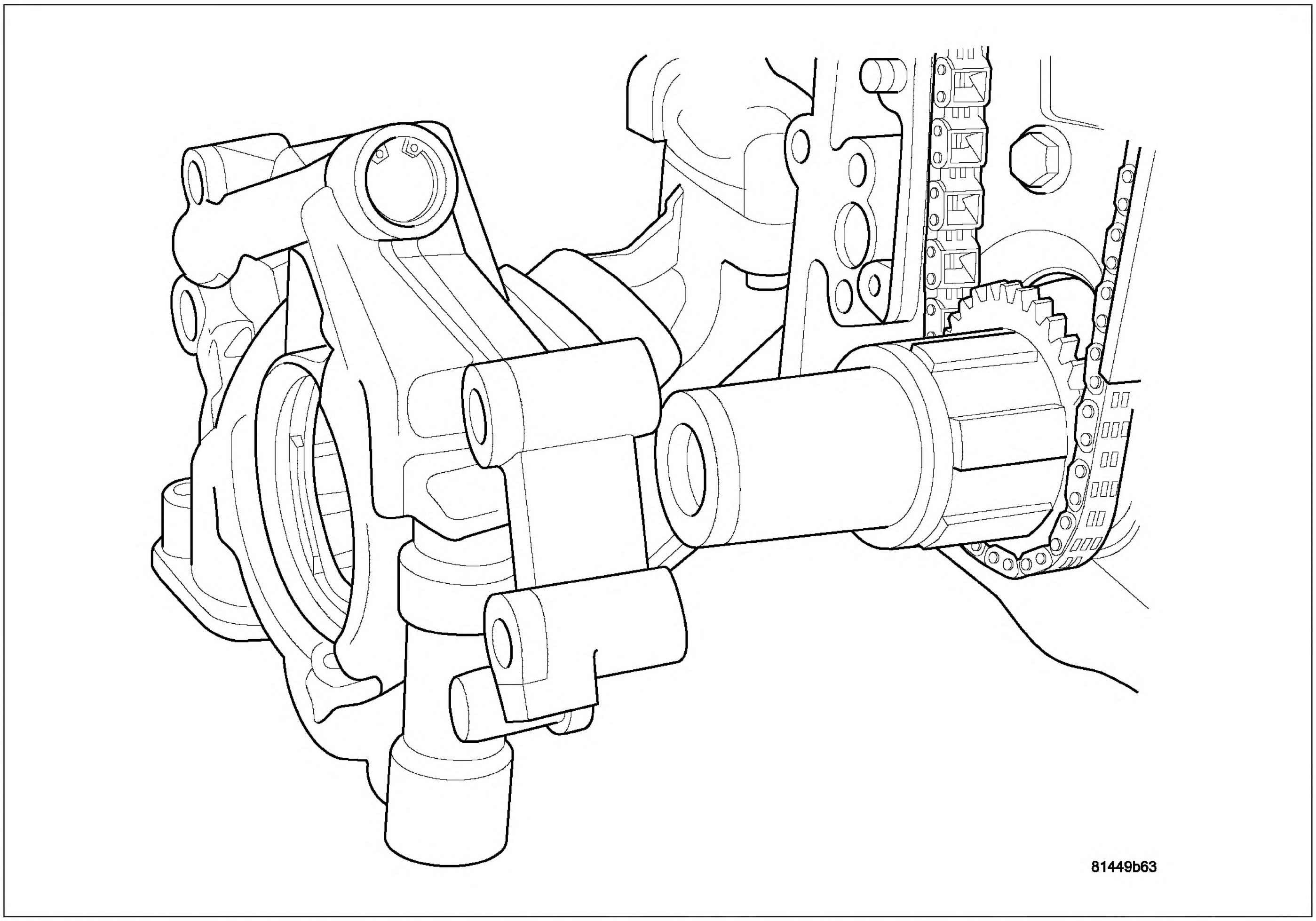
PUMP-ENGINE OIL

REMOVAL



1. Remove the oil pan and pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
2. Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).
3. Remove the four bolts, and the oil pump.

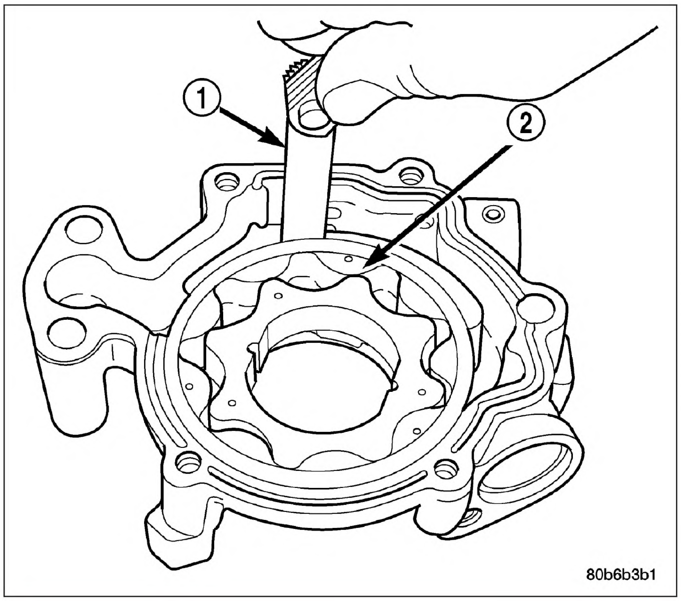
CLEANING

1. Wash all parts in a suitable solvent.

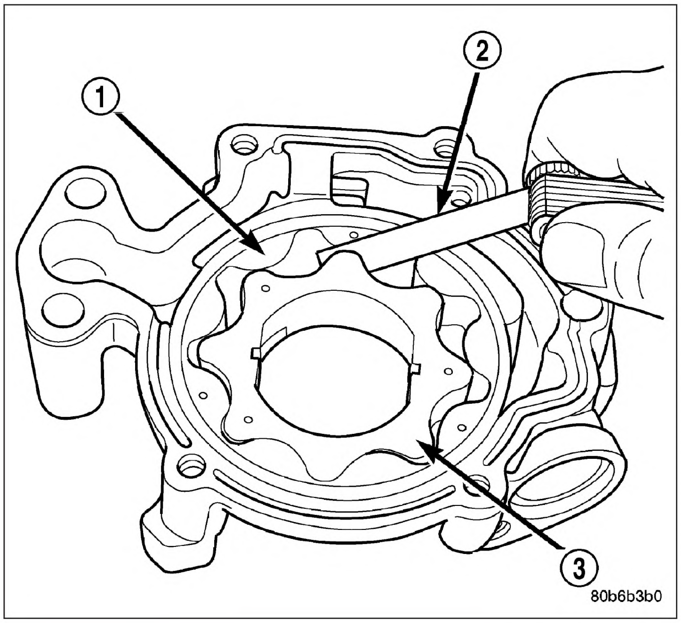
INSPECTION

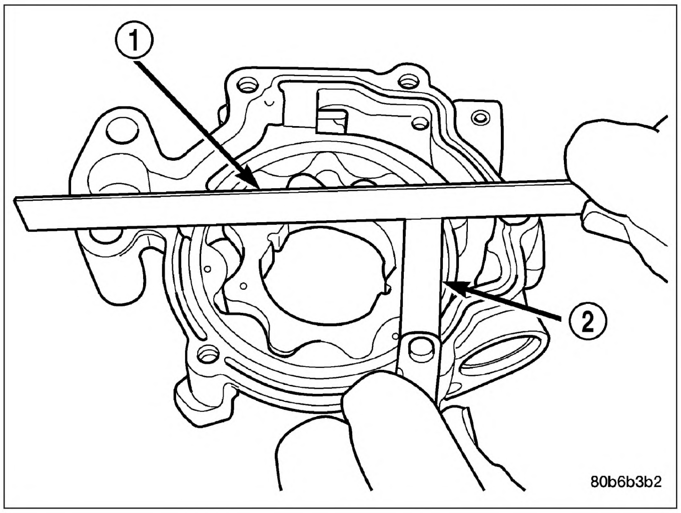
CAUTION: Oil pump pressure relief valve and spring should not be removed from the oil pump. If these components are disassembled and or removed from the pump the entire oil pump assembly must be replaced.

1. Remove the pump cover.
2. Clean all parts thoroughly. Mating surface of the oil pump housing should be smooth. If the pump cover is scratched or grooved the oil pump assembly should be replaced.
3. Slide outer rotor into the body of the oil pump. Press the outer rotor to one side of the oil pump body and measure clearance between the outer rotor (2) and the body. If the measurement is 0.235mm (0.009 in.) or more the oil pump assembly must be replaced.



4. Install the inner rotor in the into the oil pump body. Measure the clearance between the inner (3) and outer rotors (1). If the clearance between the rotors is .150 mm (0.006 in.) or more the oil pump assembly must be replaced.

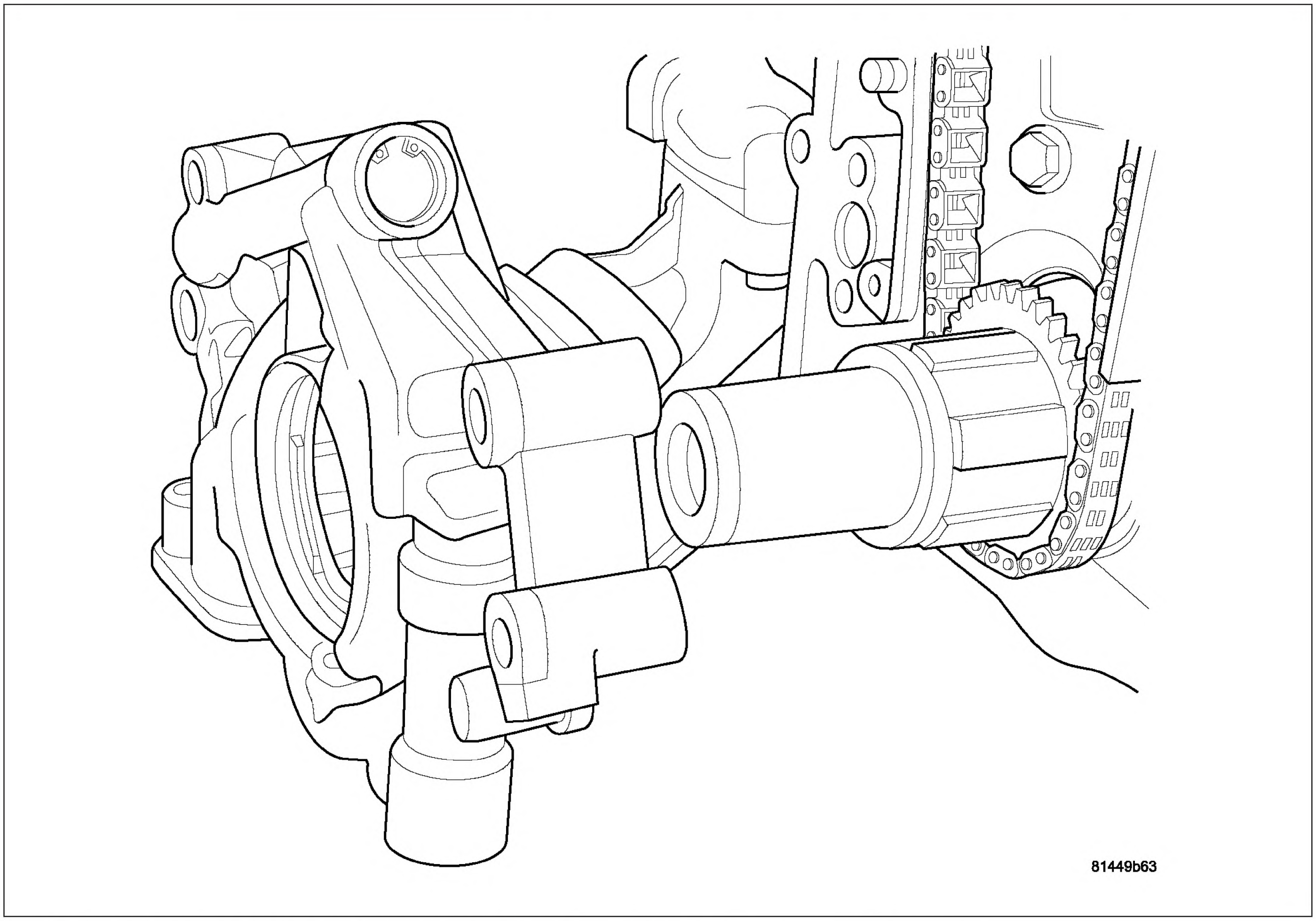




5. Place a straight edge (1) across the body of the oil pump (between the bolt holes), if a feeler gauge (2) of .095 mm (0.0038 in.) or greater can be inserted between the straightedge and the rotors, the pump must be replaced.
6. Reinstall the pump cover. Torque fasteners to 15 N·m (132 in. lbs.).

NOTE: The 5.7 Oil pump is released as an assembly. There are no DaimlerChrysler part numbers for Sub-Assembly components. In the event the oil pump is not functioning or out of specification it must be replaced as an assembly.

INSTALLATION



1. Position the oil pump onto the crankshaft and install the 4 oil pump retaining bolts.
2. Tighten the oil pump retaining bolts to 28 N·m (250 in. lbs.).
3. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
4. Install the pick-up tube and oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

MANIFOLD - INTAKE

DESCRIPTION

The intake manifold is made of a composite material and features long runners which maximizes low end torque. The intake manifold uses single plane sealing which consist of eight individual press in place port gaskets to prevent leaks.

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKAGE

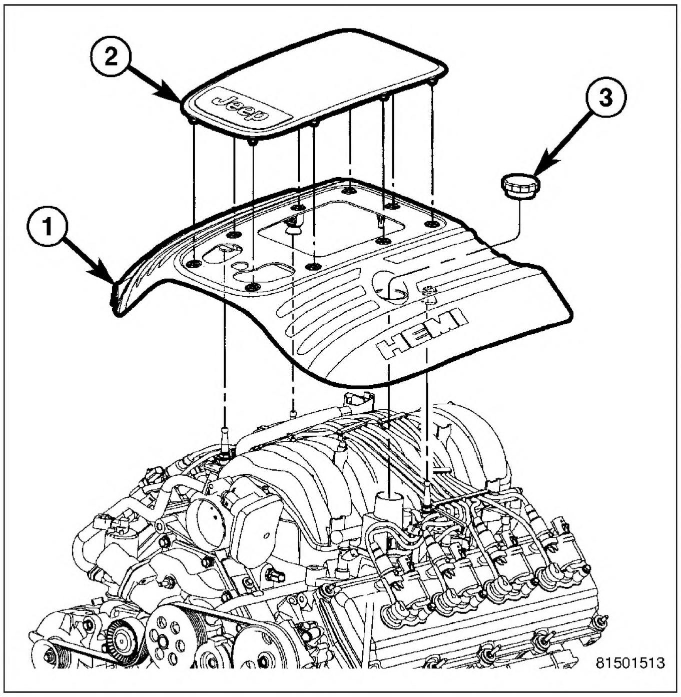
An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

1. Start the engine.
2. Spray a small stream of water at the suspected leak area.
3. If a change in RPM is observed the area of the suspected leak has been found.
4. Repair as required.

REMOVAL

1. Remove engine cover (1).
2. Bleed fuel system (Refer to 14 - FUEL SYSTEM/ FUEL DELIVERY - STANDARD PROCEDURE).
3. Disconnect negative cable from battery.
4. Remove air inlet hose.
5. Remove ignition wires from on top of intake manifold.



6. Disconnect electrical connectors for the following components:
   - Manifold Absolute Pressure (MAP) Sensor
   - Fuel Injectors
   - ETC (Electric Throttle Control)
7. Remove wire harness from intake manifold.
8. Disconnect brake booster hose, purge hose, and MUA hose (Make Up Air Hose).
9. Remove EGR tube from intake manifold.
10. Remove intake manifold retaining fasteners in a crisscross pattern starting from the outside bolts and ending at the middle bolts.

11. Remove intake manifold as an assembly.

CLEANING

NOTE: There is NO approved repair procedure for the intake manifold. If severe damage is found during inspection, the intake manifold must be replaced.

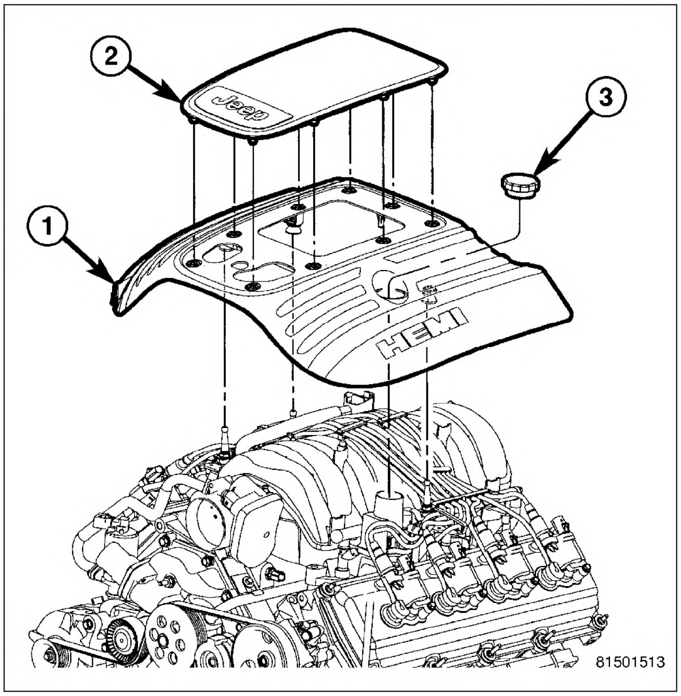
Before installing the intake manifold thoroughly clean the mating surfaces. Use a suitable cleaning solvent, then air dry.

INSPECTION

1. Inspect the intake sealing surface for cracks, nicks and distortion.
2. Inspect the intake manifold vacuum hose fittings for looseness or blockage.

INSTALLATION

1. Position intake manifold.
2. Install intake manifold retaining bolts, and tighten in sequence from the middle bolts towards the outside in a crisscross pattern. Torque fasteners to 12 N·m (105 in. lbs.).
3. Install EGR tube.
4. Install wire harness on intake manifold.
5. Connect electrical connectors for the following components:
    - Manifold Absolute Pressure (MAP) Sensor
    - Fuel Injectors
    - ETC (Electronic Throttle Control)
6. Install ignition wires.
7. Connect Brake booster hose, purge hose, and MUA hose (Make Up Air hose).
8. Install air inlet hose.
9. Connect negative cable to battery.
10. Install engine cover (1).



MANIFOLD - EXHAUST

DESCRIPTION

The exhaust manifolds are log style with a patented flow enhancing design to maximize performance. The exhaust manifolds are made of high silicon molybdenum cast iron. A multi-layer stainless steel exhaust manifold gasket is used to improve sealing to the cylinder head. The exhaust manifolds are covered by a three layer laminated heat shield for thermal protection and noise reduction. The heat shields are fastened with a torque prevailing nut that is backed off slightly to allow for the thermal expansion of the exhaust manifold, with the exception of the nut, which also secures the oil dipstick tube bracket. That nut should not be backed off.

OPERATION

The exhaust manifolds collect the engine exhaust exiting the combustion chambers, then channels the exhaust gases to the exhaust pipes attached to the manifolds.

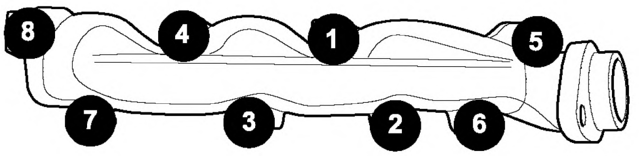
REMOVAL

EXHAUST MANIFOLD

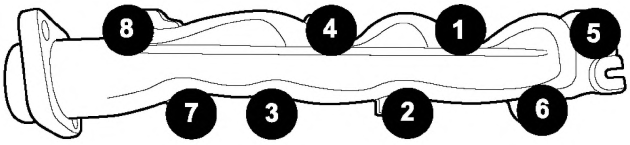
1. Disconnect negative battery cable.
2. Raise vehicle.
3. Remove exhaust pipe to manifold bolts.
4. Remove engine mount to frame fasteners (3,4).
5. Using suitable jack, raise engine enough to remove manifolds.

CAUTION: Do not damage engine harness while raising the engine.

6. Remove the engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - REMOVAL).



7. Remove heat shield.
8. Remove manifold bolts using sequence provided.
9. Remove manifold and gasket.



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CLEANING

Clean mating surfaces on cylinder head and manifold. Wash with solvent and blow dry with compressed air.

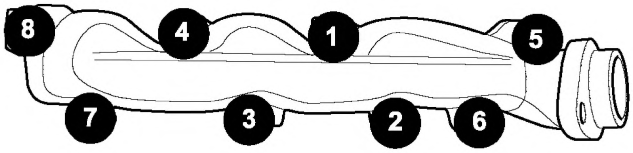
INSPECTION

Inspect manifold for cracks.

Inspect mating surfaces of manifold for flatness with a straight edge. Gasket surfaces must be flat within 0.2 mm per 300 mm (0.008 inch per foot).

INSTALLATION

EXHAUST MANIFOLD



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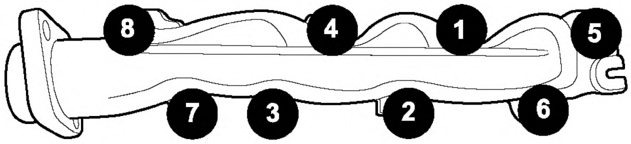
1. Install manifold gasket and manifold.
2. Install manifold bolts and tighten to 25 N·m (18 ft. lbs.).
3. Install heat shield and tighten nuts to 8 N·m (70 in. lbs.).



4. Install engine mounts. (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - INSTALLATION)
5. Lower engine.

CAUTION: Do not damage engine harness while lowering the engine.

6. Install and tighten right and left side engine mount to frame fasteners (4) (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - INSTALLATION) .
7. Install exhaust flange to pipe bolts.
8. Lower vehicle.
9. Connect negative battery cable.

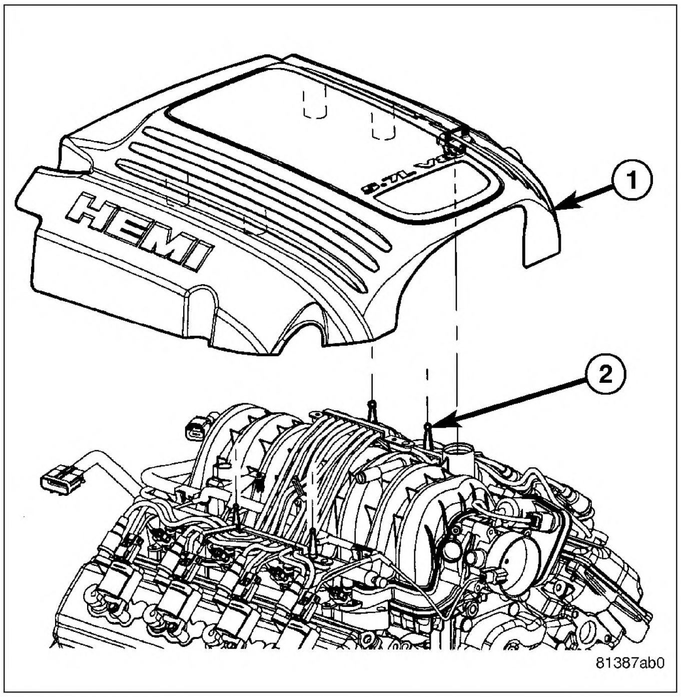
COVER-TIMING

REMOVAL

1. Disconnect the battery negative cable.
2. Remove the engine cover (1).
3. Remove air cleaner assembly.
4. Drain cooling system.
5. Remove accessory drive belt.
6. Remove fan and fan drive assembly (Refer to 7 - COOLING/ENGINE/FAN DRIVE VISCOUS CLUTCH - REMOVAL).
7. Remove coolant bottle and washer bottle.
8. Remove fan shroud.

NOTE: It is not necessary to disconnect A/C lines or discharge freon.

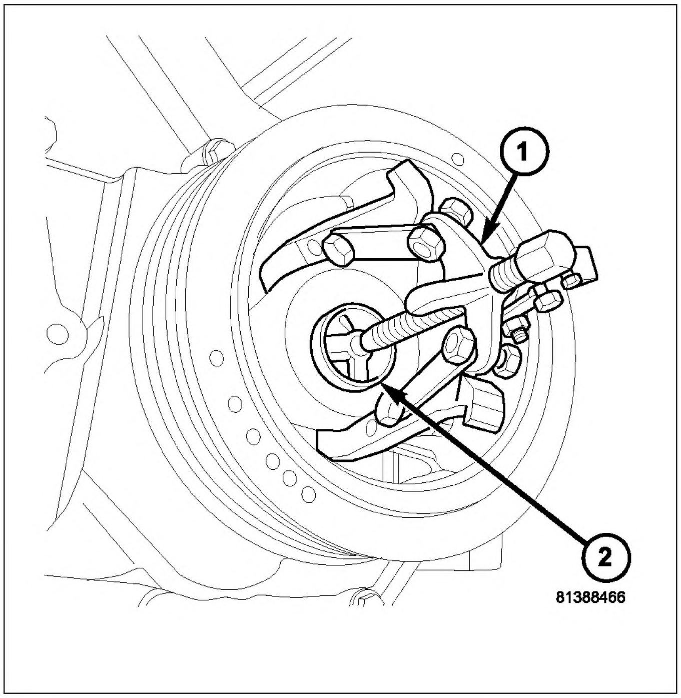
9. Remove A/C compressor and set aside.

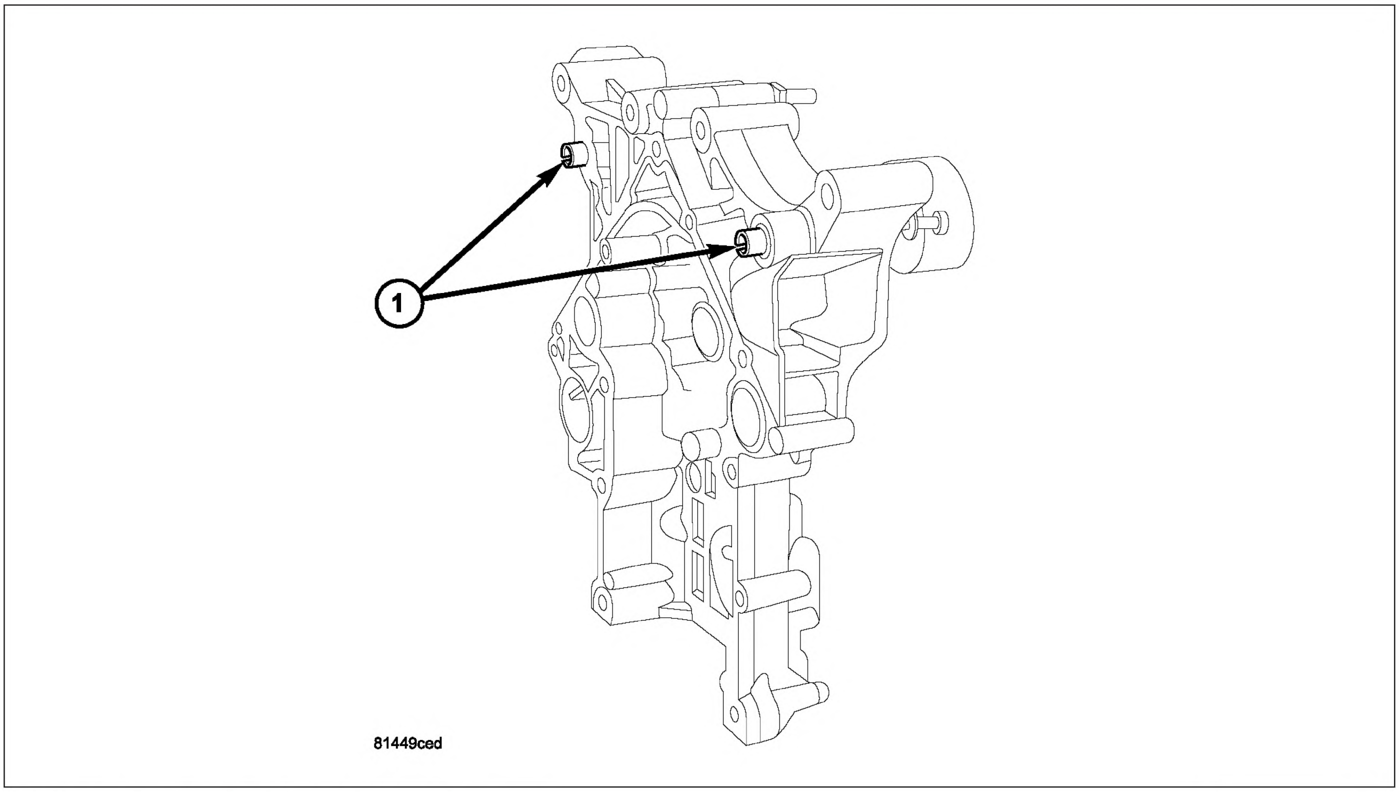


10. Remove the generator.
11. Remove upper radiator hose.
12. Disconnect both heater hoses at timing cover.
13. Disconnect lower radiator hose at engine.
14. Remove accessory drive belt tensioner and both idler pulleys.
15. Remove crankshaft damper (2) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

NOTE: Do not remove the hoses from the power steering pump.

16. Remove power steering pump and set aside.



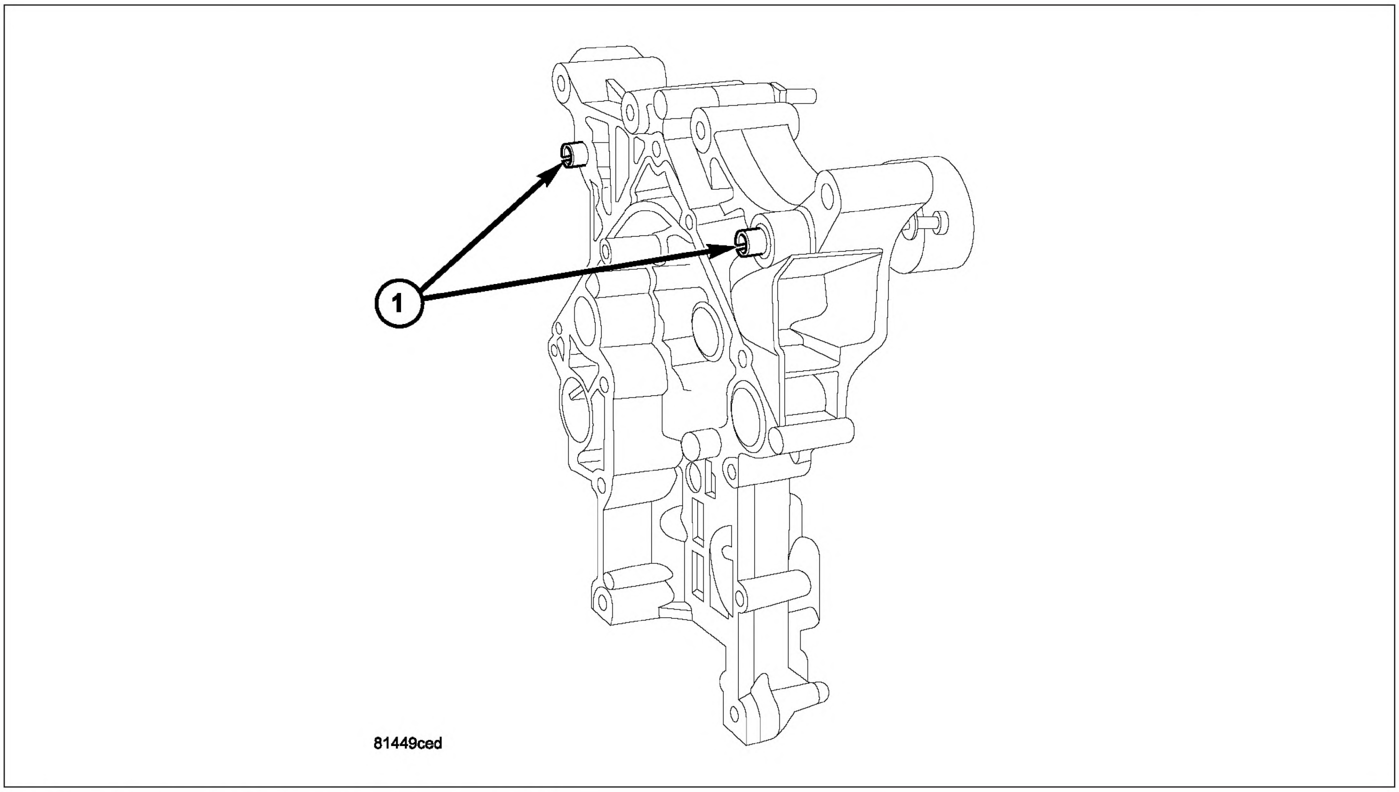


17. Remove the dipstick support bolt.
18. Drain the engine oil.
19. Remove the oil pan and pick up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

NOTE: It is not necessary to remove water pump for timing cover removal.

20. Remove timing cover bolts and remove cover.
21. Verify that timing cover slide bushings (1) are located in timing cover.

INSTALLATION



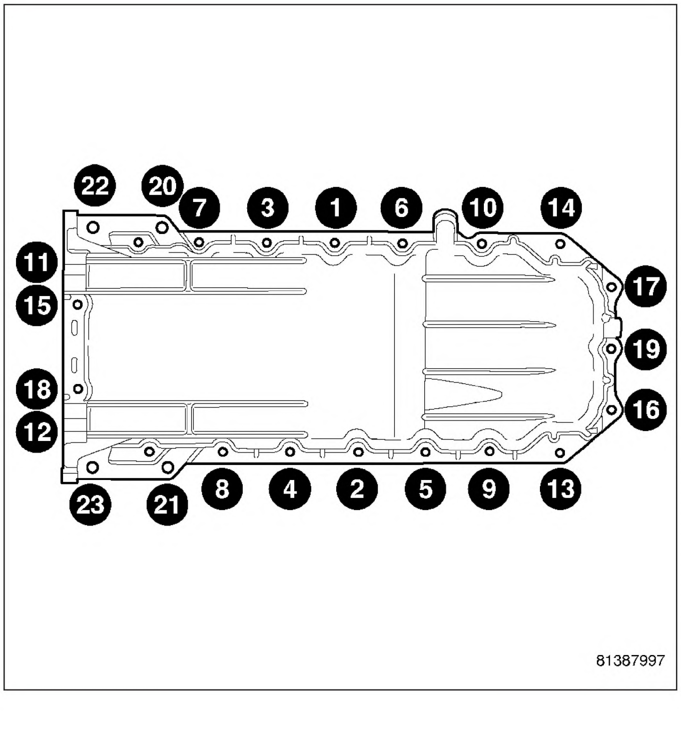
1. Clean timing chain cover and block surface.

NOTE: Always install a new gasket on timing cover.

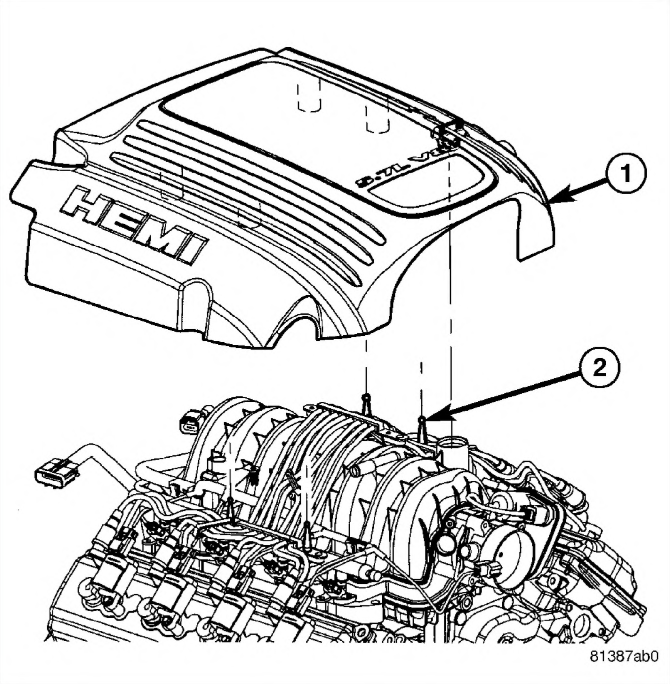
2. Verify that the slide bushings (1) are installed in timing cover.
3. Install cover and new gasket. Tighten fasteners to 28 N·m (250 in. lbs.).

NOTE: The large lifting stud is torqued to 55 N·m (40 ft. lbs.).

4. Install the oil pan and pick up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).
5. Install the A/C compressor.
6. Install the generator.
7. Install power steering pump.
8. Install the dipstick support bolt.
9. Install the thermostat housing.
10. Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

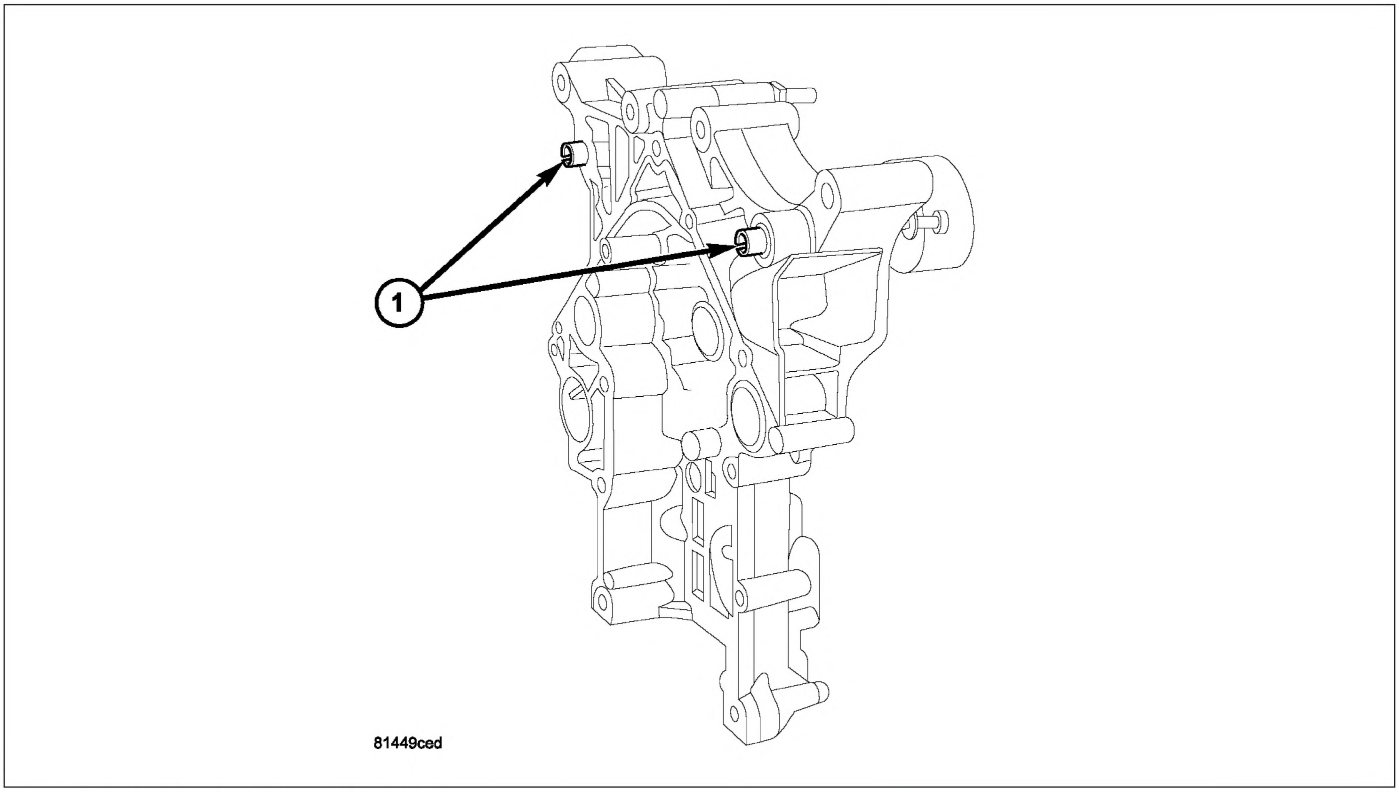


11. Install accessory drive belt tensioner assembly and both idler pulleys.
12. Install radiator lower hose.
13. Install both heater hoses.
14. Install radiator fan shroud.
15. Install the fan and fan drive assembly
16. Install the accessory drive belt.
17. Install the coolant bottle and washer bottle.
18. Install the upper radiator hose.
19. Install the air cleaner assembly.
20. Fill cooling system.
21. Refill engine oil.
22. Connect the battery negative cable.
23. Install the engine cover (1).



TIMING CHAIN & SPROCKETS

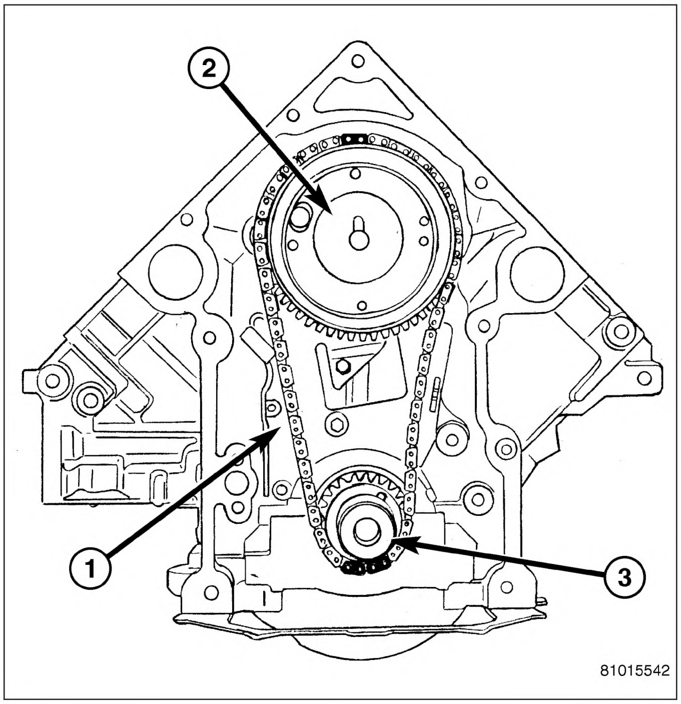
REMOVAL



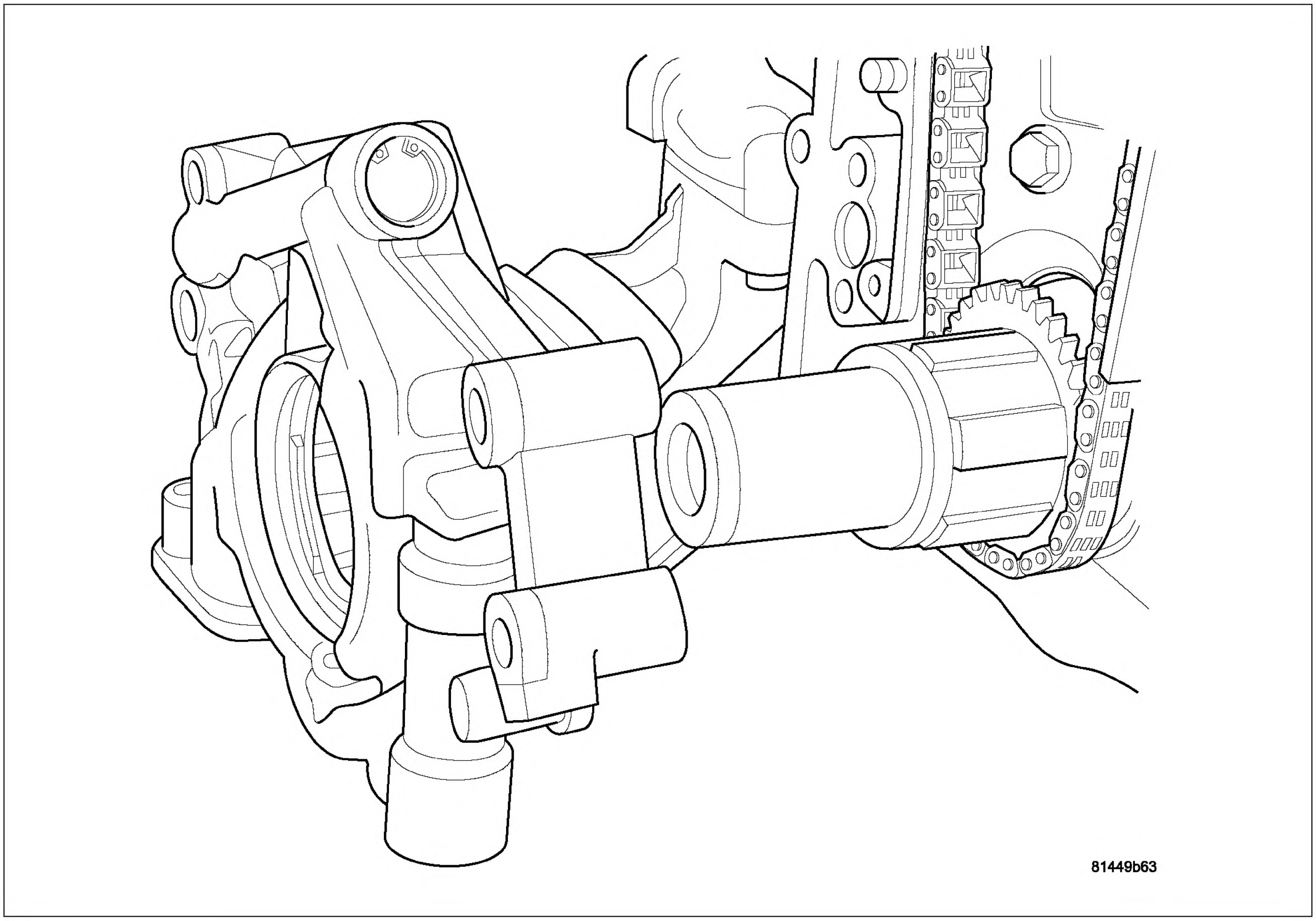
1. Disconnect battery negative cable.
2. Drain cooling system.

3. Remove Timing Chain Cover (1).

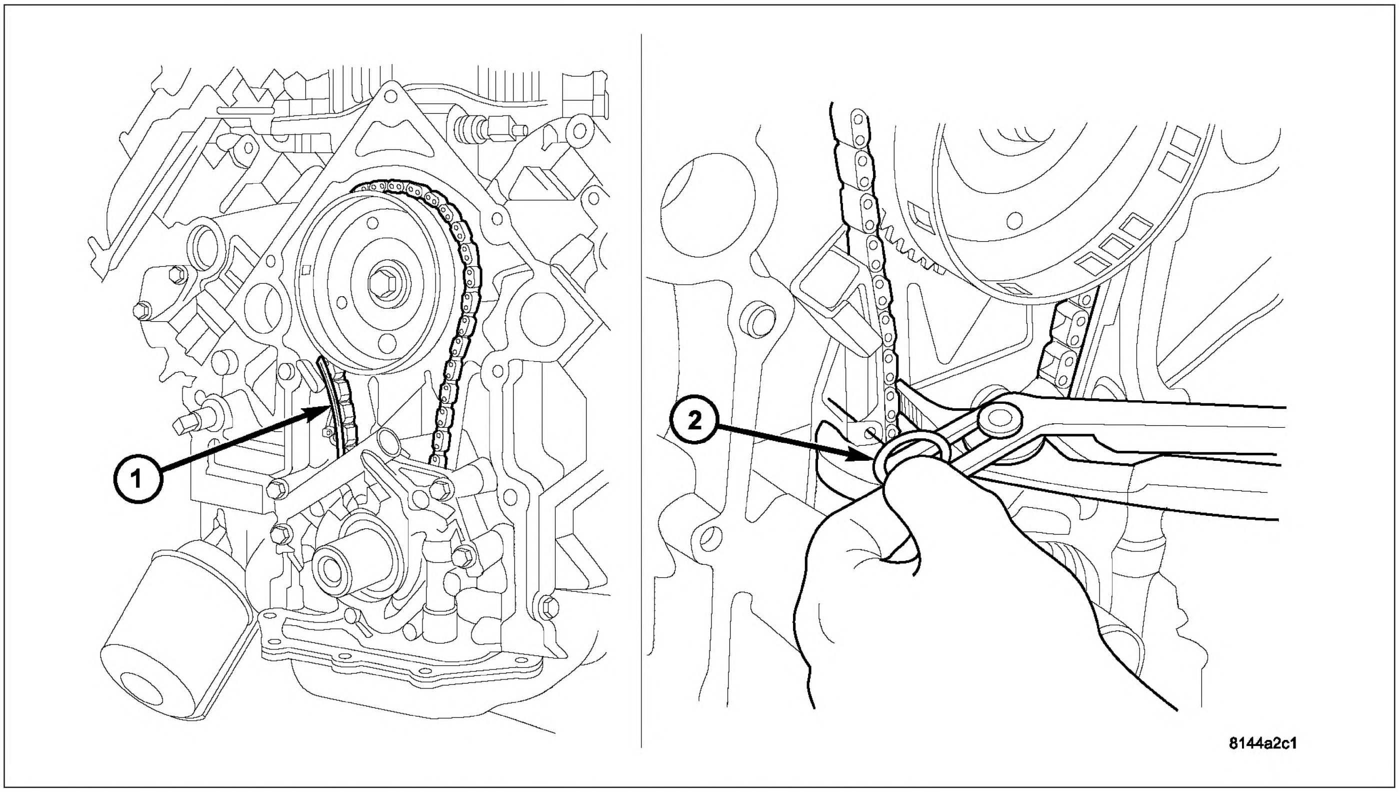
4. Re-install the vibration damper bolt finger tight. Using a suitable socket and breaker bar, rotate the crankshaft to align timing chain sprockets and keyways as shown.



CAUTION: The camshaft pin and the slot in the cam sprocket must be clocked at 12:00 (2). The crankshaft keyway must be clocked at 2:00 (3). The crankshaft sprocket must be installed so that the dots and or paint marking is at 6:00.

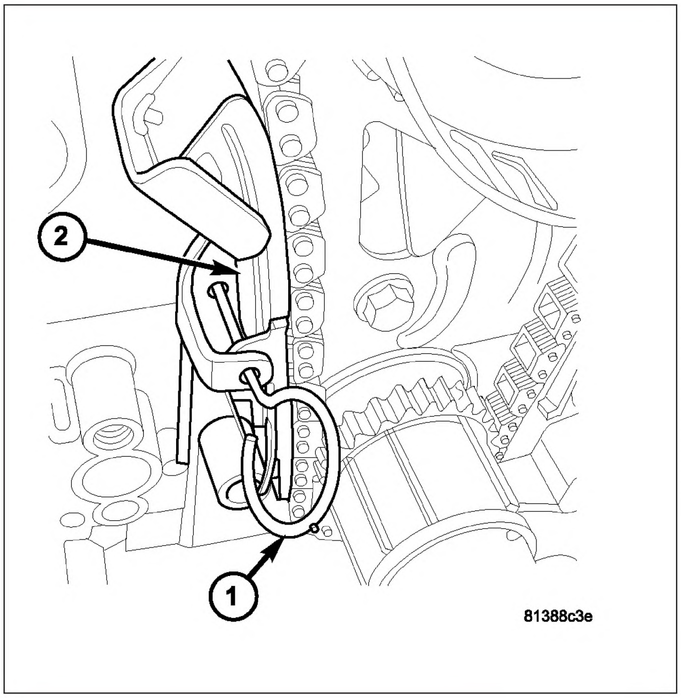


5. Remove oil pump.

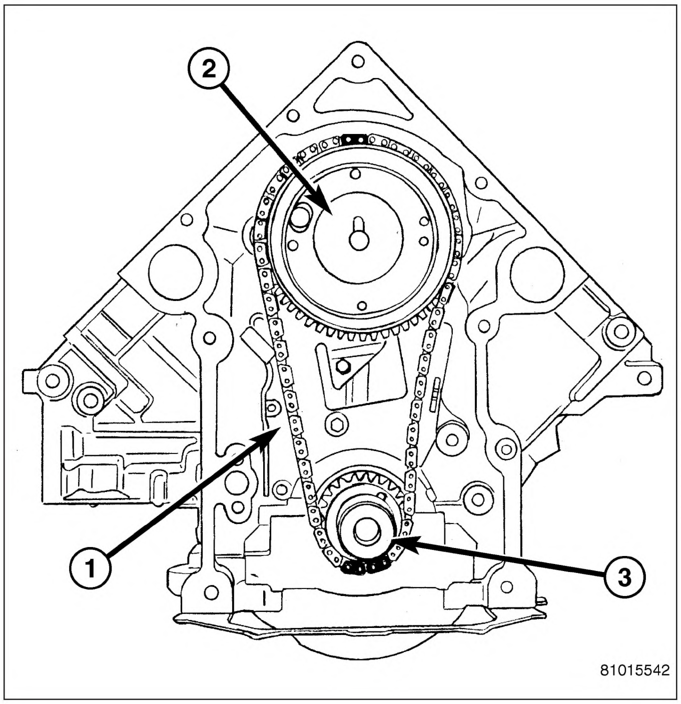

1
2
8144a2c1

6. Retract tensioner shoe (1) until hole in shoe lines up with hole in bracket..

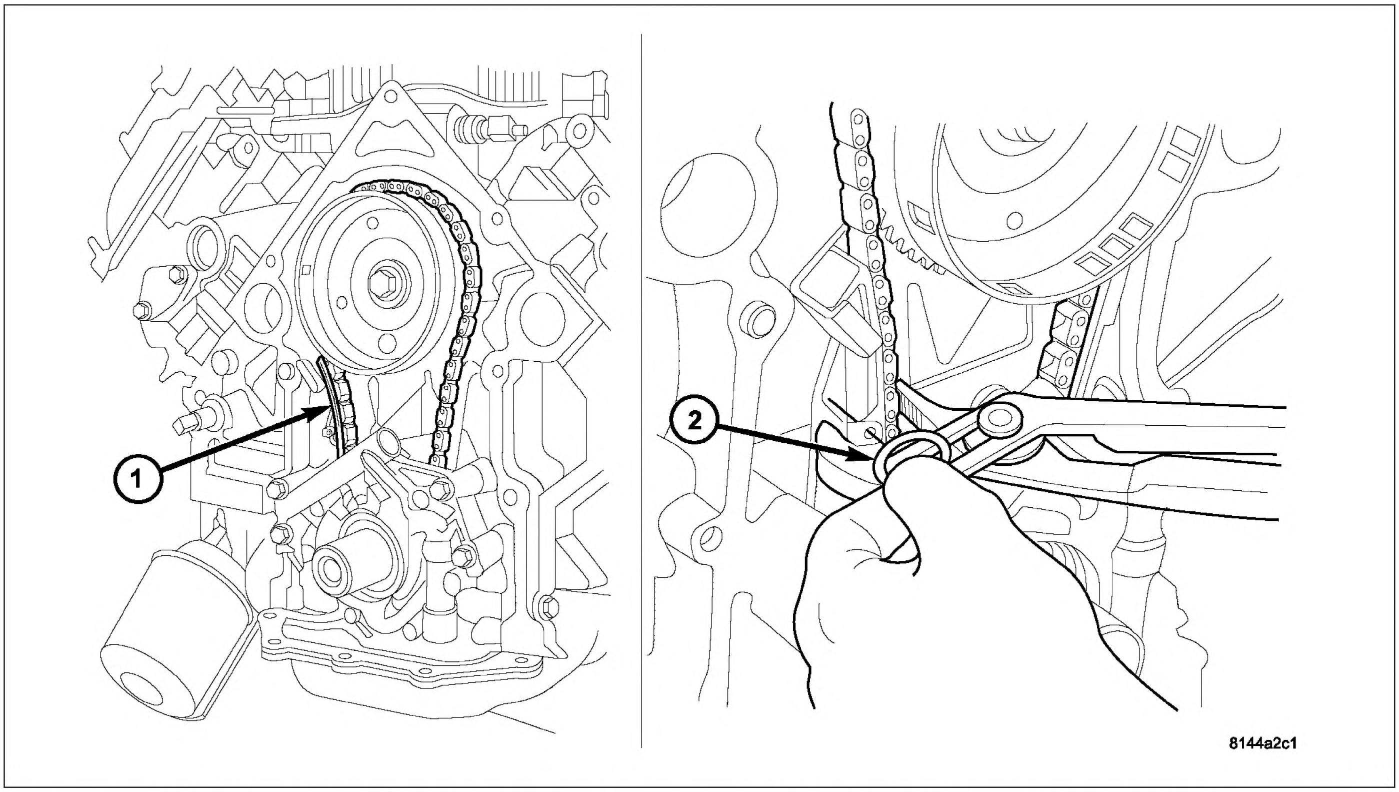
7. Slide a suitable pin (2) into the holes.


2
1
81388c3e

8. Remove camshaft sprocket attaching bolt and remove timing chain with crankshaft and camshaft sprockets (2).
9. If tensioner assembly is to be replaced, remove the tensioner to block bolts and remove tensioner assembly.



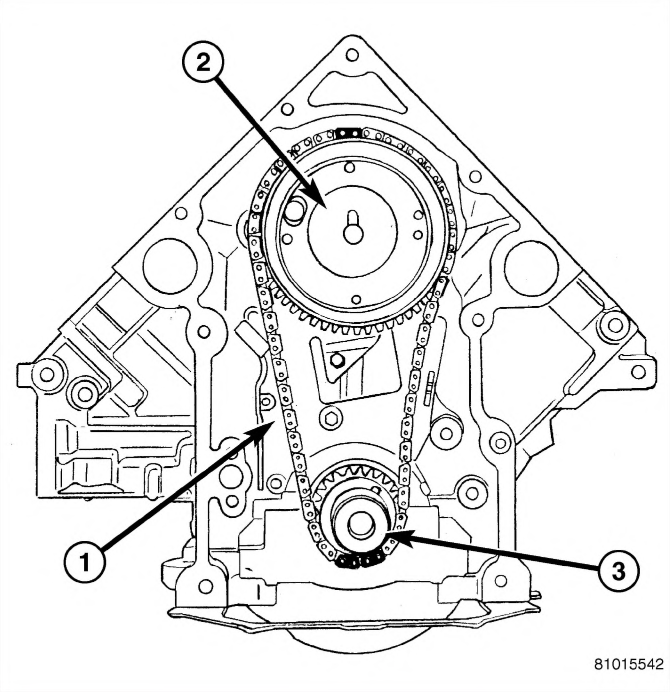
INSTALLATION



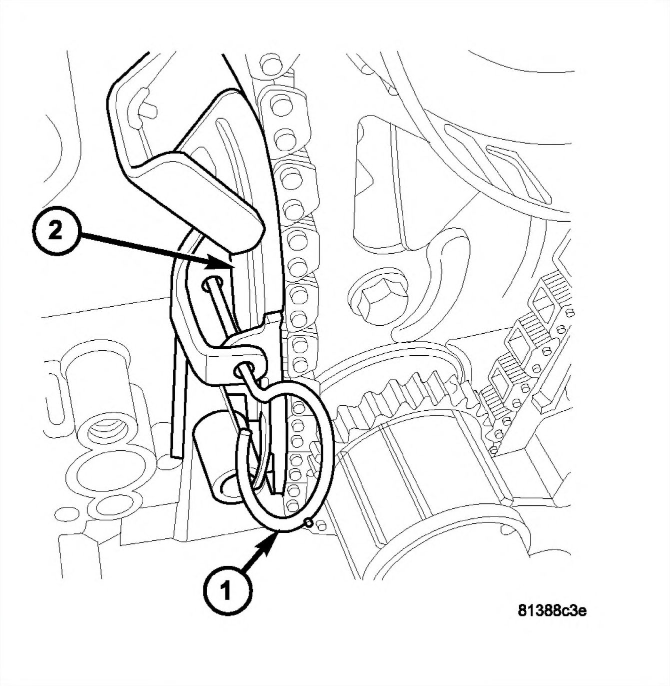
1. If tensioner (1) assembly is being replaced, install tensioner and mounting bolts. Torque bolts to 28 N·m (250 in. lbs.).
2. Retract tensioner (2) if required.

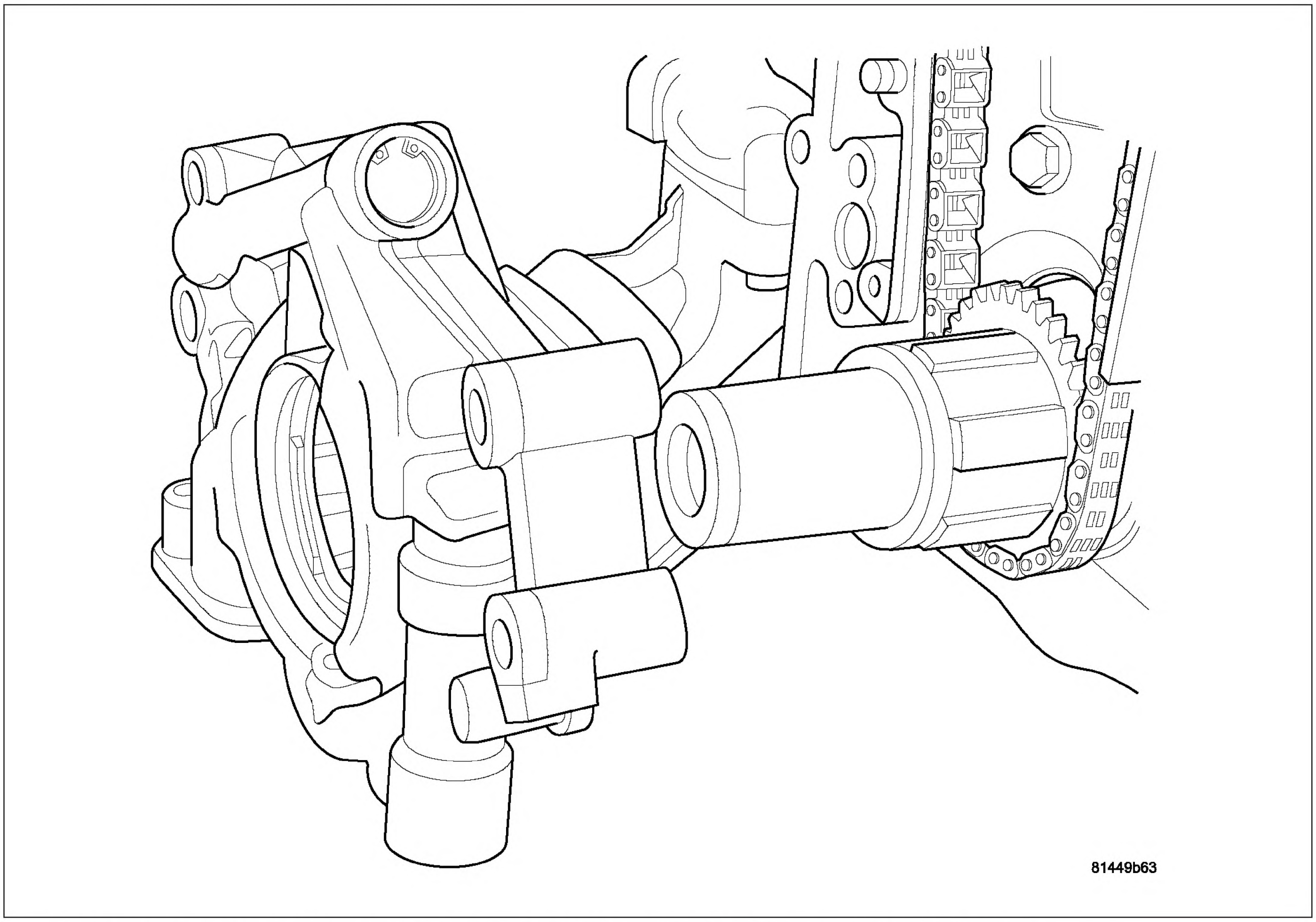
CAUTION: The timing chain must be installed with the single plated link aligned with the dot and or paint marking on the camshaft sprocket. The crankshaft sprocket is aligned with the dot and or paint marking on the sprocket between two plated timing chain links.

CAUTION: The camshaft pin and the slot in the cam sprocket must be clocked at 12:00. The crankshaft keyway must be clocked at 2:00. The crankshaft sprocket must be installed so that the dots and or paint marking is at 6:00.

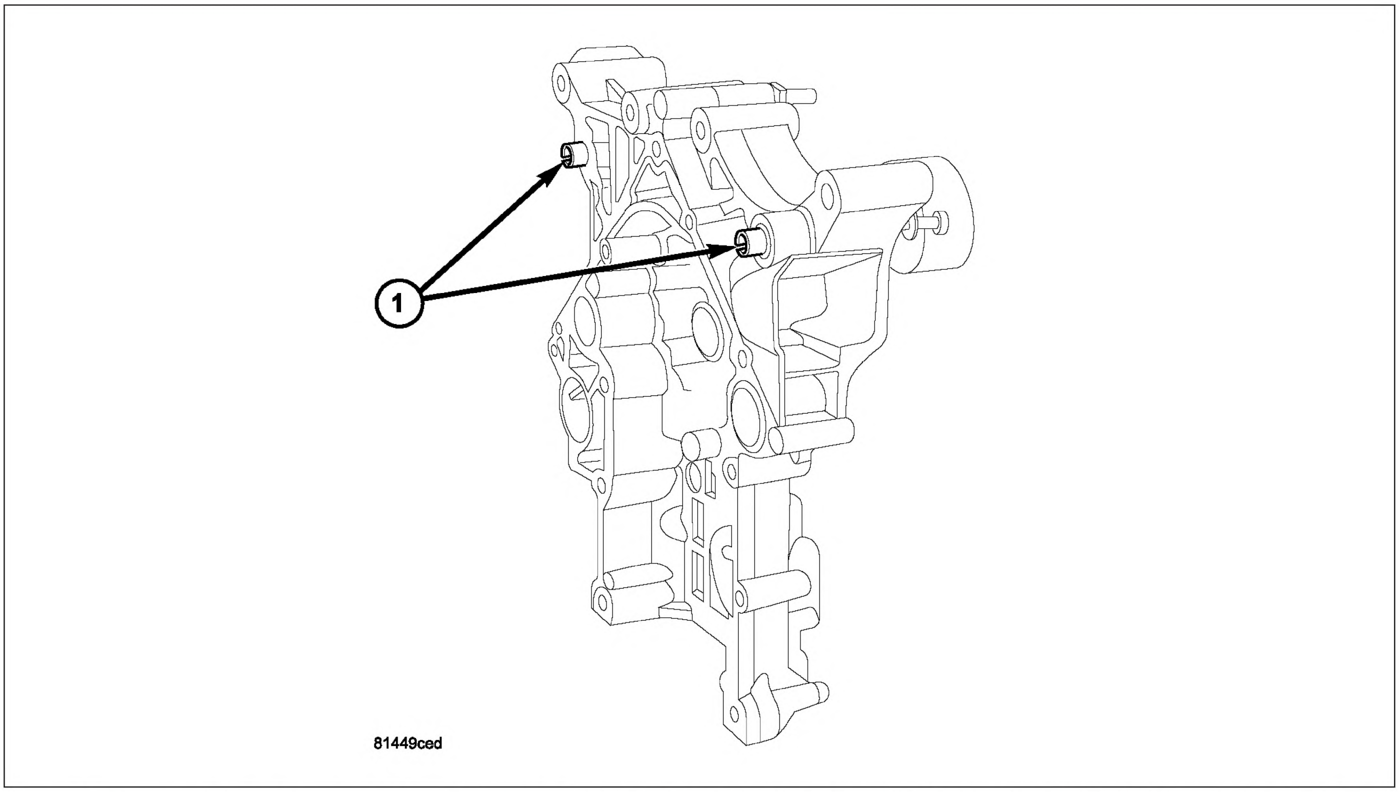


3. Place both camshaft sprocket and crankshaft sprocket on the bench with timing marks on exact imaginary center line through both camshaft and crankshaft bores.
4. Place timing chain around both sprockets.
5. Lift sprockets and chain (keep sprockets tight against the chain in position as shown).
6. Slide both sprockets (2,3) evenly over their respective shafts and check alignment of timing marks.
7. Install the camshaft bolt. Tighten the bolt to 122 N·m (90 ft. lbs.) torque.
8. **Remove tensioner pin. (1)** Again, verify alignment of timing marks.





9. Install the oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).
10. Install the oil pan and pick up (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).



11. Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).
12. Refill engine oil.

13. Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
14. Connect battery negative cable.
15. Start engine and check for oil and coolant leaks.

TENSIONER - TIMING CHAIN

DESCRIPTION

The timing chain tensioner is a stamped steel constant tension mechanical design. It is mounted to the front of the engine, behind the timing chain drive.

OPERATION

The timing chain tension is maintained by routing the timing chain through the tensioner assembly. A nylon covered spring steel arm presses on the timing chain maintaining the correct chain tension.

EXHAUST SYSTEM

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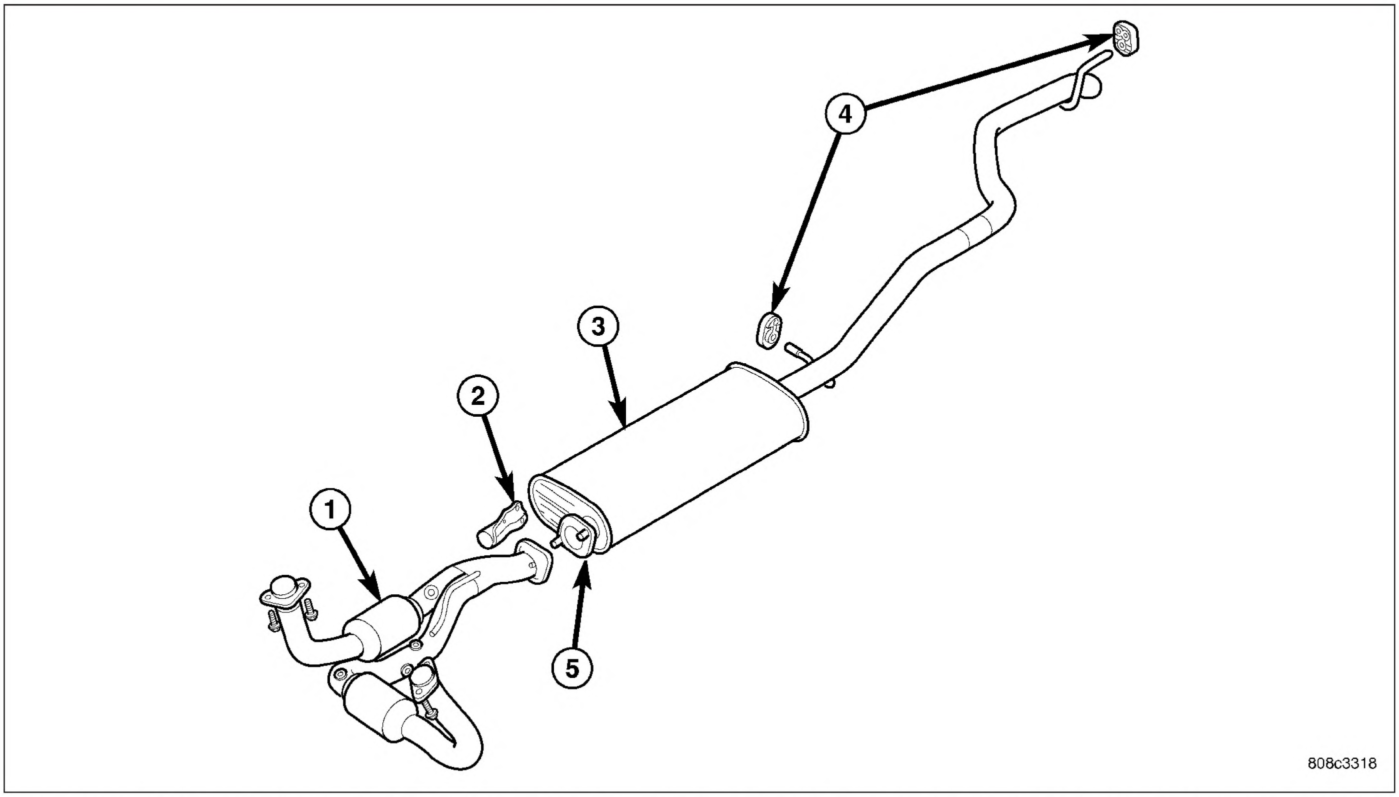
EXHAUST SYSTEM

DESCRIPTION

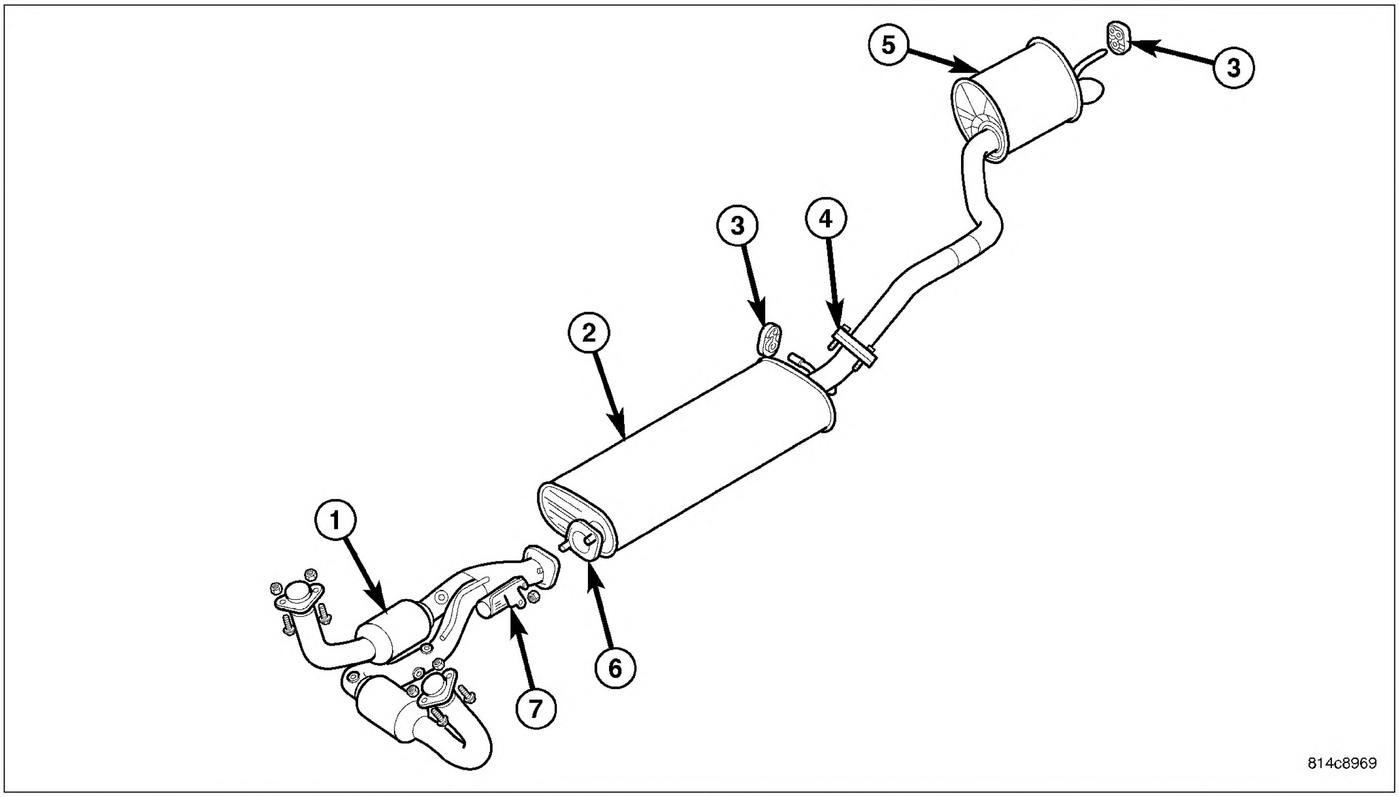
GAS ENGINES



WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

CAUTION: Avoid application of rust prevention compounds or undercoating materials to exhaust system floor pan heat shields. Light overspray near the edges is permitted. Application of coating will result in excessive floor pan temperatures and objectionable fumes.

The 3.7L/4.7L exhaust system uses two catalytic converters located in the front exhaust pipe, and a single muffler/ tailpipe assembly.



The 5.7L exhaust system uses two catalytic converters located in the front exhaust pipe, and a single muffler and tailpipe/resonator assembly.

The front exhaust pipe/catalytic converter assembly is a hydra-form thin wall air gap design. This design is used to reduce heat, noise and improve emissions. When replacement is required, use original equipment parts (or their equivalent).

The exhaust manifolds are equipped with ball flange outlets to assure a tight seal and strain free connections.

The exhaust system must be properly aligned to prevent stress, leakage and body contact. If the system contacts any body panel, it may amplify objectionable noises originating from the engine or body.

When inspecting an exhaust system, critically inspect for cracked or loose joints, stripped screw or bolt threads, corrosion damage and worn, cracked or broken hangers. Replace all components that are badly corroded or damaged. DO NOT attempt to repair.

When replacement is required, use original equipment parts (or their equivalent). This will assure proper alignment and provide acceptable exhaust noise levels.

The basic exhaust system consists of exhaust manifold(s), exhaust pipe with oxygen sensors, catalytic converter(s), muffler and tailpipe.

DIAGNOSIS AND TESTING

EXHAUST SYSTEM - GAS ENGINE

EXHAUST SYSTEM DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
EXCESSIVE EXHAUST NOISE	1. Leaks at pipe joints.	1. Tighten flanges to specified torque at leaking joints (Refer to 11 - EXHAUST SYSTEM - SPECIFICATIONS).
	2. Burned or blown out muffler.	2. 3.7L/4.7L Replace muffler/tailpipe assembly (Refer to 11 - EXHAUST SYSTEM/MUFFLER - REMOVAL). 5.7L Replace muffler. Check exhaust system.
	3. Burned or rusted-out exhaust pipe.	3. 3.7L/4.7L Replace muffler/tailpipe assembly (Refer to 11 - EXHAUST SYSTEM/MUFFLER - REMOVAL). 5.7L Replace tailpipe resonator assembly (Refer to 11 - EXHAUST SYSTEM/TAILPIPE - REMOVAL).
	4. Exhaust pipe leaking at manifold flange.	4. Tighten connection attaching nuts (Refer to 11 - EXHAUST SYSTEM - SPECIFICATIONS).
	5. Exhaust manifold cracked or broken.	5. Replace exhaust manifold (Refer to 9 - ENGINE/MANIFOLDS/ EXHAUST MANIFOLD - REMOVAL).
	6. Leak between exhaust manifold and cylinder head.	6. Tighten exhaust manifold to cylinder head stud nuts or bolts (Refer to 9 - ENGINE - SPECIFICATIONS).
	7. Restriction in muffler or tailpipe.	7. Remove restriction, if possible. Replace muffler or tailpipe, as necessary.
	8. Exhaust system contacting body or chassis.	8. Re-align exhaust system to clear surrounding components.
LEAKING EXHAUST GASES	1. Leaks at pipe joints.	1. Tighten flanges (Refer to 11 - EXHAUST SYSTEM - SPECIFICATIONS).

SPECIFICATIONS

TORQUE

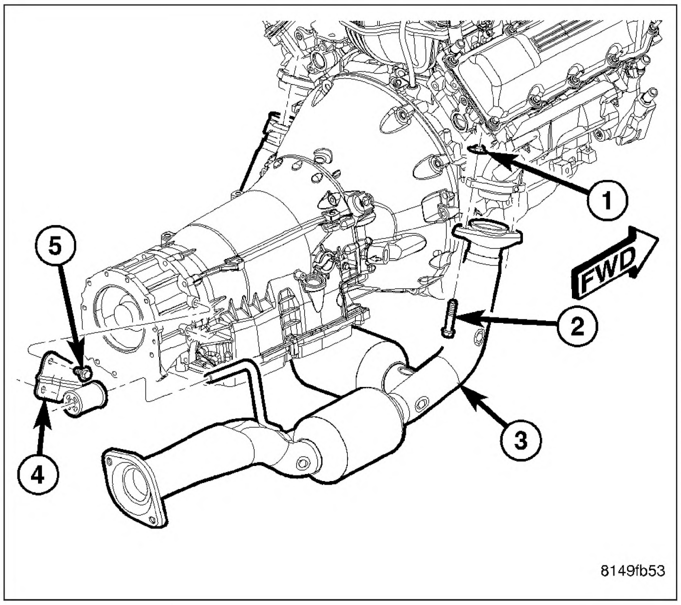
DESCRIPTION	N·m	Ft.Lbs.	In.Lbs.
Front Exhaust to Manifold Nuts	25.7	19	-
Muffler-to-Catalytic Converter flange nuts	47	35	-
Steady rest bracket mounting bolts	47	35	-

CONVERTER-CATALYTIC

DESCRIPTION - CATALYTIC CONVERTER

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

CAUTION: DO NOT remove spark plug wires from plugs or by any other means short out cylinders. Failure of the catalytic converter can occur due to a temperature increase caused by unburned fuel passing through the converter.



The front exhaust pipe/catalytic converter assembly (3) is a hydra-form thin wall air gap design. This design is used to reduce heat, noise and improve emissions. When replacement is required, use original equipment parts (or their equivalent).

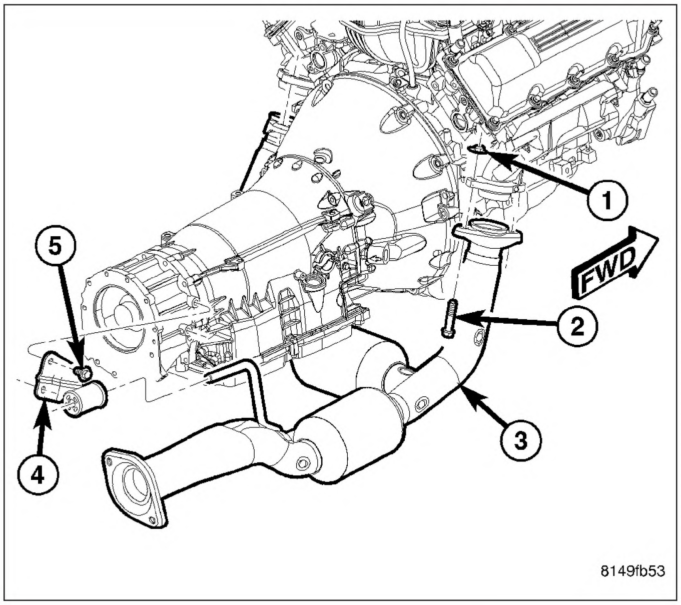
The stainless steel catalytic converter body is designed to last the life of the vehicle. Excessive heat can result in bulging or other distortion, but excessive heat will not be the fault of the converter. If unburned fuel enters the converter, overheating may occur. If a converter is heat-damaged, correct the cause of the damage at the same time the converter is replaced. Also, inspect all other components of the exhaust system for heat damage.

Unleaded gasoline must be used to avoid contaminating the catalyst core.

REMOVAL

3.7L ENGINE

WARNING: IF TORCHES ARE USED WHEN WORKING ON THE EXHAUST SYSTEM, DO NOT ALLOW THE FLAME NEAR THE FUEL LINES.

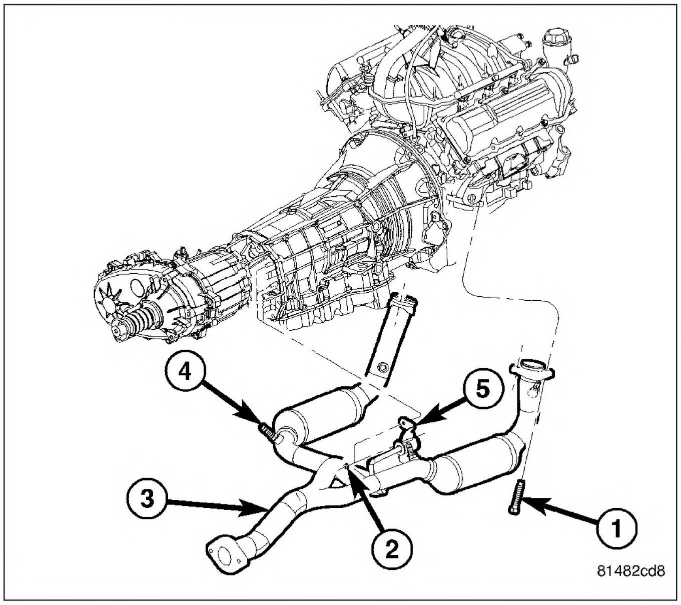


1. Raise and support the vehicle.
2. Saturate the bolts and nuts with heat valve lubricant. Allow 5 minutes for penetration.
3. Remove transmission crossmember (Refer to 13 - FRAME & BUMPERS/FRAME/REAR CROSSMEMBER - REMOVAL).
4. Disconnect and mark oxygen sensor electrical connectors.
5. Remove steady rest bracket mounting bolt (5) from transmission.
6. Remove the nuts from the front exhaust pipe/catalytic converter assembly to muffler flange.
7. Remove bolts (2) and flanged nuts (1) at the exhaust manifold.

8. Remove the front exhaust pipe/catalytic converter assembly (3) from the vehicle.
9. Remove steady rest bracket (4) from front exhaust pipe/catalytic converter assembly (3).

4.7L ENGINE

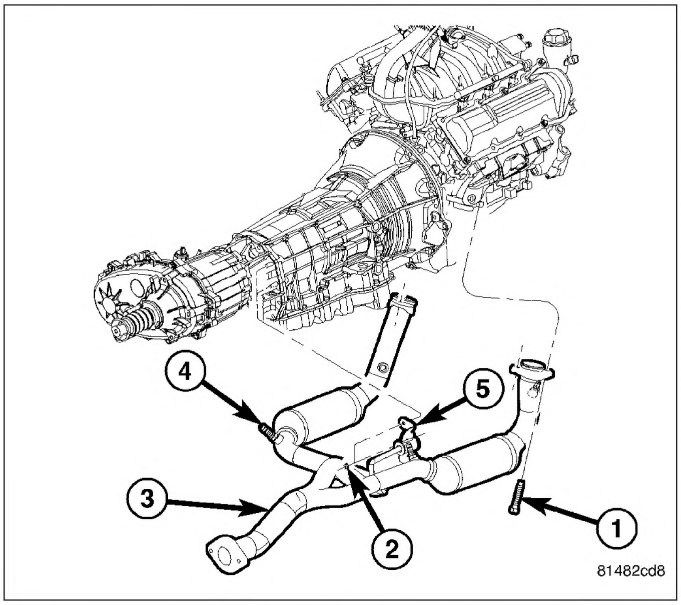
WARNING: IF TORCHES ARE USED WHEN WORKING ON THE EXHAUST SYSTEM, DO NOT ALLOW THE FLAME NEAR THE FUEL LINES.



1. Raise and support the vehicle.
2. Saturate the bolts and nuts with heat valve lubricant. Allow 5 minutes for penetration.
3. Remove transmission crossmember (Refer to 13 - FRAME & BUMPERS/FRAME/REAR CROSSMEMBER - REMOVAL).
4. Disconnect and mark oxygen sensor electrical connectors.
5. Remove steady rest bracket mounting bolt (5) from transmission.
6. Remove the nuts from the front exhaust pipe/catalytic converter assembly to muffler flange.
7. Remove bolts (2) and flanged nuts (1) at the exhaust manifold.
8. Remove the front exhaust pipe/catalytic converter assembly (3) from the vehicle.
9. Remove steady rest bracket (4) from front exhaust pipe/catalytic converter assembly (3).

5.7L ENGINE

WARNING: IF TORCHES ARE USED WHEN WORKING ON THE EXHAUST SYSTEM, DO NOT ALLOW THE FLAME NEAR THE FUEL LINES.



1. Raise and support the vehicle.
2. Saturate the bolts and nuts with heat valve lubricant. Allow 5 minutes for penetration.
3. Remove transmission crossmember (Refer to 13 - FRAME & BUMPERS/FRAME/REAR CROSSMEMBER - REMOVAL).
4. Disconnect and mark oxygen sensor electrical connectors.
5. Remove steady rest bracket mounting bolt (5) from transmission.
6. Remove the nuts from the front exhaust pipe/catalytic converter assembly to muffler flange.
7. Remove bolts (2) and flanged nuts (1) at the exhaust manifold.
8. Remove the front exhaust pipe/catalytic converter assembly (3) from the vehicle.
9. Remove steady rest bracket (4) from front exhaust pipe/catalytic converter assembly (3).

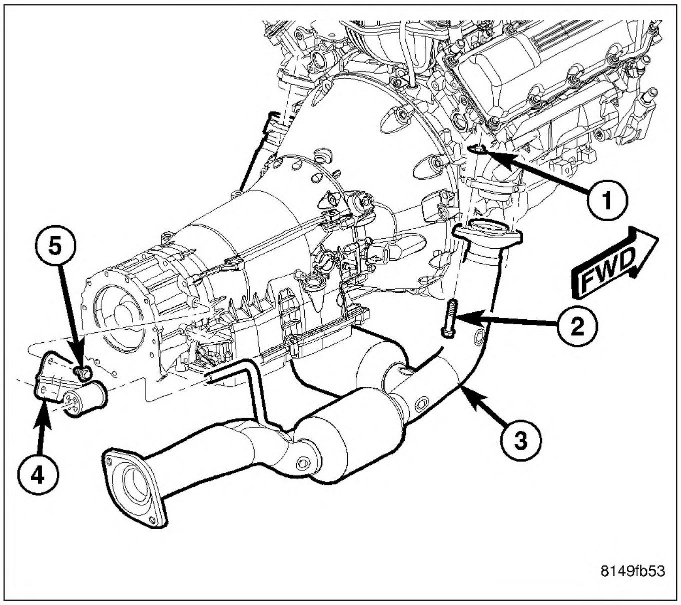
INSPECTION

Look at the stainless steel body of the converter, inspect for bulging or other distortion that could be a result of overheating.

If you suspect internal damage to the catalyst, tapping the bottom of the catalyst with a rubber mallet may indicate a damaged core.

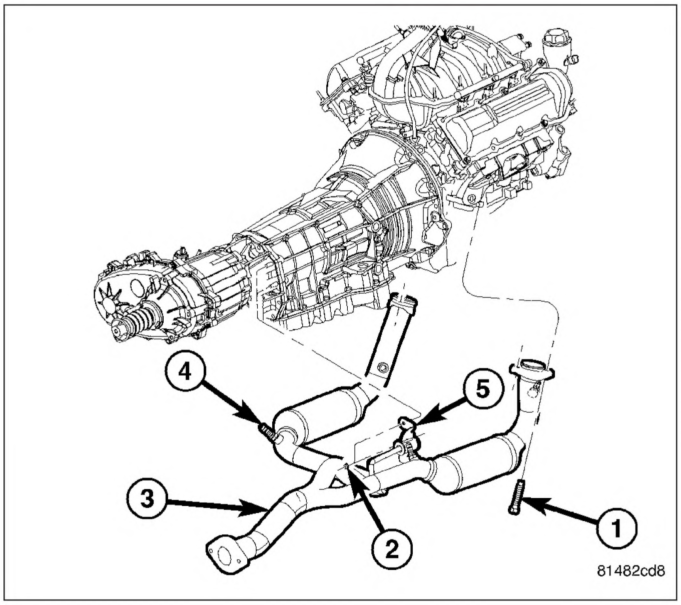
INSTALLATION

3.7L ENGINE



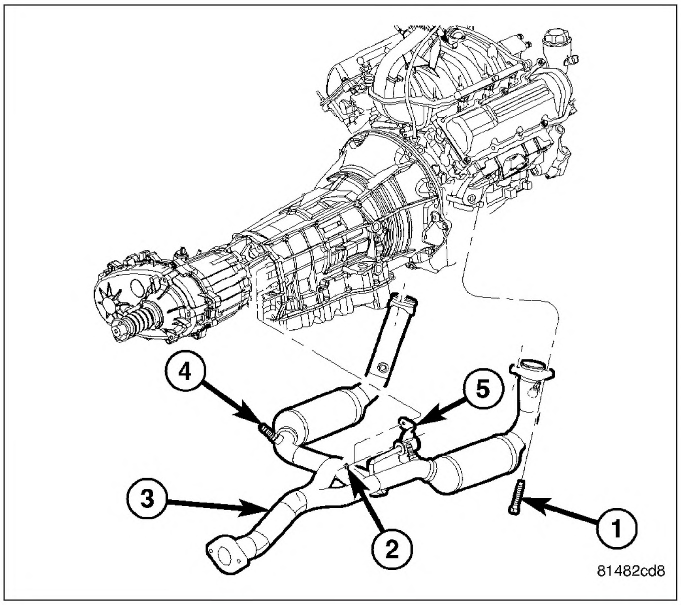
1. Position steady rest bracket (4) onto the front exhaust pipe/catalytic converter assembly (3).
2. Position the front exhaust pipe/catalytic converter assembly (4) into vehicle.
3. Install the bolts (2) and nuts (1) at the front exhaust pipe/catalytic converter assembly (3) to exhaust manifold flange. Do not tighten.
4. Install the nuts at the front exhaust pipe/catalytic converter assembly to muffler flange. Do not tighten.
5. Position the exhaust pipe for proper clearance with the frame and underbody parts. A minimum clearance of 25.4 mm (1.0 in.) is required.
6. Tighten front exhaust pipe/catalytic converter assembly to exhaust manifold bolts (2) to 25.7 N·m (19 in. lbs.) torque.
7. Tighten the front exhaust pipe and catalytic converter assembly to muffler flange nuts to 47 N·m (35 ft. lbs.) torque.
8. Install steady rest bracket bolts. Tighten bolts to 47 N·m (35 ft. lbs.).
9. Connect oxygen sensor electrical connectors.
10. Install transmission crossmember (Refer to 13 - FRAME & BUMPERS/FRAME/REAR CROSSMEMBER - INSTALLATION)
11. Lower vehicle.
12. Start the vehicle and inspect for exhaust leaks. Repair exhaust leaks as necessary.

4.7L ENGINE



1. Position steady rest bracket (4) onto the front exhaust pipe/catalytic converter assembly (3).
2. Position the front exhaust pipe/catalytic converter assembly (4) into vehicle.
3. Install the bolts (2) and nuts (1) at the front exhaust pipe/catalytic converter assembly (3) to exhaust manifold flange. Do not tighten.
4. Install the nuts at the front exhaust pipe/catalytic converter assembly to muffler flange. Do not tighten.
5. Position the exhaust pipe for proper clearance with the frame and underbody parts. A minimum clearance of 25.4 mm (1.0 in.) is required.
6. Tighten front exhaust pipe/catalytic converter assembly to exhaust manifold bolts (2) to 25.7 N·m (19 in. lbs.) torque.
7. Tighten the front exhaust pipe and catalytic converter assembly to muffler flange nuts to 47 N·m (35 ft. lbs.) torque.
8. Install steady rest bracket bolts. Tighten bolts to 47 N·m (35 ft. lbs.).
9. Connect oxygen sensor electrical connectors.
10. Install transmission crossmember (Refer to 13 - FRAME & BUMPERS/FRAME/REAR CROSSMEMBER - INSTALLATION)
11. Lower vehicle.
12. Start the vehicle and inspect for exhaust leaks. Repair exhaust leaks as necessary.

5.7L ENGINE



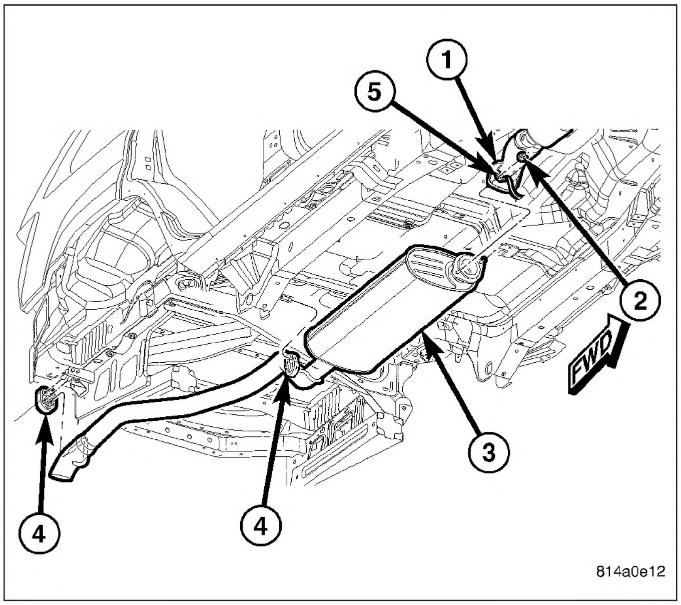
1. Position steady rest bracket (4) onto the front exhaust pipe/catalytic converter assembly (3).
2. Position the front exhaust pipe/catalytic converter assembly (4) into vehicle.
3. Install the bolts (2) and nuts (1) at the front exhaust pipe/catalytic converter assembly (3) to exhaust manifold flange. Do not tighten.
4. Install the nuts at the front exhaust pipe/catalytic converter assembly to muffler flange. Do not tighten.
5. Position the exhaust pipe for proper clearance with the frame and underbody parts. A minimum clearance of 25.4 mm (1.0 in.) is required.
6. Tighten front exhaust pipe/catalytic converter assembly to exhaust manifold bolts (2) to 25.7 N·m (19 in. lbs.) torque.
7. Tighten the front exhaust pipe and catalytic converter assembly to muffler flange nuts to 47 N·m (35 ft. lbs.) torque.
8. Install steady rest bracket bolts. Tighten bolts to 47 N·m (35 ft. lbs.).
9. Connect oxygen sensor electrical connectors.

10. Install transmission crossmember (Refer to 13 - FRAME & BUMPERS/FRAME/REAR CROSSMEMBER - INSTALLATION)
11. Lower vehicle.
12. Start the vehicle and inspect for exhaust leaks. Repair exhaust leaks as necessary.

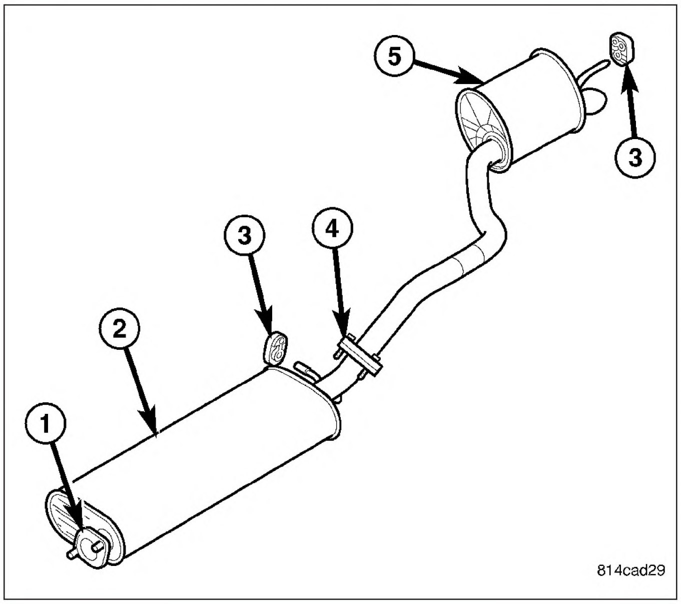
MUFFLER

DESCRIPTION

All engines use a stainless steel muffler and tailpipe assembly to control exhaust noise levels and exhaust back pressure. The 3.7L/4.7L muffler and tailpipe are a one piece assembly.



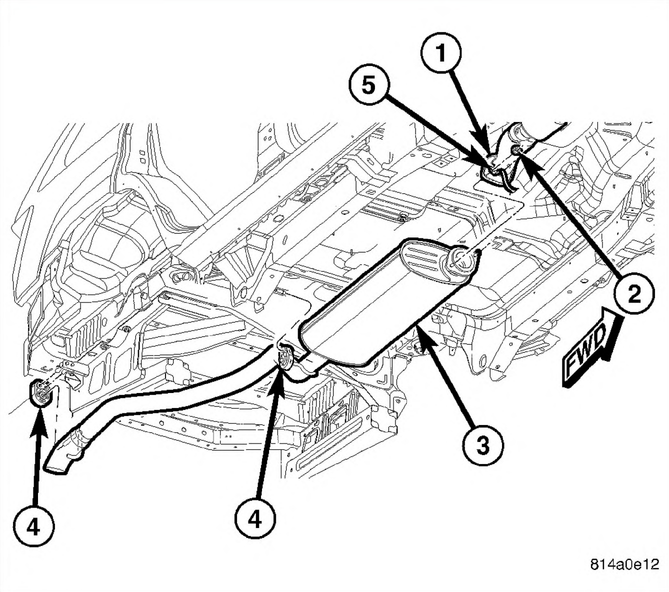
The 5.7L tailpipe is serviced separately.



REMOVAL

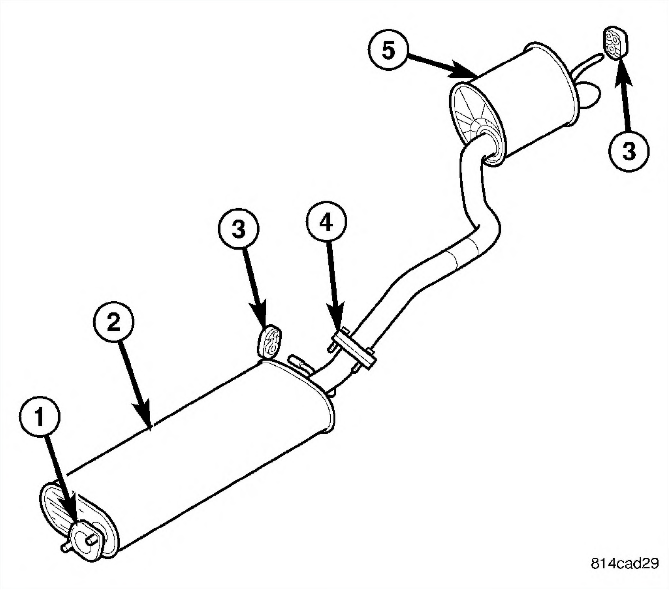
3.7L/4.7L ENGINE

1. Raise the vehicle and support the rear of the vehicle by the side rails and allow the axle to hang free.
2. Saturate the bolts and nuts (2) with heat valve lubricant. Allow 5 minutes for penetration.
3. Position a jackstand under the rear axle.
4. Remove RH rear shock absorber (Refer to 2 - SUSPENSION/REAR/SHOCK - REMOVAL) and RH side of stabilizer bar (Refer to 2 - SUSPENSION/REAR/STABILIZER BAR - REMOVAL).
5. Remove the front exhaust pipe/catalytic converter to muffler/tailpipe assembly flange nuts (2) and ground strap (5).
6. Remove tailpipe/muffler assembly (3) from Isolators.
7. Remove the muffler/tailpipe assembly (3) from vehicle.



5.7L ENGINE

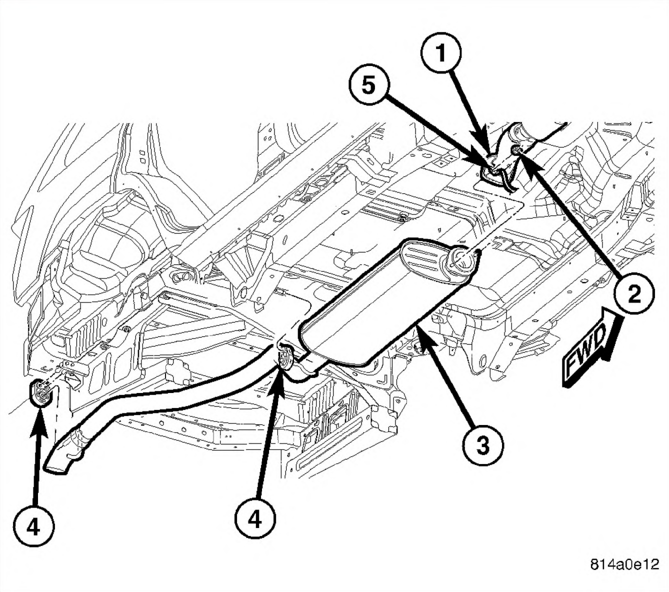
1. Raise the vehicle and support the rear of the vehicle by the side rails and allow the axle to hang free.
2. Saturate the bolts and nuts with heat valve lubricant. Allow 5 minutes for penetration.
3. Remove muffler from isolator.
4. Remove the tailpipe/resonator to muffler assembly flange nuts.
5. Remove the front exhaust pipe/catalytic converter to muffler flange nuts.
6. Remove muffler from vehicle.



INSTALLATION

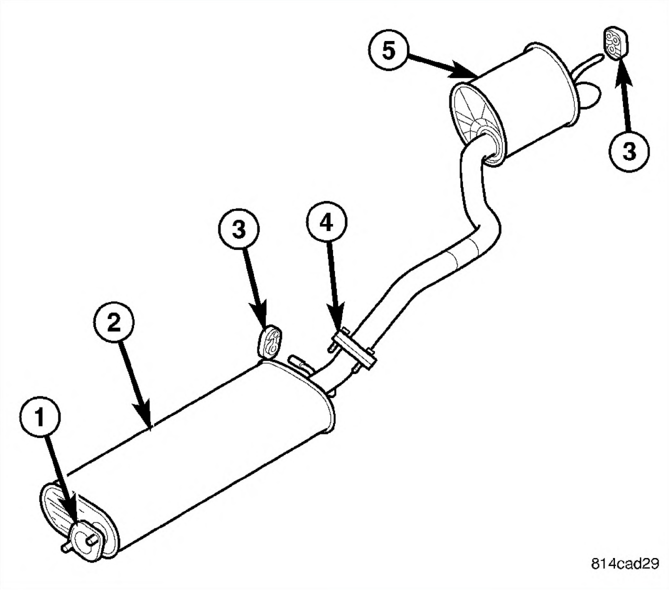
3.7L/4.7L ENGINE

1. Position muffler and tailpipe assembly in vehicle.
2. Install insulators.
3. Install bolts and nuts (2) and ground strap (5) at front exhaust pipe/catalytic converter flange (1)
4. Make sure the muffler/tailpipe assembly is correctly positioned and the properly aligned. The minimum clearance between components is 25mm (1 inch).
5. Tighten nuts (2) to 47 N·m (35 ft. lbs.).
6. Install RH shock absorber (Refer to 2 - SUSPENSION/REAR/SHOCK - INSTALLATION) and stablizer bar (Refer to 2 - SUSPENSION/REAR/STABILIZER BAR - INSTALLATION).
7. Lower the vehicle.
8. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.



INSTALLATION

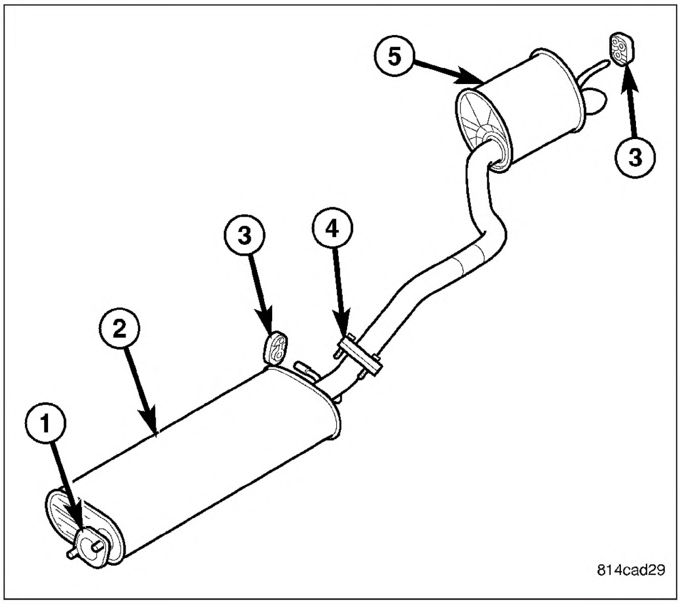
1. Position muffler in vehicle.
2. Install front exhaust pipe/catalytic converter to muffler flange nuts. Do not tighten at this time.
3. Install tailpipe/resonator assembly to muffler flange gasket and nuts. Do not tighten at this time.
4. Install rear insloator.
5. Make sure the muffler/tailpipe assembly is correctly positioned and the properly aligned. The minimum clearance between components is 25mm (1 inch).
6. Tighten flange nuts to 47 N·m (35 ft. lbs.).
7. Lower the vehicle.
8. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.



TAILPIPE

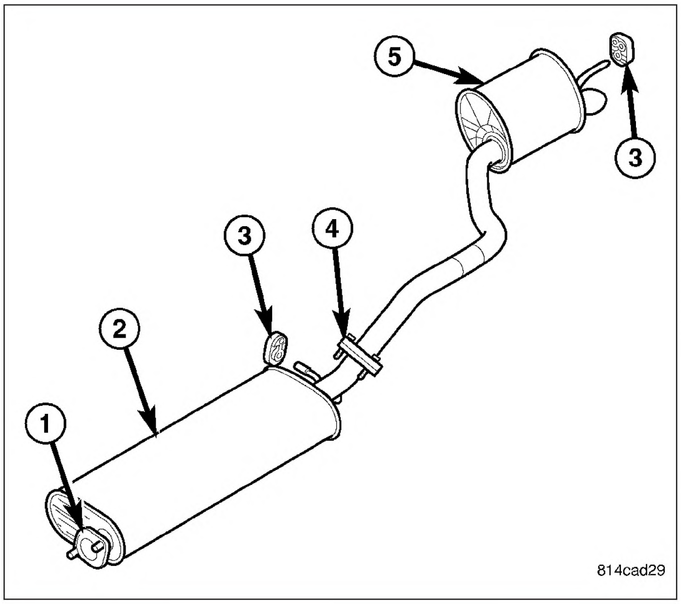
REMOVAL - 5.7L ENGINE

1. Raise the vehicle and support the rear of the vehicle by the side rails and allow the axle to hang free.
2. Saturate the bolts and nuts with heat valve lubricant. Allow 5 minutes for penetration.
3. Remove rear tailpipe isolators.
4. Remove the tailpipe/resonator to muffler assembly flange nuts.
5. Remove tailpipe and resonator assembly from vehicle.



INSTALLATION - 5.7L

1. Position the tailpipe/resonator assembly in vehicle.
2. Install tailpipe/resonator insulators.
3. Install new gasket and tailpipe/resonator to muffler flange nuts and bolts. Tighten to 47 N·m (35 ft. lbs.).
4. Make sure the tailpipe/resonator assembly is correctly positioned and the properly aligned. The minimum clearance between components is 25mm (1 inch).
5. Lower the vehicle.
6. Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.



FRAME & BUMPERS

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FRAME & BUMPERS

SPECIFICATIONS - TORQUE

TORQUE SPECIFICATIONS

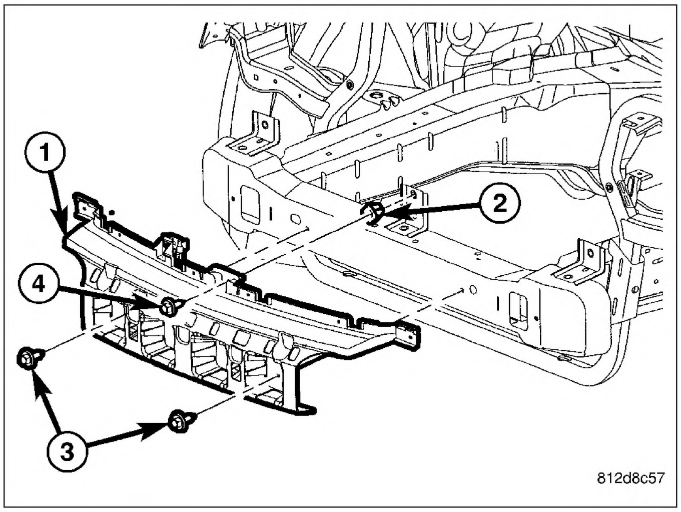
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Engine cradle bolts - front	203	150	—
Engine cradle bolts - rear	122	90	—
Engine mount bolts	111	82	—
Front differential - front support bolts	54	40	—
Front differential - rear support bolt	102	75	—
Front differential - right support bolt	102	75	—
Front skid plate bolt	28	21	—
Fuel filler tube support bolt	14	10	—
Halfshaft nuts	251	185	—
Lower ball joint nut	81	60	—
Lower clevis bolts	169	125	—
Outer tie rod end nut	75	55	—
Rear body cradle rail bolts	108	80	—
Rear body cradle rail bracket bolts/nuts	102	75	—
Rear fascia to quater panel nuts	9	—	80
Rear track bar bolts/nuts	190	140	—

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Tow eye nuts - rear	88	95	—
Tow hook nuts - front	68	50	—
Tow hook bolt/nut - rear brace	88	65	—
Tow hook nuts - rear mounting	88	65	—
Trailer hitch bolts	156	115	—
Transfer case skid plate bolts	47	35	—
Transfer case skid plate nuts	81	60	—
Transmission crossmember bolts	54	40	—
Transmission mount bolts	54	40	—
Upper ball joint nut	81	60	—
Vapor canister nuts	24	17	—

BRACKET-FRONT FASCIA MOUNTING

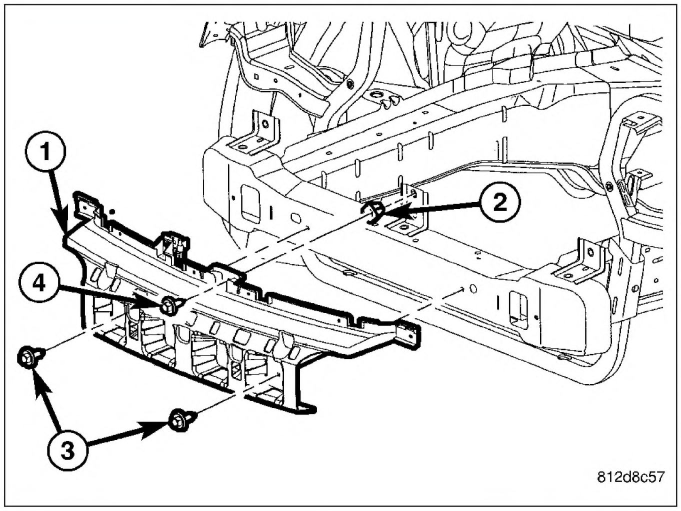
REMOVAL

1. Remove the fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)
2. Remove the bolts (3).
3. Remove the push pin fasteners and remove the fascia mounting bracket (1).



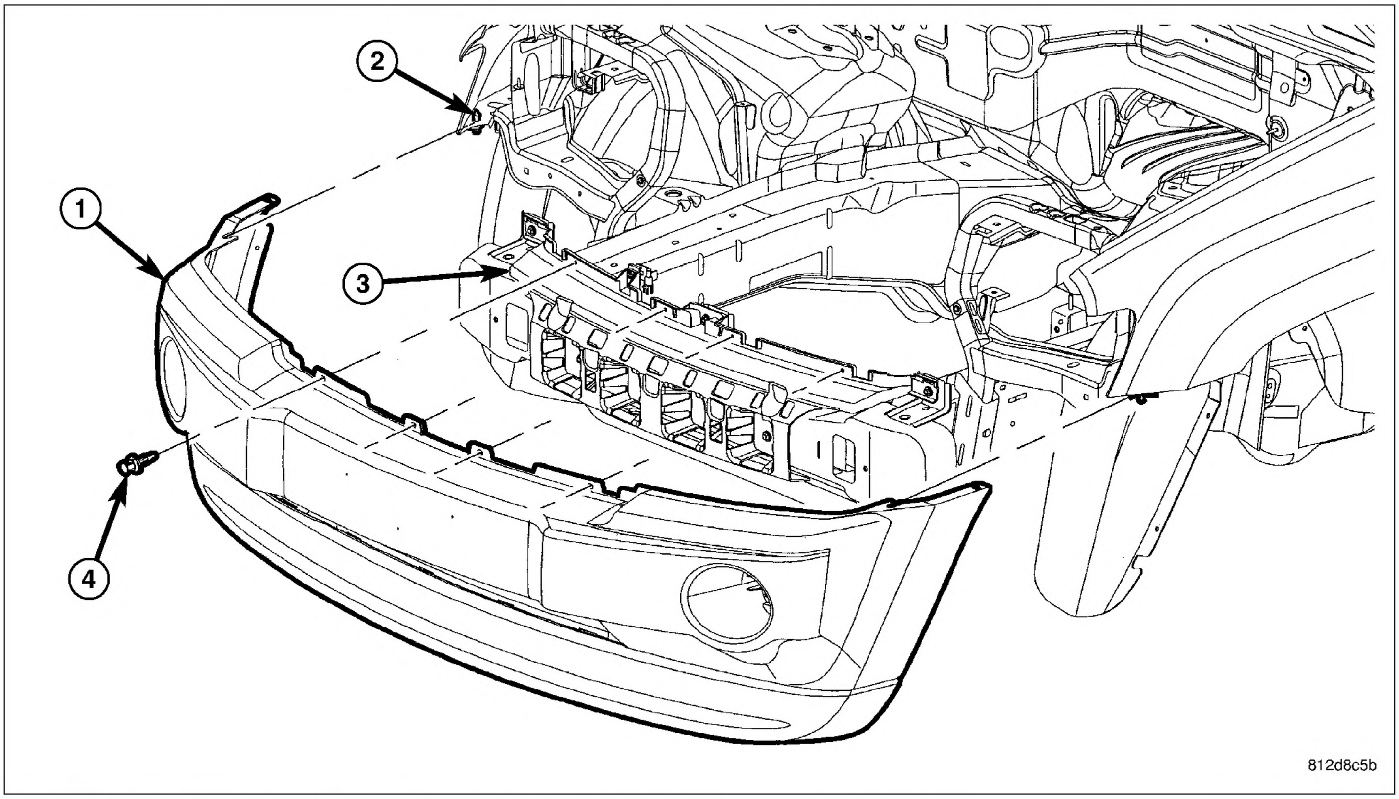
INSTALLATION

1. Position the fascia mounting bracket (1) over the bumper beam,
2. Install the push pin fasteners (4) and screws (3).
3. Install the fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION)



FASCIA-FRONT

REMOVAL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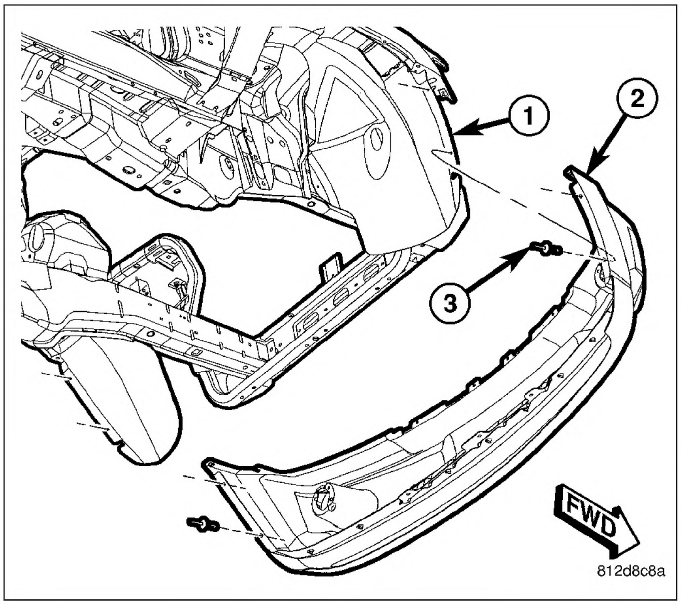
1. Remove the grille. (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL)
2. Remove the push pin fasteners (4) along the top of the fascia (1).
3. Remove the plastic rivets (3) at each wheelhouse splash shield (1).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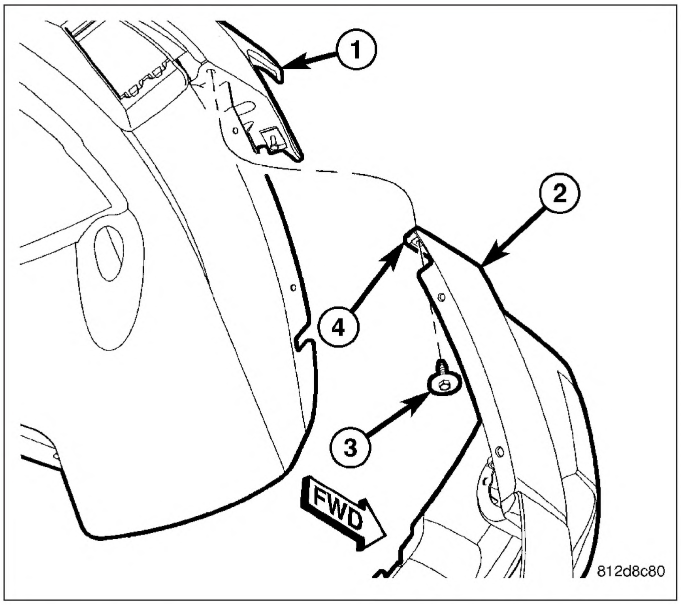
4. Remove the screws (3) from inside the fascia (2).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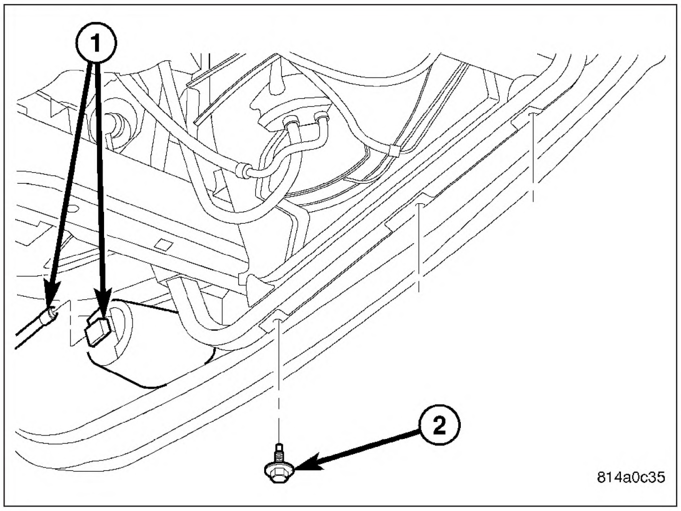
5. Remove the three lower screws (2).
6. Disconnect the fog lamp electrical connectors (1), if equipped.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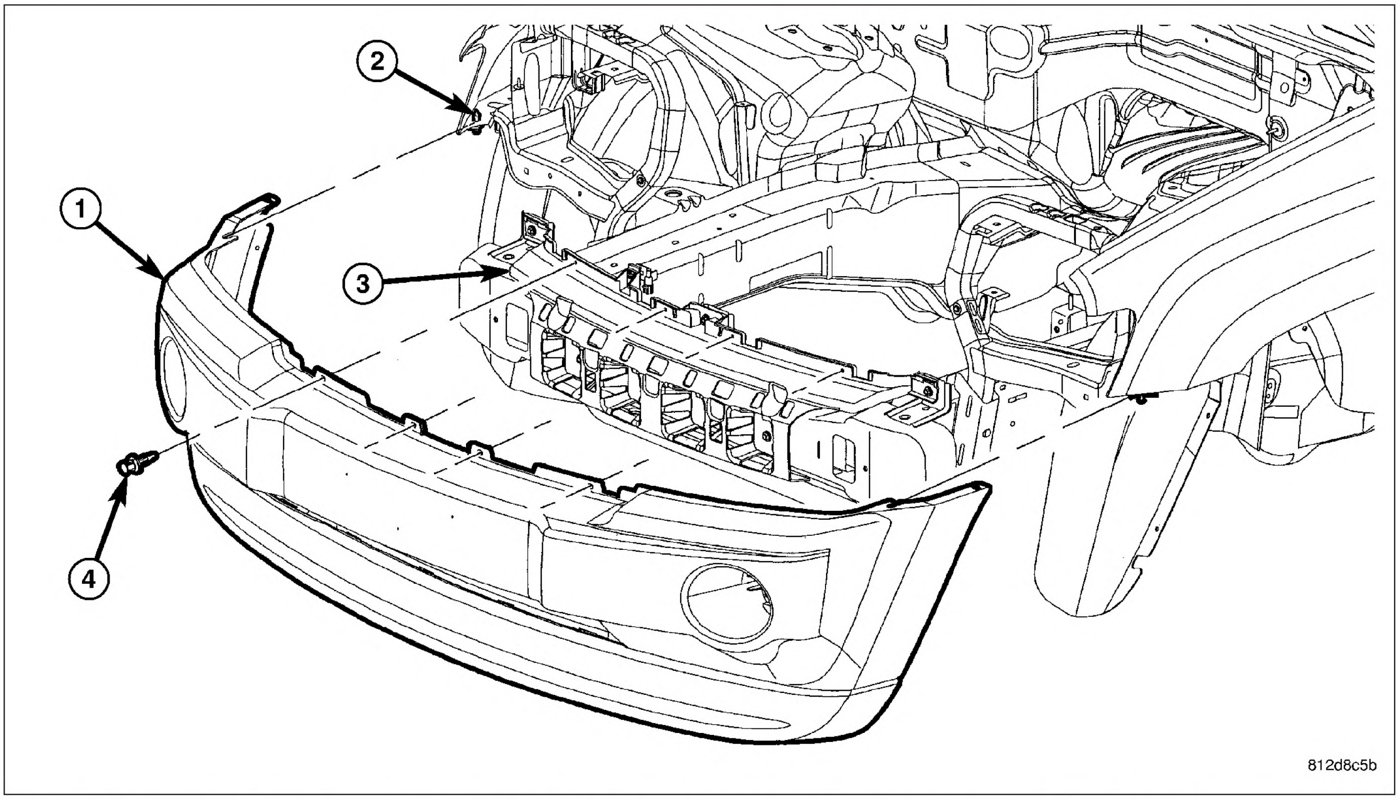
INSTALLATION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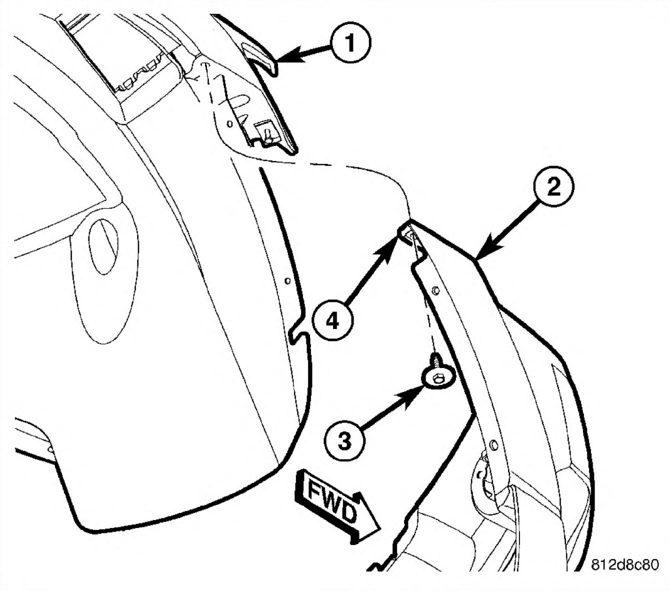
1. Position the fascia (1) onto the vehicle and align the fascia flange slot onto the t-push pin (2).
2. Install the four upper push pin fasteners (4).
3. Install the two upper screws (3) on the inside of the fascia (4) to the fender (1).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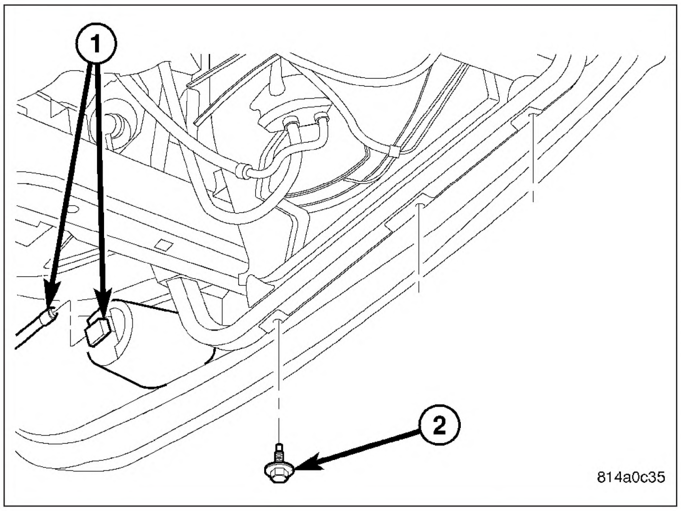
4. Install the three lower screws (2).
5. Connect the fog lamp electrical connectors (1), if equipped.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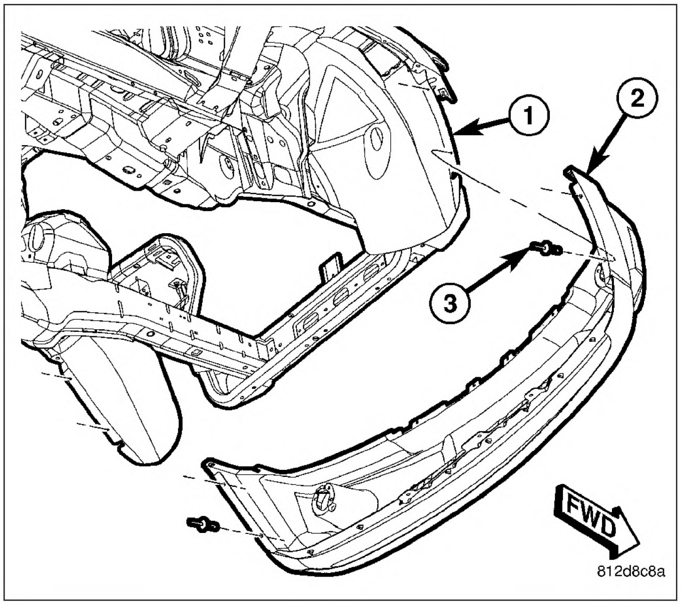
6. Install new plastic rivets (3) at each wheelhouse splash shield (1).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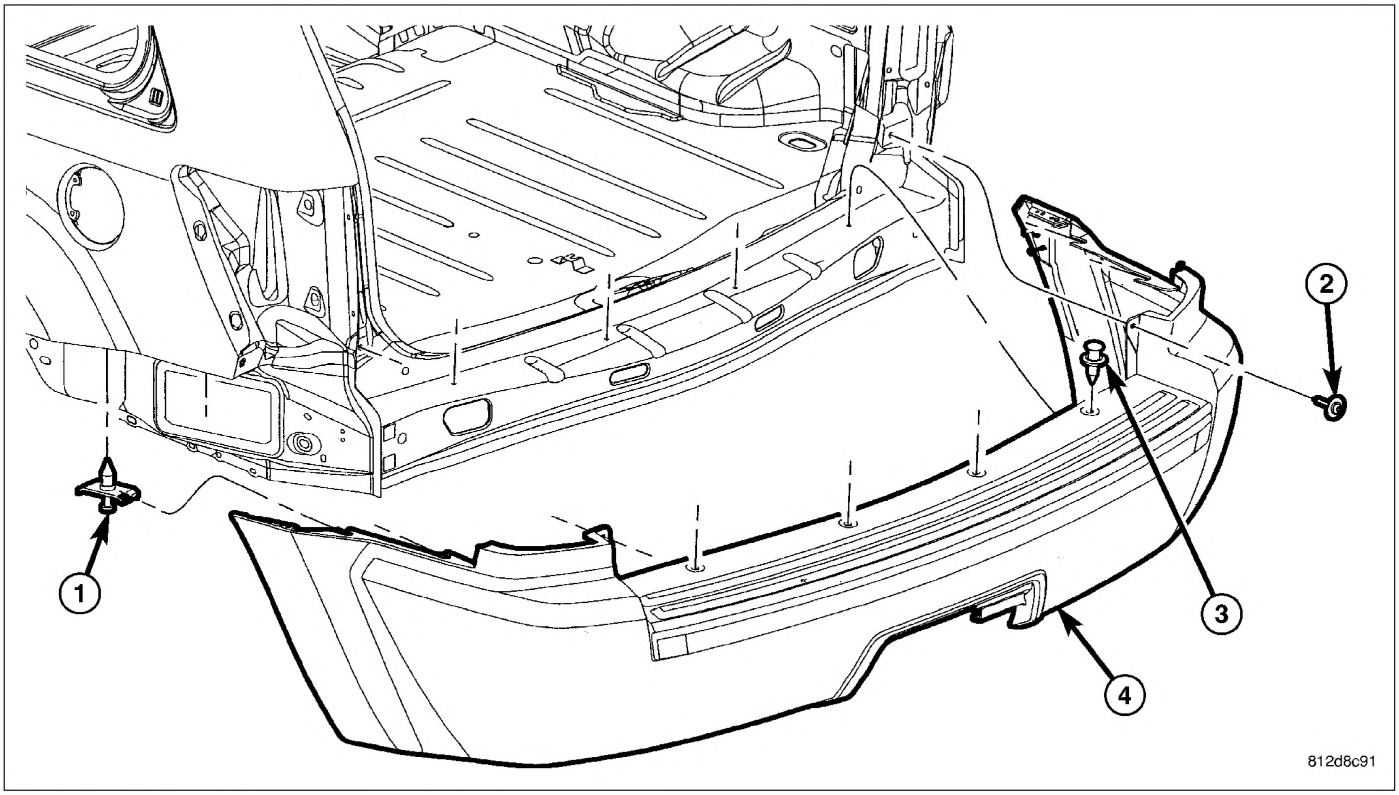
FASCIA-REAR

REMOVAL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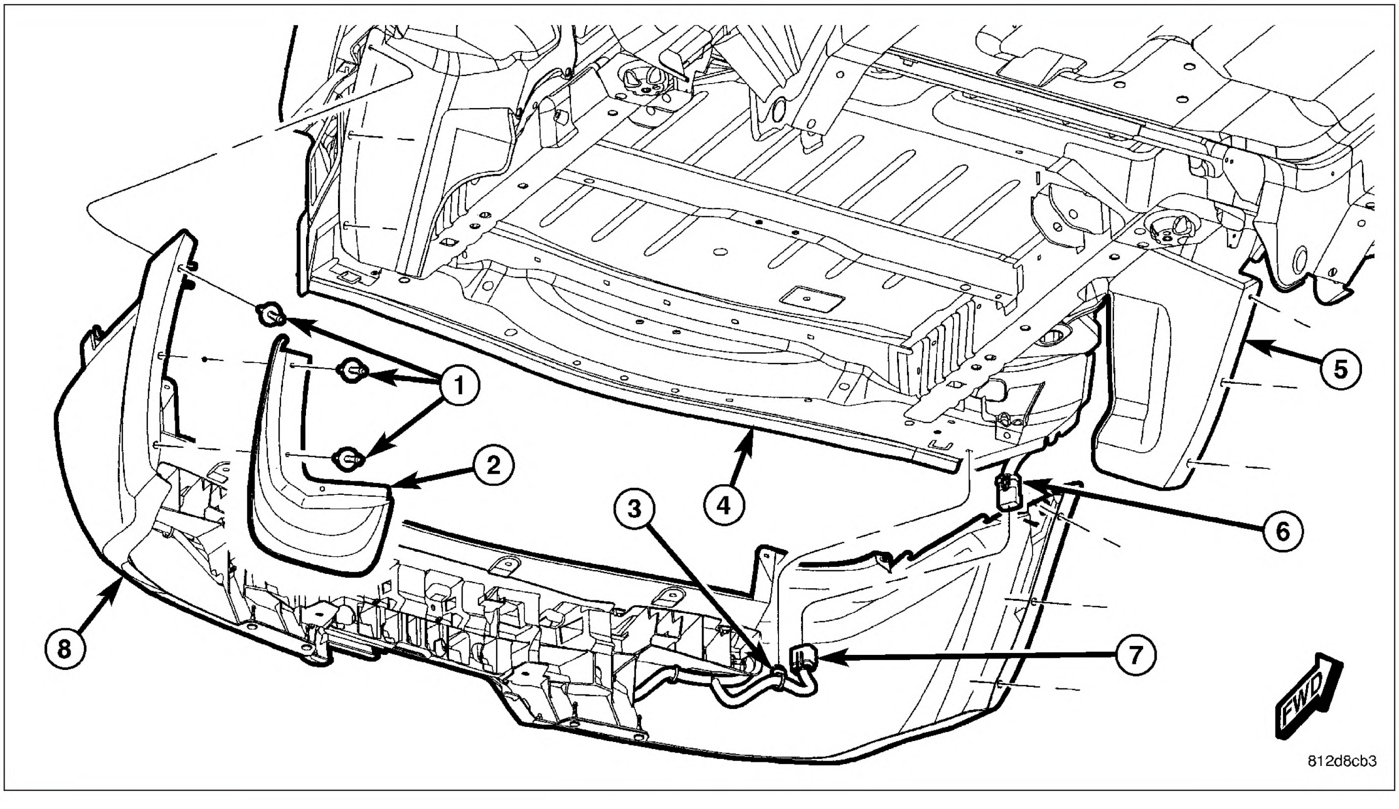
1. Open the liftgate.
2. Remove the four push pin fasteners (3) and 2 screws (2) at the step pad area.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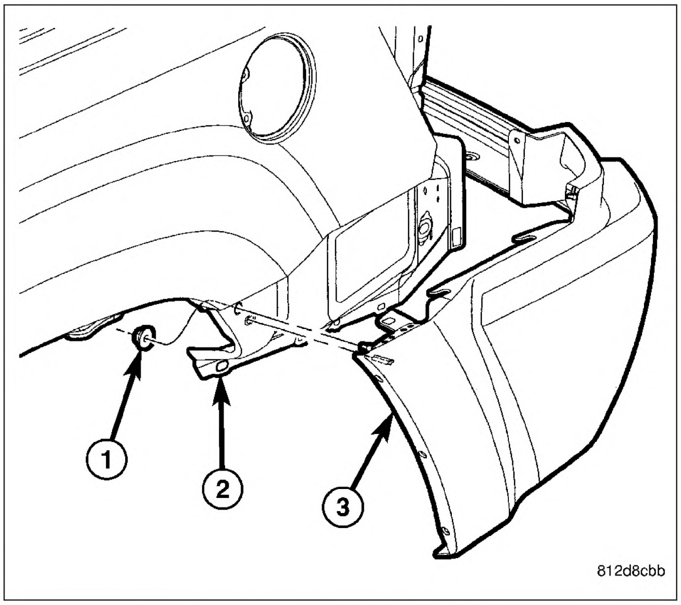
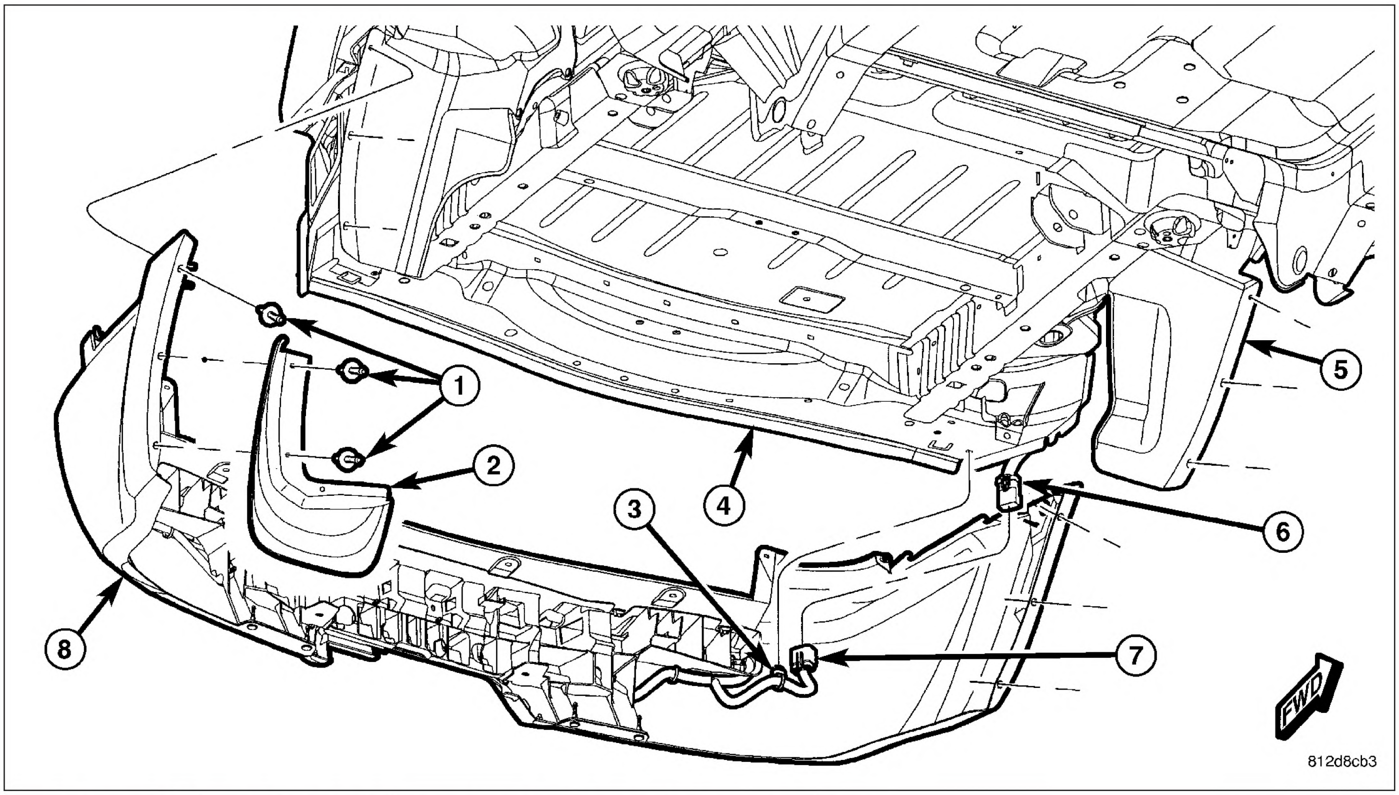
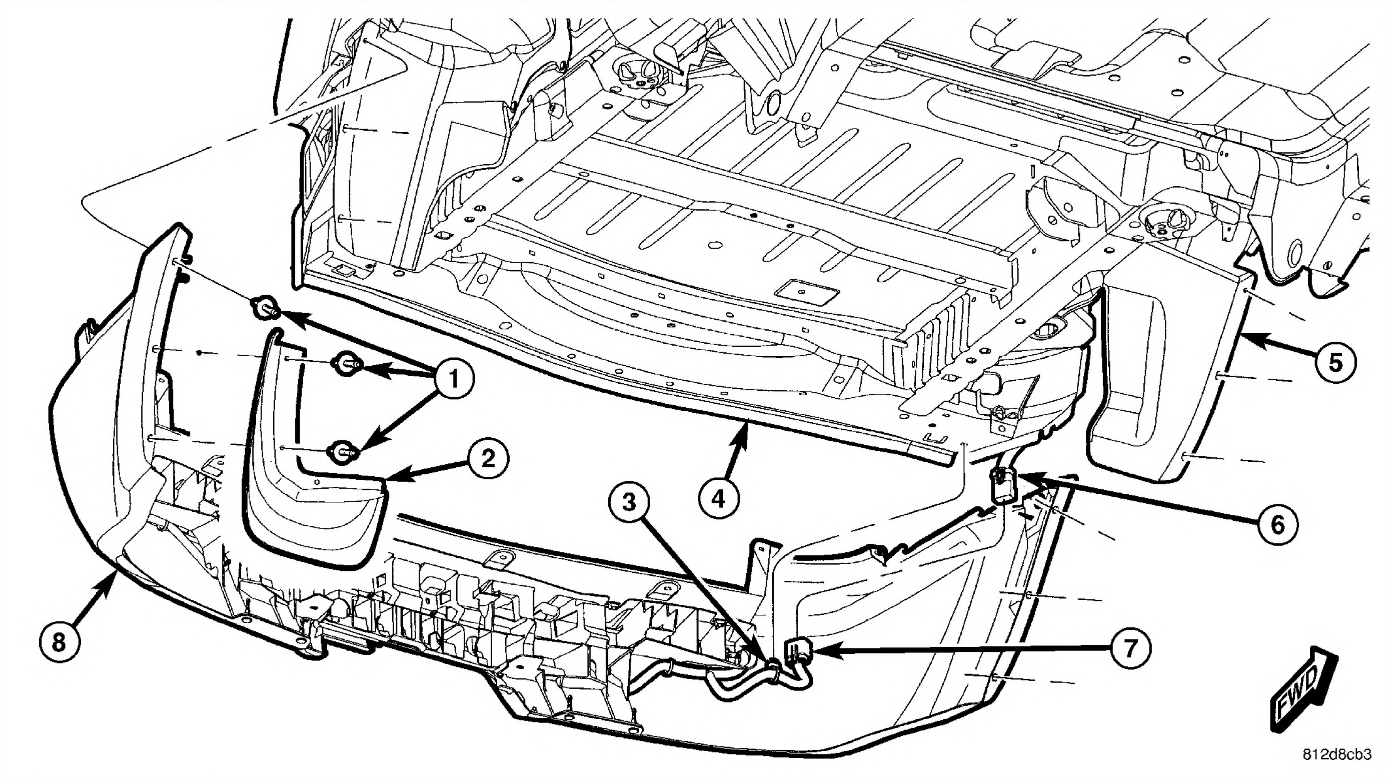
3. Remove the plastic rivets at the wheel wells (1).
4. Remove the two push pin fasteners and remove the rear wheel splash shields.
5. Remove the nuts (1) at the back sides of the quarter panels (2).





6. Remove the fascia (8) and disconnect the electrical connector (6 & 7).
7. Remove the four push pin fasteners and the energy absorber.
8. Disconnect the park assist electrical sensors.
9. Remove the park assist sensors.

INSTALLATION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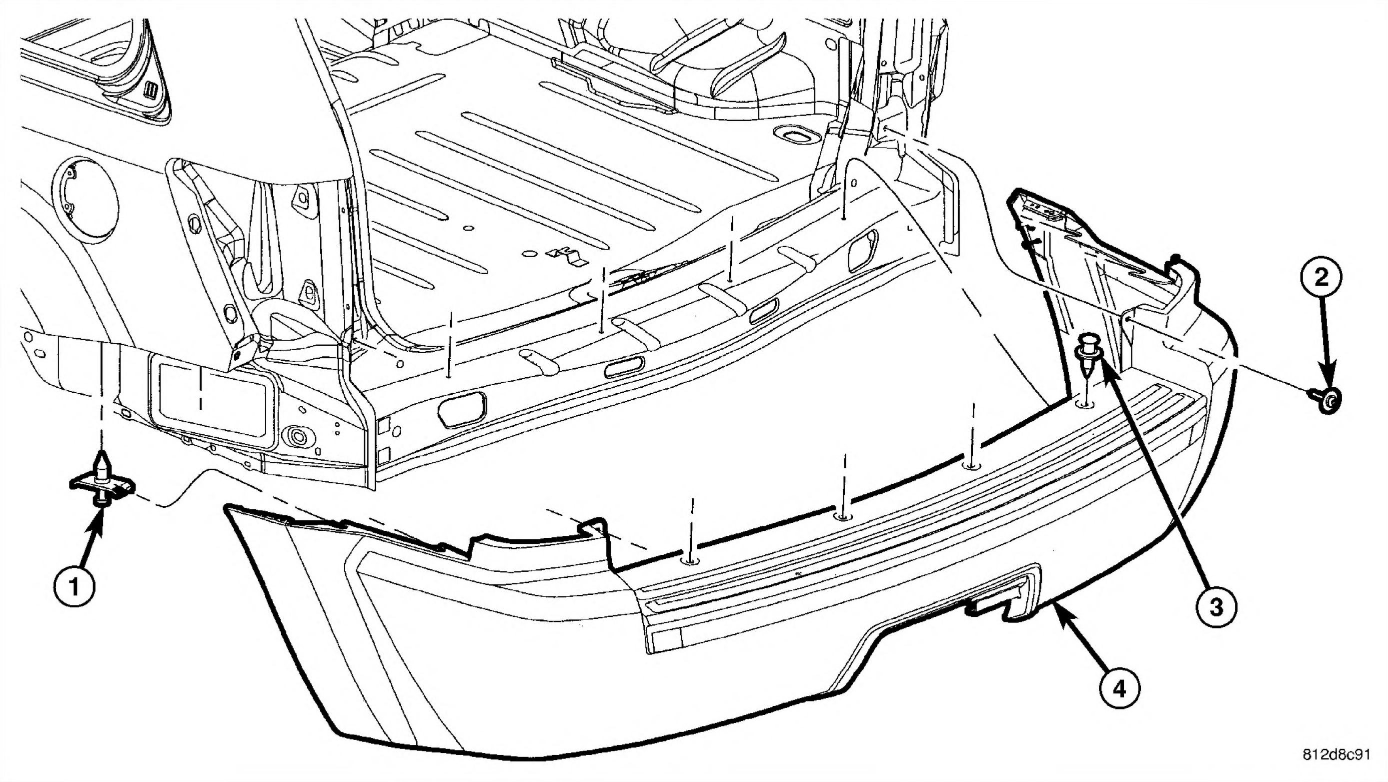
1. Install the park assist sensors, if equipped.
2. Install the energy absorber and install the four push pin fasteners.
3. Position the fascia onto the vehicle and connect the electrical connector.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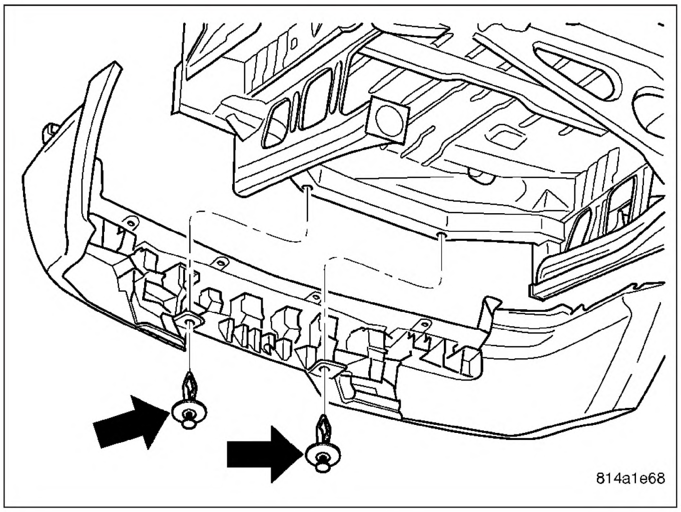
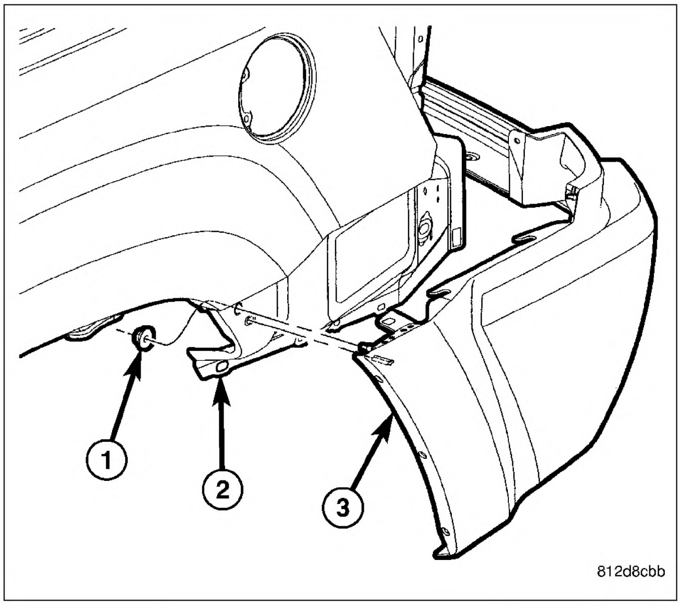
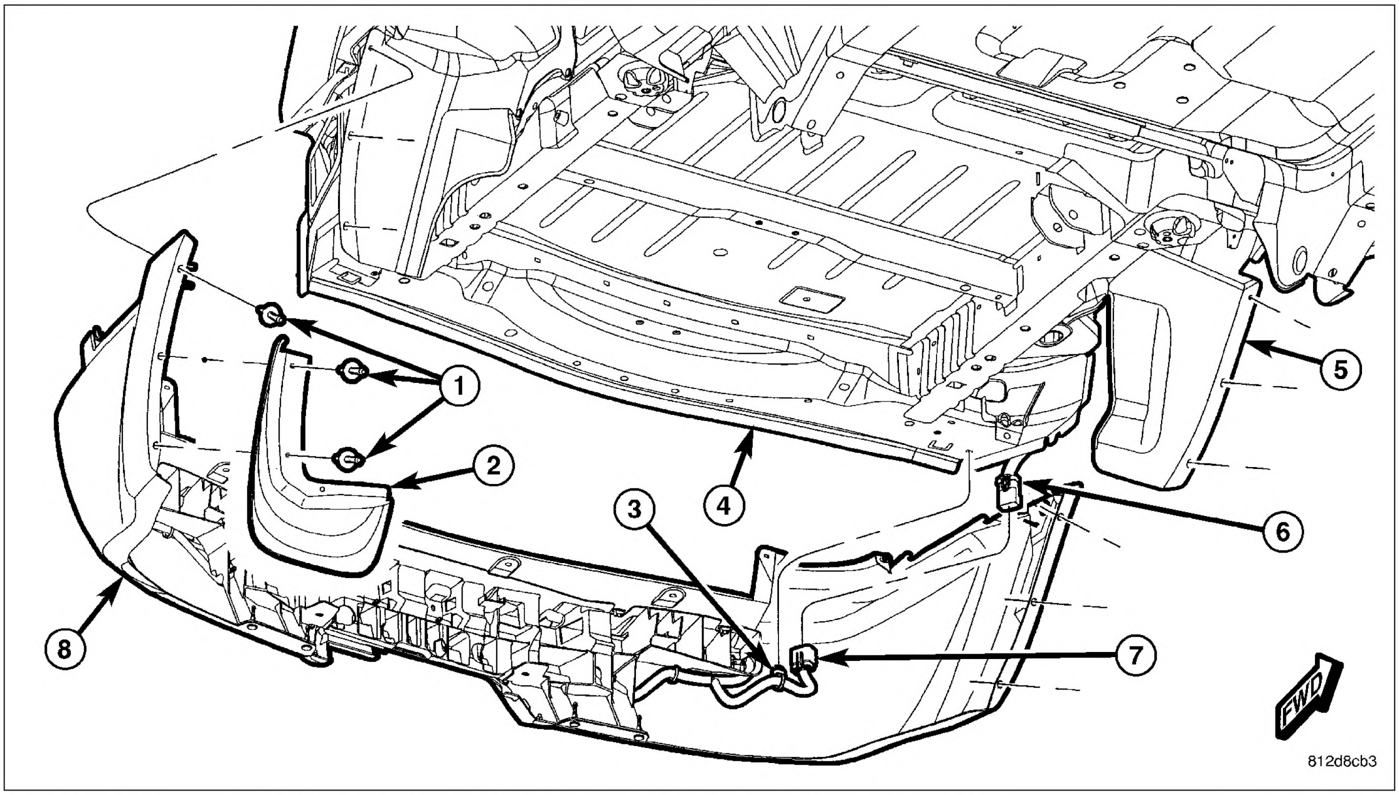
4. Slightly spread the sides of the fascia to clear the painted surfaces.
5. Direct the slots in the upper sides of the fascia onto the two t-pushpins (1) on either side.
6. Install the two screws (2) and four push pin fasteners (3).
7. Install the two lower push pin fasteners.



8. Install the nuts (1) and tighten to 9 N·m (80 in. lbs.).





9. Install new rivets (1) attaching the wheelhouse splash shields (4) to the fascia.

FRAME

SPECIFICATIONS

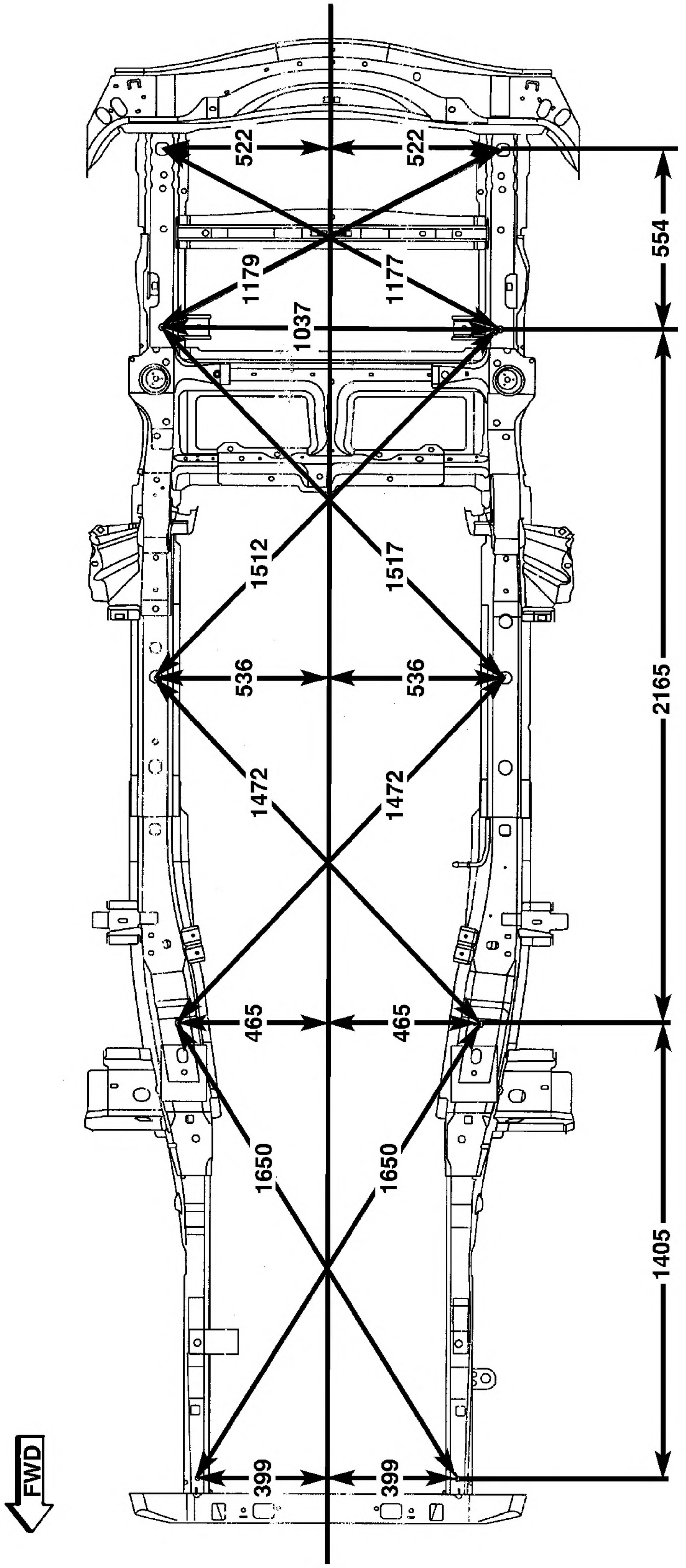
FRAME DIMENSIONS

Frame dimensions are listed in metric scale. All dimensions are from center to center of Principal Locating Point (PLP), or from center to center of PLP and fastener location.

VEHICLE PREPARATION

Position the vehicle on a frame alignment rack, refer to instructions provided with equipment being used. Adjust the vehicle PLP heights to the specified dimension above the work surface (datum line). Vertical dimensions can be taken from the datum line to the locations indicated were applicable.

DESCRIPTION	FIGURE
FRAME DIMENSIONS - TOP VIEW	1
FRAME DIMENSIONS - SIDE VIEW	2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554
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536
2165
1472
1472
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1650
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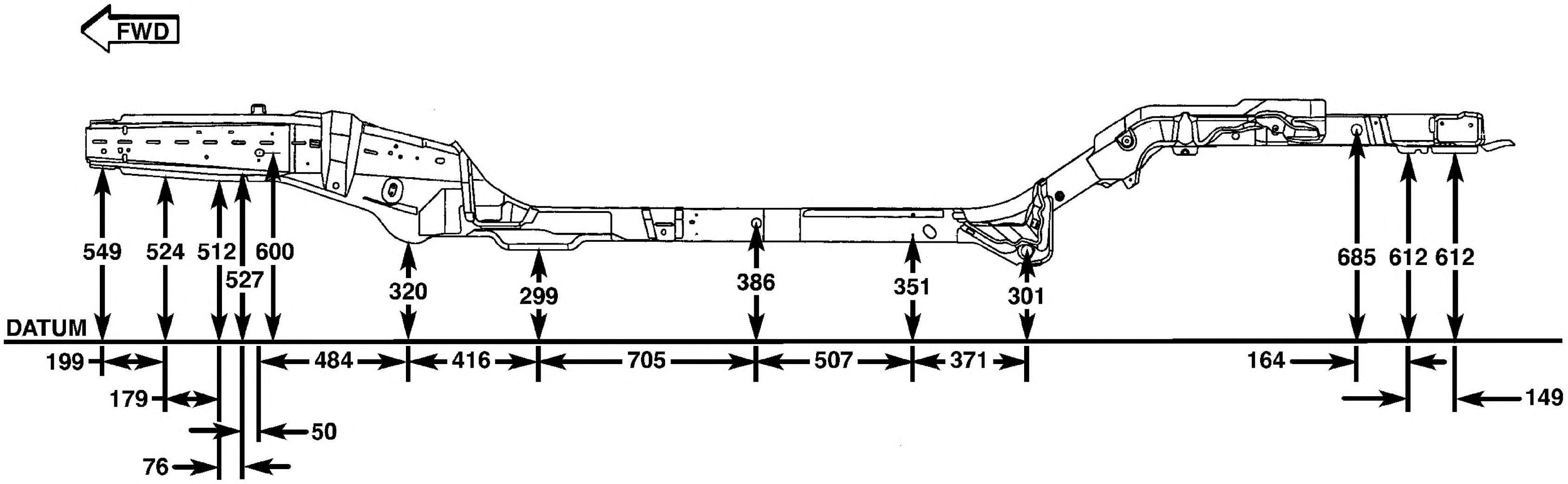
399
FWD

ALL DIMENSIONS ARE IN MILLIMETERS

Fig. 1 FRAME DIMENSIONS - TOP VIEW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524
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320
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612
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416
705
507
371
164
149

NOTE: DATUM PLANE DETERMINED BY USING 245/65R17 TIRE.

ALL DIMENSIONS ARE IN MILLIMETERS

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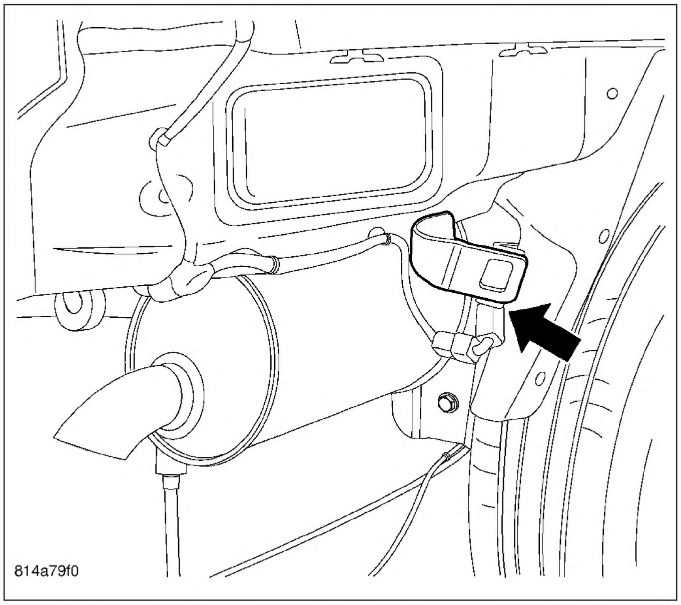
Fig. 2 FRAME DIMENSIONS - SIDE VIEW

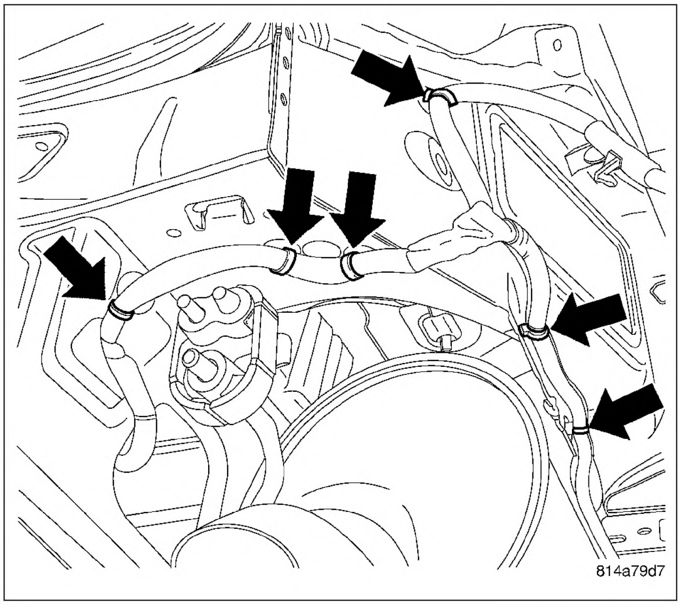
CRADLE-REAR BODY

REMOVAL

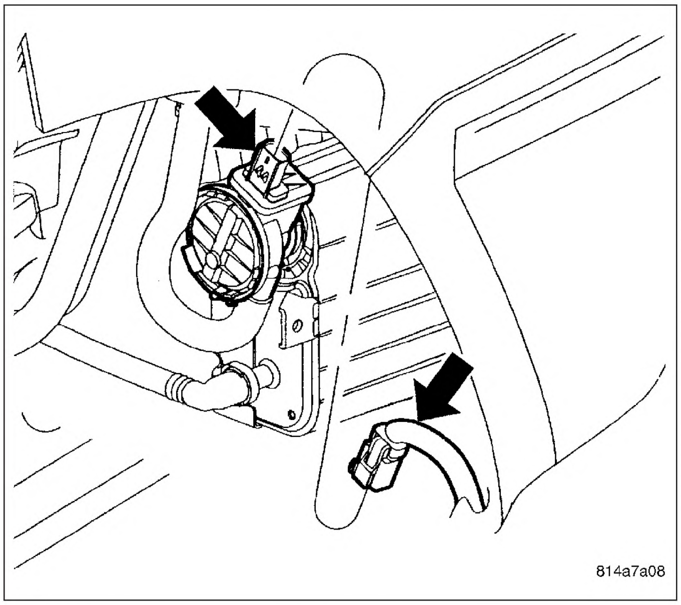
1. Remove the rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL)
2. Remove the spare wheel.
3. Remove the tail lamps.
4. Disconnect the tire pressure monitor sensor, if equipped.



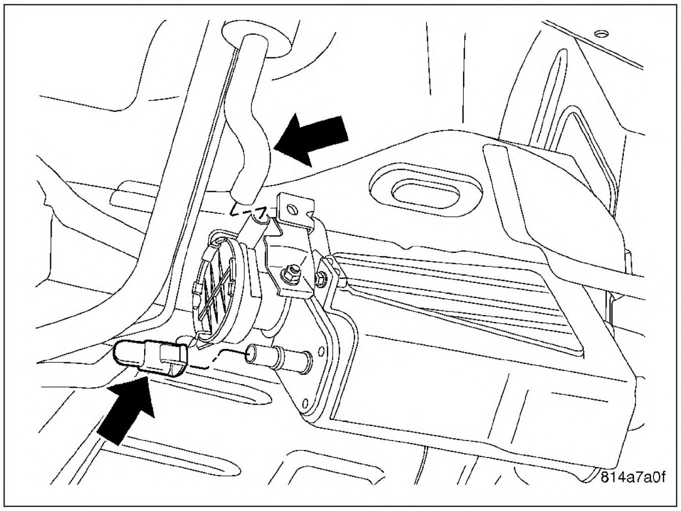
5. Separate the right harness hangers and position the harness through the cradle.



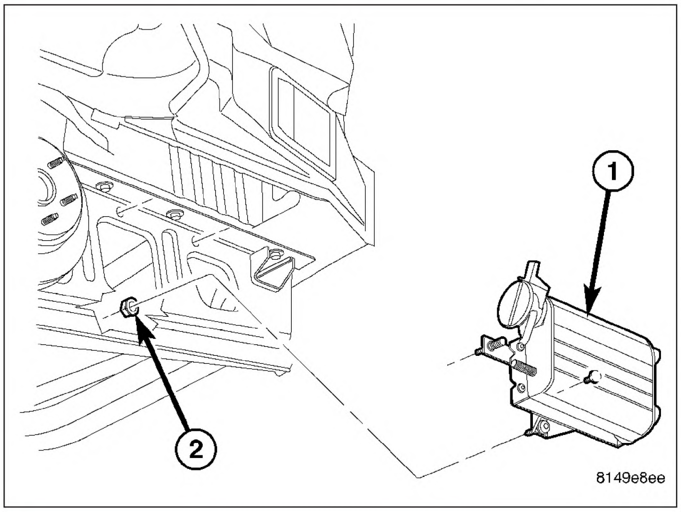
6. Disconnect the vapor canister electrical connector.



7. Disconnect the vapor canister hoses.



8. Loosen the upper two canister nuts.
9. Remove the lower canister nut (2) and remove the vapor canister (1).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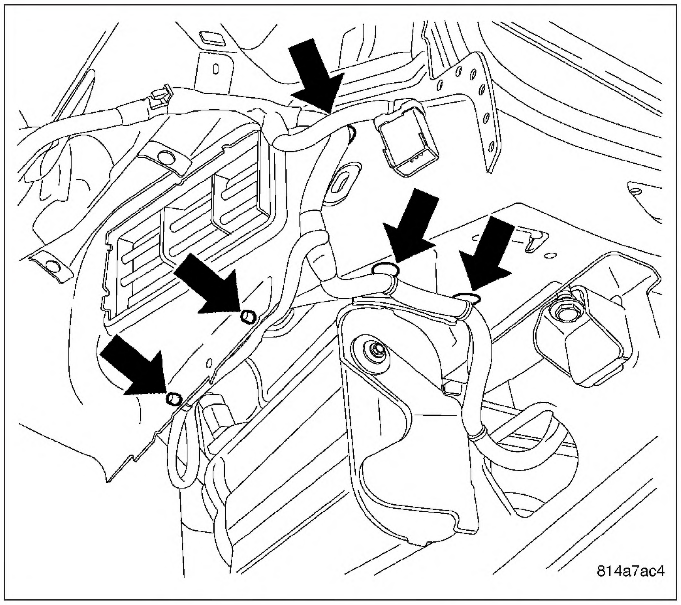
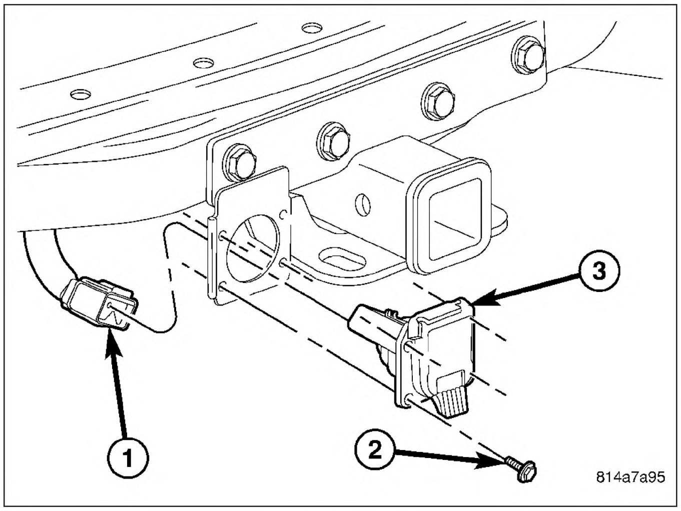
10. Separate the left harness hangers and position the harness through the cradle.



11. Disconnect trailer wiring electrical connector (1).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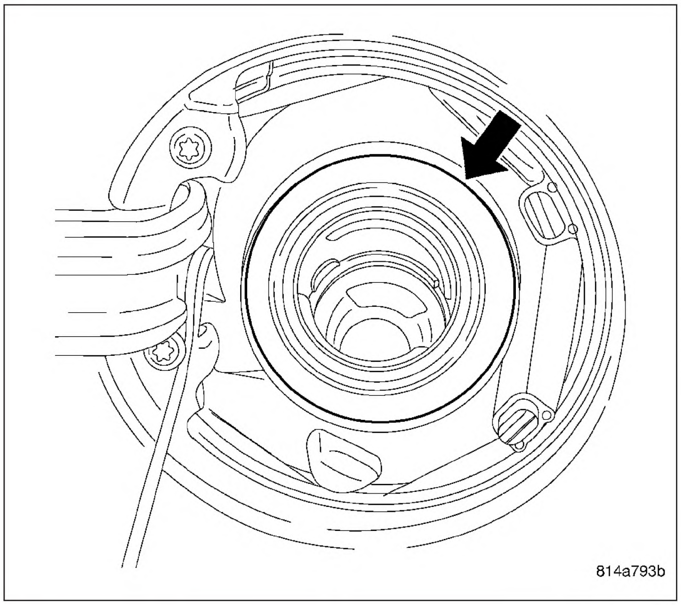
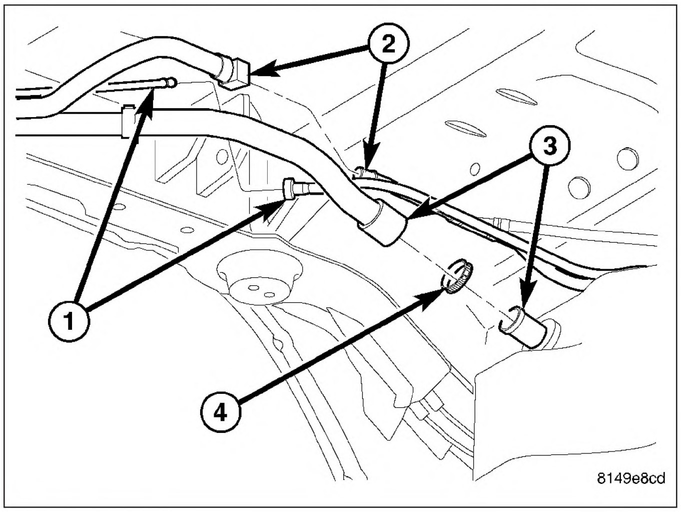
12. Lube filler neck grommet to aid with removal of the filler neck.



13. Disconnect vapor canister line (2).
14. Disconnect the fuel line (1).
15. Loosen the clamp (4) and disconnect the fuel filler hose (3).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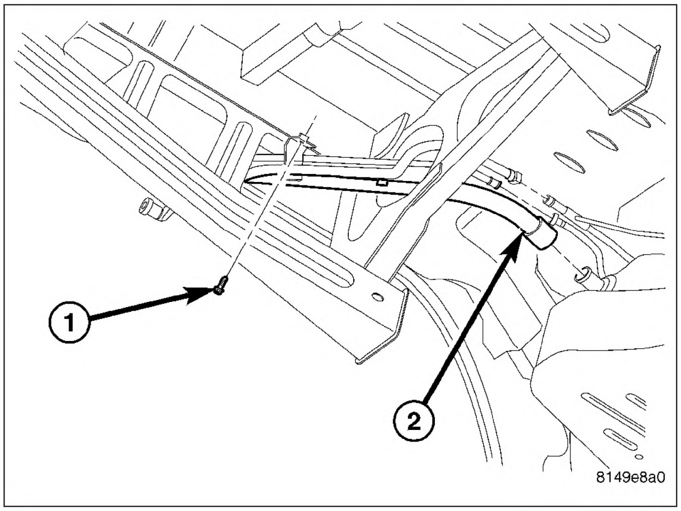
16. Remove the bolt (1) supporting the fuel filler tube (2).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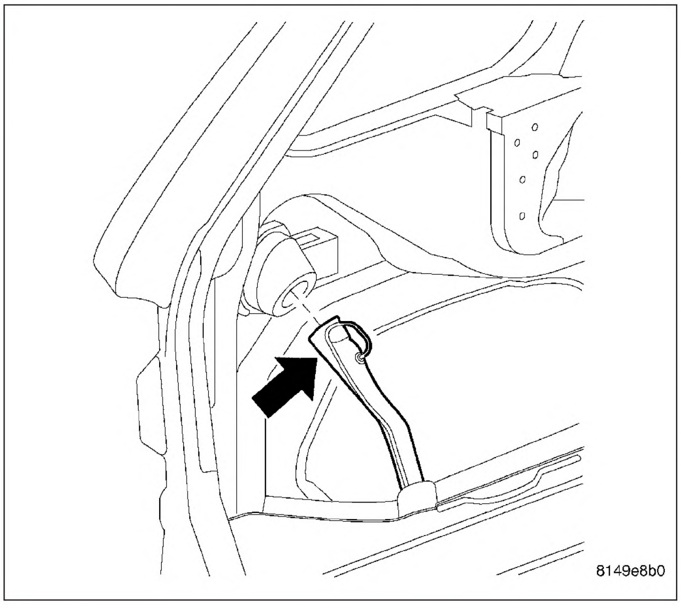
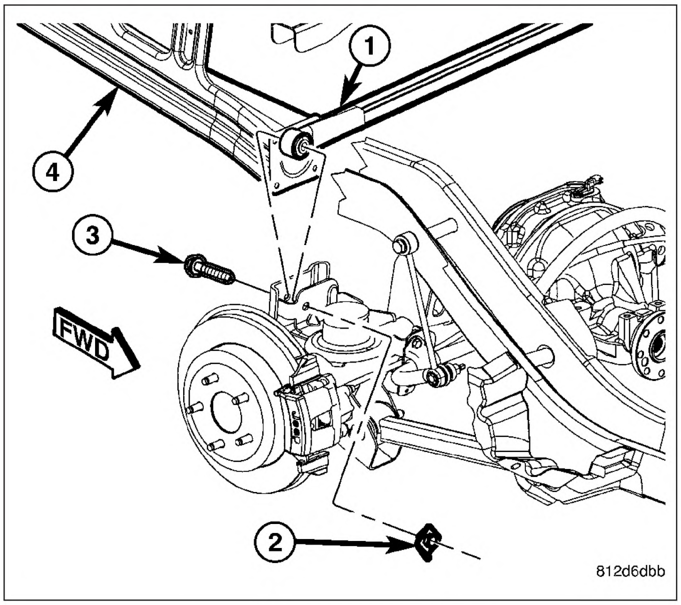
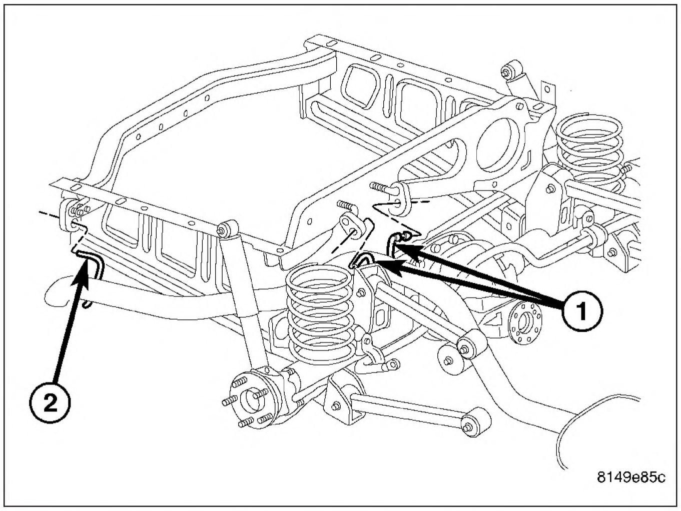
17. Separate and remove the fuel filler neck.



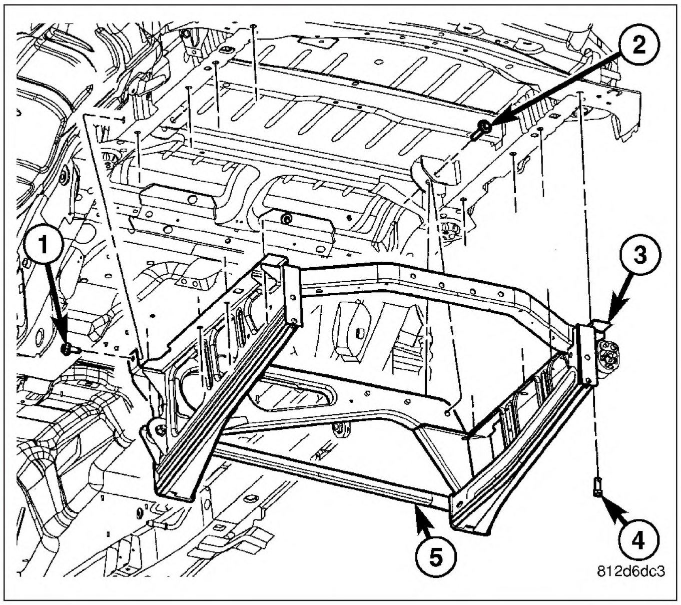
18. Remove the outer bolt (2 and 3) and disconnect the track bar (1).



19. Separate the exhaust hangers (1 and 2) and support the exhaust.

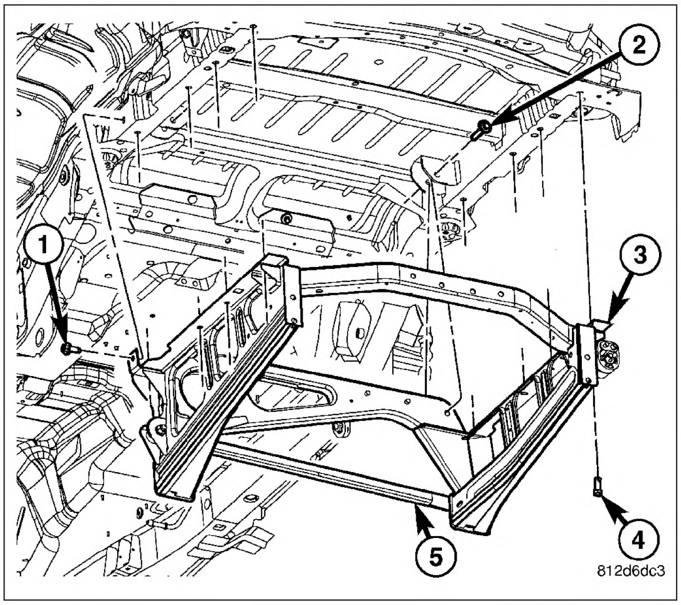


20. Using a grease pencil or equivalent, mark the location of the body cradle (3) on the underbody to aid installation.
21. Support the cradle (3) with a suitable lifting device.
22. Remove the upper cradle bolts (2).
23. Remove the side cradle bolt (1).
24. Remove the rail bolts (4) and remove the cradle (3).

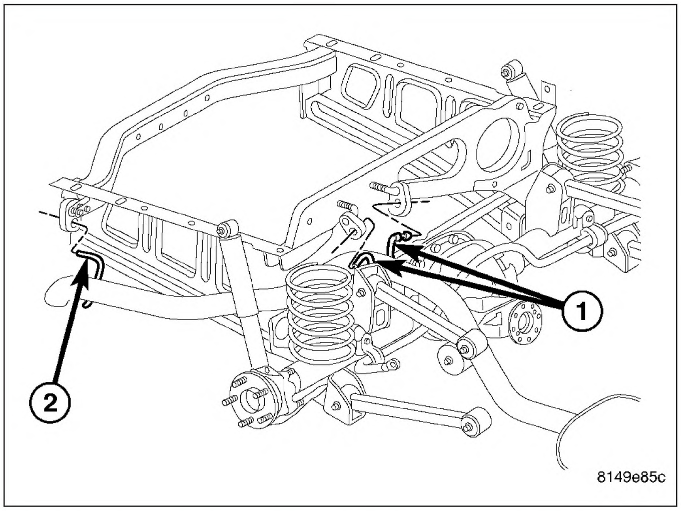


INSTALLATION

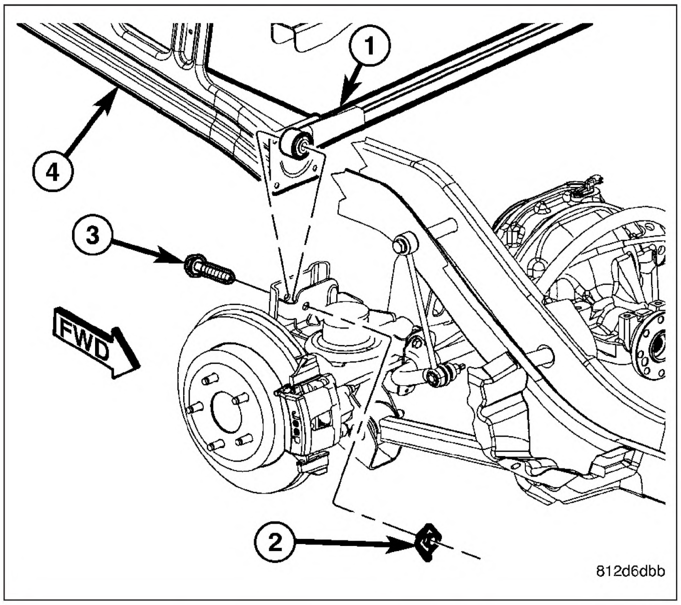
1. Install the cradle and install the rail bolts (4).
2. Align the cradle to the marks made previously.
3. Tighten the bolts (4) to 108 N·m (80 ft. lbs.).
4. Install the side cradle bolt (1).
5. Tighten the bolt (1) to 108 N·m (80 ft. lbs.).
6. Install the upper cradle bolts (2).
7. Tighten the bolts (2) to 102 N·m (75 ft. lbs.).



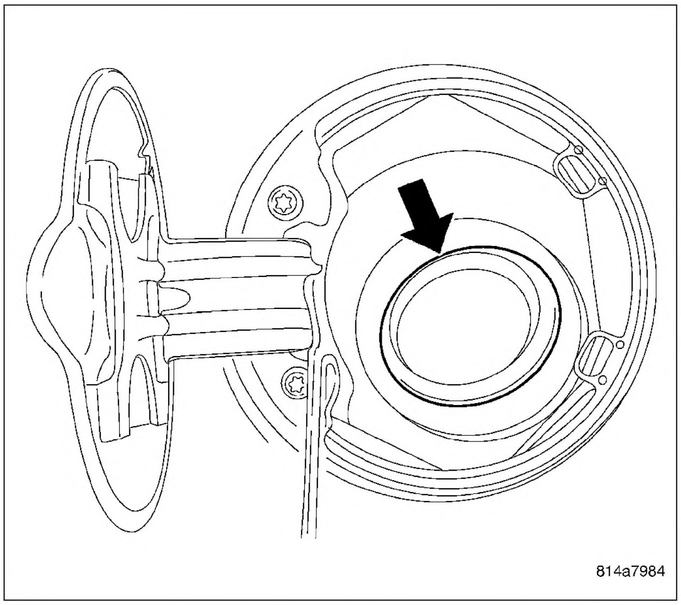
8. Connect the exhaust hangers (1 and 2).



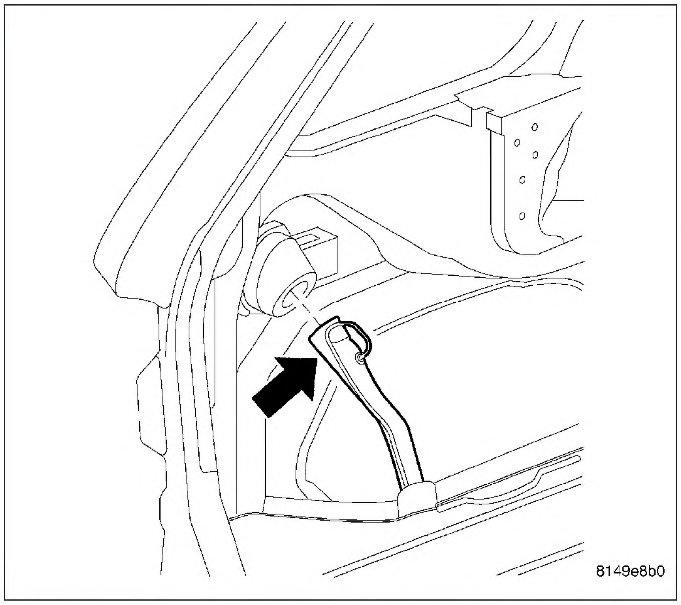
9. Attach the track bar (1) and install the outer bolt (3) and nut (2).
10. Tighten the bolt (3) to 190 N·m (140 ft. lbs.).



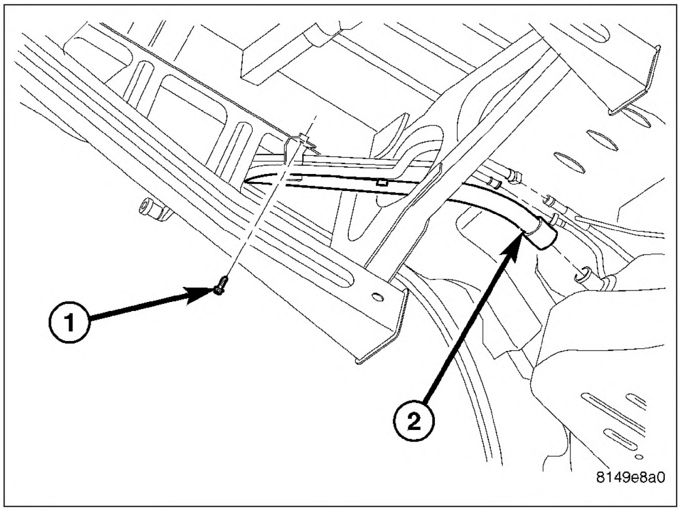
11. Verify that the fuel filler tube grommet is in place and lube the grommet to aid installation of the filler tube.



12. Install the filler tube through the grommet.



13. Install the bolt (1) supporting the fuel filler tube (2) and tighten to 14 N·m (10 ft. lbs.).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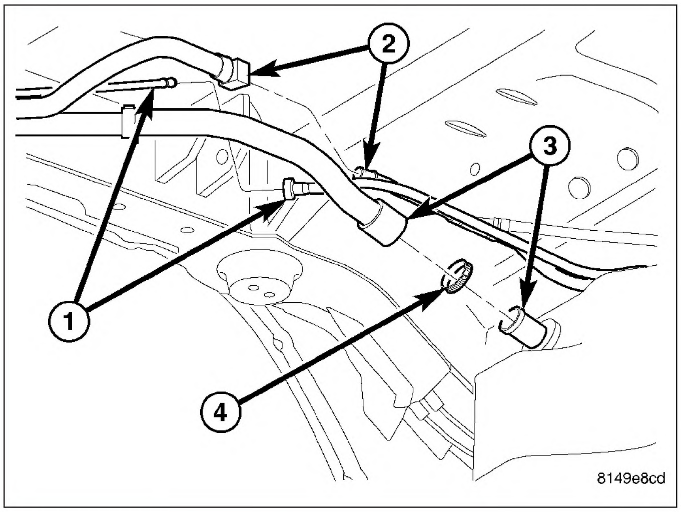
14. Connect the fuel filler hose (3) to the fuel tank and install the clamp (4).
15. Connect the fuel line (1).
16. Connect the vapor canister line (2).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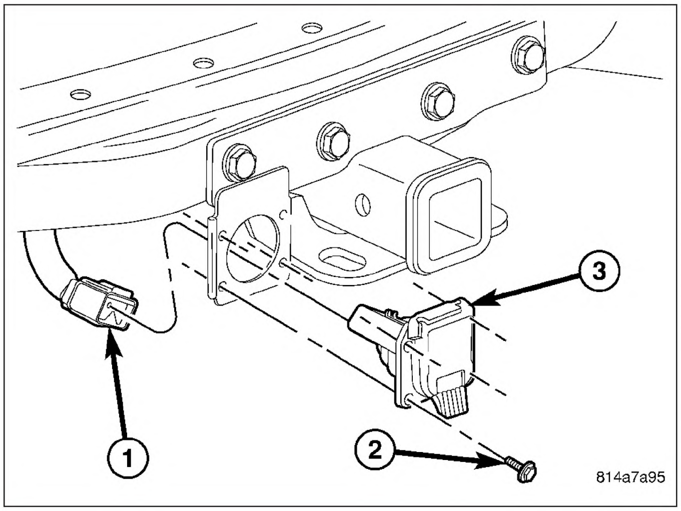
17. Connect the trailer wiring electrical connector (1).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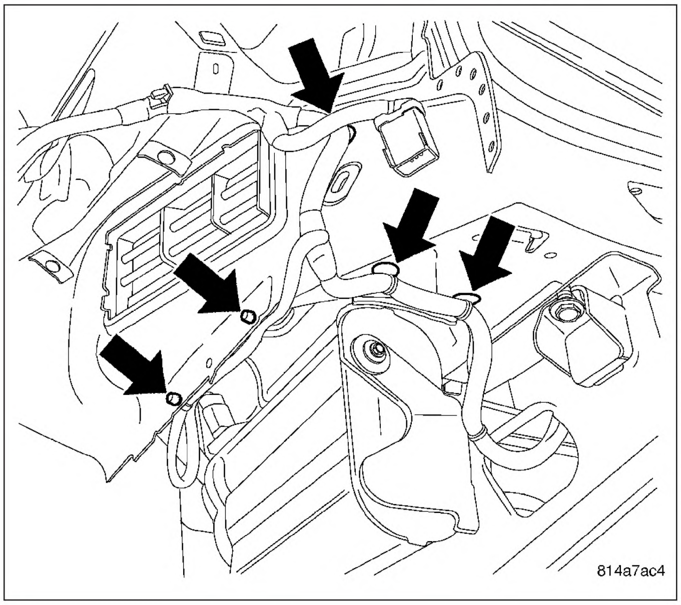
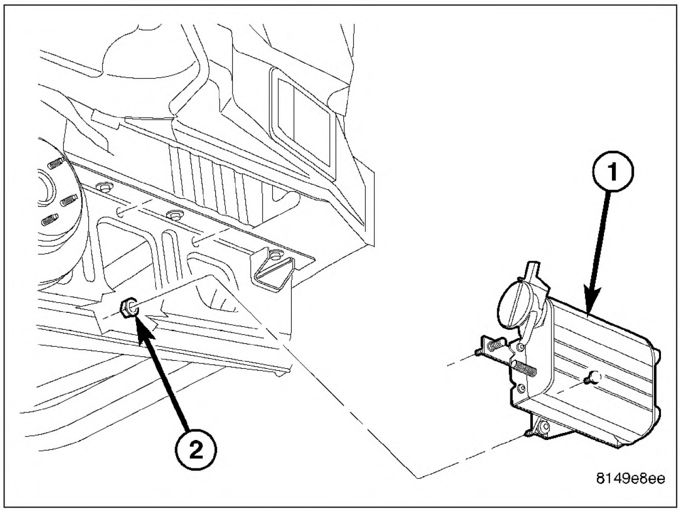
18. Position the left wire harness through the cradle and secure the harness hangers.



19. Install the vapor canister (1) and install the lower canister nut (2).
20. Tighten the nuts to 24 N·m (17 ft. lbs.).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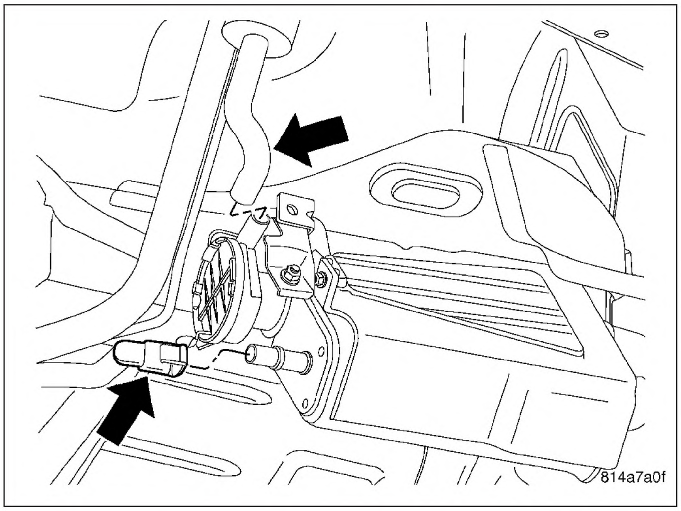
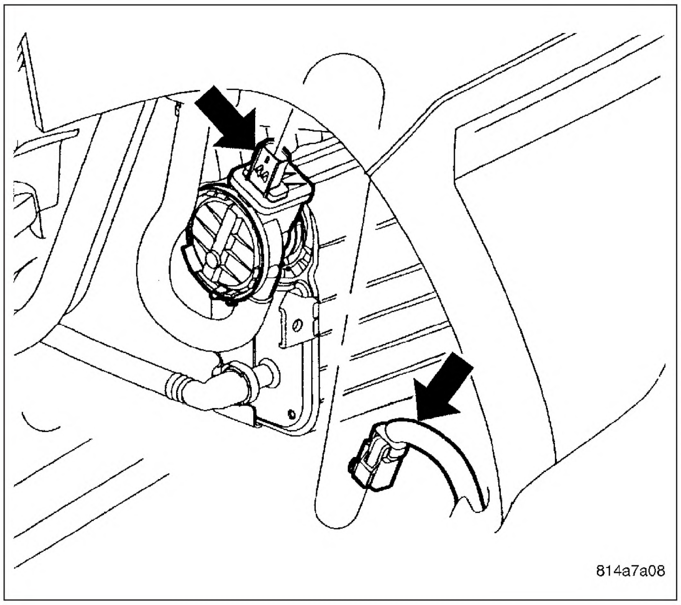
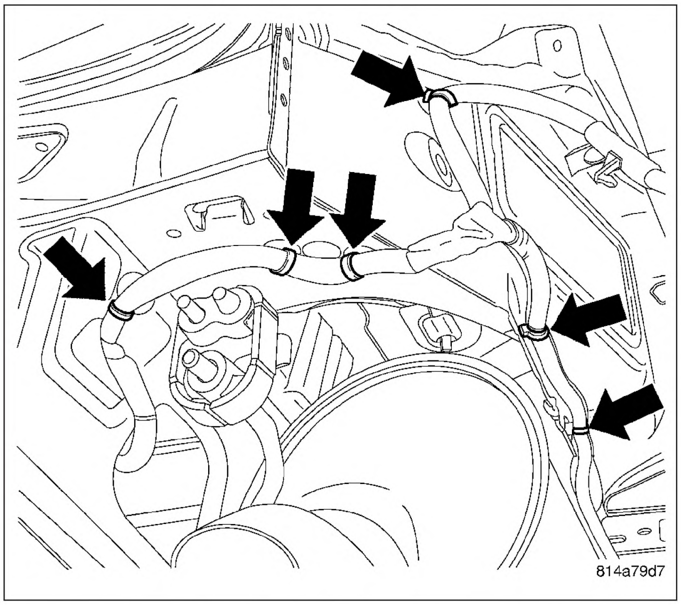
21. Connect the vapor canister hoses.



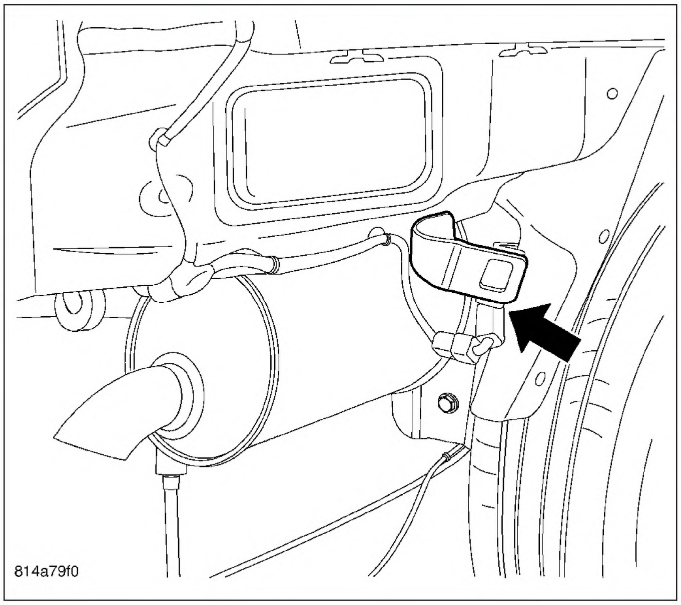
22. Connect the vapor canister electrical connector.



23. Position the right wire harness through the cradle and secure the harness hangers.



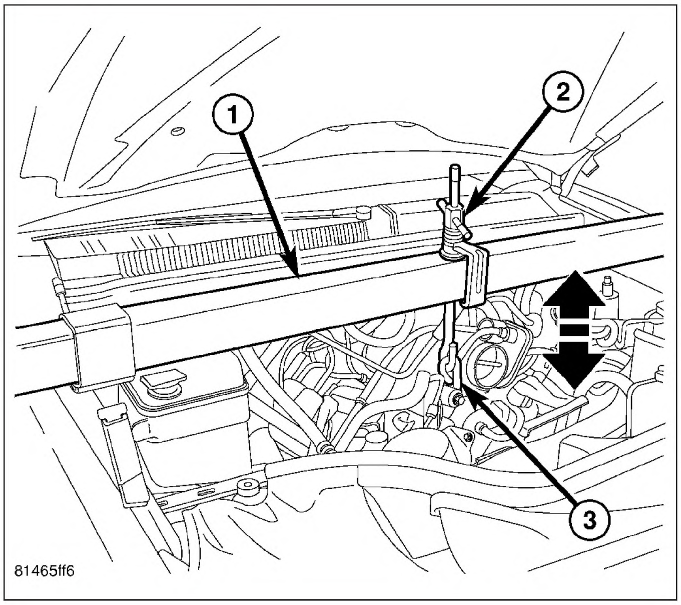
24. Connect the tire pressure monitor sensor, if equipped.
25. Install the tail lamps. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP - INSTALLATION)
26. Install the fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FASCIA-REAR - INSTALLATION)
27. Install the spare wheel.



CROSSMEMBER-ENGINE CRADLE

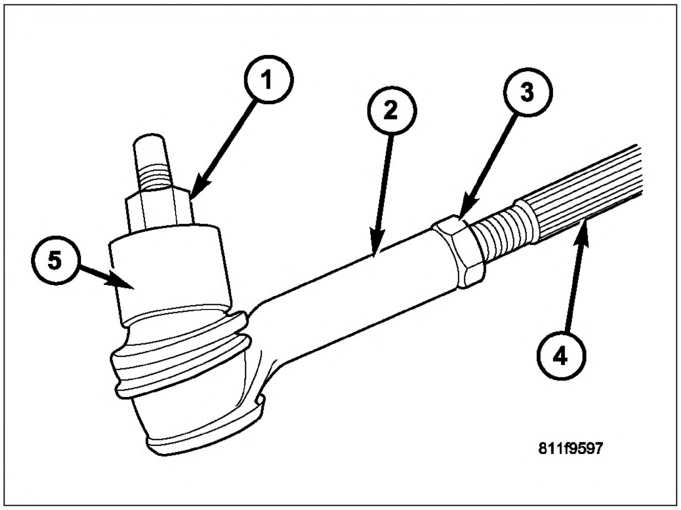
REMOVAL

1. Support engine using engine support tool #8534 or equivalent.
2. Remove the front skid plates. (Refer to 13 - FRAME & BUMPERS/FRAME/SKID PLATE-FRONT - REMOVAL)
3. Remove the rotors. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/REMOVAL - FRONT DISC BRAKE ROTOR)

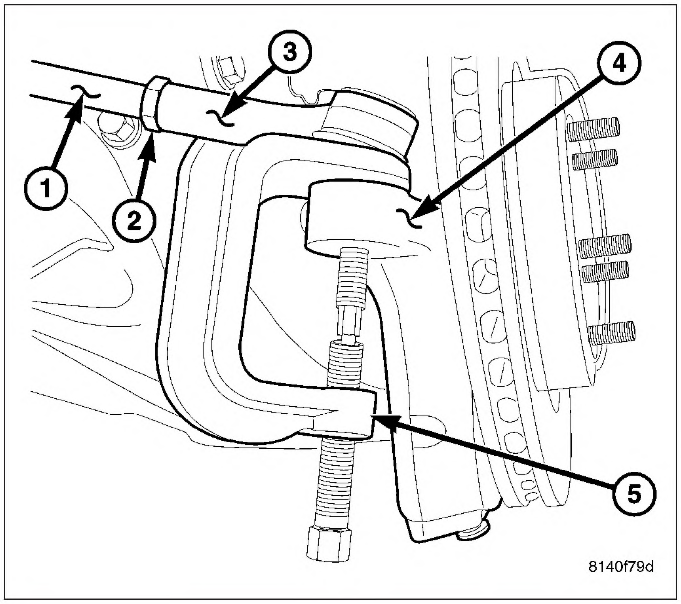


NOTE: Do not twist the boot anytime during removal or installation.

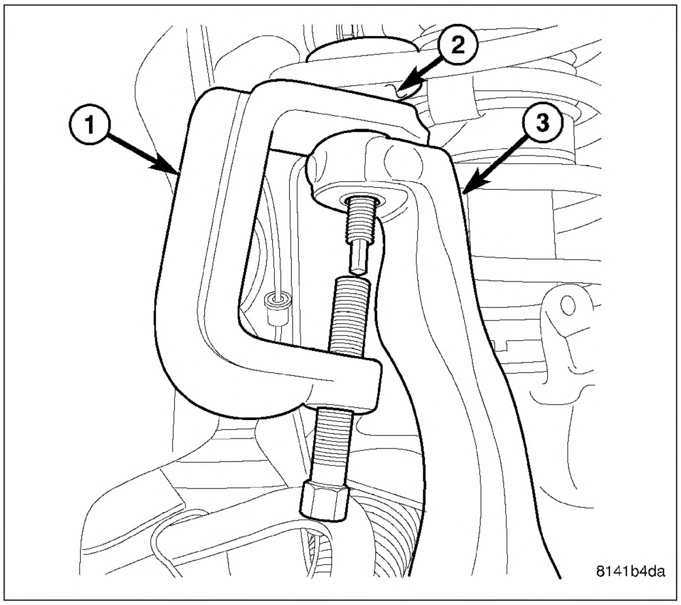
4. Remove the outer tie rod end (2) nut (1) from the ball stud.



5. Separate the outer tie rod end (3) from the knuckle with Remover 8677 (5).



6. Remove the upper ball joint nut.
7. Separate the upper ball joint (2) from the knuckle (3) using tool 8677 (1).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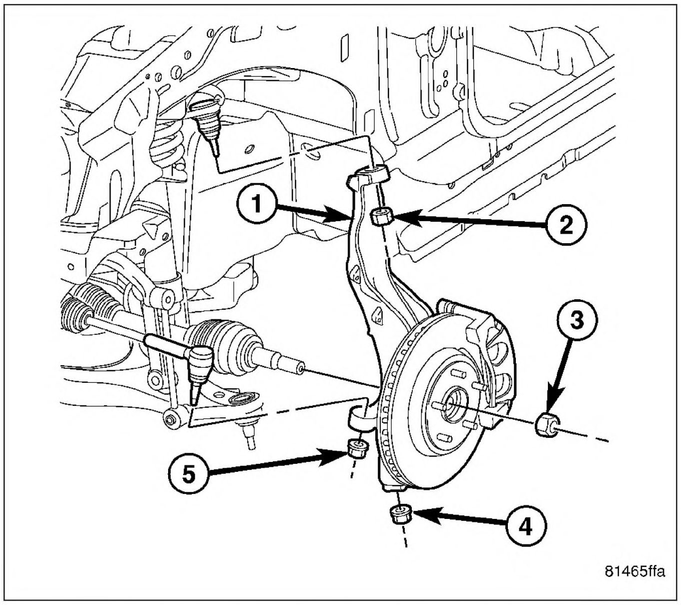
8. Remove the axle nuts and reinstall a couple threads.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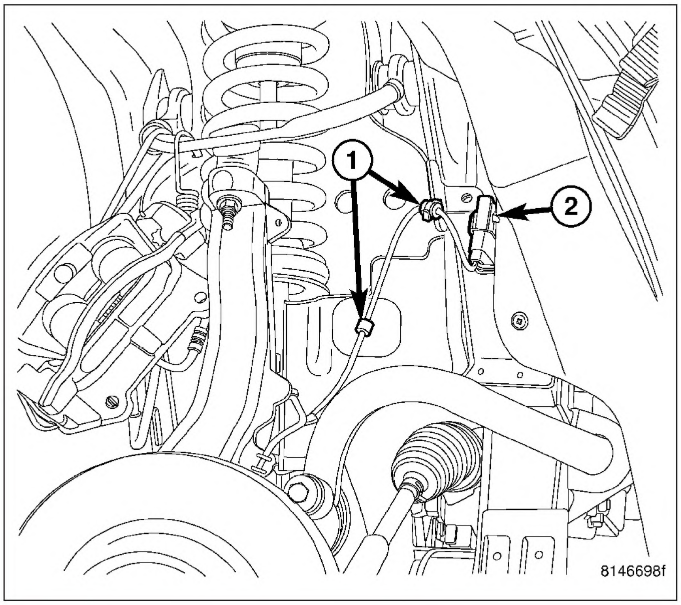
9. Disconnect the speed sensors (2) and separate the harness from the support clips (1).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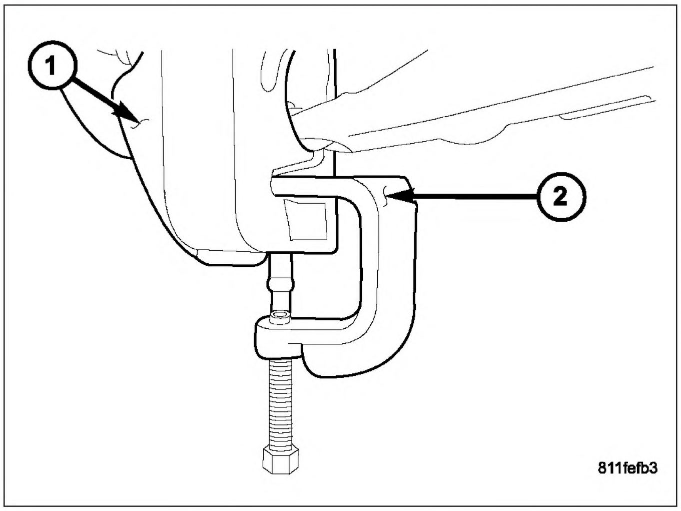
10. Remove the lower ball joint nut.
11. Separate the lower ball joint from the knuckle (1) using tool C–4150A (2).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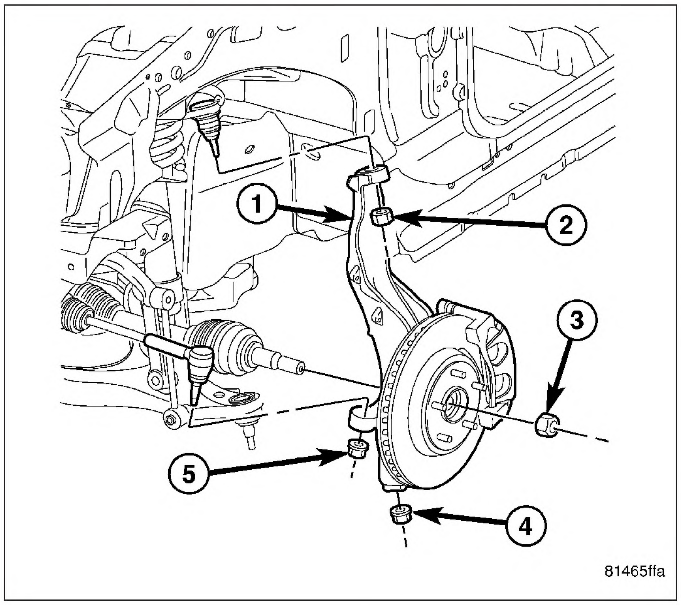
12. Remove the axle nuts (3) and remove the knuckles (1) from the vehicle.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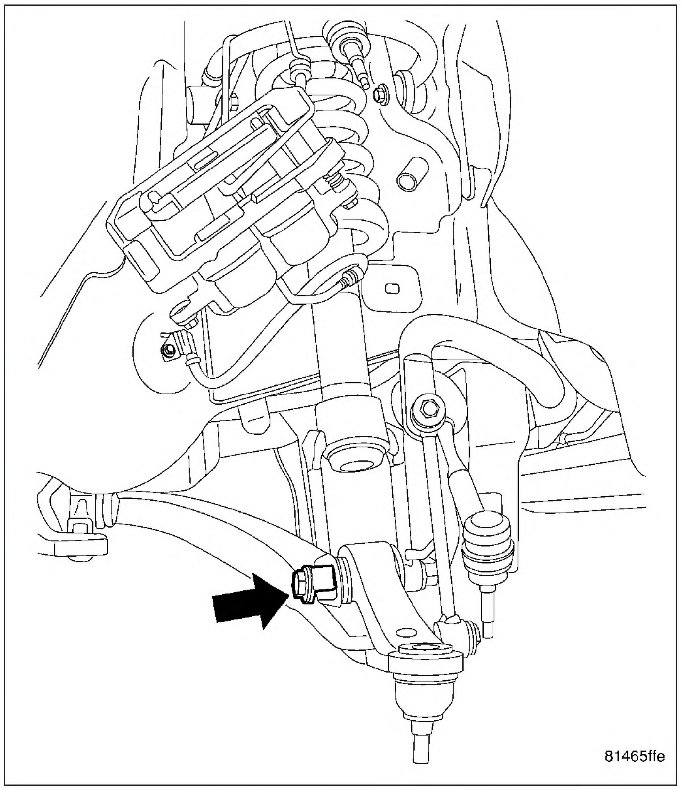
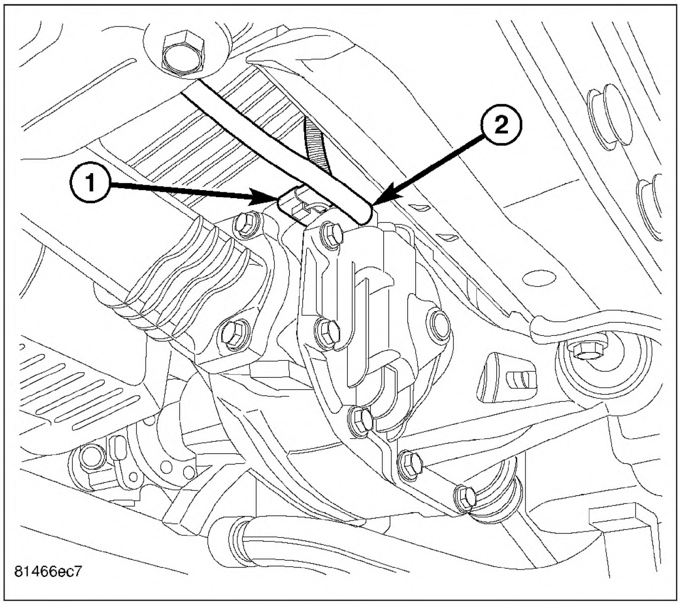
13. Remove the lower clevis bolts.

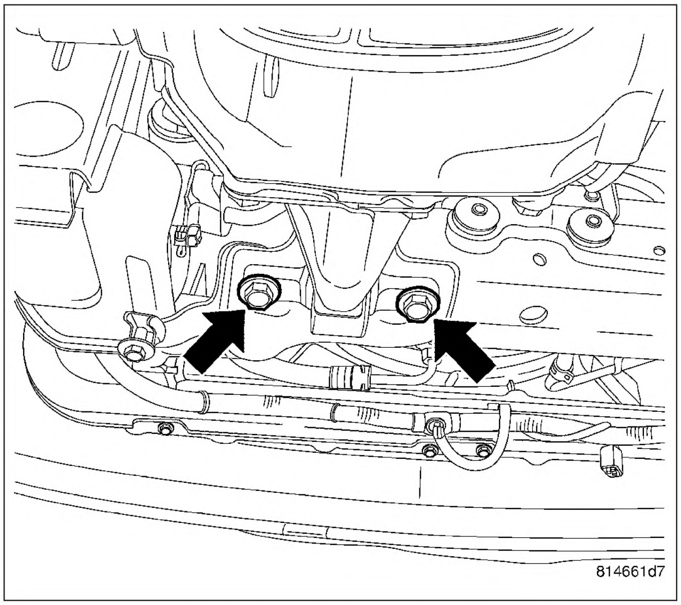


On 4WD models:

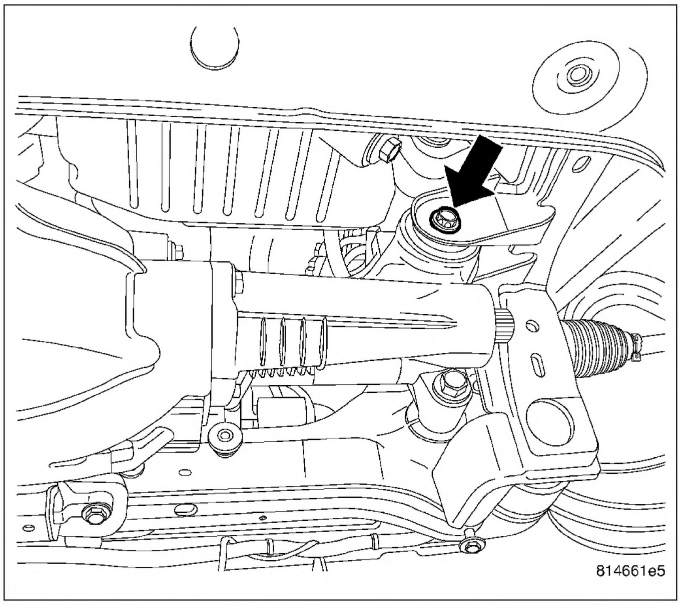
1. Disconnect the electrical connector(1) (if equipped) and the vent hose (2).



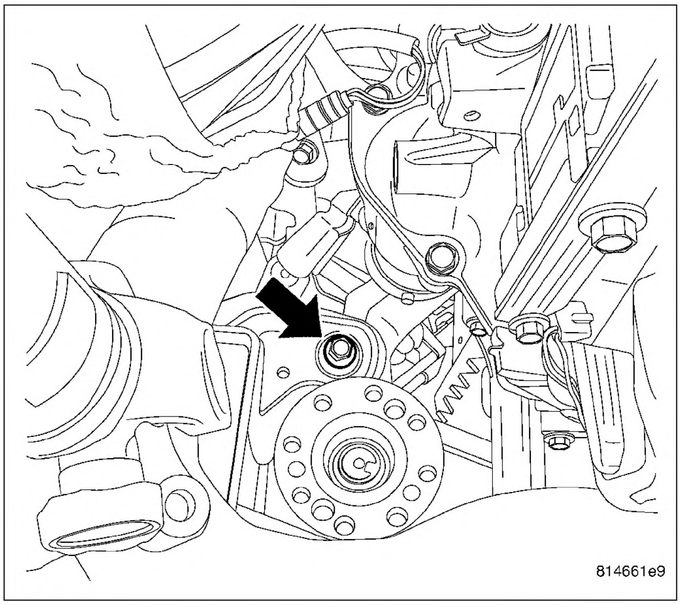
2. Remove the right half shaft.
3. Separate the propeller shaft as necessary, and position out of the way. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT-FRONT - REMOVAL)
4. Drain the differential.
5. Support the differential with a suitable lifting device.
6. Remove the front differential front bolts.



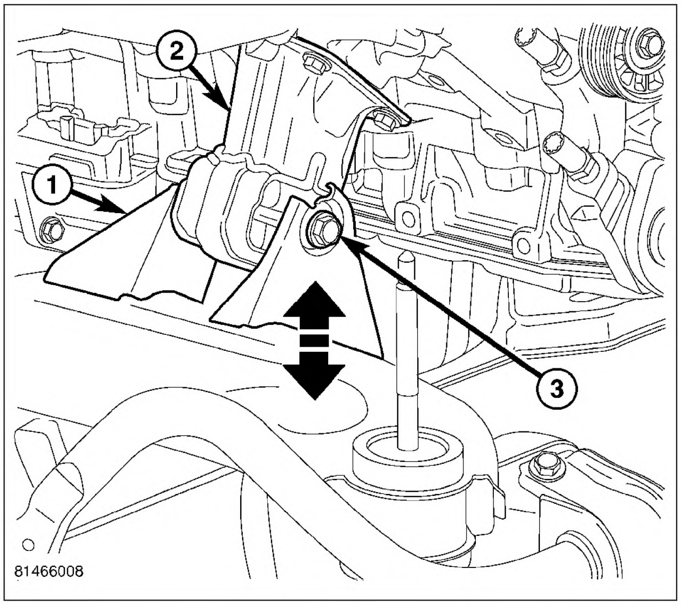
7. Remove the differential right bolt.



8. Remove the differential rear bolt.
9. Remove the differential assembly with the left half shaft still attached.



14. Loosen the engine mount bolts.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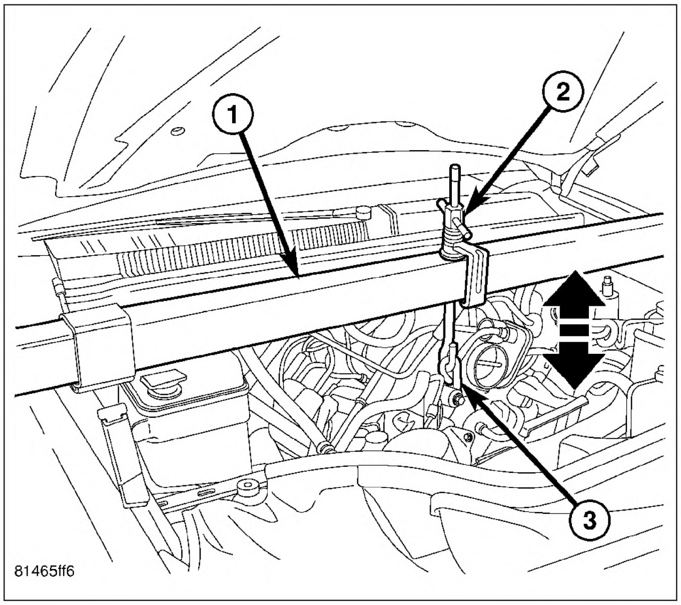
15. Raise the engine so that the weight is off of the mount bolts.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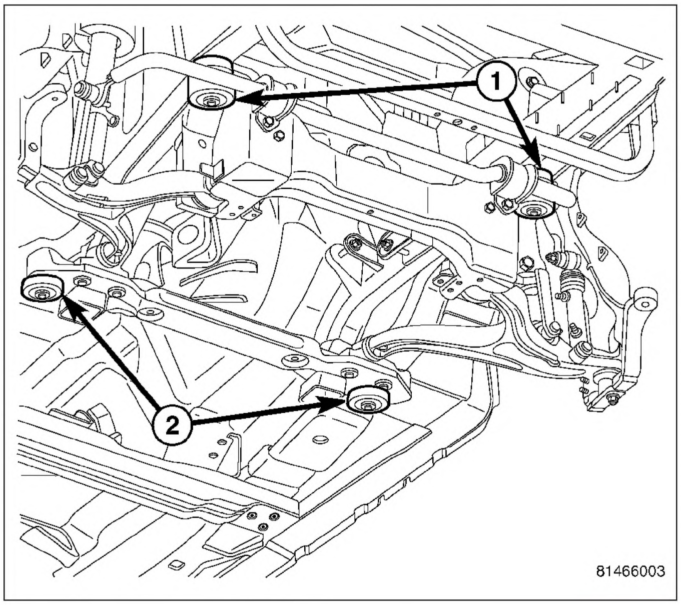
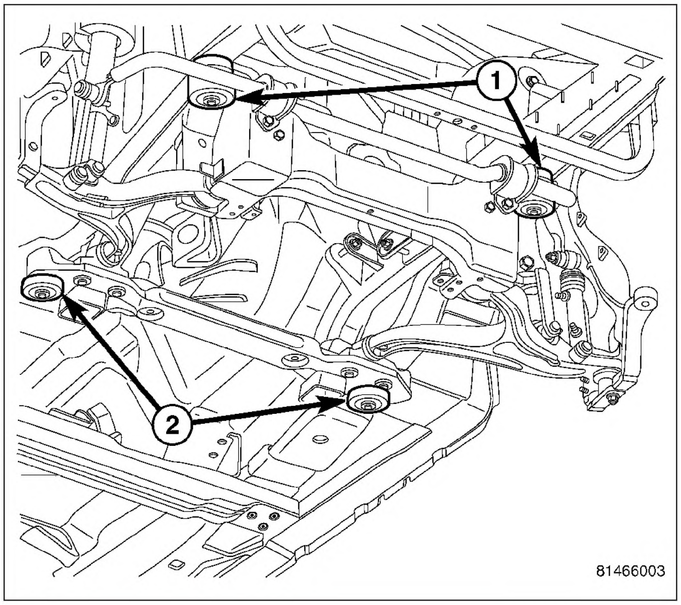
16. Secure the steering wheel in the straight ahead position.
17. Remove the steering gear as necessary. (Refer to 19 - STEERING/GEAR - REMOVAL)
18. Support the cradle with suitable lifting device.
19. Using a grease pencil or equivalent, mark the location of the engine support cradle on the underbody.
20. Remove the four bolts at each corner and lower the cradle.
21. Remove the lower control arms.
22. Remove the sway bar.

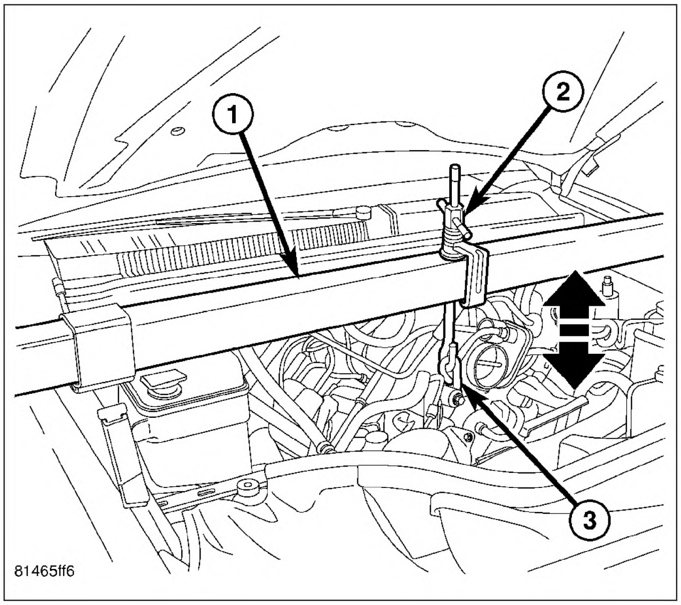


INSTALLATION

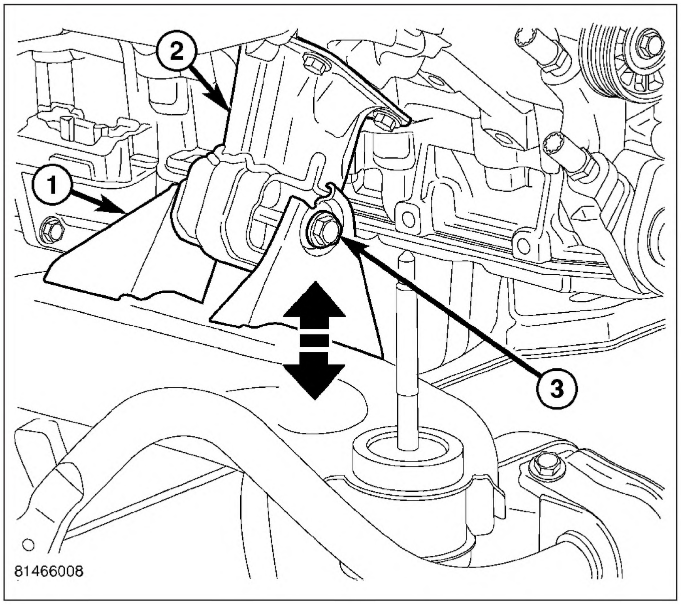
1. Install the sway bar onto the engine cradle as necessary. (Refer to 2 - SUSPENSION/FRONT/STABILIZER BAR - INSTALLATION)
2. Install the lower control arms as necessary. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION)
3. Raise the engine cradle into position guiding the engine mount bolts into the engine cradle slots.
4. Install the four engine cradle bolts (1 & 2).
5. Align the engine cradle to the marks made during removal and tighten the front bolts (1) to 203 N·m (150 ft. lbs.).
6. Tighten the rear bolts (2) to 122 N·m (90 ft. lbs.).



7. Install the steering gear as necessary. (Refer to 19 - STEERING/GEAR - INSTALLATION)
8. Lower the engine fully onto the engine mounts.



9. Tighten the engine mount bolts to 111 N·m (82 ft. lbs.).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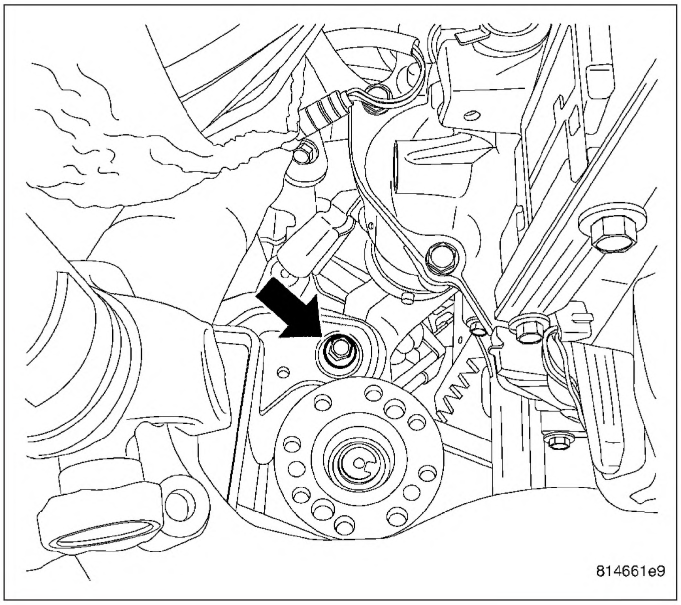
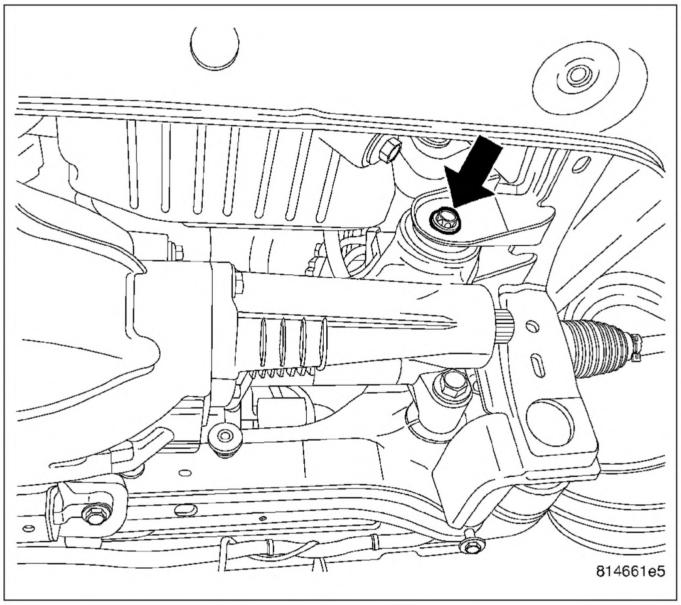
81466008

On 4WD models:

1. Position the front differential into the vehicle and install the bolts.
2. Tighten the rear bolt to 102 N·m (75 ft. lbs.).



3. Tighten the right differential bolt to 102 N·m (75 ft. lbs.).



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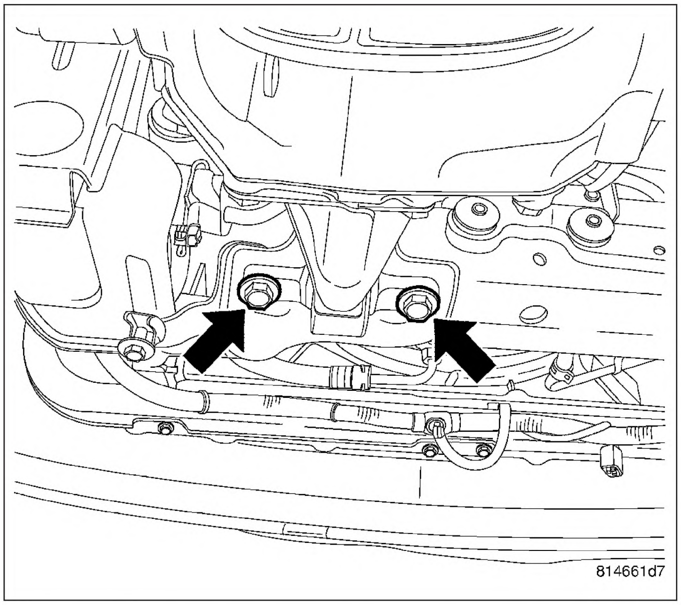
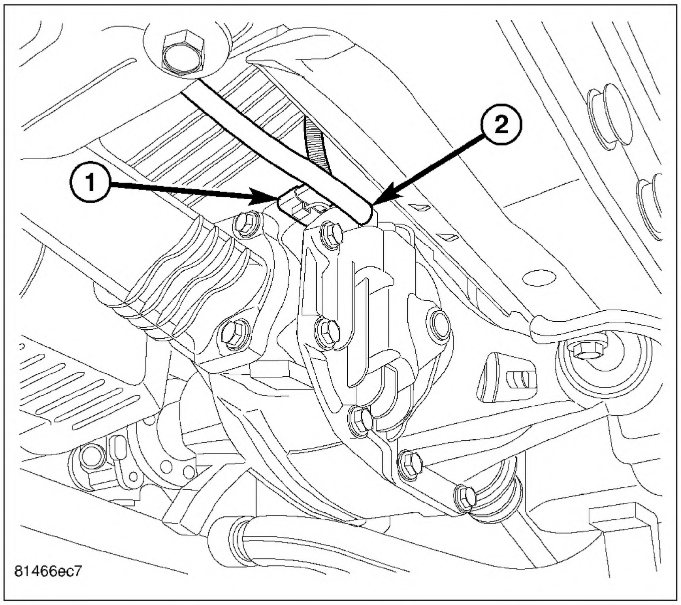
4. Tighten the front differential front bolts to 54 N·m (40 ft. lbs.).



814661d7

5. Install the propeller shaft as necessary. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)
6. Install the right half shaft onto the differential.
7. Connect the electrical connector (1) (if equipped) and the vent hose (2).



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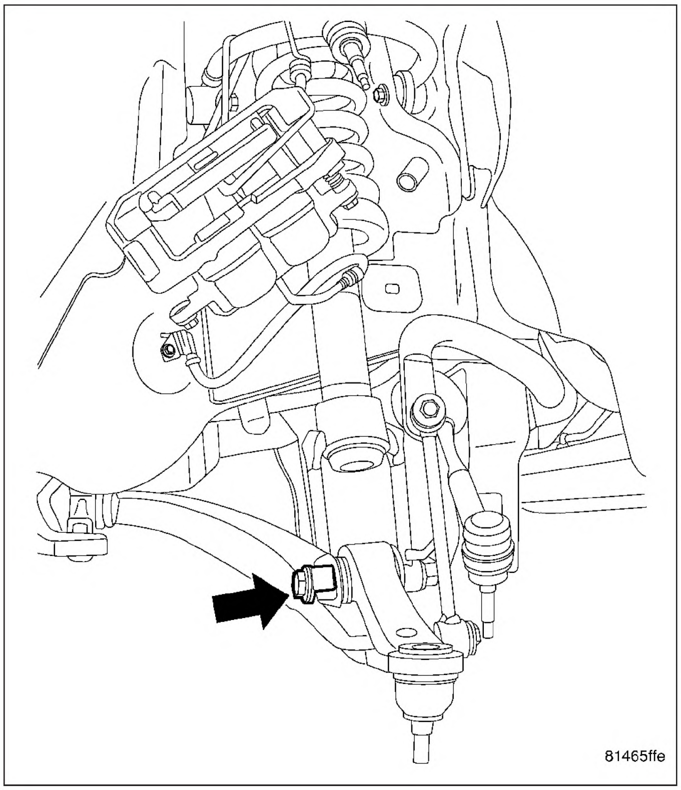
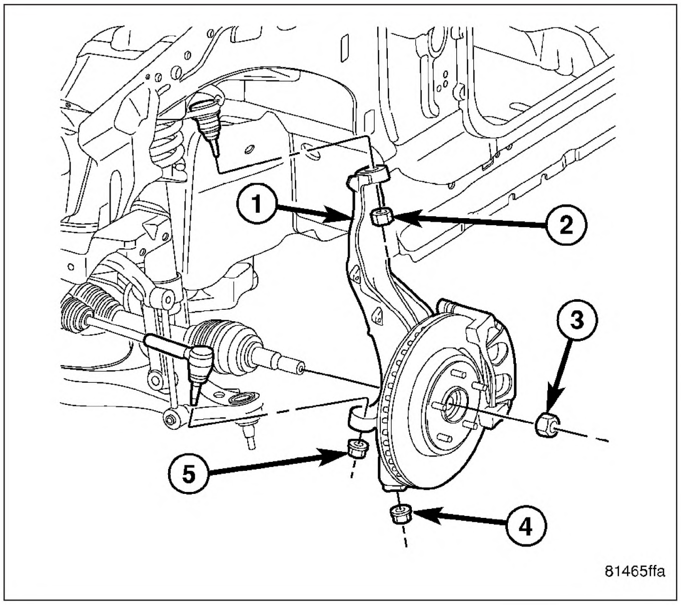
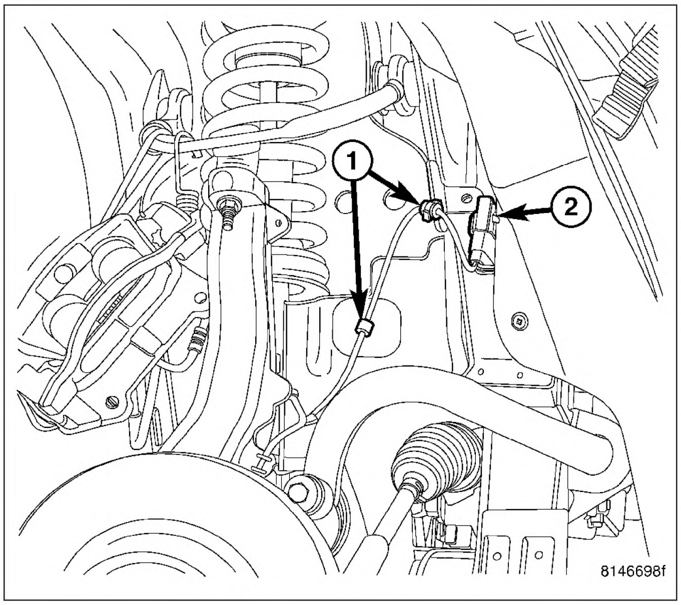
10. Install the lower clevis bolts and tighten to 169 N·m (125 ft. lbs.).



11. Install the knuckles (1) and install the halfshaft nut (3). (if equipped)
12. Tighten the halfshaft nut (3) to 251 N·m (185 ft. lbs.). (if equipped)
13. Install the lower ball joint into the knuckle.
14. Install the lower ball joint nut (4) and tighten the nut to 81 N·m (60 ft. lbs.).
15. Install the upper ball joint into the knuckle.
16. Install the upper ball joint nut (2). Tighten the nut to 81 N·m (60 ft. lbs.).
17. Install the outer tie rod end into the steering knuckle.
18. Tighten the ball stud nut (5) on the ball stud to 75 N·m (55 ft. lbs.).



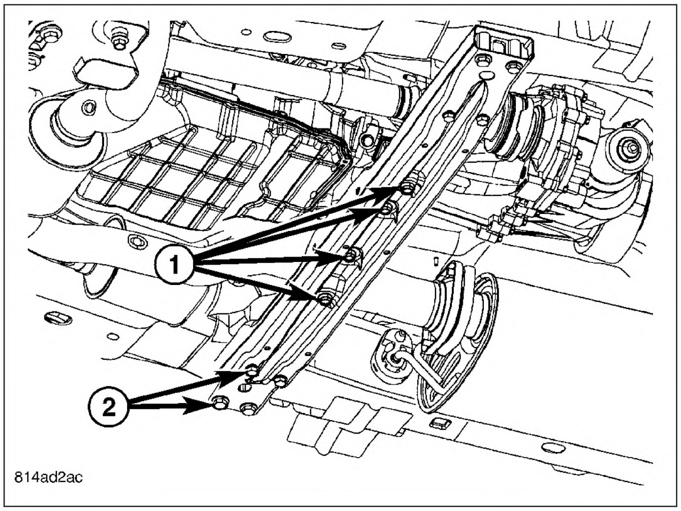
19. Connect the speed sensor electrical connectors (2) and fasten the harness support clips (1) fully.
20. Install the rotors. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION - FRONT DISC BRAKE ROTOR)
21. Check and fill the front differential as necessary. (Refer to LUBRICATION & MAINTENANCE/FLUID CAPACITIES - SPECIFICATIONS)
22. Install the front skid plates. (Refer to 13 - FRAME & BUMPERS/FRAME/FRONT SKID PLATE - INSTALLATION)
23. Check and adjust front wheel alignment as necessary. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE - COMPLETE)



CROSSMEMBER-REAR/TRANSMISSION

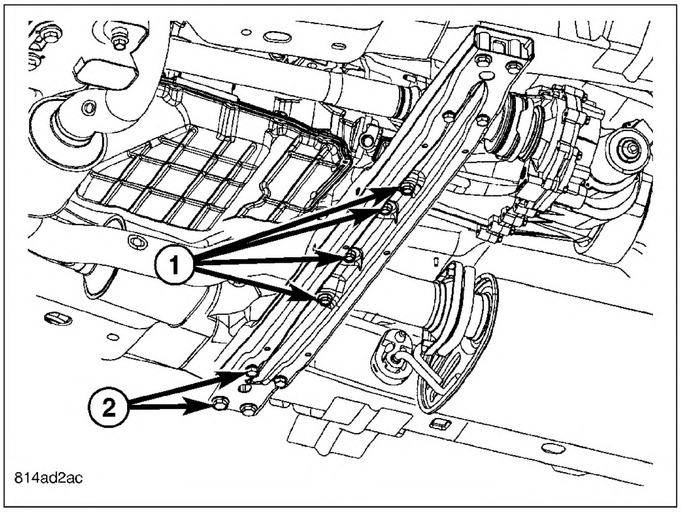
REMOVAL

1. Remove the skid plate. (Refer to 13 - FRAME & BUMPERS/FRAME/SKID PLATE-TRANSFER CASE - REMOVAL)
2. Support the transmission with a suitable lifting device.
3. Remove the four transmission mount bolts (1).
4. Remove the eight crossmember bolts (2) and remove the crossmember.



INSTALLATION

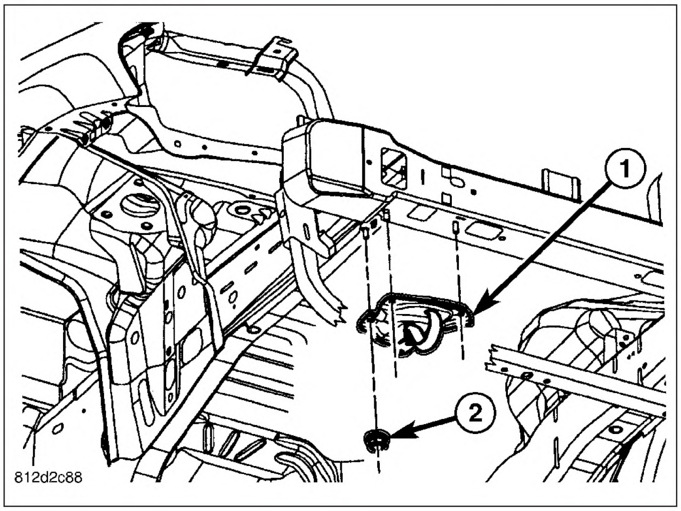
1. Install the crossmember and install the eight crossmember bolts (2).
2. Tighten the crossmember bolts to 54 N·m (40 ft. lbs.).
3. Remove the lifting device.
4. Install the four transmission mount bolts (1) and tighten to 54 N·m (40 ft. lbs.).
5. Install the skid plate. (Refer to 13 - FRAME & BUMPERS/FRAME/SKID PLATE-TRANSFER CASE - INSTALLATION)



HOOK-FRONT TOW

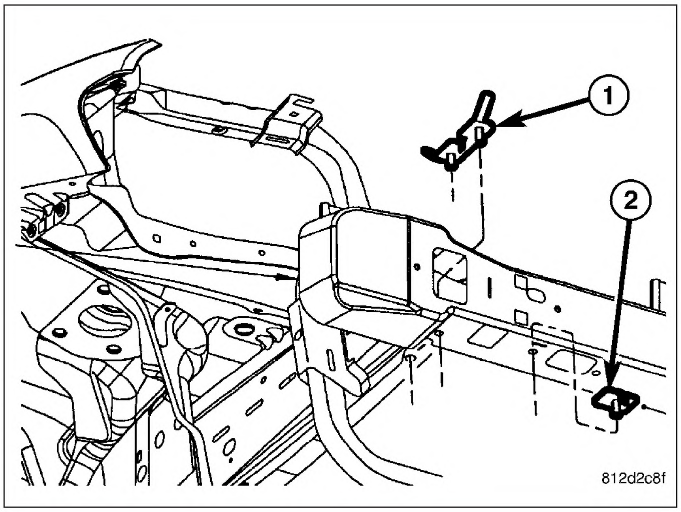
REMOVAL

1. Remove the nuts (2) and remove the tow hook (1).



Stud Plates

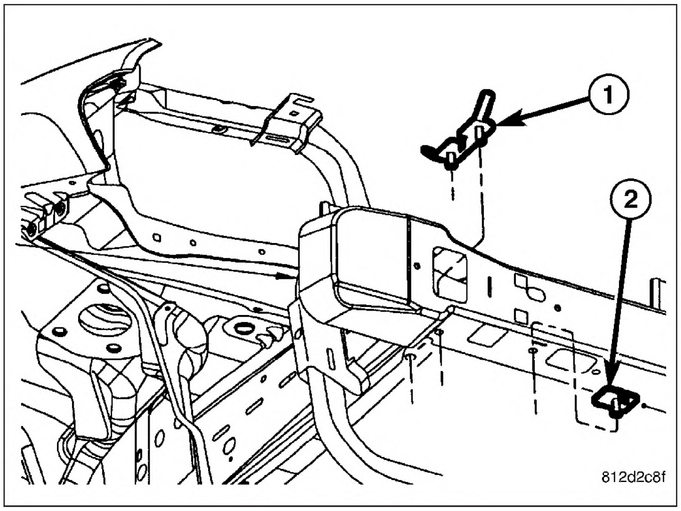
1. Remove the front fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)
2. Release the clip fasteners and remove the stud plates (1 & 2).



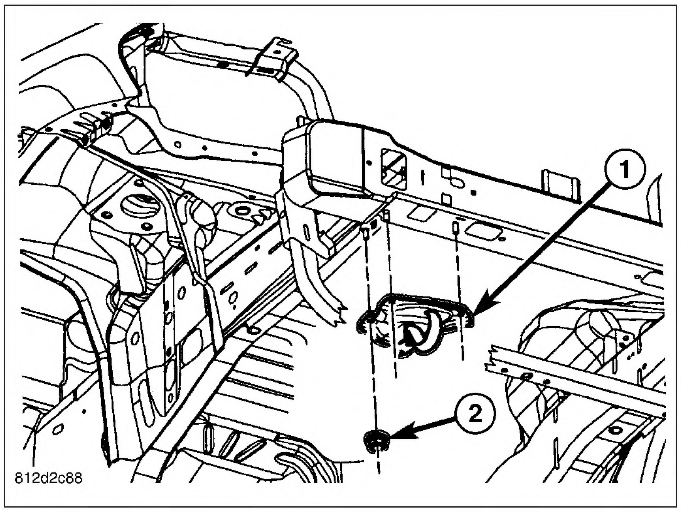
INSTALLATION

Stud Plates

1. Install the stud plates (1 & 2) through the holes in the front bumper beam.



1. Install the tow hook (1) and install the nuts (2).
2. Tighten the nuts to 68 N·m (50 ft. lbs.).
3. Install the front fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION)

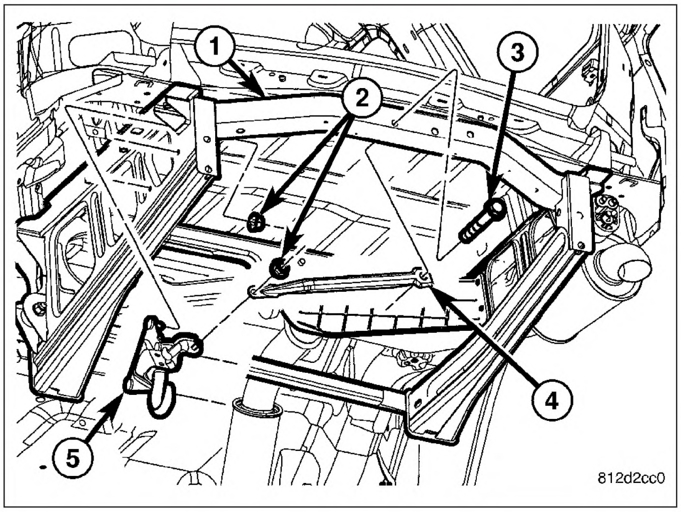


HOOK-REAR TOW

REMOVAL

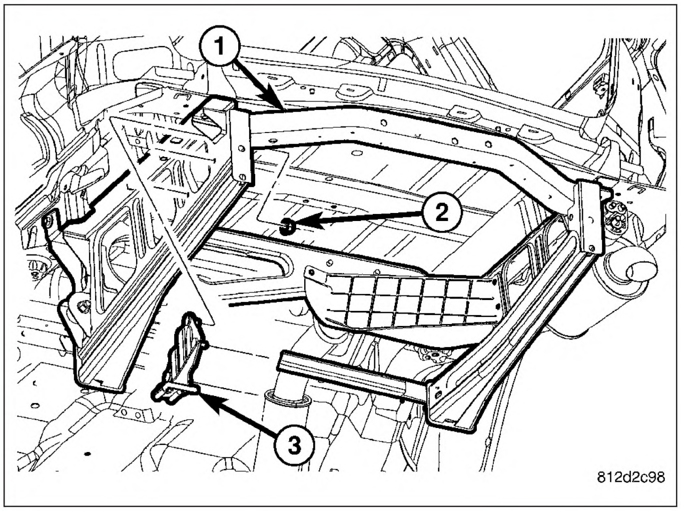
REAR TOW HOOK

1. Remove the rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FASCIA-REAR - REMOVAL)
2. Loosen the bolt (3).
3. Remove the brace nut and separate the brace (4).
4. Remove the mounting nuts (2) and remove the hook (5).



REAR TOW EYE

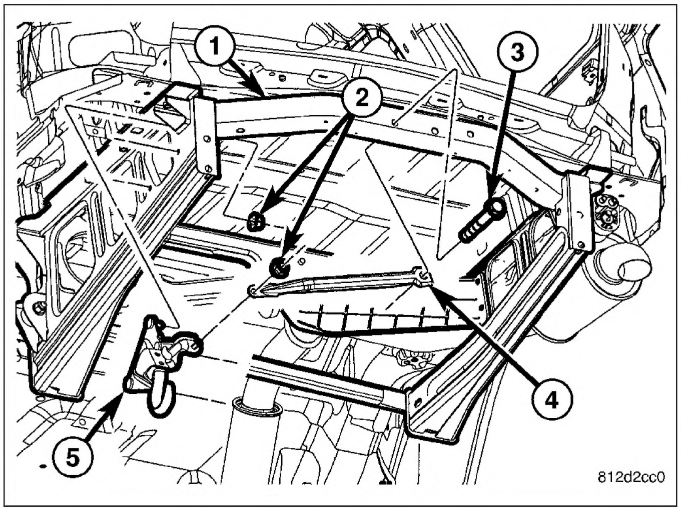
1. Remove the mounting nuts (2) and remove the eye (3).



INSTALLATION

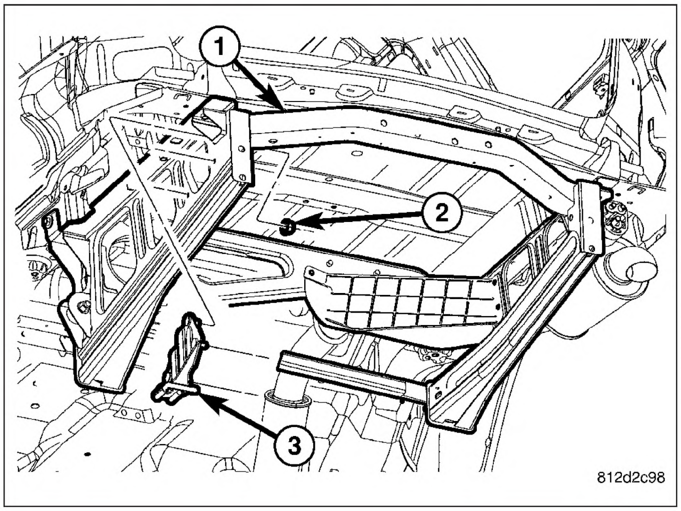
REAR TOW HOOK

1. Install the tow hook (5) and install the nuts (2).
2. Tighten the nuts (2) to 88 N·m (65 ft. lbs.).
3. Tighten the brace bolt (3) to 88 N·m (65 ft. lbs.).
4. Install the rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FASCIA-REAR - INSTALLATION)



REAR TOW EYE

1. Install the tow eye (3) and install the mounting nuts (2).
2. Tighten the nuts to 88 N·m (65 ft. lbs.).

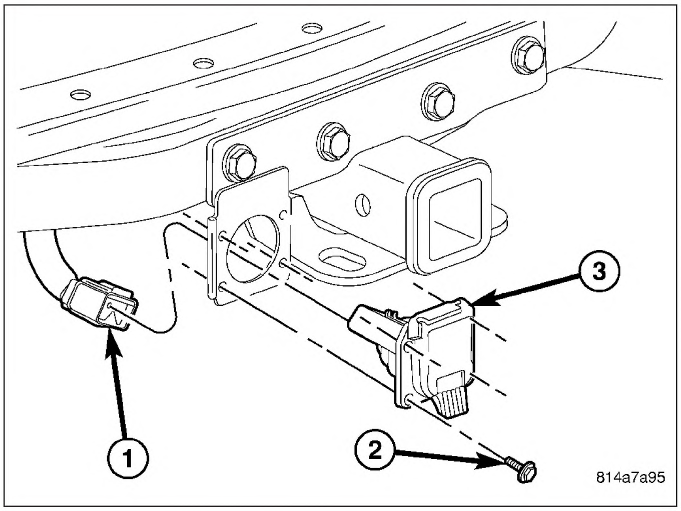


HITCH-TRAILER

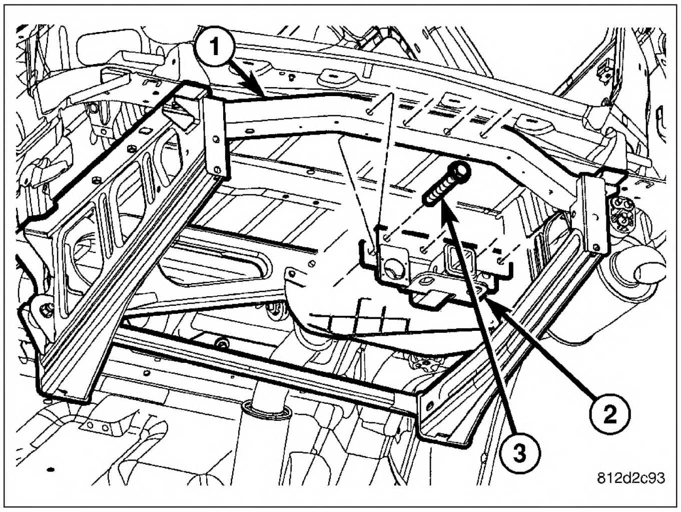
REMOVAL

1. Remove the rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL)
2. Disconnect the trailer wiring connector (1) harness.

NOTE: 7-way connector shown, 4 way similar.

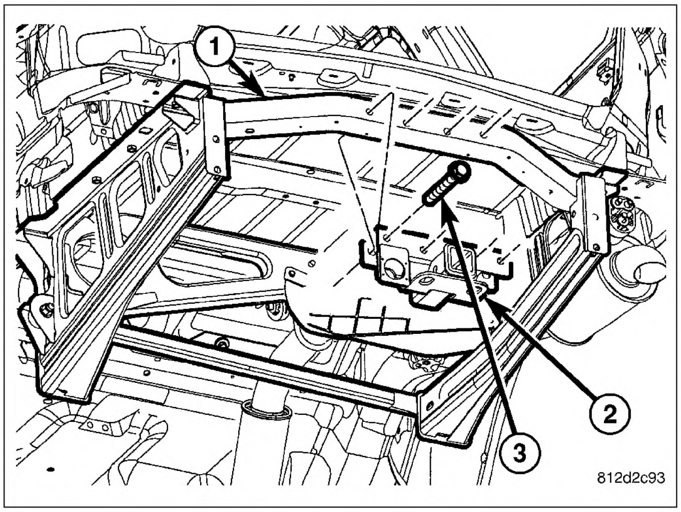


3. Remove the bolts (3) and remove the hitch (2).



INSTALLATION

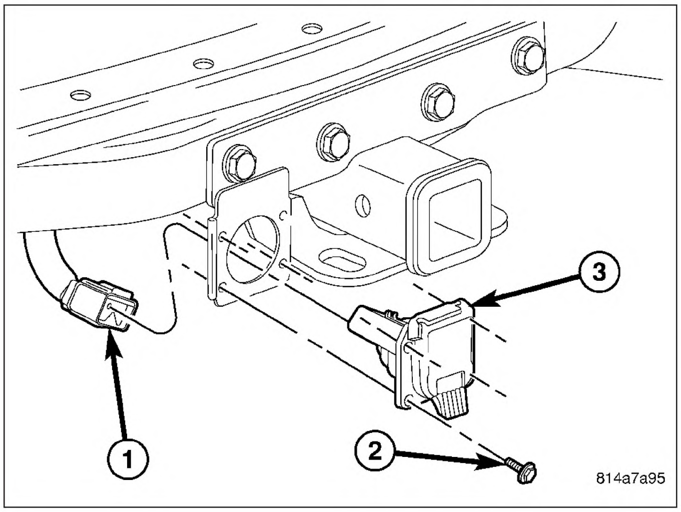
1. Install the hitch (2) onto the rear body cradle (1) and install the bolts (3).
2. Tighten the bolts (3) to 156 N·m (115 ft. lbs.).



3. Connect the trailer connector wire harness (1).

NOTE: 7-way connector shown, 4 way similar.

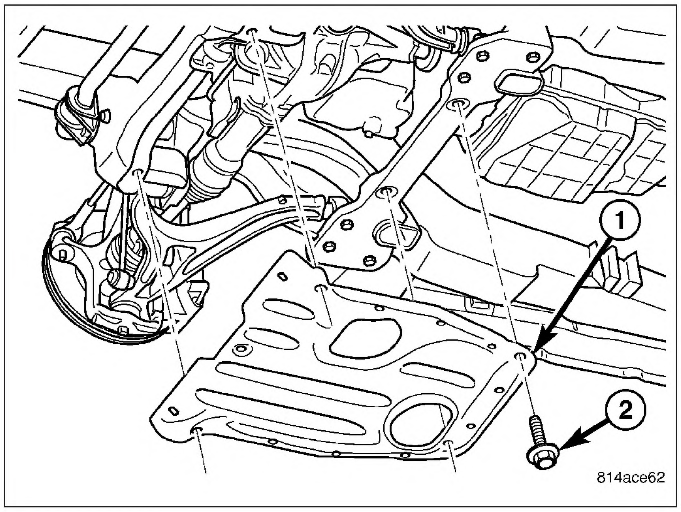
4. Install the rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FASCIA-REAR - INSTALLATION)



SKID PLATE-FRONT

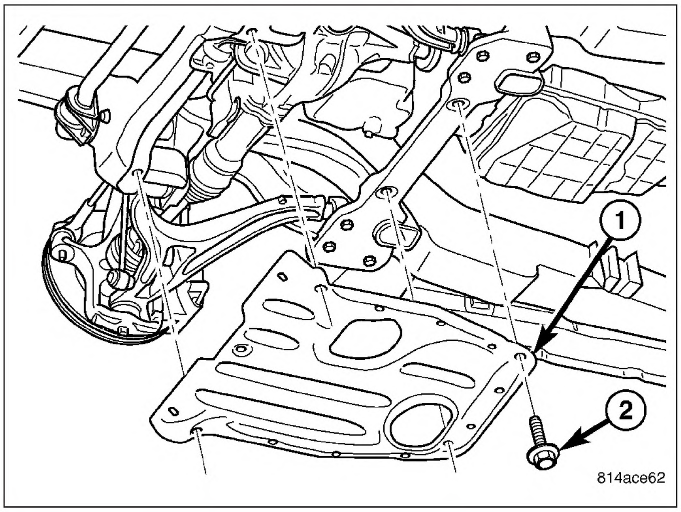
REMOVAL

1. Remove the four bolts (2) and remove the skid plate (1).



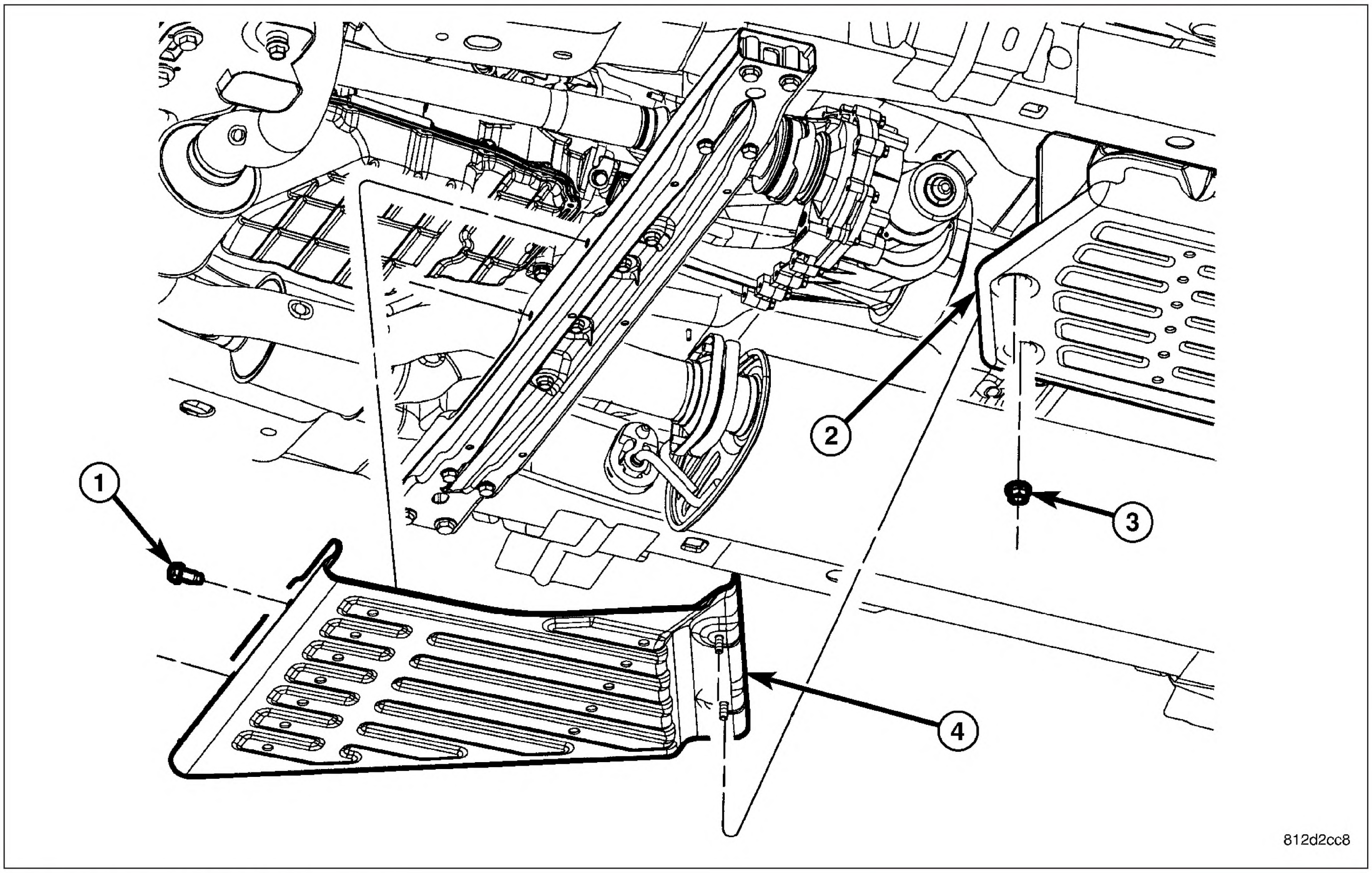
INSTALLATION

1. Install the skid plate (1) and install the four bolts (2).
2. Tighten the bolts to 28 N·m (21 ft. lbs.).



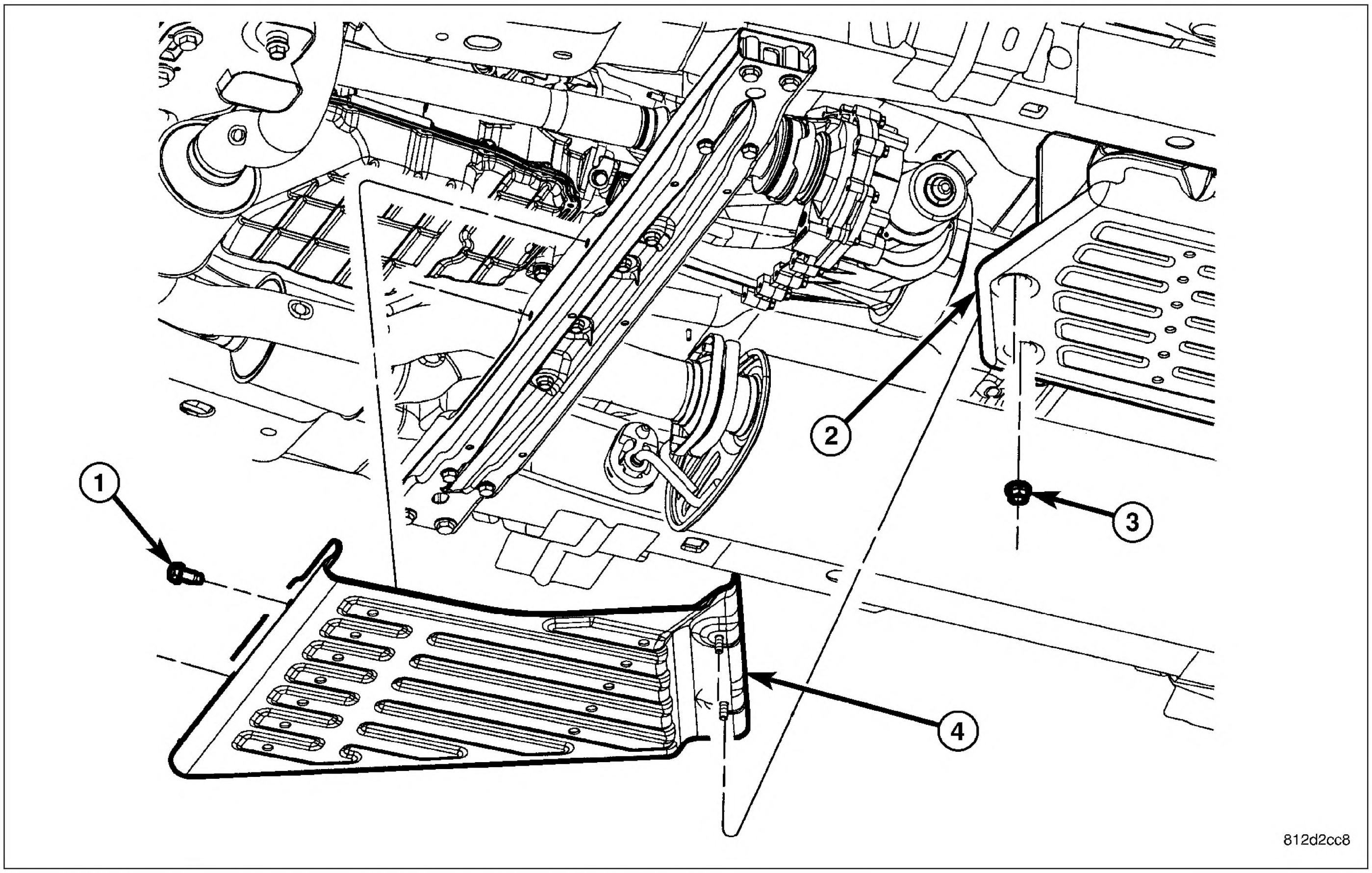
SKID PLATE-TRANSFER CASE

REMOVAL



1. Raise and support the vehicle.
2. Remove the crossmember bolts (1).
3. Remove the nuts (3) and remove the skid plate.

INSTALLATION



1. Install the skid plate and install the crossmember bolts (1).
2. Tighten the bolts to 47 N·m (35 ft. lbs.).
3. Install the nuts and tighten to 81 N·m (60 ft. lbs.).

FUEL SYSTEM

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FUEL INJECTION 26

FUEL DELIVERY

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FUEL DELIVERY

STANDARD PROCEDURE - FUEL SYSTEM PRESSURE RELEASE

Use following procedure if the fuel injector rail is, or is not equipped with a fuel pressure test port.

1. Remove fuel fill cap.
2. Remove fuel pump relay from Power Distribution Center (PDC). For location of relay, refer to label on underside of PDC cover.
3. Start and run engine until it stalls.
4. Attempt restarting engine until it will no longer run.
5. Turn ignition key to OFF position.

CAUTION: Steps 1, 2, 3 and 4 must be performed to relieve high pressure fuel from within fuel rail. Do not attempt to use following steps to relieve this pressure as excessive fuel will be forced into a cylinder chamber.

6. Unplug connector from any fuel injector.
7. Attach one end of a jumper wire with alligator clips (18 gauge or smaller) to either injector terminal.
8. Connect other end of jumper wire to positive side of battery.
9. Connect one end of a second jumper wire to remaining injector terminal.

CAUTION: Powering an injector for more than a few seconds will permanently damage the injector.

10. Momentarily touch other end of jumper wire to negative terminal of battery for no more than a few seconds.
11. Place a rag or towel below fuel line quick-connect fitting at fuel rail.
12. Disconnect quick-connect fitting at fuel rail. Refer to Quick-Connect Fittings.
13. Return fuel pump relay to PDC.
14. One or more Diagnostic Trouble Codes (DTC's) may have been stored in PCM memory due to fuel pump relay removal. A diagnostic scan tool must be used to erase a DTC.

SPECIFICATIONS

FUEL SYSTEM PRESSURE

58 psi +/- 2 psi

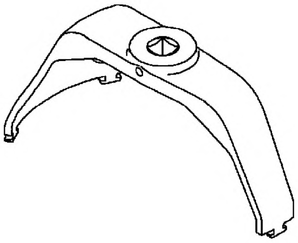
TORQUE - FUEL SYSTEM

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Accelerator Pedal Bracket Mounting	12	-	105
Accelerator Pedal Position Sensor Mounting Nuts - 5.7L	3	-	30
Crankshaft Position Sensor - 3.7L	28	21	-
Crankshaft Position Sensor - 4.7L	28	21	-
Crankshaft Position Sensor - 5.7L	12	-	105 (+/-20)
Camshaft Position Sensor - 3.7L	12	-	106
Camshaft Position Sensor - 4.7L	12	-	106
Camshaft Position Sensor - 5.7L	12	9	105 (+/-) 20
Engine Coolant Temperature Sensor - 3.7L	11	-	96
Engine Coolant Temperature Sensor - 4.7L	11	-	96
Engine Coolant Temperature Sensor - 5.7L	11	-	96
Fuel Filler Hose Clamp	3	-	30
Fuel Filler Housing-to-Body Screws	2	-	17
Fuel Rail Mounting Bolts - 3.7L	11	-	100

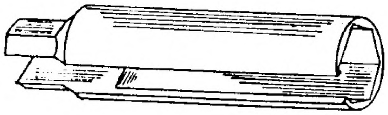
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Fuel Rail Mounting Bolts - 4.7L	11	-	100
Fuel Rail Mounting Bolts - 5.7L	11	-	100
Fuel Tank Mounting Bolts	68	50	-
IAC Motor Mounting Screws - 3.7L	7	-	60
IAC Motor Mounting Screws - 4.7L	7	-	60
NVLD Pump Mounting Bolt	8.5	-	75
Map Sensor Mounting Screws - 3.7L	3	-	25
Map Sensor Mounting Screws - 4.7L	3	-	25
PCM-to-Mounting Bracket Mounting Screws	4	-	35
Power Steering Pressure Switch - 3.7L	14-22	-	124-195
Power Steering Pressure Switch - 4.7L	14-22	-	124-195
TPS Mounting Screws - 3.7L	7	-	60
TPS Mounting Screws - 4.7L	7	-	60
Throttle Body Mounting Bolts - 3.7L	11	-	100
Throttle Body Mounting Bolts - 4.7L	12	-	105
Throttle Body Mounting Bolts - 5.7L	12	-	105
Oxygen Sensors	30	22	-

SPECIAL TOOLS

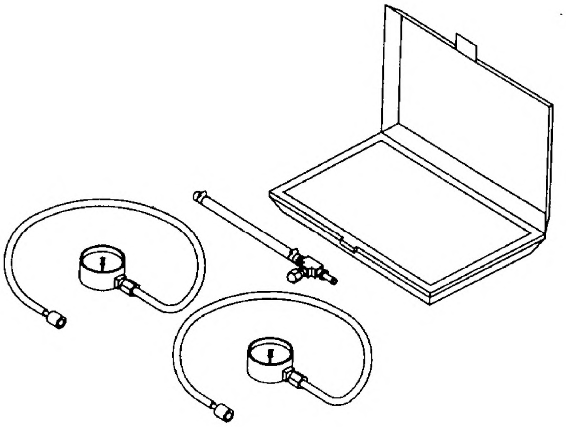
FUEL SYSTEM



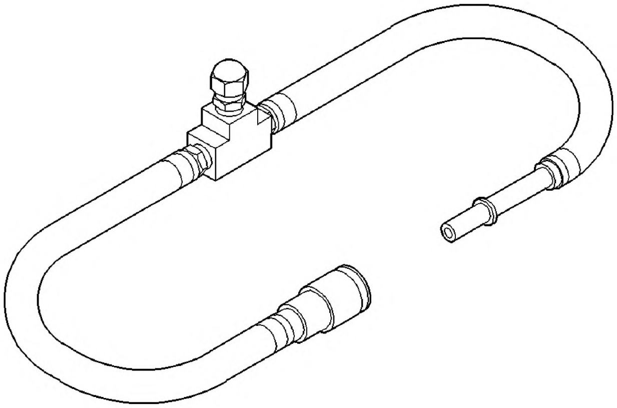
LOCKRING REMOVER/INSTALLER #9340



O2S (OXYGEN SENSOR) REMOVER/INSTALLER - #C-4907



TEST KIT, FUEL PRESSURE #5069



ADAPTERS, FUEL PRESSURE TEST - #6539 AND/OR #6631

SENSOR-FUEL LEVEL SENDING UNIT

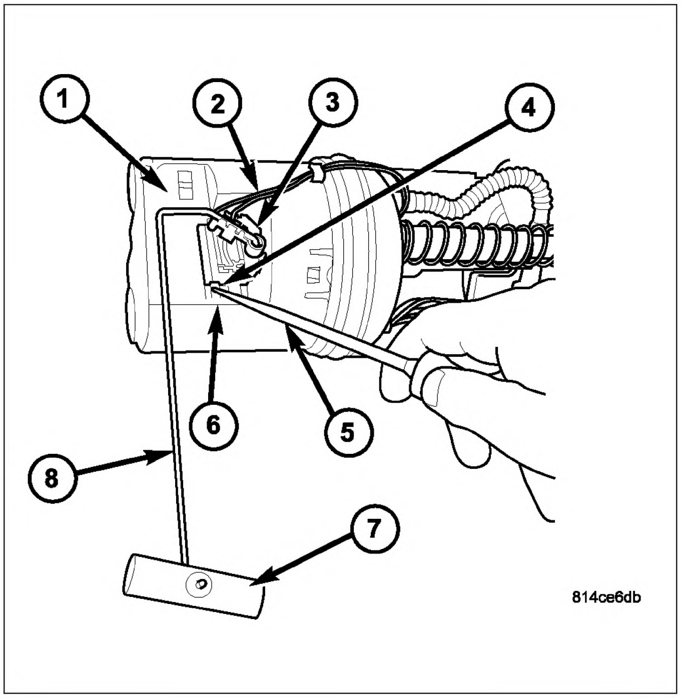
DESCRIPTION

Refer to Fuel Pump Module for information.

REMOVAL

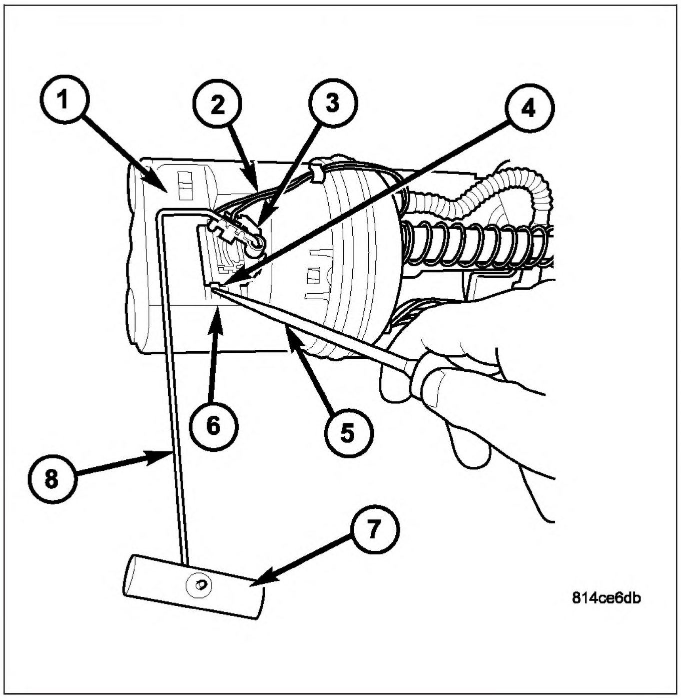
The fuel level sending unit (fuel level sensor) (3) and float assembly (7) and (8) is located on the side of the fuel pump module.

1. Remove fuel pump module from fuel tank. Refer to Fuel Pump Module Removal/Installation.
2. Disconnect electrical connector from fuel pump module. Record pin location first. Separate necessary sending unit wiring from connector using terminal pick / removal tool. Refer to Special Tools in 8W Wiring for tool part numbers.
3. To remove sending unit from pump module, use a small pick (5) or screwdriver. Lift on plastic locking tab (4) while sliding sending unit (3) down the mounting tracks (6).



INSTALLATION

1. Noting the previously recorded pin positions, connect necessary wiring into electrical connectors, and into pump module.
2. Position sending unit (3) to pump module. Slide unit on mounting tracks (6) and snap into place.
3. Install fuel pump module. Refer to Fuel Pump Module Removal/Installation.



LINES, FUEL

DESCRIPTION

Also refer to Quick-Connect Fittings.

WARNING: THE FUEL SYSTEM MAY BE UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSES, FITTINGS, LINES, OR MOST COMPONENTS, FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO THE FUEL SYSTEM PRESSURE RELEASE PROCEDURE.

The lines/tubes/hoses used on fuel injected vehicles are of a special construction. This is due to the higher fuel pressures and the possibility of contaminated fuel in this system. If it is necessary to replace these lines/tubes/ hoses, only those marked EFM/EFI may be used.

If equipped: The hose clamps used to secure rubber hoses on fuel injected vehicles are of a special rolled edge construction. This construction is used to prevent the edge of the clamp from cutting into the hose. Only these rolled edge type clamps may be used in this system. All other types of clamps may cut into the hoses and cause high-pressure fuel leaks.

Use new original equipment type hose clamps.

FITTING, QUICK CONNECT

DESCRIPTION

Different types of quick-connect fittings are used to attach the various fuel system components, lines and tubes. These are: a single-button type, a two-button type, a pinch type, a single-tab type, a two-tab type or a plastic retainer ring type. Some are equipped with safety latch clips. Some may require the use of a special tool for disconnection and removal. Refer to Quick-Connect Fittings Removal/Installation for more information.

CAUTION: Before separating a quick-connect fitting, pay attention to what type of fitting is being used by referring to Quick-Connect Fitting Removal. This will prevent unnecessary fitting or fitting latch breakage.

CAUTION: The interior components (o-rings, clips) of quick-connect fittings are not serviced separately, but new plastic spacers and latches are available for some types. If service parts are not available, do not attempt to repair the damaged fitting or fuel line (tube). If repair is necessary, replace the complete fuel line (tube) assembly.

STANDARD PROCEDURE - QUICK-CONNECT FITTINGS

Different types of quick-connect fittings are used to attach the various fuel system components, lines and tubes. These are: a single-button type, a two-button type, a pinch type, a single-tab type, a two-tab type or a plastic retainer ring type. Some are equipped with safety latch clips. Some may require the use of a special tool for disconnection and removal.

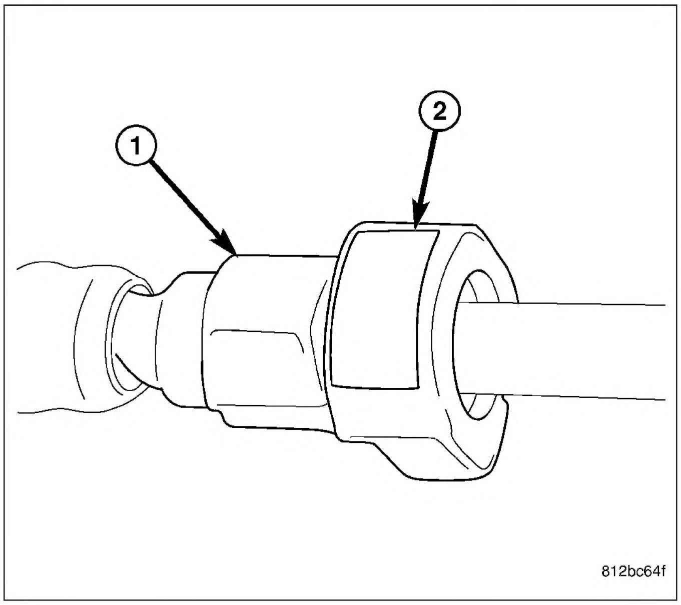
DISCONNECTING

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSE, FITTING OR LINE, FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO FUEL SYSTEM PRESSURE RELEASE PROCEDURE.

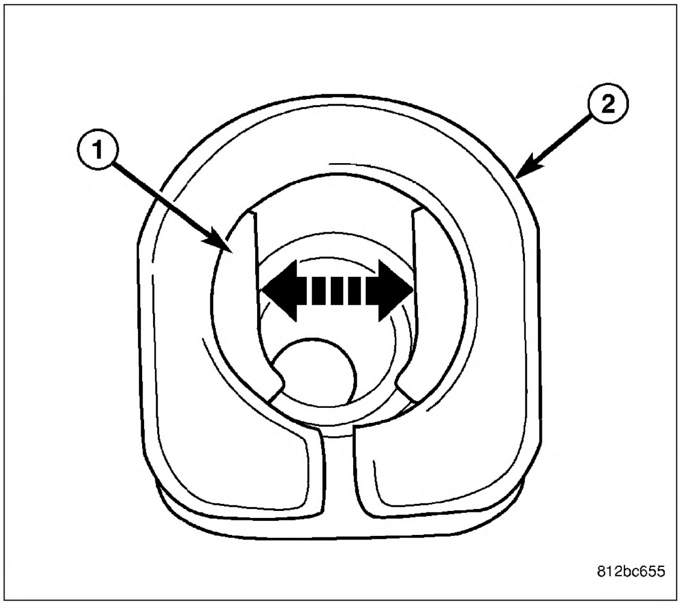
CAUTION: Before separating a quick-connect fitting, pay attention to what type of fitting is being used by referring to Quick-Connect Fitting Removal. This will prevent unnecessary fitting or fitting latch breakage.

CAUTION: The interior components (o-rings, clips) of quick-connect fittings are not serviced separately, but new plastic spacers and latches are available for some types. If service parts are not available, do not attempt to repair the damaged fitting or fuel line (tube). If repair is necessary, replace the complete fuel line (tube) assembly.

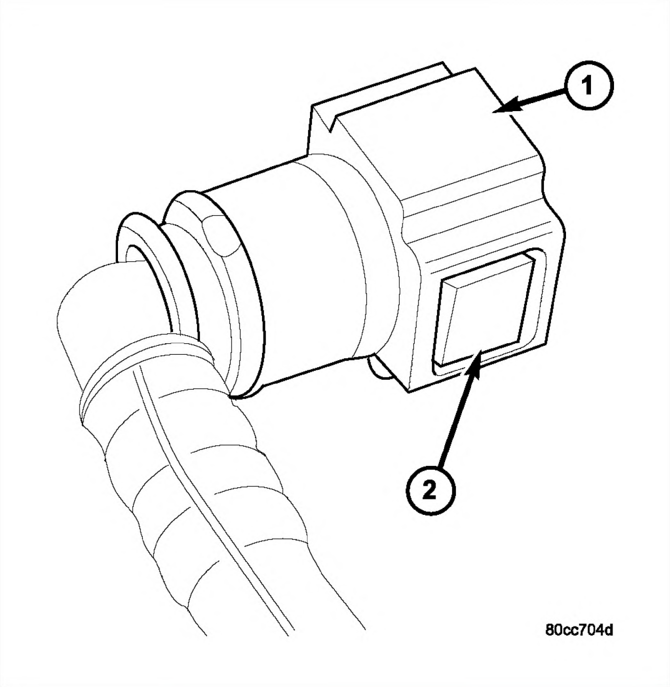
1. Perform fuel pressure release procedure. Refer to Fuel Pressure Release Procedure.
2. Disconnect negative battery cable from battery.
3. Clean fitting of any foreign material before disassembly.
4. **Single–Button Type Fitting:** This type of fitting is equipped with a single push-button (2) located on the quick-connect fitting.



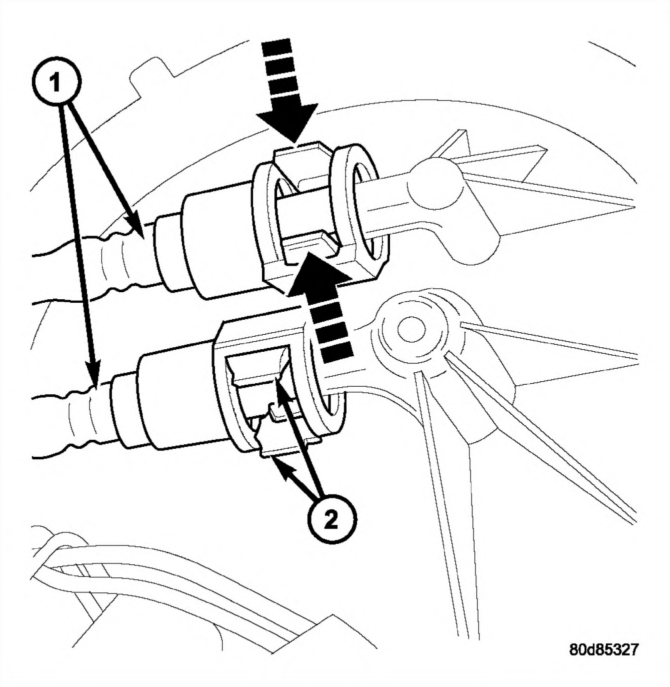
5. The push-button is attached to two internal latches (1). To disconnect, press on push-button with your thumb and unlatch fitting from fuel line. Special tools are not required for disconnection. **DO NOT ATTEMPT TO PRY OR PULL UP ON PUSH-BUTTON. LATCHES WILL BE BROKEN.**



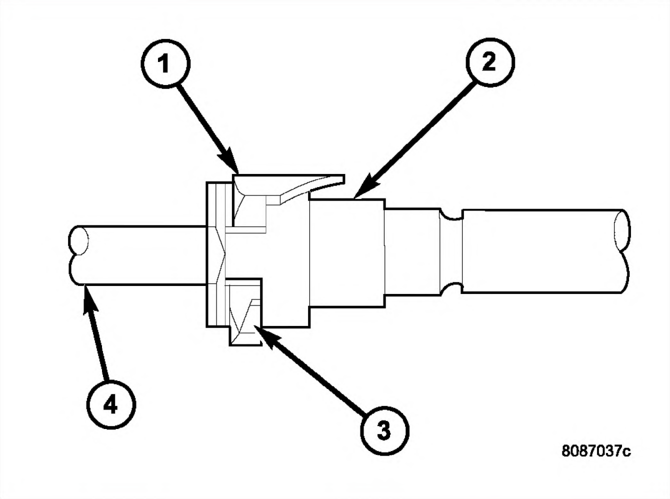
6. Perform fuel pressure release procedure. Refer to Fuel Pressure Release Procedure.
7. Disconnect negative battery cable from battery.
8. Clean fitting of any foreign material before disassembly.
9. **2–Button Type Fitting:** This type of fitting (1) is equipped with a push-button located on each side of quick-connect fitting (2). Press on both buttons simultaneously for removal. Special tools are not required for disconnection.



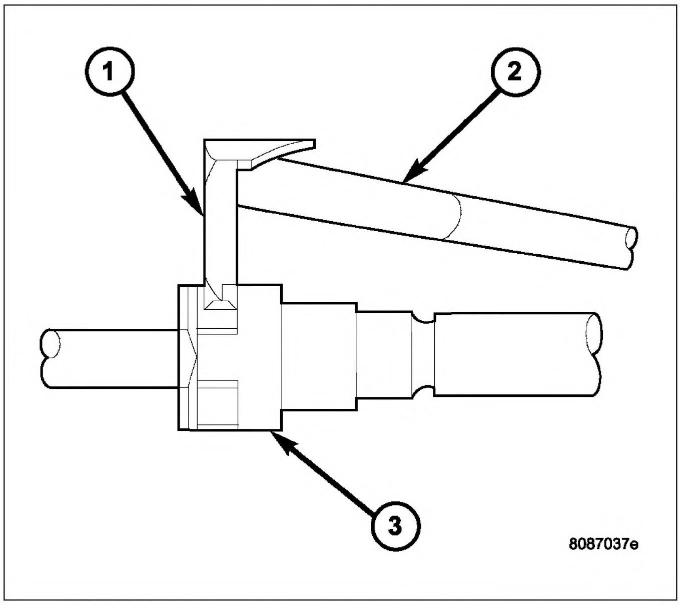
10. **Pinch-Type Fitting:** This fitting (1) is equipped with two finger tabs (2). Pinch both tabs together while removing fitting. Special tools are not required for disconnection.



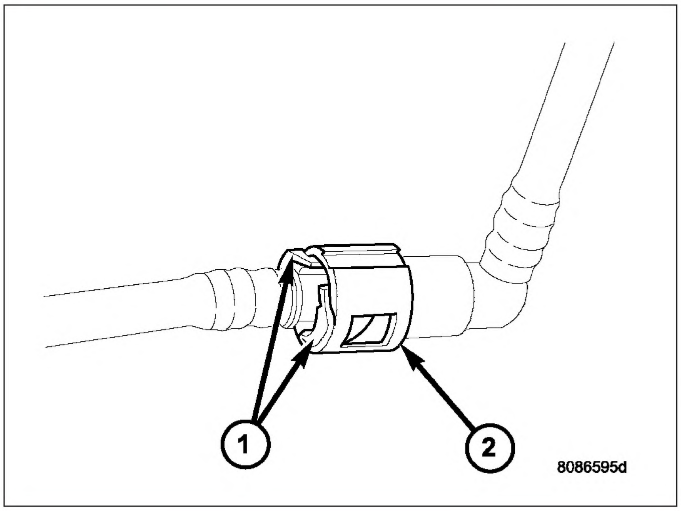
11. **Single-Tab Type Fitting:** This type of fitting (3) is equipped with a single pull tab (1). The tab is removable. After tab is removed, quick-connect fitting can be separated from fuel system component. Special tools are not required for disconnection.



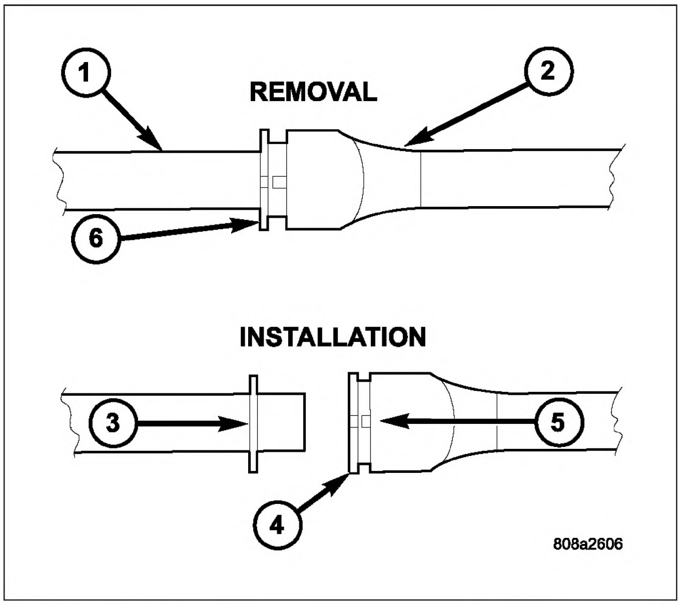
12. Press release tab on side of fitting to release pull tab (1). **If release tab is not pressed prior to releasing pull tab, pull tab will be damaged.**
13. While pressing release tab on side of fitting, use screwdriver (2) to pry up pull tab.
14. Raise pull tab until it separates from quick-connect fitting.



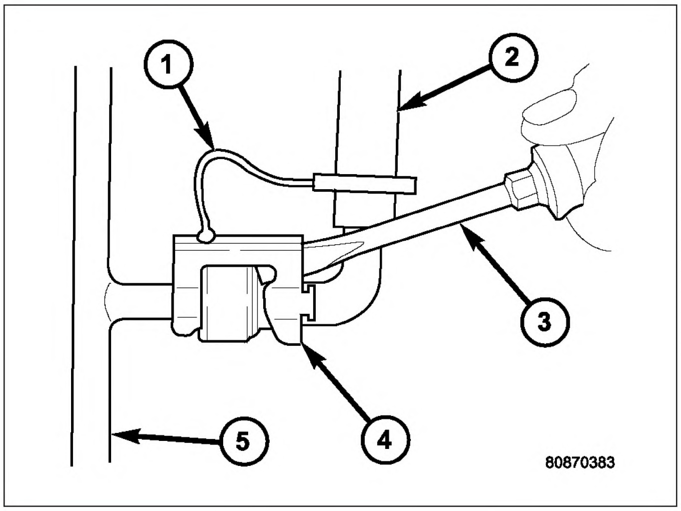
15. **Two-Tab Type Fitting:** This type of fitting (2) is equipped with tabs located on both sides of fitting (1). The tabs are supplied for disconnecting quick-connect fitting from component being serviced.
    a. To disconnect quick-connect fitting, squeeze plastic retainer tabs (1) against sides of quick-connect fitting with your fingers. Tool use is not required for removal and may damage plastic retainer.
    b. Pull fitting from fuel system component being serviced.
    c. The plastic retainer will remain on component being serviced after fitting is disconnected. The o-rings and spacer will remain in quick-connect fitting connector body.



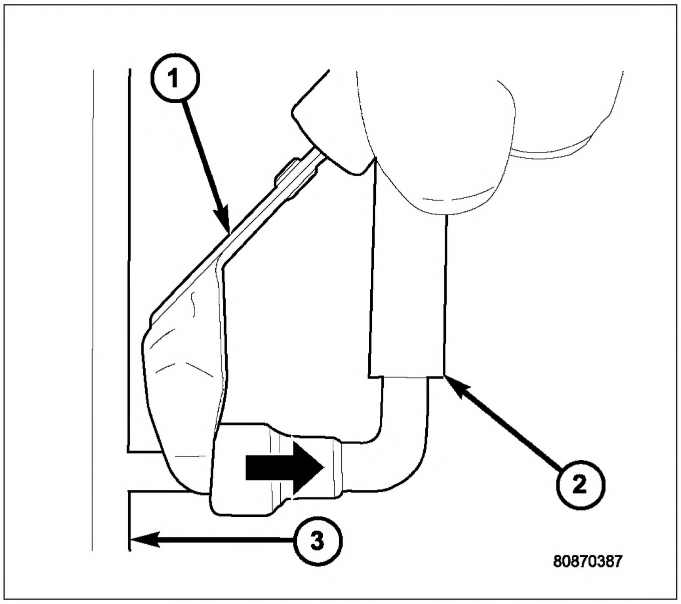
16. **Plastic Retainer Ring Type Fitting:** This type of fitting can be identified by the use of a full-round plastic retainer ring (4) usually black in color.
    a. To release fuel system component from quick-connect fitting, firmly push fitting towards component being serviced while firmly pushing plastic retainer ring into fitting (6). With plastic ring depressed, pull fitting from component. **The plastic retainer ring must be pressed squarely into fitting body. If this retainer is cocked during removal, it may be difficult to disconnect fitting. Use an open-end wrench on shoulder of plastic retainer ring to aid in disconnection.**
    b. After disconnection, plastic retainer ring will remain with quick-connect fitting connector body.
    c. Inspect fitting connector body, plastic retainer ring and fuel system component for damage. Replace as necessary.



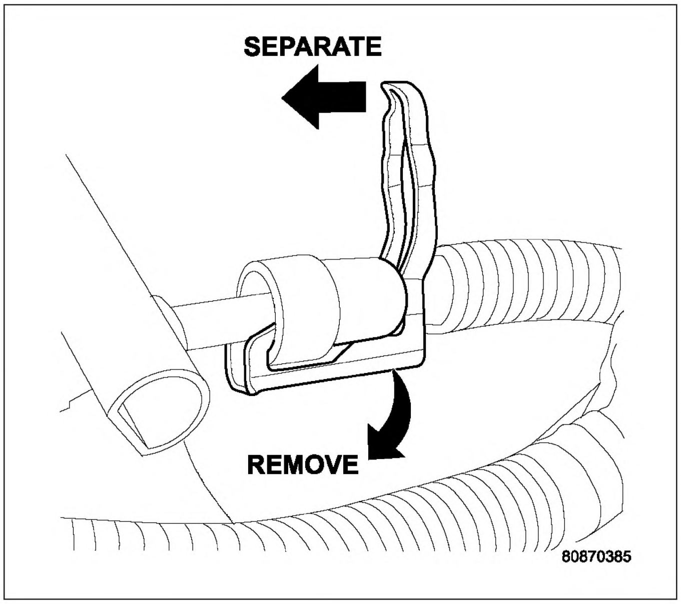
17. **Latch Clips — Type 1:** Depending on vehicle model and engine, 2 different types of safety latch clips are used. Type-1 (4) is tethered to fuel line and type-2 is not. A special tool will be necessary to disconnect fuel line after latch clip is removed. The latch clip may be used on certain fuel line/ fuel rail connection, or to join fuel lines together.
18. Pry up on latch clip with a screwdriver (3).
19. Slide latch clip toward fuel rail while lifting with screwdriver.



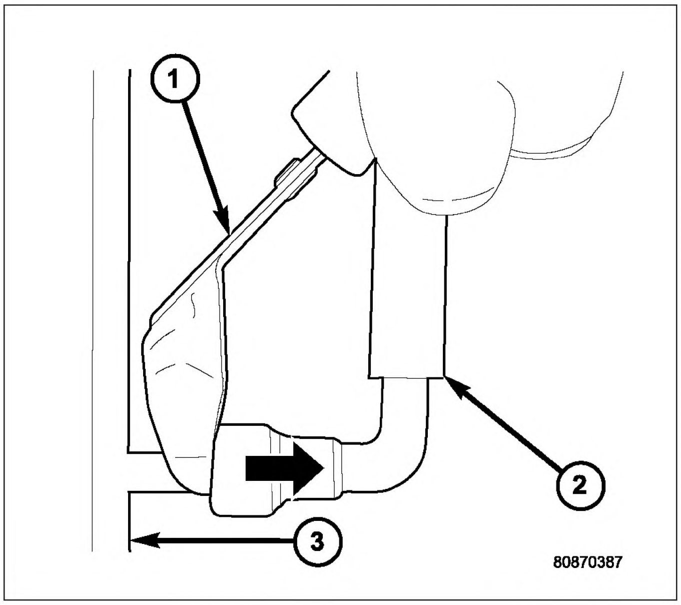
20. Insert special fuel line removal tool (Snap-On number FIH 9055-1 or equivalent) into fuel line (1). Use tool to release locking fingers in end of line.
21. With special tool still inserted, pull fuel line from fuel rail.
22. After disconnection, locking fingers will remain within quick-connect fitting at end of fuel line.
23. Disconnect quick-connect fitting from fuel system component being serviced.



24. **Latch Clips — Type 2:** Depending on vehicle model and engine, 2 different types of safety latch clips are used. Type-1 is tethered to fuel line and type-2 is not. A special tool will be necessary to disconnect fuel line after latch clip is removed. The latch clip may be used on certain fuel line/ fuel rail connection, or to join fuel lines together.
25. Type 2: Separate and unlatch 2 small arms (1) on end of clip and swing away from fuel line.
26. Slide latch clip toward fuel rail while lifting with screwdriver.



27. Insert special fuel line removal tool (Snap-On number FIH 9055-1 or equivalent) into fuel line (1). Use tool to release locking fingers in end of line.
28. With special tool still inserted, pull fuel line from fuel rail.
29. After disconnection, locking fingers will remain within quick-connect fitting at end of fuel line.
30. Disconnect quick-connect fitting from fuel system component being serviced.



CONNECTING

1. Inspect quick-connect fitting body and fuel system component for damage. Replace as necessary.
2. Prior to connecting quick-connect fitting to component being serviced, check condition of fitting and component. Clean parts with a lint-free cloth. Lubricate with clean engine oil.
3. Insert quick-connect fitting into fuel tube or fuel system component until built-on stop on fuel tube or component rests against back of fitting.
4. Continue pushing until a click is felt.
5. Single-tab type fitting: Push new tab down until it locks into place in quick-connect fitting.
6. Verify a locked condition by firmly pulling on fuel tube and fitting (15-30 lbs.).
7. Latch Clip Equipped: Install latch clip (snaps into position). **If latch clip will not fit, this indicates fuel line is not properly installed to fuel rail (or other fuel line). Recheck fuel line connection.**
8. Connect negative cable to battery.
9. Start engine and check for leaks.

PUMP-FUEL

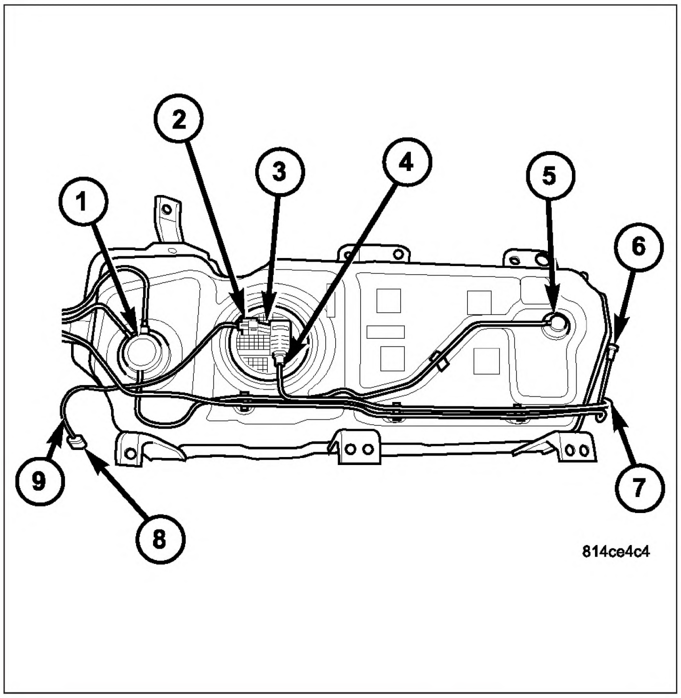
DESCRIPTION

Refer to Fuel Pump Module for information.

MODULE-FUEL PUMP

DESCRIPTION

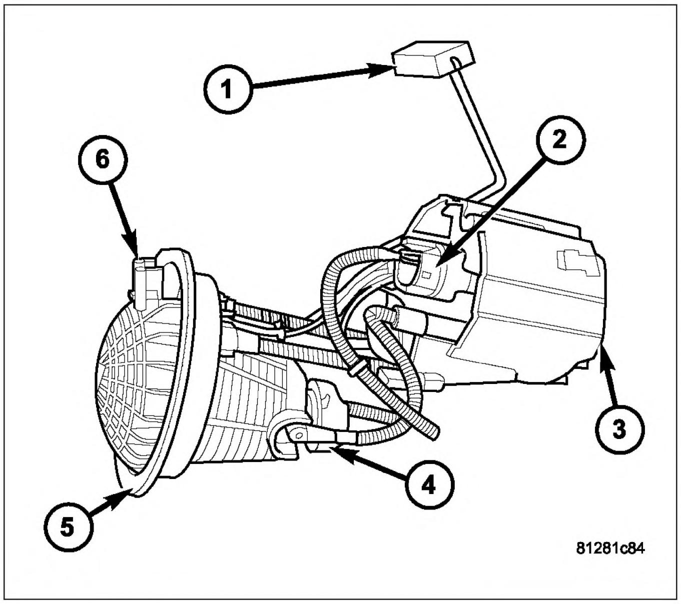
The fuel pump module assembly (3) is located on top of fuel tank.



The module assembly (5) contains the following components:

- An internal fuel filter
- A separate fuel pick-up, or inlet filter (3)
- A fuel pressure regulator (4)
- An electric fuel pump (2)
- A lockring to retain pump module to tank
- A soft gasket between tank flange and module
- A fuel gauge sending unit (fuel level sensor) (1)
- Fuel line connection (6)

If the fuel gauge sending unit , electrical fuel pump, primary inlet filter, fuel filter or fuel pressure regulator require service, the fuel pump module must be replaced.



Electric Fuel Pump

The electric fuel pump is located inside of the fuel pump module. A 12 volt, permanent magnet, electric motor powers the fuel pump. The electric fuel pump is not a separate, serviceable component.

Fuel Filters

Two fuel filters are used. One is located at the bottom of the fuel pump module. The other is located inside the module. A separate frame mounted fuel filter is not used with any engine.

Both fuel filters are designed for extended service. They do not require normal scheduled maintenance. Filters should only be replaced if a diagnostic procedure indicates to do so.

Fuel Pressure Regulator

The fuel pressure regulator is located within fuel pump module.

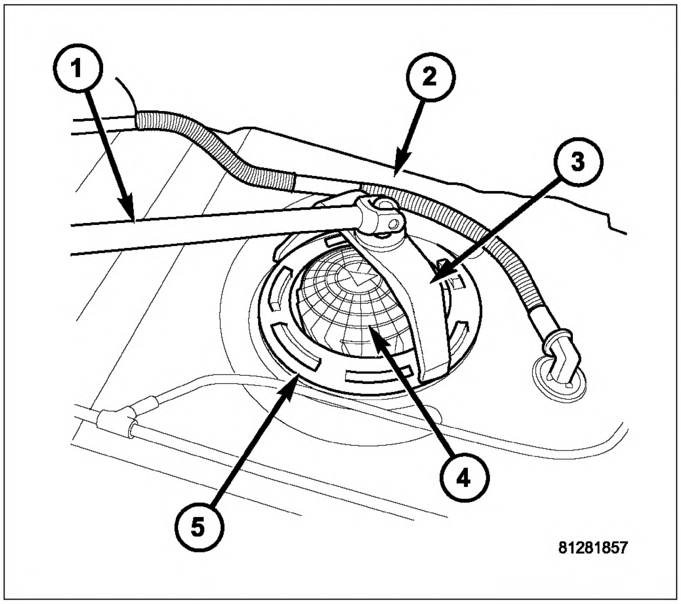
Fuel Gauge Sending Unit (Fuel level sensor)

The fuel gauge sending unit (fuel level sensor) is attached to the side of the fuel pump module. The sending unit consists of a float, an arm, and a variable resistor track (card).

REMOVAL

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING THE FUEL PUMP MODULE, THE FUEL SYSTEM PRESSURE MUST BE RELEASED.

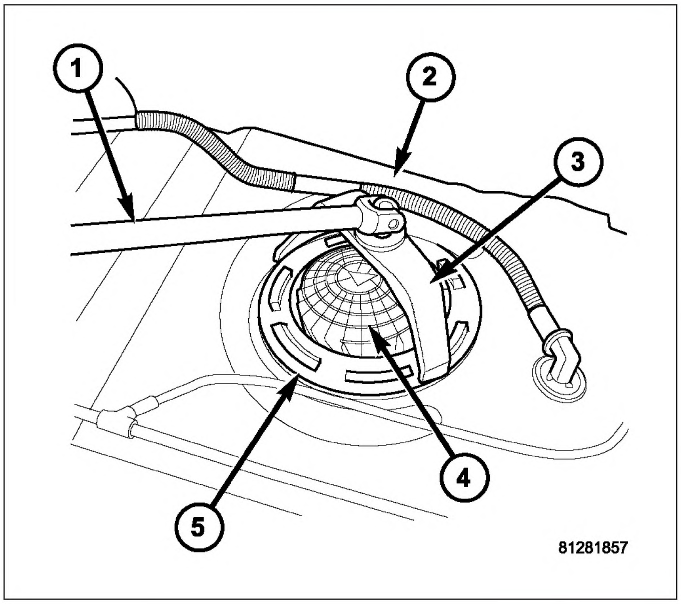
1. Drain and remove fuel tank. Refer to Fuel Tank Removal/Installation.
2. Note rotational position of module before attempting removal. An indexing arrow is located on top of module for this purpose.
3. Position Special Tool 9340 (3) into notches on outside edge of lockring (5).
4. Install 1/2 inch drive breaker bar (1) to tool 9340 (3).
5. Rotate breaker bar counter-clockwise to remove lockring.
6. Remove lockring. The module will spring up slightly when lockring is removed.
7. Remove module from fuel tank. Be careful not to bend float arm while removing.



INSTALLATION

CAUTION: Whenever the fuel pump module is serviced, the rubber seal (gasket) must be replaced.

1. Using a new seal (gasket), position fuel pump module into opening in fuel tank.
2. Position lockring (5) over top of fuel pump module.
3. Rotate module until embossed alignment arrow points to center alignment mark. This step must be performed to prevent float from contacting side of fuel tank. Also be sure fuel fitting on top of pump module is pointed to drivers side of vehicle.
4. Install Special Tool 9340 (3) to lockring.
5. Install 1/2 inch drive breaker (1) into Special Tool 9340 (3).
6. Tighten lockring (clockwise) until all seven notches have engaged.
7. Install fuel tank. Refer to Fuel Tank Removal/ Installation.



RAIL-FUEL

DESCRIPTION

The fuel injector rail is used to mount the fuel injectors to the engine.

OPERATION

High pressure from the fuel pump is routed to the fuel rail. The fuel rail then supplies the necessary fuel to each individual fuel injector.

A quick-connect fitting with a safety latch clip is used to attach the fuel line to the fuel rail.

The fuel rail is not repairable.

CAUTION: The left and right sections of the fuel rail are connected with either a flexible connecting hose, or joints. Do not attempt to separate the rail halves at these connecting hose or joints. Due to the design of the connecting hose or joint, it does not use any clamps. Never attempt to install a clamping device of any kind to the hose or joint. When removing the fuel rail assembly for any reason, be careful not to bend or kink the connecting hose or joint.

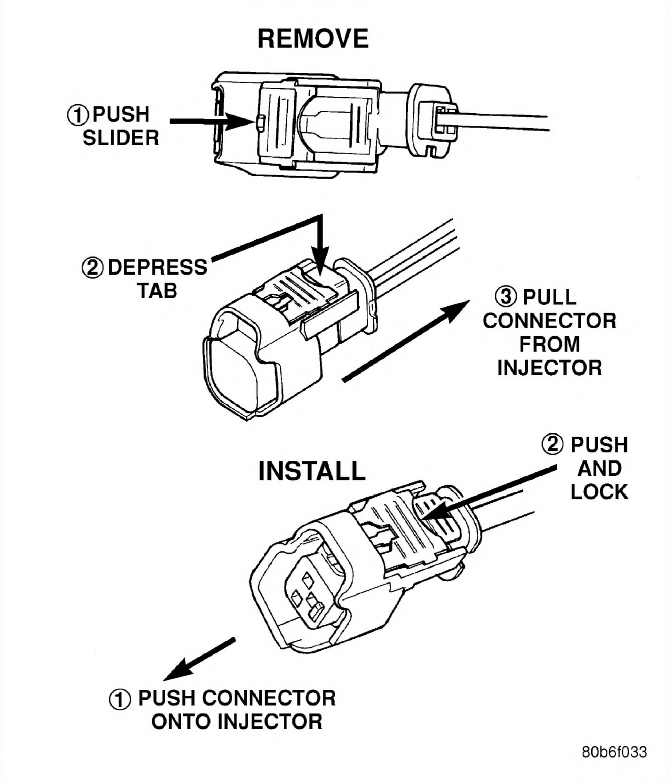
REMOVAL

3.7L V-6

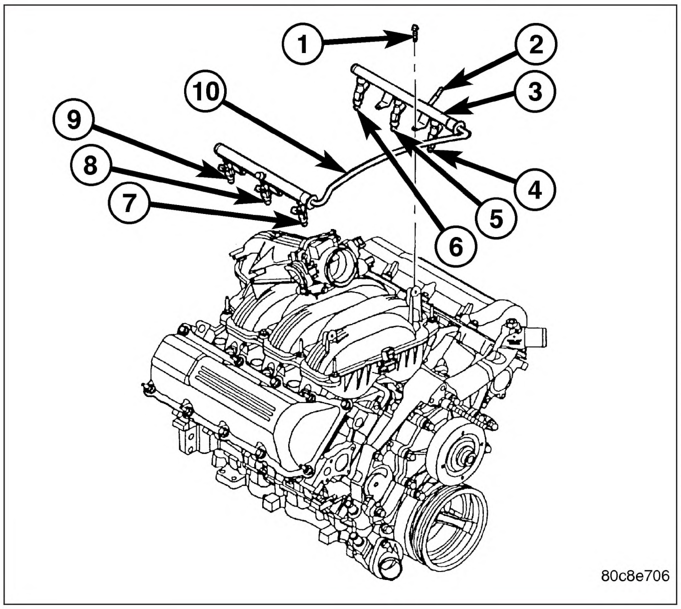
WARNING: THE FUEL SYSTEM IS UNDER CONSTANT PRESSURE EVEN WITH ENGINE OFF. BEFORE SERVICING FUEL RAIL, FUEL SYSTEM PRESSURE MUST BE RELEASED.

CAUTION: The left and right fuel rails are replaced as an assembly. Do not attempt to separate rail halves at connector tubes. Due to design of tubes, it does not use any clamps. Never attempt to install a clamping device of any kind to tubes. When removing fuel rail assembly for any reason, be careful not to bend or kink tubes.

1. Remove fuel tank filler tube cap.
2. Perform Fuel System Pressure Release Procedure.
3. Remove negative battery cable at battery.
4. Remove air duct at throttle body air box.
5. Remove air box at throttle body.
6. Remove air resonator mounting bracket at front of throttle body (2 bolts).
7. Disconnect fuel line latch clip and fuel line at fuel rail. A special tool will be necessary for fuel line disconnection. Refer to Quick-Connect Fittings.
8. Remove necessary vacuum lines at throttle body.
9. Disconnect electrical connectors at all 6 fuel injectors. Refer to graphic. Push red colored slider away from injector (1). While pushing slider, depress tab (2) and remove connector (3) from injector. The factory fuel injection wiring harness is numerically tagged (INJ 1, INJ 2, etc.) for injector position identification. If harness is not tagged, note wiring location before removal.
10. Disconnect electrical connectors at all throttle body sensors.
11. Remove 6 ignition coils. Refer to Ignition Coil Removal/Installation.



12. Remove four fuel rail mounting bolts (1).
13. Gently rock and pull **left** side of fuel rail until fuel injectors just start to clear machined holes in cylinder head. Gently rock and pull **right** side of rail until injectors just start to clear cylinder head holes. Repeat this procedure (left/right) until all injectors have cleared cylinder head holes.
14. Remove fuel rail (with injectors attached) from engine.
15. If fuel injectors are to be removed, refer to Fuel Injector Removal/Installation.

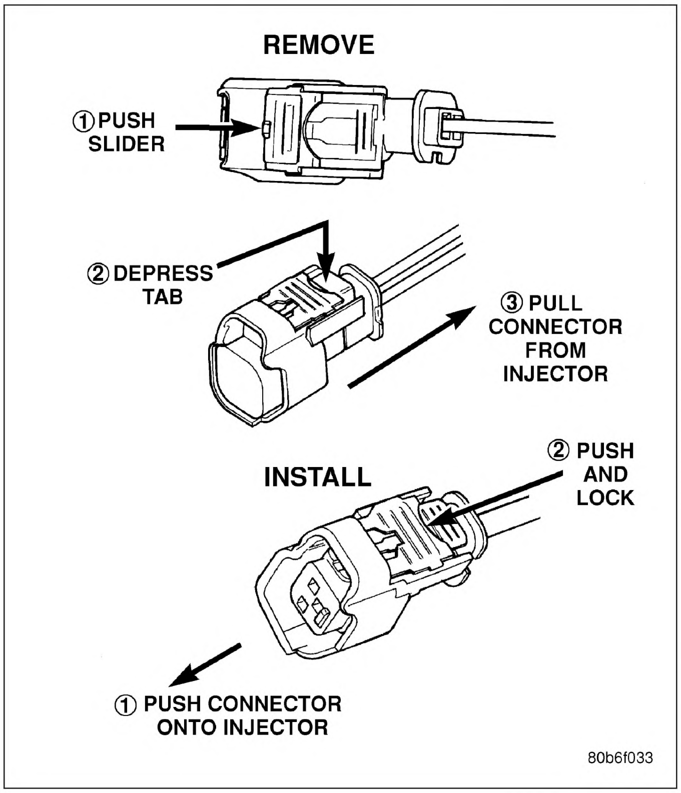


4.7L V-8

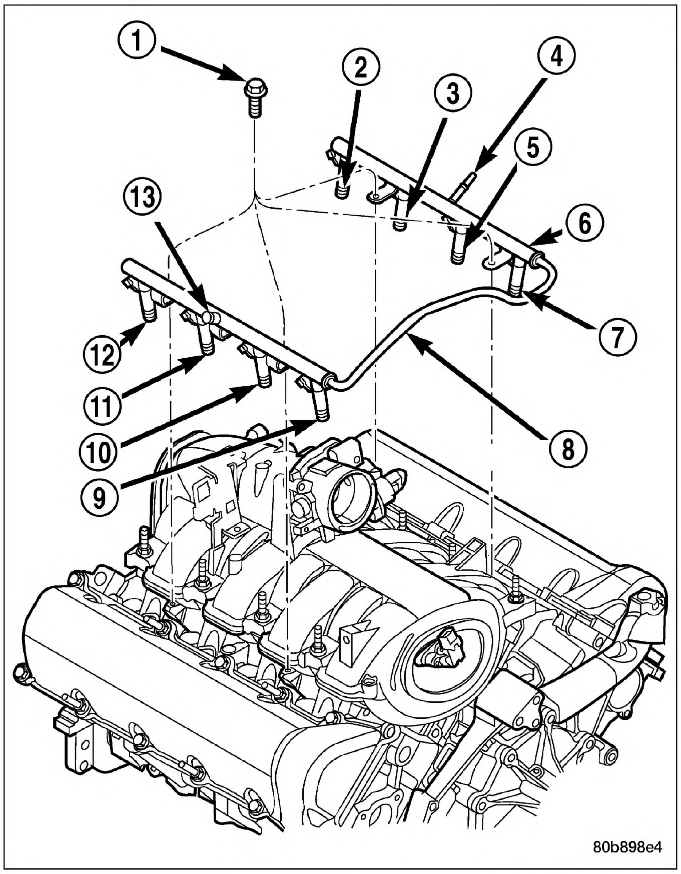
WARNING: THE FUEL SYSTEM IS UNDER CONSTANT PRESSURE EVEN WITH ENGINE OFF. BEFORE SERVICING FUEL RAIL, FUEL SYSTEM PRESSURE MUST BE RELEASED.

CAUTION: The left and right fuel rails are replaced as an assembly. Do not attempt to separate rail halves at connector tubes. Due to design of tubes, it does not use any clamps. Never attempt to install a clamping device of any kind to tubes. When removing fuel rail assembly for any reason, be careful not to bend or kink tubes.

1. Remove fuel tank filler tube cap.
2. Perform Fuel System Pressure Release Procedure.
3. Remove negative battery cable at battery.
4. Remove air duct at throttle body air box.
5. Remove air box at throttle body.
6. Remove air resonator mounting bracket at front of throttle body (2 bolts).
7. Disconnect fuel line latch clip and fuel line at fuel rail. A special tool will be necessary for fuel line disconnection. Refer to Quick-Connect Fittings.
8. Remove necessary vacuum lines at throttle body.
9. Disconnect electrical connectors at all 8 fuel injectors. Refer to graphic. Push red colored slider away from injector (1). While pushing slider, depress tab (2) and remove connector (3) from injector. The factory fuel injection wiring harness is numerically tagged (INJ 1, INJ 2, etc.) for injector position identification. If harness is not tagged, note wiring location before removal.
10. Disconnect electrical connectors at all throttle body sensors.
11. Remove 8 ignition coils. Refer to Ignition Coil Removal/Installation.



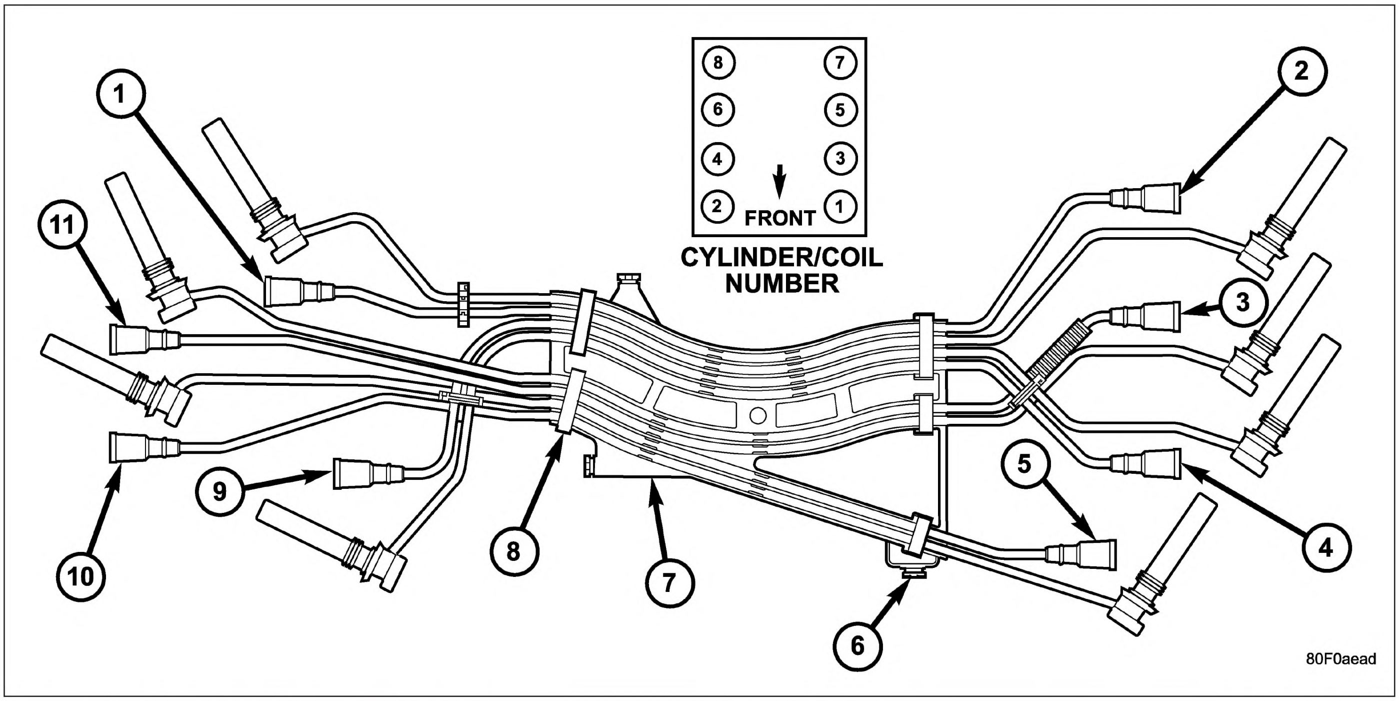
12. Remove 4 fuel rail mounting bolts (1).
13. Gently rock and pull **left** side of fuel rail until fuel injectors just start to clear machined holes in cylinder head. Gently rock and pull **right** side of rail until injectors just start to clear cylinder head holes. Repeat this procedure (left/right) until all injectors have cleared cylinder head holes.
14. Remove fuel rail (with injectors attached) from engine.
15. If fuel injectors are to be removed, refer to Fuel Injector Removal/Installation.



5.7L V-8

WARNING: THE FUEL SYSTEM IS UNDER CONSTANT PRESSURE EVEN WITH ENGINE OFF. BEFORE SERVICING FUEL RAIL, FUEL SYSTEM PRESSURE MUST BE RELEASED.

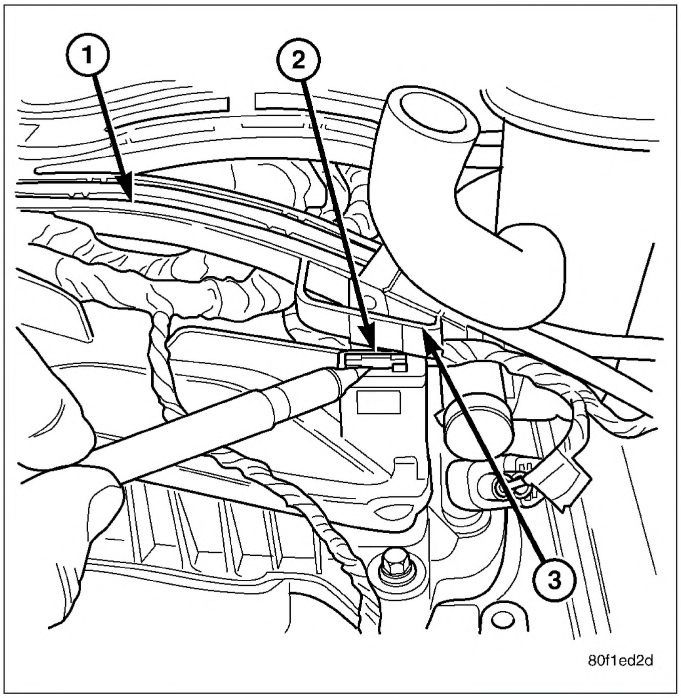
CAUTION: The left and right fuel rails are replaced as an assembly. Do not attempt to separate rail halves at connector tube. Due to design of tube, it does not use any clamps. Never attempt to install a clamping device of any kind to tube. When removing fuel rail assembly for any reason, be careful not to bend or kink tube.



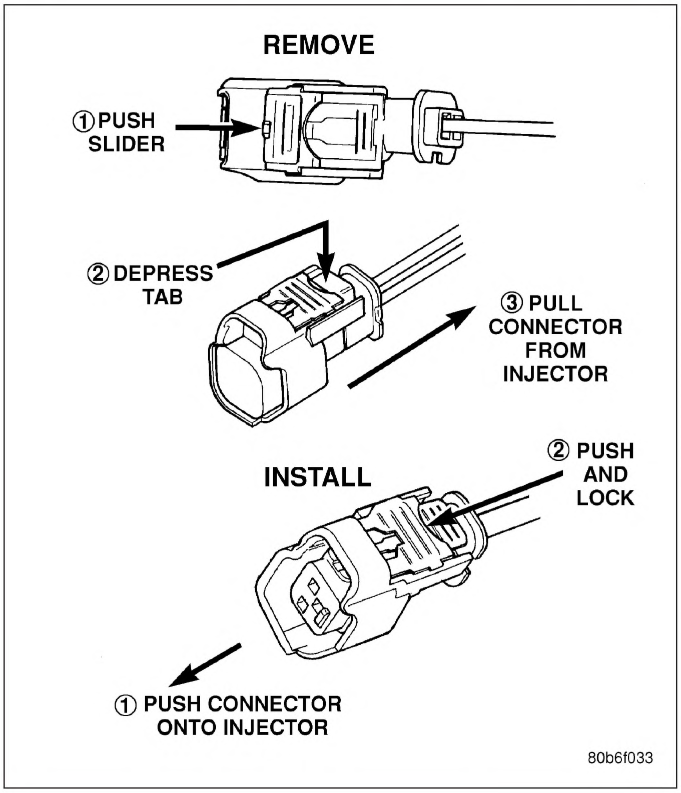
1 - #8 COIL-TO- #5 SPARK PLUG (MARKED 5/8)
2 - #5 COIL-TO- #8 SPARK PLUG (MARKED 5/8)
3 - #7 COIL-TO- #4 SPARK PLUG (MARKED 4/7)
4 - #3 COIL-TO- #2 SPARK PLUG (MARKED 2/3)
5 - #1 COIL-TO- #6 SPARK PLUG (MARKED 1/6)
6 - CLIPS (TRAY-TO-MANIFOLD RETENTION)
7 - CABLE TRAY
8 - CLIPS (SPARK PLUG CABLE-TO-TRAY- RETENTION)
9 - #2 COIL-TO- #3 SPARK PLUG (MARKED 2/3)
10 - #6 COIL-TO- #1 SPARK PLUG (MARKED 1/6)
11 - #4 COIL-TO- #7 SPARK PLUG (MARKED 4/7)

1. Remove fuel tank filler tube cap.
2. Perform Fuel System Pressure Release Procedure.
3. Remove negative battery cable at battery.
4. Remove flex tube (air cleaner housing to engine).
5. Remove air resonator box at throttle body.
6. Disconnect all spark plug cables from all spark plugs and ignition coils. Do not remove cables from cable routing tray. Note original cable positions while removing.

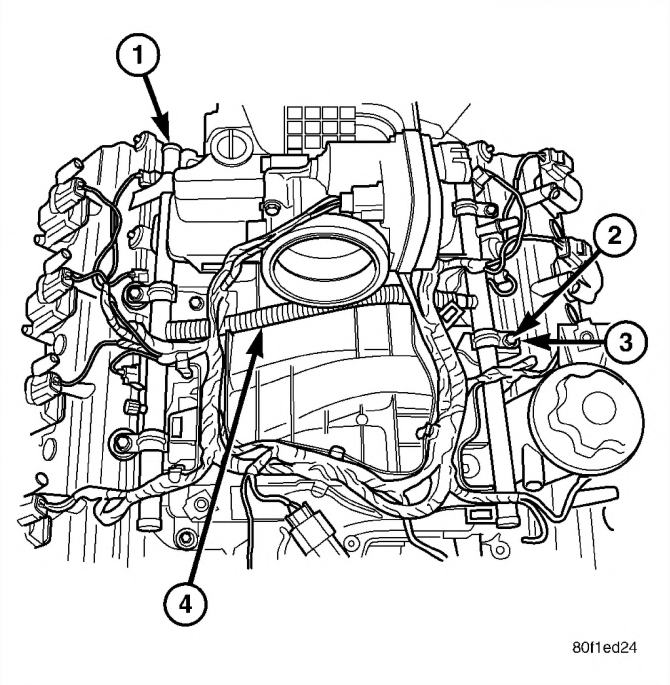
7. Remove spark plug cable tray from engine by releasing 4 retaining clips (2). Remove tray and cables from engine as an assembly.
8. Disconnect electrical connectors at all 8 ignition coils. Refer to Ignition Coil Removal/Installation.
9. Disconnect fuel line latch clip and fuel line at fuel rail. A special tool will be necessary for fuel line disconnection. Refer to Quick-Connect Fittings.


1
2
3
80f1ed2d

10. Disconnect electrical connectors at all 8 fuel injectors. Refer to graphic.. Push red colored slider away from injector (1). While pushing slider, depress tab (2) and remove connector (3) from injector. The factory fuel injection wiring harness is numerically tagged (INJ 1, INJ 2, etc.) for injector position identification. If harness is not tagged, note wiring location before removal.
11. Disconnect electrical connectors at all throttle body sensors.


REMOVE
① PUSH SLIDER
② DEPRESS TAB
③ PULL CONNECTOR FROM INJECTOR
INSTALL
② PUSH AND LOCK
① PUSH CONNECTOR ONTO INJECTOR
80b6f033

12. Remove four fuel rail mounting bolts (2) and hold-own clamps.
13. Gently rock and pull **left** side of fuel rail until fuel injectors just start to clear machined holes in intake manifold. Gently rock and pull **right** side of rail until injectors just start to clear intake manifold head holes. Repeat this procedure (left/right) until all injectors have cleared machined holes.
14. Remove fuel rail (with injectors attached) from engine.
15. If fuel injectors are to be removed, refer to Fuel Injector Removal/Installation.



INSTALLATION

3.7L V-6

1. If fuel injectors are to be installed, refer to Fuel Injector Removal/Installation.
2. Clean out fuel injector machined bores in intake manifold.
3. Apply a small amount of engine oil to each fuel injector o-ring. This will help in fuel rail installation.
4. Position fuel rail/fuel injector assembly to machined injector openings in cylinder head.
5. Guide each injector into cylinder head. Be careful not to tear injector o-rings.
6. Push **right** side of fuel rail down until fuel injectors have bottomed on cylinder head shoulder. Push **left** fuel rail down until injectors have bottomed on cylinder head shoulder.
7. Install 4 fuel rail mounting bolts and tighten. Refer to torque specifications.
8. Install 6 ignition coils. Refer to Ignition Coil Removal/Installation.
9. Connect electrical connectors to throttle body.
10. Connect electrical connectors at all fuel injectors. Refer to graphic. Push connector onto injector (1) and then push and lock red colored slider (2). Verify connector is locked to injector by lightly tugging on connector.
11. Connect necessary vacuum lines to throttle body.
12. Install air resonator mounting bracket near front of throttle body (2 bolts).
13. Connect fuel line latch clip and fuel line to fuel rail. Refer to Quick-Connect Fittings.
14. Install air box to throttle body.
15. Install air duct to air box.
16. Connect battery cable to battery.
17. Start engine and check for leaks.

4.7L V-8

1. If fuel injectors are to be installed, refer to Fuel Injector Removal/Installation.
2. Clean out fuel injector machined bores in intake manifold.
3. Apply a small amount of engine oil to each fuel injector o-ring. This will help in fuel rail installation.
4. Position fuel rail/fuel injector assembly to machined injector openings in cylinder head.
5. Guide each injector into cylinder head. Be careful not to tear injector o-rings.

6. Push **right** side of fuel rail down until fuel injectors have bottomed on cylinder head shoulder. Push **left** fuel rail down until injectors have bottomed on cylinder head shoulder.
7. Install 4 fuel rail mounting bolts and tighten. Refer to torque specifications.
8. Install 8 ignition coils. Refer to Ignition Coil Removal/Installation.
9. Connect electrical connectors to throttle body.
10. Connect electrical connectors at all fuel injectors. Refer to graphic. Push connector onto injector (1) and then push and lock red colored slider (2). Verify connector is locked to injector by lightly tugging on connector.
11. Connect necessary vacuum lines to throttle body.
12. Install air resonator mounting bracket near front of throttle body (2 bolts).
13. Connect fuel line latch clip and fuel line to fuel rail. Refer to Quick-Connect Fittings.
14. Install air box to throttle body.
15. Install air duct to air box.
16. Connect battery cable to battery.
17. Start engine and check for leaks.

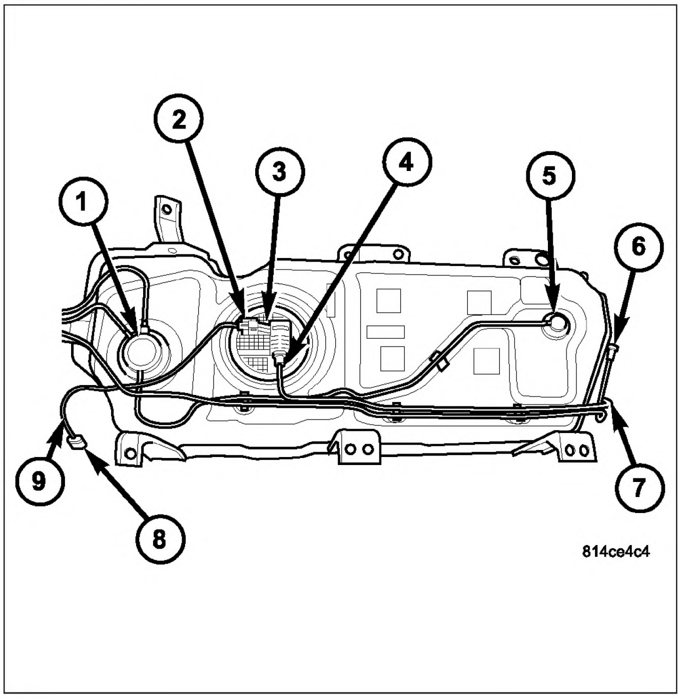
5.7L V-8

1. If fuel injectors are to be installed, refer to Fuel Injector Removal/Installation.
2. Clean out fuel injector machined bores in intake manifold.
3. Apply a small amount of engine oil to each fuel injector o-ring. This will help in fuel rail installation.
4. Position fuel rail/fuel injector assembly to machined injector openings in intake manifold.
5. Guide each injector into intake manifold. Be careful not to tear injector o-rings.
6. Push **right** side of fuel rail down until fuel injectors have bottomed on shoulders. Push **left** fuel rail down until injectors have bottomed on shoulders.
7. Install 4 fuel rail holdown clamps and 4 mounting bolts. Refer to Torque Specifications.
8. Position spark plug cable tray and cable assembly to intake manifold. Snap 4 cable tray retaining clips into intake manifold.
9. Install all cables to spark plugs and ignition coils.
10. Connect electrical connector to throttle body.
11. Install electrical connectors to all 8 ignition coils. Refer to Ignition Coil Removal/Installation.
12. Connect electrical connector to throttle body.
13. Connect electrical connectors at all fuel injectors. Refer to graphic. Push connector onto injector (1) and then push and lock red colored slider (2). Verify connector is locked to injector by lightly tugging on connector.
14. Connect fuel line latch clip and fuel line to fuel rail. Refer to Quick-Connect Fittings.
15. Install air resonator to throttle body (2 bolts).
16. Install flexible air duct to air box.
17. Connect battery cable to battery.
18. Start engine and check for leaks.

TANK-FUEL

DESCRIPTION

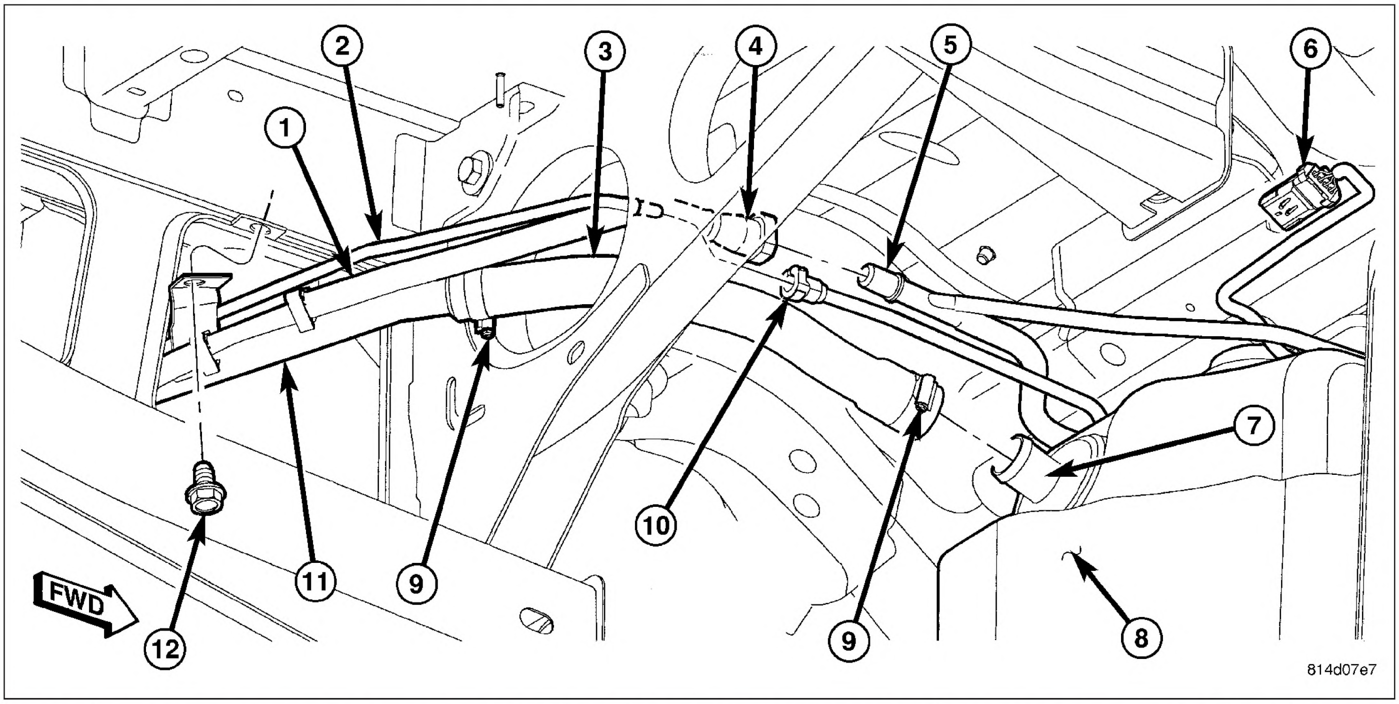
The fuel tank is constructed of a plastic material. Its main functions are for fuel storage and for placement of the fuel pump module (3), and (if equipped) certain EVAP and ORVR components (1) and (5).



REMOVAL

Fuel Tank Draining

WARNING: THE FUEL SYSTEM MAY BE UNDER CONSTANT FUEL PRESSURE EVEN WITH THE ENGINE OFF. THIS PRESSURE MUST BE RELEASED BEFORE SERVICING FUEL TANK.



Two different procedures may be used to drain fuel tank: through the fuel fill fitting on tank, or using a diagnostic scan tool.

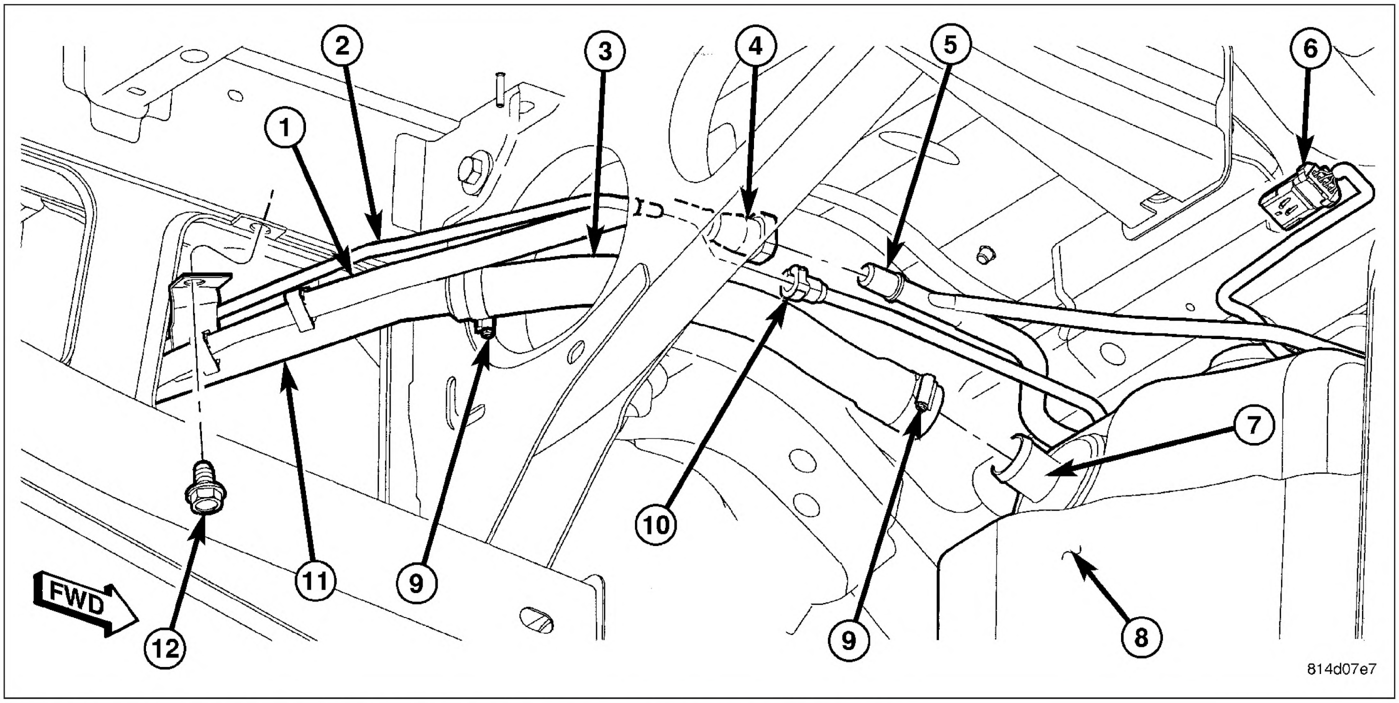
The quickest draining procedure involves removing the rubber fuel fill hose (3) from fuel tank fitting (7).

As an alternative procedure, the electric fuel pump may be activated allowing tank to be drained at fuel rail connection. Refer to scan tool for fuel pump activation procedures. Before disconnecting fuel line at fuel rail, release fuel pressure. Refer to the Fuel System Pressure Release Procedure for procedures. Attach end of special test hose tool number 6541, 6539, 6631 or 6923 at fuel rail disconnection (tool number will depend on model and/or engine application). Position opposite end of this hose tool to an approved gasoline draining station. Activate fuel pump and drain tank until empty.

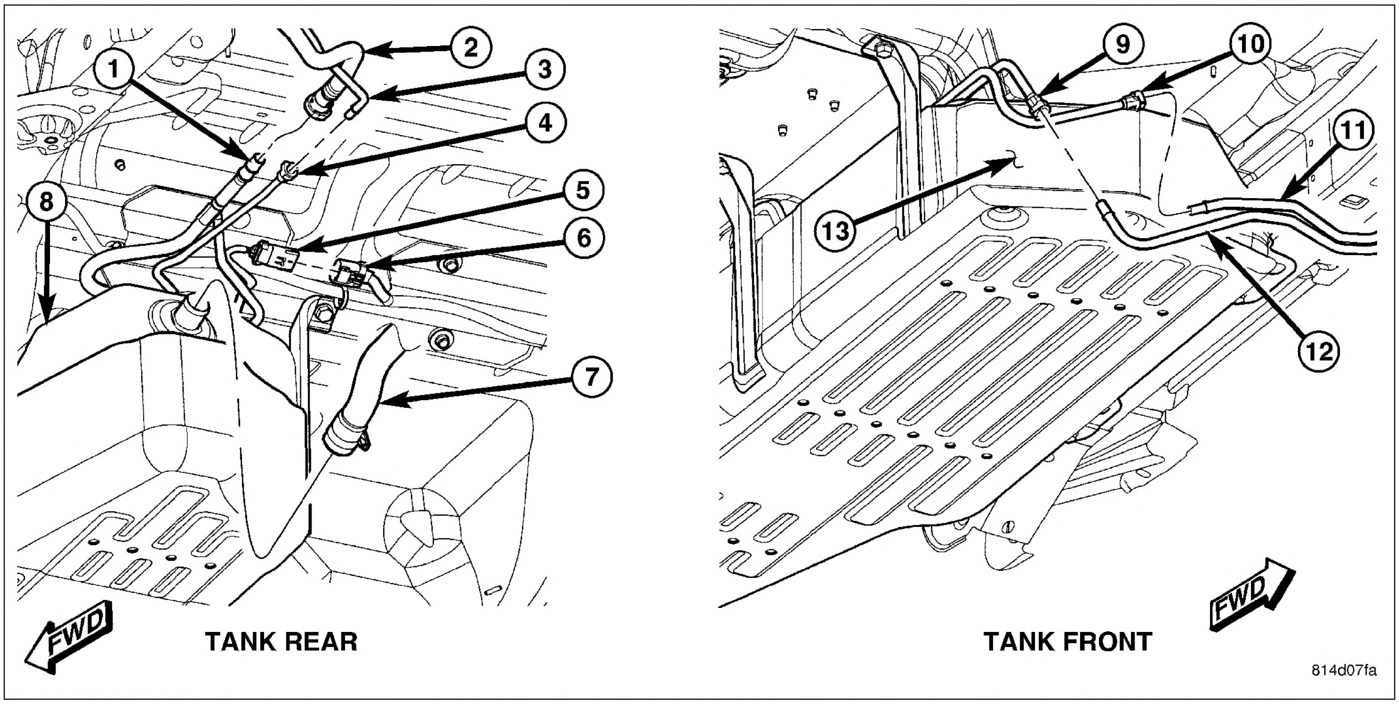
If electric fuel pump is not operating, fuel must be drained through fuel fill fitting at tank. Refer to following procedures.

1. Release fuel system pressure.
2. Raise vehicle.
3. Thoroughly clean area around fuel fill fitting (7) and rubber fuel fill hose (3) at rear of fuel tank (8).
4. Loosen clamp (9) at tank fitting (7) and disconnect rubber fuel fill hose at fuel tank fitting. Using an approved gas holding tank, drain fuel tank through this fitting.

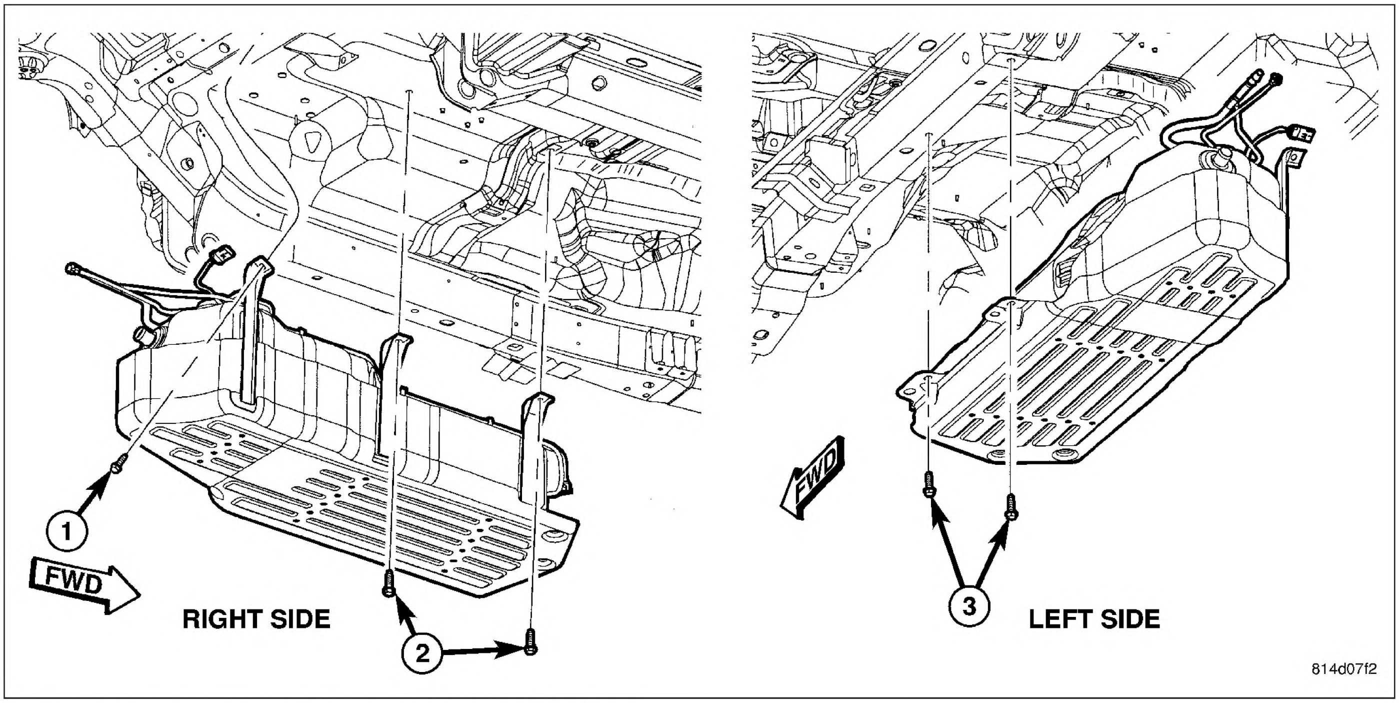
Tank Removal



1. Loosen clamp (9) and disconnect rubber fill hose (3) at tank fitting (7).

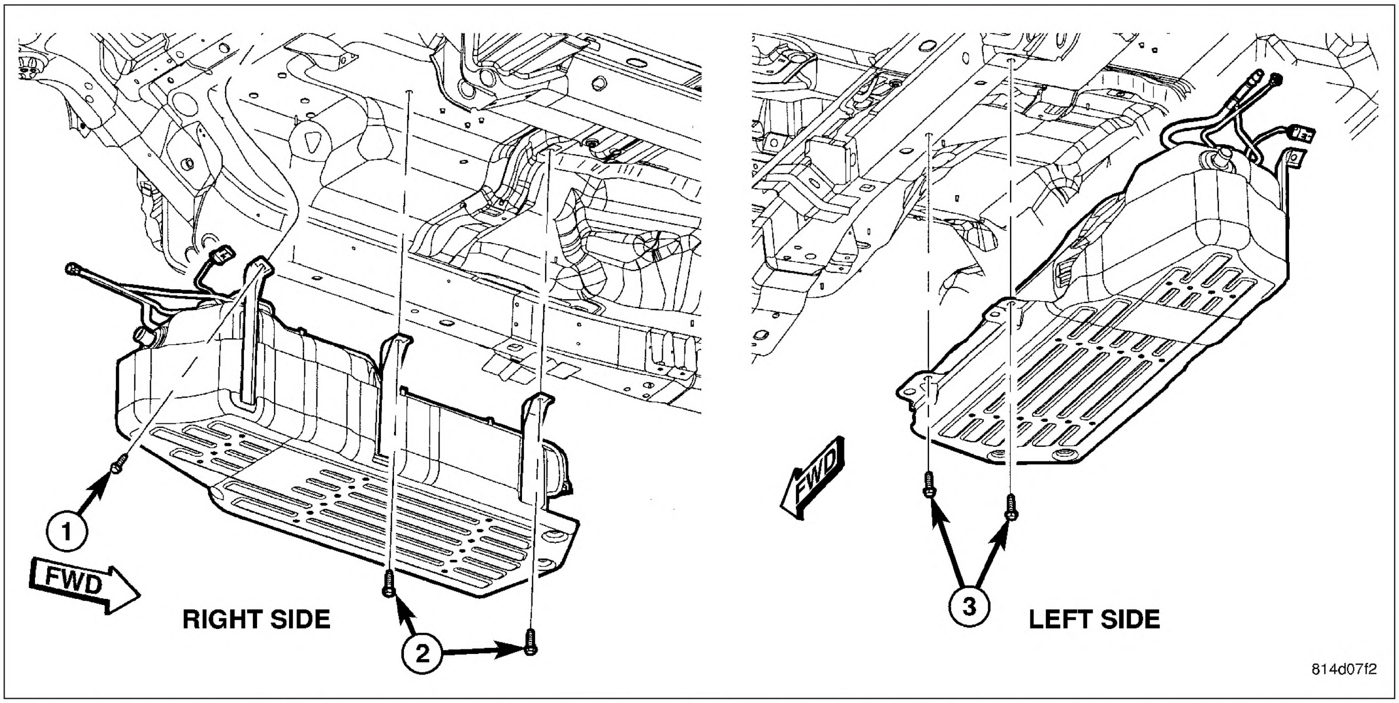

1
2
3
4
5
6
7
8
FWD
TANK REAR
9
10
11
12
13
TANK FRONT
FWD
814d07fa

2. At rear of tank, disconnect fuel pump module electrical jumper connector (5) from body connector (6).
3. At rear of tank, disconnect EVAP lines (2) and (3) from lines (1) and (4).
4. At front of tank, disconnect fuel and EVAP lines (9) and (10) from lines (11) and (12).
5. Support tank with a hydraulic jack.

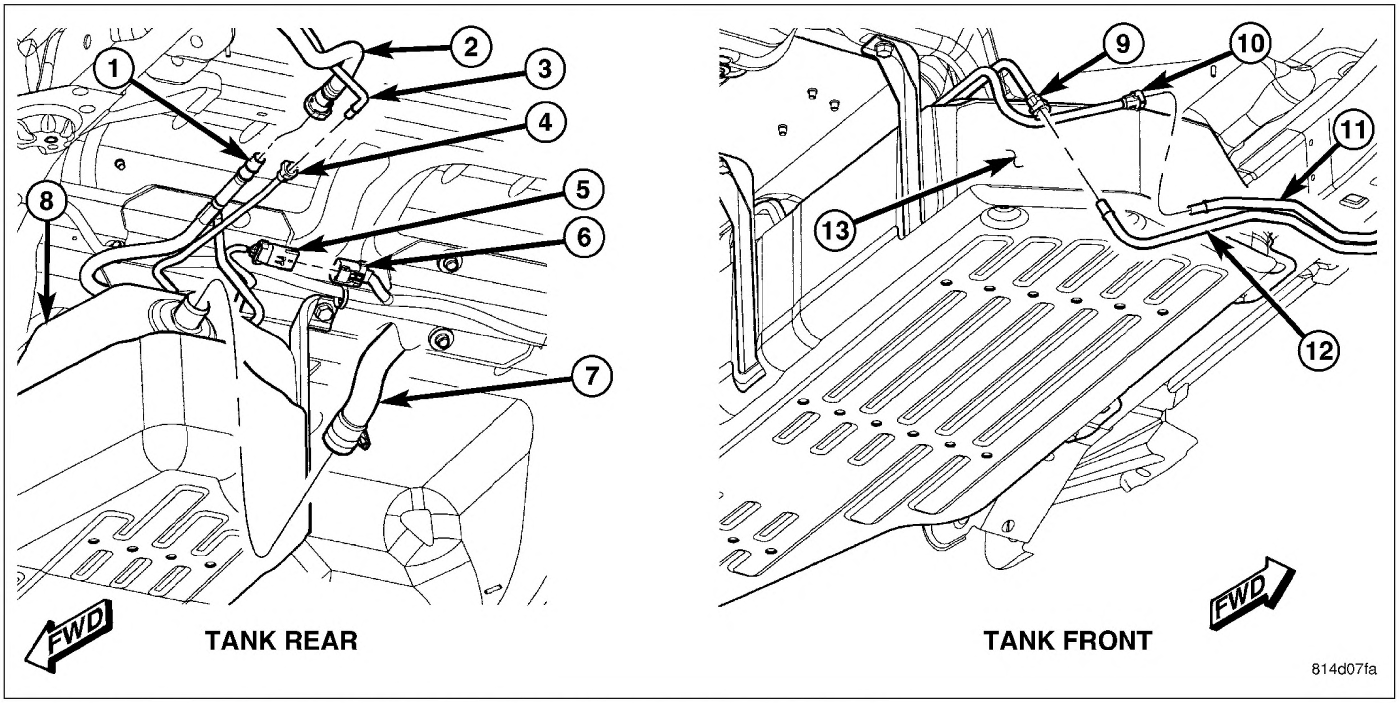

1
FWD
RIGHT SIDE
2
FWD
3
LEFT SIDE
814d07f2

6. Remove bolts (1) and (2) at right side of fuel tank.
7. Remove bolts (3) at left side of fuel tank.
8. Lower tank for removal.
9. If fuel tank is to be replaced, remove fuel pump module from tank. Refer to Fuel Pump Module Removal/Installation procedures.

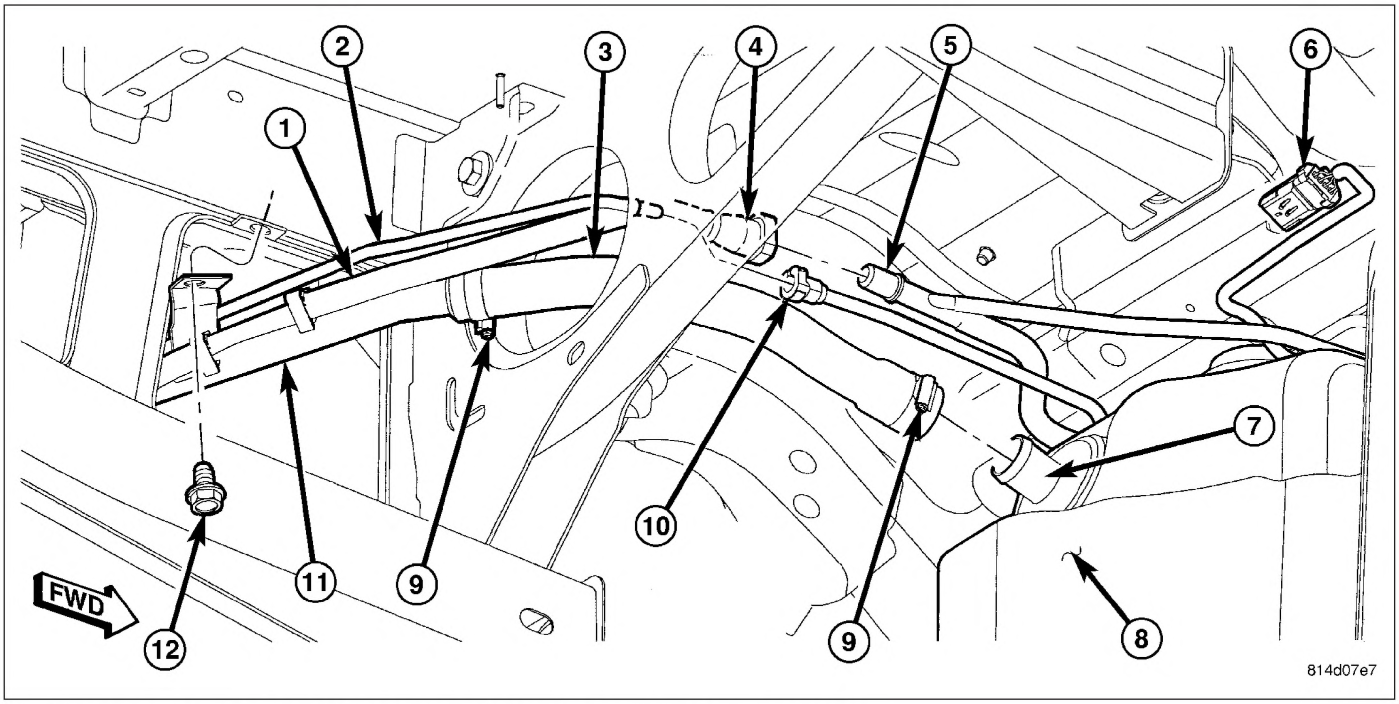
INSTALLATION


1
FWD
RIGHT SIDE
2
FWD
3
LEFT SIDE
814d07f2

1. If fuel tank is to be replaced, install fuel pump module into tank. Refer to Fuel Pump Module Removal/Installation procedures.
2. Position fuel tank to hydraulic jack.
3. Raise tank until positioned to body.
4. Install and tighten bolts (1) (2) and (3). Refer to Torque Specifications.
5. Remove hydraulic jack.


1
2
3
4
5
6
7
8
FWD
TANK REAR
9
10
11
13
12
FWD
TANK FRONT
814d07fa

6. Connect EVAP, ORVR, fuel and NVLD lines at front and rear of tank.
7. Connect fuel pump module electrical jumper connector (5) to body connector (6).



8. Connect rubber fill hose (3) to tank fitting (7) and tighten clamp (9).
9. Lower vehicle.
10. Fill fuel tank with fuel.
11. Start engine and check for fuel leaks near top of module.

FILTER-INLET

DESCRIPTION

Refer to Fuel Pump Module for information.

REGULATOR-FUEL PRESSURE

DESCRIPTION

Refer to Fuel Pump Module for information.

FILTER-FUEL

DESCRIPTION

A separate fuel filter is not used. The fuel filter is built into the fuel pump module.

Refer to Fuel Pump Module for information.

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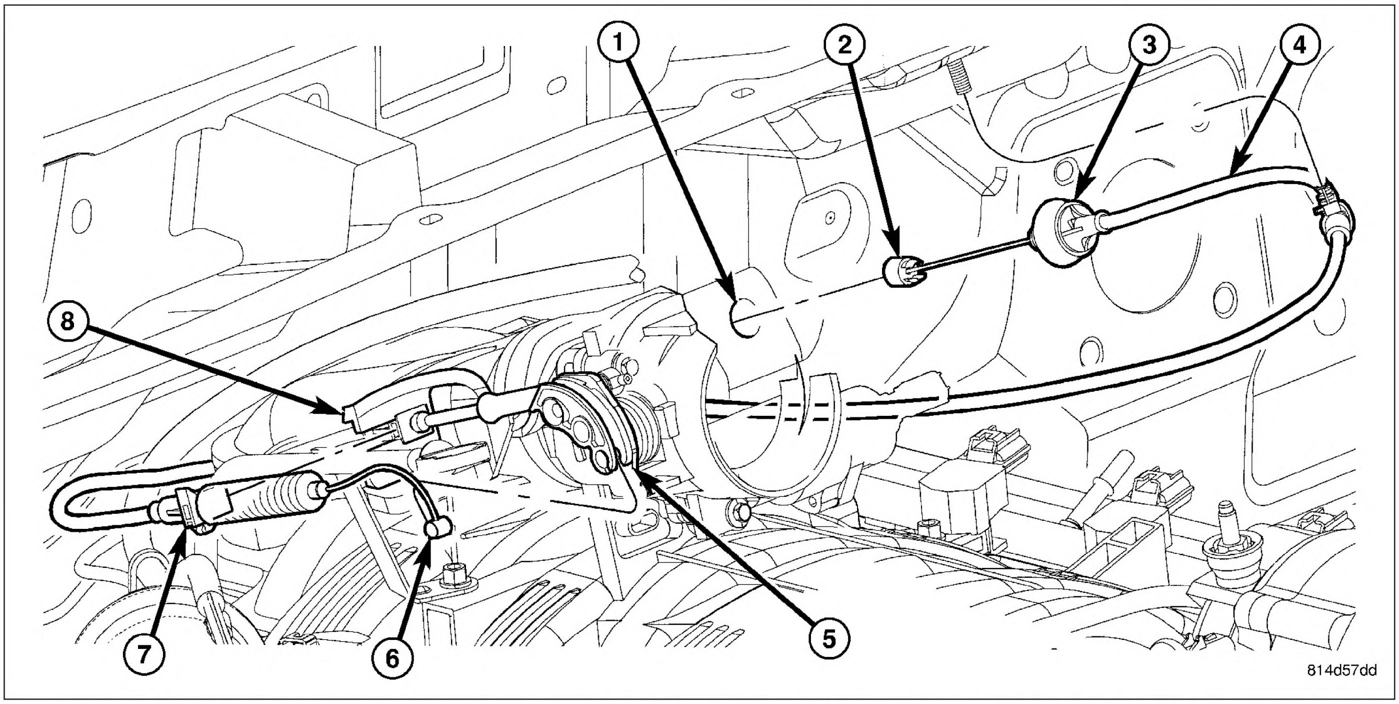
PEDAL-ACCELERATOR

REMOVAL

Without APPS (Accelerator Pedal Position Sensor)

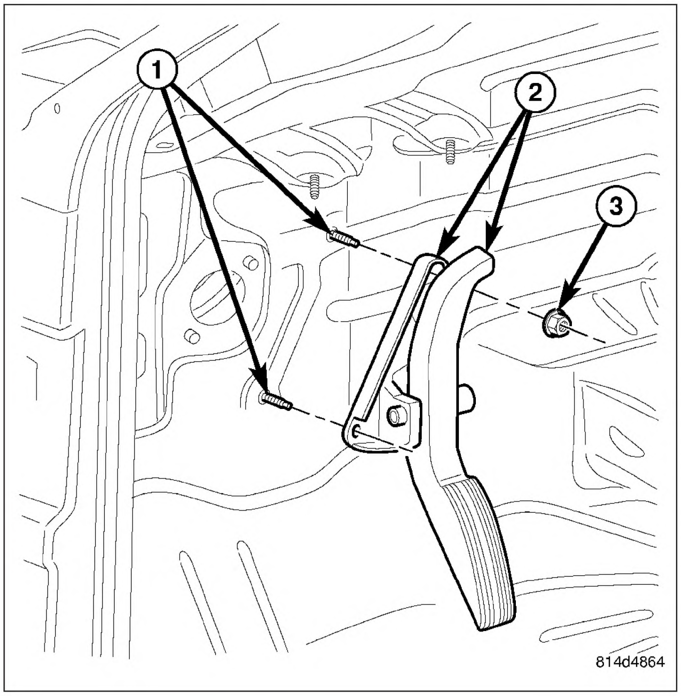
The following procedure applies only to vehicles without the Adjustable Pedal Package (code XAP). It also applies to vehicles **not equipped** with an accelerator pedal position sensor.

The accelerator pedal is serviced as a complete assembly including the bracket.



1. From inside the vehicle, hold up accelerator pedal. Remove plastic cable retainer (clip) (2) and throttle cable core wire from upper end of accelerator pedal arm. Plastic cable retainer (clip) (2) snaps into top of pedal arm.

2. Remove two accelerator pedal mounting bracket nuts (3). Remove accelerator pedal assembly (2).

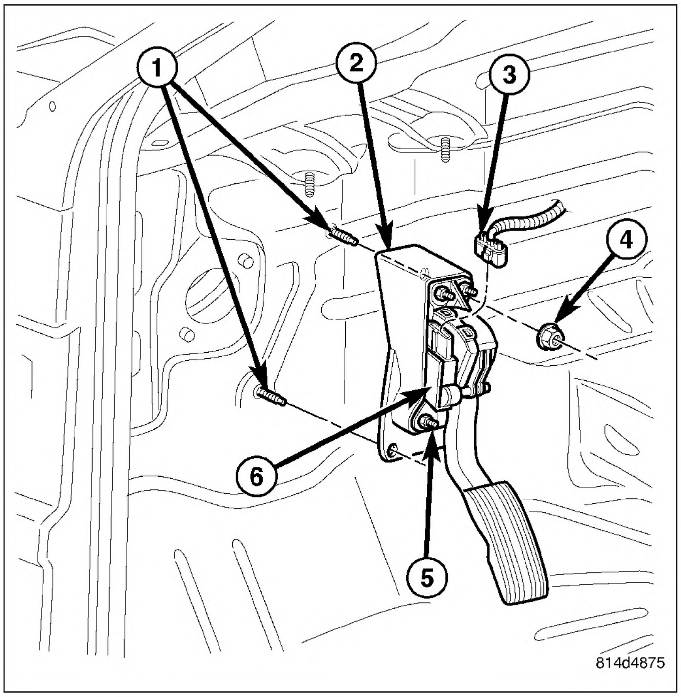


With APPS (Accelerator Pedal Position Sensor)

The following procedure applies only to vehicles without the Adjustable Pedal Package (code XAP). It also applies to vehicles **equipped** with an accelerator pedal position sensor (6).

The accelerator pedal is serviced as a complete assembly including the bracket.

1. Disconnect electrical connector (3) at APPS (6).
2. Remove two accelerator pedal mounting bracket nuts (4). Remove accelerator pedal assembly.
3. Remove three sensor-to-pedal nuts (5). Remove APPS from accelerator pedal assembly.



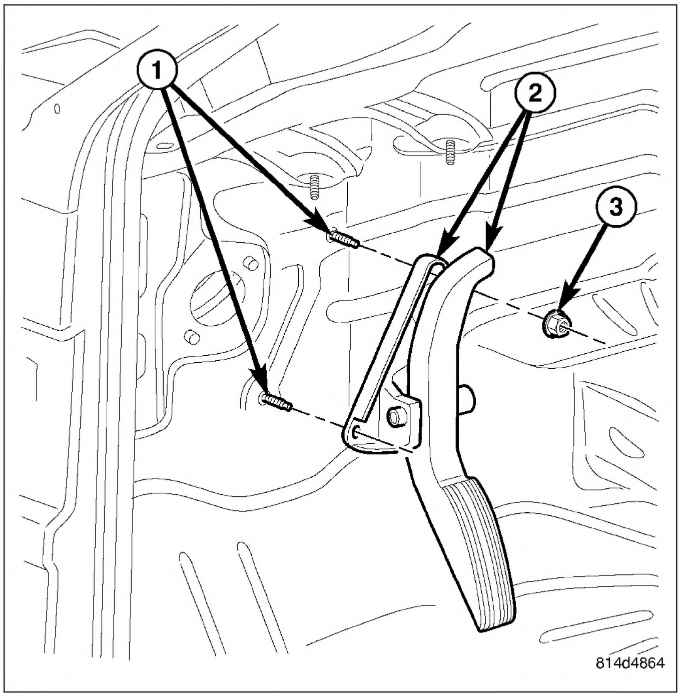
INSTALLATION

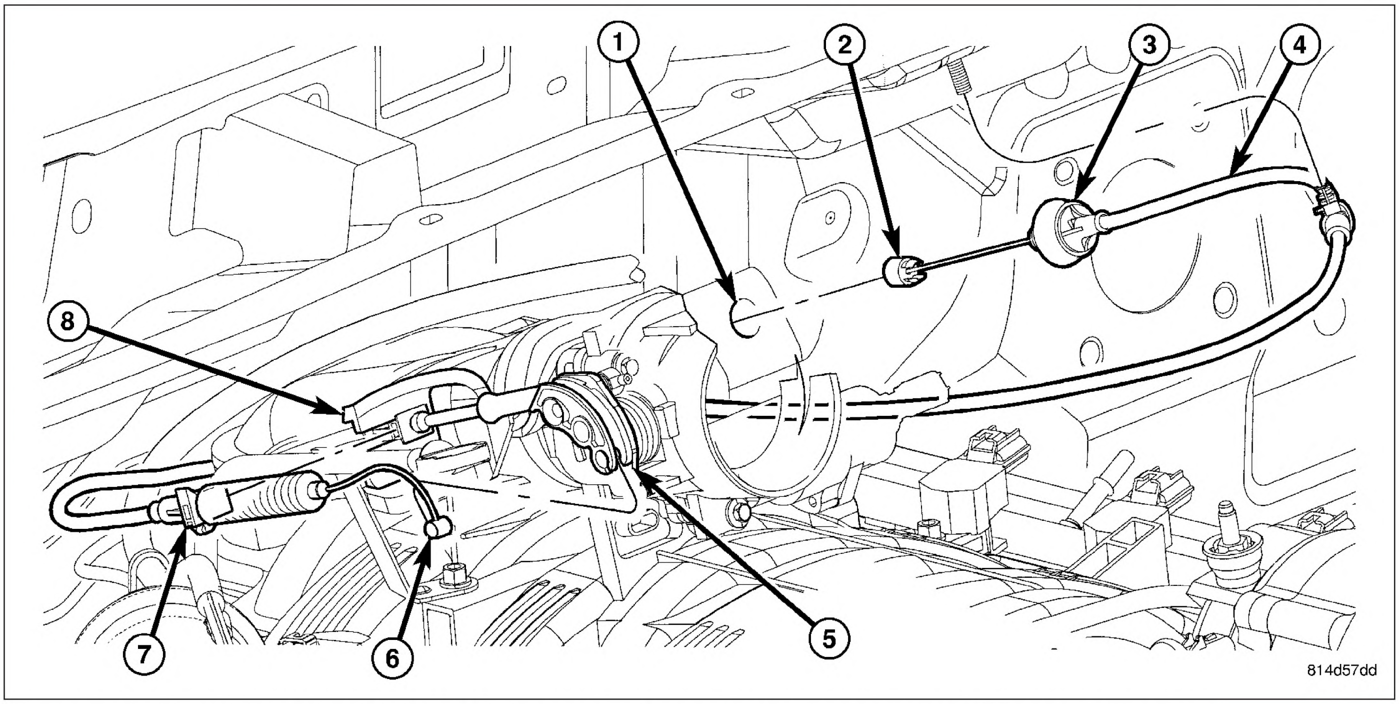
Without APPS (Accelerator Pedal Position Sensor)

The following procedure applies only to vehicles without the Adjustable Pedal Package (code XAP). It also applies to vehicles **not equipped** with an accelerator pedal position sensor.

The accelerator pedal is serviced as a complete assembly including the bracket.

1. Place accelerator pedal assembly (2) over two mounting studs (1).
2. Install and tighten two mounting nuts (3). Refer to Torque Specifications.
3. Slide throttle cable into opening slot in top of pedal arm.





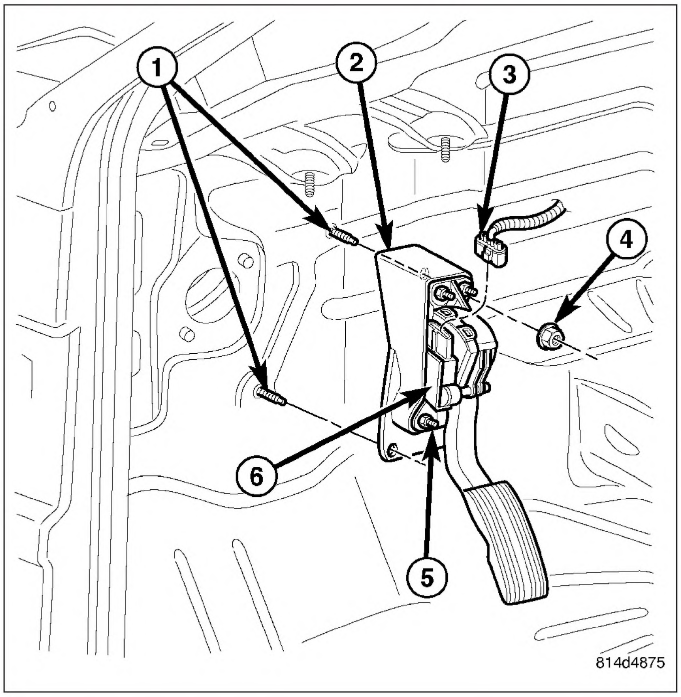
4. Push plastic cable retainer (clip) (2) into accelerator pedal arm opening until it snaps into place.
5. Before starting engine, operate accelerator pedal to check for any binding.

With APPS (Accelerator Pedal Position Sensor)

The following procedure applies only to vehicles without the Adjustable Pedal Package (code XAP). It also applies to vehicles **equipped** with an accelerator pedal position sensor.

The accelerator pedal is serviced as a complete assembly including the bracket.

1. Install APPS to pedal assembly and install three nuts (5).
2. Place accelerator pedal assembly over two mounting studs (1).
3. Install and tighten two mounting nuts (4). Refer to Torque Specifications.
4. Install electrical connector (3) to APPS (6).
5. Use a scan tool may to learn electrical parameters. Go to the Miscellaneous menu, and then select ETC Learn.
6. If the previous step is not performed, a Diagnostic Trouble Code (DTC) will be set.
7. If necessary, also use a scan tool to erase any Diagnostic Trouble Codes (DTC's) from PCM.
8. Before starting engine, operate accelerator pedal to check for any binding.

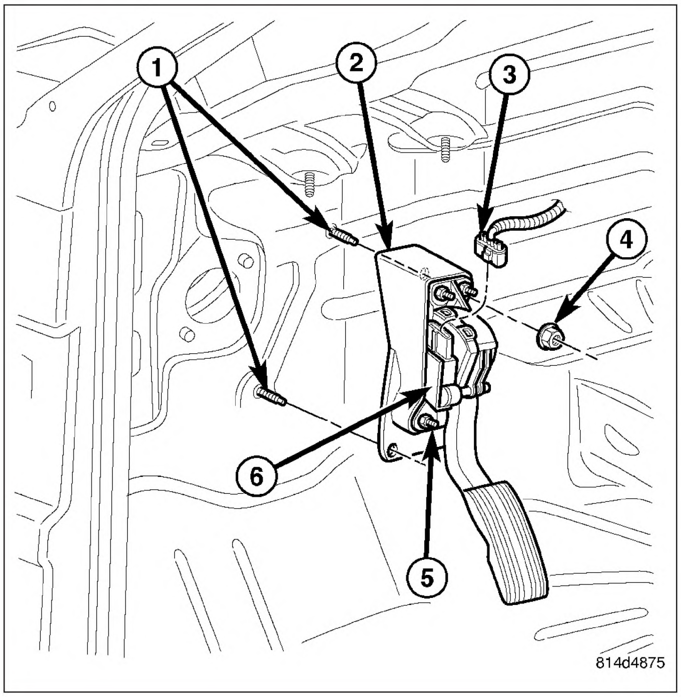


SENSOR-ACCELERATOR PEDAL POSITION

DESCRIPTION

The Accelerator Pedal Position Sensor (APPS) (6) is attached to the accelerator pedal assembly under the instrument panel.

The APPS is used only with the 5.7L V-8 engine. The 5.7L engine does not use a mechanical throttle cable.



OPERATION

The Accelerator Pedal Position Sensor (APPS) is a linear potentiometer. It provides the Powertrain Control Module (PCM) with a DC voltage signal proportional to the angle, or position of the accelerator pedal. The APPS signal is translated (along with other sensors) to place the throttle plate (within the throttle body) to a pre-determined position.

REMOVAL

Refer to Accelerator Pedal for Removal and Installation procedures.

INSTALLATION

Refer to Accelerator Pedal for Removal and Installation procedures.

SENSOR-CRANKSHAFT POSITION

DESCRIPTION

3.7L V-6

The Crankshaft Position (CKP) sensor is mounted into the right rear side of the cylinder block. It is positioned and bolted into a machined hole.

4.7L V-8

The Crankshaft Position (CKP) sensor is mounted into the right rear side of the cylinder block. It is positioned and bolted into a machined hole.

5.7L V-8

The Crankshaft Position (CKP) sensor is mounted into the right rear side of the cylinder block. It is positioned and bolted into a machined hole.

OPERATION

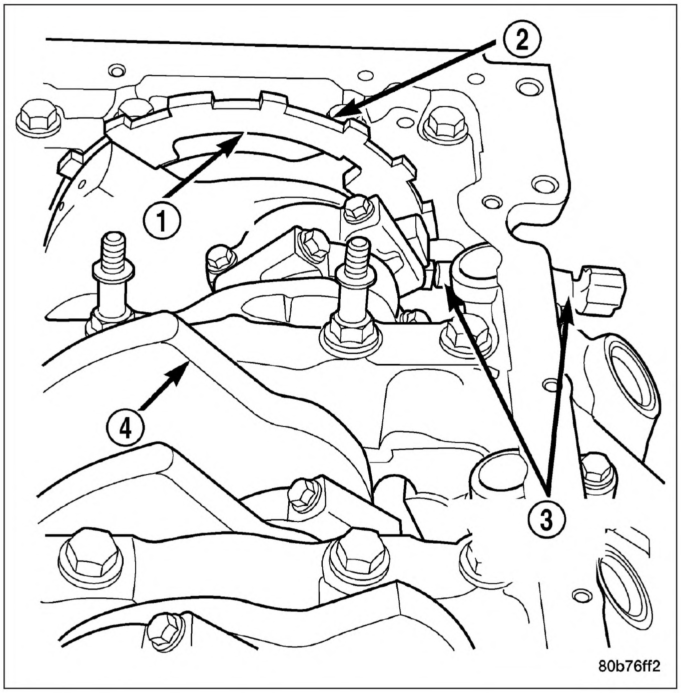
3.7L V-6

Engine speed and crankshaft position are provided through the CKP (Crankshaft Position) sensor. The sensor generates pulses that are the input sent to the Powertrain Control Module (PCM). The PCM interprets the sensor input to determine the crankshaft position. The PCM then uses this position, along with other inputs, to determine injector sequence and ignition timing.

The sensor (3) is a hall effect device combined with an internal magnet. It is also sensitive to steel within a certain distance from it.

A tonewheel (targetwheel) is bolted to the engine crankshaft (1). This tonewheel has sets of notches (2) at its outer edge.

The notches cause a pulse to be generated when they pass under the sensor. The pulses are the input to the PCM.



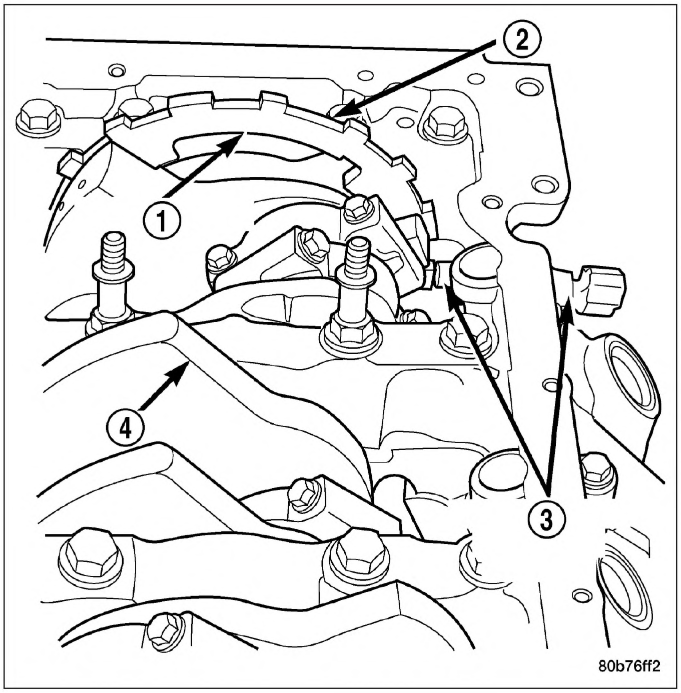
4.7L V-8

Engine speed and crankshaft position are provided through the crankshaft position sensor. The sensor generates pulses that are the input sent to the powertrain control module (PCM). The PCM interprets the sensor input to determine the crankshaft position. The PCM then uses this position, along with other inputs, to determine injector sequence and ignition timing.

The sensor (3) is a hall effect device combined with an internal magnet. It is also sensitive to steel within a certain distance from it.

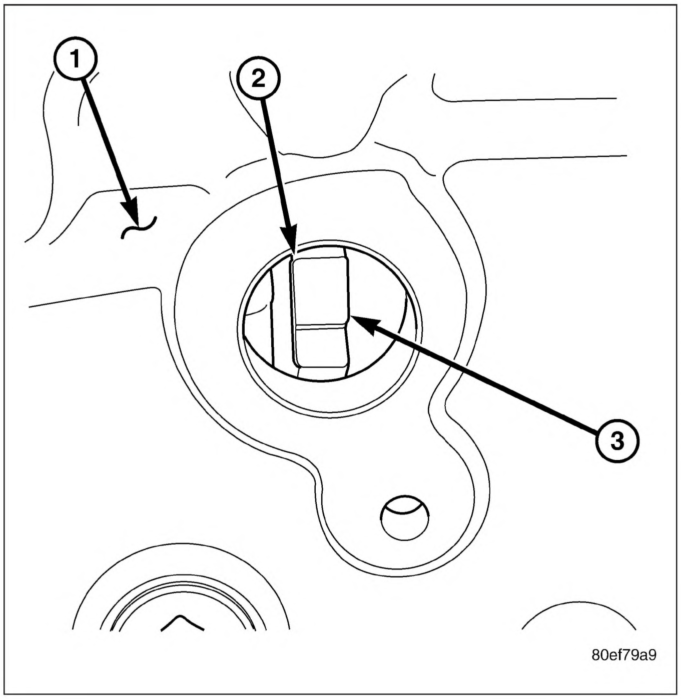
On the 4.7L V–8 engine, a tonewheel (1) is bolted to the engine crankshaft. This tonewheel has sets of notches (2) at its outer edge.

The notches cause a pulse to be generated when they pass under the sensor. The pulses are the input to the PCM.



5.7L V-8

Engine speed and crankshaft position are provided through the crankshaft position sensor. The sensor generates pulses that are the input sent to the powertrain control module (PCM). The PCM interprets the sensor input to determine the crankshaft position. The PCM then uses this position, along with other inputs, to determine injector sequence and ignition timing.



The sensor is a hall effect device combined with an internal magnet. It is also sensitive to steel within a certain distance from it.

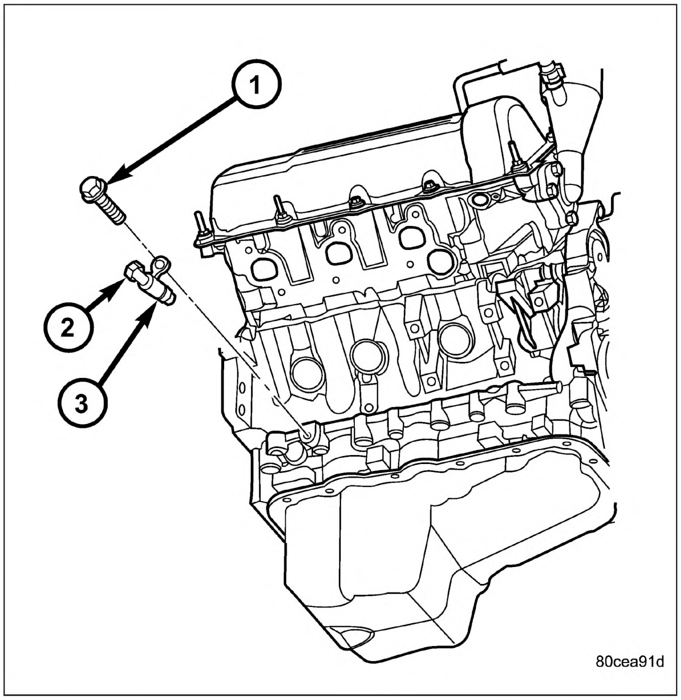
On the 5.7L V–8 engine, a tonewheel is bolted to the engine crankshaft. This tonewheel has sets of notches (3) at its outer edge.

The notches cause a pulse to be generated when they pass under the sensor. The pulses are the input to the PCM.

REMOVAL

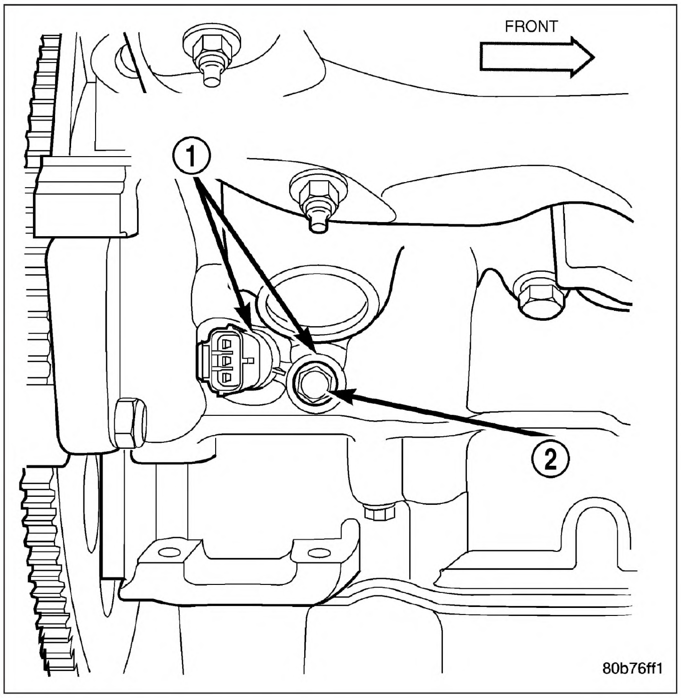
3.7L V-6

The Crankshaft Position (CKP) sensor (2) is mounted into the right rear side of the cylinder block. It is positioned and bolted into a machined hole.



1. Raise vehicle.
2. Disconnect sensor electrical connector.
3. Remove sensor mounting bolt (1).
4. Carefully twist sensor from cylinder block.
5. Check condition of sensor o-ring (3).

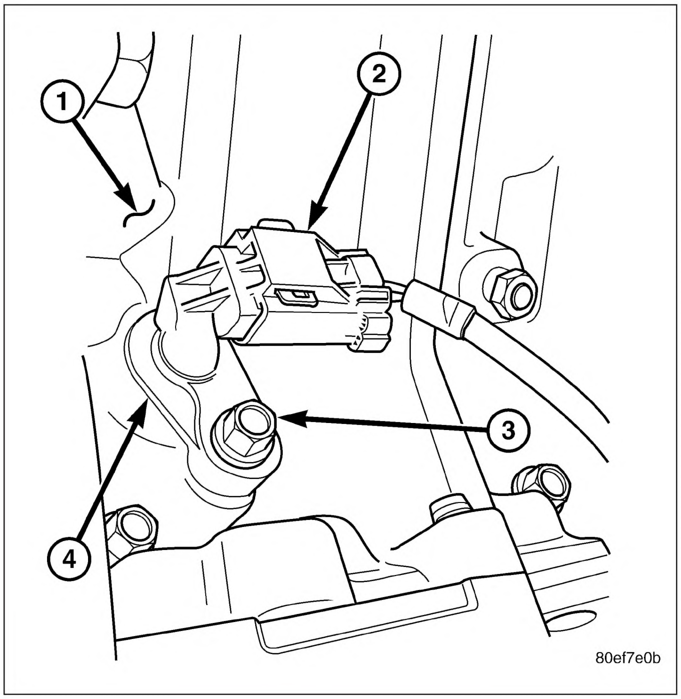
4.7L V-8



The Crankshaft Position (CKP) sensor (1) is located at the right-rear side of the engine cylinder block. It is positioned and bolted into a machined hole in the engine block.

1. Raise vehicle.
2. Disconnect CKP electrical connector at sensor.
3. Remove CKP mounting bolt (2).
4. Carefully twist sensor from cylinder block.
5. Remove sensor from vehicle.
6. Check condition of sensor o-ring.

5.7L V-8



The Crankshaft Position (CKP) sensor (4) is located at the right-rear side of the engine cylinder block (1). It is positioned and bolted into a machined hole in the engine block.

1. Raise vehicle.
2. Disconnect CKP electrical connector (2) at sensor.
3. Remove CKP mounting bolt (3).
4. Carefully twist sensor from cylinder block.
5. Remove sensor from vehicle.
6. Check condition of sensor o-ring.

INSTALLATION

3.7L V-6

1. Clean out machined hole in engine block.
2. Apply a small amount of engine oil to sensor o-ring.
3. Install sensor into engine block with a slight rocking and twisting action.

CAUTION: Before tightening sensor mounting bolt, be sure sensor is completely flush to cylinder block. If sensor is not flush, damage to sensor mounting tang may result.

4. Install mounting bolt and tighten to 28 N·m (21 ft. lbs.) torque.
5. Connect electrical connector to sensor.
6. Lower vehicle.

4.7L V-8

1. Clean out machined hole in engine block.
2. Apply a small amount of engine oil to sensor o-ring.
3. Install sensor into engine block with a slight rocking and twisting action.

CAUTION: Before tightening sensor mounting bolt, be sure sensor is completely flush to cylinder block. If sensor is not flush, damage to sensor mounting tang may result.

4. Install mounting bolt and tighten to 28 N·m (21 ft. lbs.) torque.
5. Connect electrical connector to sensor.
6. Lower vehicle.

5.7L V-8

1. Clean out machined hole in engine block.
2. Apply a small amount of engine oil to sensor o-ring.
3. Install sensor into engine block with a slight rocking and twisting action.

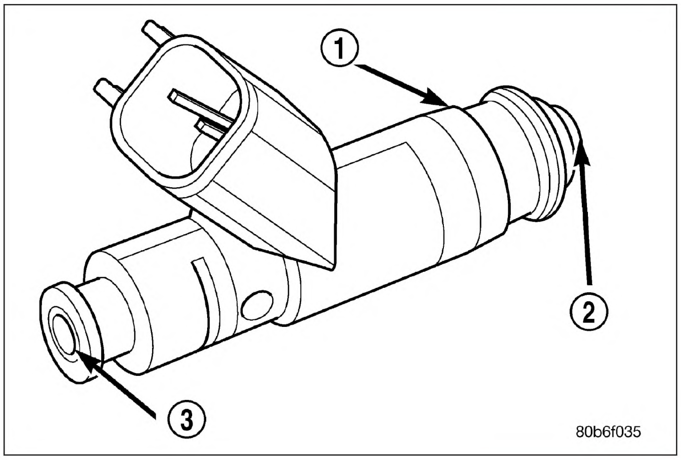
CAUTION: Before tightening sensor mounting bolt, be sure sensor is completely flush to cylinder block. If sensor is not flush, damage to sensor mounting tang may result.

4. Install mounting bolt and tighten to 28 N·m (21 ft. lbs.) torque.
5. Connect electrical connector to sensor.
6. Lower vehicle.

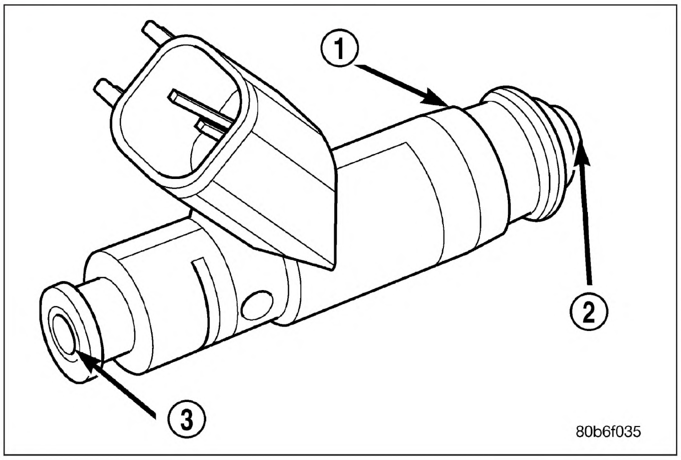
INJECTOR-FUEL

DESCRIPTION

An individual fuel injector (1) is used for each individual cylinder.



OPERATION - FUEL INJECTOR



The top (fuel entry) end of the injector (3) is attached into an opening on the fuel rail.

The fuel injectors are electrical solenoids. The injector contains a pintle that closes off an orifice at the nozzle end. When electric current is supplied to the injector, the armature and needle move a short distance against a spring, allowing fuel to flow out the orifice. Because the fuel is under high pressure, a fine spray is developed in the shape of a pencil stream. The spraying action atomizes the fuel, adding it to the air entering the combustion chamber.

The nozzle (outlet) ends of the injectors (2) are positioned into openings in the intake manifold just above the intake valve ports of the cylinder head. The engine wiring harness connector for each fuel injector is equipped with an attached numerical tag (INJ 1, INJ 2 etc.). This is used to identify each fuel injector.

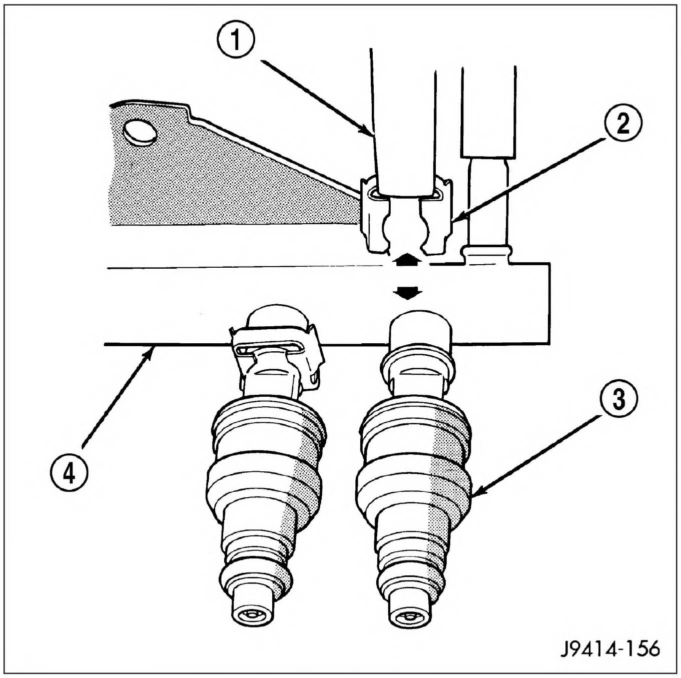
The injectors are energized individually in a sequential order by the Powertrain Control Module (PCM). The PCM will adjust injector pulse width by switching the ground path to each individual injector on and off. Injector pulse width is the period of time that the injector is energized. The PCM will adjust injector pulse width based on various inputs it receives.

Battery voltage is supplied to the injectors through the ASD relay.

The PCM determines injector pulse width based on various inputs.

REMOVAL

1. Remove fuel rail. Refer to Fuel Injector Rail Removal.
2. Disconnect clip(s) that retain fuel injector(s) to fuel rail (2).



INSTALLATION

1. Install fuel injector(s) into fuel rail assembly and install retaining clip(s).
2. If same injector(s) is being reinstalled, install new o-ring(s).
3. Apply a small amount of clean engine oil to each injector o-ring. This will aid in installation.
4. Install fuel rail. Refer to Fuel Rail Installation.
5. Start engine and check for fuel leaks.

RELAY-FUEL PUMP

DESCRIPTION

The 5–pin, 12–volt, fuel pump relay is located in the Power Distribution Center (PDC). Refer to the label on the PDC cover for relay location.

OPERATION

The Powertrain Control Module (PCM) energizes the electric fuel pump through the fuel pump relay. The fuel pump relay is energized by first applying battery voltage to it when the ignition key is turned ON, and then applying a ground signal to the relay from the PCM.

Whenever the ignition key is turned ON, the electric fuel pump will operate. But, the PCM will shut-down the ground circuit to the fuel pump relay in approximately 1–3 seconds unless the engine is operating or the starter motor is engaged.

REMOVAL

The fuel pump relay is located in the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

1. Remove PDC cover.
2. Remove relay from PDC.
3. Check condition of relay terminals and PDC connector terminals for damage or corrosion. Repair if necessary before installing relay.
4. Check for pin height (pin height should be the same for all terminals within the PDC connector). Repair if necessary before installing relay.

INSTALLATION

The fuel pump relay is located in the Power Distribution Center (PDC). Refer to label on PDC cover for relay location.

1. Install relay to PDC.
2. Install cover to PDC.

MOTOR-IDLE AIR CONTROL

DESCRIPTION

A separate IAC motor is not used with the 5.7L V-8 engine.

The IAC stepper motor is mounted to the throttle body, and regulates the amount of air bypassing the control of the throttle plate. As engine loads and ambient temperatures change, engine rpm changes. A pintle on the IAC stepper motor protrudes into a passage in the throttle body, controlling air flow through the passage. The IAC is controlled by the Powertrain Control Module (PCM) to maintain the target engine idle speed.

OPERATION

A separate IAC motor is not used with the 5.7L V-8 engine.

At idle, engine speed can be increased by retracting the IAC motor pintle and allowing more air to pass through the port, or it can be decreased by restricting the passage with the pintle and diminishing the amount of air bypassing the throttle plate.

The IAC is called a stepper motor because it is moved (rotated) in steps, or increments. Opening the IAC opens an air passage around the throttle blade which increases RPM.

The PCM uses the IAC motor to control idle speed (along with timing) and to reach a desired MAP during decel (keep engine from stalling).

The IAC motor has 4 wires with 4 circuits. Two of the wires are for 12 volts and ground to supply electrical current to the motor windings to operate the stepper motor in one direction. The other 2 wires are also for 12 volts and ground to supply electrical current to operate the stepper motor in the opposite direction.

To make the IAC go in the opposite direction, the PCM just reverses polarity on both windings. If only 1 wire is open, the IAC can only be moved 1 step (increment) in either direction. To keep the IAC motor in position when no movement is needed, the PCM will energize both windings at the same time. This locks the IAC motor in place.

In the IAC motor system, the PCM will count every step that the motor is moved. This allows the PCM to determine the motor pintle position. If the memory is cleared, the PCM no longer knows the position of the pintle. So at the first key ON, the PCM drives the IAC motor closed, regardless of where it was before. This zeros the counter. From this point the PCM will back out the IAC motor and keep track of its position again.

When engine rpm is above idle speed, the IAC is used for the following:

- Off-idle dashpot (throttle blade will close quickly but idle speed will not stop quickly)
- Deceleration air flow control
- A/C compressor load control (also opens the passage slightly before the compressor is engaged so that the engine rpm does not dip down when the compressor engages)
- Power steering load control

The PCM can control polarity of the circuit to control direction of the stepper motor.

IAC Stepper Motor Program: The PCM is also equipped with a memory program that records the number of steps the IAC stepper motor most recently advanced to during a certain set of parameters. For example: The PCM was attempting to maintain a 1000 rpm target during a cold start-up cycle. The last recorded number of steps for that may have been 125. That value would be recorded in the memory cell so that the next time the PCM recognizes the identical conditions, the PCM recalls that 125 steps were required to maintain the target. This program allows for greater customer satisfaction due to greater control of engine idle.

Another function of the memory program, which occurs when the power steering switch (if equipped), or the A/C request circuit, requires that the IAC stepper motor control engine rpm, is the recording of the last targeted steps into the memory cell. The PCM can anticipate A/C compressor loads. This is accomplished by delaying compressor operation for approximately 0.5 seconds until the PCM moves the IAC stepper motor to the recorded steps that were loaded into the memory cell. Using this program helps eliminate idle-quality changes as loads change. Finally, the PCM incorporates a ″No-Load″ engine speed limiter of approximately 1800 - 2000 rpm, when it recognizes that the TPS is indicating an idle signal and IAC motor cannot maintain engine idle.

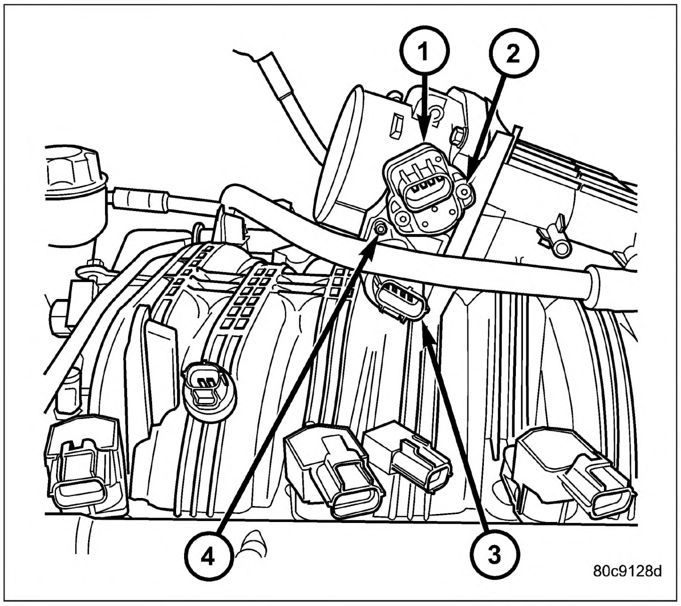
A (factory adjusted) set screw is used to mechanically limit the position of the throttle body throttle plate. **Never attempt to adjust the engine idle speed using this screw.** All idle speed functions are controlled by the IAC motor through the PCM.

REMOVAL

3.7L V-6

The Idle Air Control (IAC) motor (3) is located on the side of the throttle body.

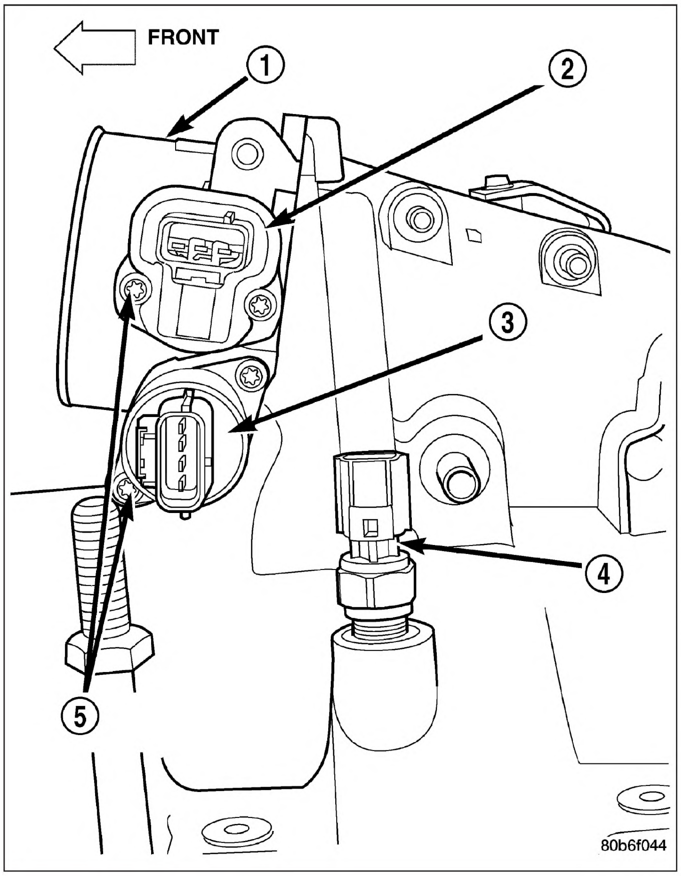
1. Remove air resonator box at throttle body.
2. Disconnect electrical connector from IAC motor.
3. Remove two mounting bolts (screws).
4. Remove IAC motor from throttle body.



4.7L V-8

The Idle Air Control (IAC) motor (3) is located on the side of the throttle body.

1. Remove air resonator box at throttle body.
2. Disconnect electrical connector from IAC motor.
3. Remove two mounting bolts (screws).
4. Remove IAC motor from throttle body.



5.7L V-8

The IAC motor is not serviceable on the 5.7L V-8 engine.

INSTALLATION

3.7L V-6

1. Install IAC motor to throttle body.
2. Install and tighten two mounting bolts (screws) to 7 N·m (60 in. lbs.) torque.
3. Install electrical connector.
4. Install air resonator to throttle body.

4.7L V-8

1. Install IAC motor to throttle body.
2. Install and tighten two mounting bolts (screws) to 7 N·m (60 in. lbs.) torque.
3. Install electrical connector.
4. Install air resonator to throttle body.

5.7L V-8

The IAC motor is not serviceable on the 5.7L V-8 engine.

SENSOR-INTAKE AIR TEMPERATURE

DESCRIPTION

The 2–wire Intake Manifold Air Temperature (IAT) sensor is installed in the intake manifold with the sensor element extending into the air stream.

The IAT sensor is a two-wire Negative Thermal Coefficient (NTC) sensor. Meaning, as intake manifold temperature increases, resistance (voltage) in the sensor decreases. As temperature decreases, resistance (voltage) in the sensor increases.

OPERATION

The IAT sensor provides an input voltage to the Powertrain Control Module (PCM) indicating the density of the air entering the intake manifold based upon intake manifold temperature. At key-on, a 5–volt power circuit is supplied to the sensor from the PCM. The sensor is grounded at the PCM through a low-noise, sensor-return circuit.

The PCM uses this input to calculate the following:

- Injector pulse-width
- Adjustment of spark timing (to help prevent spark knock with high intake manifold air-charge temperatures)

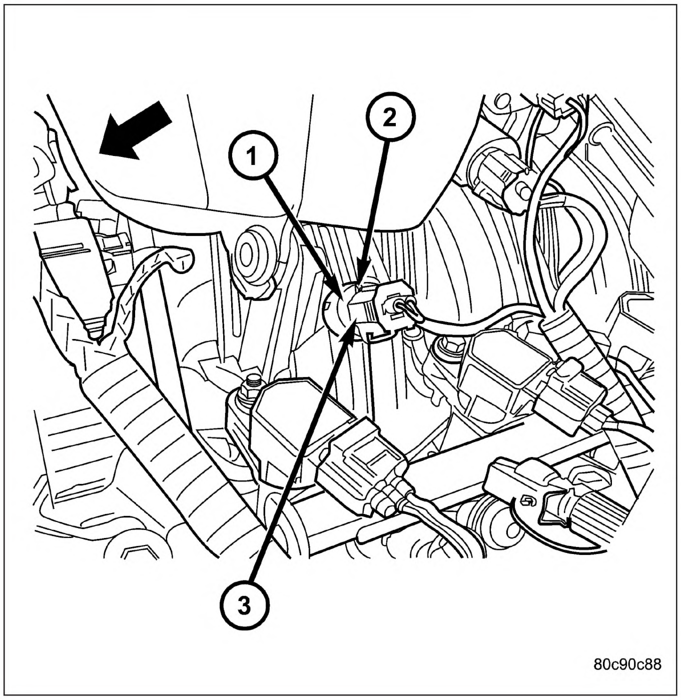
The resistance values of the IAT sensor is the same as for the Engine Coolant Temperature (ECT) sensor.

REMOVAL

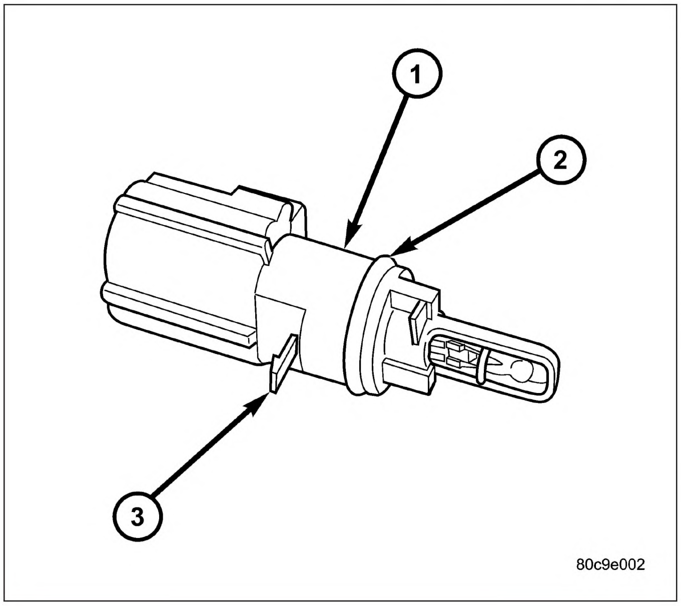
3.7L V-6

The intake manifold air temperature (IAT) sensor (1) is installed into the left side of intake manifold plenum.

1. Disconnect electrical connector (3) from IAT sensor.
2. Clean dirt from intake manifold at sensor base.



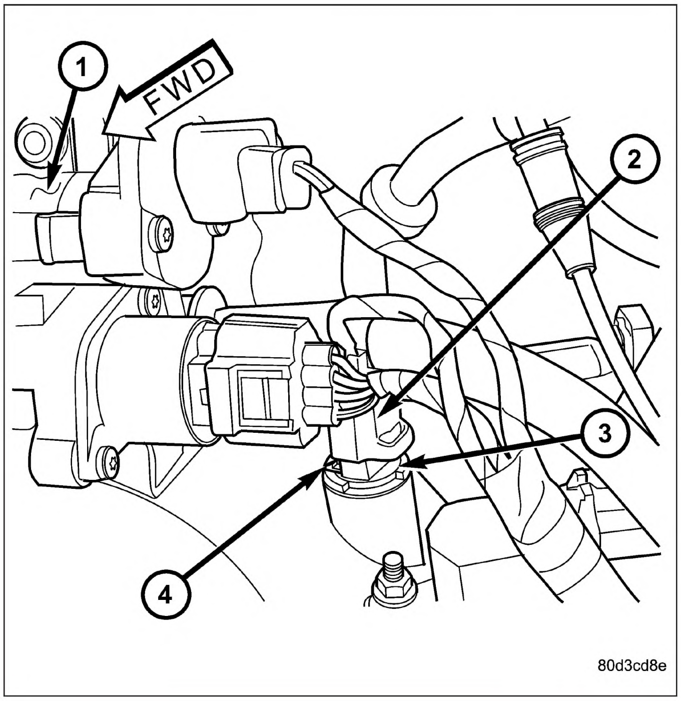
3. Gently lift on small plastic release tab (3) and rotate sensor about 1/4 turn counter-clockwise for removal.
4. Check condition of sensor o-ring (2).



4.7L V-8

The intake manifold air temperature (IAT) sensor (3) is installed into the left side of intake manifold plenum.

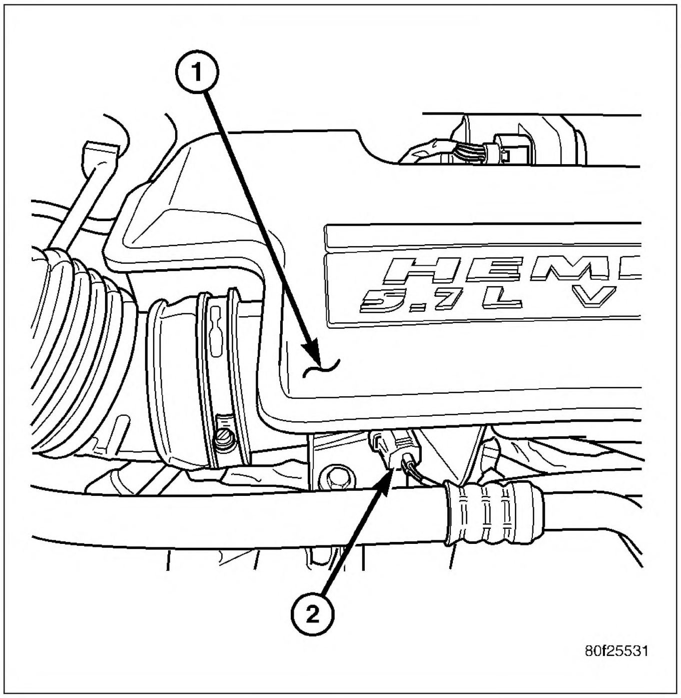
1. Disconnect electrical connector from IAT sensor.
2. Clean dirt from intake manifold at sensor base.
3. Gently lift on small plastic release tab (4) and rotate sensor about 1/4 turn counter-clockwise for removal.
4. Check condition of sensor o-ring.



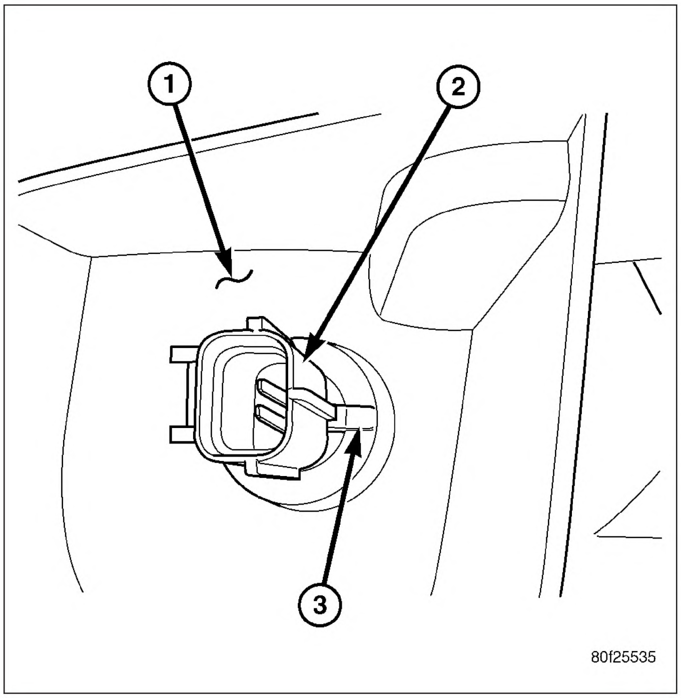
5.7L V-8

The intake manifold air temperature (IAT) sensor is installed into the front of the intake manifold air box plenum (2).

1. Disconnect electrical connector (2) from IAT sensor.
2. Clean dirt from intake manifold at sensor base.



3. Gently lift on small plastic release tab (3) and rotate sensor about 1/4 turn counter-clockwise for removal.
4. Check condition of sensor o-ring.



INSTALLATION

3.7L V-6

1. Check condition of sensor o-ring.
2. Clean sensor mounting hole in intake manifold.
3. Position sensor into intake manifold and rotate clockwise until past release tab.
4. Install electrical connector.

4.7L V-8

1. Check condition of sensor o-ring.
2. Clean sensor mounting hole in intake manifold.
3. Position sensor into intake manifold and rotate clockwise until past release tab.
4. Install electrical connector.

5.7L V-8

1. Check condition of sensor o-ring.
2. Clean sensor mounting hole in intake manifold.
3. Position sensor into intake manifold and rotate clockwise until past release tab.
4. Install electrical connector.

SENSOR-MAP

DESCRIPTION

3.7L V-6

The Manifold Absolute Pressure (MAP) sensor is mounted into the front of the intake manifold with 2 screws.

4.7L V-8

The Manifold Absolute Pressure (MAP) sensor is mounted into the front of the intake manifold with 2 screws.

5.7L V-8

The Manifold Absolute Pressure (MAP) sensor is mounted to the front of the intake manifold air plenum box.

OPERATION

The MAP sensor is used as an input to the Powertrain Control Module (PCM). It contains a silicon based sensing unit to provide data on the manifold vacuum that draws the air/fuel mixture into the combustion chamber. The PCM requires this information to determine injector pulse width and spark advance. When manifold absolute pressure (MAP) equals Barometric pressure, the pulse width will be at maximum.

A 5 volt reference is supplied from the PCM and returns a voltage signal to the PCM that reflects manifold pressure. The zero pressure reading is 0.5V and full scale is 4.5V. For a pressure swing of 0–15 psi, the voltage changes 4.0V. To operate the sensor, it is supplied a regulated 4.8 to 5.1 volts. Ground is provided through the low-noise, sensor return circuit at the PCM.

The MAP sensor input is the number one contributor to fuel injector pulse width. The most important function of the MAP sensor is to determine barometric pressure. The PCM needs to know if the vehicle is at sea level or at a higher altitude, because the air density changes with altitude. It will also help to correct for varying barometric pressure. Barometric pressure and altitude have a direct inverse correlation; as altitude goes up, barometric goes down. At key-on, the PCM powers up and looks at MAP voltage, and based upon the voltage it sees, it knows the current barometric pressure (relative to altitude). Once the engine starts, the PCM looks at the voltage again, continuously every 12 milliseconds, and compares the current voltage to what it was at key-on. The difference between current voltage and what it was at key-on, is manifold vacuum.

During key-on (engine not running) the sensor reads (updates) barometric pressure. A normal range can be obtained by monitoring a known good sensor.

As the altitude increases, the air becomes thinner (less oxygen). If a vehicle is started and driven to a very different altitude than where it was at key-on, the barometric pressure needs to be updated. Any time the PCM sees Wide Open Throttle (WOT), based upon Throttle Position Sensor (TPS) angle and RPM, it will update barometric pressure in the MAP memory cell. With periodic updates, the PCM can make its calculations more effectively.

The PCM uses the MAP sensor input to aid in calculating the following:

- Manifold pressure
- Barometric pressure
- Engine load
- Injector pulse-width
- Spark-advance programs
- Shift-point strategies (certain automatic transmissions only)
- Idle speed
- Decel fuel shutoff

The MAP sensor signal is provided from a single piezoresistive element located in the center of a diaphragm. The element and diaphragm are both made of silicone. As manifold pressure changes, the diaphragm moves causing the element to deflect, which stresses the silicone. When silicone is exposed to stress, its resistance changes. As manifold vacuum increases, the MAP sensor input voltage decreases proportionally. The sensor also contains electronics that condition the signal and provide temperature compensation.

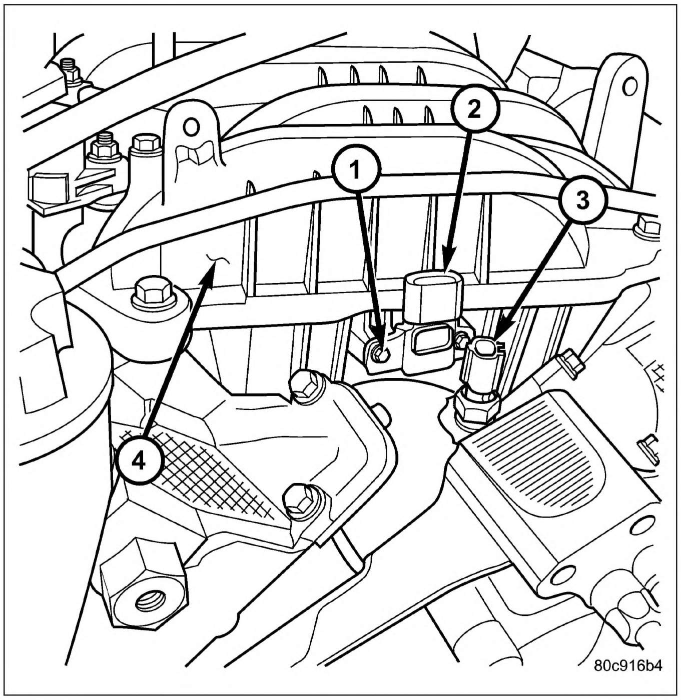
The PCM recognizes a decrease in manifold pressure by monitoring a decrease in voltage from the reading stored in the barometric pressure memory cell. The MAP sensor is a linear sensor; meaning as pressure changes, voltage changes proportionately. The range of voltage output from the sensor is usually between 4.6 volts at sea level to as low as 0.3 volts at 26 in. of Hg. Barometric pressure is the pressure exerted by the atmosphere upon an object. At sea level on a standard day, no storm, barometric pressure is approximately 29.92 in Hg. For every 100 feet of altitude, barometric pressure drops 0.10 in. Hg. If a storm goes through, it can change barometric pressure from what should be present for that altitude. You should know what the average pressure and corresponding barometric pressure is for your area.

REMOVAL

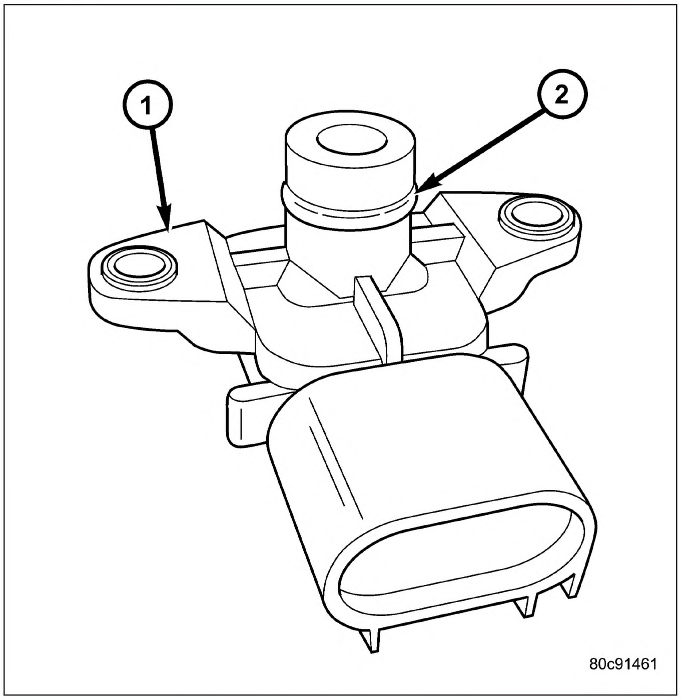
3.7L V-6

The Manifold Absolute Pressure (MAP) sensor (2) is mounted into the front of the intake manifold.

1. Disconnect electrical connector at sensor.
2. Clean area around MAP sensor.
3. Remove two sensor mounting screws (1).
4. Remove MAP sensor from intake manifold.



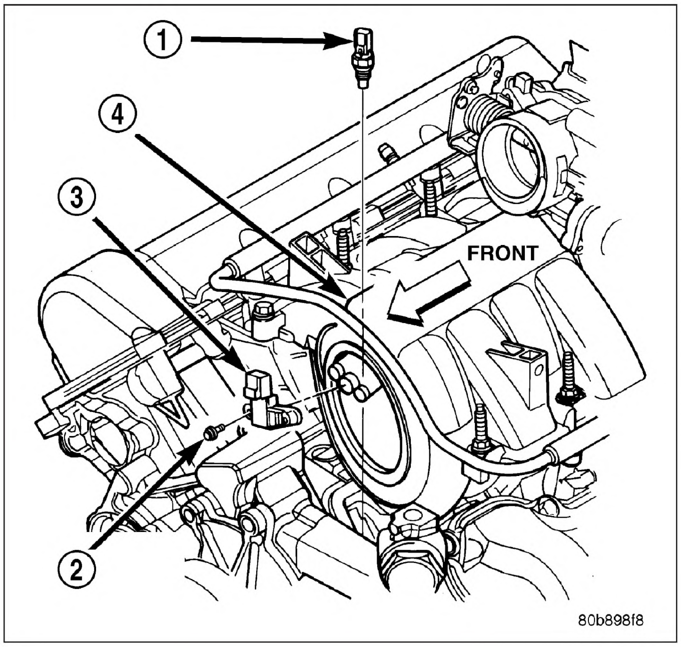
5. Check condition of sensor o-ring (2) .



4.7L V-8

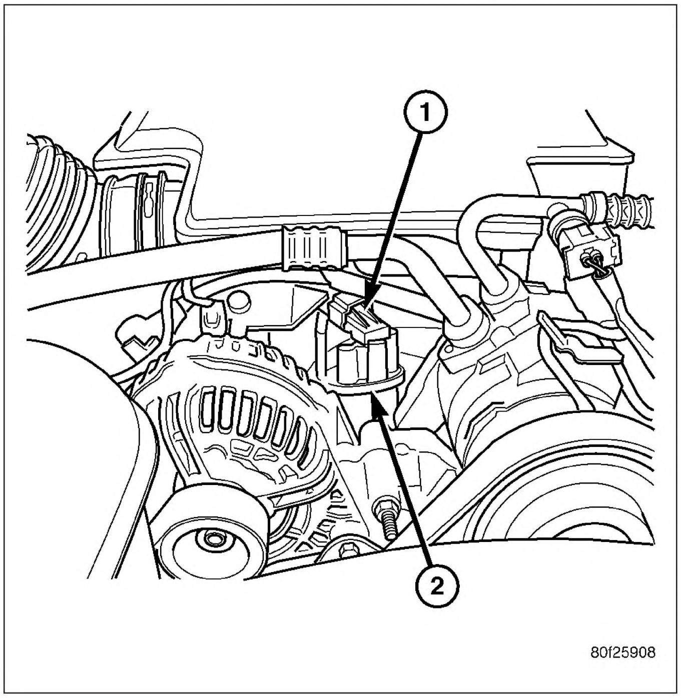
The MAP sensor (3) is located on the front of the intake manifold. An o-ring seals the sensor to the intake manifold.

1. Disconnect electrical connector at sensor.
2. Clean area around MAP sensor.
3. Remove two sensor mounting bolts (2).
4. Remove MAP sensor from intake manifold.
5. Check condition of sensor o-ring.

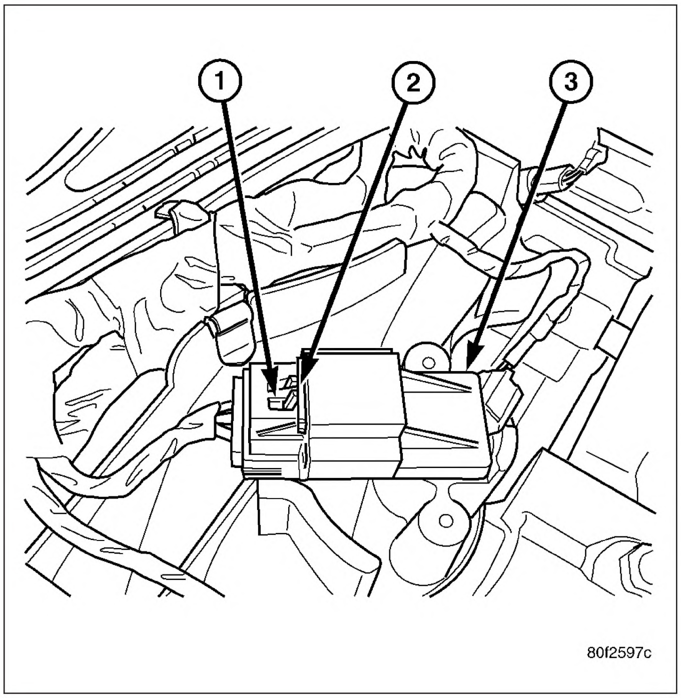


5.7L V-8

The Manifold Absolute Pressure (MAP) sensor (1) is mounted to the front of the intake manifold air plenum box.



1. Disconnect electrical connector at sensor by sliding release lock out (1). Press down on lock tab (2) for removal.
2. Rotate sensor 1/4 turn counter-clockwise for removal.
3. Check condition of sensor o-ring.



INSTALLATION

3.7L V-6

The Manifold Absolute Pressure (MAP) sensor is mounted into the front of the intake manifold. An o-ring is used to seal the sensor to the intake manifold.

1. Clean MAP sensor mounting hole at intake manifold.
2. Check MAP sensor o-ring seal for cuts or tears.
3. Position sensor into manifold.
4. Install MAP sensor mounting bolts (screws). Refer to Torque Specifications.
5. Connect electrical connector.

4.7L V-8

The MAP sensor is located on the front of the intake manifold. An o-ring seals the sensor to the intake manifold.

1. Clean MAP sensor mounting hole at intake manifold.
2. Check MAP sensor o-ring seal for cuts or tears.
3. Position sensor into manifold.
4. Install MAP sensor mounting bolts (screws). Refer to Torque Specifications.
5. Connect electrical connector.

5.7L V-8

The Manifold Absolute Pressure (MAP) sensor is mounted to the front of the intake manifold air plenum box.

1. Clean MAP sensor mounting hole at intake manifold.
2. Check MAP sensor o-ring seal for cuts or tears.
3. Position sensor into manifold.
4. Rotate sensor 1/4 turn clockwise for installation.
5. Connect electrical connector.

SENSOR-OXYGEN

DESCRIPTION

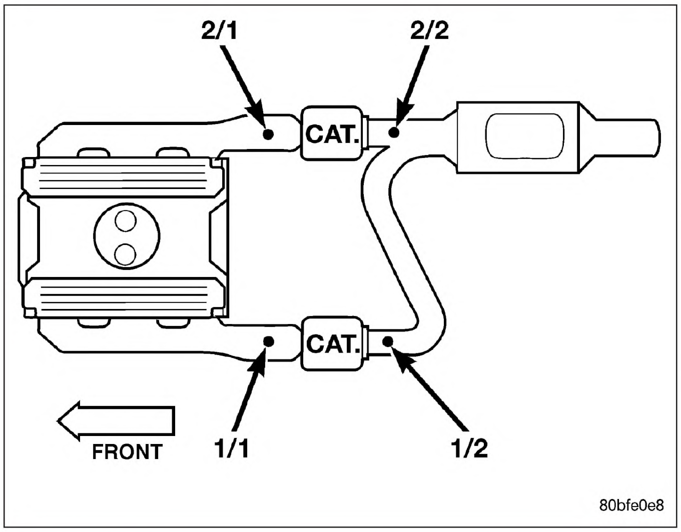
The Oxygen Sensors (O2S) are attached to, and protrude into the vehicle exhaust system. Depending on the engine or emission package, the vehicle may use a total of either 2 or 4 sensors.

Federal Emission Packages : Two sensors are used: upstream (referred to as 1/1) and downstream (referred to as 1/2). With this emission package, the upstream sensor (1/1) is located just before the main catalytic convertor. The downstream sensor (1/2) is located just after the main catalytic convertor.

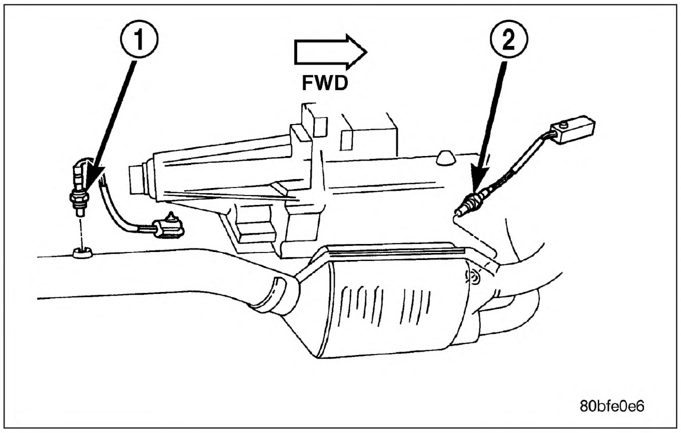
California Emission Packages: On this emissions package, 4 sensors are used: 2 upstream (referred to as 1/1 and 2/1) and 2 downstream (referred to as 1/2 and 2/2). With this emission package, the right upstream sensor (2/1) is located in the right exhaust downpipe just before the mini-catalytic convertor. The left upstream sensor (1/1) is located in the left exhaust downpipe just before the mini-catalytic convertor. The right downstream sensor (2/2) is located in the right exhaust downpipe just after the mini-catalytic convertor, and before the main catalytic convertor. The left downstream sensor (1/2) is located in the left exhaust downpipe just after the mini-catalytic convertor, and before the main catalytic convertor.

REMOVAL

Refer to graphic for typical O2S (oxygen sensor) locations if equipped with four oxygen sensors.



Refer to graphic for typical O2S (oxygen sensor) locations if equipped with two oxygen sensors.



CAUTION: Never apply any type of grease to the oxygen sensor electrical connector, or attempt any soldering of the sensor wiring harness.

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR.

1. Raise and support vehicle.
2. Disconnect wire connector from O2S sensor.

CAUTION: When disconnecting sensor electrical connector, do not pull directly on wire going into sensor.

3. Remove O2S sensor with an oxygen sensor removal and installation tool.
4. Clean threads in exhaust pipe using appropriate tap.

INSTALLATION

Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT add any additional anti-seize compound to threads of a new oxygen sensor.**

1. Install O2S sensor. Tighten to 30 N·m (22 ft. lbs.) torque.
2. Connect O2S sensor wire connector.
3. Lower vehicle.

THROTTLE BODY

DESCRIPTION

The throttle body is located on the intake manifold. Fuel does not enter the intake manifold through the throttle body. Fuel is sprayed into the manifold by the fuel injectors.

OPERATION

Filtered air from the air cleaner enters the intake manifold through the throttle body. The throttle body contains an air control passage controlled by an Idle Air Control (IAC) motor. The air control passage is used to supply air for idle conditions. A throttle valve (plate) is used to supply air for above idle conditions.

5.7L V-8 Engine:

The throttle body on the 5.7L engine is an electrically controlled unit. A mechanical cable is not used to connect the throttle body to the accelerator pedal. The Accelerator Pedal Position Sensor (APPS) along with inputs from other sensors sets the throttle blade to pre-determined positions.

Except 5.7L V-8 Engine:

Certain sensors are attached to the throttle body. The accelerator pedal cable, speed control cable and transmission control cable (when equipped) are connected to the throttle body linkage arm.

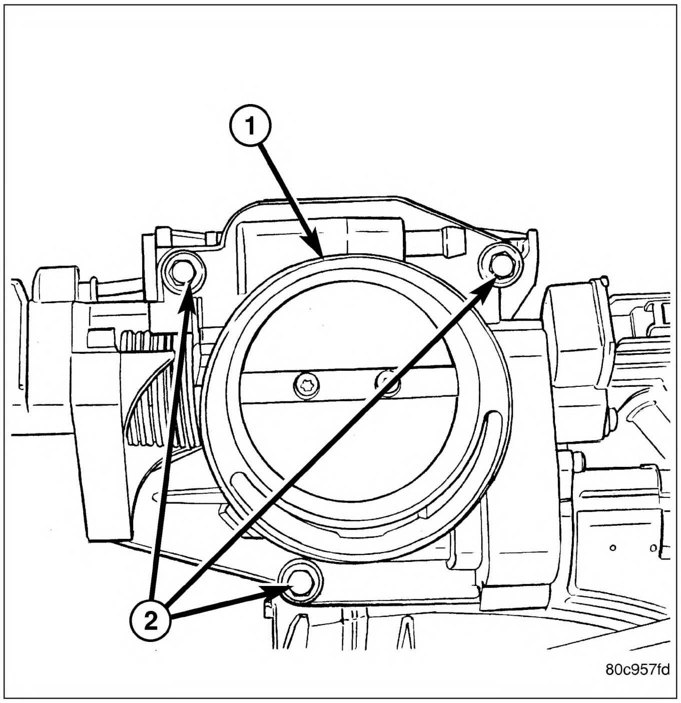
A (factory adjusted) set screw is used to mechanically limit the position of the throttle body throttle plate. **Never attempt to adjust the engine idle speed using this screw.** All idle speed functions are controlled by the PCM.

REMOVAL

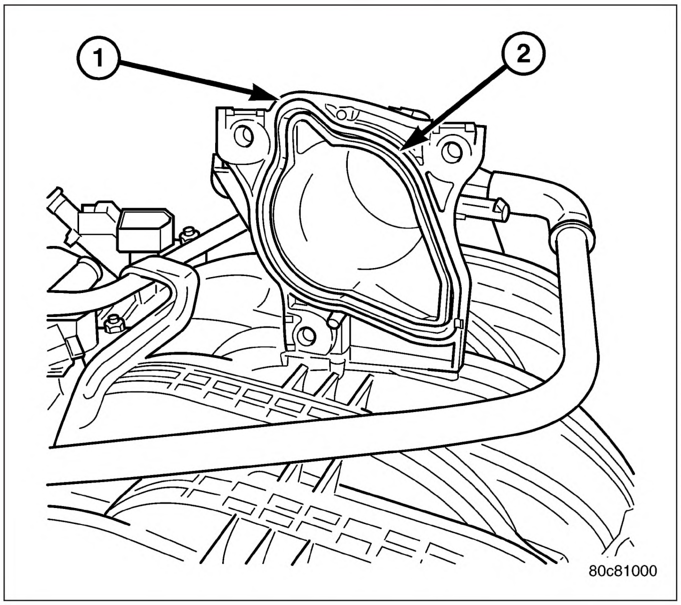
3.7L V-6

A (factory adjusted) set screw is used to mechanically limit the position of the throttle body throttle plate. **Never attempt to adjust the engine idle speed using this screw.** All idle speed functions are controlled by the Powertrain Control Module (PCM).

1. Remove air cleaner tube at throttle body.
2. Disconnect throttle body electrical connectors at IAC motor and TPS.
3. Remove all control cables from throttle body (lever) arm. Refer to the Accelerator Pedal and Throttle Cable section for removal/installation procedures.
4. Disconnect necessary vacuum lines at throttle body.
5. Remove three throttle body mounting bolts (2).
6. Remove throttle body from intake manifold.

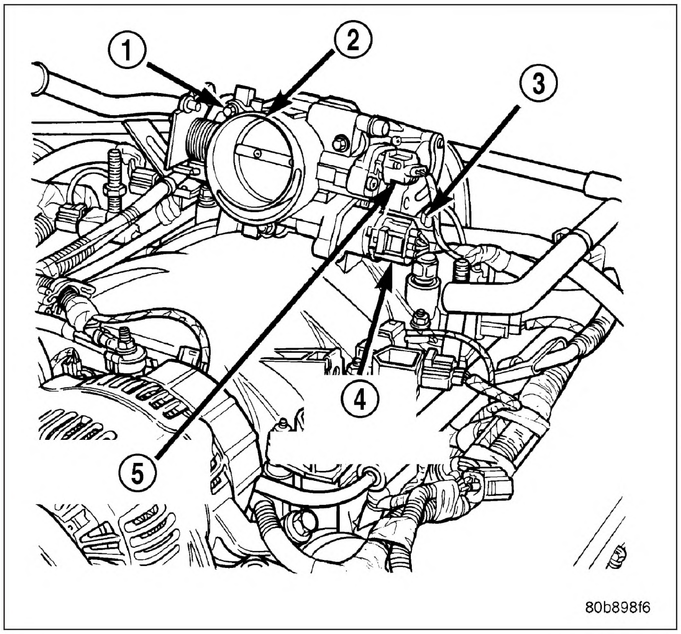


7. Check condition of old throttle body-to-intake manifold o-ring (2).



4.7L V-8

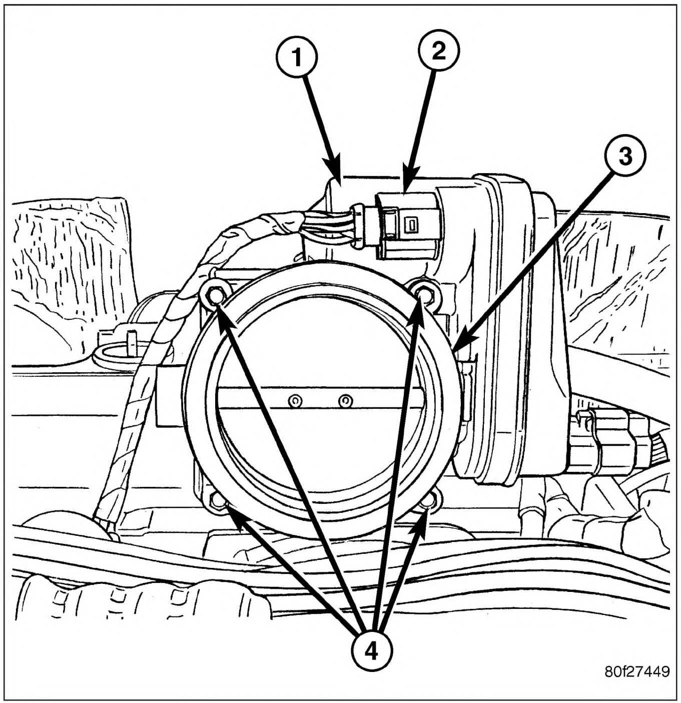
1. Remove air duct and air resonator box at throttle body.
2. Disconnect throttle body electrical connectors at IAC motor and TPS (3) , (4), and (5).
3. Remove vacuum line at throttle body.
4. Remove all control cables from throttle body (lever) arm. Refer to Accelerator Pedal and Throttle Cable.
5. Remove three throttle body mounting bolts (1).
6. Remove throttle body from intake manifold.



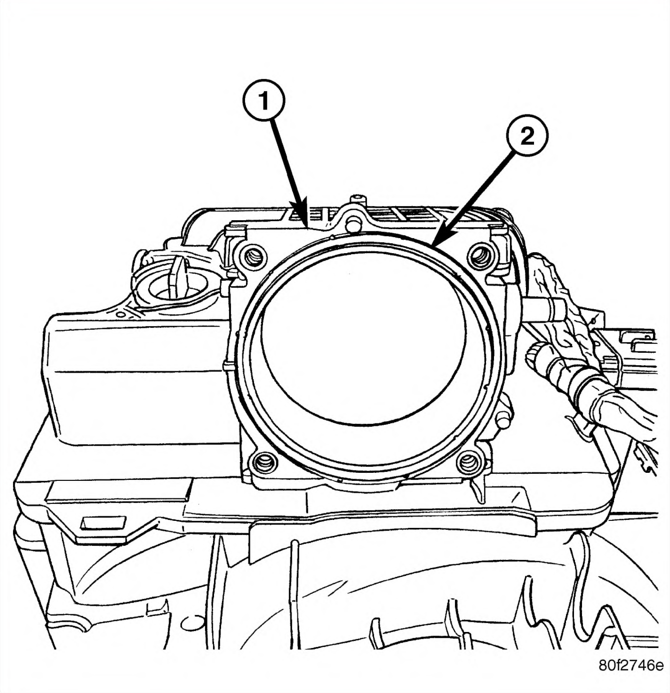
5.7L V-8

CAUTION: Do not use spray (carb) cleaners on any part of the throttle body. Do not apply silicone lubricants to any part of the throttle body.

1. Remove air duct and air resonator box at throttle body.
2. Disconnect electrical connector at throttle body (2).
3. Remove four throttle body mounting bolts (4).
4. Remove throttle body from intake manifold.



5. Check condition of throttle body o-ring (2).



INSTALLATION

3.7L V-6

1. Check condition of throttle body-to-intake manifold o-ring. Replace as necessary.
2. Clean mating surfaces of throttle body and intake manifold.
3. Install throttle body-to-intake manifold o-ring.
4. Install throttle body to intake manifold.
5. Install 3 mounting bolts. Tighten bolts to 12 N·m (105 in. lbs.) torque.
6. Install control cables.
7. Install electrical connectors.

8. Install necessary vacuum lines.
9. Install air plenum.

4.7L V-8

1. Clean throttle body-to-intake manifold o-ring.
2. Clean mating surfaces of throttle body and intake manifold.
3. Install throttle body to intake manifold by positioning throttle body to manifold alignment pins.
4. Install three mounting bolts. Tighten bolts to 12 N·m (105 in. lbs.) torque.
5. Install control cables.
6. Install vacuum line to throttle body.
7. Install electrical connectors.
8. Install air plenum.

5.7L V-8

CAUTION: Do not use spray (carb) cleaners on any part of the throttle body. Do not apply silicone lubricants to any part of the throttle body.

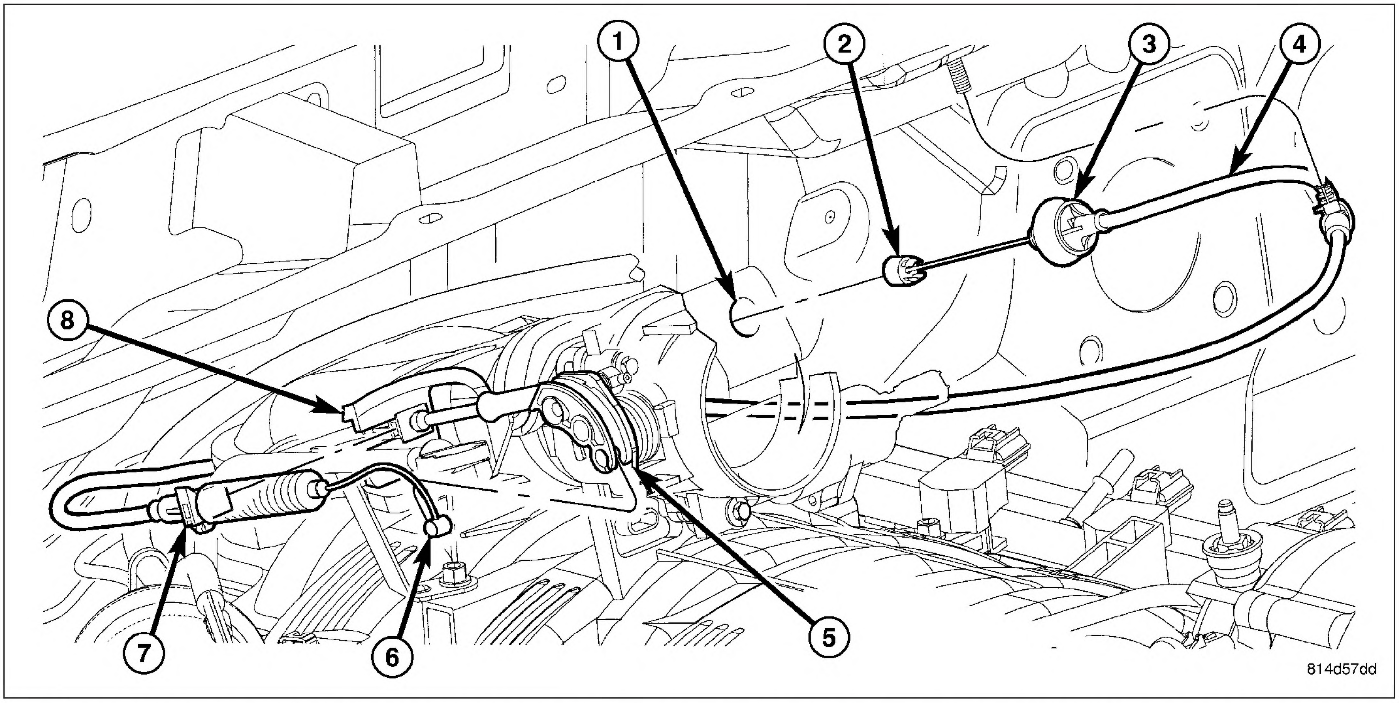
1. Clean and check condition of throttle body-to-intake manifold o-ring.
2. Clean mating surfaces of throttle body and intake manifold.
3. Install throttle body to intake manifold by positioning throttle body to manifold alignment pins.
4. Install 4 mounting bolts. Refer to Torque Specifications.
5. Install electrical connector.
6. Install air plenum.
7. A Scan Tool may be used to learn electrical parameters. Go to the Miscellaneous menu, and then select ETC Learn.
8. If the previous step is not performed, a Diagnostic Trouble Code (DTC) will be set.
9. If necessary, use a scan tool to erase any Diagnostic Trouble Codes (DTC's) from PCM.

CABLE-THROTTLE CONTROL

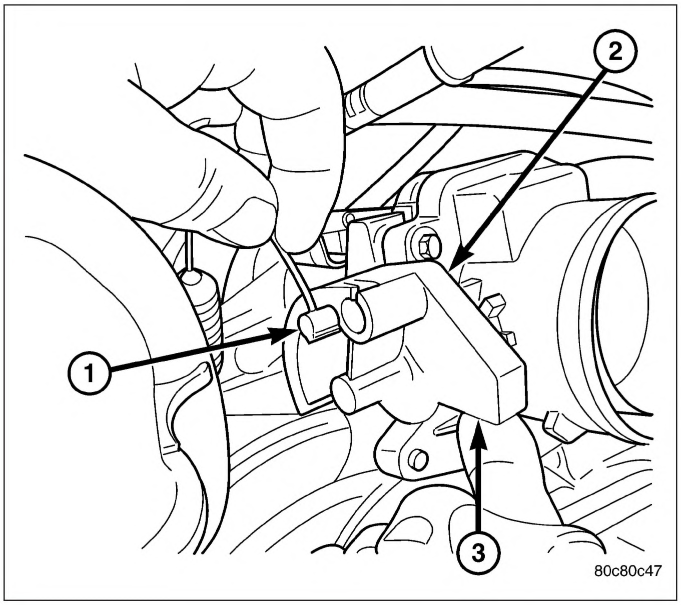
REMOVAL

3.7L V-6

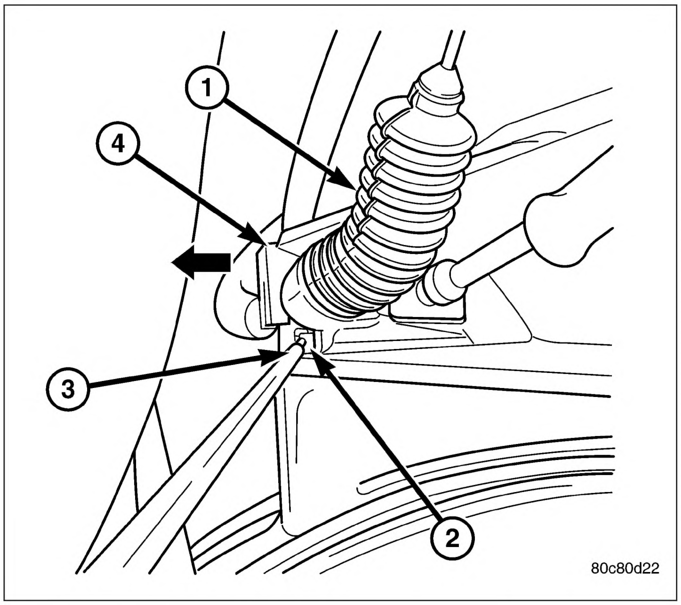
CAUTION: Be careful not to damage or kink cable core wire (within cable sheathing) while servicing accelerator pedal or throttle cable.



1. From inside vehicle, hold up accelerator pedal. Remove plastic cable retainer (clip) (2) and throttle cable core wire from upper end of pedal arm. Plastic cable retainer snaps into top of pedal arm.
2. Remove cable core wire at pedal arm.
3. From inside vehicle, remove metal clip holding cable (3) to dashpanel.
4. Remove air resonator box at throttle body.
5. Unsnap cable from dashpanel routing clip.
6. Remove cable housing from dash panel and pull into engine compartment
   .
7. Hold throttle in wide open position. While held in this position, slide throttle cable pin (1) from throttle body bellcrank.

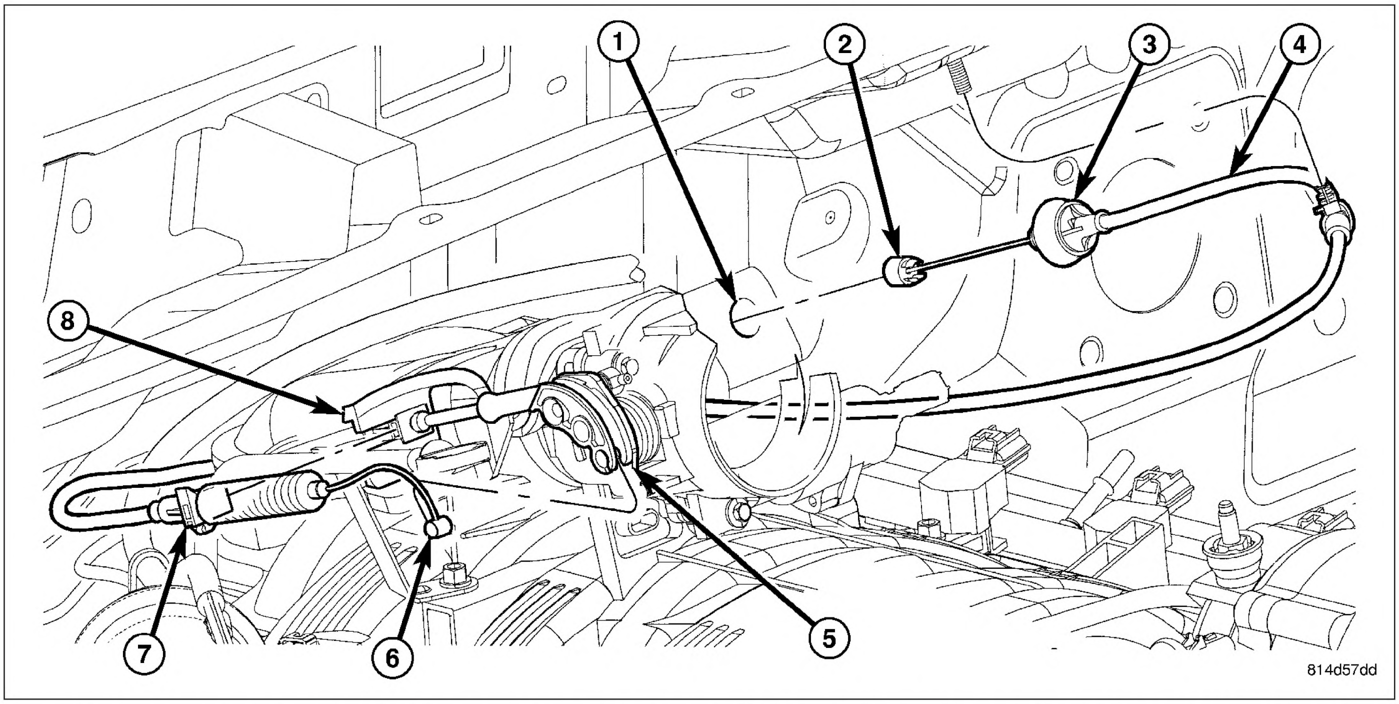


8. Using a pick or small screwdriver (3), press release tab (2) to release plastic cable mount from bracket. **Press on tab only enough to release cable from bracket. If tab is pressed too much, it will be broken.** Slide plastic mount (4) towards right side of vehicle to remove throttle cable from throttle body bracket.
9. Remove throttle cable from vehicle.



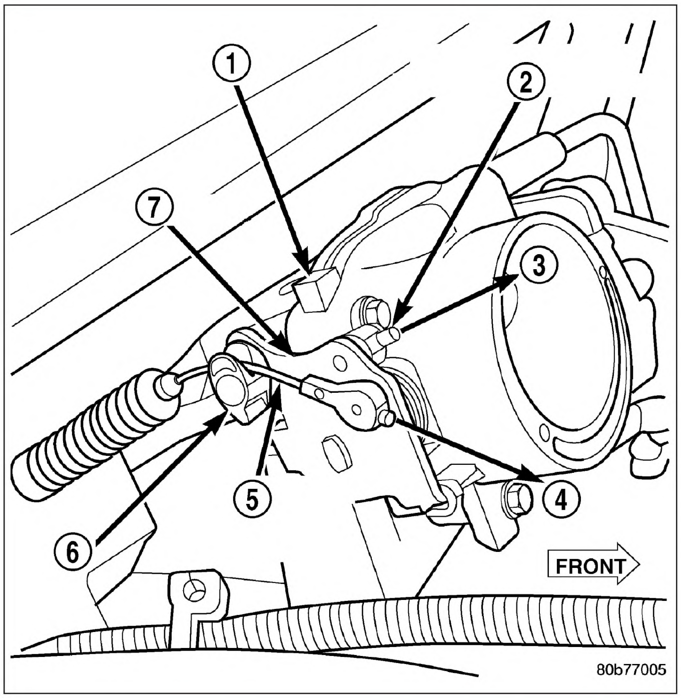
4.7L V-8

CAUTION: Be careful not to damage or kink cable core wire (within cable sheathing) while servicing accelerator pedal or throttle cable.

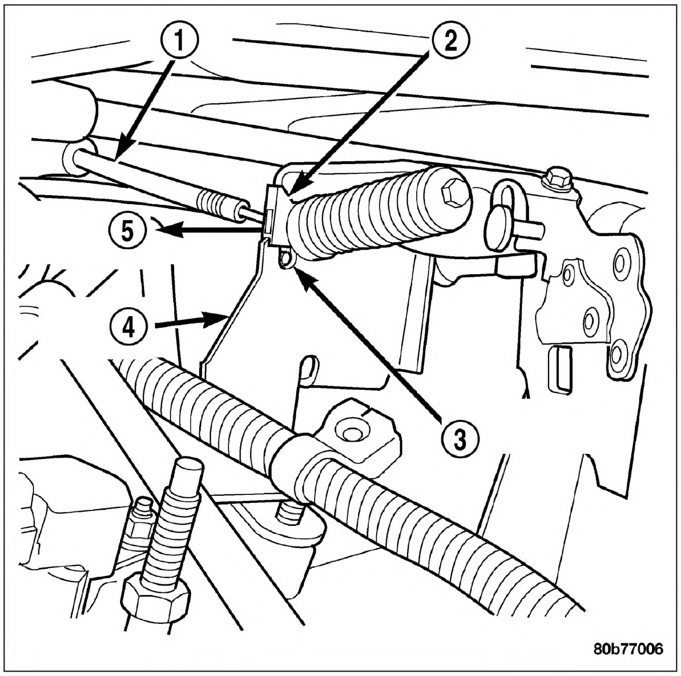


1. From inside vehicle, hold up accelerator pedal. Remove plastic cable retainer (clip) (2) and throttle cable core wire from upper end of pedal arm. Plastic cable retainer (clip) snaps into pedal arm.
2. Remove cable core wire at pedal arm.
3. From inside vehicle, remove cable clip holding cable (3) to dashpanel.
4. Remove air box at throttle body.
5. Unsnap cable from dashpanel routing clip.
6. Remove cable housing from dash panel and pull into engine compartment.

7. Using finger pressure only, disconnect accelerator cable connector at throttle body bellcrank pin by pushing connector off bellcrank pin towards front of vehicle (4). **DO NOT try to pull connector off perpendicular to bellcrank pin. Connector will be broken.**
8. Lift accelerator cable from top of cable cam (6).



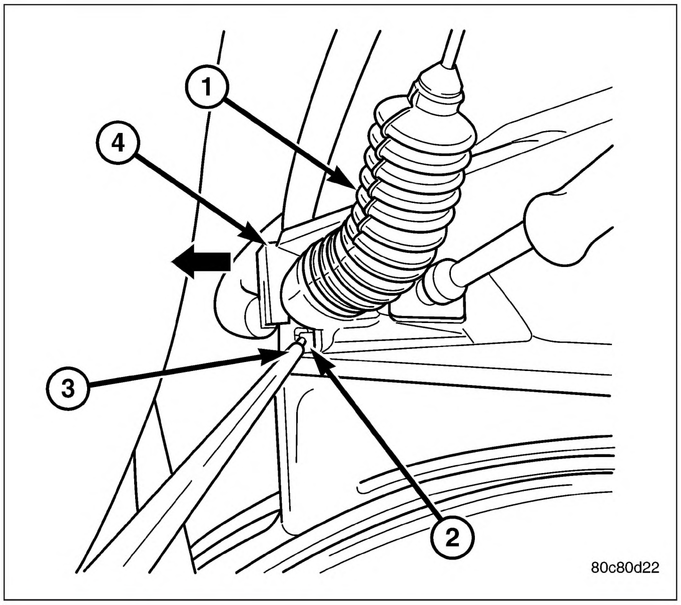
9. Press tab (3) to release plastic cable mount from bracket. **Press on tab only enough to release cable from bracket. If tab is pressed too much, it will be broken.** Slide plastic mount (2) towards passenger side of vehicle to remove cable from bracket.
10. Remove throttle cable from vehicle.



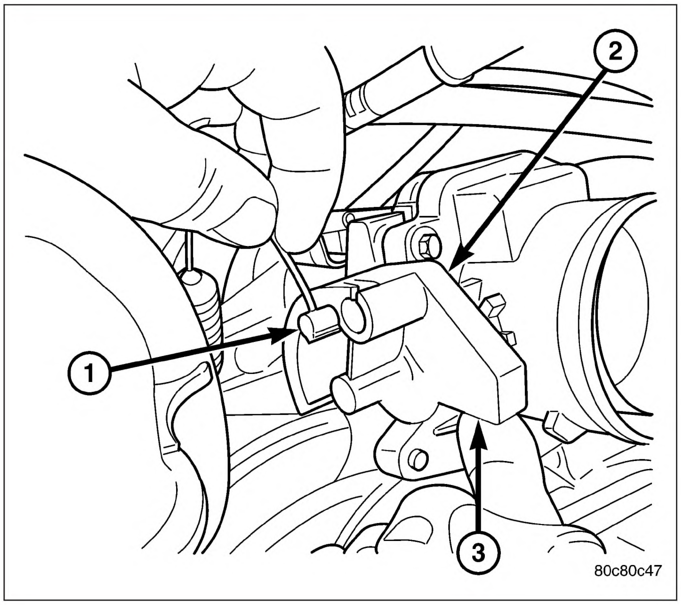
INSTALLATION

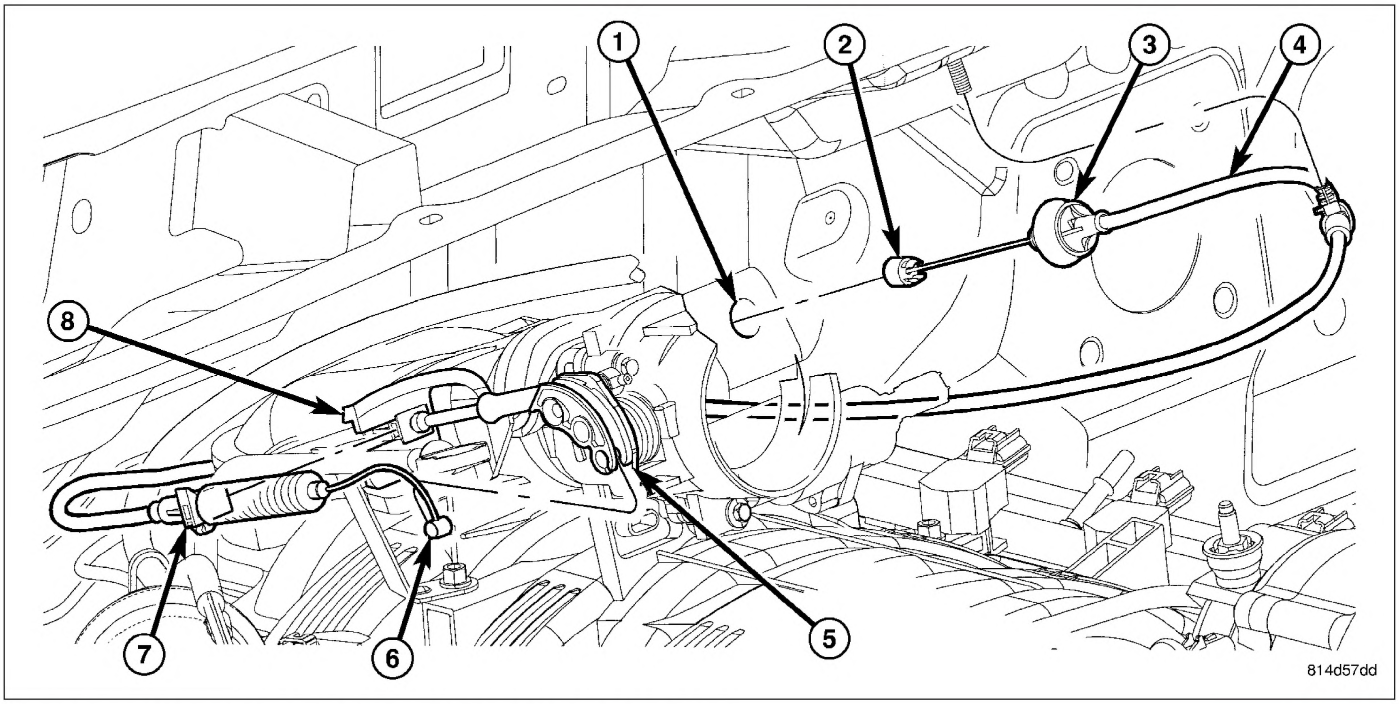
3.7L V-6

1. Slide accelerator cable plastic mount into throttle body mounting bracket. Continue sliding until release tab (2) is aligned to hole in mounting bracket.



2. Hold throttle in wide open position. While held in this position, slide throttle cable pin (1) into throttle body bellcrank.

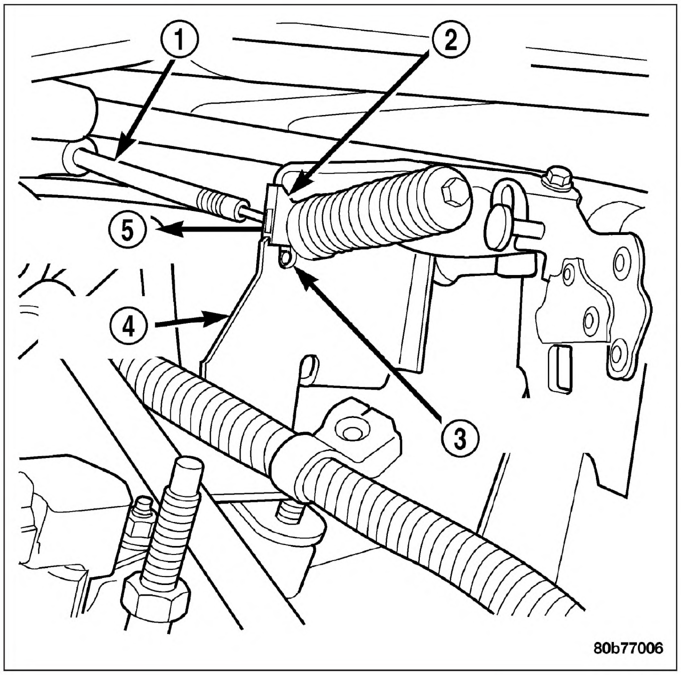


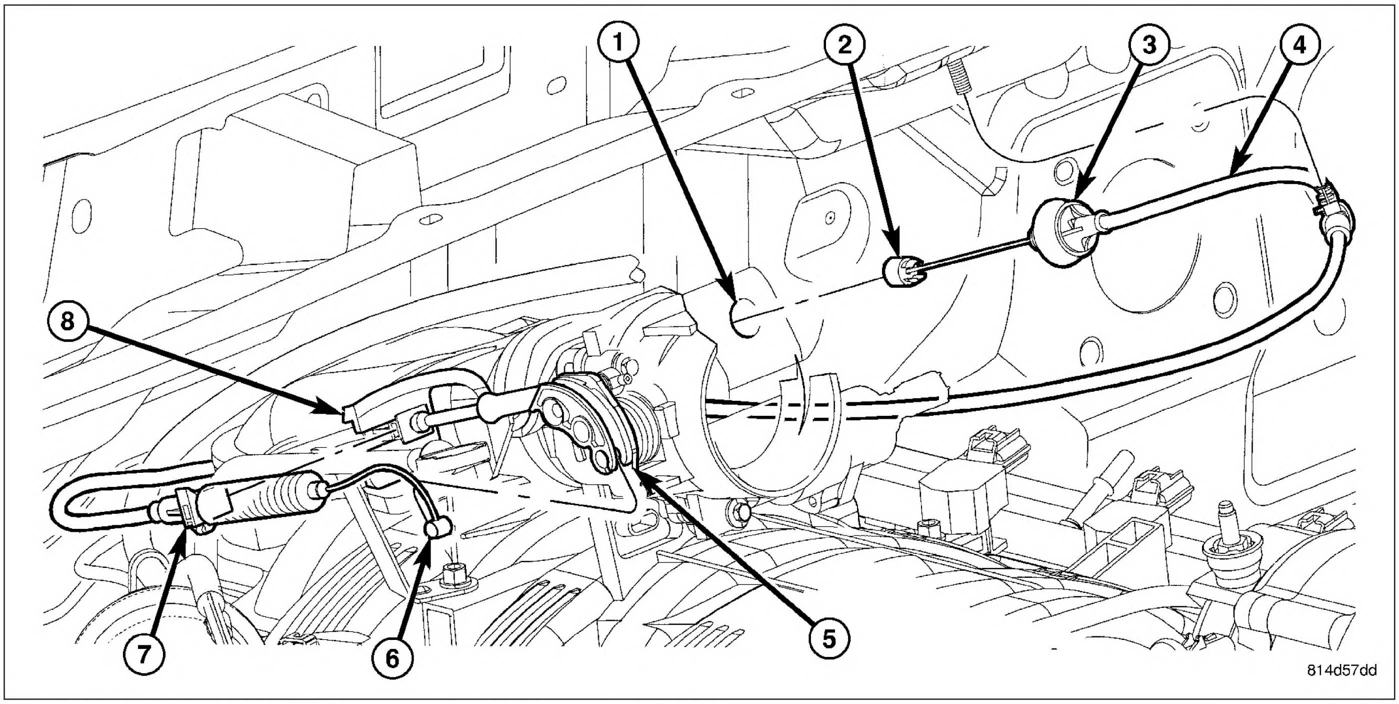


3. Push rubber grommet (3) through opening in dash panel.
4. From inside vehicle, slide throttle cable core wire into opening (slot) in top of pedal arm.
5. Push plastic cable retainer (clip) (2) into pedal arm opening until it snaps in place.
6. Install air resonator tube to throttle body.
7. Before starting engine, operate accelerator pedal to check for any binding.

4.7L V-8

1. Slide accelerator cable plastic mount into bracket. Continue sliding until tab (3) is aligned to hole in mounting bracket.
2. Route accelerator cable over top of cable cam.
3. Connect cable end to throttle body bellcrank pin (snaps on rearward).
4. Slide rubber grommet away from plastic cable housing.





5. Install rubber grommet (3) into dash panel until seated.
6. Push cable housing into rubber grommet and through opening in dash panel.
7. From inside vehicle, slide throttle cable core wire into opening (6) in top of pedal arm.
8. Push cable retainer (clip) (2) into pedal arm opening until it snaps in place.
9. Snap cable into dashpanel routing clip.
10. Install air resonator tube to throttle body.
11. Before starting engine, operate accelerator pedal to check for any binding.

SENSOR-THROTTLE POSITION

DESCRIPTION

The 3-wire Throttle Position Sensor (TPS) is mounted on the throttle body and is connected to the throttle blade shaft.

The 5.7L V-8 engine does not use a separate TPS on the throttle body.

OPERATION

The 5.7L V-8 engine does not use a separate Throttle Position Sensor (TPS) on the throttle body.

The 3–wire TPS provides the Powertrain Control Module (PCM) with an input signal (voltage) that represents the throttle blade position of the throttle body. The sensor is connected to the throttle blade shaft. As the position of the throttle blade changes, the output voltage of the TPS changes.

The PCM supplies approximately 5 volts to the TPS. The TPS output voltage (input signal to the PCM) represents the throttle blade position. The PCM receives an input signal voltage from the TPS. This will vary in an approximate range of from .26 volts at minimum throttle opening (idle), to 4.49 volts at wide open throttle. Along with inputs from other sensors, the PCM uses the TPS input to determine current engine operating conditions. In response to engine operating conditions, the PCM will adjust fuel injector pulse width and ignition timing.

The PCM needs to identify the actions and position of the throttle blade at all times. This information is needed to assist in performing the following calculations:

- Ignition timing advance
- Fuel injection pulse-width
- Idle (learned value or minimum TPS)
- Off-idle (0.06 volt)

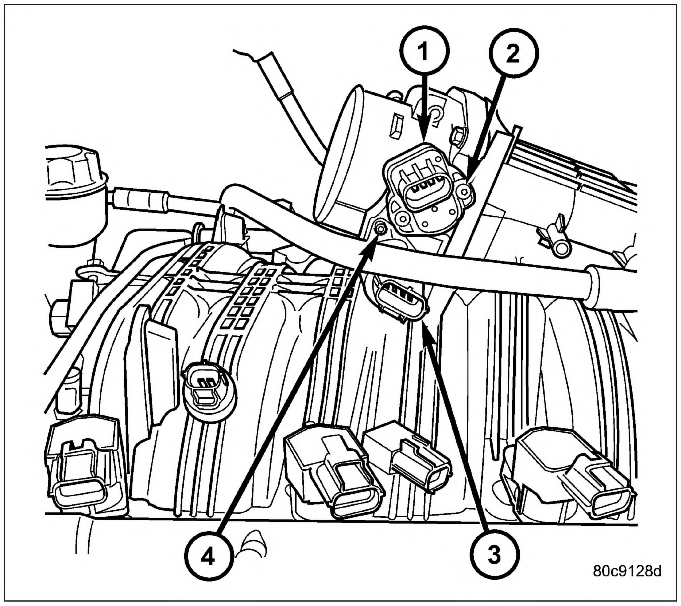
- Wide Open Throttle (WOT) open loop (2.608 volts above learned idle voltage)
- Deceleration fuel lean out
- Fuel cutoff during cranking at WOT (2.608 volts above learned idle voltage)
- A/C WOT cutoff (certain automatic transmissions only)

REMOVAL

3.7L V6

The Throttle Position Sensor (TPS) is mounted to the throttle body (1).

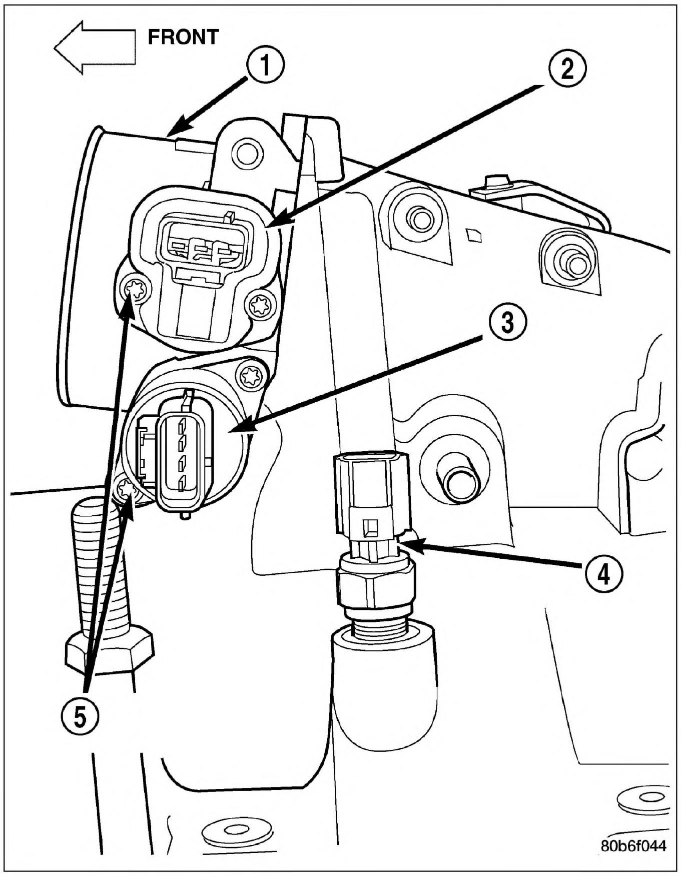
1. Remove air resonator tube at throttle body.
2. Disconnect TPS electrical connector.
3. Remove two TPS mounting screws (2).
4. Remove TPS.



4.7L V-8

The TPS is located on the throttle body (2).

1. Remove air duct and tube at throttle body.
2. Disconnect TPS electrical connector.
3. Remove two TPS mounting bolts (screws) (5).
4. Remove TPS from throttle body.



5.7L V-8

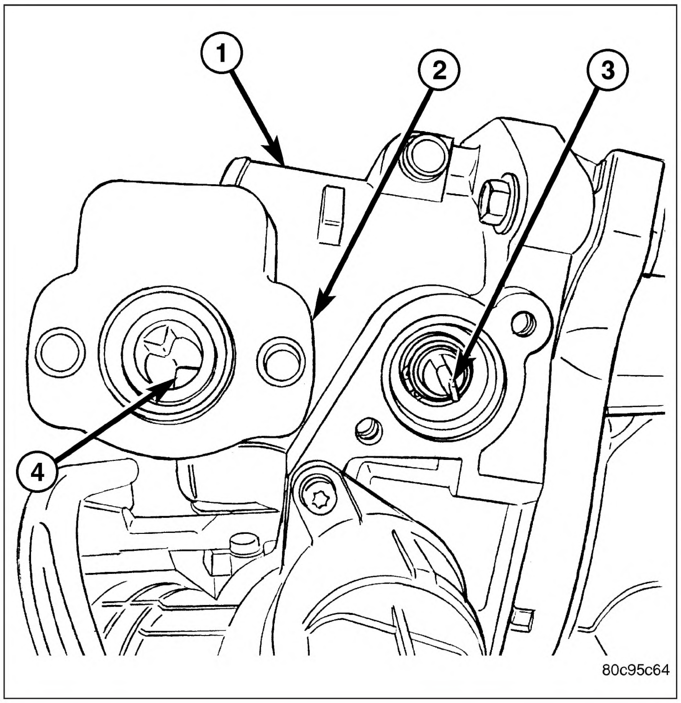
The 5.7L V-8 engine **does not use** a separate Throttle Position Sensor (TPS) on the throttle body.

INSTALLATION

3.7L V-6

The throttle shaft end of throttle body (3) slides into a socket in TPS (4). The TPS must be installed so that it can be rotated a few degrees. (If sensor will not rotate, install sensor with throttle shaft on other side of socket tangs). The TPS will be under slight tension when rotated.

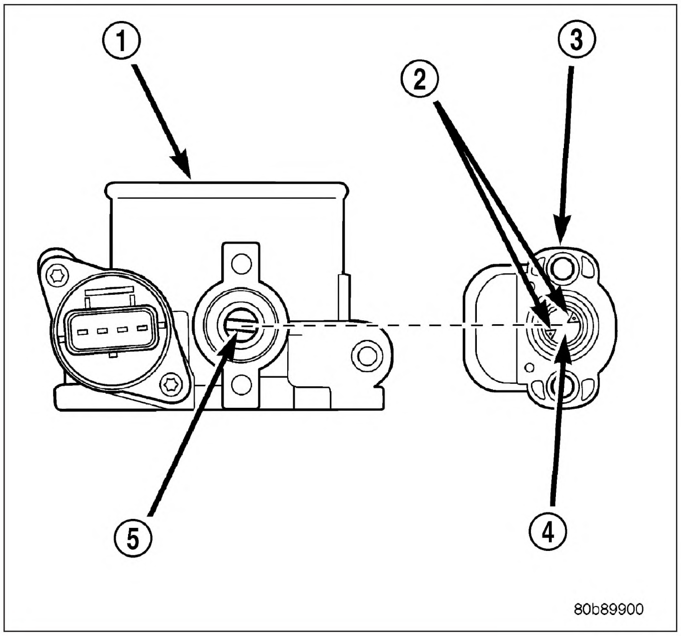
1. Install TPS and retaining screws.
2. Tighten screws to 7 N·m (60 in. lbs.) torque.
3. Connect TPS electrical connector to TPS.
4. Manually operate throttle (by hand) to check for any TPS binding before starting engine.
5. Install air cleaner tube to throttle body.



4.7L V-8

The throttle shaft end of throttle body (5) slides into a socket in TPS (4). The TPS must be installed so that it can be rotated a few degrees. If sensor will not rotate, install sensor with throttle shaft on other side of socket tangs. The TPS will be under slight tension when rotated.

1. Install TPS and two retaining bolts.
2. Tighten bolts to 7 N·m (60 in. lbs.) torque.
3. Manually operate throttle control lever by hand to check for any binding of TPS.
4. Connect TPS electrical connector to TPS.
5. Install air duct/air box to throttle body.



STEERING

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STEERING

DESCRIPTION

CAUTION: THIS SYSTEM REQUIRES THE USE OF HYDRAULIC SYSTEM / POWER STEERING FLUID WHICH MEETS DAIMLER CHRYSLER SPECIFICATION MS-10838, SUCH AS MOPAR PART NUMBER 05142893AA, OR EQUIVALENT, DO NOT MIX POWER STEERING FLUID TYPES. DAMAGE MAY RESULT TO THE POWER STEERING PUMP AND SYSTEM IF ANY OTHER FLUID IS USED, AND DO NOT OVERFILL.

Power steering systems consist of:

- Steering column & Intermediate Shaft
- Rack and pinion steering gear
- Belt driven hydraulic steering pump
- Pump pressure, supply and return hoses
- Oil Cooler
- Hydraulic cooling fan (5.7L only)

OPERATION

The steering column intermediate shaft attaches the steering column to the gear pinion. The rotation of the pinion moves the gear rack from side-to-side. This lateral action of the rack pushes and pulls the tie rods to change the direction of the front wheels.

Power assist is provided by an engine mounted hydraulic pump. The pump supplies hydraulic fluid to the steering gear. All vehicles are equipped with an oil cooler.

DIAGNOSIS AND TESTING

POWER STEERING SYSTEM

There is some noise in all power steering systems. One of the most common is a hissing sound evident at a standstill/parking, or when the steering is at the end of it’s travel. Hiss is a high frequency noise similar to that of a water tap being closed slowly. The noise is present in all valves that have a high velocity fluid passing through an orifice. There is no relationship between this noise and steering performance.

STEERING NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
OBJECTIONAL HISS OR WHISTLE	1. Steering intermediate shaft to dash panel seal.	1. Check and repair seal at dash panel.
	2. Noisy valve in power steering gear.	2. Replace steering gear.
RATTLE OR CLUNK	1. Gear mounting bolts loose.	1. Tighten bolts to specification.
	2. Loose or damaged suspension components.	2. Inspect and repair suspension.
	3. Internal gear noise.	3. Replace steering gear.
	4. Loose or damaged intermediate shaft or column.	4. Inspect and repair or replace.
MOAN	Pressure hose in contact with other components.	Reposition hose.
CHIRP OR SQUEAL	1. Loose belt.	1. Adjust or replace.
WHINE OR GROWL	1. Low fluid level.	1. Fill to proper level.
	2. Pressure hose in contact with other components.	2. Reposition hose.
	3. Internal pump noise.	3. Replace pump.
SUCKING AIR SOUND	1. Loose return line clamp.	1. Replace clamp.
	2. O-ring missing or damaged on hose fitting.	2. Replace o-ring.
	3. Low fluid level.	3. Fill to proper level.
	4. Air leak between pump and reservoir.	4. Repair as necessary.
	5. Reservoir cap not installed correctly.	5. Install reservoir cap correctly.
SCRUBBING OR KNOCKING	1. Wrong tire size.	1. Verify tire size.
	2. Wrong gear.	2. Verify gear.
	3. Tire Pressure	3. Adjust Tire Pressure

BINDING AND STICKING

CONDITION	POSSIBLE CAUSE	CORRECTION
DIFFICULT TO TURN WHEEL STICKS OR BINDS	1. Low fluid level.	1. Fill to proper level.
	2. Tire pressure.	2. Adjust tire pressure.
	3. Steering components (ball joints/tie rod ends).	3 Inspect and repair as necessary.
	4. Loose belt.	4. Adjust or replace.
	5. Low pump pressure.	5. Pressure test and replace if necessary.
	6. Column Intermediate shaft binding.	6. Replace Intermediate Shaft.
	7. Steering gear worn.	7. Replace gear.

INSUFFICIENT ASST. OR POOR RETURN TO CENTER

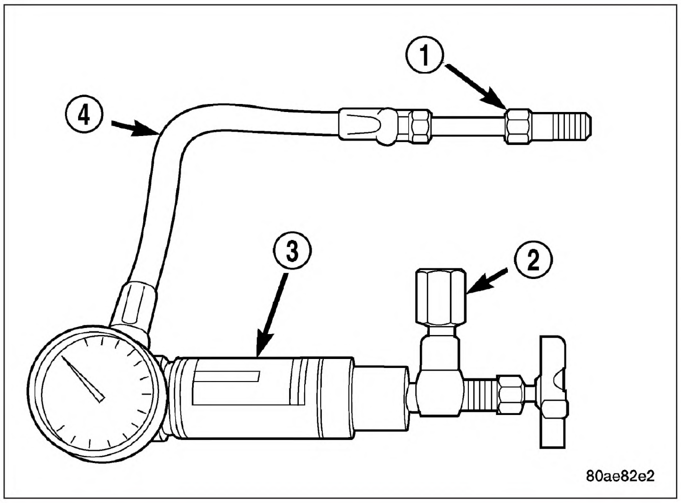
CONDITION	POSSIBLE CAUSE	CORRECTION
HARD TURNING OR MOMENTARY INCREASE IN TURNING EFFORT	1. Tire pressure.	1. Adjust tire pressure.
	2. Low fluid level.	2. Fill to proper level.
	3. Loose belt.	3. Adjust or replace.
	4. Low pump pressure.	4. Pressure test and repair as necessary.
	5. Internal gear leak.	5. Replace gear.
STEERING WHEEL DOES NOT WANT TO RETURN TO CENTER POSITION	1. Tire pressure.	1. Adjust tire pressure.
	2. Wheel alignment.	2. Align front end.
	3. Lack of lubrication.	3. Inspect and lubricate suspension compnents.
	4. High friction in steering gear.	4. Replace gear.

LOOSE STEERING AND VEHICLE LEAD

CONDITION	POSSIBLE CAUSE	CORRECTION
EXCESSIVE PLAY IN STEERING WHEEL	1. Worn or loose suspension or steering components.	1. Inspect and repair as necessary.
	2. Worn or loose wheel bearings.	2. Inspect and replace bearings.
	3. Steering gear mounting.	3. Tighten / replace gear mounting bolts/ isolators to specification.
	4. Gear out of adjustment.	4. Replace gear.
	5. Worn or loose steering intermediate shaft.	5. Inspect and replace as necessary.
VEHICLE PULLS, DRIFTS OR LEADS TO ONE SIDE.	1. Tire Pressure.	1. Adjust tire pressure.
	2. Radial tire lead.	2. Rotate tires.
	3. Brakes dragging.	3. Repair as necessary.
	4. Wheel alignment.	4. Align front end.

POWER STEERING FLOW AND PRESSURE

The following procedure is used to test the operation of the power steering system on the vehicle. This test will provide the gallons per minute (GPM) or flow rate of the power steering pump along with the maximum relief pressure. Perform test any time a power steering system problem is present. This test will determine if the power steering pump or power steering gear is not functioning properly. The following pressure and flow test is performed using Power Steering Analyzer Tool kit 6815 (3) Adapter Kit 6893 and 6825A.



FLOW AND PRESSURE TEST

1. Check the power steering belt to ensure it is in good condition and adjusted properly.
2. Connect pressure gauge hose from the Power Steering Analyzer to Tube 6825A.
3. Connect Adapter 6826 to Power Steering Analyzer test valve end.
4. Disconnect the high pressure hose from the power steering pump.
5. Connect the tube to the pump hose fitting.
6. Connect the power steering hose from the steering gear to the adapter.
7. Open the test valve completely.
8. Start engine and let idle long enough to circulate power steering fluid through flow/pressure test gauge and to get air out of the fluid. Then shut off engine.
9. Check fluid level, add fluid as necessary. Start engine again and let idle.
10. Gauge should read below 862 kPa (125 psi), if above, inspect the hoses for restrictions and repair as necessary. The initial pressure reading should be in the range of 345-552 kPa (50-80 psi).
11. Increase the engine speed to 1500 RPM and read the flow meter. If the flow rate (GPM) is below specification, (refer to pump specification chart for GPM) the pump should be replaced.

CAUTION: The following test procedure involves testing maximum pump pressure output and flow control valve operation. Do not leave valve closed for more than three seconds as the pump could be damaged.

12. Close valve fully three times and record highest pressure indicated each time. **All three readings must be above specifications and within 345 kPa (50 psi) of each other.**
    - Pressures above specifications but not within 345 kPa (50 psi) of each other, replace pump.
    - Pressures within 345 kPa (50 psi) of each other but below specifications, replace pump.
13. Open the test valve and turn the steering wheel to the extreme left and right positions three times against the stops. Record the highest pressure reading at each position. Compare readings to the pump specifications chart. If pressures readings are not within 50 psi of each other, the gear is leaking internally and must be replaced.

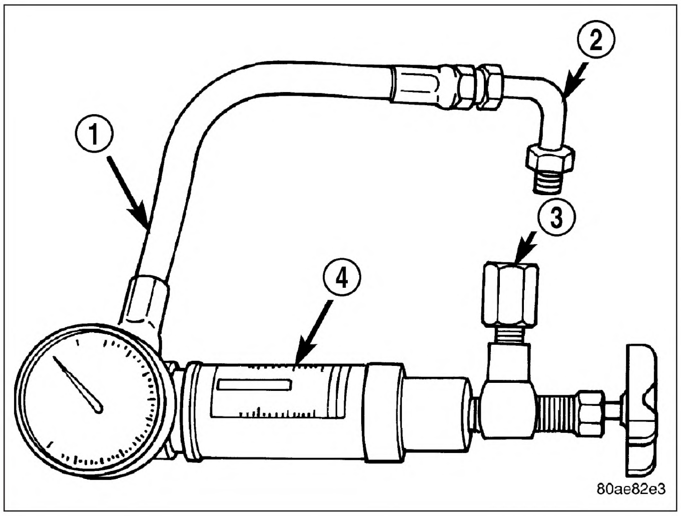
CAUTION: Do not force the pump to operate against the stops for more than 2 to 3 seconds at a time because, pump damage will result.

PUMP SPECIFICATION

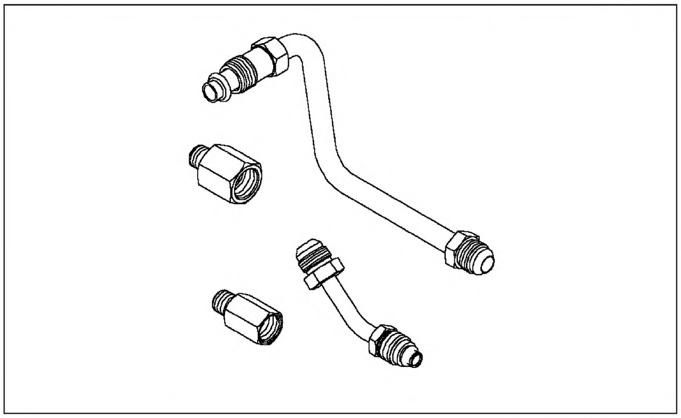
ENGINE	RELIEF PRESSURE ± 50	FLOW RATE (GPM) AT 1500 RPM
3.7L & 4.7L	12411 kPa (1800 psi)	2.6 - 3.0 GPM

HYDRAULIC COOLING FAN

The following procedures are used to test the operation of the power steering and hydraulic fan systems on the vehicle. This test will provide the gallons per minute (GPM) or flow rate of the power steering pump along with any maximum relief pressure. Perform test anytime a power steering system problem is present. This test will determine if the power steering pump, hydraulic fan, and power steering gear are not functioning properly. It will also determine if the flow coming out of the hydraulic fan motor is sufficient for the power steering gear. The following pressure and flow test is performed using the Power Steering Analyzer Tool kit 6815 (4) and Adapter kit 8630.



Adapter kit 8630.



FLOW TEST - FLOW FROM POWER STEERING PUMP

1. Check the power steering belt to ensure it is in good condition and adjusted properly.
2. Connect the pressure gauge hose from the Power Steering Analyzer to Tube 8630-2.
3. Connect Adapter 8630-3 to Power Steering Analyzer test valve end.
4. Disconnect the high pressure hose from the power steering pump.
5. Connect Tube 8630-2 to the pump hose fitting.
6. Connect the power steering hose from the fan motor to Adapter 8630-3.
7. Open the test valve completely.
8. Start engine and let idle long enough to circulate power steering fluid through the flow/pressure test gauge.
9. Shut off the engine and check the fluid level, add fluid ass necessary. Start engine again and let idle.
10. The initial pressure reading should be 483 - 690 kPa (70 - 100 psi). If pressure is higher inspect the hoses for restrictions and repair as necessary.
11. Increase the engine speed to 1100 rpm and read the flow meter. The reading should be 2.6 GPM minimum, if the reading is below this specification, the pump should be replaced.

FLOW AND PRESSURE TEST - FLOW FROM HYDRAULIC FAN MOTOR TO STEERING GEAR (should be done if necessary after the Pump flow test)

1. Connect the pressure gauge hose from the Power Steering Analyzer to Fitting 8630-1.
2. Connect Adapter 8630-4 to Power Steering Analyzer test valve end.
3. Disconnect the high pressure hose from the power steering gear.
4. Connect Fitting 8630-1 to the high pressure hose.

5. Connect Adapter 8630-4 to the power steering gear.
6. Open the test valve completely.
7. Start engine and let idle long enough to circulate power steering fluid through the flow/pressure test gauge.
8. Shut off the engine and check the fluid level, add fluid ass necessary. Start engine again and let idle.
9. The initial pressure reading should be 345-552 kPa (50-80 psi). If pressure is higher inspect the hoses for restrictions and repair as necessary.
10. Increase the engine speed to 1500 RPM and read the flow meter. The reading should be 2.4 - 2.8 GPM if the reading is below this specification the fan should be replaced.

CAUTION: This next step involves testing maximum fan motor steering relief pressure. Do not leave the valve closed for more than three seconds.

11. Close the valve fully three times for three seconds and record highest pressures indicated each time. All three readings must be at fan motor steering relief pressures.
12. Open the test valve and turn the steering wheel to the extreme left and right positions against the stops. Record the highest pressure readings at each position. If pressure readings are not within 50 psi from each other, the gear is leaking internally and must be repaired.

PUMP SPECIFICATIONS

ENGINE	RELIEF PRESSURE ± 50	FLOW RATE (GPM)
5.7L	1241 kPa (1800 psi)	1500 RPM 2.9 - 3.3 GPM Minium @ 200 psi

SPECIFICATIONS

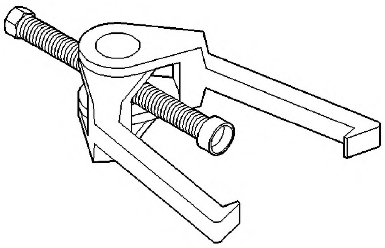
TORQUE CHART

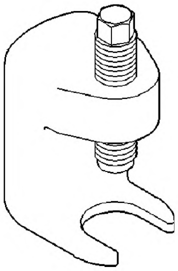
TORQUE SPECIFICATIONS

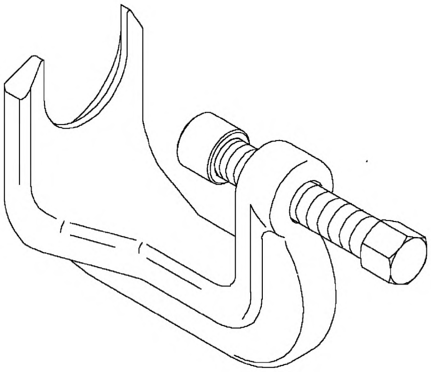
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Pitman Arm Shaft Nut	251	185	—
Drag Link Pitman Arm Nut	88	65	—
Drag Link Knuckle Nut	47	35	—
Drag Link Clamp Nuts	41	30	—
Tie Rod Knuckle Nut	47	35	—
Tie Rod Clamp Nuts	41	30	—
Steering Damper Axle Bolt	88	65	—
Steering Damper Tie Rod Nut	41	30	—

SPECIAL TOOLS

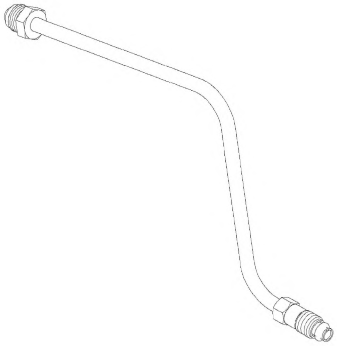
STEERING LINKAGE



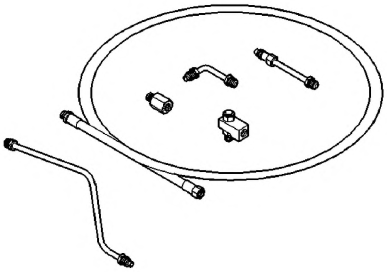


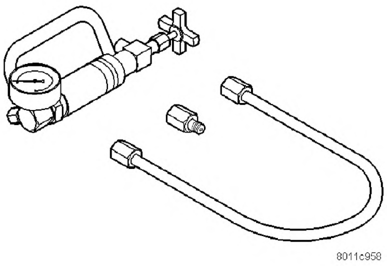


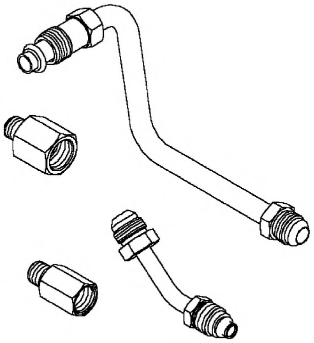
PULLER - 8677

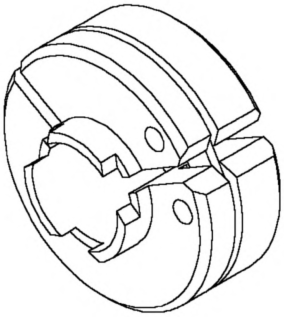


ADAPTER, POWER STEERING FLOW/PRESSURE - 6825A









QUICK CONNECT TOOL - 8875-A

COLUMN - ELECTRICAL DIAGNOSTICS

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COLUMN - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

C1240-STEERING ANGLE SENSOR ANGLE OVERTRAVEL PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Steering Column Module (SCM) has detected that the Steering Angle Sensor travel (rotation) has exceeded 900 degrees.

Possible Causes
INTERMITTENT STEERING ANGLE SENSOR ANGLE OVERTRAVEL PERFORMANCE DTC
STEERING OR FRONT SUSPENSION COMPONENT DAMAGE
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. DTC IS ACTIVE

NOTE: If B210D–BATTERY VOLTAGE LOW or B210E–BATTERY VOLTAGE HIGH is set along with this DTC, diagnose the battery voltage DTC first.

Ignition on, engine not running.

Turn the steering wheel from stop to stop at least three times.

With the Scan Tool, select View DTCs in the Steering Column Module.

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 4

---

2. STEERING OR FRONT SUSPENSION COMPONENT DAMAGE

Inspect the front suspension and steering components for damage or wear that may cause a steering column overtravel condition.

Were any problems found?

Yes >> Repair or replace front suspension or steering components as necessary in accordance with the Service Information.

No >> Go To 3

---

3. STEERING COLUMN MODULE (SCM)

Remove the Steering Column Module in accordance with the Service Information. Inspect the steering column for any problem that can result in a steering column overtravel condition. If any problems are found, repair as necessary. If no problems are found, view repair.

Repair

Replace the Steering Column Module (SCM) in accordance with the Service Information.

C1240-STEERING ANGLE SENSOR ANGLE OVERTRAVEL PERFORMANCE (CONTINUED)

4. INTERMITTENT STEERING ANGLE SENSOR ANGLE OVERTRAVEL PERFORMANCE DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.

No >> Test complete.

C1219-STEERING ANGLE SENSOR VELOCITY PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Steering Column Module (SCM) has detected that the Steering Angle Sensor rotational speed has exceeded 3000 degrees per second.

Possible Causes
INTERMITTENT STEERING ANGLE SENSOR VELOCITY PERFORMANCE DTC
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. DTC IS ACTIVE

NOTE: If D210D–BATTERY VOLTAGE LOW or D210E–BATTERY VOLTAGE HIGH is set along with this DTC, diagnose the battery voltage DTC first.

Ignition on, engine not running.

Turn the steering wheel from stop to stop at least three times.

With the Scan Tool, select View DTCs in the Steering Column Module.

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 3

---

2. STEERING COLUMN MODULE (SCM)

View repair.

Repair

Replace the Steering Column Module (SCM) in accordance with the Service Information.

---

3. INTERMITTENT STEERING ANGLE SENSOR VELOCITY PERFORMANCE DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.

No >> Test complete.

B2225–STEERING ANGLE SENSOR INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Steering Column Module (SCM) is configured for a Steering Angle Sensor and has detected an internal error in the Sensor.

Possible Causes
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. STEERING COLUMN MODULE (SCM)

The Steering Column Module (SCM) has detected an internal error in the Steering Angle Sensor.

View repair.

Repair

Replace the Steering Column Module in accordance with the Service Information.

B2108–IGNITION SWITCH SENSE INPUT CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Steering Column Module (SCM) detects a short to ground on the Ignition Switch Sense circuit for more than 5 seconds.

Possible Causes
INTERMITTENT IGNITION SWITCH SENSE INPUT CIRCUIT LOW DTC
(G20) IGNITION SWITCH SENSE CIRCUIT SHORT TO GROUND
(Z907) GROUND CIRCUIT HIGH RESISTANCE
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Steering Column Module.

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 5

---

2. (G20) IGNITION SWITCH SENSE CIRCUIT SHORT TO GROUND

Turn the ignition off.

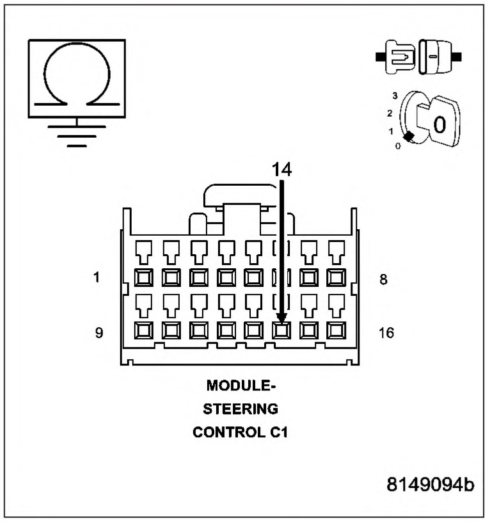
Disconnect the Steering Column Module harness connector.

Measure the resistance between ground and the (G20) Ignition Switch Sense circuit in the Steering Column Module harness connector.

Is the resistance below 5.0 ohms?

Yes >> Repair the (G20) Ignition Switch Sense circuit for a short to ground.

No >> Go to 3



B2108–IGNITION SWITCH SENSE INPUT CIRCUIT LOW (CONTINUED)

3. (Z907) GROUND CIRCUIT HIGH RESISTANCE

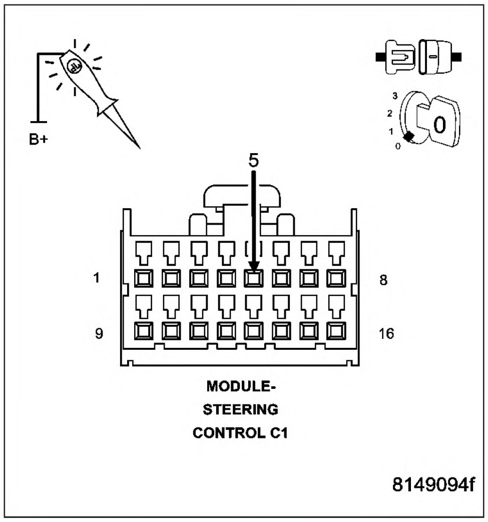
Using a 12–volt test light connected to 12–volts, check the (Z907) Ground circuit in the Steering Column Module harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z907) Ground circuit for an open circuit or high resistance.



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4. STEERING COLUMN MODULE (SCM)

View repair.

Repair

Replace the Steering Column Module (SCM) in accordance with the Service Information.

---

5. INTERMITTENT IGNITION SWITCH SENSE INPUT CIRCUIT LOW DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.

No >> Test complete.

B2109–IGNITION SWITCH SENSE INPUT CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Steering Column Module (SCM) detects that the Ignition Switch Sense circuit is open for more than 5 seconds.

Possible Causes
INTERMITTENT IGNITION SWITCH SENSE INPUT CIRCUIT HIGH DTC
(G20) IGNITION SWITCH SENSE CIRCUIT OPEN OR HIGH RESISTANCE
(Z907) GROUND CIRCUIT OPEN OR HIGH RESISTANCE
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Steering Column Module.

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 5

---

2. (G20) IGNITION SWITCH SENSE CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Steering Column Module harness connector.

Turn the ignition on.

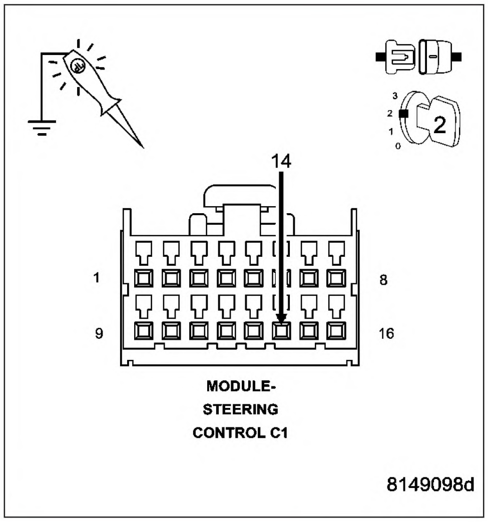
Using a 12–volt test light connected to ground, check the (G20) Ignition Switch Sense circuit in the Steering Column Module harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Repair the (G20) Ignition Switch Sense circuit for an open circuit or high resistance.

No >> Go to 3



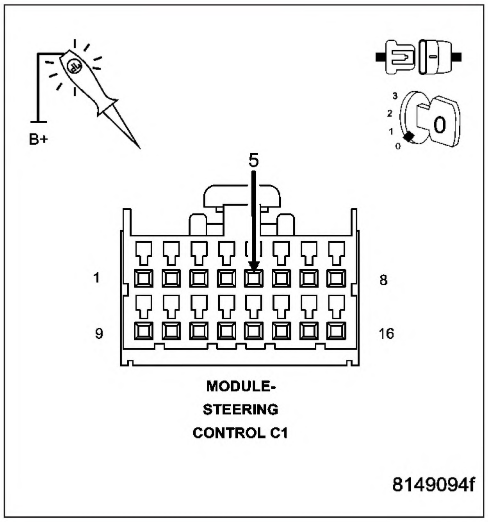
B2109–IGNITION SWITCH SENSE INPUT CIRCUIT HIGH (CONTINUED)

3. (Z907) GROUND CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Using a 12–volt test light connected to 12–volts, check the (Z907) Ground circuit in the Steering Column Module harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.



Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (Z907) Ground circuit for an open circuit or high resistance.

---

4. STEERING COLUMN MODULE (SCM)

View repair.

Repair

Replace the Steering Column Module (SCM) in accordance with the Service Information.

---

5. INTERMITTENT IGNITION SWITCH SENSE INPUT CIRCUIT HIGH DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.

No >> Test complete.

B210D-BATTERY VOLTAGE LOW

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously.
- **Set Condition:**
  If the voltage to the Steering Column Module (SCM) is below 9 volts for more than one minute.

Possible Causes
RELATED DTC(S) PRESENT IN PCM
INTERMITTENT BATTERY VOLTAGE LOW DTC
(A108) FUSED B(+) CIRCUIT OPEN OR HIGH RESISTANCE
(Z907) GROUND CIRCUIT OPEN OR HIGH RESISTANCE
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. RELATED DTC(S) PRESENT IN PCM

Ignition on, engine not running.
With the scan tool, select View DTCs in the Powertrain Control Module.

Are there any charging system or related battery voltage DTCs present in the PCM?

Yes >> Refer to the appropriate diagnostic procedure in the Driveability category.

No >> Go to 2

---

2. DTC STATUS IS ACTIVE

With the scan tool, select View DTCs in the Steering Column Module.

Is the DTC status Active at this time?

Yes >> Go to 3

No >> Go to 6

---

3. (A108) FUSED B(+) CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Steering Column Module harness connector.

Turn the ignition on.

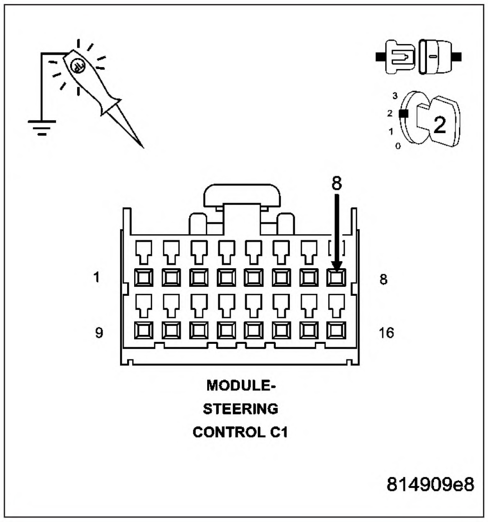
Using a 12–volt test light connected to ground, check the (A108) Fused B(+) circuit in the Steering Column Module harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go to 4

No >> Repair the (A108) Fused B(+) circuit for an open circuit or high resistance.



B210D-BATTERY VOLTAGE LOW (CONTINUED)

4. (Z907) GROUND CIRCUIT HIGH RESISTANCE

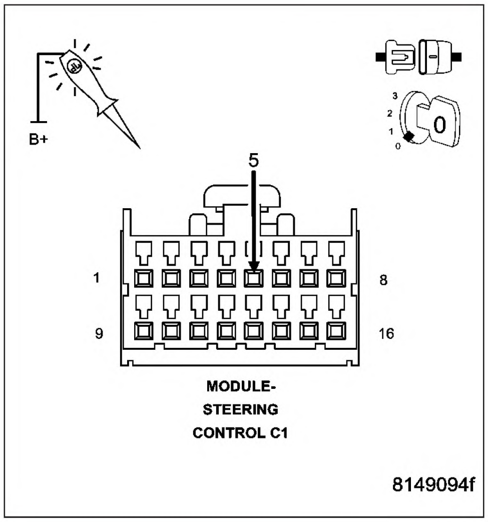
Using a 12–volt test light connected to 12–volts, check the (Z907) Ground circuit in the Steering Column Module harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (Z907) Ground circuit for an open circuit or high resistance.



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5. STEERING COLUMN MODULE (SCM)

View repair.

Repair

Replace the Steering Column Module (SCM) in accordance with the Service Information.

---

6. INTERMITTENT BATTERY VOLTAGE LOW DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.

No >> Test complete.

B210E-BATTERY VOLTAGE HIGH

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously.
- **Set Condition:**
  If the voltage to the Steering Column Module (SCM) is above 16.5 volts for more than one minute.

Possible Causes
RELATED DTC(S) PRESENT IN THE PCM
INTERMITTENT BATTERY VOLTAGE HIGH DTC
(A108) FUSED B(+) CIRCUIT HIGH RESISTANCE
(Z907) GROUND CIRCUIT HIGH RESISTANCE
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. RELATED DTC(S) PRESENT IN THE PCM

Ignition on, engine not running.
With the scan tool, select View DTCs in the Powertrain Control Module.

Are there any charging system or related battery voltage DTCs present in the PCM?

Yes >> Refer to the appropriate symptom in the Driveability category.

No >> Go to 2

---

2. DTC IS ACTIVE

Start the engine. Allow the engine to idle for 2 minutes.
With the scan tool, select View DTCs in the Steering Column Module.

Is the DTC status Active at this time?

Yes >> Go to 3

No >> Go to 6

---

3. (A108) FUSED B(+) CIRCUIT HIGH RESISTANCE

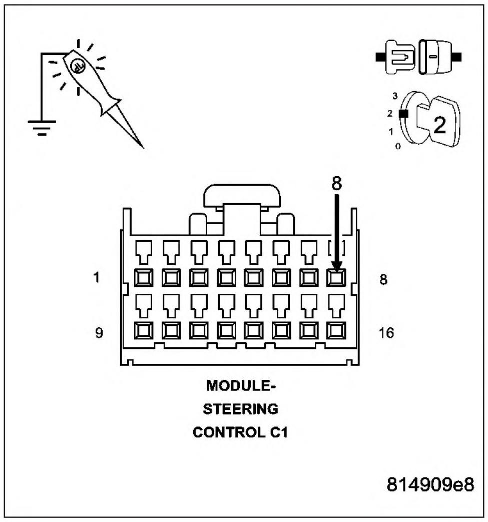
Turn the ignition off.
Disconnect the Steering Column Module harness connector.
Turn the ignition on.
Using a 12–volt test light connected to ground, check the (A108) Fused B(+) circuit in the Steering Column Module harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go to 4

No >> Repair the high resistance in the (A108) Fused B(+) circuit.



B210E-BATTERY VOLTAGE HIGH (CONTINUED)

4. (Z907) GROUND CIRCUIT HIGH RESISTANCE

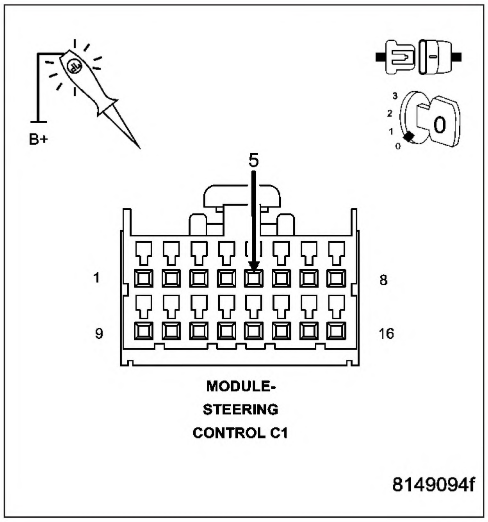
Using a 12–volt test light connected to 12–volts, check the (Z907) Ground circuit in the Steering Column Module harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the high resistance in the (Z907) Ground circuit.



---

5. STEERING COLUMN MODULE (SCM)

View repair.

Repair

Replace the Steering Column Module (SCM) in accordance with the Service Information.

---

6. INTERMITTENT BATTERY VOLTAGE HIGH DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.

No >> Test complete.

B2225–STEERING COLUMN MODULE INTERNAL

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Steering Column Module (SCM) detects an internal error.

Possible Causes
STEERING COLUMN MODULE (SCM)

Diagnostic Test

1. STEERING COLUMN MODULE (SCM)

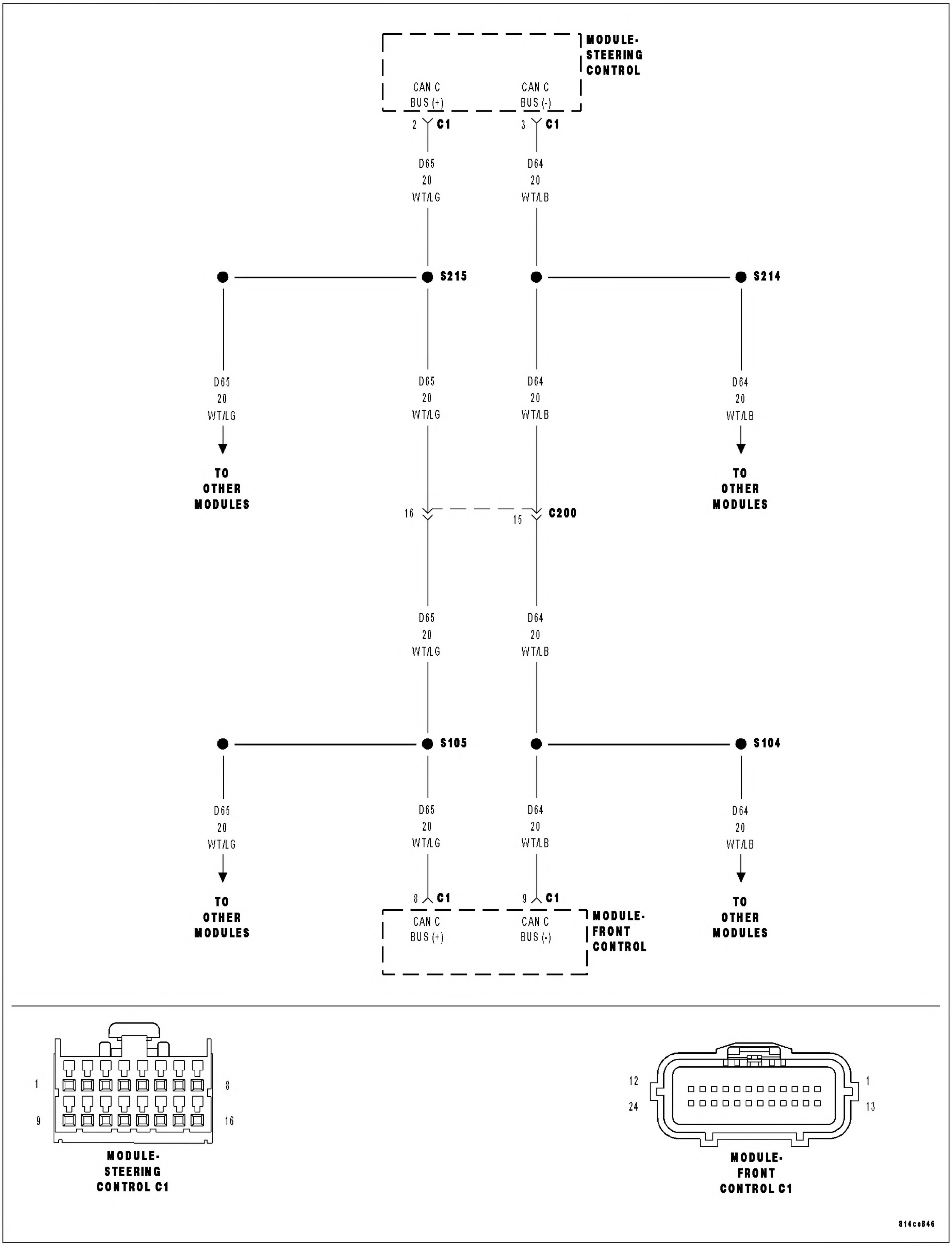
The Steering Column Module (SCM) is reporting an internal error.

View repair.

Repair

Replace the Steering Column Module (SCM) in accordance with the Service Information.

U0001–CAN C BUS


MODULE-
STEERING
CONTROL
CAN C
BUS (+)
CAN C
BUS (-)
2 C1
3 C1
D65
20
WT/LG
D64
20
WT/LB
S215
S214
TO
OTHER
MODULES
16
15
C200
S105
S104
8 C1
9 C1
MODULE-
FRONT
CONTROL
1
8
9
16
MODULE-
STEERING
CONTROL C1
12
24
1
13
MODULE-
FRONT
CONTROL C1
814ce846

U0001–CAN C BUS (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  Whenever the CAN C Bus (+) or CAN C Bus (-) circuit is open, shorted to voltage or shorted to ground.

Possible Causes
CAN C BUS DTC's IN FRONT CONTROL MODULE
(D65) CAN C BUS (+) CIRCUIT OPEN
(D64) CAN C BUS (-) CIRCUIT OPEN
STEERING COLUMN MODULE

Diagnostic Test

1. CHECK FOR ACTIVE DTCS

With the scan tool, read the active SCM DTC's.

Cycle the ignition switch from off to on at least 5 times, leaving the ignition on for a minimum of 90 seconds per cycle.

With the scan tool, read the active SCM DTC's.

Does the scan tool display this DTC as active?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.

---

2. CHECK FRONT CONTROL MODULE DTC's

With the scan tool, read Front Control Module active DTC's

Does the scan tool display any CAN C BUS DTC's – ACTIVE?

Yes >> (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING)

No >> Go To 3

U0001–CAN C BUS (CONTINUED)

3. (D65) CAN C BUS (+) CIRCUIT OPEN

Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the Steering Column Module C1 harness connector.

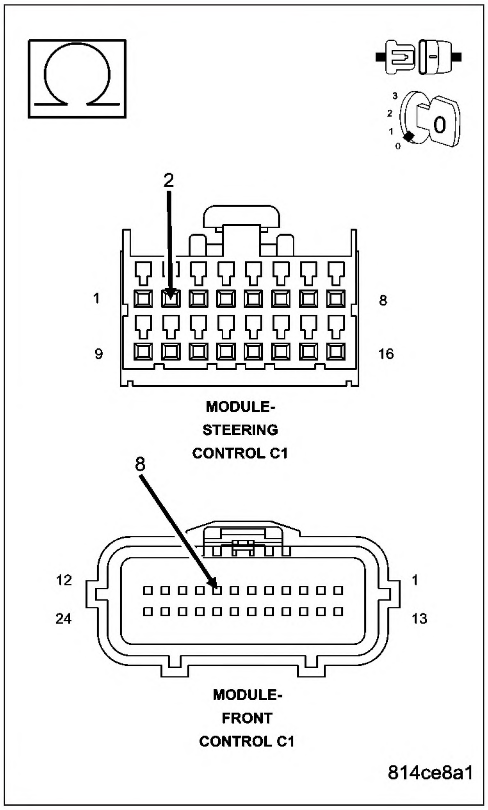
Disconnect the Front Control Module C1 connector.

Measure the resistance of the (D65) CAN C Bus (+) circuit between the Front Control Module connector and the Steering Column Module connector.

Is the resistance below 2.0 ohms?

Yes >> Go To 4

No >> Repair the (D65) CAN C Bus (+) circuit for an open.


3
2
1
0
0
2
1
8
9
16
MODULE-
STEERING
CONTROL C1
8
12
1
24
13
MODULE-
FRONT
CONTROL C1
814ce8a1

---

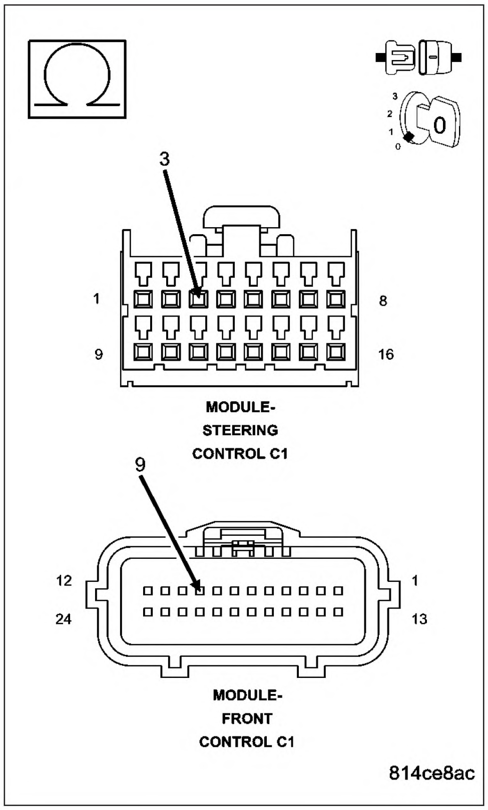
4. (D64) CAN C BUS (–) CIRCUIT OPEN

Measure the resistance of the (D64) CAN C Bus (–) circuit between the Front Control Module connector and the Steering Column Module connector.

Is the resistance below 2.0 ohms?

Yes >> Replace the Steering Column Module in accordance with the service information.

No >> Repair the (D64) CAN C Bus (–) circuit for an open.


3
2
1
0
0
3
1
8
9
16
MODULE-
STEERING
CONTROL C1
9
12
1
24
13
MODULE-
FRONT
CONTROL C1
814ce8ac

U0021-CAN B BUS (+) CIRCUIT OPEN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0022-CAN B BUS (+) CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0023-CAN B BUS (+) CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0024-CAN B BUS (-) CIRCUIT OPEN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0025-CAN B BUS (-) CIRCUIT LOW

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0026-CAN B BUS (-) CIRCUIT HIGH

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0027-CAN B BUS (-) SHORTED TO BUS (+)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151-LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154-LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156-LOST COMMUNICATION WITH EOM

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159-LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0167-LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168-LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM)

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169-LOST COMMUNICATION WITH SUNROOF CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184-LOST COMMUNICATION WITH RADIO

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186-LOST COMMUNICATION WITH AUDIO AMPLIFIER

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195-LOST COMMUNICATION WITH SDARS

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196-LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197-LOST COMMUNICATION WITH HANDS FREE MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199-LOST COMMUNICATION WITH DRIVER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200-LOST COMMUNICATION WITH PASSENGER DOOR MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208-LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209-LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231-LOST COMMUNICATION WITH RAIN SENSING MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241-LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE

For a complete wiring diagram **Refer to Section 8W**.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

COLUMN - SERVICE INFORMATION

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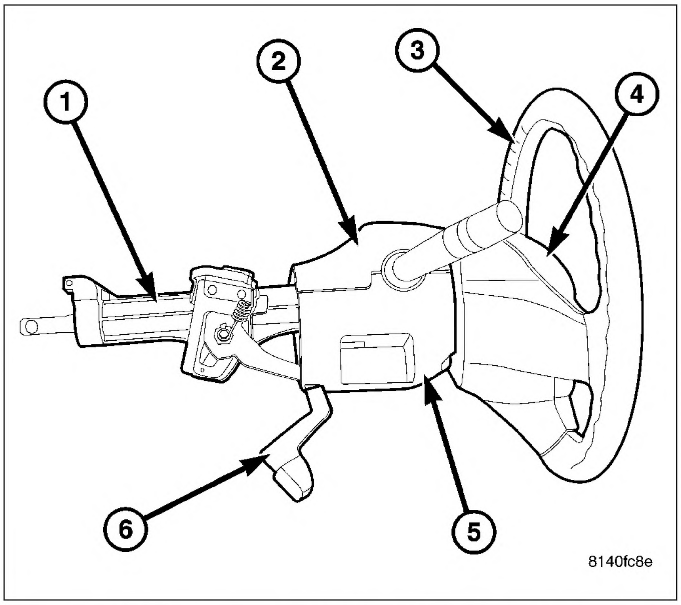
COLUMN - SERVICE INFORMATION

WARNING

WARNINGS AND CAUTIONS



The steering column on vehicles with an automatic transmission may not be equipped with an internal locking shaft that allows the ignition key cylinder to be locked with the key. Alternative methods of locking the steering wheel for service will have to be used.

The tilt column has been designed to be serviced as an assembly, less the wiring, switches, shrouds (2 & 5), steering wheel (3), airbag (4) etc. Most steering column components can be serviced without removing the steering column (1) from the vehicle.

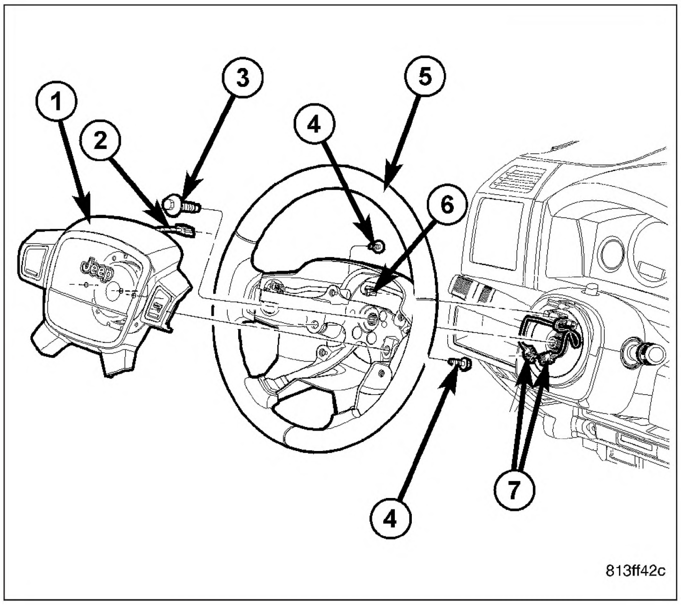
The airbag system is a sensitive, complex electromechanical unit. Before attempting to diagnose, remove or install the airbag system components you must first disconnect and isolate the battery negative (ground) cable. Then wait two minutes for the system capacitor to discharge. Failure to do so could result in accidental deployment of the airbag and possible personal injury. The fasteners, screws, and bolts, originally used for the airbag components, have special coatings and are specifically designed for the airbag system. They must never be replaced with any substitutes. Anytime a new fastener is needed, replace with the correct fasteners provided in the service package or fasteners listed in the parts books.

Safety goggles should be worn at all times when working on steering columns.

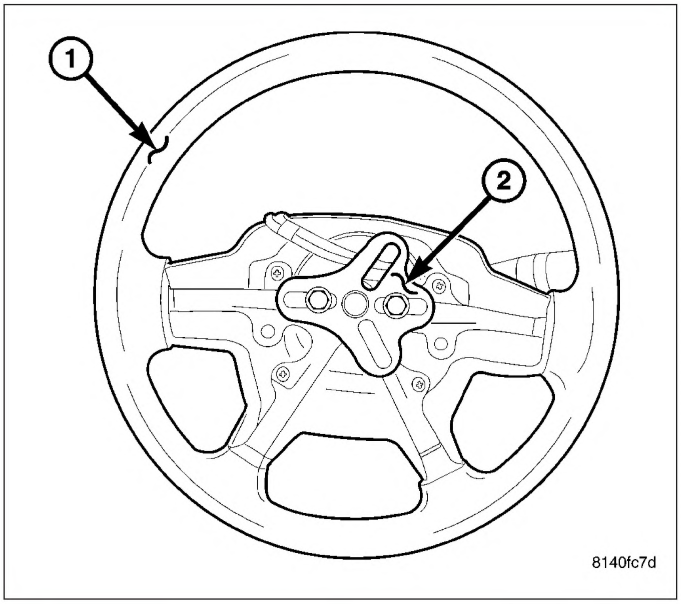
REMOVAL

WARNING: BEFORE SERVICING THE STEERING COLUMN THE AIRBAG SYSTEM MUST BE DISARMED. FAILURE TO DO SO MAY RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIRBAG AND POSSIBLE PERSONAL INJURY. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

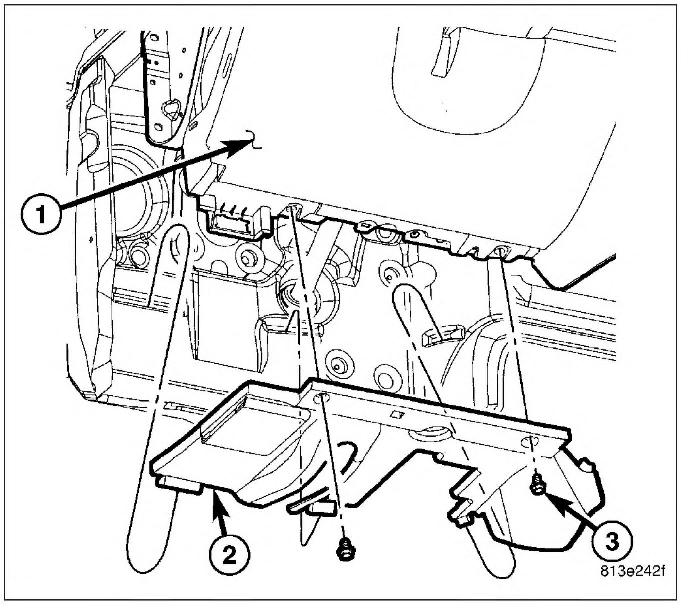
1. Position front wheels straight ahead.
2. Disconnect and isolate the negative (ground) cable from the battery.
3. Remove the airbag (1), (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).



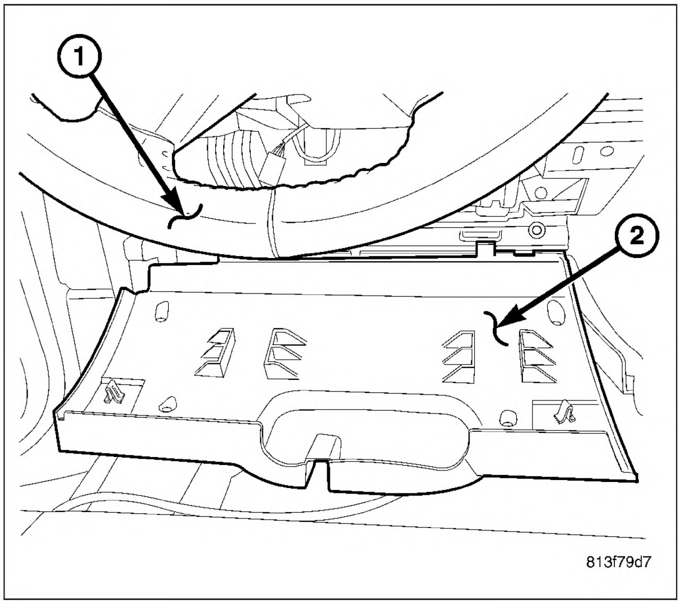
4. Remove the steering wheel bolt and remove wheel (1) with appropiate Puller (2).



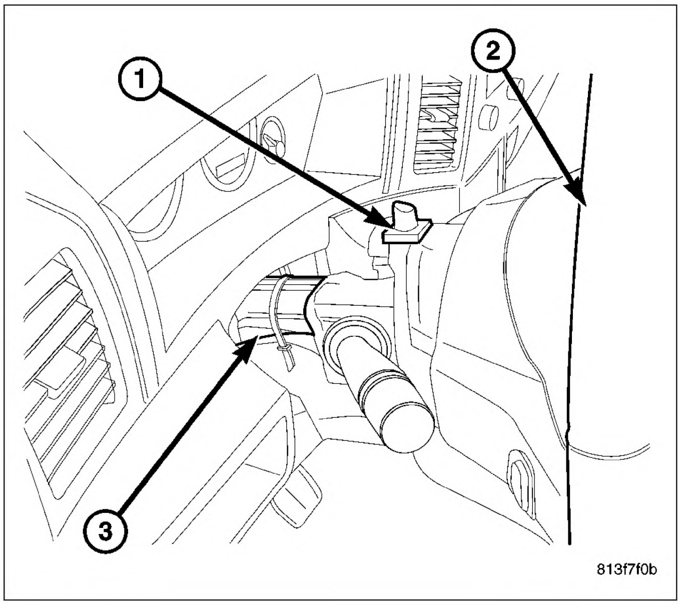
5. Remove the hush panel (2).


1
2
3
813e242f

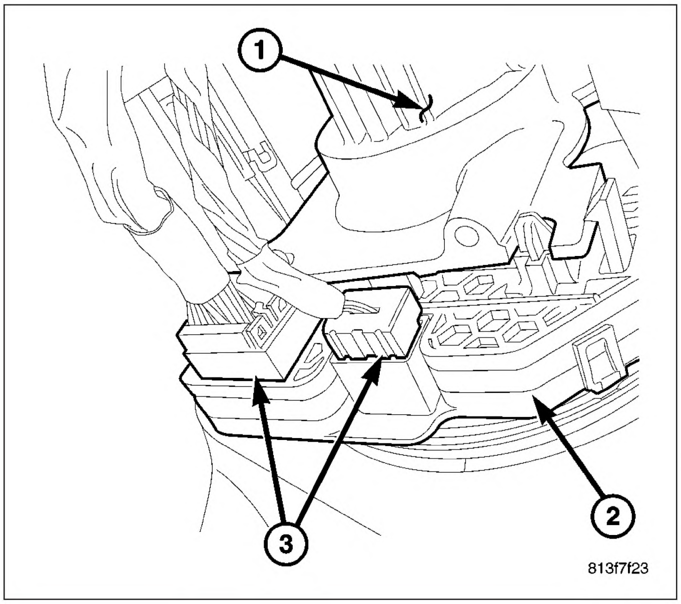
6. Remove the access cover (2), (Refer to 23 - BODY/INSTRUMENT PANEL - REMOVAL).


1
2
813f79d7

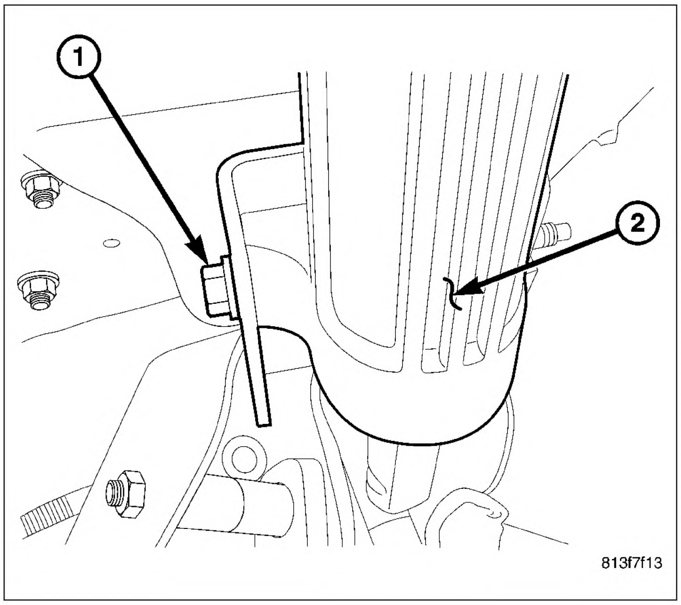
7. Remove the steering column shrouds to gain access to mulit-function switch (1) electrical connectors.



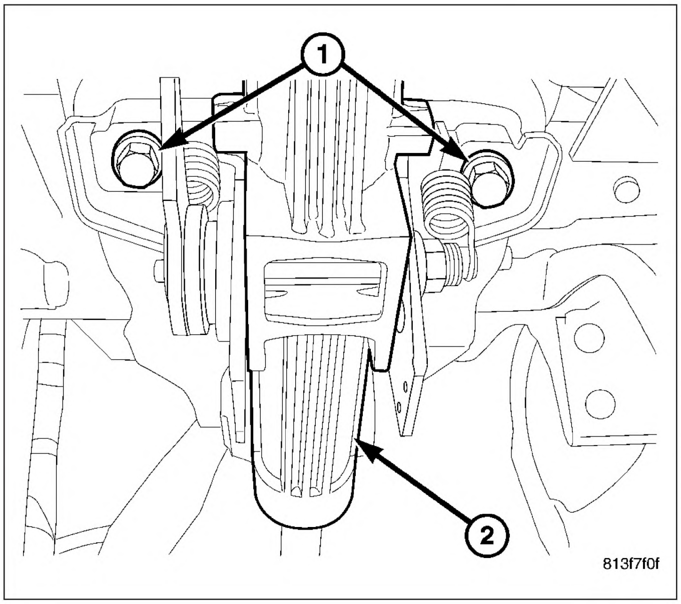
8. Disconnect the multifunction switch harness (30.
9. Remove the multifunction switch. Slide the multifuction switch and clock spring off the column as an assembly.



10. Remove the column cross bolt (1) and slide the column (2) downward off the bracket.



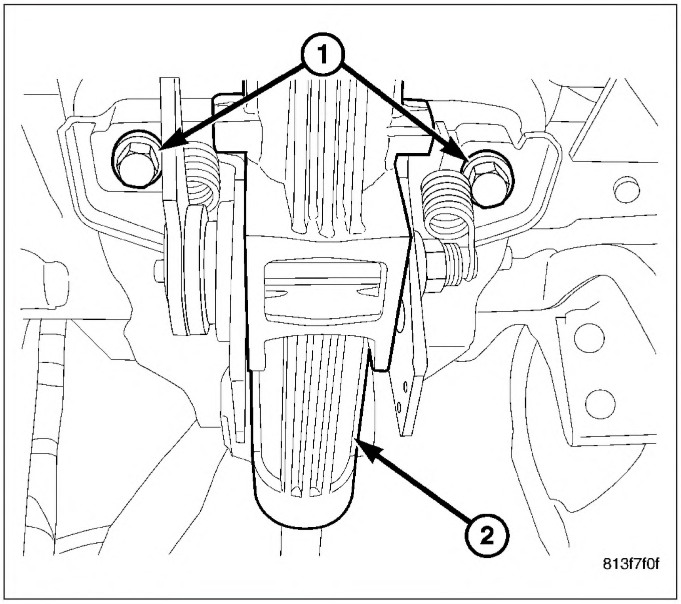
11. Remove the pinch bolt at the lower part of the column and upper intermediate shaft coupling.
12. Remove the column mounting bolts (1) and lower column (2) down. Remove the column (2) from the vehicle.



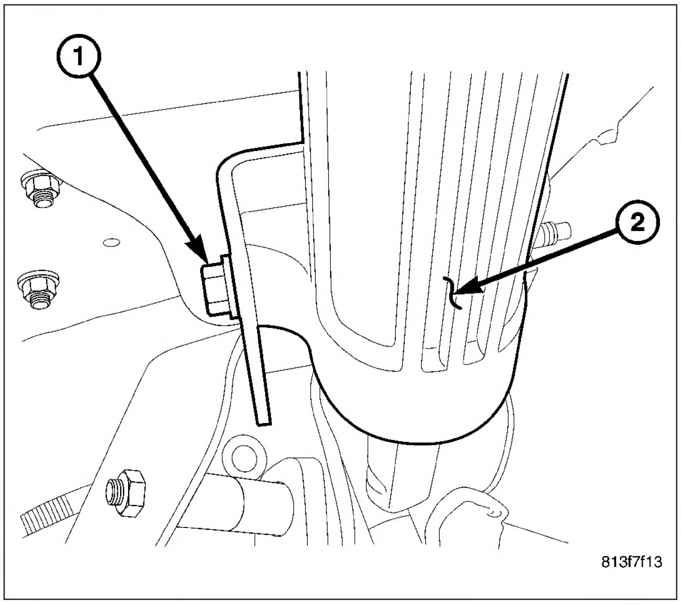
INSTALLATION

WARNING: BEFORE SERVICING THE STEERING COLUMN THE AIRBAG SYSTEM MUST BE DISARMED. FAILURE TO DO SO MAY RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIRBAG AND POSSIBLE PERSONAL INJURY. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

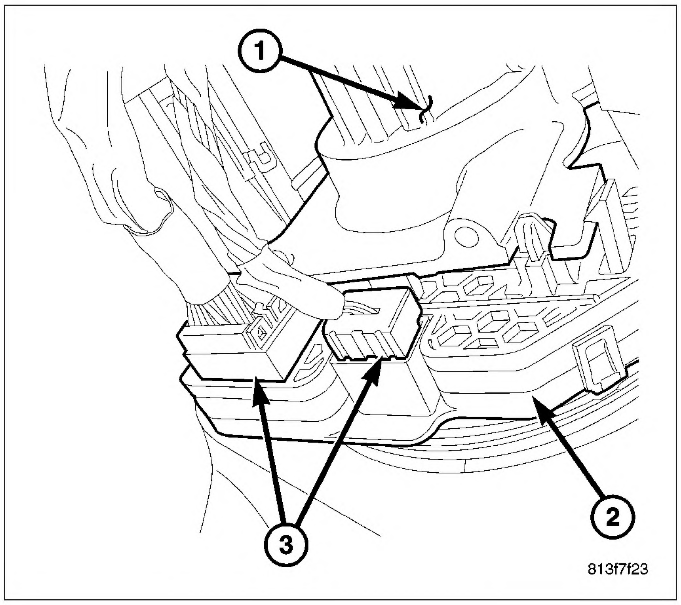
1. Install the column (2) into the vehicle and lift the column up into place. Install the mounting bolts (1) and tighten to 12 N·m (105 in. lbs.).
2. Slide the coupler onto the column shaft and install a **new** coupler bolt. Tighten the coupler bolt to 49 N·m (36 ft. lbs.).



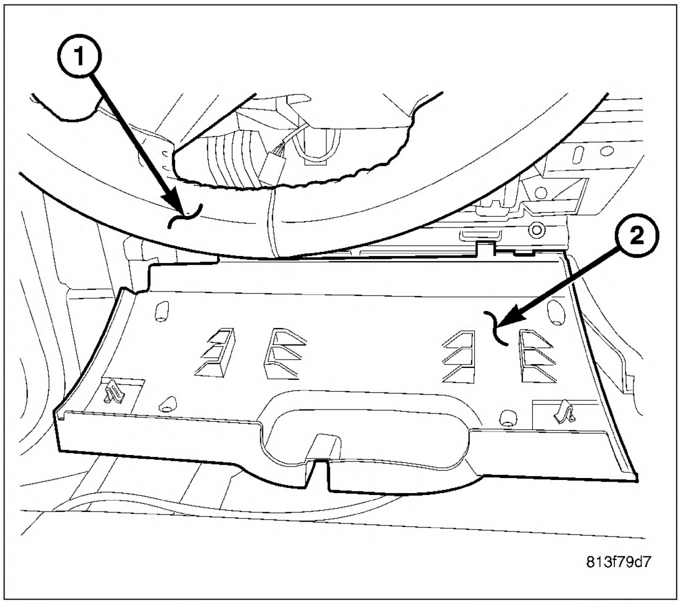
3. Install the column cross bolt (1) and tighten to 12 N·m (105 in. lbs.).



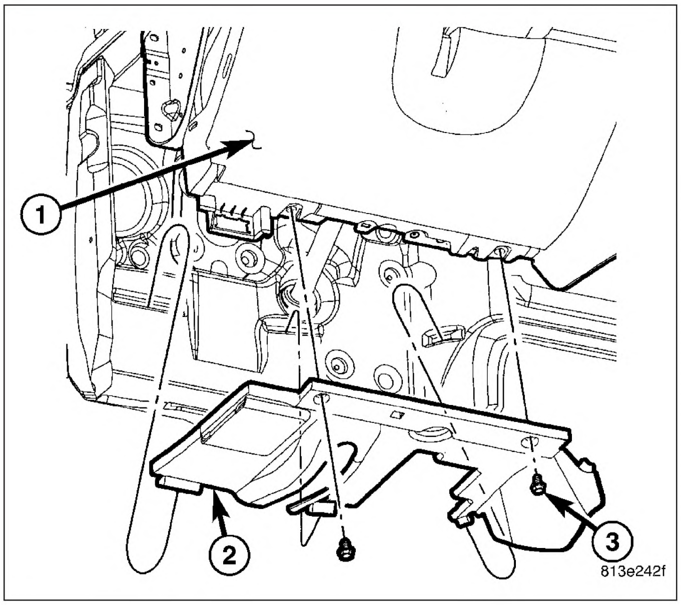
4. Slide the multifunction switch and clock spring onto the column as an assembly.
5. Connect the electrical connector (3) for the multifunction switch (2).



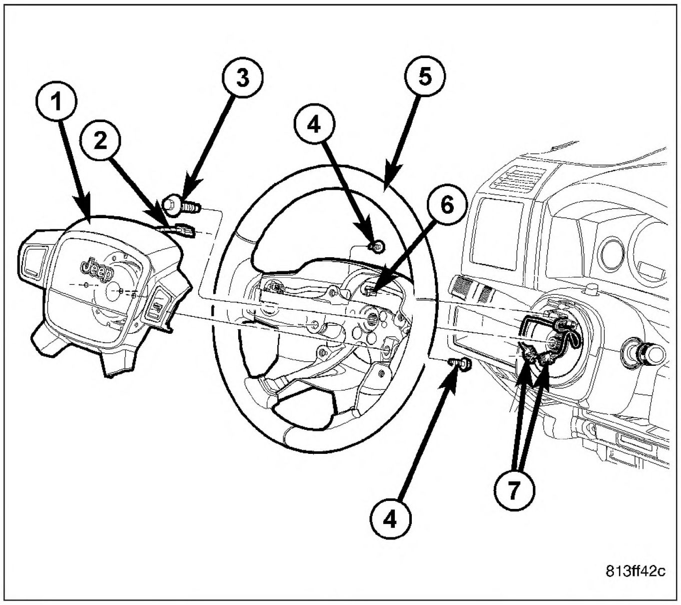
6. Install the shrouds.
7. Install the column access cover (2) (Refer to 23 - BODY/INSTRUMENT PANEL - INSTALLATION).



8. Install the hush panel (2).



9. Align the steering wheel (5) with the column index spline and install the wheel on the column shaft. Pull the clockspring wire harness (7) through the steering wheel armature spokes.
10. Install and tighten the steering wheel mounting bolt (3) to 61 N·m (45 ft. lbs.).
11. Connect the steering wheel wire harness connector (2 &6) to the clock spring connector.
12. Install the airbag (1), (Refer to 8 - ELECTRICAL/ RESTRAINTS/DRIVER AIRBAG - INSTALLATION).
13. Connect the negative (ground) cable to the battery.



SPECIFICATIONS

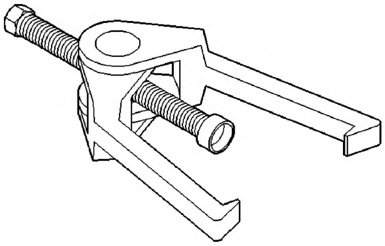
TORQUE CHART

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Steering Column Steering Wheel Nut	61	45	—
Steering Column Column Bracket Nuts	12	—	105
Steering Column Shaft Coupler Bolts	49	36	—

SPECIAL TOOLS

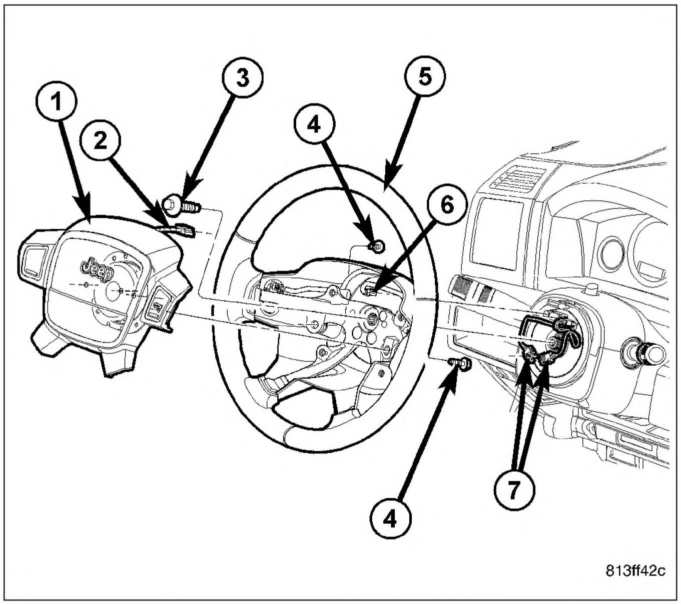
STEERING COLUMN



STEERING WHEEL

REMOVAL

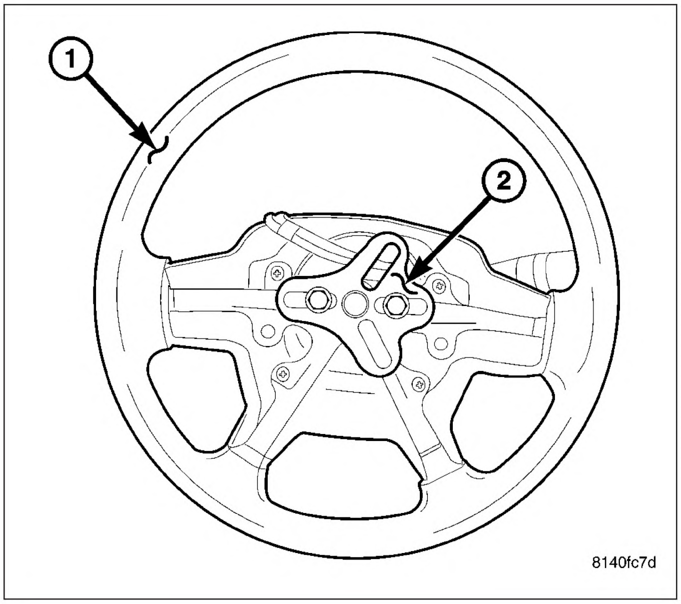
1. Disable and remove the drivers side airbag (1). (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).
2. Disconnect all the electrical connectors (2,6&7).



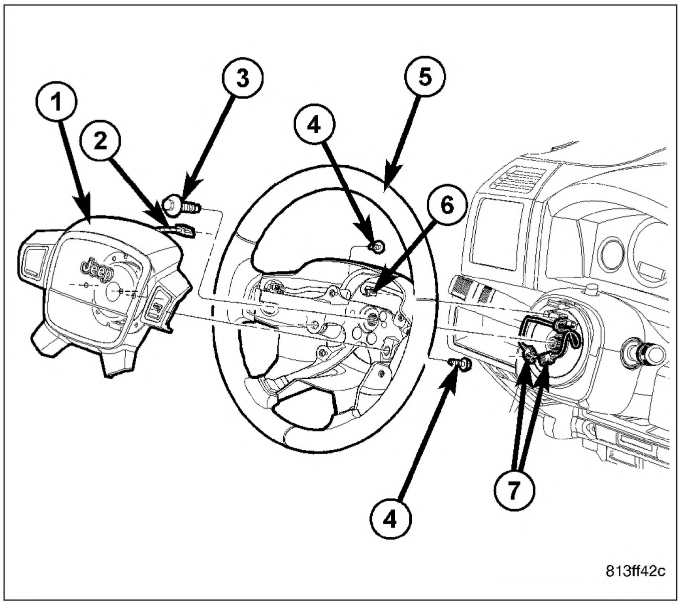
3. Partially remove the steering wheel bolt and leave the bolt in the column.
4. Install puller (2) or equivalent using the top of the bolt to push on.

NOTE: Ensure the bolts are threaded firmly into the steering wheel.

5. Remove the steering wheel.



INSTALLATION



1. Install steering wheel (5) to the column

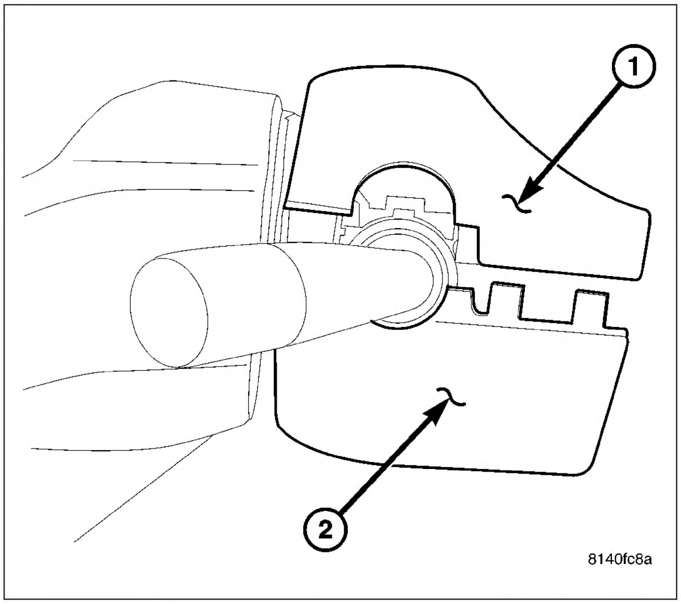
NOTE: Do not reuse the old steering wheel bolt (3) (a new bolt must be used)

NOTE: Be certain that the steering wheel mounting bolt is tightened to the proper torque specification to ensure proper clockspring operation.

2. Install the new steering wheel bolt (3). Tighten the bolt to 54 N·m (40 ft. lbs.).
3. Reconnect all the electrical connectors (2,6&7).
4. Install the drivers side air bag (1). (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

SHROUD

REMOVAL



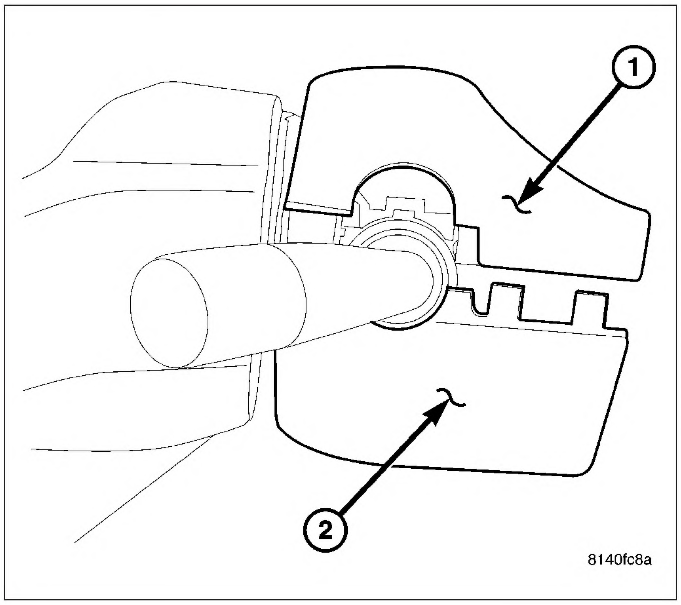
1. Remove the three bolts in the lower shroud (2).

NOTE: Use care not to break off the tangs on the shrouds.

2. Then unsnap the lower shroud (2) from the upper shroud (1).

INSTALLATION

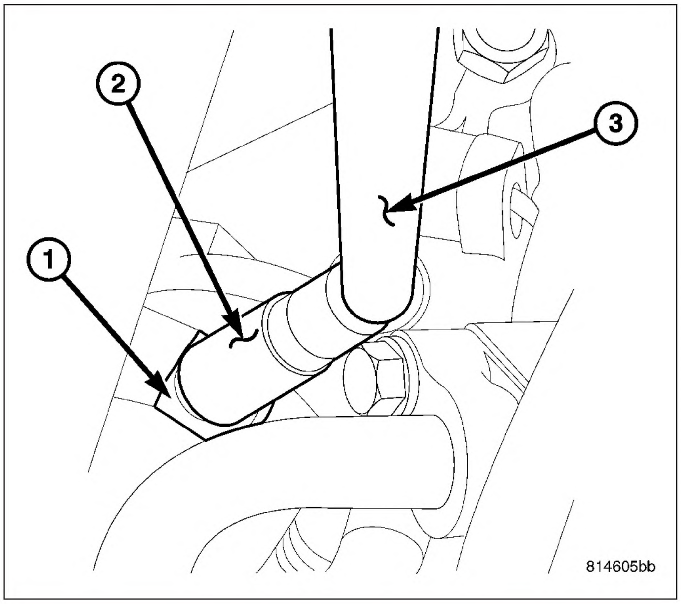
1. Install the upper shroud (1) on the column.
2. Install the lower shroud (2) to the column.
3. Snap the two halves back into place.
4. Install the three mounting bolts to secure the shroud in place.



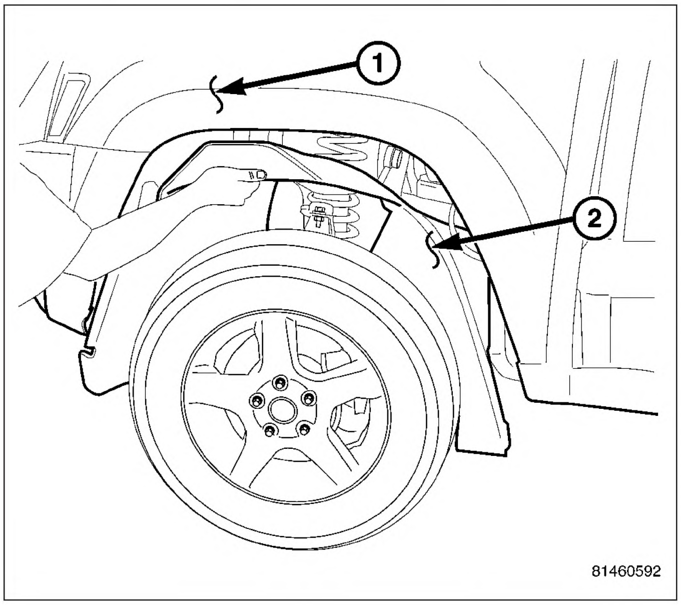
INTERMEDIATE SHAFT

REMOVAL

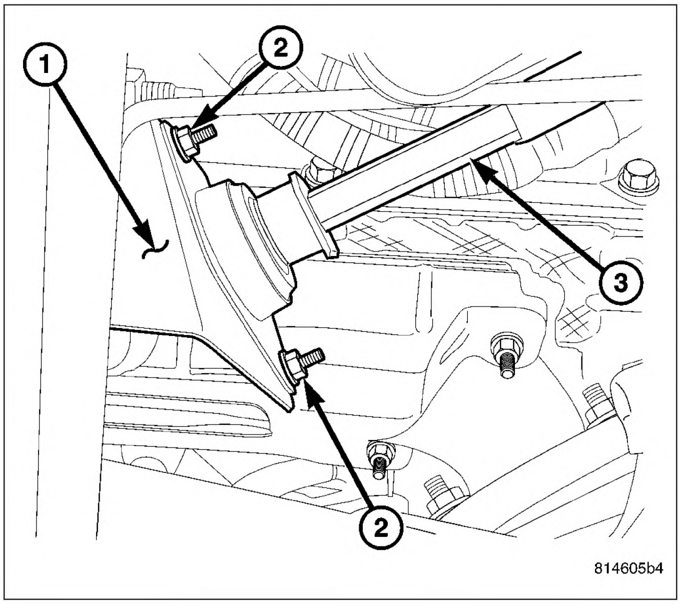
1. Remove the lower coupling (1) pinch bolt using a long extension (3) with a swivel socket (2).



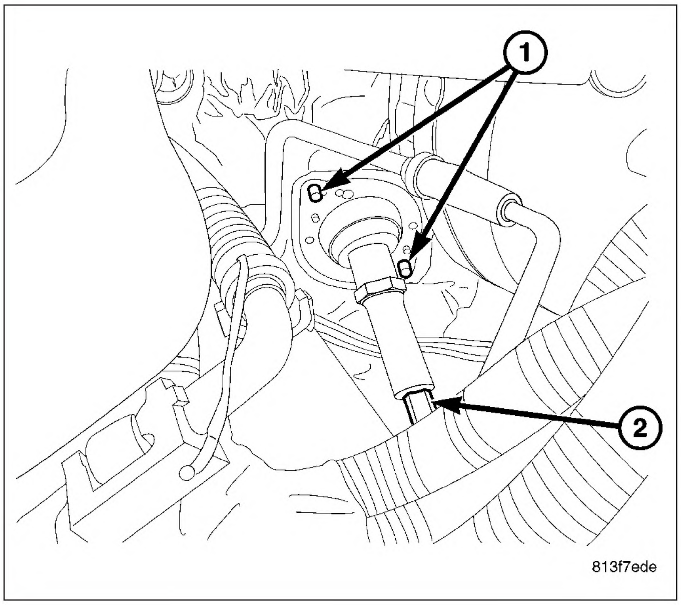
2. Raise and support the vehicle.
3. Remove the left inner fender well (2) to gain access to the intermediate shaft.



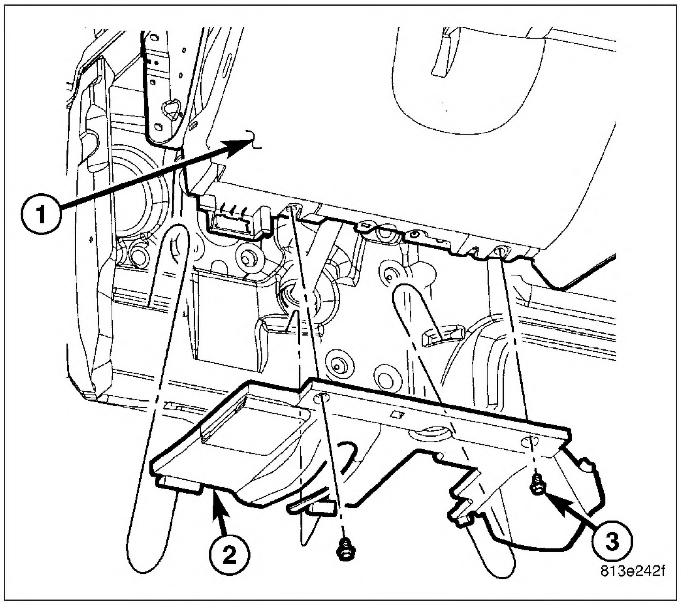
4. Remove the intermediate shaft bearing nuts (2) from the bracket (1).
5. Remove the intermediate shaft bearing bracket (1) from the frame.



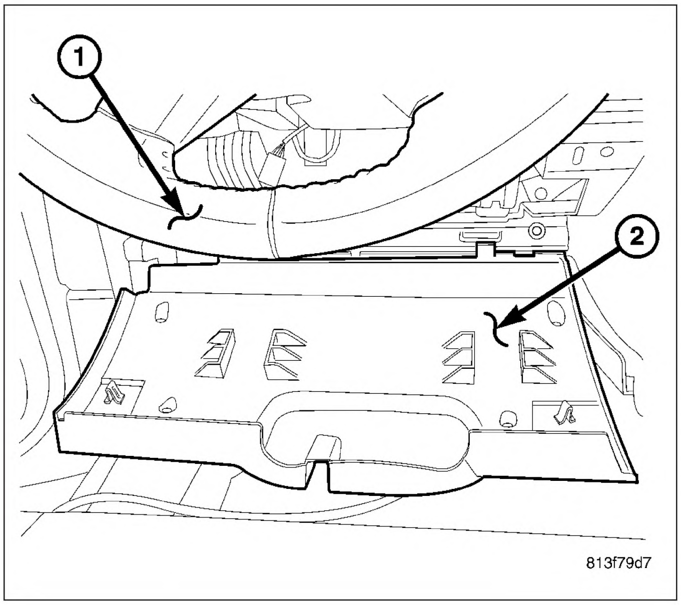
6. Remove the intermediate shaft (2) mounting nuts (1) to the bulkhead (The lower nut can be accessed from the inner fender well and the upper can be accessed from the top by the master cylinder).



7. Remove the hush panel (2).



8. Remove the column access cover (2).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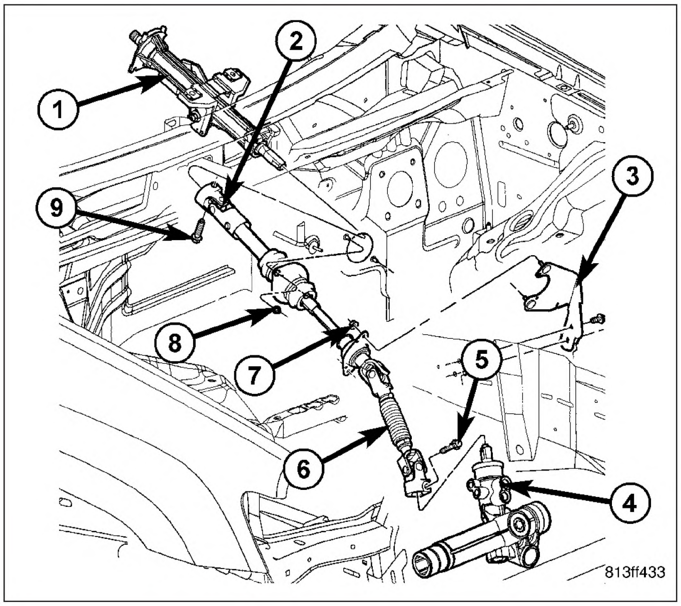
9. Remove the pinch bolt at the upper coupling (2) to the column (1).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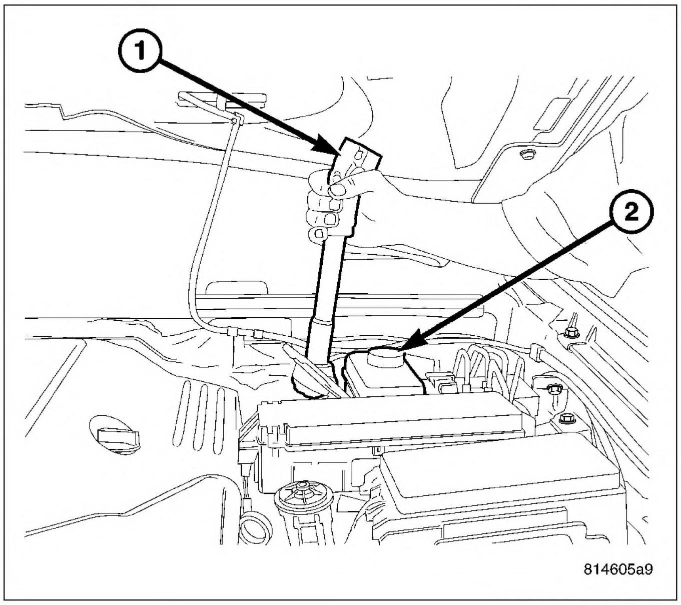
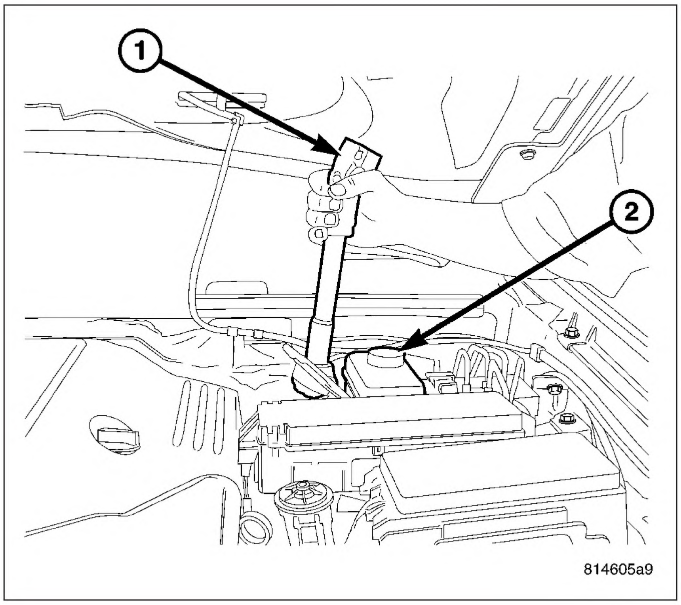
10. Slide the shaft forward past the lines and then upwards.
11. Remove the shaft (1) out from the top by the master cylinder (2).

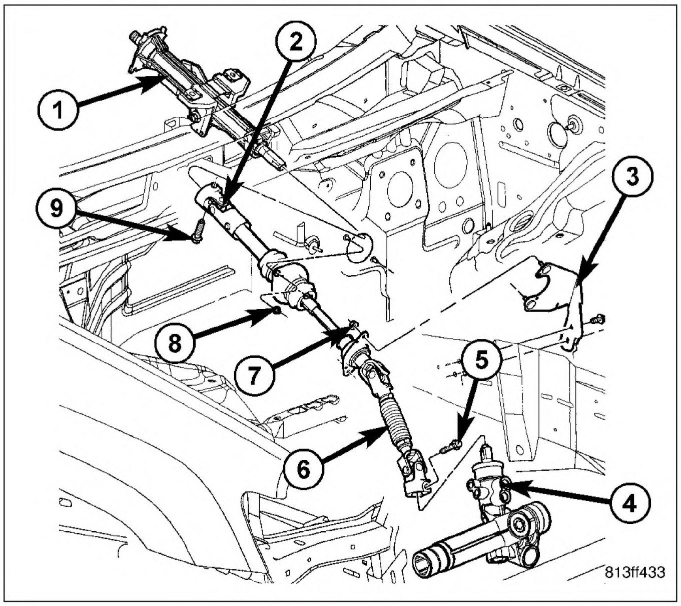


INSTALLATION

1. Install the shaft (1) in from the top by the master cylinder (2).
2. Slide the shaft forward past the lines and then upwards.



3. Install a **new** pinch bolt at the upper coupling (2) to the column (1).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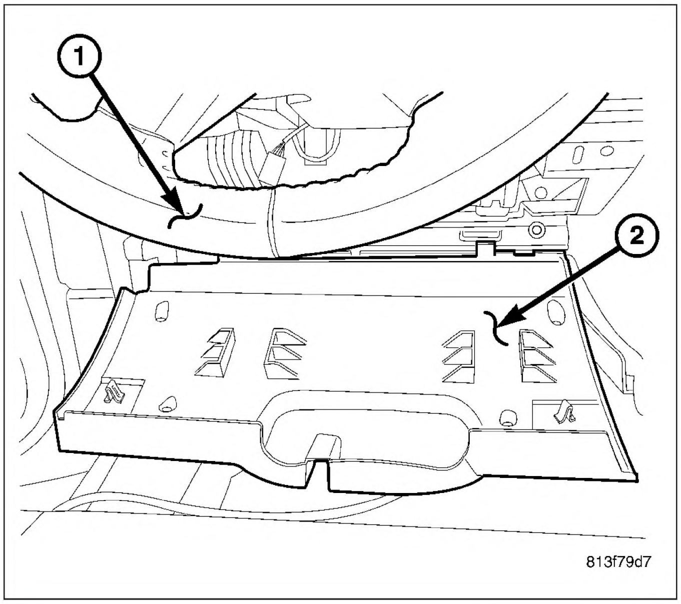
4. Install the column access cover (2).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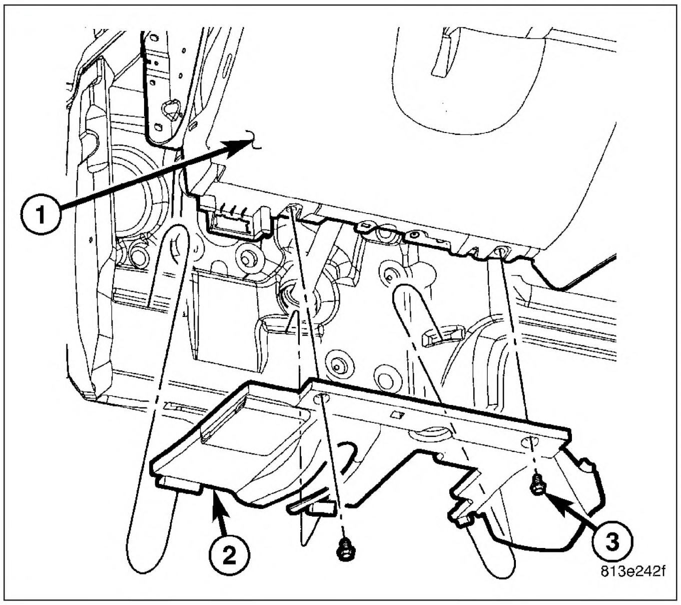
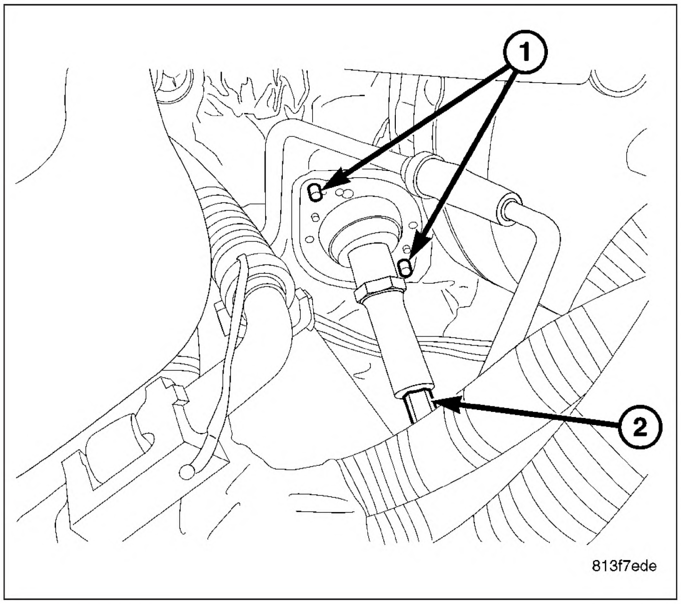
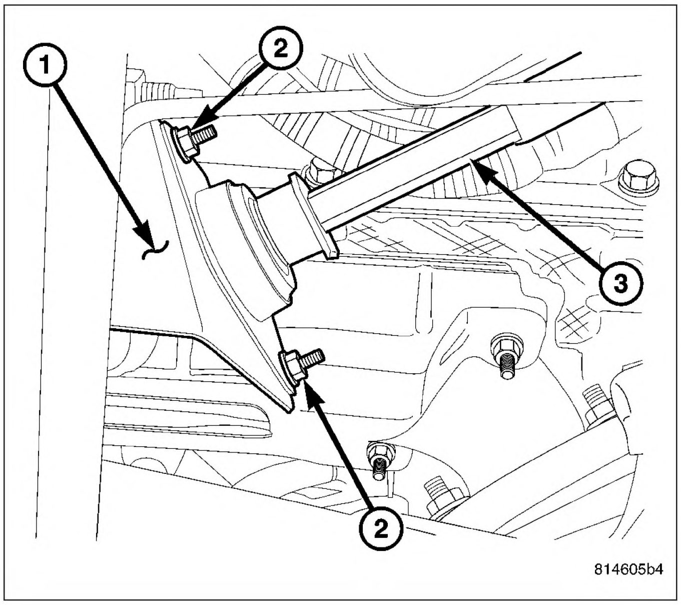
5. Install the hush panel (2).



6. Install the intermediate shaft (2) mounting nuts (1) to the bulkhead (The lower nut can be accessed from the inner fender well and the upper can be accessed from the top by the master cylinder).



7. Install the intermediate shaft bearing nuts (2) to the bracket (1).
8. Install the intermediate shaft bearing bracket (1) to the frame.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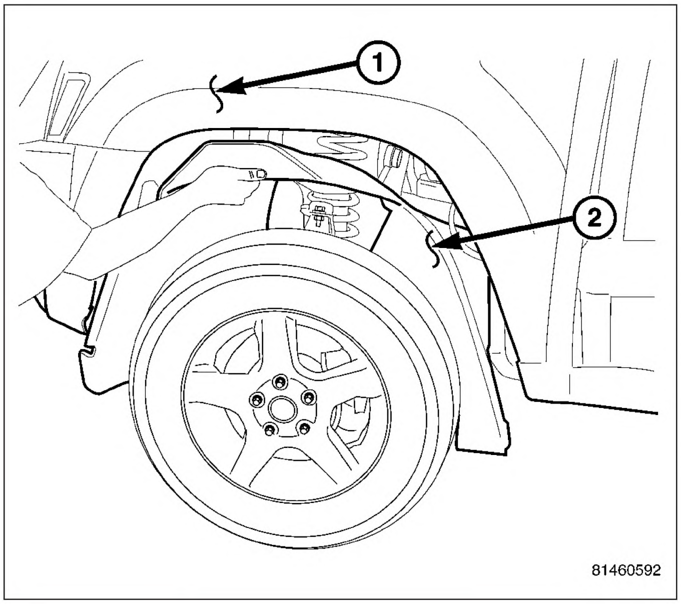
9. Install the left inner fender well (2).
10. Lower the vehicle.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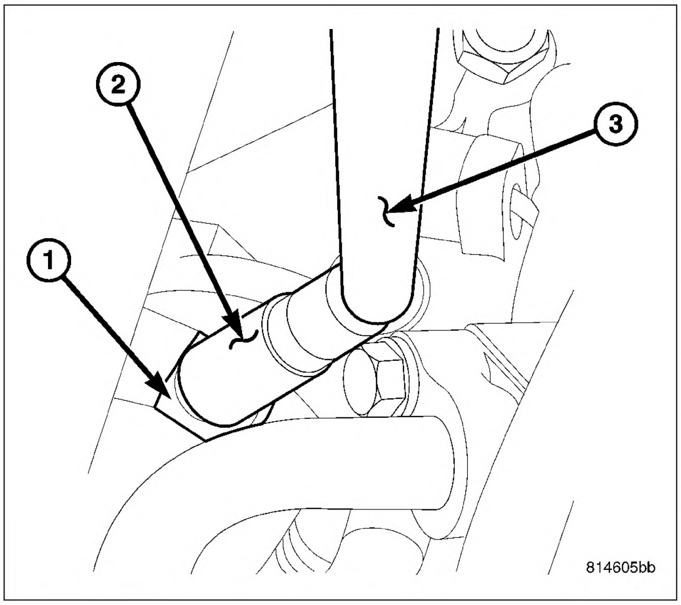
11. Install the lower coupling (1) pinch bolt using a long extension (3) with a swivel socket (2).

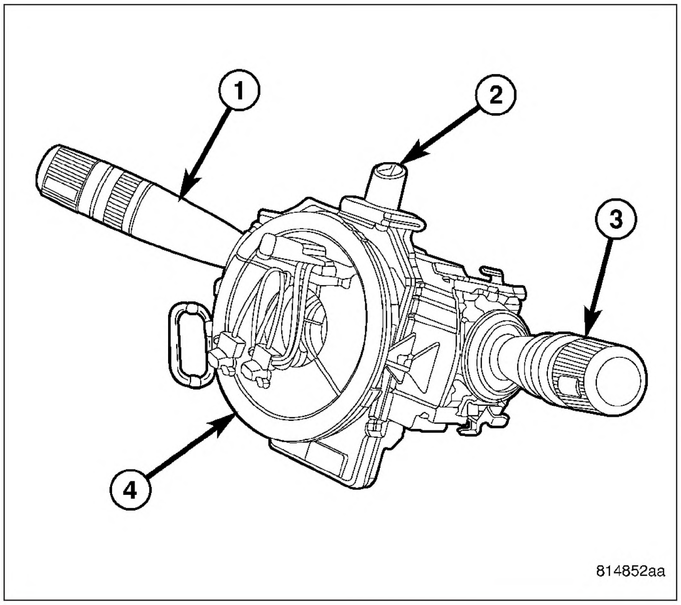


MODULE-STEERING CONTROL

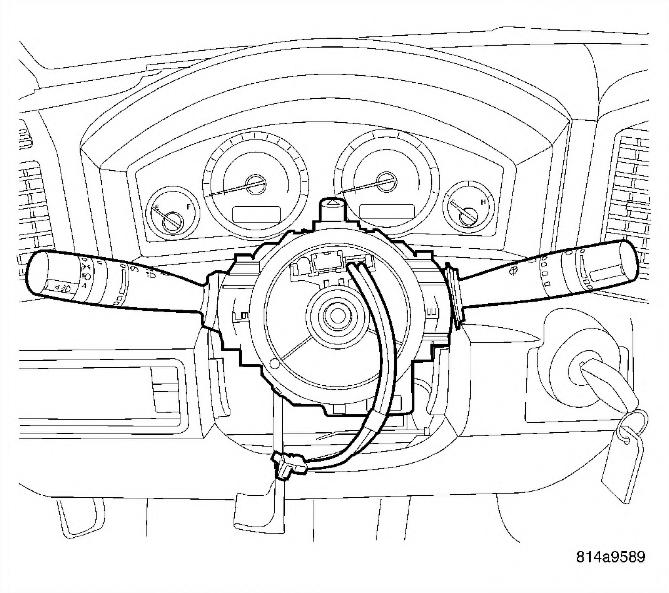
DESCRIPTION

WARNING: The Steering Control Module (SCM) must be replaced in the event of a frontal impact event where the front airbags have been deployed. The clockspring is integral to the SCM and is not reusable.

This vehicle is equipped with a Steering Control Module (SCM) that houses an integral clockspring. It is an interface for switches such as ignition, lighting, wipers, horn, speed control, and remote radio. The SCM receives switch input and either directly sends or buses the outputs to the proper destinations. The module communicates via the Controller Area Network (CAN) B data bus. If the vehicle is equipped with ESP, the module is equipped with a steering angle sensor. Steering angle data is sent over the CAN C data bus.



The Steering Control Module (SCM) is mounted to the steering column shaft. The SCM is located under the steering column shroud and is attached to the steering column with two screws at the upper portion of the module. A key on the cancel cam indexes with a keyway on the steering shaft. There are five electrical connections on the column side of the SCM. The module connects to the vehicles wiring harness with two connectors; a 4-way which is a pass through for the airbag squibs, and a 16-way. The other three connectors are for the hazard and multi-function switches and are concealed when the switches are in place. Any switched input that would cause a vehicle system to function that does not require that the key be ON, such as turning on the lights or sounding the horn, prompts the SCM to wake up on the CAN data bus network. **If equipped with ESP** the steering angle sensor must be recalibrated using the scan tool.



The components that are contained within or attach to the SCM are:

- **Clockspring** - The clockspring is integral to and serviced as a unit with the Steering Control Module (SCM).
- **Connectors** - The steering wheel side of the SCM contains four connectors. These consist of a 2-way, a 6-way and two squib connectors. Two short harnesses connect the steering wheel mounted airbag to the clockspring. These circuits pass directly through the SCM and are connected to the vehicle wiring at the 4-way connector located on the column side of the module. These circuits are directly connected to the ORC. The 6-way connector contains the horn signal and horn return circuits. The horn is an input to the SCM. The SCM receives the switch input and sends a bussed message over CAN B Bus. The 6-way connector also contains 2-speed control sense circuits and a speed control sense return. These circuits pass through and go directly to the PCM.
- **Hazard Switch** - The hazard switch is located on the column side of the SCM. The FCM provides a 12-volt sense to the hazard switch. When the hazard switch is latched ON the sense circuit is connected to ground. Pulling the sense circuit voltage low indicates a request for hazard operation. The hazard switch is attached to the SCM using locking tabs and ears and can be serviced separately.
- **Ignition switch** - The ignition switch is a combination of direct power feed and a position sensor. The SCM sends a 5-volt reference to the MUX portion of the switch. The SCM determines switch positions and sends this information over the CAN B Bus. The ignition sense inputs to the SCM are ignition switch sense (MUX reference) and ignition switch sense return. The SCM ″decodes″ the ignition switch status input to determine the current position of the ignition switch because the switch is a resistive MUX component. The voltage values of the ignition switch changes depending on the position of the switch.
- **Left Multi-Function Switch** - The left multi-function stalk contains the lighting functions, high beams, turn signals, park lamps, fog lamps, interior lights and panel dimmer. It is a MUX type switch and is connected to the SCM using an 11-way connector. All outputs form the left multi-function switch are bused from the SCM. The left multi-function switch can be serviced separately. It attaches to the SCM using a combination of locking tabs and two screws.
- **Right Multi-Function Switch** - The right multi-function stalk contains the front and rear wiper and washer functions. It is a MUX-type switch and is connected to the SCM using a 9-way connector. All outputs from the right multi-function switch are bused from the SCM except the Rear Wiper On signal and the Rear Wiper Delay signal. These are controlled by high side drivers in the SCM based on MUX inputs. They are direct inputs to the rear wiper motor. The right multi-function switch can be serviced separately. It attaches to the SCM using a combination of locking tabs and two screws.
- **Steering wheel mounted switches** - Steering wheel mounted remote radio controls use MUX type switches. A MUX signal and a return circuit connect to the SCM at the 2-way connector. The SCM receives the switch input and sends a bussed message over CAN B Bus.
- **Steering Angle Hall Effect Sensor (if equipped with Electronic Stability Program (ESP)** - The SCM contains an additional Hall Effect sensor which is driven off the steering shaft. A 51-tooth gear attached to the data wheel drives an 18-tooth gear containing magnets. (.35 to 1 ratio) These magnets change the magnetic field surrounding the Hall sensors as the steering wheel is rotated. Determining if the clockspring is centered is

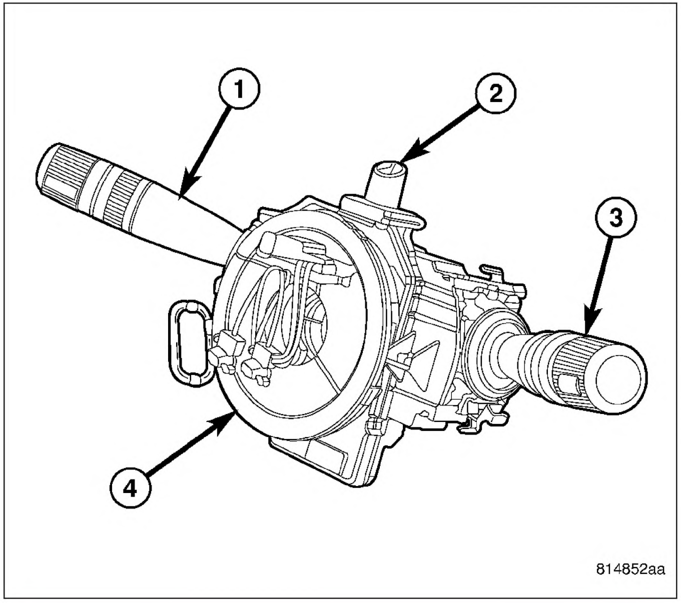
possible by observing the scan tool. Steering wheel position is displayed as ″Angle″ with a range of up to ± 900 degrees. Since the SCM determines the position from the data of both sensors, the SCM does not have to be initialized following a battery disconnect. Steering angle information is sent over the CAN C Bus.

- **Steering Angle Sensor (if equipped with Electronic Stability Program (ESP)** - Vehicles equipped with ESP use a steering angle sensor. The sensor is internal to the SCM and cannot be serviced separately. As the steering wheel is rotated an internal data wheel or code disc interrupts infrared light beams. Optic clusters containing three rows of four light detectors, determine steering wheel position based on which beams are interrupted and which are not. The SCM can also distinguish all steering wheel position from lock to lock.

NOTE: Vehicles using Electronic Throttle Control (ETC) use a second (redundant) speed control sense circuit.

The following components can be serviced separately.

- Hazard Switch (2)
- Right Multi-Function (wiper/washer) Switch (3)
- Left Multi-Function (lighting control) Switch (1)
- Cancel Cam
- Steering Angle Sensor (if equipped with Electronic Stability Program (ESP)
- Steering Control Module (SCM) with integral clockspring (4)



OPERATION

The Steering Control Module (SCM) is connected to a battery feed and ground. It receives battery power on Cavity 8 of the 16-way Connector from the A108 circuit. It is protected by a 10 Amp fuse in Cavity 16 of the Junction Block. It receives ground at Cavity 5 of the 16-way Connector, which is grounded on the Z907 circuit.

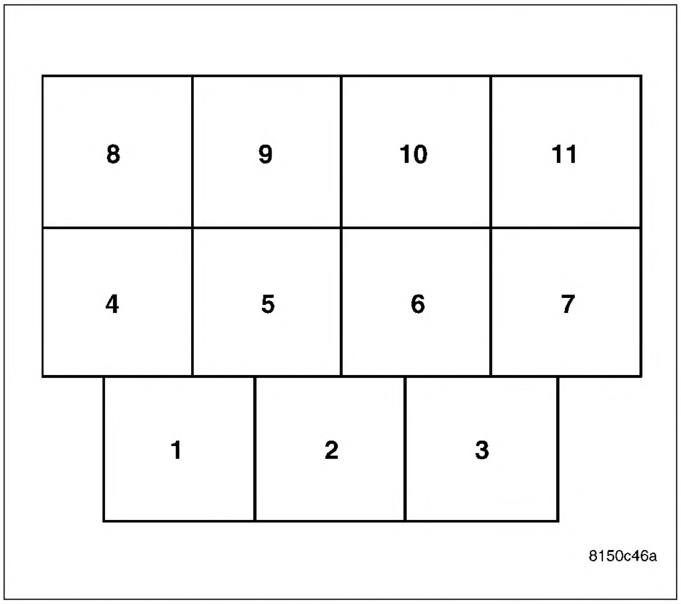
DIAGNOSIS AND TESTING

STEERING CONTROL MODULE SWITCHES

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

The left multi-function switch and right multi-function switch can be diagnosed using conventional diagnostic tools and methods. However, proper testing of the multiplexed inputs to the Steering Control Module (SCM) requires the use of a diagnostic scan tool. Refer to the appropriate diagnostic information.

NOTE: Only the effected cavities are listed in each of the tables.



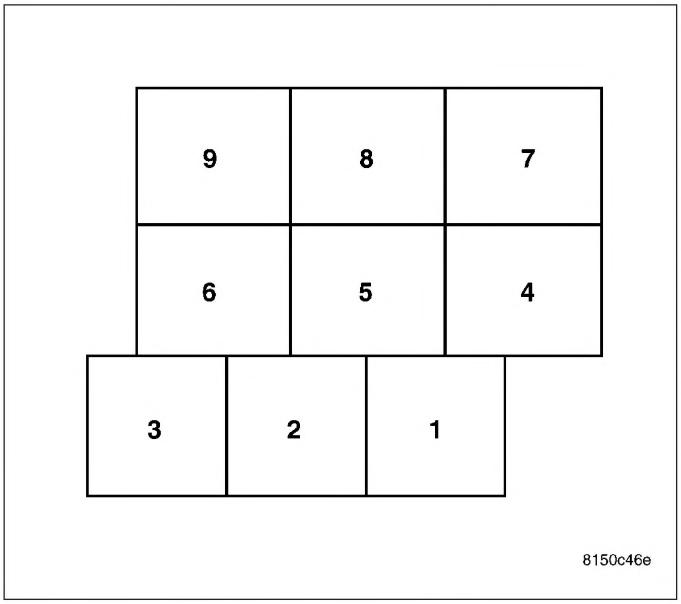
LEFT MULTI-FUNCTION (LIGHTING CONTROL) SWITCH RESISTANCE - TURN AND BEAM SELECT

FUNCTION	CAVITY			RESISTANCE
	1	2	3	
Nuetral	X	X	X	Open
Right Turn		X	X	0 Ohms
Left Turn		X	X	649 Ohms
High Beam	X	X		649 Ohms
Flash to Pass	X	X		0 Ohms

LEFT MULTI-FUNCTION (LIGHTING CONTROL) SWITCH RESISTANCE - EXTERIOR LAMPS

FUNCTION	CAVITY				RESISTANCE
	4	5	6	7	
Off	X			X	869 Ohms
Park Lamps			X	X	221 Ohms
Headlamps	X			X	221 Ohms
Auto			X	X	69 Ohms
Fog Lamps		X		X	0 Ohms

NOTE: Only the cavities being tested are listed in each of the tables.



RIGHT MULTI-FUNCTION (WIPER/WASHER) SWITCH RESISTANCE - WASH AND MIST

FUNCTION	CAVITY		RESISTANCE
	1	2	
Wash	X	X	0 Ohms
Mist	X	X	650 Ohms

RIGHT MULTI-FUNCTION (WIPER/WASHER) SWITCH RESISTANCE - FRONT WIPER FUNCTIONS

FUNCTION	CAVITY		RESISTANCE
	7	9	
Off	X	X	1581 Ohms
Delay 1	X	X	695 Ohms
Delay 2	X	X	463 Ohms
Delay 3	X	X	323 Ohms
Delay 4	X	X	232 Ohms
Delay 5	X	X	169 Ohms
Low	X	X	96 Ohms
High	X	X	0 Ohms

RIGHT MULTI-FUNCTION (WIPER/WASHER) SWITCH RESISTANCE - REAR WIPER FUNCTIONS

FUNCTION	CAVITY		RESISTANCE
	4	5	
Wash	X	X	0 Ohms
Off	X	X	1045 Ohms
Intermittant	X	X	382 Ohms
Wiper	X	X	174 Ohms
Wash0 Ohms	X	X	0 Ohms

REMOVAL

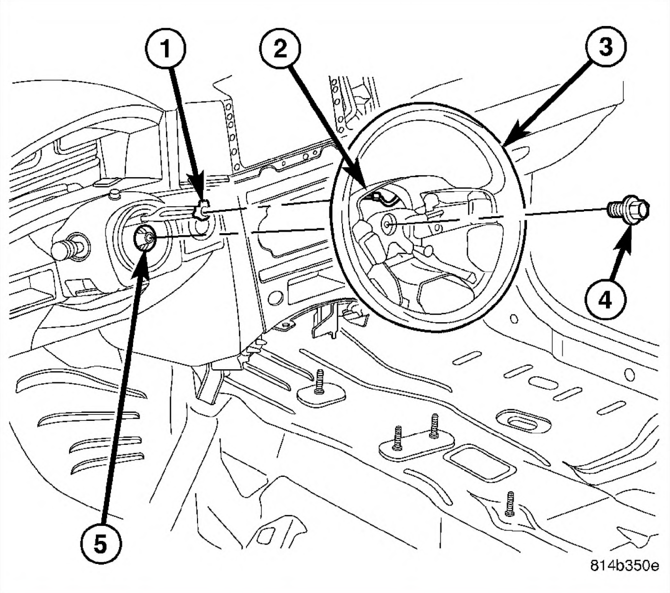
WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

CAUTION: All fasteners must be torqued to specification to ensure proper operation of the steering column.

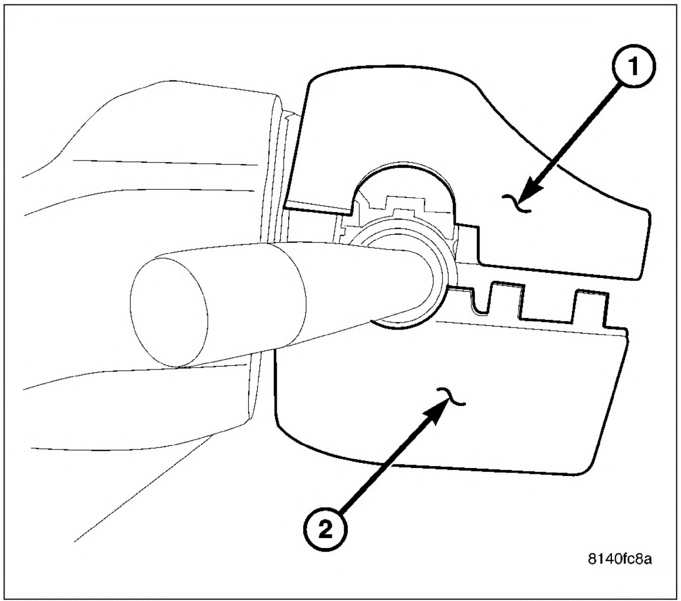
1. Position the front wheels **straight-ahead**.
2. Disconnect and isolate the negative (ground) cable from the battery.

WARNING: Wait two minutes for the airbag system reserve capacitor to discharge before performing further diagnosis or service.

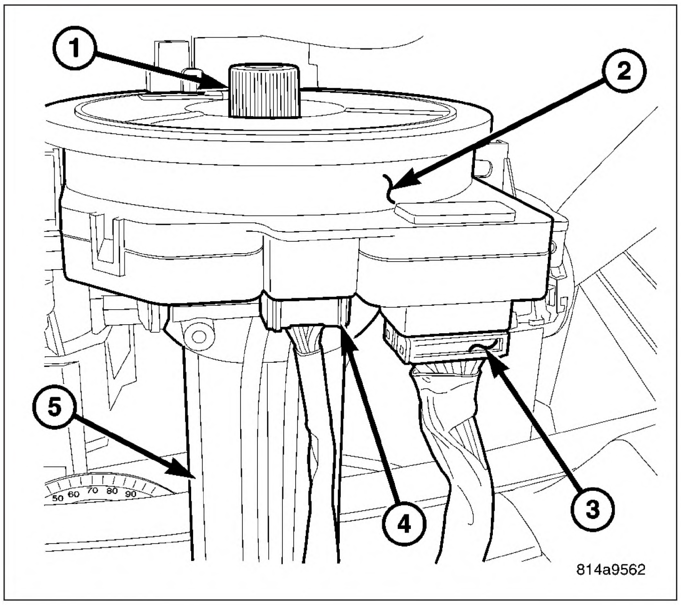
3. Remove the driver airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).
4. Remove the steering wheel retaining bolt (4), then slide the steering wheel (3) off the shaft (5).



Remove the steering column shrouds (1 & 2). (Refer to 19 - STEERING/COLUMN/SHROUD - REMOVAL).



5. Disconnect the two electrical connectors (3 & 4) to the SCM (2).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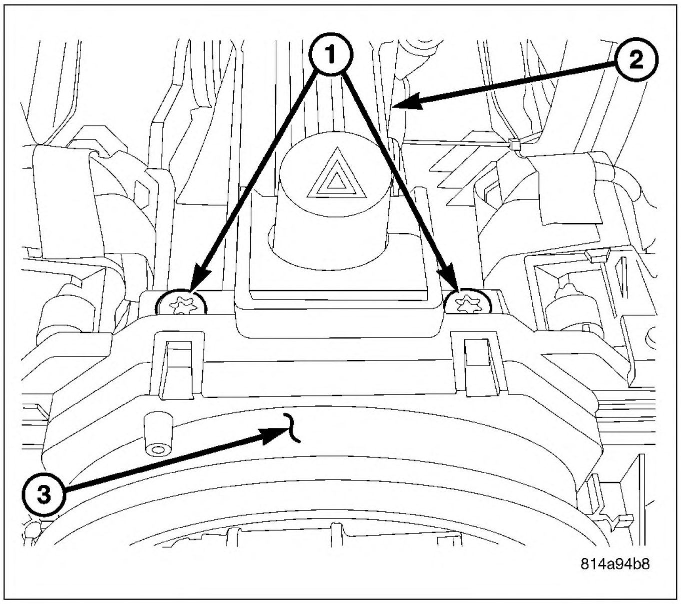
6. Remove the two screws (1) retaining the SCM (3) to the column shaft (2).
7. Pull the SCM (3) off the steering column shaft (2).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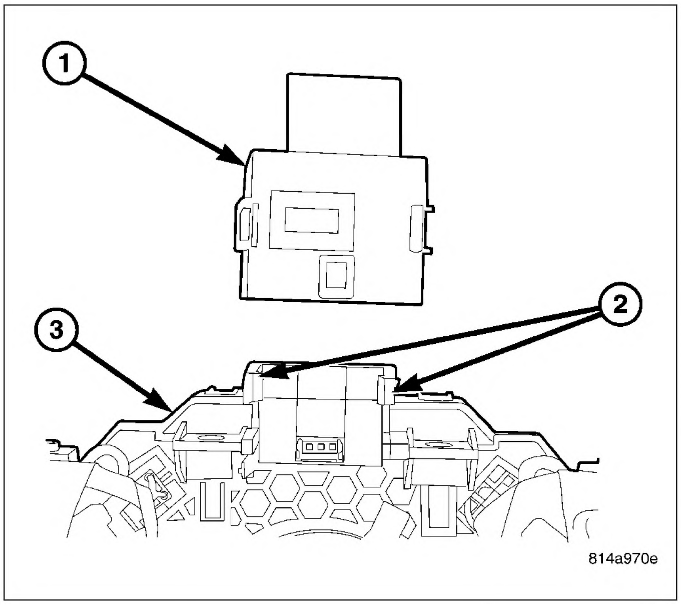
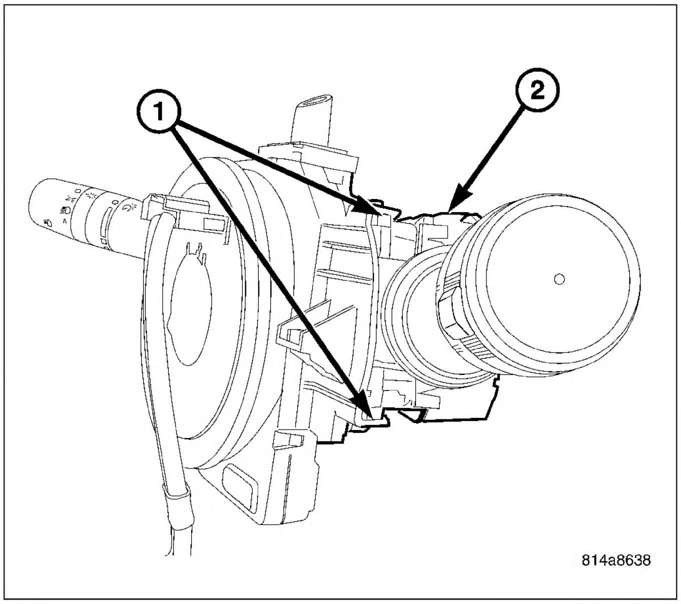
DISASSEMBLY

1. With the SCM (4) removed (Refer to 19 - STEERING/COLUMN/STEERING COLUMN CONTROL MODULE - REMOVAL), remove the hazard switch by releasing the tangs (2) and sliding the switch (1) out of position.

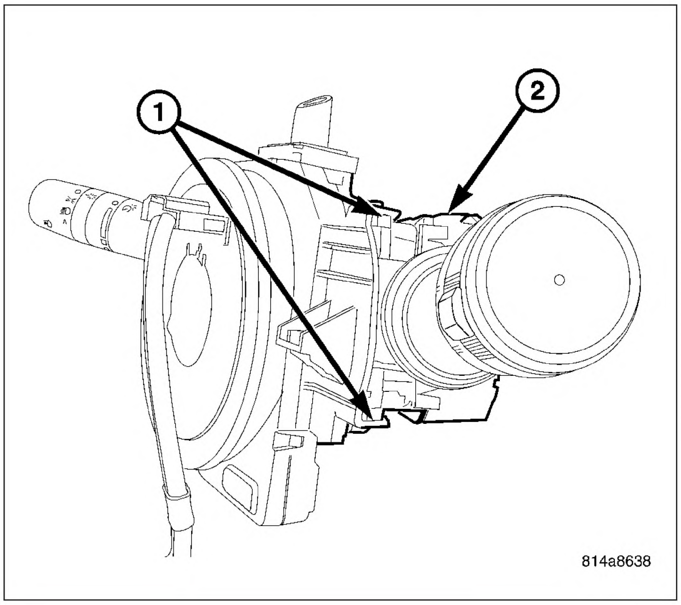


2. Remove the two screws (1) for the right multi-function (wiper/washer) switch (2). The left multi-function (lighting control) switch will be mounted on the left side of the SCM the exact same way. The connectors are integral to the SCM and are self docking.
3. Using a trim stick (special tool #C-4755) or equivalent, gently pry in on the three tabs holding the turn signal cancel cam to the SCM. You must go in through the front of the SCM to release the tabs. Be careful not to break tabs if reusing the cancel cam for they are brittle.

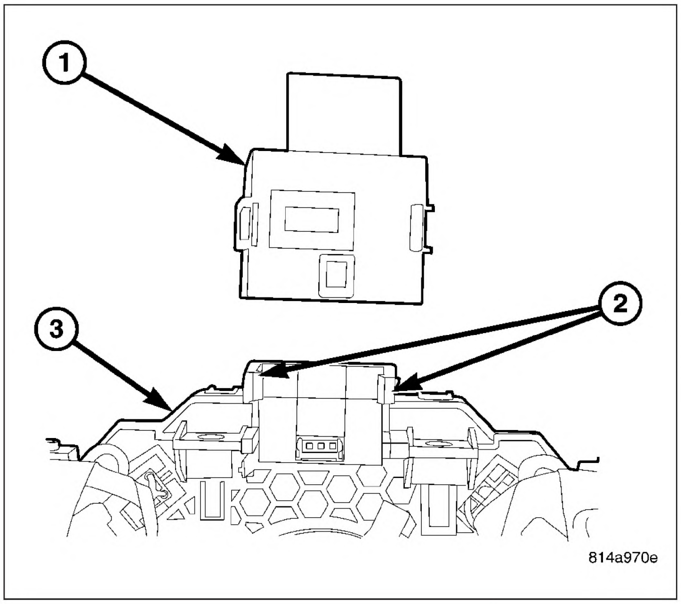


ASSEMBLY

1. Place the turn signal cancel cam into the center of the SCM and firmly snap into place. There is an alignment dowel that will only let you install it one way.
2. Install the right multi-function switch (2) by aligning the self docking connector. Push down firmly to snap switch into place. Install the two screws (1). The left multi-function switch installs the exact same way.

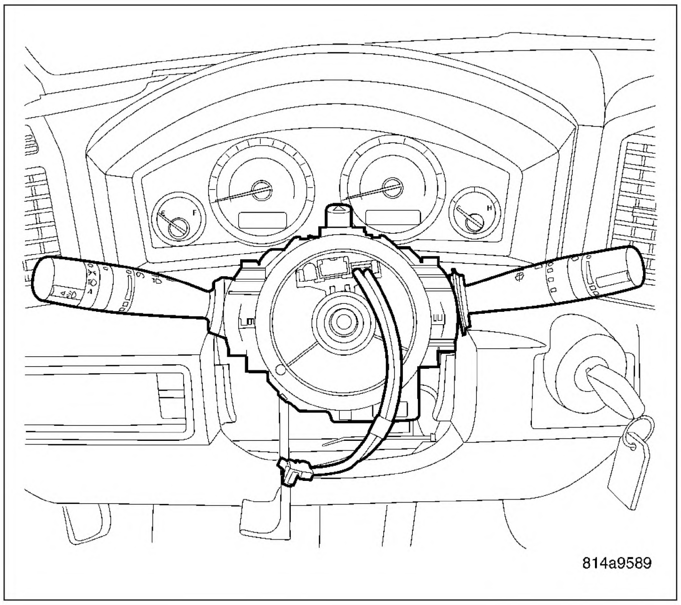


3. Install the hazard switch (1) to the SCM (3) by firmly sliding the switch into position, into the tangs (2).



4. Install the SCM (Refer to 19 - STEERING/COLUMN/STEERING COLUMN CONTROL MODULE - INSTALLATION).

NOTE: IF EQUIPPED WITH ESP - recalibrate the steering angle sensor using the scan tool (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - STANDARD PROCEDURE).

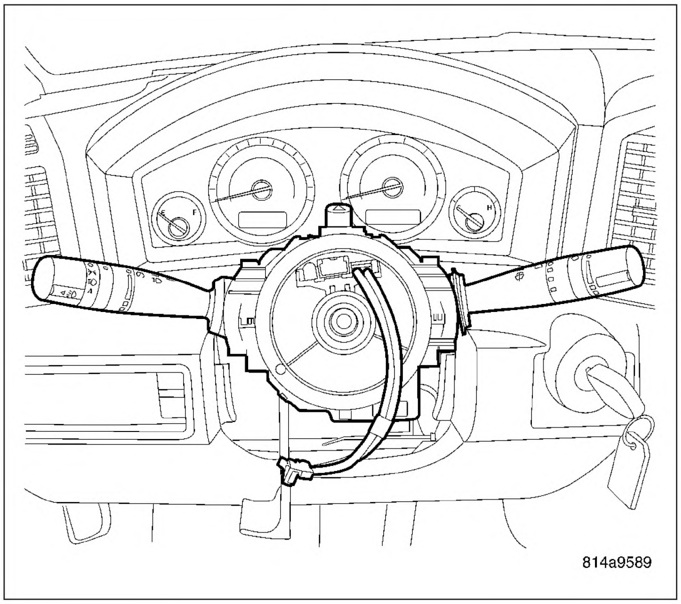


INSTALLATION

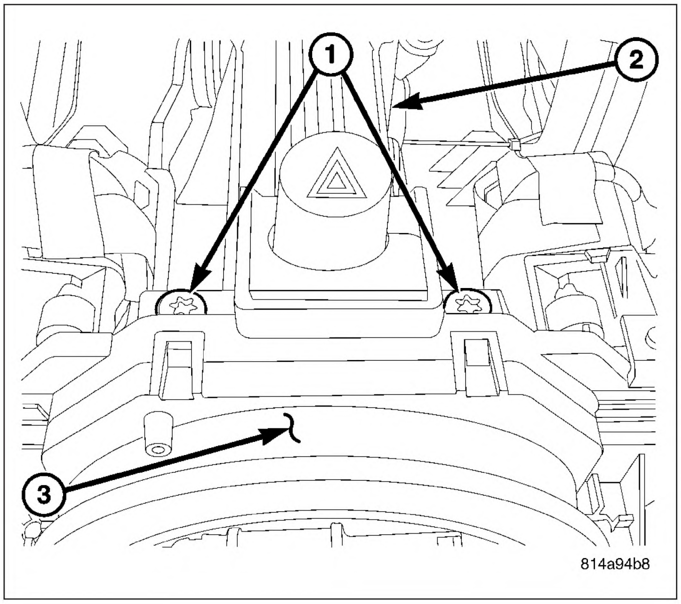
WARNING: If the clockspring, which is integral to the Steering Control Module (SCM) is not properly centered in relation to the steering wheel, steering shaft and steering gear, it may be damaged. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING). Service replacement clocksprings are shipped pre-centered and with a locking pin installed. This locking pin should not be removed until the clockspring has been installed on the steering column. If the locking pin is removed before the clockspring is installed on a steering column, the clockspring centering procedure must be performed.

NOTE: Before starting this procedure, be certain that the front wheels are still in the straight-ahead position.

1. Install the SCM onto the steering column.



2. Tighten the two screws (1) securing the SCM (3) to the column shaft housing.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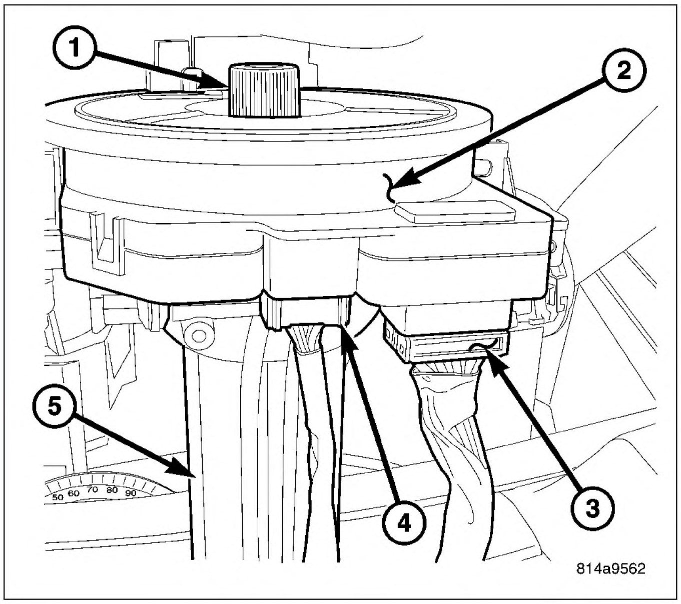
3. Connect the two electrical connectors (3 & 4) to the SCM (2).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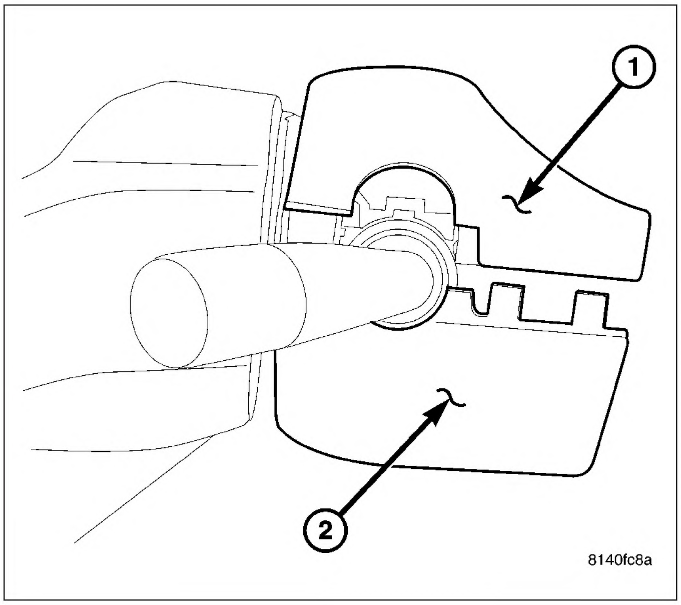
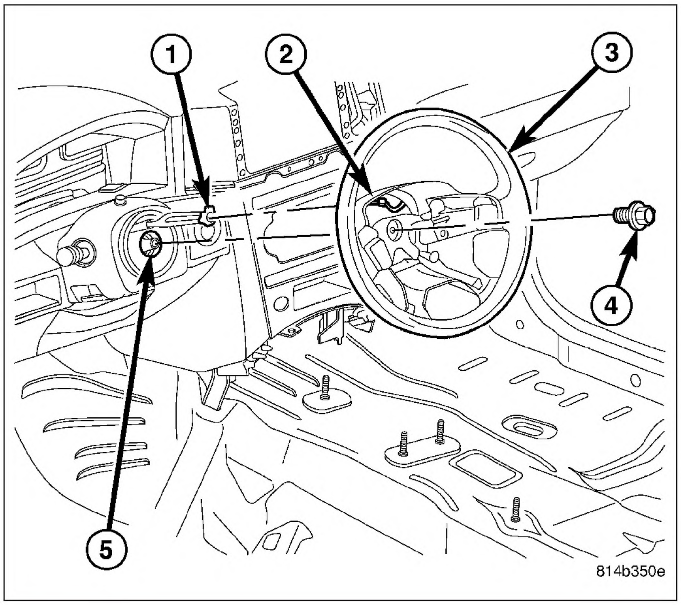
4. Install the steering column shrouds (1 & 2) (Refer to 19 - STEERING/COLUMN/SHROUD - INSTALLATION).



5. Align the spline on the steering wheel hub to shaft (5) and install the steering wheel (3). (Refer to 19 - STEERING/COLUMN/STEERING WHEEL - INSTALLATION).
6. Install a **NEW** retaining bolt (4). Torque the bolt to 61 N·m (45 ft. lbs.).
7. Install the driver airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).
8. Connect the battery negative cable.



NOTE: IF EQUIPPED WITH ESP - recalibrate the steering angle sensor using the scan tool (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - STANDARD PROCEDURE).

GEAR - SERVICE INFORMATION

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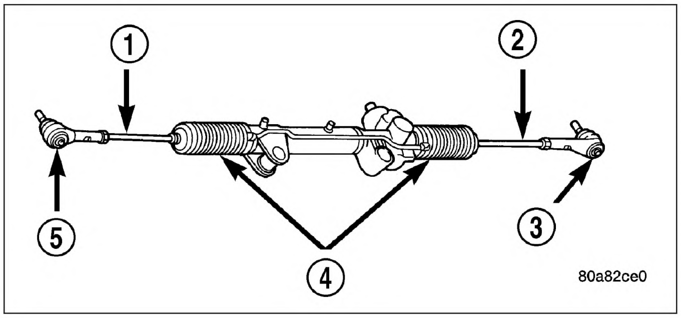
GEAR - SERVICE INFORMATION

DESCRIPTION

A rack and pinion steering gear is made up of two main components, the pinon shaft and the rack. The gear cannot be adjusted or internally serviced. If a malfunction or a fluid leak occurs, the gear must be replaced as an assembly.

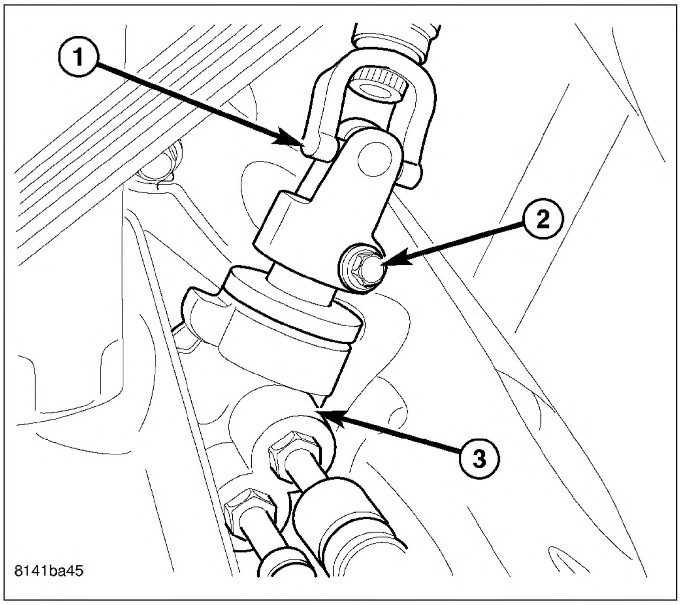


OPERATION

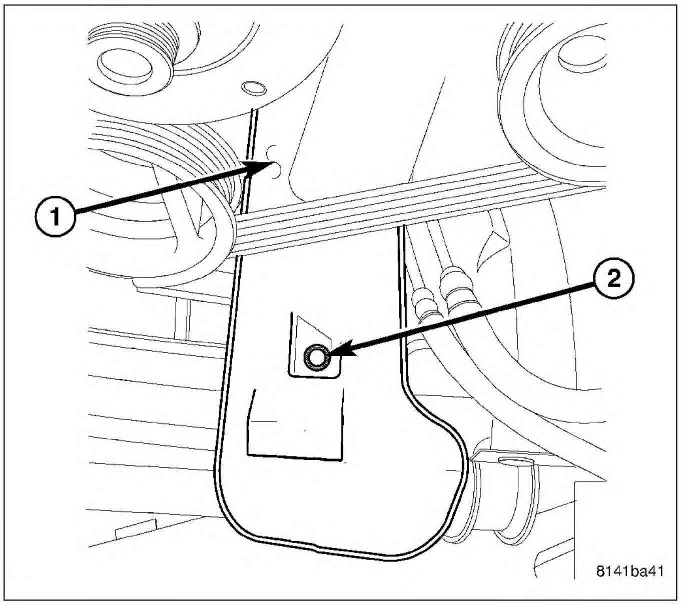
The steering column intermediate shaft is attached to the gear pinion. The rotation of the pinion moves the gear rack from side-to-side. This lateral action of the rack pushes and pulls the tie rods, which are connected to the steering knuckles to change the direction of the front wheels.

REMOVAL

1. Place the front wheels in the straight ahead position with the steering wheel centered and locked with a steering wheel lock.
2. Drain or siphon the power steering system.
3. Remove the column coupler shaft bolt (2) and remove the shaft from the gear (3).



4. Remove the oil drip tray (1).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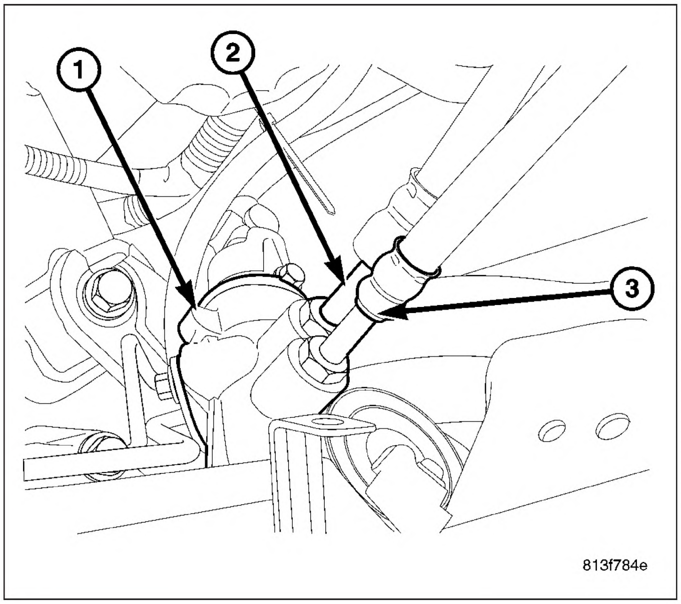
5. Remove the pressure line (2) at the gear (1).
6. Remove the return line (3) at the gear (1).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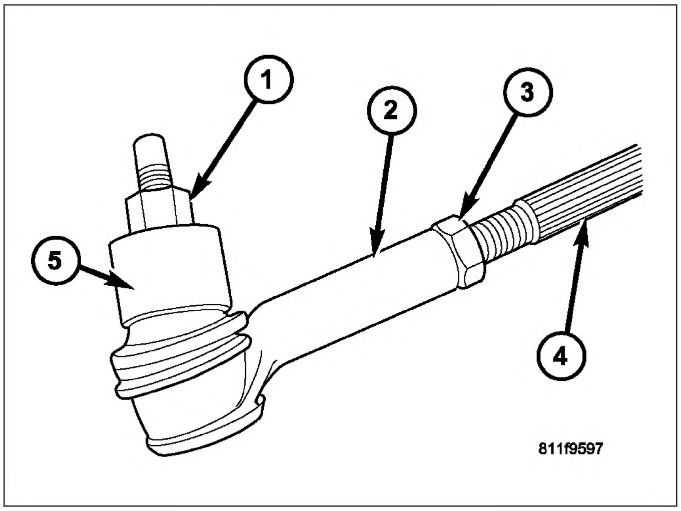
7. Raise and support the vehicle.
8. Remove the front tires.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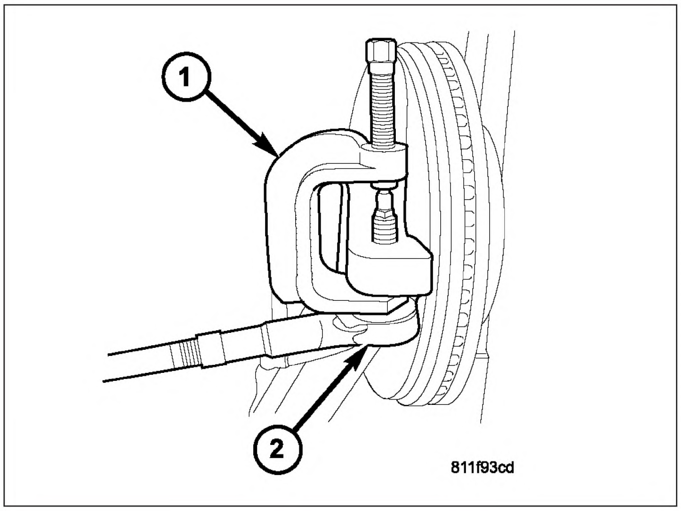
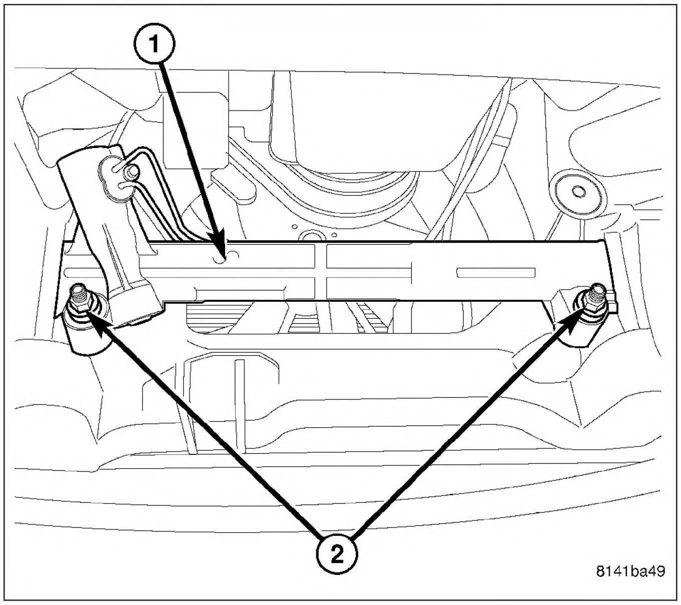
9. Loosen the tie rod end jam nuts (3).

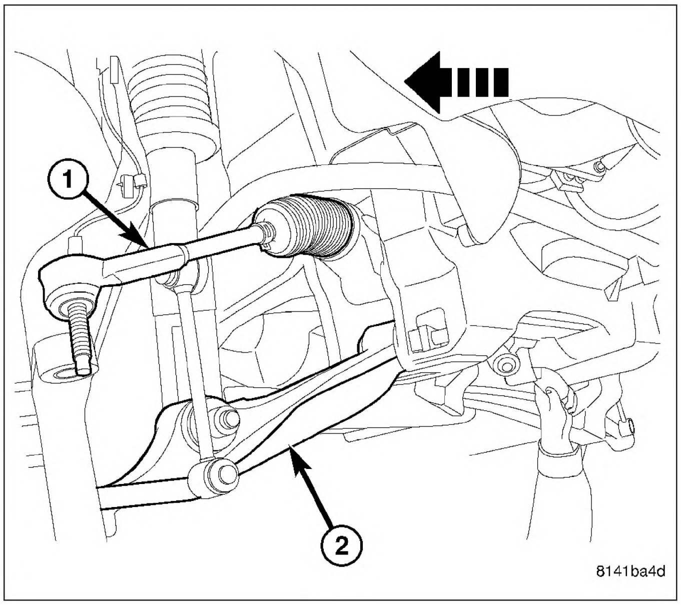
10. Remove the outer tie rod end nut and separate the tie rod (2) from the knuckle using special tool #8677 (1).



11. Remove the front splash shield.
12. **4X4 Only** - Remove the front axle (Refer to 3 - DIFFERENTIAL & DRIVELINE/FRONT AXLE - REMOVAL).
13. Remove the two steering gear mounting bolts (2).

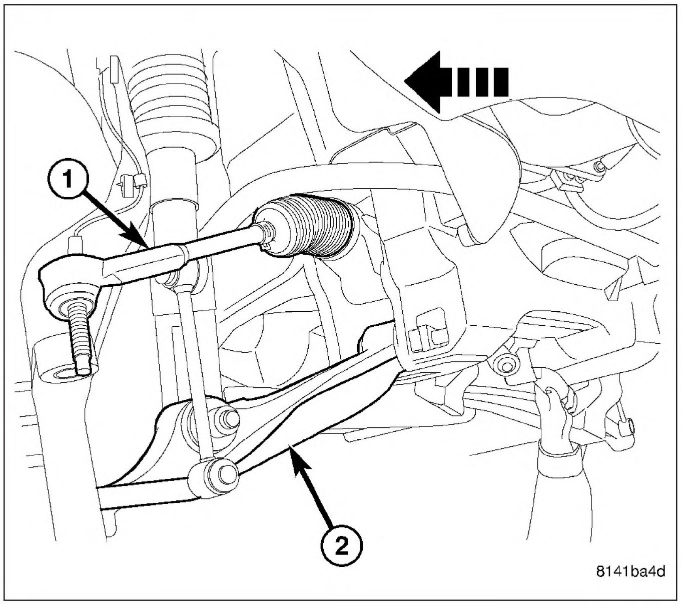


14. Move the gear (1) to the full right position to allow clearance over the control arm (2) then lower the gear down, then turn the gear to the full left position then to allow clearance then remove from the vehicle.
15. Remove the outer tie rod ends from the steering gear (if needed).

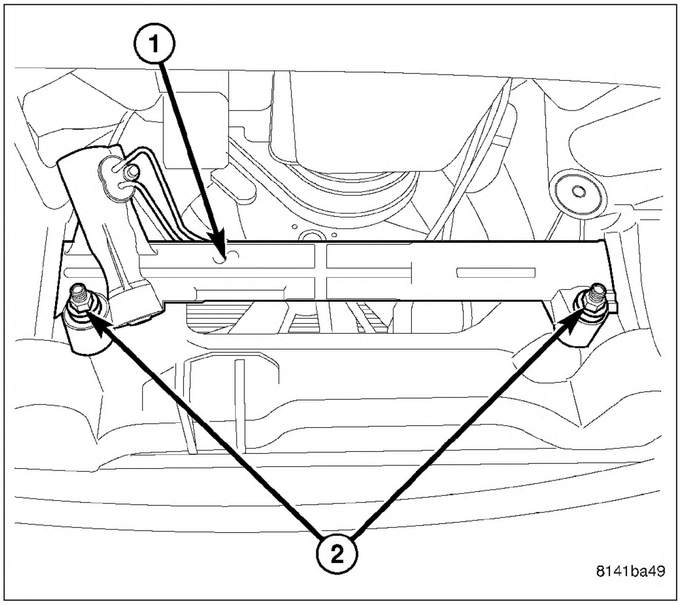


INSTALLATION

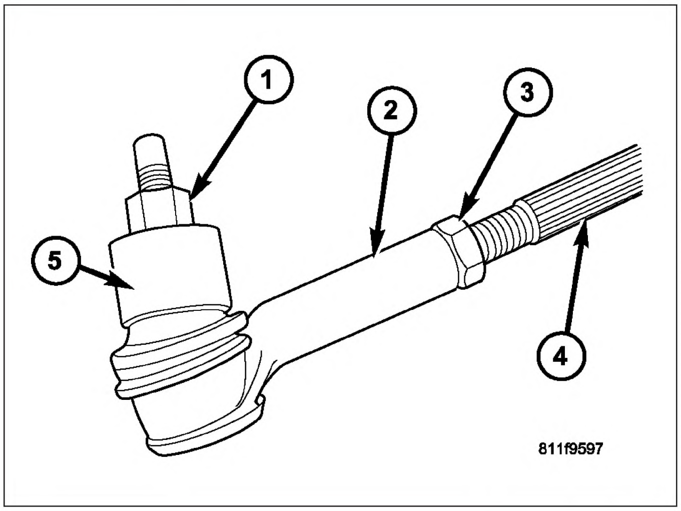
1. Install the outer tie rod ends. (if removed).
2. Position the steering gear (1) back into the vehicle the same way it was removed.



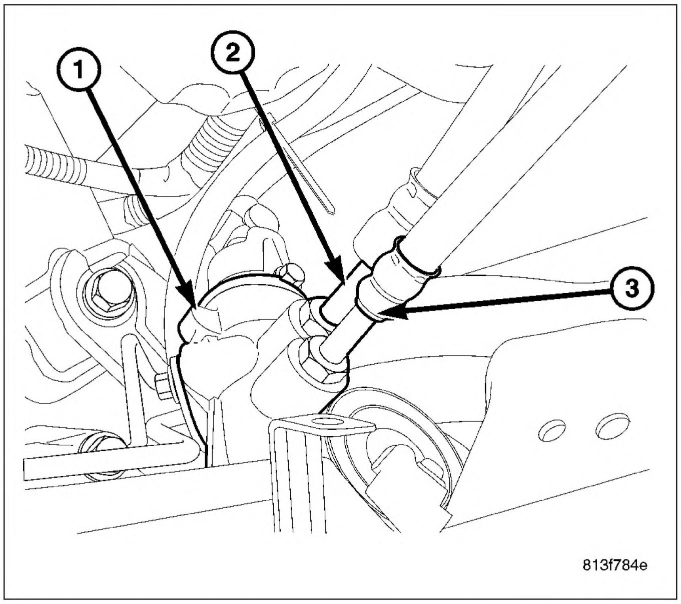
3. Install the Steering gear mounting bolts (2) Tighten to 217 N·m (160 ft. lbs.).
4. Install the front splash shield.



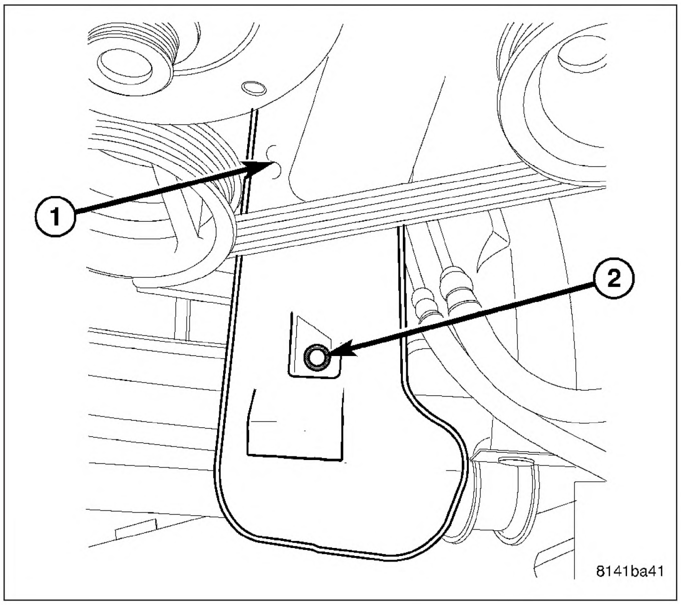
5. Install the outer tie rod ends jam nuts (3) (loose).
6. Install the outer tie rod ends (2) to the knuckle (5) and tighten the tie rod end nut (1) to 95 N·m (70 ft. lbs.).



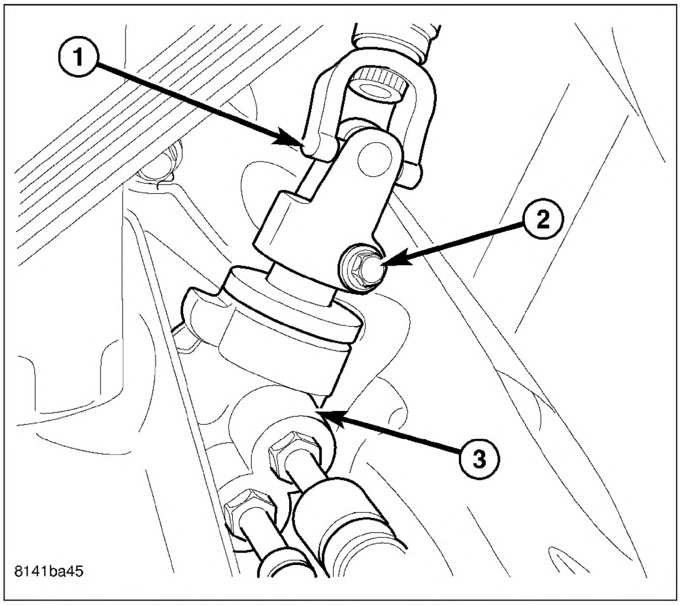
7. Install the pressure and return hoses (2&3) to the steering gear (1) and tighten to 28 N·m (21 ft. lbs.).



8. Install the oil filter drip tray (1).



9. Install the column coupler shaft into the lower coupling (1) and install a **new** bolt (2), Tighten to 49 N·m (36 ft. lbs.).
10. Install the front axle housing unit (Refer to 3 - DIFFERENTIAL & DRIVELINE/FRONT AXLE - C200FE - INSTALLATION). **4x4 ONLY**
11. Install the wheel and tire assembly.
12. Remove the support and lower the vehicle.
13. Remove the steering wheel lock.
14. Fill the power steering pump (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).
15. Set the toe. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).



SPECIFICATIONS

TORQUE CHART

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Rack and Pinion Steering Gear Gear to Frame Bolts	217	160	—
Rack and Pinion Steering Gear Intermediate Shaft Bolt	49	36	—
Tie Rod End Knuckle Nut	95	70	—
Tie Rod End Jam Nut	81	60	—
Power Steering Lines ALL	28	21	275

LINKAGE - SERVICE INFORMATION

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TIE ROD END

STANDARD PROCEDURE

STEERING LINKAGE

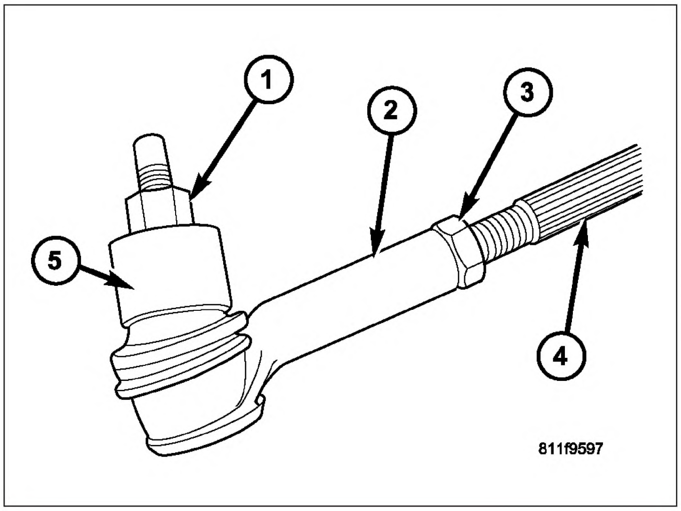
The tie rod end and ball stud seals should be inspected during all oil changes. If a seal is damaged, replace the tie rod.

CAUTION: If any steering components are replaced or serviced an alignment must be performed, to ensure the vehicle meets all alignment specifications.

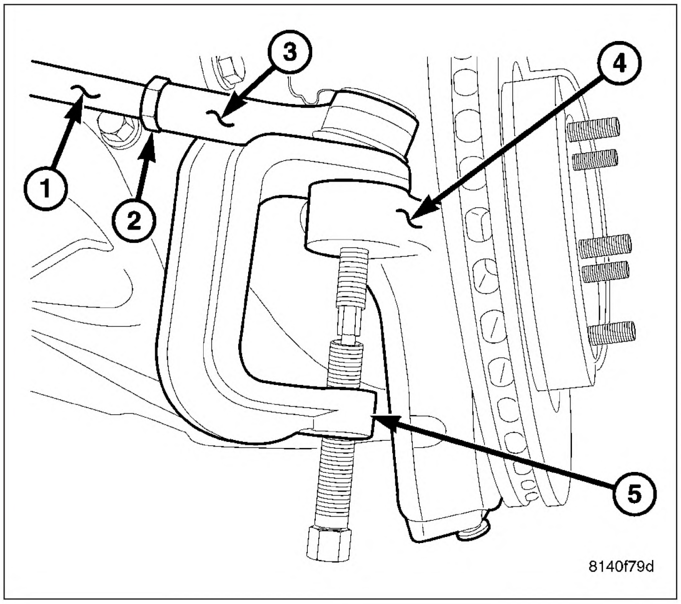
REMOVAL - OUTER TIE ROD END

NOTE: Do not twist the boot anytime during removal or installation.

1. Loosen the jam nut (3).
2. Remove the outer tie rod end (2) nut (1) from the ball stud.



3. Separate the outer tie rod end (3) from the knuckle with Remover 8677 (5).
4. Unthread the outer tie rod end (3) from the inner tie rod (1). **Count the number of turns when removing the tie rod end, This will give a good starting point when reassembiling and toe adjustment.**

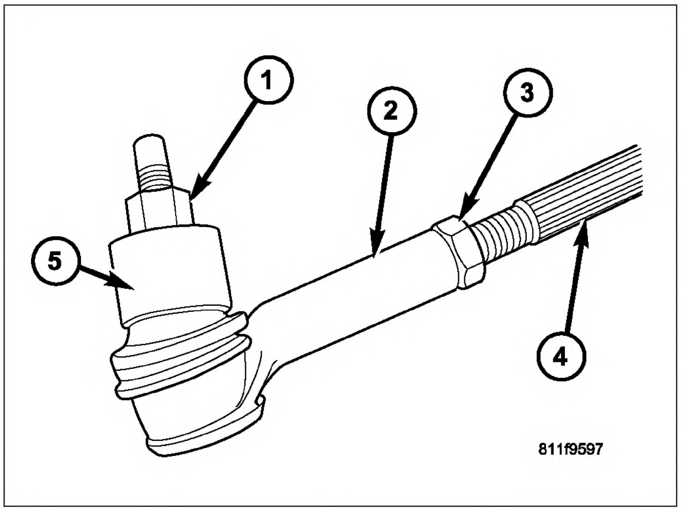


INSTALLATION - OUTER TIE ROD END

NOTE: Do not twist the boot at anytime during removal or installation.

NOTE: Make sure jam nut (3) is installed on inner tie rod end (4) before the outer tie rod end (2) is installed.

1. Thread the outer tie rod end (2) onto the inner tie rod (4), to it's original position.
2. Install the outer tie rod end into the steering knuckle (5) Tighten to 95 N·m (70 ft.lbs.).
3. Set wheel toe pattern, (Refer to 2 - SUSPENSION/ WHEEL ALIGNMENT - STANDARD PROCEDURE).
4. Tighten jam nut (3) to 81N·m (60 ft. lbs.).



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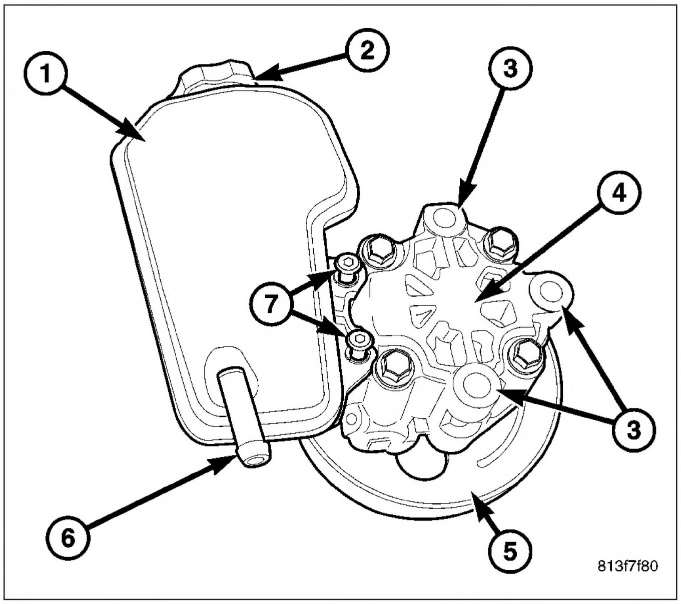
PUMP - SERVICE INFORMATION

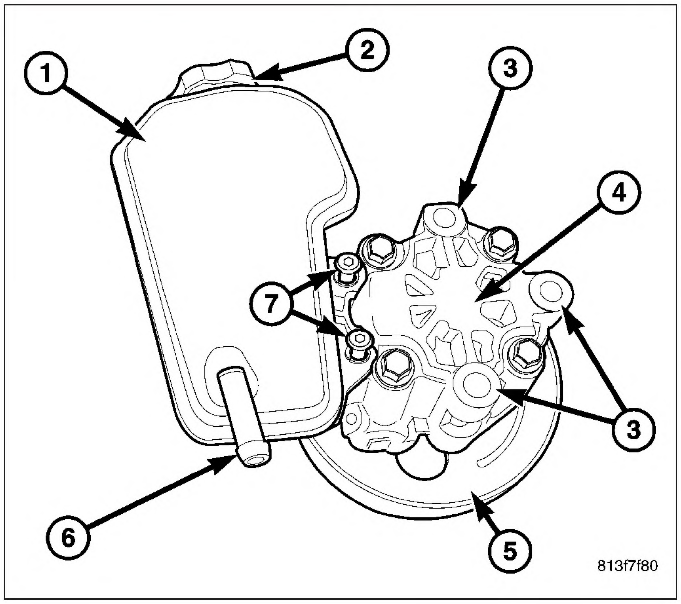
DESCRIPTION

Hydraulic pressure for the power steering system is provided by a belt driven power steering pump (4). The pump shaft has a pressed-on drive pulley (5) that is belt driven by the crankshaft pulley. The power steering reservoir (1) is mounted to the pump body (4), except if the vehicle has 5.7L or Diesel engines then it has a remote reservoir mounted to the fan shroud.



OPERATION

The power steering pump (4) is a constant flow rate and displacement, vane-type pump. The pump internal parts operate submerged in fluid. The flow control orifice is part of the high pressure line fitting. The pressure relief valve inside the flow control valve limits the pump pressure. The reservoir is attached to the pump body with three bolts (7), except if the vehicle is equipped with a 5.7L or Diesel engine then it has a remote reservoir mounted to the fan shroud. The power steering pump is connected to the steering gear by the pressure and return hoses.



NOTE: Power steering pumps have different pressure rates and are not interchangeable with other pumps.

STANDARD PROCEDURE

INITIAL OPERATION

WARNING: THE FLUID LEVEL SHOULD BE CHECKED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING COMPONENTS.

CAUTION: THIS SYSTEM REQUIRES THE USE OF HYDRAULIC SYSTEM / POWER STEERING FLUID WHICH MEETS DAIMLER CHRYSLER SPECIFICATION MS-10838, SUCH AS MOPAR PART NUMBER 05142893AA, OR EQUIVALENT, DO NOT MIX POWER STEERING FLUID TYPES. DAMAGE MAY RESULT TO THE POWER STEERING PUMP AND SYSTEM IF ANY OTHER FLUID IS USED, AND DO NOT OVERFILL.

Wipe filler cap clean, then check the fluid level. The dipstick should indicate **COLD** when the fluid is at normal ambient temperature.

1. Fill the pump fluid reservoir to the proper level and let the fluid settle for at least two minutes.
2. Start the engine and let run for a few seconds then turn engine off.
3. Add fluid if necessary. Repeat the above procedure until the fluid level remains constant after running the engine.
4. Raise the front wheels off the ground.
5. Slowly turn the steering wheel right and left, lightly contacting the wheel stops at least 20 times.
6. Check the fluid level add if necessary.
7. Lower the vehicle, start the engine and turn the steering wheel slowly from lock to lock.
8. Stop the engine and check the fluid level and refill as required.
9. If the fluid is extremely foamy or milky looking, allow the vehicle to stand a few minutes and repeat the procedure.

CAUTION: Do not run a vehicle with foamy fluid for an extended period. This may cause pump damage.

INITIAL OPERATION - WITH HYDRAULIC COOLING FAN

CAUTION: THIS SYSTEM REQUIRES THE USE OF HYDRAULIC SYSTEM / POWER STEERING FLUID WHICH MEETS DAIMLER CHRYSLER SPECIFICATION MS-10838, SUCH AS MOPAR PART NUMBER 05142893AA, OR EQUIVALENT, DO NOT MIX POWER STEERING FLUID TYPES. DAMAGE MAY RESULT TO THE POWER STEERING PUMP AND SYSTEM IF ANY OTHER FLUID IS USED, AND DO NOT OVERFILL.

WARNING: THE FLUID LEVEL SHOULD BE CHECKED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING COMPONENTS.

NOTE: Remove as much of the old fluid out of the system as possible with a suction tool or by removing a hose, When a component has failed. Then refill it with fresh fluid until it is clean. This may have to be done more than once.

Wipe filler cap clean, then check the fluid level. The dipstick should indicate **COLD** when the fluid is at normal ambient temperature.

1. Fill the pump fluid reservoir to the proper level and let the fluid settle for at least two minutes.
2. Start the engine and let run for a few seconds then turn engine off.
3. Add fluid if necessary. Repeat the above procedure until the fluid level remains constant after running the engine.
4. Raise the front wheels off the ground.
5. Slowly turn the steering wheel right and left, lightly contacting the wheel stops at least 20 times.
6. Check the fluid level add if necessary.
7. Lower the vehicle, start the engine, and use the DRB III to activate the hydraulic fan on full fan operation.
8. Turn the steering wheel slowly from lock to lock.
9. Stop the engine, check the fluid level and refill as required and repeat the process

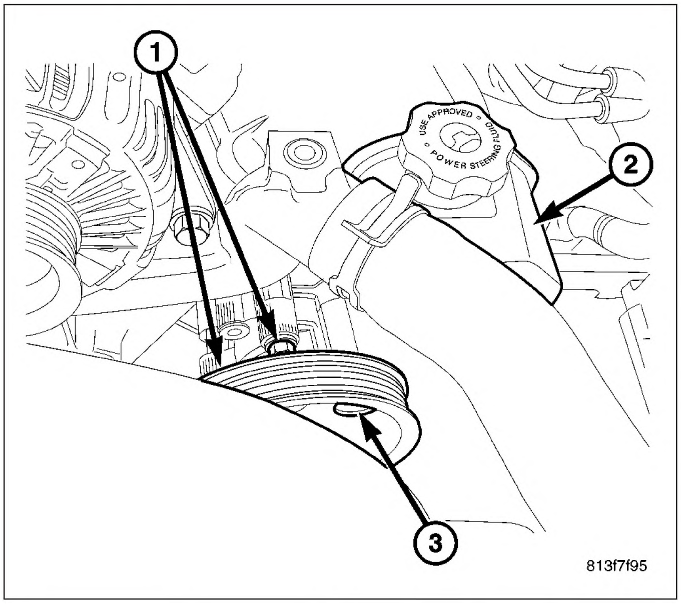
CAUTION: Do not run a vehicle with foamy fluid for an extended period. This may cause pump damage.

10. If the fluid is extremely foamy or milky looking, allow the vehicle to stand a few minutes and repeat the procedure.
11. While the vehicle is in park, use the DRB III to activate the hydraulic fan to full fan operation and briefly rev the engine up to 3000 rpm to fully engage the hydraulic fan.
12. Check the fluid level add if necessary.

REMOVAL

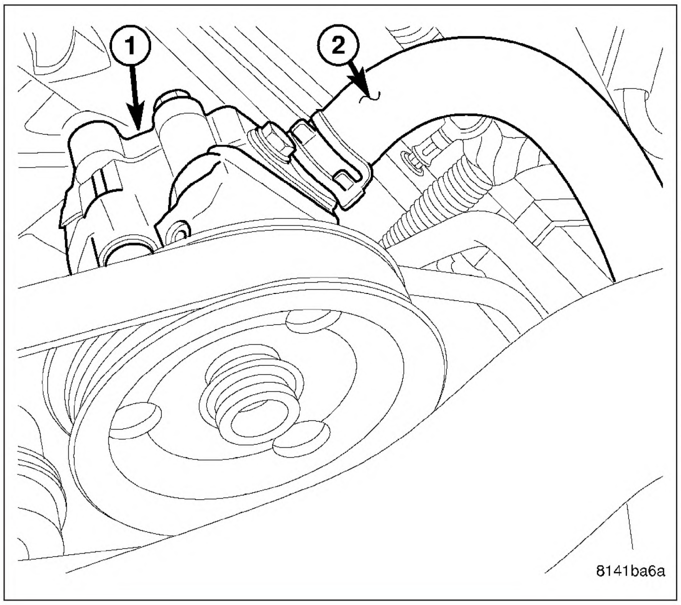
PUMP - 3.7L & 4.7L

1. Siphon power steering reservoir.
2. Remove the cooler return hose at the reservoir.
3. Disconnect the pressure hose nut at the pump.
4. Remove the pressure hose at the pump.
5. Remove serpentine drive belt, (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
6. Remove 3 pump mounting bolts (1).
7. Remove pulley from pump if necessary (Refer to 19 - STEERING/PUMP/PULLEY - REMOVAL).



PUMP - 5.7L

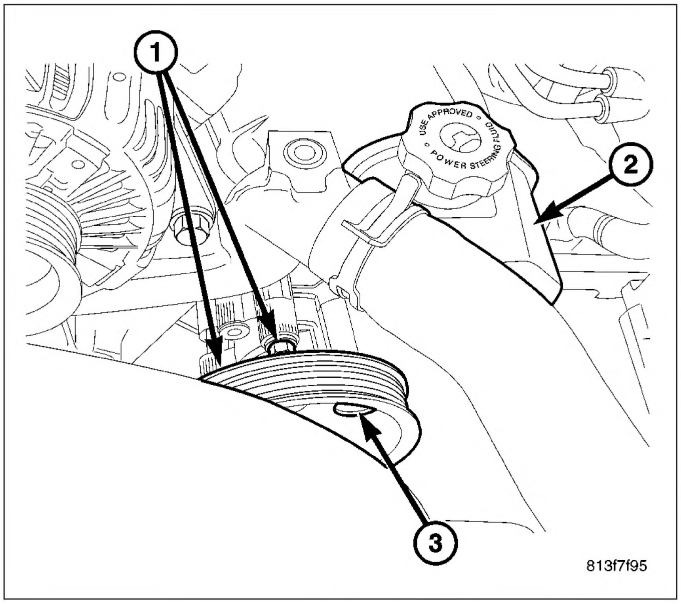
1. Siphon power steering reservoir.
2. Remove the air intake tube.
3. Remove the drive belt.
4. Disconnect the supply hose (2) at the pump (1).
5. Disconnect the pressure line at the pump.
6. Remove the three pump mounting bolts.



INSTALLATION

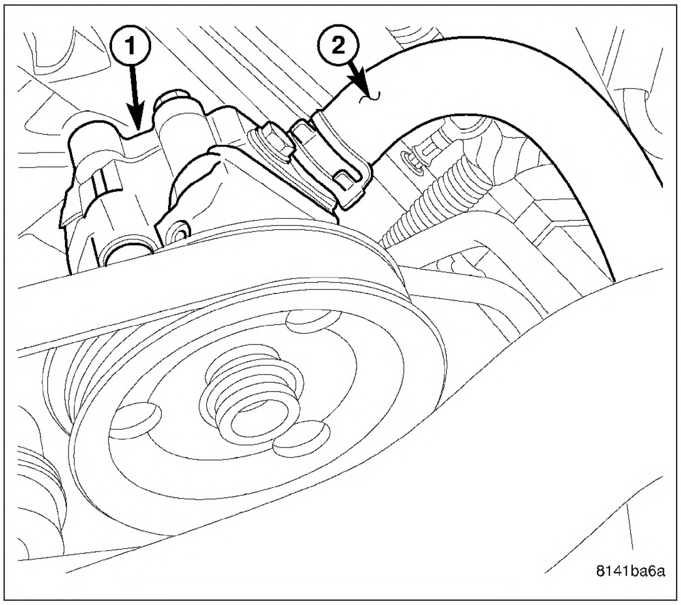
PUMP - 3.7L & 4.7L

1. Install pulley on pump if removed (Refer to 19 - STEERING/PUMP/PULLEY - INSTALLATION).
2. Install 3 pump mounting bolts (1) and tighten to 27 N·m (20 ft. lbs.).
3. Install the drive belt, (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
4. Install the pressure hose on the pump and tighten the nut to 28 N·m (21 ft. lbs.).
5. Install the cooler return hose at the reservoir.
6. Add power steering fluid, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).



PUMP - 5.7L

1. Install pulley on pump if removed (Refer to 19 - STEERING/PUMP/PULLEY - INSTALLATION).
2. Install 3 pump mounting bolts (1) and tighten to 27 N·m (20 ft. lbs.).
3. Install the pressure hose on the pump and tighten the nut to 28 N·m (21 ft. lbs.).
4. Reconnect the supply hose (2) at the pump (1).
5. Install the drive belt, (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
6. Install the air intake tube.
7. Fill the system with power steering fluid.
8. Bleed the hydraulic fan system using a scan tool (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).



SPECIFICATIONS

TORQUE CHART

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Power Steering Pump 3.7L & 4.7L	57	42	—
Power Steering Pump 5.7L			
Power Steering Pump Pump Bolts-3.7L & 4.7L	28	21	250
Power Steering Pump Pump Bolts-5.7L	28	21	250
Power Steering Pump Pressure Line 3.7L & 4.7L	28	21	—
Power Steering Pump Pressure Line 5.7L	47	35	416
Power Steering Pump Return Line 3.7L & 4.7L	28	21	—
Power steering Lines at Gear	28	21	—

FLUID

STANDARD PROCEDURE

POWER STEERING FLUID LEVEL CHECKING

WARNING: FLUID LEVEL SHOULD BE CHECKED WITH THE ENGINE OFF TO PREVENT PERSONAL INJURY FROM MOVING PARTS.

CAUTION: THIS SYSTEM REQUIRES THE USE OF HYDRAULIC SYSTEM / POWER STEERING FLUID WHICH MEETS DAIMLER CHRYSLER SPECIFICATION MS-10838, SUCH AS MOPAR PART NUMBER 05142893AA, OR EQUIVALENT, DO NOT MIX POWER STEERING FLUID TYPES. DAMAGE MAY RESULT TO THE POWER STEERING PUMP AND SYSTEM IF ANY OTHER FLUID IS USED, AND DO NOT OVERFILL.

The power steering fluid level can be viewed on the dipstick attached to the filler cap. There are two ranges listed on the dipstick, COLD and HOT. Before opening power steering system, wipe the reservoir filler cap free of dirt and debris. Remove the cap and check the fluid level on its dipstick. When the fluid is at normal ambient temperature, approximately 21°C to 27°C (70°F to 80°F), the fluid level should read between the minimum and maximum area of the cold range. When the fluid is hot, fluid level is allowed to read up to the highest end of the HOT range. Only add fluid when the vehicle is cold.

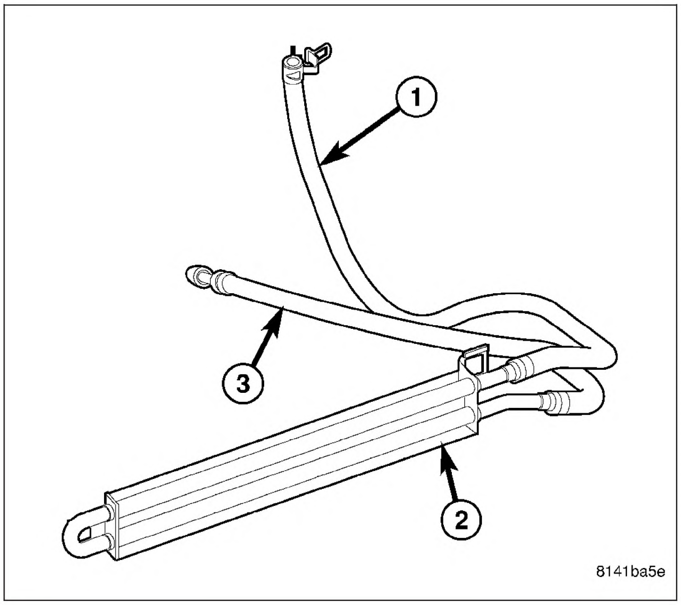
Use only hydraulic system / power steering fluid which meets Daimler Chrysler specifications MS - 10838 Mopar Part number 05142893AA or equivalent Do not overfill the power steering system.

FLUID COOLER

DESCRIPTION

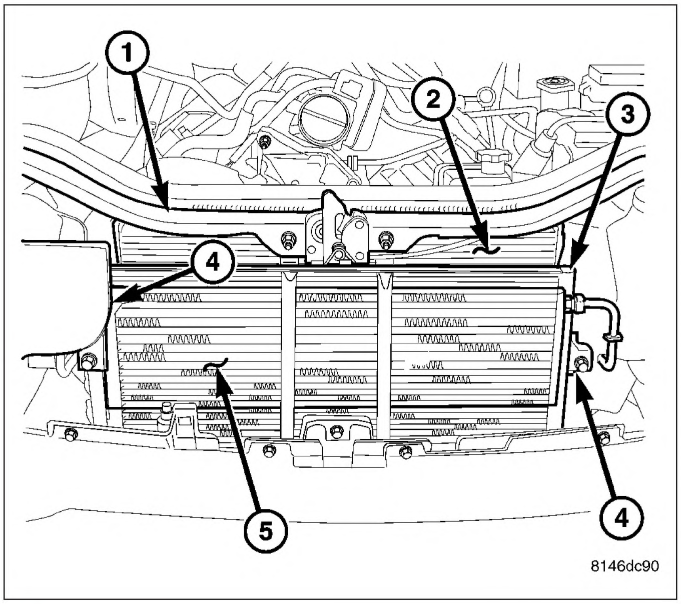
FLUID COOLER - 3.7L & 4.7L

The power steering fluid cooler (2) is located at the front of the vehicle. It is mounted to the radiator support just forward of the air-conditioning condenser and just rearward of the front fascia. The cooler is positioned so it is in the air flow through the front fascia of the vehicle.



FLUID COOLER - 5.7L & DIESEL

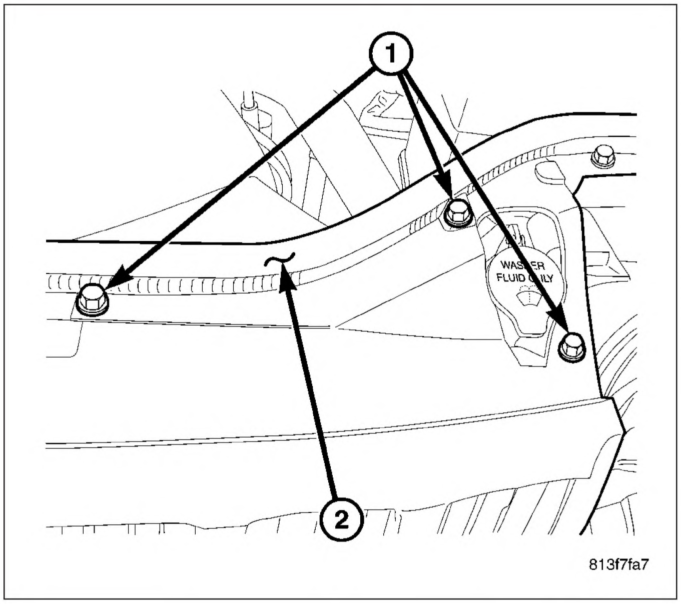
The power steering fluid cooler (3) is located at the front of the vehicle. It is mounted to the radiator support just forward of the air-conditioning condenser and just rearward of the front fascia. The cooler is positioned so it is in the air flow through the front fascia of the vehicle.



REMOVAL

FLUID COOLER - 3.7L & 4.7L

1. Drain the power steering fluid out of the reservoir.
2. Remove the hood weather-strip seal (2) at the radiator cowl.
3. Remove the 6 grille push pins (1).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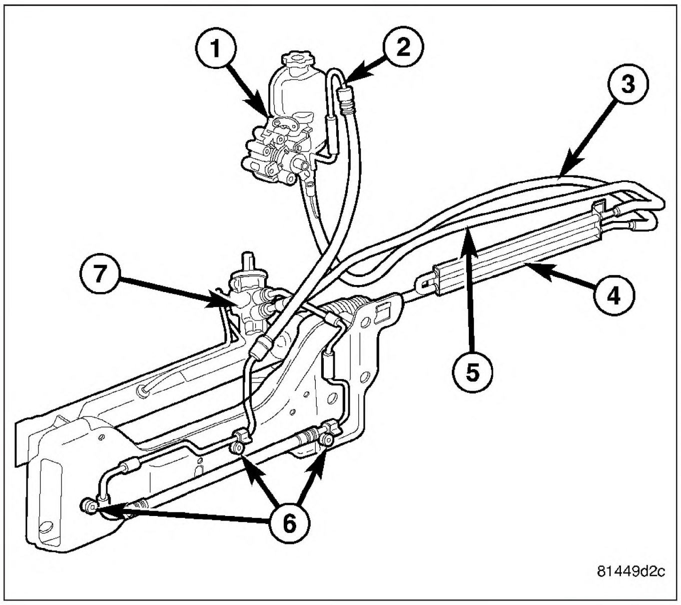
WASHER FLUID ONLY
813f7fa7

4. Remove the reservoir return hose (3) from the cooler.
5. Disconnect the steering gear return line (5) at the gear to cooler.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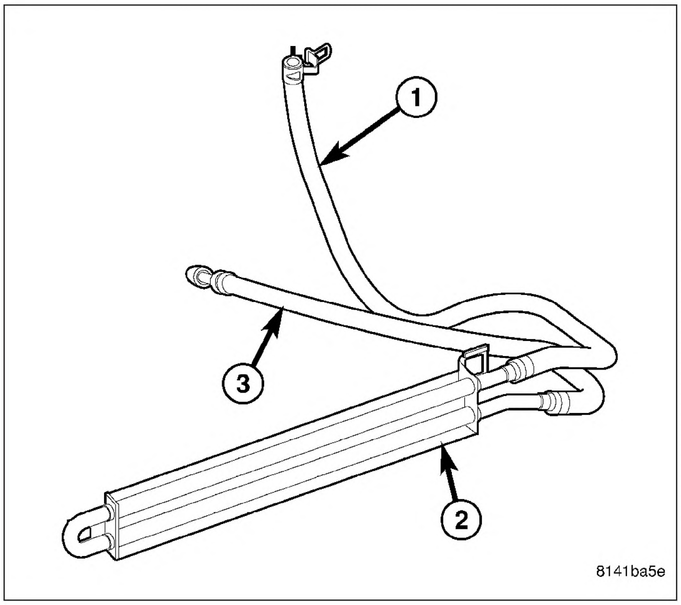
6. Remove the cooler mounting bolts.
7. Remove the cooler (2) with hoses (1&2) from the vehicle.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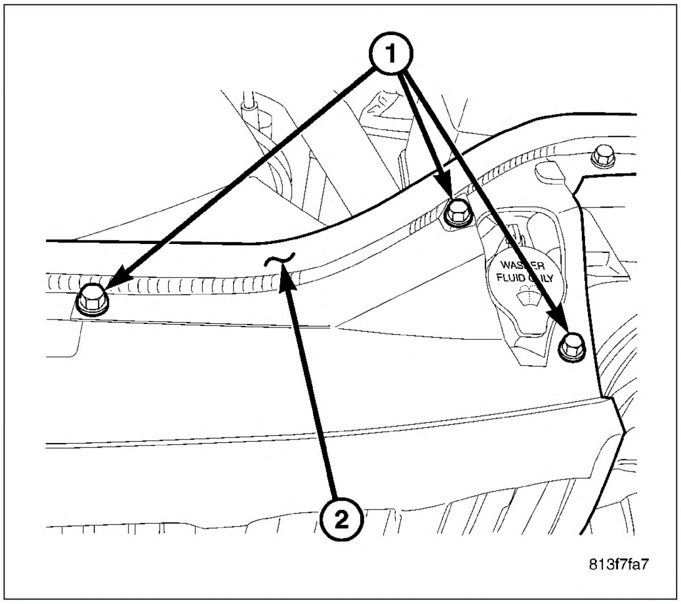
8141ba5e

FLUID COOLER - 5.7L & DIESEL

1. Drain the power steering fluid out of the reservoir.
2. Remove the hood weather-strip seal (2) at the radiator cowl.
3. Remove the 6 grille push pins (1).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WASHER FLUID ONLY
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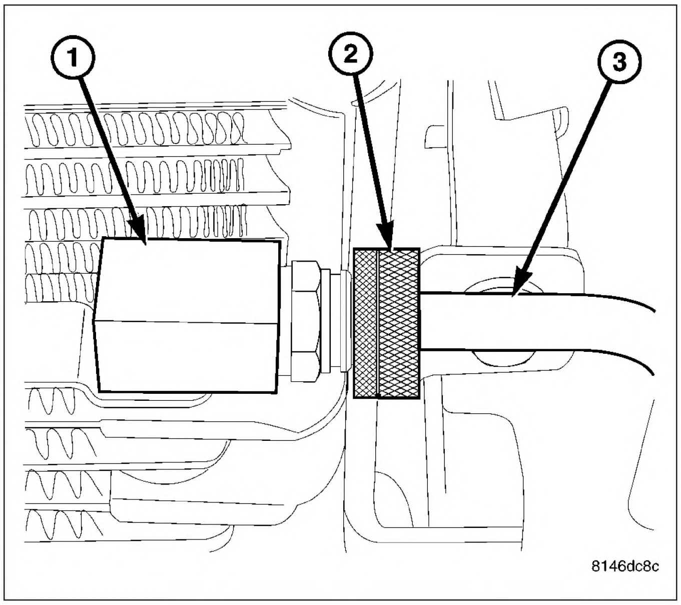
813f7fa7

4. Install tool 8875-A (2) to remove the quick connect lines (3) from the fluid cooler (1).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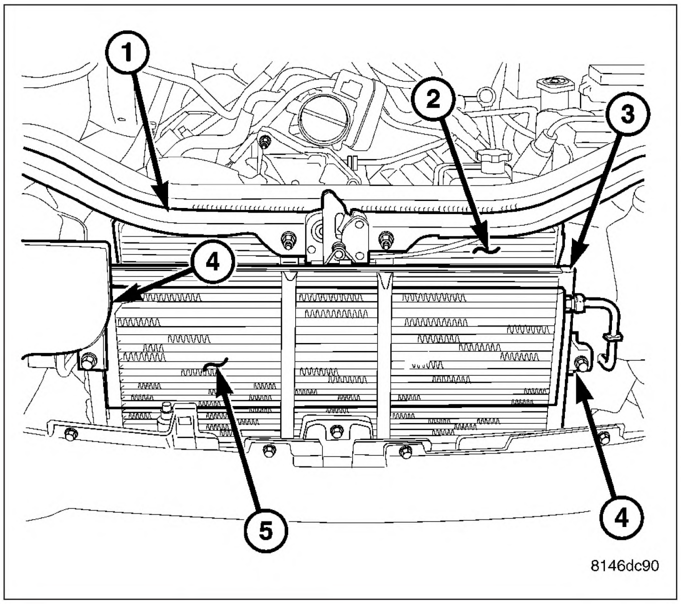
5. Remove the two hood latch support brackets.
6. Remove the two mounting bolts (4) from the cooler (5).
7. Remove the fluid cooler (5) from the vehicle.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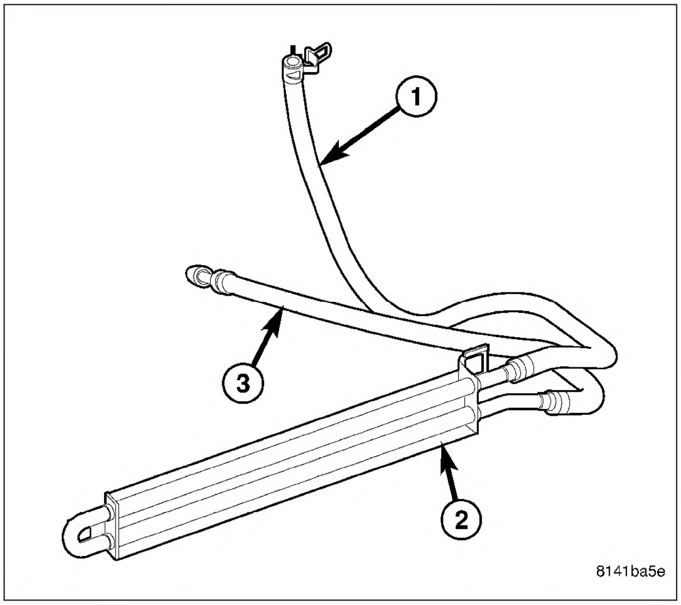
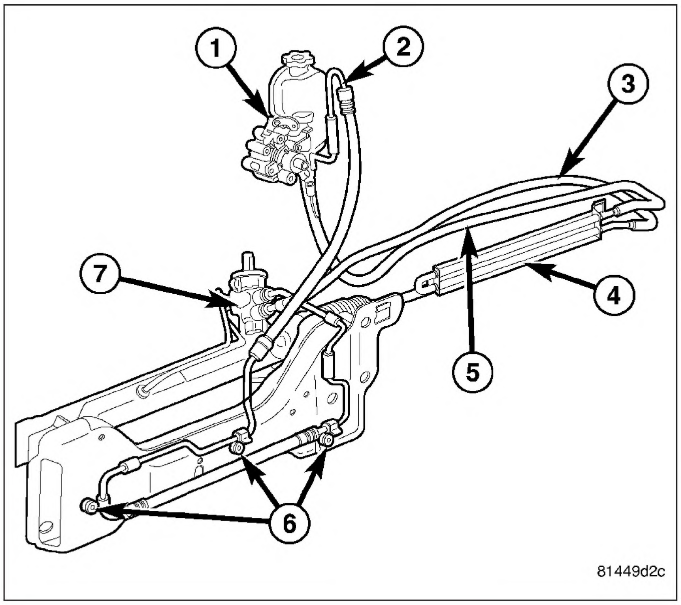
INSTALLATION

FLUID COOLER - 3.7L & 4.7L

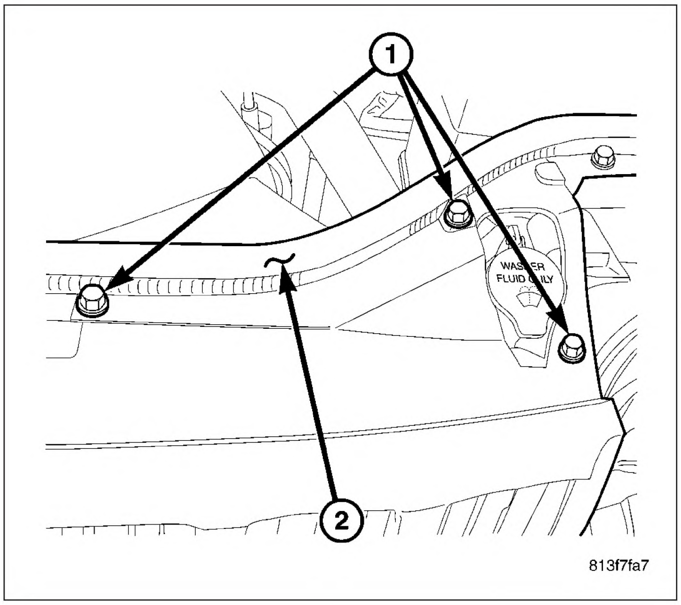
1. Position and install the power steering cooler (2) with hoses (1&2) to the vehicle.
2. Install the cooler mounting bolt (2).



3. Reconnect the steering gear return line (5) from the gear to the cooler.
4. Reconnect the reservoir return hose (3) to the cooler.
5. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).
6. Start engine and check for leaks.



7. Install the grille and the 6 grille push pins (1).
8. Install the hood weather-strip seal (2) at the radiator cowl.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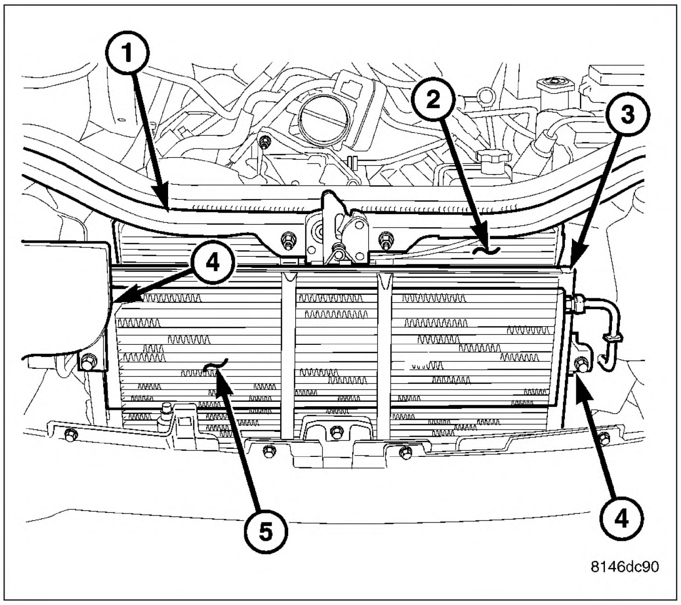
FLUID COOLER - 5.7L & DIESEL

1. Install the fluid cooler (5) to the vehicle.
2. Install the two fluid cooler mounting bolts (4).
3. Install the hood latch brackets.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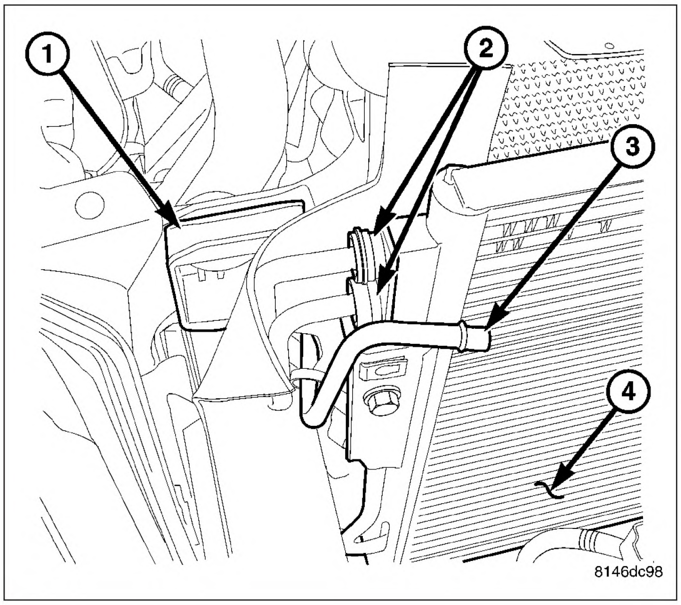
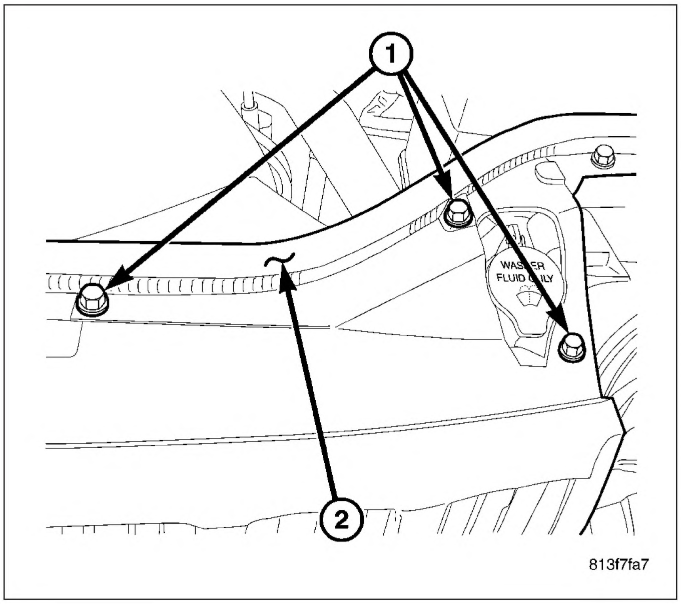
4. Install the power steering cooler lines (3) to the fluid cooler (4).
5. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).
6. Start engine and check for leaks.



7. Install the grille and the 6 grille push pins (1).
8. Install the hood weather-strip seal (2) at the radiator cowl.



HOSES - 3.7L & 4.7L

OPERATION

PRESSURE LINE

Power steering pressure line, is used to transfer high pressure power steering fluid, from the power steering pump to the power steering gear.

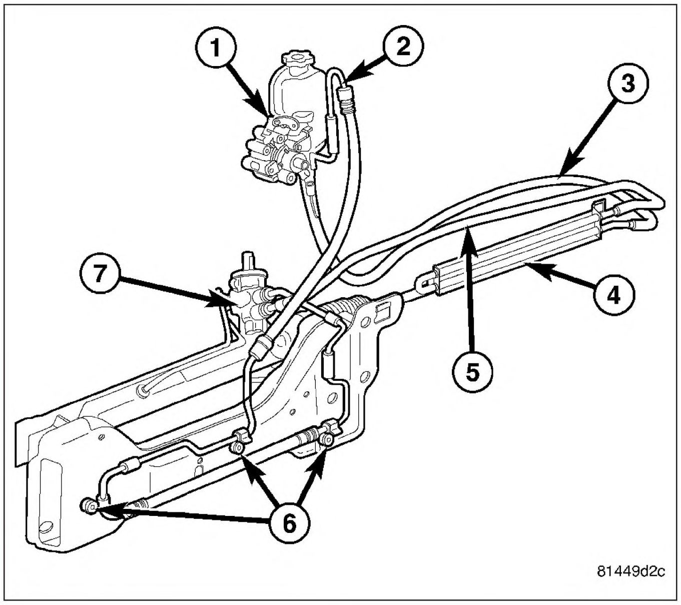
RETURN LINE

Power steering return line, is used to transfer low pressure power steering fluid, from the power steering gear to the power steering pump.

REMOVAL

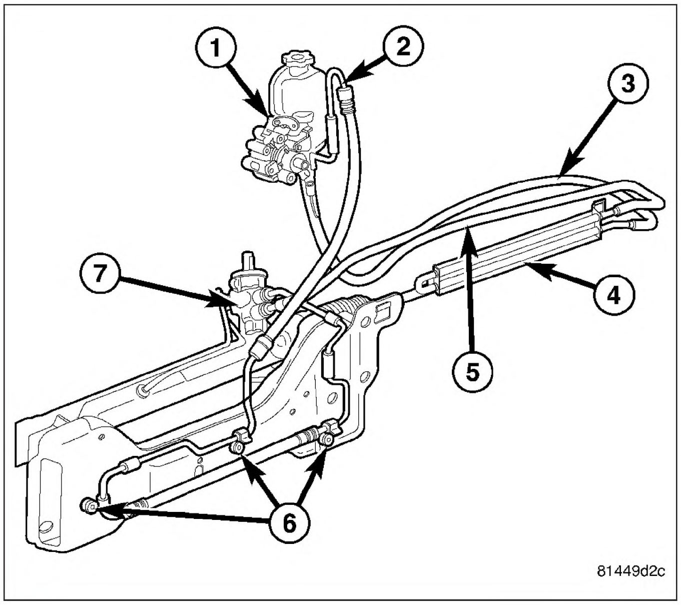
PRESSURE HOSE - GEAR TO PUMP

1. Siphon the power steering fluid from the reservoir.
2. Disconnect the pressure line (2) at the pump (1).
3. Disconnect the pressure line (2) at the gear (7).
4. Remove the three mounting brackets (6) for the pressure line at the engine cradle.
5. Remove the pressure line (2) from the vehicle.



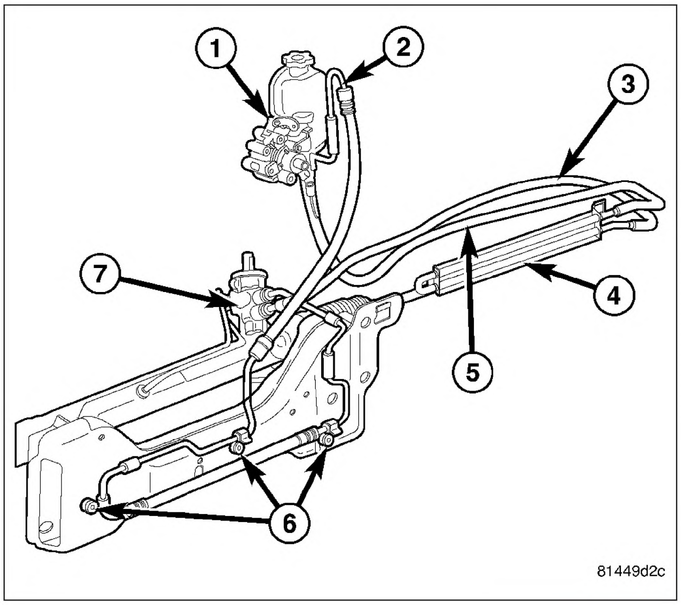
RETURN HOSE - PUMP TO COOLER

1. Siphon the power steering fluid from the reservoir.
2. Disconnect the return hose (3) at the pump (1).
3. Disconnect the return hose (3) at the cooler (4).
4. Remove the return hose (3) from the vehicle.



RETURN HOSE - GEAR TO COOLER

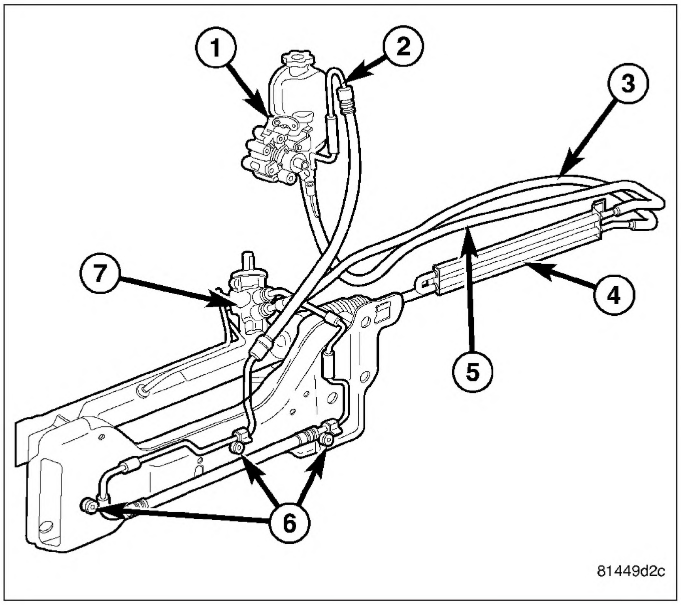
1. Siphon the power steering fluid from the reservoir.
2. Disconnect the return hose (5) at the fluid cooler (4).
3. Disconnect the return hose (5) at the gear (7).
4. Remove the return hose (5) from the vehicle.



INSTALLATION

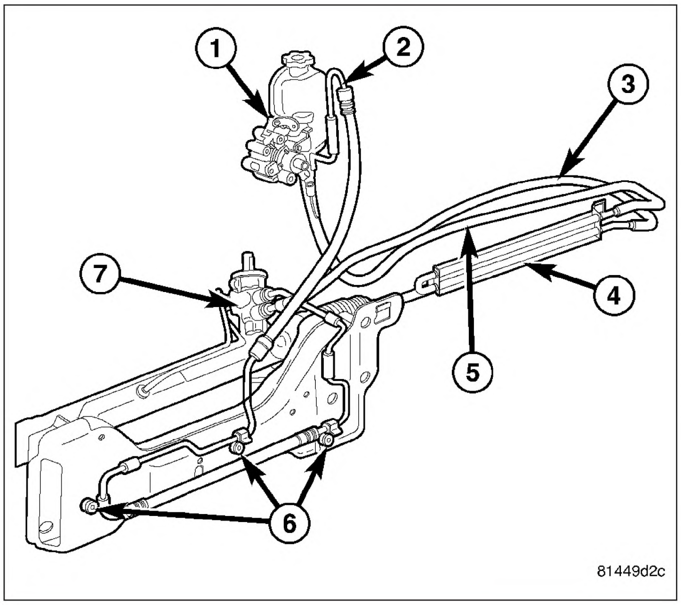
PRESSURE HOSE - GEAR TO PUMP

1. Install the line (2) to the vehicle.
2. Install the three mounting brackets (6) for the pressure line (2) to the engine cradle.
3. Reconnect the power steering pressure line (2) to the power steering gear (7) Tighten to 28 N·m (21 ft.lbs.).
4. Reconnect the power steering pressure line (2) to the power steering pump (1) Tighten to 28 N·m (21 ft.lbs.).
5. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).



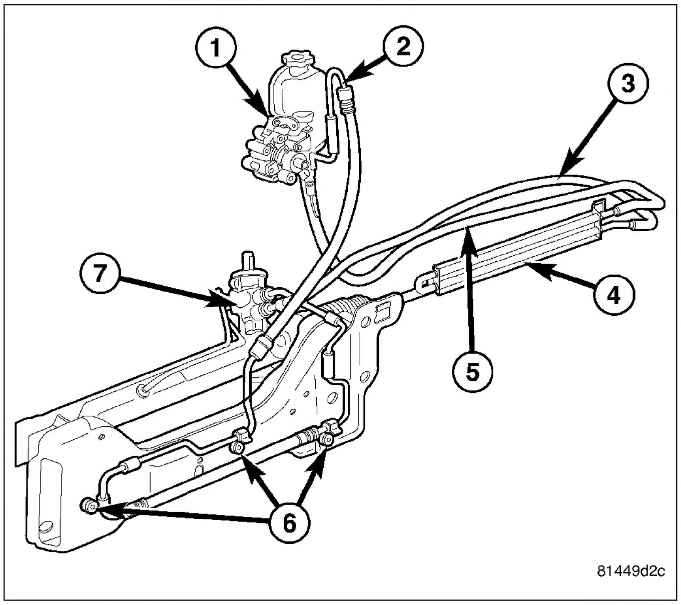
RETURN HOSE - PUMP TO COOLER

1. Install the line (3) to the vehicle.
2. Reconnect the power steering return hose (3) to the power steering cooler (4).
3. Reconnect the power steering return hose (3) to the power steering pump (1) Tighten to 28 N·m (21 ft.lbs.).
4. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).



RETURN HOSE - GEAR TO COOLER

1. Install the line (5) to the vehicle.
2. Reconnect the power steering return hose (5) to the power steering gear (7) Tighten to 28 N·m (21 ft.lbs.).
3. Reconnect the power steering return hose (5) to the fluid cooler (4).
4. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).



HOSES - 5.7L

OPERATION

PRESSURE LINE

Power steering pressure line, is used to transfer high pressure power steering fluid, from the power steering pump to the power steering gear. The Hydraulic Cooling Fan Power steering pressure line, is used to transfer high pressure power steering fluid, from the power steering pump to the engine cooling fan and the steering gear.

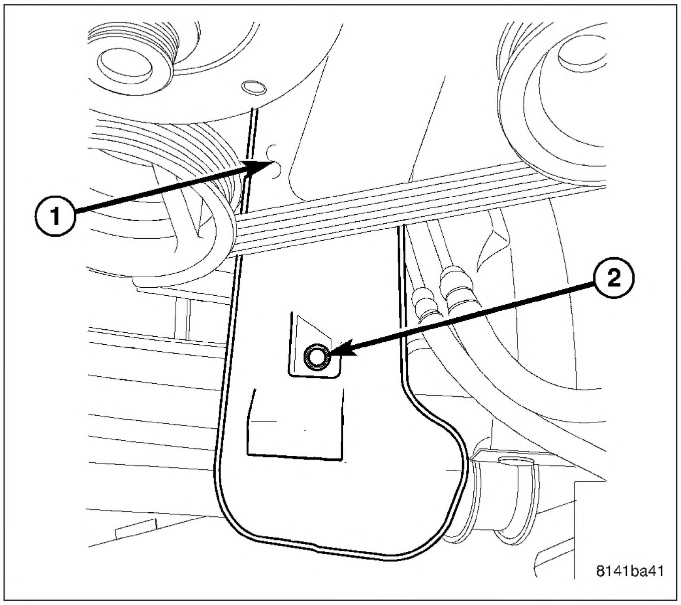
RETURN LINE

Power steering return line, is used to transfer low pressure power steering fluid, from the power steering gear to the power steering pump.

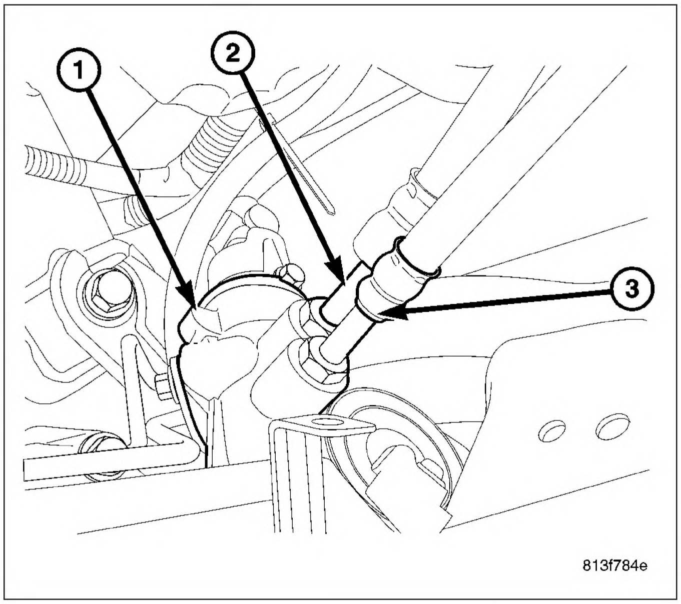
REMOVAL

PRESSURE LINE - PUMP TO GEAR

1. Siphon the power steering fluid from the reservoir.
2. Remove the air cleaner assembly.
3. Disconnect the power steering pressure line from the power steering pump.
4. Raise and support the vehicle.
5. Remove the front splash shield.
6. Remove the 3 bolts (2) for the oil filter drain (1) and remove the drain.

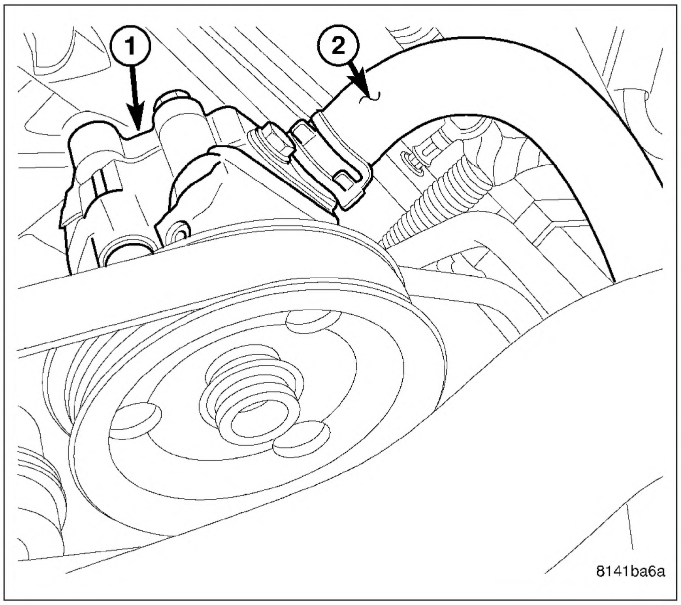


7. Disconnect the power steering pressure line (2) from the power steering gear (1).
8. Remove the line from the vehicle.

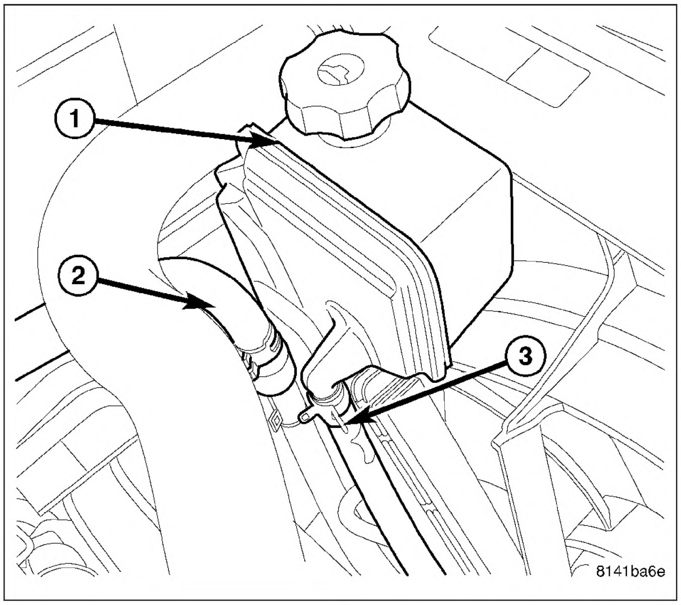


SUPPLY HOSE - PUMP TO RESERVOIR

1. Remove the air cleaner assembly.
2. Siphon the power steering fluid from the reservoir.
3. Disconnect the power steering supply hose (2) from the power steering pump (1).

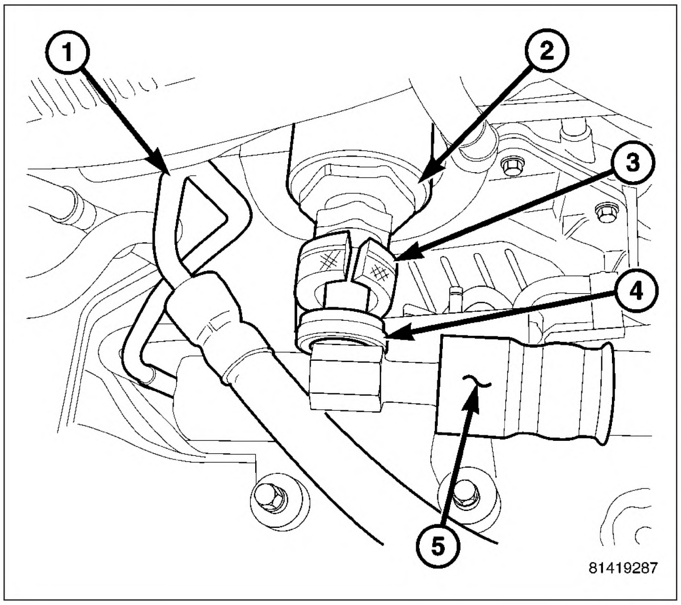


4. Disconnect the supply hose (2) from the reservoir (1).



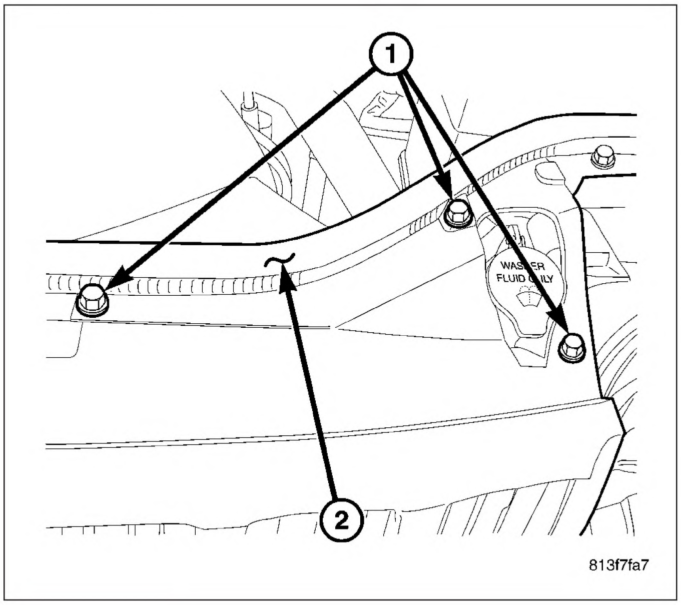
PRESSURE LINE - FAN TO PUMP

1. Siphon the power steering fluid from the reservoir.
2. Remove the pressure line at the pump.
3. Raise and support the vehicle.
4. Remove the front skid plate.
5. Disconnect the electrical connector (6) for the pressure switch (1).
6. Remove the quick connect pressure line (5) from the hydraulic cooling fan filter (2) using special tool 8875-A (3).
7. Remove the pressure line (5) from the vehicle.
8. Remove the pressure switch (1) if necessary.

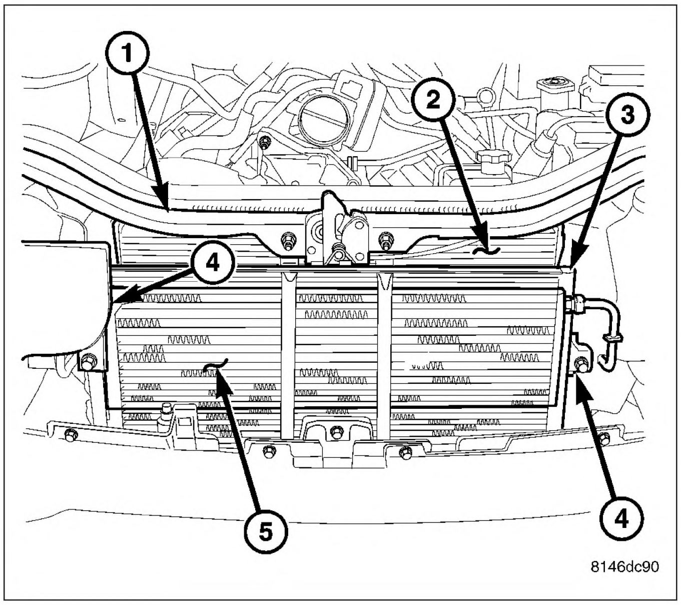


REMOVAL

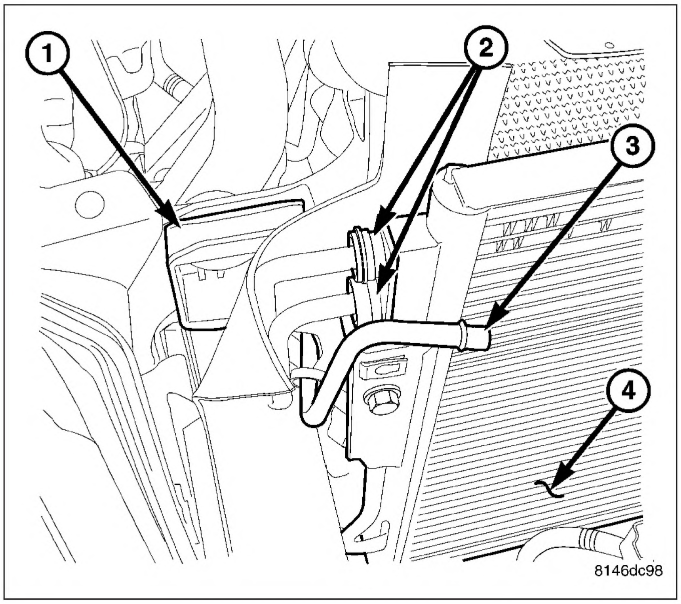
1. Drain the power steering fluid out of the reservoir.
2. Remove the hood weather-strip seal (2) at the radiator cowl.
3. Remove the 6 grille push pins (1).



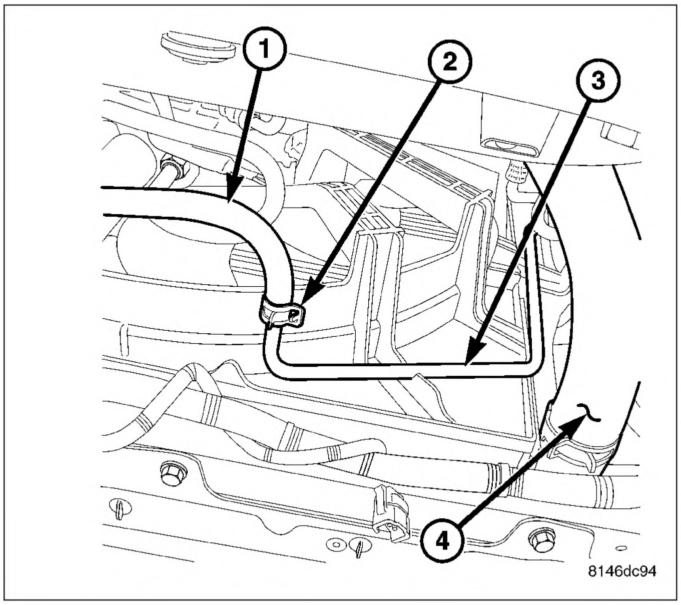
4. Remove the radiator core support (1).



5. Install tool 8875-A to remove the quick connect line from the fluid cooler (4).
6. Remove the radiator, A/C assembly mounting bolts (1).
7. Move the radiator, A/C assembly toward the front of the vehicle to gain access in order to remove the line.



8. Raise and support the vehicle.
9. Remove the clamp (2) to the fluid line (3) at the radiator.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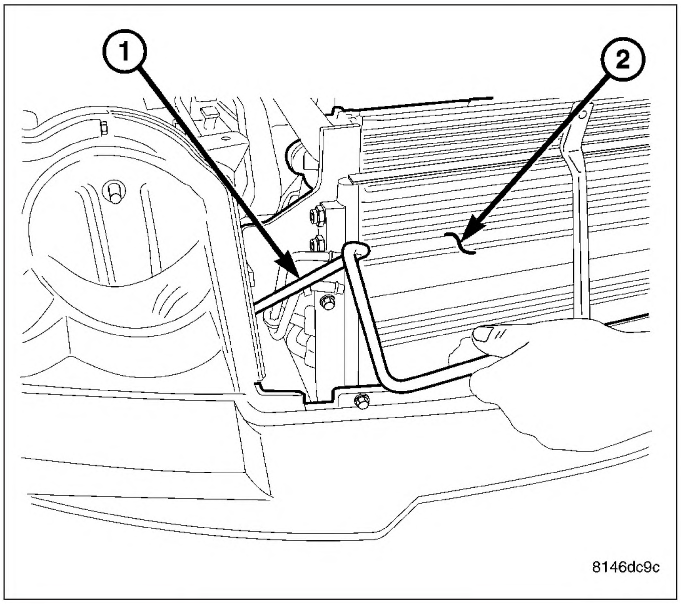
10. Remove the line (1) from the front of the vehicle by rotating the line in order to clear components.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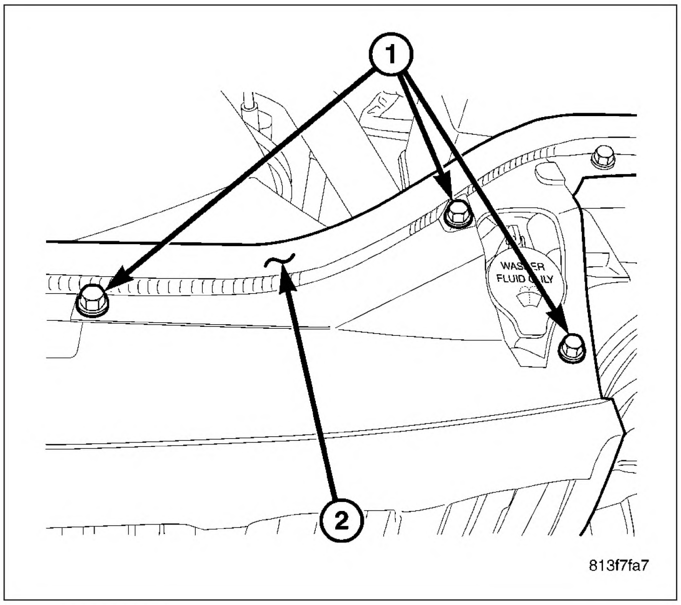
LINE FROM COOLER TO RESERVOIR

1. Drain the power steering fluid out of the reservoir.
2. Remove the hood weather-strip seal (2) at the radiator cowl.
3. Remove the 6 grille push pins (1).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WASHER FLUID ONLY
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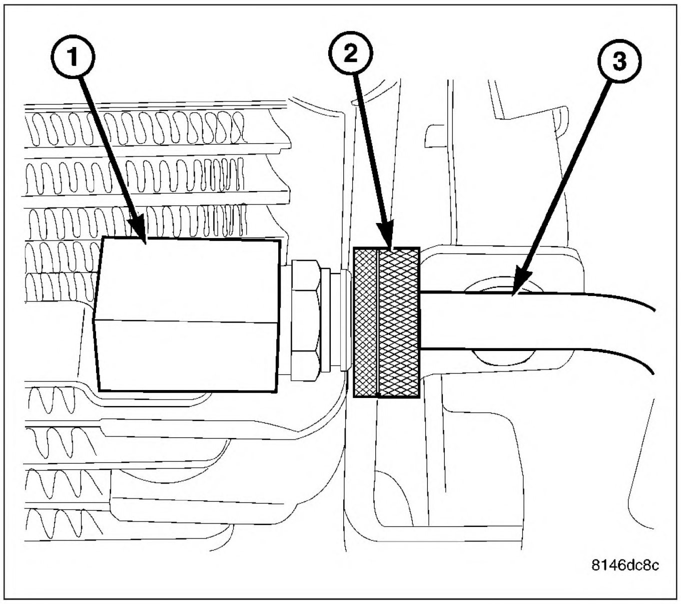
4. Install tool 8875-A (2) to remove the quick connect line (3) from the fluid cooler (1).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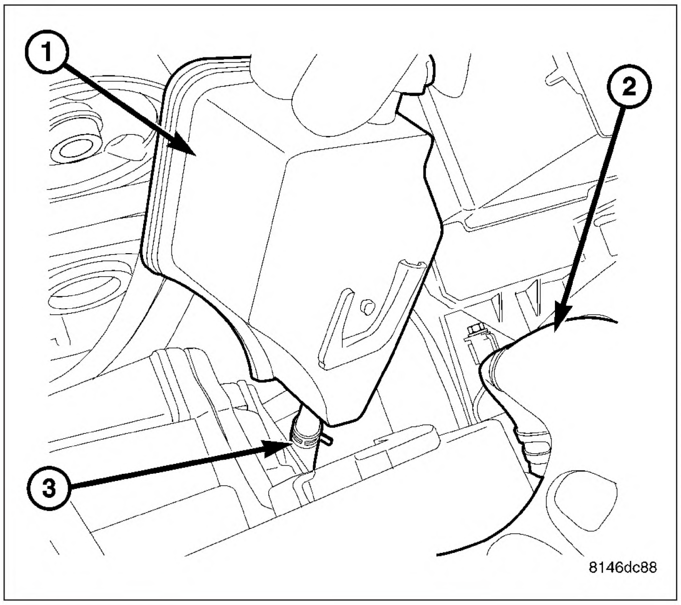
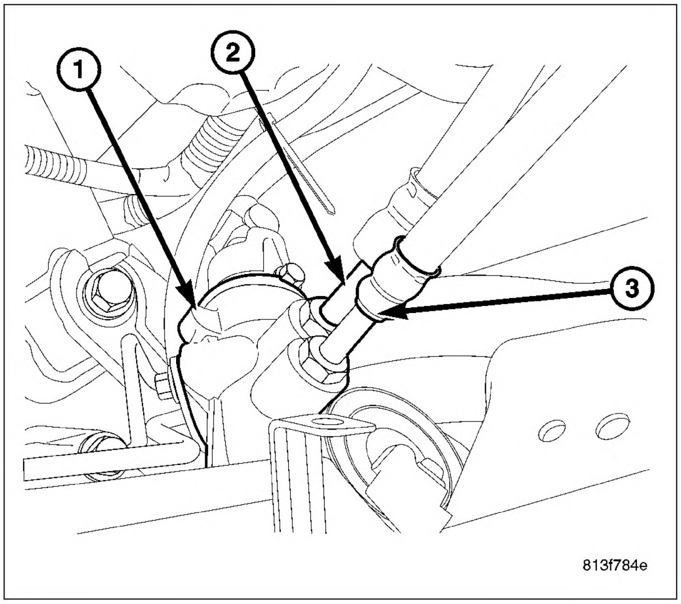
5. Unseat the reservoir (1) by lifting up, Remove the fluid cooler hose (3) to the reservoir (1).
6. Remove the fluid cooler line from the vehicle.



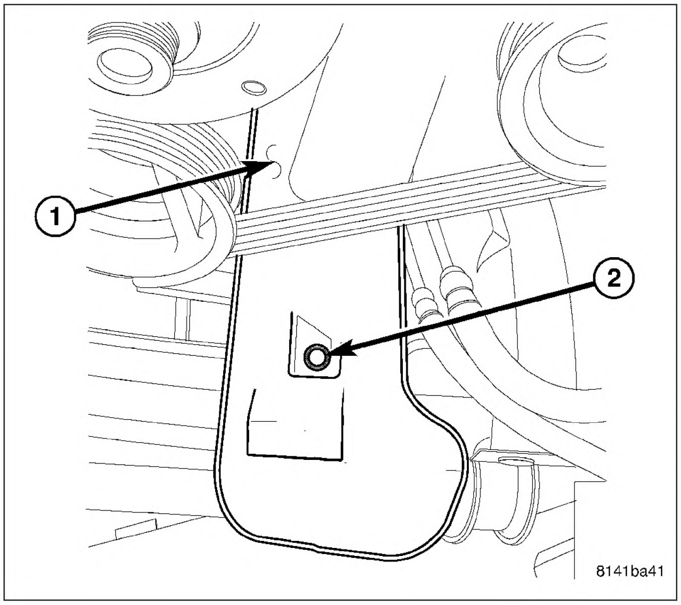
INSTALLATION

PRESSURE LINE - PUMP TO GEAR

1. Install the line (2) to the vehicle.
2. Reconnect the power steering pressure line (2) to the power steering gear (1) Tighten to 28 N·m (21 ft.lbs.).

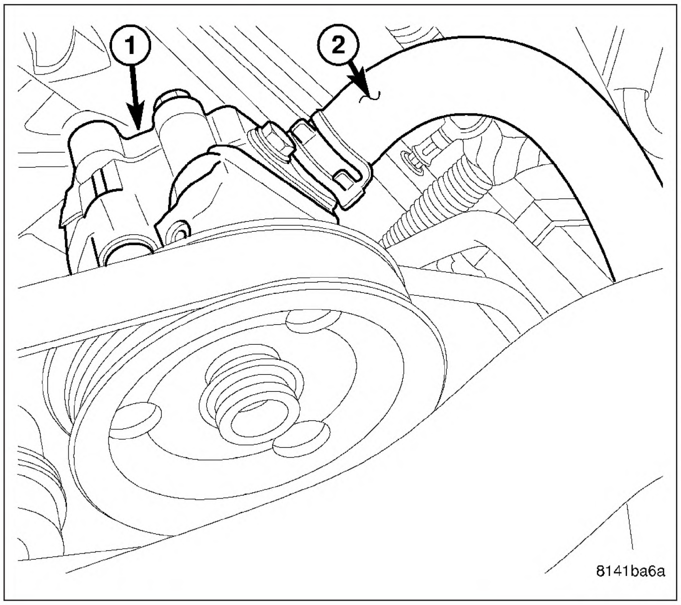


3. Install the oil filter drain (1) and tighten the 3 bolts (2).
4. Install the front splash shield.
5. Lower the vehicle.
6. Reconnect the power steering pressure line to the power steering pump Tighten to 28 N·m (21 ft.lbs.).
7. Install the air cleaner assemby.
8. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).

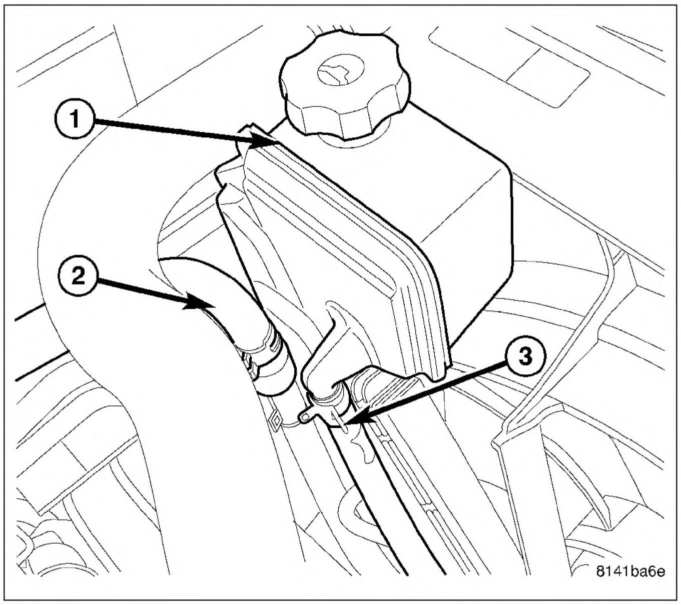


SUPPLY HOSE - PUMP TO RESERVOIR

1. Reconnect the power steering supply hose (2) to the power steering pump (1).

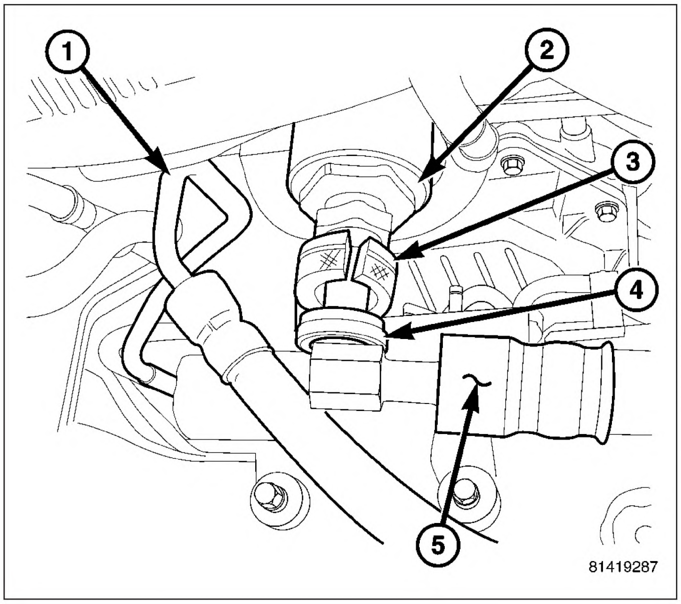


2. Reconnect the supply hose (2) to the reservoir (1).
3. Fill the system with power steering fluid.
4. Install the air cleaner assembly.
5. Bleed the system (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).



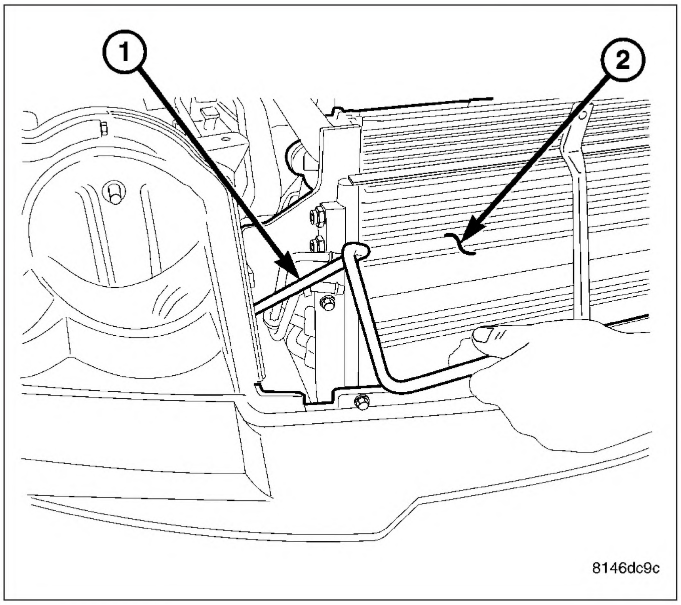
PRESSURE LINE - FAN TO PUMP

1. Install the pressure line(5) to the vehicle.
2. Install the pressure line (5) at the hydraulic cooling fan filter (2).
3. Reconnect the electrical connector (6) for the pressure switch (1).
4. Install the front skid plate.
5. Lower the vehicle.
6. Install the pressure line at the pump Tighten to 28 N·m (21 ft.lbs.).
7. Fill the system with power steering fluid.
8. Bleed the DHS system using a scan tool (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).

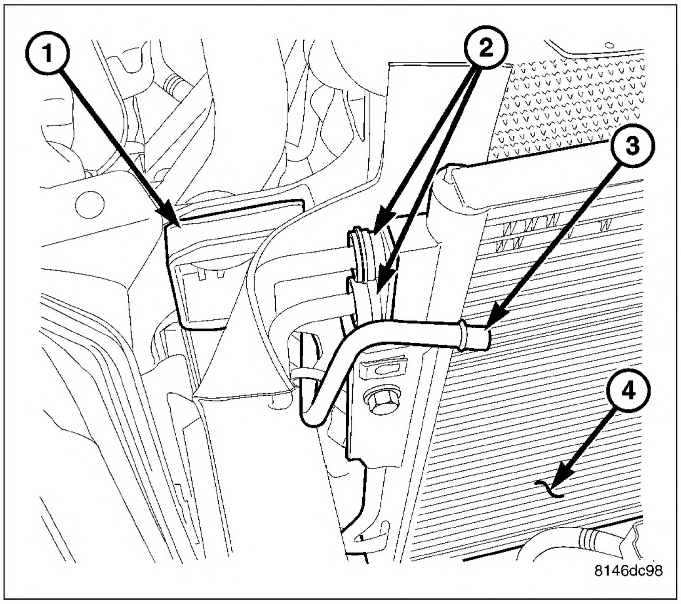


INSTALLATION

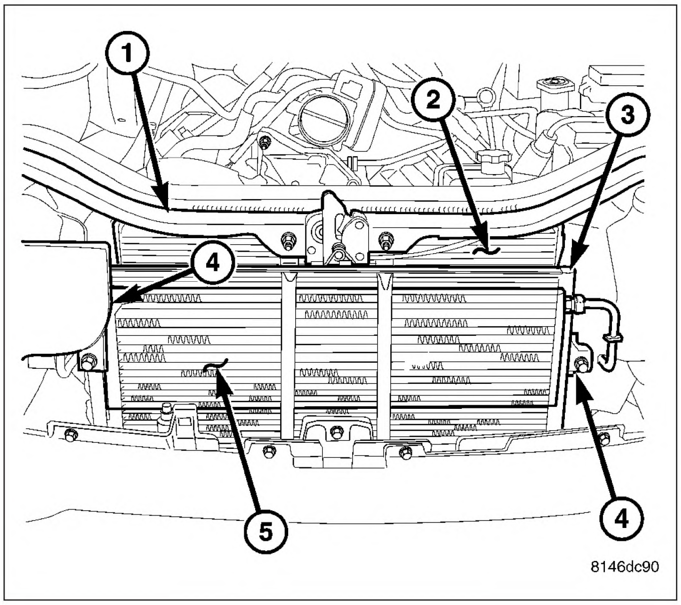
1. Install the line (1) into place from the front of the vehicle by rotating the line in order to clear components.



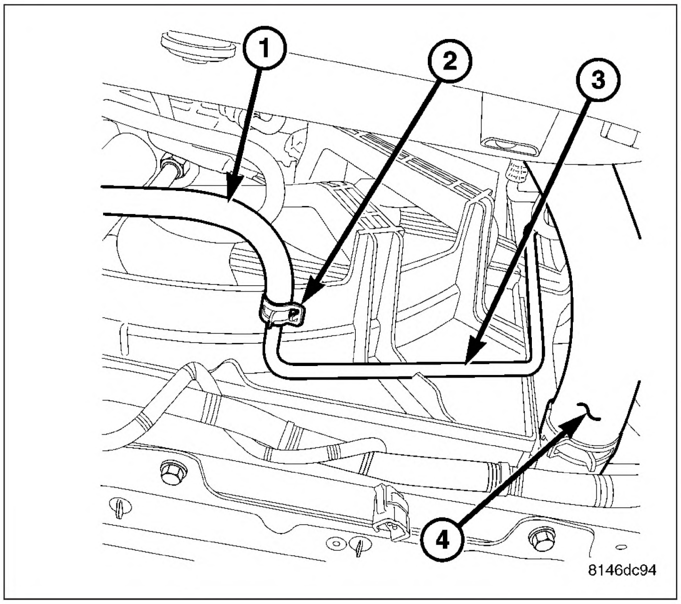
2. Install the fluid cooler quick connect line (3) to the fluid cooler (4).
3. Move the radiator, A/C assembly back in place.
4. Install the radiator, A/C assembly mounting bolts (1).



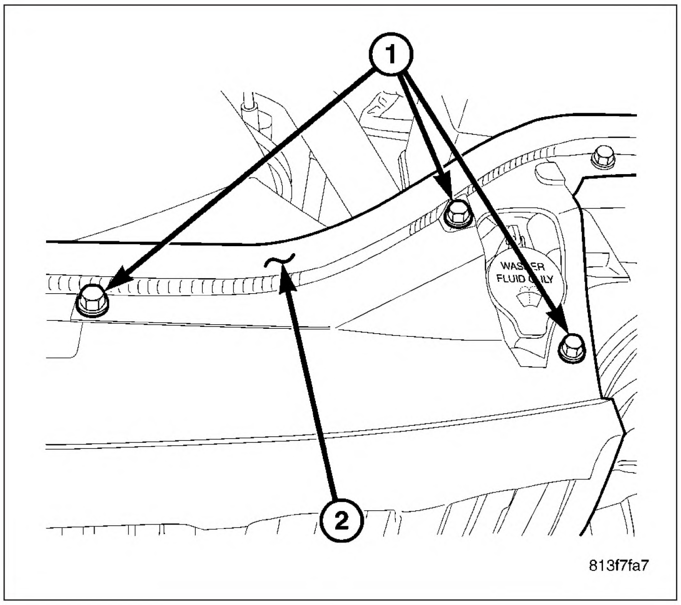
5. Install the radiator core support (1).



6. Raise and support the vehicle.
7. Reconnect the rubber hose 1) to the fluid cooler line (3) and reclamp (2) secure the line in place at the radiator.
8. Lower the vehicle.
9. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).
10. Start engine and check for leaks.



11. Install the grille and the 6 grille push pins (1).
12. Install the hood weather-strip seal (2) at the radiator cowl.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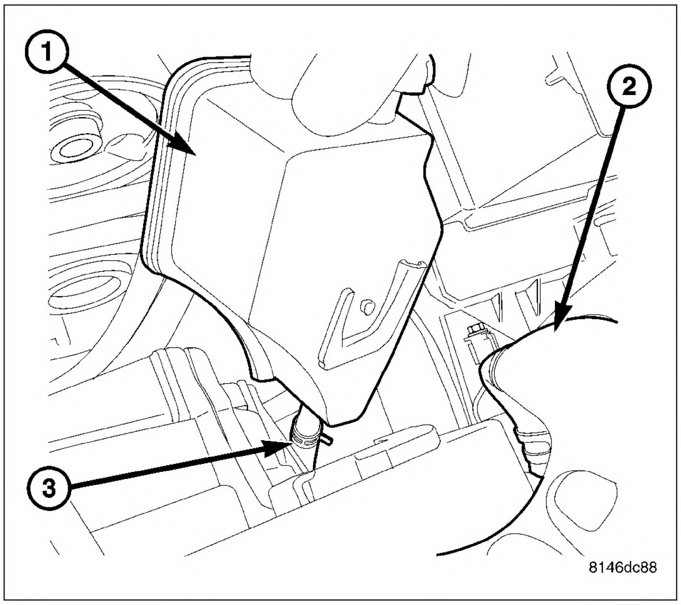
LINE FROM COOLER TO RESERVOIR

1. install the fluid cooler hose (3) to the reservoir (1).
2. Reinstall the reservoir (1) into the mounting slot.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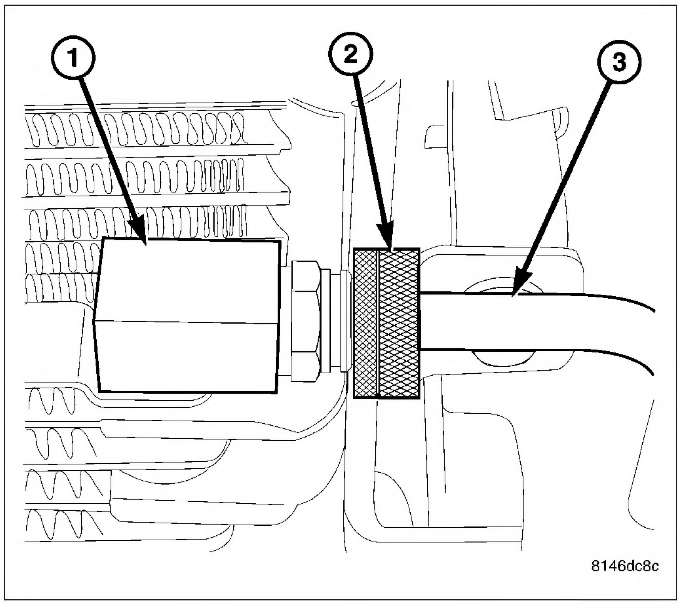
3. Install the fluid cooler quick connect line (3) to the fluid cooler (1).
4. Refill the power steering fluid and bleed the system, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).
5. Start engine and check for leaks.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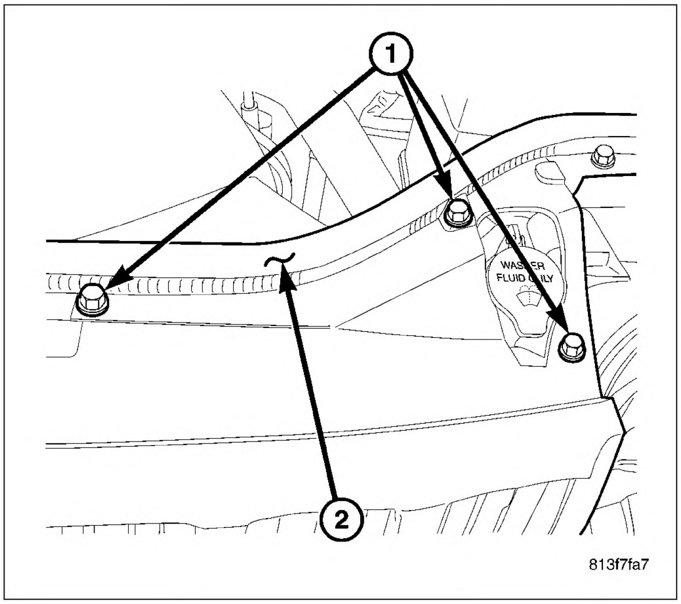
6. Install the grille and the 6 grille push pins (1).
7. Install the hood weather-strip seal (2) at the radiator cowl.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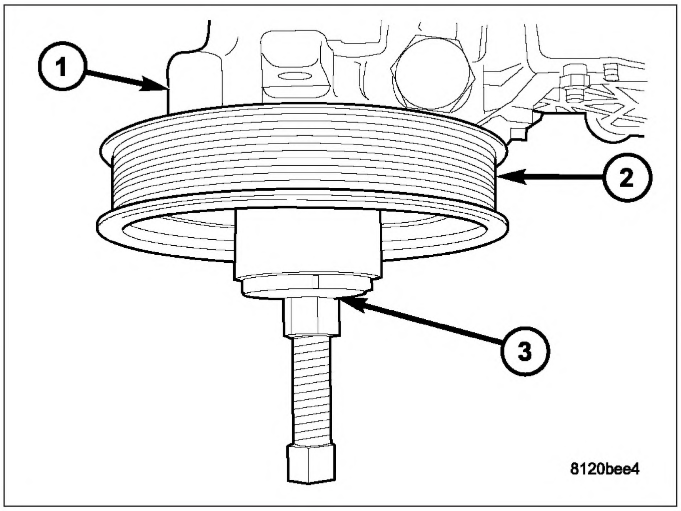
PULLEY

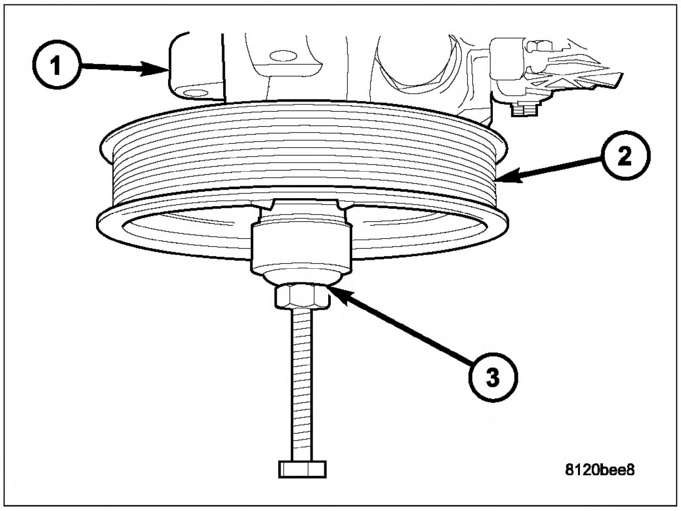
REMOVAL



CAUTION: Do not reuse the old power steering pump pulley it is not intended for reuse. A new pulley must be installed if removed.

1. Remove the power steering pump assembly, **4.7L & 5.7L only.** (Refer to 19 - STEERING/PUMP - REMOVAL).
2. Remove the pulley (2) from the pump (1) using (OTC® 7185) power steering pulley removal tool (3) or equivalent.

INSTALLATION



CAUTION: Do not reuse the old power steering pump pulley it is not intended for reuse. A new pulley must be installed if removed.

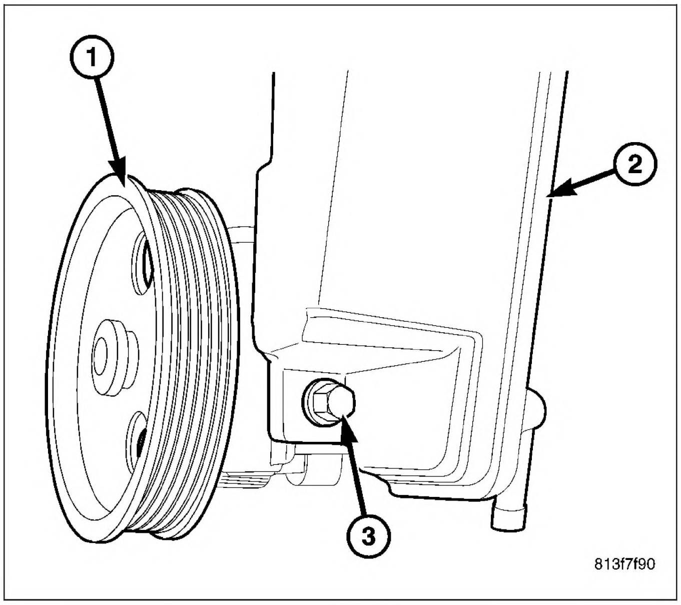
1. Replace the pulley if it's bent, cracked, or loose.
2. Install the pulley (2) on the pump (1) using (OTC® 7771) power steering pulley installation tool (3) or equivalent making sure it is flush with the end of the shaft. Ensure the tool and pulley remain aligned with the pump shaft.
3. Install the power steering pump assembly, **4.7L & 5.7L only.** (Refer to 19 - STEERING/PUMP - INSTALLATION).
4. Run engine until warm (5 min.) and note any belt chirp. If chirp exists, move pulley outward approximately 0.5 mm (0.020 in.). If noise increases, press on 1.0 mm (0.040 in.). **Be careful that pulley does not contact mounting bolts.**

RESERVOIR

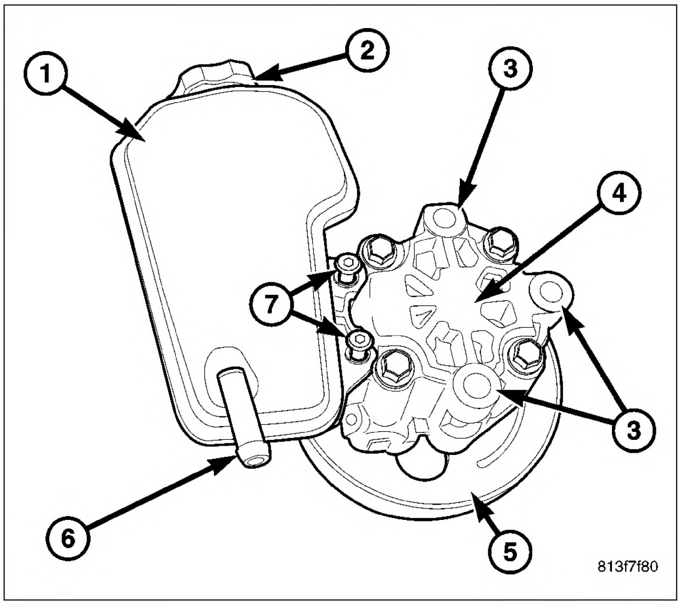
REMOVAL

FLUID RESERVOIR - 3.7L & 4.7L

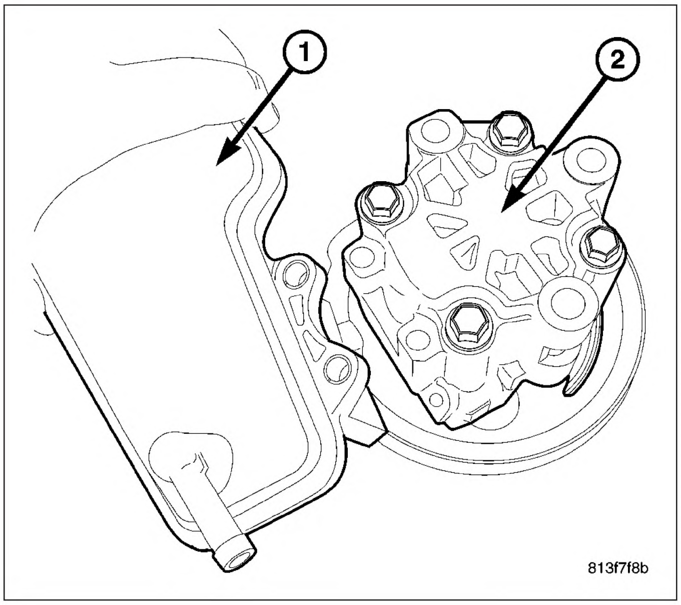
1. Remove power steering pump (Refer to 19 - STEERING/PUMP - REMOVAL).
2. Clean exterior of pump.
3. Clamp the pump body in a soft jaw vice.
4. Remove the mounting bolt (3) from the side of the reservoir (2).



5. Remove the 2 reservoir mounting bolts (7) to the pump (4).

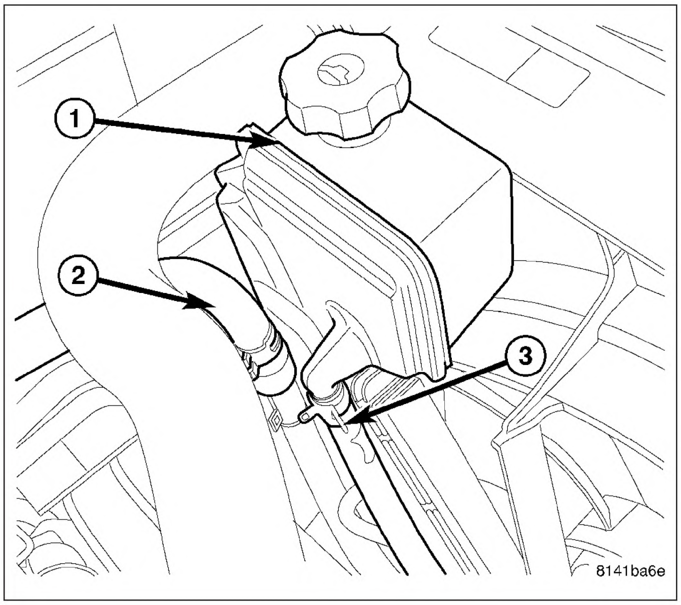


6. Remove fluid reservoir (1) from pump body (2). Remove and discard O-ring seal.

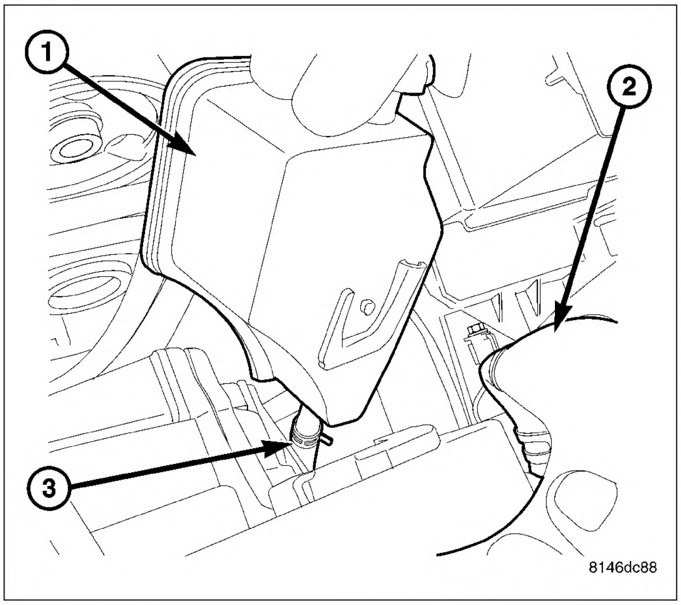

1
2
813f7f8b

FUILD RESERVOIR - 5.7L & DIESEL

1. Siphon the power steering reservoir.
2. Remove all the hoses (2&3).


1
2
3
8141ba6e

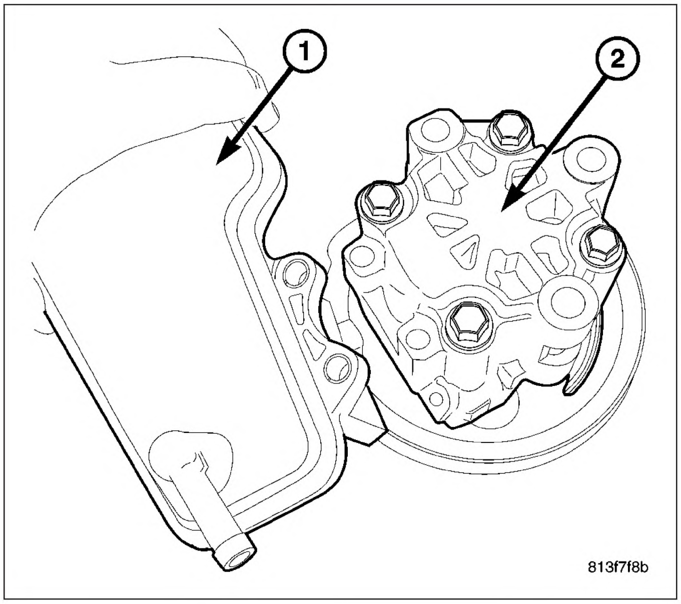
3. Lift the reservoir (1) straight upwards out of the mounting slot.
4. Remove the lower return hose (3).
5. Remove the reservoir (1).



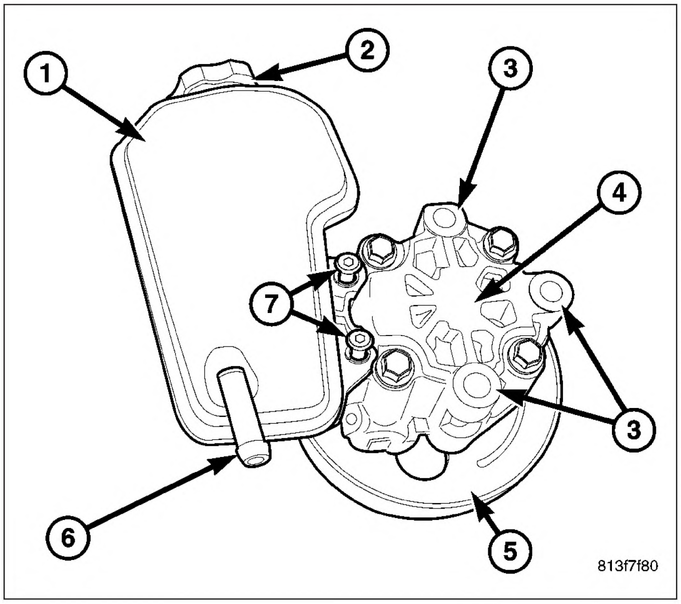
INSTALLATION

FLUID RESERVOIR - 3.7L & 4.7L

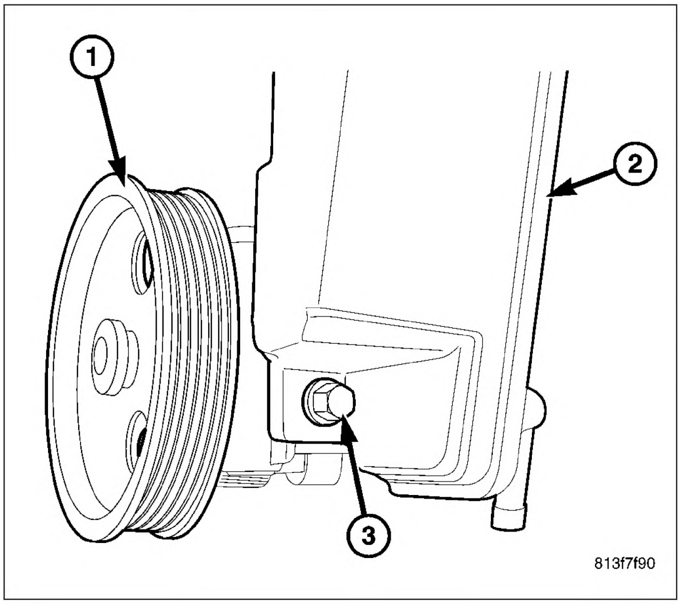
1. Lubricate new O-ring Seal with Mopar Power Steering Fluid or equivalent.
2. Install O-ring seal.
3. Install the reservoir (1) onto the pump body (2).



4. Install the 2 reservoir mounting bolts (7) to the pump (4).

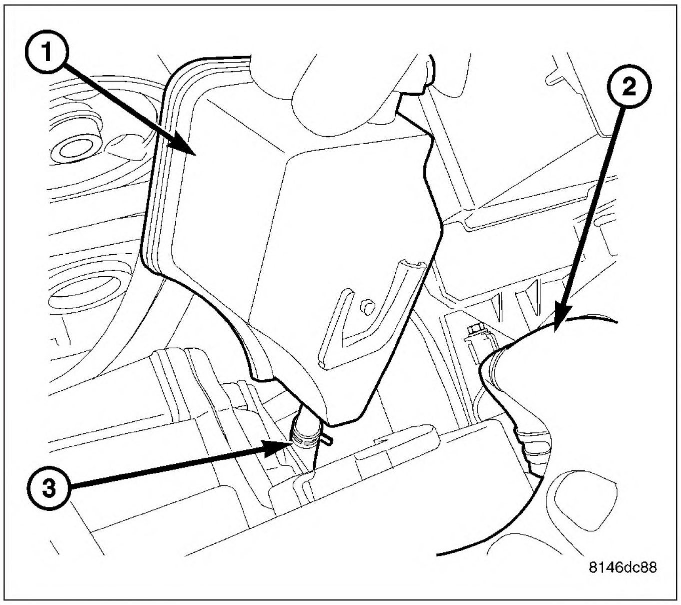

1
2
3
4
7
3
6
5
813f7f80

5. Install the side reservoir (2) mounting bolt (3) to the pump.
6. Install power steering pump (Refer to 19 - STEERING/PUMP - INSTALLATION).
7. Add power steering fluid, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).

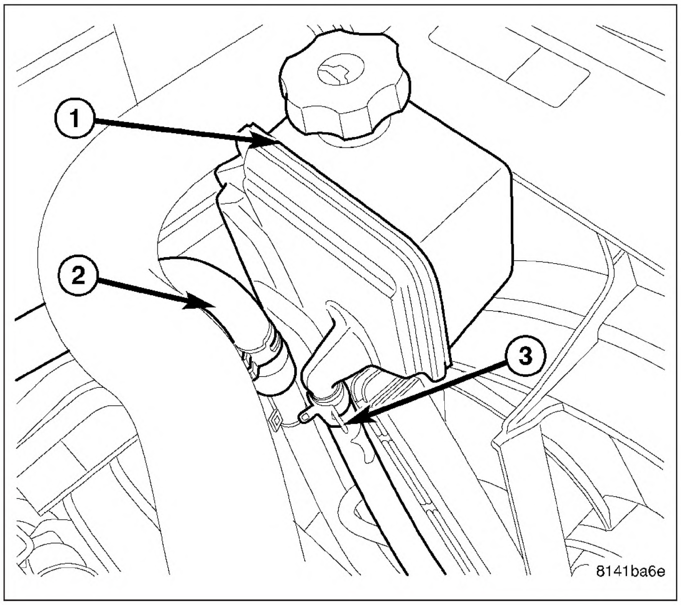

1
2
3
813f7f90

FLUID RESERVOIR - 5.7L & DIESEL

1. Install the lower return hose (3) to the reservoir (1).
2. Install the reservoir (1) into the mounting slot.



3. Install the hoses (2&3).
4. Add power steering fluid, (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).



TRANSMISSION AND TRANSFER CASE

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AUTOMATIC TRANSMISSION NAG1 - SHIFTER DIAGNOSTICS

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AUTOMATIC TRANSMISSION NAG1 - SHIFTER DIAGNOSTICS

DIAGNOSIS AND TESTING

P0562–BATTERY VOLTAGE LOW

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

The Shift Lever Assembly monitors ignition voltage. The DTC will set if the monitored battery voltage drops below 6.0 volts and a temporary limp in will be activated. If the voltage rises above 9.0 volts, normal operations is resumed.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When monitored battery voltage drops below 6.0 volts.

Possible Causes
VEHICLE CHARGING SYSTEM
(F1) IGNITION UNLOCK RUN START CIRCUIT
(Z911) GROUND CIRCUIT
SHIFT LEVER ASSSEMBLY

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

Diagnostic Test

1. CHECK FOR ENGINE CHARGING SYSTEM DTCS

With the scan tool, read Engine DTCs.

Are there any Engine Charging System DTCs present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK (F1) IGNITION UNLOCK RUN START CIRCUIT

Turn the ignition off to the lock position.

Disconnect the Shift Lever Assembly harness connector.

Turn the ignition on.

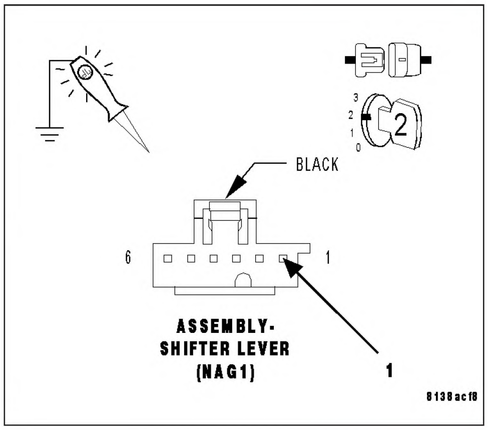
Using a 12-volt test light connected to ground, check the (F1) Ignition Unlock Run Start circuit in the Shift Lever Assembly harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the (F1) Ignition Unlock Run Start circuit for high resistance.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.



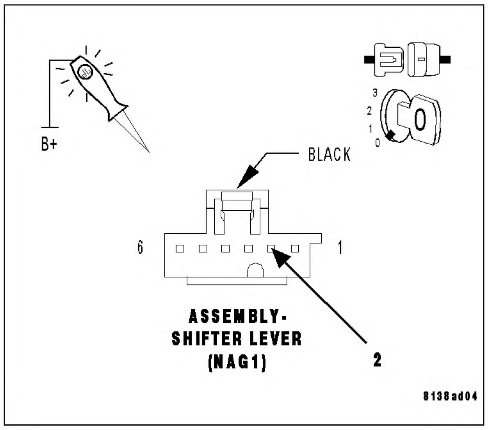
P0562–BATTERY VOLTAGE LOW (CONTINUED)

3. CHECK (Z911) GROUND CIRCUIT

Turn the ignition off to the lock position.

Using a 12-volt test light connected to 12-volts, check the (Z911) Ground circuit in the Shift Lever Assembly harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.



Does the test light illuminate brightly?

Yes >> Go To 4

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair the (Z911) Ground circuit for high resistance.

---

4. SHIFT LEVER ASSEMBLY

Reconnect all disconnected harness connectors.

With the scan tool, erase Shift Lever DTC’s.

Start the engine and raise the engine speed to 2000 RPM.

With the scan tool, read Shift Lever DTC’s.

Did the P0562–BATTERY VOLTAGE LOW DTC reset?

Yes >> Replace the Shift Lever Assembly per the Service Information

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0563–BATTERY VOLTAGE HIGH

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

The Shift Lever Assembly monitors ignition voltage. The DTC will set, if the monitored battery voltage rises above 16.0 volts.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the monitored battery voltage rises above 16.0 volts.

Possible Causes
CHARGING SYSTEM DTCS
VEHICLE WAS JUMP STARTED INCORRECTLY
SHIFT LEVER ASSEMBLY

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

Diagnostic Test

1. CHECK FOR CHARGING SYSTEM DTCS

With the scan tool, read Engine DTCs.

NOTE: This includes any one trip faults.

Are there any Engine Charging System DTCs present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and perform the appropriate symptom.

No >> Go To 2

---

2. VEHICLE WAS JUMP STARTED INCORRECTLY

Verify if the vehicle was jump started by another vehicle using a 24-volt charging system or incorrectly jump started with the 12 volt battery in series.

Was the vehicle jump started by another vehicle?

Yes >> This is the cause of the DTC. Erase the DTC and return the vehicle to the customer.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

P0563–BATTERY VOLTAGE HIGH (CONTINUED)

3. SHIFT LEVER ASSEMBLY

Reconnect all disconnected harness connectors.
With the scan tool, erase Shift Lever DTC's.
Start the engine and raise the engine speed to 2000 RPM.
With the scan tool, read Shift Lever DTC's.

Did the P0562–BATTERY VOLTAGE HIGH DTC reset?

Yes >> Replace the Shift Lever Assembly per the Service Information
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0607–ECU INTERNAL PERFORMANCE

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

The Shifter Lever Assembly performs various internal tests to verify proper controller operation. This DTC indicates that there is an issue with the Shifters internal processor.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the Shift Lever Assembly controller detects an error with the optical sensors or internal checksum value is not correct.

Possible Causes
SHIFTER LEVER ASSEMBLY

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

Diagnostic Test

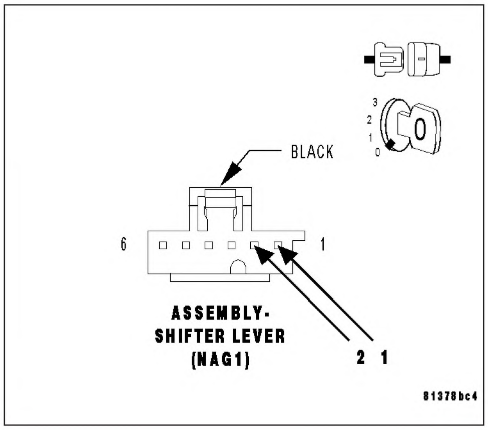
1. SHIFT LEVER ASSEMBLY

View repair

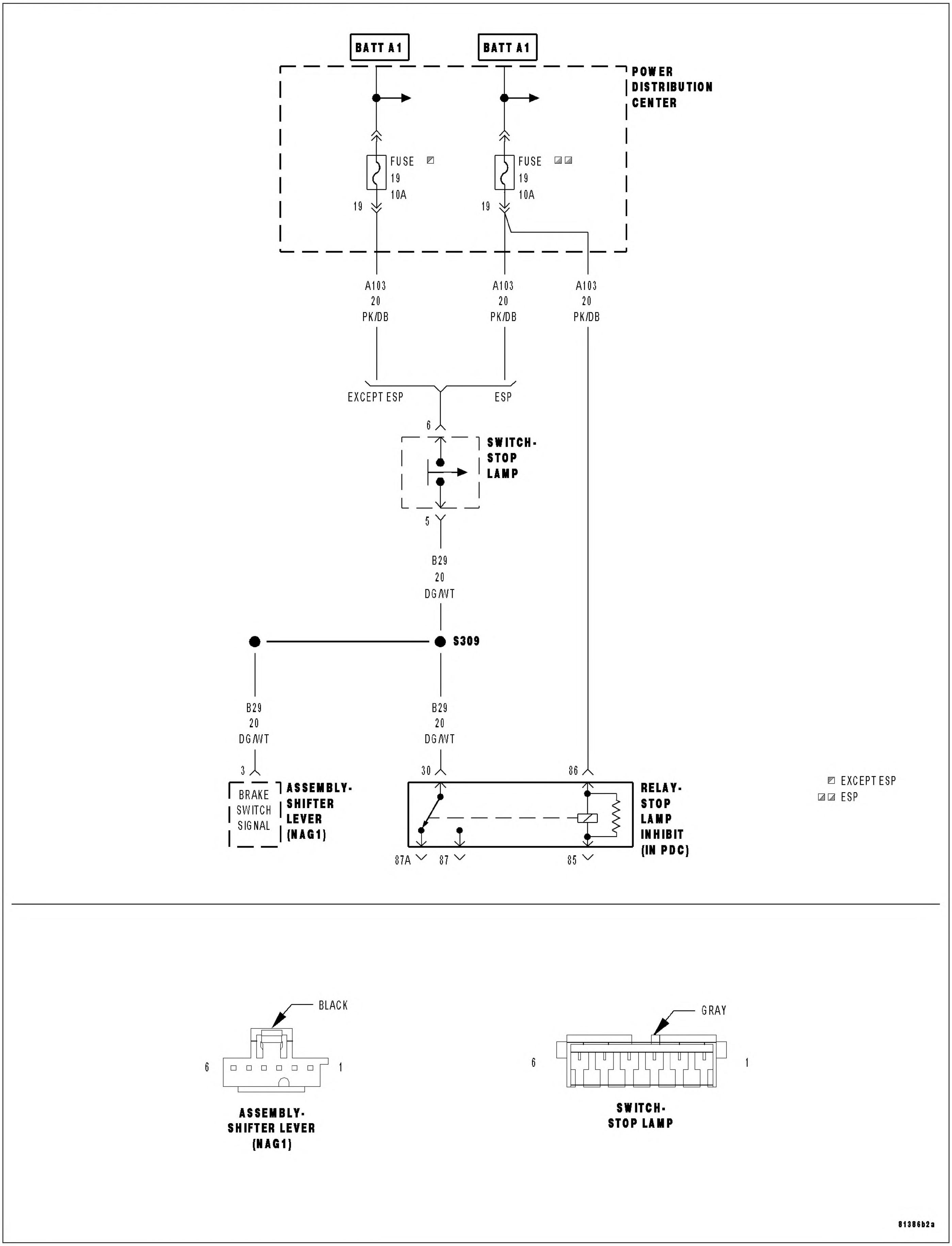
Repair

Using the schematics as a guide, check the Shifter Lever Assemby Control Module terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Shift Lever Assembly per the Service Information. Refer to the 21 — AUTOMATIC TRANSMISSION NAG1 — Shift Mechanism for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.



P0930–BTSI CONTROL CIRCUIT LOW


BATT A1
BATT A1
POWER DISTRIBUTION CENTER
FUSE ▨ 19 10A
FUSE ▨▨ 19 10A
19
19
A103 20 PK/DB
A103 20 PK/DB
A103 20 PK/DB
EXCEPT ESP
ESP
6
SWITCH-STOP LAMP
5
B29 20 DG/WT
S309
B29 20 DG/WT
B29 20 DG/WT
3
BRAKE SWITCH SIGNAL
ASSEMBLY-SHIFTER LEVER (NAG1)
30
86
RELAY-STOP LAMP INHIBIT (IN PDC)
87A
87
85
▨ EXCEPT ESP
▨▨ ESP
BLACK
6
1
ASSEMBLY-SHIFTER LEVER (NAG1)
GRAY
6
1
SWITCH-STOP LAMP
81386b2a

P0930–BTSI CONTROL CIRCUIT LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

The brake switch signal must be active before the shift lever can be moved out of the park position. The Shifter lever assembly receives two brake switch signals. The first signal is a CAN C Bus message sent to the shift lever assembly. The second signal is a hardwired brake switch signal to the shift lever assembly. The CAN C Bus message is the primary brake switch signal and the hardwired signal serves as the backup brake switch signal.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if the high side driver detects a short to ground for 10 seconds.

Possible Causes
ENGINE BRAKE DTC'S PRESENT
ABS DTC'S PRESENT
(B29) BRAKE SWITCH SIGNAL SHORT TO GROUND
SHIFT LEVER ASSEMBLY

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

Diagnostic Test

1. ENGINE DTC'S PRESENT

With the scan tool, read Engine DTCs.

Are there any Engine brake DTC's present?

Yes >> Refer to 9 — ENGINE ELECTRICAL DIAGNOSTICS and perform the appropriate diagnostic procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. ABS MODULE DTC'S PRESENT

With the scan tool, read ABS Module DTCs.

Are there any ABS DTC's present?

Yes >> Refer to Section 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS and perform the appropriate diagnostic procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

P0930–BTSI CONTROL CIRCUIT LOW (CONTINUED)

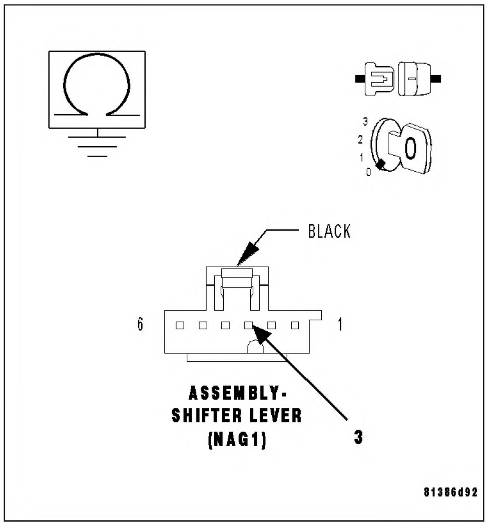
3. (B29) BRAKE SWITCH SIGNAL SHORT TO GROUND

Turn the ignition off to the lock position.

Disconnect the Shift Lever Assembly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance between ground and the (B29) Brake Switch Signal circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (B29) Brake Switch Signal for a short to ground.

No >> Go To 4

---

4. SHIFT LEVER ASSEMBLY

Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits.

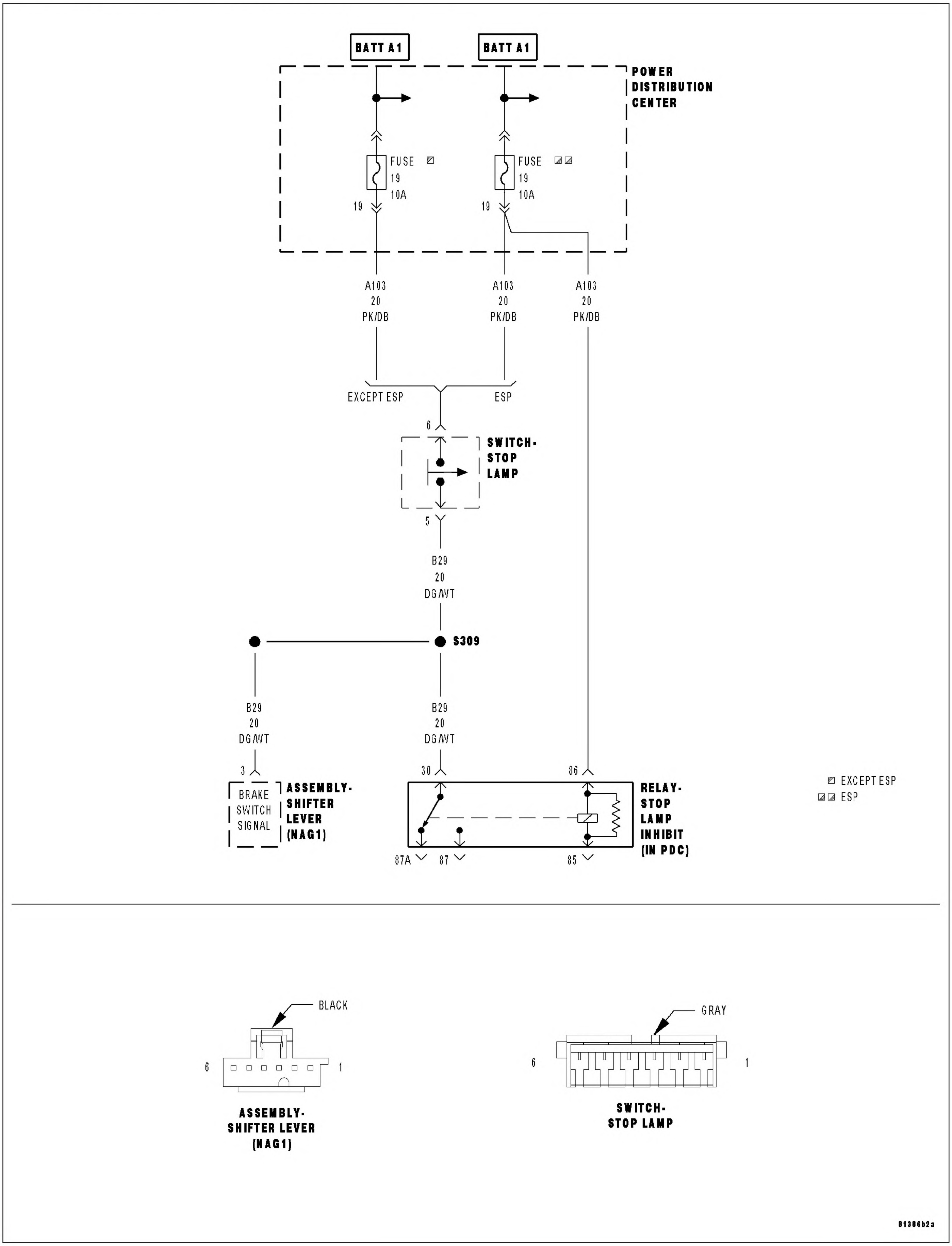
If there are no possible causes remaining, view repair.

Repair

Replace the Shift Lever Assembly per the Service Information.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0931–BTSI CONTROL CIRCUIT HIGH


BATT A1
BATT A1
POWER DISTRIBUTION CENTER
FUSE ▨ 19 10A
FUSE ▨▨ 19 10A
19
19
A103 20 PK/DB
A103 20 PK/DB
A103 20 PK/DB
EXCEPT ESP
ESP
6
SWITCH-STOP LAMP
5
B29 20 DG/WT
S309
B29 20 DG/WT
B29 20 DG/WT
3
BRAKE SWITCH SIGNAL
ASSEMBLY-SHIFTER LEVER (NAG1)
30
86
RELAY-STOP LAMP INHIBIT (IN PDC)
87A
87
85
▨ EXCEPT ESP
▨▨ ESP
BLACK
6
1
ASSEMBLY-SHIFTER LEVER (NAG1)
GRAY
6
1
SWITCH-STOP LAMP
81386b2a

P0931–BTSI CONTROL CIRCUIT HIGH (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

The brake switch signal must be active before the shift lever can be moved out of the park position. The Shifter lever assembly receives two brake switch signals. The first signal is a CAN C Bus message sent to the shift lever assembly. The second signal is a hardwired brake switch signal to the shift lever assembly. The CAN C Bus message is the primary brake switch signal and the hardwired signal serves as the backup brake switch signal. These two brake switch signals are compared against each other to verify proper brake switch operation.

- **When Monitored:**
  Continously with the ignition key on.
- **Set Condition:**
  The DTC will set if the high side driver detects an open load for 10 seconds.

Possible Causes
ENGINE BRAKE DTC'S PRESENT
ABS DTC'S PRESENT
(B29) BRAKE SWITCH SIGNAL OPEN
(B29) BRAKE SWITCH SIGNAL SHORT TO VOLTAGE
SHIFT LEVER ASSEMBLY

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

Diagnostic Test

1. ENGINE DTC'S PRESENT

With the scan tool, read Engine DTCs.

Are there any Engine brake DTC's present?

Yes >> Refer to 9 — ENGINE ELECTRICAL DIAGNOSTICS and perform the appropriate diagnostic procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. ABS MODULE DTC'S PRESENT

With the scan tool, read ABS Module DTCs.

Are there any ABS DTC's present?

Yes >> Refer to Section 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS and perform the appropriate diagnostic procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

P0931–BTSI CONTROL CIRCUIT HIGH (CONTINUED)

3. (B29) BRAKE SWITCH SIGNAL OPEN

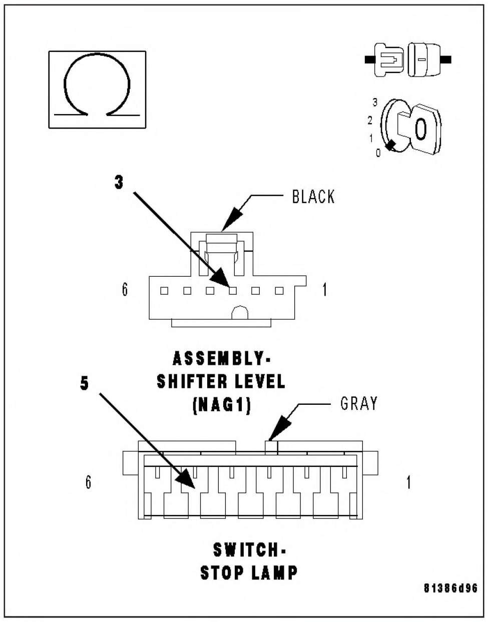
Turn the ignition off to the lock position.

Disconnect the Shift Lever Assmbly harness connector.

Disconnect the Stop Lamp Switch harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance of the (B29) Brake Switch Signal circuit between the Shift Lever Assembly harness connector and the Stop Lamp Switch.



Is the resistance above 5.0 ohms?

Yes >> Repair the (B29) Brake Switch Signal for an open.

No >> Go To 4

4. (B29) BRAKE SWITCH SIGNAL SHORT TO VOLTAGE

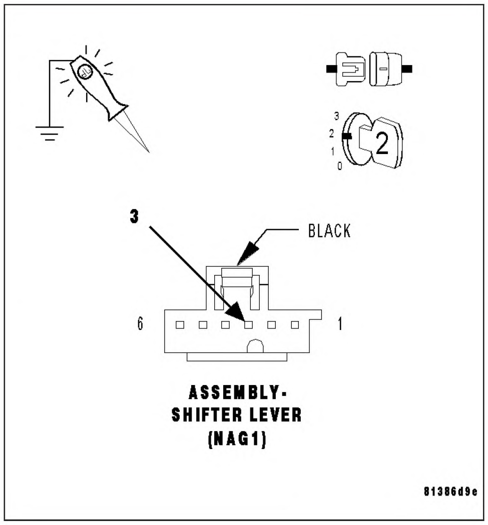
Turn the ignition off to the lock position.

Disconnect the Shift Lever Assmbly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Turn the ignition on..

Measure the voltage of the (B29) Brake Switch Signal circuit.



Is the voltage above 0.5 volts?

Yes >> Repair the (B29) Brake Switch Signal for a short to voltage.

No >> Go To 5

5. SHIFT LEVER ASSEMBLY

Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits.

If there are no possible causes remaining, view repair.

Repair

Replace the Shift Lever Assembly per the Service Information.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P2775–AUTOSTICK UPSHIFT SWITCH CIRCUIT PERFORMANCE

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

The AutoStick Switch is integrated into the Shift Lever Assembly. The gear requested by the AutoStick selection in then sent over the CAN C bus to the TCM to engage the requested gear.

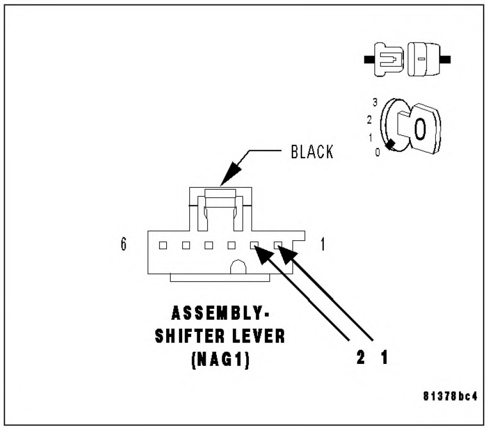
- **When Monitored:**
  When in AutoStick mode.
- **Set Condition:**
  When the expected switch state is not correctly sensed by the Shift Lever Assembly. If the upshift switch signal is detected as active in gear position other than drive or both upshift and downshift signals are active at the same time.

Possible Causes
SHIFTER LEVER ASSEMBLY

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

1. SHIFTER LEVER ASSEMBLY

Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits.



If there are no possible causes remaining, view repair.

Repair

Using the schematics as a guide, check the Shifter Lever Assembly Control Module terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Shift Lever Assembly per the Service Information. Refer to Shift Mechanism for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P2779–AUTOSTICK DOWNSHIFT SWITCH CIRCUIT PERFORMANCE

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

The AutoStick Switch is integrated into the Shift Lever Assembly. The gear requested by the AutoStick selection in then sent over the CAN C bus to the TCM to engage the requested gear.

- **When Monitored:**
  When in AutoStick mode.
- **Set Condition:**
  When the expected switch state is not correctly sensed by the Shift Lever Assembly. If the upshift switch signal is detected as active in gear position other than drive or both upshift and downshift signals are active at the same time.

Possible Causes
SHIFTER LEVER ASSEMBLY

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

1. SHIFTER LEVER ASSEMBLY

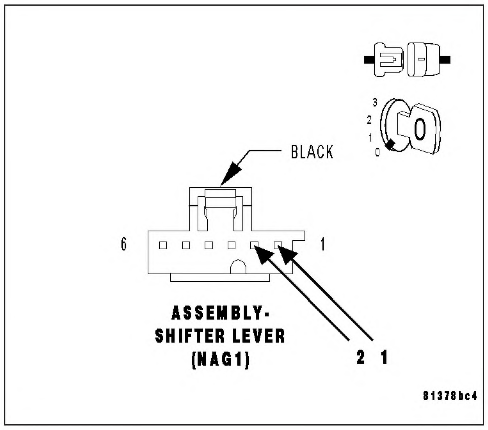
Using the schematics as a guide, inspect the wiring and connectors. Repair as necessary. Pay particular attention to all power and ground circuits.

If there are no possible causes remaining, view repair.

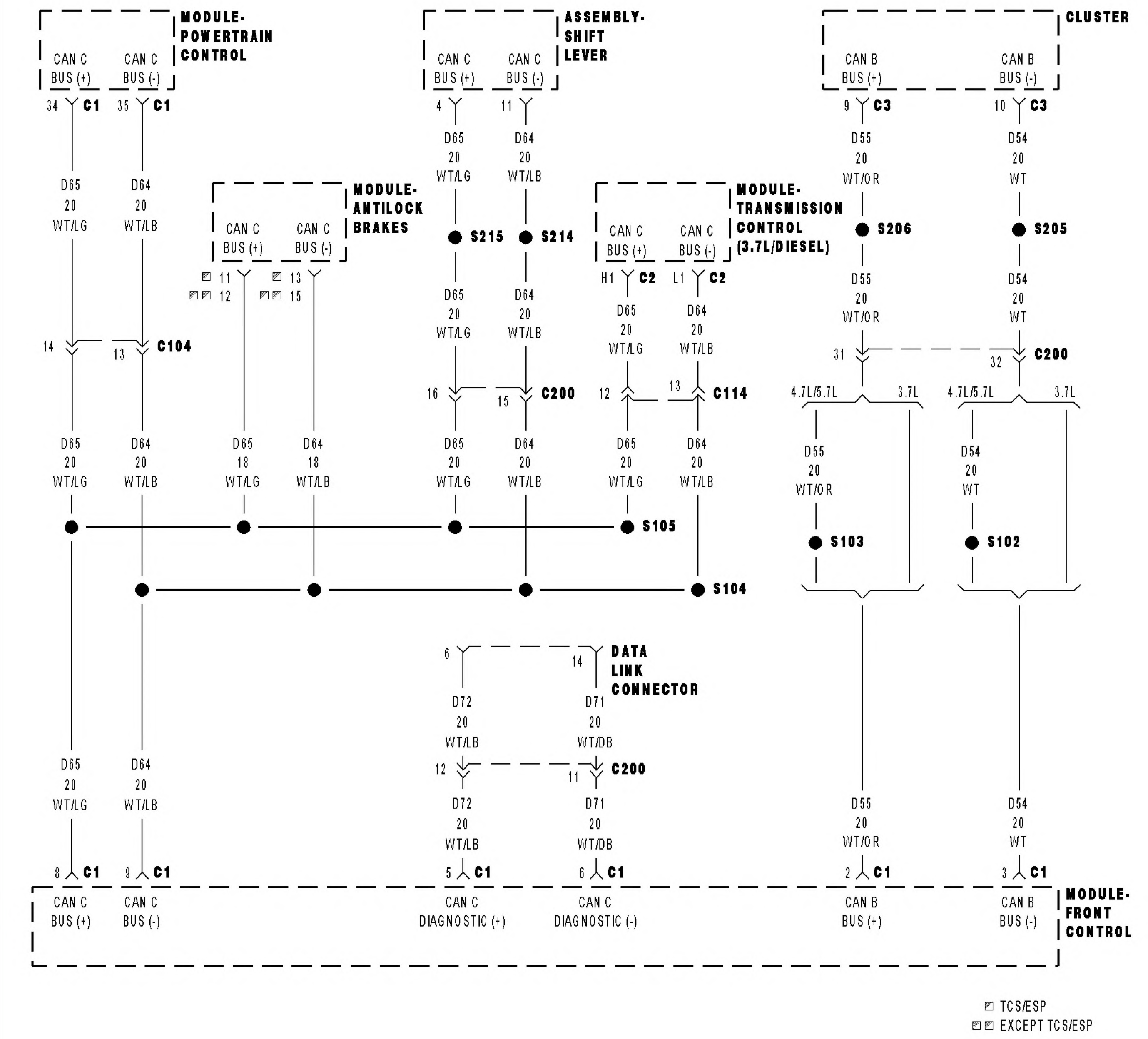
Repair

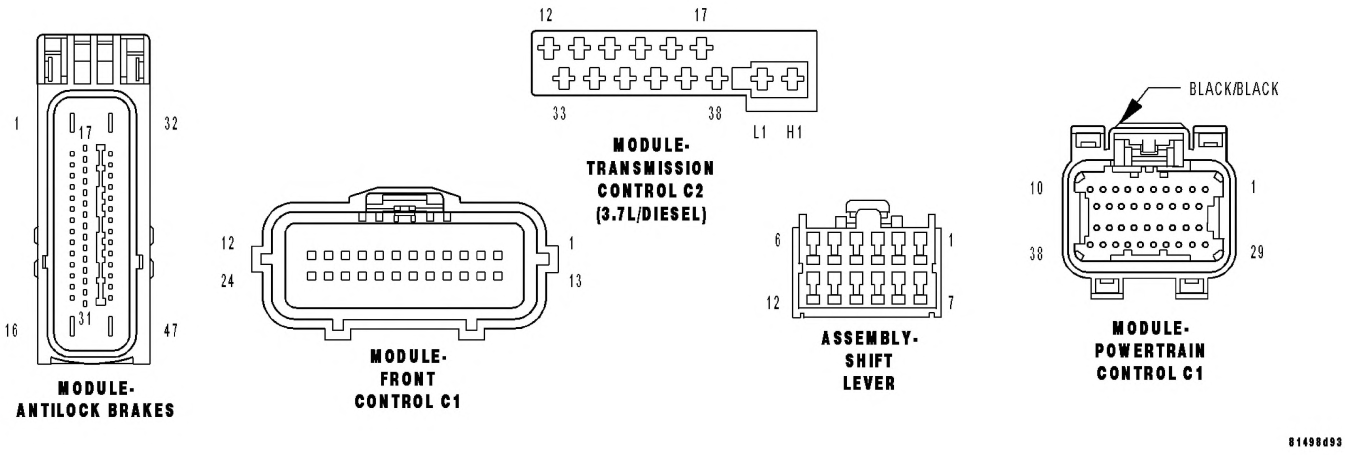
Using the schematics as a guide, check the Shifter Lever Assembly Control Module terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the Shift Lever Assembly per the Service Information. Refer to Shift Mechanism for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.



U0002–CAN C BUS OFF PERFORMANCE


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0002–CAN C BUS OFF PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

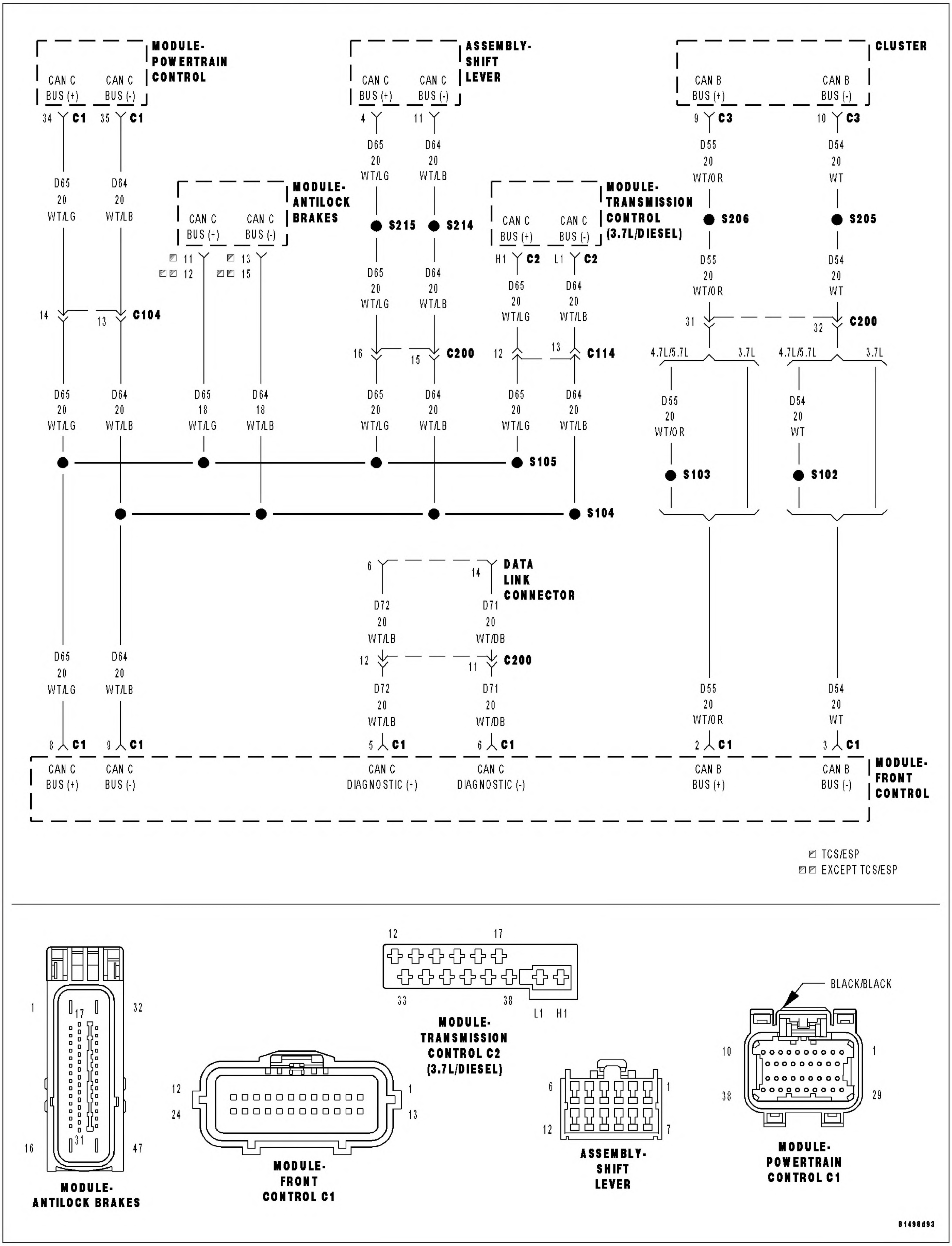
For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

Some controllers communicate with other controllers over the CAN C bus. The Shifter controller continuously monitors the bus activity and receives the messages it needs. The CAN C bus is also used to communicate transmission MIL status to the Engine Controller.

Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

U0100–LOST COMMUNICATION WITH ECM/PCM


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
MODULE-ANTILOCK BRAKES
1
17
32
31
16
47
MODULE-FRONT CONTROL C1
12
24
1
13
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
17
33
38
L1
H1
ASSEMBLY-SHIFT LEVER
6
12
7
MODULE-POWERTRAIN CONTROL C1
BLACK/BLACK
10
38
29
81498d93

U0100–LOST COMMUNICATION WITH ECM/PCM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

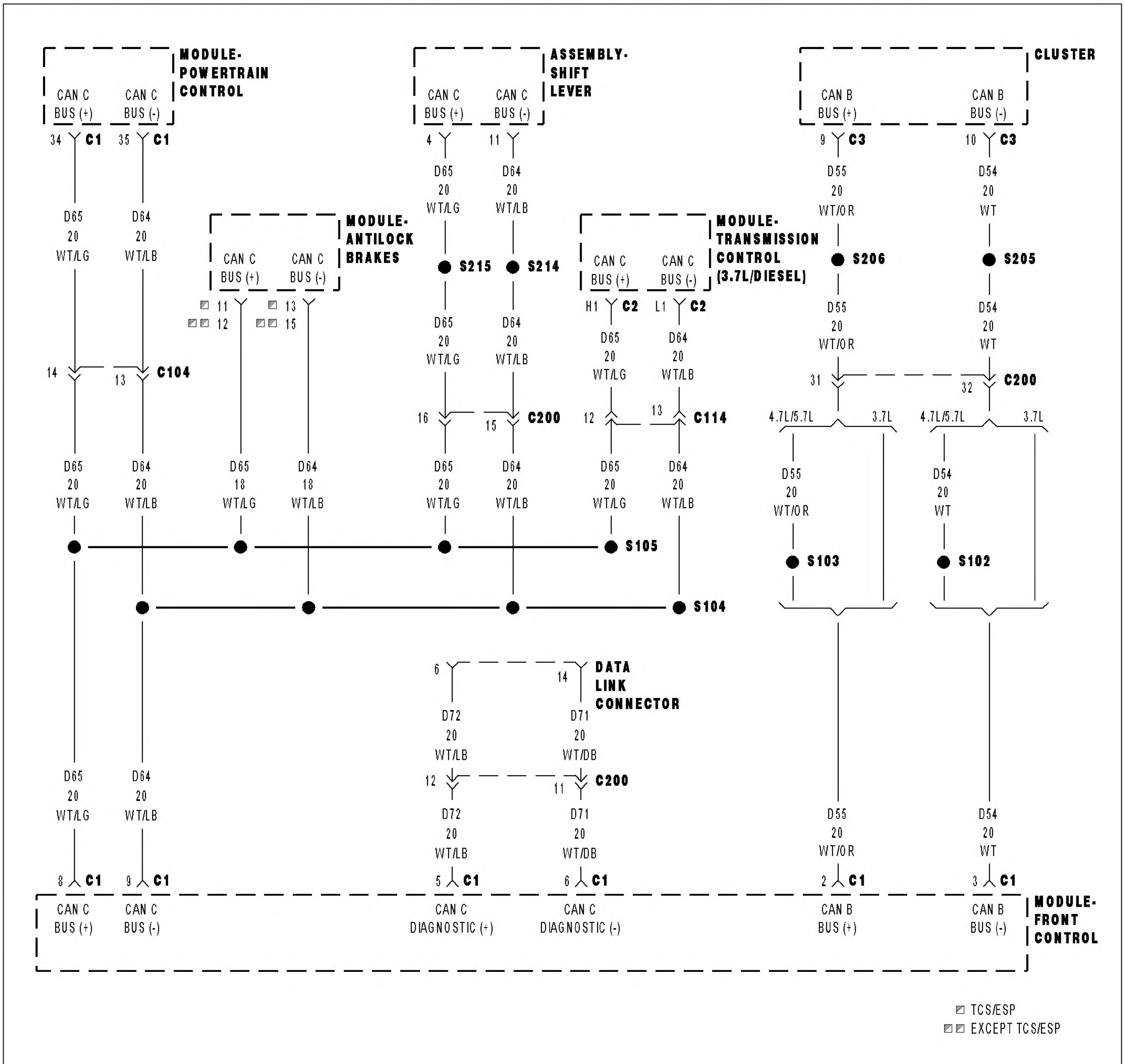
For a complete wiring diagram**Refer to Section 8W**

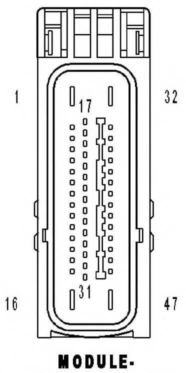
Theory of Operation

Some controllers communicate with other controllers over the CAN C bus. The Shifter controller continuously monitors the bus activity and receives the messages it needs. The CAN C bus is also used to communicate transmission MIL status to the Engine Controller.

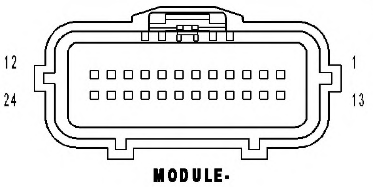
Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

U0121–LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE

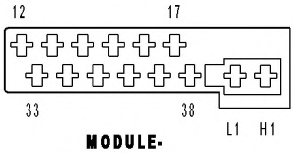

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
11
12
13
15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
31
32
C200
16
15
C200
12
13
C114
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47

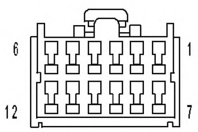
MODULE-ANTILOCK BRAKES



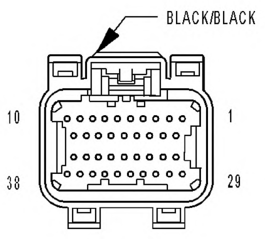
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U0121–LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

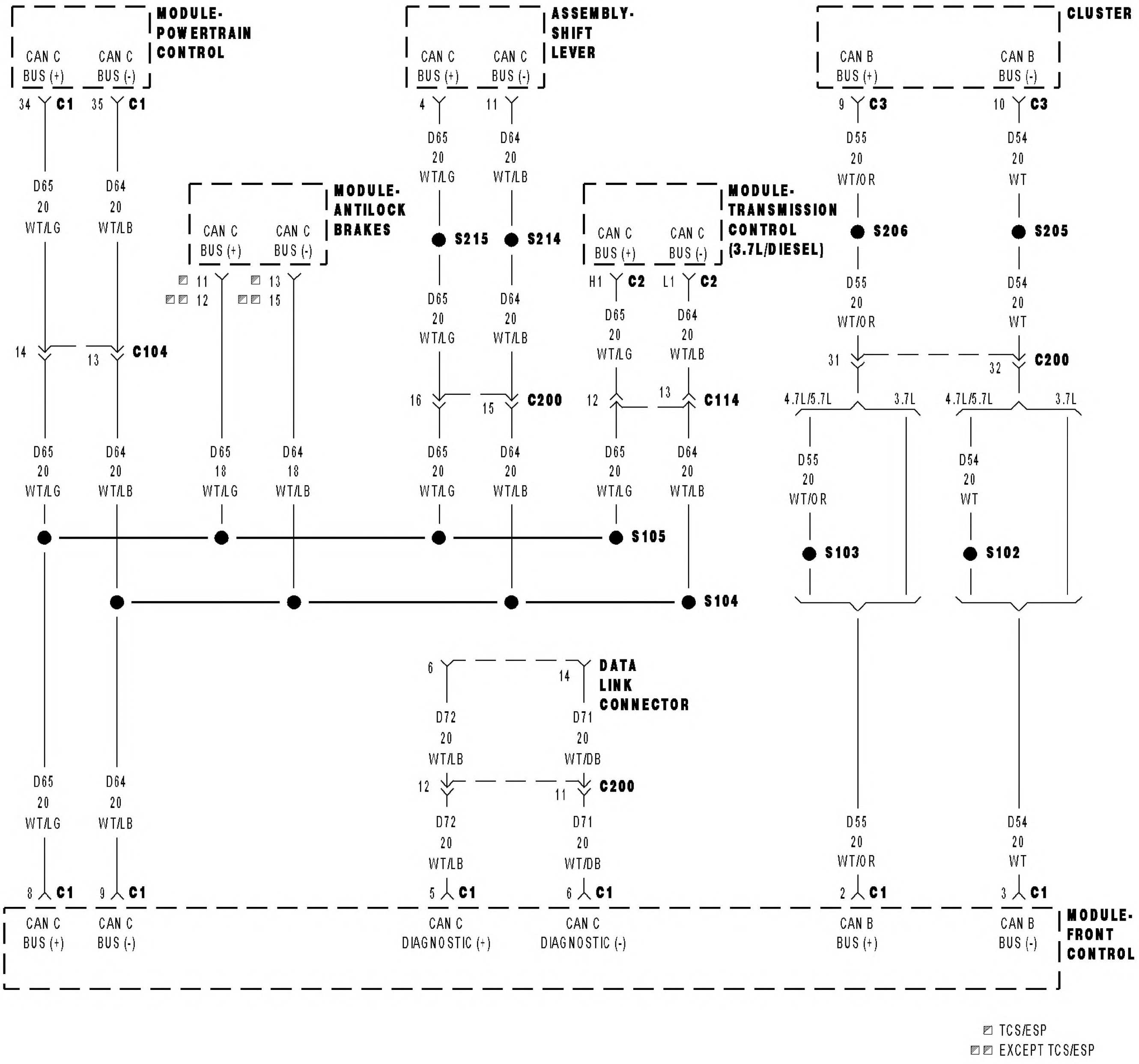
For a complete wiring diagram**Refer to Section 8W**

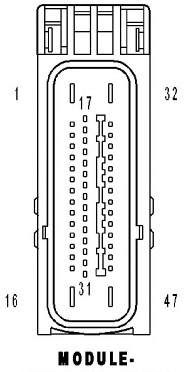
Theory of Operation

Some controllers communicate with other controllers over the CAN C bus. The ABS controller continuously monitors the bus activity and receives the messages it needs. The CAN C bus is also used to communicate transmission MIL status to the Engine Controller.

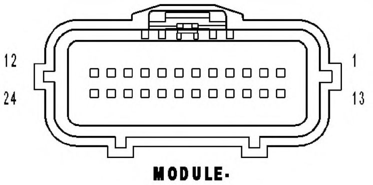
Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE

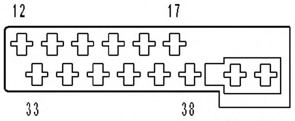

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13
C104
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
ASSEMBLY-SHIFT LEVER
4
11
S215
S214
16
15
C200
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
12
13
C114
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32
C200
4.7L/5.7L
3.7L
S103
S102
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47

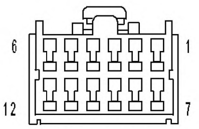
MODULE-ANTILOCK BRAKES



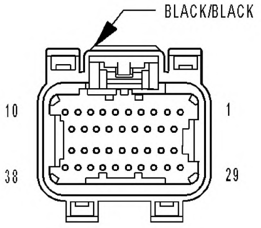
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram**Refer to Section 8W**

Theory of Operation

Some controllers communicate with other controllers over the CAN C bus. The FCM controller continuously monitors the bus activity and receives the messages it needs. The CAN C bus is also used to communicate transmission MIL status to the Engine Controller.

Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

AUTOMATIC TRANSMISSION 545RFE - ELECTRICAL DIAGNOSTICS

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AUTOMATIC TRANSMISSION 545RFE - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1

For the Transmission circuit diagram (Refer to)(Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1

1. 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1

1. After completion of the Transmission Verification Test, the Powertrain Verification Test must be performed.

2. Connect the scan tool to the Data Link Connector (DLC).

3. Reconnect any disconnected components.

4. If the PCM has been replaced or reflashed, or the transmission has been repaired or replaced, it is necessary to perform the scan tool Quick Learn Procedure.

5. With the scan tool, erase all Transmission and Engine DTC's.

6. With the scan tool, display Transmission Temperature. Start and run the engine until the Transmission Temperature is HOT.

7. Check the Transmission fluid level and adjust if necessary. Refer to the Service Information for the Fluid Fill procedure. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE/FLUID - STANDARD PROCEDURE)

8. Road test the vehicle.

9. Perform the following shifts from a standing start with a constant throttle opening of 20 to 25 degrees to the speeds of 97 Km/h or 60 MPH; make fifteen to twenty 1 to 2, 2 to 3, 3 to 4 upshifts and for 545RFE, 4 to 5.

10. Perform the following shifts with speeds below 40 Km/h or 25 MPH; make five to eight wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown.

11. Check for DTC's during the road test.

12. Use the EATX OBDII task manager to run Good Trip time in each gear, this will confirm the repair and to ensure that the DTC has not re-matured.

13. With the scan tool, perform a BATTERY DISCONNECT, this will clear the EATX DTC EVENT DATA

Were there any Diagnostic Trouble Codes (DTCs) set during the road test?

Yes >> Refer to the Symptom List for the appropriate diagnostic tests.

No >> Repair is complete.

PRE-DIAGNOSTIC CHECK OUT

For a complete wiring diagram **Refer to Section 8W**.

Diagnostic Test

1. PRE-DIAGNOSTIC CHECK OUT

Check the transmission fluid level. If the fluid level is low, locate and repair any leaks and fill the transmission to the proper level. Refer to the appropriate Service Information for procedures. Many transmission symptoms can be caused by a low fluid level.

Check the battery. To avoid false diagnosis, testing should only be performed with the battery fully charged.

With the scan tool, read Engine (PCM) DTCs. If DTCs are present, refer to the Driveability Category and perform to the appropriate diagnostic procedure(s) before proceeding.

With the scan tool, read Transmission (TCM) DTCs. Record all Stored, Active, and Pending DTC information. Diagnose any Pending DTC as a matured DTC.

With the scan tool, read EATX DTC EVENT DATA. Use this data to identify the conditions in which the DTC was set.

Performing a Battery Disconnect will clear all EATX DTC EVENT DATA and reset all learned Transmission values to the default values, which may temporarily result in erratic shift schedules.

With the scan tool, perform the Shift Lever Position Test. If the test does not pass, refer to the diagnostic procedure for P0706 Check Shifter Signal.

For Gear Ratio Error DTCs, use the scan tool to view CVI Monitor data. Read and record the Clutch Volume Index information.

Use the wiring diagram as a guide. Inspect the wiring and connectors related to this circuit. Repair as necessary.

Refer to the When Monitored and Set Conditions for this DTC. DTCs can set at ignition on, at start up, after driving under specific conditions and after diagnostic monitors have been run.

Refer to applicable Technical Service Bulletins (TSBs) for controller software update information. Some conditions can be corrected by upgrading the Engine (PCM) or Transmission (TCM) controller software.

Refer to any Service Information Tune Ups or Technical Service Bulletins that apply to this symptom.

Were there any repairs made that fixed the vehicle?

Yes >> Testing complete.

No >> Refer to the Transmission category and perform the appropriate diagnostic procedure(s).

P0122-TPS/APP CIRCUITLOW

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - DIAGNOSIS AND TESTING).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  This DTC will set if the monitored TPS voltage drops below .078 volts for the period of 0.48 seconds.

Possible Causes
RELATED ENGINE TPS/APPS DTC'S PRESENT
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Due to the integration of the Powertrain and Transmission Control Modules the New Generation Control Module III will be referred to as the Powertrain Control Module (PCM). The 3–wire TPS (4.7L V-8 Engine) provides the PCM with an input signal voltage that represents the throttle blade position of the throttle body. The Throttle Position Sensor (TPS) is connected to the throttle blade shaft. As the position of the throttle blade changes, the output voltage of the TPS changes.

The PCM supplies approximately 5.0 volts to the TPS. The TPS output voltage (input signal to the PCM) represents the throttle blade position. The PCM receives an input signal voltage from the TPS. This will vary in an approximate range from 0.26 volts at minimum throttle opening (idle), to 4.49 volts at maximum opening (wide open throttle).

The Accelerator Pedal Position Sensor (APPS) is currently used only with the 5.7L V-8 engine. The APPS is a linear potentiometer. It provides the PCM with a voltage signal proportional to the angle, or position of the accelerator pedal. The APPS signal along with inputs from other sensors is used by the PCM to calculate the throttle plate position.

A mechanical cable is used between the accelerator pedal and the APPS assembly. Although a cable is used between the accelerator pedal and the APPS assembly, a mechanical cable is not used between the accelerator pedal and the throttle body. The throttle plate position is electronically controlled by the PCM.

Diagnostic Test

1. DETERMINING IF RELATED ENGINE TPS/APPS DTC'S ARE PRESENT

With the scan tool, check Engine DTC's.

Are there any Engine TPS/APPS DTCs present?

Yes >> Refer to the Drivability Category and perform the appropriate Symptom.

No >> Go To 2

P0122-TPS/APP CIRCUITLOW (CONTINUED)

2. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, record the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

With the scan tool, erase Transmission DTCs.

NOTE: To erase EATX DTC DTC EVENT DATA information, a BATTERY DISCONNECT must be performed. Performing a BATTERY DISCONNECT may reset learned Transmission values to controller defaults which may lead to erratic shift schedules.

Drive the vehicle and try to duplicate the conditions in which the DTC was reported by the EATX DTC EVENT DATA.

With the scan tool, read Transmission DTCs.

Did the DTC P0122 TPS/APPS LOW, reset?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

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3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set the DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0123- TPS/APP CIRCUIT HIGH

For the Transmission circuit diagram (Refer to) (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  This DTC will set if the monitored TPS voltage rises above 4.94 volts for the period of 0.48 seconds.

Possible Causes
RELATED ENGINE TPS/APPS DTC'S PRESENT
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Due to the integration of the Powertrain and Transmission Control Modules the New Generation Control Module III will be referred as the Powertrain Control Module (PCM). The 4.7L V-8 Throttle Positioning Sensor (TPS) provides the PCM with an input signal voltage that represents the throttle blade position of the throttle body. The TPS is connected to the throttle blade shaft. As the position of the throttle blade changes, the output voltage of the TPS changes.

The 5.7L V-8 Accelerator Pedal Position Sensor (APPS) is a linear potentiometer that provides the PCM with a voltage signal proportional to the angle, or position of the accelerator pedal. The APPS signal along with inputs from other sensors is used by the PCM to calculate the throttle plate position which is electronically controlled.

Diagnostic Test

1. DETERMINING IF RELATED ENGINE TPS/APPS DTC'S ARE PRESENT

With the scan tool, check Engine DTC's, this includes all one trip failures.

Are there any Engine TPS/APPS DTCs present?

Yes >> Refer to the Drivability category and perform the appropriate symptom.

No >> Go To 2

P0123- TPS/APP CIRCUIT HIGH (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

With the scan tool, record the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

With the scan tool, erase Transmission DTCs.

NOTE: To erase EATX DTC EVENT DATA information, a BATTERY DISCONNECT must be performed. Performing a BATTERY DISCONNECT may reset all learned Transmission values to controller defaults that could lead to an inconsistent shift schedule.

Drive the vehicle and try to duplicate the conditions in which the DTC was reported by the EATX DTC EVENT DATA.

With the scan tool, read Transmission DTCs.

Did the DTC P0123 TPS/APPS HIGH, reset?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set the DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0124-TPS/APP INTERMITTENT

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete Transmission wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  This DTC will set if the monitored TPS throttle angle between the angles of 6° and 120° and the degree change is greater than 5° within a period of less than 7.0 ms

Possible Causes
RELATED TPS ENGINE DTC'S PRESENT
THROTTLE POSITION SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Due to the integration of the Powertrain and Transmission Control Modules the New Generation Control Module III will be referred as the Powertrain Control Module (PCM). The 4.7L V-8 Throttle Positioning Sensor (TPS) provides the PCM with an input signal voltage that represents the throttle blade position of the throttle body. The TPS is connected to the throttle blade shaft. As the position of the throttle blade changes, the output voltage of the TPS changes.

The 5.7L V-8 Accelerator Pedal Position Sensor (APPS) is a linear potentiometer that provides the PCM with a voltage signal proportional to the angle, or position of the accelerator pedal. The APPS signal along with inputs from other sensors is used by the PCM to calculate the throttle plate position which is electronically controlled.

Diagnostic Test

1. DETERMINING IF RELATED ENGINE TPS DTC'S ARE PRESENT

With the scan tool, check Engine DTC's including all one trip failures.

Are there any Engine TPS/APPS DTCs present?

Yes >> Refer to the Powertrain category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, record the DTC EVENT DATA to help identify the conditions in which the DTC was set.

With the scan tool, erase Transmission DTCs.

NOTE: To erase EATX EVENT DATA information, a BATTERY DISCONNECT must be performed. Performing a BATTERY DISCONNECT may reset all learned transmission values to controller default. This may lead to erratic shift schedules.

Drive the vehicle and try to duplicate the conditions in which the DTC was reported by the DTC EVENT DATA.

With the scan tool, read Transmission DTCs.

Did the DTC P0124 TPS/APPS INTERMITTENT, reset?

Yes >> Go To 3

No >> Go To 4

P0124-TPS/APP INTERMITTENT (CONTINUED)

3. CHECK THROTTLE POSITION SENSOR OPERATION

Ignition On, Engine Not Running.

With the scan tool, under Transmission Sensors, monitor the TPS voltage in the following step.

Slowly open and close the throttle while checking for erratic voltage changes.

Was the TPS voltage change smooth and consistent?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Throttle Position Sensor per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set the DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0218-HIGH TEMPERATURE OPERATION ACTIVATED

For the Transmission circuit diagram. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the engine is running.
- **Set Condition:**
  Immediately after a Overheat shift schedule is activated when the Transmission temperature exceeds 127° C or 260° F.

Possible Causes
HIGH TEMPERATURE OPERATION ACTIVATED
TORQUE CONVERTER CLUTCH SLIPPING / NOT ACTIVATING
EXCESSIVE TIME IDLING IN GEAR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

Theory of Operation

The DTC is intended as an informational DTC to aid the technician in determining the root cause of a customer dirveability issue. The DTC is also intended to alert the technicain to determine if a cooling system malfunction has occurred or if an additional transmission air to oil cooler is needed to support the customers driving behavior.

Diagnostic Test

1. HIGH TEMPERATURE OPERATION

This DTC is an informational DTC designed to aid the Technician in diagnosing shift quality complaints.

This DTC indicates that the transmission has been operating in the ″Overheat″ shift schedule which may generate a customer complaint.

The customer driving patterns may indicate the need for an additional transmission oil cooler.

Verify proper Engine cooling system operation which would affect proper transmission operation.

Verify proper torque converter clutch operation.

With the scan tool, check the DTC EVENT DATA to help identify the conditions in which the DTC was set.

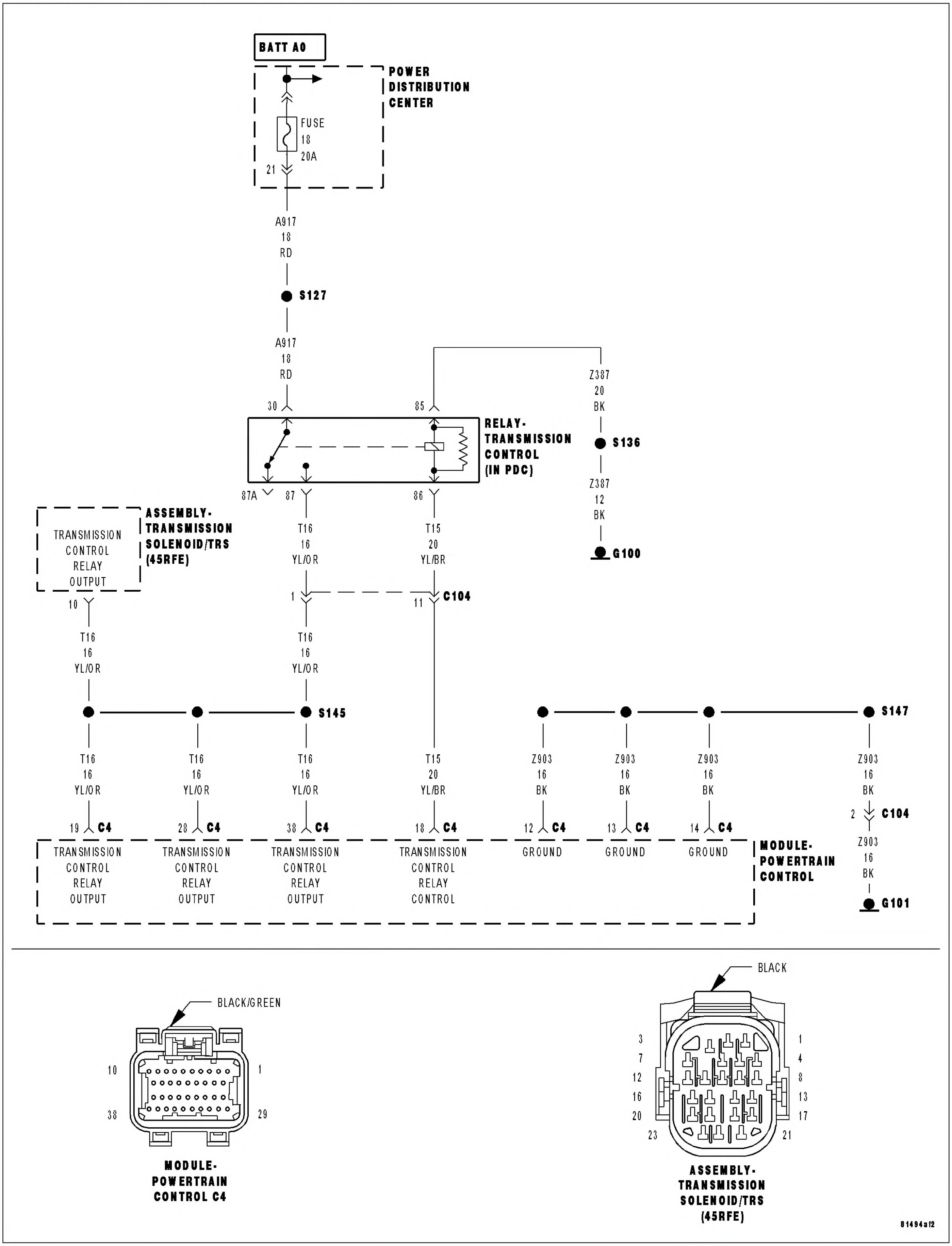
If there are no possible causes remaining, view repair.

Repair

Repair the cause of transmission overheating. Refer to the Service Information for the proper repair procedure. Make sure to check for any Service Bulletins pertaining to this problem.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0562-BATTERY VOLTAGE LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD
S127
A917 18 RD
Z387 20 BK
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
S136
87A
87
86
Z387 12 BK
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
TRANSMISSION CONTROL RELAY OUTPUT
T16 16 YL/OR
T15 20 YL/BR
G100
10
1
11
C104
T16 16 YL/OR
T16 16 YL/OR
S145
S147
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
Z903 16 BK
Z903 16 BK
Z903 16 BK
Z903 16 BK
2 C104
19 C4
28 C4
38 C4
18 C4
12 C4
13 C4
14 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
GROUND
GROUND
GROUND
MODULE-POWERTRAIN CONTROL
Z903 16 BK
G101
BLACK/GREEN
10
1
38
29
MODULE-POWERTRAIN CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
81494af2

P0562-BATTERY VOLTAGE LOW (CONTINUED)

For the Transmission circuit diagram. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the engine running and the PCM has closed the Transmission Control Relay.
- **Set Condition:**
  If the battery voltage of the Transmission Control Relay Output Sense circuit(s) to the PCM is less than 10.0 volts for the period of 15 seconds. Note: P0562 generally indicates a gradually falling battery voltage or a resistive connection(s) to the PCM. The DTC will also set if the battery voltage sensed at the PCM is less than 6.5-volts for 200ms or where Transmission Control Relay Output circuits are less than 7.2-volts for 200ms.

Possible Causes
RELATED CHARGING SYSTEM DTC'S
(Z908, Z977) GROUND CIRCUIT OPEN OR HIGH RESISTANCE
(A104) FUSED B+ CIRCUIT TO PCM OPEN OR HIGH RESISTANCE
(T16) TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN OR HIGH RESISTANCE
TRANSMISSION CONTROL RELAY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Friction element distress could result from an insufficient supply voltage to properly control the solenoids. To prevent this possibility, the battery voltage is monitored and the system is placed in logical limp-in if the battery voltage drops below the limit.

Diagnostic Test

1. RELATED CHARGING SYSTEM DTC'S

With the scan tool, read the Engine DTC's.

Are there any related Charging System DTC's also present?

Yes >> Refer to the Charging System category and repair any Engine Charging System DTC's, before testing DTC P0562. NOTE: After repairing the Engine Charging System DTC's, perform the Transmission Verification test to verify the transmission was not damaged.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0562-BATTERY VOLTAGE LOW (CONTINUED)

2. CONDITION P0562 PRESENT

NOTE: Generator, battery, and charging system must be fully functional before performing this test.
With the scan tool, read Transmission DTC's.

With the scan tool, Check the STARTS SINCE SET counter for P0562.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter set at 0?

Yes >> Go To 3

No >> Go To 7

---

3. CHECKING (Z908, Z977) GROUND CIRCUITS

Turn the ignition off to the lock position.

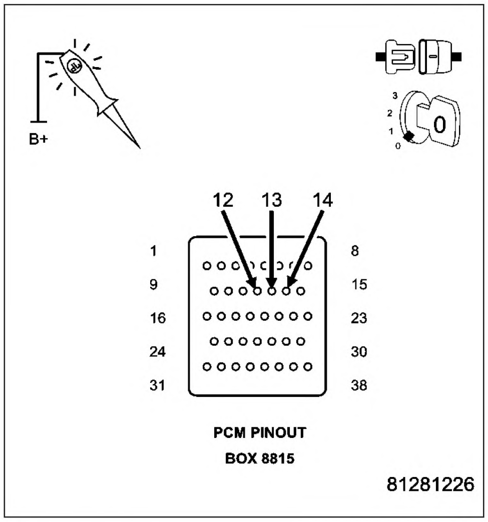
Disconnect the PCM C4 harness connector and connect Miller tool #8815.

NOTE: Check connectors - Clean/repair as necessary.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.
Using a 12-volt test light connected to 12-volts, check the PCM (Z908, Z977) Ground circuits at the appropriate terminals of Miller tool #8815.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly for the PCM (Z908, Z977) Ground circuits?



Yes >> Go To 4

No >> Repair the (Z908, Z977) Ground circuit(s) for an open or high resistance.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

4. CHECKING (A104) FUSED B+ CIRCUIT

Remove the Transmission Control Relay.

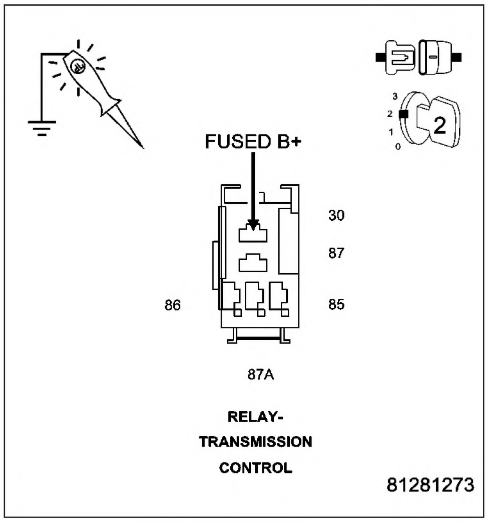
Ignition on, engine not running.

Using a 12-volt test light connected to ground, check the (A104) Fused B+ circuit at the Transmission Control Relay connector.

Does the test light illuminate brightly?

Yes >> Go To 5

No >> Repair the (A104) Fused B+ circuit for an open or high resistance.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.



P0562-BATTERY VOLTAGE LOW (CONTINUED)

5. CHECKING THE (T16) TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT

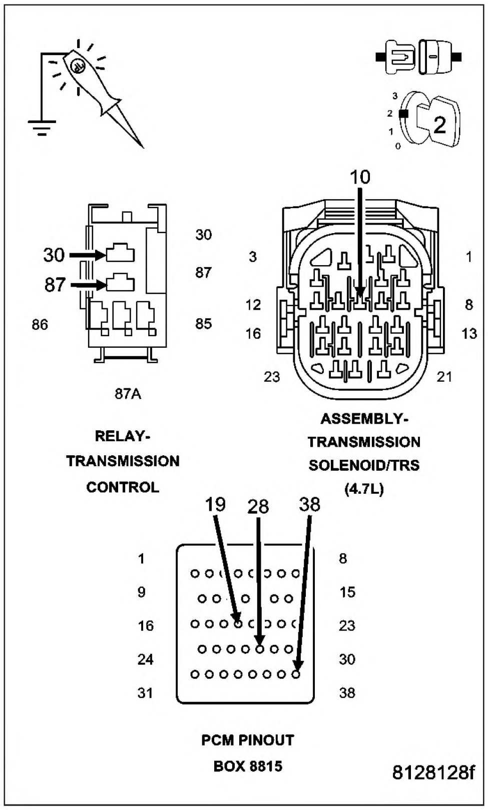
Turn the ignition off to the lock position.

NOTE: Check connectors - Clean/repair as necessary.

Connect a jumper wire between (A104) Fused B+ circuit and the (T16) Transmission Control Relay Output circuit in the Transmission Control Relay connector.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, check all (T16) Transmission Control Relay Output circuits at the appropriate terminals of Miller tool #8815.



Does the test light illuminate brightly?

Yes >> Go To 6

No >> Repair the (T16) Transmission Control Relay Output circuit for an open or high resistance.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

6. TRANSMISSION CONTROL RELAY

Turn the ignition off to the lock position.

Reconnect all previously disconnected connectors.

Install a substitute Relay in place of the Transmission Control Relay.

Start the engine.

Using a voltmeter, measure the vehicles battery voltage.

With the scan tool, monitor the Transmission Switched Battery Voltage.

Compare the scan tool Transmission Switched Battery voltage to the actual battery voltage reading on the voltmeter.

Is the scan tool voltage within 1.0 volt of the battery voltage?

Yes >> Replace the Transmission Control Relay.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0562-BATTERY VOLTAGE LOW (CONTINUED)

7. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0602-CONTROL MODULE PROGRAMMING ERROR/NOT PROGRAMMED

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Check for generic software is made at power-up
- **Set Condition:**
  If genic software is found , the MIL will light immediately. This DTC is designed to signal the technician that the controller still has generic software installed.

Possible Causes
PCM - PROGRAMMING ERROR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING)

Theory of Operation

The controller is programmed during manufacturing with generic software to facilitate testing. This software does not have the proper calibrations to control a transmission in a vehicle. The check for generic software is made at power-up. If generic software is found , the MIL will light immediately and the MIL will stay on even if the fault is cleared, until the proper software is installed. Note: Transmission will be placed in limp-in mode.

Diagnostic Test

1. CONTROL MODULE PROGRAMMING ERROR

NOTE: Controller is programmed with generic software and will not allow the correct vehicle Powertrain management.

With the scan tool.

Record the vehicles controller part number.

Select Use Controller Part Number under the Flash Tab.

Flash the controller with the correct software.

Verify the controller flashed successfully.

Test Complete

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1. Perform Quick Learn Procedure.

P0604-INTERNAL CONTROL MODULE RAM

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  One time after the controller is reset (ignition turned to the RUN position).
- **Set Condition:**
  Whenever the Powertrain Control Module (PCM) detects an internal controller problem.

Possible Causes
POWER OR GROUND CIRCUIT
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

After the controller is reset (ignition turned to the RUN position), the microprocessor checks the integrity of each RAM location by writing to it and reading back from it. The read value should be same as value written.

Diagnostic Test

1. CHECK WIRING AND CONNECTORS FOR INTERMITTENT OPERATION

Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits.

NOTE: Due to the integration of the Powertrain and Transmission Control Modules, the transmission part of the PCM has it's own specific power and ground circuits.

Wiggle the wires while checking for shorted and open circuits.

Check for any Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair the power and/or ground circuits to the PCM and Transmission Control Relay as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0605-INTERNAL CONTROL MODULE ROM

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  One time after the controller is reset (ignition turned to the RUN position).
- **Set Condition:**
  Whenever the Powertrain Control Module (PCM) detects an internal controller problem.

Possible Causes
POWER OR GROUND CIRCUIT
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

After the controller is reset (ignition turned to the RUN position) the microprocessor checks the integrity of the program memory (ROM). A checksum is calculated by adding all used bytes in the program memory. The sum should be the same as a known constant stored in the program memory.

Diagnostic Test

1. CHECK WIRING AND CONNECTORS FOR INTERMITTENT OPERATION

Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits.

NOTE: Due to the integration of the Powertrain and Transmission Control Modules, the transmission part of the PCM has it's own specific power and ground circuits.

Wiggle the wires while checking for shorted and open circuits.

Check for any Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair the power and/or ground circuits as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0613-INTERNAL TCM

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  1) One time after the controller is reset (ignition turned to the RUN position) and every 60 seconds thereafter. The Delay Test is executed after a reset only.
  2) 2 seconds after an invalid test.
- **Set Condition:**
  If either of the following conditions occur 3 times:
  1) The watchdog fault line remains high after the period has elapsed for the too early - too late watchdog test.
  2) The Transmission Control Relay remains on after the watchdog delay expired.

Possible Causes
POWER OR GROUND CIRCUIT
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The internal Watchdog (WD) is a separate hardware circuit that continuously monitors the microprocessor. To insure the proper operation of the EATX controller the watchdog must receive a signal from the microprocessor within a specific time window (14ms ± 1ms) to prevent a system shutdown after a short delay (570ms). The microprocessor periodically tests the WD's ability to provide this shutdown function using a three phase test;

1) Send the signal too late > 15ms

2) Send the signal too early < 13ms

3) Delay test < 590ms

If the watchdog input signal arrives too early or too late, the Watchdog Fault line will go low and the watchdog delay will start to time out. The delay will be reset by the correct timing of watchdog signal sent during subsequent operations.

The Delay Test checks the delay time out. The Delay Monitor line is pulled low, which forces the delay to start timing out. At the end of the delay time the Transmission Relay will be turned off. The delay test, upon detection of the relay turning off, will immediately turn the relay back on before shutdown can occur.

Diagnostic Test

1. CHECK THE WIRING AND CONNECTORS

Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits.

NOTE: Due to the integration of the Powertrain and Transmission Control Modules, the transmission part of the PCM has it's own specific power and ground circuits.
Wiggle the wires while checking for shorted and open circuits.

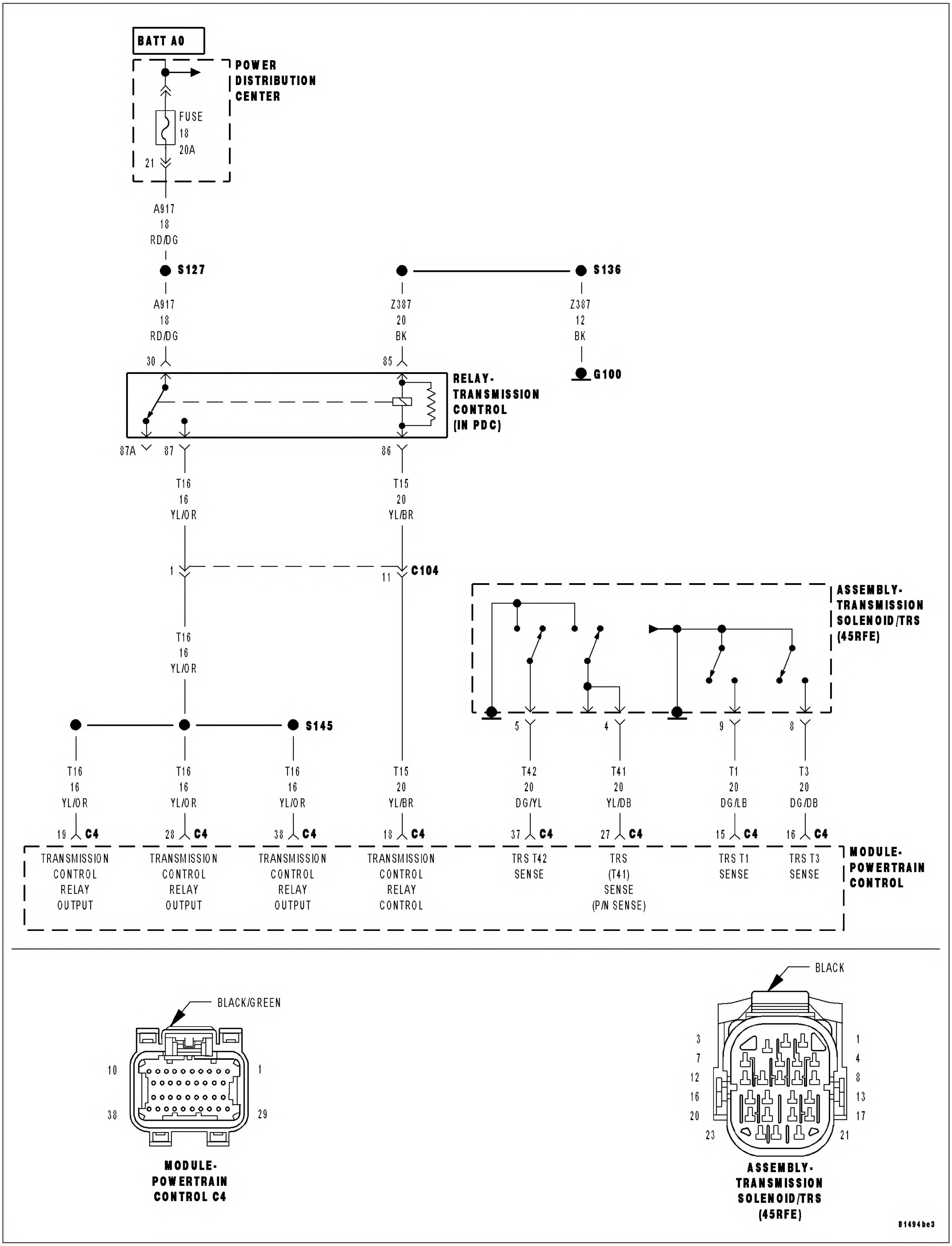
Check for any Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair the power and/or ground circuits as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0706-TRANSMISSION RANGE SENSOR RATIONALITY


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
Z387 20 BK
S136
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 16 YL/OR
T15 20 YL/BR
1
11
C104
T16 16 YL/OR
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
S145
5
4
9
8
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
T42 20 DG/YL
T41 20 YL/DB
T1 20 DG/LB
T3 20 DG/DB
19 C4
28 C4
38 C4
18 C4
37 C4
27 C4
15 C4
16 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
TRS T42 SENSE
TRS (T41) SENSE (P/N SENSE)
TRS T1 SENSE
TRS T3 SENSE
MODULE-POWERTRAIN CONTROL
BLACK/GREEN
10
1
38
29
MODULE-POWERTRAIN CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
81494be3

P0706-TRANSMISSION RANGE SENSOR RATIONALITY (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if the controller detects an invalid PRNDL code which lasts for more than 0.042 seconds.

Possible Causes
SHIFTER OUT OF ADJUSTMENT
TRS SENSE CIRCUIT OPEN
TRS SENSE CIRCUIT SHORT TO GROUND
TRS SENSE CIRCUIT SHORT TO VOLTAGE
METAL DEBRIS IN OIL PAN
TRANSMISSION RANGE SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The T1, T2, T3, T41, or T42 (C1 - C5) Sense circuits communicate the shift lever position to the Transmission Control System. Each circuit is terminated at the transmission by a switch (TRS). Each switch can be either open or closed, depending on the shift lever position. The PCM can decode this information and determine the shift lever position.

Each shift lever position has it own unique combination of closed and open switches. This is called a PRNDL code. There are 5 switches, therefore: there are many possible combinations of open and closed switches (codes). There are 12 valid codes: two for neutral, one for each other gear position (5), and five temporary (transition zone) codes. The remainder of the codes should never occur, these are called invalid codes.

Diagnostic Test

1. CHECK TO SEE IF P0706 DTC IS CURRENT

With the scan tool, perform the Shift Lever Position Test.

Select the test outcome from the following:

Test passes:
Go To 6

Test fails with Error Code:
Go To 2

Test fails without Error Code:
Perform the Gearshift Adjustment Procedure per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0706-TRANSMISSION RANGE SENSOR RATIONALITY (CONTINUED)

2. ASSEMBLY-TRANSMISSION SOLENOID/TRS

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

NOTE: Check connectors - Clean/repair as necessary.

Install Transmission Simulator, Miller tool #8333.

Ignition on, engine not running.

With the scan tool, perform the Shift Lever Position Test.

When the scan tool instructs you to put the Gear Selector in a particular position, you must do so using the selector switch on the Transmission Simulator.

The LED for the gear position in question must be illuminated on the Transmission Simulator prior to pressing ″ENTER″ on the scan tool.

NOTE: When the scan tool requests the O/D off button be depressed, you must use the O/D OFF button in the vehicle or you will fail the Shift Lever Position Test with an error code 11 or OD-TOW/HALL STUCK OPEN.

NOTE: If the Shift Lever Position test fails, make sure to note the identification of the TRS Sense circuit for future reference.

Did the Shift Lever Position test pass?

Yes >> Remove the Oil Pan and Main Valve Body Assembly per the Service Information. Check for metal debris on top of the Solenoid/TRS Assembly and the manual valve code plate. If debris is present, determine the cause of the debris and repair the transmission as necessary. If no problems are found, replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. TRS SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM harness connectors and install Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the identified (T1, T2, T3, T41, or T42) TRS Sense circuit, from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the identified (T1, T2, T3, T41, or T42) TRS Sense circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0706-TRANSMISSION RANGE SENSOR RATIONALITY (CONTINUED)

4. TRS SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the identified (T1, T2, T3, T41, or T42) TRS Sense circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the identified (T1, T2, T3, T41, or T42) TRS Sense circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. TRS SENSE CIRCUIT SHORT TO OTHER CIRCUITS

Measure the resistance between the identified (T1, T2, T3, T41, or T42) TRS Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.

Is the resistance below 100k ohms between the identified (T1, T2, T3, T41, or T42) TRS Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the identified (T1, T2, T3, T41, or T42) TRS Sense circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set the DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for shorted and open circuits.

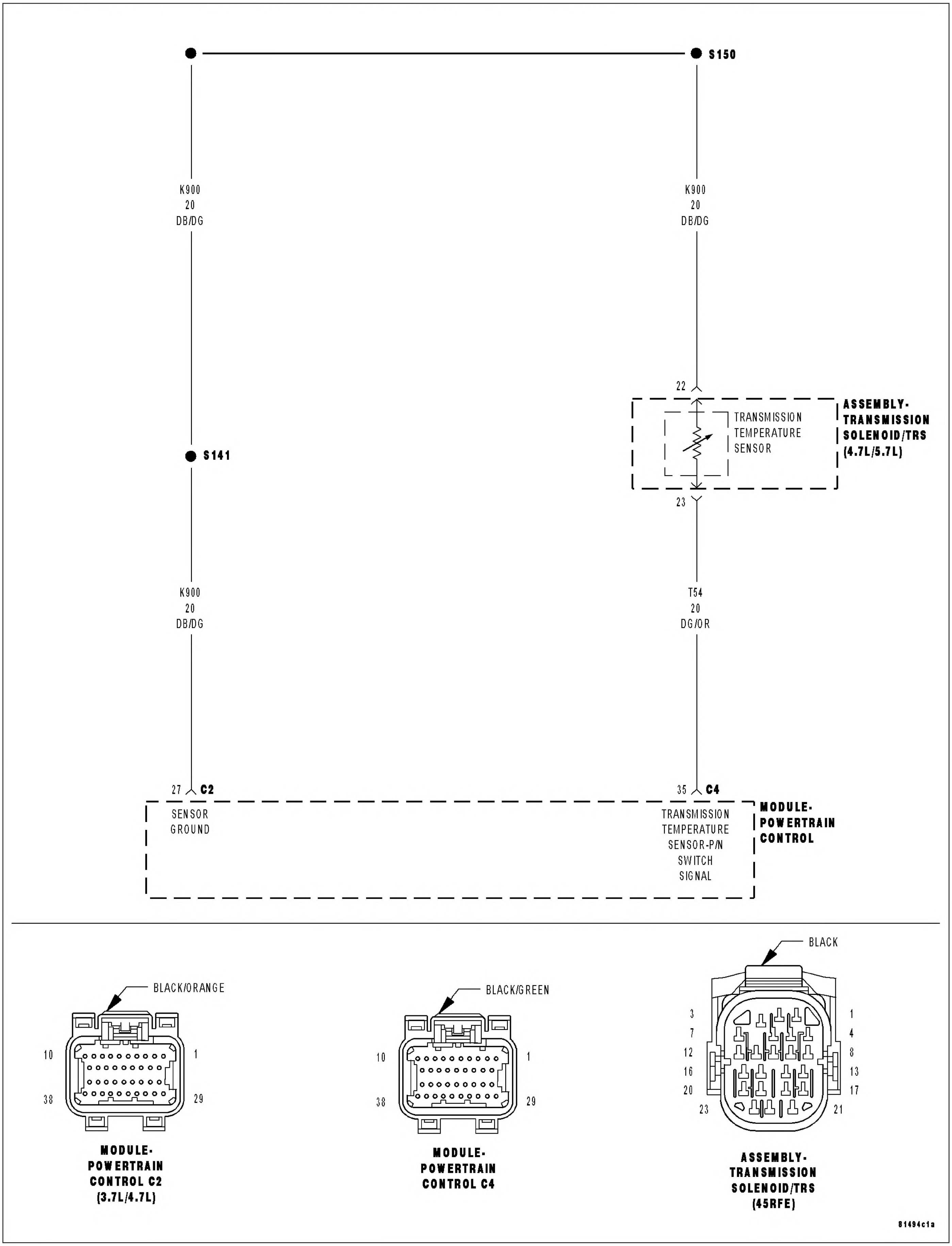
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0711-TRANSMISSION TEMPERATURE SENSOR PERFORMANCE


S150
K900
20
DB/DG
K900
20
DB/DG
22
TRANSMISSION
TEMPERATURE
SENSOR
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L/5.7L)
23
S141
K900
20
DB/DG
T54
20
DG/OR
27
C2
35
C4
SENSOR
GROUND
TRANSMISSION
TEMPERATURE
SENSOR-P/N
SWITCH
SIGNAL
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/GREEN
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(45RFE)
81494c1a

P0711-TRANSMISSION TEMPERATURE SENSOR PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS) .

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  This DTC will set when the desired transmission temperature does not reach a normal operating temperature within a given time frame. Time is variable due to ambient temperature. Approximate times are starting temperature to warm up time: (-40° F / -40° C - 35 min) (-20° F / -28° C - 25 min) (20° F / -6.6° C - 20 min) (60° F / 15.5 ° C - 10 min)

Possible Causes
RELATED DTC’S PRESENT
TRANSMISSION TEMPERATURE SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Temperature Sensor is a variable resistor that changes with temperature, or otherwise known as a thermister. The temperature of the transmission fluid can affect a variety of electronically controlled transmission operations such as shift quality, torque converter lock-up, and when and/or if certain OBDII or system self-diagnostic test are performed. The Powertrain Control Module (PCM) substitutes a calculated transmission temperature value if a fault is detected in the Transmission Temperature Sensor circuit.

Diagnostic Test

1. DETERMINE IF RELATED DTC’S ARE PRESENT

With the scan tool, check Transmission DTC’s.

Are there any other related Transmission Temperature Sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, Check the STARTS SINCE SET counter for P0711.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 3

No >> Go To 4

P0711-TRANSMISSION TEMPERATURE SENSOR PERFORMANCE (CONTINUED)

3. TRANSMISSION TEMPERATURE SENSOR

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Input/Output switch to OFF.

With the scan tool, monitor the TRANS TEMP VOLTS while turning the Thermistor Voltage switch to all three positions on the Transmission Simulator.

Compare the scan tool readings to the voltage readings listed on the Transmission Simulator.

Do the readings on the scan tool match the Transmission Simulator readings ± 0.2 volts?

Yes >> Replace Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

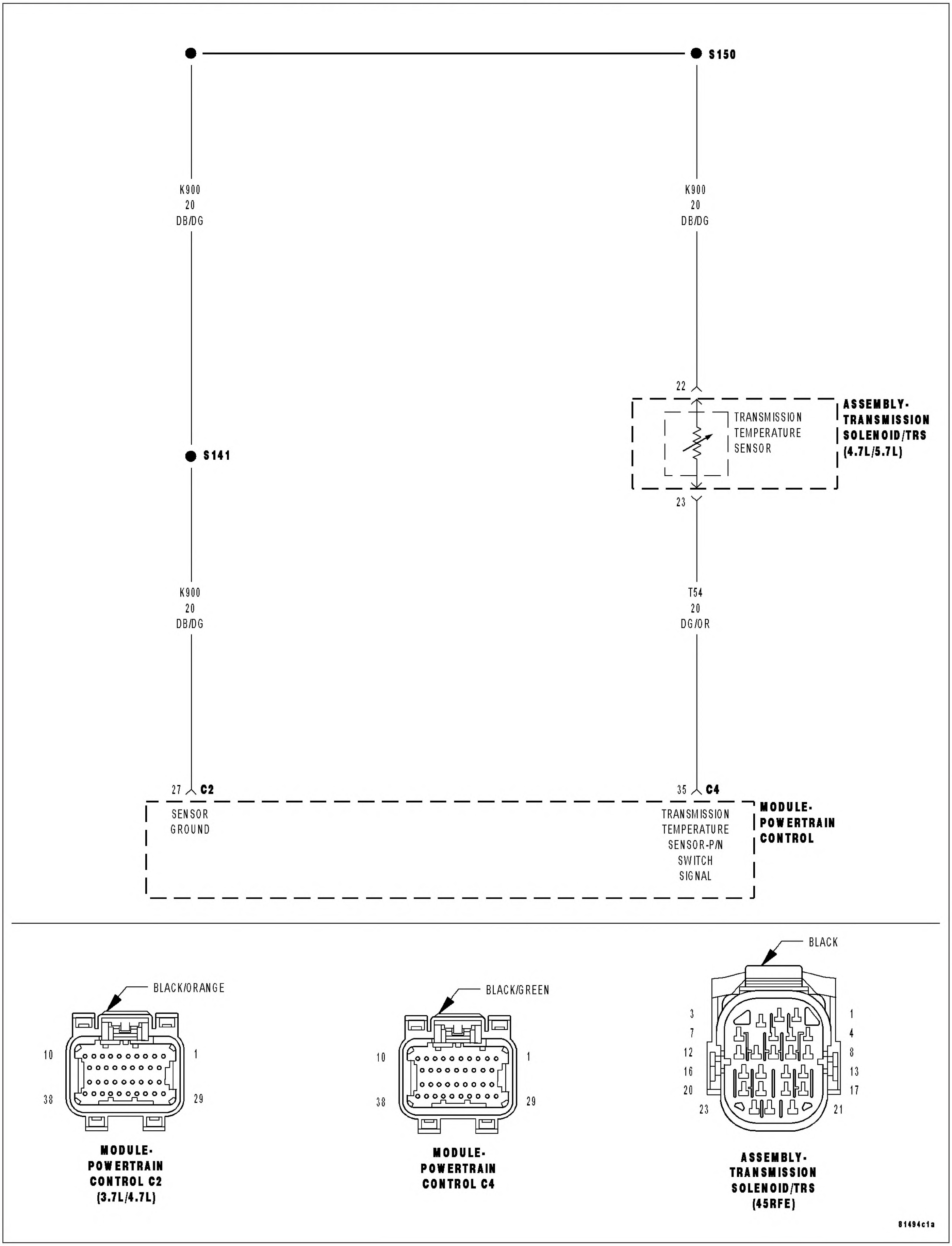
With the scan tool, check the DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0712-TRANSMISSION TEMPERATURE SENSOR LOW


S150
K900
20
DB/DG
K900
20
DB/DG
22
TRANSMISSION
TEMPERATURE
SENSOR
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L/5.7L)
S141
23
K900
20
DB/DG
T54
20
DG/OR
27 C2
35 C4
SENSOR
GROUND
TRANSMISSION
TEMPERATURE
SENSOR-P/N
SWITCH
SIGNAL
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/GREEN
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(45RFE)
81494c1a

P0712-TRANSMISSION TEMPERATURE SENSOR LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  The DTC will set when the monitored Temperature Sensor voltage drops below 0.078 volts for the period of 0.45 seconds.

Possible Causes
RELATED DTC'S PRESENT
(T54) TRANSMISSION TEMPERATURE SENSOR SIGNAL CIRCUIT SHORT TO GROUND
TRANSMISSION TEMPERATURE SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Temperature Sensor is a variable resistor that changes with temperature, or otherwise known as a thermister. The temperature of the transmission fluid can affect a variety of electronically controlled transmission operations such as shift quality, torque converter lock-up, and when and/or if certain OBDII or system self-diagnostic test are performed. The Powertrain Control Module (PCM) substitutes a calculated transmission temperature value if a fault is detected in the Transmission Temperature Sensor circuit.

Diagnostic Test

1. DETERMINE IF RELATED DTC'S ARE PRESENT

With the scan tool, check Transmission DTC's.

Are there any line pressure sensor or throttle position sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, Check the STARTS SINCE SET counter for P0712.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 3

No >> Go To 5

P0712-TRANSMISSION TEMPERATURE SENSOR LOW (CONTINUED)

3. TRANSMISSION TEMPERATURE SENSOR

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Input/Output switch to OFF.

With the scan tool, monitor the TRANS TEMP VOLTS while turning the Thermistor Voltage switch to all three positions on the Transmission Simulator.

Compare the scan tool readings with the numbers listed on the Transmission Simulator.

Do the readings on the Transmission Simulator match the scan tool readings ± 0.2 volts?

Yes >> Replace Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. (T54) TRANSMISSION TEMPERATURE SENSOR SIGNAL CIRCUIT SHORT TO GROUND

Turn the ignition off to the lock position.

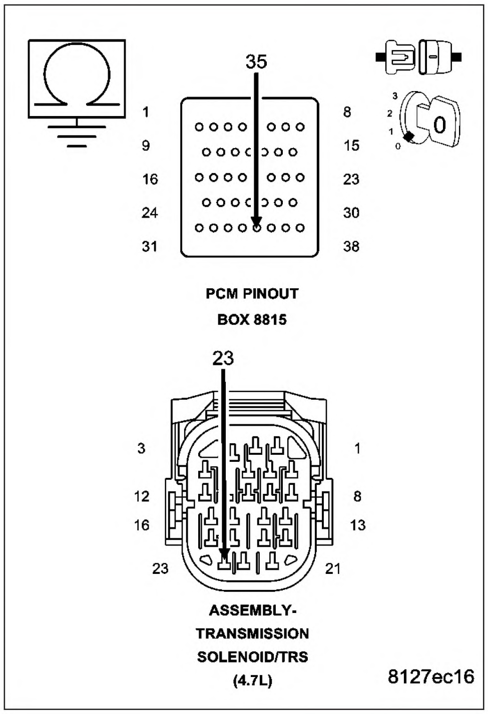
Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

NOTE: Check connectors - Clean/repair as necessary.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance between ground and the (T54) Transmission Temperature Sensor Signal circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (T54) Transmission Temperature Sensor Signal circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0712-TRANSMISSION TEMPERATURE SENSOR LOW (CONTINUED)

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

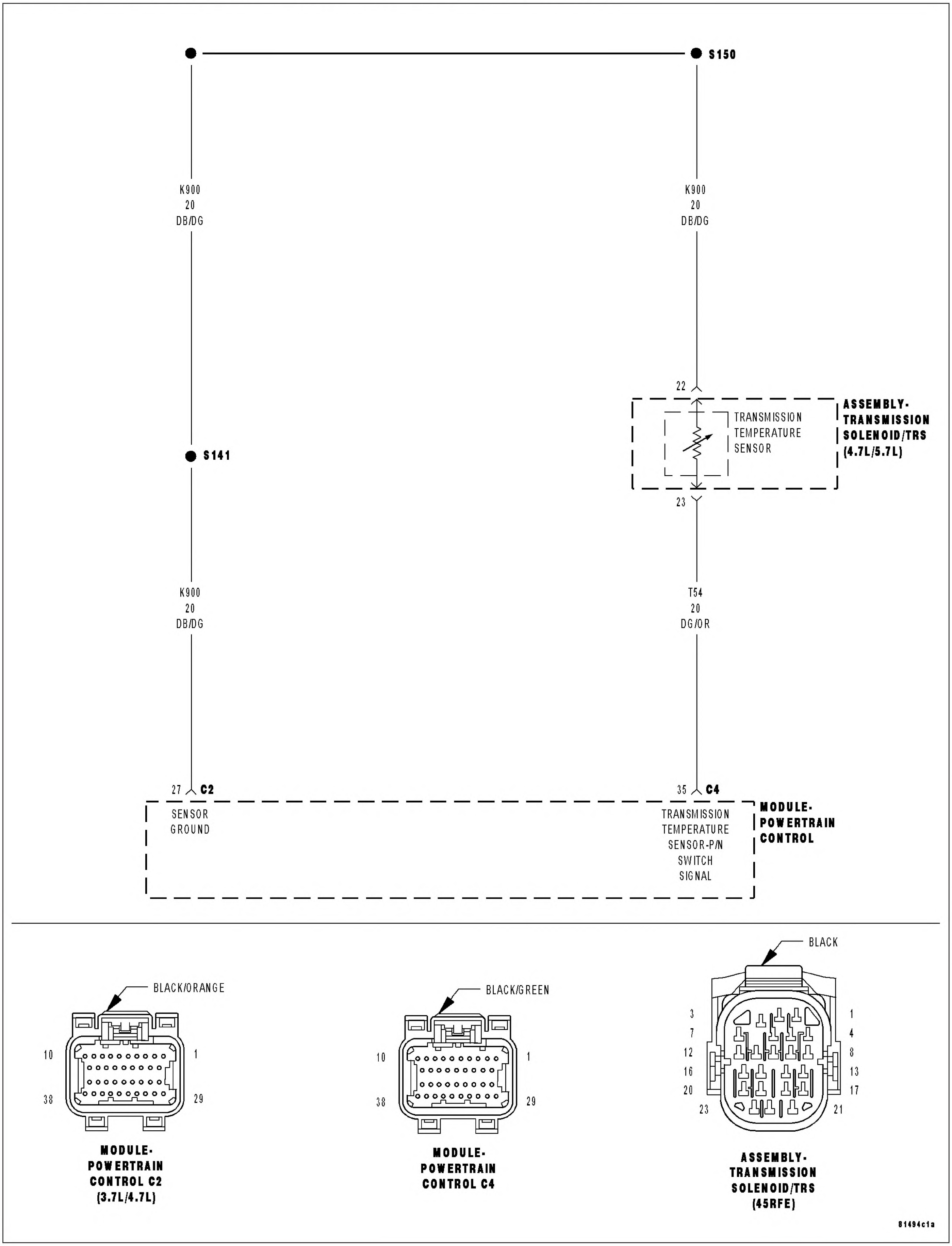
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0713-TRANSMISSION TEMPERATURE SENSOR HIGH


S150
K900
20
DB/DG
K900
20
DB/DG
22
TRANSMISSION
TEMPERATURE
SENSOR
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L/5.7L)
S141
23
K900
20
DB/DG
T54
20
DG/OR
27 C2
35 C4
SENSOR
GROUND
TRANSMISSION
TEMPERATURE
SENSOR-P/N
SWITCH
SIGNAL
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/GREEN
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(45RFE)
81494c1a

P0713-TRANSMISSION TEMPERATURE SENSOR HIGH (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  The DTC will set when the monitored Temperature Sensor voltage rises above 4.94 volts for the period of 0.45 seconds.

Possible Causes
RELATED DTC'S PRESENT
(T54) TRANSMISSION TEMPERATURE SENSOR SIGNAL CIRCUIT SHORT TO OTHER CIRCUITS
TRANSMISSION TEMPERATURE SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Temperature Sensor is a variable resistor that changes with temperature, or otherwise known as a thermister. The temperature of the transmission fluid can affect a variety of electronically controlled transmission operations such as shift quality, torque converter lock-up, and when and/or if certain OBDII or system self-diagnostic test are performed. The Powertrain Control Module (PCM) substitutes a calculated transmission temperature value if a fault is detected in the Transmission Temperature Sensor circuit.

Diagnostic Test

1. DETERMINE IF RELATED DTC'S ARE PRESENT

With the scan tool, check Transmission DTC's.

Are there any line pressure sensor or throttle position sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, check the STARTS SINCE SET counter for P0713.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 3

No >> Go To 5

P0713-TRANSMISSION TEMPERATURE SENSOR HIGH (CONTINUED)

3. TRANSMISSION TEMPERATURE SENSOR

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Note: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Input/Output switch to OFF.

With the scan tool, monitor the TRANS TEMP VOLTS while turning the Thermistor Voltage switch to all three positions on the Transmission Simulator.

Compare the scan tool readings with the numbers listed on the Transmission Simulator.

Do the readings on the Transmission Simulator match the scan tool readings ± 0.2 volts?

Yes >> Replace Transmission Solenoid/TRS assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. (T54) TRANSMISSION SENSOR SIGNAL CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

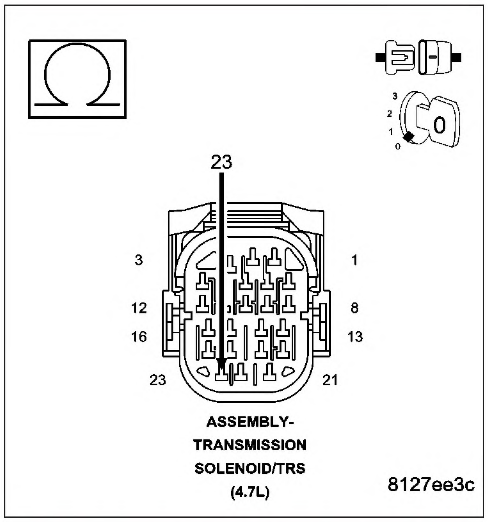
Disconnect the PCM harness connectors.

Measure the resistance between the (T54) Transmission Temperature Sensor Signal circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.

Is the resistance below 5.0 ohms between the (T54) Transmission Temperature Sensor Signal circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the Transmission Temperature Sensor Signal circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.



P0713-TRANSMISSION TEMPERATURE SENSOR HIGH (CONTINUED)

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

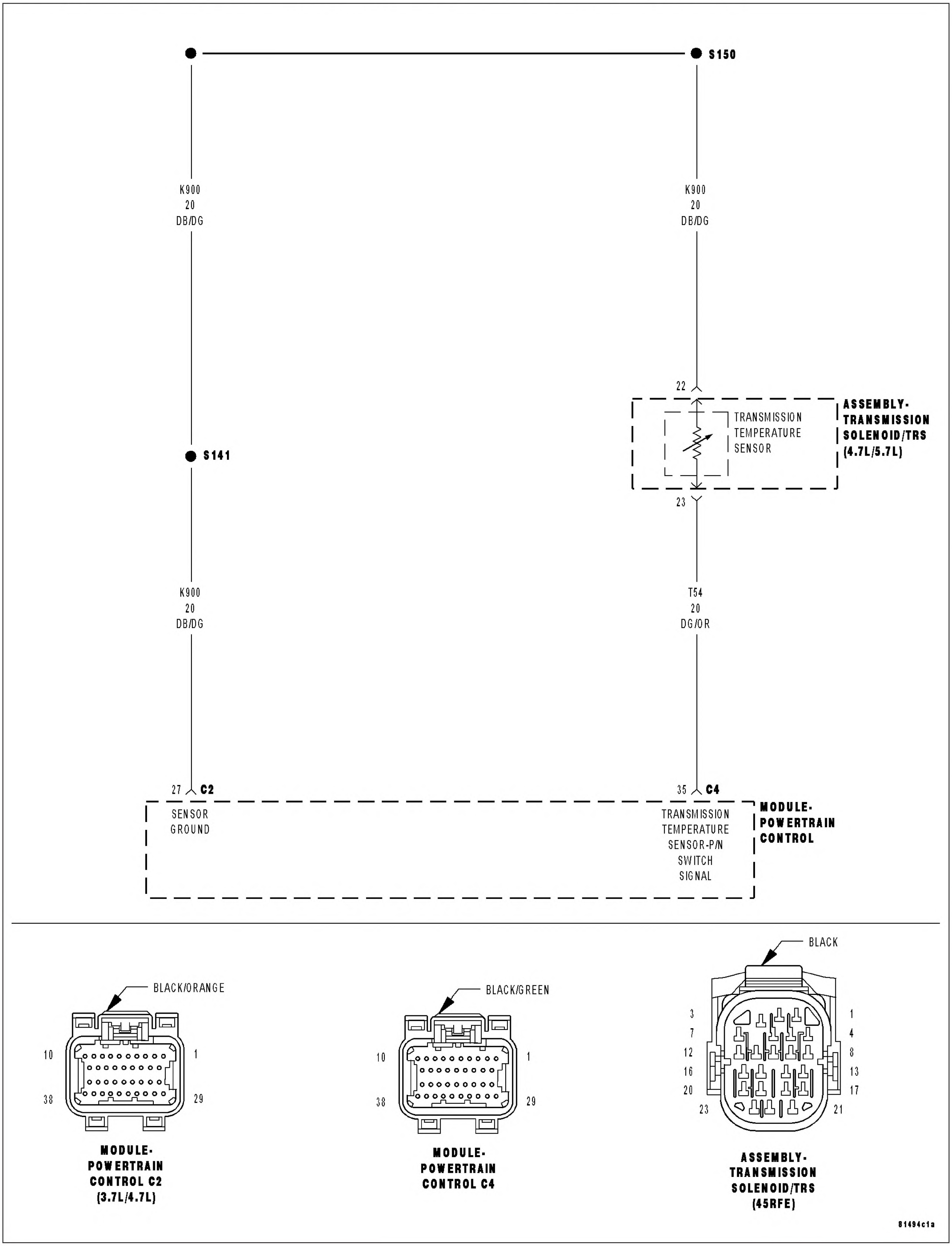
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0714-TRANSMISSION TEMPERATURE SENSOR INTERMITTENT


S150
K900
20
DB/DG
K900
20
DB/DG
22
TRANSMISSION
TEMPERATURE
SENSOR
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L/5.7L)
S141
23
K900
20
DB/DG
T54
20
DG/OR
27 C2
35 C4
SENSOR
GROUND
TRANSMISSION
TEMPERATURE
SENSOR-P/N
SWITCH
SIGNAL
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
BLACK/GREEN
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(45RFE)
81494c1a

P0714-TRANSMISSION TEMPERATURE SENSOR INTERMITTENT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS) .

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  The DTC will set when the monitored Temperature Sensor voltage fluctuates or changes abruptly within a predetermined period of time.

Possible Causes
RELATED DTC'S PRESENT
TRANSMISSION TEMPERATURE SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Temperature Sensor is a variable resistor that changes with temperature, or otherwise known as a thermister. The temperature of the transmission fluid can affect a variety of electronically controlled transmission operations such as shift quality, torque converter lock-up, and when and/or if certain OBDII or system self-diagnostic test are performed. The Powertrain Control Module (PCM) substitutes a calculated transmission temperature value if a fault is detected in the Transmission Temperature Sensor circuit.

Diagnostic Test

1. DETERMINE IF RELATED DTC'S ARE PRESENT

With the scan tool, check Transmission DTC's.

Are there any line pressure sensor or throttle position sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, Check the STARTS SINCE SET counter for P0714.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 3

No >> Go To 4

P0714-TRANSMISSION TEMPERATURE SENSOR INTERMITTENT (CONTINUED)

3. TRANSMISSION TEMPERATURE SENSOR

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Input/Output switch to OFF.

With the scan tool, monitor the TRANS TEMP VOLTS while turning the Thermistor Voltage switch to all three positions on the Transmission Simulator.

Compare the scan tool readings with the numbers listed on the Transmission Simulator.

Do the readings on the Transmission Simulator match a non-fluctuating scan tool reading ± 0.2 volts?

Yes >> Replace Transmission Solenoid/TRS assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

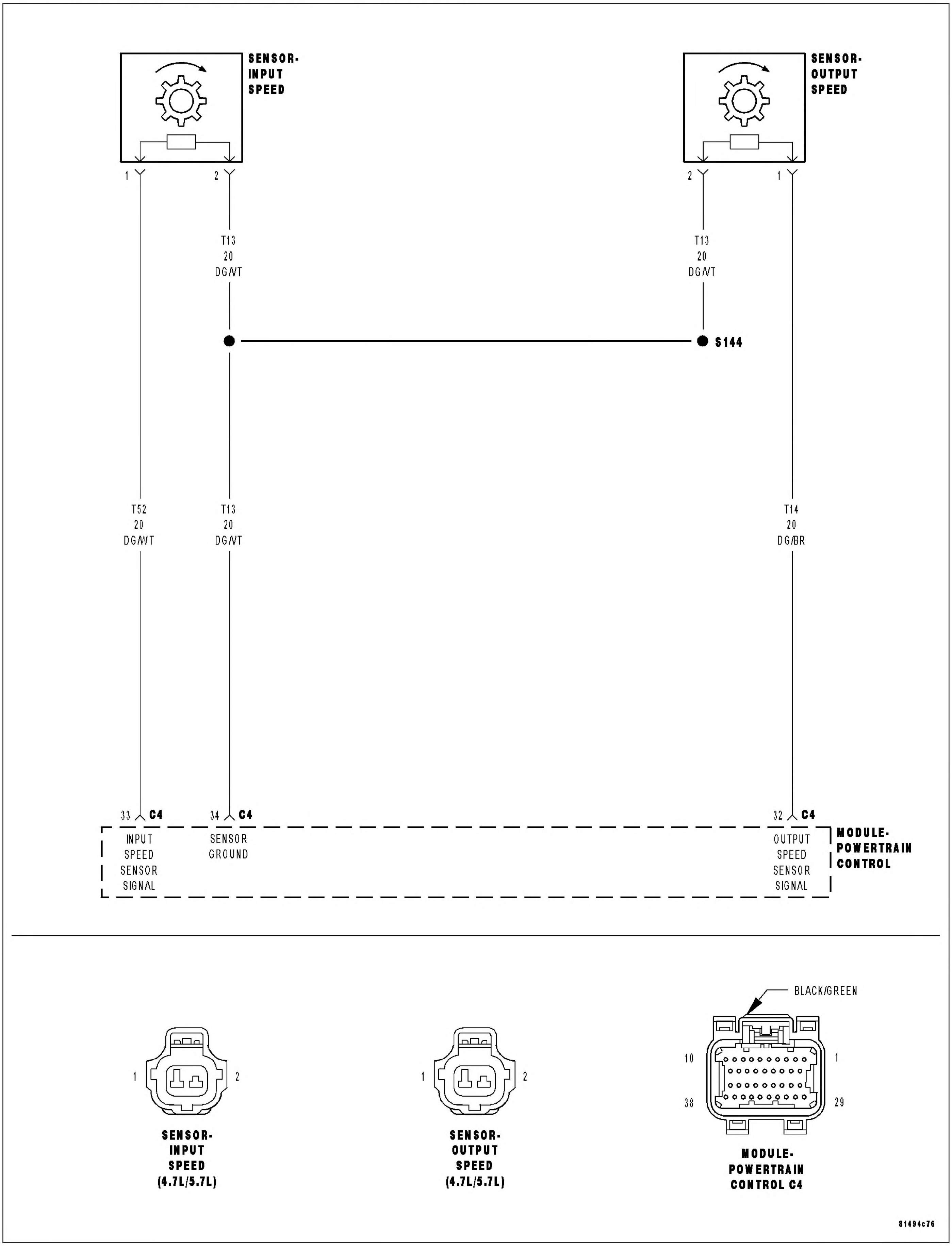
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0715-INPUT SPEED SENSOR 1 CIRCUIT


SENSOR-
INPUT
SPEED
SENSOR-
OUTPUT
SPEED
1
2
2
1
T13
20
DG/VT
T13
20
DG/VT
S144
T52
20
DG/WT
T13
20
DG/VT
T14
20
DG/BR
33 C4
34 C4
32 C4
INPUT
SPEED
SENSOR
SIGNAL
SENSOR
GROUND
OUTPUT
SPEED
SENSOR
SIGNAL
MODULE-
POWERTRAIN
CONTROL
BLACK/GREEN
1
2
SENSOR-
INPUT
SPEED
(4.7L/5.7L)
1
2
SENSOR-
OUTPUT
SPEED
(4.7L/5.7L)
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C4
81494c76

P0715-INPUT SPEED SENSOR 1 CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS) .

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The transmission gear ratio is monitored continuously while the transmission is in gear.
- **Set Condition:**
  If there is an excessive change in input RPM in any gear. This DTC can take up to five minutes of problem identification before illuminating the MIL.

Possible Causes
(T52) INPUT SPEED SENSOR SIGNAL CIRCUIT OPEN
(T13) SPEED SENSOR GROUND CIRCUIT OPEN
(T52) INPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND
(T13) SPEED SENSOR GROUND CIRCUIT SHORT TO GROUND
(T52) INPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
(T13) SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE
INPUT SPEED SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) When in gear, if the gear ratio does not compare to a known gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent which may result in the DTCs P0715 and/or P0720 to set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the signal from the input speed sensor at idle in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set when at a stop.

Diagnostic Test

1. CHECK TO SEE IF DTC P0715 IS CURRENT

Start the engine in park.

With the scan tool, monitor the Input Speed Sensor RPM.

Is the Input Speed Sensor RPM below 400 RPM?

Yes >> Go To 2

No >> Go To 9

P0715-INPUT SPEED SENSOR 1 CIRCUIT (CONTINUED)

2. INPUT SPEED SENSOR

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, set the selector switch to 3000/1000 and the Input/Output switch to ON.

With the scan tool, monitor the Input and Output Speed Sensor RPM.

Does the Input speed read 3000 RPM and the Output speed read 1000 RPM ± 50 RPM?

Yes >> Replace the Input Speed Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. (T52) INPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off to the lock position.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

NOTE: Make sure to leave the Speed Sensor, Transmission Solenoid/TRS Assembly, and Line Pressure Sensor harness connectors disconnected.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Remove the Transmission Control Relay.

Place a jumper wire between the (A104) Fused B+ circuit and the (T16) Transmission Control Relay Output circuit in the Transmission Control Relay connector.

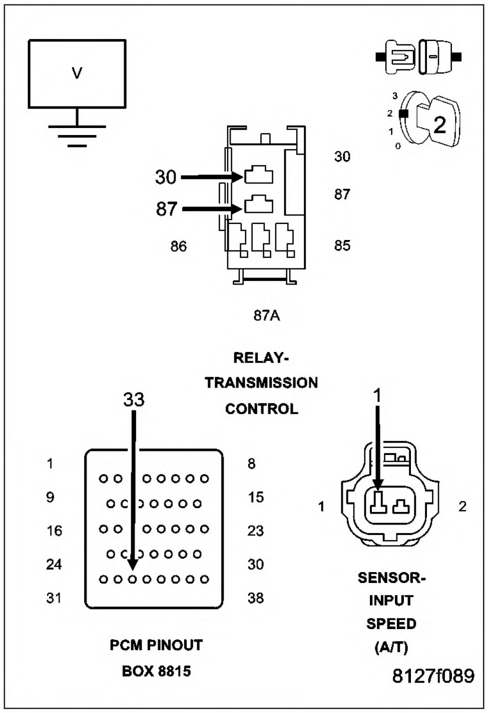
Ignition on, engine not running.

Measure the voltage of the (T52) Input Speed Sensor Signal circuit.

Is the voltage above 0.5 volts?

Yes >> Repair the (T52) Input Speed Sensor Signal circuit for a short to voltage.
Perform (NGC) 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4



P0715-INPUT SPEED SENSOR 1 CIRCUIT (CONTINUED)

4. (T13) SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE

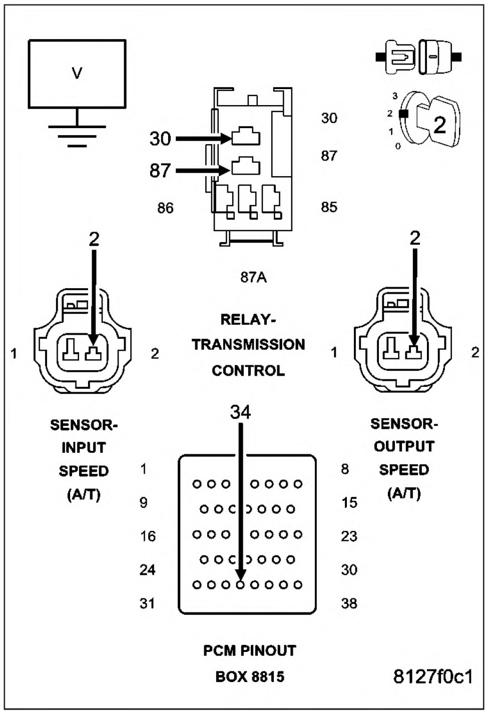
Measure the voltage of the (T13) Speed Sensor Ground circuit.

Is the voltage above 0.5 volts?

Yes >> Repair the (T13) Speed Sensor Ground circuit for a short to voltage.

Perform (NGC) 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5


V
30
87
86
30
87
85
87A
RELAY-
TRANSMISSION
CONTROL
3
2
1
0
2
2
1
2
SENSOR-
INPUT
SPEED
(A/T)
2
1
2
SENSOR-
OUTPUT
SPEED
(A/T)
34
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8127f0c1

---

5. (T52) INPUT SPEED SENSOR SIGNAL CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the jumper wire between the (A104) Fused B+ circuit and the (T16) Transmission Control Relay Output circuit in the Transmission Control Relay connector.

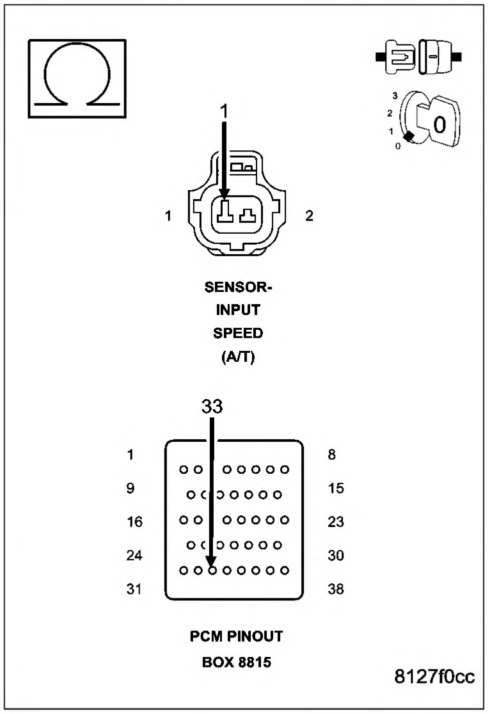
Measure the resistance of the (T52) Input Speed Sensor Signal circuit between the Input Speed Sensor harness connector and the appropriate terminal of Miller tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T52) Input Speed Sensor Signal circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

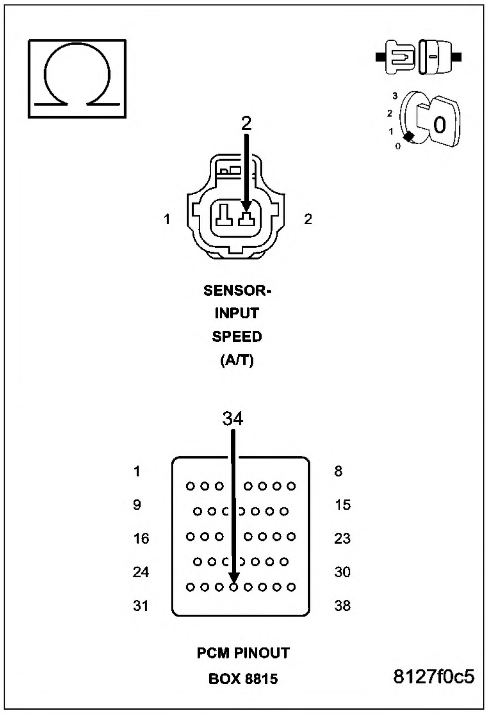
No >> Go To 6


Ω
3
2
1
0
0
1
1
2
SENSOR-
INPUT
SPEED
(A/T)
33
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8127f0cc

P0715-INPUT SPEED SENSOR 1 CIRCUIT (CONTINUED)

6. (T13) SPEED SENSOR GROUND CIRCUIT OPEN

Measure the resistance of the (T13) Speed Sensor Ground circuit between the Input Speed Sensor harness connector and the appropriate terminal of Miller tool #8815.



2
1
2
SENSOR-
INPUT
SPEED
(A/T)
34
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8127f0c5

Is the resistance above 5.0 ohms?

Yes >> Repair the (T13) Speed Sensor Ground circuit for an open.

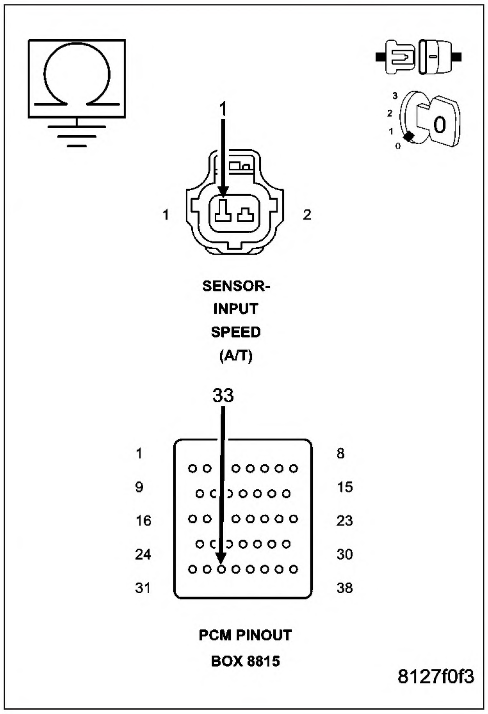
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. (T52) INPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the Input Speed Sensor Signal circuit.



1
1
2
SENSOR-
INPUT
SPEED
(A/T)
33
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8127f0f3

Is the resistance below 5.0 ohms?

Yes >> Repair the (T52) Input Speed Sensor Signal circuit for a short to ground.

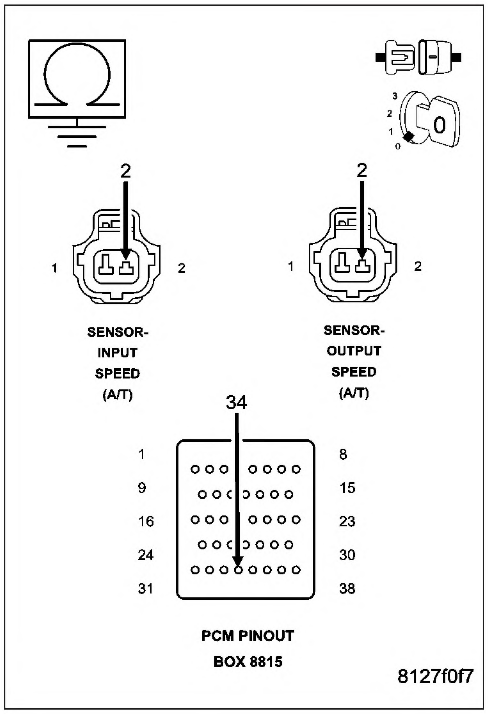
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

P0715-INPUT SPEED SENSOR 1 CIRCUIT (CONTINUED)

8. (T13) SPEED SENSOR GROUND CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T13) Speed Sensor Ground circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (T13) Speed Sensor Ground circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

9. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

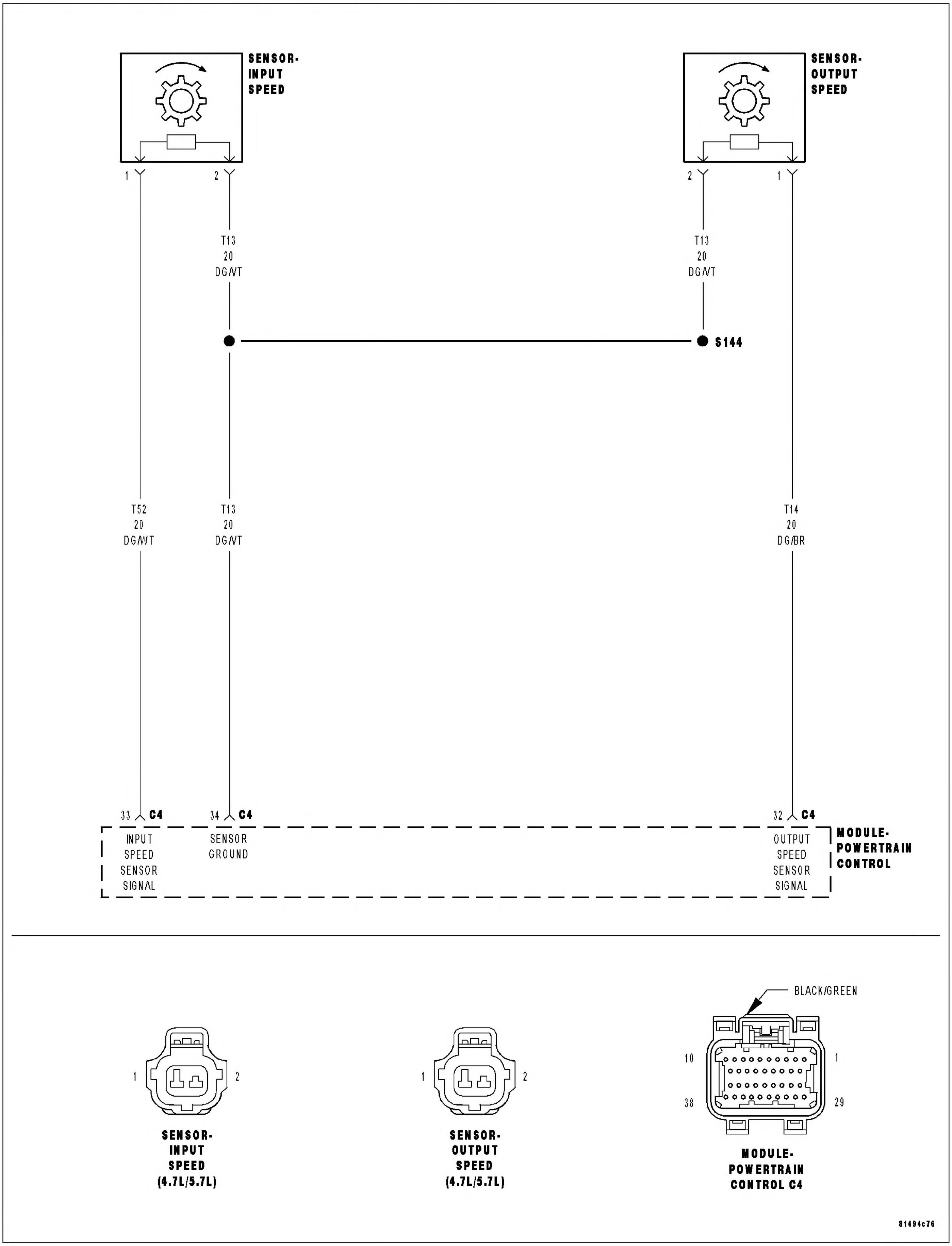
Were there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0720-OUTPUT SPEED SENSOR CIRCUIT


SENSOR-
INPUT
SPEED
SENSOR-
OUTPUT
SPEED
1
2
2
1
T13
20
DG/VT
T13
20
DG/VT
S144
T52
20
DG/WT
T13
20
DG/VT
T14
20
DG/BR
33 C4
34 C4
32 C4
INPUT
SPEED
SENSOR
SIGNAL
SENSOR
GROUND
OUTPUT
SPEED
SENSOR
SIGNAL
MODULE-
POWERTRAIN
CONTROL
BLACK/GREEN
1
2
1
2
10
1
38
29
SENSOR-
INPUT
SPEED
(4.7L/5.7L)
SENSOR-
OUTPUT
SPEED
(4.7L/5.7L)
MODULE-
POWERTRAIN
CONTROL C4
81494c76

P0720-OUTPUT SPEED SENSOR CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  The transmission gear ratio is monitored continuously while the transmission is in gear.
- **Set Condition:**
  If there is an excessive change in output RPM in any gear. This DTC can take up to five minutes of problem identification before illuminating the MIL.

Possible Causes
OUTPUT SPEED SENSOR SIGNAL CIRCUIT OPEN
SPEED SENSOR GROUND CIRCUIT OPEN
OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND
SPEED SENSOR GROUND CIRCUIT SHORT TO GROUND
OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE
OUTPUT SPEED SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) When in gear, if the gear ratio does not compare to a known gear ratio, the corresponding in-gear trouble code is set (codes P0731 through P0736).

2) An excessive change in input or output speeds indicating signal intermittent will result in codes P0715 and/or P0720 being set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the signal from the input speed sensor at idle in neutral. Since the input speed sensor has 60 teeth and the output speed sensor has 30 teeth, this results in a an apparent speed ratio of 1:2 and may cause the DTC P1794 to set.

P0720-OUTPUT SPEED SENSOR CIRCUIT (CONTINUED)

Diagnostic Test

1. CHECK TO SEE IF DTC P0720 IS CURRENT

Turn the ignition off to the lock position.

CAUTION: Properly support the vehicle and raise all drive wheels off the ground.

Release the parking brake.

Start the engine in park.

Place the transmission gear selector in drive, release foot from brake.

WARNING: BE SURE TO KEEP HANDS AND FEET CLEAR OF ROTATING WHEELS.

With the scan tool, monitor the Output Speed Sensor RPM.

Is the Output Speed Sensor RPM below 100 RPM?

Yes >> Go To 2

No >> Go To 9

---

2. OUTPUT SPEED SENSOR

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, set the selector switch to 3000/1000 and the Input/Output switch to ON.

With the scan tool, monitor the Input and Output Speed Sensor RPM

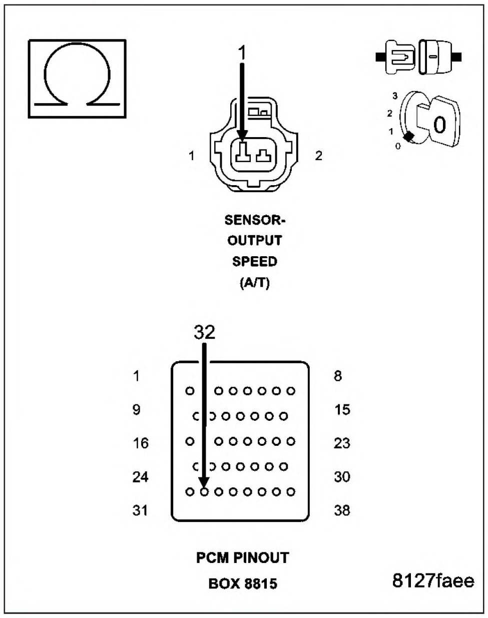
Does the Input Speed read 3000 RPM and the Output Speed read 1000 RPM, ± 50 RPM?

Yes >> Replace the Output Speed Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

P0720-OUTPUT SPEED SENSOR CIRCUIT (CONTINUED)

3. OUTPUT SPEED SENSOR SIGNAL CIRCUIT OPEN


1
1
2
SENSOR-
OUTPUT
SPEED
(A/T)
32
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8127faee

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM harness connectors and connect Miller special tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller special tool #8815 to perform diagnosis..

Measure the resistance of the Output Speed Sensor Signal circuit from the Output Speed Sensor harness connector to the appropriate terminal of special tool #8815.

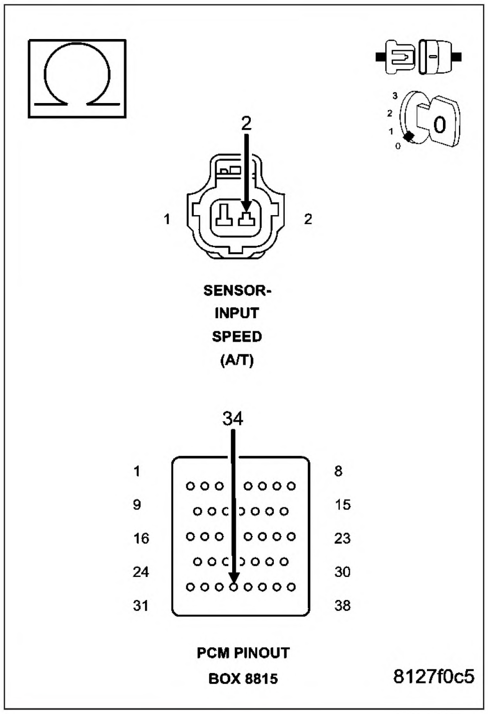
Is the resistance above 5.0 ohms?

Yes >> Repair the Output Speed Sensor Signal circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. SPEED SENSOR GROUND CIRCUIT OPEN


2
1
2
SENSOR-
INPUT
SPEED
(A/T)
34
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8127f0c5

Measure the resistance of the Speed Sensor Ground circuit from the Output Speed Sensor harness connector to the appropriate terminal in the special tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the Speed Sensor Ground circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

P0720-OUTPUT SPEED SENSOR CIRCUIT (CONTINUED)

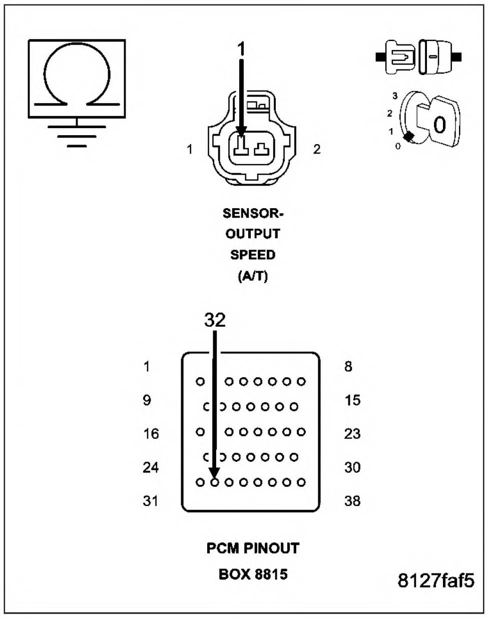
5. OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the Output Speed Sensor Signal circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the Output Speed Sensor Signal circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6


1
1
2
SENSOR-
OUTPUT
SPEED
(A/T)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
3
2
1
0
0
8127faf5

---

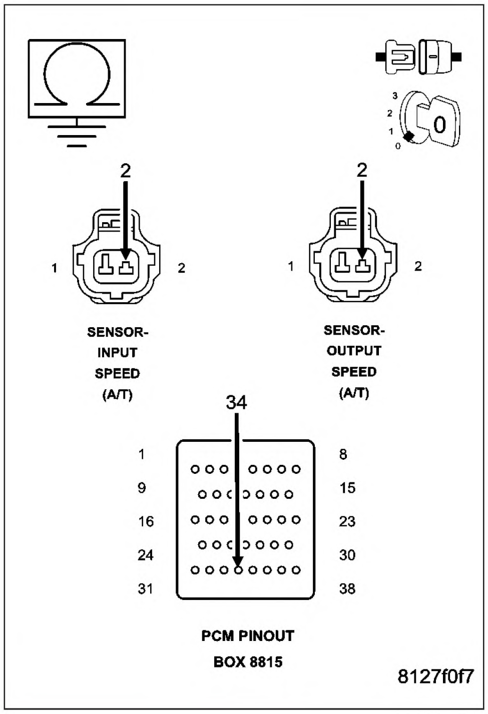
6. SPEED SENSOR GROUND CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the Speed Sensor Ground circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the Speed Sensor Ground circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7


3
2
1
0
0
2
1
2
SENSOR-
INPUT
SPEED
(A/T)
2
1
2
SENSOR-
OUTPUT
SPEED
(A/T)
34
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8127f0f7

P0720-OUTPUT SPEED SENSOR CIRCUIT (CONTINUED)

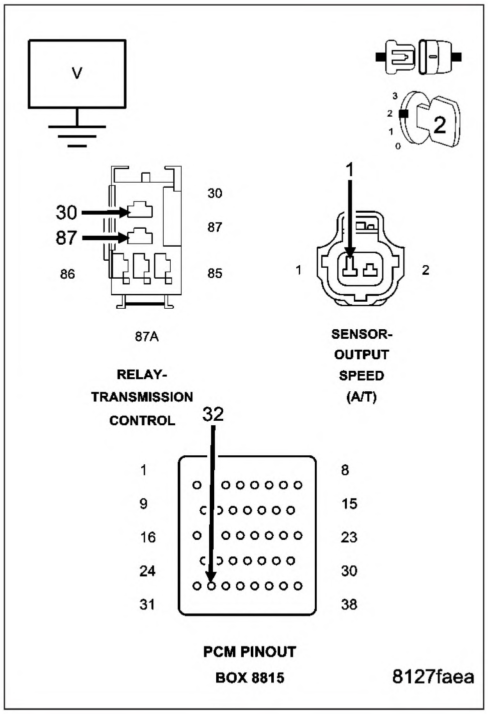
7. OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE

Remove the Transmission Control Relay.

Place a jumper wire between the Fused B+ circuit and the Transmission Relay Output circuit in the Transmission Control Relay connector.

Ignition on, engine not running.

Measure the voltage of the Output Speed Sensor Signal circuit.


V
3
2
1
0
2
30
87
86
30
87
85
87A
RELAY-
TRANSMISSION
CONTROL
1
1
2
SENSOR-
OUTPUT
SPEED
(A/T)
32
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8127faea

Is the voltage above 0.5 volts?

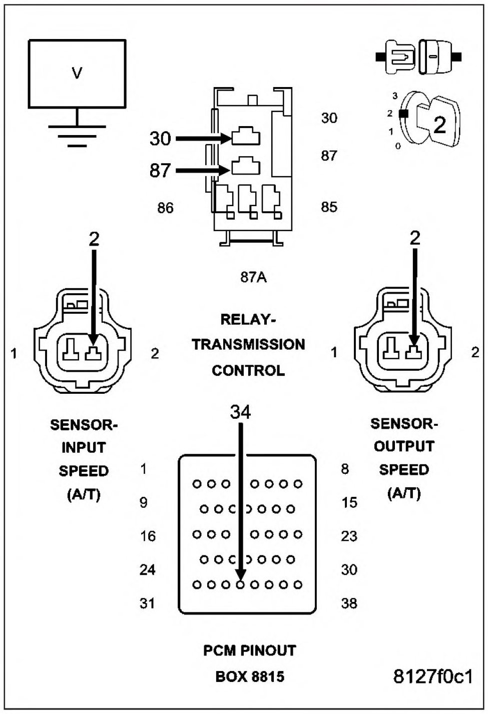
Yes >> Repair the Output Speed Sensor Signal circuit for a short to voltage.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE

Measure the voltage of the Speed Sensor Ground circuit.


V
3
2
1
0
2
30
87
86
30
87
85
87A
RELAY-
TRANSMISSION
CONTROL
2
1
2
SENSOR-
INPUT
SPEED
(A/T)
2
1
2
SENSOR-
OUTPUT
SPEED
(A/T)
34
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
8127f0c1

Is the voltage above 0.5 volts?

Yes >> Repair the Speed Sensor Ground circuit for a short to voltage.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0720-OUTPUT SPEED SENSOR CIRCUIT (CONTINUED)

9. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0725-ENGINE SPEED SENSOR CIRCUIT

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously every 7 msec with the ignition on and engine running.
- **Set Condition:**
  This DTC will set when the calculated engine speed is less than 390 RPM with the engine running, or greater than 8000 RPM, for the period of 2.0 seconds. The PCM will place the Transmission in Limp-in when this DTC is set. **Note: This is not a Transmission Input Speed Sensor DTC.**

Possible Causes
RELATED ENGINE DTC'S PRESENT
CRANK POSITION SENSOR OR WIRING
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System calculates the engine RPM by directly reading the engine crank position sensor. It compares the calculated value to the engine speed sensor signal transmitted from the Engine Control System over the controllers internal bus. The calculated engine RPM is also compared to a minimum and a maximum value. **Note: Due to the integration of the Powertrain Control Module (PCM) and Transmission Control Module (TCM), bus communication between the modules is internal and unserviceable.**

Diagnostic Test

1. RELATED ENGINE DTCS PRESENT

NOTE: This is not a Transmission Input Speed Sensor DTC.
Ignition on, engine not running.

With the scan tool, read all Engine DTC's. This includes any active or stored or one trip DTCs.

Are there any engine RPM related DTCs present?

Yes >> Refer to the Powertrain category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0725-ENGINE SPEED SENSOR CIRCUIT (CONTINUED)

2. VERIFY IF THE DTC IS CURRENT

Ignition on, engine not running.

With a scan tool, read and record all EATX DTC EVENT DATA.

With the scan tool, erase all active and stored transmission DTCs. (Note: it may be necessary to perform a battery disconnect with the scan tool to clear EATX DTC EVENT DATA.)

Using the EATX DTC EVENT DATA, duplicate the conditions in which the original DTC set.

With the scan tool, read transmission and engine DTCs.

NOTE: Refer to all engine DTCs first in the following question.

Pick the answer below that best describes your findings, (this includes one trip failures).

Transmission DTC P0725 set

Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Also check the Crank Position sensor and wiring. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

Engine DTC set

Refer to the Driveability category and perform the appropriate symptom.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No DTC set at all

Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0731-GEAR RATIO ERROR IN 1ST

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  If the ratio of the Input RPM to the Output RPM does not match the current gear ratio. This DTC can take up to five minutes of problem identification before illuminating the MIL

Possible Causes
CUT UD PISTON SEAL
LOW FLUID LEVEL
CRACKED OR MISINSTALLED PRIMARY OIL FILTER OR SEAL
STUCK OR STICKING MAIN REGULATOR VALVE
FAILED OVERRUNNING CLUTCH
CUT UD ACCUMULATOR SEAL RING
BROKEN UD ACCUMULATOR PISTON
BROKEN REACTION SHAFT SUPPORT SEAL RING
LOW LINE PRESSURE
BROKEN / MISSING MAIN VALVE BODY BLEED ORIFICE
BROKEN / MISSING DRIBBLER ORIFICE ASSEMBLY IN REACTION SHAFT SUPPORT
POOR MACHINING ON PUMP VALVE BODY FACE
INPUT SPEED SENSOR AND RELATED WIRING
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) Once in a particular gear, if the gear ratio varies from the correct gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent may result in the DTCs P0715 and/or P0720 being set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the pulses from the input speed sensor when at a stop in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set.

P0731-GEAR RATIO ERROR IN 1ST (CONTINUED)

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

If any of these DTC's are present, perform their respective tests first.

Are there any Transmission; solenoid, line pressure, speed sensor, and/or loss of prime DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If any of these DTCs are present, they may cause a Speed Ratio Error. Perform the test for P0944 first if it is present.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK TO SEE IF DTC P0731 IS CURRENT

With the scan tool, perform the 1st Gear Clutch Test. Follow the instructions on the scan tool.

Increase the throttle angle or TPS Degree to 30° for no more than a few seconds.

CAUTION: Do not overheat the transmission.

Did the Clutch Test pass, Input Speed remain at zero?

Yes >> Go To 3

No >> Go To 4

---

3. CHECK FOR INTERMITTENT OPERATION

The conditions to set this DTC are not currently present.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

- If the DTC Event Data shows fault P0731 was set in Park, Reverse, or Neutral, replace the Powertrain Control Module.

- If the DTC Event Data shows fault P0731 set with input RPM = zero, check the input speed sensor and related wiring.

- If the DTC Event Data shows fault P0731 set with line pressure significantly below desired line pressure, check for the cause of low line pressure (i.e., oil level, misinstalled or damaged primary filter or filter seal, sticking main regulator valve in pump, etc.).

- If the DTC Event Data shows fault P0731 set with the UD pressure switch open (but line pressure matches Desired Line Pressure), air check the UD hydraulic clutch circuit for leakage per the Service Information. If the UD hydraulic clutch circuit is OK, replace the solenoid/TRS assembly.

Check the gearshift linkage adjustment.

Intermittent Gear Ratio DTCs can be set by problems in the Input and Output Speed Sensor circuits and/or Speed Sensor Ground circuit.

Remove the Starter Relay.

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Install Transmission Simulator, Miller tool #8333.

Wiggle wiring and connectors while checking for intermittent operation with the Transmission Simulator.

Gear ratio DTC's can also be set under extreme temperature conditions.

Verify if the problem is only experienced under extreme hot or cold conditions.

Were there any problems found.

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0731-GEAR RATIO ERROR IN 1ST (CONTINUED)

4. INTERNAL TRANSMISSION

Repair internal transmission as necessary. Refer to the Service Information.

If there were any line pressure DTC's present along with this DTC, make sure to inspect the: Primary oil filter and seal, Transmission Oil Pump, and the Main regulator valve per the Service Information.

If DTC's P0876 and/or P0875 were present in addition to the P0731, replace the Transmission Solenoid/TRS Assembly in addition to necessary internal repairs.

Pay particular attention to the following list of possible causes when repairing the transmission condition.

- Cut UD piston seal
- Failed overrunning clutch
- Cut UD accumulator seal ring
- Broken UD accumulator piston
- Broken reaction shaft support seal ring
- Low line pressure
- Broken/missing main valve body bleed orifice
- Broken/missing dribbler orifice assembly in reaction shaft support
- Poor machining on pump valve body face
- Transmission Solenoid/TRS Assembly

View repair.

Repair

Repair internal transmission per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0732-GEAR RATIO ERROR IN 2ND

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  If the ratio of the Input RPM to the Output RPM does not match the current gear ratio. This DTC can take up to five minutes of problem identification before illuminating the MIL

Possible Causes
RELATED DTC'S PRESENT
INPUT SPEED SENSOR OR WIRING
LOW FLUID LEVEL
CRACKED OR MISINSTALLED PRIMARY OIL FILTER OR SEAL
WORN SOLENOID SWITCH VALVE OR PLUGS
STUCK OR STICKING MAIN REGULATOR VALVE
BURNED UD OR 2C CLUTCH
CUT 2C OR UD PISTON SEAL
BROKEN 2C PISTON CASTING
BROKEN OR MISSING 2C BLEED ORIFICE
BROKEN OR MISSING UD BLEED ORIFICE
CUT 2C OR UD ACCUMULATOR PISTON SEAL
CRACKED 2C OR UD ACCUMULATOR PISTON
CUT OR MISSING #5 OR #7 CHECK BALL
TRANSMISSION SOLENOID/TRS ASSEMBLY
BROKEN WELD - REACTION CARRIER TO REVERSE SUN GEAR
MISSING TEETH ON INPUT CLUTCH HUB TONE WHEEL

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) Once in a particular gear, if the gear ratio varies from the correct gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent may result in the DTCs P0715 and/or P0720 being set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the pulses from the input speed sensor when at a stop in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set.

P0732-GEAR RATIO ERROR IN 2ND (CONTINUED)

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Are there any Transmission; solenoid, line pressure, speed sensor, and/or loss of prime DTC's present?

Yes >> Refer to appropriate symptom in the Transmission category. Perform the test for P0944–LOSS OF PRIME first if it is present.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK IF DTC IS CURRENT

With the scan tool, read and record the EATX DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA display information for the DTC P0732?

Yes >> Go To 4

No >> Go To 3

---

3. CHECK EATX DTC EVENT DATA

In the EATX DTC EVENT DATA, identify the DTC that was recorded earlier.

Does the EATX DTC EVENT DATA display information for the DTC P1790, with target gear = 2nd, or with both 2C and UD clutches applying?

Yes >> Go To 4

No >> Go To 7

---

4. CHECK RPM IN EATX DTC EVENT DATA

Refer to the EATX DTC EVENT DATA recorded earlier.

Does the Input RPM read zero?

Yes >> Check the input speed sensor and wiring. Refer to test P0715 and diagnose as if the DTC is current.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. CHECK LINE PRESSURE READING

Refer to the EATX DTC EVENT DATA recorded earlier.

Is the line pressure reading more than 10 psi below the desired line pressure?

Yes >> Go To 6

No >> Go To 7

P0732-GEAR RATIO ERROR IN 2ND (CONTINUED)

6. CHECK TRANSMISSION OIL FILTER

Turn the ignition off to the lock position.

Remove and inspect the Transmission Oil Pan for excessive debris per the Service Information.

Remove and inspect the Primary Oil Filter per the Service Information.

NOTE: Make sure the Primary Transmission Oil Filter and seal are properly installed and are not cracked or split.

Does the Oil Pan contain excessive debris and/or is the Primary Oil Filter cracked, plugged or misinstalled?

Yes >> Repair the plugged, cracked, or split Primary Transmission Oil Filter and/or seal. If excessive clutch debris is present, check the clutches for damage. Refer to the Service Information for the proper hydraulic clutch repair procedure.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Remove the Transmission Oil Pump per the Service Information. Check the main Regulator Valve for sticking in its bore, scoring, and/or damage and clean and repair as necessary. If no problem is found, replace the Transmission Solenoid/TRS Assembly.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

7. CHECK TO SEE IF DTC P0732 IS CURRENT

With the scan tool, perform the 2nd Gear Clutch Test. Follow the instructions on the scan tool.

Increase the throttle angle, TPS Degree, to 30° for no more than a few seconds.

CAUTION: Do not overheat the transmission.

NOTE: If the 2C clutch is faulty, the overrunning clutch will hold and the slip test will pass. The 2nd gear clutch test will not detect a faulty 2C clutch. However, it will detect a faulty UD clutch.

Did the clutch test pass, did the Input Speed remain at zero?

Yes >> Go To 8

No >> Go To 10

---

8. CHECK FOR INTERMITTENT OPERATION

Check the Shifter adjustment per the Service Information.

Intermittent gear ratio DTCs can be set by problems in the Input and Output Speed Sensor circuits and/or Speed Sensor Ground circuit.

Check the Speed Sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333.

Were there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

P0732-GEAR RATIO ERROR IN 2ND (CONTINUED)

9. CHECK FOR SLIPPAGE

With the scan tool, erase Transmission DTCs.

Road test the vehicle.

Is there an obvious slippage noticed in 2nd gear, or runaway on the 1–2 shift?

Yes >> Go To 12

No >> Go To 15

---

10. UD HYDRAULIC CLUTCH CIRCUIT

Remove Transmission Oil Pan and check for excessive debris.

Remove the Valve Body and air check the UD hydraulic clutch circuit (in the case) per the Service Information.

NOTE: The UD clutch passage contains a small bleed orifice, a small amount of air leakage is normal.

Were there any problems found, excessive debris and/or excessive air leakage in the UD clutch hydraulic circuit?

Yes >> Repair as necessary. Check the UD clutch piston seals, reaction shaft support seal rings and the dribbler assembly, and the flatness of the pump valve body and pump housing faces. Check main regulator valve for sticking in the bore.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 11

---

11. UD ACCUMULATOR PISTON

Check the UD bleed orifice, accumulator piston, and accumulator piston seal in the main valve body.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

12. EXCESSIVE DEBRIS

Remove the Transmission Oil Pan and check for excessive debris.

If grey sludge is present, check for a improperly assembled 2C clutch with the thick reaction plate not against the case.

Remove the valve body and air check the 2C hydraulic clutch circuit (in the 2C/4C clutch retainer) per the Service Information.

NOTE: The 2C clutch passage contains a small bleed orifice, a small amount of air leakage is normal.

Were there any problems found, excessive debris, improperly assembled 2C clutch and/or excessive air leakage in the 2C hydraulic clutch circuit?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures. Note: Check the 2C piston seals and bleed orifice.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

P0732-GEAR RATIO ERROR IN 2ND (CONTINUED)

13. 2C ACCUMULATOR

Check the 2C Accumulator piston for cracks or a cut seal.

Check for a cut or missing #7 or #5 check balls.

Check the Solenoid Switch Valve and its plugs for sticking in its bore or excessive wear.

Were there any problems found

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 14

---

14. CHECK FOR BROKEN REVERSE SUN GEAR WELD

Working through the windows in the bottom of the case, check for a broken Reverse Sun gear weld to the reaction carrier as follows:

(1) Hold the Transmission Output Shaft by holding the Transmission Manual Lever in the park position.

(2) Rotate the Input Annulus gear and drive shell, (the drum that encloses the two rearmost carriers).

(3) Check to see if the reaction carrier (the frontmost carrier, whose outer shell is splined to the 2C clutch) is rotating faster than the drive shell is being turned.

Is the reaction carrier turning faster than the drive shell?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the reaction carrier per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

15. CHECK IF DTC RESET

Did the DTC P0732 reset during the road test?

Yes >> Go To 16

No >> Go To 17

P0732-GEAR RATIO ERROR IN 2ND (CONTINUED)

16. LIST OF POSSIBLE CAUSES

If any other DTC's set during the road test, refer to the appropriate symptom in the Transmission category.

If no other DTC's set during the road test, below is a list of possible causes, but not strictly limited to those:

— Check for excessive debris in the Transmission Oil pan, plugged, cracked, or misinstalled Primary Transmission Oil Filter and/or seal.

— Check for cut and/or missing #7 and #5 check balls in the main valve body.

— Check the 2C and UD accumulator pistons and seals, UD bleed orifice, and the Solenoid Switch Valve and Plugs in the main valve body.

— Check the UD clutch piston seals, reaction shaft support seal rings and dribbler assembly.

— Check the 2C clutch piston seals, and bleed orifice.

— Check the main regulator valve for sticking in its bore and the flatness of the pump valve body and pump housing faces.

— Check for a improperly assembled 2C clutch with the thick reaction plate not against the case.

View repair

Repair

Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

17. INTERMITTENT DTC

The conditions to set this DTC are not currently present.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

- If the DTC Event Data shows fault P0732 was set in Park, Reverse, or Neutral, replace the Powertrain Control Module.

- If the DTC Event Data shows fault P0732 set with input RPM = zero, check the input speed sensor and related wiring.

- If the DTC Event Data shows fault P0732 set with line pressure significantly below desired line pressure, check for the cause of low line pressure (i.e., oil level, misinstalled or damaged primary filter or filter seal, sticking main regulator valve in pump, etc.).

- If the DTC Event Data shows fault P0732 set with the UD or 2C pressure switch open (but line pressure matches Desired Line Pressure), air check the UD and 2C hydraulic clutch circuits for leakage per the Service Information. If the UD and 2C hydraulic clutch circuits are OK, replace the Transmission Solenoid/TRS assembly.

Check the gearshift linkage adjustment.

Intermittent Gear Ratio DTCs can be set by problems in the Input and Output Speed Sensor circuits and/or Speed Sensor Ground circuit.

Remove the Starter Relay.

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Install Transmission Simulator, Miller tool #8333.

Wiggle wiring and connectors while checking for intermittent operation with the Transmission Simulator.

Gear ratio DTC's can also be set under extreme temperature conditions.

Verify if the problem is only experienced under extreme hot or cold conditions.

Were there any problems found.

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0733-GEAR RATIO ERROR IN 3RD

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  If the ratio of the Input RPM to the Output RPM does not match the current gear ratio. This DTC can take up to five minutes of problem identification before illuminating the MIL

Possible Causes
RELATED DTC'S PRESENT
INPUT SPEED SENSOR OR WIRING
LOW FLUID LEVEL
CRACKED OR MISINSTALLED PRIMARY OIL FILTER OR SEAL
BENT OR BROKEN ACCUMULATOR COVER ON MAIN VALVE BODY
WORN SOLENOID SWITCH VALVE OR PLUGS
STUCK OR STICKING MAIN REGULATOR VALVE
BURNED UD OR OD CLUTCH
CUT OD OR UD PISTON SEAL
BROKEN OR MISSING UD OR OD BLEED ORIFICE IN MAIN VALVE BODY
BROKEN OR MISSING BLEED ORIFICE IN UD OR OD CLUTCH PISTON
CUT OD OR UD ACCUMULATOR PISTON SEAL
CRACKED OD OR UD ACCUMULATOR PISTON
CUT OR MISSING #6 CHECK BALL
TRANSMISSION SOLENOID/TRS ASSEMBLY
BROKEN WELD - REVERSE CARRIER HUB TO CARRIER
BROKEN REACTION SHAFT SUPPORT SEAL RING
POOR MACHINING ON PUMP VALVE BODY FACE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) Once in a particular gear, if the gear ratio varies from the correct gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent may result in the DTCs P0715 and/or P0720 being set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the pulses from the input speed sensor when at a stop in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set.

P0733-GEAR RATIO ERROR IN 3RD (CONTINUED)

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Are there any Transmission; solenoid, line pressure, speed sensor, and/or loss of prime DTC's present?

Yes >> Refer to appropriate symptom in the Transmission category. Perform the test for P0944–LOSS OF PRIME first if it is present.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK EATX DTC EVENT DATA

With the scan tool, read and record the EATX DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA display information for the DTC P0733?

Yes >> Go To 4

No >> Go To 3

---

3. TARGET GEAR IN EATX DTC EVENT DATA

In the EATX DTC EVENT DATA, identify the DTC that was recorded earlier.

Does the EATX DTC EVENT DATA display information for the DTC P1790, with target gear = 3rd, or with both OD and UD clutches applying?

Yes >> Go To 4

No >> Go To 7

---

4. CHECK RPM IN EATX DTC EVENT DATA

Refer to the EATX DTC EVENT DATA recorded earlier.

Does the Input RPM read zero?

Yes >> Check the input speed sensor and wiring. Refer to test P0715 and diagnose as if the DTC is current.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. CHECK LINE PRESSURE READING

Refer to the EATX DTC EVENT DATA recorded earlier.

Is the line pressure reading more than 10 psi below the desired line pressure?

Yes >> Go To 6

No >> Go To 7

P0733-GEAR RATIO ERROR IN 3RD (CONTINUED)

6. CHECK TRANSMISSION OIL FILTER

Turn the ignition off to the lock position.

Remove and inspect the Transmission Oil Pan for excessive debris per the Service Information.

Remove and inspect the Primary Oil Filter per the Service Information.

NOTE: Make sure the Primary Transmission Oil Filter and seal are properly installed and are not cracked or split.

Does the Oil Pan contain excessive debris and/or is the Primary Oil Filter cracked, plugged or misinstalled?

Yes >> Repair the plugged, cracked, or split Primary Transmission Oil Filter and/or seal. If excessive clutch debris is present, check the clutches for damage. Refer to the Service Information for the proper hydraulic clutch repair procedure.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Remove the Transmission Oil Pump per the Service Information. Check the main Regulator Valve for sticking in its bore, scoring, and/or damage and clean and repair as necessary. If no problem is found, replace the Transmission Solenoid/TRS Assembly.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

7. CHECK TO SEE IF DTC P0733 IS CURRENT

With the scan tool, perform the 3rd Gear Clutch Test. Follow the instructions on the scan tool.

Increase the throttle angle, TPS Degree, to 30° for no more than a few seconds.

CAUTION: Do not overheat the transmission.

NOTE: If the OD clutch is faulty, the overrunning clutch will hold and the slip test will pass. The 3rd gear clutch test will not detect a faulty OD clutch. However, it will detect a faulty UD clutch.

Did the clutch test pass, did the Input Speed remain at zero?

Yes >> Go To 8

No >> Go To 10

---

8. CHECK FOR INTERMITTENT OPERATION

Check the Shifter adjustment per the Service Information.

Intermittent gear ratio DTCs can be set by problems in the Input and Output Speed Sensor circuits and/or Speed Sensor Ground circuit.

Check the Speed Sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333.

Were there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

P0733-GEAR RATIO ERROR IN 3RD (CONTINUED)

9. CHECK FOR SLIPPAGE

With the scan tool, erase Transmission DTCs.

Road test the vehicle. Check operation in 3rd gear, 4th gear, and Reverse.

Is there an obvious slippage noticed in 3rd gear, or runaway on the 2–3 shift?

Yes >> Go To 12

No >> Go To 16

---

10. UD HYDRAULIC CLUTCH CIRCUIT

Remove Transmission Oil Pan and check for excessive debris.

Remove the Valve Body and air check the UD hydraulic clutch circuit (in the case) per the Service Information.

NOTE: The UD clutch passage contains a small bleed orifice, a small amount of air leakage is normal.

Were there any problems found, excessive debris and/or excessive air leakage in the UD hydraulic clutch circuit?

Yes >> Repair as necessary. Check the UD clutch piston seals, reaction shaft support seal rings and dribbler assemblies, and the flatness of the pump valve body and pump housing faces. Check main regulator valve for sticking in the bore.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 11

---

11. UD ACCUMULATOR PISTON

Check the UD bleed orifice, accumulator piston, and accumulator piston seal in the main valve body.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

12. EXCESSIVE DEBRIS

Remove the Transmission Oil Pan and check for excessive debris.

Remove the valve body and check if the accumulator cover is intact.

Air check the OD hydraulic clutch circuit (in the case) per the Service Information.

NOTE: The OD clutch passage contains a small bleed orifice which connects to the Reverse clutch hydraulic circuit, a small amount of air leakage into the Reverse clutch passage is normal.

Were there any problems found, excessive debris, and/or excessive air leakage in the OD hydraulic clutch circuit?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures. Note: Check the bleed orifice in the OD/Reverse clutch piston.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

P0733-GEAR RATIO ERROR IN 3RD (CONTINUED)

13. OD ACCUMULATOR

Check the OD Accumulator piston for cracks or a cut seal.

Check for a cut or missing #6 check ball.

Check the Solenoid Switch Valve and its plugs for sticking in its bore or excessive wear.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 14

---

14. CHECK FOR NO REVERSE

During the road test on a previous test, did the vehicle have no reverse and no 3rd gear, but 1st and 2nd gears were OK?

Yes >> Go To 15

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

15. CHECK FOR BROKEN REVERSE CARRIER WELD

Remove the Transmission per the Service Information and inspect the weld on the reverse carrier hub.

Were there any problems found?

Yes >> Repair as necessary.

No >> Disassemble and inspect the input clutch assembly. Check the OD and Reverse clutch seals, discs, and bleed orifice (in the OD/Reverse clutch piston). Check the OD hub and shaft. Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

16. CHECK IF DTC RESET

Did the DTC P0733 reset during the road test?

Yes >> Go To 17

No >> Go To 18

P0733-GEAR RATIO ERROR IN 3RD (CONTINUED)

17. LIST OF POSSIBLE CAUSES

If any other DTC's set during the road test, refer to the appropriate symptom in the Transmission category.

If no other DTC's set during the road test, below is a list of possible causes, but not strictly limited to those.

Check for:

— Excessive debris in the Transmission Oil pan, plugged, cracked, or misinstalled Primary Transmission Oil Filter and/or seal.

— Cut or missing #6 check ball in the main valve body.

— OD and UD accumulator pistons and seals and bleed orifices, and the Solenoid Switch Valve and Plugs in the main valve body.

— OD and UD clutch piston seals, reaction shaft support seal rings and dribbler assemblies, and the flatness of the pump valve body and pump housing faces.

— Main regulator valve for sticking in its bore.

View repair

Repair

Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

18. CHECK FOR INTERMITTENT OPERATION

The conditions to set this DTC are not currently present.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

— If the DTC Event Data shows fault P0733 was set in the Park, Reverse, or Neutral, replace the Powertrain Control Module.

— If the DTC Event Data shows fault P0733 set with input RPM = zero, check the input speed sensor and related wiring.

— If the DTC Event Data shows fault P0733 set with line pressure significantly below desired line pressure, check for the cause of low line pressure (i.e., oil level, misinstalled or damaged primary filter or filter seal, sticking main regulator valve in pump, etc.).

— If the DTC Event Data shows fault P0733 set with the OD or UD pressure switch open (but line pressure matches Desired Line Pressure), air check the OD and UD hydraulic clutch circuits for leakage per the Service Information. If the OD and UD hydraulic clutch circuits are OK, replace the Transmission Solenoid/TRS assembly.

Check the gearshift linkage adjustment.

Intermittent Gear Ratio DTCs can be set by problems in the Input and Output Speed Sensor circuits and/or Speed Sensor Ground circuit.

Remove the Starter Relay.

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Install the Transmission Simulator, Miller tool #8333.

Wiggle wiring and connectors while checking for intermittent operation with the Transmission Simulator.

Gear ratio DTC's can also be set under extreme temperature conditions.

Verify if the problem is only experienced under extreme hot or cold conditions.

Were there any problems found.

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0734-GEAR RATIO ERROR IN 4TH

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  If the ratio of the Input RPM to the Output RPM does not match the current gear ratio. This DTC can take up to five minutes of problem identification before illuminating the MIL.

Possible Causes
LOW FLUID LEVEL
INPUT SPEED SENSOR OR WIRING
VALVE BODY ACCUMULATOR COVER FAILED
CUT OD OR 4C ACCUMULATOR SEAL
CRACKED OD OR 4C ACCUMULATOR PISTON
BROKEN OR MISSING OD BLEED ORIFICE IN MAIN VALVE BODY
CUT 4C TOWER SEAL
TRANSMISSION SOLENOID/TRS ASSEMBLY
CUT OR MISSING #5 OR #6 CHECK BALL
WORN SOLENOID SWITCH VALVE OR PLUGS
CUT OD OR 4C PISTON SEAL
STUCK MAIN REGULATOR VALVE
BURNED OD OR 4C CLUTCH
BROKEN OR MISSING 4C BLEED ORIFICE IN 2C/4C RETAINER
BROKEN REACTION SHAFT SUPPORT SEAL RING
POOR MACHINING ON PUMP VALVE BODY FACE
LOOSE / MISSING DRIBBLER ORIFICE ASSEMBLY IN REACTION SHAFT SUPPORT
CRACKED / LOOSE / MISSING OD/REVERSE PISTON BLEED ORIFICE
BROKEN REVERSE CARRIER HUB WELD
BROKEN REVERSE SUN GEAR WELD TO REACTION CARRIER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

P0734-GEAR RATIO ERROR IN 4TH (CONTINUED)

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) Once in a particular gear, if the gear ratio varies from the correct gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent may result in the DTCs P0715 and/or P0720 being set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the pulses from the input speed sensor when at a stop in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set.

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

If any of these DTC's are present, perform their respective tests first.

Are there any Transmission; solenoid, line pressure, speed sensor, and/or loss of prime DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If any of these DTCs are present, they may cause a Speed Ratio Error. Perform the test for P0944 first if it is present.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK DTC EVENT DATA

With the scan tool, read and record the DTC EVENT DATA.

NOTE: Make sure to record all DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the DTC EVENT DATA display information for the DTC P0734?

Yes >> Go To 4

No >> Go To 3

---

3. CHECK FOR OTHER DTC

In the DTC EVENT DATA recorded earlier, does the DTC EVENT DATA show the DTC P1790, with Target Gear = 4th, or with both the 4C and OD clutches applying?

Yes >> Go To 4

No >> Go To 6

---

4. CHECK INPUT RPM

In the DTC EVENT DATA recorded earlier, does the Input RPM read zero?

Yes >> Refer to the Transmission category and perform the diagnostic procedure for P0715 (Input Speed Sensor Error). Diagnose the DTC as if it is set and current.

No >> Go To 5

P0734-GEAR RATIO ERROR IN 4TH (CONTINUED)

5. CHECK LINE PRESSURE READING

In the DTC EVENT DATA recorded earlier, is the line pressure reading more than 10 PSI below the desired line pressure reading?

Yes >> Remove the Transmission Oil pan and check the Transmission Oil filter for improper installation or plugged, if Primary oil filter is OK, check the main regulator valve in pump. If excessive debris is in the oil pan, check clutches and repair as necessary. Refer to the Service Information for proper repair procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. CHECK TRANSMISSION FOR SLIPPAGE

Erase DTCs and road test the vehicle.

Check the transmission operation in reverse and all forward gears.

During the road test, was there any obvious slippage noted in 4th gear or a runaway during the 3–4 shift?

Yes >> Go To 8

No >> Go To 7

---

7. CHECK IF DTC RESET

With the scan tool, check for Transmission DTCs after the road test.

Did the DTC P0734 reset?

Yes >> Go To 8

No >> Test Complete.

---

8. CHECK INTERNAL TRANSMISSION

— Remove the Transmission Oil Pan and Valve Body per the Service Information and check for the following:

— Excessive debris in the oil pan.

— Remove the Valve Body and check if the accumulator cover is intact and the 4C tower seal is not cut or split.

— OD and 4C accumulator pistons for cracks and/or cut seals.

— Solenoid Switch Valve and its plugs for stickiness or wear.

— Cut or missing #5 and/or #6 check ball.

— OD bleed orifice on top of the Valve Body

— Air check the OD and 4C hydraulic clutch circuits for excessive leakage. Refer to the Service information.

NOTE: Both the OD and 4C hydraulic clutch circuits contain a small bleed orifice. A small amount of air leakage is considered normal. The OD hydraulic clutch circuit bleed orifice connects to the Reverse input clutch hydraulic cavity. A small amount of air leakage into the Reverse hydraulic clutch circuit is considered normal.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.

No >> Go To 9

P0734-GEAR RATIO ERROR IN 4TH (CONTINUED)

9. TRANSMISSION SOLENOID/TRS ASSEMBLY

Was there no reverse gear during the road test?

Yes >> Go To 10

No >> Replace the Solenoid/TRS Assembly per the Service Information.

---

10. CHECK ROAD TEST RESULTS

During the road test, was there no 2nd gear and no 4th gear, but 3rd gear (limp-in) was OK?

Yes >> Go To 11

No >> Go To 12

---

11. CHECK FOR BROKEN REVERSE SUN GEAR WELD

Working through the windows in the bottom of the case, check for a broken Reverse Sun gear weld to the reaction carrier as follows:

(1) Hold the Transmission Output Shaft by holding the Transmission Manual Lever in the park position.

(2) Rotate the Input Annulus gear and drive shell, (the drum that encloses the two rearmost carriers).

(3) Check to see if the reaction carrier (the frontmost carrier, whose outer shell is splined to the 2C clutch) is rotating faster than the drive shell is being turned.

Is the reaction carrier turning faster than the drive shell?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the reaction carrier per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

12. CHECK FOR NO REVERSE

Remove the Transmission per the Service Information and inspect the weld on the reverse carrier hub.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.

No >> Disassemble and inspect the input clutch assembly. Check the OD and Reverse clutch seals, discs, and bleed orifice (in the OD/Reverse clutch piston). Check the OD hub and shaft. Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0735-GEAR RATIO ERROR IN 5TH

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  If the ratio of the Input RPM to the Output RPM does not match the current gear ratio. This DTC can take up to five minutes of problem identification before illuminating the MIL.

Possible Causes
LOW FLUID LEVEL
INPUT SPEED SENSOR OR WIRING
VALVE BODY ACCUMULATOR COVER FAILED
CUT OD OR 2C ACCUMULATOR SEAL
CRACKED OD OR 2C ACCUMULATOR PISTON
BROKEN OR MISSING OD BLEED ORIFICE IN MAIN VALVE BODY
CUT 2C TOWER SEAL
TRANSMISSION SOLENOID/TRS ASSEMBLY
CUT OR MISSING #5, #6, OR #7 CHECK BALL
WORN SOLENOID SWITCH VALVE OR PLUGS
CUT OD OR 2C PISTON SEAL
STUCK MAIN REGULATOR VALVE
BURNED OD OR 2C CLUTCH
BROKEN OR MISSING 2C BLEED ORIFICE IN 2C/4C RETAINER
BROKEN REACTION SHAFT SUPPORT SEAL RING
POOR MACHINING ON PUMP VALVE BODY FACE
LOOSE / MISSING DRIBBLER ORIFICE ASSEMBLY IN REACTION SHAFT SUPPORT
CRACKED / LOOSE / MISSING OD/REVERSE PISTON BLEED ORIFICE
BROKEN REVERSE CARRIER HUB WELD
BROKEN REVERSE SUN GEAR WELD TO REACTION CARRIER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

P0735-GEAR RATIO ERROR IN 5TH (CONTINUED)

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) Once in a particular gear, if the gear ratio varies from the correct gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent may result in the DTCs P0715 and/or P0720 being set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the pulses from the input speed sensor when at a stop in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set.

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

If any of these DTC's are present, perform their respective tests first.

Are there any Transmission; solenoid, line pressure, speed sensor, and/or loss of prime DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If any of these DTCs are present, they may cause a Speed Ratio Error. Perform the test for P0944 first if it is present.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK EATX DTC EVENT DATA

With the scan tool, read and record the EATX DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA display information for the DTC P0735?

Yes >> Go To 4

No >> Go To 3

---

3. CHECK TARTET GEAR

In the EATX DTC EVENT DATA recorded earlier, does the DTC EVENT DATA show the DTC P1790, with Target gear = 5th, or with both the 2C and OD clutches applying?

Yes >> Go To 4

No >> Go To 6

---

4. CHECK INPUT RPM

In the EATX DTC EVENT DATA recorded earlier, does the Input RPM read zero?

Yes >> Refer to the Transmission category and perform the diagnostic procedure for P0715 (Input Speed Sensor Error). Diagnose the DTC as if it is set and current.

No >> Go To 5

P0735-GEAR RATIO ERROR IN 5TH (CONTINUED)

5. CHECK LINE PRESSURE READING

In the EATX DTC EVENT DATA recorded earlier, is the line pressure reading more than 10 PSI below the desired line pressure reading?

Yes >> Remove the Transmission Oil pan and check the Transmission Oil filter for improper installation or plugged, if Primary oil filter is OK, check the main regulator valve in pump. If excessive debris is in the oil pan, check clutches and repair as necessary. Refer to the Service Information for proper repair procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

6. CHECK TRANSMISSION FOR SLIPPAGE

Erase DTCs and road test the vehicle.

Check the transmission operation in reverse and all forward gears.

During the road test, was there any obvious slippage noted in 5th gear or a runaway during the 4–5 shift?

Yes >> Go To 8

No >> Go To 7

7. CHECK IF DTC RESET

With the scan tool, check for Transmission DTCs after the road test.

Did the DTC P0735 reset?

Yes >> Go To 8

No >> Test Complete.

8. CHECK INTERNAL TRANSMISSION

Remove the Transmission Oil Pan and Valve Body, per the Service Information, and check for the following:

— Excessive clutch and or metal debris in the oil pan.
— If the accumulator cover is intact and the 2C tower seal is not cut or split.
— OD and 2C accumulator pistons for cracks or cut seals.
— Solenoid Switch Valve and its plugs for stickiness or wear.
— Cut or missing #5, #6, or #7 check ball.
— OD bleed orifice on top of the valve body.
— Air check the OD and 2C hydraulic clutch circuits for excessive leakage. Refer to the Service information.

NOTE: Both the OD and 2C hydraulic clutch circuits contain a small bleed orifice. A small amount of air leakage is considered normal. The OD hydraulic clutch circuit bleed orifice connects to the Reverse input clutch hydraulic cavity. A small amount of air leakage into the Reverse hydraulic clutch circuit is considered normal.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

P0736-GEAR RATIO ERROR IN REVERSE

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  If the ratio of the Input RPM to the Output RPM does not match the current gear ratio. This DTC can take up to five minutes of problem identification before illuminating the MIL

Possible Causes
LOW FLUID LEVEL
CUT LR TOWER SEAL ON MAIN VALVE BODY
CUT LR CLUTCH PISTON SEALS
BROKEN OR MISSING LR CLUTCH BLEED ORIFICE (IN LR CLUTCH RETAINER)
CUT LR ACCUMULATOR PISTON SEAL IN MAIN VALVE BODY
CRACKED LR ACCUMULATOR PISTON IN MAIN VALVE BODY
CUT OD/REV PISTON SEALS
BROKEN OR MISSING OD/REV BLEED ORIFICE (IN OD/REV CLUTCH PISTON)
BROKEN REVERSE CARRIER HUB WELD
BROKEN REVERSE SUN GEAR WELD TO THE REACTION CARRIER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) Once in a particular gear, if the gear ratio varies from the correct gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent may result in the DTCs P0715 and/or P0720 being set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the pulses from the input speed sensor when at a stop in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set.

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Are there any Transmission; solenoid, line pressure, speed sensor, and/or loss of prime DTC's present?

Yes >> Refer to appropriate symptom in the Transmission category. Perform the test for P0944–LOSS OF PRIME first if it is present.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0736-GEAR RATIO ERROR IN REVERSE (CONTINUED)

2. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, perform the Reverse Gear Clutch test. Follow the instructions on the scan tool.

Increase the throttle angle, TPS degree, to 30°, for no more than a few seconds.

CAUTION: Do not overheat the transmission.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Did the clutch test pass, input speed remain at zero?

Yes >> Go To 3

No >> Go To 4

---

3. CHECK DTC EVENT DATA

The conditions necessary to set this DTC are not currently present.

With the scan tool, check the DTC EVENT DATA to help identify the conditions in which the DTC was set.

Does the DTC EVENT DATA show an input speed reading of zero?

Yes >> Go To 8

No >> Go To 4

---

4. POSSIBLE INTERNAL TRANSMISSION CAUSES

Remove the Transmission Oil Pan and Valve Body and check the following per the Service Information:

Clutch or metal debris in the pan

LR clutch tower seal on the main valve body or cuts and the LR accumulator piston and seals.

Air check the Reverse and LR Hydraulic Clutch circuits (in the case) for excessive air leakage.

NOTE: Both Hydraulic Clutch circuits contain a small bleed orifice , a small amount of air leakage is normal. The Reverse hydraulic clutch circuit bleed orifice connects to the OD hydraulic clutch cavity. A small amount of air leakage into the OD hydraulic clutch circuit is considered normal.

Were there any problems found?

Yes >> Repair as necessary. If clutch debris is present, remove the transmission and inspect the Reverse and LR clutches, and inspect the Transmission Oil Pump and Main Regulator Valve for damage or sticking in its bore.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. CLUTCH TEST FAILURE

Did the clutch test fail in reverse?

Yes >> Go To 6

No >> Test complete.

P0736-GEAR RATIO ERROR IN REVERSE (CONTINUED)

6. CHECK FOR BROKEN REVERSE SUN GEAR WELD

Working through the windows in the bottom of the case, check for a broken Reverse Sun gear weld to the reaction carrier as follows:

(1) Hold the Transmission Output Shaft by holding the Transmission Manual Lever in the park position.

(2) Rotate the Input Annulus gear and drive shell, (the drum that encloses the two rearmost carriers).

(3) Check to see if the reaction carrier (the frontmost carrier, whose outer shell is splined to the 2C clutch) is rotating faster than the drive shell is being turned.

Is the reaction carrier turning faster than the drive shell?

Yes >> Go To 7

No >> Replace the reaction carrier per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

7. CHECK REVERSE CARRIER HUB

Remove the Transmission per the Service Information and inspect the weld on the reverse carrier hub.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.

No >> Disassemble and inspect the input clutch assembly. Check the Reverse clutch reaction plate snap ring. Check the OD and Reverse clutch seals, discs, and bleed orifice (in the OD/Reverse clutch piston). Check the Reverse hub and shaft. Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

8. CHECK FOR INTERMITTENT OPERATION

Intermittent gear ratio DTCs can be set by problems in the Input and Output Speed Sensor circuits and/or Speed Sensor Ground circuit.

Remove the Starter Relay

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Check the Speed Sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test complete.

P0740–TCC OUT OF RANGE

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS) .

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  During Electronically Modulated Converter Clutch (EMCC) Operation.
- **Set Condition:**
  Transmission must be in EMCC, with input speed greater than 1750 RPM. TCC-L/R Solenoid achieves the maximum duty cycle and can not pull engine speed within 60 RPM of input speed. Also when the transmission is in FEMCC and the engine slips TCC less than 100 RPM for 10 seconds. This DTC can take up to five minutes of problem identification before illuminating the MIL.

Possible Causes
RELATED DTC P0750 PRESENT
L/R SOLENOID
TORQUE CONVERTER AND/OR INTERNAL TRANSMISSION

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

When in 2nd, 2nd Prime, 3rd, or 4th gear, the torque converter clutch (TCC) can be engaged when certain conditions are met. The TCC piston is electronically modulated by increasing the duty cycle of the LR Solenoid until the torque converter slip difference (difference between engine and transmission input speed) is within 60 RPM. Then the LR solenoid is fully energized (FEMCC / 100% duty cycle). Torque converter slip is monitored in FEMCC to ensure adequate clutch capacity.

Diagnostic Test

1. DETERMINING IF RELATED DTC P0750 IS PRESENT

With the scan tool, read transmission DTC’s

Is the DTC P0750 present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0740–TCC OUT OF RANGE (CONTINUED)

2. CHECK TO SEE IF DTC P0740 IS CURRENT

With the scan tool, Read and RECORD ALL Transmission DTC’s. After recording DTC’s, erase DTC’s.

Drive the vehicle until the transmission temperature is at least 43° C or 110° F and the engine temperature at least 49° C or 120° F.

Perform the following steps 3 times.

Drive the vehicle to the speed of at least 88 km/h or 55 MPH.

Allow 4th gear to engage for at least 10 seconds.

Close the throttle.

Tip back into the throttle until the TPS angle is between 25 and 29 degrees.

NOTE: If the throttle angle goes over 30 degrees, you must close the throttle and try again.

Did the TCC engage during any of the attempts, Engine speed approximately equal to input speed?

Yes >> Go To 3

No >> Go To 4

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorts and open circuits.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorts and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

---

4. LR SOLENOID

With the scan tool, check for other transmission DTC’s.

Are the DTCs P1775 and P0841 present also?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

P0740–TCC OUT OF RANGE (CONTINUED)

5. TORQUE CONVERTER AND/OR INTERNAL TRANSMISSION

Repair internal transmission as necessary.

Check for the following possible causes. Refer to the Service information for the proper repair procedures.

Inspect the Transmission Oil Pump.

If no problems are found, replace the Transmission Solenoid/TRS Assembly.

Check the Torque Converter Switch Valve and the Torque Converter Clutch Control Valve for sticking in the bore.

Check the Teflon seal rings on the input shaft.

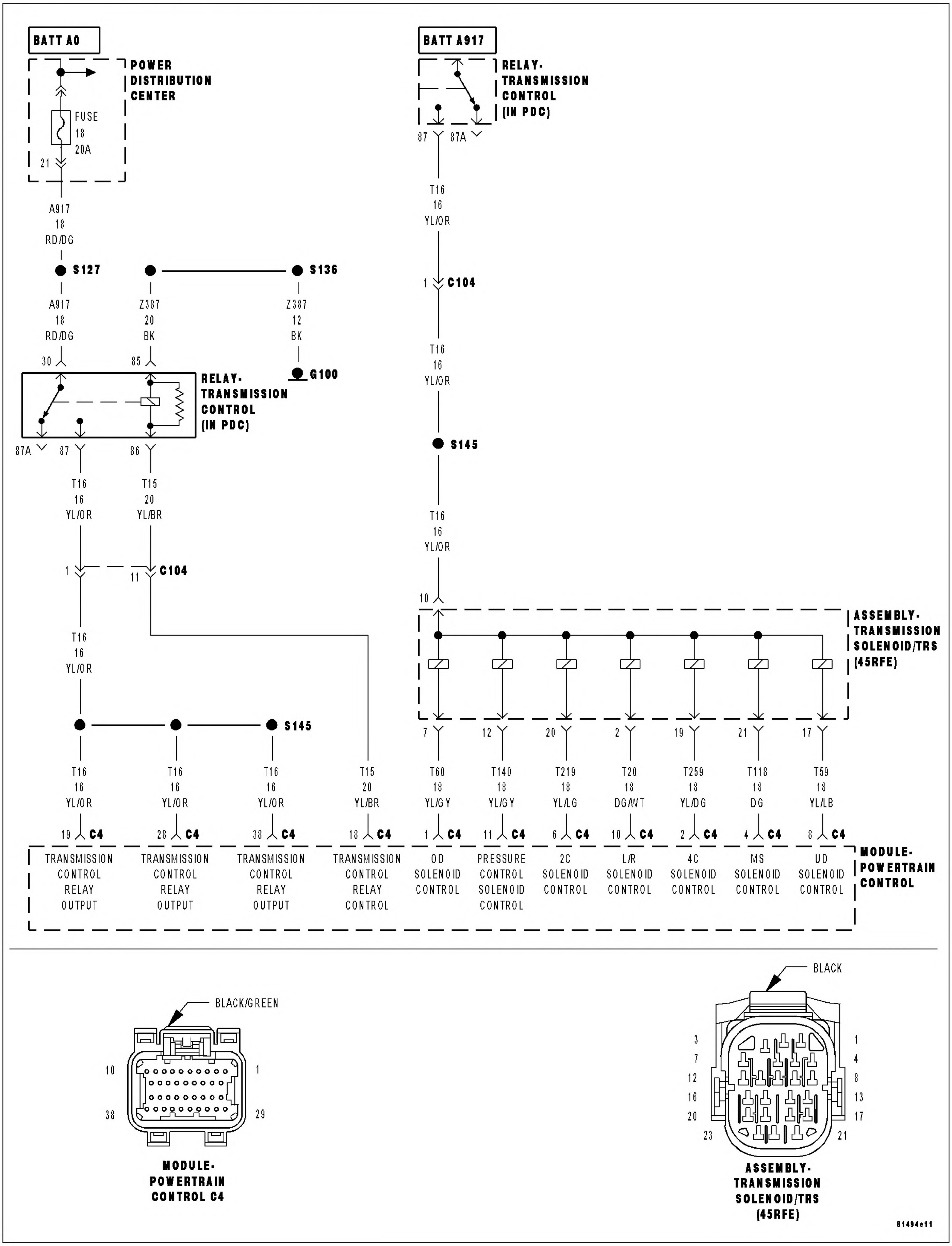
View repair.

Repair

In all cases, replace the Torque Converter. Make sure to check all other possible causes in addition to the Torque Converter.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0750-LR SOLENOID CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
Z387 20 BK
S136
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 16 YL/OR
T15 20 YL/BR
1
11
C104
T16 16 YL/OR
S145
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
BATT A917
RELAY-TRANSMISSION CONTROL (IN PDC)
87
87A
T16 16 YL/OR
1
C104
T16 16 YL/OR
S145
T16 16 YL/OR
10
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
7
12
20
2
19
21
17
T60 18 YL/GY
T140 18 YL/GY
T219 18 YL/LG
T20 18 DG/WT
T259 18 YL/DG
T118 18 DG
T59 18 YL/LB
19 C4
28 C4
38 C4
18 C4
1 C4
11 C4
6 C4
10 C4
2 C4
4 C4
8 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
OD SOLENOID CONTROL
PRESSURE CONTROL SOLENOID CONTROL
2C SOLENOID CONTROL
L/R SOLENOID CONTROL
4C SOLENOID CONTROL
MS SOLENOID CONTROL
UD SOLENOID CONTROL
MODULE-POWERTRAIN CONTROL
BLACK/GREEN
10
1
38
29
MODULE-POWERTRAIN CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
81494e11

P0750-LR SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Initially at power-up, then every 10 seconds thereafter. The solenoid circuits will also be tested immediately after a gear ratio or pressure switch error is detected.
- **Set Condition:**
  After three consecutive solenoid continuity test failures, or one failure if test is run in response to a gear ratio or pressure switch error. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Possible Causes
RELATED RELAY DTC'S PRESENT
(T20) LR SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
(T20) LR SOLENOID CONTROL CIRCUIT OPEN
(T20) LR SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System uses six electronically controlled solenoids that allow hydraulic fluid to be applied to various friction elements (clutches), which enables the gear requested. The continuity of each solenoid circuit is periodically tested. Each inactive solenoid is turned on for a few milliseconds, then off. Each active solenoid is turned off for a few milliseconds, then on. This pulsing of voltage to the solenoid causes an inductive spike which can be sensed by the Transmission Control System. If an inductive spike is not sensed by the Transmission Control System during the continuity check, it is tested again. If the test fails three consecutive times, the appropriate Diagnostic Trouble Code (DTC) is set. If the solenoid test is run in response to a gear ratio or pressure switch error, one failure will result in setting the appropriate DTC. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Diagnostic Test

1. RELATED TRANSMISSION RELAY DTC'S PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0750-LR SOLENOID CIRCUIT (CONTINUED)

2. CHECK TO SEE IF P0750 IS PRESENT

Ignition on, engine not running.

With the scan tool, erase all Transmission DTC's.

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, actuate the LR Solenoid.

Monitor the LR Solenoid LED on the Transmission Simulator.

Did the LR Solenoid LED on the Transmission Simulator blink on and off?

Yes >> Go To 3

No >> Go To 4

3. TRANSMISSION SOLENOID/TRS ASSEMBLY

With the scan tool, continue to actuate the LR Solenoid for the period of 2 minutes with the Transmission Simulator still connected.

After 2 minutes of actuation, with the scan tool, stop the actuation and check for transmission DTCs.

Did the DTC P0750 reset during the actuation test?

Yes >> Go To 4

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

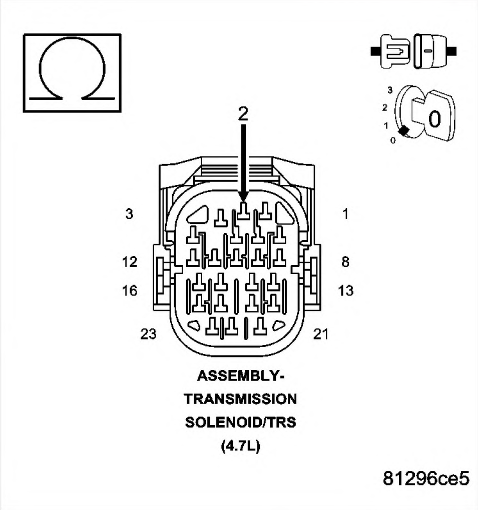
4. (T20) LR SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM harness connectors.

Measure the resistance between the (T20) LR Solenoid Control circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T20) LR Solenoid Control circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T20) LR Solenoid Control circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

P0750-LR SOLENOID CIRCUIT (CONTINUED)

5. (T20) LR SOLENOID CONTROL CIRCUIT OPEN

Connect Miller tool #8815 to the PCM C4 harness connector.

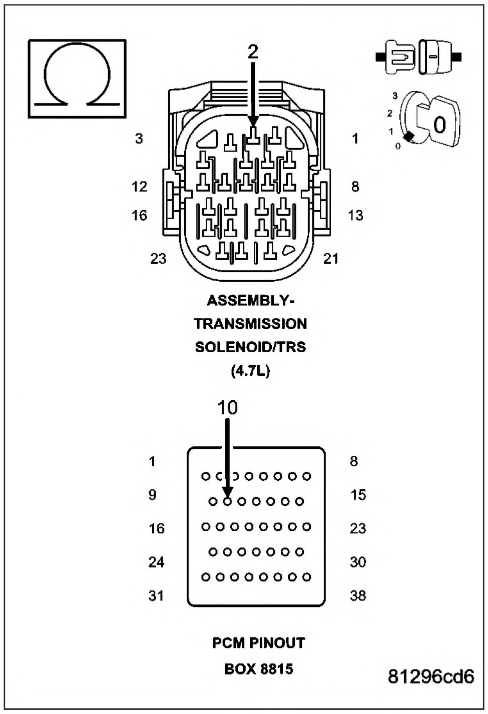
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T20) LR Solenoid Control circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T20) LR Solenoid Control circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6


2
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
10
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81296cd6

---

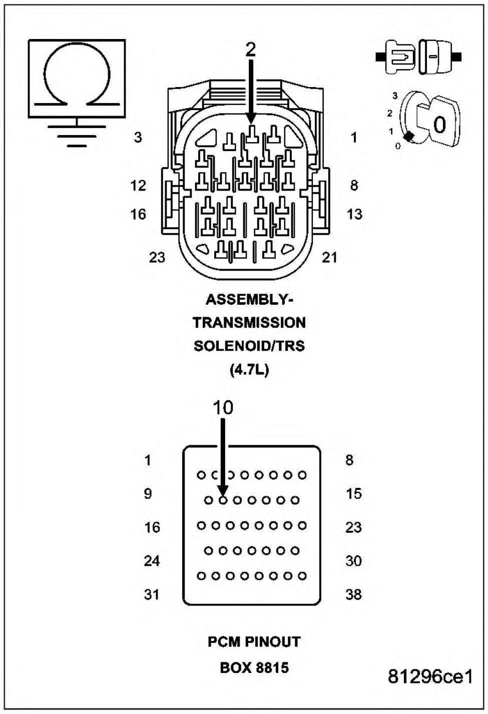
6. (T20) LR SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T20) LR Solenoid Control circuit.

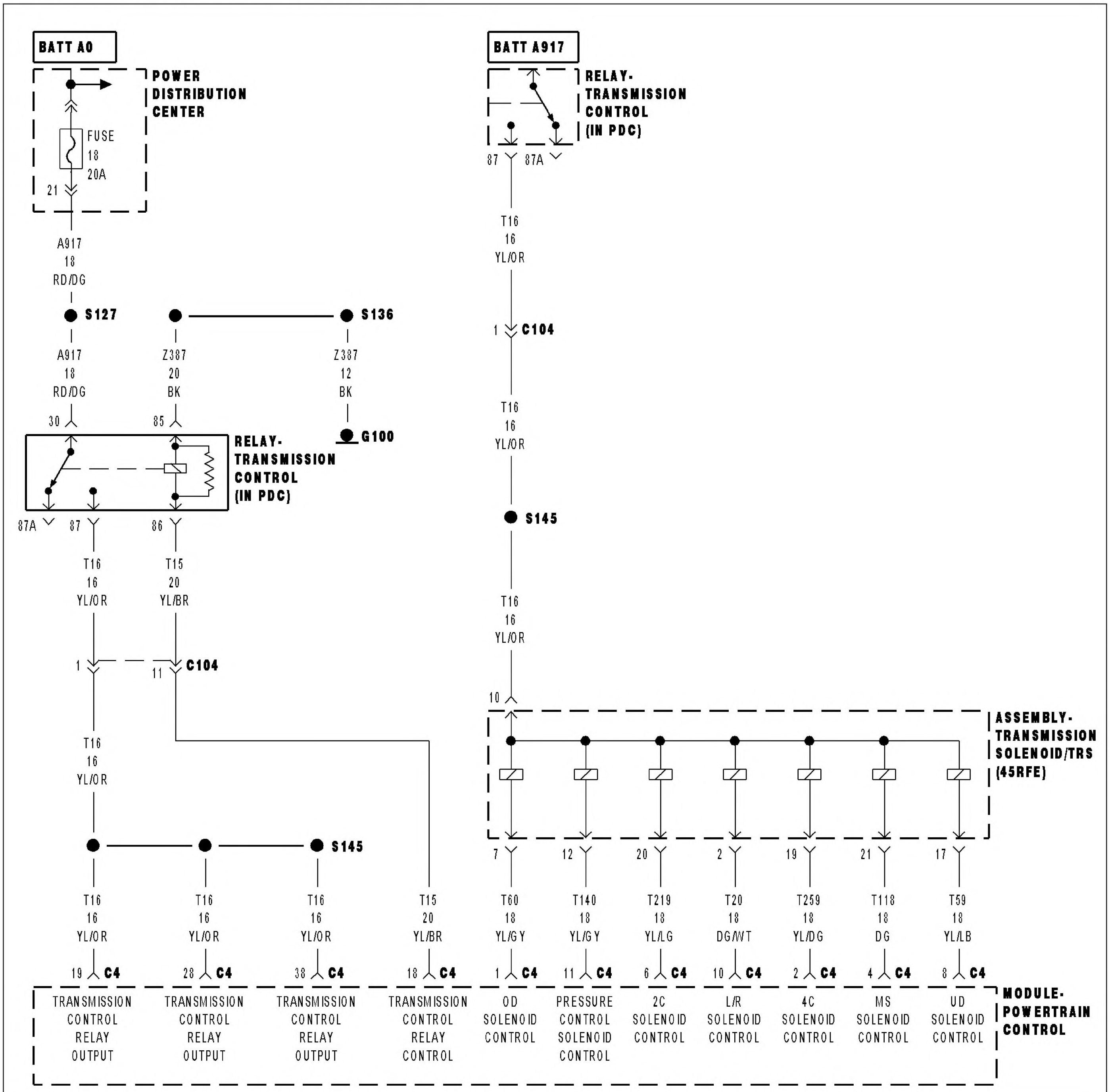
Is the resistance below 5.0 ohms?

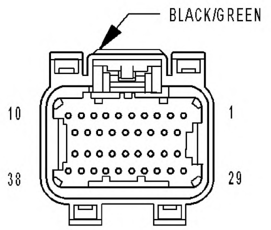
Yes >> Repair the (T20) LR Solenoid Control circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

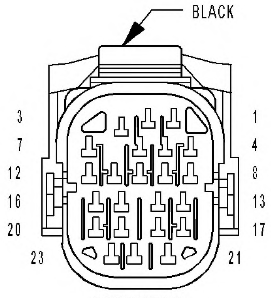

2
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
10
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81296ce1

P0755-2C SOLENOID CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
Z387 20 BK
S136
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 16 YL/OR
T15 20 YL/BR
1
11
C104
T16 16 YL/OR
S145
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
BATT A917
RELAY-TRANSMISSION CONTROL (IN PDC)
87
87A
T16 16 YL/OR
1 C104
T16 16 YL/OR
S145
T16 16 YL/OR
10
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
7
12
20
2
19
21
17
T60 18 YL/GY
T140 18 YL/GY
T219 18 YL/LG
T20 18 DG/WT
T259 18 YL/DG
T118 18 DG
T59 18 YL/LB
19 C4
28 C4
38 C4
18 C4
1 C4
11 C4
6 C4
10 C4
2 C4
4 C4
8 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
OD SOLENOID CONTROL
PRESSURE CONTROL SOLENOID CONTROL
2C SOLENOID CONTROL
L/R SOLENOID CONTROL
4C SOLENOID CONTROL
MS SOLENOID CONTROL
UD SOLENOID CONTROL
MODULE-POWERTRAIN CONTROL


BLACK/GREEN
10
1
38
29

MODULE-POWERTRAIN CONTROL C4


BLACK
3
7
12
16
20
23
1
4
8
13
17
21

ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)

81494e11

P0755-2C SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Initially at power-up, then every 10 seconds thereafter. The solenoid circuits will also be tested immediately after a gear ratio or pressure switch error is detected.
- **Set Condition:**
  After three consecutive solenoid continuity test failures, or one failure if test is run in response to a gear ratio or pressure switch error. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Possible Causes
RELATED RELAY DTC'S PRESENT
(T219) 2C SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
(T219) 2C SOLENOID CONTROL CIRCUIT OPEN
(T219) 2C SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System uses six electronically controlled solenoids that allow hydraulic fluid to be applied to various friction elements (clutches), which enables the gear requested. The continuity of each solenoid circuit is periodically tested. Each inactive solenoid is turned on for a few milliseconds, then off. Each active solenoid is turned off for a few milliseconds, then on. This pulsing of voltage to the solenoid causes an inductive spike which can be sensed by the Transmission Control System. If an inductive spike is not sensed by the Transmission Control System during the continuity check, it is tested again. If the test fails three consecutive times, the appropriate Diagnostic Trouble Code (DTC) is set. If the solenoid test is run in response to a gear ratio or pressure switch error, one failure will result in setting the appropriate DTC. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Diagnostic Test

1. RELATED TRANSMISSION RELAY DTC'S PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0755-2C SOLENOID CIRCUIT (CONTINUED)

2. CHECK TO SEE IF P0755 IS PRESENT

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, actuate the 2C Solenoid.

Did the 2C Solenoid LED blink on and off on the Transmission Simulator?

Yes >> Go To 3

No >> Go To 4

---

3. TRANSMISSION SOLENOID/TRS ASSEMBLY

With the scan tool, continue to actuate the 2C Solenoid for the period of 2 minutes with the Transmission Simulator still connected.

After 2 minutes of actuation, with the scan tool, stop the actuation and check for transmission DTCs.

Did the DTC P0755 reset during the actuation test?

Yes >> Go To 4

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

4. (T219) 2C SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

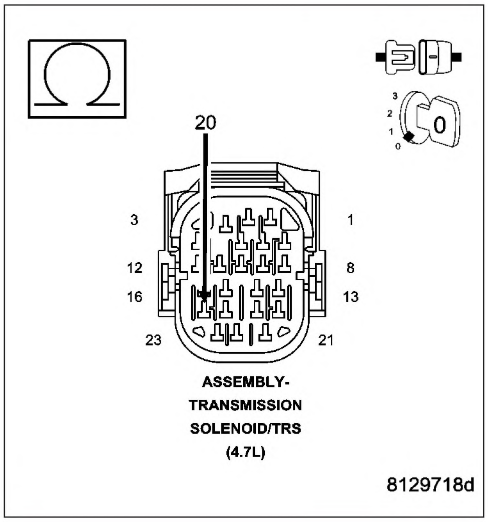
Disconnect the PCM harness connectors.

Measure the resistance between the (T219) 2C Solenoid Control circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.

Is the resistance below 5.0 ohms between the (T219) 2C Solenoid Control circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T219) 2C Solenoid Control circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5



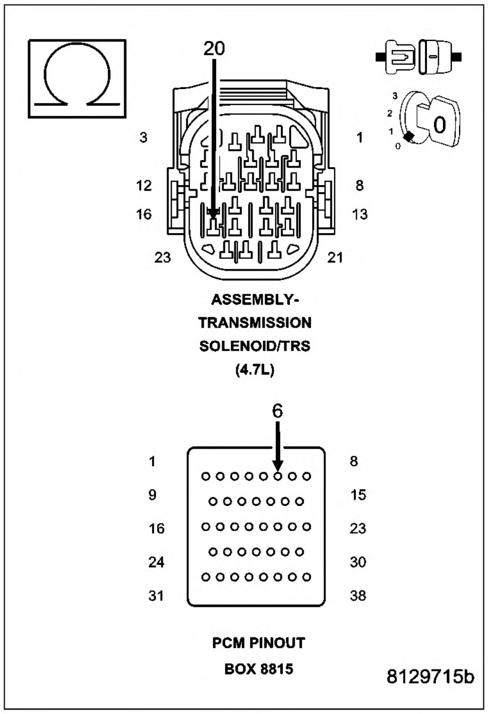
P0755-2C SOLENOID CIRCUIT (CONTINUED)

5. (T219) 2C SOLENOID CONTROL CIRCUIT OPEN

Connect Miller tool #8815 to the PCM C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T219) 2C Solenoid Control circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.


20
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
6
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8129715b

Is the resistance above 5.0 ohms?

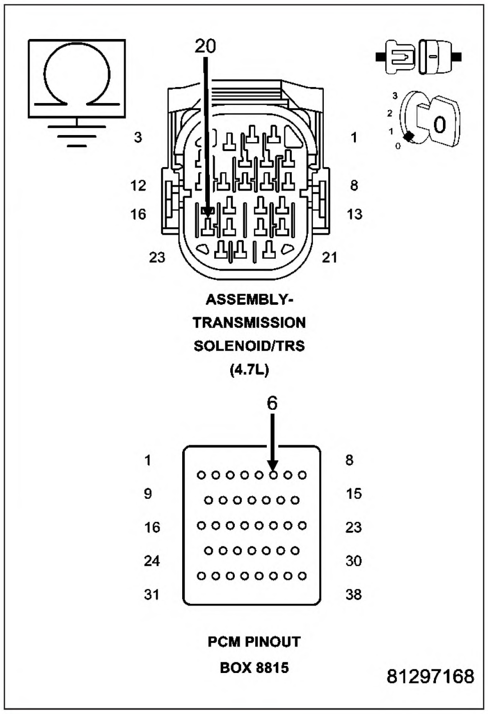
Yes >> Repair the (T219) 2C Solenoid Control circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. (T219) 2C SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T219) 2C Solenoid Control circuit.

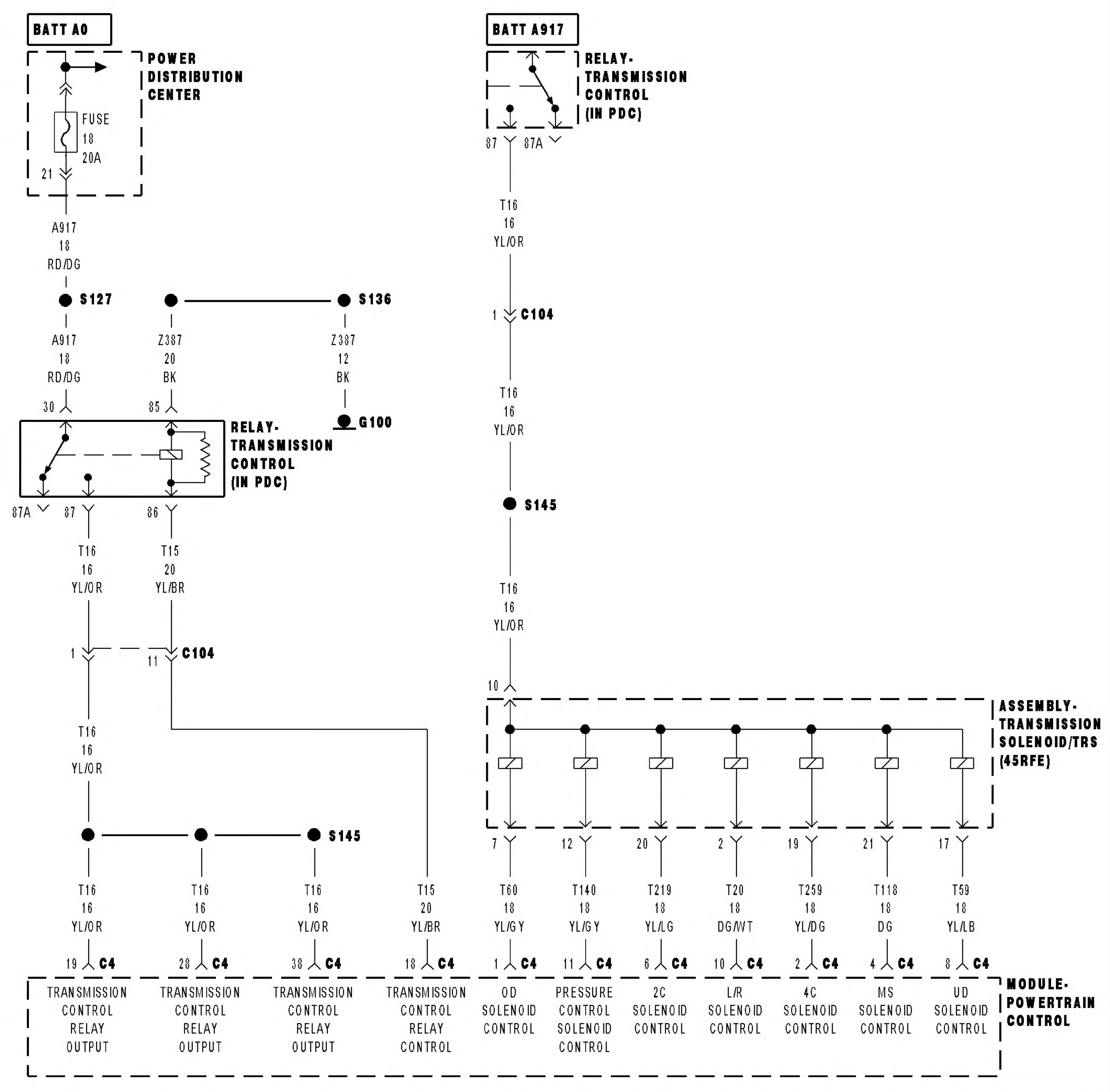

20
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
6
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81297168

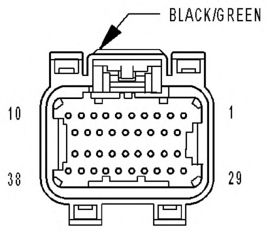
Is the resistance below 5.0 ohms?

Yes >> Repair the (T219) 2C Solenoid Control circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

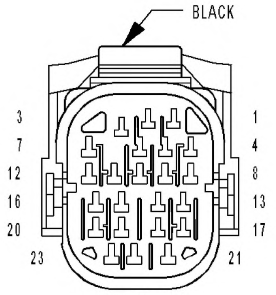
No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0760-OD SOLENOID CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
Z387 20 BK
Z387 12 BK
S136
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 16 YL/OR
T15 20 YL/BR
1
11
C104
T16 16 YL/OR
S145
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
BATT A917
RELAY-TRANSMISSION CONTROL (IN PDC)
87
87A
T16 16 YL/OR
1 C104
T16 16 YL/OR
S145
T16 16 YL/OR
10
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
7
12
20
2
19
21
17
T60 18 YL/GY
T140 18 YL/GY
T219 18 YL/LG
T20 18 DG/WT
T259 18 YL/DG
T118 18 DG
T59 18 YL/LB
19 C4
28 C4
38 C4
18 C4
1 C4
11 C4
6 C4
10 C4
2 C4
4 C4
8 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
OD SOLENOID CONTROL
PRESSURE CONTROL SOLENOID CONTROL
2C SOLENOID CONTROL
L/R SOLENOID CONTROL
4C SOLENOID CONTROL
MS SOLENOID CONTROL
UD SOLENOID CONTROL
MODULE-POWERTRAIN CONTROL


BLACK/GREEN
10
1
38
29

MODULE-POWERTRAIN CONTROL C4


BLACK
3
7
12
16
20
23
1
4
8
13
17
21

ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)

81494e11

P0760-OD SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS) .

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Initially at power-up, then every 10 seconds thereafter. The solenoid circuits will also be tested immediately after a gear ratio or pressure switch error is detected.
- **Set Condition:**
  After three consecutive solenoid continuity test failures, or one failure if test is run in response to a gear ratio or pressure switch error. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Possible Causes
RELATED RELAY DTC'S PRESENT
(T60) OD SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
(T60) OD SOLENOID CONTROL CIRCUIT OPEN
(T60) OD SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System uses six electronically controlled solenoids that allow hydraulic fluid to be applied to various friction elements (clutches), which enables the gear requested. The continuity of each solenoid circuit is periodically tested. Each inactive solenoid is turned on for a few milliseconds, then off. Each active solenoid is turned off for a few milliseconds, then on. This pulsing of voltage to the solenoid causes an inductive spike which can be sensed by the Transmission Control System. If an inductive spike is not sensed by the Transmission Control System during the continuity check, it is tested again. If the test fails three consecutive times, the appropriate Diagnostic Trouble Code (DTC) is set. If the solenoid test is run in response to a gear ratio or pressure switch error, one failure will result in setting the appropriate DTC. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Diagnostic Test

1. RELATED TRANSMISSION RELAY DTC'S PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0760-OD SOLENOID CIRCUIT (CONTINUED)

2. CHECK TO SEE IF P0760 IS PRESENT

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, actuate the OD Solenoid.

Monitor the OD Solenoid LED on the Transmission Simulator.

Did the OD Solenoid LED on the Transmission Simulator blink on and off?

Yes >> Go To 3

No >> Go To 4

---

3. TRANSMISSION SOLENOID/TRS ASSEMBLY

With the scan tool, continue to actuate the OD Solenoid for the period of 2 minutes with the Transmission Simulator still connected.

After 2 minutes of actuation, with the scan tool, stop the actuation and check for transmission DTCs.

Did the DTC P0760 reset during the actuation test?

Yes >> Go To 4

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

4. (T60) OD SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

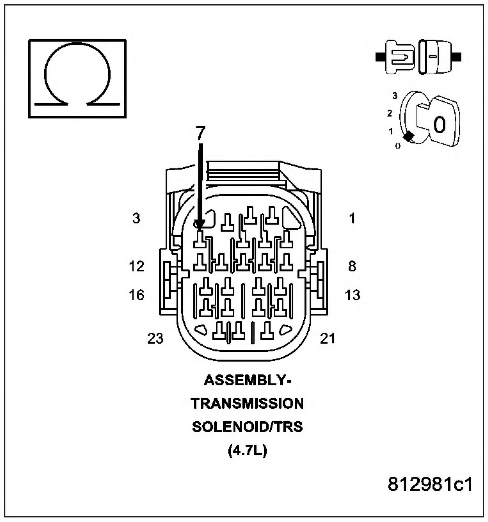
Disconnect the PCM harness connectors.

Measure the resistance between the (T60) OD Solenoid Control circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.

Is the resistance below 5.0 ohms between the (T60) OD Solenoid Control circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T60) OD Solenoid Control circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5



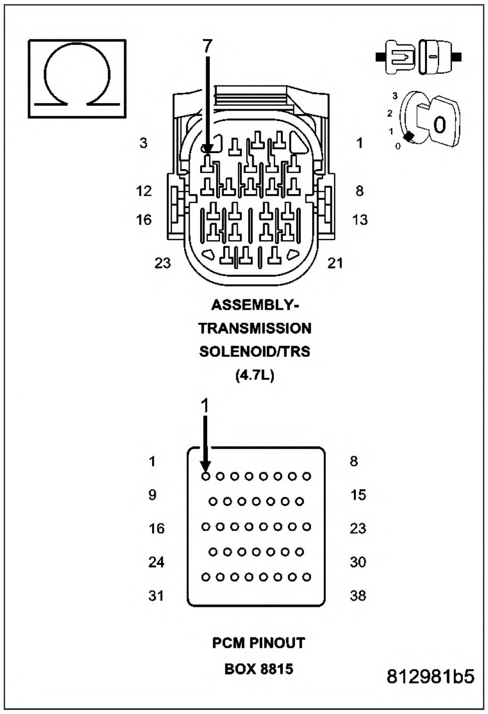
P0760-OD SOLENOID CIRCUIT (CONTINUED)

5. (T60) OD SOLENOID CONTROL CIRCUIT OPEN

Connect Miller tool #8815 to the PCM C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller special tool #8815 to perform diagnosis.

Measure the resistance of the (T60) OD Solenoid Control circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.


7
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
1
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812981b5

Is the resistance above 5.0 ohms?

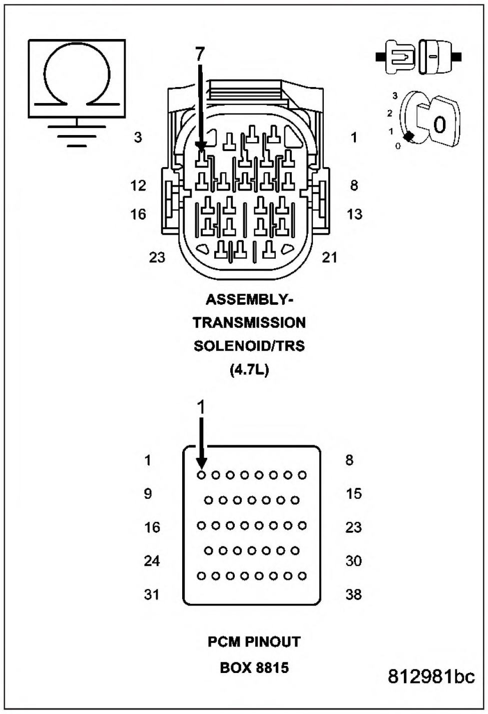
Yes >> Repair the (T60) OD Solenoid Control circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. (T60) OD SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T60) OD Solenoid Control circuit.

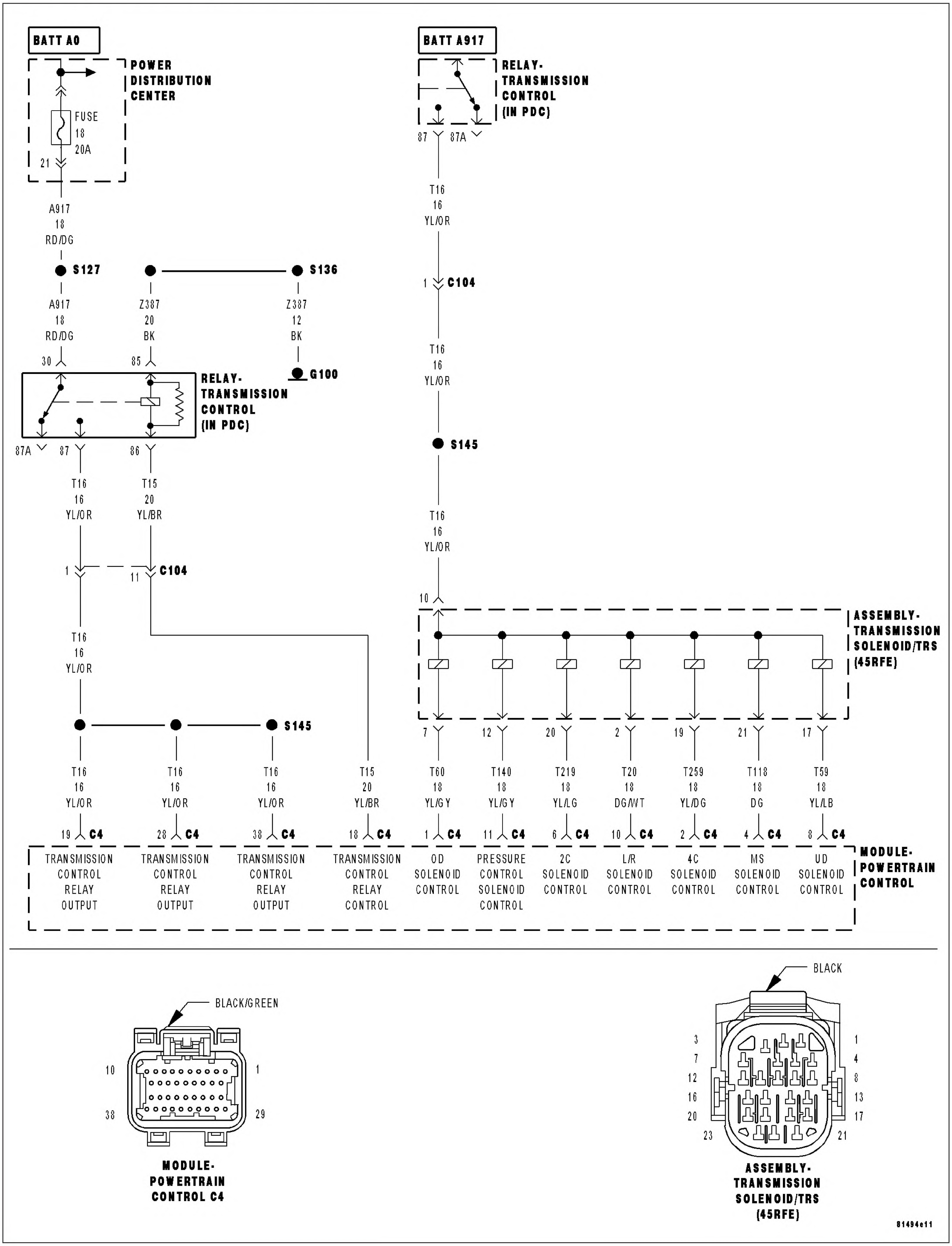

7
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
1
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812981bc

Is the resistance below 5.0 ohms?

Yes >> Repair the (T60) OD Solenoid Control circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0765-UD SOLENOID CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
Z387 20 BK
S136
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A 87 86
T16 16 YL/OR
T15 20 YL/BR
1 C104 11
T16 16 YL/OR
S145
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
BATT A917
RELAY-TRANSMISSION CONTROL (IN PDC)
87 87A
T16 16 YL/OR
1 C104
T16 16 YL/OR
S145
T16 16 YL/OR
10
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
7 12 20 2 19 21 17
T60 18 YL/GY
T140 18 YL/GY
T219 18 YL/LG
T20 18 DG/WT
T259 18 YL/DG
T118 18 DG
T59 18 YL/LB
19 C4
28 C4
38 C4
18 C4
1 C4
11 C4
6 C4
10 C4
2 C4
4 C4
8 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
OD SOLENOID CONTROL
PRESSURE CONTROL SOLENOID CONTROL
2C SOLENOID CONTROL
L/R SOLENOID CONTROL
4C SOLENOID CONTROL
MS SOLENOID CONTROL
UD SOLENOID CONTROL
MODULE-POWERTRAIN CONTROL
BLACK/GREEN
10 1 38 29
MODULE-POWERTRAIN CONTROL C4
BLACK
3 7 12 16 20 23
1 4 8 13 17 21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
81494e11

P0765-UD SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Initially at power-up, then every 10 seconds thereafter. The solenoid circuits will also be tested immediately after a gear ratio or pressure switch error is detected.
- **Set Condition:**
  After three consecutive solenoid continuity test failures, or one failure if test is run in response to a gear ratio or pressure switch error. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Possible Causes
RELATED RELAY DTC'S PRESENT
(T59) UD SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
(T59) UD SOLENOID CONTROL CIRCUIT OPEN
(T59) UD SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System uses six electronically controlled solenoids that allow hydraulic fluid to be applied to various friction elements (clutches), which enables the gear requested. The continuity of each solenoid circuit is periodically tested. Each inactive solenoid is turned on for a few milliseconds, then off. Each active solenoid is turned off for a few milliseconds, then on. This pulsing of voltage to the solenoid causes an inductive spike which can be sensed by the Transmission Control System. If an inductive spike is not sensed by the Transmission Control System during the continuity check, it is tested again. If the test fails three consecutive times, the appropriate Diagnostic Trouble Code (DTC) is set. If the solenoid test is run in response to a gear ratio or pressure switch error, one failure will result in setting the appropriate DTC. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Diagnostic Test

1. RELATED TRANSMISSION RELAY DTC'S PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0765-UD SOLENOID CIRCUIT (CONTINUED)

2. CHECK TO SEE IF P0765 IS PRESENT

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, actuate the UD Solenoid.

Monitor the UD Solenoid LED on the Transmission Simulator.

Did the UD Solenoid LED on the Transmission Simulator blink on and off?

Yes >> Go To 3

No >> Go To 4

---

3. TRANSMISSION SOLENOID/TRS ASSEMBLY

With the scan tool, continue to actuate the UD Solenoid for the period of 2 minutes with the Transmission Simulator still connected.

After 2 minutes of actuation, with the scan tool, stop the actuation and check for transmission DTCs.

Did the DTC P0765 reset during the actuation test?

Yes >> Go To 4

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

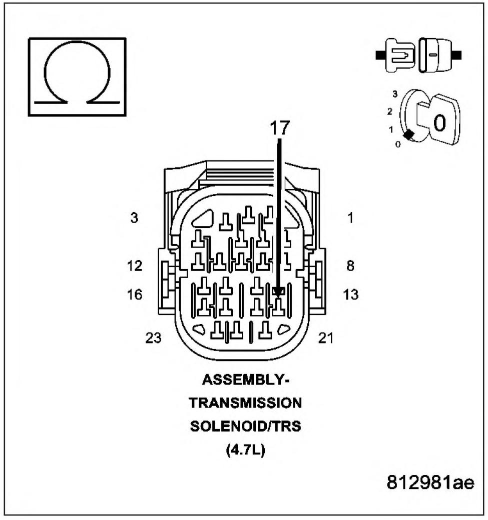
4. (T59) UD SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM harness connectors.

Measure the resistance between the (T59) UD Solenoid Control circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T59) UD Solenoid Control circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T59) UD Solenoid Control circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

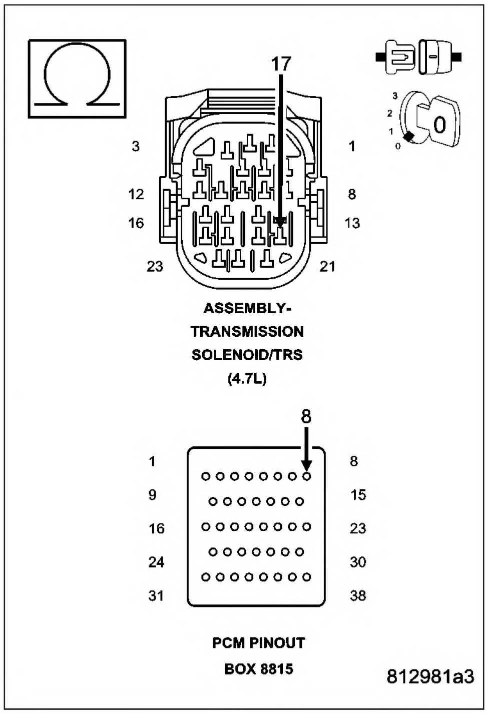
P0765-UD SOLENOID CIRCUIT (CONTINUED)

5. (T59) UD SOLENOID CONTROL CIRCUIT OPEN

Connect Miller tool #8815 to the PCM C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T59) UD Solenoid Control circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.


17
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
8
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
3
2
1
0
0
812981a3

Is the resistance above 5.0 ohms?

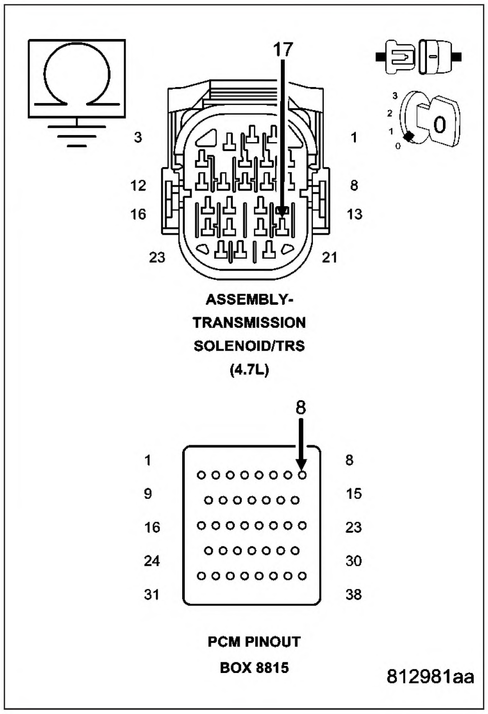
Yes >> Repair the (T59) UD Solenoid Control circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. (T59) UD SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T59) UD Solenoid Control circuit.

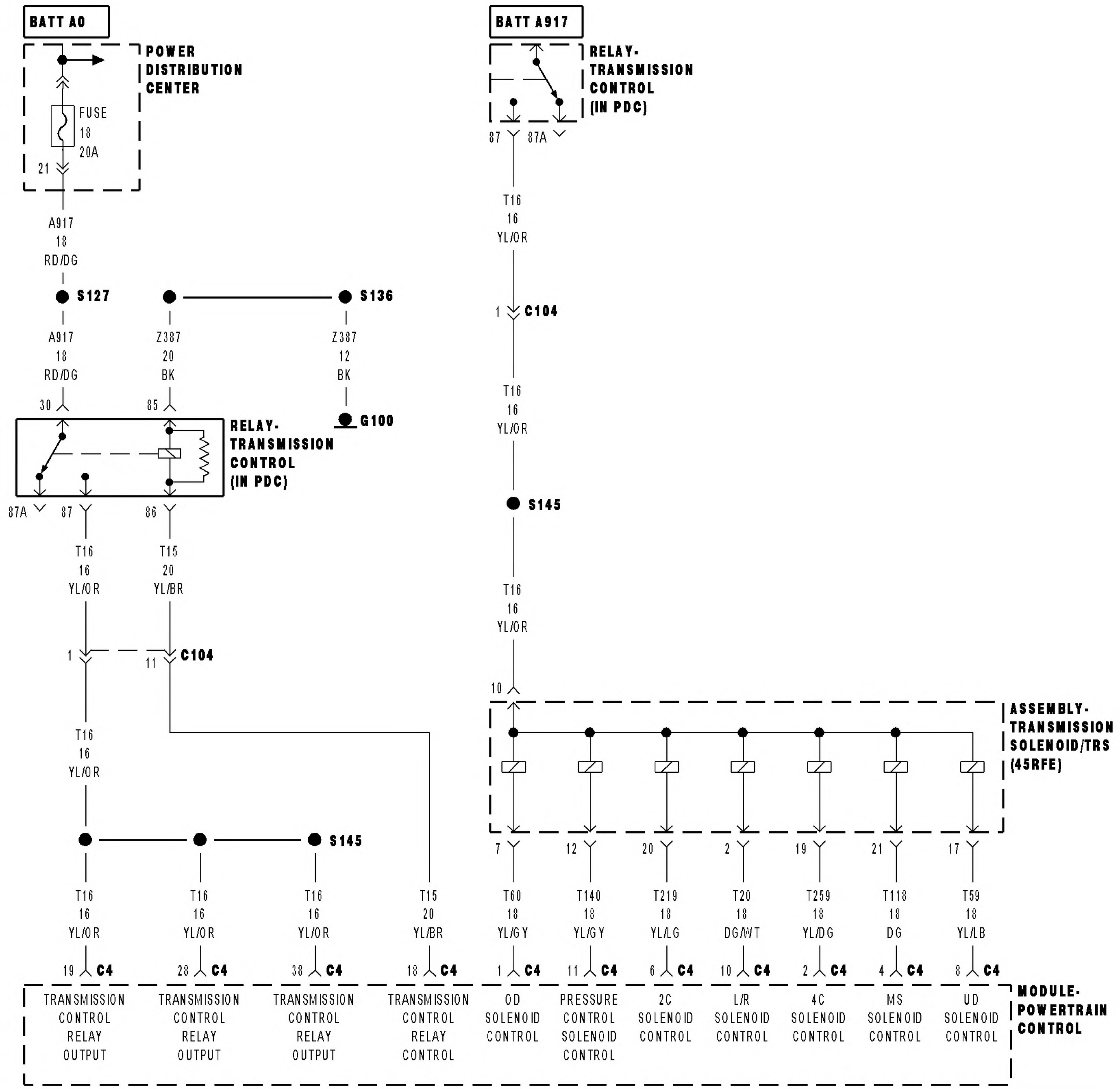

17
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
8
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
3
2
1
0
0
812981aa

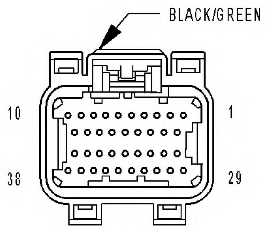
Is the resistance below 5.0 ohms?

Yes >> Repair the (T59) UD Solenoid Control circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

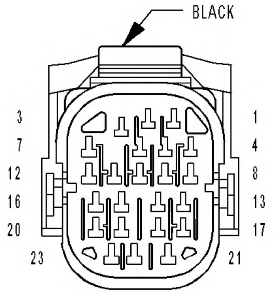
No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0770-4C SOLENOID CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
Z387 20 BK
S136
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 16 YL/OR
T15 20 YL/BR
1
11
C104
T16 16 YL/OR
S145
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
BATT A917
RELAY-TRANSMISSION CONTROL (IN PDC)
87
87A
T16 16 YL/OR
1 C104
T16 16 YL/OR
S145
T16 16 YL/OR
10
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
7
12
20
2
19
21
17
T60 18 YL/GY
T140 18 YL/GY
T219 18 YL/LG
T20 18 DG/WT
T259 18 YL/DG
T118 18 DG
T59 18 YL/LB
19 C4
28 C4
38 C4
18 C4
1 C4
11 C4
6 C4
10 C4
2 C4
4 C4
8 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
OD SOLENOID CONTROL
PRESSURE CONTROL SOLENOID CONTROL
2C SOLENOID CONTROL
L/R SOLENOID CONTROL
4C SOLENOID CONTROL
MS SOLENOID CONTROL
UD SOLENOID CONTROL
MODULE-POWERTRAIN CONTROL


BLACK/GREEN
10
1
38
29

MODULE-
POWERTRAIN
CONTROL C4


BLACK
3
7
12
16
20
23
1
4
8
13
17
21

ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(45RFE)

81494e11

P0770-4C SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Initially at power-up, then every 10 seconds thereafter. The solenoid circuits will also be tested immediately after a gear ratio or pressure switch error is detected.
- **Set Condition:**
  After three consecutive solenoid continuity test failures, or one failure if test is run in response to a gear ratio or pressure switch error. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Possible Causes
RELATED RELAY DTC'S PRESENT
(T259) 4C SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
(T259) 4C SOLENOID CONTROL CIRCUIT OPEN
(T259) 4C SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System uses six electronically controlled solenoids that allow hydraulic fluid to be applied to various friction elements (clutches), which enables the gear requested. The continuity of each solenoid circuit is periodically tested. Each inactive solenoid is turned on for a few milliseconds, then off. Each active solenoid is turned off for a few milliseconds, then on. This pulsing of voltage to the solenoid causes an inductive spike which can be sensed by the Transmission Control System. If an inductive spike is not sensed by the Transmission Control System during the continuity check, it is tested again. If the test fails three consecutive times, the appropriate Diagnostic Trouble Code (DTC) is set. If the solenoid test is run in response to a gear ratio or pressure switch error, one failure will result in setting the appropriate DTC. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Diagnostic Test

1. RELATED TRANSMISSION RELAY DTC'S PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0770-4C SOLENOID CIRCUIT (CONTINUED)

2. CHECK TO SEE IF P0770 IS PRESENT

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, actuate the 4C Solenoid.

Monitor the 4C Solenoid LED on the Transmission Simulator.

Did the 4C Solenoid LED on the Transmission Simulator blink on and off?

Yes >> Go To 3

No >> Go To 4

---

3. TRANSMISSION SOLENOID/TRS ASSEMBLY

With the scan tool, continue to actuate the 4C Solenoid for the period of 2 minutes with the Transmission Simulator still connected.

After 2 minutes of actuation, with the scan tool, stop the actuation and check for transmission DTCs.

Did the DTC P0770 reset during the actuation test?

Yes >> Go To 4

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

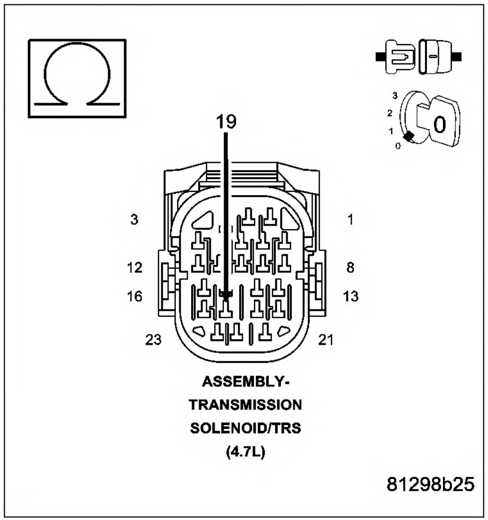
4. (T259) 4C SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM harness connectors.

Measure the resistance between the (T259) 4C Solenoid Control circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T259) 4C Solenoid Control circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T259) 4C Solenoid Control circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

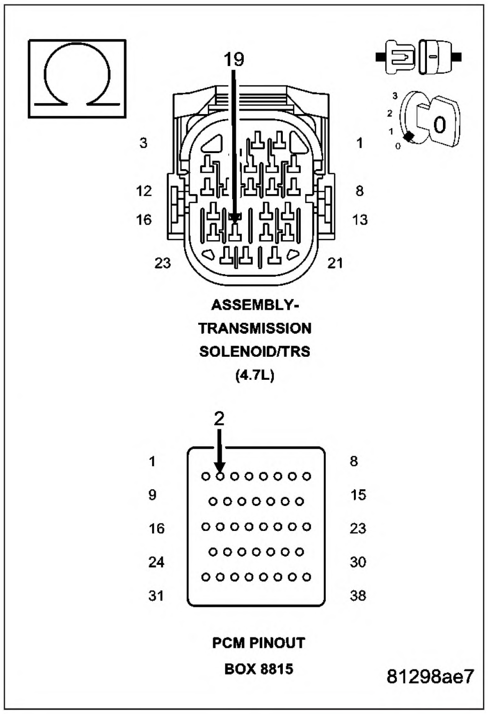
P0770-4C SOLENOID CIRCUIT (CONTINUED)

5. (T259) 4C SOLENOID CONTROL CIRCUIT OPEN

Connect Miller tool #8815 to the PCM C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller special tool #8815 to perform diagnosis.

Measure the resistance of the (T259) 4C Solenoid Control circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.


19
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
2
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
2
1
0
O
81298ae7

Is the resistance above 5.0 ohms?

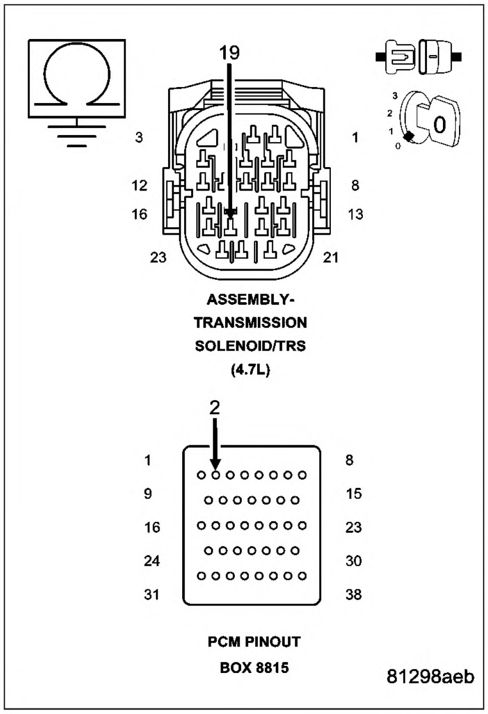
Yes >> Repair the (T259) 4C Solenoid Control circuit for an open. Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. (T259) 4C SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T259) 4C Solenoid Control circuit.


19
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
2
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
2
1
0
O
81298aeb

Is the resistance below 5.0 ohms?

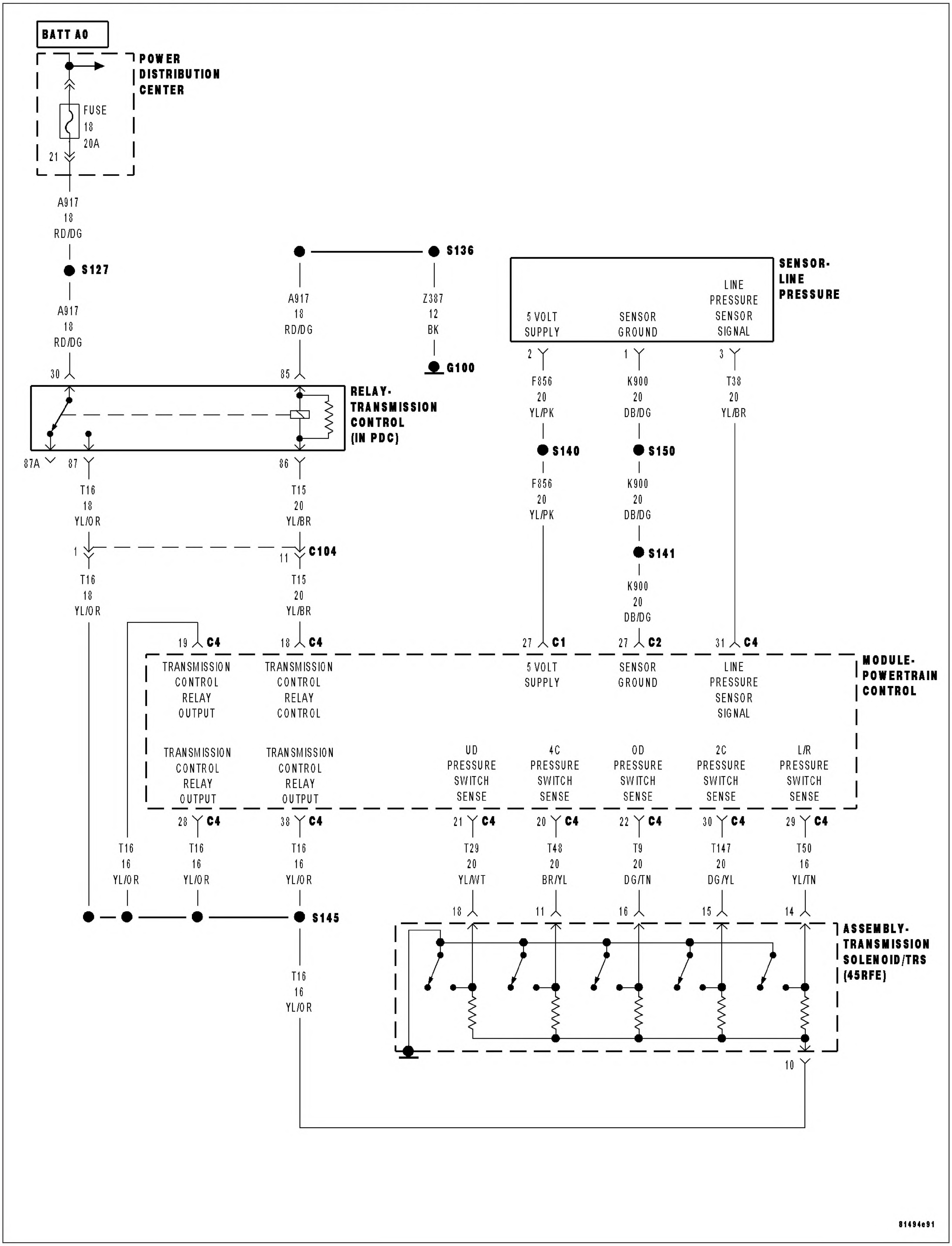
Yes >> Repair the (T259) 4C Solenoid Control circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0841-LR PRESSURE SWITCH RATIONALITY


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
30
S136
A917 18 RD/DG
Z387 12 BK
G100
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0841-LR PRESSURE SWITCH RATIONALITY (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  The DTC will set if the LR Pressure Switch reads open or closed at the wrong time in a given gear.

Possible Causes
LOSS OF PRIME AND/OR TRANSMISSION CONTROL RELAY DTC PRESENT
LOW FLUID LEVEL
LOW LINE PRESSURE
REVERSE CARRIER SNAP RING DISLODGED
CRACKED OR MISINSTALLED PRIMARY OIL FILTER OR FILTER SEAL
STICKING MAIN REGULATOR VALVE IN PUMP VALVE BODY
NO. 1 CHECK BALL CUT OR DAMAGED
WIRING AND CONNECTORS
(T50) LR PRESSURE SWITCH SENSE CIRCUIT OPEN
(T50) LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
(T50) LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission system uses five pressure switches to monitor the fluid pressure in the LR, 2C, 4C, UD, and OD clutch circuits. The pressure switches are continuously monitored for the correct states in each gear as shown.

GEAR	L/R	2C	4C	UD	OD
REVERSE	OPEN	OPEN	OPEN	OPEN	OPEN
P/N	CLOSED**	OPEN	OPEN	OPEN	OPEN
1ST	CLOSED*	OPEN	OPEN	CLOSED	OPEN
2ND	OPEN	CLOSED	OPEN	CLOSED	OPEN
2ND PRIME	OPEN	OPEN	CLOSED	CLOSED	OPEN
3RD	OPEN	OPEN	OPEN	CLOSED	CLOSED
4TH	OPEN	OPEN	CLOSED	OPEN	CLOSED
5TH	OPEN	CLOSED	OPEN	OPEN	CLOSED

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is closed in Manual 1.

**May be open when rolling in Neutral or at low oil temperatures.

P0841-LR PRESSURE SWITCH RATIONALITY (CONTINUED)

Diagnostic Test

1. OTHER RELATED DTC'S PRESENT

Ignition on, engine not running.

With the scan tool, check for other transmission DTC's.

Are there any Loss of Prime and/or Transmission Control Relay related DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If the DTC P0944 is present, perform its respective test first.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CONDITION P0841 PRESENT

With the scan tool, check the EATX DTC EVENT DATA for P0841.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show the DTC P0841?

Yes >> Go To 3

No >> Refer to the Symptom Catagory and perform diagnostics for the DTC reported in the EATX DTC EVENT DATA.

---

3. DTC SET IN REVERSE

Does the EATX DTC EVENT DATA show the DTC P0841 set while in Reverse?

Yes >> Go To 10

No >> Go To 4

---

4. LR PRESSURE SWITCH CLOSED

Does the EATX DTC EVENT DATA show the LR Pressure Switch reading CLOSED when the DTC P0841 was set?

Yes >> Go To 5

No >> Go To 14

P0841-LR PRESSURE SWITCH RATIONALITY (CONTINUED)

5. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

Turn the Pressure Switch selector to LR on the Transmission Simulator.

With the scan tool, monitor the LR Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator.

Did the LR Pressure Switch state change from open to closed while pressing the Pressure Switch Test button on the Transmission Simulator?

Yes >> Go To 6

No >> Go To 10

---

6. POOR WIRING AND CONNECTIONS

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. DTC SET IN FIRST GEAR

With the EATX DTC EVENT DATA recorded earlier, check what gear the transmission was in when the DTC P0841 was set.

Does the EATX DTC EVENT DATA show the Present Gear as first gear when the DTC P0841 was set ?

Yes >> Go To 8

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

8. NO. 1 CHECK BALL CUT OR DAMAGED

Turn the ignition off to the lock position.

Remove the Transmission Valve Body per the Service Information.

Check the No. 1 Check Ball for any possible cuts or damage.

Is the No. 1 Check Ball cut or damaged?

Yes >> Replace the No. 1 Check Ball and check for clutch debris in the transmission oil pan. If there is excessive debris, perform internal repairs to the LR Clutch assembly. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

P0841-LR PRESSURE SWITCH RATIONALITY (CONTINUED)

9. REVERSE CARRIER SNAP RING DISLODGED OR TRANSMISSION SOLENOID/TRS ASSEMBLY

Looking through the windows in the bottom of the case, check whether the snap ring at the front of the Reverse (center) Carrier has dislodged.

NOTE: It may be necessary to pry the Input Annulus Gear Shell rearward to check this snap ring.

Is the Reverse Carrier Snap Ring dislodged?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

10. (T50) LR PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

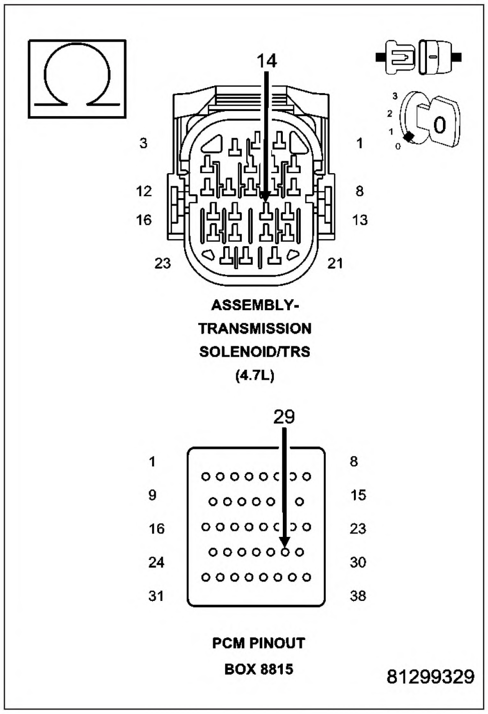
Disconnect the Transmission Simulator, Miller tool #8333 if connected in a previous step or disconnect the Transmission Solenoid /TRS Assembly harness connector.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

NOTE: Check connectors - Clean/repair as necessary.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T50) LR Pressure Switch Sense circuit from the Solenoid/TRS Assembly harness connector to the appropriate terminal of the Miller tool #8815.



Is the resistance above 5.0 ohms?

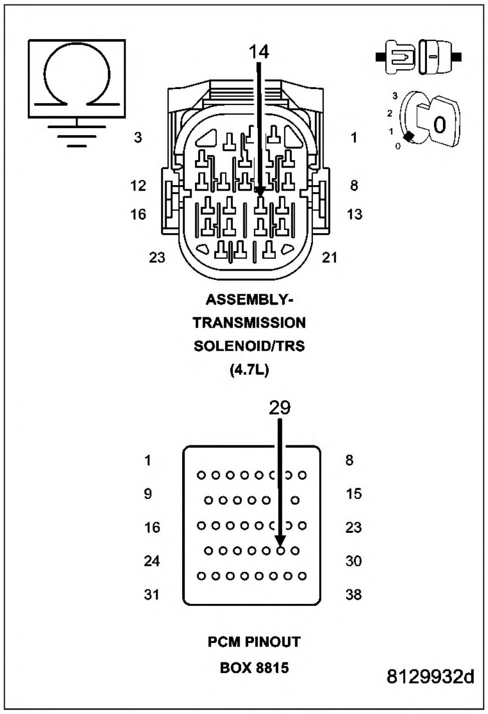
Yes >> Repair the (T50) LR Pressure Switch Sense circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 11

P0841-LR PRESSURE SWITCH RATIONALITY (CONTINUED)

11. (T50) LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T50) LR Pressure Switch Sense circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (T50) LR Pressure Switch Sense circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 12

---

12. PCM POWERS AND GROUNDS

Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

---

13. ROAD TEST THE VEHICLE

With the scan tool, clear the DTC and road test the vehicle.

Try to duplicate the conditions in which the DTC originally set using the EATX DTC EVENT DATA recorded earlier.

Did the DTC P0841 reset?

Yes >> Replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 17

P0841-LR PRESSURE SWITCH RATIONALITY (CONTINUED)

14. LOW LINE PRESSURE

In the EATX DTC EVENT DATA recorded earlier, compare the Line Pressure and the Desired Line Pressure.

Is the Line Pressure less than 40 psi, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check for low fluid level. Check the Primary Oil Filter seal for a split, crack, or improperly installed. Refer to the Service Information for the proper installation procedure. If the fluid level and Primary Oil Filter are OK, check the Main Regulator Valve in the Oil Pump per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15

---

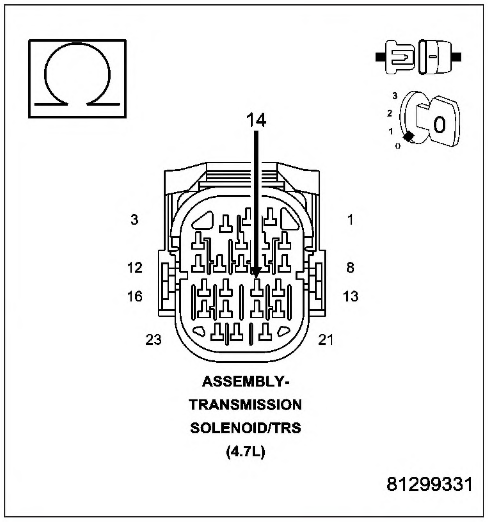
15. (T50) LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

Disconnect all PCM harness connectors.

Measure the resistance between the (T50) LR Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T50) LR Pressure Switch Sense circuit and all other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T50) LR Pressure Switch Sense circuit for a short to other circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16

---

16. ROAD TEST THE VEHICLE

With the scan tool, clear the DTC and road test the vehicle.

Try to duplicate the conditions in which the DTC originally set using the EATX DTC EVENT DATA recorded earlier.

Did the DTC P0841 reset?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 17

P0841-LR PRESSURE SWITCH RATIONALITY (CONTINUED)

17. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

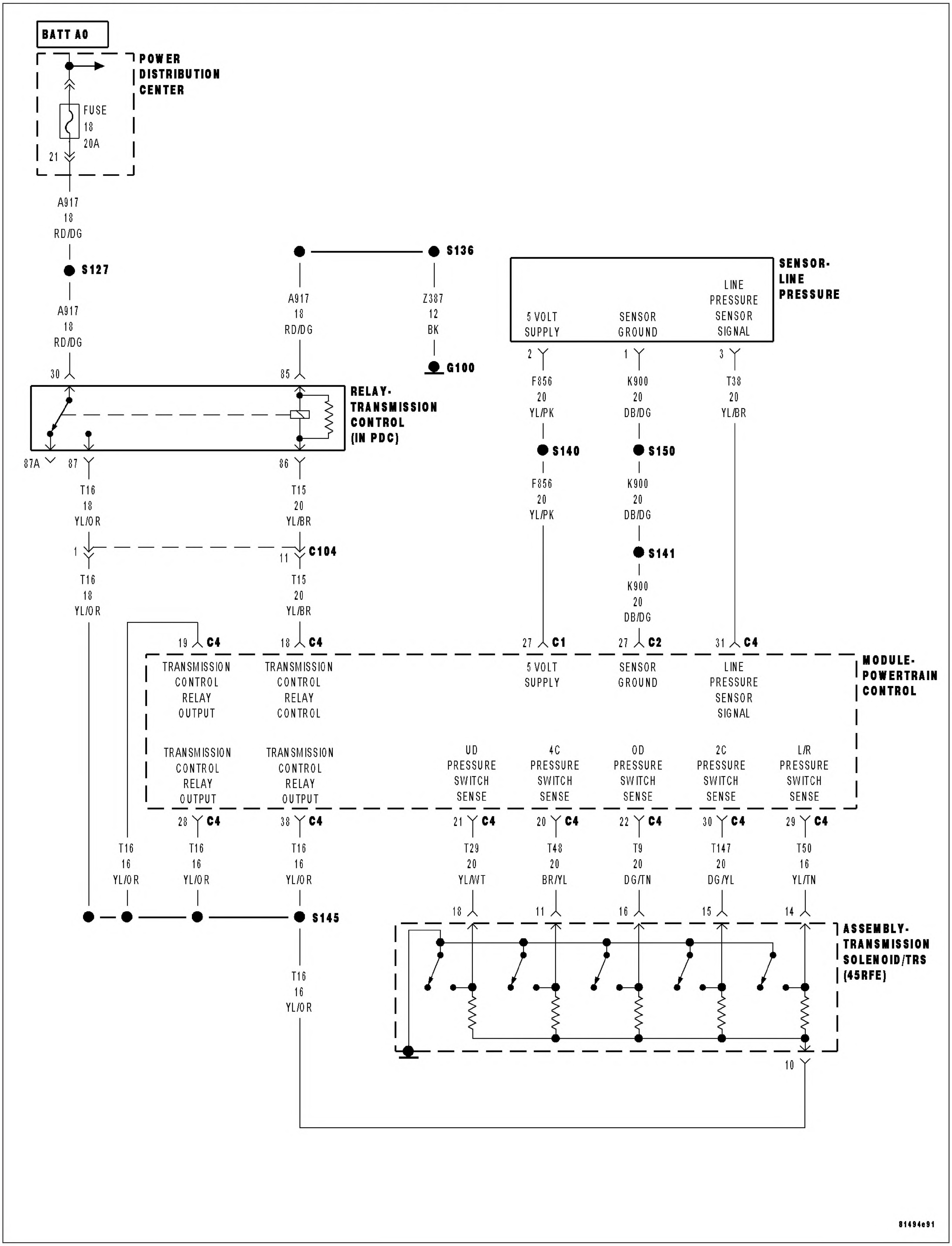
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0845-2C HYDRAULIC PRESSURE TEST


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0845-2C HYDRAULIC PRESSURE TEST (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  In any forward gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.
- **Set Condition:**
  After a shift into a forward gear, with engine speed above 1000 RPM, the PCM momentarily turns on element pressure to the Clutch circuits that don't have pressure to identify the correct Pressure Switch closes. If the Pressure Switch does not close 2 times, the DTC sets.

Possible Causes
LINE PRESSURE SENSOR
TRANSMISSION FLUID CONTAMINATION
RELATED DTC'S PRESENT
TRANSMISSION SOLENOID/TRS ASSEMBLY
EXCESSIVE DEBRIS IN OIL PAN
POOR LINE PRESSURE SENSOR CONNECTION
(T147) 2C PRESSURE SWITCH SENSE CIRCUIT OPEN
TRANSMISSION CONTROL RELAY DTCS PRESENT
(T147) 2C PRESSURE SWITCH SENSE CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
TRANSMISSION SOLENOID/TRS ASSEMBLY
INTERNAL TRANSMISSION
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System tests the pressure switches when they are off. The test verifies that the switches are operational (They will close with pressure applied). The Transmission Control System verifies that the switch closes when the corresponding element is applied. If a switch fails to close, it is re-tested. If it fails the second test, the DTC will set, the MIL will illuminate and the transmission system will default to the orderly Shutdown routine.

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Is there any Loss of Prime, Transmission Control Relay, and/or Line Pressure Sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If the DTC, P0944-LOSS OF PRIME is present, perform its respective test first.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0845-2C HYDRAULIC PRESSURE TEST (CONTINUED)

2. DTC P0755 PRESENT

With the scan tool, check Transmission DTCs.

Is the DTC P0755 also present?

Yes >> Refer to the symptom list and perform diagnostics for P0755–2C SOLENOID CIRCUIT.

No >> Go To 3

---

3. DTCS P0732, P0735 AND/OR P0846 PRESENT

With the scan tool, check for other transmission DTC's

Are the DTCs P0732, P0735, and/or P0846 present also?

Yes >> Go To 12

No >> Go To 4

---

4. CHECK TO SEE IF DTC P0845 IS CURRENT

With the scan tool, Check the STARTS SINCE SET counter for P0845.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 5

No >> Go To 17

---

5. LINE PRESSURE STAYS THE SAME

Start the engine.

Warm the transmission to 82° C or 180° F.

Firmly apply the brakes.

With the scan tool, monitor the Line Pressure during the following step.

Move the shift lever to each gear position, pausing momentarily in each position and record the line pressure reading. Allow the pressure to stabilize for at least 5 seconds in each range.

Did the line pressure remain at a steady value between 585 and 655 kPa or 85 and 95 PSI in each position?

Yes >> Go To 6

No >> Go To 10

---

6. CHECK LINE PRESSURE SENSOR CONNECTION

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while firmly pushing the Transmission Line Pressure Sensor connector inwards towards the Transmission.

Did the Line Pressure reading on the scan tool change to about 207 kPa or 30 PSI when the connector was pushed inward?

Yes >> Disconnect and properly reconnect the Line Pressure Sensor connector. Inspect terminals and repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

P0845-2C HYDRAULIC PRESSURE TEST (CONTINUED)

7. LINE PRESSURE SENSOR OPERATION

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

With the Transmission Simulator select the ″OFF″ position on the ″Input/Output Speed″ switch.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while turning the Pressure Switch selector to each of the 3 line pressure positions on the Transmission Simulator.

NOTE: All three scan tool Line Pressure readings should be steady and ±14 kPa or 2.0 PSI of the reading specified on the Transmission Simulator.

Did the scan tool Line Pressure readings match the specified readings on the Transmission Simulator and remain steady in all three positions?

Yes >> Replace the Line Pressure Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

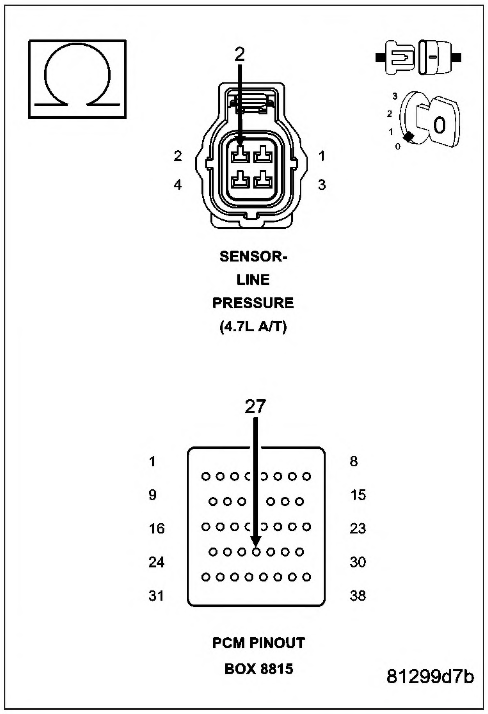
Turn the ignition off to the lock position.

Disconnect Transmission Simulator.

Disconnect the PCM C1 harness connector and connect Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.



Is the resistance above 5.0 ohms?

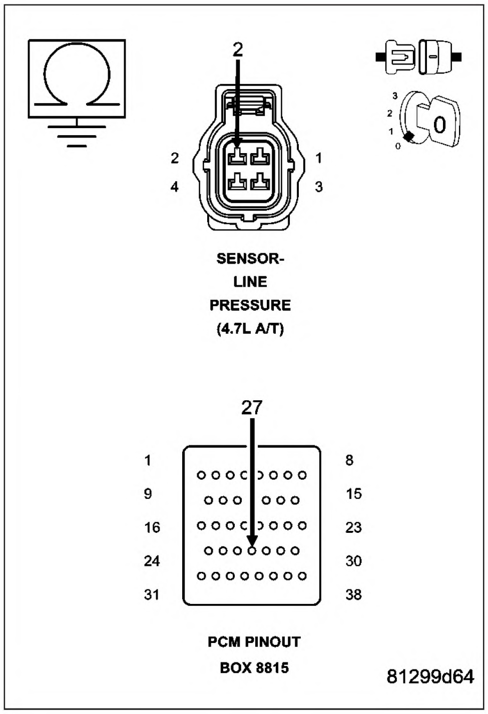
Yes >> Repair the (F856) 5-volt Supply circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

P0845-2C HYDRAULIC PRESSURE TEST (CONTINUED)

9. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

10. COMPARE SCAN TOOL TO PRESSURE GAUGE

Turn the ignition off to the lock position.

Connect the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP. Refer to the Service Information for proper installation procedure.

CAUTION: Apply parking brake.

Start the engine.

In the following steps, compare the scan tool Line Pressure to the Pressure Gauge readings in each gear.

CAUTION: Do not overheat transmission.

With the gear selector in park, raise the RPM to 1500, and compare line pressure readings.

Firmly apply the brakes, move the gear selector into reverse, raise the RPM to 1500, and compare the line pressure readings.

Firmly apply the brakes, move the gear selector into drive, raise the RPM to 1500, and compare the line pressure readings.

Does the scan tool Line Pressure readings match the Pressure Gauge readings ± 10 psi?

Yes >> Go To 11

No >> Replace the Line Pressure Sensor per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0845-2C HYDRAULIC PRESSURE TEST (CONTINUED)

11. WIRING AND CONNECTORS

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Remove the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP.

Install the Transmission Simulator, Miller tool #8333.

On the Transmission Simulator, turn the Pressure Switch selector switch to 2C.

Ignition on, engine not running.

With the scan tool, monitor the 2C Pressure Switch state while pressing and holding the Pressure Switch test button and wiggling the wire harness and connectors that pertain to the 2C Pressure Switch.

Did the 2C Pressure Switch state change to closed and remain closed while wiggling the wires?

Yes >> Go To 12

No >> Go To 14

---

12. CHECK FOR EXCESSIVE DEBRIS

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333.

Remove and inspect the Transmission Oil Pan per the Service Information.

Does the Transmission Oil Pan contain excessive debris or contamination?

Yes >> Repair the cause of the excessive debris in the Transmission Oil Pan. Refer to the Service Information for the proper procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

---

13. CHECK 2C HYDRAULIC CLUTCH CIRCUIT

Remove the Valve Body and air check the 2C clutch hydraulic circuit, in the 2C/4C clutch retainer, for leakage per the Service Information.

NOTE: The 2C hydraulic clutch circuit contains a small bleed orifice, a small amount of air leakage is normal.

Was there excessive air leakage noticed during the air check?

Yes >> Repair as necessary. Check the 2C clutch piston, piston seals and bleed orifice assembly.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Disassemble and inspect the Valve Body and repair as necessary. Inspect the 2C Accumulator piston and seals. Check for an extra check ball downstream from the #7 check ball pocket and repair as necessary. If no problems are found in the Valve Body, replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0845-2C HYDRAULIC PRESSURE TEST (CONTINUED)

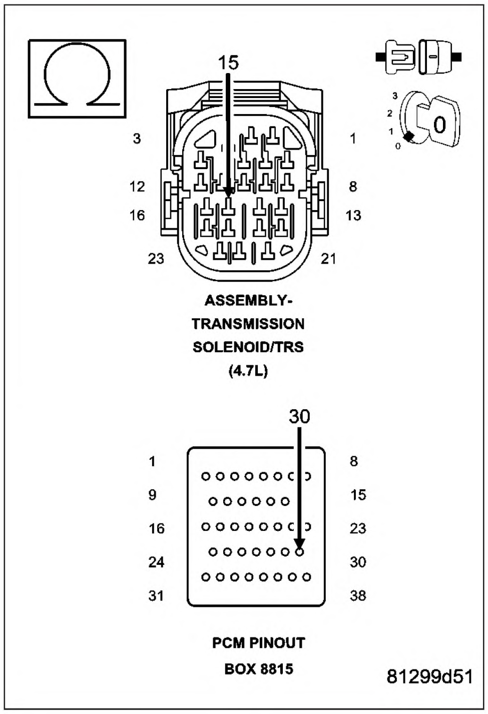
14. (T147) 2C PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Measure the resistance of the (T147) 2C Pressure Switch Sense circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.


15
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
30
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
2
1
0
0

81299d51

Is the resistance above 5.0 ohms?

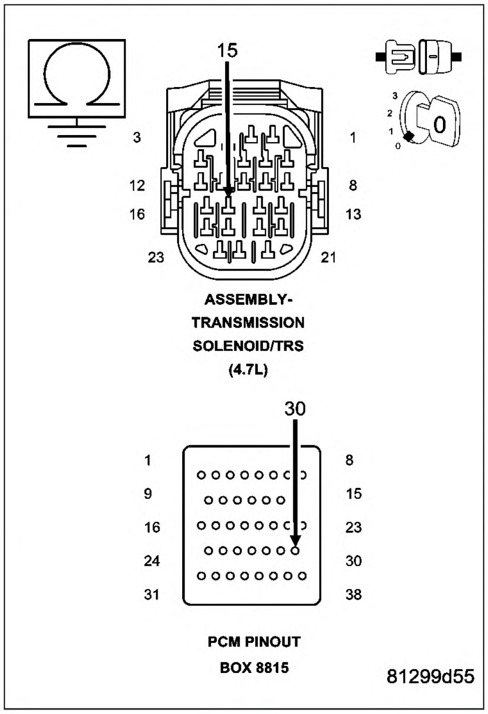
Yes >> Repair the (T147) 2C Pressure Switch Sense circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15

---

15. (T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T147) 2C Pressure Switch Sense circuit.


15
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
30
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
2
1
0
0

81299d55

Is the resistance below 5.0 ohms?

Yes >> Repair the (T147) 2C Pressure Switch Sense circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16

P0845-2C HYDRAULIC PRESSURE TEST (CONTINUED)

16. (T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

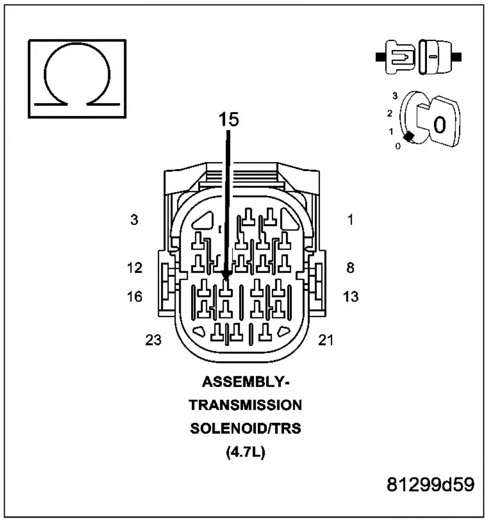
Disconnect all PCM harness connectors.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

NOTE: Make sure the Transmission Solenoid/TRS Assembly harness connector is disconnected.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance between the (T147) 2C Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T147) 2C Pressure Switch Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T147) 2C Pressure Switch Sense circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

17. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

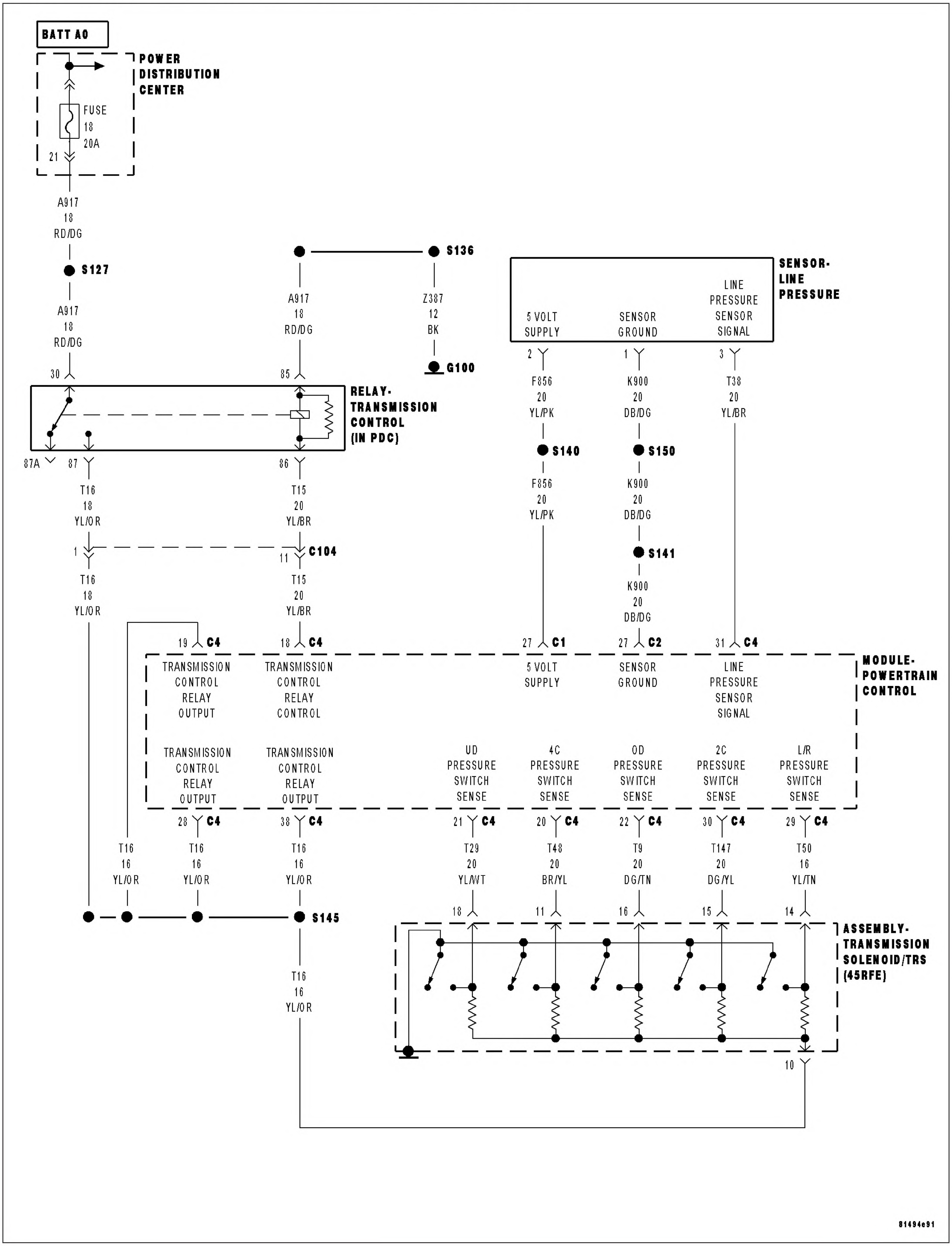
If the EATX DTC EVENT DATA shows the DTC P0845 set while the Line Pressure was significantly below the Desired Line Pressure reading, check for causes of low line pressure (low fluid level, broken or mis-installed primary oil filter or filter seal, sticking Main Regulator Valve in the Pump Valve Body etc.). If the data shows the DTC set while the Line Pressure reading was significantly higher than the Desired Line Pressure, check the Line Pressure Sensor and related wiring.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0846-2C PRESSURE SWITCH RATIONALITY


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0846-2C PRESSURE SWITCH RATIONALITY (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  The DTC is set if the 2C Pressure Switch reads open or closed at the wrong time in a given gear.

Possible Causes
RELATED RELAY DTC'S PRESENT
(T147) 2C PRESSURE SWITCH SENSE CIRCUIT OPEN
(T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
(T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS
EXCESSIVE FLUID LEAKAGE IN 2C CLUTCH CIRCUIT
NO. 5 AND/OR NO. 7 CHECK BALL CUT OR DAMAGED
EXTRA CHECK BALL DOWNSTREAM OF THE NO. 7 CHECK BALL SOCKET
LOW LINE PRESSURE
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE
WIRING AND CONNECTORS

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission system uses five pressure switches to monitor the fluid pressure in the LR, 2C, 4C, UD, and OD clutch circuits. The pressure switches are continuously monitored for the correct states in each gear as shown.

GEAR	L/R	2C	4C	UD	OD
REVERSE	OPEN	OPEN	OPEN	OPEN	OPEN
P/N	CLOSED**	OPEN	OPEN	OPEN	OPEN
1ST	CLOSED*	OPEN	OPEN	CLOSED	OPEN
2ND	OPEN	CLOSED	OPEN	CLOSED	OPEN
2ND PRIME	OPEN	OPEN	CLOSED	CLOSED	OPEN
3RD	OPEN	OPEN	OPEN	CLOSED	CLOSED
4TH	OPEN	OPEN	CLOSED	OPEN	CLOSED
5TH	OPEN	CLOSED	OPEN	OPEN	CLOSED

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is closed in Manual 1.

**May be open when rolling in Neutral or at low oil temperatures.

P0846-2C PRESSURE SWITCH RATIONALITY (CONTINUED)

Diagnostic Test

1. DETERMINING IF RELATED RELAY DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay related DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. EATX DTC DATA SHOW CURRENT DTC

With the scan tool, check the EATX DTC EVENT DATA.

Does the EATX DTC EVENT DATA show data for DTC P0846?

Yes >> Go To 3

No >> Refer to the Transmission category and perform the appropriate symptom shown in the EATX DTC EVENT DATA.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

3. MULTIPLE DTCS PRESENT

With the scan tool, check for other transmission DTC's.

Are there two or more related pressure switch rationality DTCs present in addition to P0846?

Yes >> Go To 4

No >> Go To 7

---

4. RELATED DTC PRESENT

With the scan tool, check the EATX DTC EVENT DATA for P0846.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Do all the pressure switches read CLOSED in the EATX DTC EVENT DATA for P0846?

Yes >> Refer to Transmission category and perform diagnostics for P0888.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. EATX DTC EVENT DATA READ OPEN

In the EATX DTC EVENT DATA recorded earlier, read the state of all pressure switches.

Do all the pressure switches read OPEN?

Yes >> Go To 6

No >> Go To 7

P0846-2C PRESSURE SWITCH RATIONALITY (CONTINUED)

6. LOW LINE PRESSURE

In the EATX DTC EVENT DATA recorded earlier, compare the Line Pressure and the Desired Line Pressure.

Is the Line Pressure less than 40 psi, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check fluid level and adjust as necessary. If fluid level is OK, check the Primary Oil Filter seal for a split, crack, or improperly installed. If the filter and seal are OK, check the Main Regulator Valve in the Oil Pump. Refer to the Service Information for the above procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

7. EATX DTC EVENT DATA READ PARK REVERSE OR NEUTRAL

With the scan tool, check the EATX DTC EVENT DATA for P0846.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show the DTC P0846 set in Park, Neutral, or Reverse?

Yes >> Go To 12

No >> Go To 8

---

8. EATX DTC EVENT DATA READ CLOSED

With the scan tool, check the EATX DTC EVENT DATA for P0846.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show the 2C Pressure Switch reading CLOSED?

Yes >> Go To 10

No >> Go To 9

---

9. PRIMARY OIL FILTER SEAL

In the EATX DTC EVENT DATA recorded earlier, compare the Line Pressure and the Desired Line Pressure.

Is the Line Pressure less than 40 psi, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check fluid level and adjust as necessary. If fluid level is OK, check the Primary Oil Filter seal for a split, crack, or improperly installed. If the filter and seal are OK, check the Main Regulator Valve in the Oil Pump. Refer to the Service Information for the above procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15

P0846-2C PRESSURE SWITCH RATIONALITY (CONTINUED)

10. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Pressure Switch selector switch to the 2C position.

With the scan tool, monitor the 2C Pressure Switch while pressing the Pressure Switch test button on the Transmission Simulator.

Did the state of the 2C Pressure Switch change while pressing the Pressure Switch Test button?

Yes >> Go To 11

No >> Go To 12

---

11. TRANSMISSION SOLENOID/TRS ASSEMBLY

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

12. (T147) 2C PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM C4 harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Connect Miller tool #8815 to the PCM C4 harness connector.

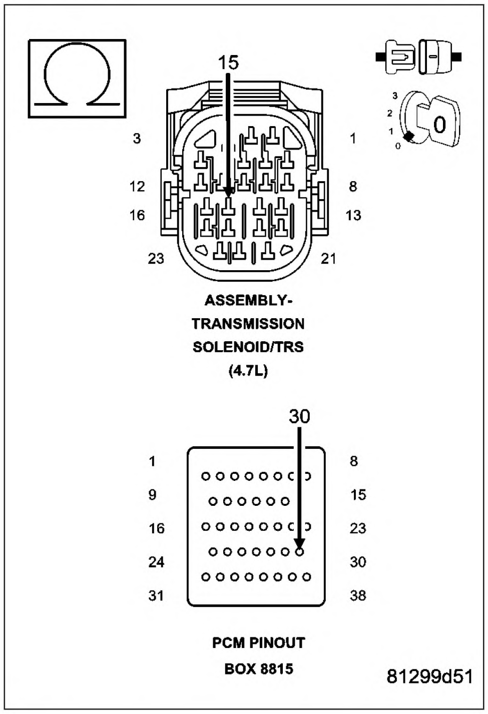
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T147) 2C Pressure Switch Sense circuit from the appropriate terminal of Miller tool #8815 to the Transmission Solenoid/TRS Assembly harness connector.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T147) 2C Pressure Switch Sense circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

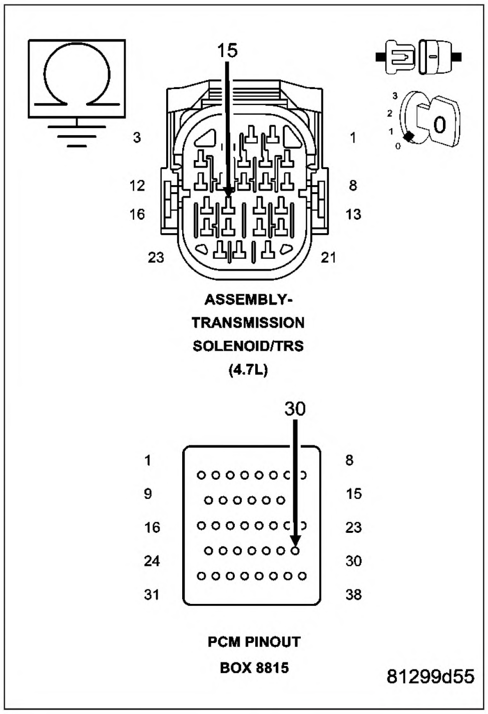
No >> Go To 13



P0846-2C PRESSURE SWITCH RATIONALITY (CONTINUED)

13. (T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T147) 2C Pressure Switch Sense circuit.


15
3
1
12
8
16
13
23
21
3
2
1
0
0
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
30
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d55

Is the resistance below 5.0 ohms?

Yes >> Repair the (T147) 2C Pressure Switch Sense circuit for a short to ground.

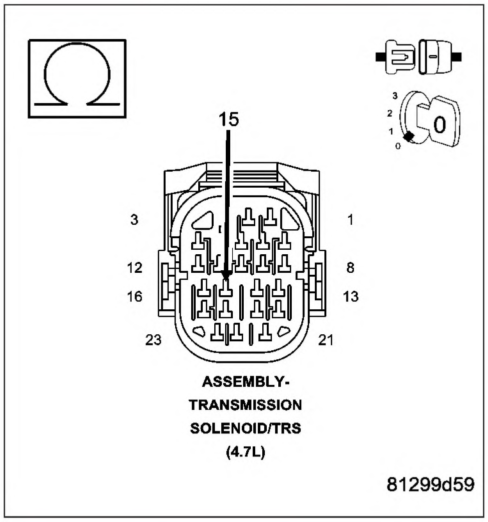
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 14

---

14. (T147) 2C PRESSURE SWITCH SENSE CIRCUIT SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T147) 2C Pressure Switch Sense circuit and all the other circuits in the Transmission Solenoid/ TRS Assembly harness connector.


15
3
1
12
8
16
13
23
21
3
2
1
0
0
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
81299d59

Is the resistance below 5.0 ohms?

Yes >> Repair the (T147) 2C Pressure Switch Sense circuit for a short to another circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Powertrain Control Module per the Service Information. With the scan tool, perform the QUICK LEARN procedure.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0846-2C PRESSURE SWITCH RATIONALITY (CONTINUED)

15. #5 AND/OR #7 CHECK BALL CUT OR DAMAGED

Turn the Ignition off to the lock position.

Remove the Valve Body Assembly per the Service Information.

Inspect the #5 and #7 check balls for any cuts or damage.

Inspect the 2C accumulator piston and seals and also the 2C tower seal on top of the valve body. Refer to the Service Information.

Where there any problems found?

Yes >> Repair as necessary. Check for excessive clutch debris in the transmission oil pan. If excessive clutch debris is present, repair 2C clutch as necessary. Refer to the Service Information for proper repair procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16

16. EXCESSIVE FLUID LEAKAGE WITH 2C CLUTCH CIRCUIT

Air check the 2C Clutch hydraulic circuit. Refer to the Service Information.

NOTE: This hydraulic clutch circuit contains a small bleed orifice. Small leakage is considered normal.

Was there excessive air leakage in the 2C Clutch hydraulic circuit?

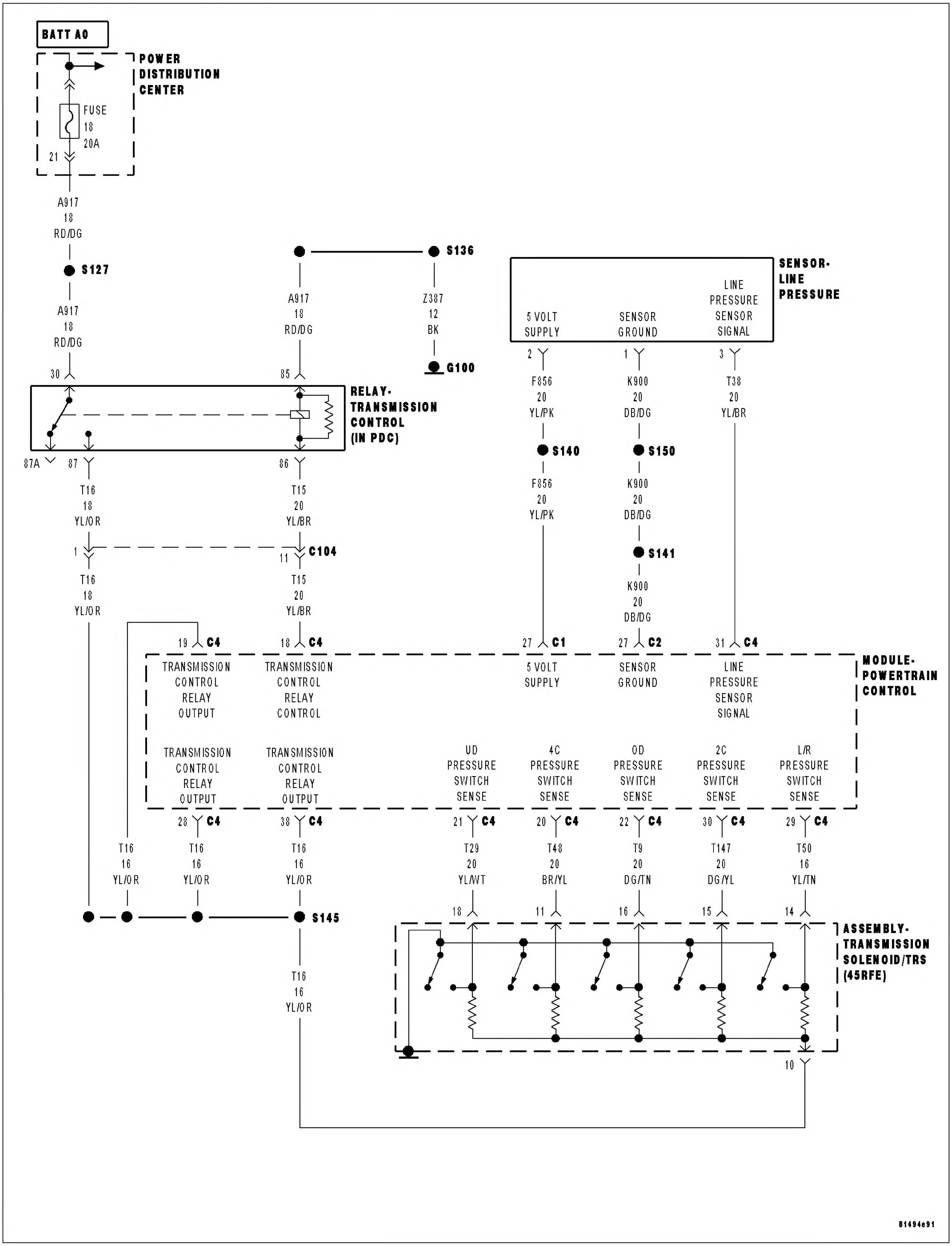
Yes >> Repair as necessary. Refer to the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0868-LINE PRESSURE LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0868-LINE PRESSURE LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously while driving in a forward gear.
- **Set Condition:**
  The PCM continuously monitors Actual Line Pressure and compares it to Desired Line Pressure. If the Actual Line Pressure is more than 10 PSI below Desired Line Pressure, this DTC will set.

Possible Causes
CHECK FOR RELATED DTC'S
LOW FLUID LEVEL
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
POOR LINE PRESSURE SENSOR CONNECTION
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO VOLTAGE
(T140) PRESSURE CONTROL SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
INTERNAL TRANSMISSION
LINE PRESSURE SENSOR
CRACKED, PLUGGED, OR MISINSTALLED PRIMARY OIL FILTER
STUCK OR STICKING MAIN REGULATOR VALVE
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Line pressure is measured by the Line Pressure Sensor (LPS) and regulation is achieved by changing the duty cycle of the Pressure Control Solenoid (PCS) controlled by the Transmission Control System. (5% duty cycle = solenoid off = max line pressure, 62% duty cycle = solenoid on = min line pressure). The Transmission Control System calculates the desired line pressure based on inputs from both the engine and transmission.

The Transmission Control System calculates torque input to the transmission and uses it as the primary input to the desired line pressure calculation. This is called Torque Based Line Pressure. In addition, the line pressure is set to a preset level 827 or 931kPa (120 or 135 PSI) during shifts and in Park and Neutral to ensure consistent shift quality. The desired line pressure is continuously being compared to the actual line pressure. If the actual line pressure is consistently lower than the target while driving, the line pressure low DTC P0868 will set.

Diagnostic Test

1. CHECK FOR RELATED DTC'S

With the scan tool, check for other transmission DTC's

Is the DTC P0932 present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0868-LINE PRESSURE LOW (CONTINUED)

2. CONDITION P0868 PRESENT

With the scan tool, check the STARTS SINCE SET counter for P0868.

NOTE: This counter only applies to the last DTC set.

Is the START SINCE SET COUNTER 2 or less?

Yes >> Go To 3

No >> Go To 11

---

3. CHECK LINE PRESSURE SENSOR CONNECTION

Ignition on, **engine not running.**

With the scan tool, monitor the Line Pressure, firmly push the Line Pressure Sensor harness connector towards the Transmission.

Did the Line Pressure change to about 207 kPa or 30 PSI when the connector was pushed?

Yes >> Disconnect and properly reconnect the Line Pressure Sensor connector. Inspect terminals and repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

With the Transmission Simulator select the ″OFF″ position on the ″Input/Output Speed″ switch.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure during the following steps.

Using the Transmission Simulator, set the rotary knob to each of the 3 line pressure positions.

NOTE: All three scan tool Line Pressure readings should be steady and ±14 kPa or 2.0 PSI of the reading specified on the Transmission Simulator.

Did the Line Pressure read within ±14 kPa or 2.0 PSI in all three positions?

Yes >> Go To 5

No >> Go To 7

P0868-LINE PRESSURE LOW (CONTINUED)

5. LINE PRESSURE SENSOR

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333 and reconnect all previously disconnected connectors.

Install the Line Pressure Adaptor, Miller tool #8259, and the Pressure Gauge, Miller tool #C-3293, 0 to 2000 kPa or 0 to 300 PSI.

Start the engine in park.

Monitor the line pressure readings of both the scan tool and the pressure gauge and compare the two readings.

Is the line pressure gauge reading within 34 kPa or 5 PSI of the scan tool reading?

Yes >> Go To 6

No >> Replace the Line Pressure Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

6. PLUGGED TRANSMISSION OIL FILTER

Turn the ignition off to the lock position.

Remove and inspect the Transmission Oil Pan for excessive debris per the Service Information.

Remove and inspect the Primary Oil Filter per the Service Information.

NOTE: Make sure the Primary Transmission Oil Filter and/or O-ring is not cracked or split.

Does the Oil Pan contain excessive debris and/or is the Primary Oil Filter cracked or plugged?

Yes >> Repair the plugged, cracked, or split Primary Transmission Oil Filter and/or O-ring. If the Primary Transmission Oil Filter is plugged refer to the Service Information for the proper Hydraulic repair procedure.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair internal transmission and inspect the Transmission Oil Pump per the Service Information and replace if necessary. If no problem is found, replace the Solenoid/TRS Assembly.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

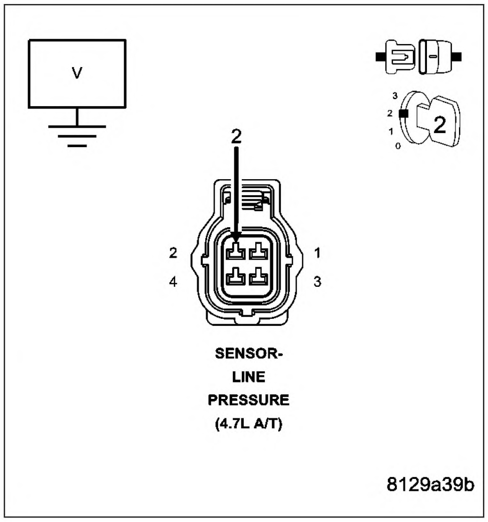
7. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO VOLTAGE

Disconnect the Transmission Simulator, Miller tool #8333.

Reconnect all previously disconnected connectors except the Line Pressure Sensor harness connector.

Ignition on, engine not running.

Measure the voltage of the (F856) 5-volt Supply circuit in the Line Pressure Sensor harness connector.



Is the voltage above 5.5 volts?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to voltage.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

P0868-LINE PRESSURE LOW (CONTINUED)

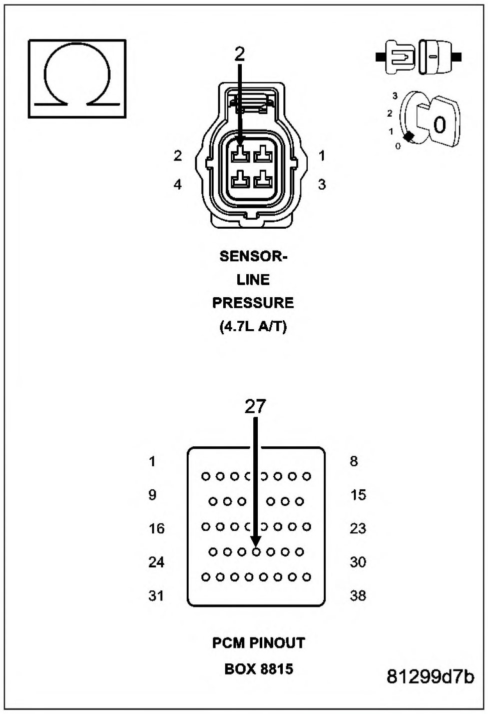
8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the PCM C1 harness connector and connect Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.


2
2
1
4
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d7b

Is the resistance above 5.0 ohms?

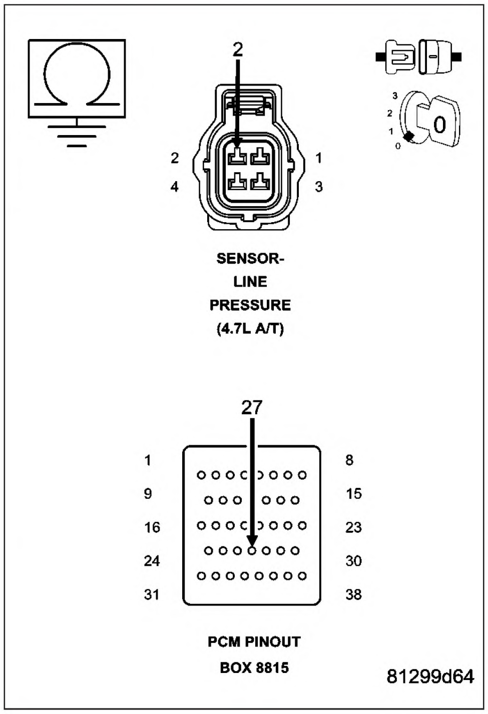
Yes >> Repair the (F856) 5-volt Supply circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

---

9. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit.


2
2
1
4
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d64

Is the resistance below 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 10

P0868-LINE PRESSURE LOW (CONTINUED)

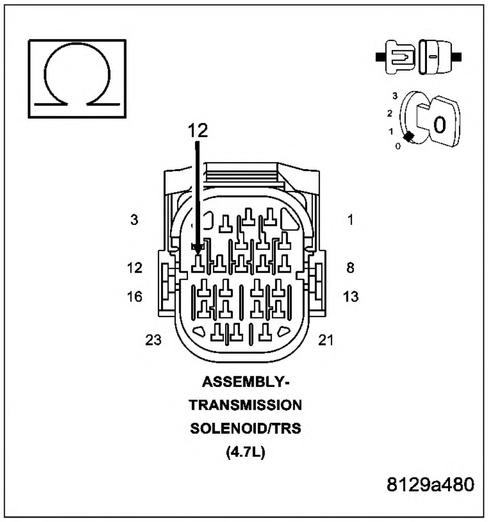
10. (T140) PRESSURE CONTROL SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT

Turn the ignition off to the lock position.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

Disconnect all PCM harness connectors.

Measure the resistance between the (T140) Pressure Control Solenoid Control circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T140) Pressure Control Solenoid Control circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T140) Pressure Control Solenoid Control circuit for a short to another circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

11. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

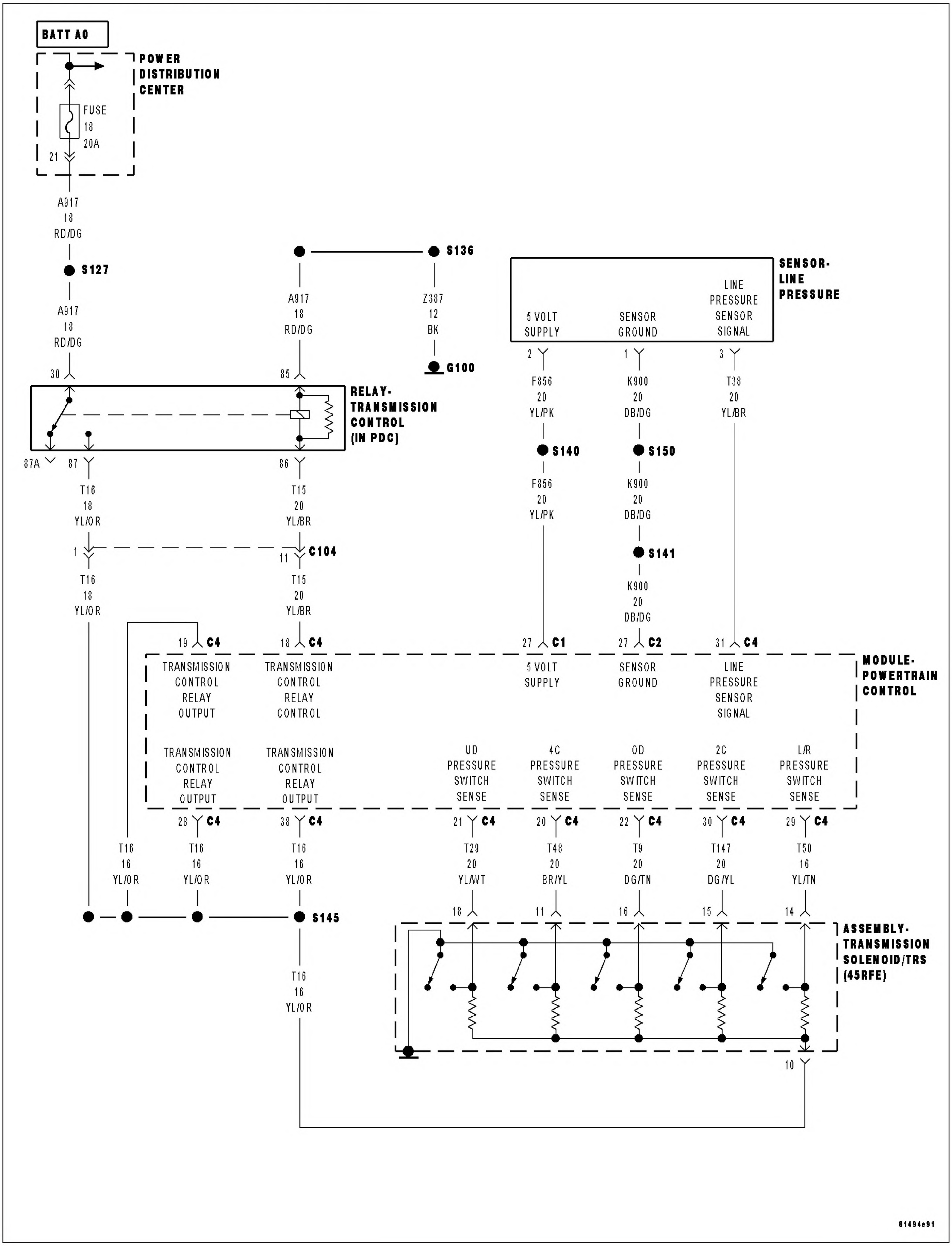
Where there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0869-LINE PRESSURE HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0869-LINE PRESSURE HIGH (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously while driving in a forward gear.
- **Set Condition:**
  The PCM continuously monitors Actual Line Pressure. If the Actual Line Pressure reading is greater than the highest Desired Line Pressure ever used in the current gear, while the Pressure Control Solenoid duty cycle is at or near its maximum value (which should result in minimum line pressure), the DTC will set.

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
LINE PRESSURE SENSOR CONNECTION
(T140) PRESSURE CONTROL SOLENOID CONTROL CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(T140) PRESSURE CONTROL SOLENOID CONTROL CIRCUIT SHORT TO GROUND
ITRANSMISSION CONTROL RELAY OUTPUT CIRCUIT
LINE PRESSURE SENSOR
STUCK OR STICKING MAIN REGULATOR VALVE
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Line pressure is measured by the Line Pressure Sensor (LPS) and regulation is achieved by changing the duty cycle of the Pressure Control Solenoid (PCS) controlled by the Transmission Control System. (5% duty cycle = solenoid off = max line pressure, 62% duty cycle = solenoid on = min line pressure). The Transmission Control System calculates the desired line pressure based on inputs from both the engine and transmission.

The Transmission Control System calculates torque input to the transmission and uses it as the primary input to the desired line pressure calculation. This is called Torque Based Line Pressure. In addition, the line pressure is set to a preset level 827 or 931kPa (120 or 135 PSI) during shifts and in Park and Neutral to ensure consistent shift quality. The desired line pressure is continuously being compared to the actual line pressure. If the actual line pressure is consistently higher than the highest desired line pressure ever used in the current gear, the line pressure high DTC P0869 will set.

Diagnostic Test

1. CHECK FOR RELATED DTC'S

With the scan tool, check for other Transmission DTC's

Is the DTC P0932 or P0888present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0869-LINE PRESSURE HIGH (CONTINUED)

2. CONDITION P0869 PRESENT

With the scan tool, check the STARTS SINCE SET counter for P0869.

Is the STARTS SINCE SET COUNTER 2 or less?

Yes >> Go To 3

No >> Go To 10

---

3. CHECK LINE PRESSURE SENSOR CONNECTION

Ignition on, engine not running.

With the scan tool, monitor the Transmission Line Pressure.

Firmly push the Line Pressure Sensor harness connector inward towards the Transmission.

Did the Line Pressure change to about 207 kPa or 30 PSI when the sensor connector was pushed?

Yes >> Disconnect and properly reconnect the Line Pressure Sensor connector. Inspect terminals and repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

With the Transmission Simulator select the ″OFF″ position on the ″Input/Output Speed″ switch.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure during the following step.

Using the Transmission Simulator, set the rotary switch to each of the 3 line pressure positions.

NOTE: All three scan tool Line Pressure readings should be steady and ±14 kPa or 2.0 PSI of the reading specified on the Transmission Simulator.

Did the Line Pressure read within ±14 kPA or 2.0 PSI in all three positions?

Yes >> Go To 5

No >> Go To 6

P0869-LINE PRESSURE HIGH (CONTINUED)

5. CHECK LINE PRESSURE SENSOR CALIBRATION

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333 and reconnect all previously disconnected connectors.

Install the Line Pressure Adaptor, Miller tool #8259, and Pressure Gauge, Miller tool #C-3293, 0 to 2000 kPa or 0 to 300 PSI.

Start the engine in park.

Monitor the Line Pressure readings on the scan tool and the pressure gauge.

Compare the Line Pressure readings between the scan tool and the pressure gauge.

Is the pressure gauge reading within 34 kPa or 5 PSI of the scan tool reading?

Yes >> Repair the internal transmission and inspect the Transmission Oil Pump per the Service Information and replace if necessary. If no problem is found, replace the Transmission Solenoid/TRS Assembly, possible cause is a stuck Pressure Control Solenoid.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Line Pressure Sensor per the Service information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

6. (T140) PRESSURE CONTROL SOLENOID CONTROL CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the Powertrain Control Module C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

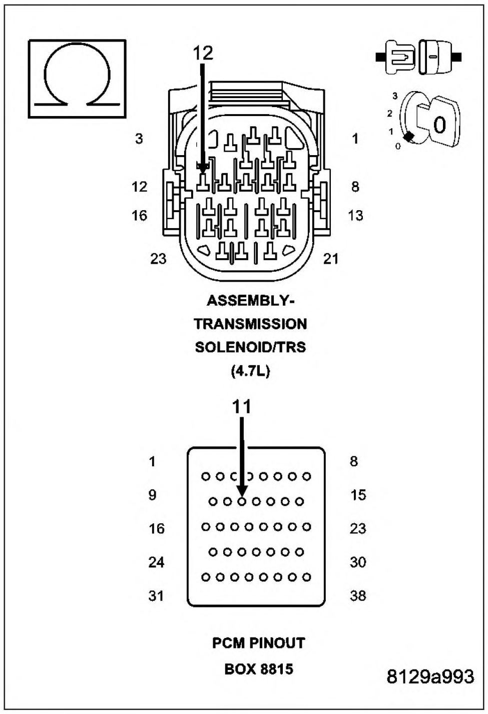
Measure the resistance of the (T140) Pressure Control Solenoid Control circuit from the appropriate terminal of Miller tool #8815 to the Solenoid/TRS harness connector.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T140) Pressure Control Solenoid Control circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

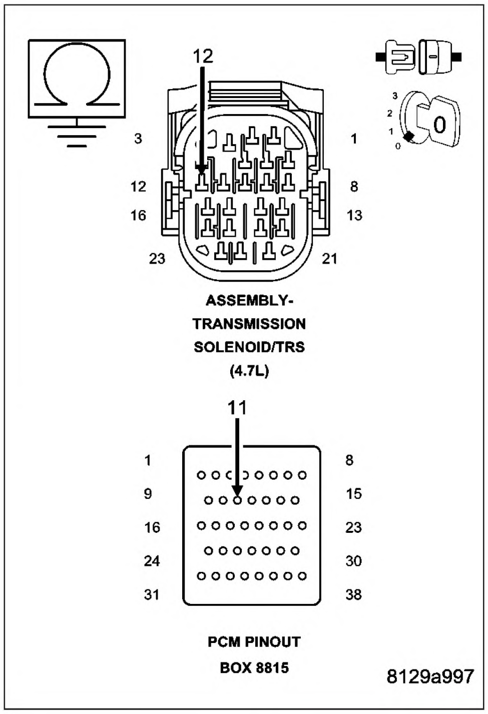
No >> Go To 7



P0869-LINE PRESSURE HIGH (CONTINUED)

7. (T140) PRESSURE CONTROL SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T140) Pressure Control Solenoid Control circuit.


12
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
11
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8129a997

Is the resistance below 5.0 ohms?

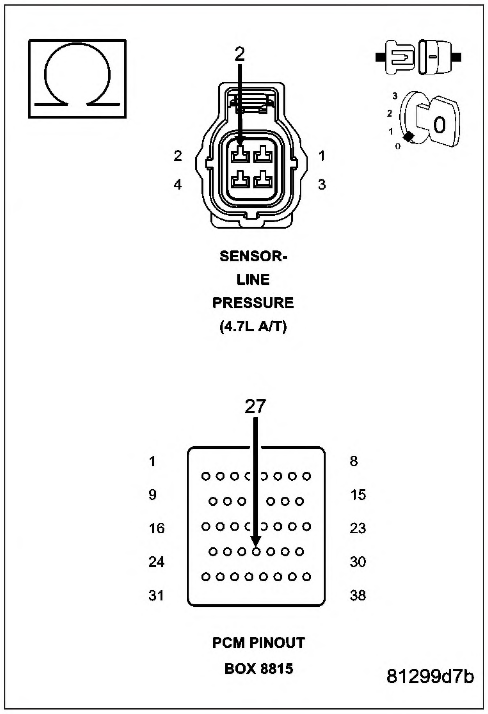
Yes >> Repair the (T140) Pressure Control Solenoid Control circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Measure the resistance of the (F856) 5-volt Supply circuit between the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.


2
2
1
4
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d7b

Is the resistance above 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

P0869-LINE PRESSURE HIGH (CONTINUED)

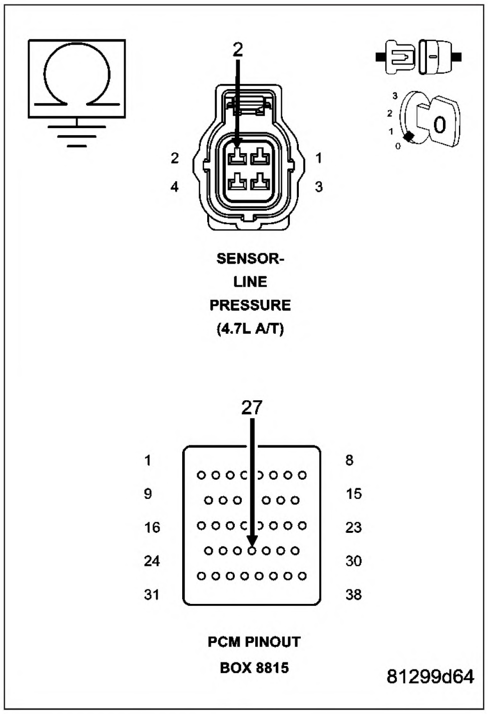
9. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND

Disconnect the PCM C1 harness connector.

Disconnect the Line Pressure Sensor harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance between ground and the (F856) 5-volt Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Powertrain Control Module per the Service Information. With the scan tool perform the QUICK LEARN procedure.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

10. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

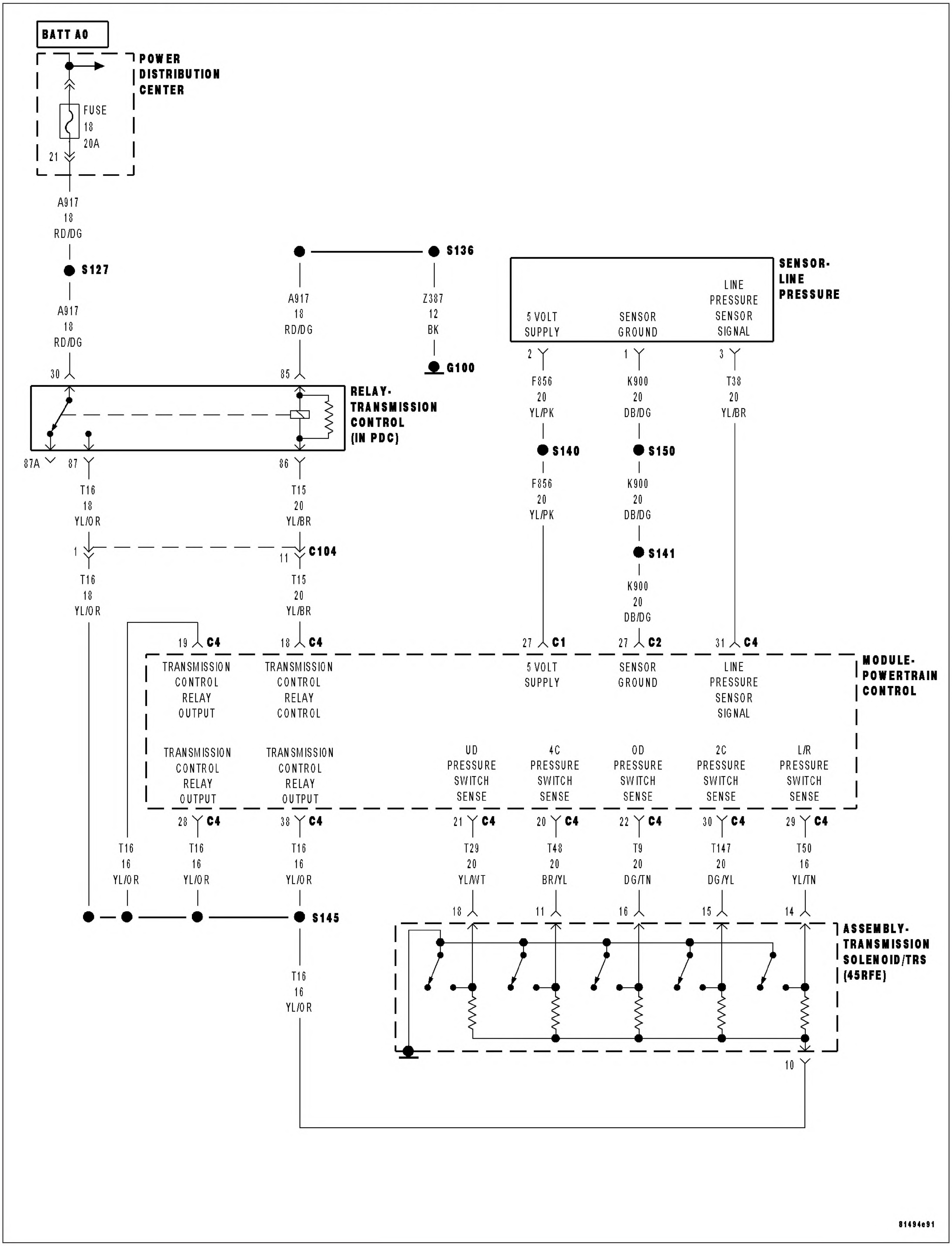
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0870-OD HYDRAULIC PRESSURE TEST


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  In any forward gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.
- **Set Condition:**
  After a shift into a forward gear, with engine speed above 1000 RPM, the PCM momentarily turns on element pressure to the Clutch circuits that don't have pressure to identify the correct Pressure Switch closes. If the Pressure Switch does not close 2 times, the DTC sets.

Possible Causes
LINE PRESSURE SENSOR
TRANSMISSION FLUID CONTAMINATION
RELATED DTC'S PRESENT
TRANSMISSION SOLENOID/TRS ASSEMBLY
EXCESSIVE DEBRIS IN OIL PAN
POOR LINE PRESSURE SENSOR CONNECTION
(T9) OD PRESSURE SWITCH SENSE CIRCUIT OPEN
TRANSMISSION CONTROL RELAY DTCS PRESENT
(T9) OD PRESSURE SWITCH SENSE CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
(T9) OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(T9) OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS
TRANSMISSION SOLENOID/TRS ASSEMBLY
INTERNAL TRANSMISSION
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System tests the pressure switches when they are off. The test verifies that the switches are operational (They will close with pressure applied). The Transmission Control System verifies that the switch closes when the corresponding element is applied. If a switch fails to close, it is re-tested. If it fails the second test, the DTC will set, the MIL will illuminate and the transmission system will default to the orderly Shutdown routine.

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Is there any Loss of Prime, Transmission Control Relay, and/or Line Pressure Sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If the DTC, P0944-LOSS OF PRIME is present, perform its respective test first.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. DTC P0760 PRESENT

With the scan tool, check Transmission DTCs.

Is the DTC P0760 also present?

Yes >> Refer to the symptom list and perform diagnostics for P0760–OD SOLENOID CIRCUIT.

No >> Go To 3

---

3. OTHER DTCS PRESENT

With the scan tool, check for other transmission DTC's

Are any of the DTCs, P0733, P0734 ,P0735 and/or P0871 present also?

Yes >> Go To 12

No >> Go To 4

---

4. CHECK TO SEE IF DTC P0870 IS CURRENT

With the scan tool, check the STARTS SINCE SET counter for P0870.

Is the STARTS SINCE SET COUNTER 2 or less?

Yes >> Go To 5

No >> Go To 17

---

5. LINE PRESSURE STAYS THE SAME

Start the engine.

Warm the transmission to 82° C or 180° F.

Firmly apply the brakes.

With the scan tool, monitor the Line Pressure during the following step.

Move the shift lever to each gear position, pausing momentarily in each position and record the line pressure reading. Allow the pressure to stabilize for at least 5 seconds in each range.

Did the line pressure remain at a steady value between 585 and 655 kPa or 85 and 95 PSI in each position?

Yes >> Go To 6

No >> Go To 10

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

6. CHECK LINE PRESSURE SENSOR CONNECTION

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while firmly pushing the Transmission Line Pressure Sensor connector inwards towards the Transmission.

Did the Line Pressure reading on the scan tool change to about 207 kPa or 30 PSI when the connector was pushed inward?

Yes >> Disconnect and properly reconnect the Line Pressure Sensor connector. Inspect terminals and repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. LINE PRESSURE SENSOR OPERATION

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

With the Transmission Simulator select the ″OFF″ position on the ″Input/Output Speed″ switch.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while turning the Pressure Switch selector to each of the 3 line pressure positions on the Transmission Simulator.

NOTE: All three scan tool Line Pressure readings should be steady and ±14 kPa or 2.0 PSI of the reading specified on the Transmission Simulator.

Did the scan tool Line Pressure readings match the specified readings on the Transmission Simulator and remain steady in all three positions?

Yes >> Replace the Line Pressure Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

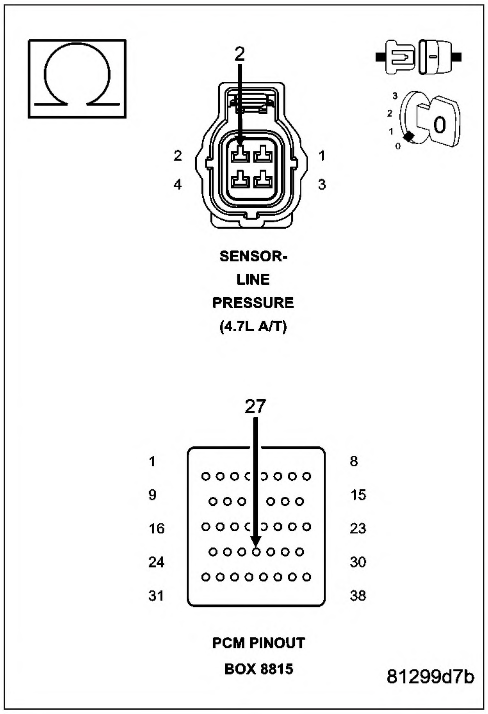
Turn the ignition off to the lock position.

Disconnect Transmission Simulator.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.


2
2
1
4
3
3
2
1
0
0
SENSOR-
LINE
PRESSURE
(4.7L A/T)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d7b

Is the resistance above 5.0 ohms?

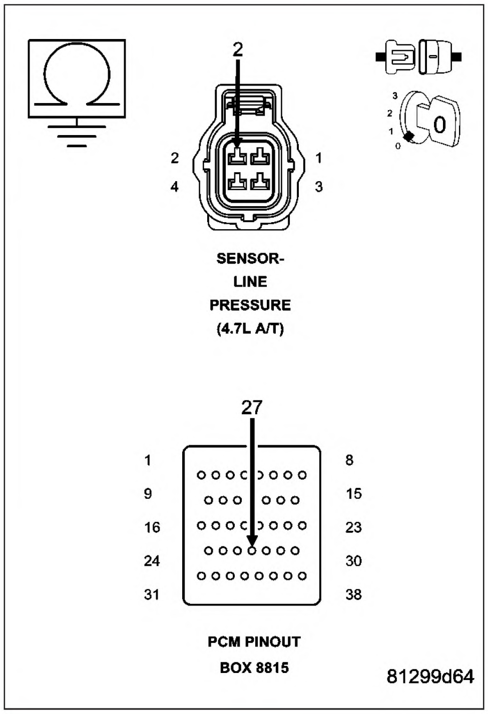
Yes >> Repair the (F856) 5-volt Supply circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

---

9. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit.


2
2
1
4
3
3
2
1
0
0
SENSOR-
LINE
PRESSURE
(4.7L A/T)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d64

Is the resistance below 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

10. COMPARE SCAN TOOL TO PRESSURE GAUGE

Turn the ignition off to the lock position.

Connect the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP. Refer to the Service Information for proper installation procedure.

CAUTION: Apply parking brake.

Start the engine.

In the following steps, compare the scan tool Line Pressure to the Pressure Gauge readings in each gear.

CAUTION: Do not overheat transmission.

With the gear selector in park, raise the RPM to 1500, and compare line pressure readings.

Firmly apply the brakes, move the gear selector into reverse, raise the RPM to 1500, and compare the line pressure readings.

Firmly apply the brakes, move the gear selector into drive, raise the RPM to 1500, and compare the line pressure readings.

Does the scan tool Line Pressure readings match the Pressure Gauge readings ± 10 psi?

Yes >> Go To 11

No >> Replace the Line Pressure Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

11. WIRING AND CONNECTORS

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Remove the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP.

Install the Transmission Simulator, Miller tool #8333.

On the Transmission Simulator, turn the Pressure Switch selector switch to OD.

Ignition on, engine not running.

With the scan tool, monitor the OD Pressure Switch state while pressing and holding the Pressure Switch test button and wiggling the wire harness and connectors that pertain to the OD Pressure Switch.

Did the OD Pressure Switch state change to closed and remain closed while wiggling the wires?

Yes >> Go To 12

No >> Go To 14

---

12. CHECK FOR EXCESSIVE DEBRIS

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333.

Remove and inspect the Transmission Oil Pan per the Service Information.

Does the Transmission Oil Pan contain excessive debris or contamination?

Yes >> Repair the cause of the excessive debris in the Transmission Oil Pan. Refer to the Service Information for the proper procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

13. CHECK OD HYDRAULIC CLUTCH CIRCUIT

Remove the Valve Body and air check the OD hydraulic clutch circuit (in the case) for leakage per the Service Information.

NOTE: The OD hydraulic clutch circuit contains a small bleed orifice which connects to the Reverse hydraulic clutch circuit. A small amount of air leakage is normal.

Was there excessive air leakage noticed during the air check?

Yes >> Repair as necessary. Check the OD/Rev clutch piston seals, bleed orifice assembly, reaction shaft support seal rings, and machining of the main mating faces on the pump housing, pump valve boday, and reaction shaft support..

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Disassemble and inspect the Valve Body and repair as necessary. Inspect the OD Accumulator piston and seals. Check for an extra check ball downstream from the #6 check ball pocket and repair as necessary. If no problems are found in the Valve Body, replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

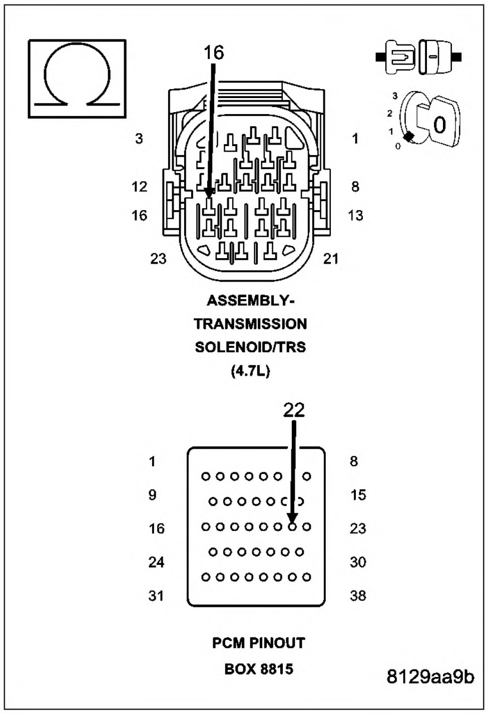
14. (T9) OD PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Measure the resistance of the (T9) OD Pressure Switch Sense circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.



Is the resistance above 5.0 ohms?

Yes >> Repair the (T9) OD Pressure Switch Sense circuit for an open.

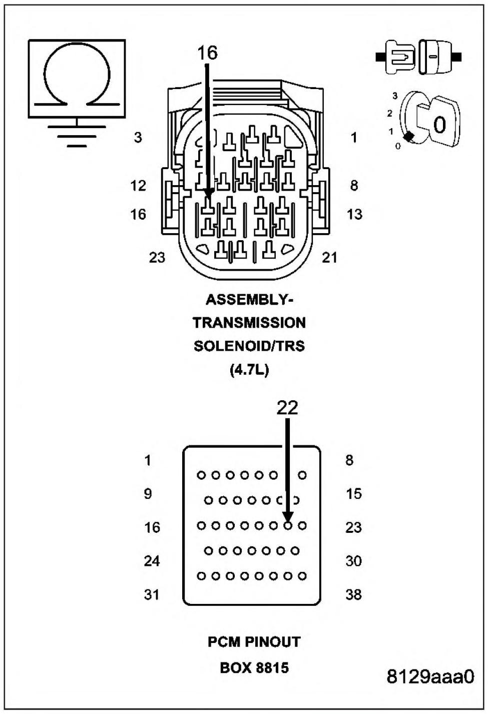
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

15. OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T9) OD Pressure Switch Sense circuit.


16
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
22
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8129aaa0

Is the resistance below 5.0 ohms?

Yes >> Repair the (T9) OD Pressure Switch Sense circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16

---

16. OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

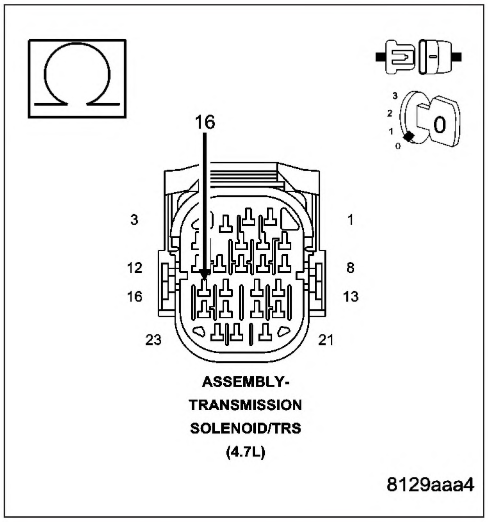
Disconnect all PCM harness connectors.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

NOTE: Make sure the Transmission Solenoid/TRS Assembly harness connector is disconnected.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance between the (T9) OD Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.


16
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
8129aaa4

Is the resistance below 5.0 ohms between the (T9) OD Pressure Switch Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T9) OD Pressure Switch Sense circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0870-OD HYDRAULIC PRESSURE TEST (CONTINUED)

17. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

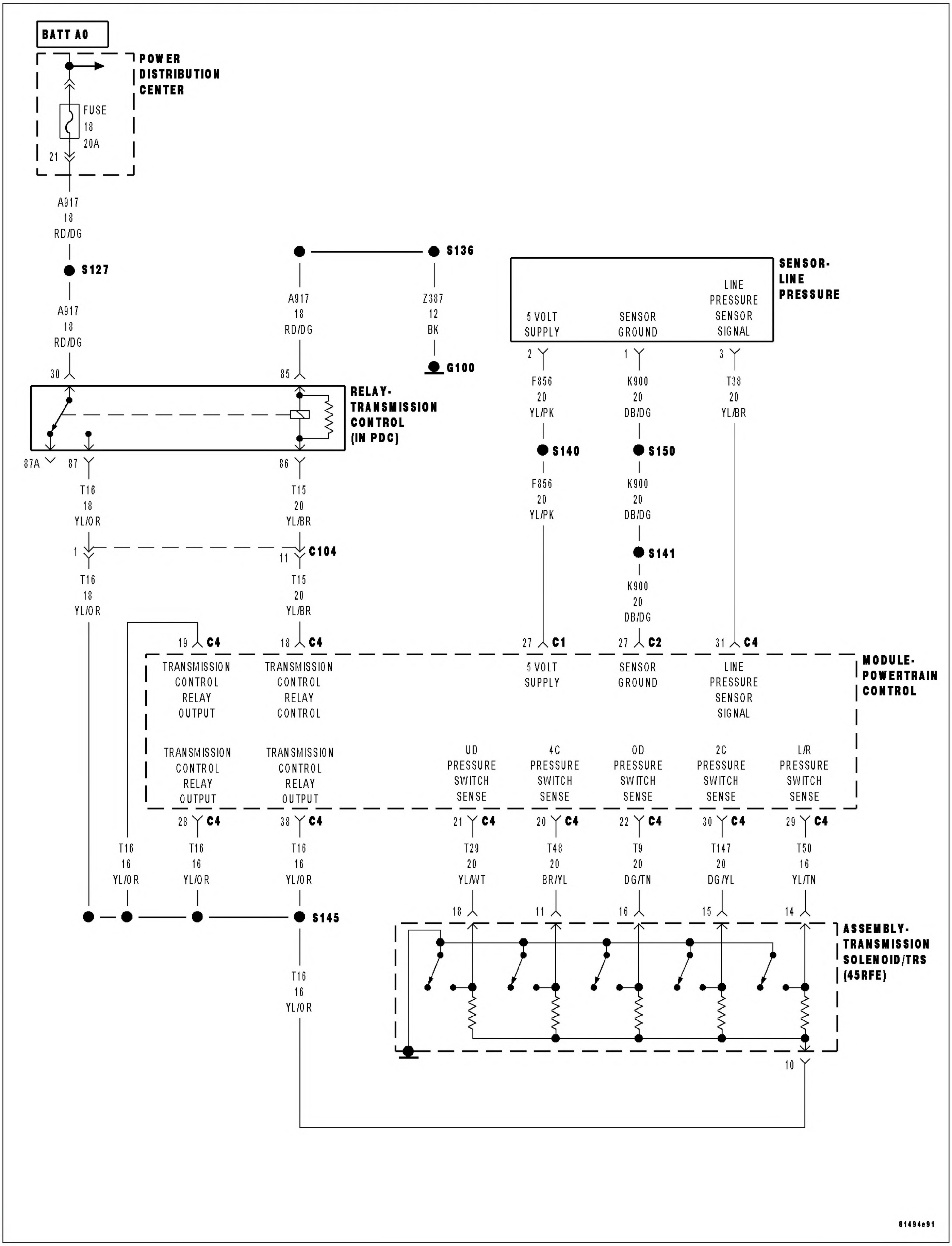
If the EATX DTC EVENT DATA shows the DTC P0870 set while the Line Pressure was significantly below the Desired Line Pressure reading, check for causes of low line pressure (low fluid level, broken or mis-installed primary oil filter or filter seal, sticking Main Regulator Valve in the Pump Valve Body etc.). If the data shows the DTC set while the Line Pressure reading was significantly higher than the Desired Line Pressure, check the Line Pressure Sensor and related wiring.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0871-OD PRESSURE SWITCH RATIONALITY


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
30
S136
A917 18 RD/DG
Z387 12 BK
G100
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  The appropriate DTC is set if one of the pressure switches are open or closed at the wrong time in a given gear.

Possible Causes
RELATED RELAY DTC'S PRESENT
LINE PRESSURE DTCS PRESENT
NO. 4 OR 6 CHECK BALL CUT OR DAMAGED
(T9) OD PRESSURE SWITCH SENSE CIRCUIT OPEN
(T9) OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
(T9) OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS
LOW LINE PRESSURE
WIRING AND CONNECTORS
CUT OD/REV PISTON SEAL
BROKEN OR MISSING DO/REV PISTON BLEED ORIFICE
BROKEN REACTION SHAFT SUPPORT SEAL RING
POOR MACHINING ON PUMP VALVE BODY FACE
BROKEN OR MISSING DRIBBLER ORIFICE ASSEMBLY IN REACTION SHAFT SUPPORT
TRANSMISSION SOLENOID/TRS ASSEMBLY
CUT OD ACCUMULATOR PISTON SEAL
CRACKED OD ACCUMULATOR PISTON
BROKEN OR MISSING OD BLEED ORIFICE IN MAIN VALVE BODY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

Theory of Operation

The Transmission system uses five pressure switches to monitor the fluid pressure in the LR, 2C, 4C, UD, and OD clutch circuits. The pressure switches are continuously monitored for the correct states in each gear as shown.

GEAR	L/R	2C	4C	UD	OD
REVERSE	OPEN	OPEN	OPEN	OPEN	OPEN
P/N	CLOSED**	OPEN	OPEN	OPEN	OPEN
1ST	CLOSED*	OPEN	OPEN	CLOSED	OPEN
2ND	OPEN	CLOSED	OPEN	CLOSED	OPEN
2ND PRIME	OPEN	OPEN	CLOSED	CLOSED	OPEN
3RD	OPEN	OPEN	OPEN	CLOSED	CLOSED
4TH	OPEN	OPEN	CLOSED	OPEN	CLOSED
5TH	OPEN	CLOSED	OPEN	OPEN	CLOSED

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is closed in Manual 1.

**May be open when rolling in Neutral or at low oil temperatures.

Diagnostic Test

1. DETERMINING IF RELATED RELAY DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay related DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. LINE PRESSURE DTCS PRESENT

With the scan tool, read Transmission DTCs.

Are there any Line Pressure DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK FOR OTHER PRESSURE SWITCH DTCS

With the scan tool, check Transmission DTCs.

Are there two or more other pressure switch rationality DTCs present in addition to P0871?

Yes >> Go To 5

No >> Go To 4

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

4. CHECK IF DTC IS CURRENT

With the scan tool, check and record the EATX DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show data for P0871

Yes >> Go To 8

No >> Refer to the Transmission Category and perform the appropriate symptom.

---

5. RELATED DTC PRESENT

With the scan tool, check and record the EATX DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Do all the pressure switches read CLOSED in the EATX DTC EVENT DATA?

Yes >> Refer to the Transmission category and perform diagnostics for P0888. Follow instructions as if the DTC is current.

No >> Go To 6

---

6. CHECK IF PRESSURE SWITCHES READ OPEN

In the EATX DTC EVENT DATA recorded earlier, read the state of all pressure switches.

Do all the pressure switches read open?

Yes >> Go To 7

No >> Go To 8

---

7. CHECK FOR LOW LINE PRESSURE

In the EATX DTC EVENT DATA recorded earlier, compare the Line Pressure to the Desired Line Pressure.

Is the Line Pressure less than 40 PSI, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check fluid level and adjust as necessary. If fluid level is OK, check the Primary Oil Filter weal for a spit, crack , or improperly installed. If the filer and seal are OK, check the Main Regulator Valve in the Oil Pump. Refer to the Service Information for the above procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

8. CHECK IF IN PARK, NEUTRAL, OR REVERSE

Ignition on, engine not running.

With the scan tool, read and record the EATX DTC EVENT DATA for P0871.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show the OD Pressure Switch DTC set while in Park, Neutral, or Reverse?

Yes >> Go To 18

No >> Go To 9

---

9. OD PRESSURE SWITCH OPEN

Refer to the EATX DTC EVENT DATA recorded earlier for P0871.

Did the OD Pressure Switch read OPEN?

Yes >> Go To 10

No >> Go To 15

---

10. LOW LINE PRESSURE

Refer to the EATX DTC EVENT DATA recorded earlier and compare the Line Pressure and the Desired Line Pressure.

Is the Line Pressure less than 40 psi, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check the fluid level. Check the Primary Oil Filter seal for a split, crack, or improperly installed. Refer to the Service Information for the proper installation procedure. If the fluid level and filter are OK, check the Main Regulator Valve in the Oil Pump.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 11

---

11. (T9) OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

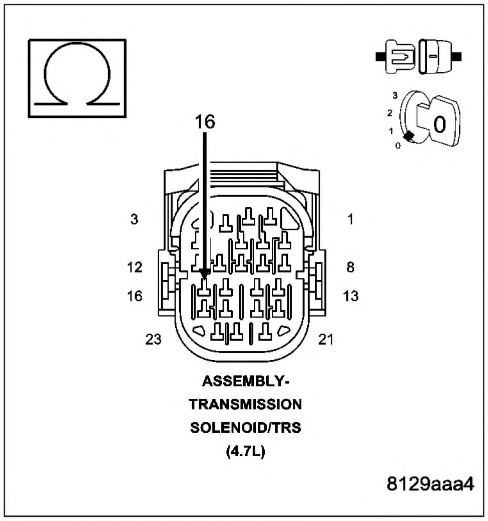
Turn the ignition off to the lock position.

Disconnect all PCM harness connectors.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance between the (T9) OD Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T9) OD Pressure Switch Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T9) OD Pressure Switch Sense circuit for a short to other circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 12

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

12. CHECK TO SEE IF DTC RESETS

Reconnect all previously disconnected connectors.

With the scan too, erase transmission DTCs.

Test drive the vehicle, use the EATX DTC EVENT DATA recored earlier to help duplicate the conditions when the DTC originality set.

Does the DTC P0871 reset?

Yes >> Go To 13

No >> Go To 22

---

13. POWERTRAIN CONTROL MODULE

Remove the Transmission Control Relay.

Operate the vehicle in Drive.

Is the transmission slipping while in Drive?

Yes >> Go To 14

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

14. INTERNAL TRANSMISSION

Perform an Air Check Transmission Clutch Operation procedure per the Service Information.

NOTE: The OD/Rev piston contains a small bleed orifice, a small amount of leakage between the OD and Reverse hydraulic clutch circuits is considered normal.

Is there excessive air leakage in any clutch circuit?

Yes >> Check the OD/Rev piston seals and bleed orifice, reaction shaft support seal rings, dribbler orifice assemblies in the reaction shaft support and for poor machine on the pump valve body faces. Refer to the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair the Valve Body. Check the OD Accumulator piston and seals, OD bleed orifice, and No.6 check ball cuts or damage. If no problems are found in the Valve Body, replace the Transmission Solenoid/TRS Assembly. Refer to the Service Information for proper repair procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

15. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Pressure Switch selector switch to OD.

With the scan tool, monitor the OD Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator.

Did the state of the OD Pressure Switch change from OPEN to CLOSED while pressing the Test button?

Yes >> Go To 16

No >> Go To 18

---

16. NO. 4 AND/OR NO. 6 CHECK BALL CUT OR DAMAGED

With the scan tool, erase previously stored DTC's and test drive the vehicle, use the EATX DTC EVENT DATA to help duplicate the conditions when the DTC originality set. Note any DTCs that may set.

Remove the Transmission Valve Body per the Service Information.

Check the No. 4 and No. 6 Check Balls for cuts or damage.

Is the No. 4 and/or No. 6 Check Ball cut or damaged?

Yes >> Replace the No. 4 and/or No. 6 Check Ball and check for clutch debris in the transmission oil pan. If there is excessive debris, perform internal repairs to the OD Clutch Assembly. Refer to the Service Information for proper repair procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 17

---

17. TRANSMISSION SOLENOID/TRS ASSEMBLY

Did the DTC P0871 reset during the test drive in the previous step?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 22

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

18. (T9) OD PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

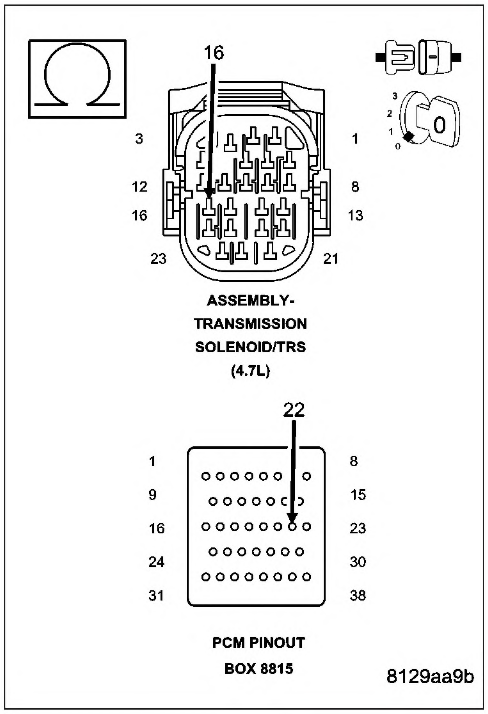
Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Disconnect the Transmission Solenoid /TRS Assembly harness connector

NOTE: Check connectors - Clean/repair as necessary.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T9) OD Pressure Switch Sense circuit from the appropriate terminal of Miller tool #8815 to the Solenoid/TRS Assembly harness connector.


16
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
22
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8129aa9b

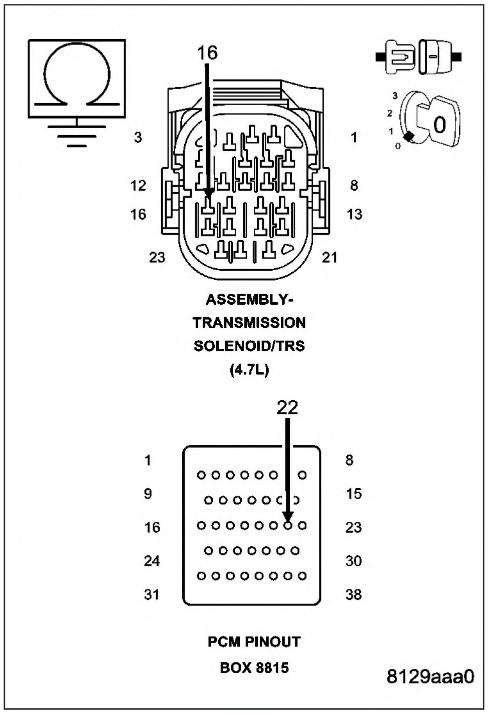
Is the resistance above 5.0 ohms?

Yes >> Repair the (T9) OD Pressure Switch Sense circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 19

19. (T9) OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T9) OD Pressure Switch Sense circuit.


16
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
22
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8129aaa0

Is the resistance below 5.0 ohms?

Yes >> Repair the (T9) OD Pressure Switch Sense circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 20

P0871-OD PRESSURE SWITCH RATIONALITY (CONTINUED)

20. WIRING AND CONNECTORS

Using the schematics as a guide, inspect the wiring and connectors. Pay particular attention to all power and ground circuits.

Were there any problems found

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 21

---

21. POWERTRAIN CONTROL MODULE

Reconnect all previously disconnected connectors.

Make sure all EATX DTC EVENT DATA is recorded.

With the scan tool, erase previously stored DTC's and test drive the vehicle, use the EATX DTC EVENT DATA to help duplicate the conditions when the DTC originality set.

Does the DTC P0871 reset?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 22

---

22. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

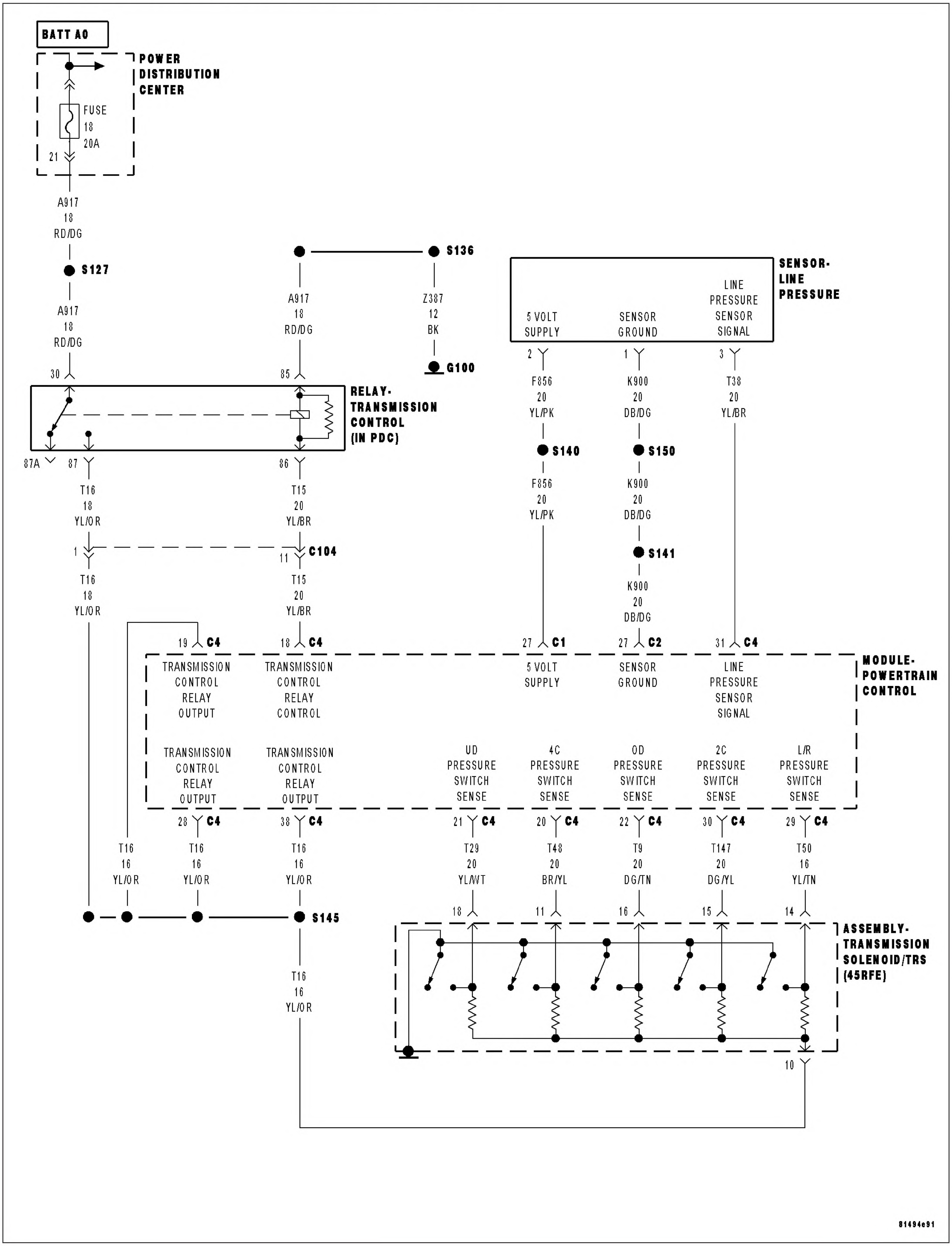
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0875-UD HYDRAULIC PRESSURE TEST


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0875-UD HYDRAULIC PRESSURE TEST (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  In any forward gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.
- **Set Condition:**
  After a shift into a forward gear, with engine speed above 1000 RPM, the PCM momentarily turns on element pressure to the Clutch circuits that don't have pressure to identify the correct Pressure Switch closes. If the Pressure Switch does not close 2 times, the DTC sets.

Possible Causes
LINE PRESSURE SENSOR
TRANSMISSION FLUID CONTAMINATION
RELATED DTC'S PRESENT
TRANSMISSION SOLENOID/TRS ASSEMBLY
EXCESSIVE DEBRIS IN OIL PAN
POOR LINE PRESSURE SENSOR CONNECTION
(T29) UD PRESSURE SWITCH SENSE CIRCUIT OPEN
TRANSMISSION CONTROL RELAY DTCS PRESENT
(T29) UD PRESSURE SWITCH SENSE CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
TRANSMISSION SOLENOID/TRS ASSEMBLY
INTERNAL TRANSMISSION
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System tests the pressure switches when they are off. The test verifies that the switches are operational (They will close with pressure applied). The Transmission Control System verifies that the switch closes when the corresponding element is applied. If a switch fails to close, it is re-tested. If it fails the second test, the DTC will set, the MIL will illuminate and the transmission system will default to the orderly Shutdown routine.

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Is there any Loss of Prime, Transmission Control Relay, and/or Line Pressure Sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If the DTC, P0944-LOSS OF PRIME is present, perform its respective test first.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0875-UD HYDRAULIC PRESSURE TEST (CONTINUED)

2. DTC P0765 PRESENT

With the scan tool, check Transmission DTCs.

Is the DTC P0765 also present?

Yes >> Refer to the symptom list and perform diagnostics for P0765-UD SOLENOID CIRCUIT.

No >> Go To 3

---

3. OTHER DTCS PRESENT

With the scan tool, check for other transmission DTC's

Are any of the DTCs, P0731, P0732, P0733, P0876, and/or P1736 present also?

Yes >> Go To 12

No >> Go To 4

---

4. CHECK TO SEE IF DTC P0875 IS CURRENT

With the scan tool, check the STARTS SINCE SET counter for P0875.

Is the STARTS SINCE SET COUNTER 2 or less?

Yes >> Go To 5

No >> Go To 17

---

5. LINE PRESSURE STAYS THE SAME

Start the engine.

Warm the transmission to 82° C or 180° F.

Firmly apply the brakes.

With the scan tool, monitor the Line Pressure during the following step.

Move the shift lever to each gear position, pausing momentarily in each position and record the line pressure reading. Allow the pressure to stabilize for at least 5 seconds in each range.

Did the line pressure remain at a steady value between 585 and 655 kPa or 85 and 95 PSI in each position?

Yes >> Go To 6

No >> Go To 10

---

6. CHECK LINE PRESSURE SENSOR CONNECTION

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while firmly pushing the Transmission Line Pressure Sensor connector inwards towards the Transmission.

Did the Line Pressure reading on the scan tool change to about 207 kPa or 30 PSI when the connector was pushed inward?

Yes >> Disconnect and properly reconnect the Line Pressure Sensor connector. Inspect terminals and repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

P0875-UD HYDRAULIC PRESSURE TEST (CONTINUED)

7. LINE PRESSURE SENSOR OPERATION

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

With the Transmission Simulator select the ″OFF″ position on the ″Input/Output Speed″ switch.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while turning the Pressure Switch selector to each of the 3 line pressure positions on the Transmission Simulator.

NOTE: All three scan tool Line Pressure readings should be steady and ±14 kPa or 2.0 PSI of the reading specified on the Transmission Simulator.

Did the scan tool Line Pressure readings match the specified readings on the Transmission Simulator and remain steady in all three positions?

Yes >> Replace the Line Pressure Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect Transmission Simulator.

Disconnect the PCM C1 harness connector and connect Miller tool #8815.

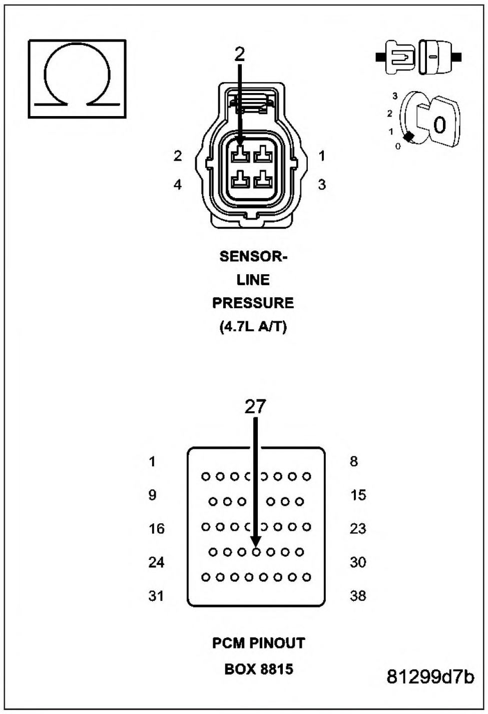
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

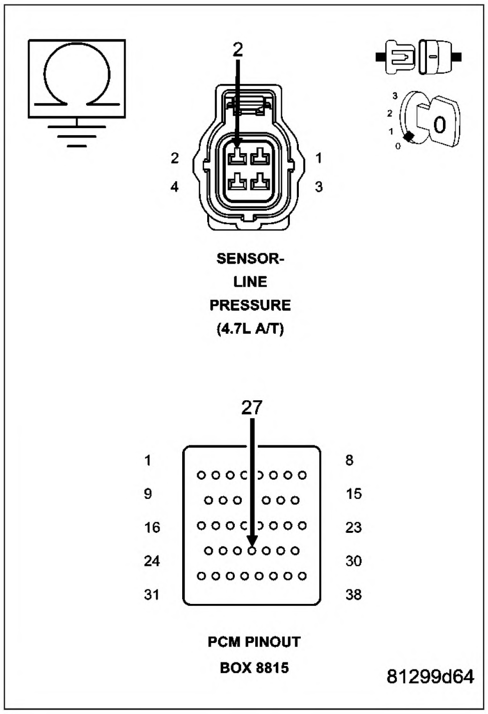
No >> Go To 9



P0875-UD HYDRAULIC PRESSURE TEST (CONTINUED)

9. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

10. COMPARE SCAN TOOL TO PRESSURE GAUGE

Turn the ignition off to the lock position.

Connect the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP. Refer to the Service Information for proper installation procedure.

CAUTION: Apply parking brake.

Start the engine.

In the following steps, compare the scan tool Line Pressure to the Pressure Gauge readings in each gear.

CAUTION: Do not overheat transmission.

With the gear selector in park, raise the RPM to 1500, and compare line pressure readings.

Firmly apply the brakes, move the gear selector into reverse, raise the RPM to 1500, and compare the line pressure readings.

Firmly apply the brakes, move the gear selector into drive, raise the RPM to 1500, and compare the line pressure readings.

Does the scan tool Line Pressure readings match the Pressure Gauge readings ± 10 psi?

Yes >> Go To 11

No >> Replace the Line Pressure Sensor per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0875-UD HYDRAULIC PRESSURE TEST (CONTINUED)

11. WIRING AND CONNECTORS

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Remove the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP.

Install the Transmission Simulator, Miller tool #8333.

On the Transmission Simulator, turn the Pressure Switch selector switch to UD.

Ignition on, engine not running.

With the scan tool, monitor the UD Pressure Switch state while pressing and holding the Pressure Switch test button and wiggling the wire harness and connectors that pertain to the UD Pressure Switch.

Did the UD Pressure Switch state change to closed and remain closed while wiggling the wires?

Yes >> Go To 12

No >> Go To 14

---

12. CHECK FOR EXCESSIVE DEBRIS

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333.

Remove and inspect the Transmission Oil Pan per the Service Information.

Does the Transmission Oil Pan contain excessive debris or contamination?

Yes >> Repair the cause of the excessive debris in the Transmission Oil Pan. Refer to the Service Information for the proper procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

---

13. CHECK UD HYDRAULIC CLUTCH CIRCUIT

Remove the Valve Body and air check the UD hydraulic clutch circuit (in the case) for leakage per the Service Information.

NOTE: The UD hydraulic clutch circuit contains a small bleed orifice. A small amount of air leakage is normal.

Was there excessive air leakage noticed during the air check?

Yes >> Repair as necessary. Check the UD clutch piston, piston seals and bleed orifice, reaction shaft support seal rings, and machining of the main mating faces of the pump housing, pump valve body, and reaction shaft support.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Disassemble and inspect the Valve Body and repair as necessary. Inspect the UD Accumulator piston and seals. If no problems are found in the Valve Body, replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0875-UD HYDRAULIC PRESSURE TEST (CONTINUED)

14. (T29) UD PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333.

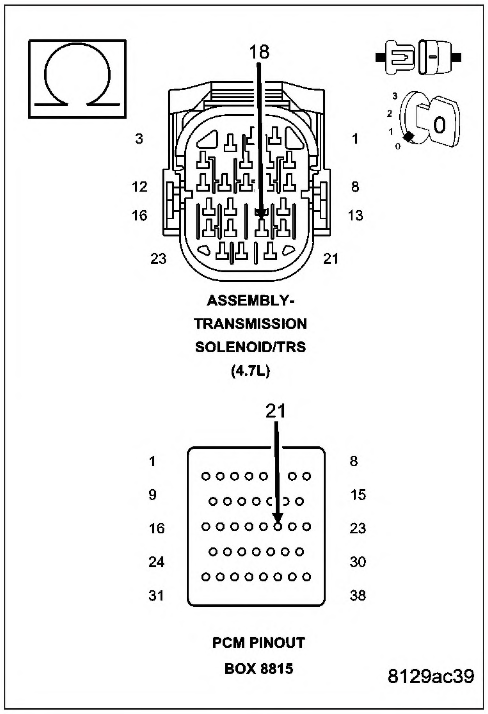
Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Measure the resistance of the (T29) UD Pressure Switch Sense circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T29) UD Pressure Switch Sense circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15


18
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
21
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8129ac39

---

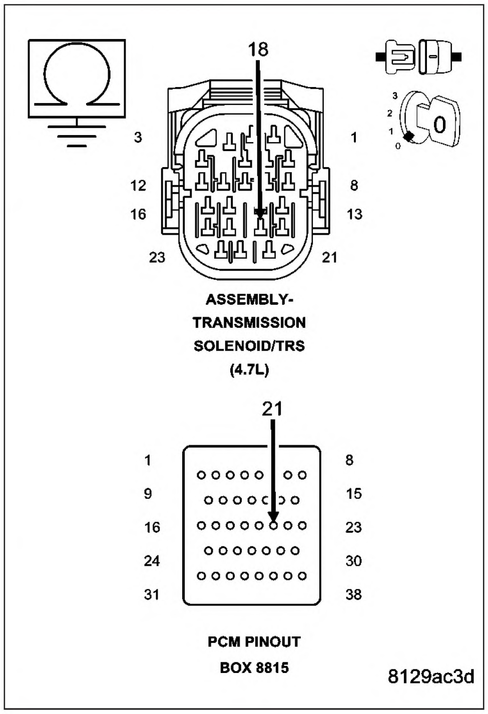
15. (T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T29) UD Pressure Switch Sense circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T29) UD Pressure Switch Sense circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16


18
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
21
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
8129ac3d

P0875-UD HYDRAULIC PRESSURE TEST (CONTINUED)

16. (T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

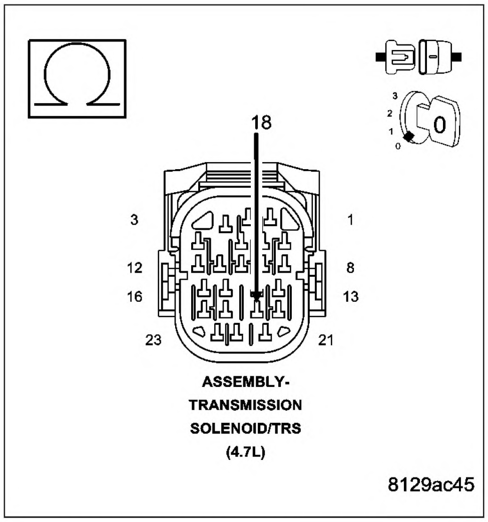
Disconnect all PCM harness connectors.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

NOTE: Make sure the Transmission Solenoid/TRS Assembly harness connector is disconnected.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance between the (T29) UD Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T29) UD Pressure Switch Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T29) UD Pressure Switch Sense circuit for a short to other circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

17. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

If the EATX DTC EVENT DATA shows the DTC P0875 set while the Line Pressure was significantly below the Desired Line Pressure reading, check for causes of low line pressure (low fluid level, broken or mis-installed primary oil filter or filter seal, sticking Main Regulator Valve in the Pump Valve Body etc.). If the data shows the DTC set while the Line Pressure reading was significantly higher than the Desired Line Pressure, check the Line Pressure Sensor and related wiring.

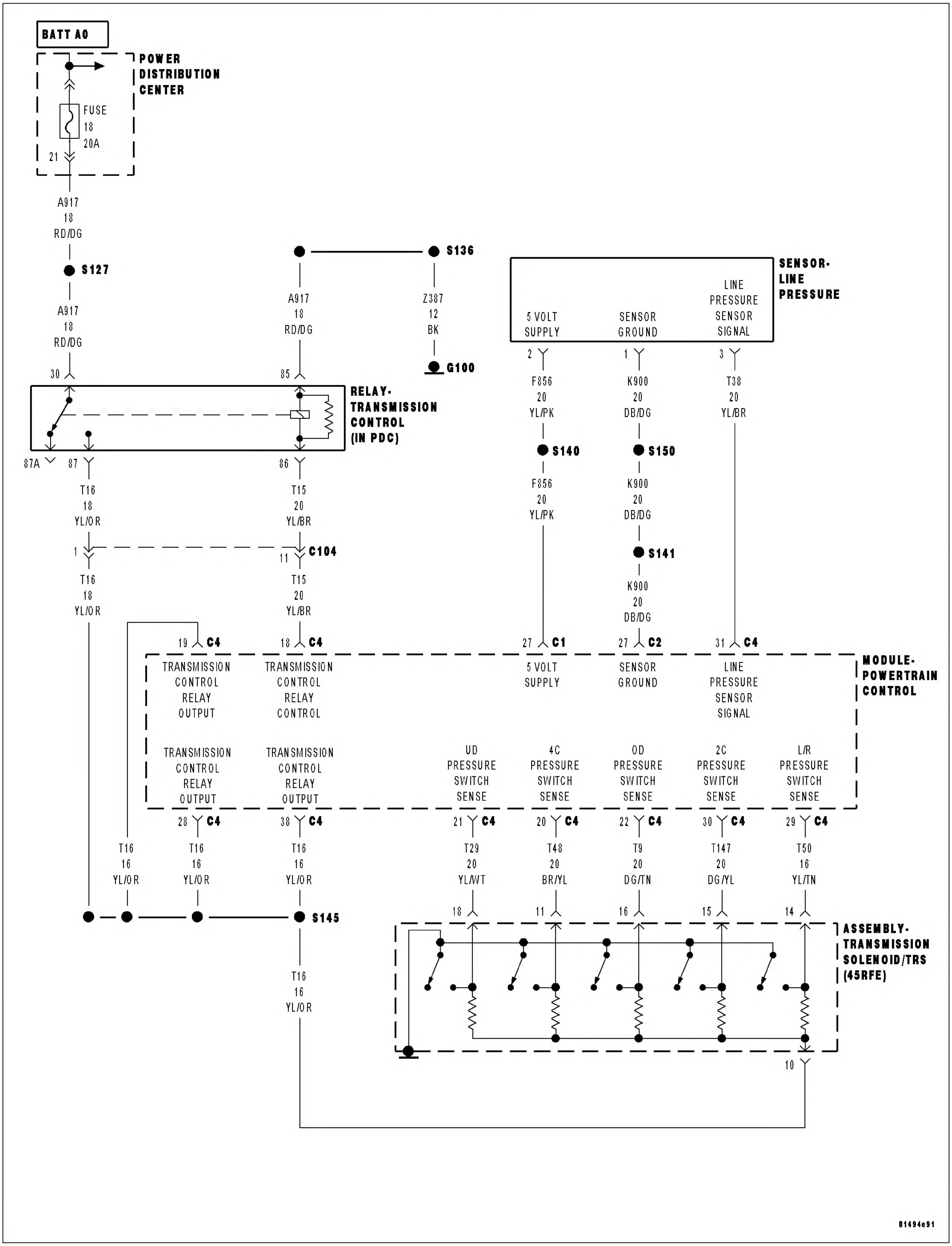
Where there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0876-UD PRESSURE SWITCH RATIONALITY


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0876-UD PRESSURE SWITCH RATIONALITY (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  This DTC is set if the UD pressure switch is in the wrong state for the current gear. For example, this code would be set if the UD pressure switch remained off while the transmission was in second gear.

Possible Causes
RELATED RELAY DTC'S PRESENT
LOW FLUID LEVEL
NO. 2 CHECK BALL CUT OR DAMAGED
LOW LINE PRESSURE
CRACKED OR MISINSTALLED SUMP FILTER OR SEAL
STICKING MAIN REGULATOR VALVE IN PUMP VALVE BODY
(T29) UD PRESSURE SWITCH SENSE CIRCUIT OPEN
(T29) UD PRESSURE SWITCH CIRCUIT SHORT TO GROUND
(T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO ANOTHER CIRCUITS
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission system uses five pressure switches to monitor the fluid pressure in the LR, 2C, 4C, UD, and OD clutch circuits. The pressure switches are continuously monitored for the correct states in each gear as shown.

GEAR	L/R	2C	4C	UD	OD
REVERSE	OPEN	OPEN	OPEN	OPEN	OPEN
P/N	CLOSED**	OPEN	OPEN	OPEN	OPEN
1ST	CLOSED*	OPEN	OPEN	CLOSED	OPEN
2ND	OPEN	CLOSED	OPEN	CLOSED	OPEN
2ND PRIME	OPEN	OPEN	CLOSED	CLOSED	OPEN
3RD	OPEN	OPEN	OPEN	CLOSED	CLOSED
4TH	OPEN	OPEN	CLOSED	OPEN	CLOSED
5TH	OPEN	CLOSED	OPEN	OPEN	CLOSED

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is closed in Manual 1.

**May be open when rolling in Neutral or at low oil temperatures.

P0876-UD PRESSURE SWITCH RATIONALITY (CONTINUED)

Diagnostic Test

1. CHECK IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay, Line Pressure, and/or Loss of Prime DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If a Loss of Prime DTC is present, perform its respective test first.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK FOR PRESSURE SWITCH DTCS

Are there two or more other pressure switch rationality DTC's present in addition to P0876?

Yes >> Go To 3

No >> Go To 4

---

3. CHECK IF ALL PRESSURE SWITCHES READ CLOSED

With the scan tool, read and record all EATX DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show all pressure switches reading CLOSED?

Yes >> Refer to the symptom category and perform diagnostics for P0888. Diagnose the symptom as if the DTC is current.

No >> Go To 4

---

4. CHECK FOR OTHER DTCS

With the scan tool, check for other transmission DTC's.

Is the DTC P2704 present also?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. CHECK EATX DTC EVENT DATA

With the scan tool, read and record the DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the DTC EVENT DATA display information for the DTC P0876?

Yes >> Go To 6

No >> Refer to the symptom list and perform diagnostics for the DTC listed in the EATX DTC EVENT DATA.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0876-UD PRESSURE SWITCH RATIONALITY (CONTINUED)

6. CHECK IF DTC EVENT DATA WAS SET IN PARK, NEUTRAL OR REVERSE

Refer to the DTC EVENT DATA recorded earlier.

Did the DTC P0876 set in Park, Neutral, or Reverse?

Yes >> Go To 10

No >> Go To 7

---

7. CHECK FOR UD PRESSURE SWITCH STATUS

Refer to the DTC EVENT DATA recorded earlier.

Did the DTC P0876 set with the UD Pressure Switch closed?

Yes >> Go To 10

No >> Go To 8

---

8. CHECK LINE PRESSURE

In the EATX DTC EVENT DATA recorded earlier, compare the Line Pressure and the Desired Line Pressure.

Is the Line Pressure less than 40 PSI, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check fluid level and adjust as necessary. If fluid level is OK, check the Primary Oil Filter seal for a split, crack, or improperly installed. If the filter and seal are OK, check the Main Regulator Valve in the Oil Pump. Refer to the Service Information for the above procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

---

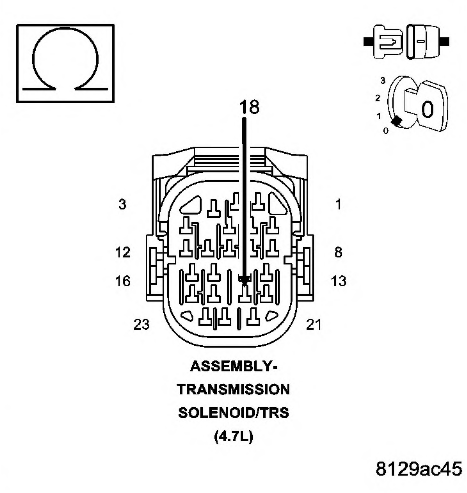
9. (T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect all PCM harness connectors.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

Measure the resistance between the (T29) UD Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T29) UD Pressure Switch Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T29) UD Pressure Switch Sense circuit for a short to other circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0876-UD PRESSURE SWITCH RATIONALITY (CONTINUED)

10. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Pressure Switch selector switch to the UD position.

With the scan tool, monitor the UD Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator.

Did the state of the UD Pressure Switch change while pressing the Pressure Switch Test button?

Yes >> Go To 14

No >> Go To 11

---

11. (T29) UD PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

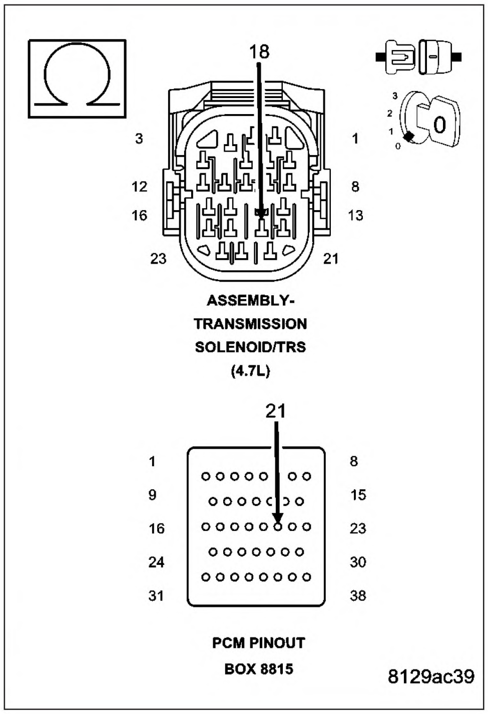
Measure the resistance of the (T29) UD Pressure Switch Sense circuit from the Transmission Solenoid/TRS Assembly harness connector and the appropriate terminal of the special tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T29) UD Pressure Switch Sense circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 12



P0876-UD PRESSURE SWITCH RATIONALITY (CONTINUED)

12. (T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

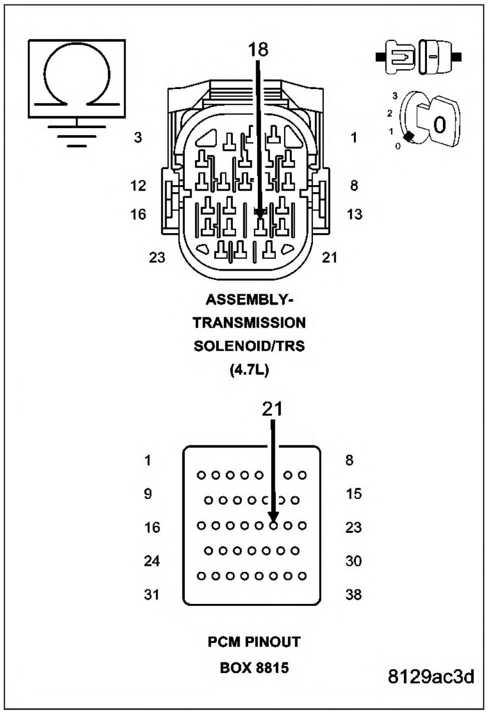
Measure the resistance between ground and the (T29) UD Pressure Switch Sense circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T29) UD Pressure Switch Sense circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13


18
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
21
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8129ac3d

---

13. (T29) UD PRESSURE SWITCH SENSE CIRCUIT SHORT TO ANOTHER CIRCUIT

Disconnect all PCM harness connectors.

NOTE: Make sure the Transmission Solenoid/TRS Assembly harness connector is disconnected.

Measure the resistance between the (T29) UD Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.

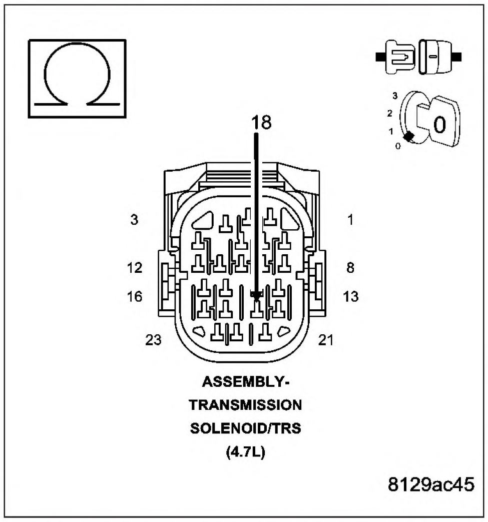
Is the resistance below 5.0 ohms between the (T29) UD Pressure Switch Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T29) UD Pressure Switch Sense circuit for a short to another circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.


18
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
8129ac45

P0876-UD PRESSURE SWITCH RATIONALITY (CONTINUED)

14. WIGGLE TEST WITH SIMULATOR

Perform the steps in the previous test while wiggling the wiring harness and connectors pertaining to the UD Pressure Switch.

Did the state of the UD Pressure Switch change while pressing the Pressure Switch Test button?

Yes >> Repair the wiring harness and/or connectors as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15

---

15. CHECK FOR TRANSMISSION SOLENOID/TRS ASSEMBLY FOR A SHORT TO GROUND

Disconnect the Transmission Simulator and reconnect the Transmission Solenoid/TRS Assembly harness connector.

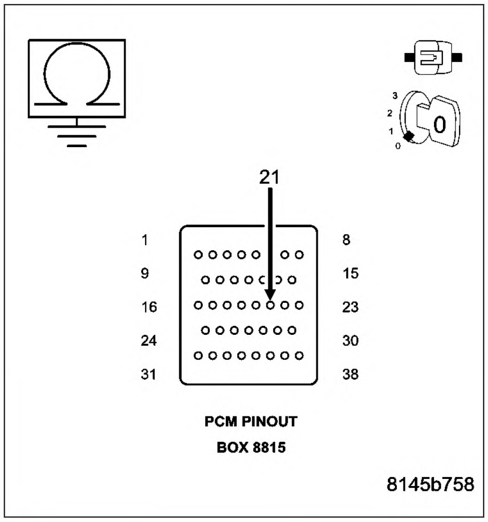
Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Measure the resistance between ground and the (T29) UD Pressure Switch Sense circuit in the appropriate terminal of Miller tool #8815.

Is the resistance below 5.0 ohms?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16



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16. CHECK IF DTC RESETS

Reconnect all previously disconnected connectors.

With the scan tool, erase all transmission DTCs.

Test drive the vehicle. Using the EATX DTC EVENT DATA recorded earlier, try to duplicate the conditions in which the DTC originally set.

Does the DTC P0876 reset?

Yes >> Go To 17

No >> Go To 18

P0876-UD PRESSURE SWITCH RATIONALITY (CONTINUED)

17. CHECK FOR CUT NO. 2 CHECK BALL

Remove the Valve Body per the Service Information.

Check the No. 2 check ball for cuts or damage.

Is the No. 2 check ball cut or damaged?

Yes >> Replace the No. 2 check ball. Check for excessive clutch debris in the oil pan. If excessive debris is present, check the UD Clutch and repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information. Check for excessive clutch debris in the oil pan. If excessive debris is present, check the UD Clutch and repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

18. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

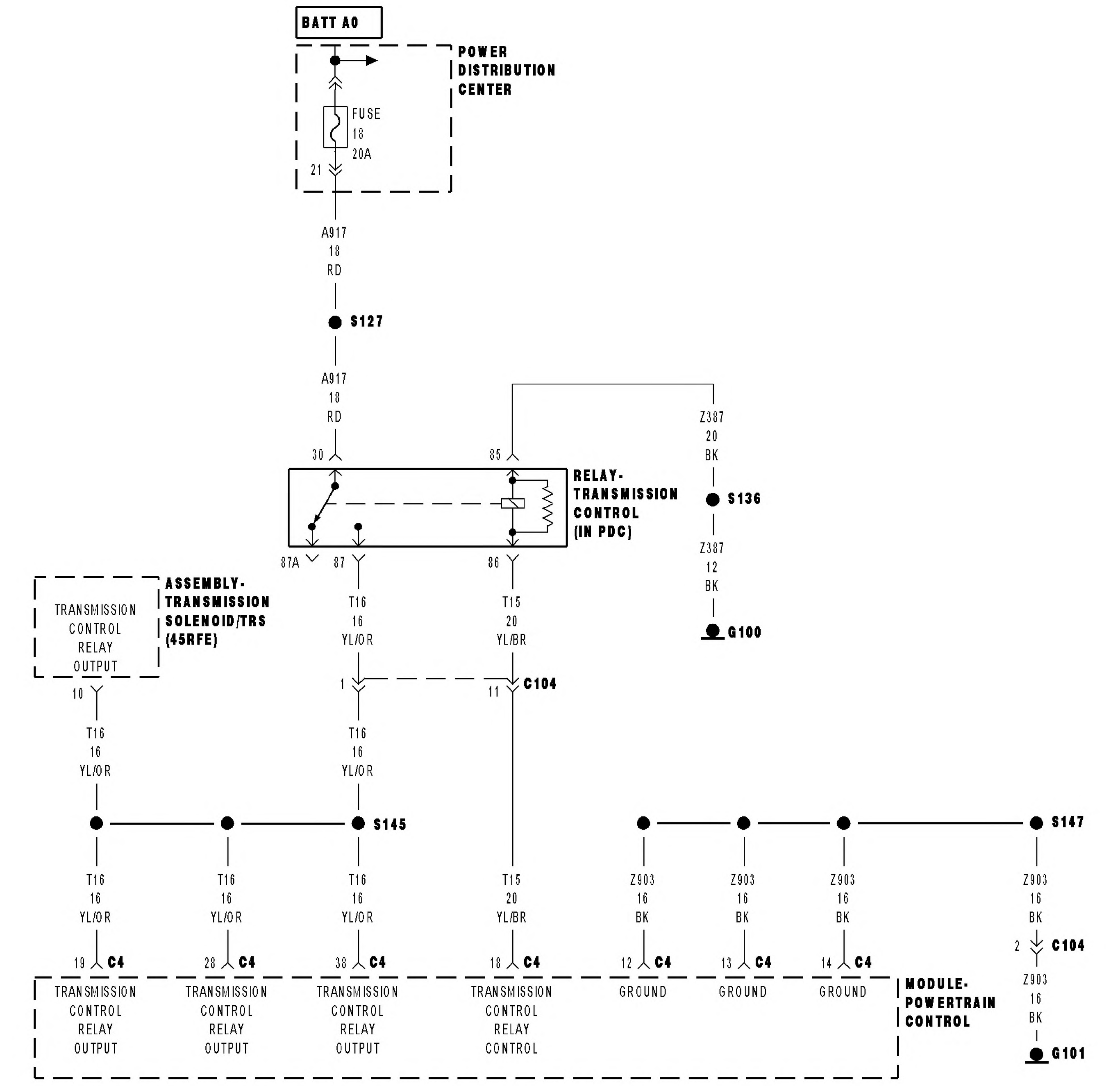
Were there any problems found?

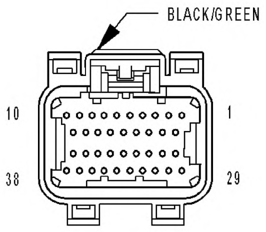
Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

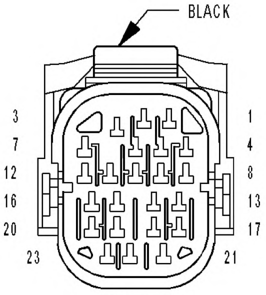
No >> Test Complete.

P0884-POWER UP AT SPEED


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD
S127
A917 18 RD
30
85
Z387 20 BK
RELAY-TRANSMISSION CONTROL (IN PDC)
S136
Z387 12 BK
G100
87A
87
86
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
TRANSMISSION CONTROL RELAY OUTPUT
T16 16 YL/OR
T15 20 YL/BR
1
11
C104
10
T16 16 YL/OR
T16 16 YL/OR
S145
S147
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
Z903 16 BK
Z903 16 BK
Z903 16 BK
Z903 16 BK
2
C104
19 C4
28 C4
38 C4
18 C4
12 C4
13 C4
14 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
GROUND
GROUND
GROUND
MODULE-POWERTRAIN CONTROL
Z903 16 BK
G101


BLACK/GREEN
10
1
38
29

MODULE-POWERTRAIN CONTROL C4


BLACK
3
7
12
16
20
23
1
4
8
13
17
21

ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)

81494a12

P0884-POWER UP AT SPEED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When Powertrain Control Module initially powers up. Due to the integration of the Powertrain and Transmission Control Modules, the transmission part of the PCM has its own specific power and ground circuits.
- **Set Condition:**
  This DTC will set if the PCM powers up and senses the vehicle in a valid forward gear, with no PRNDL DTCs, and an output speed above 800 RPM, approximately 32 Kmh (20 MPH).

Possible Causes
POWER UP AT SPEED

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

If a vehicle loses power to the Transmission Control System, the solenoids (LR, 2C, OD, UD, 4C) will go to their respective power off state. Some solenoids are normally vented and some are normally applied in their power off state. The transmission is designed to be in 3rd gear with all of the solenoids in this state. However, if power is restored, the Transmission Control System will power-up and normal operation will be restored.

This code identifies that power to the Transmission Control System was restored when the gear selector was in a ″Drive″ position while the vehicle was moving at speeds above 32 Kmh (20 MPH). **This DTC does not indicate a problem with the transmission or Transmission Control System,** instead, it suggests intermittent problems in the fused ignition switch output, fused B(+), or ground circuits to the TCM. Alternately, if a person performs a rolling restart maneuver, the DTC can be set. Therefore it is critical that this DTC be investigated if the vehicle is experiencing intermittent 3rd gear operation and a subsequent return to normal operation.

Diagnostic Test

1. CHECK FOR INTERMITTENT POWER AND GROUND CIRCUITS

This DTC is set when the Transmission portion of the Powertrain Control Module is initialized while the vehicle is moving down the road in a valid forward gear.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

NOTE: Due to the integration of the Powertrain and Transmission Control Modules, the transmission part of the PCM has its own specific power and ground circuits.

Check all of the Fused B(+), Fused Ignition Switch Output, and ground circuits to the PCM for an intermittent open or short to ground.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

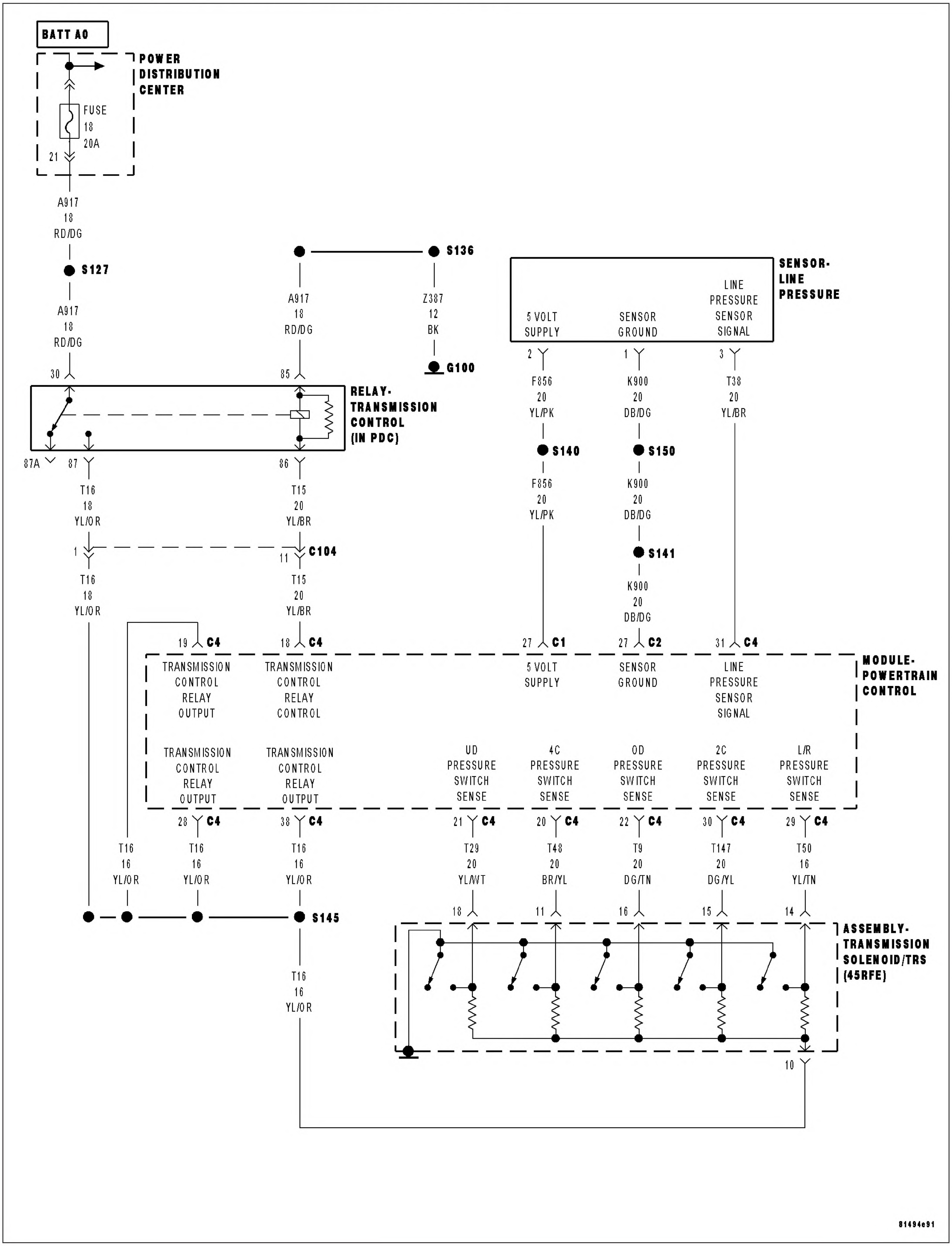
If there are no possible causes remaining, view repair.

Repair

Check all power and ground circuits to the PCM and repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0888-TRANSMISSION RELAY ALWAYS OFF


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0888-TRANSMISSION RELAY ALWAYS OFF (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  When the ignition is turned from ″OFF″ position to ″RUN″ position and/or the ignition is turned from ″START″ position to ″RUN″ position.
- **Set Condition:**
  This DTC is set when less than 3.0 volts are present at the transmission control relay output circuits at the Powertrain Control Module when the PCM is energizing the relay.

Possible Causes
(A104) FUSED B+ CIRCUIT OPEN
(T16) TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
(T16) TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT SHORT TO GROUND
(T15) TRANSMISSION CONTROL RELAY CONTROL CIRCUIT OPEN
(T15) TRANSMISSION CONTROL RELAY CONTROL CIRCUIT SHORT TO GROUND
(Z915) TRANSMISSION CONTROL RELAY GROUND CIRCUIT OPEN
TRANSMISSION CONTROL RELAY STUCK OPEN
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission control relay is used to supply power to the solenoids and pressure switches when the transmission is in normal operating mode. The relay output is fed back to the TCM through pins 16, 17, and 36. It is referred to as ″Transmission Control Relay Output″. This circuit does not supply power to the TCM, it is only a sense circuit. When the relay is off, no power is supplied to the solenoids and pressure switches, and the transmission is in ″limp-in″ or ″default″ mode. **Note: Inadequate Transmission Control Relay Output voltage can also cause DTCs P0846, P0869, P0871, P0876 or P0988 to set. This does not indicate an internal transmission or solenoid/ TRS problem. Repairing the P0888 fault should also eliminate the related DTCs.**

Diagnostic Test

1. CHECK TO SEE IF DTC P0888 IS CURRENT

With the scan tool, Check the STARTS SINCE SET counter for P0888.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter equal to 0?

Yes >> Go To 2

No >> Go To 9

P0888-TRANSMISSION RELAY ALWAYS OFF (CONTINUED)

2. (A104) FUSED B+ CIRCUIT OPEN

Turn the ignition off to the lock position.

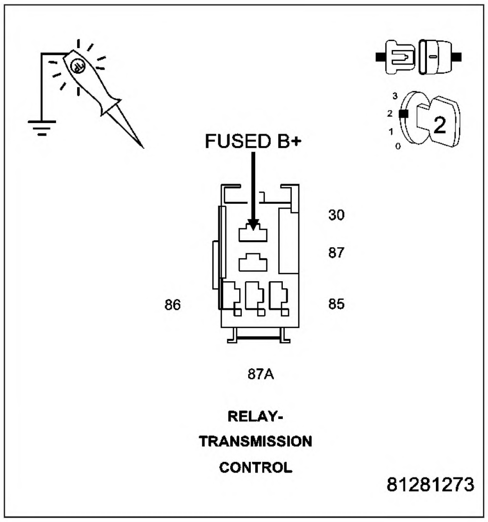
Remove the Transmission Control Relay.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, check the (A104) Fused B+ circuit in the Transmission Control Relay connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.



Does the test light illuminate brightly?

Yes >> Go To 3

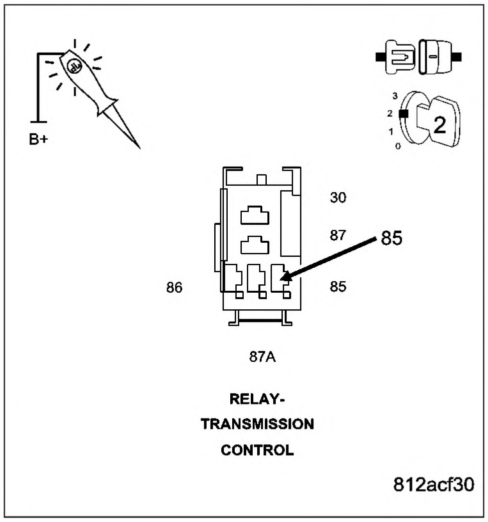
No >> Repair the (A104) Fused B+ circuit for an open. If the fuse is open make sure to check for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

3. (Z915) TRANSMISSION CONTROL RELAY GROUND CIRCUIT OPEN

Turn the ignition off to the lock position.

Using a 12-volt test light connected to 12-volts, check the (Z915) Transmission Control Relay Ground circuit in the Transmission Control Relay connector.



Does the test light illuminate brightly?

Yes >> Repair the (Z915) Transmission Control Relay Ground circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. TRANSMISSION CONTROL RELAY

Install a substitute relay in place of the Transmission Control Relay.

Start the vehicle.

With the scan tool, check transmission DTCs.

Did the DTC P0888 reset?

Yes >> Replace the Transmission Control Relay.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

P0888-TRANSMISSION RELAY ALWAYS OFF (CONTINUED)

5. (T16) TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

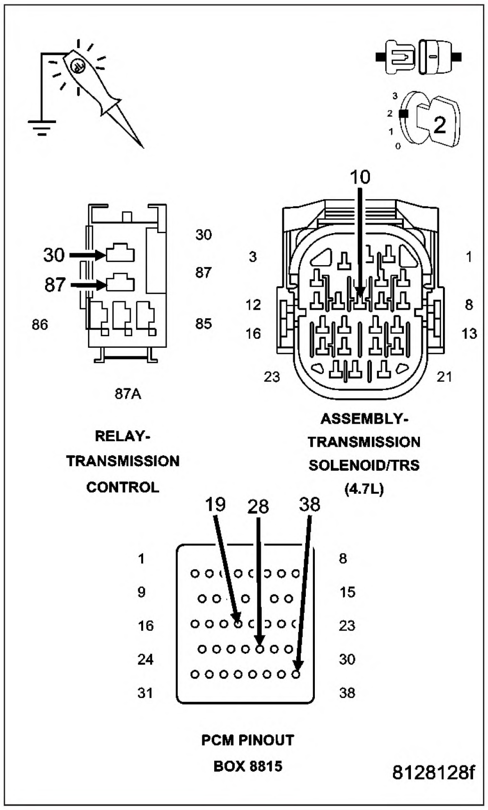
Disconnect the Transmission Solenoid/TRS Assembly harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Connect a jumper wire between the (A104) Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, check all four (T16) Transmission Control Relay Output circuits in the PCM C4 harness connector and Transmission Solenoid/TRS Assembly harness connector.



10
30
87
86
30
87
85
87A
3
1
12
8
16
13
23
21
RELAY-
TRANSMISSION
CONTROL
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
19
28
38
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
2
8128128f

Does the test light illuminate brightly on all four (T16) Transmission Control Relay Output circuits?

Yes >> Go To 6

No >> Repair the (T16) Transmission Control Relay Output circuit(s) for an open or high resistance.

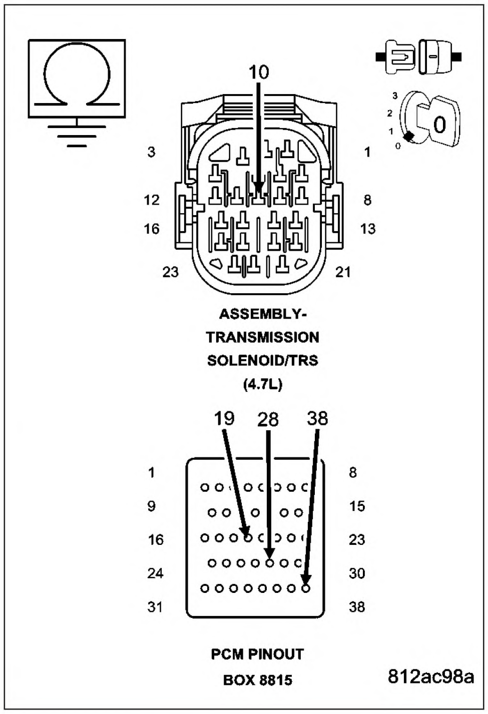
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

6. (T16) TRANSMISSION RELAY OUTPUT CIRCUIT SHORT TO GROUND

Turn the ignition off to the lock position.

Measure the resistance between ground and the (T16) Transmission Control Relay Output circuit.



10
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
19
28
38
1
9
16
24
31
8
15
23
30
38
PCM PINOUT
BOX 8815
0
812ac98a

Is the resistance below 5.0 ohms?

Yes >> Repair the (T16) Transmission Control Relay Output circuit for a short to ground.

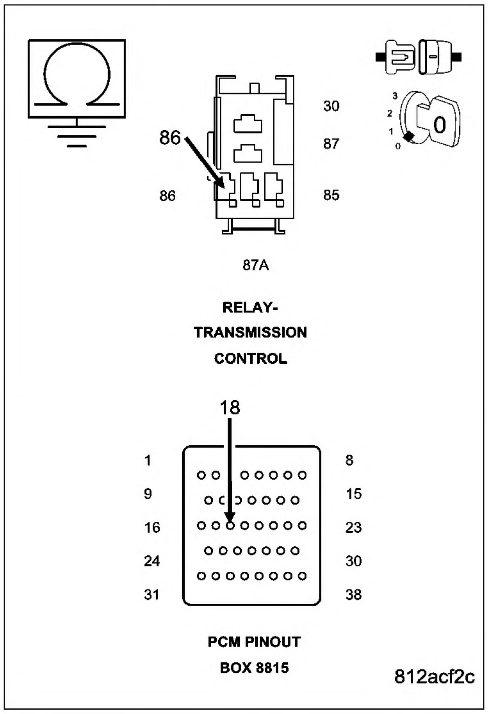
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

P0888-TRANSMISSION RELAY ALWAYS OFF (CONTINUED)

7. (T15) TRANSMISSION CONTROL RELAY CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T15) Transmission Control Relay Control circuit.


86
30
87
86
85
87A
RELAY-
TRANSMISSION
CONTROL
18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812acf2c

Is the resistance below 5.0 ohms?

Yes >> Repair the (T15) Transmission Control Relay Control circuit for a short to ground.

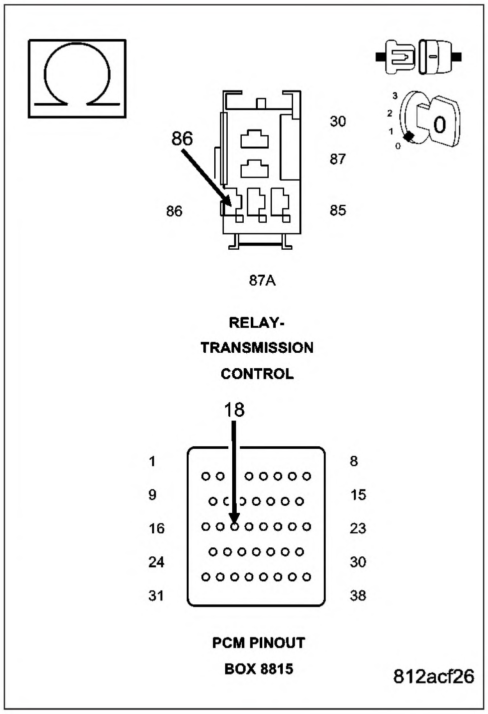
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. (T15) TRANSMISSION CONTROL RELAY CONTROL CIRCUIT OPEN

Measure the resistance of the (T15) Transmission Control Relay Control circuit between the Transmission Control Relay connector and the appropriate terminal of Miller tool #8815.


86
30
87
86
85
87A
RELAY-
TRANSMISSION
CONTROL
18
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812acf26

Is the resistance above 5.0 ohms?

Yes >> Repair the (T15) Transmission Control Relay Control circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0888-TRANSMISSION RELAY ALWAYS OFF (CONTINUED)

9. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

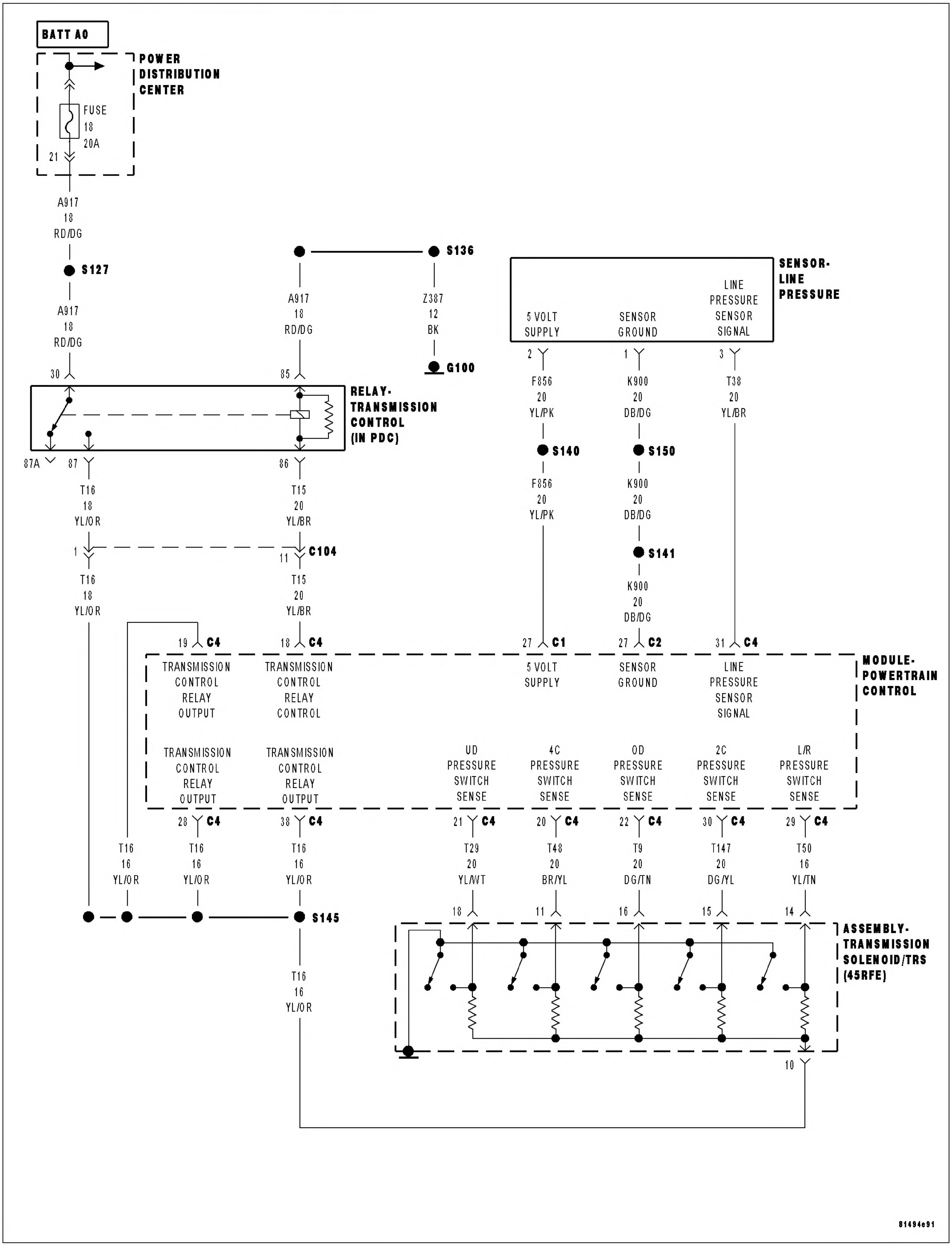
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0890-SWITCHED BATTERY


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0890-SWITCHED BATTERY (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the ignition is turned from ″OFF″ position to ″RUN″ position and/or the ignition is turned from ″START″ position to ″RUN″ position.
- **Set Condition:**
  This DTC is set if the Powertrain Control Module senses voltage on any of the pressure switch inputs prior to the Transmission Control Relay being energized.

Possible Causes
PRESSURE SWITCH SENSE CIRCUITS SHORT TO VOLTAGE
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission control relay is used to supply power to the solenoids and pressure switches (Transmission Solenid/TRS Assembly) when the transmission is in normal operating mode. When the relay is off, no power is supplied and the transmission is in ″limp-in″ mode. The relay output is fed back to the PCM through pins C4–19, C4–28 and C4–38 and are referred to as ″Transmission Control Relay Output″.

Immediately after a controller reset (ignition key turned to the ″run″ position or after cranking engine), the TCM verifies that the relay contacts are open by checking for no voltage at the transmission control relay output terminals. After this is verified, the voltage at the pressure switches are checked. There should be no voltage on the pressure switches at this time. The PCM will then activate the relay.

Diagnostic Test

1. CHECK TO SEE IF DTC P0890 IS PRESENT

With the scan tool, Check the STARTS SINCE SET counter for P0890.

NOTE: This counter only applies to the last DTC set.

Is the ″Starts Since Set″ counter set at 0?

Yes >> Go To 2

No >> Go To 4

P0890-SWITCHED BATTERY (CONTINUED)

2. PRESSURE SWITCH SENSE CIRCUITS SHORT TO VOLTAGE

Turn the ignition off to the lock position.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

Remove the Transmission Control Relay.

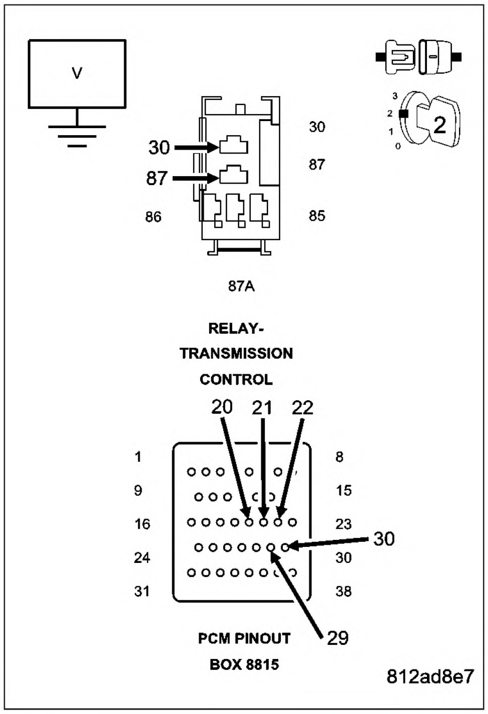
NOTE: Note: Check connectors - Clean/repair as necessary.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector.

Ignition on, engine not running.

Measure the voltage of the (T147) 2C, (T48) 4C, (T50) LR, (T9) OD, and (T29) UD Pressure Switch Sense circuits in Miller tool #8815.



Is the voltage above 0.5 volt on any of the measured circuits?

Yes >> Repair the (T147) 2C, (T48) 4C, (T50) LR, (T9) OD, and/or (T29) UD Pressure Switch Sense circuit(s) for a short to voltage.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. TRANSMISSION SOLENOID/TRS ASSEMBLY

Turn the ignition off.

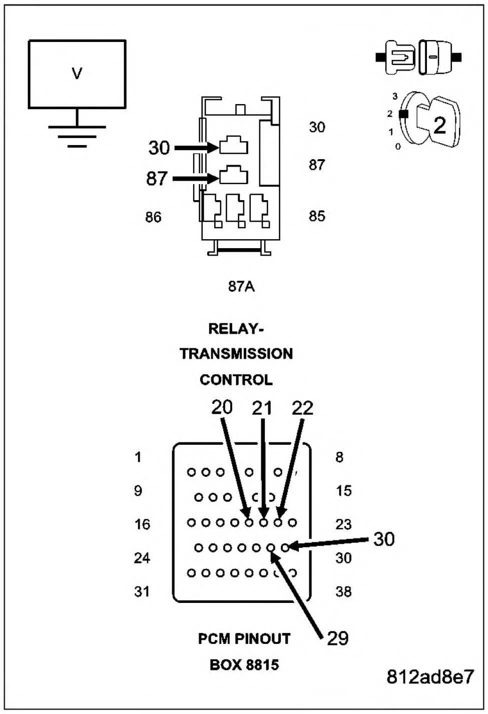
Remove the jumper wire.

NOTE: Do not reinstall the Transmission Relay.

Reconnect the Transmission Solenoid/TRS Assembly harness connector.

Ignition on, engine not running.

Measure the voltage of the (T147) 2C, (T48) 4C, (T50) LR, (T9) OD, and (T29) UD Pressure Switch Sense circuits in Miller tool #8815.



Is the voltage above 0.5 volts on any of the sense circuits?

Yes >> Replace the Transmission Solenoid/TRS Assembly.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0890-SWITCHED BATTERY (CONTINUED)

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

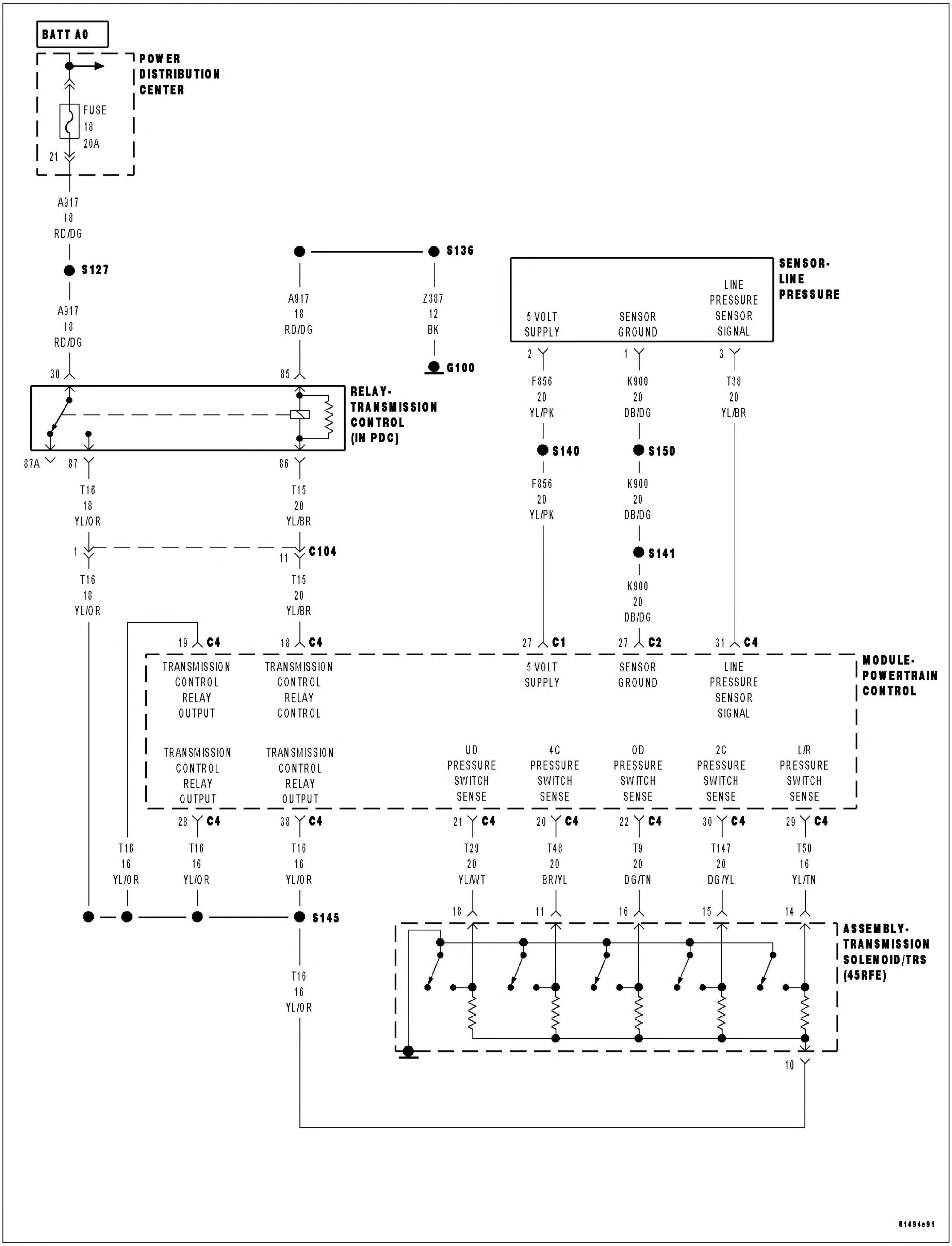
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0891-TRANSMISSION RELAY ALWAYS ON


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
30
S136
A917 18 RD/DG
Z387 12 BK
G100
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0891-TRANSMISSION RELAY ALWAYS ON (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the ignition is turned from ″OFF″ position to ″RUN″ position and/or the ignition is turned from ″START″ position to ″RUN″ position.
- **Set Condition:**
  This DTC is set if the Powertrain Control Module senses greater than 3.0 volts on the Transmission Control Relay Output circuits prior to a request from the PCM to energize the Transmission Control Relay.

Possible Causes
(T15) TRANSMISSION CONTROL RELAY CONTROL CIRCUIT SHORT TO VOLTAGE
(T16) TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT SHORT VOLTAGE
TRANSMISSION CONTROL RELAY
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control Relay is used to supply power (Transmission Control Relay Output) to the Transmission Solenoid/TRS Assembly when in normal operating mode and to pins C4–19, C4–28 and C4–38 of the PCM. The purpose of the Transmission Control Relay is to allow the PCM to turn off the power to the Transmission Solenoid/TRS Assembly in event that the transmission should need to be placed into “limp-in” mode due to a DTC.

After a PCM reset, (ignition switch turned to the run position, or after cranking engine) the PCM verifies that the Transmission Control Relay contacts are open by checking for voltage on the Transmission Control Relay Output circuit before the Transmission Control Relay is energized. If voltage is detected, the DTC will set.

Diagnostic Test

1. CHECK TO SEE IF DTC P0891 IS CURRENT

With the scan tool, check the STARTS SINCE SET counter.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter set to 0?

Yes >> Go To 2

No >> Go To 6

P0891-TRANSMISSION RELAY ALWAYS ON (CONTINUED)

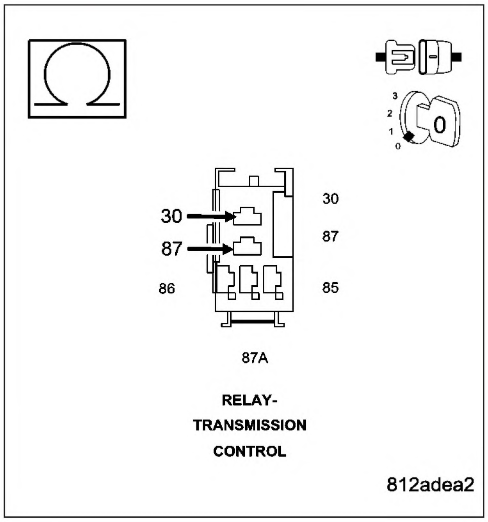
2. TRANSMISSION CONTROL RELAY

Turn the ignition off to the lock position.

Disconnect the Transmission Control Relay.

NOTE: Note: Check connectors - Clean/repair as necessary.

Measure the resistance between the (A104) Fused B+ circuit and the (T16) Transmission Control Relay Output Circuit of the Transmission Control Relay.



3
2
1
0
0
30
87
30
87
86
85
87A
RELAY-
TRANSMISSION
CONTROL
812adea2

Is the resistance above 5.0 ohms?

Yes >> Go To 3

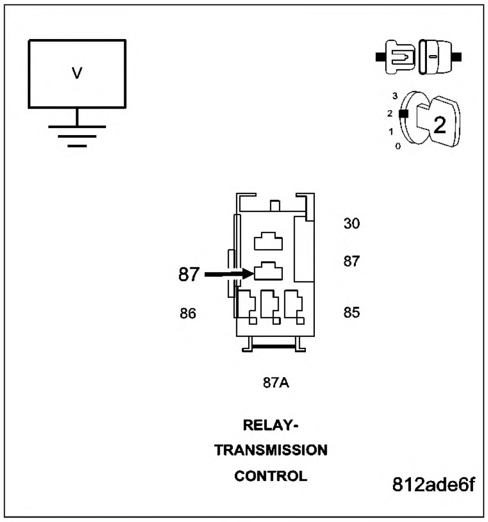
No >> Replace the Transmission Control Relay.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

3. (T16) TRANSMISSION RELAY OUTPUT CIRCUIT SHORT TO VOLTAGE

Ignition on, engine not running.

Measure the voltage at the (T16) Transmission Control Relay Output circuit in the Transmission Control Relay connector.



V
3
2
1
0
2
30
87
87
86
85
87A
RELAY-
TRANSMISSION
CONTROL
812ade6f

Is the voltage above 0.5 volts?

Yes >> Go To 4

No >> Go To 5

P0891-TRANSMISSION RELAY ALWAYS ON (CONTINUED)

4. TRANSMISSION SOLENOID/TRS ASSEMBLY

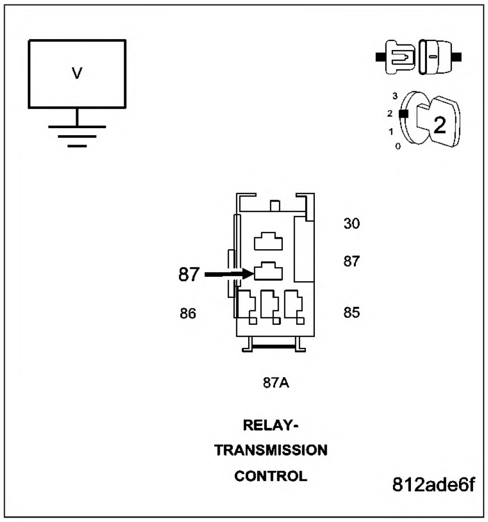
Turn the ignition off to the lock position.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

NOTE: NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

Measure the voltage at the (T16) Transmission Control Relay Output circuit in the Transmission Control Relay connector.



Is the voltage above 0.5 volts?

Yes >> Repair the (T16) Transmission Control Relay Output circuit for a short to voltage.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

5. (T15)TRANSMISSION CONTROL RELAY CONTROL CIRCUIT SHORT TO VOLTAGE

Turn the ignition off to the lock position.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

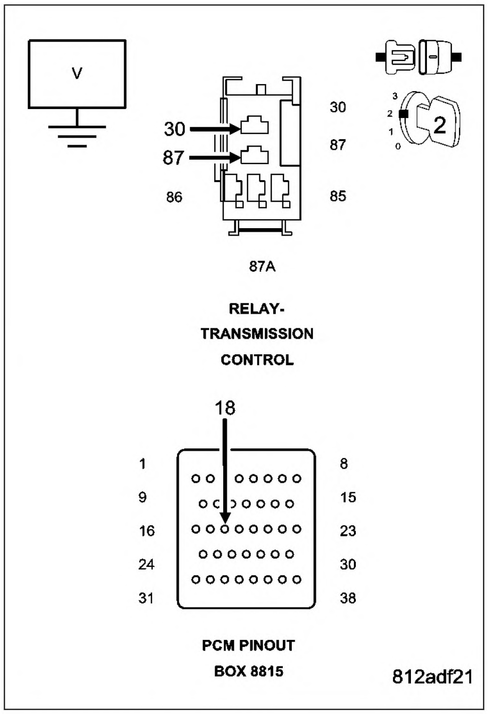
Disconnect the Transmission Solenoid/TRS Assembly harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Connect a jumper wire between the (A104) Fused B+ circuit and the (T16) Transmission Control Relay Output circuit in the Transmission Control Relay connector.

Ignition on, engine not running.

Measure the voltage of the (T15) Transmission Control Relay Control circuit.



Is the voltage above 0.5 volts?

Yes >> Repair the (T15) Transmission Control Relay Control circuit for a short to voltage.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0891-TRANSMISSION RELAY ALWAYS ON (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

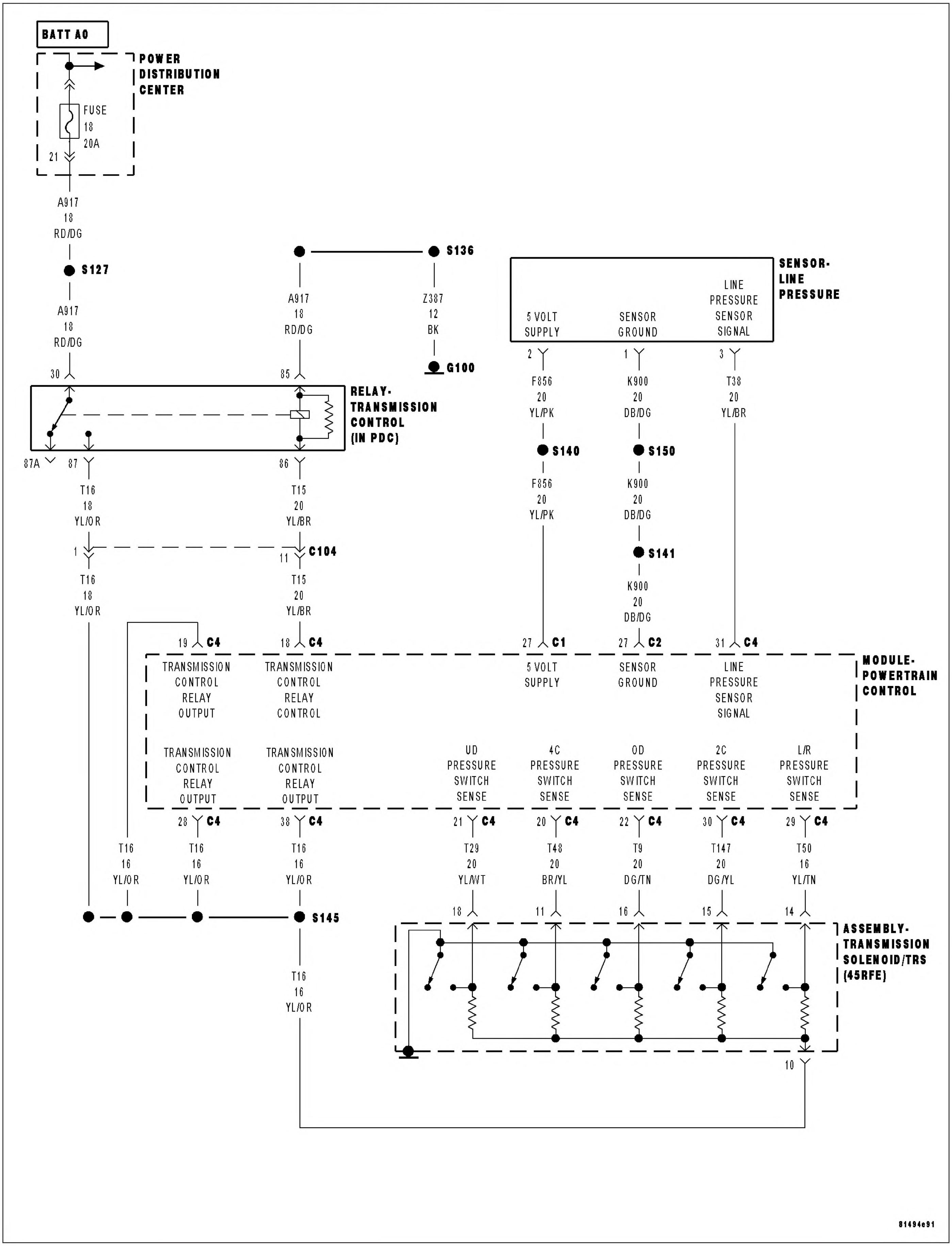
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0932-LINE PRESSURE SENSOR CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
30
85
S136
A917 18 RD/DG
Z387 12 BK
G100
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0932-LINE PRESSURE SENSOR CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  The PCM continuously monitors Actual Line Pressure and compares it to Desired Line Pressure. If the Actual Line Pressure reading is more than 172.4 kPa (25 psi) higher than the Desired Line Pressure, but is less than the highest Line Pressure ever used in the current gear, the DTC sets.

Possible Causes
RELATED DTC'S PRESENT
LINE PRESSURE CONNECTOR AND WIRING
INTERNAL TRANSMISSION
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Line pressure is electronically controlled by the Transmission Control System and is measured by the Line Pressure Sensor (LPS). The desired line pressure is continuously being compared to the actual line pressure and is regulated by electronically changing the duty cycle of the Pressure Control Solenoid (PCS). (5% duty cycle = solenoid off = max line pressure, 62% duty cycle = solenoid on = min line pressure).

The Transmission Control System calculates the desired line pressure based on inputs from the transmission and engine. A calculated torque input to the transmission is used as the primary input of the desired line pressure calculation and is called Torque Based Line Pressure. In addition, the line pressure is set to a preset level 827 to 931kPa (120 to 135 PSI) during shifts and in Park and Neutral to ensure consistent shift quality.

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's.

Are there any other line pressure related DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. Perform the test for P0934 and/or P0935 first if present.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0932-LINE PRESSURE SENSOR CIRCUIT (CONTINUED)

2. CONDITION P0932 PRESENT

CAUTION: Apply Parking Brake

Start the engine.

CAUTION: Firmly apply the brakes.

With the scan tool, monitor the Line Pressure, Desired Line Pressure and the TPS degrees.

While firmly applying the brakes, place the shifter in reverse, then slowly press the accelerator pedal to a TPS degree of 15°.

Compare the Line Pressure reading to the Desired Line Pressure reading on the scan tool.

Does the Line Pressure stay within ± 34 kPa or 5 PSI of the Desired Line Pressure?

No >> Go To 3

Yes >> Go To 5

---

3. CHECK LINE PRESSURE CONNECTOR AND WIRING

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure Sensor voltage while wiggling the wiring harness and connectors pertaining to the Line Pressure Sensor and the Transmission Solenoid/TRS Assembly.

Did the voltage remain steady while wiggling the wiring harness and connectors?

Yes >> Go To 4

No >> Disconnect and properly reconnect the Line Pressure Sensor connector. Inspect terminals and repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

4. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

With the Transmission Simulator select the ″OFF″ position on the ″Input/Output Speed″ switch.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure during the following step.

With the Transmission Simulator, turn the selector switch to each of the 3 Line Pressure positions.

NOTE: All three scan tool Line Pressure readings should be steady and ±14 kPa or 2.0 PSI of the reading specified on the Transmission Simulator.

Does the Line Pressure on the scan tool fluctuate up and down more than 69 kPa or 10 PSI at any of the 3 line pressure positions on the Transmission Simulator?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair internal transmission and inspect the oil pump per the Service information and replace if necessary. If no problems are found, replace the Transmission Solenoid/TRS Assembly — possible cause is the Pressure Control Solenoid is stuck.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0932-LINE PRESSURE SENSOR CIRCUIT (CONTINUED)

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

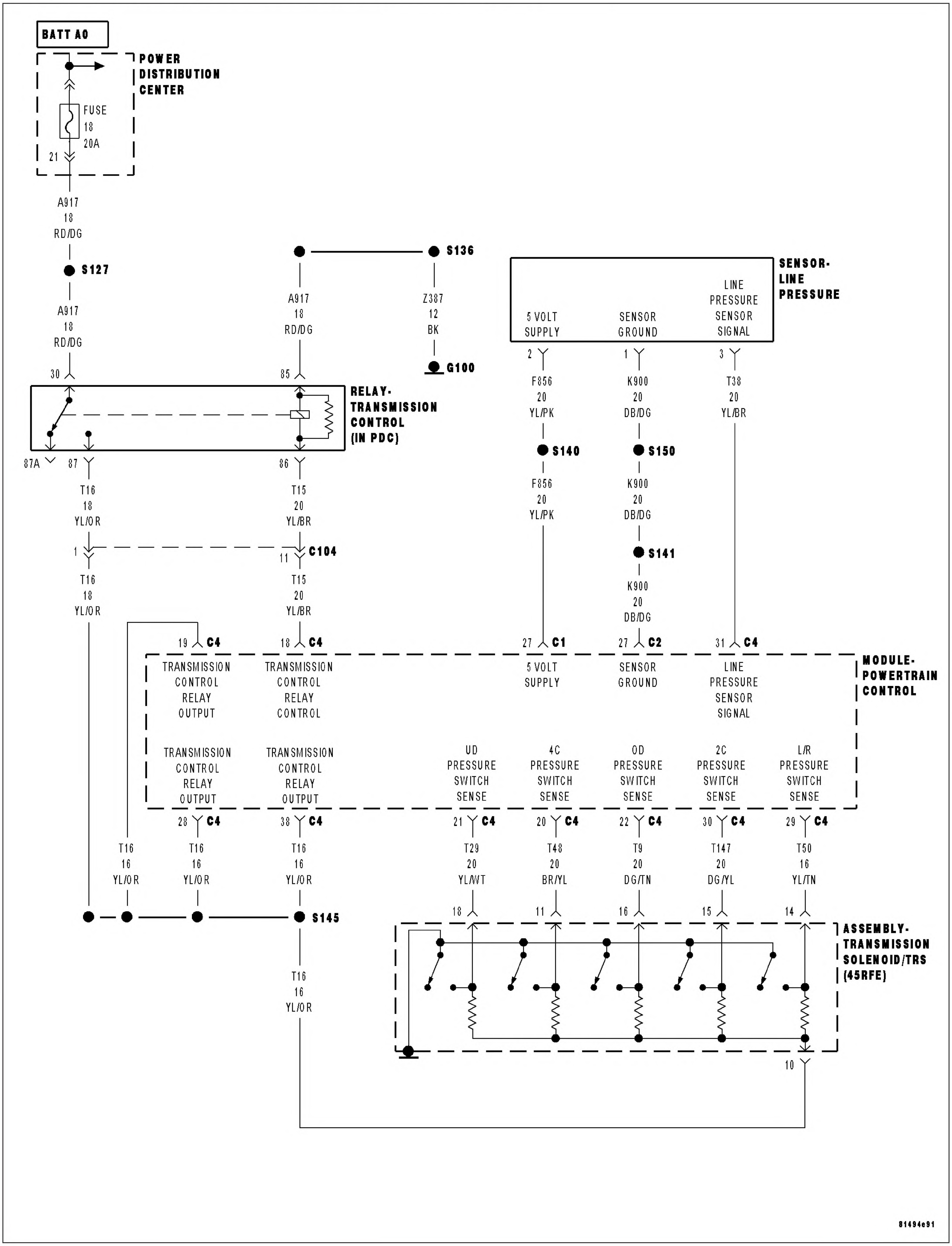
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0934-LINE PRESSURE SENSOR CIRCUIT LOW


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0934-LINE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on and engine running.
- **Set Condition:**
  This DTC will set when the monitored Line Pressure Sensor voltage is less than or equal to 0.35 volts for 0.18 seconds.

Possible Causes
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(T38) LINE PRESSURE SENSOR SIGNAL CIRCUIT SHORT TO GROUND
LINE PRESSURE SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Line pressure is electronically controlled by the Transmission Control System and is measured by the Line Pressure Sensor (LPS). The desired line pressure is continuously being compared to the actual line pressure and is regulated by electronically changing the duty cycle of the Pressure Control Solenoid (PCS). (5% duty cycle = solenoid off = max line pressure, 62% duty cycle = solenoid on = min line pressure).

The Transmission Control System calculates the desired line pressure based on inputs from the transmission and engine. A calculated torque input to the transmission is used as the primary input of the desired line pressure calculation and is called Torque Based Line Pressure. In addition, the line pressure is set to a preset level 827 to 931 kPa (120 to 135 PSI) during shifts and in Park and Neutral to ensure consistent shift quality.

The monitored Line Pressure Sensor voltage should always be between 0.35 and 4.75 volts. Any monitored voltages outside these parameters indicate an Line Pressure Sensor or wiring problem and will cause either DTC P0934 or P0935 to set.

Diagnostic Test

1. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, check the STARTS SINCE SET counter for P0934.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 2

No >> Go To 6

P0934-LINE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

2. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

Ignition on, engine not running.

With the scan tool, under Transmission Sensors, monitor the Line Pressure.

Using the Transmission Simulator, set the rotary switch to each of the 3 line pressure positions.

NOTE: The readings should be within ±14 kPa or 2.0 PSI on the scan tool to the pressure readings specified on Transmission Simulator.

Does the Line Pressure on the scan tool match the line pressures on the Transmission Simulator?

Yes >> Replace the Line Pressure Sensor per the Service Information.
Perform (NGC) 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. (T38) LINE PRESSURE SENSOR SIGNAL CIRCUIT SHORT TO GROUND

Turn the ignition off to the lock position.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Disconnect the Transmission Simulator, Miller tool #8333.

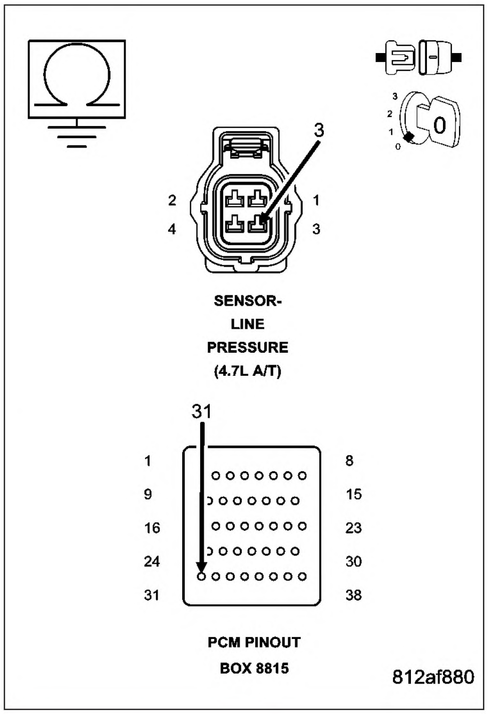
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance between ground and the (T38) Line Pressure Sensor Signal circuit.

Is the resistance below 5.0 ohms?

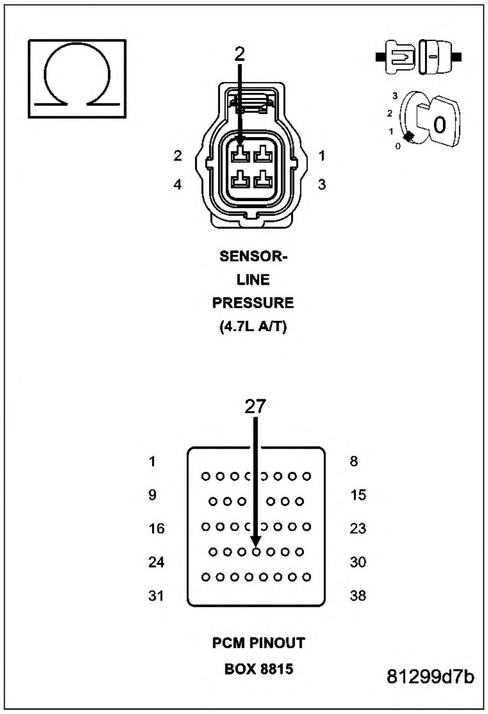
Yes >> Repair the (T38) Line Pressure Sensor Signal circuit for a short to ground.
Perform (NGC) 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4



P0934-LINE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

4. (F856) 5-VOLT SUPPLY CIRCUIT OPEN


2
2
1
4
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d7b

Disconnect the PCM C1 harness connector and connect Miller tool #8815.

Measure the resistance of the (F856) 5-volt Supply circuit between Line Pressure sensor harness connector and the appropriate terminal of Miller tool #8815.

Is the resistance below 5.0 ohms?

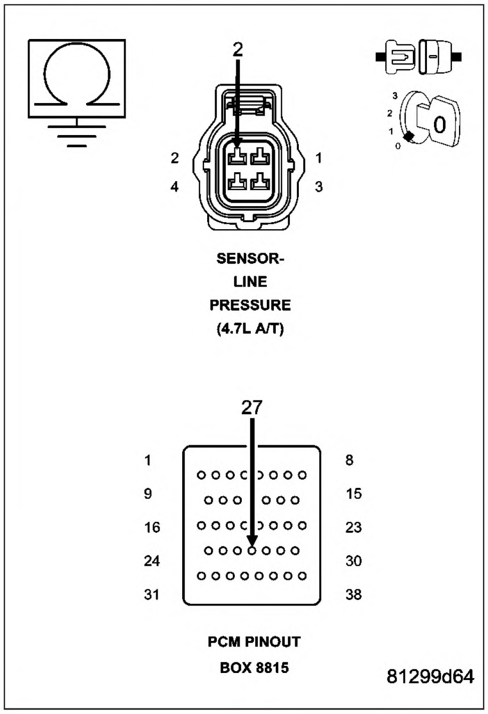
Yes >> Repair the (F856) 5-volt Supply circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND


2
2
1
4
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299d64

Disconnect the PCM C1 harness connector and connect Miller tool #8815.

Measure the resistance between ground and the (F856) 5-volt Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to ground.

Perform (NGC) 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0934-LINE PRESSURE SENSOR CIRCUIT LOW (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

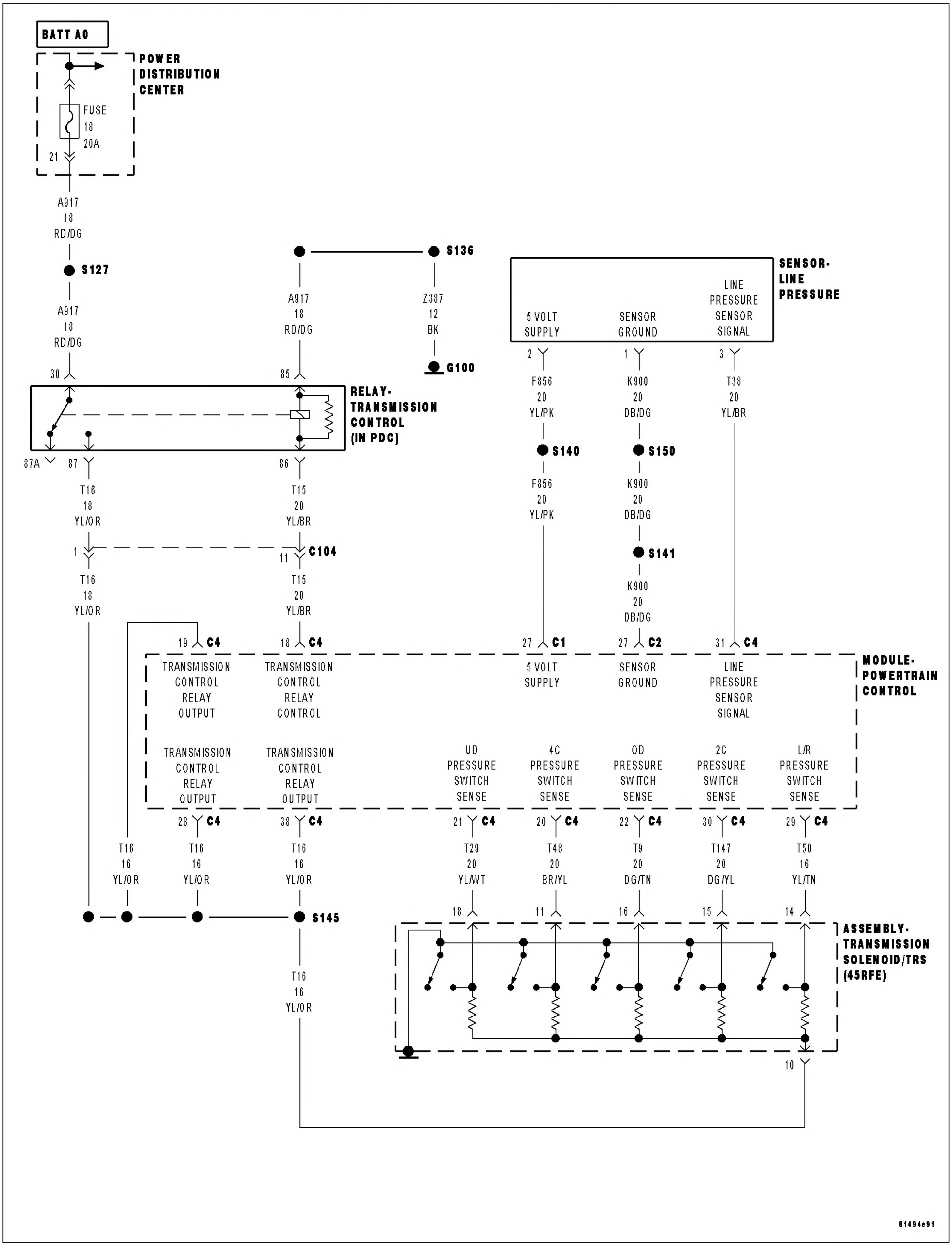
With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0935-LINE PRESSURE SENSOR CIRCUIT HIGH


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0935-LINE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with ignition on and engine running.
- **Set Condition:**
  This DTC will set if the monitored Line Pressure Sensor voltage is greater than or equal to 4.75 volts for the period of 0.18 seconds

Possible Causes
(T38) LINE PRESSURE SENSOR SIGNAL CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(T38) LINE PRESSURE SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
LINE PRESSURE SENSOR
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

Line pressure is electronically controlled by the Transmission Control System and is measured by the Line Pressure Sensor (LPS). The desired line pressure is continuously being compared to the actual line pressure and is regulated by electronically changing the duty cycle of the Pressure Control Solenoid (PCS). (5% duty cycle = solenoid off = max line pressure, 62% duty cycle = solenoid on = min line pressure).

The Transmission Control System calculates the desired line pressure based on inputs from the transmission and engine. A calculated torque input to the transmission is used as the primary input of the desired line pressure calculation and is called Torque Based Line Pressure. In addition, the line pressure is set to a preset level 827 to 931 kPa (120 to 135 PSI) during shifts and in Park and Neutral to ensure consistent shift quality.

The monitored Line Pressure Sensor voltage should always be between 0.35 and 4.75 volts. Any monitored voltages outside these parameters indicate an Line Pressure Sensor or wiring problem and will cause either DTC P0934 or P0935 to set.

Diagnostic Test

1. CHECK TO SEE IF DTC IS CURRENT

With the scan tool, Check the STARTS SINCE SET counter for P0935.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 2

No >> Go To 6

P0935-LINE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

2. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure.

Using the Transmission Simulator, set the rotary switch to each of the 3 line pressure positions.

NOTE: The readings should be within ±14 kPa or 2.0 PSI on the scan tool of the pressure reading specified on Transmission Simulator.

Does the 3 line pressures on the scan tool match the Line pressure readings on the Transmission Simulator?

Yes >> Replace the Line Pressure Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. (K900) SENSOR GROUND CIRCUIT OPEN

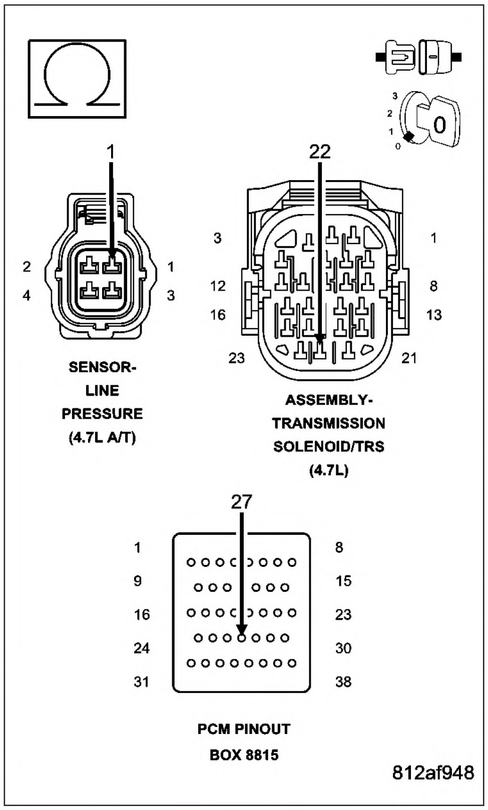
Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM C2 harness connector and connect Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (K900) Sensor Ground circuit from the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.



Is the resistance above 5.0 ohms?

Yes >> Repair the (K900) Sensor Ground circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

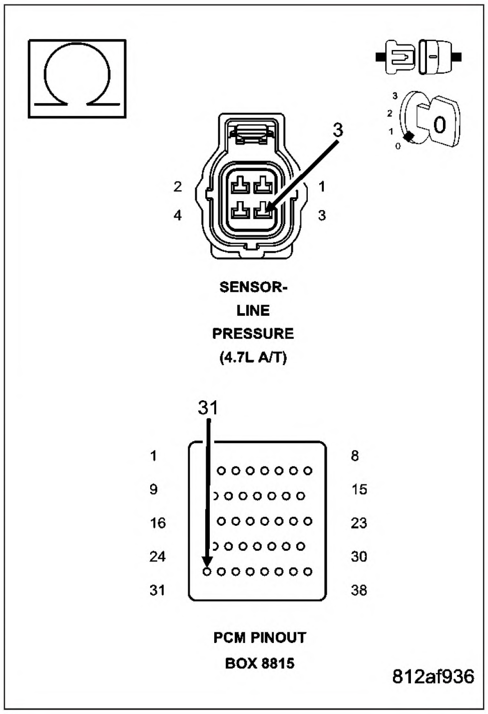
No >> Go To 4

P0935-LINE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

4. (T38) LINE PRESSURE SENSOR SIGNAL CIRCUIT OPEN

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Measure the resistance of the (T38) Line Pressure Sensor Signal circuit from the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.


Ω
3
2
1
0
0
3
2
1
4
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
31
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812af936

Is the resistance above 5.0 ohms?

Yes >> Repair the (T38) Line Pressure Sensor Signal circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

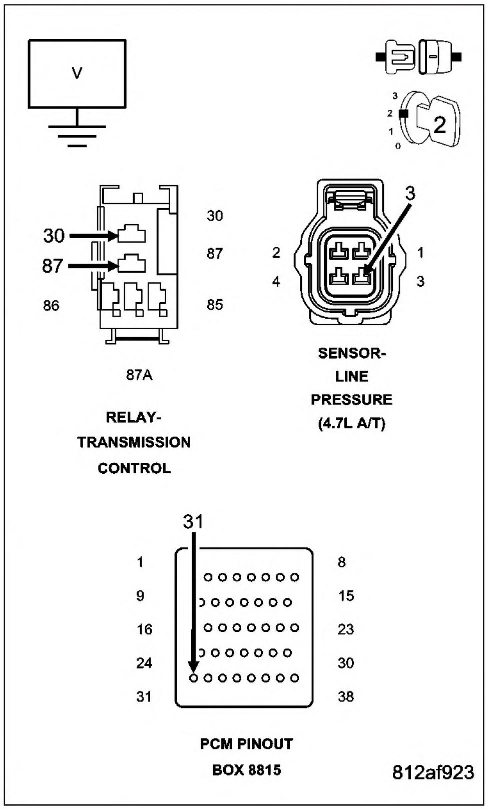
5. (T38) LINE PRESSURE SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE

Remove the Transmission Control Relay.

Connect a jumper wire between the (A104) Fused B+ circuit and the (T16) Transmission Control Relay Output circuit in the Transmission Control Relay connector.

Ignition on, engine not running.

Measure the voltage of the (T38) Line Pressure Sensor Signal circuit.


V
3
2
1
0
2
30
87
30
87
86
85
87A
RELAY-
TRANSMISSION
CONTROL
3
2
1
4
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
31
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812af923

Is the voltage above 5.5 volts?

Yes >> Repair the (T38) Line Pressure Sensor Signal circuit for a short to voltage.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0935-LINE PRESSURE SENSOR CIRCUIT HIGH (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0944-LOSS OF HYDRAULIC PUMP PRIME

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  If the transmission is slipping in any forward gear and all the pressure switches are not indicating pressure, a loss of prime test is run.
- **Set Condition:**
  If the transmission begins to slip in a forward gear and all the pressure switch(s) that should be closed are open a loss of prime test begins. Available elements are turned on by the PCM to see if pump prime exists. The DTC sets if no pressure switch(s) respond.

Possible Causes
SHIFT LEVER OUT OF ADJUSTMENT
INPROPER FLUID LEVEL
CRACKED OR IMPROPERLY INSTALLED PRIMARY OIL FILTER OR SEAL
LOOSE COOLER RETURN FILTER
STUCK OR STICKING MAIN REGULATOR VALVE
TRANSMISSION OIL PUMP

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Loss of prime test is used to prevent transmission defaults and erroneous fault codes during temporary loss of pump prime that may occur with low transmission fluid under severe braking conditions, start-up, etc. and to point towards more subtle problems such as a plugged or cracked oil filter.

The Loss of Prime DTC is set by a loss of hydraulic pressure in the transmission system. This condition, if sustained, will result in the vehicle being unable to move.

Diagnostic Test

1. SHIFT LEVER POSITION TEST

Using the scan tool, perform a Shift Lever Position test. Follow the instructions on the scan tool.

Did the Shift Lever Position Test pass?

Yes >> Go To 2

No >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0944-LOSS OF HYDRAULIC PUMP PRIME (CONTINUED)

2. CHECK TO SEE IF DTC P0944 IS CURRENT

Place the gear selector in Park.

Start the engine.

The transmission must be at operating temperature prior to checking pressure. A cold transmission will give higher readings.

Run the engine at 1500 RPM.

With the scan tool, monitor the Transmission Line Pressure.

Does the Line Pressure match the Desired Line Pressure within ± 5 psi?

No >> Go To 6

Yes >> Go To 3

---

3. CHECK LINE PRESSURE IN DRIVE AND REVERSE

Firmly apply the brake and repeat the previous test in both Drive and the Reverse gear positions.

With the scan tool, monitor the Transmission Line Pressure.

Does the Line Pressure match the Desired Line Pressure within ± 5 psi in all gear ranges?

Yes >> Go To 4

No >> Go To 5

---

4. REVIEW CUSTOMER COMMENTS

The conditions necessary to set this DTC are not present at this time.

Verify with the customer if a delayed engagement and/or an intermittent ″No Drive″ condition has occurred.

If the customers answer is ″No″ erase the DTC and return the vehicle to the customer.

Make sure to check for any TSBs or controller flash updates that my apply.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Has the customer experienced any delayed engagement and/or ″No Drive″ conditions?

Yes >> Repair internal transmission as necessary. Replace the Transmission Oil Pump if inspection reveals no signs of internal seal leakage. Refer to the Service Information for the proper repair procedure.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

---

5. DTC VERIFICATION

Read and record the DTC and the EATX DTC EVENT DATA information.

Test drive the vehicle and attempt to operate the vehicle within the parameters in which the DTC set.

With the scan tool, read DTCs.

Did any following DTCs set, P0868, P0944, P0841, P0846, P0871, P0876, or P0988?

Yes >> Go To 6

No >> Test Complete.

P0944-LOSS OF HYDRAULIC PUMP PRIME (CONTINUED)

6. CHECK TRANSMISSION OIL FILTER

Remove and inspect the Transmission Oil Pan per the Service Information.

Remove and inspect the Primary Oil Filter per the Service Information.

Inspect the oil filter seal for damage and proper installation.

Does the Oil Pan contain excessive debris and/or is the Oil Filter plugged or seal damaged?

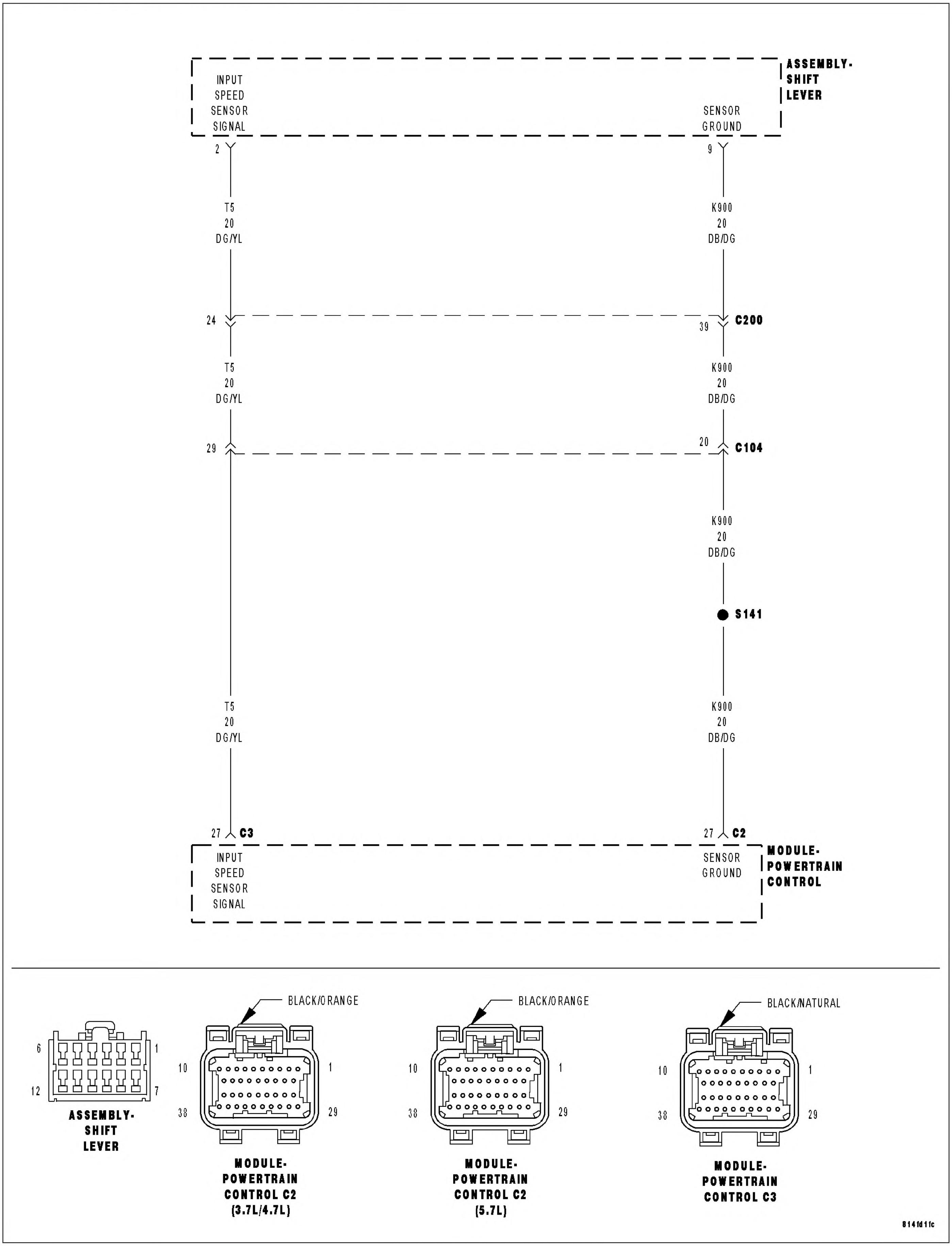
Yes >> Repair the cause of the plugged transmission oil filter or excessive debris. Check the Transmission Oil Filter seal for improper installation onto filter neck instead of into the pump bore, not fully seated against pump housing, filter neck not engaged into pump. Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair the Transmission Oil Pump as necessary. Check for a stuck main regulator valve and clean if necessary. Refer to the Service Information for the proper repair procedure.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0957-AUTOSTICK CIRCUIT LOW


ASSEMBLY-
SHIFT
LEVER
INPUT SPEED SENSOR SIGNAL
SENSOR GROUND
2
9
T5 20 DG/YL
K900 20 DB/DG
24
39
C200
29
20
C104
S141
27
C3
C2
MODULE-
POWERTRAIN
CONTROL
BLACK/ORANGE
BLACK/NATURAL
6
1
12
7
10
38
29
ASSEMBLY-
SHIFT
LEVER
MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)
MODULE-
POWERTRAIN
CONTROL C2
(5.7L)
MODULE-
POWERTRAIN
CONTROL C3
814fd1fc

P0957-AUTOSTICK CIRCUIT LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS) .

For a complete wiring diagram **Refer to Section 8W.**

Theory of Operation

The AutoStick Switch is located in the Shift Lever Assembly (SLA). The gear requested by the AutoStick selection is then sent over the AutoStick Up/Down sense circuit to the PCM to engage the requested gear. Normal AutoStick® voltages are: Down = 0.71 to 1.11 volts, Up = 2.02 to 2.41 volts.

- **When Monitored:**
  Ignition on and engine running and after 0.5 seconds.
- **Set Condition:**
  When the monitored AutoStick Up/Down Sense circuit voltage drops below 0.35 volts.

Possible Causes
(T5) AUTOSTICK UP/DOWN SENSE CIRCUIT SHORT TO GROUND
(T5) AUTOSTICK UP/DOWN SENSE CIRCUIT SHORT TO ANOTHER CIRCUIT
SHIFT LEVER ASSEMBLY
TRANSMISSION CONTROL MODULE

Always perform the 545 RFE Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

Start the engine in park.
With the scan tool, read the AutoStick® voltage.

Does the scan tool AutoStick voltage read below 0.35 volts?

Yes >> Go To 2

No >> Go To 5

---

2. CHECK THE SHIFT LEVER ASSEMBLY

Turn the ignition off to the lock position.
Disconnect the Shift Lever Assembly harness connector.
Start the engine in park.
With the scan tool, read the AutoStick voltage.

Does the scan tool AutoStick voltage read below 0.35 volts?

Yes >> Go To 3

No >> Replace the Shift Lever Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0957-AUTOSTICK CIRCUIT LOW (CONTINUED)

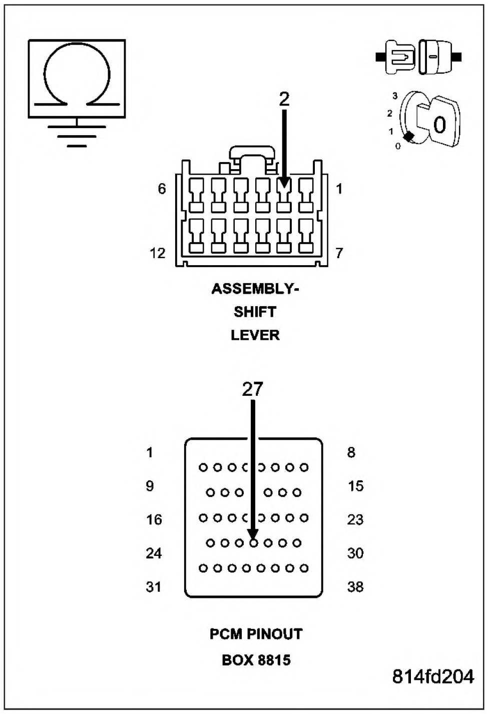
3. CHECK THE (T5) AUTOSHIFT UP/DOWN SENSE CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off to the lock position.

Disconnect the PCM C3 harness connector and connect Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance between ground and the (T5) AutoStick Up/Down Sense circuit.



Is the resistance below 5.0 ohms

Yes >> Repair the (T5) AutoStick Up/Down Sense circuit for a short to ground.

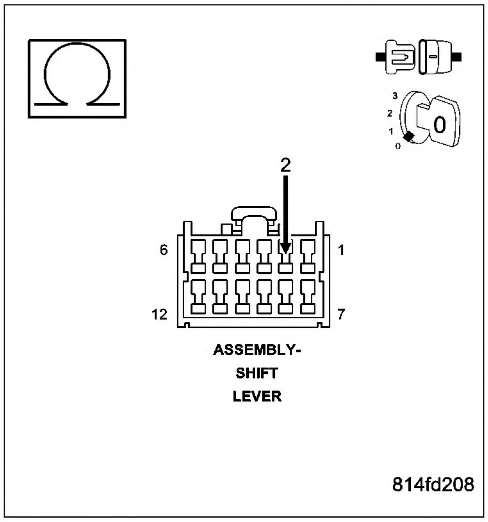
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK THE (T5) AUTOSHIFT UP/DOWN SENSE CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T5) AutoStick Up/Down Sense circuit and all other circuits in the Shift Lever Assembly harness connector.



Is the resistance below 5.0 ohms between the (T5) AutoStick Up/Down Sense circuit and any other circuit(s) in the Shift Lever Assembly harness connector.

Yes >> Repair the (T5) AutoStick Up/Down Sense circuit for a short to another circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0957-AUTOSTICK CIRCUIT LOW (CONTINUED)

5. CHECK THE AUTOSTICK VOLTAGE WHILE SHIFTING

Start the engine in park.
With the brakes firmly applied, shift into AutoStick.
With the scan tool, monitor the AutoStick voltage while shifting both Up and Down.

Did the scan tool AutoStick voltage drop below 0.35 volts at any given time?

Yes >> Replace the Shift Lever Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

6. INTERMITTENT WIRING AND CONNECTORS

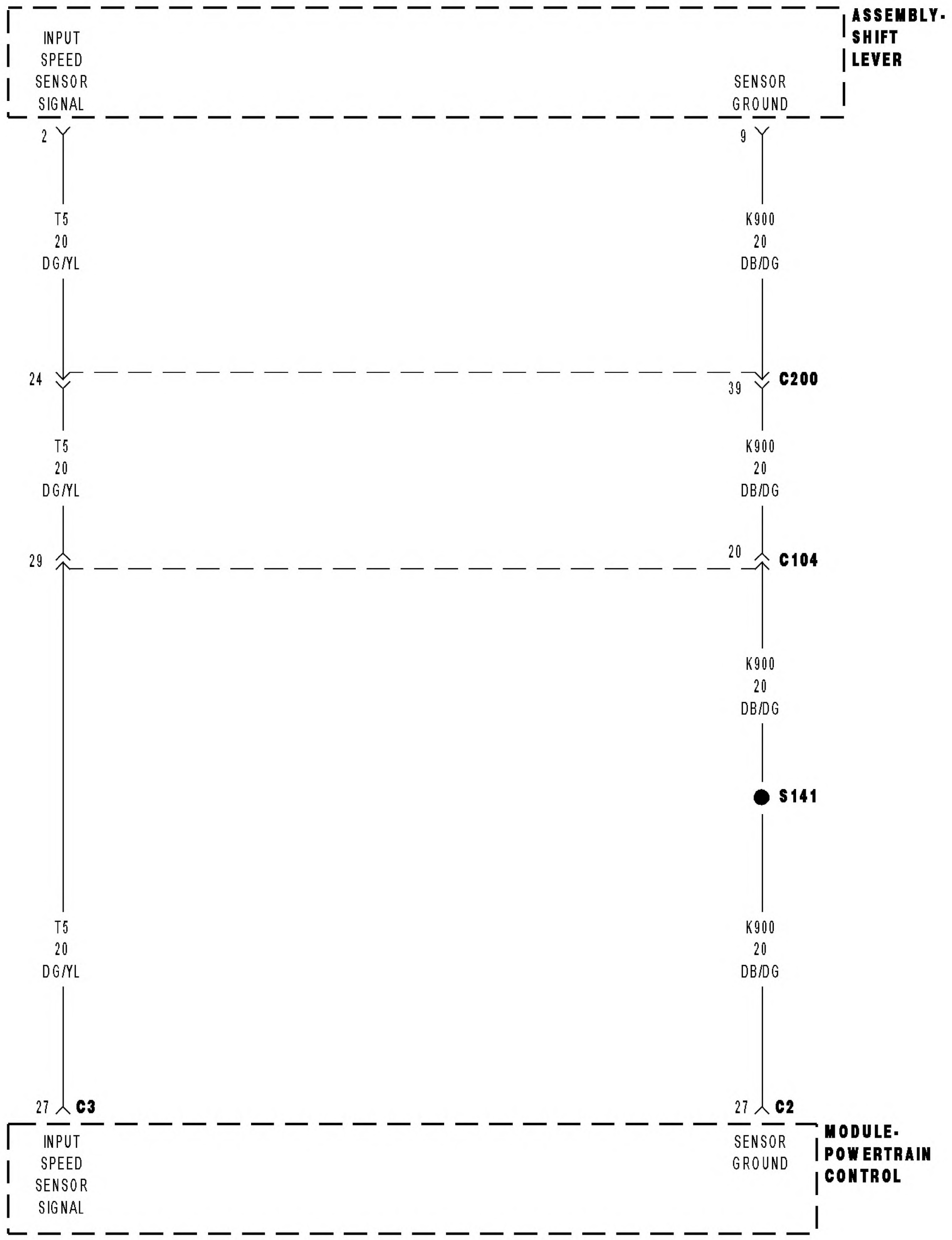
The conditions necessary to set this DTC are not present at this time.
Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.
Wiggle the wiring and connectors while checking for any possible open or shorted circuits.
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

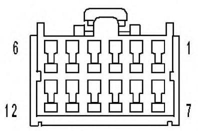
Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

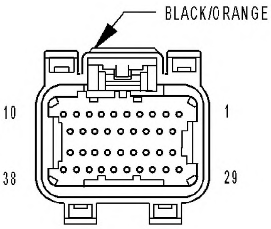
No >> Test Complete.

P0958-AUTOSTICK CIRCUIT HIGH

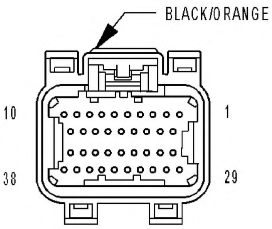

ASSEMBLY-
SHIFT
LEVER
INPUT SPEED SENSOR SIGNAL
SENSOR GROUND
2
9
T5
20
DG/YL
K900
20
DB/DG
24
39
C200
29
20
C104
S141
27
C3
27
C2
INPUT SPEED SENSOR SIGNAL
SENSOR GROUND
MODULE-
POWERTRAIN
CONTROL



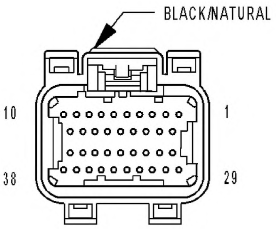
**ASSEMBLY-
SHIFT
LEVER**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(3.7L/4.7L)**


BLACK/ORANGE
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C2
(5.7L)**


BLACK/NATURAL
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C3**

814fd1fc

P0958-AUTOSTICK CIRCUIT HIGH (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The AutoStick Switch is located in the Shift Lever Assembly (SLA). The gear requested by the AutoStick selection is then sent over the AutoStick Up/Down sense circuit to the PCM to engage the requested gear. Normal AutoStick® voltages are: Down = 0.71 to 1.11 volts, Up = 2.02 to 2.41 volts.

- **When Monitored:**
  Ignition on and engine running and after 0.5 seconds.
- **Set Condition:**
  When the monitored AutoStick Up/Down Sense circuit voltage rises above 4.75 volts.

Possible Causes
(T5) AUTOSTICK UP/DOWN SENSE CIRCUIT OPEN
(K900) SENSOR GROUND CIRCUIT OPEN
(T5) AUTOSTICK UP/DOWN SENSE CIRCUIT SHORT TO VOLTAGE
(T5) AUTOSTICK UP/DOWN SENSE CIRCUIT SHORT TO ANOTHER CIRCUIT
SHIFT LEVER ASSEMBLY
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

Start the engine in park.
With the scan tool, read the AutoStick® voltage.

Does the scan tool AutoStick voltage read above 4.75 volts?

Yes >> Go To 2
No >> Go To 7

P0958-AUTOSTICK CIRCUIT HIGH (CONTINUED)

2. CHECK THE (T5) AUTOSHIFT UP/DOWN SENSE CIRCUIT FOR A OPEN

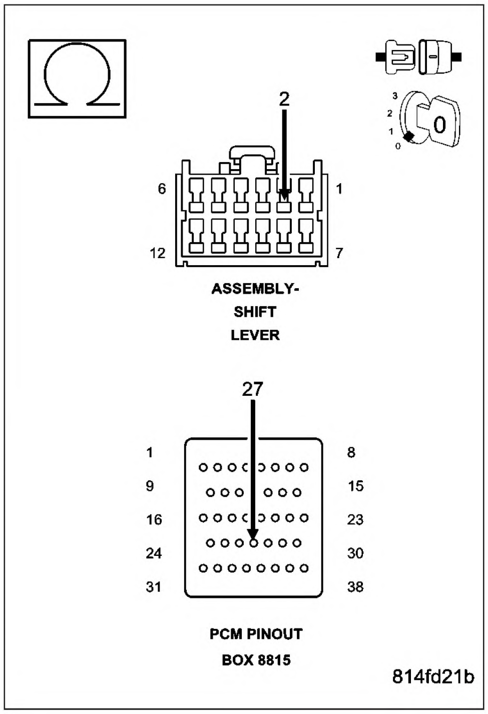
Turn the ignition off to the lock position.

Disconnect the PCM C3 harness connector and connect Miller tool #8815.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Disconnect the Shift Lever Assembly harness connector.

Measure the resistance of the (T5) AutoStick Up/Down Sense circuit between the Shift Lever Assembly harness connector and the appropriate terminal of Miller tool #8815.


2
6
1
12
7
ASSEMBLY-
SHIFT
LEVER
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
814fd21b

Is the resistance below 5.0 ohms?

Yes >> Go To 3

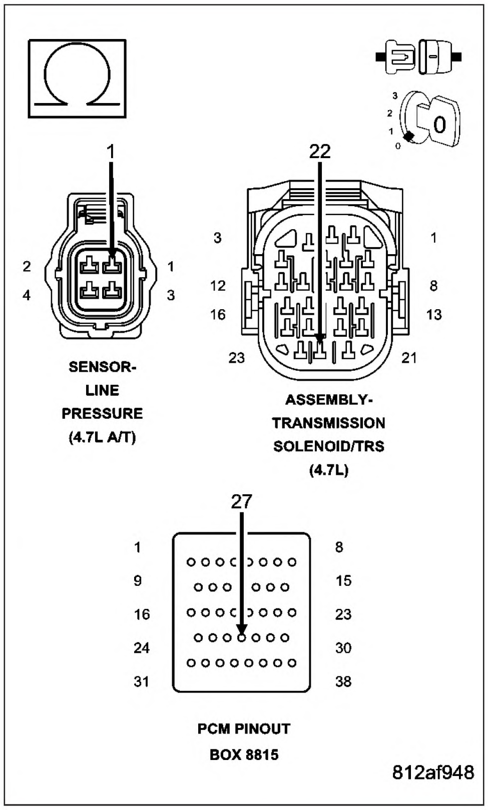
No >> Repair the (T5) AutoStick Up/Down Sense circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

3. CHECK THE (K900) SENSOR GROUND CIRCUIT FOR AN OPEN

Disconnect the PCM C2 harness connector and connect Miller tool #8815.

Measure the resistance of the (K900) Sensor Ground circuit between the Shift Lever Assembly harness connector and the appropriate terminal of Miller tool #8815.


1
2
4
1
3
SENSOR-
LINE
PRESSURE
(4.7L A/T)
22
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812af948

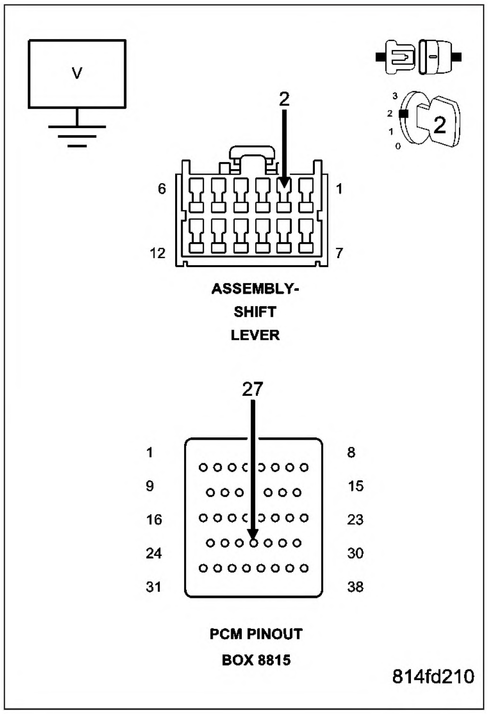
Is the resistance below 5.0 ohms?

Yes >> Go To 4

No >> Repair the (K900) Sensor Ground circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0958-AUTOSTICK CIRCUIT HIGH (CONTINUED)

4. CHECK THE (T5) AUTOSHIFT UP/DOWN SENSE CIRCUIT FOR A SHORT TO VOLTAGE


V
2
6
1
12
7
ASSEMBLY-
SHIFT
LEVER
27
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
3
2
1
0
2
814fd210

Ignition on, engine not running.

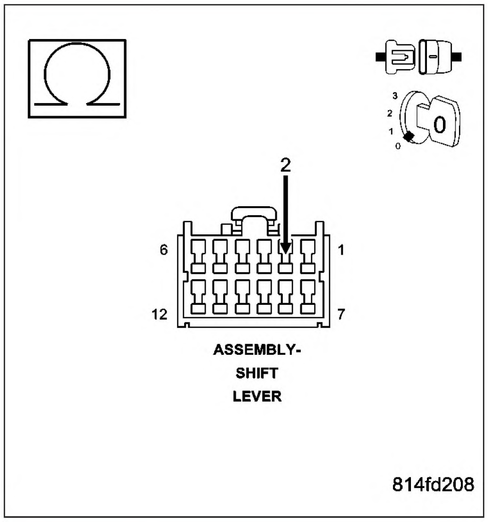
Measure the voltage of the (T5) AutoStick Up/Down Sense circuit.

Is the voltage above 0.5 volts?

Yes >> Repair the (T5) AutoStick Up/Down Sense circuit for a short to voltage.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

5. CHECK THE (T5) AUTOSHIFT UP/DOWN SENSE CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT


2
6
1
12
7
ASSEMBLY-
SHIFT
LEVER
3
2
1
0
0
814fd208

Turn the ignition off to the lock position.

Measure the resistance between the (T5) AutoStick Up/Down Sense circuit and all other circuits in the Shift Lever Assembly harness connector.

Is the resistance below 5.0 ohms between the (T5) AutoStick Up/Down Sense circuit and any other circuit(s) in the Shift Lever Assembly harness connector.

Yes >> Repair the (T5) AutoStick Up/Down Sense circuit for a short to another circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

P0958-AUTOSTICK CIRCUIT HIGH (CONTINUED)

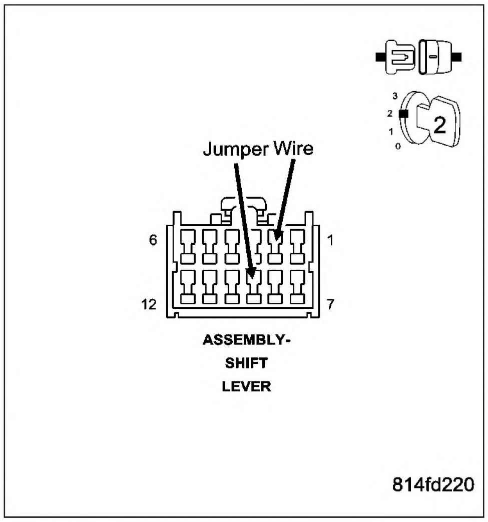
6. CHECK THE AUTOSTICK SWITCH

Reconnect the PCM C2 and C3 harness connectors.

Connect a jumper wire between (T5) AutoStick Up/Down Sense circuit and (K900) Sensor Ground circuit in the Shift Lever Assembly harness connector.

Ignition on, engine not running.

With the scan tool, read the AutoStick voltage.



Did the scan tool AutoStick voltage drop below 0.5 volts?

Yes >> Replace the Shift Lever Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

7. CHECK THE AUTOSTICK VOLTAGE WHILE SHIFTING

Start the engine in park.

With the brakes firmly applied, shift into AutoStick.

With the scan tool, monitor the AutoStick voltage while shifting both low and high.

Did the scan tool AutoStick voltage rise above 4.75 volts at any given time?

Yes >> Replace the Shift Lever Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

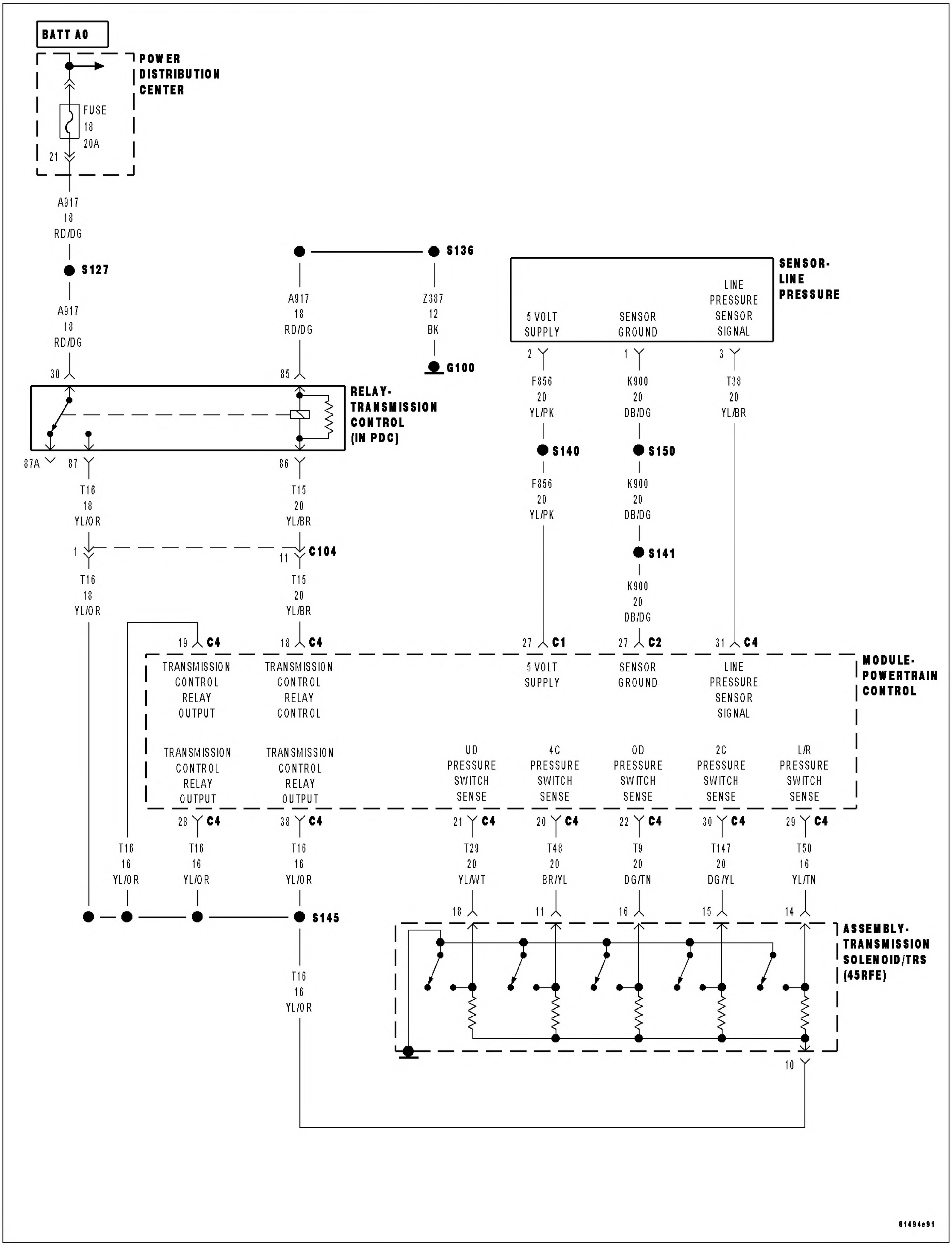
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0987-4C HYDRAULIC PRESSURE TEST


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
T16 18 YL/OR
T15 20 YL/BR
S141
1
11
C104
K900 20 DB/DG
T16 18 YL/OR
T15 20 YL/BR
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
18
11
16
15
14
S145
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0987-4C HYDRAULIC PRESSURE TEST (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  In any forward gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.
- **Set Condition:**
  After a shift into a forward gear, with engine speed above 1000 RPM, the PCM momentarily turns on element pressure to the Clutch circuits that don't have pressure to identify the correct Pressure Switch closes. If the Pressure Switch does not close 2 times, the DTC sets.

Possible Causes
LINE PRESSURE SENSOR
TRANSMISSION FLUID CONTAMINATION
RELATED DTC'S PRESENT
TRANSMISSION SOLENOID/TRS ASSEMBLY
EXCESSIVE DEBRIS IN OIL PAN
POOR LINE PRESSURE SENSOR CONNECTION
TRANSMISSION CONTROL RELAY DTCS PRESENT
(T48) 4C PRESSURE SWITCH SENSE CIRCUIT OPEN
(F856) 5-VOLT SUPPLY CIRCUIT OPEN
(T48) 4C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
(F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND
(T48) 4C PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHERS
TRANSMISSION SOLENOID/TRS ASSEMBLY
INTERNAL TRANSMISSION
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System tests the pressure switches when they are off. The test verifies that the switches are operational (They will close with pressure applied). The Transmission Control System verifies that the switch closes when the corresponding element is applied. If a switch fails to close, it is re-tested. If it fails the second test, the DTC will set, the MIL will illuminate and the transmission system will default to the orderly Shutdown routine.

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Is there any Loss of Prime, Transmission Control Relay, and/or Line Pressure Sensor DTCs present?

Yes >> Refer to the Transmission category and perform the appropriate symptom. If the DTC P0944 is present, perform its respective test first.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0987-4C HYDRAULIC PRESSURE TEST (CONTINUED)

2. DTC P0770 PRESENT

With the scan tool, check Transmission DTCs.

Is the DTC P0770 also present?

Yes >> Refer to the symptom list and perform diagnostics for P0770.

No >> Go To 3

---

3. OTHER DTCS PRESENT

With the scan tool, check for other transmission DTC's

Are the DTCs P0988 and/or P1736 present also?

Yes >> Go To 12

No >> Go To 4

---

4. CHECK TO SEE IF DTC P0987 IS CURRENT

With the scan tool, check if the DTC P0987-4C HYDRAULIC PRESSURE TEST FAILURE is active or stored.

Is the DTC P0987-4C HYDRAULIC PRESSURE TEST FAILURE active?

Yes >> Go To 5

No >> Go To 17

---

5. LINE PRESSURE STAYS THE SAME

Start the engine.

Warm the transmission to 82° C or 180° F.

Firmly apply the brakes.

With the scan tool, monitor the Line Pressure during the following step.

Move the shift lever to each gear position, pausing momentarily in each position and record the line pressure reading. Allow the pressure to stabilize for at least 5 seconds in each range.

Did the line pressure remain at a steady value between 585 and 655 kPa or 85 and 95 PSI in each position?

Yes >> Go To 6

No >> Go To 10

---

6. CHECK LINE PRESSURE SENSOR CONNECTION

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while firmly pushing the Transmission Line Pressure Sensor connector inwards towards the Transmission.

Did the Line Pressure reading on the scan tool change to about 207 kPa or 30 PSI when the connector was pushed inward?

Yes >> Disconnect and properly reconnect the Line Pressure Sensor connector. Inspect terminals and repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

P0987-4C HYDRAULIC PRESSURE TEST (CONTINUED)

7. LINE PRESSURE SENSOR OPERATION

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

With the Transmission Simulator select the ″OFF″ position on the ″Input/Output Speed″ switch.

Ignition on, engine not running.

With the scan tool, monitor the Line Pressure while turning the Pressure Switch selector to each of the 3 line pressure positions on the Transmission Simulator.

NOTE: All three scan tool Line Pressure readings should be steady and ±14 kPa or 2.0 PSI of the reading specified on the Transmission Simulator.

Did the scan tool Line Pressure readings match the specified readings on the Transmission Simulator and remain steady in all three positions?

Yes >> Replace the Line Pressure Sensor per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. (F856) 5-VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect Transmission Simulator.

Disconnect the PCM C1 harness connector and connect Miller tool #8815.

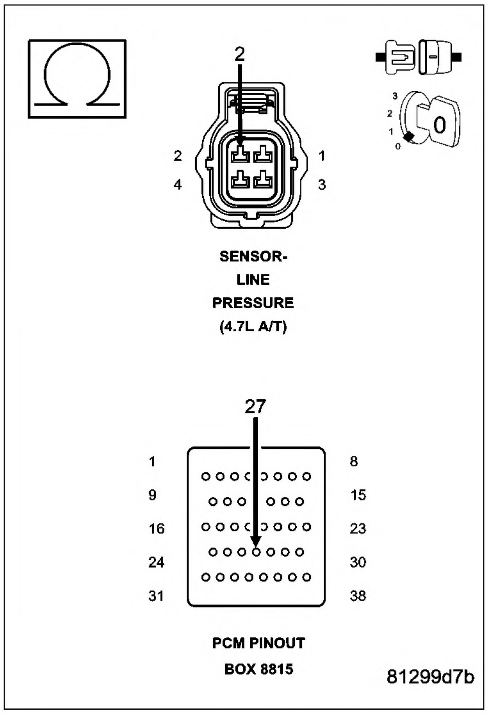
CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (F856) 5-volt Supply circuit from the Line Pressure Sensor harness connector to the appropriate terminal of Miller tool #8815.

Is the resistance above 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

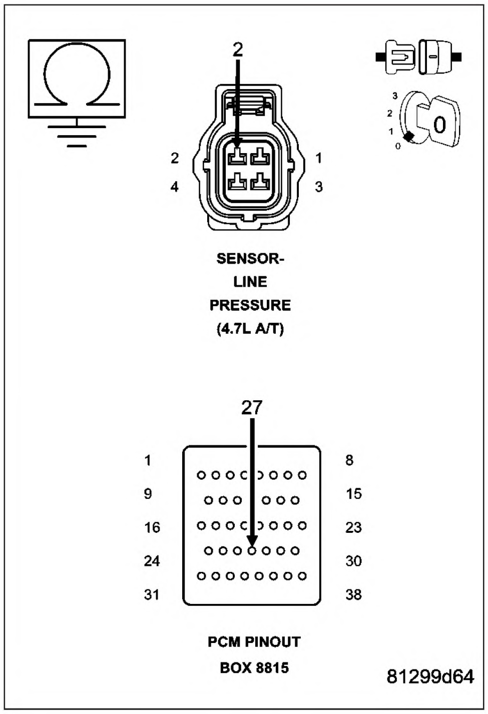
No >> Go To 9



P0987-4C HYDRAULIC PRESSURE TEST (CONTINUED)

9. (F856) 5-VOLT SUPPLY CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (F856) 5-volt Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (F856) 5-volt Supply circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

10. COMPARE SCAN TOOL TO PRESSURE GAUGE

Turn the ignition off to the lock position.

Connect the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP. Refer to the Service Information for proper installation procedure.

CAUTION: Apply parking brake.

Start the engine.

In the following steps, compare the scan tool Line Pressure to the Pressure Gauge readings in each gear.

CAUTION: Do not overheat transmission.

With the gear selector in park, raise the RPM to 1500, and compare line pressure readings.

Firmly apply the brakes, move the gear selector into reverse, raise the RPM to 1500, and compare the line pressure readings.

Firmly apply the brakes, move the gear selector into drive, raise the RPM to 1500, and compare the line pressure readings.

Does the scan tool Line Pressure readings match the Pressure Gauge readings ± 10 psi?

Yes >> Go To 11

No >> Replace the Line Pressure Sensor per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0987-4C HYDRAULIC PRESSURE TEST (CONTINUED)

11. WIRING AND CONNECTORS

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Failure to remove the Starter Relay can cause a Transmission - No Response condition.

Remove the Line Pressure Adapter, Miller tool #8259 and 0-300 psi Test Gauge, Miller tool #C-3293-SP.

Install the Transmission Simulator, Miller tool #8333.

On the Transmission Simulator, turn the Pressure Switch selector switch to 4C.

Ignition on, engine not running.

With the scan tool, monitor the 4C Pressure Switch state while pressing and holding the Pressure Switch test button and wiggling the wire harness and connectors that pertain to the 4C Pressure Switch.

Did the 4C Pressure Switch state change to closed and remain closed while wiggling the wires?

Yes >> Go To 12

No >> Go To 14

---

12. CHECK FOR EXCESSIVE DEBRIS

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333.

Remove and inspect the Transmission Oil Pan per the Service Information.

Does the Transmission Oil Pan contain excessive debris or contamination?

Yes >> Repair the cause of the excessive debris in the Transmission Oil Pan. Refer to the Service Information for the proper procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

---

13. CHECK 4C HYDRAULIC CLUTCH CIRCUIT

Remove the Valve Body and air check the 4C hydraulic clutch circuit (in the case) for leakage per the Service Information.

NOTE: The 4C hydraulic clutch circuit contains a small bleed orifice. A small amount of air leakage is normal.

Was there excessive air leakage noticed during the air check?

Yes >> Repair as necessary. Check the 4C clutch piston, piston seals and bleed orifice assembly.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Disassemble and inspect the Valve Body and repair as necessary. Inspect the 4C Accumulator piston and seals. If no problems are found in the Valve Body, replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0987-4C HYDRAULIC PRESSURE TEST (CONTINUED)

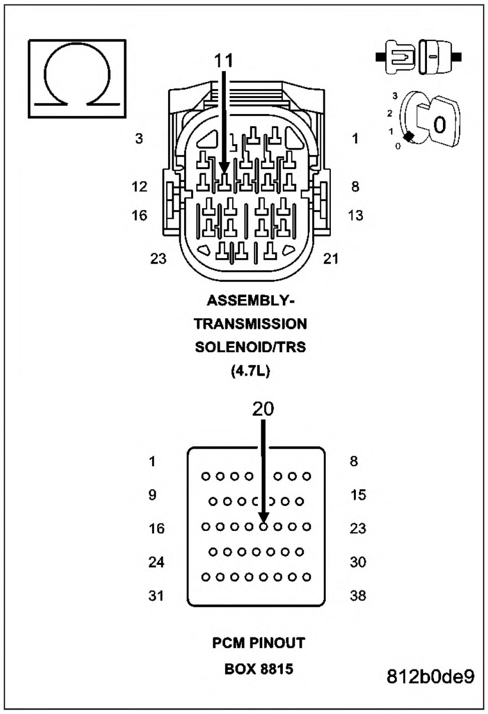
14. (T48) 4C PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Remove the Transmission Simulator, Miller tool #8333 and connect Miller tool #8815.

Disconnect the PCM C4 harness connector.

Measure the resistance of the (T48) 4C Pressure Switch Sense circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.


11
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
20
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812b0de9

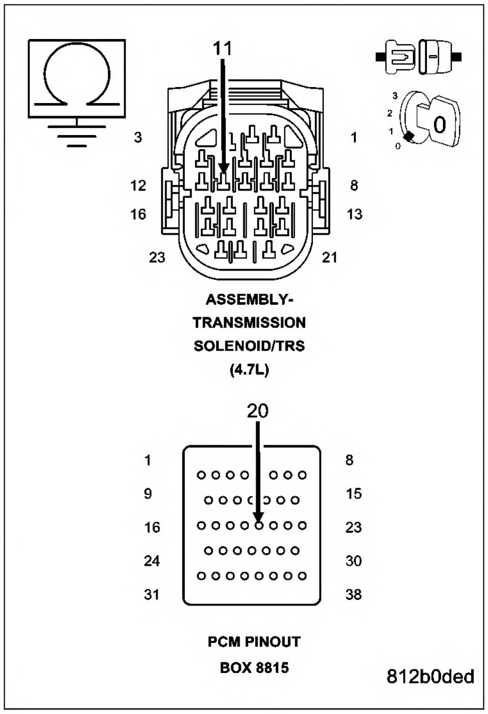
Is the resistance above 5.0 ohms?

Yes >> Repair the (T48) 4C Pressure Switch Sense circuit for an open.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15

15. (T48) 4C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T48) 4C Pressure Switch Sense circuit.


11
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
20
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812b0ded

Is the resistance below 5.0 ohms?

Yes >> Repair the (T48) 4C Pressure Switch Sense circuit for a short to ground.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16

P0987-4C HYDRAULIC PRESSURE TEST (CONTINUED)

16. (T48) 4C PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

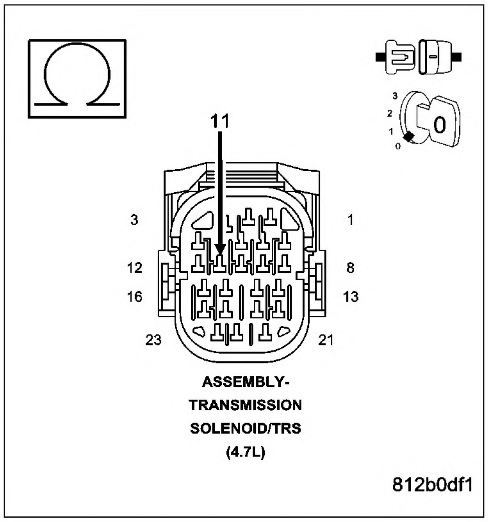
Disconnect all PCM harness connectors.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

NOTE: Make sure the Transmission Solenoid/TRS Assembly harness connector is disconnected.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance between the (T48) 4C Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T48) 4C Pressure Switch Sense circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T48) 4C Pressure Switch Sense circuit for a short to other circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

17. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

If the EATX DTC EVENT DATA shows the DTC P0987 set while the Line Pressure was significantly below the Desired Line Pressure reading, check for causes of low line pressure (low fluid level, broken or mis-installed primary oil filter or filter seal, sticking Main Regulator Valve in the Pump Valve Body etc.). If the data shows the DTC set while the Line Pressure reading was significantly higher than the Desired Line Pressure, check the Line Pressure Sensor and related wiring.

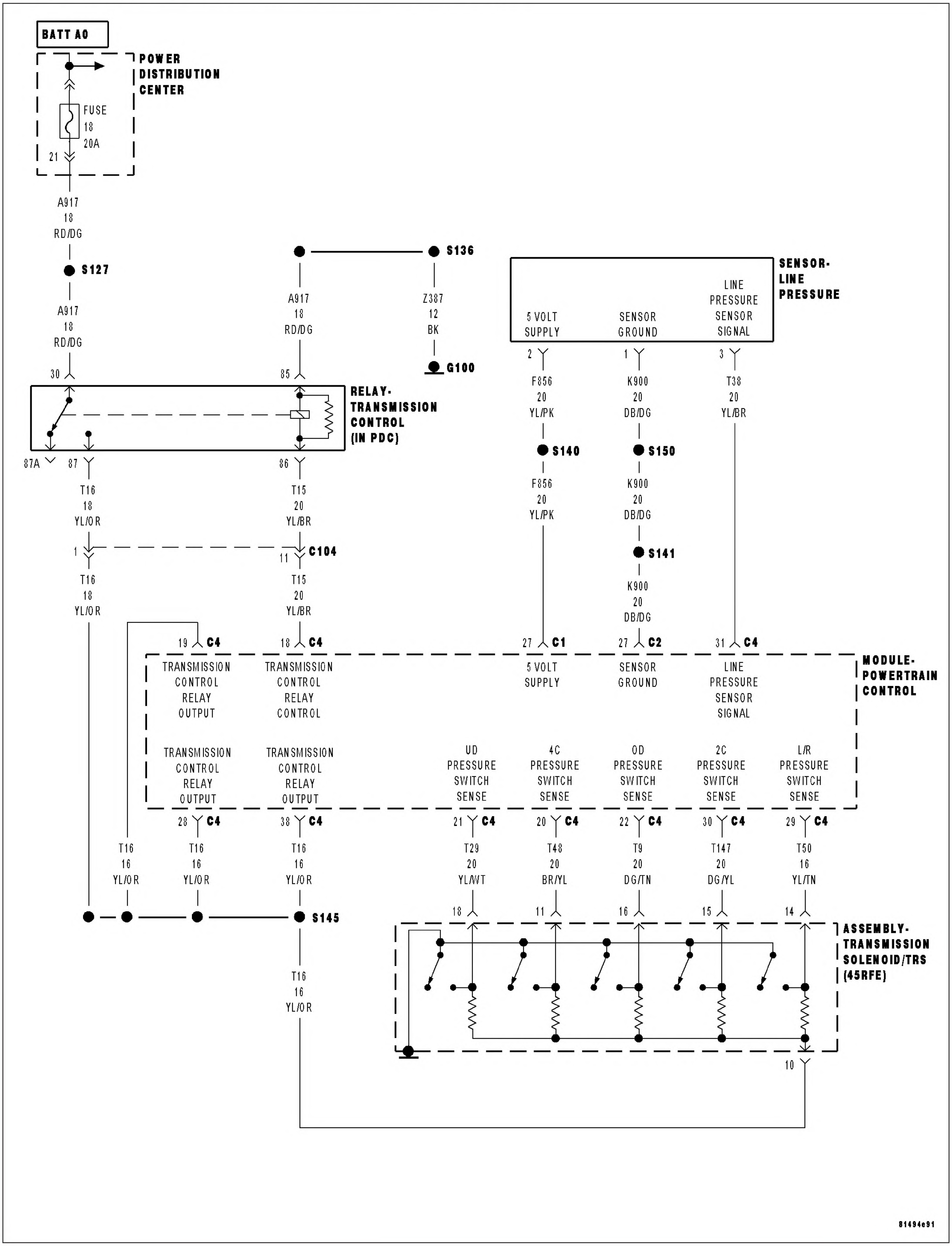
Where there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0988-4C PRESSURE SWITCH RATIONALITY


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P0988-4C PRESSURE SWITCH RATIONALITY (CONTINUED)

For the Transmission circuit diagram (Refer to)(Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  The DTC is set if the 4C Pressure Switch reads open or closed at the wrong time in a given gear.

Possible Causes
RELATED RELAY DTC'S PRESENT
DTC P0871 ALSO PRESENT
LOSS OF 12-VOLT FEED
(T48) 4C PRESSURE SWITCH SENSE CIRCUIT OPEN
(T48) 4C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
EXCESSIVE FLUID LEAKAGE WITH 2C CLUTCH CIRCUIT
#5 AND/OR #7 CHECK BALL CUT OR DAMAGED
LOW LINE PRESSURE
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE
WIRING AND CONNECTORS

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission system uses five pressure switches to monitor the fluid pressure in the LR, 2C, 4C, UD, and OD clutch circuits. The pressure switches are continuously monitored for the correct states in each gear as shown.

GEAR	L/R	2C	4C	UD	OD
REVERSE	OPEN	OPEN	OPEN	OPEN	OPEN
P/N	CLOSED	OPEN	OPEN	OPEN	OPEN
1ST	CLOSED*	OPEN	OPEN	CLOSED	OPEN
2ND	OPEN	CLOSED	OPEN	CLOSED	OPEN
2ND PRIME	OPEN	OPEN	CLOSED	CLOSED	OPEN
DRIVE	OPEN	OPEN	OPEN	CLOSED	CLOSED
4TH	OPEN	OPEN	CLOSED	OPEN	CLOSED
5TH	OPEN	CLOSED	OPEN	OPEN	CLOSED

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is open in Manual 1.

P0988-4C PRESSURE SWITCH RATIONALITY (CONTINUED)

Diagnostic Test

1. DETERMINING IF RELATED RELAY DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay related DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. EATX DTC DATA SHOW CURRENT DTC

With the scan tool, check the EATX DTC EVENT DATA.

Does the EATX DTC EVENT DATA show data for DTC P0988?

Yes >> Go To 3

No >> Refer to the Transmission category and perform the appropriate symptom shown in the EATX DTC EVENT DATA.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

3. MULTIPLE DTCS PRESENT

With the scan tool, check for other transmission DTC's.

Are there two or more related Pressure Switch Sense DTCs present in addition to P0988?

Yes >> Go To 4

No >> Go To 7

---

4. RELATED DTC PRESENT

With the scan tool, check the EATX DTC EVENT DATA for P0988.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Do all the pressure switches read CLOSED in the EATX DTC EVENT DATA for P0988?

Yes >> Refer to Transmission category and perform diagnostics for the DTC P0888.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. EATX DTC EVENT DATA READ OPEN

In the EATX DTC EVENT DATA recorded earlier, read the state of all pressure switches.

Do all the pressure switches read OPEN?

Yes >> Go To 6

No >> Go To 7

P0988-4C PRESSURE SWITCH RATIONALITY (CONTINUED)

6. LOW LINE PRESSURE

In the EATX DTC EVENT DATA recorded earlier, compare the Line Pressure and the Desired Line Pressure.

Is the Line Pressure less than 40 psi, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check fluid level and adjust as necessary. If fluid level is OK, check the Primary Oil Filter seal for a split, crack, or improperly installed. If the filter and seal are OK, check the Main Regulator Valve in the Oil Pump. Refer to the Service Information for the above procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

7. DTC P0871 ALSO PRESENT

With the scan tool, check Transmission DTCs.

Is the DTC P0871 also present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

8. EATX DTC EVENT DATA READ PARK REVERSE OR NEUTRAL

With the scan tool, check the EATX DTC EVENT DATA for P0988.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show the DTC set in Park, Neutral, or Reverse for P0988?

Yes >> Go To 13

No >> Go To 9

9. EATX DTC EVENT DATA READ CLOSED

With the scan tool, check the EATX DTC EVENT DATA for P0988.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA show the 4C Pressure Switch reading CLOSED?

Yes >> Go To 11

No >> Go To 10

P0988-4C PRESSURE SWITCH RATIONALITY (CONTINUED)

10. PRIMARY OIL FILTER SEAL

In the EATX DTC EVENT DATA recorded earlier, compare the Line Pressure and the Desired Line Pressure.

Is the Line Pressure less than 40 psi, and significantly below the Desired Line Pressure?

Yes >> Repair as necessary to correct low line pressure. Check fluid level and adjust as necessary. If fluid level is OK, check the Primary Oil Filter seal for a split, crack, or improperly installed. If the filter and seal are OK, check the Main Regulator Valve in the Oil Pump. Refer to the Service Information for the above procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 15

---

11. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Pressure Switch selector switch to the 4C position.

With the scan tool, monitor the 4C Pressure Switch while pressing the Pressure Switch test button on the Transmission Simulator.

Did the state of the 4C Pressure Switch change while pressing the Pressure Switch Test button?

Yes >> Go To 12

No >> Go To 13

---

12. TRANSMISSION SOLENOID/TRS ASSEMBLY

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

Where there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0988-4C PRESSURE SWITCH RATIONALITY (CONTINUED)

13. (T48) 4C PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

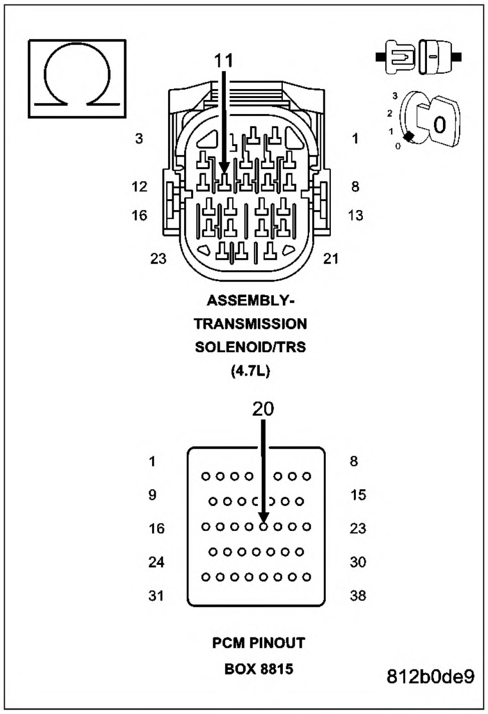
Disconnect the PCM C4 harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Connect Miller tool #8815 to the PCM C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T48) 4C Pressure Switch Sense circuit from the appropriate terminal of Miller tool #8815 to the Transmission Solenoid/TRS Assembly harness connector.


11
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
20
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
3
2
1
0
0

812b0de9

Is the resistance above 5.0 ohms?

Yes >> Repair the (T48) 4C Pressure Switch Sense circuit for an open.

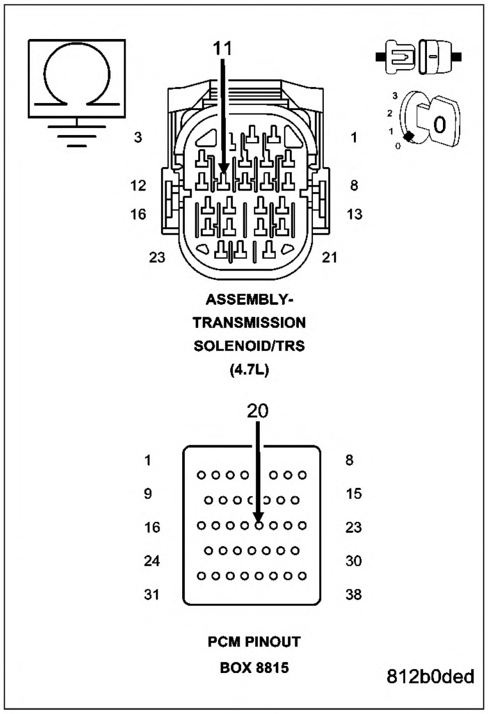
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 14

---

14. (T48) 4C PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T48) 4C Pressure Switch Sense circuit.


11
3
1
12
8
16
13
23
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (4.7L)
20
1
8
9
15
16
23
24
30
31
38
PCM PINOUT BOX 8815
3
2
1
0
0

812b0ded

Is the resistance below 5.0 ohms?

Yes >> Repair the (T48) 4C Pressure Switch Sense circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Powertrain Control Module per the Service Information. With the scan tool, perform the QUICK LEARN procedure.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P0988-4C PRESSURE SWITCH RATIONALITY (CONTINUED)

15. #5 AND/OR #7 CHECK BALL CUT OR DAMAGED

Turn the Ignition off to the lock position.

Remove the Valve Body Assembly per the Service Information.

Inspect the #5 and #7 check balls for any cuts or damage.

Inspect the 4C accumulator piston and seals and also the 4C tower seal on top of the valve body. Refer to the Service Information.

Where there any problems found?

Yes >> Repair as necessary. Check for excessive clutch debris in the transmission oil pan. If excessive clutch debris is present, repair 4C clutch as necessary. Refer to the Service Information for proper repair procedures.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 16

---

16. EXCESSIVE FLUID LEAKAGE WITH 4C CLUTCH CIRCUIT

Air check the 4C Clutch hydraulic circuit. Refer to the Service Information.

NOTE: This hydraulic clutch circuit contains a small bleed orifice. Small leakage is considered normal.

Was there excessive air leakage in the 4C Clutch hydraulic circuit?

Yes >> Repair as necessary. Refer to the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1684-BATTERY WAS DISCONNECTED

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the ignition is in the Run/Start position.
- **Set Condition:**
  This DTC will set whenever Powertrain Control Module is disconnected from Fused B+ or ground. It will also be set during the DRBIII® Battery Disconnect and/or Quick Learn procedure.

Possible Causes
BATTERY WAS DISCONNECTED
SCAN TOOL BATTERY DISCONNECT PERFORMED
PCM WAS REPLACED OR DISCONNECTED
QUICK LEARN WAS PERFORMED

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The PCM uses a battery backed RAM (Random Access Memory) is used to maintain some learned values. When the battery B(+) is disconnected, the memory is lost. When the B(+) is restored, this memory loss is detected by the Transmission Control System. The DTC is set and the learned values are initialized to known constants or previously learned values from EEPROM (Electronic Erasable Programmable Read Only Memory). This results in the reinitialization of some parameters.

Diagnostic Test

1. POSSIBLE CAUSES

This DTC is an informational DTC only.

This DTC is set due to a momentary loss of power and/or the ground circuits to the PCM.

Below are a list of possible causes associated with this DTC.

Battery was disconnected.

The BATTERY DISCONNECT feature on the scan tool was performed.

The QUICK LEARN feature on the scan tool was performed.

PCM was replaced or disconnected.

Were any of the above possible causes performed?

Yes >> This is the cause of the DTC. Erase the DTC and return vehicle to customer.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P1684-BATTERY WAS DISCONNECTED (CONTINUED)

2. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

NOTE: Check all power and ground circuits to the PCM for a intermittent or high resistance condition.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P1715-RESTRICTED MANUAL VALVE IN T3 RANGE

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Whenever the PRNDL code indicates Temp3.
- **Set Condition:**
  This DTC sets when conditions for the DTC P1776 are satisfied or 3 unsuccessful attempts to engage 1st gear while the shifter is in the temp3 zone. This indicates a restricted port at the manual valve because the shifter is not fully engaged in the drive position.

Possible Causes
RELATED TRANSMISSION DTC'S PRESENT
CUSTOMER DRIVING HABITS
MISADJUSTED SHIFTER

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Are any of the following DTC's P0731, P0732, P0733, P0734, P1736 or P0715 present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK SHIFTER ADJUSTMENT

Check Shifter adjustment per the Service Information.

Is the shifter properly adjusted?

Yes >> Go To 3

No >> Adjust the Shifter Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1715-RESTRICTED MANUAL VALVE IN T3 RANGE (CONTINUED)

3. CHECK CUSTOMER DRIVING HABIT

This DTC can be set if the customer rests their hand on the shift lever while they are driving. The transmission can be put in the T3 position if just enough forward pressure is exerted on the shift lever.

When this occurs, the feed port to the clutch is restricted, the transmission will declare neutral, and this DTC will be set. The customer should be informed not to rest their hand on the shifter while driving.

This DTC can also be set by simply bumping the shift lever toward neutral while accelerating.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

If there are no possible causes remaining, view repair.

Repair

This DTC can be set by putting too much forward pressure on the shift lever while it is in the OD position. Make sure the customer is informed.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1736-GEAR RATIO ERROR IN 2ND PRIME

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear.
- **Set Condition:**
  If the ratio of the Input RPM to the Output RPM does not match the current gear ratio. This DTC can take up to five minutes of problem identification before illuminating the MIL

Possible Causes
RELATED DTC'S PRESENT
INPUT SPEED SENSOR OR WIRING
LOW FLUID LEVEL
CRACKEC OR MISINSTALLED PRIMARY OIL FILTER OR SEAL
WORN SOLENOID SWITCH VALVE OR PLUGS
STUCK OR STICKING MAIN REGULATOR VALVE
BURNED UD OR 4C CLUTCH
CUT 4C OR UD PISTON SEAL
BROKEN 4C PISTON CASTING
BROKEN OR MISSING 4C BLEED ORIFICE
BROKEN OR MISSING UD BLEED ORIFICE
CUT 4C OR UD ACCUMULATOR PISTON SEAL
CRACKED 4C OR UD ACCUMULATOR PISTON
EXTRA CHECK BALL IN PASSAGE DOWNSTREAM OF #7 CHECK BALL POCKET
TRANSMISSION SOLENOID/TRS ASSEMBLY
BROKEN WELD - REACTION CARRIER TO REVERSE SUN GEAR
MISSING TEETH ON INPUT CLUTCH HUB TONE WHEEL

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) When in gear, if the gear ratio does not compare to a known gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent which may result in the DTCs P0715 and/or P0720 to set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the signal from the input speed sensor at idle in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set when at a stop.

P1736-GEAR RATIO ERROR IN 2ND PRIME (CONTINUED)

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Are any Transmission: solenoid, line pressure, speed sensor, or loss of prime DTC's present?

Yes >> Refer to appropriate symptom in the Transmission category. Perform the test for P0944–LOSS OF PRIME first if it is present.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK EATX DTC EVENT DATA

With the scan tool, read and record the EATX DTC EVENT DATA.

NOTE: Make sure to record all EATX DTC EVENT DATA stored in the scan tool for future reference in this test procedure.

Does the EATX DTC EVENT DATA display information for the DTC P1736?

Yes >> Go To 3

No >> Go To 6

---

3. CHECK RPM IN EATX DTC EVENT DATA

Refer to the EATX DTC EVENT DATA recorded earlier.

Does the Input RPM read zero?

Yes >> Check the input speed sensor and wiring. Refer to test P0715 and diagnose as if the DTC is current.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK LINE PRESSURE READING

Refer to the EATX DTC EVENT DATA recorded earlier.

Is the line pressure reading more than 10 psi below the desired line pressure?

Yes >> Go To 5

No >> Go To 6

P1736-GEAR RATIO ERROR IN 2ND PRIME (CONTINUED)

5. PLUGGED TRANSMISSION OIL FILTER

Turn the ignition off to the lock position.

Remove and inspect the Transmission Oil Pan for excessive debris per the Service Information.

Remove and inspect the Primary Oil Filter per the Service Information.

NOTE: Make sure the Primary Transmission Oil Filter and/or seal is not cracked or split.

Does the Oil Pan contain excessive debris and/or is the Primary Oil Filter cracked or plugged?

Yes >> Repair the plugged, cracked, or split Primary Transmission Oil Filter and/or seal. If the Primary Transmission Oil Filter is plugged, refer to the Service Information for the proper hydraulic clutch repair procedure.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Remove the Transmission Oil Pump per the Service Information. Check the main Regulator Valve for sticking in its bore, scoring, and/or damage and clean and repair as necessary. If no problem is found, replace the Transmission Solenoid/TRS Assembly.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

6. CHECK TO SEE IF DTC P1736 IS CURRENT

With the scan tool, perform the 2nd Prime Gear Clutch Test. Follow the instructions on the scan tool.

Increase the throttle angle, TPS Degree, to 30° for no more than a few seconds.

CAUTION: Do not overheat the transmission.

NOTE: If the 4C clutch is faulty, the overrunning clutch will hold and the slip test will pass. The 2nd Prime Gear Clutch Test will not detect a faulty 4C clutch. However, it will detect a faulty UD clutch.

Did the clutch test pass, did the Input Speed remain at zero?

Yes >> Go To 7

No >> Go To 9

---

7. CHECK FOR INTERMITTENT OPERATION

Check the Shifter adjustment per the Service Information.

Intermittent gear ratio DTCs can be set by problems in the Input and Output Speed Sensor circuits and/or Speed Sensor Ground circuit.

Check the Speed Sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333.

Were there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

---

8. CHECK FOR SLIPPAGE

With the scan tool, erase Transmission DTCs.

Road test the vehicle.

Durning the road test, operate in 4th gear, and perform kickdown shifts from 4th to 2nd (prime) gears.

Is there an obvious slippage noticed in 4th or 2nd prime gears, or runaway on the 4-2 shift?

Yes >> Go To 11

No >> Go To 14

P1736-GEAR RATIO ERROR IN 2ND PRIME (CONTINUED)

9. UD CLUTCH HYDRAULIC CIRCUIT

Remove Transmission Oil Pan and check for excessive debris.

Remove the Valve Body and air check the UD clutch hydraulic circuit (in the case) per the Service Information.

NOTE: The UD clutch passage contains a small bleed orifice, a small amount of air leakage is normal.

Were there any problems found, excessive debris and/or excessive air leakage in the UD clutch hydraulic circuit?

Yes >> Repair as necessary. Check the UD clutch piston seals and the dribbler assembly, reaction shaft support seal rings, and the flatness of the pump valve body and pump housing faces. Check main regulator valve for sticking in the bore.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 10

---

10. UD ACCUMULATOR PISTON

Check the UD bleed orifice, accumulator piston, and accumulator piston seal in the main valve body.

Were there any problems found?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

11. EXCESSIVE DEBRIS

Remove the Transmission Oil Pan and check for excessive debris.

Remove the valve body and air check the 4C clutch hydraulic circuit per the Service Information.

NOTE: The 4C clutch passage contains a small bleed orifice, a small amount of air leakage is normal.

Were there any problems found, excessive debris, improperly assembled 4C clutch and/or excessive air leakage in the 4C clutch hydraulic circuit?

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures. Note: Check the 4C piston seals and bleed orifice.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 12

---

12. 4C ACCUMULATOR

Check the 4C Accumulator piston for cracks or a cut seal.

Check for a cut or missing #7 or #5 check balls.

Check the Solenoid Switch Valve and its plugs for sticking in its bore or excessive wear.

Were there any problems found

Yes >> Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 13

P1736-GEAR RATIO ERROR IN 2ND PRIME (CONTINUED)

13. CHECK FOR BROKEN REVERSE SUN GEAR WELD

Working through the windows in the bottom of the case, check for a broken Reverse Sun gear weld to the reaction carrier as follows:

(1) Hold the Transmission Output Shaft by holding the Transmission Manual Lever in the park position.

(2) Rotate the Input Annulus gear and drive shell, (the drum that encloses the two rearmost carriers).

(3) Check to see if the reaction carrier (the frontmost carrier, whose outer shell is splined to the 4C clutch) is rotating faster than the drive shell is being turned.

Is the reaction carrier turning faster than the drive shell?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the reaction carrier per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

14. CHECK IF DTC RESET

Did the DTC P1736 reset during the road test?

Yes >> Go To 15

No >> Go To 16

---

15. LIST OF POSSIBLE CAUSES

If any other DTC’s set during the road test, refer to the appropriate symptom in the Transmission category.

If no other DTC’s set during the road test, below is a list of possible causes, but not strictly limited to those:

Check for excessive debris in the Transmission Oil pan, plugged, cracked, or split Primary Transmission Oil Filter and/or seal.

Check for cuts or missing #7 and #5 check balls in the main valve body.

Check the 4C and UD accumulator pistons and seals, UD bleed orifice, and the Solenoid Switch Valve and Plugs in the main valve body.

Check the UD clutch piston seals, reaction shaft support seal rings, and the flatness of the pump valve body and pump housing faces.

Check the 4C clutch piston seals, and bleed orifice.

Check the UD clutch piston seals, reaction shaft support seal rings, and dribbler assemblies, and the flatness of the pump valve body and pump housing faces.

View repair

Repair

Repair as necessary. Refer to the Service Information for proper repair procedures.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1736-GEAR RATIO ERROR IN 2ND PRIME (CONTINUED)

16. INTERMITTENT DTC

The conditions necessary to set this DTC are not present at this time.

Use the EATX DTC EVENT DATA to help identify the conditions and/or possible causes that may have caused the DTC to set.

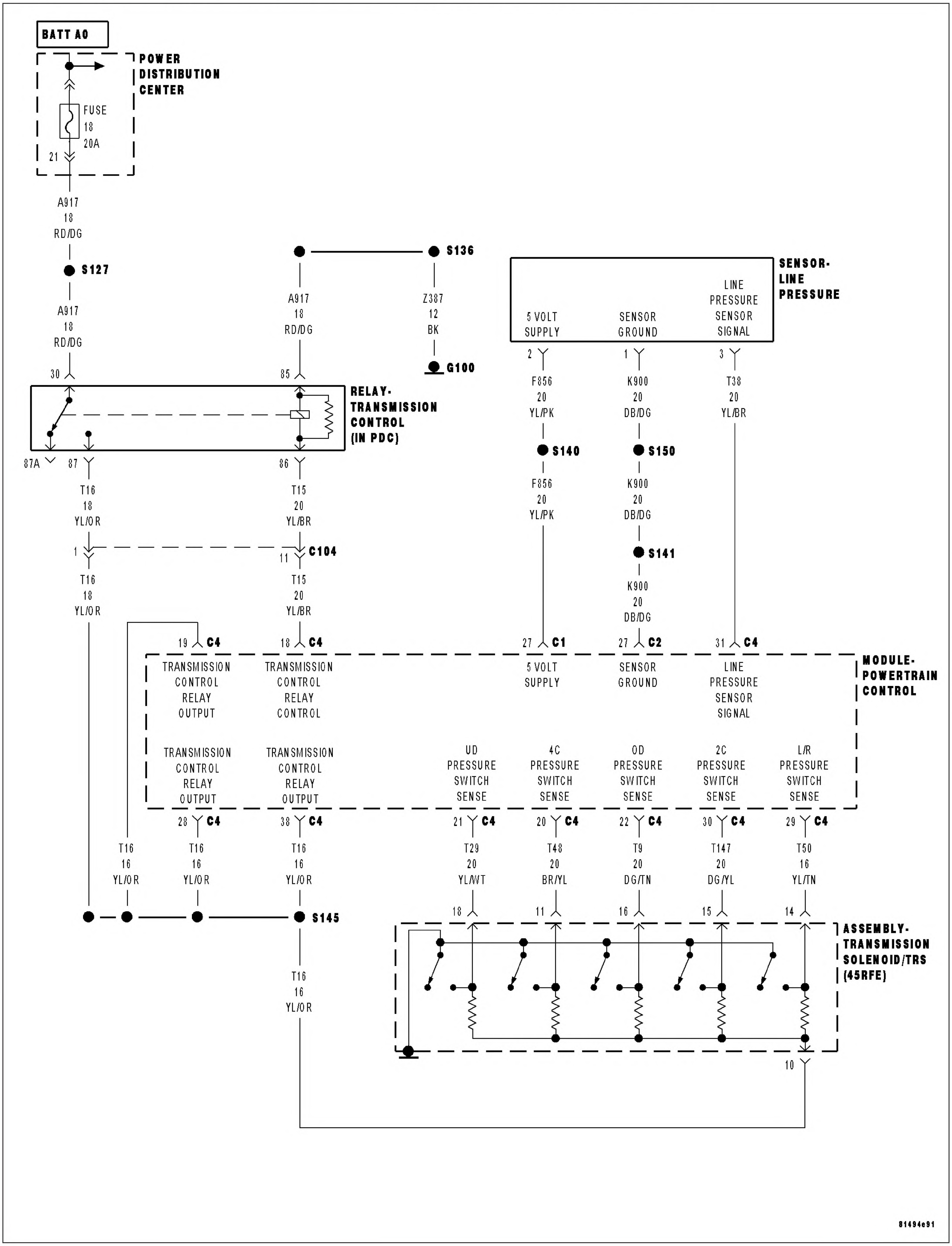
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  During an attempted shift into 1st gear.
- **Set Condition:**
  This DTC is set if three unsuccessful attempts are made to shift the Solenoid Switch Valve (SSV) into the downshifted position in one given ignition start. This DTC can take up to five minutes to mature before illuminating the MIL.

Possible Causes
RELATED DTC P0841 PRESENT
SOLENOID SWITCH VALVE STICKING
LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Solenoid Switch Valve (SSV) controls the direction of the transmission fluid when the L/R Solenoid is energized. The SSV will be in the downshifted position in 1st gear, thus directing the fluid to the L/R clutch circuit. In 2nd through 5th gears, it will be in the upshifted position and directing the fluid into the torque converter clutch (TCC).

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L/R Pressure Switch is monitored to confirm SSV movement. If movement is not confirmed (the L/R pressure switch does not close), EMCC is inhibited until SSV operation is confirmed.

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Is the DTC P0841 present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK TO SEE IF DTC P1775 IS CURRENT

Perform a visual inspection of all connectors, wiring, and cooler connections before proceeding. Repair as necessary.

With the scan tool, Check the STARTS SINCE SET counter.

NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter for P1775 at 2 or less?

Yes >> Go To 3

No >> Go To 6

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION (CONTINUED)

3. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Pressure Switch selector switch to LR.

With the scan tool, monitor the LR Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator.

Did the state of the L/R Pressure Switch change while pressing the Pressure Switch Test button?

Yes >> Go To 4

No >> Go To 5

4. SOLENOID SWITCH VALVE STICKING

Turn the ignition off to the lock position.

Remove the Transmission Oil Pan per the Service Information.

Remove the Transmission Valve body per the Service Information.

Inspect the Solenoid Switch Valve and Plugs for sticking.

Is the Solenoid Switch Valve or Plugs sticking?

Yes >> Clean and inspect per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION (CONTINUED)

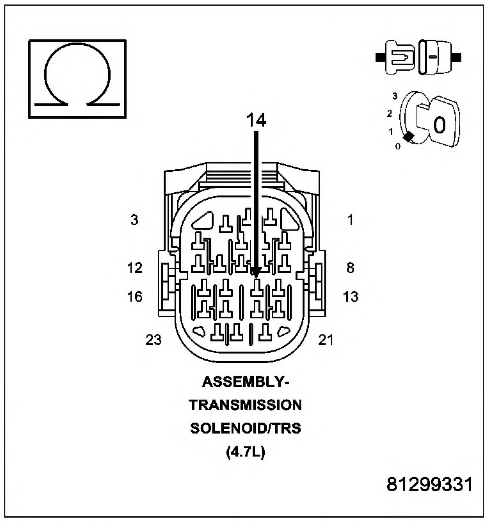
5. LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Solenoid/TRS Assembly harness connector.

Disconnect all PCM harness connectors.

Measure the resistance between the (T50) LR Pressure Switch Sense circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.



Is the resistance below 5.0 ohms between the (T50) LR Pressure Switch Sense circuit and all other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T50) LR Pressure Switch Sense circuit for a short to other circuit(s).

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

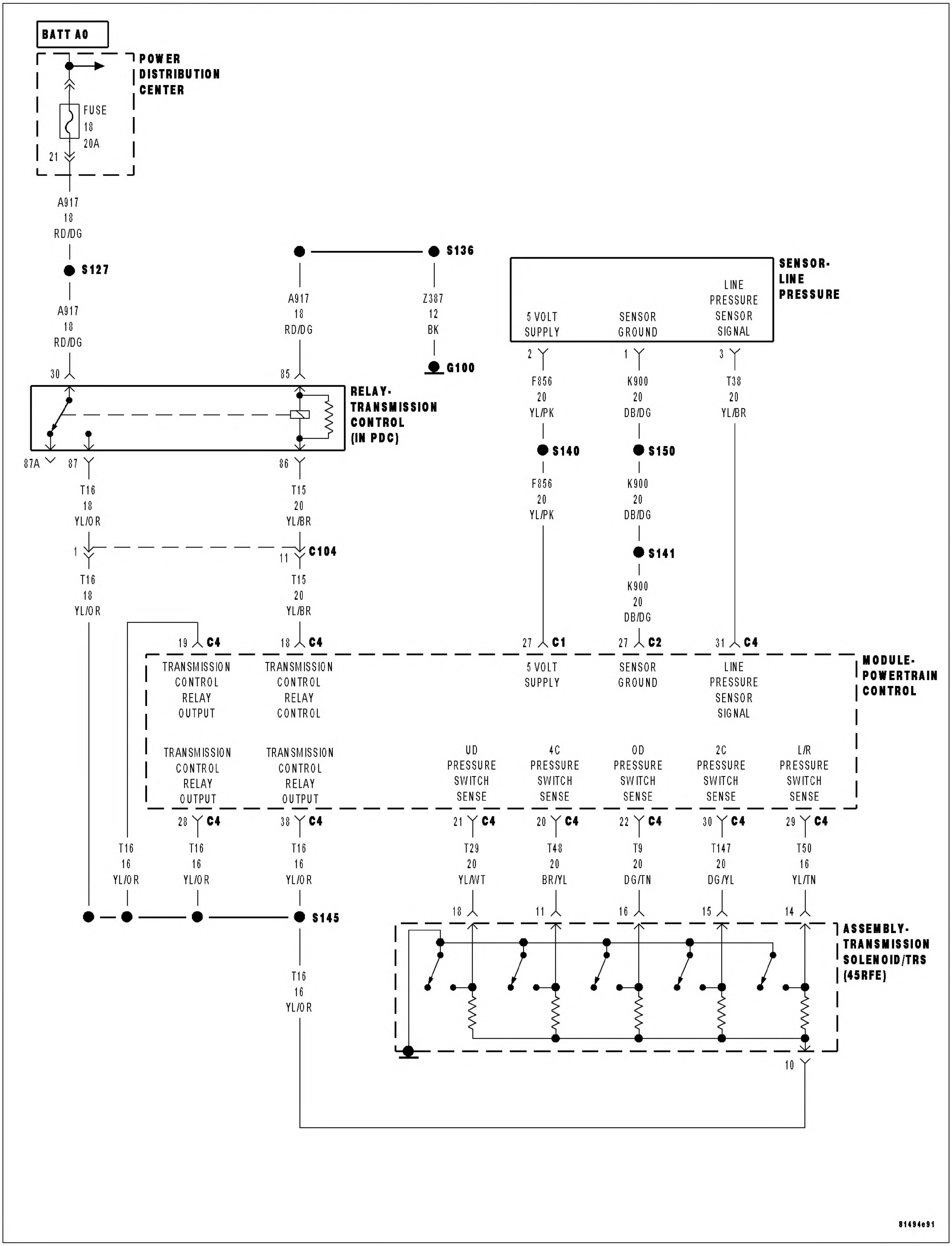
Where there any problems found?

Yes >> Repair as necessary.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
S136
A917 18 RD/DG
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously when performing partial or full EMCC - PEMCC or FEMCC.
- **Set Condition:**
  If the transmission senses the L/R pressure switch closing while performing PEMCC or FEMCC. This DTC will set after two unsuccessful attempts to perform PEMCC or FEMCC. This DTC can take up to five minutes of problem identification before illuminating the MIL.

Possible Causes
RELATED DTC P0841 PRESENT
LR PRESSURE SWITCH SENSE CIRCUIT OPEN
LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
SOLENOID SWITCH VALVE
POWERTRAIN CONTROL MODULE
INTERMITTENT WIRING AND CONNECTORS

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Solenoid Switch Valve (SSV) controls the direction of the transmission fluid when the L/R Solenoid is energized. The SSV will be in the downshifted position in 1st gear, thus directing the fluid to the L/R clutch circuit. In 2nd through 5th gears, it will be in the upshifted position and directing the fluid into the torque converter clutch (TCC).

When in 2nd, 2nd Prime, 3rd, 4th, or 5th gear, the Torque Converter Clutch (TCC) can be engaged when certain conditions are met. The TCC piston is electronically modulated by increasing the duty cycle of the L/R solenoid until the torque converter slip difference (difference between engine and transmission input speed) is within 60 RPM. Then the L/R solenoid is fully energized (FEMCC / 100% duty cycle). Torque converter slip is monitored in FEMCC to ensure adequate clutch capacity.

Diagnostic Test

1. DETERMINING IF RELATED DTC'S ARE PRESENT

With the scan tool, check for other transmission DTC's

Is the DTC P0841 present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION (CONTINUED)

2. CHECK TO SEE IF DTC P1776 IS CURRENT

With the scan tool, Check the STARTS SINCE SET counter.

NOTE: NOTE: This counter only applies to the last DTC set.

Is the STARTS SINCE SET counter 2 or less?

Yes >> Go To 3

No >> Go To 7

---

3. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the Transmission Simulator, turn the Pressure Switch selector switch to the LR position.

With the scan tool, monitor the LR Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator.

Did the state of the LR Pressure Switch change while pressing the Pressure Switch Test button?

Yes >> Go To 4

No >> Go To 5

---

4. SOLENOID SWITCH VALVE

Remove the Valve Body per the Service Information.

Inspect the Solenoid Switch Valve and plugs for sticking in the bore and/or wear.

Were there any problems found?

Yes >> Clean and repair as necessary per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION (CONTINUED)

5. LR PRESSURE SWITCH SENSE CIRCUIT OPEN

Turn the ignition off to the lock position.

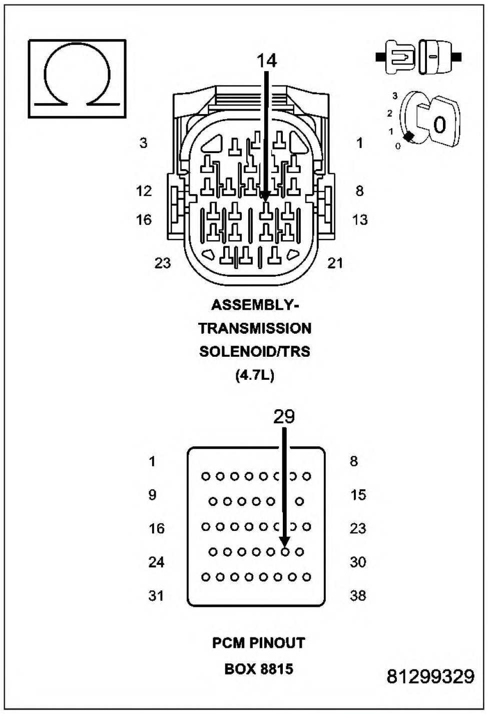
Disconnect the Transmission Simulator, Miller tool #8333.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

NOTE: Note: Check connectors - Clean/repair as necessary.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

Measure the resistance of the (T50) LR Pressure Switch Sense circuit between the appropriate terminal of Miller tool #8815 to the Solenoid/ TRS Assembly harness connector.


14
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
29
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
81299329

Is the resistance above 5.0 ohms?

Yes >> Repair the (T50) LR Pressure Switch Sense circuit for an open.

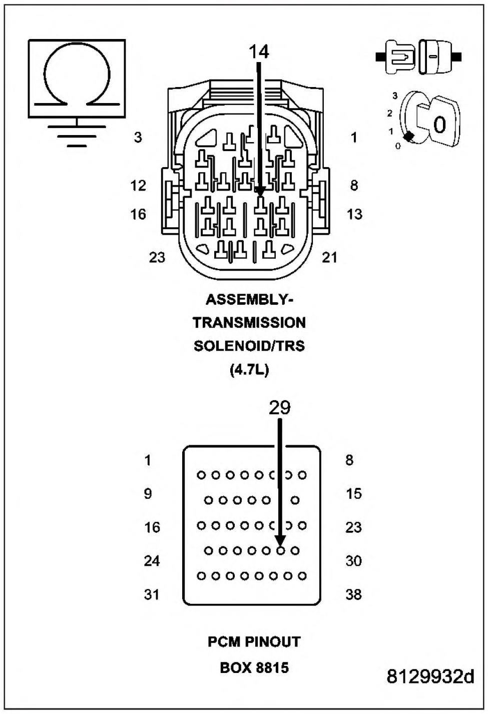
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. (T50) LR PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T50) LR Pressure Switch Sense circuit.


14
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
29
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
8129932d

Is the resistance below 5.0 ohms?

Yes >> Repair the (T50) LR Pressure Switch Sense circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION (CONTINUED)

7. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

This DTC can also be set by the Solenoid Switch Valve intermittently sticking in it's bore under extreme temperature conditions, or by a worn Solenoid Switch Valve or plugs.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P1790-FAULT IMMEDIATELY AFTER SHIFT

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  After a speed ratio error is stored.
- **Set Condition:**
  This DTC is set if the associated speed ratio DTC is stored within 1.3 seconds after a shift.

Possible Causes
FAULT AFTER SHIFT

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

This DTC will only be stored along with a gear ratio DTC. If this DTC is set, it indicates a probable hydraulic (line pressure) or mechanical problem exists. Diagnosing the transmission should be based on the associated speed ratio DTC and mechanical causes should be considered first.

INTENDED GEAR	CLUTCHES APPLYING	RECOMENDED DTC
REVERSE	UD** - MS	P0738
1ST	UD - LR*	P0731
2ND	UD - 2C	P0732
2ND PRIME	UD - 4C	P1736
3RD	UD - OD/MS	P0733
4TH	OD/MS - 2C	P0734
5TH	OD/MS - 2C	P0735

* L/R is used only up to 150 output RPM in 1st gear. ** UD will show as applied in Reverse but the UD clutch is actually released. OD/MS is OD and/or MS.

Diagnostic Test

1. INTENDED GEAR TO APPLIED CLUTCH

With the scan tool, check the EATX DTC EVENT DATA to determine in which gear the slippage occurred and the clutches that were applied.

With the EATX DTC EVENT DATA, use the information provided above to determine the proper symptom for diagnosis.

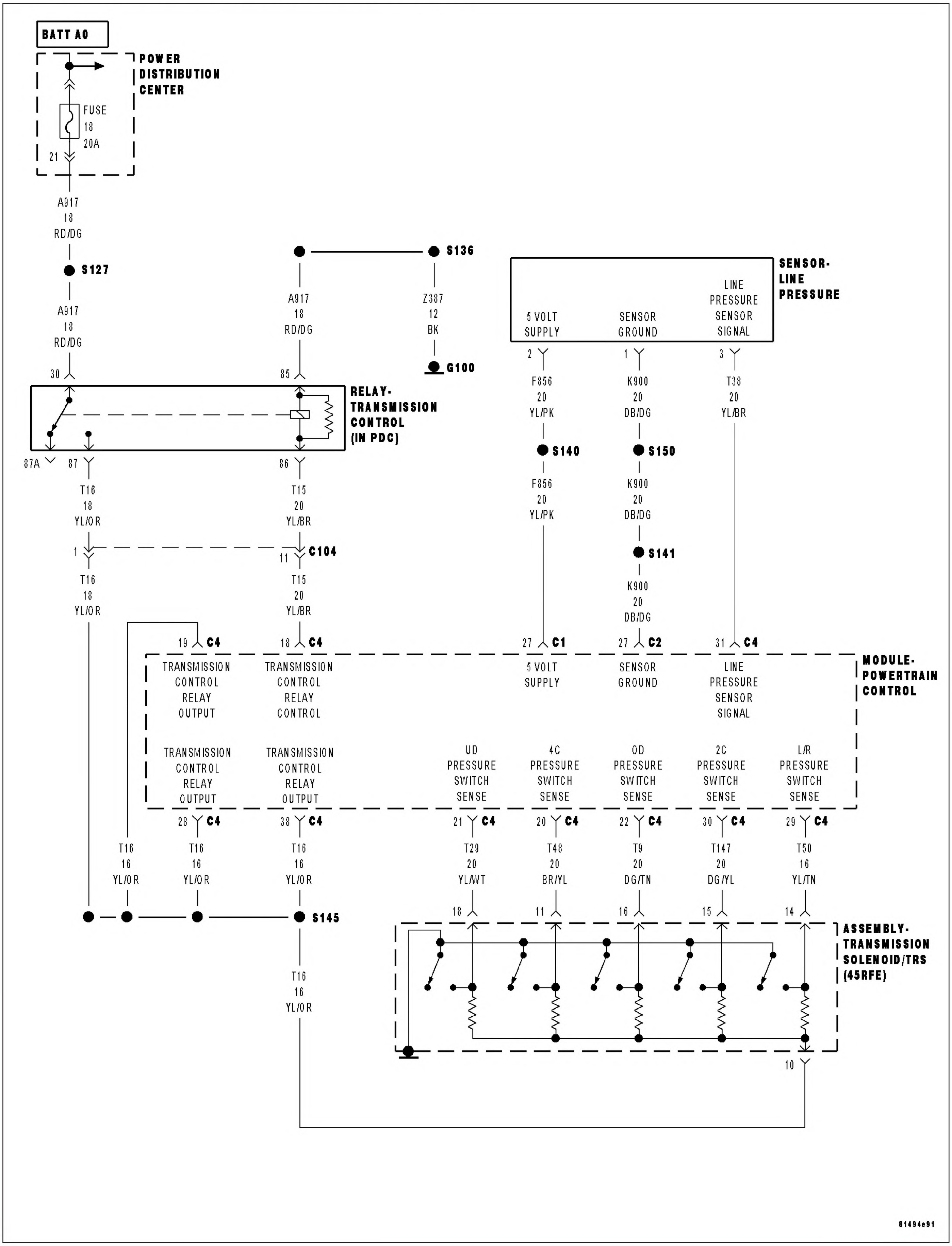
View repair

Repair

Refer to the Transmission category and perform the appropriate symptom identified from the EATX DTC EVENT DATA, intended gear, and applied clutches.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1794-SPEED SENSOR GROUND ERROR


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
30
S136
A917 18 RD/DG
Z387 12 BK
G100
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 18 YL/OR
T15 20 YL/BR
1
11
C104
T16 18 YL/OR
T15 20 YL/BR
SENSOR-LINE PRESSURE
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
2
1
3
F856 20 YL/PK
K900 20 DB/DG
T38 20 YL/BR
S140
S150
F856 20 YL/PK
K900 20 DB/DG
S141
K900 20 DB/DG
19 C4
18 C4
27 C1
27 C2
31 C4
MODULE-POWERTRAIN CONTROL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
5 VOLT SUPPLY
SENSOR GROUND
LINE PRESSURE SENSOR SIGNAL
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
UD PRESSURE SWITCH SENSE
4C PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2C PRESSURE SWITCH SENSE
L/R PRESSURE SWITCH SENSE
28 C4
38 C4
21 C4
20 C4
22 C4
30 C4
29 C4
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T29 20 YL/WT
T48 20 BR/YL
T9 20 DG/TN
T147 20 DG/YL
T50 16 YL/TN
S145
18
11
16
15
14
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
T16 16 YL/OR
10
81494e91

P1794-SPEED SENSOR GROUND ERROR (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  The gear ratio is monitored continuously while the Transmission is in gear.
- **Set Condition:**
  After a controller reset in neutral and a ratio of input to output, of 1 to 2. This DTC can take up to five minutes of problem identification before illuminating the MIL.

Possible Causes
(T13) SPEED SENSOR GROUND CIRCUIT OPEN
(T13) SPEED SENSOR GROUND CIRCUIT SHORT TO GROUND
(T13) SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) When in gear, if the gear ratio does not compare to a known gear ratio, the corresponding in-gear trouble code is set (DTCs P0731–36).

2) An excessive change in input or output speeds indicating signal intermittent which may result in the DTCs P0715 and/or P0720 to set.

3) If the common speed sensor ground circuit is lost, both sensor inputs will read the signal from the input speed sensor at idle in neutral. Since the input speed sensor reads 60 teeth from the input clutch hub and the output speed sensor reads 30 teeth from the park gear, the result is an apparent speed ratio of 1:2 and may cause the DTC P1794 to set when at a stop.

Diagnostic Test

1. CHECK TO SEE IF DTC P1794 IS CURRENT

Engine Running, Shift lever in park.

With the scan tool, read the Transmission Output and Input Speed Sensor states.

Is the Output Speed Sensor reading twice the Input Speed Sensor reading?

Yes >> Go To 2

No >> Go To 6

P1794-SPEED SENSOR GROUND ERROR (CONTINUED)

2. PCM AND WIRING

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install the Transmission Simulator, Miller tool 8333.

NOTE: Check connectors - Clean/repair as necessary.

With the Transmission Simulator, set the Input/Output Speed selector switch to the ″3000/1000″ position. Turn the Input/Output Speed switch to ″ON″.

Ignition on, engine not running.

With the scan tool, monitor the Input and Output Speed Sensor state.

Does the Input speed read 3000 RPM and the Output speed read 1000 RPM, within 50 RPM?

Yes >> Go To 6

No >> Go To 3

---

3. (T13) SPEED SENSOR GROUND CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the PCM C4 harness connector and connect Miller tool #8815.

Disconnect the Transmission Simulator, Miller tool #8333.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller tool #8815 to perform diagnosis.

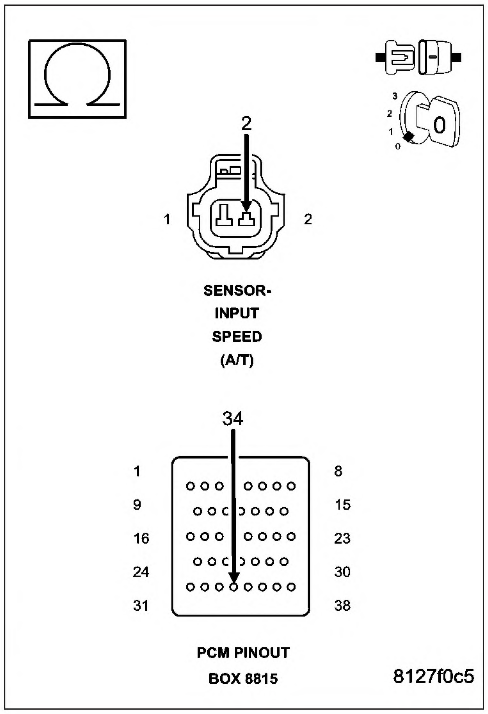
Measure the resistance of the (T13) Speed Sensor Ground circuit from the appropriate terminal of Miller tool #8815 to the Transmission Solenoid/TRS Assembly and both Input and Output Speed Sensor harness connectors.

Is the resistance above 5.0 ohms on any of the above measurements?

Yes >> Repair the (T13) Speed Sensor Ground circuit for an open.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

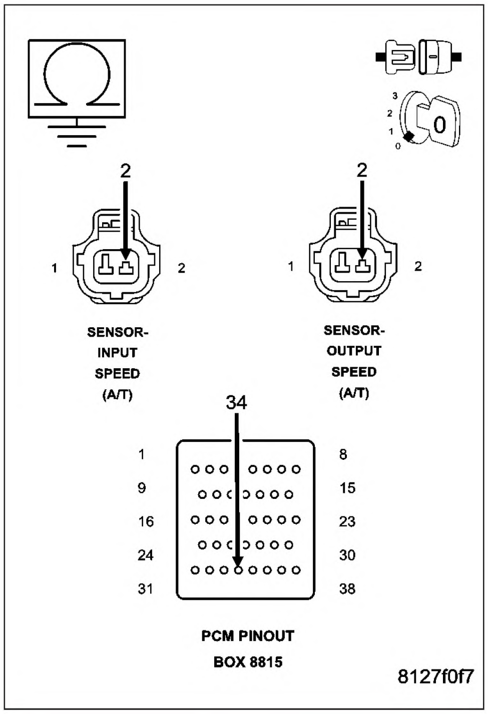
No >> Go To 4



P1794-SPEED SENSOR GROUND ERROR (CONTINUED)

4. (T13) SPEED SENSOR GROUND CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T13) Speed Sensor Ground circuit.


2
2
1
2
1
2
SENSOR-
INPUT
SPEED
(A/T)
SENSOR-
OUTPUT
SPEED
(A/T)
34
1
9
16
24
31
8
15
23
30
38
3
2
1
0
0
PCM PINOUT
BOX 8815
8127f0f7

Is the resistance below 5.0 ohms?

Yes >> Repair the (T13) Speed Sensor Ground circuit for a short to ground.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

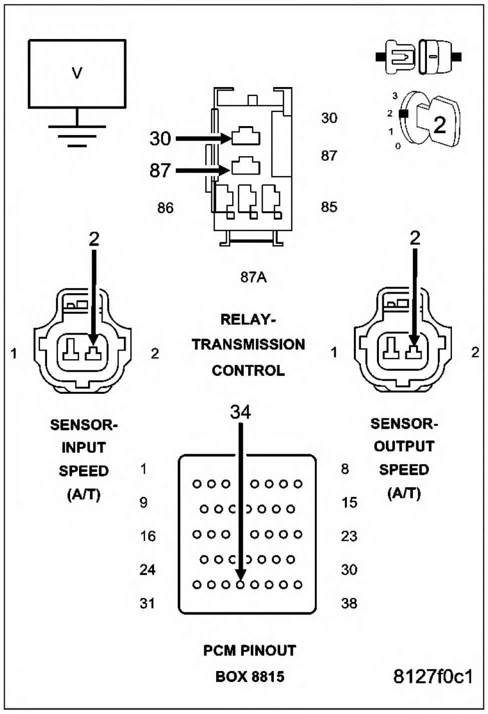
No >> Go To 5

---

5. (T13) SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE

Ignition on, engine not running.

Measure the voltage of the (T13) Speed Sensor Ground circuit.


V
30
87
30
87
86
85
87A
RELAY-
TRANSMISSION
CONTROL
2
2
1
2
1
2
SENSOR-
INPUT
SPEED
(A/T)
SENSOR-
OUTPUT
SPEED
(A/T)
34
1
9
16
24
31
8
15
23
30
38
3
2
1
0
2
PCM PINOUT
BOX 8815
8127f0c1

Is the voltage above 0.5 volt?

Yes >> Repair the (T13) Speed Sensor Ground circuit for a short to voltage.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

P1794-SPEED SENSOR GROUND ERROR (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

With the scan tool, check the EATX DTC EVENT DATA to help identify the conditions in which the DTC was set.

Where there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P2700-INADEQUATE ELEMENT VOLUME LR

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the engine is running. The LR clutch volume index (CVI) is updated during a 3-1 or 2-1 manual downshift with throttle angle below 5 degrees. Transmission temperature must be at least 43° C (110° F).
- **Set Condition:**
  When the LR clutch volume index (CVI) falls below 16.

Possible Causes
HYDRAULIC LEAK IN THE VALVE BODY
BROKEN L/R CLUTCH PISTON RETURN SPRING OR SPRING RETAINERS
BROKEN L/R ACCUMULATOR SPRING(S)
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The volumes of the transmission fluid needed to apply the friction elements are continuously monitored and learned for adaptive controls. As the clutch friction material wears, the volume of fluid needed to apply the clutch increases. Certain transmission mechanical problems can cause near-zero learned volumes resulting in setting a DTC. The DTC will usually set with other DTC's, which indicates an internal transmission problem.

Diagnostic Test

1. OTHER DTCS PRESENT

With the scan tool, check for other transmission DTCs.

Are there any Pressure Switch Sense circuit DTCs present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK LR CLUTCH VOLUME INDEX

With the scan tool, erase DTCs.

Start the engine and warm the transmission.

NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.
Drive the vehicle and perform at least ten 3-1 manual downshifts at closed throttle from speeds of about 32 Kmh or 20 MPH.

With the scan tool, read the LR CL VOL INDEX.

Is the LR CL VOL INDEX below 20?

Yes >> Go To 3

No >> Go To 5

P2700-INADEQUATE ELEMENT VOLUME LR (CONTINUED)

3. L/R CLUTCH CIRCUIT LEAKS IN THE VALVE BODY

Turn the ignition off to the lock position.

Remove the transmission oil pan per the Service Information.

Remove the valve body per the service information.

Check condition of the L/R accumulator springs.

Look for possible leak paths into the L/R clutch hydraulics circuit within the valve body.

Were any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. AIR CHECK L/R CLUTCH CIRCUITS

Perform an air check on the L/R Clutch circuit per the Service Information.

Watch and listen for L/R Clutch piston movement.

Does the L/R piston stroke and return properly?

Yes >> Replace the Transmission/TRS Solenoid Assembly per the service information. With the scan tool, perform Quick Learn.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair internal transmission as necessary. Pay attention to the components related to the L/R clutch. A broken or weak L/R clutch return spring, Accumulator Spring, and/or dislocated snap ring could cause this problem.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

5. VERIFY PCM OPERATION

NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.

Perform eight learnable starts. A learnable start is defined as follows: Start engine. From a standstill, accelerate lightly to 80 Kmh or 50 MPH, then brake lightly to a stop. Turn off engine.

With the scan tool, record the CL VOL INDEX (CVI) for all clutches

With the scan tool, perform a BATTERY DISCONNECT.

With the scan tool, read the CVI's and compare them to the readings recorded before the BATTERY DISCONNECT.

Are any of the CVI's less than 5 or different than before the BATTERY DISCONNECT?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P2701-INADEQUATE ELEMENT VOLUME 2C

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the engine is running. The 2C clutch volume index (CVI) is updated during a 3-2 kickdown with throttle angle between 10 and 54 degrees. Transmission temperature must be at least 43° C (110° F).
- **Set Condition:**
  When the 2C CVI falls below 5.

Possible Causes
HYDRAULIC LEAK IN THE VALVE BODY
BROKEN 2C CLUTCH PISTON RETURN SPRING / DISLODGED SNAP RING
BROKEN ACCUMULATOR SPRING(S)
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The volumes of the transmission fluid needed to apply the friction elements are continuously monitored and learned for adaptive controls. As the clutch friction material wears, the volume of fluid needed to apply the clutch increases. Certain transmission mechanical problems can cause near-zero learned volumes resulting in setting a DTC. The DTC will usually set with other DTC’s, which indicates an internal transmission problem.

Diagnostic Test

1. OTHER DTCS PRESENT

With the scan tool, check for other transmission DTCs.

Are there any Pressure Switch Sense circuit DTCs present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK 2C CLUTCH VOLUME INDEX

With the scan tool, erase Transmission DTCs.

Drive the vehicle at about 80 Kmh or 50 MPH, then depress the OD off button. This will put the vehicle into third gear.

NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.
Perform at least ten 3-2 kickdowns by depressing the throttle between 10 and 54 TPS DEGREES at speeds of about 80 Kmh or 50 MPH.
With the scan tool, read the 2C CL VOL INDEX.

Is the 2C CL VOL INDEX below 10?

Yes >> Go To 3

No >> Go To 5

P2701-INADEQUATE ELEMENT VOLUME 2C (CONTINUED)

3. 2C CLUTCH CIRCUIT LEAKS IN THE VALVE BODY

Turn the ignition off to the lock position.

Remove the transmission oil pan per the Service Information.

Remove the valve body per the service information.

Check condition of the 2C accumulator springs.

Look for possible leak paths into the 2C clutch hydraulics circuit within the valve body.

Were any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. AIR CHECK 2C CLUTCH CIRCUIT

Turn the ignition off to the lock position.

Perform an air check on the 2C Clutch circuit per the Service Information.

Watch and listen for 2C Clutch piston movement.

Dose the piston stroke and return properly?

Yes >> Replace the Transmission/TRS Solenoid Assembly per the service information. With the scan tool, perform Quick Learn.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair internal transmission as necessary. Pay attention to the components related to the 2C clutch. A broken or dislodged 2C return spring, snap ring or broken 2C Accumulator Spring could cause this problem.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

5. VERIFY PCM OPERATION

NOTE: NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.

Perform eight learnable starts. A learnable start is defined as follows: Start engine. From a standstill, accelerate lightly to 80 Kmh or 50 MPH, then brake lightly to a stop. Turn off engine.

With the scan tool, record the CL VOL INDEX (CVI) for all clutches

With the scan tool, perform a BATTERY DISCONNECT.

With the scan tool, read the CVI's and compare them to the readings recorded before the BATTERY DISCONNECT.

Are any of the CVI's less than 5 or different than before the BATTERY DISCONNECT?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P2702-INADEQUATE ELEMENT VOLUME OD

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the engine is running. The OD clutch volume index (CVI) is updated during a 2-3 upshift with throttle angle between 10 and 54 degrees. Transmission temperature must be at least 43° C (110° F).
- **Set Condition:**
  When the OD CVI falls below 5.

Possible Causes
HYDRAULIC LEAK IN THE VALVE BODY
BROKEN OD ACCUMULATOR SPRING
BROKEN OD/REV PISTON BELLEVILLE SPRING OR DISLODGED SNAP RING
INTERNAL LEAKAGE IN PUMP ASSEMBLY
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The volumes of the transmission fluid needed to apply the friction elements are continuously monitored and learned for adaptive controls. As the clutch friction material wears, the volume of fluid needed to apply the clutch increases. Certain transmission mechanical problems can cause near-zero learned volumes resulting in setting a DTC. The DTC will usually set with other DTC's, which indicates an internal transmission problem.

Diagnostic Test

1. OTHER DTCS PRESENT

With the scan tool, check for other transmission DTCs.

Are there any Pressure Switch Sense circuit DTCs present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK THE OD CLUTCH VOLUME INDEX

With the scan tool, erase DTCs.

NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.

Drive the vehicle and perform at least ten 2-3 upshifts with the TPS degree between 10 and 54.

With the scan tool, read the OD CL VOL INDEX.

Is the OD CL VOL INDEX below 10?

Yes >> Go To 3

No >> Go To 5

P2702-INADEQUATE ELEMENT VOLUME OD (CONTINUED)

3. OD CLUTCH CIRCUIT LEAKS IN THE VALVE BODY

Turn the ignition off to the lock position.

Remove the transmission oil pan per the Service Information.

Remove the valve body per the service information.

Check condition of the OD accumulator spring.

Look for possible leak paths into the OD clutch hydraulics circuit within the valve body.

Were any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. AIR CHECK OD CLUTCH CIRCUIT

Perform an air check on the OD Clutch circuit per the Service Information.

Watch and listen for OD Clutch piston movement.

Air check all other pump passages and watch for air leakage into the OD clutch passage.

NOTE: There is a bleed orifice between the OD and Reverse Clutch passages, so a small amount of air leakage from Reverse to OD is normal.

Were any problems found?

Yes >> Repair internal transmission. Pay attention to the OD Clutch. Broken or weak return spring or a dislocated snap ring could cause this problem. If no problems were found in the OD clutch, or if leakage into the OD passage was noted, replace Pump Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission/TRS Solenoid Assembly per the service information. With the scan tool, perform Quick Learn.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

5. VERIFY PCM OPERATION

NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.

Perform eight learnable starts. A learnable start is defined as follows: Start engine. From a standstill, accelerate lightly to 80 Kmh or 50 MPH, then brake lightly to a stop. Turn off engine.

With the scan tool, record the CL VOL INDEX (CVI) for all clutches.

With the scan tool, perform a BATTERY DISCONNECT.

With the scan tool, read the CVI's and compare them to the readings recorded before the BATTERY DISCONNECT.

Are any of the CVI's less than 5 or different than before the BATTERY DISCONNECT?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P2703- INADEQUATE ELEMENT VOLUME UD

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the engine is running. The UD clutch volume index (CVI) is updated during a 4-3 kickdown with throttle angle between 10 and 54 degrees. Transmission temperature must be at least 43° C (110° F).
- **Set Condition:**
  When the UD CVI falls below 11.

Possible Causes
BROKEN UD ACCUMULATOR SPRING(S)
BROKEN UD CLUTCH PISTON SPRING OR DISLODGED SNAP RING
INTERNAL LEAKAGE IN PUMP OR VALVE BODY ASSEMBLIES
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The volumes of the transmission fluid needed to apply the friction elements are continuously monitored and learned for adaptive controls. As the clutch friction material wears, the volume of fluid needed to apply the clutch increases. Certain transmission mechanical problems can cause near-zero learned volumes resulting in setting a DTC. The DTC will usually set with other DTC's, which indicates an internal transmission problem.

Diagnostic Test

1. OTHER DTCS PRESENT

With the scan tool, check for other transmission DTCs.

Are there any Pressure Switch Sense circuit DTCs present also?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK UD CLUTCH VOLUME INDEX

With the scan tool, erase Transmission DTCs.

NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.

Drive the vehicle and perform at least ten 4-3 kickdowns by depressing the throttle between 30 and 54 TPS degrees at speeds about 80 Kmh or 50 MPH.

With the scan tool, read the UD clutch volume index (CVI).

Is the UD CVI below 10?

Yes >> Go To 3

No >> Go To 5

P2703- INADEQUATE ELEMENT VOLUME UD (CONTINUED)

3. UD CLUTCH CIRCUIT LEAKS IN THE VALVE BODY

Turn the ignition off to the lock position.

Remove the transmission oil pan and valve body per the Service Information.

Check the condition of the UD accumulator springs.

Look for possible leak paths into the UD clutch hydraulics circuit within the valve body.

Were there any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. AIR CHECK UD CLUTCH CIRCUIT

Perform an air check on the UD Clutch circuit per the Service Information.

Watch and listen for UD Clutch piston movement.

Air check all other pump passages for air leakage into the UD Clutch circuit.

Were any problems found?

Yes >> Repair internal transmission. Pay attention to components related to the UD clutch. Broken or weak return spring or a dislocated snap ring. If no trouble is found in UD clutch component or UD clutch leakage was noted in passage, replace the Pump Assembly.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission/TRS Solenoid Assembly per the service information. With the scan tool, perform Quick Learn.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

5. VERIFY PCM OPERATION

NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.
Perform eight learnable starts. A learnable start is defined as follows: Start engine. From a standstill, accelerate lightly to 80 Kmh or 50 MPH, then brake lightly to a stop. Turn off engine.

With the scan tool, record the clutch volume index (CVI) for all clutches.

With the scan tool, perform a BATTERY DISCONNECT.

With the scan tool, read the CVI's and compare them to the readings recorded before the BATTERY DISCONNECT.

Are any of the CVI's less than 5 or different than before the BATTERY DISCONNECT?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P2704-INADEQUATE ELEMENT VOLUME 4C

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Whenever the engine is running. The 4C clutch volume index (CVI) is updated during a 3-4 upshift with throttle angle between 10 and 54 degrees. Transmission temperature must be at least 43° C (110° F).
- **Set Condition:**
  When the 4C CVI falls below 5.

Possible Causes
BROKEN 4C RETURN SPRING OR DISLODGED SNAP RING
BROKEN 4C ACCUMULATOR SPRING(S)
HYDRAULIC LEAK IN THE VALVE BODY
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The volumes of the transmission fluid needed to apply the friction elements are continuously monitored and learned for adaptive controls. As the clutch friction material wears, the volume of fluid needed to apply the clutch increases. Certain transmission mechanical problems can cause near-zero learned volumes resulting in setting a DTC. The DTC will usually set with other DTC's, which indicates an internal transmission problem.

Diagnostic Test

1. CHECK THE 4C CLUTCH VOLUME

With the scan tool, record the 4C clutch volume index (CVI) and erase DTC's.

Perform at least 10, 3-4 upshifts with the throttle between 10 and 54 degrees. The Transmission temperature must be at least 43° C or 110° F.

With the scan tool, read the 4C CVI.

Is the current 4C CVI below 10?

Yes >> Go To 2

No >> Go To 5

---

2. DTC P0876 PRESENT

With the scan tool, read DTCs.

NOTE: The DTC P0876 must also be set with P2704 in order for this test to be valid.

Is the DTC P0876 also present?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

P2704-INADEQUATE ELEMENT VOLUME 4C (CONTINUED)

3. 4C CLUTCH CIRCUIT LEAKS IN THE VALVE BODY

Turn the ignition off to the lock position.

Remove the transmission oil pan per the Service Information.

Remove the valve body per the Service Information.

Check condition of the 4C accumulator springs.

Look for possible leak paths into the 4C clutch hydraulics circuit within the valve body.

Were any problems found?

Yes >> Repair as necessary.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. AIR CHECK 4C CLUTCH CIRCUIT

Perform an air check on the 4C Clutch circuit per the Service Information.

Listen for proper 4C Clutch piston movement.

Were any problems found?

Yes >> Repair Internal transmission as necessary. Pay attention to the mechanical components related to the 4th clutch. A broken or weak return spring or a dislocated snap ring could cause this problem.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Transmission Solenoid/TRS Assembly per the service information. With the scan tool, perform Quick Learn.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

5. VERIFY PCM OPERATION

Perform eight learnable starts. A learnable start is defined as follows: Start engine. From a standstill, accelerate lightly to 50 MPH, then brake lightly to a stop. Turn off engine.

With the scan tool, record Transmission CL VOL INDEX (CVI) for all clutches.

With the scan tool, perform a BATTERY DISCONNECT.

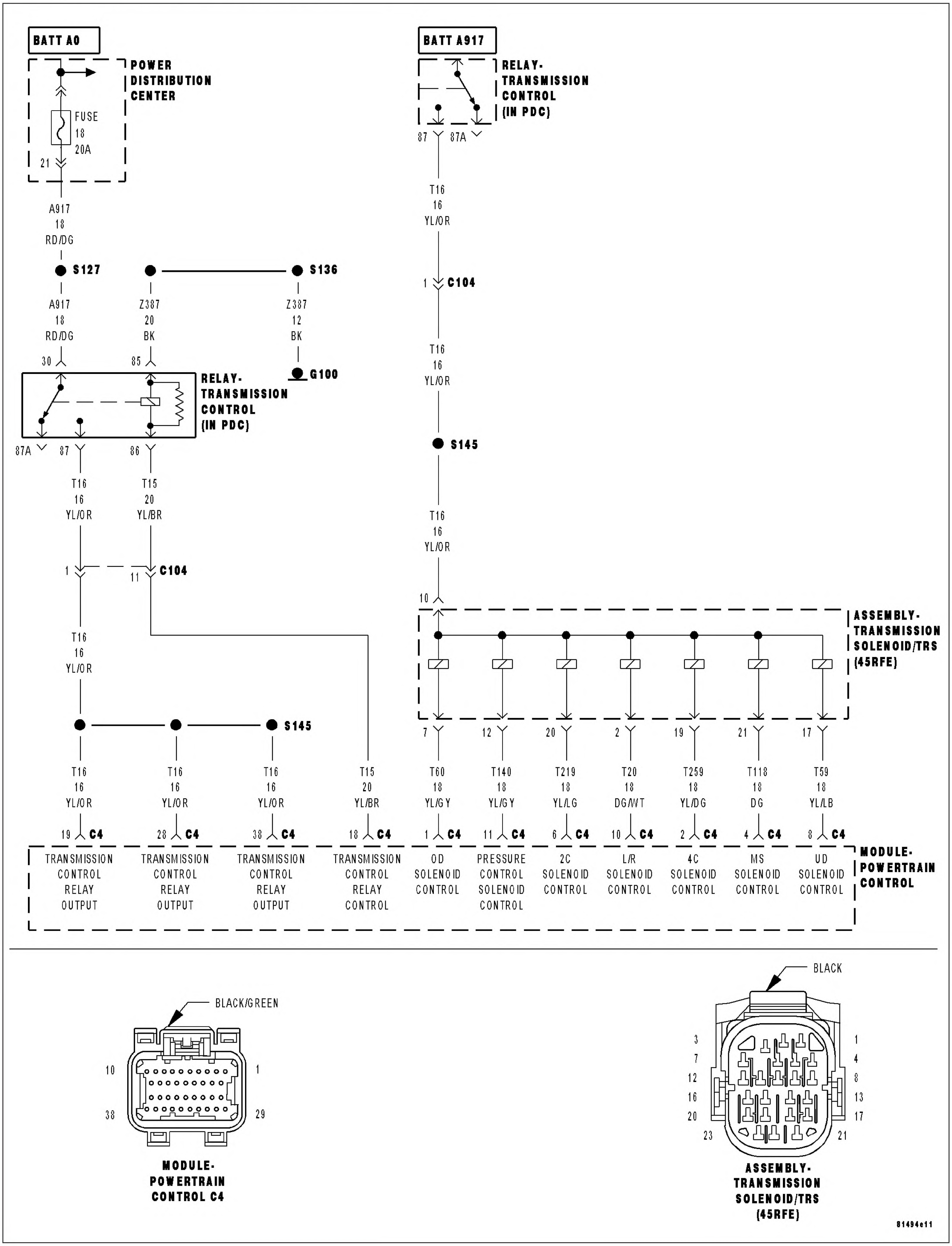
With the scan tool, read the CVI's and compare them to the reading recorded before the BATTERY DISCONNECT.

Are any of the CVI's less than 5 or are they different than before the battery disconnect?

Yes >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P2706-MS SOLENOID CIRCUIT


BATT A0
POWER DISTRIBUTION CENTER
FUSE 18 20A
21
A917 18 RD/DG
S127
A917 18 RD/DG
Z387 20 BK
S136
Z387 12 BK
G100
30
85
RELAY-TRANSMISSION CONTROL (IN PDC)
87A
87
86
T16 16 YL/OR
T15 20 YL/BR
1
11
C104
T16 16 YL/OR
S145
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
T15 20 YL/BR
BATT A917
RELAY-TRANSMISSION CONTROL (IN PDC)
87
87A
T16 16 YL/OR
1
C104
T16 16 YL/OR
S145
T16 16 YL/OR
10
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
7
12
20
2
19
21
17
T60 18 YL/GY
T140 18 YL/GY
T219 18 YL/LG
T20 18 DG/WT
T259 18 YL/DG
T118 18 DG
T59 18 YL/LB
19 C4
28 C4
38 C4
18 C4
1 C4
11 C4
6 C4
10 C4
2 C4
4 C4
8 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY CONTROL
OD SOLENOID CONTROL
PRESSURE CONTROL SOLENOID CONTROL
2C SOLENOID CONTROL
L/R SOLENOID CONTROL
4C SOLENOID CONTROL
MS SOLENOID CONTROL
UD SOLENOID CONTROL
MODULE-POWERTRAIN CONTROL
BLACK/GREEN
10
1
38
29
MODULE-POWERTRAIN CONTROL C4
BLACK
3
7
12
16
20
23
1
4
8
13
17
21
ASSEMBLY-TRANSMISSION SOLENOID/TRS (45RFE)
81494e11

P2706-MS SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to)(Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Initially at power-up, then every 10 seconds thereafter. The solenoid circuits will also be tested immediately after a gear ratio or pressure switch error is detected.
- **Set Condition:**
  After three consecutive solenoid continuity test failures, or one failure if test is run in response to a gear ratio or pressure switch error. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Possible Causes
RELATED RELAY DTC'S PRESENT
(T118) MS SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS
(T118) MS SOLENOID CONTROL CIRCUIT OPEN
(T118) MS SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TRANSMISSION SOLENOID/TRS ASSEMBLY
POWERTRAIN CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - DIAGNOSIS AND TESTING).

Theory of Operation

The Transmission Control System uses six electronically controlled solenoids that allow hydraulic fluid to be applied to various friction elements (clutches), which enables the gear requested. The continuity of each solenoid circuit is periodically tested. Each inactive solenoid is turned on for a few milliseconds, then off. Each active solenoid is turned off for a few milliseconds, then on. This pulsing of voltage to the solenoid causes an inductive spike which can be sensed by the Transmission Control System. If an inductive spike is not sensed by the Transmission Control System during the continuity check, it is tested again. If the test fails three consecutive times, the appropriate Diagnostic Trouble Code (DTC) is set. If the solenoid test is run in response to a gear ratio or pressure switch error, one failure will result in setting the appropriate DTC. **Note: This DTC is strictly an electrical fault and does not apply to any internal transmission failures.**

Diagnostic Test

1. RELATED TRANSMISSION RELAY DTC'S PRESENT

With the scan tool, check for other transmission DTC's.

Are there any Transmission Control Relay DTC's present?

Yes >> Refer to the Transmission category and perform the appropriate symptom.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P2706-MS SOLENOID CIRCUIT (CONTINUED)

2. TRANSMISSION SOLENOID/TRS ASSEMBLY

Turn the ignition off to the lock position.

Remove the Starter Relay.

NOTE: Removal of the Starter Relay is to prevent a Transmission, NO RESPONSE, condition and disable the starter.

Install Transmission Simulator, Miller tool #8333.

NOTE: Check connectors - Clean/repair as necessary.

Ignition on, engine not running.

With the scan tool, actuate the MS Solenoid.

Monitor the MS Solenoid LED on the Transmission Simulator.

Did the MS Solenoid LED on the Transmission Simulator blink on and off?

Yes >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

3. TRANSMISSION SOLENOID/TRS ASSEMBLY

With the scan tool, continue to actuate the MS Solenoid for the period of 2 minutes with the Transmission Simulator still connected.

After 2 minutes of actuation, with the scan tool, stop the actuation and check for transmission DTCs.

Did the DTC P2706 reset during the actuation test?

Yes >> Go To 4

No >> Replace the Transmission Solenoid/TRS Assembly per the Service Information.
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

---

4. (T118) MS SOLENOID CONTROL CIRCUIT SHORT TO OTHER CIRCUITS

Turn the ignition off to the lock position.

Disconnect the Transmission Simulator, Miller tool #8333.

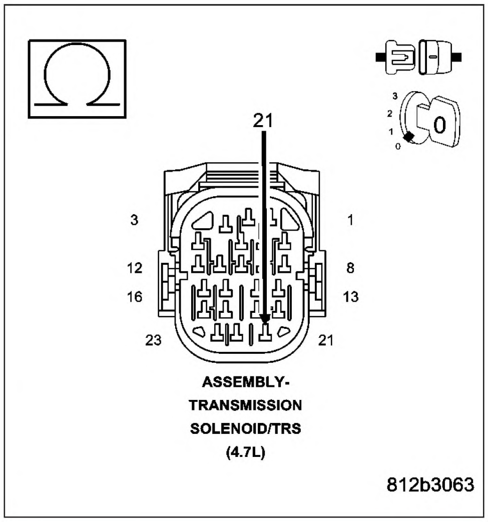
Disconnect the PCM harness connectors.

Measure the resistance between the (T118) MS Solenoid Control circuit and all other circuits in the Transmission Solenoid/TRS Assembly harness connector.

Is the resistance below 5.0 ohms between the (T118) MS Solenoid Control circuit and any other circuit(s) in the Transmission Solenoid/TRS Assembly harness connector?

Yes >> Repair the (T118) MS Solenoid Control circuit for a short to other circuit(s).
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5



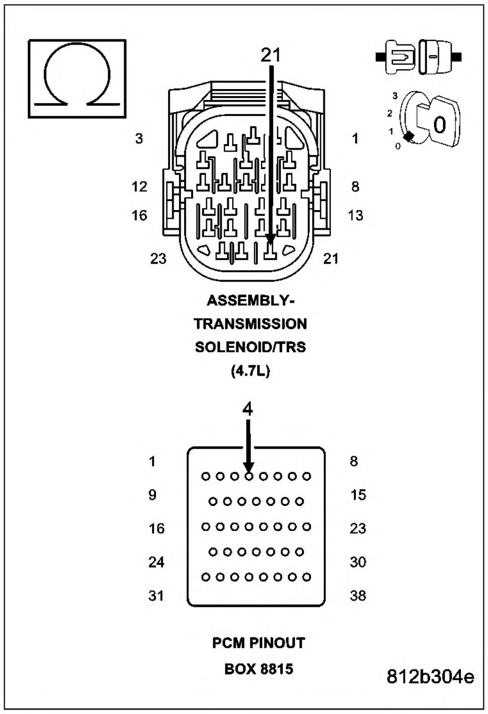
P2706-MS SOLENOID CIRCUIT (CONTINUED)

5. (T118) MS SOLENOID CONTROL CIRCUIT OPEN

Connect Miller tool #8815 to the PCM C4 harness connector.

CAUTION: Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install Miller special tool #8815 to perform diagnosis.

Measure the resistance of the (T118) MS Solenoid Control circuit from the Transmission Solenoid/TRS Assembly harness connector to the appropriate terminal of Miller tool #8815.


21
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
4
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812b304e

Is the resistance above 5.0 ohms?

Yes >> Repair the (T118) MS Solenoid Control circuit for an open.

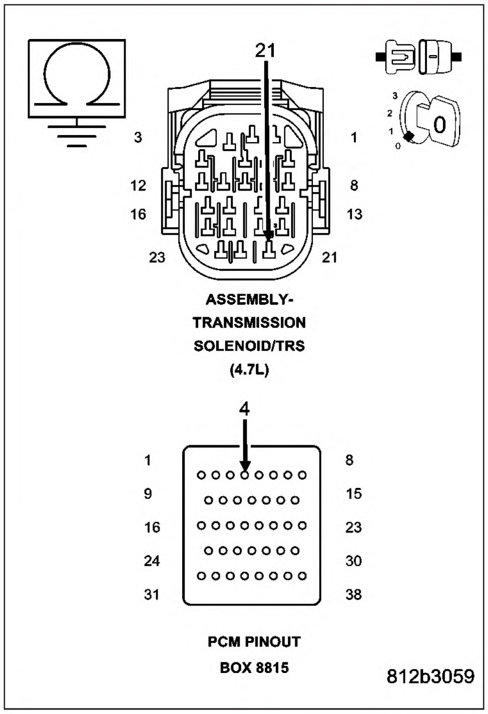
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

---

6. (T118) MS SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T118) MS Solenoid Control circuit.


21
3
1
12
8
16
13
23
21
ASSEMBLY-
TRANSMISSION
SOLENOID/TRS
(4.7L)
4
1
8
9
15
16
23
24
30
31
38
PCM PINOUT
BOX 8815
812b3059

Is the resistance below 5.0 ohms?

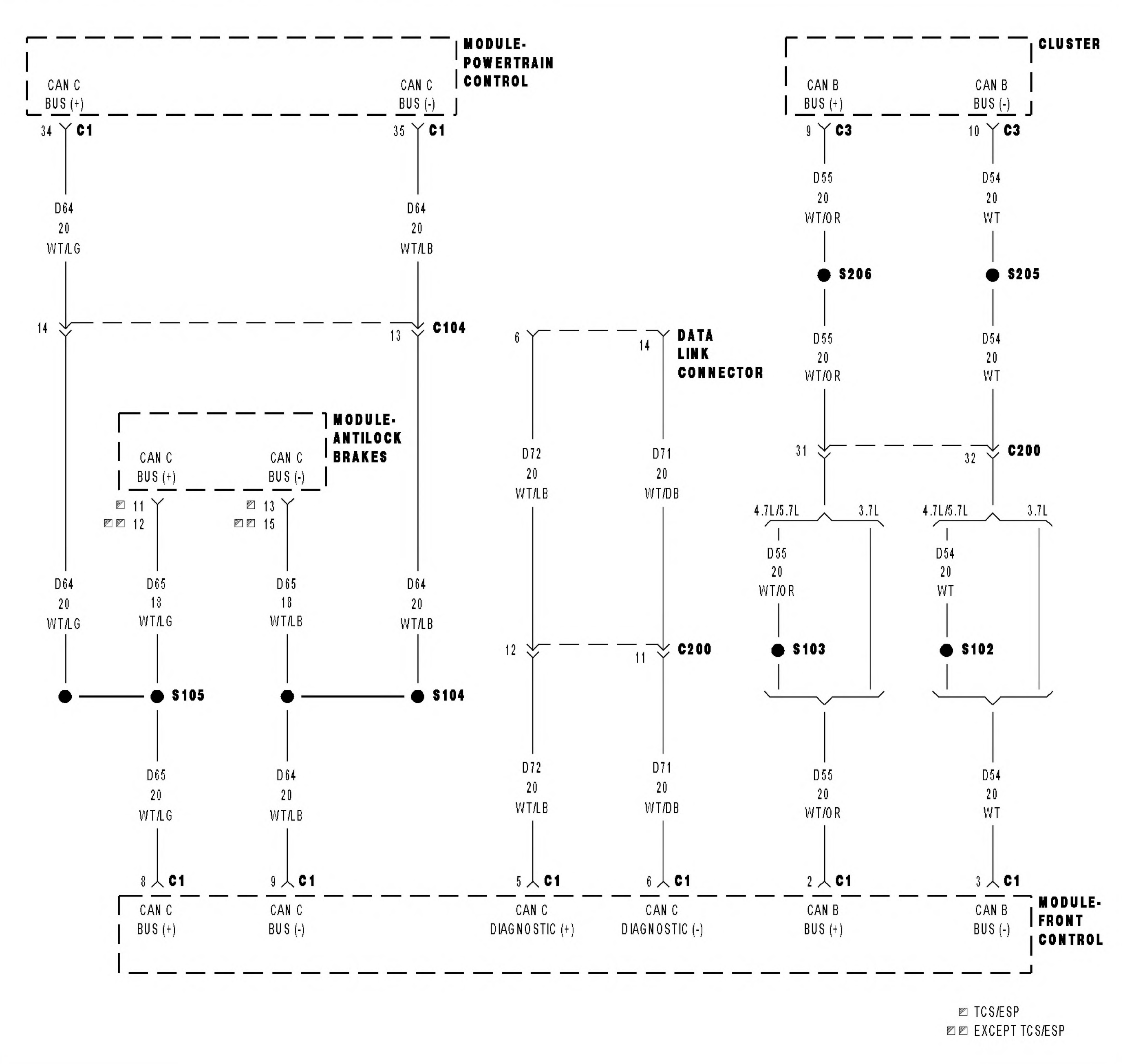
Yes >> Repair the (T118) MS Solenoid Control circuit for a short to ground.

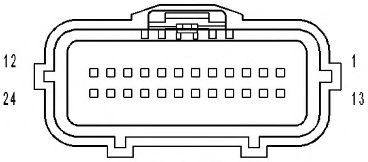
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Powertrain Control Module (PCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the PCM per the Service Information. With the scan tool, perform QUICK LEARN.

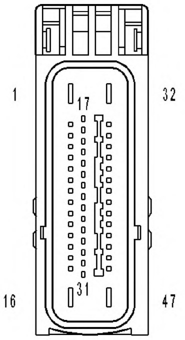
Perform 45RFE/545RFE TRANSMISSION VERIFICATION TEST - VER 1.

U0002 CAN C BUS OFF PERFORMANCE

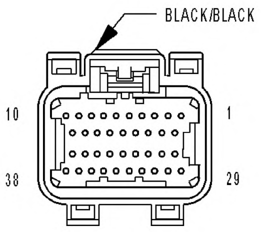

MODULE-
POWERTRAIN
CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D64 20 WT/LG
D64 20 WT/LB
14
13 C104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
D55 20 WT/OR
D54 20 WT
31
32 C200
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D55 20 WT/OR
D54 20 WT
S103
S102
D55 20 WT/OR
D54 20 WT
6
14
DATA
LINK
CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11 C200
D72 20 WT/LB
D71 20 WT/DB
MODULE-
ANTILOCK
BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D64 20 WT/LG
D65 18 WT/LG
D65 18 WT/LB
D64 20 WT/LB
S105
S104
D65 20 WT/LG
D64 20 WT/LB
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-
FRONT
CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP



MODULE-
FRONT
CONTROL C1


1
32
17
31
16
47

MODULE-
ANTILOCK BRAKES


BLACK/BLACK
10
38
1
29

MODULE-
POWERTRAIN
CONTROL C1

81495239

U0002 CAN C BUS OFF PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

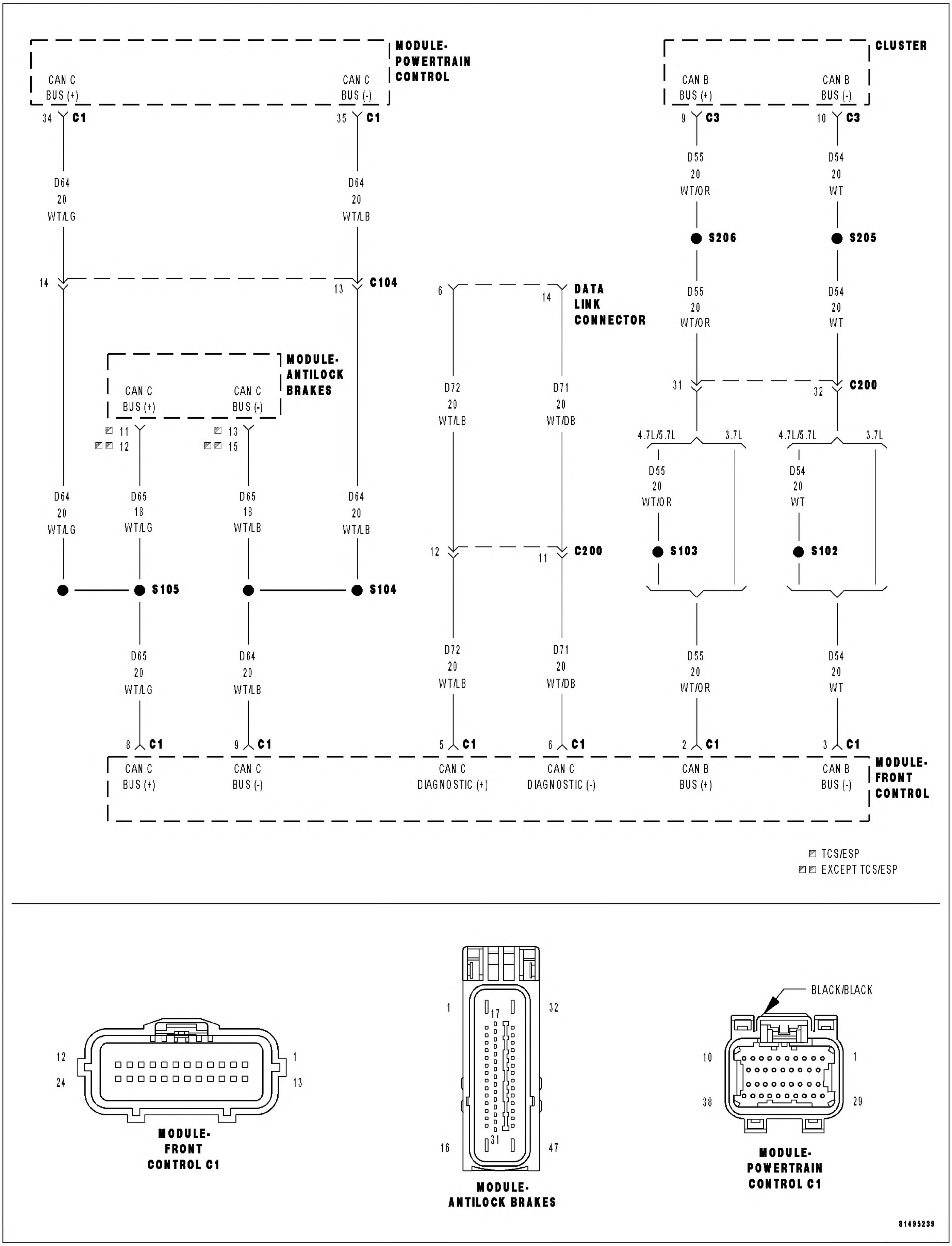
- **When Monitored:**
  Every 7 msec. Conditions: 1) Engine speed greater than 500 RPM. 2) Battery voltage greater than 10v but less than 16v.
- **Set Condition:**
  CAN C bus messages not received for 10 seconds.

Theory of Operation

Some NGC controllers communicate with other controllers over the CAN C bus. The transmission controller continuously monitors the bus activity and receives the messages it needs. The CAN C bus is also used to communicate transmission MIL status to the Engine Controller, therefor if the Engine Controller is unable to communicate with the Transmission Controller, the Engine Controller will light the MIL.

Diagnose the U0002 CAN C BUS OFF PERFORMANCE as the U0001 CAN C BUS CIRCUIT test in 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

U0100–NO COMMUNICATION WITH THE ECM/PCM


MODULE-
POWERTRAIN
CONTROL
CAN C
BUS (+)
CAN C
BUS (-)
34 C1
35 C1
D64
20
WT/LG
D64
20
WT/LB
14
13 C104
CLUSTER
CAN B
BUS (+)
CAN B
BUS (-)
9 C3
10 C3
D55
20
WT/OR
D54
20
WT
S206
S205
6
14
DATA
LINK
CONNECTOR
MODULE-
ANTILOCK
BRAKES
CAN C
BUS (+)
CAN C
BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D72
20
WT/LB
D71
20
WT/DB
31
32 C200
4.7L/5.7L
3.7L
D65
18
WT/LG
D65
18
WT/LB
12
11 C200
S103
S102
S105
S104
D65
20
WT/LG
D64
20
WT/LB
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C
BUS (+)
CAN C
BUS (-)
CAN C
DIAGNOSTIC (+)
CAN C
DIAGNOSTIC (-)
CAN B
BUS (+)
CAN B
BUS (-)
MODULE-
FRONT
CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
12
24
1
13
MODULE-
FRONT
CONTROL C1
1
17
32
16
31
47
MODULE-
ANTILOCK BRAKES
BLACK/BLACK
10
1
38
29
MODULE-
POWERTRAIN
CONTROL C1
81495239

U0100–NO COMMUNICATION WITH THE ECM/PCM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

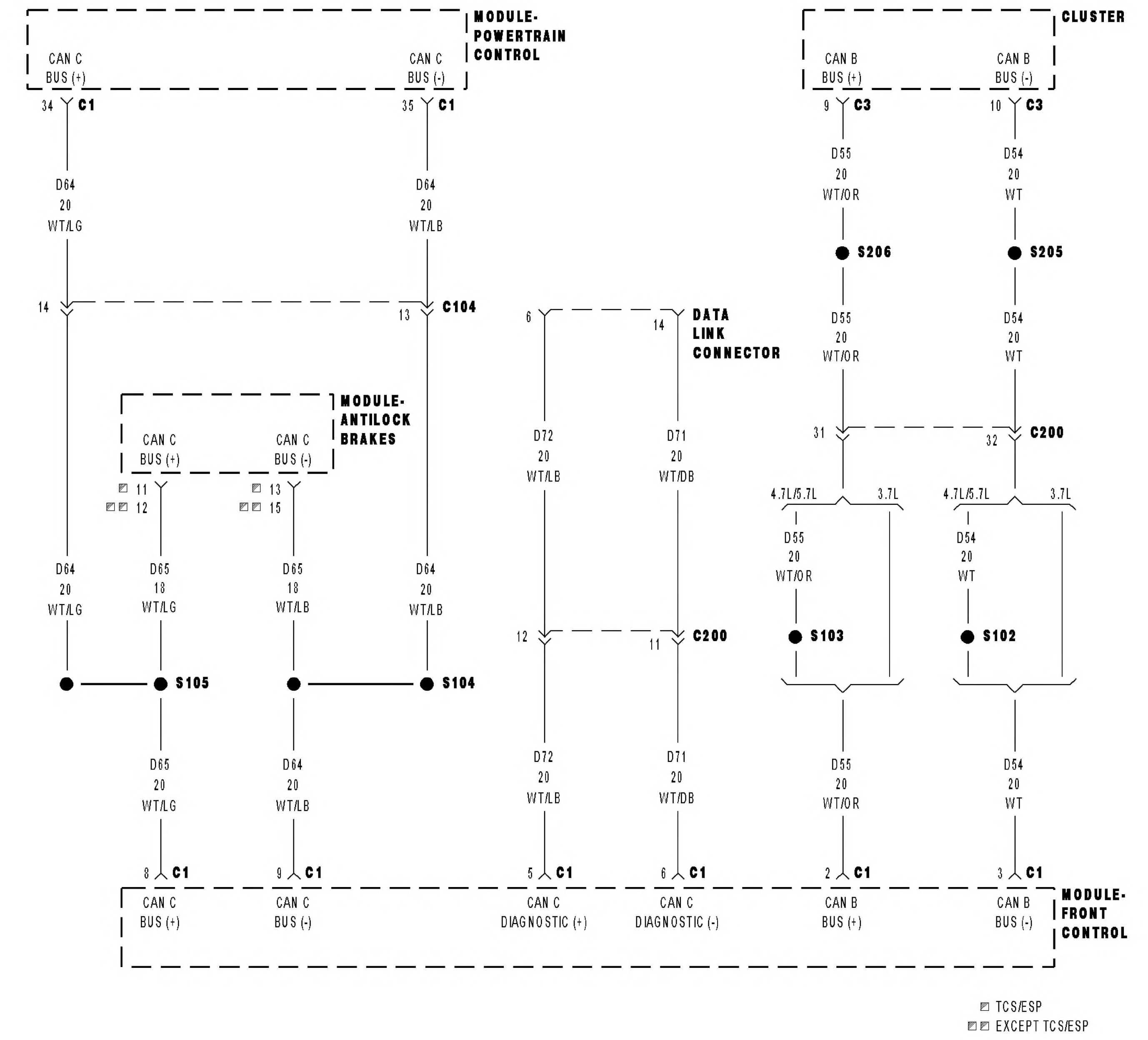
- **When Monitored:**
  Every 7 msec. with the ignition on.
- **Set Condition:**
  ECM/PCM CAN bus message not received by the Transmission Control System for the period of 10 seconds.

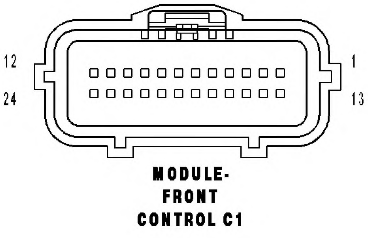
Theory of Operation

Communication over the CAN bus is continuously monitored between the Engine Control System and the Transmission Control System. Due to the integration of both systems into one module, (Powertrain Control Module) the bus communication between the systems is internally transmitted over the duel port ram.

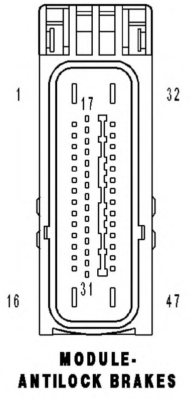
Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

U0121–LOST COMMUNICATION WITH ABS

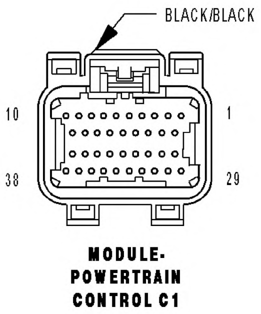

MODULE-
POWERTRAIN
CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D64 20 WT/LG
D64 20 WT/LB
14
13 C104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
6
14
DATA
LINK
CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
31
32 C200
MODULE-
ANTILOCK
BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
4.7L/5.7L
3.7L
D64 20 WT/LG
D65 18 WT/LG
D65 18 WT/LB
D64 20 WT/LB
12
11 C200
S103
S102
S105
S104
D65 20 WT/LG
D64 20 WT/LB
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-
FRONT
CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP



MODULE-
FRONT
CONTROL C1


1
17
32
16
31
47

MODULE-
ANTILOCK BRAKES


BLACK/BLACK
10
38
1
29

MODULE-
POWERTRAIN
CONTROL C1

81495239

U0121–LOST COMMUNICATION WITH ABS (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

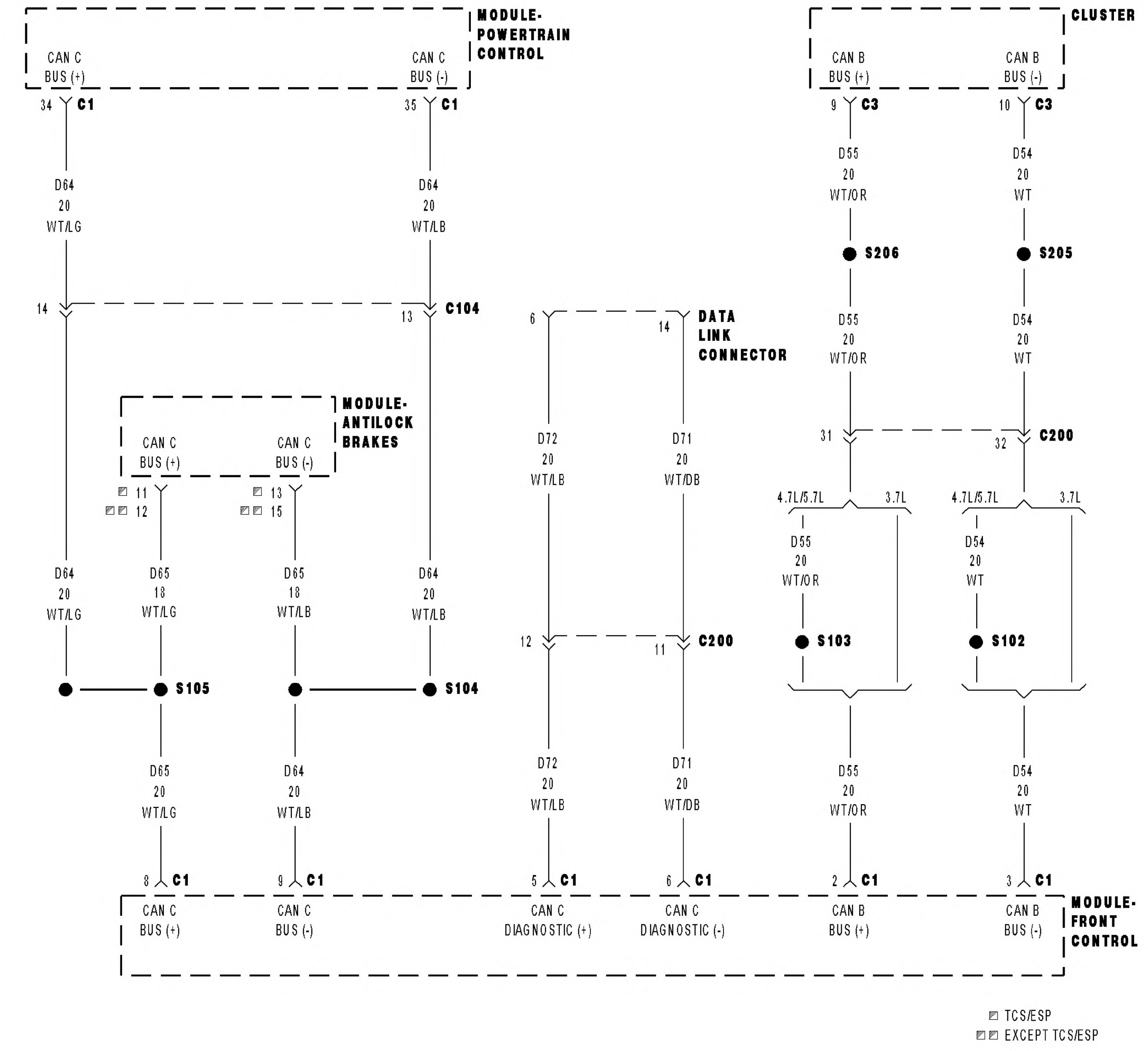
- **When Monitored:**
  Every 7 msec. Conditions: 1) Engine speed greater than 500 RPM. 2) Battery voltage greater than 10v but less than 16v.
- **Set Condition:**
  CAN C bus messages not received for 10 seconds.

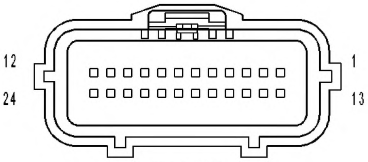
Theory of Operation

Some NGC controllers communicate with other controllers over the CAN C bus. The transmission controller continuously monitors the bus activity and receives the messages it needs. The CAN C bus is also used to communicate transmission MIL status to the Engine Controller, therefor if the Engine Controller is unable to communicate with the Transmission Controller, the Engine Controller will light the MIL.

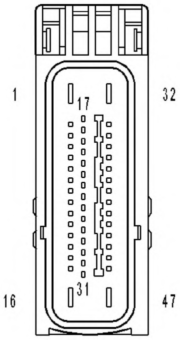
Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

U0141 LOST COMMUNICATION WITH FCM

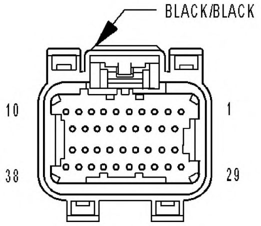

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D64 20 WT/LG
D64 20 WT/LB
14
13 C104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
6
14
DATA LINK CONNECTOR
D55 20 WT/OR
D54 20 WT
31
32 C200
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D72 20 WT/LB
D71 20 WT/DB
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D55 20 WT/OR
D54 20 WT
D64 20 WT/LG
D65 18 WT/LG
D65 18 WT/LB
D64 20 WT/LB
12
11 C200
S103
S102
S105
S104
D65 20 WT/LG
D64 20 WT/LB
D72 20 WT/LB
D71 20 WT/DB
D55 20 WT/OR
D54 20 WT
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP



MODULE-FRONT CONTROL C1


1
17
32
16
31
47

MODULE-ANTILOCK BRAKES


BLACK/BLACK
10
38
1
29

MODULE-POWERTRAIN CONTROL C1

81495239

U0141 LOST COMMUNICATION WITH FCM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Every 7 msec. Conditions: 1) Engine speed greater than 500 RPM. 2) Battery voltage greater than 10v but less than 16v.
- **Set Condition:**
  CAN C bus messages not received for 10 seconds.

Theory of Operation

Some NGC controllers communicate with other controllers over the CAN C bus. The transmission controller continuously monitors the bus activity and receives the messages it needs. The CAN C bus is also used to communicate transmission MIL status to the Engine Controller, therefor if the Engine Controller is unable to communicate with the Transmission Controller, the Engine Controller will light the MIL.

Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING for diagnostic procedures and for further possible causes.

SCHEMATICS AND DIAGRAMS

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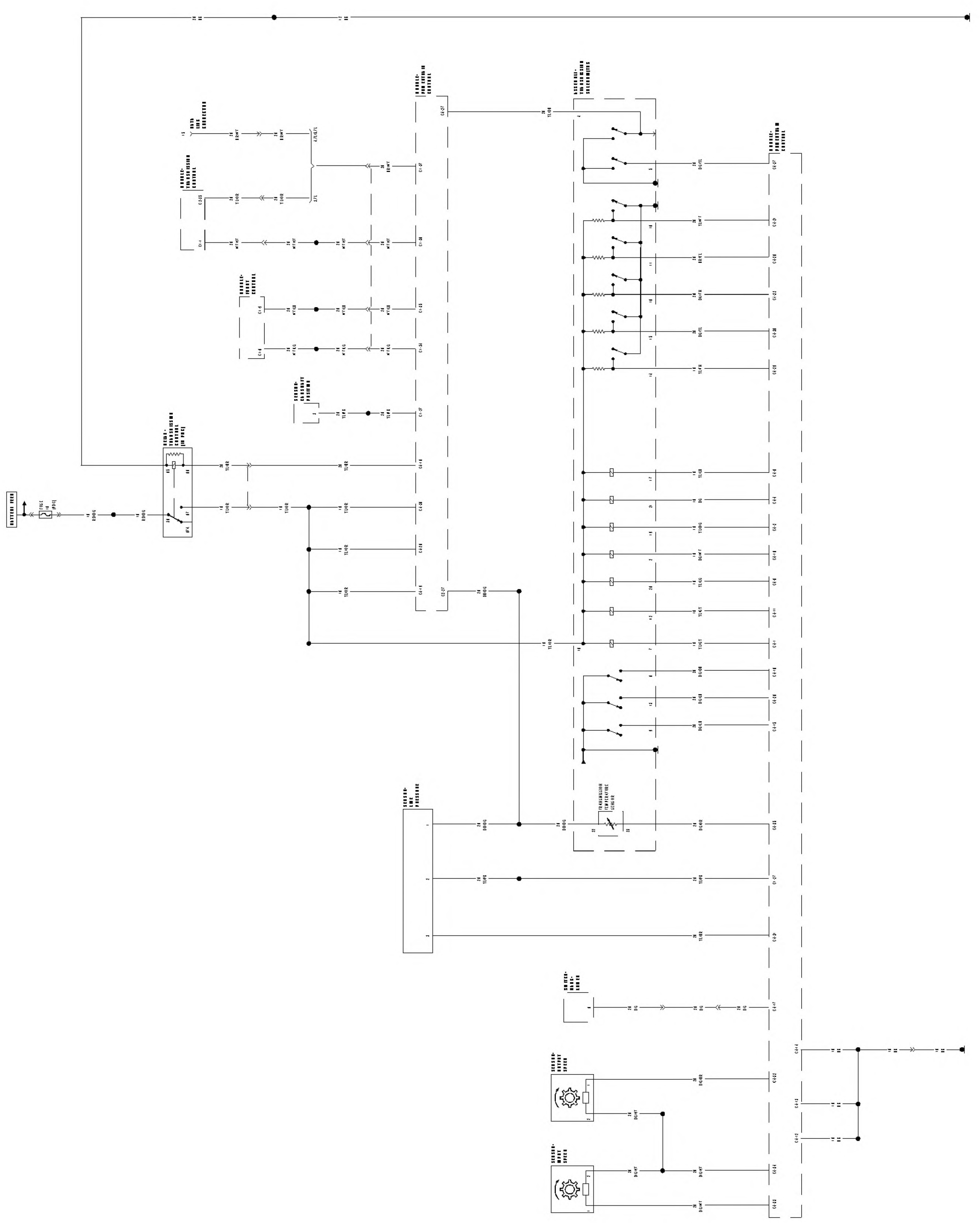

RFE TRANSMISSION CIRCUIT DIAGRAM

AUTOMATIC TRANSMISSION - 545RFE - SERVICE INFORMATION

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AUTOMATIC TRANSMISSION - 545RFE - SERVICE INFORMATION

DESCRIPTION

The 45RFE/545RFE automatic transmissions is a sophisticated, multi-range, electronically controlled transmission which combines optimized gear ratios for responsive performance, state of the art efficiency features and low NVH. Other features include driver adaptive shifting and three planetary gear sets to provide wide ratio capability with precise ratio steps for optimum driveability. The three planetary gear sets also make available a unique alternate second gear ratio. The primary 2nd gear ratio fits between 1st and 3rd gears for normal through-gear accelerations. The alternate second gear ratio (2prime) allows smoother 4-2 kickdowns at high speeds to provide 2nd gear passing performance over a wider highway cruising range.

The hydraulic portion of the transmission consists of the transmission fluid, fluid passages, hydraulic valves, and various line pressure control components.

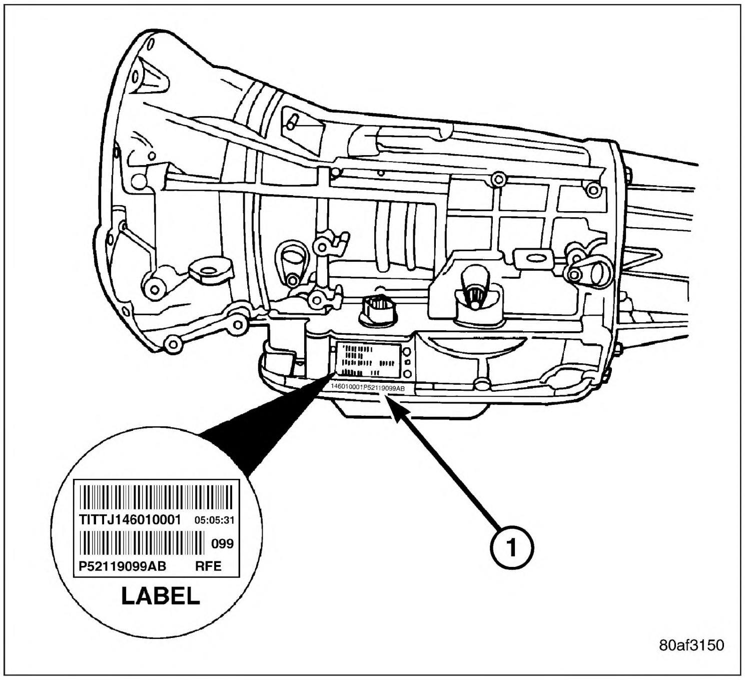
The primary mechanical components of the transmission consist of the following:

- Three multiple disc input clutches
- Three multiple disc holding clutches
- Five hydraulic accumulators
- Three planetary gear sets
- Dual Stage Hydraulic oil pump
- Valve body
- Solenoid pack

The Transmission Control Module (TCM) is the “heart” or “brain” of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. Depending on the vehicle configuration, the TCM may be a standalone module or it it may be housed along with the Powertrain Control Module (PCM) in a single module. With this information, the TCM can calculate and perform timely and quality shifts through various output or control devices (solenoid pack, transmission control relay, etc.).

TRANSMISSION IDENTIFICATION

Transmission identification numbers are stamped (1) on the left side of the case just above the oil pan sealing surface. Refer to this information when ordering replacement parts. A label is attached to the transmission case above the stamped numbers. The label gives additional information which may also be necessary for identification purposes.



GEAR RATIOS

The 45RFE gear ratios are:

1st	3.00:1
2nd	1.67:1
2nd Prime	1.50:1
3rd	1.00:1
4th	0.75:1
Reverse	3.00:1

GEAR RATIOS

The 545RFE gear ratios are:

1st	3.00:1
2nd	1.67:1
2nd Prime	1.50:1
3rd	1.00:1
4th	0.75:1
5th	0.67:1
Reverse	3.00:1

OPERATION

The 45RFE/545RFE offers full electronic control of all automatic up and downshifts, and features real-time adaptive closed-loop shift and pressure control. Electronic shift and torque converter clutch controls help protect the transmission from damage due to high temperatures, which can occur under severe operating conditions. By altering shift schedules, line pressure, and converter clutch control, these controls reduce heat generation and increase transmission cooling.

To help reduce efficiency-robbing parasitic losses, the transmissions includes a dual-stage transmission fluid pump with electronic output pressure control. Under most driving conditions, pump output capacity greatly exceeds that which is needed to keep the clutches applied. The 45RFE/545RFE pump-pressure control system monitors input torque and adjusts the pump pressure accordingly. The primary stage of the pump works continuously; the second stage is bypassed when demand is low. The control system also monitors input and output speed and, if incipient clutch slip is observed, the pressure control solenoid duty cycle is varied, increasing pressure in proportion to demand.

A high-travel torque converter damper assembly allows earlier torque converter clutch engagement to reduce slippage. Needle-type thrust bearings reduce internal friction. The 45RFE/545RFE is packaged in a one-piece die-cast aluminum case. To reduce NVH, the case has high lateral, vertical and torsional stiffness. It is also designed to maximize the benefit of the structural dust cover that connects the bottom of the bell housing to the engine bedplate, enhancing overall power train stiffness. Dual filters protect the pump and other components. A cooler return filter is added to the customary main sump filter. Independent lubrication and cooler circuits assure ample pressure for normal transmission operation even if the cooler is obstructed or the fluid cannot flow due to extremely low temperatures.

The hydraulic control system design (without electronic assist) provides the transmission with PARK, REVERSE, NEUTRAL, SECOND, and THIRD gears, based solely on driver shift lever selection. This design allows the vehicle to be driven (in “limp-in” mode) in the event of a electronic control system failure, or a situation that the Transmission Control Module (TCM) recognizes as potentially damaging to the transmission.

The TCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTC’s, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the DRB® scan tool.

DIAGNOSIS AND TESTING

AUTOMATIC TRANSMISSION

CAUTION: Before attempting any repair on a RFE automatic transmission, check for Diagnostic Trouble Codes with the scan tool.

Transmission malfunctions may be caused by these general conditions:

- Poor engine performance
- Improper adjustments
- Hydraulic malfunctions
- Mechanical malfunctions
- Electronic malfunctions

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, gearshift cable adjustment. Then perform a road test to determine if the problem has been corrected or if more diagnosis is necessary. If the problem persists after the preliminary tests and corrections are completed, hydraulic pressure checks should be performed.

PRELIMINARY

Two basic procedures are required. One procedure for vehicles that are drivable and an alternate procedure for disabled vehicles (will not back up or move forward).

VEHICLE IS DRIVABLE

1. Check for transmission fault codes using scan tool.
2. Check fluid level and condition.
3. Adjust gearshift cable if complaint was based on delayed, erratic, or harsh shifts.
4. Road test and note how transmission upshifts, downshifts, and engages.
5. Perform hydraulic pressure test if shift problems were noted during road test.
6. Perform air-pressure test to check clutch operation.

VEHICLE IS DISABLED

1. Check fluid level and condition.
2. Check for broken or disconnected gearshift cable.
3. Check for cracked, leaking cooler lines, or loose or missing pressure-port plugs.
4. Raise and support vehicle on safety stands, start engine, shift transmission into gear, and note following:
   a. If propeller shaft turns but wheels do not, problem is with differential or axle shafts.
   b. If propeller shaft does not turn and transmission is noisy, stop engine. Remove oil pan, and check for debris. If pan is clear, remove transmission and check for damaged driveplate, converter, oil pump, or input shaft.
   c. If propeller shaft does not turn and transmission is not noisy, perform hydraulic-pressure test to determine if problem is hydraulic or mechanical.

ROAD TESTING

Before road testing, be sure the fluid level and control cable adjustments have been checked and adjusted if necessary. Verify that all diagnostic trouble codes have been resolved.

Observe engine performance during the road test. A poorly tuned engine will not allow accurate analysis of transmission operation.

Operate the transmission in all gear ranges. Check for shift variations and engine flare which indicates slippage. Note if shifts are harsh, spongy, delayed, early, or if part throttle downshifts are sensitive.

Slippage indicated by engine flare, usually means clutch, overrunning clutch, or line pressure problems.

A slipping clutch can often be determined by comparing which internal units are applied in the various gear ranges. The Clutch Application charts provide a basis for analyzing road test results.

45RFE CLUTCH APPLICATION CHART

SLP	UD	OD	R	2C	4C	L/R	OVERRUNNING
P–PARK						ON	
R–REVERSE			ON			ON	
N-NEUTRAL						ON	
D-FIRST	ON					ON*	ON
D-SECOND	ON			ON			
D-SECOND PRIME	ON				ON		
D-THIRD	ON	ON					
D-FOURTH		ON			ON		
D-LIMP-IN	ON	ON					
2–FIRST	ON					ON*	ON
2–SECOND	ON			ON			
2–LIMP-IN	ON			ON			
1–LOW	ON					ON	ON

*L/R clutch is on only with the output shaft speed below 150 rpm.

545RFE CLUTCH APPLICATION CHART

SLP	UD	OD	R	2C	4C	L/R	OVERRUNNING
P–PARK						ON	
R–REVERSE			ON			ON	
N-NEUTRAL						ON	
D–FIRST	ON					ON*	ON
D–SECOND	ON			ON			
D–SECOND PRIME	ON				ON		
D–THIRD	ON	ON					
D–FOURTH		ON			ON		
D–FIFTH		ON		ON			
D–LIMP-IN	ON	ON					
2–FIRST	ON					ON*	ON
2–SECOND	ON			ON			
2–LIMP-IN	ON			ON			
1–LOW	ON					ON	ON

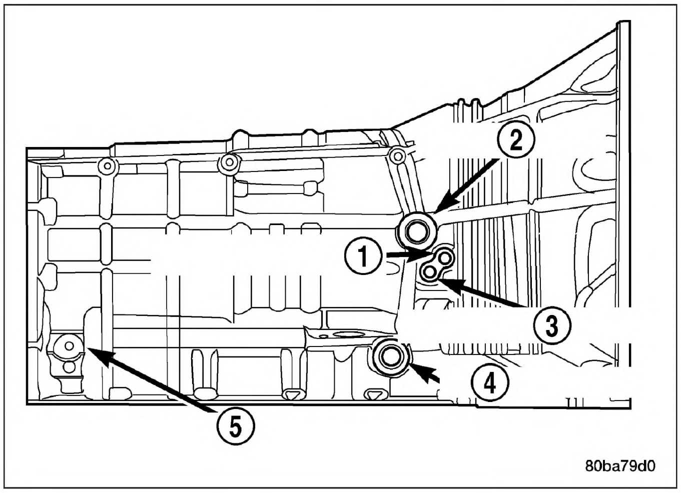
*L/R clutch is on only with the output shaft speed below 150 rpm.

HYDRAULIC PRESSURE TEST

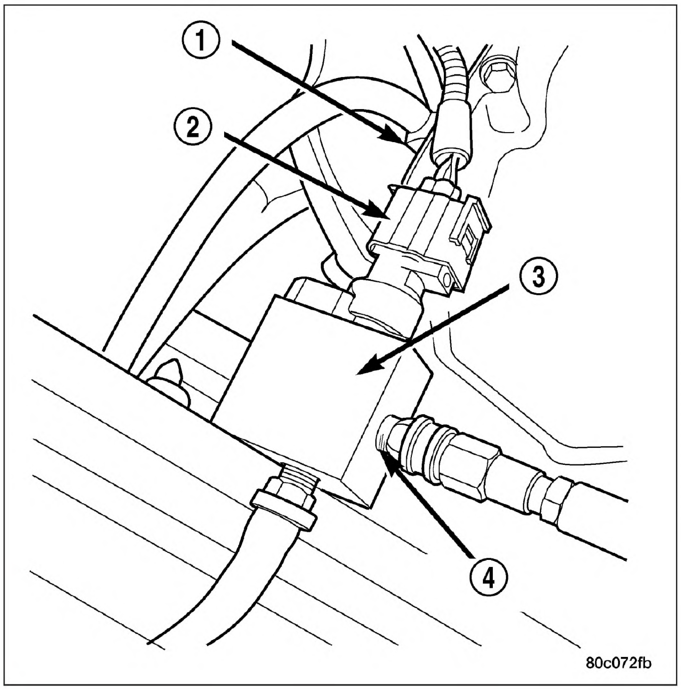
An accurate tachometer and pressure test gauges are required. Test Gauge C-3293-SP has a 300 psi range and is used at all locations where pressures exceed 100 psi.

Pressure Test Port Locations

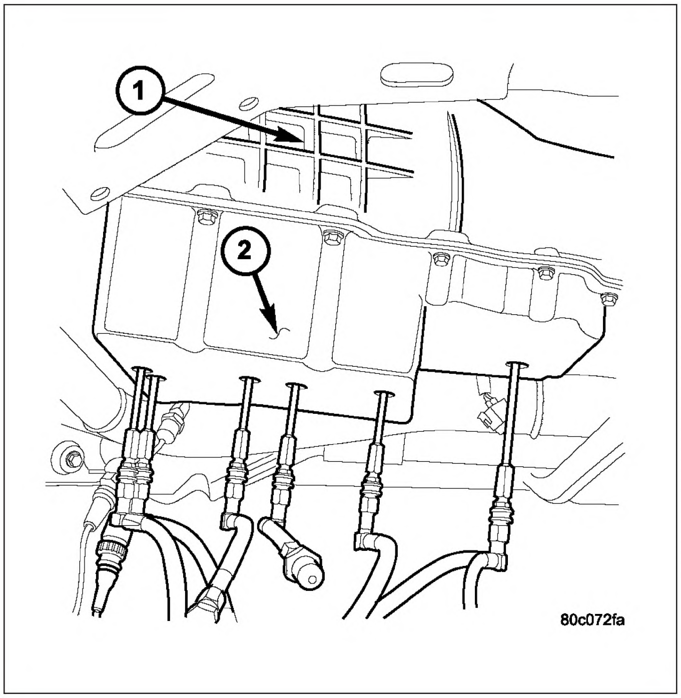
Only two pressure ports are supplied on the transmission case. The torque converter clutch apply (3) and release (1) ports are located on the right side of the transmission case.



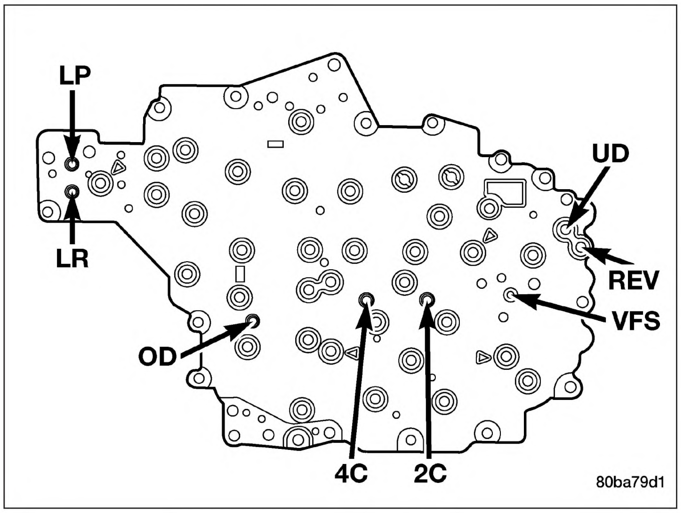
To determine the line pressure, there are two available methods. The scan tool can be used to read line pressure from the line pressure sensor. The second method is to install Line Pressure Adapter 8259 (3) into the transmission case and then install the pressure gauge and the original sensor (2) into the adapter. This will allow a comparison of the scan tool readings and the gauge reading to determine the accuracy of the line pressure sensor. The scan tool line pressure reading should match the gauge reading within ±10 psi.



In order to access any other pressure tap locations, the transmission oil pan must be removed, the pressure port plugs removed and Valve Body Pressure Tap Adapter 8258-A (2) installed. The extensions supplied with Adapter 8258-A will allow the installation of pressure gauges to the valve body.



Refer to the Pressure Tap Locations graphic for correct pressure tap location identification.



TEST PROCEDURE

All pressure readings should be taken with the transmission fluid level full, transmission oil at the normal operating temperature, and the engine at 1500 rpm. Check the transmission for proper operation in each gear position that is in question or if a specific element is in question, check the pressure readings in at least two gear positions that employ that element. Refer to the Hydraulic Schematics at the rear of this section to determine the correct pressures for each element in a given gear position.

NOTE: The 45RFE/545RFE utilizes closed loop control of pump line pressure. The pressure readings may therefore vary greatly but should always follow line pressure.

Some common pressures that can be measured to evaluate pump and clutch performance are the upshift/downshift pressures, garage shift pressures, and TCC pressure. The upshift/downshift pressure for all shifts are shown in UPSHIFT PRESSURES and DOWNSHIFT PRESSURES . In-gear maximum pressure for each gear position is shown in IN-GEAR PRESSURES . The garage shift pressure when performing a N-R shift is 220 psi for 3.7L/4.7L equipped vehicles and 250 psi for 5.7L equipped vehicles. The garage shift pressure for the R-N shift is 120 psi. The garage shift pressure for the N-1 shift is 135 psi for 3.7L/4.7L equipped vehicles and 165 psi for 5.7L equipped vehicles. Torque converter lock-up pressure is 120 psi for 3.7L/4.7L equipped vehicles and 125 psi for 5.7L equipped vehicles.

UPSHIFT PRESSURES

ENGINE	1-2	2-3	2prime-3	3-4	2prime-4	2-5	3-5	4-5
5.7L	150	125	125	135	135	135	135	135
3.7L/4.7L	120	120	120	120	120	120	120	130

DOWNSHIFT PRESSURES

ENGINE	5-4	5-3	5-2	4-3	4-2prime	3-2	3-2prime	2prime-1	2-1	3-1
5.7L	135	135	135	135	135	135	135	135	135	135
3.7L/4.7L	120	120	120	120	120	120	120	120	120	120

IN-GEAR PRESSURES

ENGINE	1	2	2prime	3	4	5	NEUTRAL	REVERSE
5.7L	160	135	135	135	135	135	120	250
3.7L/4.7L	135	120	120	120	120	120	120	220

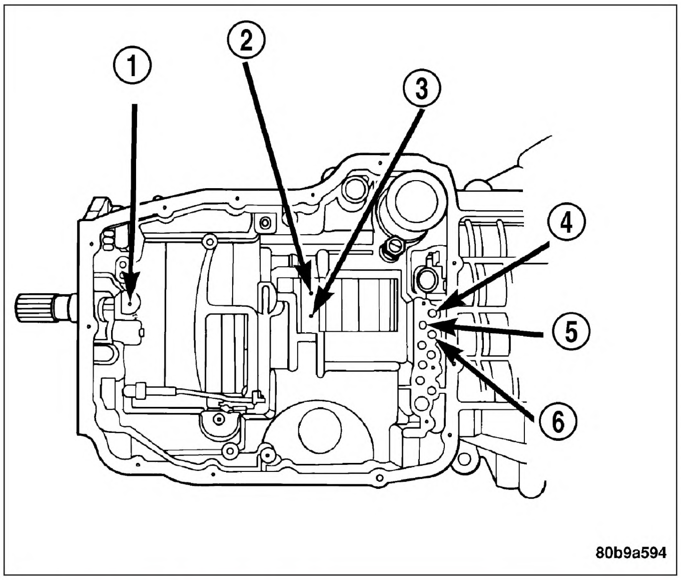
AIR CHECKING TRANSMISSION CLUTCH OPERATION

Air-pressure testing can be used to check transmission clutch operation. The test can be conducted with the transmission either in the vehicle or on the work bench, as a final check.

Air-pressure testing requires that the oil pan and valve body be removed from the transmission. The clutch apply passages are shown in the Air Pressure Test Passages graphic.

NOTE: The air supply which is used must be free of moisture and dirt. Use a pressure of 30 psi to test clutch operation.

Apply air pressure at each port. If the clutch is functioning, a soft thump will be heard as the clutch is applied. The clutch application can also be felt by touching the appropriate element while applying air pressure. As the air pressure is released, the clutch should also release.



1 - LOW REVERSE CLUTCH
2 - 4TH CLUTCH
3 - 2ND CLUTCH
4 - OVERDRIVE CLUTCH
5 - UNDERDRIVE CLUTCH
6 - REVERSE CLUTCH

CONVERTER HOUSING FLUID LEAK

When diagnosing converter housing fluid leaks, two items must be established before repair.

1. Verify that a leak condition actually exists.
2. Determined the true source of the leak.

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair. Torque converter seal leaks tend to move along the drive hub and onto the rear of the converter. Pump cover seal leaks tend to run down the cover and the inside surface of the bellhousing.

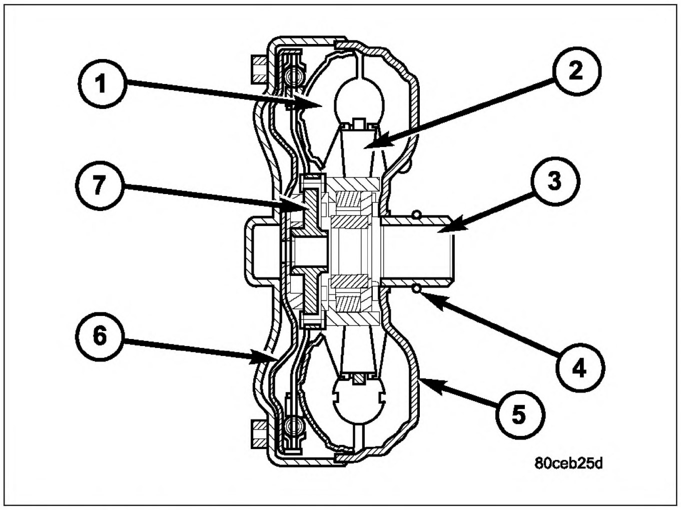
Some leaks, or suspected leaks, may be particularly difficult to locate. If necessary, a Mopar® approved dye should be used to locate and confirm a leak.

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

1. Leaks at the weld joint around the outside diameter weld.
2. Leaks at the converter hub weld.

In most cases, a torque converter which is wet from transmission fluid indicates a leak at one of these areas.



1 - TURBINE ASSEMBLY
2 - STATOR
3 - CONVERTER HUB
4 - O-RING
5 - IMPELLER ASSEMBLY
6 - CONVERTER CLUTCH PISTON
7 - TURBINE HUB

STANDARD PROCEDURE - ALUMINUM THREAD REPAIR

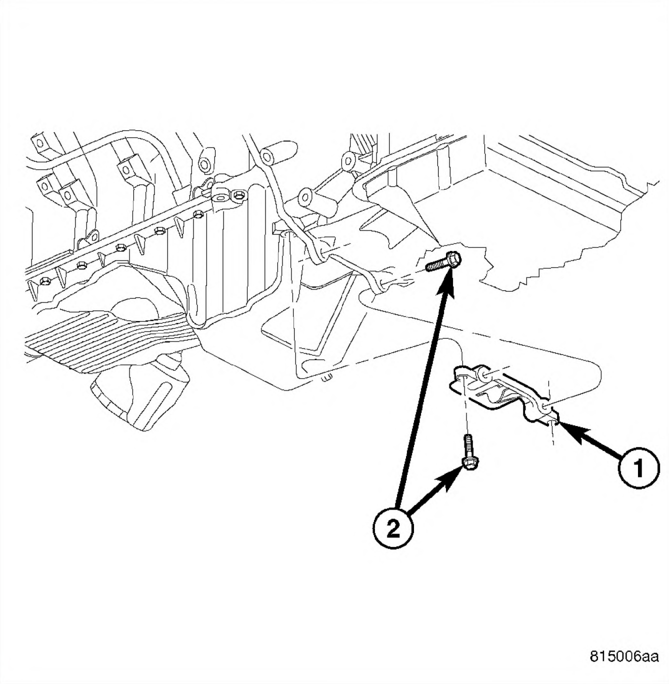
Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils™, or equivalent. This repair consists of drilling out the worn-out damaged threads. Then tap the hole with a special Heli-Coil™ tap, or equivalent, and installing a Heli-Coil™ insert, or equivalent, into the hole. This brings the hole back to its original thread size.

Heli-Coil™, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

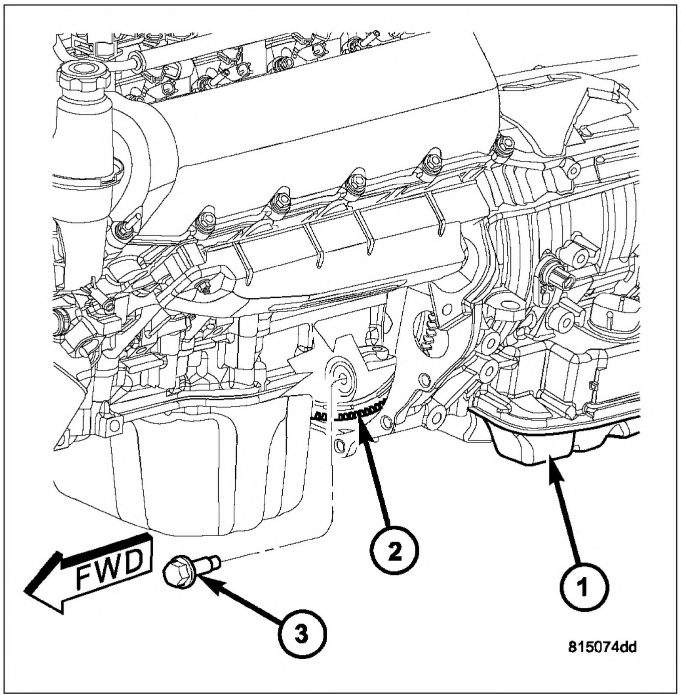
REMOVAL

CAUTION: The transmission and torque converter must be removed as an assembly to avoid component damage. The converter driveplate, oil pump, or oil seal can be damaged if the converter is left attached to the driveplate during removal. Be sure to remove the transmission and converter as an assembly.

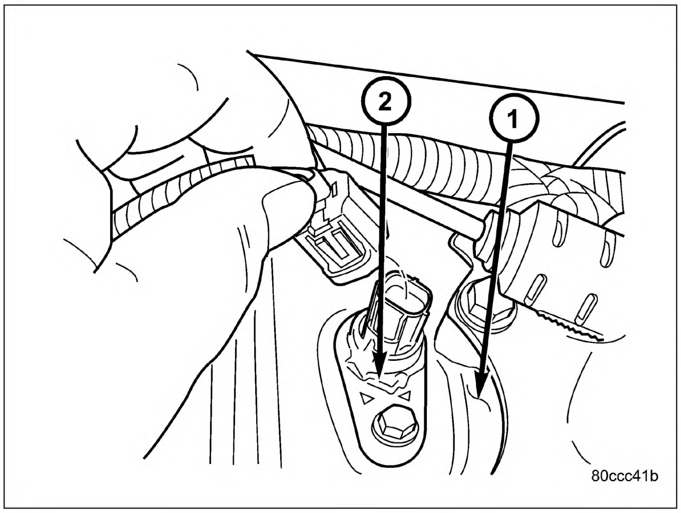
1. Disconnect the negative battery cable.
2. Raise and support the vehicle
3. Remove the rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
4. Remove the front propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
5. Remove the engine to transmission structural cover (1), 5.7L shown. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL)



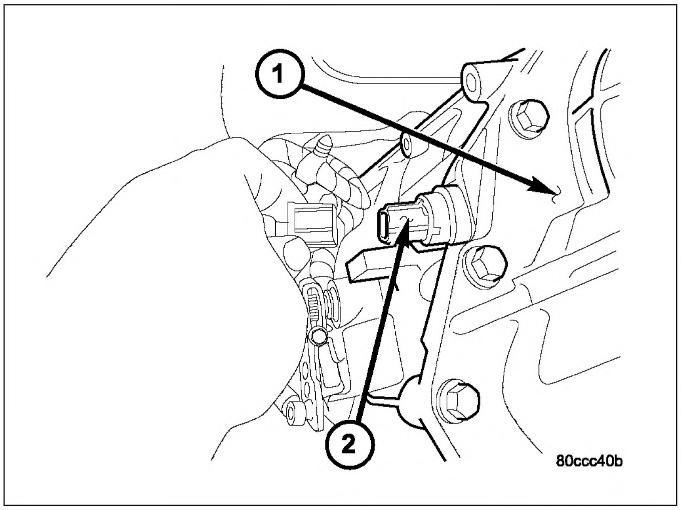
6. Remove the torque converter bolts (3).



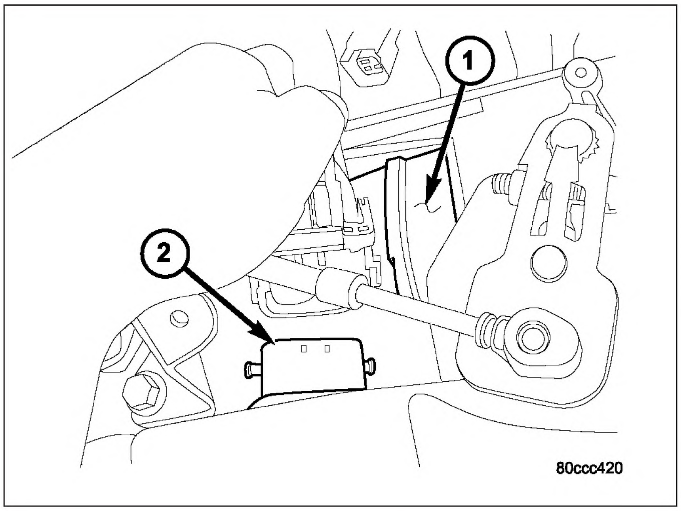
7. Remove the exhaust support bracket from the rear of the transmission.
8. Disconnect and lower or remove any necessary exhaust components.
9. Remove the starter motor.
10. Rotate crankshaft in clockwise direction until converter bolts are accessible. Then remove bolts one at a time. Rotate crankshaft with socket wrench on dampener bolt.
11. Disconnect the input speed sensor (2) connector.



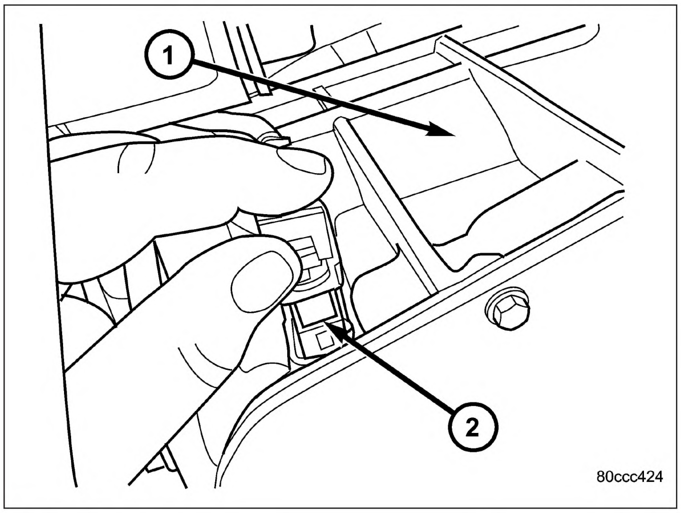
12. Disconnect the output speed sensor (2) connector.



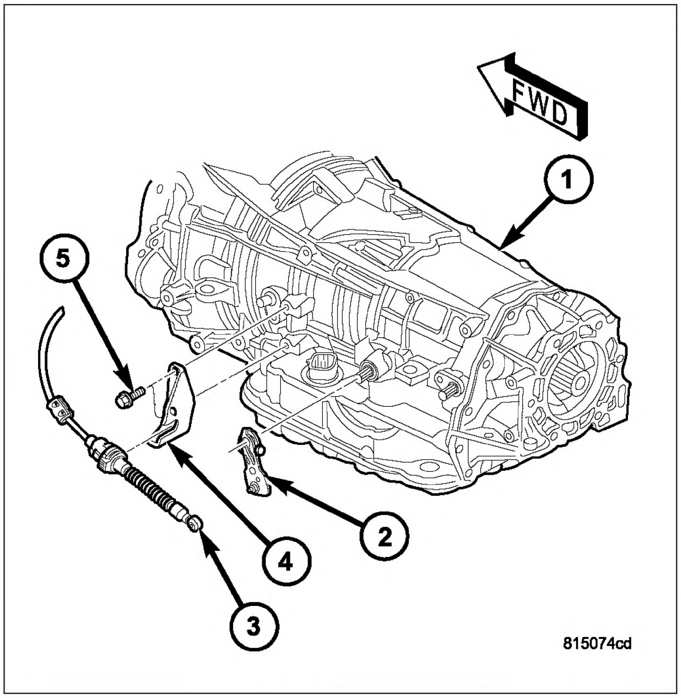
13. Disconnect the solenoid and pressure switch assembly (2) connector.



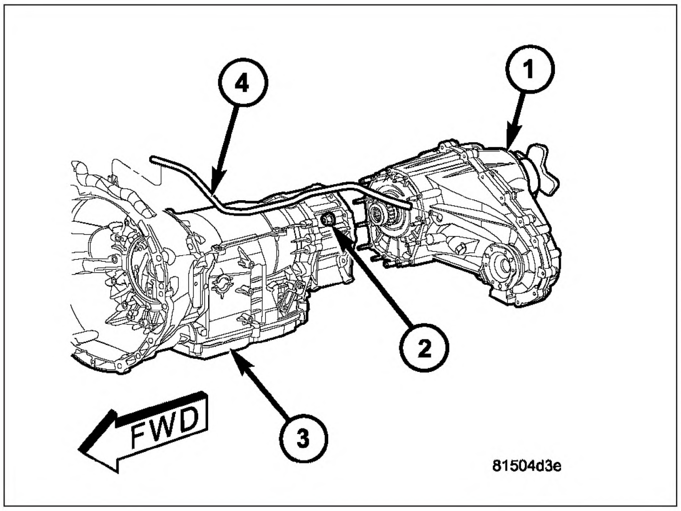
14. Disconnect the line pressure sensor (2) connector.


1
2
80ccc424

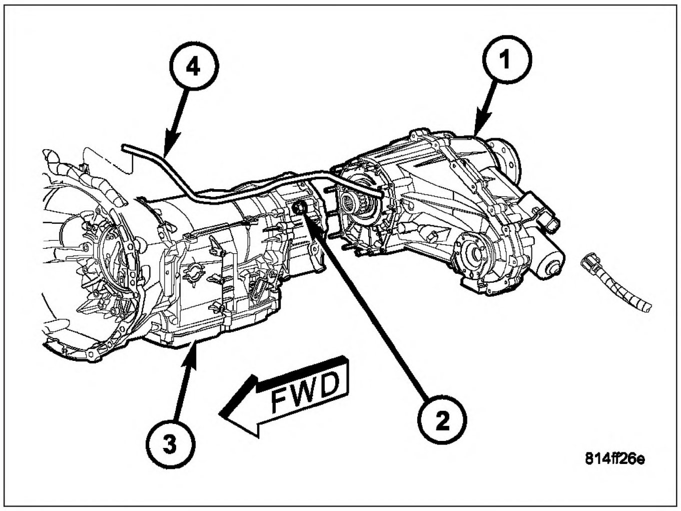
15. Disconnect gearshift cable (3) from transmission manual valve lever (2) and shift cable bracket (4).


FWD
1
5
2
4
3
815074cd

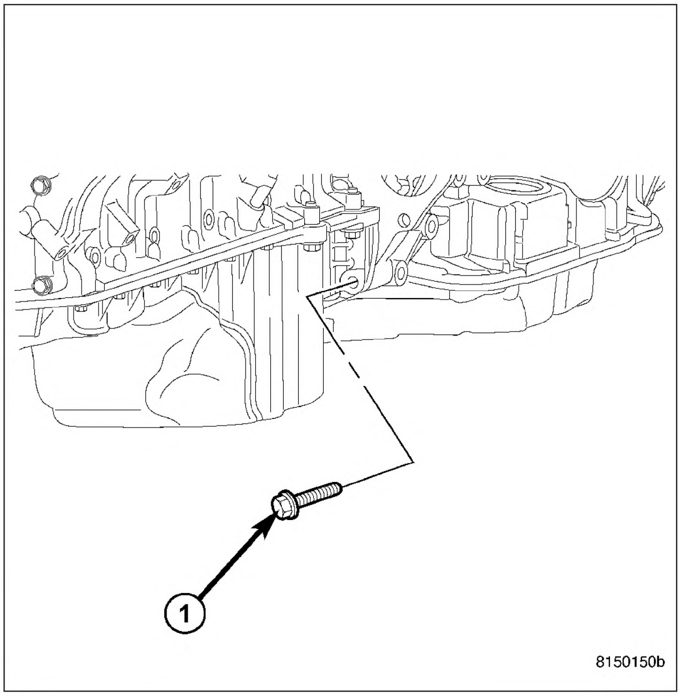
16. If necesary, remove the NV140 transfer case (1) from the transmission (3). (Refer to 21 - TRANSMISSION/TRANSFER CASE - REMOVAL)


4
1
2
FWD
3
81504d3e

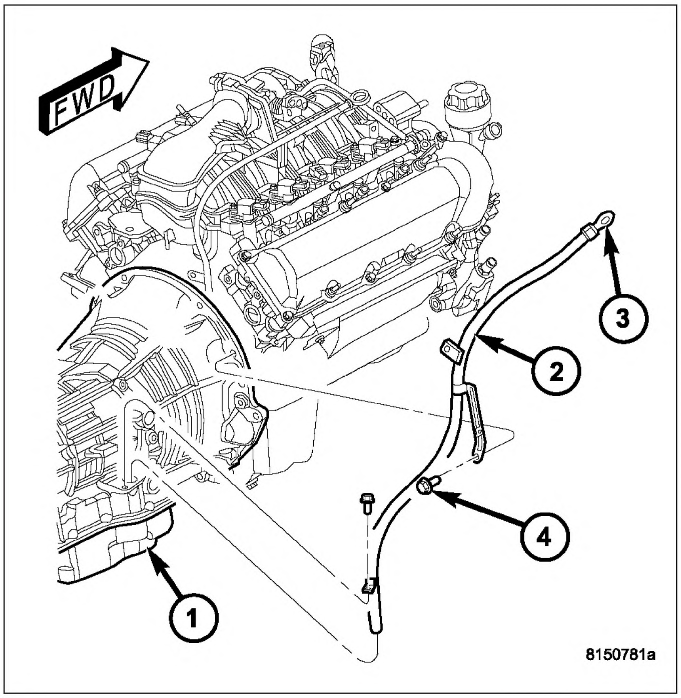
17. If necesary, remove the NV245 transfer case (1) from the transmission (3). (Refer to 21 - TRANSMISSION/TRANSFER CASE - REMOVAL)


4
1
FWD
2
3
814ff26e

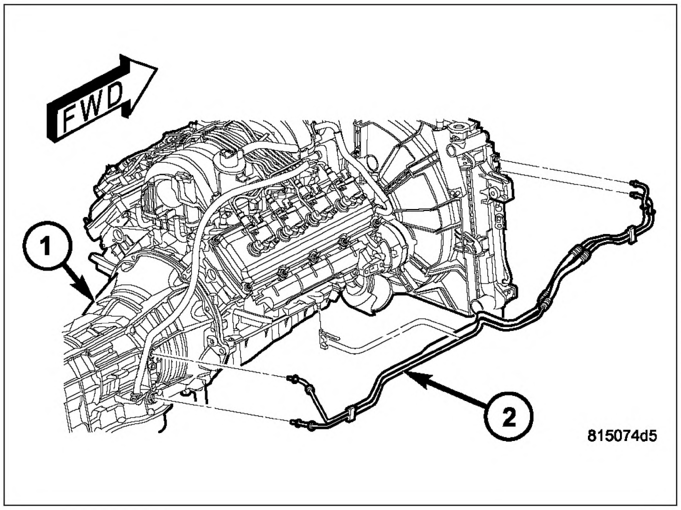
18. Remove the engine oil pan to transmission bolts (1), 5.7L only.



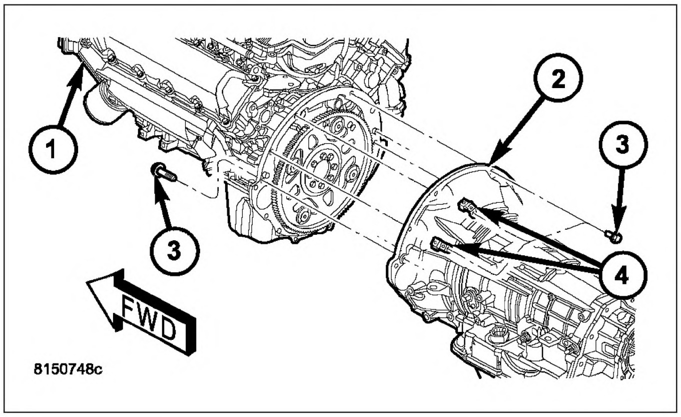
19. Remove the bolt (4) holding the transmission fill tube (2) to the transmission (1) and remove the fill tube and dipstick (3).



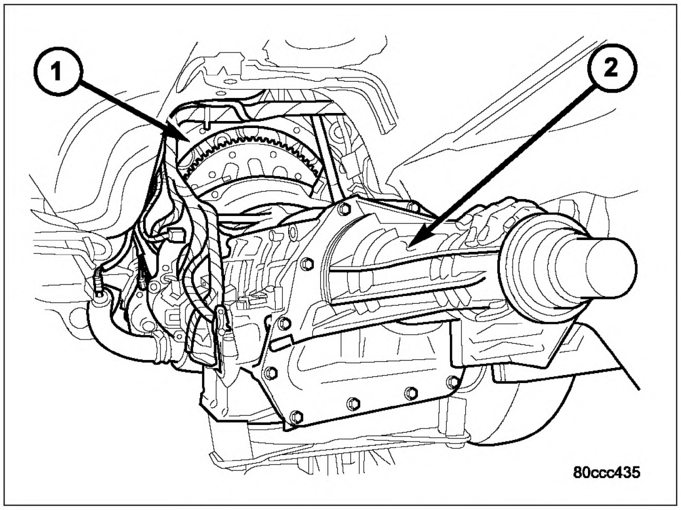
20. Disconnect transmission fluid cooler lines (2) at transmission (1) fittings and clips. (Refer to 7 - COOLING/TRANSMISSION/TRANS COOLER - STANDARD PROCEDURE)



21. Disconnect the transmission vent hose from the transmission.
22. Support rear of engine with safety stand or jack.
23. Raise transmission slightly with service jack to relieve load on crossmember and supports.
24. Remove bolts attaching crossmember to frame and remove crossmember.
25. Remove all remaining transmission (2) to engine (1) bolts (3).

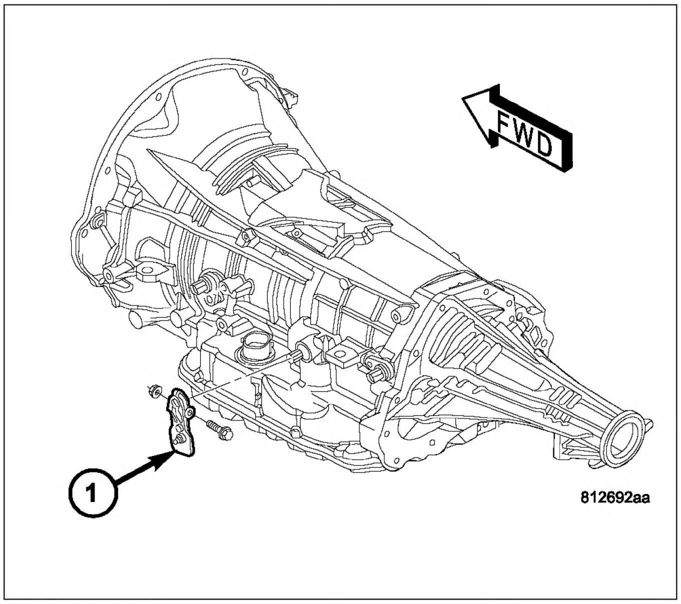


26. Carefully work transmission (2) and torque converter assembly rearward off engine (1) block dowels.
27. Hold torque converter in place during transmission removal.
28. Lower transmission and remove assembly from under the vehicle.
29. To remove torque converter, carefully slide torque converter out of the transmission.

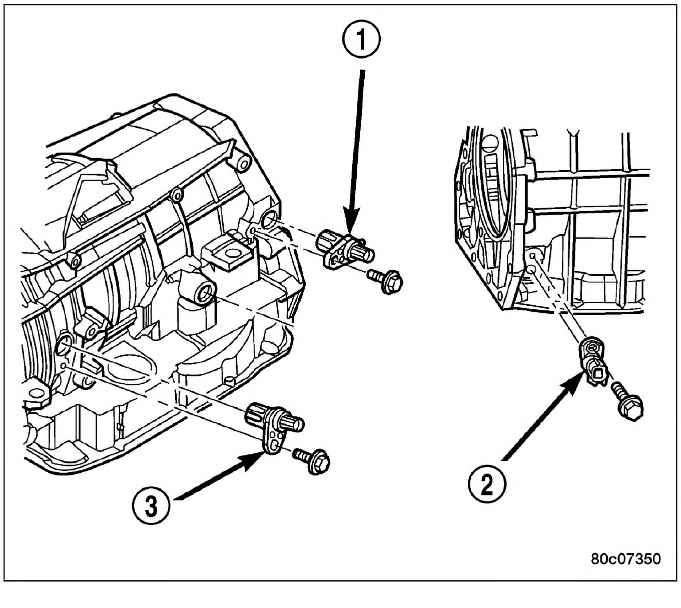


DISASSEMBLY

1. Drain fluid from transmission.
2. Clean exterior of transmission with suitable solvent or pressure washer.
3. Remove the torque converter from the transmission.
4. Remove the manual shift lever (1) from the transmission.

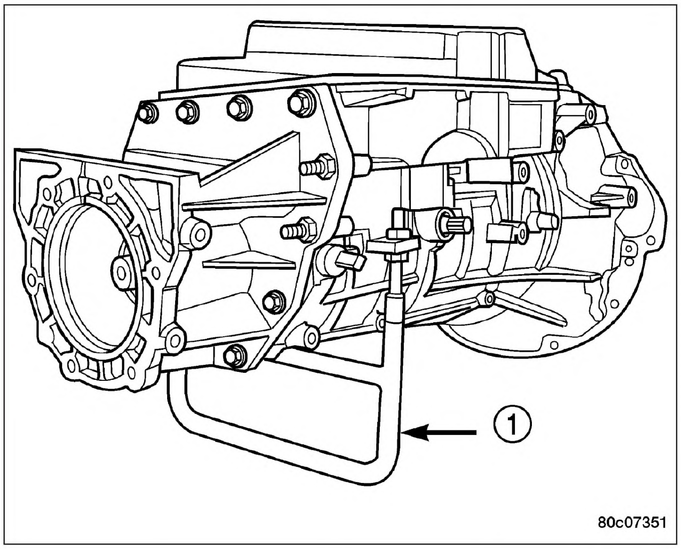


5. Remove the input (3), output (1), and line pressure sensors (2) from the transmission case.



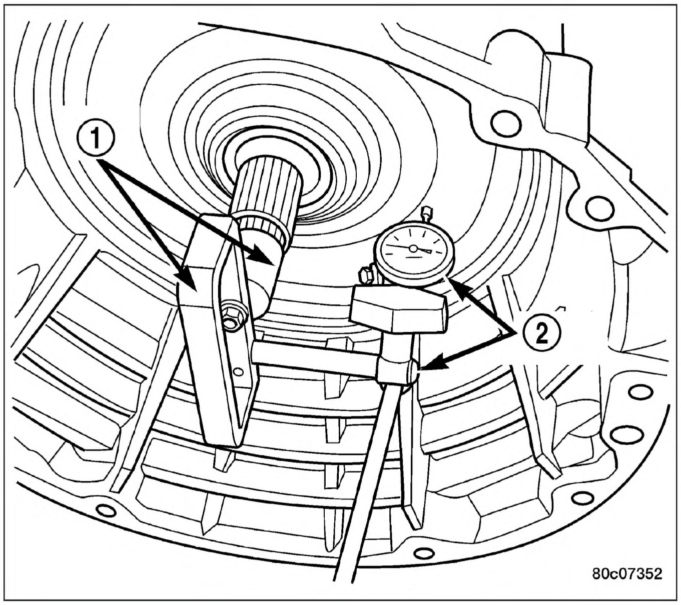
6. Inspect the ends of the sensors for debris, which may indicate the nature of the transmission failure.

7. Install Support Stand 8257 (1) onto the transmission case.

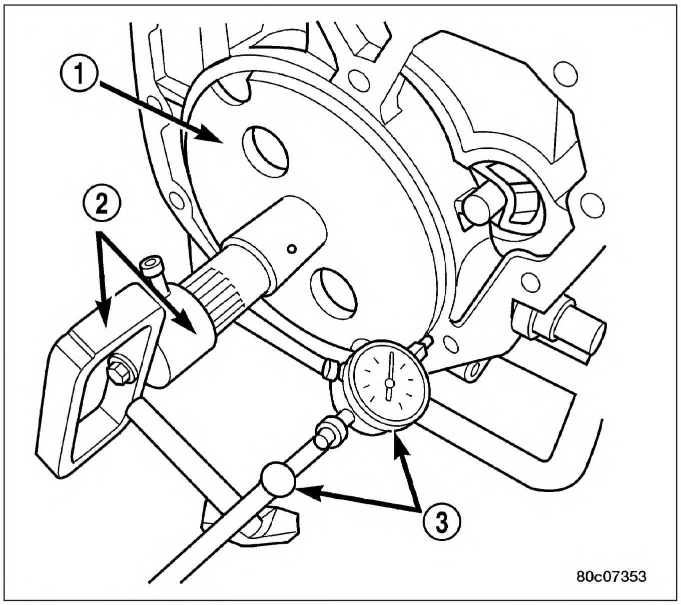


8. Using Adapter 8266-1 from End-Play Tool Set 8266 (1) and Dial Indicator C-3339 (2), measure and record the input shaft end-play.

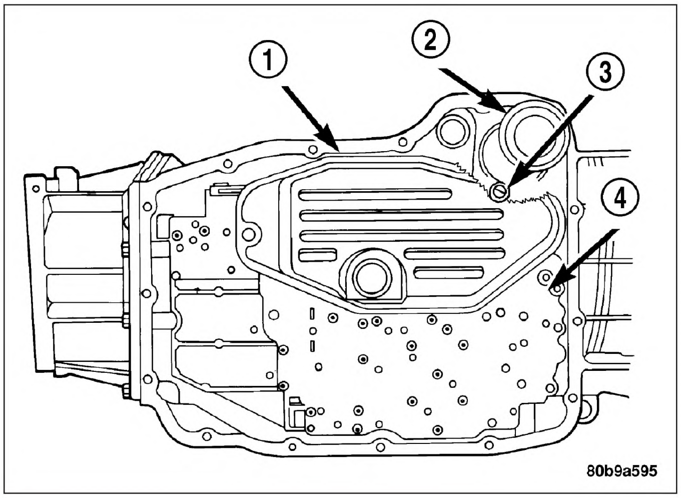
NOTE: When measuring the input shaft end-play, two ″stops″ will be felt. When the input shaft is pushed inward and the dial indicator zeroed, the first ″stop″ felt when the input shaft is pulled outward is the movement of the input shaft in the input clutch housing hub. This value should not be included in the end-play measured value and therefore must be recorded and subtracted from the dial indicator reading.



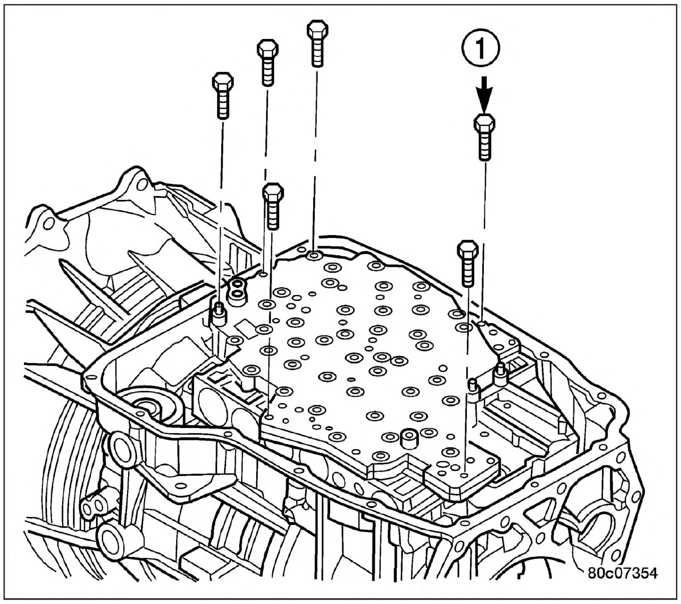
9. Remove the bolts holding the transmission extension/adapter housing to the transmission case.
10. Remove the extension/adapter housing from the transmission case.
11. Using Alignment Plate 8261 (1), Adapter 8266-17 from End-Play Tool Set 8266 (2) and Dial Indicator C-3339 (3), measure and record the output shaft end-play.



12. Remove the bolts holding the transmission oil pan to the transmission case.
13. Remove the transmission oil pan from the transmission case.
14. Remove the primary oil filter (1) and the oil cooler return filter (2).
15. Remove the cooler return filter bypass valve (3).

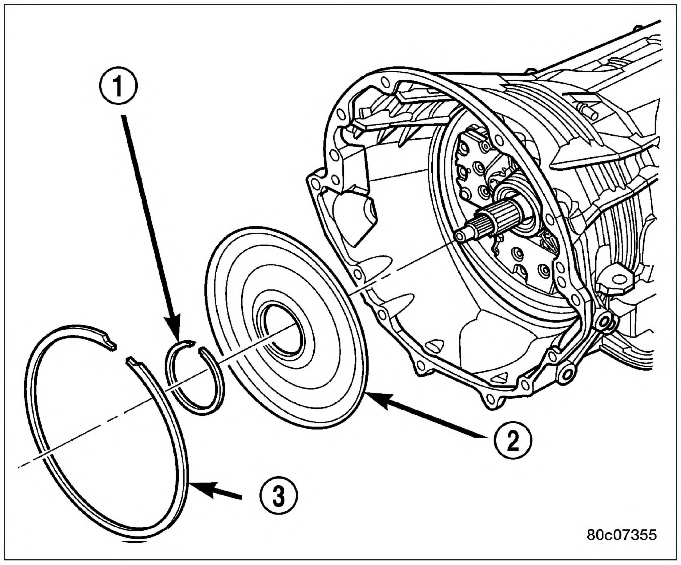


16. Remove the bolts (1) holding the valve body to the transmission case.



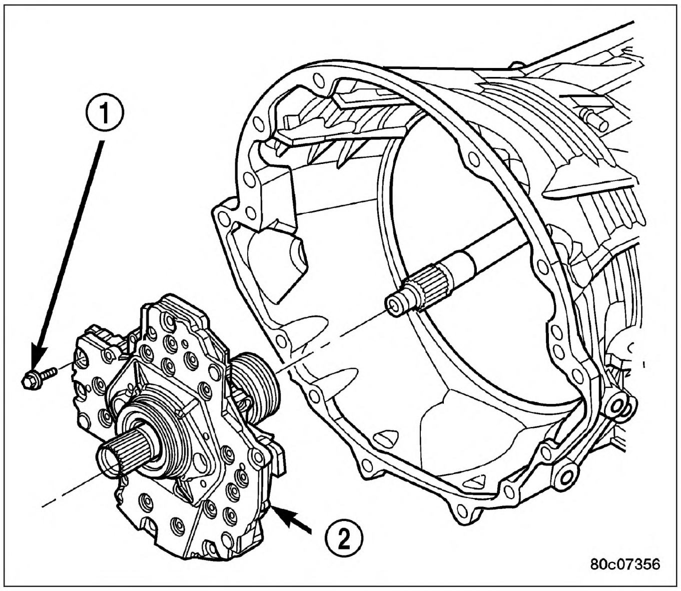
17. Remove the valve body from the transmission case.

18. Remove the outer snap-ring (3) securing the transmission front cover (2) into the transmission case.
19. Remove the inner snap-ring (1) securing the transmission front cover to the oil pump.
20. Reaching through a case opening in the valve body area with a long blunted tool, remove the transmission front cover from the transmission case.

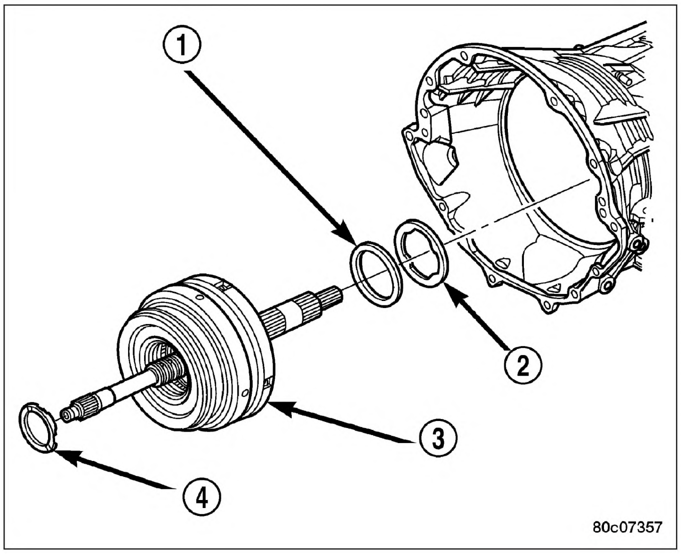


21. Remove the bolts (1) holding the oil pump into the transmission case.
22. Remove the oil pump (2). Hold inward on the input shaft to prevent pulling the input clutch assembly with the oil pump.

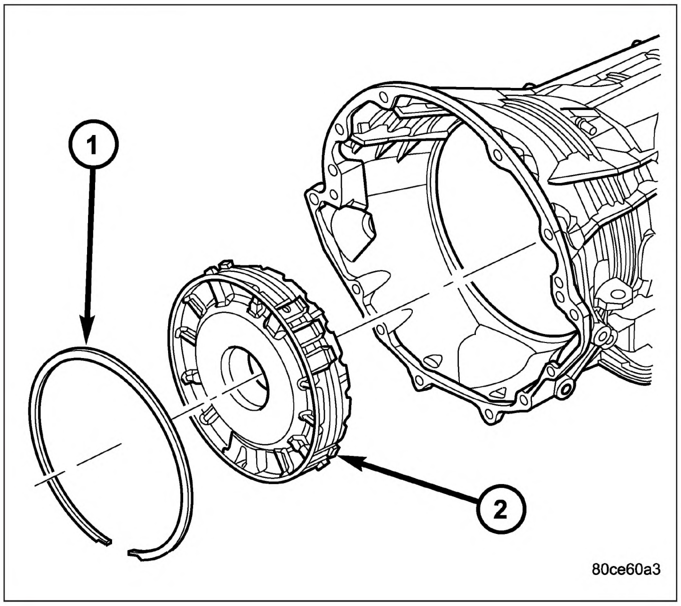
CAUTION: If the input shaft is not held during oil pump removal, the input clutch assembly will attempt to move forward with the oil pump and the numbers 2, 3, or 4 bearings inside the input clutch assembly may become dislodged.



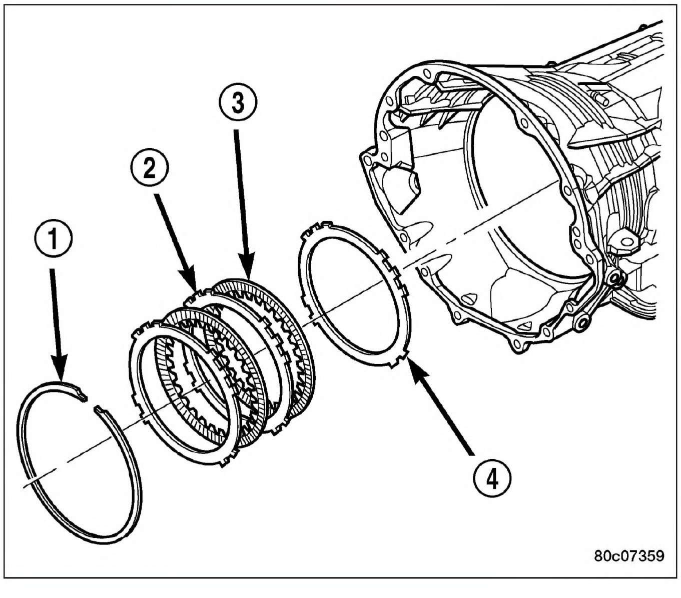
23. Remove the number 1 thrust bearing (4) from the input clutch assembly.
24. Remove the input clutch assembly (3) from the transmission case.
25. Remove the number 5 thrust bearing (1) and selective thrust plate (2) from the input clutch assembly (3) , or the 4C clutch retainer/bulkhead.



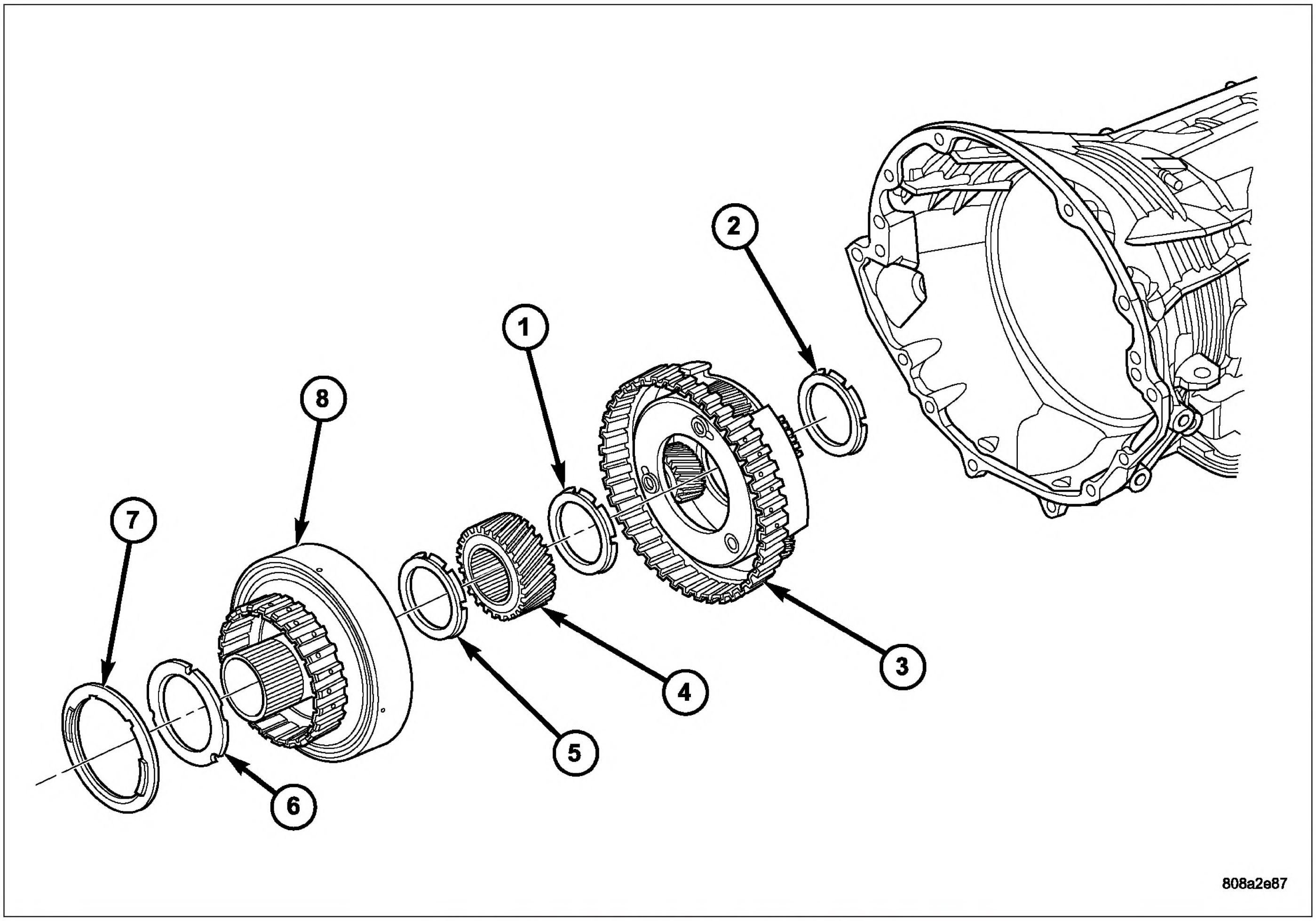
26. Remove the 4C clutch retainer/bulkhead tapered snap-ring (1) from the transmission case.
27. Remove the 4C clutch retainer/bulkhead (2) from the transmission case.



28. Remove the front 2C clutch pack snap-ring (1) from the transmission case.



29. Remove the 2C clutch pack (2, 3, 4) from the transmission case.

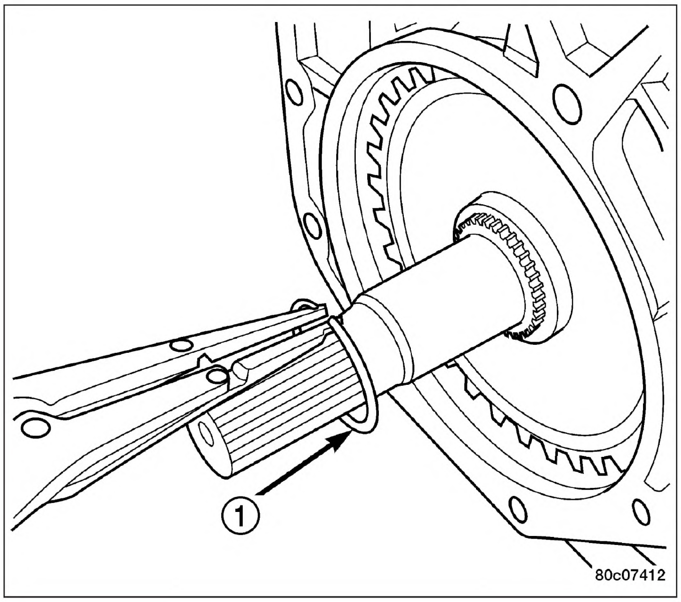


Remove Reaction Annulus and Carrier

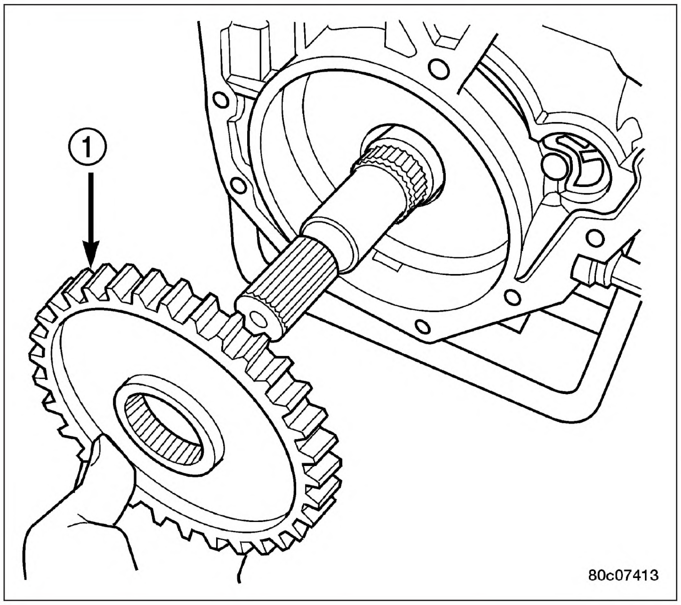
1 - THRUST BEARING NUMBER 8
2 - THRUST BEARING NUMBER 9
3 - REACTION PLANETARY CARRIER
4 - REACTION SUN GEAR
5 - THRUST BEARING NUMBER 7
6 - THRUST PLATE (SELECT)
7 - THRUST BEARING NUMBER 6
8 - REACTION ANNULUS

30. Remove the rear selective plate (6) and number 6 thrust bearing (7) from the reaction annulus (8).
31. Remove the reaction annulus (8) from the reaction planetary carrier (3).
32. Remove the number 7 thrust bearing (5).
33. Remove the reaction sun gear (4).
34. Remove the number 8 thrust bearing (1) from the reaction planetary carrier (3).
35. Remove the reaction planetary carrier (3). Note that this planetary gear set has three pinion gears.
36. Remove the number 9 thrust bearing (2) from the reverse planetary gear set.

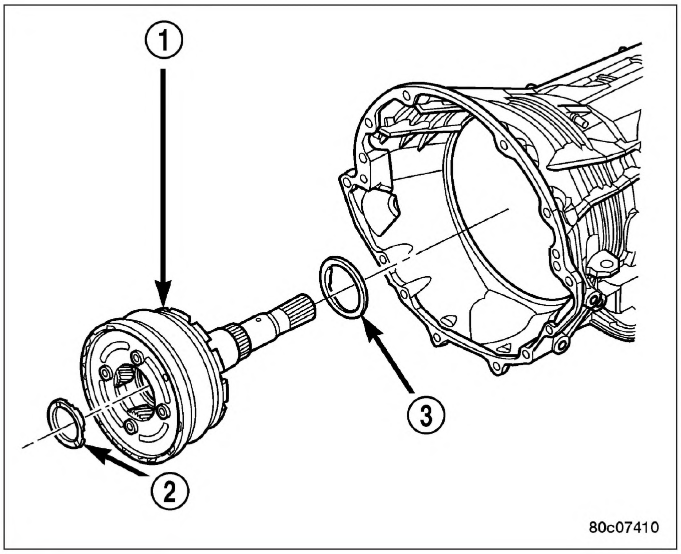
37. Remove the snap-ring (1) holding the park sprag gear onto the output shaft.



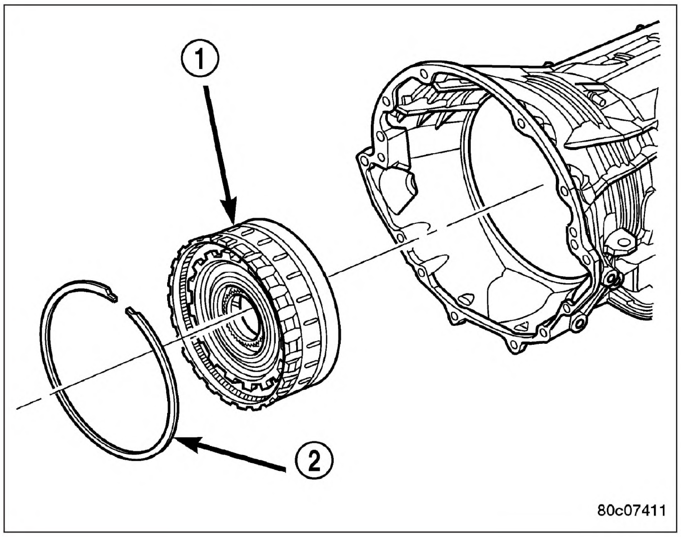
38. Remove the park sprag gear (1) from the output shaft.



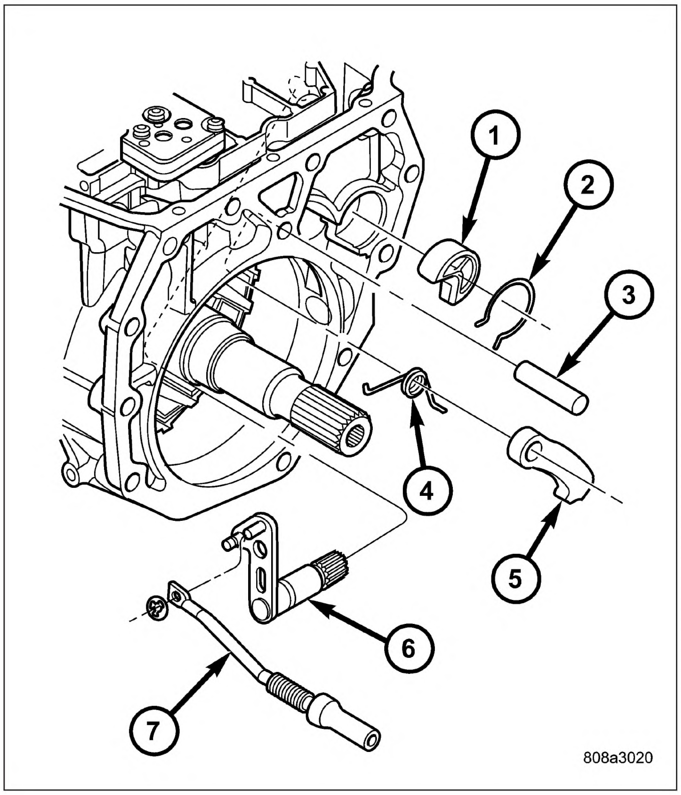
39. Remove the input/reverse planetary assembly (1).
40. Remove the number 12 thrust bearing (3) from the input/reverse planetary assembly (1).



41. Remove the snap-ring (2) holding the low/reverse clutch retainer (1) into the transmission case.
42. Remove the low/reverse clutch retainer (1) from the transmission case.



43. Remove the park rod (7) and e-clip.
44. Remove the park rod guide snap-ring (2).
45. Remove the park rod guide (1).
46. Remove the park pawl pivot shaft (3), park pawl (5), and spring (4).
47. Remove the manual selector shaft (6).
48. Remove the manual selector shaft seal.
49. Remove the dipstick tube seal.



CLEANING

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on shafts, or valves, use extreme care to avoid rounding off sharp edges. Sharp edges are vital as they prevent foreign matter from getting between the valve and valve bore.

Do not reuse oil seals, gaskets, seal rings, or O-rings during overhaul. Replace these parts as a matter of course. Also do not reuse snap rings or E-clips that are bent or distorted. Replace these parts as well.

Lubricate transmission parts with Mopar® ATF +4, Automatic Transmission Fluid, during overhaul and assembly. Use petroleum jelly, Mopar® Door Ease, or Ru-Glyde to prelubricate seals, O-rings, and thrust washers. Petroleum jelly can also be used to hold parts in place during reassembly.

Clean the case in a solvent tank. Flush the case bores and fluid passages thoroughly with solvent. Dry the case and all fluid passages with compressed air. Be sure all solvent is removed from the case and that all fluid passages are clear.

NOTE: Do not use shop towels or rags to dry the case (or any other transmission component) unless they are made from lint-free materials. Lint will stick to case surfaces and transmission components and circulate throughout the transmission after assembly. A sufficient quantity of lint can block fluid passages and interfere with valve body operation.

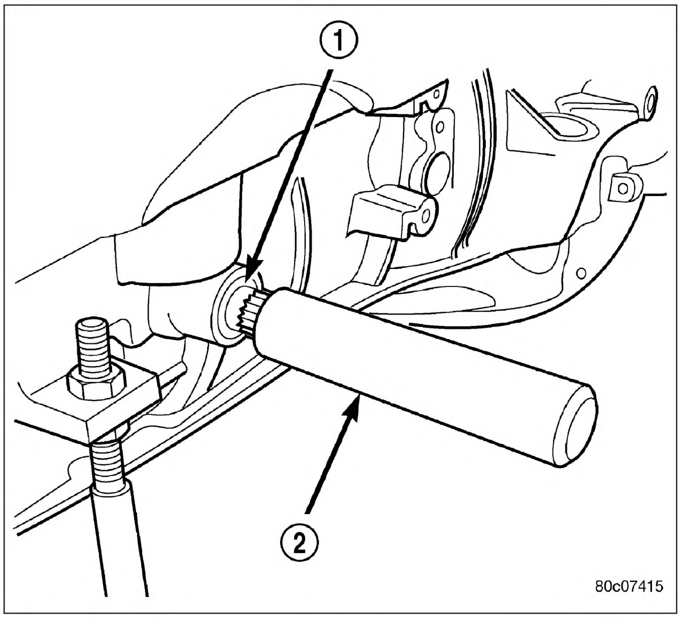
INSPECTION

Inspect the case for cracks, porous spots, worn bores, or damaged threads. Damaged threads can be repaired with Helicoil® thread inserts. However, the case will have to be replaced if it exhibits any type of damage or wear.

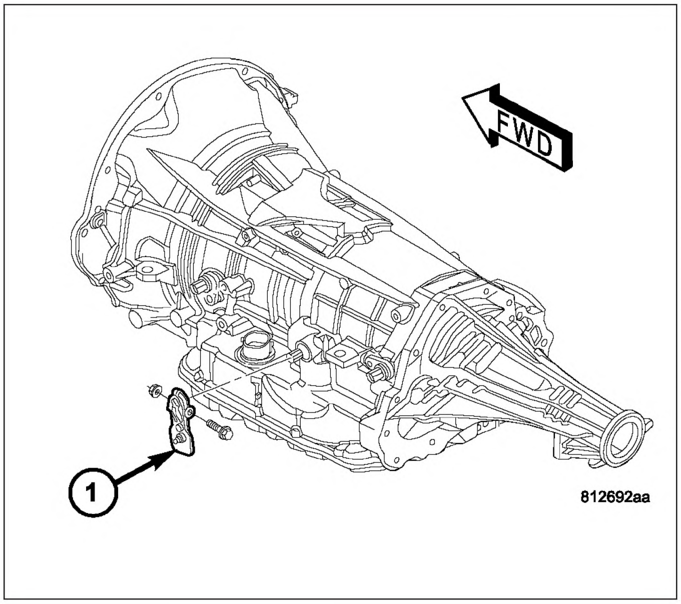
ASSEMBLY

NOTE: Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.

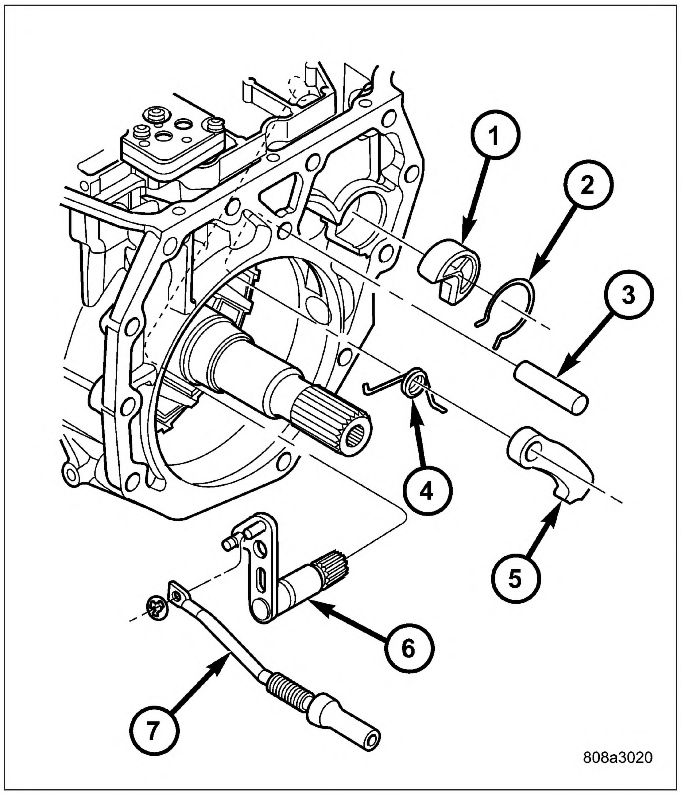
1. Install the cooler filter bypass valve. Torque the bypass valve to specification. The valve uses a tapered pipe thread and excessive torque can damage the transmission case. Tighten the cooler filter bypass valve to 4.5 N·m (40 in.lbs.).
2. Install a new selector shaft seal (1) using Seal Installer 8253 (2).



3. Install the manual selector shaft and retaining screw. Tighten the manual selector shaft retaining screw to 28 N·m (250 in.lbs.).
4. Install the manual shift lever (1) onto the manual selector shaft. Torque the retaining cross-bolt to 16 N·m (140 in.lbs.).



5. Install the park pawl (5), spring (4), and shaft (3).
6. Install the park rod (7) and e-clip.
7. Install the park rod guide (1) and snap-ring (2).


1
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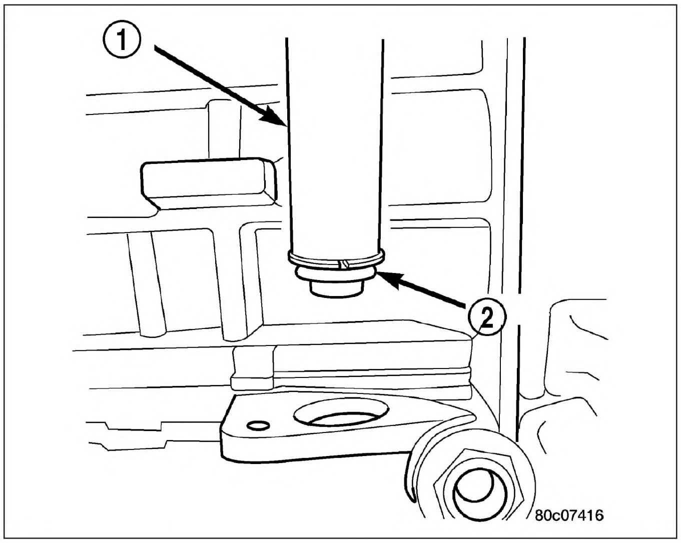
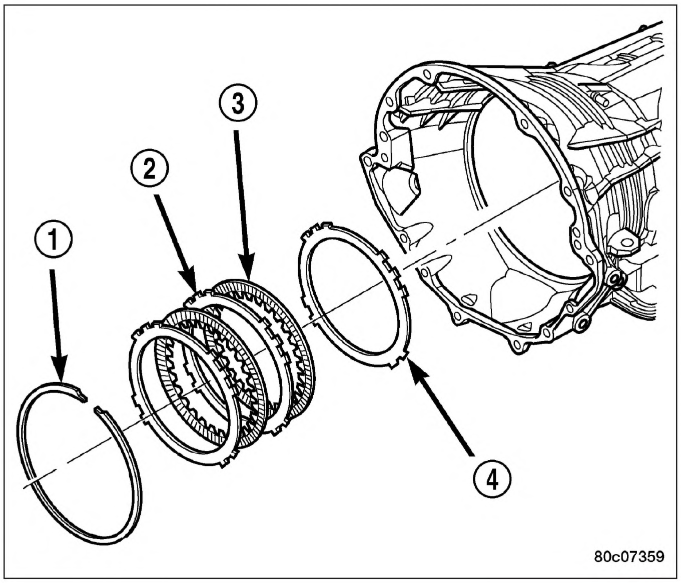
6
7
808a3020

8. Install a new dipstick tube seal (2) using Seal Installer 8254 (1).

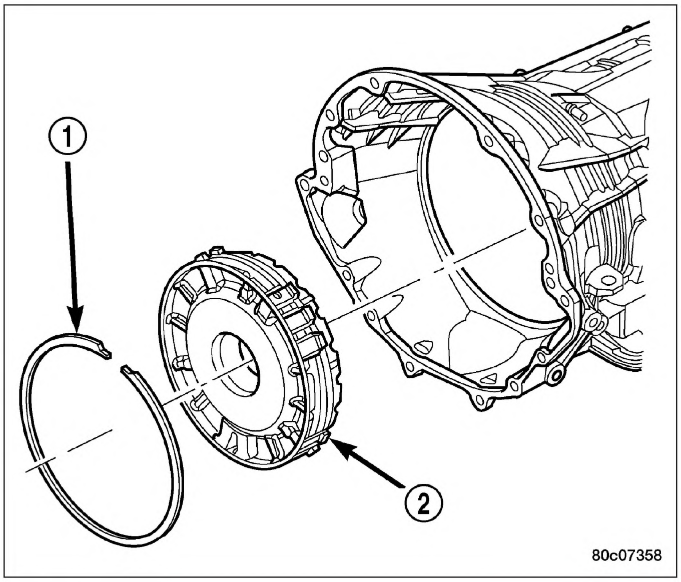

1
2
80c07416

NOTE: Before final assembly of transmission centerline, the 2C/4C clutch components should be installed into position and measured as follows:

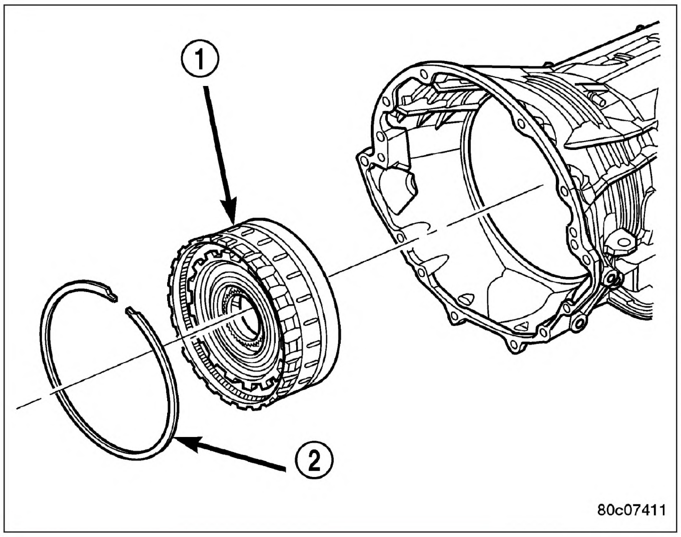
9. Install the 2C reaction plate (4) into the transmission case.
10. Install the 2C clutch pack (2, 3) into the transmission case.
11. Install the flat 2C clutch snap-ring (1) into the transmission case.



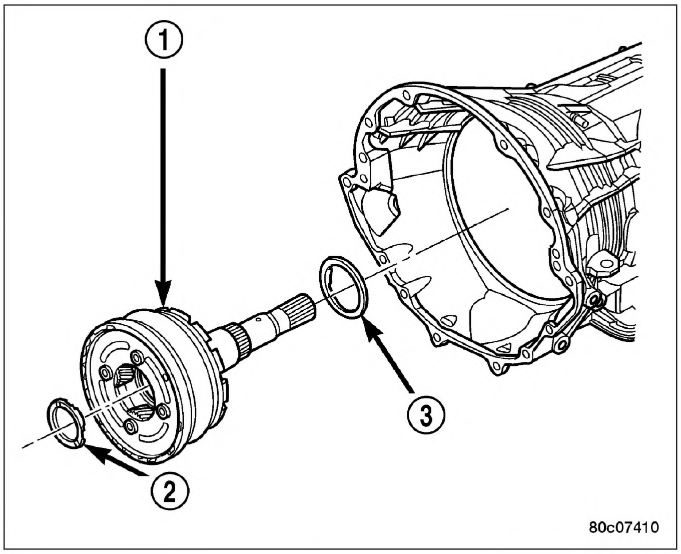
12. Install the 4C retainer/bulkhead (2) into the transmission case. Make sure that the oil feed holes are pointing toward the valve body area.
13. Install the 4C retainer/bulkhead tapered snap-ring (1) into the transmission case. Make sure that the open ends of the snap-ring are located in the case opening toward the valve body area.
14. Using a feeler gauge through the opening in the rear of the transmission case, measure the 2C clutch pack clearance between the 2C reaction plate and the transmission case at four different points. The average of these measurements is the 2C clutch pack clearance. The correct clutch clearance is 0.455-1.335 mm (0.018-0.053 in.). The reaction plate is not selective. If the clutch pack clearance is not within specification, the reaction plate, all the friction discs, and steels must be replaced.
15. Remove the 4C retainer/bulkhead and all of the 2C clutch components from the transmission case.



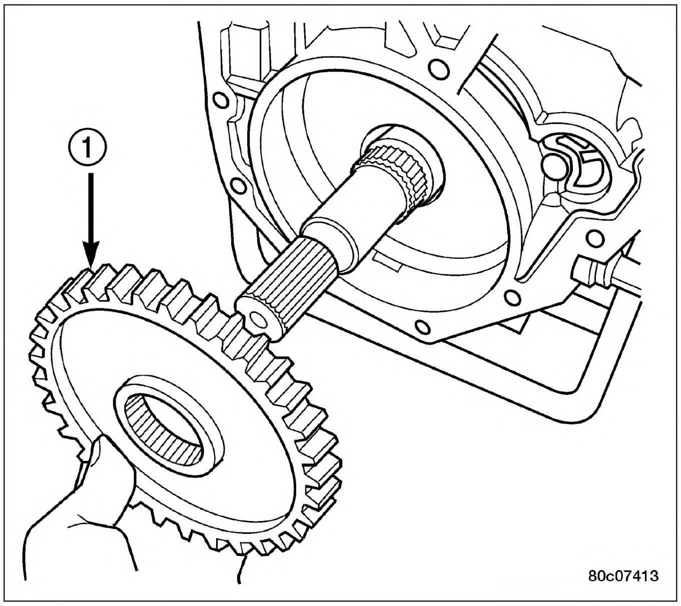
16. Install the low/reverse clutch assembly (1). Make sure that the oil feed hole points toward the valve body area and that the bleed orifice is aligned with the notch in the rear of the transmission case.
17. Install the snap-ring (2) to hold the low/reverse clutch retainer into the transmission case. The snap-ring is tapered and must be installed with the tapered side forward. Once installed, verify that the snap-ring is fully seated in the snap-ring groove.
18. Air check the low/reverse clutch and verify correct overrunning clutch operation.



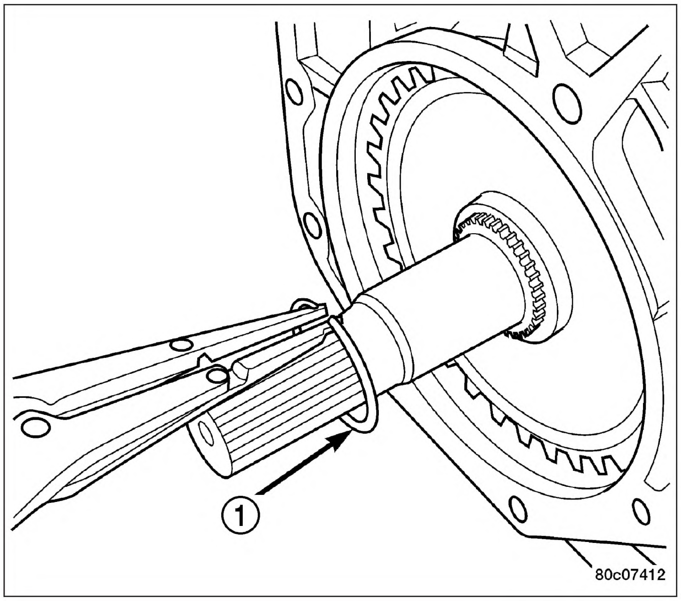
19. Install the number 12 thrust bearing (3) over the output shaft and against the rear planetary gear set. The flat side of the bearing goes toward the planetary gearset and the raised tabs on the inner race should face the rear of the transmission.



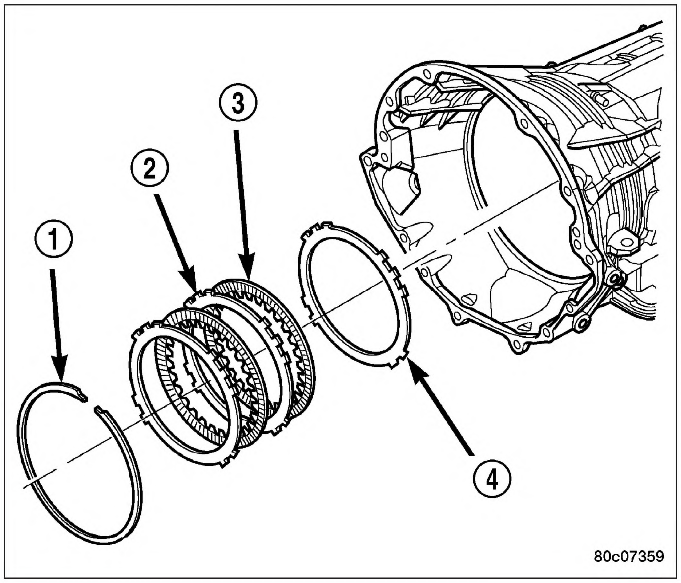
20. Install the reverse/input planetary assembly (1) through the low/reverse clutch assembly.
21. Install the park sprag gear (1) onto the output shaft.

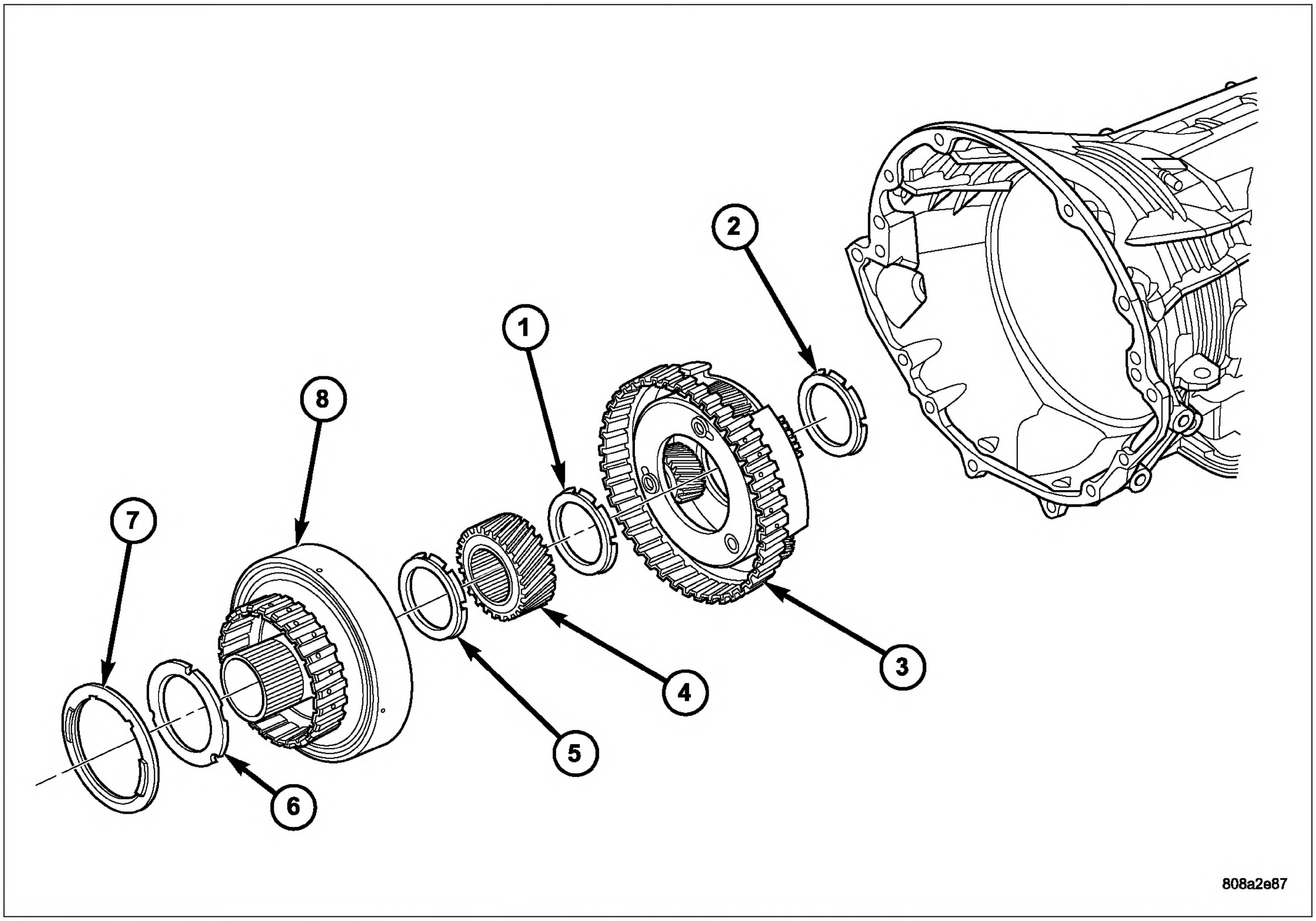


22. Install the snap-ring (1) to hold the park sprag onto the output shaft.



23. Install the 2C reaction plate (4) into the transmission case.
24. Install the 2C clutch pack (2, 3, 4) into the transmission case.

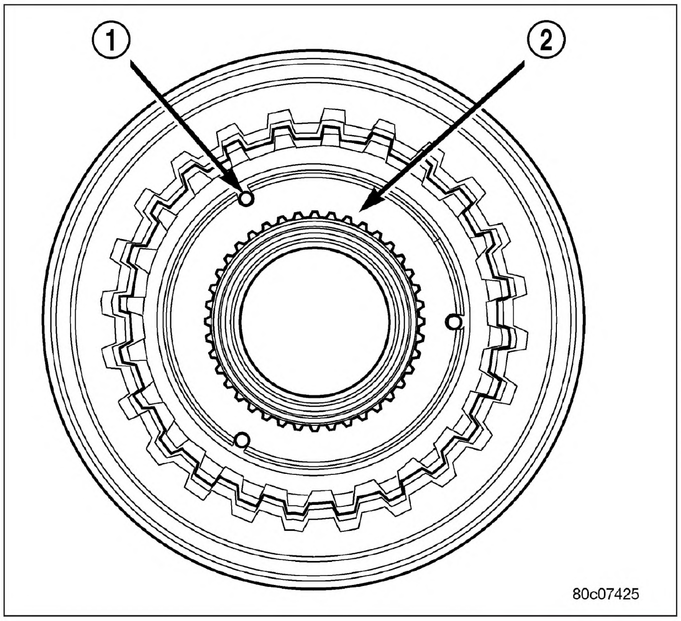




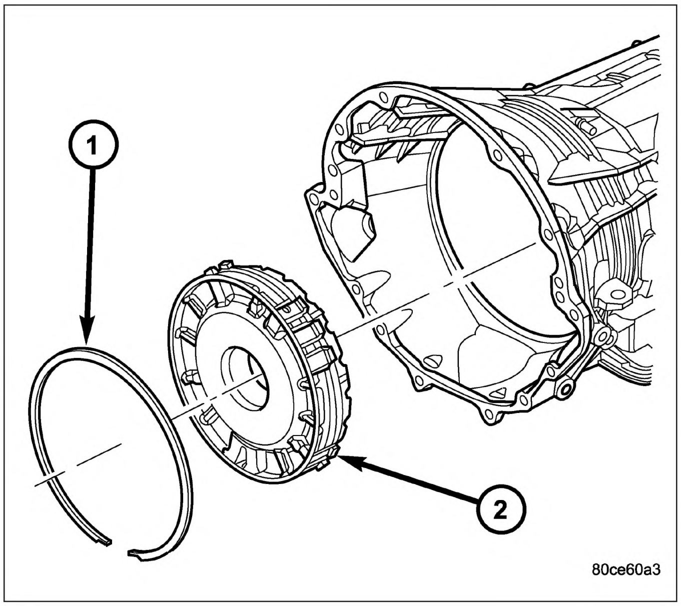
Install Reaction Annulus and Carrier

1 - THRUST BEARING NUMBER 8
2 - THRUST BEARING NUMBER 9
3 - REACTION PLANETARY CARRIER
4 - REACTION SUN GEAR
5 - THRUST BEARING NUMBER 7
6 - THRUST PLATE (SELECT)
7 - THRUST BEARING NUMBER 6
8 - REACTION ANNULUS

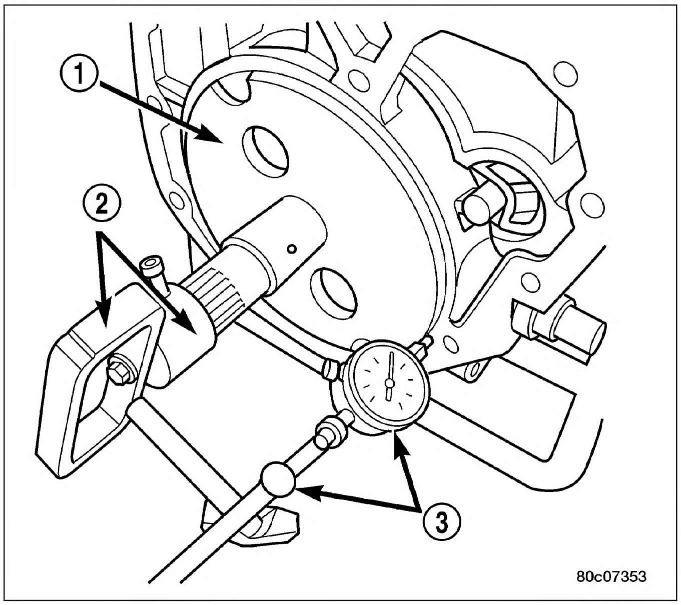
25. Install the number 8 thrust bearing (1) inside the reaction carrier with the outer race against the reaction planetary carrier (3).
26. Install the reaction planetary gear set and the number 9 thrust bearing (2), with the inner race against the reaction planetary carrier (3), into the transmission case.
27. Install the flat 2C clutch snap-ring into the transmission case.
28. Install the reaction sun gear (4) into the reaction planetary gear set. **Make sure** the small shoulder is facing the front of the transmission.
29. Install the number 7 thrust bearing (5) onto the reaction sun gear (4) with the inner race against the sun gear.
30. Install the output shaft selective thrust plate (2) onto the reaction annulus with the oil grooves facing the annulus gear and the lugs (1) and notches aligned as shown.
31. Install the number 6 thrust bearing (7) against the output shaft selective thrust plate (6) with the flat side against the thrust plate and the raised tabs on the inner race facing the front of the transmission.
32. Install the reaction annulus (8) into the reaction planetary gear set.



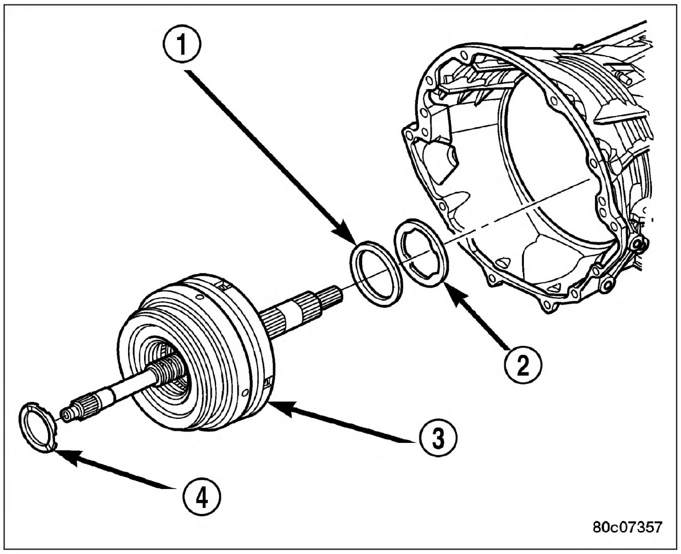
33. Install the 4C retainer/bulkhead (2) into the transmission case. Make sure that the oil feed holes are pointing toward the valve body area. Rotate the reaction annulus during the installation of the 4C retainer/bulkhead to ease installation.
34. Install the 4C retainer/bulkhead tapered snap-ring (1) into the transmission case with the taper toward the front of the case. Make sure that the open ends of the snap-ring are located in the case opening toward the valve body area.
35. Air check the 2C and 4C clutch operation.



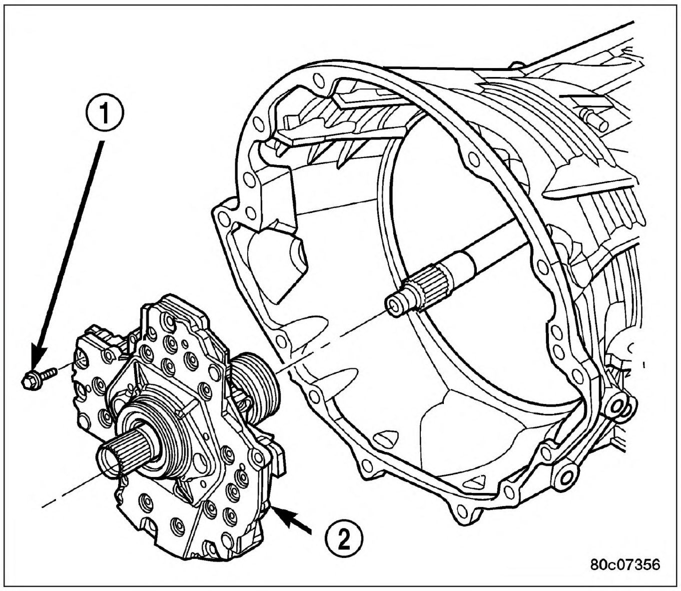
36. Using Alignment Plate 8261 (1), Adapter 8266-17 from End-Play Tool Set 8266 (2) and Dial Indicator C-3339 (3), measure and record the output shaft end-play. The correct output shaft end-play is 0.22-0.55 mm (0.009-0.021 in.). Adjust as necessary. Install the chosen output shaft selective thrust plate and re-measure end-play to verify selection.
37. Apply a bead of RTV silicone and install the extension/adapter housing onto the transmission case.
38. Install and torque the bolts to hold the extension/adapter housing onto the transmission case. The correct torque is 54 N·m (40 ft.lbs.).



39. Install the number 5 thrust bearing (1) and selective thrust plate (2) onto the 4C retainer/bulkhead. Be sure that the outer race of the bearing is against the thrust plate.
40. Install the input clutch assembly (3) into the transmission case. Make sure that the input clutch assembly is fully installed by performing a visual inspection through the input speed sensor hole. If the tone wheel teeth on the input clutch assembly are centered in the hole, the assembly is fully installed.
41. Install the number 1 thrust bearing (4) with the outer race up in the pocket of the input clutch assembly.

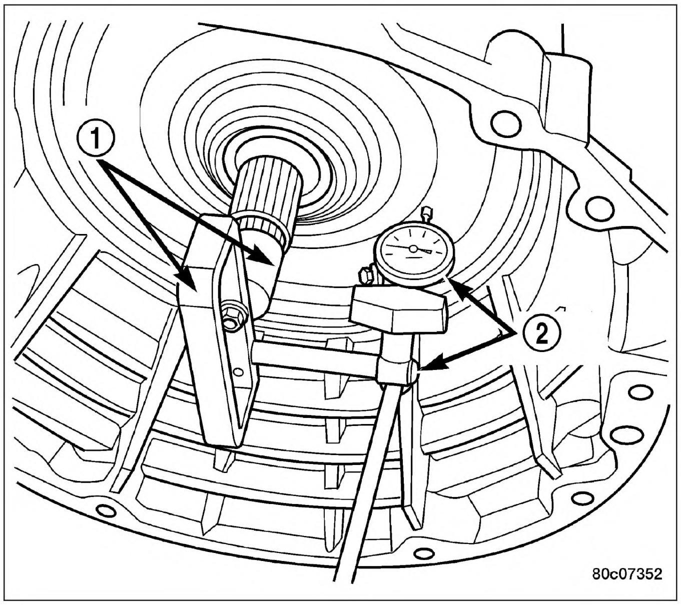


42. Install the oil pump (2) into the transmission case.
43. Install the bolts (1) to hold the oil pump into the transmission case. Tighten the oil pump bolts to 28 N·m (250 in.lbs.).

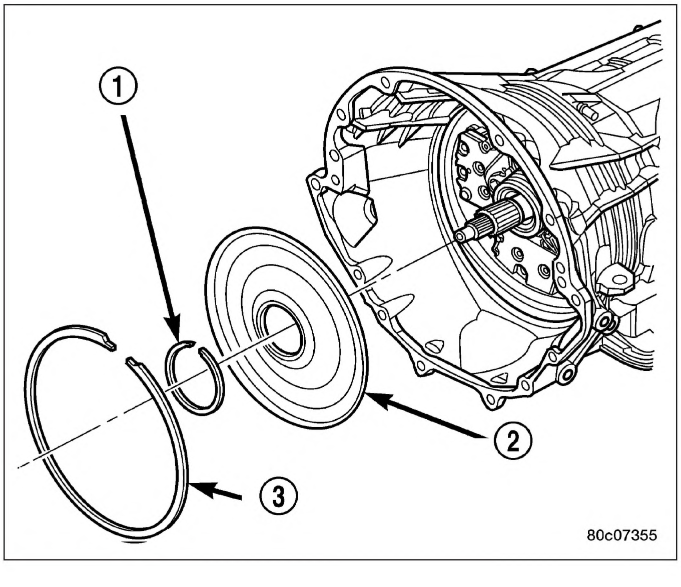


44. Using Adapter 8266-1 from End-Play Tool Set 8266 (1) and Dial Indicator C-3339 (2), measure and record the input shaft end-play. The correct end-play is 0.46-0.89 mm (0.018-0.035 in.). Adjust as necessary. Install the chosen thrust plate on the number 5 thrust bearing and re-measure end-play to verify selection.

NOTE: When measuring the input shaft end-play, two ″stops″ will be felt. When the input shaft is pushed inward and the dial indicator zeroed, the first ″stop″ felt when the input shaft is pulled outward is the movement of the input shaft in the input clutch housing hub. This value should not be included in the end-play measured value and therefore must be recorded and subtracted from the dial indicator reading.

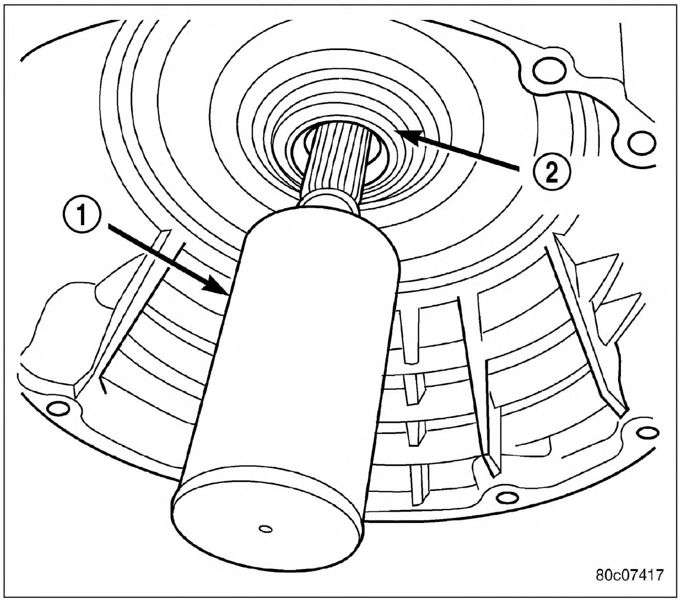


45. Install the transmission front cover (2) into the transmission case.
46. Install the outer snap-ring (3) to hold the transmission front cover (2) into the transmission case.

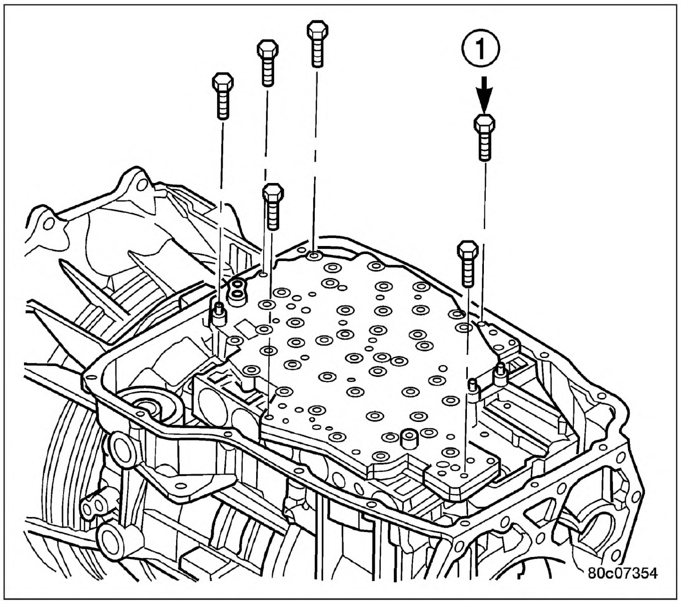


47. Partially install the inner transmission front cover snap-ring (1) onto the oil pump.

48. Using Installer 8255 (1), install the inner transmission front cover snap-ring (2) the remainder of the way onto the oil pump.

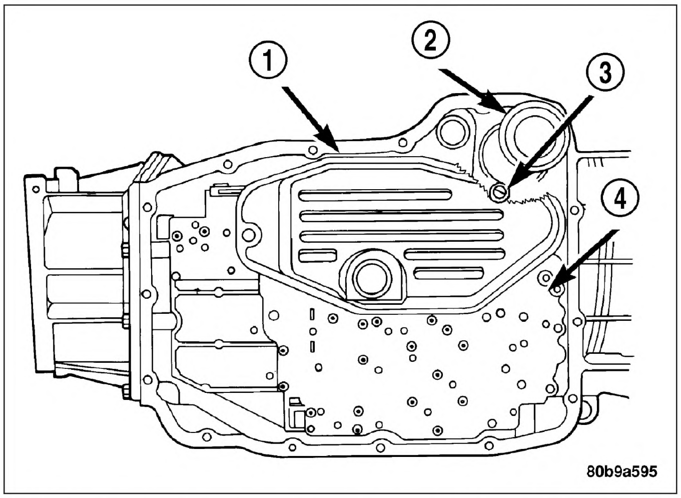


49. Install the valve body. Verify that the pin on the manual lever has properly engaged the TRS selector plate. Tighten the valve body to transmission case bolts (1) to 12 N·m (105 in.lbs.).



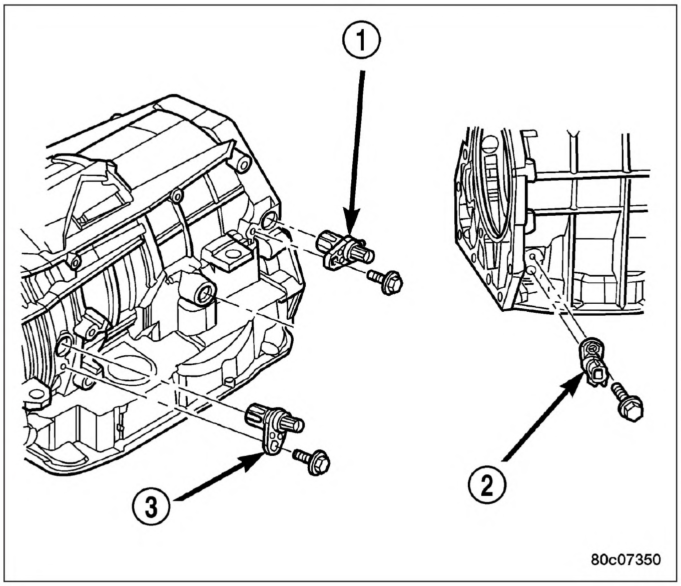
CAUTION: The primary oil filter seal MUST be fully installed flush against the oil pump body. DO NOT install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

50. Install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with the butt end of a hammer, or other suitable tool.
51. Install the primary oil filter (1) and the oil cooler return filter (2). Tighten the screw to hold the primary oil filter to the valve body to 4.5 N·m (40 in.lbs.). Using Oil Filter Wrench 8321, tighten the cooler return oil filter to the transmission case to 14 N·m (125 in.lbs.).



52. Apply RTV silicone to the oil pan and install the transmission oil pan. Tighten the bolts to 12 N·m (105 in.lbs.).

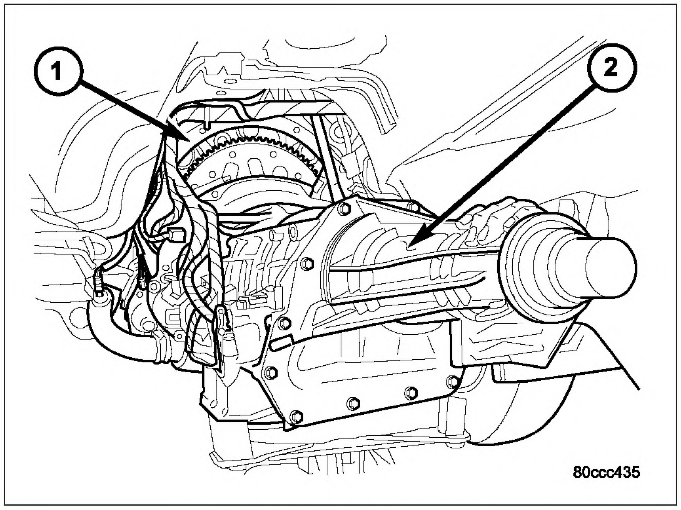
53. Install the input (3), output (1), and line pressure sensors (2). Tighten the bolts to 12 N·m (105 in.lbs.).



INSTALLATION

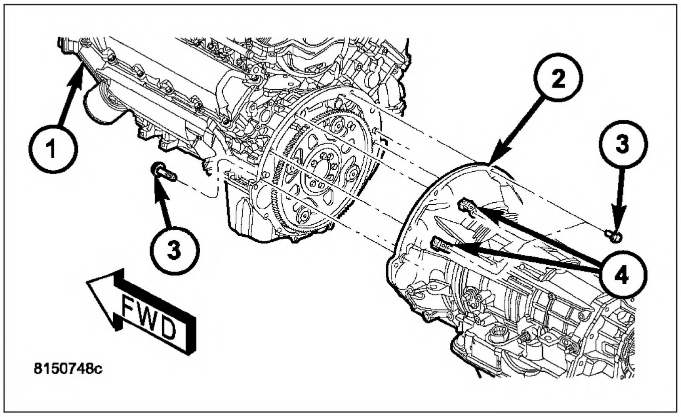
1. Check torque converter hub and hub drive flats for sharp edges burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper and crocus cloth if necessary. Verify that the converter hub o-ring is properly installed and is free of any debris. The hub must be smooth to avoid damaging pump seal at installation.
2. If a replacement transmission is being installed, transfer any components necessary, such as the manual shift lever and shift cable bracket, from the original transmission onto the replacement transmission.
3. Lubricate oil pump seal lip with transmission fluid.
4. Align converter and oil pump.
5. Carefully insert converter in oil pump. Then rotate converter back and forth until fully seated in pump gears.
6. Check converter seating with steel scale and straightedge. Surface of converter lugs should be at least 13 mm (1/2 in.) to rear of straightedge when converter is fully seated.
7. Temporarily secure converter with C-clamp.

8. Position transmission on jack and secure it with chains.
9. Check condition of converter driveplate. Replace the plate if cracked, distorted or damaged. **Also be sure transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.**
10. Apply a light coating of Mopar® High Temp Grease to the torque converter hub pocket in the rear pocket of the engine's crankshaft.
11. Raise transmission and align the torque converter with the drive plate and the transmission converter housing with the engine block.
12. Move transmission forward. Then raise, lower, or tilt transmission (2) to align the converter housing with the engine (1) block dowels.

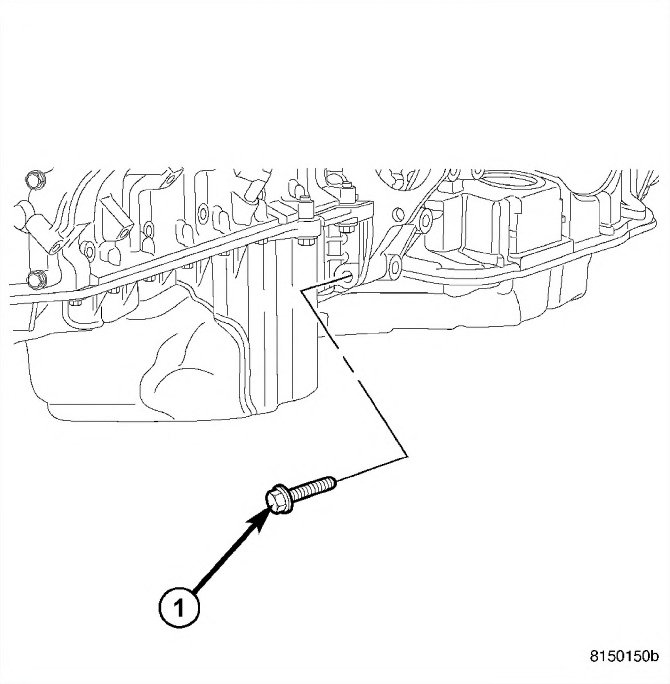


13. Carefully work transmission forward and over engine block dowels until converter hub is seated in crankshaft. Verify that no wires, or the transmission vent hose, have become trapped between the engine block and the transmission.

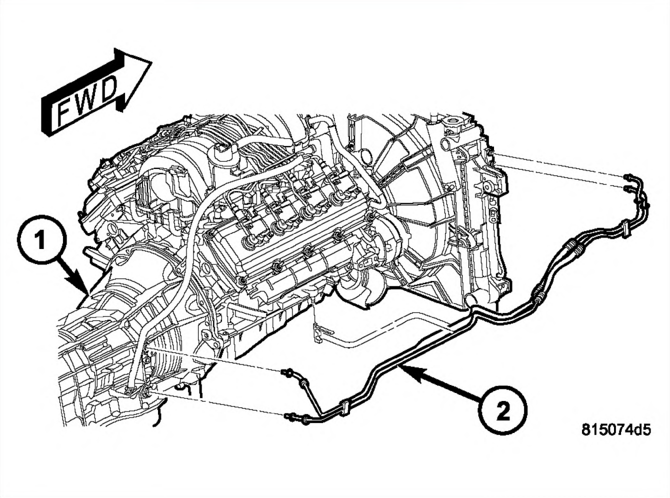
14. Install two bolts (3) to attach the transmission (2) to the engine (1).
15. Install remaining torque converter housing to engine bolts. Tighten to 68 N·m (50 ft.lbs.).



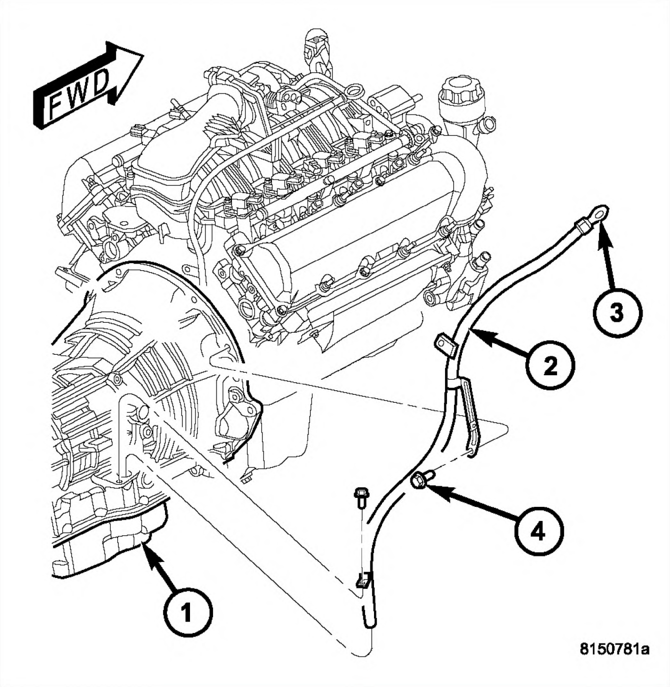
16. Install the
17. Install both the left and right side oil pan to transmission bolts (1), 5.7L only. Torque the bolts to 54 N·m (39 ft. lbs.).



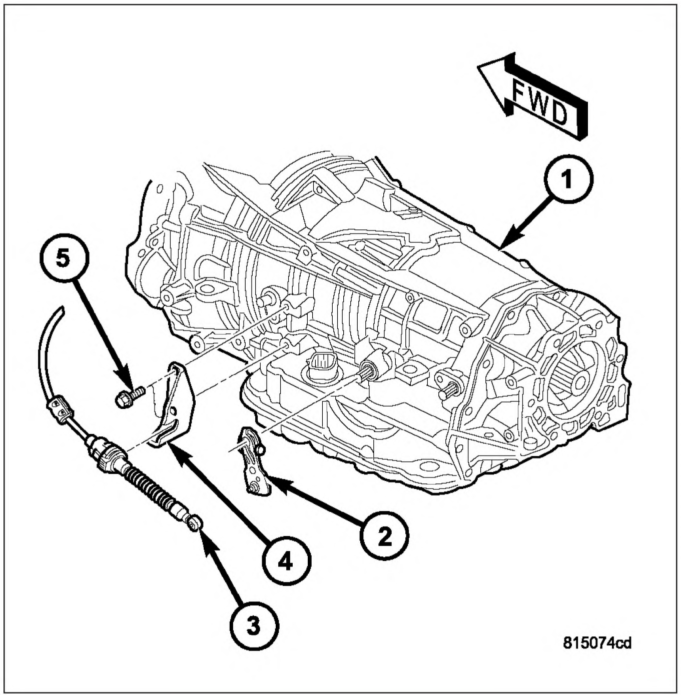
18. Connect cooler lines (2) to transmission (1). (Refer to 7 - COOLING/TRANSMISSION/TRANS COOLER - STANDARD PROCEDURE)



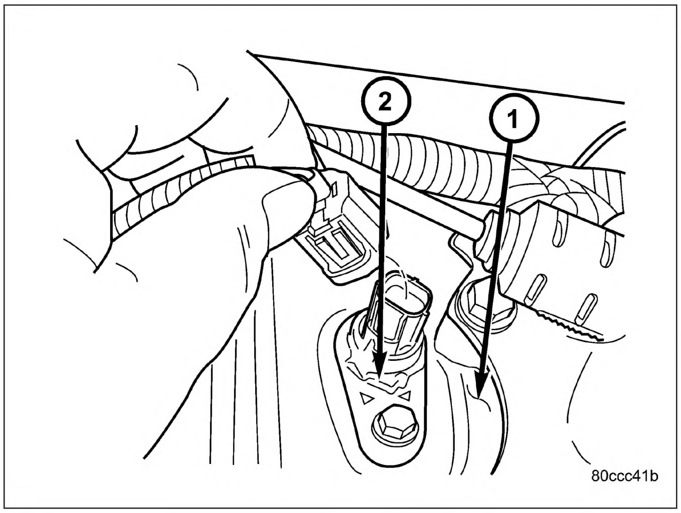
19. Install transmission fill tube (2) and dipstick (3) to the transmission (1).



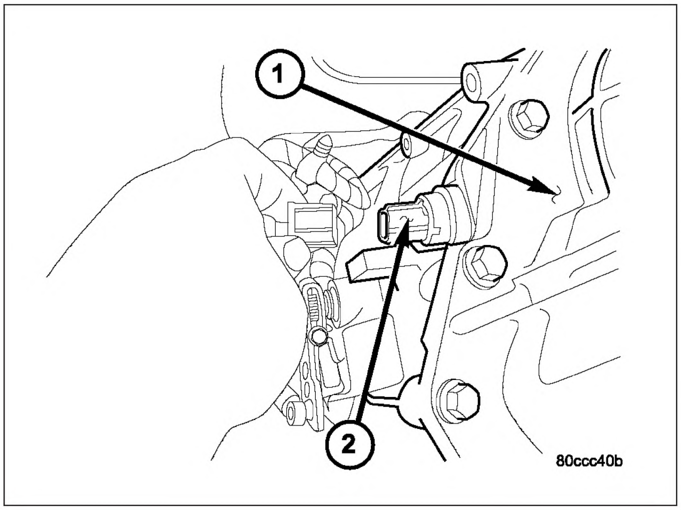
20. Install rear transmission crossmember. Tighten crossmember to frame bolts to 68 N·m (50 ft.lbs.).
21. Install rear support to transmission. Tighten bolts to 47 N·m (35 ft.lbs.).
22. Lower transmission onto crossmember and install bolts attaching transmission mount to crossmember. Tighten clevis bracket to crossmember bolts to 47 N·m (35 ft.lbs.). Tighten the clevis bracket to rear support bolt to 68 N·m (50 ft.lbs.).
23. Remove engine support fixture.
24. Install new plastic retainer grommet on any shift cable that was disconnected. Grommets should not be reused. Use pry tool to remove rod from grommet and cut away old grommet. Use pliers to snap new grommet into cable and to snap grommet onto lever.
25. Connect gearshift cable (3) to the shift calbe bracket (4) and the transmission manual lever (2).



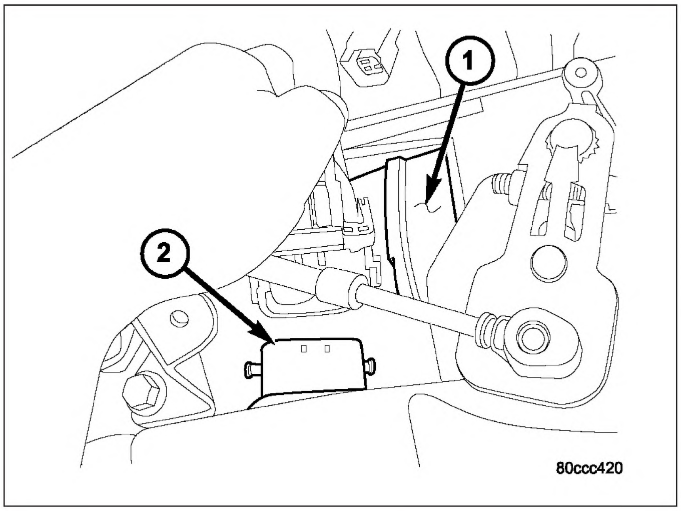
26. Connect wires to the input speed sensor (2). Be sure transmission harnesses are properly routed.



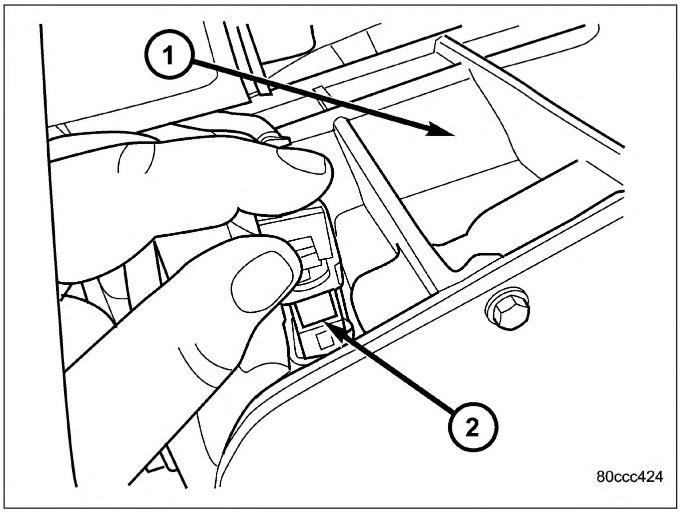
27. Connect wires to the output speed sensor (2). Be sure transmission harnesses are properly routed.



28. Connect wires to the transmission solenoid/TRS assembly (2). Be sure transmission harnesses are properly routed.

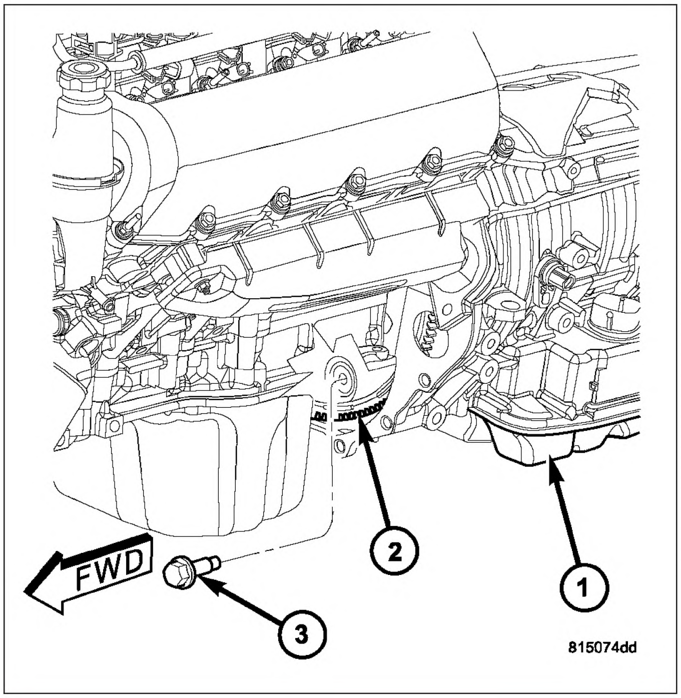


29. Connect wires to the line pressure sensor (2). Be sure transmission harnesses are properly routed.

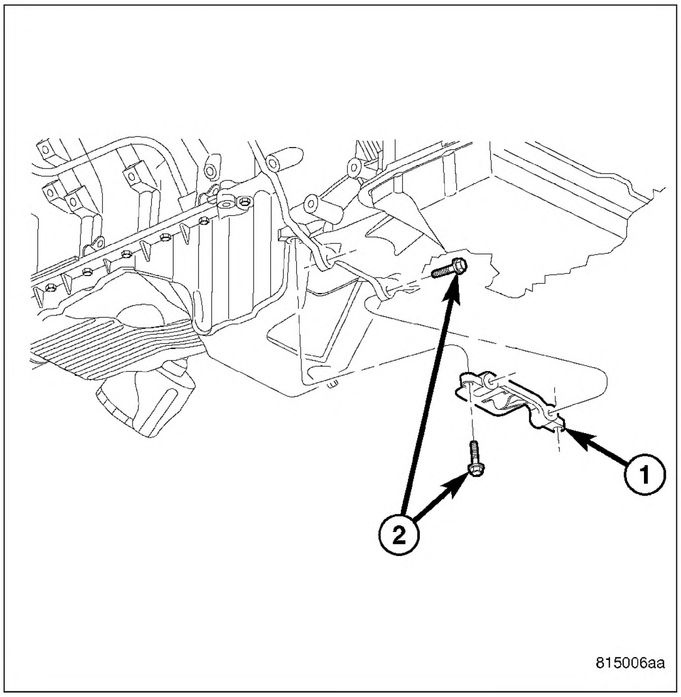


CAUTION: It is essential that correct length bolts be used to attach the converter to the driveplate. Bolts that are too long will damage the clutch surface inside the converter.

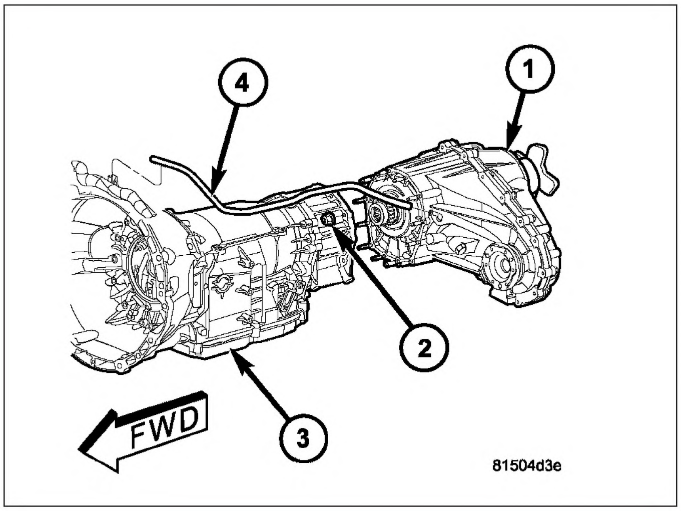
30. Install all torque converter-to-driveplate bolts (3) by hand.
31. Verify that the torque converter is pulled flush to the driveplate. Tighten bolts to 31 N·m (270 in. lbs.).



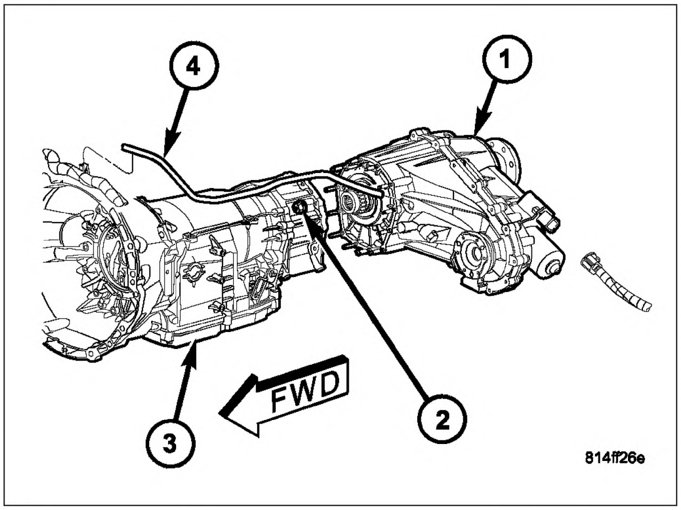
32. Install the structural cover (1), 5.7L shown. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION)


1
2
815006aa

33. If necessary, install the NV140 transfer case (1). (Refer to 21 - TRANSMISSION/TRANSAXLE/ TRANSFER CASE - INSTALLATION)


4
1
2
FWD
3
81504d3e

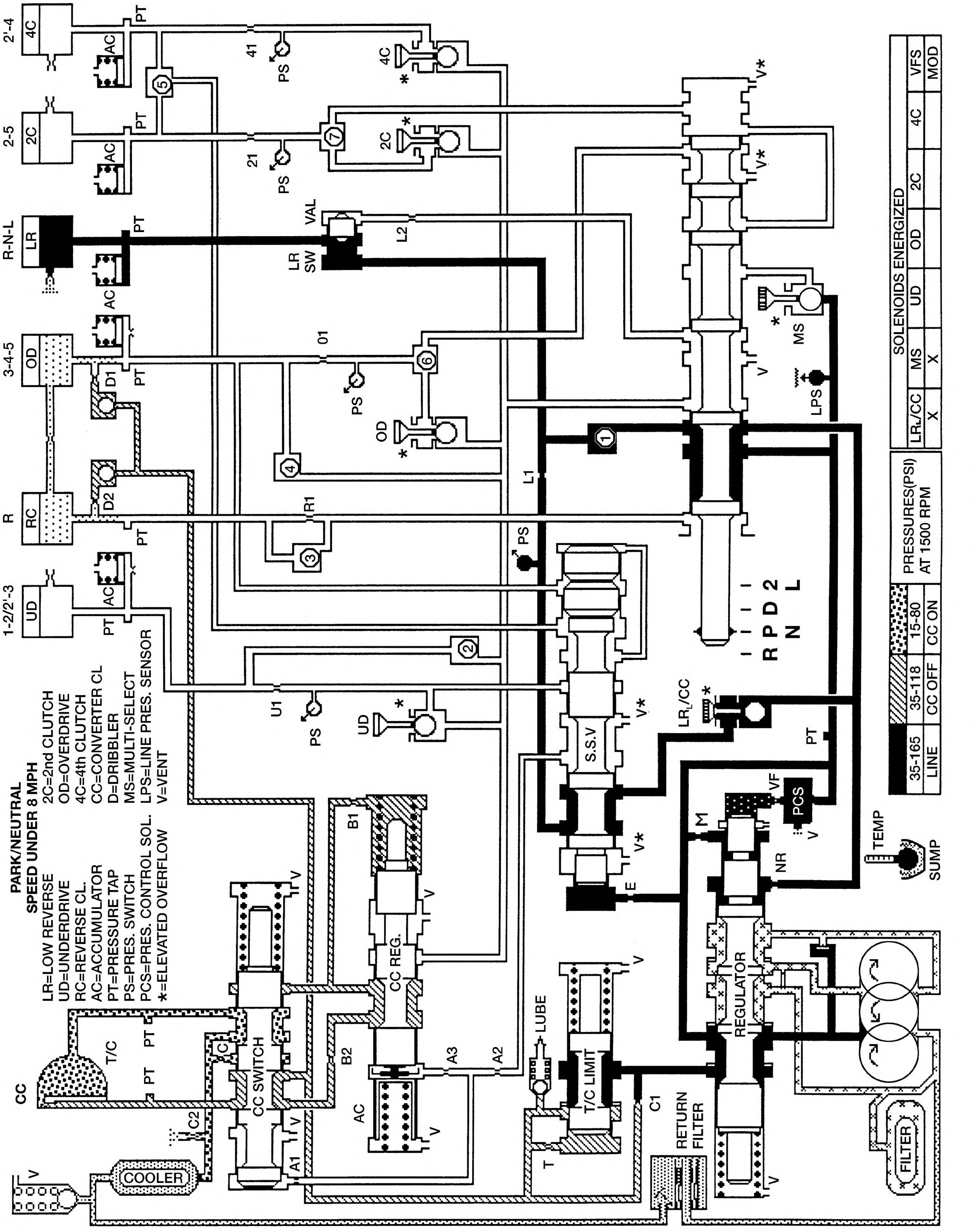
34. If necessary, install the NV245 transfer case (1). (Refer to 21 - TRANSMISSION/TRANSAXLE/ TRANSFER CASE - INSTALLATION)


4
1
FWD
2
3
814ff26e

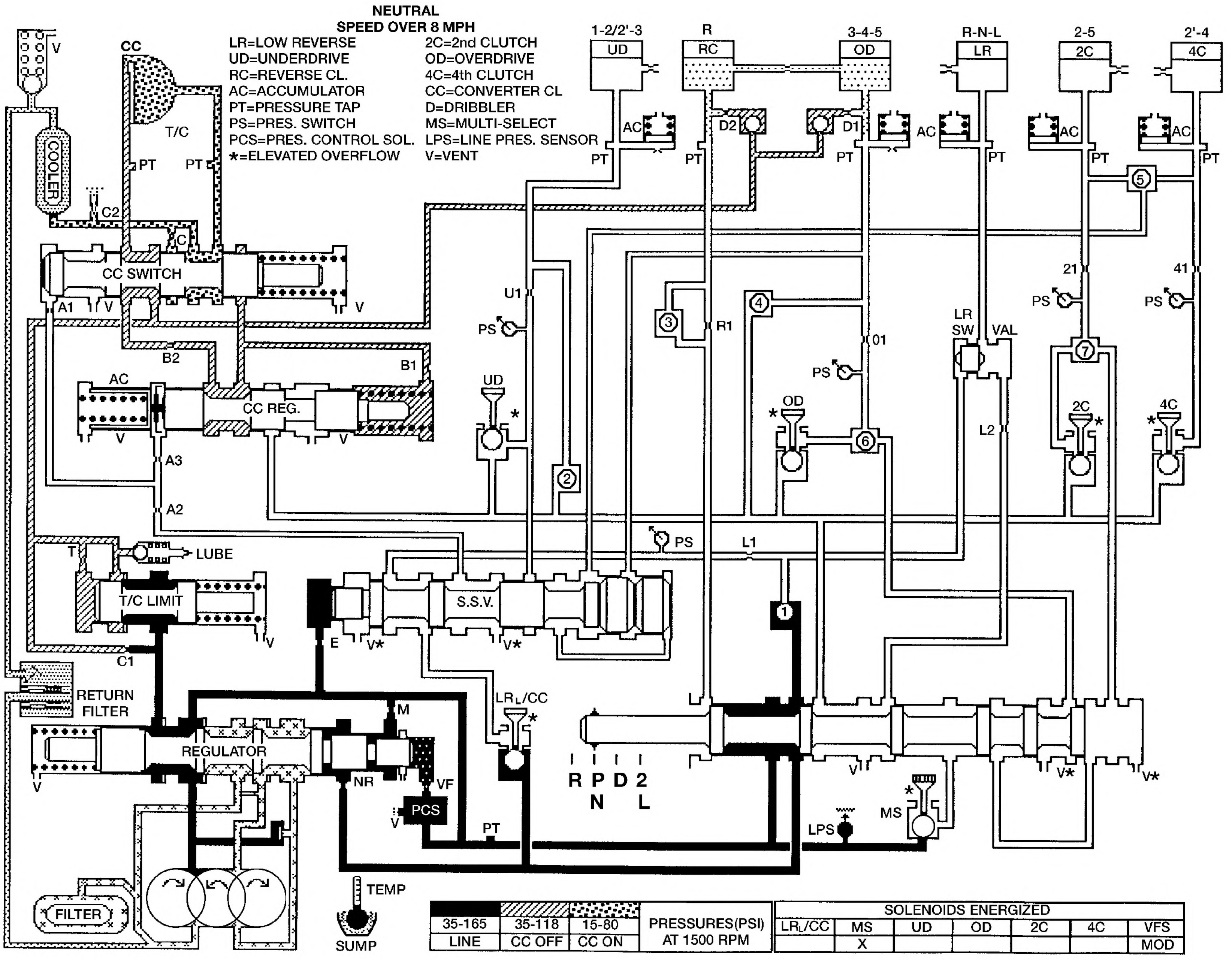
35. Install starter motor. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION)
36. Install exhaust components.
37. Align and connect propeller shaft(s). (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)
38. Adjust gearshift cable if necessary. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/545RFE/GEAR SHIFT CABLE - ADJUSTMENTS)
39. Lower vehicle.
40. Fill transmission with appropriate fluid. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION)

SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS


80a0df0a
PARK/NEUTRAL
SPEED UNDER 8 MPH
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
41
21
01
R1
U1
L1
L2
PS
LR SW
VAL
S.S.V
LR/CC
LPS
MS
R P D 2
N L
CC
T/C
CC SWITCH
CC REG.
B1
B2
A1
A2
A3
C1
C2
COOLER
LUBE
T/C LIMIT
T
RETURN FILTER
REGULATOR
NR
M
E
VF
PCS
TEMP
SUMP
FILTER
SOLENOIDS ENERGIZED
LR/CC
MS
UD
OD
2C
4C
VFS
X
X
MOD
PRESSURES(PSI) AT 1500 RPM
35-165
LINE
35-118
CC OFF
15-80
CC ON

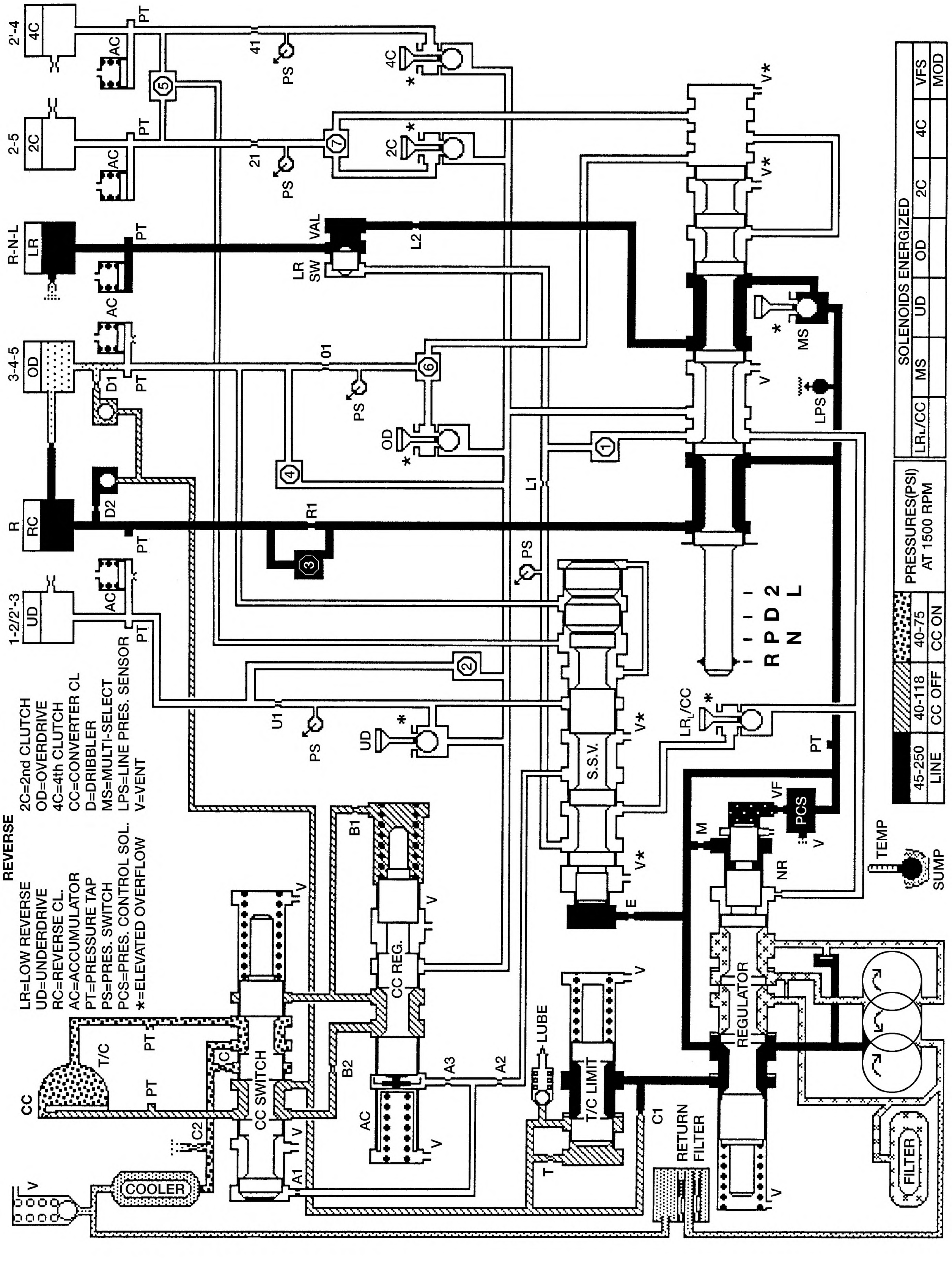
HYDRAULIC FLOW IN PARK/NEUTRAL


NEUTRAL
SPEED OVER 8 MPH
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
CC
T/C
COOLER
C2
C
CC SWITCH
A1
V
U1
PS
R1
01
41
21
LR SW
VAL
B1
B2
AC
CC REG.
A3
A2
UD
OD
2C
4C
L2
L1
T
LUBE
T/C LIMIT
S.S.V.
E
V*
C1
RETURN FILTER
REGULATOR
M
NR
VF
PCS
LR_L/CC
R P D 2
N L
LPS
MS
TEMP
SUMP
FILTER
35-165
LINE
35-118
CC OFF
15-80
CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC
MS
X
UD
OD
2C
4C
VFS
MOD
1
2
3
4
5
6
7

80a0df34

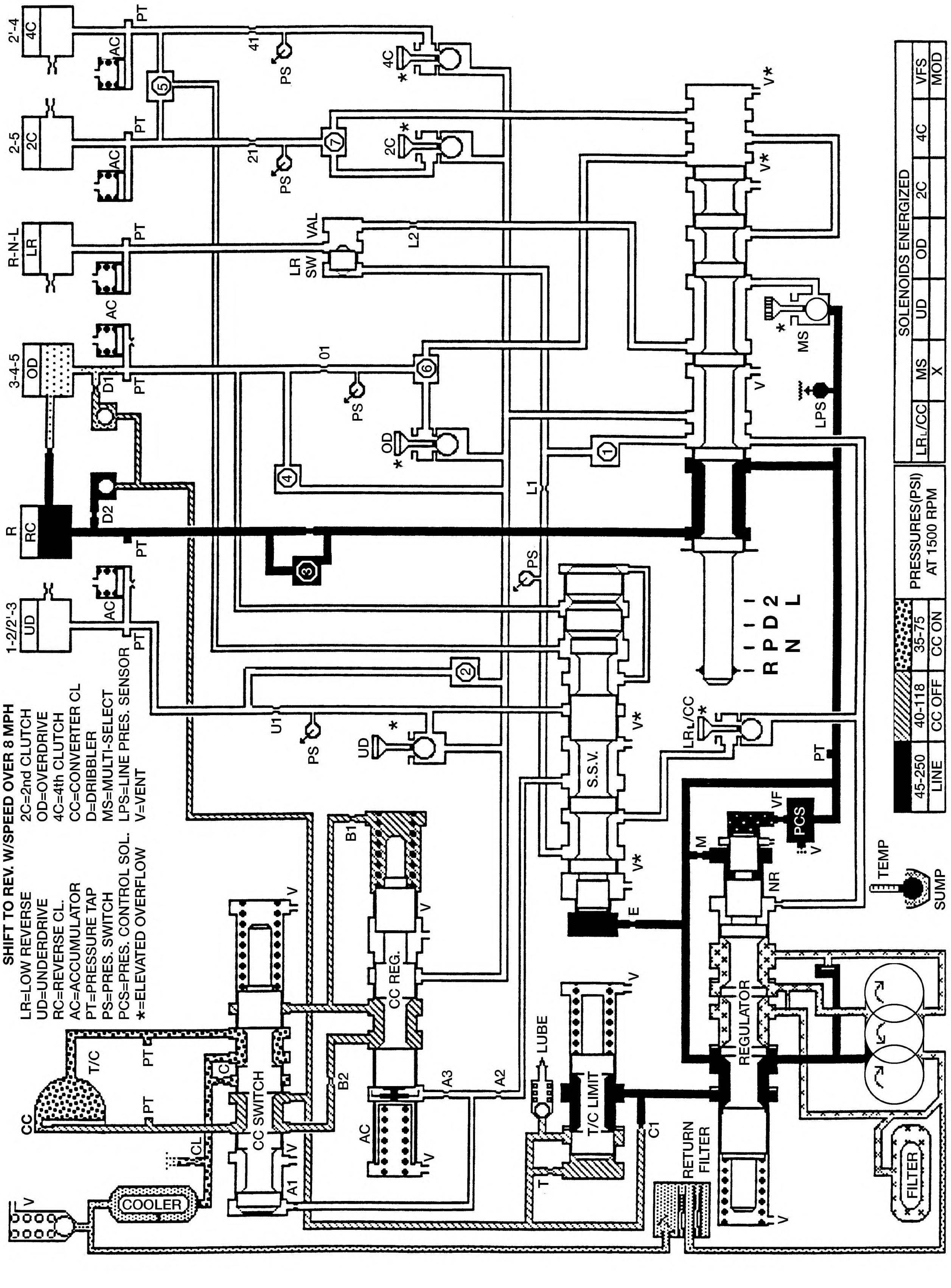
HYDRAULIC FLOW IN NEUTRAL OVER 8MPH

80a0df65

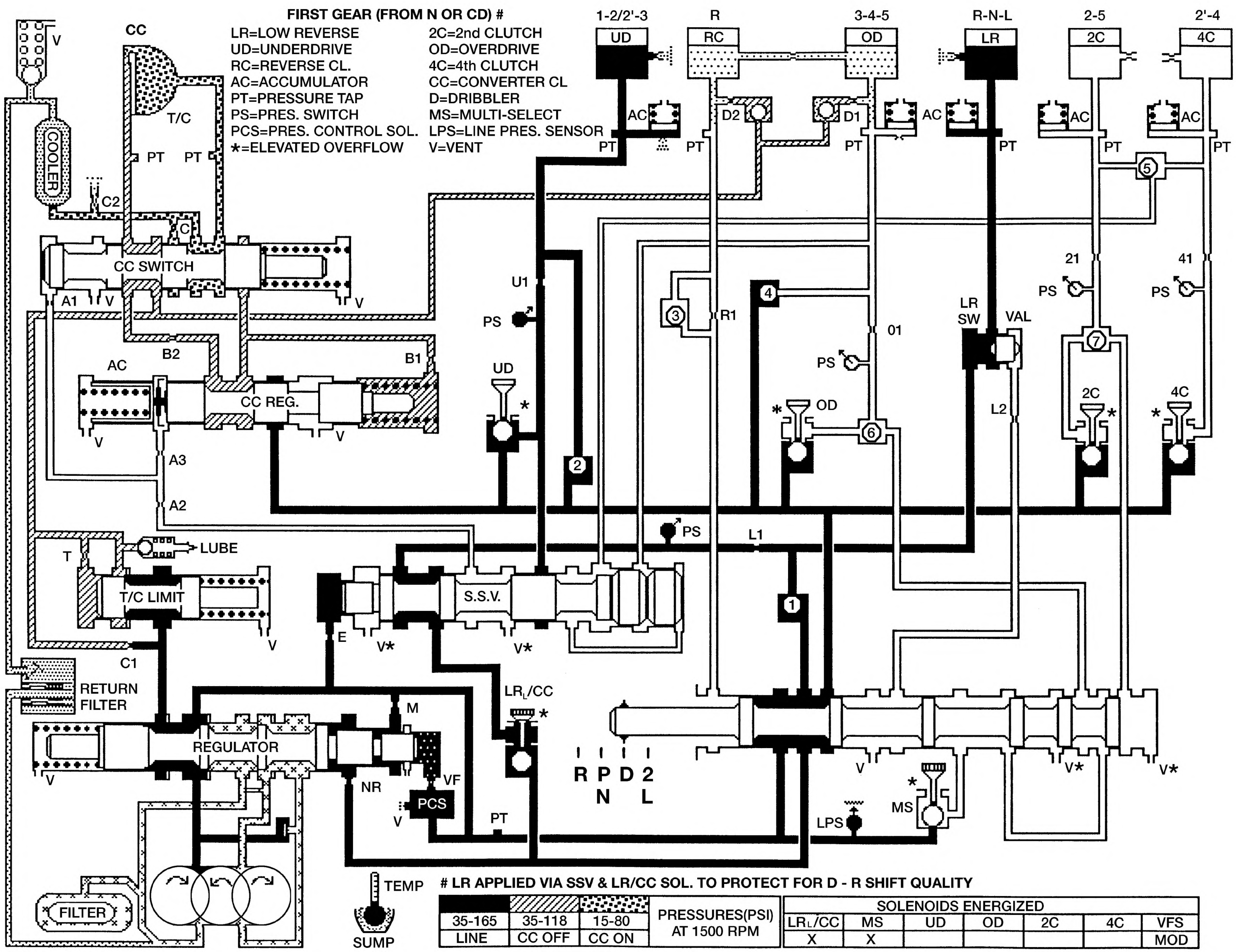

REVERSE
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
∗=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
PS
U1
R1
01
L1
L2
21
41
LR SW
VAL
MS
LPS
LRL/CC
S.S.V.
R P D 2
N L
CC
T/C
CC SWITCH
C2
COOLER
A1
A2
A3
B1
B2
CC REG.
LUBE
T/C LIMIT
C1
RETURN FILTER
REGULATOR
NR
M
E
VF
PCS
TEMP
SUMP
FILTER
SOLENOIDS ENERGIZED
LRL/CC
MS
UD
OD
2C
4C
VFS
MOD
PRESSURES(PSI) AT 1500 RPM
45-250 LINE
40-118 CC OFF
40-75 CC ON

HYDRAULIC FLOW IN REVERSE

80a0dfc5

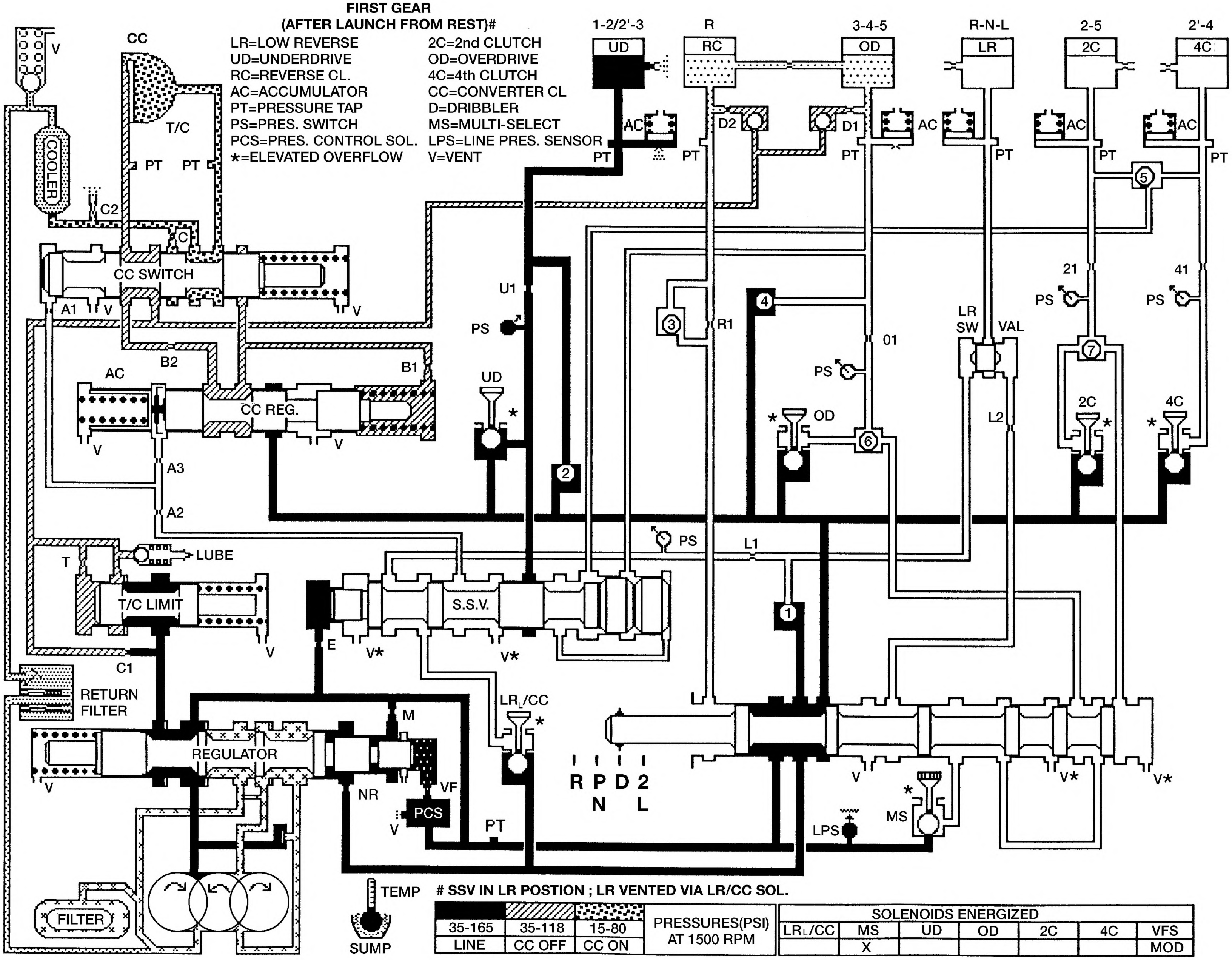

REVERSE BLOCK
SHIFT TO REV. W/SPEED OVER 8 MPH
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
∗=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
PS
U1
21
41
01
L1
L2
LR SW
VAL
S.S.V.
R P D 2 N L
MS
LPS
LRL/CC
PCS
VF
M
NR
E
TEMP
SUMP
CC
T/C
CL
COOLER
CC SWITCH
C
A1
B2
B1
CC REG.
A3
A2
LUBE
T/C LIMIT
T
C1
RETURN FILTER
REGULATOR
FILTER
V
V∗
∗
45-250 LINE
40-118 CC OFF
35-75 CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC
MS X
UD
OD
2C
4C
VFS MOD

HYDRAULIC FLOW IN REVERSE BLOCK


FIRST GEAR (FROM N OR CD) #
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
R
3-4-5
R-N-L
2-5
2'-4
UD
RC
OD
LR
2C
4C
AC
D2
D1
PT
CC
T/C
COOLER
C2
C
CC SWITCH
A1
V
U1
PS
R1
01
LR
SW
VAL
21
41
B2
B1
CC REG.
AC
A3
A2
L2
2C
4C
L1
LUBE
T
T/C LIMIT
S.S.V.
E
V*
C1
RETURN
FILTER
M
LR_L/CC
REGULATOR
NR
VF
PCS
R P D 2
N L
LPS
MS
TEMP
SUMP
FILTER
# LR APPLIED VIA SSV & LR/CC SOL. TO PROTECT FOR D - R SHIFT QUALITY
35-165 LINE
35-118 CC OFF
15-80 CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC X
MS X
UD
OD
2C
4C
VFS MOD

80a0dfee

HYDRAULIC FLOW IN FIRST GEAR (FROM N OR OD)



FIRST GEAR
(AFTER LAUNCH FROM REST)#

LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
∗=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT

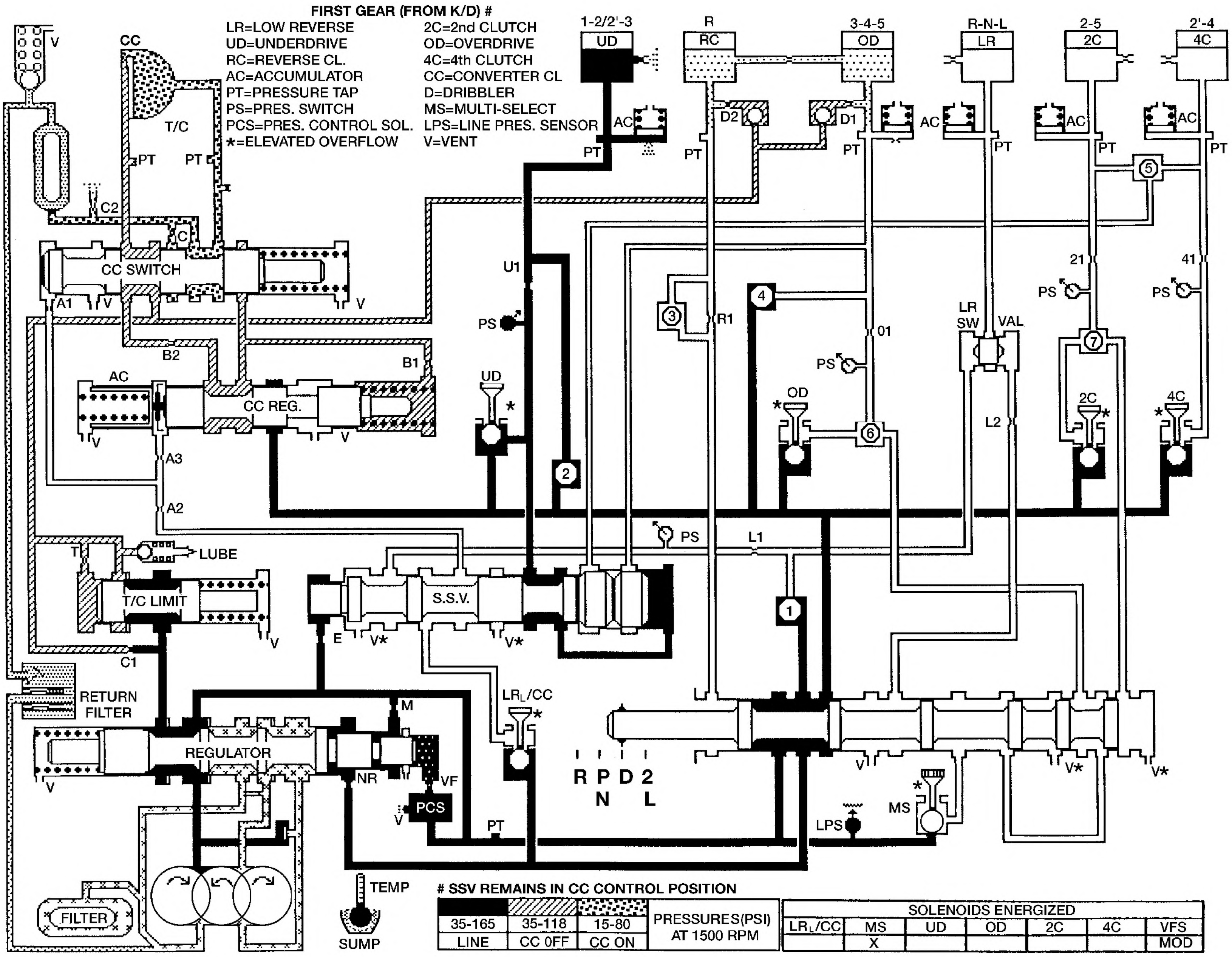
SSV IN LR POSTION ; LR VENTED VIA LR/CC SOL.

■	▨	▒	PRESSURES(PSI) AT 1500 RPM
35-165	35-118	15-80	
LINE	CC OFF	CC ON	

SOLENOIDS ENERGIZED						
LR_L/CC	MS	UD	OD	2C	4C	VFS
	X					MOD

1-2/2'-3
R
3-4-5
R-N-L
2-5
2'-4
UD
RC
OD
LR
2C
4C
CC
T/C
PT
PT
AC
D2
D1
AC
AC
AC
PT
PT
PT
PT
PT
PT
V
COOLER
C2
C
CC SWITCH
A1
V
V
U1
PS
21
41
PS
PS
5
3
R1
4
01
PS
LR
SW
VAL
7
AC
B2
B1
CC REG.
V
V
UD
∗
2
OD
6
L2
2C
4C
A3
A2
PS
L1
T
LUBE
T/C LIMIT
V
S.S.V.
1
E
V∗
V∗
C1
RETURN
FILTER
LR_L/CC
M
REGULATOR
V
NR
VF
PCS
V
PT
R P D 2
N L
V
V∗
V∗
MS
LPS
FILTER
TEMP
SUMP
80a0e087

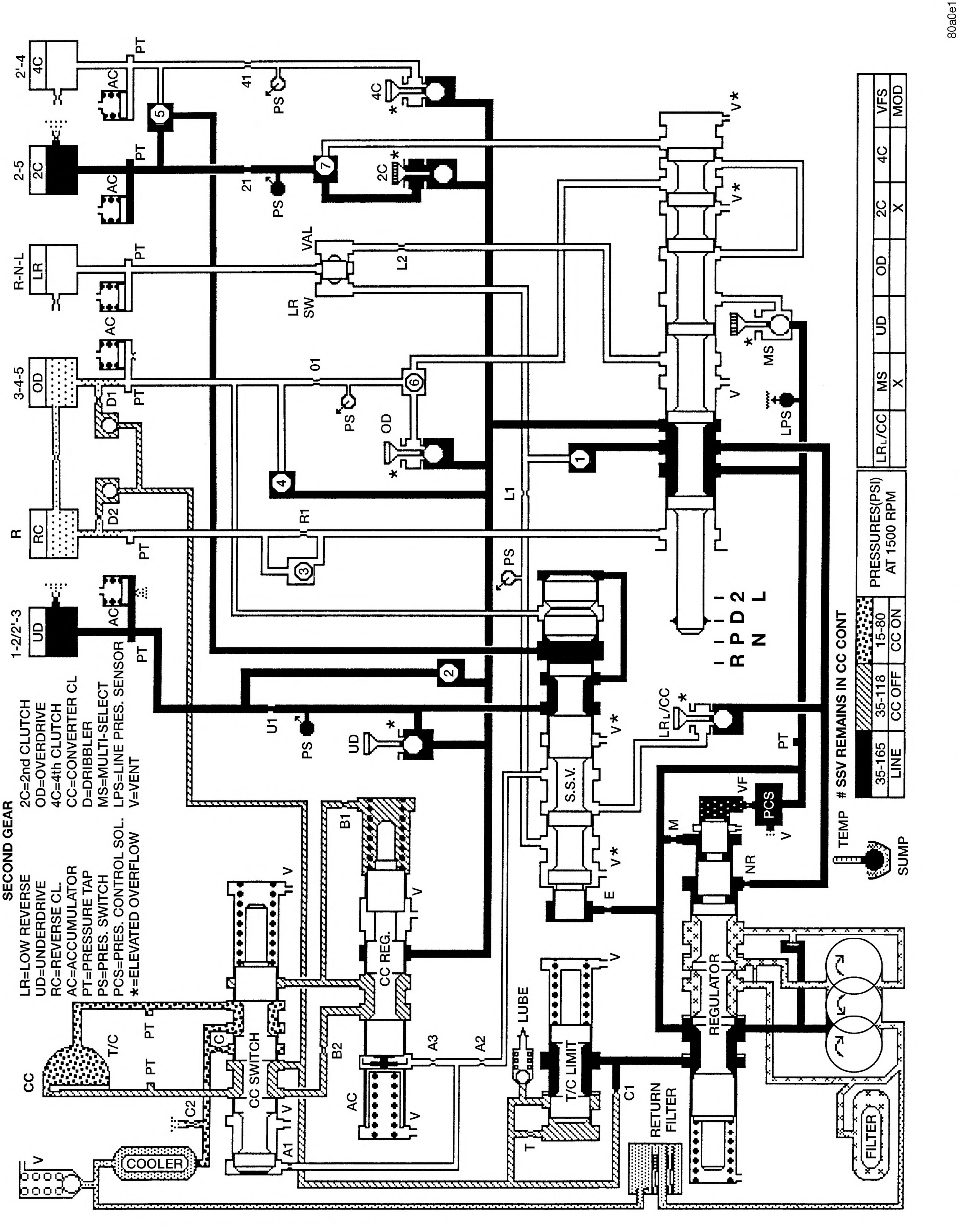
HYDRAULIC FLOW IN FIRST GEAR (AFTER LAUNCH FROM REST)


FIRST GEAR (FROM K/D) #
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
CC
T/C
PT
C2
C
CC SWITCH
A1
V
AC
B2
B1
CC REG.
A3
A2
T
LUBE
T/C LIMIT
C1
RETURN FILTER
REGULATOR
NR
M
VF
PCS
FILTER
TEMP
SUMP
U1
PS
UD
D2
D1
R1
01
L1
L2
LR SW
VAL
21
41
S.S.V.
E
V*
LR_L/CC
R P D 2
N L
LPS
MS
1
2
3
4
5
6
7
# SSV REMAINS IN CC CONTROL POSITION
35-165 LINE
35-118 CC 0FF
15-80 CC ON
PRESSURES(PSI) AT 1500 RPM

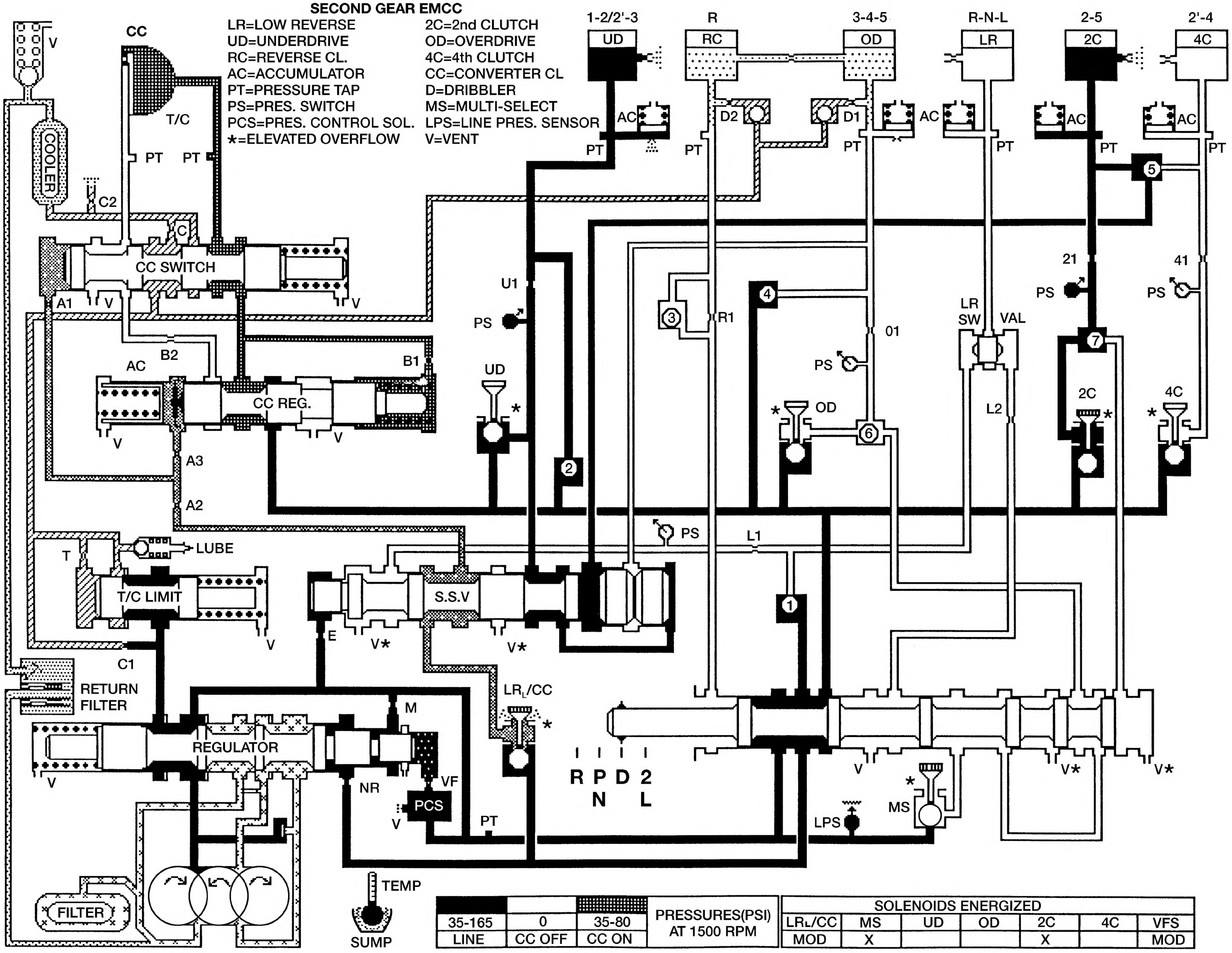
SOLENOIDS ENERGIZED						
LR_L/CC	MS	UD	OD	2C	4C	VFS
	X					MOD

80a0e0b7

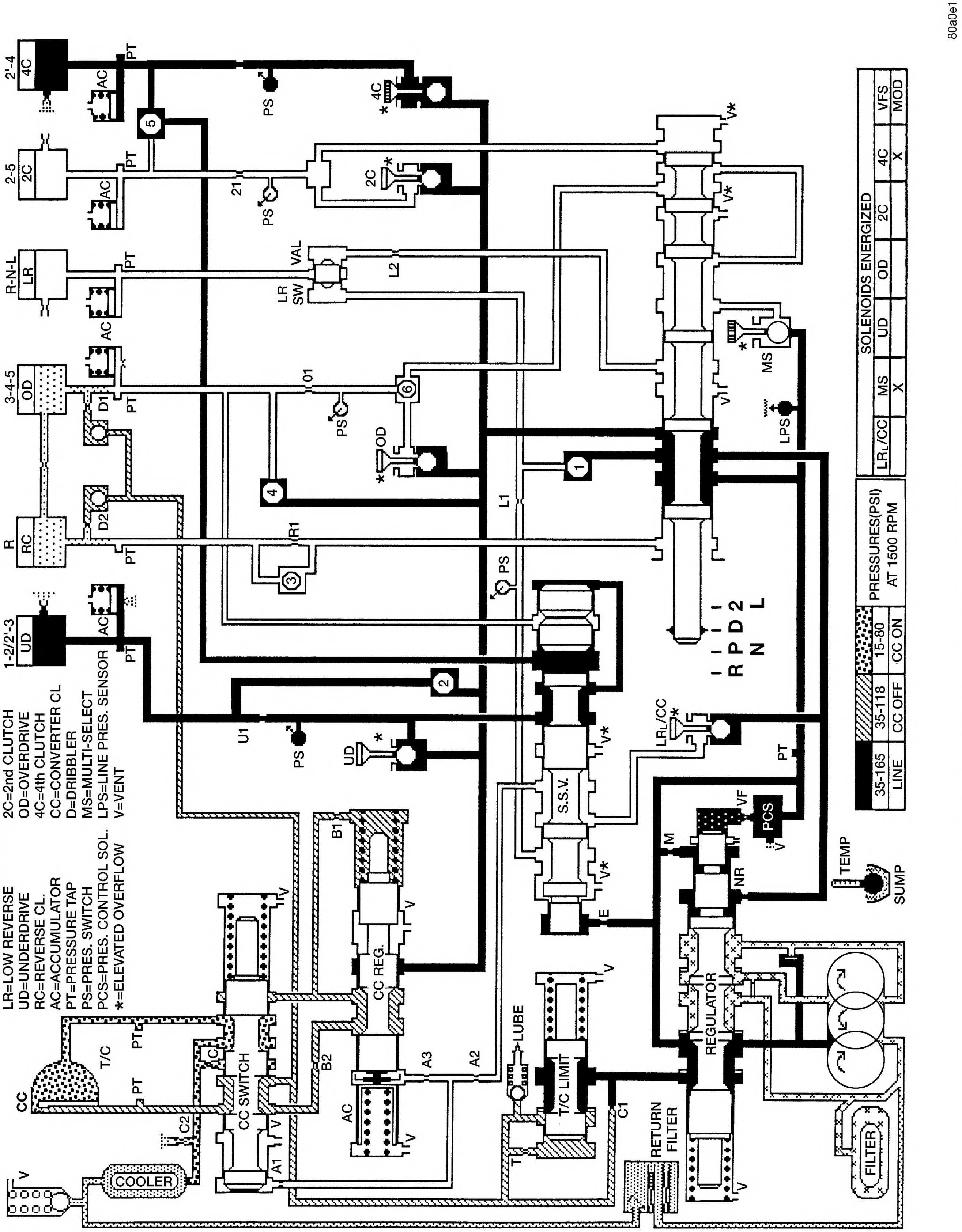
HYDRAULIC FLOW IN FIRST GEAR (FROM K/D)


80a0e167
SECOND GEAR
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
✱=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
U1
R1
01
L1
L2
21
41
PS
VAL
LR SW
S.S.V.
LR/CC
MS
LPS
PCS
VF
M
NR
E
V✱
R P D 2 N L
CC
T/C
CC SWITCH
CC REG.
B1
B2
A1
A2
A3
C1
C2
COOLER
LUBE
T/C LIMIT
T
RETURN FILTER
REGULATOR
FILTER
TEMP
SUMP
# SSV REMAINS IN CC CONT
35-165 LINE
35-118 CC OFF
15-80 CC ON
PRESSURES(PSI) AT 1500 RPM
LR/CC MS UD OD 2C 4C VFS
X X MOD

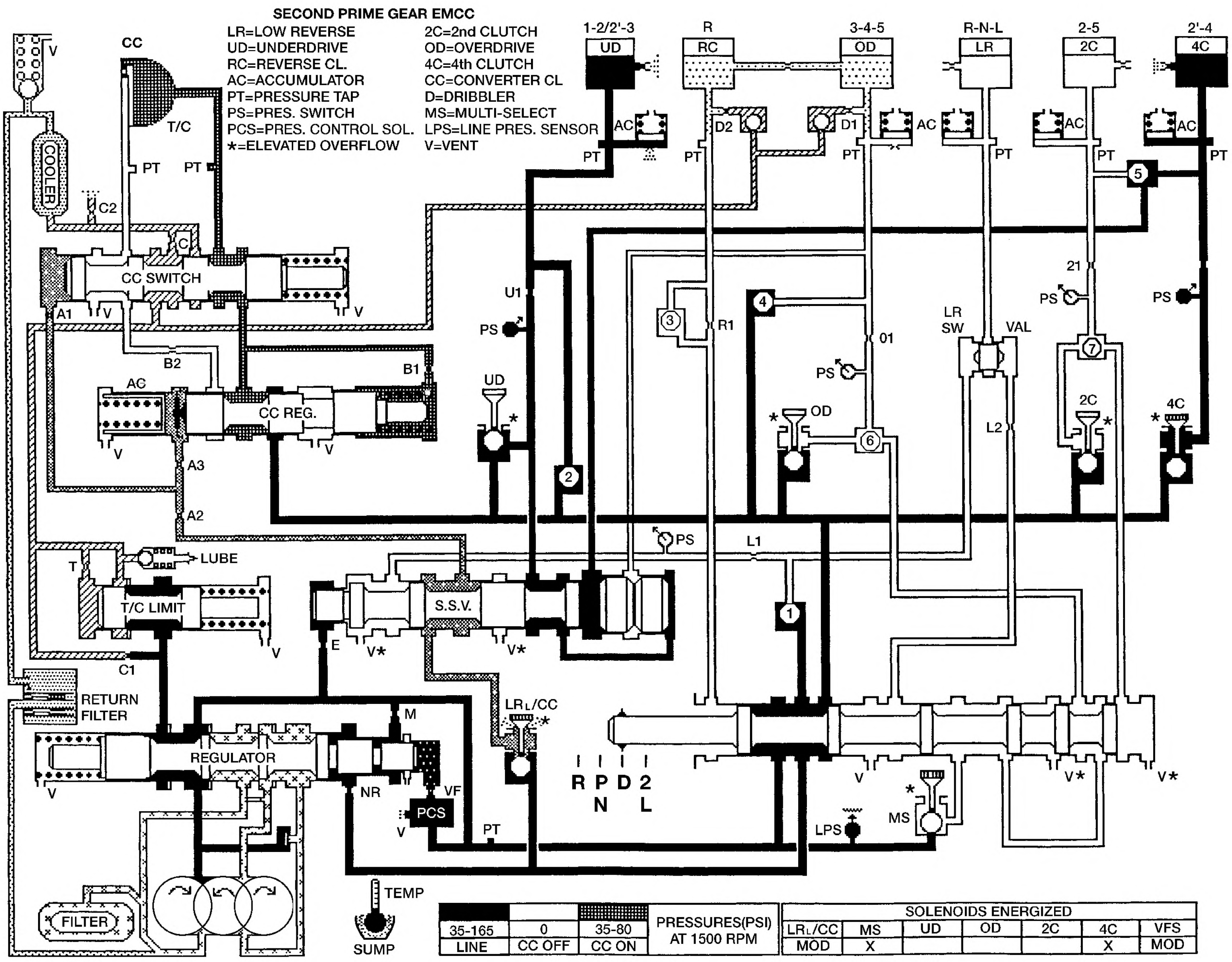
HYDRAULIC FLOW IN SECOND GEAR


SECOND GEAR EMCC
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
CC
T/C
PT
COOLER
C2
C
CC SWITCH
A1
V
AC
B2
B1
CC REG.
A3
A2
LUBE
T
T/C LIMIT
C1
RETURN FILTER
REGULATOR
FILTER
E
V*
S.S.V
M
NR
VF
PCS
LR_L/CC
TEMP
SUMP
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
D2
D1
U1
PS
21
41
R1
01
LR SW
VAL
L2
L1
1
2
3
4
5
6
7
R P D 2
N L
MS
LPS
35-165
LINE
0
CC OFF
35-80
CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LR_L/CC
MS
UD
OD
2C
4C
VFS
MOD
X
X
MOD
80a0e1cb

HYDRAULIC FLOW IN SECOND GEAR EMCC


80a0e1ed
SECOND PRIME GEAR
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
∗=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
PS
U1
R1
01
L1
L2
21
LR SW
VAL
UD
OD
2C
4C
S.S.V.
LR_L/CC
MS
LPS
R P D 2
N L
PCS
VF
M
NR
E
TEMP
SUMP
REGULATOR
FILTER
RETURN FILTER
T/C LIMIT
LUBE
C1
T
CC REG.
CC SWITCH
B1
B2
A1
A2
A3
C2
CC
T/C
COOLER
SOLENOIDS ENERGIZED
LR_L/CC | MS | UD | OD | 2C | 4C | VFS MOD
X | X
PRESSURES(PSI) AT 1500 RPM
35-165 LINE
35-118 CC OFF
15-80 CC ON

HYDRAULIC FLOW IN SECOND PRIME GEAR

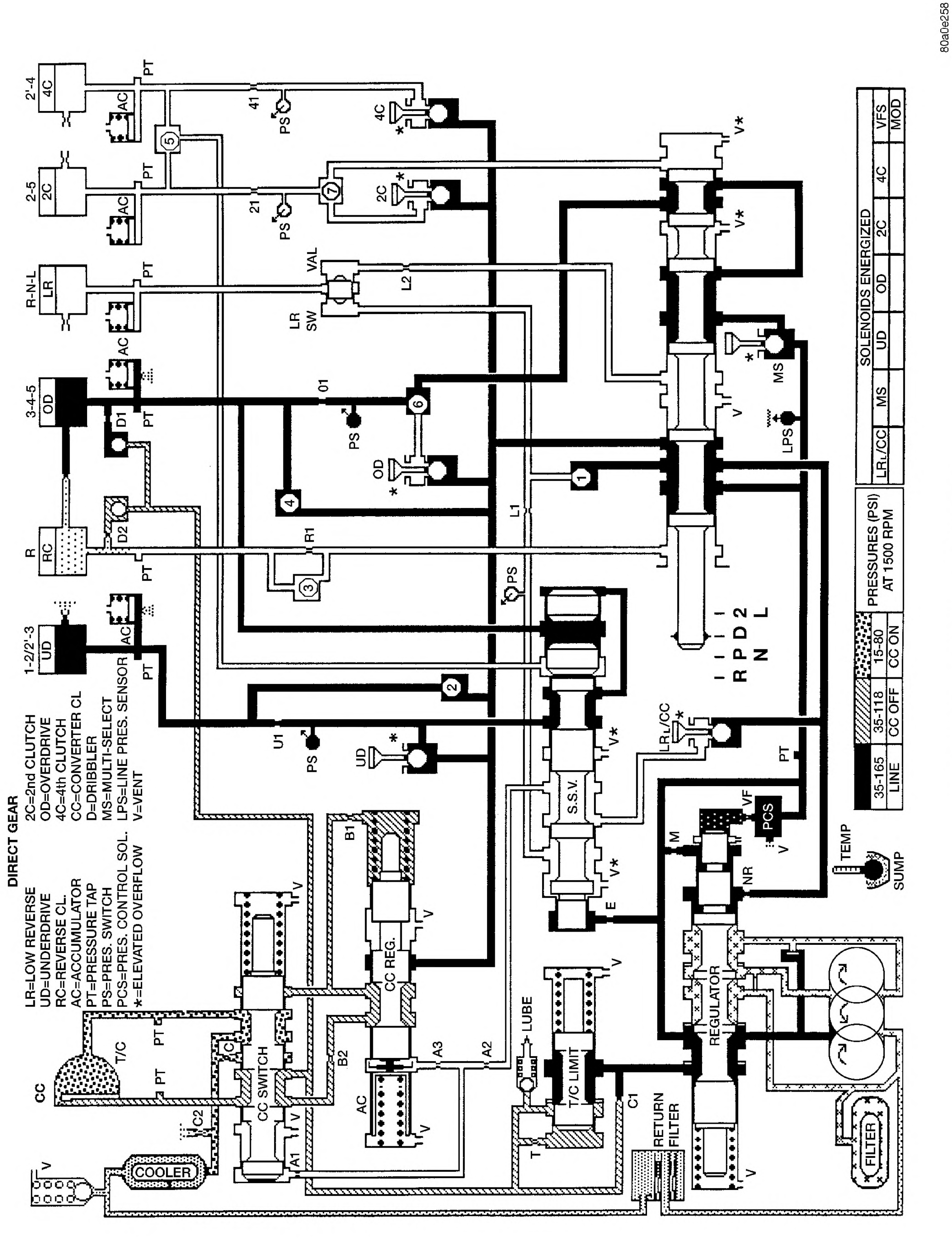

SECOND PRIME GEAR EMCC
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
CC
T/C
C2
C
COOLER
CC SWITCH
A1
V
B1
B2
AC
CC REG.
A3
A2
LUBE
T
T/C LIMIT
C1
RETURN FILTER
REGULATOR
FILTER
M
NR
VF
PCS
E
S.S.V.
V*
U1
PS
UD
LRL/CC
R1
01
L1
L2
LR SW
VAL
21
OD
2C
4C
5
4
3
2
1
6
7
R P D 2
N L
LPS
MS
TEMP
SUMP

			PRESSURES(PSI) AT 1500 RPM
35-165	0	35-80	
LINE	CC OFF	CC ON	

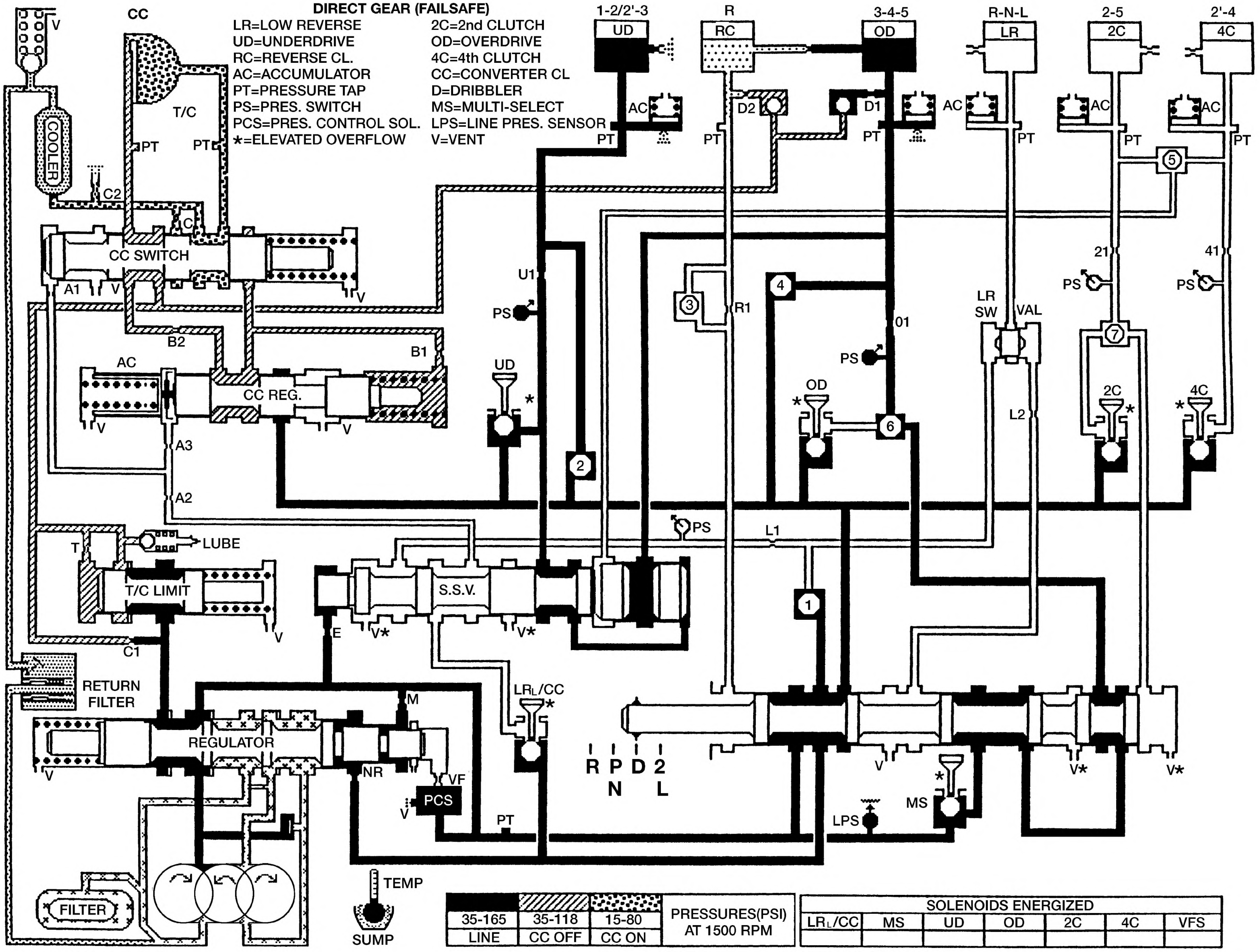
SOLENOIDS ENERGIZED						
LRL/CC	MS	UD	OD	2C	4C	VFS
MOD	X				X	MOD

80a0e238

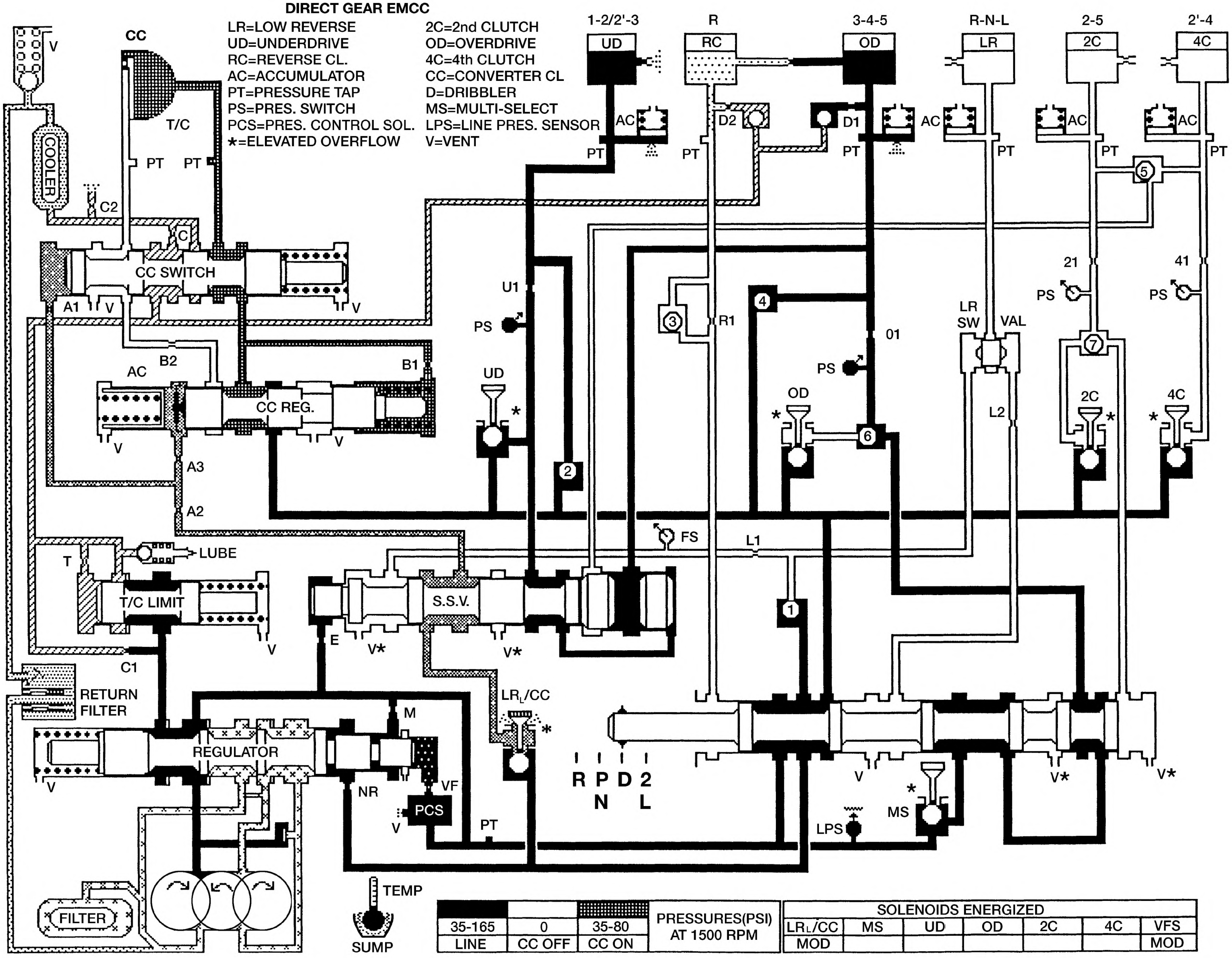
HYDRAULIC FLOW IN SECOND PRIME GEAR EMCC


80a0e258
DIRECT GEAR
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
CC
T/C
PT
PT
C
C2
V
COOLER
CC SWITCH
V
V
A1
B2
AC
CC REG.
B1
A3
A2
LUBE
T/C LIMIT
T
V
C1
RETURN FILTER
REGULATOR
FILTER
V
E
S.S.V.
V*
V*
UD
PS
U1
LR/CC
PT
M
NR
VF
PCS
V
TEMP
SUMP
1-2/2'-3
UD
AC
PT
R
RC
D2
PT
3-4-5
OD
D1
PT
AC
R-N-L
LR
PT
2-5
2C
AC
PT
2'-4
4C
AC
PT
5
7
21
41
PS
PS
4C
2C
*
*
LR SW
VAL
L2
01
PS
6
OD
4
R1
3
L1
PS
2
1
MS
LPS
V
V*
V*
R P D 2
N L
PRESSURES (PSI) AT 1500 RPM
35-165 LINE
35-118 CC OFF
15-80 CC ON
SOLENOIDS ENERGIZED
LR/CC
MS
UD
OD
2C
4C
VFS MOD

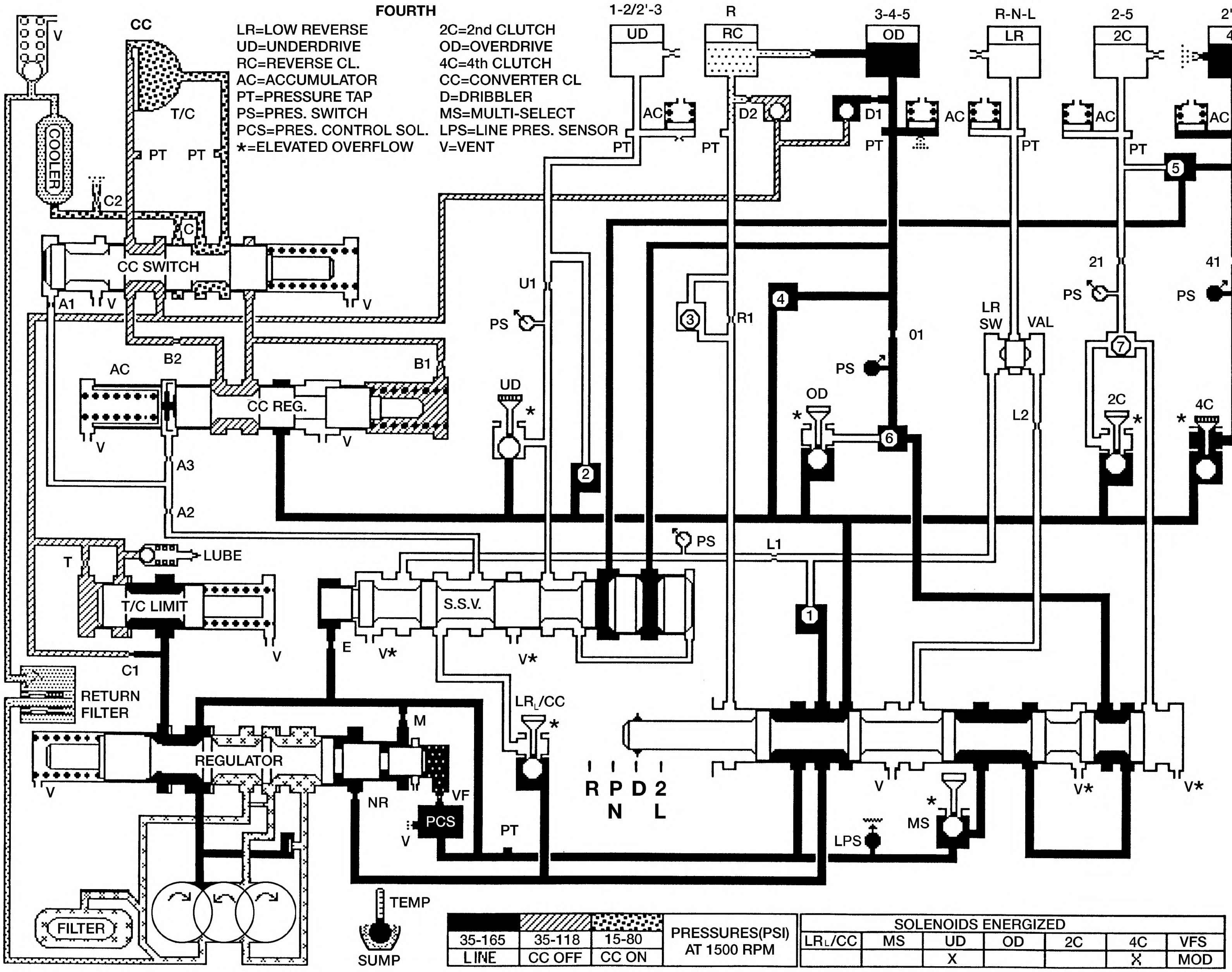
HYDRAULIC FLOW IN DIRECT GEAR


DIRECT GEAR (FAILSAFE)
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
CC
T/C
PT
COOLER
C2
C
CC SWITCH
A1
V
B2
B1
AC
CC REG.
A3
A2
LUBE
T
T/C LIMIT
C1
RETURN FILTER
REGULATOR
NR
M
VF
PCS
FILTER
TEMP
SUMP
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
D2
D1
U1
R1
01
L1
L2
21
41
LR SW
VAL
S.S.V.
E
V*
LRL/CC
LPS
MS
R P D 2
N L
1
2
3
4
5
6
7
35-165
LINE
35-118
CC OFF
15-80
CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC
MS
UD
OD
2C
4C
VFS
80a0e26d

HYDRAULIC FLOW IN DIRECT GEAR (FAILSAFE)


DIRECT GEAR EMCC
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
R
3-4-5
R-N-L
2-5
2'-4
UD
RC
OD
LR
2C
4C
AC
D2
D1
PT
CC
T/C
COOLER
C2
C
CC SWITCH
A1
V
B2
B1
AC
CC REG.
A3
A2
U1
PS
UD
2
R1
3
4
01
OD
6
LR
SW
VAL
L2
21
41
7
5
FS
L1
1
LUBE
T
T/C LIMIT
S.S.V.
E
V*
C1
RETURN
FILTER
REGULATOR
M
NR
VF
PCS
LR_L/CC
R P D 2
N L
MS
LPS
FILTER
TEMP
SUMP
35-165
LINE
0
CC OFF
35-80
CC ON
PRESSURES(PSI)
AT 1500 RPM
SOLENOIDS ENERGIZED
LR_L/CC
MS
UD
OD
2C
4C
VFS
MOD
MOD
80a0e328

HYDRAULIC FLOW IN DIRECT GEAR EMCC

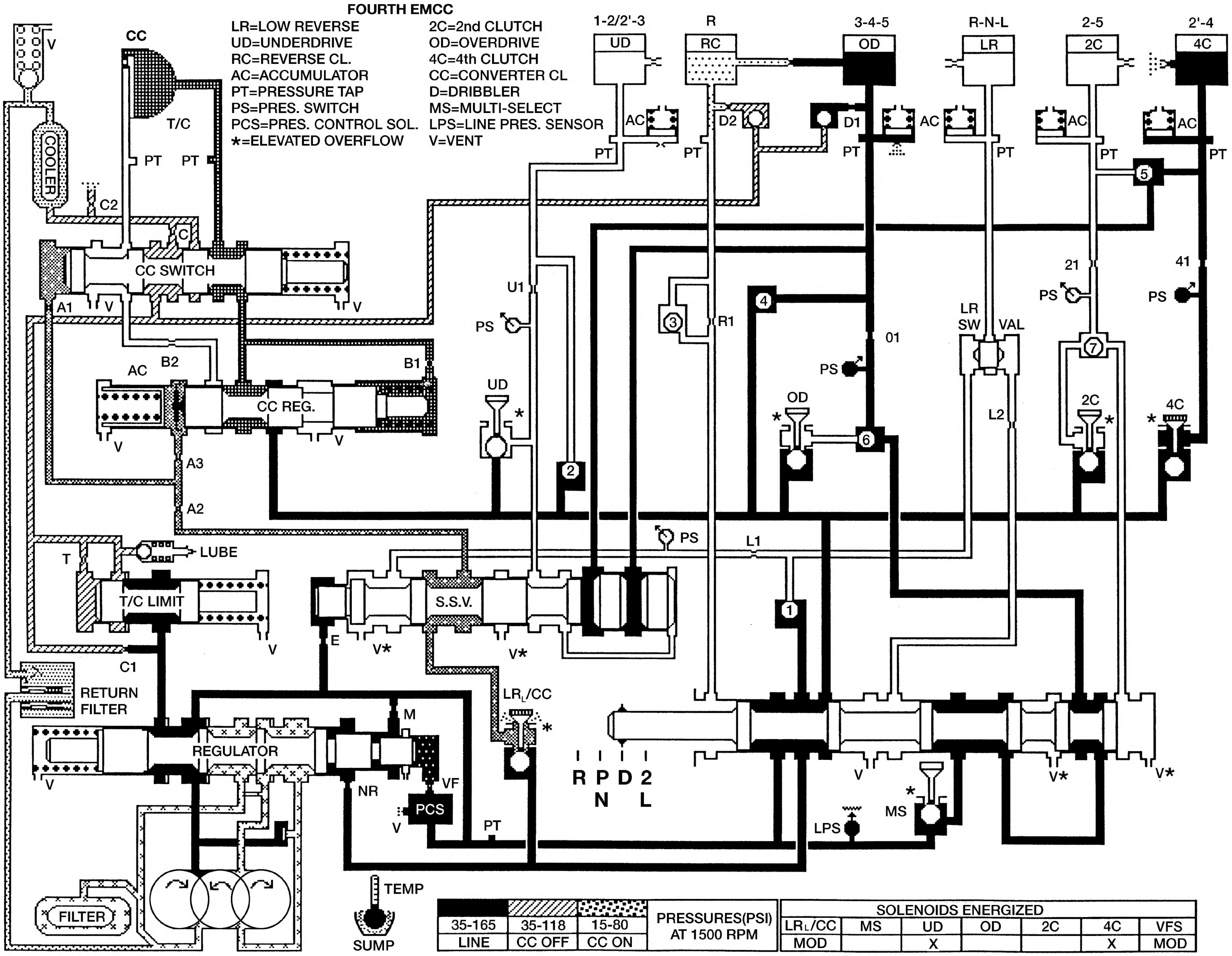

FOURTH
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
CC
T/C
PT
COOLER
C2
C
CC SWITCH
A1
V
AC
B2
B1
CC REG.
A3
A2
LUBE
T
T/C LIMIT
C1
RETURN FILTER
REGULATOR
FILTER
TEMP
SUMP
M
NR
VF
PCS
E
S.S.V.
V*
LR_L/CC
1-2/2'-3
UD
R
RC
D2
3-4-5
OD
D1
R-N-L
LR
2-5
2C
2'-4
4C
U1
PS
R1
01
21
41
LR SW
VAL
L1
L2
1
2
3
4
5
6
7
LPS
MS
R P D 2
N L

35-165	35-118	15-80	PRESSURES(PSI) AT 1500 RPM
LINE	CC OFF	CC ON	

SOLENOIDS ENERGIZED						
LR_L/CC	MS	UD	OD	2C	4C	VFS
		X			X	MOD

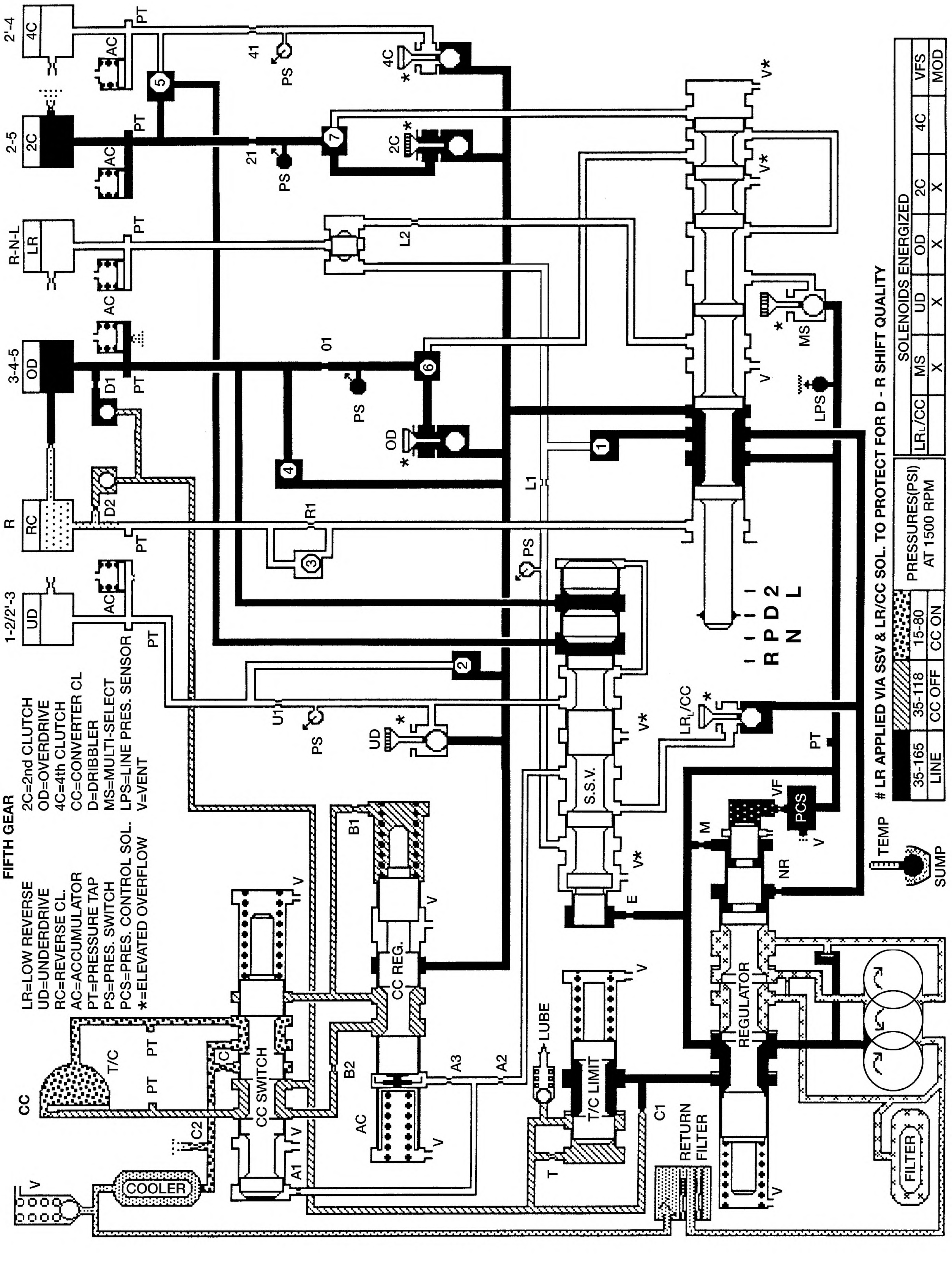
80a0e373

HYDRAULIC FLOW IN FOURTH


FOURTH EMCC
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
D2
D1
PT
CC
T/C
C
C2
COOLER
CC SWITCH
A1
V
U1
PS
21
41
R1
01
LR SW
VAL
L2
AC
B2
B1
CC REG.
A3
A2
UD
OD
2C
4C
*
LUBE
T
T/C LIMIT
S.S.V.
E
V*
L1
C1
RETURN FILTER
REGULATOR
M
NR
VF
PCS
LR$_L$/CC
R P D 2
N L
MS
LPS
TEMP
SUMP
FILTER
1
2
3
4
5
6
7
35-165 LINE
35-118 CC OFF
15-80 CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC MOD
MS
UD X
OD
2C
4C X
VFS MOD

80a0e384

HYDRAULIC FLOW IN FOURTH EMCC


FIFTH GEAR
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
∗=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
PS
R1
01
21
41
L1
L2
U1
UD
OD
2C
4C
MS
LPS
LR/CC
S.S.V.
PCS
VF
M
NR
E
REGULATOR
T/C LIMIT
LUBE
CC REG.
CC SWITCH
B1
B2
A1
A2
A3
C1
C2
T/C
CC
COOLER
RETURN FILTER
FILTER
TEMP
SUMP
T
R P D 2
N L
1 2 3 4 5 6 7
V
V∗

80a0e564

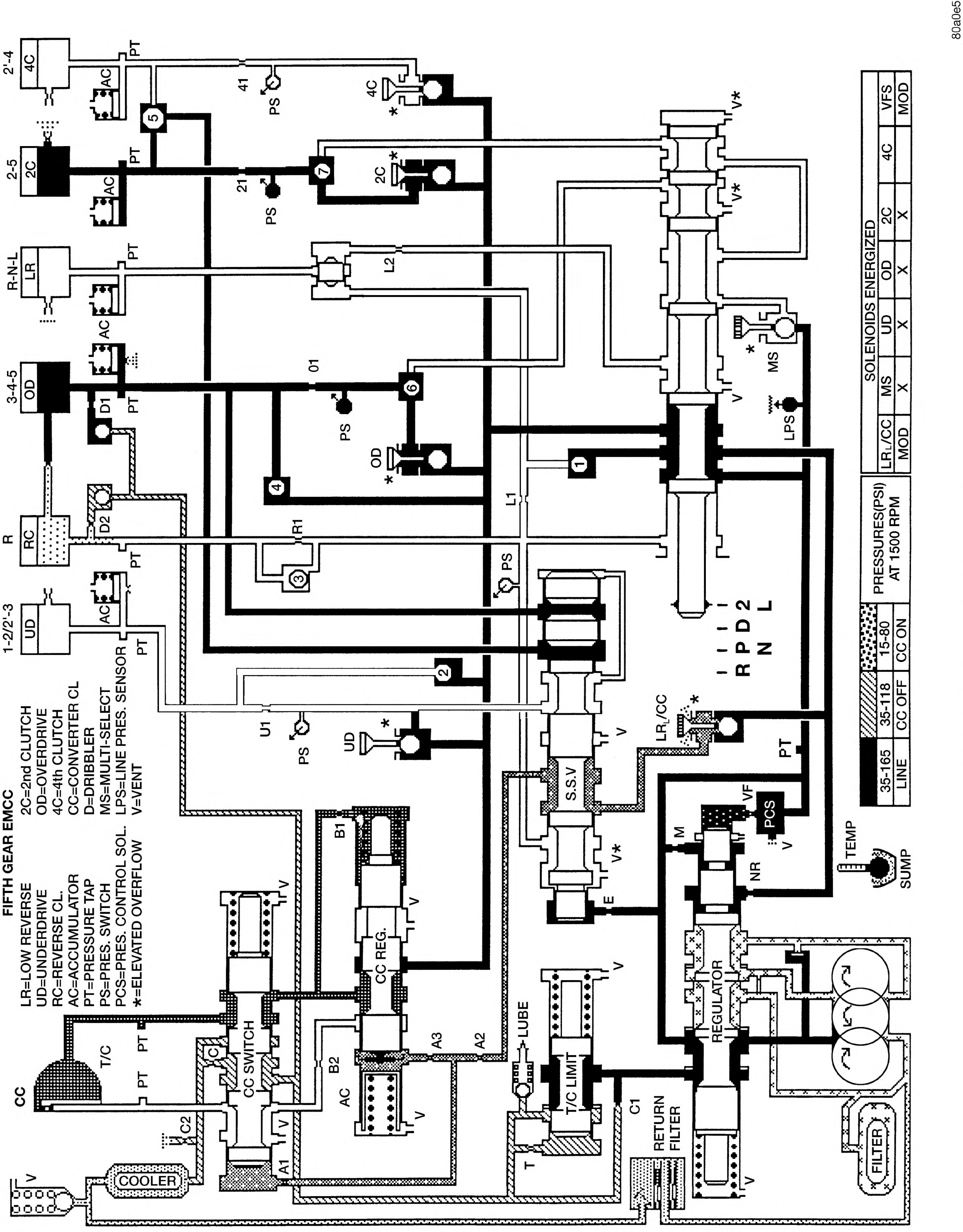
	LINE	CC OFF	CC ON
■	35-165	35-118	15-80

PRESSURES(PSI) AT 1500 RPM

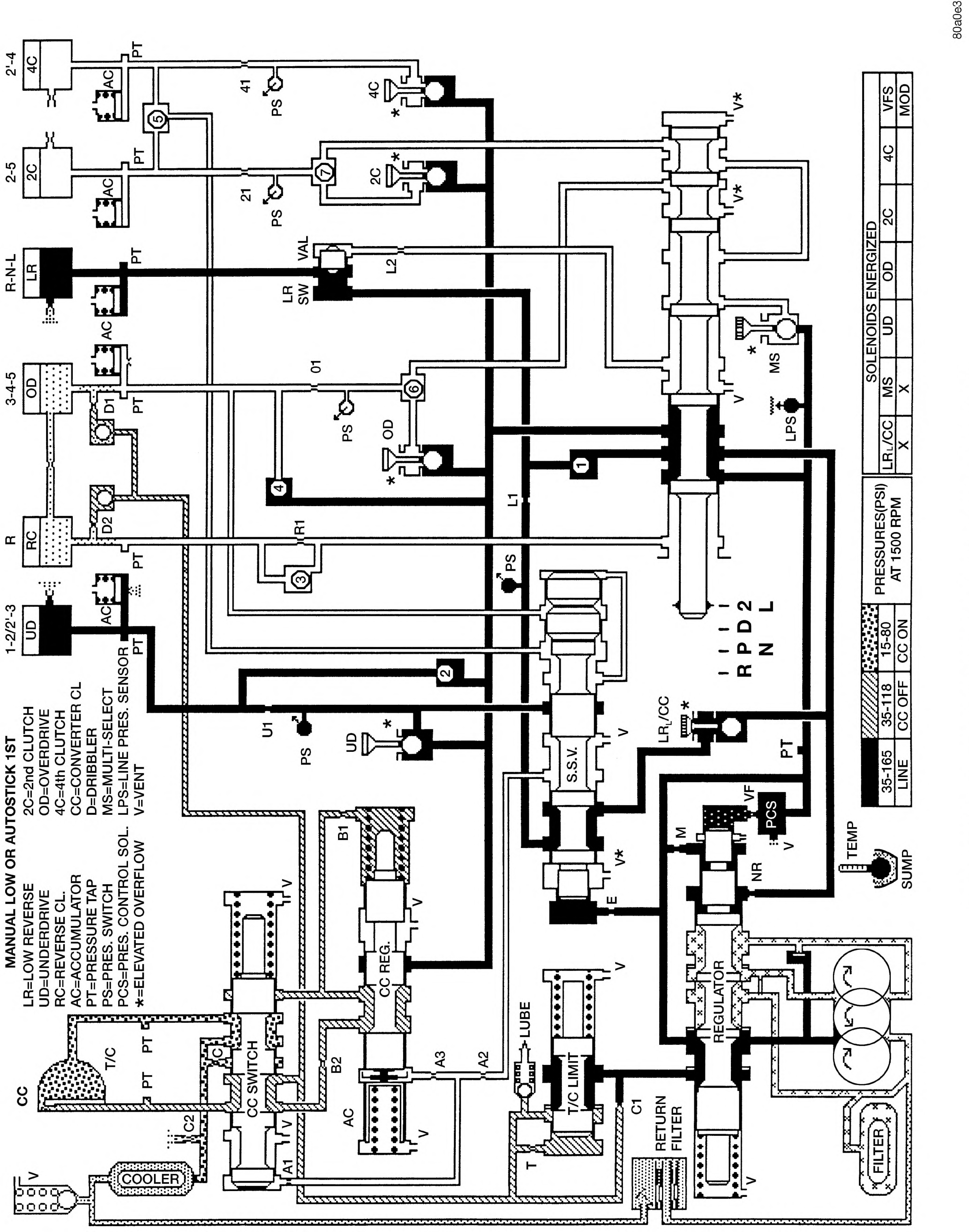
SOLENOIDS ENERGIZED						
LR/CC	MS	UD	OD	2C	4C	VFS
	X	X	X	X		MOD

LR APPLIED VIA SSV & LR/CC SOL. TO PROTECT FOR D - R SHIFT QUALITY

HYDRAULIC FLOW IN FIFTH

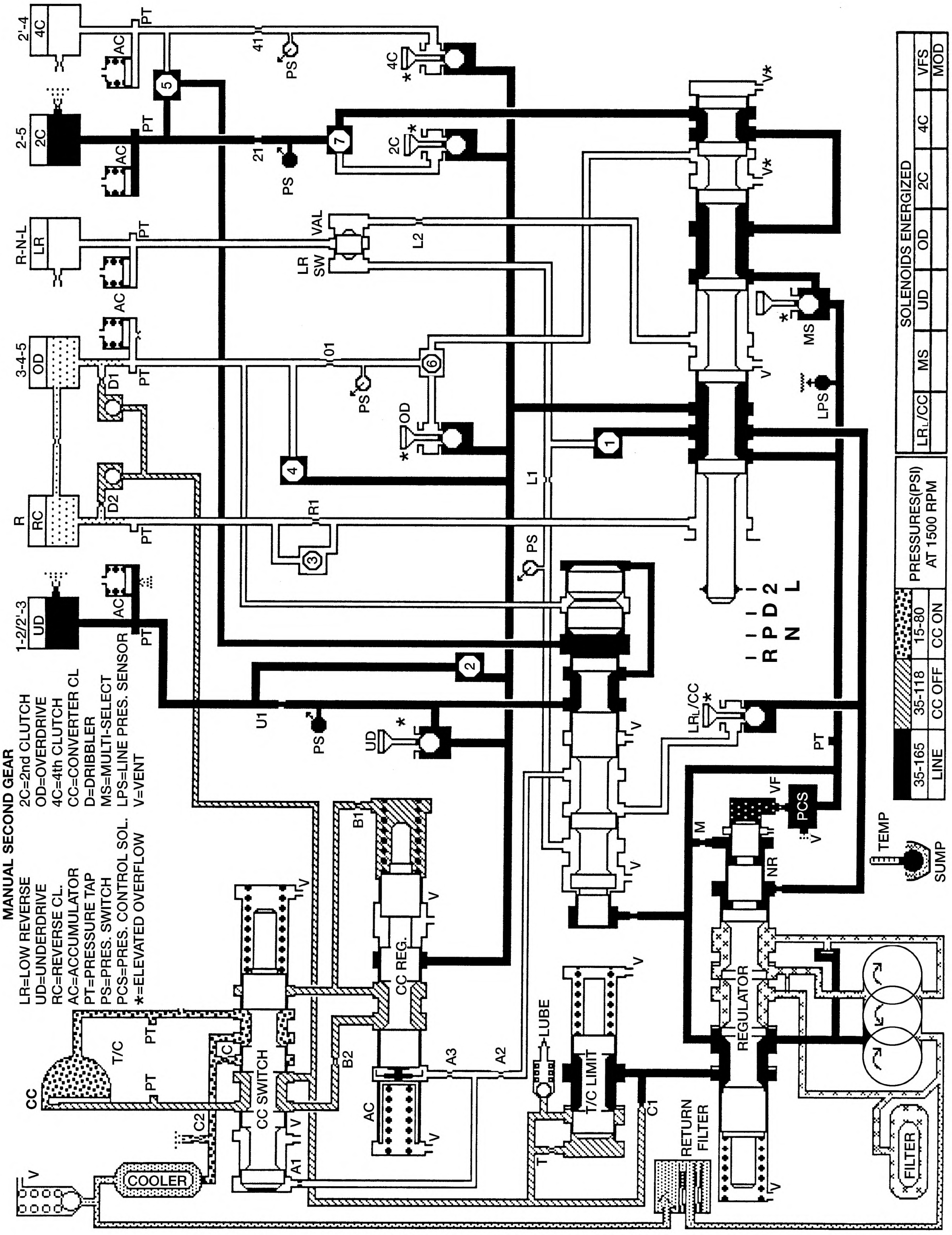

80a0e555
FIFTH GEAR EMCC
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESS. TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
PS
U1
R1
L1
L2
01
21
41
CC
T/C
C
C2
COOLER
CC SWITCH
A1
A2
A3
B1
B2
CC REG.
LUBE
T/C LIMIT
T
C1
RETURN FILTER
REGULATOR
FILTER
SUMP
TEMP
NR
M
E
S.S.V
PCS
VF
LRL/CC
MS
LPS
R P D 2
N L
35-165
LINE
35-118
CC OFF
15-80
CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC | MS | UD | OD | 2C | 4C | VFS
MOD | X | X | X | X | | MOD

HYDRAULIC FLOW IN FIFTH EMCC

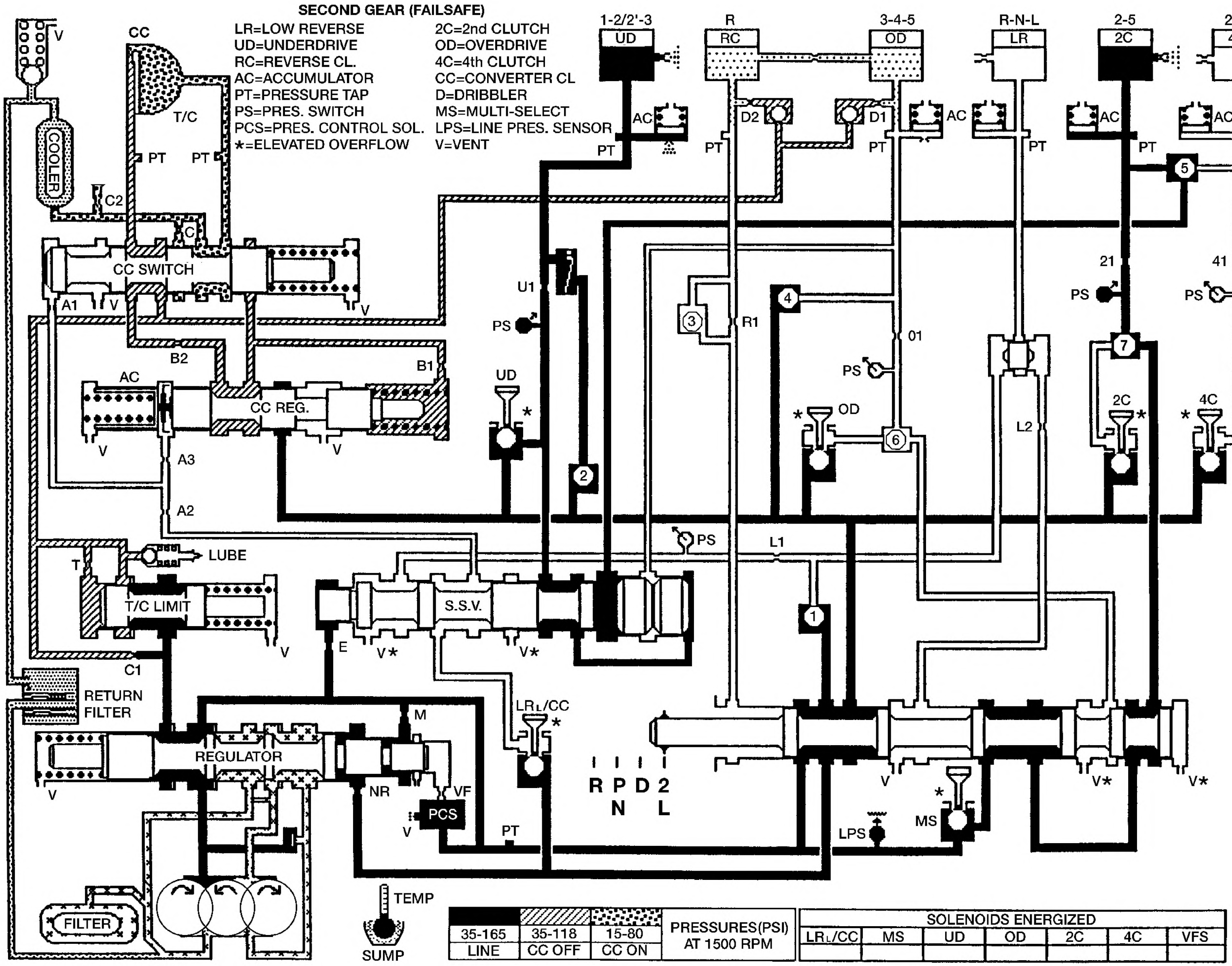

80a0e3c7
MANUAL LOW OR AUTOSTICK 1ST
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
∗=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
PS
U1
R1
01
21
41
L1
L2
LR SW
VAL
1
2
3
4
5
6
7
S.S.V.
R P D 2
N L
LR/CC
MS
LPS
PCS
VF
M
NR
E
REGULATOR
T/C LIMIT
LUBE
CC SWITCH
CC REG.
B1
B2
A1
A2
A3
AC
C1
C2
C
T/C
CC
COOLER
RETURN FILTER
FILTER
TEMP
SUMP
T
V
V∗
35-165 LINE
35-118 CC OFF
15-80 CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC X
MS X
UD
OD
2C
4C
VFS MOD

HYDRAULIC FLOW IN MANUAL LOW OR AUTOSTICK 1ST

80a0e484


MANUAL SECOND GEAR
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
∗=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
PT
D1
D2
R1
U1
L1
L2
01
21
41
PS
VAL
LR SW
R P D 2 N L
LRL/CC
MS
LPS
PCS
VF
M
NR
TEMP
SUMP
REGULATOR
FILTER
RETURN FILTER
T/C LIMIT
LUBE
C1
C2
CC SWITCH
CC REG.
AC
A1
A2
A3
B1
B2
T/C
CC
COOLER
35-165 LINE
35-118 CC OFF
15-80 CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC
MS
UD
OD
2C
4C
VFS MOD

HYDRAULIC FLOW IN MANUAL SECOND


SECOND GEAR (FAILSAFE)
LR=LOW REVERSE
UD=UNDERDRIVE
RC=REVERSE CL.
AC=ACCUMULATOR
PT=PRESSURE TAP
PS=PRES. SWITCH
PCS=PRES. CONTROL SOL.
*=ELEVATED OVERFLOW
2C=2nd CLUTCH
OD=OVERDRIVE
4C=4th CLUTCH
CC=CONVERTER CL
D=DRIBBLER
MS=MULTI-SELECT
LPS=LINE PRES. SENSOR
V=VENT
1-2/2'-3
UD
R
RC
3-4-5
OD
R-N-L
LR
2-5
2C
2'-4
4C
AC
D2
D1
PT
CC
T/C
C
C2
COOLER
CC SWITCH
A1
B2
B1
AC
CC REG.
A3
A2
U1
PS
UD
21
41
R1
01
L2
L1
1
2
3
4
5
6
7
OD
2C
4C
LUBE
T
T/C LIMIT
C1
RETURN FILTER
S.S.V.
E
V*
LRL/CC
M
REGULATOR
NR
VF
PCS
PT
R P D 2
N L
MS
LPS
FILTER
TEMP
SUMP
V
35-165
LINE
35-118
CC OFF
15-80
CC ON
PRESSURES(PSI) AT 1500 RPM
SOLENOIDS ENERGIZED
LRL/CC
MS
UD
OD
2C
4C
VFS
80a0e533

HYDRAULIC FLOW IN MANUAL SECOND (FAILSAFE)

SPECIFICATIONS

TRANSMISSION

GENERAL

Component	Metric	Inch
Output Shaft End Play	0.22-0.55 mm	0.009-0.021 in.
Input Shaft End Play	0.46-0.89 mm	0.018-0.035 in.
2C Clutch Pack Clearance	0.455-1.335 mm	0.018-0.053 in.
4C Clutch Pack Clearance	0.770-1.390 mm	0.030-0.055 in.
L/R Clutch Pack Clearance	1.00-1.74 mm	0.039-0.069 in.
OD Clutch Pack Clearance	1.103-1.856 mm	0.043-0.073 in.
UD Clutch Pack Clearance	0.84-1.54 mm	0.033-0.061 in.
Reverse Clutch Pack Clearance	0.81-1.24 mm	0.032-0.049 in.
Recommended fluid	Mopar® ATF +4	

GEAR RATIOS

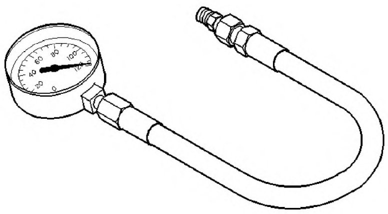
1ST	3.00:1
2ND	1.67:1
2ND Prime	1.50:1
3RD	1.0:1
4TH	0.75:1
5TH	0.67:1
REVERSE	3.00:1

TORQUE SPECIFICATIONS

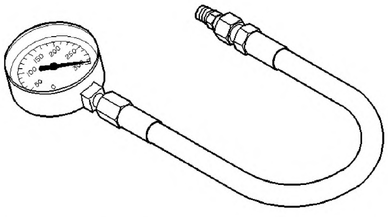
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fitting, cooler line at trans	17.5	-	155
Bolt, torque convertor	31	23	-
Bolt/nut, crossmember	68	50	-
Bolt, driveplate to crankshaft	75	55	-
Bolt, oil pan	11.8	-	105
Screw, primary fluid filter	4.5	-	40
Bolt, oil pump	28.2	-	250
Bolt, oil pump body to cover	4.5	-	40
Screw, plate to oil pump body	4.5	-	40
Bolt, valve body to case	11.8	-	105
Plug, pressure test port	5.1	-	45
Bolt, reaction shaft support	11.8	-	105
Screw, valve body to transfer plate	5.6	-	50
Screw, solenoid module to transfer plate	5.7	-	50
Screw, accumulator cover	7	-	60
Screw, detent spring	4.5	-	40
Bolt, input speed sensor	11.8	-	105
Bolt, output speed sensor	11.8	-	105
Bolt, line pressure sensor	11.8	-	105
Bolt, extension housing	54	40	-
Valve, cooler return filter bypass	4.5	-	40
Screw, manual valve cam retaining	4.5	-	40
Bolt, manual lever	28.2	-	250

SPECIAL TOOLS

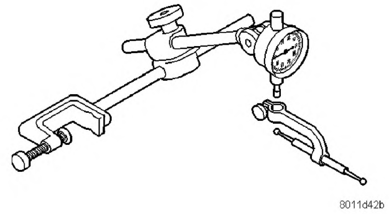
AUTOMATIC TRANSMISSION - RFE



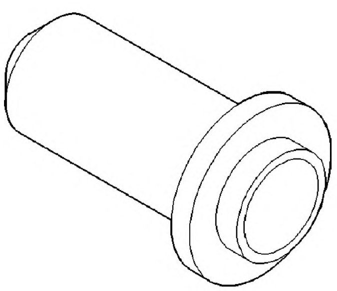
Gauge, Oil Pressure - C-3292



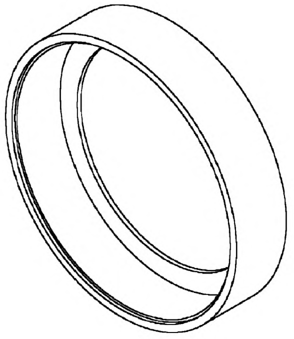
Gauge, Oil Pressure - C-3293SP



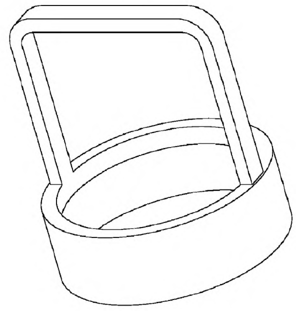
Dial Indicator - C-3339



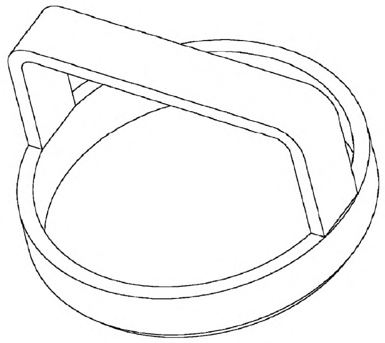
Installer, Seal - C-3860-A



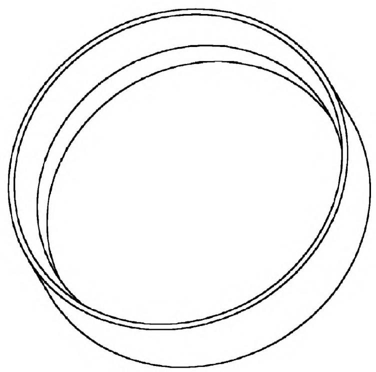
Compressor, Spring - 8249



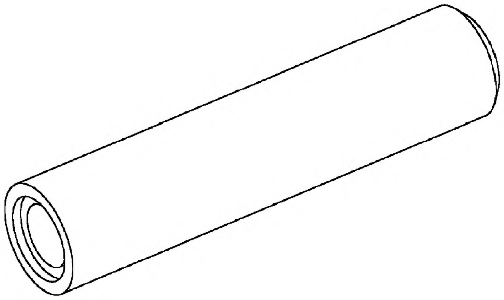
Compressor, Spring - 8250



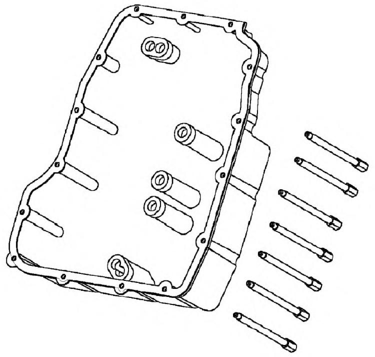
Compressor, Spring - 8251



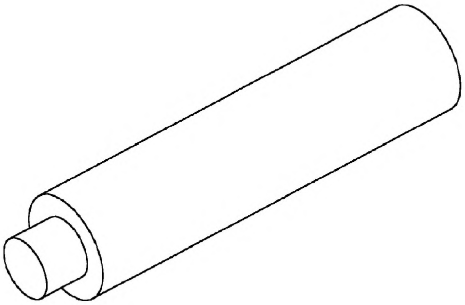
Installer, Piston - 8252



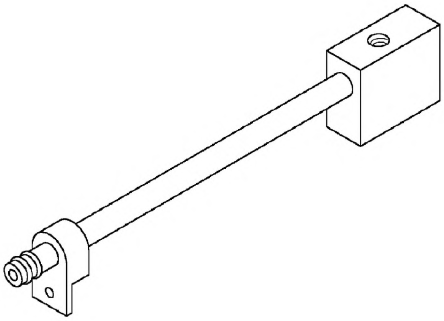
Installer, Seal - 8253



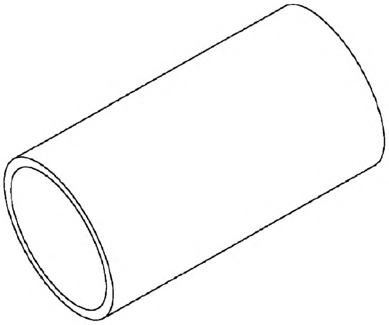
Adapter, Pressure Tap - 8258-A



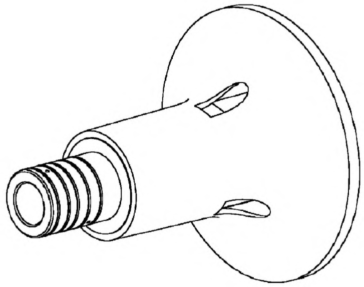
Installer, Seal - 8254



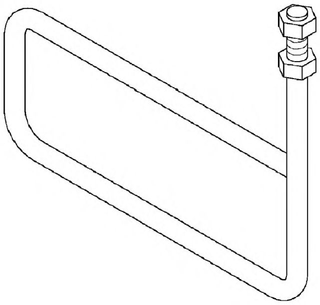
Adapter, Line Pressure - 8259



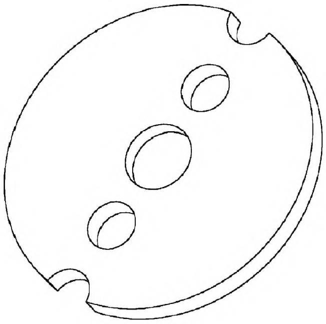
Installer, Snap-ring - 8255



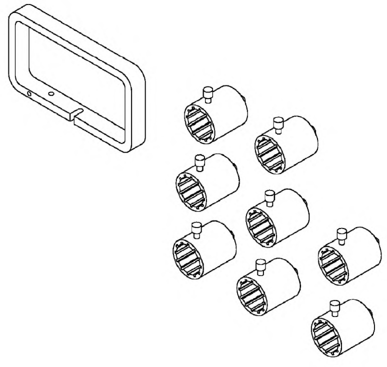
Fixture, Input Clutch Pressure - 8260



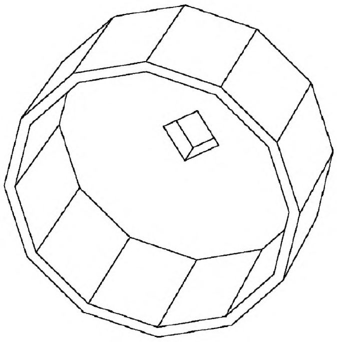
Stand, Support - 8257



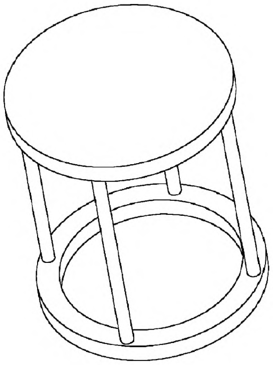
Plate, Alignment - 8261



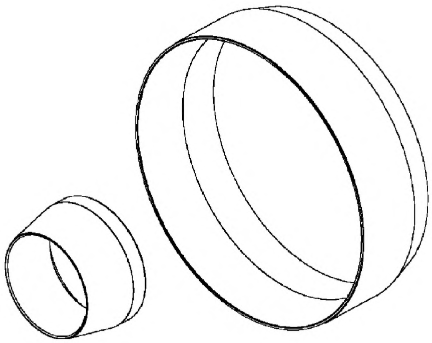
End Play Set - 8266



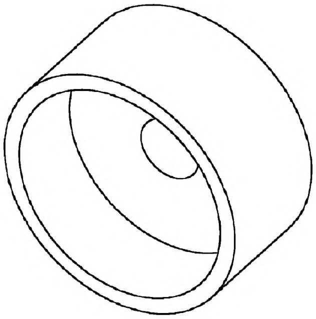
Wrench, Filter - 8321



Compressor, Spring - 8285



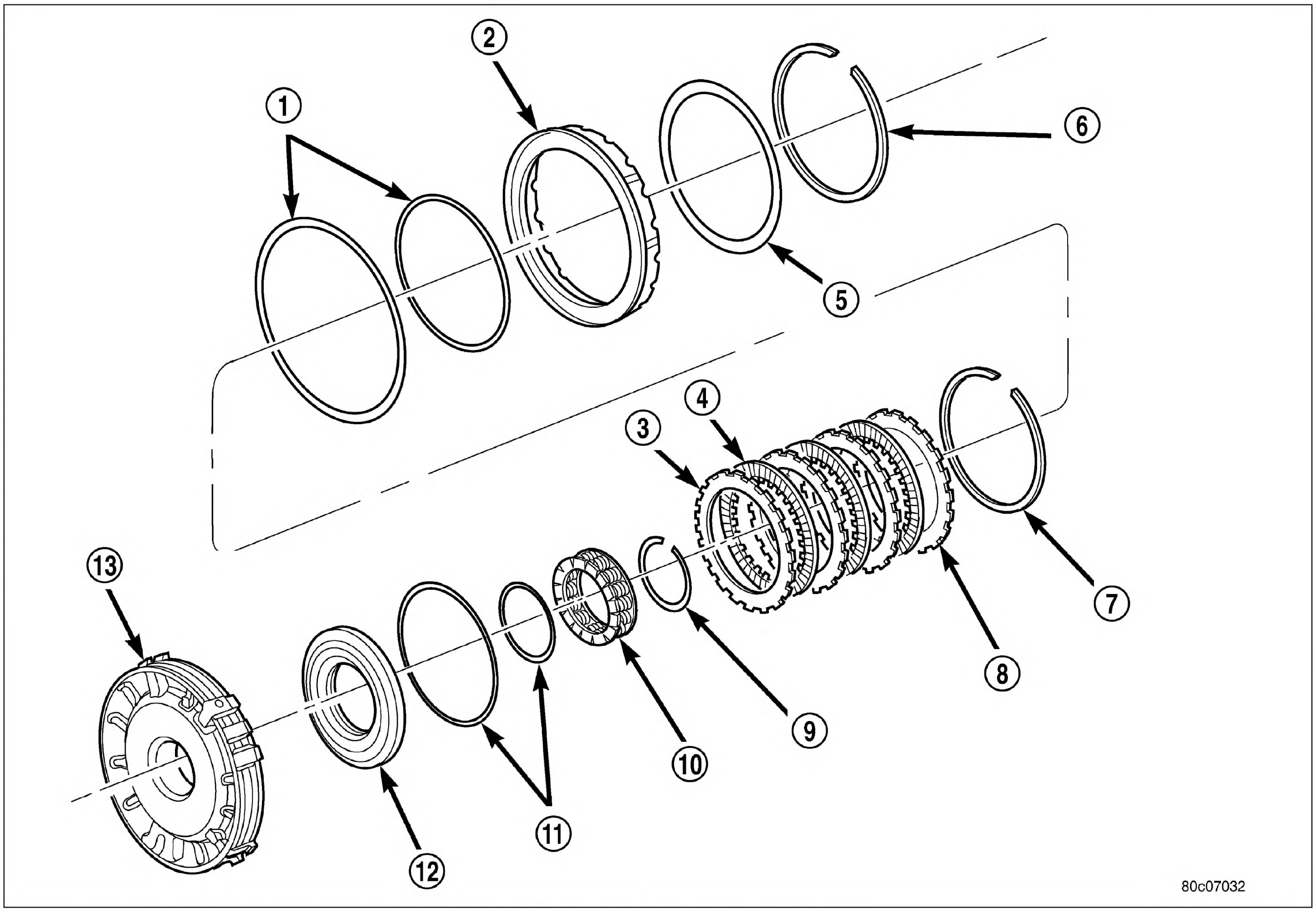
Installer, Piston - 8504



Installer, Bearing - 8320

RETAINER/BULKHEAD-4C

DISASSEMBLY

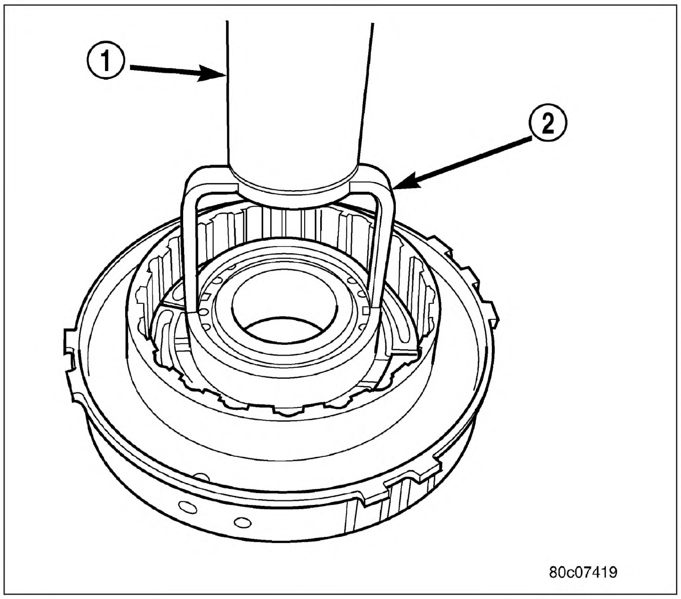


4C Retainer/Bulkhead Components

1 - SEAL
2 - 2C PISTON
3 - PLATE
4 - DISC
5 - 2C BELLEVILLE SPRING
6 - SNAP-RING
7 - SNAP-RING (SELECT)
8 - REACTION PLATE
9 - SNAP-RING
10 - RETURN SPRING
11 - SEAL
12 - 4C PISTON
13 - 4C RETAINER/BULKHEAD

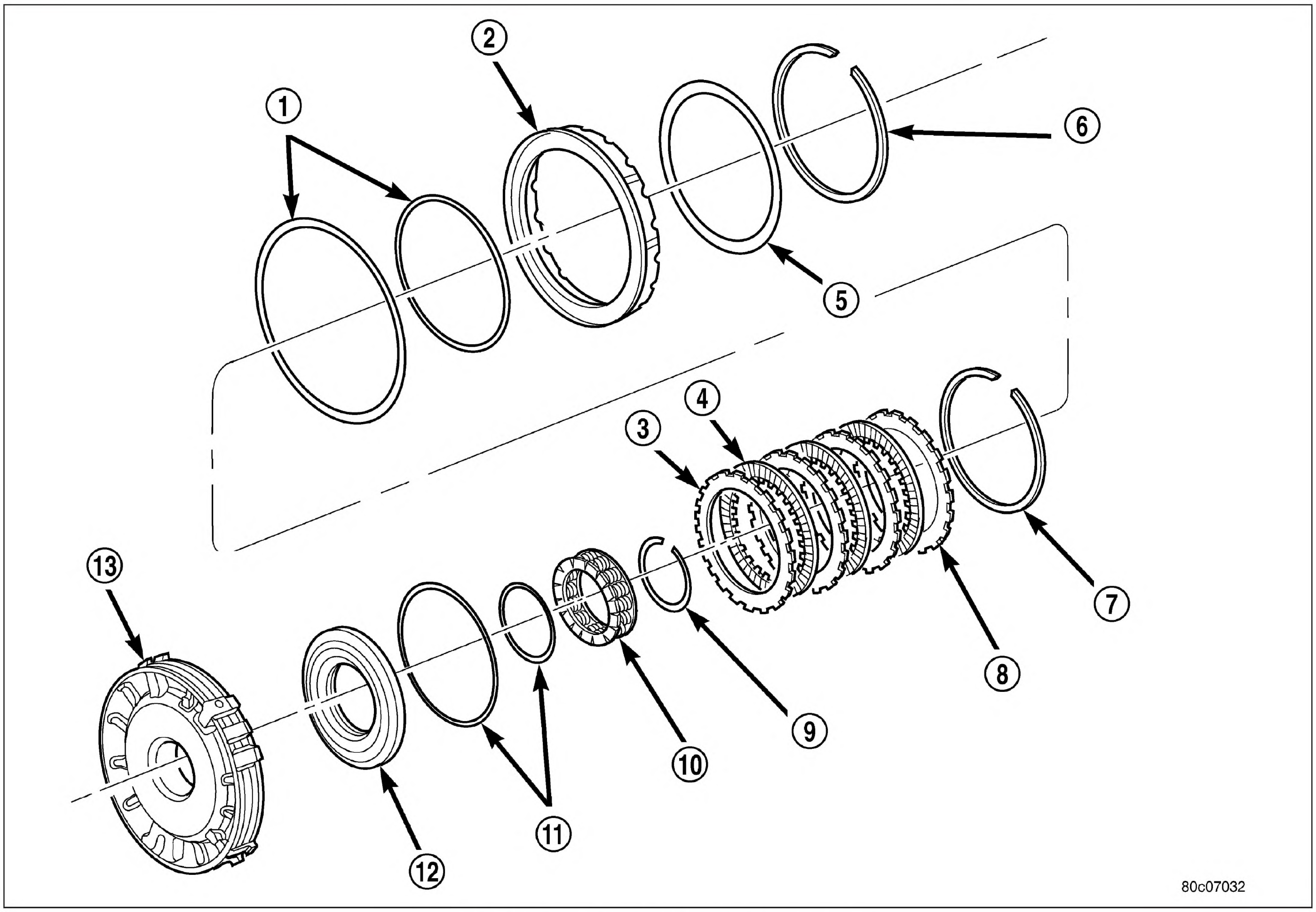
1. Remove the 2C piston Belleville spring snap-ring (6) from the 4C retainer /bulkhead (13).
2. Remove the 2C piston Belleville spring (5) from the retainer/bulkhead (13).
3. Remove the 2C piston (2) from the retainer/bulkhead (13). Use 20 psi of air pressure to remove the piston if necessary.
4. Remove the 4C clutch snap-ring (7) from the retainer/bulkhead (13).
5. Remove the 4C clutch pack (3, 4, 8) from the retainer/bulkhead (13).

6. Using Spring Compressor 8250 (2) and a suitable shop press (1), compress the 4C piston return spring (10) and remove the snap-ring (9).
7. Remove the 4C piston return spring (10) and piston (12) from the retainer/bulkhead (13). Use 20 psi of air pressure to remove the piston if necessary.



ASSEMBLY

NOTE: Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.

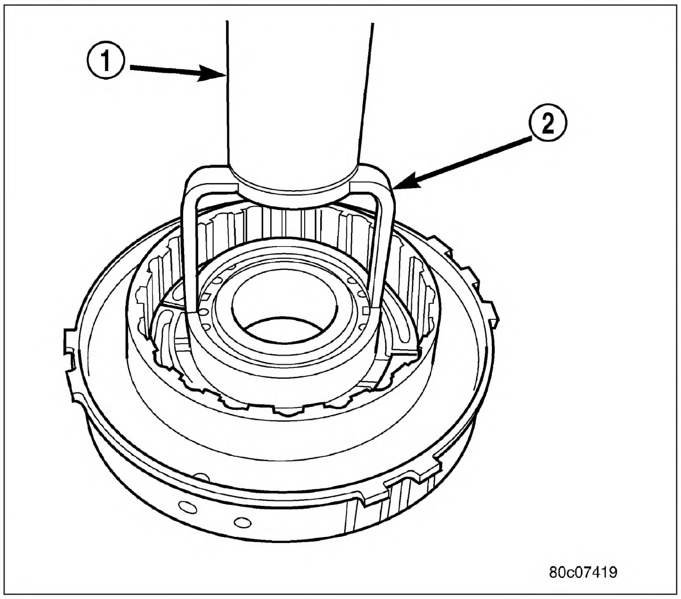


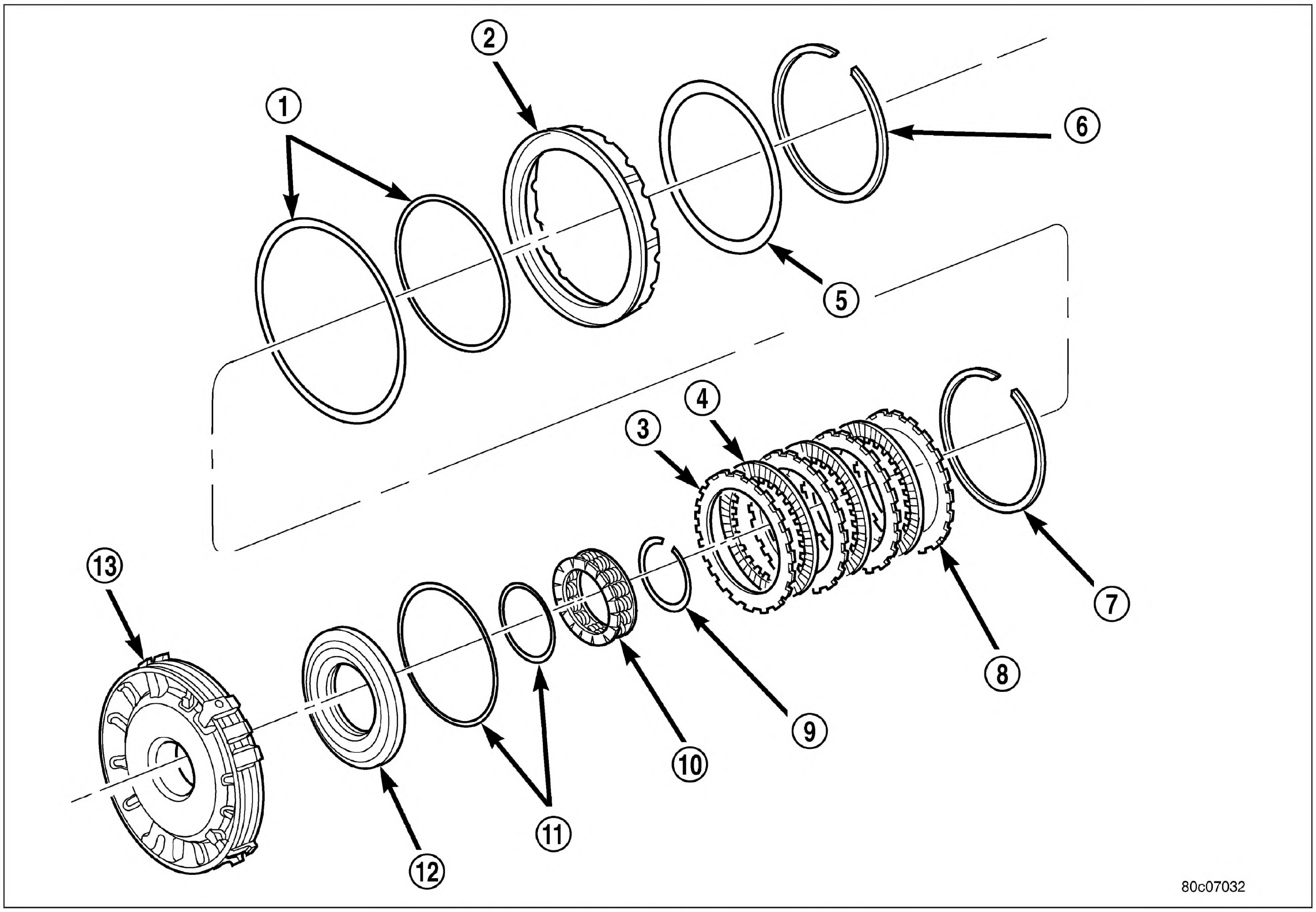
4C Retainer/Bulkhead Components

1 - SEAL
2 - 2C PISTON
3 - PLATE
4 - DISC
5 - 2C BELLEVILLE SPRING
6 - SNAP-RING
7 - SNAP-RING (SELECT)
8 - REACTION PLATE
9 - SNAP-RING
10 - RETURN SPRING
11 - SEAL
12 - 4C PISTON
13 - 4C RETAINER/BULKHEAD

1. Install new seals (1, 11) on the 2C and 4C pistons or in the piston retainers.
2. Lubricate all seals with Mopar® ATF +4 prior to installation.
3. Install the 4C piston (12) into the 4C retainer/bulkhead (13).
4. Position the 4C piston return spring (10) onto the 4C piston (12).

5. Using Spring Compressor 8250 (2) and a suitable shop press (1), compress the 4C piston return spring and install the snap-ring.



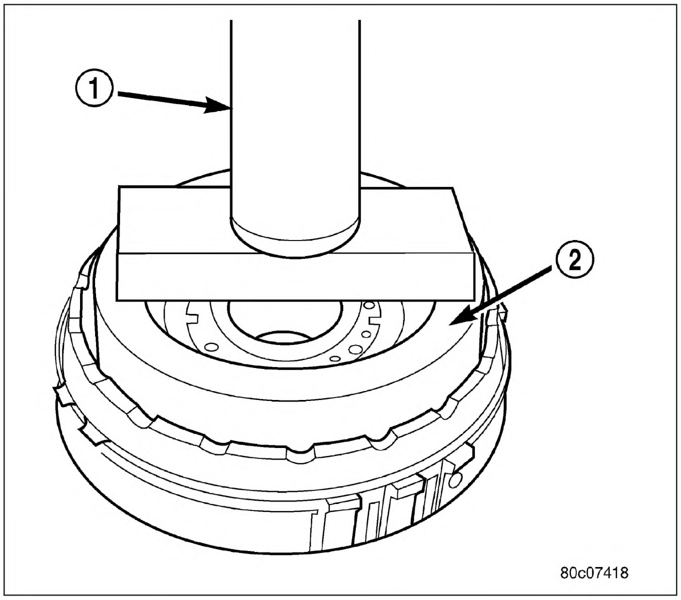


4C Retainer/Bulkhead Components

1 - SEAL	8 - REACTION PLATE
2 - 2C PISTON	9 - SNAP-RING
3 - PLATE	10 - RETURN SPRING
4 - DISC	11 - SEAL
5 - 2C BELLEVILLE SPRING	12 - 4C PISTON
6 - SNAP-RING	13 - 4C RETAINER/BULKHEAD
7 - SNAP-RING (SELECT)	

6. Assemble and install the 4C clutch pack (3, 4) into the retainer/bulkhead (13) with the steel separator plate against the piston.
7. Install the 4C reaction plate (8) and snap-ring (7) into the retainer/bulkhead (13). The 4C reaction plate is non-directional.
8. Measure the 4C clutch clearance. The correct clutch clearance is 0.77-1.39 mm (0.030-0.055 in.). The snap-ring (7) is selectable. Install the chosen snap-ring and re-measure to verify the selection.
9. Install the 2C piston (2) into the retainer/bulkhead (13).
10. Position the 2C Belleville spring (5) onto the 2C piston (2).
11. Position the 2C Belleville spring snap-ring (6) onto the 2C Belleville spring (5).

12. Using Spring Compressor 8249 (2) and a suitable shop press (1), compress the Belleville spring (5) until the snap-ring (6) is engaged with the snap-ring groove in the retainer/bulkhead.



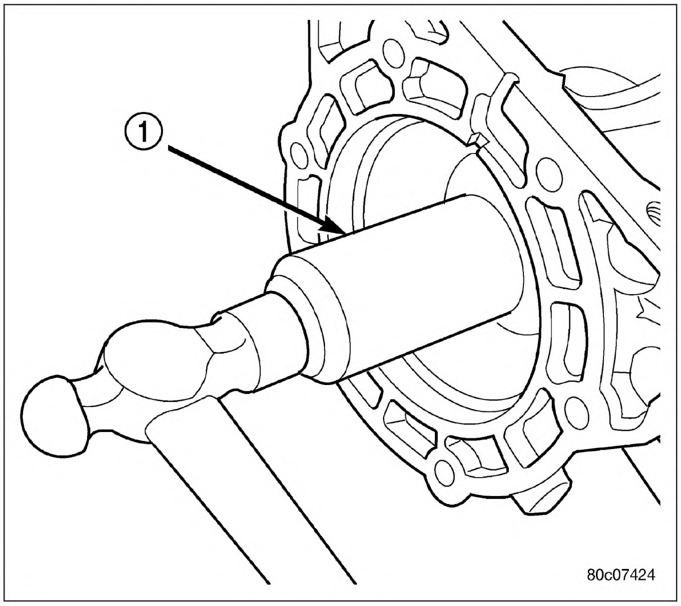
SEAL-ADAPTER HOUSING

REMOVAL

1. Remove the transfer case from the transmission.
2. Using a screw mounted on a slide hammer, remove the adapter housing seal.

INSTALLATION

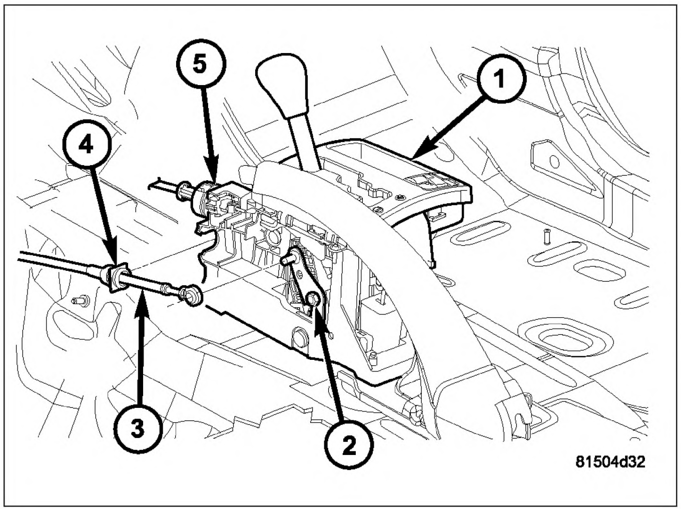
1. Clean the adapter seal bore in the adapter housing of any residue or particles remaining from the original seal.
2. Install new oil seal in the adapter housing using Seal Installer C-3860-A (1) . A properly installed seal is flush to the face of the seal bore.
3. Install the transfer case onto the transmission.



MECHANISM-BRAKE TRANSMISSION SHIFT INTERLOCK

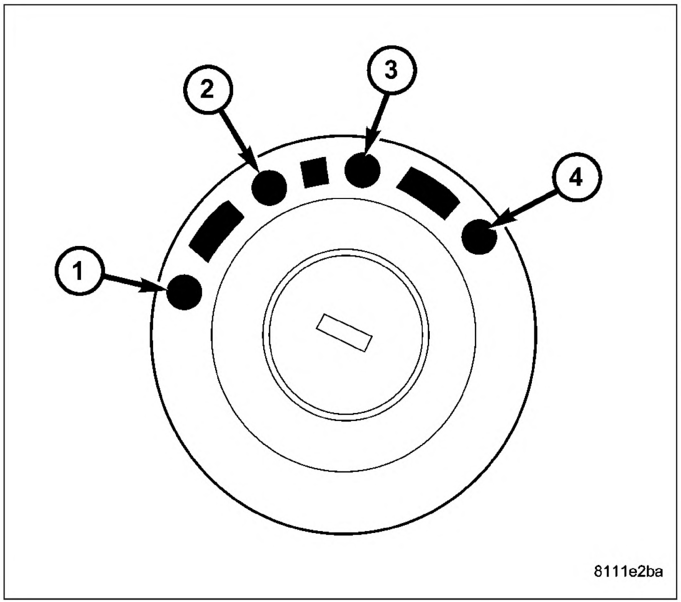
DESCRIPTION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable operated system that prevents the transmission gear shifter from being moved out of PARK without the proper driver inputs. The system also contains a solenoid that is integral to the shifter assembly. The solenoid works in conjunction with the park lock cable (5) to permit shifter movement out of PARK when the brake is depressed.



OPERATION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK (1) position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A solenoid in the shifter assembly is de-energized when the ignition is in the ON position and the brake pedal is depressed. When the key is in the ON position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK position, unless the shifter is in the gated PARK position.



The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the “expected response” differs from the vehicle’s response, then system repair and/or adjustment is necessary.

ACTION	EXPECTED RESPONSE
1. Turn key to the ″ACC″ position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON″ position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the ″ON″ position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear, except ″PARK″, and try to return key to the ″LOCK″ position.	4. Key cannot be returned to the ″LOCK″ position.

ACTION	EXPECTED RESPONSE
5. Return shifter to ″PARK″ and try to remove the key.	5. Key can be removed (after returning to ″LOCK″ position).
6. With the key removed, and the brake depressed, try to shift out of ″PARK″.	6. Shifter cannot be shifted out of ″PARK″.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

DIAGNOSIS AND TESTING - BRAKE TRANSMISSION SHIFT INTERLOCK

SYSTEM VERIFICATION

1. Verify that the key can only be removed in the PARK position
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely from ACC to LOCK. When the shifter is in any other gear or neutral position, the ignition key cylinder should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.
4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).
5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.
6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.

DIAGNOSTIC CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
KEY WILL NOT ROTATE TO THE LOCK POSITION.	1. Misadjusted Park Lock cable.	1. Adjust Park Lock cable. (Refer to 21 - TRANSMISSION AND TRANSFER CASE/AUTOMATIC TRANSMISSION/BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM - ADJUSTMENTS)
	2. Misadjusted gearshift cable.	2. Adjust gearshift cable. (Refer to 21 - TRANSMISSION AND TRANSFER CASE/AUTOMATIC TRANSMISSION/GEAR SHIFT CABLE - ADJUSTMENTS)
	3. Burrs on ignition key.	3. Remove burrs and cycle key several times to verify operation.
	4. Binding or broken components.	4. Inspect system components and repair/replace components as necessary.
VEHICLE WILL NOT START UNLESS SHIFTER IS HELD FORWARD, OR REARWARD, OF THE PARK POSITION.	1. Misadjusted gearshift cable.	1. Adjsut gearshift cable. (Refer to 21 - TRANSMISSION AND TRANSFER CASE/AUTOMATIC TRANSMISSION/GEAR SHIFT CABLE - ADJUSTMENTS)

ADJUSTMENTS - BRAKE TRANSMISSION SHIFT INTERLOCK

The park interlock cable is part of the brake/shift lever interlock system. Correct cable adjustment is important to proper interlock operation. The gear shift and park lock cables must both be correctly adjusted in order to shift out of PARK.

ADJUSTMENT PROCEDURE

1. Remove floor console as necessary for access to the park lock cable. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
2. Shift the transmission into the PARK position.
3. Turn ignition switch to LOCK position. **Be sure ignition key cylinder is in the LOCK position. Cable will not adjust correctly in any other position.**

NOTE: If the key will not turn to the LOCK position, pull up on the cable lock button and manually move the cable in and out until the key can be turned to the LOCK position.

4. Pull cable lock button up to release cable, if necessary.
5. Ensure that the cable is free to self-adjust by pushing cable rearward and releasing.
6. Push lock button down until it snaps in place. The lock should be flush to the surface of the cylinderical portion of the cable adjustment housing.

BTSI FUNCTION CHECK

1. Verify removal of ignition key allowed in PARK position only.
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely LOCK position. When the shifter is in any other position, the ignition key should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.
4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).
5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.
6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.
7. The floor shifter lever and gate positions should be in alignment with all transmission detent positions.
8. Engine starts must be possible with shifter lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gate positions other than PARK or NEUTRAL.
9. With the shifter lever handle in the:
   - PARK position- apply forward force on center of handle and remove pressure. Engine start must be possible.
   - PARK position- apply rearward force on center of handle and remove pressure. Engine start must be possible.
   - NEUTRAL position- engine start must be possible.
   - NEUTRAL position, engine running and brakes applied- Apply forward force on center of shift handle. Transmission should not be able to shift into REVERSE detent.

FLUID AND FILTER

DIAGNOSIS AND TESTING

EFFECTS OF INCORRECT FLUID LEVEL

A low fluid level allows the pump to take in air along with the fluid. Air in the fluid will cause fluid pressures to be low and develop slower than normal. If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation, and varnish buildup which interferes with valve and clutch operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has three primary causes.

1. Internal clutch slippage, usually caused by low line pressure, inadequate clutch apply pressure, or clutch seal failure.
2. A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged oil cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.
3. Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid
- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid
- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
- failure to replace contaminated converter after repair

The use of non-recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission, an overhaul is necessary.

The torque converter should be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

STANDARD PROCEDURE

FLUID LEVEL CHECK

Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

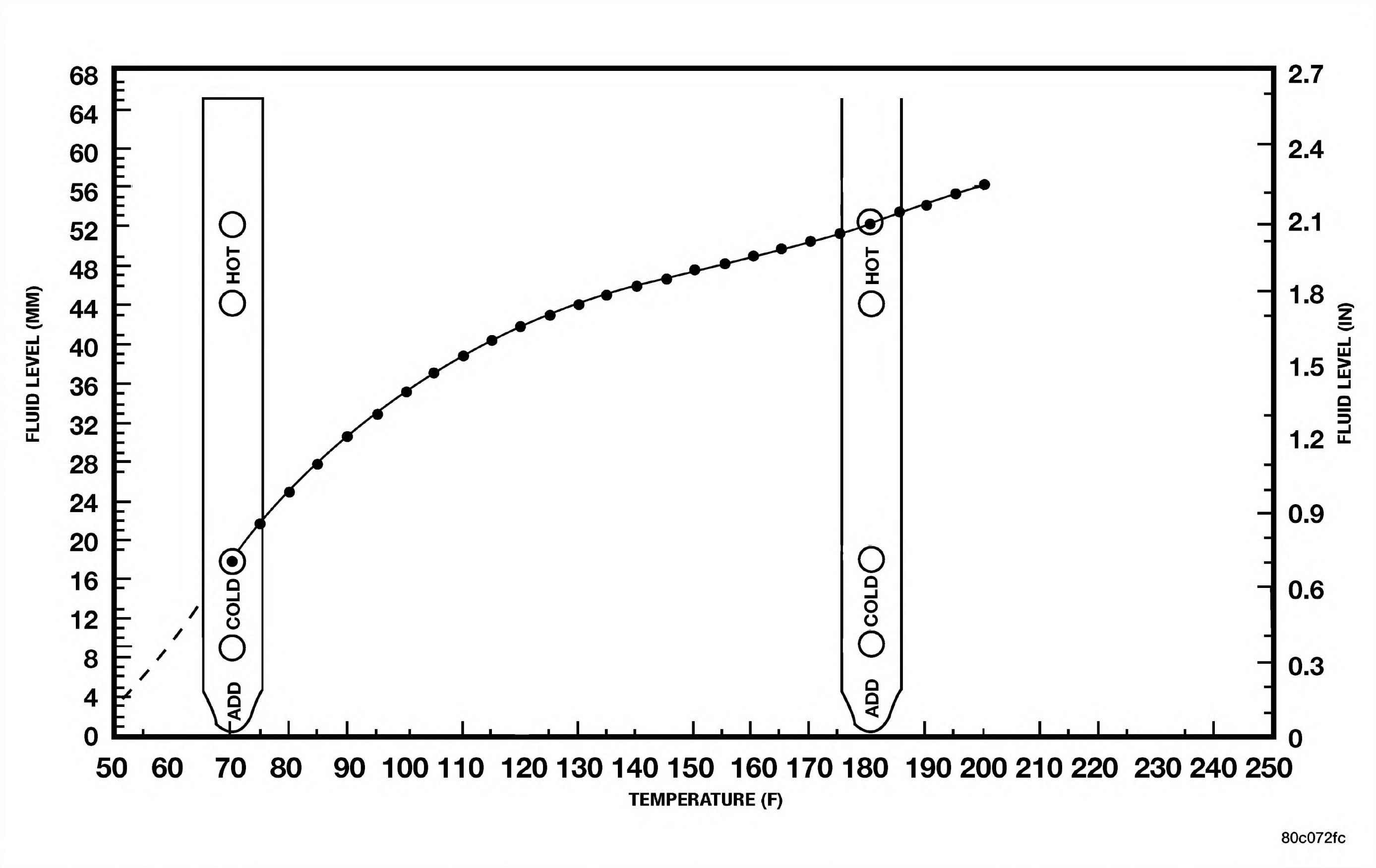
Improper filling can also raise the fluid level too high. When the transmssion has too much fluid, the geartrain churns up foam and cause the same conditions which occur with a low fluid level.

In either case, air bubbles can cause overheating and/or fluid oxidation, and varnishing. This can interfere with normal valve, clutch, and accumulator operation. Foaming can also result in fluid escaping from the transmission vent where it may be mistaken for a leak.

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

The transmission has a dipstick to check oil level. It is located on the right side of the engine. Be sure to wipe all dirt from dipstick handle before removing.

The torque converter fills in both the P (PARK) and N (NEUTRAL) positions. Place the selector lever in P (PARK) to be sure that the fluid level check is accurate. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.** At normal operating temperature (approximately 82 C. or 180 F.), the fluid level is correct if it is in the HOT region (cross-hatched area) on the oil level indicator. The fluid level will be approximately at the upper COLD hole of the dipstick at 70° F fluid temperature.



NOTE: Engine and Transmission should be at normal operating temperature before performing this procedure.

1. Start engine and apply parking brake.
2. Shift the transmission into DRIVE for approximately 2 seconds.
3. Shift the transmission into REVERSE for approximately 2 seconds.
4. Shift the transmission into PARK.
5. Hook up the scan tool and select transmission.
6. Select sensors.
7. Read the transmission temperature value.
8. Compare the fluid temperature value with the chart.
9. Adjust transmission fluid level shown on the dipstick according to the Transmission Fluid Temperature Chart.

NOTE: After adding any fluid to the transmission, wait a minimum of 2 minutes for the oil to fully drain from the fill tube into the transmission before rechecking the fluid level.

10. Check transmission for leaks.

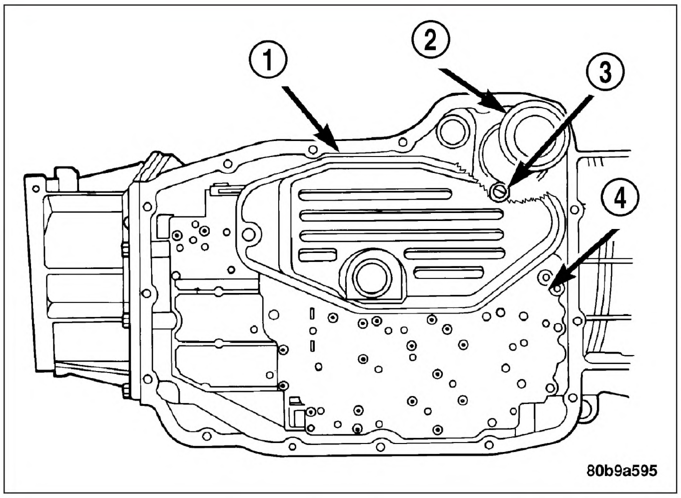
FLUID AND FILTER REPLACEMENT

For proper service intervals (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION).

REMOVAL

1. Hoist and support vehicle on safety stands.
2. Place a large diameter shallow drain pan beneath the transmission pan.
3. Remove bolts holding front and sides of pan to transmission.
4. Loosen bolts holding rear of pan to transmission.

5. Slowly separate front of pan away from transmission allowing the fluid to drain into drain pan.
6. Hold up pan and remove remaining bolts holding pan to transmission.
7. While holding pan level, lower pan away from transmission.
8. Pour remaining fluid in pan into drain pan.
9. Remove the screw holding the primary oil filter (1) to valve body.
10. Separate filter from valve body and oil pump and pour fluid in filter into drain pan.
11. Inspect the oil filter seal in the bottom of the oil pump. If the seal is not installed completely in the oil pump, or is otherwise damaged, then remove and discard the oil filter seal from the bottom of the oil pump. If the seal is installed correctly and is in good condition, it can be reused.
12. If replacing the cooler return filter (2), use Oil Filter Wrench 8321 to remove the filter from the transmission.
13. Dispose of used trans fluid and filter(s) properly.



INSPECTION

Inspect bottom of pan and magnet for excessive amounts of metal. A light coating of clutch material on the bottom of the pan does not indicate a problem unless accompanied by a slipping condition or shift lag. If fluid and pan are contaminated with excessive amounts of debris, refer to the diagnosis section of this group.

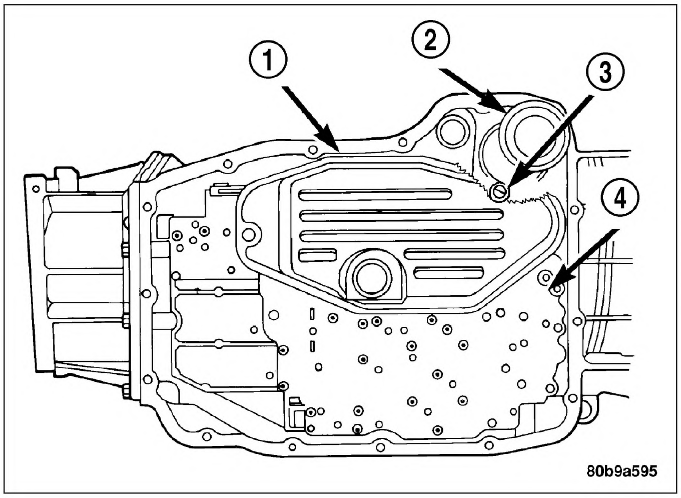
CLEANING

1. Using a suitable solvent, clean pan and magnet.
2. Using a suitable gasket scraper, clean original sealing material from surface of transmission case and the transmission pan.

INSTALLATION

CAUTION: The primary oil filter seal MUST be fully installed flush against the oil pump body. DO NOT install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

1. If necessary, install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with a suitable tool (appropriately sized drift or socket, the butt end of a hammer, or other suitable tool).
2. Place replacement filter in position on valve body and into the oil pump.
3. Install screw to hold the primary oil filter (1) to valve body. Tighten screw to 4.5 N·m (40 in. lbs.) torque.



4. Install new cooler return filter (2) onto the transmission, if necessary. Torque the filter to 14.12 N·m (125 in.lbs.).
5. Place bead of Mopar® RTV sealant onto the transmission case sealing surface.
6. Place pan in position on transmission.
7. Install bolts to hold pan to transmission. Tighten bolts to 11.8 N·m (105 in. lbs.) torque.

8. Lower vehicle and fill transmission with Mopar® ATF +4.

TRANSMISSION FILL

To avoid overfilling transmission after a fluid change or overhaul, perform the following procedure:

1. Remove dipstick and insert clean funnel in transmission fill tube.
2. Add following initial quantity of Mopar® ATF +4 to transmission:
    a. If only fluid and filter were changed, add **10 pints (5 quarts)** of ATF +4 to transmission.
    b. If transmission was completely overhauled and the torque converter was replaced or drained, add **24 pints (12 quarts)** of ATF +4 to transmission.
3. Check the transmission fluid (Refer to 21 - TRANSMISSION/AUTOMATIC - RFE/FLUID - STANDARD PROCEDURE) and adjust as required.

GEARSHIFT CABLE

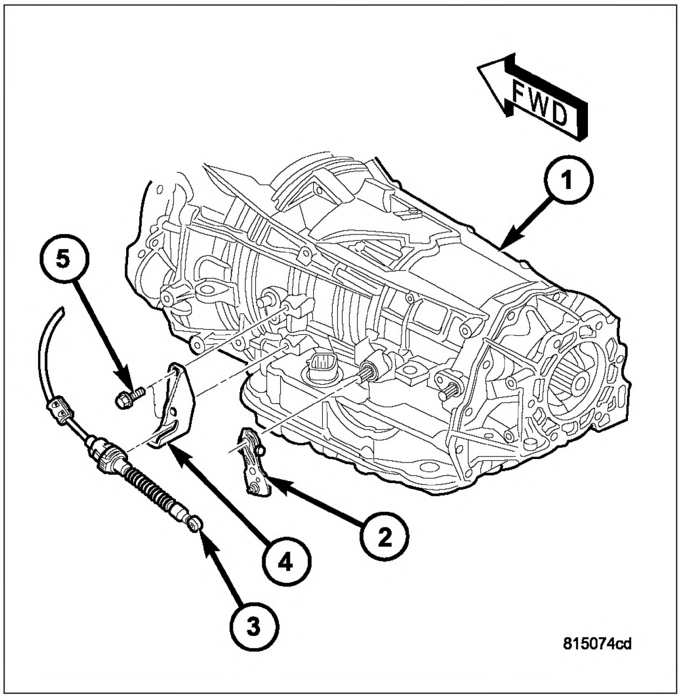
DIAGNOSIS AND TESTING

GEARSHIFT CABLE

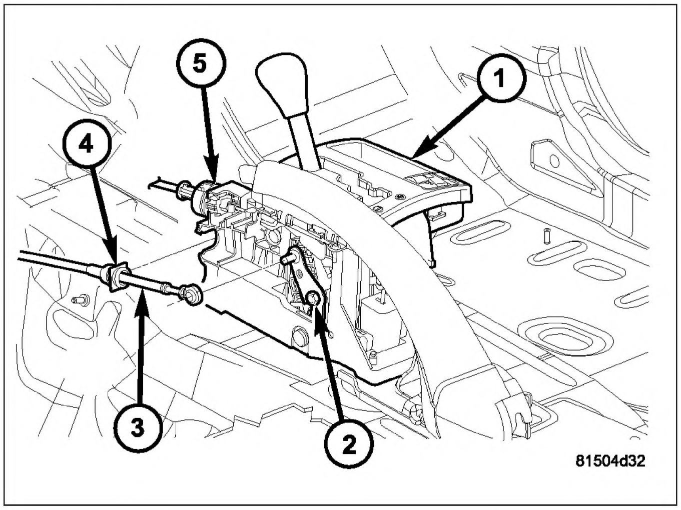
1. The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.
2. Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.
3. With floor shift lever handle push-button not depressed and lever in:
    a. PARK position - Apply forward force on center of handle and remove pressure. Engine starts must be possible.
    b. PARK position - Apply rearward force on center of handle and remove pressure. Engine starts must be possible.
    c. NEUTRAL position - Normal position. Engine starts must be possible.
    d. NEUTRAL position - Engine running and brakes applied, apply forward force on center of shift handle. Transmission shall not be able to shift from NEUTRAL to REVERSE.

REMOVAL

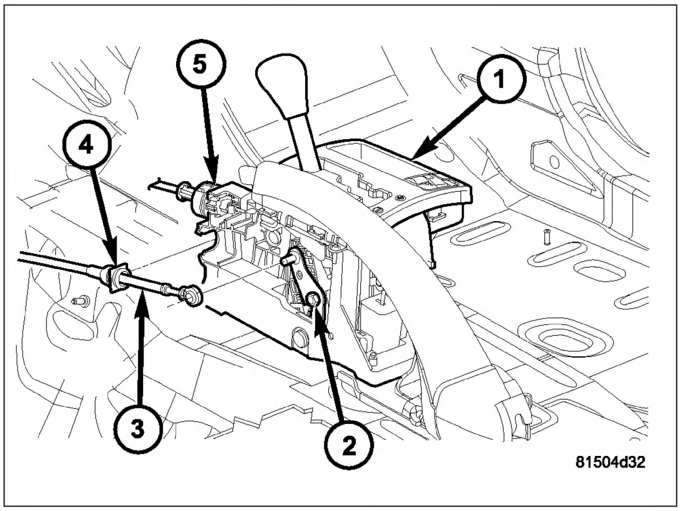
1. Shift transmission into PARK.
2. Raise vehicle.
3. Disengage the gearshift cable (3) eyelet at transmission manual shift lever (2) and pull cable out of the mounting bracket (4).



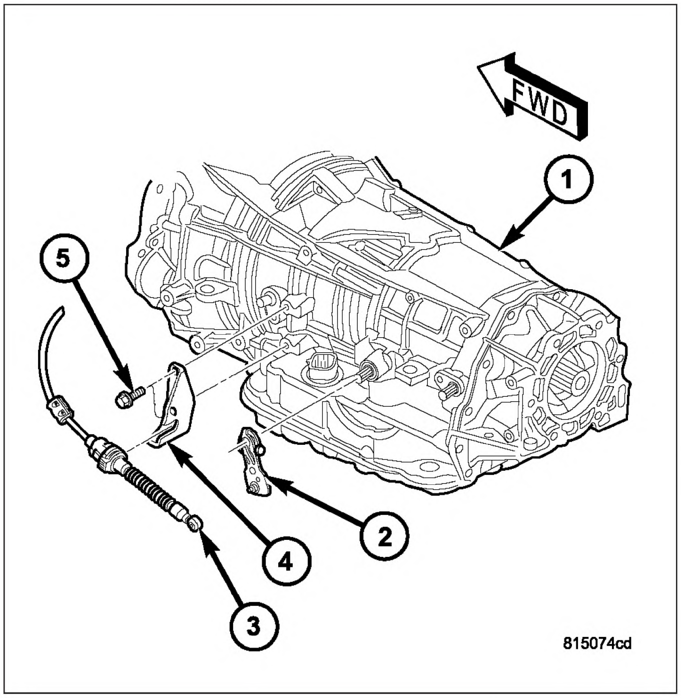
4. Lower the vehicle.
5. Remove the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL) as necessary to access the shift mechanism and cables.
6. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
7. Remove the gearshift cable (3) from the shift lever pin.
8. Remove the gearshift cable retainer (4) from the notch in the shifter assembly.
9. From under the hood, remove the shift cable grommet from the dash panel.
10. Remove gearshift cable from vehicle.



INSTALLATION

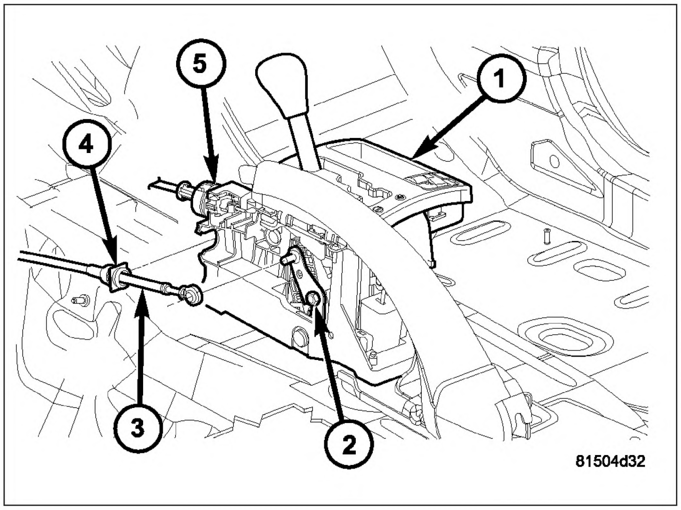


1. From under the hood, route the gearshift cable (3) through the dash panel and toward the shifter assembly.
2. From under the hood, install the grommet to the dash panel.
3. Engage the gearshift cable retainer (4) into the notch in the shifter assembly.
4. Install the gearshift cable (3) onto the shift lever pin.
5. Loosen the cable adjustment nut (2), if necessary.



6. Raise vehicle.
7. Verify that the transmission is in the PARK position by trying to rotate the propeller shaft. If the propeller shaft rotates, move the transmission manual shift lever to the full rearward position and turn the propeller shaft until the PARK system is engaged.
8. Route the gearshift cable (3) through the mounting bracket (4).
9. Engage the gearshift cable (3) eyelet onto the transmission manual shift lever (2).

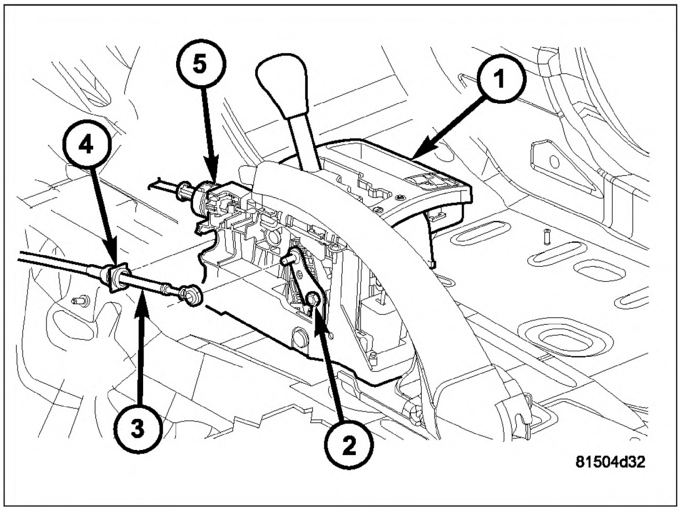
10. Lower vehicle.
11. Verify that the shifter is in the PARK position.
12. Tighten the adjustment nut (2) to 30 N·m (265 in.lbs.).
13. Verify correct shifter operation.
14. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
15. Install the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION), lower instrument panel components (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION) and dash panel insulation pad as necessary.



ADJUSTMENTS - GEARSHIFT CABLE

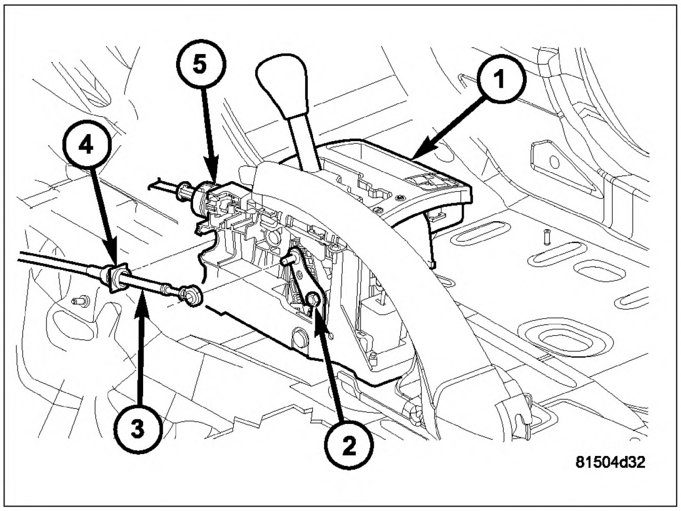
Check adjustment by starting the engine in PARK and NEUTRAL. Adjustment is CORRECT if the engine starts only in these positions. Adjustment is INCORRECT if the engine starts in one but not both positions. If the engine starts in any position other than PARK or NEUTRAL, or if the engine will not start at all, the park/neutral position contact may be faulty.

1. Shift transmission into PARK.
2. Remove floor console as necessary for access to the shift cable adjustment. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
3. Loosen the shift cable adjustment nut (2).



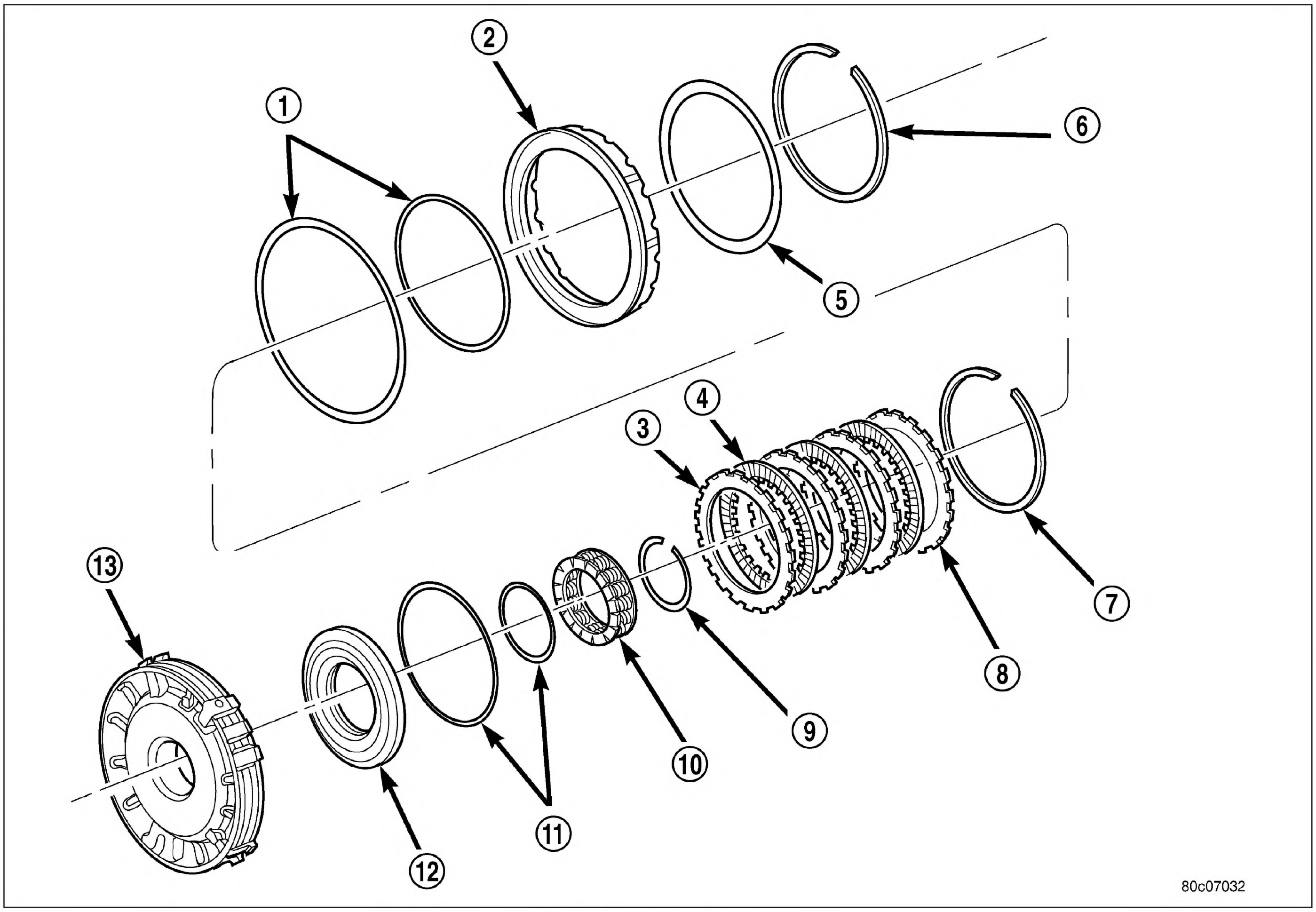
4. Raise vehicle.
5. Unsnap cable eyelet from transmission shift lever.
6. Verify transmission shift lever is in PARK detent by moving lever fully rearward. Last rearward detent is PARK position.
7. Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
8. Snap cable eyelet onto transmission shift lever.

9. Lower vehicle
10. Tighten the shift cable adjustment nut (2) to 30 N·m (265 in.lbs.).
11. Verify correct operation.
12. Install any floor console components removed for access. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)



CLUTCHES-HOLDING

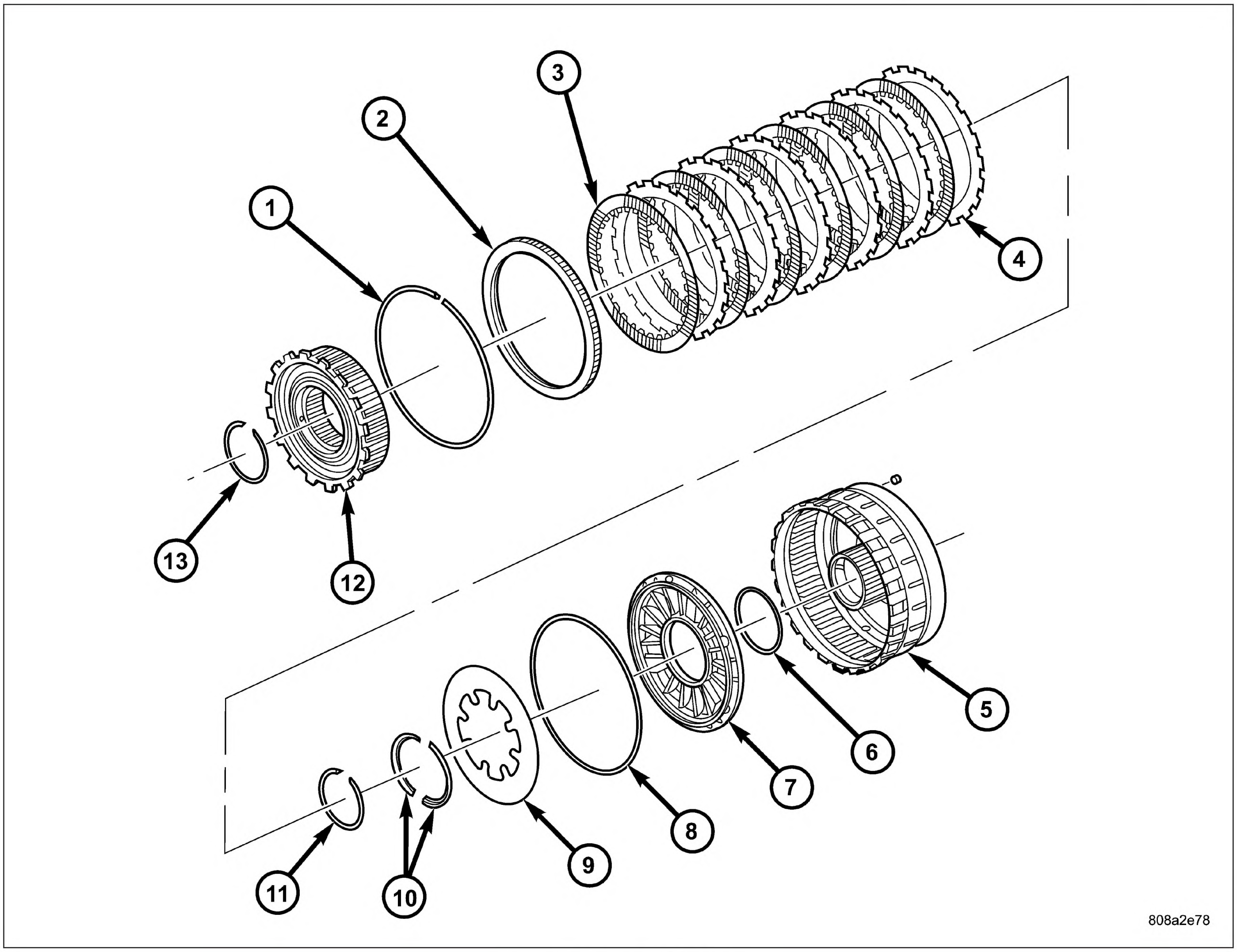
DESCRIPTION



2C and 4C Clutches

1 - SEAL
2 - 2C PISTON
3 - PLATE
4 - DISC
5 - 2C BELLEVILLE SPRING
6 - SNAP-RING
7 - SNAP-RING (SELECT)
8 - REACTION PLATE
9 - SNAP-RING
10 - RETURN SPRING
11 - SEAL
12 - 4C PISTON
13 - 4C RETAINER/BULKHEAD

Three hydraulically applied multi-disc clutches are used to hold some planetary geartrain components stationary while the input clutches drive others. The 2C, 4C, and Low/Reverse clutches are considered holding clutches. The 2C and 4C clutches are located in the 4C retainer/bulkhead (13).



Low/Reverse Clutch

1 - SNAP-RING (SELECT)
2 - REACTION PLATE
3 - DISC
4 - PLATE
5 - L/R CLUTCH RETAINER
6 - SEAL
7 - PISTON
8 - SEAL
9 - BELLEVILLE SPRING
10 - RETAINER
11 - SNAP-RING
12 - OVERRUNNING CLUTCH
13 - SNAP-RING

The Low/Reverse clutch is located at the rear of the transmission case.

OPERATION

2C CLUTCH

The 2C clutch is hydraulically applied in second and fifth gear by pressurized fluid against the 2C piston. When the 2C clutch is applied, the reverse sun gear assembly is held or grounded to the transmission case by holding the reaction planetary carrier.

4C CLUTCH

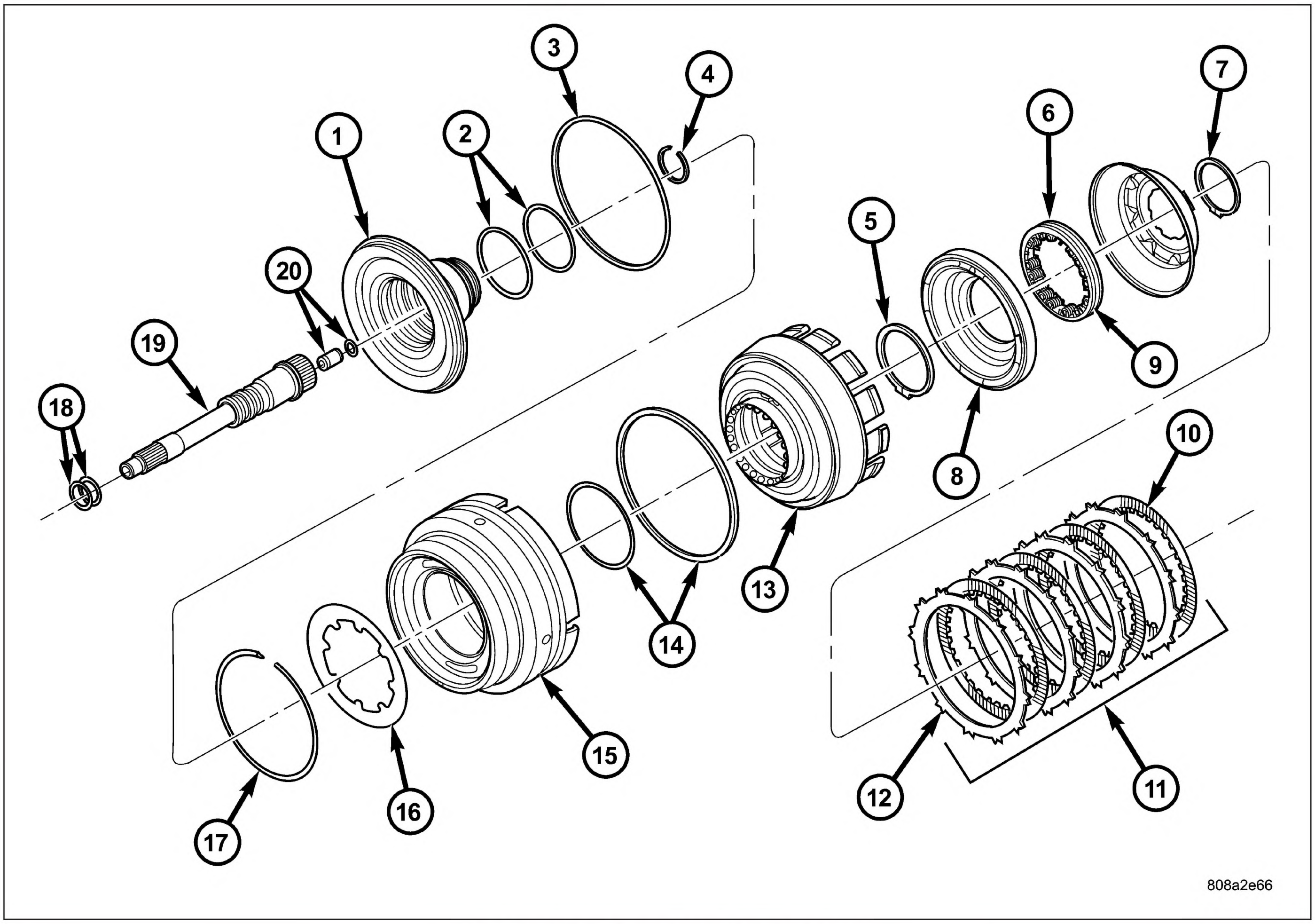
The 4C clutch is hydraulically applied in second prime and fourth gear by pressurized fluid against the 4C clutch piston. When the 4C clutch is applied, the reaction annulus gear is held or grounded to the transmission case.

LOW/REVERSE CLUTCH

The Low/Reverse clutch is hydraulically applied in park, reverse, neutral, and first gear, only at low speeds, by pressurized fluid against the Low/Reverse clutch piston. When the Low/Reverse clutch is applied, the input annulus assembly is held or grounded to the transmission case.

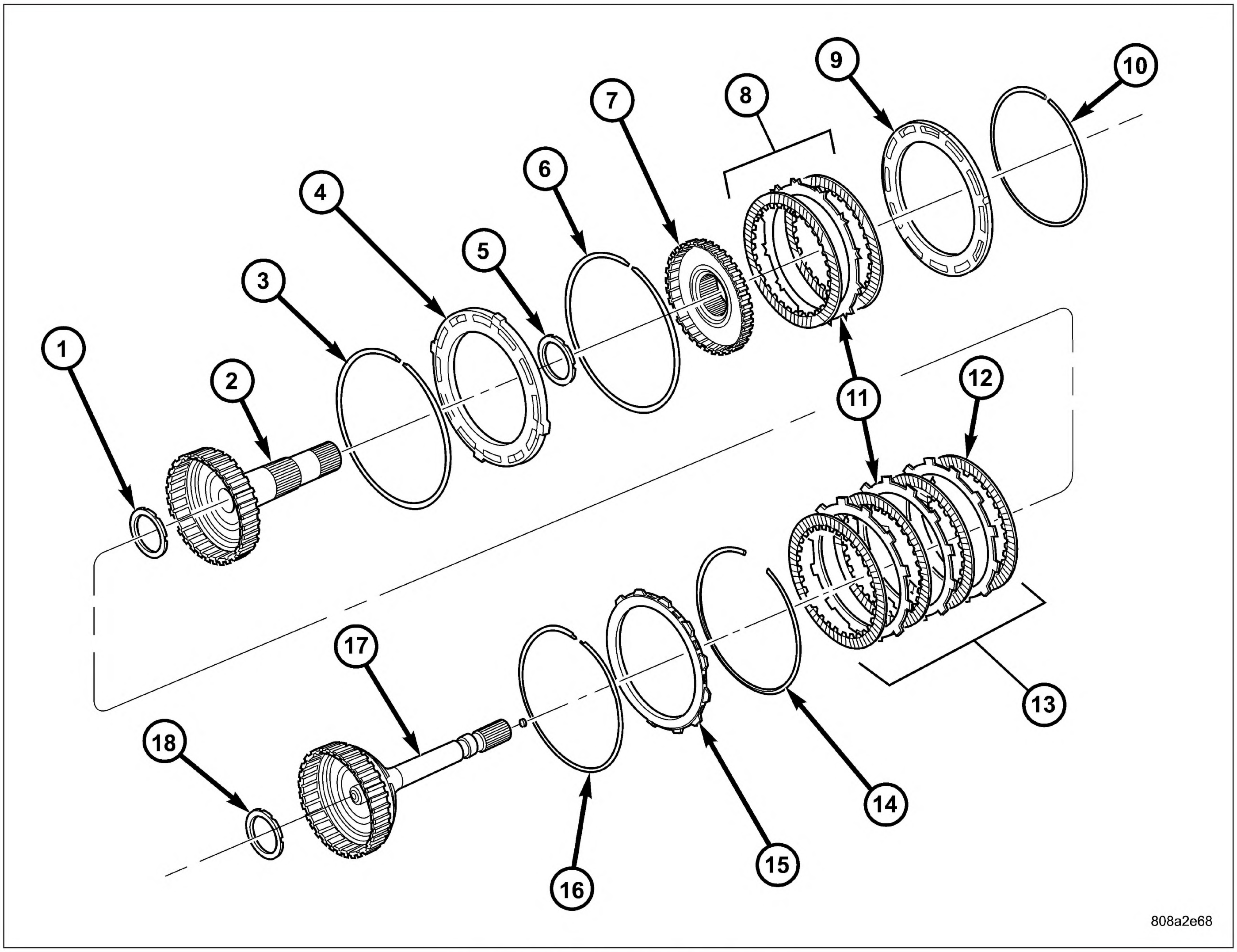
ASSEMBLY-INPUT CLUTCH

DESCRIPTION



Input Clutch Assembly - Part 1

1 - INPUT CLUTCH HUB	11 - UD CLUTCH
2 - O-RING SEALS	12 - PLATE
3 - SEAL	13 - CLUTCH RETAINER
4 - SNAP-RING	14 - SEAL
5 - SNAP-RING	15 - OD/REV PISTON
6 - UD BALANCE PISTON	16 - BELLEVILLE SPRING
7 - SNAP-RING	17 - SNAP-RING
8 - UD PISTON	18 - SEAL RINGS
9 - SPRING	19 - INPUT SHAFT
10 - DISC	20 - LUBRICATION CHECK VALVE AND SNAP-RING



Input Clutch Assembly - Part 2

1 - THRUST BEARING NUMBER 3
2 - OD HUB/SHAFT
3 - SNAP-RING (WAVE)
4 - REV/OD REACTION PLATE
5 - THRUST BEARING NUMBER 4
6 - SNAP-RING (FLAT)
7 - REVERSE HUB/SHAFT
8 - REVERSE CLUTCH
9 - REVERSE REACTION PLATE
10 - SNAP-RING (SELECT)
11 - PLATE
12 - DISC
13 - OD CLUTCH
14 - SNAP-RING (TAPERED)
15 - UD/OD REACTION PLATE
16 - SNAP-RING (FLAT)
17 - UD HUB/SHAFT
18 - THRUST BEARING NUMBER 2

Three hydraulically applied input clutches are used to drive planetary components. The underdrive, overdrive, and reverse clutches are considered input clutches and are contained within the input clutch assembly.

The input clutch assembly also contains:

- Input shaft
- Input hub
- Clutch retainer
- Underdrive piston
- Overdrive/reverse piston
- Overdrive hub
- Underdrive hub

OPERATION

The three input clutches are responsible for driving different components of the planetary geartrain.

UNDERDRIVE CLUTCH

The underdrive clutch is hydraulically applied in first, second, second prime, and third (direct) gears by pressurized fluid against the underdrive piston. When the underdrive clutch is applied, the underdrive hub drives the input sun gear.

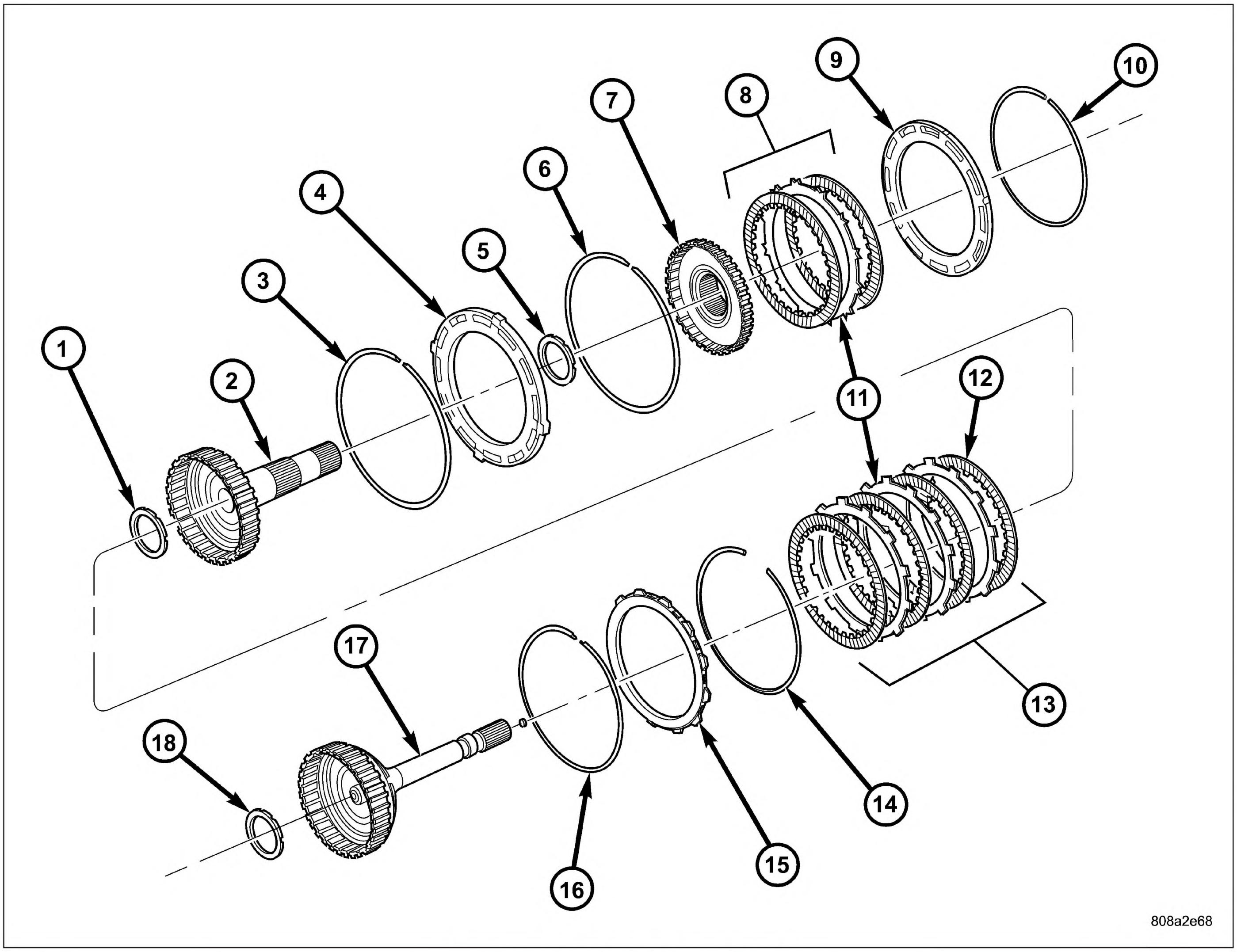
OVERDRIVE CLUTCH

The overdrive clutch is hydraulically applied in third (direct), fourth, and fifth gears by pressurized fluid against the overdrive/reverse piston. When the overdrive clutch is applied, the overdrive hub drives the reverse carrier/input annulus assembly.

REVERSE CLUTCH

The reverse clutch is hydraulically applied in reverse gear by pressurized fluid against the overdrive/reverse piston. When the reverse clutch is applied, the reaction annulus gear is driven.

DISASSEMBLY



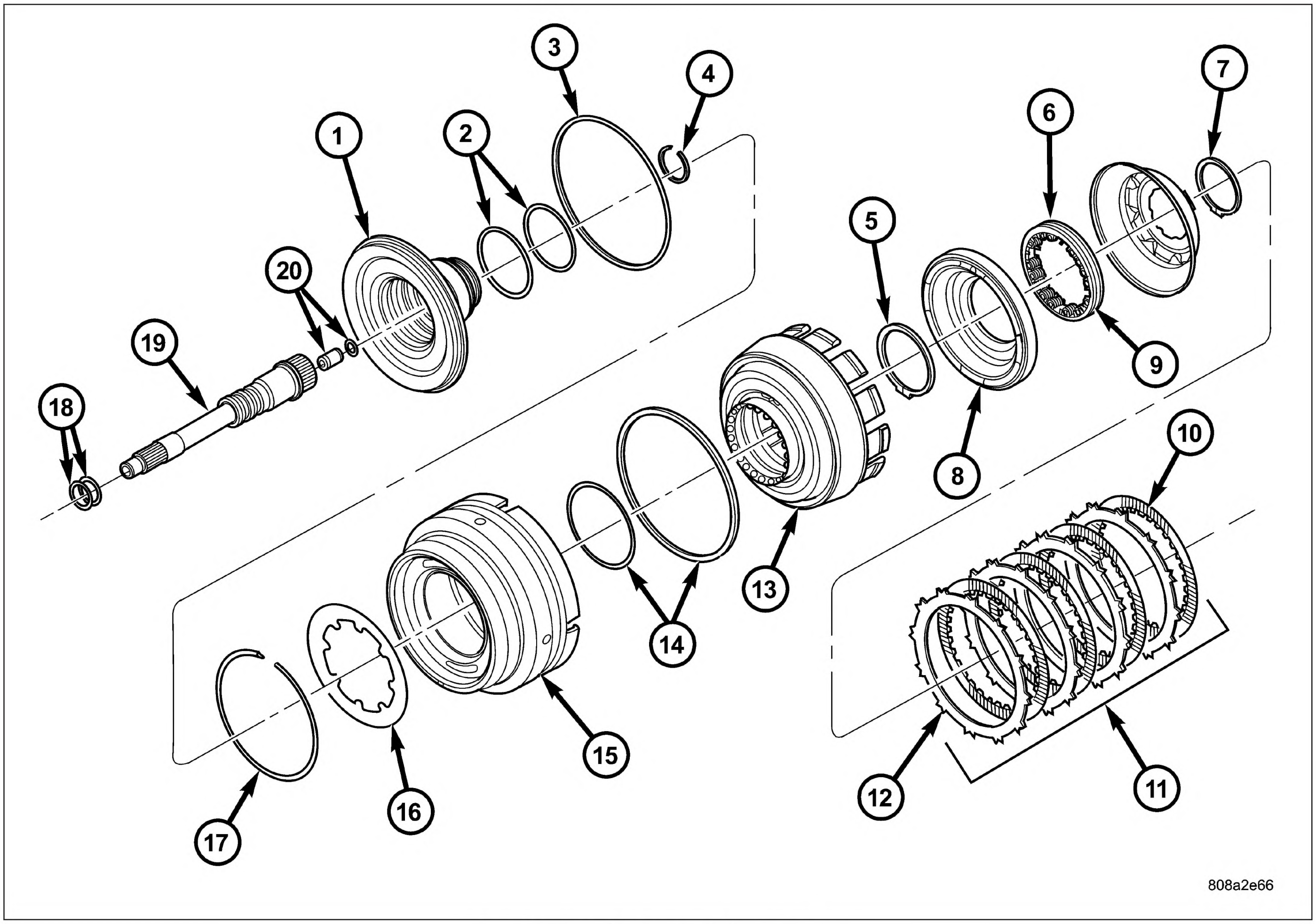
Input Clutch Assembly - Part 2

1 - THRUST BEARING NUMBER 3
2 - OD HUB/SHAFT
3 - SNAP-RING (WAVE)
4 - REV/OD REACTION PLATE
5 - THRUST BEARING NUMBER 4
6 - SNAP-RING (FLAT)
7 - REVERSE HUB/SHAFT
8 - REVERSE CLUTCH
9 - REVERSE REACTION PLATE
10 - SNAP-RING (SELECT)
11 - PLATE
12 - DISC
13 - OD CLUTCH
14 - SNAP-RING (TAPERED)
15 - UD/OD REACTION PLATE
16 - SNAP-RING (FLAT)
17 - UD HUB/SHAFT
18 - THRUST BEARING NUMBER 2

1. Remove the reverse reaction plate selective snap-ring (10) from the input clutch retainer (13).
2. Remove the reverse reaction plate (9) from the input clutch retainer (13).
3. Remove the reverse hub (7) and reverse clutch pack (8) from the input clutch retainer (13).
4. Remove the number 4 thrust bearing (5) from the overdrive hub (2).
5. Remove the overdrive hub (2) from the input clutch retainer (13).
6. Remove the number 3 thrust bearing (1) from the underdrive hub (17).
7. Remove the OD/reverse reaction plate snap-ring (6) from the input clutch retainer (13).
8. Remove the underdrive hub (17), overdrive clutch (13), and overdrive reaction plate (15) from the input clutch retainer (13).

NOTE: The overdrive friction discs and steel discs are thicker than the matching components in the underdrive and reverse clutches.

9. Remove the number 2 thrust bearing (18) from the input clutch hub (1).
10. Remove the overdrive clutch wave snap-ring (3) from the input clutch retainer (13).
11. Remove the UD/OD reaction plate tapered snap-ring (14) from the input clutch retainer (13).
12. Remove the UD/OD reaction plate (15) from the input clutch retainer (13).
13. Remove the UD/OD reaction plate flat snap-ring (16) from the input clutch retainer (13).

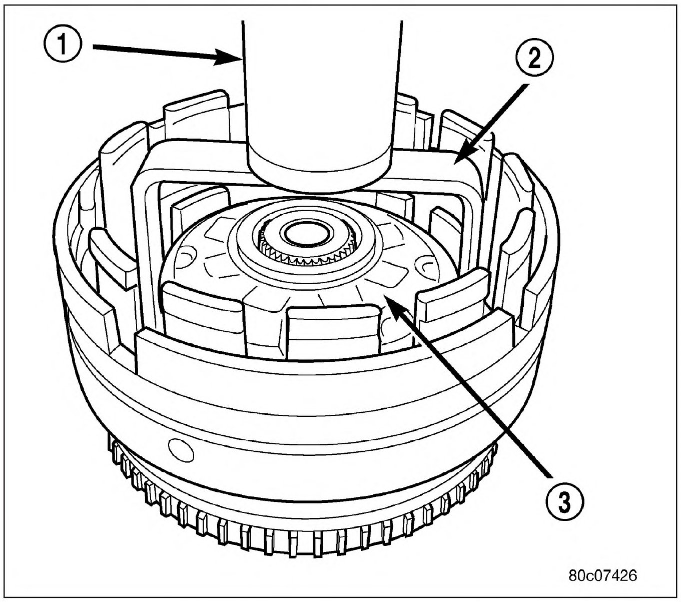


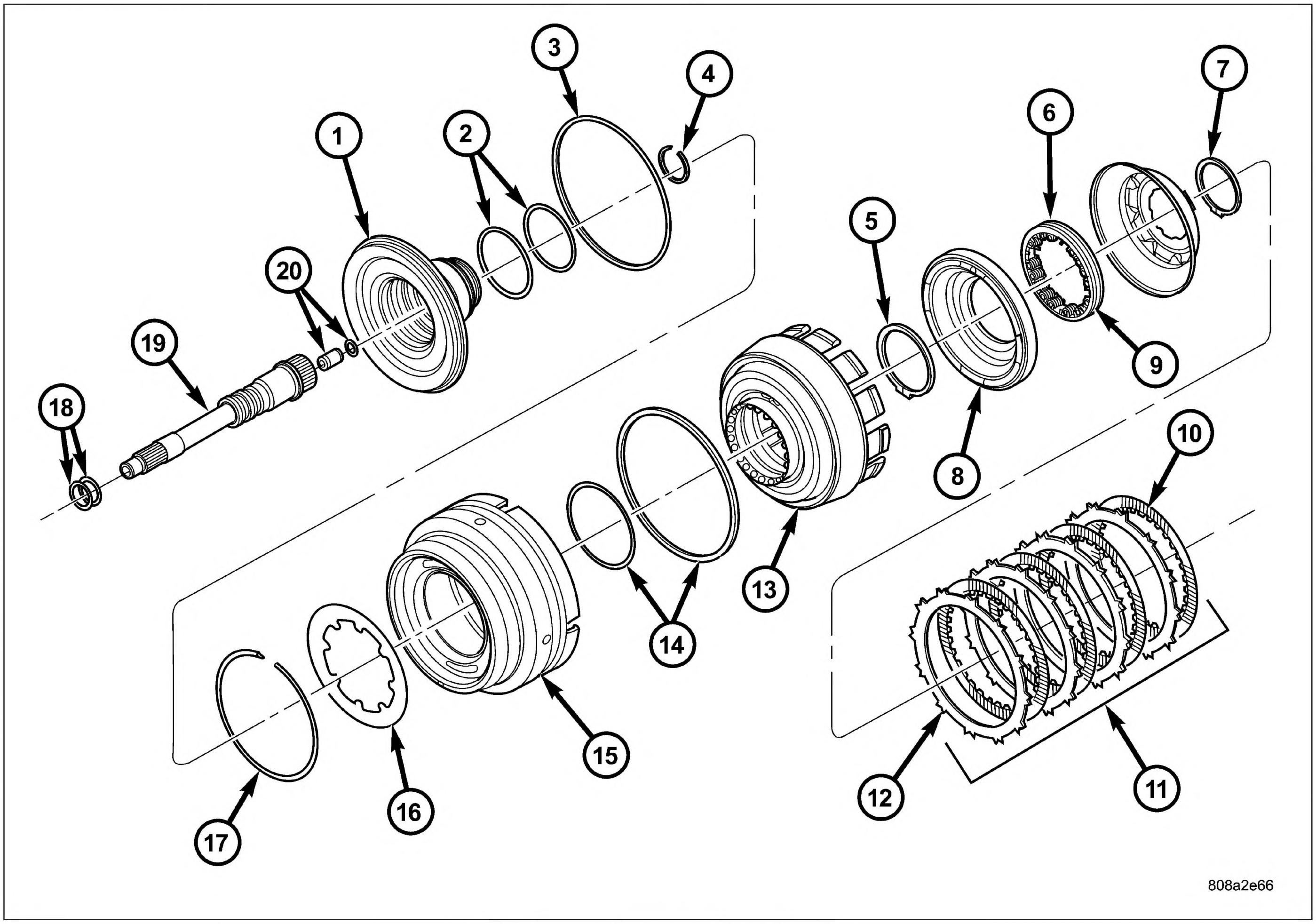
Input Clutch Assembly - Part 1

1 - INPUT CLUTCH HUB
2 - O-RING SEALS
3 - SEAL
4 - SNAP-RING
5 - SNAP-RING
6 - UD BALANCE PISTON
7 - SNAP-RING
8 - UD PISTON
9 - SPRING
10 - DISC
11 - UD CLUTCH
12 - PLATE
13 - CLUTCH RETAINER
14 - SEAL
15 - OD/REV PISTON
16 - BELLEVILLE SPRING
17 - SNAP-RING
18 - SEAL RINGS
19 - INPUT SHAFT
20 - LUBRICATION CHECK VALVE AND SNAP-RING

14. Remove the underdrive clutch pack (11) from the input clutch retainer (13).

15. Using Spring Compressor 8251 (2) , compress the UD/OD balance piston (3) and remove the snap-ring from the input clutch hub (1).





Input Clutch Assembly - Part 1

1 - INPUT CLUTCH HUB	11 - UD CLUTCH
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3 - SEAL	13 - CLUTCH RETAINER
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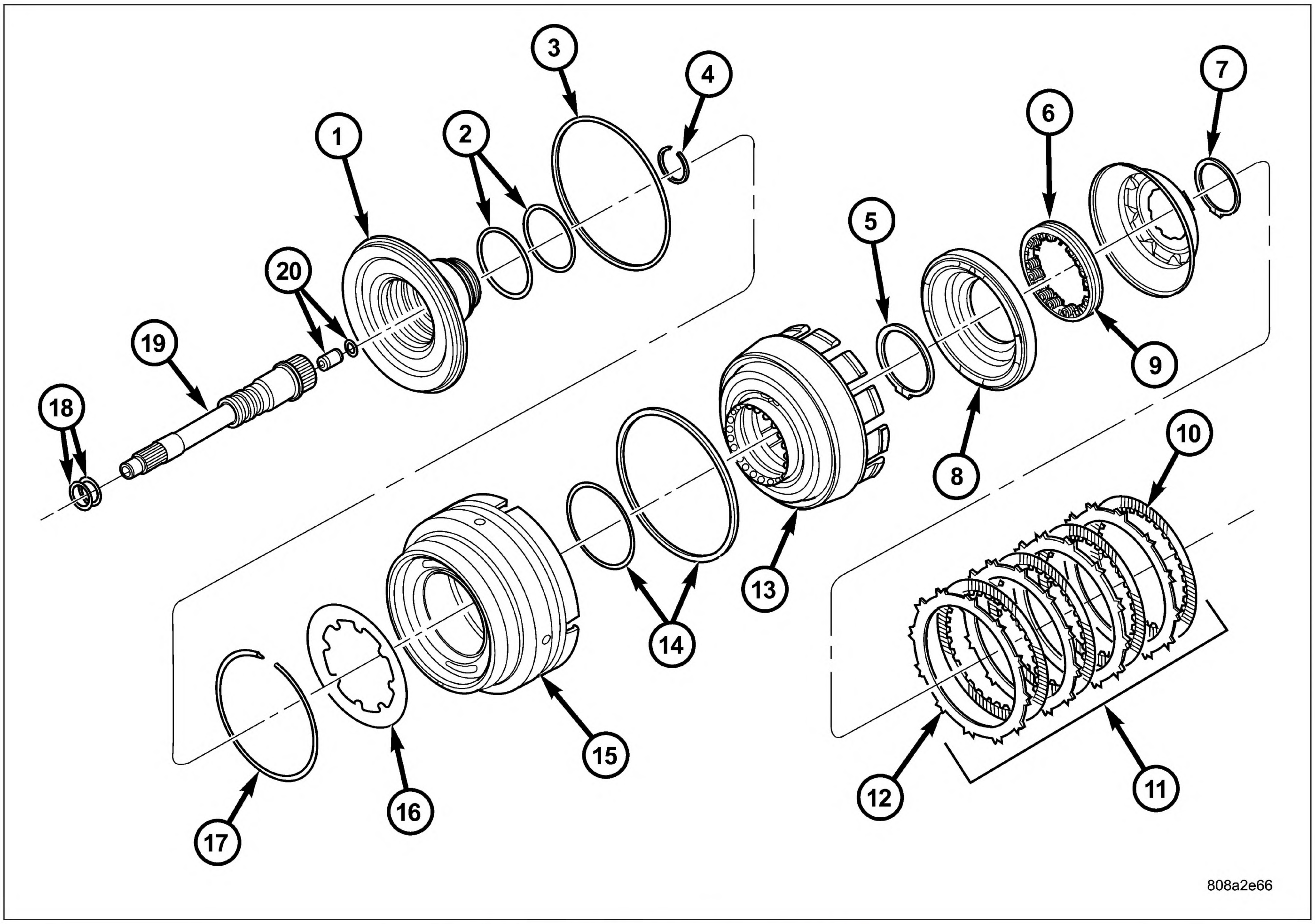
5 - SNAP-RING	15 - OD/REV PISTON
6 - UD BALANCE PISTON	16 - BELLEVILLE SPRING
7 - SNAP-RING	17 - SNAP-RING
8 - UD PISTON	18 - SEAL RINGS
9 - SPRING	19 - INPUT SHAFT
10 - DISC	20 - LUBRICATION CHECK VALVE AND SNAP-RING

16. Remove the UD/OD balance piston (6) and piston return spring (9) from the input clutch retainer (13).
17. Remove the underdrive piston (8) from the input clutch retainer (13).

NOTE: Both the UD/OD balance piston and the underdrive piston have seals molded onto them. If the seal is damaged, do not attempt to install a new seal onto the piston. The piston/seal must be replaced as an assembly.

18. Remove the input clutch retainer tapered snap-ring (5).
19. Separate input clutch retainer (13) from input clutch hub (1).
20. Separate OD/reverse piston (15) from input clutch hub retainer (13).
21. Remove all seals and o-rings from the input shaft and input hub. The o-rings on the input hub are color coded. Be sure to make note of which o-ring belongs in which location.

ASSEMBLY



Input Clutch Assembly - Part 1

1 - INPUT CLUTCH HUB	11 - UD CLUTCH
2 - O-RING SEALS	12 - PLATE
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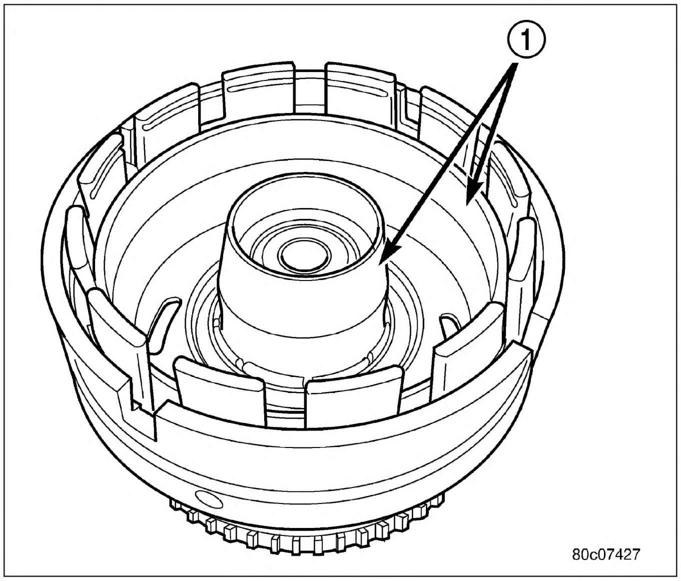
7 - SNAP-RING	17 - SNAP-RING
8 - UD PISTON	18 - SEAL RINGS
9 - SPRING	19 - INPUT SHAFT
10 - DISC	20 - LUBRICATION CHECK VALVE AND SNAP-RING

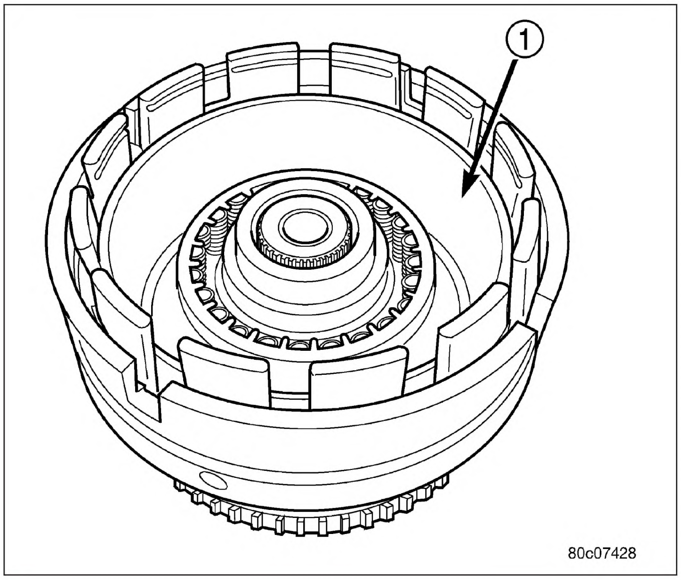
NOTE: Install all new seals and o-rings onto the input shaft and input hub. The o-rings on the input hub are color coded. Be sure to install the correct o-ring in the correct location.

1. Check the transmission lubrication check valve (20) located in the input shaft using shop air. The valve should only allow air flow in one direction. If the valve allows no air flow, or air flow in both directions, the valve will need to be replaced.
2. Lubricate all seals with Mopar® ATF +4, Automatic Transmission Fluid, prior to installation.
3. Assemble the OD/reverse piston (15) onto the input clutch hub (1).
4. Assemble the input clutch retainer (13) onto the input clutch hub (1).
5. Install the input clutch retainer tapered snap-ring (5) with tapered side up onto the input clutch hub (1).

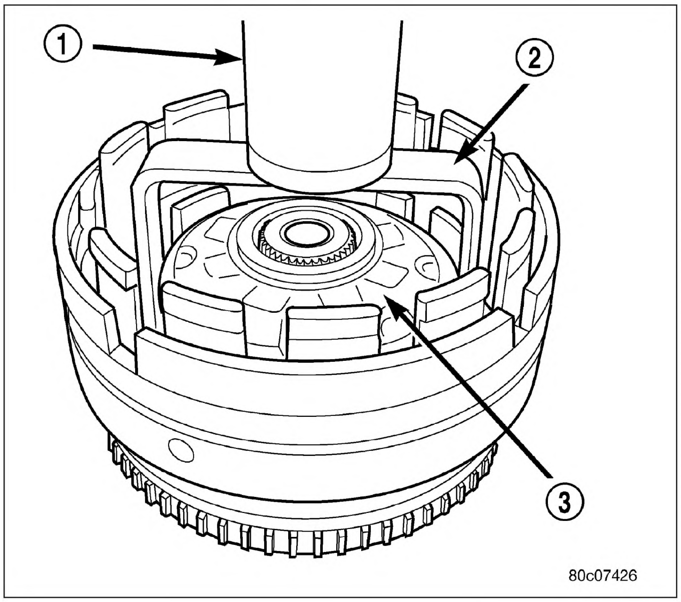
6. Install Piston Guides 8504 (1) into the input clutch retainer (13) and onto the input clutch hub (1) to guide the inner and outer underdrive piston (8) seals into position.
7. Install the underdrive piston (8) into the input clutch retainer (13) and over the input clutch hub (1).

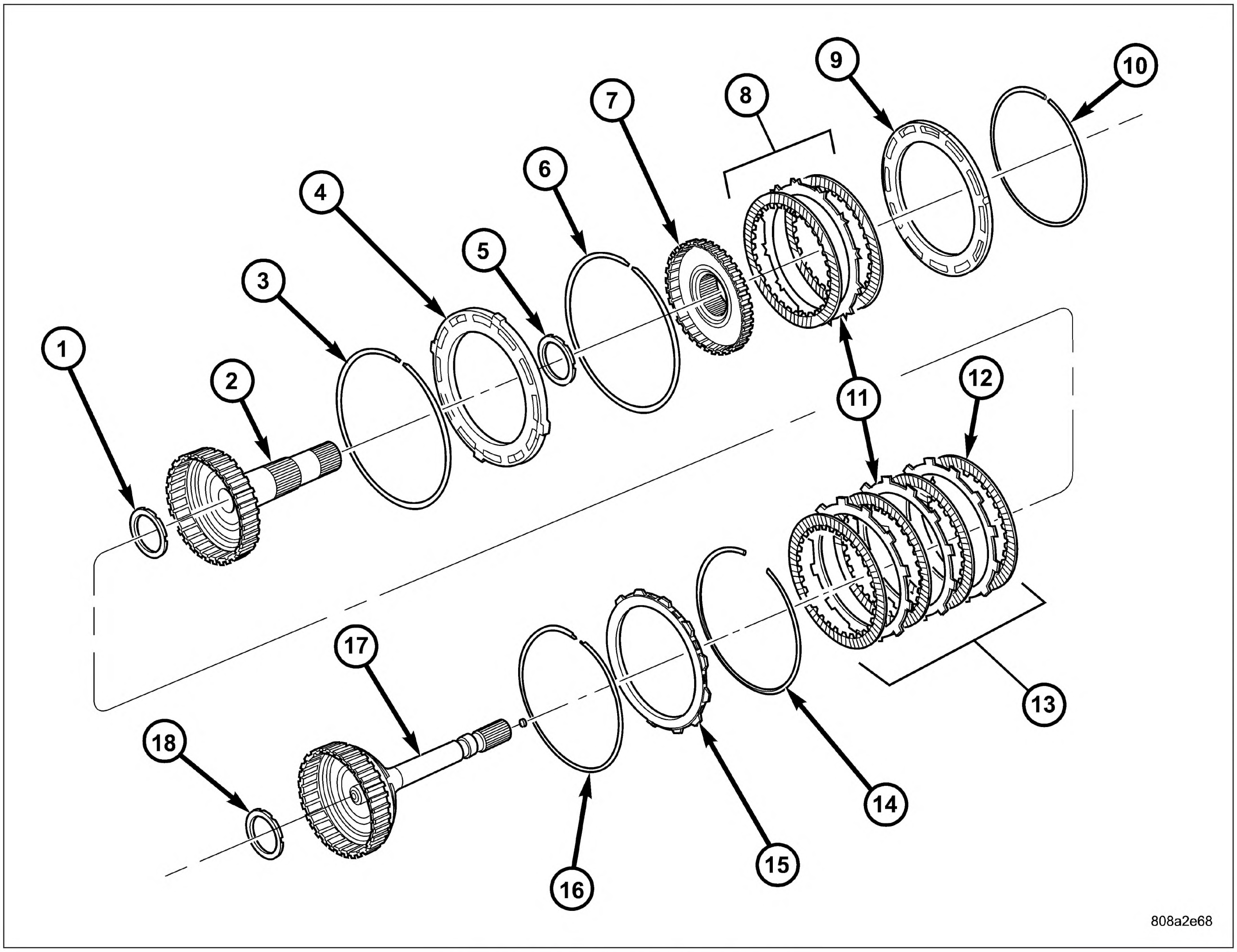


8. Install the UD/OD balance piston return spring pack (9) into the input clutch retainer (13).
9. Install Piston Guide 8252 (1) into the input clutch retainer (13) to guide the UD/OD balance piston (6) seal into position inside the underdrive piston (8).



10. Install the UD/OD balance piston (3) into the input clutch retainer and the underdrive piston.
11. Using Spring Compressor 8251 (2), compress the UD/OD return spring pack and secure the piston in place with the snap-ring.
12. Install the underdrive clutch pack (11) into the input clutch retainer.



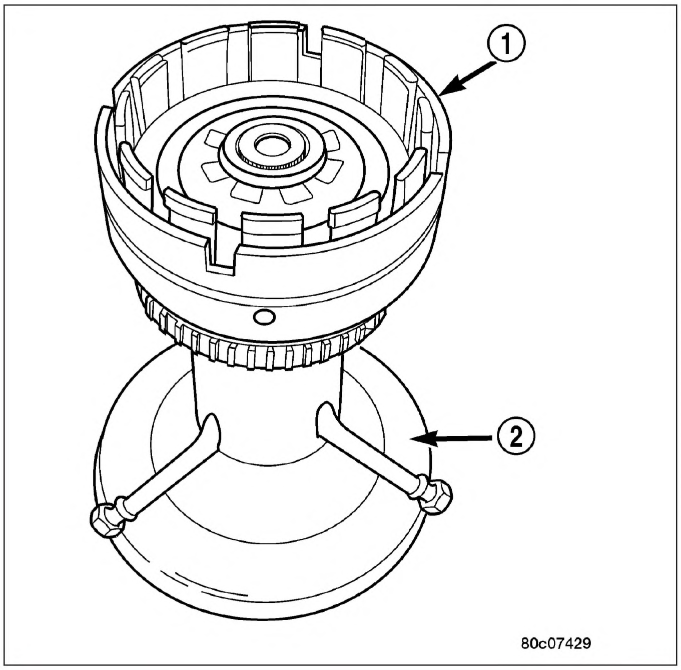


Input Clutch Assembly - Part 2

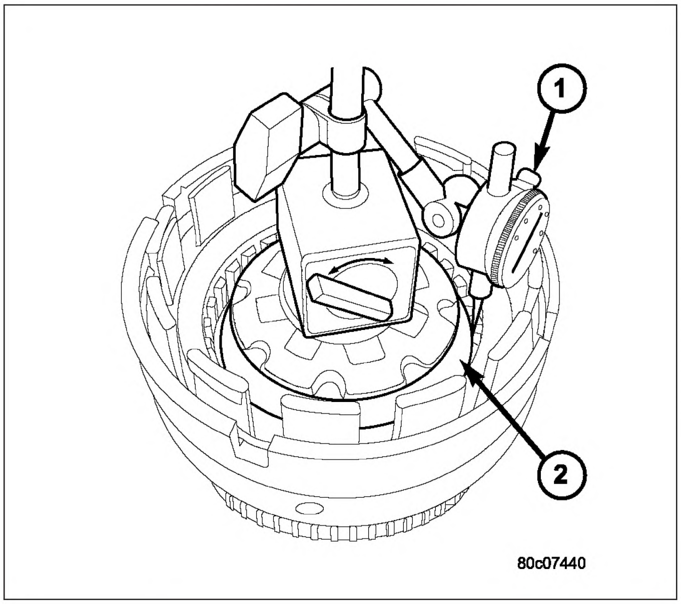
1 - THRUST BEARING NUMBER 3
2 - OD HUB/SHAFT
3 - SNAP-RING (WAVE)
4 - REV/OD REACTION PLATE
5 - THRUST BEARING NUMBER 4
6 - SNAP-RING (FLAT)
7 - REVERSE HUB/SHAFT
8 - REVERSE CLUTCH
9 - REVERSE REACTION PLATE
10 - SNAP-RING (SELECT)
11 - PLATE
12 - DISC
13 - OD CLUTCH
14 - SNAP-RING (TAPERED)
15 - UD/OD REACTION PLATE
16 - SNAP-RING (FLAT)
17 - UD HUB/SHAFT
18 - THRUST BEARING NUMBER 2

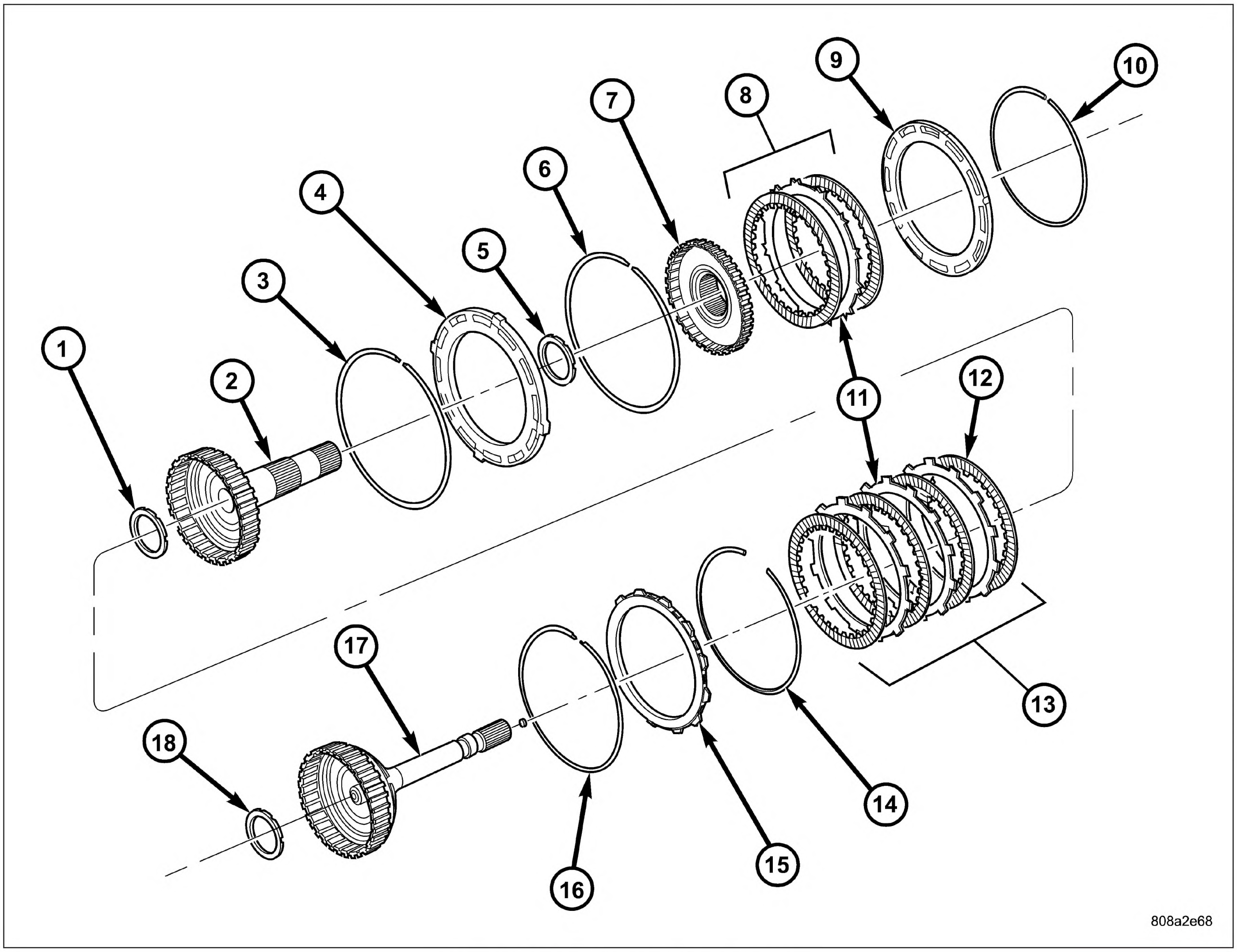
13. Install the UD/OD reaction plate lower flat snap-ring (16). The correct snap-ring can be identified by the two tabbed ears.
14. Install the UD/OD reaction plate (15) into the input clutch retainer. The reaction plate is to be installed with the big step down.
15. Install the UD/OD reaction plate upper tapered snap-ring (14) with tapered side up.

16. Install the input clutch assembly into Input Clutch Pressure Fixture 8260 (2).



17. Mount a dial indicator to the assembly, push down on the clutch discs and zero the indicator against the underdrive clutch discs. Apply 20 psi of air pressure to the underdrive clutch and record the dial indicator reading. Measure and record UD clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with UD clutch pack clearance specification. The correct clutch clearance is 0.84-1.54 mm (0.033-0.061 in.). The reaction plate is not selective. If the clutch clearance is not within specification, replace the reaction plate along with all the friction and steel discs.



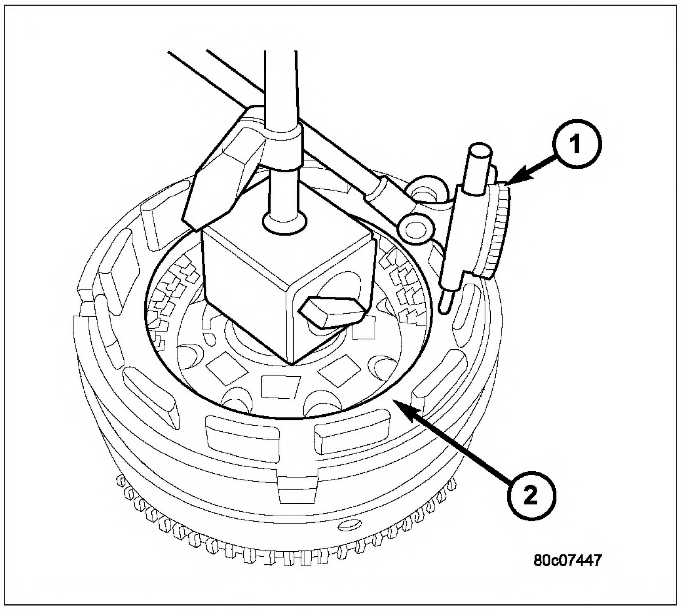


Input Clutch Assembly - Part 2

1 - THRUST BEARING NUMBER 3	10 - SNAP-RING (SELECT)
2 - OD HUB/SHAFT	11 - PLATE
3 - SNAP-RING (WAVE)	12 - DISC
4 - REV/OD REACTION PLATE	13 - OD CLUTCH
5 - THRUST BEARING NUMBER 4	14 - SNAP-RING (TAPERED)
6 - SNAP-RING (FLAT)	15 - UD/OD REACTION PLATE
7 - REVERSE HUB/SHAFT	16 - SNAP-RING (FLAT)
8 - REVERSE CLUTCH	17 - UD HUB/SHAFT
9 - REVERSE REACTION PLATE	18 - THRUST BEARING NUMBER 2

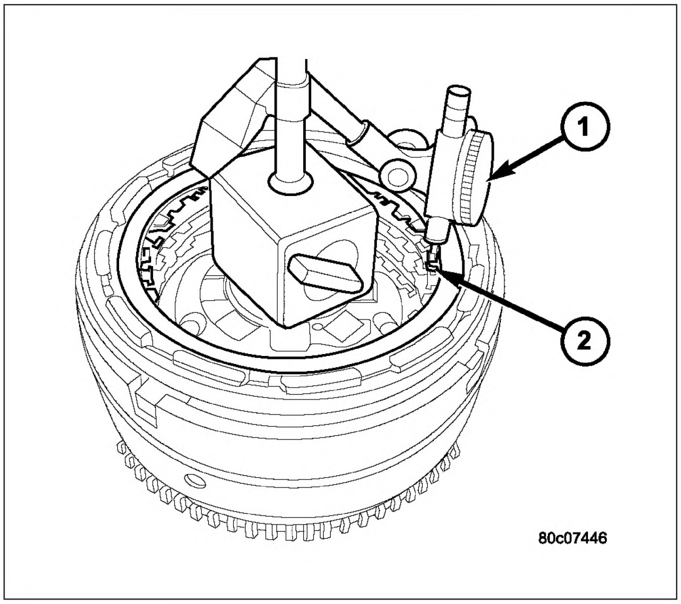
18. Install the overdrive clutch pack (13) into the input clutch retainer. The overdrive steel separator plates can be identified by the lack of the half-moon cuts in the locating tabs.
19. Install the overdrive clutch wavy snap-ring (3) with the two tabbed ears into the input clutch retainer.
20. Install the OD/reverse reaction plate (4) into the input clutch retainer. The reaction plate is non-directional.
21. Install the OD/reverse reaction plate flat snap-ring (6) into the input clutch retainer.

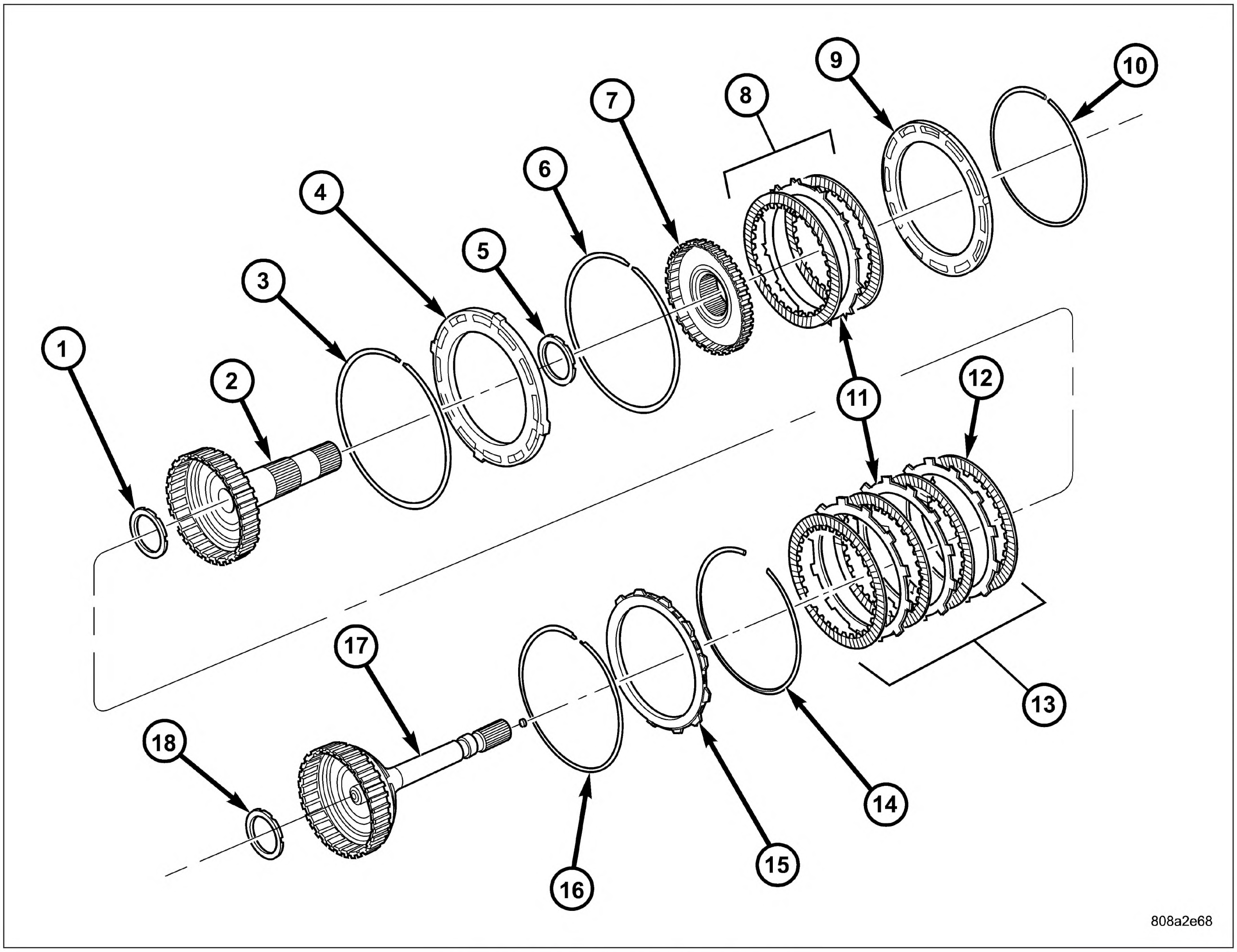
22. Mount a dial indicator to the assembly and zero the indicator against the OD/reverse reaction plate (2). Apply 20 psi of air pressure to the overdrive clutch and record the dial indicator reading. Measure and record OD clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with OD clutch pack clearance specification.Verify that the clutch clearance is 1.103-1.856 mm (0.043-0.073 in.). The reaction plate is not selective. If the clutch clearance is not within specification, replace the reaction plate along with all the friction and steel discs.



23. Install the reverse clutch pack (8) into the input clutch retainer.
24. Install the reverse reaction plate(9) into the input clutch retainer.
25. Install the reverse reaction plate selective snap-ring (10) into the input clutch retainer.

26. Mount a dial indicator to the assembly, push down on the clutch discs, pull up on the reaction plate to ensure the plate is properly seated and zero the indicator against the reverse clutch discs (2). Apply 20 psi of air pressure to the reverse clutch and record the dial indicator reading. Measure and record Reverse clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with Reverse clutch pack clearance specification. The correct clutch clearance is 0.58-1.47 mm (0.023-0.058 in.). Adjust as necessary. Install the chosen snap-ring and re-measure to verify selection.





Input Clutch Assembly - Part 2

1 - THRUST BEARING NUMBER 3
2 - OD HUB/SHAFT
3 - SNAP-RING (WAVE)
4 - REV/OD REACTION PLATE
5 - THRUST BEARING NUMBER 4
6 - SNAP-RING (FLAT)
7 - REVERSE HUB/SHAFT
8 - REVERSE CLUTCH
9 - REVERSE REACTION PLATE
10 - SNAP-RING (SELECT)
11 - PLATE
12 - DISC
13 - OD CLUTCH
14 - SNAP-RING (TAPERED)
15 - UD/OD REACTION PLATE
16 - SNAP-RING (FLAT)
17 - UD HUB/SHAFT
18 - THRUST BEARING NUMBER 2

27. Remove the reverse clutch pack (8) from the input clutch retainer.
28. Install the number 2 thrust bearing (18) onto the underdrive hub (17) with outer race against the hub with petroleum jelly.
29. Install the underdrive hub (17) into the input clutch retainer.
30. Install the number 3 thrust bearing (1) into the overdrive hub (2) with the outer race against the hub with petroleum jelly.
31. Install the overdrive hub (2) into the input clutch retainer.
32. Install the number 4 thrust bearing (5) into the reverse hub with outer race against the hub with petroleum jelly.
33. Install the reverse hub (7) into the input clutch retainer.
34. Install the complete reverse clutch pack (8).
35. Install the reverse reaction plate (9) and snap-ring (10).
36. Push up on reaction plate to allow reverse clutch to move freely.

SENSOR-INPUT SPEED

DESCRIPTION

The Input and Output Speed Sensors are two-wire magnetic pickup devices that generate AC signals as rotation occurs. They are mounted in the left side of the transmission case and are considered primary inputs to the Transmission Control Module (TCM).

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil, an AC voltage is generated and sent to the TCM. The TCM interprets this information as input shaft rpm.

The Output Speed Sensor generates an AC signal in a similar fashion, though its coil is excited by rotation of the rear planetary carrier lugs. The TCM interprets this information as output shaft rpm.

The TCM compares the input and output speed signals to determine the following:

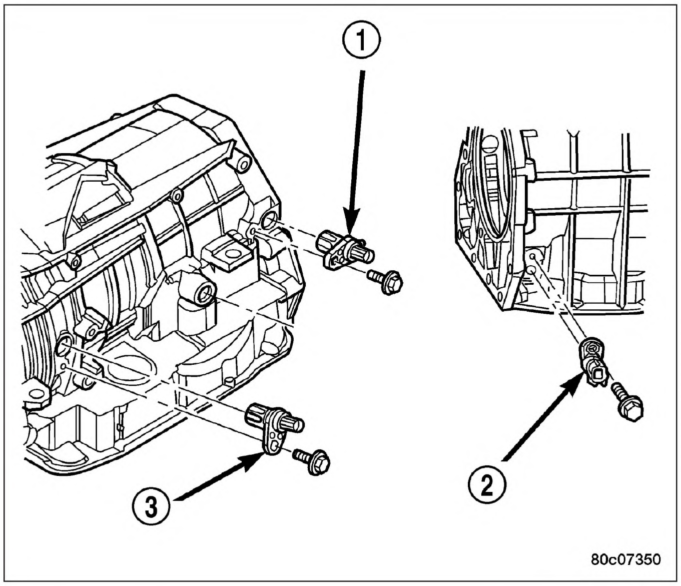
- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

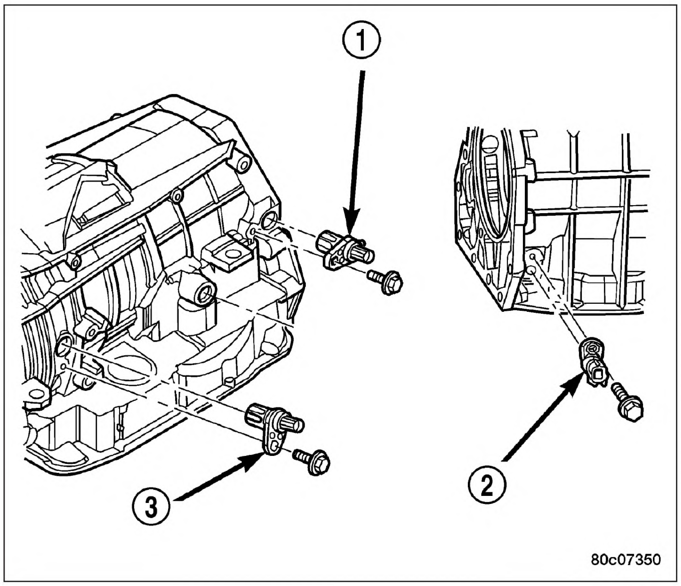
REMOVAL

1. Raise vehicle.
2. Place a suitable fluid catch pan under the transmission.
3. Remove the wiring connector from the input speed sensor (3).
4. Remove the bolt holding the input speed sensor to the transmission case.
5. Remove the input speed sensor (3) from the transmission case.



INSTALLATION

1. Install the input speed sensor (3) into the transmission case.
2. Install the bolt to hold the input speed sensor (3) into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).
3. Install the wiring connector onto the input speed sensor.
4. Verify the transmission fluid level. Add fluid as necessary.
5. Lower vehicle.



SENSOR-LINE PRESSURE

DESCRIPTION

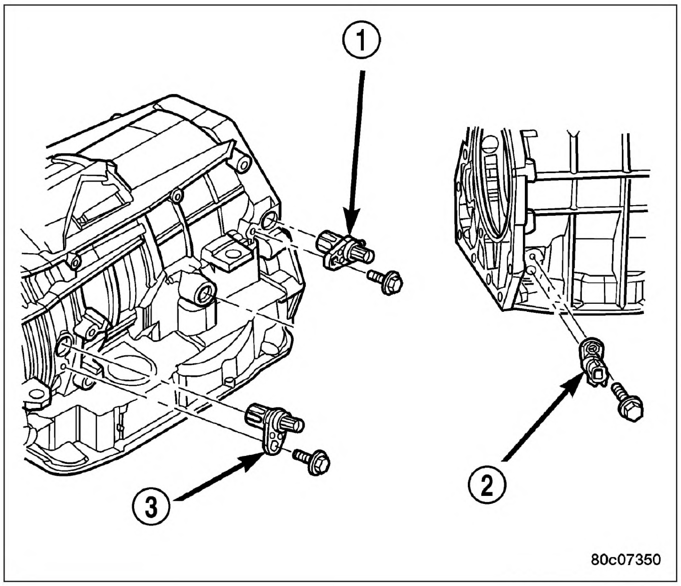
The TCM utilizes a closed-loop system to control transmission line pressure. The system contains a variable force style solenoid, the Pressure Control Solenoid, mounted on the side of the solenoid and pressure switch assembly. The solenoid is duty cycle controlled by the TCM to vent the unnecessary line pressure supplied by the oil pump back to the sump. The system also contains a variable pressure style sensor, the Line Pressure Sensor, which is a direct input to the TCM. The line pressure solenoid monitors the transmission line pressure and completes the feedback loop to the TCM. The TCM uses this information to adjust its control of the pressure control solenoid to achieve the desired line pressure.

OPERATION

The TCM calculates the desired line pressure based upon inputs from the transmission and engine. The TCM calculates the torque input to the transmission and uses that information as the primary input to the calculation. The line pressure is set to a predetermined value during shifts and when the transmission is in the PARK and NEUTRAL positions. This is done to ensure consistent shift quality. During all other operation, the actual line pressure is compared to the desired line pressure and adjustments are made to the pressure control solenoid duty cycle.

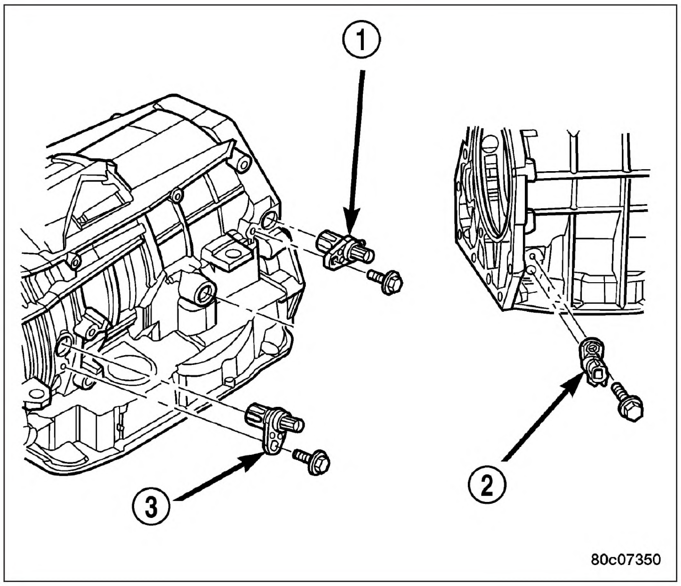
REMOVAL

1. Raise vehicle.
2. Place a suitable fluid catch pan under the transmission.
3. Remove the wiring connector from the line pressure sensor (2).
4. Remove the bolt holding the line pressure sensor (2) to the transmission case.
5. Remove the line pressure sensor (2) from the transmission case.



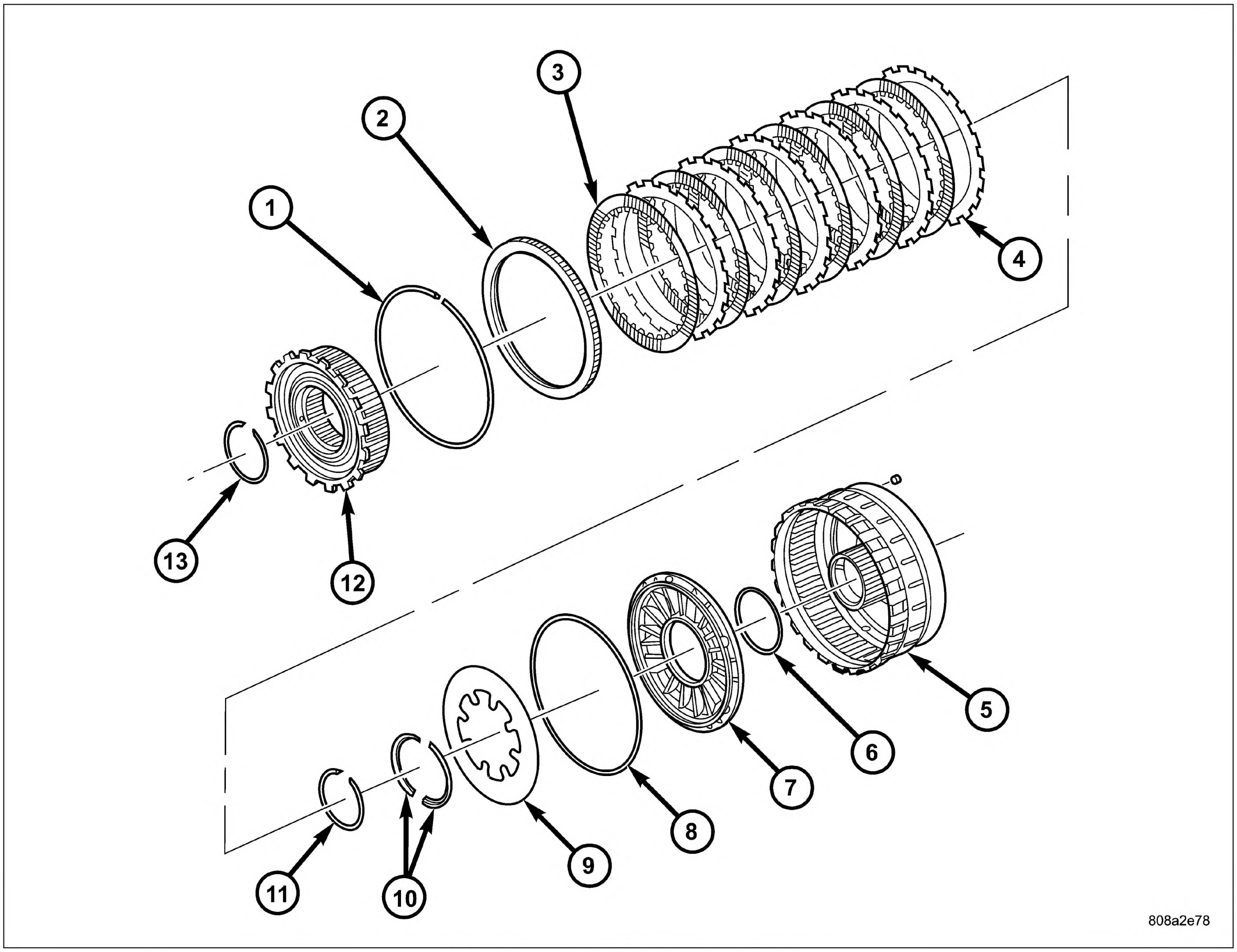
INSTALLATION

1. Install the line pressure sensor (2) into the transmission case.
2. Install the bolt to hold the line pressure sensor (2) into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).
3. Install the wiring connector onto the line pressure sensor (2).
4. Verify the transmission fluid level. Add fluid as necessary.
5. Lower vehicle.



CLUTCH-LOW/REVERSE

DISASSEMBLY

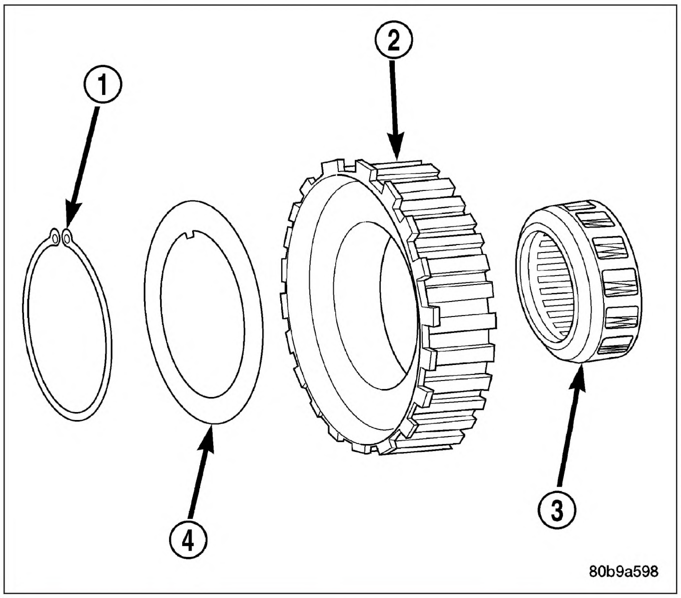


Low/Reverse Clutch Assembly

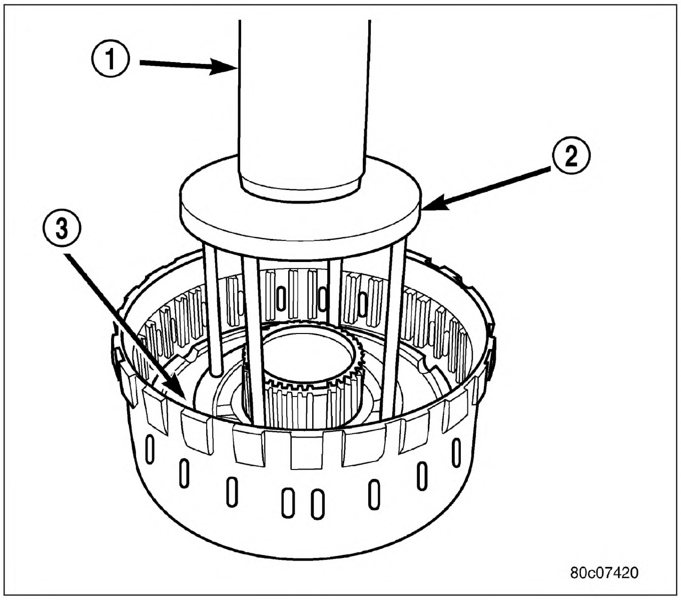
1 - SNAP-RING (SELECT)
2 - REACTION PLATE
3 - DISC
4 - PLATE
5 - L/R CLUTCH RETAINER
6 - SEAL
7 - PISTON
8 - SEAL
9 - BELLEVILLE SPRING
10 - RETAINER
11 - SNAP-RING
12 - OVERRUNNING CLUTCH
13 - SNAP-RING

1. Remove the inner overrunning clutch snap-ring (13) from the low/reverse clutch retainer (5).
2. Remove the outer low/reverse reaction plate flat snap-ring (1.
3. Remove the low/reverse clutch (3, 4) and the overrunning clutch (12) from the low/reverse clutch retainer (5) as an assembly.
4. Separate the low/reverse clutch (3, 4) from the overrunning clutch (12).

5. Remove the overrunning clutch snap-ring (1).
6. Remove the spacer (4) from the overrunning clutch (3).
7. Separate the inner and outer races (2) of the overrunning clutch (3).
8. Remove the overrunning clutch lower snap-ring.



9. Using Spring Compressor 8285 (2) and a suitable shop press (1), compress the low/reverse piston Belleville spring (3) and remove the split retaining ring holding the Belleville spring into the low/reverse clutch retainer.
10. Remove the low/reverse clutch Belleville spring (3) and piston from the low/reverse clutch retainer. Use 20 psi of air pressure to remove the piston if necessary.



CLEANING

Clean the overrunning clutch assembly, clutch cam, and low-reverse clutch retainer. Dry them with compressed air after cleaning.

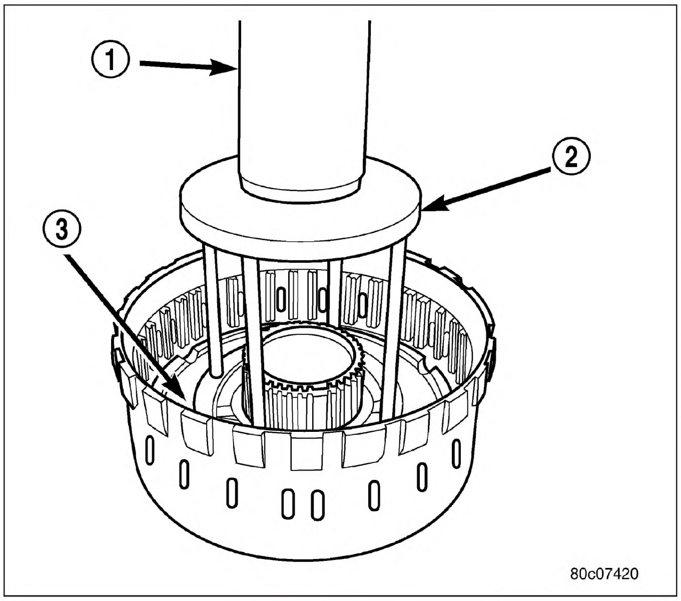
INSPECTION

Inspect condition of each clutch part after cleaning. Replace the overrunning clutch roller and spring assembly if any rollers or springs are worn or damaged, or if the roller cage is distorted, or damaged. Replace the cam if worn, cracked or damaged.

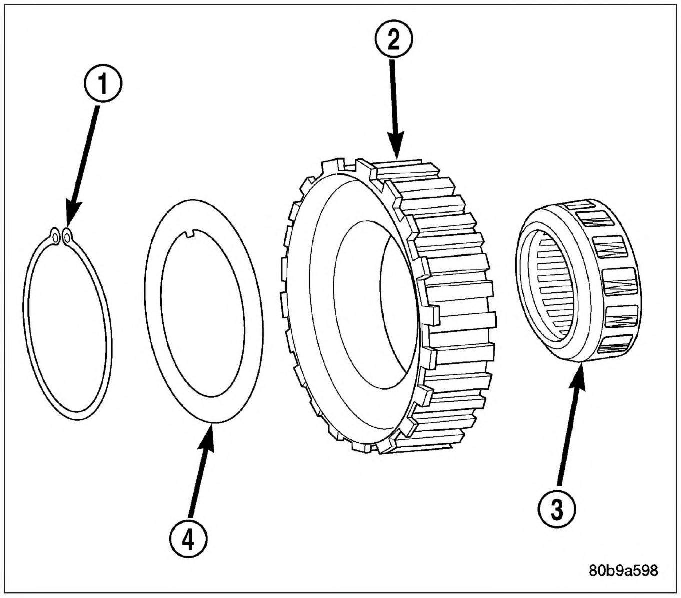
Replace the low-reverse clutch retainer if the clutch race, roller surface or inside diameter is scored, worn or damaged.

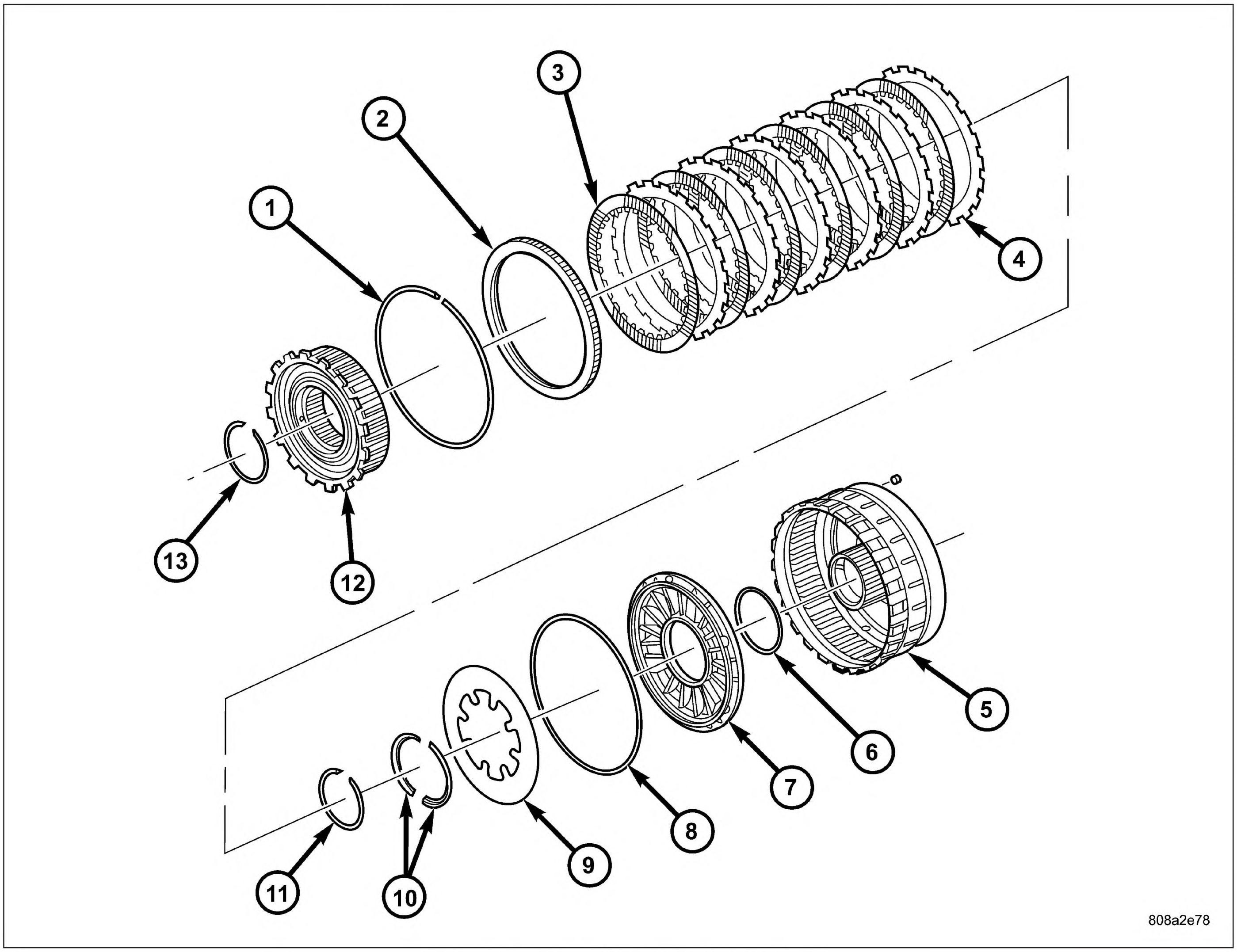
ASSEMBLY

1. Check the bleed orifice to ensure that it is not plugged or restricted.
2. Install a new seal on the low/reverse piston. Lubricate the seal with Mopar® ATF +4, Automatic Transmission Fluid, prior to installation.
3. Install the low/reverse piston into the low/reverse clutch retainer.
4. Position the low/reverse piston Belleville spring (3) on the low/reverse piston.
5. Using Spring Compressor 8285 (2) and a suitable shop press (1), compress the low/reverse piston Belleville spring (3) and install the split retaining ring to hold the Belleville spring into the low/reverse clutch retainer.



6. Install the lower overrunning clutch snap-ring.
7. Assemble the inner and outer races (2) of the overrunning clutch (3).
8. Position the overrunning clutch spacer (4) on the overrunning clutch (3).
9. Install the upper overrunning clutch snap-ring (1).





Low/Reverse Clutch Assembly

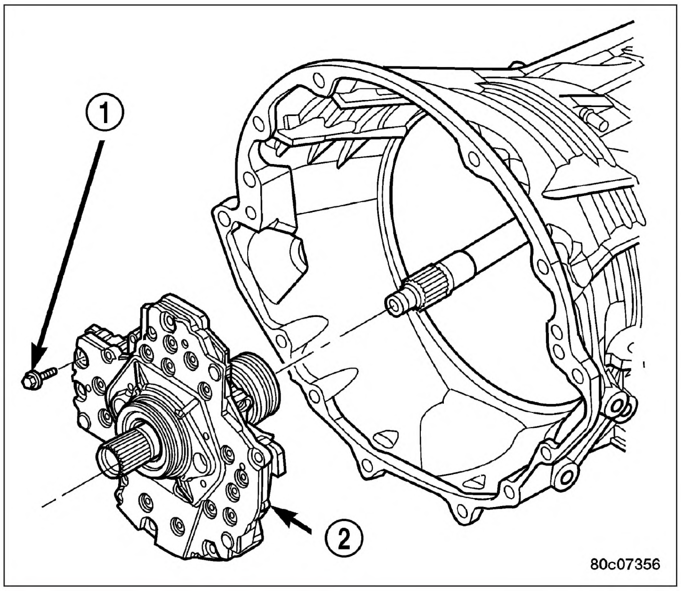
1 - SNAP-RING (SELECT)	8 - SEAL
2 - REACTION PLATE	9 - BELLEVILLE SPRING
3 - DISC	10 - RETAINER
4 - PLATE	11 - SNAP-RING
5 - L/R CLUTCH RETAINER	12 - OVERRUNNING CLUTCH
6 - SEAL	13 - SNAP-RING
7 - PISTON	

10. Assemble and install the low/reverse clutch pack (3, 4) into the low/reverse clutch retainer (5).
11. Install the low/reverse reaction plate (2) into the low/reverse clutch retainer (5). The reaction plate is directional and must be installed with the flat side down.
12. Install the low/reverse clutch pack snap-ring (1). The snap-ring is selectable and should be chosen to give the correct clutch pack clearance.
13. Measure the low/reverse clutch pack clearance and adjust as necessary. The correct clutch clearance is 1.00-1.74 mm (0.039-0.075 in.).
14. Install the overrunning clutch (12) into the low/reverse clutch retainer (5) making sure that the index splines are aligned with the retainer.
15. Install the overrunning clutch inner snap-ring (13).

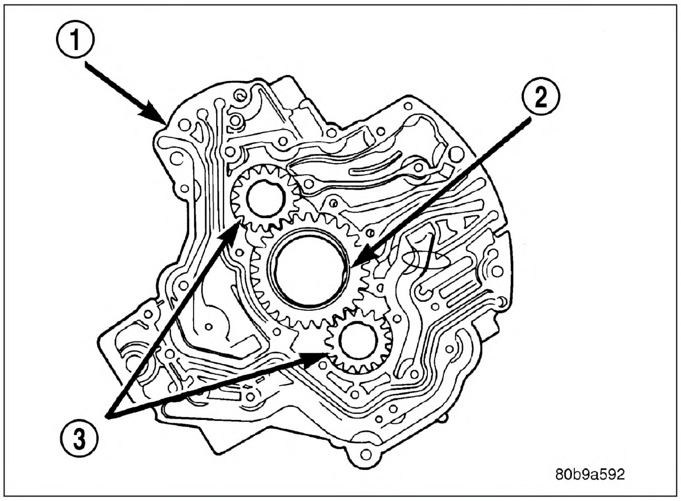
PUMP-OIL

DESCRIPTION

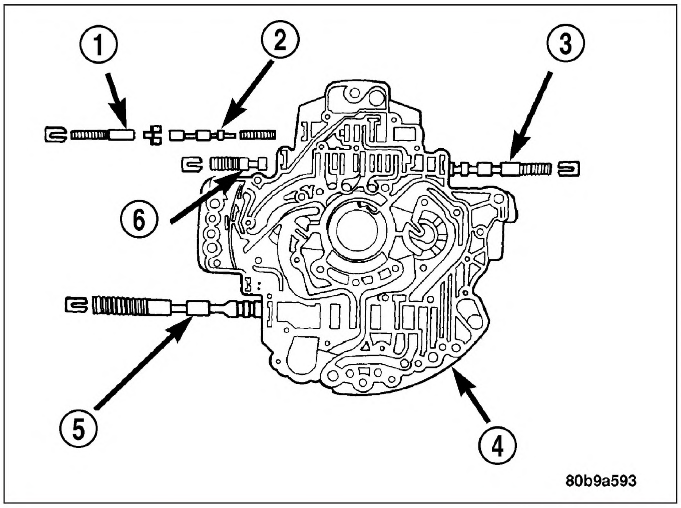
The oil pump (2) is located at the front of the transmission inside the bell housing and behind the transmission front cover.

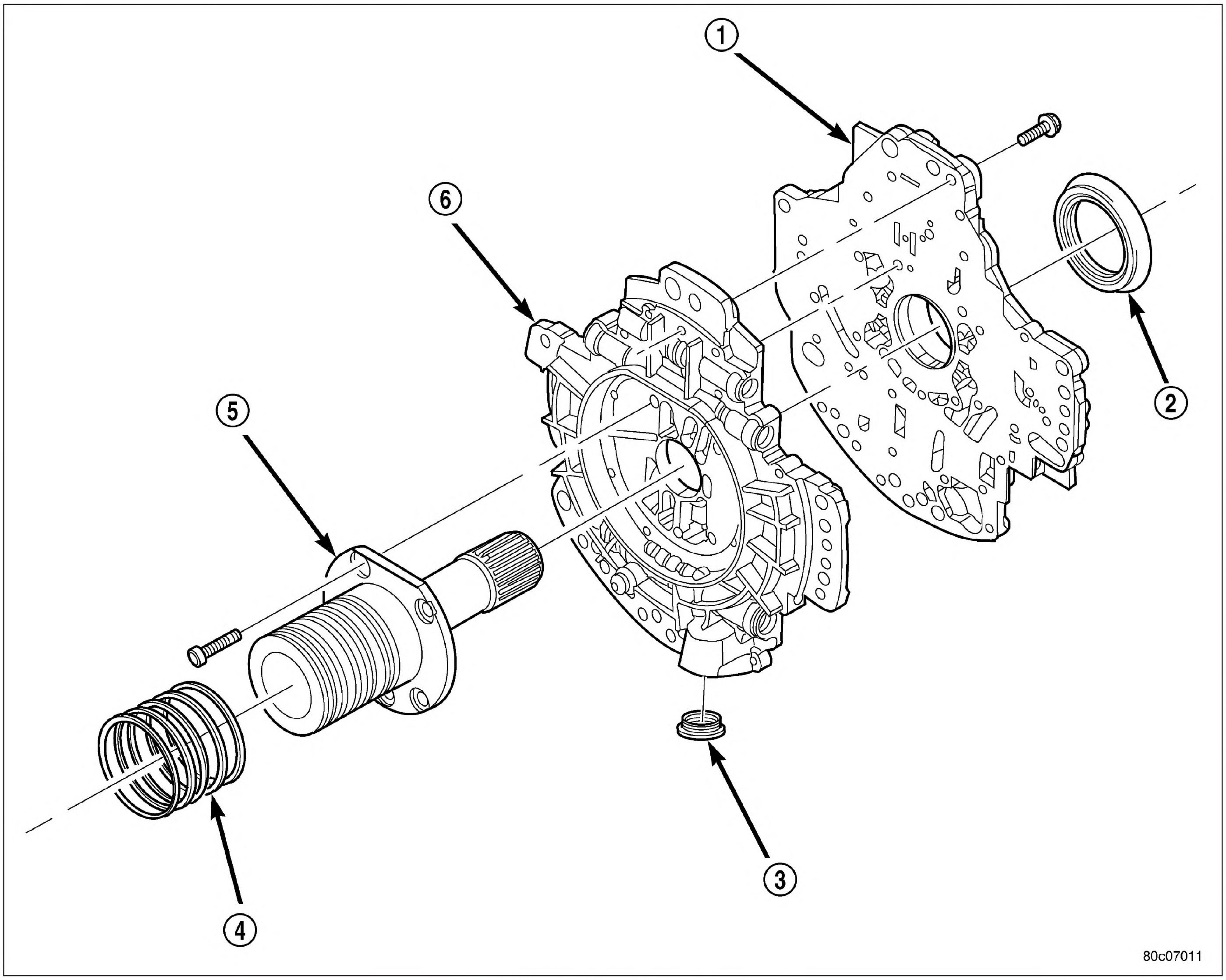


The oil pump consists of two independent pumps.



The oil pump also contains a number of valves. The converter clutch switch (3) and control valves (2), pressure regulator valve (5), and converter pressure limit valve (6) are all located in the oil pump valve body.





Oil Pump Reaction Shaft

1 - PUMP HOUSING
2 - SEAL
3 - OIL FILTER SEAL
4 - SEAL RING (5)
5 - REACTION SHAFT SUPPORT
6 - PUMP VALVE BODY

A front seal (2), and a bolt on reaction shaft (5) complete the oil pump assembly.

OPERATION

As the torque converter rotates, the converter hub rotates the oil pump drive gear. As the drive gear rotates both driven gears, a vacuum is created when the gear teeth come out of mesh. This suction draws fluid through the pump inlet from the oil pan. As the gear teeth come back into mesh, pressurized fluid is forced into the pump outlet and to the oil pump valves.

At low speeds, both sides of the pump supply fluid to the transmission. As the speed of the torque converter increases, the flow from both sides increases until the flow from the primary side alone is sufficient to meet system demands. At this point, the check valve located between the two pumps closes. The secondary side is shut down and the primary side supplies all the fluid to the transmission.

CONVERTER CLUTCH SWITCH VALVE

The converter clutch switch valve is used to control the hydraulic pressure supplied to the front (OFF) side of the torque converter clutch.

CONVERTER CLUTCH REGULATOR VALVE

The converter clutch regulator valve is used to control the hydraulic pressure supplied to the back (ON) side of the torque converter clutch.

TORQUE CONVERTER LIMIT VALVE

The torque converter limit valve serves to limit the available line pressure to the torque converter clutch.

STANDARD PROCEDURE - OIL PUMP VOLUME CHECK

Measuring the oil pump output volume will determine if sufficient oil flow to the transmission oil cooler exists, and whether or not an internal transmission failure is present.

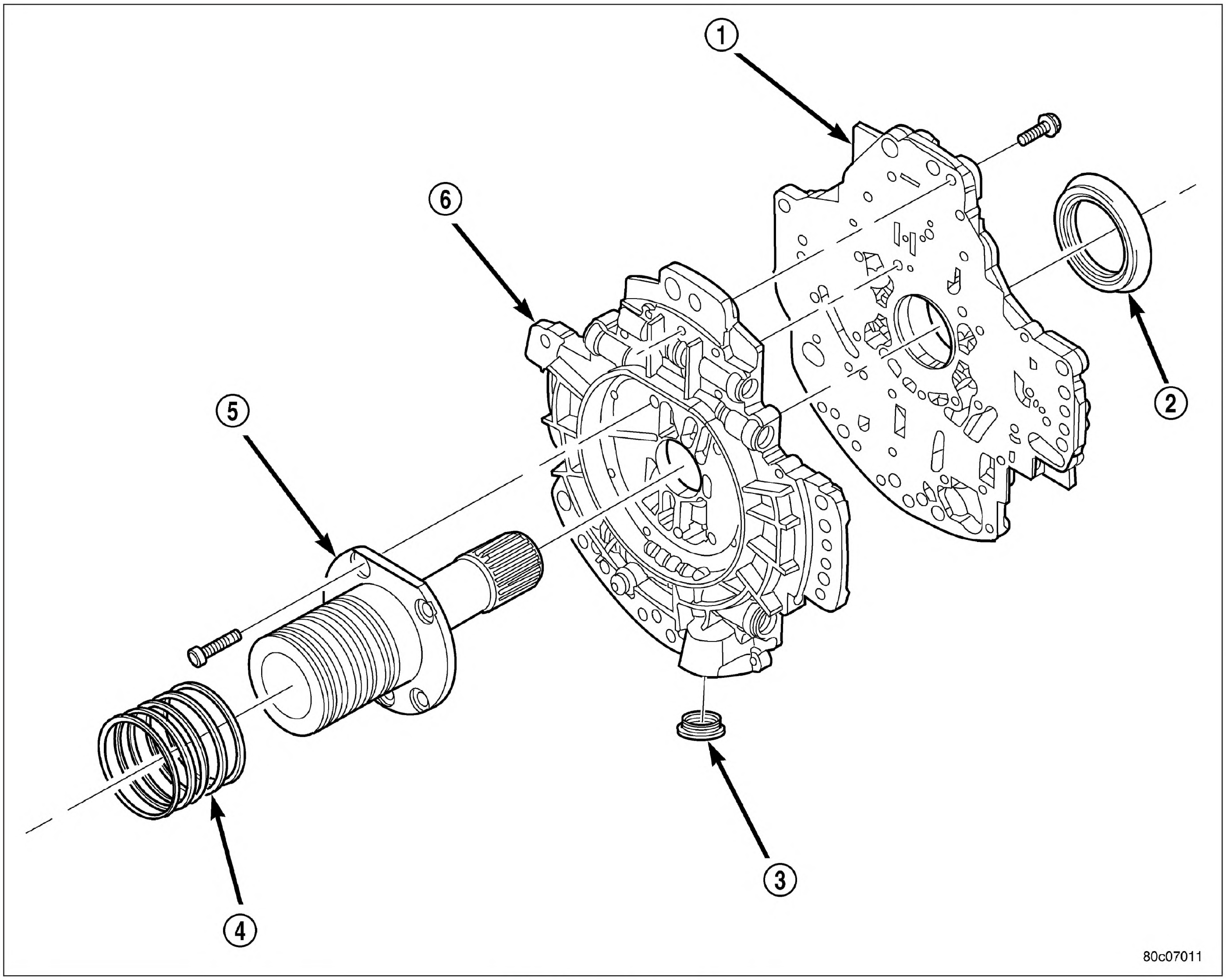
Verify that the transmission fluid is at the proper level. Refer to the Fluid Level Check procedure in this section. If necessary, fill the transmission to the proper level with Mopar® ATF +4, Automatic Transmission Fluid.

1. Disconnect the **To cooler** line at the cooler inlet and place a collecting container under the disconnected line.

CAUTION: With the fluid set at the proper level, fluid collection should not exceed (1) quart or internal damage to the transmission may occur.

2. Run the engine **at 1800 rpm**, with the shift selector in neutral. Verify that the transmission fluid temperature is below 104.5° C (220° F) for this test.
3. If one quart of transmission fluid is collected in the container in 30 seconds or less, oil pump flow volume is within acceptable limits. If fluid flow is intermittent, or it takes more than 30 seconds to collect one quart of fluid, refer to the Hydraulic Pressure tests in this section for further diagnosis.
4. Re-connect the **To cooler** line to the transmission cooler inlet.
5. Refill the transmission to proper level.

DISASSEMBLY

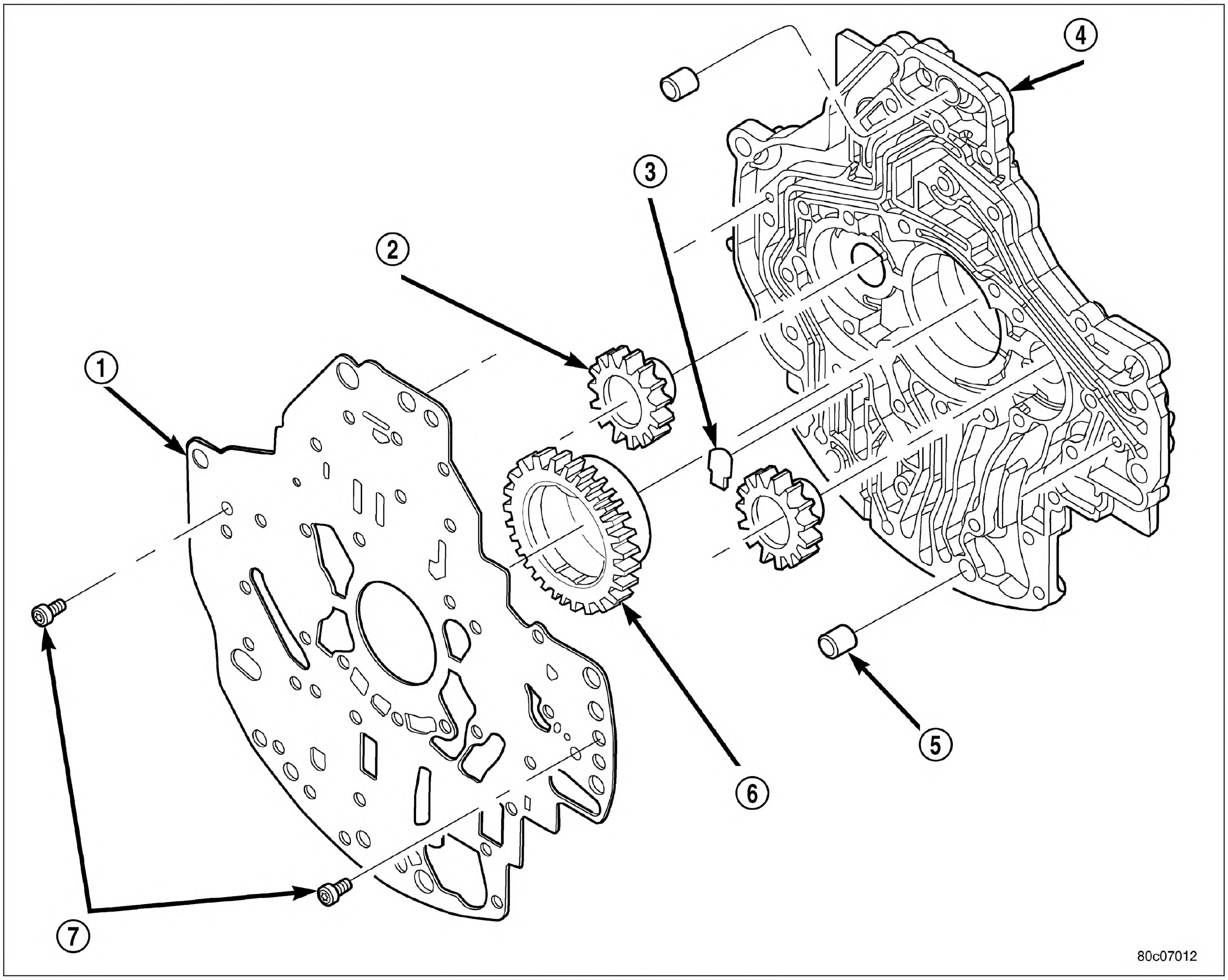


Oil Pump Assembly

1 - PUMP HOUSING
2 - SEAL
3 - OIL FILTER SEAL
4 - SEAL RING (5)
5 - REACTION SHAFT SUPPORT
6 - PUMP VALVE BODY

1. Remove the bolts holding the reaction shaft support (5) to the oil pump.
2. Remove the reaction shaft support (5) from the oil pump.
3. Remove all bolts holding the oil pump halves together.
4. Using suitable prying tools, separate the oil pump sections by inserting the tools in the supplied areas and prying the halves apart.

NOTE: The oil pump halves are aligned to each other through the use of two dowels. Be sure to pry upward evenly to prevent damage to the oil pump components.

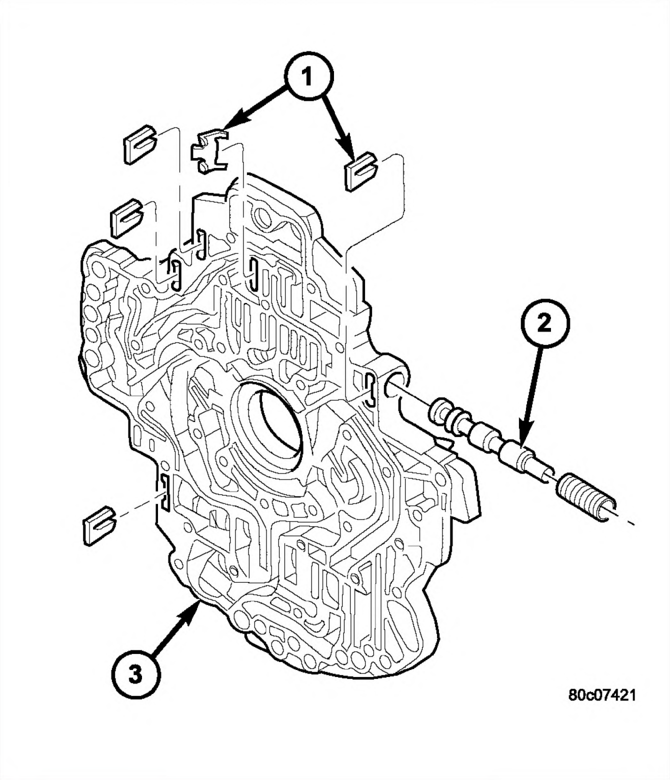


Oil Pump Housing and Gears

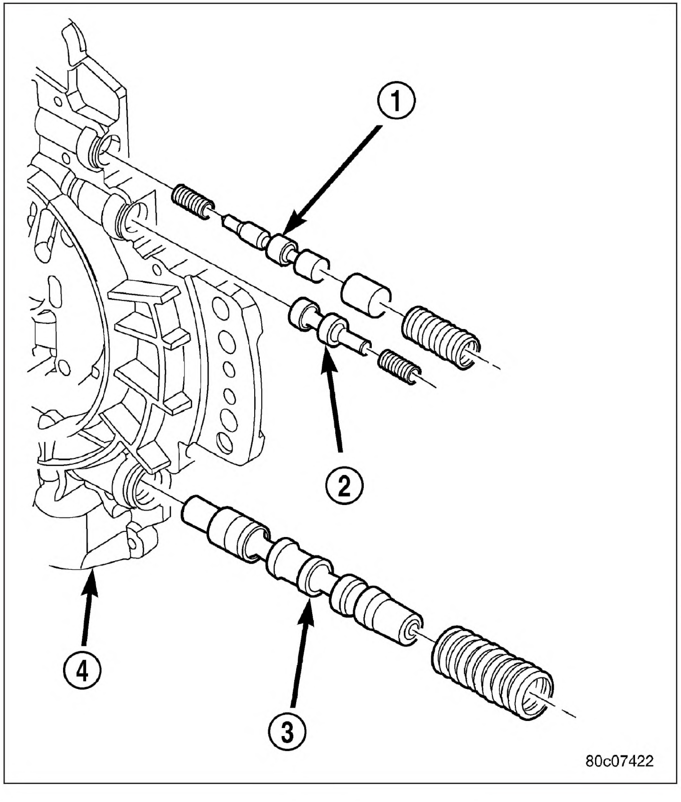
1 - SEPARATOR PLATE	5 - DOWEL (2)
2 - DRIVEN GEAR (2)	6 - DRIVE GEAR
3 - CHECK VALVE	7 - SCREW
4 - PUMP HOUSING	

5. Remove the screws (7) holding the separator plate (1) onto the oil pump housing (4).
6. Remove the separator plate (1) from the oil pump housing (4).
7. Mark all gears for location. The gears are select fit and if the oil pump is to be reused, the gears must be returned to their original locations.
8. Remove the oil pump gears (2, 6) from the oil pump housing (4).

9. Remove the oil pump valve retainers (1) and associated valve (2) and spring one at a time. Mark the combination of components as a group and tag them as to the location from which they were removed.



10. Remove the T/C regulator valve (1), T/C limit valve (2), and regulator valve (3).



CLEANING

Clean pump and support components with solvent and dry them with compressed air.

INSPECTION

Check condition of the seal rings and thrust washer on the reaction shaft support. The seal rings do not need to be replaced unless cracked, broken, or severely worn.

Inspect the pump and support components. Replace the pump or support if the seal ring grooves or machined surfaces are worn, scored, pitted, or damaged. Replace the pump gears if pitted, worn chipped, or damaged.

Inspect the pump reaction shaft support bushings. Replace either bushing only if heavily worn, scored or damaged. It is not necessary to replace the bushings unless they are actually damaged.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands.** Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the bore.

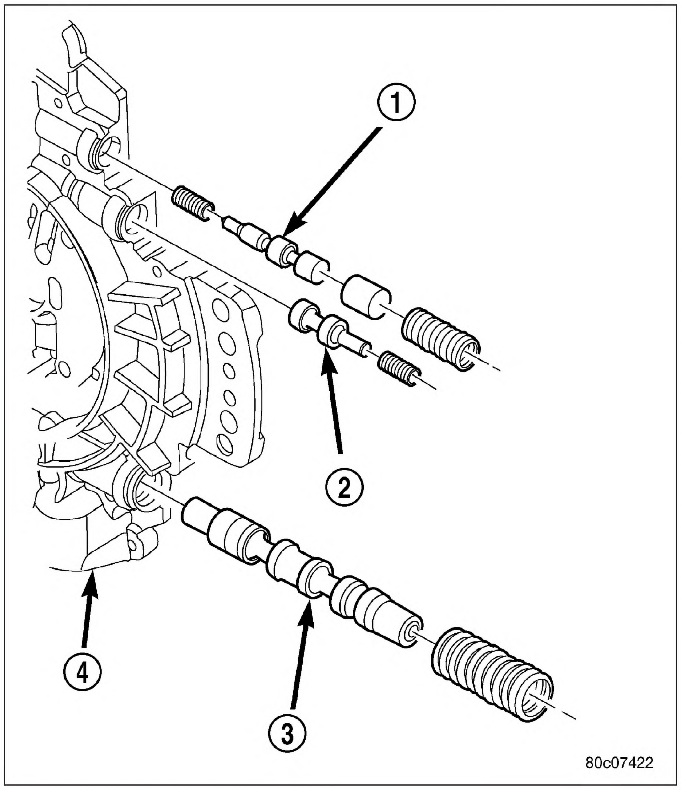
Inspect all the valve and plug bores in the oil pump cover. Use a penlight to view the bore interiors. Replace the oil pump if any bores are distorted or scored. Inspect all of the valve springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

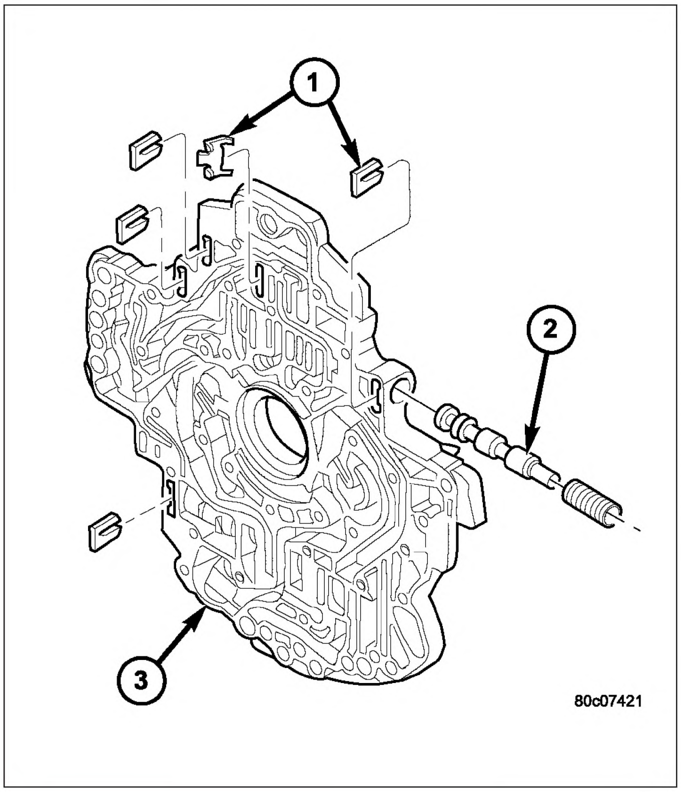
ASSEMBLY

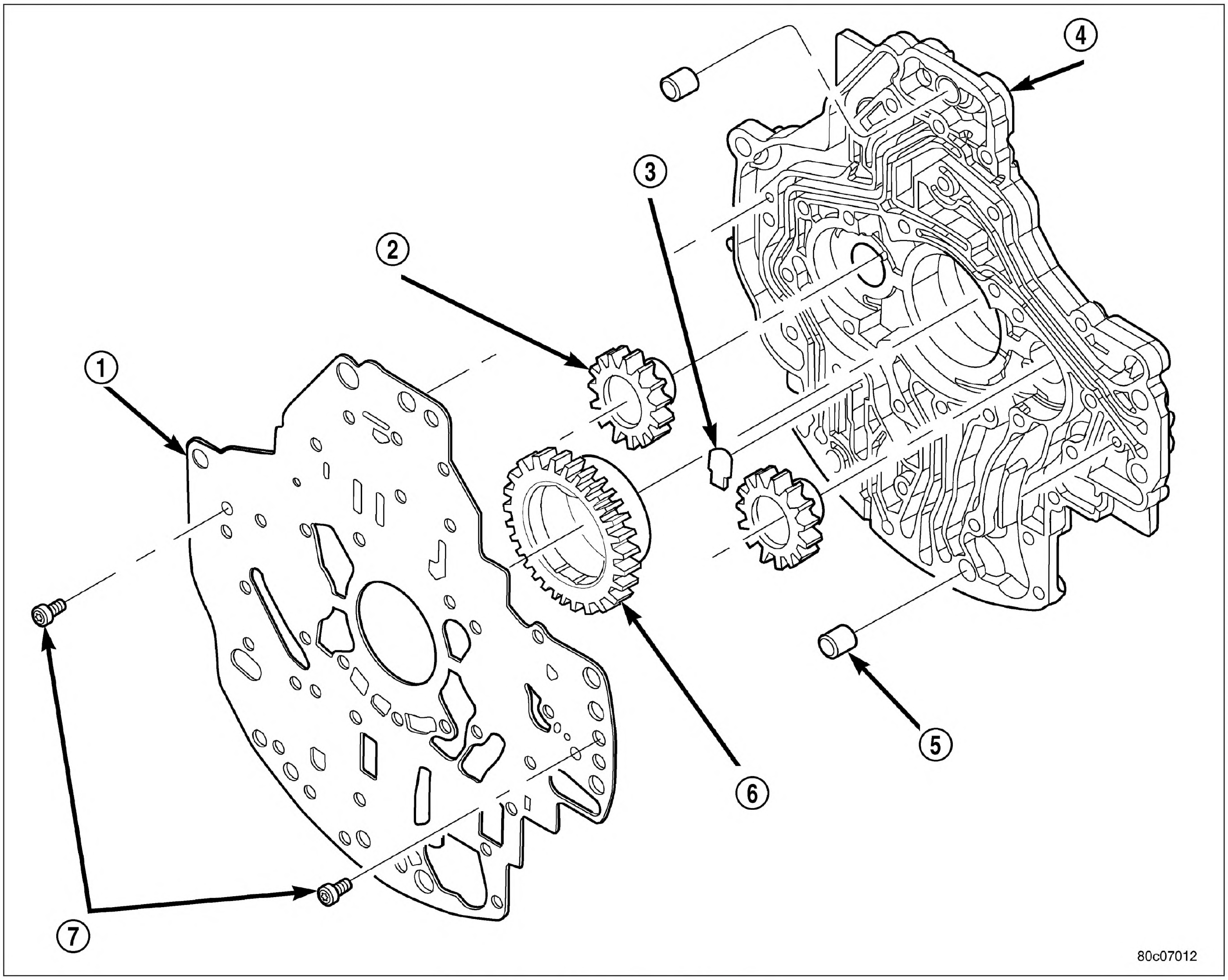
NOTE: Clean and inspect all components. Make sure that all passages are thoroughly cleaned and are free from dirt or debris. Make sure that all valves move freely in their proper bore. Make sure that all gear pockets and bushings are free from excessive wear and scoring. Replace the oil pump if any excessive wear or scoring is found.

1. Install the T/C regulator valve (1), T/C limit valve (2), and regulator valve (3).



2. Lubricate the oil pump valves with Mopar® ATF +4 and install the valve (2), spring, and retainer (1) into the appropriate oil pump valve body (3) bore.

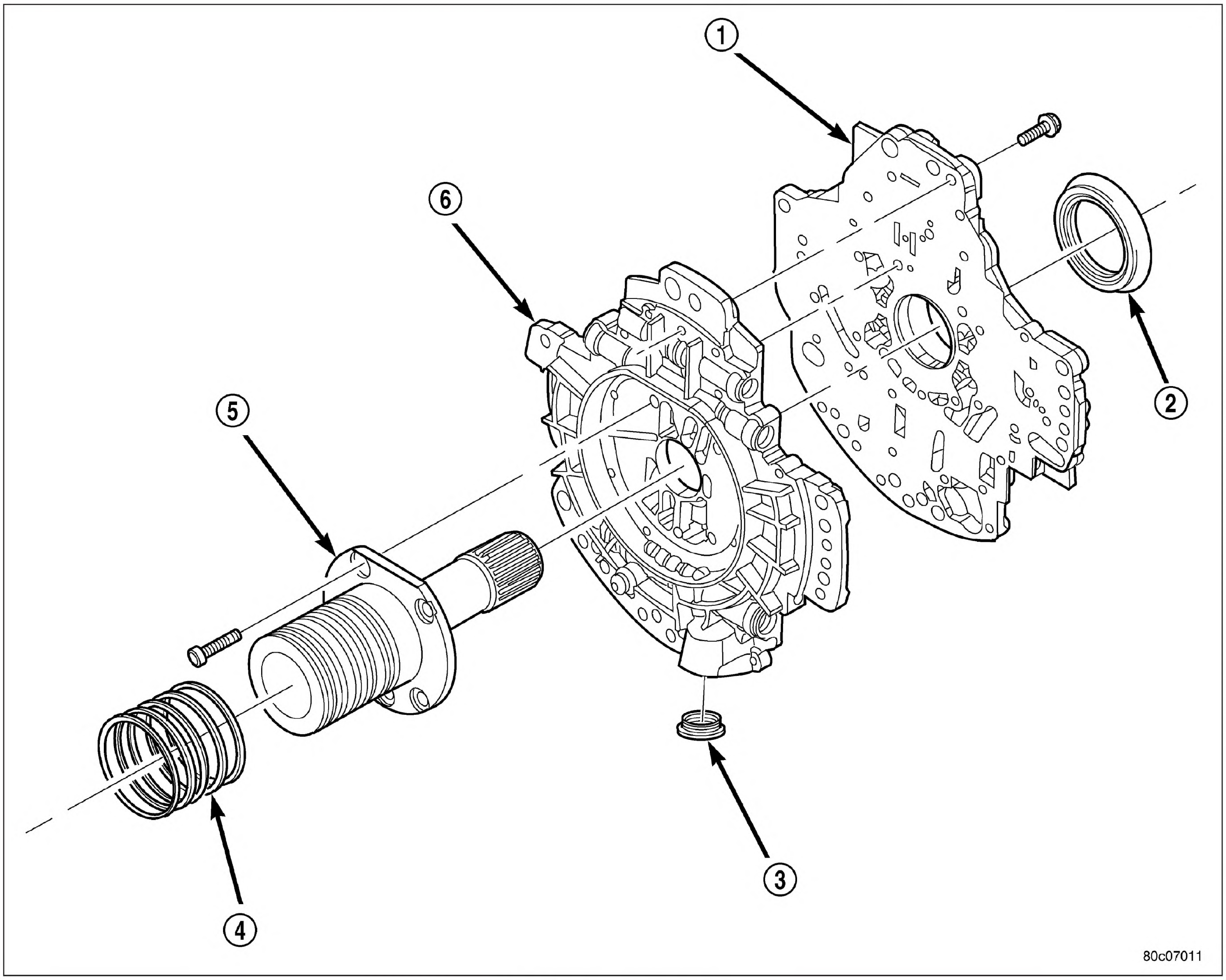




Oil Pump Housing and Gears

1 - SEPARATOR PLATE	5 - DOWEL (2)
2 - DRIVEN GEAR (2)	6 - DRIVE GEAR
3 - CHECK VALVE	7 - SCREW
4 - PUMP HOUSING	

3. Coat the gears (2, 6) with Mopar® ATF +4 and install into their original locations.
4. Place the separator plate (1) onto the oil pump housing (4).
5. Install the screws(7) to hold the separator plate (1) onto the oil pump housing (4). Tighten the screws to 4.5 N·m (40 in.lbs.).



Oil Pump Assembly

1 - PUMP HOUSING	4 - SEAL RING (5)
2 - SEAL	5 - REACTION SHAFT SUPPORT
3 - OIL FILTER SEAL	6 - PUMP VALVE BODY

6. Position the oil pump valve body (6) onto the locating dowels.
7. Seat the two oil pump halves together and install all bolts finger tight.
8. Torque all bolts down slowly starting in the center and working outward. The correct torque is 4.5 N·m (40 in.lbs.).
9. Verify that the oil pump gears rotate freely and smoothly.
10. Position the reaction shaft support (5) onto the oil pump valve body (6).
11. Install and torque the bolts to hold the reaction shaft support (5) to the oil pump valve body (6). The correct torque is 12 N·m (105 in.lbs.).

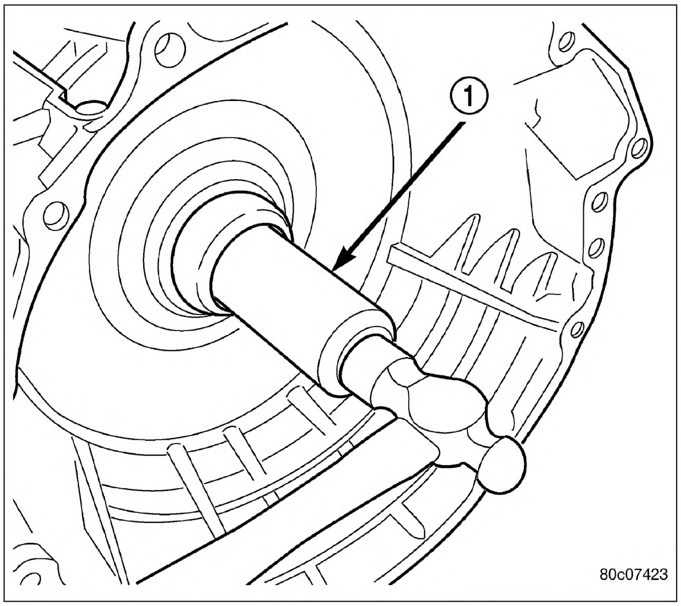
SEAL-OIL PUMP FRONT

REMOVAL

1. Remove transmission from the vehicle.
2. Remove the torque converter from the transmission.
3. Using a screw mounted in a slide hammer, remove the oil pump front seal.

INSTALLATION

1. Clean seal bore of the oil pump of any residue or particles from the original seal.
2. Install new oil seal in the oil pump housing using Seal Installer C-3860-A (1).



SENSOR-OUTPUT SPEED

DESCRIPTION

The Input and Output Speed Sensors are two-wire magnetic pickup devices that generate AC signals as rotation occurs. They are mounted in the left side of the transmission case and are considered primary inputs to the Transmission Control Module (TCM).

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil, an AC voltage is generated and sent to the TCM. The TCM interprets this information as input shaft rpm.

The Output Speed Sensor generates an AC signal in a similar fashion, though its coil is excited by rotation of the rear planetary carrier lugs. The TCM interprets this information as output shaft rpm.

The TCM compares the input and output speed signals to determine the following:

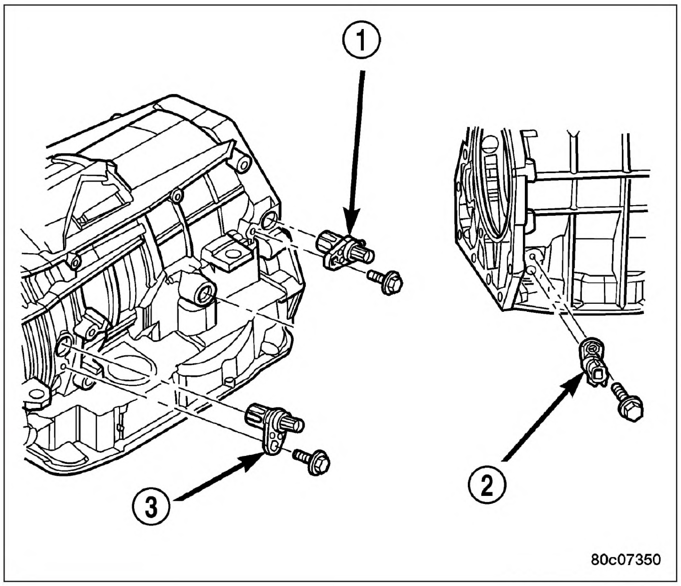
- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

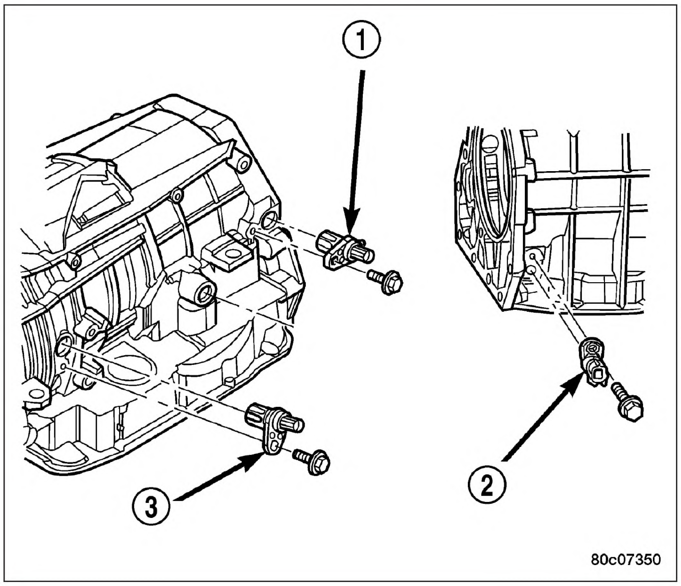
REMOVAL

1. Raise vehicle.
2. Place a suitable fluid catch pan under the transmission.
3. Remove the wiring connector from the output speed sensor (1).
4. Remove the bolt holding the output speed sensor (1) to the transmission case.
5. Remove the output speed sensor (1) from the transmission case.



INSTALLATION

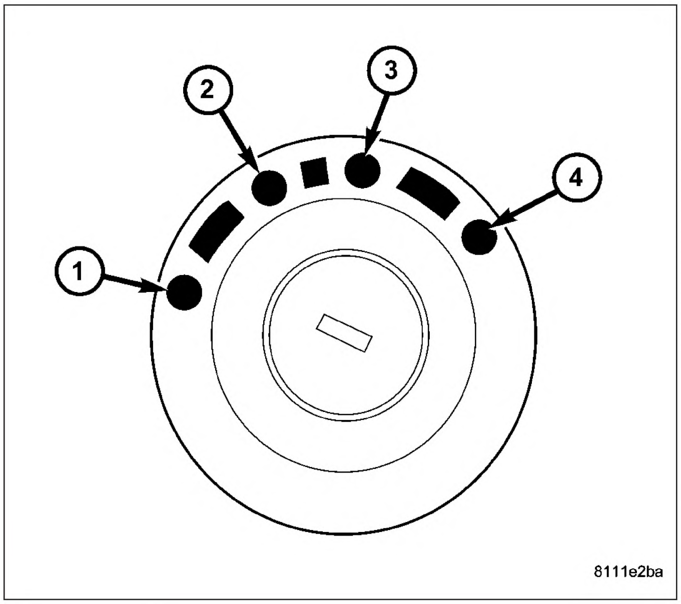
1. Install the output speed sensor (1) into the transmission case.
2. Install the bolt to hold the output speed sensor (1) into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).
3. Install the wiring connector onto the output speed sensor (1).
4. Verify the transmission fluid level. Add fluid as necessary.
5. Lower vehicle.



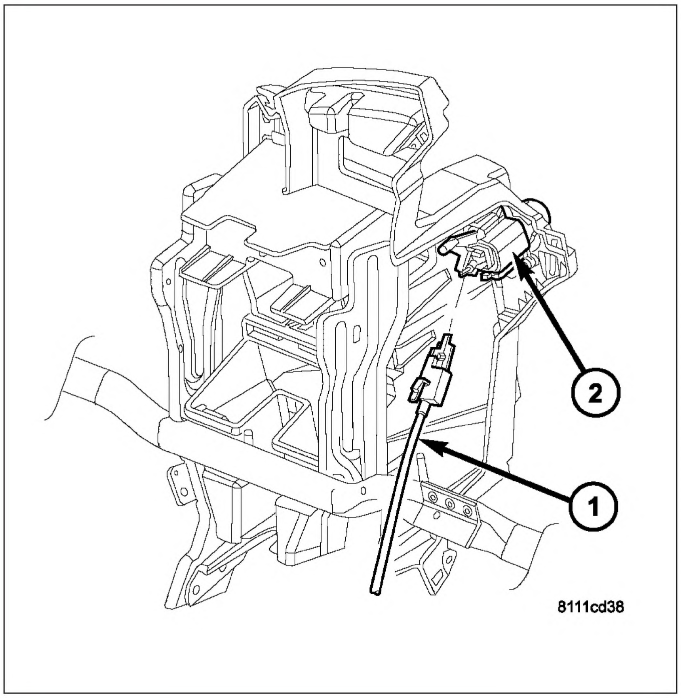
CABLE-PARK LOCK

REMOVAL

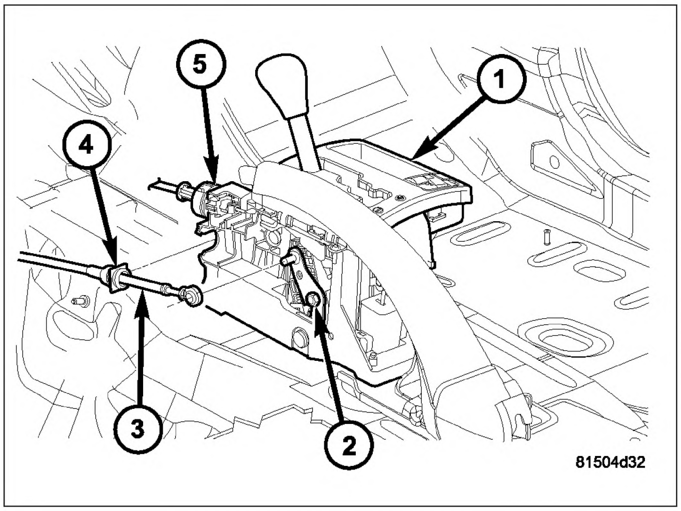
1. Place ignition key in the ACC (2) position.



2. Remove the lower instrument panel trim as necessary to access the park lock cable.
3. Disconnect park lock cable (4) from ignition cylinder (3).

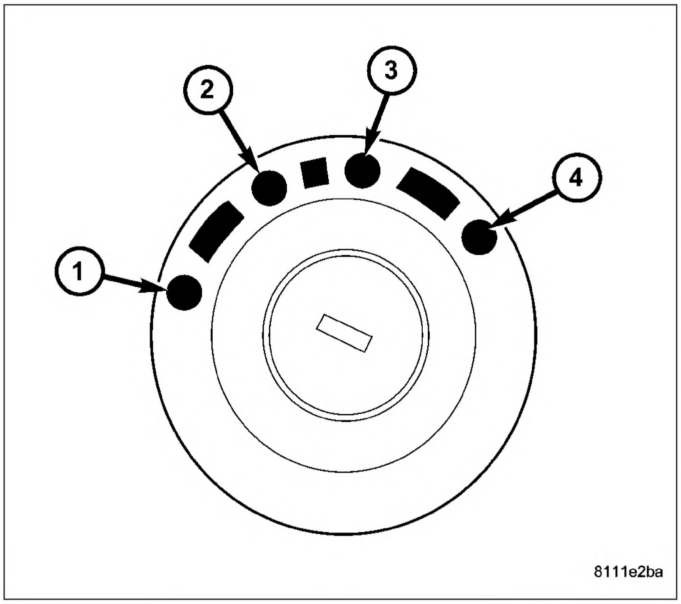


4. Remove the floor console as necessary for access to the park lock cable. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
5. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
6. Disconnect the park lock cable (5) from the shift mechanism. Release retention tab using suitable screwdriver.

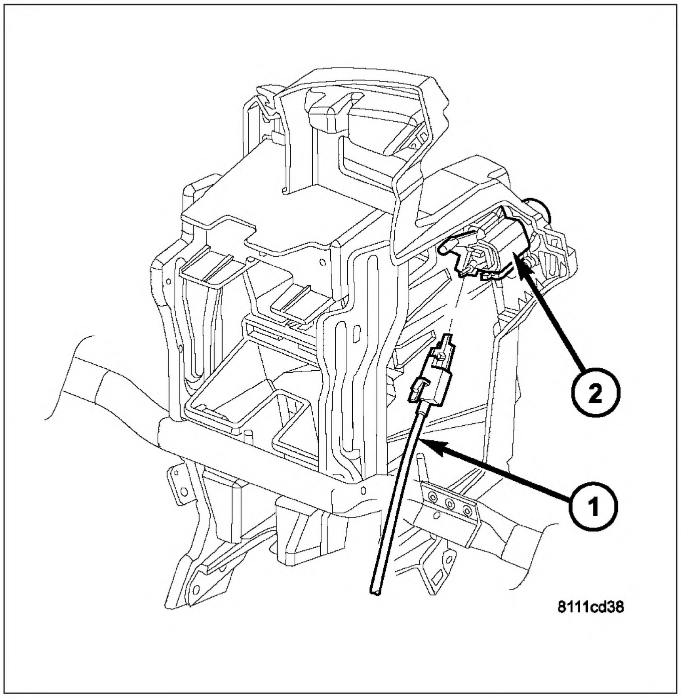


INSTALLATION

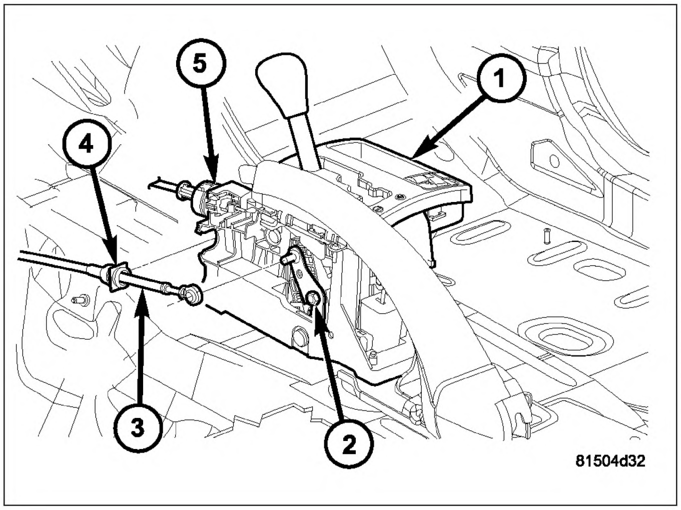
1. Verify that ignition key is in ACC (2) position.



2. Install the park lock cable (4) to the ignition cylinder (3). Secure the cable to instrument panel at retainer.
3. Install any instrument panel trim that was removed to access the park lock cable.



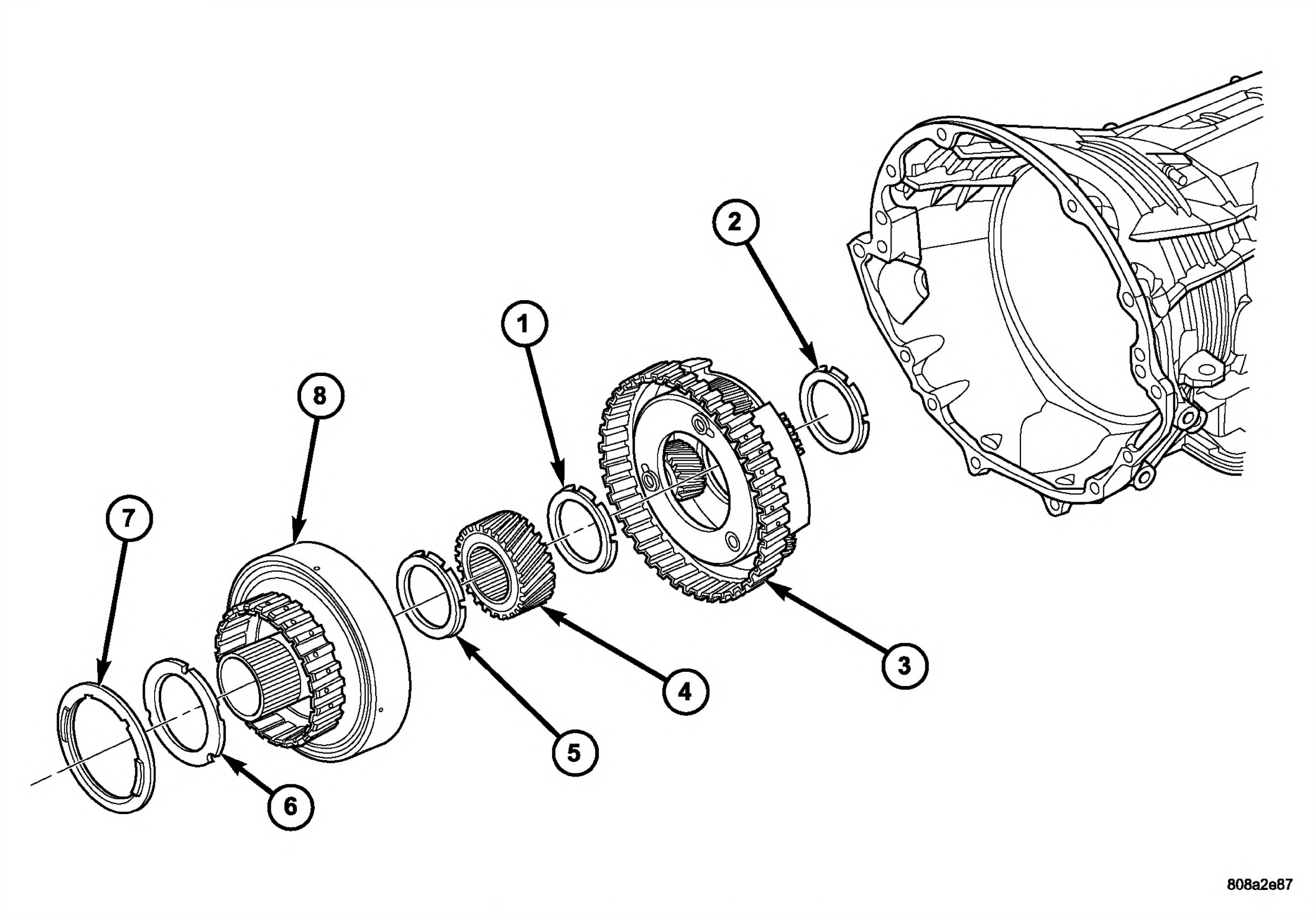
4. Route park lock cable towards shift mechanism.
5. Connect the park lock cable (5) core to shift mechanism cam, and then secure cable housing to shift mechanism.



6. Adjust the park lock cable. (Refer to 21 - TRANSMISSION/AUTOMATIC TRANSMISSION/SHIFT INTERLOCK MECHANISM - ADJUSTMENTS)
7. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
8. Install the floor console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

GEARTRAIN-PLANETARY

DESCRIPTION

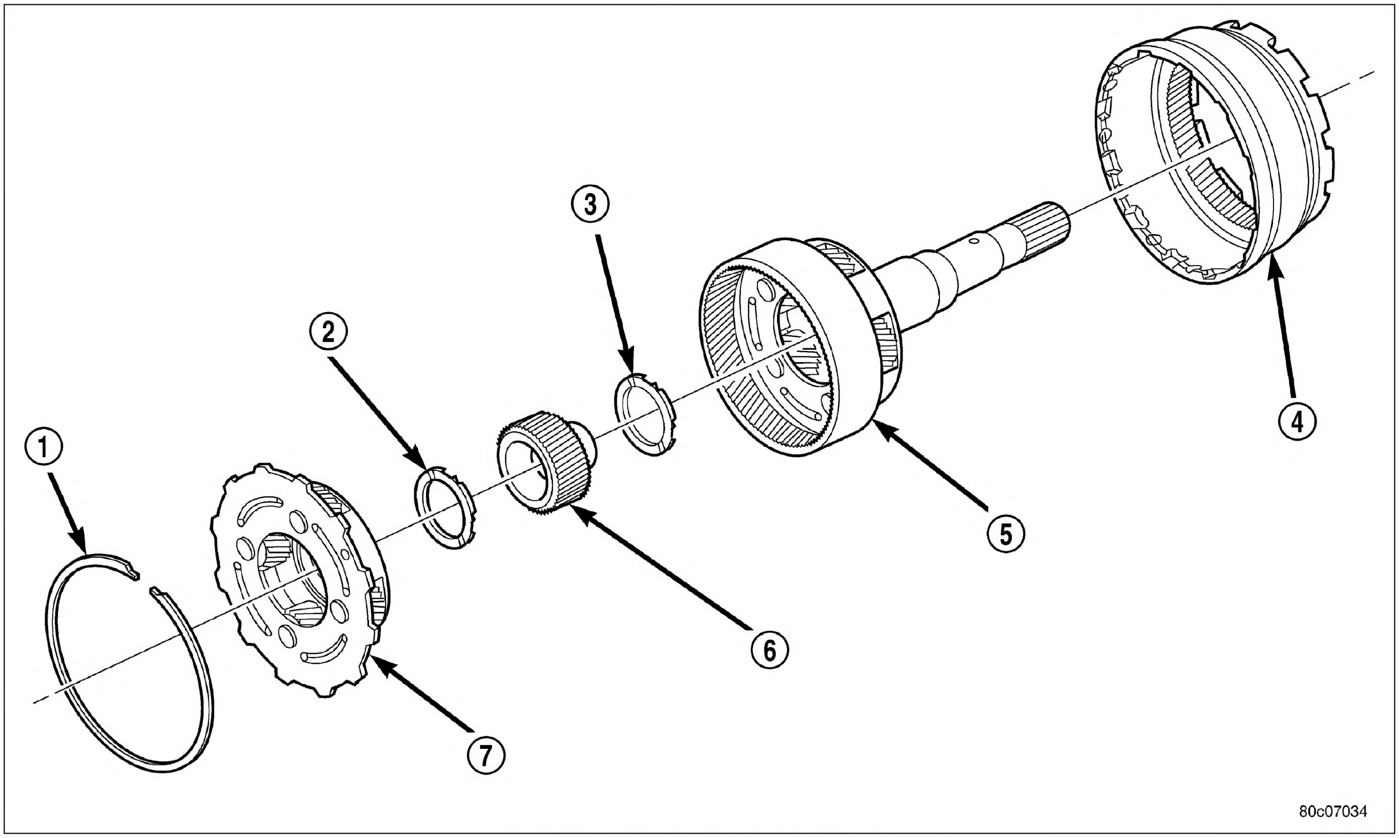


Reaction Planetary Geartrain

1 - THRUST BEARING NUMBER 8
2 - THRUST BEARING NUMBER 9
3 - REACTION PLANETARY CARRIER
4 - REACTION SUN GEAR
5 - THRUST BEARING NUMBER 7
6 - THRUST PLATE (SELECT)
7 - THRUST BEARING NUMBER 6
8 - REACTION ANNULUS

The planetary geartrain is located behind the 4C retainer/bulkhead, toward the rear of the transmission. The planetary geartrain consists of three primary assemblies:

- Reaction (3, 4, 8).



Reverse/Input Planetary Geartrain

1 - SNAP-RING	5 - INPUT PLANETARY CARRIER
2 - THRUST BEARING NUMBER 10	6 - INPUT SUN GEAR
3 - THRUST BEARING NUMBER 11	7 - REVERSE PLANETARY CARRIER
4 - INPUT ANNULUS	

- Reverse (7).
- Input (4, 5, 6).

OPERATION

REACTION PLANETARY GEARTRAIN

The reaction planetary carrier and reverse sun gear of the reaction planetary geartrain are a single component which is held by the 2C clutch when required. The reaction annulus gear is a stand alone component that can be driven by the reverse clutch or held by the 4C clutch. The reaction sun gear is driven by the overdrive clutch.

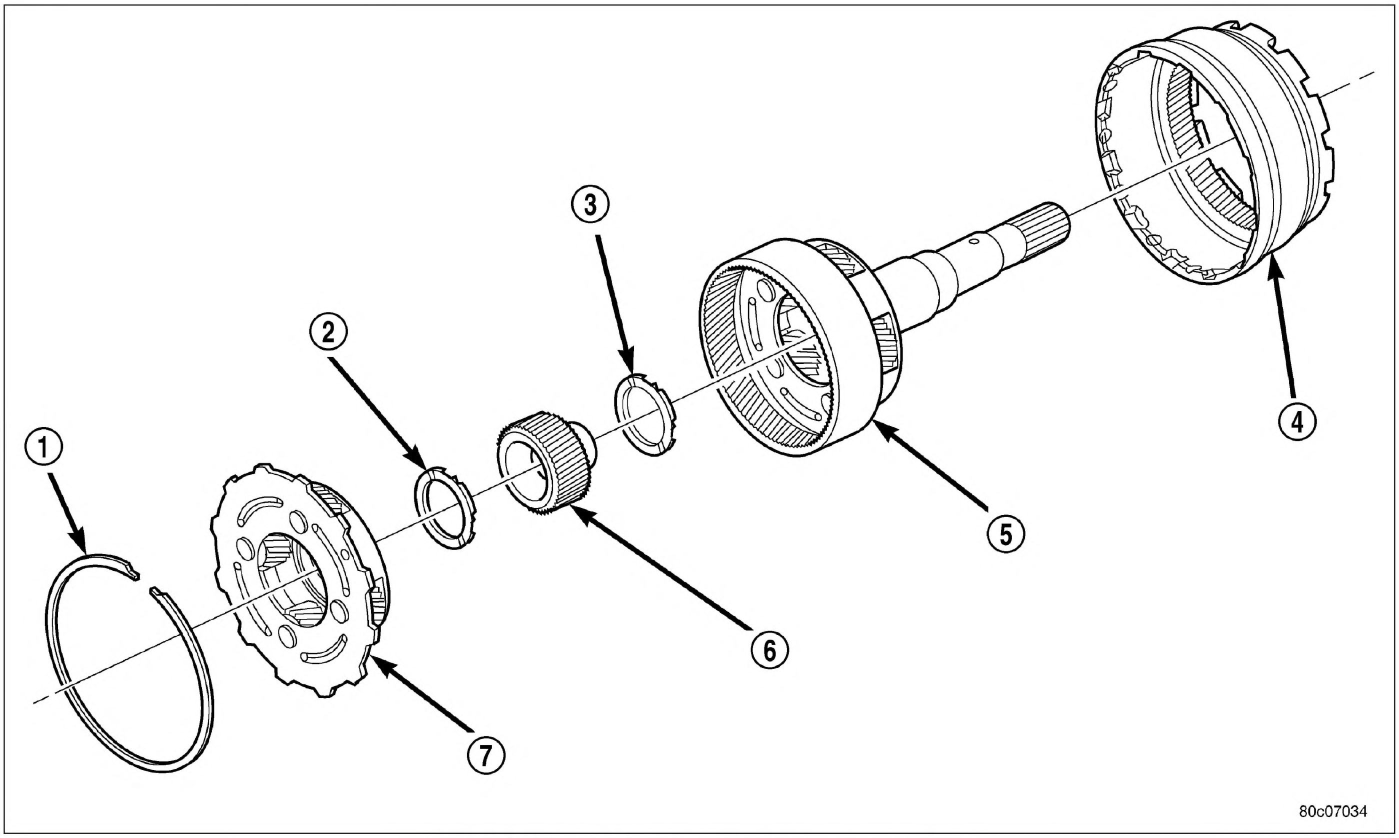
REVERSE PLANETARY GEARTRAIN

The reverse planetary geartrain is the middle of the three planetary sets. The reverse planetary carrier can be driven by the overdrive clutch as required. The reverse planetary carrier is also splined to the input annulus gear, which can be held by the low/reverse clutch. The reverse planetary annulus, input planetary carrier, and output shaft are all one piece.

INPUT PLANETARY GEARTRAIN

The input sun gear of the input planetary geartrain is driven by the underdrive clutch.

DISASSEMBLY



Reverse/Input Planetary Carrier Assembly

1 - SNAP-RING
2 - THRUST BEARING NUMBER 10
3 - THRUST BEARING NUMBER 11
4 - INPUT ANNULUS
5 - INPUT PLANETARY CARRIER
6 - INPUT SUN GEAR
7 - REVERSE PLANETARY CARRIER

1. Remove the snap-ring (1) holding the input annulus (4) into the input carrier (5).
2. Remove the input annulus (4) from the input carrier (5).
3. Remove the number 9 thrust bearing from the reverse planetary carrier. Note that this planetary carrier has four pinion gears.
4. Remove the reverse planetary gear carrier (7).
5. Remove the number 10 thrust bearing (2) from the input sun gear (6).
6. Remove the input sun gear (6) from the input carrier (5).
7. Remove the number 11 thrust bearing (3) from the input carrier (5).

CLEANING

Clean the planetary components in solvent and dry them with compressed air.

INSPECTION

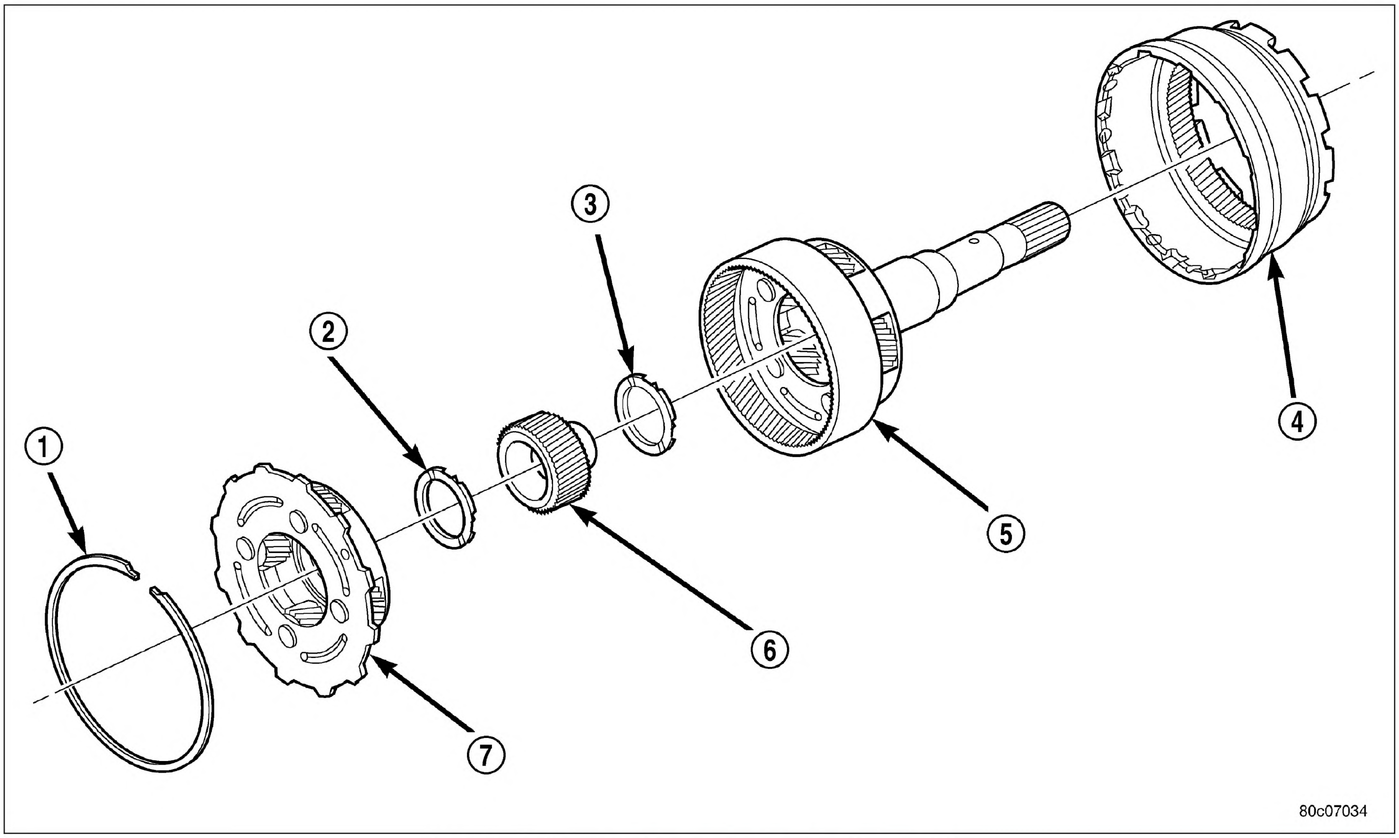
Check sun gear and driving shell condition. Replace the gear if damaged or if the bushings are scored or worn. The bushings are not serviceable. Replace the driving shell if worn, cracked or damaged.

Replace planetary gear sets if gears, pinion pins, or carrier are damaged in any way. Replace the annulus gears and supports if either component is worn or damaged.

Replace the output shaft if the machined surfaces are scored, pitted, or damaged in any way. Also replace the shaft if the splines are damaged, or exhibits cracks at any location.

ASSEMBLY

NOTE: Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.



Reverse/Input Planetary Carrier Assembly

1 - SNAP-RING
2 - THRUST BEARING NUMBER 10
3 - THRUST BEARING NUMBER 11
4 - INPUT ANNULUS
5 - INPUT PLANETARY CARRIER
6 - INPUT SUN GEAR
7 - REVERSE PLANETARY CARRIER

---

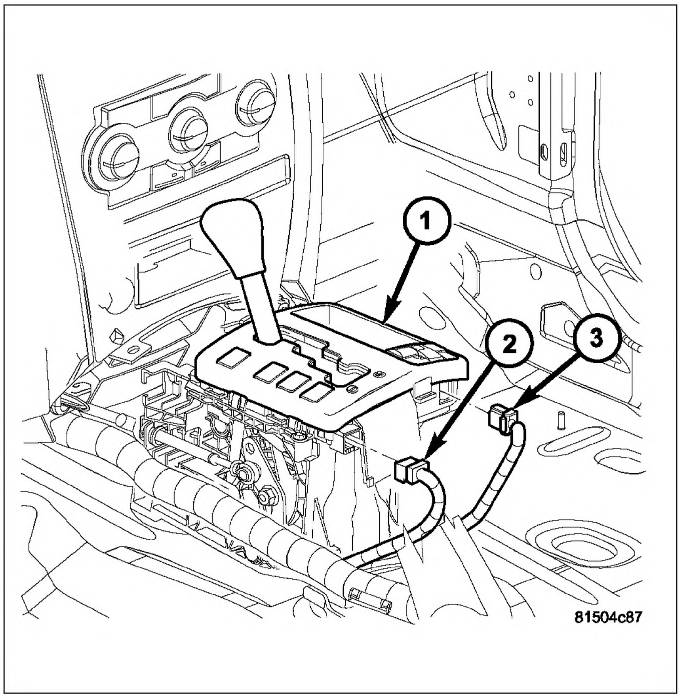
1. Install the number 11 thrust bearing (3) into the input planetary carrier (5) so that the inner race will be toward the front of the transmission.
2. Install the input sun gear (6) into the input carrier (5).
3. Install the number 10 thrust bearing (2) onto the rear of the reverse planetary carrier (7) with the inner race toward the carrier.
4. Install the number 9 thrust bearing onto the front of the reverse planetary carrier (7) with the outer race toward the carrier and the inner race facing upward.
5. Install the reverse planetary gear carrier (7) into the input carrier (5).
6. Install the input annulus gear (4) into the input carrier (5).
7. Install the snap-ring (1) to hold the input annulus gear (4) into the input carrier (5).

MECHANISM-SHIFT

DESCRIPTION

The automatic transmission is operated with the help of a shift lever assembly (SLA) (1) located in the floor console. There are four positions to which the selection lever can be shifted: P, R, N, D. In addition, the selector lever can be moved sideways (+/-) in position ″D″ to adjust the shift range.

All selector lever positions are identified by the SLA and transmitted by a shift cable to the selector shaft in the transmission.



The SLA is comprised of the following functions:

- **Key lock:** Depending on the selector lever position, the ignition cylinder is locked/unlocked, i.e., the ignition key can be removed only if the selector lever is in position ″P″. A park lock cable is used to perform this function.
- **Park lock:** The selector lever is not released from postion ″P″ until the brake pedal has been applied and the ignition key is in ”ACC” or ON” positions. Shift lock is controlled by the brake light switch in conjunction with a locking solenoid in the SLA. As soon as the brake pedal is applied firmly, the locking solenoid is de-energized to unlock the selector lever.

OPERATION

With the selector lever in position ″D″, the transmission control module (TCM) automatically shifts the gears that are best-suited to the current operating situation. This means that shifting of gears is continuously adjusted to current driving and operating conditions in line with the selected shift range and the accelerator pedal position. Starting off is always performed in 1st gear.

The current selector lever position or, if the shift range has been limited, the current shift range is indicated in the instrument cluster display.

The permissible shifter positions and transmission operating ranges are:

- P = Parking lock and engine starting.
- R = Reverse.
- N = Neutral and engine starting (no power is transmitted to the axles).
- D = The shift range includes all forward gears.

The shift range can be adjusted to the current operating conditions by tipping the selector lever to the left-hand side (″-″) or the right-hand side (″+″) when in position ″D″. If the shift range is limited, the display in the instrument cluster indicates the selected shift range and not the currently engaged gear.

- 4= Shift range is limited to gears 1 to 4.
- 3= Shift range is limited to gears 1 to 3.
- 2= Shift range is limited to gears 1 to 2.

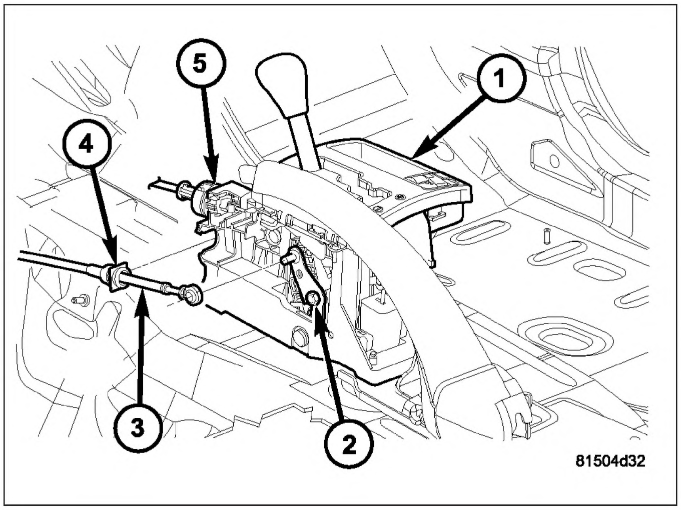
- 1= Shift range is limited to the 1st gear.

Tipping the shift lever will have the following results:

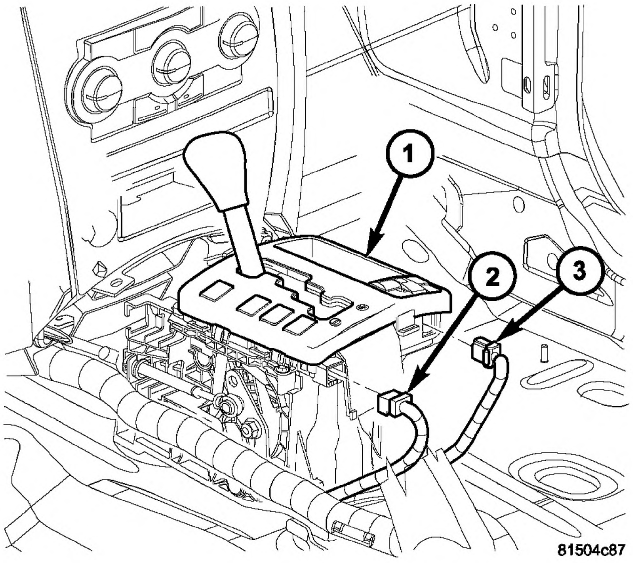
- **Tipping the selector lever toward ″-″ one time after another:** The shift range is reduced in descending sequence by one gear each time, i.e., from D - 4 - 3 - 2 - 1. If the selected limitation of the shift range would result in a downshift causing excessive engine speed, the shifting is not executed and the engaged gear as well as the shift range remain unchanged. This is to prevent the engine from overspeeding. Engine retardation is low with the selector lever in position ″D″. To make use of the full braking power of the engine, ″manual″ downshifting by tipping the lever towards the left-hand side is recommended. If this has been done, subsequent upshifting must be carried out manually as well.
- **Tipping the selector lever toward ″-″ and holding it in this position:** The currently engaged gear in range ″D″ is indicated in the instrument cluster display and the shift range is limited to this gear.
- **Tipping the selector lever toward ″+″ one time after another:** The shift range is increased by one gear each time and the increased shift range is displayed in the instrument cluster; possibly, the transmission upshifts to a faster gear.
- **Tipping the selector lever toward ″+″ several times:** The shift range is increased by one gear each time the lever is tipped until the shift range ends up in ″D″.
- **Tipping the selector lever toward ″+″ and holding it in this position:** The shift range is extended immediately to ″D″, shift ranges are indicated in ascending sequence; possibly, the transmission upshifts to a faster gear due to the extension of the shift range.

REMOVAL

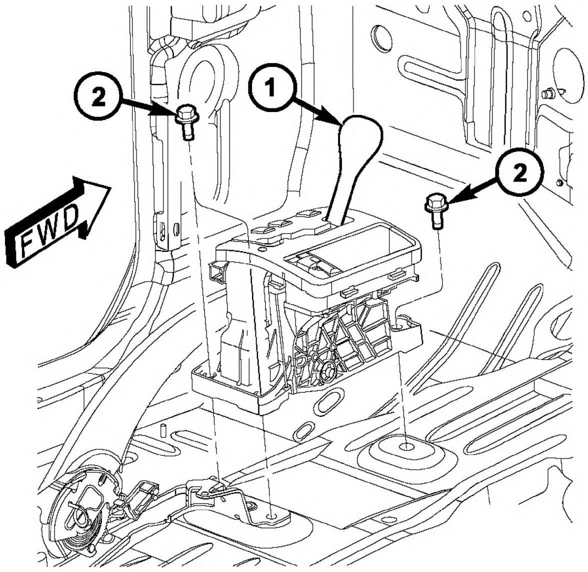
1. Remove any necessary console parts for access to shift lever assembly and shifter cables. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
2. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
3. Shift transmission into PARK.
4. Disconnect the transmission shift cable (3) at shift lever (1).
5. Remove the shift cable retainer (4) from the notch in the shifter assembly.
6. Verify the key is in the LOCK position and disconnect the park lock cable (5) from the shifter mechansim cam and the notch in the shifter assembly.



7. Disengage all wiring connectors (2, 3) from the shifter assembly (1).

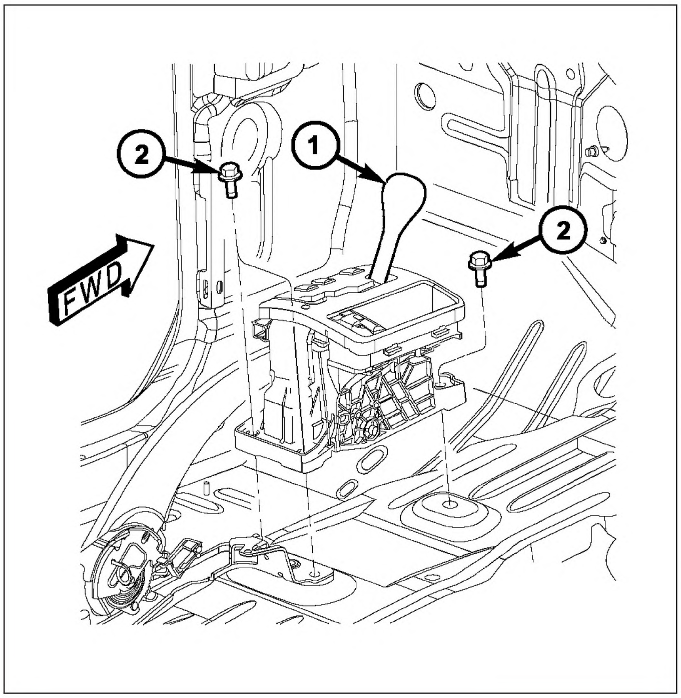


8. Remove all bolts (2) holding the shifter assembly (1) to the floor pan.
9. Remove the shifter assembly (1) from the vehicle.

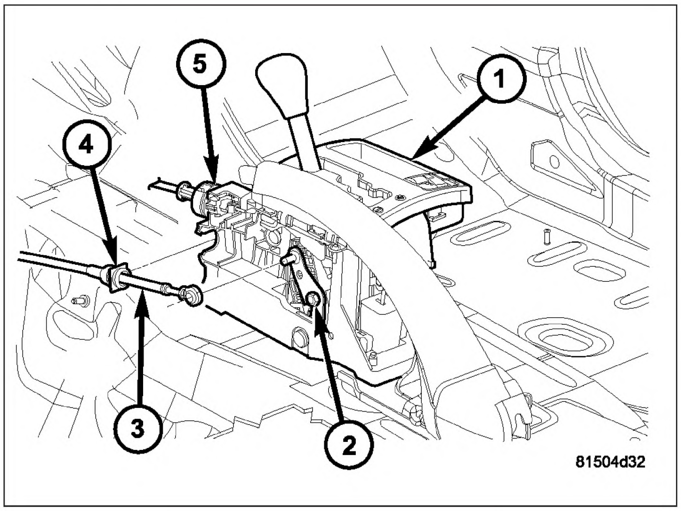


INSTALLATION

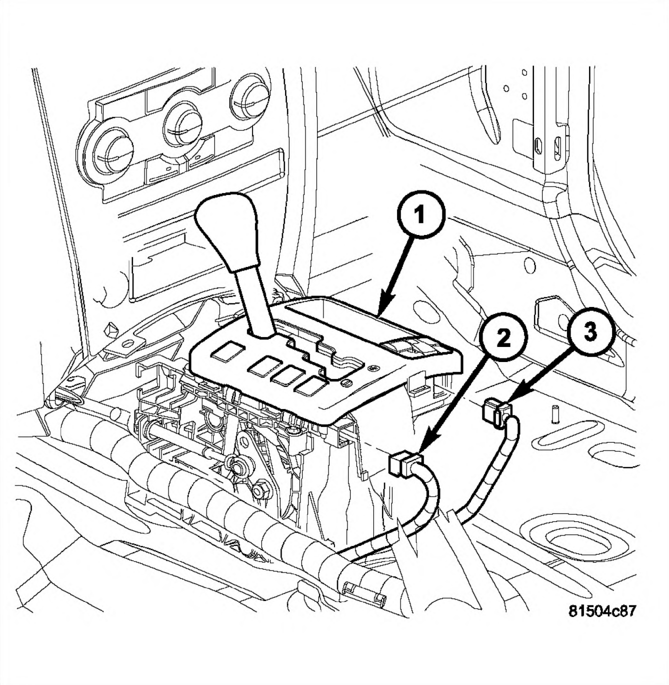
1. Install shifter assembly (1) in position on the floor pan.
2. Install the bolts (2) to hold the shifter assembly (1) onto the floor pan. Tighten bolts to 12 N·m (105 in.lbs.).



3. Place the floor shifter lever in PARK position.
4. Loosen the adjustment nut (2) on the shifter assembly (1).
5. Install the gearshift cable (3) to the shift lever pin.
6. Install the park lock cable (5) to the shift mechanism cam and the notch in the shifter assembly.
7. Verify that the key is in the LOCK position and remains there until the cable is fully adjusted.
8. Verify that the park lock cable adjustment tab is pulled upward to the unlocked position.



9. Install the wiring harness connectors (2) to the shifter assembly (1).
10. Verify that the shift lever is in the PARK position.
11. Tighten the adjustment screw to 30 N·m (265 in.lbs.).
12. Verify that the key in the LOCK position and the shifter is in PARK.
13. Push downward on the park lock cable adjustment tab to lock the adjustment.
14. Verify correct shifter, park lock, and BTSI operation.
15. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
16. Install any console parts removed for access to shift lever assembly and shift cables. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)



VALVE-SOLENOID SWITCH

DESCRIPTION

The Solenoid Switch Valve (SSV) is located in the valve body and controls the direction of the transmission fluid when the L/R-TCC solenoid is energized.

OPERATION

The Solenoid Switch Valve controls line pressure from the LR-TCC solenoid. In 1st gear, the SSV will be in the downshifted position, thus directing fluid to the L/R clutch circuit. In 2nd, 3rd, 4th, and 5th gears, the solenoid switch valve will be in the upshifted position and directs the fluid into the torque converter clutch (TCC) circuit.

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L/R pressure switch is monitored to confirm SSV movement. If the movement is not confirmed (the L/R pressure switch does not close), 2nd gear is substituted for 1st. A DTC will be set after three unsuccessful attempts are made to get into 1st gear in one given key start.

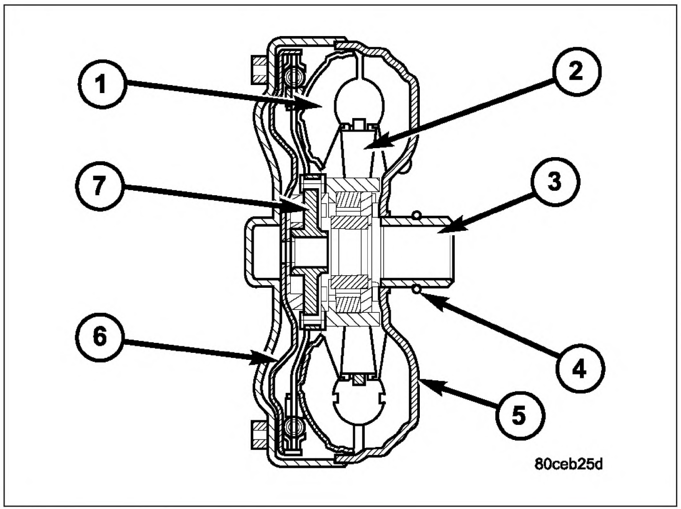
CONVERTER-TORQUE

DESCRIPTION

The torque converter is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine (1), a stator (2), an overrunning clutch, an impeller (5), and an electronically applied converter clutch (6). The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The torque converter hub (3) drives the transmission oil (fluid) pump and contains an o-ring seal (4) to better control oil flow.

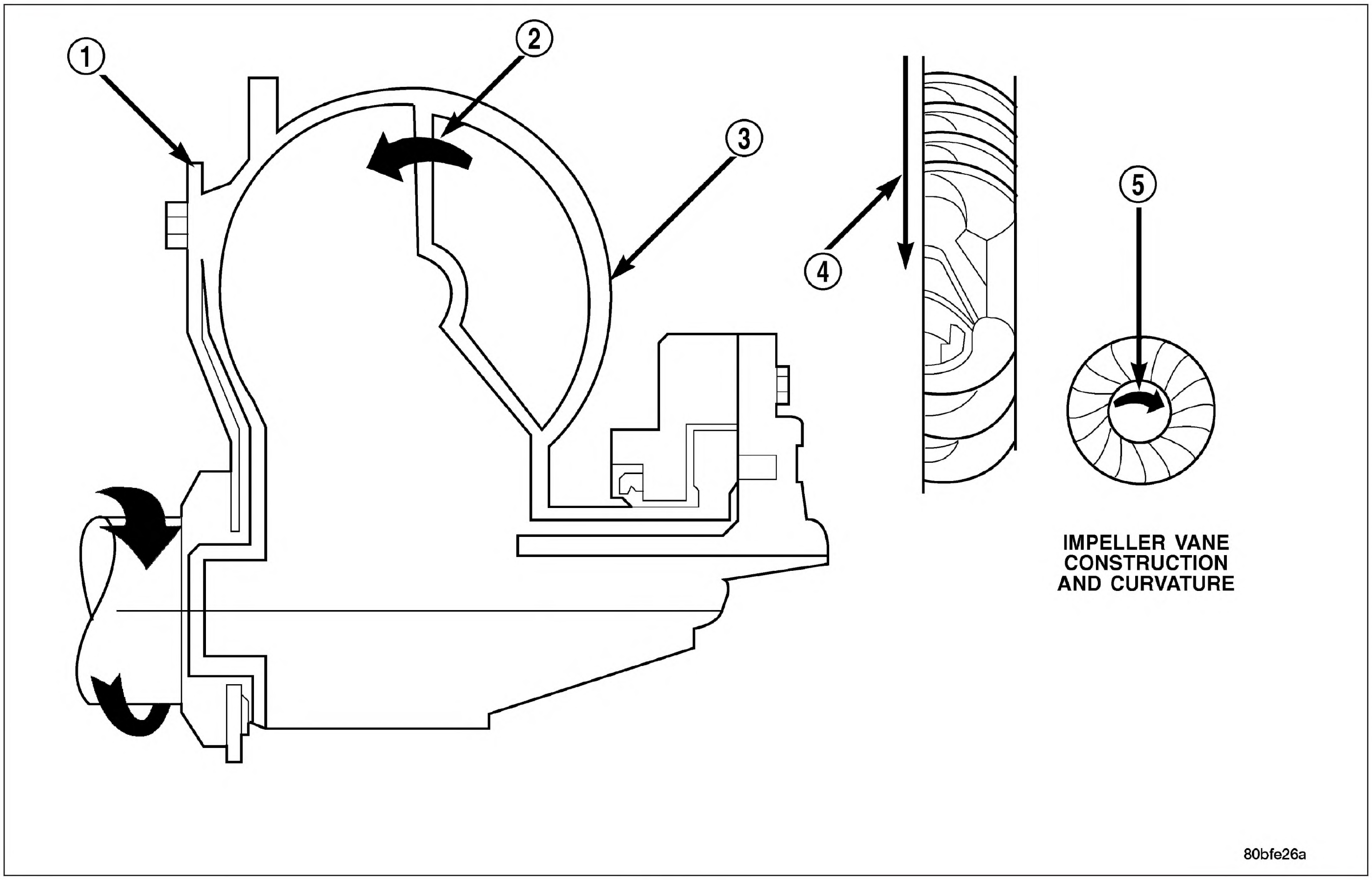
The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid.



1 - TURBINE ASSEMBLY
2 - STATOR
3 - CONVERTER HUB
4 - O-RING
5 - IMPELLER ASSEMBLY
6 - CONVERTER CLUTCH PISTON
7 - TURBINE HUB

IMPELLER

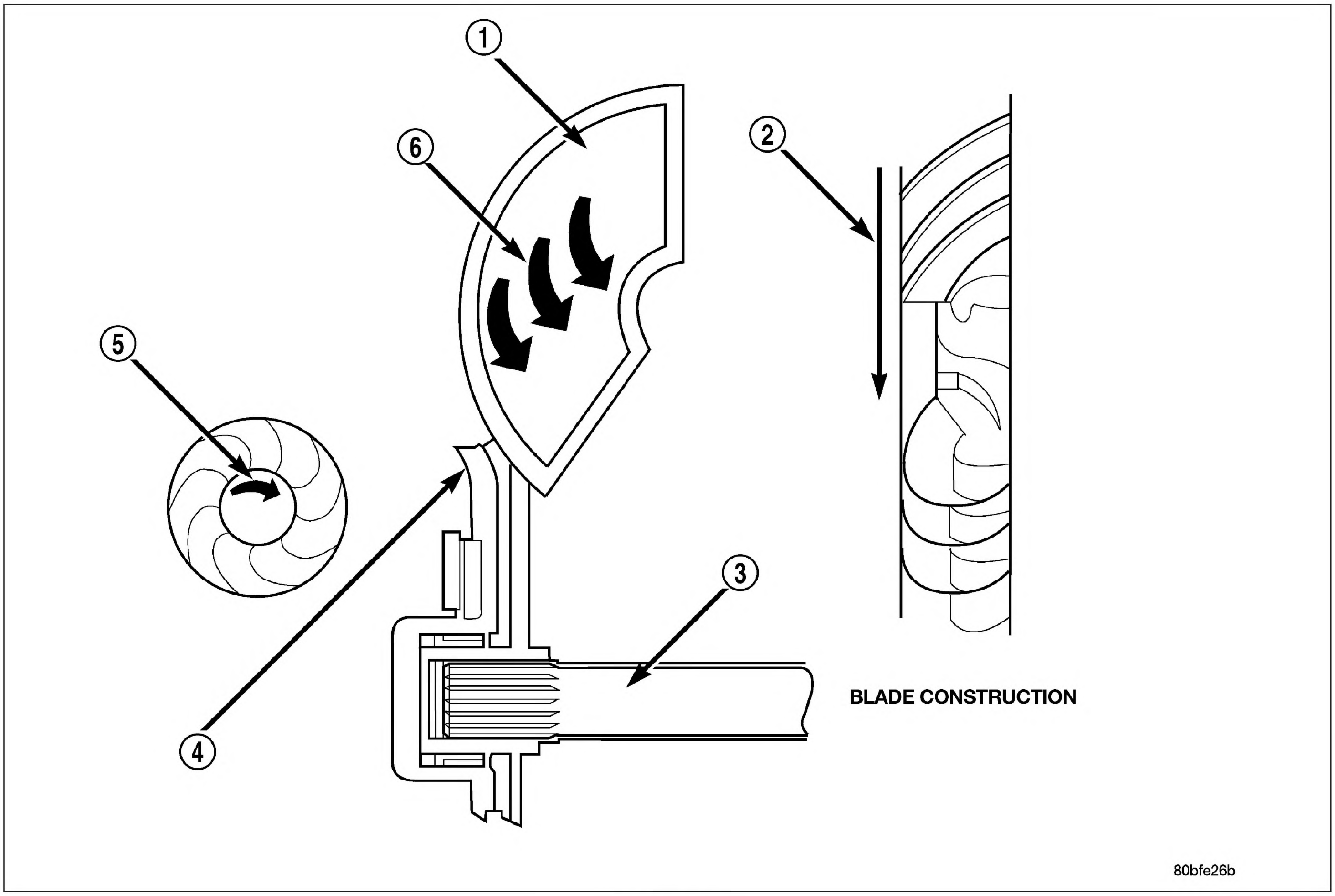


Impeller

1 - ENGINE FLEXPLATE
2 - OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION
3 - IMPELLER VANES AND COVER ARE INTEGRAL
4 - ENGINE ROTATION
5 - ENGINE ROTATION

The impeller is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving members of the system.

TURBINE



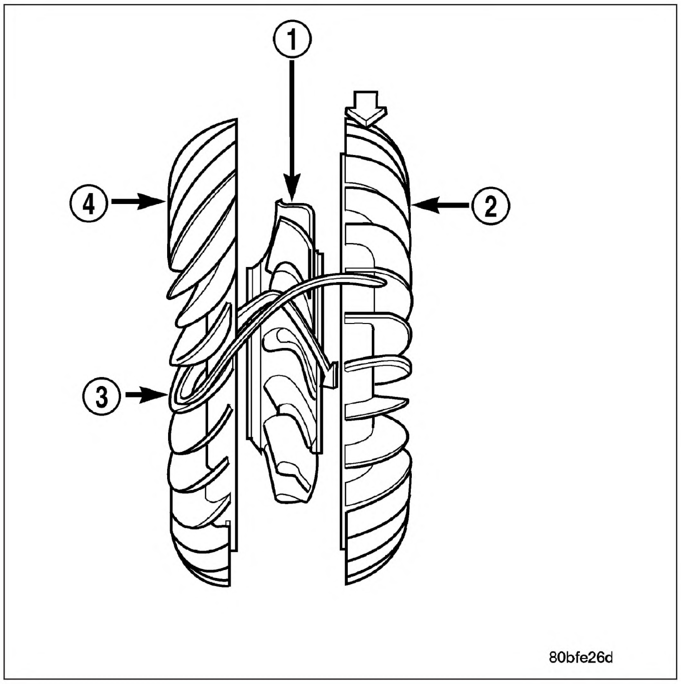
Turbine

1 - TURBINE VANE
2 - ENGINE ROTATION
3 - INPUT SHAFT
4 - PORTION OF TORQUE CONVERTER COVER
5 - ENGINE ROTATION
6 - OIL FLOW WITHIN TURBINE SECTION

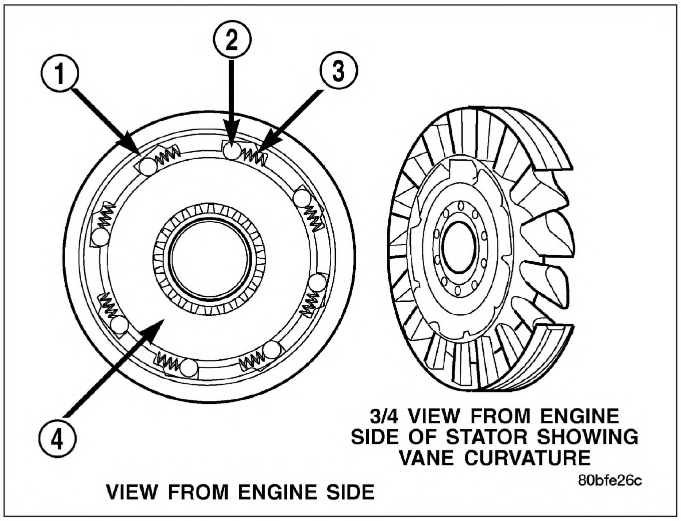
The turbine is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

STATOR

The stator assembly is mounted on a stationary shaft which is an integral part of the oil pump. The stator (1) is located between the impeller (2) and the turbine (4) within the torque converter case.

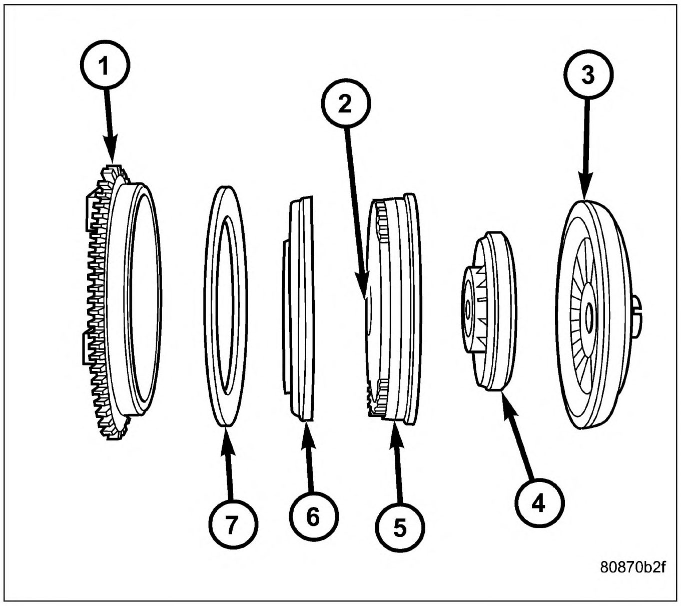

1
2
3
4
80bfe26d

The stator contains an over-running clutch (1-4), which allows the stator to rotate only in a clockwise direction. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.


1
2
3
4
3/4 VIEW FROM ENGINE SIDE OF STATOR SHOWING VANE CURVATURE
VIEW FROM ENGINE SIDE
80bfe26c

TORQUE CONVERTER CLUTCH (TCC)

The TCC was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller (3) and turbine (5) were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston (6) with friction material (7) was added to the turbine assembly (5) to provide this mechanical lock-up.

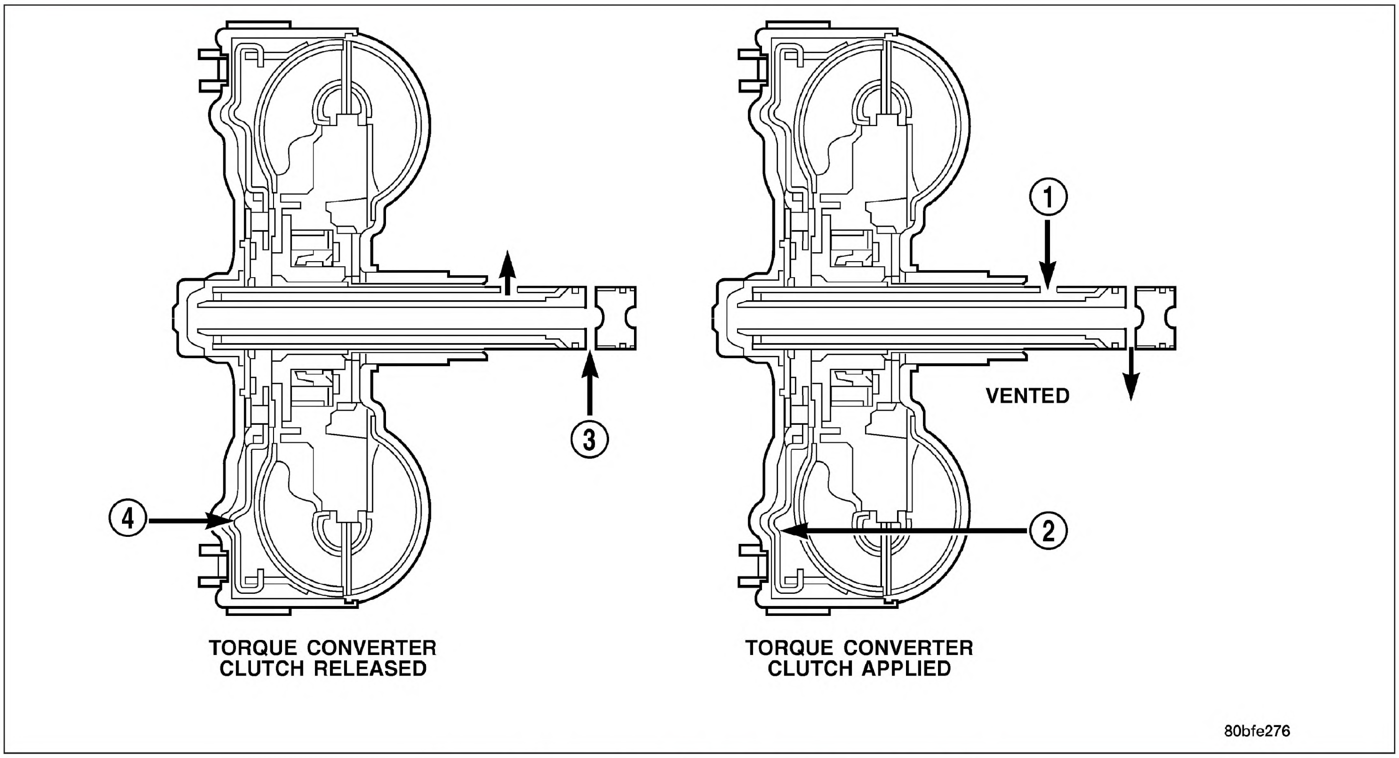


In order to reduce heat build-up in the transmission and buffer the powertrain against torsional vibrations, the TCM can duty cycle the L/R-CC Solenoid to achieve a smooth application of the torque converter clutch. This function, referred to as Electronically Modulated Converter Clutch (EMCC) can occur at various times depending on the following variables:

- Shift lever position
- Current gear range
- Transmission fluid temperature
- Engine coolant temperature
- Input speed
- Throttle angle
- Engine speed

OPERATION

The converter impeller (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.


1
2
3
4
VENTED
TORQUE CONVERTER CLUTCH RELEASED
TORQUE CONVERTER CLUTCH APPLIED
80bfe276

Torque Converter Fluid Operation - Typical

1 - APPLY PRESSURE	3 - RELEASE PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD	4 - THE PISTON MOVES SLIGHTLY REARWARD

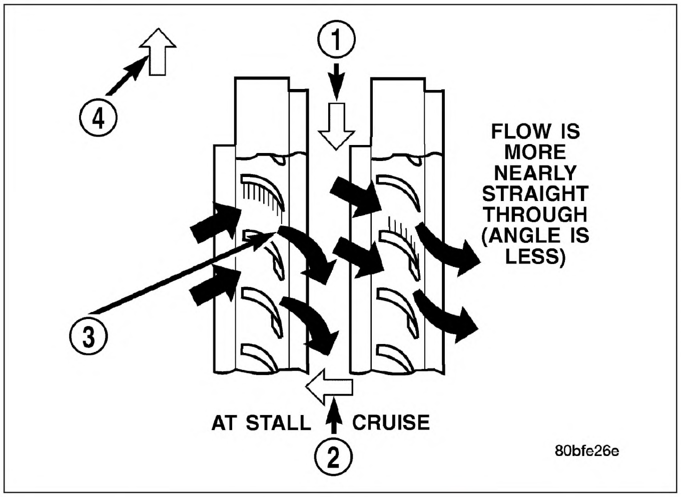
TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft. Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counterclockwise direction. When this happens the over-running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such as way as to cause it to lock-up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.

TORQUE CONVERTER CLUTCH (TCC)



In a standard torque converter, the impeller and turbine are rotating at about the same speed and the stator is freewheeling, providing no torque multiplication. By applying the turbine's piston and friction material to the front cover, a total converter engagement can be obtained. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The clutch can be engaged in second, third, fourth, and fifth gear ranges depending on overdrive control switch position. If the overdrive control switch is in the normal ON position, the clutch will engage after the shift to fourth gear, and above approximately 72 km/h (45 mph). If the control switch is in the OFF position, the clutch will engage after the shift to third gear, at approximately 56 km/h (35 mph) at light throttle.

The TCM controls the torque converter by way of internal logic software. The programming of the software provides the TCM with control over the L/R-CC Solenoid. There are four output logic states that can be applied as follows:

- No EMCC
- Partial EMCC
- Full EMCC
- Gradual-to-no EMCC

NO EMCC

Under No EMCC conditions, the L/R Solenoid is OFF. There are several conditions that can result in NO EMCC operations. No EMCC can be initiated due to a fault in the transmission or because the TCM does not see the need for EMCC under current driving conditions.

PARTIAL EMCC

Partial EMCC operation modulates the L/R Solenoid (duty cycle) to obtain partial torque converter clutch application. Partial EMCC operation is maintained until Full EMCC is called for and actuated. During Partial EMCC some slip does occur. Partial EMCC will usually occur at low speeds, low load and light throttle situations.

FULL EMCC

During Full EMCC operation, the TCM increases the L/R Solenoid duty cycle to full ON after Partial EMCC control brings the engine speed within the desired slip range of transmission input speed relative to engine rpm.

GRADUAL-TO-NO EMCC

This operation is to soften the change from Full or Partial EMCC to No EMCC. This is done at mid-throttle by decreasing the L/R Solenoid duty cycle.

REMOVAL

1. Remove transmission and torque converter from vehicle. (Refer to 21 - TRANSMISSION/AUTOMATIC - 45RFE/545RFE - REMOVAL)
2. Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition. The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

3. Pull the torque converter forward until the center hub clears the oil pump seal.
4. Separate the torque converter from the transmission.

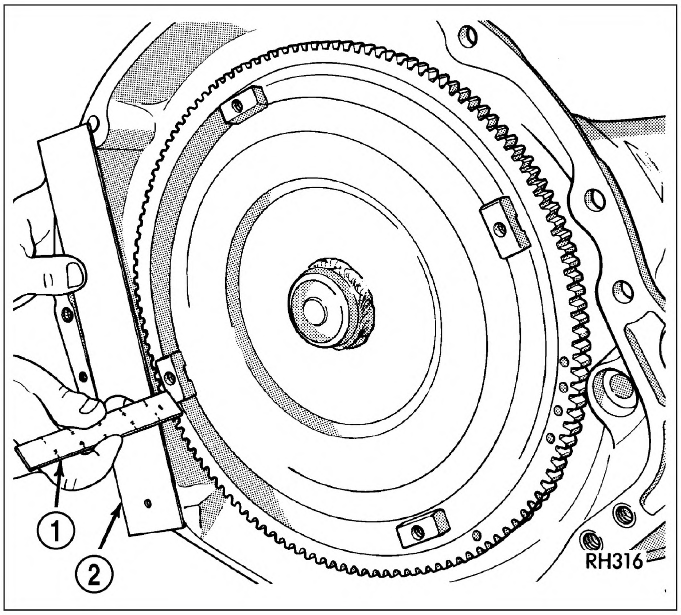
INSTALLATION

NOTE: Check converter hub and drive flats for sharp edges, burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper or crocus cloth if necessary. Verify that the converter hub o-ring is properly installed and is free from debris. The hub must be smooth to avoid damaging the pump seal at installation.

1. Lubricate oil pump seal lip with transmission fluid.
2. Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or converter hub o-ring while inserting torque converter into the front of the transmission.

3. Align torque converter to oil pump seal opening.
4. Insert torque converter hub into oil pump.
5. While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.
6. Check converter seating with a scale (1) and straightedge (2). Surface of converter lugs should be at least 13 mm (1/2 in.) to rear of straightedge when converter is fully seated.
7. If necessary, temporarily secure converter with C-clamp attached to the converter housing.
8. Install the transmission in the vehicle.
9. Fill the transmission with the recommended fluid.



SWITCH-TOW/HAUL OVERDRIVE

DESCRIPTION

The tow/haul overdrive OFF (control) switch is located in the lower portion of the center instrument panel switch cluster. The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function.

OPERATION

At key-on, overdrive operation is allowed. Pressing the switch once causes the tow/haul overdrive OFF mode to be entered and the Tow/Haul lamp to be illuminated. Pressing the switch a second time causes normal overdrive operation to be restored and the tow/haul lamp to be turned off. The tow/haul overdrive OFF mode defaults to ON after the ignition switch is cycled OFF and ON. The normal position for the control switch is the ON position. The switch must be in this position to energize the solenoid and allow a 3-4 upshift. The control switch indicator light illuminates only when the tow/haul overdrive switch is turned to the OFF position, or when illuminated by the transmission control module.

RELAY-TRANSMISSION CONTROL

DESCRIPTION

The relay is supplied fused B+ voltage, energized by the TCM, and is used to supply power to the solenoid pack when the transmission is in normal operating mode.

OPERATION

When the relay is "off", no power is supplied to the solenoid pack and the transmission is in "limp-in" mode. After a controller reset, the TCM energizes the relay. Prior to this, the TCM verifies that the contacts are open by checking for no voltage at the switched battery terminals. After this is verified, the voltage at the solenoid pack pressure switches is checked. After the relay is energized, the TCM monitors the terminals to verify that the voltage is greater than 3 volts.

SENSOR-TRANSMISSION RANGE

DESCRIPTION

The Transmission Range Sensor (TRS) is part of the solenoid module, which is mounted to the top of the valve body inside the transmission.

The Transmission Range Sensor (TRS) has five switch contact pins that:

- Determine shift lever position
- Supply ground to the Starter Relay in Park and Neutral only.
- Supply +12 V to the backup lamps in Reverse only.

The TRS also has an integrated temperature sensor (thermistor) that communicates transmission temperature to the TCM and PCM.

OPERATION

The Transmission Range Sensor (TRS) communicates shift lever position to the TCM as a combination of open and closed switches. Each shift lever position has an assigned combination of switch states (open/closed) that the TCM receives from four sense circuits. The TCM interprets this information and determines the appropriate transmission gear position and shift schedule.

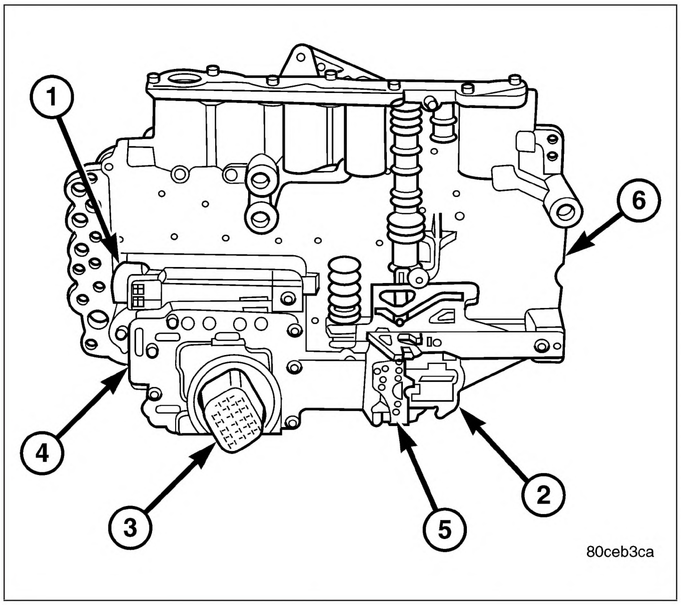
There are many possible combinations of open and closed switches (codes). Seven of these possible codes are related to gear position and five are recognized as "between gear" codes. This results in many codes which should **never occur**. These are called "invalid" codes. An invalid code will result in a DTC, and the TCM will then determine the shift lever position based on pressure switch data. This allows reasonably normal transmission operation with a TRS failure.

GEAR	C5	C4	C3	C2	C1
Park	CL	OP	OP	CL	CL
Temp 1	CL	OP	OP	CL	OP
Reverse	OP	OP	OP	CL	OP
Temp 2	OP	OP	CL	CL	OP
Neutral 1	OP	OP	CL	CL	CL
Neutral 2	OP	CL	CL	CL	CL
Temp 3	OP	CL	CL	CL	OP
Drive	OP	CL	CL	OP	OP
Temp 4	OP	CL	OP	OP	OP
Manual 2	CL	CL	OP	OP	OP
Temp 5	CL	OP	OP	OP	OP
Manual 1	CL	OP	CL	OP	OP

ASSEMBLY-TRANSMISSION SOLENOID/TRS

DESCRIPTION

The transmission solenoid/TRS assembly is internal to the transmission and mounted on the valve body assembly. The assembly consists of six solenoids that control hydraulic pressure to the six friction elements (transmission clutches), and the torque converter clutch. The pressure control solenoid is located on the side of the solenoid/TRS assembly. The solenoid/TRS assembly also contains five pressure switches that feed information to the TCM.



OPERATION

SOLENOIDS

Solenoids are used to control the L/R, 2C, 4C, OD, and UD friction elements. The reverse clutch is controlled by line pressure and the position of the manual valve in the valve body. All the solenoids are contained within the Solenoid and Pressure Switch Assembly. The solenoid and pressure switch assembly contains one additional solenoid, Multi-Select (MS), which serves primarily to provide 2nd and 3rd gear limp-in operation.

The solenoids receive electrical power from the Transmission Control Relay through a single wire. The TCM energizes or operates the solenoids individually by grounding the return wire of the solenoid as necessary. When a solenoid is energized, the solenoid valve shifts, and a fluid passage is opened or closed (vented or applied), depending on its default operating state. The result is an apply or release of a frictional element.

The MS and UD solenoids are normally applied to allow transmission limp-in in the event of an electrical failure.

The continuity of the solenoids and circuits are periodically tested. Each solenoid is turned on or off depending on its current state. An inductive spike should be detected by the TCM during this test. If no spike is detected, the circuit is tested again to verify the failure. In addition to the periodic testing, the solenoid circuits are tested if a speed ratio or pressure switch error occurs.

PRESSURE SWITCHES

The TCM relies on five pressure switches to monitor fluid pressure in the L/R, 2C, 4C, UD, and OD hydraulic circuits. The primary purpose of these switches is to help the TCM detect when clutch circuit hydraulic failures occur. The switches close at approximately 23 psi and open at approximately 11 psi, and simply indicate whether or not pressure exists. The switches are continuously monitored by the TCM for the correct states (open or closed) in each gear as shown in the following chart:

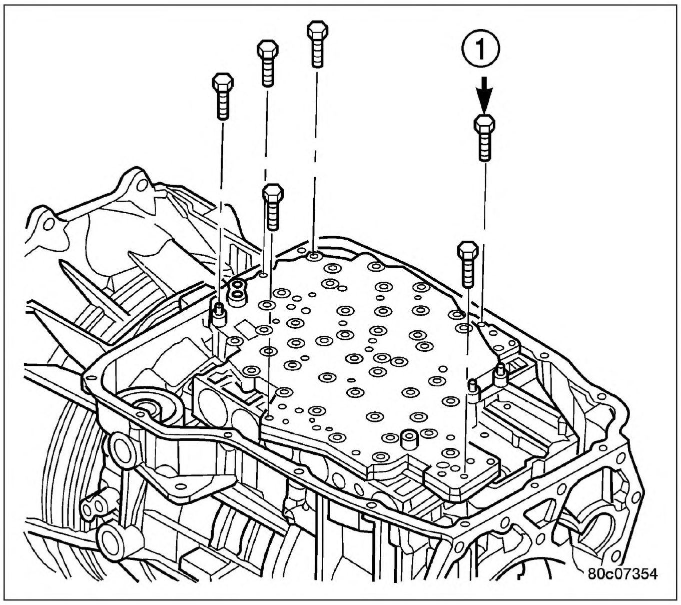
GEAR	L/R	2C	4C	UD	OD
R	OP	OP	OP	OP	OP
P/N	CL	OP	OP	OP	OP
1ST	CL*	OP	OP	CL	OP
2ND	OP	CL	OP	CL	OP
2ND PRIME	OP	OP	CL	CL	OP
D	OP	OP	OP	CL	CL
4TH	OP	OP	CL	OP	CL
5TH	OP	CL	OP	OP	CL

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is open in Manual 1.

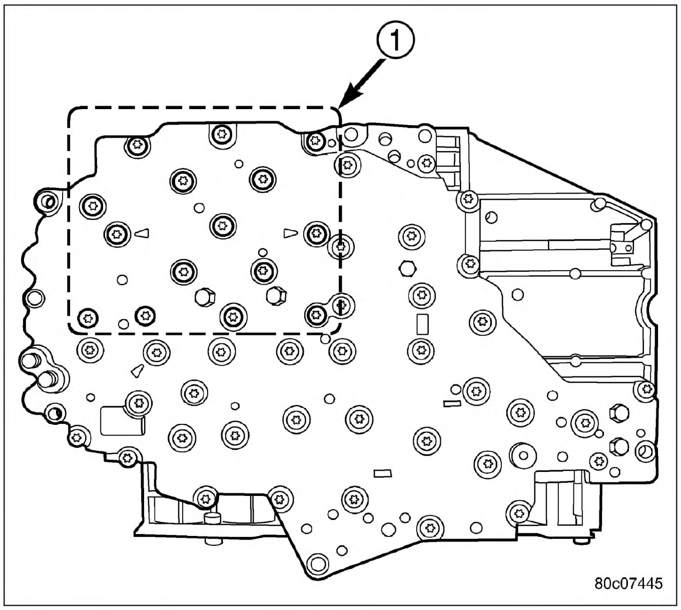
A Diagnostic Trouble Code (DTC) will set if the TCM senses any switch open or closed at the wrong time in a given gear.

REMOVAL

1. Remove the valve body from the transmission. (Refer to 21 - TRANSMISSION/AUTOMATIC - 45RFE/545RFE/VALVE BODY - REMOVAL)

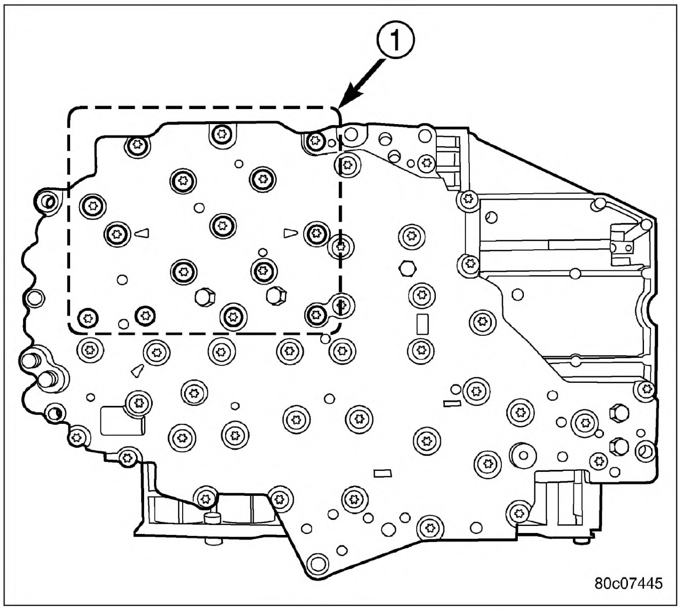


2. Remove the bolts (1) holding the transmission solenoid/TRS assembly onto the valve body.
3. Separate the transmission solenoid/TRS assembly from the valve body.



INSTALLATION

1. Place TRS selector plate in the PARK position.
2. Position the transmission solenoid/TRS assembly onto the valve body. Be sure that both alignment dowels are fully seated in the valve body and that the TRS switch contacts are properly positioned in the selector plate
3. Install the bolts (1) to hold the transmission solenoid/TRS assembly onto the valve body.
4. Tighten the solenoid assembly screws adjacent to the arrows cast into the bottom of the valve body first. Tighten the screws to 5.7 N·m (50 in.lbs.).
5. Tighten the remainder of the solenoid assembly screws to 5.7 N·m (50 in.lbs.).
6. Install the valve body into the transmission.



SENSOR-TRANSMISSION TEMPERATURE

DESCRIPTION

The transmission temperature sensor is a thermistor that is integral to the Transmission Range Sensor (TRS).

OPERATION

The transmission temperature sensor is used by the TCM to sense the temperature of the fluid in the sump. Since fluid temperature can affect transmission shift quality and convertor lock up, the TCM requires this information to determine which shift schedule to operate in.

Calculated Temperature

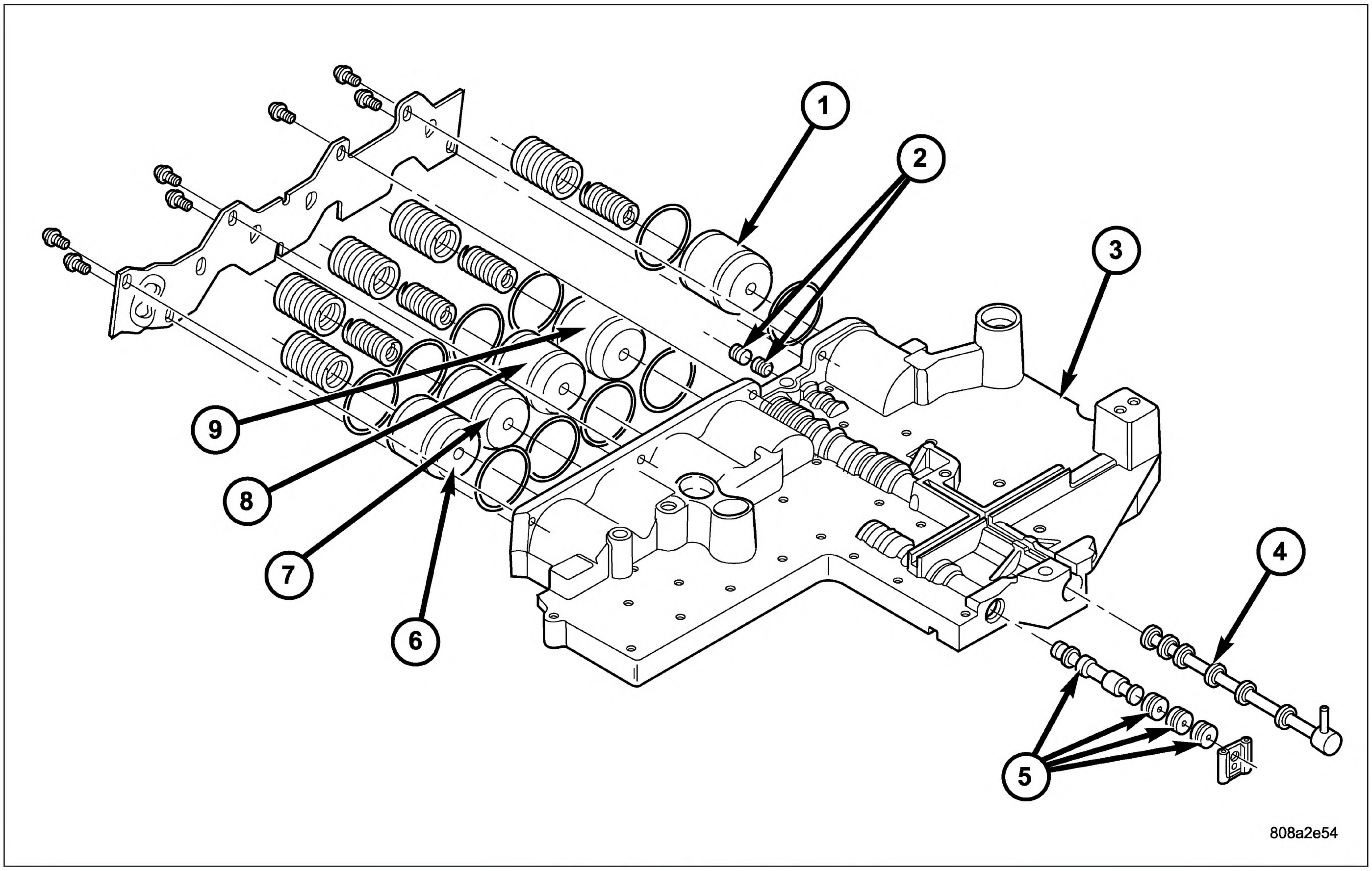
A failure in the temperature sensor or circuit will result in calculated temperature being substituted for actual temperature. Calculated temperature is a predicted fluid temperature which is calculated from a combination of inputs:

- Battery (ambient) temperature

- Engine coolant temperature
- In-gear run time since start-up

BODY-VALVE

DESCRIPTION



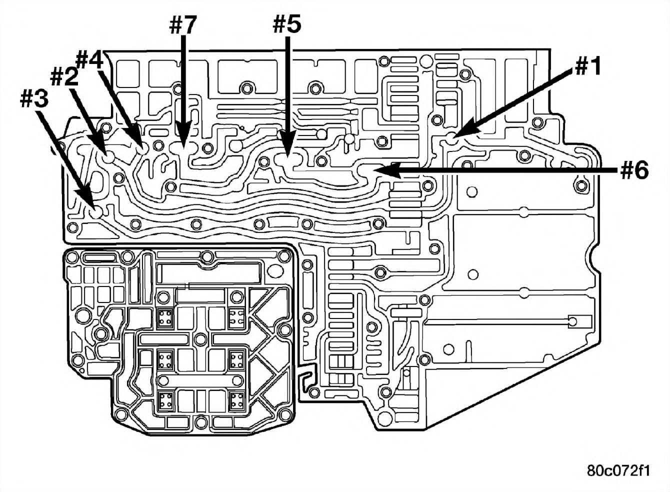
Valve Body Components

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SWITCH VALVE	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE	

The valve body consists of a cast aluminum valve body, a separator plate, and a transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, bands, and frictional clutches. The valve body contains the following components :

- Solenoid switch valve
- Manual valve
- Low/reverse switch valve
- 5 Accumulators

- 7 check balls



OPERATION

NOTE: Refer to the Hydraulic Schematics for a visual aid in determining valve location, operation and design.

SOLENOID SWITCH VALVE

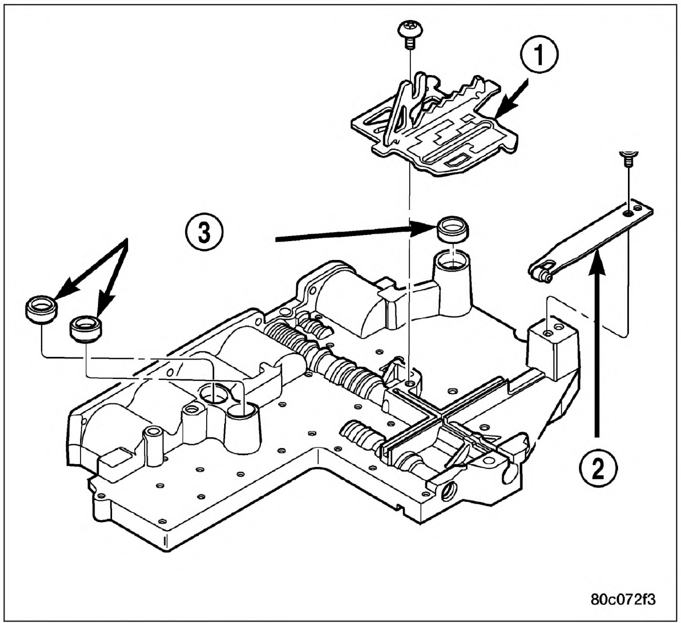
The Solenoid Switch Valve (SSV) controls the direction of the transmission fluid when the L/R-TCC solenoid is energized.

The Solenoid Switch Valve controls line pressure from the LR-TCC solenoid. In 1st gear, the SSV will be in the downshifted position, thus directing fluid to the L/R clutch circuit. In 2nd, 3rd, 4th, and fifth gears, the solenoid switch valve will be in the upshifted position and directs the fluid into the torque converter clutch (TCC) circuit.

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L/R pressure switch is monitored to confirm SSV movement. If the movement is not confirmed (the L/R pressure switch does not close), 2nd gear is substituted for 1st. A DTC will be set after three unsuccessful attempts are made to get into 1st gear in one given key start.

MANUAL VALVE

The manual valve is a relay valve. The purpose of the manual valve is to direct fluid to the correct circuit needed for a specific gear or driving range. The manual valve, as the name implies, is manually operated by the driver with a lever located on the top of the valve body. The valve is connected mechanically by a cable to the gearshift mechanism. The valve is held in each of its positions by a roller detent spring (2) that engages the “roostercomb” of the TRS selector plate (1).



1 - TRS SELECTOR PLATE
2 - DETENT SPRING
3 - CLUTCH PASSAGE SEALS

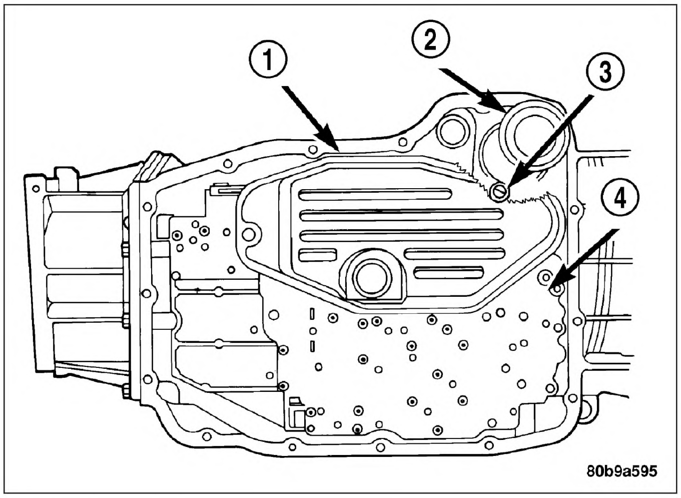
LOW/REVERSE SWITCH VALVE

The low/reverse switch valve allows the low/reverse clutch to be operated by either the LR/CC solenoid or the MS solenoid.

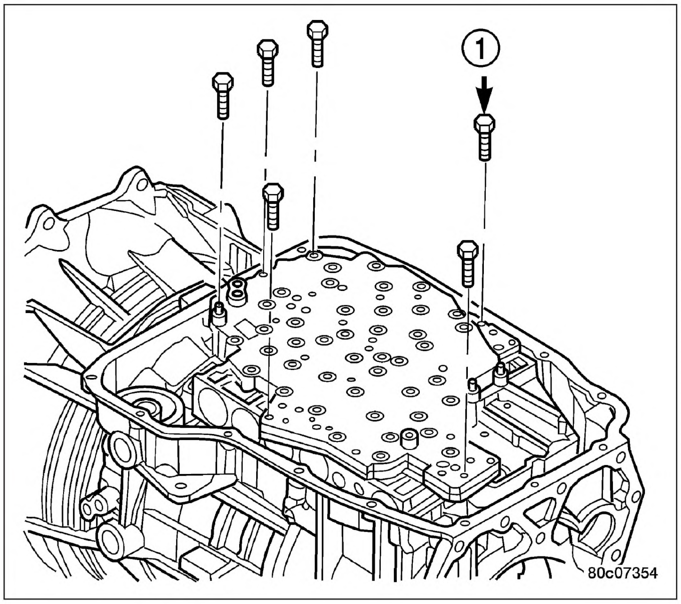
REMOVAL

NOTE: The valve body can be removed for service without having to remove the transmission assembly. The valve body can be disassembled for cleaning and inspection of the individual components. (Refer to 21 - TRANSMISSION/AUTOMATIC - 45RFE/VALVE BODY - DISASSEMBLY)

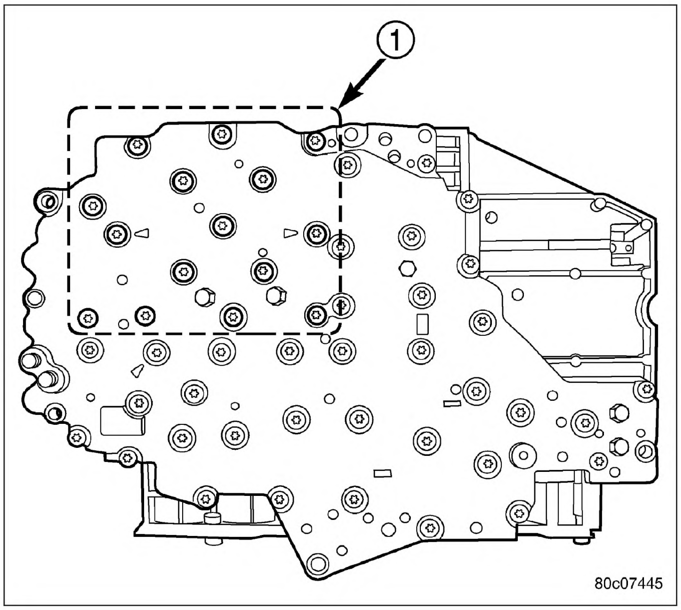
1. Shift transmission into PARK.
2. Raise vehicle.
3. Disconnect wires at the solenoid and pressure switch assembly connector.
4. Position drain pan under transmission oil pan.
5. Remove transmission oil pan.
6. Remove the primary oil filter (1) from valve body.



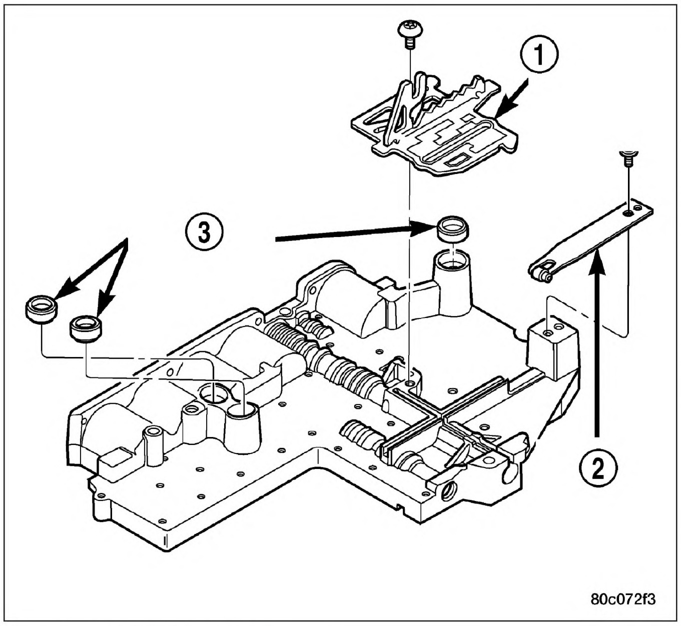
7. Remove bolts (1) attaching valve body to transmission case.
8. Lower the valve body and work the electrical connector out of transmission case.
9. Separate the valve body from the transmission.



DISASSEMBLY

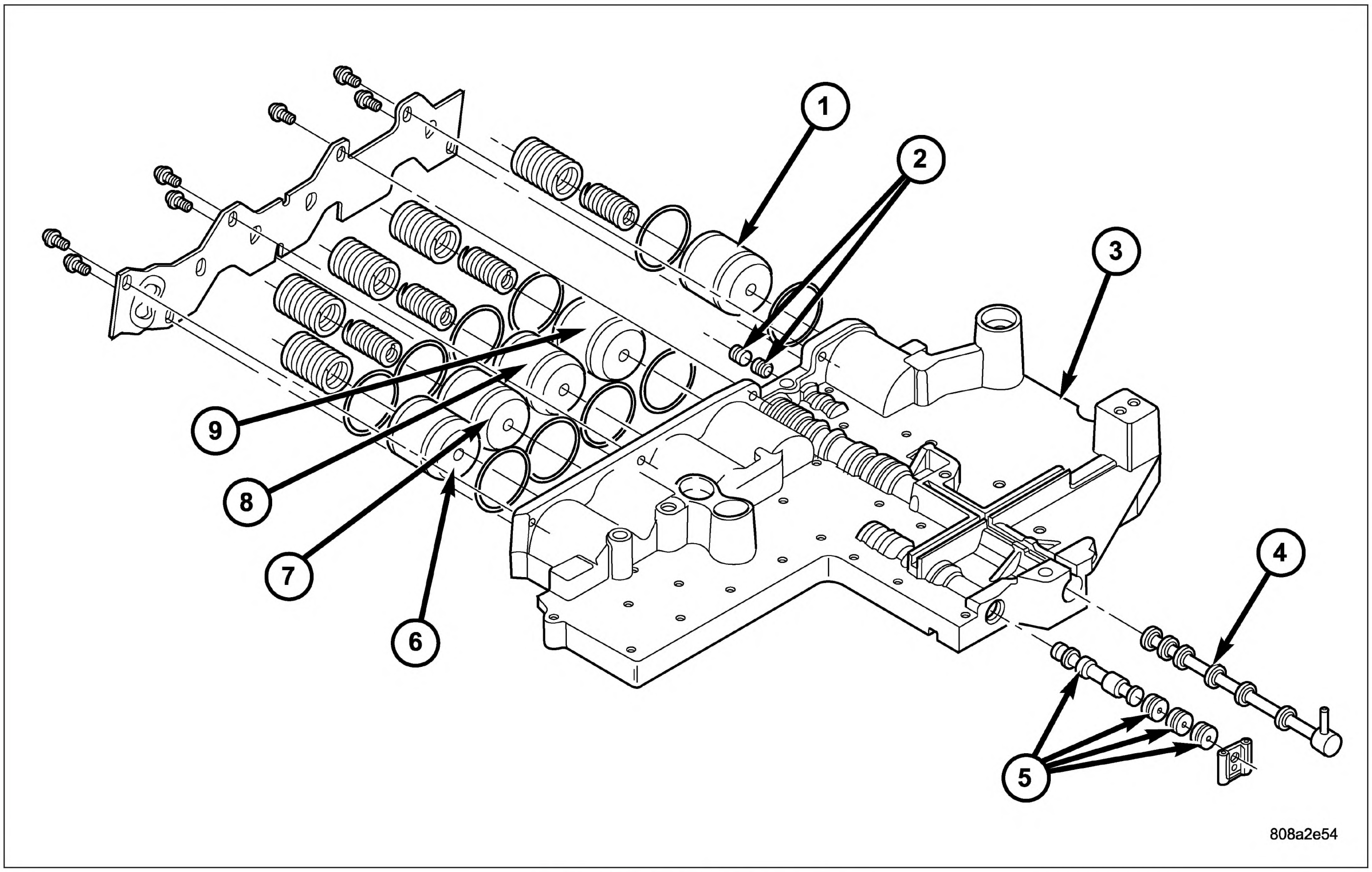


1. Remove the bolts (1) holding the solenoid and pressure switch assembly to the valve body. Do not remove the screws on the top of the solenoid and pressure switch assembly.
2. Separate the solenoid and pressure switch assembly from the valve body.



1 - TRS SELECTOR PLATE
2 - DETENT SPRING
3 - CLUTCH PASSAGE SEALS

3. Remove the screw holding the detent spring (2) onto the valve body.
4. Remove the detent spring (2) from the valve body.
5. Remove the TRS selector plate (1) from the valve body and the manual valve.
6. Remove the clutch passage seals (3) from the valve body, if necessary.



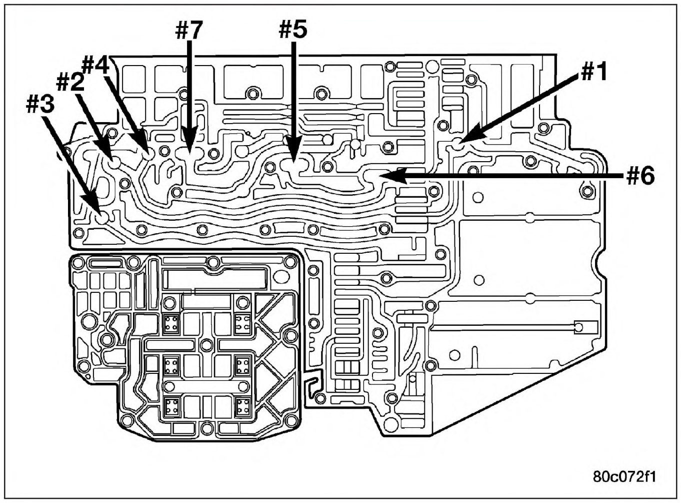
Valve Body Components

1 - LOW/REVERSE ACCUMULATOR
2 - LOW/REVERSE SWITCH VALVE
3 - UPPER VALVE BODY
4 - MANUAL VALVE
5 - SOLENOID SWITCH VALVE
6 - OVERDRIVE ACCUMULATOR
7 - UNDERDRIVE ACCUMULATOR
8 - 4C ACCUMULATOR
9 - 2C ACCUMULATOR

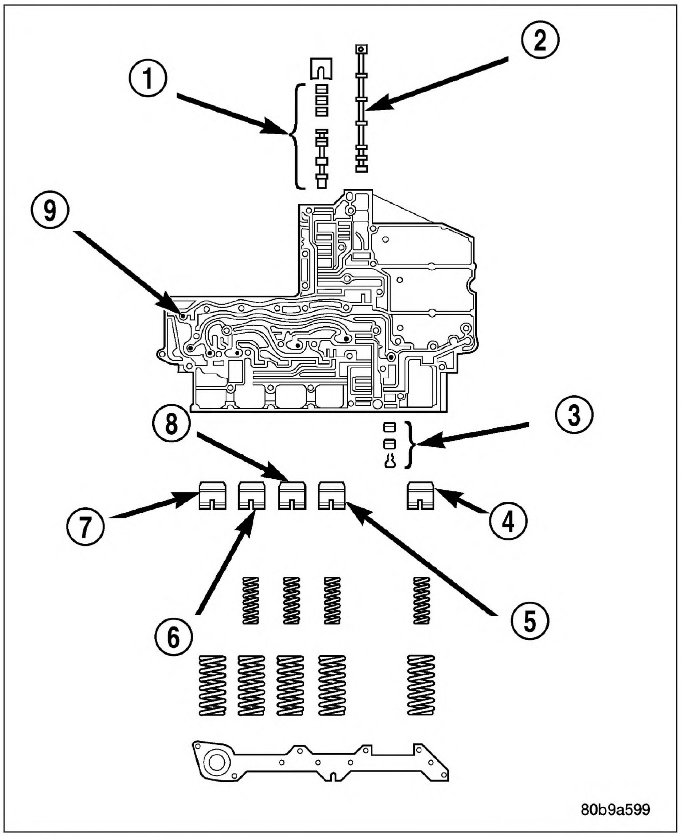
7. Remove the screws holding the accumulator cover onto the valve body.
8. Remove the accumulator springs and pistons (1, 6-9) from the valve body. Note which accumulator piston and spring belong in each location.
9. Place the valve body on the bench with the transfer plate upward.

NOTE: The valve body contains seven check balls. The transfer plate must be placed upward to prevent losing the check balls when the transfer plate is removed from the valve body.

10. Remove the screws holding the valve body to the valve body transfer plate.
11. Remove the transfer plate from the valve body. Note the location of all check balls.
12. Remove the check balls from the valve body.



13. Remove the retainers securing the solenoid switch valve (1), manual valve (2), and the low/reverse switch valve (3) from the valve body and remove the associated valve and spring. Tag each valve and spring combination with location information to aid in assembly.



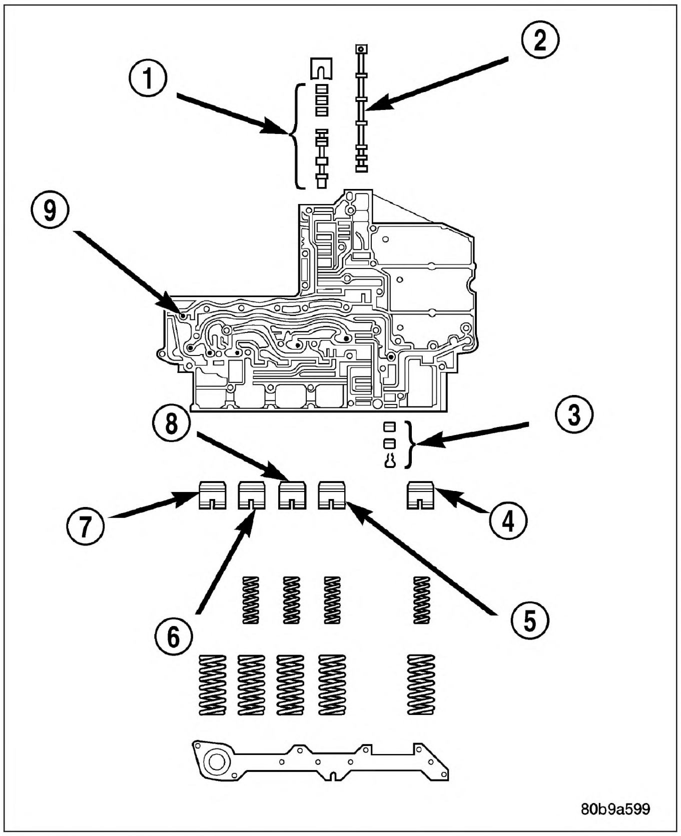
1 - SOLENOID SWITCH VALVE
2 - MANUAL VALVE
3 - LOW REVERSE SWITCH VALVE
4 - LOW REVERSE ACCUMULATOR
5 - 2ND CLUTCH ACCUMULATOR
6 - UNDERDRIVE ACCUMULATOR
7 - OVERDRIVE ACCUMULATOR
8 - 4TH CLUTCH ACCUMULATOR
9 - CHECK BALLS (7)

CLEANING

Clean the valve housings, valves, plugs, springs, and separator plates with a standard parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution.

Do not immerse any of the electrical components in cleaning solution. Clean the electrical components by wiping them off with dry shop towels only.

Dry all except the electrical parts with compressed air. Make sure all passages are clean and free from obstructions. **Do not use rags or shop towels to dry or wipe off valve body components. Lint from these materials can stick to valve body parts, interfere with valve operation, and clog filters and fluid passages.**



1 - SOLENOID SWITCH VALVE
2 - MANUAL VALVE
3 - LOW REVERSE SWITCH VALVE
4 - LOW REVERSE ACCUMULATOR
5 - 2ND CLUTCH ACCUMULATOR
6 - UNDERDRIVE ACCUMULATOR
7 - OVERDRIVE ACCUMULATOR
8 - 4TH CLUTCH ACCUMULATOR
9 - CHECK BALLS (7)

INSPECTION

Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straightedge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

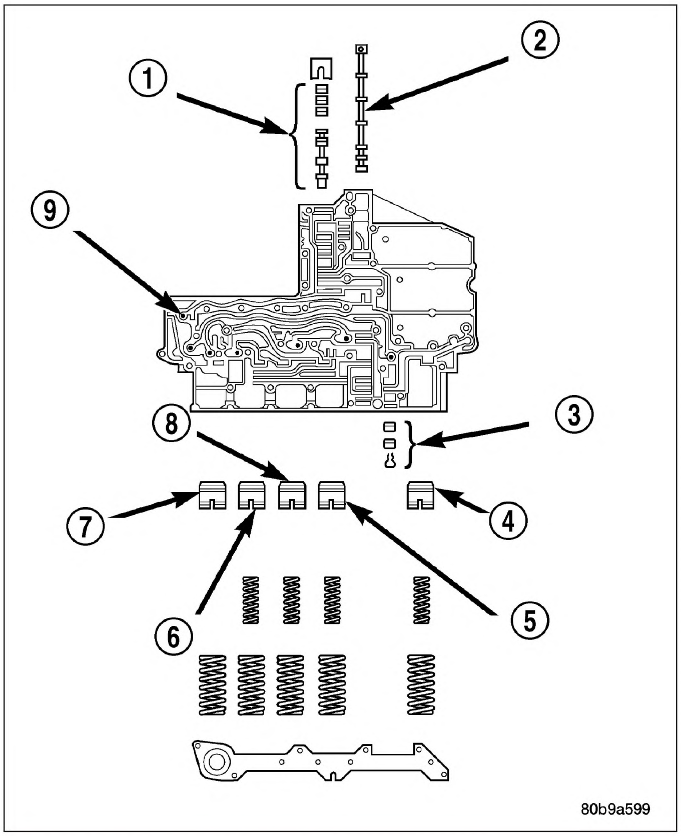
Minor distortion of a valve body mating surface may be corrected by smoothing the surface with a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands.** Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the bore.

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

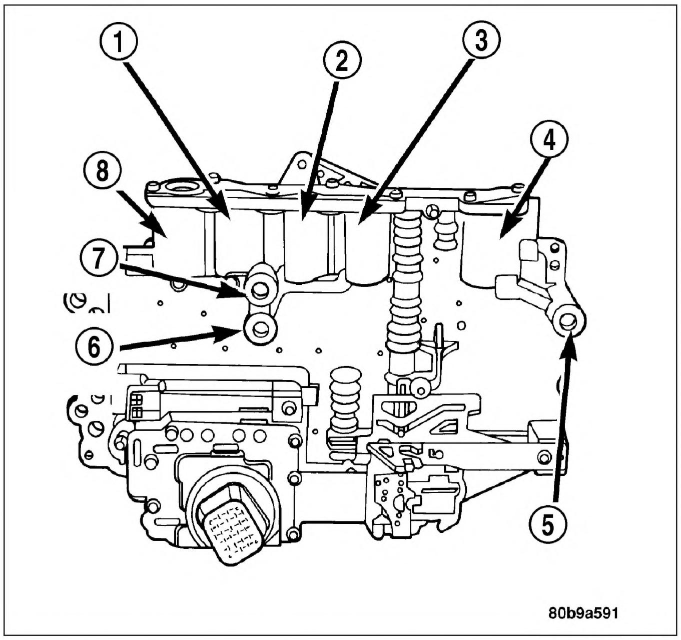
Valve body bores do not change dimensionally with use. If the valve body functioned correctly when new, it will continue to operate properly after cleaning and inspection. It should not be necessary to replace a valve body assembly unless it is damaged in handling.



1 - SOLENOID SWITCH VALVE
2 - MANUAL VALVE
3 - LOW REVERSE SWITCH VALVE
4 - LOW REVERSE ACCUMULATOR
5 - 2ND CLUTCH ACCUMULATOR
6 - UNDERDRIVE ACCUMULATOR
7 - OVERDRIVE ACCUMULATOR
8 - 4TH CLUTCH ACCUMULATOR
9 - CHECK BALLS (7)

Inspect all the accumulator bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the accumulator springs. The springs must be free of distortion, warpage or broken coils.

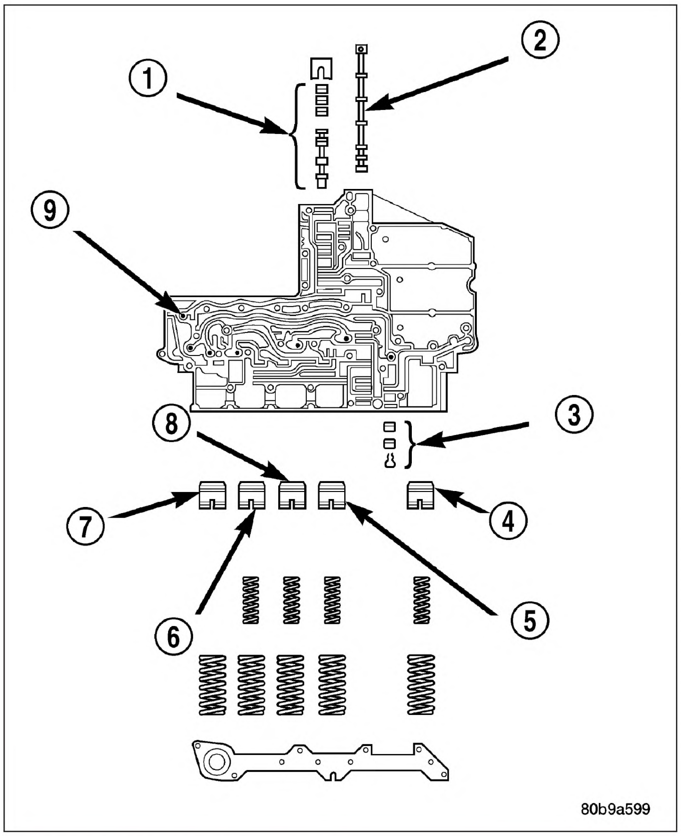
Inspect all the fluid seals on the valve body. Replace any seals that are cracked, distorted, or damaged in any way. These seals pass fluid pressure directly to the clutches. Any pressure leak at these points, may cause transmission performance problems.



1 - UNDERDRIVE ACCUMULATOR (2 SPRINGS)
2 - 4TH CLUTCH ACCUMULATOR (2 SPRINGS)
3 - 2ND CLUTCH ACCUMULATOR (2 SPRINGS)
4 - LOW REVERSE ACCUMULATOR (2 SPRINGS)
5 - LOW/REVERSE PASSAGE SEAL
6 - 2ND CLUTCH PASSAGE SEAL
7 - 4TH CLUTCH PASSAGE SEAL
8 - OVERDRIVE ACCUMULATOR (1 SPRING)

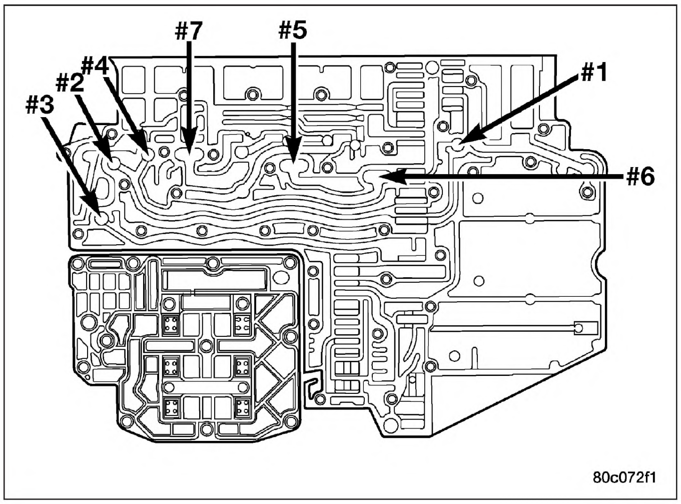
ASSEMBLY

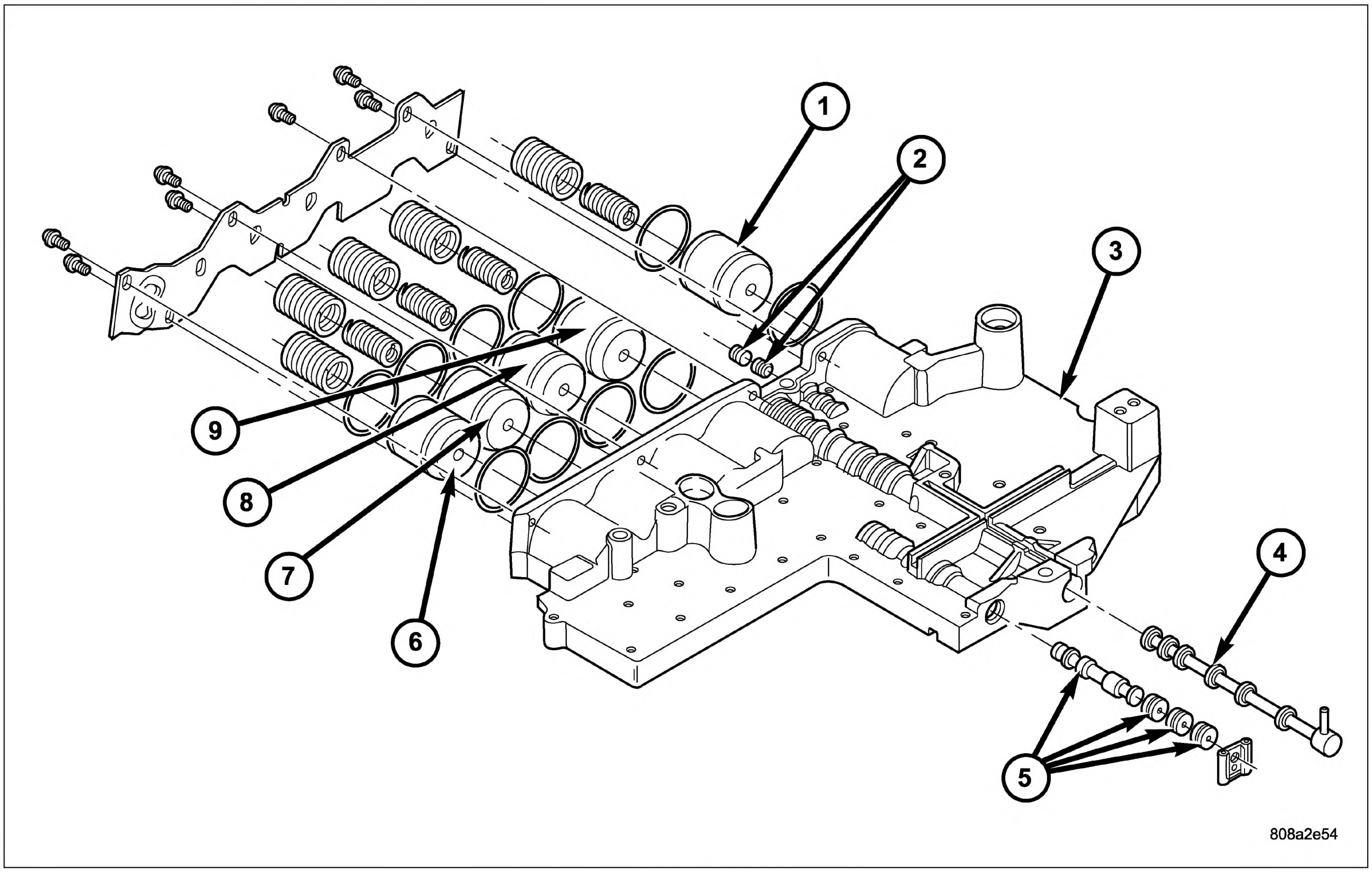
1. Lubricate valves, springs, and the housing valve bores with clean transmission fluid.
2. Install solenoid switch valve (1), manual valve (2), and the low/reverse switch valve (3) into the valve body.
3. Install the retainers to hold each valve into the valve body.



1 - SOLENOID SWITCH VALVE
2 - MANUAL VALVE
3 - LOW REVERSE SWITCH VALVE
4 - LOW REVERSE ACCUMULATOR
5 - 2ND CLUTCH ACCUMULATOR
6 - UNDERDRIVE ACCUMULATOR
7 - OVERDRIVE ACCUMULATOR
8 - 4TH CLUTCH ACCUMULATOR
9 - CHECK BALLS (7)

4. Install the valve body check balls into their proper locations.
5. Position the transfer plate onto the valve body.
6. Install the screws to hold the transfer plate to the valve body. Tighten the screws to 5.6 N·m (50 in. lbs.).



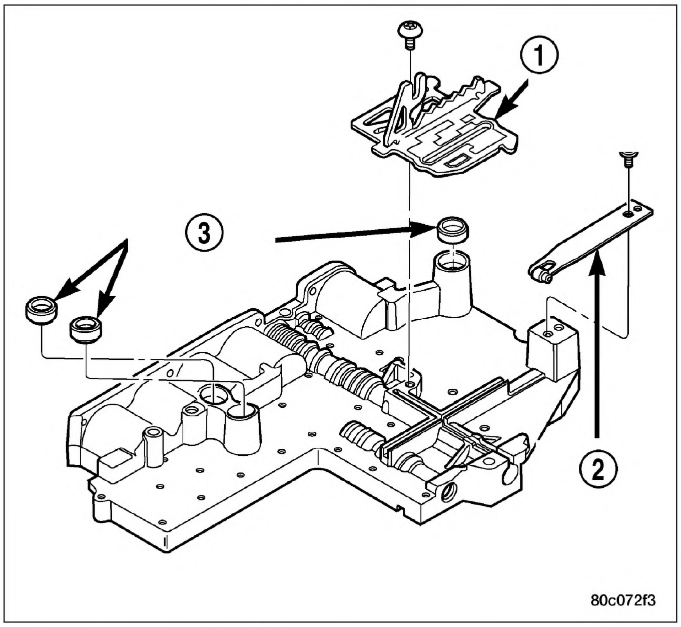


Valve Body Components

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SWITCH VALVE	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE	

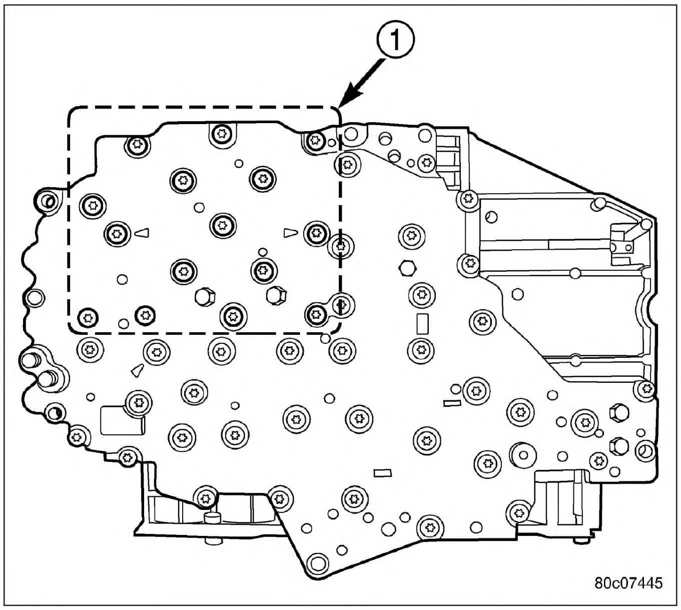
7. Install the accumulator pistons (1, 6-9) and springs into the valve body in the location from which they were removed. Note that all accumulators except the overdrive have two springs. The overdrive accumulator piston (6) has only one spring.
8. Position the accumulator cover onto the valve body.
9. Install the screws to hold the accumulator cover onto the valve body. Tighten the screws to 7 N·m (60 in. lbs.).

10. Install the TRS selector plate (1) onto the valve body and the manual valve.
11. Position the detent spring (2) onto the valve body.
12. Install the screw to hold the detent spring (2) onto the valve body. Tighten the screw to 4.5 N·m (40 in. lbs.).
13. Install new clutch passage seals (3) onto the valve body, if necessary.



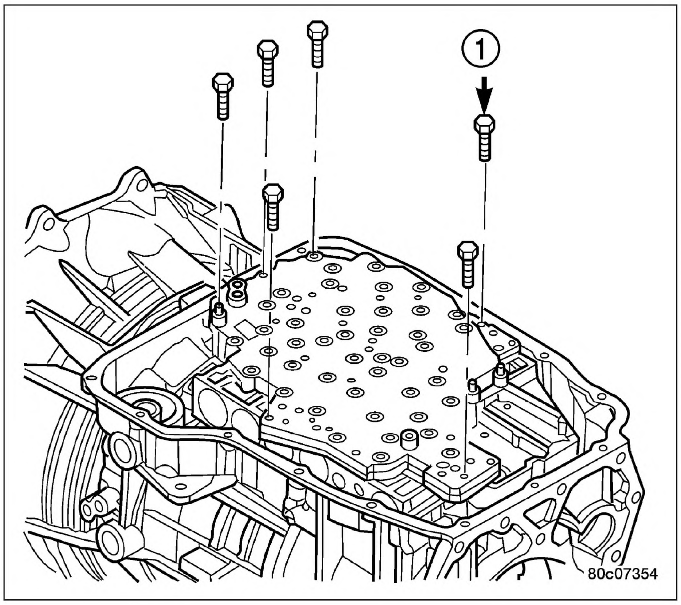
1 - TRS SELECTOR PLATE
2 - DETENT SPRING
3 - CLUTCH PASSAGE SEALS

14. Install the solenoid and pressure switch assembly onto the valve body.
15. Install the bolts (1) to hold the solenoid and pressure switch assembly onto the valve body. Tighten the bolts to 5.7 N·m (50 in. lbs.). Tighten the bolts adjacent to the arrows cast into the bottom of the transfer plate first.

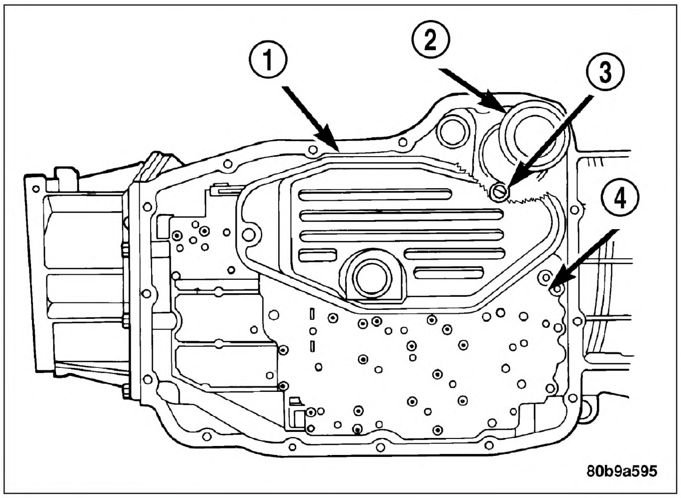


INSTALLATION

1. Check condition of seals on valve body and the solenoid and pressure switch assembly. Replace seals if cut or worn.
2. Place TRS selector plate in the PARK position.
3. Place the transmission in the PARK position.
4. Lubricate seal on the solenoid and pressure switch assembly connector with petroleum jelly.
5. Position valve body in transmission and align the manual lever on the valve body to the pin on the transmission manual shift lever.
6. Seat valve body in case and install one or two bolts to hold valve body in place.
7. Tighten valve body bolts alternately and evenly to 12 N·m (105 in. lbs.) torque.



CAUTION: The primary oil filter seal MUST be fully installed flush against the oil pump body. DO NOT install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.



8. Install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with the butt end of a hammer, or other suitable tool.
9. Place replacement filter (1) in position on valve body and into the oil pump.
10. Install screw to hold filter to valve body. Tighten screw to 4.5 N·m (40 in. lbs.) torque.
11. Connect the solenoid and pressure switch assembly connector.
12. Install oil pan. Tighten pan bolts to 12 N·m (105 in. lbs.) torque.
13. Lower vehicle and fill transmission with Mopar® ATF +4.
14. Check and adjust gearshift cable, if necessary.

AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS

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AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

P0219–ENGINE OVERSPEED

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) monitors the engine speed over the CAN bus. If the engine speed is greater than 4100+ 800 RPM, the TCM assumes that either the information from the Powertrain Control Module (PCM) is incorrect or that a major mechanical problem exist. Once the DTC is set, the TCM will position the transmission gear into neutral to protect the engine and transmissin from damage. The transmission will remain in neutral and will not be revaluated by the TCM until the ignition is cycled.

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear with a valid Engine RPM message received at least once, and the CAN Bus Circuit and Engine CAN Message Missing are not active.
- **Set Condition:**
  Engine speed is greater than 4100+ 800 RPM.

Possible Causes
MECHANICAL ENGINE PROBLEM
MECHANICAL TRANSMISSION PROBLEM
POWERTRAIN CONTROL MODULE
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR OTHER TRANSMISSION DTCS

With the scan tool, check for other transmission DTCs.

Are there any gear ratio and/or speed sensor DTCs present in addition to P0219?

Yes >> Refer to the Symptom Category and perform the appropriate symptom. If speed sensor DTCs are present, perform their respective test first.

No >> Go To 2

---

2. CHECK IF ENGINE MECHANICAL PROBLEMS ARE PRESENT

Determine if any Engine mechanical problems are present.

Are there any Engine mechanical problems present?

Yes >> Repair engine as necessary. Refer to 9 - ENGINE-SERVICE INFORMATION for the appropriate repair procedures.

No >> Go To 3

P0219–ENGINE OVERSPEED (CONTINUED)

3. CHECK IF TRANSMISSION MECHANICAL PROBLEMS ARE PRESENT

Determine if any Transmission mechanical problems are present.

Turn the ignition off to the lock position.

Remove the Transmission Oil Pan and inspect for debris or a plugged Transmission Oil Filter. Refer to 21 - AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedures.

Is there any debris, plugged Transmission Oil Filter, or signs of an internal transmission problem?

Yes >> Repair Transmission as necessary. Refer to 21 - AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION-NAG1/SERVICE INFORMATION for the appropriate service procedures.

No >> Go To 4

---

4. TEST DRIVE VEHICLE

NOTE: The Engine and Transmission must not have mechanical problems and be operating normally before proceeding with this test.

Replace and program the Powertrain Control Module (PCM) per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE for the appropriate service procedures.

Reassemble any previously disconnected connectors and/or components.

With the scan tool, erase Transmission DTCs.

Road test the vehicle.

With the scan tool, read Transmission DTCs.

Did DTC P0219-ENGINE OVERSPEED reset?

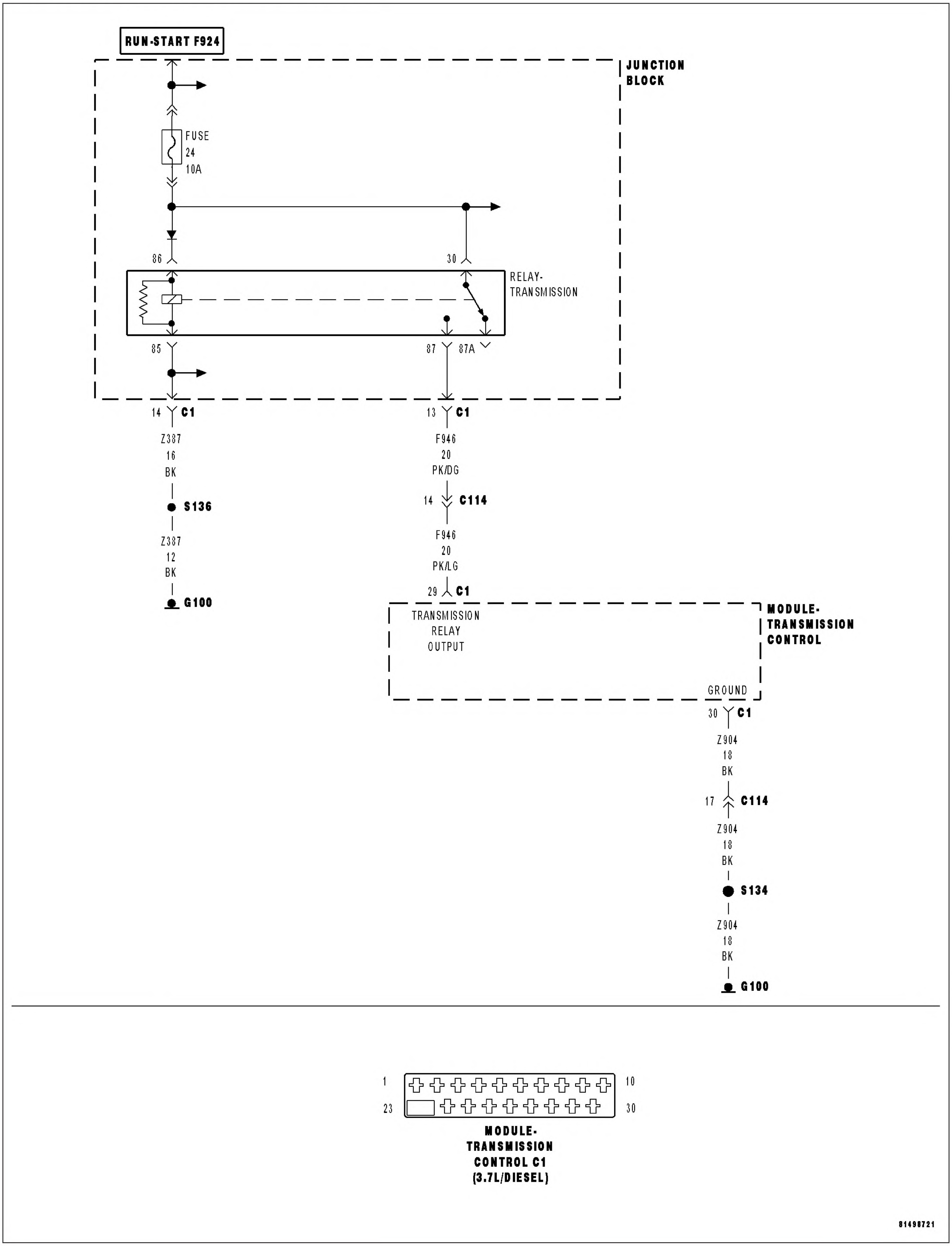
Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0562-BATTERY VOLTAGE LOW


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/DG
14 C114
F946 20 PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P0562-BATTERY VOLTAGE LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) monitors ignition voltage. The DTC will set if the monitored battery voltage drops below 8.5 volts and a temporary limp in will be activated. If the voltage rises above 9.0 volts, normal operations is resumed and the TCM will record the DTC as a one trip fault. The DTC will only mature to a full DTC if the voltage is less than 8.5 volts with a engine speed greater than 2000 RPM for a least 60 seconds.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When monitored battery voltage drops below 8.5 volts.

Possible Causes
ENGINE CHARGING SYSTEM DTCS
LOW BATTERY VOLTAGE
(F942) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT HIGH RESISTANCE
(Z904) GROUND CIRCUIT HIGH RESISTANCE
(F946) TRANSMISSION RELAY OUTPUT CIRCUIT HIGH RESISTANCE
TRANSMISSION RELAY
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR ENGINE CHARGING SYSTEM DTCS

With the scan tool, read Engine DTCs.

Are there any Engine Charging System DTCs present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK SYSTEM VOLTAGE

Start the engine.

With the scan tool, under transmission, check system voltage.

Is the transmission system voltage above 9.0 volts?

Yes >> Go To 4

No >> Go To 2

P0562-BATTERY VOLTAGE LOW (CONTINUED)

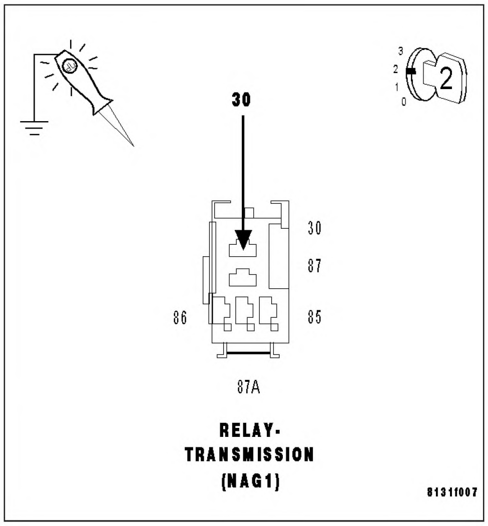
3. CHECK (F942) FUSED IGNITION SWITCH OUTPUT (RUN-START) CIRCUIT

Turn the ignition off to the lock position.

Remove the Transmission Control relay.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, check the (F942) Fused Ignition Switch Output (Run-Start) circuit in the Transmission Relay connector.



NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go To 4

No >> Repair the (F942) Fused Ignition Switch Output (Run-Start) circuit for high resistance.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

4. CHECK THE (F946) TRANSMISSION RELAY OUTPUT CIRCUIT

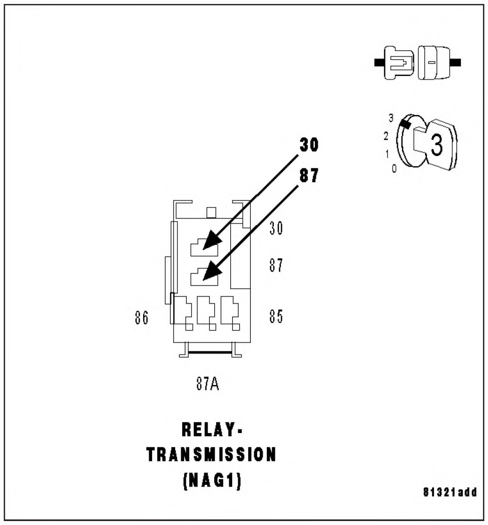
Turn the ignition off to the lock position.

Remove the Transmission Relay.

Connect a jumper wire between the (F942) Fused Ignition Switch Output (Run-Start) circuit and the (F946) Transmission Relay Output circuit in the Transmission Relay connector.

Start the engine.

With the scan tool, under transmission, check system voltage.



Is the transmission system voltage above 9.0 volts?

Yes >> Replace the Transmission Relay.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

P0562-BATTERY VOLTAGE LOW (CONTINUED)

5. CHECK THE (F946) TRANSMISSION RELAY OUTPUT CIRCUIT

Turn the ignition off to the lock position.

Disconnect the TCM C1 harness connector.

Ignition on, engine not running.

Using a 12-volt test light connected to ground, check the (F946) Transmission Relay Output circuit in the TCM C1 harness connector.

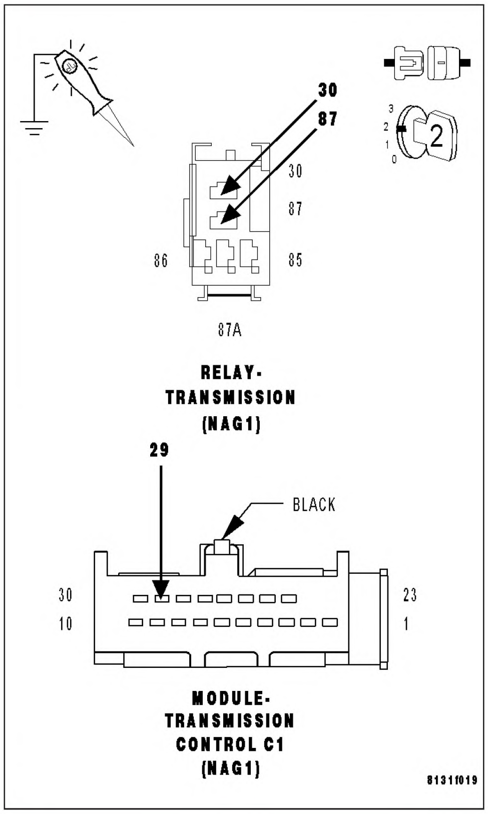
NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly?

Yes >> Go To 3

No >> Repair the (F946) Transmission Relay Output circuit for high resistance.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.


30
87
3
2
1
0
2
30
87
86
85
87A
RELAY-
TRANSMISSION
(NAG1)
29
BLACK
30
10
23
1
MODULE-
TRANSMISSION
CONTROL C1
(NAG1)
8131f019

---

6. CHECK (Z904) GROUND CIRCUIT

Turn the ignition off to the lock position.

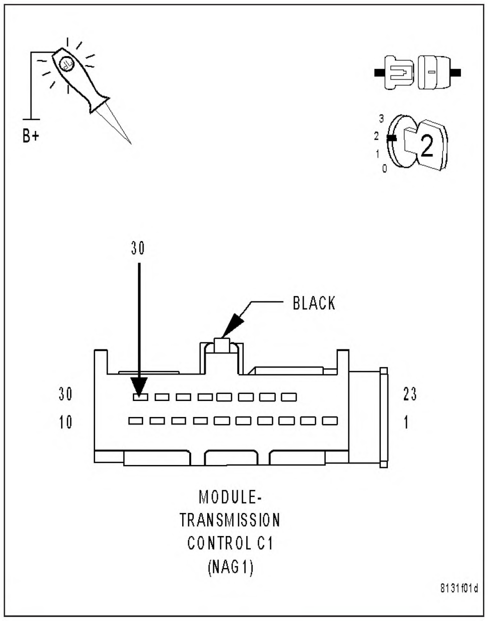
Using a 12-volt test light connected to 12-volts, check the (Z904) Ground circuit in the TCM C1 harness connector.

Does the test light illuminate brightly?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Repair the (Z912) Ground circuit for high resistance.


B+
3
2
1
0
2
30
BLACK
30
10
23
1
MODULE-
TRANSMISSION
CONTROL C1
(NAG1)
8131f01d

P0562-BATTERY VOLTAGE LOW (CONTINUED)

7. INTERMITTENT WIRING AND CONNECTORS

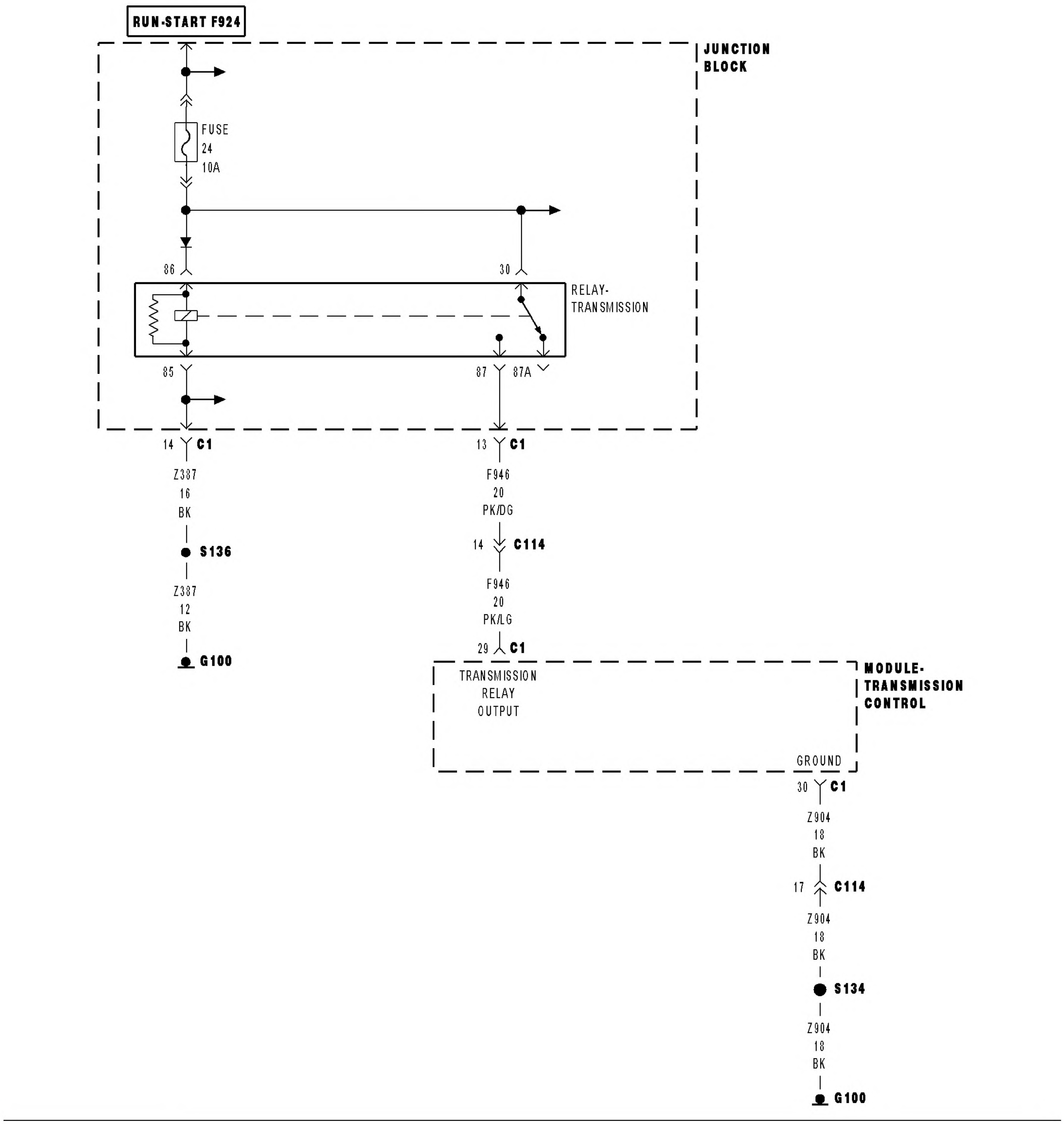
The conditions necessary to set this DTC are not present at this time.
Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.
Wiggle the wires while checking for shorted and open circuits.

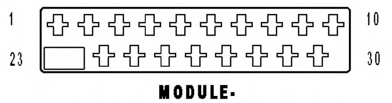
Where there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0563-BATTERY VOLTAGE HIGH


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/DG
14 C114
F946 20 PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P0563-BATTERY VOLTAGE HIGH (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) monitors ignition voltage. The DTC will set and temporary limp-in will be activated, if the monitored battery voltage rises above 16.9 volts. If the voltage drops below 16.4 volts, normal operations is resumed and the TCM will record the DTC as a one trip fault. The DTC will only mature to a full DTC if the voltage rises above 16.9 volts with a engine speed greater than 2000 RPM for a least 60 seconds.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the monitored battery voltage rises above 16.9 volts.

Possible Causes
CHARGING SYSTEM OVERCHARGE CONDITION
JUMP START OFF A 24 VOLT SYSTEM
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR CHARGING SYSTEM DTCS

With the scan tool, read Engine DTCs.

NOTE: This includes any one trip faults.

Are there any Engine Charging System DTCs present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF VOLTAGE IS GREATER THAN 16.9 VOLTS

Start the engine and raise the engine speed to 2000 RPM.

With the scan tool, monitor the Transmission system voltage for at least 60 seconds.

Does the Transmission system voltage read above 16.9 volts for any period of time?

Yes >> Go To 4

No >> Go To 2

---

3. VERIFY IF VEHICLE WAS JUMP STARTED WITH 24-VOLT SYSTEM

Verify if the vehicle was jump started by another vehicle using a 24-volt charging system.

Was the vehicle jump started by another vehicle using a 24-volt charging system?

Yes >> This is the cause of the DTC. Erase the DTC and return the vehicle to the customer.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

P0563-BATTERY VOLTAGE HIGH (CONTINUED)

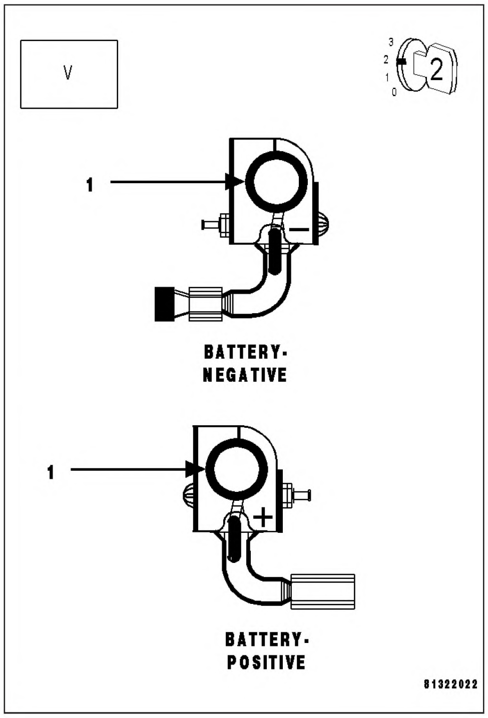
4. CHECK BATTERY VOLTAGE

Start the engine and raise the engine speed to 2000 RPM.

With the scan tool, read the Transmission system voltage.

With a voltmeter, measure the battery voltage at the battery.

Compare the readings.



Does the voltage readings match between the Transmission scan tool reading and the battery voltmeter reading?

Yes >> Repair the charging system for an over charging condition. Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom as if the DTC is current.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

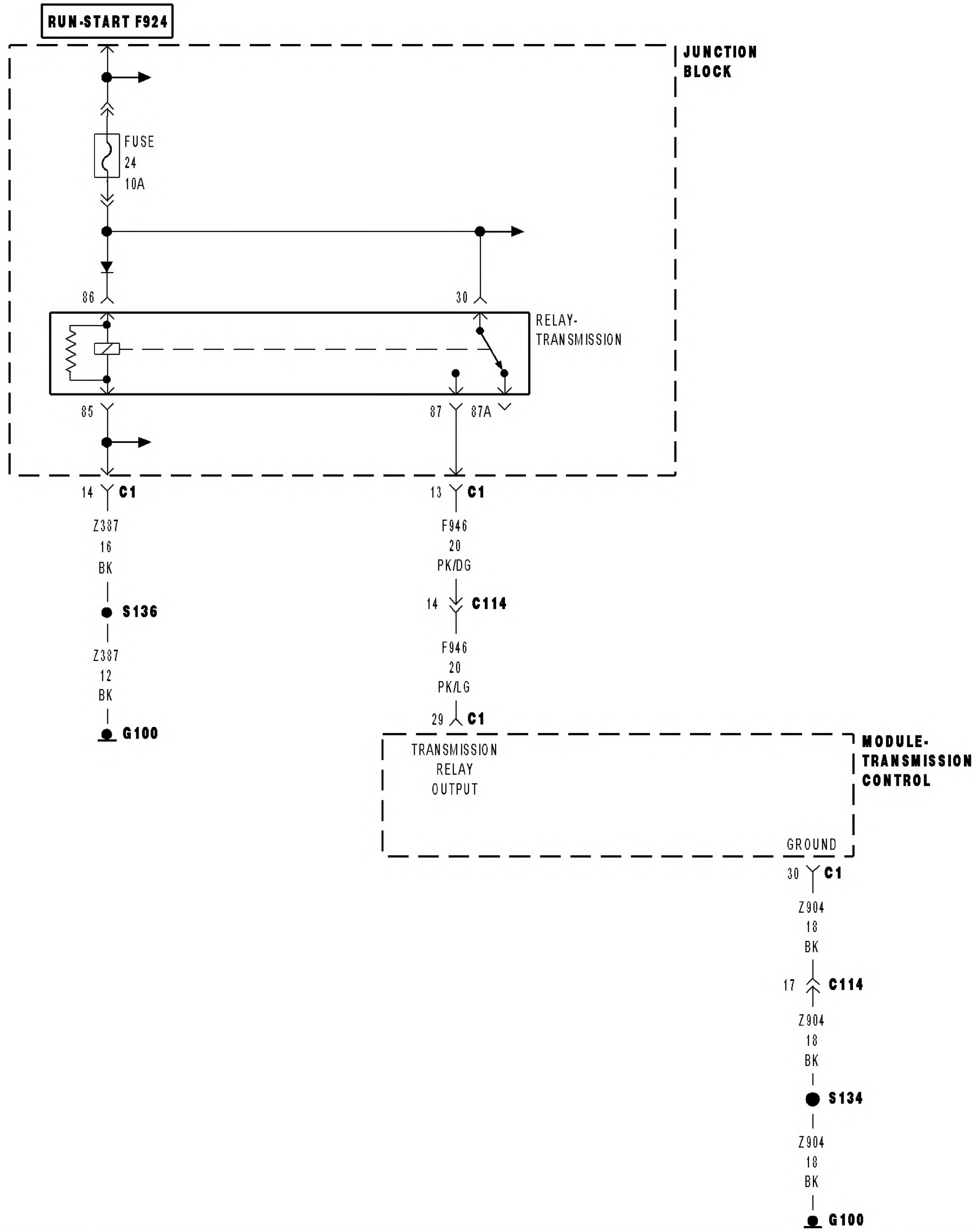
Were there any problems found?

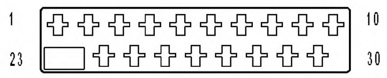
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0602-CONTROL MODULE PROGRAMMING ERROR/NOT PROGRAMMED


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387
16
BK
S136
Z387
12
BK
G100
F946
20
PK/DG
14 C114
F946
20
PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904
18
BK
17 C114
Z904
18
BK
S134
Z904
18
BK
G100



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P0602-CONTROL MODULE PROGRAMMING ERROR/NOT PROGRAMMED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. If the TCM detects that the variables that dictate the vehicle application are not present, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects that the variables that dictate the vehicle application are not present.

Possible Causes
CONTROLLER NOT CODED
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF TCM IS FLASHABLE

NOTE: Controller is programmed with generic software and will not allow the correct vehicle Powertrain management.

With the scan tool, record the vehicles controller part number.

Select Use Controller Part Number under the Flash Tab.

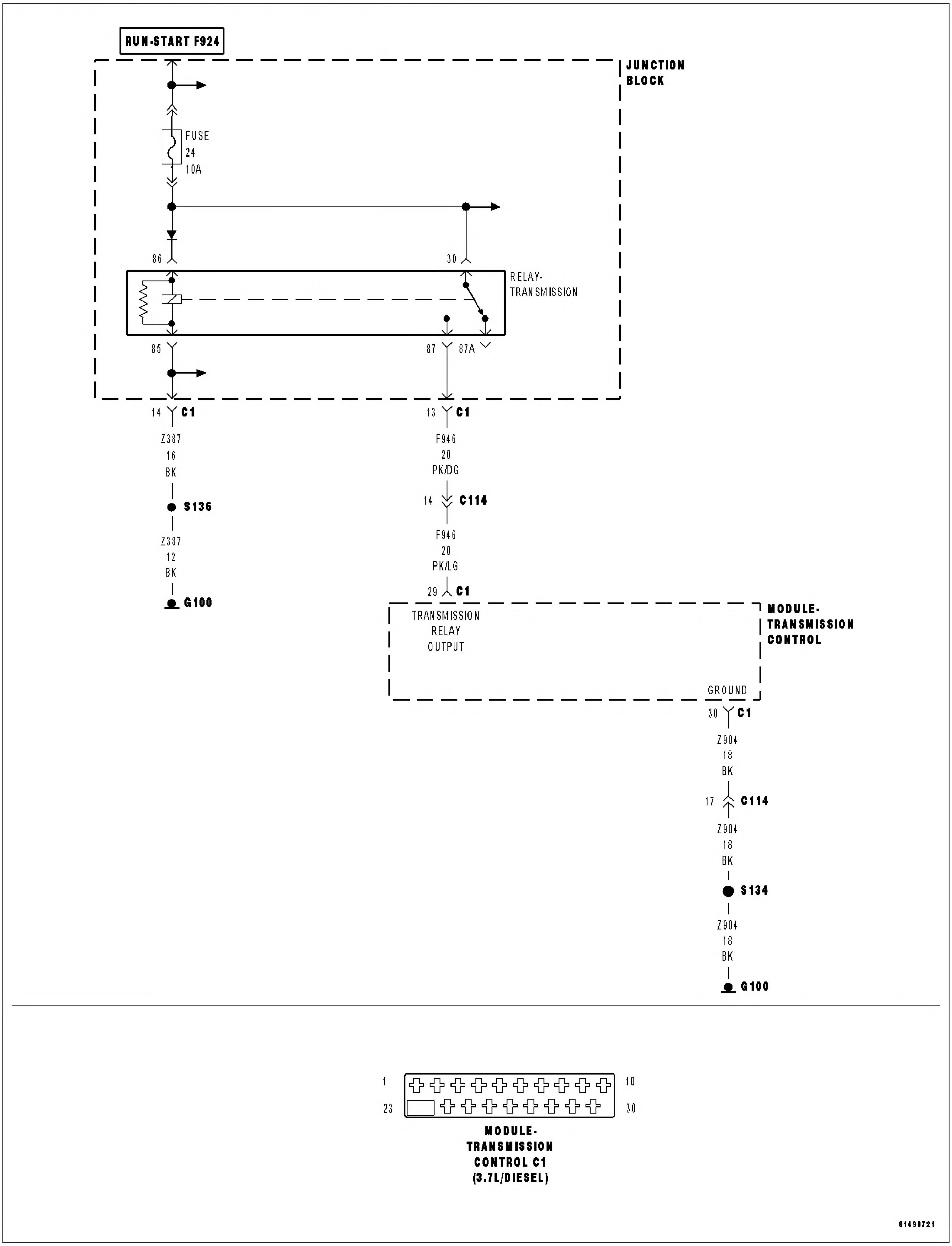
Flash the controller with the correct software.

Were you able to update (flash) the controller successfully?

Yes >> Test Complete.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0604-INTERNAL CONTROL MODULE RAM


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387
16
BK
S136
Z387
12
BK
G100
13 C1
F946
20
PK/DG
14 C114
F946
20
PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904
18
BK
17 C114
Z904
18
BK
S134
Z904
18
BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P0604-INTERNAL CONTROL MODULE RAM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. If the TCM detects an error with the controllers Random Access Memory (RAM), the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an error with the controllers Random Access Memory (RAM).

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

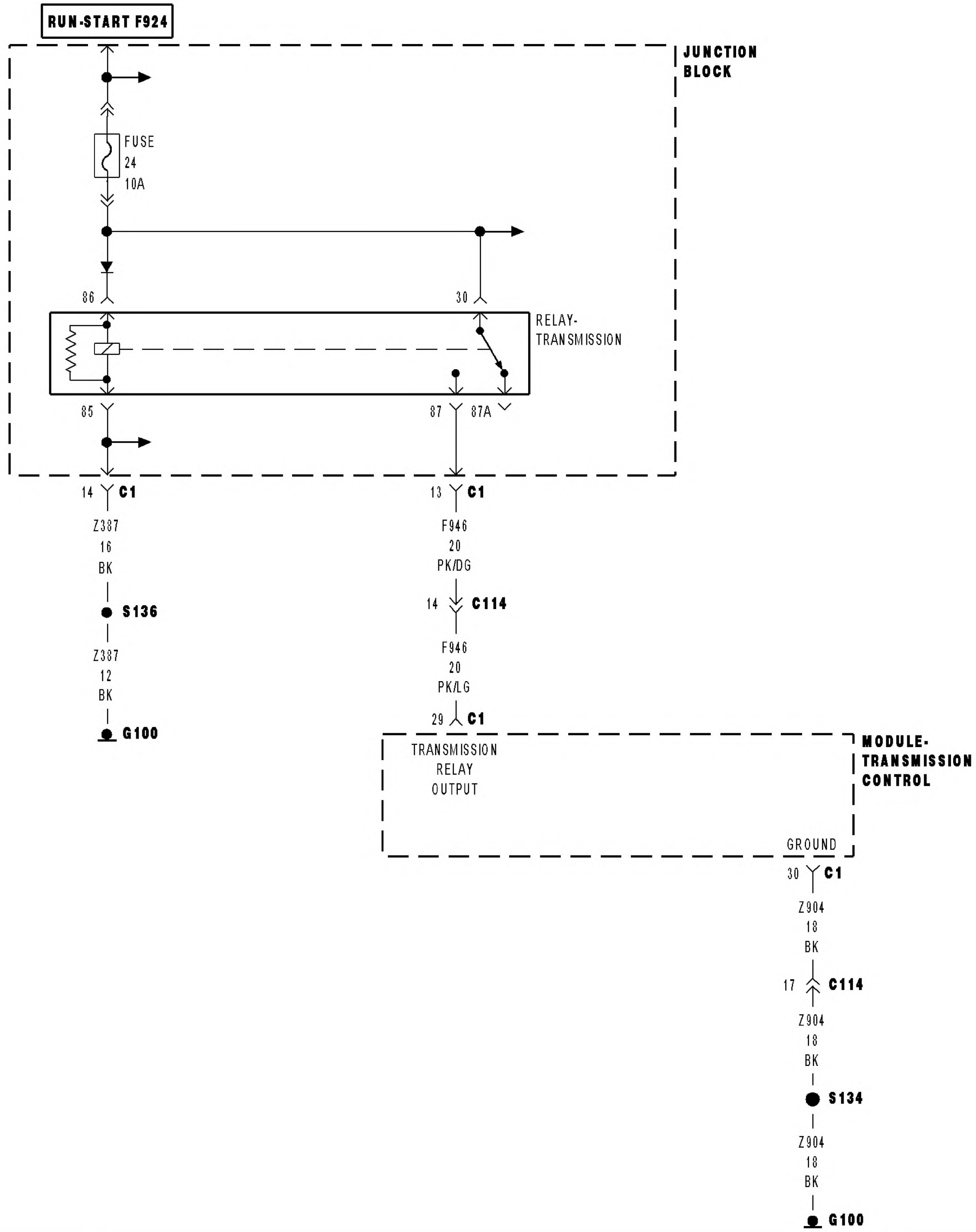
View repair

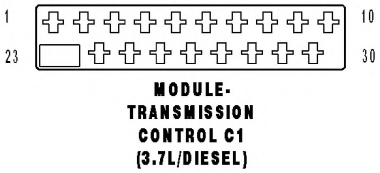
Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0605-INTERNAL CONTROL MODULE ROM


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/DG
14 C114
F946 20 PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100


1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P0605-INTERNAL CONTROL MODULE ROM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. If the TCM detects an error with the controllers Read Only Memory (ROM), the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an error with the controllers Read Only Memory (ROM).

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - DIAGNOSIS AND TESTING)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

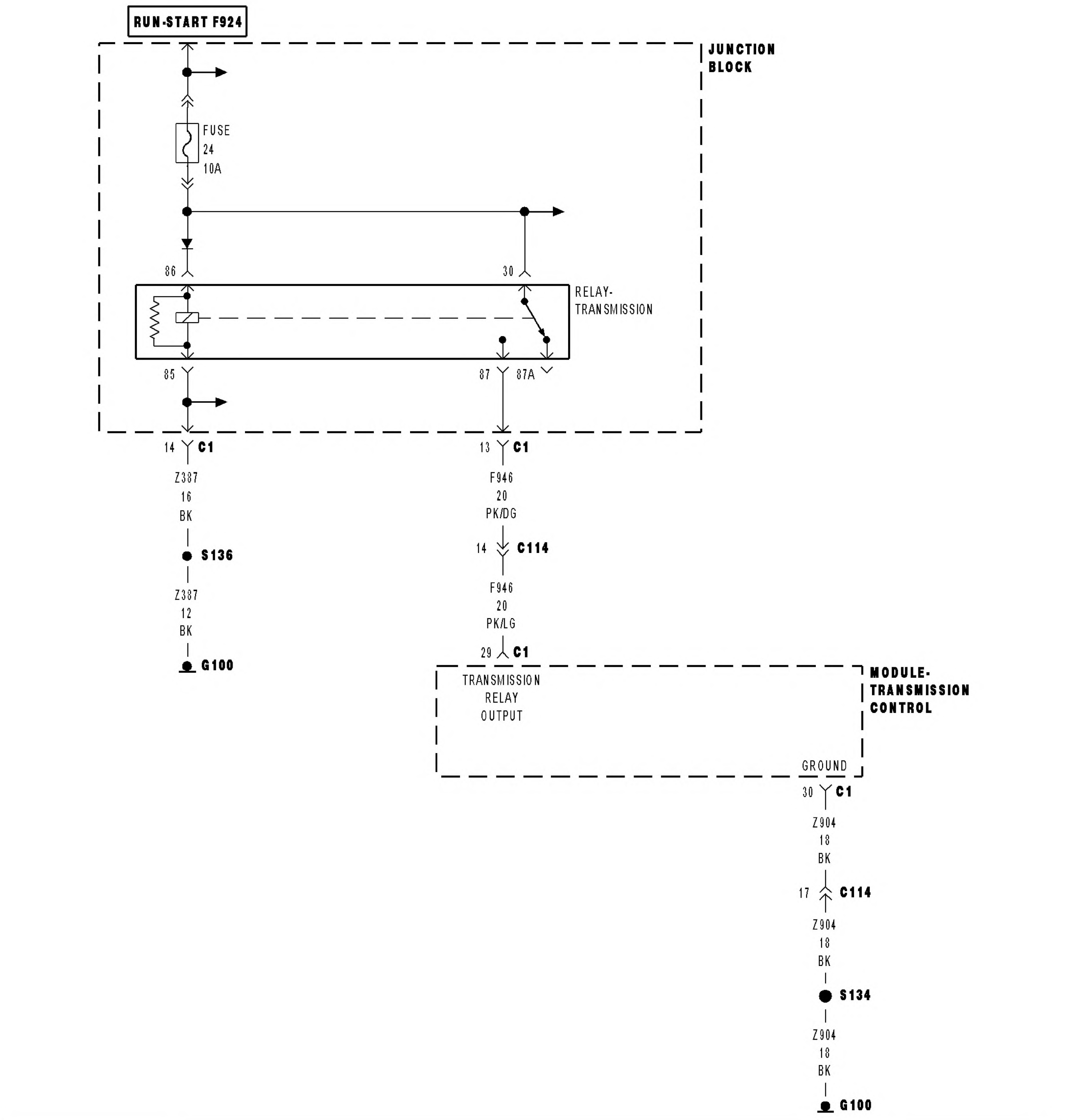
View repair

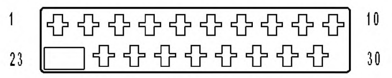
Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0613-INTERNAL TRANSMISSION PROCESSOR


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14
C1
13
C1
Z387
16
BK
S136
Z387
12
BK
G100
F946
20
PK/DG
14
C114
F946
20
PK/LG
29
C1
MODULE-TRANSMISSION CONTROL
TRANSMISSION RELAY OUTPUT
GROUND
30
C1
Z904
18
BK
17
C114
Z904
18
BK
S134
Z904
18
BK
G100



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P0613-INTERNAL TRANSMISSION PROCESSOR (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. If the TCM detects an error with the controllers processor, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an error with the controllers processor.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

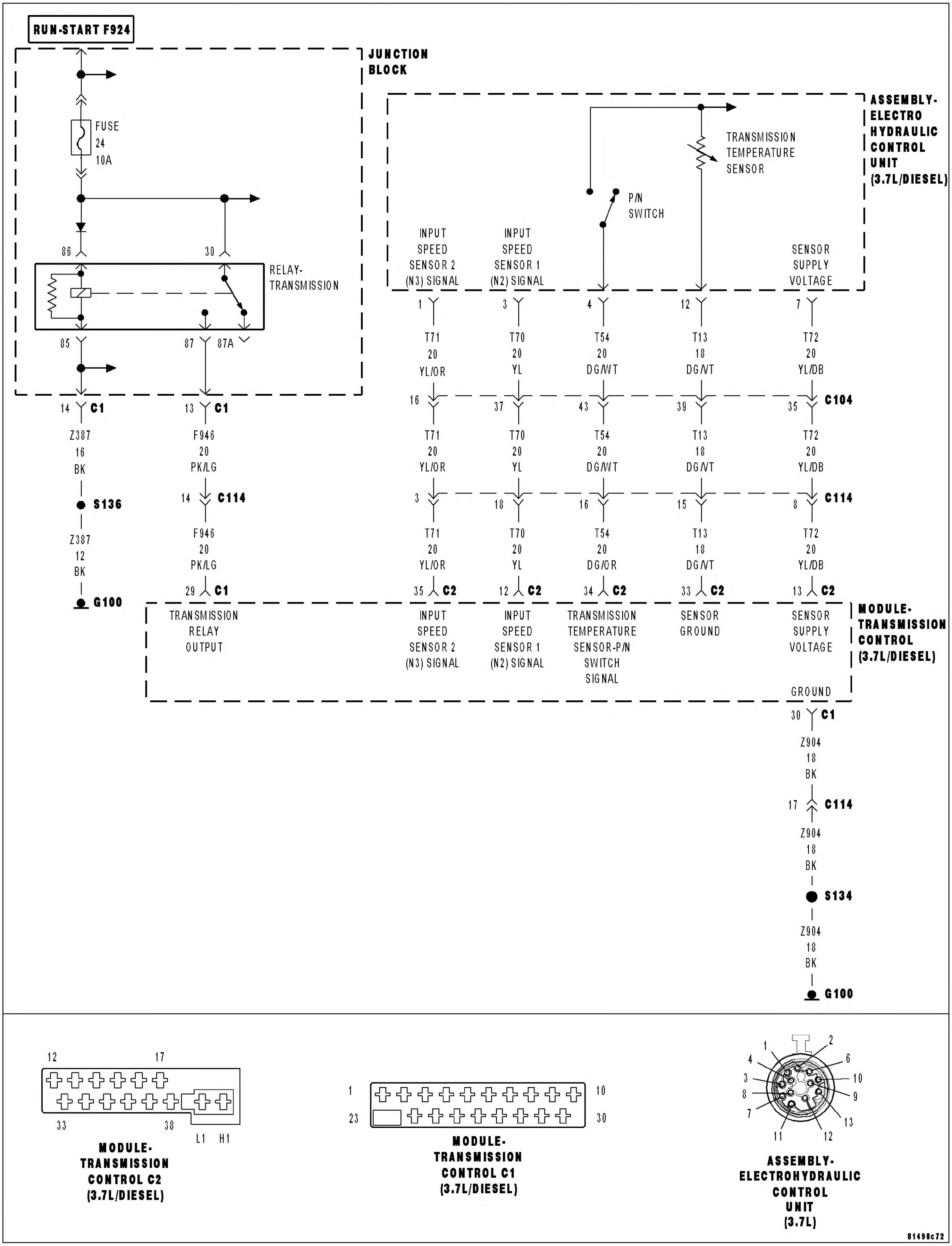
View repair

Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0642-SENSOR REFERENCE VOLTAGE 1 CIRCUIT LOW


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387
16
BK
S136
Z387
12
BK
G100
F946
20
PK/LG
14 C114
F946
20
PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1
3
4
12
7
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/WT
T72 20 YL/DB
16
37
43
39
35 C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/WT
T72 20 YL/DB
3
18
16
15
8 C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/WT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498c72

P0642-SENSOR REFERENCE VOLTAGE 1 CIRCUIT LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Sensor Supply Voltage circuit supplies a 6-volt power supply to the two input speed sensors. The Sensor Supply Voltage circuit is constantly monitored for correct voltage between 4.8 to 7.2 volts. If the voltage does not stay within the 4.8 to 7.2 volt range, the appropriate DTC will set.

- **When Monitored:**
  Continuously with the ignition on and no undervoltage condition exist.
- **Set Condition:**
  When the monitored sensor voltage is not within specified limits drops below 4.8 volts.

Possible Causes
SPEED SENSOR DTCS PRESENT
(T72) SENSOR SUPPLY VOLTAGE SHORT TO GROUND
INTERNAL SHORT IN THE ELECTROHYDRAULIC CONTROL UNIT ASSEMBLY
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR SPEED SENSOR DTCS

With the scan tool, check for other transmission DTCs.

Are there any speed sensor DTCs present?

Yes >> Refer to the AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

P0642-SENSOR REFERENCE VOLTAGE 1 CIRCUIT LOW (CONTINUED)

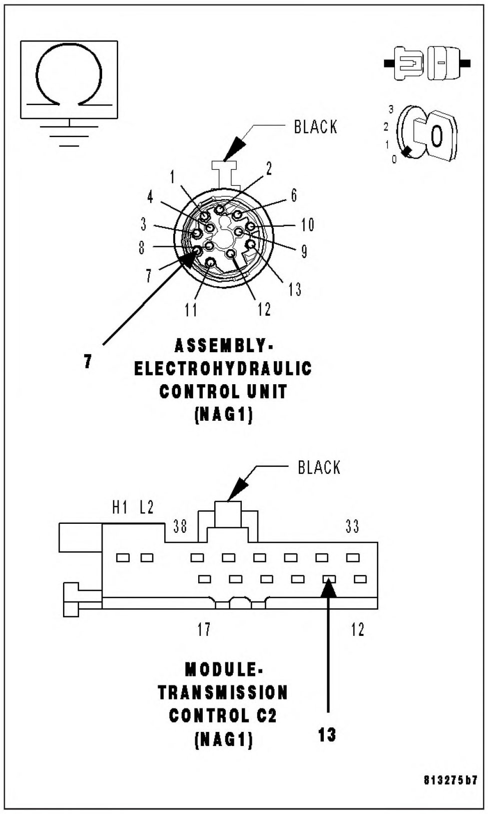
2. CHECK FOR (T72) SENSOR SUPPLY VOLTAGE SHORT TO GROUND

Turn the ignition off to the lock position.

Disconnect the Electrohydraulic Control Unit Assembly harness connector.

Disconnect the TCM C2 harness connectors.

Measure the resistance between ground and the (T72) Sensor Supply Voltage circuit in the TCM harness connector.


BLACK
1
2
4
6
3
10
8
9
7
13
11
12
7
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-TRANSMISSION CONTROL C2 (NAG1)
13
813275b7

Is the resistance below 5.0 ohms?

Yes >> Repair the (T72) Sensor Supply Voltage circuit for a short to ground
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

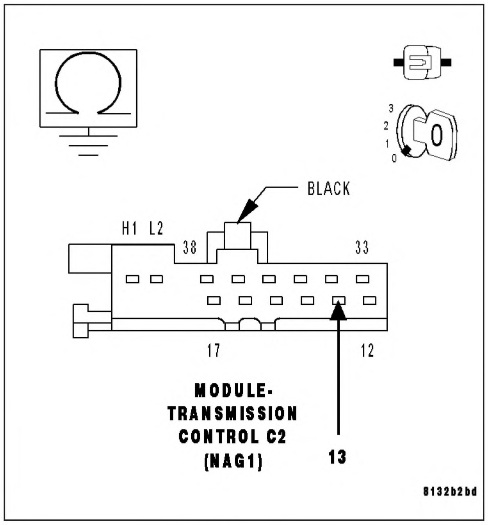
No >> Go To 3

---

3. CHECK FOR A SHORT IN THE ELECTOHYDRAULIC CONTROL UNIT

Reconnect the Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance between ground and the (T72) Sensor Supply Voltage circuit in the TCM harness connector.

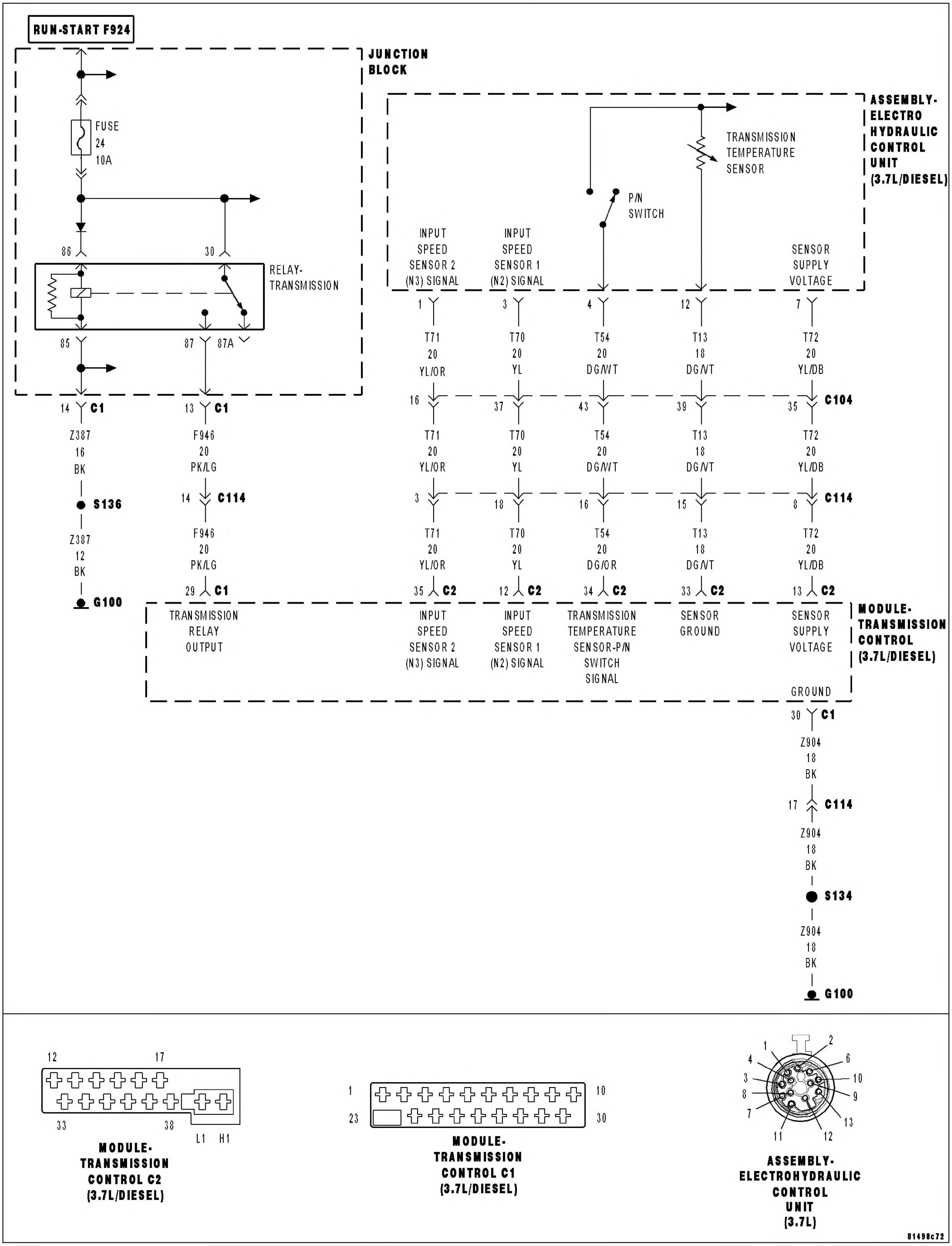

BLACK
H1 L2
38
33
17
12
MODULE-TRANSMISSION CONTROL C2 (NAG1)
13
8132b2bd

Is the resistance below 5.0 ohms?

Yes >> Repair the Electrohydraulic Control Unit Assembly for a short to ground. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for proper service procedures.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0643-SENSOR REFERENCE VOLTAGE 1 CIRCUIT HIGH


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1 Z387 16 BK
S136
Z387 12 BK
G100
13 C1 F946 20 PK/LG
14 C114
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1 T71 20 YL/OR
3 T70 20 YL
4 T54 20 DG/WT
12 T13 18 DG/VT
7 T72 20 YL/DB
16 37 43 39 35 C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
3 18 16 15 8 C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/VT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 10 23 30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1 2 4 6 3 10 8 9 7 13 11 12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498c72

P0643-SENSOR REFERENCE VOLTAGE 1 CIRCUIT HIGH (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Sensor Supply Voltage circuit supplies a 6 volt power supply for the two input speed sensors. The Sensor Supply Voltage circuit is constantly monitored for correct voltage between 4.8 to 7.2 volts. If the voltage does not stay within the 4.8 to 7.2 volt range, the appropriate DTC will set.

- **When Monitored:**
  Continuously with the ignition on and no overvoltage condition exist.
- **Set Condition:**
  When the monitored sensor voltage is not within specified limits and rises above 7.2 volts.

Possible Causes
(T72) SENSOR SUPPLY VOLTAGE CIRCUIT SHORT TO VOLTAGE
(T72) SENSOR SUPPLY VOLTAGE CIRCUIT SHORT TO OTHER CIRCUITS
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR SPEED SENSOR DTCS

With the scan tool, check for other transmission DTCs.

Are there any speed sensor and/or temperature sensor DTCs present?

Yes >> Refer to the AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK SOLENOID SUPPLY VOLTAGE ON THE SCAN TOOL

Start the engine.

With the scan tool, check the Transmission Solenoid Supply Voltage.

Is the Transmission Solenoid Supply Voltage above 7.2 volts?

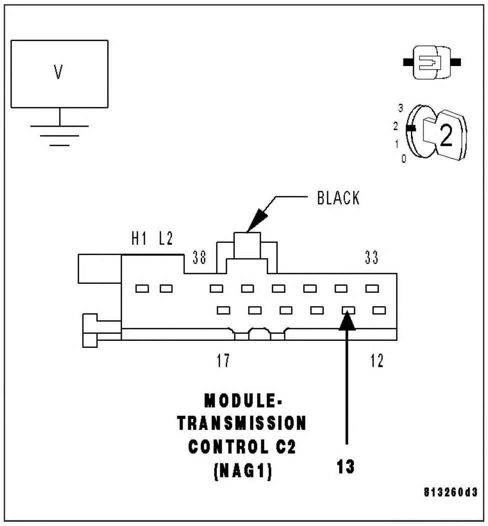
Yes >> Go To 3

No >> Go To 5

P0643-SENSOR REFERENCE VOLTAGE 1 CIRCUIT HIGH (CONTINUED)

3. CHECK (T72) SENSOR SUPPLY CIRCUIT VOLTAGE

While back probing, measure the voltage of the (T72) Solenoid Supply Voltage circuit in the TCM harness connector.



Does the measured voltage match the voltage reading on the scan tool ± 0.2 volts?

Yes >> Go To 4

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

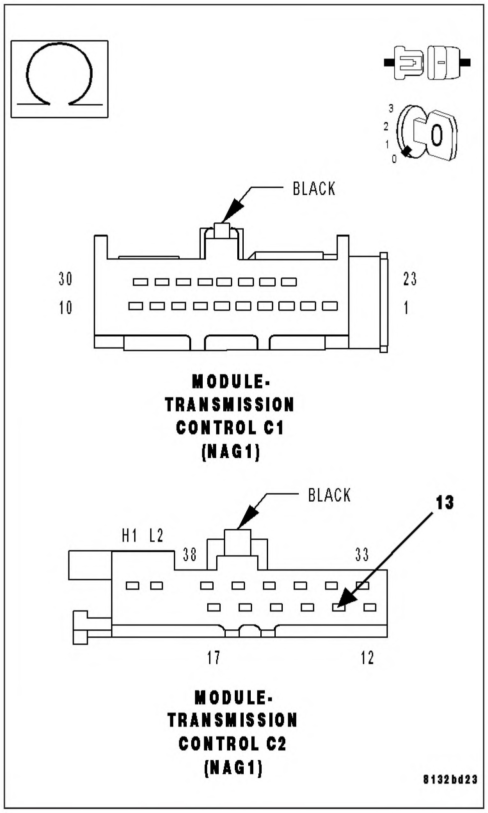
4. (T72) SENSOR SUPPLY VOLTAGE CIRCUIT SHORT TO ANOTHER CIRCUIT

Turn the ignition off to the lock position.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Disconnect all TCM harness connectors.

Measure the resistance between the (T72) Solenoid Supply Voltage circuit and all other circuits in the Transmission Electrohydraulic Control Unit harness connector.



Is the resistance below 5.0 ohms between the (T72) Solenoid Supply Voltage circuit and all other circuits in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T72) Solenoid Supply Voltage circuit for a short to another circuit(s).

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0643-SENSOR REFERENCE VOLTAGE 1 CIRCUIT HIGH (CONTINUED)

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

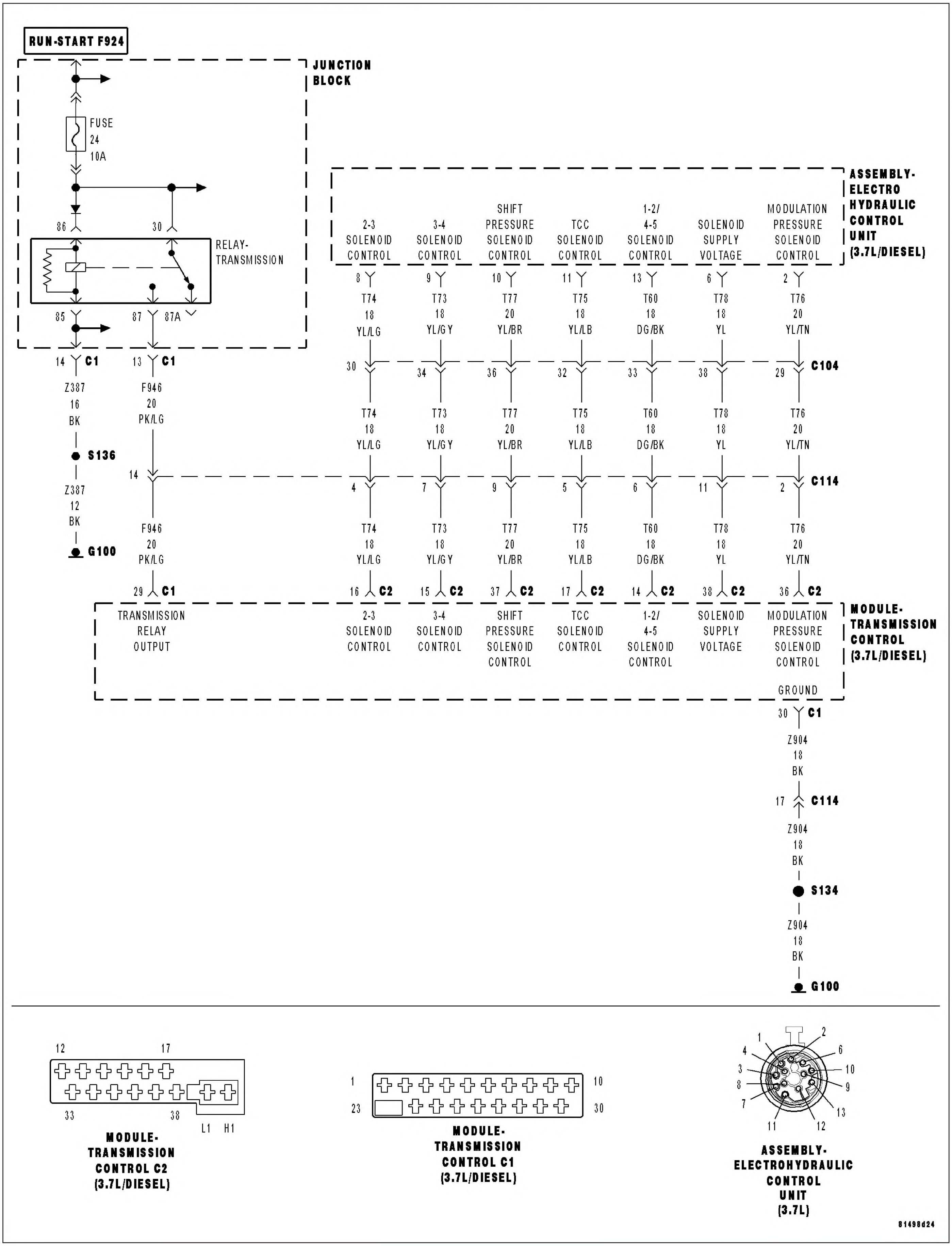
Wiggle the wires while checking for shorted and open circuits.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0657-SOLENOID SUPPLY VOLTAGE CIRCUIT


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/LG
S136
Z387 12 BK
G100
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 T74 18 YL/LG
9 T73 18 YL/GY
10 T77 20 YL/BR
11 T75 18 YL/LB
13 T60 18 DG/BK
6 T78 18 YL
2 T76 20 YL/TN
C104
30 34 36 32 33 38 29
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
C114
4 7 9 5 6 11 2
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 10 23 30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1 2 4 6 3 10 8 9 7 13 11 12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498d24

P0657-SOLENOID SUPPLY VOLTAGE CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Solenoid Supply Voltage output of the Transmission Control Module (TCM) provides the voltage to the three shift, two pressure and TCC solenoids. The output is active whenever the system is in normal operation. If a major system fault is detected, this output is turned off to ensure that no solenoids are active.

- **When Monitored:**
  When the output is active and no undervoltage condition exists.
- **Set Condition:**
  When the monitored supply voltage and battery voltage differ by 3.6 volts.

Possible Causes
(T78) SOLENOID SUPPLY VOLTAGE CIRCUIT OPEN
(T78) SOLENOID SUPPLY VOLTAGE CIRCUIT SHORT TO GROUND
(T78) SOLENOID SUPPLY VOLTAGE CIRCUIT SHORT TO VOLTAGE
(T78) SOLENOID SUPPLY VOLTAGE CIRCUIT SHORT TO ANOTHER CIRCUIT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. (T78) SOLENOID SUPPLY VOLTAGE CIRCUIT SHORT TO VOLTAGE

With the scan tool, check for other transmission DTCs.

Is the DTC P1629-TCM INTERNAL - SOLENOID SUPPLY/WATCHDOG also present?

Yes >> When both P0657-SOLENOID SUPPLY VOLTAGE CIRCUIT and P1629-TCM INTERNAL - SOLENOID SUPPLY/WATCHDOG DTCs set at the same time indicates that the (T78) Solenoid Supply Voltage circuit is shorted to voltage. Repair the Solenoid Supply Voltage circuit for a short to voltage. If no short to voltage is present, using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0657-SOLENOID SUPPLY VOLTAGE CIRCUIT (CONTINUED)

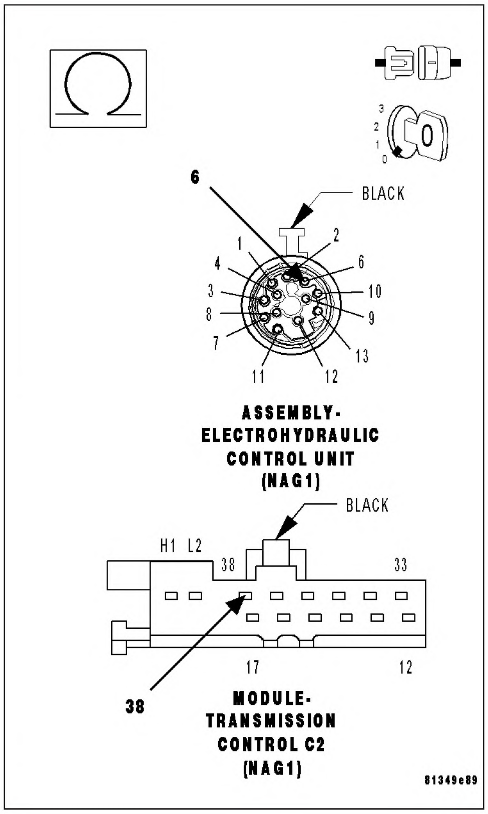
2. (T78) SOLENOID SUPPLY VOLTAGE CIRCUIT OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C1 and C2 harness connectors.

Disconnect the Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T78) Solenoid Supply Voltage circuit between the TCM C2 harness connector and the Electrohydraulic Control Unit Assembly harness connector.


6
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
38
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
81349e89

Is the resistance below 5.0 ohms?

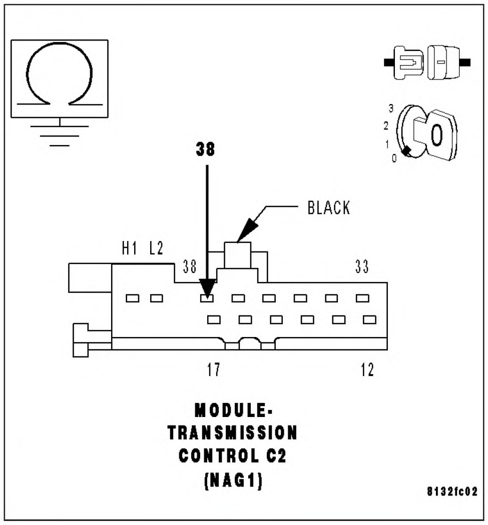
Yes >> Repair the (T78) Solenoid Supply Voltage circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. (T78) SOLENOID SUPPLY VOLTAGE CIRCUIT SHORT TO GROUND

Measure the resistance between ground and the (T78) Solenoid Supply Voltage circuit.


38
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
81321c02

Is the resistance below 5.0 ohms?

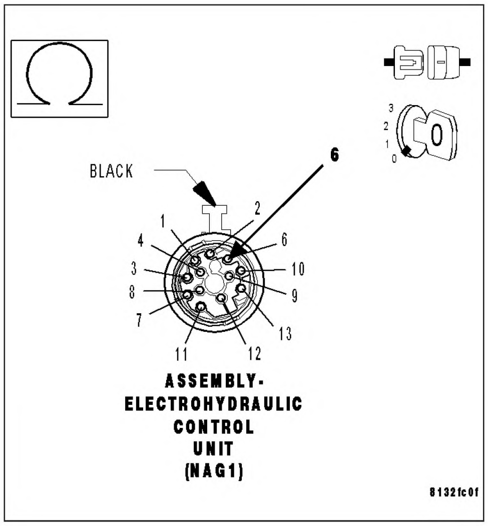
Yes >> Repair the (T78) Solenoid Supply Voltage circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0657-SOLENOID SUPPLY VOLTAGE CIRCUIT (CONTINUED)

4. (T78) SOLENOID SUPPLY VOLTAGE CIRCUIT SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T78) Solenoid Supply Voltage circuit and all other circuits in the Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T78) Solenoid Supply Voltage circuit and any other circuit(s) in the Electrohydraulic Control Unit Assembly harness connector?

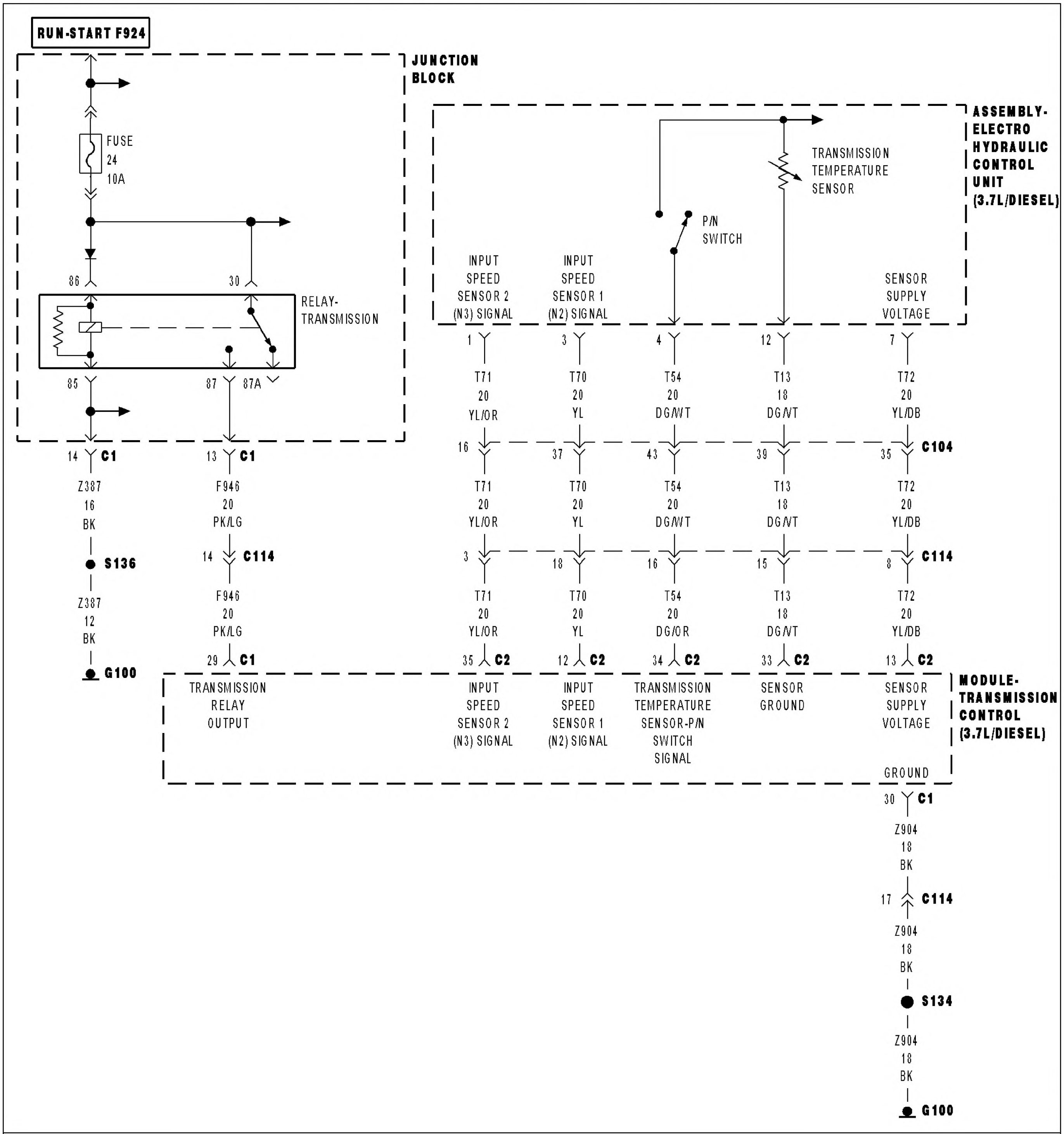
Yes >> Repair the (T78) Solenoid Supply Voltage circuit for a short to another circuit(s).

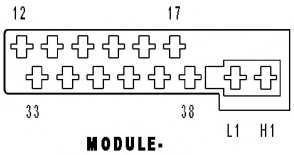
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

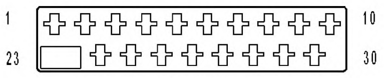
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0710-TRANSMISSION TEMPERATURE SENSOR CIRCUIT

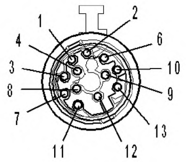

RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14 C114
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1
3
4
12
7
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
16
37
43
39
35
C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
3
18
16
15
8
C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/VT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100


12
17
33
38
L1 H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)


1
2
4
6
3
10
8
9
7
13
11
12

ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)

81498c72

P0710-TRANSMISSION TEMPERATURE SENSOR CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Electrohydraulic Control Unit Assembly of the NAG1 transmission contains a temperature sensor to monitor the transmission oil temperature. This sensor is wired in series with the transmission Park/Neutral switch. The Transmission Control Module (TCM) expects to see a valid voltage level from the sensor when the shifter is in Reverse or any forward Drive position. The TCM also expects to see an open circuit condition when the shifter is in the Park or Neutral position. When the controller detects an open circuit when in Reverse or any forward drive position the DTC will set. Note: Due to a open circuit condition in Park or Neutral, the TCM substitutes the Transmission Temperature reading with Engine Temperature when in Park or Neutral

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the TCM detects an open circuit when in Reverse or any forward drive position the DTC will set.

Possible Causes
SHIFT LEVER ASSEMBLY OUT OF ADJUSTMENT
(T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT OPEN
(T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT SHORT TO VOLTAGE
(T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT SHORT TO OTHER CIRCUITS
(T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT SHORT TO ANOTHER CIRCUIT(S)
SHIFT LEVER ASSEMBLY
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF SPEED SENSOR DTCS ARE PRESENT

With the scan tool, read Transmission DTCs.

Are there any speed sensor DTCs present also?

Yes >> Refer to the AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF SHIFT LEVER ASSEMBLY SHIFT CABLE IS OUT OF ADJUSTMENT

Check the Shift Lever Assembly shift cable for proper adjustment. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the proper service procedures.

Is the Shift Lever Assembly shift cable properly adjusted?

Yes >> Go To 3

No >> Adjust the Shift Lever Assembly shift cable. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the proper service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0710-TRANSMISSION TEMPERATURE SENSOR CIRCUIT (CONTINUED)

3. CHECK IF ENGINE STARTS IN PART OR NEUTRAL

Attempt to start the engine in Park or Neutral.

Does the engine start in either Park or Neutral?

Yes >> Go To 4

No >> Go To 5

---

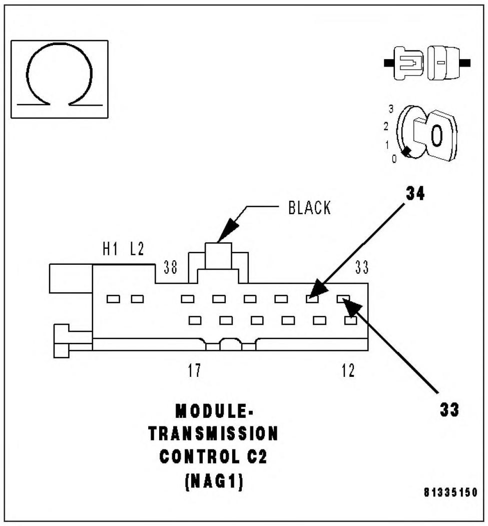
4. TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Place the gear selector in Drive.

Measure the resistance of the Transmission Temperature Sensor between the (T54) Temperature Sensor-P/N Switch Signal circuit and the (T13) Sensor Ground circuit in the TCM C2 harness connector.



Is the resistance between 500 to 2500 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Electrohydraulic Control Unit Assembly and Transmission Temperature Sensor-P/N Switch pins and connector terminals for corrosion, damage, or terminal push out. If no problems are found, replace the Transmission Temperature Sensor-P/N Switch. Refer to 21-AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the proper service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

5. CHECK THE TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH

Turn the ignition off to the lock position.

Reconnect the TCM C2 harness connector.

Disconnect the Electrohydraulic Control Unit Assembly harness connector.

NOTE: This procedure may set various DTCs to multiple modules connected to the CAN bus. Disregard and erase any DTCs that may set after completion of this procedure.

With the Shift Lever in the Park position, attempt to start the engine.

Does the engine start?

Yes >> Replace the Transmission Temperature Sensor-P/N Switch. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the proper service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

P0710-TRANSMISSION TEMPERATURE SENSOR CIRCUIT (CONTINUED)

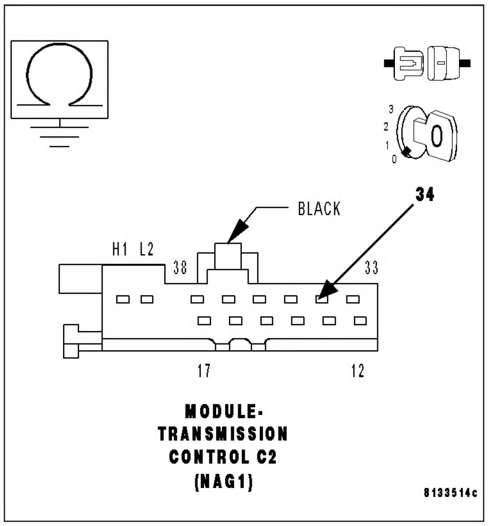
6. CHECK IF THE (T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT IS SHORTED TO GROUND

Turn the ignition off to the lock position.

Reconnect the Electrohydraulic Control Unit Assembly harness connector.

Disconnect the TCM C1 and C2 harness connectors.

Measure the resistance between ground and the (T54) Temperature Sensor-P/N Switch Signal circuit.


3
2
1
0
BLACK
34
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
8133514c

Is the resistance below 5.0 ohms?

Yes >> Repair the (T54) Temperature Sensor-P/N Switch Signal circuit for a short to ground.

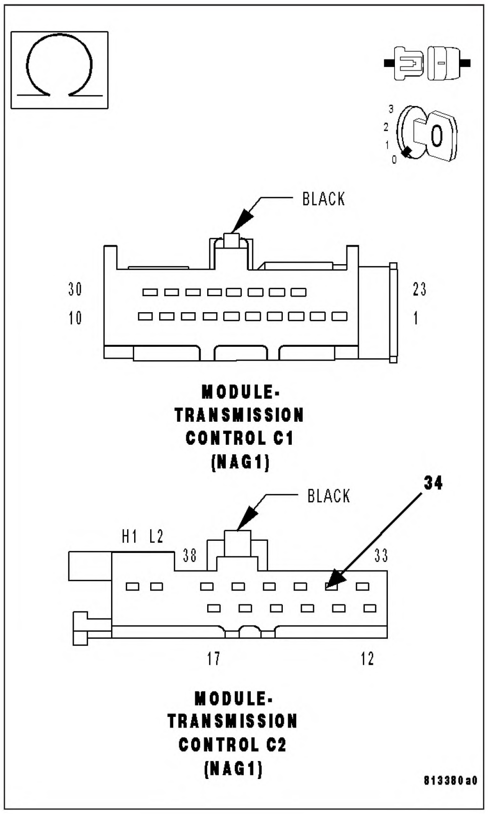
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. CHECK IF (T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT IS SHORTED TO ANOTHER CIRCUIT(S)

Measure the resistance between the (T54) Temperature Sensor-P/N Switch Signal circuit and all other circuits in the TCM C1 and C2 harness connectors.


3
2
1
0
BLACK
30
10
23
1
MODULE-
TRANSMISSION
CONTROL C1
(NAG1)
BLACK
34
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
813380a0

Is the resistance below 5.0 ohms between the (T54) Temperature Sensor-P/N Switch Signal circuit and any other circuit(s)?

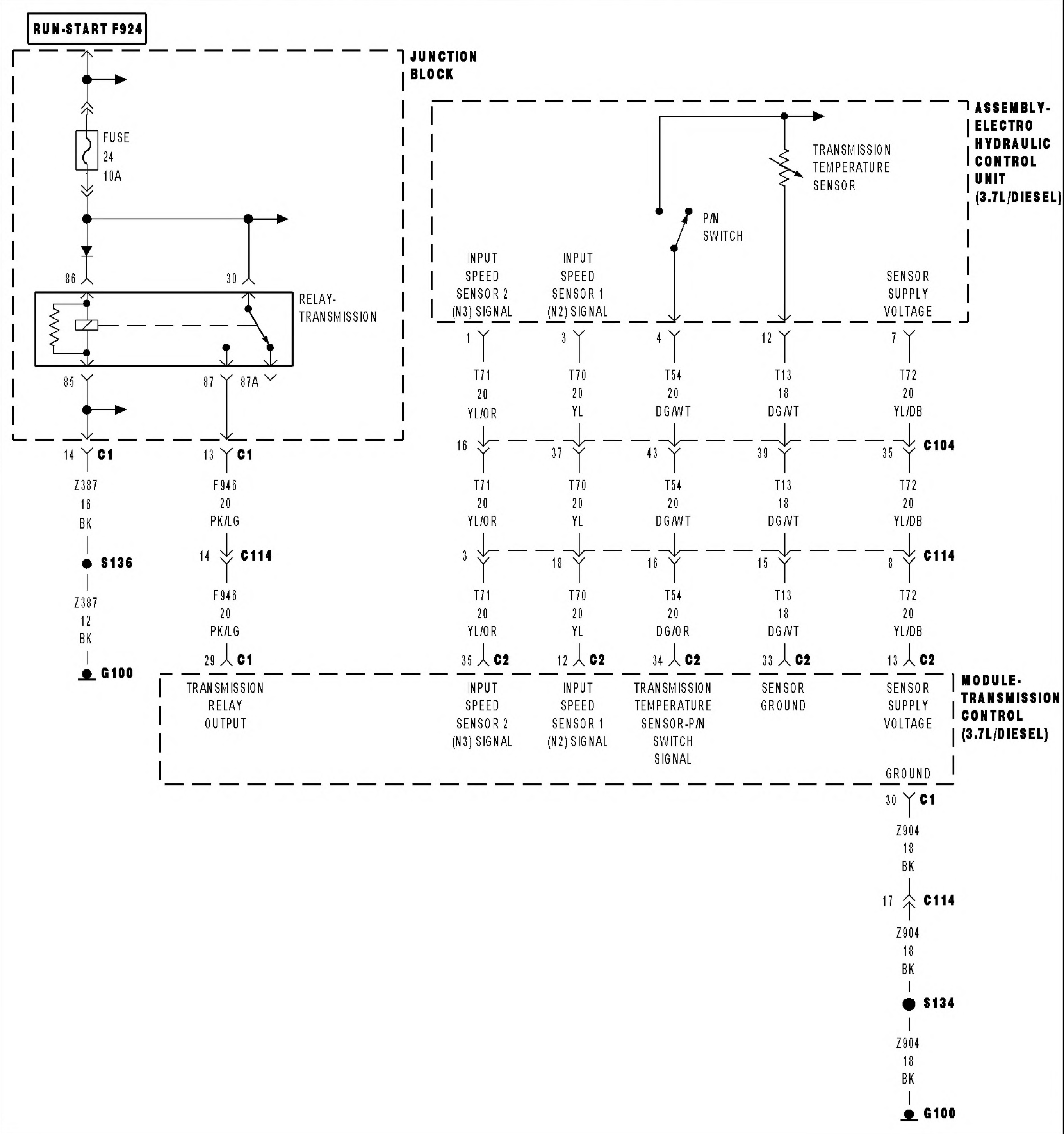
Yes >> Repair the (T54) Temperature Sensor-P/N Switch Signal circuit for a short to another circuit(s).

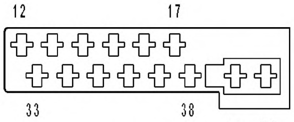
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

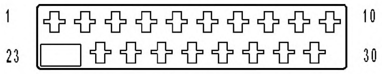
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0712-TRANSMISSION TEMPERATURE SENSOR LOW

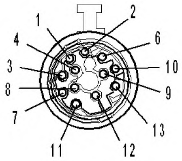

RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14 C114
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1
3
4
12
7
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
16
37
43
39
35
C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
3
18
16
15
8
C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/VT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)


1
2
4
6
3
10
8
9
7
13
11
12

ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)

81498c72

P0712-TRANSMISSION TEMPERATURE SENSOR LOW (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Electrohydraulic Control Unit Assembly of the NAG1 transmission contains a temperature sensor to monitor the transmission oil temperature. This sensor is wired in series with the transmission Park/Neutral switch. The Transmission Control Module (TCM) expects to see a valid voltage level from the sensor when the shifter is in Reverse or any forward Drive position. The TCM also expects to see an open circuit condition when the shifter is in the Park or Neutral position. When the controller detects an open circuit when in Reverse or any forward drive position the DTC will set. Note: The TCM substitutes the Transmission Temperature reading with Engine Temperature due to a open circuit condition in Park or Neutral.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  When the TCM detects the Temperature sensor input is below 0.5 volts.

Possible Causes
(T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT SHORT TO GROUND
(T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT SHORT TO ANOTHER CIRCUIT
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR SHIFT LEVER ASSEMBLY DTCS

With the scan tool, check for Shift Lever Assembly DTCs.

Are there any Shift Lever Assembly DTCs present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - SHIFTER DIAGNOSTICS category and perform the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK THE SHIFT LEVER ASSEMBLY CABLE FOR PROPER ADJUSTMENT

Check the Shift Lever Assembly Cable for proper adjustment. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Is the Shift Lever Assembly Cable for properly adjusted?

Yes >> Go To 3

No >> Adjust the Shift Lever Assembly Cable per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

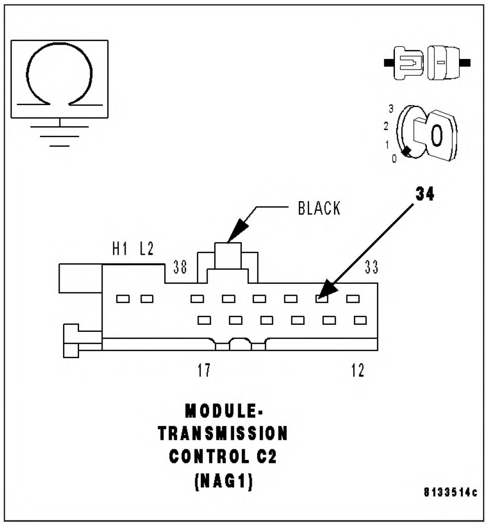
P0712-TRANSMISSION TEMPERATURE SENSOR LOW (CONTINUED)

3. CHECK THE (T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Measure the resistance between ground and the (T54) Temperature Sensor-P/N Switch Signal circuit.


3
2
1
0
BLACK
34
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
8133514c

Is the resistance below 5.0 ohms?

Yes >> Repair the (T54) Temperature Sensor-P/N Switch Signal circuit for a short to ground.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

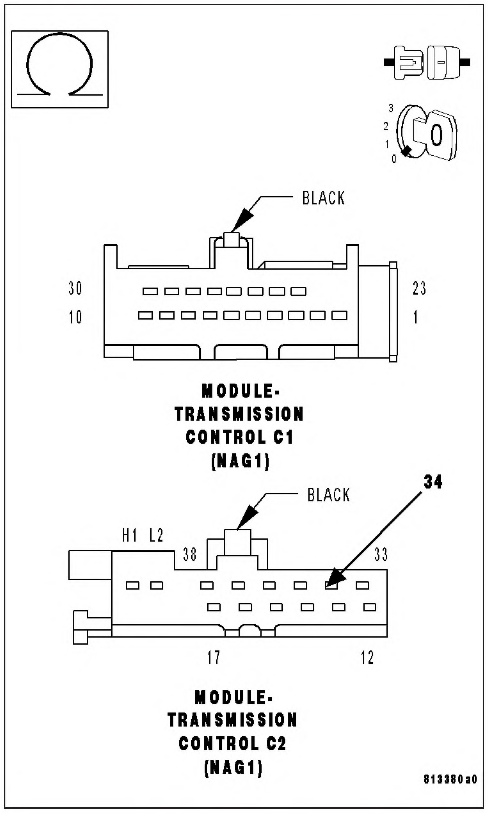
---

4. CHECK THE (T54) TEMPERATURE SENSOR-P/N SWITCH SIGNAL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Disconnect the TCM C1 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance between the (T54) Temperature Sensor-P/N Switch Signal circuit and all other circuits in the TCM C1 and C2 harness connectors.


3
2
1
0
BLACK
30
10
23
1
MODULE-
TRANSMISSION
CONTROL C1
(NAG1)
BLACK
34
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
813380a0

Is the resistance below 5.0 ohms between the (T54) Temperature Sensor-P/N Switch Signal circuit and any other circuit(s)?

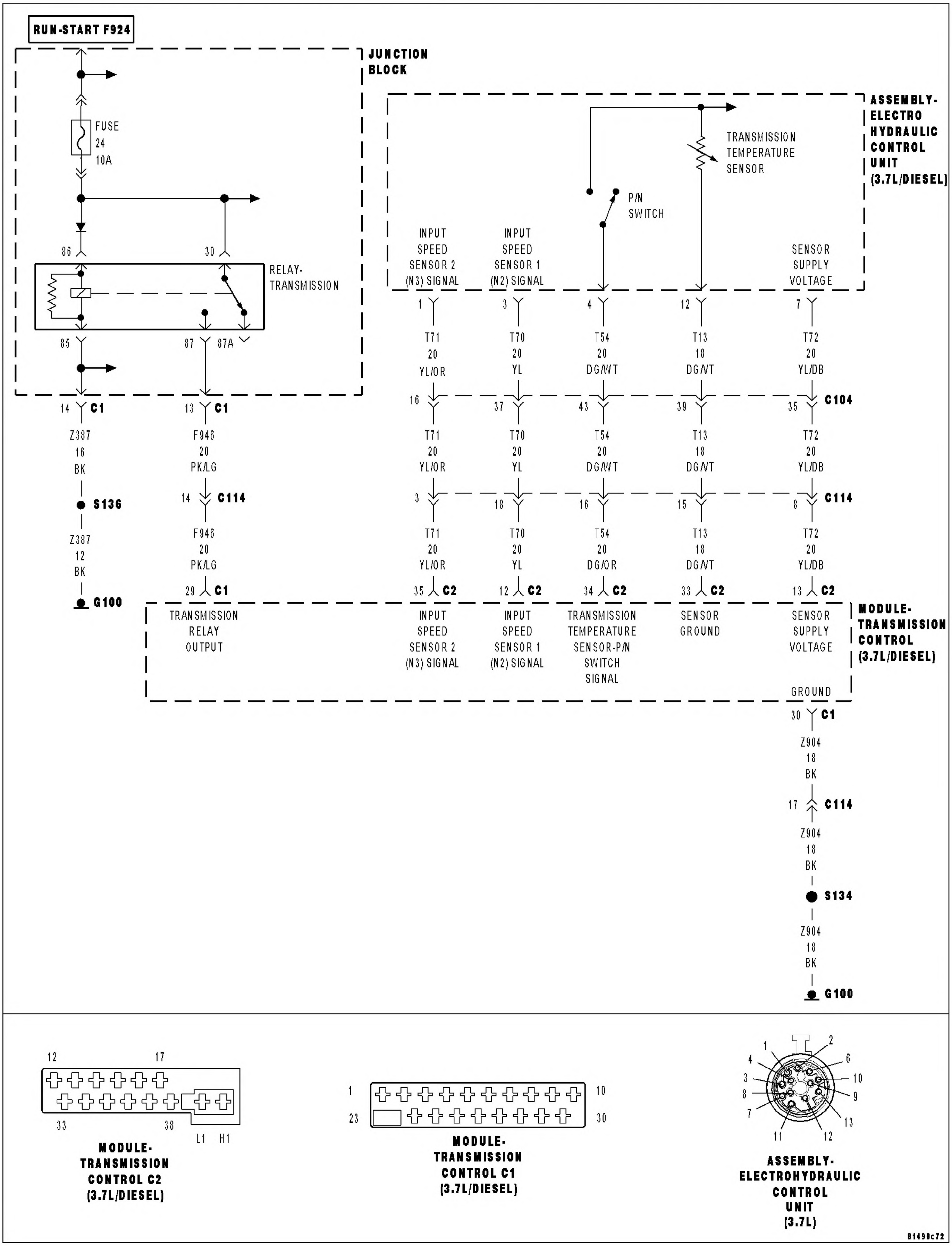
Yes >> Repair the (T54) Temperature Sensor-P/N Switch Signal circuit for a short to another circuit(s).

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0714-TRANSMISSION TEMPERATURE SENSOR INTERMITTENT


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14 C114
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1
3
4
12
7
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/WT
T72 20 YL/DB
16
37
43
39
35
C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/WT
T72 20 YL/DB
3
18
16
15
8
C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/WT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498c72

P0714-TRANSMISSION TEMPERATURE SENSOR INTERMITTENT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Electrohydraulic Control Unit Assembly of the NAG1 transmission contains a temperature sensor to monitor the transmission oil temperature. This sensor is wired in series with the transmission Park/Neutral switch. The Transmission Control Module (TCM) expects to see a valid voltage level from the sensor when the shifter is in Reverse or any forward Drive position. The TCM also expects to see an open circuit condition when the shifter is in the Park or Neutral position. When the controller detects an open circuit when in Reverse or any forward drive position the DTC will set. Note: The TCM substitutes the Transmission Temperature reading with Engine Temperature due to a open circuit condition in Park or Neutral.

- **When Monitored:**
  Continuously with the ignition on and the Transmission Temperature below 170 °C (338 °F).
- **Set Condition:**
  When the TCM detects the Temperature sensor input changes more than 10 °C (50 °F) between each 20 mSec sensor read.

Possible Causes
WIRING AND CONNECTORS
TRANSMISSION TEMPERATURE SENSOR - P/N SWITCH
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK WIRING AND CONNECTORS

Ignition on, engine not running.

With the scan tool, monitor the Transmission Temperature.

Apply the parking brake.

With the brakes firmly applied, place the gear selector in Drive.

While monitoring the scan tool, wiggle the wires and connectors from the TCM to the Electrohydraulic Control Unit.

Did the transmission temperature fluctuate while wiggling the wires?

Yes >> Repair the wiring and/or connectors as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0714-TRANSMISSION TEMPERATURE SENSOR INTERMITTENT (CONTINUED)

2. CHECK IF DTC RESETS

Replace the Transmission Temperature Sensor - P/N Switch. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for proper service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

With the scan tool, read Transmission DTCs.

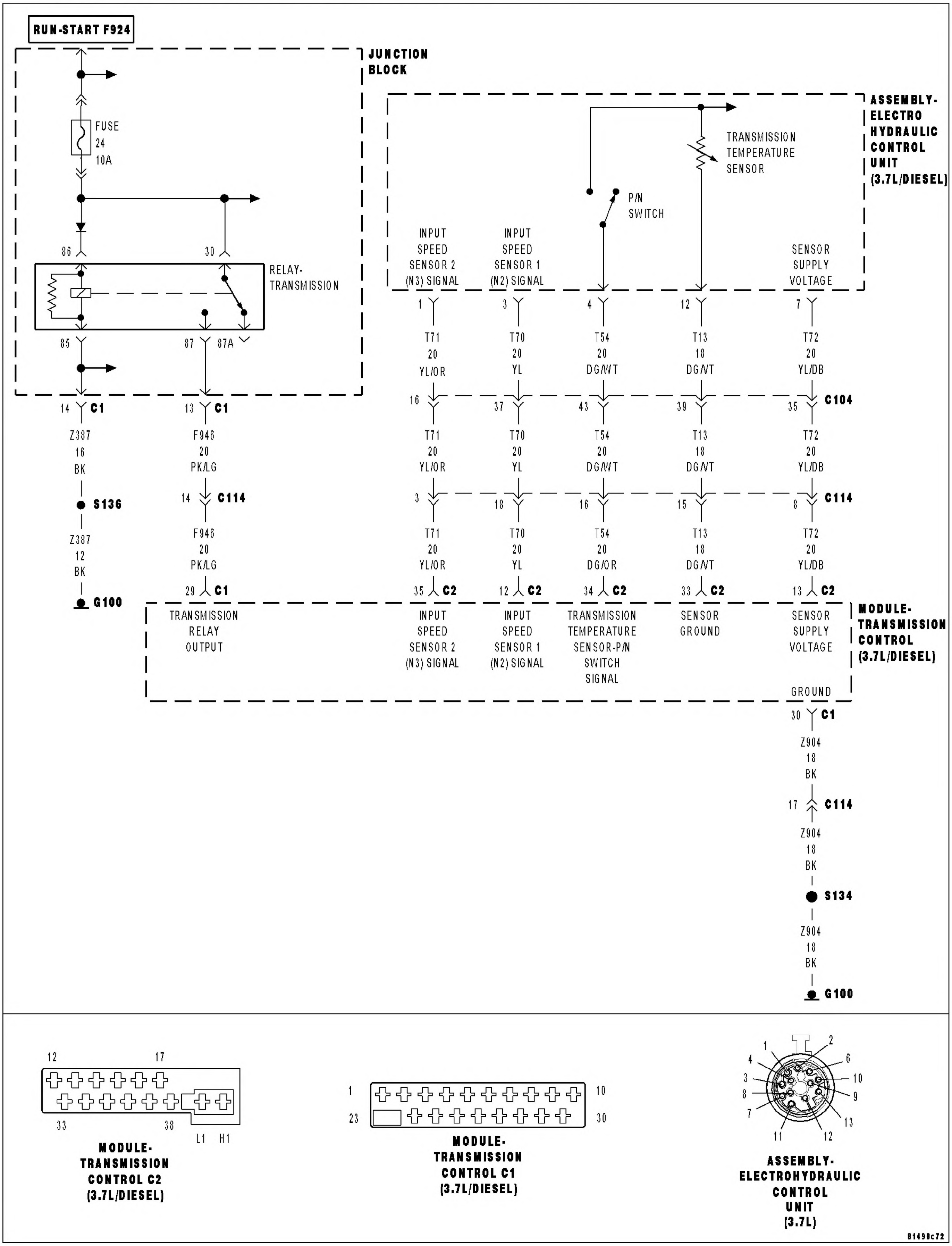
Did DTC P0714 reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0717-INPUT SPEED SENSOR 1 CIRCUIT NO SIGNAL


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14 C114
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1
3
4
12
7
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
16
37
43
39
35
C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
3
18
16
15
8
C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/VT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498c72

P0717-INPUT SPEED SENSOR 1 CIRCUIT NO SIGNAL (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Input Speed Sensor 1 (N2) is one of two hall effect speed sensors that are used by the Transmission Control Module (TCM) to calculate the transmissions turbine speed. Since the turbine speed could not be measured directly, two of the drive elements are measured. Two input speed sensors are required because both elements are not active in all gears.

- **When Monitored:**
  Engine speed greater than 450 RPM with none of the following DTCs present: engine speed, TCM undervoltage, output speed sensor, and/or rear wheel speed DTCs. Also required are all wheel speeds above 250 RPM and no wheel slip detected (signal from the ABS system).
- **Set Condition:**
  If the Input Speed Sensor 1 (N2) signal is equal to 0 RPM.

Possible Causes
(T72) SENSOR SUPPLY VOLTAGE CIRCUIT OPEN
(T70) INPUT SPEED SENSOR 1 (N2) SIGNAL CIRCUIT OPEN
(T70) SPEED SENSOR 1 (N2) SIGNAL CIRCUIT SHORT TO ANOTHER CIRCUIT
(T13) SENSOR GROUND CIRCUIT OPEN
(T13) SENSOR GROUND CIRCUIT SHORT TO ANOTHER CIRCUIT
(T70) SPEED SENSOR 1 (N2) SIGNAL CIRCUIT SHORT TO GROUND
(T13) SENSOR GROUND CIRCUIT SHORT TO GROUND
SPEED SENSOR 1 (N2)
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF DTC IS CURRENT

NOTE: The Transmission Control Module stores under Environmental Data the transmission operating conditions when the DTC was set. Before erasure of any DTC, record all information pertaining to the DTC, even if there is more than one DTC stored.

With the scan tool, erase transmission DTCs.

Using the Environmental Data previously recorded, drive the vehicle and try to duplicate the conditions in which the DTC originally set.

Does the DTC reset?

Yes >> Go To 2

No >> Go To 10

P0717-INPUT SPEED SENSOR 1 CIRCUIT NO SIGNAL (CONTINUED)

2. CHECK THE (T72) SENSOR SUPPLY VOLTAGE CIRCUIT FOR AN OPEN

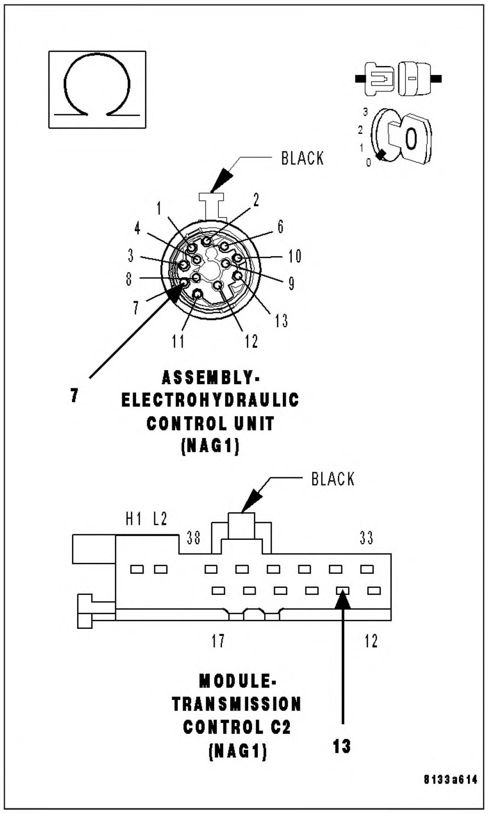
Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Electrohydraulic Control Unit Assembly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance of the (T72) Sensor Supply Voltage circuit from the TCM C2 harness connector to the Electrohydraulic Control Unit Assembly harness connector.


3
2
1
0
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
7
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
13
8133a614

Is the resistance below 5.0 ohms?

Yes >> Repair the (T72) Sensor Supply Voltage circuit for an open.

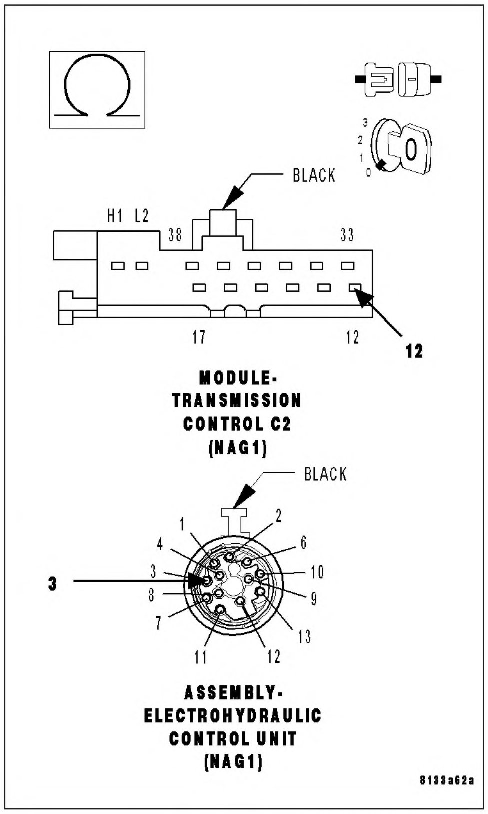
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (T70) INPUT SPEED SENSOR 1 (N2) SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (T70) Input Speed Sensor 1 (N2) Signal circuit from the TCM C2 harness connector to the Electrohydraulic Control Unit Assembly harness connector.


3
2
1
0
BLACK
H1 L2
38
33
17
12
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
BLACK
1
2
4
6
3
10
3
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
8133a62a

Is the resistance below 5.0 ohms?

Yes >> Repair the (T70) Input Speed Sensor 1 (N2) Signal circuit for an open.

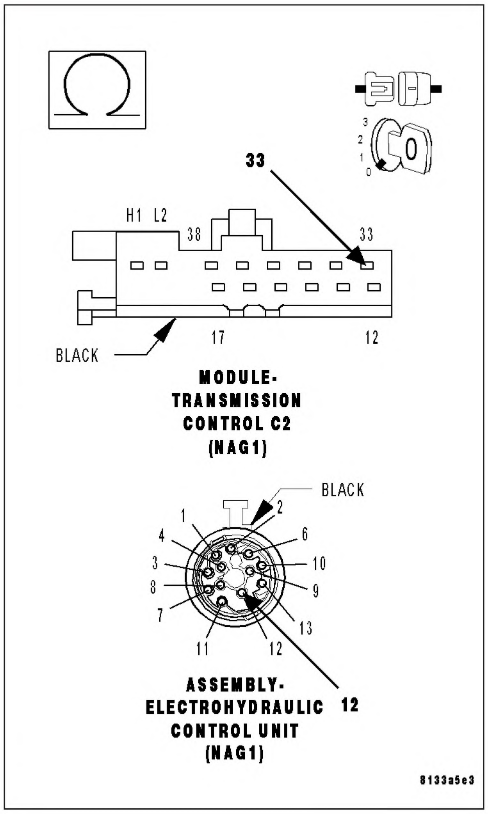
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0717-INPUT SPEED SENSOR 1 CIRCUIT NO SIGNAL (CONTINUED)

4. CHECK THE (T13) SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (T13) Sensor Ground circuit from the TCM C2 harness connector to the Electrohydraulic Control Unit Assembly harness connector.


33
H1 L2
38
33
BLACK
17
12
MODULE-TRANSMISSION CONTROL C2 (NAG1)
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (NAG1)
12
8133a5e3

Is the resistance below 5.0 ohms?

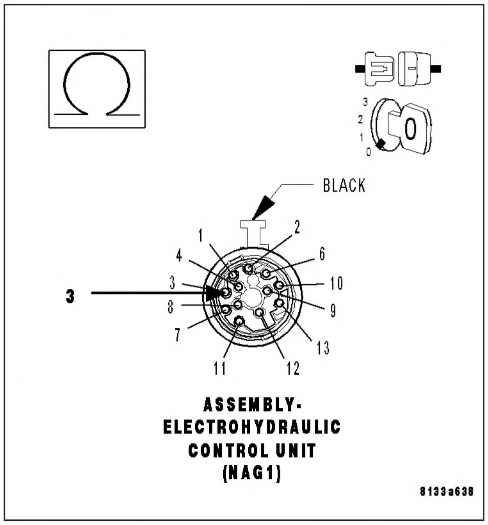
Yes >> Repair the (T13) Sensor Ground circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. CHECK THE (T70) INPUT SPEED SENSOR 1 (N2) SIGNAL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT(S)

Measure the resistance of the (T70) Input Speed Sensor 1 (N2) Signal circuit to all the other circuits in the Electrohydraulic Control Unit Assembly harness connector.


BLACK
1
2
4
6
3
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (NAG1)
8133a638

Is the resistance below 5.0 ohms between the (T70) Input Speed Sensor 1 (N2) Signal circuit and any other circuit(s) in the Electrohydraulic Control Unit Assembly harness connector?

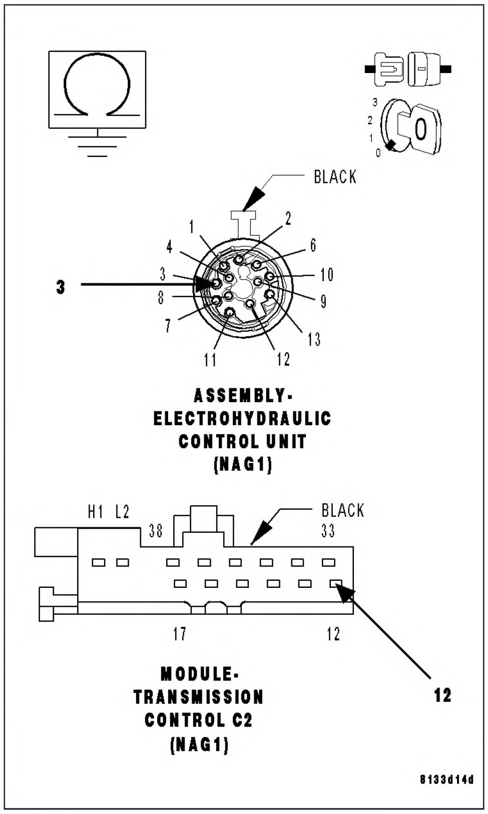
Yes >> Repair the (T70) Input Speed Sensor 1 (N2) Signal circuit for a short to another circuit(s).
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

P0717-INPUT SPEED SENSOR 1 CIRCUIT NO SIGNAL (CONTINUED)

6. CHECK THE (T70) INPUT SPEED SENSOR 1 (N2) SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T70) Input Speed Sensor 1 (N2) Signal circuit.


BLACK
1
2
4
6
3
10
8
9
7
13
11
12
3
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
H1 L2
38
BLACK
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
12
8133d14d

Is the resistance below 5.0 ohms?

Yes >> Repair the (T70) Input Speed Sensor 1 (N2) Signal circuit for a short to ground.

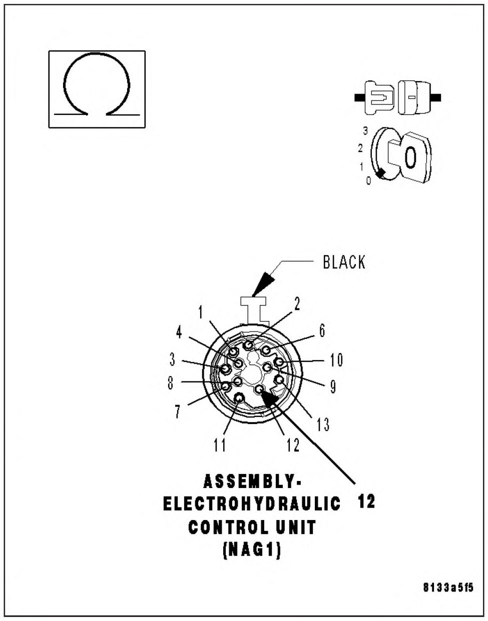
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. CHECK THE (T13) SENSOR GROUND CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT(S)

Measure the resistance between the (T13) Sensor Ground circuit to all the other circuits in the Electrohydraulic Control Unit Assembly harness connector.


BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
12
8133a5f5

Is the resistance below 5.0 ohms between the (T13) Sensor Ground circuit and any other circuit(s) in the Electrohydraulic Control Unit Assembly harness connector.

Yes >> Repair the (T13) Sensor Ground circuit for a short to another circuit(s)

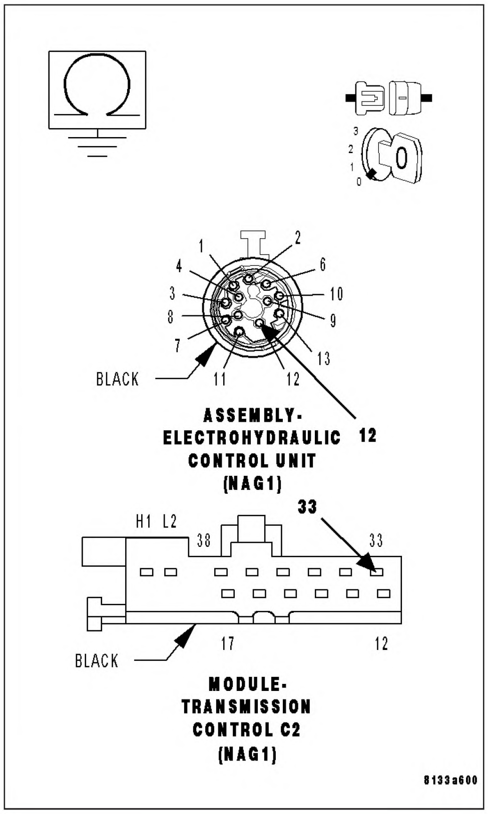
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

P0717-INPUT SPEED SENSOR 1 CIRCUIT NO SIGNAL (CONTINUED)

8. CHECK THE (T13) SENSOR GROUND CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T13) Sensor Ground circuit.


3
2
1
0
1
2
4
6
3
10
8
9
7
13
BLACK
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
12
33
H1 L2
38
33
17
12
BLACK
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
8133a600

Is the resistance below 5.0 ohms?

Yes >> Repair the (T13) Sensor Ground circuit for a short to ground.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

P0717-INPUT SPEED SENSOR 1 CIRCUIT NO SIGNAL (CONTINUED)

9. CHECK THE INPUT SPEED SENSOR 1 (N2) SIGNAL

Reconnect the Electrohydraulic Control Unit Assembly harness connector.

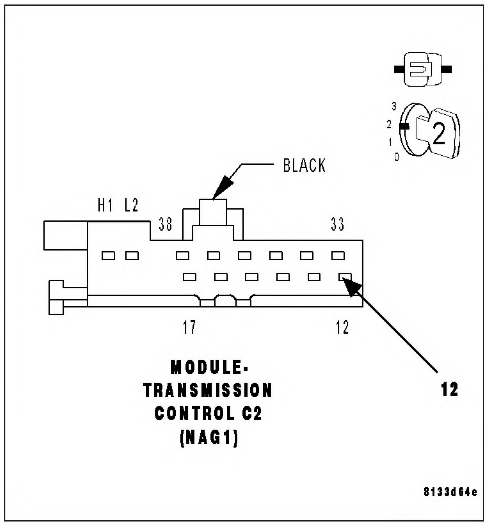
Using a Lab Scope, backprobe the (T70) Input Speed Sensor 1 (N2) Signal circuit at the TCM C2 harness connector.

WARNING: Properly support the vehicle.
Raise all drive wheels off the ground.

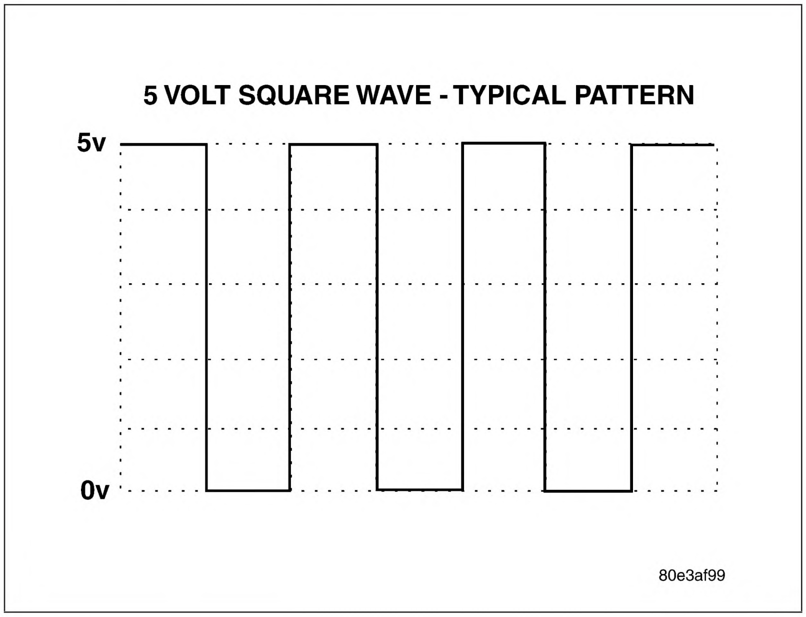
Start the engine.

WARNING: To avoid personal injury or death, keep hands and feet clear of rotating wheels.
Place gear selector in drive and increase vehicle speed to engage 2nd gear.

Compare the scope pattern on the Lab Scope with a typical 5-volt square wave pattern.



Is the scope pattern comparable to the typical 5-volt square wave signal scope pattern?



Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Input Speed Sensor 1 (N2). Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

10. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wires while checking for shorted and open circuits.

Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0730-INCORRECT GEAR RATIO

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) constantly calculates the transmission ratio based on the input speed sensor 1 and 2 (N2-N3) signals and the calculated output shaft speed. The intent of this diagnostic is to detect if the transmission is trying to mechanically shift into a lower gear then the TCM intends.

- **When Monitored:**
  Engine RPM greater than 450 RPM, output speed greater than 180 RPM, no N2 - N3 input speed sensor errors present, no gear selector lever errors present, no ABS system errors, and all wheel speeds above 450 RPM.
- **Set Condition:**
  No shifting operation and detected gear is not the actual gear. No shifting operation - detected (calculated) gear is less than actual (expected) gear, no plausible gear is calculated, actual turbine speed - calculated turbine speed is greater than 300 RPM or calculated transmission ratio is above threshold. During an Upshift - detected (calculated) gear is less than actual (expected) gear. During Downshift - detected (calculated) gear is less than actual (expected) gear.

Possible Causes
INTERNAL TRANSMISSION PROBLEM
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR INTERNAL TRANSMISSION PROBLEM

Determine if there are any Transmission mechanical problems present.

Remove the Transmission Oil Pan and inspect for excessive debris or a plugged Transmission Oil Filter. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure

Is there any Transmission mechanical problems present?

Yes >> Repair as necessary. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0731-GEAR RATIO ERROR IN 1ST

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) constantly calculates the transmission ratio based on the input speed sensor 1 and 2 (N2-N3) signals and the calculated output shaft speed. The intent of this diagnostic is to detect if the transmission is slipping or an invalid gear ratio is present.

- **When Monitored:**
  Engine RPM greater than 450 RPM, output speed greater than 180 RPM, no N2 - N3 input speed sensor errors present, no gear selector lever errors present, no ABS system errors, and all wheel speeds above 450 RPM.
- **Set Condition:**
  No shifting operation and detected gear is not the actual gear. No shifting operation - detected (calculated) gear is less than actual (expected) gear, no plausible gear is calculated, actual turbine speed - calculated turbine speed is greater than 300 RPM or calculated transmission ratio is above threshold. During an Upshift - detected (calculated) gear is less than actual (expected) gear. During Downshift - detected (calculated) gear is less than actual (expected) gear.

Possible Causes
LOW TRANSMISSION FLUID
OTHER TRANSMISSION DTCS PRESENT
INTERNAL TRANSMISSION FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR OTHER TRANSMISSION DTCS

With the scan tool, check transmission DTCS

Are there any solenoid and/or solenoid supply voltage DTCs present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK TRANSMISSION FLUID LEVEL

Check the transmission fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Is the fluid level correct?

Yes >> Go To 3

No >> Properly adjust the fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0731-GEAR RATIO ERROR IN 1ST (CONTINUED)

3. CHECK IF DTC IS CURRENT

With the scan tool, record the Environmental Data and erase Transmission DTCs.

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Using the Environmental Data recorded earlier, test drive the vehicle while trying to duplicate the conditions in which the DTC originally set.

Did the DTC P0731-GEAR RATIO ERROR IN 1ST reset?

Yes >> Repair internal transmission as necessary. Pay particular attention to components related to referenced DTC. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedures.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0732-GEAR RATIO ERROR IN 2ND

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) constantly calculates the transmission ratio based on the input speed sensor 1 and 2 (N2-N3) signals and the calculated output shaft speed. The intent of this diagnostic is to detect if the transmission is slipping or an invalid gear ratio is present.

- **When Monitored:**
  Engine RPM greater than 450 RPM, output speed greater than 180 RPM, no N2 - N3 input speed sensor errors present, no gear selector lever errors present, no ABS system errors, and all wheel speeds above 450 RPM.
- **Set Condition:**
  No shifting operation and detected gear is not the actual gear. No shifting operation - detected (calculated) gear is less than actual (expected) gear, no plausible gear is calculated, actual turbine speed - calculated turbine speed is greater than 300 RPM or calculated transmission ratio is above threshold. During an Upshift - detected (calculated) gear is less than actual (expected) gear. During Downshift - detected (calculated) gear is less than actual (expected) gear.

Possible Causes
LOW TRANSMISSION FLUID
OTHER TRANSMISSION DTCS PRESENT
INTERNAL TRANSMISSION FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR OTHER TRANSMISSION DTCS

With the scan tool, check transmission DTCS

Are there any solenoid and/or solenoid supply voltage DTCs present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK TRANSMISSION FLUID LEVEL

Check the transmission fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Is the fluid level correct?

Yes >> Go To 3

No >> Properly adjust the fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0732-GEAR RATIO ERROR IN 2ND (CONTINUED)

3. CHECK IF DTC IS CURRENT

With the scan tool, record the Environmental Data and erase Transmission DTCs.

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Using the Environmental Data recorded earlier, test drive the vehicle while trying to duplicate the conditions in which the DTC originally set.

Did the DTC P0732-GEAR RATIO ERROR IN 2ND reset?

Yes >> Repair internal transmission as necessary. Pay particular attention to components related to the referenced DTC. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedures.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0733-GEAR RATIO ERROR IN 3RD

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) constantly calculates the transmission ratio based on the input speed sensor 1 and 2 (N2-N3) signals and the calculated output shaft speed. The intent of this diagnostic is to detect if the transmission is slipping or an invalid gear ratio is present.

- **When Monitored:**
  Engine RPM greater than 450 RPM, output speed greater than 180 RPM, no N2 - N3 input speed sensor errors present, no gear selector lever errors present, no ABS system errors, and all wheel speeds above 450 RPM.
- **Set Condition:**
  No shifting operation and detected gear is not the actual gear. No shifting operation - detected (calculated) gear is less than actual (expected) gear, no plausible gear is calculated, actual turbine speed - calculated turbine speed is greater than 300 RPM or calculated transmission ratio is above threshold. During an Upshift - detected (calculated) gear is less than actual (expected) gear. During Downshift - detected (calculated) gear is less than actual (expected) gear.

Possible Causes
LOW TRANSMISSION FLUID
OTHER TRANSMISSION DTCS PRESENT
INTERNAL TRANSMISSION FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR OTHER TRANSMISSION DTCS

With the scan tool, check transmission DTCS

Are there any solenoid and/or solenoid supply voltage DTCs present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

2. CHECK TRANSMISSION FLUID LEVEL

Check the transmission fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Is the fluid level correct?

Yes >> Go To 3

No >> Properly adjust the fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0733-GEAR RATIO ERROR IN 3RD (CONTINUED)

3. CHECK IF DTC IS CURRENT

With the scan tool, record the Environmental Data and erase Transmission DTCs.

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Using the Environmental Data recorded earlier, test drive the vehicle while trying to duplicate the conditions in which the DTC originally set.

Did the DTC P0733-GEAR RATIO ERROR IN 3RD reset?

Yes >> Repair internal transmission as necessary. Pay particular attention to components related to referenced DTC. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0734-GEAR RATIO ERROR IN 4TH

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) constantly calculates the transmission ratio based on the input speed sensor 1 and 2 (N2-N3) signals and the calculated output shaft speed. The intent of this diagnostic is to detect if the transmission is slipping or an invalid gear ratio is present.

- **When Monitored:**
  Engine RPM greater than 450 RPM, output speed greater than 180 RPM, no N2 - N3 input speed sensor errors present, no gear selector lever errors present, no ABS system errors, and all wheel speeds above 450 RPM.
- **Set Condition:**
  No shifting operation and detected gear is not the actual gear. No shifting operation - detected (calculated) gear is less than actual (expected) gear, no plausible gear is calculated, actual turbine speed - calculated turbine speed is greater than 300 RPM or calculated transmission ratio is above threshold. During an Upshift - detected (calculated) gear is less than actual (expected) gear. During Downshift - detected (calculated) gear is less than actual (expected) gear.

Possible Causes
LOW TRANSMISSION FLUID
OTHER TRANSMISSION DTCS PRESENT
INTERNAL TRANSMISSION FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR OTHER TRANSMISSION DTCS

With the scan tool, check transmission DTCS

Are there any solenoid and/or solenoid supply voltage DTCs present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK TRANSMISSION FLUID LEVEL

Check the transmission fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Is the fluid level correct?

Yes >> Go To 3

No >> Properly adjust the fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0734-GEAR RATIO ERROR IN 4TH (CONTINUED)

3. CHECK IF DTC IS CURRENT

With the scan tool, record the Environmental Data and erase Transmission DTCs.

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Using the Environmental Data recorded earlier, test drive the vehicle while trying to duplicate the conditions in which the DTC originally set.

Did the DTC P0734-GEAR RATIO ERROR IN 4TH reset?

Yes >> Repair internal transmission as necessary. Pay particular attention to components related to referenced DTC. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedures.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0735-GEAR RATIO ERROR IN 5TH

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) constantly calculates the transmission ratio based on the input speed sensor 1 and 2 (N2-N3) signals and the calculated output shaft speed. The intent of this diagnostic is to detect if the transmission is slipping or an invalid gear ratio is present.

- **When Monitored:**
  Engine RPM greater than 450 RPM, output speed greater than 180 RPM, no N2 - N3 input speed sensor errors present, no gear selector lever errors present, no ABS system errors, and all wheel speeds above 450 RPM.
- **Set Condition:**
  No shifting operation and detected gear is not the actual gear. No shifting operation - detected (calculated) gear is less than actual (expected) gear, no plausible gear is calculated, actual turbine speed - calculated turbine speed is greater than 300 RPM or calculated transmission ratio is above threshold. During an Upshift - detected (calculated) gear is less than actual (expected) gear. During Downshift - detected (calculated) gear is less than actual (expected) gear.

Possible Causes
LOW TRANSMISSION FLUID
OTHER TRANSMISSION DTCS PRESENT
INTERNAL TRANSMISSION FAILURE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR OTHER TRANSMISSION DTCS

With the scan tool, check transmission DTCS

Are there any solenoid and/or solenoid supply voltage DTCs present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

2. CHECK TRANSMISSION FLUID LEVEL

Check the transmission fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Is the fluid level correct?

Yes >> Go To 3

No >> Properly adjust the fluid level per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0735-GEAR RATIO ERROR IN 5TH (CONTINUED)

3. CHECK IF DTC IS CURRENT

With the scan tool, record the Environmental Data and erase Transmission DTCs.

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Using the Environmental Data recorded earlier, test drive the vehicle while trying to duplicate the conditions in which the DTC originally set.

Did the DTC P0735-GEAR RATIO ERROR IN 5TH reset?

Yes >> Repair internal transmission as necessary. Pay particular attention to components related to referenced DTC. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

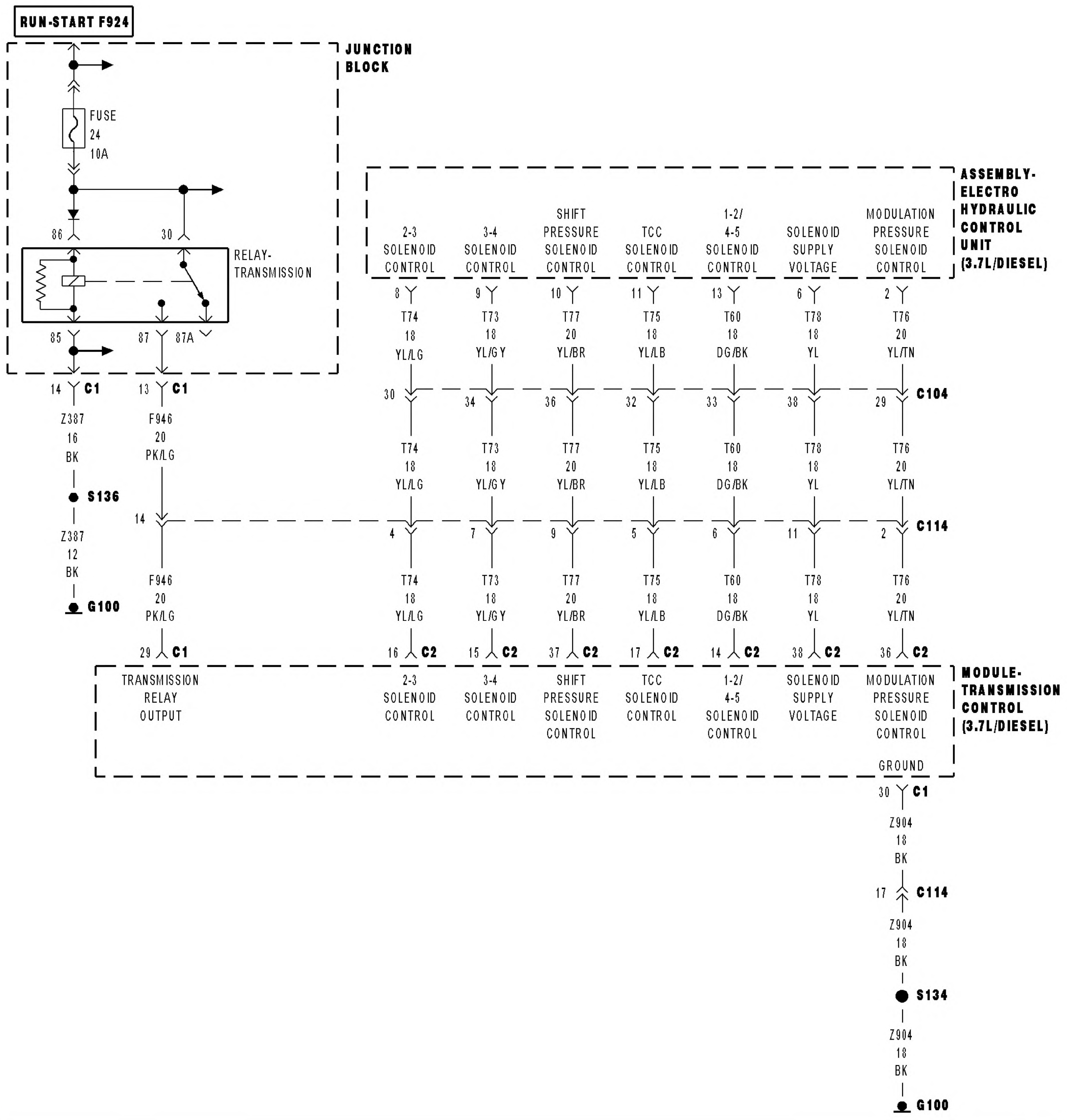
Were there any problems found?

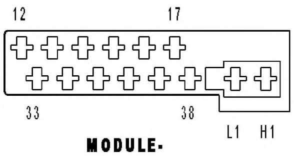
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

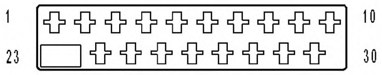
No >> Test Complete.

P0742-TORQUE CONVERTER CLUTCH STUCK ON

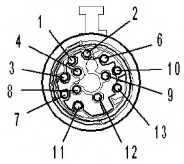

RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 T74 18 YL/LG
9 T73 18 YL/GY
10 T77 20 YL/BR
11 T75 18 YL/LB
13 T60 18 DG/BK
6 T78 18 YL
2 T76 20 YL/TN
30 34 36 32 33 38 29 C104
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
4 7 9 5 6 11 2 C114
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100


12
17
33
38
L1 H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)


1
2
4
6
3
10
8
9
7
13
11
12

ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)

81498d24

P0742-TORQUE CONVERTER CLUTCH STUCK ON (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) constantly monitors the amount of torque converter slippage. When the torque converter clutch (TCC) is open the slippage is expected to be above a threshold. If the slippage is less then expected when the TCC is open, the TCM assumes that the TCC is stuck on.

- **When Monitored:**
  Ignition on, TCM not in initialization phase, No input speed sensor 1 or 2 (N2–N3) DTCs, No CAN bus or ECM DTCs, No CAN engine speed signal or engine torque signal not implausible DTCs, Engine speed greater than 450 rpm, No shift in progress, Gear 1, 2, 3, 4 or 5 engaged, and the TCM torque converter status is OPEN
- **Set Condition:**
  Engine RPM (Turbine Speed) is greater than 30 RPM when engine torque less than 100 N·m (74.0 ft.lbs.) for period of 1.0 second.

Possible Causes
(T75) TCC SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T75) TCC SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
INTERNAL TRANSMISSION
LOCKUP CONTROL VALVE STICKING IN ITS BORE
LEAKING TCC SOLENOID
TORQUE CONVERTER
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF ENGINE STALLS OR STUMBLES IN GEAR

Turn the ignition off to the lock position.

Disconnect the Electrohydraulic Control Unit Assembly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Start the engine.

With the brakes firmly applied, shift the gear selector into Drive.

Did the engine stall or stumble?

Yes >> Repair internal transmission. Pay particular attention to the components related to the TCC such as the Lockup Control Valve sticking in its bore or a leaking TCC Solenoid. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P0742-TORQUE CONVERTER CLUTCH STUCK ON (CONTINUED)

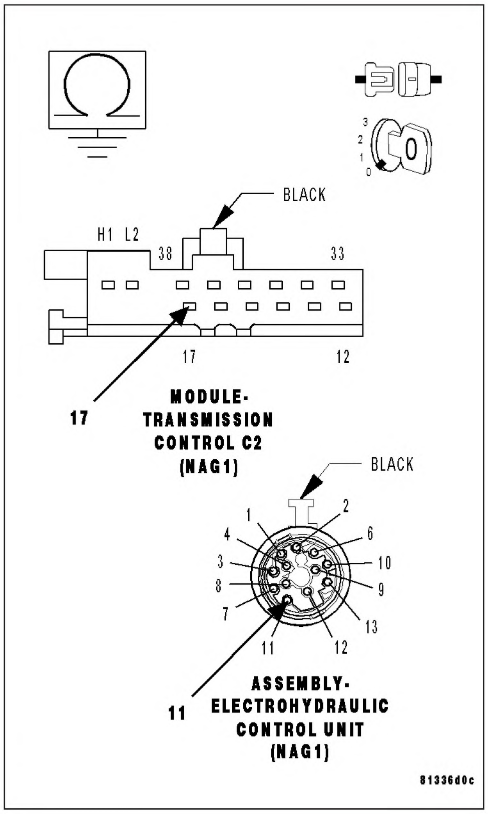
2. (T75) TCC SOLENOID CONTROL CIRCUIT SHORT TO GROUND

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance between ground and the (T75) TCC Solenoid Control circuit.


BLACK
H1 L2
38
33
17
12
17
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
11
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
81336d0c

Is the resistance below 5.0 ohms?

Yes >> Repair the (T75) TCC Solenoid Control circuit for a short to ground.

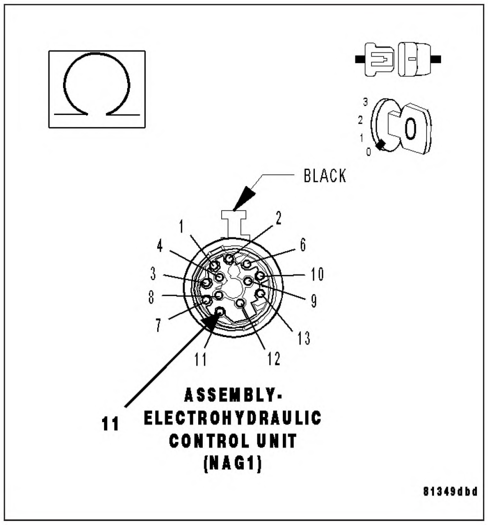
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. (T75) TCC SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T75) TCC Solenoid Control circuit and all other circuits in the Transmission Electrohydraulic Control Unit Assembly harness connector.


BLACK
1
2
4
6
3
10
8
9
7
13
11
12
11
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
81349dbd

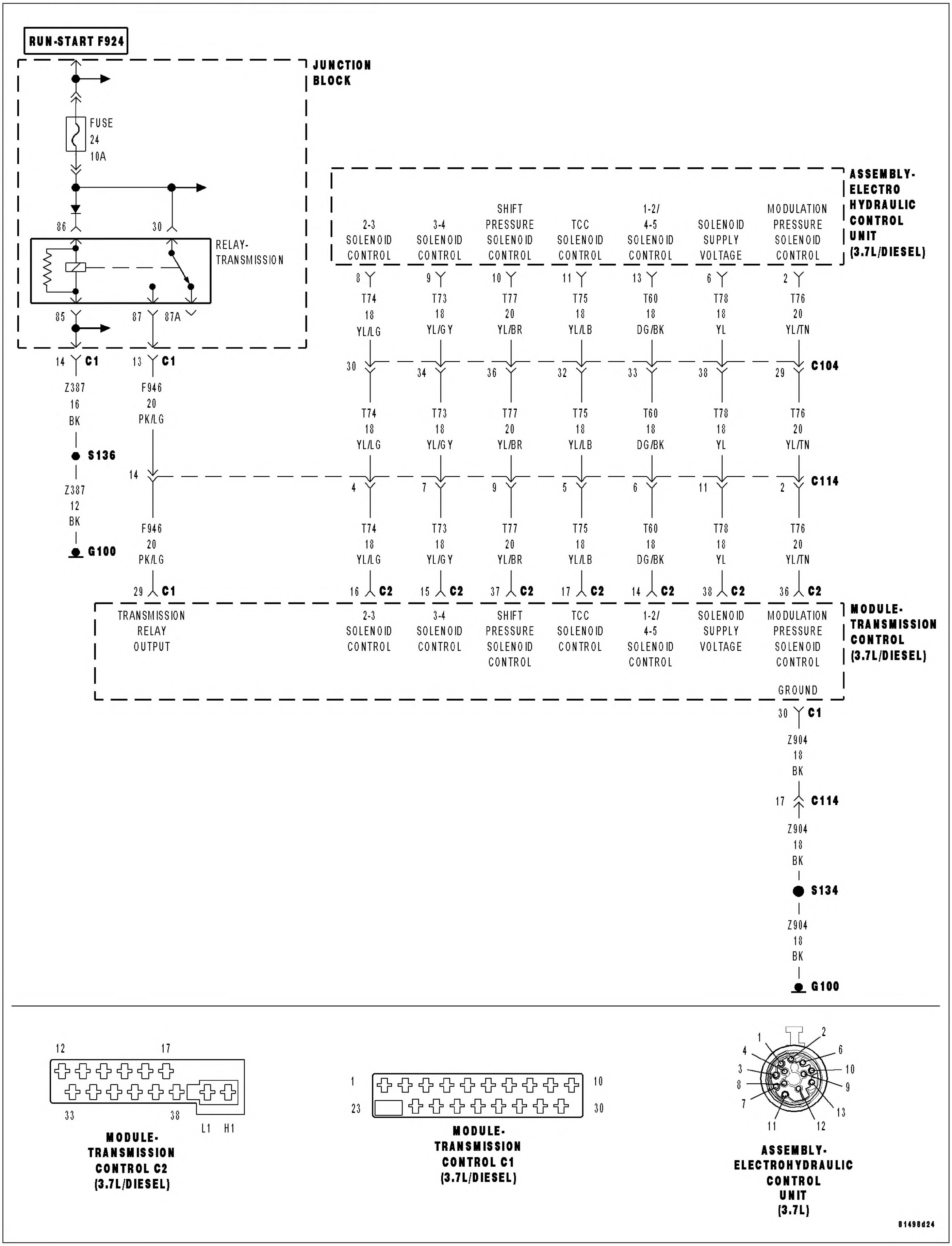
Is the resistance below 5.0 ohms between the (T75) TCC Solenoid Control circuit and all other circuits in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T75) TCC Solenoid Control circuit for a short to another circuit(s).

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P0743-TCC SOLENOID CIRCUIT


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/LG
S136
Z387 12 BK
G100
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 9 10 11 13 6 2
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
C104
30 34 36 32 33 38 29
C114
4 7 9 5 6 11 2
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904 18 BK
17 C114
S134
G100
12 17
33 38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 10
23 30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1 2 4 6 3 10 8 9 7 13 11 12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498d24

P0743-TCC SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The TCC Solenoid is activated when the Transmission Control Module (TCM) determines that the Torque Converter Clutch should be activated. The Torque Converter Clutch is a variable slip torque clutch that allows control of the slip from 5.5% to 95.5% of lock-up. The Clutch is controlled by the TCC Solenoid which is pulse width modulated (PWM) to provide the desired amount of slip. The clutch requires both an electrical PWM of 1000Hz and an hydraulic PWM of 100Hz.

- **When Monitored:**
  Continuously with the ignition on, engine running, with the transmission in gear, the TCC Solenoid is inactive, or when the TCC Solenoid is active and controlled above 25% duty cycle, with the Solenoid Supply voltage active.
- **Set Condition:**
  If the TCM detects on the TCC Solenoid control circuit a open, short to ground, short to voltage, internal short in the TCC Solenoid or open in the TCC Solenoid.

Possible Causes
(T75) TCC SOLENOID CONTROL CIRCUIT OPEN
(T75) TCC SOLENOID CONTROL CIRCUIT SHORT TO GROUND
TCC SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT
TCC SOLENOID
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC P0743 reset?

Yes >> Go To 2

No >> Go To 6

P0743-TCC SOLENOID CIRCUIT (CONTINUED)

2. CHECK THE (T75) TCC SOLENOID CONTROL CIRCUIT FOR AN OPEN

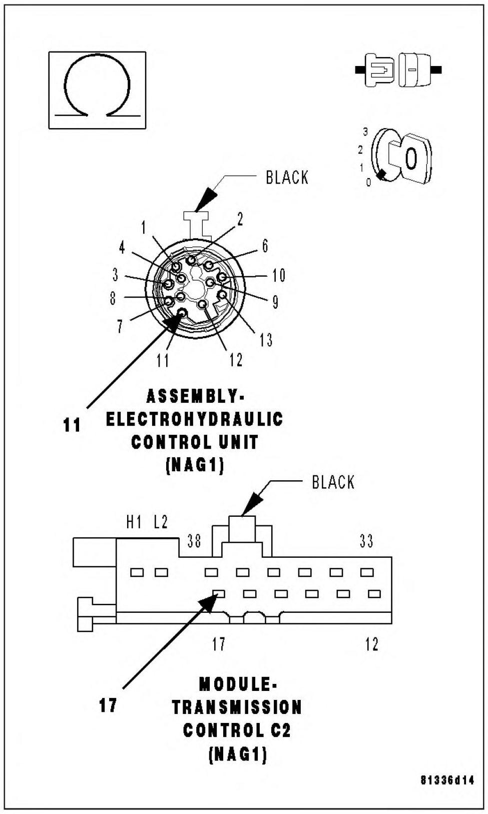
Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance of the (T75) TCC Solenoid Control circuit from the TCM C2 harness connector to the Transmission Electrohydraulic Control Unit Assembly harness connector.


3
2
1
0
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
11
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
17
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
81336d14

Is the resistance below 5.0 ohms?

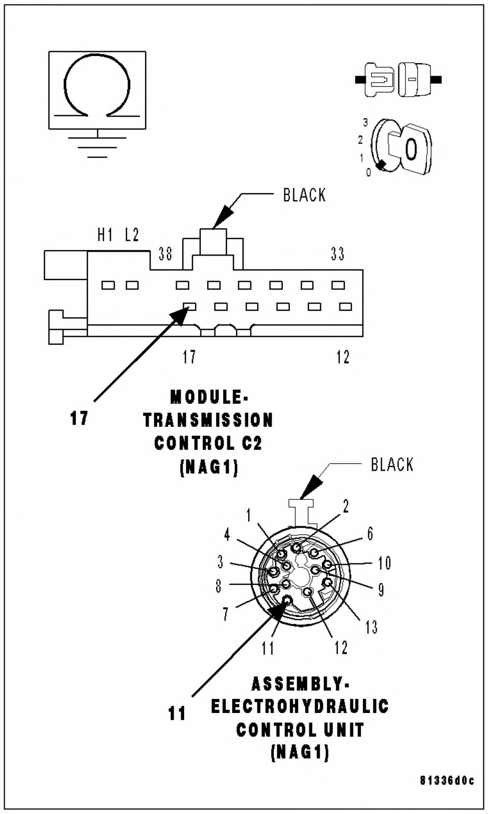
Yes >> Repair the (T75) TCC Solenoid Control circuit for an open. Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (T75) TCC SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T75) TCC Solenoid Control circuit.


3
2
1
0
BLACK
H1 L2
38
33
17
12
17
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
11
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
81336d0c

Is the resistance below 5.0 ohms?

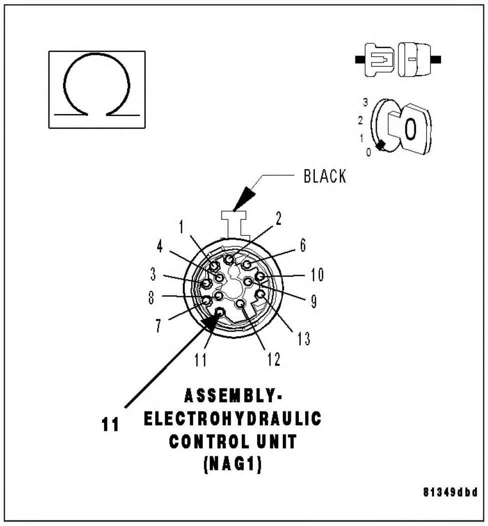
Yes >> Repair the (T75) TCC Solenoid Control circuit for a short to ground. Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0743-TCC SOLENOID CIRCUIT (CONTINUED)

4. CHECK THE (T75) TCC SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T75) TCC Solenoid Control circuit and all other circuits in the Transmission Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T75) TCC Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T75) TCC Solenoid Control circuit for a short to another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

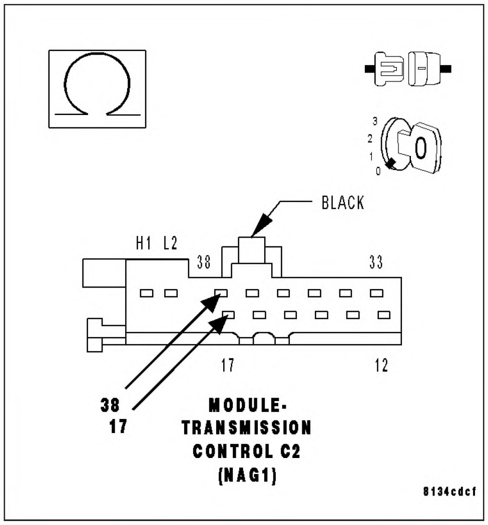
No >> Go To 5

---

5. CHECK THE TCC SOLENOID RESISTANCE

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the TCC Solenoid between the (T75) TCC Solenoid Control circuit and the (T78) Solenoid Supply circuit in the TCM C2 harness connector.



Is the resistance between 2.0 and 4.0 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the TCC Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

P0743-TCC SOLENOID CIRCUIT (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

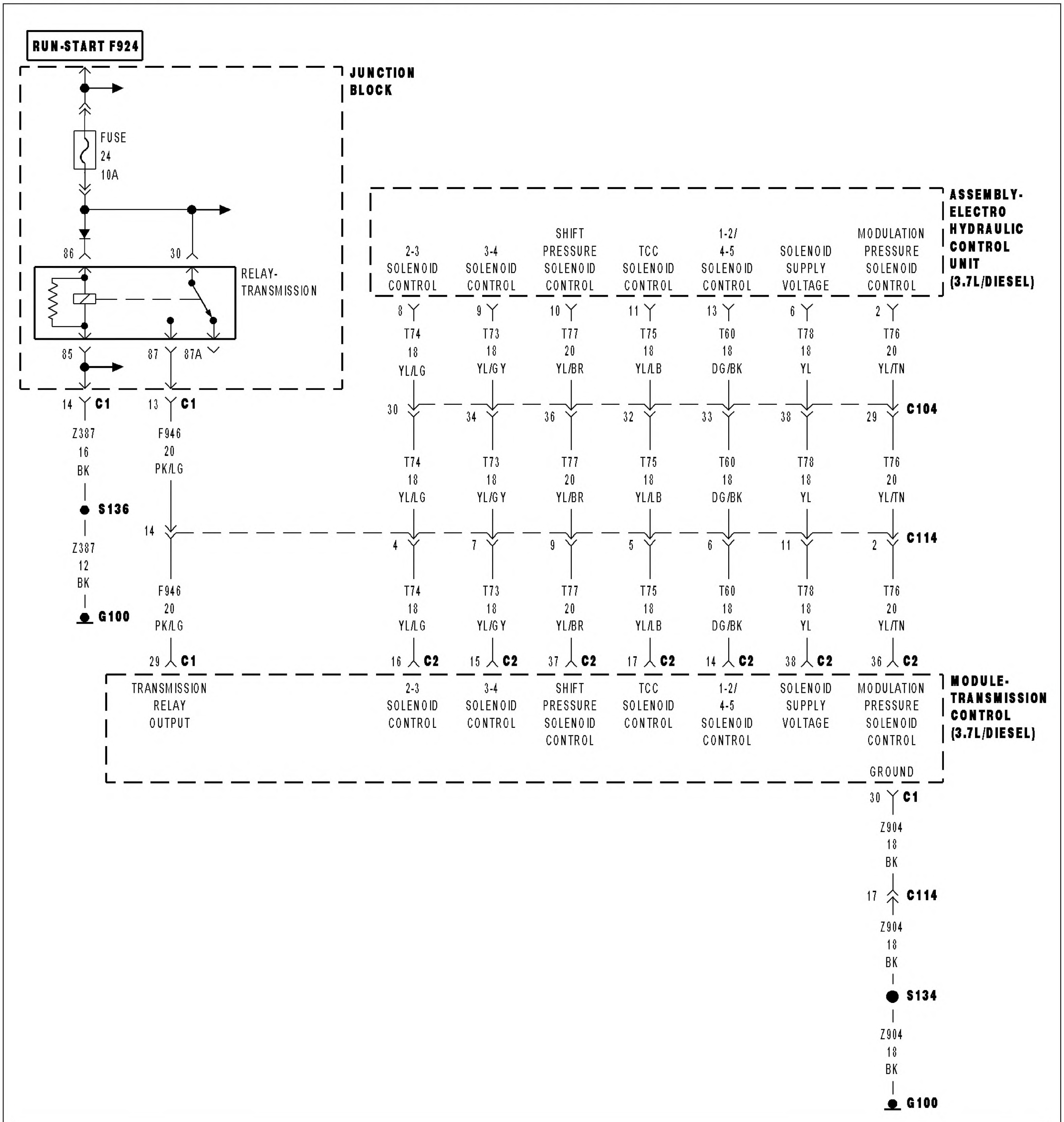
The conditions necessary to set this DTC are not present at this time.
Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.
Wiggle the wiring and connectors while checking for any possible open or shorted circuits.
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

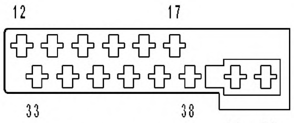
Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

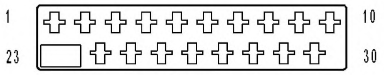
No >> Test Complete.

P0748-MODULATOR PRESSURE SOLENOID CIRCUIT

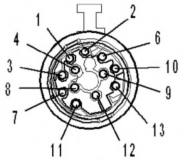

RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/LG
S136
Z387 12 BK
G100
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 T74 18 YL/LG
9 T73 18 YL/GY
10 T77 20 YL/BR
11 T75 18 YL/LB
13 T60 18 DG/BK
6 T78 18 YL
2 T76 20 YL/TN
30 34 36 32 33 38 29 C104
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
4 7 9 5 6 11 2 C114
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100


12
17
33
38
L1
H1

MODULE-
TRANSMISSION
CONTROL C2
(3.7L/DIESEL)



MODULE-
TRANSMISSION
CONTROL C1
(3.7L/DIESEL)


1
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4
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3
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8
9
7
13
11
12

ASSEMBLY-
ELECTROHYDRAULIC
CONTROL
UNIT
(3.7L)

81498d24

P0748-MODULATOR PRESSURE SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Modulating Pressure Control Solenoid Valve's purpose is to control the modulating pressure depending on the continuously changing operating conditions, such as load and gear change.

The Modulating Pressure Control Solenoid Valve is always active. The solenoid uses pulse width modulation (PWM) to control the transmissions hydraulic fluid pressure that is determined by the Transmission Control Module (TCM).

- **When Monitored:**
  Continuously with the ignition on, engine running, the Modulating Pressure Control Solenoid Valve is either off, or active with 25-75% duty cycle, with no Solenoid Supply Voltage DTCs present.
- **Set Condition:**
  When the Modulating Pressure Control Solenoid Valve is turned on and the Solenoid driver detects an error (the measured current is too different then the target current) or when the solenoid is off and a short to ground is detected.

Possible Causes
(T76) MODULATION PRESSURE SOLENOID CONTROL CIRCUIT OPEN
(T76) MODULATION PRESSURE SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T76) MODULATION PRESSURE SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
MODULATING PRESSURE CONTROL SOLENOID VALVE
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC P0748 reset?

Yes >> Go To 2

No >> Go To 6

P0748-MODULATOR PRESSURE SOLENOID CIRCUIT (CONTINUED)

2. CHECK THE (T76) MODULATION PRESSURE SOLENOID CONTROL CIRCUIT FOR AN OPEN

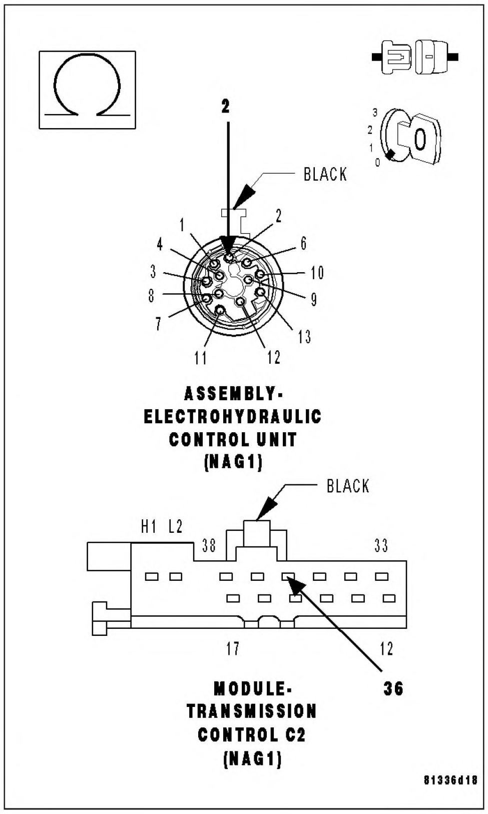
Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance of the (T76) Modulation Pressure Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


Ω
2
3
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1
0
0
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
36
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
81336d18

Is the resistance below 5.0 ohms?

Yes >> Repair the (T76) Modulation Pressure Solenoid Control circuit for an open.

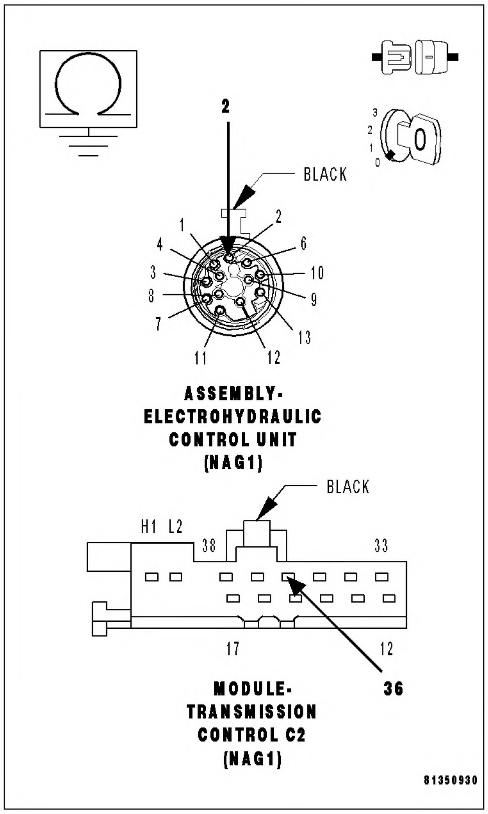
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

P0748-MODULATOR PRESSURE SOLENOID CIRCUIT (CONTINUED)

3. CHECK THE (T76) MODULATION PRESSURE SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T76) Modulation Pressure Solenoid Control circuit.


2
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
36
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
81350930

Is the resistance below 5.0 ohms?

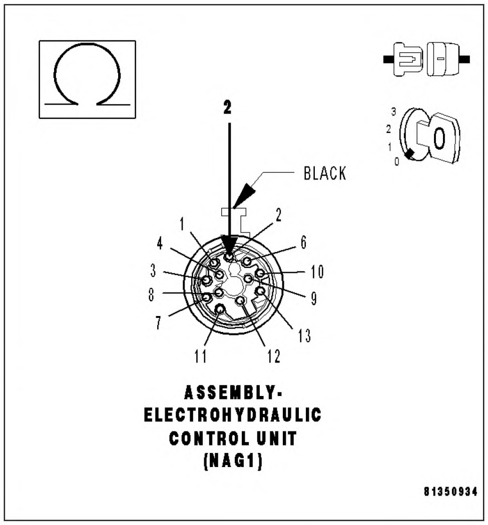
Yes >> Repair the (T76) Modulation Pressure Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

---

4. CHECK THE (T76) MODULATION PRESSURE SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T76) Modulation Pressure Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.


2
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
81350934

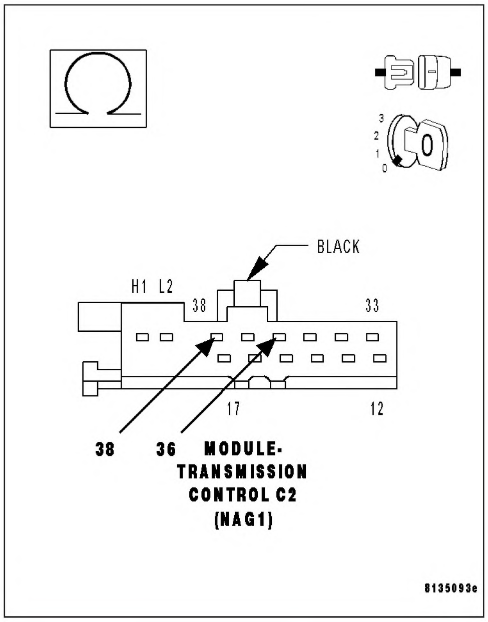
Is the resistance below 5.0 ohms?

Yes >> Repair the (T76) Modulation Pressure Solenoid Control circuit for a short to another circuit.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

P0748-MODULATOR PRESSURE SOLENOID CIRCUIT (CONTINUED)

5. CHECK THE MODULATING PRESSURE CONTROL SOLENOID VALVE



Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance between the (T76) Modulation Pressure Solenoid Control circuit and the (T78) Solenoid Supply Voltage circuit in the TCM C2 harness connector.

Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Modulating Pressure Control Solenoid Valve per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/ SERVICE INFORMATION for the appropriate service procedure.

---

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

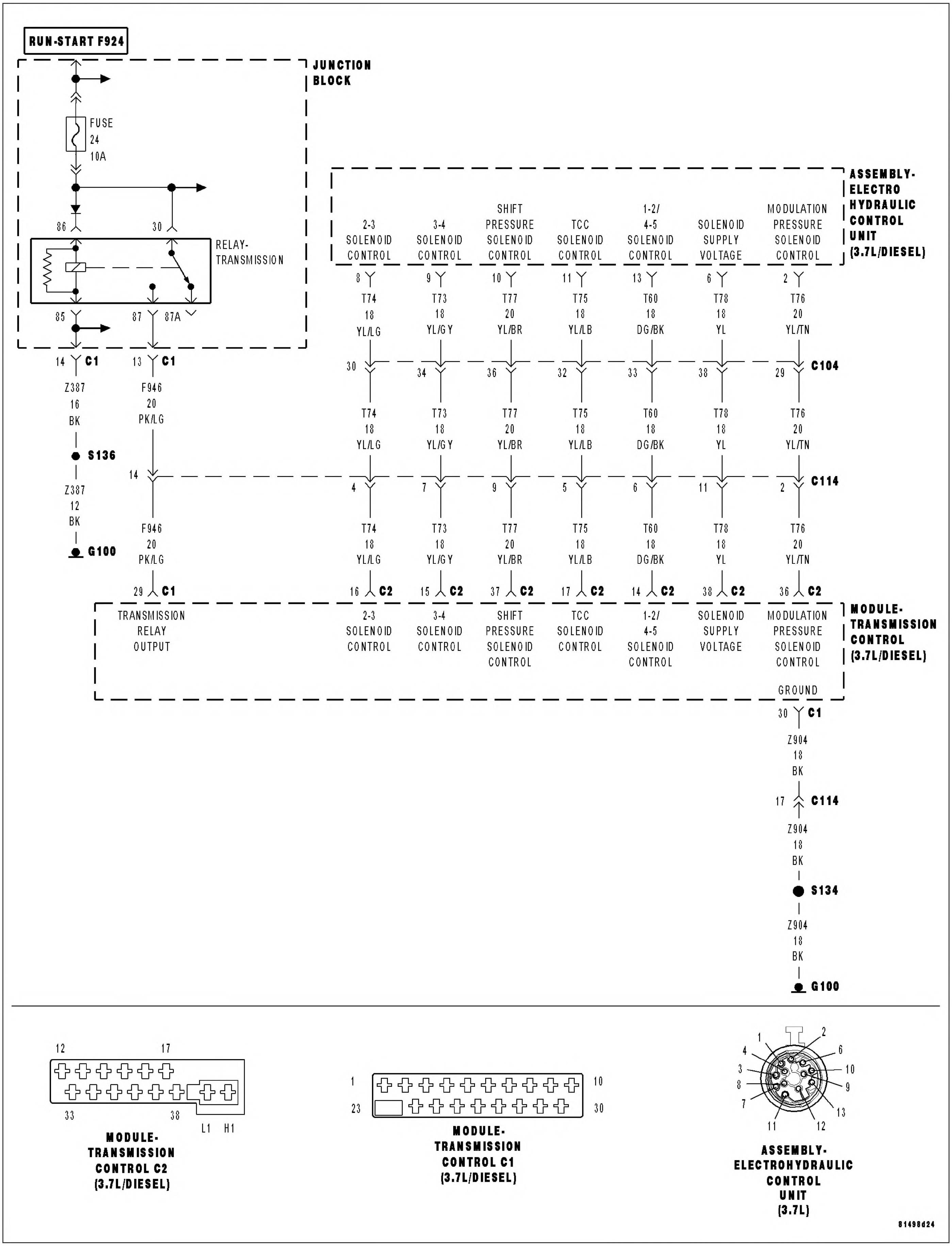
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0752-1-2/4-5 SOLENOID


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/LG
S136
Z387 12 BK
G100
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 9 10 11 13 6 2
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
30 34 36 32 33 38 29 C104
4 7 9 5 6 11 2 C114
16 C2 15 C2 37 C2 17 C2 14 C2 38 C2 36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904 18 BK
17 C114
S134
G100
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 10 23 30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1 2 4 6 3 10 8 9 7 13 11 12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498d24

P0752-1-2/4-5 SOLENOID (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The 1-2/4-5 Solenoid is activated when the Transmission Control Module (TCM) determines that the transmission must shift into or out of second or fifth gear. The solenoid is only activated during the actual shift of the transmission. When the solenoid is activated, hydraulic pressure is applied to the proper shift elements in the transmission to allow the desired shift. Once the shift is completed the solenoid is turned off.

- **When Monitored:**
  When both the 1-2/4-5 Solenoid and the Solenoid Supply voltage is active.
- **Set Condition:**
  When 1-2/4-5 Solenoid is turned on and the TCM detects any of the following in the 1-2/4-5 Solenoid or circuit: open, short to ground, short to voltage, or the solenoid driver in the TCM.

Possible Causes
(T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT OPEN
(T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
1-2/4-5 SOLENOID
TRANSMISSSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC’s.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC’s.

Did the DTC P0752 reset?

Yes >> Go To 2

No >> Go To 6

P0752-1-2/4-5 SOLENOID (CONTINUED)

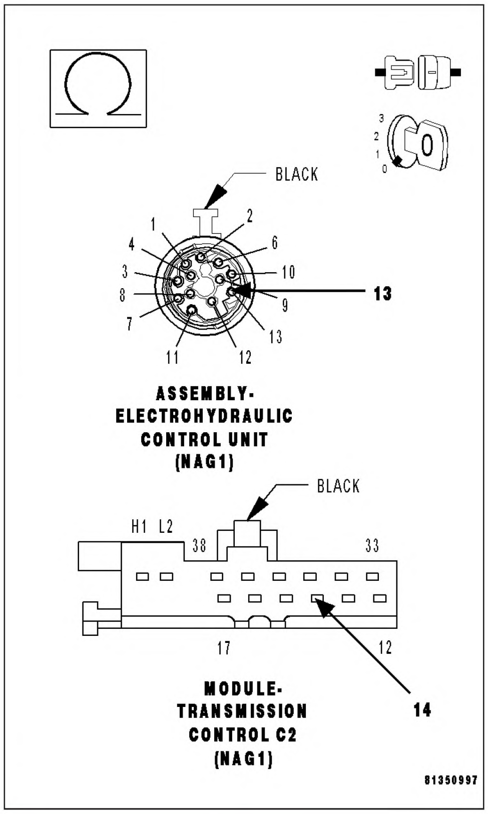
2. CHECK THE (T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T76) 1-2/4-5 Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


BLACK
1
2
4
6
3
10
8
9
7
13
11
12
13
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (NAG1)
BLACK
H1 L2
38
33
17
12
14
MODULE-TRANSMISSION CONTROL C2 (NAG1)
81350997

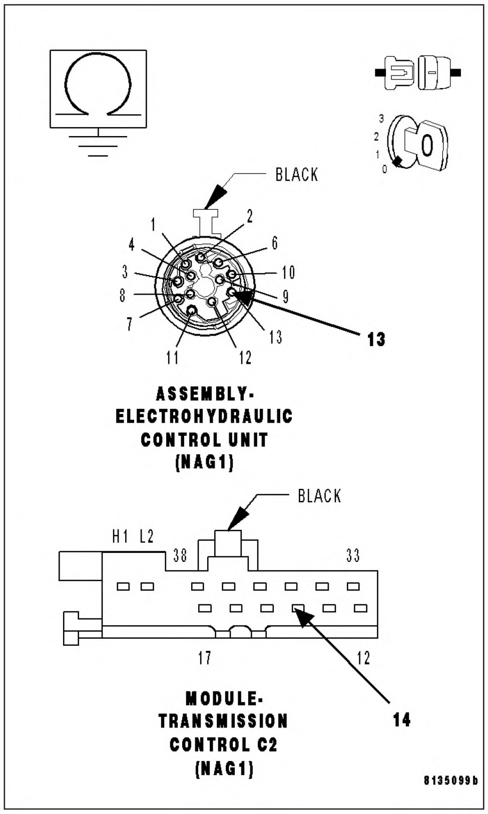
Is the resistance below 5.0 ohms?

Yes >> Go To 3

No >> Repair the (T76) 1-2/4-5 Solenoid Control circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

3. CHECK THE (T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T76) 1-2/4-5 Solenoid Control circuit.


BLACK
1
2
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3
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8
9
7
13
11
12
13
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (NAG1)
BLACK
H1 L2
38
33
17
12
14
MODULE-TRANSMISSION CONTROL C2 (NAG1)
8135099b

Is the resistance below 5.0 ohms?

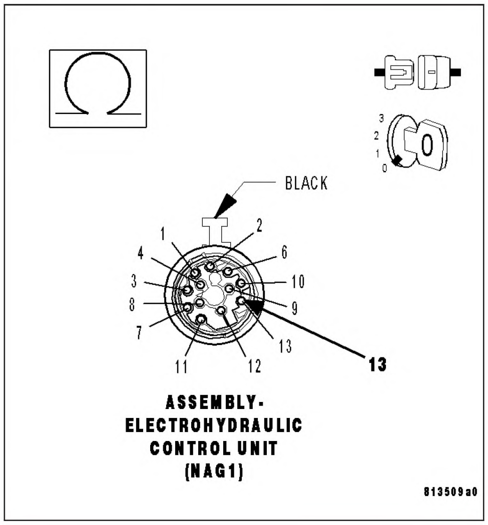
Yes >> Repair the (T76) 1-2/4-5 Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0752-1-2/4-5 SOLENOID (CONTINUED)

4. CHECK THE (T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT FOR A TO ANOTHER CIRCUIT

Measure the resistance between the (T76) 1-2/4-5 Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T76) 1-2/4-5 Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T76) 1-2/4-5 Solenoid Control circuit for another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

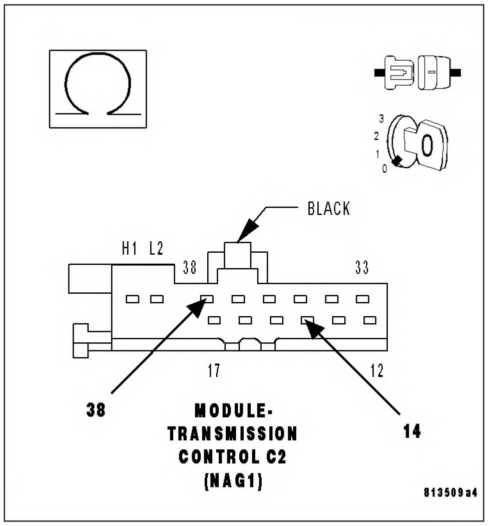
No >> Go To 5

---

5. CHECK THE 1-2/4-5 SOLENOID

Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the 1-2/4-5 Solenoid between the (T76) 1-2/4-5 Solenoid Control circuit and the (T78) Solenoid Voltage Supply circuit in the TCM C2 harness connector.



Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the 1-2/4-5 Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

---

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

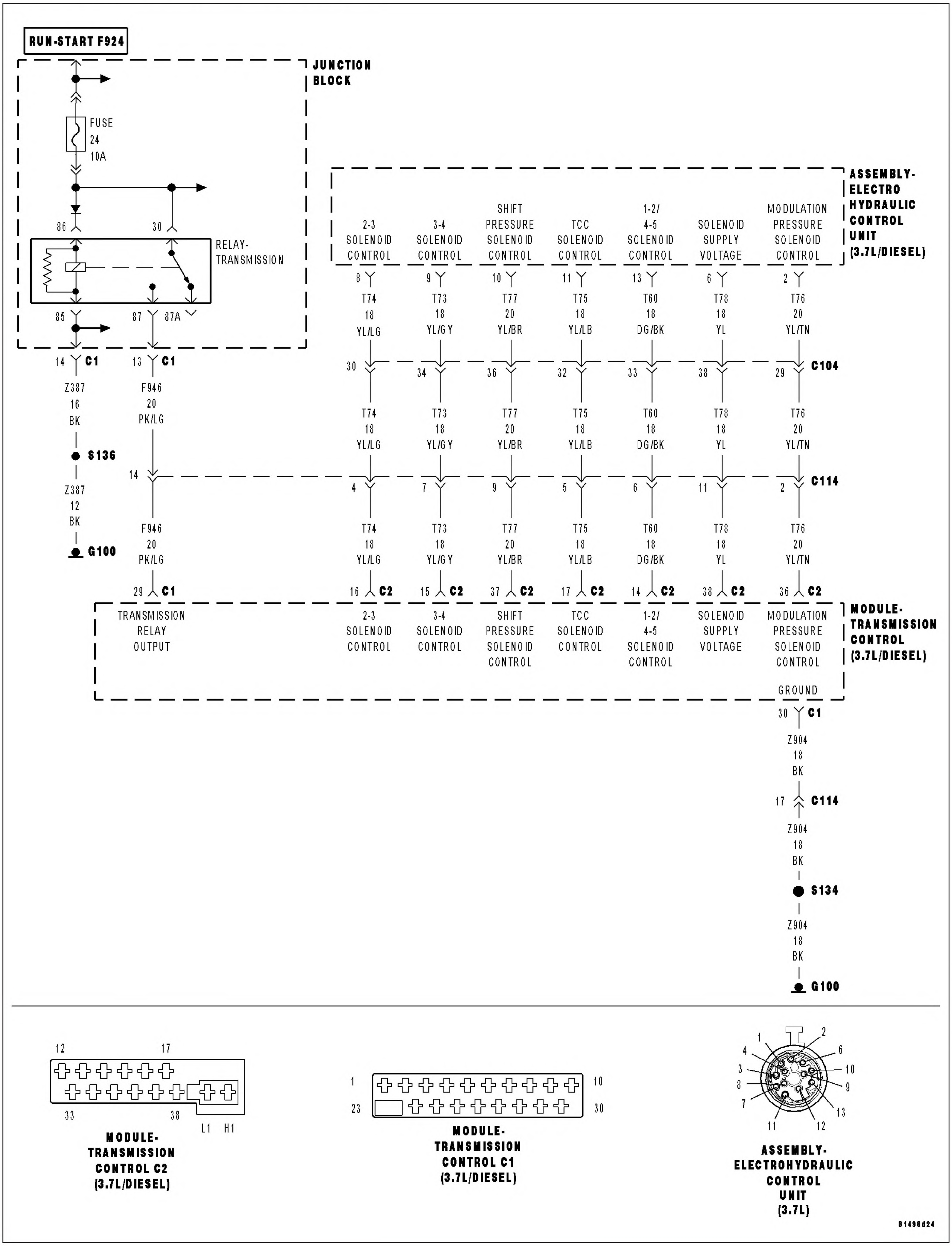
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0753-1-2/4-5 SOLENOID CIRCUIT


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/LG
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 T74 18 YL/LG
9 T73 18 YL/GY
10 T77 20 YL/BR
11 T75 18 YL/LB
13 T60 18 DG/BK
6 T78 18 YL
2 T76 20 YL/TN
C104
30 34 36 32 33 38 29
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
C114
4 7 9 5 6 11 2
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 10 23 30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1 2 4 6 3 10 8 9 7 13 11 12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498d24

P0753-1-2/4-5 SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The 1-2/4-5 Solenoid is activated when the Transmission Control Module (TCM) determines that the transmission must shift into or out of second or fifth gear. The solenoid is only activated during the actual shift of the transmission. When the solenoid is activated, hydraulic pressure is applied to the proper shift elements in the transmission to allow the desired shift. Once the shift is completed the solenoid is turned off.

- **When Monitored:**
  When both the 1-2/4-5 Solenoid and the Solenoid Supply voltage is active.
- **Set Condition:**When 1-2/4-5 Solenoid is turned on and the TCM detects any of the following in the 1-2/4-5 Solenoid or circuit: open, short to ground, short to voltage, or the solenoid driver in the TCM.

Possible Causes
(T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT OPEN
(T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
1-2/4-5 SOLENOID
TRANSMISSSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC’s.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC’s.

Did the DTC P0753 reset?

Yes >> Go To 2

No >> Go To 6

P0753-1-2/4-5 SOLENOID CIRCUIT (CONTINUED)

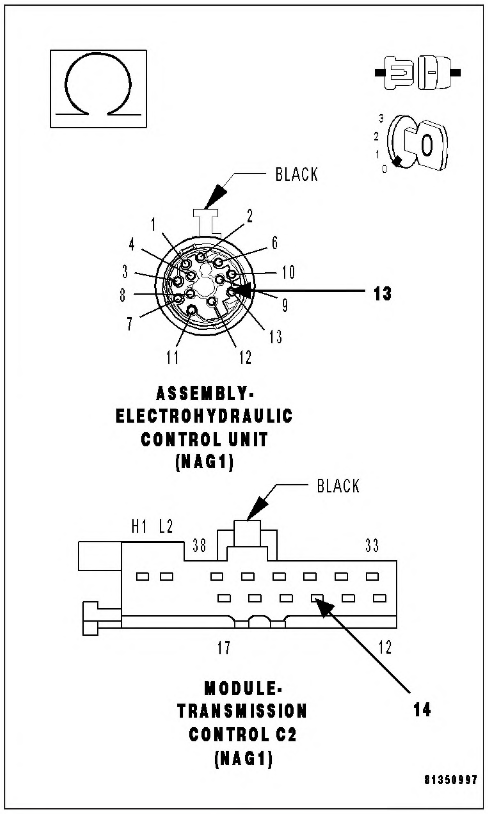
2. CHECK THE (T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T76) 1-2/4-5 Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


BLACK
1
2
4
6
3
10
8
13
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
14
81350997

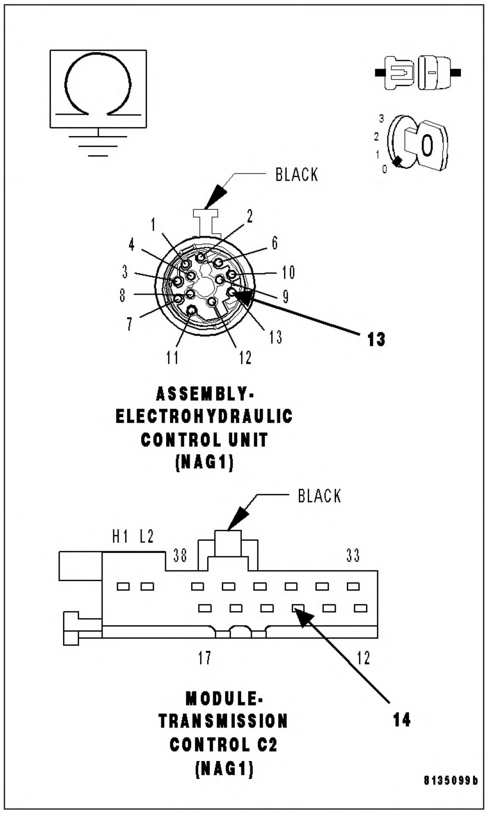
Is the resistance below 5.0 ohms?

Yes >> Go To 3

No >> Repair the (T76) 1-2/4-5 Solenoid Control circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

3. CHECK THE (T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T76) 1-2/4-5 Solenoid Control circuit.


BLACK
1
2
4
6
3
10
8
9
7
13
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
14
8135099b

Is the resistance below 5.0 ohms?

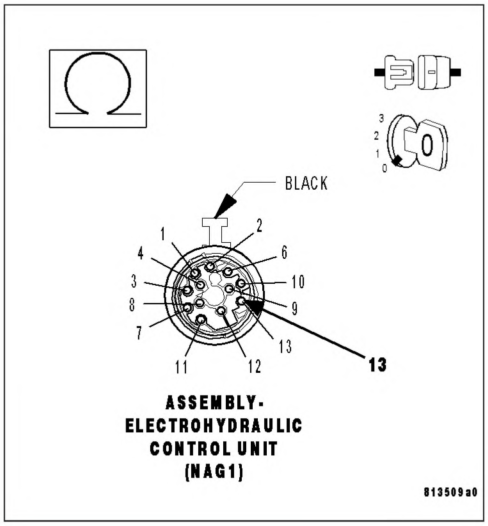
Yes >> Repair the (T76) 1-2/4-5 Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0753-1-2/4-5 SOLENOID CIRCUIT (CONTINUED)

4. CHECK THE (T76) 1-2/4-5 SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T76) 1-2/4-5 Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T76) 1-2/4-5 Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T76) 1-2/4-5 Solenoid Control circuit for another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

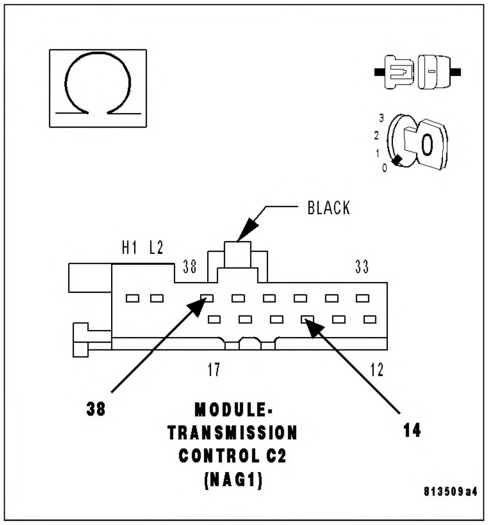
No >> Go To 5

---

5. CHECK THE 1-2/4-5 SOLENOID

Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the 1-2/4-5 Solenoid between the (T76) 1-2/4-5 Solenoid Control circuit and the (T78) Solenoid Voltage Supply circuit in the TCM C2 harness connector.



Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the 1-2/4-5 Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

P0753-1-2/4-5 SOLENOID CIRCUIT (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

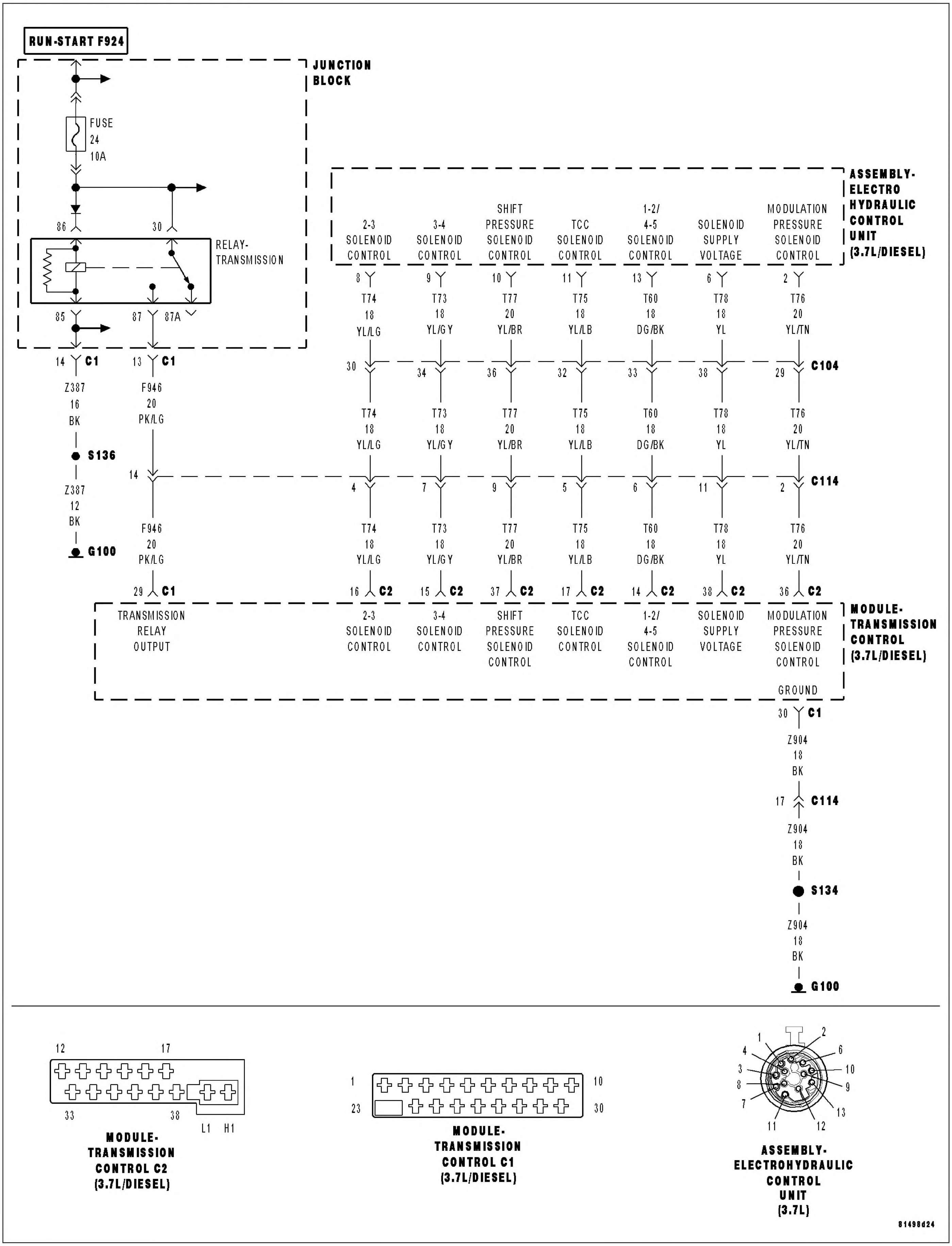
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0758-2-3 SOLENOID


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 T74 18 YL/LG
9 T73 18 YL/GY
10 T77 20 YL/BR
11 T75 18 YL/LB
13 T60 18 DG/BK
6 T78 18 YL
2 T76 20 YL/TN
C104
30 34 36 32 33 38 29
C114
4 7 9 5 6 11 2
C2
16 15 37 17 14 38 36
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 10 23 30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1 2 4 6 3 10 8 9 7 13 11 12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498d24

P0758-2-3 SOLENOID (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The 2-3 Solenoid is activated when the Transmission Control Module (TCM) determines that the transmission must shift into or out of 3rd gear. The solenoid is only activated during the shifting of the transmission. When the solenoid is activated hydraulic pressure is applied to the proper shift elements in the transmission to allow the desired shift. Once the shift is completed the solenoid is turned off.

- **When Monitored:**
  When both the 2-3 Solenoid and the Solenoid Supply voltage is active.
- **Set Condition:**
  When 2-3 Solenoid is turned on and the TCM detects any of the following in the 2-3 Solenoid or circuit: open, short to ground, short to voltage, or the solenoid driver in the TCM.

Possible Causes
(T74) 2-3 SOLENOID CONTROL CIRCUIT OPEN
(T74) 2-3 SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T74) 2-3 SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
2-3 SOLENOID
TRANSMISSSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC P0757 reset?

Yes >> Go To 2

No >> Go To 6

P0758-2-3 SOLENOID (CONTINUED)

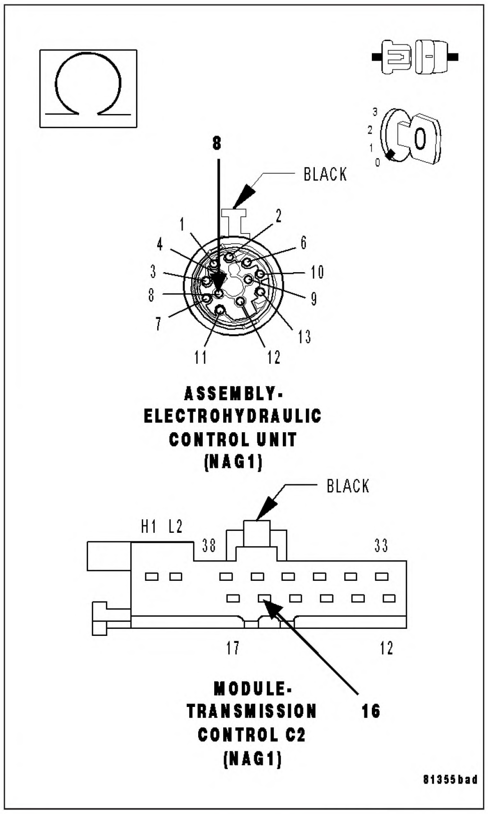
2. CHECK THE (T74) 2-3 SOLENOID CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T74) 2-3 Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


3
2
1
0
0
8
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
16
81355bad

Is the resistance below 5.0 ohms?

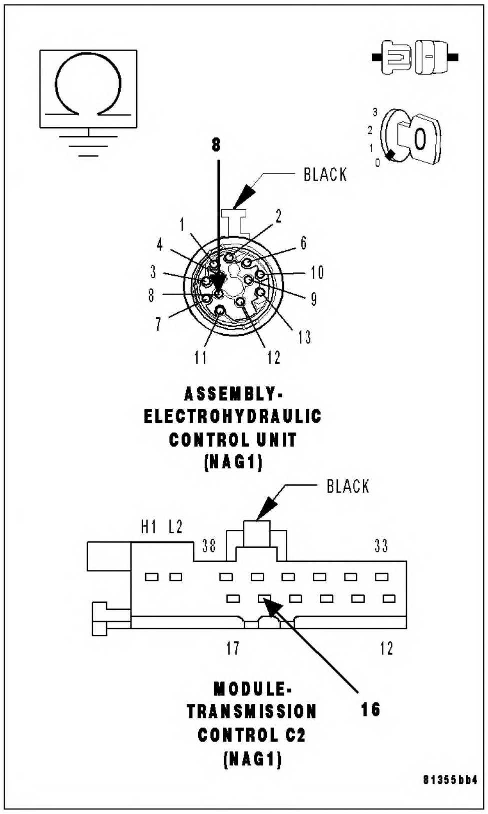
Yes >> Go To 3

No >> Repair the (T74) 2-3 Solenoid Control circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

3. CHECK THE (T74) 2-3 SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T74) 2-3 Solenoid Control circuit.


3
2
1
0
0
8
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
16
81355bb4

Is the resistance below 5.0 ohms?

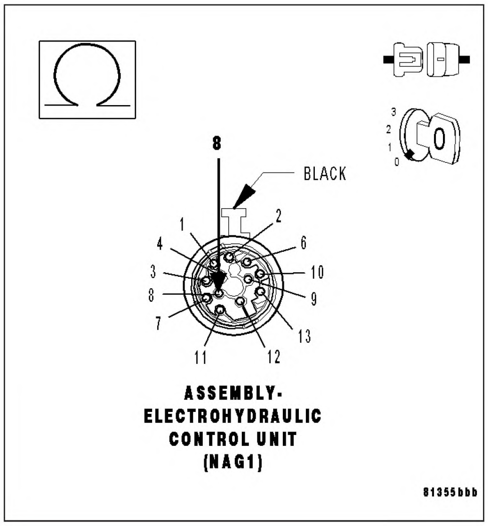
Yes >> Repair the (T74) 2-3 Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0758-2-3 SOLENOID (CONTINUED)

4. CHECK THE (T74) 2-3 SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T74) 2-3 Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T74) 2-3 Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T74) 2-3 Solenoid Control circuit for another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

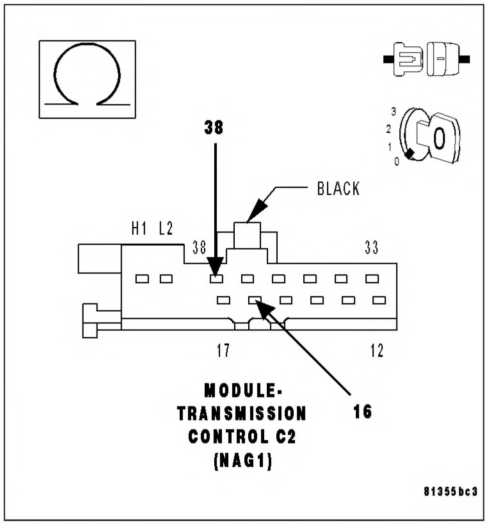
No >> Go To 5

---

5. CHECK THE 2-3 SOLENOID

Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the 2-3 Solenoid between the (T74) 2-3 Solenoid Control circuit and the (T78) Solenoid Voltage Supply circuit in the TCM C2 harness connector.



Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the 2-3 Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

P0758-2-3 SOLENOID (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

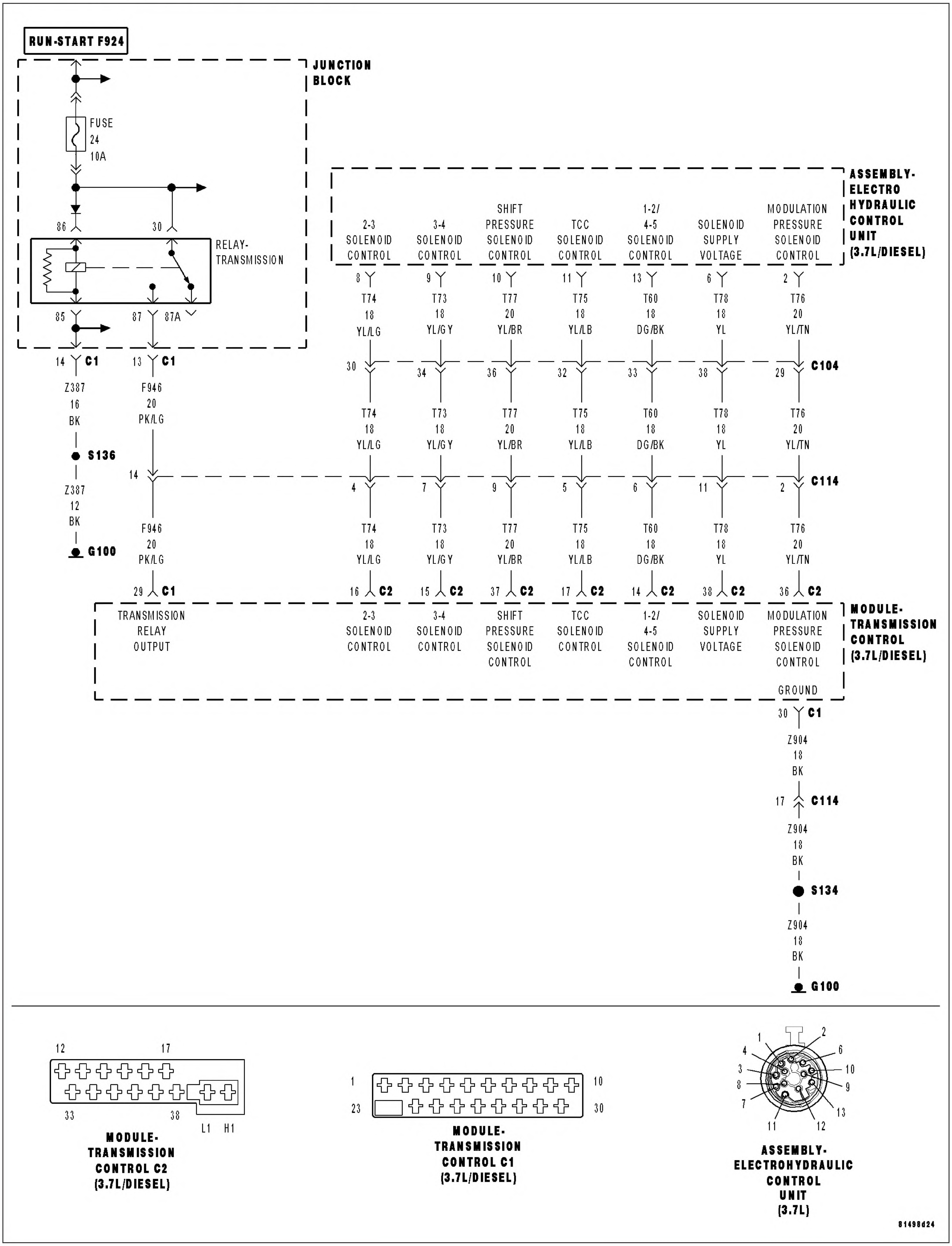
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0758-2-3 SOLENOID CIRCUIT


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/LG
S136
14
Z387 12 BK
G100
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8 9 10 11 13 6 2
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
30 34 36 32 33 38 29 C104
4 7 9 5 6 11 2 C114
16 C2 15 C2 37 C2 17 C2 14 C2 38 C2 36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12 17 33 38 L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1 10 23 30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1 2 4 6 3 10 8 9 7 13 11 12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498d24

P0758-2-3 SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The 2-3 Solenoid is activated when the Transmission Control Module (TCM) determines that the transmission must shift into or out of 3rd gear. The solenoid is only activated during the shifting of the transmission. When the solenoid is activated, hydraulic pressure is applied to the proper shift elements in the transmission to allow the desired shift. Once the shift is completed the solenoid is turned off.

- **When Monitored:**
  When both the 2-3 Solenoid and the Solenoid Supply voltage is active.
- **Set Condition:**
  When 2-3 Solenoid is turned on and the TCM detects any of the following in the 2-3 Solenoid or circuit: open, short to ground, short to voltage, or the solenoid driver in the TCM.

Possible Causes
(T74) 2-3 SOLENOID CONTROL CIRCUIT OPEN
(T74) 2-3 SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T74) 2-3 SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
2-3 SOLENOID
TRANSMISSSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC’s.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC’s.

Did the DTC P0758 reset?

Yes >> Go To 2

No >> Go To 6

P0758-2-3 SOLENOID CIRCUIT (CONTINUED)

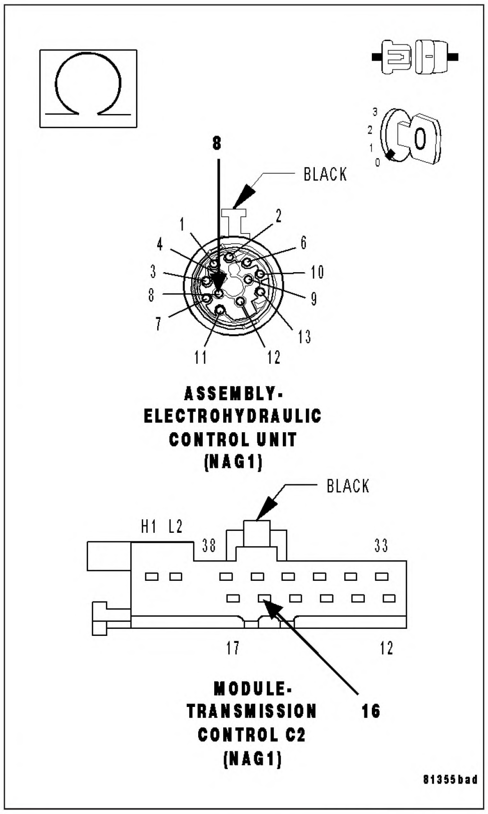
2. CHECK THE (T74) 2-3 SOLENOID CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T74) 2-3 Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


8
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
16
81355bad

Is the resistance below 5.0 ohms?

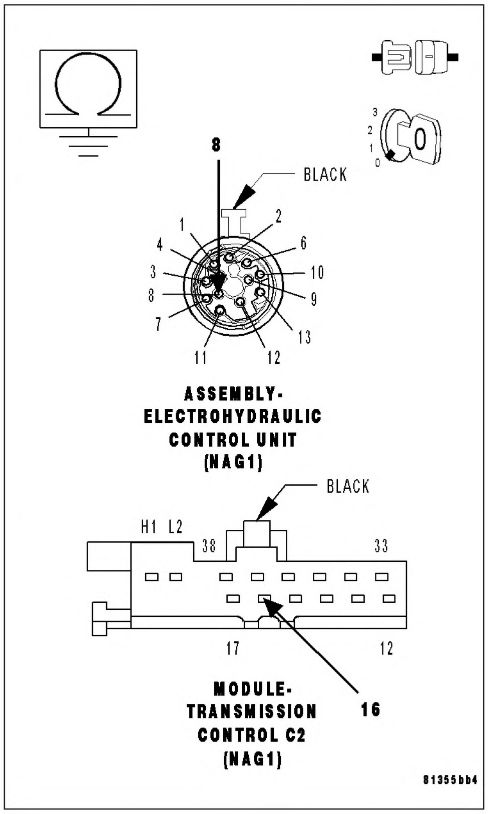
Yes >> Go To 3

No >> Repair the (T74) 2-3 Solenoid Control circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

3. CHECK THE (T74) 2-3 SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T74) 2-3 Solenoid Control circuit.


8
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
16
81355bb4

Is the resistance below 5.0 ohms?

Yes >> Repair the (T74) 2-3 Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0758-2-3 SOLENOID CIRCUIT (CONTINUED)

4. CHECK THE (T74) 2-3 SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

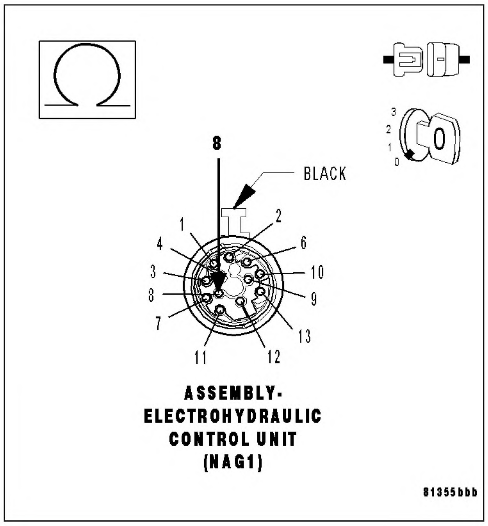
Measure the resistance between the (T74) 2-3 Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.

Is the resistance below 5.0 ohms between the (T74) 2-3 Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T74) 2-3 Solenoid Control circuit for another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5



---

5. CHECK THE 2-3 SOLENOID

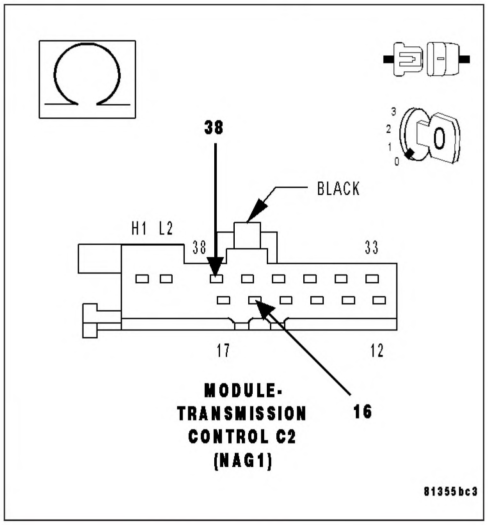
Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the 2-3 Solenoid between the (T74) 2-3 Solenoid Control circuit and the (T78) Solenoid Voltage Supply circuit in the TCM C2 harness connector.

Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.



No >> Replace the 2-3 Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

P0758-2-3 SOLENOID CIRCUIT (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

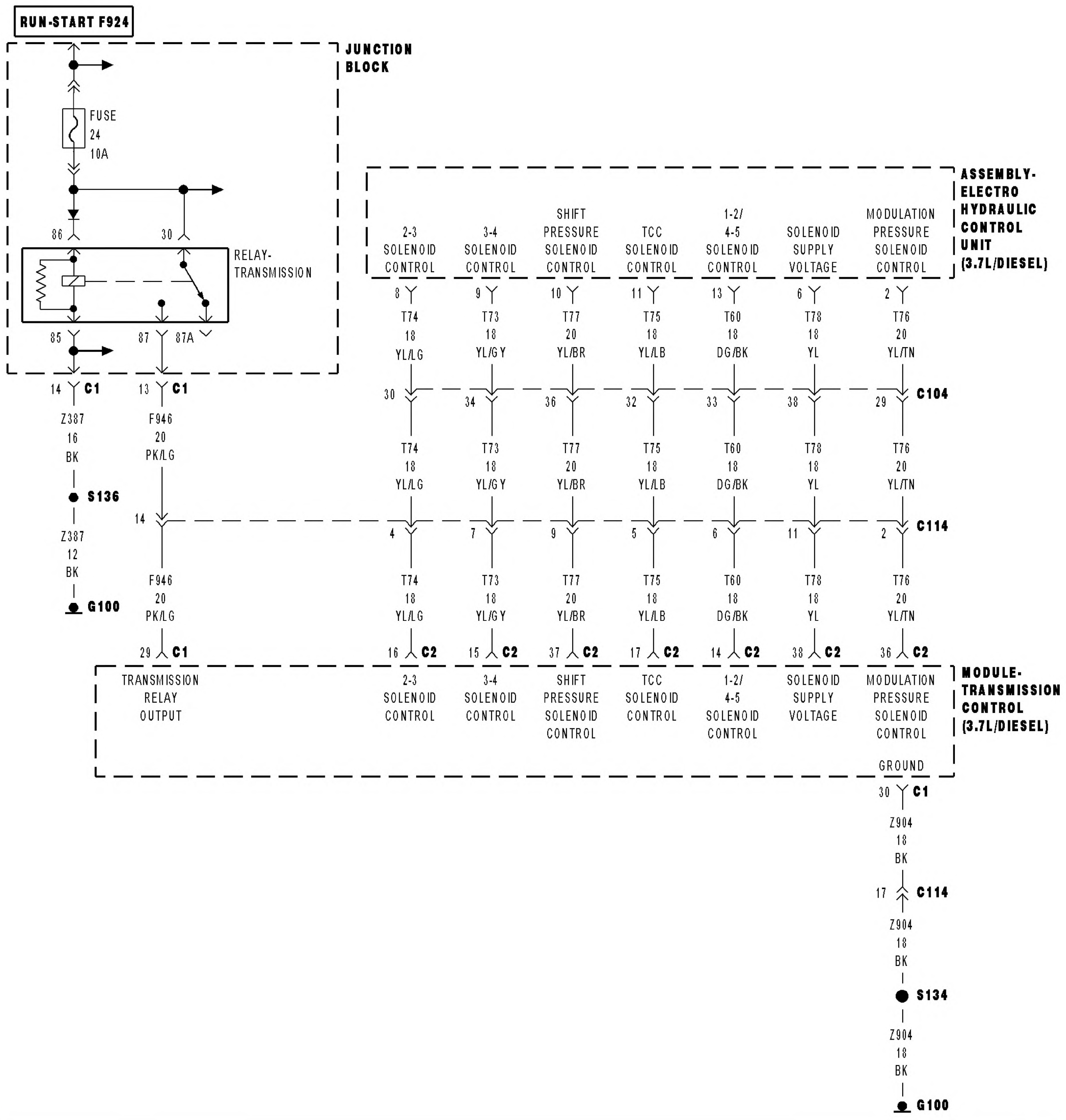
The conditions necessary to set this DTC are not present at this time.
Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.
Wiggle the wiring and connectors while checking for any possible open or shorted circuits.
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0762-3-4 SOLENOID


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387
16
BK
S136
Z387
12
BK
G100
13 C1
F946
20
PK/LG
14
F946
20
PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
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T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
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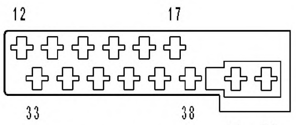
C104
4
7
9
5
6
11
2
C114
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904
18
BK
17 C114
S134
G100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17
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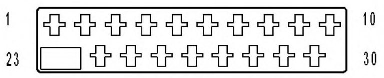
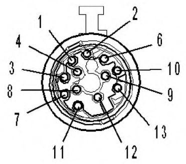
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)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ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)

81498d24

P0762-3-4 SOLENOID (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The 3-4 Solenoid is activated when the Transmission Control Module (TCM) determines that the transmission must shift into or out of 4th gear. The solenoid is only activated during the shifting of the transmission. When the solenoid is activated, hydraulic pressure is applied to the proper shift elements in the transmission to allow the desired shift. Once the shift is completed the solenoid is turned off.

- **When Monitored:**
  When both the 3-4 Solenoid and the Solenoid Supply voltage is active.
- **Set Condition:**
  When 3-4 Solenoid is turned on and the TCM detects any of the following in the 3-4 Solenoid or circuit: open, short to ground, short to voltage, or the solenoid driver in the TCM.

Possible Causes
(T73) 3-4 SOLENOID CONTROL CIRCUIT OPEN
(T73) 3-4 SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T73) 3-4 SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
3-4 SOLENOID
TRANSMISSSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC’s.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC’s.

Did the DTC P0762 reset?

Yes >> Go To 2

No >> Go To 6

P0762-3-4 SOLENOID (CONTINUED)

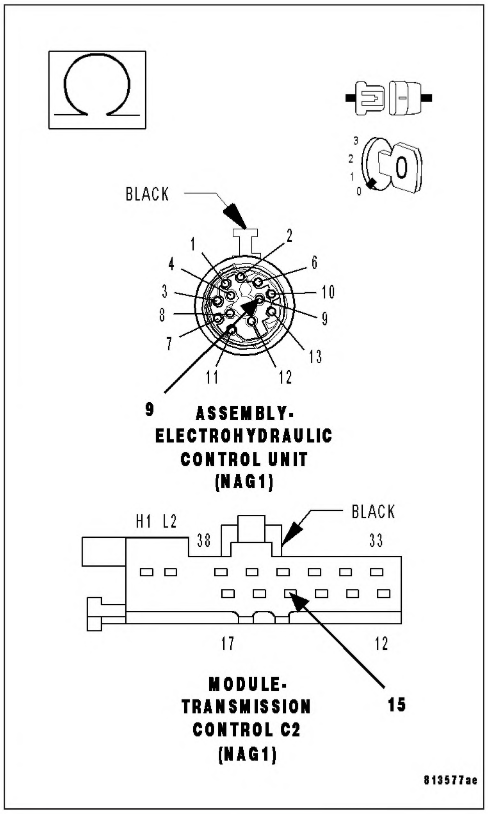
2. CHECK THE (T73) 3-4 SOLENOID CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T73) 3-4 Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


BLACK
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6
3
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8
9
7
13
11
12
9
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
15
813577ae

Is the resistance below 5.0 ohms?

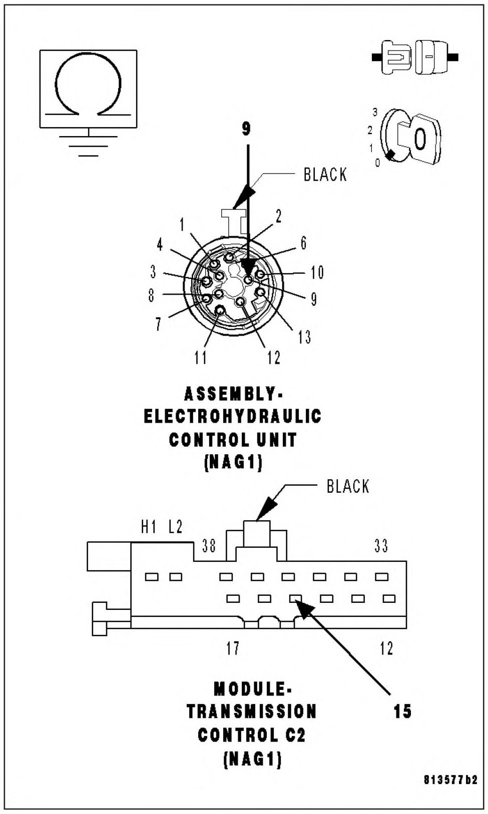
Yes >> Go To 3

No >> Repair the (T73) 3-4 Solenoid Control circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

3. CHECK THE (T73) 3-4 SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T73) 3-4 Solenoid Control circuit.


9
BLACK
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2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
15
813577b2

Is the resistance below 5.0 ohms?

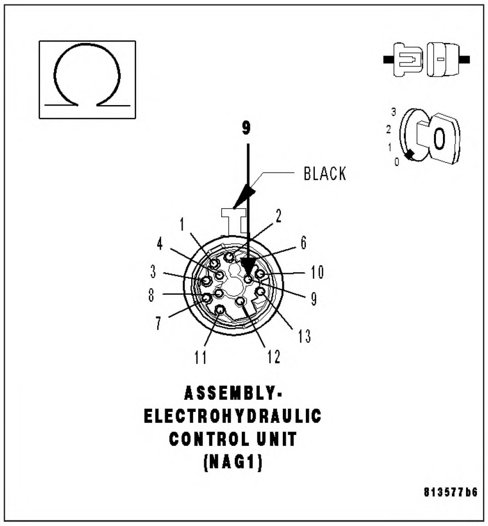
Yes >> Repair the (T73) 3-4 Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0762-3-4 SOLENOID (CONTINUED)

4. CHECK THE (T73) 3-4 SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T73) 3-4 Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T73) 3-4 Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T73) 3-4 Solenoid Control circuit for another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

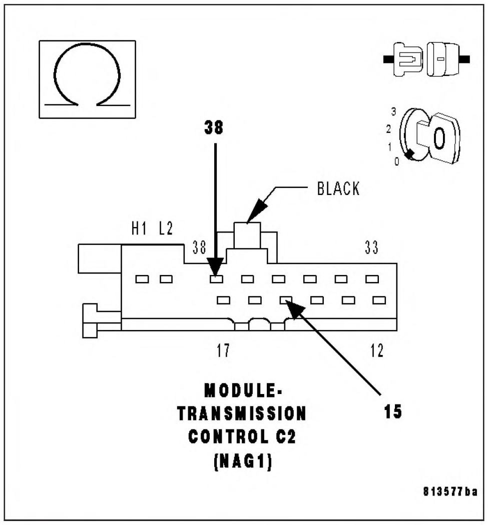
No >> Go To 5

---

5. CHECK THE 3-4 SOLENOID

Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the 3-4 Solenoid between the (T73) 3-4 Solenoid Control circuit and the (T78) Solenoid Voltage Supply circuit in the TCM C2 harness connector.



Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the 3-4 Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

P0762-3-4 SOLENOID (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

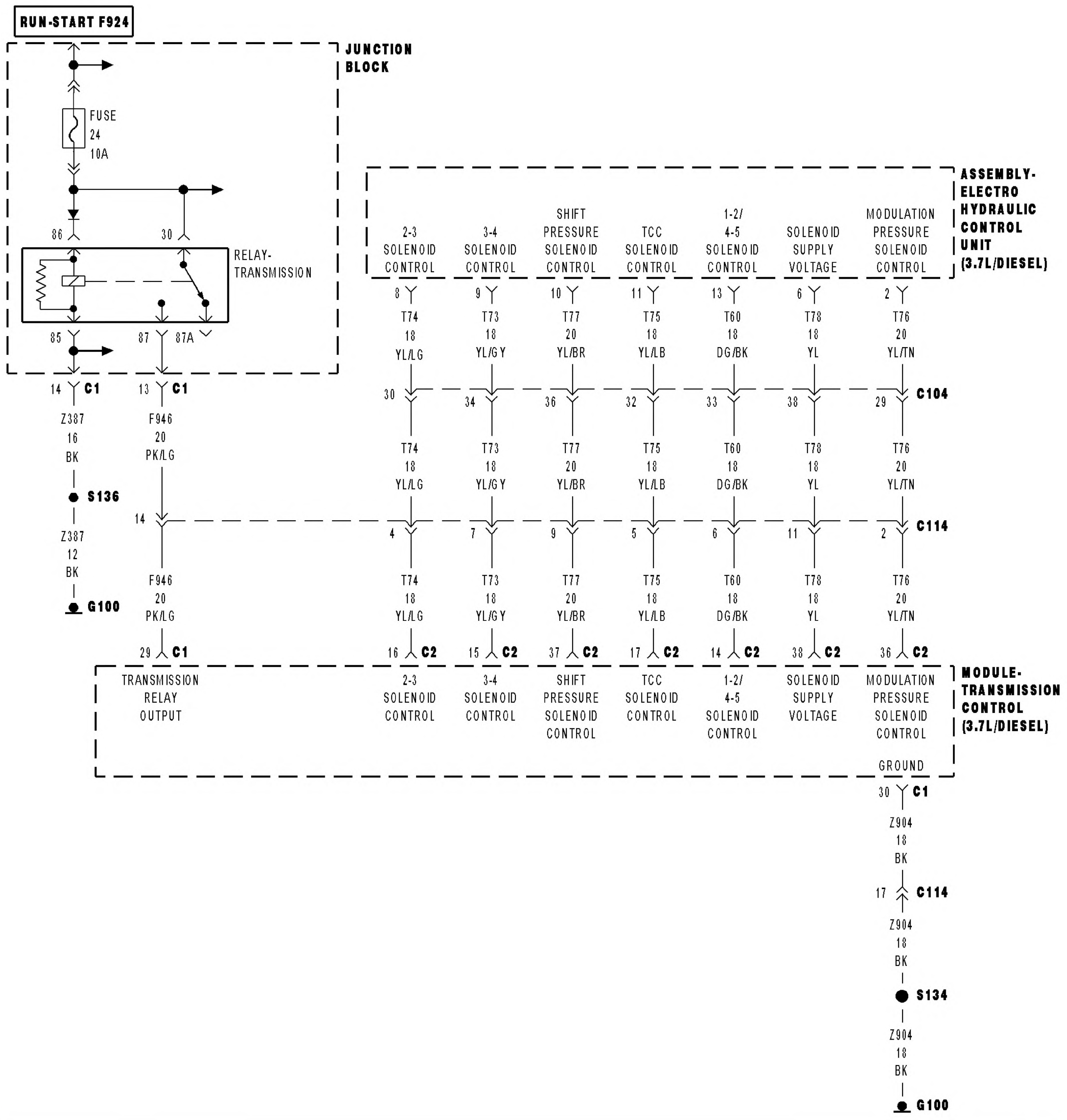
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0763-3-4 SOLENOID CIRCUIT


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387
16
BK
S136
Z387
12
BK
G100
F946
20
PK/LG
14
F946
20
PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8
9
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6
2
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
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C104
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
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11
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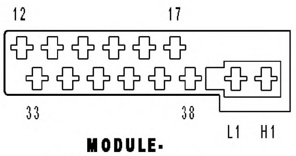
C114
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
GROUND
30 C1
Z904
18
BK
17 C114
Z904
18
BK
S134
Z904
18
BK
G100


12
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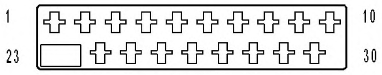
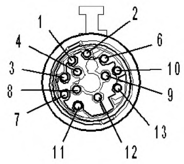
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)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ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)

81498d24

P0763-3-4 SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The 3-4 Solenoid is activated when the Transmission Control Module (TCM) determines that the transmission must shift into or out of 4th gear. The solenoid is only activated during the shifting of the transmission. When the solenoid is activated, hydraulic pressure is applied to the proper shift elements in the transmission to allow the desired shift. Once the shift is completed the solenoid is turned off.

- **When Monitored:**
  When both the 3-4 Solenoid and the Solenoid Supply voltage is active.
- **Set Condition:**
  When 3-4 Solenoid is turned on and the TCM detects any of the following in the 3-4 Solenoid or circuit: open, short to ground, short to voltage, or the solenoid driver in the TCM.

Possible Causes
(T73) 3-4 SOLENOID CONTROL CIRCUIT OPEN
(T73) 3-4 SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T73) 3-4 SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
3-4 SOLENOID
TRANSMISSSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC’s.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC’s.

Did the DTC P0763 reset?

Yes >> Go To 2

No >> Go To 6

P0763-3-4 SOLENOID CIRCUIT (CONTINUED)

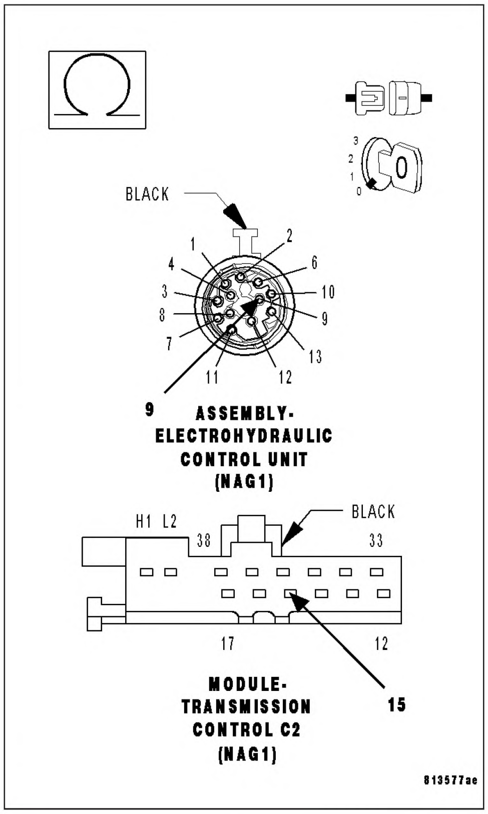
2. CHECK THE (T73) 3-4 SOLENOID CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T73) 3-4 Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


BLACK
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13
11
12
9
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
15
813577ae

Is the resistance below 5.0 ohms?

Yes >> Go To 3

No >> Repair the (T73) 3-4 Solenoid Control circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

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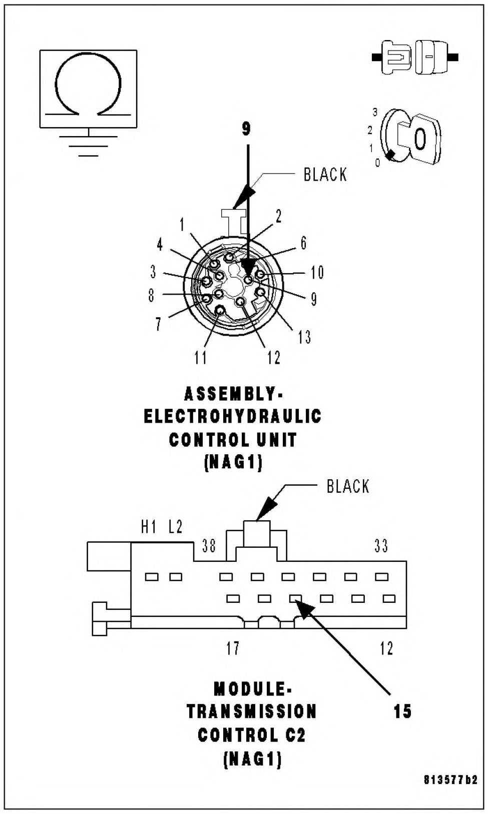
3. CHECK THE (T73) 3-4 SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T73) 3-4 Solenoid Control circuit.


9
BLACK
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7
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11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
15
813577b2

Is the resistance below 5.0 ohms?

Yes >> Repair the (T73) 3-4 Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0763-3-4 SOLENOID CIRCUIT (CONTINUED)

4. CHECK THE (T73) 3-4 SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

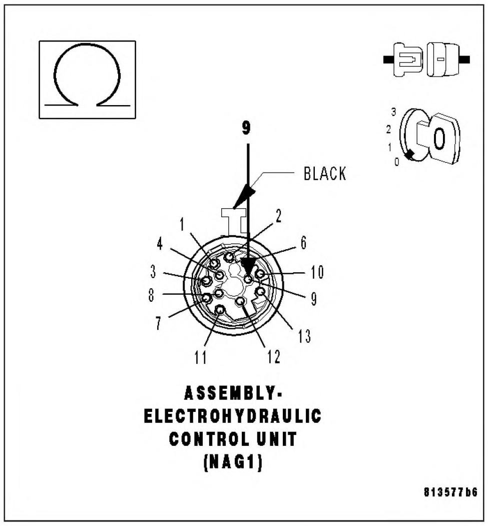
Measure the resistance between the (T73) 3-4 Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.

Is the resistance below 5.0 ohms between the (T73) 3-4 Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T73) 3-4 Solenoid Control circuit for another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5



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5. CHECK THE 3-4 SOLENOID

Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

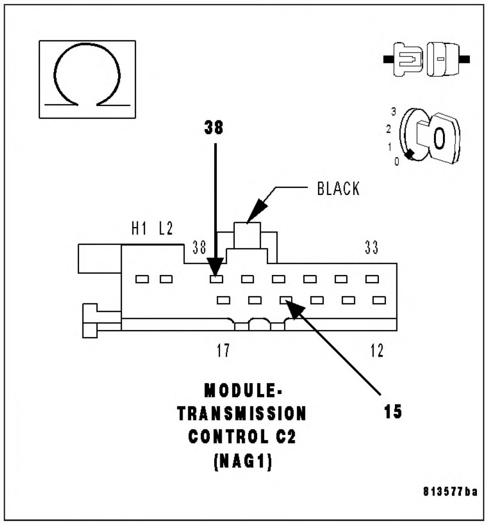
Measure the resistance of the 3-4 Solenoid between the (T73) 3-4 Solenoid Control circuit and the (T78) Solenoid Voltage Supply circuit in the TCM C2 harness connector.

Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the 3-4 Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.



P0763-3-4 SOLENOID CIRCUIT (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

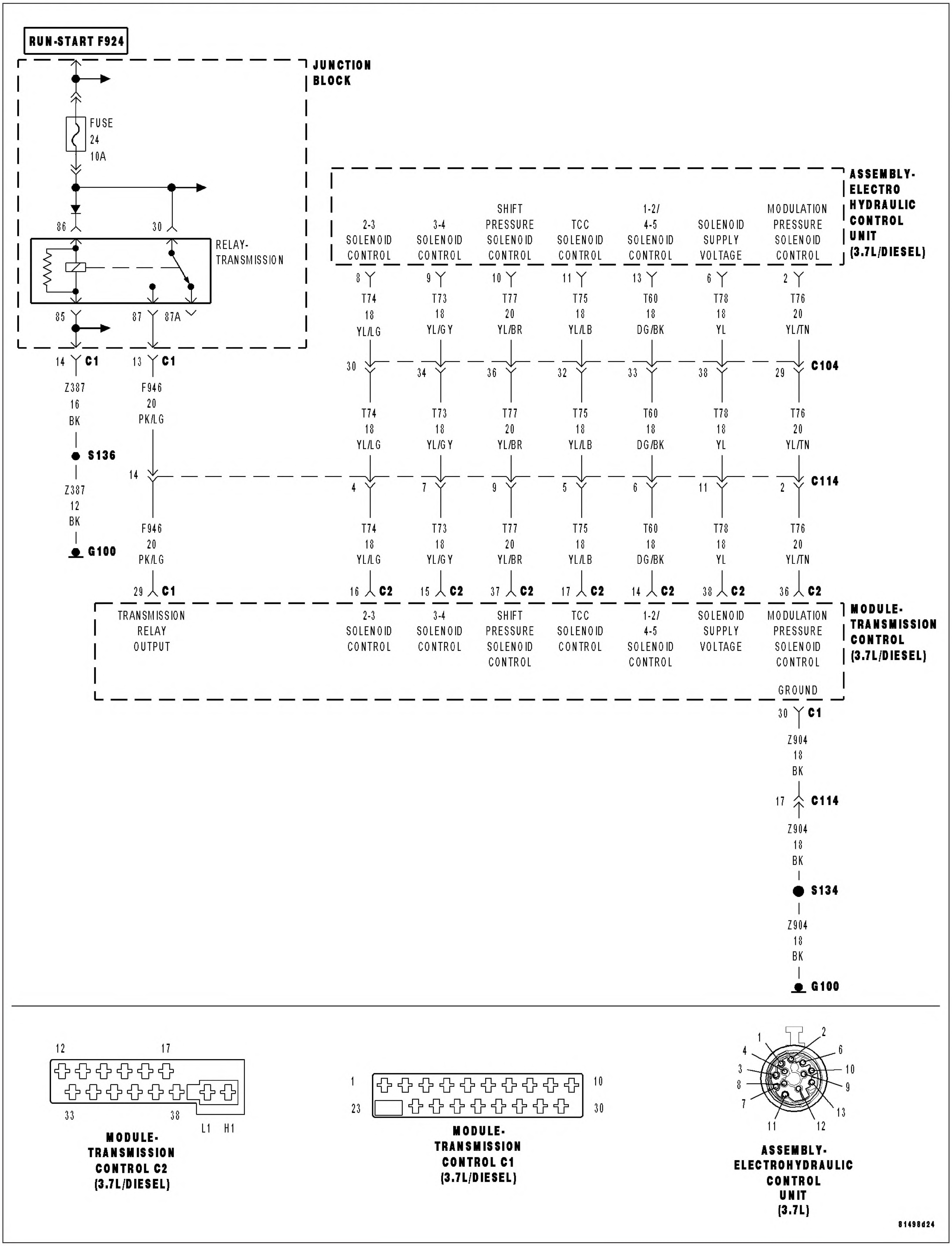
The conditions necessary to set this DTC are not present at this time.
Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.
Wiggle the wiring and connectors while checking for any possible open or shorted circuits.
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P0778-SHIFT PRESSURE SOLENOID CIRCUIT


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/LG
S136
Z387 12 BK
G100
14
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
8
9
10
11
13
6
2
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
30
34
36
32
33
38
29
C104
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
4
7
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6
11
2
C114
T74 18 YL/LG
T73 18 YL/GY
T77 20 YL/BR
T75 18 YL/LB
T60 18 DG/BK
T78 18 YL
T76 20 YL/TN
16 C2
15 C2
37 C2
17 C2
14 C2
38 C2
36 C2
TRANSMISSION RELAY OUTPUT
2-3 SOLENOID CONTROL
3-4 SOLENOID CONTROL
SHIFT PRESSURE SOLENOID CONTROL
TCC SOLENOID CONTROL
1-2/ 4-5 SOLENOID CONTROL
SOLENOID SUPPLY VOLTAGE
MODULATION PRESSURE SOLENOID CONTROL
GROUND
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498d24

P0778-SHIFT PRESSURE SOLENOID CIRCUIT (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Shift Pressure Solenoid is activated when the Transmission Control Module (TCM) determines that a transmission gear shift is required. The Shift Pressure Solenoid is pulse width modulated (PWM) controlled to allow the proper amount of hydraulic pressure to the shift elements. The Shift Pressure Solenoid is only activated during the shift of the transmission. When the Shift Pressure Solenoid is activated, hydraulic pressure is applied to the proper shift elements through one of the shift solenoids in the transmission to allow the desired shift. Once the shift is completed the solenoid is turned off.

- **When Monitored:**
  When the Shift Pressure Solenoid is: off, or active with 25-75% duty cycle, and the Solenoid Supply voltage is active.
- **Set Condition:**
  When Shift Pressure Solenoid is turned on and the TCM detects any of the following in the Shift Pressure Solenoid or circuit: open, short to ground, short to voltage, or the solenoid driver in the TCM.

Possible Causes
(T77) SHIFT PRESSURE SOLENOID CONTROL CIRCUIT OPEN
(T77) SHIFT PRESSURE SOLENOID CONTROL CIRCUIT SHORT TO GROUND
(T77) SHIFT PRESSURE SOLENOID CONTROL CIRCUIT SHORT TO ANOTHER CIRCUIT
SHIFT PRESSURE SOLENOID
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Turn the ignition off to the lock position.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC P0778 reset?

Yes >> Go To 2

No >> Go To 6

P0778-SHIFT PRESSURE SOLENOID CIRCUIT (CONTINUED)

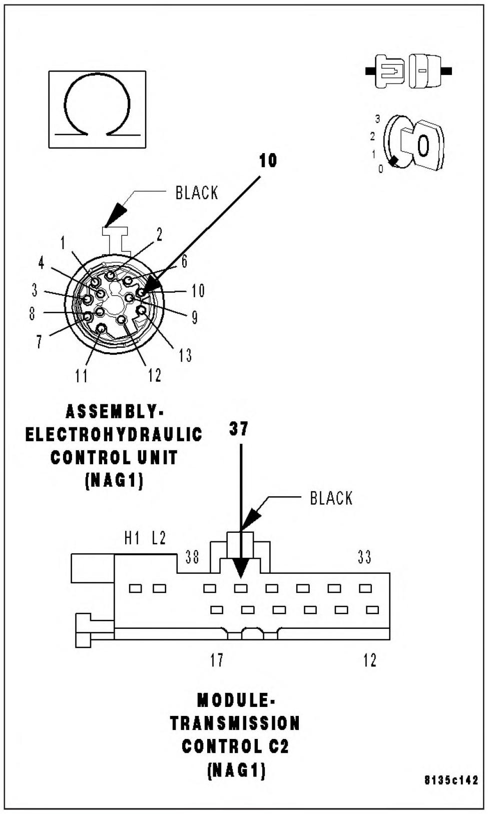
2. CHECK THE (T77) SHIFT PRESSURE SOLENOID CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the (T77) Shift Pressure Solenoid Control circuit between the TCM C2 harness connector and the Transmission Electrohydraulic Control Unit Assembly harness connector.


10
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (NAG1)
37
BLACK
H1 L2
38
33
17
12
MODULE-TRANSMISSION CONTROL C2 (NAG1)
8135c142

Is the resistance below 5.0 ohms?

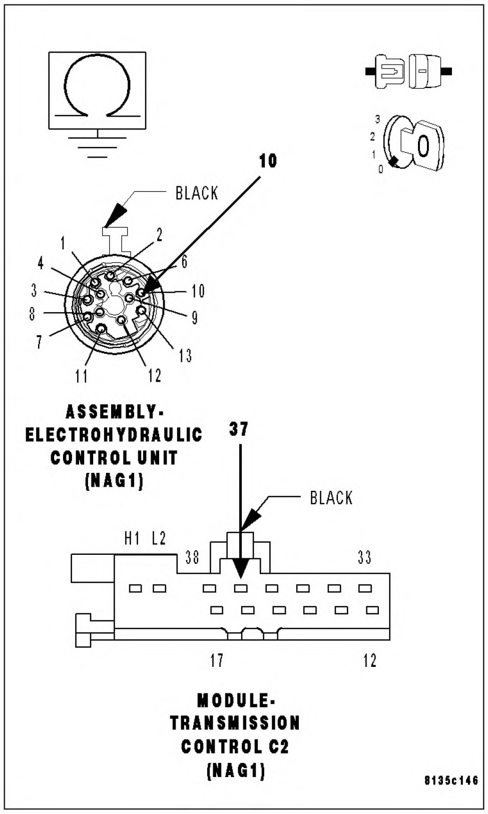
Yes >> Go To 3

No >> Repair the (T77) Shift Pressure Solenoid Control circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

3. CHECK THE (T77) SHIFT PRESSURE SOLENOID CONTROL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T77) Shift Pressure Solenoid Control circuit.


10
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (NAG1)
37
BLACK
H1 L2
38
33
17
12
MODULE-TRANSMISSION CONTROL C2 (NAG1)
8135c146

Is the resistance below 5.0 ohms?

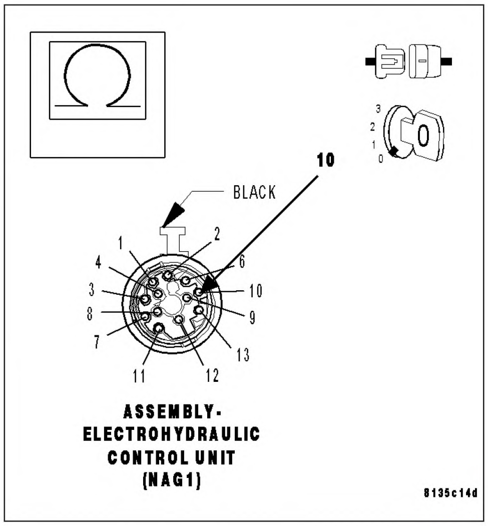
Yes >> Repair the (T77) Shift Pressure Solenoid Control circuit for a short to ground.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P0778-SHIFT PRESSURE SOLENOID CIRCUIT (CONTINUED)

4. CHECK THE (T77) SHIFT PRESSURE SOLENOID CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Measure the resistance between the (T77) Shift Pressure Solenoid Control circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T77) Shift Pressure Solenoid Control circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T77) Shift Pressure Solenoid Control circuit for another circuit.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

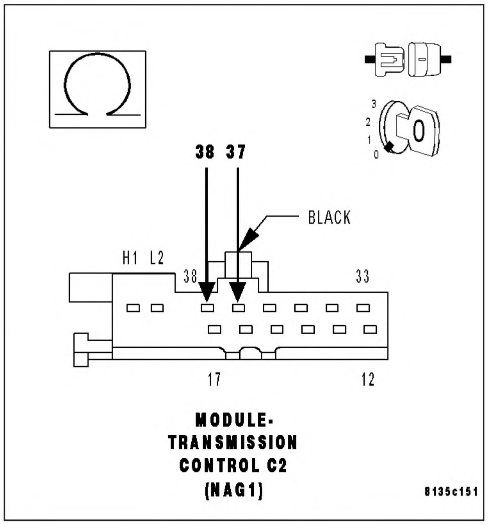
No >> Go To 5

---

5. CHECK THE SHIFT PRESSURE SOLENOID

Reconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance of the Shift Pressure Solenoid between the (T77) Shift Pressure Solenoid Control circuit and the (T78) Solenoid Voltage Supply circuit in the TCM C2 harness connector.



Is the resistance between 2.5 and 6.5 ohms?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Shift Pressure Solenoid per the Service Information. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

P0778-SHIFT PRESSURE SOLENOID CIRCUIT (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

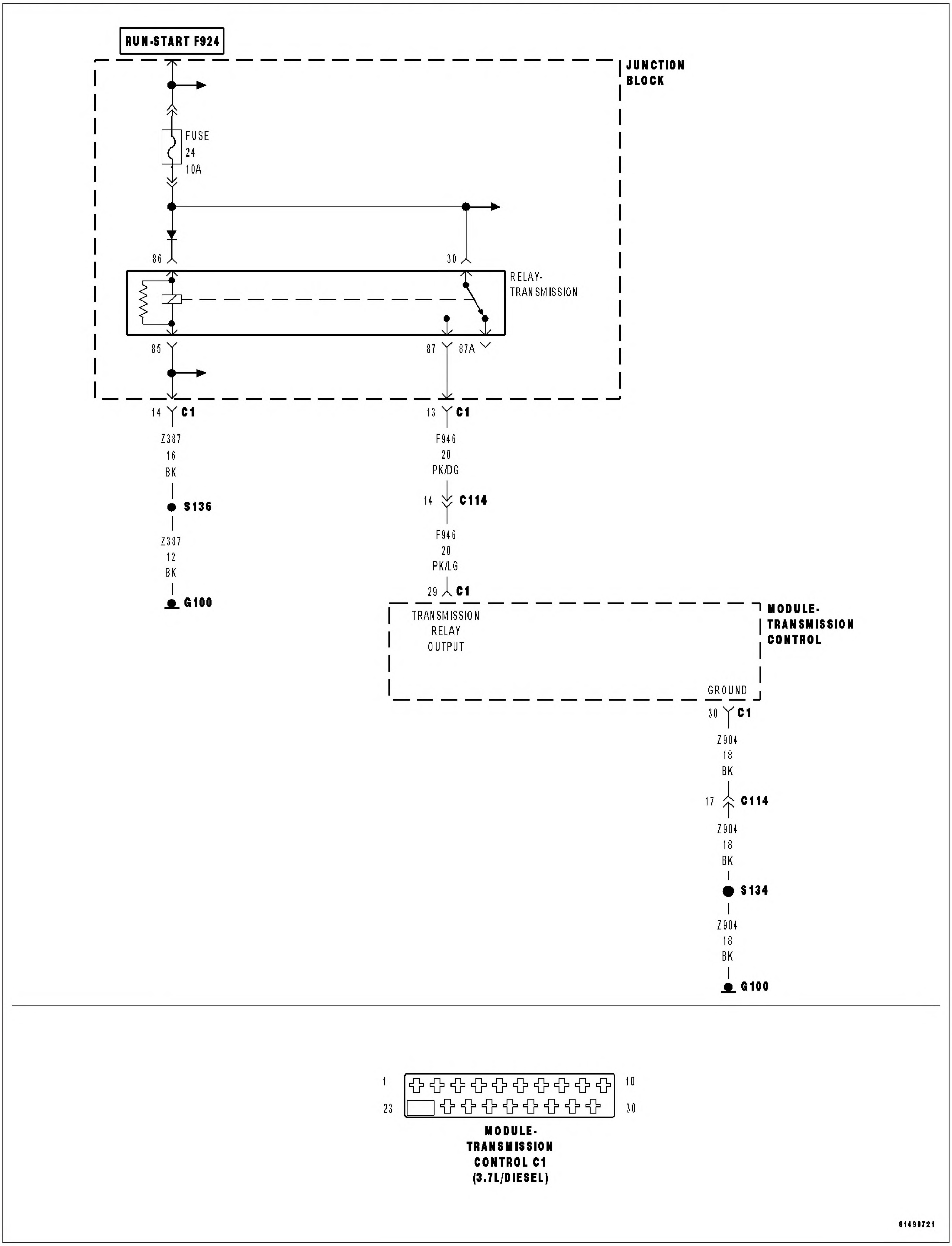
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P1629-TCM INTERNAL - SOLENOID SUPPLY/ WATCHDOG


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/DG
14 C114
F946 20 PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P1629-TCM INTERNAL - SOLENOID SUPPLY/ WATCHDOG (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. During the power up of the controller, the TCM tests the ability of the TCM to shut down the Solenoid Supply Voltage circuit. The controller monitors the A/D feedback on the Solenoid Supply driver output to ensure that battery voltage is no longer present. Note: A short to voltage on the Solenoid Supply Voltage circuit or any one of the solenoids may set this DTC.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects voltage on the Solenoid Supply Voltage circuit when the TCM request the circuit to be off.

Possible Causes
(T78) SOLENOID SUPPY VOLTAGE CIRCUIT SHORT TO VOLTAGE
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

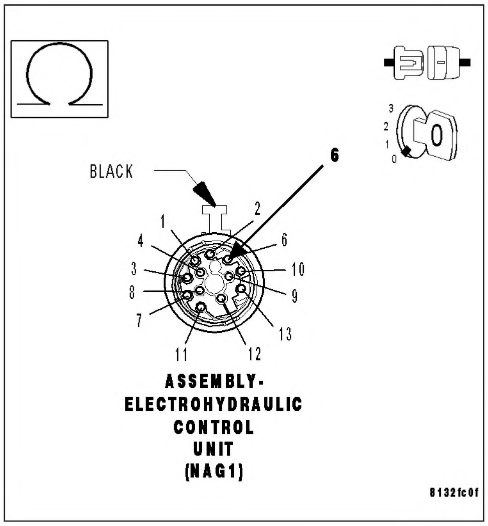
1. CHECK THE (T78) SOLENOID SUPPLY VOLTAGE CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

Turn the ignition off to the lock position.

Disconnect the TCM C1 and C2 harness connectors.

Disconnect the Transmission Electrohydraulic Control Unit Assembly harness connector.

Measure the resistance between the (T78) Solenoid Supply Voltage circuit and every other circuit in the Transmission Electrohydraulic Control Unit Assembly harness connector.



Is the resistance below 5.0 ohms between the (T78) Solenoid Supply Voltage circuit and any other circuit(s) in the Transmission Electrohydraulic Control Unit Assembly harness connector?

Yes >> Repair the (T78) Solenoid Supply Voltage circuit for short to another circuit.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

P1629-TCM INTERNAL - SOLENOID SUPPLY/ WATCHDOG (CONTINUED)

2. TRANSMISSION CONTROL MODULE

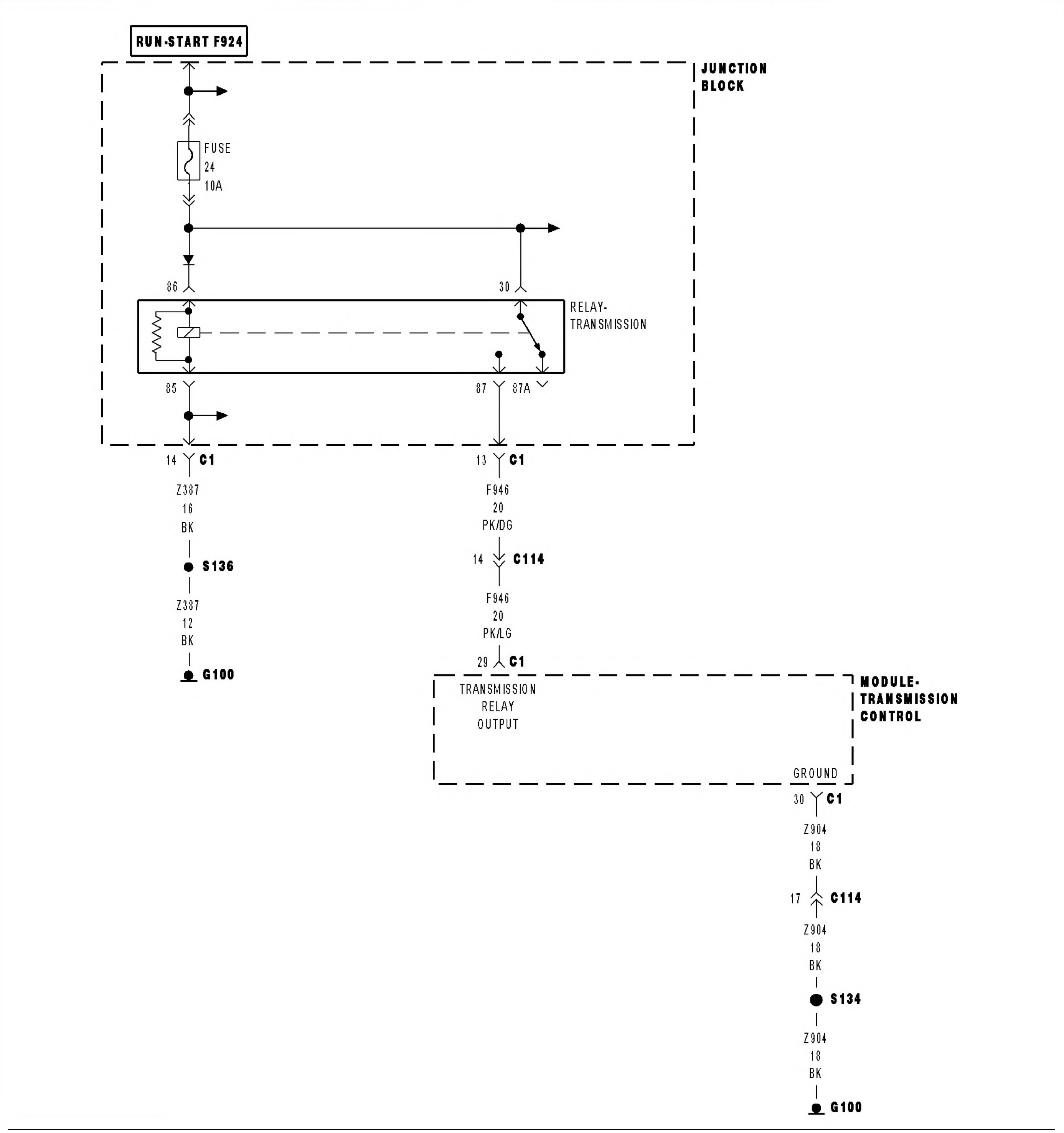
View repair

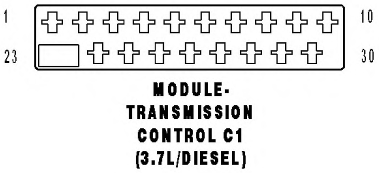
Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1631-TCM INTERNAL- PROCESSOR CLOCK PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387
16
BK
S136
Z387
12
BK
G100
F946
20
PK/DG
14 C114
F946
20
PK/LG
29 C1
MODULE-TRANSMISSION CONTROL
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904
18
BK
17 C114
Z904
18
BK
S134
Z904
18
BK
G100


1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P1631-TCM INTERNAL- PROCESSOR CLOCK PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that there is an issue with the TCM's internal clock. If the TCM detects an error with the controllers internal clock, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an error with the controllers internal clock.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

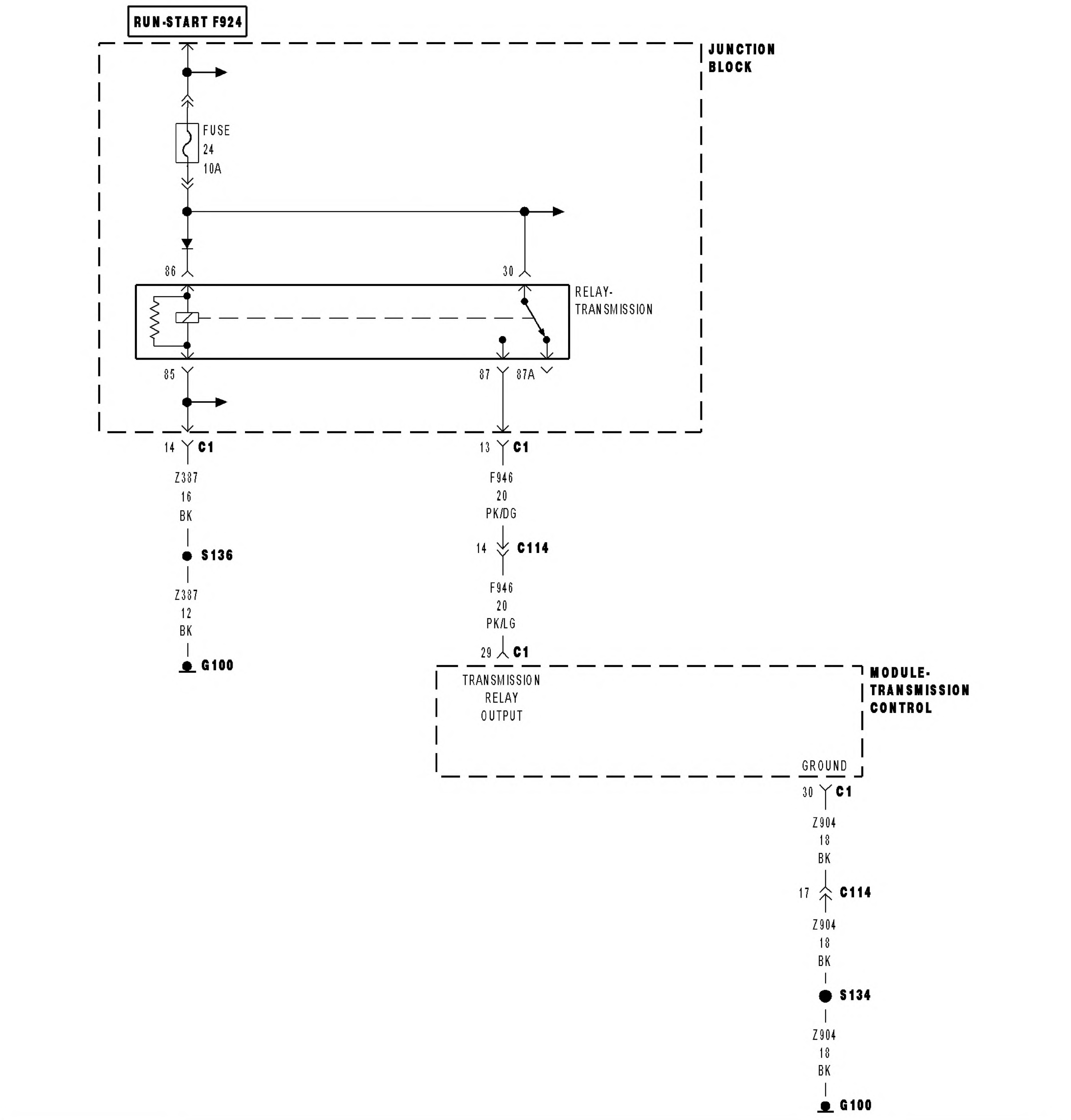
View repair

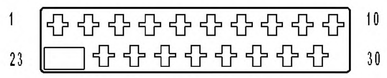
Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1632-TCM INTERNAL - TEST INTERNAL WATCHDOG PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/DG
S136
14 C114
Z387 12 BK
F946 20 PK/LG
G100
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P1632-TCM INTERNAL - TEST INTERNAL WATCHDOG PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that there is an issue with the TCM's internal watchdog failed. If the TCM detects an error with the controllers internal watchdog, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an error with the controllers internal watchdog.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

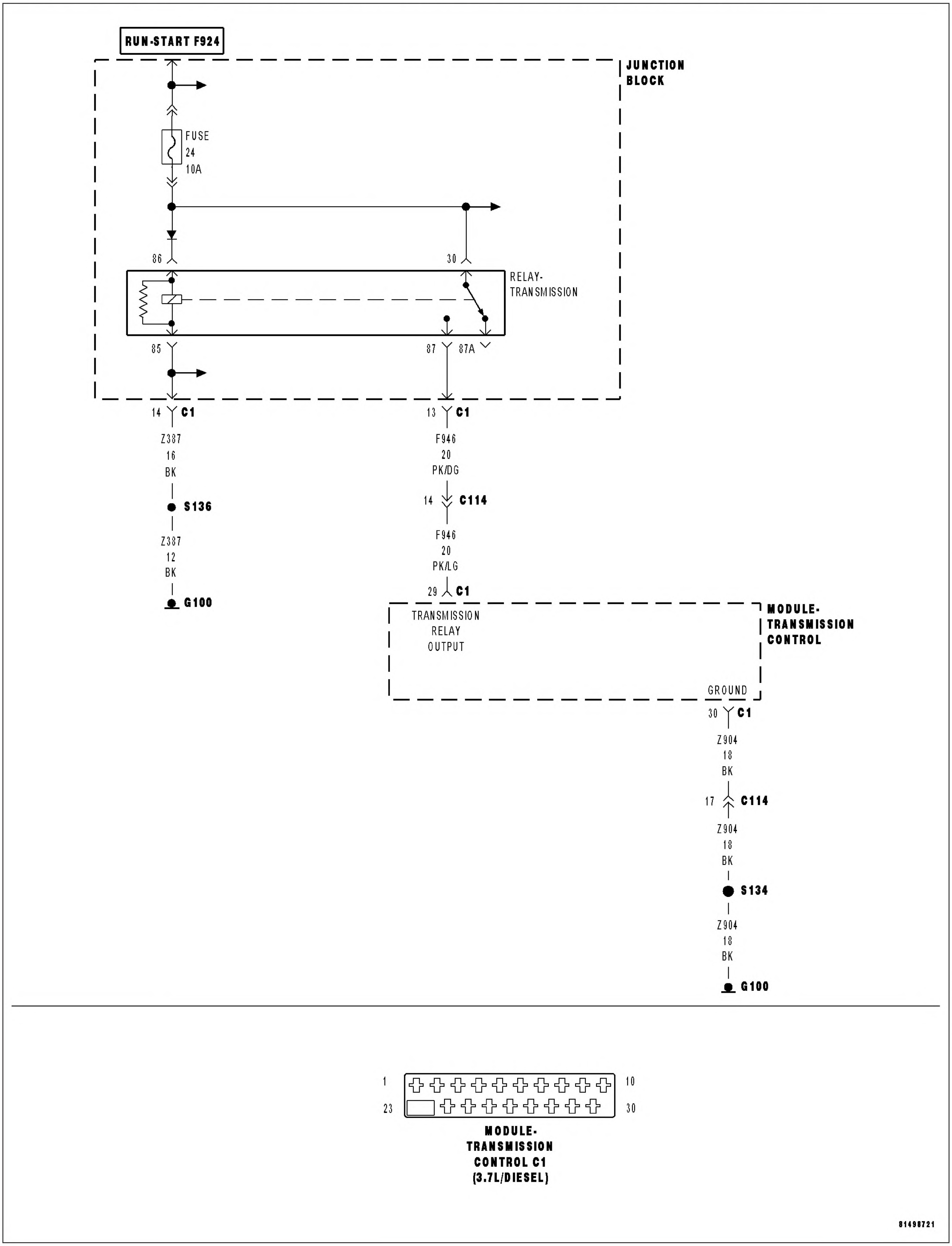
View repair

Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1633-TCM INTERNAL - TEST EXTERNAL WATCHDOG PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/DG
S136
14 C114
Z387 12 BK
F946 20 PK/LG
G100
29 C1
MODULE-TRANSMISSION CONTROL
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P1633-TCM INTERNAL - TEST EXTERNAL WATCHDOG PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that there is an issue with the TCM's external watchdog. If the TCM detects an error with the controllers external watchdog failed the power up test, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an error with the controllers external watchdog failed the power up test.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

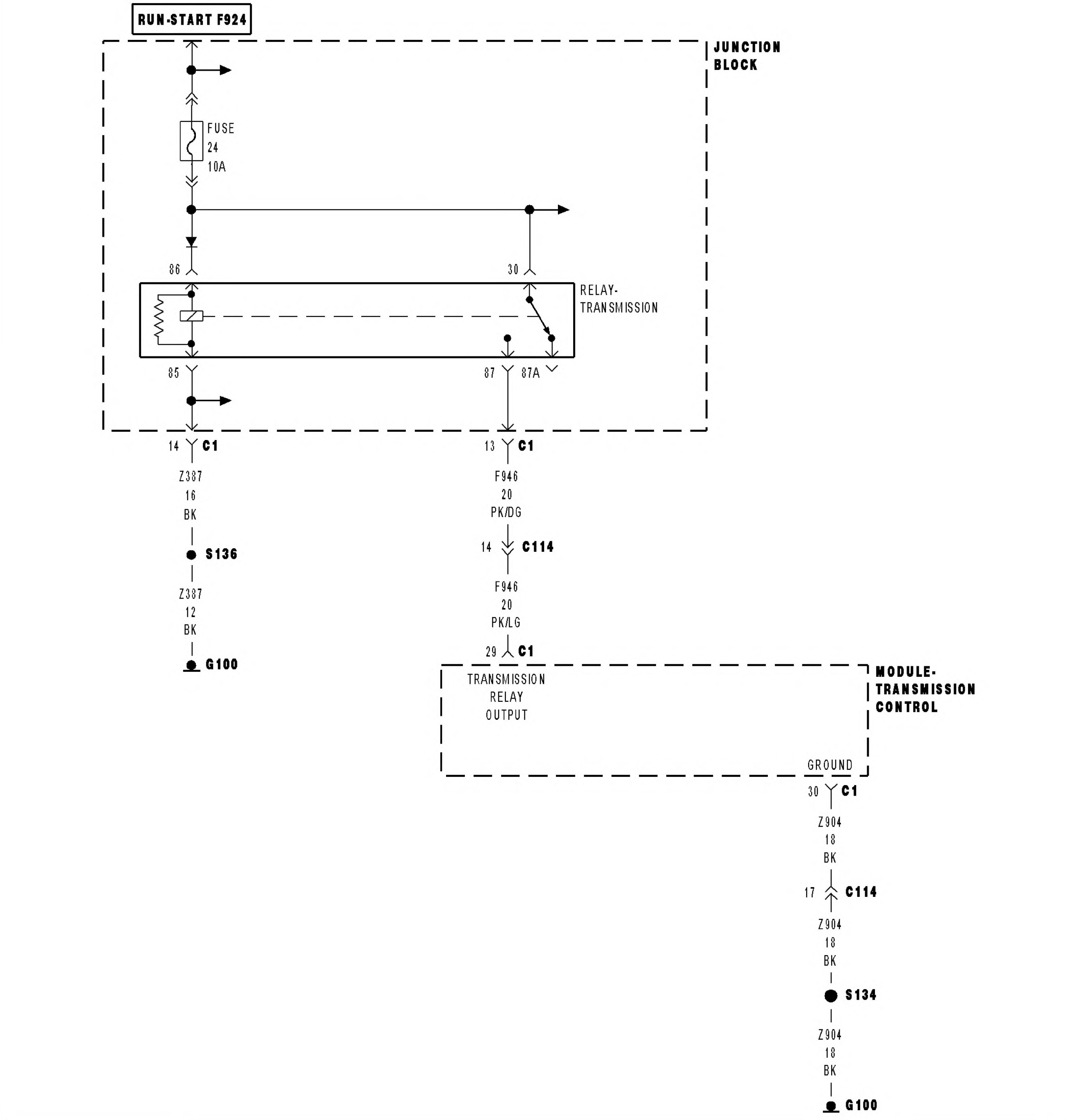
View repair

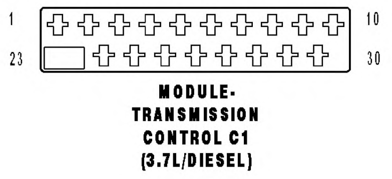
Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1634-TCM INTERNAL- INTERNAL WATCHDOG PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/DG
14 C114
F946 20 PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100


1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P1634-TCM INTERNAL- INTERNAL WATCHDOG PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that the controller's microprocessor internal watchdog has detected an error. If the TCM microprocessor detects an internal watchdog error, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM microprocessor internal watchdog detects an error.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

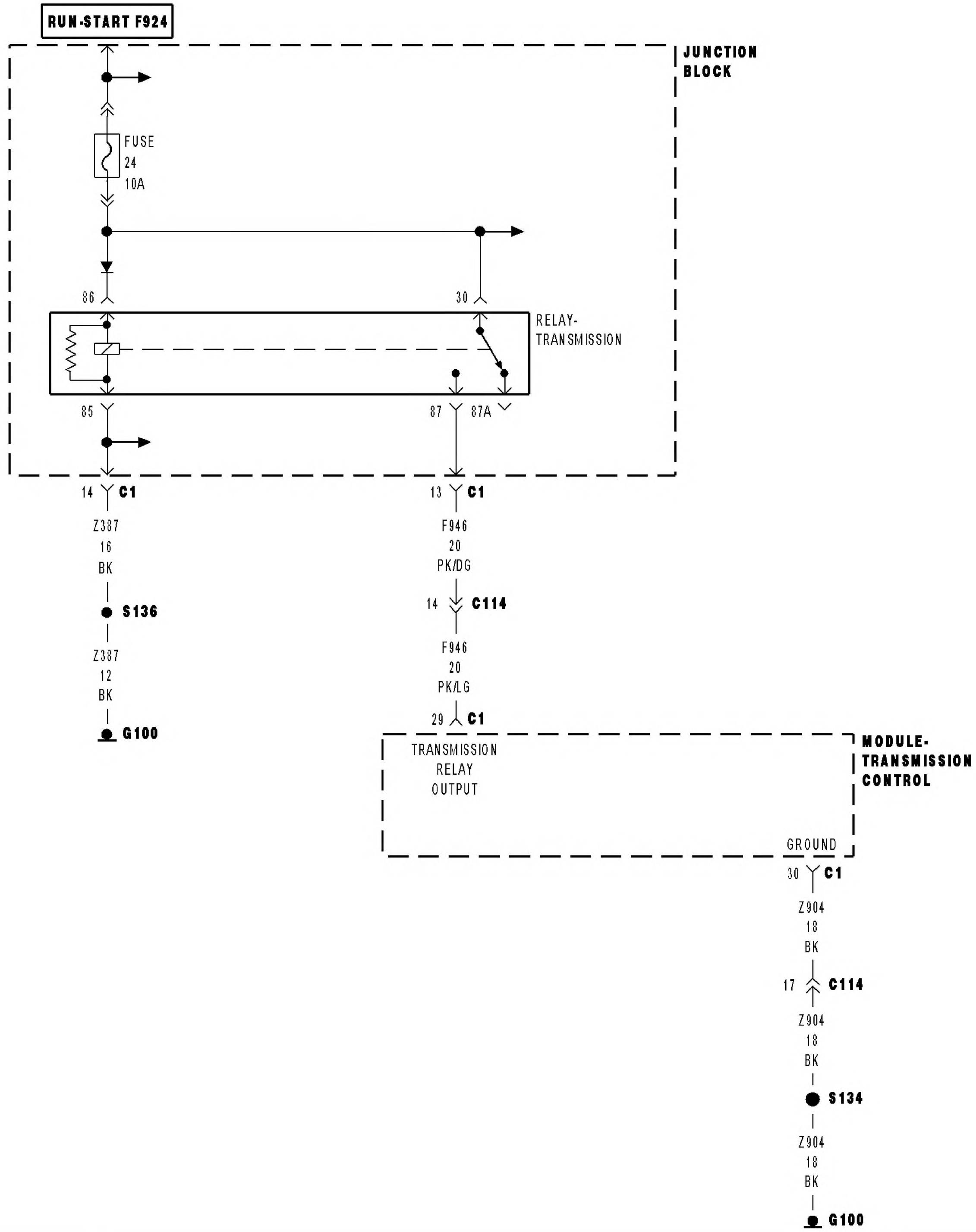
View repair

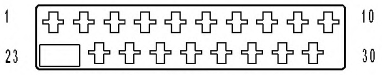
Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1636-TCM INTERNAL- EXTERNAL WATCHDOG PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387
16
BK
S136
Z387
12
BK
G100
13 C1
F946
20
PK/DG
14 C114
F946
20
PK/LG
29 C1
MODULE-TRANSMISSION CONTROL
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904
18
BK
17 C114
Z904
18
BK
S134
Z904
18
BK
G100



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P1636-TCM INTERNAL- EXTERNAL WATCHDOG PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that watch dog circuitry external to the microprocessor has detected an error. If the TCM watch dog circuitry external to the microprocessor detects an error, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM watch dog circuitry external to the microprocessor detects an error.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

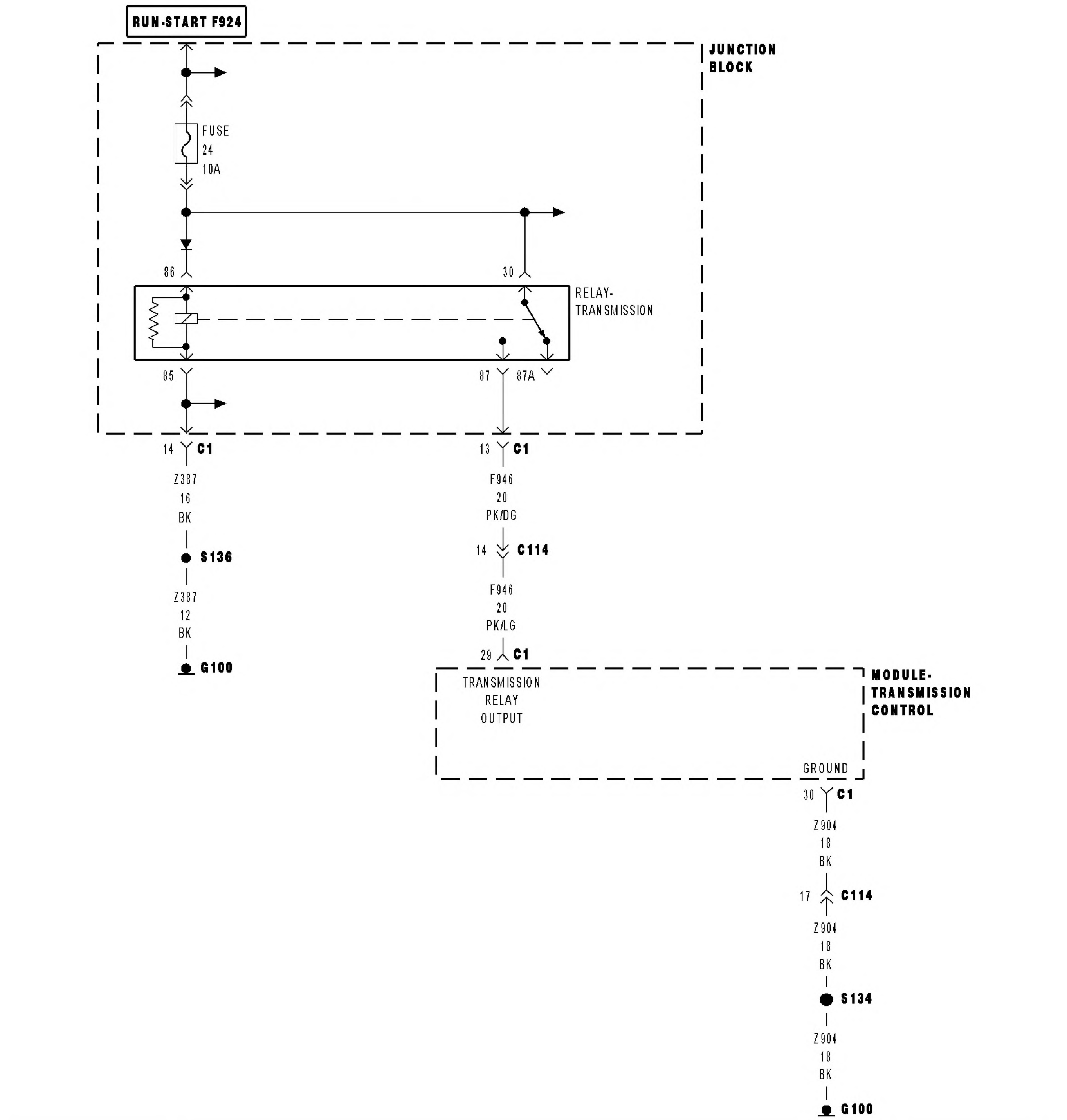
View repair

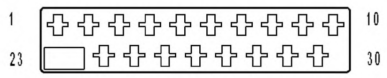
Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1637-TCM INTERNAL-EEPROM PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/DG
S136
14 C114
Z387 12 BK
F946 20 PK/LG
G100
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P1637-TCM INTERNAL-EEPROM PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that there is an internal error with the controllers Random Access Memory. If detected, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM indicates that there is an internal error with the controllers Random Access Memory.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

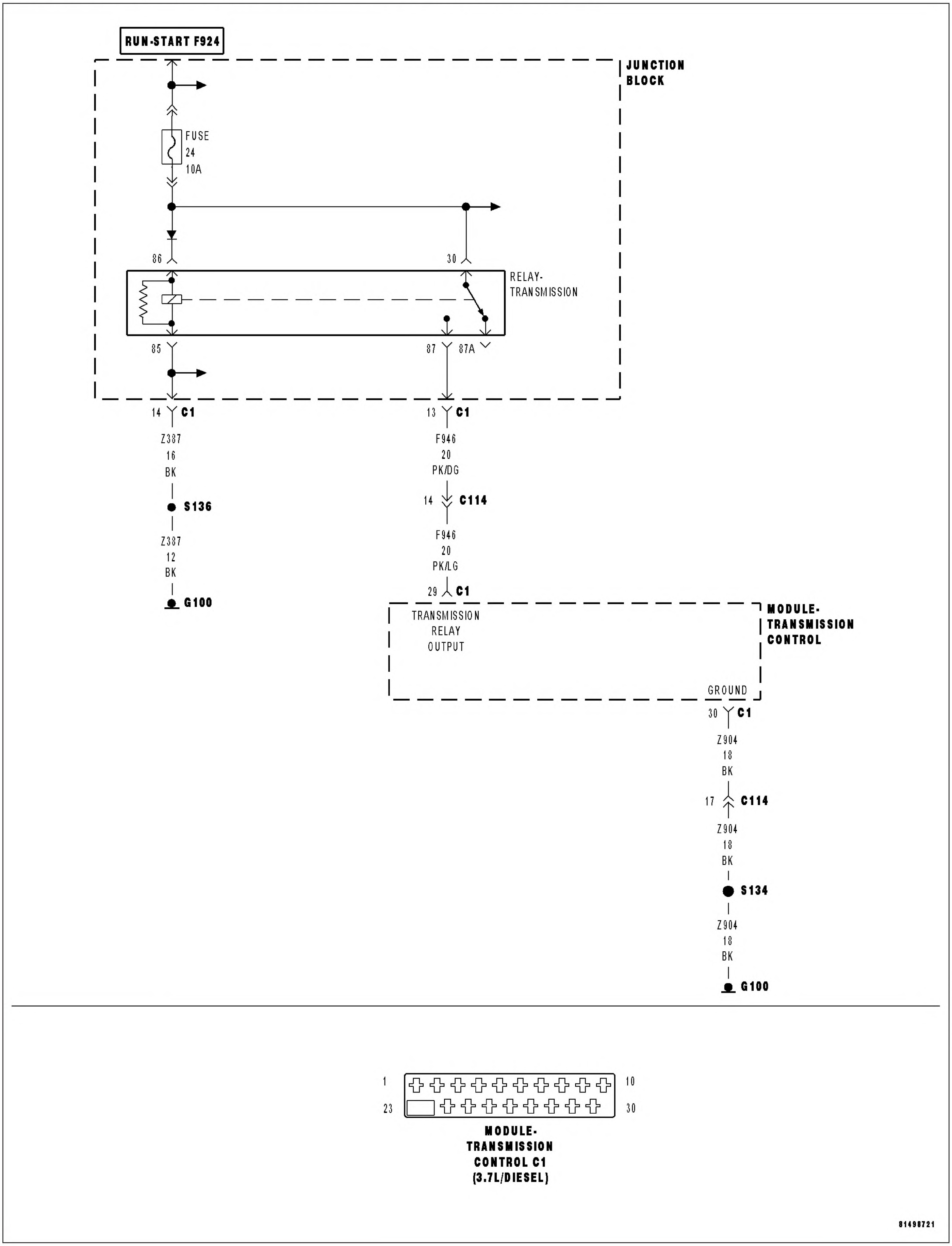
View repair

Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1638-TCM INTERNAL-CAN 1 RAM PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
F946 20 PK/DG
S136
14 C114
Z387 12 BK
F946 20 PK/LG
G100
29 C1
MODULE-TRANSMISSION CONTROL
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P1638-TCM INTERNAL-CAN 1 RAM PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that there is an internal error with the controllers Random Access Memory (RAM) on the CAN controller 1 section of the microprocessor. If detected, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an internal error with the controllers Random Access Memory (RAM) on the CAN controller 1 section of the microprocessor.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

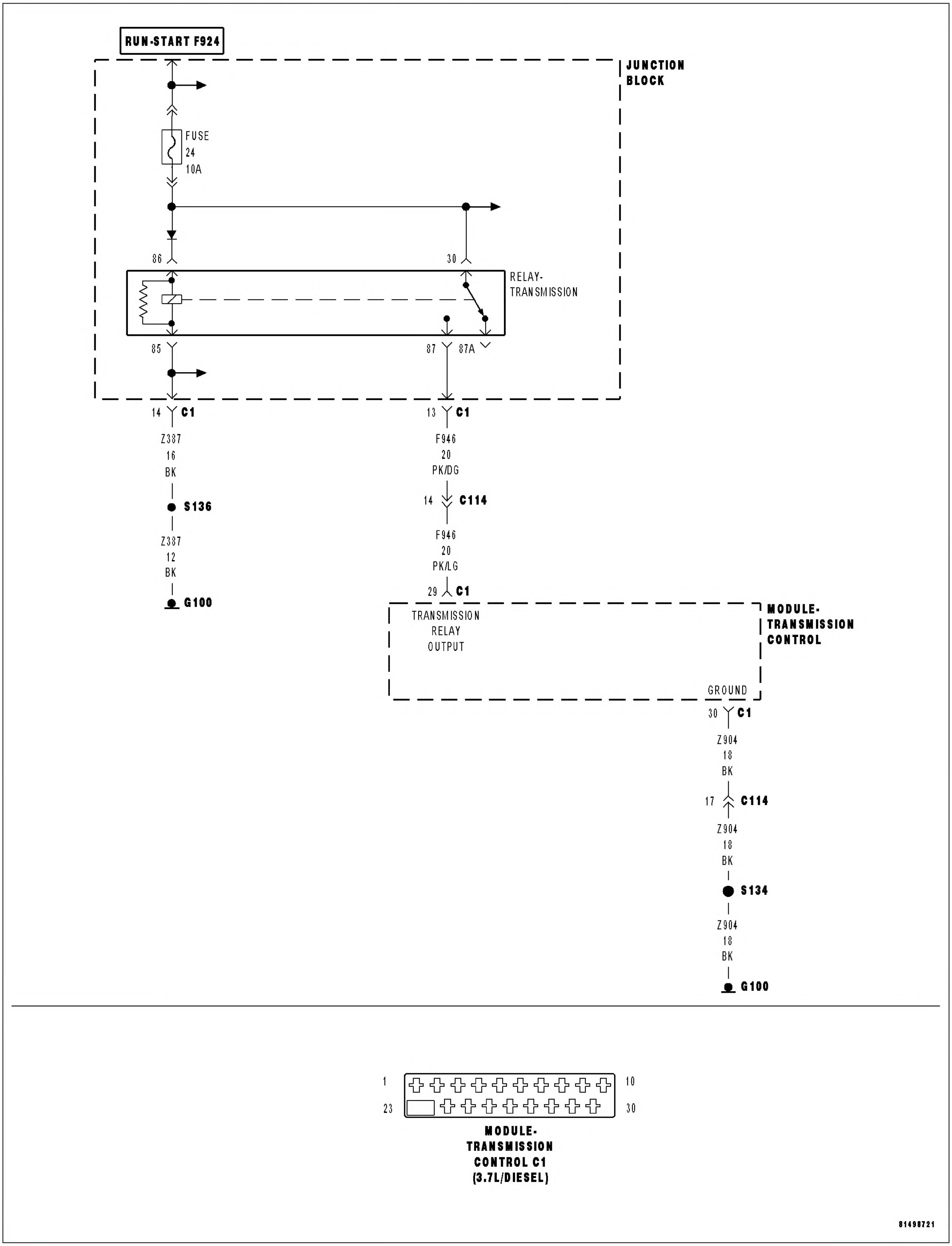
View repair

Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1639-TCM INTERNAL-CAN 2 RAM PERFORMANCE


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/DG
14 C114
F946 20 PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P1639-TCM INTERNAL-CAN 2 RAM PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. This DTC indicates that there is an internal error with the controllers Random Access Memory (RAM) on the CAN controller 2 section of the microprocessor. If detected, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects an internal error with the controllers Random Access Memory (RAM) on the CAN controller 2 section of the microprocessor.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. TRANSMISSION CONTROL MODULE

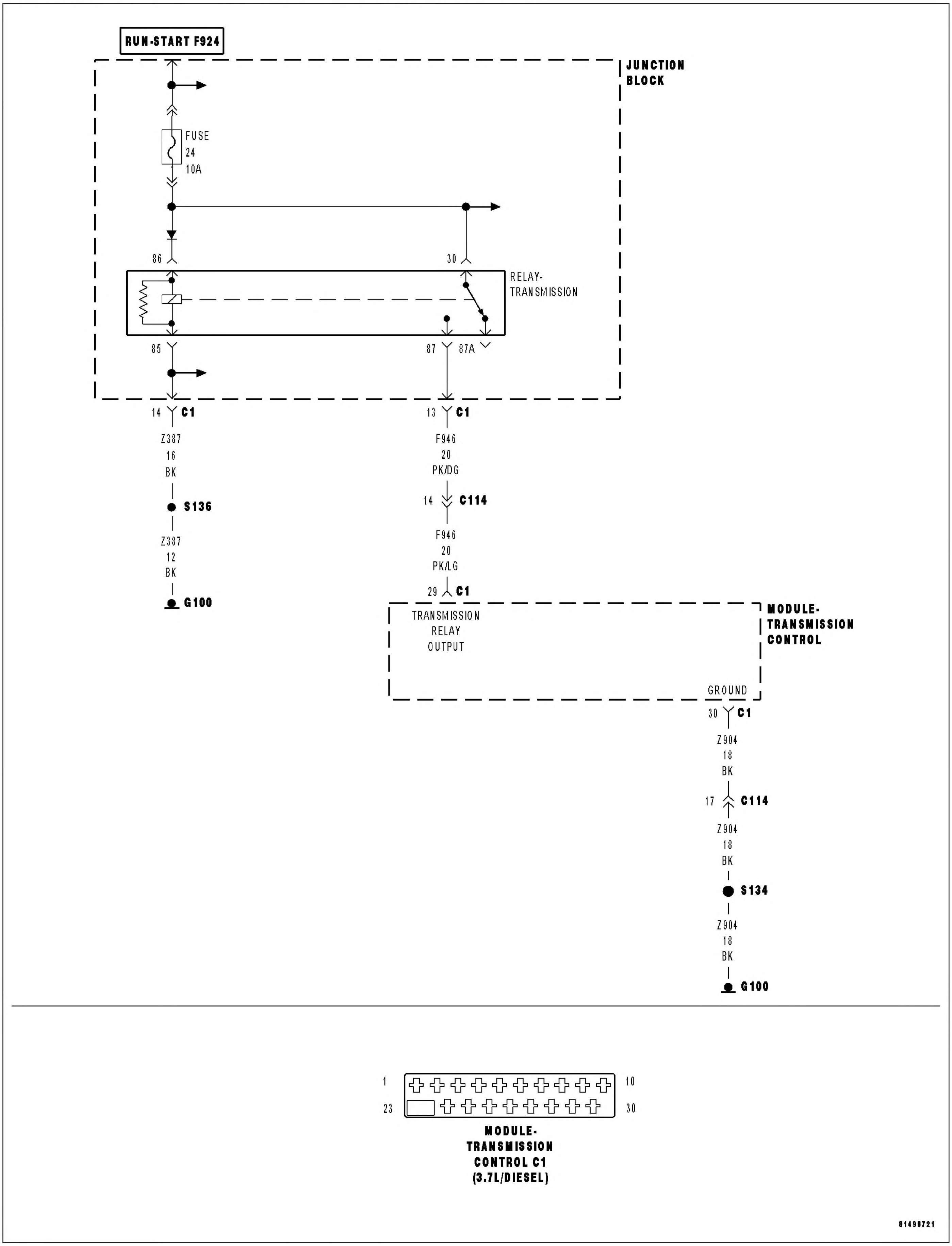
View repair

Repair

Using the schematics as a guide, check the Transmission Control Module (TCM) terminals for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1644-INCORRECT VARIANT/CONFIGURATION


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387
16
BK
S136
Z387
12
BK
G100
F946
20
PK/DG
14 C114
F946
20
PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904
18
BK
17 C114
Z904
18
BK
S134
Z904
18
BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P1644-INCORRECT VARIANT/CONFIGURATION (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) performs various internal tests to verify proper controller operation. If the TCM detects that the variables that dictate the vehicle application are not present, the controller will enter Limp-in mode and illuminate the MIL.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  If the TCM detects that the variables that dictate the vehicle application are not present.

Possible Causes
CONTROLLER NOT CODED
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF TCM IS FLASHABLE

NOTE: Controller is programmed with generic software and will not allow the correct vehicle Powertrain management.

With the scan tool, record the vehicles controller part number.

Select Use Controller Part Number under the Flash Tab.

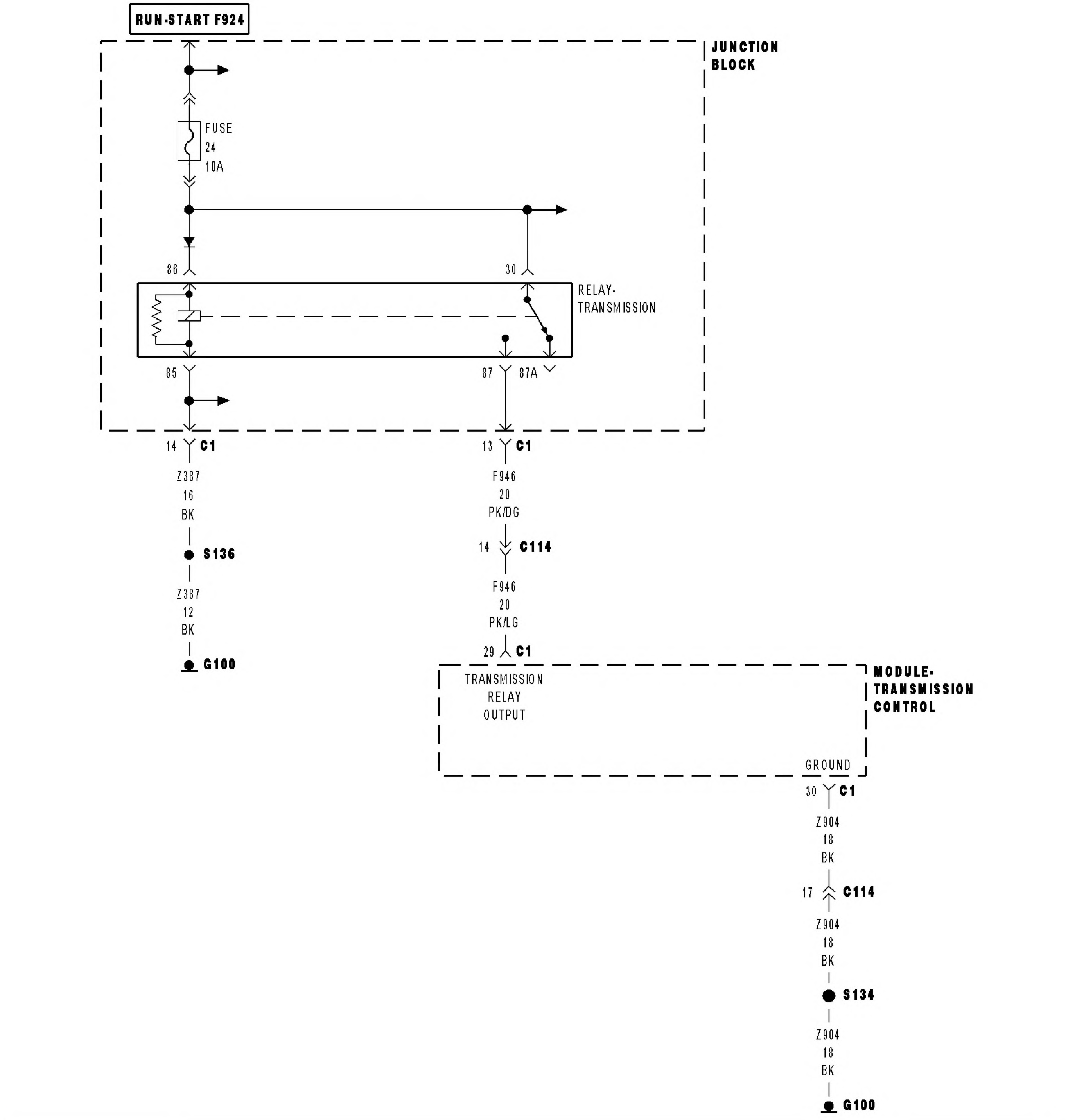
Flash the controller with the correct software.

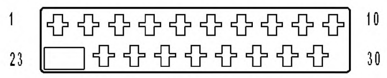
Were you able to update (flash) the controller successfully?

Yes >> Test Complete.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedures.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P1704-INPUT SPEED SENSOR 1 OVERSPEED


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
Z387 16 BK
S136
Z387 12 BK
G100
13 C1
F946 20 PK/DG
14 C114
F946 20 PK/LG
29 C1
MODULE-TRANSMISSION CONTROL
TRANSMISSION RELAY OUTPUT
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100



MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)

81498721

P1704-INPUT SPEED SENSOR 1 OVERSPEED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The NAG1 transmission has two input speed sensors 1 and 2 (N2 and N3), both speed sensors are located on the valve body. The speed sensors are hall effect speed sensors that are used by the Transmission Control Module (TCM) to calculate the transmissions input speed. Since the input speed could not be measured directly, two of the drive elements are measured. Two input speed sensors were required because both drive elements are not active in all gears.

The input speed sensors 1 and 2 will report the same input speed in gears 2nd, 3rd or 4th. If the 1 and 2 input speed sensor signals are not the same in these gears, the TCM will set the DTC P2784-Input Speed Sensor 1/2 Correlation. The input speed sensor 2 is not reported in 1st and 5th gears. The input speed sensor 1 (N2) is not reported in Reverse. The P01704-Input Speed Sensor 1 Overspeed and P01705-Input Speed Sensor 2 Overspeed DTCs are rationality checks designed to detect a major transmission failure. If either DTC is detected, the TCM will place the transmission in Neutral.

- **When Monitored:**
  Continuously with the ignition on, engine running, transmission in gear, and Input Speed Sensor 1 (N2) greater than 0 RPM
- **Set Condition:**
  If the RPM of the Input Speed Sensor 1 (N2) is greater than 7700 RPM.

Possible Causes
INTERNAL TRANSMISSION
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK TO SEE IF DTC IS CURRENT

Turn the ignition on.

With the scan tool, erase Transmission DTCs.

Raise the vehicle on the hoist.

Start the engine.

With the scan tool, monitor the Input Speed Sensor 1 RPM.

Firmly apply the brakes and place the gear selector in Drive.

WARNING: To avoid personal injury or death, keep hands and feet clear of rotating wheels.
Release the brakes and raise the engine RPM to allow the transmission to upshift to the 2-3 and 3-4 shift schedule.

Did the Input Speed Sensors 1 display an RPM above 7700?

Yes >> Go To 2

No >> Go To 3

P1704-INPUT SPEED SENSOR 1 OVERSPEED (CONTINUED)

2. INTERNAL TRANSMISSION

This DTC is an indication of a internal transmission failure.

Remove the Transmission Oil Pan and inspect for excessive debris such as clutch friction material or metal contamination.

Is there any indication of an internal transmission failure?

Yes >> Repair internal transmission as necessary. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

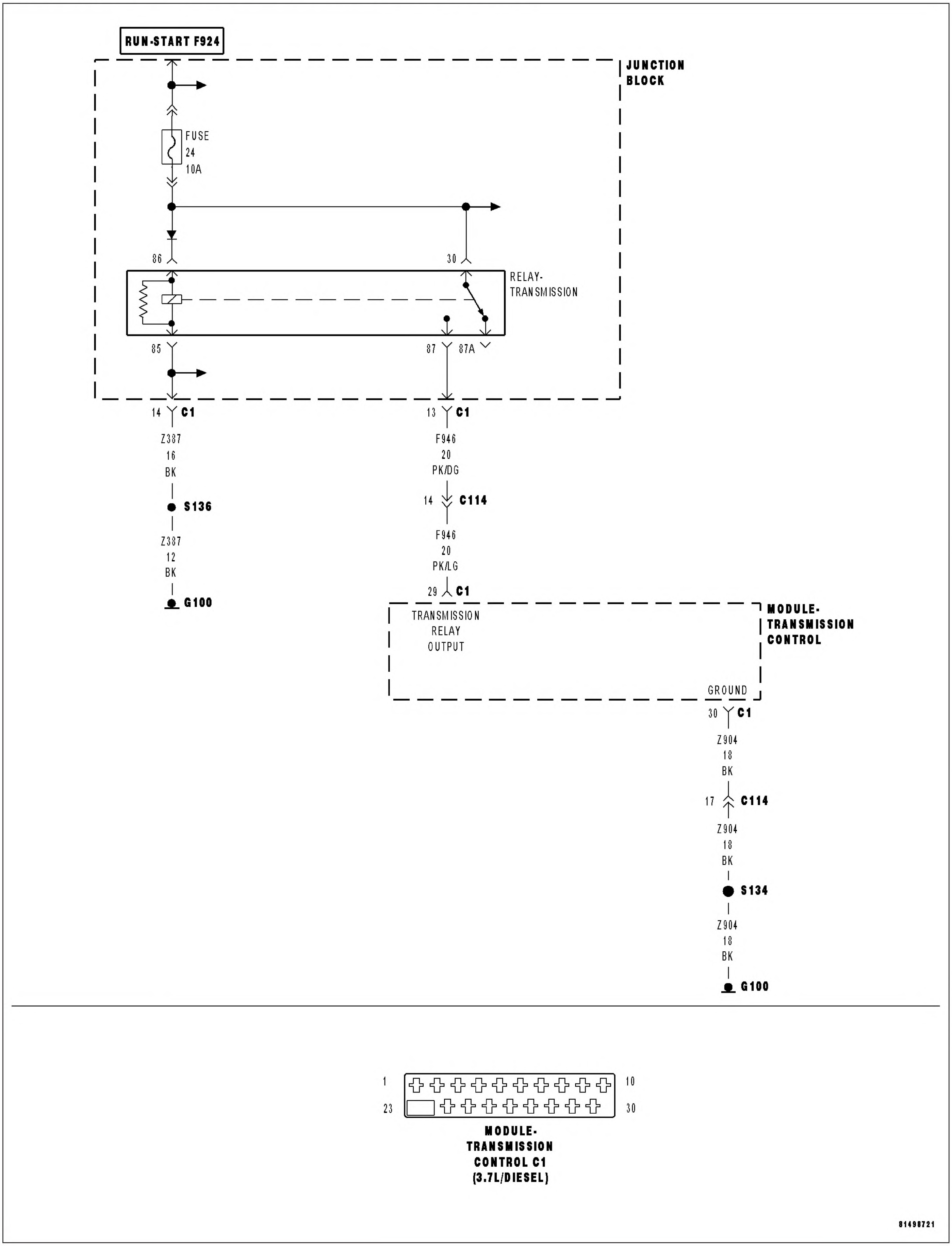
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P1705-INPUT SPEED SENSOR 2 OVERSPEED


RUN-START F924
JUNCTION BLOCK
FUSE
24
10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387
16
BK
S136
Z387
12
BK
G100
F946
20
PK/DG
14 C114
F946
20
PK/LG
29 C1
TRANSMISSION RELAY OUTPUT
MODULE-TRANSMISSION CONTROL
GROUND
30 C1
Z904
18
BK
17 C114
Z904
18
BK
S134
Z904
18
BK
G100
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
81498721

P1705-INPUT SPEED SENSOR 2 OVERSPEED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The NAG1 transmission has two input speed sensors 1 and 2 (N2 and N3), both speed sensors are located on the valve body. The speed sensors are hall effect speed sensors that are used by the Transmission Control Module (TCM) to calculate the transmissions input speed. Since the input speed could not be measured directly, two of the drive elements are measured. Two input speed sensors were required because both drive elements are not active in all gears.

The input speed sensors 1 and 2 will report the same input speed in gears 2nd, 3rd or 4th. If the 1 and 2 input speed sensor signals are not the same in these gears, the TCM will set the DTC P2784-Input Speed Sensor 1/2 Correlation. The input speed sensor 2 is not reported in 1st and 5th gears. The input speed sensor 1 (N2) is not reported in Reverse. The P01704-Input Speed Sensor 1 Overspeed and P01705-Input Speed Sensor 2 Overspeed DTCs are rationality checks designed to detect a major transmission failure. If either DTC is detected, the TCM will place the transmission in Neutral.

- **When Monitored:**
  Continuously with the ignition on, engine running, transmission in gear, and Input Speed Sensor 2 (N3) greater than 0 RPM
- **Set Condition:**
  If the RPM of the Input Speed Sensor 2 (N3) is greater than 7700 RPM.

Possible Causes
INTERNAL TRANSMISSION
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK TO SEE IF DTC IS CURRENT

Turn the ignition on.

With the scan tool, erase Transmission DTCs.

Raise the vehicle on the hoist.

Start the engine.

With the scan tool, monitor the Input Speed Sensor 2 RPM.

Firmly apply the brakes and place the gear selector in Drive.

WARNING: To avoid personal injury or death, keep hands and feet clear of rotating wheels.
Release the brakes and raise the engine RPM to allow the transmission to upshift to the 2-3 and 3-4 shift schedule.

Did the Input Speed Sensor 2 display an RPM above 7700?

Yes >> Go To 2

No >> Go To 3

P1705-INPUT SPEED SENSOR 2 OVERSPEED (CONTINUED)

2. INTERNAL TRANSMISSION

This DTC is an indication of a internal transmission failure.

Remove the Transmission Oil Pan and inspect for excessive debris such as clutch friction material or metal contamination.

Is there any indication of an internal transmission failure?

Yes >> Repair internal transmission as necessary. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P1731-INCORRECT GEAR ENGAGED

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The TCM compares the calculated gear with the gear the transmission has actually engaged. The actual gear is identified by verifying the signals of the two input speed sensors 1 (N2) and 2 (N3) as well as the transmission output speed (from the ABS system). If the actual gear differs from the gear calculated by the TCM, the TCM value is adjusted to the engaged gear and a counter is increased by 2 points. If after a shift the engaged gear and the calculated gear still match, the counter is decreased by 1 point. A DTC is detected as soon as the counter exceeds a threshold.

- **When Monitored:**
  The conditions for gear detection are: engine speed greater than 450 rpm, no input speed sensor failures are active, no selector lever error active, selector lever is not in intermediate position, selector lever position is not showing power-up value, no output speed error is active, no transfer case error is active, output speed (ABS system) greater than 180 rpm, no wheel speed (ABS system) overspeed detected.
- **Set Condition:**
  The detected gear calculated by the TCM is not identical to the actual gear. Exception: detected gear is 1st and actual gear is 2nd. If the problem is present for three consecutive ignition cycles, the TCM places the transmission into Limp-in mode until the DTC is cleared by the scan tool.

Possible Causes
TRANSMISSION SOLENOID DTCS PRESENT
ABS DTCS PRESENT
INTERNAL TRANSMISSION
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF TRANSMISSION SOLENOID DTCS ARE PRESENT

With the scan tool, check for other transmission DTCs.

Are there any Transmission Solenoid DTCS present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTCS ARE PRESENT

With the scan tool, check for ABS DTCs.

Are there any ABS DTCs present?

Yes >> Refer to 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 3

P1731-INCORRECT GEAR ENGAGED (CONTINUED)

3. CHECK FOR INTERNAL TRANSMISSION PROBLEM

This DTC is usually set due to an internal transmission problem such as but not limited to: stuck solenoid valve and/or contamination in the valve body, broken springs, leaking clutch seals, dislodged or broken snap ring.

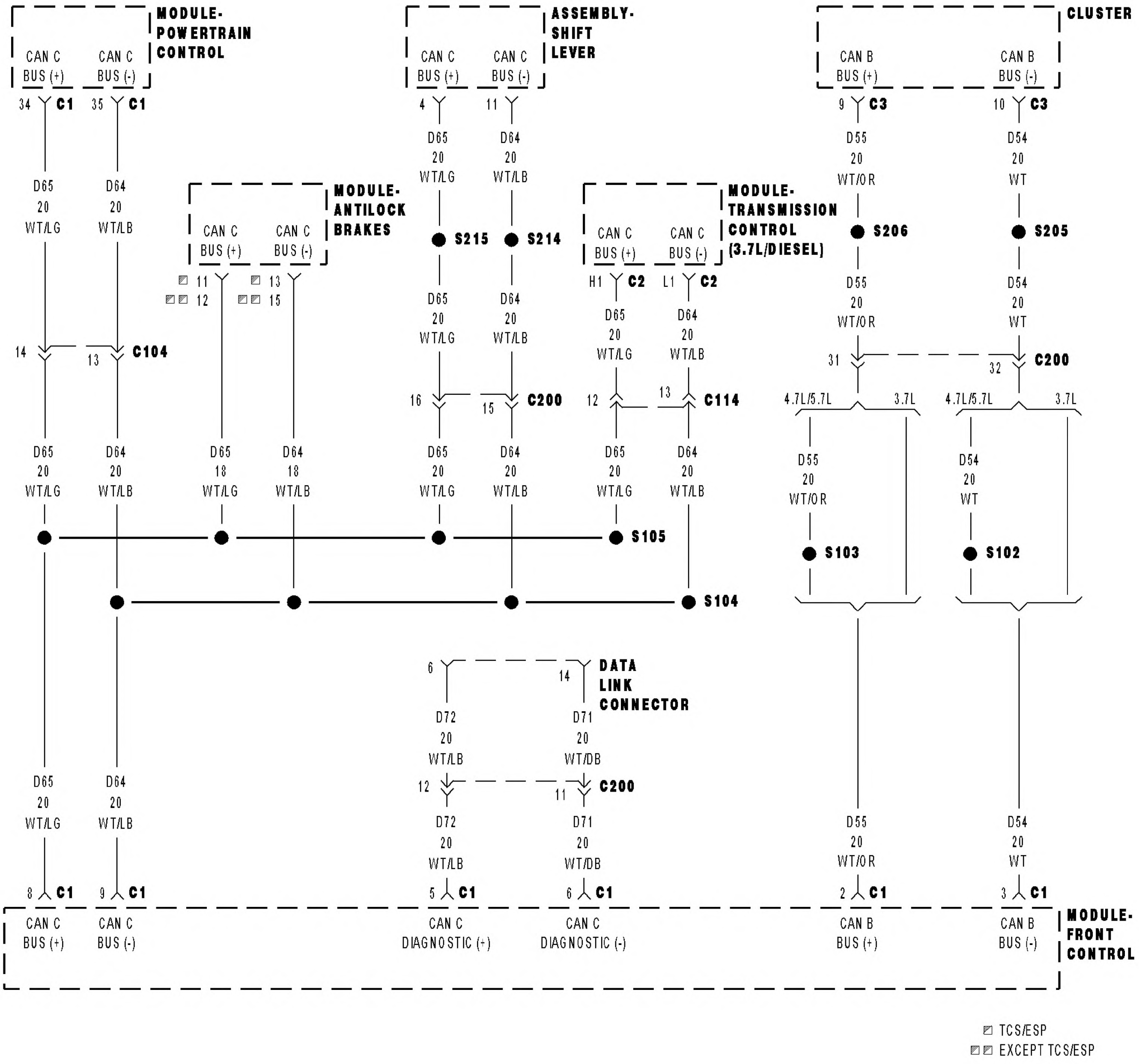
Inspect the internal transmission, Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/ SERVICE INFORMATION for the appropriate service procedure(s).

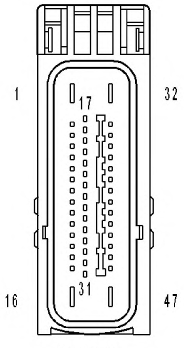
Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

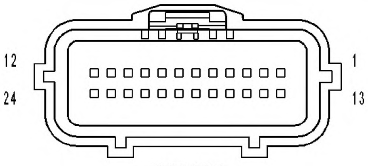
No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P2638-TORQUE MANAGEMENT FEEDBACK SIGNAL PERFORMANCE

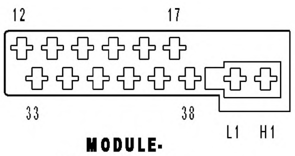

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
S103
S102
S105
S104
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
17
32
31
16
47

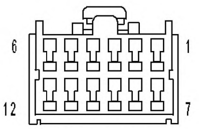
MODULE-ANTILOCK BRAKES



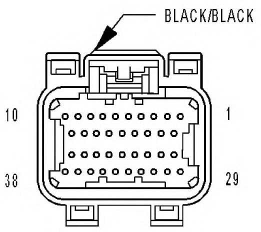
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

P2638-TORQUE MANAGEMENT FEEDBACK SIGNAL PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) requests torque reductions over the CAN bus during a transmission shift to improve shift quality. The TCM verifies that the PCM / ECM has performed the requested torque reduction by monitoring the response to the request. If the response is not within a specified tolerance, the TCM increments a counter, and if this counter reaches a threshold, the DTC sets.

- **When Monitored:**
  Engine intervention active for at least 20 ms, no engine torque errors, engine torque demand is greater than 0.
- **Set Condition:**
  Torque Reduction acknowledge bit - not set, no shift aborts, the error flag Torque Reduction Acknowledge is not set, Powertrain controller not supporting torque requests.

Possible Causes
CAN BUS CIRCUIT DTC PRESENT
TRANSMISSION CONTROL MODULE
POWERTRAIN / ENGINE CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR ENGINE DTC PRESENT

With the scan tool, check engine DTCs.

Are there any engine DTCs present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK FOR CAN BUS DTCS

With the scan tool, check for any CAN bus DTCs or a sign of a CAN bus failure.

Are there any CAN bus DTCs present in any module other than the TCM or an overall indication of a CAN bus communication problem?

Yes >> This is an indication of a CAN bus communication problem. Depending on the DTC, either refer to the module reporting the DTC and perform diagnostics for the appropriate symptom or refer to 8 - ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS and perform the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

P2638-TORQUE MANAGEMENT FEEDBACK SIGNAL PERFORMANCE (CONTINUED)

3. CHECK IF DTC RESETS

Turn the ignition off to the lock position.

Replace and program the Powertrain Control Module per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE for the appropriate service procedure.

With the scan tool, record the Environmental Data and erase Transmission DTCs.

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Using the Environmental Data recorded earlier, test drive the vehicle while trying to duplicate the conditions in which the DTC originally set.

With the scan tool, read Transmission DTCs.

Did the DTC P2638-TORQUE MANAGEMENT FEEDBACK SIGNAL PERFORMANCE reset?

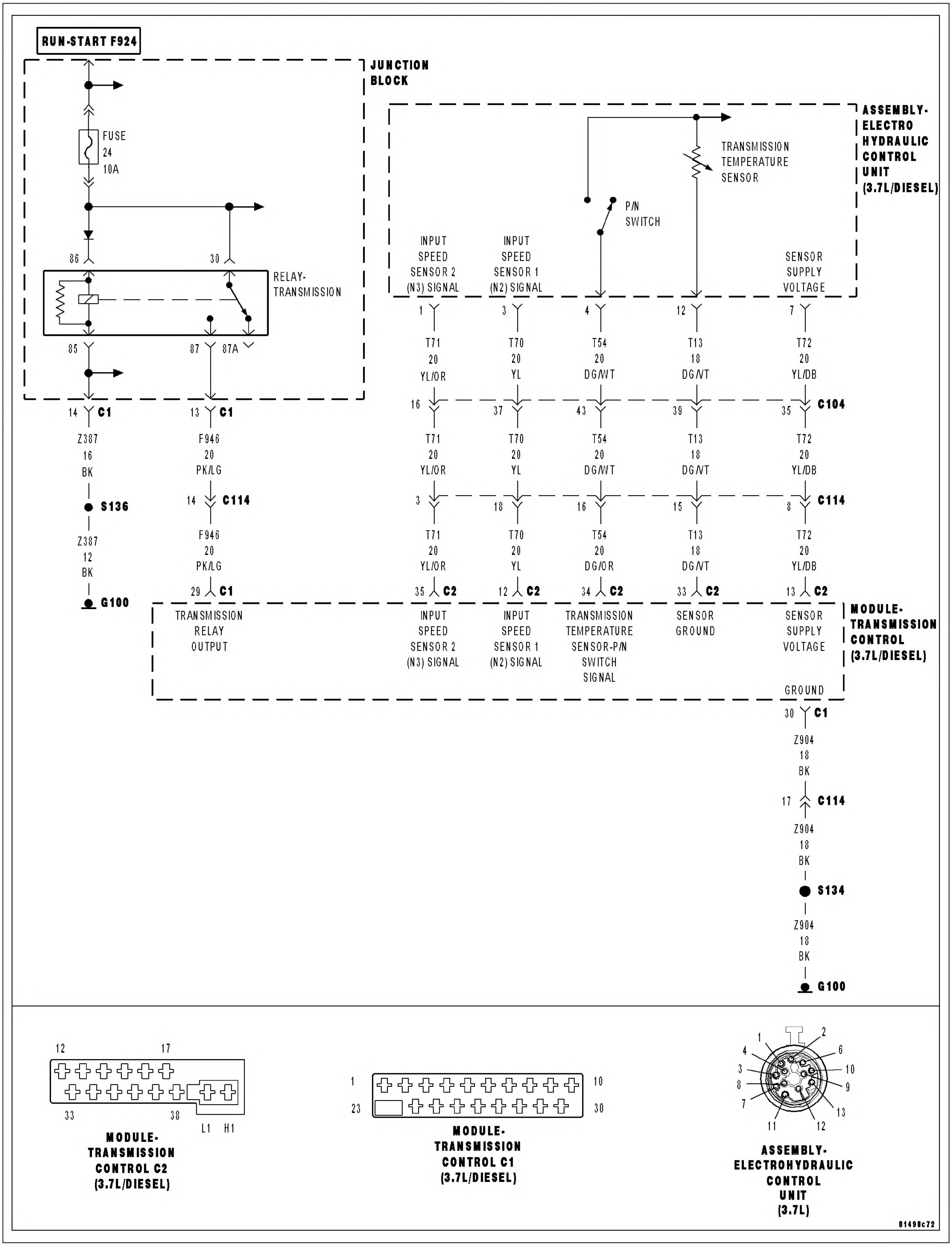
Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P2767-INPUT SPEED SENSOR 2 CIRCUIT NO SIGNAL


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14 C114
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1
3
4
12
7
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/WT
T72 20 YL/DB
16
37
43
39
35
C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/WT
T72 20 YL/DB
3
18
16
15
8
C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/WT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498c72

P2767-INPUT SPEED SENSOR 2 CIRCUIT NO SIGNAL (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Input Speed Sensor 2 (N3) is one of two hall effect speed sensors that are used by the Transmission Control Module (TCM) to calculate the transmissions turbine speed. Since the turbine speed could not be measured directly, two of the drive elements are measured. Two input speed sensors are required because both elements are not active in all gears.

- **When Monitored:**
  Engine speed greater than 450 RPM with none of the following DTCs present: engine speed, TCM undervoltage, output speed sensor, and/or rear wheel speed DTCs. Also required are all wheel speeds above 250 RPM and no wheel slip detected (signal from the ABS system).
- **Set Condition:**
  If the Input Speed Sensor 2 (N3) signal is equal to 0 RPM.

Possible Causes
(T72) SENSOR SUPPLY VOLTAGE CIRCUIT OPEN
(T71) INPUT SPEED SENSOR 2 (N3) SIGNAL CIRCUIT OPEN
(T71) SPEED SENSOR 2 (N3) SIGNAL CIRCUIT SHORT TO ANOTHER CIRCUIT
(T13) SENSOR GROUND CIRCUIT OPEN
(T13) SENSOR GROUND CIRCUIT SHORT TO ANOTHER CIRCUIT
(T71) SPEED SENSOR 2 (N3) SIGNAL CIRCUIT SHORT TO GROUND
(T13) SENSOR GROUND CIRCUIT SHORT TO GROUND
INPUT SPEED SENSOR 2 (N3)
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF DTC IS CURRENT

NOTE: The Transmission Control Module stores under Environmental Data the transmission operating conditions when the DTC was set. Before erasure of any DTC, record all information pertaining to the DTC, even if there is more than one DTC stored.

With the scan tool, erase transmission DTCs.

Using the Environmental Data previously recorded, drive the vehicle and try to duplicate the conditions in which the DTC originally set.

Did the DTC P2767 reset?

Yes >> Go To 2

No >> Go To 10

P2767-INPUT SPEED SENSOR 2 CIRCUIT NO SIGNAL (CONTINUED)

2. CHECK THE (T72) SENSOR SUPPLY VOLTAGE CIRCUIT FOR AN OPEN

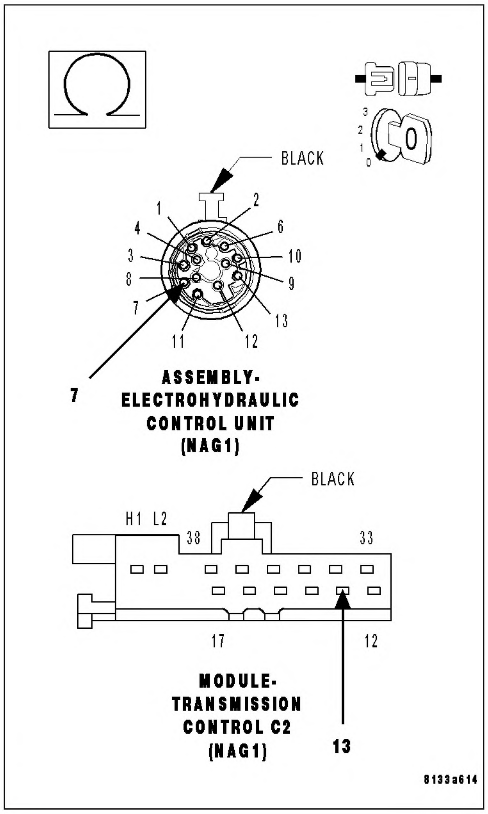
Turn the ignition off to the lock position.

Disconnect the TCM C2 harness connector.

Disconnect the Electrohydraulic Control Unit Assembly harness connector.

NOTE: Check connectors - Clean/repair as necessary.

Measure the resistance of the (T72) Sensor Supply Voltage circuit from the TCM C2 harness connector to the Electrohydraulic Control Unit Assembly harness connector.


3
2
1
0
O
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
7
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
13
8133a614

Is the resistance below 5.0 ohms?

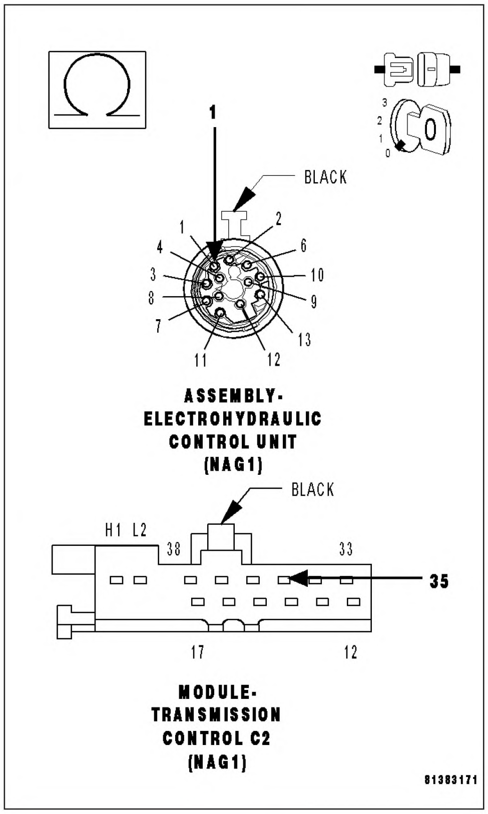
Yes >> Repair the (T72) Sensor Supply Voltage circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. CHECK THE (T71) INPUT SPEED SENSOR 2 (N3) SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (T71) Input Speed Sensor 2 (N3) Signal circuit from the TCM C2 harness connector to the Electrohydraulic Control Unit Assembly harness connector.


3
2
1
0
O
1
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
35
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
81383171

Is the resistance below 5.0 ohms?

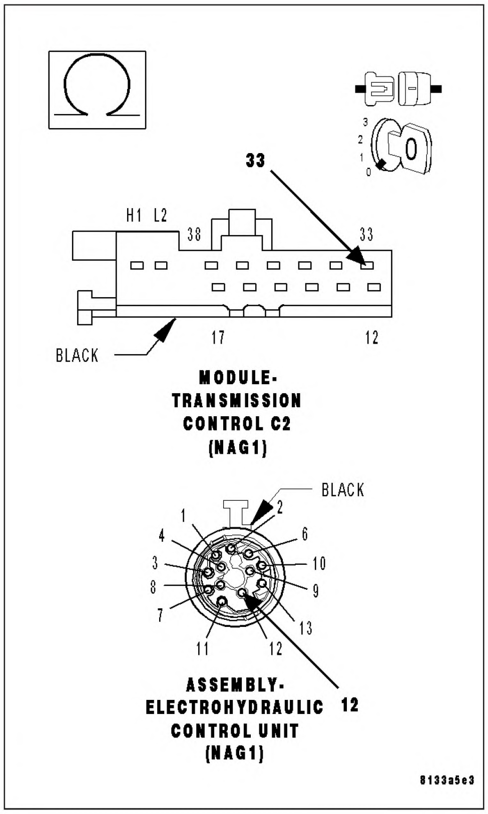
Yes >> Repair the (T71) Input Speed Sensor 2 (N3) Signal circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 4

P2767-INPUT SPEED SENSOR 2 CIRCUIT NO SIGNAL (CONTINUED)

4. CHECK THE (T13) SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (T13) Sensor Ground circuit from the TCM C2 harness connector to the Electrohydraulic Control Unit Assembly harness connector.


33
H1 L2
38
33
17
12
BLACK
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
12
3
2
1
0
8133a5e3

Is the resistance below 5.0 ohms?

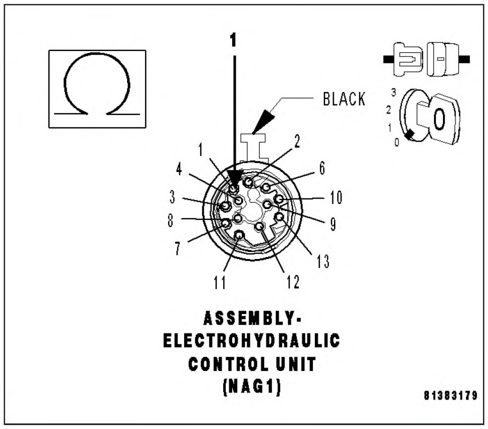
Yes >> Repair the (T13) Sensor Ground circuit for an open.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 5

---

5. CHECK THE (T71) INPUT SPEED SENSOR 2 (N3) SIGNAL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT(S)

Measure the resistance of the (T71) Input Speed Sensor 2 (N3) Signal circuit to all the other circuits in the Electrohydraulic Control Unit Assembly harness connector.


1
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
3
2
1
0
81383179

Is the resistance below 5.0 ohms between the (T71) Input Speed Sensor 2 (N3) Signal circuit and any other circuit(s) in the Electrohydraulic Control Unit Assembly harness connector?

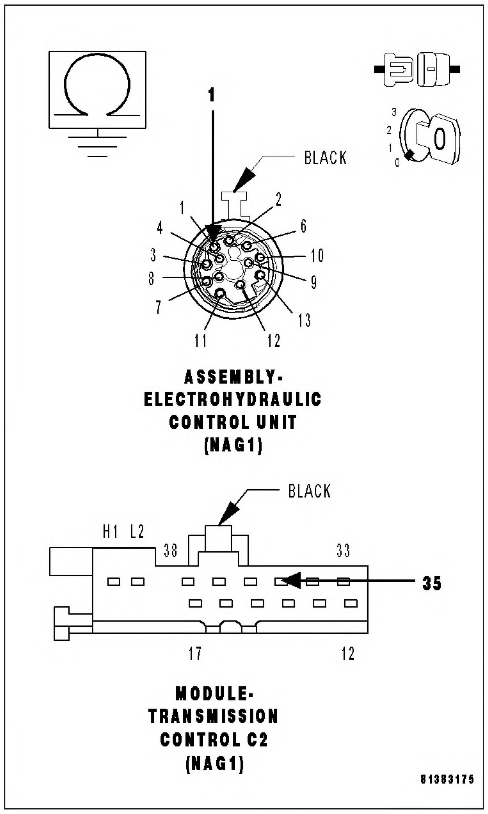
Yes >> Repair the (T71) Input Speed Sensor 2 (N3) Signal circuit for a short to another circuit(s).
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 6

P2767-INPUT SPEED SENSOR 2 CIRCUIT NO SIGNAL (CONTINUED)

6. CHECK THE (T71) INPUT SPEED SENSOR 2 (N3) SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T71) Input Speed Sensor 2 (N3) Signal circuit.


1
BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
BLACK
H1 L2
38
33
35
17
12
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
81383175

Is the resistance below 5.0 ohms?

Yes >> Repair the (T71) Input Speed Sensor 2 (N3) Signal circuit for a short to ground.

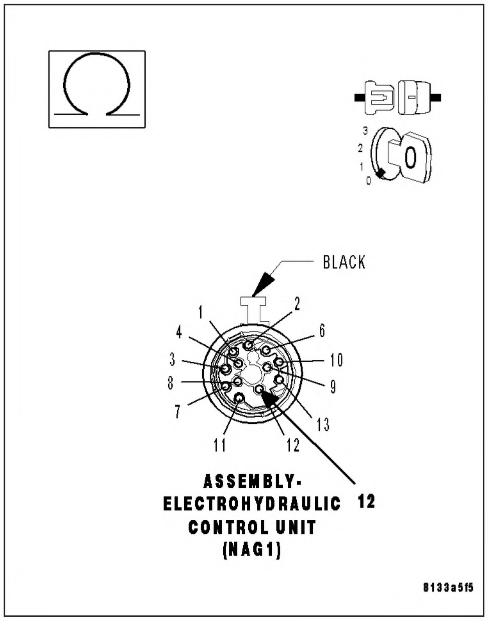
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 7

---

7. CHECK THE (T13) SENSOR GROUND CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT(S)

Measure the resistance between the (T13) Sensor Ground circuit to all the other circuits in the Electrohydraulic Control Unit Assembly harness connector.


BLACK
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
12
8133a515

Is the resistance below 5.0 ohms between the (T13) Sensor Ground circuit and any other circuit(s) in the Electrohydraulic Control Unit Assembly harness connector.

Yes >> Repair the (T13) Sensor Ground circuit for a short to another circuit(s)

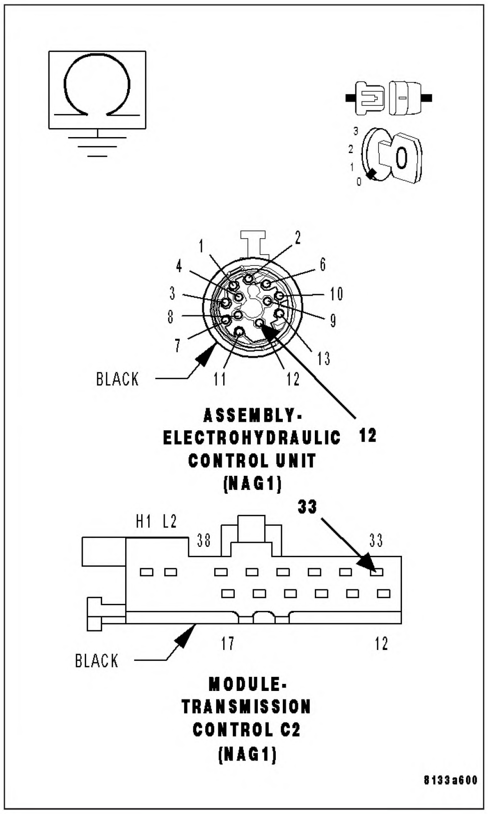
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 8

P2767-INPUT SPEED SENSOR 2 CIRCUIT NO SIGNAL (CONTINUED)

8. CHECK THE (T13) SENSOR GROUND CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between ground and the (T13) Sensor Ground circuit.



1
2
4
6
3
10
8
9
7
13
BLACK
11
12
ASSEMBLY-
ELECTROHYDRAULIC
CONTROL UNIT
(NAG1)
12
33
H1 L2
38
33
17
12
BLACK
MODULE-
TRANSMISSION
CONTROL C2
(NAG1)
8133a600

Is the resistance below 5.0 ohms?

Yes >> Repair the (T13) Sensor Ground circuit for a short to ground.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 9

P2767-INPUT SPEED SENSOR 2 CIRCUIT NO SIGNAL (CONTINUED)

9. CHECK THE INPUT SPEED SENSOR 2 (N3) SIGNAL

Reconnect the Electrohydraulic Control Unit Assembly harness connector.

Using a Lab Scope, backprobe the (T71) Input Speed Sensor 2 (N3) Signal circuit at the TCM C2 harness connector.

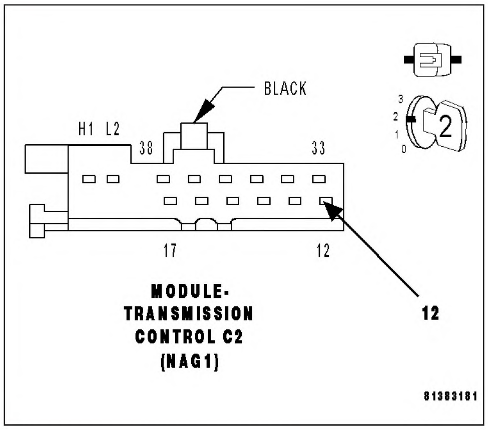
WARNING: Properly support the vehicle.

Raise all drive wheels off the ground.

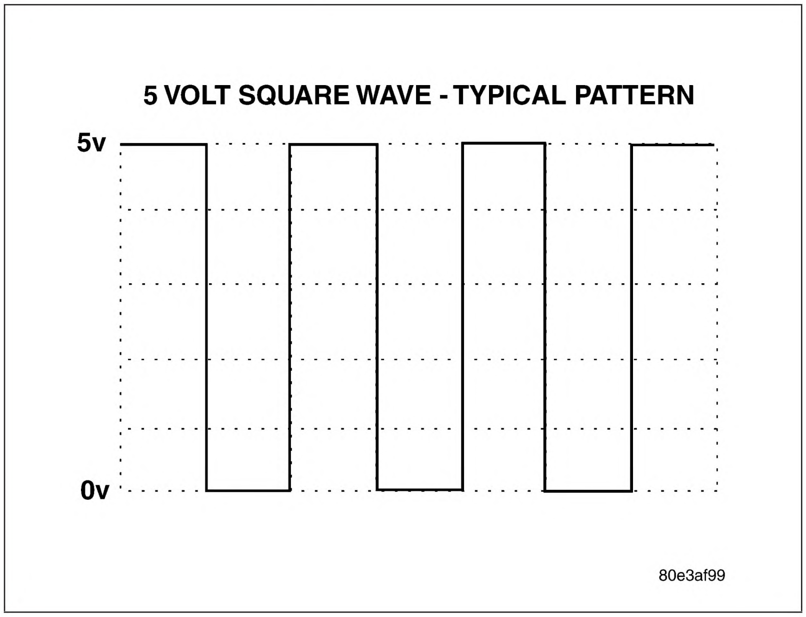
Start the engine.

WARNING: To avoid personal injury or death, keep hands and feet clear of rotating wheels.

Place gear selector in drive and increase vehicle speed to engage 2nd gear.



Compare the scope pattern on the Lab Scope with a typical 5-volt square wave pattern.



Is the scope pattern comparable to the typical 5-volt square wave signal scope pattern?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Replace the Input Speed Sensor 2 (N3). Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

10. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

P2783-TORQUE CONVERTER TEMPERATURE TOO HIGH

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) monitors the friction loss of the torque converter clutch while it is in slipping mode. The TCM calculates friction loss using CAN communication signals such as, engine speed and engine torque, as well as the torque converter turbine speed computed by the TCM. Depending on the friction loss calculated in each program cycle, a corresponding value is added to a factor as long as the torque converter clutch is in slipping mode. The factor is set to 0 when the clutch is opened. If the factor reaches a specified value a DTC is set.

- **When Monitored:**
  When the solenoid supply voltage is active. With no reporting Input Speed Sensor 1 or 2 (N2 - N3), CAN Bus, PCM, CAN Engine, and/or CAN Engine Speed DTCs present. Torque Converter Clutch in slip mode.
- **Set Condition:**
  When the friction loss factor reaches threshold.

Possible Causes
INTERNAL TRANSMISSION OR TORQUE CONVER CLUTCH PROBLEM

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. **CHECK FOR AN INTERNAL TRANSMISSION PROBLEM**

This DTC is an informational DTC.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

This is usually a sign of Torque Converter Clutch failure or an internal transmission problem.

Check the Engine and Transmission Cooling Systems for proper operation.

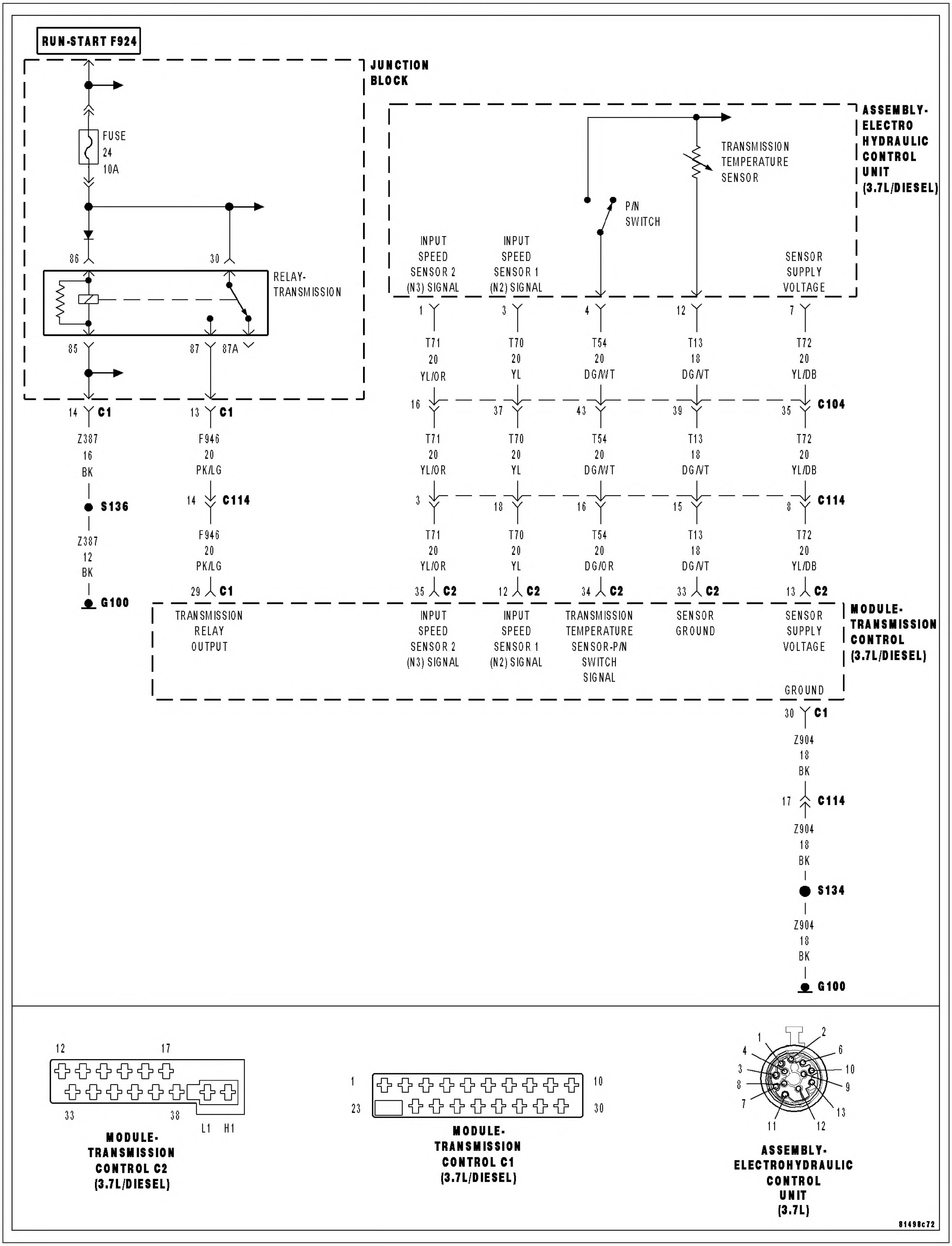
View repair.

Repair

Repair internal Transmission, Torque Converter, and/or Transmission and Engine Cooling systems as necessary. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/SERVICE INFORMATION and/or 7 - COOLING for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

P2784-INPUT SPEED SENSOR 1/2 CORRELATION


RUN-START F924
JUNCTION BLOCK
FUSE 24 10A
86
30
RELAY-TRANSMISSION
85
87
87A
14 C1
13 C1
Z387 16 BK
S136
Z387 12 BK
G100
F946 20 PK/LG
14 C114
F946 20 PK/LG
29 C1
ASSEMBLY-ELECTRO HYDRAULIC CONTROL UNIT (3.7L/DIESEL)
TRANSMISSION TEMPERATURE SENSOR
P/N SWITCH
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
SENSOR SUPPLY VOLTAGE
1
3
4
12
7
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
16
37
43
39
35
C104
T71 20 YL/OR
T70 20 YL
T54 20 DG/WT
T13 18 DG/VT
T72 20 YL/DB
3
18
16
15
8
C114
T71 20 YL/OR
T70 20 YL
T54 20 DG/OR
T13 18 DG/VT
T72 20 YL/DB
35 C2
12 C2
34 C2
33 C2
13 C2
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
TRANSMISSION RELAY OUTPUT
INPUT SPEED SENSOR 2 (N3) SIGNAL
INPUT SPEED SENSOR 1 (N2) SIGNAL
TRANSMISSION TEMPERATURE SENSOR-P/N SWITCH SIGNAL
SENSOR GROUND
SENSOR SUPPLY VOLTAGE
GROUND
30 C1
Z904 18 BK
17 C114
Z904 18 BK
S134
Z904 18 BK
G100
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
1
10
23
30
MODULE-TRANSMISSION CONTROL C1 (3.7L/DIESEL)
1
2
4
6
3
10
8
9
7
13
11
12
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT (3.7L)
81498c72

P2784-INPUT SPEED SENSOR 1/2 CORRELATION (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Input Speed Sensors 1 and 2 (N2 - N3) will report the same speed in 2nd, 3rd and 4th gears. If the Input Speed Sensor 1 and 2 signals are not the same in these gears, the DTC will set.

- **When Monitored:**
  Engine speed greater than 450 RPM, no engine speed DTCs, no TCM undervoltage system operation, no output speed sensor DTCs (CAN signal from the ABS system), all wheel speeds above 250 RPM (CAN signal from the ABS system), no rear wheel speed DTCs (signal from the ABS system), and no wheel slip detected (CAN signal from the ABS system), no shifting operation, Input Speed Sensor 2 (N3) greater than 800 RPM and Input Speed Sensor 1 (N2) greater than 0 RPM and the TCM not in reset.
- **Set Condition:**
  If the speed difference between the Input Speed Sensors 1 and 2 (N2 - N3) is greater than 150 RPM.

Possible Causes
INTERNAL TRANSMISSION
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR SPEED SENSOR OR SENSOR SUPPLY VOLTAGE DTCS

With the scan tool, check for other transmission DTCs.

Are any Input Speed Sensor and/or Sensor Supply Voltage DTCs present?

Yes >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK TO SEE IF INPUT SENSOR MISMATCH IS CURRENT

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

With the scan tool, record the Environmental Data and erase Transmission DTCs.

Using the Environmental Data recorded earlier, test drive the vehicle while trying to duplicate the conditions in which the DTC originally set.

Did the DTC P2784-INPUT SPEED SENSOR 1/2 CORRELATION reset?

Yes >> Go To 3

No >> Go To 4

P2784-INPUT SPEED SENSOR 1/2 CORRELATION (CONTINUED)

3. INTERNAL TRANSMISSION

Turn the ignition off to the lock position.

Remove the Transmission Oil Pan and inspect for debris, a plugged Transmission Oil Filter, or any sign of an internal transmission problem.

Is there any debris, plugged Transmission Oil Filter, or any sign of an internal transmission problem?

Yes >> Repair as necessary. Refer to 21- AUTOMATIC TRANSMISSION-AUTOMATIC TRANSMISSION NAG1/ SERVICE INFORMATION for the appropriate service procedures.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

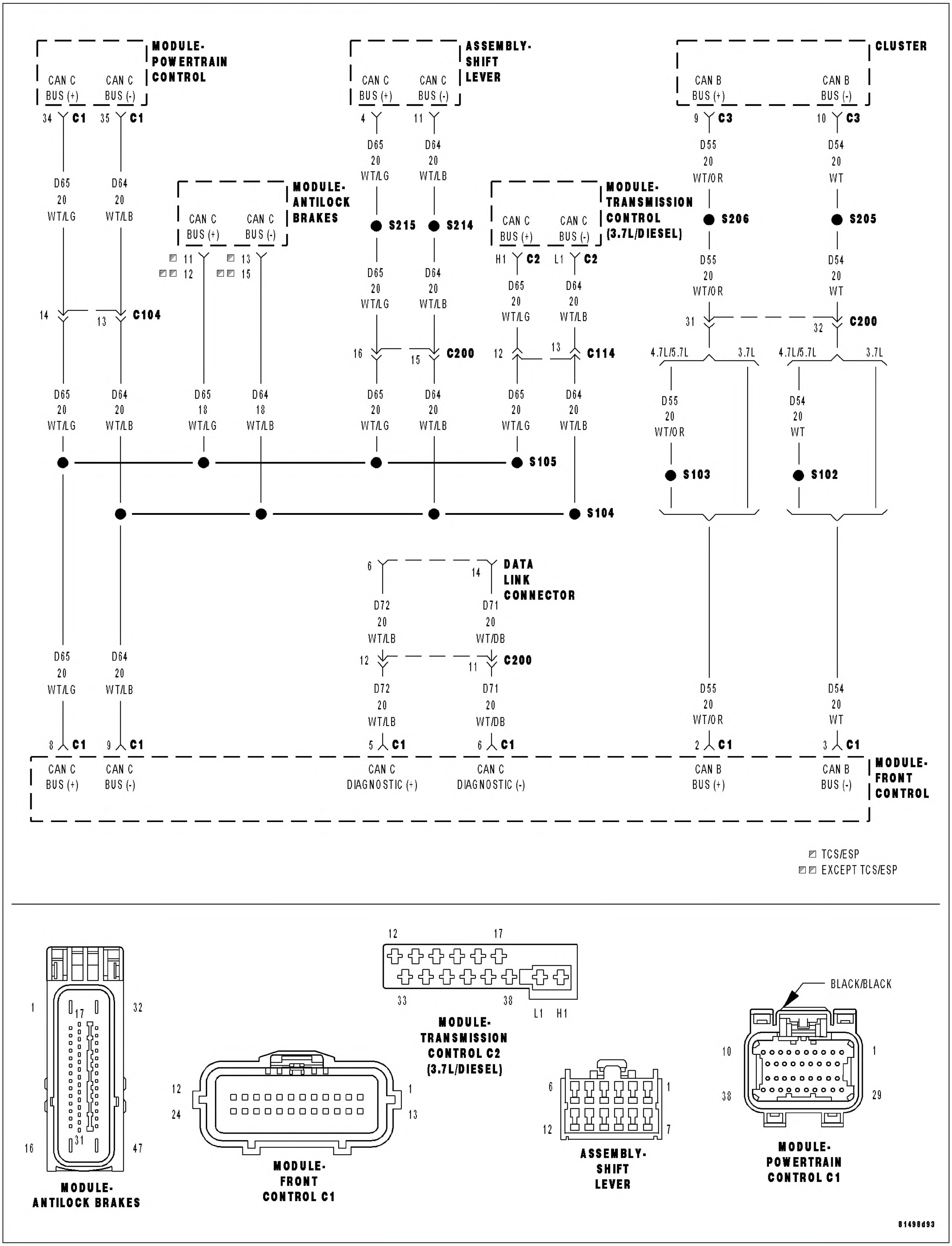
Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

Were there any problems found?

Yes >> Repair as necessary.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

U0002-CAN C BUS OFF PERFORMANCE


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0002-CAN C BUS OFF PERFORMANCE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between controllers. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured in a twisted pair within the electrical harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The TCM detects an: open, short to ground, short to voltage of the CAN C (+) or CAN C (-) circuits, short between the CAN C (+) or CAN C (-) circuits.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FCM FOR AN OVERALL CAN COMMUNICATION BUS FAILURE

With the scan tool, check for FCM DTCs.

Does the FCM report a CAN C Bus failure, or one or more CAN C Bus DTCs?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS DTC first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0002-CAN C BUS OFF PERFORMANCE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U0002-CAN C BUS OFF PERFORMANCE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

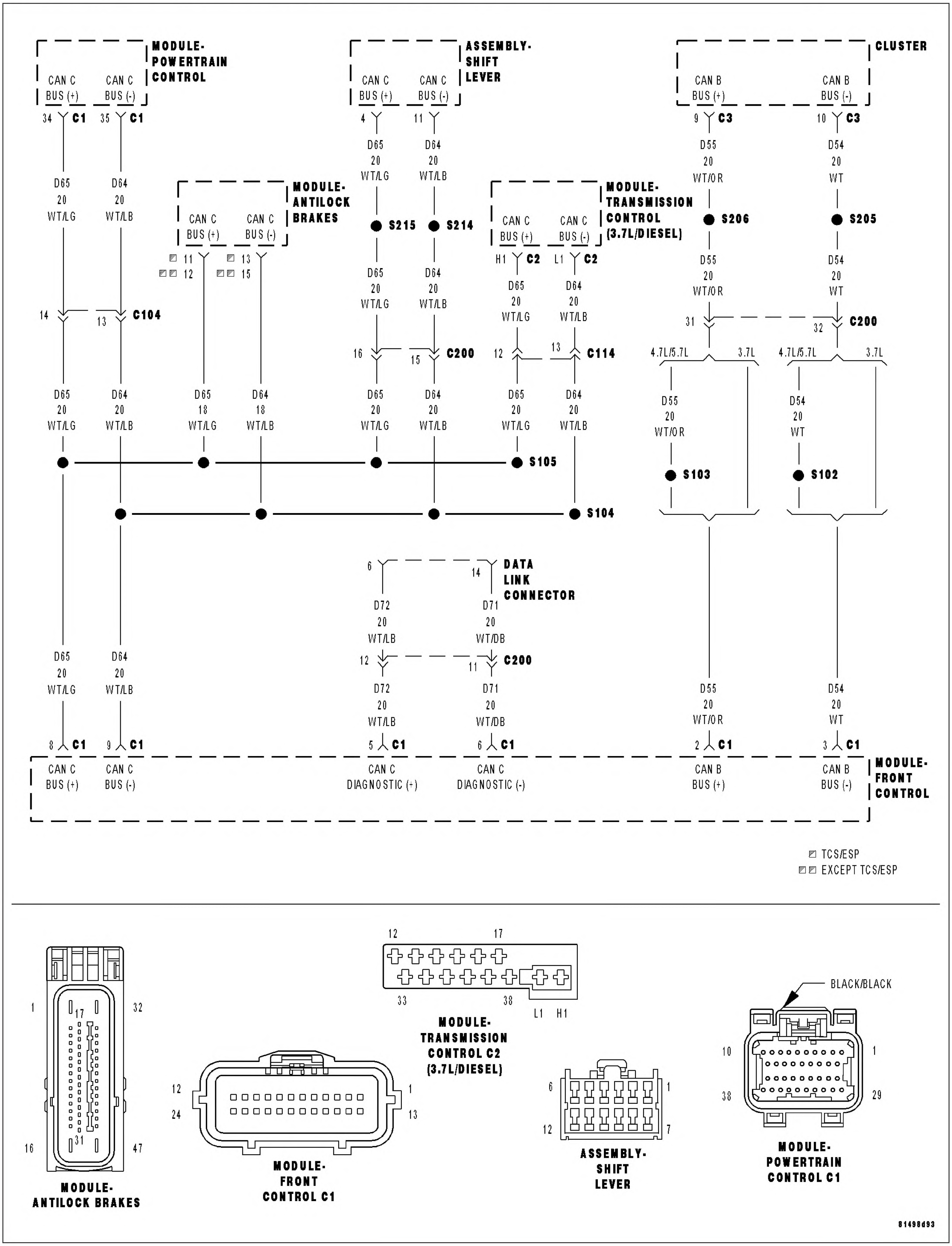
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

U0100-LOST COMMUNICATION WITH ECM/PCM


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14 C104 13
ASSEMBLY-SHIFT LEVER
4
11
S215
S214
16 C200 15
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
12 C114 13
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31 C200 32
4.7L/5.7L
3.7L
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12 C200 11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0100-LOST COMMUNICATION WITH ECM/PCM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  U0002-CAN C BUS OFF PERFORMANCE not present. One second after ignition on and not in Park or Neutral, no System Overvoltage or System Undervoltage condition present, or the transmission in Park or Neutral and engine RPM greater than 850 RPM.
- **Set Condition:**
  The DTC will set if a CAN ID was not received in the required time from the ECM or PCM.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS or U0100-LOST COMMUNICATION WITH ECM/PCM?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0100-LOST COMMUNICATION WITH ECM/PCM (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U0100-LOST COMMUNICATION WITH ECM/PCM reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

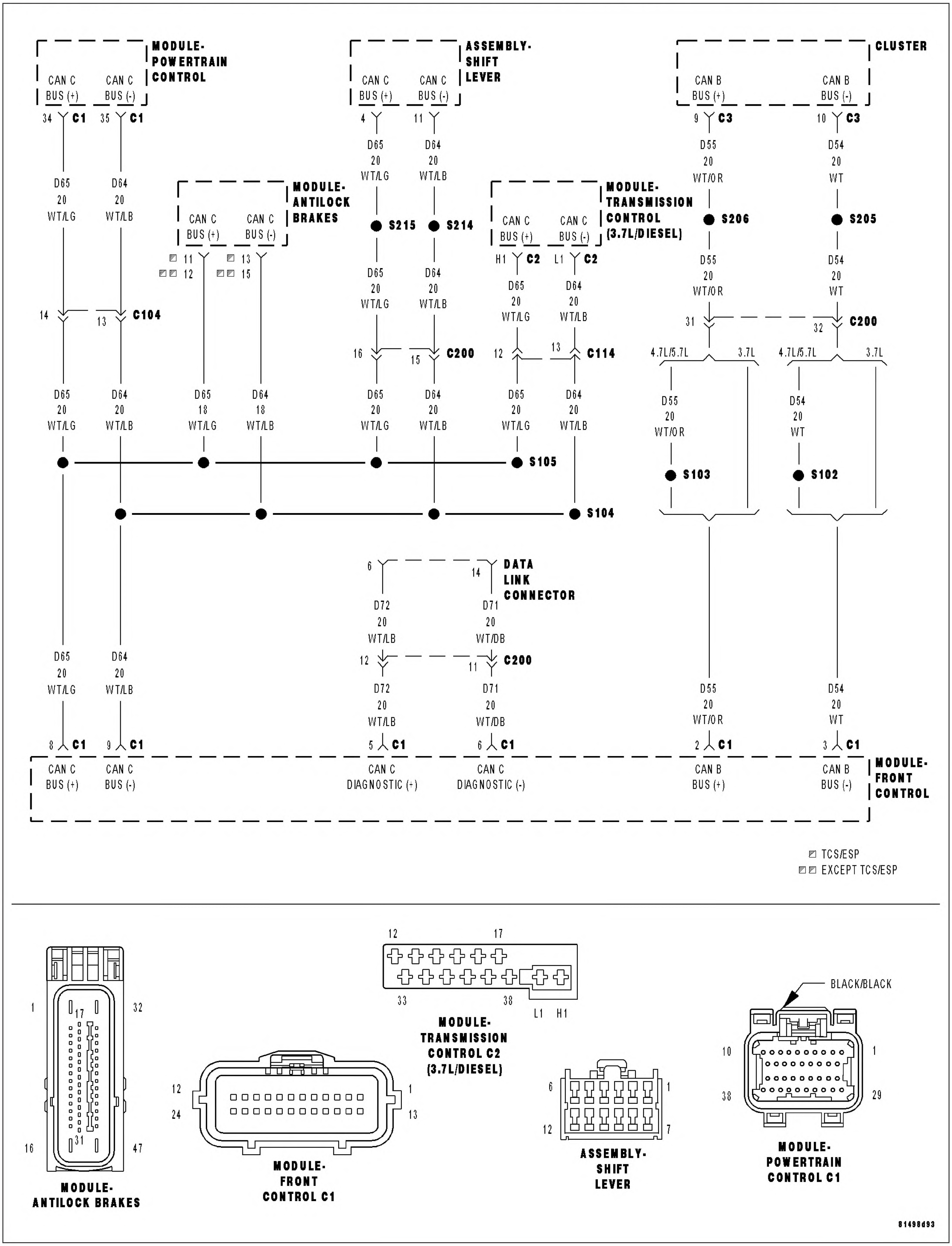
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

U0103-LOST COMMUNICATION WITH ELECTRIC GEAR SHIFT MODULE


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D55 20 WT/OR
D54 20 WT
S206
S205
14
13
C104
31
32
C200
16
15
C200
12
13
C114
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S103
S102
S105
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0103-LOST COMMUNICATION WITH ELECTRIC GEAR SHIFT MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the Electronic Gear Shift Module.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS DTC or U0100-LOST COMMUNICATION WITH ECM/PCM?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0103-LOST COMMUNICATION WITH ELECTRIC GEAR SHIFT MODULE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U0100-LOST COMMUNICATION WITH ECM/PCM reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

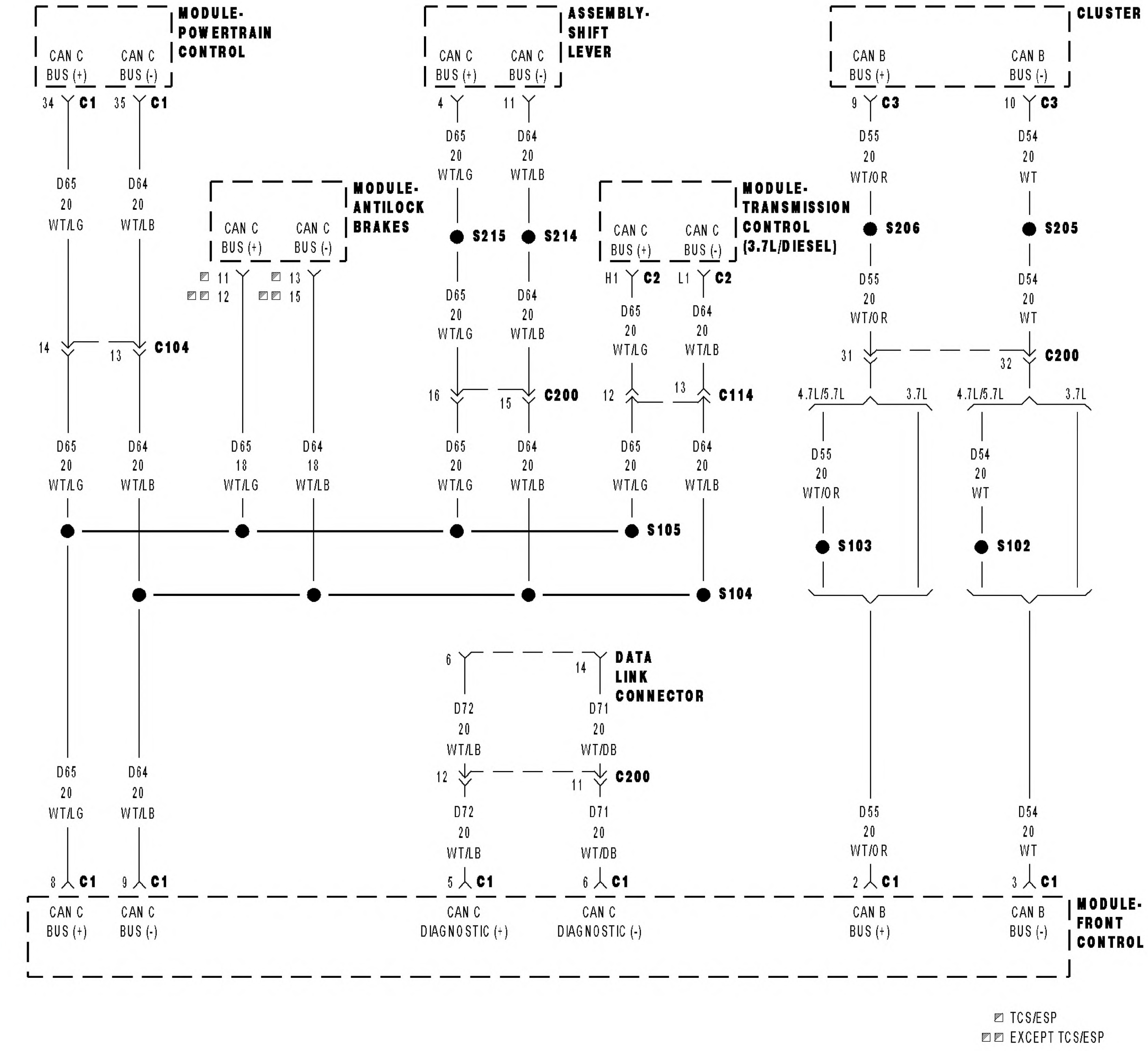
Were there any problems found?

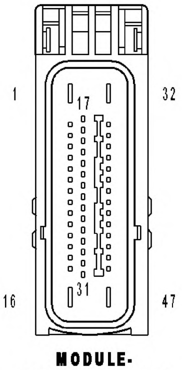
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

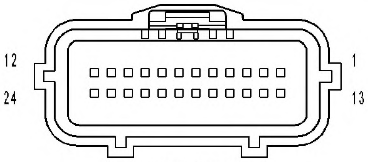
No >> Test Complete.

U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE

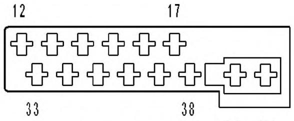

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
D65 18 WT/LG
D64 18 WT/LB
S215
S214
S206
S205
14
13 C104
16
15 C200
12
13 C114
31
32 C200
4.7L/5.7L
3.7L
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11 C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47

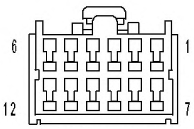
MODULE-ANTILOCK BRAKES



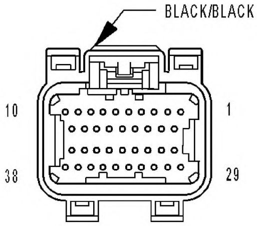
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the Final Drive control module.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS DTC or U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U0114-LOST COMMUNICATION WITH FINAL DRIVE CONTROL MODULE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

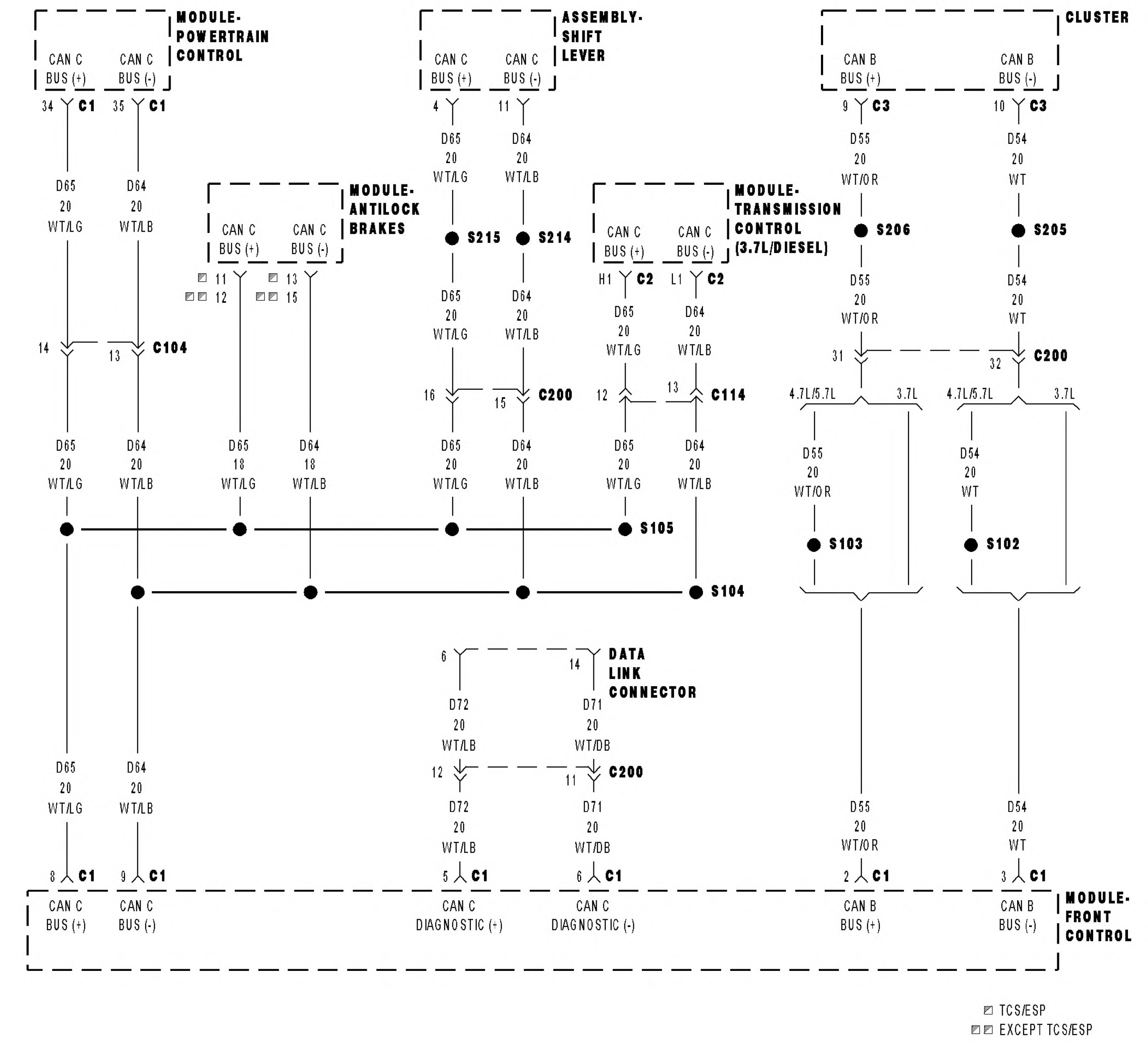
Were there any problems found?

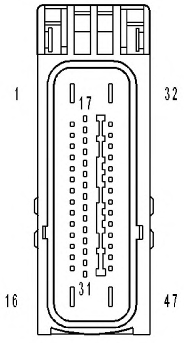
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

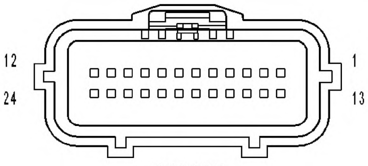
No >> Test Complete.

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE

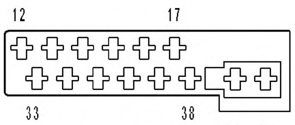

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13
C104
ASSEMBLY-SHIFT LEVER
CAN C BUS (+)
CAN C BUS (-)
4
11
S215
S214
16
15
C200
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
CAN C BUS (+)
CAN C BUS (-)
H1 C2
L1 C2
12
13
C114
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32
C200
4.7L/5.7L
3.7L
S103
S102
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
17
32
31
16
47

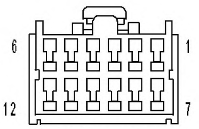
MODULE-ANTILOCK BRAKES



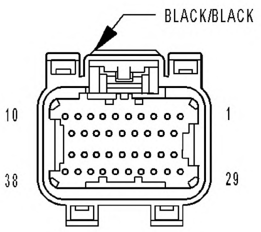
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the ABS.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS DTC or U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0121-LOST COMMUNICATION WITH ANTI-LOCK BRAKE MODULE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC’s.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC’s.

Did the DTC U0121-LOST COMMUNICATION WITH ANTILOCK BRAKE MODULE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

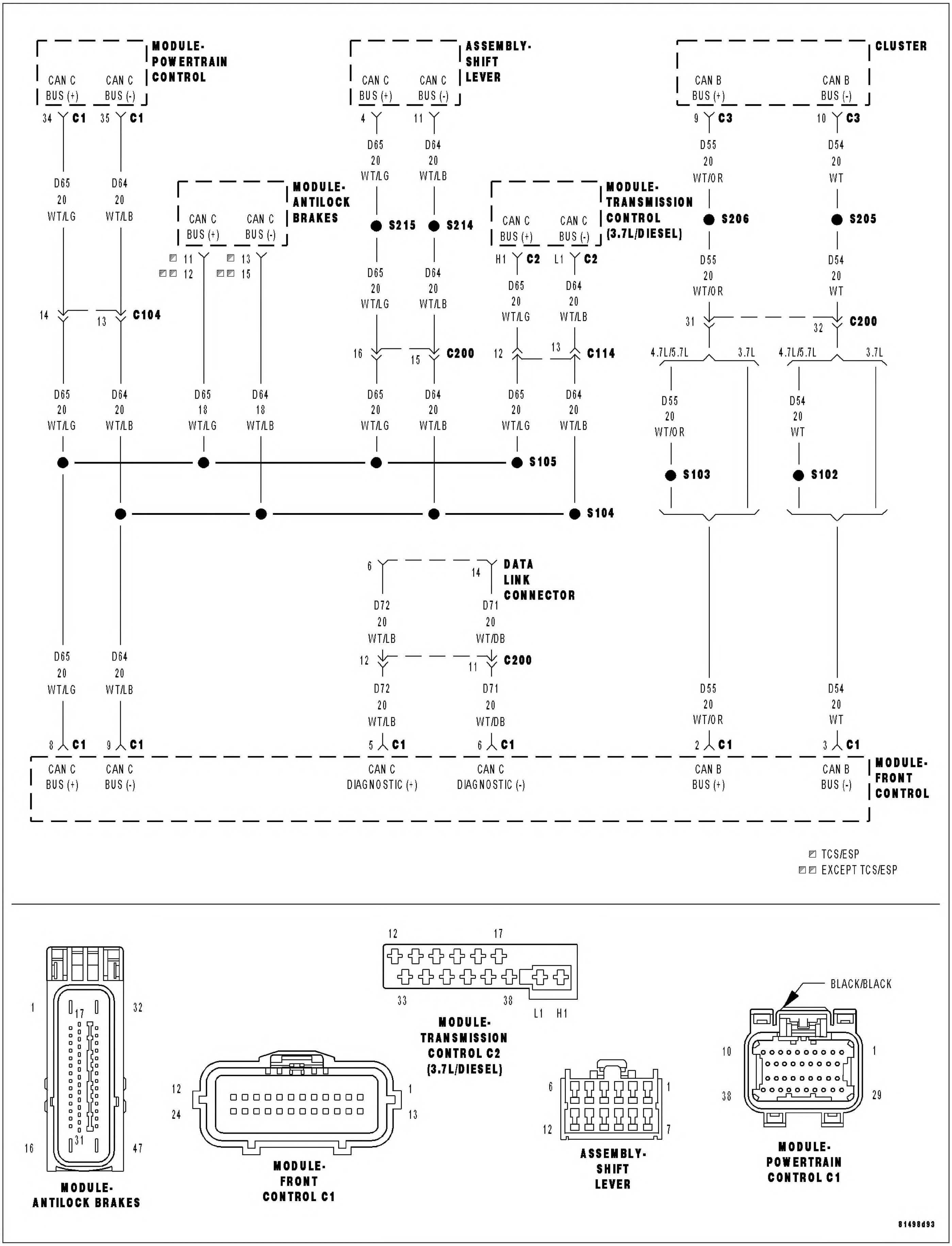
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the Front Control Module (FCM).

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS DTC or U0101-LOST COMMUNICATION WITH TCM?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U0141-LOST COMMUNICATION WITH FRONT CONTROL MODULE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

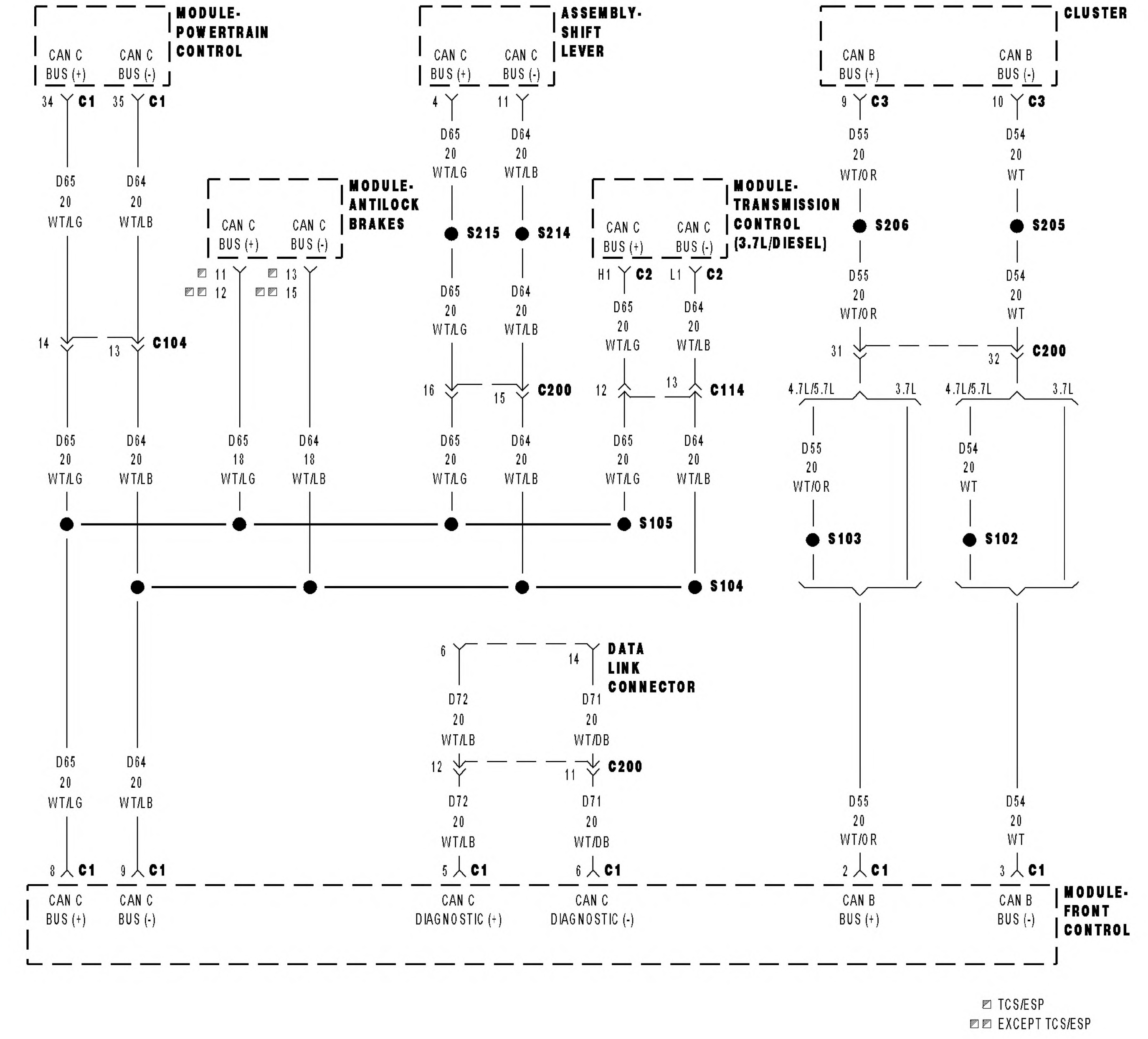
Were there any problems found?

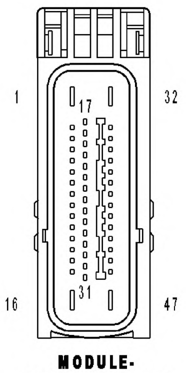
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

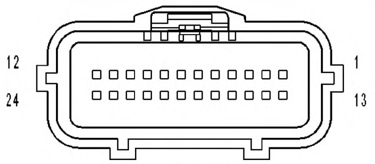
No >> Test Complete.

U0155-LOST COMMUNICATION WITH CLUSTER/CCN

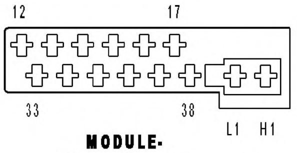

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
17
32
31
16
47

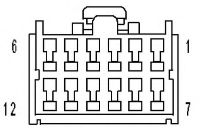
MODULE-ANTILOCK BRAKES



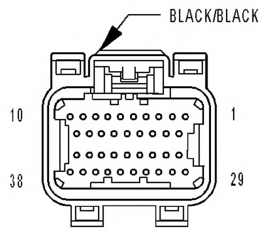
MODULE-FRONT CONTROL C1


12
17
33
38
L1 H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U0155-LOST COMMUNICATION WITH CLUSTER/CCN (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the Cluster/CCN.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS DTC or U0155-LOST COMMUNICATION WITH CLUSTER/CCN?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0155-LOST COMMUNICATION WITH CLUSTER/CCN (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U0155-LOST COMMUNICATION WITH CLUSTER/CCN reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

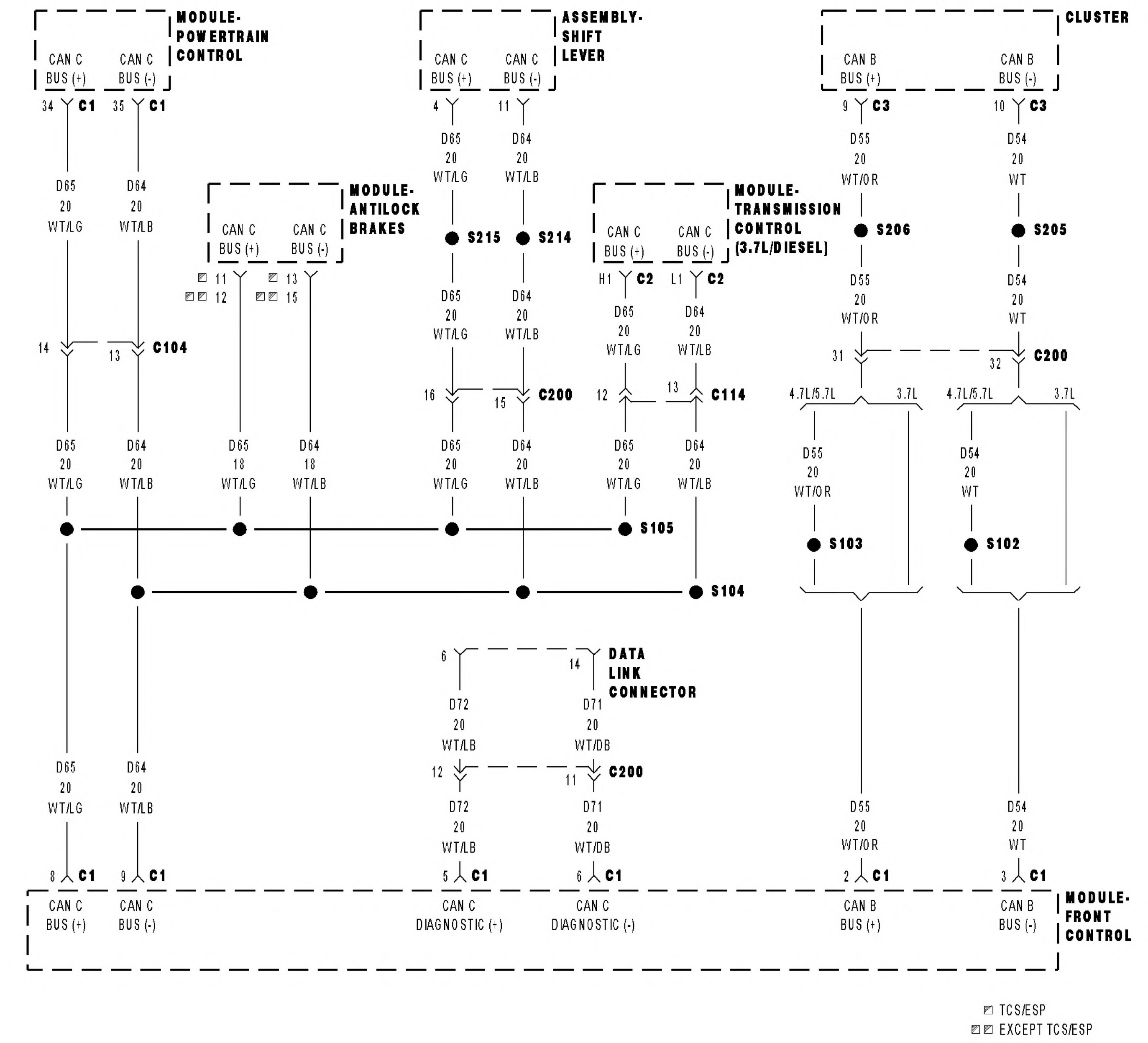
Were there any problems found?

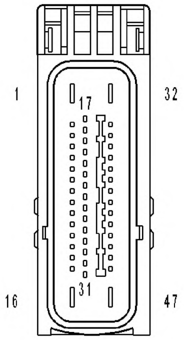
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

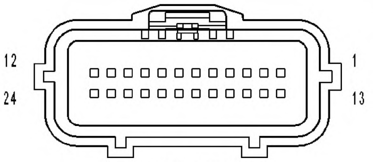
No >> Test Complete.

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE

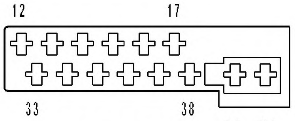

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
D65 18 WT/LG
D64 18 WT/LB
S215
S214
S206
S205
14 C104 13
16 C200 15
12 C114 13
31 C200 32
4.7L/5.7L
3.7L
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12 C200 11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
17
32
16
31
47

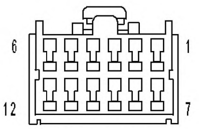
MODULE-ANTILOCK BRAKES



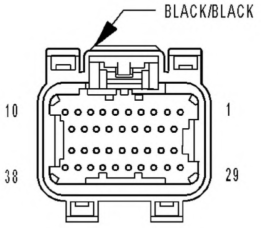
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the HVAC Control Module.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS DTC or U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U0164-LOST COMMUNICATION WITH HVAC CONTROL MODULE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

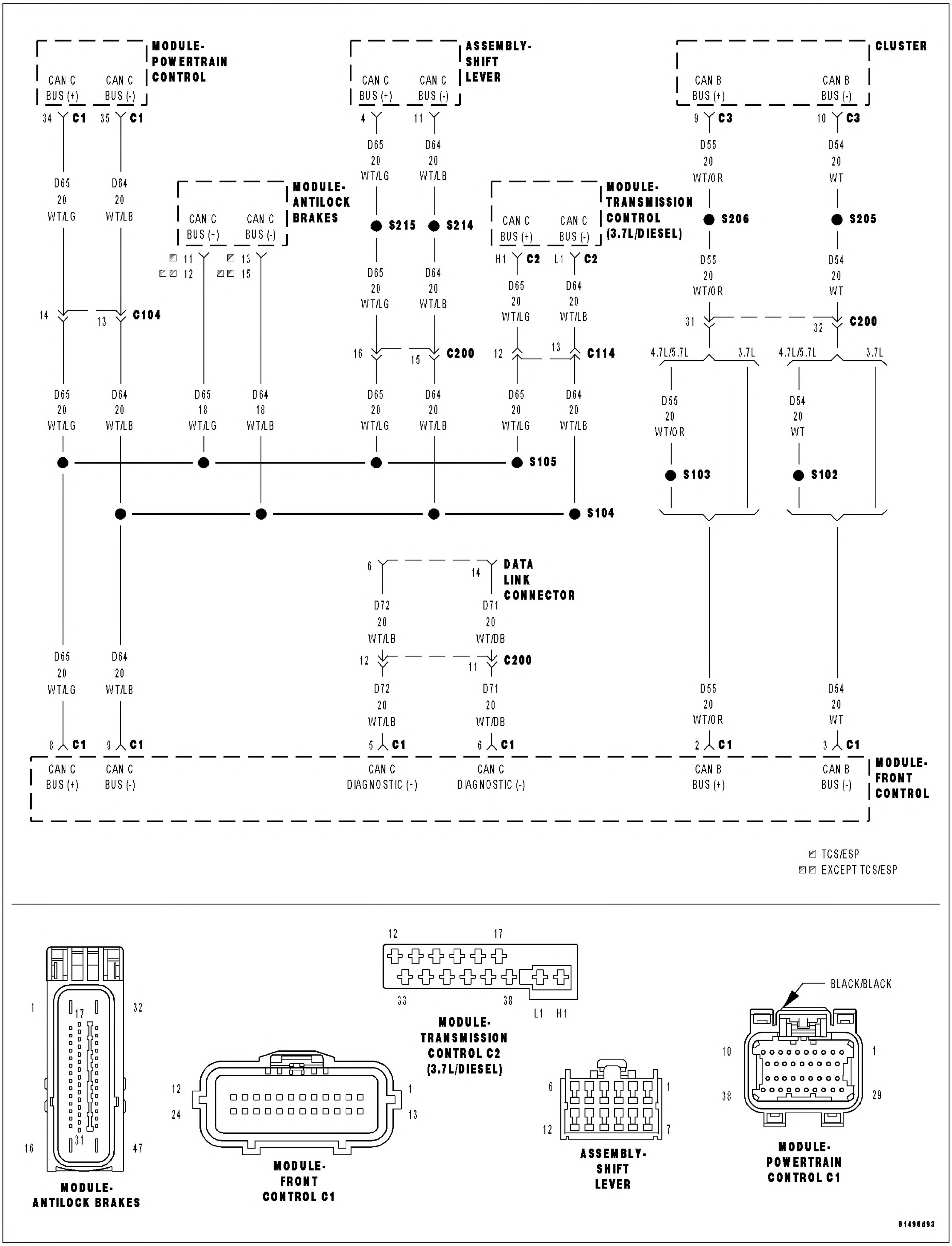
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

U0401-IMPLAUSIBLE DATA RECEIVED FROM ECM/PCM


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
31
32
C200
16
15
C200
12
13
C114
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0401-IMPLAUSIBLE DATA RECEIVED FROM ECM/PCM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN message received at least once, and no U0002-CAN C Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN message from the Engine Control Module (ECM).

Possible Causes
FCM CAN BUS DTCS
ENGINE DTCS
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK IF FCM CAN BUS DTC'S ARE PRESENT

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

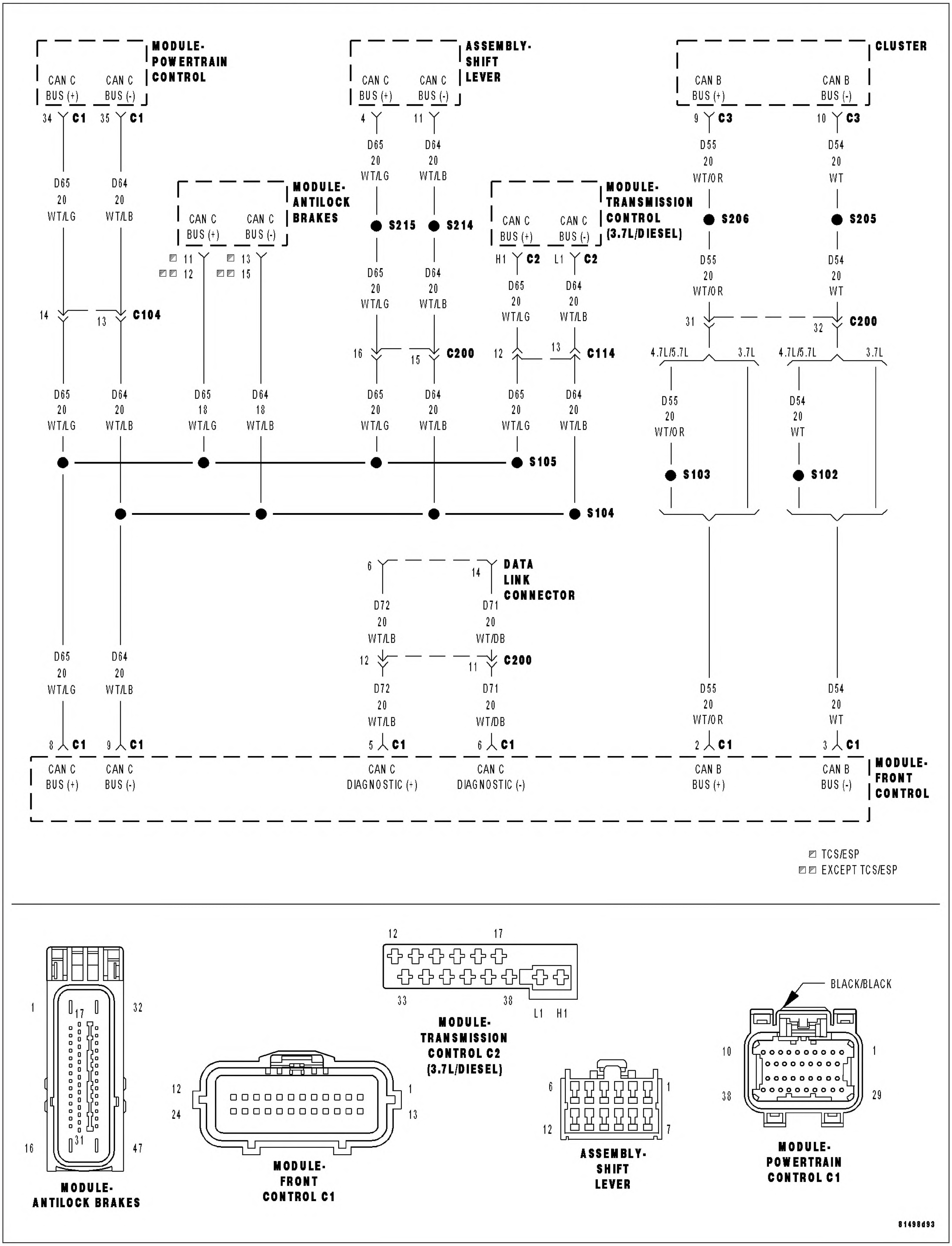
With the scan tool, read Engine DTCs.

Are there any Engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U0404-IMPLAUSIBLE DATA RECEIVED FROM ESM


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
11
12
13
15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
D65 18 WT/LG
D64 18 WT/LB
16
15
C200
12
13
C114
31
32
4.7L/5.7L
3.7L
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0404-IMPLAUSIBLE DATA RECEIVED FROM ESM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the Electronic Shift Module (ESM).

Possible Causes
FCM CAN BUS DTC'S PRESENT
ELECTRONIC SHIFT MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. ELECTRONIC SHIFT MODULE DTC'S PRESENT

With the scan tool, read Electronic Shift Module (ESM) DTCs.

Are there any ESM DTC's present?

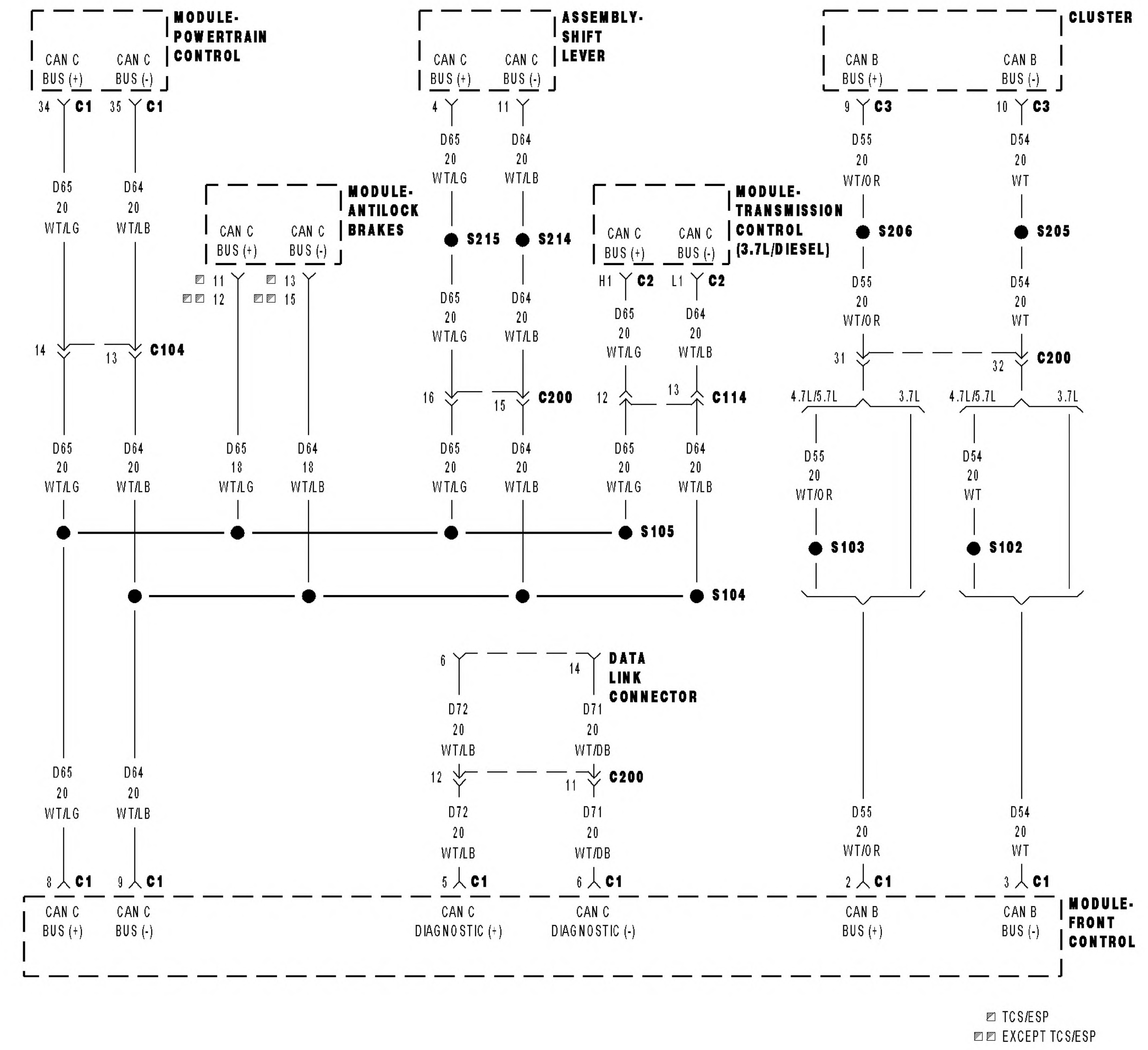
Yes >> Refer to Section 21 – AUTOMATIC TRANSMISSION NAG1 - SHIFTER DIAGNOSTICS and perform the appropriate diagnostic procedure.

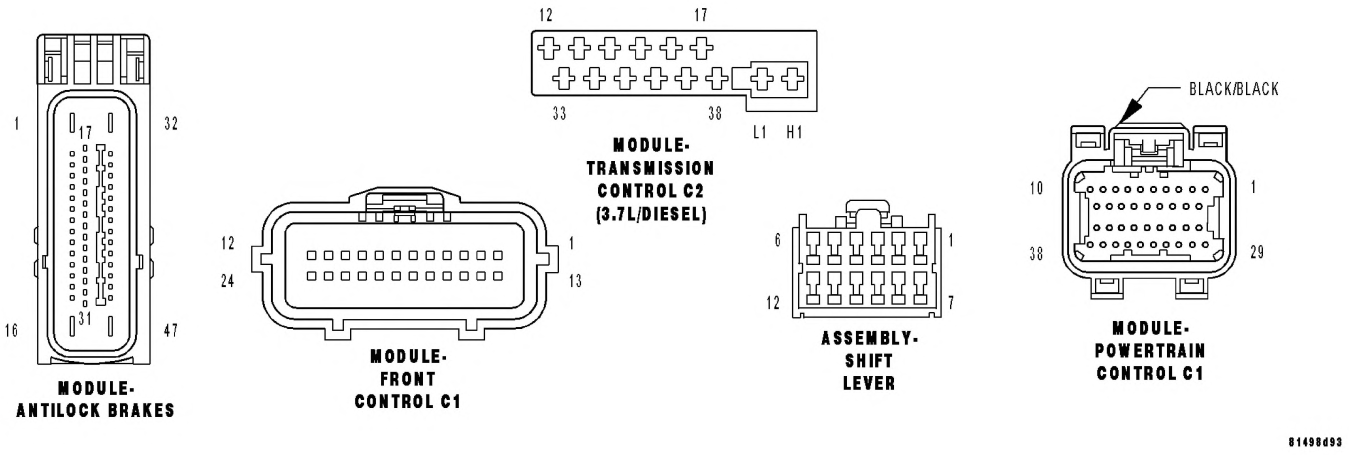
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U0415-IMPLAUSIBLE DATA RECEIVED FROM ABS


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
S215
S214
S206
S205
14 C104
13
16 C200
15
12 C114
13
31 C200
32
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12 C200
11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0415-IMPLAUSIBLE DATA RECEIVED FROM ABS (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ABS control module.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ABS DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTC'S ARE PRESENT

With the scan tool, read ABS DTCs.

Are there any ABS DTC's present?

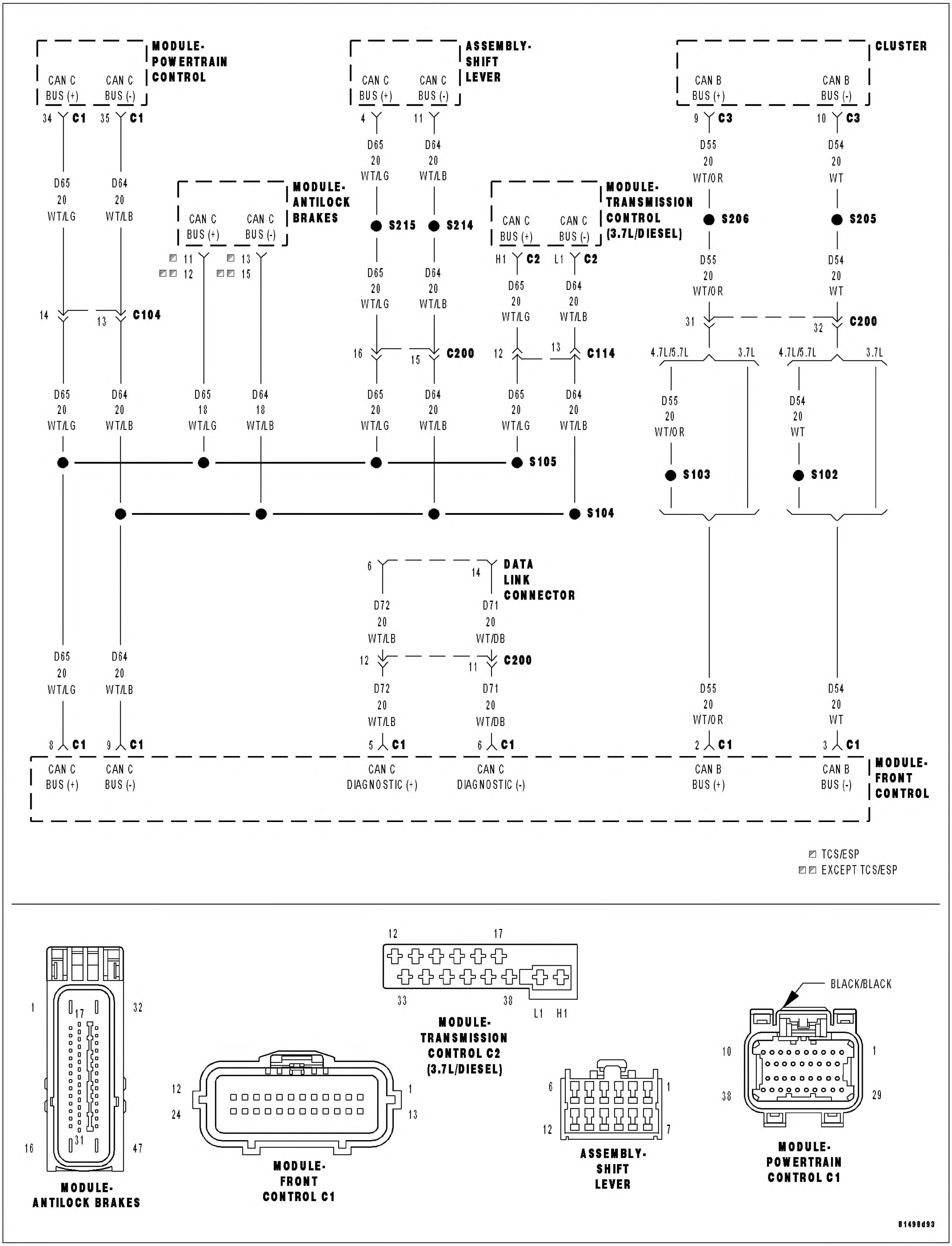
Yes >> Refer to Section 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U0423-IMPLAUSIBLE DATA RECEIVED FROM CLUSTER/CCN


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
D65 18 WT/LG
D64 18 WT/LB
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0423-IMPLAUSIBLE DATA RECEIVED FROM CLUSTER/CCN (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the CLUSTER/CCN.

Possible Causes
CAN BUS DTC'S PRESENT
CLUSTER/CCN MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF CLUSTER/CCN DTC'S ARE PRESENT

With the scan tool, read CLUSTER/CCN DTCs.

Are there any CLUSTER/CCN DTC's present?

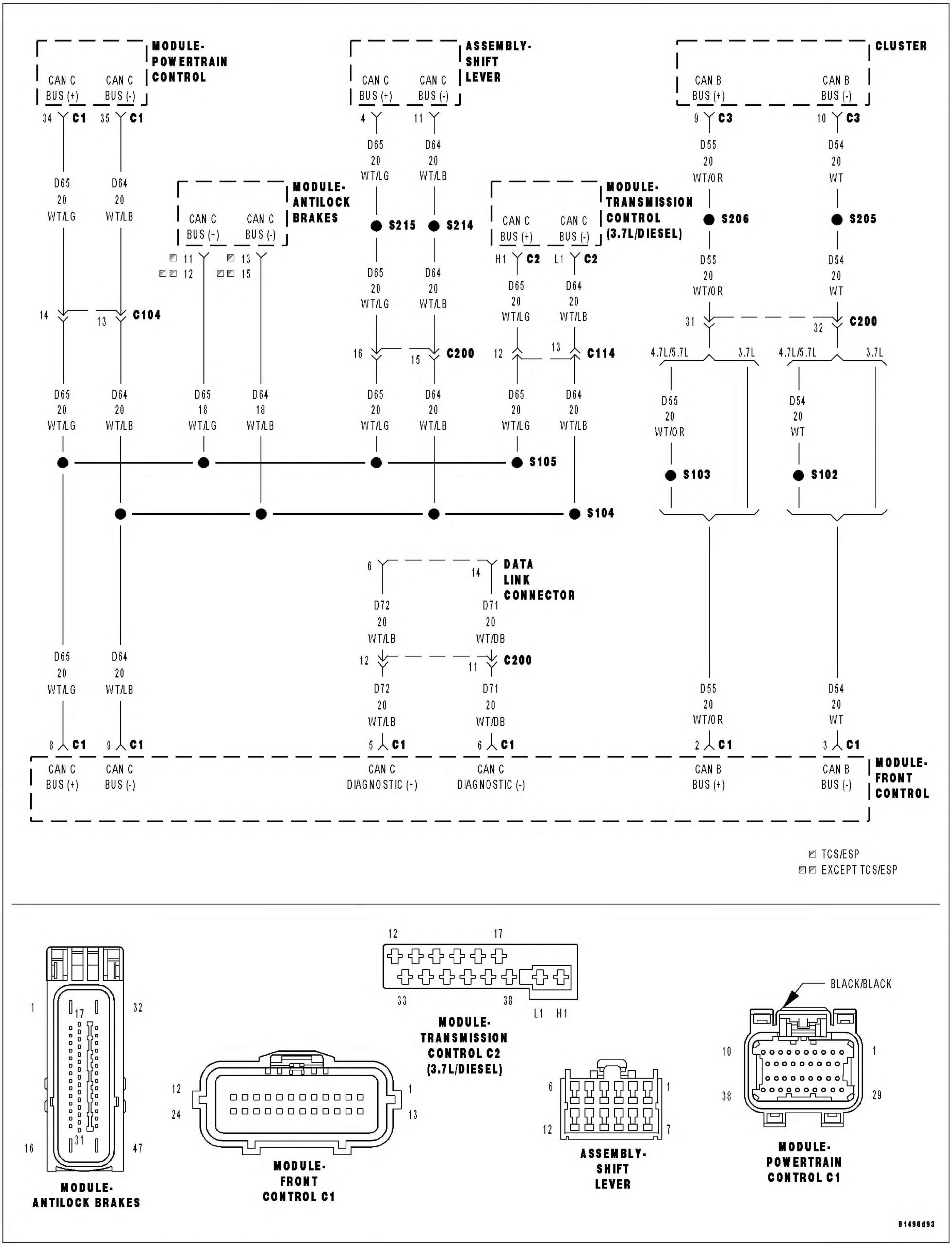
Yes >> Refer to Section Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/INSTRUMENT CLUSTER - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U0424-IMPLAUSIBLE DATA RECEIVED FROM HVAC CONTROL MODULE


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0424-IMPLAUSIBLE DATA RECEIVED FROM HVAC CONTROL MODULE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the HVAC control module.

Possible Causes
CAN BUS DTC'S PRESENT
HVAC DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

2. CHECK IF HVAC DTC'S ARE PRESENT

With the scan tool, read HVAC DTCs.

Are there any HVAC DTC's present?

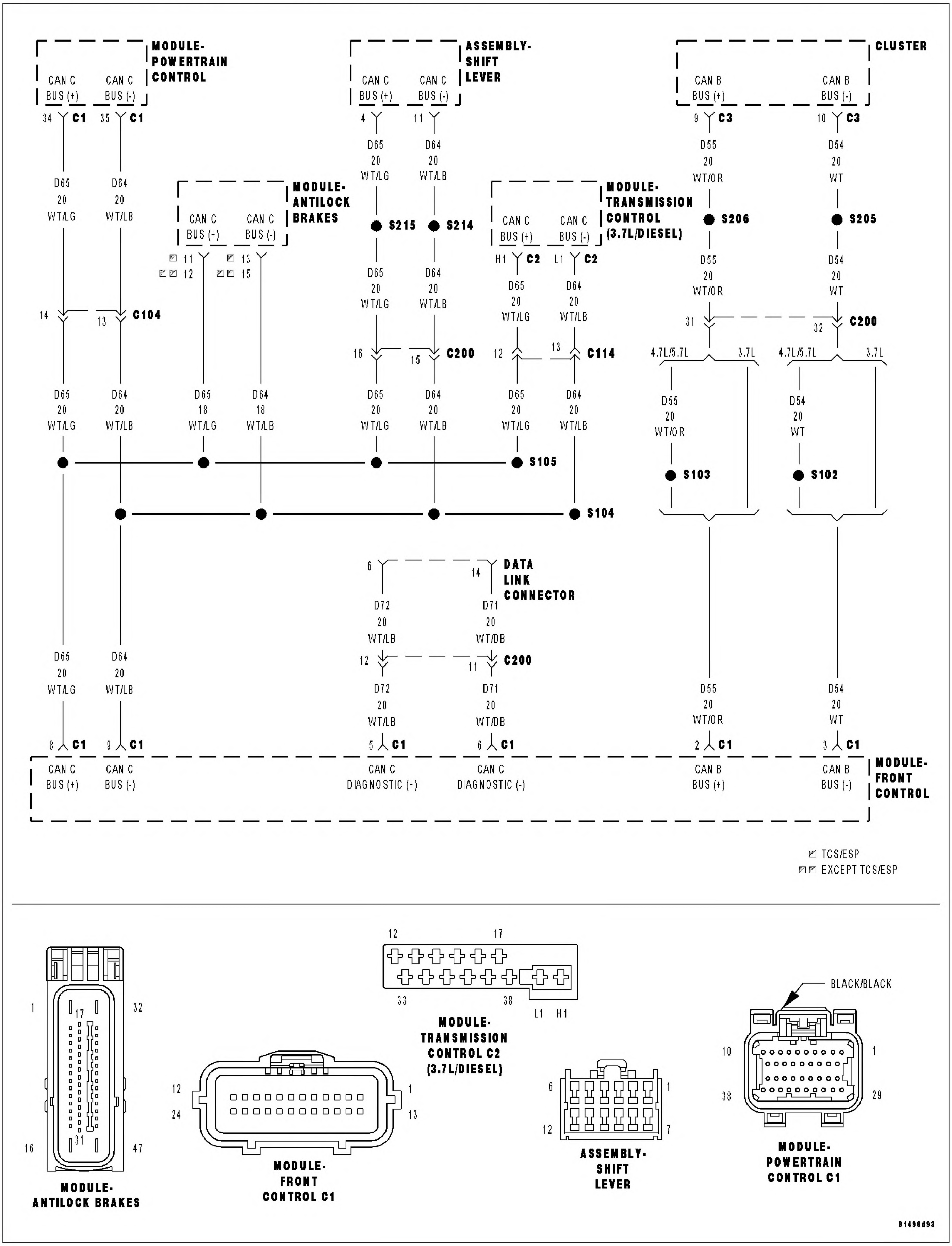
Yes >> Refer to Section 24 - HVAC - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U0431-IMPLAUSIBLE DATA FROM FCM


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
S215
S214
S206
S205
14 C104
13
16 C200
15
12 C114
13
31 C200
32
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12 C200
11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U0431-IMPLAUSIBLE DATA FROM FCM (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the FCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

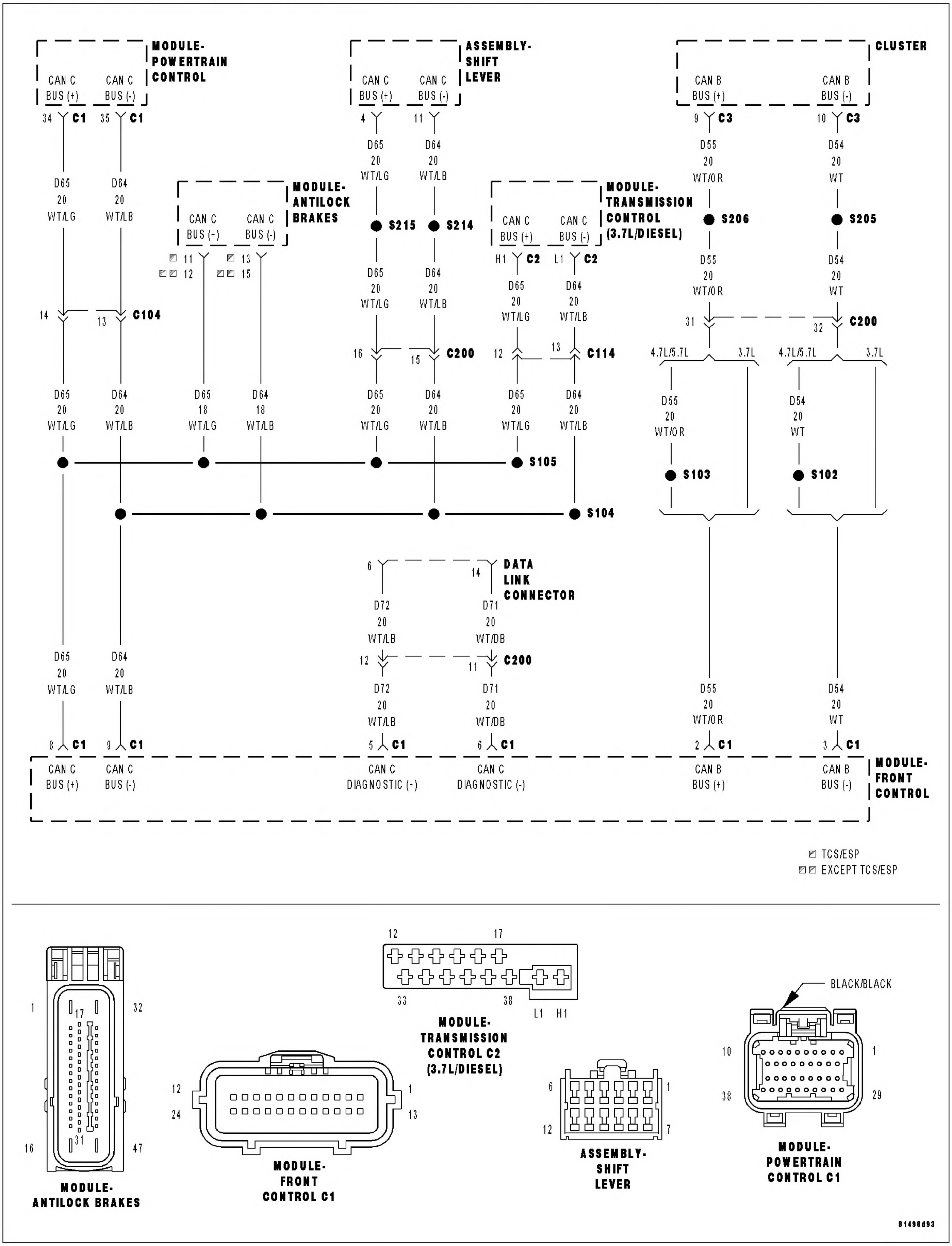
Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U110B-LOST ENGINE COOLANT MESSAGE


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13 C104
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
ASSEMBLY-SHIFT LEVER
4
11
S215
S214
16
15 C200
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
12
13 C114
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32 C200
4.7L/5.7L
3.7L
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11 C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U110B-LOST ENGINE COOLANT MESSAGE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the ECM/PCM.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS DTC or U0100-LOST COMMUNICATION WITH ECM/PCM?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U110B-LOST ENGINE COOLANT MESSAGE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U110B-LOST ENGINE COOLANT MESSAGE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

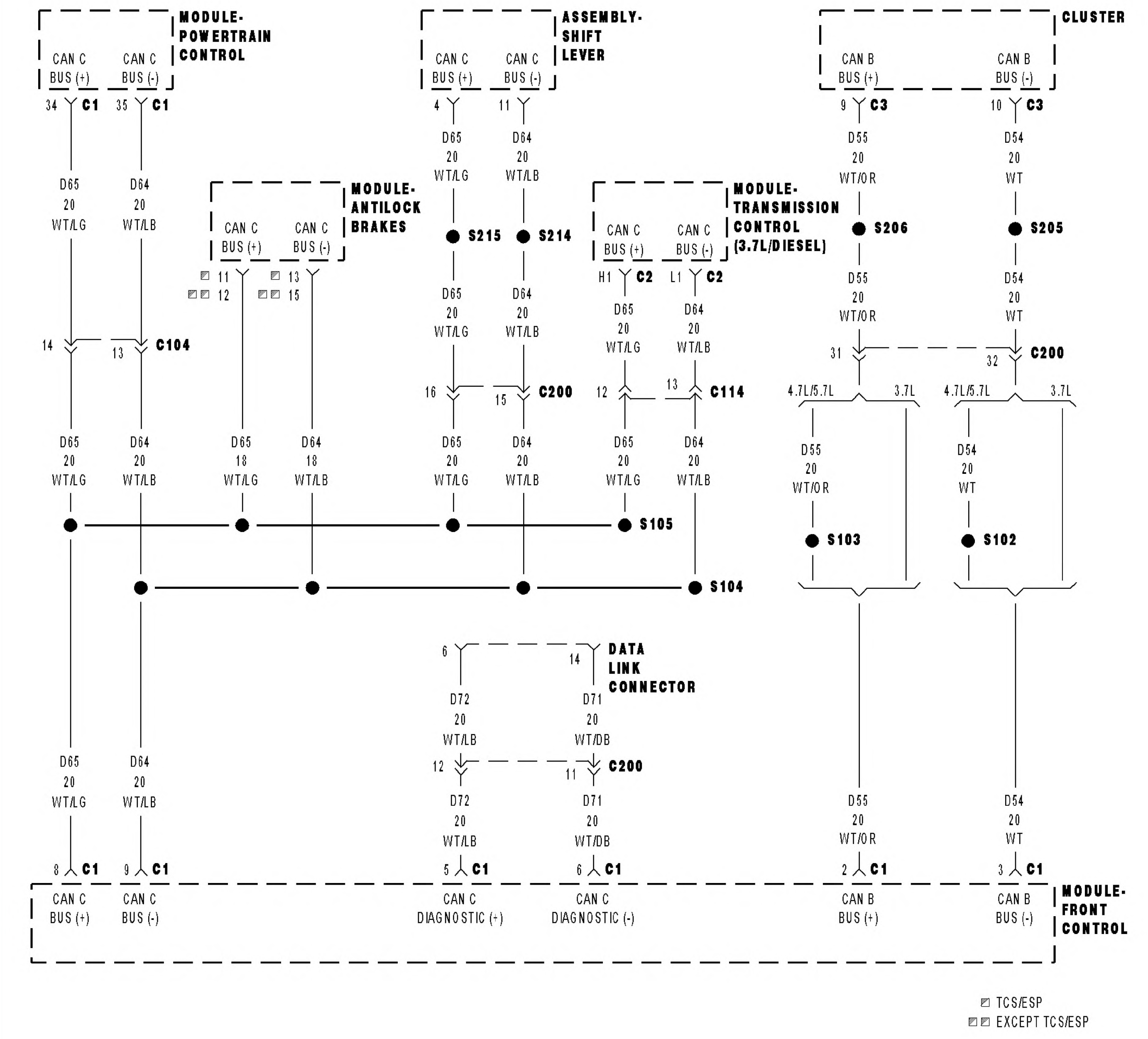
Were there any problems found?

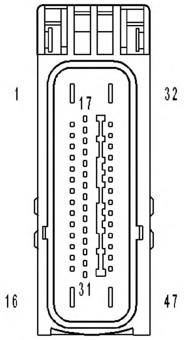
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

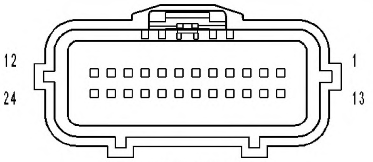
No >> Test Complete.

U1118-LOST ENGINE MESSAGE

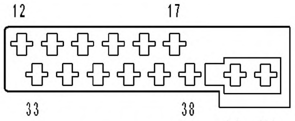

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13
C104
ASSEMBLY-SHIFT LEVER
4
11
S215
S214
16
15
C200
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
12
13
C114
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32
C200
4.7L/5.7L
3.7L
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47

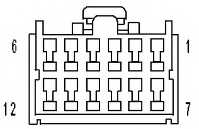
MODULE-ANTILOCK BRAKES



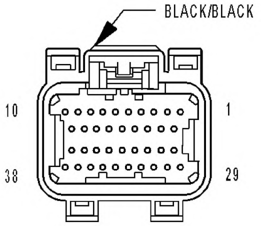
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U1118-LOST ENGINE MESSAGE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the ECM/PCM.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS or U0100-LOST COMMUNICATION WITH ECM/PCM?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U1118-LOST ENGINE MESSAGE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U1118-LOST ENGINE MESSAGE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

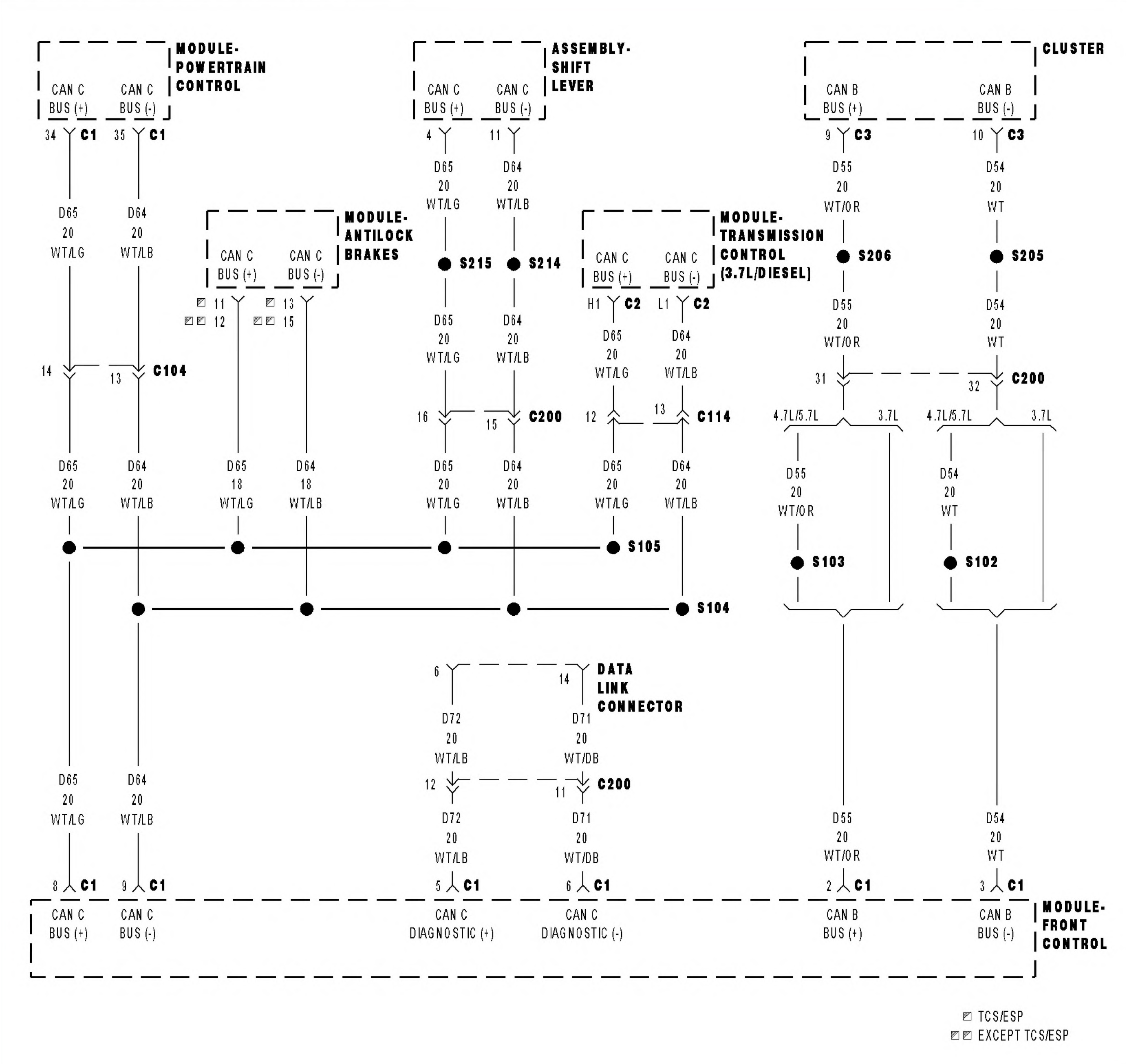
Were there any problems found?

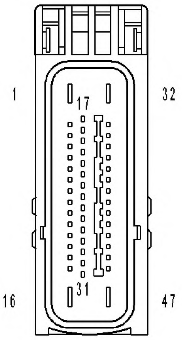
Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

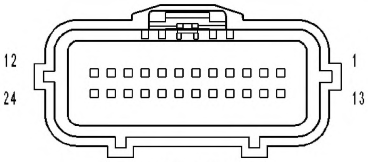
No >> Test Complete.

U1119-LOST FCM MESSAGE

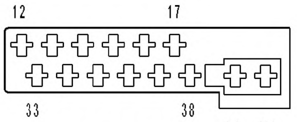

MODULE-
POWERTRAIN
CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13 C104
MODULE-
ANTILOCK
BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
ASSEMBLY-
SHIFT
LEVER
4
11
S215
S214
16
15 C200
MODULE-
TRANSMISSION
CONTROL
(3.7L/DIESEL)
H1 C2
L1 C2
12
13 C114
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32 C200
4.7L/5.7L
3.7L
S103
S102
6
14
DATA
LINK
CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11 C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-
FRONT
CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47

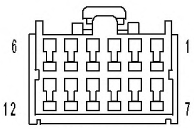
**MODULE-
ANTILOCK BRAKES**



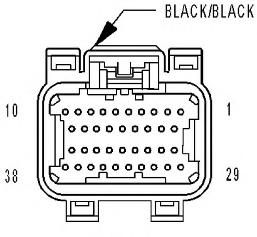
**MODULE-
FRONT
CONTROL C1**


12
17
33
38
L1
H1

**MODULE-
TRANSMISSION
CONTROL C2
(3.7L/DIESEL)**



**ASSEMBLY-
SHIFT
LEVER**


BLACK/BLACK
10
1
38
29

**MODULE-
POWERTRAIN
CONTROL C1**

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U1119-LOST FCM MESSAGE (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Transmission Control Module (TCM) receives information from the Engine, Anti-lock Brake System, and the Electronic Gear Shift control modules over the CAN C bus. The CAN C bus is a high speed communication bus that allows real time control capability between various controllers. Most messages are sent every 20 mSec, this means critical information can be shared between multiple controllers almost instantaneously. The CAN C bus is a two wire bus with a CAN (+) and a CAN (-) circuit. To reduce the potential of radio and other electrical noise interference, the CAN Bus circuit wiring is manufactured using a twisted pair configuration within the electrical wiring harness.

- **When Monitored:**
  Continuously with the ignition on.
- **Set Condition:**
  The DTC will set if a valid CAN ID was not received in the required time from the FCM.

Possible Causes
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK THE FCM FOR CAN C BUS COMMUNICATION DTCS

With the scan tool, check for FCM DTCs.

Does the FCM report the DTC U0001-CAN C BUS or U0101-LOST COMMUNICATION WITH TCM?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom. Perform the diagnostic procedure for U0001-CAN C BUS first if it is present.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 2

U1119-LOST FCM MESSAGE (CONTINUED)

2. CHECK IF THE DTC IS CURRENT

NOTE: When the Transmission Control Module (TCM) detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set. This information is located in the scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Ignition on, engine not running.

With the scan tool, erase Transmission DTC's.

Using the Environmental Data recorded earlier, try to duplicate the conditions in which the DTC originally set. It may be necessary to test drive the vehicle.

With the scan tool, read Transmission DTC's.

Did the DTC U1119-LOST FCM MESSAGE reset?

Yes >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Go To 3

---

3. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the schematics as a guide, inspect the wiring and connectors specific to this circuit.

Wiggle the wiring and connectors while checking for any possible open or shorted circuits.

Check for any Service Information Tune-ups or Technical Service Bulletins that may apply.

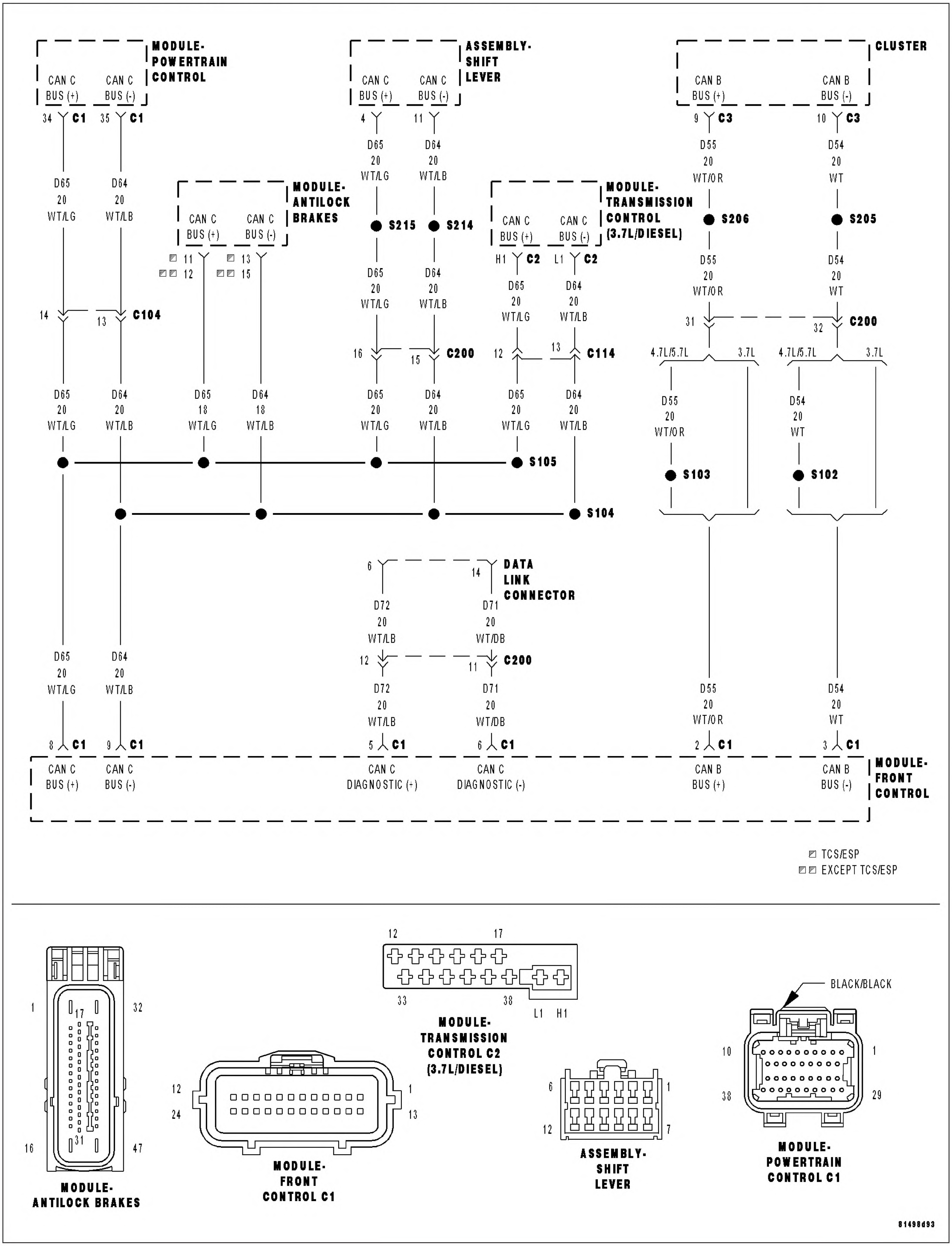
Were there any problems found?

Yes >> Repair as necessary.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Test Complete.

U1400-IMPLAUSIBLE TPS SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
S206
S205
▨ 11
▨▨ 12
▨ 13
▨▨ 15
H1 C2
L1 C2
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1400-IMPLAUSIBLE TPS SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ECM/PCM DTC'S ARE PRESENT

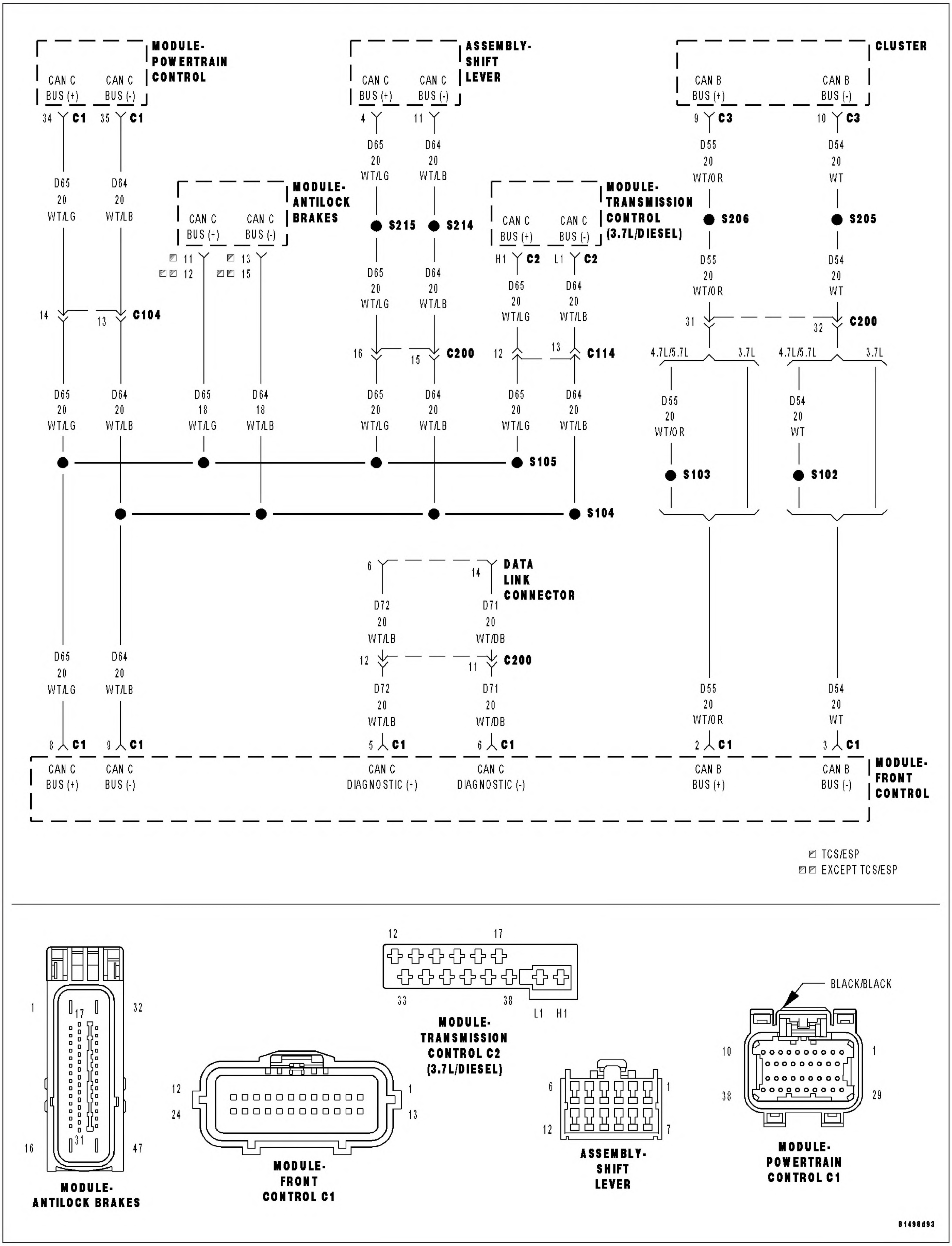
With the scan tool, read engine DTCs.

Are there any engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1401-IMPLAUSIBLE ENGINE SPEED SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
S215
S214
S206
S205
▨ 11
▨▨ 12
▨ 13
▨▨ 15
H1 C2
L1 C2
14
13
C104
31
32
C200
16
15
12
13
C114
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1401-IMPLAUSIBLE ENGINE SPEED SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ENGINE MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

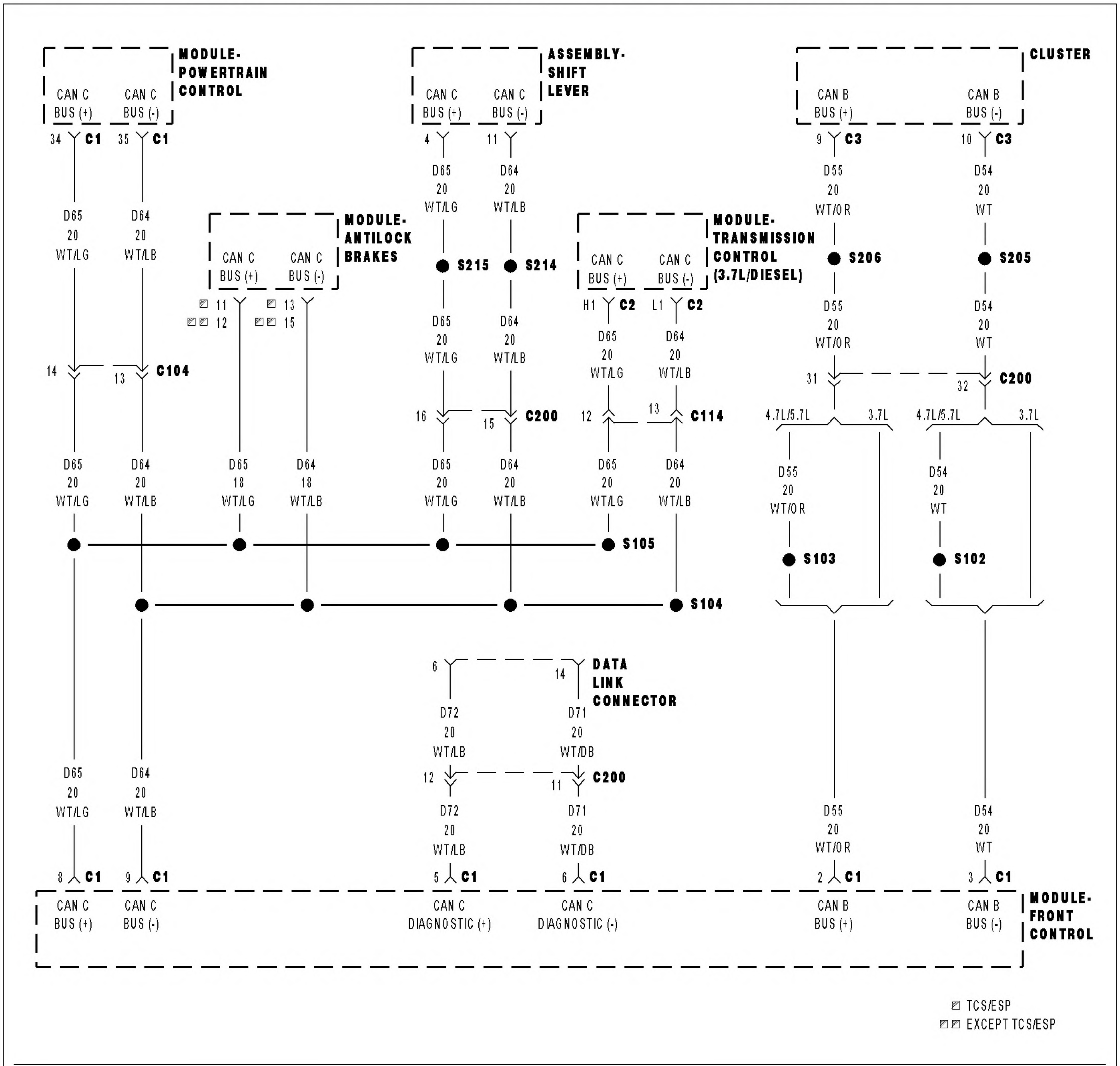
With the scan tool, read engine DTCs.

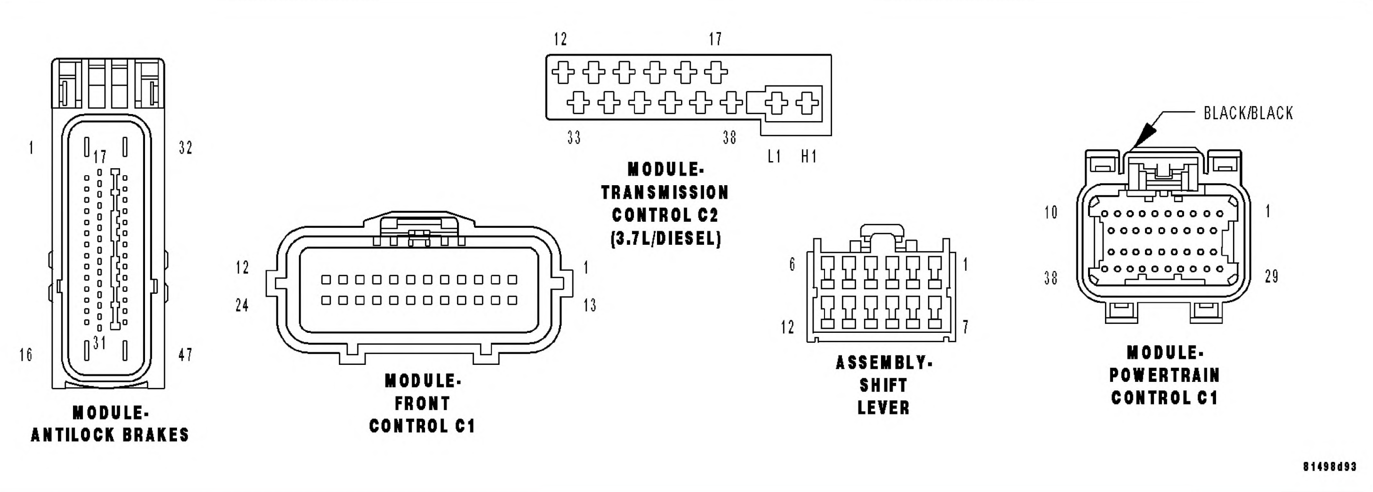
Are there any engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1402-IMPLAUSIBLE ENGINE TEMPERATURE SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
1
24
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1402-IMPLAUSIBLE ENGINE TEMPERATURE SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

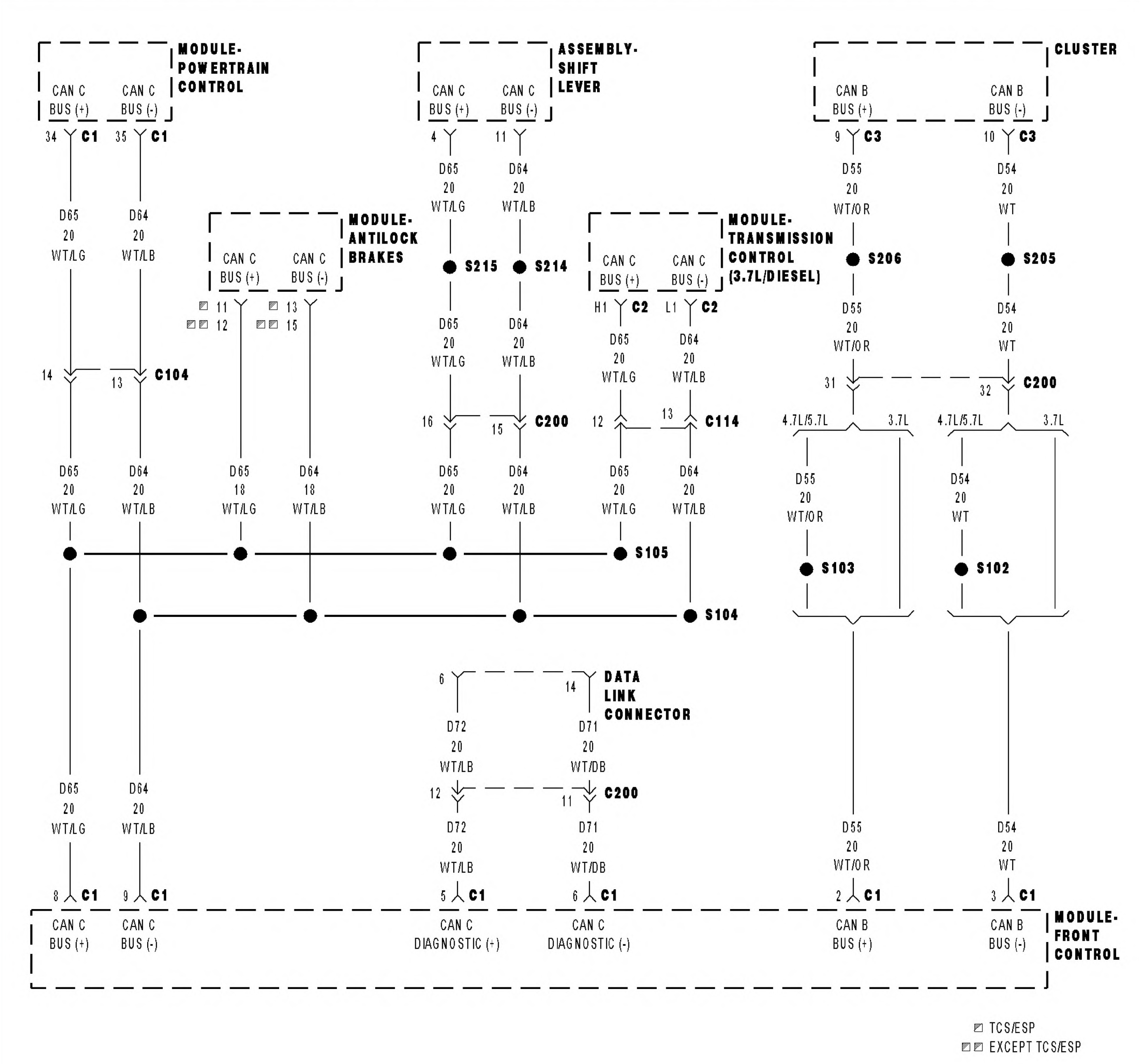
With the scan tool, read engine DTCs.

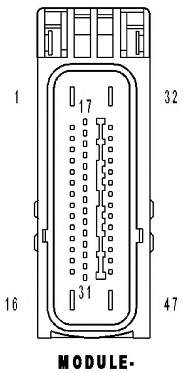
Are there any engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

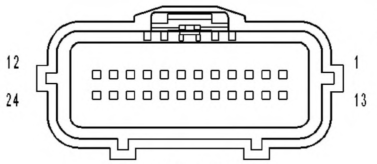
No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1404-IMPLAUSIBLE STATIC ENGINE TORQUE SIGNAL RECEIVED

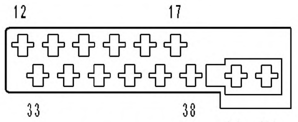

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13 C104
ASSEMBLY-SHIFT LEVER
4
11
S215
S214
16
15 C200
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32 C200
4.7L/5.7L
3.7L
S103
S102
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
12
13 C114
S105
S104
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11 C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
17
32
16
31
47

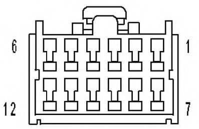
MODULE-ANTILOCK BRAKES



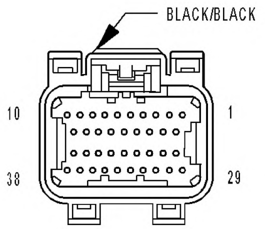
MODULE-FRONT CONTROL C1


12
17
33
38
L1 H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U1404-IMPLAUSIBLE STATIC ENGINE TORQUE SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

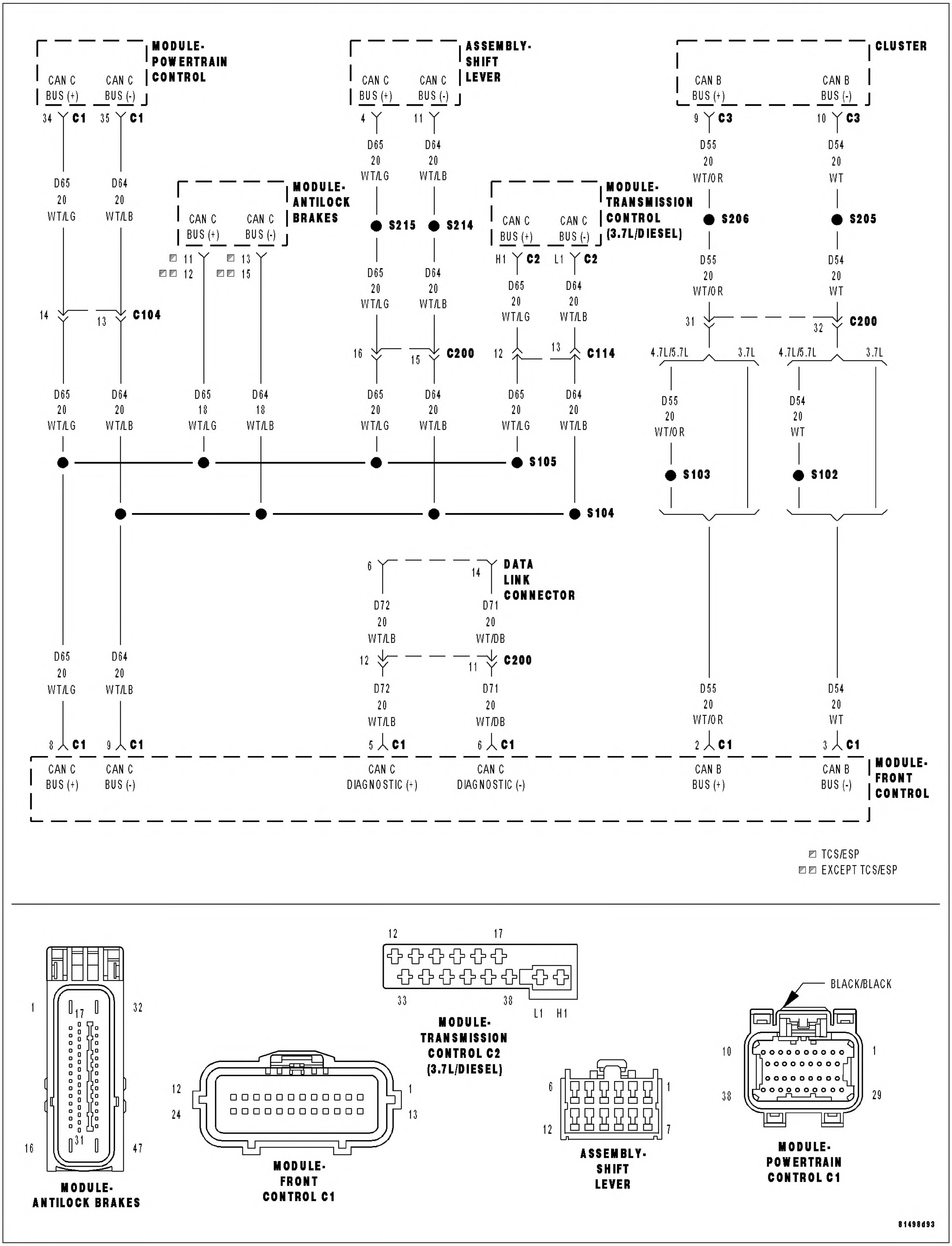
With the scan tool, read engine DTCs.

Are there any engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1405-IMPLAUSIBLE MINIMUM ENGINE TORQUE SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
CAN C BUS (+)
CAN C BUS (-)
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
CAN C BUS (+)
CAN C BUS (-)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1405-IMPLAUSIBLE MINIMUM ENGINE TORQUE SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

With the scan tool, read engine DTCs.

Are there any engine DTC's present?

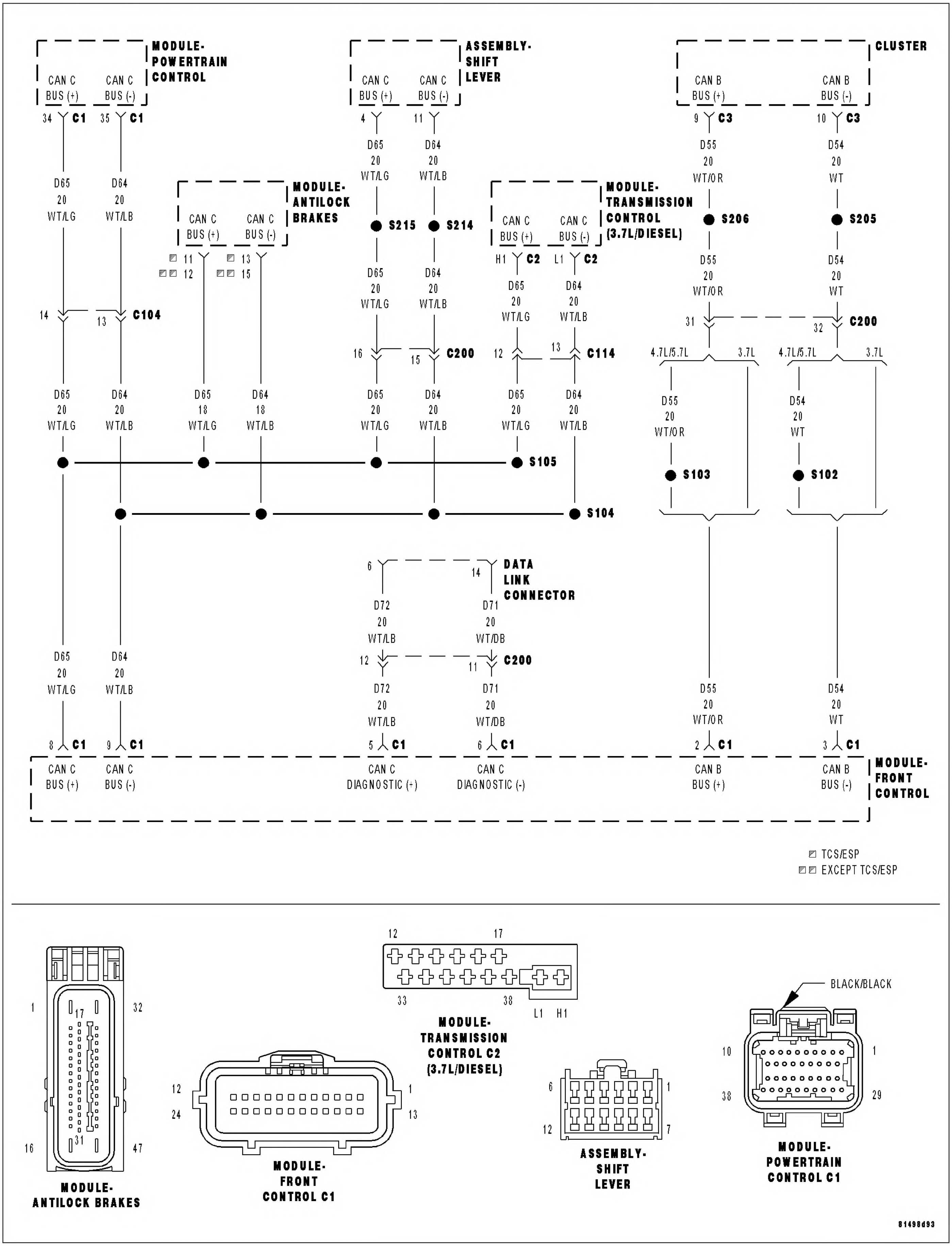
Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.</

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1406-IMPLAUSIBLE MAXIMUM ENGINE TORQUE SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
CAN C BUS (+)
CAN C BUS (-)
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
CAN C BUS (+)
CAN C BUS (-)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
12
1
24
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1406-IMPLAUSIBLE MAXIMUM ENGINE TORQUE SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

With the scan tool, read engine DTCs.

Are there any engine DTC's present?

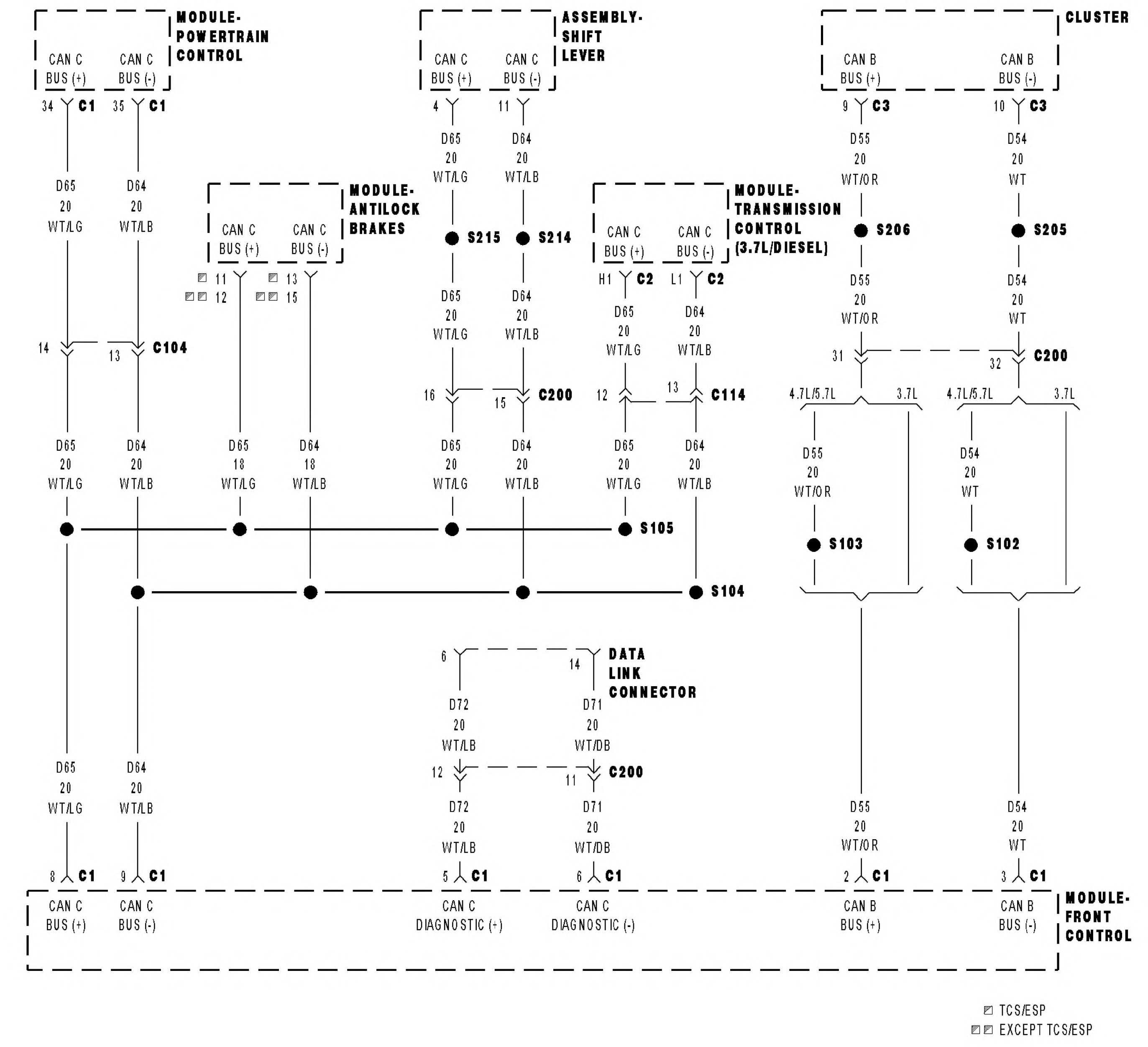
Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.

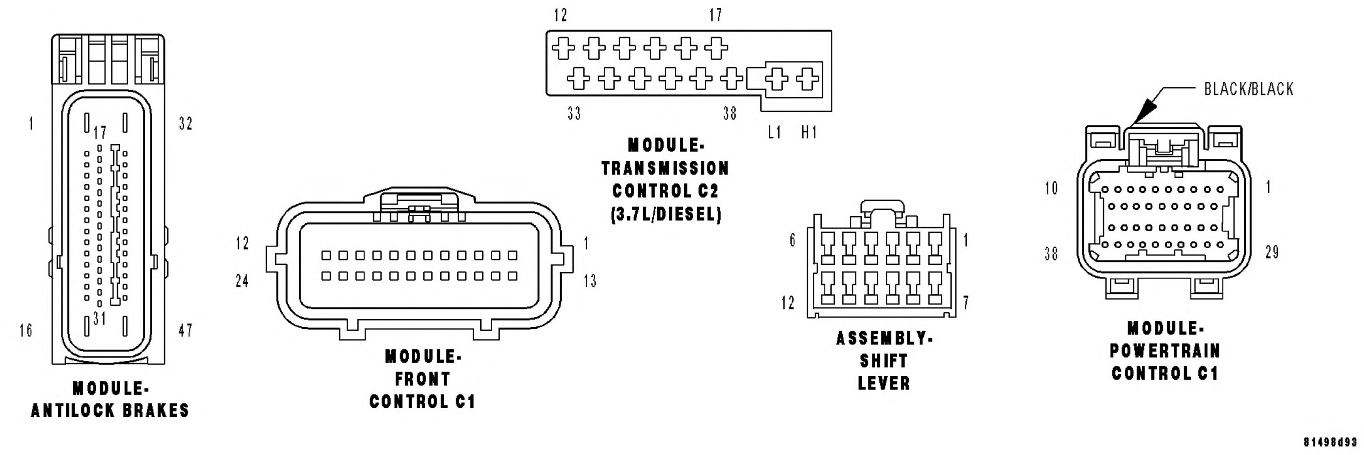
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1407-IMPLAUSIBLE ENGINE TORQUE REQUEST SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13
C104
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
ASSEMBLY-SHIFT LEVER
4
11
S215
S214
16
15
C200
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
12
13
C114
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32
C200
4.7L/5.7L
3.7L
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1407-IMPLAUSIBLE ENGINE TORQUE REQUEST SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ENGINE DTC'S ARE PRESENT

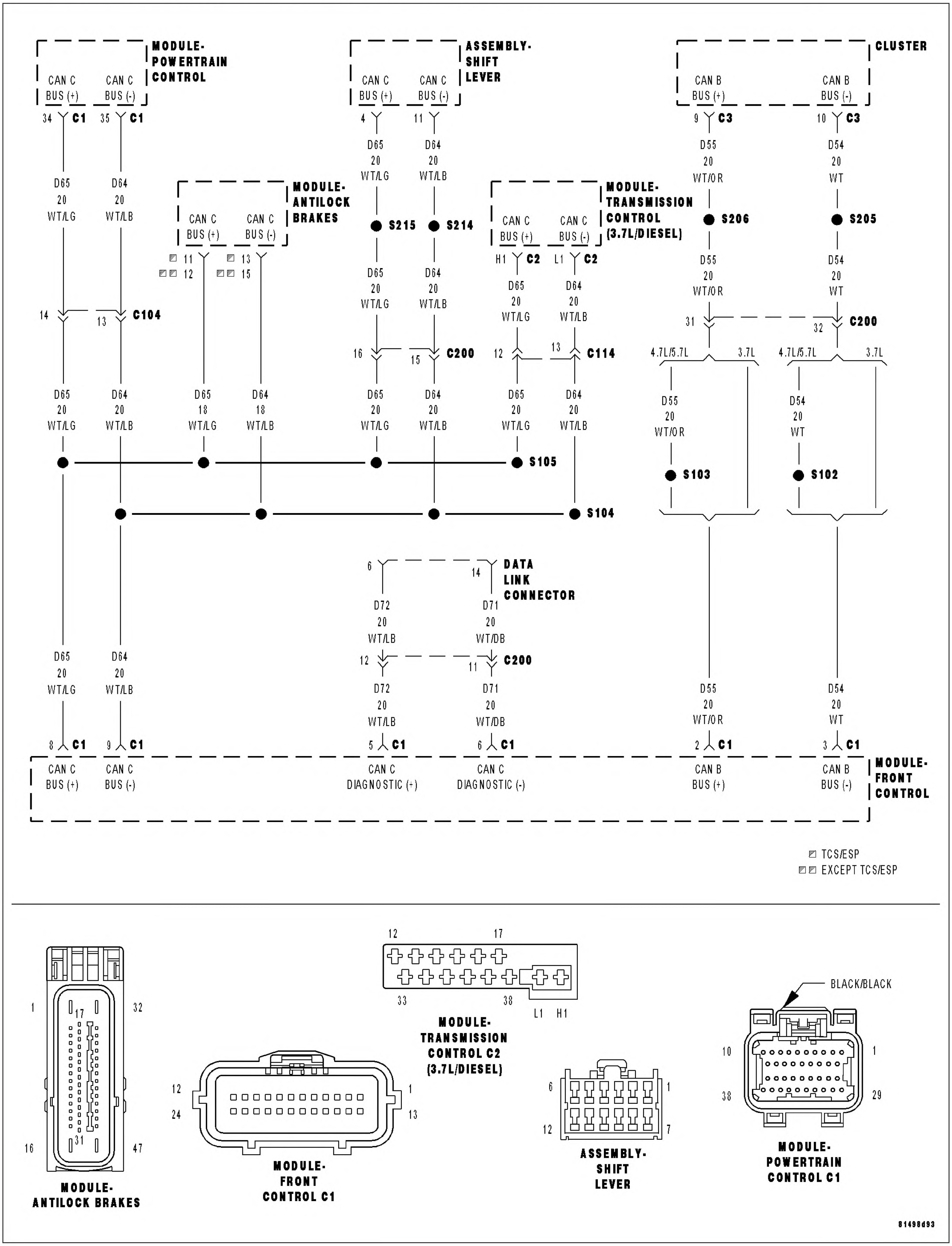
With the scan tool, read engine DTCs.

Are there any engine DTC's present?

Yes >> Refer to the 9 - ENGINE ELECTRICAL DIAGNOSTICS and diagnose the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1408-IMPLAUSIBLE BRAKE SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
S206
S205
▨ 11
▨▨ 12
▨ 13
▨▨ 15
H1 C2
L1 C2
14
13
C104
C200
31
32
16
15
12
13
C114
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1408-IMPLAUSIBLE BRAKE SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ABS control module.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ABS DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTC'S ARE PRESENT

With the scan tool, read ABS DTCs.

Are there any ABS DTC's present?

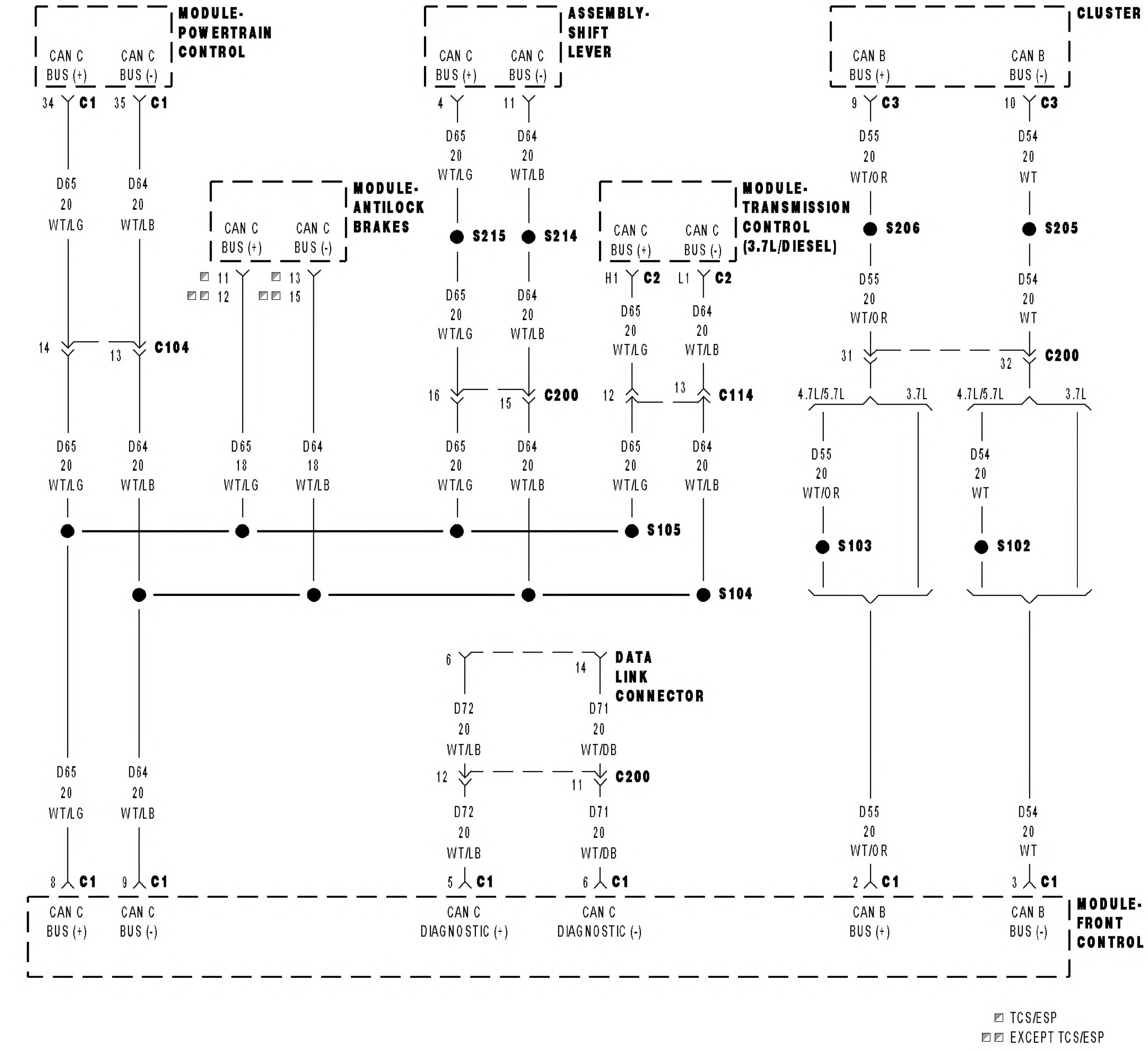
Yes >> Refer to 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

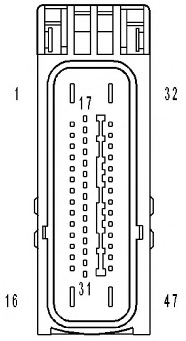
No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1409-IMPLAUSIBLE LEFT FRONT WHEEL SPEED SIGNAL RECEIVED

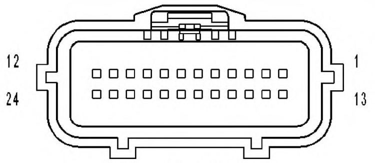


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP

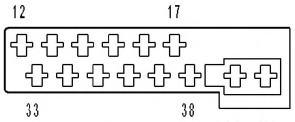


1
17
32
31
16
47

MODULE-ANTILOCK BRAKES

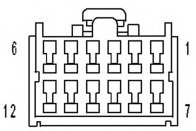


MODULE-FRONT CONTROL C1

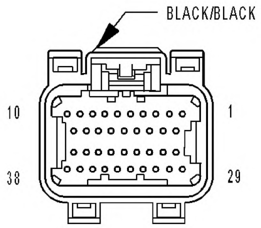


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER



BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U1409-IMPLAUSIBLE LEFT FRONT WHEEL SPEED SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ABS control module.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ABS CONTROL MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTC'S ARE PRESENT

With the scan tool, read ABS DTCs.

Are there any ABS DTC's present?

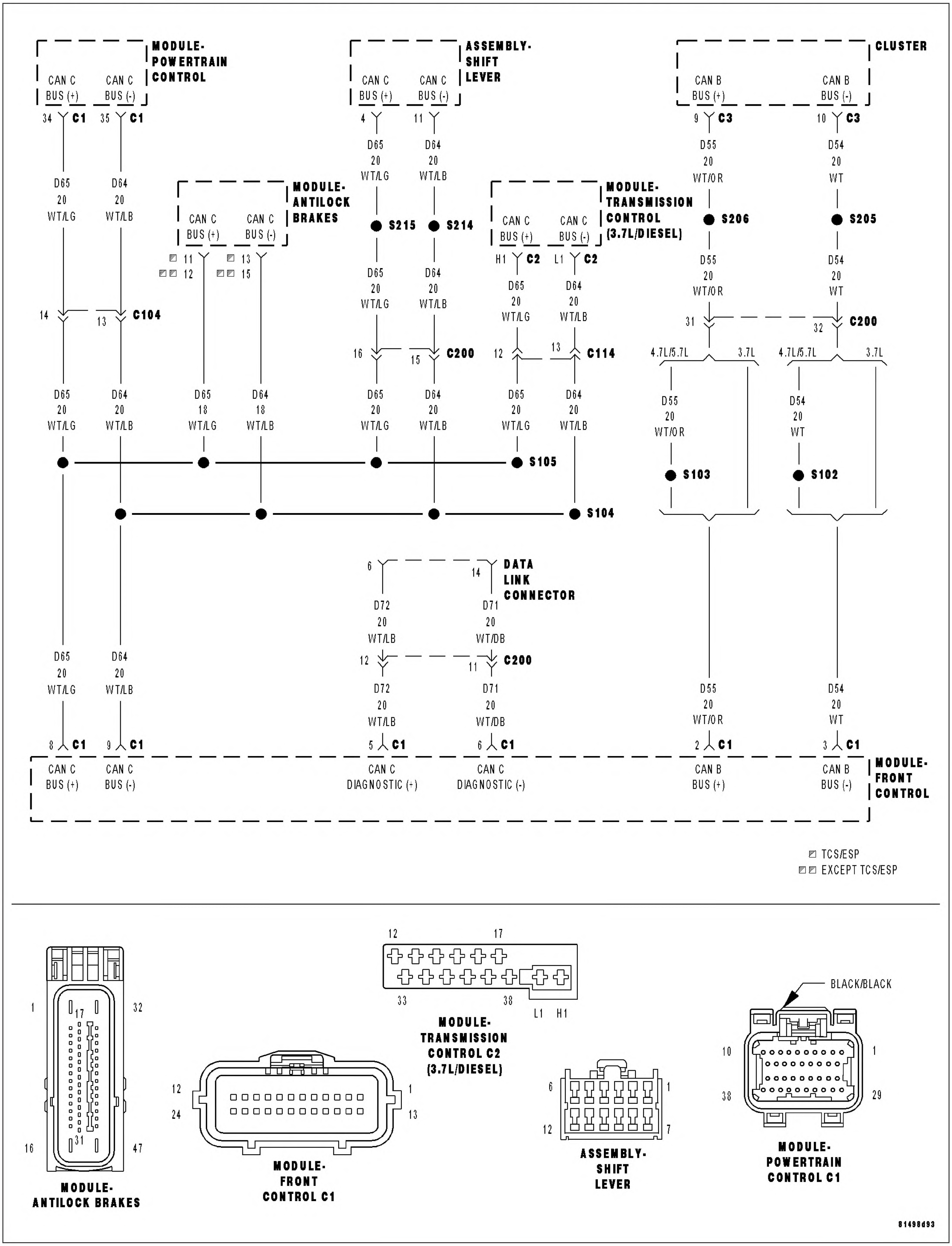
Yes >> Refer to 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U140A-IMPLAUSIBLE RIGHT FRONT WHEEL SPEED SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U140A-IMPLAUSIBLE RIGHT FRONT WHEEL SPEED SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ABS control module.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ABS CONTROL MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTC'S ARE PRESENT

With the scan tool, read ABS DTCs.

Are there any ABS DTC's present?

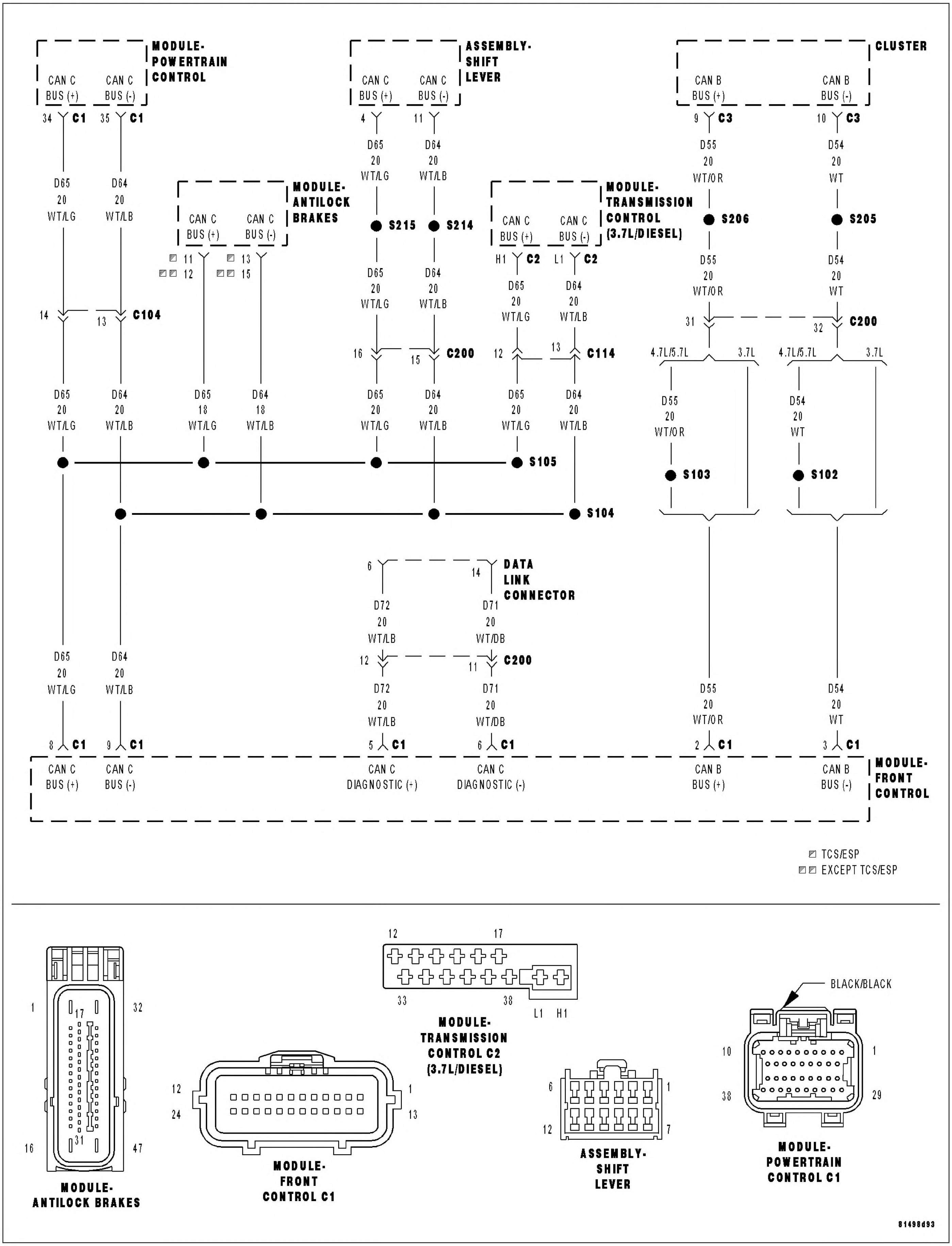
Yes >> Refer to 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U140B-IMPLAUSIBLE LEFT REAR WHEEL SPEED SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
S215
S214
S206
S205
▨ 11
▨▨ 12
▨ 13
▨▨ 15
H1 C2
L1 C2
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U140B-IMPLAUSIBLE LEFT REAR WHEEL SPEED SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ABS control module.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ABS CONTROL MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTC'S ARE PRESENT

With the scan tool, read ABS DTCs.

Are there any ABS DTC's present?

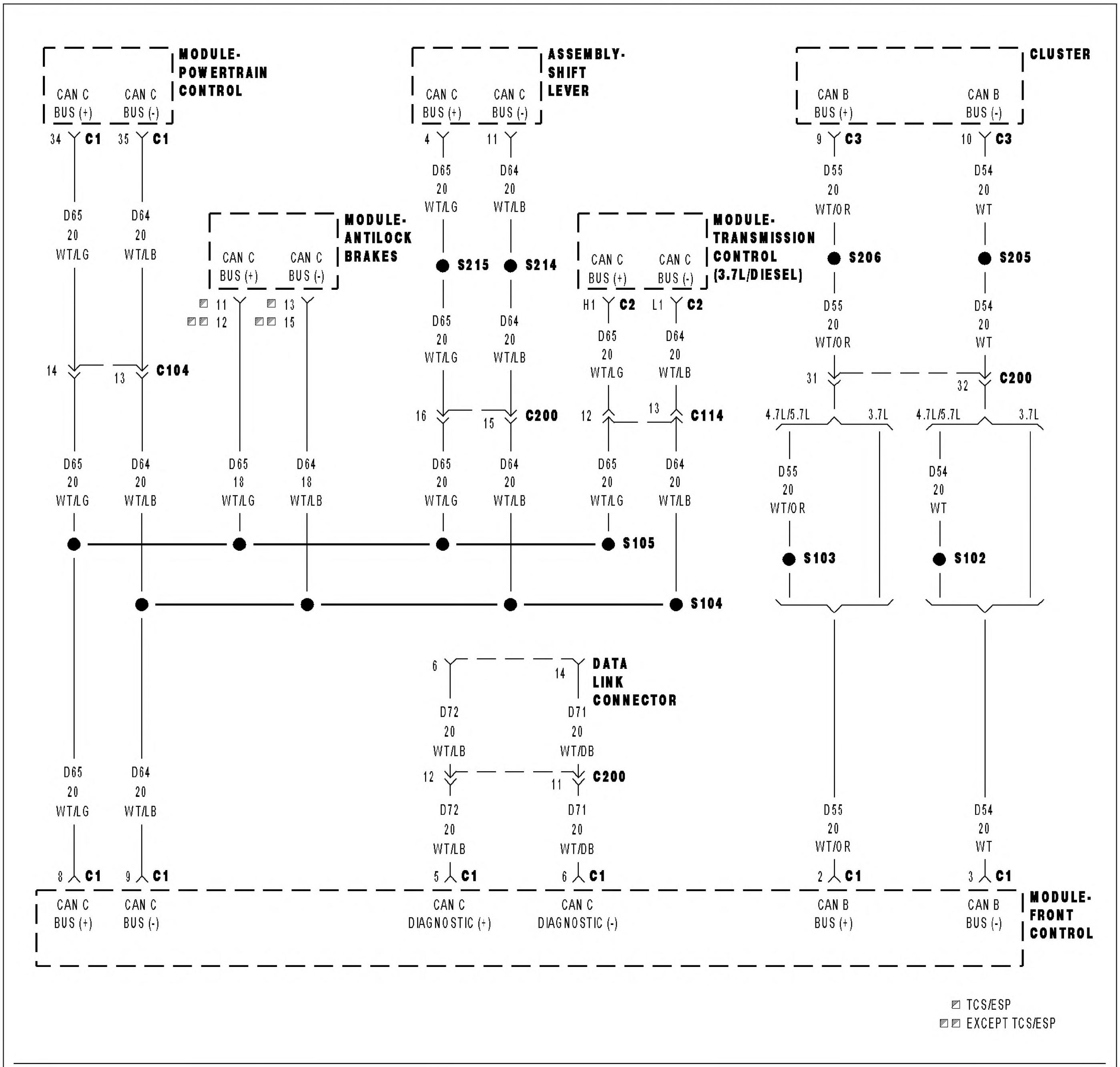
Yes >> Refer to 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

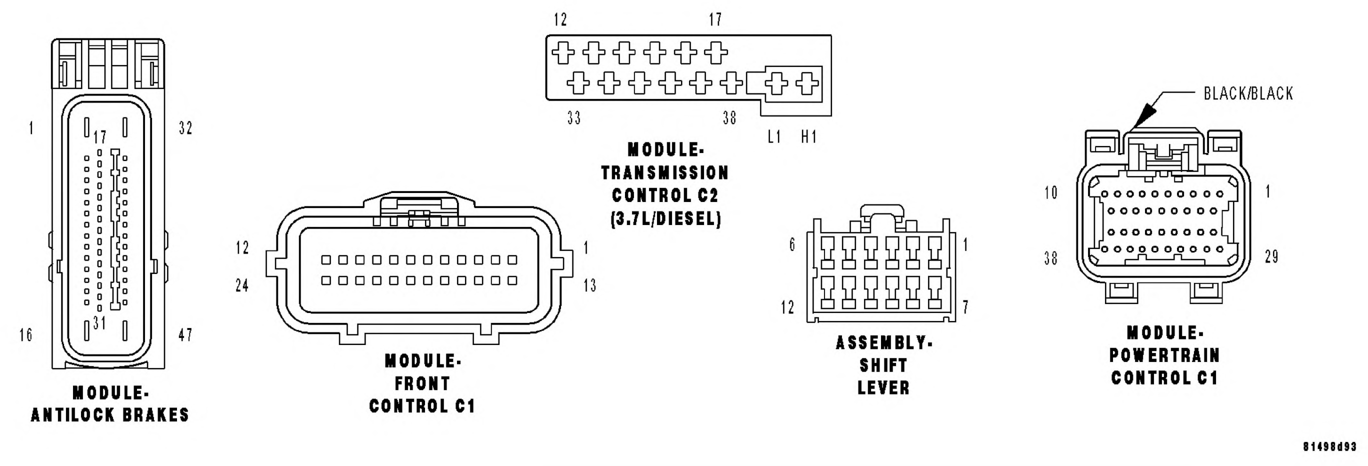
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U140C-IMPLAUSIBLE RIGHT REAR WHEEL SPEED SIGNAL RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
CAN C BUS (+)
CAN C BUS (-)
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
CAN C BUS (+)
CAN C BUS (-)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U140C-IMPLAUSIBLE RIGHT REAR WHEEL SPEED SIGNAL RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ABS control module.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ABS CONTROL MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTC'S ARE PRESENT

With the scan tool, read ABS DTCs.

Are there any ABS DTC's present?

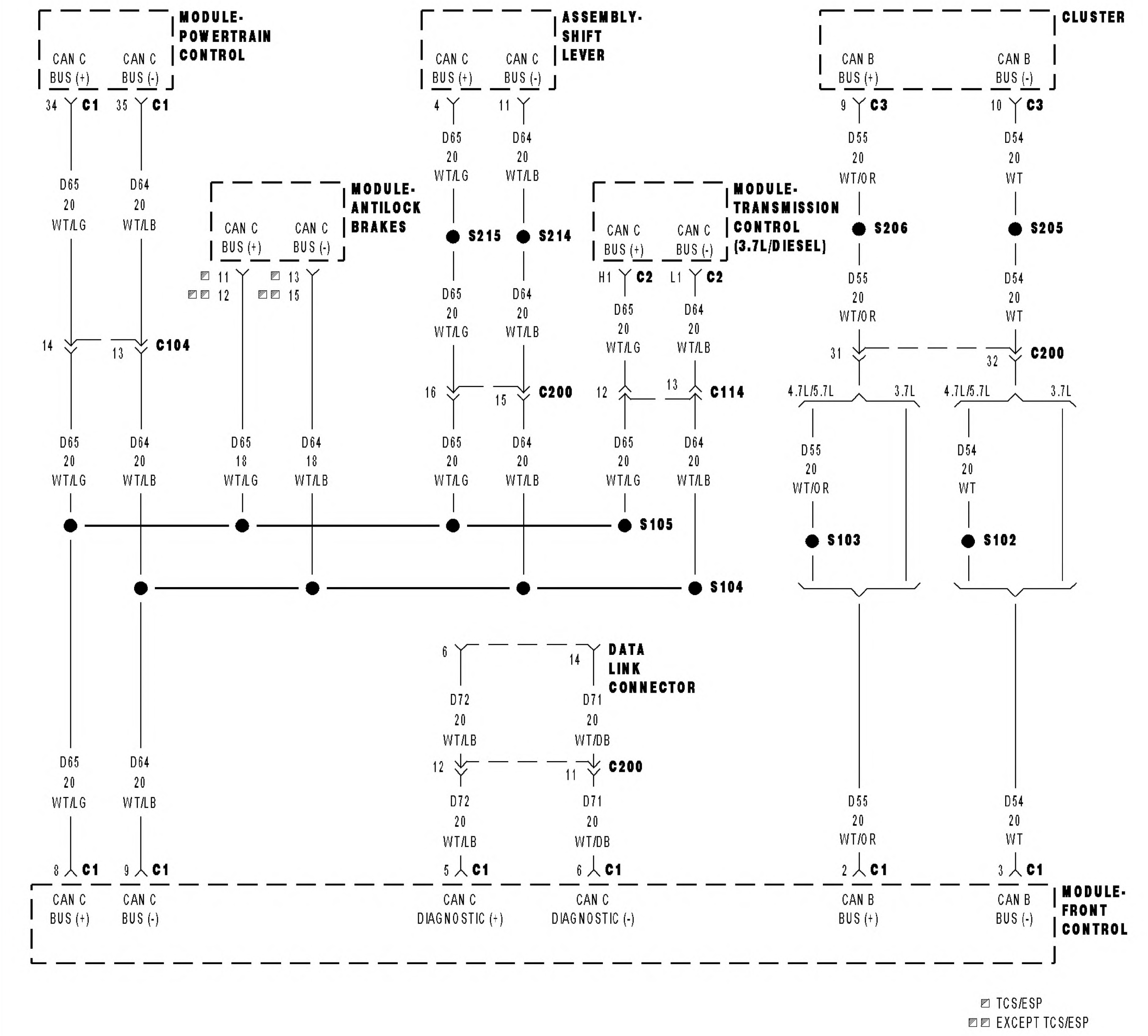
Yes >> Refer to 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

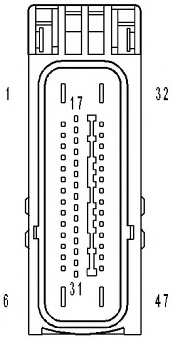
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

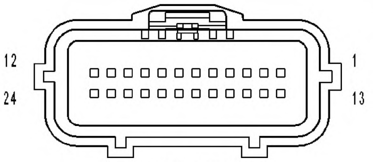
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U140D-IMPLAUSIBLE WHEEL SPEED SIGNALS RECEIVED

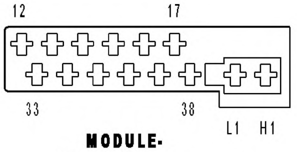

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
D65 20 WT/LG
D64 20 WT/LB
D65 18 WT/LG
D64 18 WT/LB
D55 20 WT/OR
D54 20 WT
S215
S214
S206
S205
14 C104 13
16 C200 15
12 C114 13
31 C200 32
4.7L/5.7L
3.7L
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12 C200 11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
17
32
16
31
47

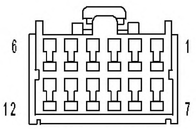
MODULE-ANTILOCK BRAKES



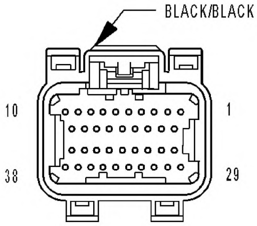
MODULE-FRONT CONTROL C1


12
17
33
38
L1
H1

MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)



ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29

MODULE-POWERTRAIN CONTROL C1

81498d93

U140D-IMPLAUSIBLE WHEEL SPEED SIGNALS RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ABS control module.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ABS CONTROL MODULE DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ABS DTC'S ARE PRESENT

With the scan tool, read ABS DTCs.

Are there any ABS DTC's present?

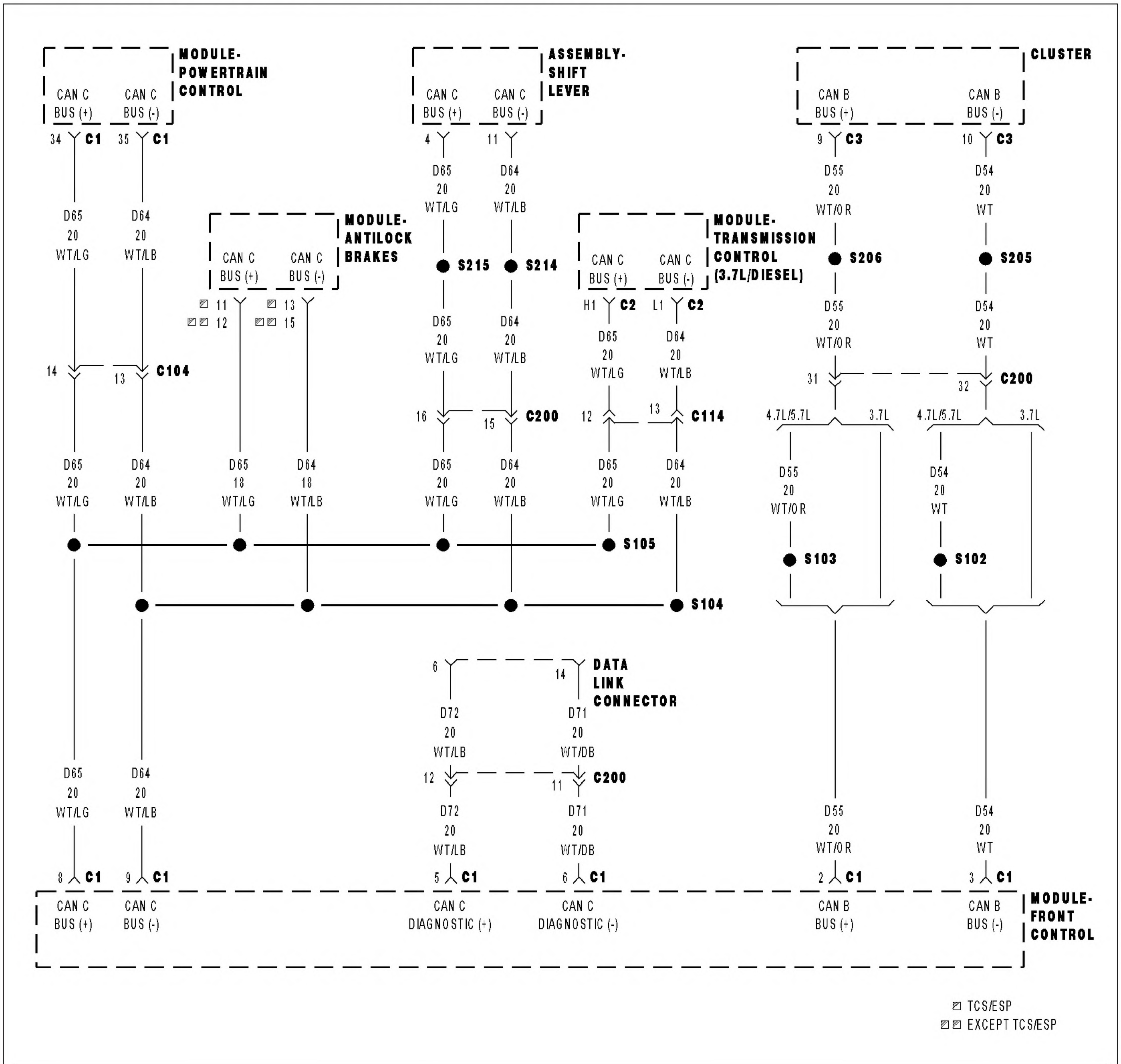
Yes >> Refer to 5 - BRAKES - ABS ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

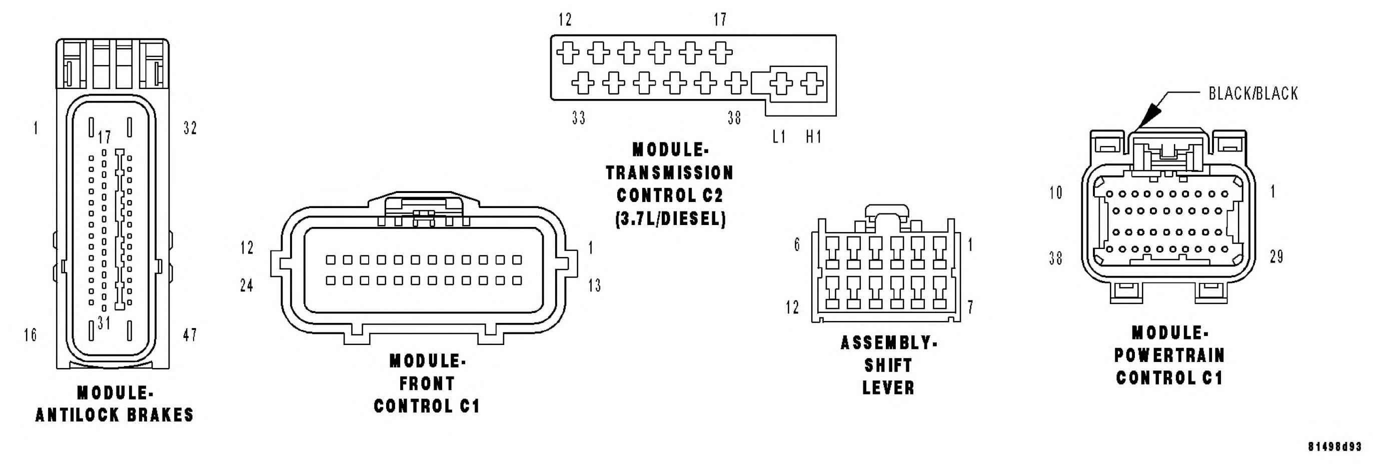
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U140F-IMPLAUSIBLE ENGINE VARIANT DATA


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
CAN C BUS (+)
CAN C BUS (-)
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
CAN C BUS (+)
CAN C BUS (-)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
1
24
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U140F-IMPLAUSIBLE ENGINE VARIANT DATA (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ECM/PCM DTC'S ARE PRESENT

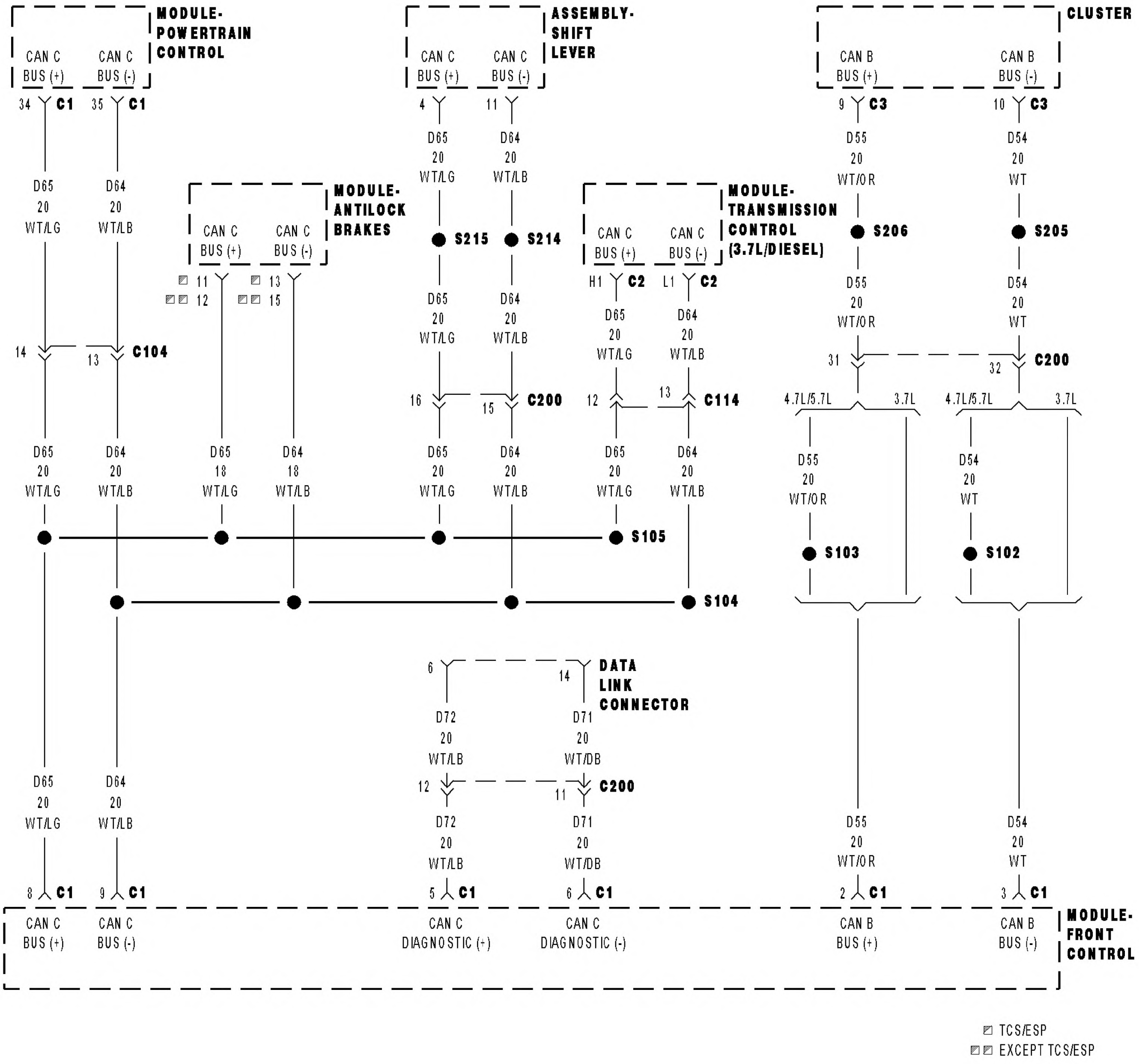
With the scan tool, read ECM/PCM DTCs.

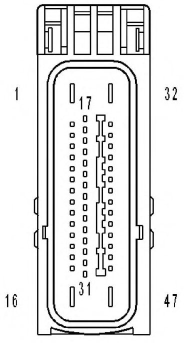
Are there any ECM/PCM DTC's present?

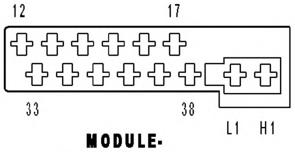
Yes >> Refer to 9 - ENGINE ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

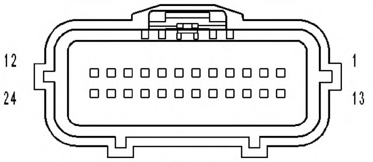
No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

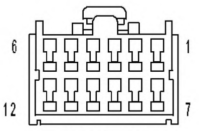
U1410-IMPLAUSIBLE/MISSING FCM VARIANT DATA

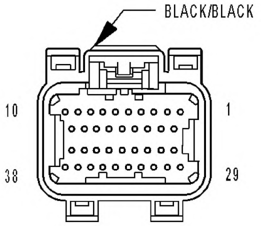

MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
D65 20 WT/LG
D64 20 WT/LB
14
13
C104
ASSEMBLY-SHIFT LEVER
4
11
S215
S214
16
15
C200
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
D65 18 WT/LG
D64 18 WT/LB
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
12
13
C114
S105
S104
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D55 20 WT/OR
D54 20 WT
S206
S205
31
32
C200
4.7L/5.7L
3.7L
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
MODULE-FRONT CONTROL
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES


12
17
33
38
L1
H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)


12
24
1
13
MODULE-FRONT CONTROL C1


6
1
12
7
ASSEMBLY-SHIFT LEVER


BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1

81498d93

U1410-IMPLAUSIBLE/MISSING FCM VARIANT DATA (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the FCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

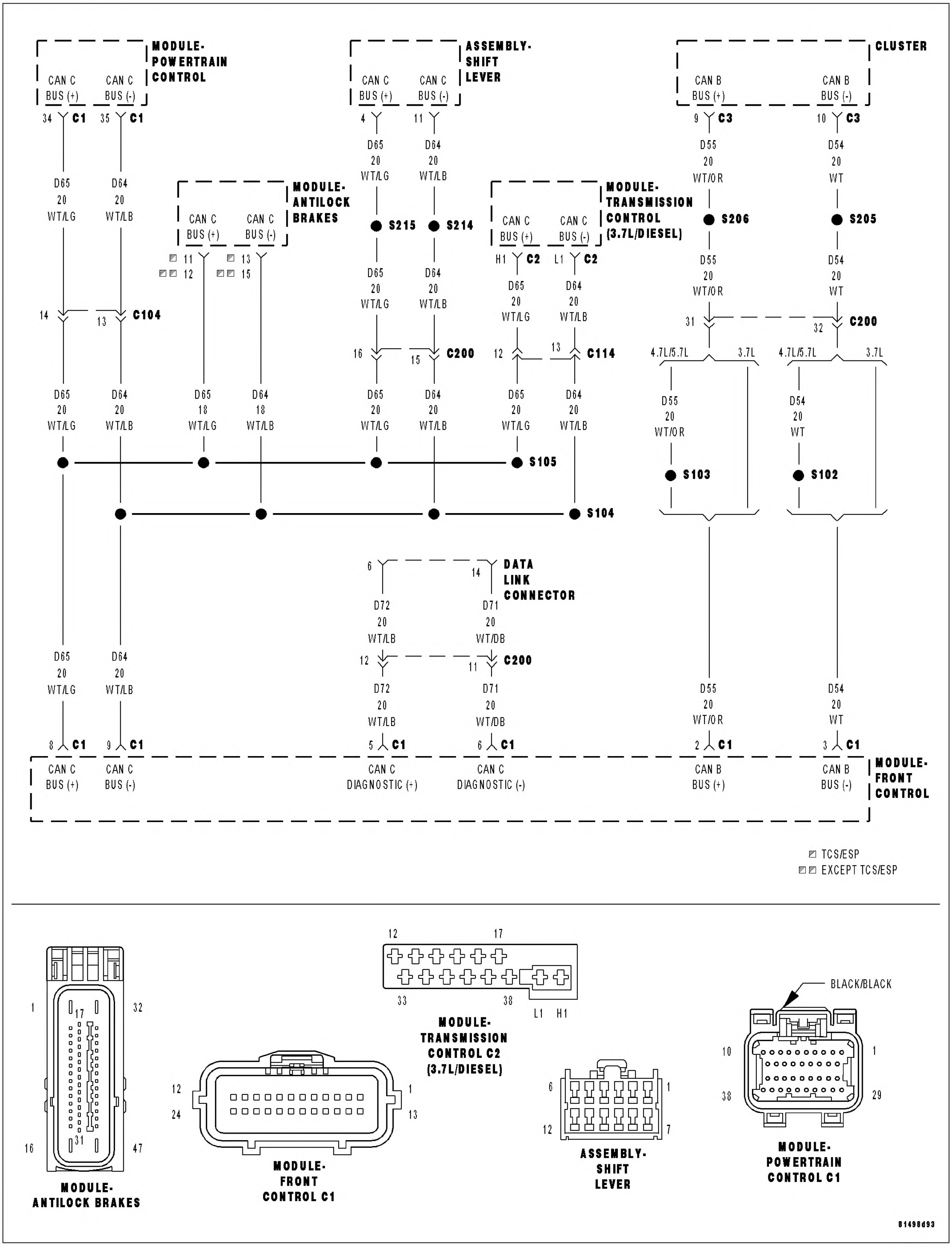
Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1507-IMPLAUSIBLE ENGINE TEMPERATURE MESSAGE DATA LENGTH RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
DATA LINK CONNECTOR
6
14
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
17
32
16
31
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1507-IMPLAUSIBLE ENGINE TEMPERATURE MESSAGE DATA LENGTH RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ECM/PCM DTC'S ARE PRESENT

With the scan tool, read ECM/PCM DTCs.

Are there any ECM/PCM DTC's present?

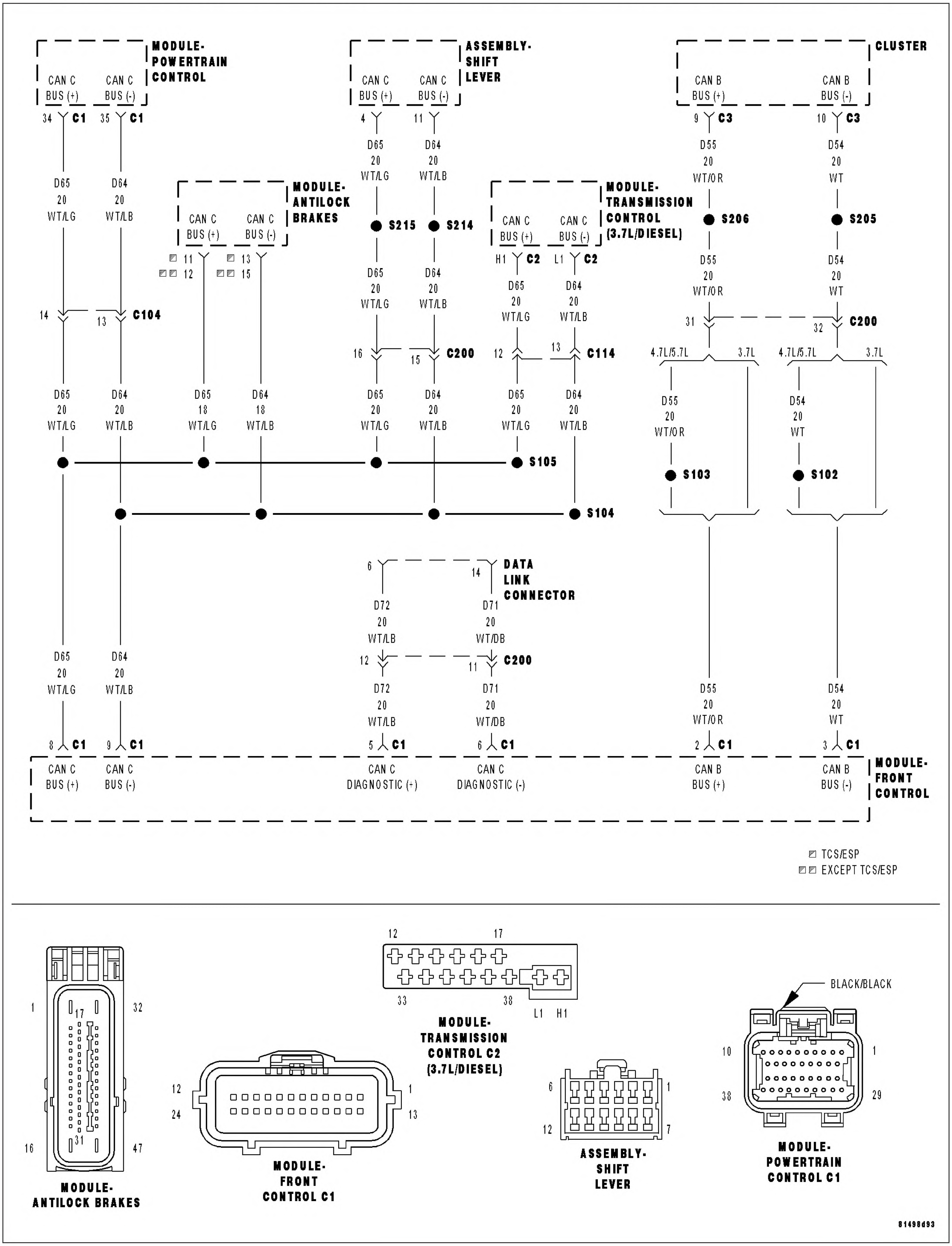
Yes >> Refer to 9 - ENGINE ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U1509-IMPLAUSIBLE ENGINE VARIANT MESSAGE DATA LENGTH RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
CAN C BUS (+)
CAN C BUS (-)
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C BUS (-)
▨ 11
▨▨ 12
▨ 13
▨▨ 15
S215
S214
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
CAN C BUS (+)
CAN C BUS (-)
H1 C2
L1 C2
S206
S205
14
13
C104
16
15
C200
12
13
C114
31
32
C200
4.7L/5.7L
3.7L
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S103
S102
S104
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
C200
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C BUS (+)
CAN C BUS (-)
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
CAN B BUS (+)
CAN B BUS (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP
1
17
32
31
16
47
MODULE-ANTILOCK BRAKES
12
24
1
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U1509-IMPLAUSIBLE ENGINE VARIANT MESSAGE DATA LENGTH RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the ECM/PCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
ECM/PCM DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Go To 2

---

2. CHECK IF ECM/PCM DTC'S ARE PRESENT

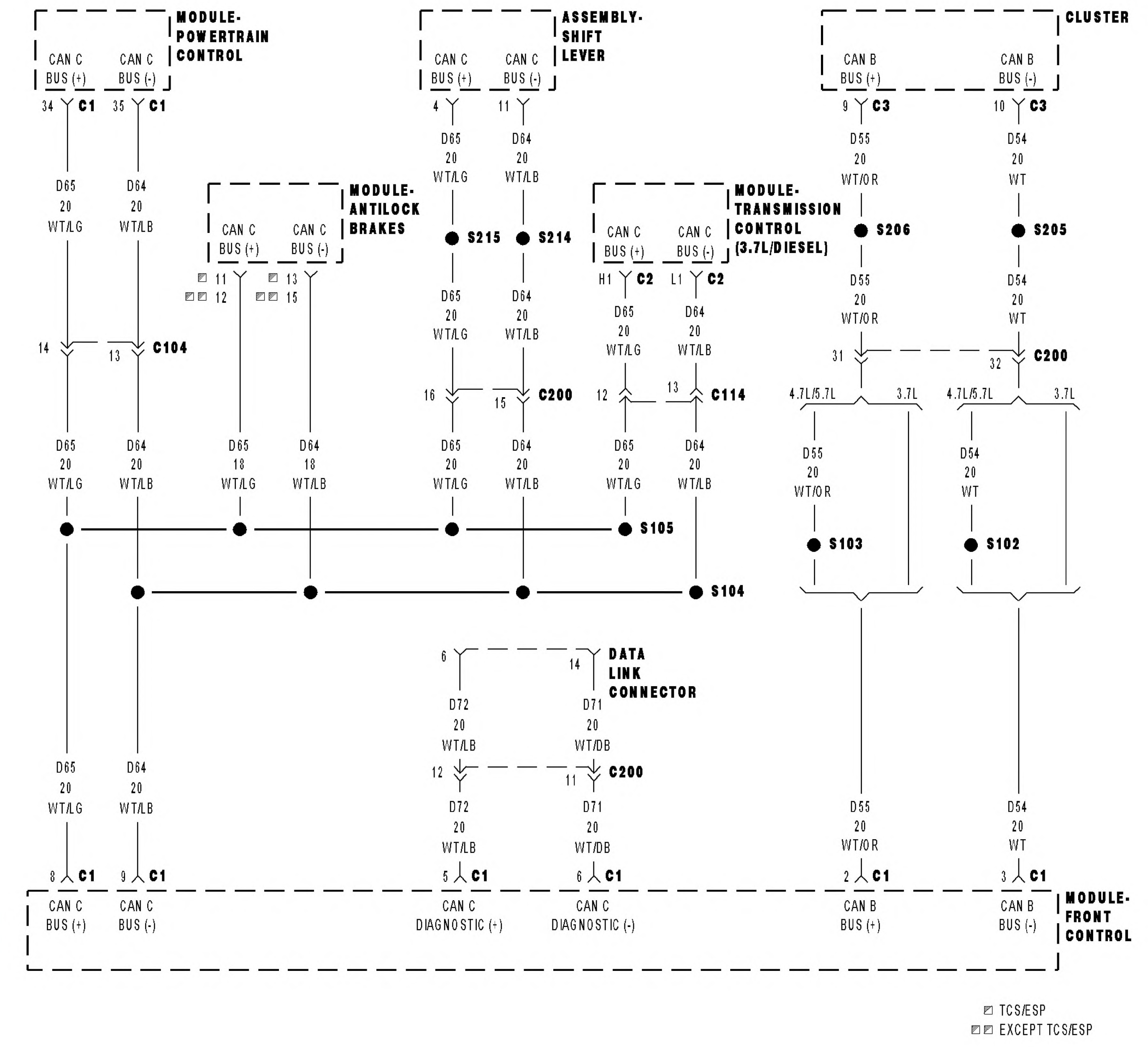
With the scan tool, read ECM/PCM DTCs.

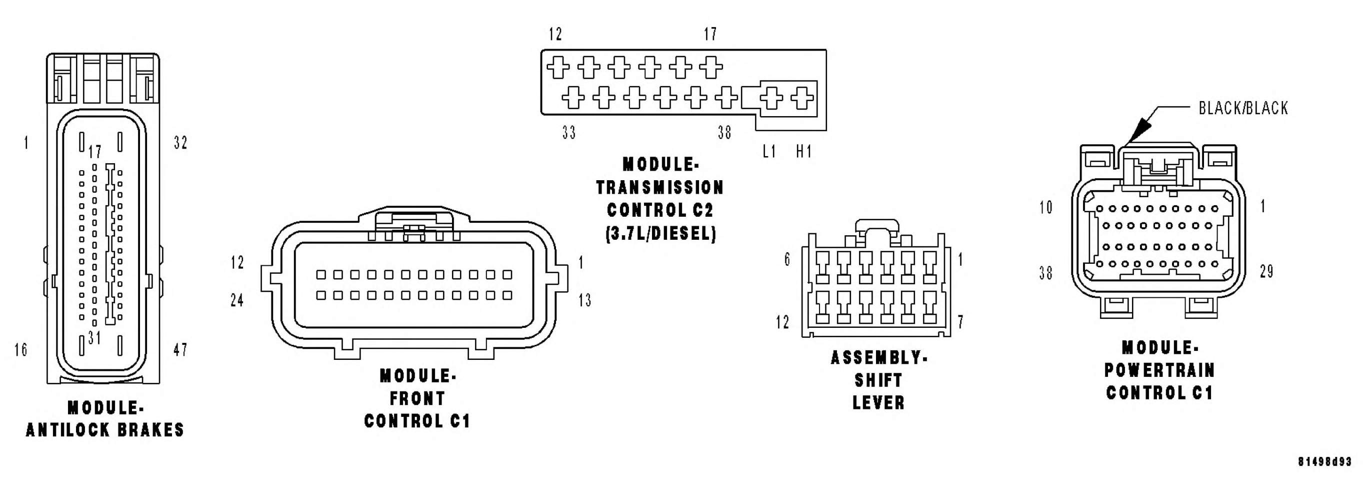
Are there any ECM/PCM DTC's present?

Yes >> Refer to 9 - ENGINE ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.
Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

U150A-IMPLAUSIBLE FCM VARIANT MESSAGE DATA LENGTH RECEIVED


MODULE-POWERTRAIN CONTROL
CAN C BUS (+)
CAN C BUS (-)
34 C1
35 C1
ASSEMBLY-SHIFT LEVER
4
11
CLUSTER
CAN B BUS (+)
CAN B BUS (-)
9 C3
10 C3
D65 20 WT/LG
D64 20 WT/LB
D55 20 WT/OR
D54 20 WT
MODULE-ANTILOCK BRAKES
MODULE-TRANSMISSION CONTROL (3.7L/DIESEL)
S215
S214
S206
S205
▨ 11
▨▨ 12
▨ 13
▨▨ 15
H1 C2
L1 C2
14
13
C104
16
15
C200
12
13
C114
31
32
4.7L/5.7L
3.7L
D65 18 WT/LG
D64 18 WT/LB
S105
S104
S103
S102
6
14
DATA LINK CONNECTOR
D72 20 WT/LB
D71 20 WT/DB
12
11
8 C1
9 C1
5 C1
6 C1
2 C1
3 C1
CAN C DIAGNOSTIC (+)
CAN C DIAGNOSTIC (-)
MODULE-FRONT CONTROL
▨ TCS/ESP
▨▨ EXCEPT TCS/ESP


1
32
17
31
16
47
MODULE-ANTILOCK BRAKES
12
1
24
13
MODULE-FRONT CONTROL C1
12
17
33
38
L1 H1
MODULE-TRANSMISSION CONTROL C2 (3.7L/DIESEL)
6
1
12
7
ASSEMBLY-SHIFT LEVER
BLACK/BLACK
10
1
38
29
MODULE-POWERTRAIN CONTROL C1
81498d93

U150A-IMPLAUSIBLE FCM VARIANT MESSAGE DATA LENGTH RECEIVED (CONTINUED)

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The messages sent on the CAN bus are distinguished by an identifier (ID). Each CAN ID is defined to contain a certain number of bytes. The Transmission Control Module (TCM) verifies that it has received the proper number of bytes for each ID.

- **When Monitored:**
  Continuously with the ignition on, one valid CAN ID received at least once, and no U0002-CAN Bus Off Performance DTC present.
- **Set Condition:**
  When the TCM detects an incorrect CAN ID from the FCM.

Possible Causes
FCM CAN BUS DTC'S PRESENT
TRANSMISSION CONTROL MODULE

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - STANDARD PROCEDURE)

Diagnostic Test

1. CHECK FOR FCM CAN BUS DTCS

With the scan tool, read FCM DTCs.

Are there any FCM CAN BUS DTC's present?

Yes >> Refer to 8-ELECTRICAL - ELECTRONIC CONTROL MODULES - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

No >> Using the schematics as a guide, check the Transmission Control Module (TCM) pins, terminals, and connectors for corrosion, damage, or terminal push out. Pay particular attention to all power and ground circuits. If no problems are found, replace the TCM per the Service Information. Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE for the appropriate service procedure.

Perform NAG1 TRANSMISSION VERIFICATION TEST - VER 1.

STANDARD PROCEDURE

NAG1 PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE

For the Transmission circuit diagram (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - NAG1 - SCHEMATICS AND DIAGRAMS)

For a complete wiring diagram **Refer to Section 8W**

1.

Low fluid level can be the cause of many transmission problems. If the fluid level is low, locate and repair the leak then check and adjust the fluid level in accordance with the Service Information.

Always perform diagnostics with a fully charged battery to avoid false symptoms.

With the scan tool, read the engine DTCs. Check and repair all engine DTCs prior to performing transmission symptom diagnostic procedures.

With the scan tool, read and record all Transmission DTCs.

NOTE: If the TCM detects and stores a DTC, the TCM also stores the vehicles operating conditions under which the DTC originally set and is located in scan tool under Environmental Data. Before erasing any stored DTCs, record any available data to assist in duplicating the conditions in which the DTC originally set.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.**Check connectors - Clean/repair as necessary.**

Most DTCs set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run.

Verify flash level of transmission controller. Some problems are corrected by software upgrades to the transmission controller. Verify no variant DTCs are present. If variant DTCs are present, perform their respective test first.

If the TCM (EGS) is flashed, perform a EGS initialization with the scan tool to relearn variant coding.

Check for any Service Information Tune-ups or Service Bulletins that may apply.

NOTE:

Were there any repairs that fixed the customer's complaint?

Yes >> Testing complete.

No >> Refer to 21 - AUTOMATIC TRANSMISSION - AUTOMATIC TRANSMISSION NAG1 - ELECTRICAL DIAGNOSTICS category and perform the appropriate symptom.

NAG1 TRANSMISSION VERIFICATION TEST - VER 1

1.

Reconnect any disconnected components.

Connect the scan tool to the Data Link Connector.

With the scan tool, erase ABS DTCs.

With the scan tool, erase PCM DTCs.

With the scan tool, erase TCM DTCs.

With the scan tool, display the Transmission temperature. Start and run the engine until the Transmission temperature is above 43° C (110° F).

Check the Transmission fluid and adjust if necessary. Refer to the Service Information for the proper Fluid Fill procedure.

NOTE: If internal repairs were performed and the shift quality is still poor, it may be necessary to check the internal repair.

If the TCM (EGS) is flashed or replaced, with the scan tool, perform a EGS initialization to relearn variant coding.

If internal transmission repairs are performed or replacement of the Transmission Control Module, perform a TCM ADAPTATION procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

ROAD TEST PROCEDURE

Road test the vehicle. Make fifteen to twenty 1–2, 2–3, 3–4, and 4–5 upshifts.

Perform these shifts from a standing start to 72 km/h (45 MPH) with a constant throttle opening of 20 to 25 degrees.

With speeds below 40 km/h (25 MPH), make five to eight wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown.

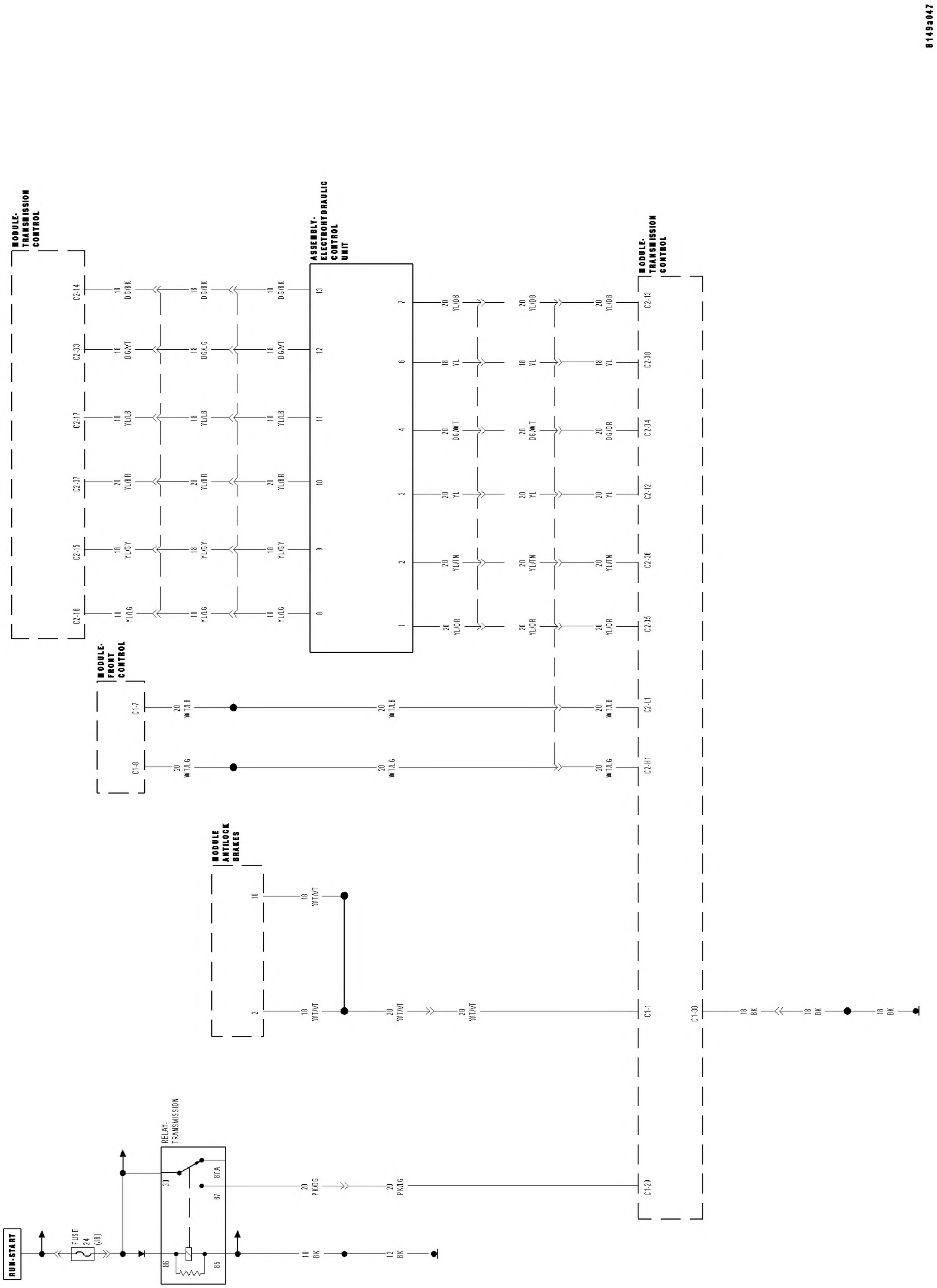
With the scan tool, read Transmission DTCs.

Were any Diagnostic Trouble Codes set?

Yes >> Repair is not complete, refer to appropriate symptom.

No >> Repair is complete.

SCHEMATICS AND DIAGRAMS


8149a047
MODULE-TRANSMISSION CONTROL
ASSEMBLY-ELECTROHYDRAULIC CONTROL UNIT
MODULE-FRONT CONTROL
MODULE ANTILOCK BRAKES
RELAY-TRANSMISSION
RUN-START
FUSE 24 (JB)
C2-14
C2-33
C2-17
C2-37
C2-15
C2-16
C2-13
C2-38
C2-34
C2-12
C2-36
C2-35
C2-L1
C2-H1
C1-1
C1-30
C1-29
C1-7
C1-8
30
87A
87
86
85
18 DG/BK
18 DG/WT
18 DG/LG
18 YL/LB
20 YL/BR
18 YL/GY
18 YL/LG
20 YL/DB
18 YL
20 DG/WT
20 DG/OR
20 YL
20 YL/TN
20 YL/OR
20 WT/LB
20 WT/LG
18 WT/VT
20 WT/VT
18 BK
20 PK/DG
20 PK/LG
16 BK
12 BK

NAG1 TRANSMISSION CIRCUIT DIAGRAM

AUTOMATIC TRANSMISSION - NAG1 - SERVICE INFORMATION

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- OPERATION 833

B1-HOLDING CLUTCH
- DISASSEMBLY 834
- ASSEMBLY 835

B2-HOLDING CLUTCH
- DISASSEMBLY 839
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- OPERATION 845

PUMP-OIL
- DESCRIPTION 845
- OPERATION 846
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- INSPECTION 847
- ASSEMBLY 847

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- REMOVAL 848
- INSTALLATION 850

SEAL-OUTPUT SHAFT
- REMOVAL 852
- INSTALLATION 852

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- REMOVAL 854
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ASSEMBLY 859
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REMOVAL 862
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SOLENOID
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OPERATION 867
CONTACT-TEMPERATURE SENSOR/PARK-NEUTRAL
DESCRIPTION
PARK/NEUTRAL CONTACT 870
TRANSMISSION TEMPERATURE SENSOR . 870
OPERATION
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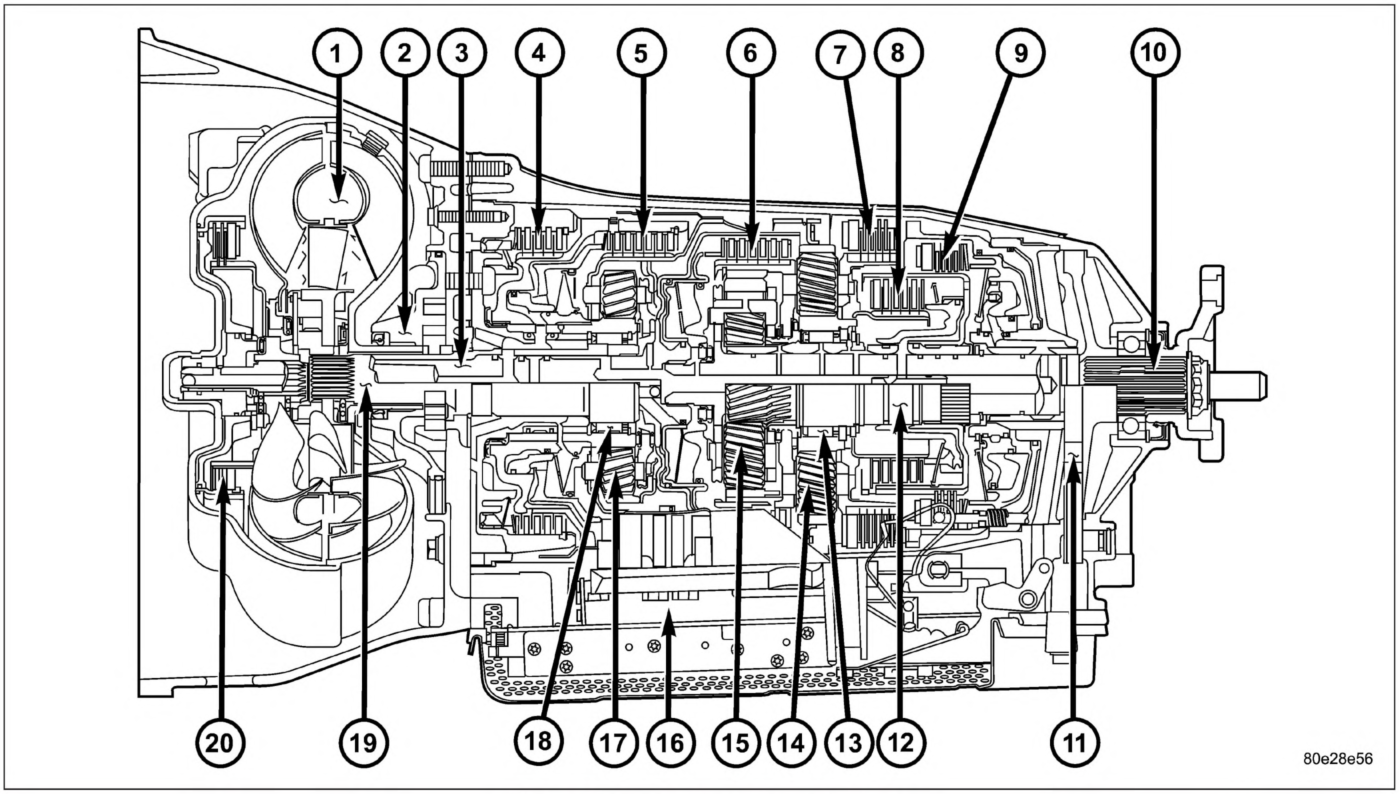
AUTOMATIC TRANSMISSION - NAG1 - SERVICE INFORMATION

DESCRIPTION



NAG1 Automatic Transmission

1 - TORQUE CONVERTER
2 - OIL PUMP
3 - DRIVESHAFT
4 - MULTI-DISC HOLDING CLUTCH B1
5 - DRIVING CLUTCH K1
6 - DRIVING CLUTCH K2
7 - MULTI-DISC HOLDING CLUTCH B3
8 - DRIVING CLUTCH K3
9 - MULTI-DISC HOLDING CLUTCH B2
10 - OUTPUT SHAFT
11 - PARKING LOCK GEAR
12 - INTERMEDIATE SHAFT
13 - FREEWHEEL F2
14 - REAR PLANETARY GEAR SET
15 - CENTER PLANETARY GEAR SET
16 - ELECTROHYDRAULIC CONTROL UNIT
17 - FRONT PLANETARY GEAR SET
18 - FREEWHEEL F1
19 - STATOR SHAFT
20 - TORQUE CONVERTER LOCK-UP CLUTCH

The NAG1 automatic transmission is an electronically controlled 5-speed transmission with a lock-up clutch in the torque converter. The ratios for the gear stages are obtained by 3 planetary gear sets. Fifth gear is designed as an overdrive with a high-speed ratio.

NAG1 identifies a family of transmissions and means “N”ew “A”utomatic “G”earbox, generation 1. Various marketing names are associated with the NAG1 family of transmissions, depending on the transmisson variation being used in a specific vehicle. Some examples of the marketing names are: W5A300, W5A380, and W5A580. The marketing name can be interpreted as follows:

- W = A transmission using a hydraulic torque converter.
- 5 = 5 forward gears.
- A = Automatic Transmission.
- 580 = Maximum input torque capacity in Newton meters.

The gears are actuated electronically/hydraulically. The gears are shifted by means of an appropriate combination of three multi-disc holding clutches, three multi-disc driving clutches, and two freewheeling clutches.

Electronic transmission control enables precise adaptation of pressures to the respective operating conditions and to the engine output during the shift phase which results in a significant improvement in shift quality.

Furthermore, it offers the advantage of a flexible adaptation to various vehicle and engines.

Basically, the automatic transmission with electronic control offers the following advantages:

- Reduces fuel consumption.
- Improved shift comfort.
- More favourable step-up through the five gears.
- Increased service life and reliability.
- Lower maintenance costs.

TRANSMISSION IDENTIFICATION

The transmission can be generically identified visually by the presence of a round 13-way connector located near the front corner of the transmission oil pan, on the right side. Specific transmission information can be found stamped into a pad on the left side of the transmission, above the oil pan rail.

TRANSMISSION GEAR RATIOS

The gear ratios for the NAG1 automatic transmission are as follows:

1st Gear	3.59:1
2nd Gear	2.19:1
3rd Gear	1.41:1
4th Gear	1.00:1
5th Gear	0.83:1
Reverse	3.16:1
Reverse (In 4WD low Range)	1.93:1

TRANSMISSION HOUSING

The converter housing and transmission are made from a light alloy. These are bolted together and centered via the outer multi-disc carrier of multi-disc holding clutch, B1. A coated intermediate plate provides the sealing. The oil pump and the outer multi-disc carrier of the multi-disc holding clutch, B1, are bolted to the converter housing. The stator shaft is pressed into it and prevented from rotating by splines. The electrohydraulic unit is bolted to the transmission housing from underneath. A sheet metal steel oil pan forms the closure.

MECHANICAL SECTION

The mechanical section consists of a input shaft, output shaft, a sun gear shaft, and three planetary gear sets which are coupled to each other. The planetary gear sets each have four planetary pinion gears. The oil pressure for the torque converter lock-up clutch and clutch K2 is supplied through bores in the input shaft. The oil pressure to clutch K3 is transmitted through the output shaft. The lubricating oil is distributed through additional bores in both shafts. All the bearing points of the gear sets, as well as the freewheeling clutches and actuators, are supplied with lubricating oil. The parking lock gear is connected to the output shaft via splines.

Freewheeling clutches F1 and F2 are used to optimize the shifts. The front freewheel, F1, is supported on the extension of the stator shaft on the transmission side and, in the locking direction, connects the sun gear of the front planetary gear set to the transmission housing. In the locking direction, the rear freewheeling clutch, F2, connects the sun gear of the center planetary gear set to the sun gear of the rear planetary gear set.

ELECTROHYDRAULIC CONTROL UNIT

The electrohydraulic control unit comprises the shift plate made from light alloy for the hydraulic control and an electrical control unit. The electrical control unit comprises of a supporting body made of plastic, into which the electrical components are assembled. The supporting body is mounted on the shift plate and screwed to it.

Strip conductors inserted into the supporting body make the connection between the electrical components and a plug connector. The connection to the wiring harness on the vehicle and the transmission control module (TCM) is produced via this 13-pin plug connector with a bayonet lock.

SHIFT GROUPS

The hydraulic control components (including actuators) which are responsible for the pressure distribution before, during, and after a gear change are described as a shift group. Each shift group contains a command valve, a holding pressure shift valve, a shift pressure shift valve, overlap regulating valve, and a solenoid.

The hydraulic system contains three shift groups: 1-2/4-5, 2-3, and 3-4. Each shift group can also be described as being in one of two possible states. The active shift group is described as being in the shift phase when it is actively engaging/disengaging a clutch combination. The 1-2/4-5 shift group control the B1 and K1 clutches. The 2-3 shift group controls the K2 and K3 clutches. The 3-4 shift group controls the K3 and B2 clutches.

OPERATION

The transmission control is divided into the electronic and hydraulic transmission control functions. While the electronic transmission control is responsible for gear selection and for matching the pressures to the torque to be transmitted, the transmission's power supply control occurs via hydraulic elements in the electrohydraulic control module. The oil supply to the hydraulic elements, such as the hydrodynamic torque converter, the shift elements and the hydraulic transmission control, is provided by way of an oil pump connected with the torque converter.

The Transmission Control Module (TCM) allows for the precise adaptation of pressures to the corresponding operating conditions and to the engine output during the gearshift phase, resulting in a noticeable improvement in shift quality. The engine speed limit can be reached in the individual gears at full throttle and kickdown. The shift range can be changed in the forward gears while driving, but the TCM employs a downshift safeguard to prevent over-revving the engine. The system offers the additional advantage of flexible adaptation to different vehicle and engine variants.

EMERGENCY RUNNING FUNCTION

In order to ensure a safe driving state and to prevent damage to the automatic transmission, the TCM control module switches to limp-home mode in the event of critical faults. A DTC assigned to the fault is stored in memory. All solenoid and regulating valves are thus de-energized.

The net effect is:

- The last engaged gear remains engaged.
- The modulating pressure and shift pressures rise to the maximum levels.
- The torque converter lockup clutch is deactivated.

In order to preserve the operability of the vehicle to some extent, the hydraulic control can be used to engage 2nd gear or reverse using the following procedure:

- Stop the vehicle.
- Move selector lever to ″P″.
- Switch off engine.
- Wait at least 10 seconds.
- Start engine.
- Move selector lever to D: 2nd gear.
- Move selector lever to R: Reverse gear.

The limp-home function remains active until the DTC is rectified or the stored DTC is erased with the DRB® tool. Sporadic faults can be reset via ignition OFF/ON.

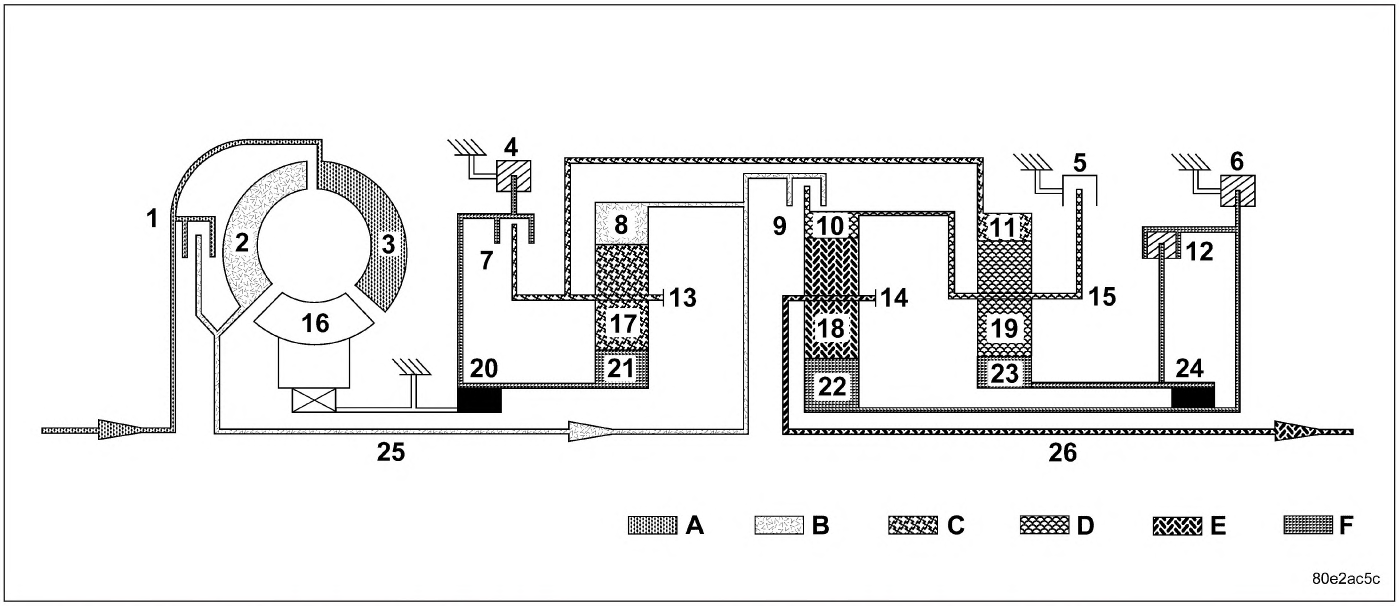
CLUTCH APPLICATION

Refer to CLUTCH APPLICATION for which shift elements are applied in each gear position.

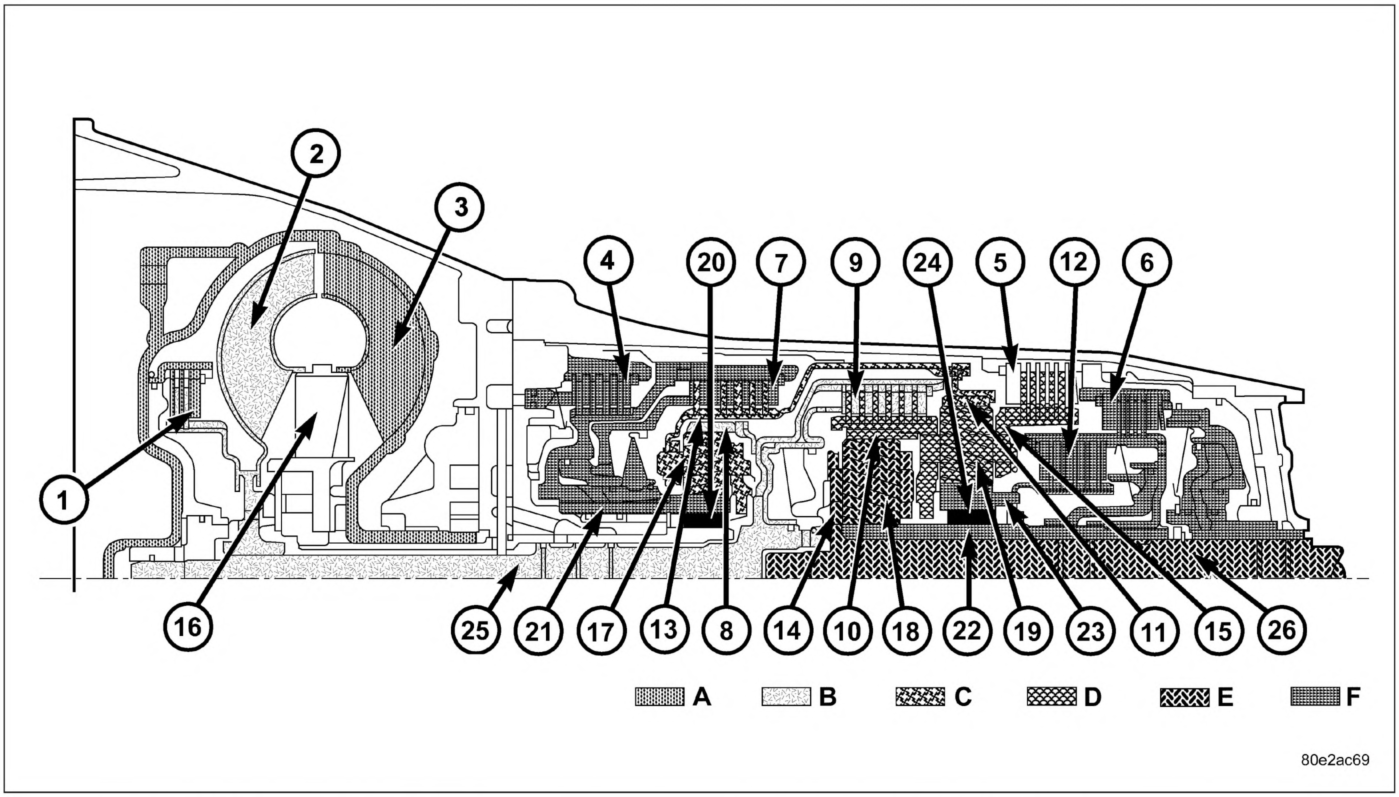
CLUTCH APPLICATION

GEAR	RATIO	B1	B2	B3	K1	K2	K3	F1	F2
1	3.59	X*	X				X*	X	X
2	2.19		X		X		X*		X
3	1.41		X		X	X			
4	1.00				X	X	X		
5	0.83	X				X	X	X*	
N	X						X		
R	3.16	X*		X			X	X	
R (4WD Low or Limp-in)	1.93			X	X		X		
* = The shift components required during coast.									

FIRST GEAR POWERFLOW



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - THIRD GEAR RATIO
F - FIXED PARTS



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - THIRD GEAR RATIO
F - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred to the output shaft (26).

Front Planetary Gear Set

The annulus gear (8) is driven by the input shaft (25). The sun gear (21) is held against the housing by the locked freewheel F1 (20) during acceleration and via the engaged multiple-disc holding clutch B1 (4) during deceleration. The planetary pinion gears (17) turn on the fixed sun gear (21) and increase the torque from the annulus gear (8) to the planetary carrier (13). The planetary carrier (13) moves at a reduced speed in the running direction of the engine.

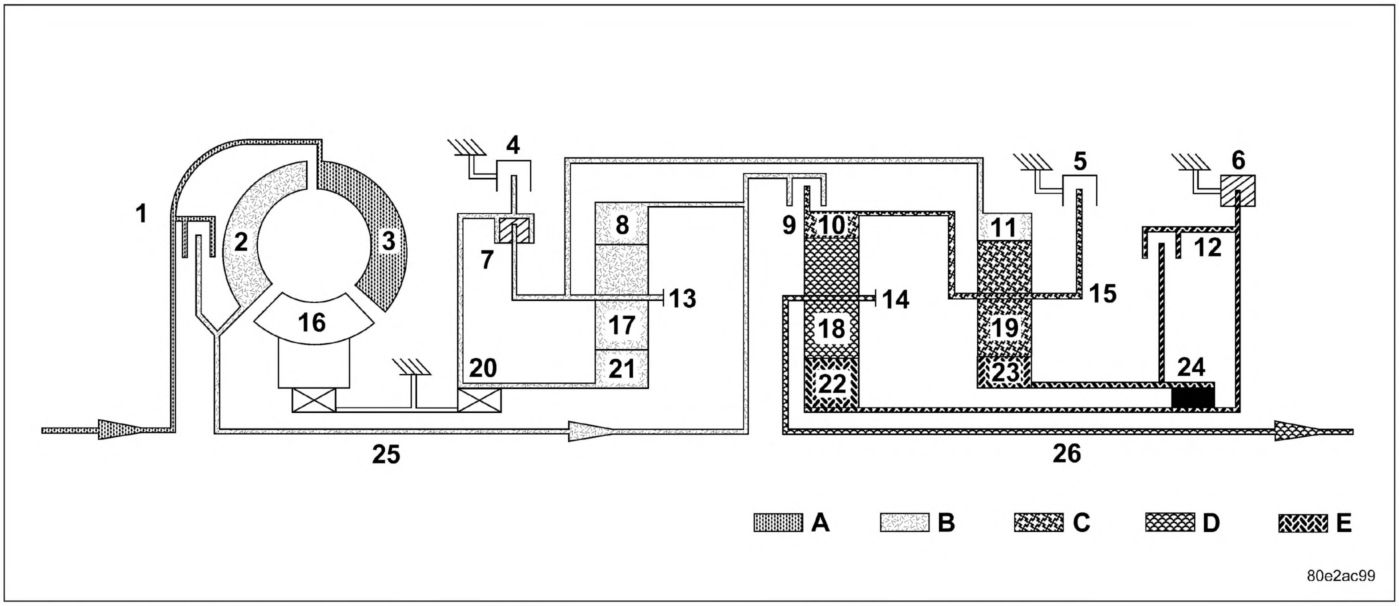
Rear Planetary Gear Set

The annulus gear (11) turns at a reduced speed due to the mechanical connection to the front planetary carrier (15). The sun gear (23) is held against the housing by the engaged multiple-disc holding clutch B2 (6), by the locked freewheel F2 (24) during acceleration and by the engaged multiple-disc clutch K3 (12) during deceleration. The planetary gears (19) turn on the fixed sun gear (23) and increase the torque from the annulus gear (11) to the planetary carrier (15). The planetary carrier (15) moves at a reduced speed in the running direction of the engine.

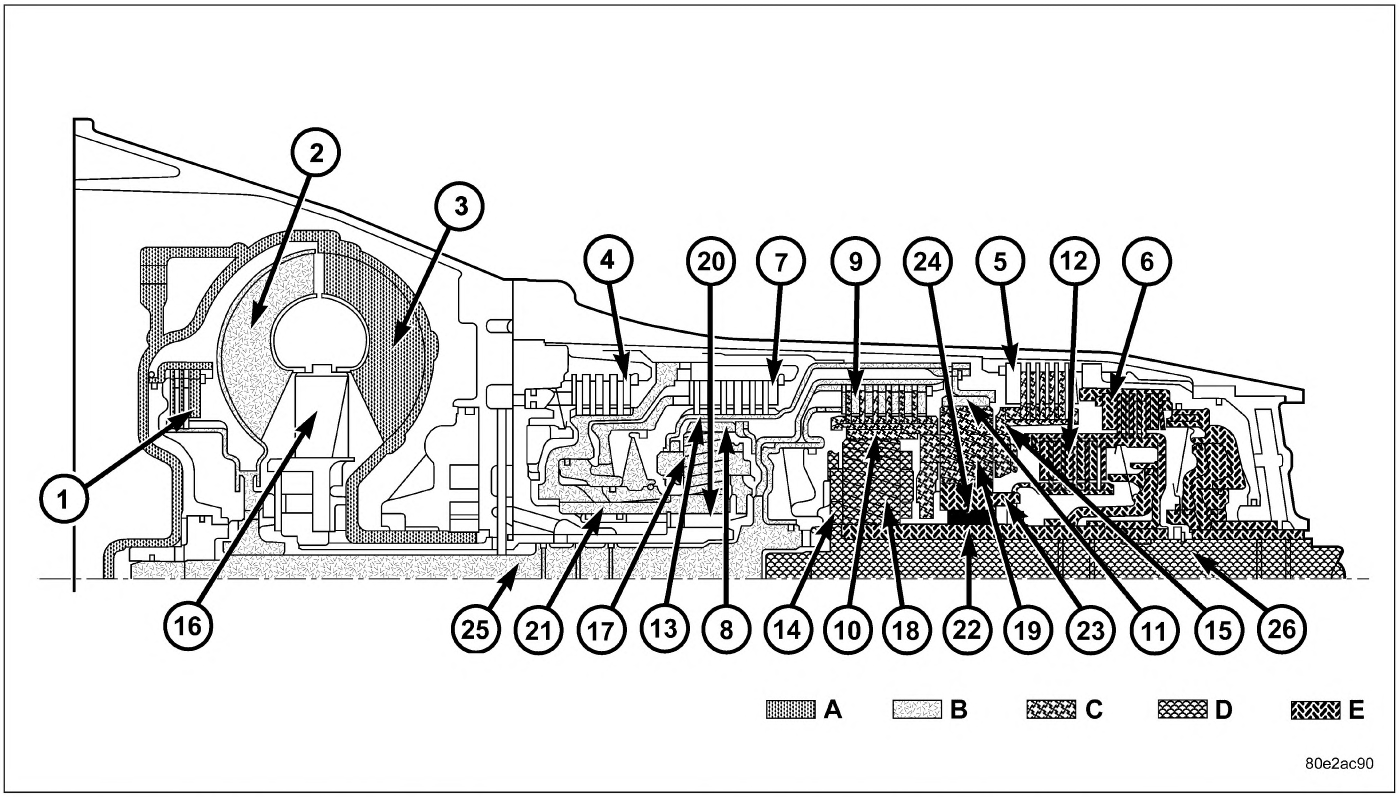
Center Planetary Gear Set

The annulus gear (10) is driven at the same speed as the rear planetary carrier (15) as a result of a mechanical connection. The sun gear (22) is held against the housing by the multiple-disc holding clutch B2 (6). The planetary pinion gears (18) turn on the fixed sun gear (22) and increase the torque from the annulus gear (10) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the running direction of the engine.

SECOND GEAR POWERFLOW



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - FIXED PARTS



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and the center and rear planetary gearset and transferred to the output shaft (26).

Front Planetary Gear Set

The planetary carrier (13) and sun gear (21) are connected via the engaged multiple-disc clutch K1 (7). The planetary gearset is therefore blocked and turns as a closed unit at the input speed due to the mechanical connection of the annulus gear (8) and input shaft.

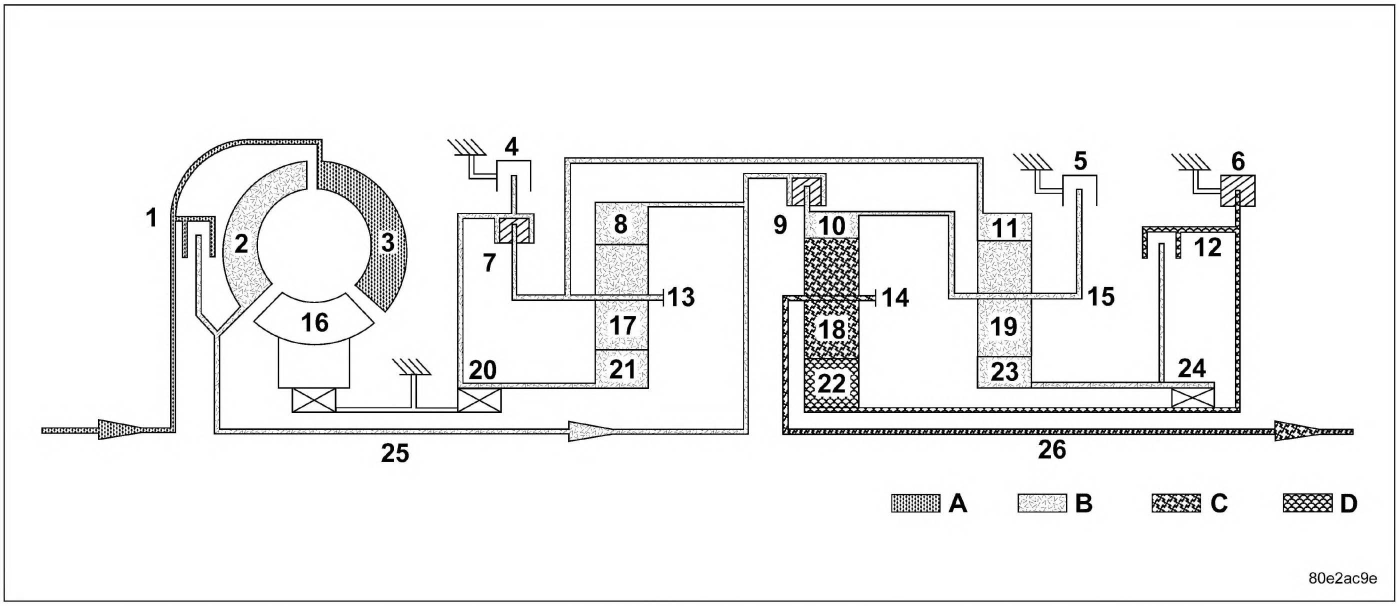
Rear Planetary Gear Set

The annulus gear (11) turns at the input speed as a result of the mechanical connection to the front planetary carrier (13). The sun gear (23) is held against the housing by the engaged multiple-disc holding clutch B2 (6), by the locked freewheel F2 (24) during acceleration and by the engaged multiple-disc clutch K3 (12) during deceleration. The planetary pinion gears (19) turn on the fixed sun gear (23) and increase the torque from the annulus gear (11) to the planetary carrier (15). The planetary carrier (15) moves at a reduced speed in the running direction of the engine.

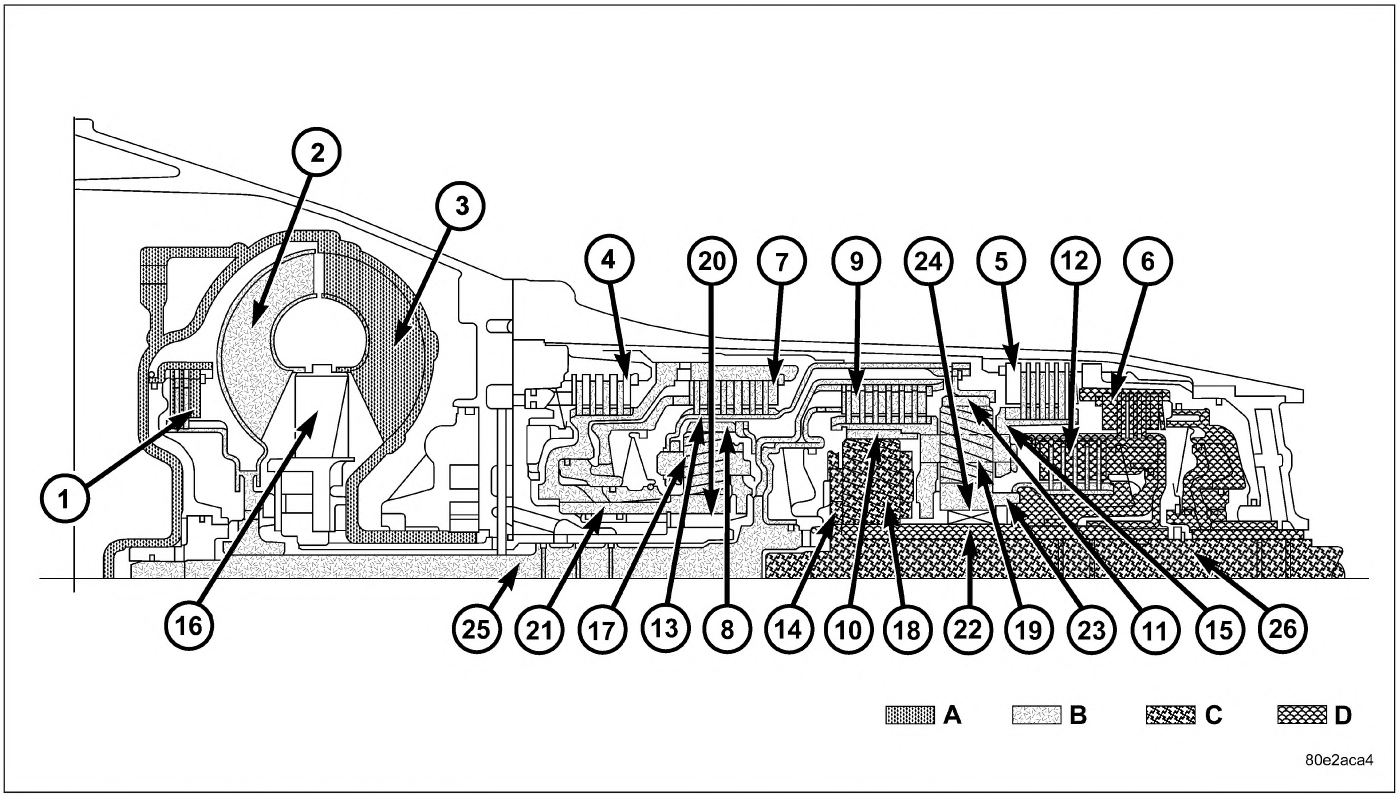
Center Planetary Gear Set

The annulus gear (10) is driven at the same speed as the rear planetary carrier (15) as a result of a mechanical connection. The sun gear (22) is held against the housing by the multiple-disc holding clutch B2 (6). The planetary pinion gears (18) turn on the fixed sun gear (22) and increase the torque from the annulus gear (10) to the planetary carrier (14). The output shaft (5) connected to the planetary carrier (14) turns at a reduced speed in the running direction of the engine.

THIRD GEAR POWERFLOW



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
C - FIRST GEAR RATIO
D - FIXED PARTS



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
C - FIRST GEAR RATIO
D - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and the center planetary gearset and transferred to the output shaft (26).

Front Planetary Gear Set

The planetary carrier (13) and sun gear (21) are connected via the engaged multiple-disc clutch K1 (7). The planetary gearset is therefore locked and turns as a closed unit at the input speed due to the mechanical connection of the annulus gear (8) and input shaft (25).

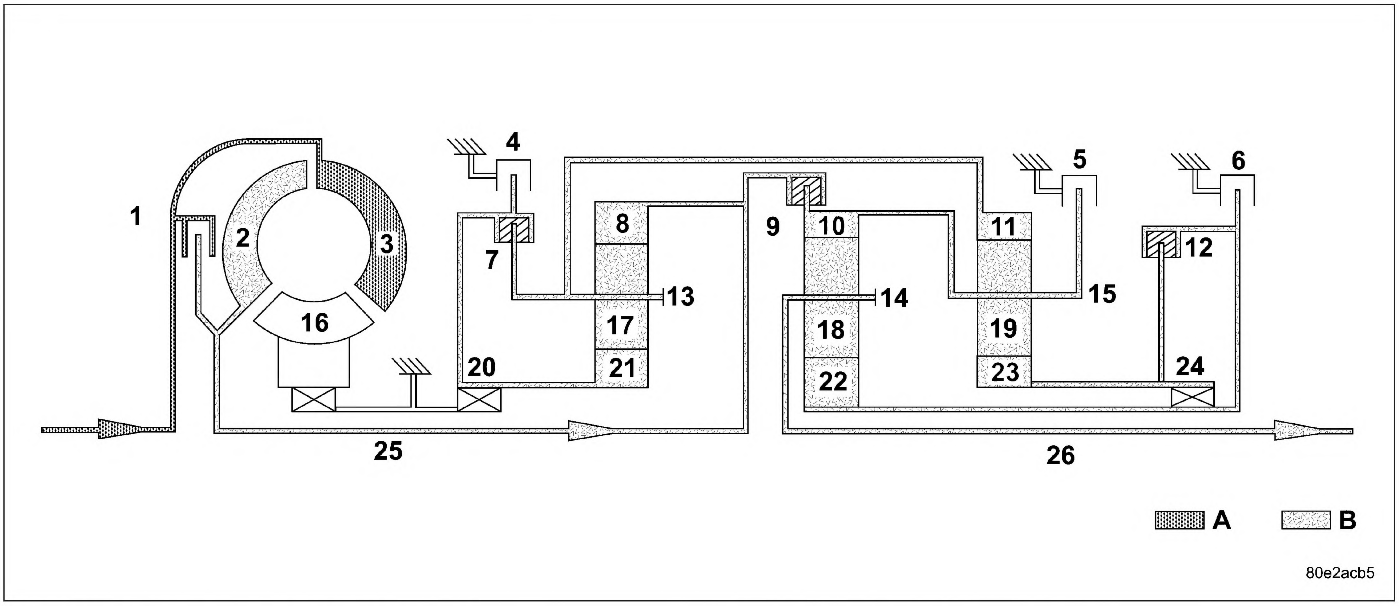
Rear Planetary Gear Set

The multiple-disc clutch K2 (9) is engaged and transfers the input speed of the input shaft (25) to the planetary carrier (15) via the annulus gear (10). The annulus gear (11) turns in the same way as the planetary carrier (15) due to the mechanical connection with the locked front planetary gearset. This planetary gearset is therefore locked and turns as a closed unit.

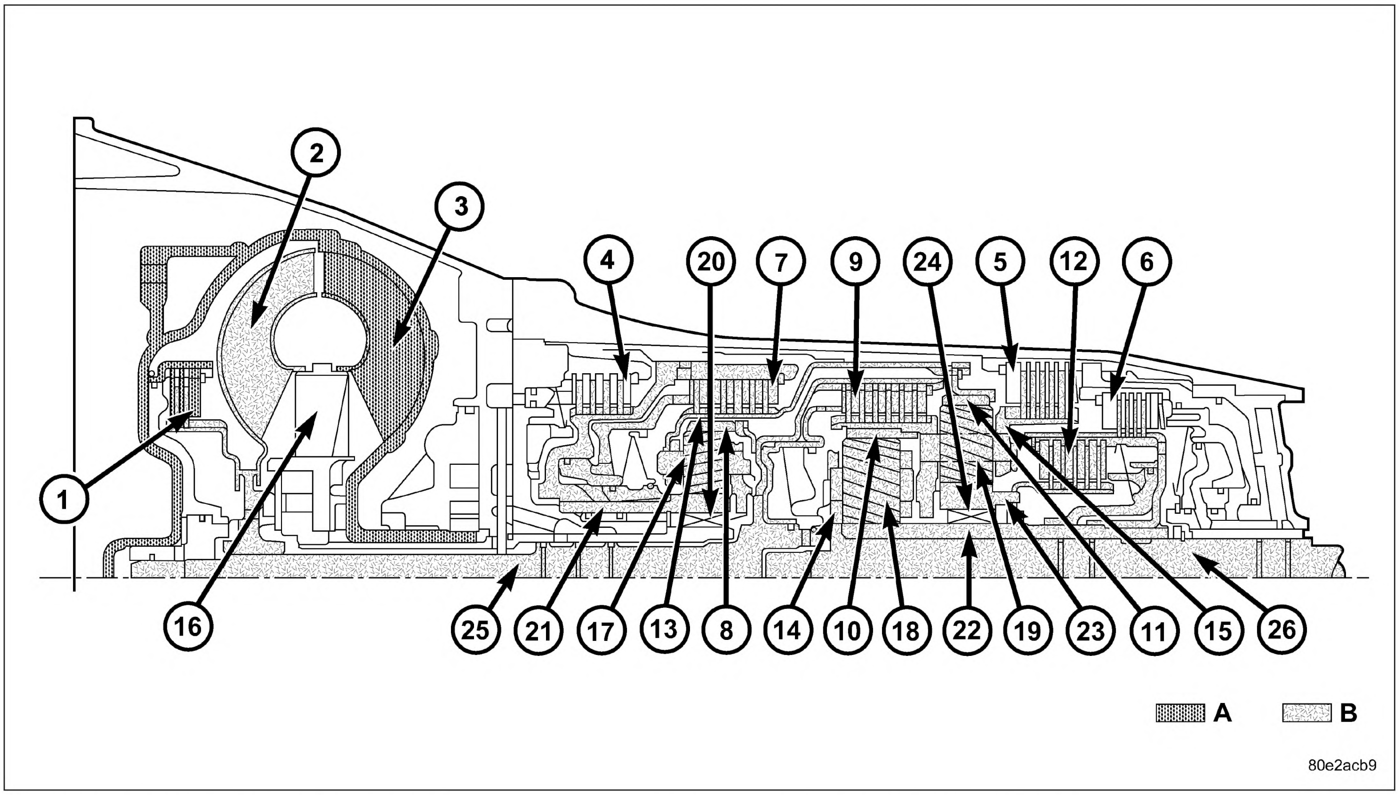
Center Planetary Gear Set

The annulus gear (10) turns at the input speed as a result of the engaged multiple-disc clutch K2 (9). The sun gear (22) is held against the housing by the multiple-disc holding clutch B2 (6). The planetary pinion gears (18) turn on the fixed sun gear (22) and increase the torque from the annulus gear (10) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the running direction of the engine.

FOURTH GEAR POWERFLOW



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
B - TRANSMISSION INPUT SPEED



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
B - TRANSMISSION INPUT SPEED

Speed and torque are not converted by the direct gear ratio of the 4th gear. Power is transferred from the input shaft (25) to the output shaft (26) via three locked planetary gearsets.

Front Planetary Gear Set

The planetary carrier (13) and sun gear (21) are connected via the engaged multiple-disc clutch K1 (7). The planetary gearset is therefore locked and turns as a closed unit at the input speed due to the mechanical connection of the annulus gear (8) and the input shaft (25).

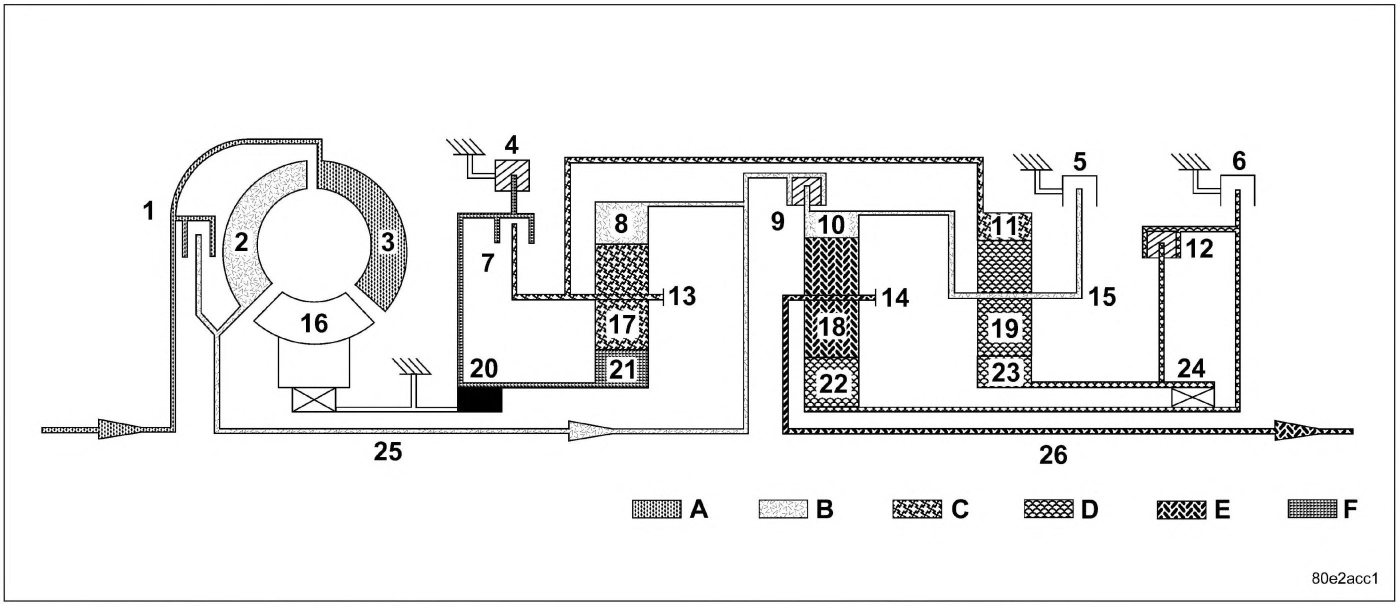
Rear Planetary Gear Set

The multiple-disc clutch K2 (9) is engaged and transfers the input speed of the input shaft (25) to the planetary carrier (15) via the annulus gear (10). The annulus gear (11) turns in the same way as the planetary carrier (15) due to the mechanical connection with the locked front planetary gearset. The planetary gearset is therefore locked and turns as a closed unit.

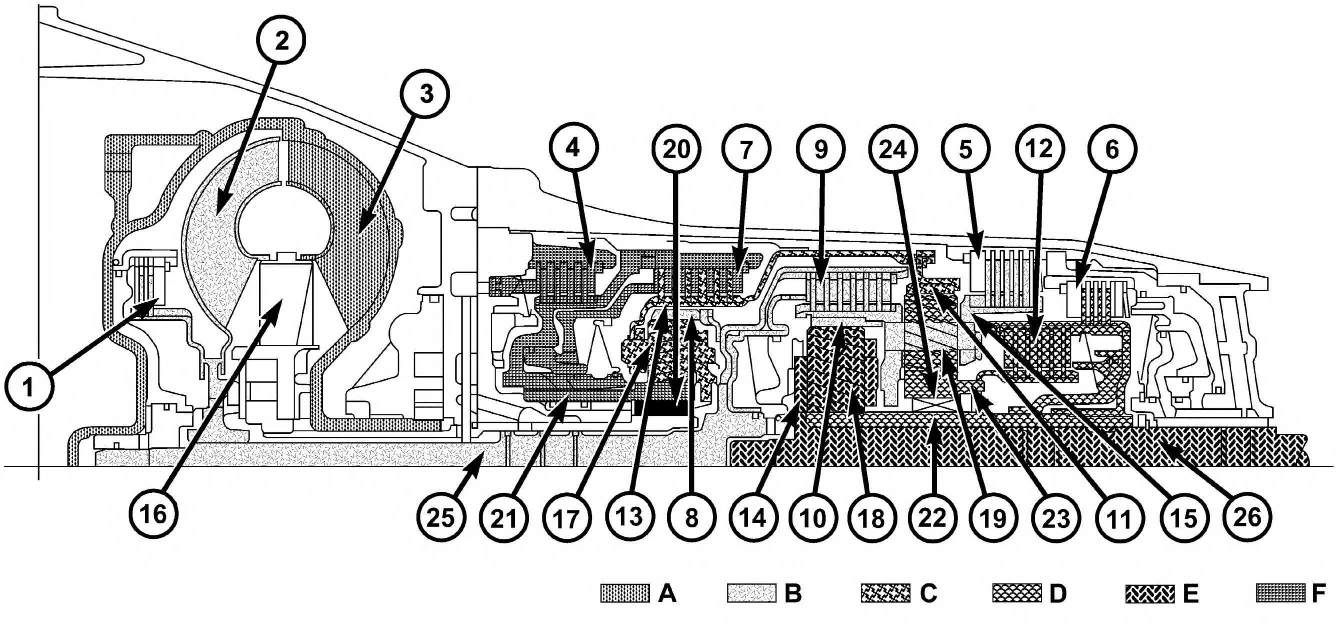
Center Planetary Gear Set

The annulus gear (10) turns at the input speed as a result of the engaged multiple-disc clutch K2 (9). The multiple-disc clutch K3 (12) connects the sun gears (22) and (23) of the rear and center planetary gearset. The planetary gearset is locked by the same speeds of the annulus gear (10) and the sun gear (22) and it turns as a closed unit.

FIFTH GEAR POWERFLOW



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - THIRD GEAR RATIO
F - FIXED PARTS



80e2acc5

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - THIRD GEAR RATIO
C - FIRST GEAR RATIO	F - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred to the output shaft (26).

Front Planetary Gear Set

The annulus gear (8) is driven by the input shaft (25). The sun gear (21) is held against the housing by the locked freewheel F1 (20) during acceleration and via the engaged multiple-disc holding clutch B1 (4) during deceleration. The planetary pinion gears (17) turn on the fixed sun gear (21) and increase the torque from the annulus gear (8) to the planetary carrier (13). The planetary carrier (13) moves at a reduced speed in the running direction of the engine.

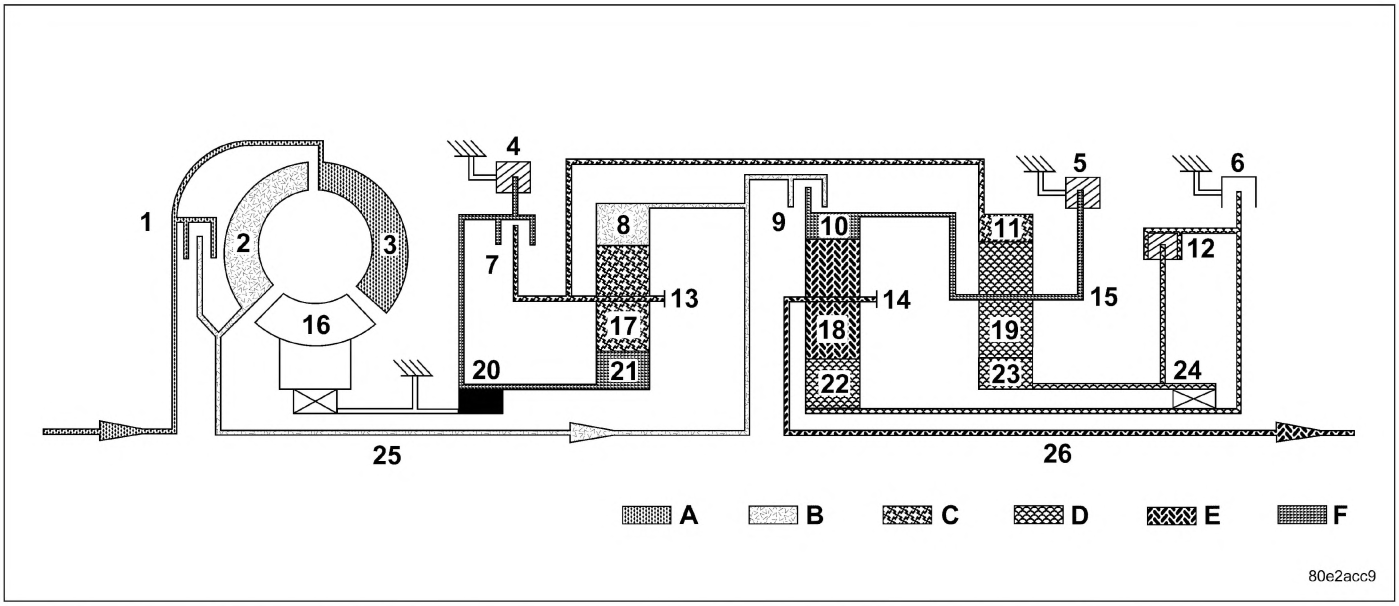
Rear Planetary Gear Set

The multiple-disc clutch K2 (9) is engaged and transfers the input speed of the input shaft (25) to the planetary carrier (15) via the annulus gear (10). The annulus gear (11) turns at a reduced speed due to the mechanical connection with the front planetary carrier (13). The planetary pinion gears (19) turn between the annulus gear (11) and the sun gear (23). The sun gear (23) moves at an increased speed in the running direction of the engine.

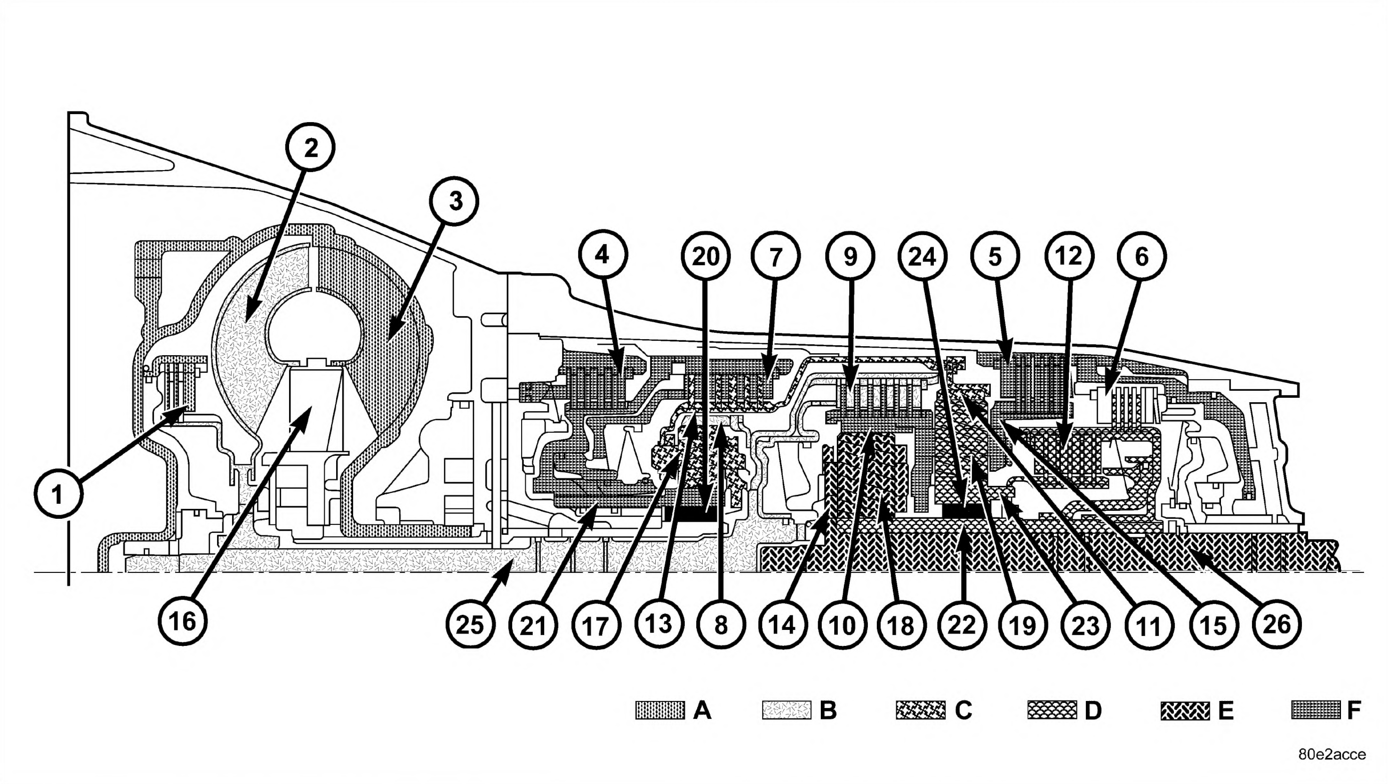
Center Planetary Gear Set

The annulus gear (10) turns at the input speed as a result of the engaged multiple-disc clutch K2 (9). The multiple-disc clutch K3 (12) transfers an increased speed to the sun gear (22) due to the connection with the sun gear (23). The planetary pinion gears (18) turn between the annulus gear (10) and the sun gear (22). The speed of the planetary carrier (14) and the output shaft connected to the planetary carrier (5) lies between that of the annulus gear (10) and the sun gear (22). This provides a step-up ratio.

REVERSE GEAR POWERFLOW



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - THIRD GEAR RATIO
F - FIXED PARTS



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - THIRD GEAR RATIO
F - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred with reversed direction of rotation to the output shaft (26).

Front Planetary Gear Set

The annulus gear (8) is driven by the input shaft (25). The sun gear (21) is held against the housing by the locked freewheel F1 (20) during acceleration and via the engaged multiple-disc holding clutch B1 (4) during deceleration. The planetary pinion gears (17) turn on the fixed sun gear (21) and increase the torque from the annulus gear (8) to the planetary carrier (13). The planetary carrier (13) moves at a reduced speed in the running direction of the engine.

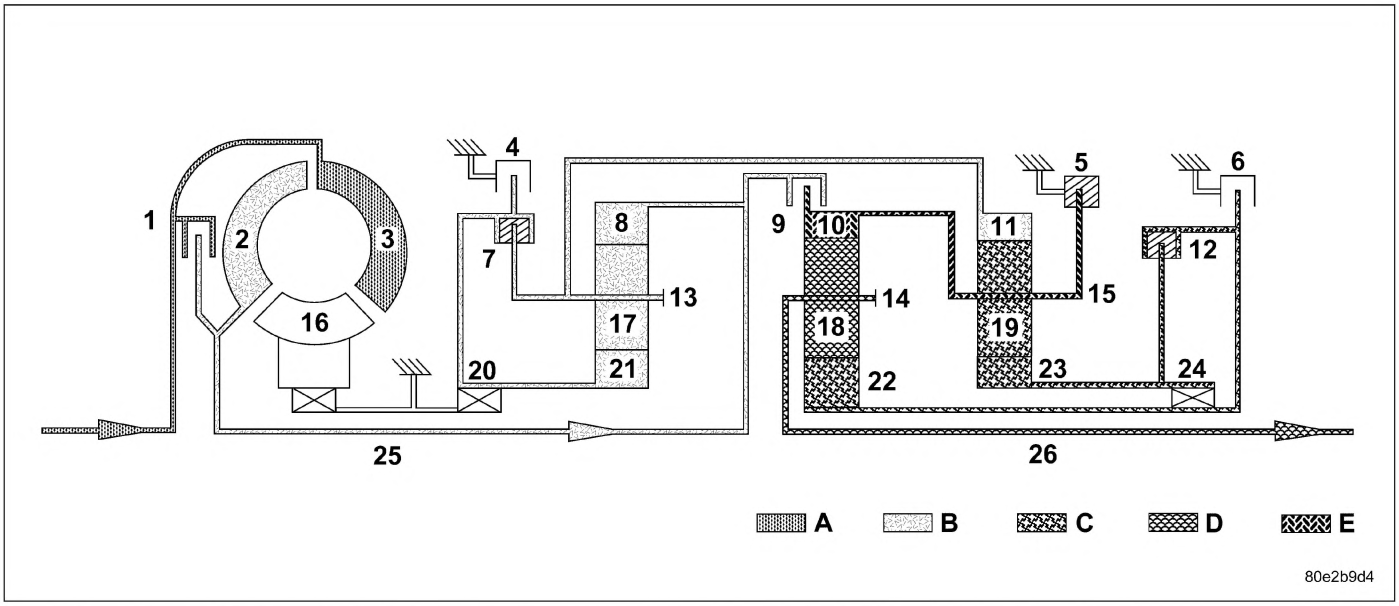
Rear Planetary Gear Set

The planetary carrier (15) is held against the housing by the engaged multiple-disc holding clutch B3 (5). The annulus gear (11) turns at a reduced speed due to the mechanical connection to the front planetary carrier (13). The planetary gears (19) turn between the annulus gear (11) and the sun gear (23). The direction is reversed by the held planetary carrier (15) so that the sun gear (23) turns in the opposite direction to the running direction of the engine.

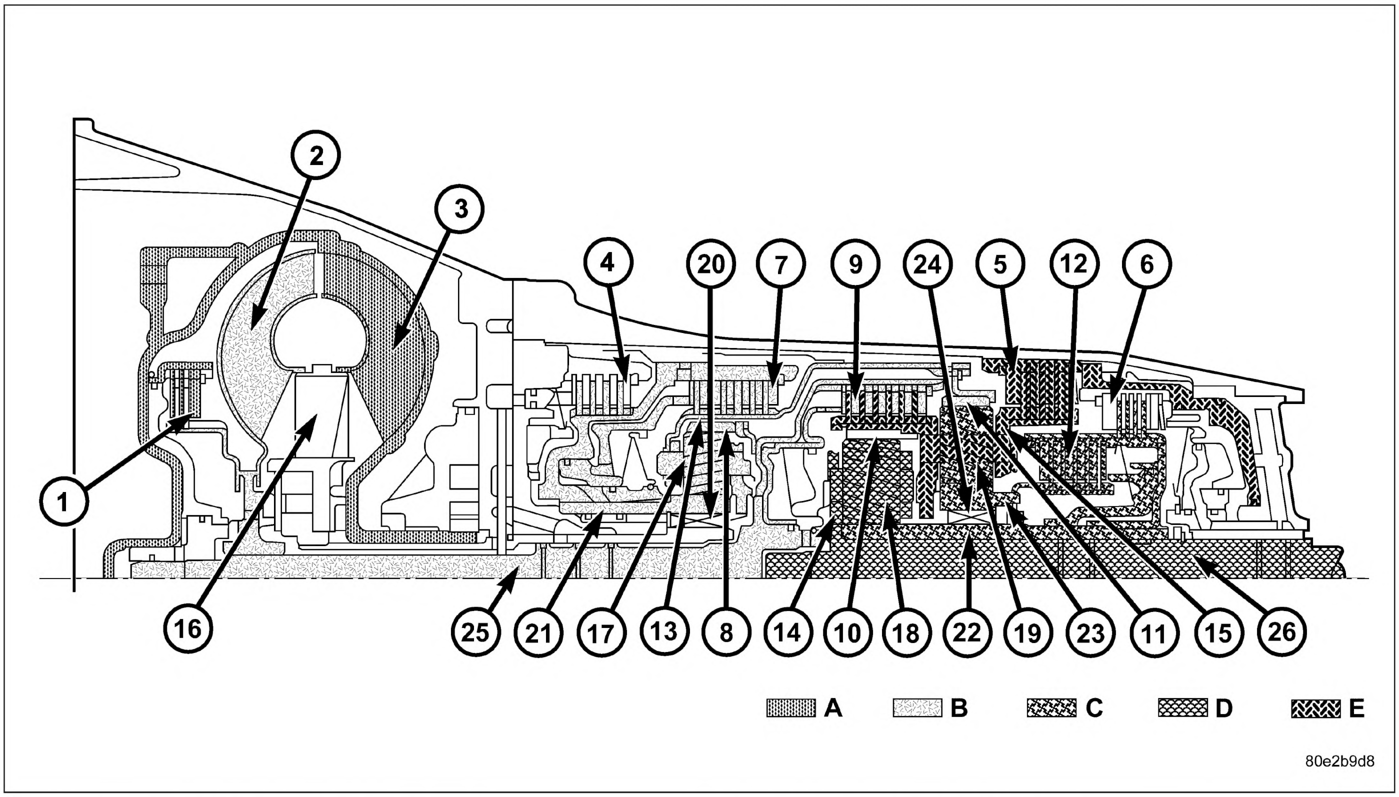
Center Planetary Gear Set

The annulus gear (10) is held against the housing by the multiple-disc holding clutch B3 (5) via the mechanical connection to the planetary carrier (15). The sun gear (22) turns backwards due to the engaged multiple-disc clutch K3 (12). The planetary gears (18) turn on the fixed annulus gear (10) and increase the torque from the sun gear (22) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the opposite direction to the running direction of the engine.

REVERSE GEAR POWERFLOW - LIMP IN or 4WD LOW RANGE



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - FIXED PARTS



1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER TURBINE
3 - TORQUE CONVERTER IMPELLER
4 - HOLDING CLUTCH B1
5 - HOLDING CLUTCH B3
6 - HOLDING CLUTCH B2
7 - DRIVING CLUTCH K1
8 - FRONT PLANETARY ANNULUS GEAR
9 - DRIVING CLUTCH K2
10 - CENTER PLANETARY ANNULUS GEAR
11 - REAR PLANETARY ANNULUS GEAR
12 - DRIVING CLUTCH K3
13 - FRONT PLANETARY CARRIER
A - ENGINE SPEED
B - TRANSMISSION INPUT SPEED
C - FIRST GEAR RATIO
14 - CENTER PLANETARY CARRIER
15 - REAR PLANETARY CARRIER
16 - TORQUE CONVERTER STATOR
17 - FRONT PLANETARY PINION GEARS
18 - CENTER PLANETARY PINION GEARS
19 - REAR PLANETARY PINION GEARS
20 - FREEWHEELING CLUTCH F1
21 - FRONT PLANETARY SUN GEAR
22 - CENTER PLANETARY SUN GEAR
23 - REAR PLANETARY SUN GEAR
24 - FREEWHEELING CLUTCH F2
25 - INPUT SHAFT
26 - OUTPUT SHAFT
D - SECOND GEAR RATIO
E - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred with reversed direction of rotation to the output shaft (26) and.

Front Planetary Gear Set

The clutch K1 (7) is shifted. The planetary carrier (13) and sun gear (21) are connected to each other as a result. The annulus gear (8) is driven via the input shaft (25). The planetary gear set is locked and turns as a unit.

Rear Planetary Gear Set

The planetary carrier (15) is held against the housing by the engaged multiple-disc holding clutch B3 (5). The annulus gear (11) turns at a reduced speed due to the mechanical connection to the front planetary carrier (13). The planetary pinion gears (19) turn between the annulus gear (11) and the sun gear (23). The direction is reversed by the held planetary carrier (15) so that the sun gear (23) turns in the opposite direction to the running direction of the engine.

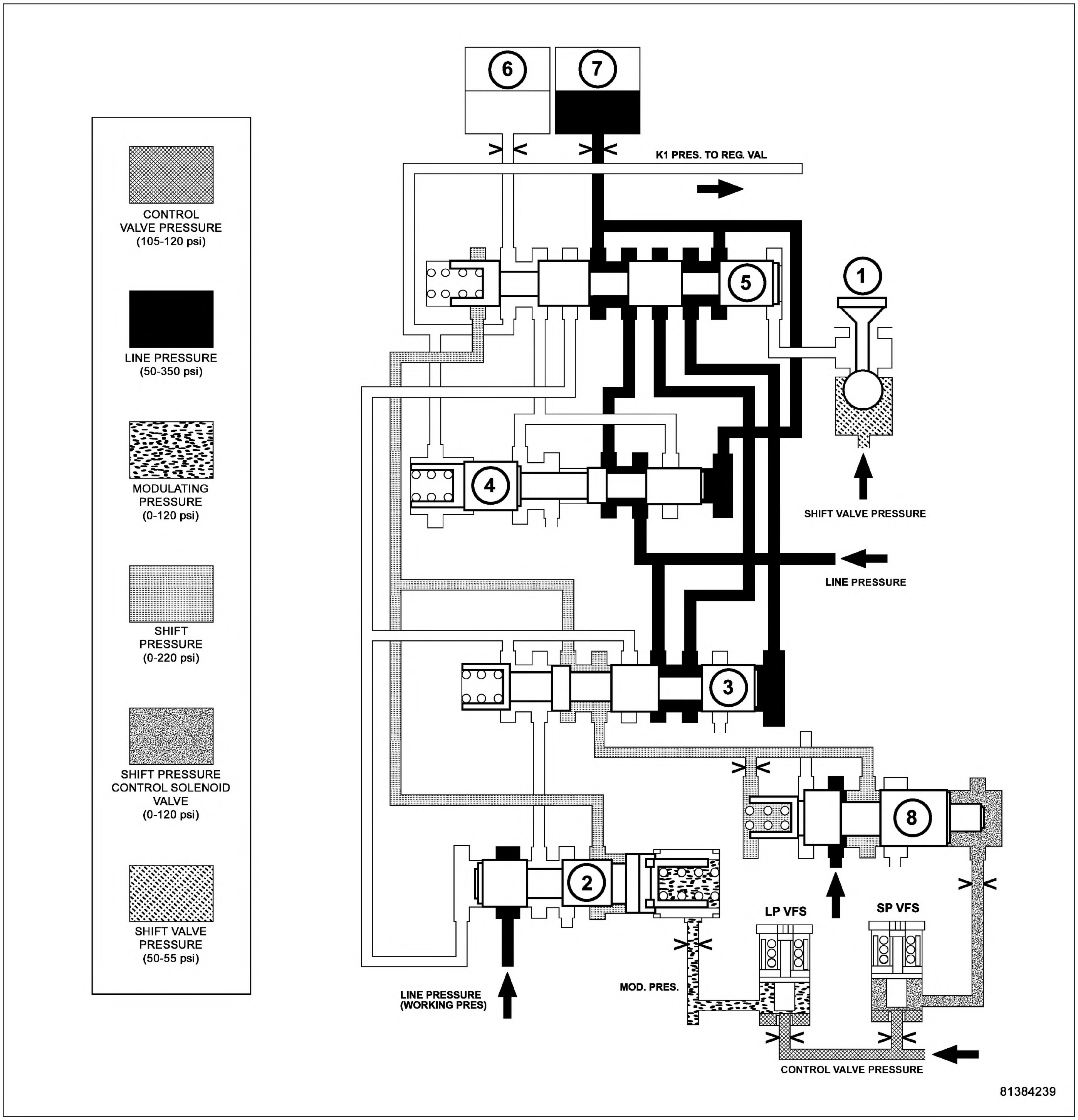
Center Planetary Gear Set

The annulus gear (10) is held against the housing by the multiple-disc holding clutch B3 (5) via the mechanical connection to the planetary carrier (15). The sun gear (22) turns backwards due to the engaged multiple-disc clutch K3 (12). The planetary gears (18) turn on the fixed annulus gear (10) and increase the torque from the sun gear

(22) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the opposite direction to the running direction of the engine.

SHIFT GROUPS/ SHIFT SEQUENCE

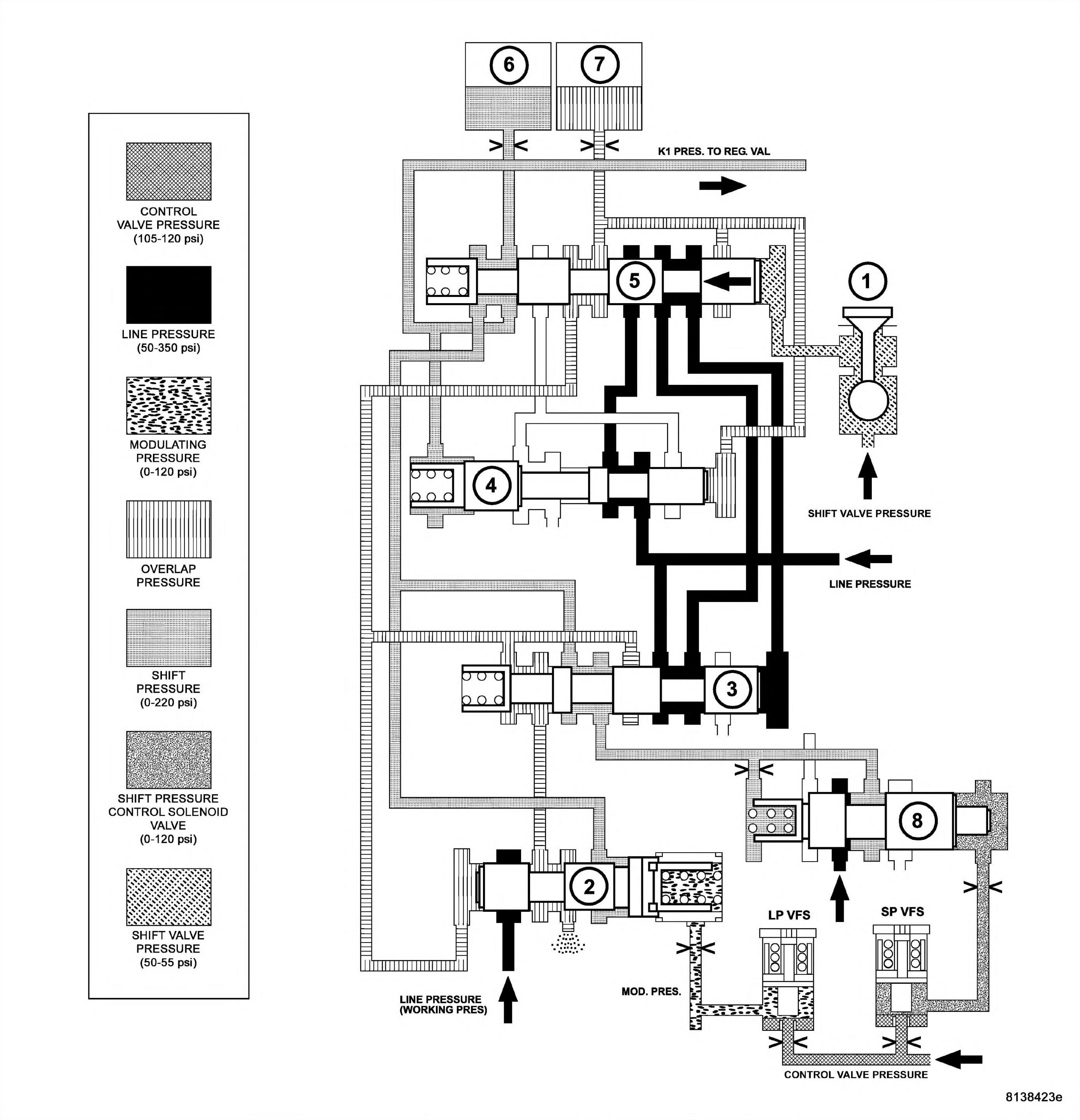
1-2 Shift - First Gear Engaged


CONTROL VALVE PRESSURE (105-120 psi)
LINE PRESSURE (50-350 psi)
MODULATING PRESSURE (0-120 psi)
SHIFT PRESSURE (0-220 psi)
SHIFT PRESSURE CONTROL SOLENOID VALVE (0-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
6
7
K1 PRES. TO REG. VAL
5
1
4
SHIFT VALVE PRESSURE
LINE PRESSURE
3
8
2
LP VFS
SP VFS
LINE PRESSURE (WORKING PRES)
MOD. PRES.
CONTROL VALVE PRESSURE
81384239

1 - 1-2/4-5 SHIFT SOLENOID
2 - 1-2/4-5 OVERLAP VALVE
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE
5 - 1-2/4-5 COMMAND VALVE
6 - DRIVING CLUTCH K1
7 - HOLDING CLUTCH B1

The end face of the command valve (5) is kept unpressurized via the solenoid valve for 1-2 and 4-5 shift (1). Because of the holding pressure shift valve (4), the working pressure (p-A) is present at the multiple-disc holding clutch B1 (7). Clutch K1 (6) is unpressurized.

Shift Phase - 1-2 Shift Phase 1

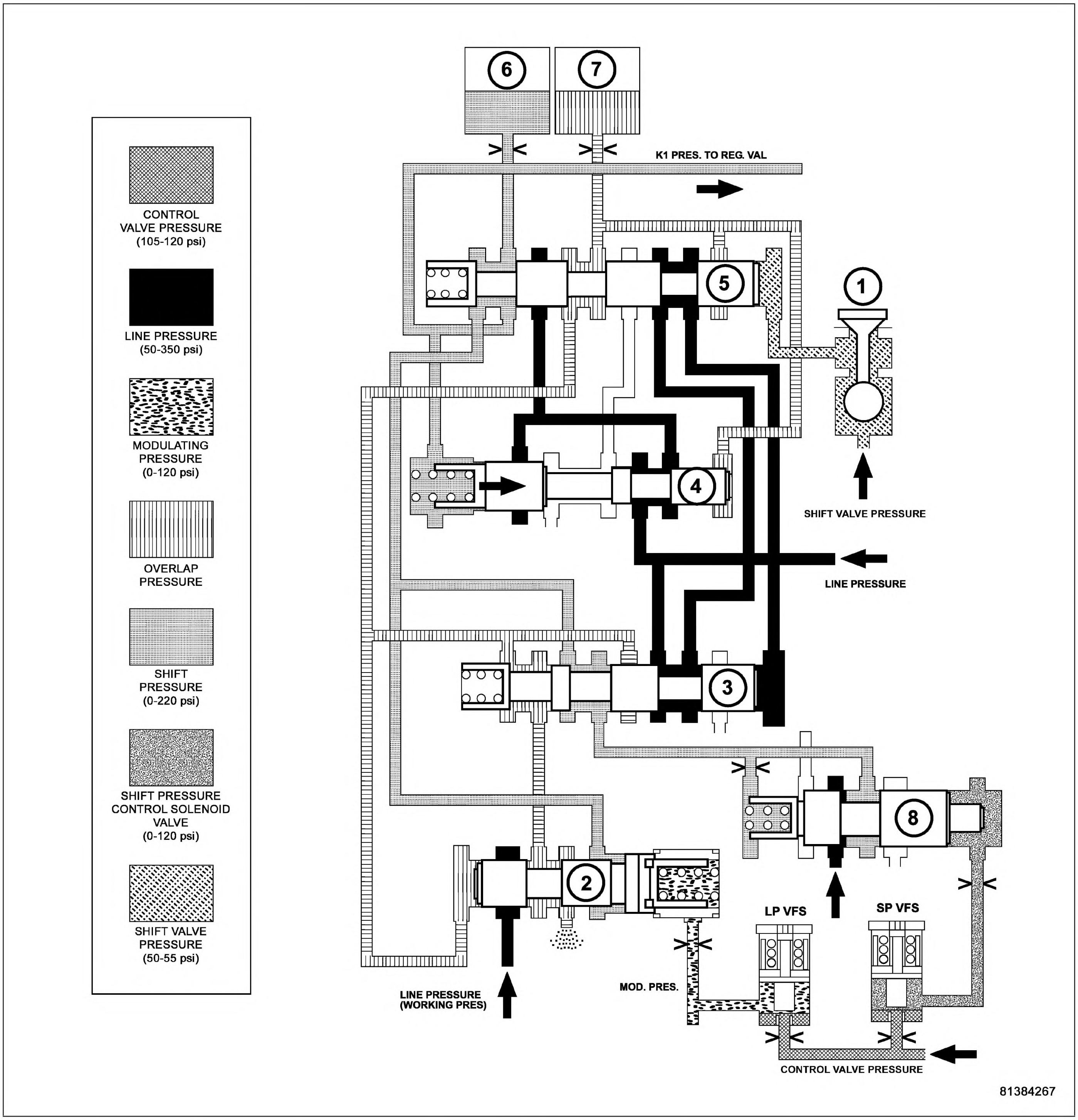

CONTROL VALVE PRESSURE (105-120 psi)
LINE PRESSURE (50-350 psi)
MODULATING PRESSURE (0-120 psi)
OVERLAP PRESSURE
SHIFT PRESSURE (0-220 psi)
SHIFT PRESSURE CONTROL SOLENOID VALVE (0-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
6
7
K1 PRES. TO REG. VAL
5
1
4
SHIFT VALVE PRESSURE
LINE PRESSURE
3
8
2
LP VFS
SP VFS
LINE PRESSURE (WORKING PRES)
MOD. PRES.
CONTROL VALVE PRESSURE
8138423e

1 - 1-2/4-5 SHIFT SOLENOID
2 - 1-2/4-5 OVERLAP VALVE
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE
5 - 1-2/4-5 COMMAND VALVE
6 - DRIVING CLUTCH K1
7 - HOLDING CLUTCH B1

When the 1-2 and 4-5 shift solenoid valve (1) is turned on, the shift valve pressure (p-SV) is directed onto the end face of the command valve (5). The command valve is moved and the shift pressure (p-S) coming from the shift pressure shift valve (3) is directed via the command valve (5) onto clutch K1 (6).

Simultaneously the clutch B1 (7) is subjected to overlap pressure by the overlap regulating valve (2). The pressure in the clutch B1 (7) as it disengages is controlled during the shift phase depending on engine load by the modulating pressure and the applying clutch pressure (the shift pressure in clutch K1). The controlled pressure in clutch B1 (7) is inversely proportional to the capacity of the clutch being engaged. The rising shift pressure (p-S) at clutch K1 (6) acts on the annular face of the overlap regulating valve (2) and reduces the overlap pressure regulated by the overlap regulating valve (2). When a corresponding pressure level is reached at the holding pressure shift valve (4), this valve switches over.

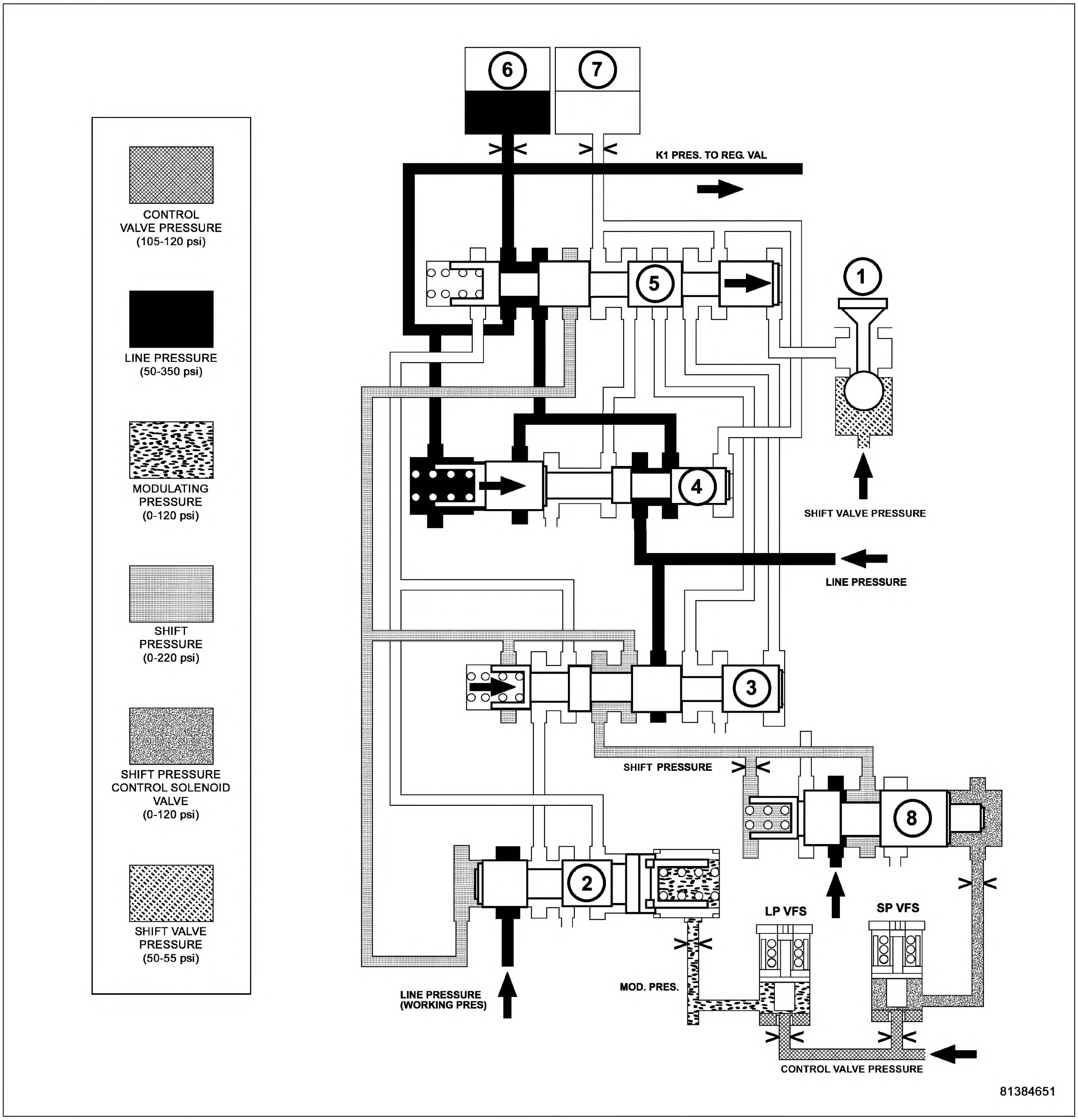
Shift Phase - 1-2 Shift Phase 2


CONTROL VALVE PRESSURE (105-120 psi)
LINE PRESSURE (50-350 psi)
MODULATING PRESSURE (0-120 psi)
OVERLAP PRESSURE
SHIFT PRESSURE (0-220 psi)
SHIFT PRESSURE CONTROL SOLENOID VALVE (0-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
6
7
K1 PRES. TO REG. VAL
5
1
4
SHIFT VALVE PRESSURE
LINE PRESSURE
3
8
2
LP VFS
SP VFS
MOD. PRES.
LINE PRESSURE (WORKING PRES)
CONTROL VALVE PRESSURE
81384267

1 - 1-2/4-5 SHIFT SOLENOID
2 - 1-2/4-5 OVERLAP VALVE
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE
5 - 1-2/4-5 COMMAND VALVE
6 - DRIVING CLUTCH K1
7 - HOLDING CLUTCH B1

The B1 (7) pressure acting on the end face of the shift pressure shift valve (3) is replaced by the working pressure (p-A). The shift pressure is also routed to the spring end of the holding valve (4) and the holding valve downshifts. The line pressure is then routed to the command valve (5).

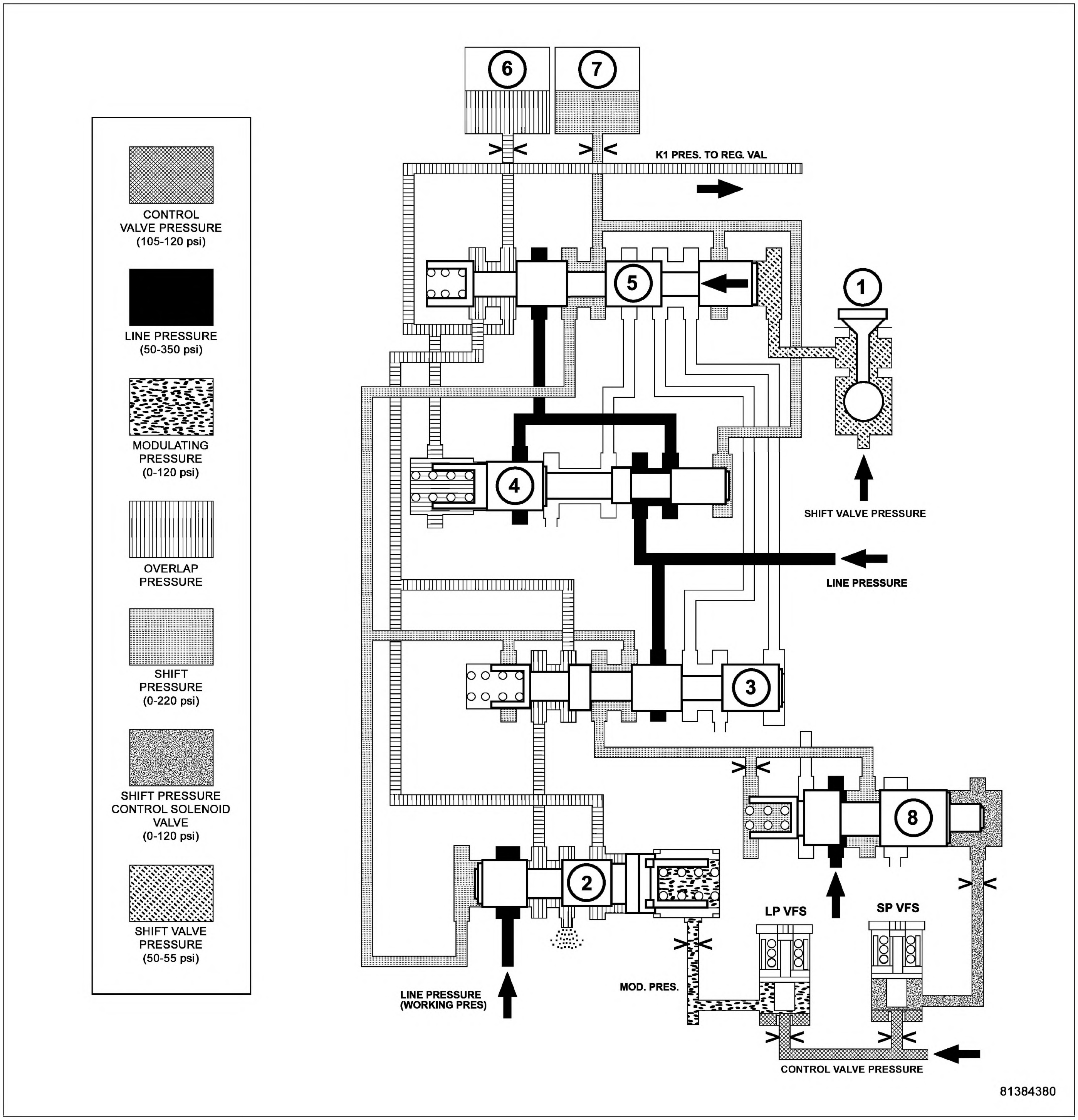
Second Gear Engaged


CONTROL VALVE PRESSURE (105-120 psi)
LINE PRESSURE (50-350 psi)
MODULATING PRESSURE (0-120 psi)
SHIFT PRESSURE (0-220 psi)
SHIFT PRESSURE CONTROL SOLENOID VALVE (0-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
6
7
K1 PRES. TO REG. VAL
5
1
4
SHIFT VALVE PRESSURE
LINE PRESSURE
3
SHIFT PRESSURE
8
2
LP VFS
SP VFS
MOD. PRES.
LINE PRESSURE (WORKING PRES)
CONTROL VALVE PRESSURE
81384651

1 - 1-2/4-5 SHIFT SOLENOID
2 - 1-2/4-5 OVERLAP VALVE
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE
5 - 1-2/4-5 COMMAND VALVE
6 - DRIVING CLUTCH K1
7 - HOLDING CLUTCH B1

After the gearchange is complete, the pressure on the end face of the command valve (5) is reduced via the 1-2 and 4-5 shift solenoid valve (1), and the command valve (5) is pushed back to its basic position. Via the holding pressure shift valve (4) the working pressure (p-A) now passes via the command valve (5) to clutch K1 (6). The multiple-disc holding clutch B1 (7) is deactivated (unpressurized). The spring of the shift pressure shift valve (3) pushes the valve back to its basic position.

Shift Phase - 2-1 Shift Phase 1

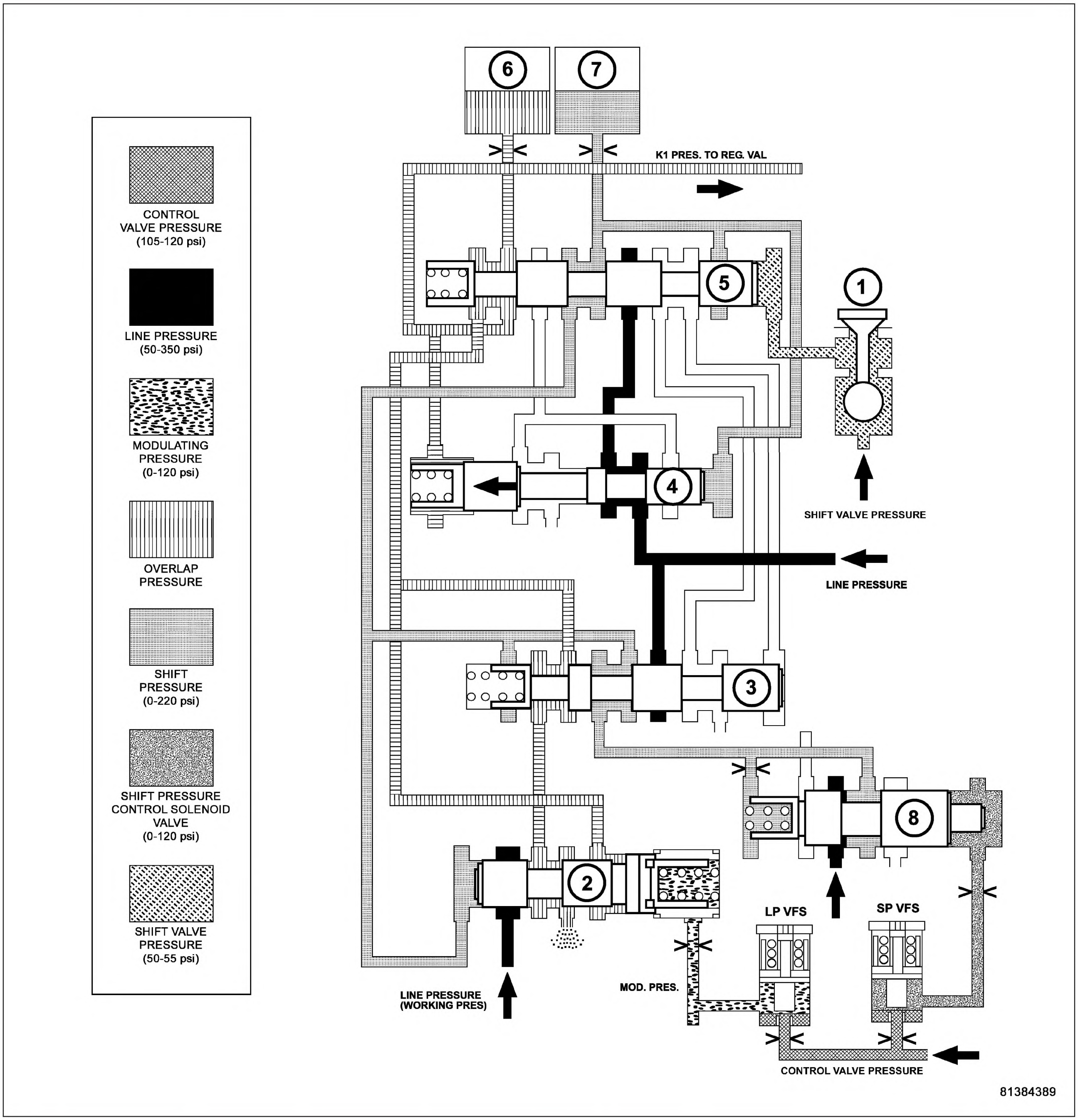

CONTROL VALVE PRESSURE (105-120 psi)
LINE PRESSURE (50-350 psi)
MODULATING PRESSURE (0-120 psi)
OVERLAP PRESSURE
SHIFT PRESSURE (0-220 psi)
SHIFT PRESSURE CONTROL SOLENOID VALVE (0-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
6
7
K1 PRES. TO REG. VAL
5
1
4
SHIFT VALVE PRESSURE
LINE PRESSURE
3
8
2
LP VFS
SP VFS
MOD. PRES.
LINE PRESSURE (WORKING PRES)
CONTROL VALVE PRESSURE
81384380

1 - 1-2/4-5 SHIFT SOLENOID
2 - 1-2/4-5 OVERLAP VALVE
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE
5 - 1-2/4-5 COMMAND VALVE
6 - DRIVING CLUTCH K1
7 - HOLDING CLUTCH B1

The 1-2/4-5 shift solenoid (1) is turned ON to apply shift pressure (p-S) to the end face of the 1-2/4-5 command valve (5). This allows the command valve to up-shift and the shift pressure coming from the 1-2/4-5 shift valve (3) is routed to the holding clutch B1 (7) via the command valve.

Simultaneously, the pressure in the releasing clutch, K1 (6), is regulated at the 1-2/4-5 overlap valve (2). The pressure in the K1 clutch as it disengages is controlled during the shift phase depending on engine load, via the modulating pressure (p-MOD), and the shift pressure in clutch B1 (7). The increasing shift pressure in clutch B1, which also acts on the end face of the overlap valve, reduces the overlap pressure.

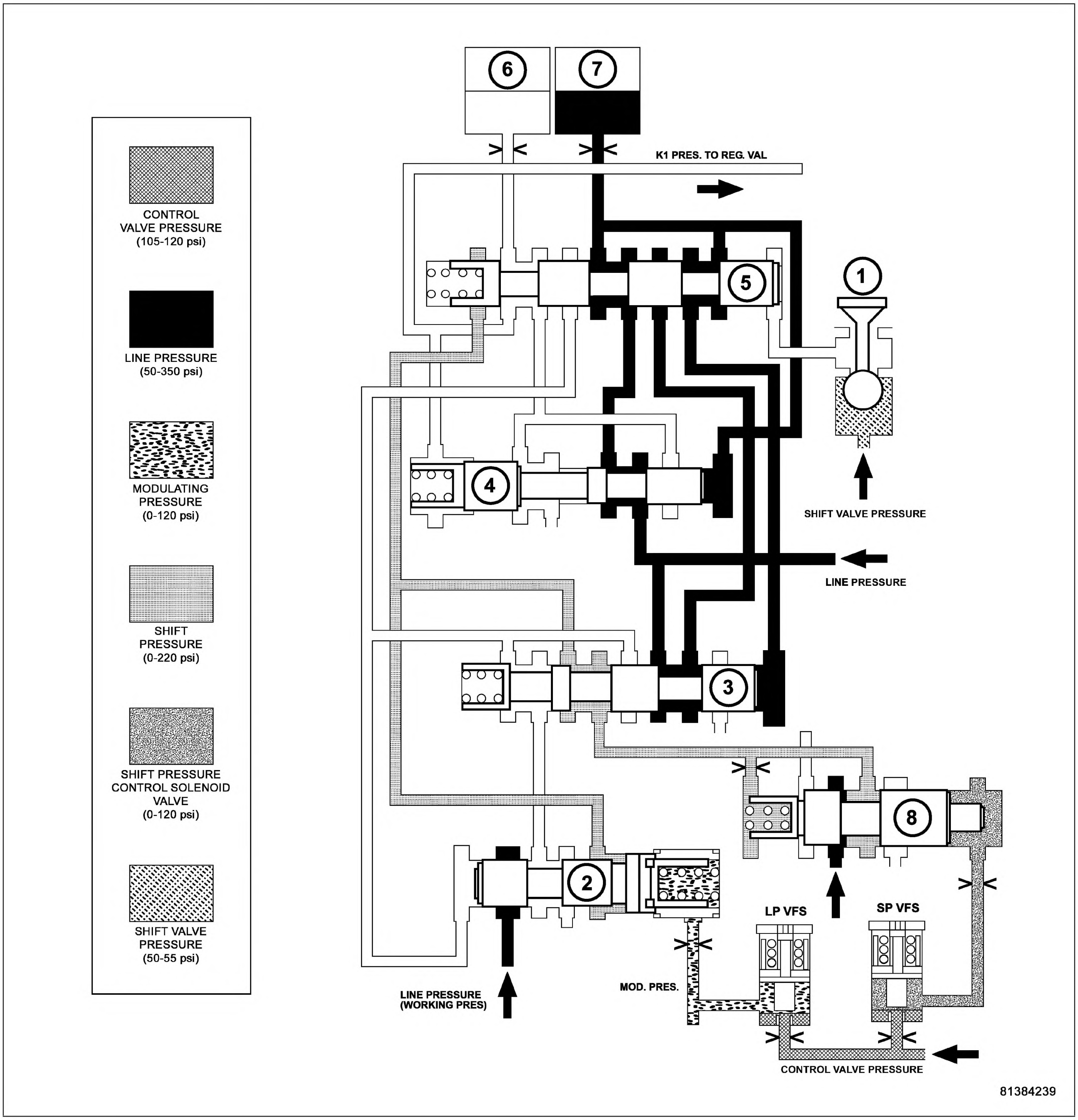
Shift Phase - 2-1 Shift Phase 2


CONTROL VALVE PRESSURE (105-120 psi)
LINE PRESSURE (50-350 psi)
MODULATING PRESSURE (0-120 psi)
OVERLAP PRESSURE
SHIFT PRESSURE (0-220 psi)
SHIFT PRESSURE CONTROL SOLENOID VALVE (0-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
6
7
K1 PRES. TO REG. VAL
5
1
SHIFT VALVE PRESSURE
4
LINE PRESSURE
3
8
2
LP VFS
SP VFS
MOD. PRES.
LINE PRESSURE (WORKING PRES)
CONTROL VALVE PRESSURE
81384389

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE	

The pressure in clutch B1 (7) acting on the end face of the 1-2/4-5 holding valve (4) forces the valve to up-shift against the spring pressure and allows line pressure (p-A) to pass through the command valve (5).

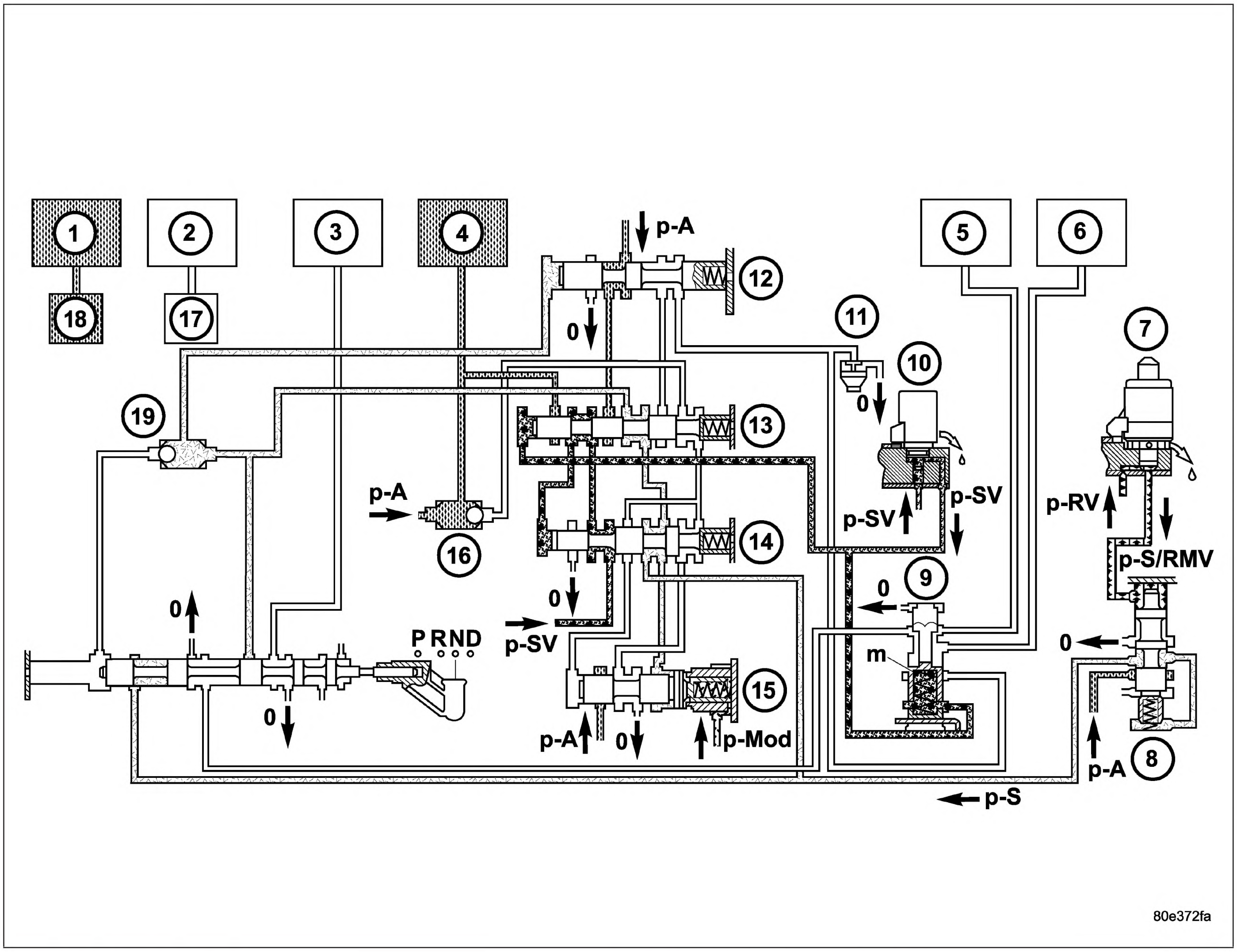
2-1 Shift - First Gear Engaged


CONTROL VALVE PRESSURE (105-120 psi)
LINE PRESSURE (50-350 psi)
MODULATING PRESSURE (0-120 psi)
SHIFT PRESSURE (0-220 psi)
SHIFT PRESSURE CONTROL SOLENOID VALVE (0-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
6
7
K1 PRES. TO REG. VAL
5
1
4
SHIFT VALVE PRESSURE
LINE PRESSURE
3
8
2
LP VFS
SP VFS
LINE PRESSURE (WORKING PRES)
MOD. PRES.
CONTROL VALVE PRESSURE
81384239

1 - 1-2/4-5 SHIFT SOLENOID
2 - 1-2/4-5 OVERLAP VALVE
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE
5 - 1-2/4-5 COMMAND VALVE
6 - DRIVING CLUTCH K1
7 - HOLDING CLUTCH B1

After the gear change is complete, the 1-2/4-5 shift solenoid (1) is turned off. This reduces the pressure on the end face of the 1-2/4-5 command valve (5) to 0 psi and the spring pressure downshifts the valve to its initial position. The line pressure (p-A) is switched to the holding clutch B1 (7) and the end face of the holding valve by the downshifted command valve. The upshifted holding valve also allows the remaining pressure in clutch K1 (6) to be vented.

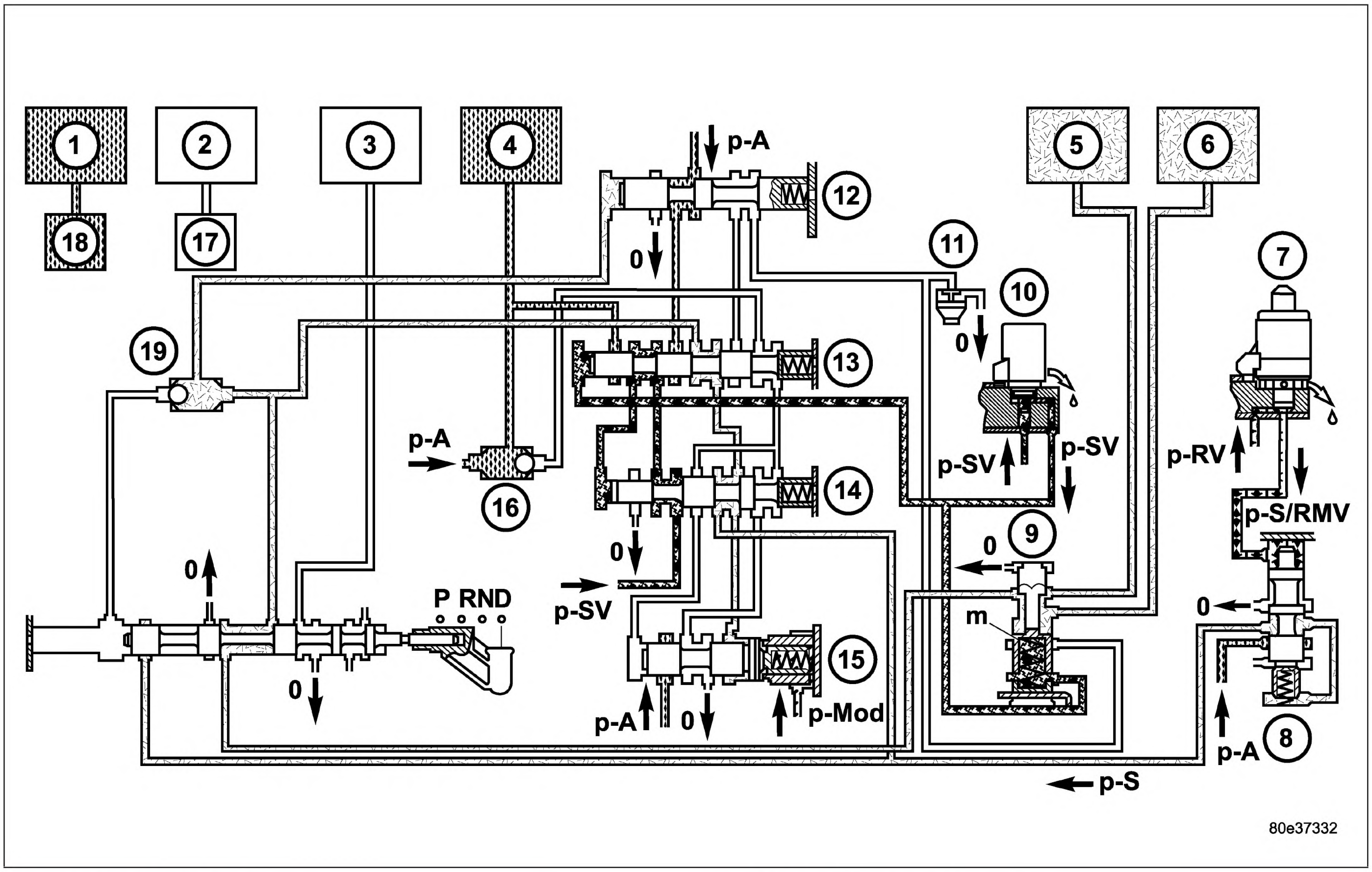
Gear Shift N to D (1st gear) - Engine Started



1 - HOLDING CLUTCH B1
2 - DRIVING CLUTCH K1
3 - HOLDING CLUTCH B3
4 - DRIVING CLUTCH K3
5 - HOLDING CLUTCH B2 PISTON
6 - HOLDING CLUTCH B2 PISTON OPPOSING FACE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - SHIFT PRESSURE REGULATING VALVE
9 - SHIFT VALVE B2
10 - 3-4 SHIFT SOLENOID
11 - PRESSURE HOLDING VALVE
12 - 3-4 HOLDING PRESSURE SHIFT VALVE
13 - 3-4 COMMAND VALVE
14 - 3-4 SHIFT PRESSURE SHIFT VALVE
15 - 3-4 OVERLAP REGULATING VALVE
16 - BALL VALVE
17 - 1-2/4-5 COMMAND VALVE
18 - 1-2/4-5 COMMAND VALVE
19 - BALL VALVE

With the engine started and the gearshift lever in the NEUTRAL or PARK positions, holding clutch B1 (1) and driving clutch K3 (4) are applied and the various valves in the 1-2/4-5 shift group are positioned to apply pressure to the holding clutch B2.

Activation Sequence

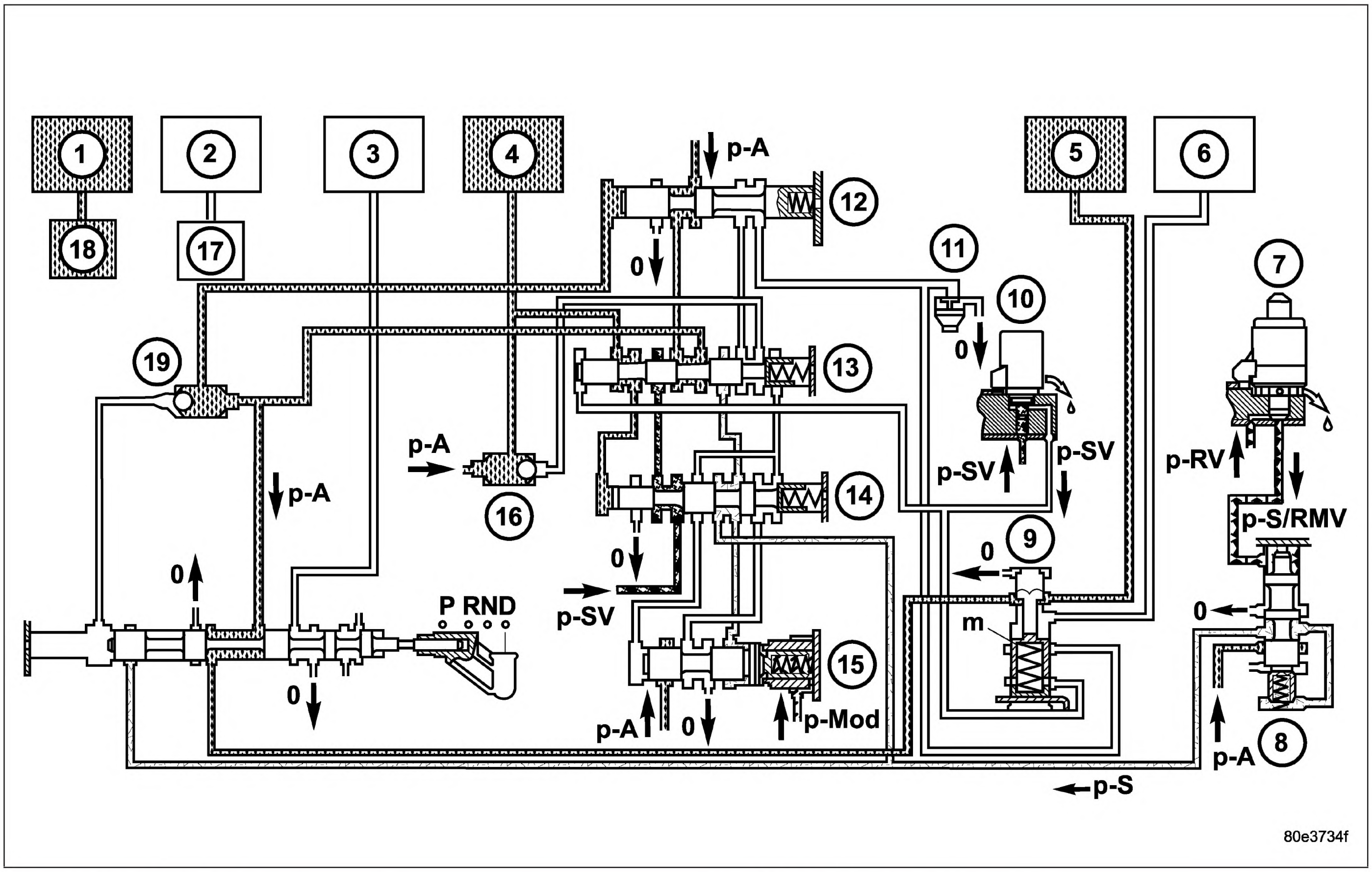


1 - HOLDING CLUTCH B1
2 - DRIVING CLUTCH K1
3 - HOLDING CLUTCH B3
4 - DRIVING CLUTCH K3
5 - HOLDING CLUTCH B2 PISTON
6 - HOLDING CLUTCH B2 PISTON OPPOSING FACE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - SHIFT PRESSURE REGULATING VALVE
9 - SHIFT VALVE B2
10 - 3-4 SHIFT SOLENOID
11 - PRESSURE HOLDING VALVE
12 - 3-4 HOLDING PRESSURE SHIFT VALVE
13 - 3-4 COMMAND VALVE
14 - 3-4 SHIFT PRESSURE SHIFT VALVE
15 - 3-4 OVERLAP REGULATING VALVE
16 - BALL VALVE
17 - 1-2/4-5 COMMAND VALVE
18 - 1-2/4-5 COMMAND VALVE
19 - BALL VALVE

The selector valve opens the shift pressure (p-S) feed connection from the ball valve (19) with the shift valve B2 (9). With the shift valve B2 (9) in the upper position, shift pressure (p-S) travels behind the piston B2 (5) and simultaneously to the opposing face of the piston B2 (6). The multiple-disc holding clutch B2 begins to close.

The pressure on the opposing face of the piston B2 (6) ensures a soft activation of the multiple-disc holding clutch B2.

First Gear Engaged



1 - HOLDING CLUTCH B1
2 - DRIVING CLUTCH K1
3 - HOLDING CLUTCH B3
4 - DRIVING CLUTCH K3
5 - HOLDING CLUTCH B2 PISTON
6 - HOLDING CLUTCH B2 PISTON OPPOSING FACE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - SHIFT PRESSURE REGULATING VALVE
9 - SHIFT VALVE B2
10 - 3-4 SHIFT SOLENOID
11 - PRESSURE HOLDING VALVE
12 - 3-4 HOLDING PRESSURE SHIFT VALVE
13 - 3-4 COMMAND VALVE
14 - 3-4 SHIFT PRESSURE SHIFT VALVE
15 - 3-4 OVERLAP REGULATING VALVE
16 - BALL VALVE
17 - 1-2/4-5 COMMAND VALVE
18 - 1-2/4-5 COMMAND VALVE
19 - BALL VALVE

The TCM monitors the activation sequence via the speed of the input shaft, which slows down as the frictional connection in the multiple-disc holding clutch increases. When the speed drops to the specified level, the TCM shuts off the power to the 3-4 shift solenoid valve (10). The spring chamber of the shift valve B2 (9) is depressurized and switches downwards. This connects the line to the opposing face of the piston B2 (6) with the pressure holding valve (11). The pressure on the opposing face of the piston B2 (6) drops to a residual pressure.

The working pressure (p-A) is formed and travels via the 2-3 holding pressure shift valve, the 2-3 command valve and the ball valve (16) to multi-plate clutch K3 (4) and via the 3-4 command valve (13) to the end face of the 3-4 shift pressure shift valve (14). The 3-4 shift pressure shift valve (14) is moved against the force of the spring towards the right. At the same time the 3-4 solenoid valve (10) is energized. This allows shift valve pressure (p-SV) to enter the spring chamber of the shift valve B2 (9) and to reach the end face of the 3-4 command valve (13). The shift valve B2 (9) is held in the upper position and the 3-4 command valve (13) switches towards the right. At the end face of the 3-4 shift pressure shift valve (14) the working pressure (p-A) is replaced by shift valve pressure (p-SV).

The 3-4 command valve (13) moves to the left. Working pressure (p-A) travels via the holding pressure shift valve (12) and the 3-4 command valve (13) to the piston of multiple-disc holding clutch B2 (5).

DIAGNOSIS AND TESTING

AUTOMATIC TRANSMISSION

CAUTION: Before attempting any repair on a NAG1 automatic transmission, check for Diagnostic Trouble Codes with the appropriate scan tool.

Transmission malfunctions may be caused by these general conditions:

- Poor engine performance.
- Improper adjustments.
- Hydraulic malfunctions.
- Mechanical malfunctions.
- Electronic malfunctions.
- Transfer case performance (if equipped).

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, gearshift cable adjustment. Then perform a road test to determine if the problem has been corrected or if more diagnosis is necessary.

PRELIMINARY

Two basic procedures are required. One procedure for vehicles that are drivable and an alternate procedure for disabled vehicles (will not back up or move forward).

VEHICLE IS DRIVABLE

1. Check for transmission fault codes using the appropriate scan tool.
2. Check fluid level and condition.
3. Adjust gearshift cable if complaint was based on delayed, erratic, or harsh shifts.
4. Road test and note how transmission upshifts, downshifts, and engages.

VEHICLE IS DISABLED

1. Check fluid level and condition.
2. Check for broken or disconnected gearshift cable.
3. Check for cracked, leaking cooler lines, or loose or missing pressure-port plugs.
4. Raise and support vehicle on safety stands, start engine, shift transmission into gear, and note following:
   a. If propeller shaft turns but wheels do not, problem is with differential or axle shafts.
   b. If propeller shaft does not turn and transmission is noisy, stop engine. Remove oil pan, and check for debris. If pan is clear, remove transmission and check for damaged driveplate, converter, oil pump, or input shaft.
   c. If propeller shaft does not turn and transmission is not noisy, perform hydraulic-pressure test to determine if problem is hydraulic or mechanical.

ROAD TESTING

Before road testing, be sure the fluid level and control cable adjustments have been checked and adjusted if necessary. Verify that all diagnostic trouble codes have been resolved.

Observe engine performance during the road test. A poorly tuned engine will not allow accurate analysis of transmission operation.

Operate the transmission in all gear ranges. Check for shift variations and engine flare which indicates slippage. Note if shifts are harsh, spongy, delayed, early, or if part throttle downshifts are sensitive.

Slippage indicated by engine flare, usually means clutch, overrunning clutch, or line pressure problems.

A slipping clutch can often be determined by comparing which internal units are applied in the various gear ranges. The Clutch Application chart CLUTCH APPLICATION provides a basis for analyzing road test results.

CLUTCH APPLICATION

GEAR	RATIO	B1	B2	B3	K1	K2	K3	F1	F2
1	3.59	X*	X				X*	X	X
2	2.19		X		X		X*		X
3	1.41		X		X	X			
4	1.00				X	X	X		
5	0.83	X				X	X	X*	
N	N/A	X					X		
R	3.16	X*		X			X	X	
R - Limp In or 4WD Low Range	1.93			X	X		X		
* = The shift components required during coast.									

AUTOMATIC TRANSMISSION

CONDITION	POSSIBLE CAUSES	CORRECTION
Harsh N-D Engagement Harsh N-R Engagement	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Transmission in limp-home mode.	2. Check TCM for DTCs. Repair as needed.
	3. Driveline lash/movement.	3. Check engine mounts, transmission mount, driveshaft couplings, rear crossmember mounts, axle mounts and axle lash.
	4. Converter clutch or lock up control valve malfunction.	4. Perform converter clutch diagnostics test. Inspect valve body for stuck or sticky lock up control valve. If valve motion is free, replace lock up solenoid and retest.
	5. Valve Body Malfunction.	5. Inspect valve body for stuck or sticky regulator valve.
	6. Clutch or planetary component damage.	6. Remove, disassemble and repair transmission as necessary.

CONDITION	POSSIBLE CAUSES	CORRECTION
Delayed N-D or N-R Engagement	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Torque converter fluid drain back, delayed soft engagement.	2. If vehicle moves normally after 3 seconds of shifting into gear, no repair is necessary. If longer, inspect pump for worn bushing.
	3. Fluid Level Low.	3. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	4. Filter plugged.	4. Check TC out pressure, if < 10psi, check for plugged filter. Replace if needed.
	5. Filter damaged or missing, missing o-ring.	5. Check for damaged/missing filter or cut/missing o-ring.
	6. Valve Body Malfunction.	6. Inspect valve body for stuck/ sticky regulator valve or shift group valves.
	7. Oil pump gears worn/damaged.	7. Inspect pump for damage or excessive clearances. Replace if needed.
No Drive or Reverse Engagement (vehicle will not move)	1. Fluid level low.	1. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	2. Misadjusted/damaged shift cable.	2. Inspect shift system. Adjust and/or replace worn/damaged parts.
	3. Filter plugged.	3. Check TC out pressure, if < 10psi, check for plugged filter. Replace if needed.
	4. Filter damaged or missing, missing filter o-ring.	4. Check for damaged/missing filter or cut/missing o-ring.
	5 Hydraulic system-Low/no line pressure.	5. Remove valve body. Inspect or sticky/stuck regulator valve. If valve motion is free, replace line pressure solenoid and retest. If condition still exists check for worn/damaged pump. Replace pump assembly if needed.

CONDITION	POSSIBLE CAUSES	CORRECTION
Shudder garage shift R-D or D-R	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Customer applying throttle while shift is in progress.	2. Instruct customer to wait until shift is complete prior to applying throttle.
Harsh rolling garage shift R-D or D-R	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Customer shifting into desired range with vehicle motion.	2. Instruct customer to only shift into the desired range with the vehicle stopped and the service brake applied.
	3. Transmission in limp-home mode.	3. Check TCM for DTCs. Repair as needed.
Engine stalls when transmission is shifted into R or D.	1. Converter clutch or lock up control valve malfunction.	1. Perform converter clutch diagnostics test. Inspect valve body for stuck or sticky lock up control valve. If valve motion is free, replace lock up solenoid and retest.
	2. Defective torque converter.	2. Replace torque converter.
Clunk/click noise during garage shift from R-D or D-R	1. Stick-slip condition between output flange and output shaft nut upon torque reversal from R to D or D to R. Click on first launch.	1. Replace output flange and nut.
Harsh Upshift or downshift	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Valve body malfunction.	2. Inspect valve body for sticky/stuck valves. Repair as needed. If valve motion is free, replace shift pressure solenoid and line pressure solenoid and retest.
	3. Damaged or misbuilt clutch.	3. Remove, disassemble and repair transmission as needed.

CONDITION	POSSIBLE CAUSES	CORRECTION
EMCC Shudder	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Fluid condition, contamination or wrong type.	2. Change fluid per service manual procedures. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	3. Valve body malfunction.	3. Remove valve body. Inspect for sticky/stuck lock up control valve. If valve motion is free, replace the lock up solenoid and retest.
	4. Defective torque converter.	4. Replace torque converter.
Grating or Scraping Noise proportional to engine speed	1. Torque converter bolts contacting dust shield.	1. Dust shield bent. Replace if needed. Torque converter bolt backed out. Replace with new bolt and torque to proper level.
	2. Damaged/broken drive plate.	2. Inspect driveplate. Replace if needed.
Grating or Scraping Noise proportional to transmission output speed	1. Driveshaft or rear axle noise.	1. Check driveshaft, center bearing and axle for noise or contact with other components.
	2. Transmission output bearing noise.	2. Replace output bearing and retest.
	3. Internal transmission damage.	3. Remove, disassemble and repair transmission as needed.
High pitched whine/noise related to engine speed	1. Fluid level low.	1. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	2. Transmission in limp-home mode.	2. Check TCM for DTCs. Repair as needed.
	3. Filter plugged.	3. Check TC out pressure, if < 10psi, check for plugged filter. Replace if needed.
	4. Filter damaged or missing.	4. Check for damaged/missing filter or cut/missing o-ring.
	5. Oil pump bushing worn/ damaged.	5. Visually inspect for worn or damaged pump bushing. Replace pump assembly if needed.
	6. Oil pump gears worn/ damaged.	6. Inspect for worn or damaged pump gears. Replace pump assembly if needed.

CONDITION	POSSIBLE CAUSES	CORRECTION
Slips on 1-2 upshift	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Fluid level low.	2. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	3. Filter damaged or missing.	3. Check for damaged/missing filter or cut/missing o-ring.
	4. Valve body malfunction.	4. Check for sticky/stuck 2-3 shift pressure valve or regulator valve.
	5. F1 or K1 clutch damaged.	5. Disassemble transmission inspect for damaged F1 or K1 clutch. Repair as needed.
Slips on 2-3 upshift	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Fluid level low.	2. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	3. Filter damaged or missing.	3. Check for damaged/missing filter or cut/missing o-ring.
	4. Valve body malfunction.	4. Check for sticky/stuck 2-3 shift pressure valve or regulator valve.
	5. F2 or B2 clutch damaged.	5. Disassemble transmission, inspect for damaged F2 or B2 clutch. Repair as needed.

CONDITION	POSSIBLE CAUSES	CORRECTION
Slips on 3-4 upshift	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Fluid level low.	2. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	3. Filter damaged or missing.	3. Check for damaged/missing filter or cut/missing o-ring.
	4. Valve body malfunction.	4. Check for sticky/stuck 2-3 shift pressure valve or regulator valve.
	5. K3 or B2 clutch damaged.	5. Disassemble transmission, inspect for damaged K3 or B2 clutch. Repair as needed.
Slips on 4-5 upshift	1. Transmission adaptation/ calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)
	2. Fluid level low.	2. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	3. Filter damaged or missing.	3. Check for damaged/missing filter or cut/missing o-ring.
	4. Valve body malfunction.	4. Check for sticky/stuck 2-3 shift pressure valve or regulator valve.
	5. B1 or K1 clutch damaged.	5. Disassemble transmission, inspect for damaged B1 or K1 clutch. Repair as needed.
In-gear shudder on heavy acceleration	1. Fluid level low.	1. Check and adjust fluid level. (Refer to 21 - TRANSMISSION/ AUTOMATIC - NAG1/FILTER - STANDARD PROCEDURE)
	2. Filter damaged or missing.	2. Check for damaged/missing filter or cut/missing o-ring.
No Drive engagement following a shift to N	1. Customer shifting into N at vehicle speeds greater than 25mph and tipping in on the throttle.	1. Instruct the customer that they should not shift into N at vehicle speeds greater 25mph.
	2. Shift system malfunction.	2. Inspect shift system for proper adjustment or damage. Check shifter for DTCs. Repair as needed.

CONDITION	POSSIBLE CAUSES	CORRECTION
Reverse gear position blocked engagement when moving shift lever from D position	1. Customer shifting into R at vehicle speeds greater than 7mph.	1. Instruct customer that R shifter position is blocked at vehicle speeds greater than 7mph.
	2. Shift system malfunction.	2. Inspect shift system for proper adjustment or damage. Check shifter for DTCs. Repair as needed.
No Engine Cranking in P or N	1. Gearshift cable adjustment.	1. Adjust shift cable and retest.
	2. Shift system malfunction.	2. Check shifter DTCs. Inspect shift cable and lever assembly. Adjust and/or replace worn/ damaged parts.
	3. Valve body malfunction.	3. Starter lockout contact malfunction. Remove valve body, replace lead frame assembly.

CONDITION	POSSIBLE CAUSES	CORRECTION
Fluid Leak	1. Leak in area of bell housing.	1. Check bolt torque on internal bell housing bolts. If loose, replace fastener and torque to proper level. If bolts are to proper torque level, check pump outer seal and impeller seal. Replace if needed.
	2. Leak in area of control unit(valve body) electrical connector.	2. Check connector for damaged(cut) or missing o-rings. Replace as needed.
	3. Leak in area of pan gasket.	3. Check for proper torque on oil pan clamps. Check for mis-positioned or rolled gasket. Repair as needed.
	3. Free Wheeling Clutch F2 Defective.	3. Replace Free Wheeling Clutch F2, Hollow Shaft, and Rear Sun Gear/Inner Disc Carrier K3.
	4. Leak in area of park guide plug.	4. Remove park guide plug. Check for damaged(cut) or missing o-ring. If o-ring is in good condition, install new plug.
	5. Leak in area of shift lever.	5. Check for damaged shift lever seal or damaged lever. Repair as needed.
	6. Leak in area of output flange.	6. Check for worn/damaged slinger seal and output seal. Visually inspect output flange seal surface for damage. Repair as needed.
	7. Leak in area of transmission vent.	7. Check fluid level for overfill condition. Adjust as needed. If fluid level is within specification, ride check vehicle. Monitor transmission temperature. If high operating temperatures are observed, fluid may be contaminated or cooling system malfunctioning. Change fluid per service manual procedures. Refer to cooling system diagnostics if needed.
	8. Leak in area of transmission fill tube.	8. Inspect fill tube cap for proper installation. Inspect fill tube grommet between case and fill tube for leakage. Repair as needed.

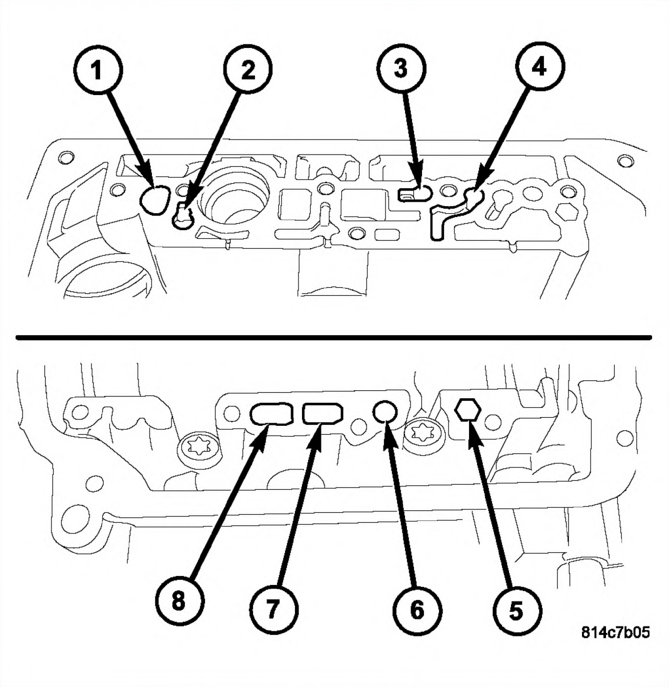
AIR CHECKING TRANSMISSION CLUTCH OPERATION

Air-pressure testing can be used to check transmission clutch operation. The test can be conducted with the transmission either in the vehicle or on the work bench, as a final check.

Air-pressure testing requires that the oil pan and valve body be removed from the transmission. The clutch apply passages are shown in the NAG1 Clutch Application Ports graphic.

NOTE: The air supply which is used must be free of moisture and dirt. Use a pressure of 30 psi to test clutch operation.

Apply air pressure at each port. If the clutch is functioning, a soft thump will be heard as the clutch is applied. The clutch application can also be felt by touching the appropriate element while applying air pressure. As the air pressure is released, the clutch should also release.



NAG1 Clutch Application Ports

1 - K1 CLUTCH APPLY PORT
2 - B1 CLUTCH APPLY PORT
3 - K2 CLUTCH APPLY PORT
4 - TORQUE CONVERTER CLUTCH APPLY PORT
5 - B3 CLUTCH APPLY PORT
6 - B2 CLUTCH COUNTER-PRESSURE PORT
7 - K3 CLUTCH APPLY PORT
8 - B2 CLUTCH APPLY PORT

STANDARD PROCEDURE - ALUMINUM THREAD REPAIR

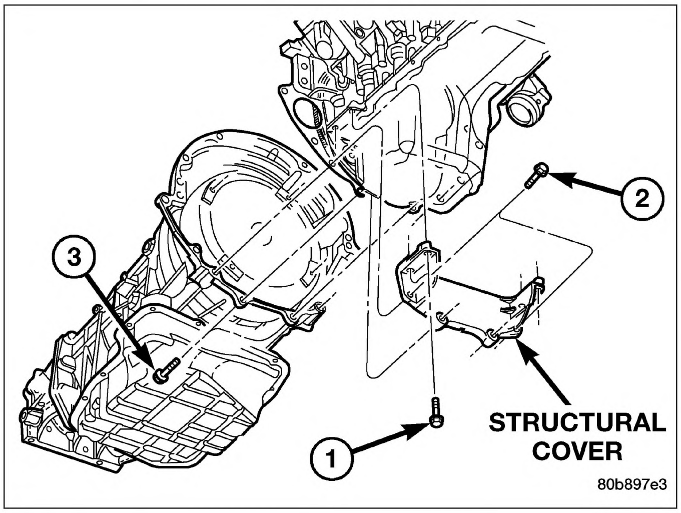
Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils™, or equivalent. This repair consists of drilling out the worn-out damaged threads. Then tap the hole with a special Heli-Coil™ tap, or equivalent, and installing a Heli-Coil™ insert, or equivalent, into the hole. This brings the hole back to its original thread size.

Heli-Coil™, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

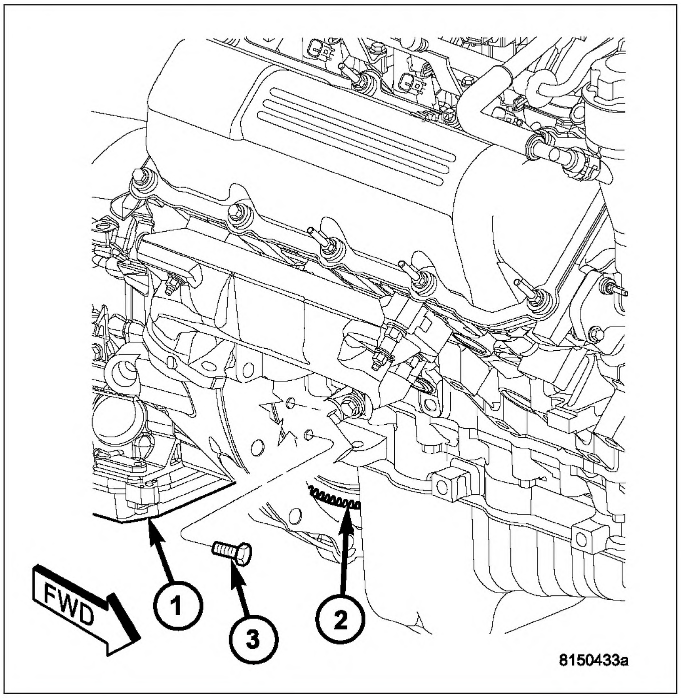
REMOVAL

NOTE: If the transmission is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the TCM Adaptation Procedure using the scan tool (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE).

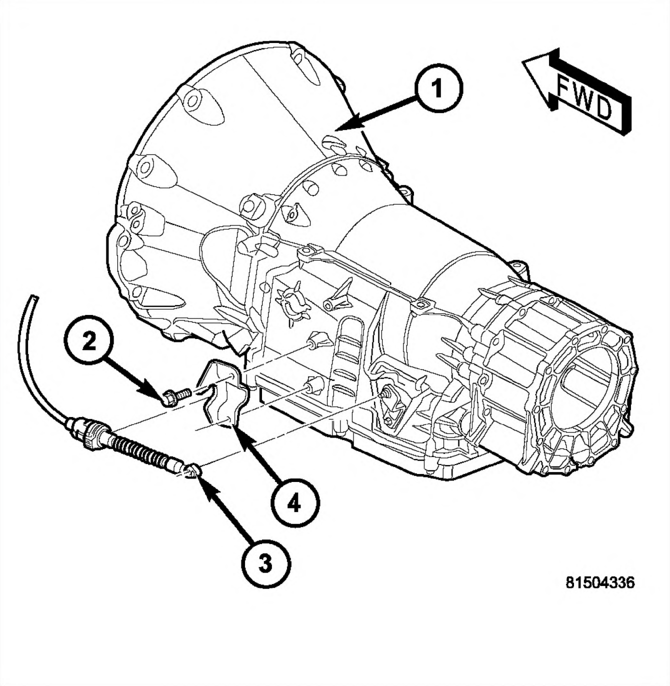
1. Disconnect the negative battery cable.
2. Raise and support the vehicle.
3. Remove the propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
4. Remove the bolts holding the starter motor to the transmission. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL)
5. Remove the starter from the transmission starter pocket and safely relocate.
6. Remove the bolts (1, 2, 3) holding the structural cover to the transmission and engine.
7. Remove the structural cover from the vehicle.



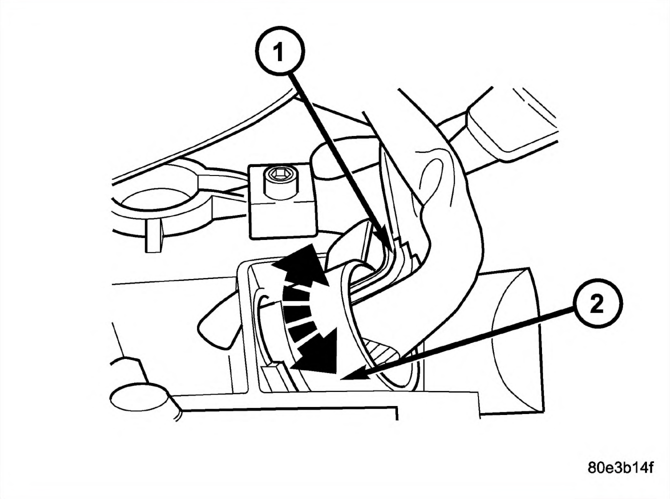
8. Rotate crankshaft in clockwise direction until converter bolts (3) are accessible. Then remove bolts (3) one at a time. Rotate crankshaft with socket wrench on dampener bolt.



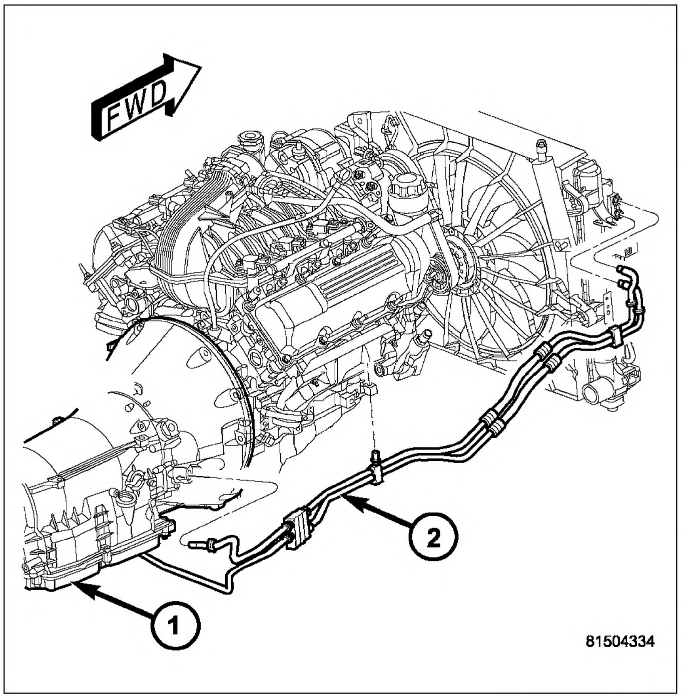
9. Disconnect the gearshift cable (3) from the transmission manual valve lever.
10. Remove the shift cable (3) from the gearshift cable bracket (2).



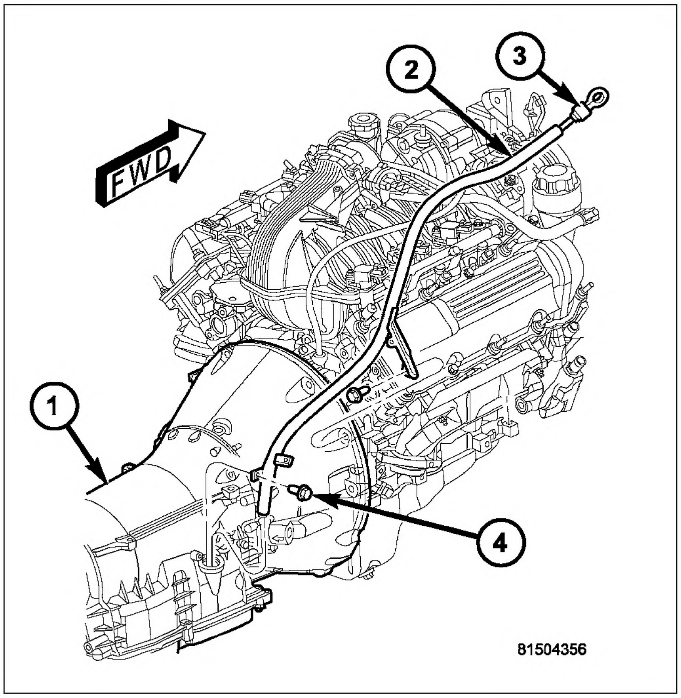
11. Disconnect 13-pin plug connector (1). Turn bayonet lock of guide bushing (2) anti-clockwise.
12. Remove the 13-pin connector (1) from the transmission.



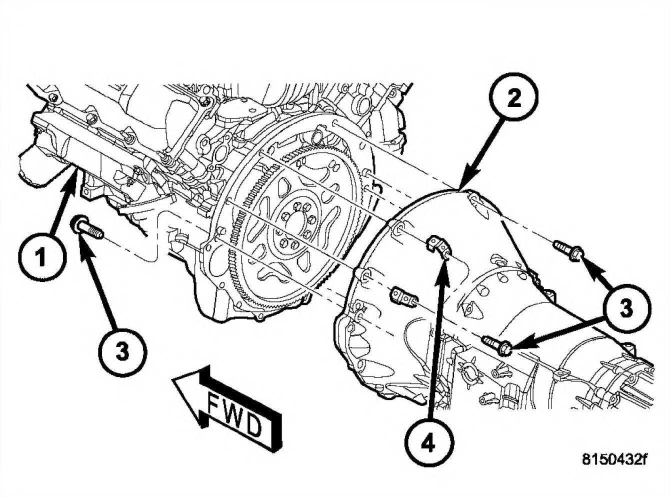
13. Disconnect transmission fluid cooler lines (2) at transmission (1).
14. Disconnect the transmission vent hose from the transmission.



15. Remove the bolts (4) holding the transmission fill tube (2) to the transmission (1).
16. Support rear of engine with safety stand or jack.
17. Raise transmission slightly with service jack to relieve load on crossmember and supports.
18. Remove bolts securing rear support and cushion to transmission crossmember.
19. Remove bolts attaching crossmember to frame and remove crossmember.



20. Remove all remaining bolts (2) holding the engine (1) to the transmission (3). Note the location of any wiring harness clips (4).
21. Carefully work transmission and torque converter assembly rearward off engine block dowels.
22. Hold torque converter in place during transmission removal.
23. Lower transmission and remove assembly from under the vehicle.
24. To remove torque converter, carefully slide torque converter out of the transmission.

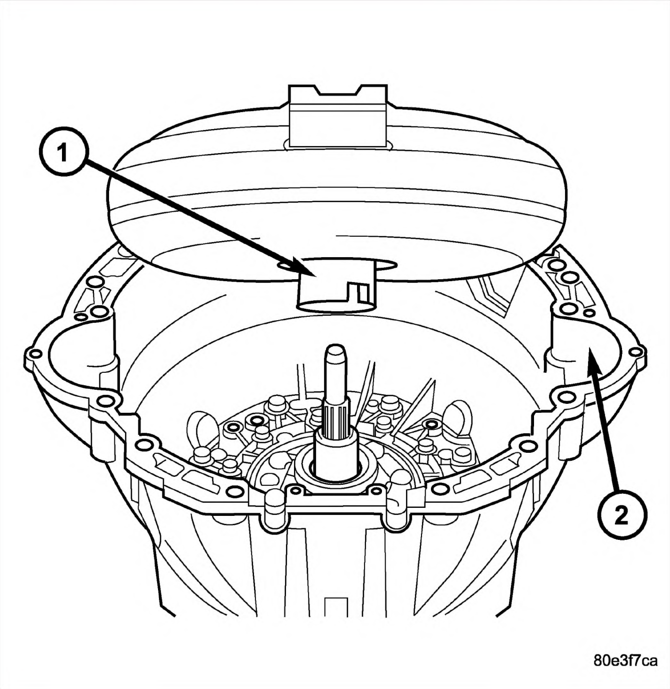


DISASSEMBLY

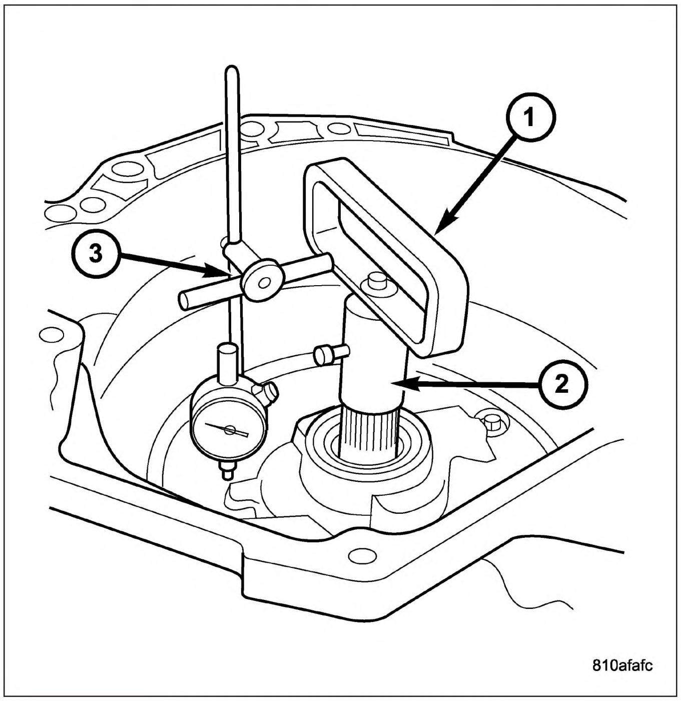
NOTE: If the transmission is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the TCM Adaptation Procedure using the scan tool (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE).

NOTE: Tag all clutch pack assemblies, as they are removed, for reassembly identification.

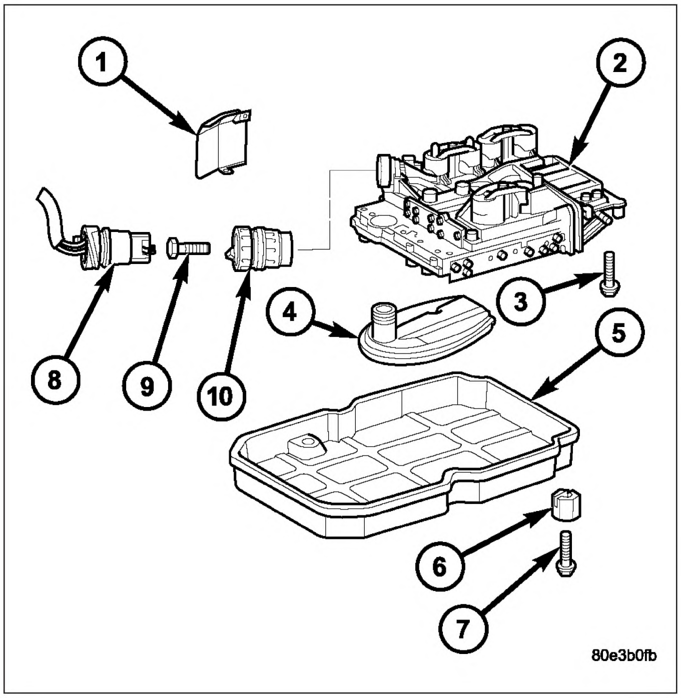
1. Remove the torque converter (1).



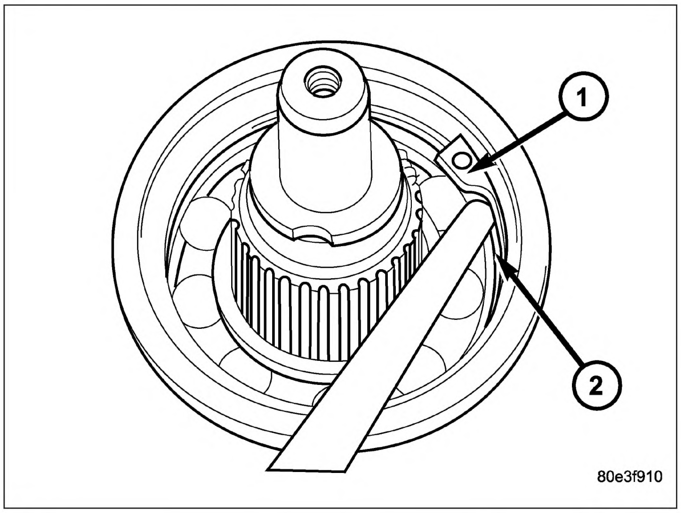
2. Place transmission in a vertical position.
3. Measure input shaft end play as follows:
    a. Attach Adapter 8266-18 (2) to Handle 8266-8 (1).
    b. Attach dial indicator C-3339 (3) to Handle 8266-8 (1).
    c. Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter 8266-18 (2) to secure it to the input shaft.
    d. Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.
    e. Move the input shaft in and out. Record the maximum travel for assembly reference.



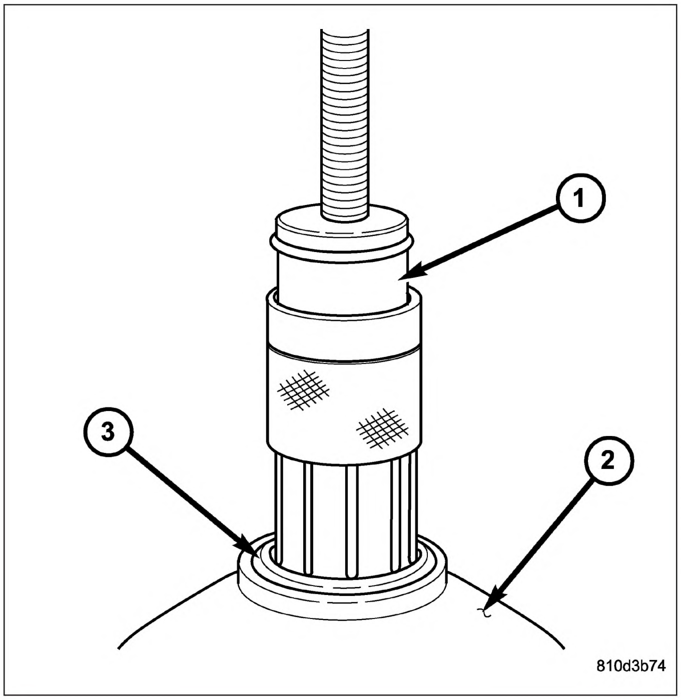
4. Loosen guide bushing (12) and remove from transmission housing.
5. Detach oil pan (5).
6. Remove oil filter (4).
7. Unscrew Torx socket bolts (3) and remove electro-hydraulic unit (2).



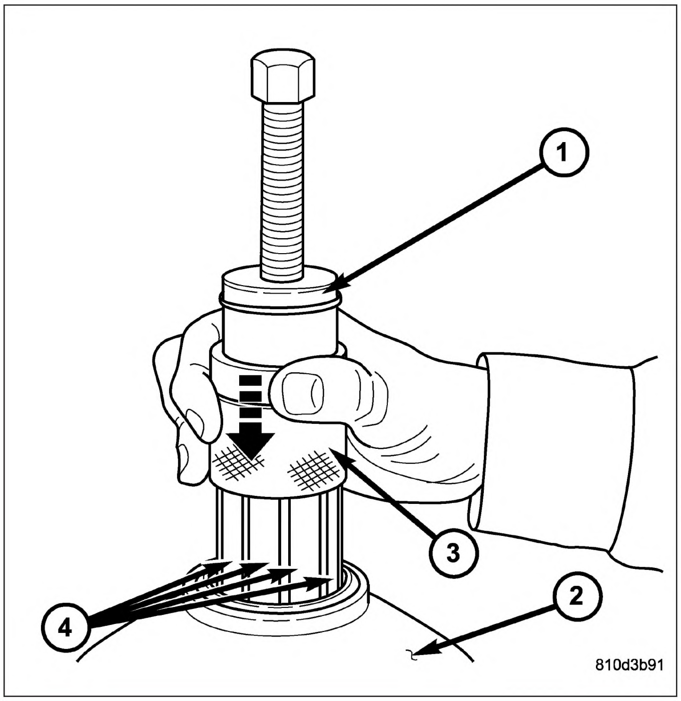
8. Place the transmission in PARK to prepare for the removal of the output shaft nut.
9. Remove the nut holding the propeller shaft flange to the output shaft and remove the flange.
10. Remove the transmission rear oil seal with a suitable slide hammer and screw.
11. Remove the transmission output shaft washer. Be sure to tag the washer since it is very similar to the geartrain end-play shim and they must not be interchanged.
12. Remove the transmission rear output shaft bearing retaining ring (1).



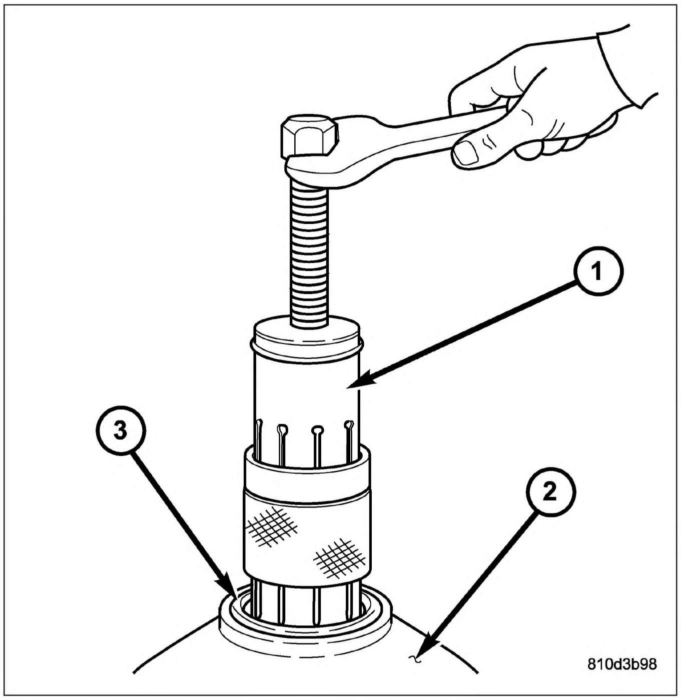
13. Position Bearing Remover 9082 (1) over the inner race of the output shaft bearing (3).

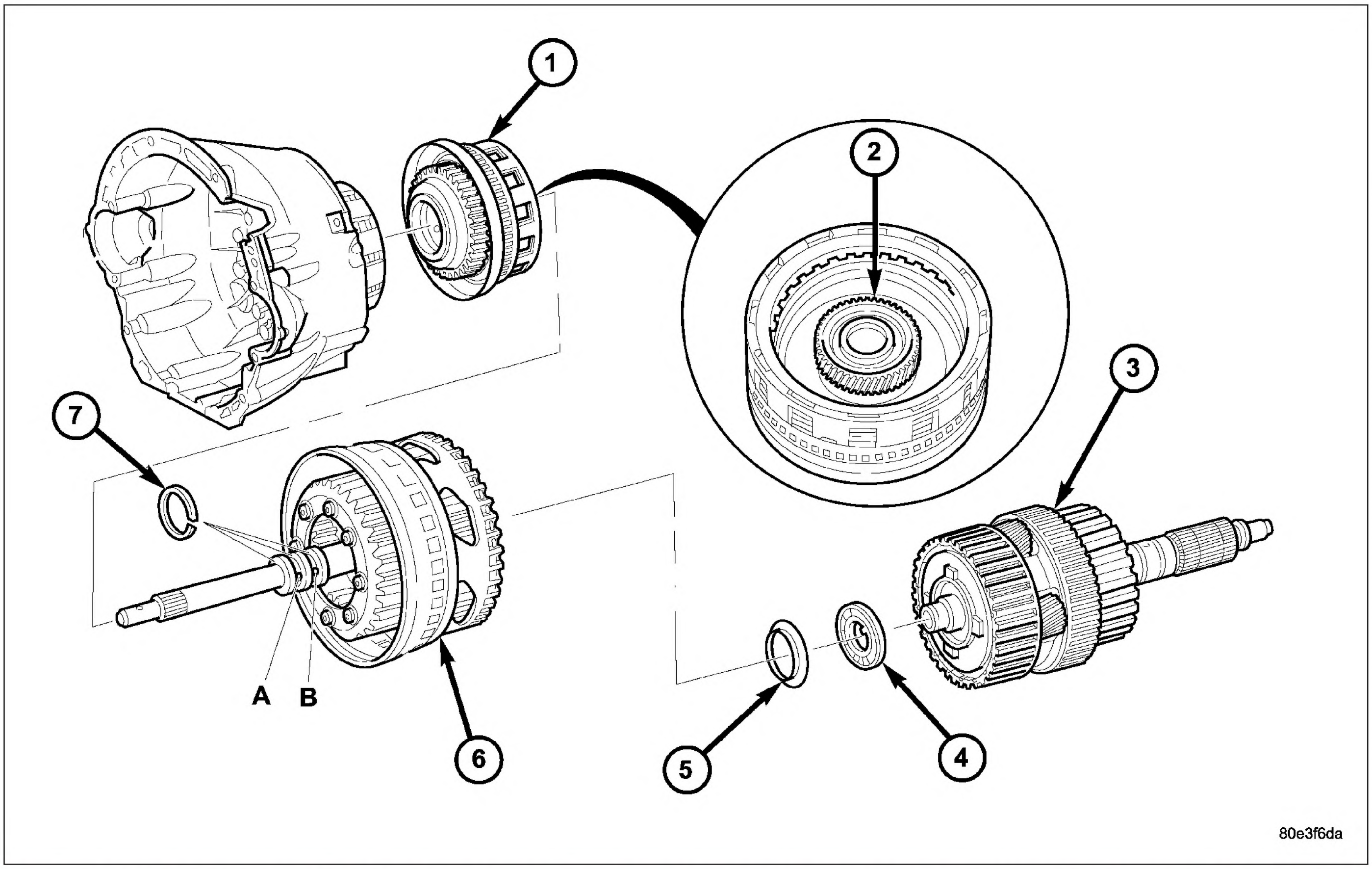


14. Slide the collar (3) on the Bearing Remover 9082 (1) downward over the fingers (4) of the tool.

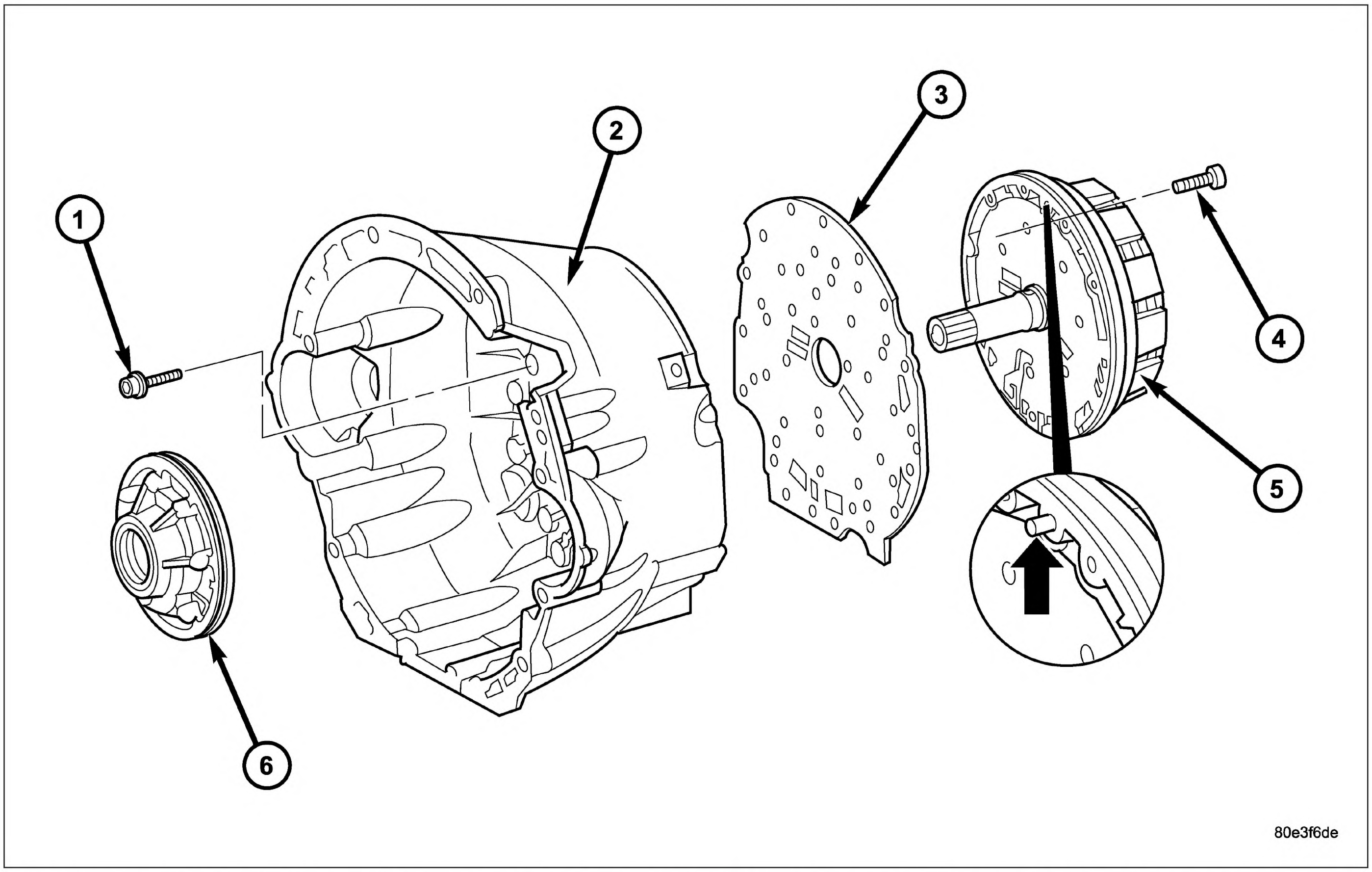


15. Remove the output shaft bearing (3).
16. Remove the geartrain end-play shim from the output shaft. Be sure to tag the shim since it is very similar to the output shaft washer and they must not be interchanged.

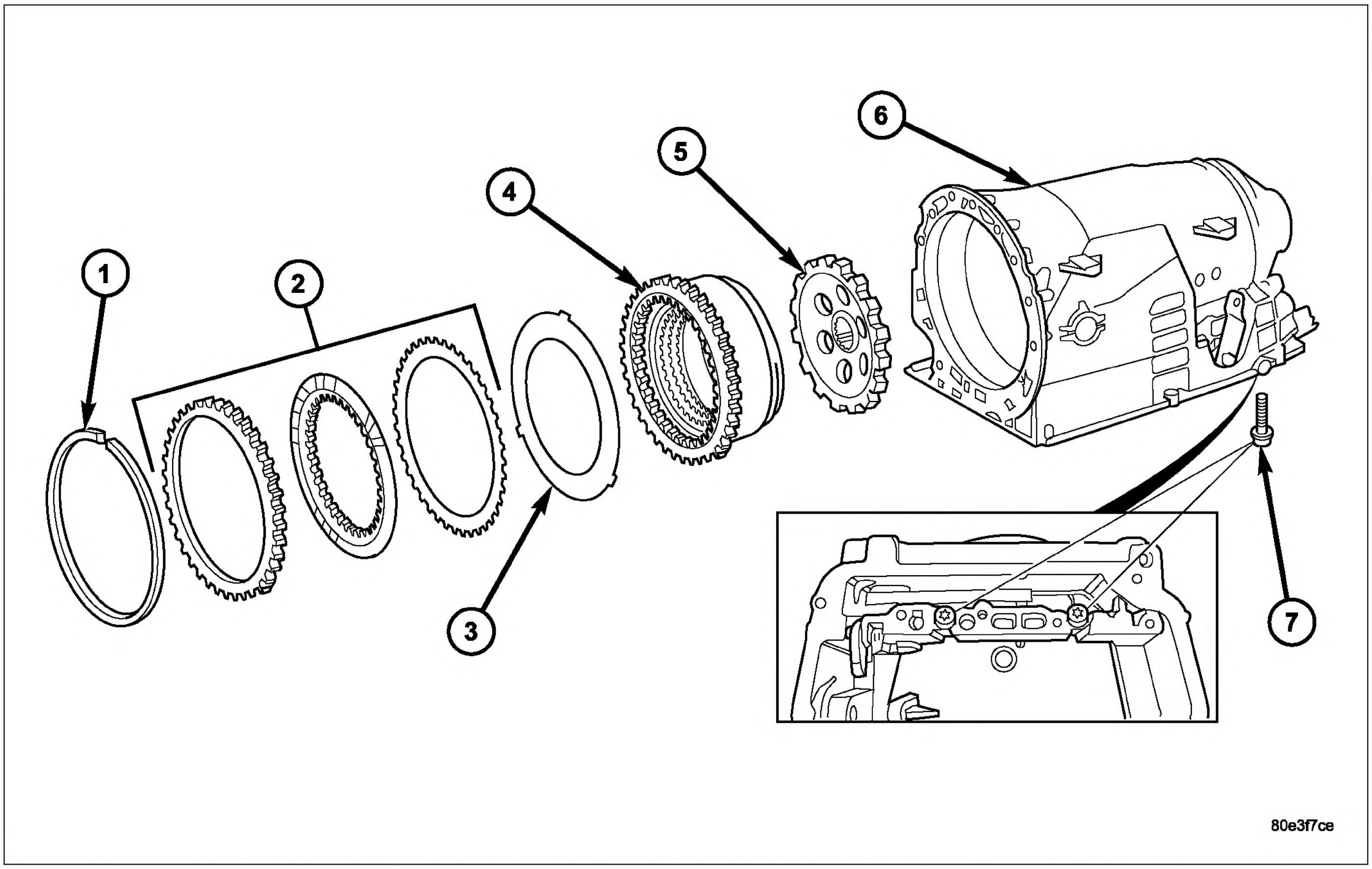




17. Remove the bolts holding the transmission housing to the converter housing from inside the converter housing.
18. Stand the transmission upright on the converter housing. Be sure to use suitable spacers between the bench surface and the converter housing since the input shaft protrudes past the front surface of the housing.
19. Remove the remaining bolts holding the transmission housing to the converter housing.
20. Remove the transmission housing from the converter housing.
21. Remove output shaft with center and rear gear set and clutch K3 (3).
22. Remove thrust needle bearing (4) and thrust washer (5).
23. Remove input shaft with clutch K2 and front gear set (6).
24. Remove clutch K1 (1).



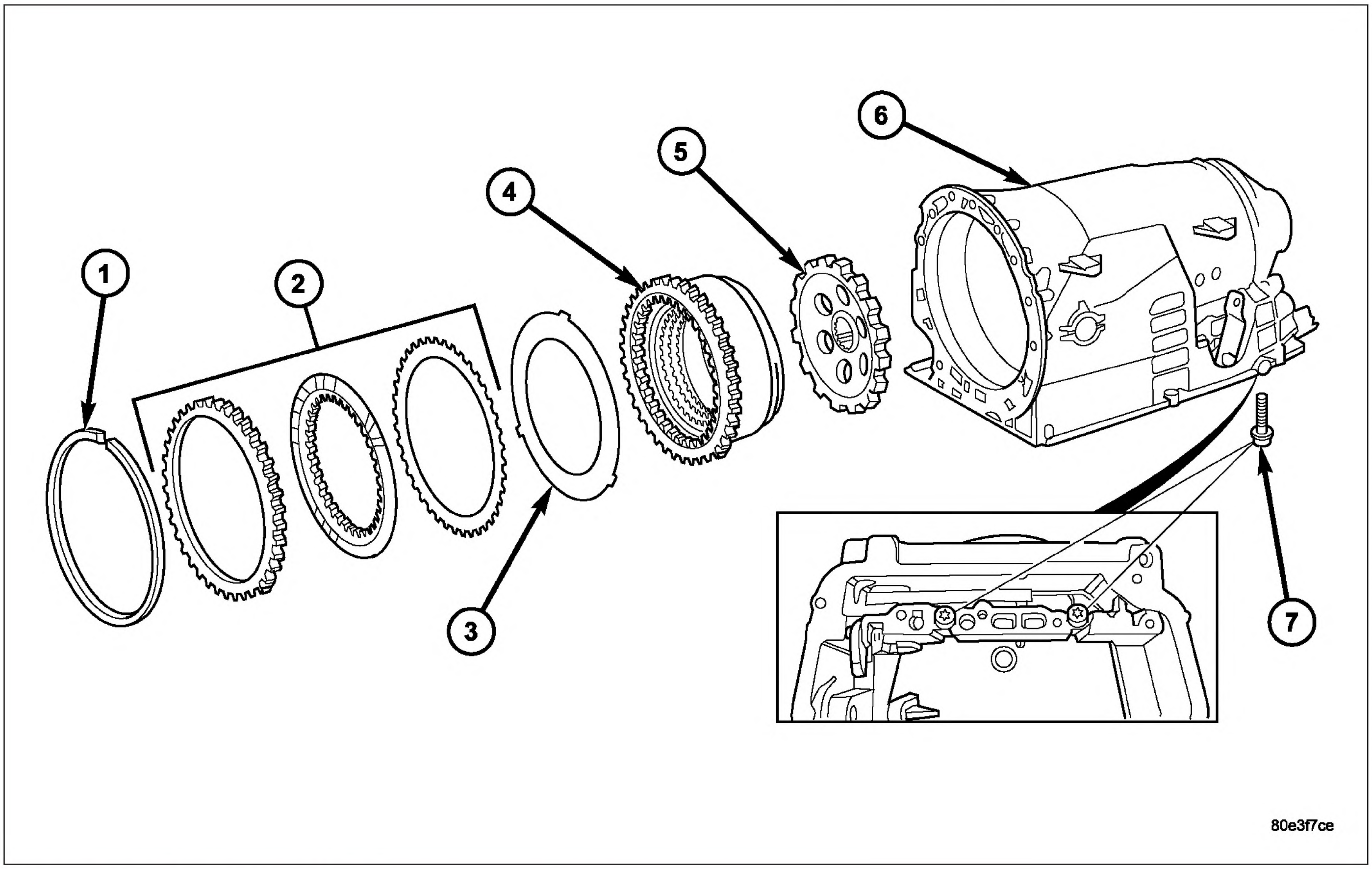
25. Unscrew Torx socket bolts (4) and remove oil pump (6). Screw two opposed bolts into the oil pump housing and press the oil pump out of the converter housing by applying light blows with a plastic hammer.
26. Remove and discard the torque converter hub seal and the oil pump outer o-ring seal from the oil pump.
27. Unscrew Torx socket bolts (1) and remove multiple-disc holding clutch B1 (5) from converter housing. Screw two opposed bolts into the multiple-disc holding clutch B1 (5) and separate from the converter housing by applying light blows with a plastic hammer.
28. Detach intermediate plate (3) from converter housing (2).



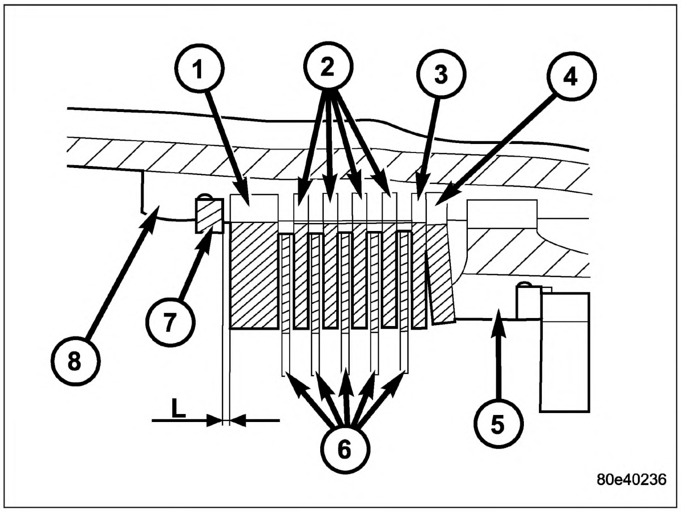
29. Remove multiple-disc pack B3 (2) and spring washer (3) by removing snap-ring (1) in transmission housing. To facilitate removal of the snap-ring (1), compress the multiple-disc pack B3 (2). Note which clutch disc is removed just prior to the spring washer (3) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the spring washer.
30. Unscrew Torx socket bolts (7).
31. Remove multiple-disc holding clutch B2 (4) from transmission housing. The externally toothed disc carrier for multiple-disc holding clutch B2 is also the piston for multiple-disc holding clutch B3.
32. Remove parking lock gear (5).

ASSEMBLY

NOTE: If the transmission is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the TCM Adaptation Procedure using the scan tool (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE).



1. Insert parking lock gear (5).
2. Install multiple-disc holding clutch B2 (4) in transmission housing (6).
3. Screw in both Torx socket bolts (7). Tighten the bolts to 16 N·m (141 in.lbs.).



NOTE: During the measurement the snap ring (7) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (8).

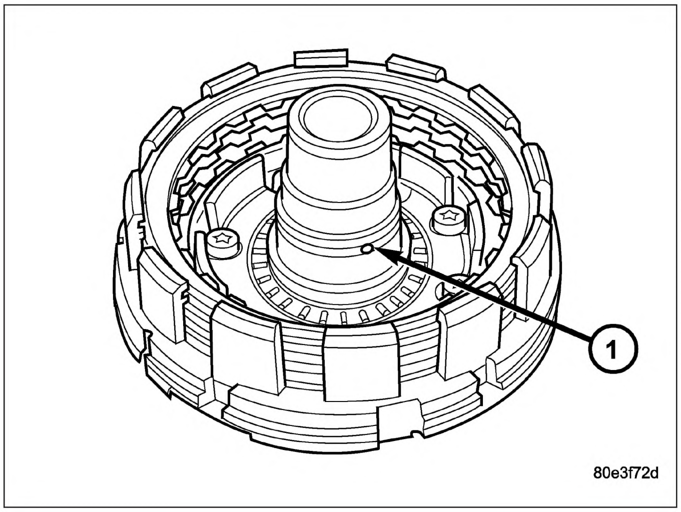
NOTE: Pay attention to sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the spring washer (4) to its original location. Place new friction multiple-discs in ATF fluid for one hour before installing.

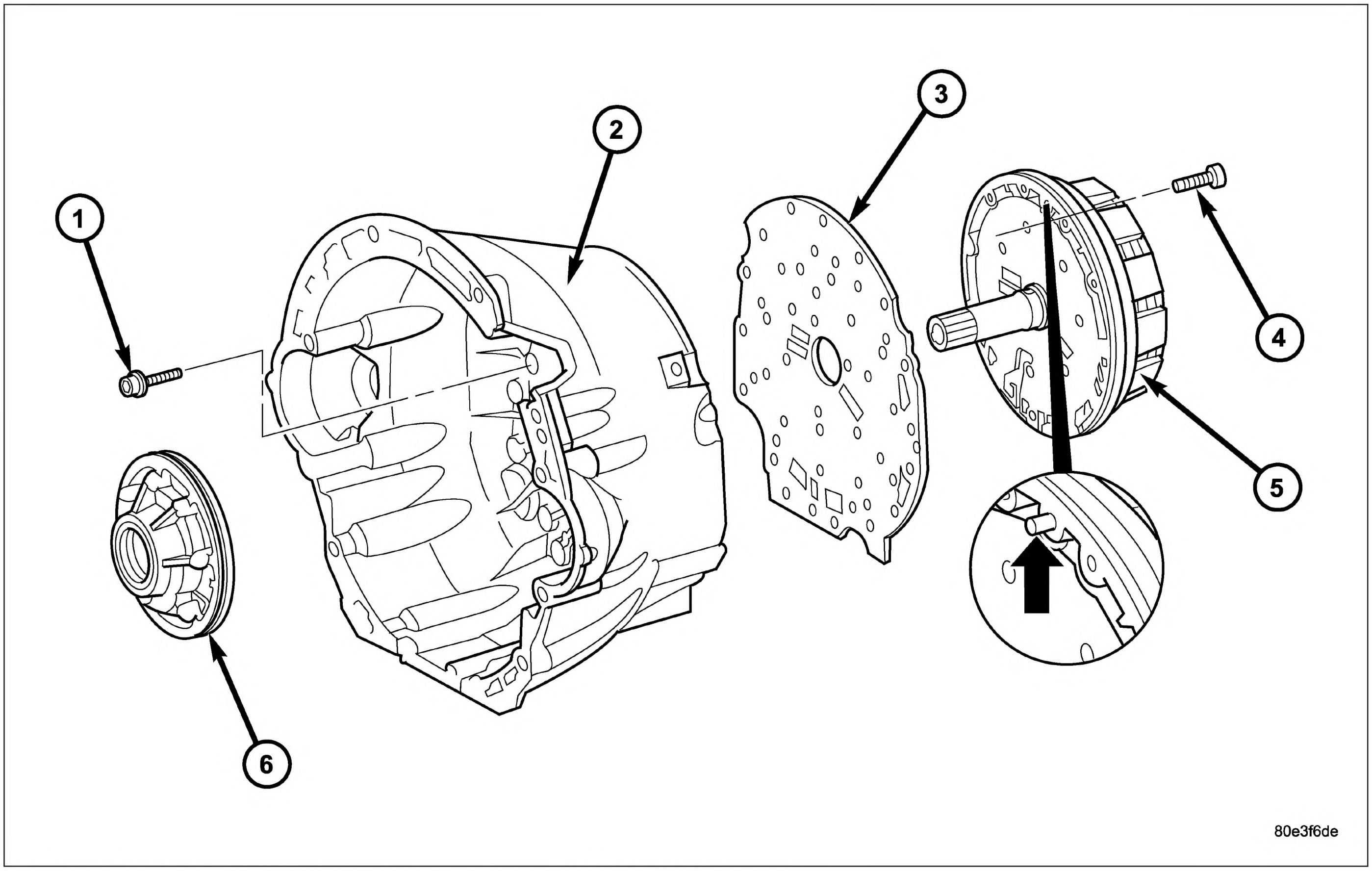
4. Insert and measure spring washer (4) and multiple-disc pack B3 (2, 6).
   a. Put multiple-discs for multiple-disc holding clutch B3 together in the sequence shown in the illustration and insert individually.
   b.

CAUTION: Apply only light pressure (less than 10 N (3 lbs.) of force) to the clutch pack when measuring the clutch clearance with the feeler gauge. Applying excessive force to the clutch will give an incorrect reading and lead to a transmission failure.Using a feeler gauge, determine the play ″L″ at three points between the snap ring (7) and outer multiple-disc (1). B3 clutch clearance should be 1.0-1.4 mm (0.039-0.055 in.). Adjust the clearance as necessary.

c. Adjust with snap-ring (7), if necessary. Snap-rings are available in thicknesses of 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), 4.1 mm (0.162 in.), 4.4 mm (0.173 in.), and 4.7 mm (0.185 in.).

5. Check that the K1 clutch feed hole (1) in the inner hub of clutch B1 is free before installing clutch B1.





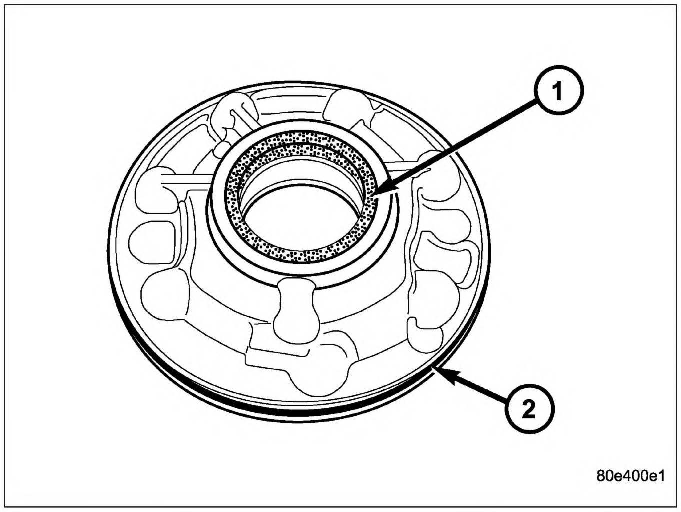
6. Place intermediate plate (3) on converter housing (2) and align.

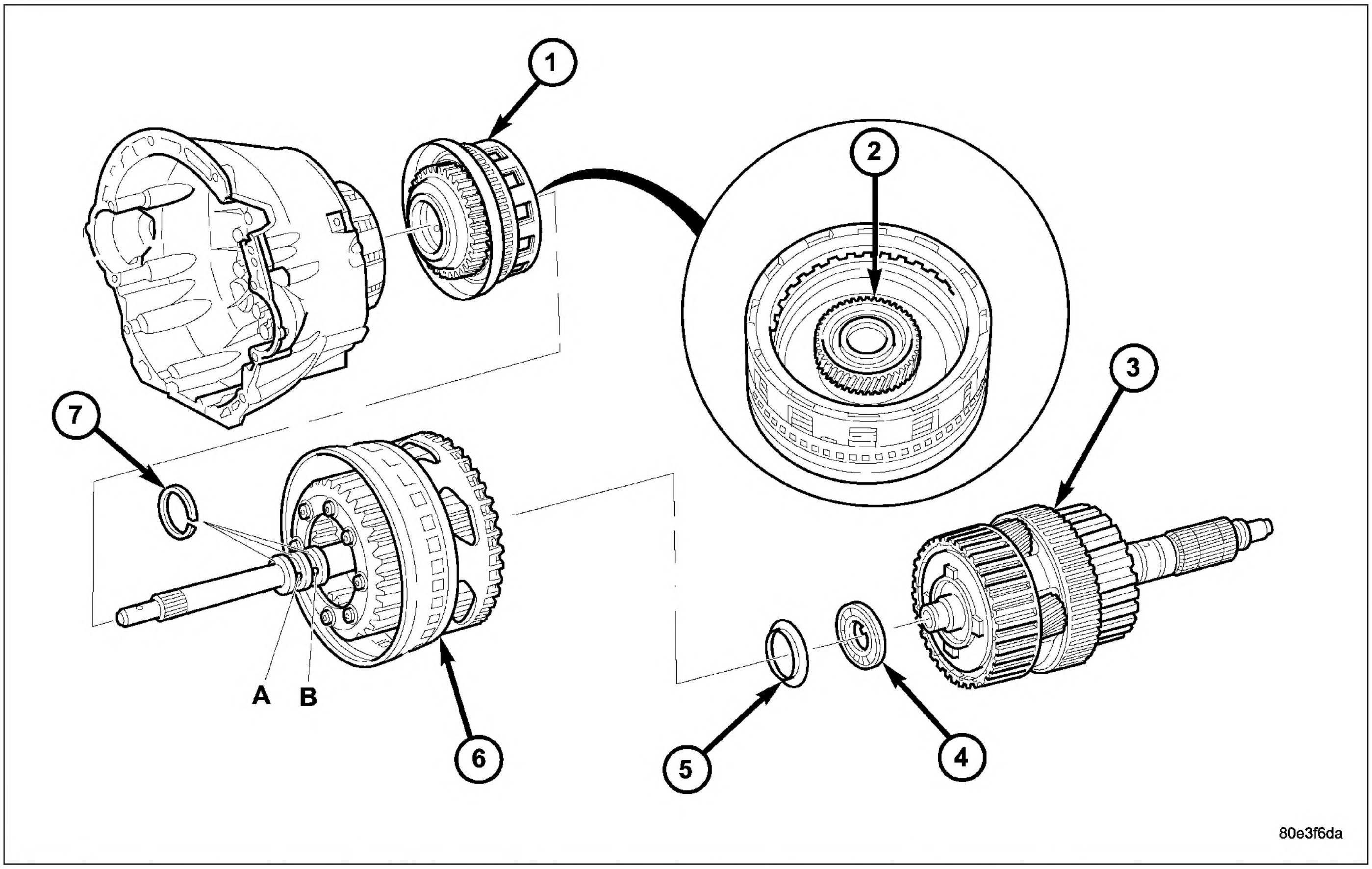
NOTE: The intermediate plate can generally be used several times. The plate must not be coated with additional sealant

7. Install the holding clutch B1 (5) onto the converter housing and intermediate plate. Installed position of clutch B1 in relation to converter housing is specified by a plain dowel pin in clutch B1 (arrow).
8. Install the bolts to hold clutch B1 (5) to the converter housing.

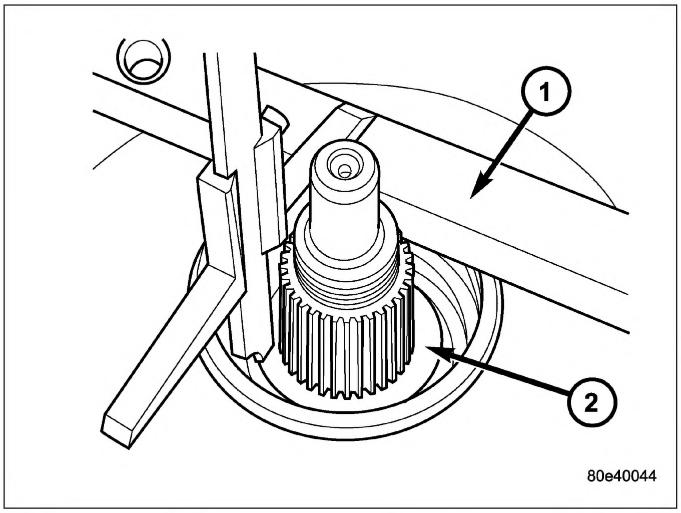
9. Securely tighten multiple-disc holding clutch B1 (5) on converter housing (2) to 10 N·m (88.5 in.lbs.).

10. Install new torque converter hub seal (1) into the oil pump using Seal Installer 8902A.
11. Install new oil pump outer o-ring seal onto oil pump.
12. Install oil pump (6) and securely tighten. Tighten the oil pump bolts to 20 N·m (177 in.lbs.).





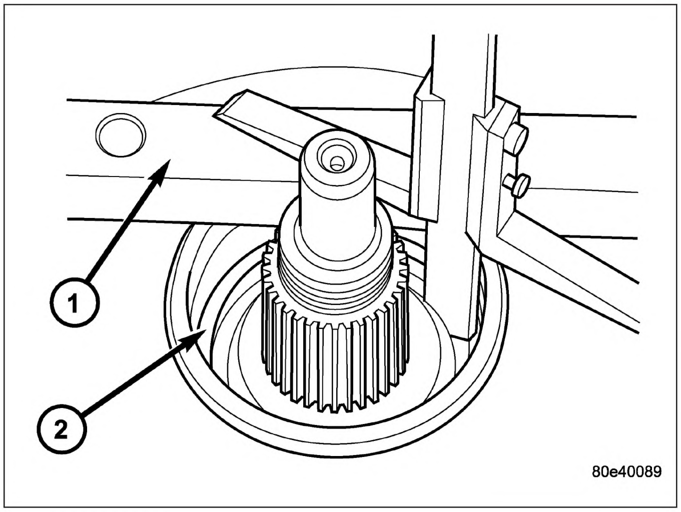
13. Using grease, insert sealing rings (7) in the groove so that the joint remains together.
14. Install the K1 (1) clutch onto the B1 clutch.
15. Install input shaft with clutch K2 (6) and front gear set (1).
16. Install front washer (5) and thrust needle bearing (4).
17. Install output shaft with center and rear gear set and clutch K3 (3).



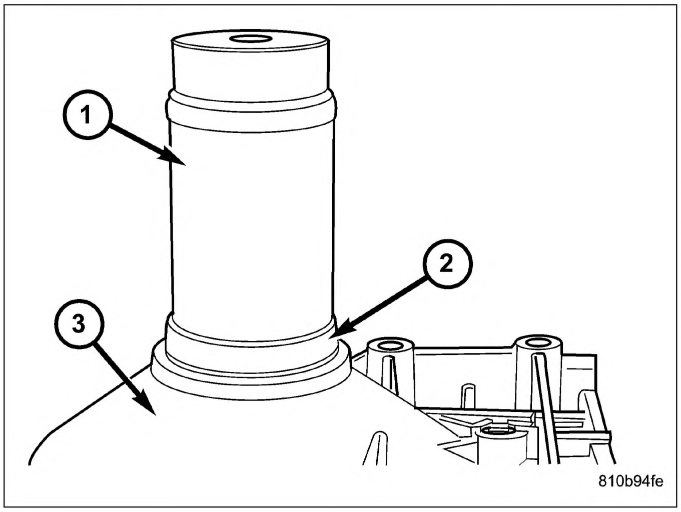
18. Using grease, install both Teflon rings in the groove at the rear of the output shaft so that the joint stays together.
19. Mount transmission housing on converter housing.
20. Screw in Torx socket bolts through the transmission housing into the converter housing. Tighten the bolts to 20 N·m (177 in.lbs.).

NOTE: Verify that there are no nicks or other irregularities in the surface of the transmission case that will cause an inaccurate measurement.

21. Measure end-play between park pawl gear and grooved ball bearing in order to select the proper geartrain end-play shim.
22. Place Gauge Bar 6311 (1) on transmission housing. Using a depth gauge, measure from the gauge bar (1) to the parking lock gear (2).

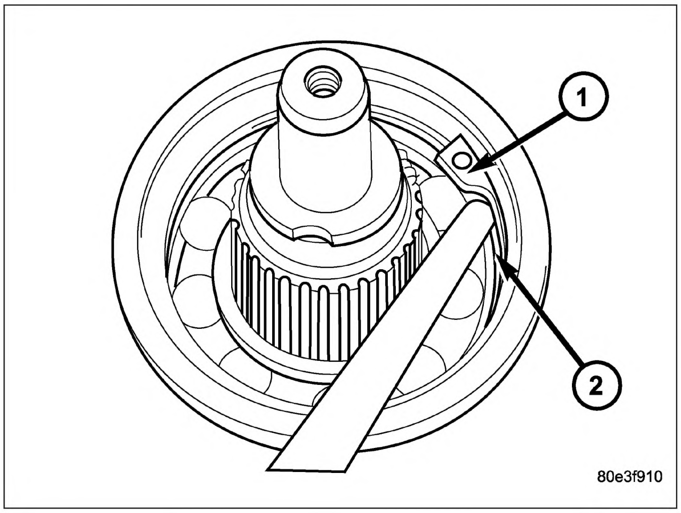


23. Using a depth gauge, measure from the Gauge Bar 6311 (1) to the contact surface of the output shaft bearing (2) in the transmission housing.
24. Subtract the first figure from the second figure to determine the current end-play of the transmission. Select a shim such that the end-play will be 0.3-0.5 mm (0.012-0.020 in.). Shims are available in thicknesses of 0.2 mm (0.008 in.), 0.3 mm (0.012 in.), 0.4 mm (0.016 in.), and 0.5 mm (0.020 in.).
25. Install the selected end-play shim.



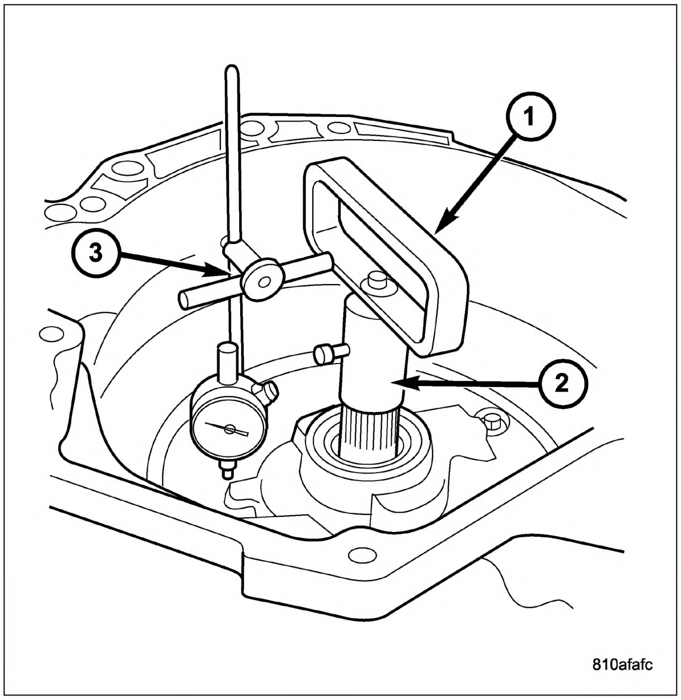
26. Screw in Torx socket bolts through the converter housing into the transmission housing. Tighten the bolts to 20 N·m (177 in.lbs.).
27. Install output shaft bearing (2) in rear transmission housing. Using Bearing Installer 9287 (1), install the output shaft bearing (2) into the transmission housing. **The closed side of the plastic cage must point towards the parking lock gear.**

28. Install the retaining ring (1). Ensure that the retaining ring is seated correctly in the groove.
29. Check that there is no play between the bearing and the retaining ring using feeler gauge.
30. There must be no play between the retaining ring and the bearing. If the ring cannot be installed, a thinner ring must be used. If there is play between the ring and the bearing, a thicker ring must be installed. Retaining rings are available in thicknesses of 2.0 mm (0.079 in.), 2.1 mm (0.083 in.), and 2.2 mm (0.087 in.).



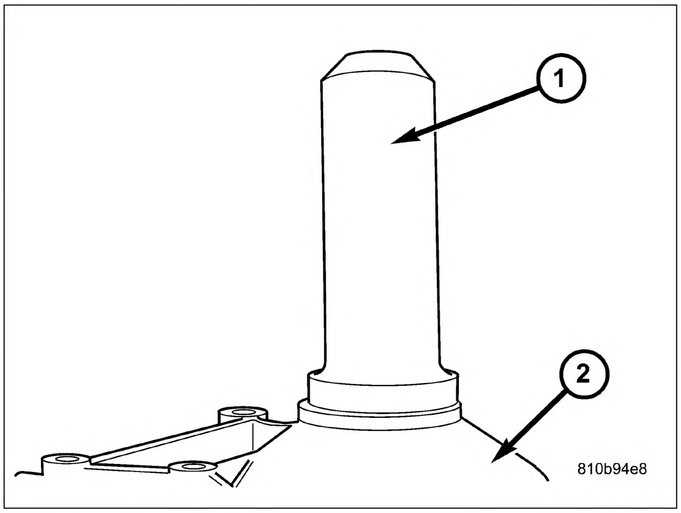
31. Rotate the transmission so that the bellhousing is pointed upward and ensuring that the output shaft is allowed to move freely.
32. Measure input shaft end-play.

NOTE: If end-play is incorrect, transmission is incorrectly assembled, or the geartrain end-play shim is incorrect. The geartrain end-play shim is selective.

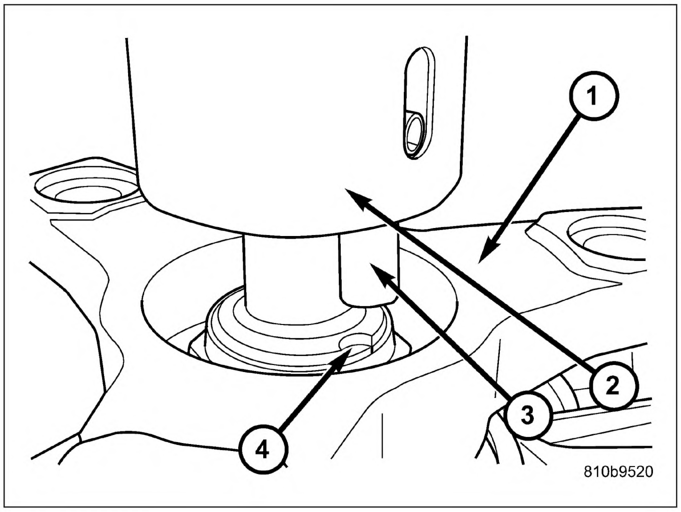


   a. Attach Adapter 8266-18 (2) to Handle 8266-8 (1).
   b. Attach dial indicator C-3339 (3) to Handle 8266-8 (1).
   c. Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter 8266-18 to secure it to the input shaft.
   d. Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.
   e. Move input shaft in and out and record reading. End play should be 0.3-0.5 mm (0.012-0.020 in.). Adjust as necessary.

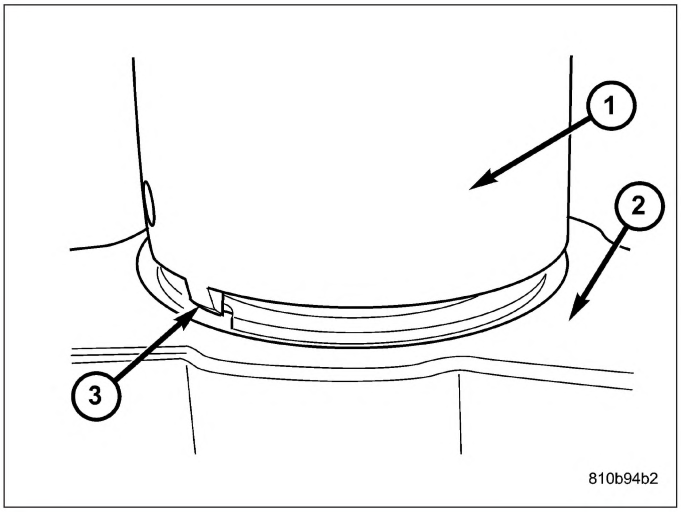
33. Install the output shaft washer onto the output shaft.
34. Install a new transmission rear seal into the transmission case with Seal Installer 8902A (1).



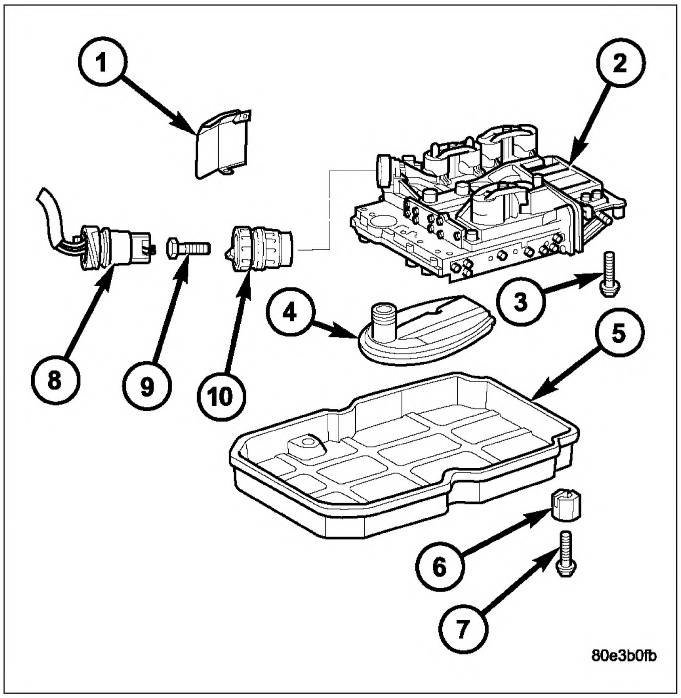
35. Place the transmission in PARK to prepare for the installation of the output shaft nut.
36. Inspect the seal protector on the rear of the output shaft flange. Replace the seal protector if damaged. the seal protector can be removed using a suitable pry tool and installed with a suitable tube style tool.
37. Install the propeller shaft flange onto the output shaft and install an new flange nut. Tighten the flange nut to 200 N·m (147.5 ft.lbs.).
38. Place the Staking Tool 9078 (2) and Driver Handle C-4171 onto the output shaft.
39. Rotate the Staking Tool 9078 (2) until the alignment pin (3) engages the output shaft notch (4).



40. Press downward on the staking tool (1) until the staking pin (3) contacts the output shaft nut flange (2).
41. Strike the Driver handle C-4171 with a suitable hammer until the output shaft nut is securely staked to the output shaft.



42. Install electrohydraulic unit (2). Tighten the bolts to 8 N·m (71 in.lbs.).
43. Install oil filter (4).
44. Install oil pan (5). Tighten the bolts to 8 N·m (71 in.lbs.).
45. Install guide bushing (12).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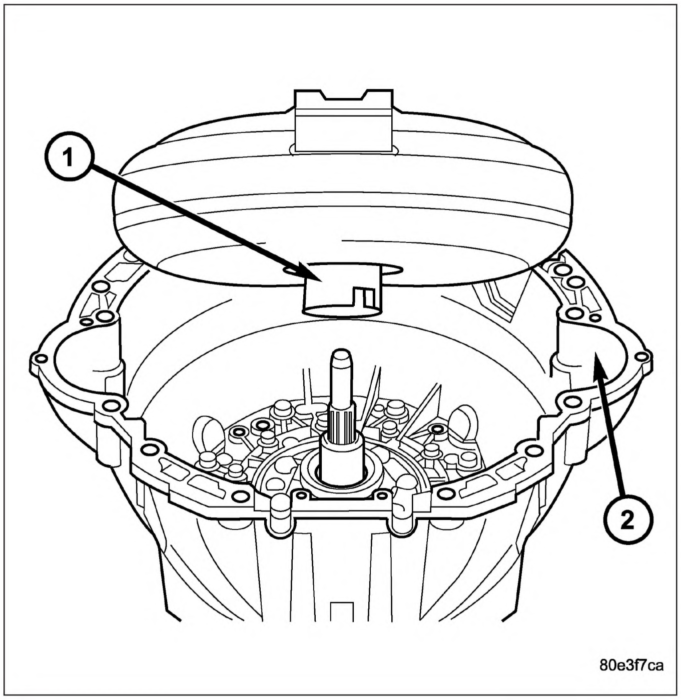
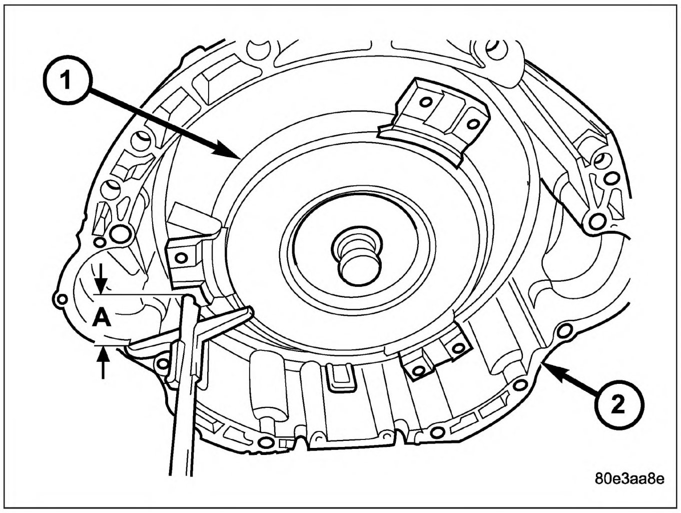
80e3b0fb

46. Install the torque converter.


1
2
80e3f7ca

INSTALLATION

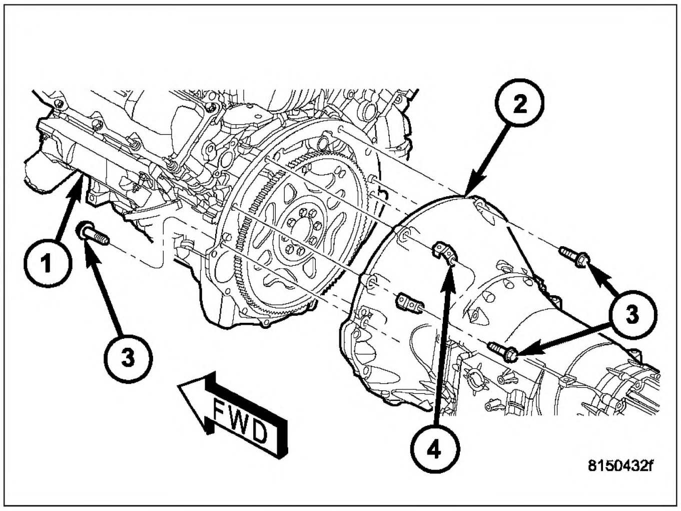
1. Check torque converter hub and hub drive flats for sharp edges burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper and crocus cloth if necessary. The hub must be smooth to avoid damaging pump seal at installation.
2. If a replacement transmission is being installed, transfer any components necessary, such as the manual shift lever and shift cable bracket, from the original transmission onto the replacement transmission.
3. Lubricate oil pump seal lip with transmission fluid.
4. Place torque converter in position on transmission.



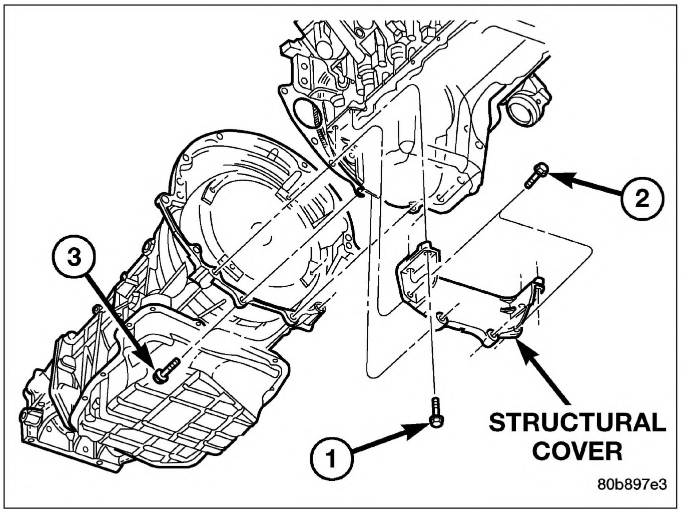
CAUTION: Do not damage oil pump seal or converter hub while inserting torque converter into the front of the transmission.

5. Align torque converter to oil pump seal opening.
6. Insert torque converter (1) hub into oil pump.
7. While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.
8. Check converter seating with a scale and straightedge. Surface of converter lugs should be at least 19 mm (3/4 in.) to rear of straightedge when converter is fully seated.
9. If necessary, temporarily secure converter with C-clamp attached to the converter housing.

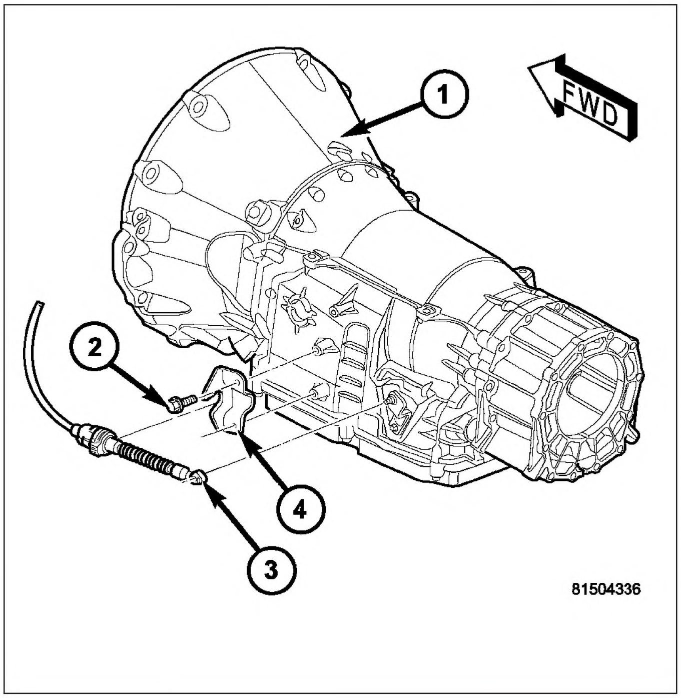
10. Check condition of converter driveplate. Replace the plate if cracked, distorted or damaged. **Also be sure transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.**
11. Apply a light coating of Mopar® High Temp Grease to the torque converter hub pocket in the rear pocket of the engine's crankshaft.
12. Raise transmission and align the torque converter with the drive plate and the transmission converter housing with the engine block.
13. Move transmission forward. Then raise, lower, or tilt transmission to align the converter housing with the engine block dowels.
14. Carefully work transmission (2) forward and over engine (1) block dowels until converter hub is seated in crankshaft. Verify that no wires, or the transmission vent hose, have become trapped between the engine block and the transmission.
15. Install two bolts (3) to attach the transmission to the engine.
16. Install remaining torque converter housing to engine bolts. Tighten to 39 N·m (29 ft.lbs.).



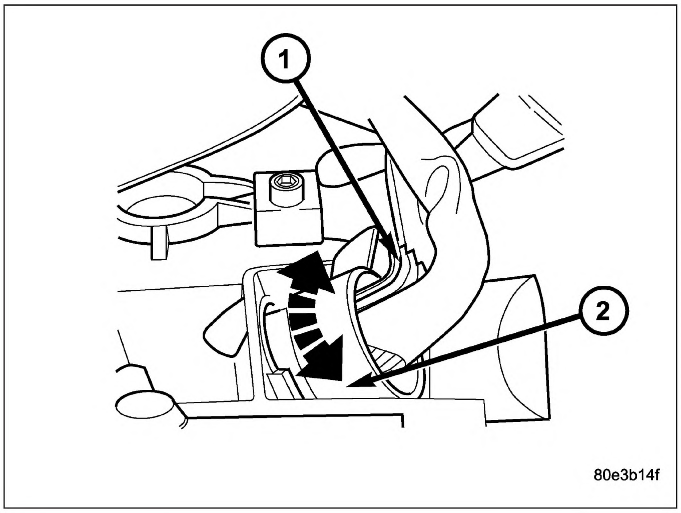
17. Install rear transmission crossmember. Tighten crossmember to frame bolts to 68 N·m (50 ft.lbs.).
18. Install rear support to transmission. Tighten bolts to 47 N·m (35 ft.lbs.).
19. Lower transmission onto crossmember and install bolts attaching transmission mount to crossmember. Tighten clevis bracket to crossmember bolts to 47 N·m (39 ft.lbs.). Tighten the clevis bracket to rear support bolt to 68 N·m (50 ft.lbs.).
20. Remove engine support fixture.
21. Install the engine to transmission structutral cover. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION)



22. Connect gearshift cable (3) to the gearshift cable bracket (2) and transmission (1).

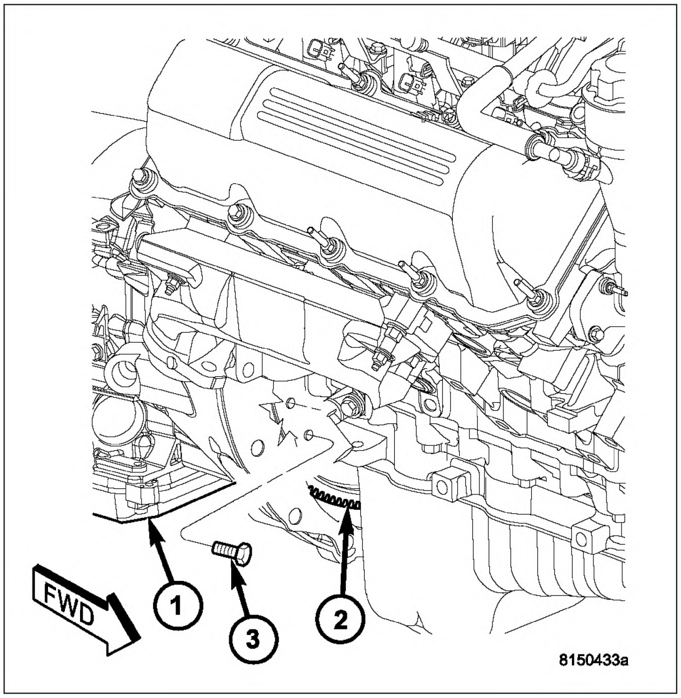


23. Check O-ring on plug connector (1) , and replace if necessary.
24. Install the plug connector (1) into the guide bushing (2). Turn bayonet lock of guide bushing (2) clockwise to connect plug connector (1).

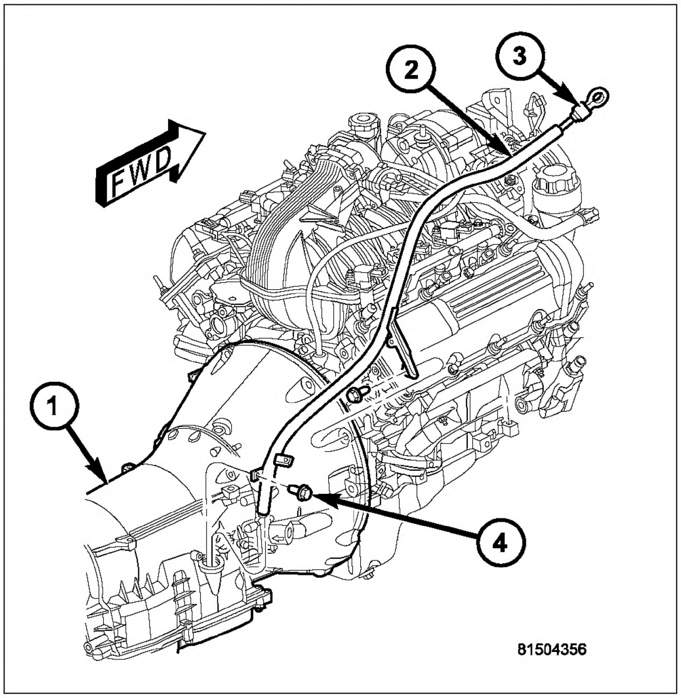


CAUTION: It is essential that correct length bolts be used to attach the converter to the driveplate. Bolts that are too long will damage the clutch surface inside the converter.

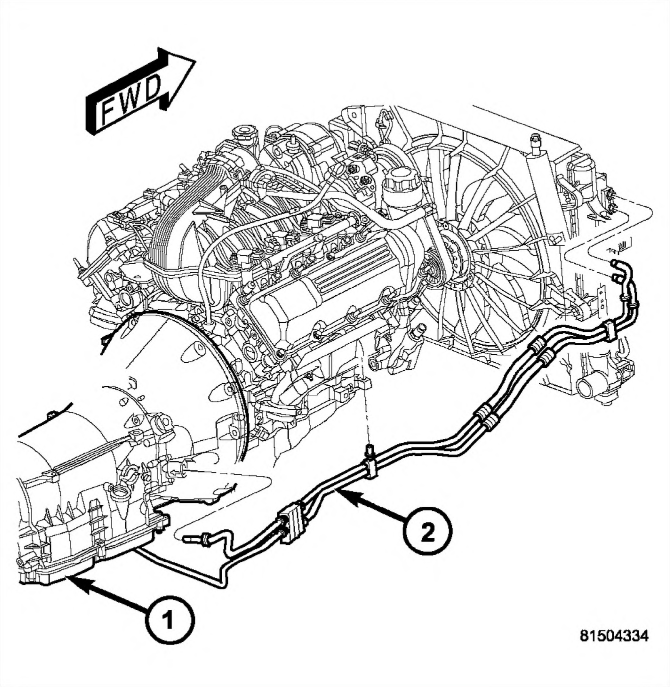
25. Install all torque converter-to-driveplate bolts (3) by hand.
26. Verify that the torque converter is pulled flush to the driveplate. Tighten bolts to 42 N·m (30.5 ft. lbs.).



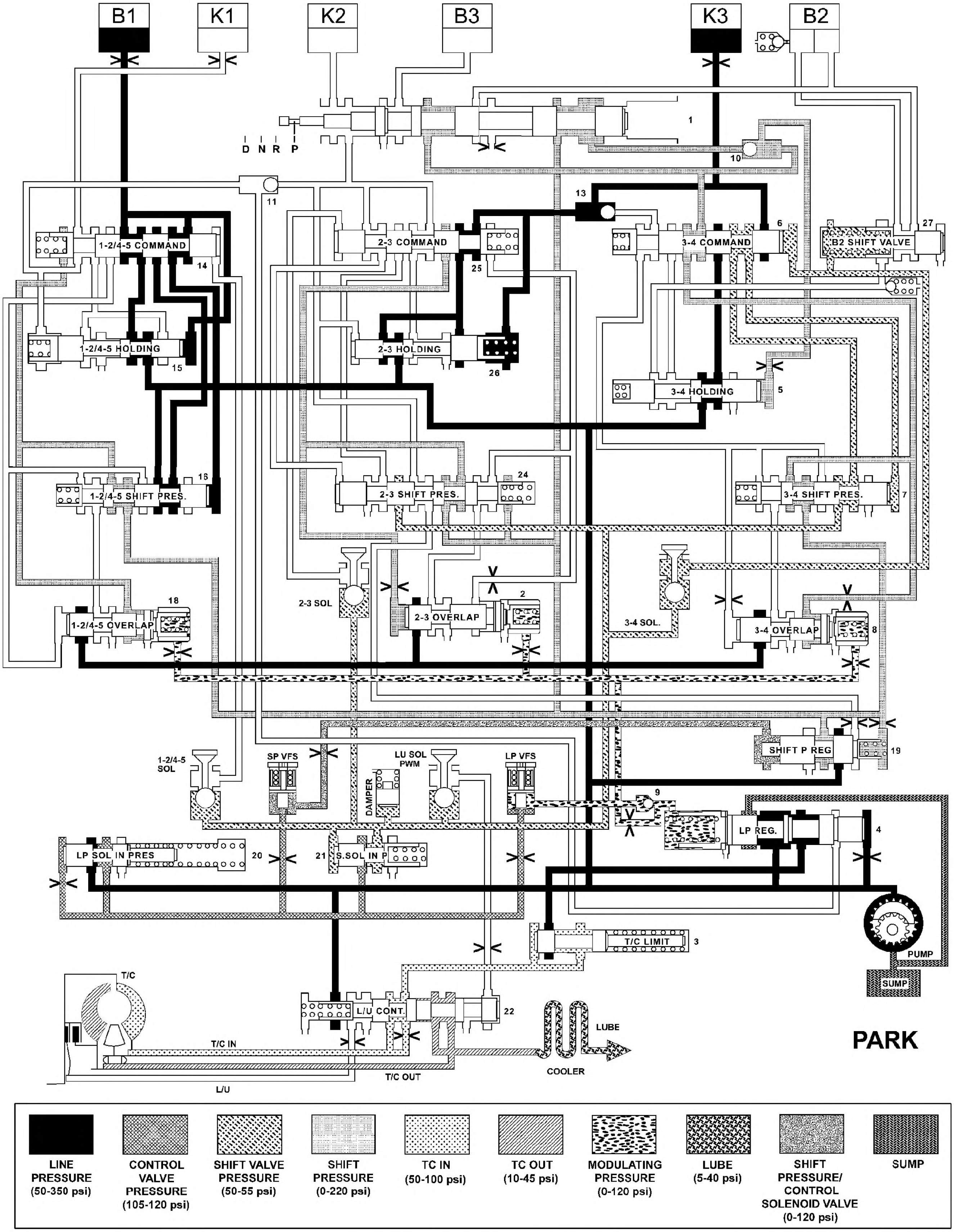
27. Install starter motor. (Refer to 8 - ELECTRICAL/ STARTING/STARTER MOTOR - INSTALLATION)
28. Install transmission fill tube (2).



29. Connect cooler lines (2) to transmission (1).
30. Install exhaust components.
31. Install transfer case, if necessary. (Refer to 21 - TRANSMISSION/TRANSAXLE/TRANSFER CASE - REMOVAL) Tighten transfer case nuts to 35 N·m (26 ft.lbs.).
32. Align and connect propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)
33. Adjust gearshift cable if necessary. (Refer to 21 - TRANSMISSION/AUTOMATIC - NAG1/GEAR SHIFT CABLE - ADJUSTMENTS)
34. Lower vehicle.
35. Connect negative battery cable.
36. Fill transmission with the appropriate fluid (Refer to 21 - TRANSMISSION/AUTOMATIC - NAG1/ FILTER - STANDARD PROCEDURE).
37. Verify proper operation.

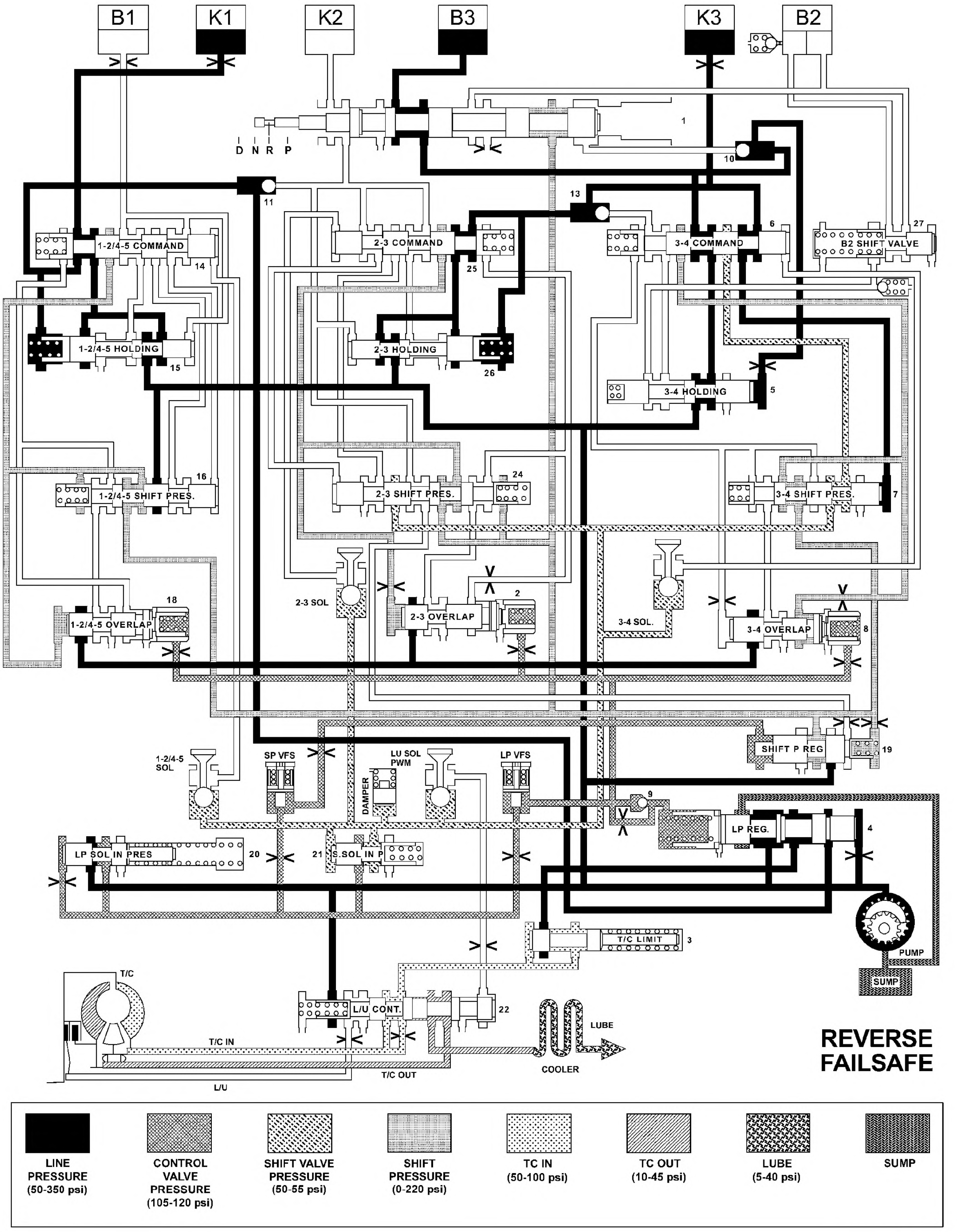


SCHEMATICS AND DIAGRAMS

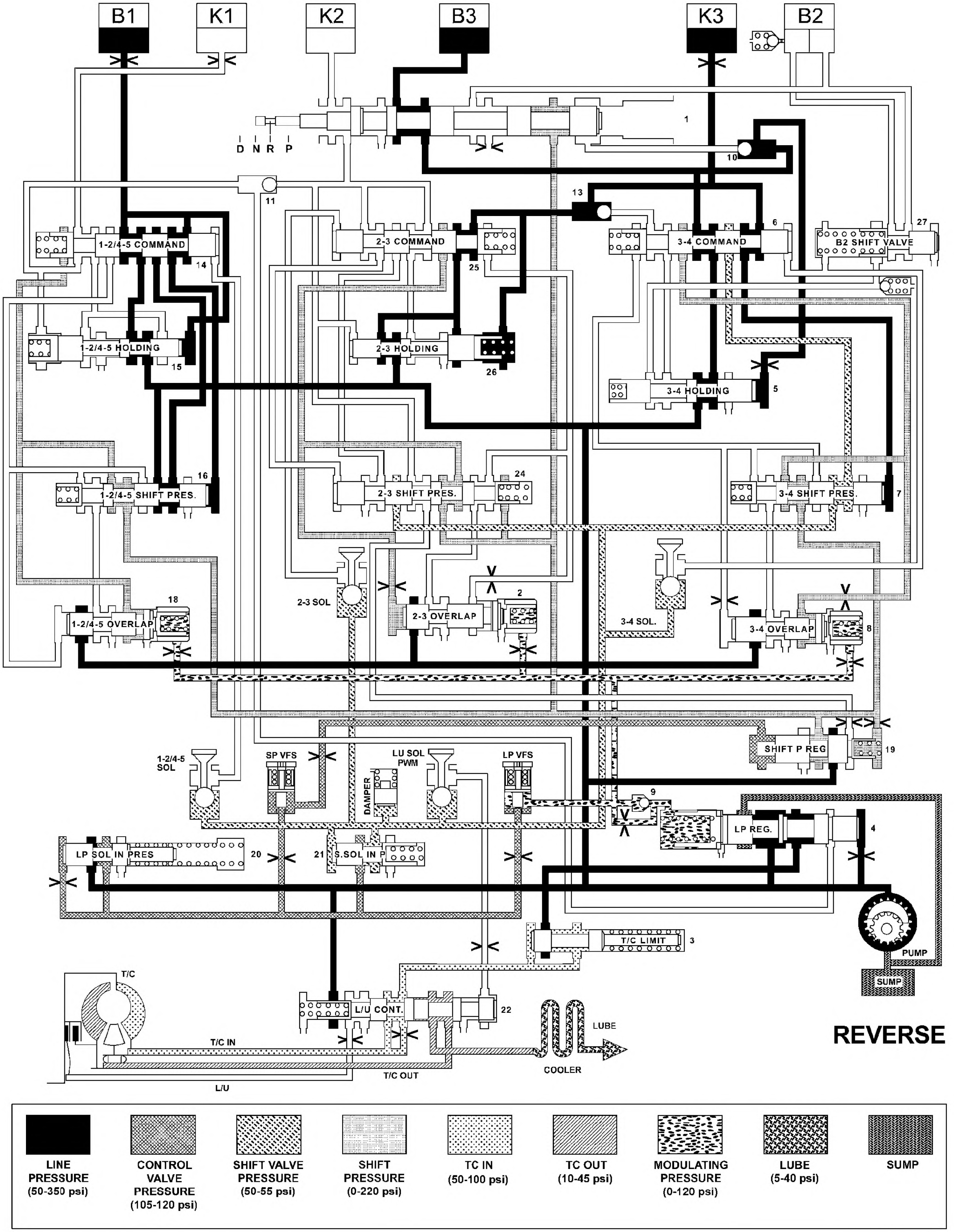

B1
K1
K2
B3
K3
B2
1
D N R P
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
24
2-3 SHIFT PRES.
3-4 SHIFT PRES.
7
18
1-2/4-5 OVERLAP
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
COOLER
T/C OUT
L/U
PARK
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP

HYDRAULIC FLOW IN PARK

810baf1a

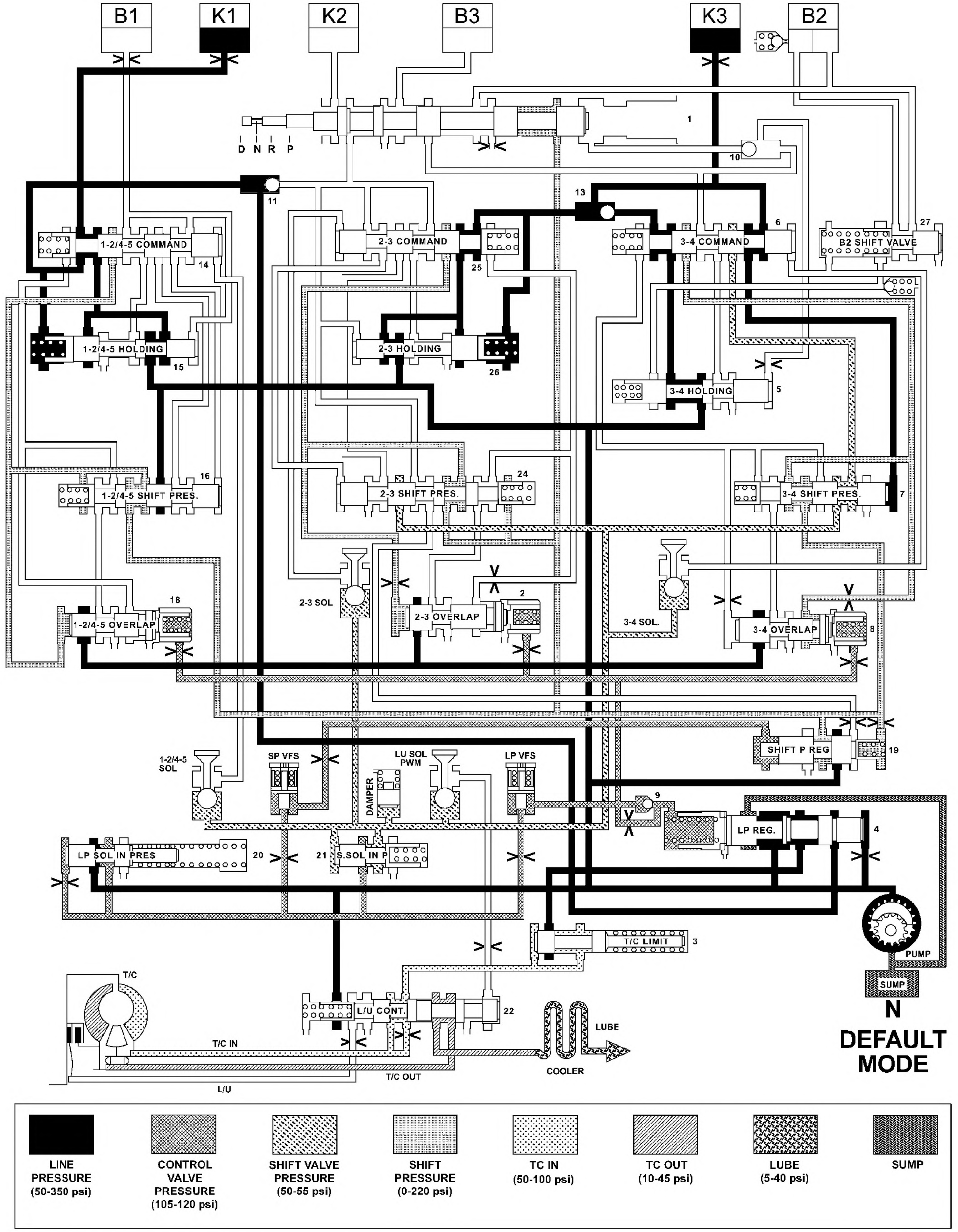

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
27
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2-3 OVERLAP
2
3-4 SOL.
3-4 OVERLAP
8
1-2/4-5 OVERLAP
18
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
T/C IN
T/C OUT
L/U
LUBE
COOLER
REVERSE FAILSAFE
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
LUBE (5-40 psi)
SUMP
810bae77

HYDRAULIC FLOW IN REVERSE - FAILSAFE


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2-3 OVERLAP
2
3-4 SOL.
3-4 OVERLAP
8
1-2/4-5 OVERLAP
18
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
L/U
COOLER
REVERSE
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SUMP

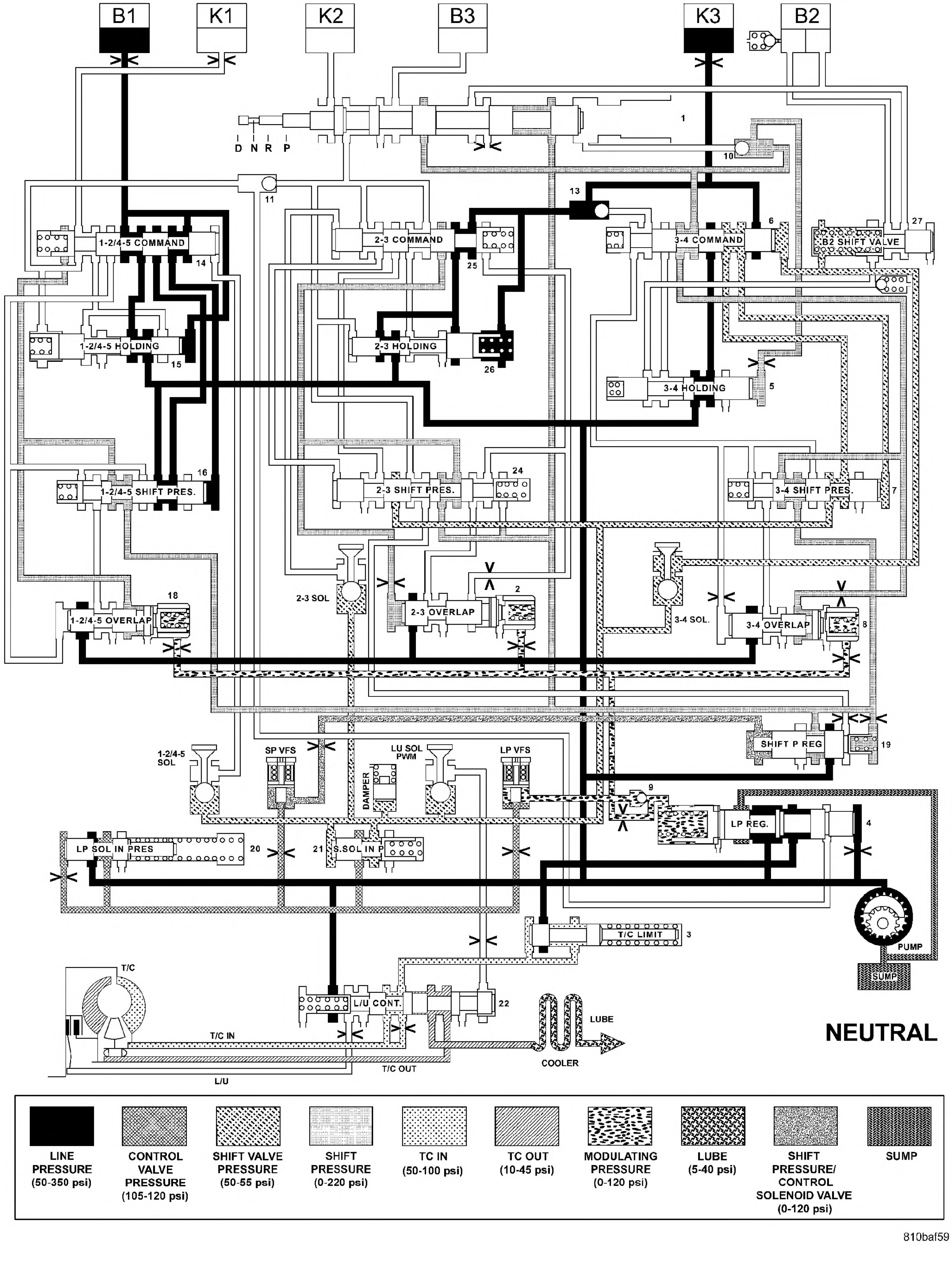
810baf23

HYDRAULIC FLOW IN REVERSE

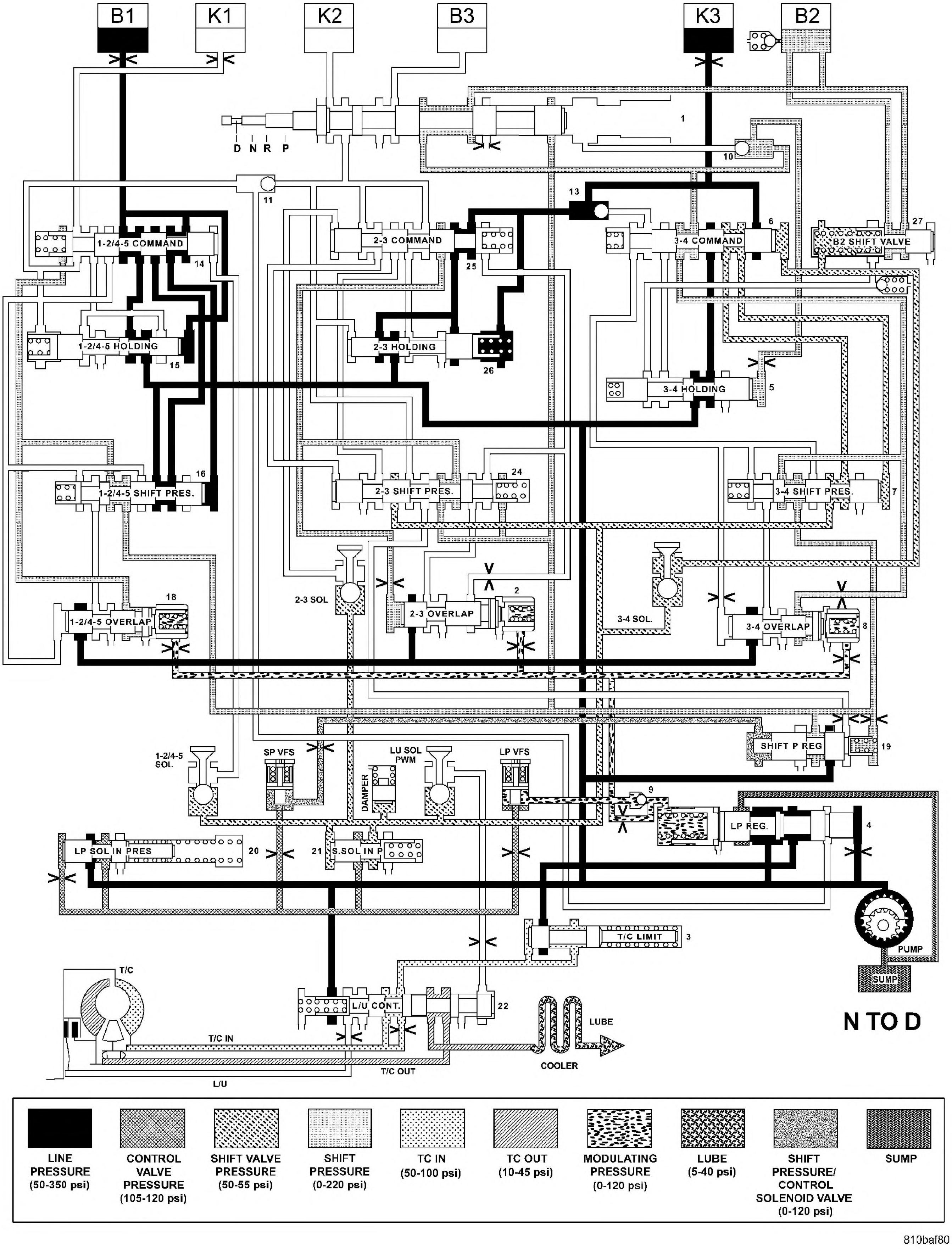

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
B2 SHIFT VALVE
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
18
1-2/4-5 OVERLAP
2-3 SOL
2-3 OVERLAP
2
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
COOLER
T/C OUT
L/U
N
DEFAULT MODE
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
LUBE (5-40 psi)
SUMP

810baf1e

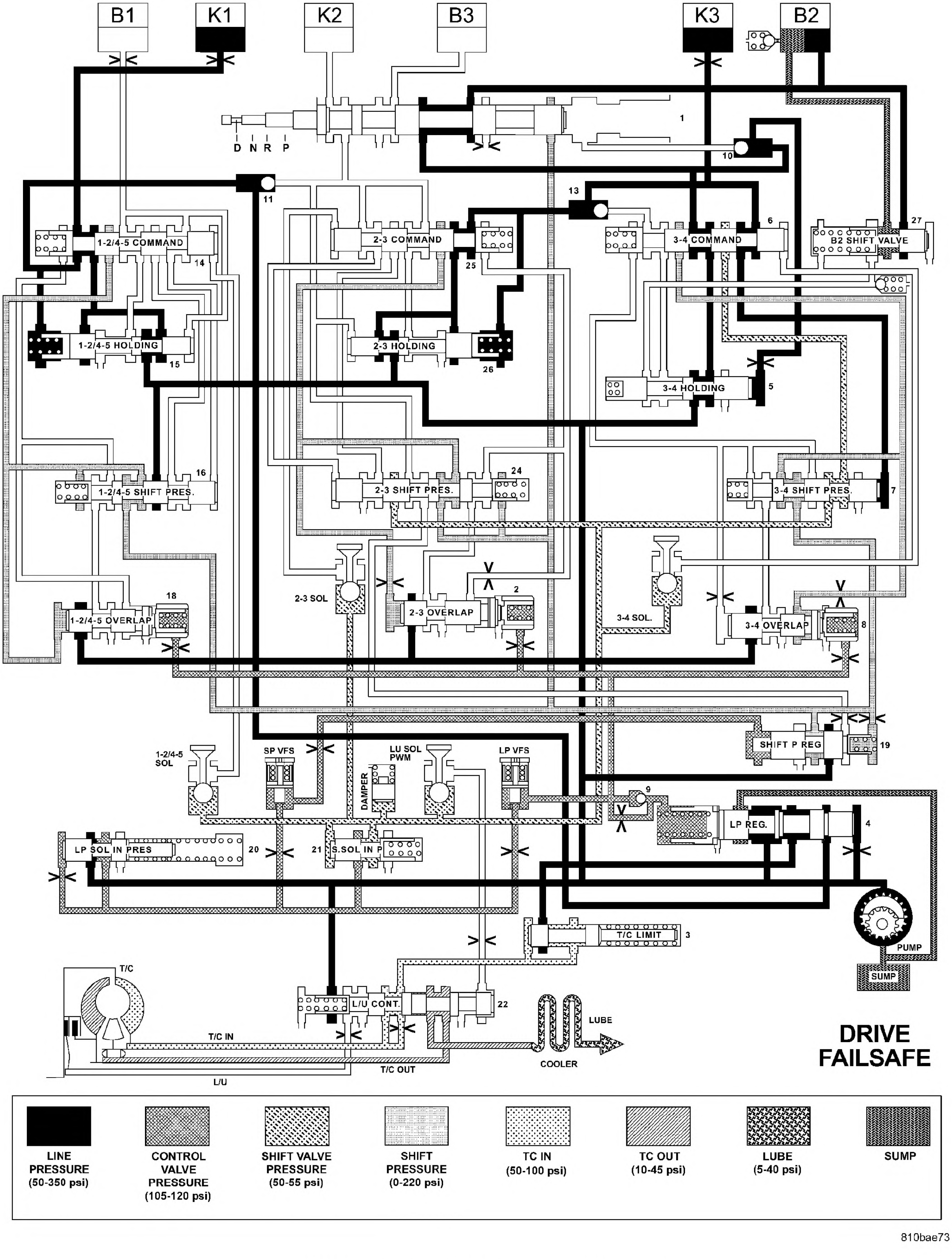
HYDRAULIC FLOW IN NEUTRAL - DEFAULT


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
6
3-4 COMMAND
27
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
24
2-3 SHIFT PRES.
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
NEUTRAL
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810baf59

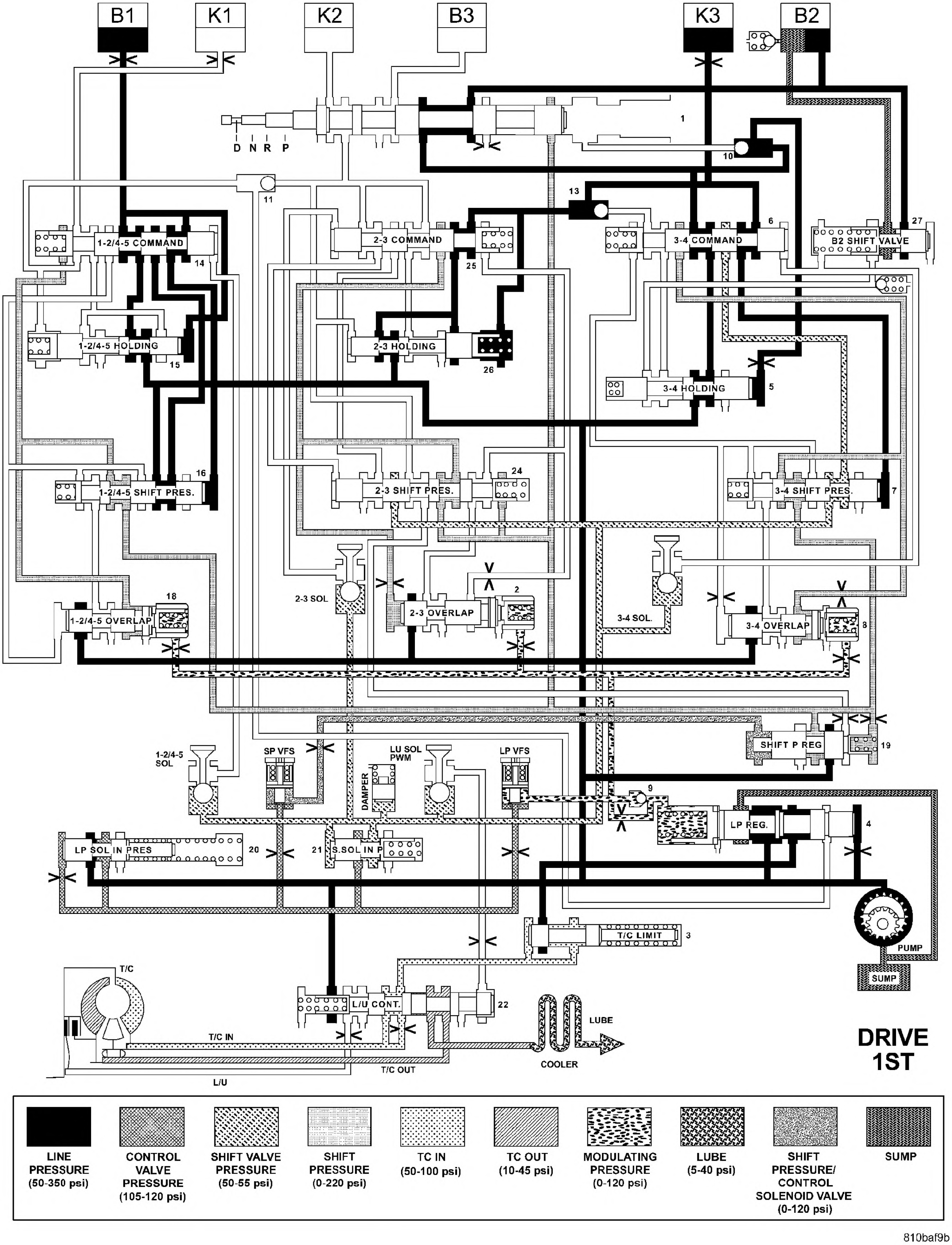
HYDRAULIC FLOW IN NEUTRAL


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL.
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
N TO D
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810baf80

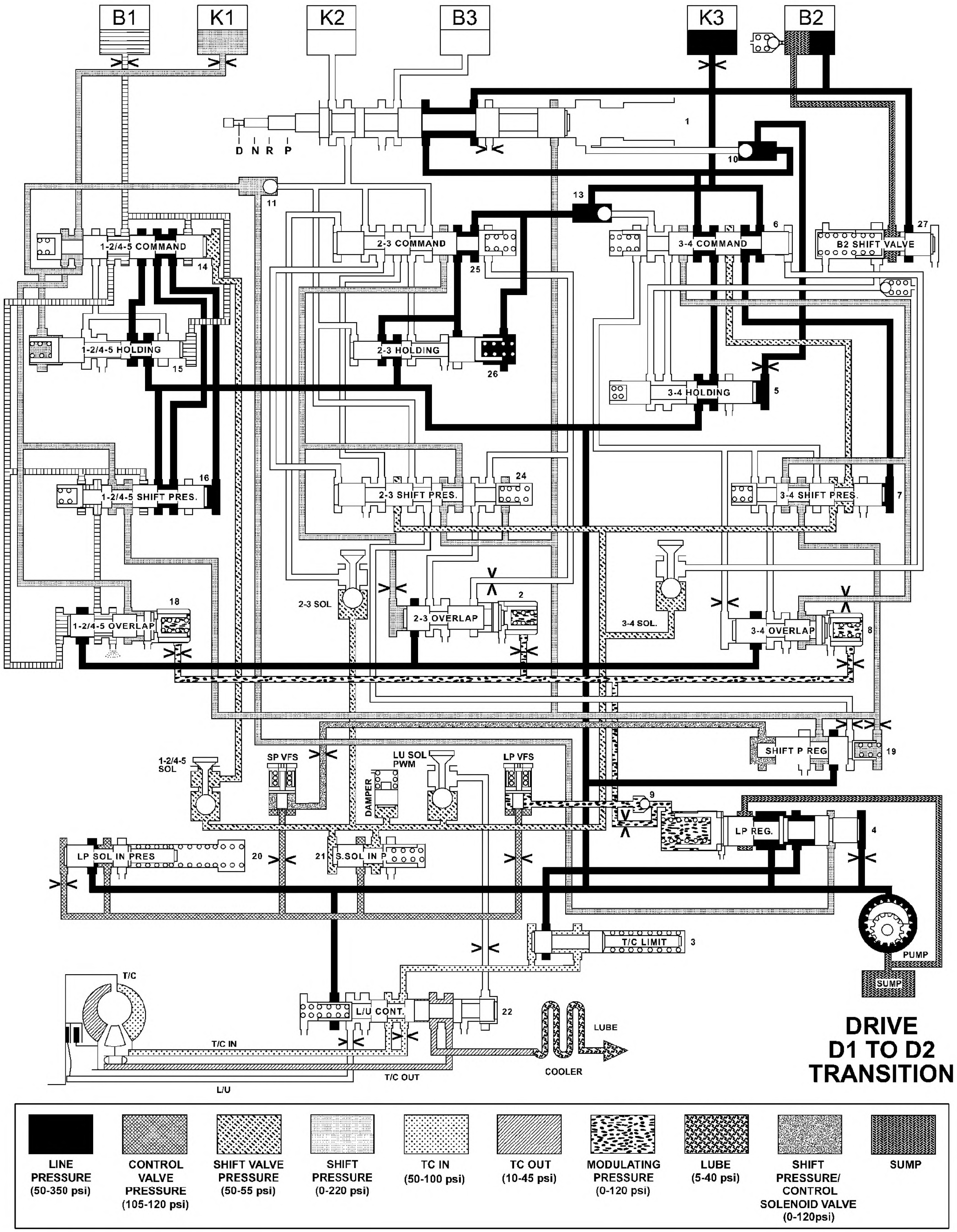
HYDRAULIC FLOW IN NEUTRAL TO DRIVE TRANSITION


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
L/U
COOLER
DRIVE FAILSAFE
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
LUBE (5-40 psi)
SUMP
810bae73

HYDRAULIC FLOW IN DRIVE - FAILSAFE

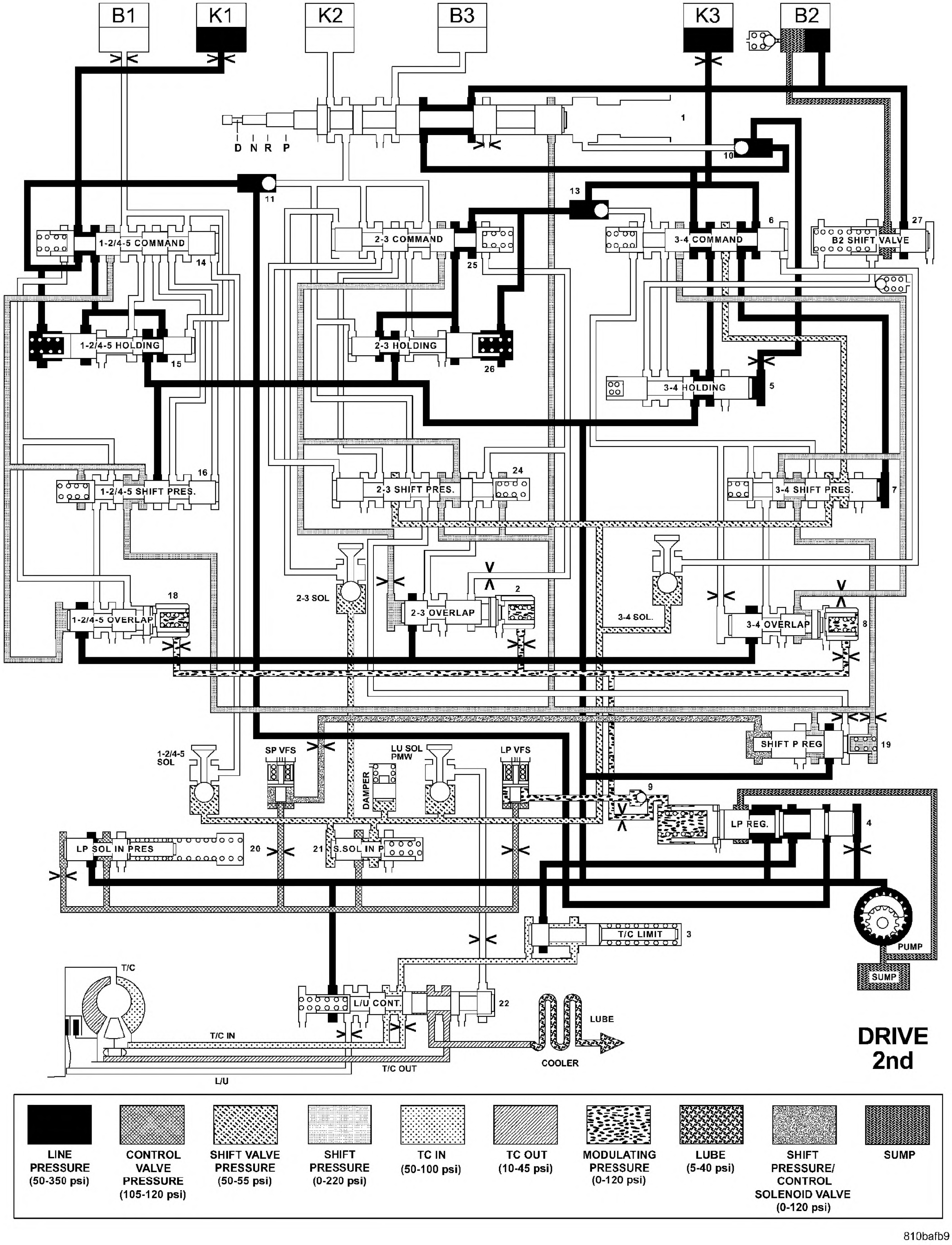

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL.
2-3 OVERLAP
2
3-4 SOL.
3-4 OVERLAP
8
1-2/4-5 OVERLAP
18
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
DRIVE 1ST
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810baf9b

HYDRAULIC FLOW IN DRIVE - FIRST GEAR

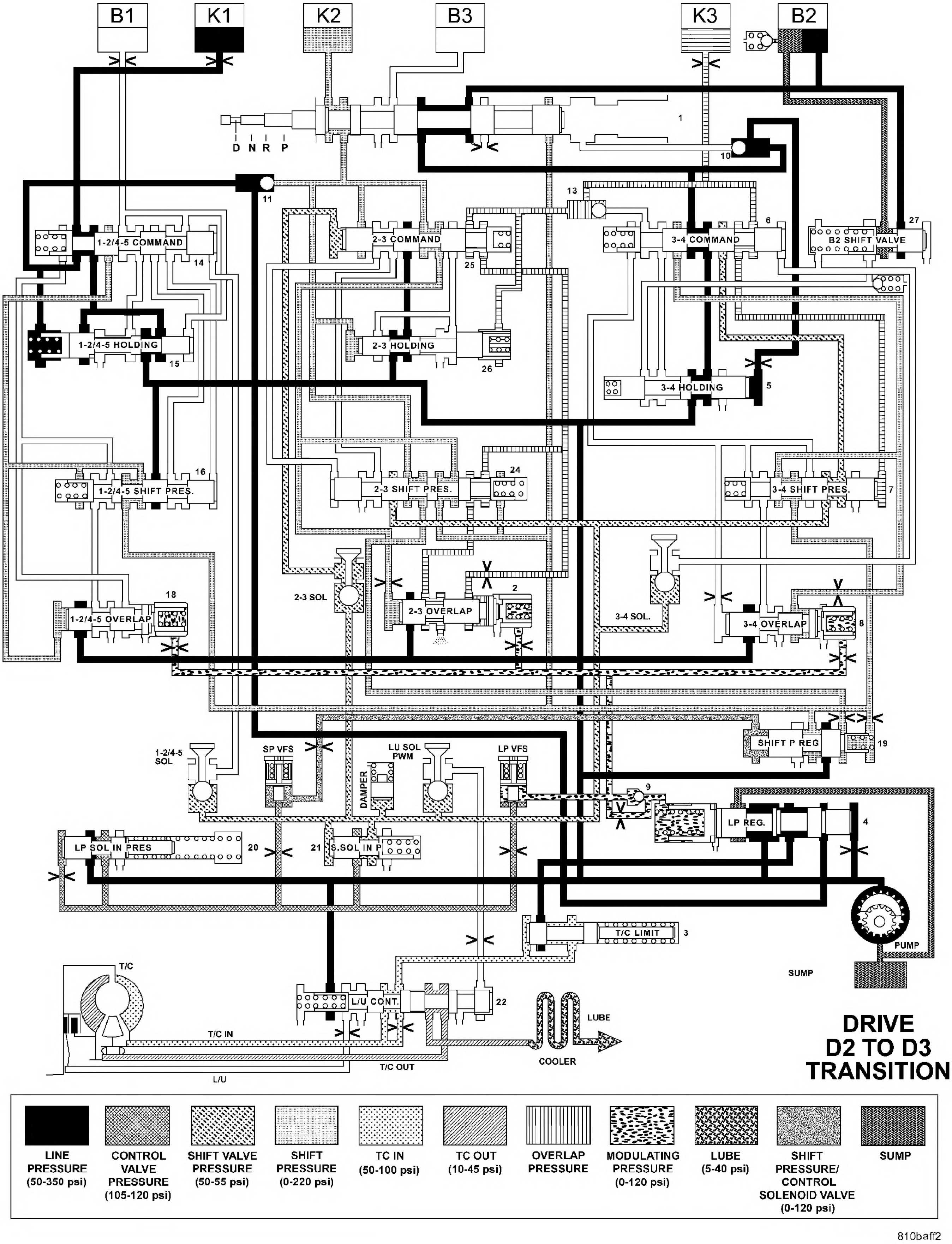

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
18
1-2/4-5 OVERLAP
2-3 SOL
2-3 OVERLAP
2
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
DRIVE
D1 TO D2
TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120psi)
SUMP

810bafa9

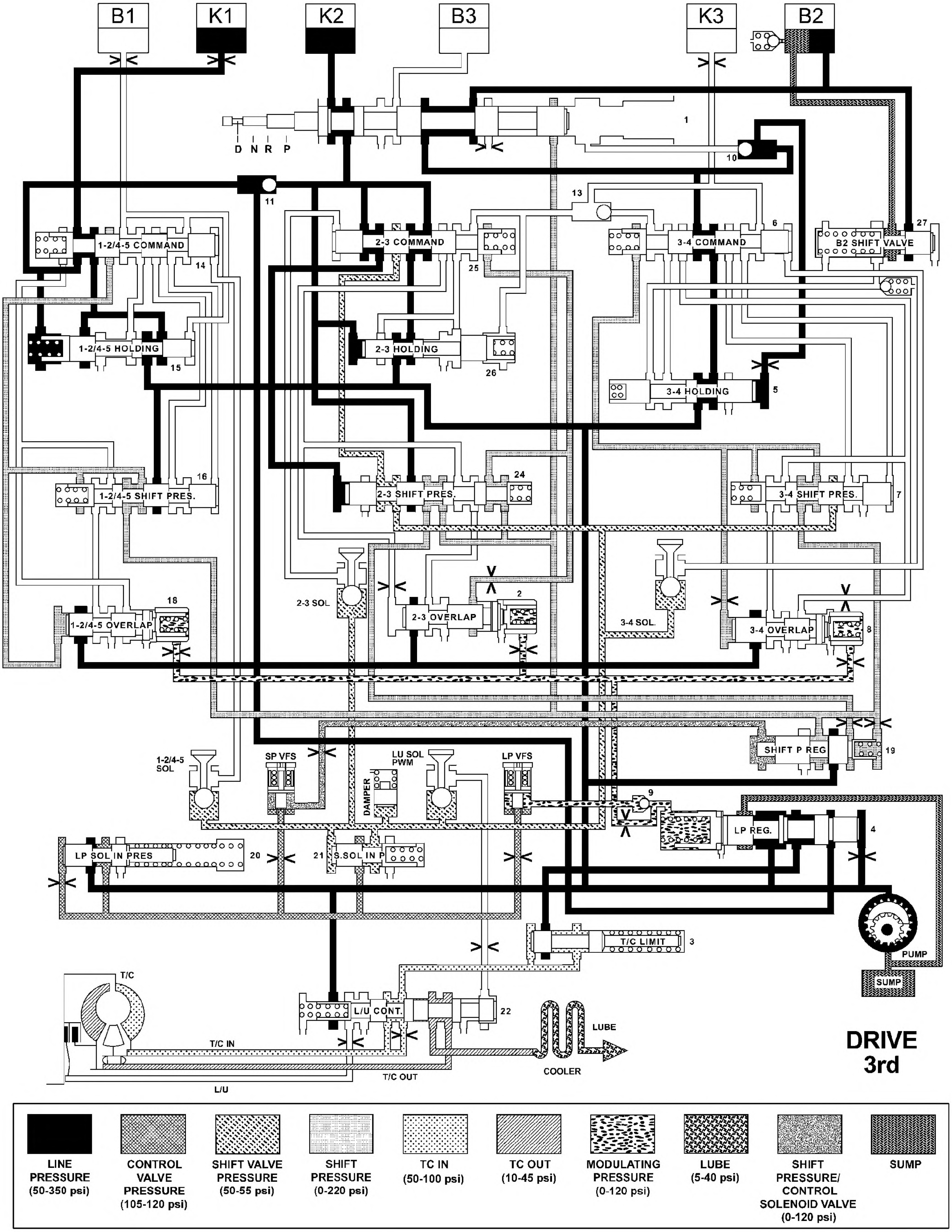
HYDRAULIC FLOW IN DRIVE - FIRST TO SECOND GEAR TRANSITION


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
18
1-2/4-5 OVERLAP
2-3 SOL
2-3 OVERLAP
2
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PMW
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
DRIVE
2nd
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810bafb9

HYDRAULIC FLOW IN DRIVE - SECOND GEAR

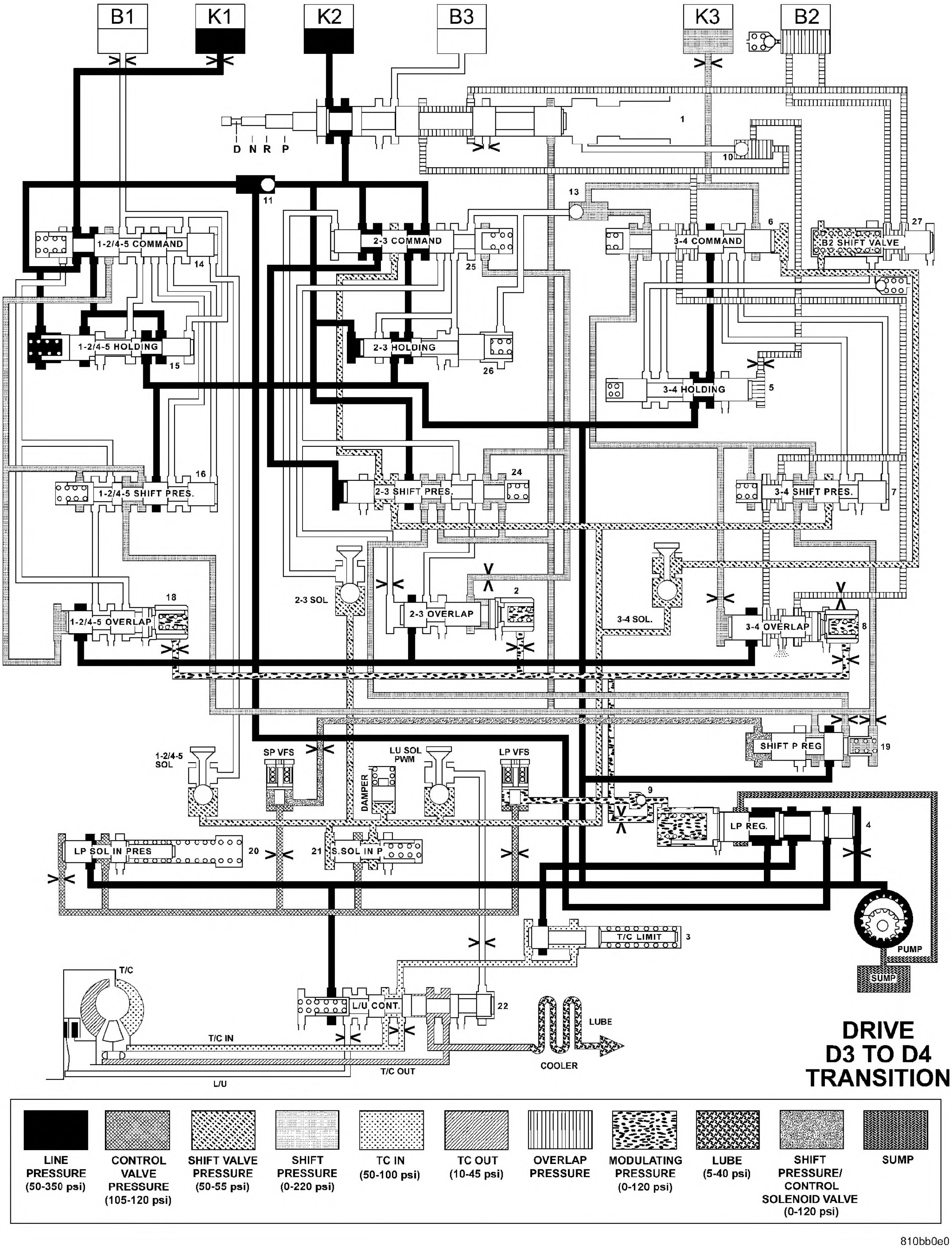

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
T/C IN
LUBE
T/C OUT
COOLER
L/U
DRIVE
D2 TO D3
TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810baff2

HYDRAULIC FLOW IN DRIVE - SECOND TO THIRD GEAR TRANSITION

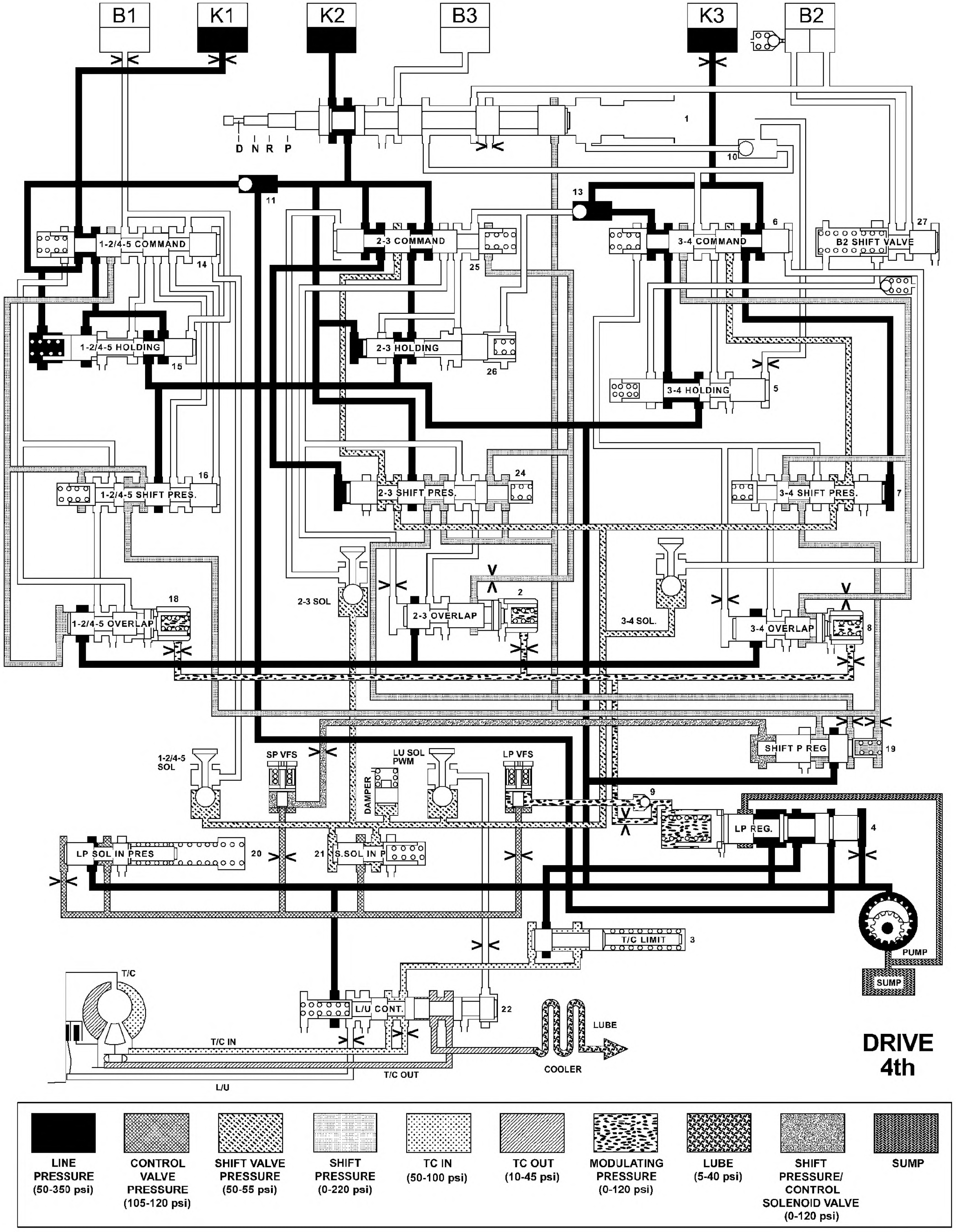

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
24
2-3 SHIFT PRES.
3-4 SHIFT PRES.
7
2-3 SOL.
2
2-3 OVERLAP
18
1-2/4-5 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
T/C IN
T/C OUT
L/U
COOLER
LUBE
DRIVE
3rd
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP

810bb0bb

HYDRAULIC FLOW IN DRIVE - THIRD GEAR

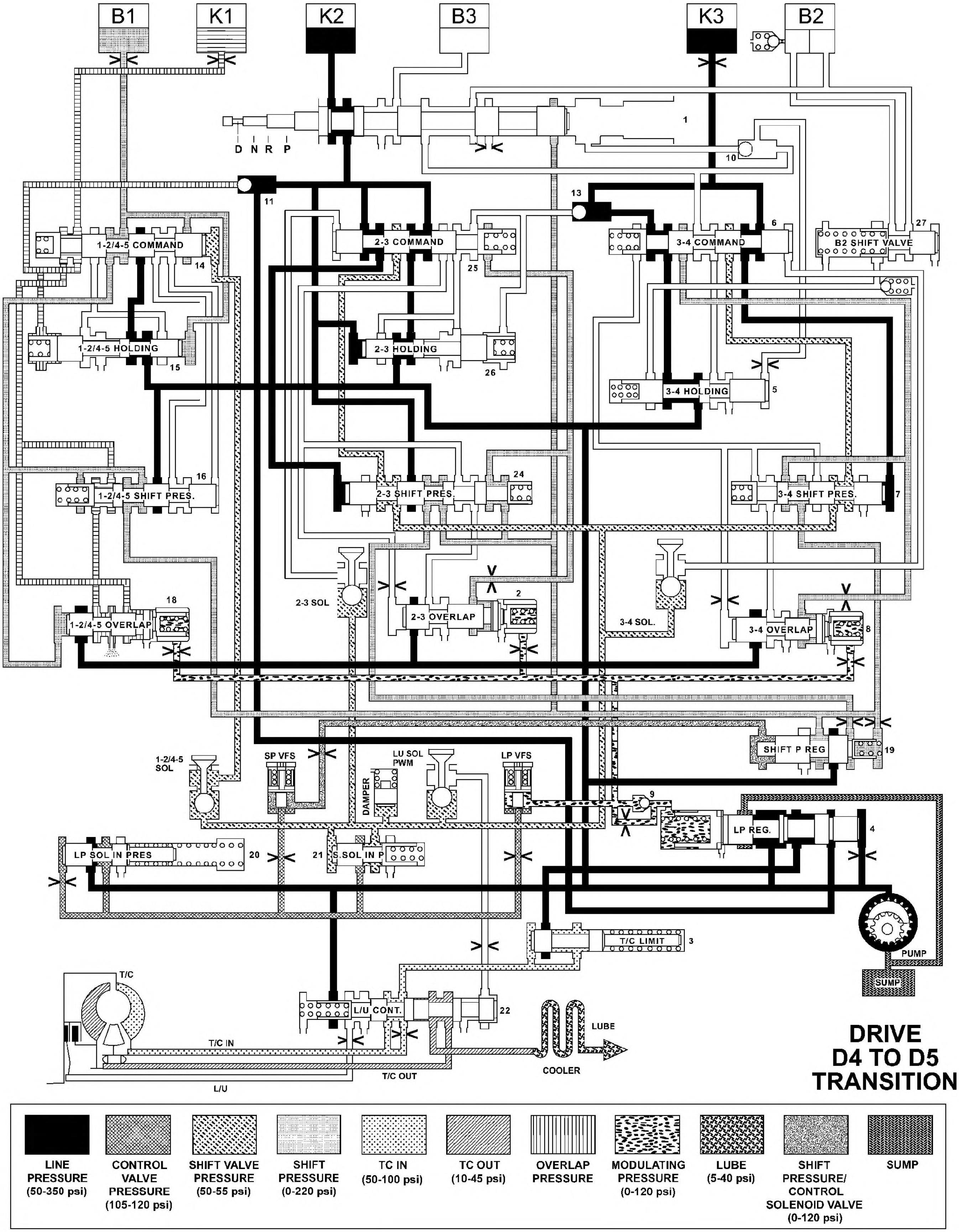

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
COOLER
T/C OUT
L/U
DRIVE
D3 TO D4
TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810bb0e0

HYDRAULIC FLOW IN DRIVE - THIRD TO FOURTH GEAR TRANSITION


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
24
2-3 SHIFT PRES.
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
COOLER
T/C OUT
L/U
DRIVE 4th
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP

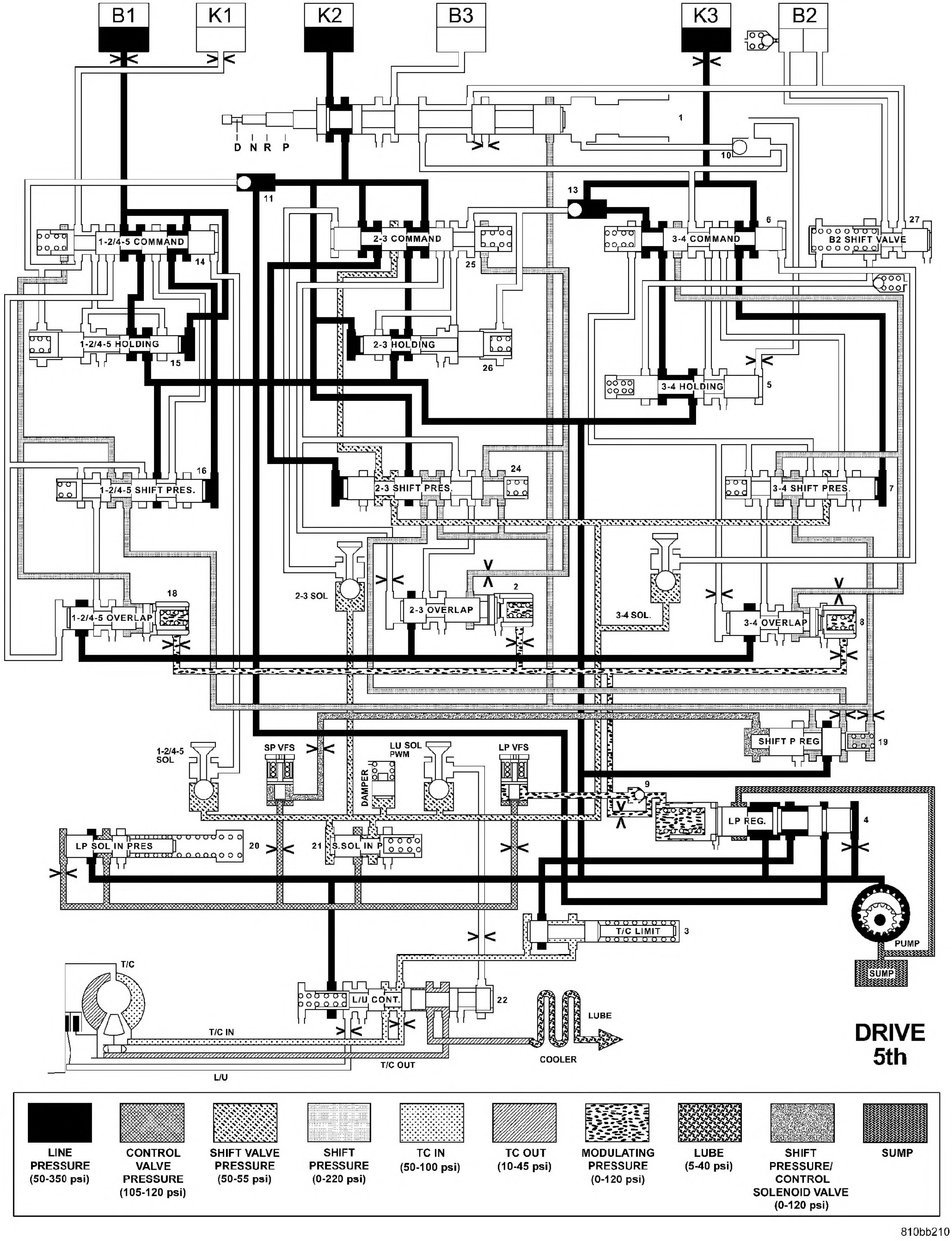
810bb1f5

HYDRAULIC FLOW IN DRIVE - FOURTH GEAR

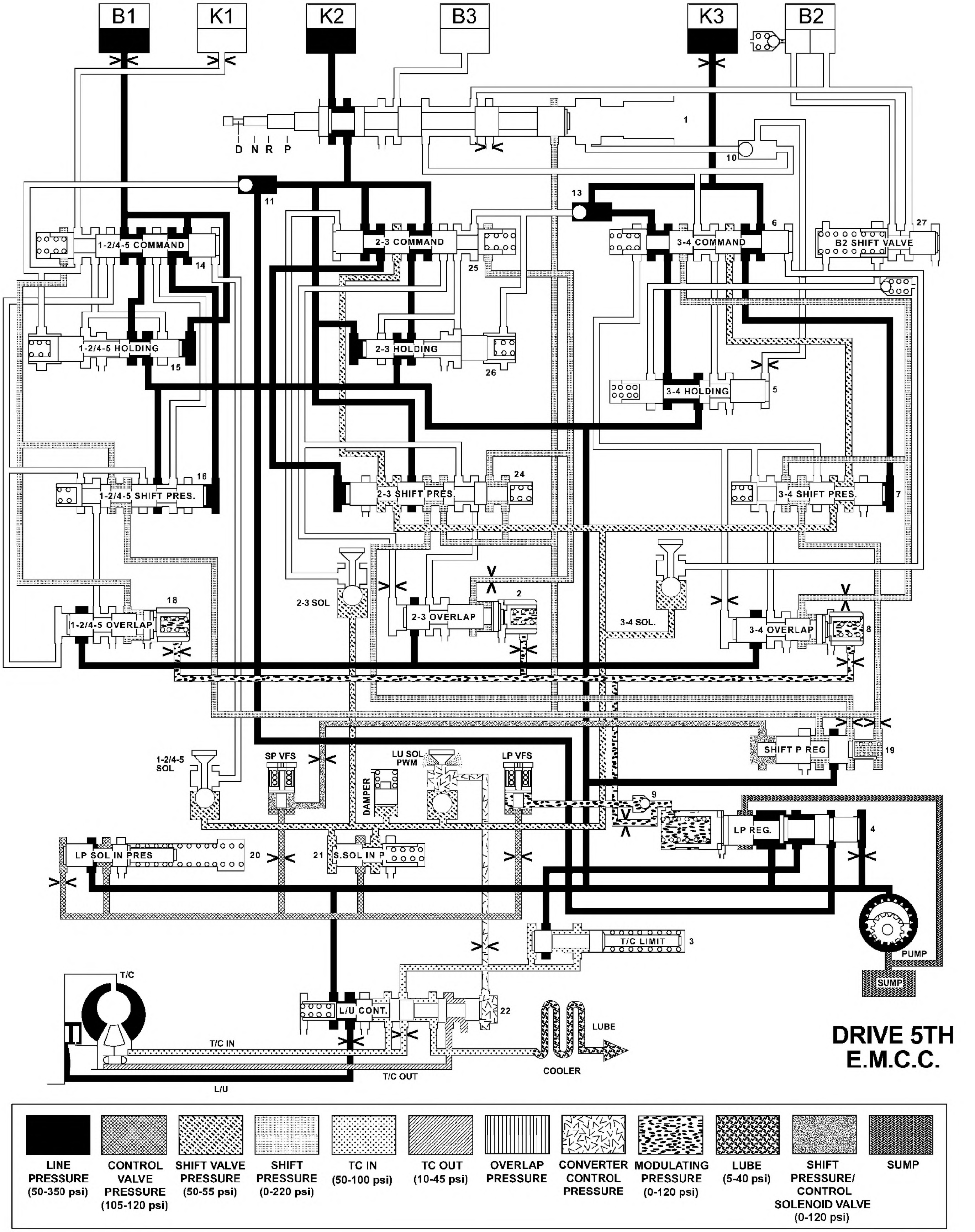

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
18
1-2/4-5 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
T/C IN
T/C OUT
L/U
LUBE
COOLER
DRIVE D4 TO D5 TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP

810bb20a

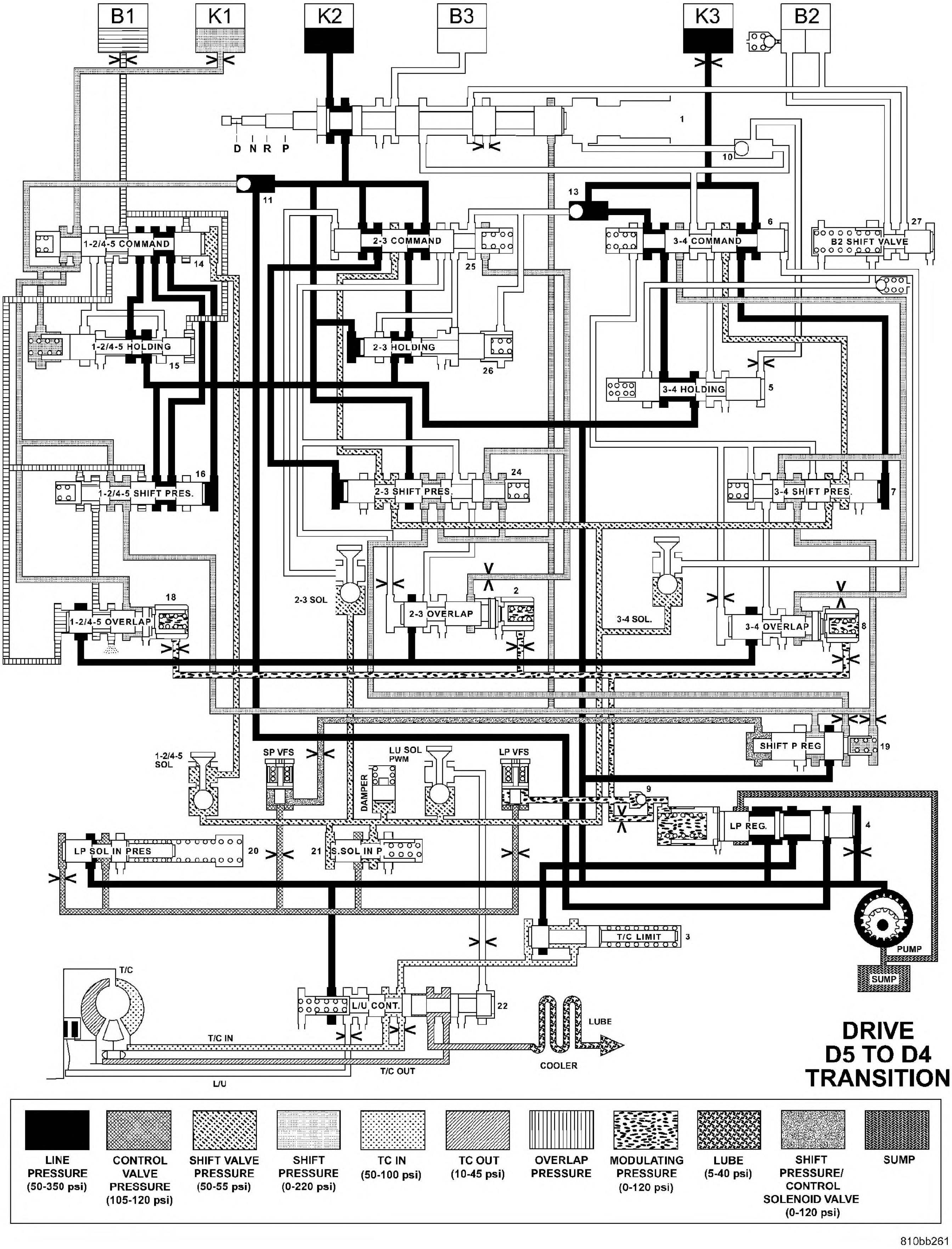
HYDRAULIC FLOW IN DRIVE - FOURTH TO FIFTH GEAR TRANSITION


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
COOLER
T/C OUT
L/U
DRIVE
5th
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810bb210

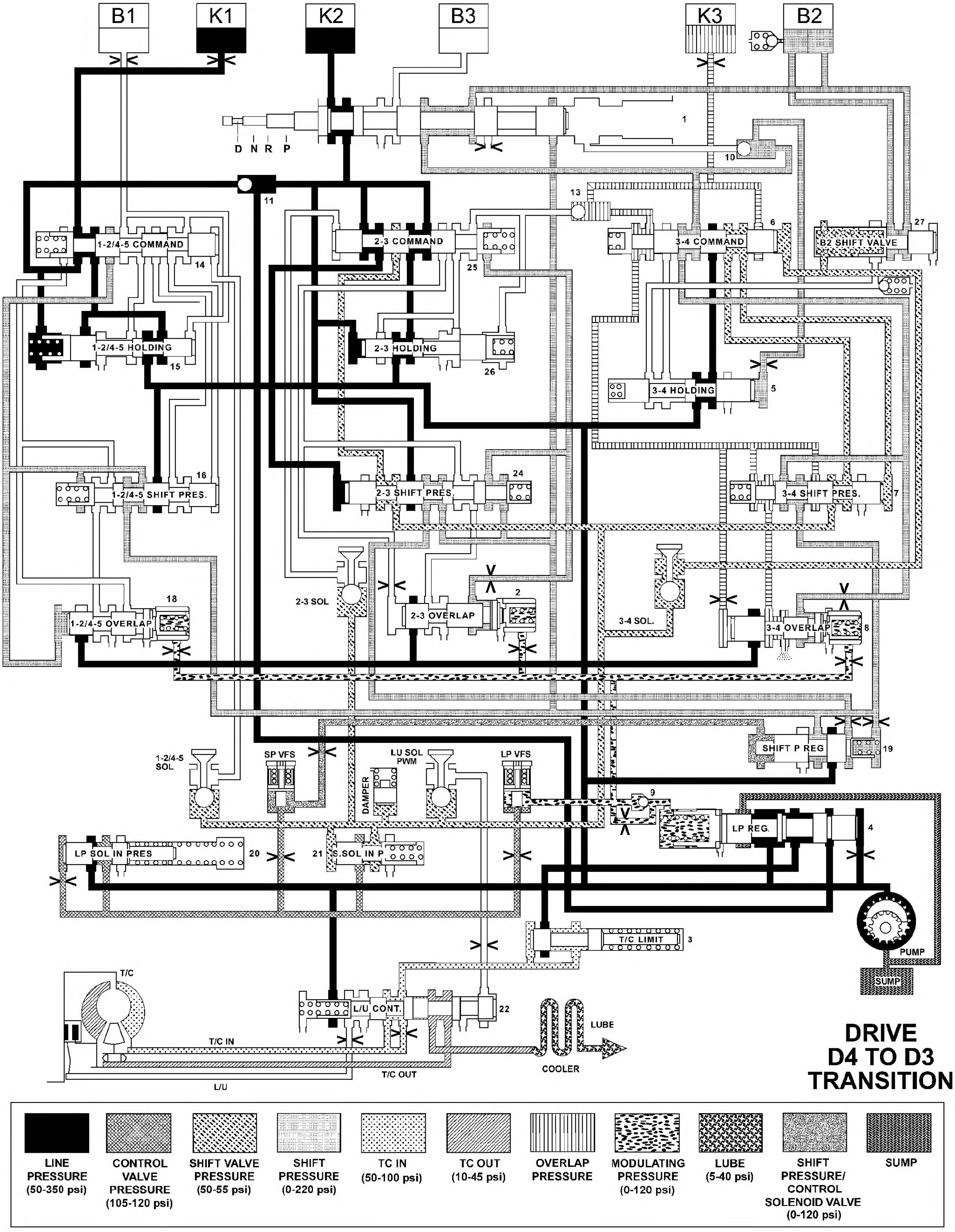
HYDRAULIC FLOW IN DRIVE - FIFTH GEAR


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
24
2-3 SHIFT PRES.
3-4 SHIFT PRES.
7
18
1-2/4-5 OVERLAP
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
COOLER
T/C OUT
L/U
DRIVE 5TH
E.M.C.C.
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
CONVERTER CONTROL PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810bb235

HYDRAULIC FLOW IN DRIVE - FIFTH GEAR - EMCC

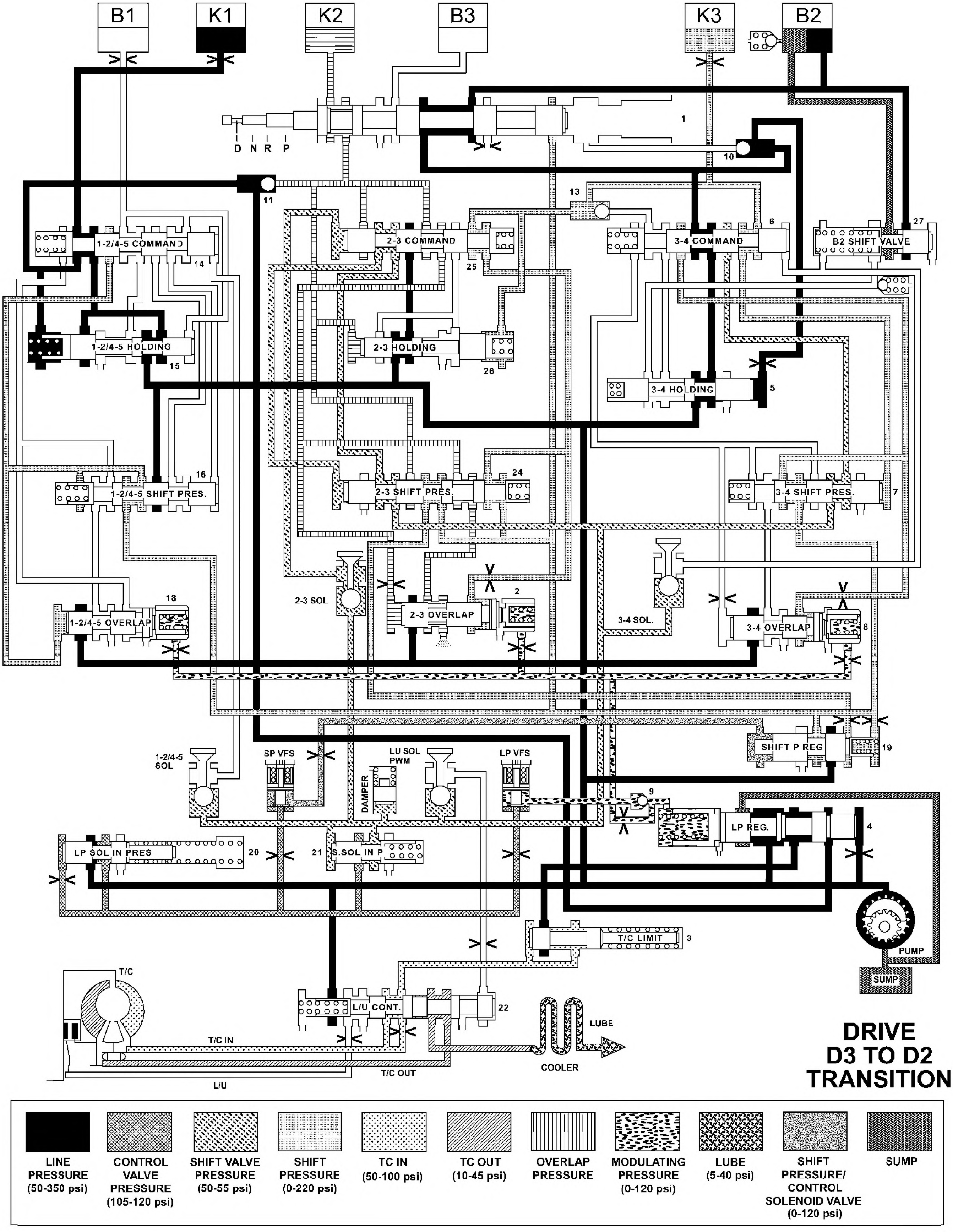

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
DRIVE
D5 TO D4
TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810bb261

HYDRAULIC FLOW IN DRIVE - FIFTH TO FOURTH GEAR TRANSITION

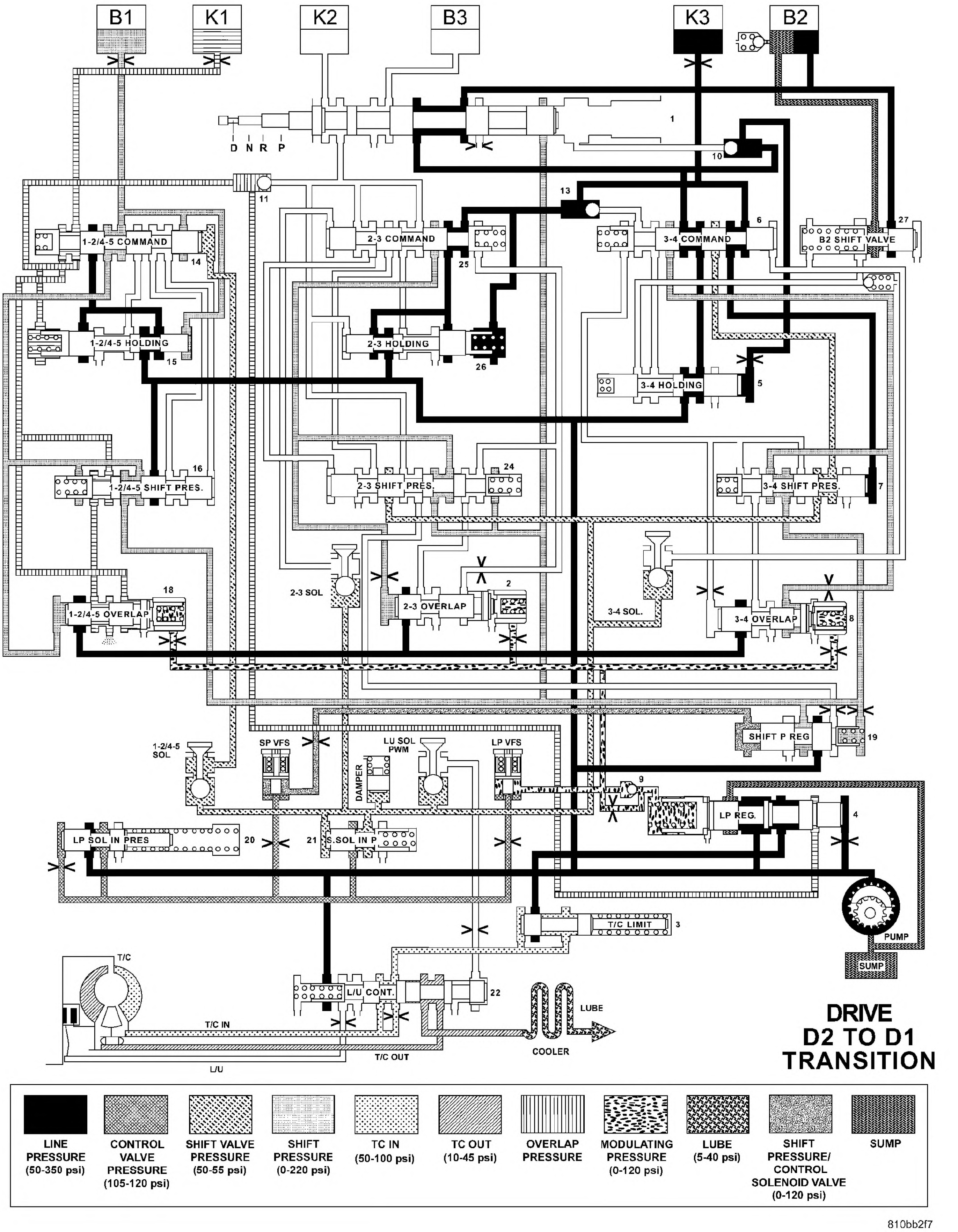

B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
24
2-3 SHIFT PRES.
3-4 SHIFT PRES.
7
18
1-2/4-5 OVERLAP
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
COOLER
T/C OUT
L/U
DRIVE
D4 TO D3
TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP

810bb2e7

HYDRAULIC FLOW IN DRIVE - FOURTH TO THIRD GEAR TRANSITION


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
6
B2 SHIFT VALVE
27
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
1-2/4-5 SHIFT PRES.
16
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
1-2/4-5 OVERLAP
18
2-3 OVERLAP
2
3-4 SOL.
3-4 OVERLAP
8
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
DRIVE
D3 TO D2
TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810bb2ec

HYDRAULIC FLOW IN DRIVE - THIRD TO SECOND GEAR TRANSITION


B1
K1
K2
B3
K3
B2
D N R P
1
10
11
13
6
27
1-2/4-5 COMMAND
14
2-3 COMMAND
25
3-4 COMMAND
B2 SHIFT VALVE
1-2/4-5 HOLDING
15
2-3 HOLDING
26
3-4 HOLDING
5
16
1-2/4-5 SHIFT PRES.
2-3 SHIFT PRES.
24
3-4 SHIFT PRES.
7
2-3 SOL
2
2-3 OVERLAP
3-4 SOL.
3-4 OVERLAP
8
18
1-2/4-5 OVERLAP
SHIFT P REG
19
1-2/4-5 SOL
SP VFS
LU SOL PWM
DAMPER
LP VFS
9
LP REG.
4
LP SOL IN PRES
20
21
S.SOL IN P
T/C LIMIT
3
PUMP
SUMP
T/C
L/U CONT.
22
LUBE
T/C IN
T/C OUT
COOLER
L/U
DRIVE
D2 TO D1
TRANSITION
LINE PRESSURE (50-350 psi)
CONTROL VALVE PRESSURE (105-120 psi)
SHIFT VALVE PRESSURE (50-55 psi)
SHIFT PRESSURE (0-220 psi)
TC IN (50-100 psi)
TC OUT (10-45 psi)
OVERLAP PRESSURE
MODULATING PRESSURE (0-120 psi)
LUBE (5-40 psi)
SHIFT PRESSURE/ CONTROL SOLENOID VALVE (0-120 psi)
SUMP
810bb2f7

HYDRAULIC FLOW IN DRIVE - SECOND TO FIRST GEAR TRANSITION

SPECIFICATIONS

GEAR RATIOS

1ST	3.59:1
2ND	2.19:1
3RD	1.41:1
4TH	1.00:1
5TH	0.83:1
REVERSE	3.16:1

SPECIFICATIONS

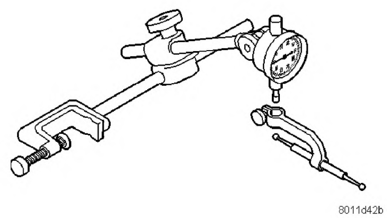
COMPONENT		METRIC (mm)	INCH (in.)
Geartrain End-play		0.3-0.5	0.012-0.020
Geartrain End-play Shim		0.2, 0.3, 0.4, and 0.5	0.008, 0.012, 0.016, 0.020
Rear Planetary Gear Set End-play		0.15-0.6	0.006-0.024
Rear Planetary Gear Set Snap-rings		3.0, 3.4, and 3.7	0.118, 0.134, 0.146
B1 Clutch Clearance - Double Sided Friction Discs	2 Disc	2.3-2.7	0.091-0.106
	3 Disc	2.7-3.1	0.106-0.122
	4 Disc	3.0-3.4	0.118-0.134
B1 Clutch Clearance - Single Sided Friction Discs	4 Disc	2.2-2.6	0.087-0.102
	6 Disc	2.4-2.8	0.095-0.110
	8 Disc	2.6-3.0	0.102-0.118
B1 Clutch Snap-rings		2.6, 2.9, 3.2, 3.5, 3.8, and 4.1	0.102, 0.114, 0.126, 0.138, 0.150, 0.162
B2 Clutch Clearance	4 Disc	1.9-2.3	0.075-0.091
	5 Disc	2.0-2.4	0.079-0.095
B2 Clutch Snap-rings		2.9, 3.2, 3.5, 3.8, and 4.1	0.114, 0.126, 0.138, 0.150, 0.162
B3 Clutch Clearance		1.0-1.4	0.039-0.055
B3 Clutch Snap-rings		3.2, 3.5, 3.8, 4.1, 4.4, and 4.7	0.126, 0.138, 0.150, 0.162, 0.173, 0.185
K1 Clutch Clearance - Double Sided Friction Discs	3 Disc	2.7-3.1	0.106-0.122
	4 Disc	3.0-3.4	0.118-0.134
	5 Disc	3.3-3.7	0.13-0.146
	6 Disc	3.6-4.0	0.142-0.158
K1 Clutch Clearance - Single Sided Friction Discs	6 Disc	2.4-2.8	0.095-0.110
	8 Disc	2.6-3.0	0.102-0.118
	10 Disc	2.8-3.2	0.110-0.126
	12 Disc	2.9-3.3	0.114-0.130
K1 Clutch Snap-rings		2.6, 2.9, 3.2, 3.5, 3.8, and 4.1	0.102, 0.114, 0.126, 0.138, 0.150, 0.162
K2 Clutch Clearance	3 Disc	2.3-2.7	0.091-0.106
	4 Disc	2.4-2.8	0.095-0.110
	5 Disc	2.5-2.9	0.099-0.114
	6 Disc	2.7-3.1	0.106-0.122

COMPONENT		METRIC (mm)	INCH (in.)
K2 Clutch Snap-rings		2.3, 2.6, 2.9, 3.2, 3.5, and 3.8	0.091, 0.102, 0.114, 0.126, 0.138, 0.150
K3 Clutch Clearance - Double Sided Friction Discs	3 Disc	2.3-2.7	0.091-0.106
	4 Disc	2.4-2.8	0.095-0.110
	5 Disc	2.5-2.9	0.099-0.114
K3 Clutch Clearance - Single Sided Friction Discs	6 Disc	2.3-2.7	0.091-0.106
	8 Disc	2.4-2.8	0.095-0.110
	10 Disc	2.5-2.9	0.099-0.114
K3 Clutch Snap-rings		2.0, 2.3, 2.6, 2.9, 3.2, and 3.5	0.079, 0.091, 0.102, 0.114, 0.126, 0.138

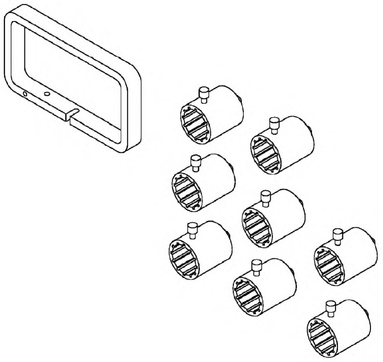
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, B2 Clutch Carrier	16	-	141
Bolt, B1 Carrier to Converter Housing	10	-	88.5
Bolt, Oil Pump	20	-	177
Nut, Propeller Flange	200	147.5	-
Nut, 4X4 Adapter Shaft	200	147.5	-
Bolt, Electrohydraulic Unit	8	-	71
Bolt, Transmission Housing to Converter Housing	20	-	177
Bolts, 4X4 Adapter Housing	20	-	177
Bolts, Oil Pan	8	-	71
Screws, Valve Body/ Housing Side Cover	4	-	35
Bolt, Shift Plate	8	-	71
Bolt, Solenoid Leaf Spring	8	-	71
Nut, Shifter Mechanism to Floor Pan	12	-	105

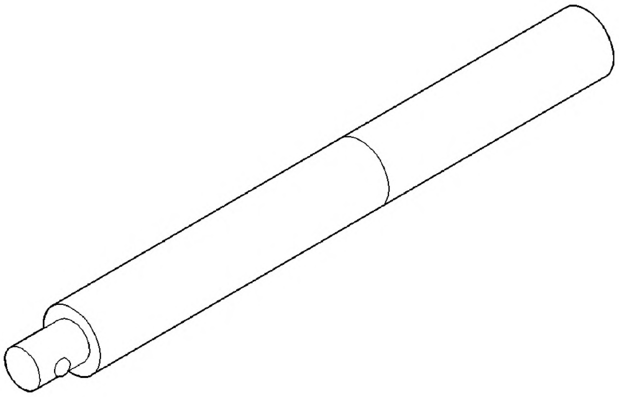
SPECIAL TOOLS - AUTOMATIC TRANSMISSION - NAG1



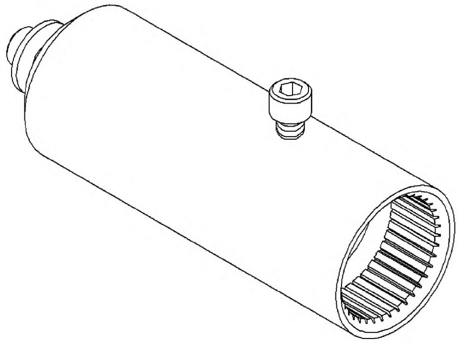
Dial Indicator - C-3339



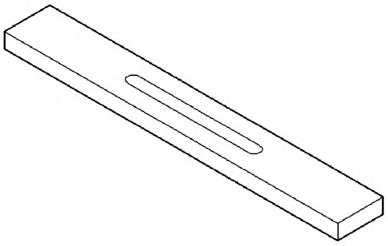
End Play Set - 8266



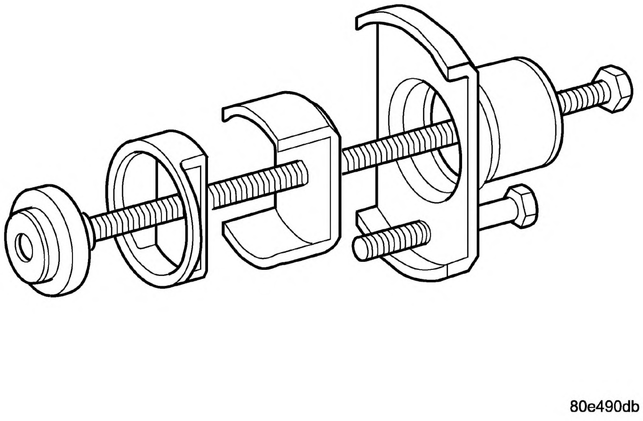
Handle, Universal - C-4171



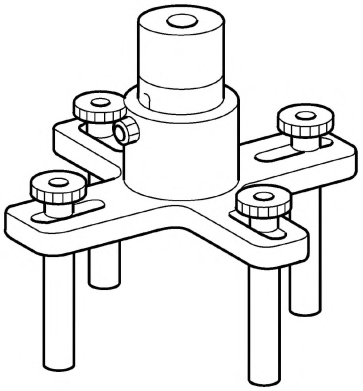
Adapter, Geartrain End-play - 8266-18



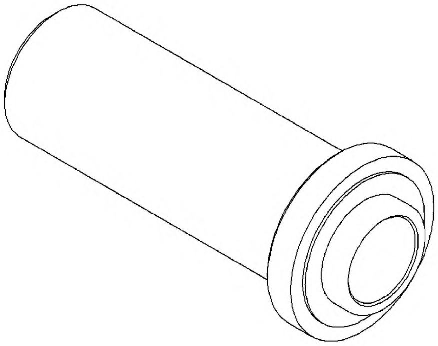
Bar, Gauge - 6311



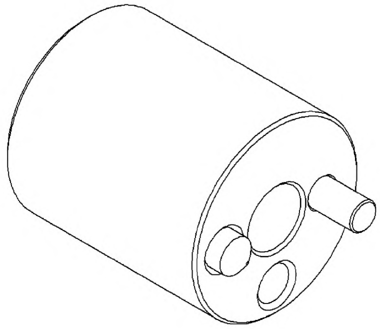
Compressor, Multi-use Spring - 8900



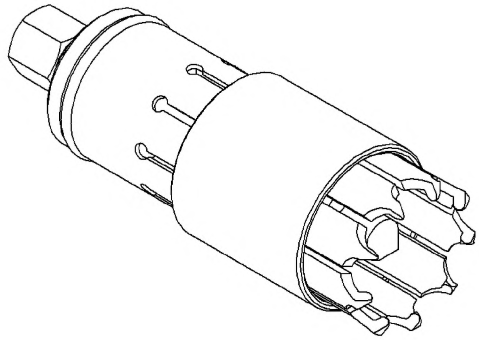
Tool, Pressing - 8901



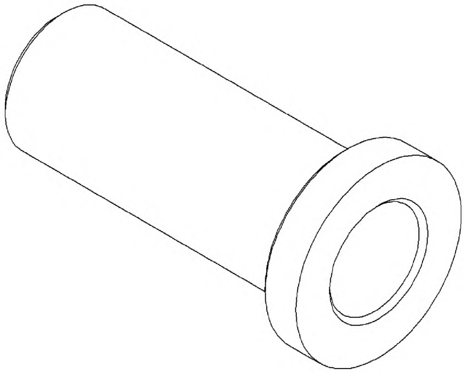
Installer, Seal - 8902A



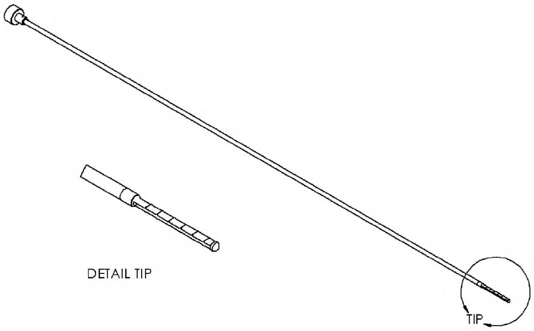
Tool, Staking - 9078



Remover, Bearing - 9082



Installer, Bearing - 9287

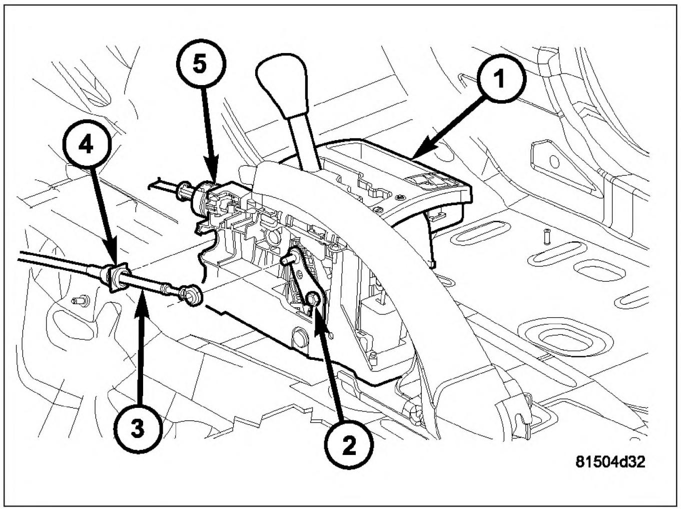

DETAIL TIP
TIP

Dipstick - 9336

MECHANISM-BRAKE TRANSMISSION SHIFT INTERLOCK

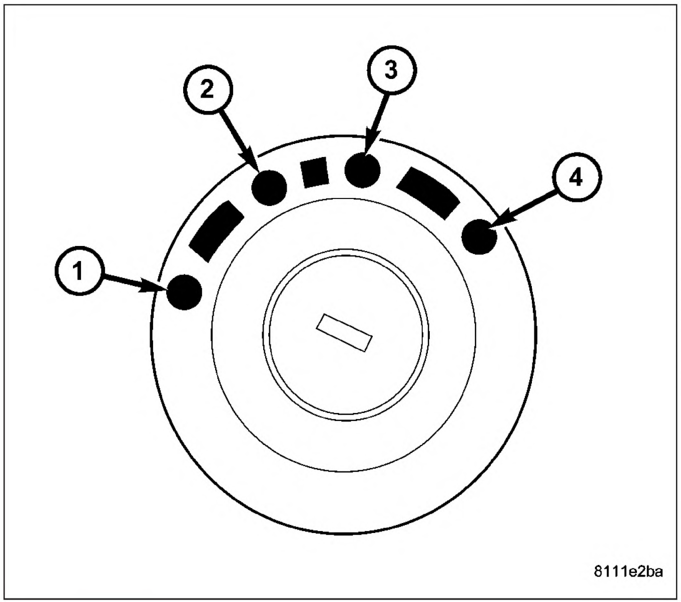
DESCRIPTION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable operated system that prevents the transmission gear shifter from being moved out of PARK without the proper driver inputs. The system also contains a solenoid that is integral to the shifter assembly. The solenoid works in conjunction with the park lock cable (5) to permit shifter movement out of PARK when the brake is depressed and prevents shifter movement into REVERSE unless a shift into REVERSE is permitted.



OPERATION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK (1) position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A solenoid in the shifter assembly is de-energized when the ignition is in the ON position and the brake pedal is depressed. When the key is in the ON position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK position, unless the shifter is in the gated PARK position.



The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the “expected response” differs from the vehicle’s response, then system repair and/or adjustment is necessary.

ACTION	EXPECTED RESPONSE
1. Turn key to the ″ACC″ position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON″ position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the ″ON″ position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear, except ″PARK″, and try to return key to the ″LOCK″ position.	4. Key cannot be returned to the ″LOCK″ position.
5. Return shifter to ″PARK″ and try to remove the key.	5. Key can be removed (after returning to ″LOCK″ position).
6. With the key removed, and the brake depressed, try to shift out of ″PARK″.	6. Shifter cannot be shifted out of ″PARK″.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

DIAGNOSIS AND TESTING - BRAKE TRANSMISSION SHIFT INTERLOCK

SYSTEM VERIFICATION

1. Verify that the key can only be removed in the PARK position
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely from ACC to LOCK. When the shifter is in any other gear or neutral position, the ignition key cylinder should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.
4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).
5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.
6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.

DIAGNOSTIC CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
KEY WILL NOT ROTATE TO THE LOCK POSITION.	1. Misadjusted Park Lock cable.	1. Adjust Park Lock cable. (Refer to 21 - TRANSMISSION AND TRANSFER CASE/AUTOMATIC TRANSMISSION/BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM - ADJUSTMENTS)
	2. Misadjusted gearshift cable.	2. Adjust gearshift cable. (Refer to 21 - TRANSMISSION AND TRANSFER CASE/AUTOMATIC TRANSMISSION/GEAR SHIFT CABLE - ADJUSTMENTS)
	3. Burrs on ignition key.	3. Remove burrs and cycle key several times to verify operation.
	4. Binding or broken components.	4. Inspect system components and repair/replace components as necessary.
VEHICLE WILL NOT START UNLESS SHIFTER IS HELD FORWARD, OR REARWARD, OF THE PARK POSITION.	1. Misadjusted gearshift cable.	1. Adjsut gearshift cable. (Refer to 21 - TRANSMISSION AND TRANSFER CASE/AUTOMATIC TRANSMISSION/GEAR SHIFT CABLE - ADJUSTMENTS)

ADJUSTMENTS - BRAKE TRANSMISSION SHIFT INTERLOCK

The park interlock cable is part of the brake/shift lever interlock system. Correct cable adjustment is important to proper interlock operation. The gear shift and park lock cables must both be correctly adjusted in order to shift out of PARK.

ADJUSTMENT PROCEDURE

1. Remove floor console as necessary for access to the park lock cable. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
2. Shift the transmission into the PARK position.
3. Turn ignition switch to LOCK position. **Be sure ignition key cylinder is in the LOCK position. Cable will not adjust correctly in any other position.**

NOTE: If the key will not turn to the LOCK position, pull up on the cable lock button and manually move the cable in and out until the key can be turned to the LOCK position.

4. Pull cable lock button up to release cable, if necessary.
5. Ensure that the cable is free to self-adjust by pushing cable rearward and releasing.
6. Push lock button down until it snaps in place. The lock should be flush to the surface of the cylinderical portion of the cable adjustment housing.

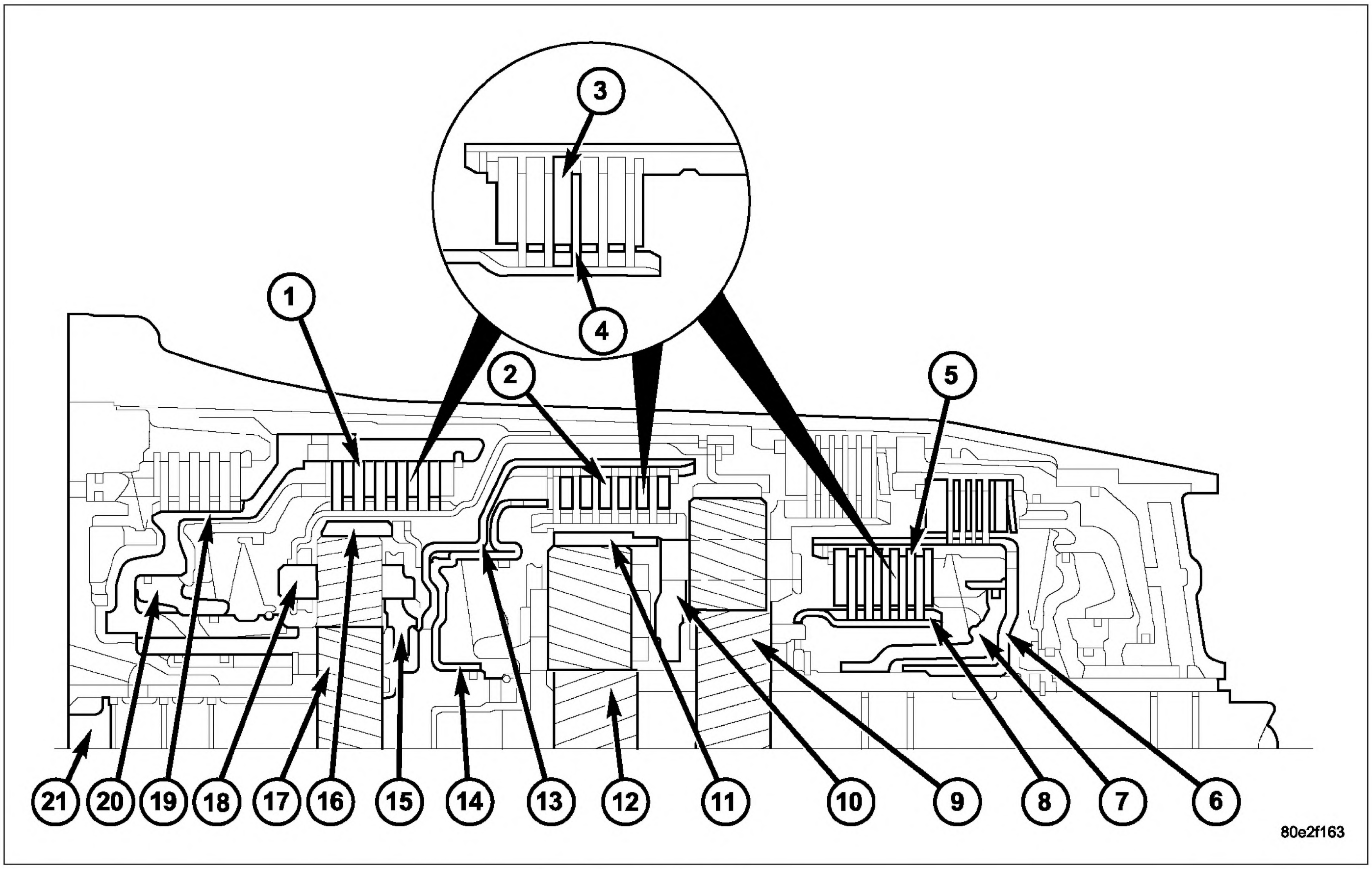
BTSI FUNCTION CHECK

1. Verify removal of ignition key allowed in PARK position only.
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely LOCK position. When the shifter is in any other position, the ignition key should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.

4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).
5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.
6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.
7. The floor shifter lever and gate positions should be in alignment with all transmission detent positions.
8. Engine starts must be possible with shifter lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gate positions other than PARK or NEUTRAL.
9. With the shifter lever handle in the:
   - PARK position- apply forward force on center of handle and remove pressure. Engine start must be possible.
   - PARK position- apply rearward force on center of handle and remove pressure. Engine start must be possible.
   - NEUTRAL position- engine start must be possible.
   - NEUTRAL position, engine running and brakes applied- Apply forward force on center of shift handle. Transmission should not be able to shift into REVERSE detent.

CLUTCHES-INPUT

DESCRIPTION



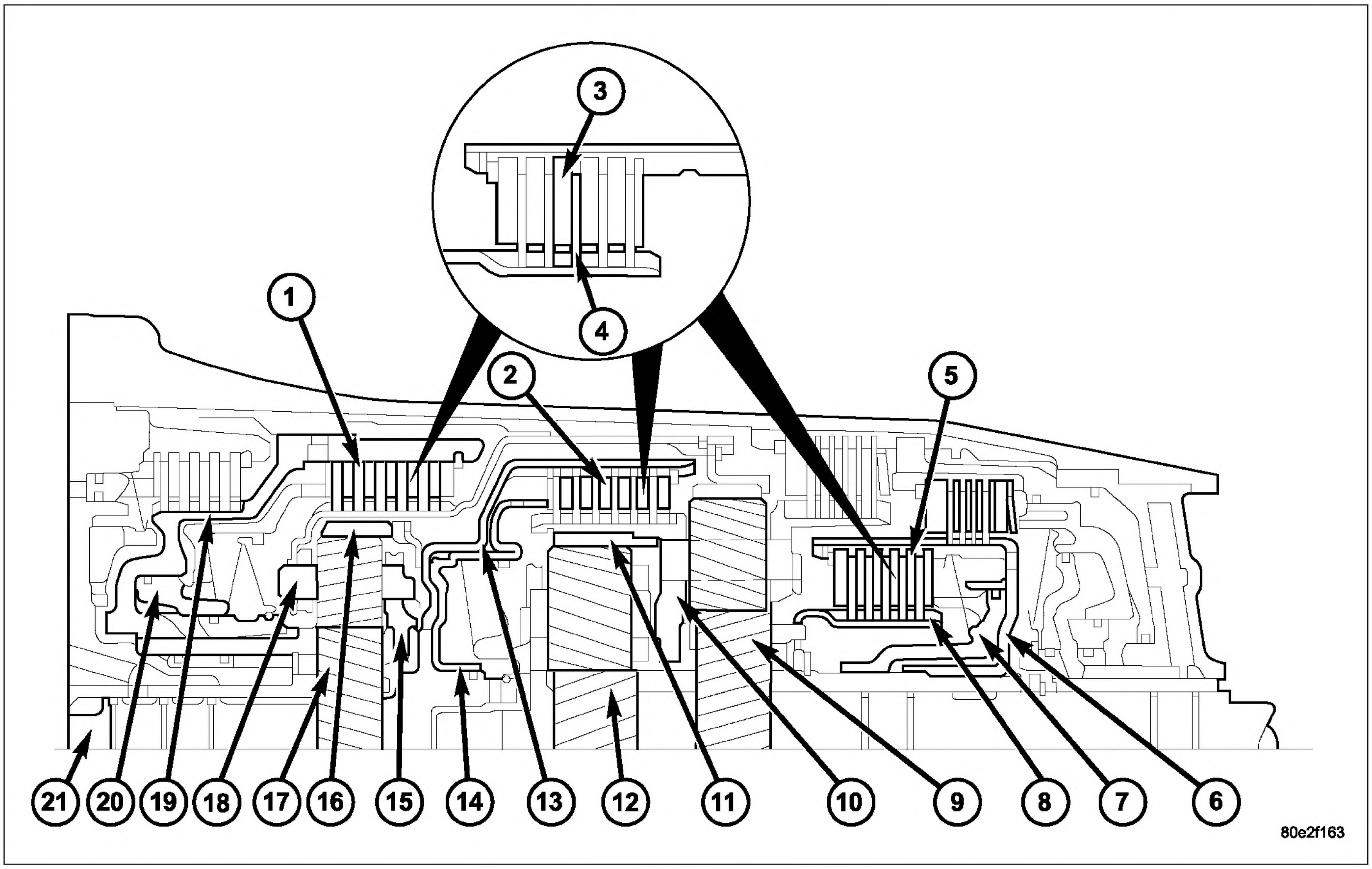
Input Clutches

1 - K1 CLUTCH
2 - K2 CLUTCH
3 - EXTERNALLY TOOTHED DISC
4 - INTERNALLY TOOTHED DISC
5 - K3 CLUTCH
6 - K3 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
7 - K3 CLUTCH PISTON
8 - K3 CLUTCH INTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET SUN GEAR
10 - CENTER PLANETARY GEARSET PLANETARY CARRIER
11 - CENTER PLANETARY GEARSET ANNULUS GEAR
12 - CENTER PLANETARY GEARSET SUN GEAR
13 - K2 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
14 - K2 CLUTCH PISTON
15 - FRONT PLANETARY GEARSET PLANETARY CARRIER
16 - FRONT PLANETARY GEARSET ANNULUS GEAR
17 - FRONT PLANETARY GEARSET SUN GEAR
18 - K1 CLUTCH INTERNALLY TOOTHED DISC CARRIER
19 - K1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
20 - K1 CLUTCH PISTON
21 - DRIVE SHAFT

Three multi-plate input clutches (1, 2, 5), the front, middle and rear multi-plate clutches K1 (1), K2 (2), and K3 (5), are located in the planetary gear sets in the transmission housing.

A multi-plate input clutch consists of a number of internally toothed discs (4) on an internally toothed disc carrier and externally toothed discs (3) on an externally toothed disc carrier.

OPERATION



Input Clutches

1 - K1 CLUTCH
2 - K2 CLUTCH
3 - EXTERNALLY TOOTHED DISC
4 - INTERNALLY TOOTHED DISC
5 - K3 CLUTCH
6 - K3 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
7 - K3 CLUTCH PISTON
8 - K3 CLUTCH INTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET SUN GEAR
10 - CENTER PLANETARY GEARSET PLANETARY CARRIER
11 - CENTER PLANETARY GEARSET ANNULUS GEAR
12 - CENTER PLANETARY GEARSET SUN GEAR
13 - K2 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
14 - K2 CLUTCH PISTON
15 - FRONT PLANETARY GEARSET PLANETARY CARRIER
16 - FRONT PLANETARY GEARSET ANNULUS GEAR
17 - FRONT PLANETARY GEARSET SUN GEAR
18 - K1 CLUTCH INTERNALLY TOOTHED DISC CARRIER
19 - K1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
20 - K1 CLUTCH PISTON
21 - DRIVE SHAFT

The input clutches produce a non-positive locking connection between two elements of a planetary gear set or between one element from each of two planetary gear sets in order to transmit the drive torque.

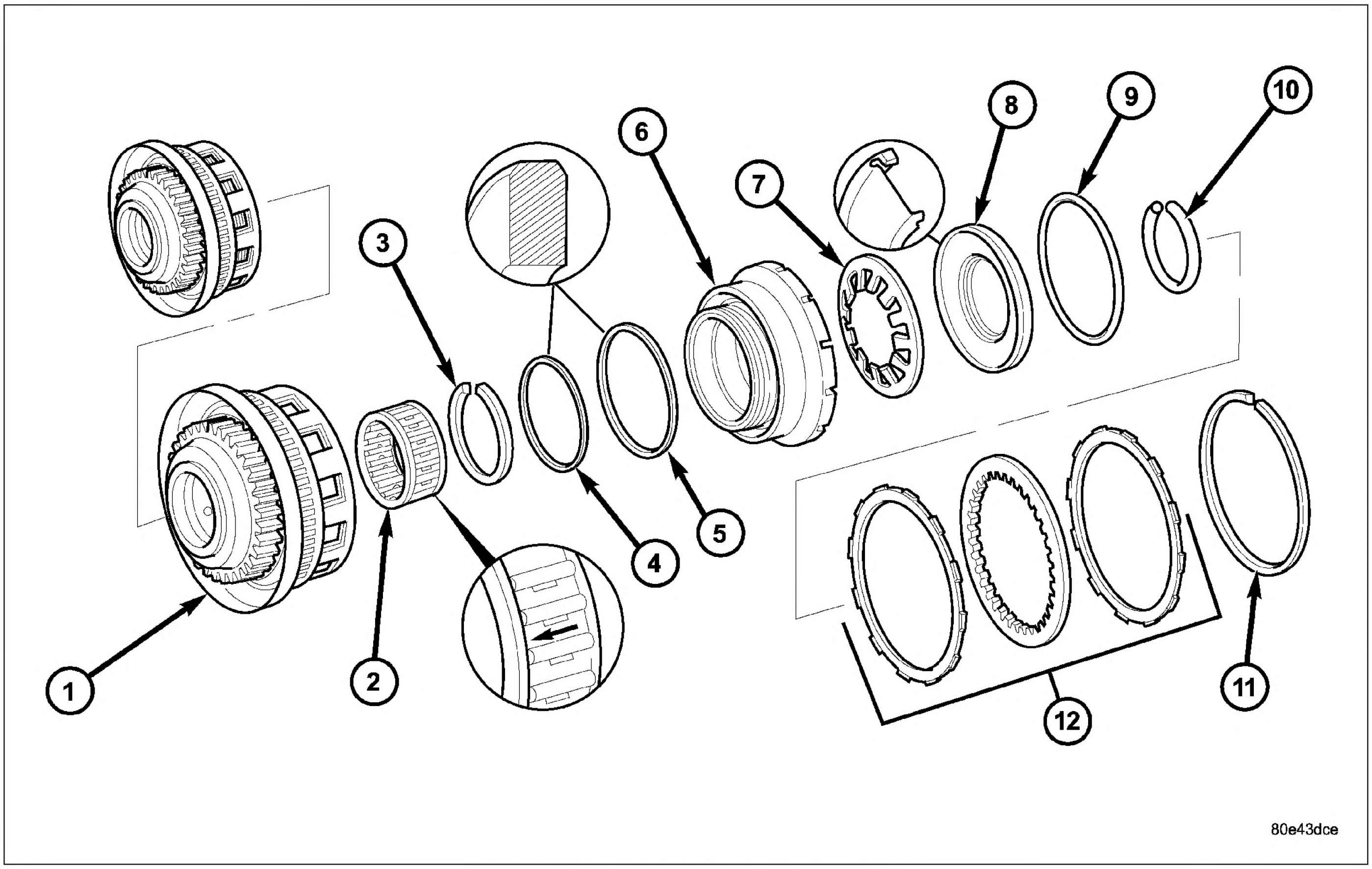
If the piston (20) on multi-plate clutch K1 (1) is subjected to oil pressure, it presses the internal and external discs of the disc set together. The sun gear (17) is locked with the planetary carrier (15) via the externally toothed disc carrier (19) and the internally toothed disc carrier (18). The front planetary gear set is thus locked and turns as a closed unit.

If the multi-plate clutch K2 (2) is actuated via the piston (14), the piston compresses the disc set. The annulus gear (16) of the front planetary gear set is locked with the annulus gear (11) of the center planetary gear set via the externally toothed disc carrier (13) and the center planetary carrier (10) on which the internally toothed discs are seated. Annulus gear (16) and annulus gear (11) turn at the same speed as the input shaft (21)

If the multi-plate clutch K3 (5) is actuated via the piston (7), the piston compresses the disc set. The sun gear (12) of the center planetary gear set is locked with the sun gear (9) of the rear planetary gear set via the externally toothed disc carrier (6) and the internally toothed disc carrier (8). Sun gear (12) and sun gear (9) turn at the same speed.

K1-INPUT CLUTCH

DISASSEMBLY

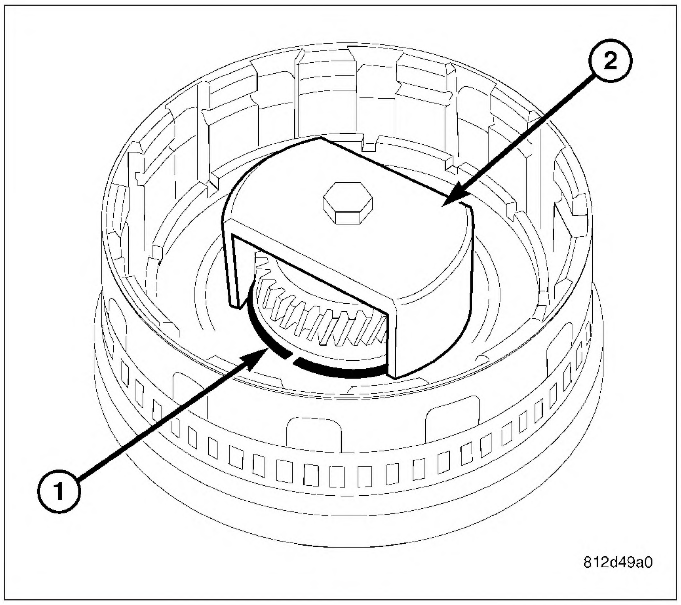


Input Clutch K1 Components

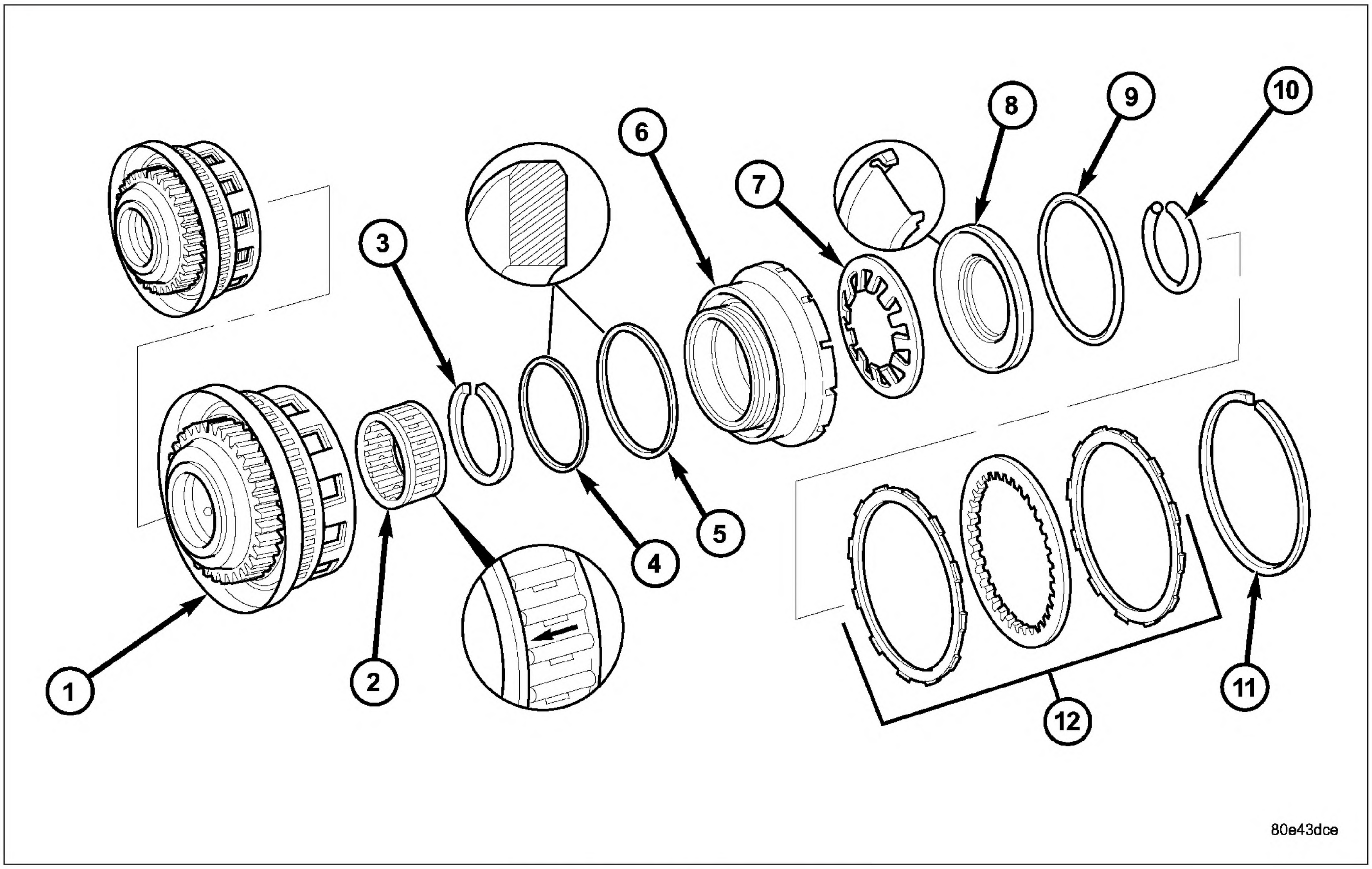
1 - K1 OUTER DISC CARRIER
2 - FREEWHEELING CLUTCH F1
3 - SNAP-RING
4 - OUTER DISC CARRIER SEALING RING
5 - PISTON SEALING RING
6 - PISTON
7 - DISC SPRING
8 - SPRING PLATE
9 - SPRING PLATE SEALING RING
10 - SNAP-RING
11 - SNAP-RING
12 - MULTIPLE DISC PACK - REFER TO TEXT FOR CORRECT ASSEMBLY ORDER

1. Remove snap-ring (11) from outer multiple-disc carrier (6).
2. Take multiple-disc pack (12) out of outer multiple-disc carrier (6). Note which clutch disc is removed just prior to the spring plate (8) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the spring plate.

3. Place Multi-use Spring Compressor 8900 (2) on the spring plate and compress the spring until the snap-ring (1) is exposed.
4. Remove snap-ring (1).
5. Take out disc spring (7) and remove piston (6) by carefully blowing compressed air into the drilled oil feed passage.
6. Remove snap-ring (3) and take out front freewheeling clutch F1 (2). Take care when removing the F1 clutch to prevent the clutch sprags from falling out. If this occurs, the clutch must be replaced.



ASSEMBLY

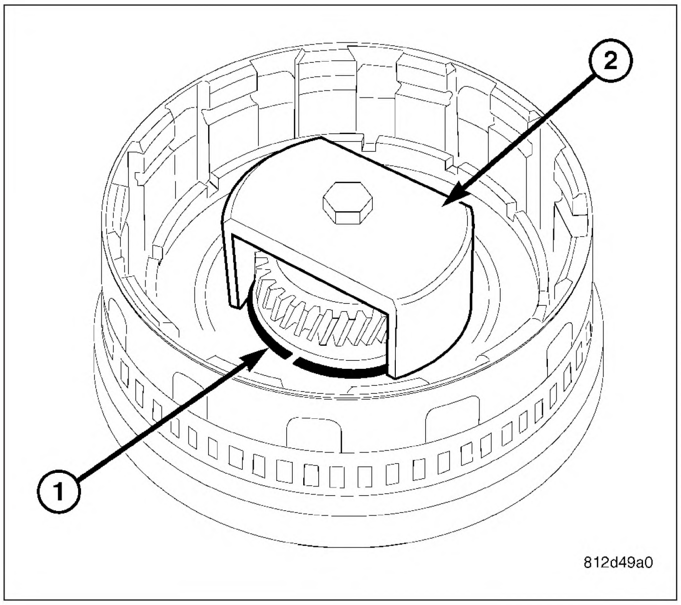


Input Clutch K1 Components

1 - K1 OUTER DISC CARRIER
2 - FREEWHEELING CLUTCH F1
3 - SNAP-RING
4 - OUTER DISC CARRIER SEALING RING
5 - PISTON SEALING RING
6 - PISTON
7 - DISC SPRING
8 - SPRING PLATE
9 - SPRING PLATE SEALING RING
10 - SNAP-RING
11 - SNAP-RING
12 - MULTIPLE DISC PACK - REFER TO TEXT FOR CORRECT ASSEMBLY ORDER

1. Install piston (6) in the outer multiple-disc carrier (1). Check sealing rings (4 and 5), replace if necessary. The rounded off edges of the sealing rings must point outwards.
2. Insert disc spring (7). Insert disc spring with the curvature towards the piston.
3. Insert spring plate (8). Insert spring plate with the curvature towards the sun gear. Check sealing ring (9), replace if necessary.

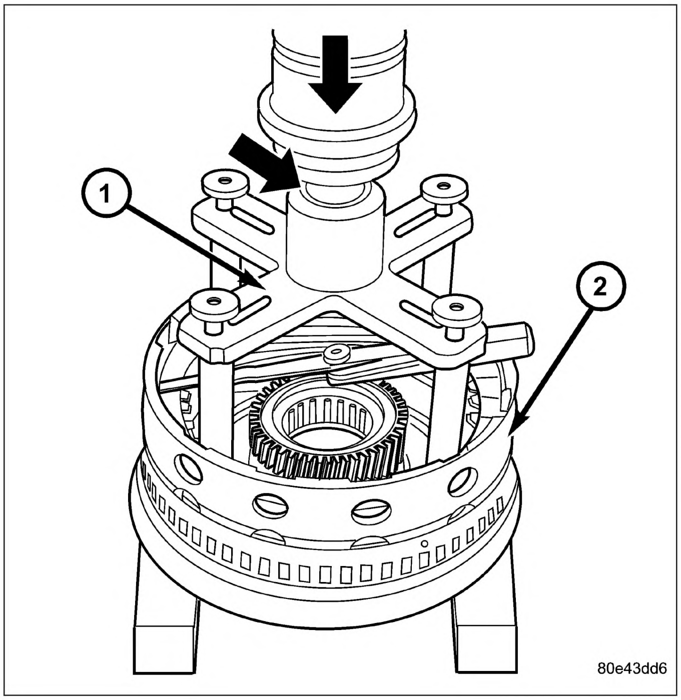
4. Place Multi-use Spring Compressor 8900 (2) on spring plate and compress the spring until the groove of the snap-ring (1) is exposed.
5. Insert snap-ring (1). After installing, check snap-ring for correct seat.



CAUTION: When working with double sided friction discs, an externally lugged steel plate is installed first, followed by a friction disc, and continuing on until all the required discs are installed. When working with single sided friction discs, an externally lugged disc is installed first, followed by an internally lugged disc, and continuing on until all the required discs are installed. All single sided discs are installed with the friction side up.

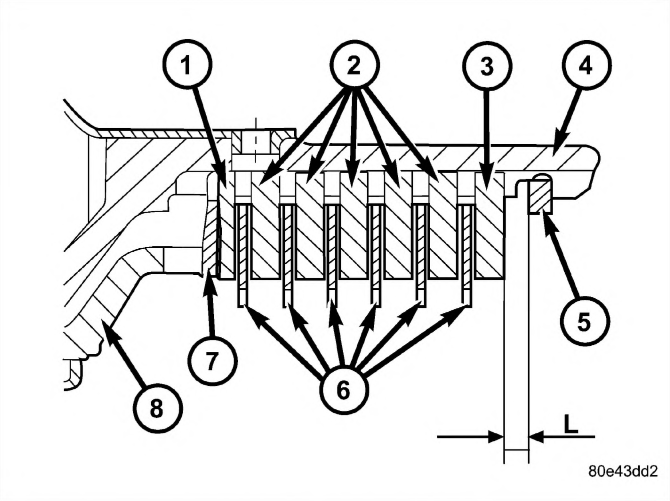
NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the spring plate (8) to its original location.

NOTE: Place new friction multiple-discs in ATF fluid for one hour before installing.



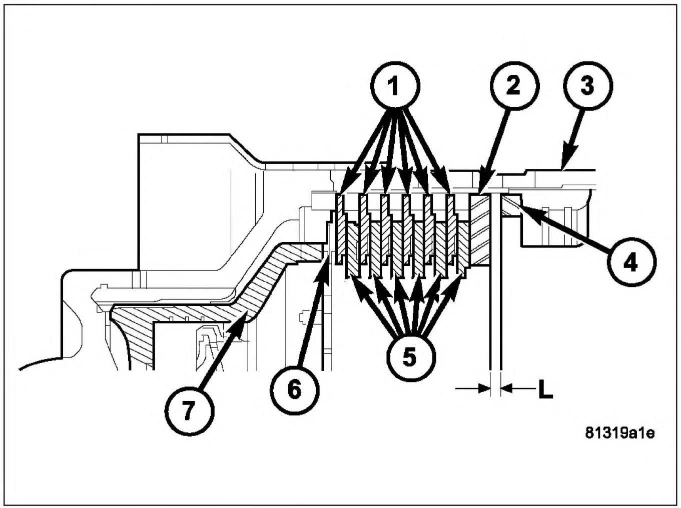
6. Insert multiple-disc pack (12) in the outer multiple-disc carrier.
7. Insert snap-ring (11).
8. Measure the K1 clutch pack clearance by mounting Pressing Tool 8901 (1) on outer multiple disc.
9. Using a lever press, compress pressing tool as far as the stop (then the marking ring is still visible, see small arrow).

10. For transmissions using double sided friction discs, use a feeler gauge to determine the play ″L″ at three points between the snap-ring (5) and outer multiple-disc (3).
11. During the measurement the snap-ring (5) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (4).
12. The correct clutch clearance for transmissions with double sided friction discs is 2.7-3.1 mm (0.106-0.122 in.) for three friction disc versions, 3.0-3.4 mm (0.118-0.134 in.) for four disc versions, 3.3-3.7 mm (0.130-0.146 in.) for five disc versions, and 3.6-4.0 mm (0.142-0.158 in.) for six disc versions.
13. Adjust with snap-ring (5), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).
14. Insert front freewheeling clutch F1 (2) and fit snap-ring (3). The freewheeling clutch F1 (2) must be installed in the direction of the arrow.



1 - OUTER MULTIPLE DISC - 1.8MM (0.071 IN.)
2 - OUTER MULTIPLE DISC - 2.8MM (0.110 IN.)
3 - OUTER MULTIPLE DISC - 4.0MM (0.158 IN.)
4 - K1 OUTER DISC CARRIER
5 - SNAP-RING
6 - FRICTION DISCS
7 - DISC SPRING
8 - PISTON

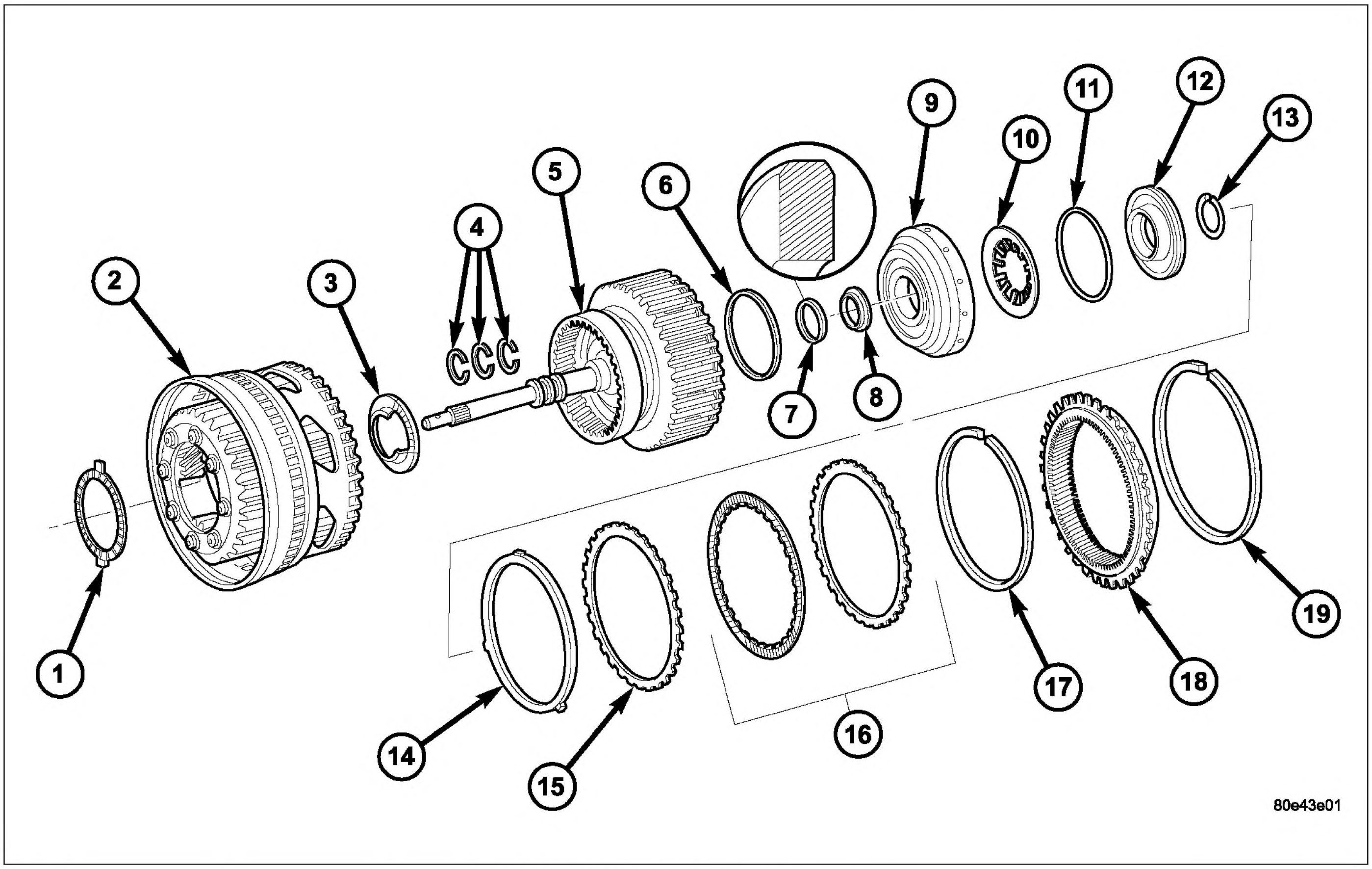
15. For transmissions using single sided friction discs, use a feeler gauge to determine the play ″L″ at three points between the snap-ring (4) and outer multiple-disc (2).
16. During the measurement the snap-ring (4) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (3).
17. The correct clutch clearance for transmissions with single sided friction discs is 2.4-2.8 mm (0.095-0.110 in.) for six friction disc versions, 2.6-3.0 mm (0.102-0.118 in.) for eight disc versions, 2.8-3.2 mm (0.110-0.126 in.) for ten disc versions, and 2.9-3.3 mm (0.114-0.130 in.) for twelve disc versions.
18. Adjust with snap-ring (4), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).
19. Insert front freewheeling clutch F1 (2) and fit snap-ring (3). The freewheeling clutch F1 (2) must be installed in the direction of the arrow.



1 - OUTER MULTIPLE DISCS
2 - OUTER MULTIPLE DISC - 4.0MM (0.158 IN.)
3 - K1 OUTER DISC CARRIER
4 - SNAP-RING
5 - INNER MULTIPLE DISCS
6 - DISC SPRING
7 - PISTON

K2-INPUT CLUTCH

DISASSEMBLY

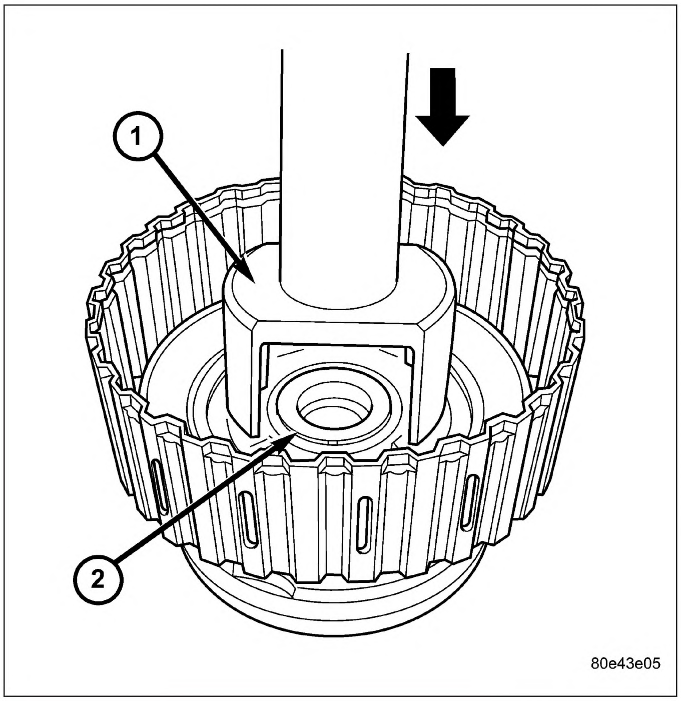


Input Clutch K2 Components

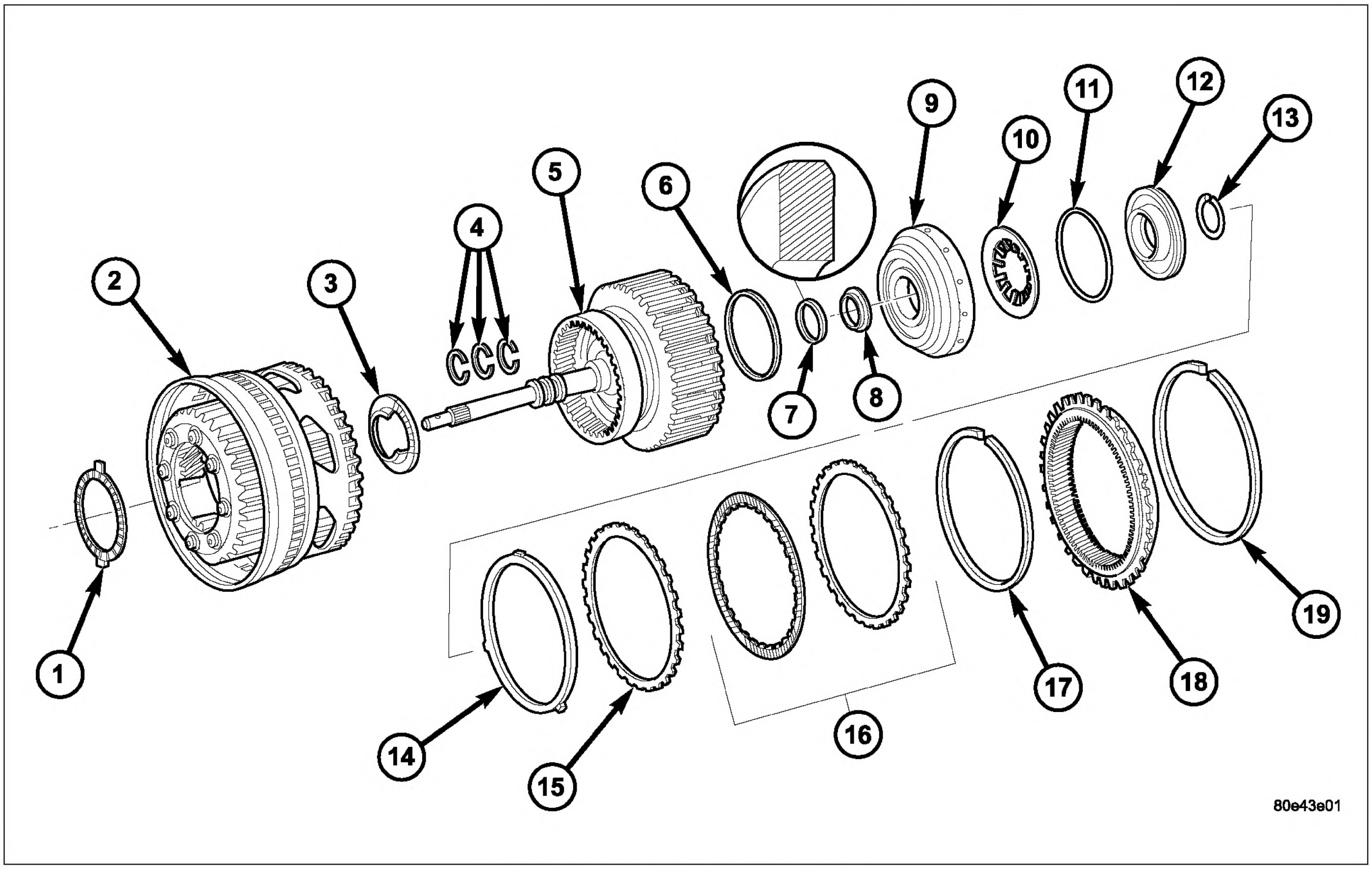
1 - NEEDLE ROLLER BEARING	11 - SPRING RETAINER SEALING - O-RING
2 - K1 INNER DISC CARRIER WITH INTEGRATED FRONT GEAR SET	12 - SPRING RETAINER
3 - THRUST BEARING	13 - SNAP-RING
4 - TORLON SEAL RINGS	14 - DISC SPRING
5 - INPUT SHAFT AND K2 CLUTCH	15 - EXTERNALLY TOOTHED PLATE - 1.8 MM (0.071 IN.)
6 - PISTON OUTER SEAL RING - O-RING	16 - MULTIPLE DISC PACK
7 - PISTON INNER SEAL RING	17 - SNAP-RING
8 - THRUST WASHER	18 - HOLLOW GEAR
9 - PISTON	19 - SNAP-RING
10 - DISC SPRING	

1. Remove snap-ring (19) from the K1 inner multiple-disc carrier with integrated front gear set (2) and take off hollow gear (18).
2. Remove input shaft with clutch K2 (5).
3. Remove needle thrust bearing (3).
4. Remove snap-ring (17) from K2 outer multiple-disc carrier.
5. Take out multiple-disc pack (16). Note which clutch disc is removed just prior to the disc spring (14) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the disc spring.
6. Take out disc spring (14).

7. Fit Multi-use Spring Compressor 8900 (1) onto spring retainer (12) and press until snap-ring (2) is released.
8. Remove snap-ring (2).
9. Take out disc spring (10) and pull piston (9) out of outer multiple-disc carrier.



ASSEMBLY

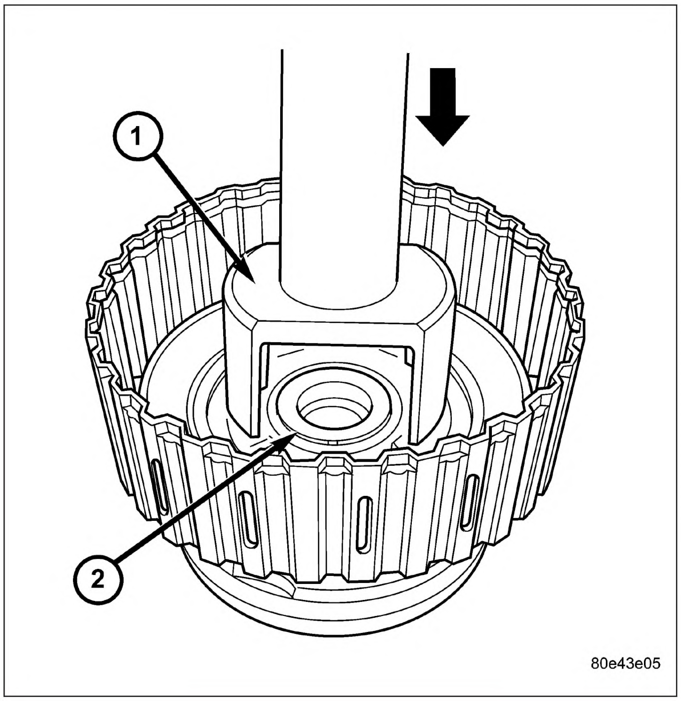


Input Clutch K2 Components

1 - NEEDLE ROLLER BEARING
2 - K1 INNER DISC CARRIER WITH INTEGRATED FRONT GEAR SET
3 - THRUST BEARING
4 - TORLON SEAL RINGS
5 - INPUT SHAFT AND K2 CLUTCH
6 - PISTON OUTER SEAL RING - O-RING
7 - PISTON INNER SEAL RING
8 - THRUST WASHER
9 - PISTON
10 - DISC SPRING
11 - SPRING RETAINER SEALING - O-RING
12 - SPRING RETAINER
13 - SNAP-RING
14 - DISC SPRING
15 - EXTERNALLY TOOTHED PLATE - 1.8 MM (0.071 IN.)
16 - MULTIPLE DISC PACK
17 - SNAP-RING
18 - HOLLOW GEAR
19 - SNAP-RING

1. Install piston (9) in outer multiple-disc carrier. Inspect seals (6 and 7), replace if necessary. The rounded edges of the inner piston seal (7) must point to the outside.
2. Insert disk spring (10) and spring retainer (12). Insert disk spring (10) with curved side pointing toward spring retainer (12). Inspect seal (11), replace if necessary.

3. Place Multi-use Spring Compressor 8900 (1) on spring plate and press until the groove (2) of the snap-ring is exposed.
4. Insert snap-ring.

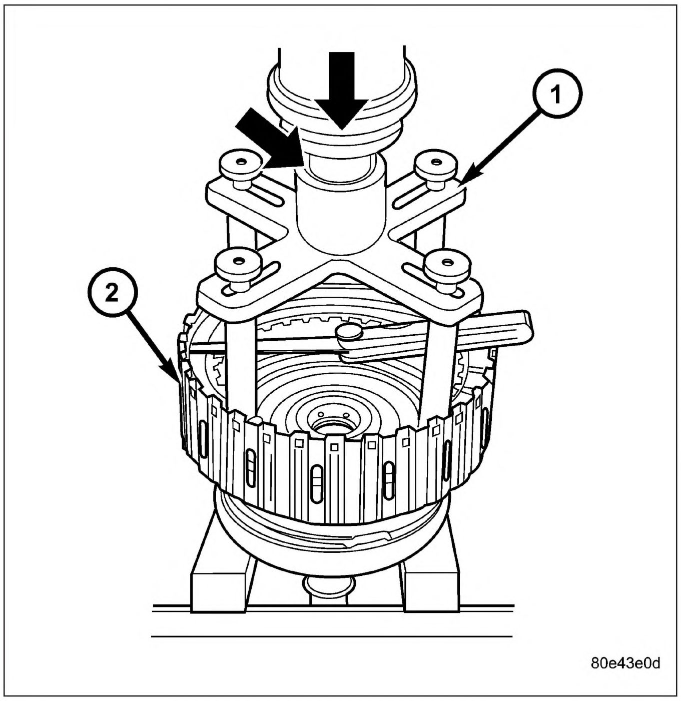


5. Insert disk spring (14).

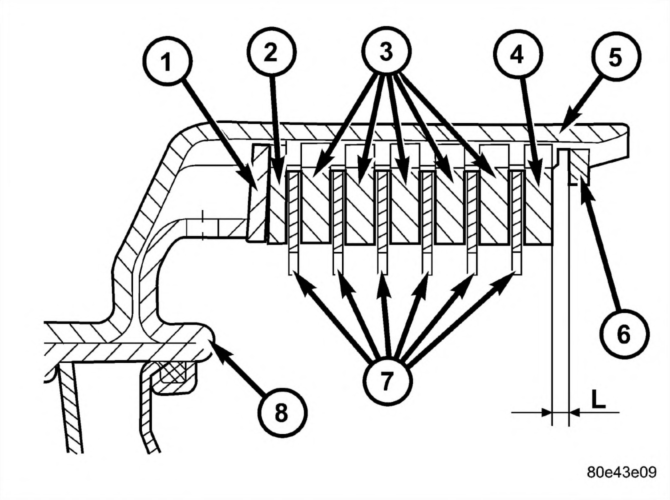
NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the disc spring (14) to its original location.

6. Insert multiple-disk set (16) into outer multiple-disk carrier.
7. Fit snap-ring (17).

8. Measure K2 clutch clearance by mounting Pressing Tool 8901 (1) on outer multiple disc.
9. Using a lever press, compress pressing tool as far as the stop (then the marking ring is still visible, see small arrow).



10. Using a feeler gauge, determine the play ″L″ at three points between the snap-ring (6) and outer multiple-disc (4).
11. During the measurement the snap-ring (6) must contact the upper bearing surface of the groove in the outer multiple-disc carrier.
12. The correct clutch clearance is 2.3-2.7 mm (0.091-0.106 in.) for three friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for four disc versions, 2.5-2.9 mm (0.099-0.114 in.) for five disc versions, and 2.7-3.1 mm (0.106-0.122 in.) for six disc versions.
13. Adjust with snap-ring (6), if necessary. Snap-rings are available in thicknesses of 2.3 mm (0.091 in.), 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), and 3.8 mm (0.150 in.).

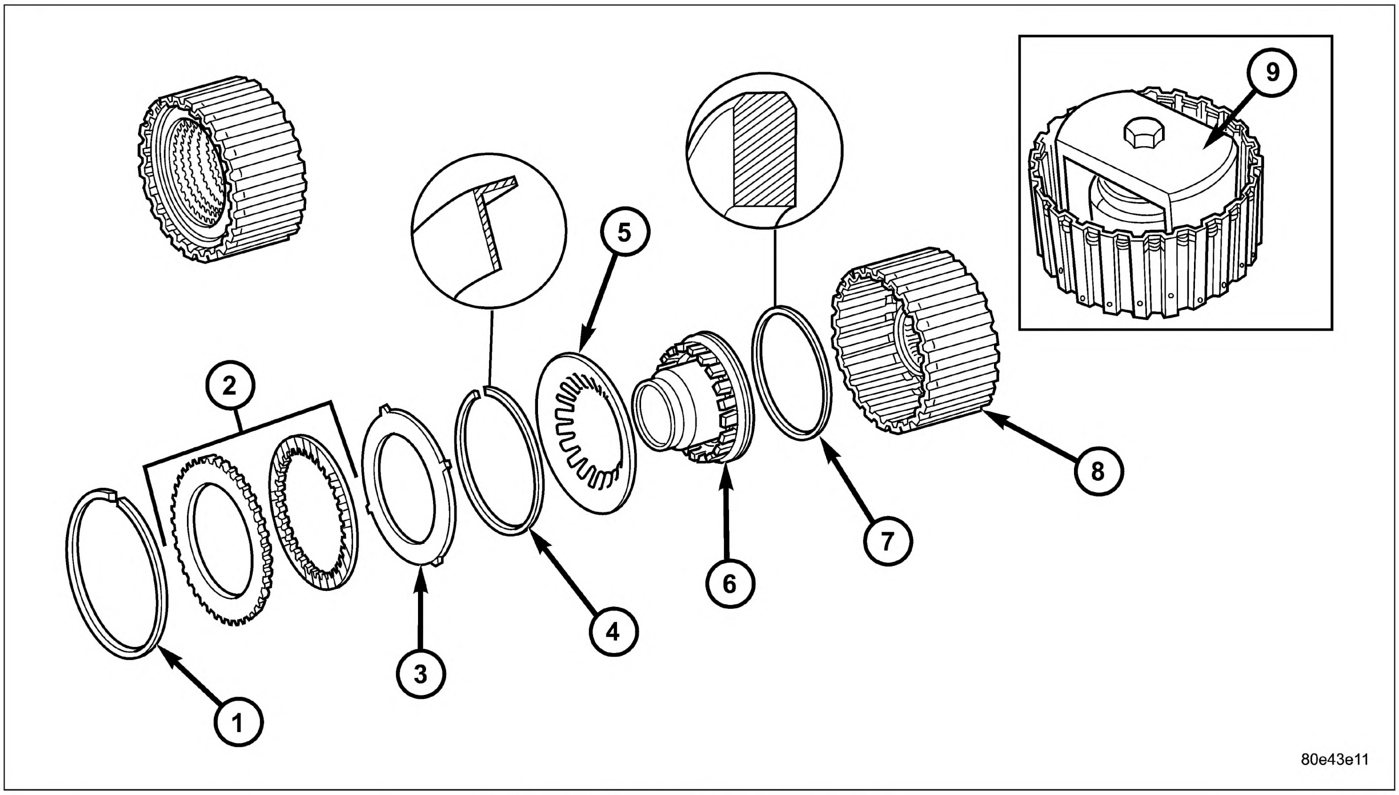


1 - DISC SPRING
2 - OUTER MULTIPLE DISC - 1.8 MM (0.071 IN.)
3 - OUTER MULTIPLE DISC - 3.5 MM (0.138 IN.)
4 - OUTER MULTIPLE DISC - 4.0 MM (0.158 IN.)
5 - K2 OUTER DISC CARRIER
6 - SNAP-RING
7 - FRICTION DISCS
8 - PISTON

14. Insert axial needle bearing (3) into K1 inner multiple-disk carrier. Insert axial needle bearing (3) with a little grease to prevent it slipping.
15. Install input shaft in K1 inner multiple-disc carrier with integrated front gear set (2).
16. Fit internally-geared wheel (18) and install snap-ring (19). Pay attention to installation position.

K3-INPUT CLUTCH

DISASSEMBLY

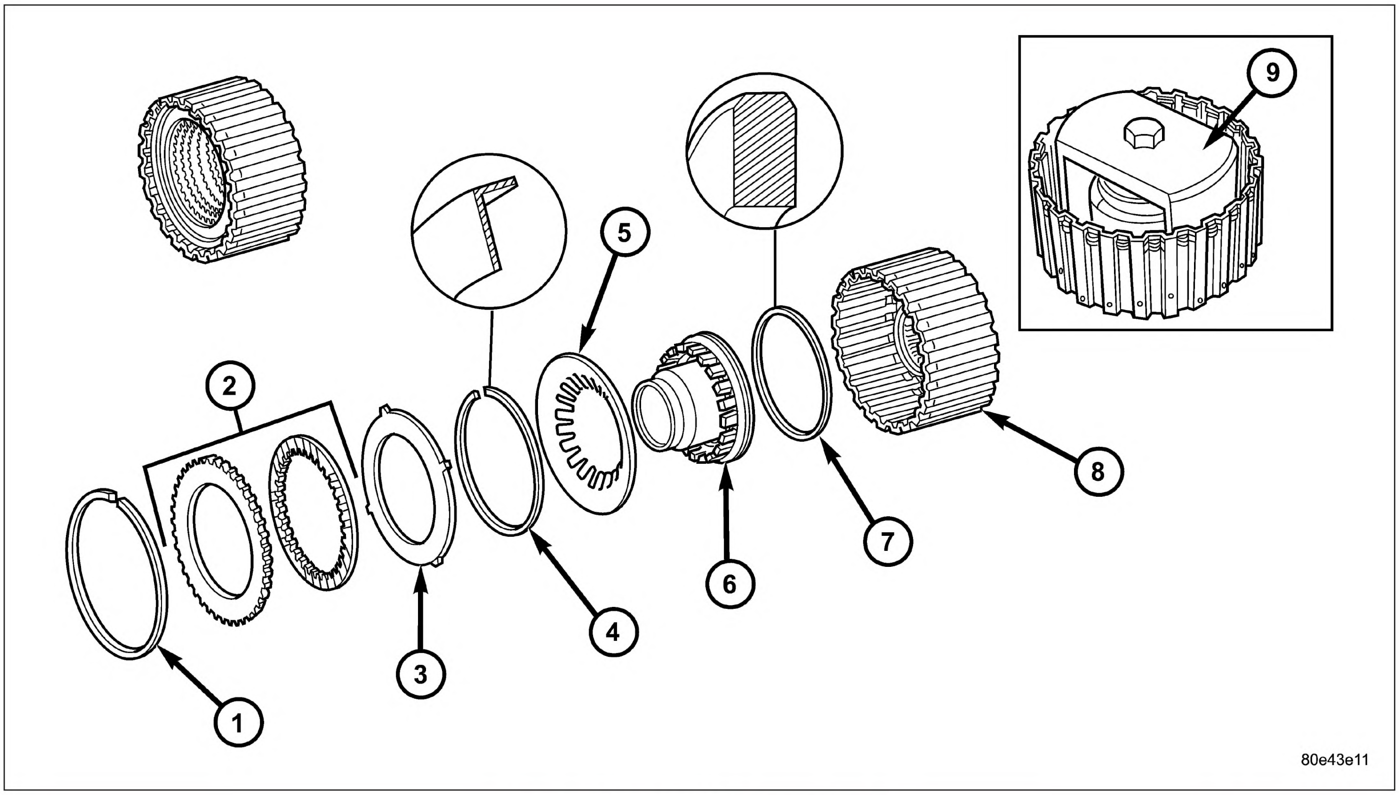


Input Clutch K3 Components

1 - SNAP-RING	6 - PISTON
2 - MULTIPLE DISC PACK	7 - SEALING RING
3 - DISC SPRING	8 - OUTER DISC CARRIER
4 - SNAP-RING	9 - MULTI-USE SPRING COMPRESSOR 8900
5 - SPRING PLATE	

1. Remove snap-ring (1) from outer multiple-disc carrier.
2. Remove multiple-disc pack (2) and disk spring (3) from outer multiple-disc carrier. Note which clutch disc is removed just prior to the spring plate (3) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the spring plate.
3. Place Multi-use Spring Compressor 8900 (9) on disc spring (5) and compress the spring until the snap-ring (4) is exposed.
4. Remove snap-ring (4).
5. Remove spring plate (5) and piston (6) from outer multiple-disc carrier.

ASSEMBLY



Input Clutch K3 Components

1 - SNAP-RING	6 - PISTON
2 - MULTIPLE DISC PACK	7 - SEALING RING
3 - DISC SPRING	8 - OUTER DISC CARRIER
4 - SNAP-RING	9 - MULTI-USE SPRING COMPRESSOR 8900
5 - SPRING PLATE	

1. Install piston (6) in the outer multiple-disc carrier (8). Check sealing ring (7), replace if necessary. The rounded off edges of the sealing ring must point outwards.
2. Insert disc spring (5). Insert disc spring with the curvature towards the piston.
3. Mount the Multi-use Spring Compressor 8900 (9) on the spring plate and clamp until the snap-ring groove is exposed.
4. Insert snap-ring (4). The collar of the snap-ring must point towards the multiple-disc pack.

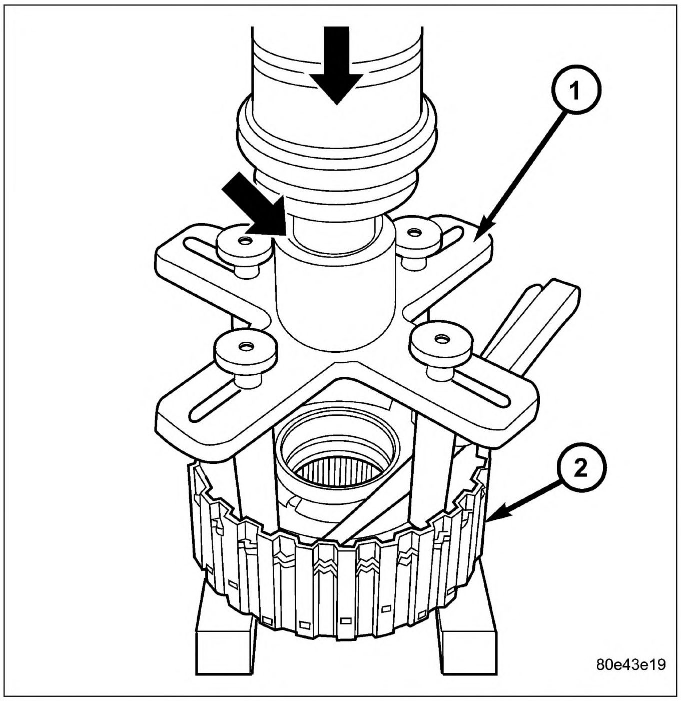
CAUTION: When working with double sided friction discs, an externally lugged steel plate is installed first, followed by a friction disc, and continuing on until all the required discs are installed. When working with single sided friction discs, an externally lugged disc is installed first, followed by an internally lugged disc, and continuing on until all the required discs are installed. All single sided discs are installed with the friction side up.

NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the spring plate (3) to its original location.

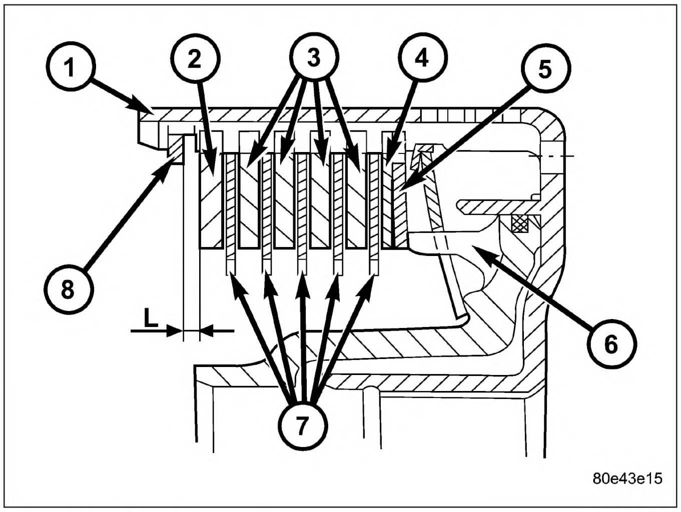
NOTE: Place new friction multiple-discs in ATF fluid for one hour before installing.

5. Install disk spring (3) and multiple-disc pack (2) in outer multiple-disc carrier (8).
6. Insert snap-ring (1).

7. Measure the K3 clutch clearance by mounting Pressing Tool 8901 (1) on outer multiple disc.
8. Using a lever press, compress pressing tool as far as the stop (then the marking ring is still visible, see small arrow).

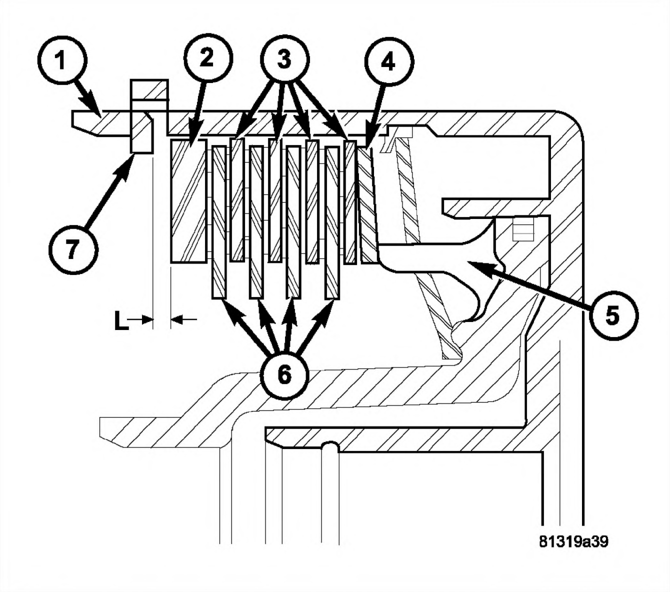


9. For transmissions using double sided friction discs, use a feeler gauge to determine the play ″L″ at three points between the snap-ring (8) and outer multiple-disc (2).
10. During the measurement the snap-ring (8) must contact the upper bearing surface of the groove in the outer multiple-disc carrier.
11. The correct clutch clearance for transmissions with double sided friction discs is 2.3-2.7 mm (0.091-0.106 in.) for three friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for four disc versions, and 2.5-2.9 mm (0.099-0.114 in.) for five disc versions.
12. Adjust with snap-ring (8), if necessary. Snap-rings are available in thicknesses of 2.0 mm (0.079 in.), 2.3 mm (0.091 in.), 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), and 3.5 mm (0.138 in.).



1 - OUTER DISC CARRIER
2 - OUTER MULTIPLE DISC - 4.0 MM (0.158 IN.)
3 - OUTER MULTIPLE DISC - 2.8 MM (0.110 IN.)
4 - OUTER MULTIPLE DISC - 1.8 MM (0.079 IN.)
5 - DISC SPRING
6 - PISTON
7 - FRICTION DISCS - 2.1 MM (0.083 IN.)
8 - SNAP-RING

13. For transmissions using single sided friction discs, use a feeler gauge to determine the play ″L″ at three points between the snap-ring (7) and outer multiple-disc (2).
14. During the measurement the snap-ring (7) must contact the upper bearing surface of the groove in the outer multiple-disc carrier.
15. The correct clutch clearance for transmissions with single sided friction discs is 2.3-2.7 mm (0.091-0.106 in.) for six friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for eight disc versions, and 2.5-2.9 mm (0.099-0.114 in.) for ten disc versions.
16. Adjust with snap-ring (7), if necessary. Snap-rings are available in thicknesses of 2.0 mm (0.079 in.), 2.3 mm (0.091 in.), 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), and 3.5 mm (0.138 in.).



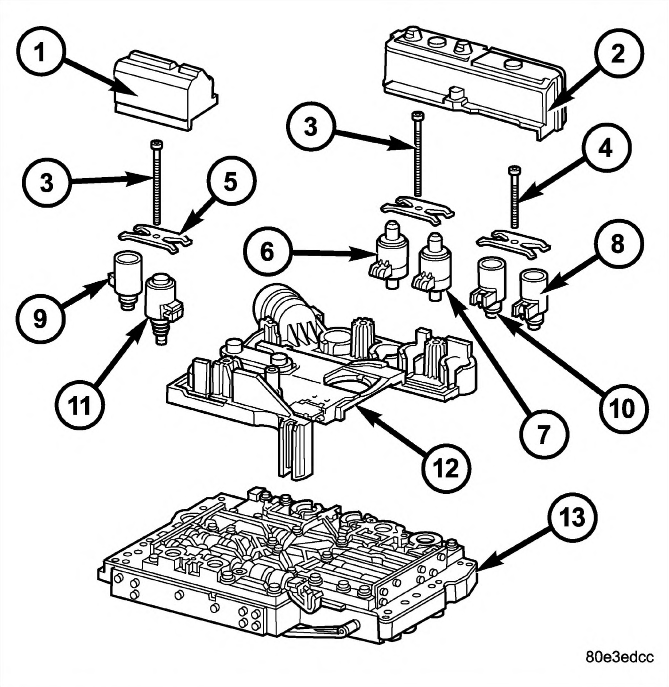
1 - OUTER DISC CARRIER
2 - OUTER MULTIPLE DISC - 4.0 MM (0.158 IN.)
3 - OUTER MULTIPLE DISCS
4 - DISC SPRING
5 - PISTON
6 - INNER MULTIPLE DISCS
7 - SNAP-RING

UNIT-ELECTROHYDRAULIC

DESCRIPTION

The electrohydraulic control unit comprises the shift plate (13) made from light alloy for the hydraulic control and an electrical control unit (12). The electrical control unit (12) comprises of a supporting body made of plastic, into which the electrical components (1 - 11) are assembled. The supporting body is mounted on the shift plate (13) and screwed to it.

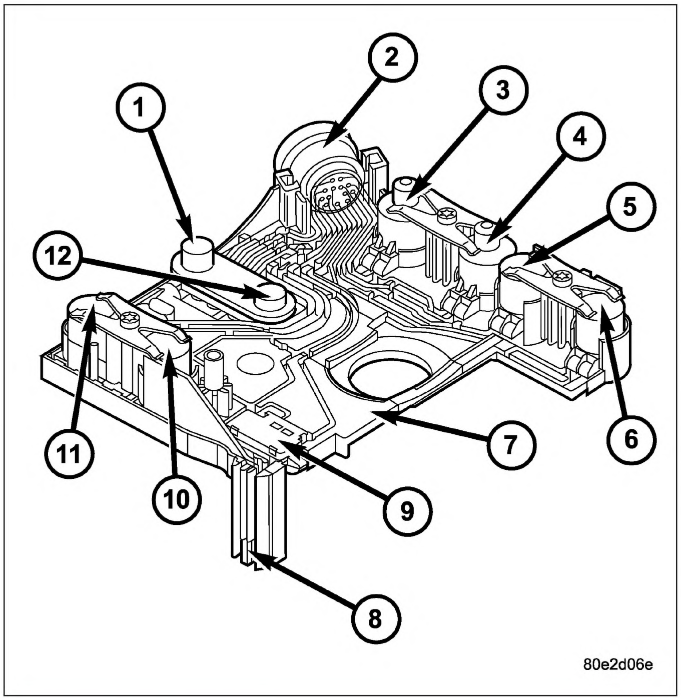
Strip conductors inserted into the supporting body make the connection between the electrical components and a plug connector. The connection to the wiring harness on the vehicle and the transmission control module (TCM) is produced via this 13-pin plug connector with a bayonet lock.



1 - SOLENOID CAP
2 - SOLENOID CAP
3 - BOLT - M6X32
4 - BOLT - M6X30
5 - LEAF SPRING
6 - MODULATING PRESSURE REGULATING SOLENOID VALVE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - 3-4 SHIFT SOLENOID
9 - TORQUE CONVERTER LOCK-UP SOLENOID
10 - 1-2/4-5 SHIFT SOLENOID
11 - 2-3 SHIFT SOLENOID
12 - ELECTRICHYDRAULIC CONTROL MODULE
13 - SHIFT PLATE

ELECTRICAL CONTROL UNIT

The electric valve control unit (7) consists of a plastic shell which houses the RPM sensors (1,12), regulating solenoid valves (3, 4), solenoid valves (5, 6, 10), the TCC solenoid valve (11), the park/neutral contact (9), and the transmission oil temperature sensor (8). Conductor tracks integrated into the shell connect the electric components to a plug connection (2). This 13-pin plug connection (2) establishes the connection to the vehicle-side cable harness and to the transmission control module (TCM). With the exception of the solenoid valves, all other electric components are fixed to the conductor tracks.



1 - N3 SPEED SENSOR
2 - PLUG CONNECTOR
3 - MODULATING PRESSURE REGULATING SOLENOID
4 - SHIFT PRESSURE REGULATING SOLENOID
5 - 1-2/4-5 SHIFT SOLENOID
6 - 3-4 SHIFT SOLENOID
7 - ELECTRICAL CONTROL UNIT
8 - TRANSMISSION TEMPERATURE SENSOR
9 - STARTER INTERLOCK CONTACT
10 - 2-3 SHIFT SOLENOID
11 - TORQUE CONVERTER LOCK-UP SOLENOID
12 - N2 SPEED SENSOR

HYDRAULIC CONTROL UNIT

Working Pressure (Line Pressure or Operating Pressure) (p-A)

The working pressure provides the pressure supply to the hydraulic control and the transmission shift elements. It is the highest hydraulic pressure in the entire hydraulic system. The working pressure is regulated at the working pressure regulating valve in relation to the load and gear. All other pressures required for the transmission control are derived from the working pressure.

Lubrication Pressure (p-Sm)

At the working pressure regulating valve surplus oil is diverted to the lubrication pressure regulating valve, from where it is used in regulated amounts to lubricate and cool the mechanical transmission components and the torque converter. Furthermore, the lubrication pressure (p-Sm) is also used to limit the pressure in the torque converter.

Shift Pressure (p-S)

The shift pressure is determined by the shift pressure regulating solenoid valve and the shift pressure regulating valve. The shift pressure:

- Regulates the pressure in the activating shift element during the shift phase.
- Determines together with the modulating pressure the pressure reduction at the deactivating shift element as regulated by the overlap regulating valve.
- Initializes 2nd gear in limp-home mode.

Modulating Pressure (p-Mod)

The modulating pressure influences the size of the working pressure and determines together with the shift pressure the pressure regulated at the overlap regulating valve. The modulating pressure is regulated at the modulating pressure regulating solenoid valve, which is under regulating valve pressure. The modulating pressure is variable and relative to the engine load.

Regulating Valve/Control Valve Pressure (p-RV)

The regulating valve pressure is regulated at the regulating valve pressure regulating valve in relation to the working pressure (p-A) up to a maximum pressure of 8 bar (116 psi). It supplies the modulating pressure regulating solenoid valve, the shift pressure regulating solenoid valve and the shift valve pressure regulating valve.

Shift Valve Pressure (p-SV)

The shift valve pressure (p-SV) is derived from the regulating valve pressure (p-RV), is regulated at the shift valve pressure regulating valve and is then present at the:

- 1-2 and 4-5 shift solenoid valve.
- 3-4 shift solenoid valve.
- 2-3 shift solenoid valve.
- Torque converter lockup solenoid valve.
- 3-4 and 2-3 shift pressure shift valve.

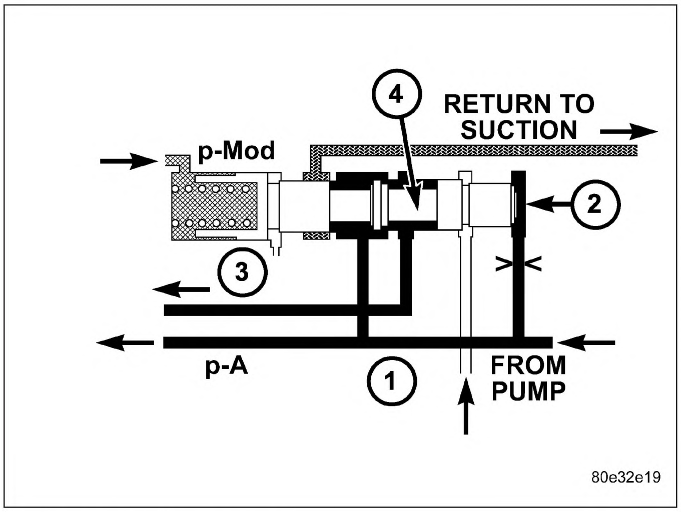
The shift valve pressure (p-SV) controls the command valves via the upshift/downshift solenoid valves.

Overlap Pressure (p-Ü)

The overlap pressure controls the shift component pressure reduction during a shift phase. The pressure in a shift element as it disengages is controlled during the shift phase depending on engine load (modulating pressure) and the pressure in the shift element as it engages. The adjusted pressure is inversely proportional to the transmission capability of the shift element being engaged (controlled overlap).

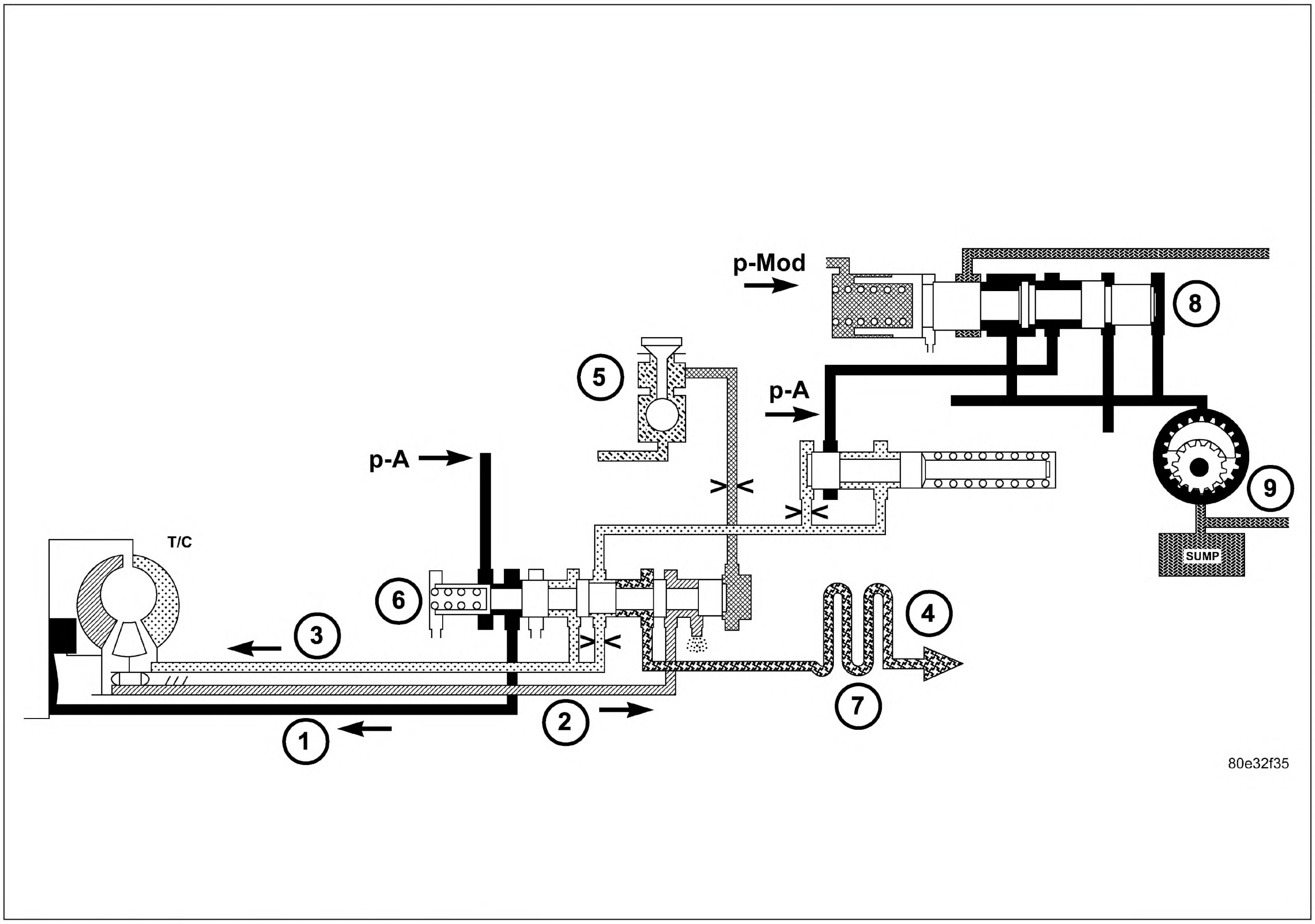
Working Pressure Regulating Valve (Operating Pressure)

The working pressure regulating valve (4) is located in the valve housing of the shift plate. It regulates the primary pressure of the hydraulic system.



1 - PRESSURE FROM K1/K2
2 - END FACE
3 - TO TORQUE CONVERTER REGULATING VALVE
4 - WORKING PRESSURE REGULATING VALVE

Torque Converter Lockup Clutch Regulating Valve

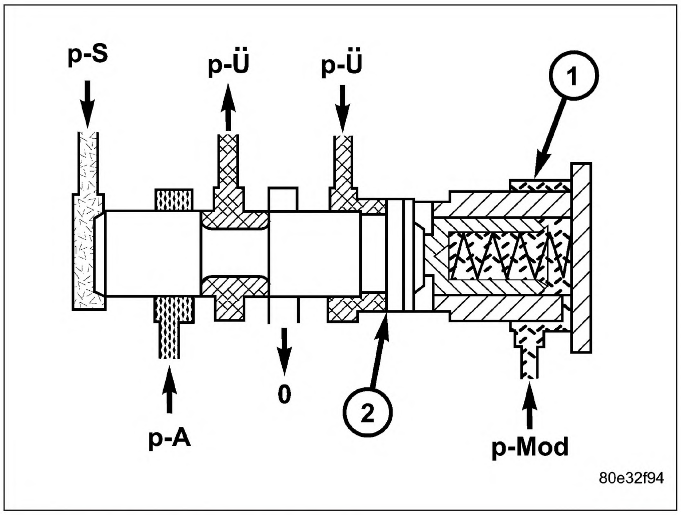


1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER OUTPUT
3 - TORQUE CONVERTER INPUT
4 - LUBRICATION
5 - TORQUE CONVERTER LOCK-UP SOLENOID
6 - TORQUE CONVERTER LOCK-UP CLUTCH REGULATING VALVE
7 - OIL COOLER
8 - LINE PRESSURE REGULATING VALVE
9 - OIL PUMP

The torque converter lock-up clutch regulating valve (6) is located in the valve housing of the electrohydraulic control module. The valve is responsible for the hydraulic control of the torque converter lockup clutch and distribution of the lubricating oil.

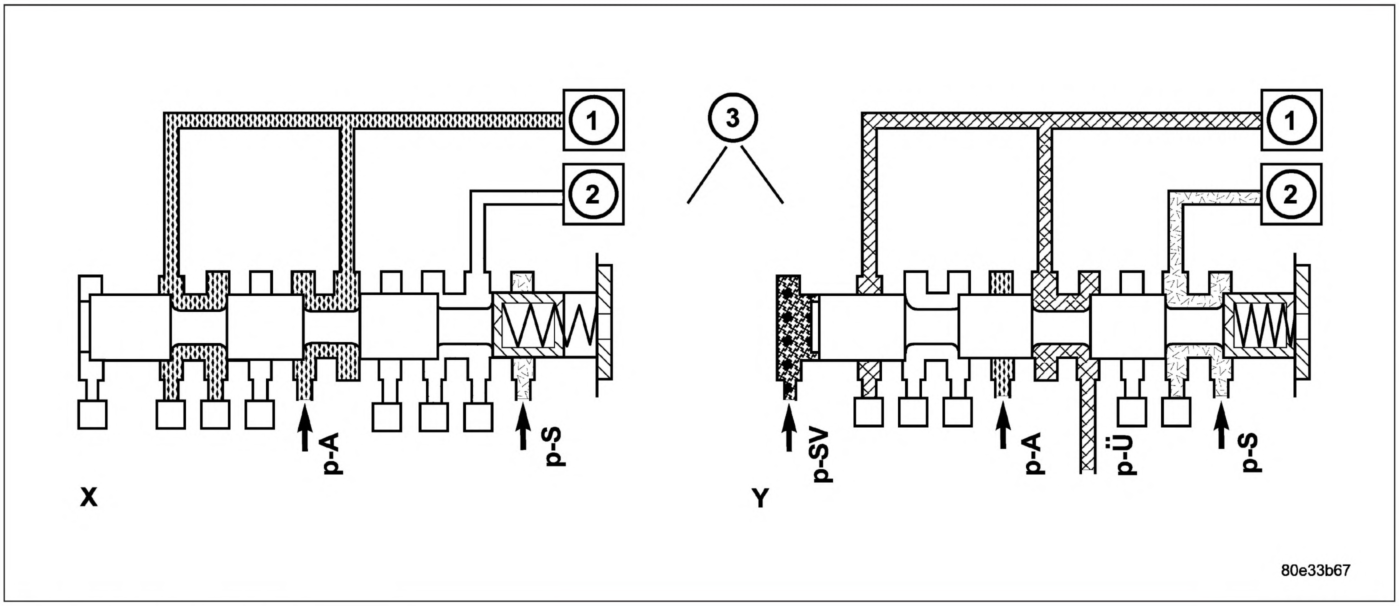
Overlap Regulating Valve

Each shift group is assigned one overlap regulating valve (1). The 1-2 / 4-5 overlap regulating valve is installed in the shift valve housing; the 2-3 and 3-4 overlap regulating valves are installed in the valve housing. The overlap regulating valve regulates the pressure reduction during a shift phase.



1 - OVERLAP REGULATING VALVE
2 - ANNULAR SURFACE ON OVERLAP REGULATING VALVE

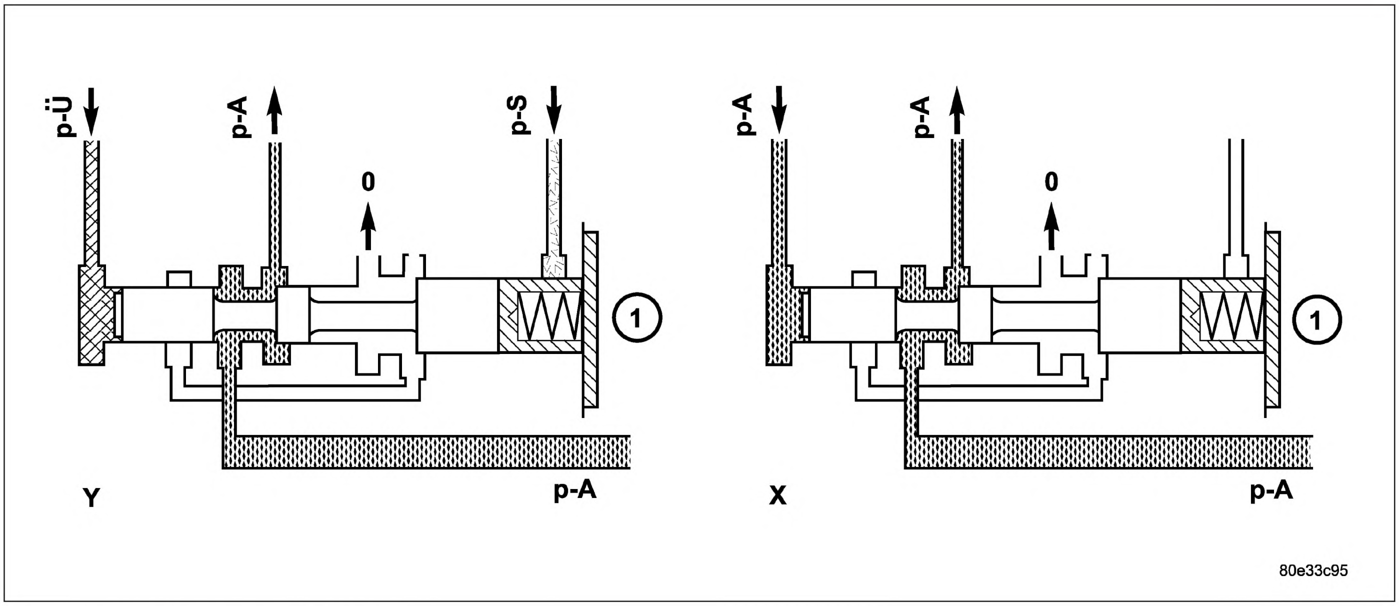
Command Valve



1 - HOLDING CLUTCH B1
2 - DRIVING CLUTCH K1
3 - 1-2/4-5 COMMAND VALVE

Each shift group possesses one command valve (3). The 1-2 / 4-5 and 2-3 command valves are installed in the shift valve housing, the 3-4 command valve is installed in the valve housing. The command valve switches the shift group from the stationary phase to the shift phase and back again.

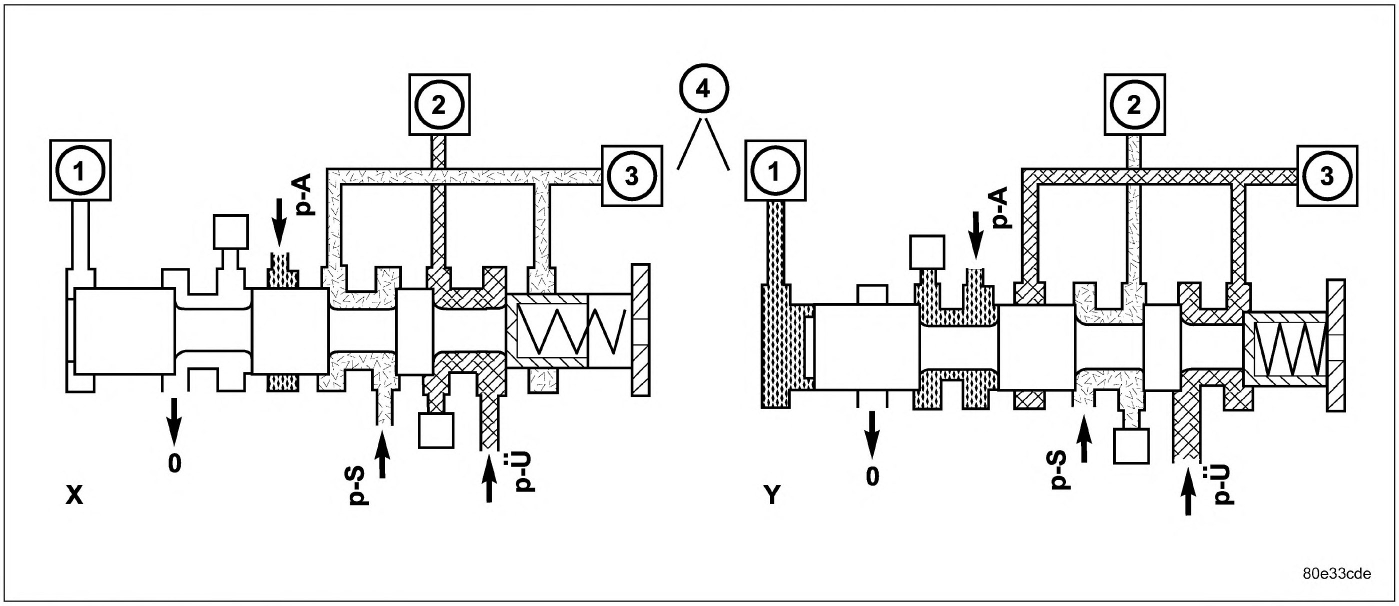
Holding Pressure Shift Valve



1 - HOLDING PRESSURE SHIFT VALVE

Each shift group possesses one holding pressure shift valve (1). The 1-2 / 4-5 and 2-3 holding pressure shift valves are installed in the shift valve housing; the 3-4 holding pressure shift valve is installed in the valve housing. The holding pressure shift valve allocates the working pressure to one actuator of a shift group.

Shift Pressure Shift Valve

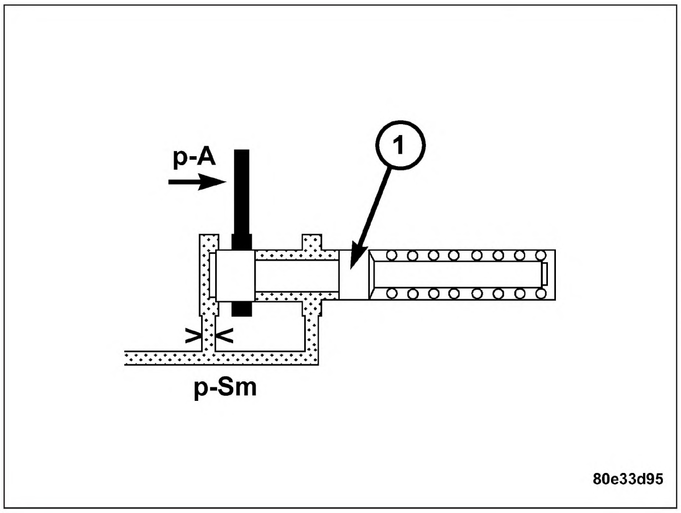


1 - 1-2/4-5 COMMAND VALVE
2 - DRIVING CLUTCH K1
3 - HOLDING CLUTCH B1
4 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE

Each shift group possesses one shift pressure shift valve (4). The 1-2 / 4-5 and 2-3 shift pressure shift valves are installed in the shift valve housing; the 3-4 shift pressure shift valve is installed in the valve housing. It assigns the shift pressure (p-S) to the activating actuator and the overlap pressure (p-Ü) regulated by the overlap regulating valve to the deactivating actuator.

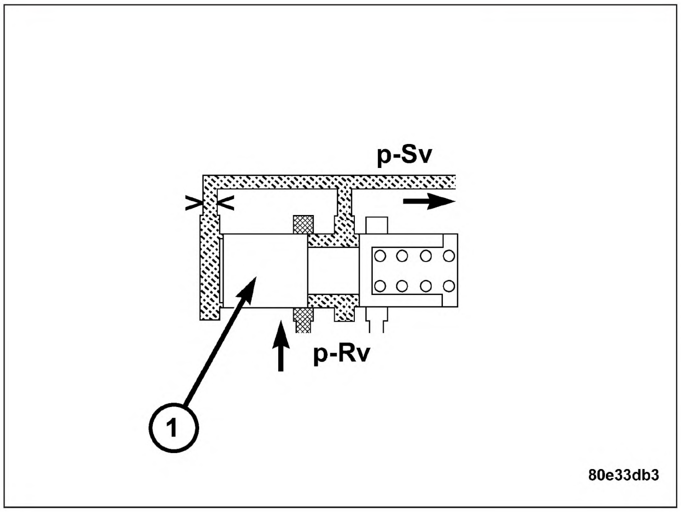
Lubrication Pressure Regulating Valve

The lubrication pressure regulating valve (1) is located in the valve housing of the electrohydraulic control module. The valve controls the fluid to lubricate and cool the mechanical part of the transmission, and limits the pressure in the torque converter.



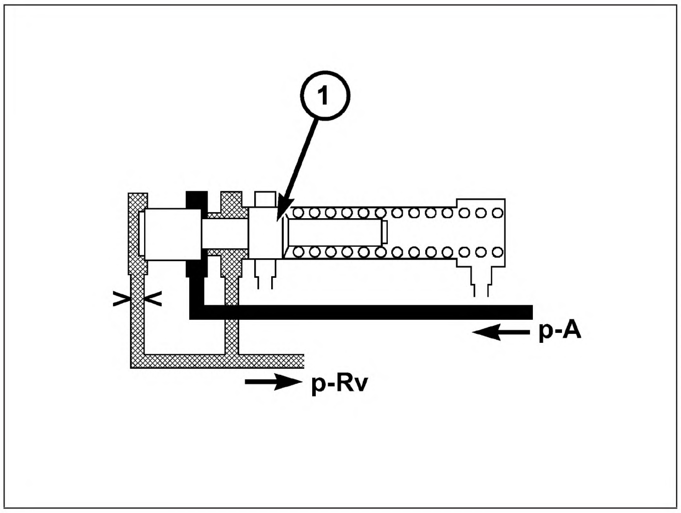
Shift Pressure Regulating Valve

The shift pressure regulating valve (1) is located in the valve housing of the shift plate. It regulates the shift pressure (p-S).



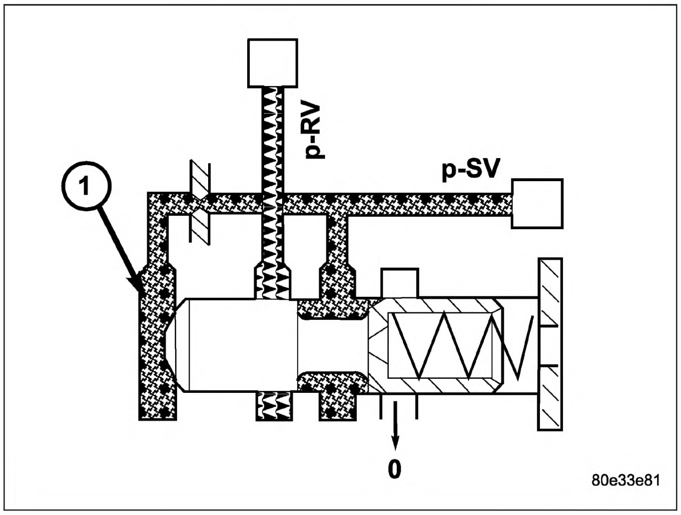
Regulating Valve Pressure Regulating Valve

The regulating valve pressure regulating valve (1) is located in the valve housing of the electrohydraulic control module. It regulates the regulating valve/control valve pressure (p-RV).



Shift Valve Pressure Regulating Valve

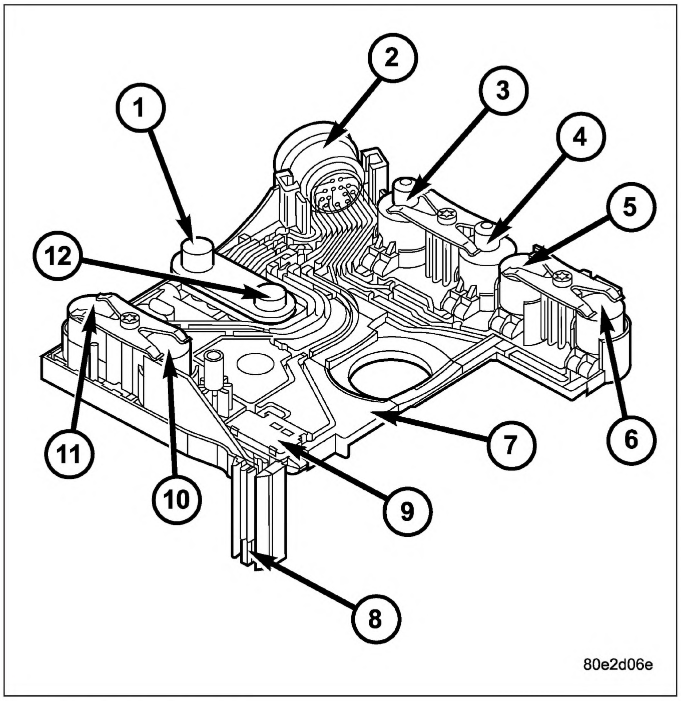
The shift valve pressure regulating valve (1) is located in the valve housing of the electrohydraulic control module. It regulates the shift valve pressure (p-SV).



OPERATION

ELECTRICAL CONTROL UNIT

Signals from the transmission control module (TCM) are converted into hydraulic functions in the electric valve control unit (7). The RPM sensors (1, 12), starter interlock contact (9), and transmission oil temperature sensor (8) of the electric valve control unit (7) supply the TCM with input signals. The solenoid valves are controlled by the TCM and trigger the hydraulic functions.

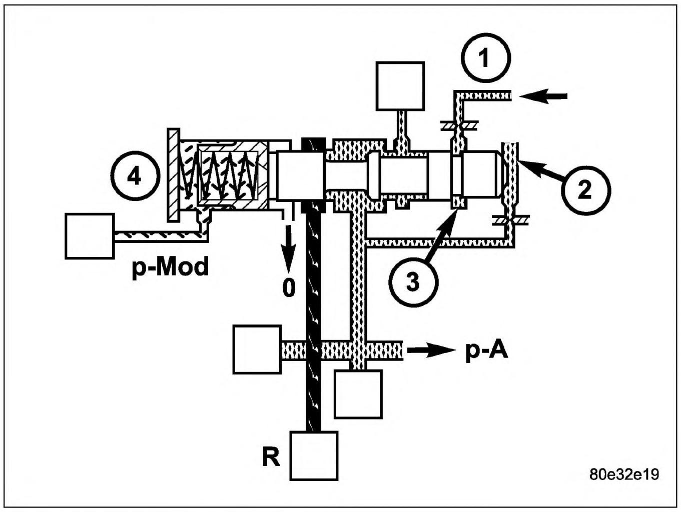


1 - N3 SPEED SENSOR
2 - PLUG CONNECTOR
3 - MODULATING PRESSURE REGULATING SOLENOID
4 - SHIFT PRESSURE REGULATING SOLENOID
5 - 1-2/4-5 SHIFT SOLENOID
6 - 3-4 SHIFT SOLENOID
7 - ELECTRICAL CONTROL UNIT
8 - TRANSMISSION TEMPERATURE SENSOR
9 - STARTER INTERLOCK CONTACT
10 - 2-3 SHIFT SOLENOID
11 - TORQUE CONVERTER LOCK-UP SOLENOID
12 - N2 SPEED SENSOR

HYDRAULIC CONTROL UNIT

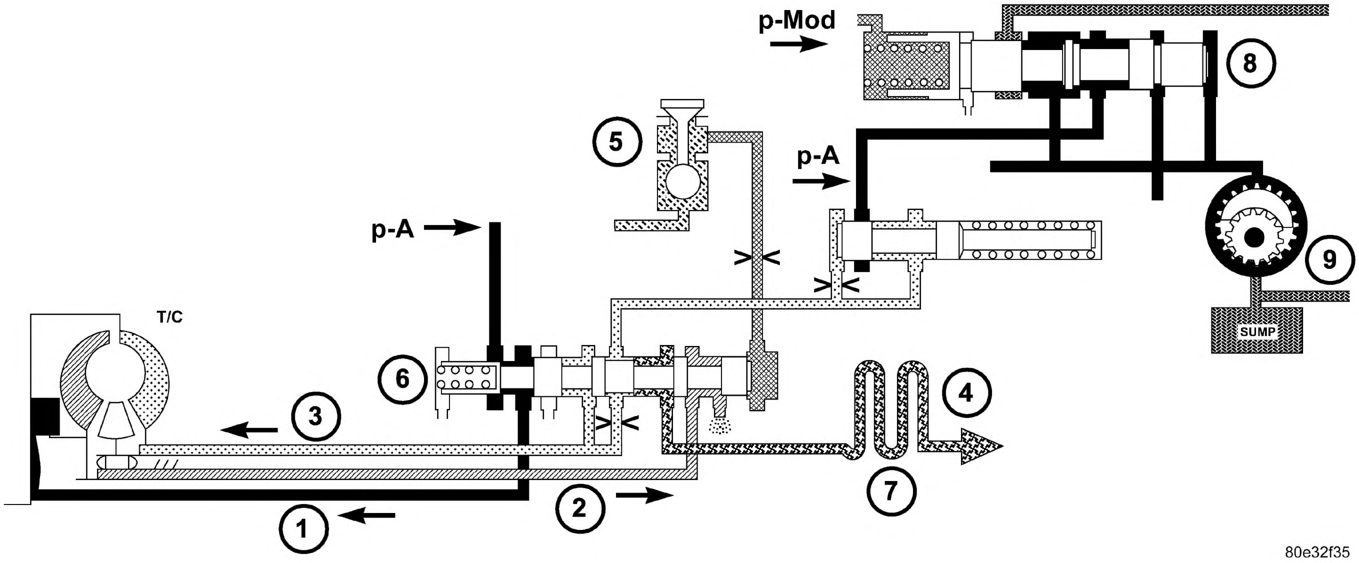
Working Pressure Regulating Valve (Line Pressure or Operating Pressure)

The working pressure (p-A) is regulated at the working pressure regulating valve (4) in relation to load (modulating pressure, p-Mod) and gear (K1 or K2 pressure) (1). The spring in the working pressure regulating valve sets a minimum pressure level (basic pressure).



1 - PRESSURE FROM K1/K2
2 - END FACE
3 - ANNULAR SURFACE
4 - WORKING PRESSURE REGULATING VALVE

Torque Converter Lockup Clutch Regulating Valve

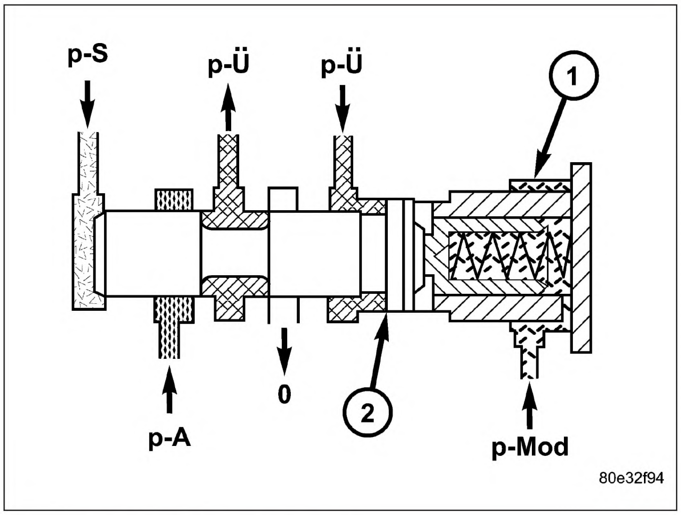


1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER OUTPUT
3 - TORQUE CONVERTER INPUT
4 - LUBRICATION
5 - TORQUE CONVERTER LOCK-UP SOLENOID
6 - TORQUE CONVERTER LOCK-UP CLUTCH REGULATING VALVE
7 - OIL COOLER
8 - LINE PRESSURE REGULATING VALVE
9 - OIL PUMP

The torque converter lockup clutch regulating valve (6) regulates the torque converter lock-up clutch working pressure (p-TCC) in relation to the torque converter clutch control pressure (p-S/TCC). According to the size of the working pressure (p-A), the torque converter lockup clutch is either Engaged, Disengaged, or Slipping. When the regulating valve (6) is in the lower position, lubricating oil flows through the torque converter and oil cooler (8) into the transmission (torque converter lockup clutch unpressurized). In its regulating position (slipping, torque converter lockup clutch pressurized), a reduced volume of lubricating oil flows through the annular passage (7) bypassing the torque converter and passing direct through the oil cooler into the transmission. The rest of the lubricating oil is directed via the throttle ″a″ into the torque converter in order to cool the torque converter lockup clutch.

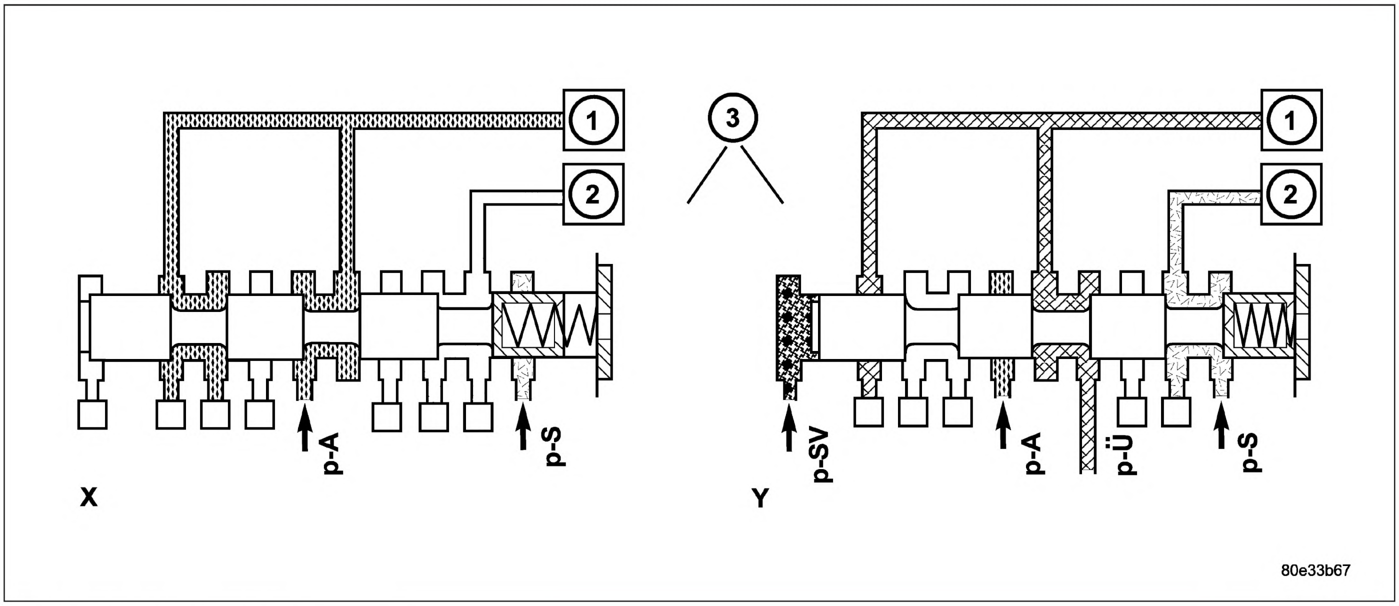
Overlap Regulating Valve

During the shift phase the pressure in the deactivating shift actuator is regulated in relation to the engine load (modulating pressure, p-Mod) and the pressure in the activating actuator. The regulated pressure is inversely proportional to the transfer capacity of the activating shift actuator (regulated overlap).



1 - OVERLAP REGULATING VALVE
2 - ANNULAR SURFACE ON OVERLAP REGULATING VALVE

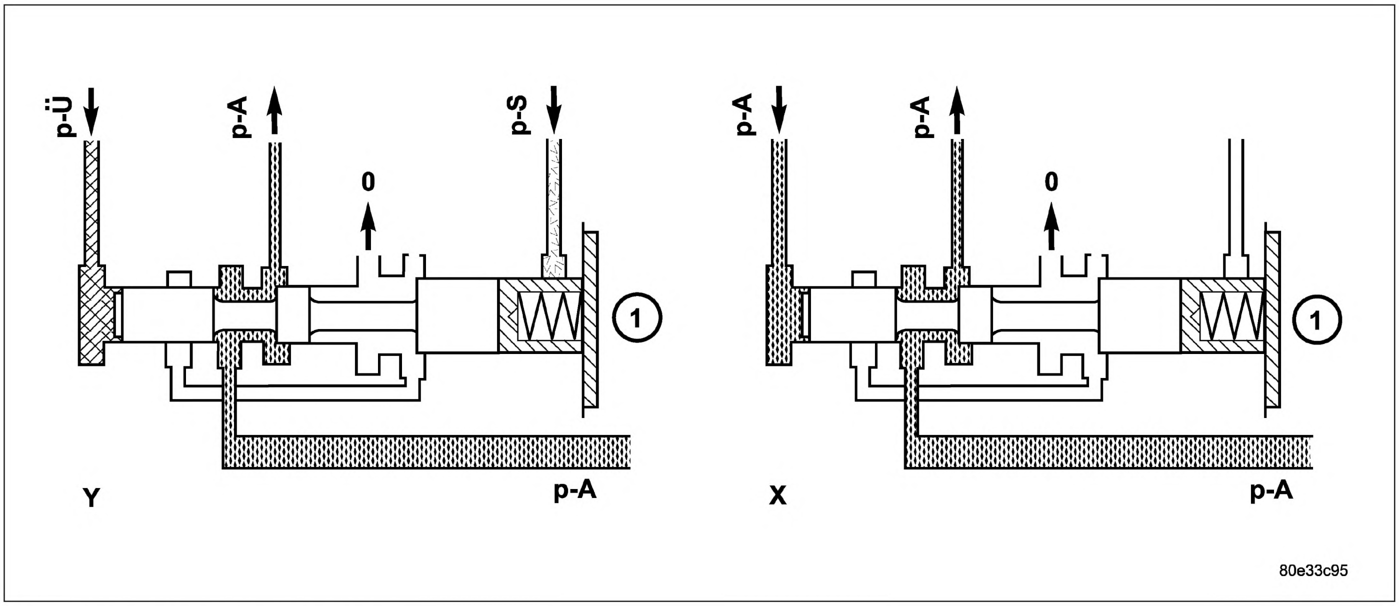
Command Valve



1 - HOLDING CLUTCH B1
2 - DRIVING CLUTCH K1
3 - 1-2/4-5 COMMAND VALVE

When the end face is unpressurized (stationary phase), the working pressure (p-A) is directed to the actuated shift element. If the end face of the command valve is subjected to the shift valve pressure (p-SV) (shift phase), then the shift pressure (p-S) is switched to the activating element and the overlap pressure (p-Ü) is switched to the deactivating element.

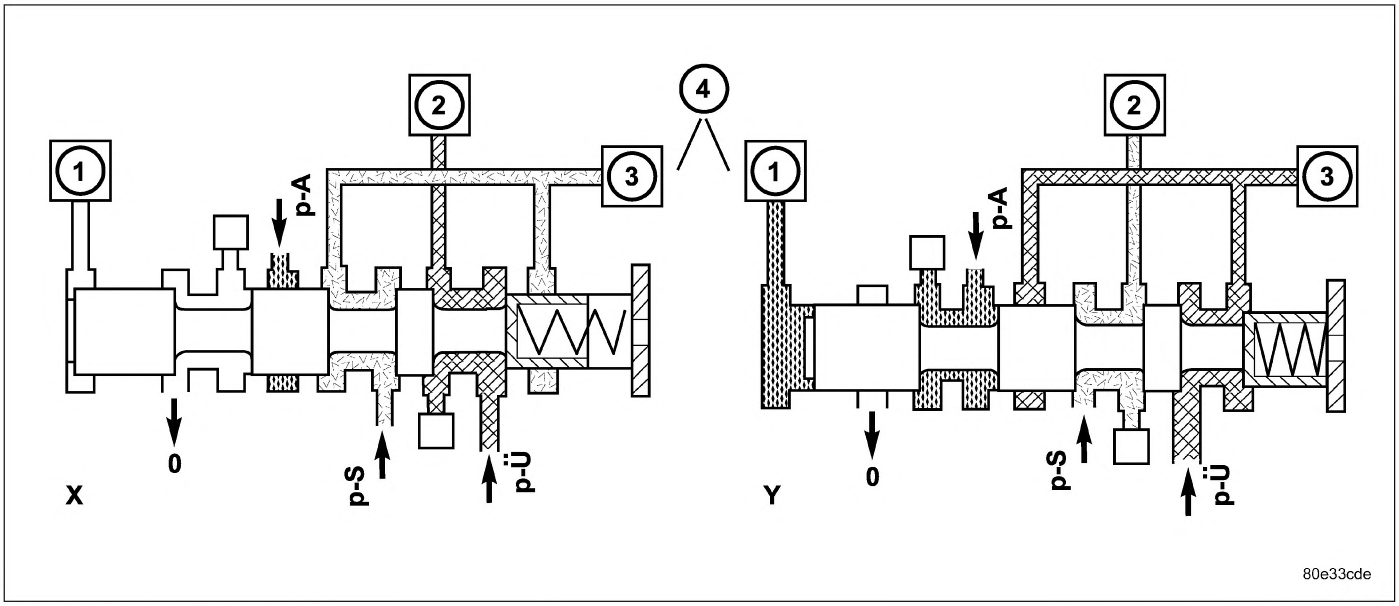
Shift Valve Holding Pressure



1 - HOLDING PRESSURE SHIFT VALVE

The holding pressure shift valve (1) is actuated by the pressures present at the end face in the actuators and a spring. It assigns the working pressure (p-A) to the actuator with the higher pressure (taking into account the spring force and the effective surface area). The other element of the shift group is then unpressurized. The valve switches over only during the shift phase and only at a certain pressure ratio between the overlap pressure (p-Ü) and the shift pressure (p-S).

Shift Pressure Shift Valve

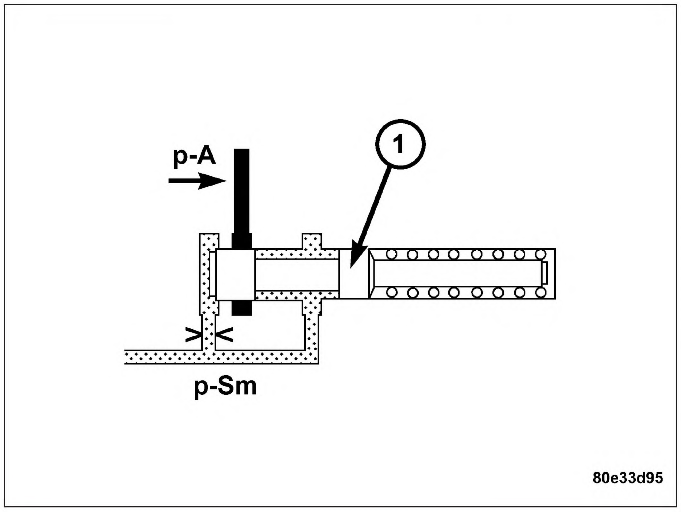


1 - 1-2/4-5 COMMAND VALVE
2 - DRIVING CLUTCH K1
3 - HOLDING CLUTCH B1
4 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE

When the multiple-disc brake B1 (3) is activated, the working pressure (p-A) is applied to the end face of the 1-2 / 4-5 shift pressure shift valve (4) via the command valve (1). Its shift state is maintained during the shift phase by substituting the shift element pressure acting on its end face (and which is variable during the shift phase) with a corresponding constant pressure. When the multi-plate clutch K1 (2) is activated, the end face of the shift valve is unpressurized during the stationary and shift phases, so the shift state is maintained during the shift phase in this case too.

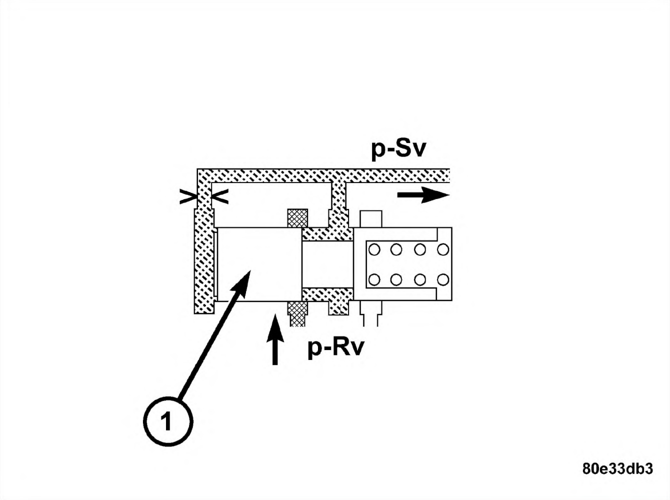
Lubrication Pressure Regulating Valve

At the working pressure regulating valve surplus oil is diverted to the lubrication pressure regulating valve (1), from where the lubrication pressure (p-Sm) is used in regulated amounts to supply the transmission lubrication system including the torque converter.



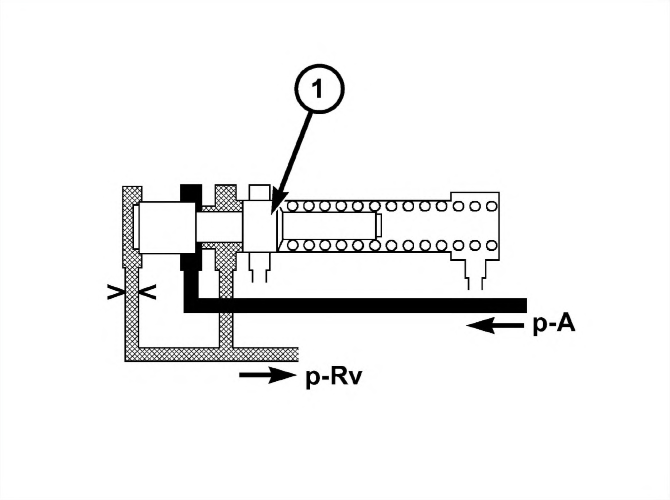
Shift Pressure Regulating Valve

The shift pressure is determined by the shift pressure regulating solenoid valve and the shift pressure regulating valve (3). In addition, pressure from the clutch K2 (1) is also present at the annular surface (2) of the shift pressure regulating valve (3). This reduces the shift pressure in 2nd gear.



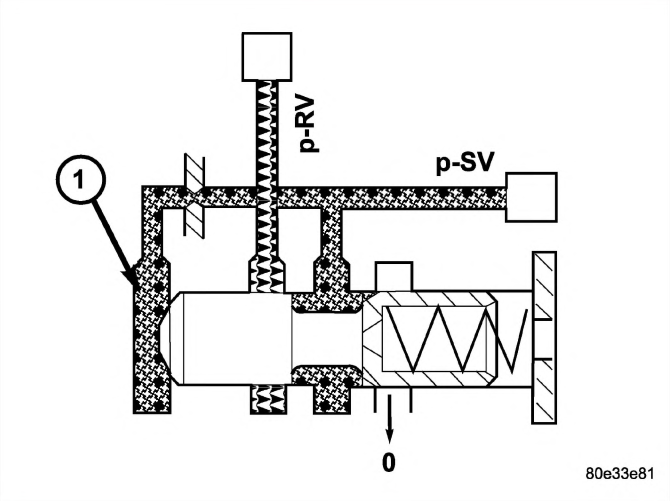
Regulating Valve Pressure Regulating Valve

The regulating valve pressure (p-RV) is set at the regulating valve pressure regulating valve (1) in relation to the working pressure (p-A) as far as the maximum pressure.



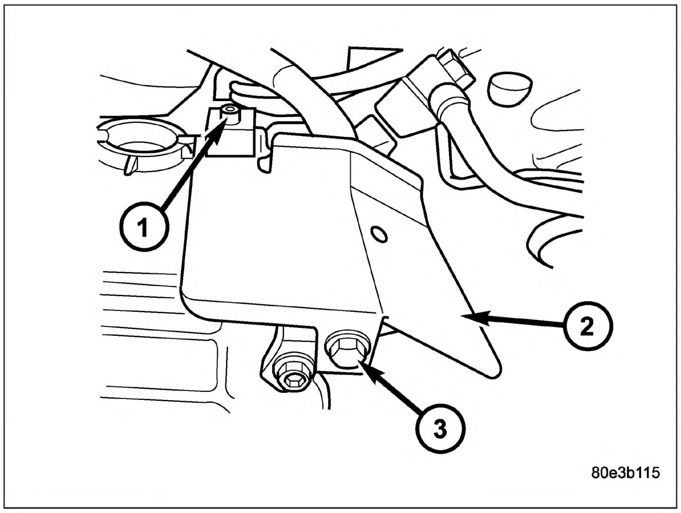
Shift Valve Pressure Regulating Valve

The non-constant regulating valve pressure (p-RV) is regulated to a constant shift valve pressure (p-SV) at the shift valve pressure regulating valve (1) and is used to supply the 1-2 and 4-5 / 3-4 / 2-3 solenoid valves and the torque converter lockup clutch PWM solenoid valve.

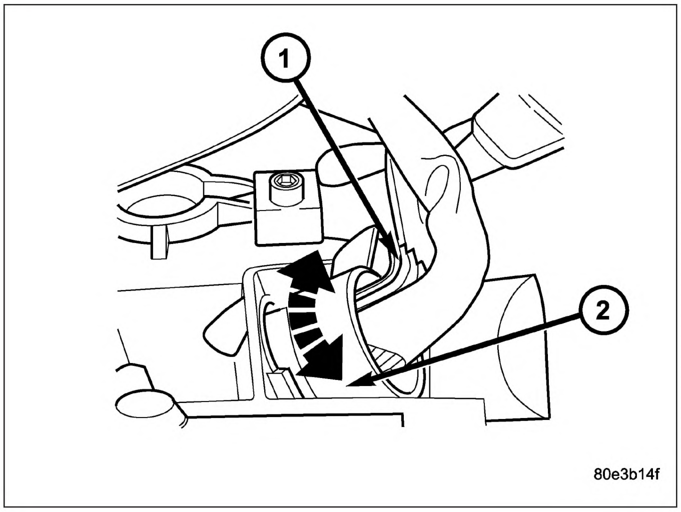


REMOVAL

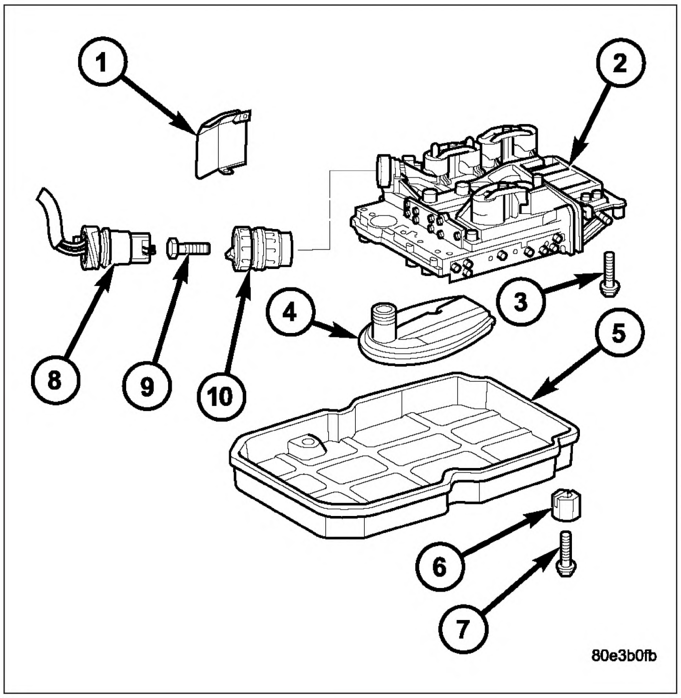
1. Move selector lever to position ″P″.
2. Raise vehicle.
3. Remove bolt (3) and screw (1) holding the heat shield (2) to the transmission.



4. Disconnect 13-pin plug connector (1). Turn bayonet lock of guide bushing (2) anti-clockwise.
5. Loosen guide bushing (2) and remove from transmission housing.



6. Detach oil pan (5).
7. Remove oil filter (4).
8. Unscrew Torx socket bolts (3) and remove electrohydraulic control module (2).



DISASSEMBLY

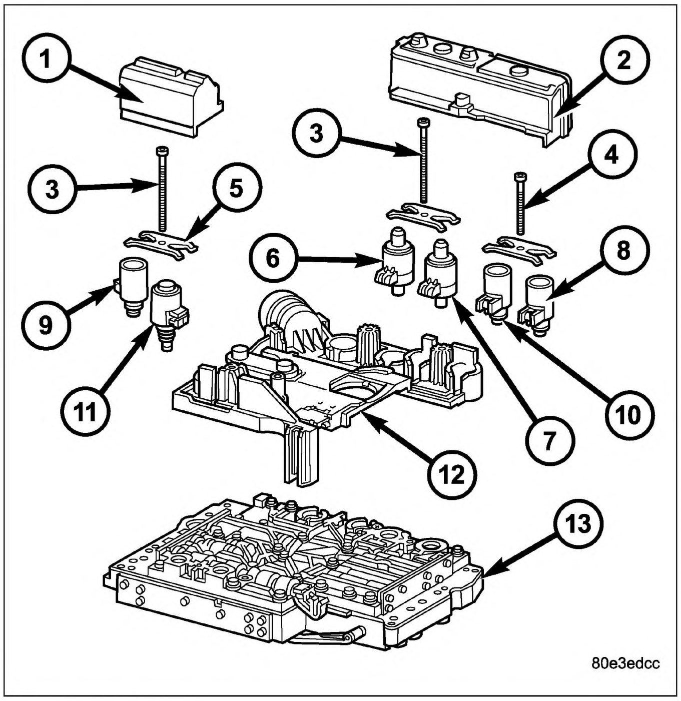
1. Remove electrohydraulic unit from the vehicle. (Refer to 21 - TRANSMISSION/AUTOMATIC TRANSMISSION - NAG1/ELECTROHYDRAULIC UNIT - REMOVAL)
2. Remove solenoid caps (1, 2).
3. Unscrew Torx® socket bolts (3, 4).

NOTE: Pay attention to the different lengths of the Torx® socket bolts.

4. Remove leaf springs (5).
5. Withdraw solenoid valves (6 - 11) from shift plate (13).

NOTE: Check O-rings on solenoid valves for damage and replace if necessary.

6. Bend away retaining lug on stiffening rib on transmission oil temperature sensor.



1 - SOLENOID CAP
2 - SOLENOID CAP
3 - BOLT - M6X32
4 - BOLT - M6X30
5 - LEAF SPRING
6 - MODULATING PRESSURE REGULATING SOLENOID VALVE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - 3-4 SHIFT SOLENOID
9 - TORQUE CONVERTER LOCK-UP SOLENOID
10 - 1-2/4-5 SHIFT SOLENOID
11 - 2-3 SHIFT SOLENOID
12 - ELECTRICHYDRAULIC CONTROL MODULE
13 - SHIFT PLATE

7. Remove electrohydraulic control module (12) from the shift plate (13).

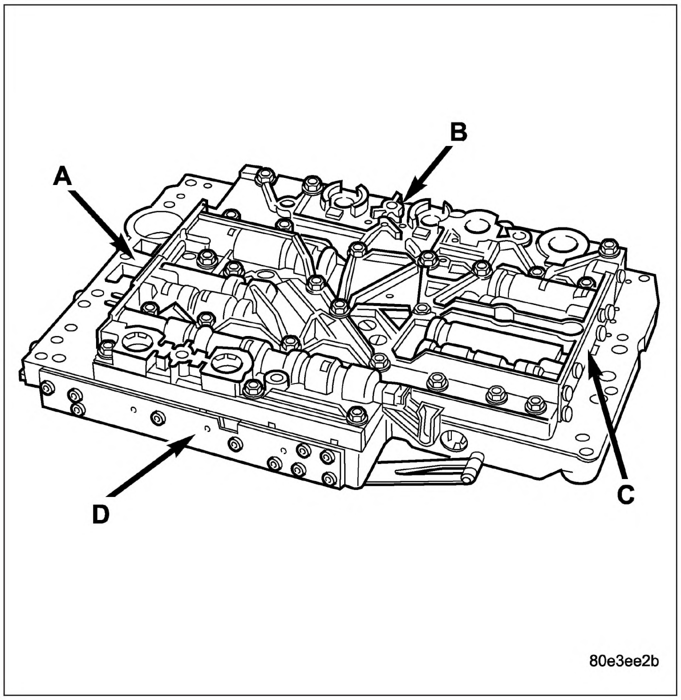
8. Note the locations of the major shift valve group components for assembly reference.

   A - Operating and Lubricating Pressure Regulating valves and 2-3 Overlap valve

   B - 1-2/4-5 Shift Group and Shift, Shift Valve, and Regulating Valve Pressure Regulating Valves

   C - 3-4 Shift Group

   D - 2-3 Shift Group, TCC Lock-up, and B2 Regulating Valves



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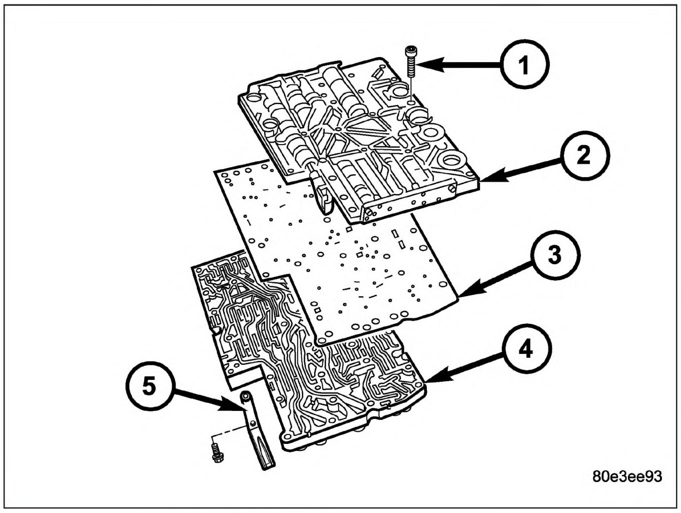
NOTE: Pay great attention to cleanliness for all work on the shift plate. Fluffy cloths must not be used. Leather cloths are particularly good. After dismantling, all parts must be washed and blown out with compressed-air, noting that parts may be blown away.

9. Unbolt leaf spring (5).
10. Unscrew Torx® bolts (1).
11. Remove valve housing (2) from valve body (4).
12. Remove sealing plate (3).



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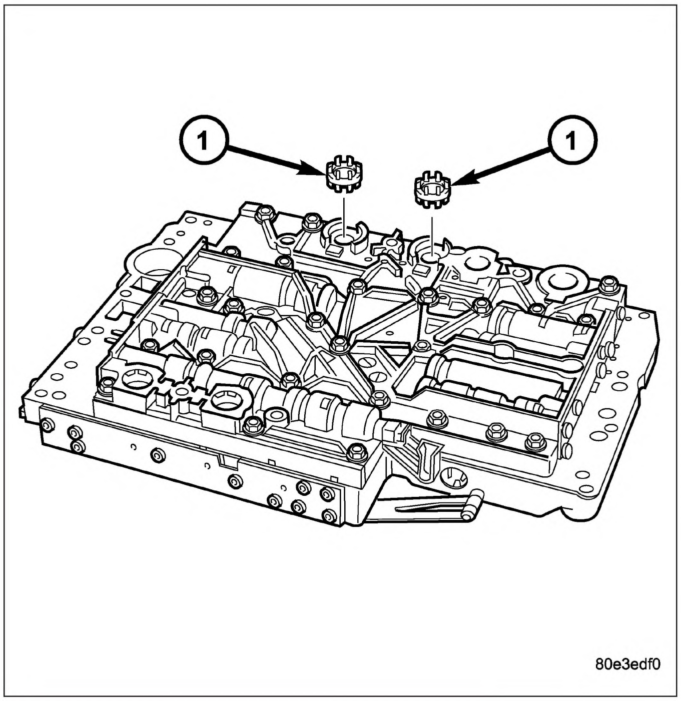
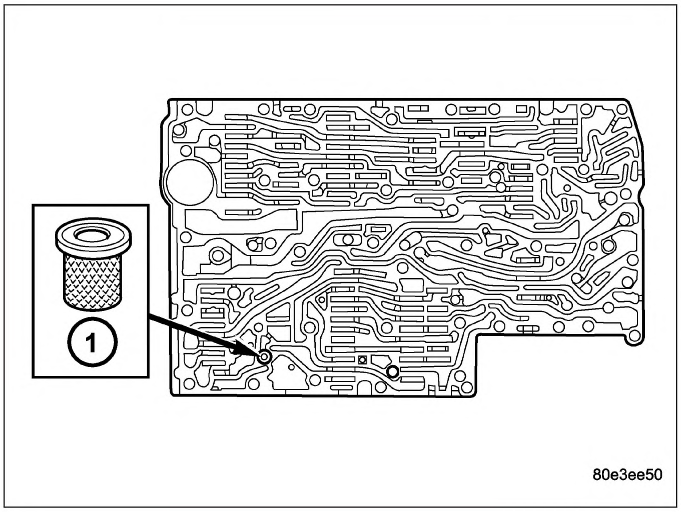
13. Remove the strainers (1, 2) for the modulating pressure and shift pressure control solenoid valves from the valve housing.

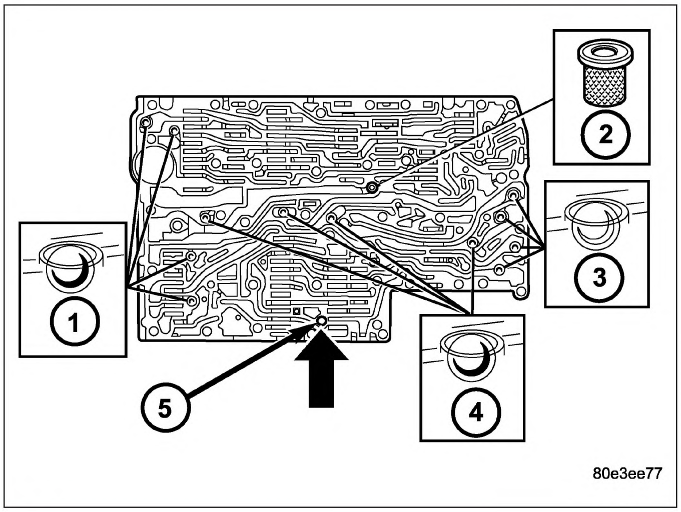


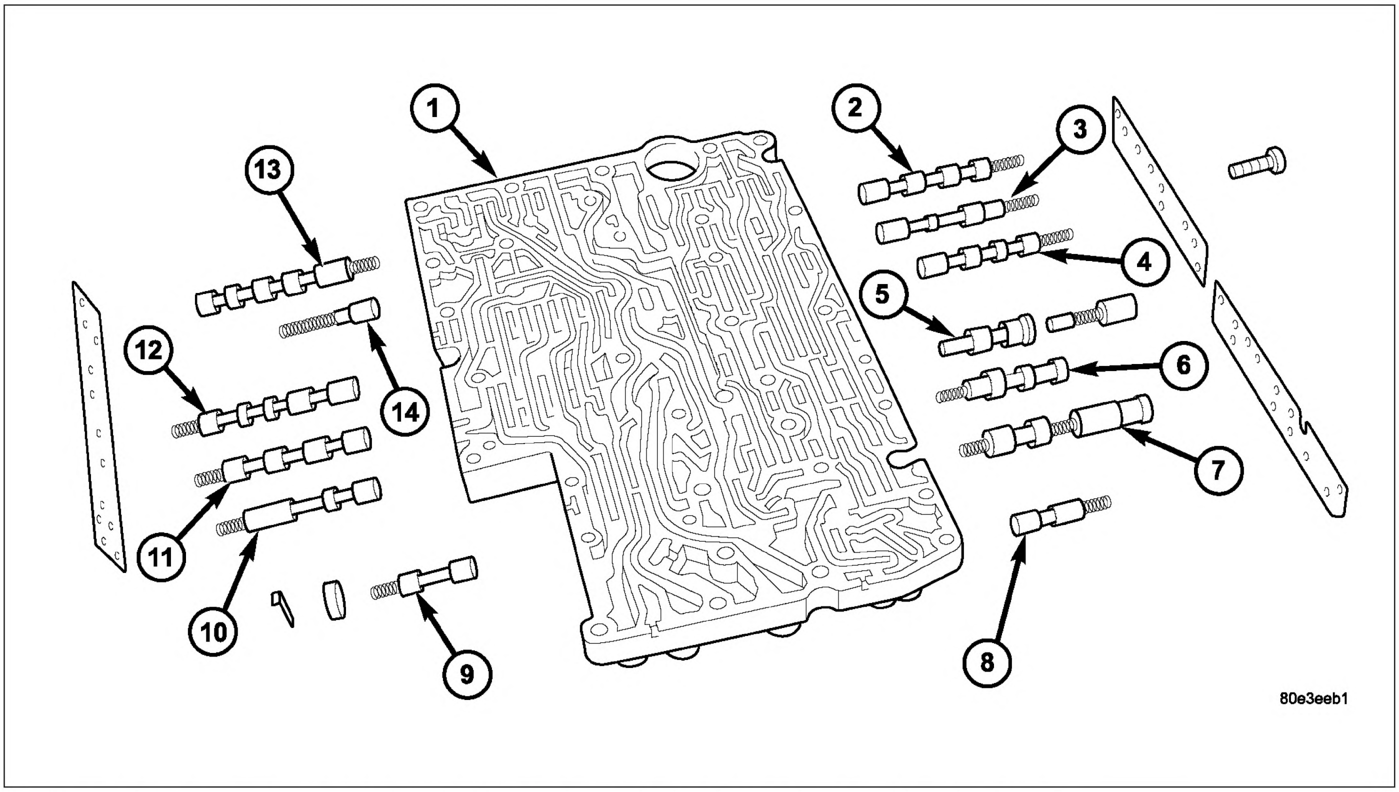
14. Remove the strainer (1) in the inlet to torque converter lock-up control solenoid valve.



NOTE: A total of 12 valve balls are located in the valve body, four made from plastic (4) and eight from steel (1, 3).

15. Note the location of all check balls (1, 3, 4) and the central strainer (2) for re-installation. Remove all check balls (1, 3, 4) and the central strainer (2).

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2
3
13
4
5
12
6
14
7
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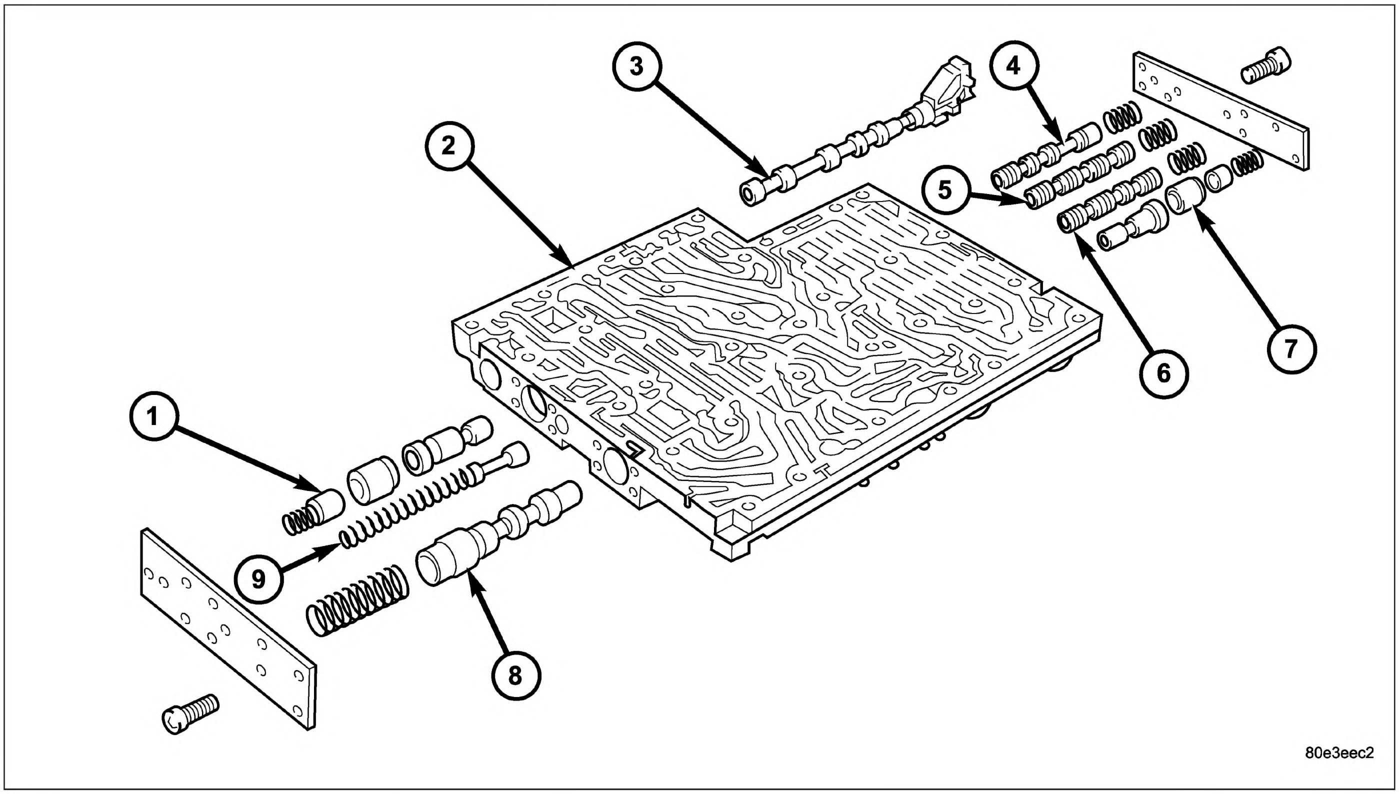
16. Remove the screws holding the side covers to the valve body and valve housing.
17. Remove all valves and springs from the valve body (1). Check all valves for ease of movement and shavings.

NOTE: The sleeves and pistons of the overlap regulating valves must not be mixed up.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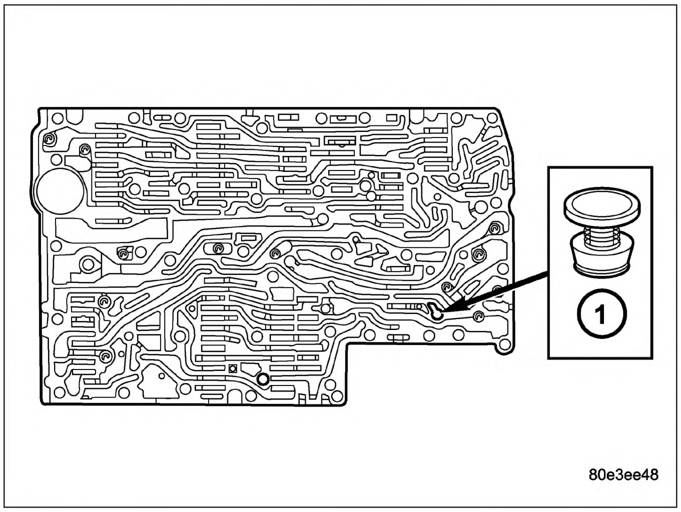
18. Remove all valves and springs from the valve housing (2). Check all valves for ease of movement and shavings.

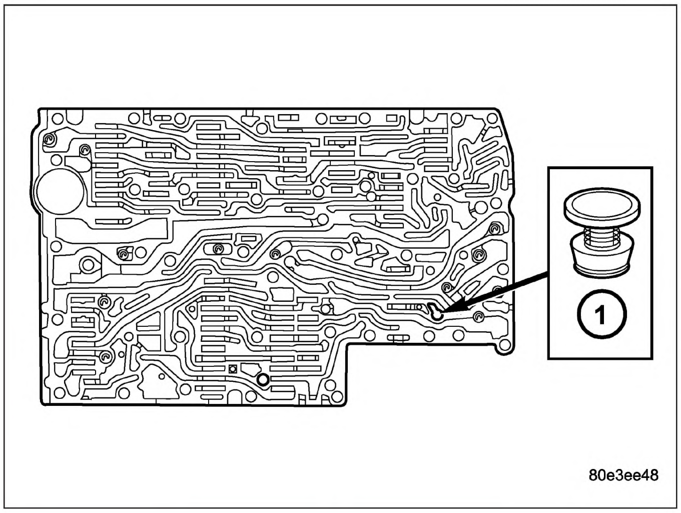
19. Remove the pressure supply valve (1) from the valve body.

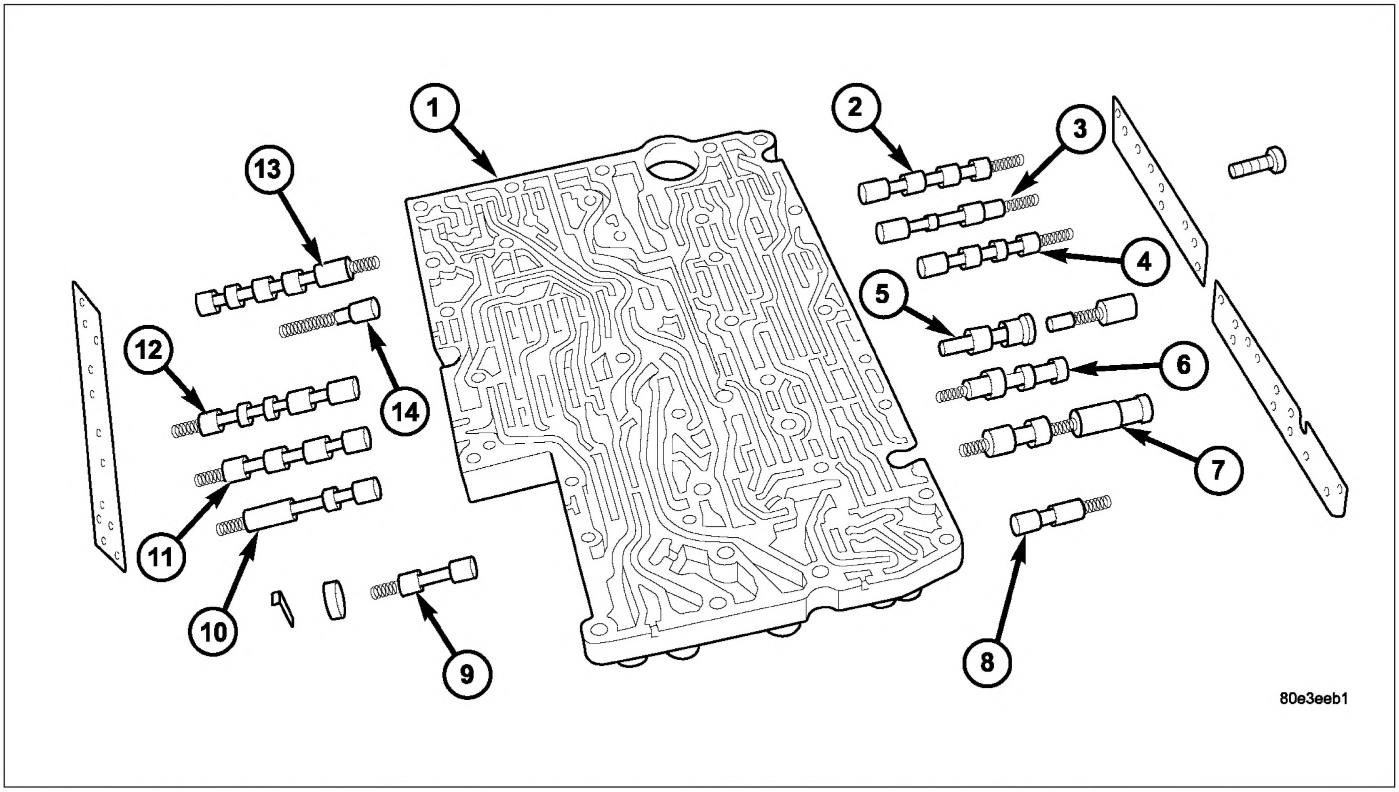


ASSEMBLY

NOTE: Pay great attention to cleanliness for all work on the shift plate. Fluffy cloths must not be used. Leather cloths are particularly good. After dismantling, all parts must be washed and blown out with compressed-air, noting that parts may be blown away.

1. Install the pressure supply valve (1) into the valve body.




1
2
3
4
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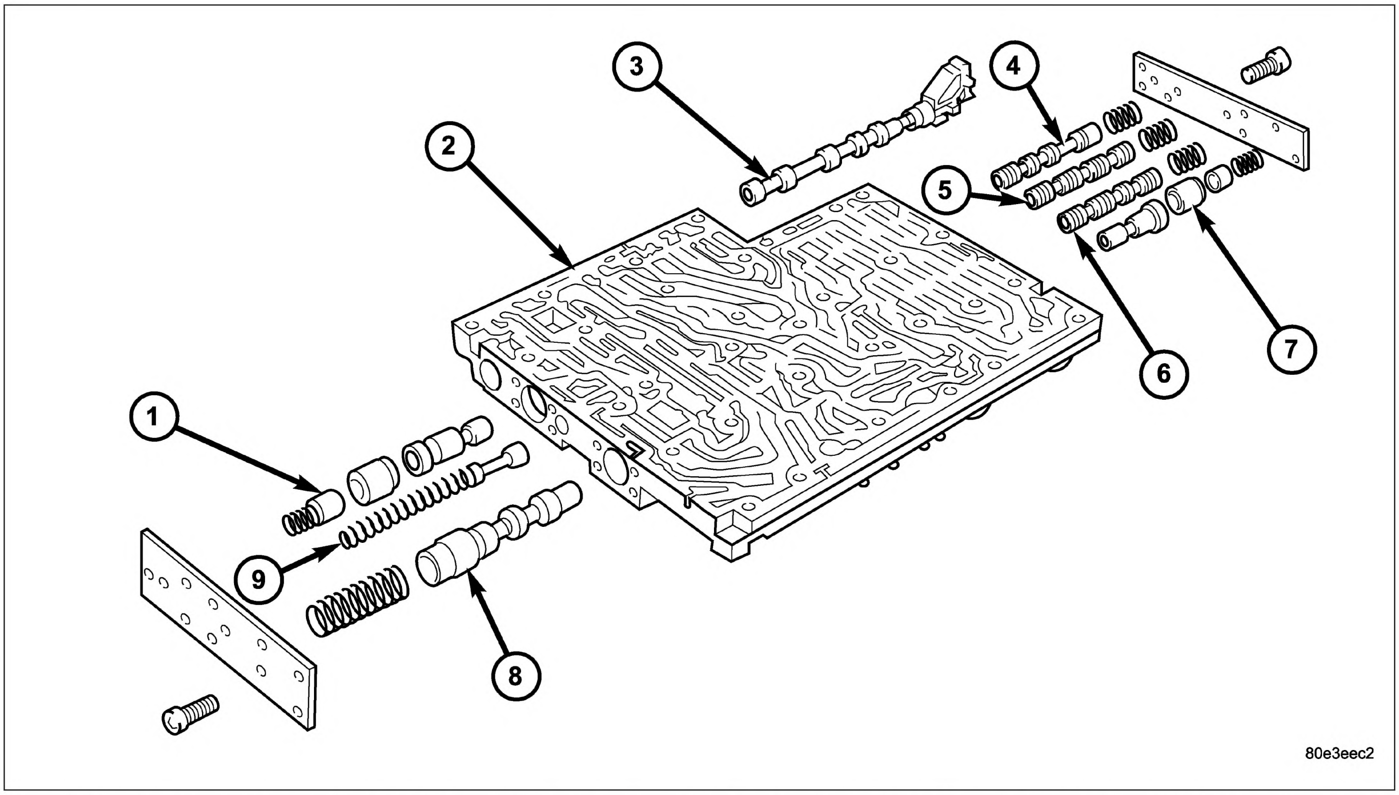
80e3eeb1

NOTE: The sleeves and pistons of the overlap regulating valves must not be mixed up.

2. Install all valves and springs from the valve body (1). Check all valves for ease of movement and shavings.
3. Install the screws to hold the side covers to the valve body. Tighten the screws to 4 N·m (35 in.lbs.).

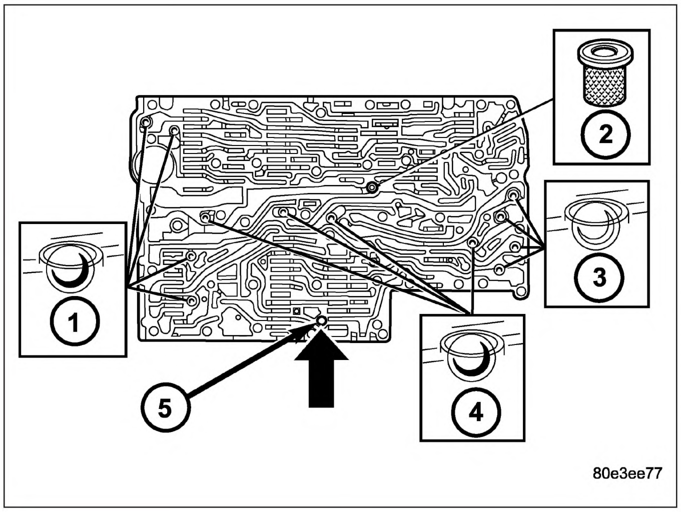

3
4
2
5
6
7
1
9
8
80e3eec2

4. Install all valves and springs into the valve housing (2). Check all valves for ease of movement and shavings.

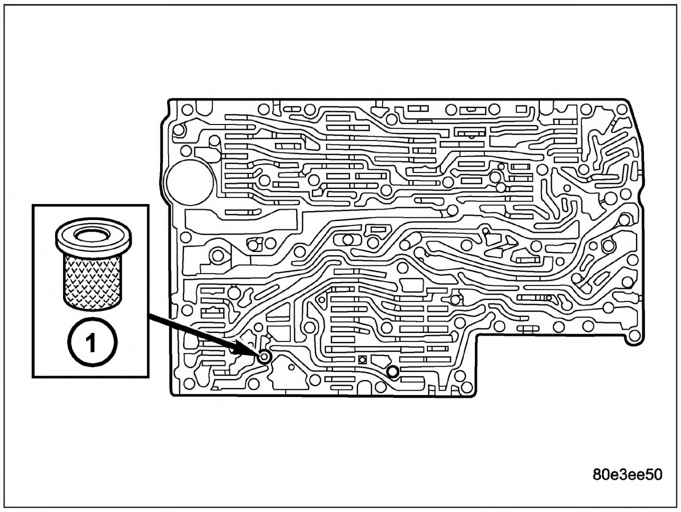
5. Install the screws to hold the side covers to the valve housing. Tighten the screws to 4 N·m (35 in.lbs.).

NOTE: A total of 12 valve balls are located in the valve body, four made from plastic (4) and eight from steel (1, 3).

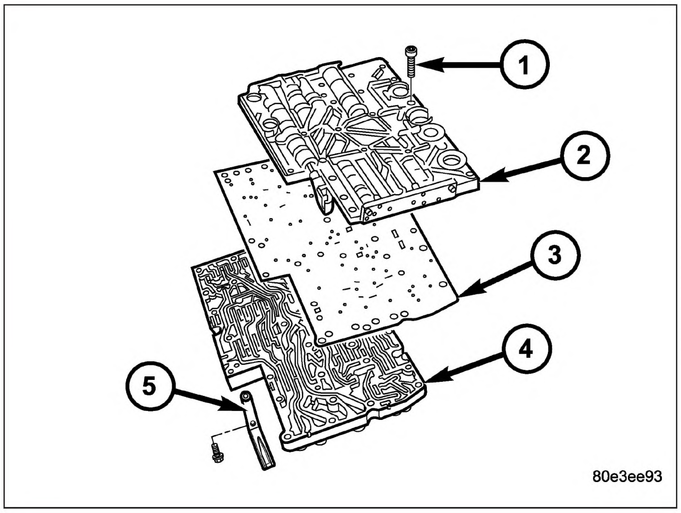
6. Install all check balls (1, 3, 4) and the central strainer (2).



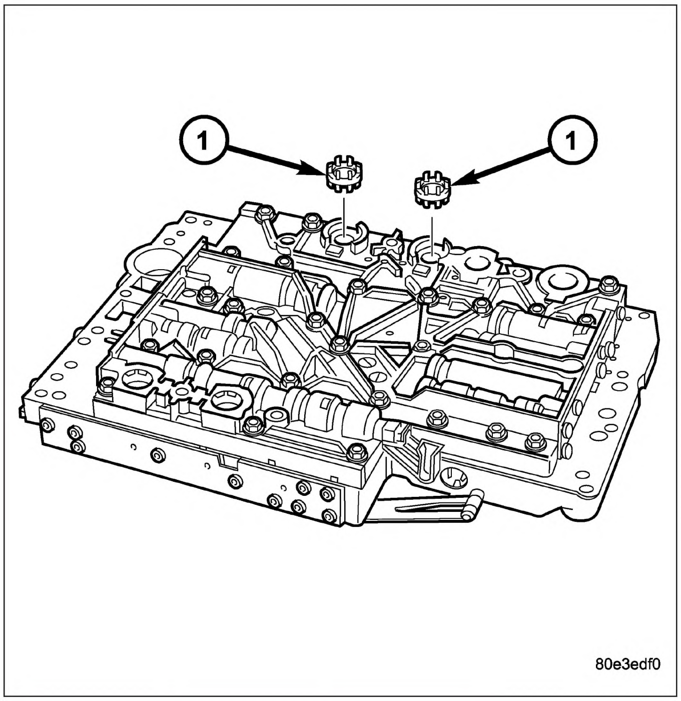
7. Install the strainer (1) in the inlet to torque converter lock-up control solenoid valve.



8. Position the sealing plate (3) onto the valve body (4).
9. Install the valve housing (2) onto the valve body (4) and sealing plate (3).
10. Install the shift plate Torx® bolts (1). Tighten the bolts to 8 N·m (71 in.lbs.).
11. Install leaf spring (5).



12. Install the strainers (1, 2) for the modulating pressure and shift pressure control solenoid valves into the valve housing.



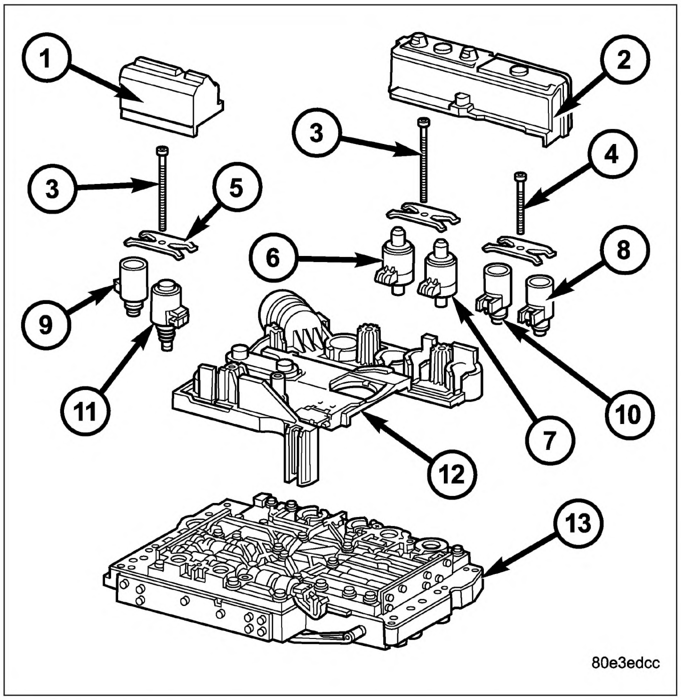
13. Install the electrohydraulic control module (12) onto the shift plate (13).
14. Bend the retaining lug on stiffening rib on transmission oil temperature sensor to retain the electrohydraulic control module.
15. Install the solenoid valves (6 - 11) into shift plate (13).

NOTE: Check O-rings on solenoid valves for damage and replace if necessary.

16. Install the leaf springs (5).
17. Install the Torx® socket bolts (3, 4). Tighten the bolts to 8 N·m (71 in.lbs.).

NOTE: Pay attention to the different lengths of the Torx® socket bolts.

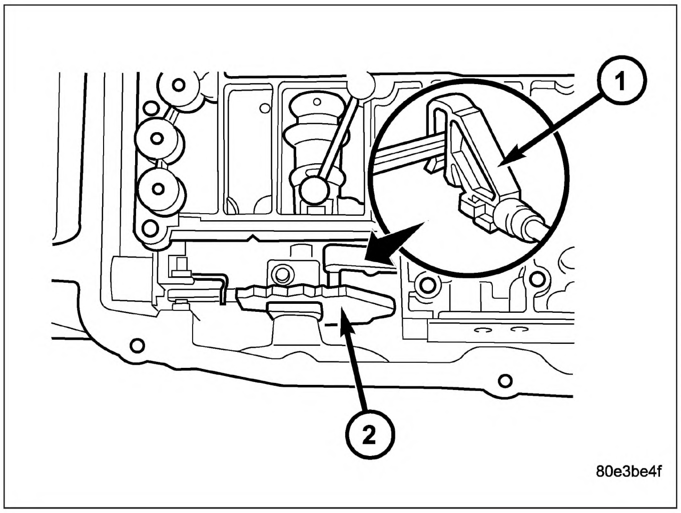
18. Install the solenoid caps (1, 2).
19. Install the electrohydraulic unit into the vehicle.



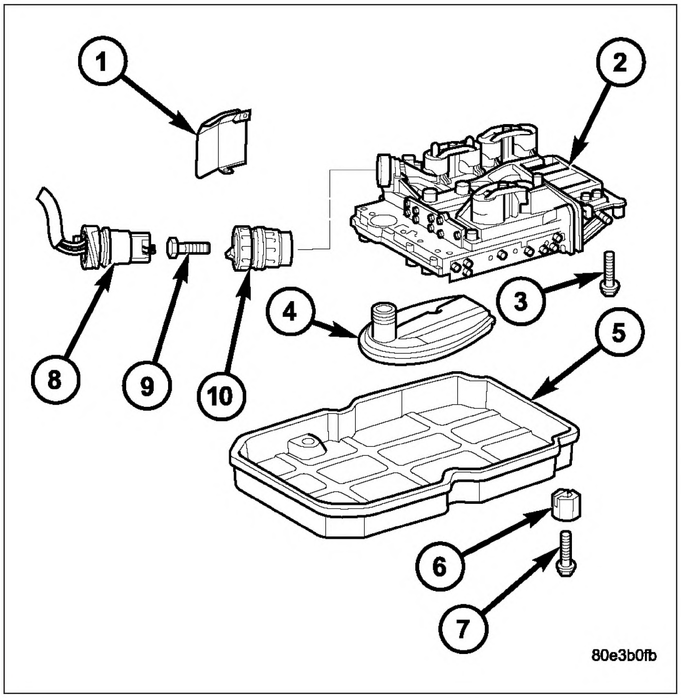
1 - SOLENOID CAP
2 - SOLENOID CAP
3 - BOLT - M6X32
4 - BOLT - M6X30
5 - LEAF SPRING
6 - MODULATING PRESSURE REGULATING SOLENOID VALVE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - 3-4 SHIFT SOLENOID
9 - TORQUE CONVERTER LOCK-UP SOLENOID
10 - 1-2/4-5 SHIFT SOLENOID
11 - 2-3 SHIFT SOLENOID
12 - ELECTRICHYDRAULIC CONTROL MODULE
13 - SHIFT PLATE

INSTALLATION

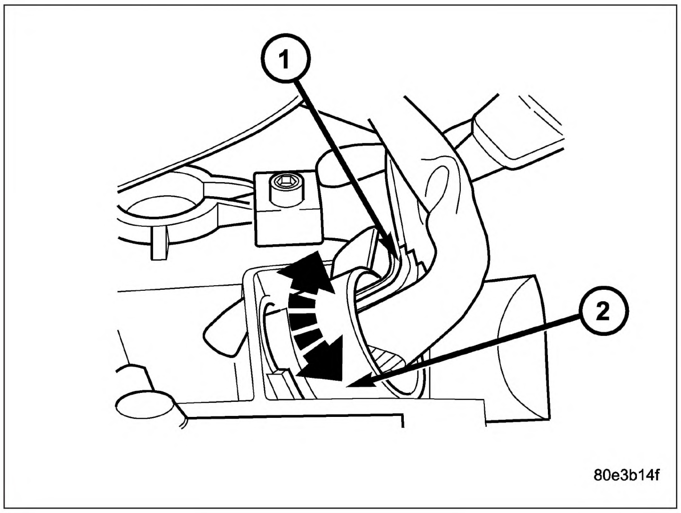
1. Position the electrohydraulic unit in the transmission housing.
2. Insert selector valve (1) in driver of detent plate (2). When installing the electrohydraulic control module in the transmission housing, the plastic part of the selector valve (1) must engage in the driver of the detent plate (2).



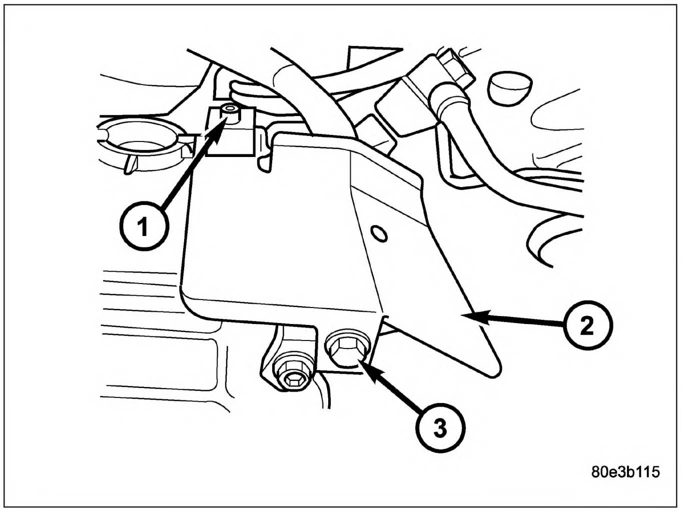
3. Install the Torx® socket bolts (3) and torque to 8 N·m (71 in.lbs.).
4. Install a new oil filter (4).
5. Install oil pan (5) and torque the oil pan bolts to 8 N·m (71 in.lbs.).
6. Install the oil drain plug (8) with a new drain plug gasket (9). Torque the drain plug to 20 N·m (177 in.lbs.).
7. Install the guide bushing (2) into the transmission housing and install the bolt (11) to hold the guide bushing in place.



8. Check O-ring on plug connector (1), and replace if necessary.
9. Install the plug connector (1) into the guide bushing (2). Turn bayonet lock of guide bushing (2) clockwise to connect plug connector (1).



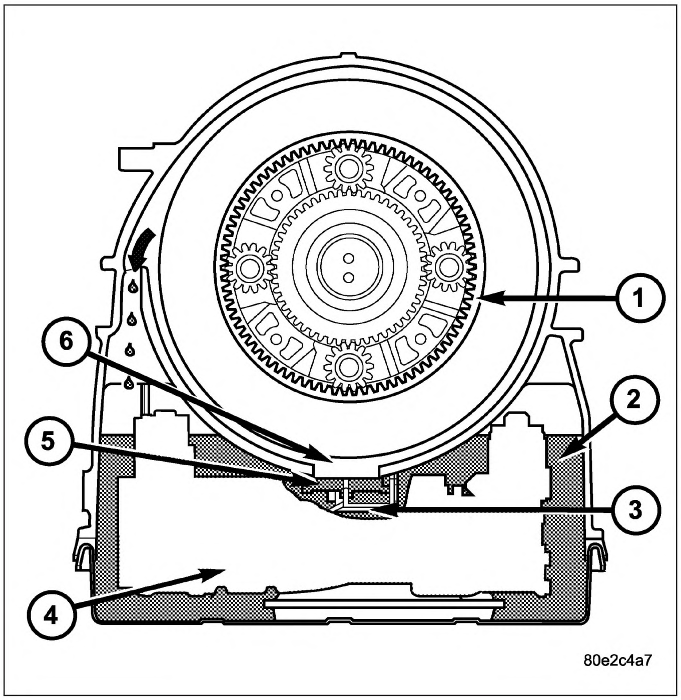
10. Position the heat shield (2) onto the transmission housing and install the screw (1) and bolt (3) to hold the shield in place.
11. Fill the transmission with the correct oil (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION) using the standard procedure (Refer to 21 - TRANSMISSION/AUTOMATIC - NAG1/FLUID AND FILTER - STANDARD PROCEDURE - TRANSMISSION FILL).



FLUID AND FILTER

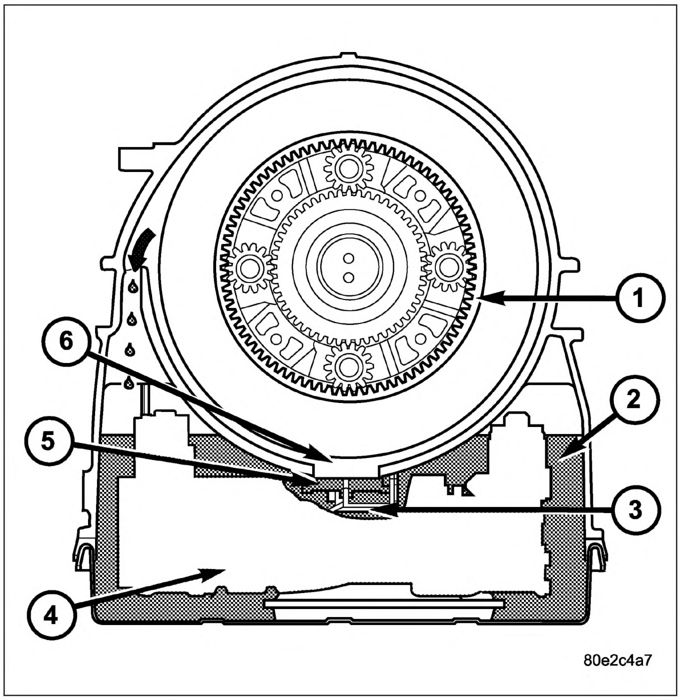
DESCRIPTION

The oil level control is located on the electrohydraulic unit (4) and consists of the float (5) which is integrated into the electrohydraulic unit. The float is positioned to plug the opening (6) between the oil gallery (2) and gearset chamber (1) so that the rotating gearsets do not splash about in oil as the oil level rises. The oil level control reduces power loss and prevents oil from being thrown out of the transmission housing at high oil temperatures.



OPERATION

With low oil levels, the lubricating oil which flows constantly out of the gearset, flows back to oil gallery (2) though the opening (6). If the oil level rises, the oil presses the float (5) against the housing opening (6). The float (5) therefore separates the oil gallery (2) from the gearset chamber (1). The lubricating oil which continues to flow out of the gearsets is thrown against the housing wall, incorporated by the rotating parts and flows back into the oil gallery (2) through the upper opening (arrow).



DIAGNOSIS AND TESTING

EFFECTS OF INCORRECT FLUID LEVEL

A low fluid level allows the pump to take in air along with the fluid. Air in the fluid will cause fluid pressures to be low and develop slower than normal. If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation, and varnish buildup which interferes with valve and clutch operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has three primary causes.

1. Internal clutch slippage, usually caused by low line pressure, inadequate clutch apply pressure, or clutch seal failure.
2. A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged oil cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.
3. Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid
- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid
- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
- failure to replace contaminated converter after repair

The use of non-recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission, an overhaul is necessary.

The torque converter should be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

STANDARD PROCEDURE

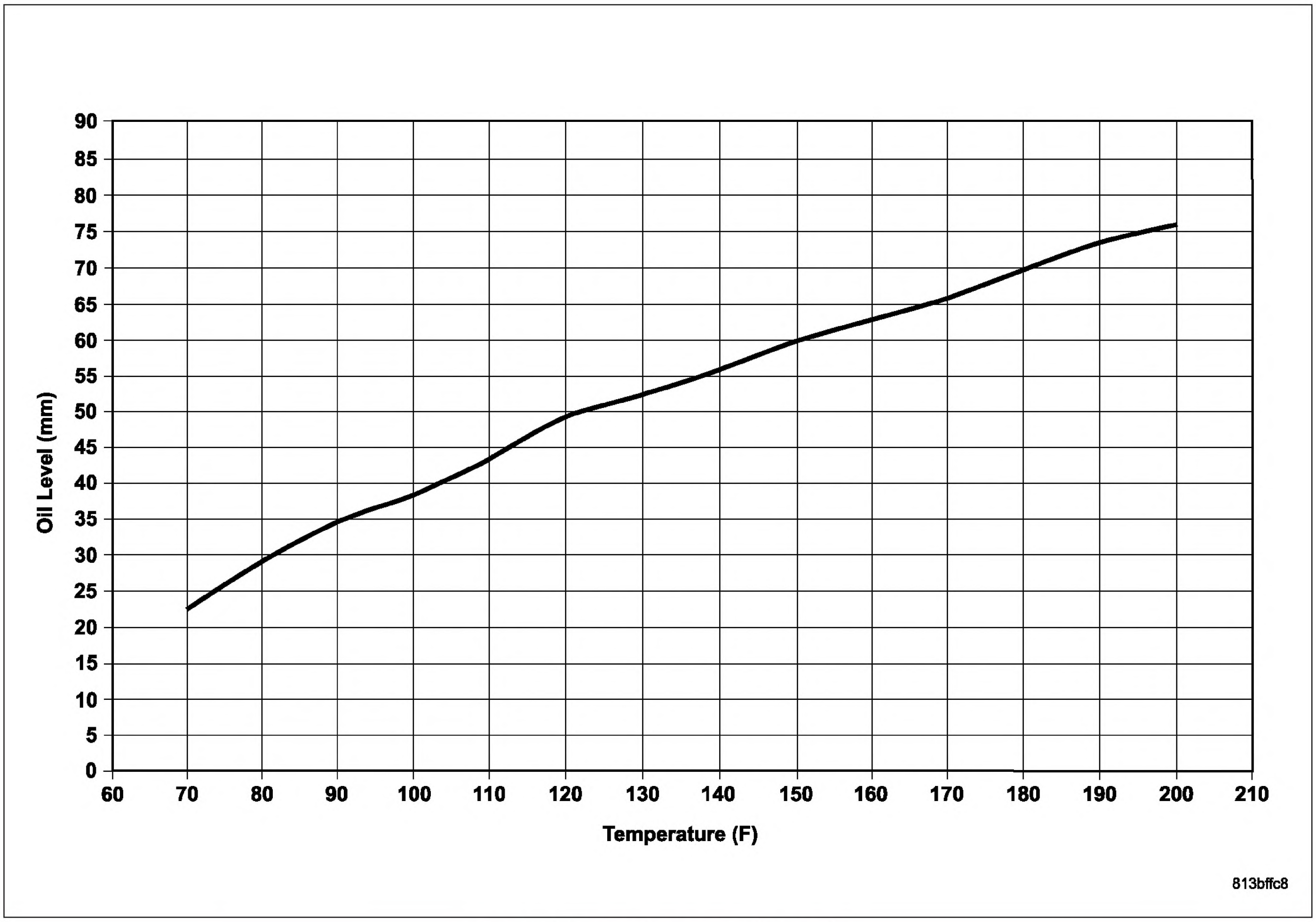
CHECK OIL LEVEL

1. Verify that the vehicle is parked on a level surface.
2. Remove the dipstick tube cap.

WARNING: Risk of accident from vehicle starting off by itself when engine running. Risk of injury from contusions and burns if you insert your hands into the engine when it is started or when it is running. Secure vehicle to prevent it from moving off by itself. Wear properly fastened and close-fitting work clothes. Do not touch hot or rotating parts.

3. Actuate the service brake. Start engine and let it run at idle speed in selector lever position ″P″.

4. Shift through the transmission modes several times with the vehicle stationary and the engine idling
5. Warm up the transmission, wait at least 2 minutes and check the oil level with the engine running. Push the oil dipstick into the transmission fill tube and pull out again, read off oil level, repeat if necessary.



NAG1 Transmission Fill Graph

6. Check transmission oil temperature using the appropriate scan tool.

NOTE: The true transmission oil temperature can only be read by a scan tool in REVERSE or any forward gear position. (Refer to 21 - AUTOMATIC TRANSMISSION- NAG1/TRANSMISSION TEMPERATURE SENSOR/ PARK-NEUTRAL SWITCH - OPERATION)

7. Determine the height of the oil level on the dipstick and using the height, the transmission temperature, and the Transmission Fluid Graph, determine if the transmission oil level is correct.
8. Add or remove oil as necessary and recheck the oil level.
9. Once the oil level is correct, install the dipstick tube cap.

TRANSMISSION FILL

To avoid overfilling transmission after a fluid change or overhaul, perform the following procedure:

1. Verify that the vehicle is parked on a level surface.
2. Remove the dipstick tube cap.
3. Add following initial quantity of Mopar® ATF +4, Automatic Transmission Fluid, to the transmission:
    a. If only fluid and filter were changed, add **7.4 L (14.8 pts.)** of transmission fluid to transmission.

b. If the transmission was completely overhauled or the torque converter was replaced or drained, add **8.1 L (17.1 pts.)** of transmission fluid to transmission.

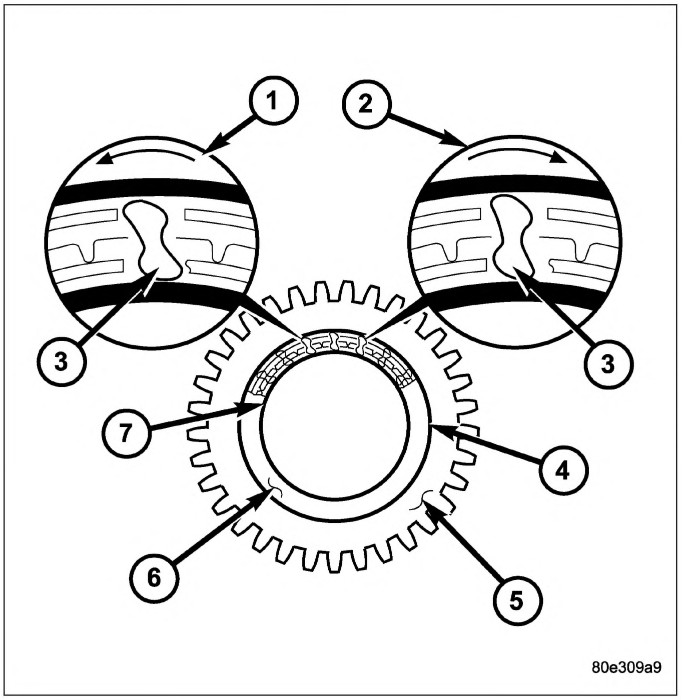
4. Check the transmission fluid (Refer to 21 - TRANSMISSION/AUTOMATIC - NAG1/FLUID AND FLUID - STANDARD PROCEDURE - CHECK OIL LEVEL) and adjust as required.

CLUTCH-FREEWHEELING

DESCRIPTION

Freewheeling clutches are installed in the front planetary gear set between the sun gear and the stator shaft, and in the rear planetary gear set between the sun gear and the intermediate shaft.

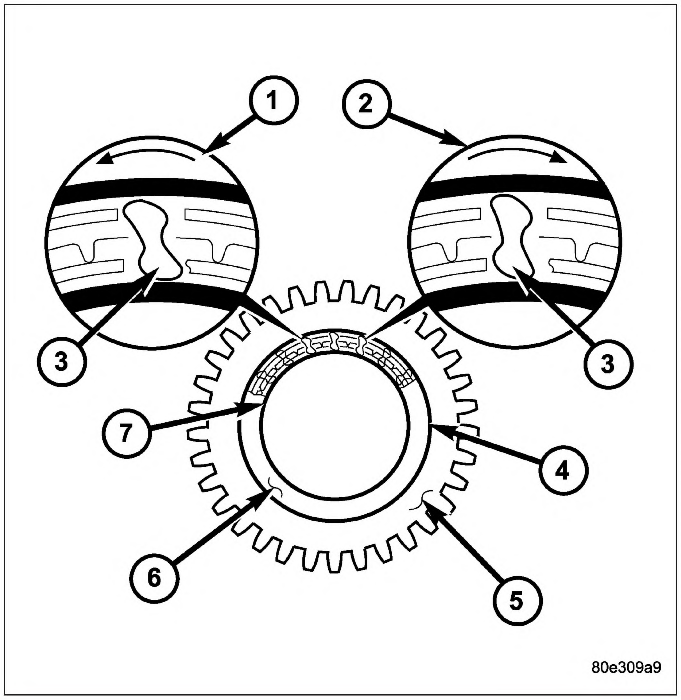
The freewheel consists of an outer race (4), an inner race (7), a number of locking elements (3) and a cage (6) for these locking elements.



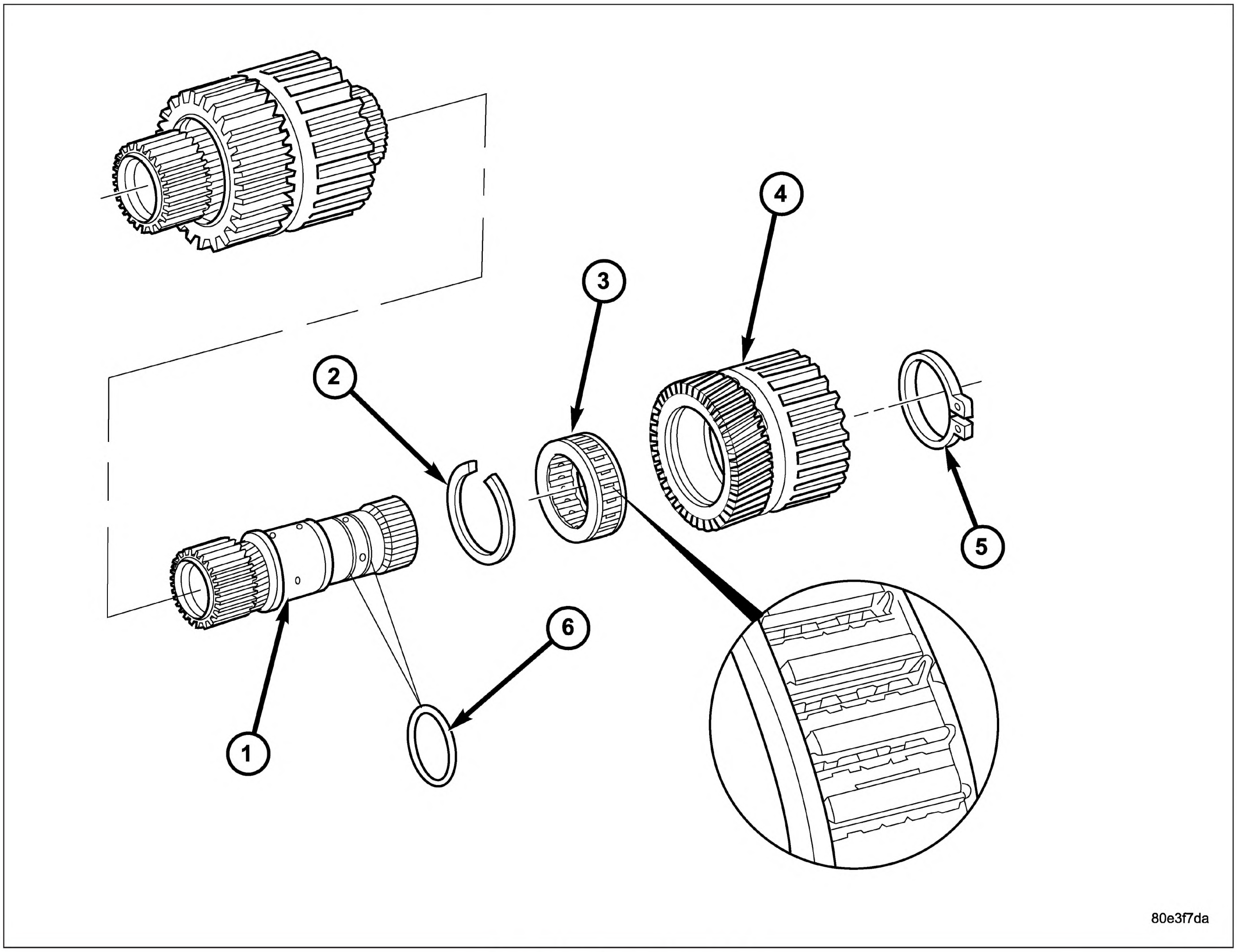
OPERATION

The freewheeling clutch optimizes individual gearshifts. They lock individual elements of a planetary gear set together or against the transmission housing in one direction of rotation to allow the torque to be transmitted.

If the inner race (7) of the freewheeling clutch is locked and the outer race (4) turns counter-clockwise (1), the locking elements (3) adopt a diagonal position on account of their special contours, allowing the freewheel function. The inner race (4) slides under the locking elements (3) with minimal friction. If the rotation of the outer race (4) changes to clockwise (2), the locking elements (3) stand up and lock the outer and inner races (4, 7) together.



DISASSEMBLY

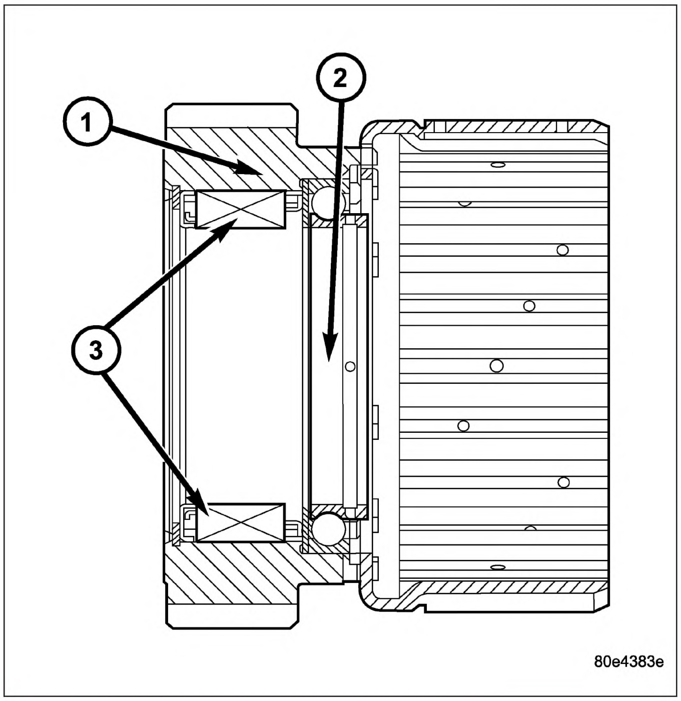


Freewheeling Clutch F2

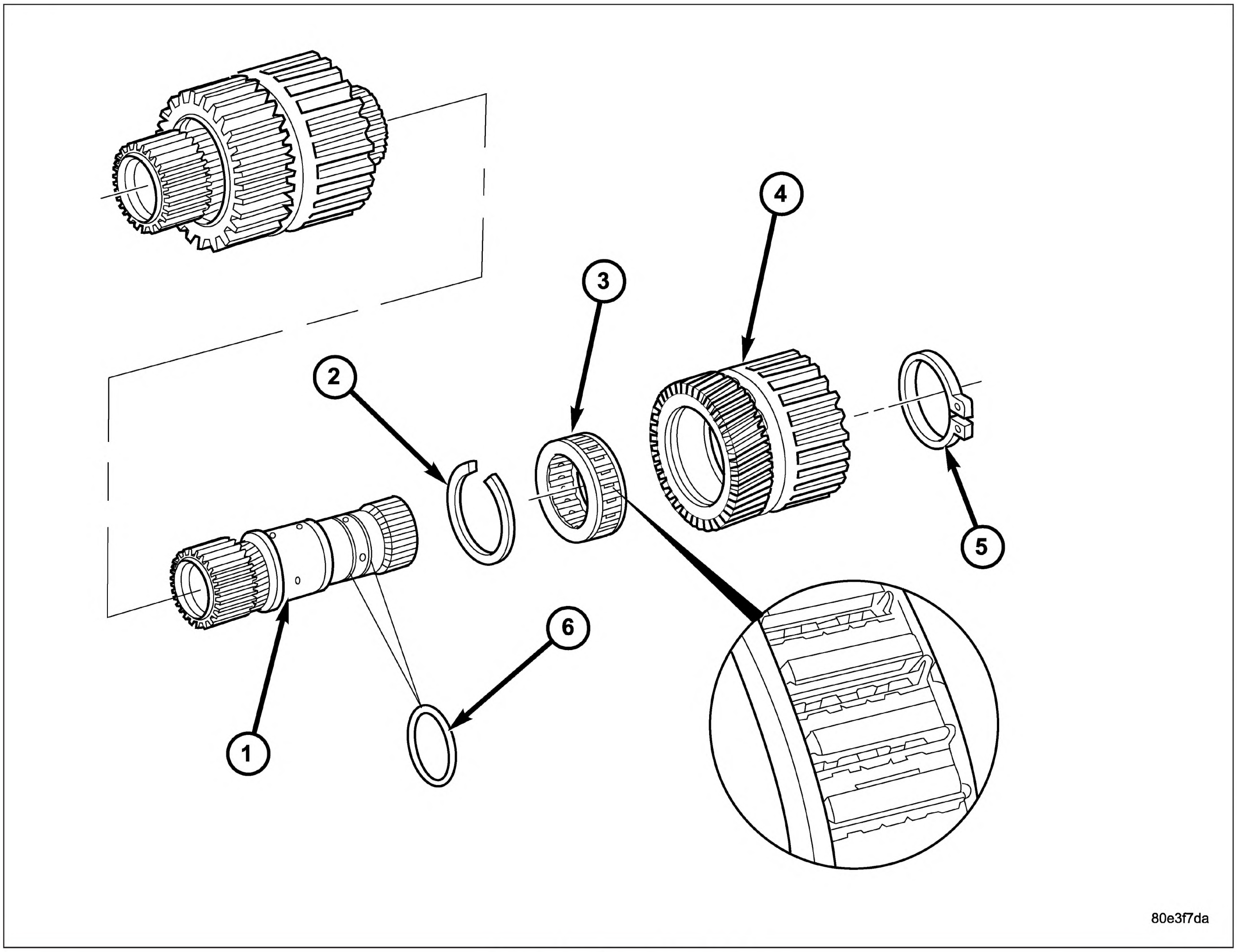
1 - HOLLOW SHAFT	4 - K3 INNER DISC CARRIER AND REAR PLANETARY SUN GEAR
2 - F2 CLUTCH SNAP-RING	5 - RETAINING RING
3 - FREEWHEELING CLUTCH F2	6 - O-RINGS

1. Remove retaining ring (5) from hollow shaft (1).
2. Remove rear sun gear (4) with the K3 internally toothed disk carrier and rear freewheeling clutch F2 (3).
3. Remove snap-ring (2) for freewheel.
4. Press freewheeling clutch (3) out of sun gear.
5. Check O-rings (6), replace if necessary.

6. Check the anti-friction bearing (2) in the rear planetary sun gear for damage. Replace as necessary.



ASSEMBLY



Freewheeling Clutch F2

1 - HOLLOW SHAFT
2 - F2 CLUTCH SNAP-RING
3 - FREEWHEELING CLUTCH F2
4 - K3 INNER DISC CARRIER AND REAR PLANETARY SUN GEAR
5 - RETAINING RING
6 - O-RINGS

NOTE: The side of the freewheeling clutch F2 (3) with the markings (directional arrow, part number, etc.) must be up when the clutch is installed in the sun gear (4).

1. Press freewheeling clutch F2 (3) into sun gear (4).
2. Install snap-ring (2) for freewheeling clutch.
3. Check O-rings (6) on hollow shaft, replace if necessary.
4. Install rear sun gear (4) with K3 internally toothed disc carrier and rear freewheeling clutch (3) onto the hollow shaft.
5. Verify proper operation of the freewheeling clutch F2. When the assembly is held with the F2 clutch snap-ring upward, it should be possible to rotate the hollow shaft counter-clockwise.
6. Install retaining ring (5) onto hollow shaft (1).

CABLE-GEARSHIFT

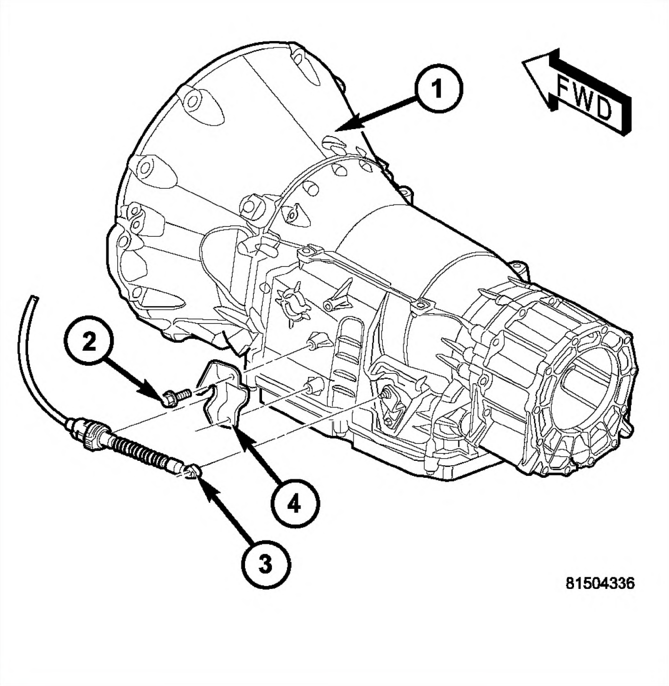
DIAGNOSIS AND TESTING

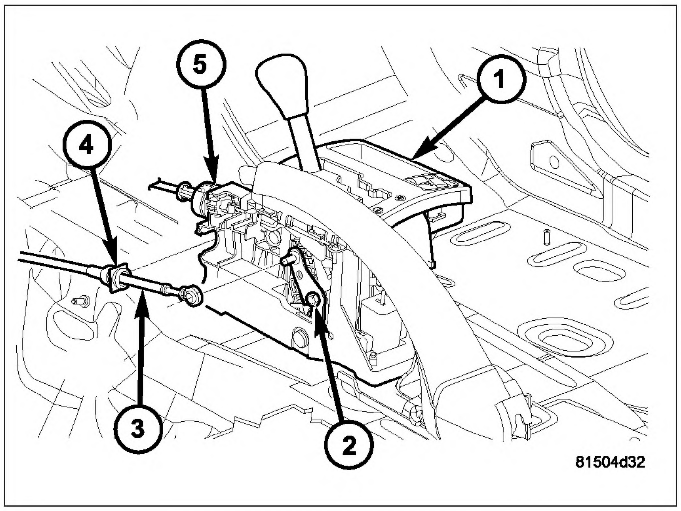
GEARSHIFT CABLE

1. The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.
2. Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.
3. With floor shift lever handle push-button not depressed and lever in:
    a. PARK position - Apply forward force on center of handle and remove pressure. Engine starts must be possible.
    b. PARK position - Apply rearward force on center of handle and remove pressure. Engine starts must be possible.
    c. NEUTRAL position - Normal position. Engine starts must be possible.
    d. NEUTRAL position - Engine running and brakes applied, apply forward force on center of shift handle. Transmission shall not be able to shift from NEUTRAL to REVERSE.

REMOVAL

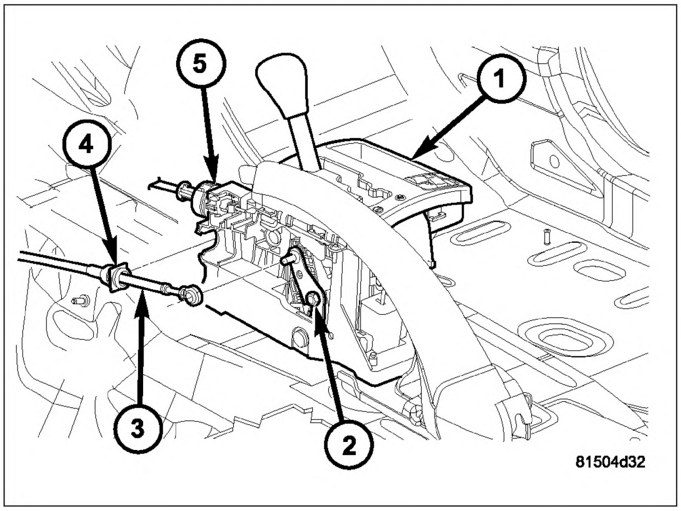
1. Shift transmission into PARK.
2. Raise vehicle.
3. Disengage the gearshift cable (3) eyelet at transmission manual shift lever and pull cable out of the mounting bracket (2).





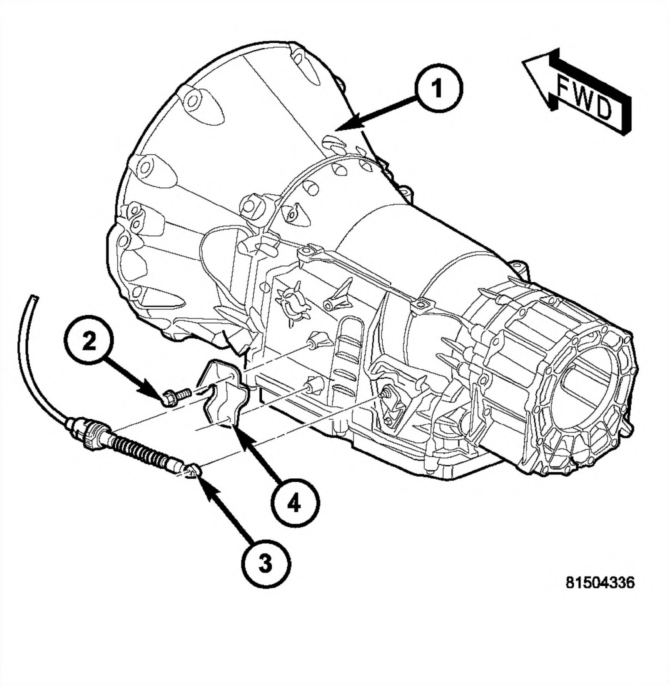
4. Lower the vehicle.
5. Remove the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL) as necessary to access the shift mechanism and cables.
6. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
7. Remove the gearshift cable (3) from the shift lever pin.
8. Remove the gearshift cable retainer (4) from the notch in the shifter assembly.
9. From under the hood, remove the shift cable grommet from the dash panel.
10. Remove gearshift cable from vehicle.

INSTALLATION

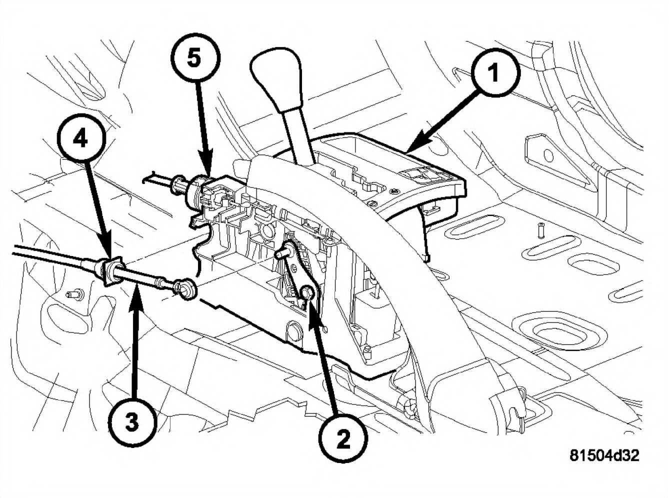


1. From under the hood, route the gearshift cable (3) through the dash panel and toward the shifter assembly.
2. From under the hood, install the grommet to the dash panel.
3. Engage the gearshift cable retainer (4) into the notch in the shifter assembly.
4. Install the gearshift cable (3) onto the shift lever pin.
5. Loosen the cable adjustment nut (2), if necessary.

6. Raise vehicle.
7. Verify that the transmission is in the PARK position by trying to rotate the propeller shaft. If the propeller shaft rotates, move the transmission manual shift lever to the full rearward position and turn the propeller shaft until the PARK system is engaged.
8. Route the gearshift cable (3) through the mounting bracket (2).
9. Engage the gearshift cable (3) eyelet onto the transmission manual shift lever.



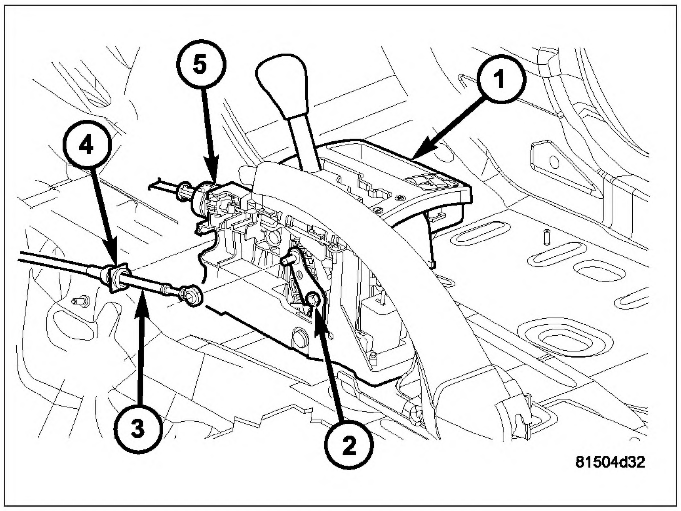
10. Lower vehicle.
11. Verify that the shifter is in the PARK position.
12. Tighten the adjustment nut (2) to 30 N·m (265 in.lbs.).
13. Verify correct shifter operation.
14. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
15. Install the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION), lower instrument panel components (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION) and dash panel insulation pad as necessary.



ADJUSTMENTS - GEARSHIFT CABLE

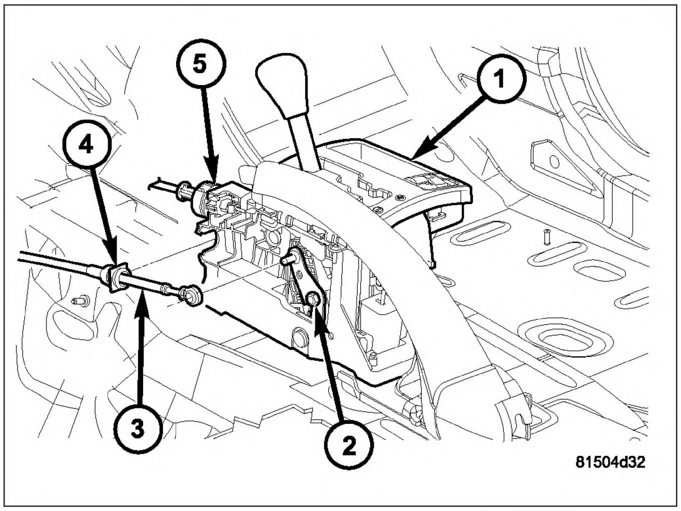
Check adjustment by starting the engine in PARK and NEUTRAL. Adjustment is CORRECT if the engine starts only in these positions. Adjustment is INCORRECT if the engine starts in one but not both positions. If the engine starts in any position other than PARK or NEUTRAL, or if the engine will not start at all, the park/neutral position contact may be faulty.

1. Shift transmission into PARK.
2. Remove floor console as necessary for access to the shift cable adjustment. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
3. Loosen the shift cable adjustment nut (2).



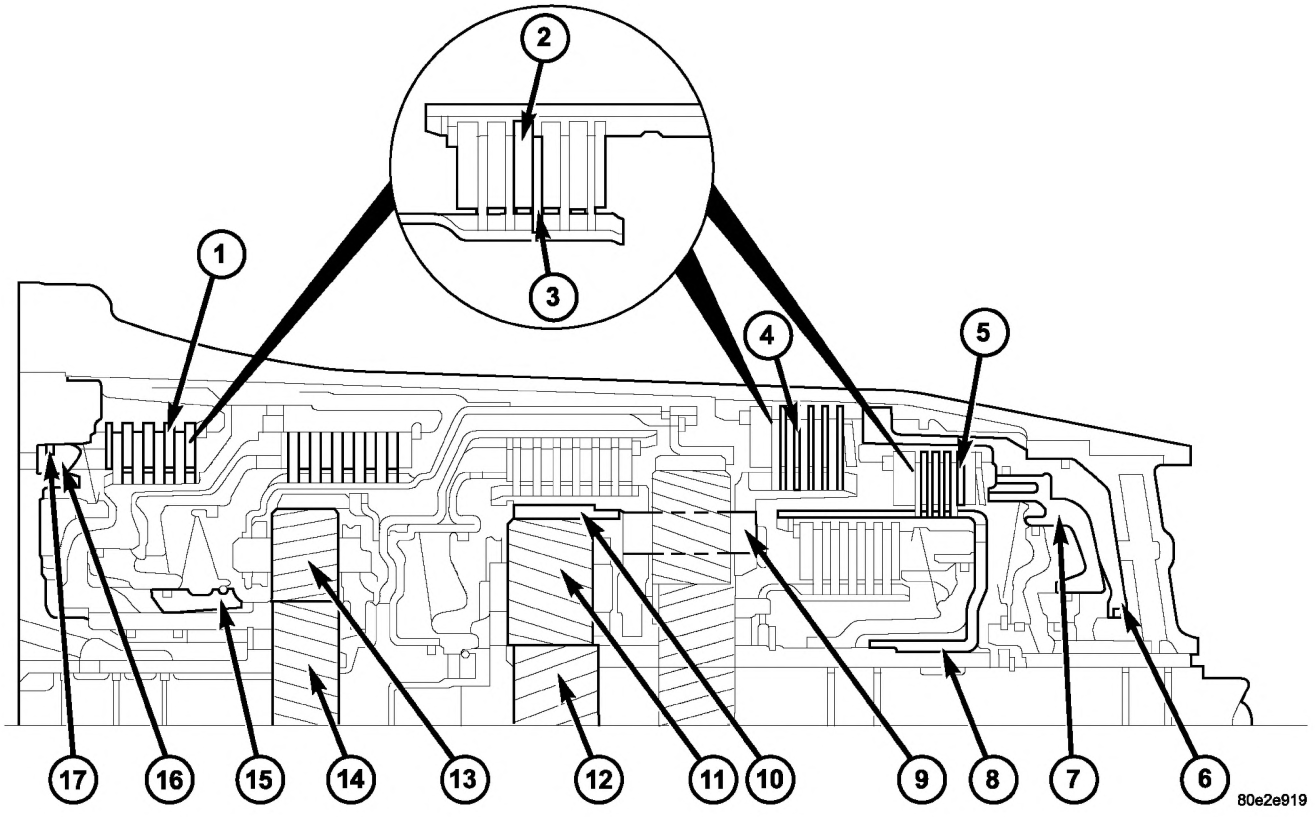
4. Raise vehicle.
5. Unsnap cable eyelet from transmission shift lever.
6. Verify transmission shift lever is in PARK detent by moving lever fully rearward. Last rearward detent is PARK position.
7. Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
8. Snap cable eyelet onto transmission shift lever.

9. Lower vehicle
10. Tighten the shift cable adjustment nut (2) to 30 N·m (265 in.lbs.).
11. Verify correct operation.
12. Install any floor console components removed for access. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)



CLUTCHES-HOLDING

DESCRIPTION



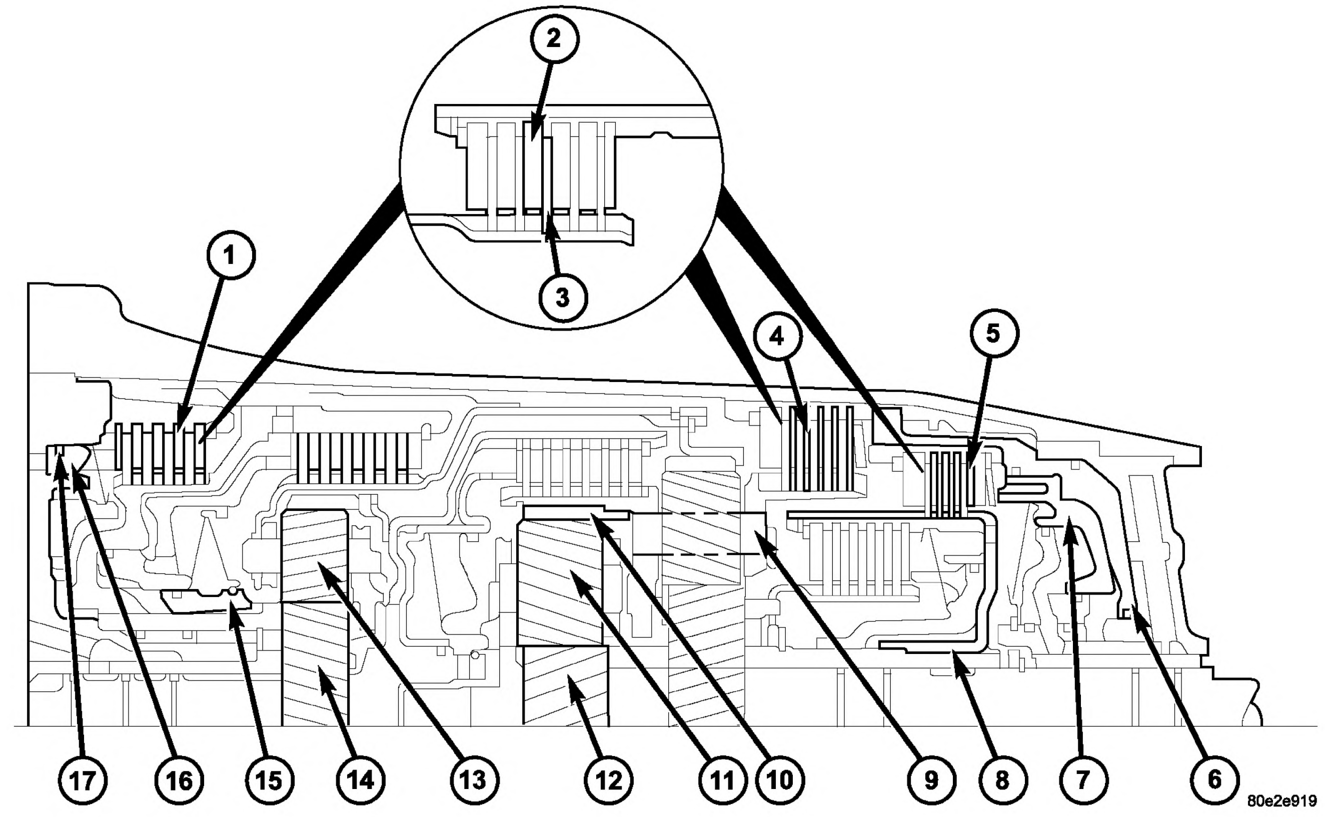
Holding Clutches

1 - B1 CLUTCH
2 - EXTERNALLY TOOTHED DISC
3 - INTERNALLY TOOTHED DISC
4 - B3 CLUTCH
5 - B2 CLUTCH
6 - B3 CLUTCH PISTON
7 - B2 CLUTCH PISTON
8 - B2 CLUTCH INTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET PLANETARY CARRIER
10 - CENTER PLANETARY GEARSET ANNULUS GEAR
11 - CENTER PLANETARY GEARSET PINION GEARS
12 - CENTER PLANETARY GEARSET SUN GEAR
13 - FRONT PLANETARY GEARSET PINION GEARS
14 - FRONT PLANETARY GEARSET SUN GEAR
15 - B1 CLUTCH INTERNALLY TOOTHED DISC CARRIER
16 - B1 CLUTCH PISTON
17 - B1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER

Three multiple-disc holding clutches, the front, B1 (1), middle, B3 (4), and rear multiple disc clutches, B2 (5), are located in the planetary gear sets in the transmission housing.

A multiple-disc holding clutch consists of a number of internally toothed discs (10) on an internally toothed disc carrier and externally toothed discs (9) on an externally toothed disc carrier, which is rigidly connected to the transmission housing.

OPERATION



Holding Clutches

1 - B1 CLUTCH
2 - EXTERNALLY TOOTHED DISC
3 - INTERNALLY TOOTHED DISC
4 - B3 CLUTCH
5 - B2 CLUTCH
6 - B3 CLUTCH PISTON
7 - B2 CLUTCH PISTON
8 - B2 CLUTCH INTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET PLANETARY CARRIER
10 - CENTER PLANETARY GEARSET ANNULUS GEAR
11 - CENTER PLANETARY GEARSET PINION GEARS
12 - CENTER PLANETARY GEARSET SUN GEAR
13 - FRONT PLANETARY GEARSET PINION GEARS
14 - FRONT PLANETARY GEARSET SUN GEAR
15 - B1 CLUTCH INTERNALLY TOOTHED DISC CARRIER
16 - B1 CLUTCH PISTON
17 - B1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER

The holding clutches connect the annulus gear, sun gear, or planetary carrier of a planetary gear set against the transmission housing in order to transmit the drive torque.

If the piston (16) on multiple-disc holding clutch B1 (1) is subjected to oil pressure, it presses the internal (3) and external discs (2) of the disc set together. The internally toothed disc carrier (15) locks the sun gear (14) against the housing. The planetary pinion gears (13) turn on the sun gear (14).

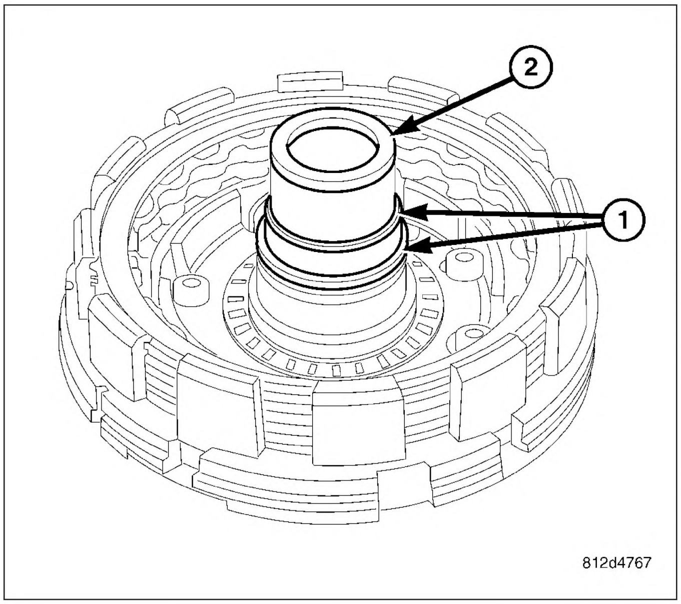
If the multiple-disc holding clutch B2 (5) is actuated via the piston (7), the piston compresses the disc set. The internally toothed disc carrier (8) locks the sun gear (12) against the housing. The planetary pinion gears (11) turn on the sun gear (12).

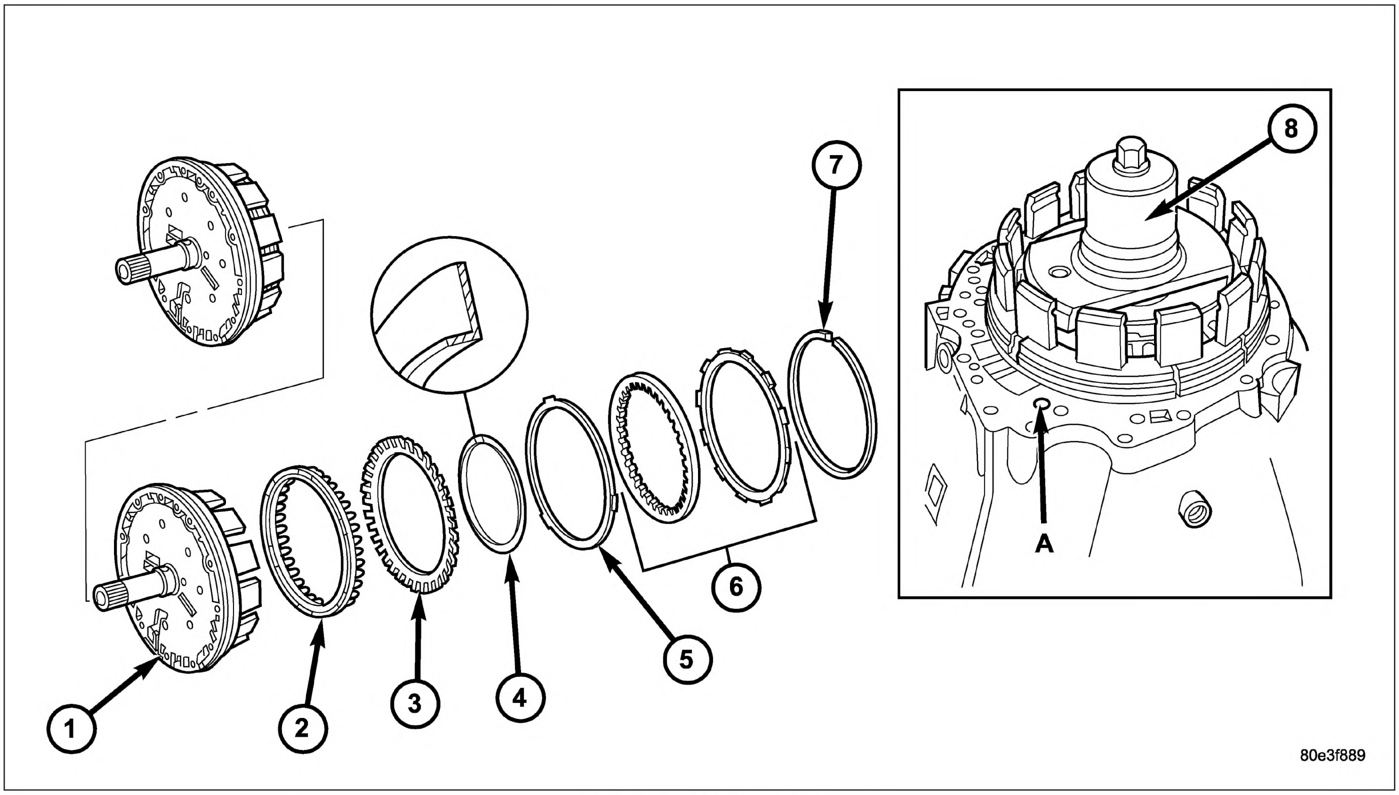
If the multiple-disc holding clutch B3 (4) is actuated via the piston (6), the planetary carrier (9) and the annulus gear (10) are locked. When the multiple-disc brake B3 (4) is actuated, the direction of rotation is reversed.

B1-HOLDING CLUTCH

DISASSEMBLY

1. Remove the teflon rings (1) from the B1 plate carrier hub (2).



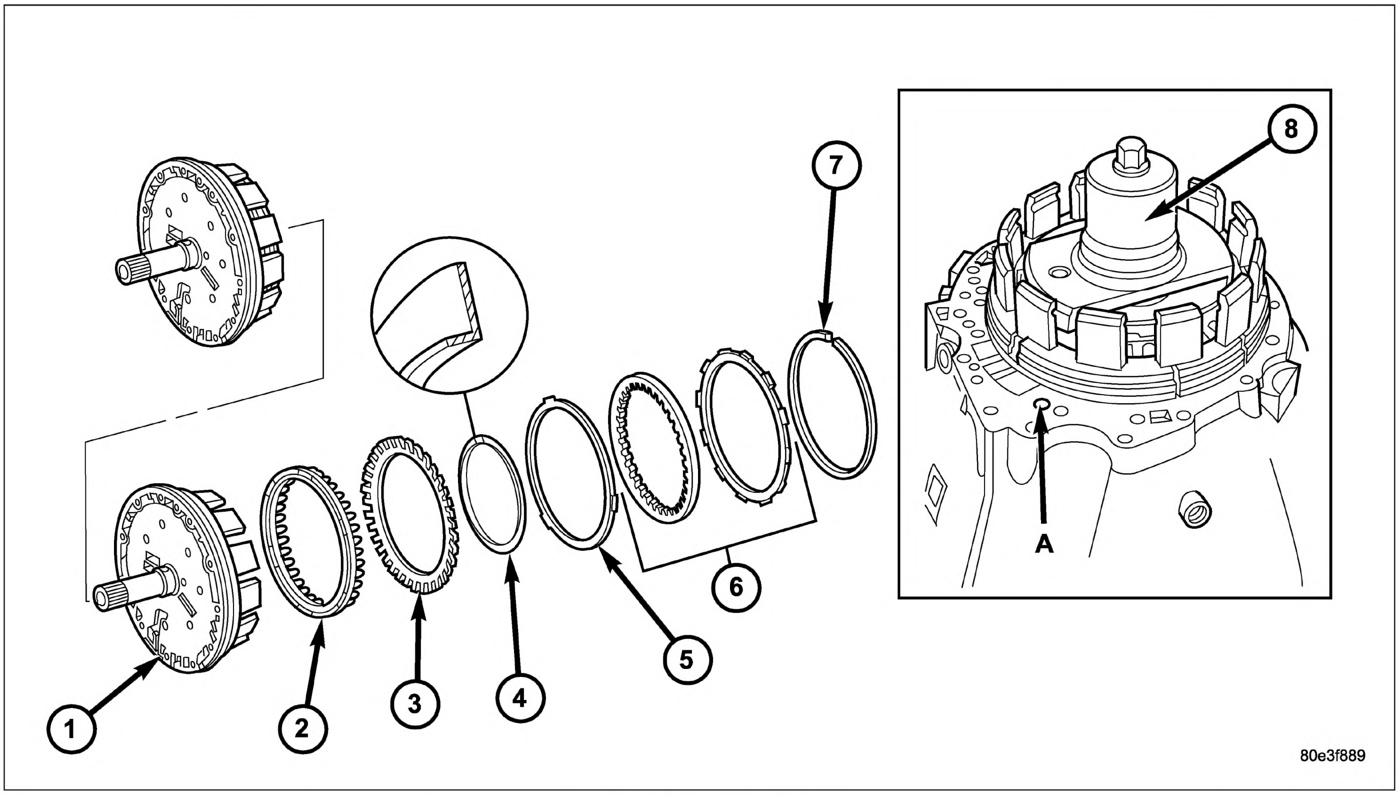


Holding Clutch B1

1 - HOLDING CLUTCH B1 OUTER CARRIER	5 - DISC SPRING
2 - PISTON	6 - MULTIPLE DISC PACK
3 - DISC SPRING	7 - SNAP-RING
4 - SNAP-RING	8 - MULTI-USE SPRING COMPRESSOR 8900

2. Remove snap-ring (7).
3. Remove multiple-disc pack (6) and disc spring (5) from outer multiple-disc carrier. Note which clutch disc is removed just prior to the disc spring (5) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the disc spring.
4. Place the Multi-use Spring Compressor 8900 (8) on disc spring (3) and compress the spring until the snap-ring (4) is exposed.
5. Remove snap-ring (4).
6. Remove piston (2) from the outer multiple-disc carrier by carefully blowing compressed air into the bore (A).

ASSEMBLY



Holding Clutch B1

1 - HOLDING CLUTCH B1 OUTER CARRIER
2 - PISTON
3 - DISC SPRING
4 - SNAP-RING
5 - DISC SPRING
6 - MULTIPLE DISC PACK
7 - SNAP-RING
8 - MULTI-USE SPRING COMPRESSOR 8900

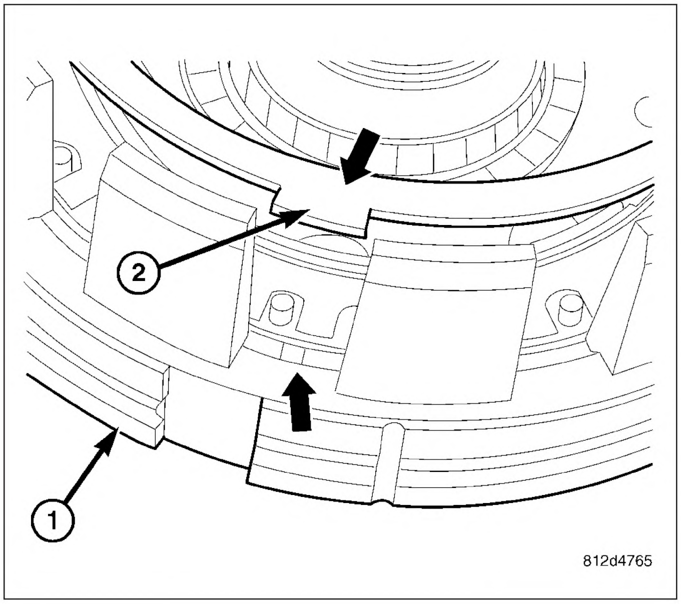
NOTE: Check vulcanized gasket, replace if necessary.

1. Install piston (2) in outer multiple-disc carrier (1).
2. Place compressor (8) on disc spring (3) and compress until the groove of the snap-ring is exposed.

NOTE: The collar of the snap-ring must point towards the multiple-disc pack. After installing, check snap-ring for correct seat.

3. Insert snap-ring (4).

4. Insert disc spring (2) in the outer multiple-disc carrier. Observe the disc spring (2) installation position. The lugs of the disc spring (2) washer must align with the 3 raised pads (arrow) of the B1 multiple-disc carrier (1). The cone of the spring washer must point downwards.

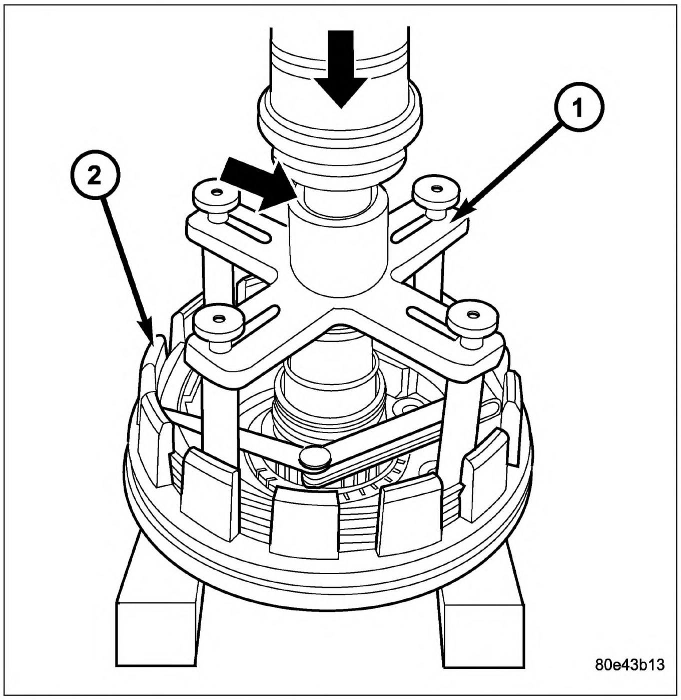


5. Insert the multiple-disc pack (6) in the outer multiple-disc carrier and measure the clutch clearance.

NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the disc spring (5) to its original location.

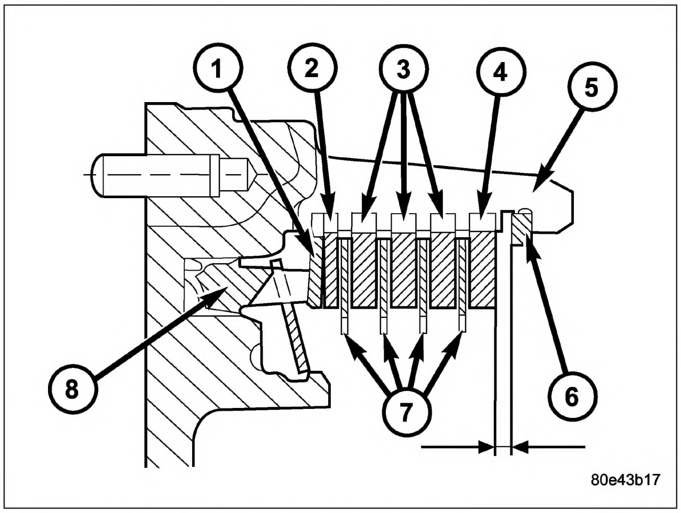
CAUTION: When working with double sided friction discs, an externally lugged steel plate is installed first, followed by a friction disc, and continuing on until all the required discs are installed. When working with single sided friction discs, an externally lugged disc is installed first, followed by an internally lugged disc, and continuing on until all the required discs are installed. All single sided discs are installed with the friction side up.

NOTE: Place new friction multiple-discs in ATF fluid for one hour before installing.



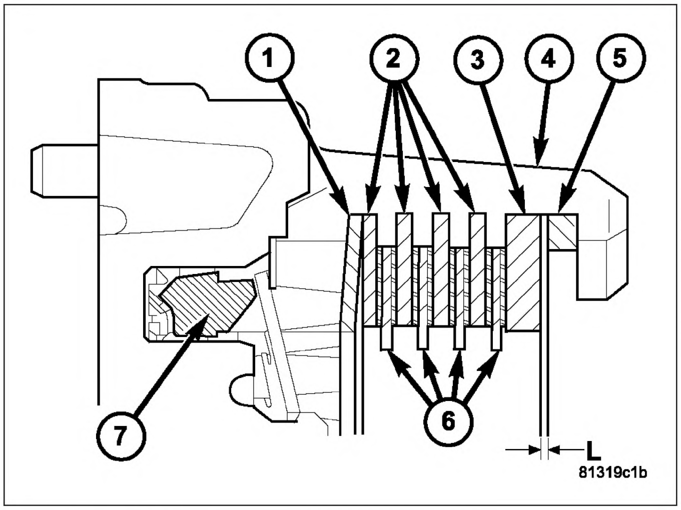
6. Measure B1 clutch clearance by mounting Pressing Tool 8901 (1) on outer multiple disc.
7. Using a lever press , compress pressing tool as far as the stop (then the marking ring is still visible, see small arrow).

8. For transmissions using double sided friction discs, use a feeler gauge to determine the play ″L″ at three points between the snap-ring (6) and outer multiple-disc (4). During the measurement, the snap-ring (6) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (5). The correct clearance for transmissions using double sided friction discs is 2.3-2.7 mm (0.091-0.106 in.) for two friction disc versions, 2.7-3.1 mm (0.106-0.122 in.) for three disc versions, and 3.0-3.4 mm (0.118-0.134 in.) for four disc versions.
9. Adjust with snap-ring (6), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).



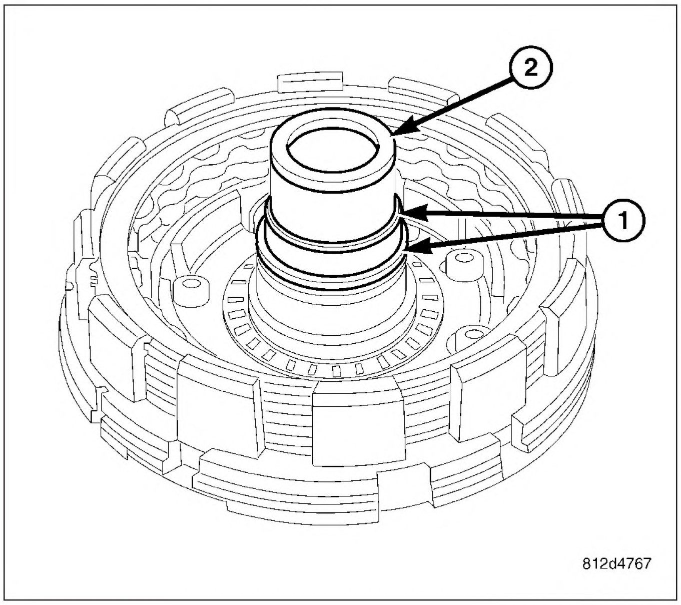
1 - DISC SPRING
2 - OUTER MULTIPLE DISC - 1.8 mm (0.071 IN.)
3 - OUTER MULTIPLE DISC - 2.8 mm (0.110 IN.)
4 - OUTER MULTIPLE DISC - 4.0 mm (0.158 IN.)
5 - B1 OUTER CARRIER
6 - SNAP-RING
7 - INNER MULTIPLE DISCS
8 - PISTON

10. For transmissions using single sided friction discs, use a feeler gauge to determine the play ″L″ at three points between the snap-ring (5) and outer multiple-disc (3). During the measurement, the snap-ring (5) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (4). The correct clearance is 2.2-2.6 mm (0.087-0.102 in.) for four friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for six disc versions, and 2.6-3.0 mm (0.102-0.118 in.) for eight disc versions.
11. Adjust with snap-ring (5), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).



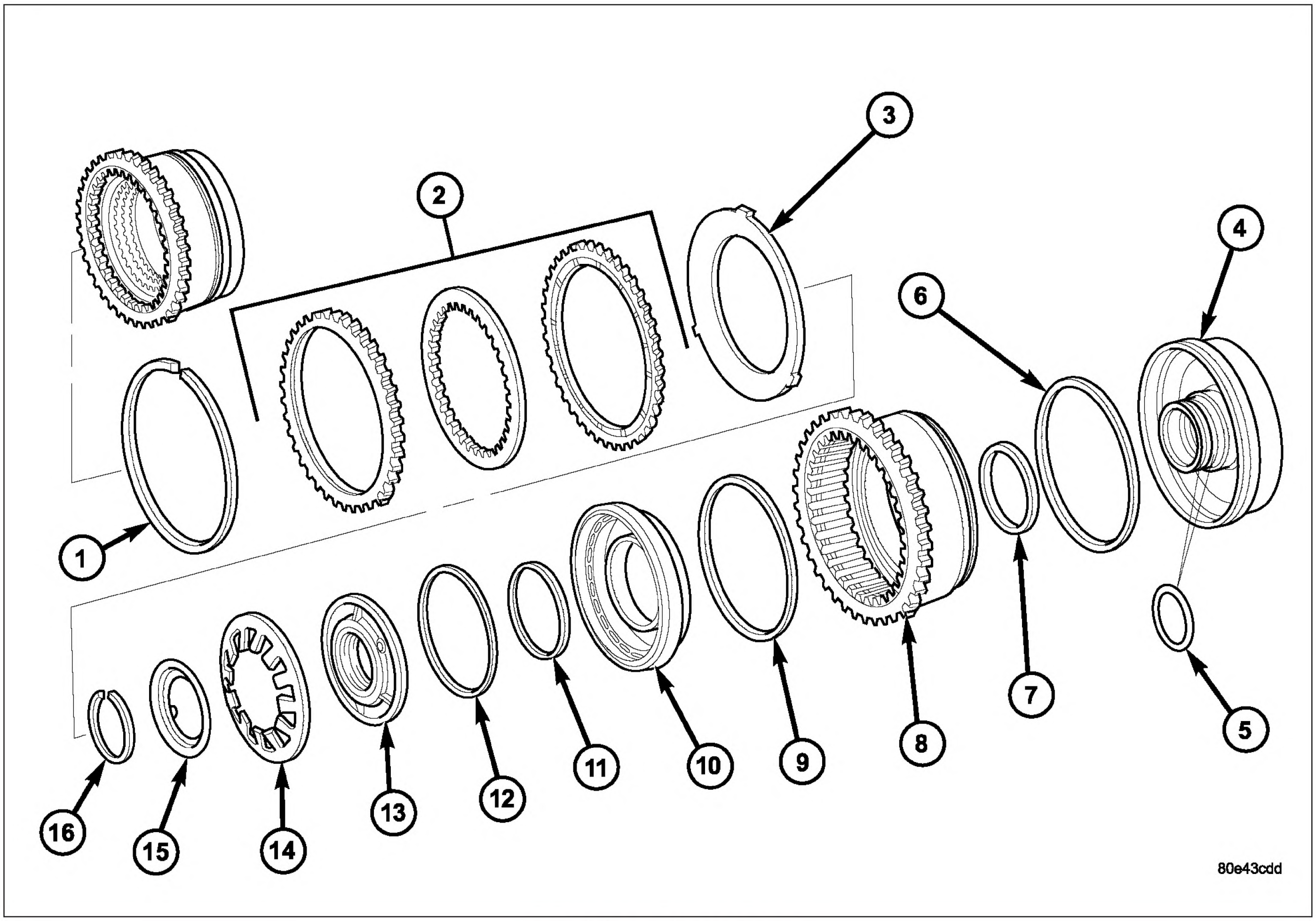
1 - DISC SPRING
2 - OUTER MULTIPLE DISC
3 - OUTER MULTIPLE DISC - 4.0 mm (0.158 IN.)
4 - B1 OUTER CARRIER
5 - SNAP-RING
6 - INNER MULTIPLE DISCS
7 - PISTON

12. Install the teflon rings (1) onto the B1 plate carrier hub (2).
13. Coat Teflon rings (1) lightly with grease and insert in the groove so that the joint remains together.



B2-HOLDING CLUTCH

DISASSEMBLY

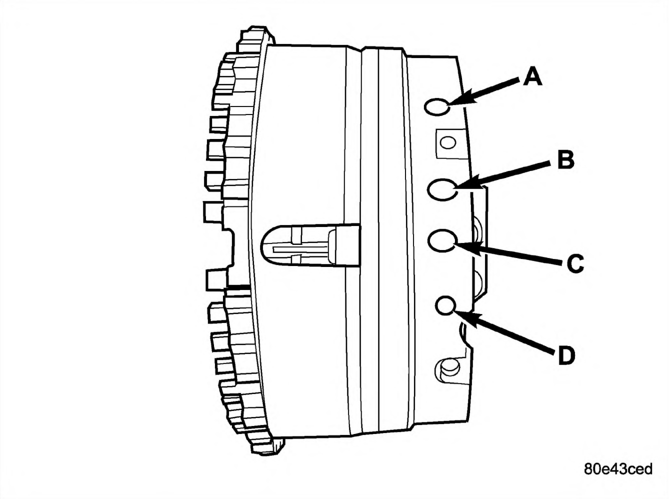


Holding Clutch B2

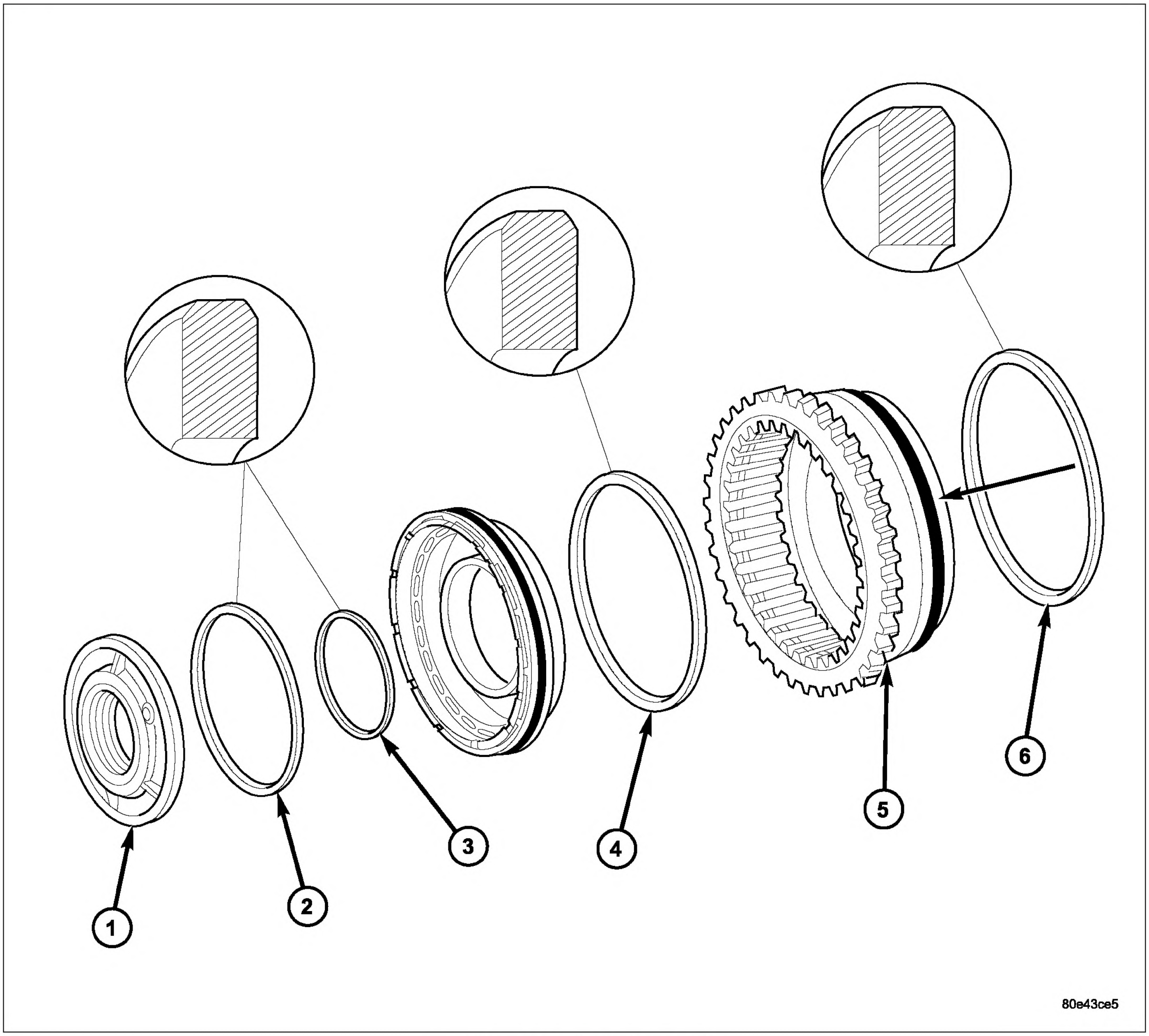
1 - SNAP-RING
2 - MULTIPLE DISC PACK
3 - DISC SPRING
4 - B2 AND B3 PISTON GUIDE
5 - O-RING
6 - B3 PISTON SEALING RING
7 - B3 PISTON SEALING RING
8 - B3 PISTON/B2 OUTER DISC CARRIER
9 - B2 PISTON SEALING RING
10 - B2 PISTON
11 - PISTON GUIDE SEALING RING
12 - PISTON GUIDE SEALING RING
13 - PISTON GUIDE RING
14 - PISTON BACK PRESSURE DISC SPRING
15 - SPRING PLATE
16 - SNAP-RING

1. Remove snap ring (1).
2. Take multiple-disc pack B2 (2) and disc spring (3) out of the outer multiple-disc carrier B2 (8). The outer multiple-disc carrier for the multi-disc holding clutch B2 is the piston for the multiple-disc holding clutch B3 at the same time. Note which clutch disc is removed just prior to the disc spring (3) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the disc spring.
3. Place the Multi-use Spring Compressor 8900 on the spring disc (14) and compress the spring until the groove for the snap-ring is exposed.
4. Remove snap-ring (16).
5. Remove spring plate (15) and disc spring (14).

6. Separate piston guide ring (13) and the B2 piston (10) from the B3 piston (8) by blowing compressed air into the bore (**D**).
7. Press piston guide ring (13) out of the B2 piston (10).
8. Separate piston guide (4) from the B3 piston (8) by blowing compressed air into the bore (**A**).



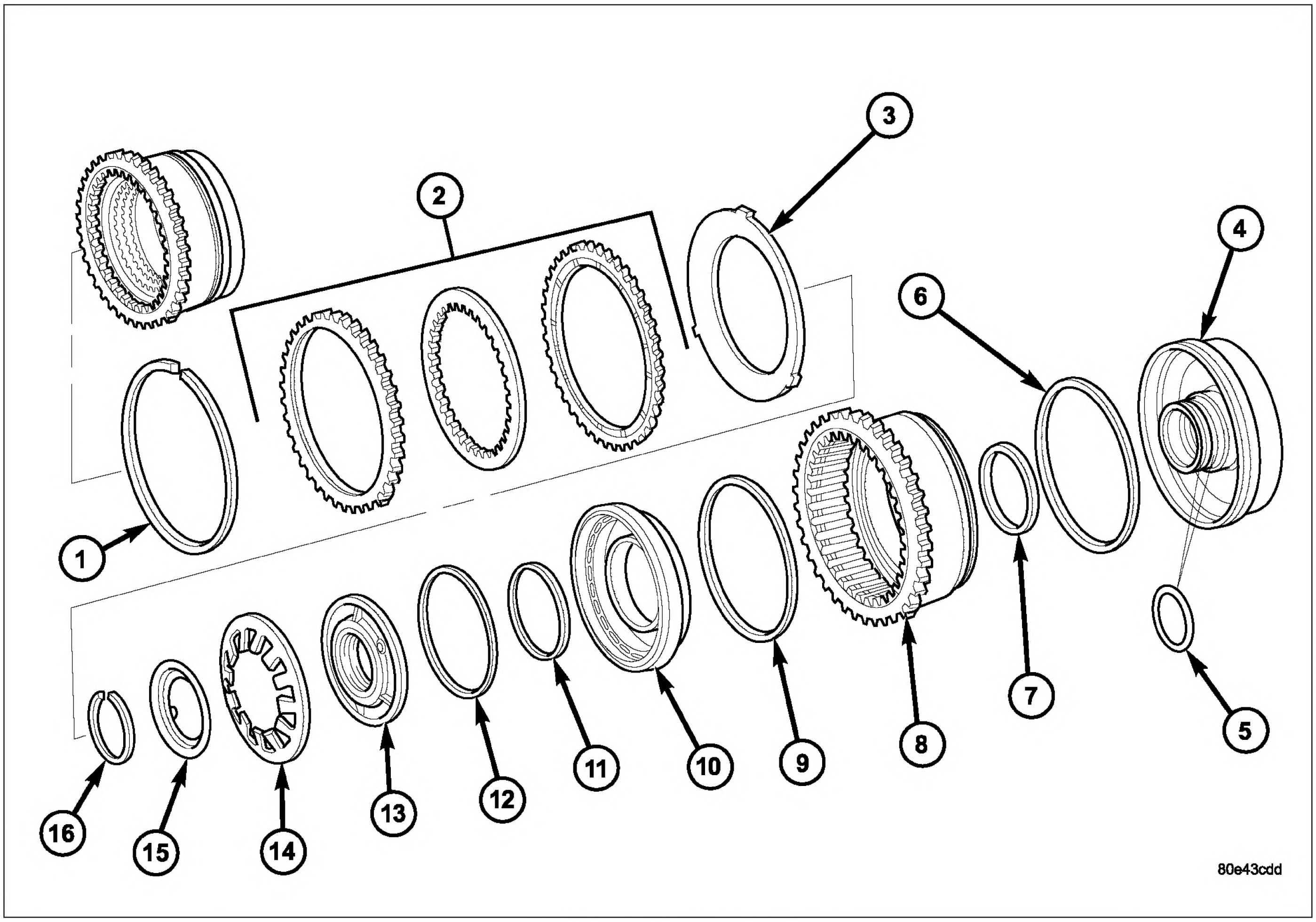
ASSEMBLY



Holding Clutch B2/B3 Seals

1 - PISTON GUIDE RING	4 - B2 PISTON SEALING RING
2 - PISTON GUIDE RING SEALING RING	5 - B3 PISTON/B2 OUTER DISC CARRIER
3 - PISTON GUIDE RING SEALING RING	6 - B3 PISTON SEALING RING

1. Check all sealing rings (2-4, 6), replace if necessary. The rounded off edges on the sealing rings (2, 4, 6) must point outwards.

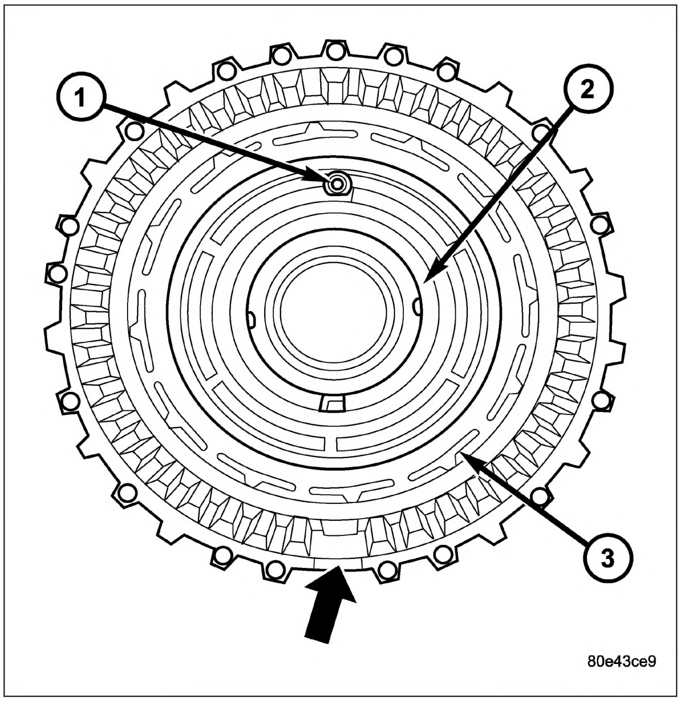


Holding Clutch B2

1 - SNAP-RING
2 - MULTIPLE DISC PACK
3 - DISC SPRING
4 - B2 AND B3 PISTON GUIDE
5 - O-RING
6 - B3 PISTON SEALING RING
7 - B3 PISTON SEALING RING
8 - B3 PISTON/B2 OUTER DISC CARRIER
9 - B2 PISTON SEALING RING
10 - B2 PISTON
11 - PISTON GUIDE SEALING RING
12 - PISTON GUIDE SEALING RING
13 - PISTON GUIDE RING
14 - PISTON BACK PRESSURE DISC SPRING
15 - SPRING PLATE
16 - SNAP-RING

2. Assemble piston guide (4) and B3 piston (8) in the correct position. Verify that the missing tooth in the B3 piston/B2 outer disc carrier (8) is aligned with the centerline of the two threaded holes in the B2 and B3 piston guide (4).
3. Insert B2 piston (10) in B3 piston (8).

4. Insert piston guide ring (2). The valve (1) in the piston guide ring must be on top.



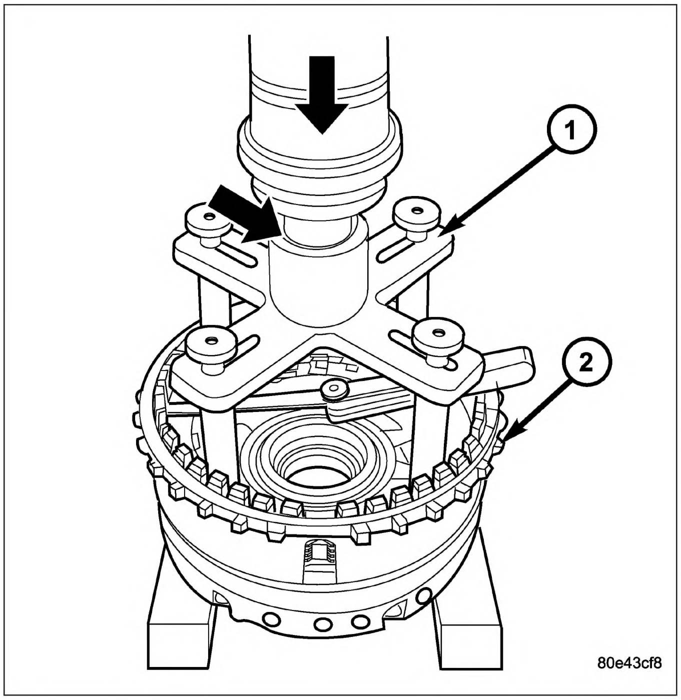
5. Insert disc spring (14) and spring plate (15). Insert disc spring with the curvature towards the spring plate
6. Place Multi-use Spring Compressor 8900 on the disc spring (14) and compress the spring until the groove for the snap-ring is exposed.
7. Insert snap-ring (16).

NOTE: Pay attention to sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the disc spring (3) to its original location. Place new friction multiple-discs in ATF fluid for one hour before installing.

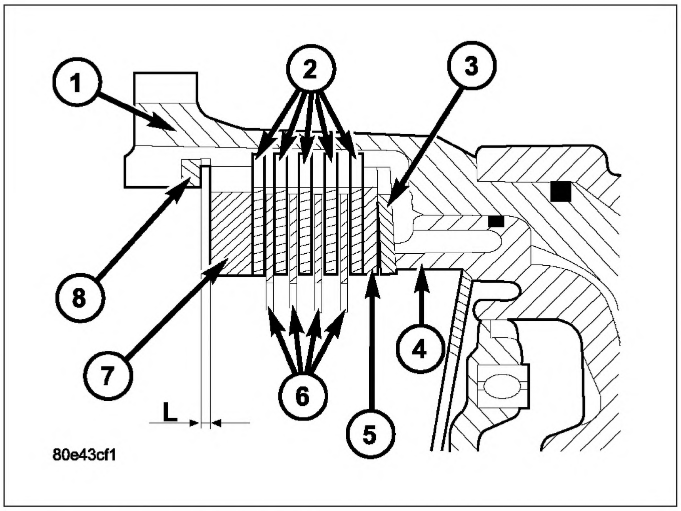
8. Insert disc spring (3) and multiple-disc pack (2) in the B2 outer multiple-disc carrier.
9. Insert snap-ring (1).

NOTE: During the measurement the snap-ring (8) must contact the upper bearing surface of the groove in the outer multiple-disc carrier.

10. Measure the B2 clutch pack clearance by mounting the Pressing Tool 8901 (1) on outer multiple disc.
11. Using a lever press, compress the pressing tool as far as the stop (then the marking ring is still visible, see small arrow).



12. Using a feeler gauge, determine the play ″L″ at three points between the snap-ring (8) and outer multiple-disc (7).
13. The correct clutch clearance is 1.9-2.3 mm (0.075-0.091 in.) for the four friction disc versions and 2.0-2.4 mm (0.079-0.095 in.) for the five disc versions.
14. Adjust with snap-ring (8), if necessary. Snap-rings are available in thicknesses of 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).

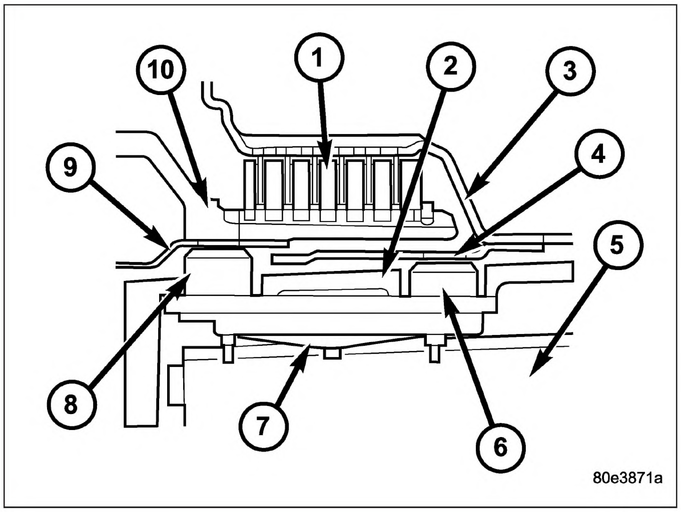


1 - B2 OUTER DISC CARRIER
2 - FRICTION DISCS
3 - DISC SPRING
4 - B2 PISTON
5 - OUTER MULTIPLE DISC - 1.8 MM (0.071 IN.)
6 - OUTER MULTIPLE DISC - 1.8 MM (0.071 IN.)
7 - OUTER MULTIPLE DISC - 6.5 MM (0.256 IN.)
8 - SNAP-RING

INPUT SPEED SENSORS

DESCRIPTION

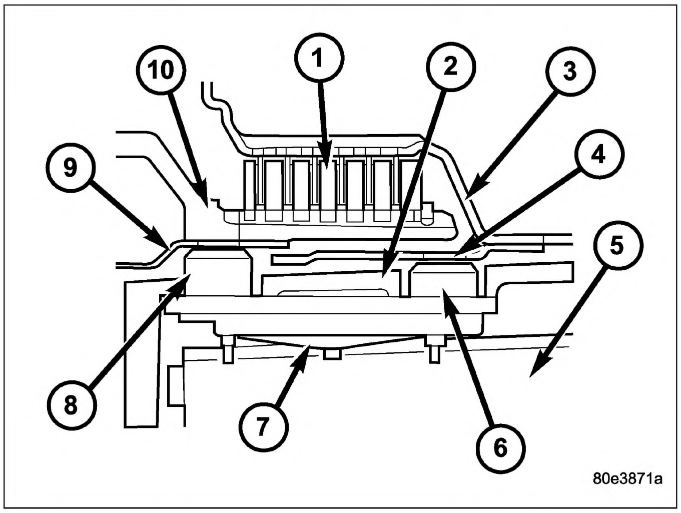
The input speed sensors (6, 8) are fixed to the shell of the control unit via contact blades. The speed sensors are pressed against the transmission housing (2) by a spring (7) which is held against the valve housing of the shift plate (5). This ensures a defined distance between the speed sensors and the exciter ring (4).



OPERATION

Signals from the input speed sensors (6, 8) are recorded in the transmission control module (TCM) together with the wheel and engine speeds and other information and are processed into an input signal for electronic control.

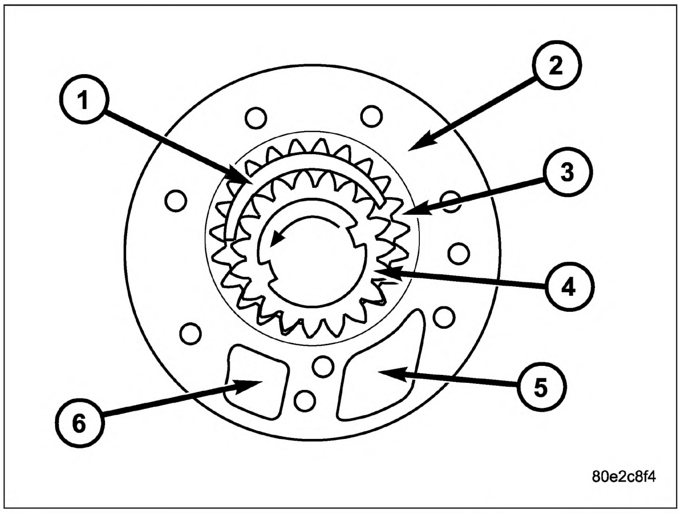
Input speed sensor N2 (6) records the speed of the front sun gear via the externally toothed disc carrier of the multiple-disc clutch K1 (10) and input speed sensor N3 (8) records the speed of the front planet carrier via the internally toothed disc carrier of multiple-disc clutch K1 (3).



PUMP-OIL

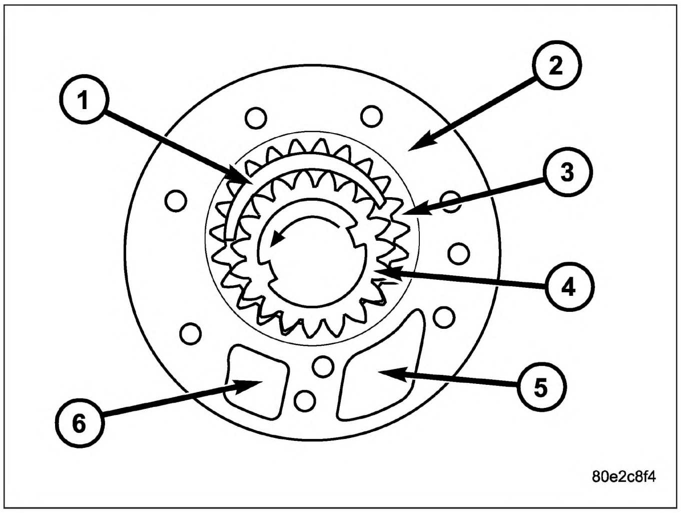
DESCRIPTION

The oil pump (2) (crescent-type pump) is installed in the bellhousing behind the torque converter and is driven by the drive flange of the torque converter. The pump creates the oil pressure required for the hydraulic procedures.



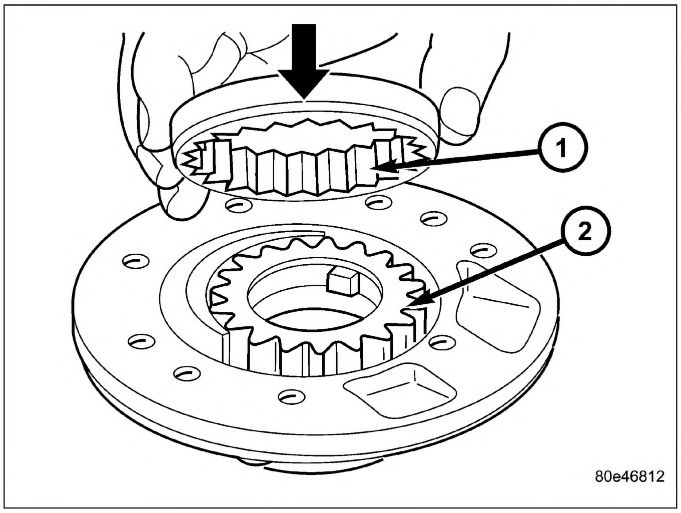
OPERATION

When the engine is running, the oil is pumped through the inlet chamber (5) along the upper and lower side of the crescent (1) to the pressure chamber (6) of the housing. The meshing of the teeth prevents oil flowing from the delivery side to the intake side. An external gear (3) is eccentrically mounted in the pump housing. The external gear is driven by the internal gear (4) which is connected to the torque converter hub.

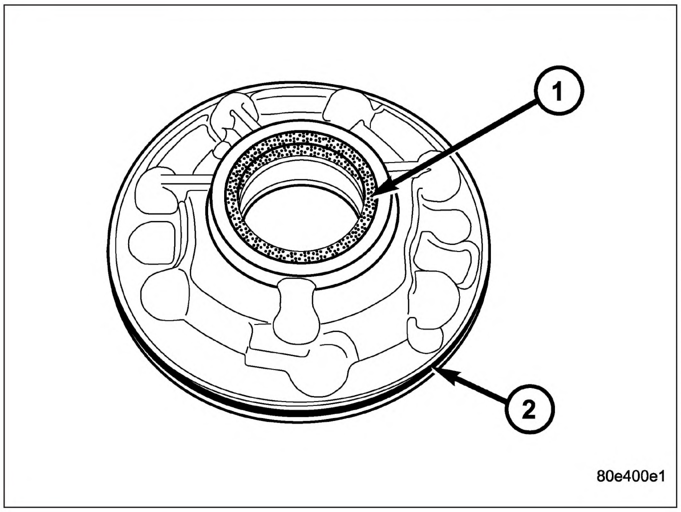


DISASSEMBLY

1. Remove pump gears (1 and 2) from pump housing.



2. Remove the inner oil pump seal (1).
3. Replace the outer oil pump O-ring (2).



INSPECTION

Before measuring any oil pump components, perform a thorough visual inspection of all the components. If any sign of scoring, scratches, or other damage is seen, replace the oil pump as an assembly.

SIDE CLEARANCE

Side clearance is the difference between the thickness of the pump gears and the depth of the pocket in the pump housing. Side clearance can be measured by laying a flat plate across the mounting face of the pump housing, and measuring the distance between the plate and the gears.

Acceptable side clearance:

- Inner gear: 0.064 mm (0.0025 in) max
- Outer gear: 0.069 mm (0.0027 in) max

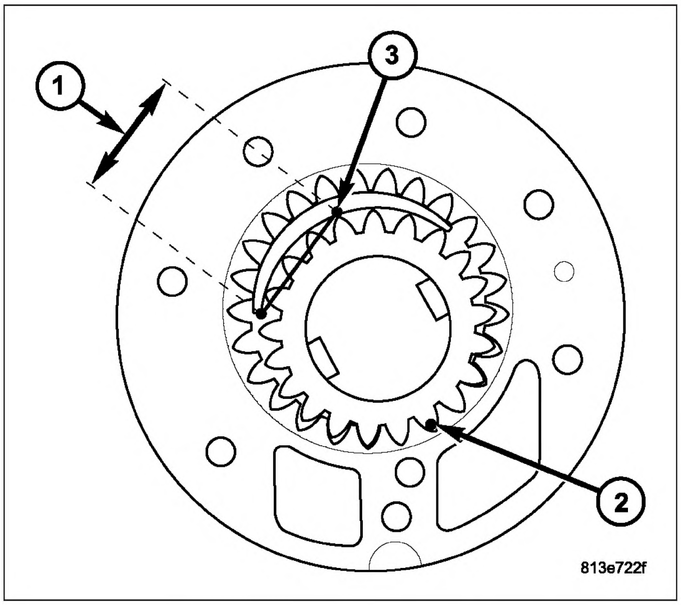
TIP CLEARANCE

Tip clearance is the difference between the tip diameters of the gear teeth and the corresponding diameters of the pocket in the pump housing.

Tip clearance for the inner gear can be checked by moving the inner gear into tight mesh (2) with the outer gear as shown. Clearance between the ID of the crescent feature of the housing and the OD of the teeth of the inner gear (3) should then me measured at a point 37 mm from the corner of the crescent (1) feature, as shown below.

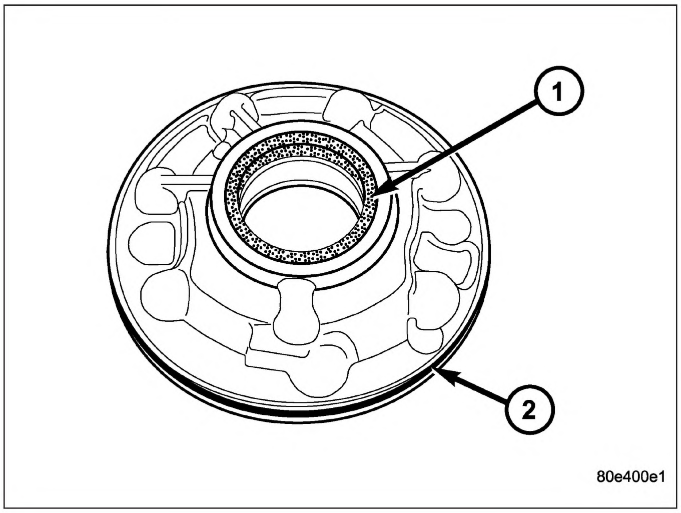
Acceptable tip clearance for inner gear:

- 0.85 mm (0.033 in) max

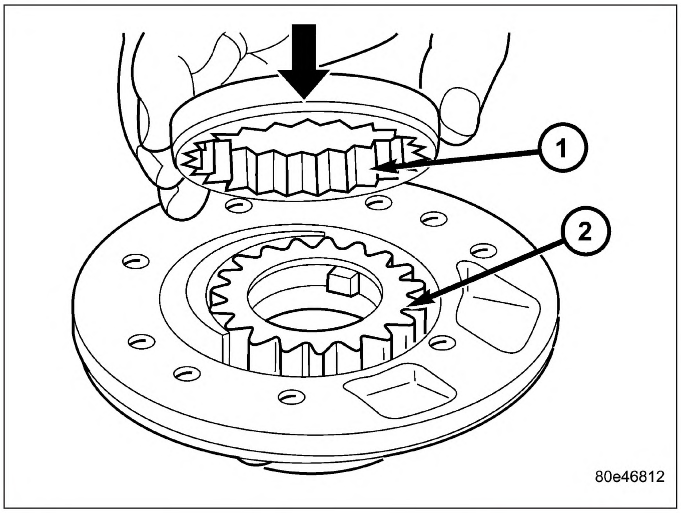


ASSEMBLY

1. Install new inner oil pump seal (1) with Seal Installer 8902-A.
2. Replace O-ring (2).



3. Lubricate pump gears and place in the pump housing. Insert pump gear (1) so that the chamfer (arrow) points towards the pump housing.

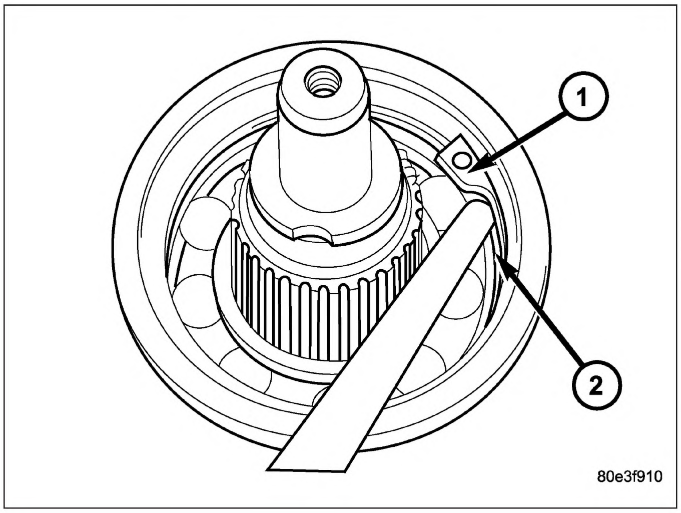


BEARING-OUTPUT SHAFT

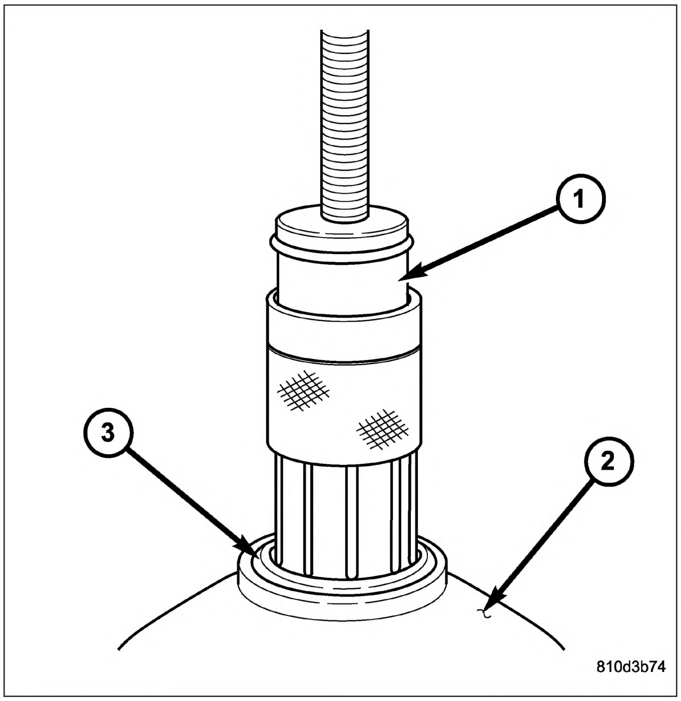
REMOVAL

1. Raise and support vehicle.
2. For 2WD transmissions:
   a. Remove the propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL).
   b. Remove the nut holding the propeller shaft flange to the output shaft and remove the flange.
3. For 4WD transmissions:
   a. Remove the transfer case (Refer to 21 - TRANSMISSION/TRANSFER CASE - REMOVAL).
   b. Remove the bolts holding the transfer case adapter housing onto the transmission case.
   c. Remove the transfer case adapter housing from the transmission case.
   d. Remove the bolt holding the output shaft extension to the output shaft.
   e. Remove the output shaft extension from the output shaft.

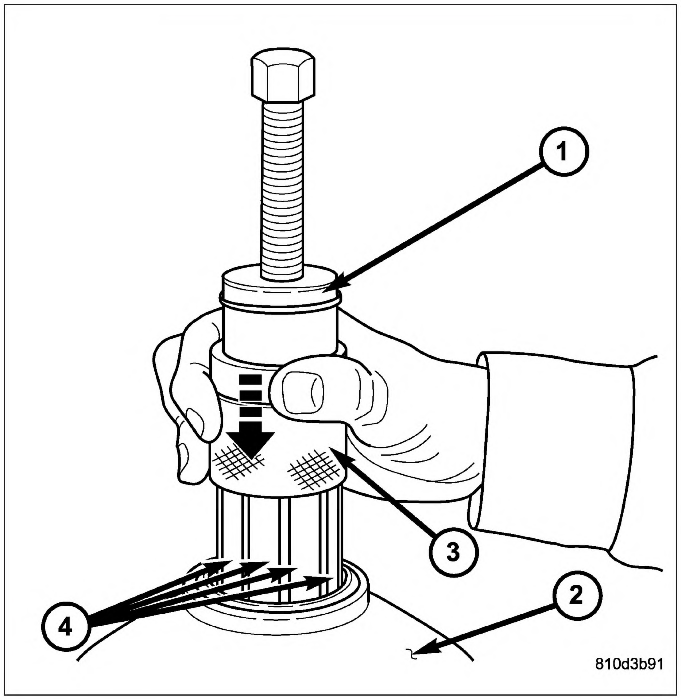
4. Remove the transmission rear oil seal with a suitable slide hammer and screw.
5. Remove the transmission output shaft washer. Be sure to tag the washer since it is very similar to the geartrain end-play shim and they must not be interchanged.
6. Remove the transmission rear output shaft bearing retaining ring (1).



7. Position Bearing Remover 9082 (1) over the inner race of the output shaft bearing (3).


1
3
2
810d3b74

8. Slide the collar (3) on the Bearing Remover 9082 (1) downward over the fingers of the tool.


1
3
4
2
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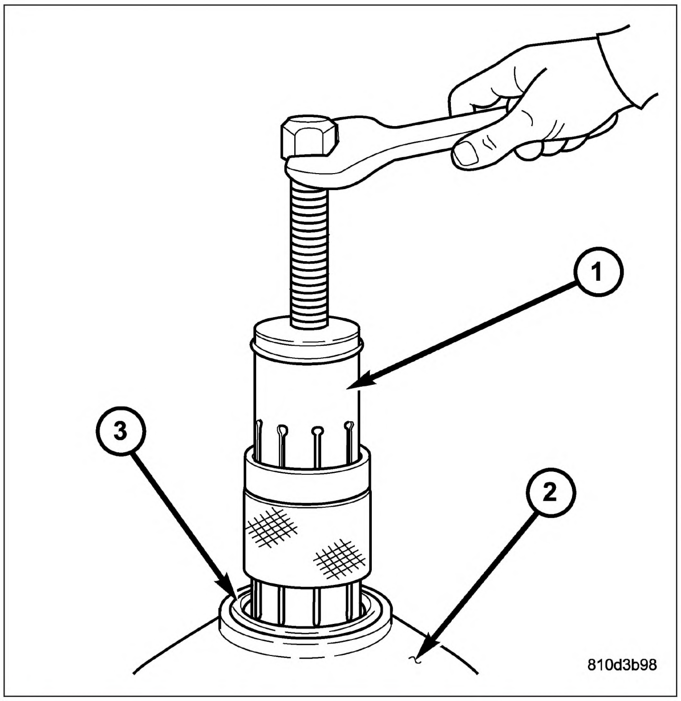
9. Remove the output shaft bearing (3).

CAUTION: Verify that the geartrain end-play shim has remained on the output shaft and against the park gear. The shim may be adhered to the bearing inner race. Retrieve the shim from the bearing and install over the output shaft and against the park gear.

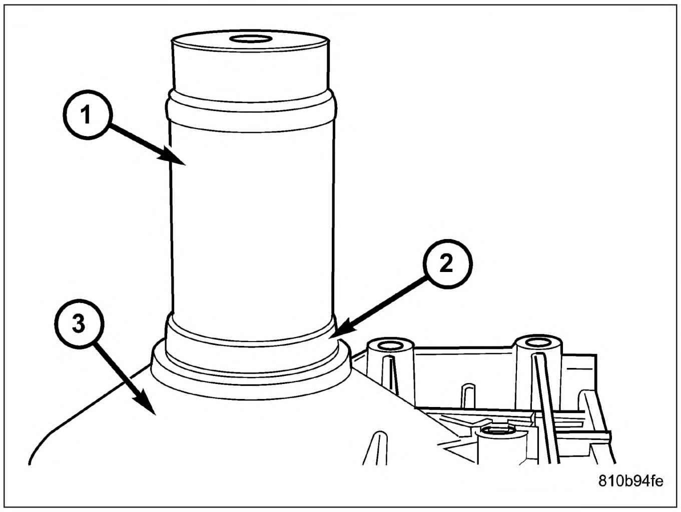


INSTALLATION

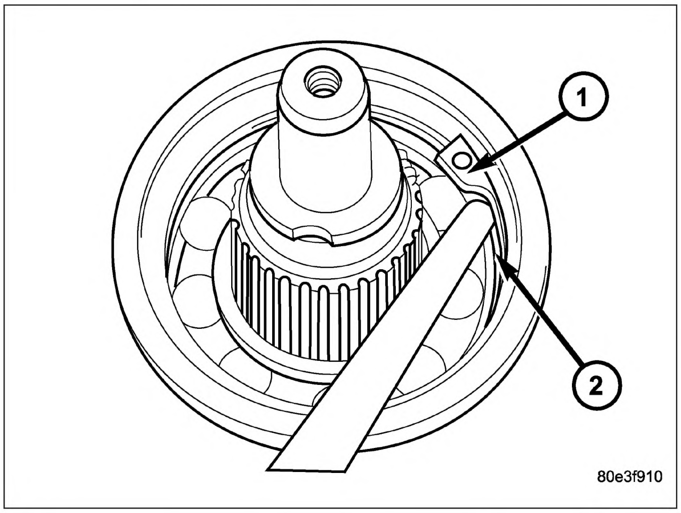
CAUTION: Verify that the geartrain end-play shim is properly installed over the output shaft and against the park gear.

NOTE: The closed side of the bearing must be installed toward the parking lock gear. If the bearing is installed in the other direction, the transmission gearcase will need to be removed in order to remove the bearing.

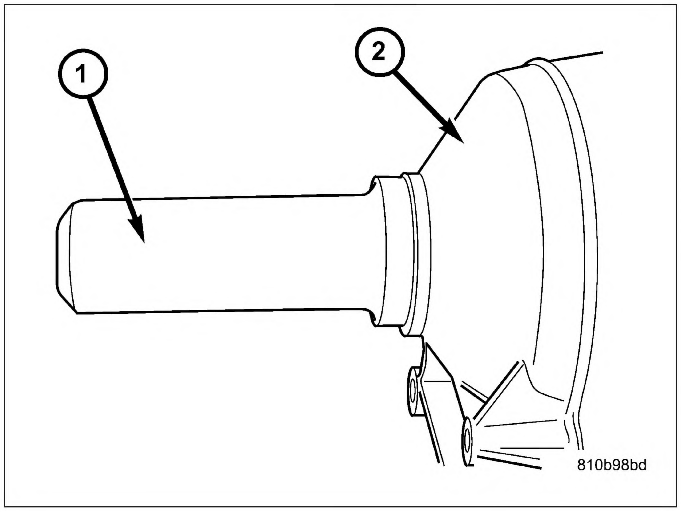
1. Using Bearing Installer 9287 (1), install the output shaft bearing (2) into the transmission housing (3). The closed side of the plastic cage must point towards the parking lock gear.



2. Install the retaining ring (1). Ensure that the retaining ring is seated correctly in the groove.
3. Check that there is no play between the bearing and the retaining ring using feeler gauge.
4. There must be no play between the retaining ring and the bearing. If the ring cannot be installed, a thinner ring must be used. If there is play between the ring and the bearing, a thicker ring must be installed. Retaining rings are available in thicknesses of 2.0 mm (0.079 in.), 2.1 mm (0.083 in.), and 2.2 mm (0.087 in.).

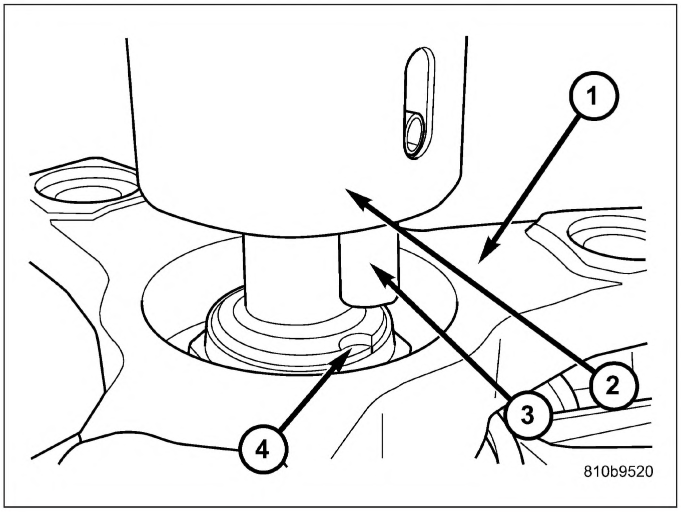


5. Install the output shaft washer onto the output shaft.
6. Install a new transmission rear seal into the transmission case with Seal Installer 8902A (1).
7. For 4WD transmissions:
    a. Install the output shaft extension onto the output shaft.
    b. Install the nut to hold the output shaft extension to the output shaft. Torque the bolt to 200 N·m (147.5 ft.lbs.).
    c. Install the transfer case adapter housing onto the transmission case.
    d. Install the bolts to hold the transfer case adapter housing onto the transmission case. Torque the bolt to 20 N·m (177 in.lbs.).
    e. Install the transfer case (Refer to 21 - TRANSMISSION/TRANSFER CASE - INSTALLATION).
8. For 2WD transmissions, install the propeller shaft flange onto the output shaft and install an new flange nut. Tighten the flange nut to 200 N·m (147.5 ft.lbs.).

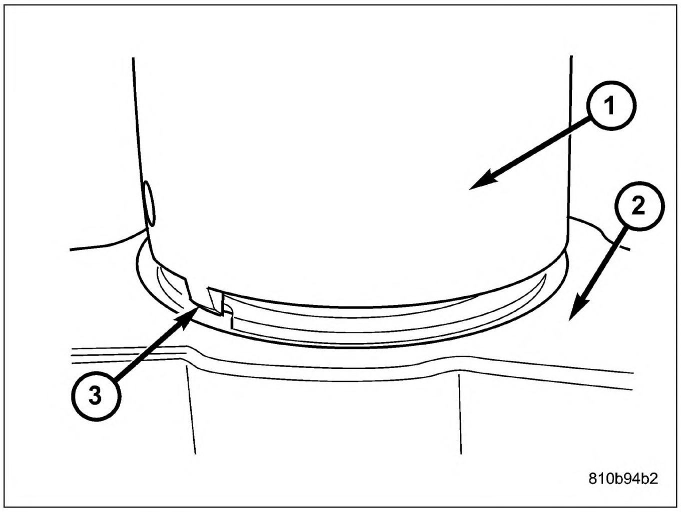


NOTE: The Staking Tool - 9078 has two possible locations for the beveled staking pin. The pin must be installed in the hole labeled “Transmission” for this operation. This hole is located directly across from the spring loaded alignment pin.

9. Place the Staking Tool 9078 and Driver Handle C-4171 onto the output shaft.



10. Rotate the Staking Tool 9078 (2) until the alignment pin (3) engages the output shaft notch (4).
11. Press downward on the staking tool until the staking pin contacts the output shaft nut flange.
12. Strike the Driver handle C-4171 with a suitable hammer until the output shaft nut is securely staked to the output shaft.
13. For 2WD transmissions, install the propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION).



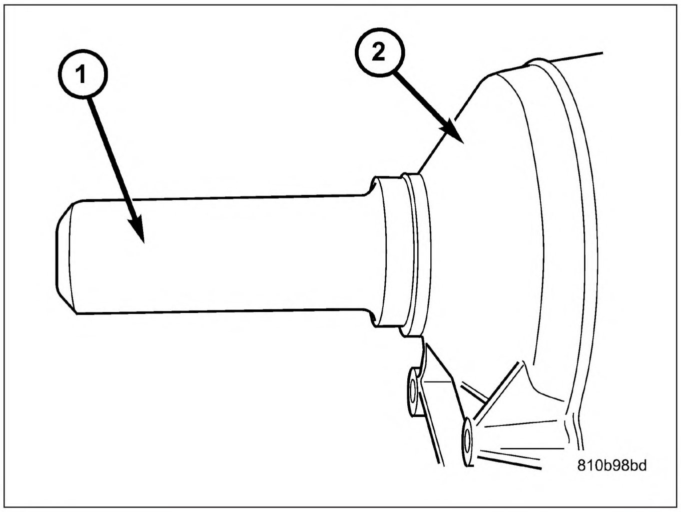
SEAL-OUTPUT SHAFT

REMOVAL

1. For 2WD transmissions;
    a. Remove the propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL). Move propeller shaft to the right and tie up.
    b. Remove the nut holding the propeller shaft flange to the output shaft and remove the flange.
2. For 4WD transmissions:
    a. Remove the transfer case (Refer to 21 - TRANSMISSION/TRANSFER CASE - REMOVAL).
    b. Remove the bolts holding the transfer case adapter housing onto the transmission case.
    c. Remove the transfer case adapter housing from the transmission case.
    d. Remove the bolt holding the output shaft extension to the output shaft.
    e. Remove the output shaft extension from the output shaft.
3. Remove the output shaft seal with suitable screw and slide hammer.

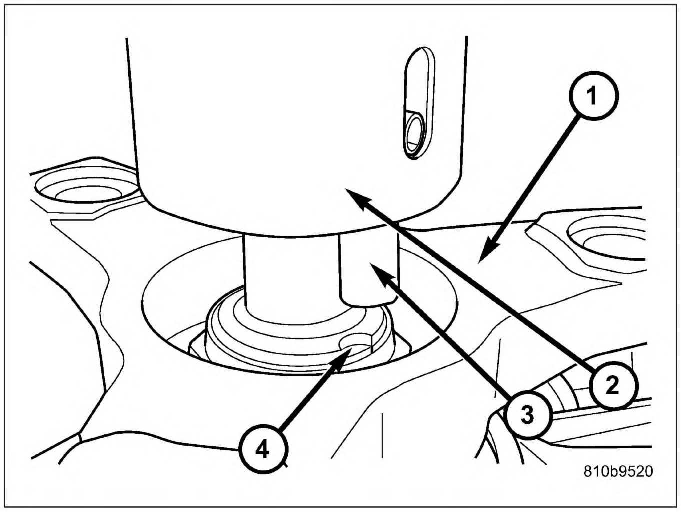
INSTALLATION

1. Position the new output shaft seal over the output shaft and against the transmission case.
2. Use Seal Installer 8902A (1) to install the seal.
3. For 4WD transmissions:
    a. Install the output shaft extension onto the output shaft.
    b. Install the bolt to hold the output shaft extension to the output shaft. Torque the bolt to 200 N·m (147.5 ft.lbs.).
    c. Install the transfer case adapter housing onto the transmission case.
    d. Install the bolts to hold the transfer case adapter housing onto the transmission case. Torque the bolt to 20 N·m (177 in.lbs.).

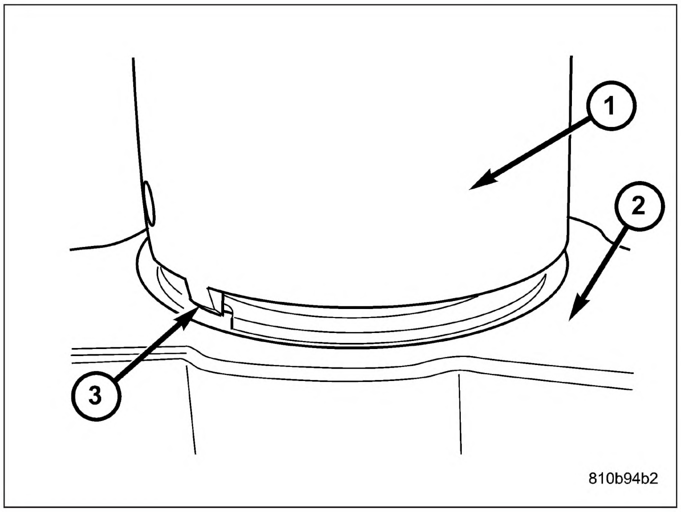


e. Install the transfer case (Refer to 21 - TRANSMISSION/TRANSFER CASE - INSTALLATION).

4. For 2WD transmissions, install the propeller shaft flange onto the output shaft and install an new flange nut. Tighten the flange nut to 200 N·m (147.5 ft.lbs.).
5. Place the Staking Tool 9078 and Driver Handle C-4171 onto the output shaft.
6. Rotate the Staking Tool 9078 (2) until the alignment pin (3) engages the output shaft notch (4).



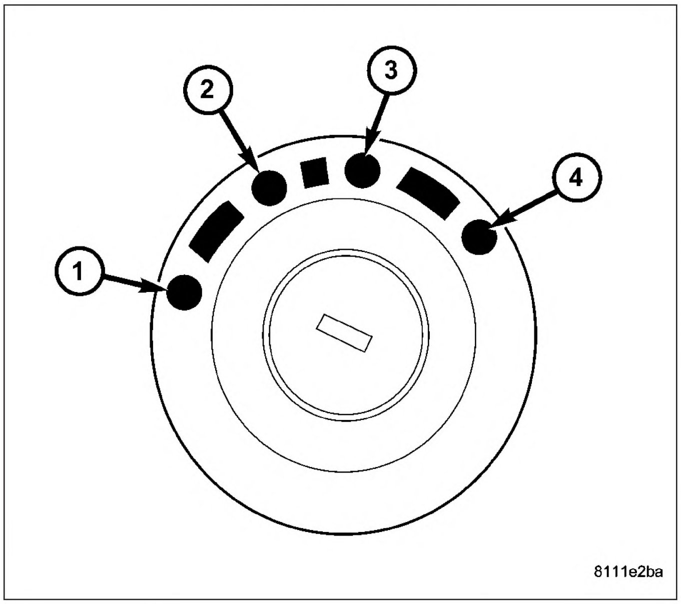
7. Press downward on the staking tool until the staking pin contacts the output shaft nut flange.
8. Strike the Driver handle C-4171 with a suitable hammer until the output shaft nut is securely staked to the output shaft.
9. For 2WD transmissions, install the propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION).



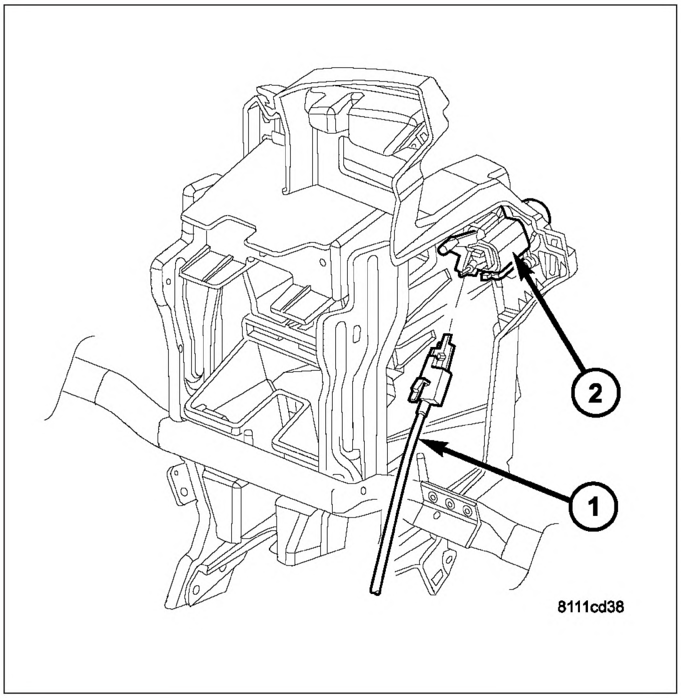
CABLE-PARK LOCK

REMOVAL

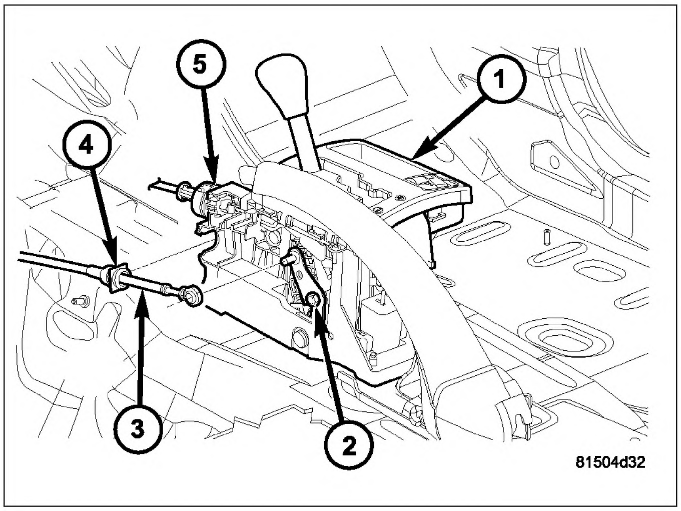
1. Place ignition key in the ACC (2) position.



2. Remove the lower instrument panel trim as necessary to access the park lock cable.
3. Disconnect park lock cable (4) from ignition cylinder (3).

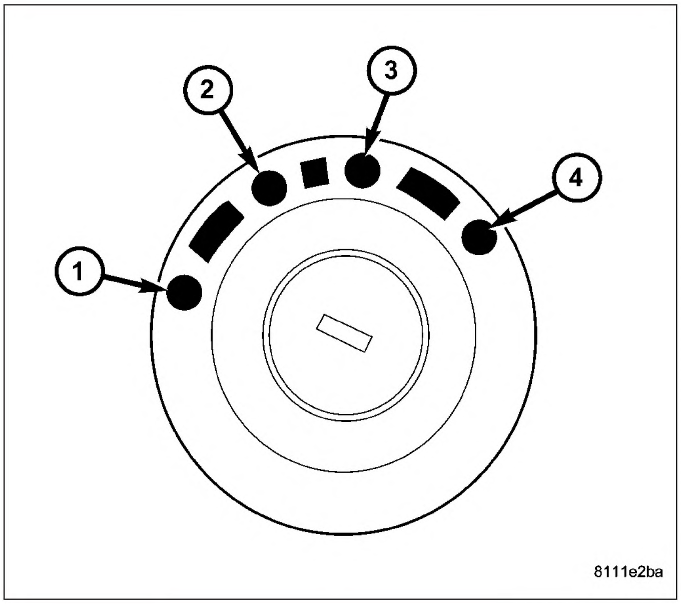


4. Remove the floor console as necessary for access to the park lock cable. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
5. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
6. Disconnect the park lock cable (5) from the shift mechanism. Release retention tab using suitable screwdriver.

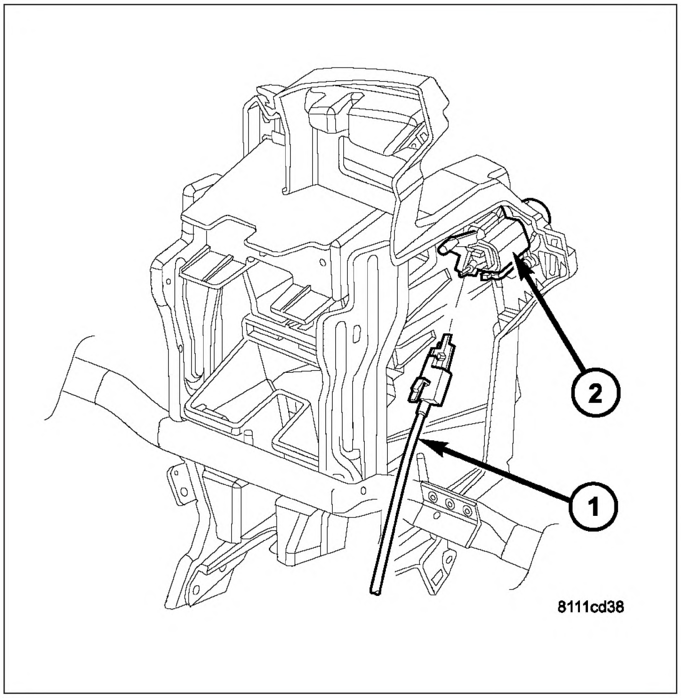


INSTALLATION

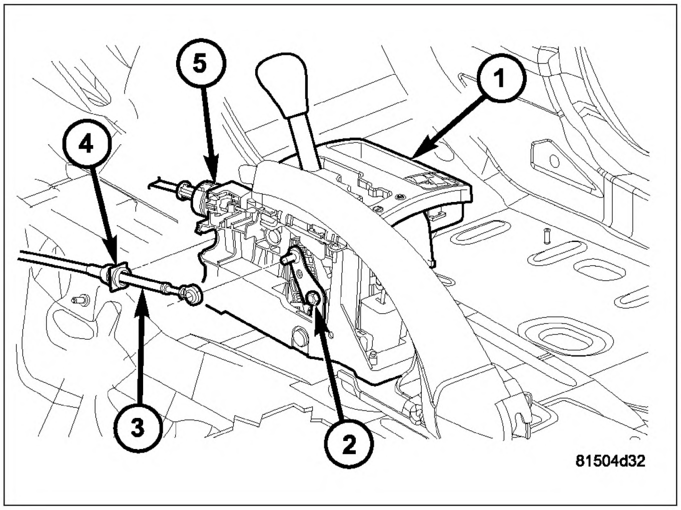
1. Verify that ignition key is in ACC (2) position.



2. Install the park lock cable (4) to the ignition cylinder (3). Secure the cable to instrument panel at retainer.
3. Install any instrument panel trim that was removed to access the park lock cable.



4. Route park lock cable towards shift mechanism.
5. Connect the park lock cable (5) core to shift mechanism cam, and then secure cable housing to shift mechanism.

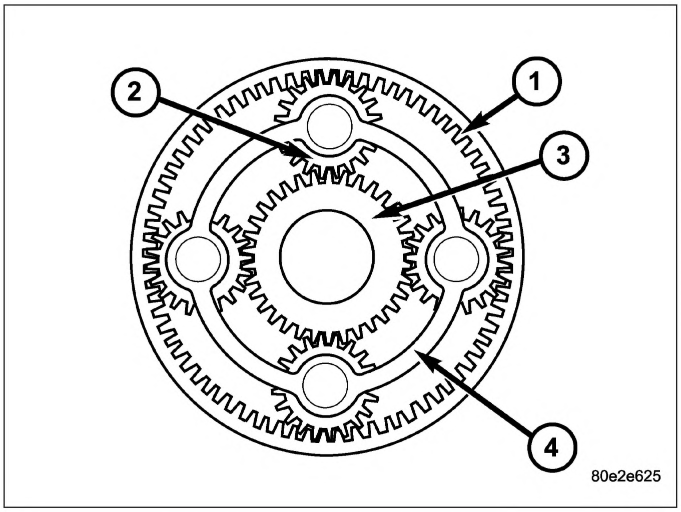


6. Adjust the park lock cable. (Refer to 21 - TRANSMISSION/AUTOMATIC TRANSMISSION/SHIFT INTERLOCK MECHANISM - ADJUSTMENTS)
7. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
8. Install the floor console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

GEARTRAIN-PLANETARY

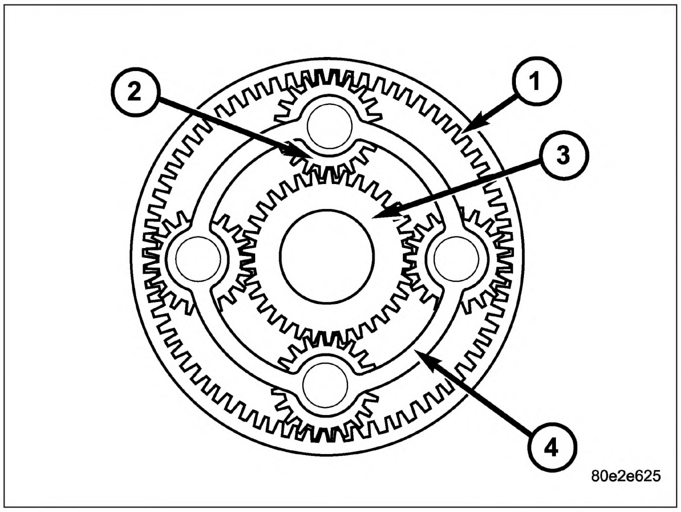
DESCRIPTION

Three planetary gear sets are used to produce the different gear ratios. These are located in the mechanical part of the transmission as the front, middle and rear planetary gear sets.



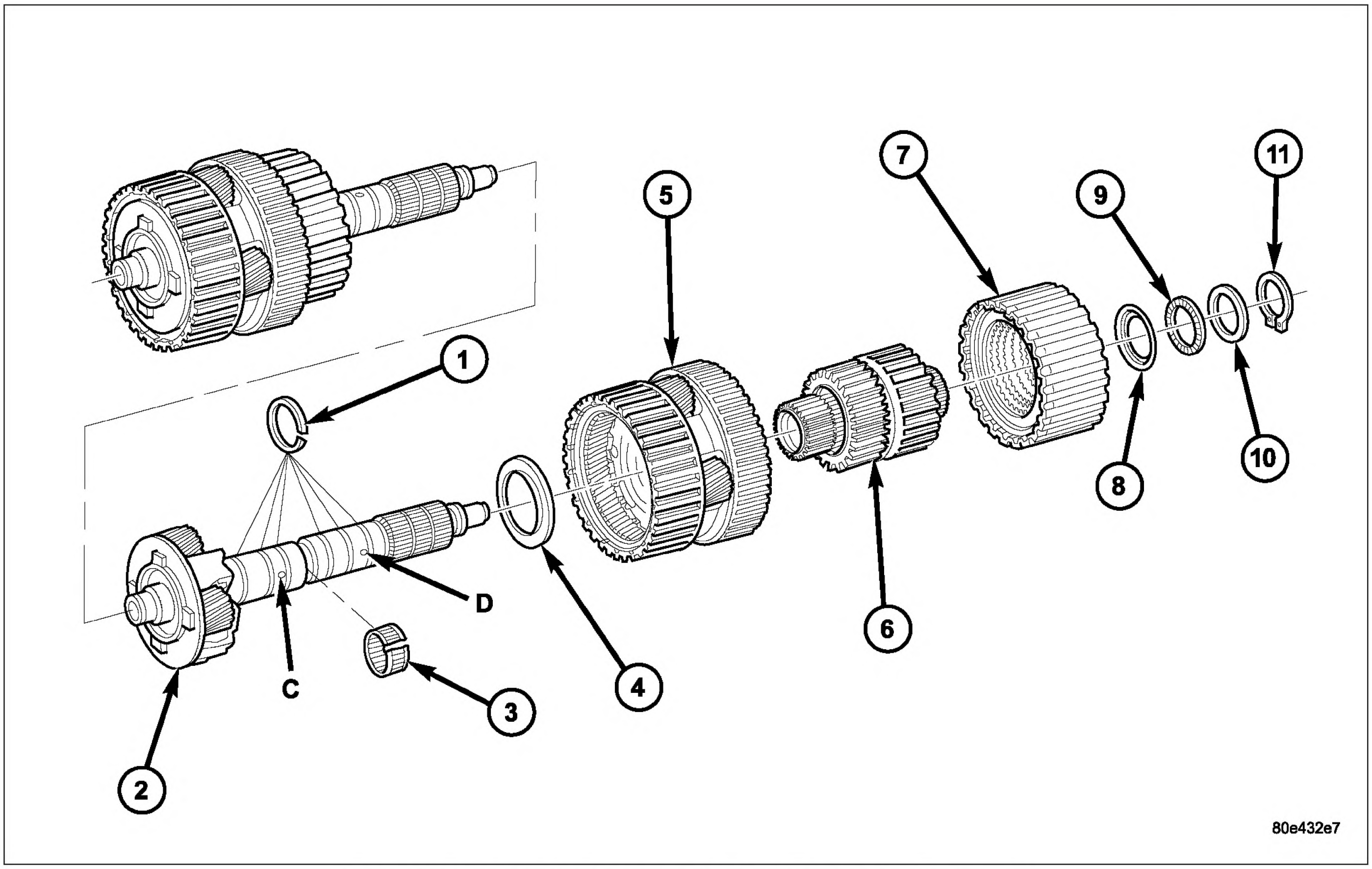
OPERATION

The annulus gear (1) and sun gear (3) elements of a planetary gear system are alternately driven and braked by the actuating elements of the multi-plate clutch and multiple-disc brake. The planetary pinion gears (2) can turn on the internal gearing of the annulus gear (1) and on the external gearing of the sun gear (3). This allows for a variety of gear ratios and the reversal of the rotation direction without the need for moving gear wheels or shift collars. When two components of the planetary gear set are locked together, the planetary gear set is locked and turns as a closed unit.



The torque and engine speed are converted according to the lever ratios and the ratio of the number of teeth on the driven gears to that on the drive gears, and is referred to as the gear ratio. The overall ratio of a number of planetary gear sets connected in series is obtained by multiplying the partial ratios.

DISASSEMBLY

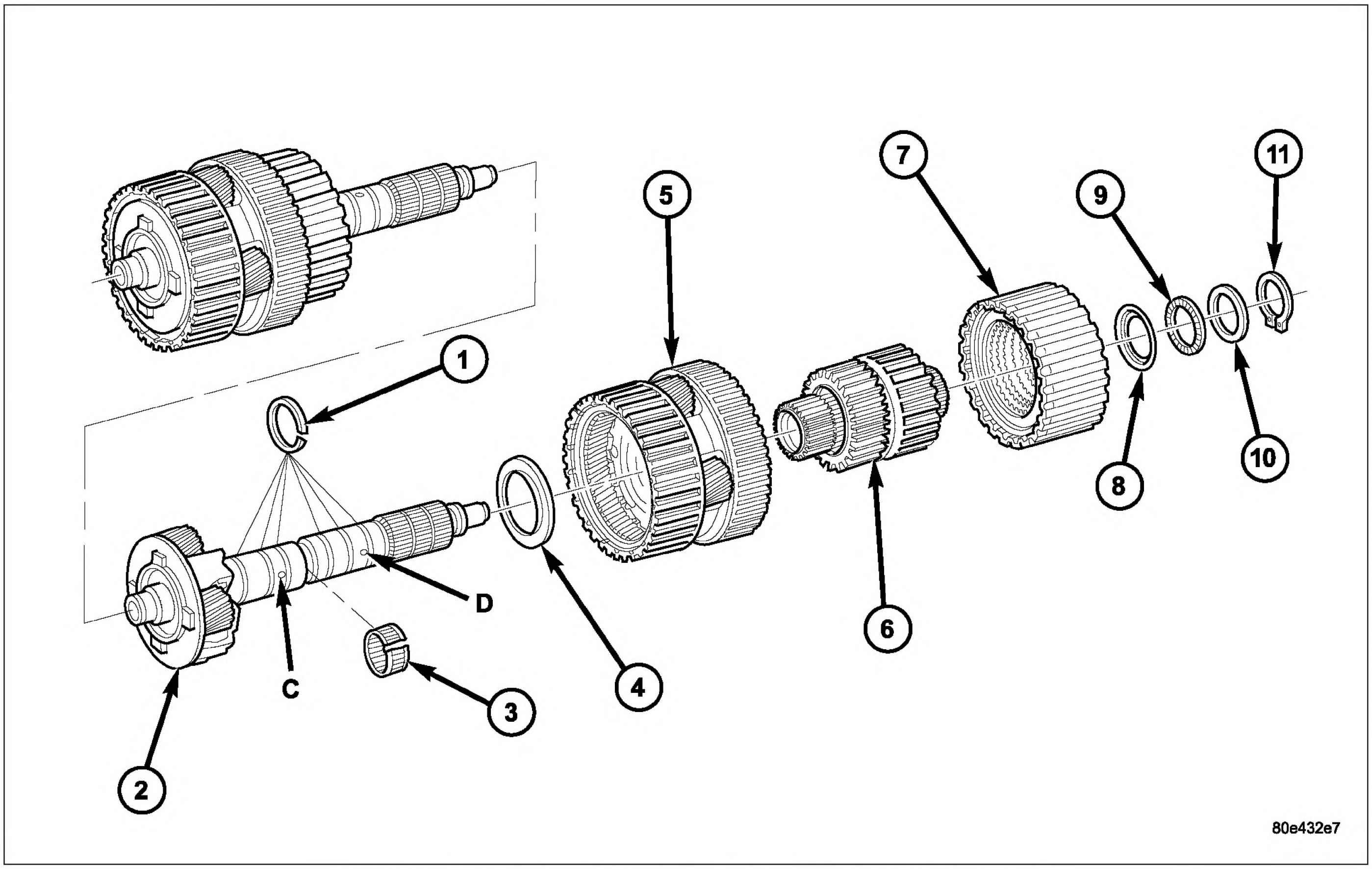


Output Shaft with Center and Rear Planetary Geartrain

1 - TEFLON RINGS
2 - OUTPUT SHAFT WITH CENTER PLANETARY CARRIER
3 - NEEDLE BEARING
4 - THRUST WASHER
5 - REAR PLANETARY GEAR SET
6 - REAR HOLLOW SHAFT/FREEWHEELING CLUTCH F2
7 - DRIVING CLUTCH K3
8 - THRUST WASHER
9 - AXIAL NEEDLE BEARING
10 - SHIM
11 - RETAINING RING

1. Remove upper two visible Teflon rings (1) from output shaft.
2. Remove retaining ring (11), shim (10), thrust needle bearing (9) and thrust washer (8) from output shaft.
3. Remove clutch K3 (7).
4. Remove rear tubular shaft/freewheeling clutch F2 (6) from output shaft.
5. Remove rear gear set (5) with integrated tubular shaft of center gear set from output shaft.
6. Remove thrust washer (4).

ASSEMBLY



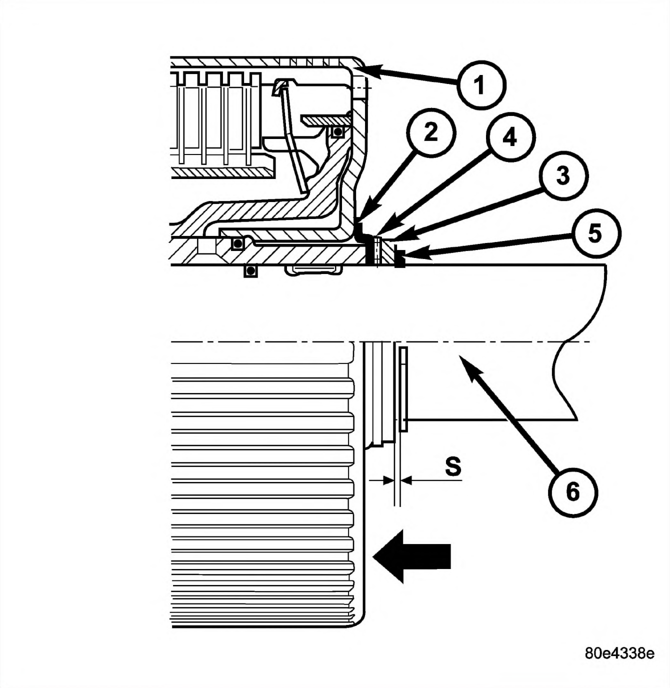
Output Shaft with Center and Rear Planetary Geartrain

1 - TEFLON RINGS	7 - DRIVING CLUTCH K3
2 - OUTPUT SHAFT WITH CENTER PLANETARY CARRIER	8 - THRUST WASHER
3 - NEEDLE BEARING	9 - AXIAL NEEDLE BEARING
4 - THRUST WASHER	10 - SHIM
5 - REAR PLANETARY GEAR SET	11 - RETAINING RING
6 - REAR HOLLOW SHAFT/FREEWHEELING CLUTCH F2	

1. Mount thrust washer (4) with the collar pointing towards the planet carrier.
2. Mount the rear gear set (5) on the rear hollow shaft (6).
3. Using grease, install lower three Teflon rings (1) in the groove so that the joint stays together
4. Put rear hollow shaft/freewheeling clutch F2 (6) with rear gear set (5) onto output shaft.
5. Install clutch K3 (7).
6. Mount retaining ring, shim, thrust needle bearing and thrust washer (8 - 11).
7. Using grease, insert the upper two Teflon rings (1) in the groove so that the joint remains together.

NOTE: During the test, apply a contact force by hand to K3 in the direction of the arrow.

8. Inspect axial play between shim (10) and retaining ring (11). Check axial play ″S″ between shim (10) and retaining ring (1) using a feeler gauge. Clearance should be 0.15-0.6 mm (0.006-0.024 in.). Shims are available in thicknesses of 3.0 mm (0.118 in.), 3.4 mm (0.134 in.), and 3.7 mm (0.146 in.). Adjust as necessary

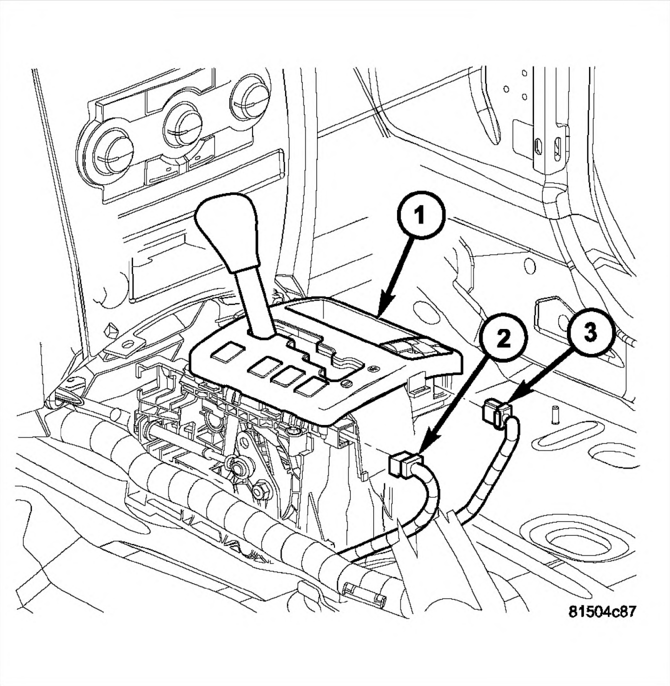


MECHANISM-SHIFT

DESCRIPTION

The automatic transmission is operated with the help of a shift lever assembly (SLA) (1) located in the floor console. There are four positions to which the selection lever can be shifted: P, R, N, D. In addition, the selector lever can be moved sideways (+/-) in position ″D″ to adjust the shift range.

All selector lever positions, as well as selected shift ranges in position ″D″, are identified by the SLA. The information is then sent to the transmission control module (TCM) via a hardwire connection. At the same time, the selector lever positions ″P″, ″R″, ″N″ and ″D″ are transmitted by a shift cable to the selector shaft in the transmission.



The SLA is comprised of the following functions:

- **Key lock:** Depending on the selector lever position, the ignition cylinder is locked/unlocked, i.e., the ignition key can be removed only if the selector lever is in position ″P″. A park lock cable is used to perform this function.
- **Park lock:** The selector lever is not released from postion ″P″ until the brake pedal has been applied and the ignition key is in ”ACC” or ON” positions. Shift lock is controlled by the brake light switch in conjunction with a

locking solenoid in the SLA. As soon as the brake pedal is applied firmly, the locking solenoid is de-energized to unlock the selector lever.

- **Reverse inhibitor:** As soon as the vehicle speed exceeds approximately 4-7 mph, it is no longer possible to move the selector lever from position ″N″ to position ″R″. The reverse inhibit functionality is controlled by the TCM and the same solenoid as the park lock. As the vehicle accelerates past the calibrated speed threshold, the solenoid is energized to block the motion of the shift lever necessary to move from NEUTRAL to REVERSE. The reverse inhibit is not released until the vehicle speed falls below approximately 4-7 mph and the shifter is moved out of the “D” shifter position.

OPERATION

With the selector lever in position ″D″, the transmission control module (TCM) automatically shifts the gears that are best-suited to the current operating situation. This means that shifting of gears is continuously adjusted to current driving and operating conditions in line with the selected shift range and the accelerator pedal position. Starting off is always performed in 1st gear.

The selector lever positions are determined by a sensor assembly internal to the shift lever assembly (SLA). The sensor assembly identifies the various positions of the SLA according to the following table.

Shift Lever Position	Bit 0	Bit 1	Bit 2	Bit 3
Default	0	0	0	0
″D″	1	0	1	0
″N″	0	1	1	0
″R″	1	1	1	0
″P″	0	0	0	1
″+″	1	0	0	1
″-″	0	1	0	1
″ND″	1	1	0	1
″RN″	0	0	1	1
″PR″	1	0	1	1
Implausible	1	1	1	1

The current selector lever position or, if the shift range has been limited, the current shift range is indicated in the instrument cluster display.

The permissible shifter positions and transmission operating ranges are:

- P = Parking lock and engine starting.
- R = Reverse.
- N = Neutral and engine starting (no power is transmitted to the axles).
- D = The shift range includes all forward gears.

The shift range can be adjusted to the current operating conditions by tipping the selector lever to the left-hand side (″-″) or the right-hand side (″+″) when in position ″D″. If the shift range is limited, the display in the instrument cluster indicates the selected shift range and not the currently engaged gear.

- 4= Shift range is limited to gears 1 to 4.
- 3= Shift range is limited to gears 1 to 3.
- 2= Shift range is limited to gears 1 to 2.
- 1= Shift range is limited to the 1st gear.

Tipping the shift lever will have the following results:

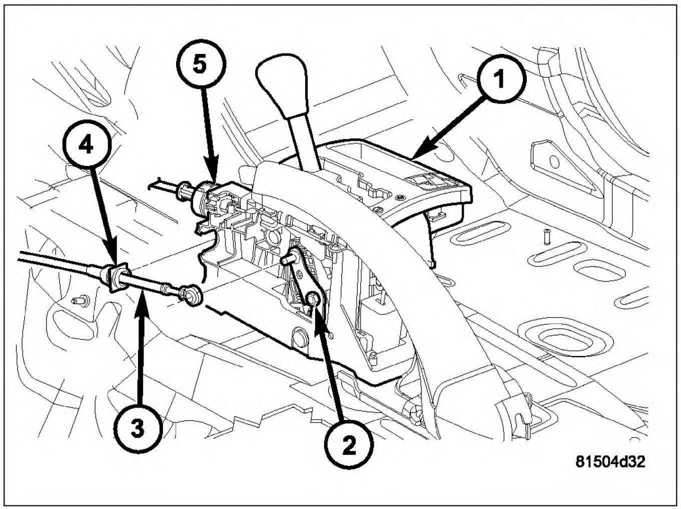
- **Tipping the selector lever toward ″-″ one time after another:** The shift range is reduced in descending sequence by one gear each time, i.e., from D - 4 - 3 - 2 - 1. If the selected limitation of the shift range would result in a downshift causing excessive engine speed, the shifting is not executed and the engaged gear as well as the shift range remain unchanged. This is to prevent the engine from overspeeding. Engine retardation is low with the selector lever in position ″D″. To make use of the full braking power of the engine, ″manual″

downshifting by tipping the lever towards the left-hand side is recommended. If this has been done, subsequent upshifting must be carried out manually as well.

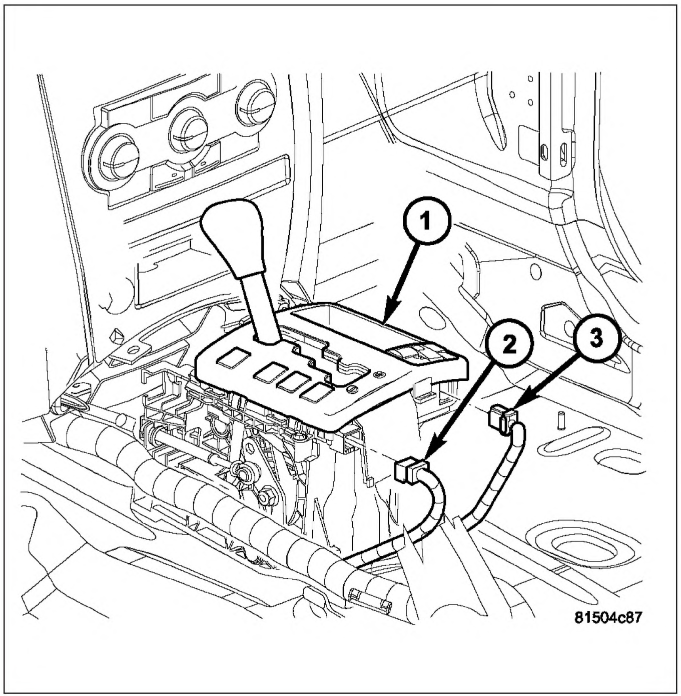
- **Tipping the selector lever toward ″-″ and holding it in this position:** The currently engaged gear in range ″D″ is indicated in the instrument cluster display and the shift range is limited to this gear.
- **Tipping the selector lever toward ″+″ one time after another:** The shift range is increased by one gear each time and the increased shift range is displayed in the instrument cluster; possibly, the transmission upshifts to a faster gear.
- **Tipping the selector lever toward ″+″ several times:** The shift range is increased by one gear each time the lever is tipped until the shift range ends up in ″D″.
- **Tipping the selector lever toward ″+″ and holding it in this position:** The shift range is extended immediately to ″D″, shift ranges are indicated in ascending sequence; possibly, the transmission upshifts to a faster gear due to the extension of the shift range.

REMOVAL

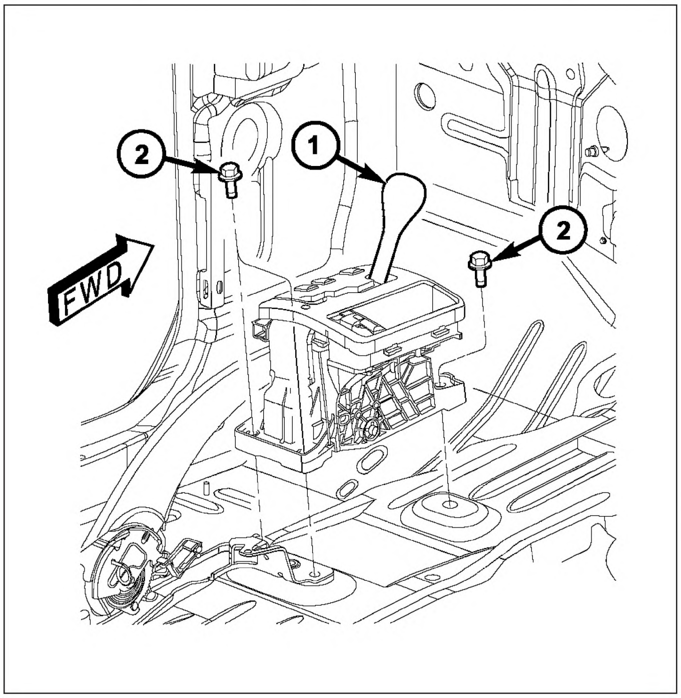
1. Remove any necessary console parts for access to shift lever assembly and shifter cables. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
2. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
3. Shift transmission into PARK.
4. Disconnect the transmission shift cable (3) at shift lever (1).
5. Remove the shift cable retainer (4) from the notch in the shifter assembly.
6. Verify the key is in the LOCK position and disconnect the park lock cable (5) from the shifter mechansim cam and the notch in the shifter assembly.



7. Disengage all wiring connectors (2, 3) from the shifter assembly (1).

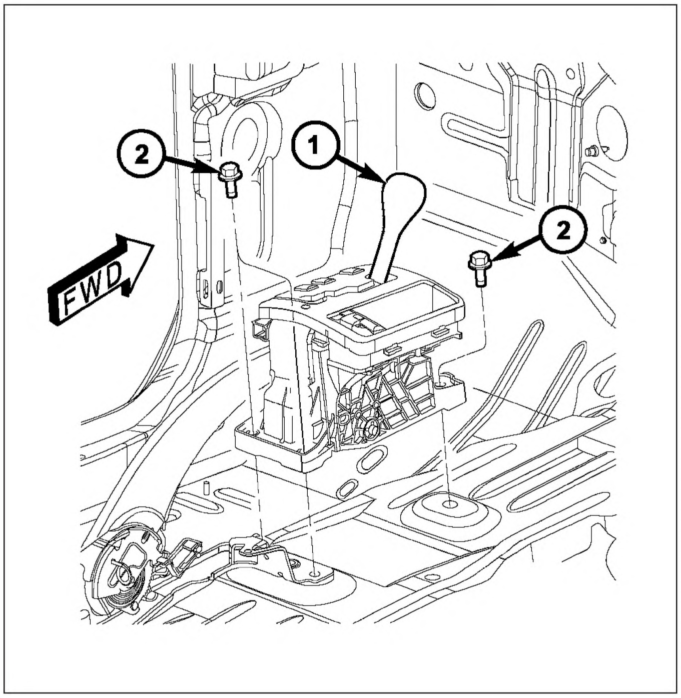


8. Remove all bolts (2) holding the shifter assembly (1) to the floor pan.
9. Remove the shifter assembly (1) from the vehicle.

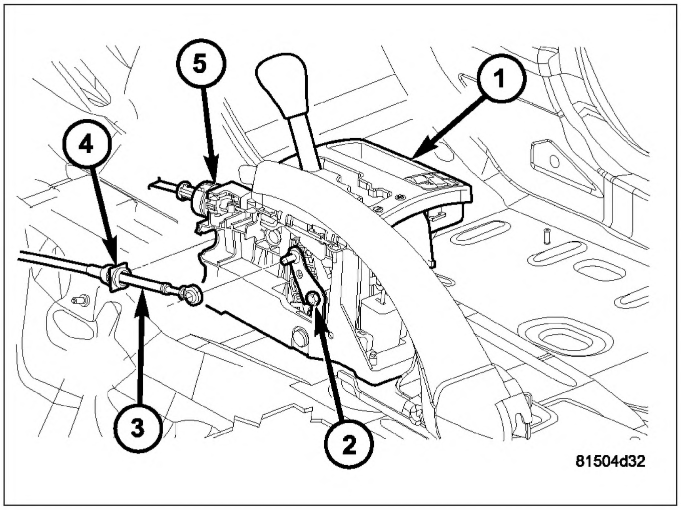


INSTALLATION

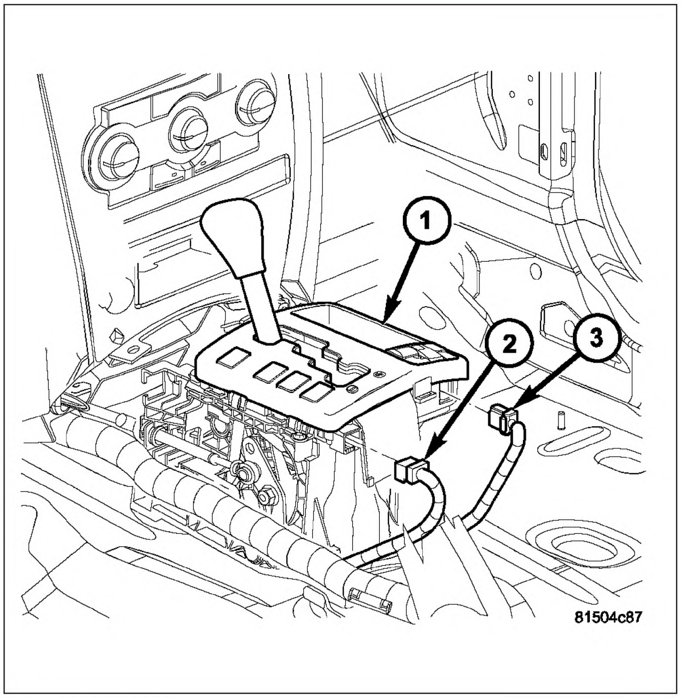
1. Install shifter assembly (1) in position on the floor pan.
2. Install the bolts (2) to hold the shifter assembly (1) onto the floor pan. Tighten bolts to 12 N·m (105 in.lbs.).



3. Place the floor shifter lever in PARK position.
4. Loosen the adjustment nut (2) on the shifter assembly (1).
5. Install the gearshift cable (3) to the shift lever pin.
6. Install the park lock cable (5) to the shift mechanism cam and the notch in the shifter assembly.
7. Verify that the key is in the LOCK position and remains there until the cable is fully adjusted.
8. Verify that the park lock cable adjustment tab is pulled upward to the unlocked position.



9. Install the wiring harness connectors (2) to the shifter assembly (1).
10. Verify that the shift lever is in the PARK position.
11. Tighten the adjustment screw to 30 N·m (265 in.lbs.).
12. Verify that the key in the LOCK position and the shifter is in PARK.
13. Push downward on the park lock cable adjustment tab to lock the adjustment.
14. Verify correct shifter, park lock, and BTSI operation.
15. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
16. Install any console parts removed for access to shift lever assembly and shift cables. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)



SOLENOID

DESCRIPTION

The typical electrical solenoid used in automotive applications is a linear actuator. It is a device that produces motion in a straight line. This straight line motion can be either forward or backward in direction, and short or long distance.

A solenoid is an electromechanical device that uses a magnetic force to perform work. It consists of a coil of wire, wrapped around a magnetic core made from steel or iron, and a spring loaded, movable plunger, which performs the work, or straight line motion.

The solenoids used in transmission applications are attached to valves which can be classified as **normally open** or **normally closed**. The **normally open** solenoid valve is defined as a valve which allows hydraulic flow when no current or voltage is applied to the solenoid. The **normally closed** solenoid valve is defined as a valve which does not allow hydraulic flow when no current or voltage is applied to the solenoid. These valves perform hydraulic control functions for the transmission and must therefore be durable and tolerant of dirt particles. For these reasons, the valves have hardened steel poppets and ball valves. The solenoids operate the valves directly, which means that the solenoids must have very high outputs to close the valves against the sizable flow areas and line pressures found in current transmissions. Fast response time is also necessary to ensure accurate control of the transmission.

The strength of the magnetic field is the primary force that determines the speed of operation in a particular solenoid design. A stronger magnetic field will cause the plunger to move at a greater speed than a weaker one. There are basically two ways to increase the force of the magnetic field:

1. Increase the amount of current applied to the coil or
2. Increase the number of turns of wire in the coil.

The most common practice is to increase the number of turns by using thin wire that can completely fill the available space within the solenoid housing. The strength of the spring and the length of the plunger also contribute to the response speed possible by a particular solenoid design.

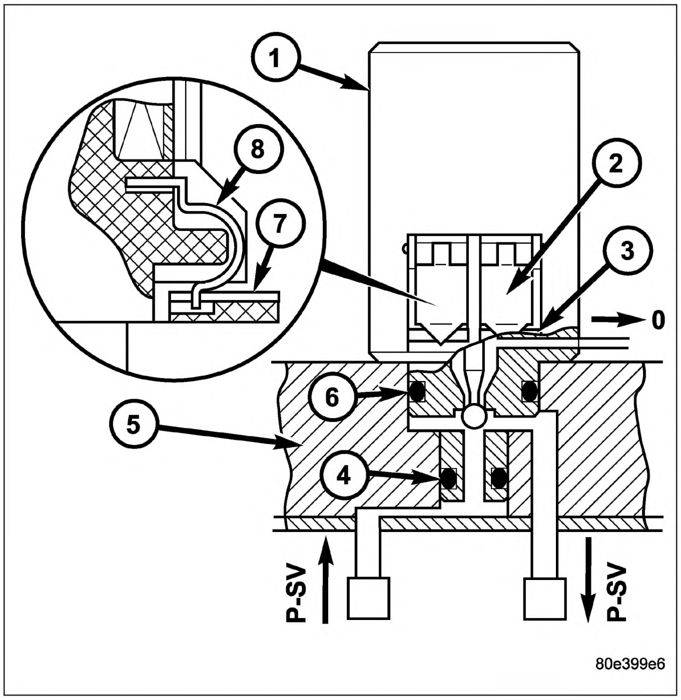
A solenoid can also be described by the method by which it is controlled. Some of the possibilities include variable force, pulse-width modulated, constant ON, or duty cycle. The variable force and pulse-width modulated versions utilize similar methods to control the current flow through the solenoid to position the solenoid plunger at a desired position somewhere between full ON and full OFF. The constant ON and duty cycled versions control the voltage across the solenoid to allow either full flow or no flow through the solenoid's valve.

UPSHIFT/DOWNSHIFT SOLENOID VALVES

The solenoid valves (1) for upshifts and downshifts are located in the shell of the electric control unit and pressed against the shift plate with a spring.

The solenoid valves (1) initiate the upshift and downshift procedures in the shift plate.

The solenoid valves (1) are sealed off from the valve housing of the shift plate (5) by two O-rings (4, 6). The contact springs (8) at the solenoid valve engage in a slot in the conductor tracks (7). The force of the contact spring (8) ensures safe contacts.

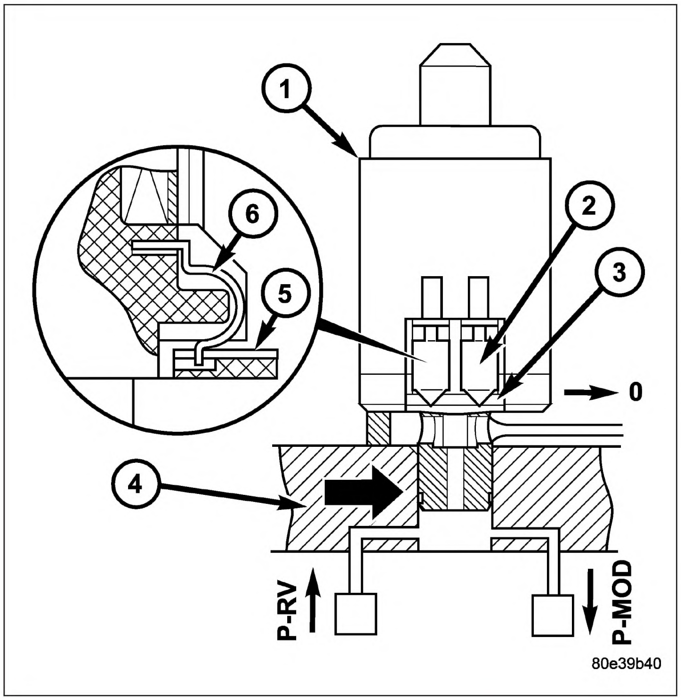


MODULATING PRESSURE CONTROL SOLENOID VALVE

The modulating pressure control solenoid valve (1) is located in the shell of the electric valve control unit and pressed against the shift plate by a spring.

Its purpose is control the modulating pressure depending on the continuously changing operating conditions, such as load and gear change.

The modulating pressure regulating solenoid valve (1) has an interference fit and is sealed off to the valve body of the shift plate (4) by a seal (arrow). The contact springs (2) at the solenoid valve engage in a slot in the conductor tracks (3). The force of the contact springs (2) ensures secure contacts.

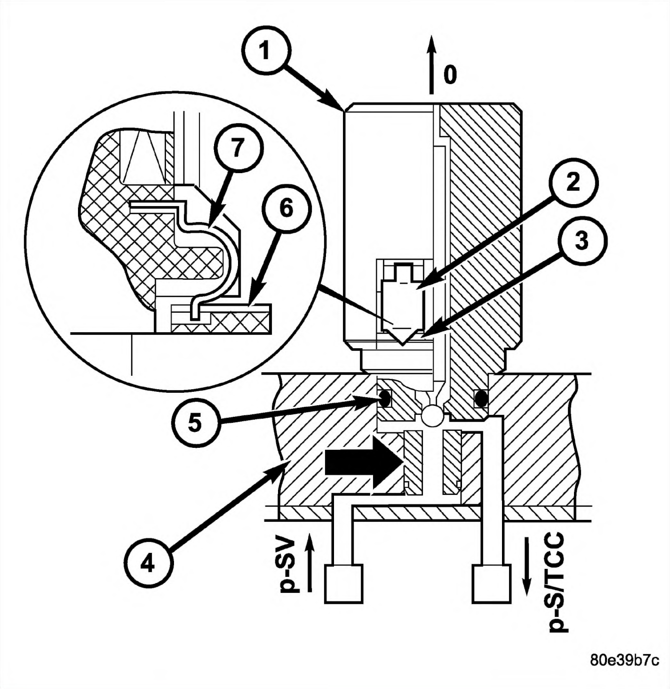


TORQUE CONVERTER LOCKUP CLUTCH PWM SOLENOID VALVE

The torque converter lockup clutch PWM solenoid valve (1) is located in the shell of the electric valve control unit and pressed against the shift plate by a spring.

The PWM solenoid valve (1) for the torque converter lockup controls the pressure for the torque converter lockup clutch.

The torque converter lockup PWM solenoid valve (1) is sealed off to the valve body of the shift plate (4) by an O-ring (5) and a seal (arrow). The contact springs (2) at the solenoid valve engage in a slot in the conductor tracks (3). The force of the contact springs (2) ensures secure contacts.

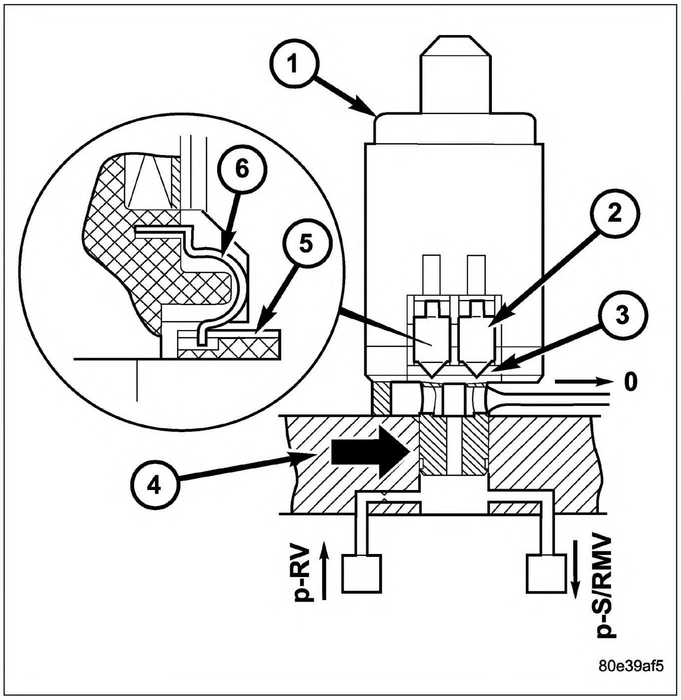


SHIFT PRESSURE CONTROL SOLENOID VALVE

The shift pressure control solenoid valve (1) is located in the shell of the electric valve control unit and pressed against the shift plate by a spring.

Its purpose is to control the shift pressure depending on the continuously changing operating conditions, such as load and gear change.

The shift pressure regulating solenoid valve (1) has an interference fit and is sealed off to the valve body of the shift plate (4) by a seal (arrow). The contact springs (2) at the solenoid valve engage in a slot in the conductor tracks (3). The force of the contact springs (2) ensures secure contacts.



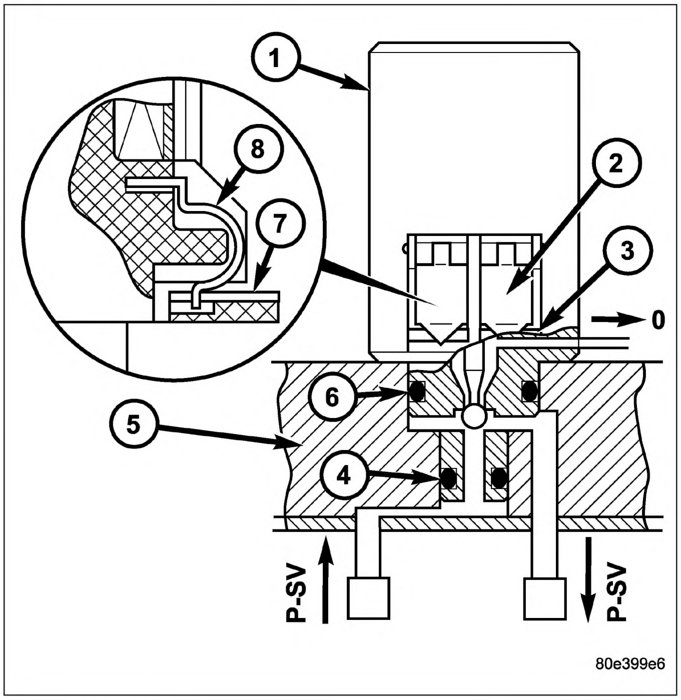
OPERATION

When an electrical current is applied to the solenoid coil, a magnetic field is created which produces an attraction to the plunger, causing the plunger to move and work against the spring pressure and the load applied by the fluid the valve is controlling. The plunger is normally directly attached to the valve which it is to operate. When the current is removed from the coil, the attraction is removed and the plunger will return to its original position due to spring pressure.

The plunger is made of a conductive material and accomplishes this movement by providing a path for the magnetic field to flow. By keeping the air gap between the plunger and the coil to the minimum necessary to allow free movement of the plunger, the magnetic field is maximized.

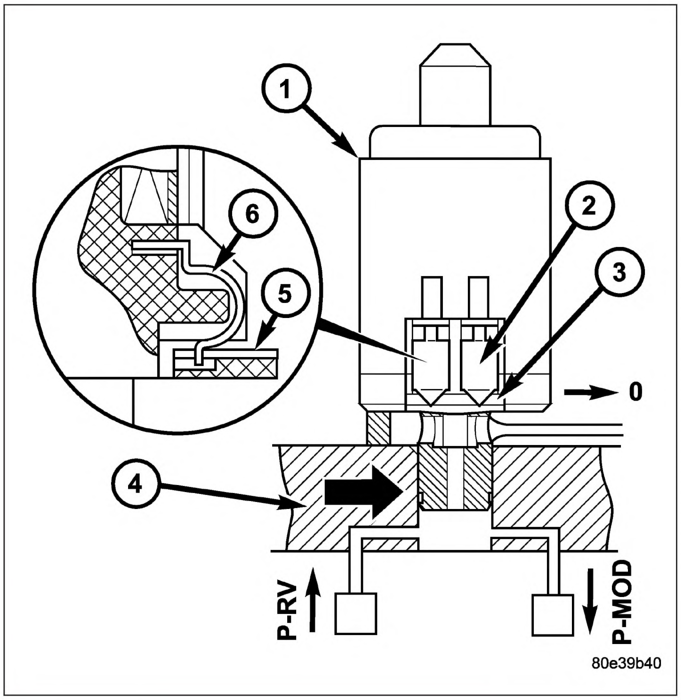
UPSHIFT/DOWNSHIFT SOLENOID VALVES

If a solenoid valve (1) is actuated by the TCM, it opens and guides the control pressure (p-SV) to the assigned command valve. The solenoid valve remains actuated and therefore open until the shifting process is complete. The shift pressure (p-SV) to the command valve is reduced to zero as soon as the power supply to the solenoid valve is interrupted.



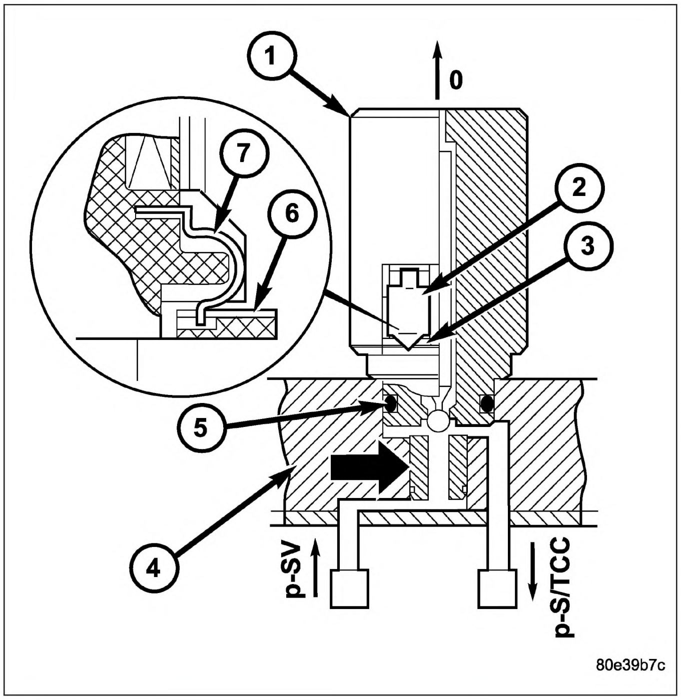
MODULATING PRESSURE CONTROL SOLENOID VALVE

The modulating pressure regulating solenoid valve (1) assigns a proportional pressure to the current which is controlled by the TCM according to the load.



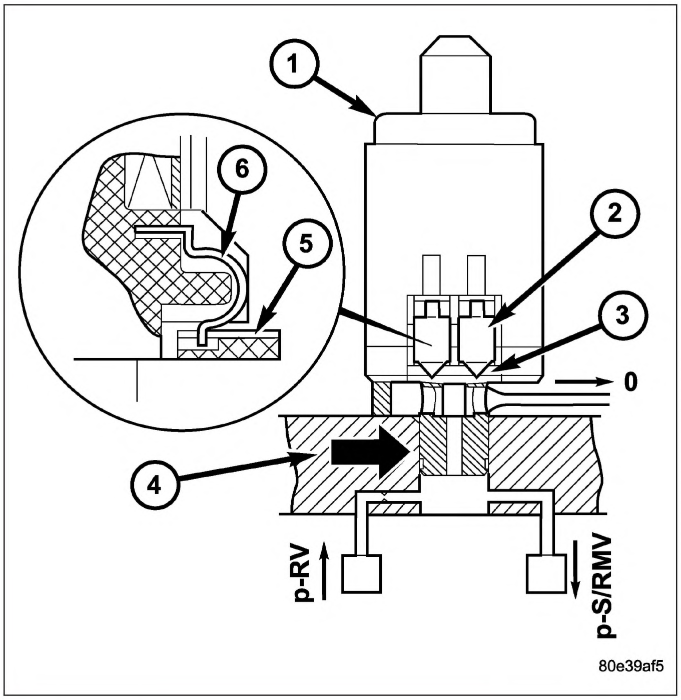
TORQUE CONVERTER LOCKUP CLUTCH PWM SOLENOID VALVE

The torque converter lockup PWM solenoid (1) valve converts pulse-wave-modulated current controlled by the TCM into the appropriate hydraulic control pressure (p-S/TCC).


1
0
7
6
2
3
5
4
p-SV
p-S/TCC
80e39b7c

SHIFT PRESSURE CONTROL SOLENOID VALVE

The shift pressure regulating solenoid valve (1) assigns a proportional pressure to the current which is controlled by the TCM according to the load.


1
6
5
2
3
0
4
p-RV
p-S/RMV
80e39af5

CONTACT-TEMPERATURE SENSOR/PARK-NEUTRAL

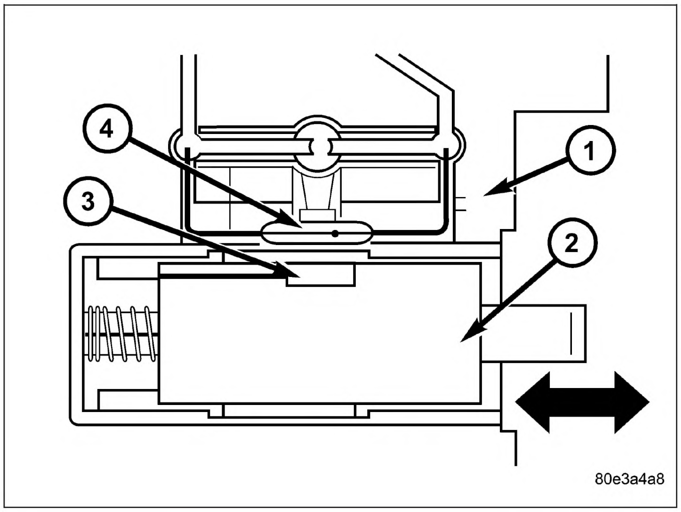
DESCRIPTION

PARK/NEUTRAL CONTACT

The park/neutral contact (4) is located in the shell of the electric control unit and is fixed to the conductor tracks.

Its purpose is to recognize selector valve and selector lever positions ″P″ and ″N″. The park/neutral contact consists of:

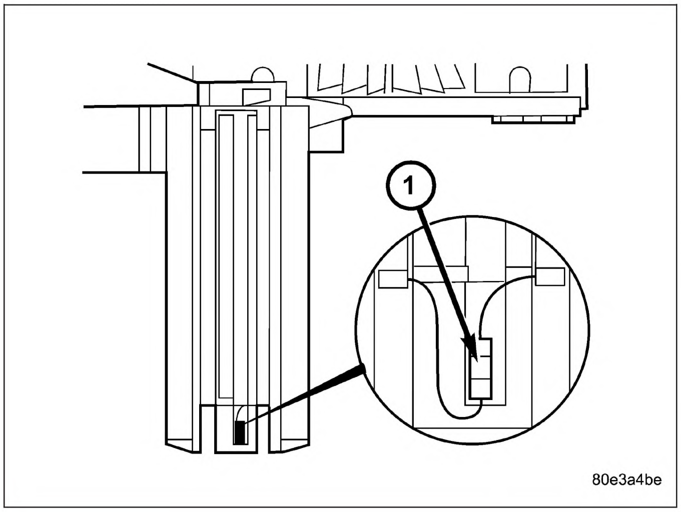
- the plunger (2).
- the permanent magnet (3).
- the dry-reed contact (4).



TRANSMISSION TEMPERATURE SENSOR

The transmission oil temperature sensor (1) is located in the shell of the electric valve control unit and is fixed to the conductor tracks.

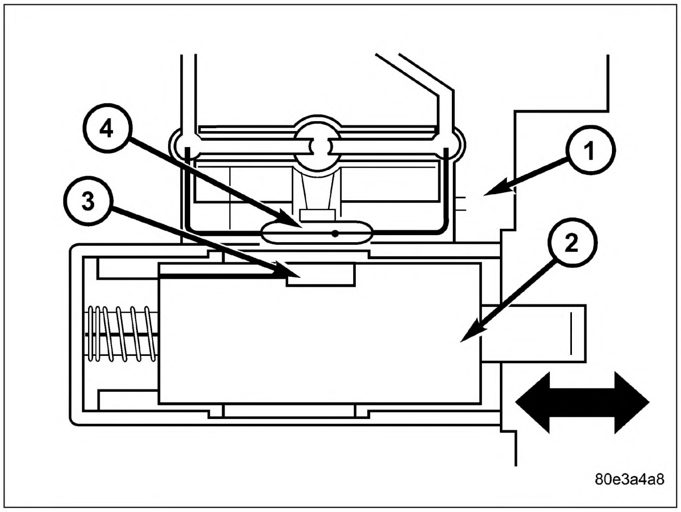
Its purpose is to measure the temperature of the transmission oil and pass the temperature to the TCM as an input signal. It is a temperature-dependent resistor (PTC).



OPERATION

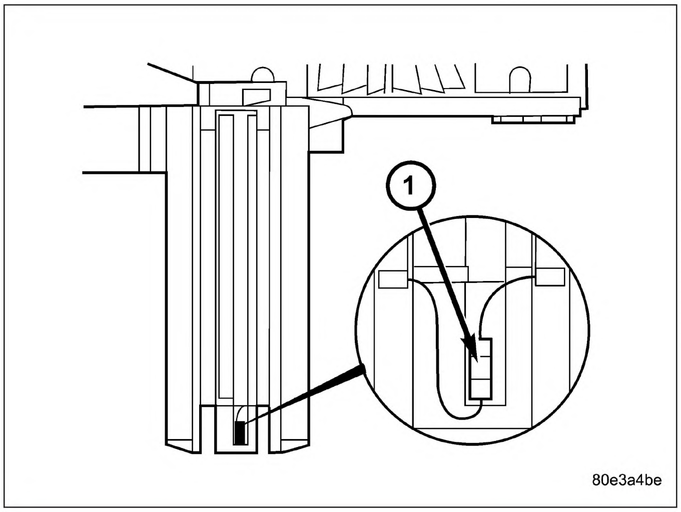
PARK/NEUTRAL CONTACT

In selector lever positions ″P″ and ″N″ the park/neutral contact (4) is actuated by a cam track which is located on the detent plate. The permanent magnet (3) is moved away from the dry-reed contact (4). The dry-reed contact (4) is opened. The TCM receives an electric signal. The circuit to the starter in the selector lever positions ″P″ and ″N″ is closed.

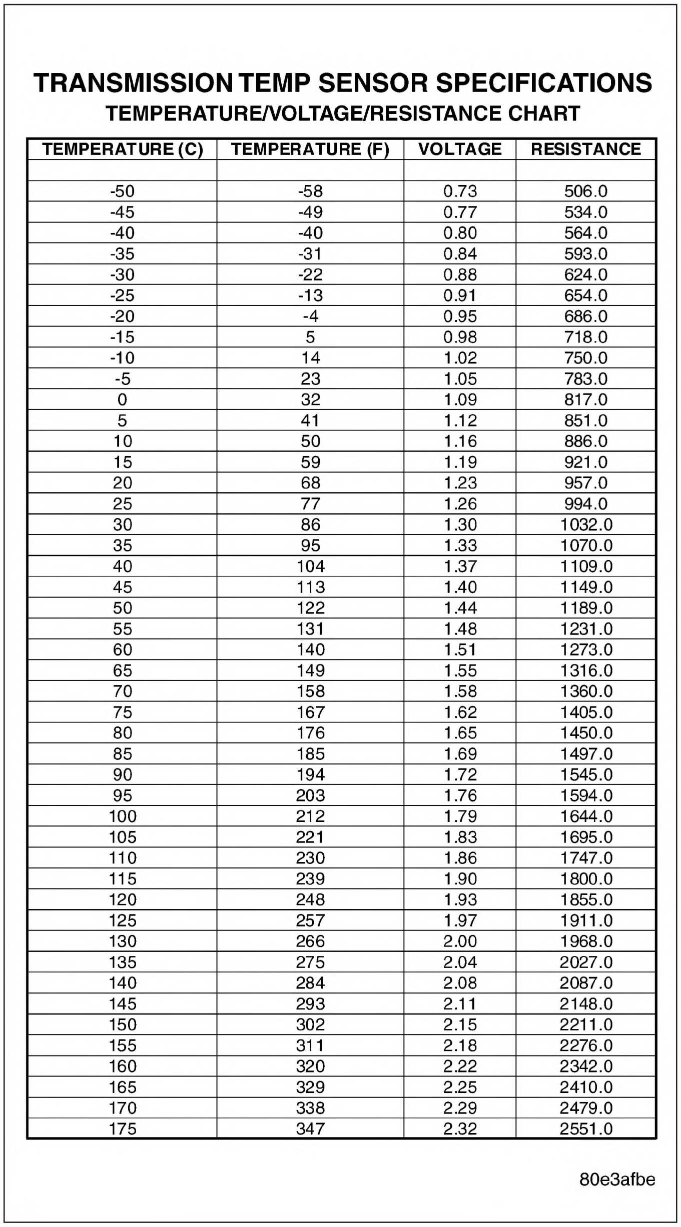


TRANSMISSION TEMPERATURE SENSOR

The temperature of the transmission oil has a considerable effect on the shifting time and therefore the shift quality. By measuring the oil temperature, shift operations can be optimized in all temperature ranges. The transmission oil temperature sensor (1) is switched in series with the park/neutral contact. The temperature signal is transferred to the TCM only when the dry-reed contact of the park/neutral contact is closed in REVERSE or a forward gear position.



Refer to the Transmission Temperature Sensor Specifications table for the relationship between transmission temperature, sensor voltage, and sensor resistance.



TRANSMISSION TEMP SENSOR SPECIFICATIONS

TEMPERATURE/VOLTAGE/RESISTANCE CHART

TEMPERATURE (C)	TEMPERATURE (F)	VOLTAGE	RESISTANCE
-50	-58	0.73	506.0
-45	-49	0.77	534.0
-40	-40	0.80	564.0
-35	-31	0.84	593.0
-30	-22	0.88	624.0
-25	-13	0.91	654.0
-20	-4	0.95	686.0
-15	5	0.98	718.0
-10	14	1.02	750.0
-5	23	1.05	783.0
0	32	1.09	817.0
5	41	1.12	851.0
10	50	1.16	886.0
15	59	1.19	921.0
20	68	1.23	957.0
25	77	1.26	994.0
30	86	1.30	1032.0
35	95	1.33	1070.0
40	104	1.37	1109.0
45	113	1.40	1149.0
50	122	1.44	1189.0
55	131	1.48	1231.0
60	140	1.51	1273.0
65	149	1.55	1316.0
70	158	1.58	1360.0
75	167	1.62	1405.0
80	176	1.65	1450.0
85	185	1.69	1497.0
90	194	1.72	1545.0
95	203	1.76	1594.0
100	212	1.79	1644.0
105	221	1.83	1695.0
110	230	1.86	1747.0
115	239	1.90	1800.0
120	248	1.93	1855.0
125	257	1.97	1911.0
130	266	2.00	1968.0
135	275	2.04	2027.0
140	284	2.08	2087.0
145	293	2.11	2148.0
150	302	2.15	2211.0
155	311	2.18	2276.0
160	320	2.22	2342.0
165	329	2.25	2410.0
170	338	2.29	2479.0
175	347	2.32	2551.0

80e3afbe

CONVERTER-TORQUE

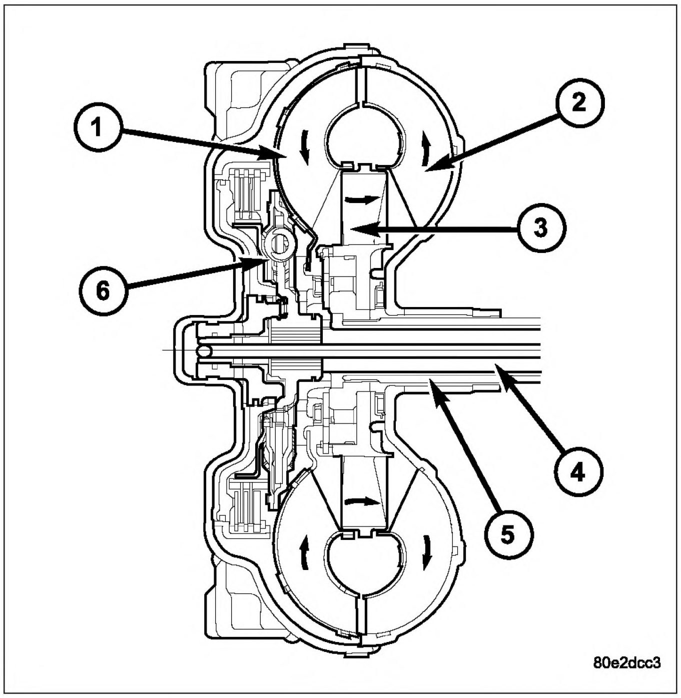
DESCRIPTION

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid.

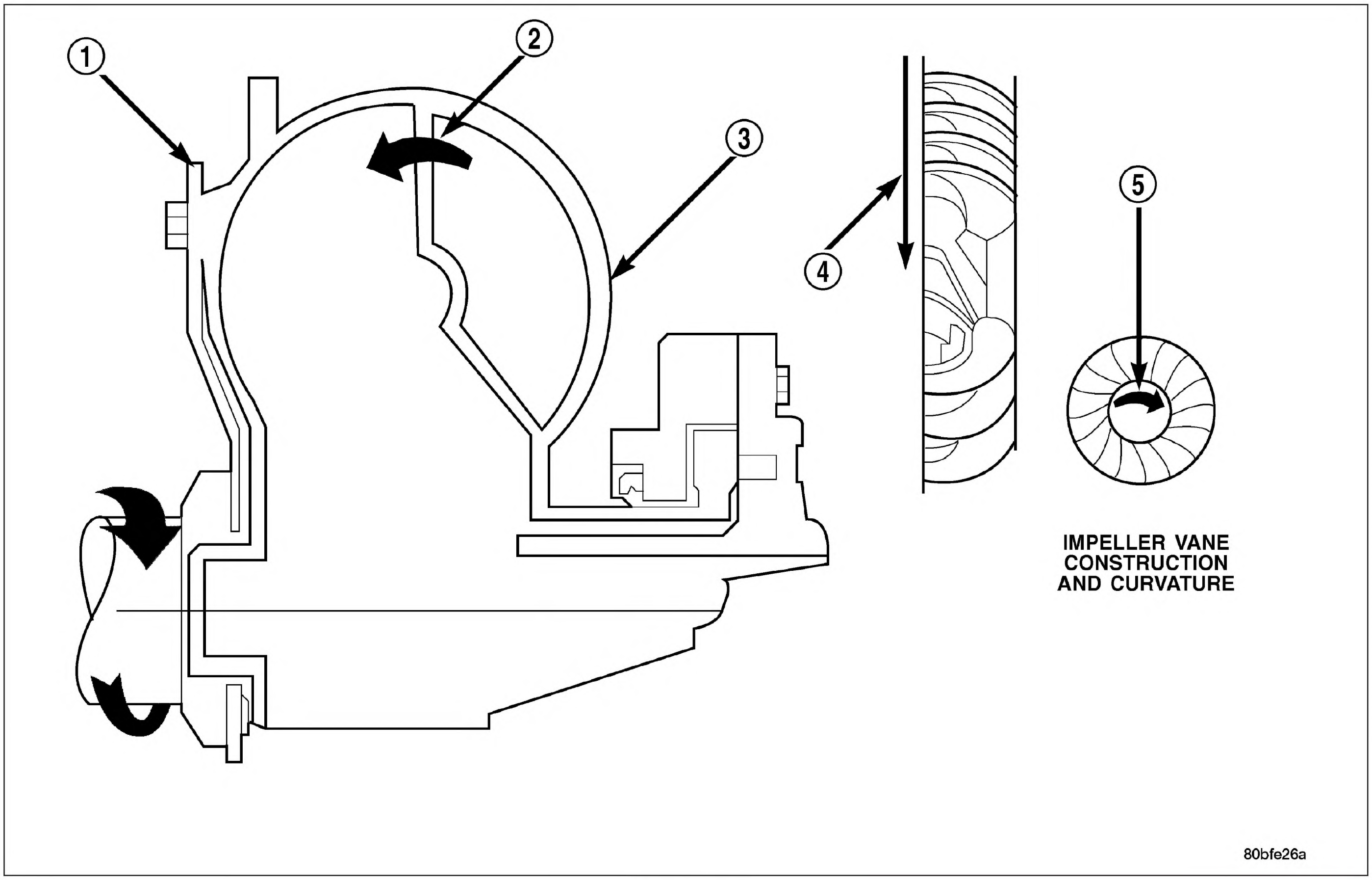
The torque converter is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine (1), a stator (3), an overrunning clutch, an impeller (2), and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The converter clutch engages in third through fifth gears. The torque converter hub drives the transmission oil (fluid) pump.

A turbine damper (6) has been added for some applications to help improve vehicle noise, vibration, and harshness (NVH) characteristics.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.



IMPELLER

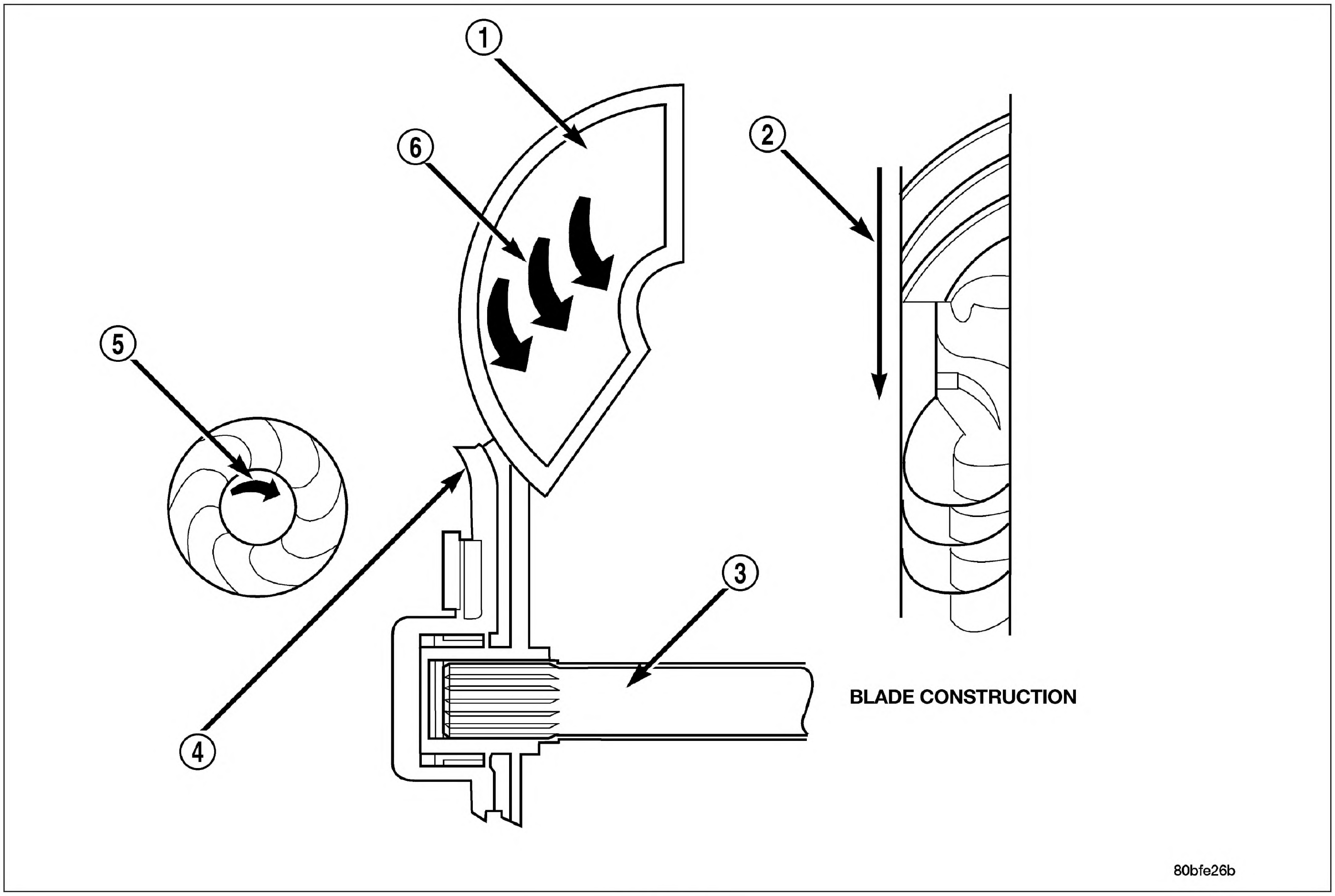


Impeller

1 - ENGINE FLEXPLATE
2 - OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION
3 - IMPELLER VANES AND COVER ARE INTEGRAL
4 - ENGINE ROTATION
5 - ENGINE ROTATION

The impeller (3) is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving members of the system.

TURBINE



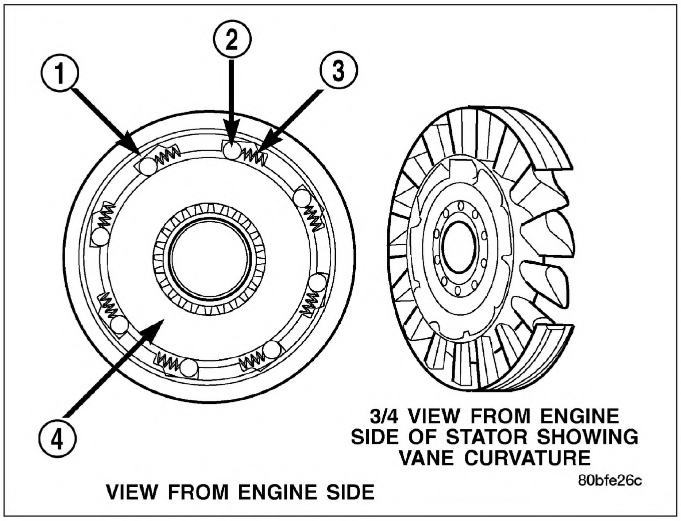
Turbine

1 - TURBINE VANE	4 - PORTION OF TORQUE CONVERTER COVER
2 - ENGINE ROTATION	5 - ENGINE ROTATION
3 - INPUT SHAFT	6 - OIL FLOW WITHIN TURBINE SECTION

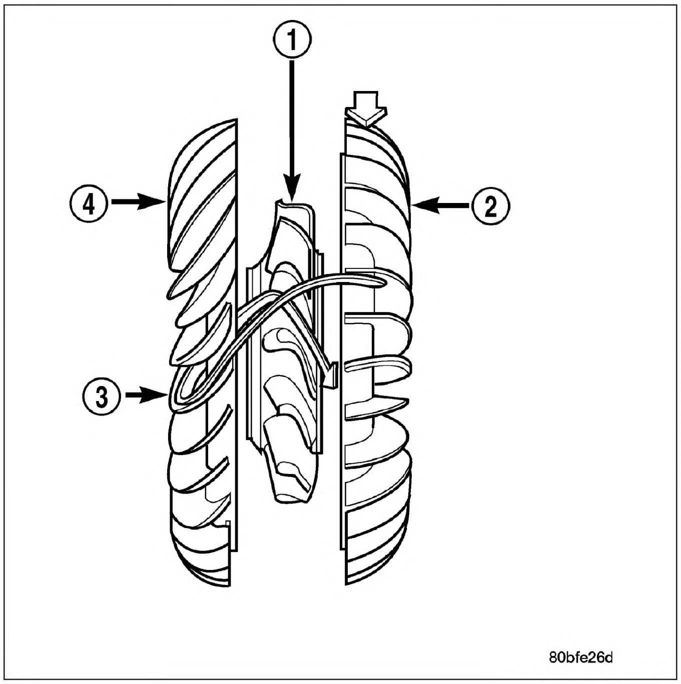
The turbine (1) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

STATOR

The stator assembly (1-4) is mounted on a stationary shaft which is an integral part of the oil pump.


1
2
3
4
3/4 VIEW FROM ENGINE SIDE OF STATOR SHOWING VANE CURVATURE
VIEW FROM ENGINE SIDE
80bfe26c

The stator (1) is located between the impeller (2) and turbine (4) within the torque converter case. The stator contains a freewheeling clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the freewheeling clutch, the torque multiplication feature of the torque converter is operational.

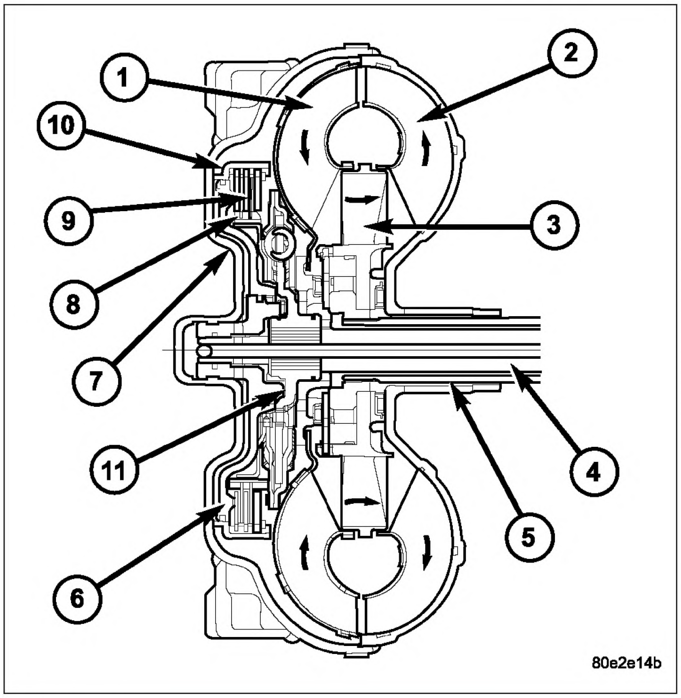

1
4
2
3
80bfe26d

TORQUE CONVERTER CLUTCH (TCC)

The TCC (9) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston with friction material was added to the turbine assembly to provide this mechanical lock-up.

In order to reduce heat build-up in the transmission and buffer the powertrain against torsional vibrations, the TCM can duty cycle the torque converter lock-up solenoid to achieve a smooth application of the torque converter clutch. This function, referred to as Electronically Modulated Converter Clutch (EMCC) can occur at various times depending on the following variables:

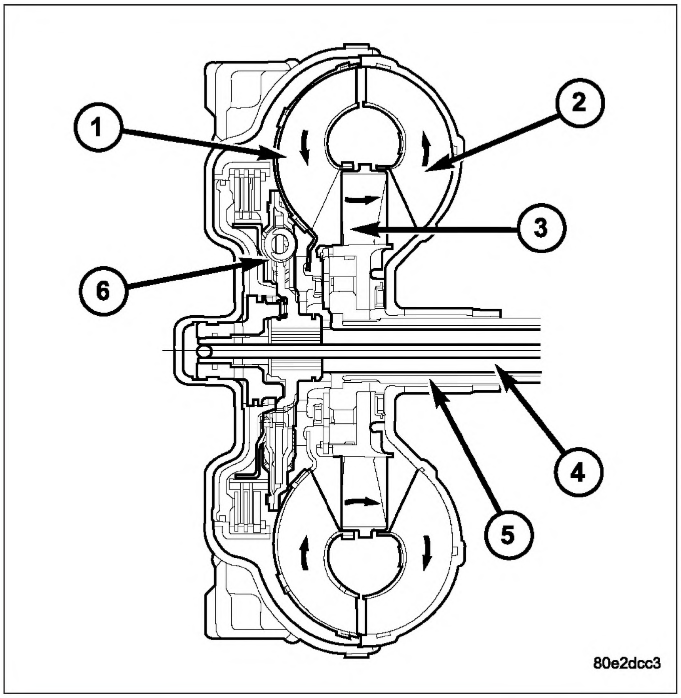
- Shift lever position
- Current gear range
- Transmission fluid temperature
- Engine coolant temperature
- Input speed
- Throttle angle
- Engine speed



1 - TURBINE
2 - IMPELLER
3 - STATOR
4 - INPUT SHAFT
5 - STATOR SHAFT
6 - PISTON
7 - COVER SHELL
8 - INTERNALLY TOOTHED DISC CARRIER
9 - CLUTCH PLATE SET
10 - EXTERNALLY TOOTHED DISC CARRIER
11 - TURBINE DAMPER

OPERATION

The converter impeller (driving member) (2), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member) (1), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft (4).

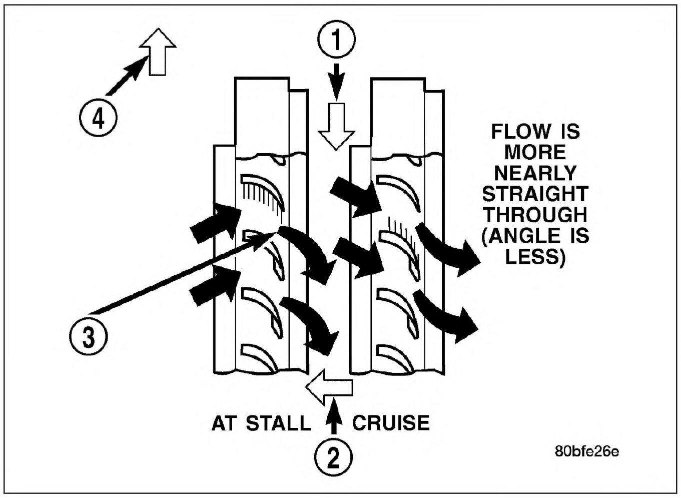


TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft. Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counterclockwise direction. When this happens the over-running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.0:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such as way as to cause it to lock-up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.



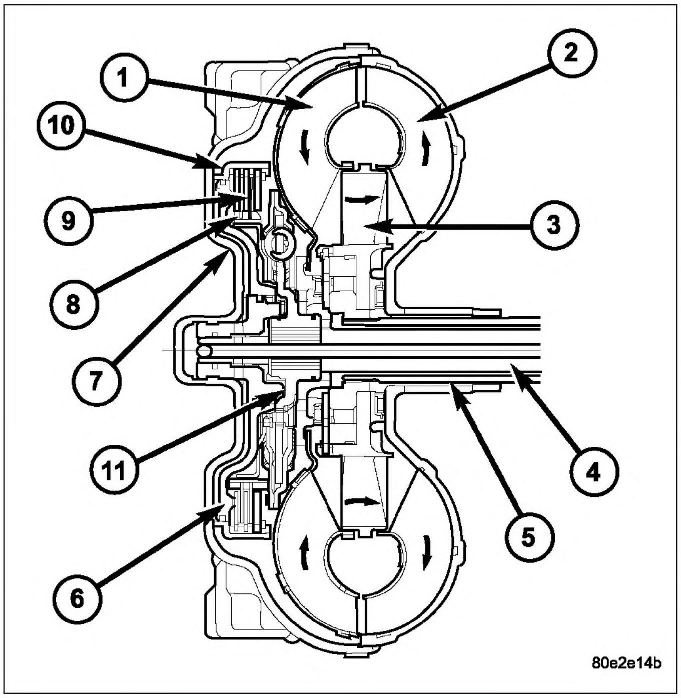
TORQUE CONVERTER CLUTCH (TCC)

In a standard torque converter, the impeller (2) and turbine (1) are rotating at about the same speed and the stator (3) is freewheeling, providing no torque multiplication. By applying the turbine's piston and friction material (9), a total converter engagement can be obtained. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The clutch can be engaged in second, third, fourth, and fifth gear ranges.

The TCM controls the torque converter by way of internal logic software. The programming of the software provides the TCM with control over the torque converter solenoid. There are four output logic states that can be applied as follows:

- No EMCC
- Partial EMCC
- Full EMCC
- Gradual-to-no EMCC



1 - TURBINE
2 - IMPELLER
3 - STATOR
4 - INPUT SHAFT
5 - STATOR SHAFT
6 - PISTON
7 - COVER SHELL
8 - INTERNALLY TOOTHED DISC CARRIER
9 - CLUTCH PLATE SET
10 - EXTERNALLY TOOTHED DISC CARRIER
11 - TURBINE DAMPER

NO EMCC

Under No EMCC conditions, the TCC Solenoid is OFF. There are several conditions that can result in NO EMCC operations. No EMCC can be initiated due to a fault in the transmission or because the TCM does not see the need for EMCC under current driving conditions.

PARTIAL EMCC

Partial EMCC operation modulates the TCC Solenoid (duty cycle) to obtain partial torque converter clutch application. Partial EMCC operation is maintained until Full EMCC is called for and actuated. During Partial EMCC some slip does occur. Partial EMCC will usually occur at low speeds, low load and light throttle situations.

FULL EMCC

During Full EMCC operation, the TCM increases the TCC Solenoid duty cycle to full ON after Partial EMCC control brings the engine speed within the desired slip range of transmission input speed relative to engine rpm.

GRADUAL-TO-NO EMCC

This operation is to soften the change from Full or Partial EMCC to No EMCC. This is done at mid-throttle by decreasing the TCC Solenoid duty cycle.

REMOVAL

1. Remove transmission and torque converter from vehicle.
2. Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition. The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

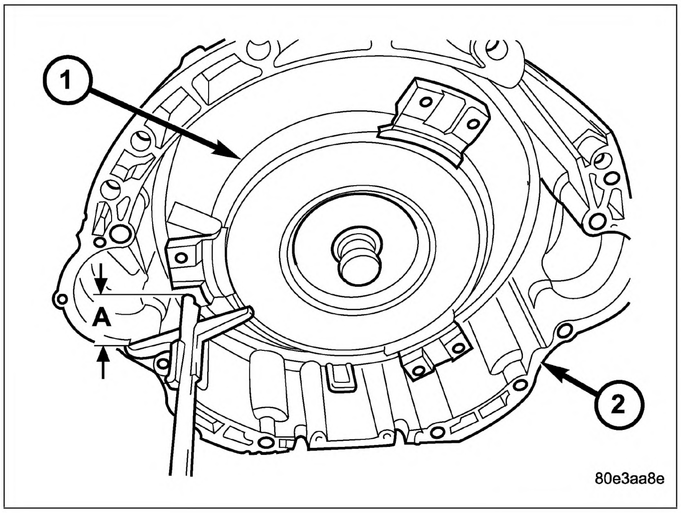
3. Pull the torque converter forward until the center hub clears the oil pump seal.
4. Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive flats for sharp edges, burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

1. Lubricate oil pump seal lip with transmission fluid.
2. Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or converter hub while inserting torque converter into the front of the transmission.



80e3aa8e

3. Align torque converter to oil pump seal opening.
4. Insert torque converter hub into oil pump.
5. While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.
6. Check converter seating with a scale and straightedge. Surface of converter lugs should be at least 19 mm (3/4 in.) to rear of straightedge when converter is fully seated.
7. If necessary, temporarily secure converter with C-clamp attached to the converter housing.
8. Install the transmission in the vehicle.
9. Fill the transmission with the recommended fluid.

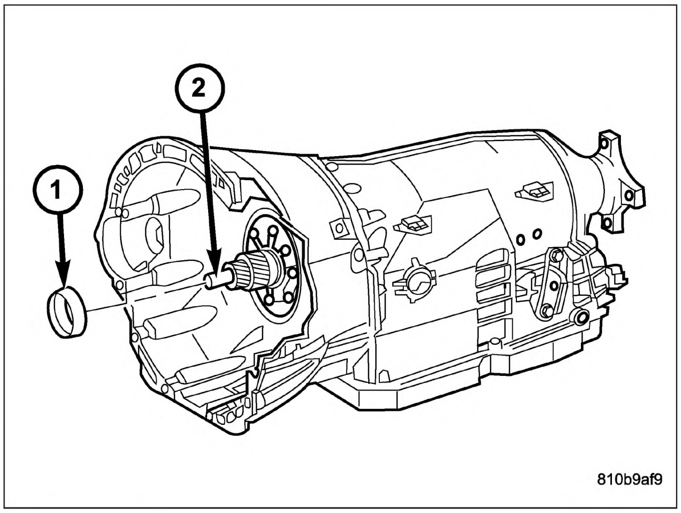
SEAL-TORQUE CONVERTER HUB

REMOVAL

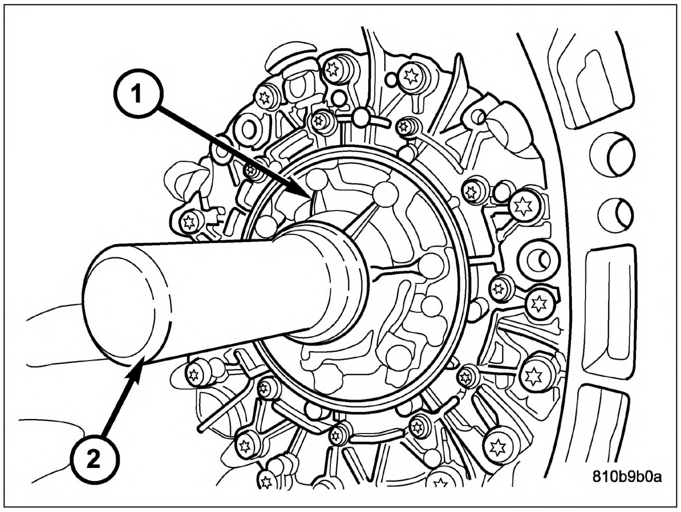
1. Remove the torque converter (Refer to 21 - TRANSMISSION/AUTOMATIC - NAG1/TORQUE CONVERTER - REMOVAL).
2. Remove the torque converter hub seal with suitable screw and slide hammer.

INSTALLATION

1. Position the torque converter hub seal (1) over the input shaft and against the transmission oil pump.



2. Using Seal Installer 8902A (2), install a new torque converter hub seal.
3. Install the torque converter (Refer to 21 - TRANSMISSION/AUTOMATIC - NAG1/TORQUE CONVERTER - INSTALLATION).



TRANSFER CASE - ELECTRICAL DIAGNOSTICS

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TRANSFER CASE - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

TRANSFER CASE VERIFICATION TEST VER 1

Diagnostic Test

1. TRANSFER CASE VERIFICATION TEST— VER 1

Disconnect all jumper wires and reconnect all previously disconnected components and connectors.

With the scan tool, select Clear Stored DTCs.

Make sure that all accessories are turned off and that the battery is fully charged.

Test drive the vehicle in each Transfer Case range and verify proper operation in each range.

NOTE: To select or deselect 4LO (if equipped), vehicle speed must be below 3 M.P.H. (5 KM/H) with the ignition ON and the transmission in neutral (auto trans).

NOTE: To select or deselect Transfer Case Neutral, vehicle speed must be 0 M.P.H. with the ignition ON, engine OFF, the brake pedal applied, and the transmission in neutral (auto trans). Press the Neutral button (if equipped) on the Transfer Case Selector Switch until the Neutral Indicator is illuminated solidly and the cluster displays ’4WD System in Neutral’.

WARNING: Apply the parking brake. The vehicle may roll with the Transfer Case in neutral.

NOTE: To verify that the Transfer Case is in Neutral, shift the automatic transmission into reverse and release the brake pedal for three seconds. There should be no vehicle movement if the Transfer Case is in Neutral.

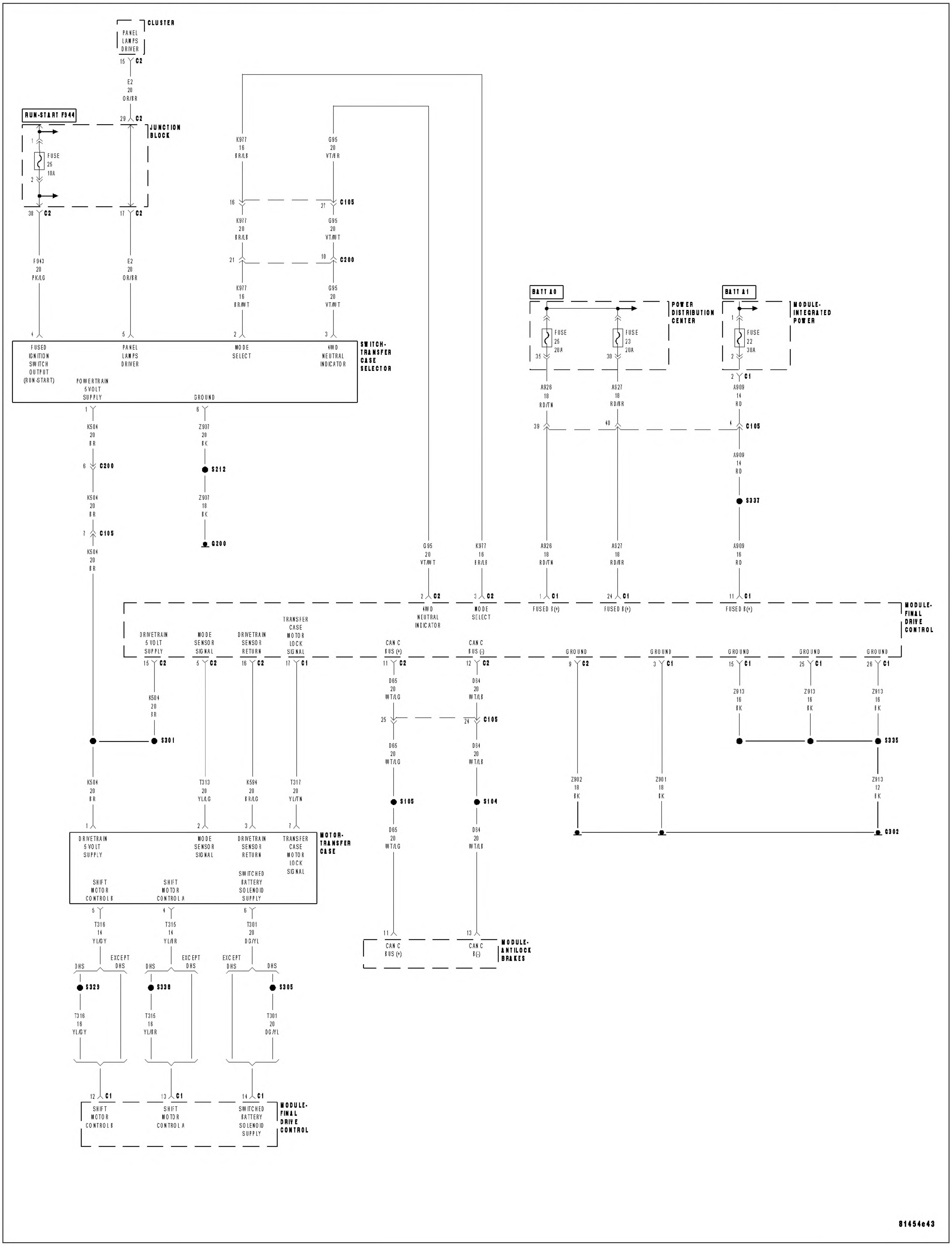
With the scan tool, select View DTCs in the Final Drive Control Module.

Are there any DTCs present in the Final Drive Control Module?

Yes >> Return to the symptom list and perform the appropriate diagnostic test.

No >> Repair is complete.

C1400-TRANSFER CASE RANGE SELECT SWITCH PERFORMANCE


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
1
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
1
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S335
S301
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302
1
2
3
7
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
D65 20 WT/LG
D64 20 WT/LB
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1400-TRANSFER CASE RANGE SELECT SWITCH PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Transfer Case Selector Switch is not reporting a valid voltage for any switch position.

Possible Causes
INTERMITTENT TRANSFER CASE RANGE SELECT SWITCH PERFORMANCE
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT OPEN
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K977) MODE SELECT CIRCUIT OPEN
(K977) MODE SELECT CIRCUIT SHORT TO GROUND
TRANSFER CASE SELECTOR SWITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on, engine not running.

NOTE: Repair any system undervoltage or overvoltage DTCs that are set in this module before proceeding.
With the scan tool, select View DTCs in the Final Drive Control Module.

Is the DTC status Active at this time?

Yes >> Go To 2

No >> Go To 9

---

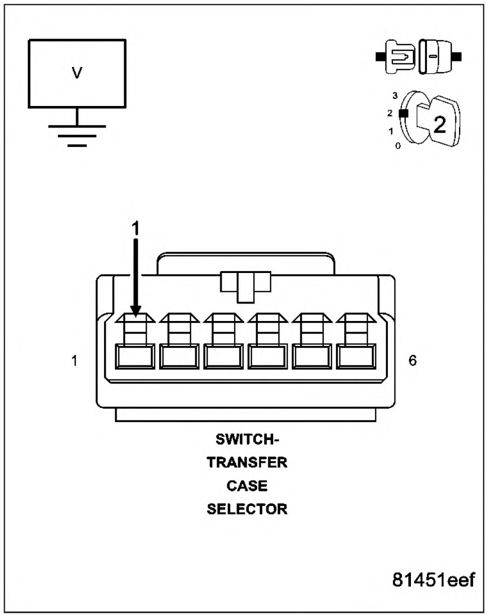
2. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT VOLTAGE

Turn the ignition off.
Disconnect the Transfer Case Selector Switch connector.
Turn the ignition on.
Measure the voltage of the (K504) Drivetrain 5 Volt Supply circuit.

Is the voltage between 4.7 and 5.2 volts?

Yes >> Go To 5

No >> Go To 3



C1400-TRANSFER CASE RANGE SELECT SWITCH PERFORMANCE (CONTINUED)

3. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

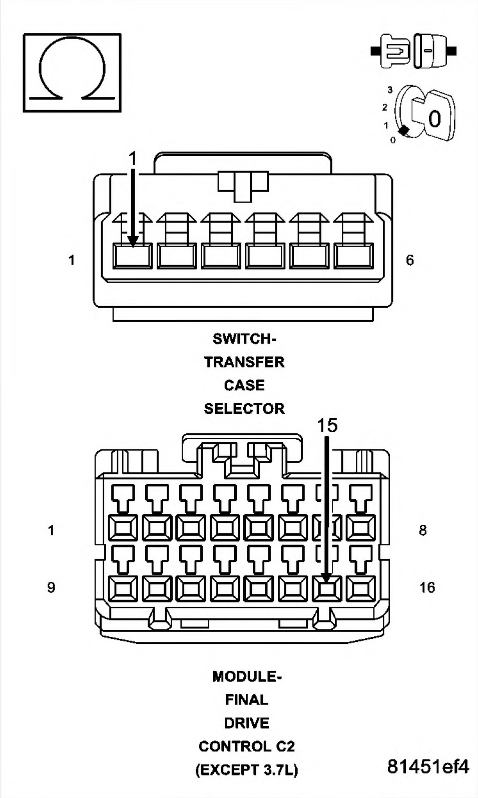
Measure the resistance of the (K504) Drivetrain 5 Volt Supply circuit.

Is the resistance greater than 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for an open.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 4


1
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
15
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451ef4

---

4. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

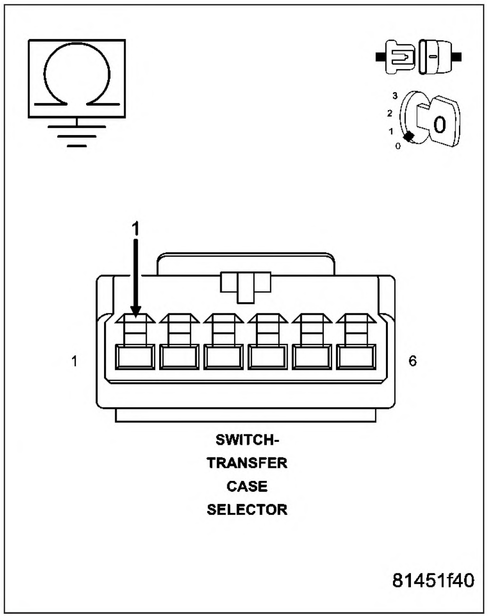
Measure the resistance between the (K504) Drivetrain 5 Volt Supply circuit and ground.

Is the resistance less than 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to ground.

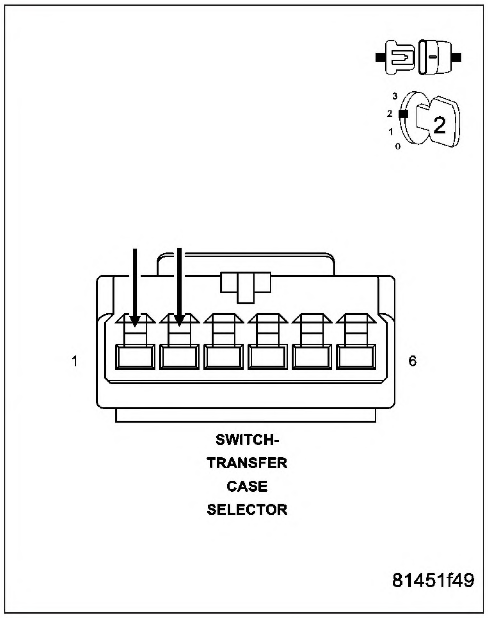
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 8


1
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
81451f40

C1400-TRANSFER CASE RANGE SELECT SWITCH PERFORMANCE (CONTINUED)

5. TRANSFER CASE SELECTOR SWITCH


3
2
1
0
2
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
81451f49

Ignition on, engine not running.

With the scan tool in Data Display, read the 4wd Range Switch Voltage with the Transfer Case Selector Switch connector disconnected.

The switch voltage should be approximately 0 volts.

Turn the ignition off.

Connect a jumper wire between the (K504) Drivetrain 5 Volt Supply circuit and the (K977) Mode Select circuit in the Transfer Case Selector Switch connector.

Ignition on, engine not running.

With the scan tool in Data Display, read the 4wd Range Switch Voltage.

The switch voltage should be approximately 5 volts.

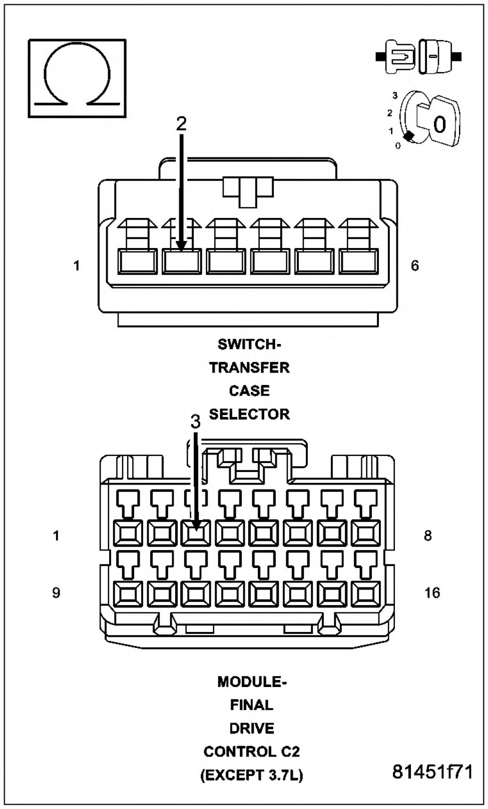
Does the voltage display as described?

Yes >> Replace the Transfer Case Selector Switch.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 6

---

6. (K977) MODE SELECT CIRCUIT OPEN


Ω
3
2
1
0
0
2
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
3
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451f71

Turn the ignition off.

Disconnect the Final Drive Control Module C2 connector.

Measure the resistance of the (K977) Mode Select circuit between the Transfer Case Selector Switch connector and the Final Drive Control Module C2 harness connector.

Is the resistance above 5.0 ohms?

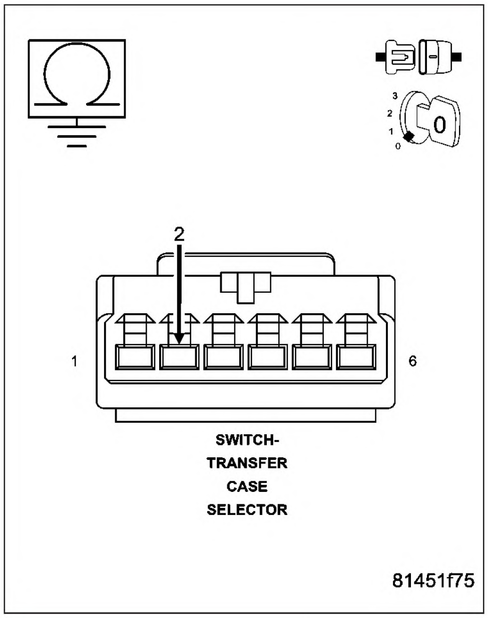
Yes >> Repair the (K977) Mode Select circuit for an open.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 7

C1400-TRANSFER CASE RANGE SELECT SWITCH PERFORMANCE (CONTINUED)

7. (K977) MODE SELECT CIRCUIT SHORT TO GROUND

Measure the resistance between the (K977) Mode Select circuit and ground.



Is the resistance less than 5.0 ohms?

Yes >> Repair the (K977) Mode Select circuit for a short to ground.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 8

---

8. FINAL DRIVE CONTROL MODULE

View repair.

Repair
Replace the Final Drive Control Module in accordance with the Service Information.
Perform the VERIFICATION TEST-VER 1.

---

9. INTERMITTENT TRANSFER CASE RANGE SELECT SWITCH PERFORMANCE

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

While monitoring the scan tool data relative to this circuit, move the selector switch to each position several times.

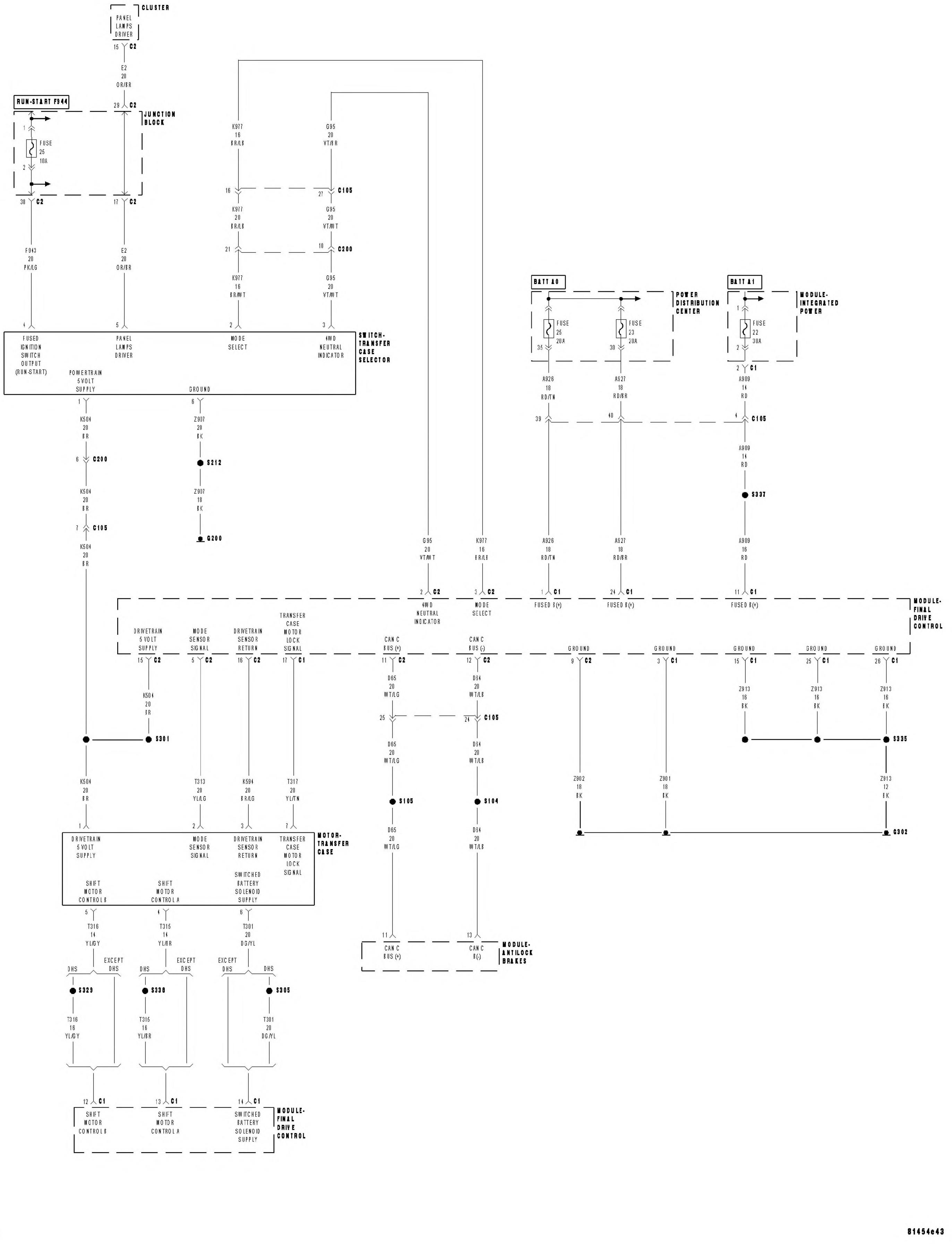
Look for the data to change other than as expected or for the DTC to reset.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1401-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT LOW


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
1
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
1
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
S105
S104
1
2
3
7
G302
D65 20 WT/LG
D64 20 WT/LB
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1401-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage or supply voltage low conditions present.
- **Set Condition:**
  The 4WD Range Switch Voltage is below a specified value for a calibrated amount of time.

Possible Causes
INTERMITTENT TRANSFER CASE RANGE SELECT SWITCH CIRCUIT LOW
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED OPEN
(K977) MODE SELECT CIRCUIT SHORTED TO GROUND
(K977) MODE SELECT CIRCUIT SHORT OPEN
TRANSFER CASE SELECTOR SWITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. 4WD RANGE SWITCH VOLTAGE LESS THAN 0.2 VOLTS

Ignition on, engine not running.

NOTE: Repair any system undervoltage or overvoltage DTCs that are set in this module before proceeding.
With the scan tool under Data Display, read the 4WD Range Switch Voltage.

Is the voltage less than 0.2 volts?

Yes >> Go To 2

No >> Go To 9

---

2. TRANSFER CASE SELECTOR SWITCH

Turn the ignition off.

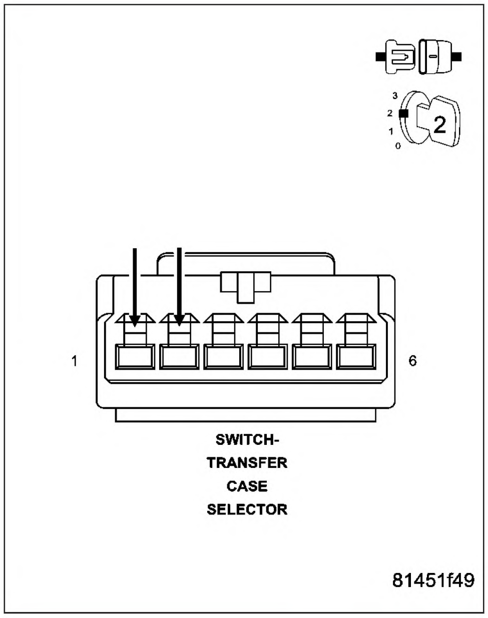
Disconnect the Transfer Case Selector Switch connector.

Connect a jumper wire between the (K504) Drivetrain 5 Volt Supply circuit and the (K977) Mode Select circuit in the Transfer Case Selector Switch connector.

Ignition on, engine not running.

With the scan tool under Data Display, read the 4WD Range Switch Voltage.

The switch voltage should be approximately 5.0 volts.



Does the voltage display as described?

Yes >> Replace the Transfer Case Selector Switch.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 3

C1401-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT LOW (CONTINUED)

3. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT VOLTAGE

Turn the ignition on.

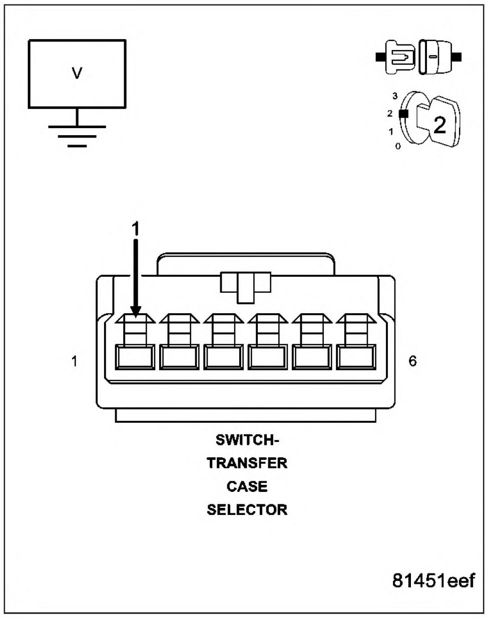
Measure the voltage of the (K504) Drivetrain 5 Volt Supply circuit.

The voltage should be approximately 5.0 volts.

Does the voltage display as described?

Yes >> Go To 6

No >> Go To 4


V
3
2
1
0
2
1
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
81451eef

---

4. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

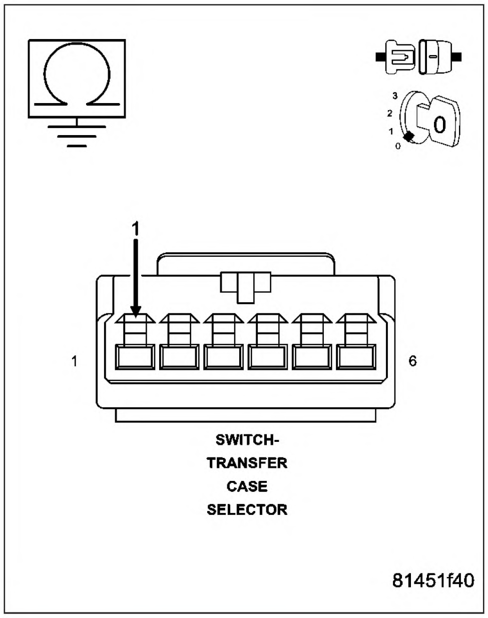
Measure the resistance between the (K504) Drivetrain 5 Volt Supply circuit and ground.

Is the resistance less than 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

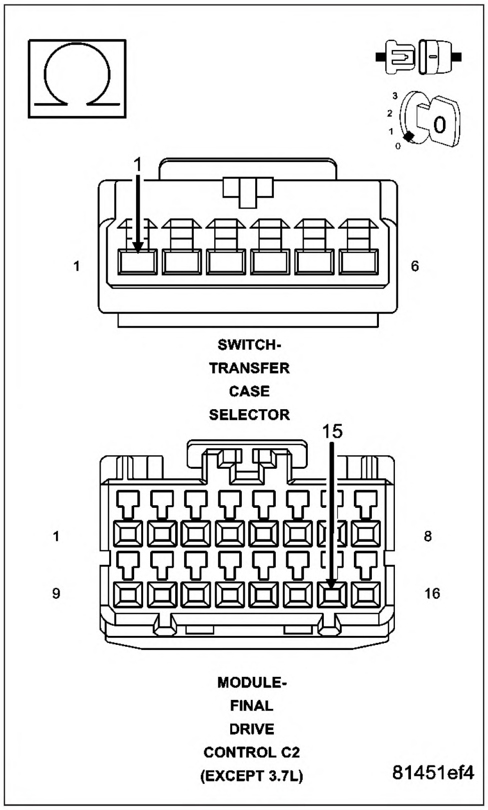
No >> Go To 5


3
2
1
0
0
1
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
81451f40

C1401-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT LOW (CONTINUED)

5. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT OPEN

Measure the resistance of the (K504) Drivetrain 5 Volt Supply circuit between the Transfer Case Selector Switch connector and the Final Drive Control Module C2 harness connector.


1
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
15
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451ef4

Is the resistance greater than 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for an open.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 8

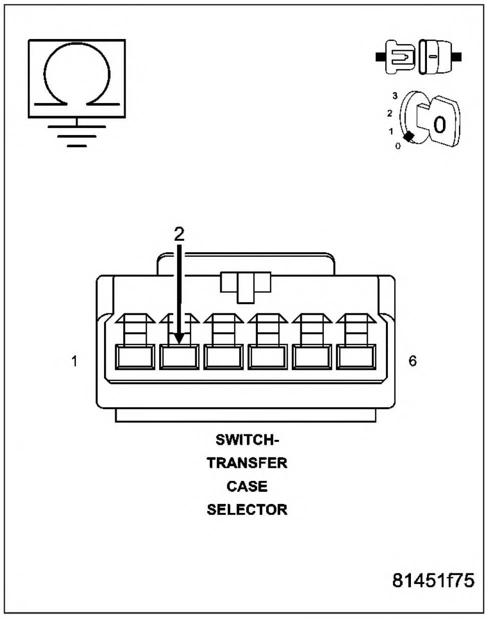
---

6. (K977) MODE SELECT CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

Measure the resistance between the (K977) Mode Select circuit and ground.


2
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
81451f75

Is the resistance less than 5.0 ohms?

Yes >> Repair the (K977) Mode Select circuit for a short to ground.

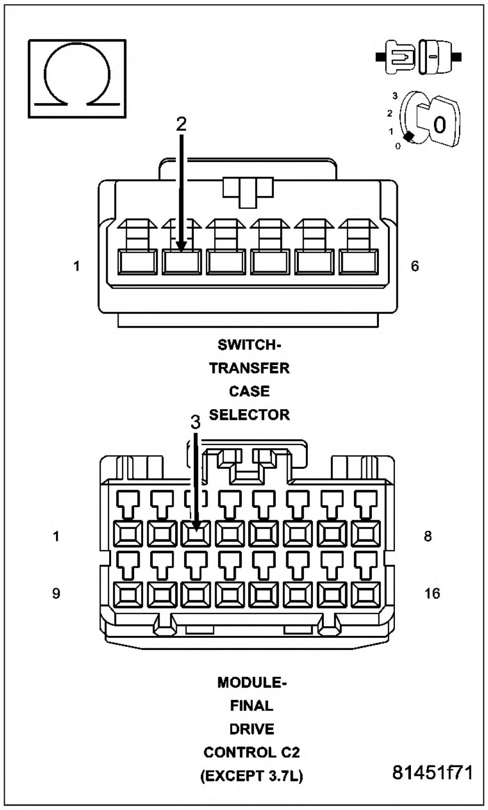
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 7

C1401-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT LOW (CONTINUED)

7. (K977) MODE SELECT CIRCUIT OPEN

Measure the resistance of the (K977) Mode Select circuit between the Transfer Case Selector Switch connector and the Final Drive Control Module C2 harness connector.



Is the resistance above 5.0 ohms?

Yes >> Repair the (K977) Mode Select circuit for an open.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 8

---

8. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

9. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

While monitoring the scan tool data relative to this circuit, move the selector switch to each position several times.

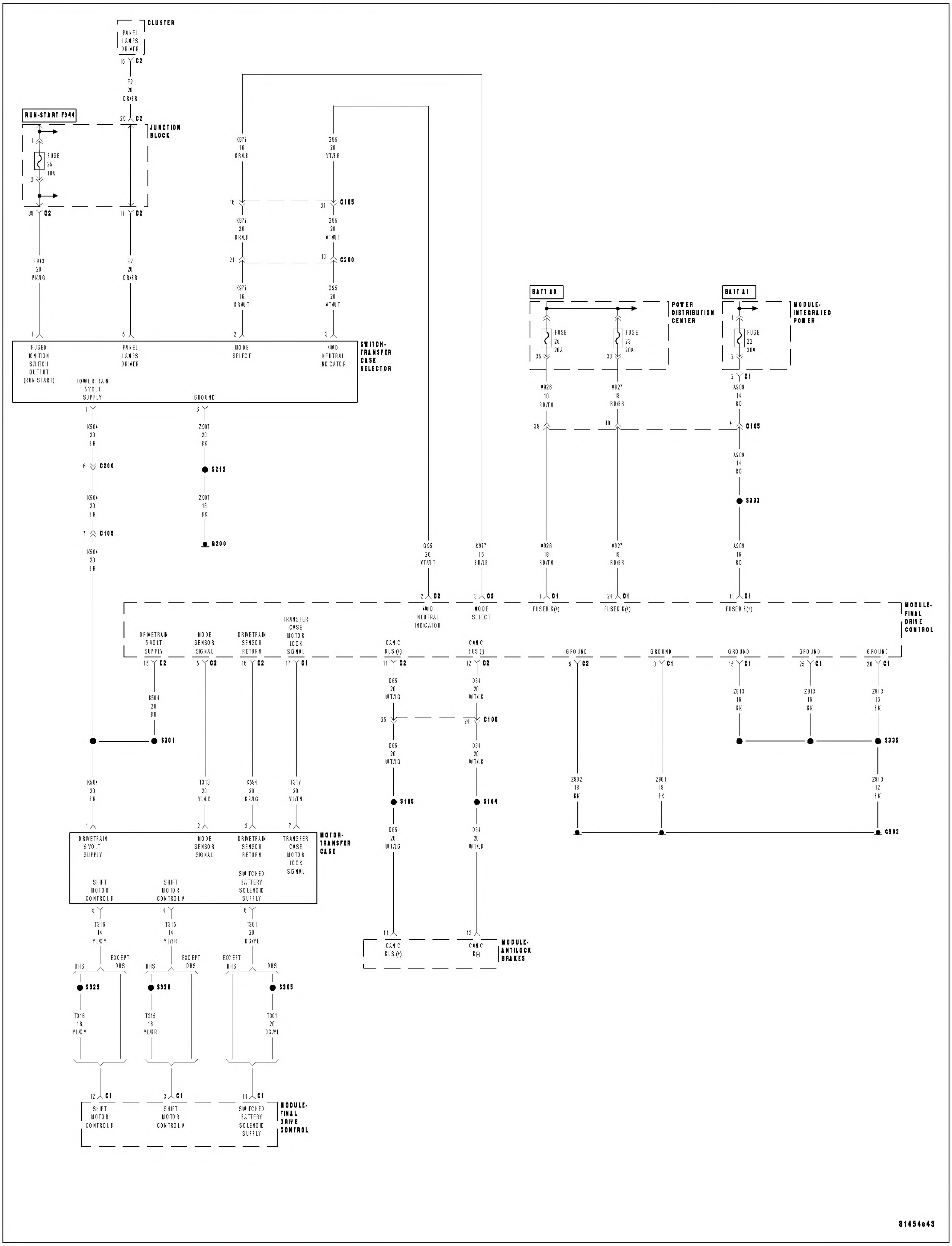
Look for the data to change other than as expected or for the DTC to reset.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1402-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT HIGH


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
K504 20 BR
Z907 20 BK
6 C200
S212
Z907 18 BK
7 C105
G200
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
S337
A909 16 RD
G95 20 VT/WT
K977 16 BR/LB
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
25
26 C105
Z913 16 BK
S301
S335
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C B(-)
81454e43

C1402-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  Transfer Case 4WD Range Switch voltage is greater than a specified voltage for a calibrated amount of time.

Possible Causes
INTERMITTENT TRANSFER CASE RANGE SELECTOR SWITCH CIRCUIT HIGH
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(K977) MODE SELECT CIRCUIT SHORTED TO VOLTAGE
TRANSFER CASE SELECTOR SWITCH (Z907) GROUND CIRCUIT OPEN
TRANSFER CASE SELECTOR SWITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. 4WD RANGE SWITCH VOLTAGE ABOVE 4.5 VOLTS

Ignition on, engine not running.

NOTE: Repair any system undervoltage or overvoltage DTCs that are set in this module before proceeding.
With the scan tool under Data Display, read the 4WD Range Switch voltage.

Is the voltage above 4.5 volts?

Yes >> Go To 2

No >> Go to 7

---

2. TRANSFER CASE SELECTOR SWITCH

Turn the ignition off.
Disconnect the Transfer Case Selector Switch harness connector.
Ignition on, engine not running.
With the scan tool under Data Display, read the 4WD Range Switch voltage.

Is the voltage equal to 0 volts?

Yes >> Replace the Transfer Case Selector Switch.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

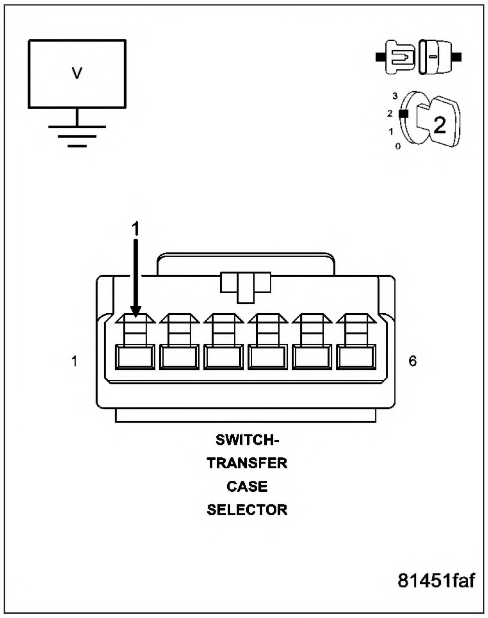
No >> Go to 3

C1402-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT HIGH (CONTINUED)

3. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (K504) Drivetrain 5 Volt Supply circuit.


V
3
2
1
0
2
1
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
81451faf

Is the voltage above 5.5 volts?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to voltage.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

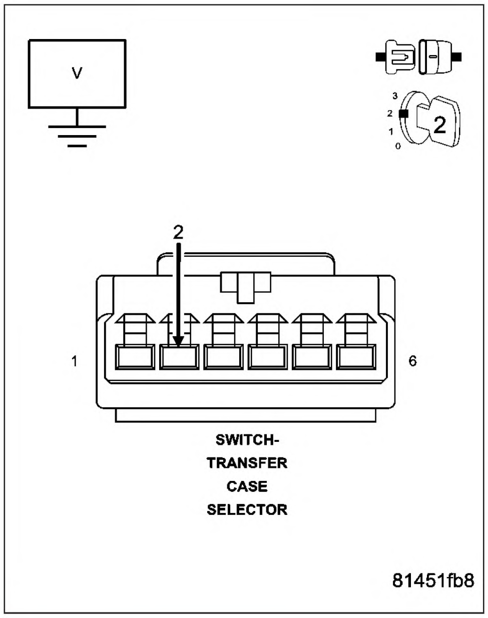
4. (K977) MODE SELECT CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

Turn the ignition on.

Measure the voltage of the (K977) Mode Select circuit.


V
3
2
1
0
2
2
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
81451fb8

Is there any voltage present?

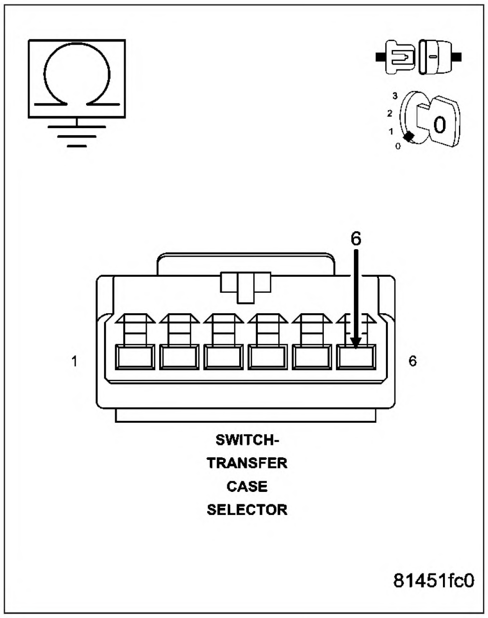
Yes >> Repair the (K977) Mode Select circuit for a short to voltage.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 5

C1402-TRANSFER CASE RANGE SELECT SWITCH CIRCUIT HIGH (CONTINUED)

5. TRANSFER CASE SELECTOR SWITCH (Z907) GROUND CIRCUIT OPEN

Measure the resistance between ground and the Transfer Case Selector Switch (Z907) Ground circuit.



Is the resistance above 5.0 ohms?

Yes >> Repair the Transfer Case Selector Switch (Z907) Ground circuit for an open.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 6

---

6. FINAL DRIVE CONTROL MODULE

Repair

Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

7. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

While monitoring the scan tool data relative to this circuit, move the selector switch to each position several times.

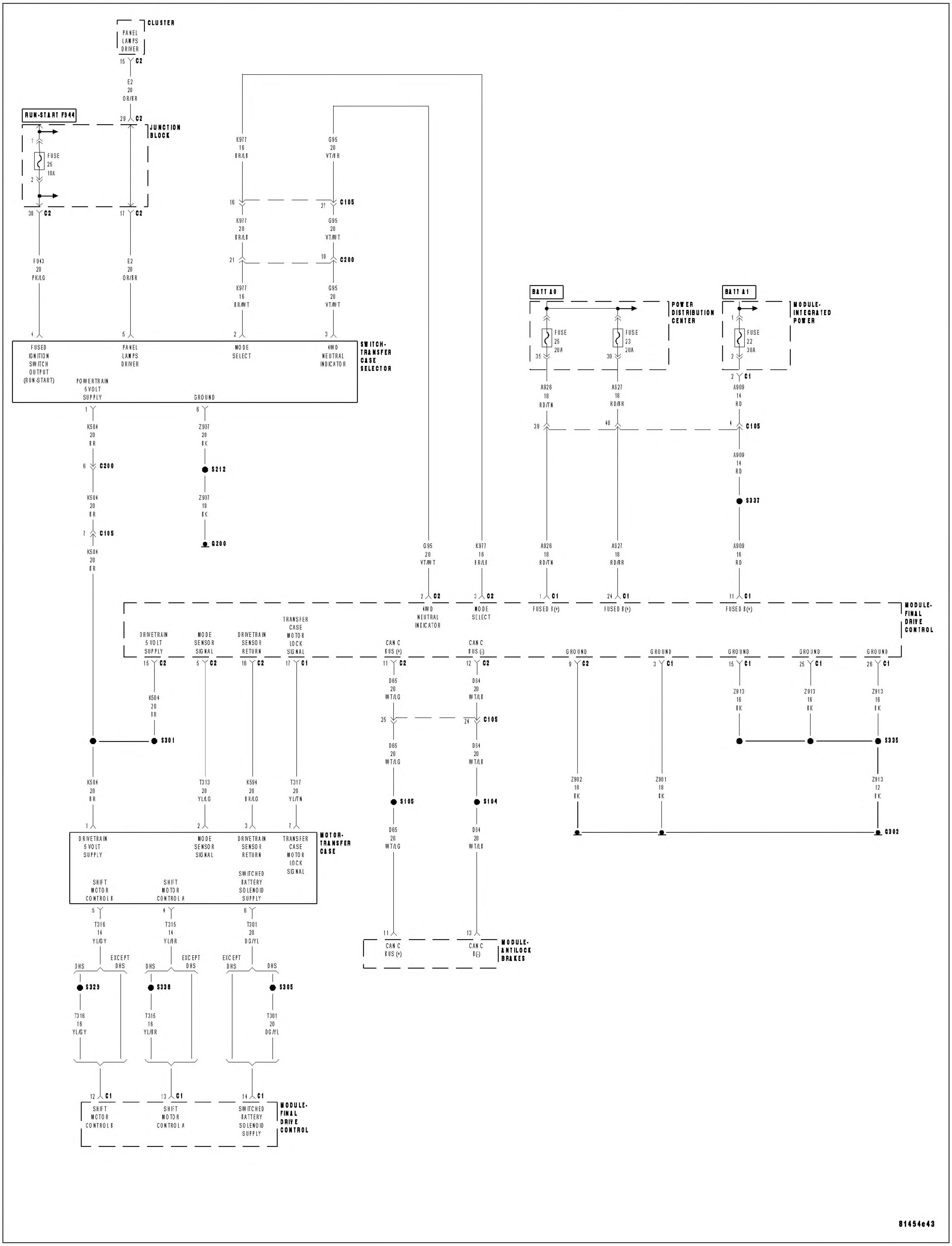
Look for the data to change other than as expected or for the DTC to reset.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1403-TRANSFER CASE RANGE POSITION SENSOR PERFORMANCE


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
1
2
3
7
G302
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
D65 20 WT/LG
D64 20 WT/LB
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
8
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1403-TRANSFER CASE RANGE POSITION SENSOR PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Ignition on. Battery voltage between 9 and 16 volts. No Range Position Sensor low or high voltage conditions present.
- **Set Condition:**
  During a blocked shift attempt, motor current indicates motor movement, but the sensor value change is less than a specified value.

Possible Causes
INTERMITTENT TRANSFER CASE RANGE POSITION SENSOR PEERFORMANCE
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT HIGH RESISTANCE
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(T313) MODE SENSOR SIGNAL CIRCUIT HIGH RESISTANCE
(T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(K594) DRIVETRAIN SENSOR RETURN CIRCUIT HIGH RESISTANCE
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on, engine not running.

NOTE: Repair any system undervoltage or overvoltage DTCs that are set in this module before proceeding. With the scan tool, select View DTCs in the Final Drive Control Module.

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 11

C1403-TRANSFER CASE RANGE POSITION SENSOR PERFORMANCE (CONTINUED)

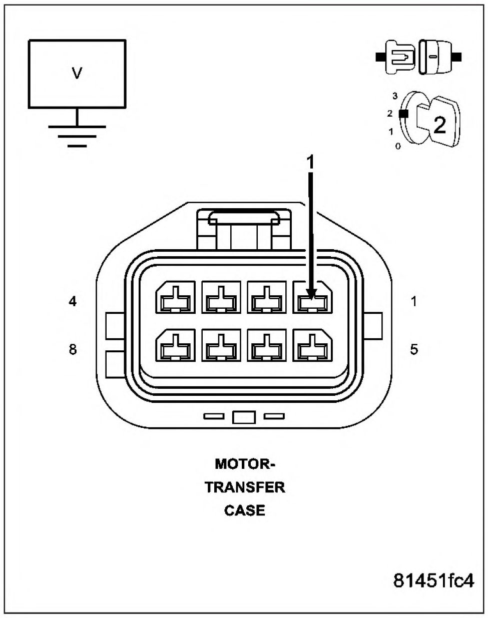
2. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT VOLTAGE

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

Turn the ignition on.

Measure the voltage of the (K504) Drivetrain 5 Volt Supply circuit.


V
3
2
1
0
2
1
4
8
1
5
MOTOR-
TRANSFER
CASE
81451fc4

Select the displayed voltage reading:

Voltage greater than 5.5 volts.

Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to voltage.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

Voltage between 4.5 and 5.5 volts.

Go to 5

Voltage less than 4.5 volts.

Go to 3

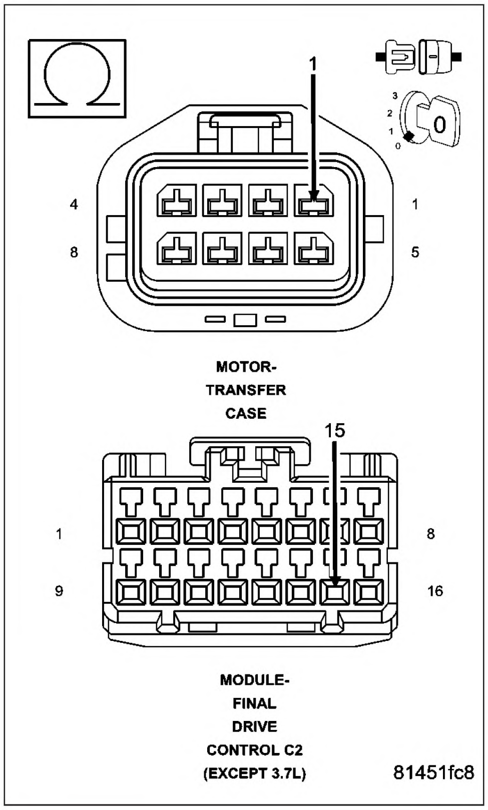
---

3. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

Measure the resistance of the (K504) Drivetrain 5 Volt Supply circuit.


Ω
1
3
2
1
0
0
4
8
1
5
MOTOR-
TRANSFER
CASE
15
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451fc8

Is the resistance above 5.0 ohms?

Yes >> Repair the high resistance in the (K504) Drivetrain 5 Volt Supply circuit.

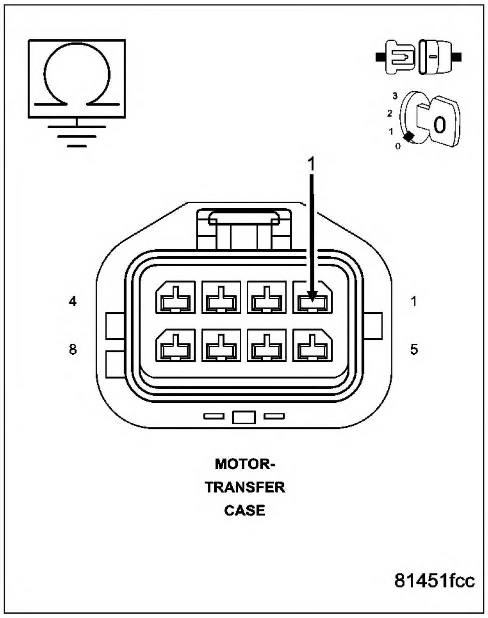
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

C1403-TRANSFER CASE RANGE POSITION SENSOR PERFORMANCE (CONTINUED)

4. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K504) Drivetrain 5 Volt Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 10

---

5. TRANSFER CASE MOTOR

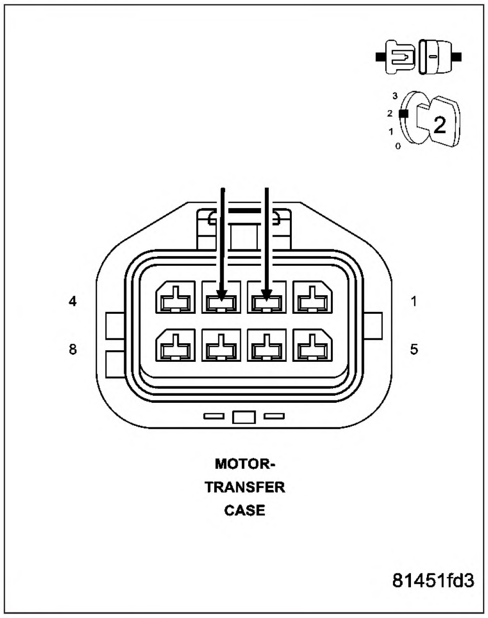
Turn the ignition off.

Connect a jumper wire between the (T313) Mode Sensor Signal circuit and the (K594) Drivetrain Sensor Return circuit.

Turn the ignition on.

With the scan tool under Data Display, read the T-Case Position Sensor voltage.

The displayed voltage should be approximately 0 volts with the jumper wire in place.



Does the voltage display as described?

Yes >> Replace the Transfer Case Motor.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6

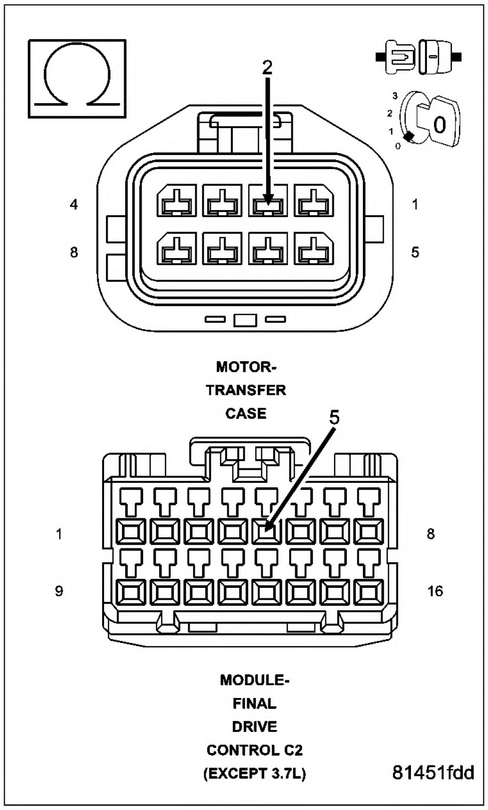
C1403-TRANSFER CASE RANGE POSITION SENSOR PERFORMANCE (CONTINUED)

6. (T313) MODE SENSOR SIGNAL CIRCUIT HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

Measure the resistance of the (T313) Mode Sensor Signal circuit.


2
4
1
8
5
MOTOR-
TRANSFER
CASE
5
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451fdd

Is the resistance above 5.0 ohms?

Yes >> Repair the high resistance in the (T313) Mode Sensor Signal circuit.

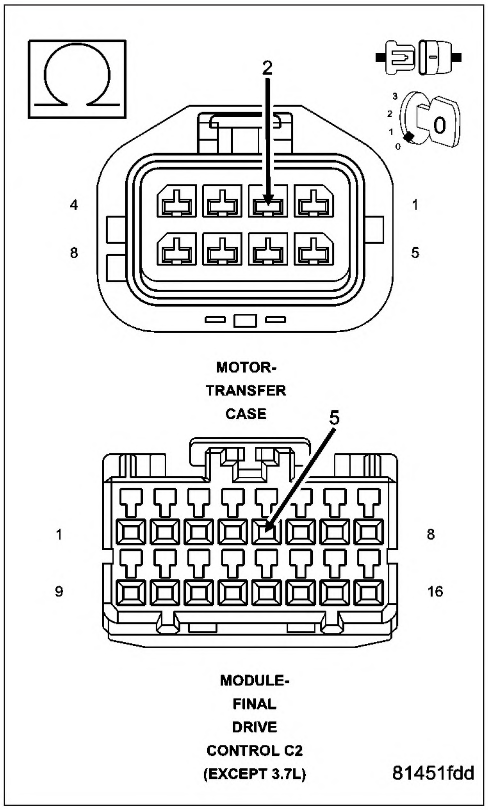
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7

---

7. (T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (T313) Mode Sensor Signal circuit.


2
4
1
8
5
MOTOR-
TRANSFER
CASE
5
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451fdd

Is the resistance below 5.0 ohms?

Yes >> Repair the (T313) Mode Sensor Signal circuit for a short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

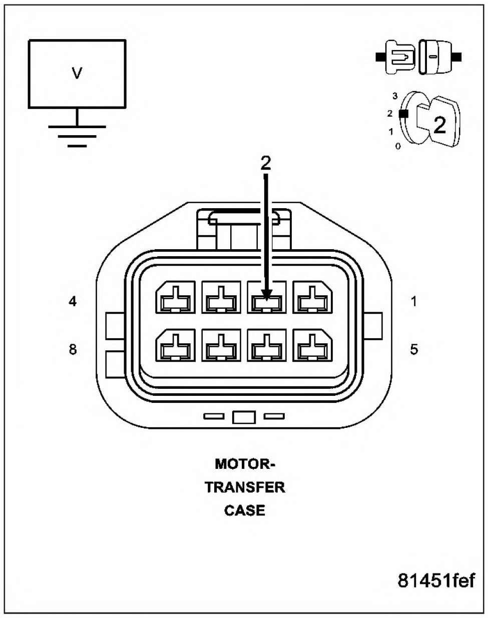
No >> Go to 8

C1403-TRANSFER CASE RANGE POSITION SENSOR PERFORMANCE (CONTINUED)

8. (T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE

Turn the ignition on.

Measure the voltage of the (T313) Mode Sensor Signal circuit.


V
3
2
1
0
2
2
4
8
1
5
MOTOR-
TRANSFER
CASE

81451fef

Is there any voltage present?

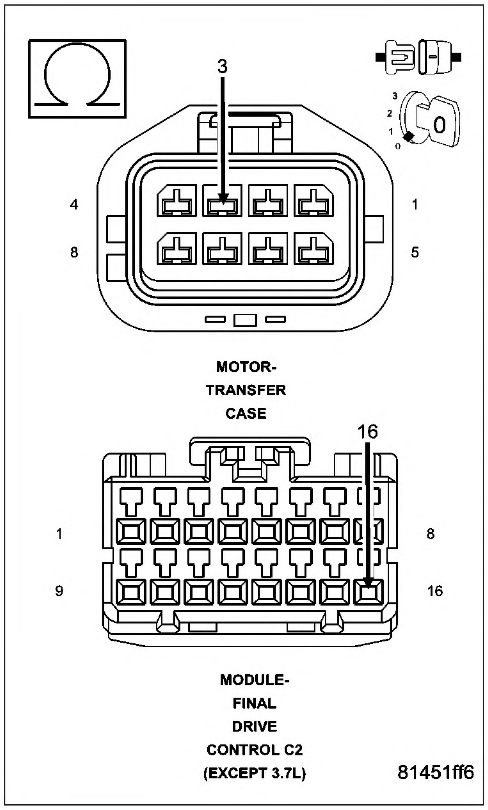
Yes >> Repair the (T313) Mode Sensor Signal circuit for a short to voltage.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 9

---

9. (K594) DRIVETRAIN SENSOR RETURN CIRCUIT HIGH RESISTANCE

Measure the resistance of the (K594) Drivetrain Sensor Return circuit.


3
3
2
1
0
0
4
8
1
5
MOTOR-
TRANSFER
CASE
16
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)

81451ff6

Is the resistance below 5.0 ohms?

Yes >> Go to 10

No >> Repair the high resistance in the (K594) Drivetrain Sensor Return circuit.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C1403-TRANSFER CASE RANGE POSITION SENSOR PERFORMANCE (CONTINUED)

10. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

11. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

While monitoring the scan tool data relative to this circuit, move the selector switch to each position several times.

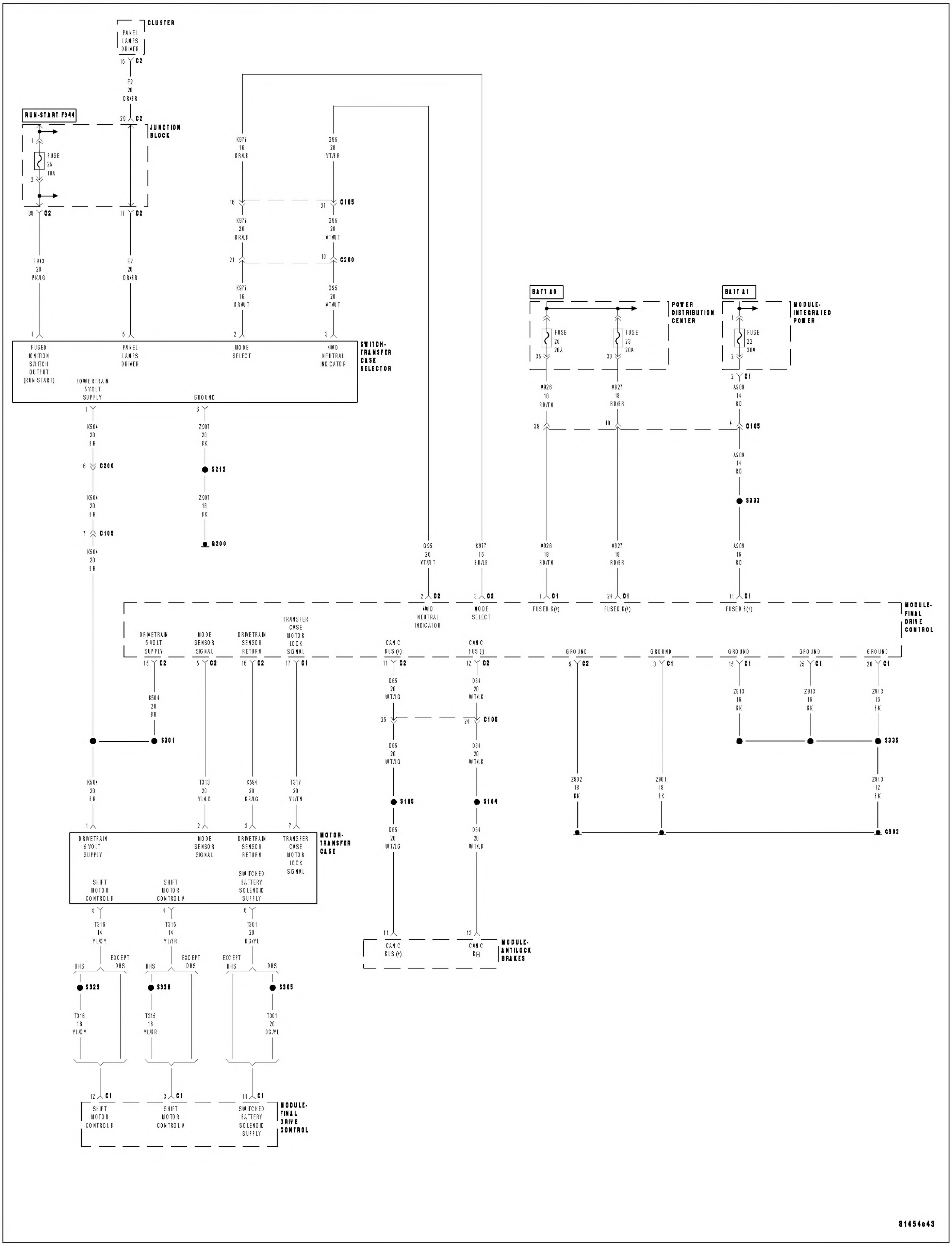
Look for the data to change other than as expected or for the DTC to reset.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1404-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT LOW


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
1
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
1
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
25
24 C105
Z913 16 BK
Z913 16 BK
Z913 16 BK
S301
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
1
2
3
7
G302
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
D65 20 WT/LG
D64 20 WT/LB
5
4
8
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1404-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage or supply voltage low conditions present.
- **Set Condition:**
  Sensor input voltage is below a specified value for a calibrated amount of time.

Possible Causes
INTERMITTENT TRANSFER CASE RANGE POSITION SENSOR CIRCUIT LOW
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT OPEN
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
(T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
TRANSFER CASE MOTOR
TRANSFER CASE CONTROL MODULE

Diagnostic Test

1. T-CASE POSITION SENSOR VOLTAGE BELOW 0.4 VOLTS

Ignition on, engine not running.

With the scan tool under Data Display, read the T-Case Position Sensor voltage.

Is the voltage below 0.4 volts?

Yes >> Go to 2

No >> Go to 8

2. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT VOLTAGE

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

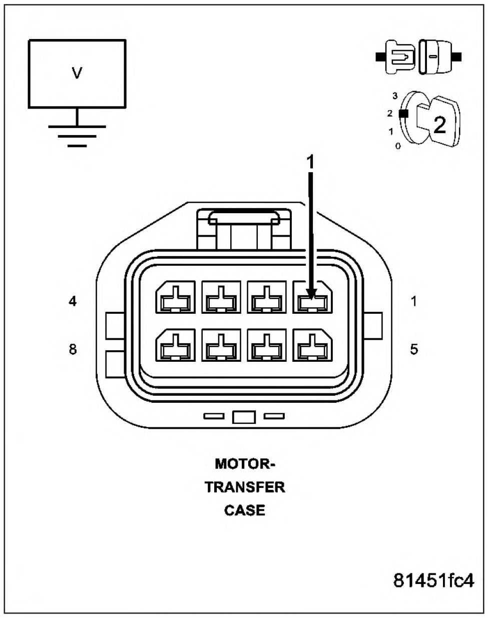
Turn the ignition on.

Measure the voltage of the (K504) Drivetrain 5 Volt Supply circuit.

Is the voltage below 0.2 volts?

Yes >> Go to 3

No >> Go to 5



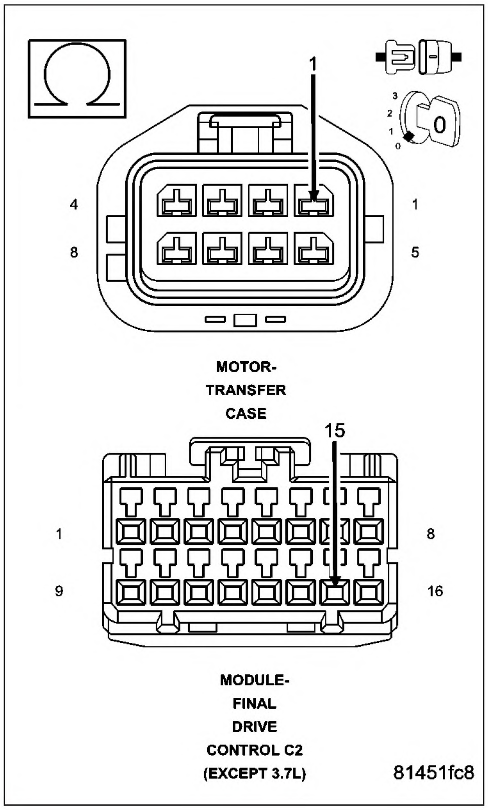
C1404-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT LOW (CONTINUED)

3. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

Measure the resistance of the (K504) Drivetrain 5 Volt Supply circuit.


1
4
8
1
5
MOTOR-
TRANSFER
CASE
15
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451fc8

Is the resistance above 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for an open.

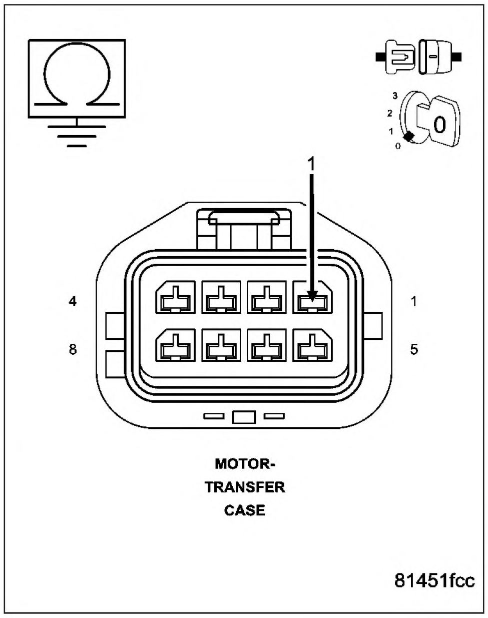
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

---

4. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (K504) Drivetrain 5 Volt Supply circuit.


1
4
8
1
5
MOTOR-
TRANSFER
CASE
81451fcc

Is the resistance below 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7

C1404-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT LOW (CONTINUED)

5. TRANSFER CASE MOTOR

With the scan tool under Data Display, read the T-Case Position Sensor voltage.

Is the voltage above 4.5 volts?

Yes >> Replace the Transfer Case Motor.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6

---

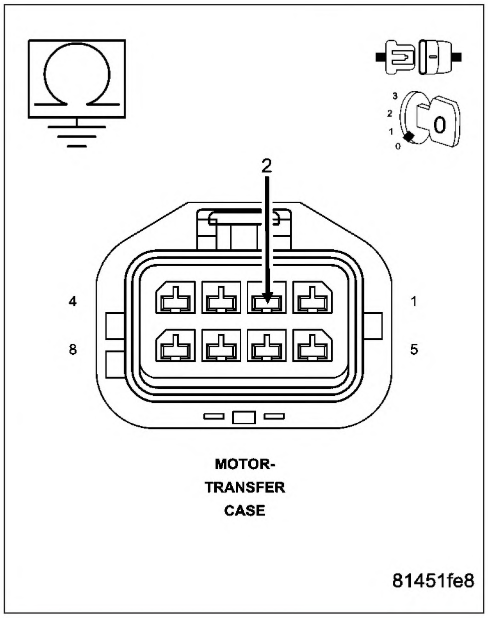
6. (T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (T313) Mode Sensor Signal circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T313) Mode Sensor Signal circuit for a short to ground.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7



---

7. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

8. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

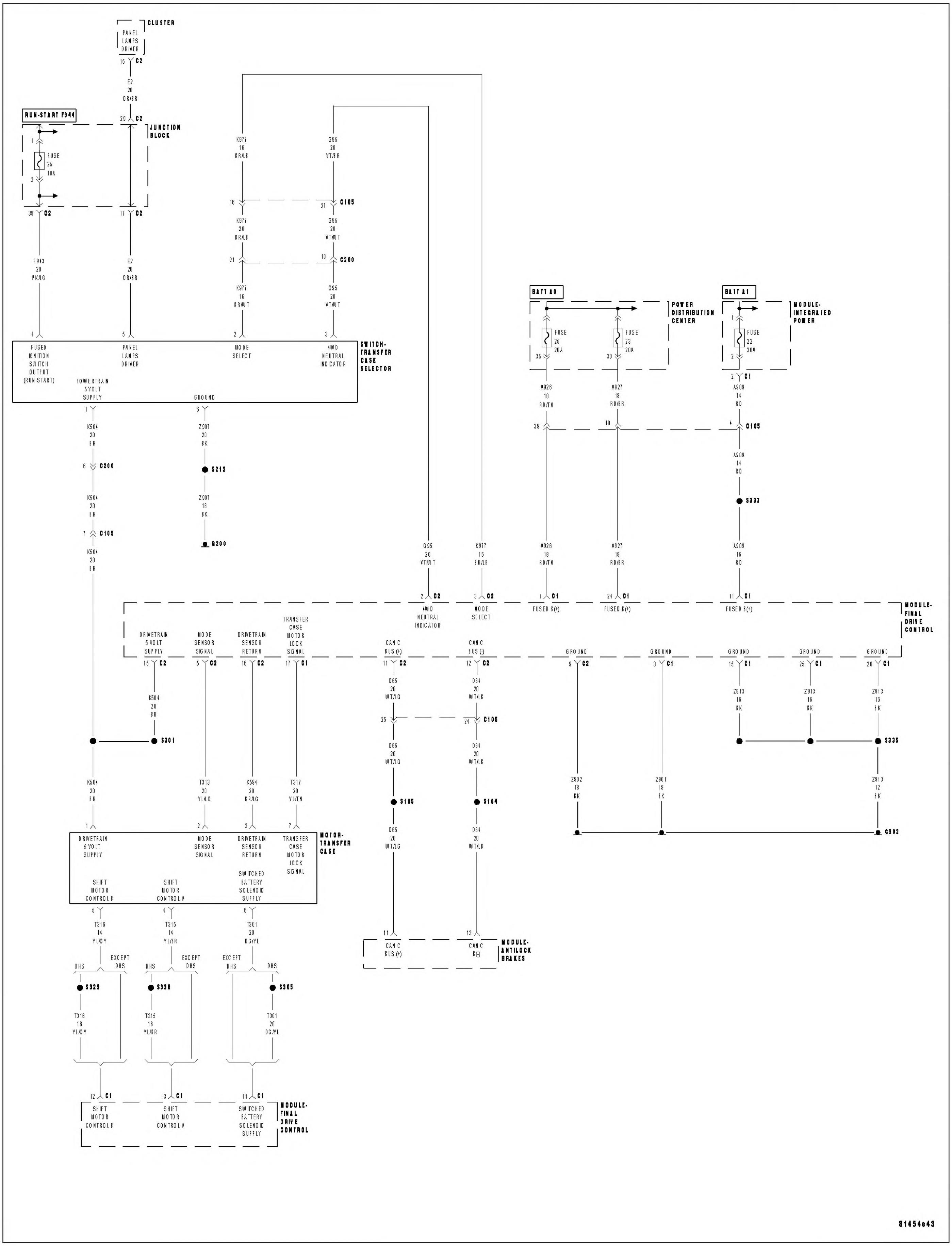
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1405-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT HIGH


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
K504 20 BR
6 C200
K504 20 BR
7 C105
K504 20 BR
Z907 20 BK
S212
Z907 18 BK
G200
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
25
24 C105
Z913 16 BK
Z913 16 BK
Z913 16 BK
S301
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
D65 20 WT/LG
D64 20 WT/LB
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
EXCEPT DHS
DHS
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1405-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The sensor voltage is above a specified value for a calibrated amount of time.

Possible Causes
INTERMITTENT TRANSFER CASE RANGE POSITION SENSOR CIRCUIT HIGH
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
(T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(T313) MODE SENSOR SIGNAL CIRCUIT OPEN
(K594) DRIVETRAIN SENSOR RETURN CIRCUIT OPEN
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. T-CASE POSITION SENSOR VOLTAGE ABOVE 4.8 VOLTS

Ignition on, engine not running.

With the scan tool under Data Display, read the T-Case Position Sensor voltage.

Is the voltage above 4.8 volts?

Yes >> Go To 2

No >> Go to 8

---

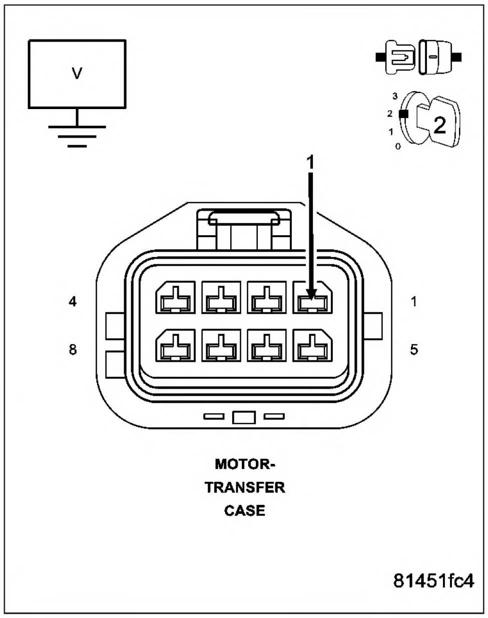
2. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

Turn the ignition on.

Measure the voltage of the (K504) Drivetrain 5 Volt Supply circuit.



Is the voltage above 5.5 volts?

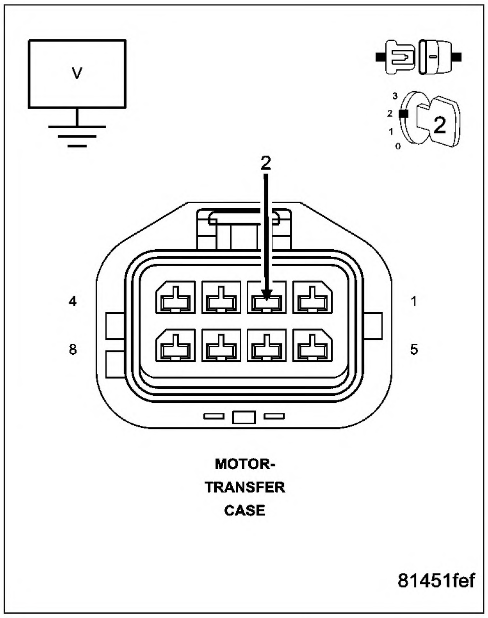
Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to voltage.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 3

C1405-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT HIGH (CONTINUED)

3. (T313) MODE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE

Measure the voltage of the (T313) Mode Sensor Signal circuit.



81451fef

Is the voltage above 5.5 volts?

Yes >> Repair the (T313) Mode Sensor Signal circuit for a short to voltage.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

---

4. TRANSFER CASE MOTOR

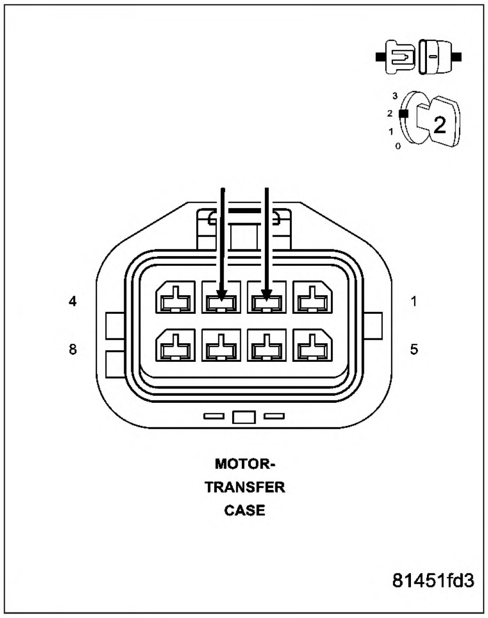
Turn the ignition off.

Connect a jumper wire between the (K594) Drivetrain Sensor Return circuit and the (T313) Mode Sensor Signal circuit in the Transfer Case Motor harness connector.

Turn the ignition on.

With the scan tool under Data Display, read the T-Case Position Sensor voltage.

NOTE: Remove the jumper wire before continuing.



81451fd3

Is the voltage below 0.2 volts?

Yes >> Replace the Transfer Case Motor.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 5

C1405-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT HIGH (CONTINUED)

5. (T313) MODE SENSOR SIGNAL CIRCUIT OPEN

Turn the ignition off.

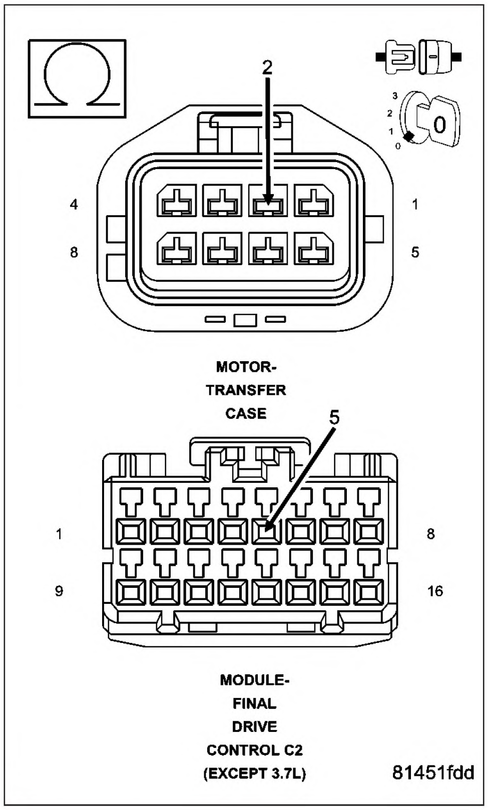
Disconnect the Final Drive Control Module C2 harness connector.

Measure the resistance of the (T313) Mode Sensor Signal circuit.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T313) Mode Sensor Signal circuit for an open. Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6


2
3
2
1
0
0
4
8
1
5
MOTOR-
TRANSFER
CASE
5
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451fdd

---

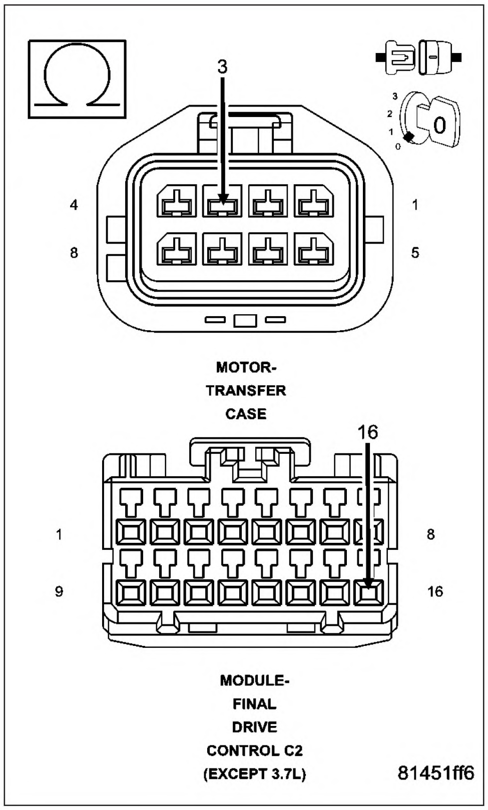
6. (K594) DRIVETRAIN SENSOR RETURN CIRCUIT OPEN

Measure the resistance of the (K594) Drivetrain Sensor Return circuit.

Yes >> Repair the (K594) Drivetrain Sensor Return circuit for an open.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7


3
3
2
1
0
0
4
8
1
5
MOTOR-
TRANSFER
CASE
16
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451ff6

C1405-TRANSFER CASE RANGE POSITION SENSOR CIRCUIT HIGH (CONTINUED)

7. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

8. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

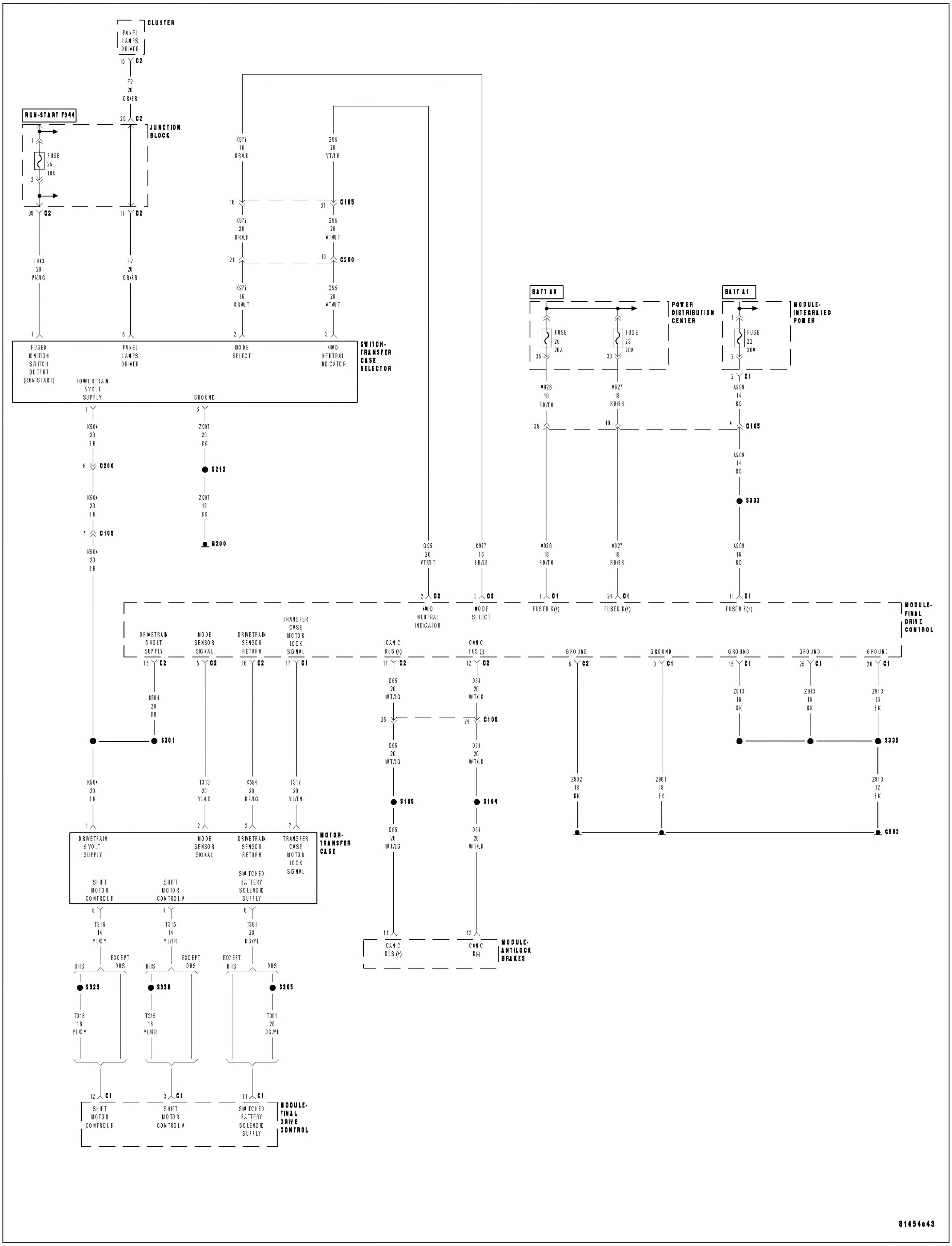
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1406-TRANSFER CASE BRAKE PERFORMANCE


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
A926 18 RD/TN
A927 18 RD/BR
39
40
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A909 14 RD
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
25
24 C105
Z913 16 BK
Z913 16 BK
Z913 16 BK
S301
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
1
2
3
7
G302
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
D65 20 WT/LG
D64 20 WT/LB
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1406-TRANSFER CASE BRAKE PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  1. The Control Module detects an excessive voltage variation on the Mode Sensor Signal circuit.
  2. The Control Module performs an error correction procedure too frequently.

Possible Causes
INTERMITTENT TRANSFER CASE BRAKE PERFORMANCE
(T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO GROUND
(T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT OPEN OR HIGH RESISTANCE
(T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT OPEN OR HIGH RESISTANCE
TRANSFER CASE MOTOR ASSEMBLY
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Start the engine and allow it to idle.

Move the Transfer Case Selector Switch to each position several times.

With the scan tool, select View DTCs in the FDCM.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 8

---

2. (T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO GROUND

Ignition off.

Disconnect the Transfer Case Motor harness connector.

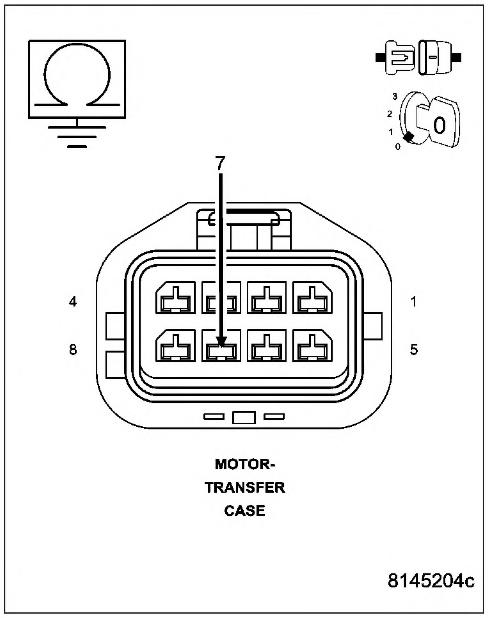
Disconnect the Final Drive Control Module C1 harness connector.

Measure the resistance between ground and the (T317) Transfer Case Motor Lock Signal circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T317) Transfer Case Motor Lock Signal circuit for a short to ground.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 3



C1406-TRANSFER CASE BRAKE PERFORMANCE (CONTINUED)

3. ACTUATE T-CASE MOTOR SOLENOID LOCK

Connect the Final Drive Control Module C1 harness connector.

Ignition on, engine not running.

With the scan tool, actuate the T-Case Motor Solenoid Lock.

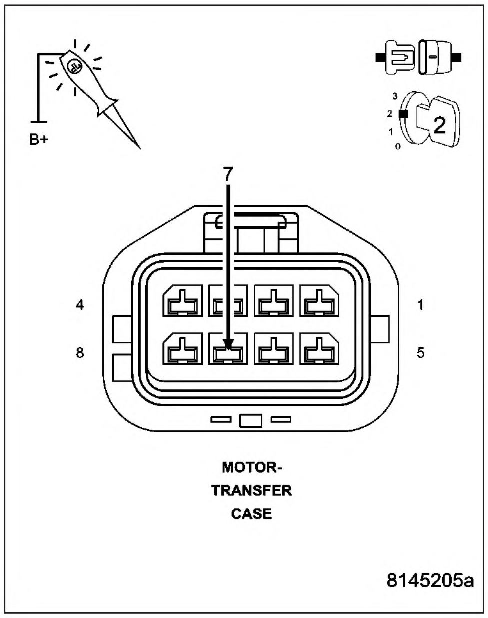
Using a 12–volt test light connected to 12–volts, check the (T317) Transfer Case Motor Lock Signal circuit with the circuit actuated.

NOTE: Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright with the circuit actuated?

Yes >> Go to 5

No >> Go to 4


B+
3
2
1
0
2
7
4
1
8
5
MOTOR-
TRANSFER
CASE
8145205a

---

4. (T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C1 connector.

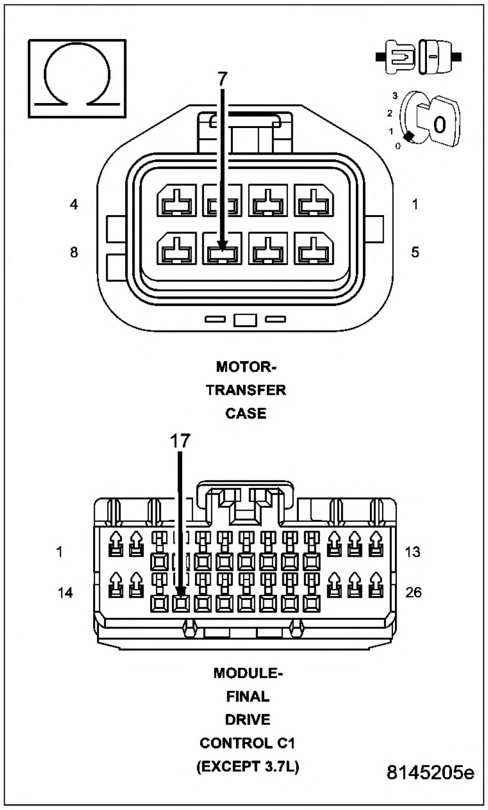
Measure the resistance of the (T317) Transfer Case Motor Lock Signal circuit between the Final Drive Control Module C1 harness connector and the Transfer Case Motor harness connector.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T317) Transfer Case Motor Lock Signal circuit for an open circuit or high resistance.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7


Ω
7
3
2
1
0
0
4
1
8
5
MOTOR-
TRANSFER
CASE
17
1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
8145205e

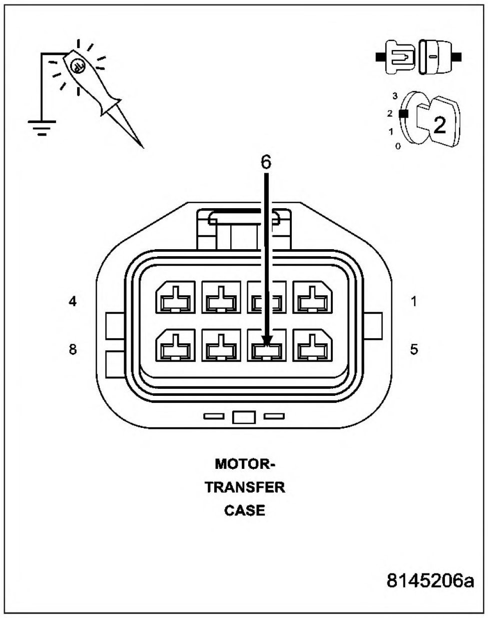
C1406-TRANSFER CASE BRAKE PERFORMANCE (CONTINUED)

5. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT VOLTAGE

Ignition on, engine not running.

Using a 12–volt test light connected to ground, check the (T301) Switched Battery Solenoid Supply circuit.

NOTE: Compare the brightness to that of a direct connection to the battery.


6
4
8
1
5
2
3
2
1
0
MOTOR-
TRANSFER
CASE
8145206a

Is the test light illuminated and bright?

Yes >> Replace the Transfer Case Motor in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6

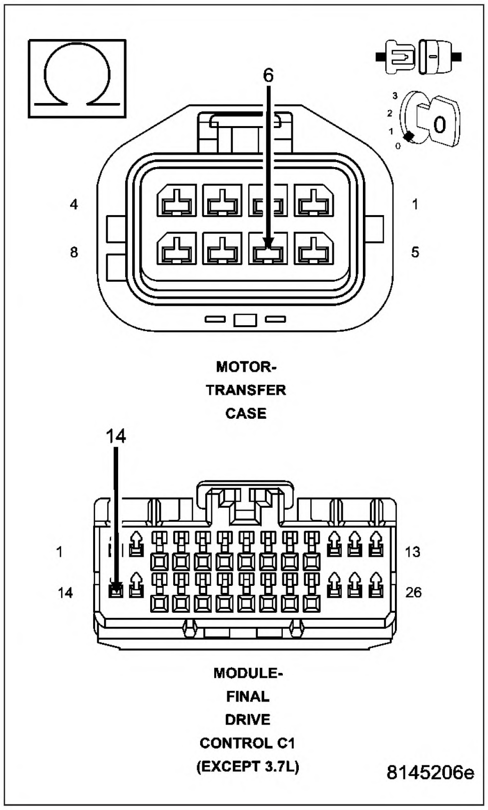
---

6. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C1 connector.

Measure the resistance of the (T301) Switched Battery Solenoid Supply circuit between the Final Drive Control Module C1 harness connector and the Transfer Case Motor harness connector.


Ω
6
0
3
2
1
0
4
8
1
5
MOTOR-
TRANSFER
CASE
14
1
14
13
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
8145206e

Is the resistance above 5.0 ohms?

Yes >> Repair the (T301) Switched Battery Solenoid Supply circuit for an open circuit or high resistance.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7

C1406-TRANSFER CASE BRAKE PERFORMANCE (CONTINUED)

7. FINAL DRIVE CONTROL MODULE

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

8. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

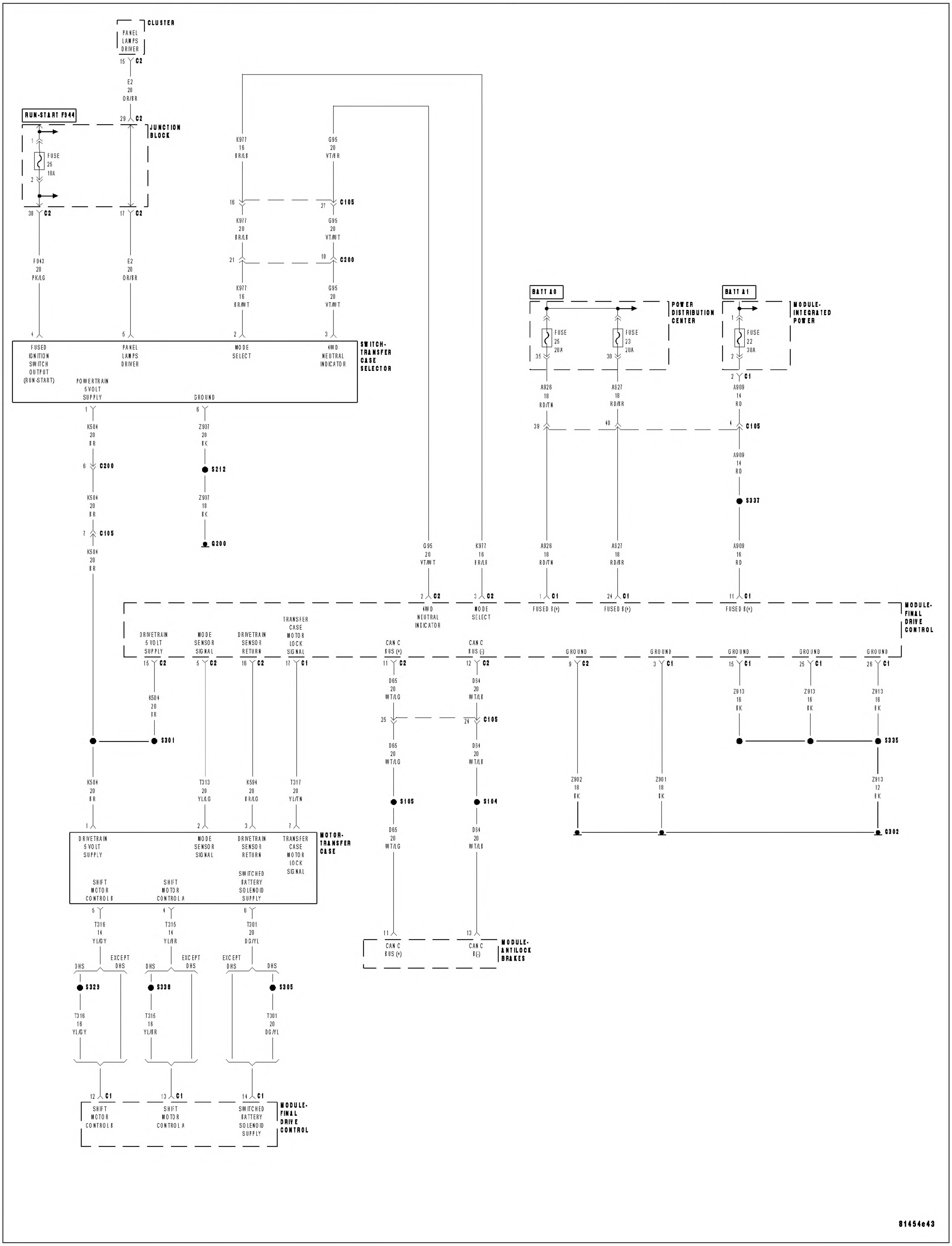
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1407-TRANSFER CASE BRAKE CONTROL CIRCUIT LOW


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
A926 18 RD/TN
A927 18 RD/BR
39
40
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A909 14 RD
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
26 C105
S301
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302
1
2
3
7
D65 20 WT/LG
D64 20 WT/LB
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1407-TRANSFER CASE BRAKE CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Control Module detects that the Transfer Case Motor Lock circuit diagnostic input is low when output is off.

Possible Causes
INTERMITTENT TRANSFER CASE BRAKE CONTROL CIRCUIT LOW
(T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO GROUND
(T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT OPEN OR HIGH RESISTANCE
(T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT OPEN OR HIGH RESISTANCE
TRANSFER CASE MOTOR ASSEMBLY
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Start the engine and allow it to idle.

Move the Transfer Case Selector Switch to each position several times.

With the scan tool, select View DTCs in the FDCM.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 8

---

2. (T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO GROUND

Ignition off.

Disconnect the Transfer Case Motor harness connector.

Disconnect the Final Drive Control Module C1 harness connector.

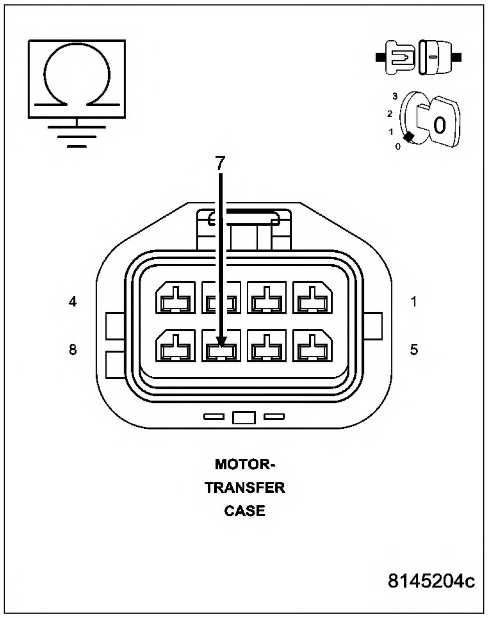
Measure the resistance between ground and the (T317) Transfer Case Motor Lock Signal circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T317) Transfer Case Motor Lock Signal circuit for a short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 3



C1407-TRANSFER CASE BRAKE CONTROL CIRCUIT LOW (CONTINUED)

3. ACTUATE T-CASE MOTOR SOLENOID LOCK

Connect the Final Drive Control Module C1 harness connector.

Ignition on, engine not running.

With the scan tool, actuate the T-Case Motor Solenoid Lock.

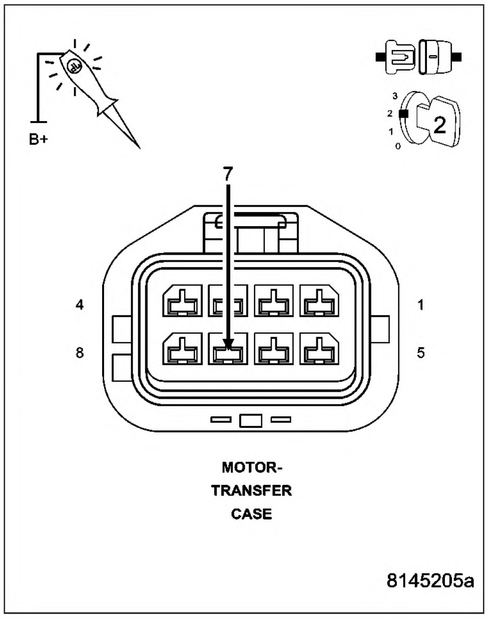
Using a 12–volt test light connected to 12–volts, check the (T317) Transfer Case Motor Lock Signal circuit with the circuit actuated.

NOTE: Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright with the circuit actuated?

Yes >> Go to 5

No >> Go to 4


B+
3
2
1
0
2
7
4
8
1
5
MOTOR-
TRANSFER
CASE
8145205a

---

4. (T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C1 connector.

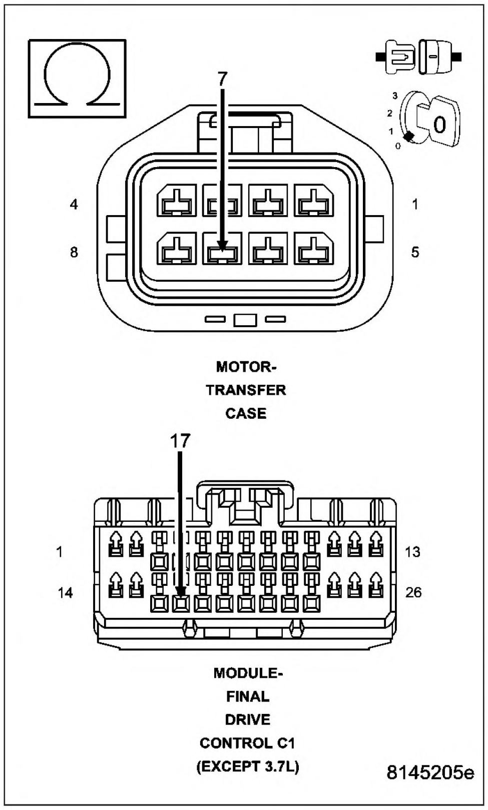
Measure the resistance of the (T317) Transfer Case Motor Lock Signal circuit between the Final Drive Control Module C1 harness connector and the Transfer Case Motor harness connector.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T317) Transfer Case Motor Lock Signal circuit for an open circuit or high resistance.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7


Ω
7
3
2
1
0
0
4
8
1
5
MOTOR-
TRANSFER
CASE
17
1
14
13
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
8145205e

C1407-TRANSFER CASE BRAKE CONTROL CIRCUIT LOW (CONTINUED)

5. (T301) SWITCHED BATTERY SOLENOID SUPPLY VOLTAGE

Ignition on, engine not running.

Using a 12–volt test light connected to ground, check the (T301) Switched Battery Solenoid Supply circuit.

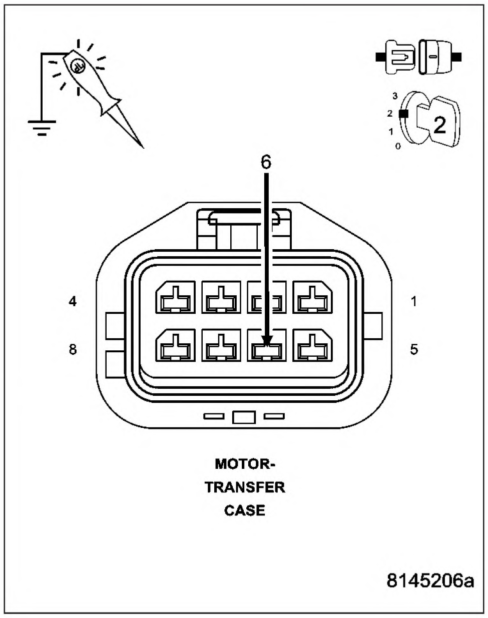
NOTE: Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Replace the Transfer Case Motor in accordance with the Service Information.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6


6
4
1
8
5
3
2
1
0
2
MOTOR-
TRANSFER
CASE
8145206a

---

6. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C1 connector.

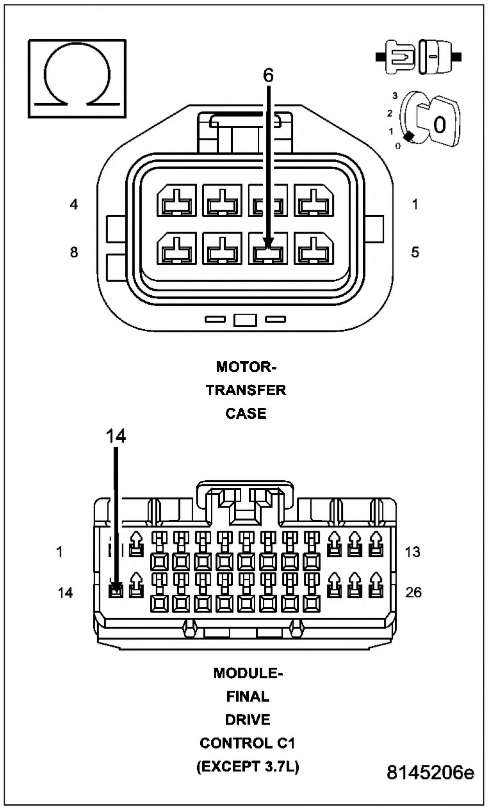
Measure the resistance of the (T301) Switched Battery Solenoid Supply circuit between the Final Drive Control Module C1 harness connector and the Transfer Case Motor harness connector.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T301) Switched Battery Solenoid Supply circuit for an open circuit or high resistance.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7


Ω
6
3
2
1
0
0
4
1
8
5
MOTOR-
TRANSFER
CASE
14
1
13
14
26
MODULE-
FINAL
DRIVE
CONTROL C1
(EXCEPT 3.7L)
8145206e

C1407-TRANSFER CASE BRAKE CONTROL CIRCUIT LOW (CONTINUED)

7. FINAL DRIVE CONTROL MODULE

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

8. INTERMITTENT WIRING AND CONNECTORS

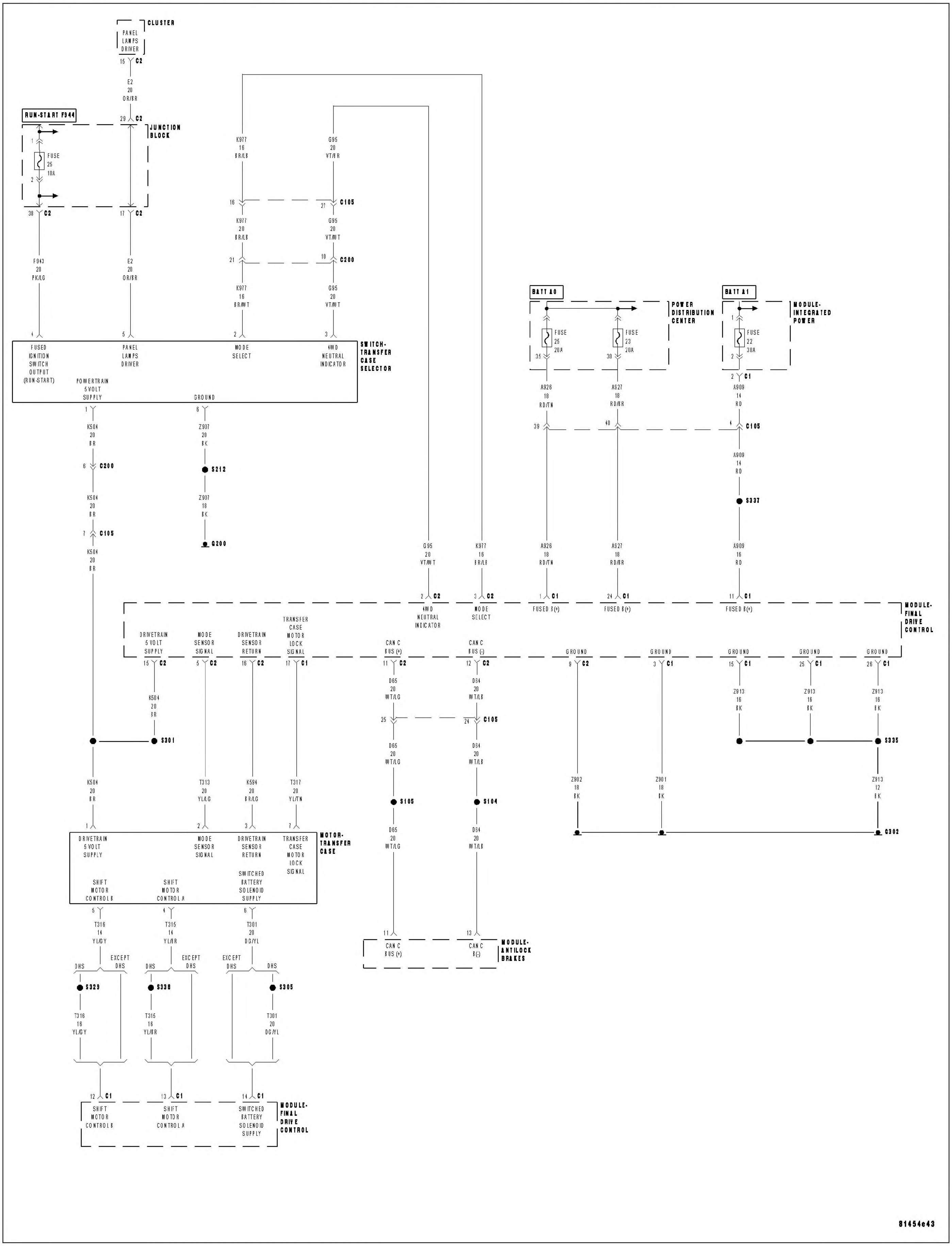
The conditions necessary to set this DTC are not present at this time.
Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1408-TRANSFER CASE BRAKE CONTROL CIRCUIT HIGH


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
K504 20 BR
Z907 20 BK
6 C200
S212
Z907 18 BK
G200
7 C105
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
25
24 C105
Z913 16 BK
S301
S335
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C B(-)
12 C1
13 C1
14 C1
MODULE-FINAL DRIVE CONTROL
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
81454e43

C1408-TRANSFER CASE BRAKE CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects that the Transfer Case Motor Lock Circuit diagnostic input is high when the output is on.

Possible Causes
INTERMITTENT TRANSFER CASE BRAKE CONTROL CIRCUIT HIGH
(T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO VOLTAGE
(T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO THE (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT
TRANSFER CASE MOTOR ASSEMBLY
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on, engine not running.

With the scan tool, Clear DTCs.

Move the Shift control to each position.

With the scan tool, select View DTCs.

Does the DTC reset?

Yes >> Go to 2

No >> Go to 6

---

2. (T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

Disconnect the Final Drive Control Module C1 harness connector.

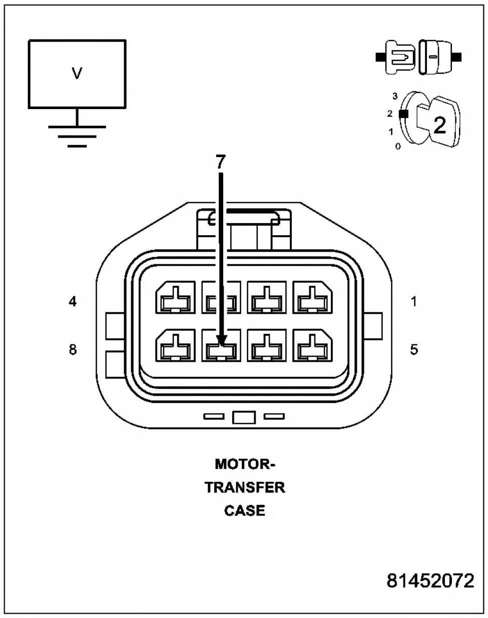
Turn the ignition on.

Measure the voltage of the (T317) Transfer Case Motor Lock Signal circuit.

Is there any voltage present?

Yes >> Repair the (T317) Transfer Case Motor Lock Signal circuit for a short to voltage.

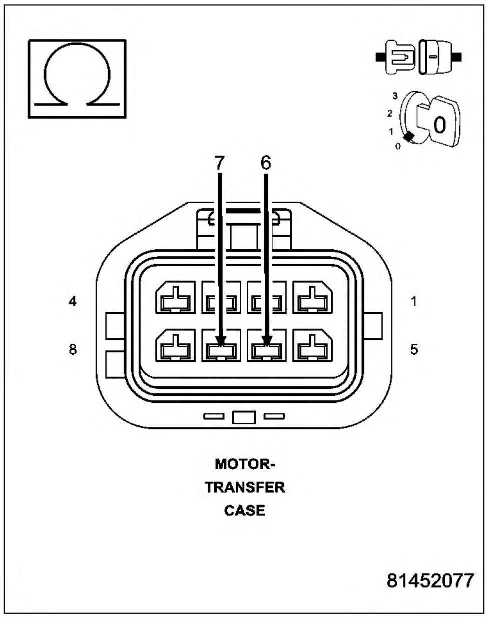
No >> Go to 3



C1408-TRANSFER CASE BRAKE CONTROL CIRCUIT HIGH (CONTINUED)

3. (T317) TRANSFER CASE MOTOR LOCK SIGNAL CIRCUIT SHORTED TO THE (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT

Measure the resistance between the (T317) Transfer Case Motor Lock Signal circuit and the (T301) Switched Battery Solenoid Supply circuit.



Is the resistance below 5.0 ohms?

Yes >> Repair the (T317) Transfer Case Motor Lock Signal circuit for a short to the (T301) Switched Battery Solenoid Supply circuit.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

---

4. TRANSFER CASE MOTOR

Turn the ignition off.

Connect the Final Drive Control Module C1 harness connector.

Turn the ignition on.

With the scan tool, Clear DTCs.

With the scan tool, select View DTCs.

Does the DTC P1407–Transfer Case Brake Control Circuit Low set?

Yes >> Replace the Transfer Case Motor assembly.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 5

---

5. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service Information.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C1408-TRANSFER CASE BRAKE CONTROL CIRCUIT HIGH (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

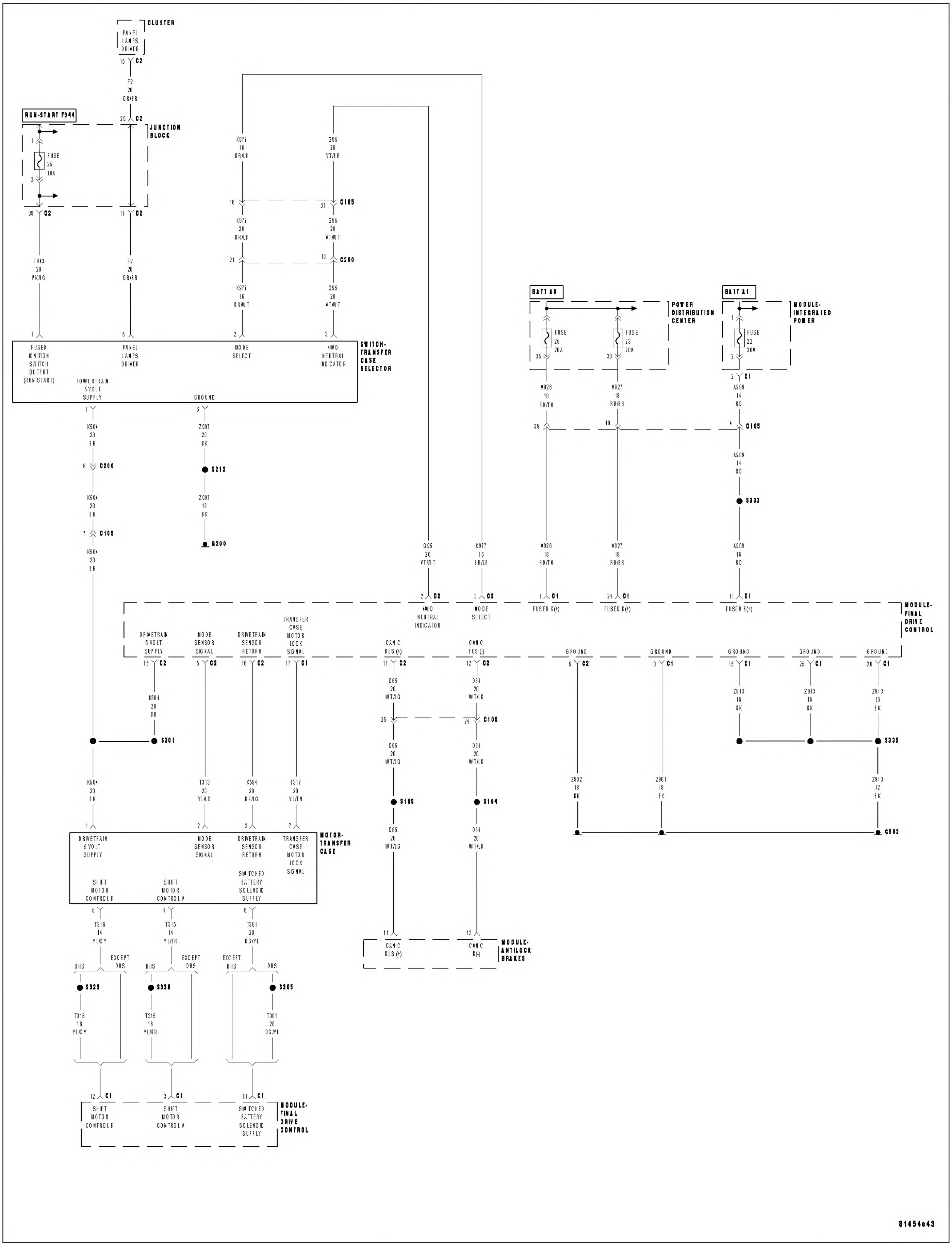
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C140A- TRANSFER CASE MOTOR PERFORMANCE


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
29 C2
RUN-START F944
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
1
2
3
7
G302
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
D65 20 WT/LG
D64 20 WT/LB
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C140A- TRANSFER CASE MOTOR PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no undervoltage or overvoltage condition present.
- **Set Condition:**
  A faulted condition is detected in the H-bridge driver.

Possible Causes
INTERMITTENT TRANSFER CASE MOTOR PERFORMANCE DTC
(T315) SHIFT MOTOR CONTROL A CIRCUIT SHORTED TO VOLTAGE
(T316) SHIFT MOTOR CONTROL B CIRCUIT SHORTED TO VOLTAGE
(T315) SHIFT MOTOR CONTROL A CIRCUIT SHORTED TO GROUND
(T316) SHIFT MOTOR CONTROL B CIRCUIT SHORTED TO GROUND
(T315) SHIFT MOTOR CONTROL A CIRCUIT SHORTED TO (T316) SHIFT MOTOR CONTROL B CIRCUIT
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on, engine not running.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 9

---

2. (T315) SHIFT MOTOR CONTROL A CIRCUIT SHORTED TO VOLTAGE

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

Disconnect the Final Drive Control Module C1 harness connector.

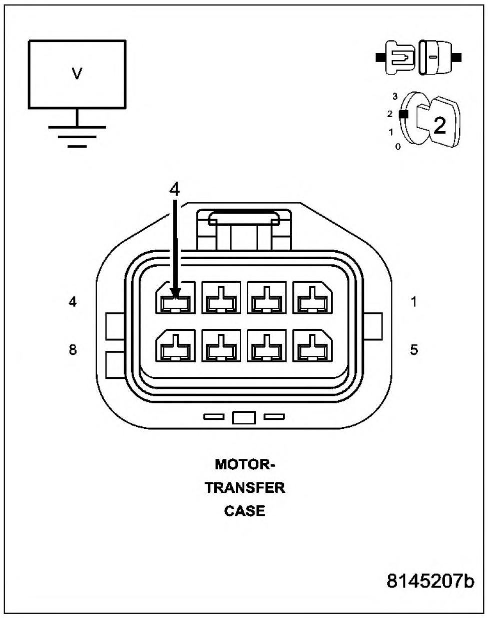
Turn the ignition on.

Measure the voltage of the (T315) Shift Motor Control A circuit.

Is there any voltage present?

Yes >> Repair the (T315) Shift Motor Control A circuit for a short to voltage.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

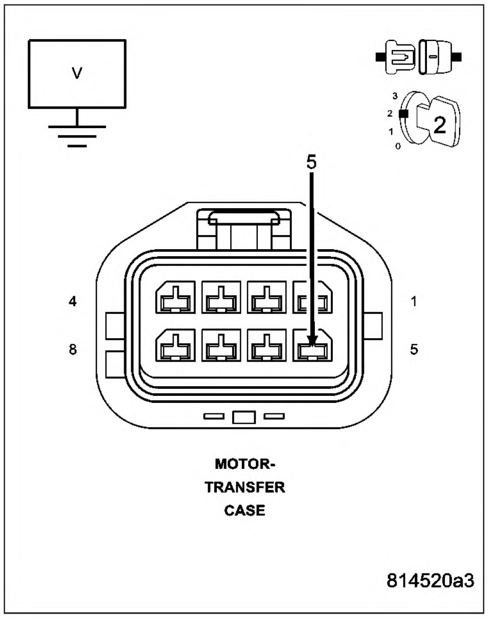
No >> Go to 3



C140A- TRANSFER CASE MOTOR PERFORMANCE (CONTINUED)

3. (T316) SHIFT MOTOR CONTROL B CIRCUIT SHORTED TO VOLTAGE

Measure the voltage of the (T316) Shift Motor Control B circuit.


V
2
3
2
1
0
5
4
1
8
5
MOTOR-
TRANSFER
CASE
814520a3

Is there any voltage present?

Yes >> Repair the (T316) Shift Motor Control B circuit for a short to voltage.

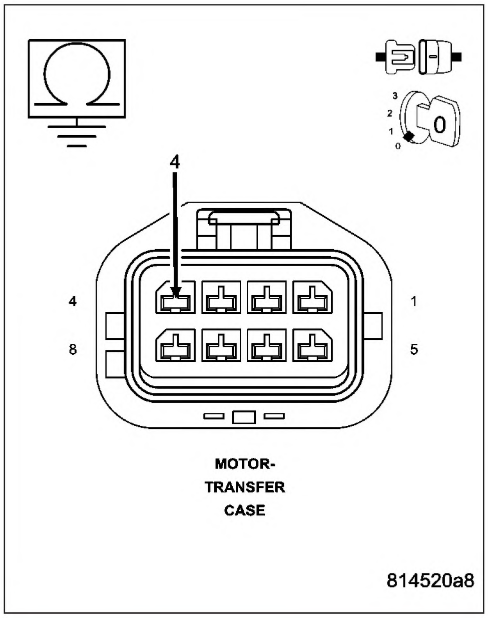
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

---

4. (T315) SHIFT MOTOR CONTROL A CIRCUIT SHORTED TO GROUND

Measure the resistance between ground and the (T315) Shift Motor Control A circuit.


Ω
0
3
2
1
0
4
4
1
8
5
MOTOR-
TRANSFER
CASE
814520a8

Is the resistance below 5.0 ohms?

Yes >> Repair the (T315) Shift Motor Control A circuit for a short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 5

C140A- TRANSFER CASE MOTOR PERFORMANCE (CONTINUED)

5. (T316) SHIFT MOTOR CONTROL B CIRCUIT SHORTED TO GROUND

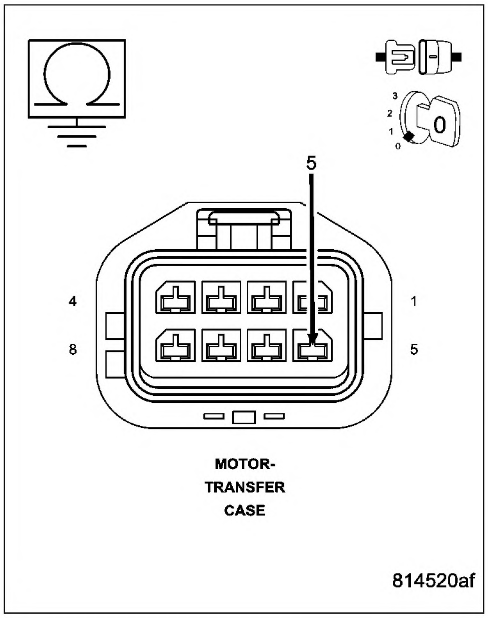
Measure the resistance between ground and the (T316) Shift Motor Control B circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T316) Shift Motor Control B circuit for a short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6



---

6. (T315) SHIFT MOTOR CONTROL A CIRCUIT SHORTED TO (T316) SHIFT MOTOR CONTROL B CIRCUIT

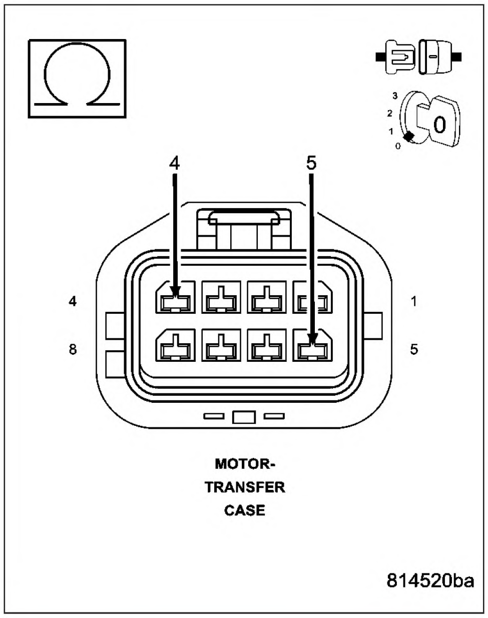
Measure the resistance between the (T315) Shift Motor Control A circuit and the (T316) Shift Motor Control B circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T315) Shift Motor Control A circuit for a short to the (T316) Shift Motor Control B circuit.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 7



C140A- TRANSFER CASE MOTOR PERFORMANCE (CONTINUED)

7. TRANSFER CASE MOTOR

At the Transfer Case Motor, measure the resistance between the (T315) Shift Motor Control A circuit and the (T316) Shift Motor Control B circuit.

Is the resistance below 5.0 ohms?

Yes >> Replace the shorted Transfer Case Motor.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 8

---

8. FINAL DRIVE CONTROL MODULE

Using the wiring diagram/schematic as a guide, inspect all wiring and connectors that pertain to this circuit.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1

---

9. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

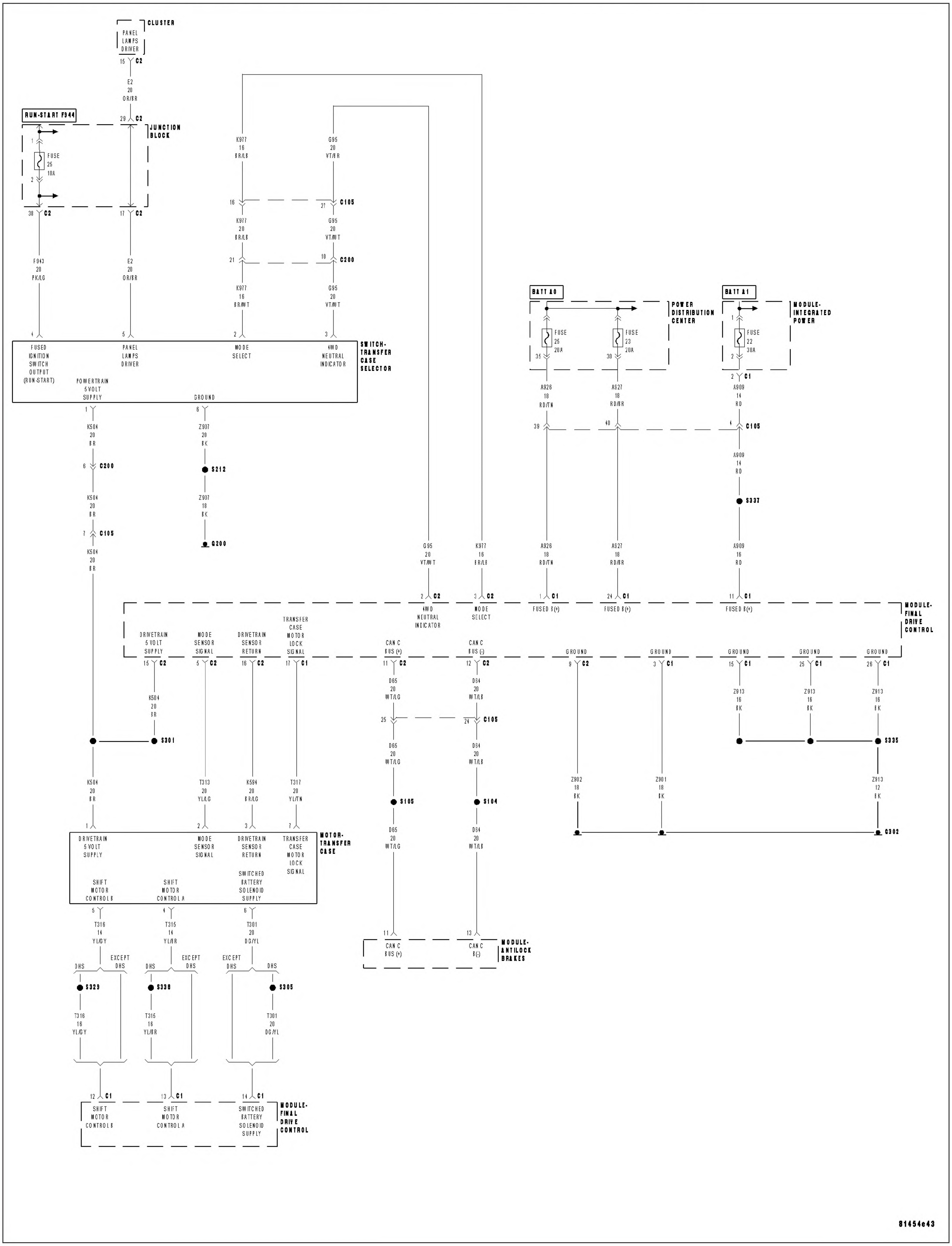
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C140D- TRANSFER CASE MOTOR CONTROL CIRCUIT OPEN


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
35
FUSE 23 20A
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
S105
S104
1
2
3
7
G302
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
D65 20 WT/LG
D64 20 WT/LB
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C140D- TRANSFER CASE MOTOR CONTROL CIRCUIT OPEN (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects an open circuit on one of the Transfer Case Shift Motor Control circuits.

Possible Causes
INTERMITTENT TRANSFER CASE MOTOR CONTROL CIRCUIT OPEN
(T315) SHIFT MOTOR CONTROL A CIRCUIT OPEN
(T316) SHIFT MOTOR CONTROL B CIRCUIT OPEN
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on, engine not running.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 8

---

2. (T315) SHIFT MOTOR CONTROL A CIRCUIT VOLTAGE

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

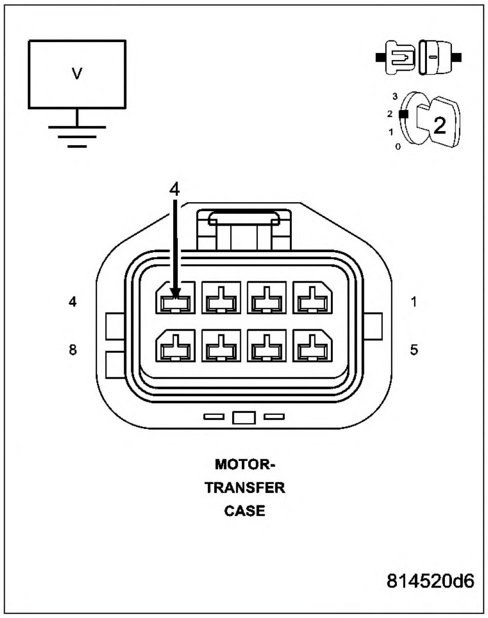
Ignition on, engine not running.

Measure the voltage of the (T315) Shift Motor Control A circuit at the harness connector.

Is the voltage within 1 volt of battery voltage?

Yes >> Go to 3

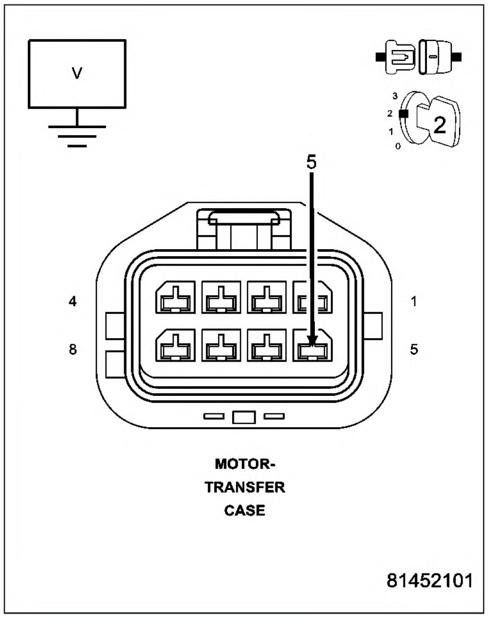
No >> Go to 4



C140D- TRANSFER CASE MOTOR CONTROL CIRCUIT OPEN (CONTINUED)

3. (T316) SHIFT MOTOR CONTROL B CIRCUIT VOLTAGE

Measure the voltage of the (T316) Shift Motor Control B circuit at the harness connector.



Is the voltage within 1 volt of battery voltage?

Yes >> Go to 6

No >> Go to 5

---

4. (T315) SHIFT MOTOR CONTROL A CIRCUIT OPEN

Turn the ignition off.

Disconnect the Final Drive Control Module C1 harness connector.

Measure the resistance of the (T315) Shift Motor Control A circuit from the Transfer Case Motor harness connector to the Final Drive Control Module C1 harness connector.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T315) Shift Motor Control A circuit for an open.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7

---

5. (T316) SHIFT MOTOR CONTROL B CIRCUIT OPEN

Turn the ignition off.

Disconnect the Final Drive Control Module C1 harness connector.

Measure the resistance of the (T316) Shift Motor Control B circuit from the Transfer Case Motor harness connector to the Final Drive Control Module C1 harness connector.

Is the resistance above 5.0 ohms?

Yes >> Repair the (T316) Shift Motor Control B circuit for an open.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 7

C140D- TRANSFER CASE MOTOR CONTROL CIRCUIT OPEN (CONTINUED)

6. TRANSFER CASE MOTOR

Using the wiring diagram/schematic as a guide, inspect all wiring and connectors that pertain to this circuit.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Transfer Case Motor in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

7. FINAL DRIVE CONTROL MODULE

Using the wiring diagram/schematic as a guide, inspect all wiring and connectors that pertain to this circuit.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

8. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C140E-TRANSFER CASE MOTOR BLOCKED

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module is unable to engage the requested range.

Possible Causes
INTERMITTENT TRANSFER CASE MOTOR BLOCKED
TRANSFER CASE INTERNAL CONDITION
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on, engine not running.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 5

---

2. TRANSFER CASE INTERNAL CONDITION

Turn the ignition off.

Inspect the Transfer Case in accordance with the Service Information to determine if there are any mechanical conditions that are preventing the Shift Motor from engaging the requested range.

Are any mechanical conditions preventing the Shift Motor from engaging the requested range?

Yes >> Repair or replace the Transfer Case in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 3

---

3. TRANSFER CASE MOTOR

Turn the ignition off.

Using the wiring diagram/schematic as a guide, inspect all wiring and connectors that pertain to this circuit.

If any problems are found, repair as necessary and retest.

If no other problems are found, replace the Transfer Case Motor in accordance with the Service Information.

Ignition on, engine not running.

Cycle the Transfer Case Selector Switch to each position several times during a test drive.

With the scan tool, select View DTCs.

Is the DTC status Active?

Yes >> Go to 4

No >> Test complete.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C140E-TRANSFER CASE MOTOR BLOCKED (CONTINUED)

4. FINAL DRIVE CONTROL MODULE

Using the wiring diagram/schematic as a guide, inspect all wiring and connectors that pertain to this circuit.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

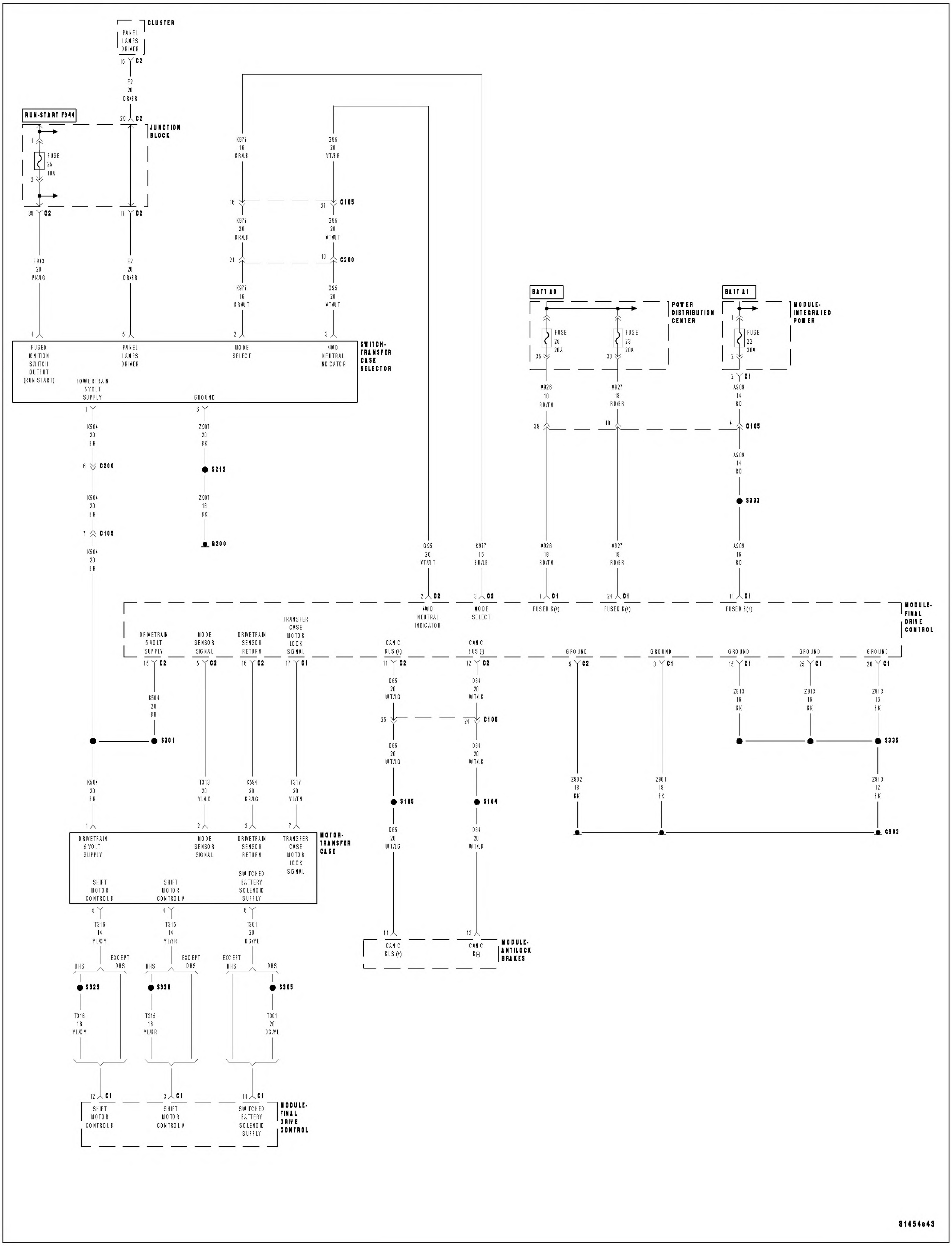
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
1
2
3
7
D65 20 WT/LG
D64 20 WT/LB
G302
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects excessive voltage fluctuation on the Mode Sensor Signal circuit.

Possible Causes
INTERMITTENT TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE DTC
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORT TO VOLTAGE
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT HIGH RESISTANCE
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORT TO GROUND
(T313) MODE SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
(T313) MODE SENSOR SIGNAL CIRCUIT HIGH RESISTANCE
(T313) MODE SENSOR SIGNAL CIRCUIT SHORT TO GROUND
(K594) DRIVETRAIN SENSOR RETURN CIRCUIT SHORT TO VOLTAGE
(K594) DRIVETRAIN SENSOR RETURN CIRCUIT HIGH RESISTANCE
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

NOTE: This DTC sets when the Final Drive Control Module detects excessive voltage fluctuation on the Mode Sensor Signal circuit. Perform a thorough inspection of all wiring and connectors between the sensor and the control module.

Ignition on, engine not running.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 14

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE (CONTINUED)

2. (T504) DRIVETRAIN 5 VOLT SUPPLY VOLTAGE ERRATIC

NOTE: This DTC sets when the Final Drive Control Module detects excessive voltage fluctuation on the Mode Sensor Signal circuit. Perform a thorough inspection of all wiring and connectors between the sensor and the control module.

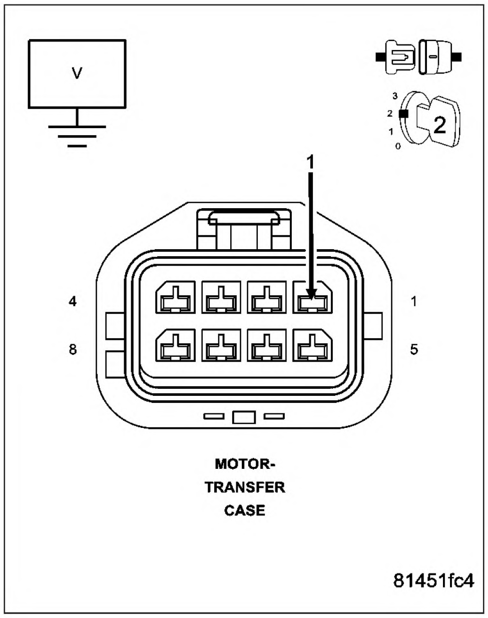
Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

Turn the ignition on.

Measure the voltage of the (T504) Drivetrain 5 Volt Supply circuit.

NOTE: Voltage should be approximately 5.0 volts and steady. Compare any slight fluctuations found to a known good circuit in order to verify voltmeter functionality.



Is the voltage approximately 5.0 volts and steady?

Yes >> Go to 6

No >> Go to 3

---

3. (T504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT INTERMITTENT SHORT TO VOLTAGE

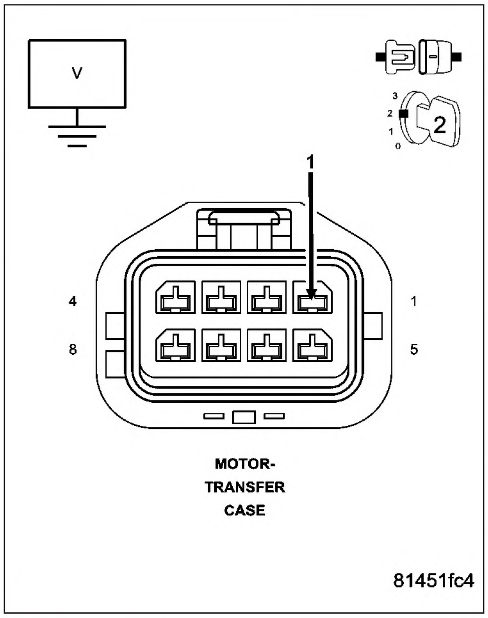
Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

Turn the ignition on.

Measure the voltage of the (T504) Drivetrain 5 Volt Supply circuit.

Monitor the voltmeter while performing a wiggle test on the wiring harness and connectors.



Is any voltage detected on the circuit during the wiggle test?

Yes >> Repair the (T504) Drivetrain 5 Volt Supply circuit for an intermittent short to voltage.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

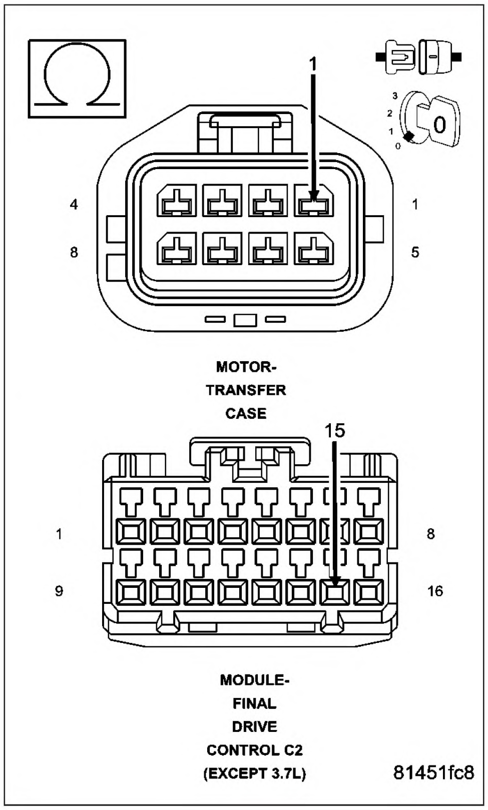
No >> Go to 4

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE (CONTINUED)

4. (T504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT HIGH RESISTANCE

Measure the resistance of the (T504) Drivetrain 5 Volt Supply circuit between the Transfer Case Motor harness connector and the Final Drive Control Module C2 harness connector.

Monitor the ohmmeter while performing a wiggle test on the wiring harness and connectors.



Is the resistance ever above 5.0 ohms during the wiggle test?

Yes >> Repair the (T504) Drivetrain 5 Volt Supply circuit for an intermittent open circuit or high resistance.

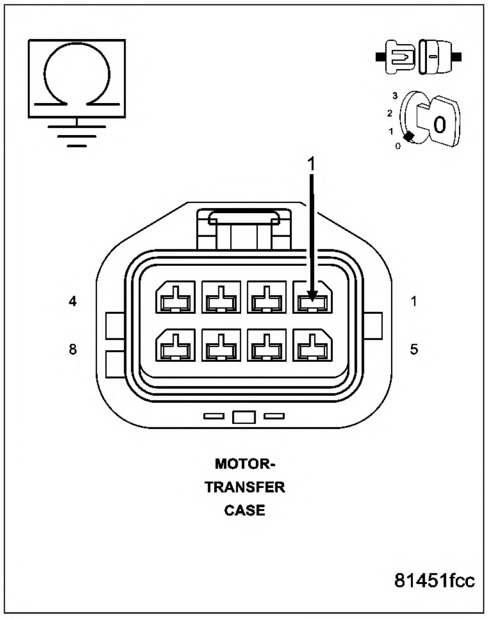
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 5

5. (T504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT INTERMITTENT SHORT TO GROUND

Measure the resistance between ground and the (T504) Drivetrain 5 Volt Supply circuit.

Monitor the ohmmeter while performing a wiggle test on the wiring harness and connectors.



Is the resistance ever below 5.0 ohms during the wiggle test?

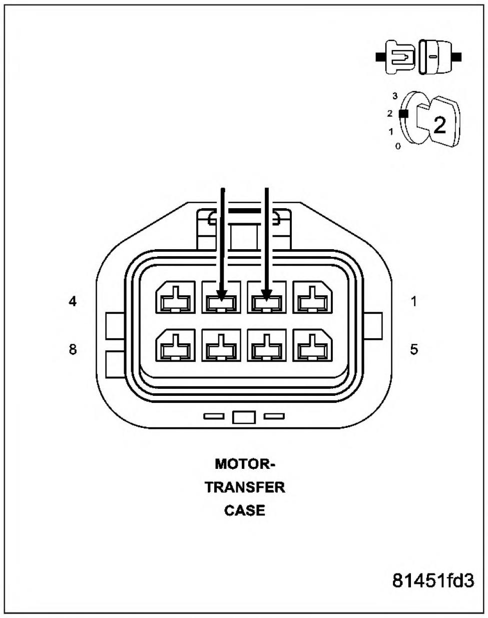
Yes >> Repair the (T504) Drivetrain 5 Volt Supply circuit for an intermittent short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 13

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE (CONTINUED)

6. T-CASE POSITION SENSOR VOLTAGE



Turn the ignition off.

Connect the Final Drive Control Module C2 harness connector.

Connect a jumper wire between the (T313) Mode Sensor Signal circuit and the (K594) Drivetrain Sensor Return circuit in the Transfer Case Motor harness connector.

Turn the ignition on.

With the Scan Tool select Data Display and monitor the T-Case Position Sensor Voltage while performing a wiggle test on the wiring and connectors between the sensor and control module.

NOTE: Voltage should be approximately 0.0 volts and steady.

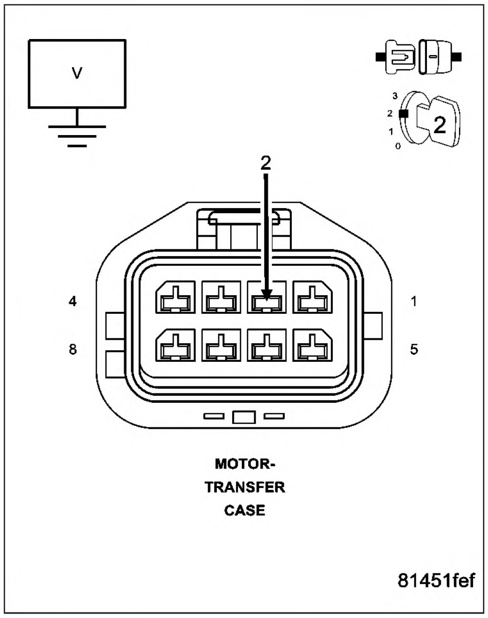
Is the T-Case Position Sensor Voltage approximately 0.0 volts and steady?

Yes >> Go to 12

No >> Go to 7

---

7. (T313) MODE SENSOR SIGNAL CIRCUIT INTERMITTENT SHORT TO VOLTAGE



NOTE: Remove the previously installed jumper wire.

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

Turn the ignition on.

Measure the voltage of the (T313) Mode Sensor Signal circuit.

Monitor the voltmeter while performing a wiggle test on the wiring harness and connectors.

Is any voltage detected on the circuit during the wiggle test?

Yes >> Repair the (T313) Mode Sensor Signal circuit for an intermittent short to voltage.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

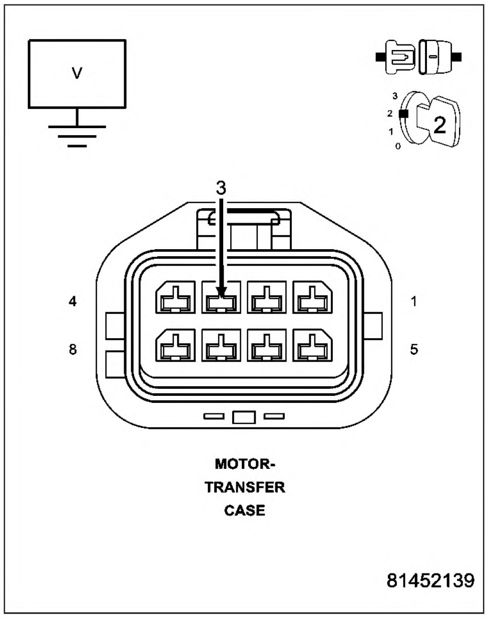
No >> Go to 8

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE (CONTINUED)

8. (K594) DRIVETRAIN SENSOR RETURN CIRCUIT INTERMITTENT SHORT TO VOLTAGE

Measure the voltage of the (K594) Drivetrain Sensor Return circuit.

Monitor the voltmeter while performing a wiggle test on the wiring harness and connectors.


V
3
2
1
0
2
3
4
1
8
5
MOTOR-
TRANSFER
CASE
81452139

Is any voltage detected on the circuit during the wiggle test?

Yes >> Repair the (K594) Drivetrain Sensor Return circuit for an intermittent short to voltage.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 9

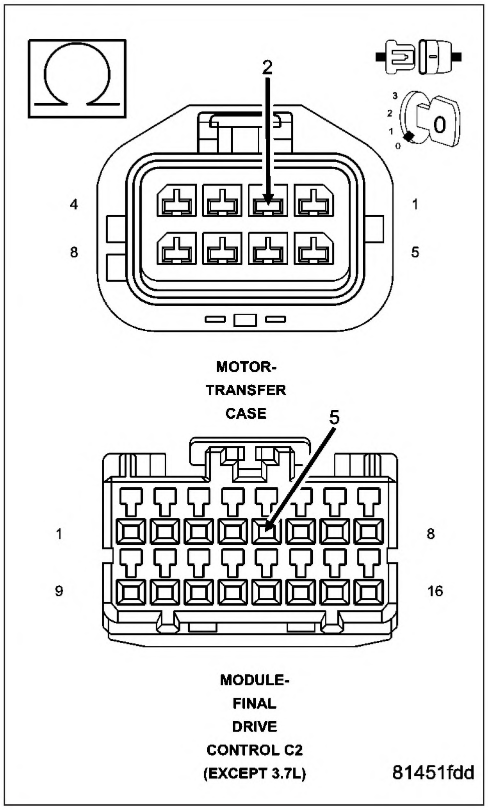
---

9. (T313) MODE SENSOR SIGNAL CIRCUIT HIGH RESISTANCE

Turn the ignition off.

Measure the resistance of the (T313) Mode Sensor Signal circuit between the Transfer Case Motor harness connector and the Final Drive Control Module C2 harness connector.

Monitor the ohmmeter while performing a wiggle test on the wiring harness and connectors.


Ω
2
3
2
1
0
0
4
1
8
5
MOTOR-
TRANSFER
CASE
5
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451fdd

Is the resistance ever above 5.0 ohms during the wiggle test?

Yes >> Repair the (T313) Mode Sensor Signal circuit for an intermittent open circuit or high resistance.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 10

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE (CONTINUED)

10. (K594) DRIVETRAIN SENSOR RETURN CIRCUIT HIGH RESISTANCE

Measure the resistance of the (K594) Drivetrain Sensor Return circuit between the Transfer Case Motor harness connector and the Final Drive Control Module C2 harness connector.

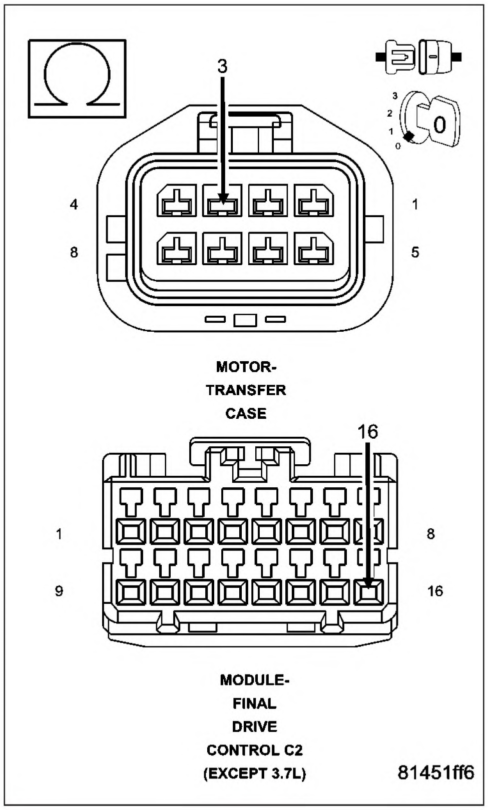
Monitor the ohmmeter while performing a wiggle test on the wiring harness and connectors.

Is the resistance ever above 5.0 ohms during the wiggle test?

Yes >> Repair the (K594) Drivetrain Sensor Return circuit for an intermittent open circuit or high resistance.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 11


3
3
2
1
0
0
4
8
1
5
MOTOR-
TRANSFER
CASE
16
1
9
8
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
81451ff6

---

11. (T313) MODE SENSOR SIGNAL CIRCUIT INTERMITTENT SHORT TO GROUND

Measure the resistance between ground and the (T313) Mode Sensor Signal circuit.

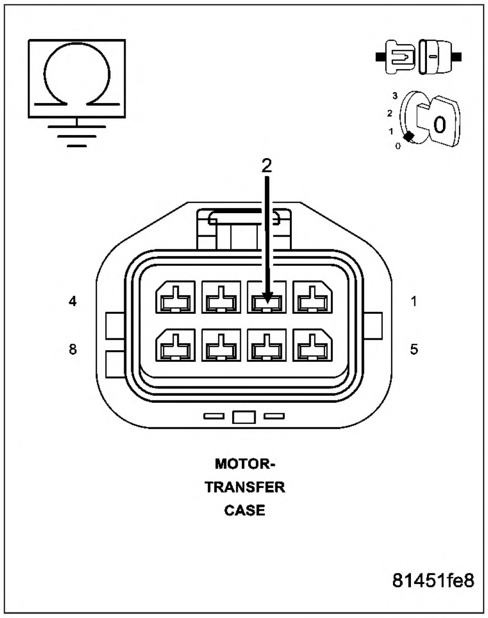
Monitor the ohmmeter while performing a wiggle test on the wiring harness and connectors.

Is the resistance ever below 5.0 ohms during the wiggle test?

Yes >> Repair the (T313) Mode Sensor Signal circuit for an intermittent short to ground.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 13


3
2
1
0
0
2
4
8
1
5
MOTOR-
TRANSFER
CASE
81451fe8

C140F-TRANSFER CASE RANGE POSITION SENSOR ERRATIC PERFORMANCE (CONTINUED)

12. TRANSFER CASE MOTOR

NOTE: This DTC sets when the Final Drive Control Module detects excessive voltage fluctuation on the Mode Sensor Signal circuit. Perform a thorough inspection of all wiring and connectors between the sensor and the control module.

Using the schematic as a guide, inspect the Final Drive Control Module power and ground circuits.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Transfer Case Motor in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

13. FINAL DRIVE CONTROL MODULE

NOTE: This DTC sets when the Final Drive Control Module detects excessive voltage fluctuation on the Mode Sensor Signal circuit. Perform a thorough inspection of all wiring and connectors between the sensor and the control module.

Using the schematic as a guide, inspect the Final Drive Control Module power and ground circuits.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

14. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

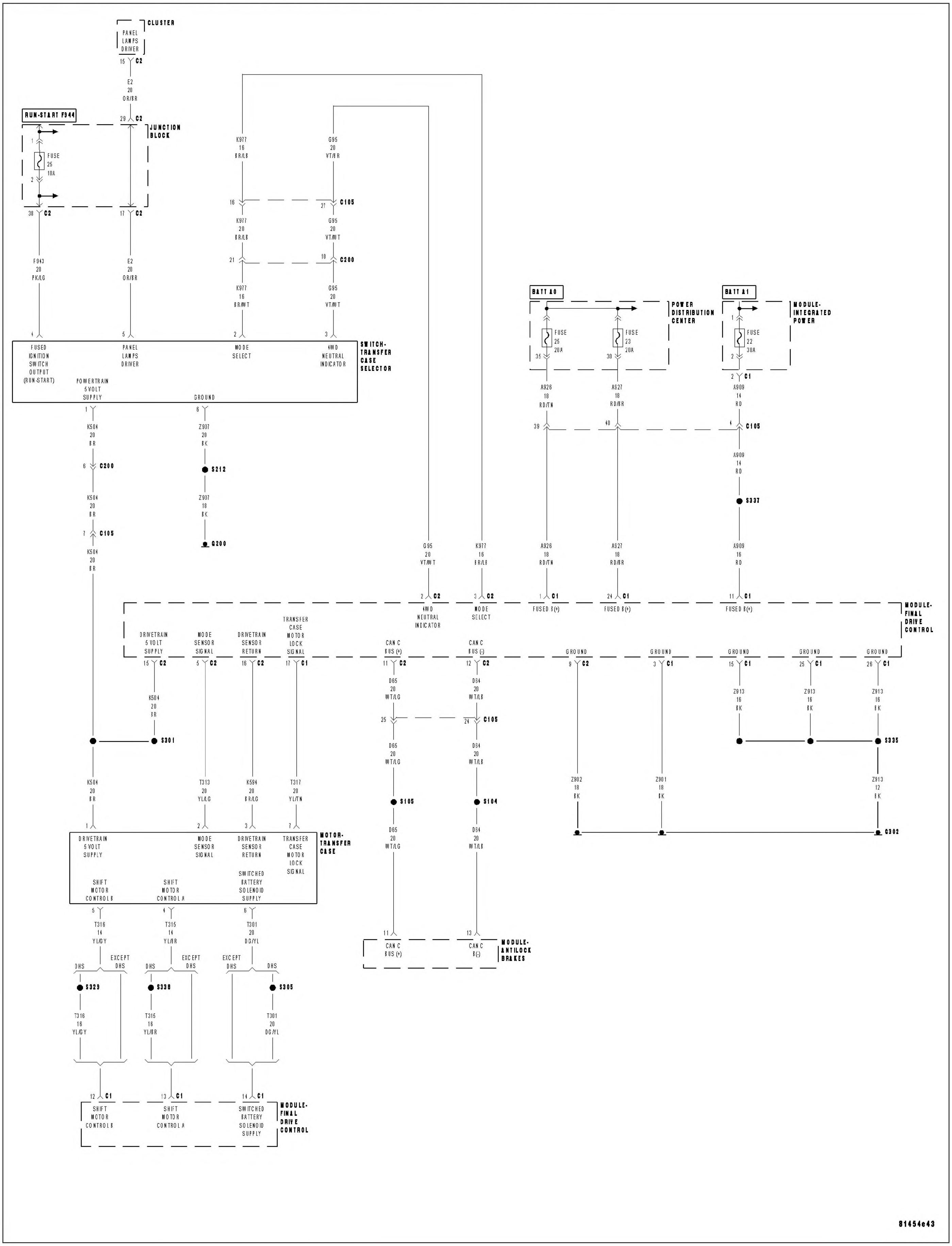
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1413–4 HI/LO SELECT SWITCH CIRCUIT STUCK


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
35
FUSE 23 20A
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
S105
S104
G302
1
2
3
7
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
D65 20 WT/LG
D64 20 WT/LB
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1413–4 HI/LO SELECT SWITCH CIRCUIT STUCK (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  Valid voltage for 4HI/4LO switch active present for a calibratable time or when shifter is not in neutral.

Possible Causes
INTERMITTENT 4 HI/LO SELECT SWITCH CIRCUIT STUCK DTC
TRANSFER CASE SELECTOR SWITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. NEUTRAL INDICATOR CONTROL CIRCUIT DTC IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Final Drive Control Module.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 4

---

2. TRANSFER CASE SELECTOR SWITCH

Turn the ignition off.

Disconnect the Transfer Case Selector Switch.

Ignition on, engine not running.

With the scan tool, select Data Display and read the 4wd Range Switch Voltage.

The switch voltage should be approximately 0 volts.

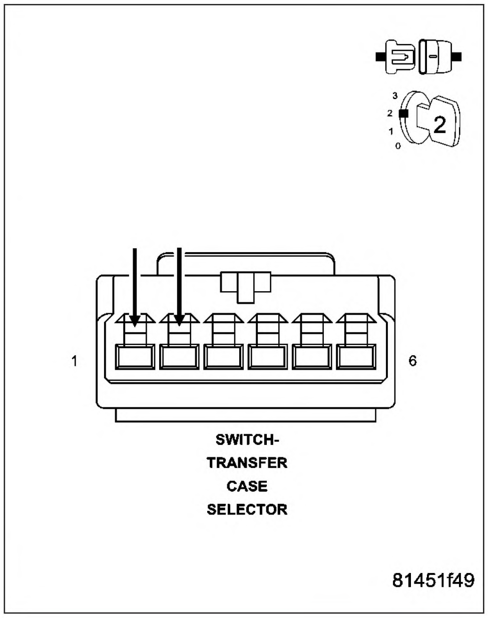
Turn the ignition off.

Connect a jumper wire between the (K504) Drivetrain 5 Volt Supply circuit and the (K977) Mode Select circuit in the Transfer Case Selector Switch connector.

Ignition on, engine not running.

With the scan tool, read the 4wd Range Switch Voltage.

The switch voltage should be approximately 5 volts.



Does the voltage display as described?

Yes >> Replace the Transfer Case Selector Switch.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 3

C1413–4 HI/LO SELECT SWITCH CIRCUIT STUCK (CONTINUED)

3. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

4. INTERMITTENT WIRING AND CONNECTORS

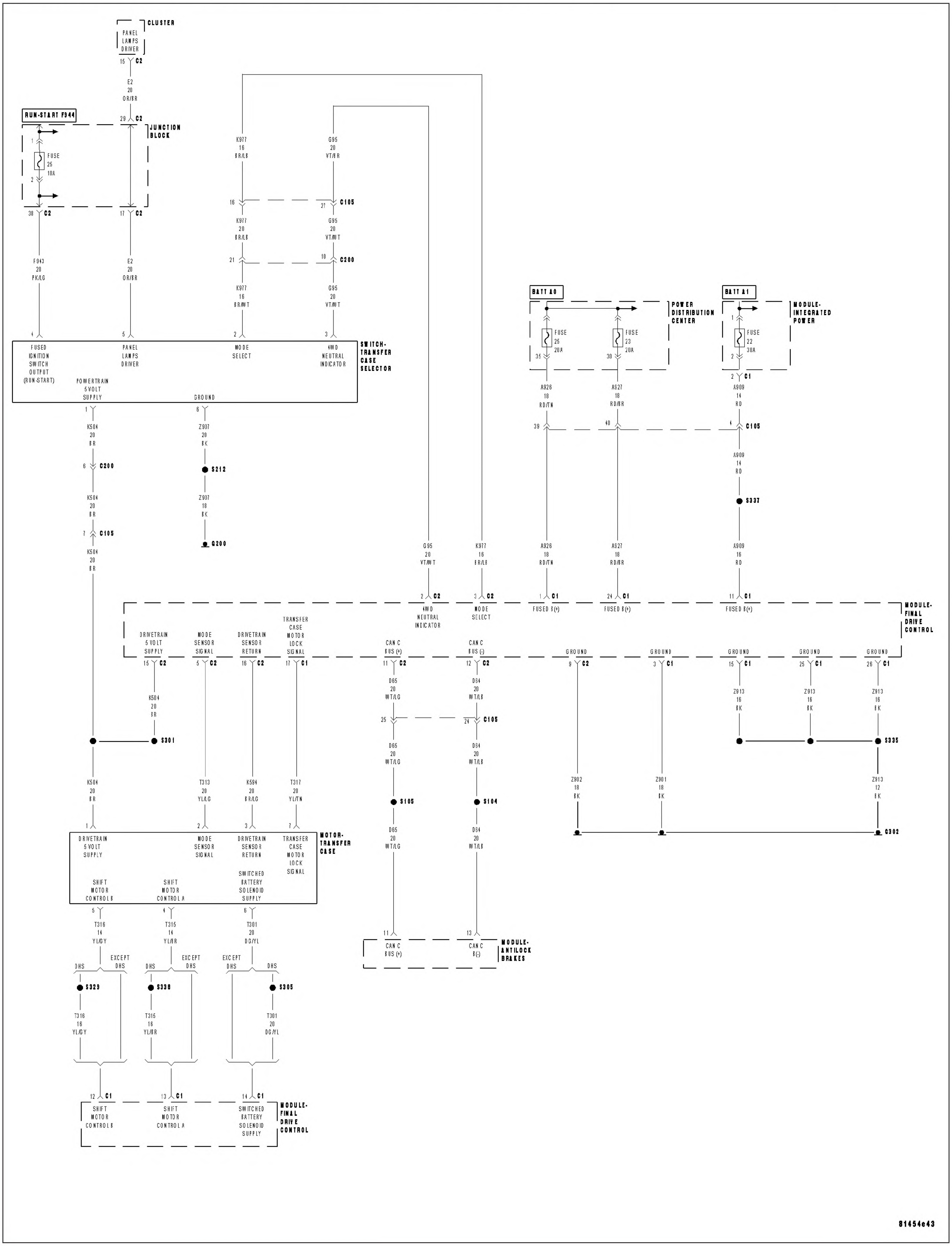
The conditions necessary to set this DTC are not present at this time.
Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1414–NEUTRAL SELECT SWITCH CIRCUIT STUCK


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
29 C2
RUN-START F944
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
A926 18 RD/TN
A927 18 RD/BR
39
40
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A909 14 RD
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
S105
S104
1
2
3
7
G302
D65 20 WT/LG
D64 20 WT/LB
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C1414–NEUTRAL SELECT SWITCH CIRCUIT STUCK (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  Valid voltage for Neutral switch active present for a calibratable time.

Possible Causes
INTERMITTENT NEUTRAL SELECT SWITCH CIRCUIT STUCK DTC
TRANSFER CASE SELECTOR SWITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Final Drive Control Module.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 4

---

2. TRANSFER CASE SELECTOR SWITCH

Turn the ignition off.

Disconnect the Transfer Case Selector Switch.

Ignition on, engine not running.

With the scan tool select Data Display and read the 4wd Range Switch Voltage.

The switch voltage should be approximately 0 volts.

Turn the ignition off.

Connect a jumper wire between the (K504) Drivetrain 5 Volt Supply circuit and the (K977) Mode Select circuit in the Transfer Case Selector Switch connector.

Ignition on, engine not running.

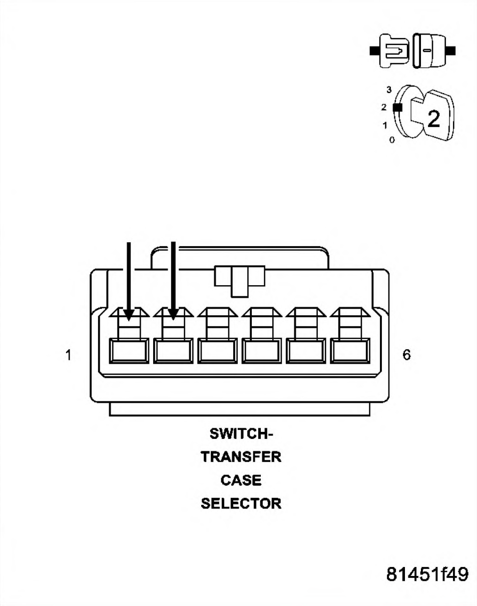
With the scan tool, read the 4wd Range Switch Voltage.

The switch voltage should be approximately 5 volts.

Does the voltage display as described?

Yes >> Replace the Transfer Case Selector Switch.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go To 3



C1414–NEUTRAL SELECT SWITCH CIRCUIT STUCK (CONTINUED)

3. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.
Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1415- TRANSFER CASE MOTOR CURRENT PERFORMANCE

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  1. Current reading greater than 1A for 200 msec with no motor activation.
  2. Current reading never greater than 1A during a completed range or neutral shift.

Possible Causes
INTERMITTENT TRANSFER CASE MOTOR CURRENT PERFORMANCE
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on, engine not running.
With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 4

---

2. TRANSFER CASE MOTOR

Turn the ignition off.
Using the wiring diagram/schematic as a guide, inspect all wiring and connectors that pertain to this circuit.
If any problems are found, repair as necessary and retest.
If no other problems are found, replace the Transfer Case Motor in accordance with the Service Information.
Ignition on, engine not running.
Cycle the Transfer Case Selector Switch to each position several times during a test drive.
With the scan tool, select View DTCs.

Is the DTC status Active?

Yes >> Go to 3

No >> Test complete.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

3. FINAL DRIVE CONTROL MODULE

Using the wiring diagram/schematic as a guide, inspect all wiring and connectors that pertain to this circuit.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C1415- TRANSFER CASE MOTOR CURRENT PERFORMANCE (CONTINUED)

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C1444-TRANSFER CASE MOTOR OVERUSE

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  A calibrated motor abuse limit has been achieved. The FDCM models the motor use and has determined that excessive motor activations have occurred.

Possible Causes
INTERMITTENT TRANSFER CASE MOTOR OVERUSE
TRANSFER CASE SELECTOR SWITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

NOTE: Diagnose and repair any system voltage or Transfer Case related DTCs in the FDCM before continuing with this test.

Ignition on, engine not running.

With the scan tool, Clear Stored DTCs.

Test drive the vehicle.

During the test drive, move the Transfer Case Selector Switch to each position several times in accordance with the Service Information.

With the scan tool, select View DTCs.

Does this DTC reset?

Yes >> Go to 2

No >> Go to 4

---

2. TRANSFER CASE SELECTOR SWITCH

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors relative to this circuit.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 3

C1444-TRANSFER CASE MOTOR OVERUSE (CONTINUED)

3. FINAL DRIVE CONTROL MODULE

Ignition off.

Replace the Transfer Case Selector Switch in accordance with the Service Information.

Ignition on, engine not running.

With the scan tool, Clear Stored DTCs.

Test drive the vehicle.

During the test drive, move the Transfer Case Selector Switch to each position several times in accordance with the Service Information.

With the scan tool, select View DTCs.

Does this DTC reset?

Yes >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test Complete.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

4. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

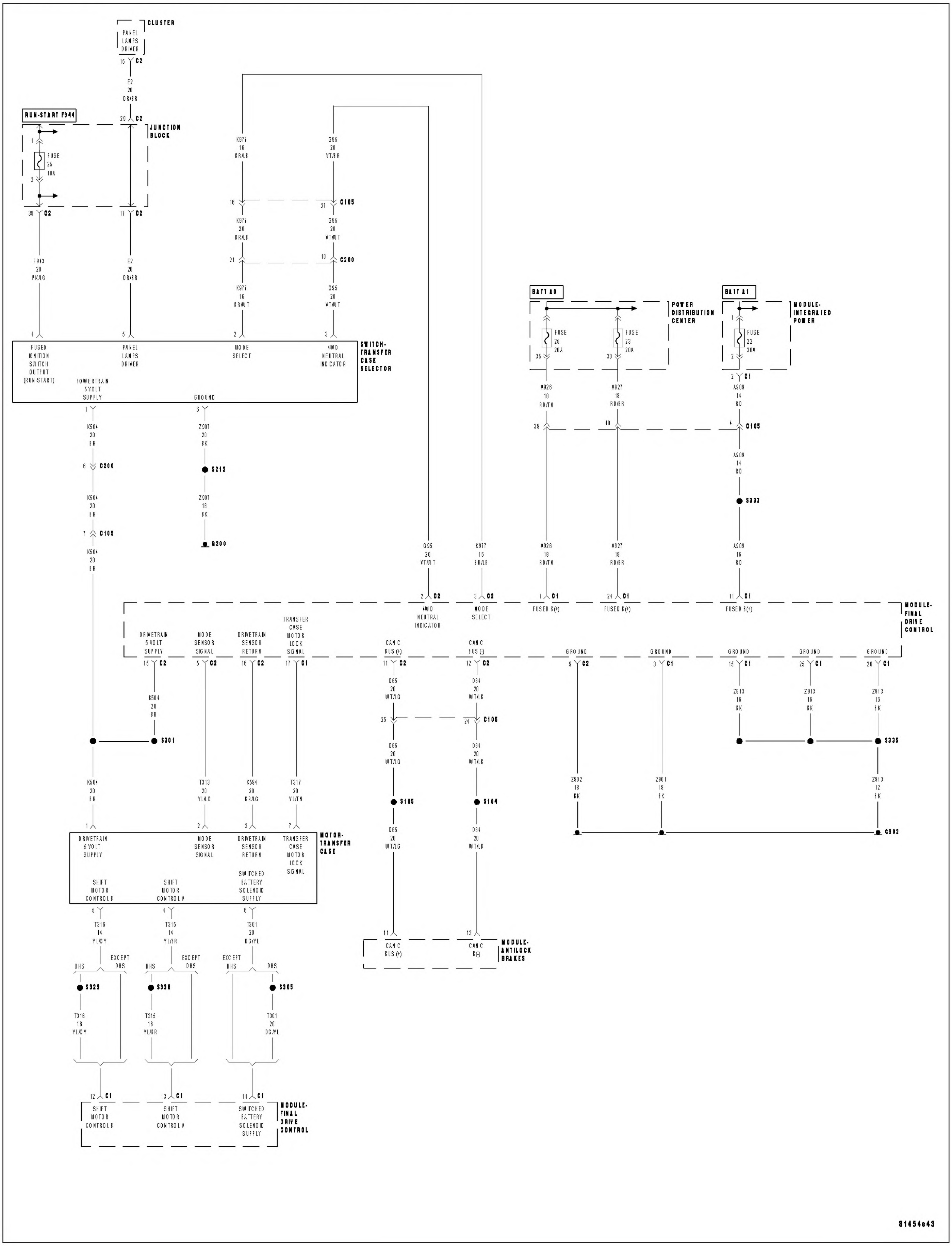
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C2100–BATTERY VOLTAGE LOW (FDCM)


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302
1
2
3
7
D65 20 WT/LG
D64 20 WT/LB
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
8
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C2100–BATTERY VOLTAGE LOW (FDCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Final Drive Control Module detects that system voltage is below 8.5 volts for 10 seconds with engine RPM greater than 1500.

Possible Causes
INTERMITTENT BATTERY VOLTAGE LOW
CHARGING SYSTEM DTCS PRESENT
FINAL DRIVE CONTROL MODULE POWER CIRCUITS OPEN OR HIGH RESISTANCE
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. CHARGING SYSTEM DTCS PRESENT

Ignition on.

With the scan tool, select View DTCs in the Powertrain Control Module.

Are there any Charging System or related voltage DTCs present?

Yes >> Refer to the symptom list and perform any Charging System DTC diagnostic procedures before continuing with this test.

No >> Go to 2

---

2. DTC IS ACTIVE

With the scan tool, select View DTCs in the Final Drive Control Module.

Is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 5

C2100–BATTERY VOLTAGE LOW (FDCM) (CONTINUED)

3. FINAL DRIVE CONTROL MODULE POWER CIRCUITS OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C1 harness connector.

Turn the ignition on.

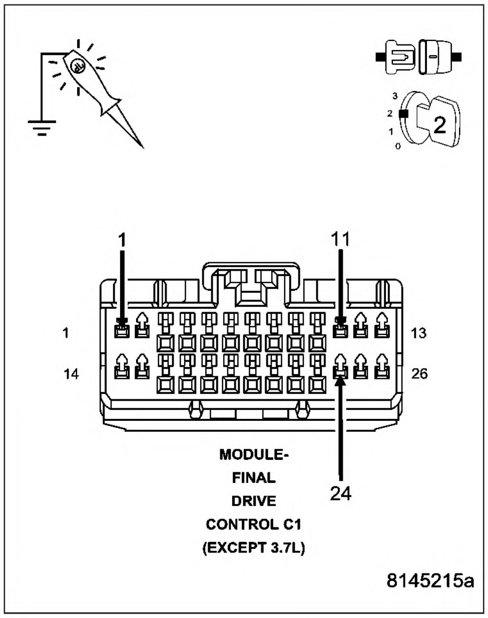
With a 12–volt test light connected to ground, check the Fused B+ circuits in the Final Drive Control Module C1 harness connector.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly for each of the Fused B+ circuits?

Yes >> Go to 4

No >> Repair the Fused B+ circuit(s) for an open circuit or high resistance.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.



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4. FINAL DRIVE CONTROL MODULE

View repair.

Repair
Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

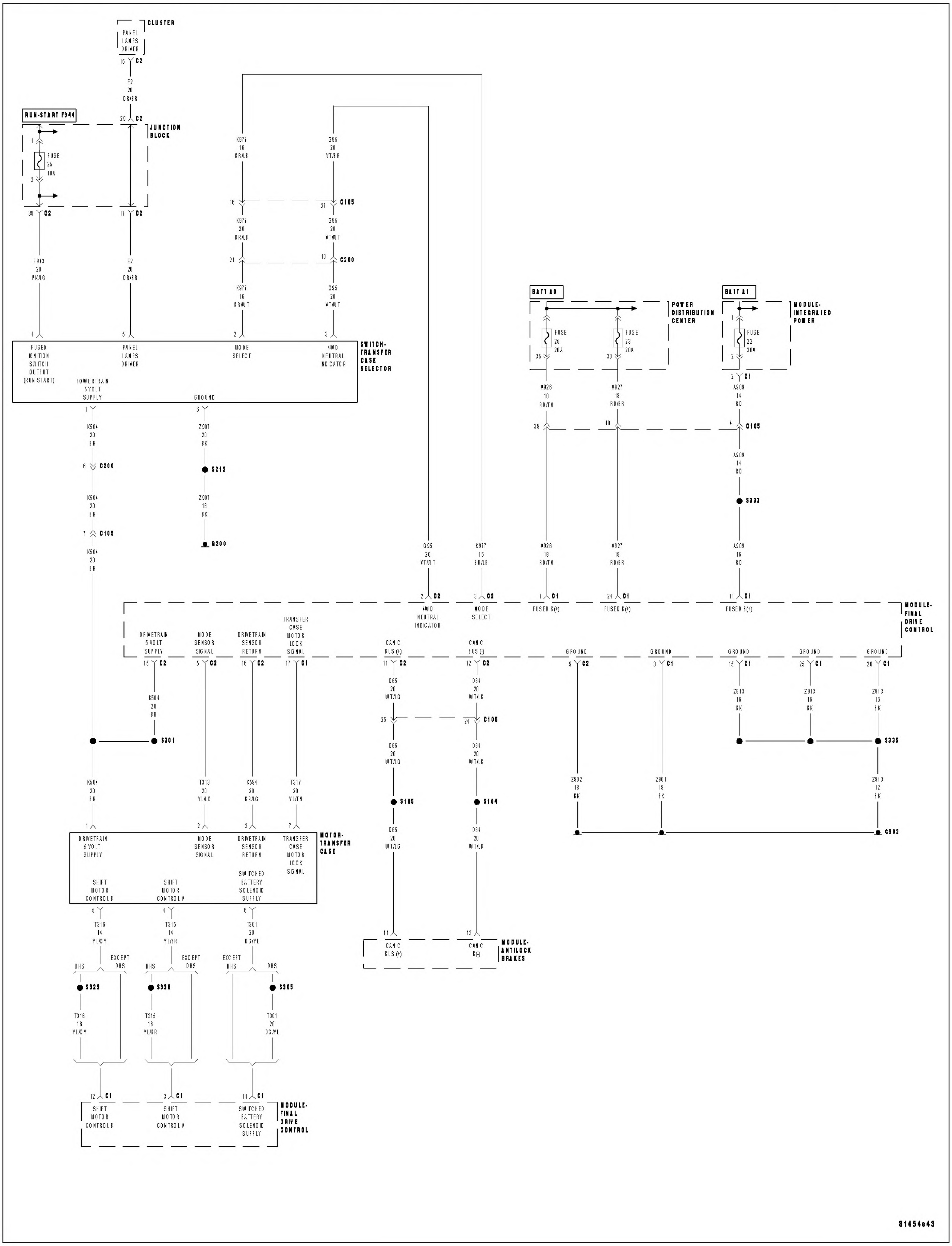
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C2101–BATTERY VOLTAGE HIGH (FDCM)


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
S105
S104
1
2
3
7
G302
D65 20 WT/LG
D64 20 WT/LB
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C2101–BATTERY VOLTAGE HIGH (FDCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The Final Drive Control Module detects that system voltage is above 16.0 volts for 10 seconds with engine RPM greater than 350.

Possible Causes
INTERMITTENT BATTERY VOLTAGE HIGH
CHARGING SYSTEM DTCS PRESENT
FINAL DRIVE CONTROL MODULE GROUND CIRCUITS OPEN OR HIGH RESISTANCE
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. CHARGING SYSTEM DTCS PRESENT

Ignition on.

With the scan tool, select View DTCs in the Powertrain Control Module.

Are there any Charging System or related voltage DTCs present?

Yes >> Refer to the symptom list and perform any Charging System DTC diagnostic procedures before continuing with this test.

No >> Go to 2

---

2. DTC IS ACTIVE

With the scan tool, select View DTCs in the Final Drive Control Module.

Is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 5

---

3. FINAL DRIVE CONTROL MODULE GROUND CIRCUITS OPEN OR HIGH RESISTANCE

Turn the ignition off.

Disconnect the Final Drive Control Module C1 and C2 harness connectors.

Turn the ignition on.

With a 12–volt test light connected to B+, check the Ground circuits in the Final Drive Control Module C1 and C2 harness connectors.

NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.

Does the test light illuminate brightly for each of the Ground circuits?

Yes >> Go to 4

No >> Repair the Ground circuit(s) for an open circuit or high resistance.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C2101–BATTERY VOLTAGE HIGH (FDCM) (CONTINUED)

4. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

5. INTERMITTENT WIRING AND CONNECTORS

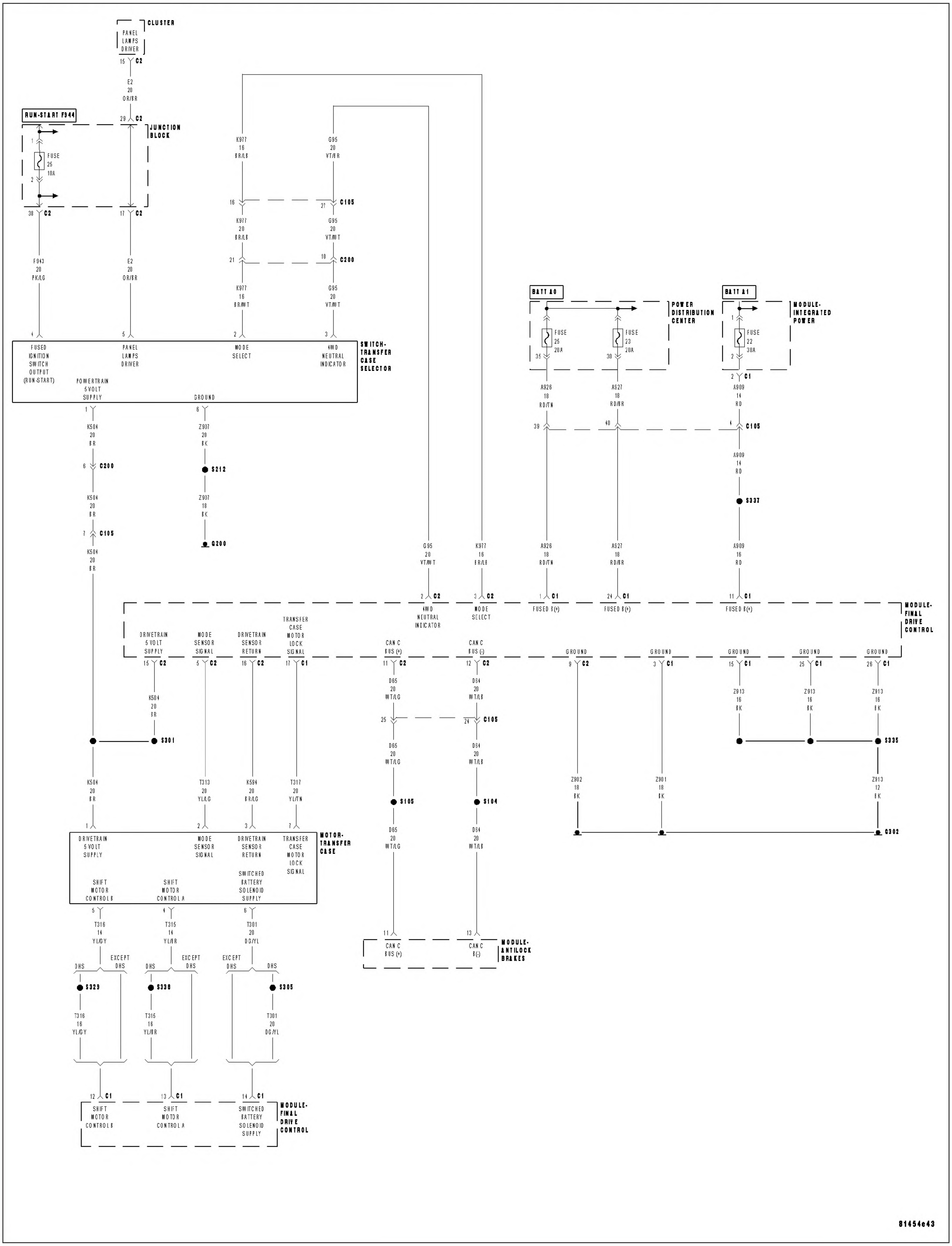
The conditions necessary to set this DTC are not present at this time.
Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C2109–DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW (FDCM)


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
SWITCH-TRANSFER CASE SELECTOR
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
A926 18 RD/TN
A927 18 RD/BR
39
40
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A909 14 RD
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
S301
D65 20 WT/LG
D64 20 WT/LB
25
24 C105
Z913 16 BK
Z913 16 BK
Z913 16 BK
S335
D65 20 WT/LG
D64 20 WT/LB
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
S105
S104
G302
1
2
3
7
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
D65 20 WT/LG
D64 20 WT/LB
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C2109–DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW (FDCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects an open circuit on the Transfer Case Motor Lock Signal circuit, the Front Differential Solenoid Control circuit and the Rear Differential Solenoid Control circuit.

Possible Causes
INTERMITTENT DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW
(T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT SHORT TO GROUND
(T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT OPEN
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 5

---

2. (T301) SWITCHED BATTERY SOLENOID SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

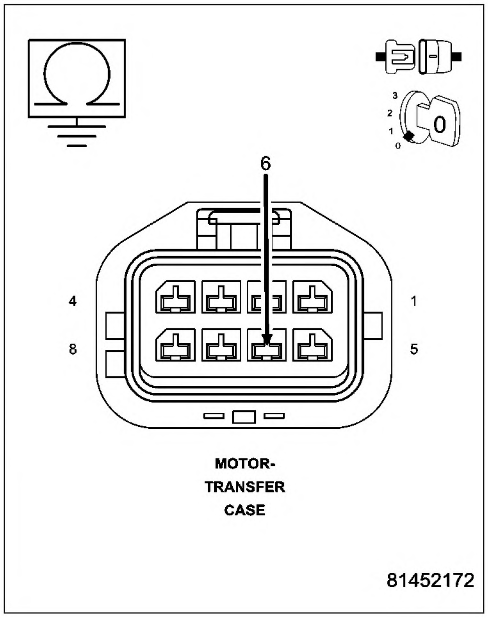
Disconnect the Final Drive Control Module C1 harness connector.

Measure the resistance between ground and the (T301) Switched Battery Solenoid Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (T301) Switched Battery Solenoid Supply circuit for a short to ground.

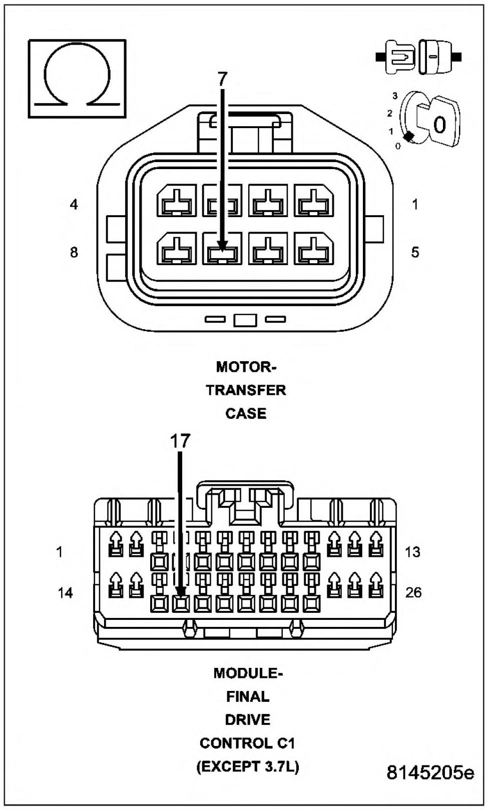
No >> Go to 3



C2109–DRIVETRAIN SUPPLY VOLTAGE CIRCUIT LOW (FDCM) (CONTINUED)

3. (T317) TRANSFER CASE MOTOR LOCK SIGNAL OPEN

Measure the resistance of the (T317) Transfer Case Motor Lock Signal circuit.



Is the resistance above 5.0 ohms?

Yes >> Repair the (T317) Transfer Case Motor Lock Signal circuit for a short to ground.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

---

4. FINAL DRIVE CONTROL MODULE

View repair.

Repair
Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

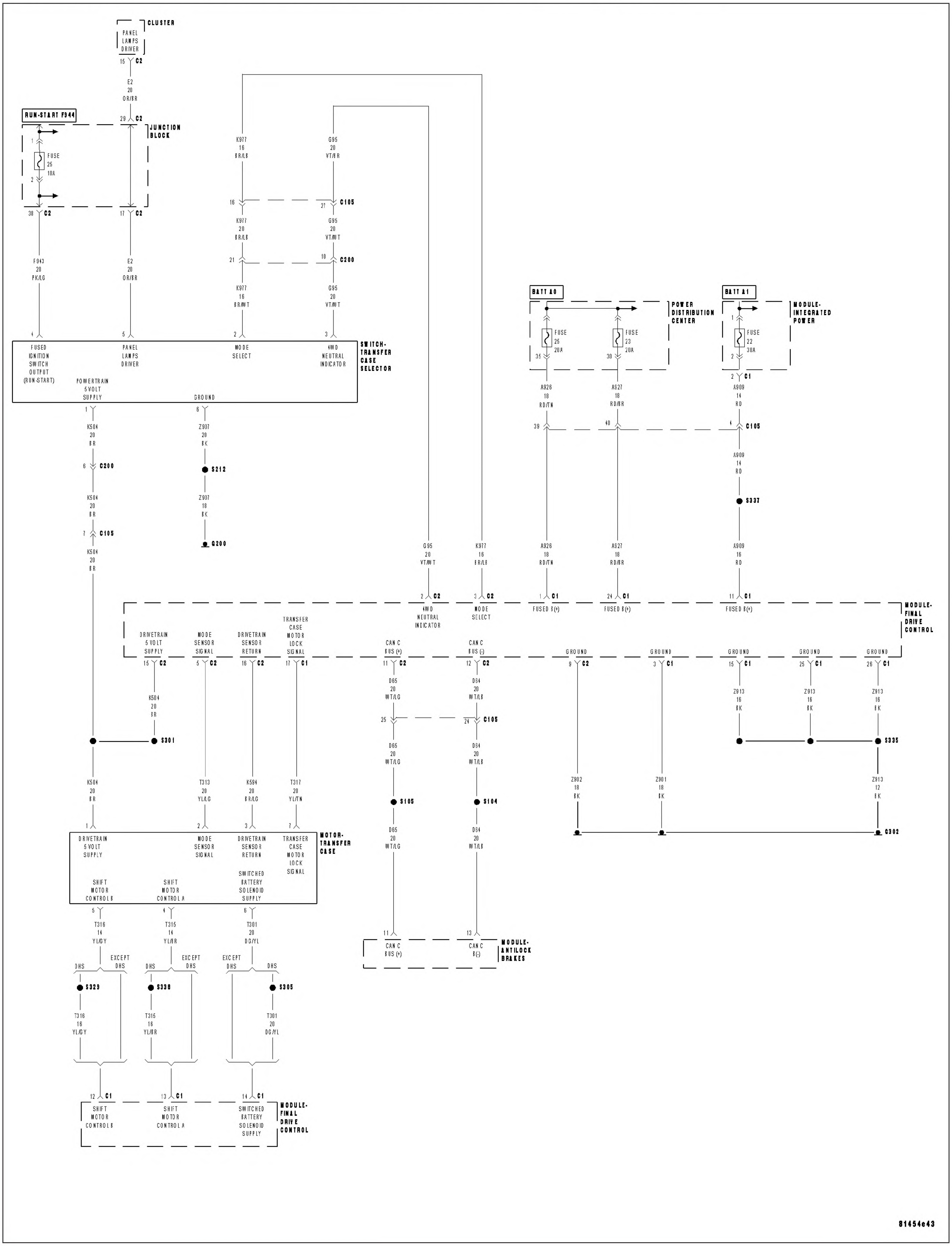
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C2111–DRIVETRAIN SENSOR SUPPLY CIRCUIT LOW (FDCM)


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
1
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4 5 2 3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
1
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
S105
S104
1 2 3 7
G302
D65 20 WT/LG
D64 20 WT/LB
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
8
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C2111–DRIVETRAIN SENSOR SUPPLY CIRCUIT LOW (FDCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects that the Drivetrain Sensor Supply voltage is below 2.5 volts for 300 mS.

Possible Causes
INTERMITTENT DRIVETRAIN SENSOR SUPPLY CIRCUIT LOW
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORT TO GROUND
TRANSFER CASE SELECTOR SWIITCH
TRANSFER CASE MOTOR
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. 5 VOLT SUPPLY (REFERENCE) VOLTAGE BELOW 4.8 VOLTS

Turn the ignition on.

With the scan tool, select Data Display in the FDCM.

Monitor the 5 Volt Supply (Reference) Voltage.

Is the voltage below 4.8 volts?

Yes >> Go to 2

No >> Go to 6

---

2. TRANSFER CASE SELECTOR SWITCH

Turn the ignition off.

Disconnect the Transfer Case Selector Switch harness connector.

Turn the ignition on.

With the scan tool, monitor the 5 Volt Supply (Reference) Voltage.

Is the voltage above 4.75 volts with the Transfer Case Selector Switch harness disconnected?

Yes >> Replace the Transfer Case Selector Switch in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 3

C2111–DRIVETRAIN SENSOR SUPPLY CIRCUIT LOW (FDCM) (CONTINUED)

3. TRANSFER CASE MOTOR

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

Turn the ignition on.

With the scan tool, monitor the 5 Volt Supply (Reference) Voltage.

Is the voltage above 4.75 volts with the Transfer Case Motor harness disconnected?

Yes >> Replace the Transfer Case Motor in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

---

4. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORT TO GROUND

Turn the ignition off.

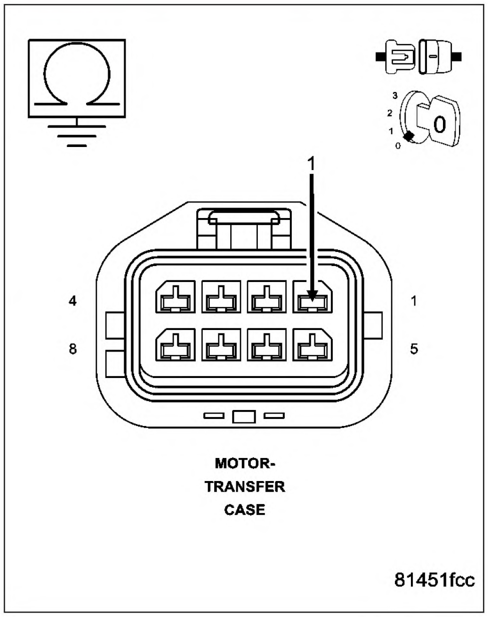
Disconnect the Final Drive Control Module harness connector.

Measure the resistance between ground and the (K504) Drivetrain 5 Volt Supply circuit.

Is the resistance below 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to ground.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 5



---

5. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C2111–DRIVETRAIN SENSOR SUPPLY CIRCUIT LOW (FDCM) (CONTINUED)

6. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

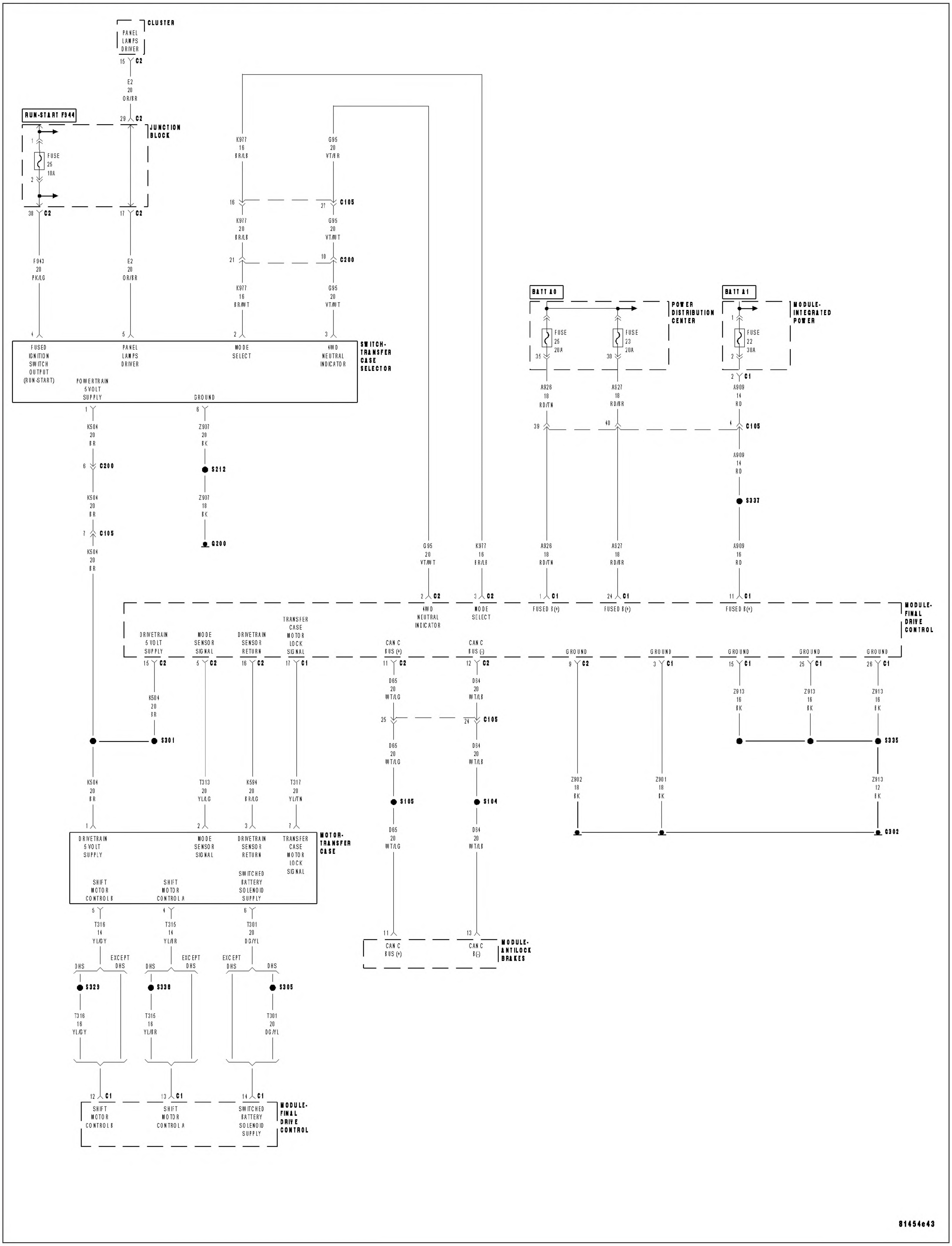
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C2112–DRIVETRAIN SENSOR SUPPLY CIRCUIT HIGH (FDCM)


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
SWITCH-TRANSFER CASE SELECTOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
BATT A1
POWER DISTRIBUTION CENTER
MODULE-INTEGRATED POWER
FUSE 25 20A
35
FUSE 23 20A
30
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
1
2
3
7
G302
D65 20 WT/LG
D64 20 WT/LB
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
MOTOR-TRANSFER CASE
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C2112–DRIVETRAIN SENSOR SUPPLY CIRCUIT HIGH (FDCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects that the Drivetrain Sensor Supply voltage is above 7.5 volts for 300 mS

Possible Causes
INTERMITTENT DRIVETRAIN SENSOR SUPPLY CIRCUIT HIGH
DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORT TO VOLTAGE
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. 5 VOLT SUPPLY (REFERENCE) VOLTAGE IS ABOVE 5.2 VOLTS

Ignition on.

With the scan tool, select Data Display in the FDCM.

Monitor the 5 Volt Supply (Reference) Voltage.

Is the voltage above 5.2 volts?

Yes >> Go to 2

No >> Go to 4

---

2. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE

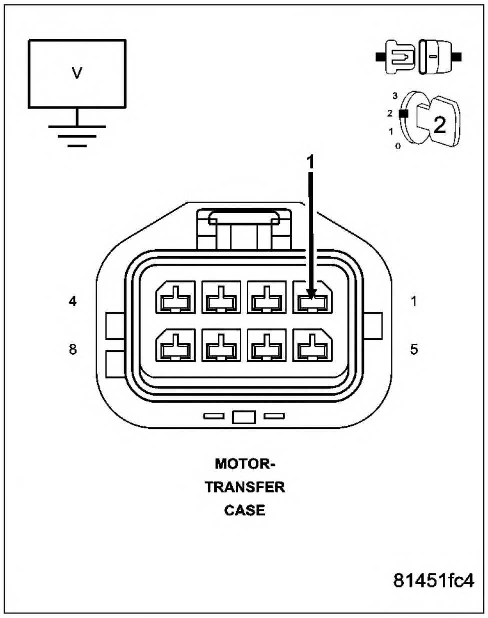
Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

Disconnect the Final Drive Control Module C2 harness connector.

Turn the ignition on.

Measure the voltage of the (K504) Drivetrain 5 Volt Supply circuit.



Is there any voltage present?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for a short to voltage.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 3

C2112–DRIVETRAIN SENSOR SUPPLY CIRCUIT HIGH (FDCM) (CONTINUED)

3. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

4. INTERMITTENT WIRING AND CONNECTORS

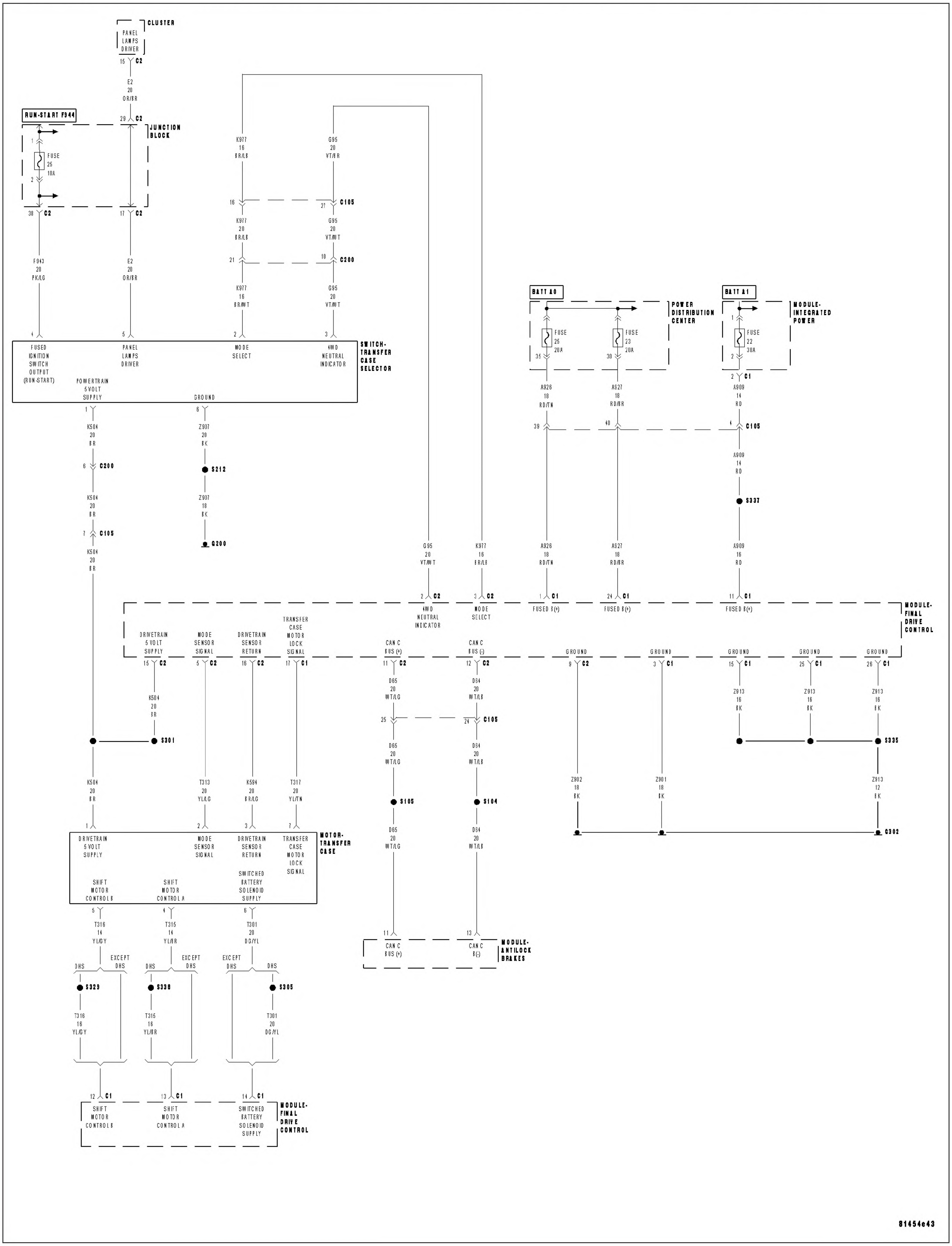
The conditions necessary to set this DTC are not present at this time.
Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C2113–DRIVETRAIN SENSOR SUPPLY VOLTAGE CIRCUIT OPEN (FDCM)


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
A926 18 RD/TN
A927 18 RD/BR
39
40
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A909 14 RD
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
25
24 C105
Z913 16 BK
Z913 16 BK
Z913 16 BK
S301
S335
D65 20 WT/LG
D64 20 WT/LB
S105
S104
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
Z902 18 BK
Z901 18 BK
Z913 12 BK
D65 20 WT/LG
D64 20 WT/LB
G302
1
2
3
7
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C2113–DRIVETRAIN SENSOR SUPPLY VOLTAGE CIRCUIT OPEN (FDCM) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects that the 5V Supply (Reference) Voltage is correct, but the Transfer Case Selector Switch and Mode Sensor indicate a low voltage condition.

Possible Causes
INTERMITTENT DRIVETRAIN SENSOR SUPPLY VOLTAGE CIRCUIT OPEN
(K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT OPEN
(K594) DRIVETRAIN SENSOR RETURN CIRCUIT OPEN
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 5

---

2. (K504) DRIVETRAIN 5 VOLT SUPPLY CIRCUIT OPEN

Turn the ignition off.

Disconnect the Transfer Case Motor harness connector.

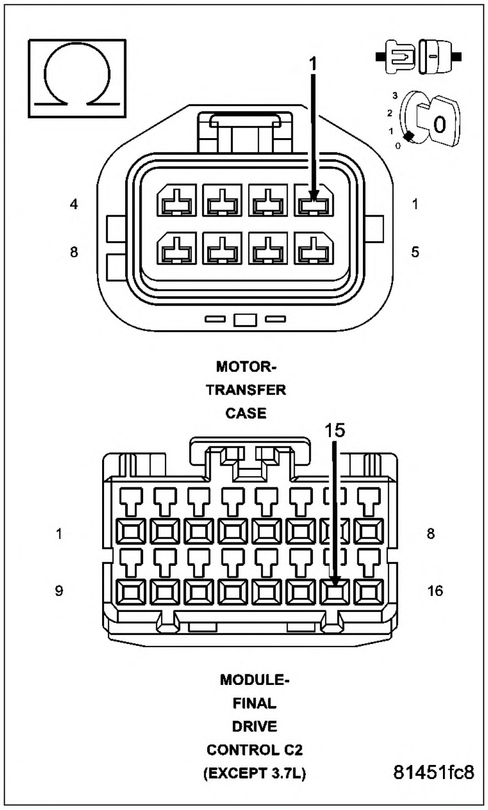
Disconnect the Final Drive Control Module C2 harness connector.

Measure the resistance of the (K504) Drivetrain 5 Volt Supply circuit.

Is the resistance above 5.0 ohms?

Yes >> Repair the (K504) Drivetrain 5 Volt Supply circuit for an open.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

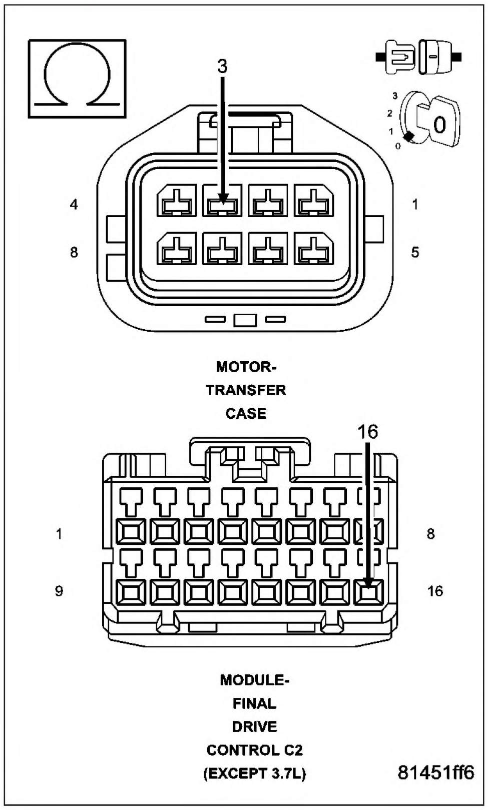
No >> Go to 3



C2113–DRIVETRAIN SENSOR SUPPLY VOLTAGE CIRCUIT OPEN (FDCM) (CONTINUED)

3. (K594) DRIVETRAIN SENSOR RETURN CIRCUIT OPEN

Measure the resistance of the (K594) Drivetrain Sensor Return circuit.



Is the resistance above 5.0 ohms?

Yes >> Repair the (K594) Drivetrain Sensor Return circuit for an open.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 4

---

4. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

5. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.

Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.

While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.

Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C2201-INTERNAL CONTROLLER (FDCM)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Final Drive Control Module has detected a failure internal to the controller.

Possible Causes
FINAL DRIVE CONTROL MODULE

1. FINAL DRIVE CONTROL MODULE

NOTE: This DTC may set after updating the controller software. Erase this DTC, cycle the ignition off for 10 seconds and recheck. If this DTC resets, proceed with repair procedure. If it does not reset, repair is complete.

The Final Drive Control Module has detected an internal failure.

View repair

Repair

Replace the Final Drive Control Module in accordance with the Service Information.

Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C2206-CONFIGURATION ERROR (FDCM)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  The Final Drive Control Module hardware check has determined that module configuration does not match vehicle configuration.

Possible Causes
FINAL DRIVE CONTROL MODULE CONFIGURATION

1. FINAL DRIVE CONTROL MODULE CONFIGURATION

The Final Drive Control Module hardware check has determined that module configuration does not match vehicle configuration. Verify that the correct module part number is installed in the vehicle.

Turn the ignition on.

With the Scan Tool, verify that the VIN stored in the controller matches the vehicle VIN.

With the Scan Tool, select Clear Stored DTCs.

Cycle the ignition off, then on.

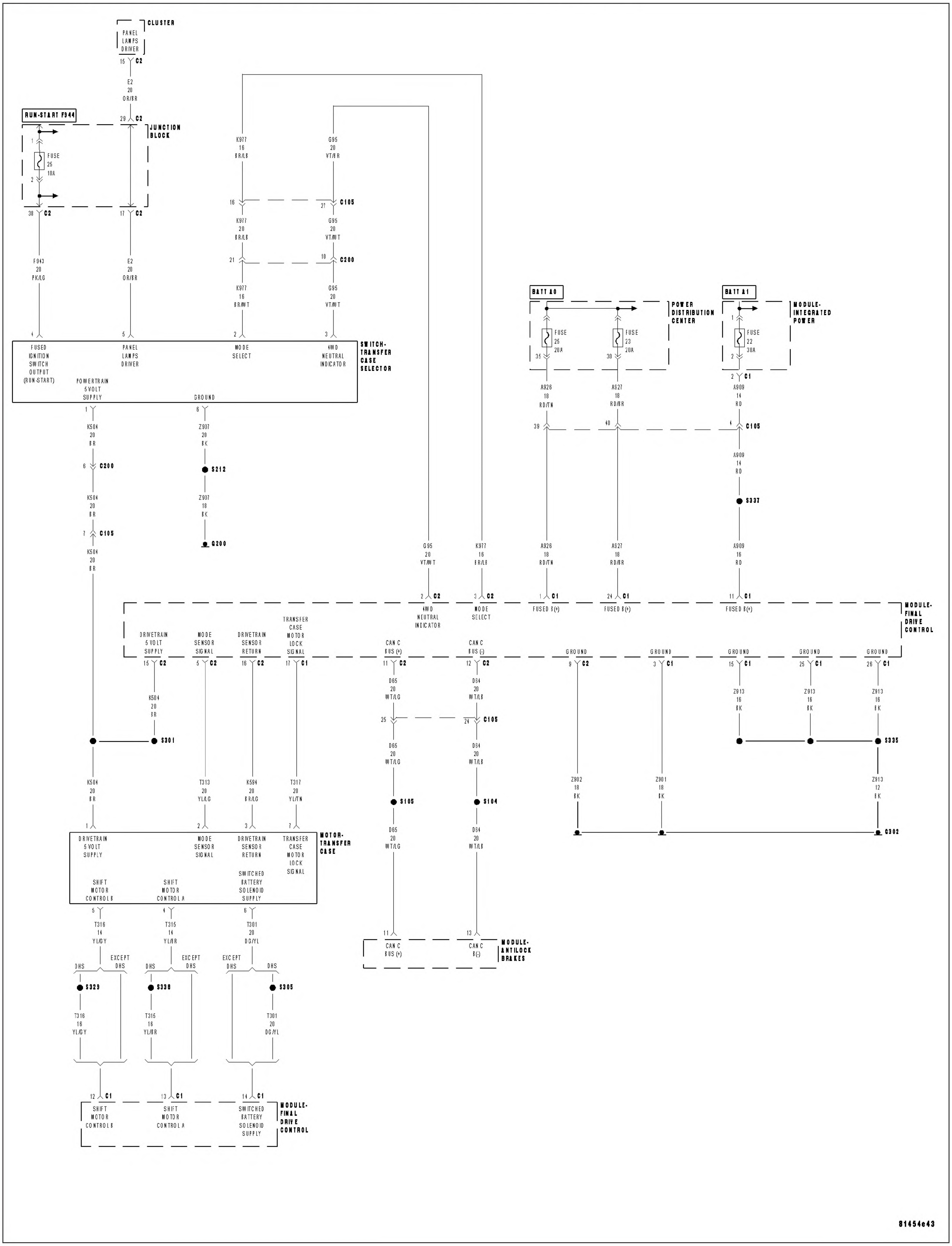
With the Scan Tool, select View DTCs.

Does this DTC reset?

Yes >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

C230A-NEUTRAL INDICATOR CONTROL CIRCUIT LOW


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
1
FUSE 25 10A
2
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
4
5
2
3
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
1
6
K504 20 BR
Z907 20 BK
6 C200
S212
K504 20 BR
Z907 18 BK
7 C105
G200
K504 20 BR
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
1
FUSE 22 30A
2
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
MODULE-FINAL DRIVE CONTROL
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
D65 20 WT/LG
D64 20 WT/LB
Z913 16 BK
Z913 16 BK
Z913 16 BK
25
24 C105
S301
D65 20 WT/LG
D64 20 WT/LB
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
1
2
3
7
D65 20 WT/LG
D64 20 WT/LB
G302
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
5
4
6
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
11
13
CAN C BUS (+)
CAN C B(-)
MODULE-ANTILOCK BRAKES
DHS
EXCEPT DHS
DHS
EXCEPT DHS
EXCEPT DHS
DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
12 C1
13 C1
14 C1
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
MODULE-FINAL DRIVE CONTROL
81454e43

C230A-NEUTRAL INDICATOR CONTROL CIRCUIT LOW (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects low voltage on the Neutral Indicator Control Circuit when output is off.

Possible Causes
INTERMITTENT NEUTRAL INDICATOR CONTROL CIRCUIT LOW
(G95) 4WD NEUTRAL INDICATOR CIRCUIT OPEN
(G95) 4WD NEUTRAL INDICATOR CIRCUIT SHORTED TO GROUND
TRANSFER CASE SELECTOR SWIITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. DTC IS ACTIVE

Ignition on.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 7

---

2. (G95) 4WD NEUTRAL INDICATOR CIRCUIT RESISTANCE TO GROUND

Turn the ignition off.

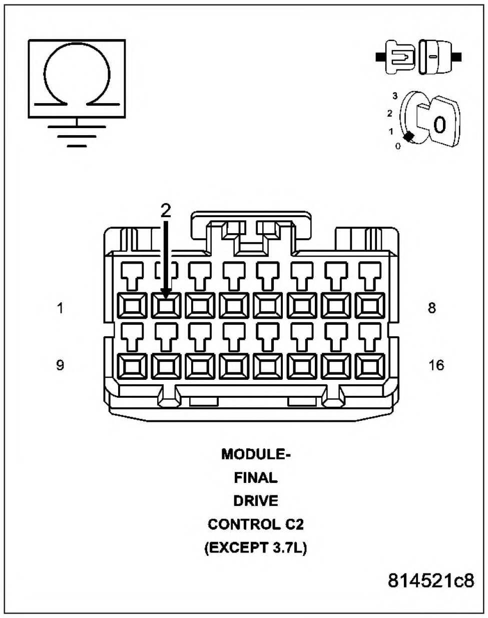
Disconnect the Final Drive Control Module C2 connector.

Measure the resistance between ground and the (G95) 4WD Neutral Indicator circuit.

Is the resistance below 5.0 ohms?

Yes >> Go to 3

No >> Go to 4

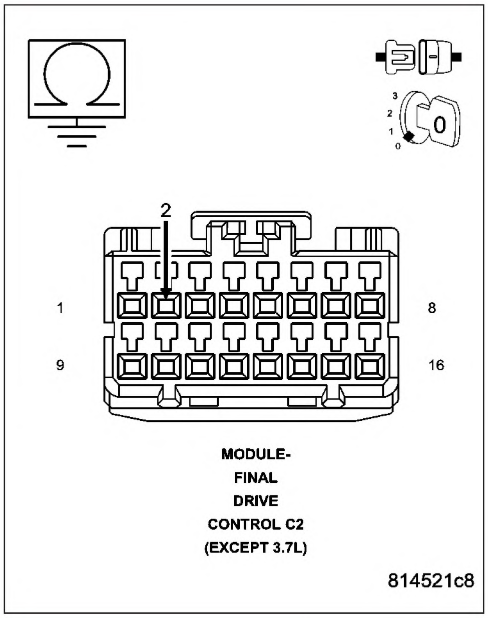


C230A-NEUTRAL INDICATOR CONTROL CIRCUIT LOW (CONTINUED)

3. (G95) 4WD NEUTRAL INDICATOR CIRCUIT SHORT TO GROUND

Disconnect the Transfer Case Selector Switch connector.

Measure the resistance between ground and the (G95) 4WD Neutral Indicator circuit.


2
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
814521c8

Is the resistance below 5.0 ohms?

Yes >> Repair the (G95) 4WD Neutral Indicator circuit for a short to ground.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

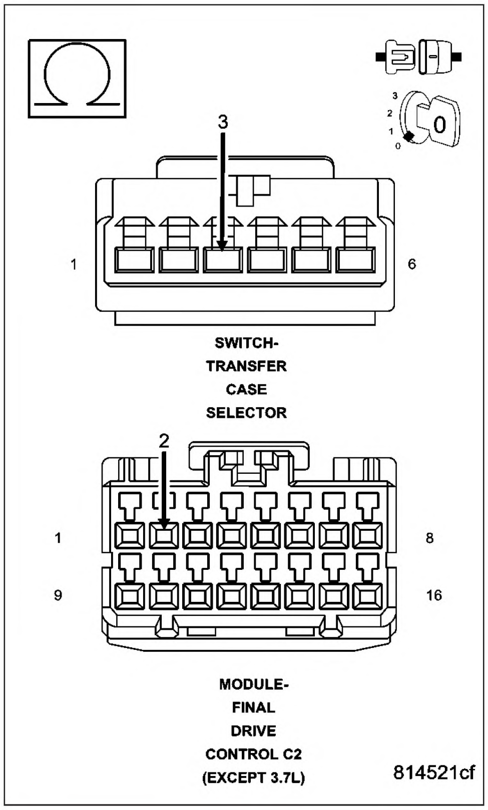
No >> Go to 5

---

4. (G95) 4WD NEUTRAL INDICATOR CIRCUIT OPEN

Disconnect the Transfer Case Selector Switch connector.

Measure the resistance of the (G95) 4WD Neutral Indicator circuit.


3
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
2
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
814521cf

Is the resistance above 5.0 ohms?

Yes >> Repair the open (G95) 4WD Neutral Indicator circuit.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6

C230A-NEUTRAL INDICATOR CONTROL CIRCUIT LOW (CONTINUED)

5. TRANSFER CASE SELECTOR SWITCH

View repair.

Repair

Replace the Transfer Case Selector Switch in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

6. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

7. INTERMITTENT WIRING AND CONNECTORS

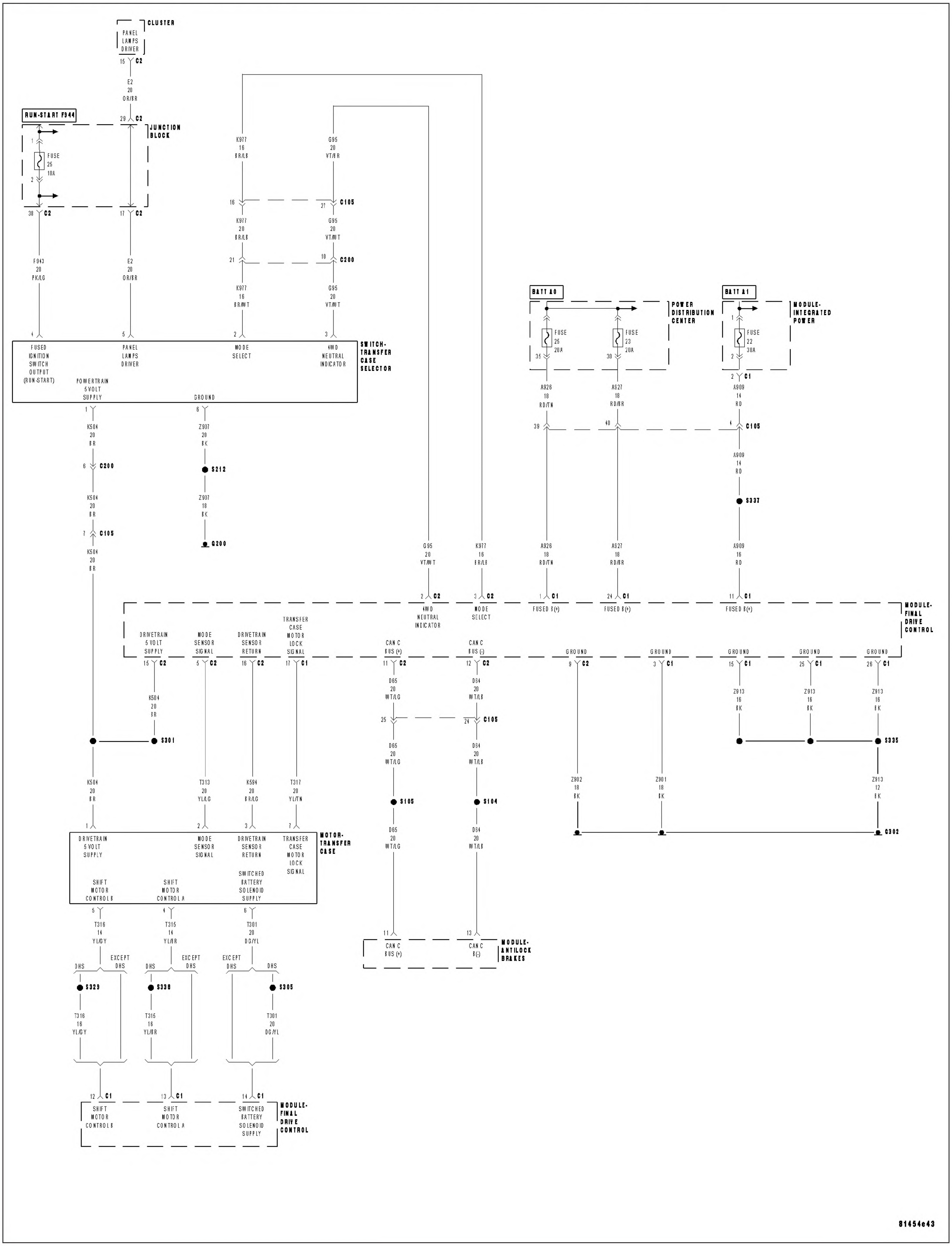
The conditions necessary to set this DTC are not present at this time.
Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

C230B- NEUTRAL INDICATOR CONTROL CIRCUIT HIGH


CLUSTER
PANEL LAMPS DRIVER
15 C2
E2 20 OR/BR
RUN-START F944
29 C2
JUNCTION BLOCK
FUSE 25 10A
38 C2
17 C2
F943 20 PK/LG
E2 20 OR/BR
K977 16 BR/LB
G95 20 VT/BR
16
27 C105
K977 20 BR/LB
G95 20 VT/WT
21
10 C200
K977 16 BR/WT
G95 20 VT/WT
SWITCH-TRANSFER CASE SELECTOR
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PANEL LAMPS DRIVER
MODE SELECT
4WD NEUTRAL INDICATOR
POWERTRAIN 5 VOLT SUPPLY
GROUND
K504 20 BR
6 C200
Z907 20 BK
S212
Z907 18 BK
G200
7 C105
BATT A0
POWER DISTRIBUTION CENTER
FUSE 25 20A
FUSE 23 20A
35
30
BATT A1
MODULE-INTEGRATED POWER
FUSE 22 30A
2 C1
A926 18 RD/TN
A927 18 RD/BR
A909 14 RD
39
40
4 C105
A909 14 RD
S337
G95 20 VT/WT
K977 16 BR/LB
A926 18 RD/TN
A927 18 RD/BR
A909 16 RD
2 C2
3 C2
1 C1
24 C1
11 C1
4WD NEUTRAL INDICATOR
MODE SELECT
FUSED B(+)
FUSED B(+)
FUSED B(+)
MODULE-FINAL DRIVE CONTROL
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
CAN C BUS (+)
CAN C BUS (-)
GROUND
GROUND
GROUND
GROUND
GROUND
15 C2
5 C2
16 C2
17 C1
11 C2
12 C2
9 C2
3 C1
15 C1
25 C1
26 C1
K504 20 BR
S301
D65 20 WT/LG
D64 20 WT/LB
25
24 C105
Z913 16 BK
Z913 16 BK
Z913 16 BK
S335
K504 20 BR
T313 20 YL/LG
K594 20 BR/LG
T317 20 YL/TN
S105
S104
Z902 18 BK
Z901 18 BK
Z913 12 BK
G302
MOTOR-TRANSFER CASE
DRIVETRAIN 5 VOLT SUPPLY
MODE SENSOR SIGNAL
DRIVETRAIN SENSOR RETURN
TRANSFER CASE MOTOR LOCK SIGNAL
SWITCHED BATTERY SOLENOID SUPPLY
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
T316 14 YL/GY
T315 14 YL/BR
T301 20 DG/YL
DHS
EXCEPT DHS
S329
S338
S305
T316 16 YL/GY
T315 16 YL/BR
T301 20 DG/YL
11
13
MODULE-ANTILOCK BRAKES
CAN C BUS (+)
CAN C B(-)
12 C1
13 C1
14 C1
MODULE-FINAL DRIVE CONTROL
SHIFT MOTOR CONTROL B
SHIFT MOTOR CONTROL A
SWITCHED BATTERY SOLENOID SUPPLY
81454e43

C230B- NEUTRAL INDICATOR CONTROL CIRCUIT HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module detects high voltage on the Neutral Indicator Control Circuit when output is on.

Possible Causes
INTERMITTENT NEUTRAL INDICATOR CONTROL CIRCUIT HIGH
(G95) 4WD NEUTRAL INDICATOR CIRCUIT OPEN
(G95) 4WD NEUTRAL INDICATOR CIRCUIT SHORTED TO VOLTAGE
TRANSFER CASE SELECTOR SWIITCH
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. NEUTRAL INDICATOR CONTROL CIRCUIT DTC IS ACTIVE

Ignition on.

With the scan tool, select View DTCs.

Is the status Active for this DTC?

Yes >> Go to 2

No >> Go to 7

---

2. (G95) 4WD NEUTRAL INDICATOR CIRCUIT VOLTAGE

Turn the ignition off.

Disconnect the Final Drive Control Module C2 harness connector.

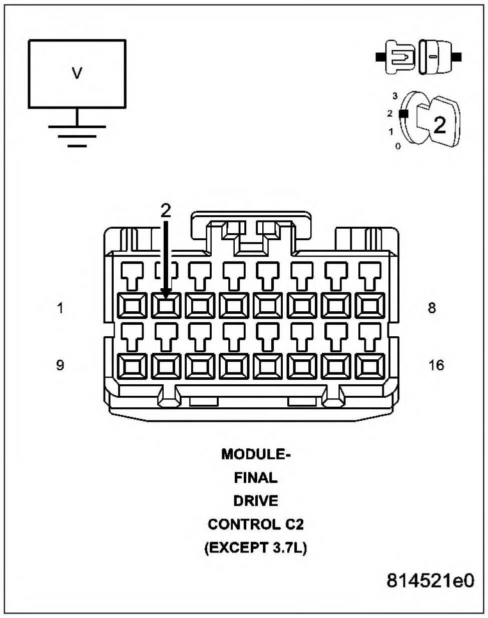
Turn the ignition on.

Measure the voltage of the (G95) 4WD Neutral Indicator circuit.

Is there any voltage present?

Yes >> Go to 3

No >> Go to 4



C230B- NEUTRAL INDICATOR CONTROL CIRCUIT HIGH (CONTINUED)

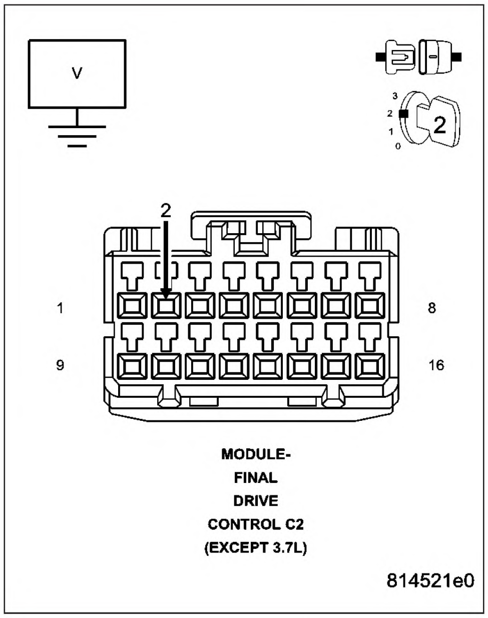
3. (G95) 4WD NEUTRAL INDICATOR CIRCUIT SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Transfer Case Selector Switch harness connector.

Turn the ignition on.

Measure the voltage of the (G95) 4WD Neutral Indicator circuit.


V
3
2
1
0
2
2
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
814521e0

Is there any voltage present?

Yes >> Repair the (G95) 4WD Neutral Indicator circuit for a short to voltage.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 5

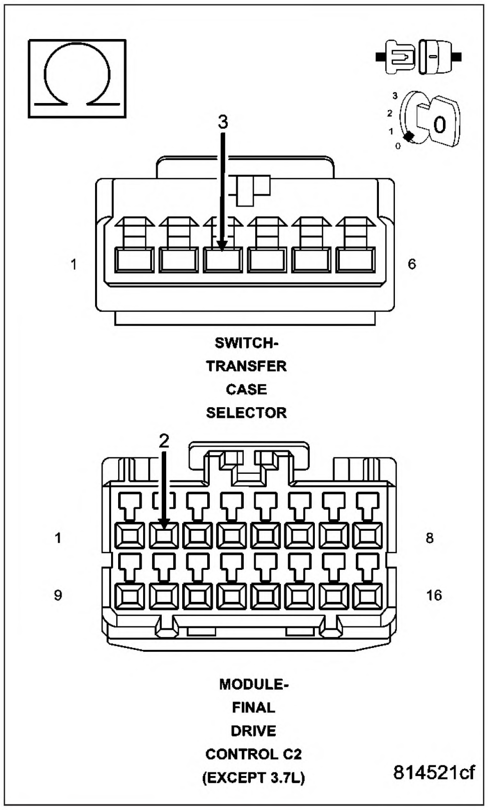
---

4. (G95) 4WD NEUTRAL INDICATOR CIRCUIT OPEN

Turn the ignition off.

Disconnect the Transfer Case Selector Switch connector.

Measure the resistance of the (G95) 4WD Neutral Indicator Control circuit.


Ω
3
2
1
0
0
3
1
6
SWITCH-
TRANSFER
CASE
SELECTOR
2
1
8
9
16
MODULE-
FINAL
DRIVE
CONTROL C2
(EXCEPT 3.7L)
814521cf

Is the resistance above 5.0 ohms?

Yes >> Repair the open (G95) 4WD Neutral Indicator circuit.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Go to 6

C230B- NEUTRAL INDICATOR CONTROL CIRCUIT HIGH (CONTINUED)

5. TRANSFER CASE SELECTOR SWITCH

View repair.

Repair

Replace the Transfer Case Selector Switch in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

6. FINAL DRIVE CONTROL MODULE

View repair.

Repair

Replace the Final Drive Control Module in accordance with the Service information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

---

7. INTERMITTENT WIRING AND CONNECTORS

The conditions necessary to set this DTC are not present at this time.
Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.
While monitoring the scan tool data relative to this circuit, wiggle test the wiring and connectors.
Look for the data to change or for the DTC to reset during the wiggle test.

Were any problems found?

Yes >> Repair as necessary.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Test complete.

U0401–IMPLAUSIBLE DATA RECEIVED FROM ECM (FDCM)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on for 4 seconds, no CAN BUS circuit error condition present, no lost communication with PCM condition present, and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module is receiving implausible data for pedal position, engine RPM, torque, or engine coolant temperature from the PCM.

Possible Causes
POWERTRAIN DTCS PRESENT
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. POWERTRAIN DTCS PRESENT

Ignition on.

With the scan tool, select View DTCs in the Powertrain Control Module.

Are there any DTCs present?

Yes >> Refer to the symptom list and perform the applicable diagnostic procedure.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

U0402–IMPLAUSIBLE DATA RECEIVED FROM TCM (FDCM)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on for 4 seconds, no CAN BUS circuit error condition present, no lost communication with TCM condition present, and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module is receiving implausible data for gear or PRNDL position from the TCM.

Possible Causes
TRANSMISSION DTCS PRESENT
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. TRANSMISSION DTCS PRESENT

Ignition on.

With the scan tool, select View DTCs in the Transmission Control Module.

Are there any DTCs present?

Yes >> Refer to the symptom list and perform the applicable diagnostic procedure.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

U0415–IMPLAUSIBLE DATA RECEIVED FROM ABS (FDCM)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on for 4 seconds, no CAN BUS circuit error condition present, no lost communication with ABS condition present, and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module is receiving implausible data for vehicle speed, wheel speed, brake switch status, longitudinal acceleration, yaw rate, or lateral acceleration from the ABS controller.

Possible Causes
ANTILOCK BRAKE SYSTEM DTCS PRESENT
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. ABS DTCS PRESENT

Ignition on.

With the scan tool, select View DTCs in the Antilock Brake Controller.

Are there any DTCs present?

Yes >> Refer to the symptom list and perform the applicable diagnostic procedure.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

U0429–IMPLAUSIBLE DATA RECEIVED FROM SCM (FDCM)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on for 4 seconds, no CAN BUS circuit error condition present, no lost communication with SCM condition present, and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module is receiving implausible data for sensor status from the SCM.

Possible Causes
STEERING COLUMN CONTROL MODULE DTCS PRESENT
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. STEERING COLUMN CONTROL MODULE DTCS PRESENT

Ignition on.

With the scan tool, select View DTCs in the Steering Column Control Module.

Are there any DTCs present?

Yes >> Refer to the symptom list and perform the applicable diagnostic procedure.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

U0431–IMPLAUSIBLE DATA RECEIVED FROM FCM (FDCM)

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on for 4 seconds, no CAN BUS circuit error condition present, no lost communication with FCM condition present, and no system undervoltage or overvoltage condition present.
- **Set Condition:**
  The Final Drive Control Module is receiving no message or implausible data for Ambient Temperature from the FCM.

Possible Causes
FRONT CONTROL MODULE DTCS PRESENT
FINAL DRIVE CONTROL MODULE

Diagnostic Test

1. FRONT CONTROL MODULE DTCS PRESENT

Ignition on.

With the scan tool, select View DTCs in the Front Control Module.

Are there any DTCs present?

Yes >> Refer to the symptom list and perform the applicable diagnostic procedure.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

No >> Replace the Final Drive Control Module in accordance with the Service Information.
Perform the TRANSFER CASE VERIFICATION TEST-VER 1.

TRANSFER CASE - NV140 - SERVICE INFORMATION

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- REMOVAL 993
- DISASSEMBLY 994
- ASSEMBLY 1001
- INSTALLATION 1009
- SPECIFICATIONS
  - TRANSFER CASE - NV140 1010
- SPECIAL TOOLS - NV140 1011

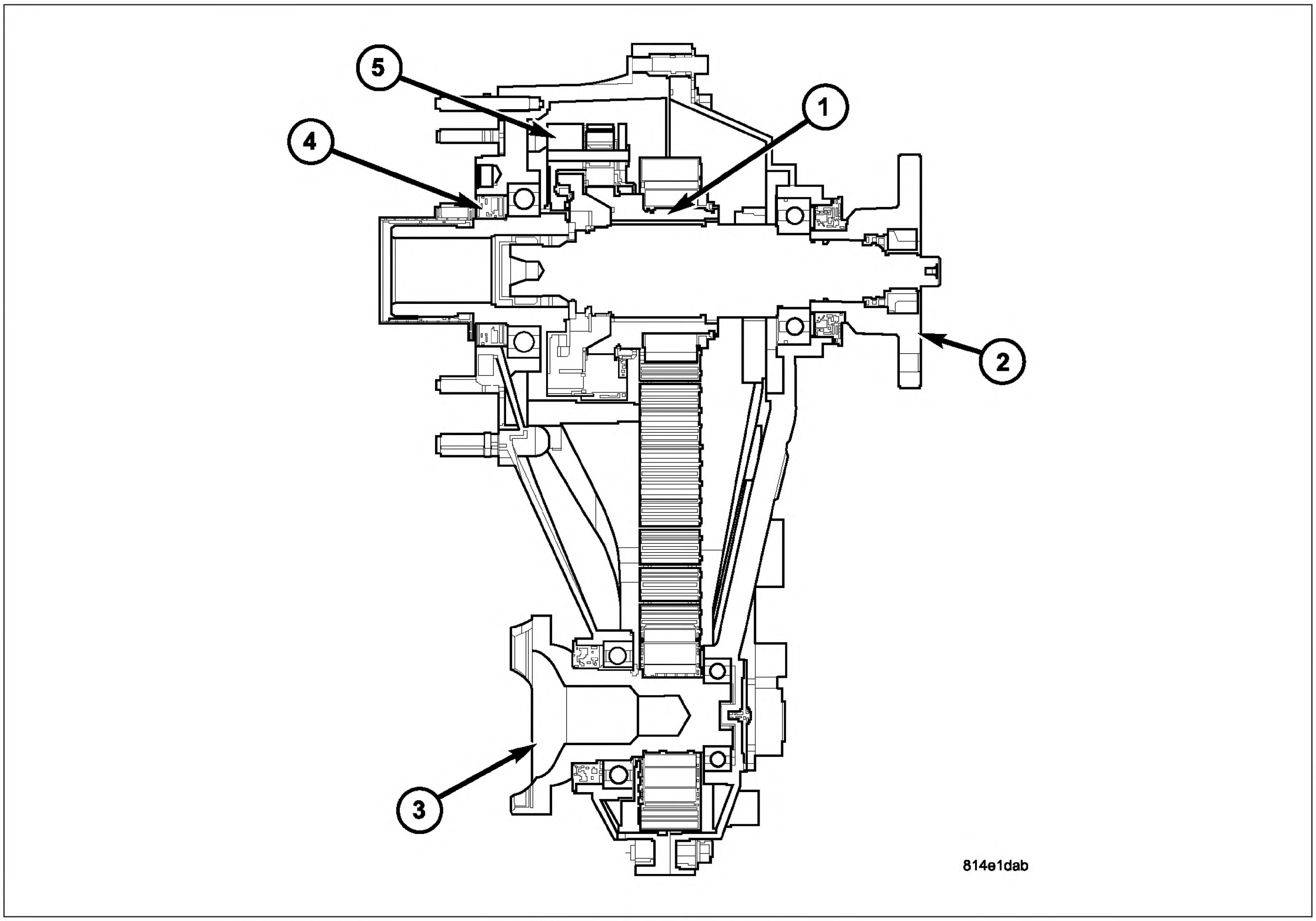
FLUID
- STANDARD PROCEDURE - FLUID DRAIN/ REFILL 1012

SEAL-FRONT OUTPUT SHAFT
- REMOVAL 1012

SEAL-REAR OUTPUT SHAFT
- REMOVAL 1012
- INSTALLATION 1013

TRANSFER CASE - NV140 - SERVICE INFORMATION

DESCRIPTION



NV140 Cross Section

1 - MAINSHAFT
2 - REAR OUTPUT SHAFT FLANGE
3 - FRONT OUTPUT SHAFT AND FLANGE
4 - INPUT SEAL
5 - DIFFERENTIAL

The NV140 is a single-speed transfer case and it is used in the Quadra- Trac I Full-Time 4-Wheel Drive System. It provides full-time 4-wheel drive. The transfer case operates with an open center differential dividing engine torque nearly evenly with 48 percent of engine torque to the front axle and 52 percent of engine torque to the rear axle. The Brake Traction Control System, which combines standard ABS and Traction Control, provides resistance to any wheel that is slipping to allow additional torque transfer to wheels with traction.

The Quadra-Trac I system with NV 140 single-speed transfer case provides the following benefits:

- No shift lever or driver interaction required.
- Full-time four-wheel drive provides smooth operation and vehicle stability under all conditions because torque is constantly being transferred.
- Even torque distribution provides traction to maintain forward motion under most conditions.
- The Brake Traction Control System (BTCS) works in tandem with full-time four-wheel drive. BTCS provides resistance to any wheel that is slipping to allow additional torque transfer to wheels with traction.
- Robust design and improved sealing enhance reliability.
- No maintenance required.

OPERATION

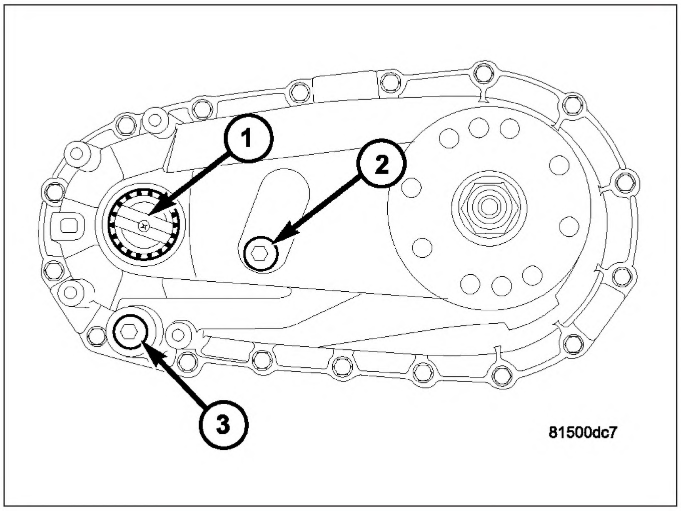
Full-time 4-wheel drive distributes even torque to all wheels under all conditions. The transfer case center differential evenly divides torque to the front and rear axles, while also allowing the driveshafts to rotate at different speeds to account for front and rear wheels traveling different distances while turning. Given that the drive shafts can rotate at different speeds, the vehicle can remain in full-time 4-wheel drive mode indefinitely, even on dry pavement, without threat of damage to the drivetrain. The vehicle uses Brake Traction Control to modulate the torque from one wheel to another across each axle and the transfer case.

REMOVAL

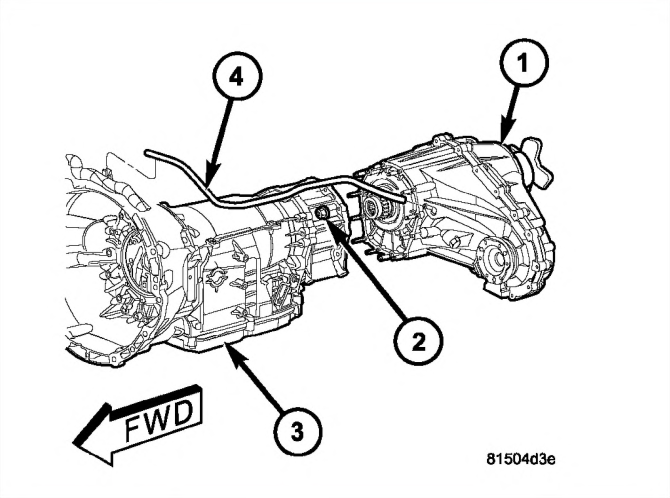
1. Raise vehicle.
2. Remove transfer case drain plug (3) and drain the transfer case lubricant.

CAUTION: Do not allow propshafts to hang at attached end. Damage to joint can result.

3. Remove the front and rear propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

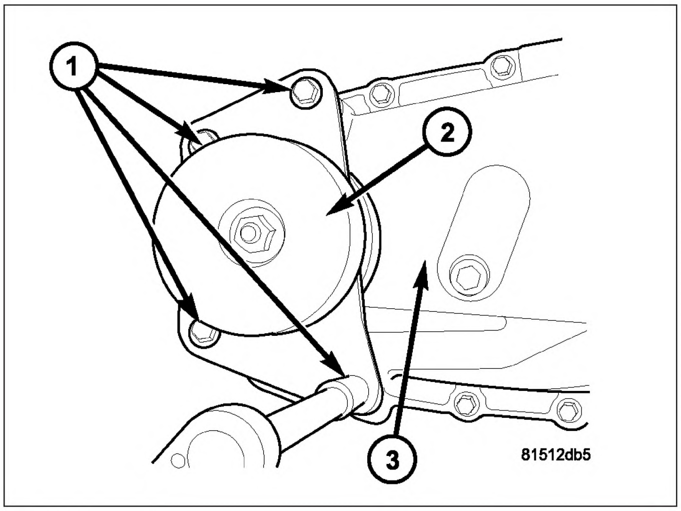


4. Support transmission with jack stand.
5. Remove rear crossmember and skid plate, if equipped.
6. Disconnect transfer case vent hose (4).
7. Support transfer case with transmission jack and secure with chains.
8. Remove nuts (2) attaching transfer case (1) to transmission (3).
9. Pull transfer case and jack rearward to disengage transfer case.
10. Remove transfer case from under vehicle.

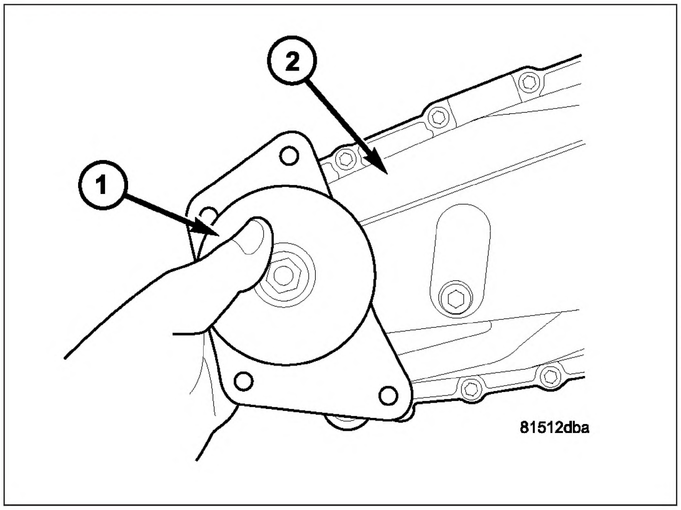


DISASSEMBLY

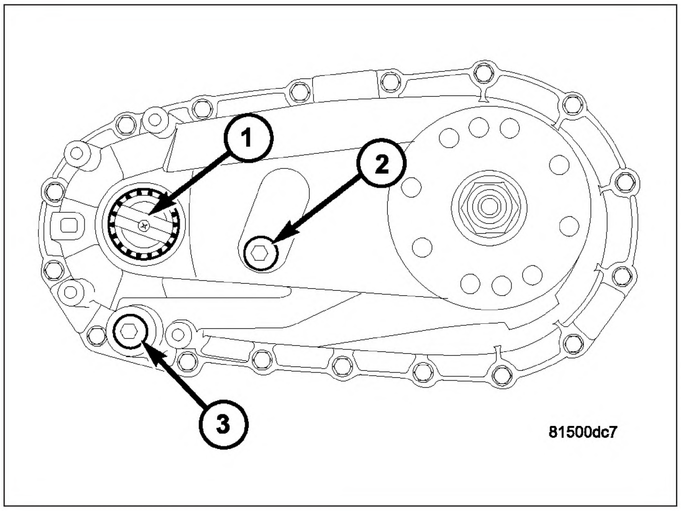
1. Remove the bolts (1) holding the dampner (2) to the rear housing (3).


1
2
3
81512db5

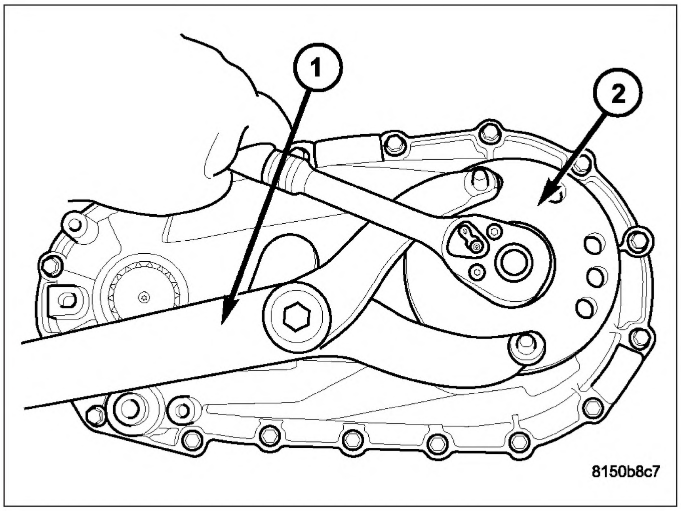
2. Remove the dampner (1) from the rear housing (2).


2
1
81512dba

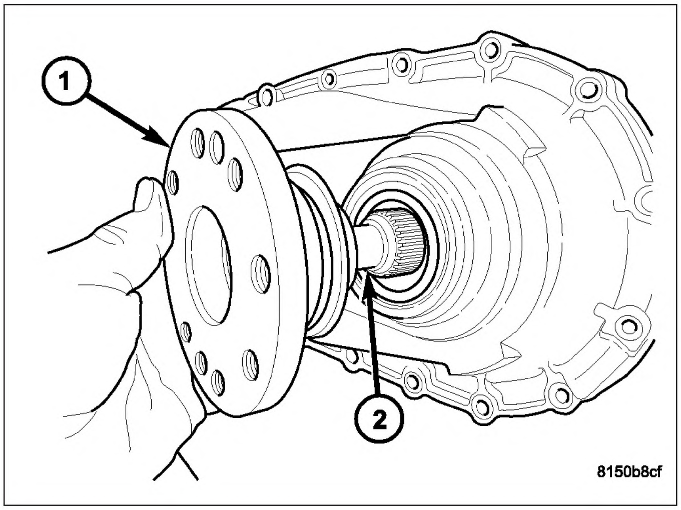
3. Position transfer case on shallow drain pan. Remove drain plug (3) and drain lubricant remaining in case.


1
2
3
81500dc7

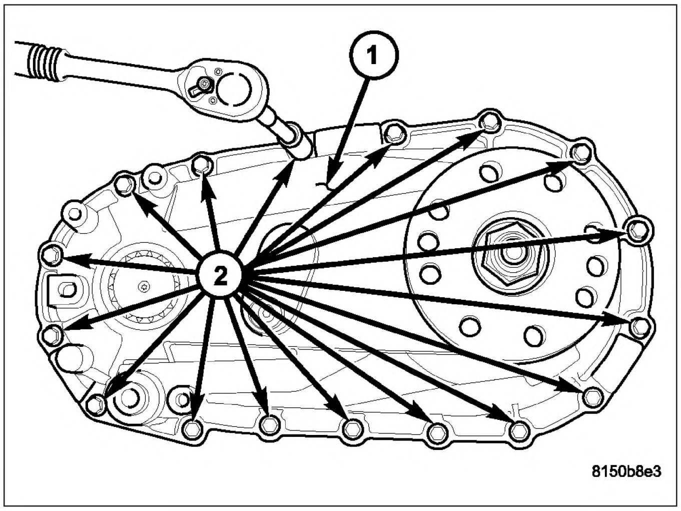
4. Using Holder C-3281 (1), remove the rear companion flange (2) nut. If flange is difficult to remove by hand, remove it with bearing splitter, or with standard two jaw puller. Be sure puller tool is positioned securely on flange.



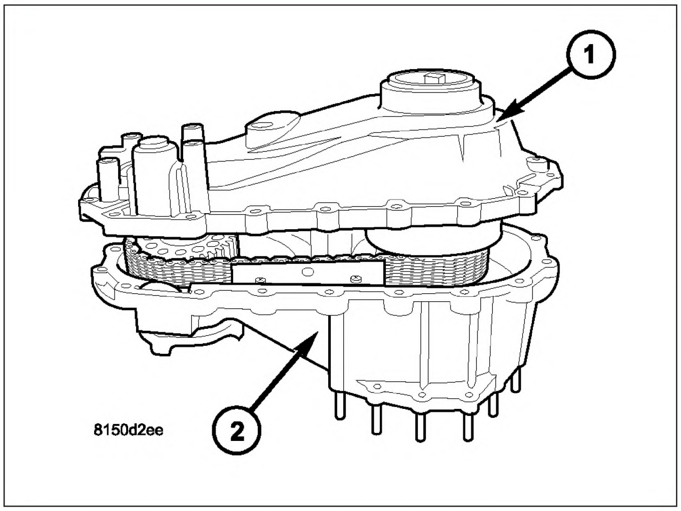
5. Remove the rear output shaft flange (1) from the output shaft (2). If necessary, use a suitable 2 or 3 jaw puller to remove the output shaft flange.



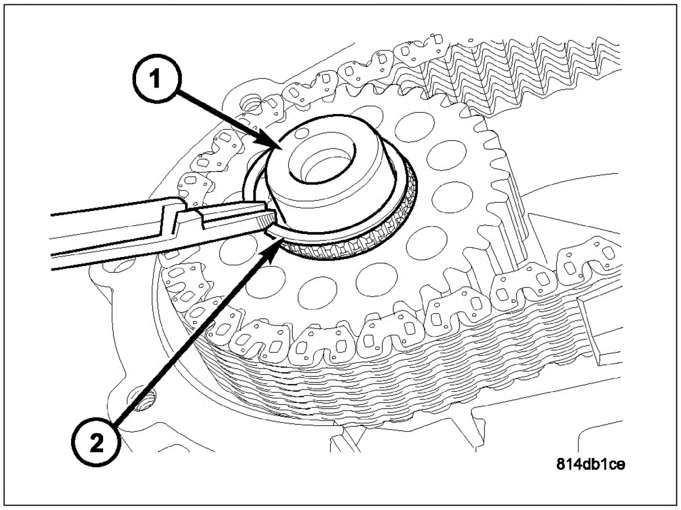
6. Support transfer case so rear case is facing upward.
7. Remove bolts (2) holding front housing (3) to rear housing (1).



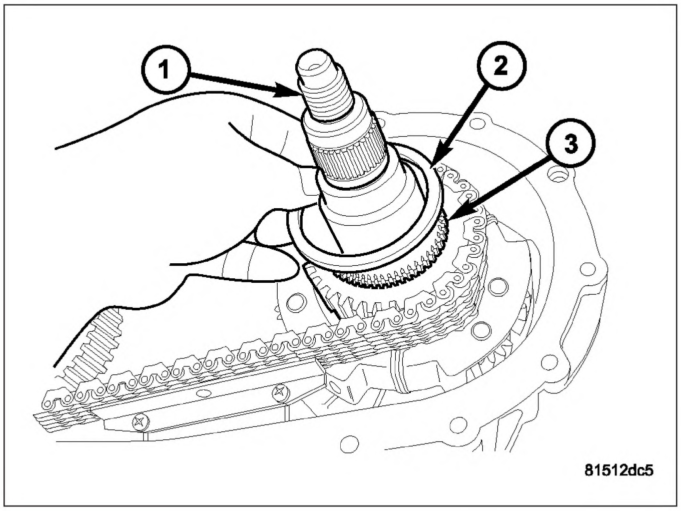
8. Loosen rear case with flat blade screwdriver to break sealer bead. Insert screwdriver blade only into notches provided at each end of case.
9. Remove rear housing (1) from front housing (2).



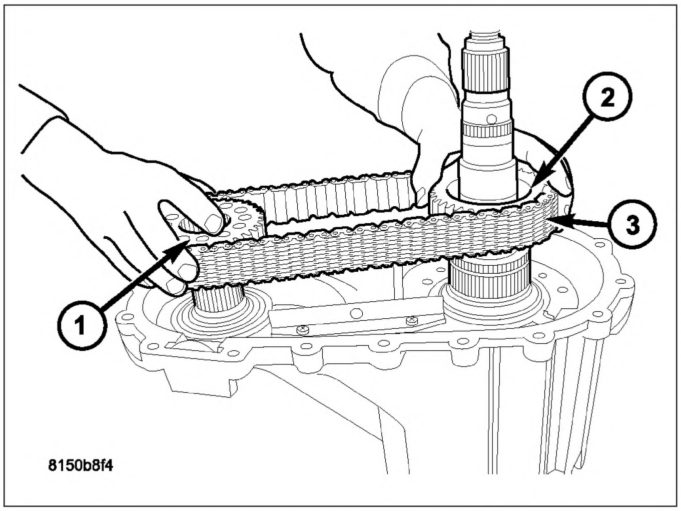
10. Remove front drive sprocket retaining ring (2) from the front output shaft (1).



11. Remove mainshaft drive sprocket retaining ring.
12. Remove the mode hub spacer (2) from the mode hub (3) and output shaft (1).



13. Remove the front drive sprocket (1), mainshaft drive sprocket (2), and the drive chain as one.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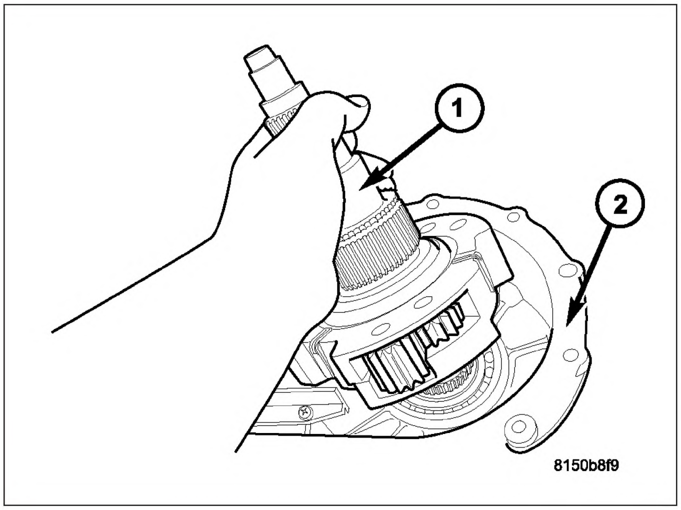
2
3
8150b8f4

14. Remove the mainshaft and differential assembly (1) from the front housing (2).


1
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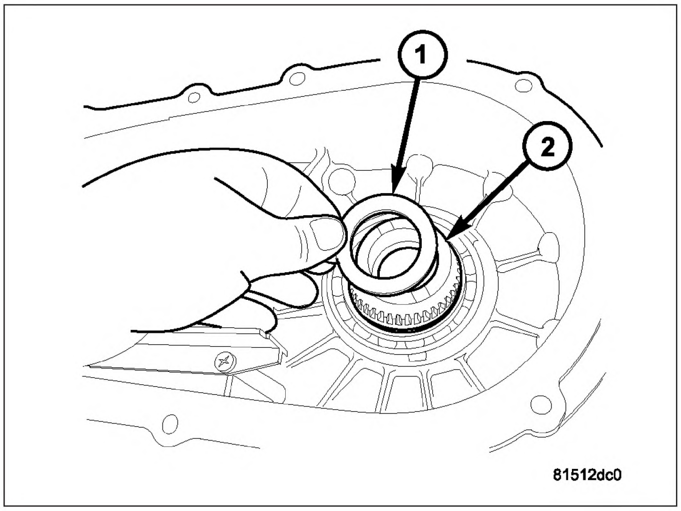
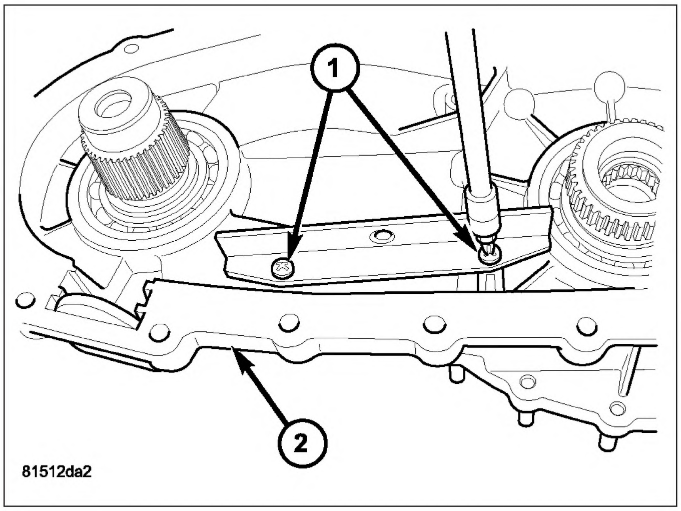
8150b8f9

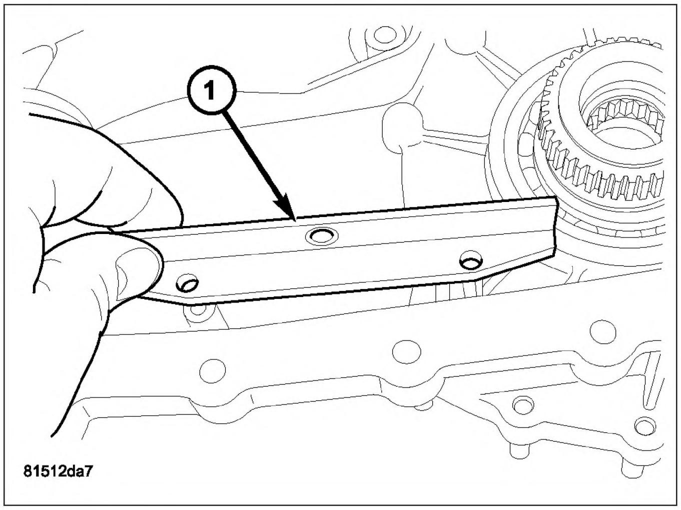
15. Remove the input gear thrust washer (1) from the input gear (2).


1
2
81512dc0

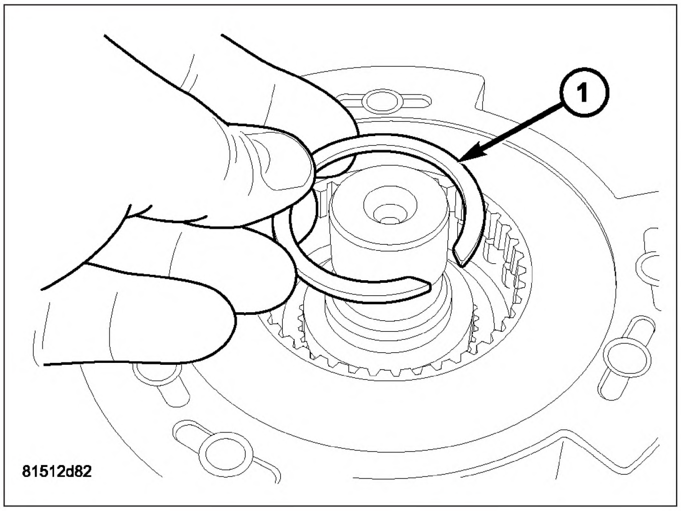
16. Remove the screws (2) holding the chain guide rails (1) to the front housing.


1
2
81512da2

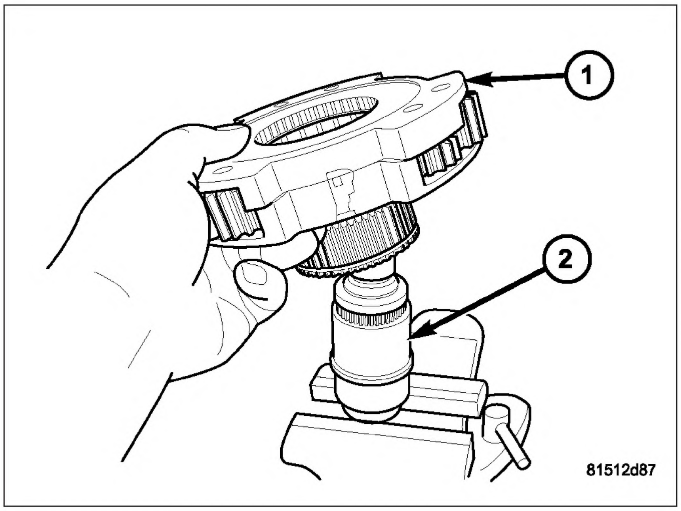
17. Remove the drive chain guide (1) from the transfer case.



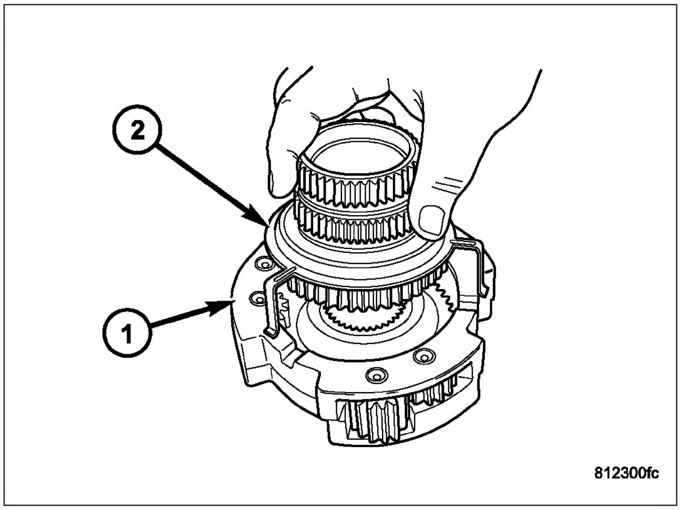
18. Remove the differential snap-ring (1).



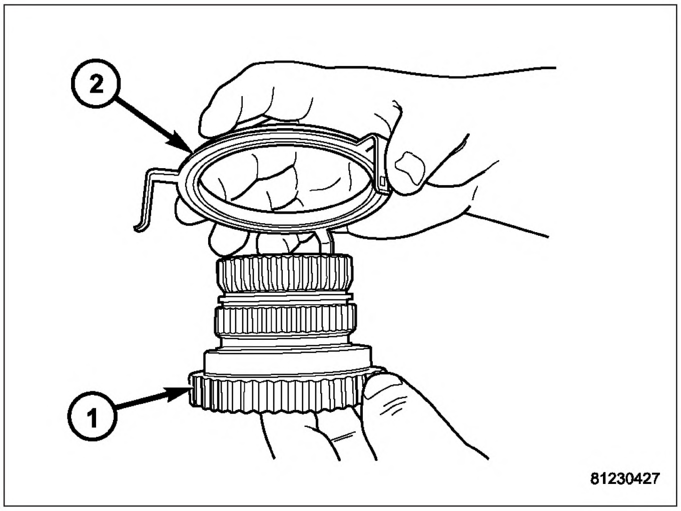
19. Remove the differential assembly (1) from the mainshaft (2).


1
2
81512d87

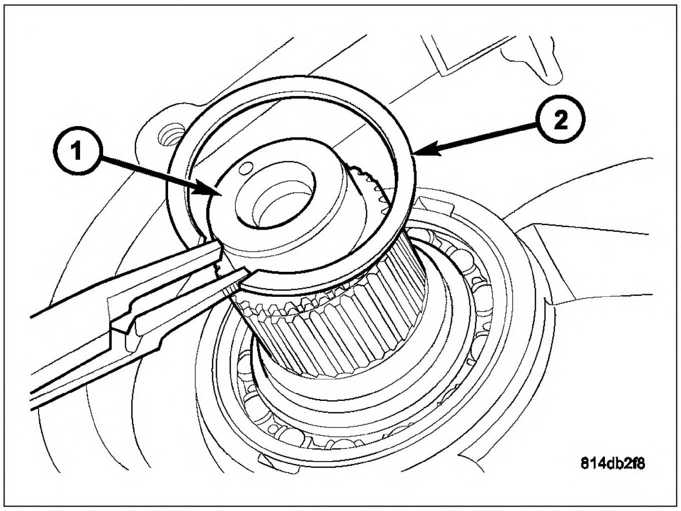
20. Remove the mode hub (2) and mode hub retainer from the differential assembly (1).


2
1
812300fc

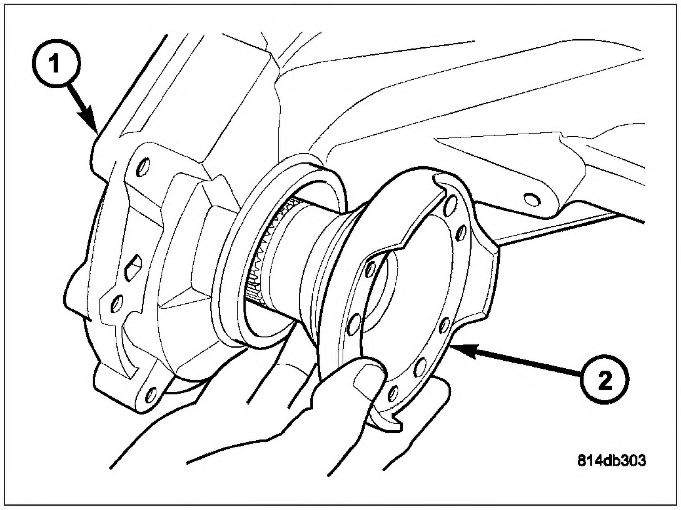
21. Remove the mode hub retainer (1) from the mode hub (2).


2
1
81230427

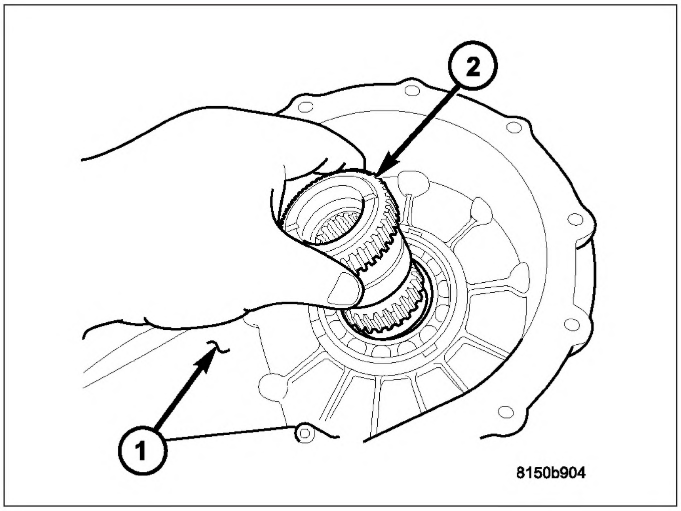
22. Remove the retaining ring (2) from the front output shaft (1).



23. Remove the front output shaft (2) from the front housing (1) and the front output shaft front bearing.
24. Remove the front output shaft seal with a suitable pry tool or a screw mounted in a slide hammer.

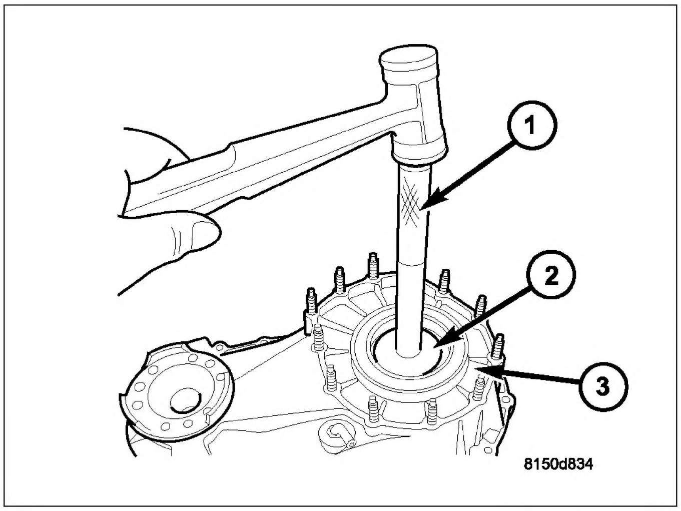


25. Remove the input shaft seal with a suitable pry tool or a screw mounted in a slide hammer.
26. Remove the input gear (2) from the front housing (1).

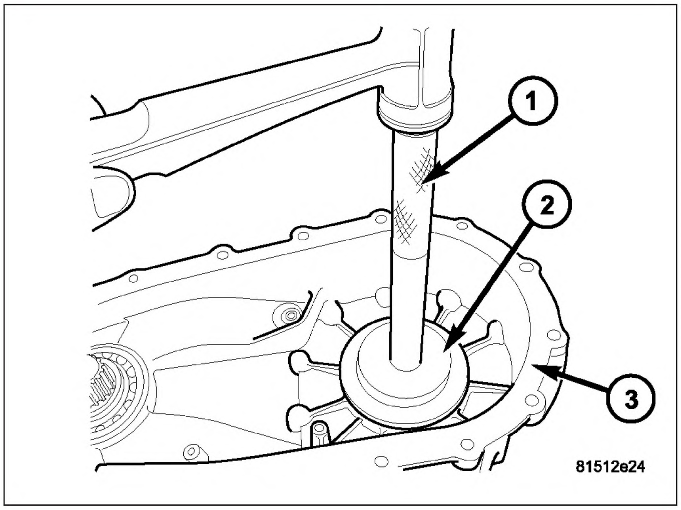


ASSEMBLY

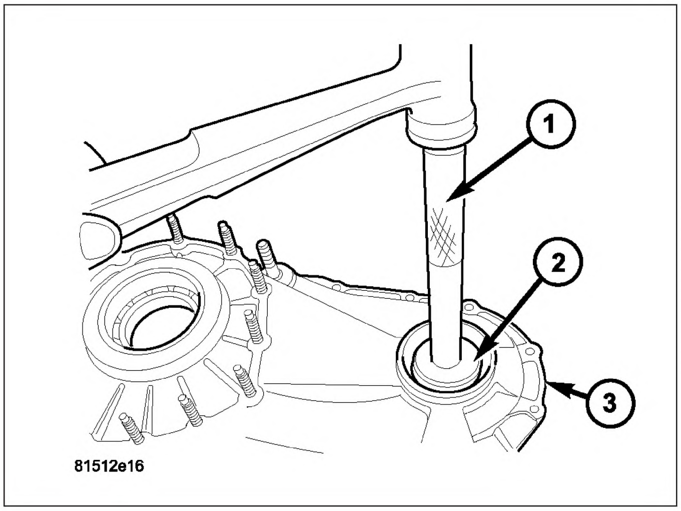
1. Remove the input shaft bearing from the front housing (3) with Handle C-4171 (1) and Installer 8693A (2).
   .



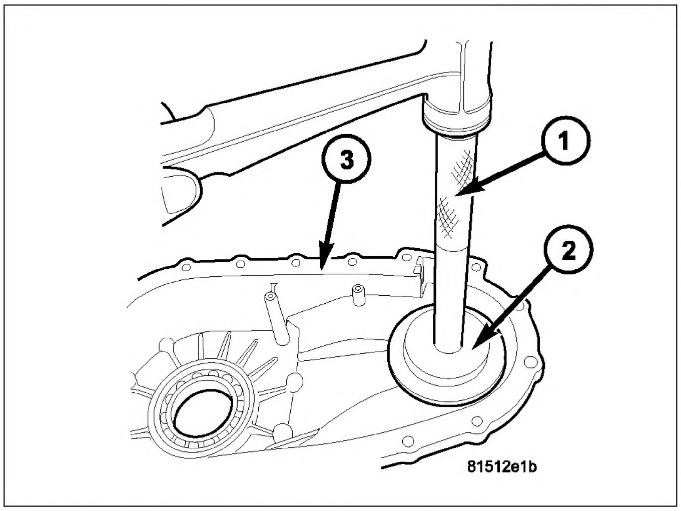
2. Install the input gear bearing into the front housing (3) using Installer 8152 (2), inverted, and Handle C-4171 (1).



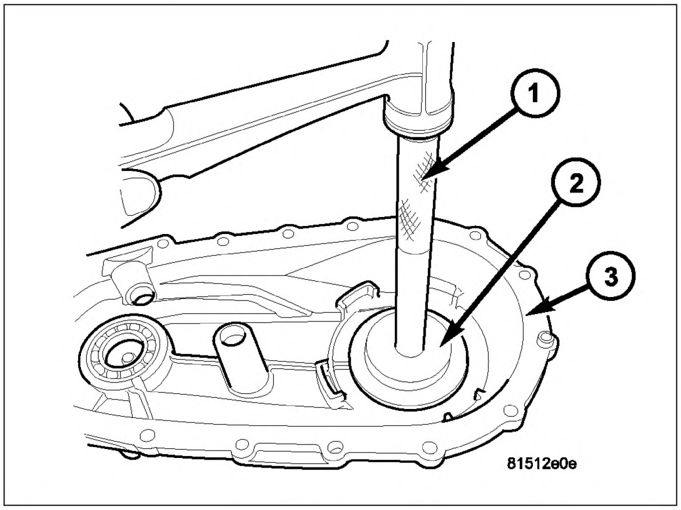
3. Using Installer 7829A (2) and Handle C-4171 (1), remove front output shaft bearing from the front housing (3).



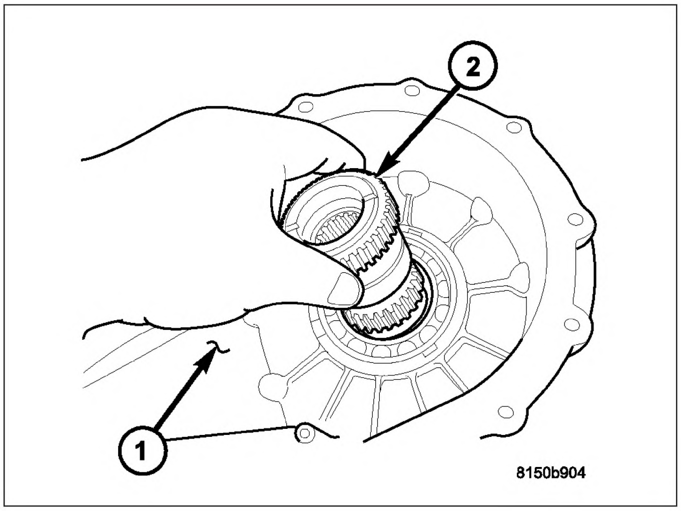
4. Start front output shaft bearing in the front housing. Using Installer 8152 (2), inverted, and Handle C-4171 (1), seat the bearing in the front housing (3).



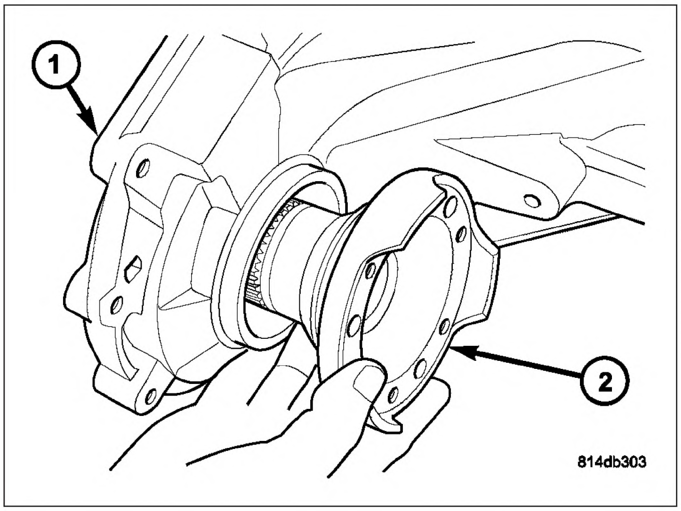
5. Remove the rear output shaft bearing from the rear case using Installer 5066 and Handle C-4171.
6. Install the rear output shaft bearing into the rear housing (3) using Installer 8152 (2), inverted, and Handle C-4171 (1).



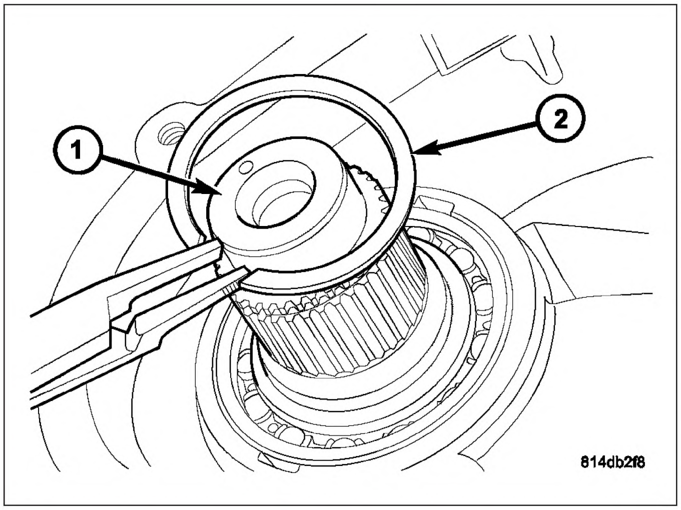
7. Install the input gear (2) into the front housing (1).
8. Install the new input shaft seal with Installer 9672 and Handle C-4171.



9. Install a new front output shaft seal with Installer 6560.
10. Install the front output shaft (2) into the front housing (1) and the front output shaft front bearing.



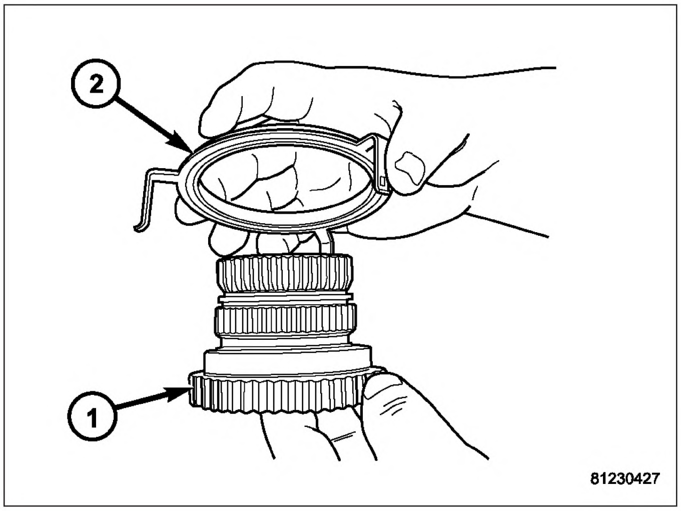
11. Install the retaining ring (2) onto the front output shaft (1).



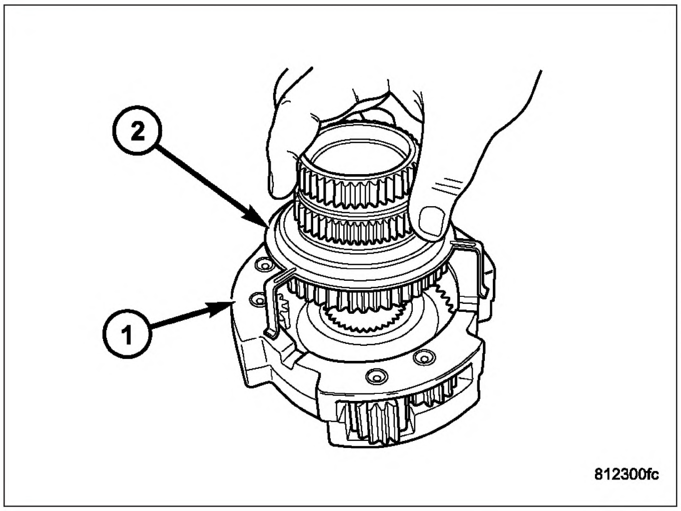
12. Lubricate mainshaft splines with recommended transmission fluid.

NOTE: Replace the mode hub retainer if the legs were distorted during removal.

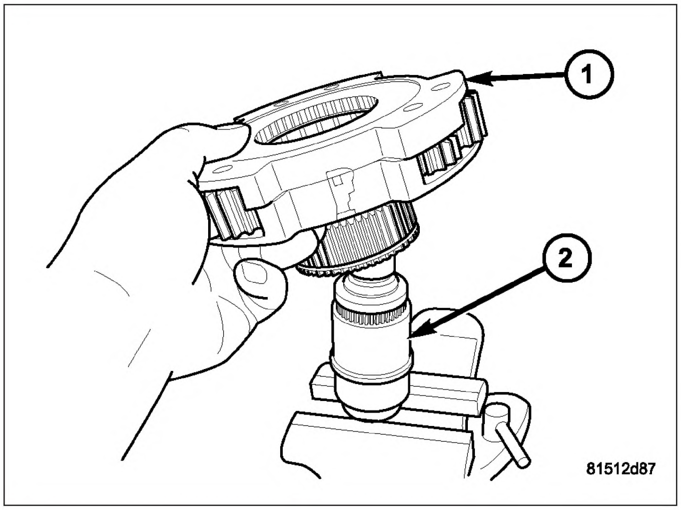
13. Install the mode hub retainer (1) onto the mode hub (2).



14. Install the mode hub (2) and mode hub retainer onto the differential assembly (1). Make sure the retainer is fully seated onto the differential.


2
1
812300fc

15. Install the differential assembly (1) onto the mainshaft (2).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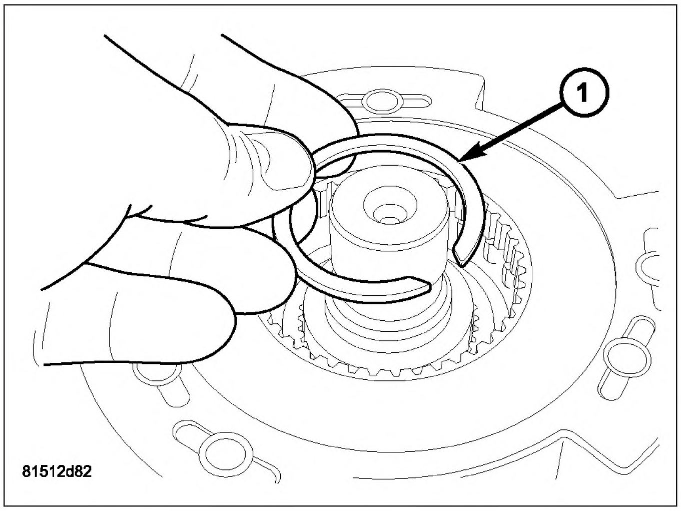
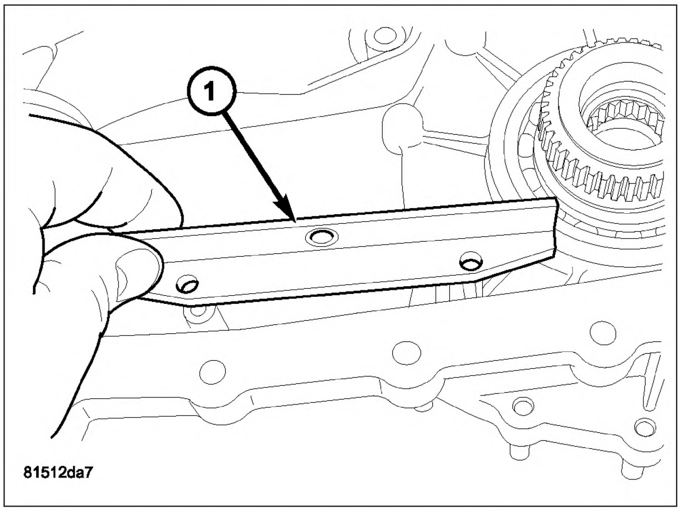
81512d87

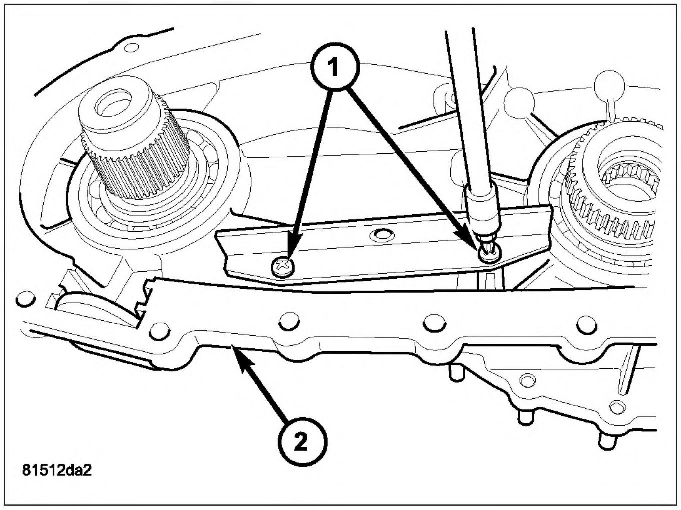
16. Install the differential snap-ring (1).



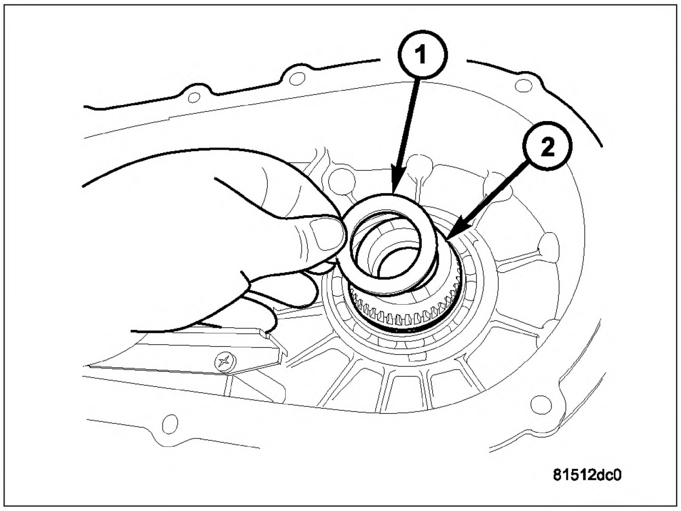
17. Install the drive chain guide (1) onto the transfer case.



18. Install the screws (2) to hold the chain guide rail (1) to the front housing. Tighten the screws to 5-8 N·m (44-71 in.lbs.).


1
2
81512da2

19. Install the input gear thrust washer (1) onto the input gear (2).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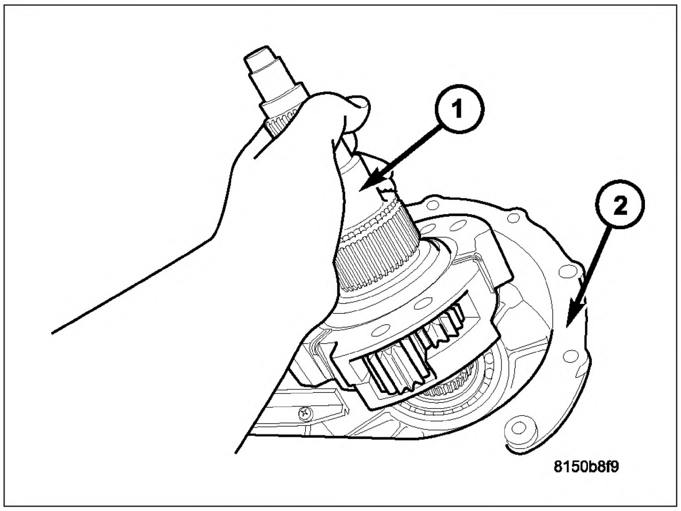
81512dc0

20. Install the mainshaft and differential assembly (1) into the front housing (2) and input gear.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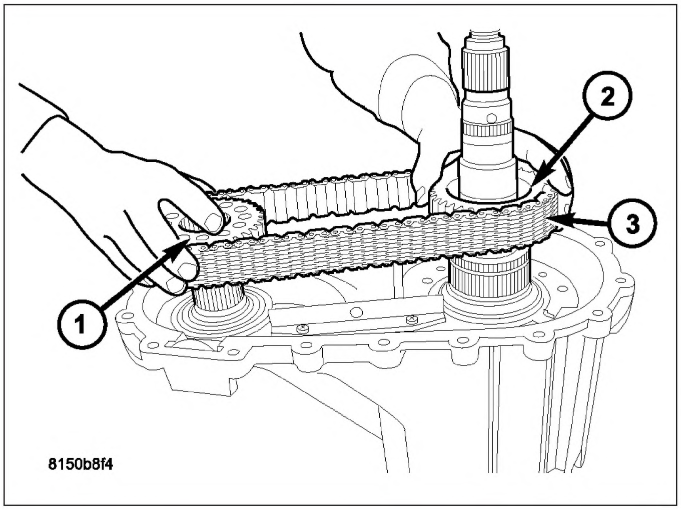
2
8150b8f9

21. Install the front drive sprocket (1), mainshaft drive sprocket (2), and drive chain (3) as one.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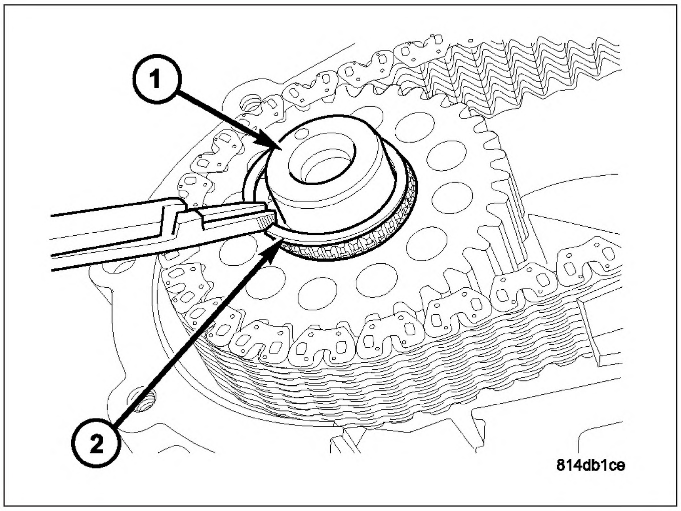
3
1
8150b8f4

22. Install the front output shaft (1) drive sprocket retaining ring (2).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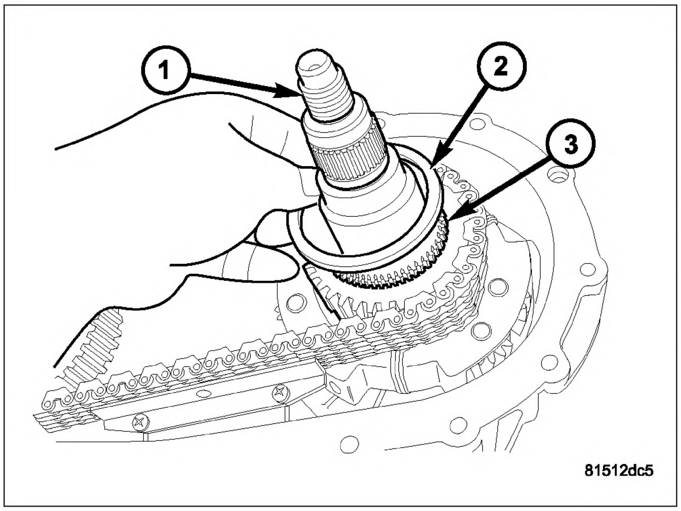
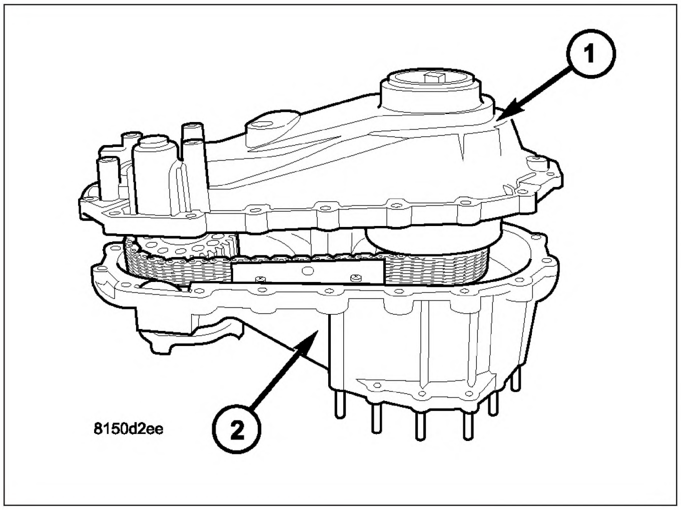
814db1ce

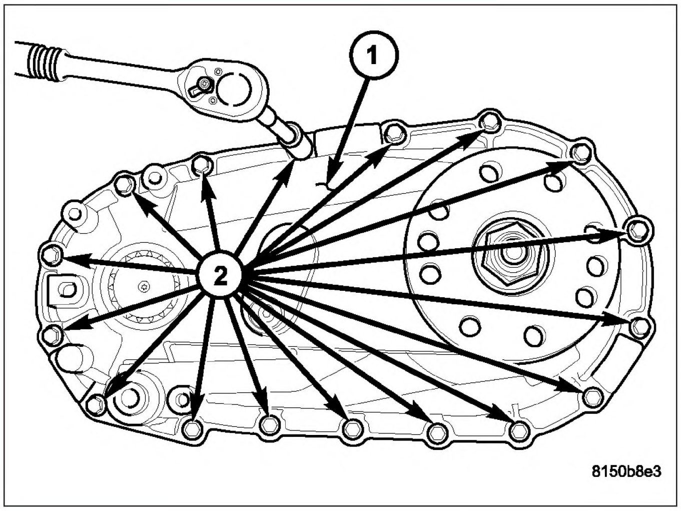
23. Install the mode hub spacer (2)onto the output shaft (1) and the mode hub (3).
24. Install the mainshaft drive sprocket retaining ring onto the mainshaft.



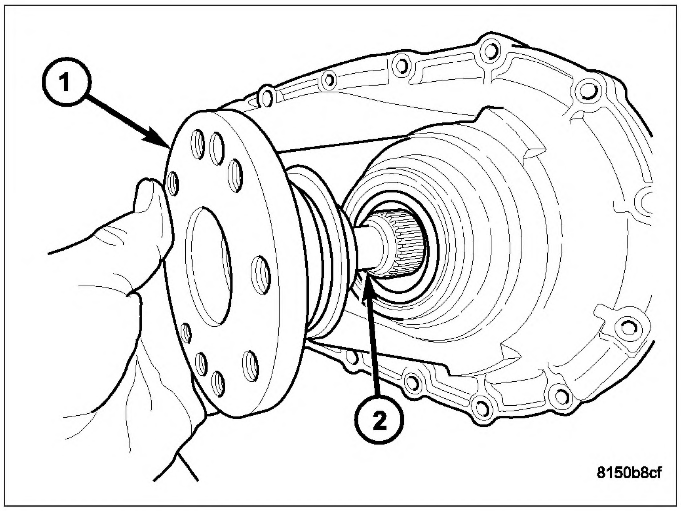
25. Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of front case. Keep sealer bead width to maximum of 3/16 inch. Do not use excessive amount of sealer as excess will be displaced into case interior.
26. Install the rear housing (1) onto the front housing (2).



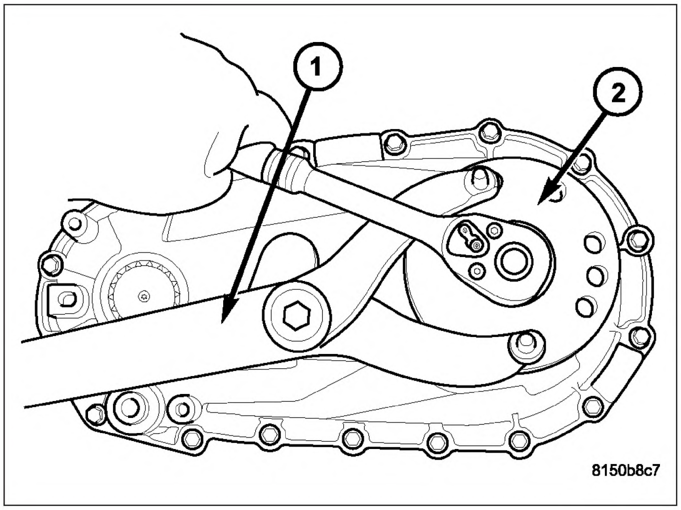
27. Install the bolts (2) to hold the rear housing (1) to the front housing (3). Tighten the bolts to 25-28 N·m (18.5-20.5 ft.lbs.).



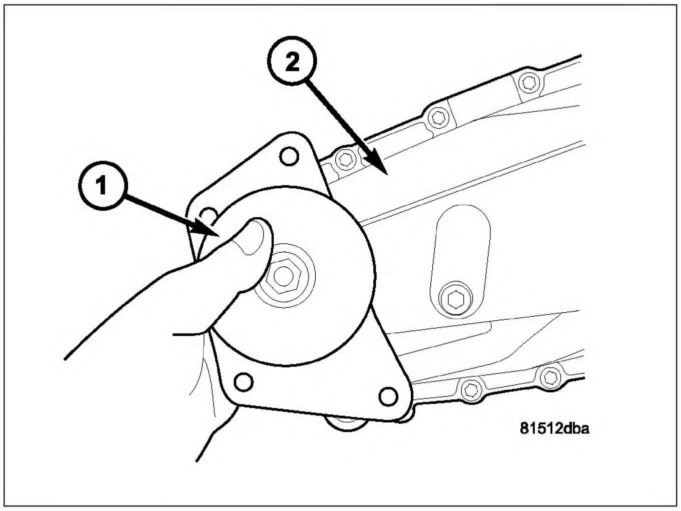
28. Install a new rear output shaft seal into the rear housing with Installer C-3972A.
29. Install the rear output shaft flange (1) onto the output shaft (2).



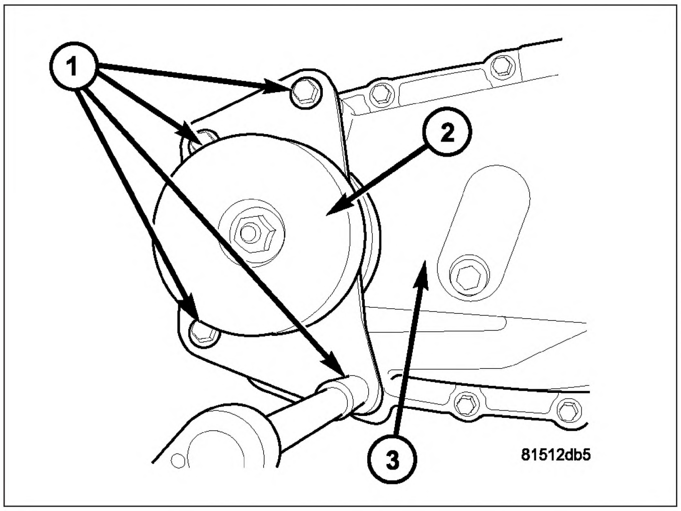
30. Using Holder C-3281 (1), install the rear companion flange (2) nut. Tighten the bolts to 122-176 N·m (90-130 ft.lbs.).



31. Install the transfer case dampner (1) onto the rear housing (2).

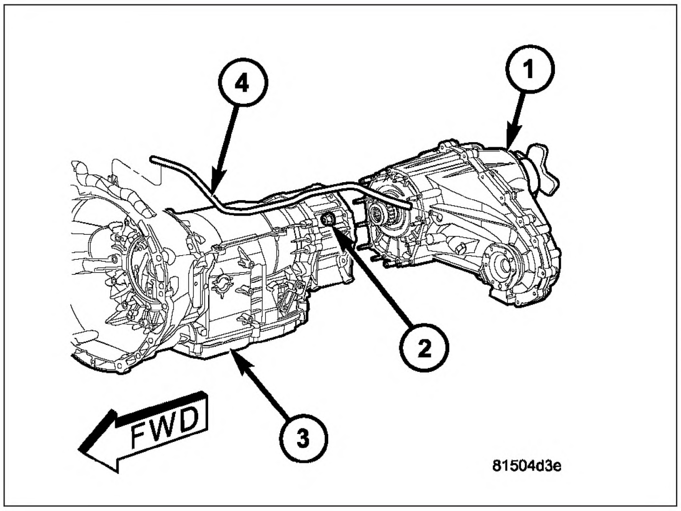


32. Install the bolts (1) to hold the dampner (2) to the rear housing (3). Tighten the bolts to 25-28 N·m (18.5-20.5 ft.lbs.).

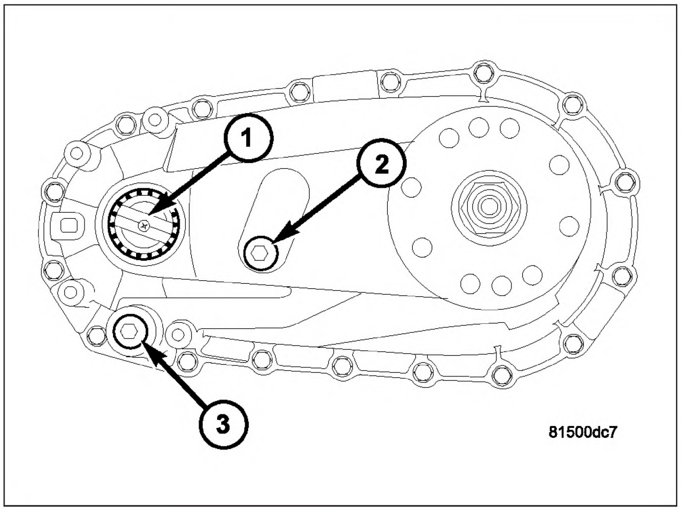


INSTALLATION

1. Mount transfer case on a transmission jack.
2. Secure transfer case to jack with chains.
3. Position transfer case under vehicle.
4. Align transfer case (1) and transmission (3) shafts and install transfer case onto the transmission.
5. Install and tighten transfer case attaching nuts (2) to 35 N·m (26 ft. lbs.) torque.
6. Connect front propeller shaft and install rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)



7. Fill transfer case with correct fluid. Check transmission fluid level. Correct as necessary.
8. Install the transfer case fill plug (1). Tighten the plug to 20-34 N·m (15-25 ft.lbs.).
9. Install rear crossmember and skid plate, if equipped. Tighten crossmember bolts to 41 N·m (30 ft. lbs.) torque.
10. Remove transmission jack and support stand.
11. Lower vehicle and verify transfer case shift operation.



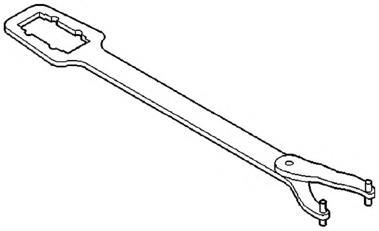
SPECIFICATIONS

TRANSFER CASE - NV140

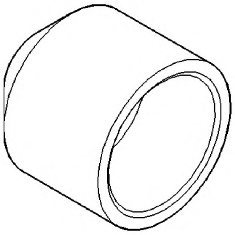
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, crossmember	41-47	30.2-34.7	-
Plugs, drain/fill	20-34	15-25	-
Bolts, case half	25-28	18.5-20.5	-
Nut, companion flange	122-176	90-130	-
Nuts, T-case mount stud	33-41	24.3-30.2	-

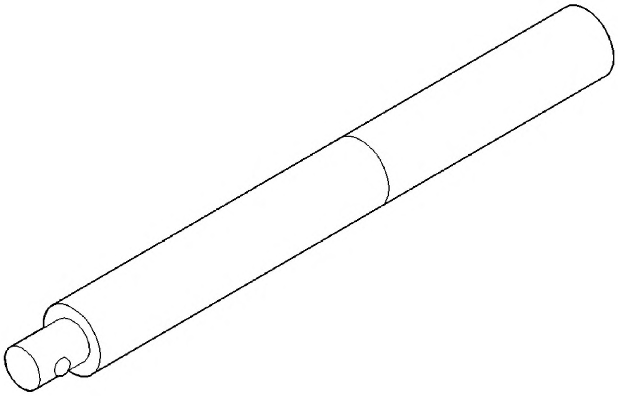
SPECIAL TOOLS - NV140



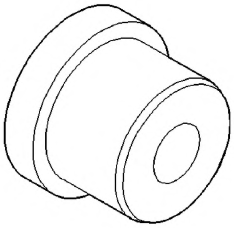
Holder, Flange - C-3281



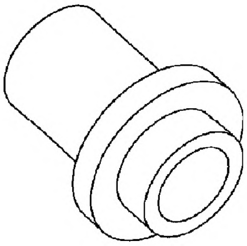
Installer, Seal - C-3972A



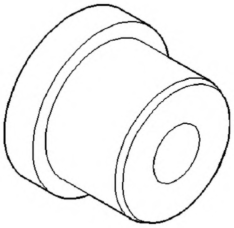
Handle, Universal - C-4171



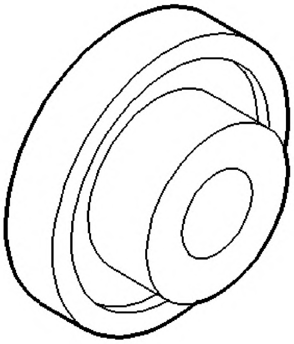
Installer, Bushing - 5066



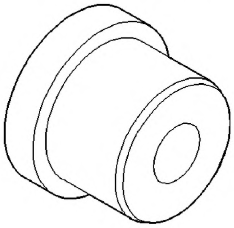
Installer, Seal - 6560



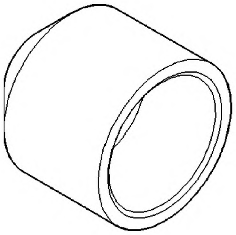
Installer - 7829A



Installer - 8152



Installer - 8693A



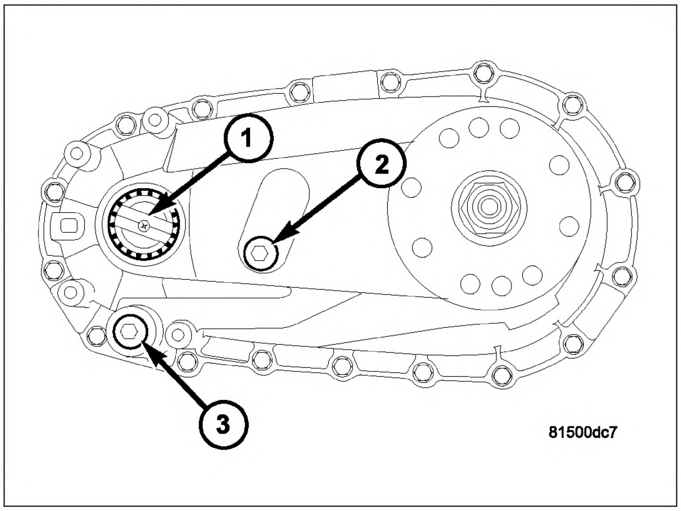
Installer, Seal - 9672

FLUID

STANDARD PROCEDURE - FLUID DRAIN/REFILL

The fill (2) and drain (3) plugs are both in the rear case.

1. Raise vehicle.
2. Position drain pan under transfer case.
3. Remove drain and fill plugs and drain lubricant completely.
4. Install drain plug. Tighten plug to 20-34 N·m (15-25 ft. lbs.).
5. Remove drain pan.
6. Fill transfer case to bottom edge of fill plug opening with the required fluid. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION)
7. Install and tighten fill plug to 20-34 N·m (15-25 ft. lbs.).
8. Lower vehicle.



SEAL-FRONT OUTPUT SHAFT

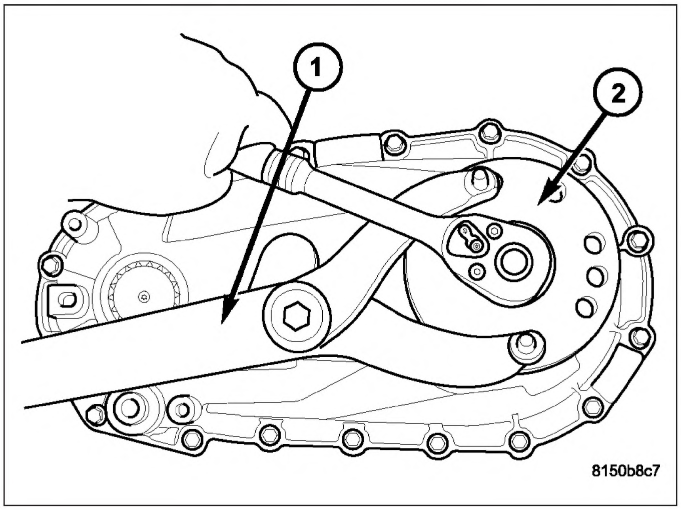
REMOVAL

The front output shaft seal cannot be serviced in the vehicle. The transfer case must be disassembled to remove the front output shaft and seal.

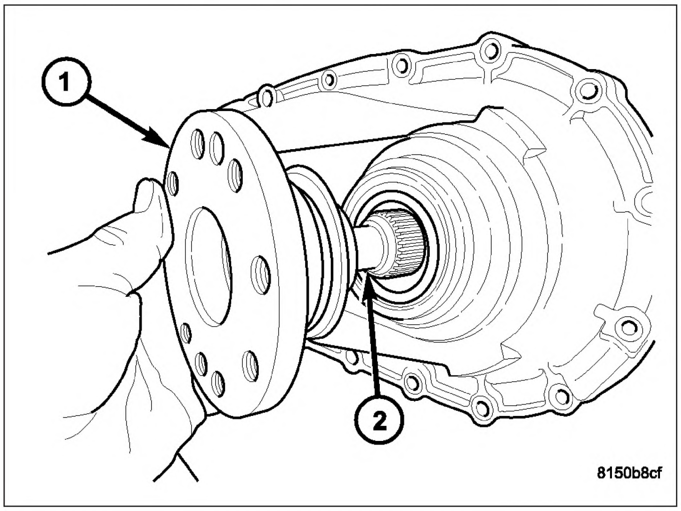
SEAL-REAR OUTPUT SHAFT

REMOVAL

1. Remove the rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
2. Using Holder C-3281 (1), remove the rear companion flange (2) nut.

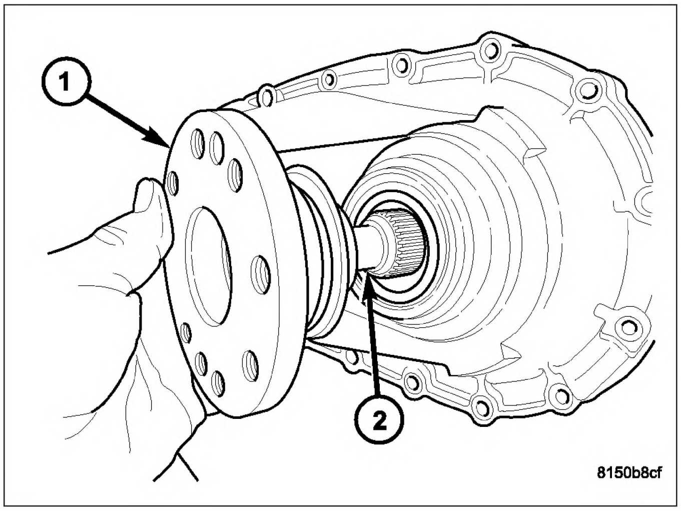


3. Remove the rear output shaft flange (1) from the output shaft (2). If necessary, use a suitable 2 or 3 jaw puller to remove the output shaft flange.
4. Remove the rear output shaft seal with a suitable pry tool or a screw mounted in a slide hammer.

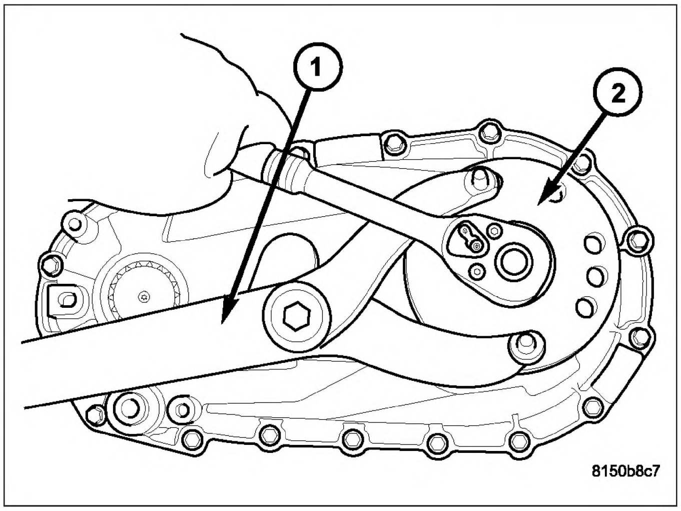


INSTALLATION

1. Install a new rear output shaft seal into the rear cover with Installer C-3972A.
2. Install the rear output shaft flange (1) onto the output shaft (2).



3. Using Holder C-3281 (1), install the rear companion flange (2) nut. Tighten the bolts to 122-176 N·m (90-130 ft.lbs.).
4. Install the rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/ PROPELLER SHAFT - REMOVAL)
5. Check the transfer case fluid level. (Refer to 21 - TRANSMISSION/TRANSFER CASE/FLUID - STANDARD PROCEDURE) Correct as necessary.



TRANSFER CASE - NV245 - SERVICE INFORMATION

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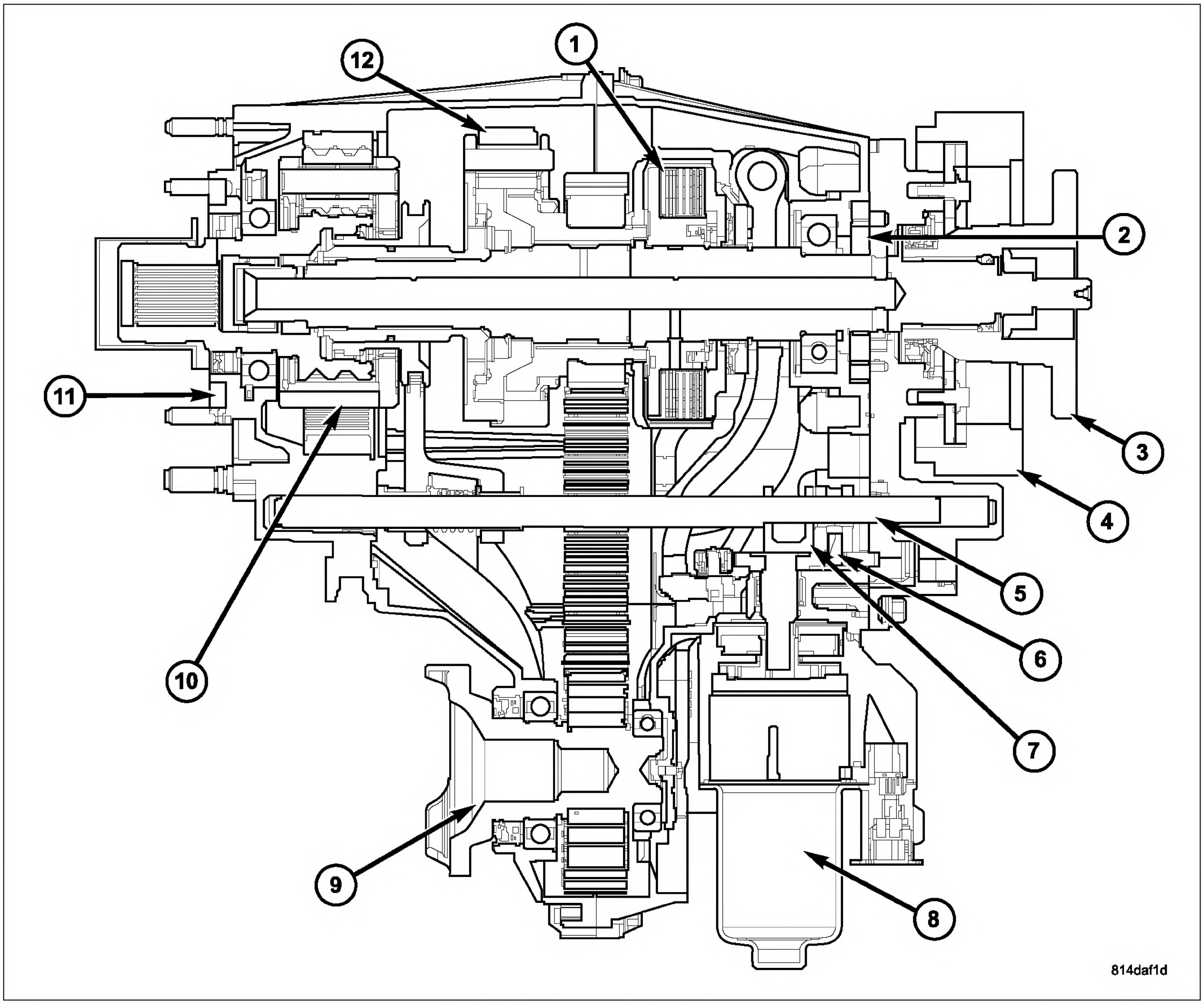
TRANSFER CASE - NV245 - SERVICE INFORMATION

DESCRIPTION



NV245 Transfer Case

1 - CLUTCH ASSEMBLY
2 - OIL PUMP
3 - REAR OUTPUT FLANGE
4 - DAMPER
5 - ROLL PIN
6 - SECTOR ROLLER
7 - ANTI-ROTATION BRACKET
8 - SHIFT MOTOR AND MODE SENSOR
9 - FRONT OUTPUT SHAFT AND FLANGE
10 - LOW RANGE PLANETARY
11 - INPUT SEAL
12 - DIFFERENTIAL

The NV245 transfer case provides Full-Time Active Four-Wheel Drive for optimum traction in a wide range of conditions and is used in Quadra-Trac® II and Quadra-Drive® II systems. The transfer case center differential distributes torque 48 percent to the front axle and 52 percent to the rear axle along with an electronically controlled clutch pack that is coupled to the center differential for torque biasing. The NV245 electronics provide an active system because it can anticipate and prevent slip. The transfer case can redistribute 100 percent of torque to the front or rear axle, depending on need. For added traction when traversing steep grades, rough terrain or extremely slippery/poor traction surfaces at low speeds, the transfer case can be switched into 4WD Low, which multiplies engine torque 2.72 times and locks the clutch pack for maximum traction at all times. The Neutral mode allows the vehicle to be flat towed behind another vehicle.

Electric shifting is accomplished with a T-handle transfer case lever in the shifter assembly to provide simplified operation and positive engagement of 4 Low. A pushpin button is provided to shifting the transfer case into NEUTRAL.

OPERATION

ACTIVE TRANSFER CASE CONTROLS

Controls for the NV245 transfer case active clutch (torque biasing device) are located in the Final Drive Control Module (FDCM) and communicated on the CAN C bus. The FDCM monitors wheel speeds at the front and rear axles to detect wheel slippage. A complete vehicle dynamics model calculates slip at each tire for given vehicle-operating conditions. The clutch pack in the transfer case is engaged to minimize the speed difference between the front and rear axle, resulting in torque transfer to the axle with higher traction. The electronically controlled wet clutch pack uses an electric motor to actuate a sector plate. The sector plate actuates a clutch lever that applies normal force to the multi-disc wet clutch pack bridging the differential. The clutch discs are alternately splined to the front and rear driveshafts. When normal force is applied to this clutch pack, torque is transferred to equalize speed differences between front and rear axles.

TRANSFER CASE MODES

The transfer case operates in active full-time four-wheel drive (4 High Full-Time) unless the driver chooses 4-wheel drive Low or Neutral. A chrome T-handle momentary contact lever in the shifter assembly labeled 4WD Low allows the driver to select 4WD Low when a set of conditions is met. A separate Neutral pushbutton switch located beside the 4WD Low T-Handle is used by the operator to enter Neutral when a set of conditions is met. An indicator located in the instrument cluster indicates when 4WD Low is active. There is an indicator next to the Neutral button to indicate Neutral position as well as a message in the EVIC in the cluster that states “4WD SYSTEM IN NEUTRAL.”

ELECTRIC SHIFT MECHANISM

All of the switching functions use resistive multiplexing to tell the Final Drive Control Module (FDCM) which mode to select. The FDCM operates an electric motor that shifts the transfer case. The FDCM obtains additional data necessary for operation and to provide diagnostic outputs via the CAN network. The electric shift mechanism helps protect the transfer case against internal damage by preventing a shift to 4WD Low range unless the vehicle speed is below 3 mph (5 km/hr) and the transmission is in Neutral. To shift the transfer case into Neutral for towing the vehicle, the pushpin button next to the range shifter must be depressed with a pen and a set of shift conditions must be met.

Through communication with various modules over the CAN network, the FDCM knows vehicle speed, automatic transmission position, engine run status, ignition status and brake switch position, some or all of which are required to determine whether shifts between 4WD Low, 4WD High or Neutral will be allowed. Diagnostic outputs include fault codes and the ability to “read” switch position and position sensor output. A warning message in the EVIC in the cluster indicates if a malfunction occurs in the electricshift system. A motor and encoder (position sensor) replace a lever on the shaft that shifts the transfer case. When a shift is called for, the motor turns the shaft until the sensor indicates that the correct angular position has been reached. To prevent the transfer case from making unintended shifts, the switch must be in position for 0.25 seconds before a shift will take place. A shift can take up to 1-2 seconds from the time that the switch is moved for full travel. If the shift is not completed in the appropriate time, the module will repeat the action up to five times. Misalignment of the gears in the transfer case may block a shift, in which case the sensor will detect this; the motor will then reverse and try again to complete the shift. Blockage can occur if the vehicle is stationary when the shift is initiated, but if the vehicle is moving as recommended when the shift is initiated, blockage is unlikely. If the shift is not completed after five attempts, the cluster indicator will flash and the driver will have to return the switch to its former position and repeat the operation.

DIAGNOSIS AND TESTING

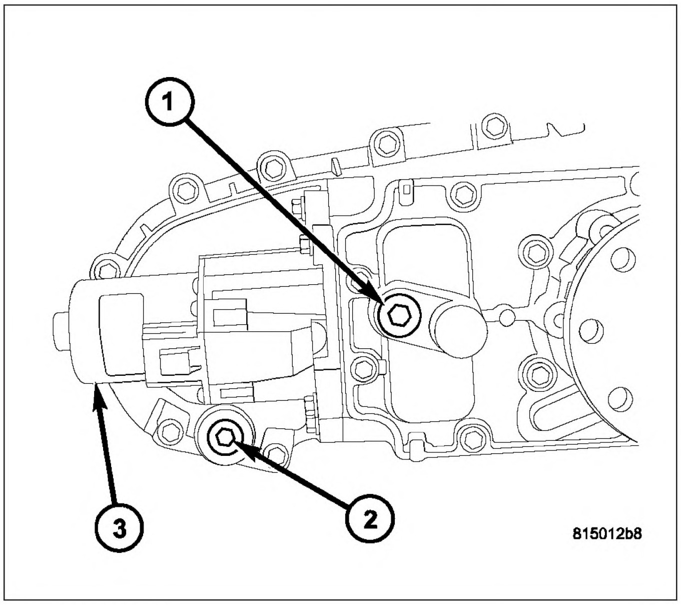
TRANSFER CASE - NV245

DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
Transfer case difficult to shift or will not shift into desired range.	1) Transfer case electronically controlled shift system malfunction.	1) Verify proper operation per the appropriate diagnostic manual.
	2) Insufficient or incorrect lubricant.	2) Drain and refill transfer case with the correct quantity of Mopar® ATF +4, Automatic Transmission Fluid.
	3) Internal transfer case components binding, worn, or damaged.	3) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	1) Insufficient or incorrect lubricant.	1) Drain and refill transfer case with the correct quantity of Mopar® ATF +4, Automatic Transmission Fluid.
	2) Internal transfer case components binding, worn, or damaged.	2) Repair or replace components as necessary.
Transfer case noisy while in, or jumps out of, 4LO.	1) Transfer case not completely engaged in 4LO position.	1) While rolling 2-3 MPH and the transmission in NEUTRAL, or the clutch depressed on vehicles equipped with a manual transmission, shift the transfer case to the AWD or 4LOCK position, and then back into the 4LO position.
	2) Range fork damaged, inserts worn, or fork is binding on the shift rail.	2) Repair or replace components as necessary.
	3) Low range gear worn or damaged.	3) Repair or replace components as necessary.
Lubricant leaking from transfer case seals or vent.	1) Transfer case overfilled.	1) Drain lubricant to the correct level.
	2) Transfer case vent closed or restricted.	2) Clean or replace vent as necessary.
	3) Transfer case seals damaged or installed incorrectly.	3) Replace suspect seal.

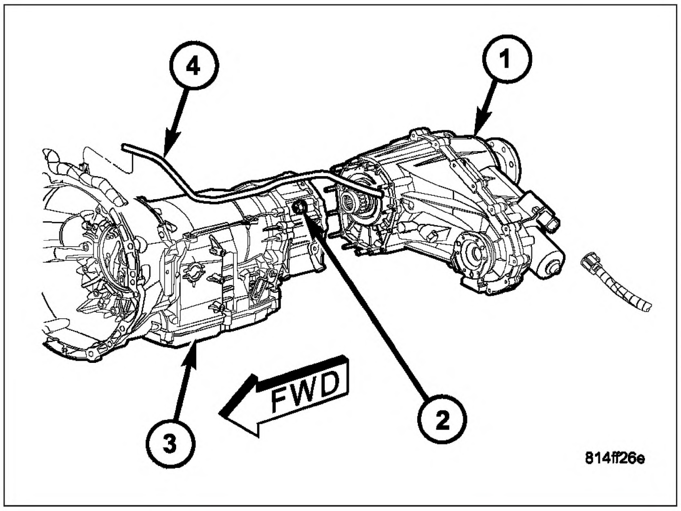
REMOVAL

1. Shift transfer case into NEUTRAL.
2. Raise vehicle.
3. Remove transfer case drain plug (2) and drain transfer case lubricant.



4. Support transmission (3) with jack stand.
5. Remove rear crossmember and skid plate, if equipped.
6. Disconnect front propeller shaft from transfer case at companion flange. Remove rear propeller shaft from vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

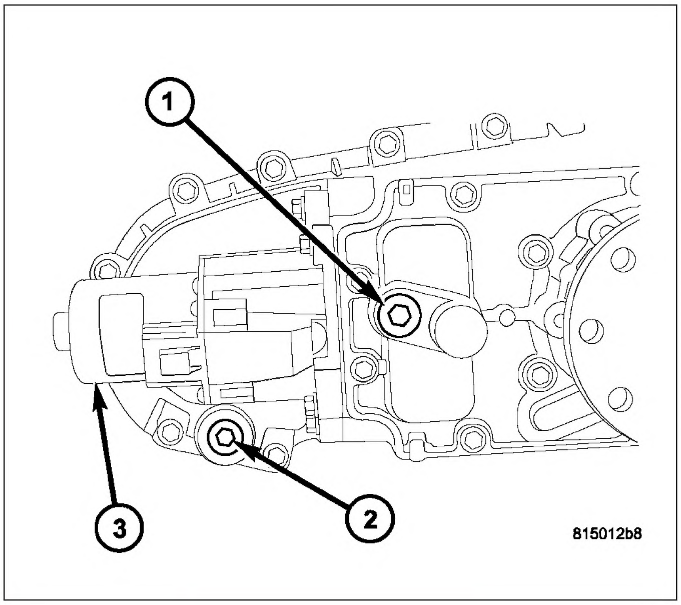
CAUTION: Do not allow propshafts to hang at attached end. Damage to joint can result.



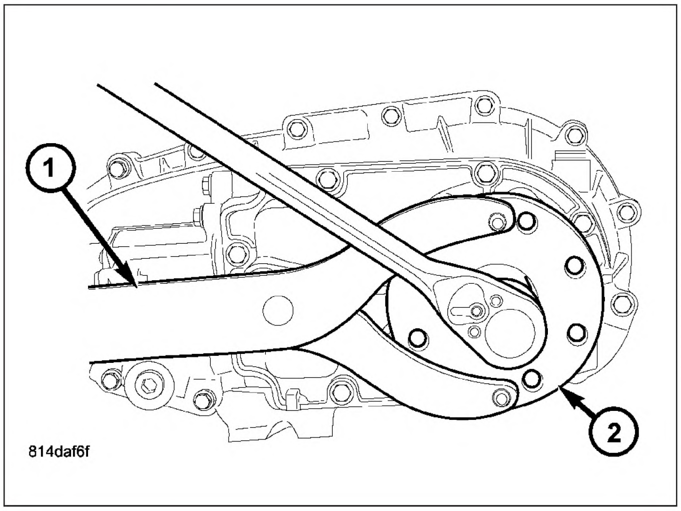
7. Disconnect the transfer case shift motor and mode sensor connector.
8. Disconnect transfer case vent hose (4).
9. Support transfer case (1) with transmission jack.
10. Secure transfer case to jack with chains.
11. Remove nuts (2) attaching transfer case to transmission.
12. Pull transfer case and jack rearward to disengage transfer case.
13. Remove transfer case from under vehicle.

DISASSEMBLY

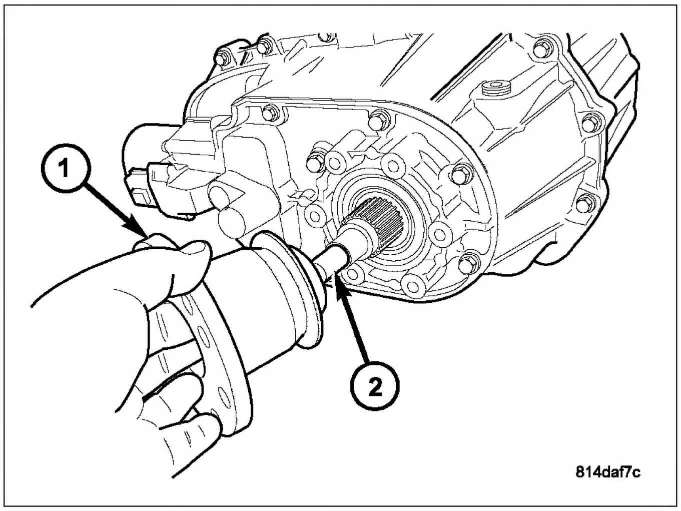
1. Place the transfer case in a shallow pan and remove the fill (1) and drain (2) plugs to drain the remainder of the fluid.



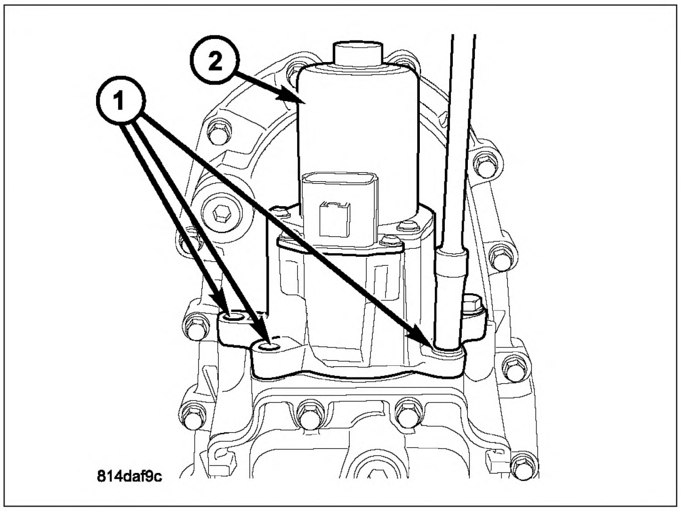
2. Using Holder C-3281 (1), remove the rear companion flange (2) nut.



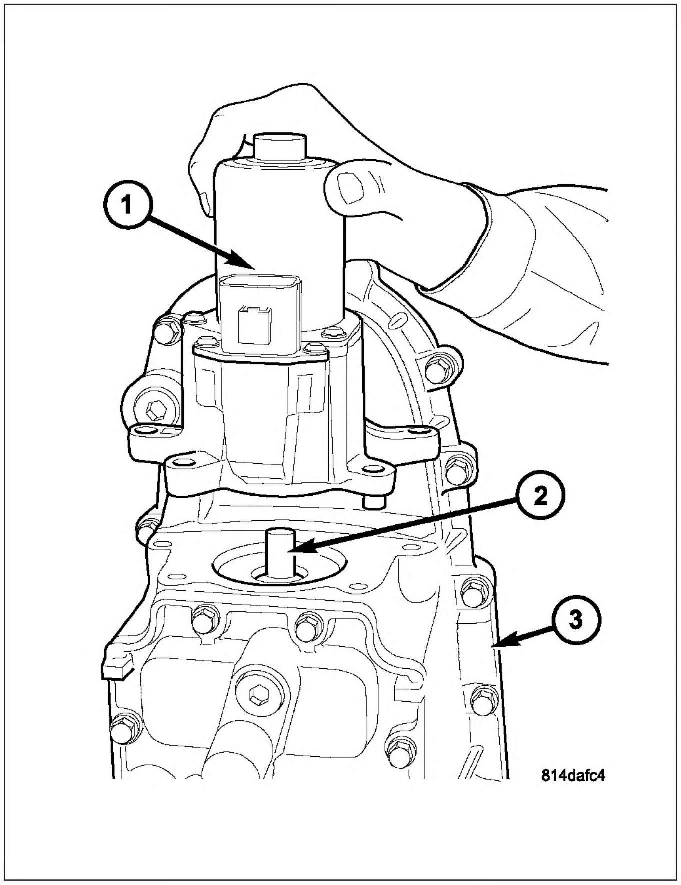
3. Remove the rear output shaft flange (1) from the output shaft (2). If necessary, use a suitable 2 or 3 jaw puller to remove the output shaft flange.



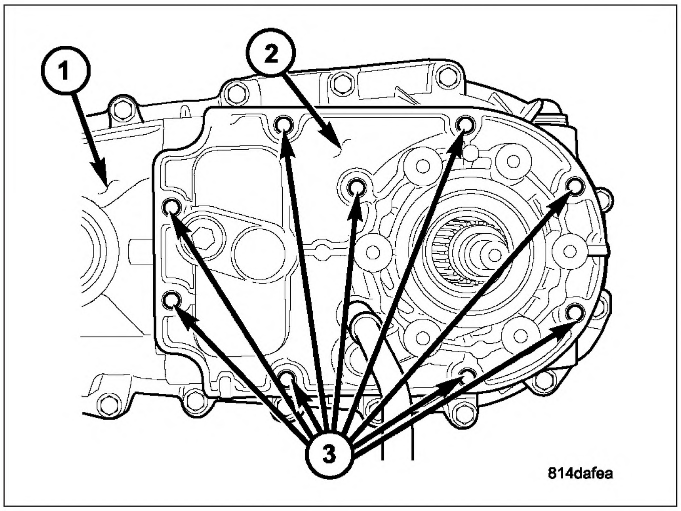
4. Remove the bolts (1) holding the shift motor and mode sensor assembly (2) to the transfer case.



5. Remove the shift motor and mode sensor assembly (1) from the shift sector (2) and the transfer case (3).



6. Remove the bolts (3) holding the rear cover (2) onto the rear housing (1).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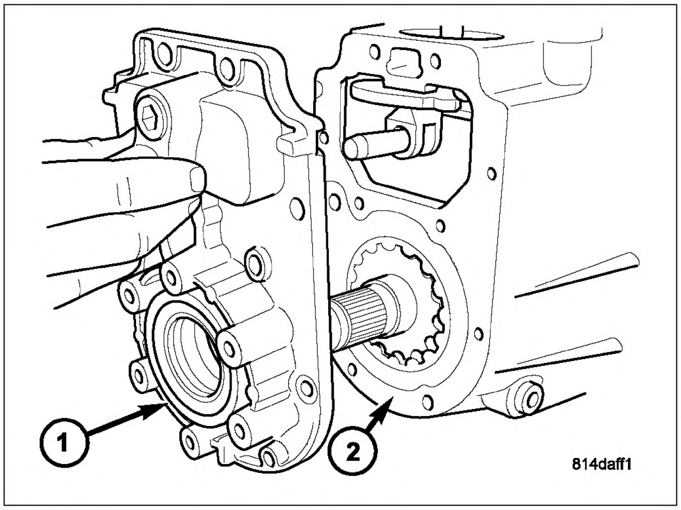
7. Remove the rear cover (1) from the rear housing (2).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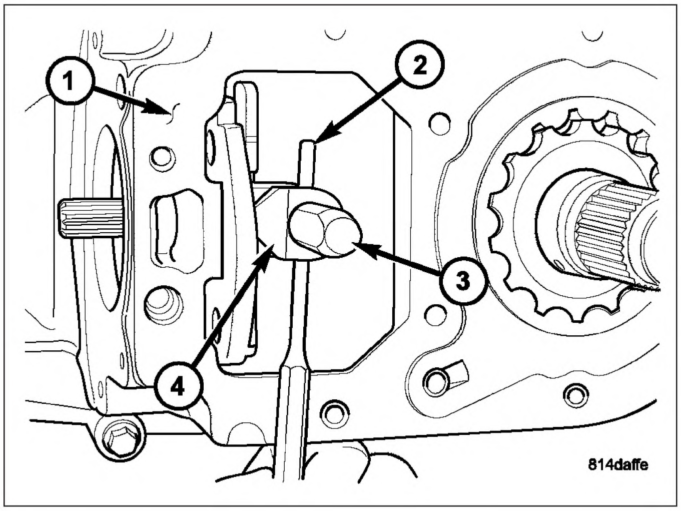
8. Using a suitable punch, remove the roll-pin (2) holding the sector roller (4) to the shift rail (3).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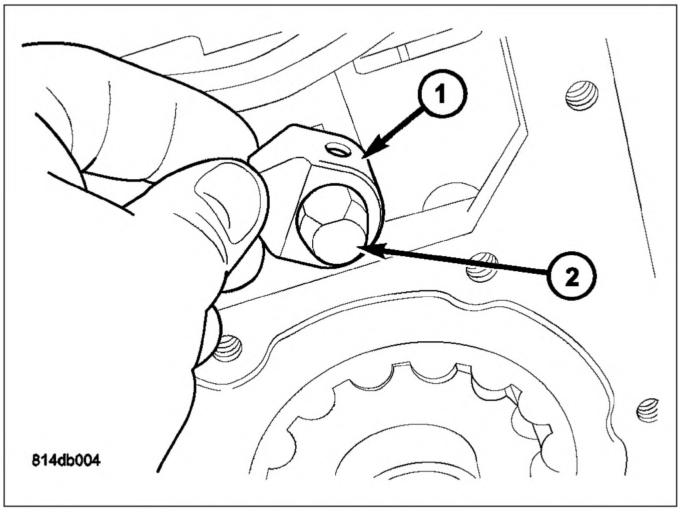
9. Remove the sector roller (1) from the shift rail (2).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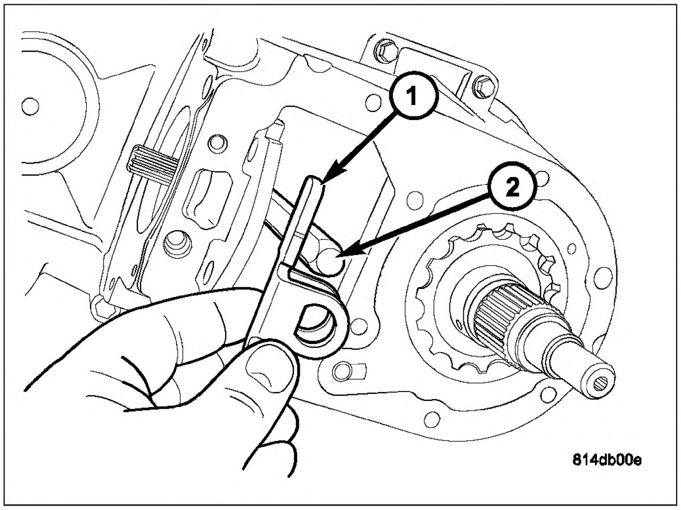
10. Remove the anti-rotation bracket (1) from the shift rail (2).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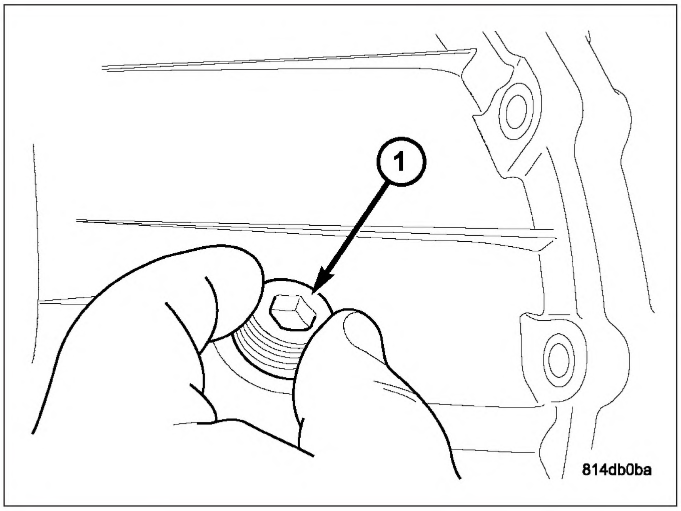
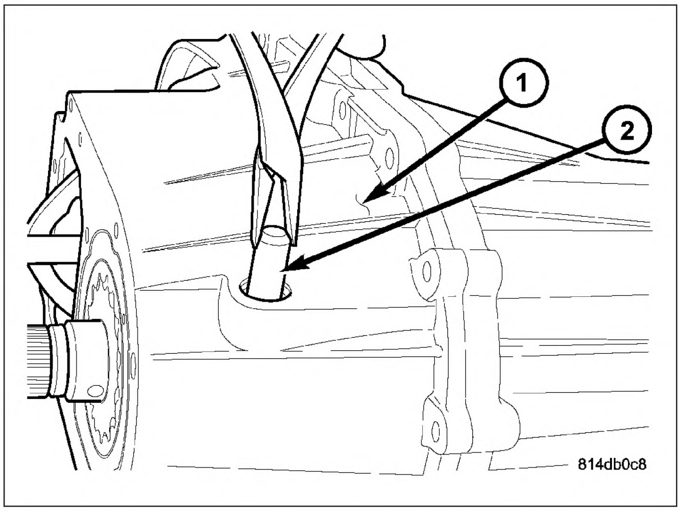
11. Remove the clutch lever rail plug (1) from the rear housing.



12. Remove the clutch lever rail (2) from the rear housing (1).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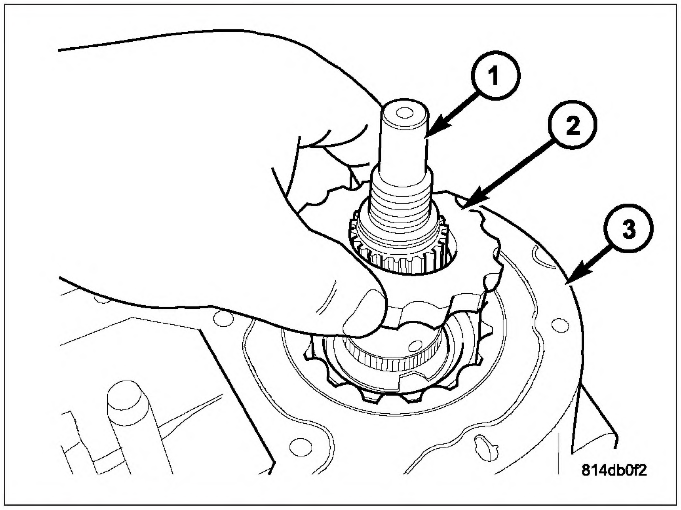
13. Remove the oil pump inner rotor (2) from the output shaft (1) and rear housing (3).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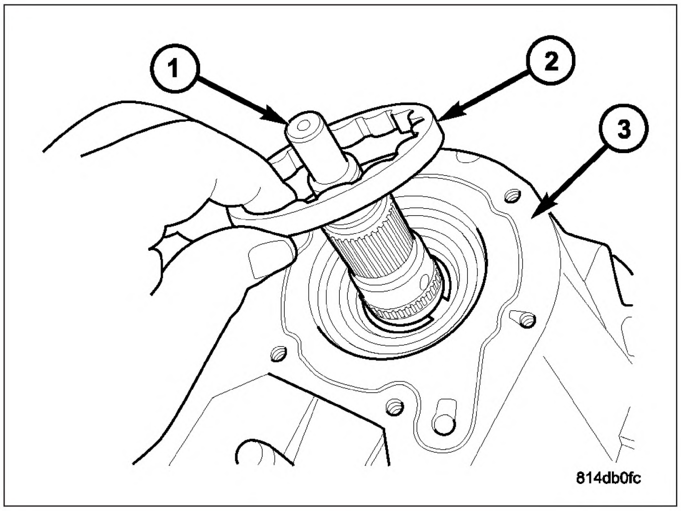
14. Remove the oil pump outer rotor (2) from the output shaft (1) and rear housing (3).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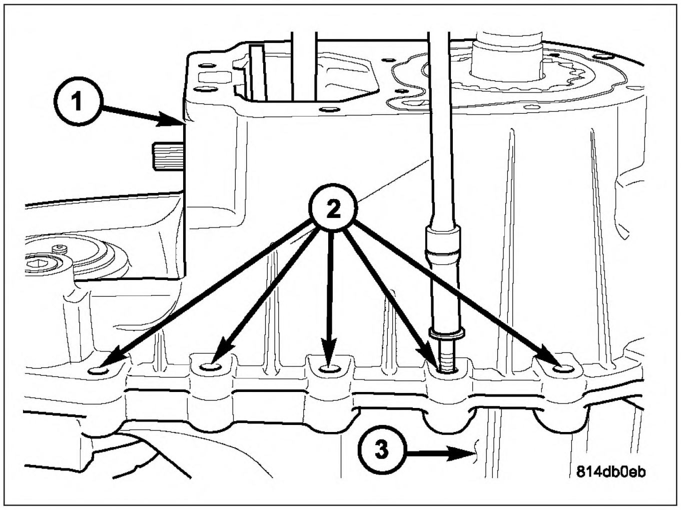
15. Remove the bolts (2) holding the rear housing (1) to the front housing (3).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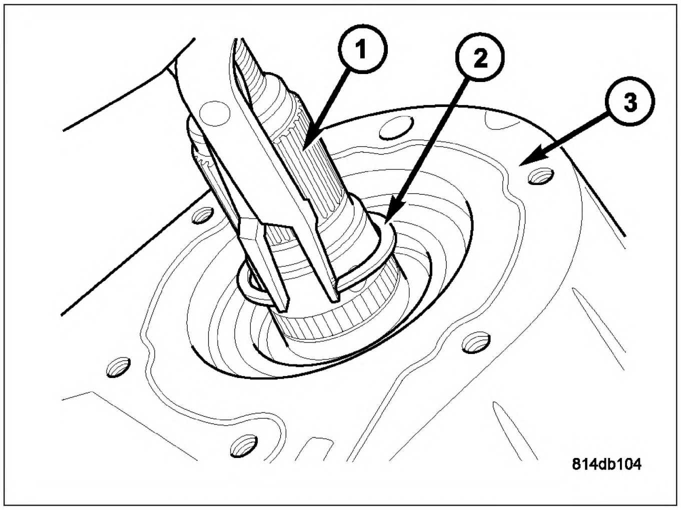
16. Remove the rear output shaft (1) retaining ring (2).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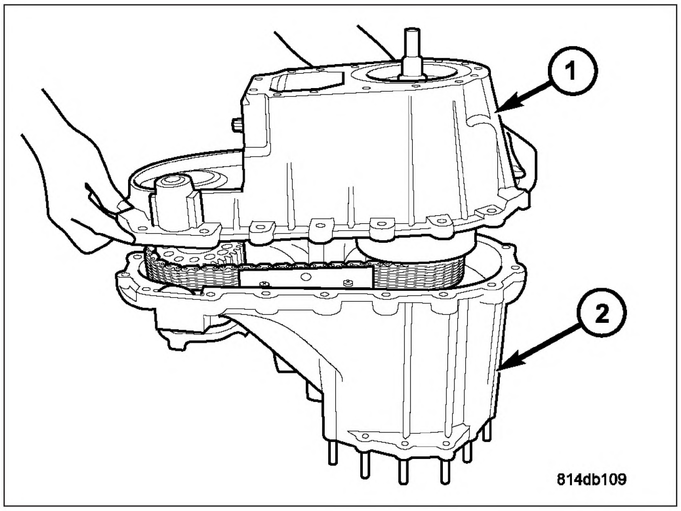
17. Remove the rear housing (1) from the front housing (2).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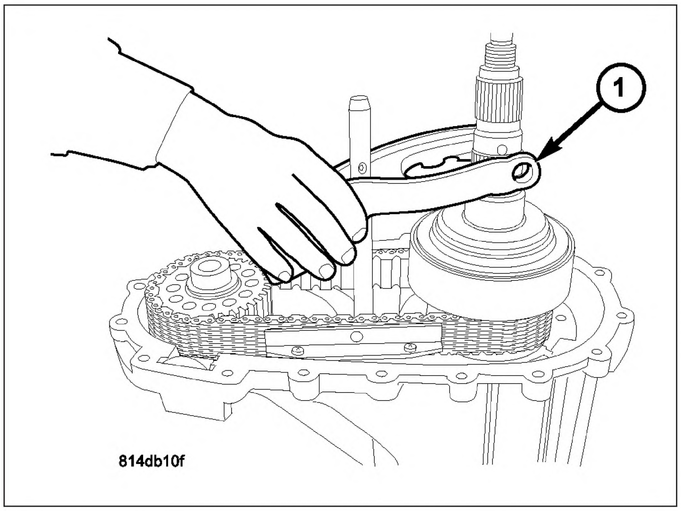
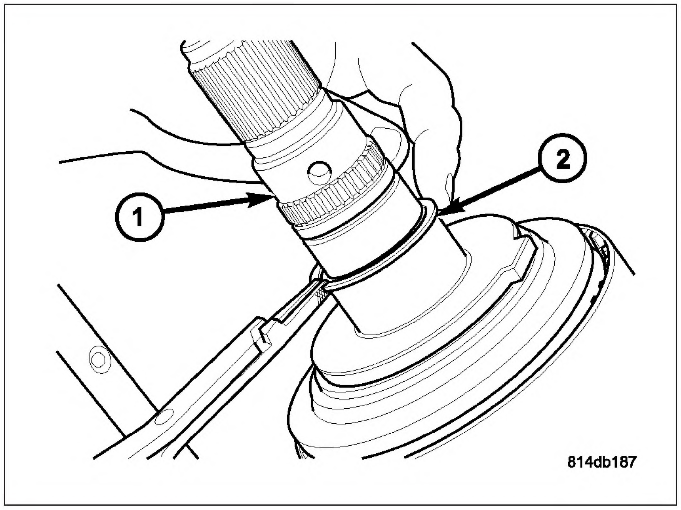
18. Remove the clutch lever assembly (1) from the mainshaft and shift rail.



19. Remove the thrust bearing support plate retaining ring (2) from the output shaft (1).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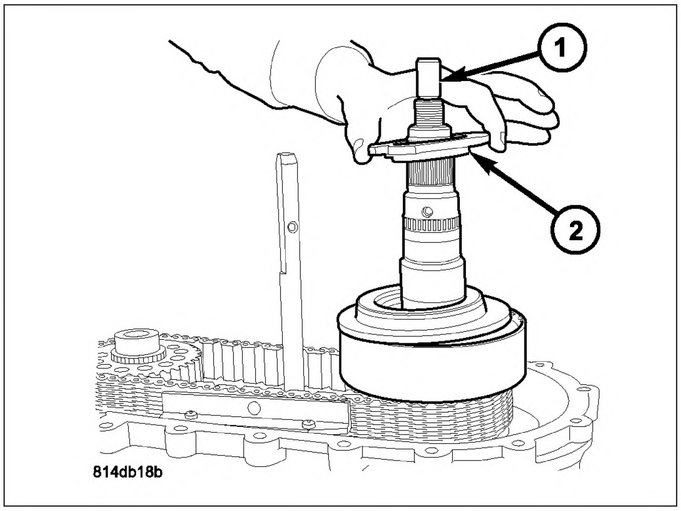
20. Remove the thrust bearing support plate (2) from the output shaft (1).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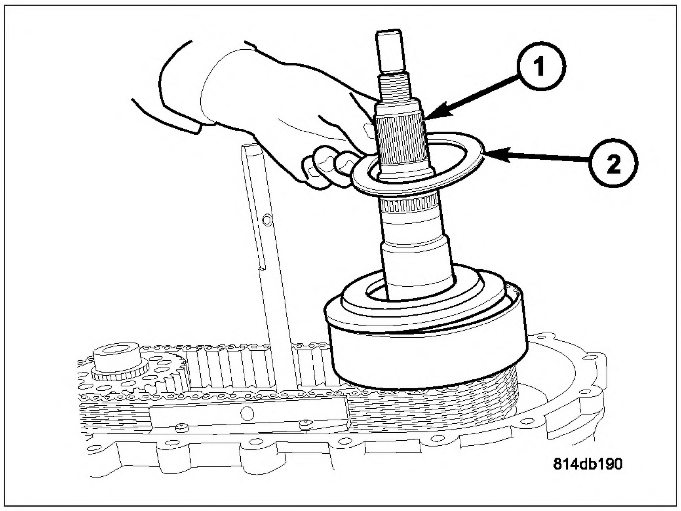
21. Remove the thrust bearing (2) from the output shaft (1).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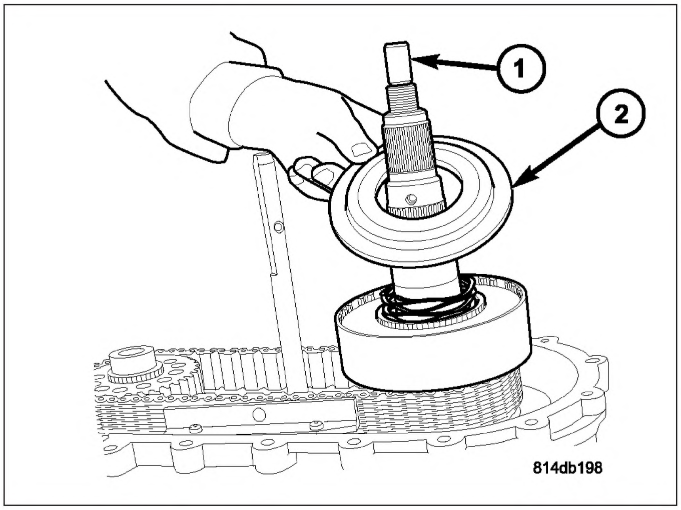
22. Remove the clutch pressure plate (2) from the output shaft (1) and clutch assembly.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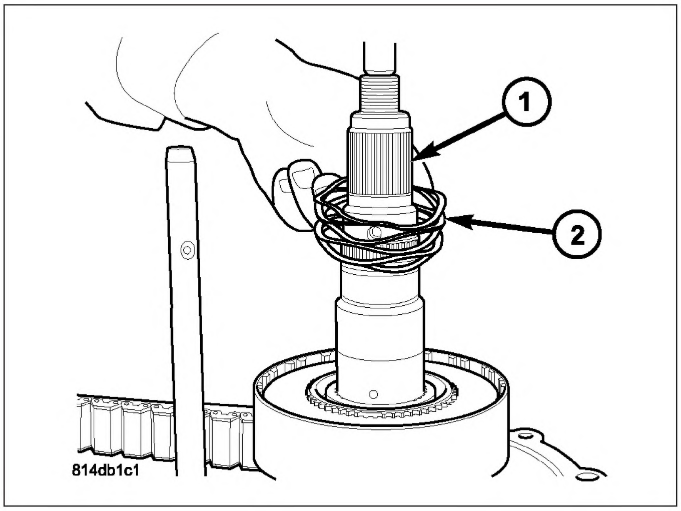
23. Remove the wave spring (2) from the output shaft (1).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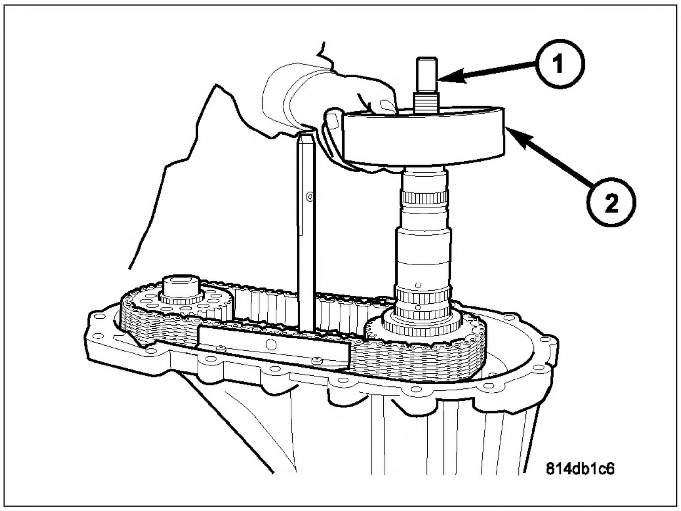
24. Remove the clutch assembly (2) from the output shaft (1).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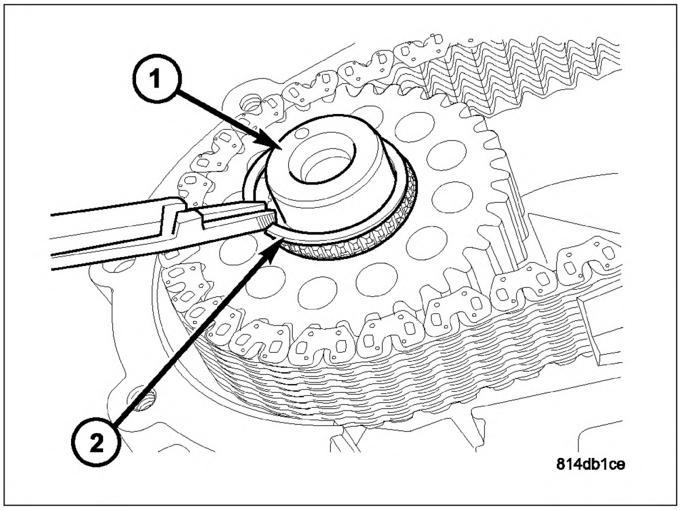
25. Remove the front output shaft (1) drive sprocket retaining ring (2).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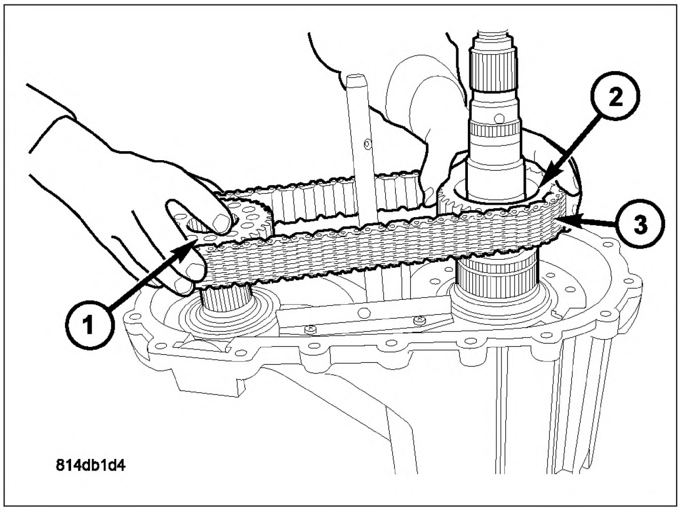
814db1ce

26. Remove the front drive sprocket (1), mainshaft drive sprocket (2), and drive chain (3) as one.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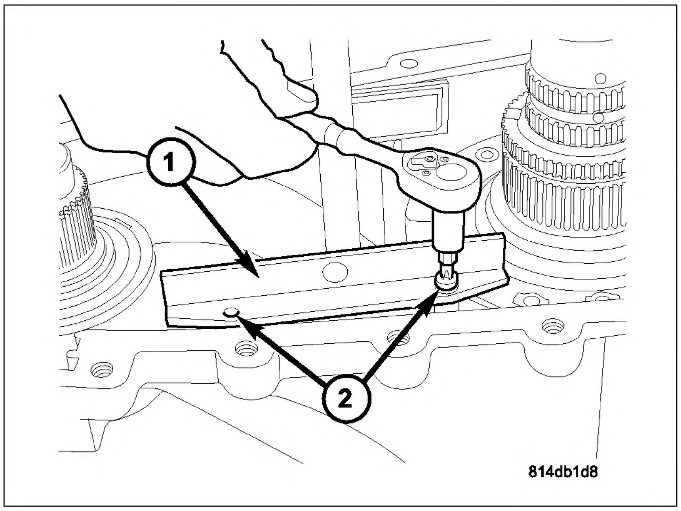
814db1d4

27. Remove the screws (2) holding the chain guide rails (1) to the front housing.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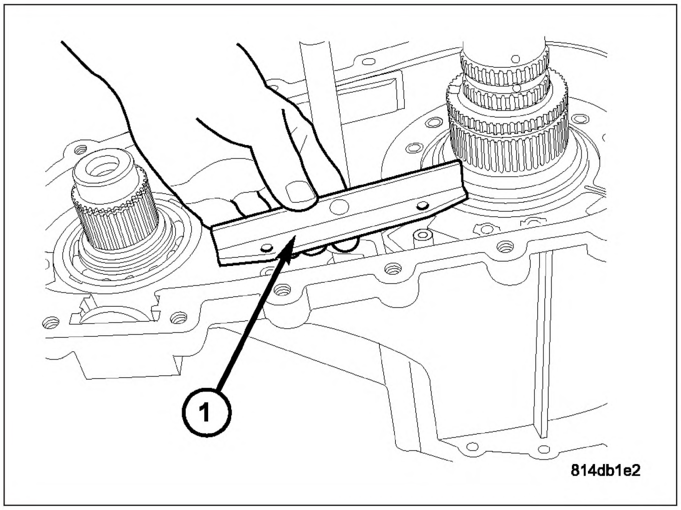
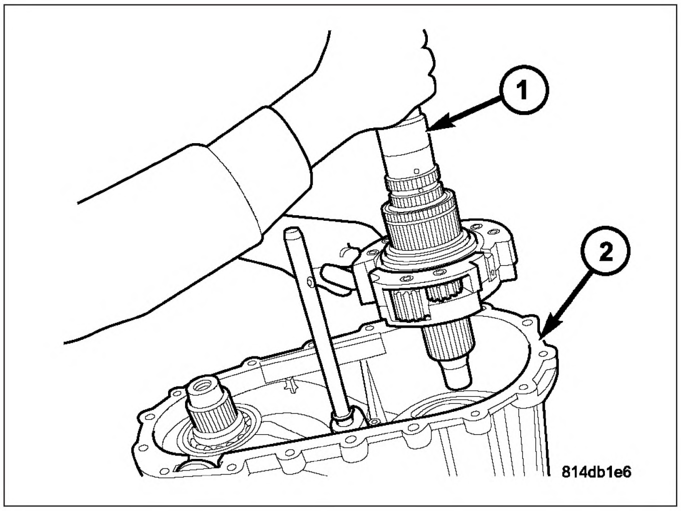
28. Remove the drive chain guides (1) from the transfer case.



29. Remove the mainshaft and differential assembly (1) from the front housing (2).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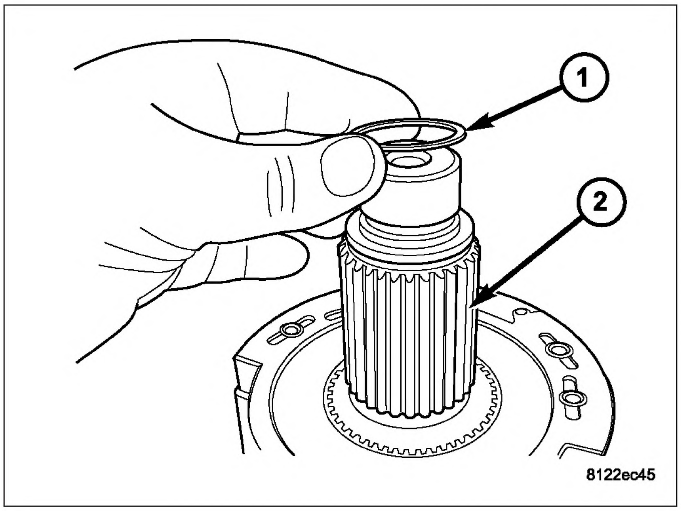
30. Remove intermediate clutch shaft (2) snap-ring (1).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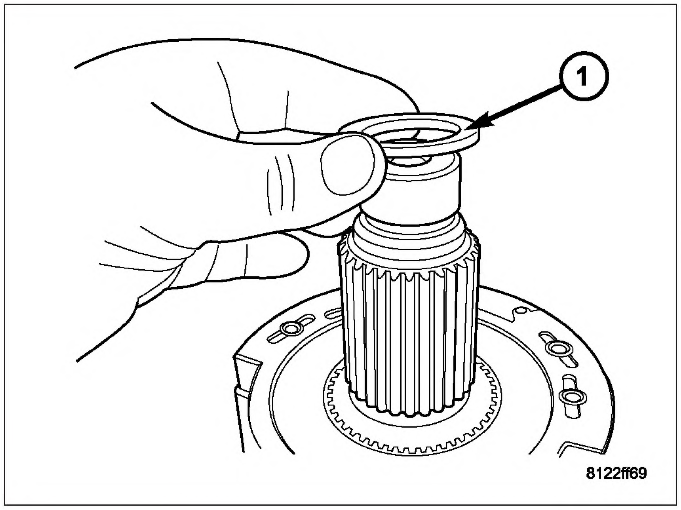
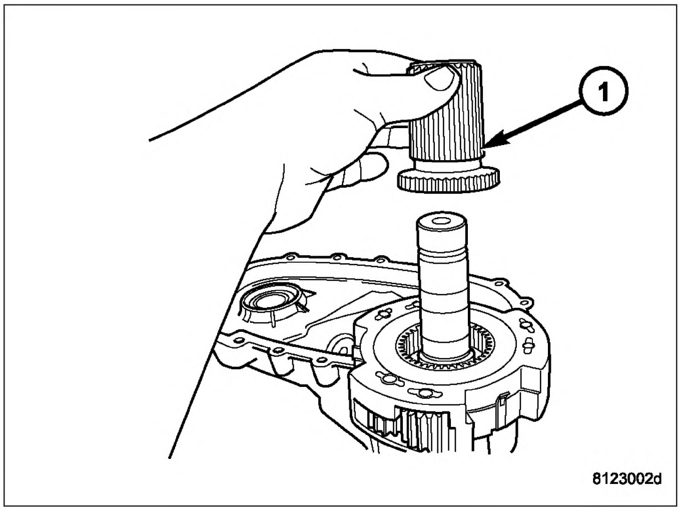
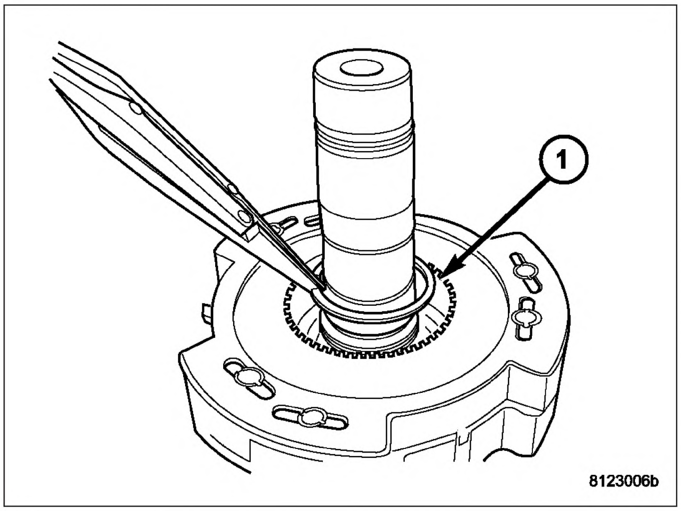
31. Remove the intermediate clutch shaft thrust ring (1).



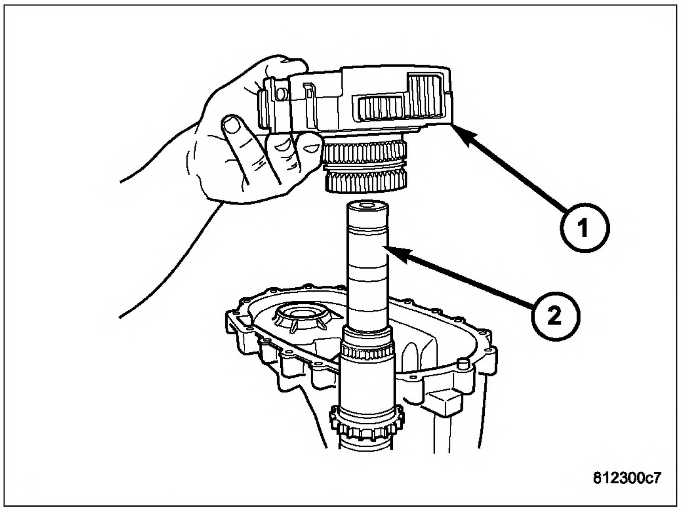
32. Remove the intermediate clutch shaft (1).



33. Remove the differential snap-ring (1).



34. Remove the differential assembly (1) from the mainshaft (2).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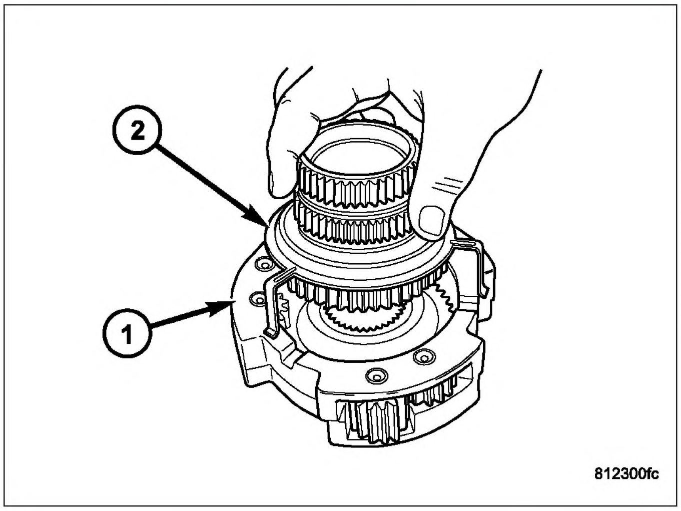
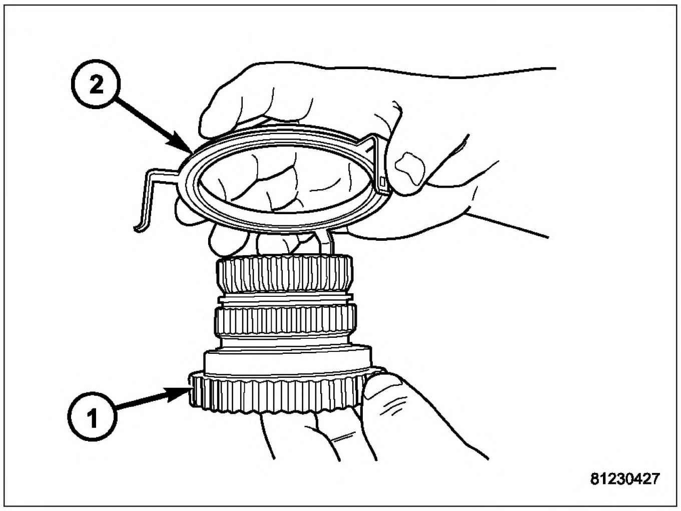
812300c7

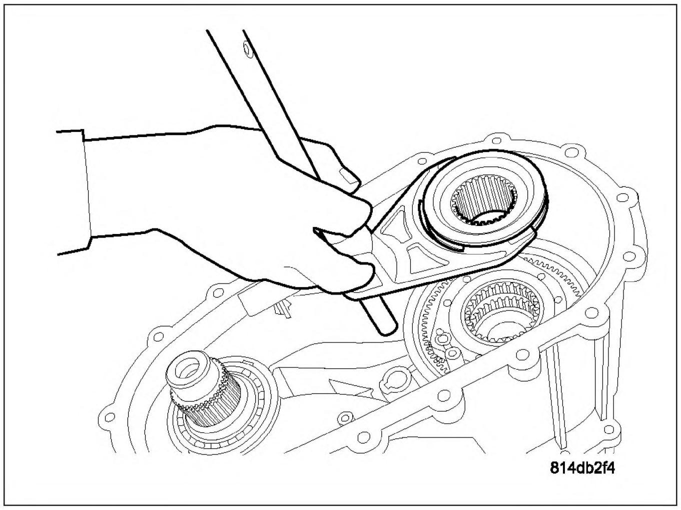
35. Remove the mode hub (2) and mode hub retainer from the differential assembly (1).


2
1
812300fc

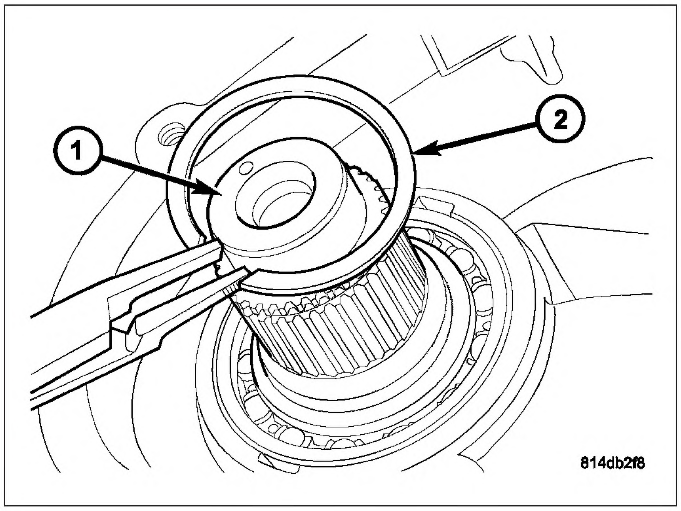
36. Remove the mode hub retainer (1) from the mode hub (2).


2
1
81230427

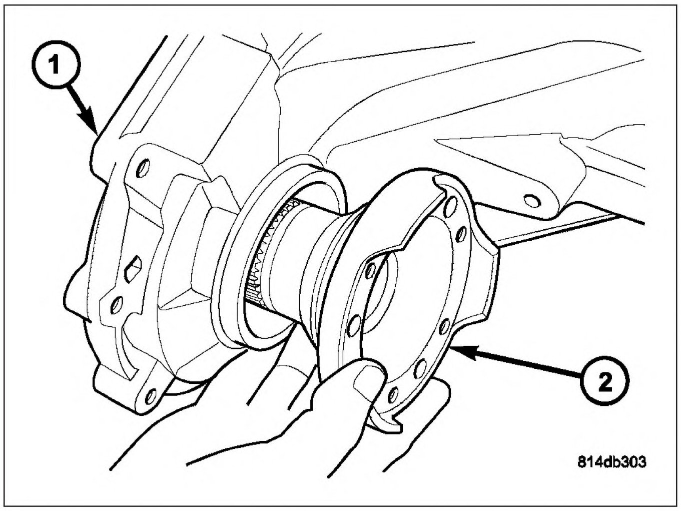
37. Remove the range fork (1) and range hub (2) as one.



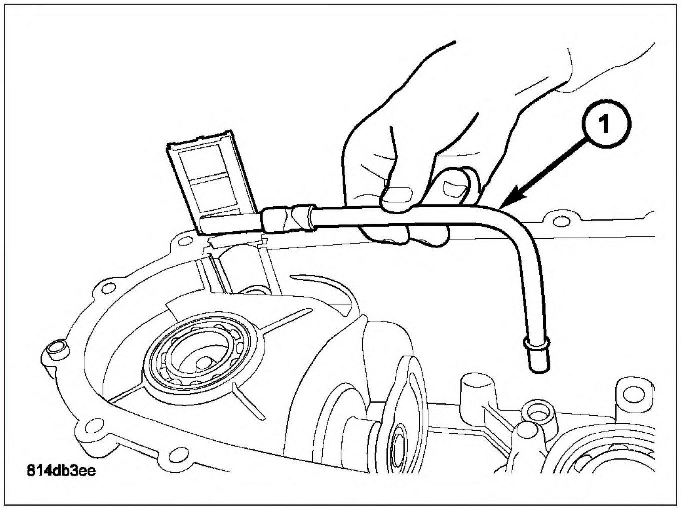
38. Remove the retaining ring (2) from the front output shaft (1).


1
2
814db2f8

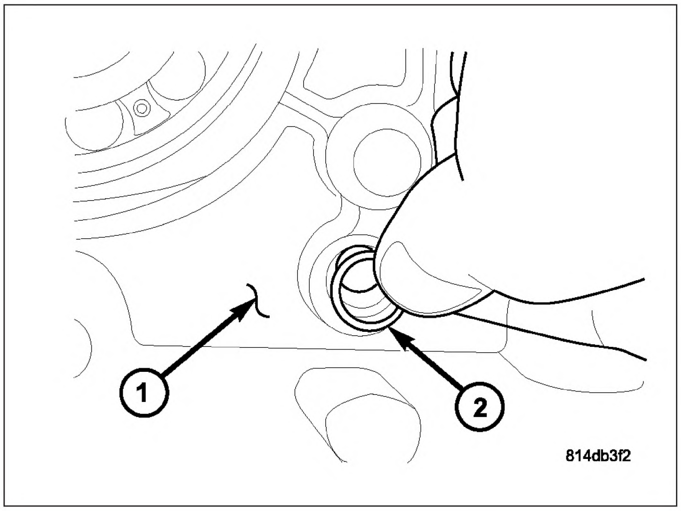
39. Remove the front output shaft (2) from the front housing (1) and the front output shaft front bearing.


1
2
814db303

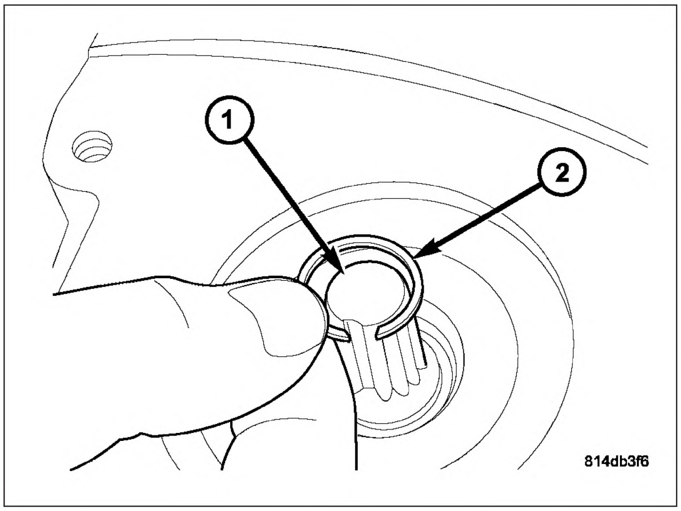
40. Remove the oil pick-up tube and screen (1) from the rear housing.



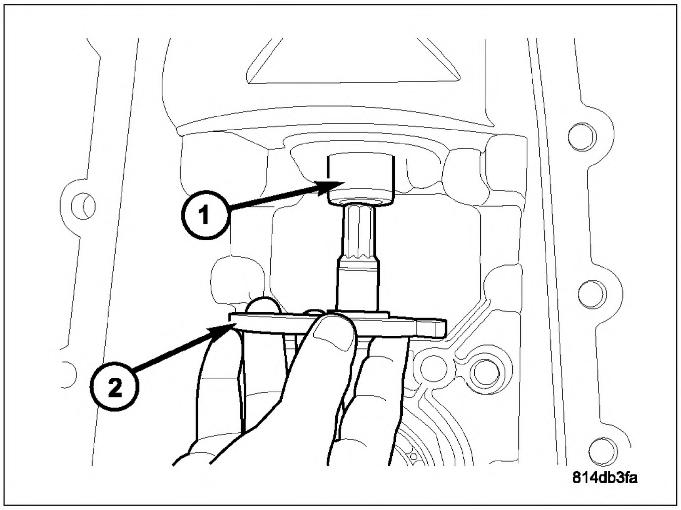
41. Remove the oil pick-up tube o-ring (2) from the rear housing (1).


1
2
814db3f2

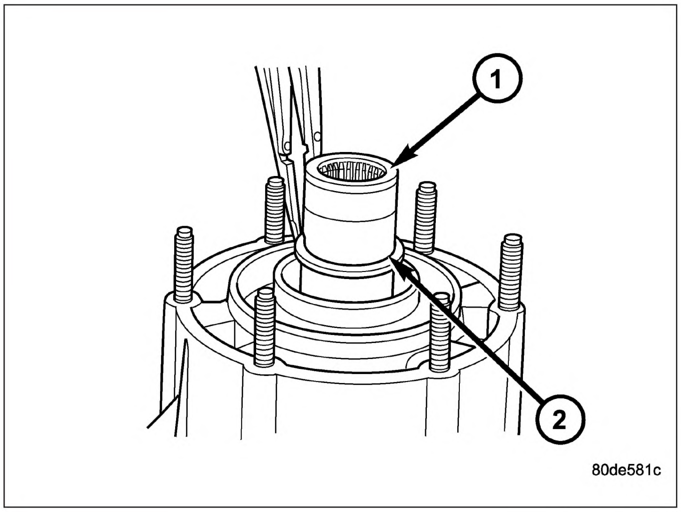
42. Remove the retaining ring (2) from the shift sector shaft (1).



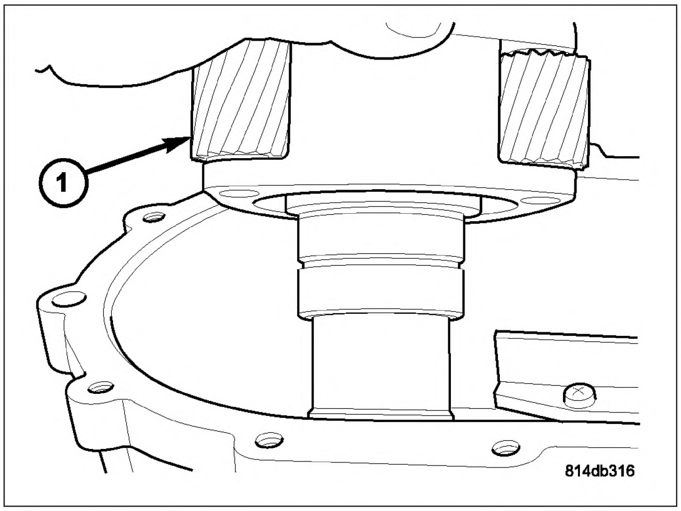
43. Remove the shift sector (2) from the front housing (1).



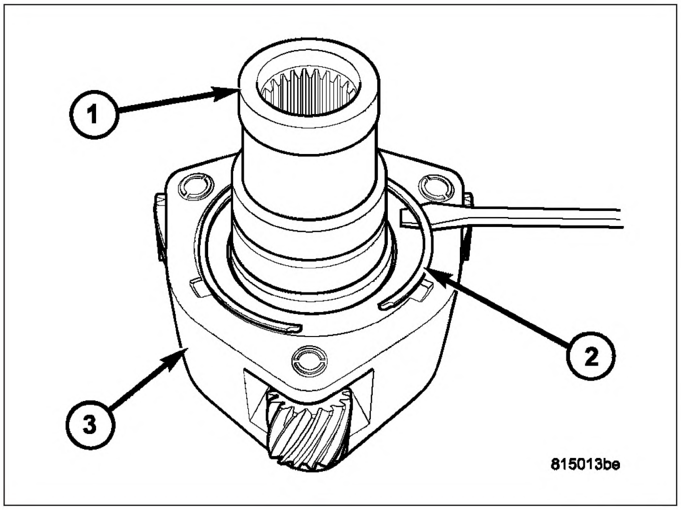
44. Remove the input shaft seal with a suitable pry tool or a screw mounted in a slide hammer.
45. Remove the retaining ring (2) holding the input gear assembly into the front housing.



46. Remove the input gear and low range planetary assembly (1) from the front housing.



47. Remove the snap-ring (2) holding the input gear (1) into the low range planetary (3).


1
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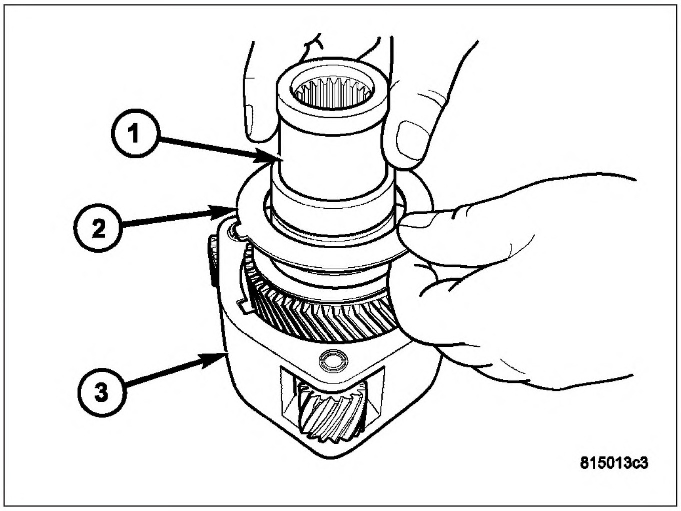
815013be

48. Remove the input gear (1) and lock plate (2) from the low range planetary (3) and remove the lock plate.


1
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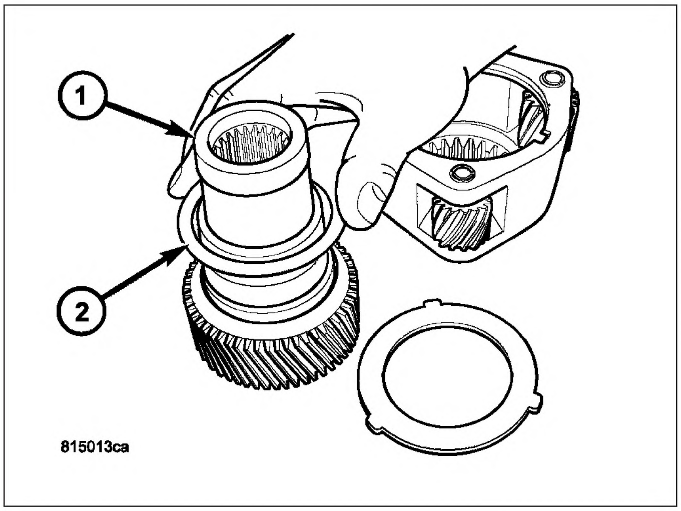
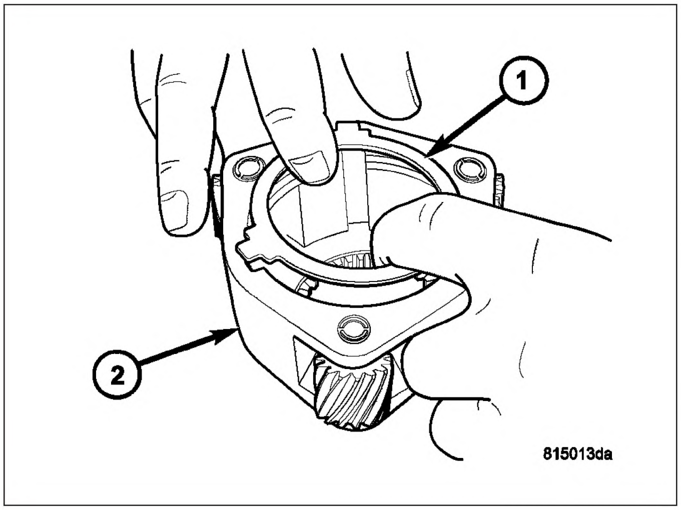
3
815013c3

49. Remove the top thrust washer (no tabs) (2) from the input gear (1).

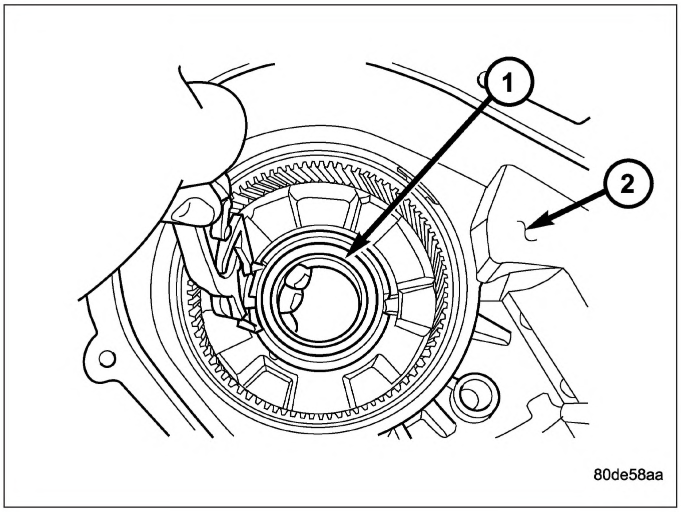


50. Remove the bottom thrust washer (3 tabs) (1) from the low range planetary (2).

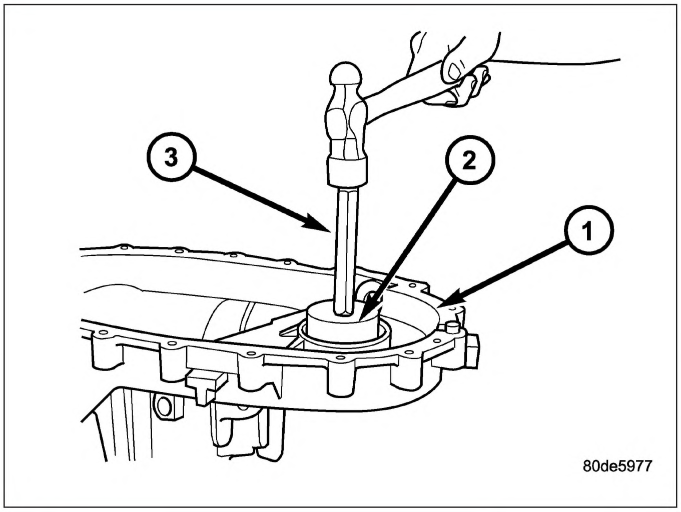


ASSEMBLY

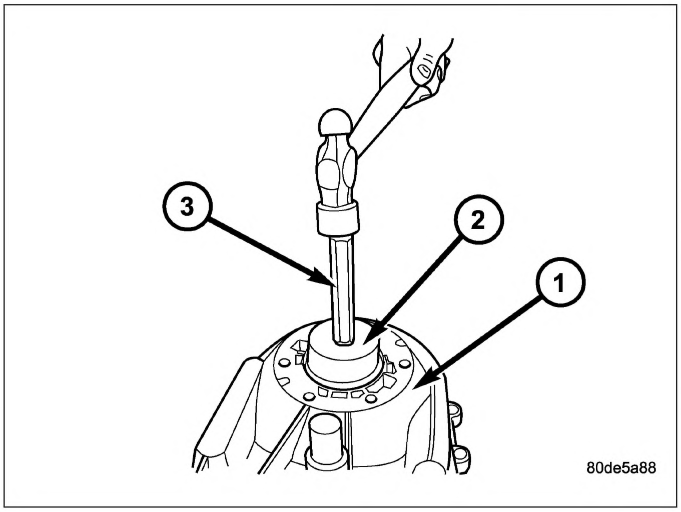
1. Remove the input shaft bearing (1) from the front case (2) with suitable snap-ring pliers.
2. Transfer the retaining ring to the new bearing if necessary and install the bearing into the front case.



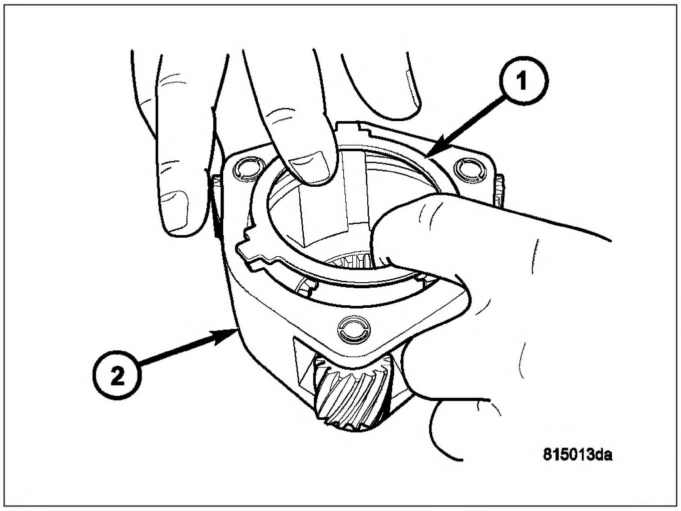
3. Remove the front output shaft bearing retaining ring from inside the front case half.
4. Using Installer 6436 and Handle C-4171, remove front output shaft bearing.
5. Start front output shaft bearing in case. Then seat bearing with Handle C-4171 (3) and Installer C-4210 (2).
6. Install front output shaft bearing retaining ring.



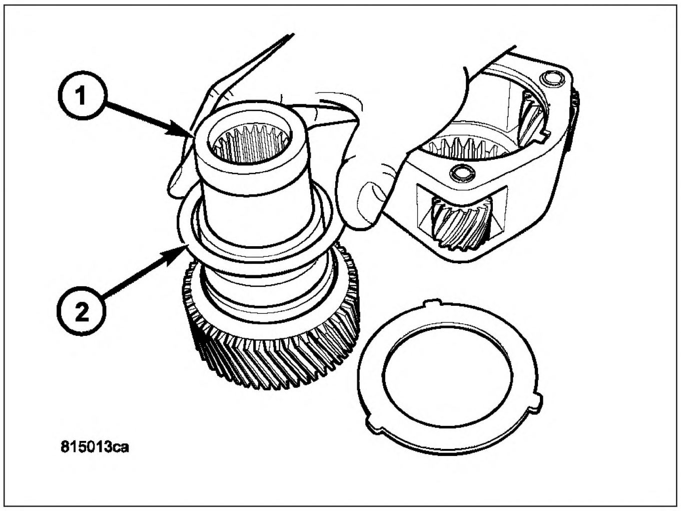
7. Remove the rear output shaft bearing retaining ring from inside the rear housing.
8. Remove the rear output shaft bearing from the rear case using Installer 5066 (2) and Handle C-4171 (3).
9. Install the rear output shaft bearing into the rear case using Remover/Installer 8281 (2) and Handle C-4171 (3).
10. Install the rear output shaft bearing retaining ring into the rear housing, from inside the rear housing.



11. Install the bottom thrust washer (3 tabs) (1) into the low range planetary (2).



12. Install the top thrust washer (no tabs) (2) onto the input gear (1).


1
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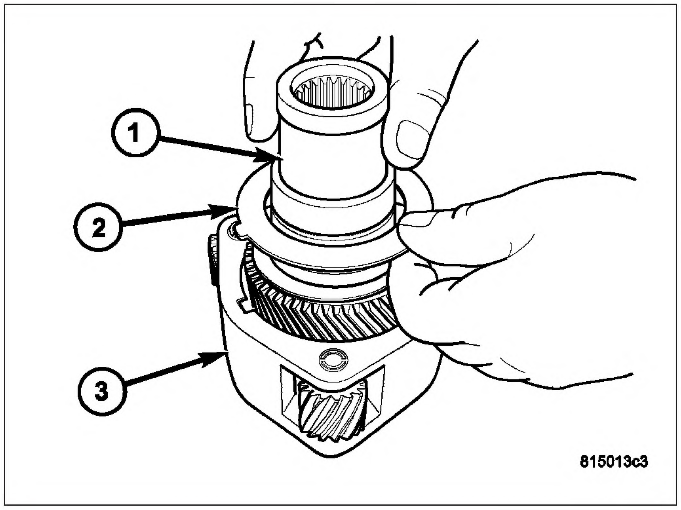
815013ca

13. Install the input gear (1) and lock plate (2) into the low range planetary (3) and install the lock plate.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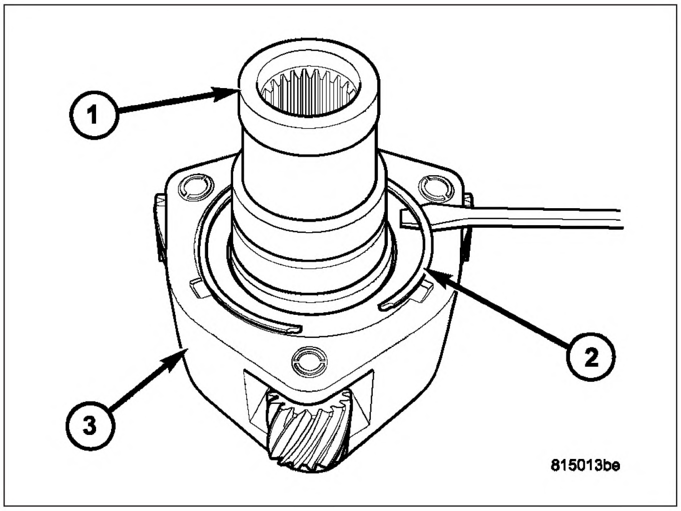
815013c3

14. Install the snap-ring (2) to hold the input gear (1) into the low range planetary (3).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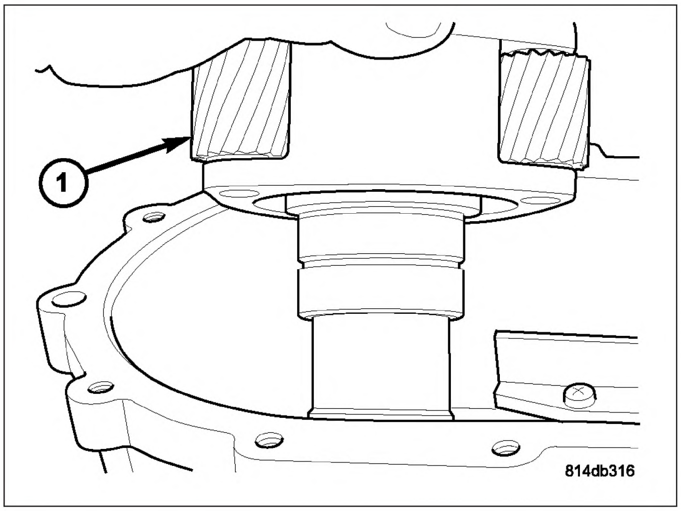
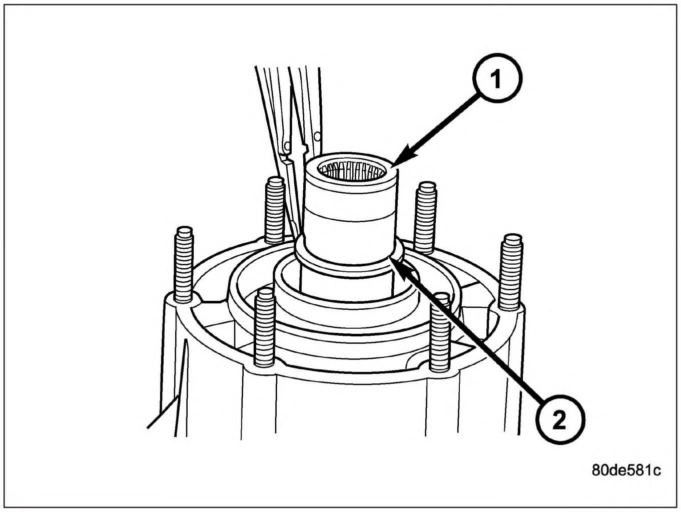
815013be

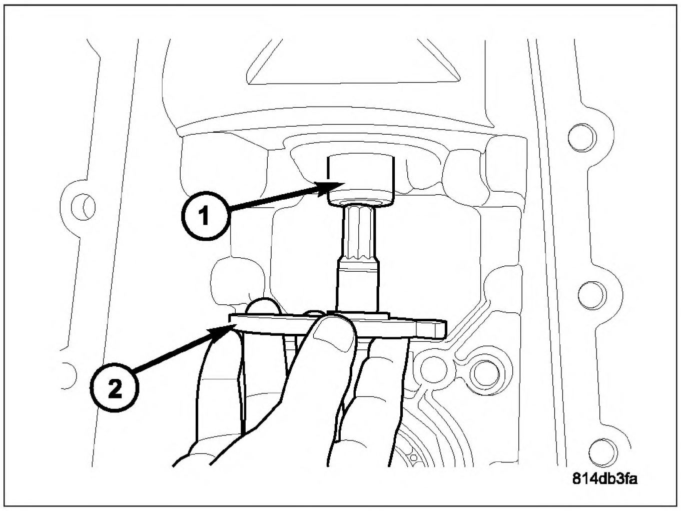
15. Install the input gear and low range planetary assembly (1) into the front housing.



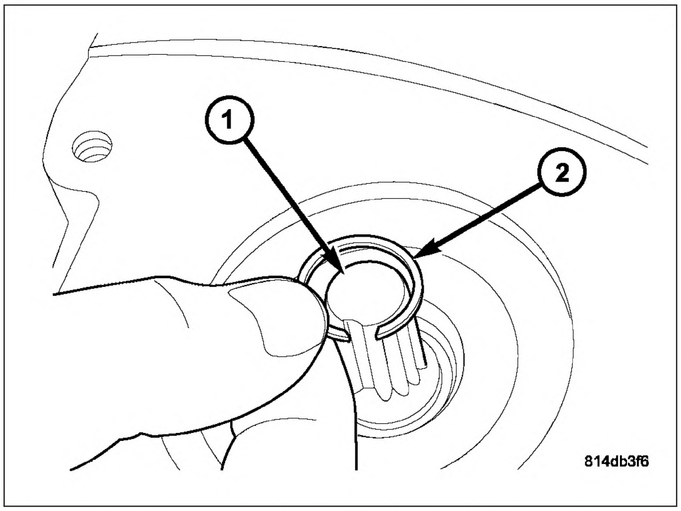
16. Install the retaining ring (2) holding the input gear assembly into the front housing.
17. Install the new input shaft seal with Installer 9672 and Handle C-4171.



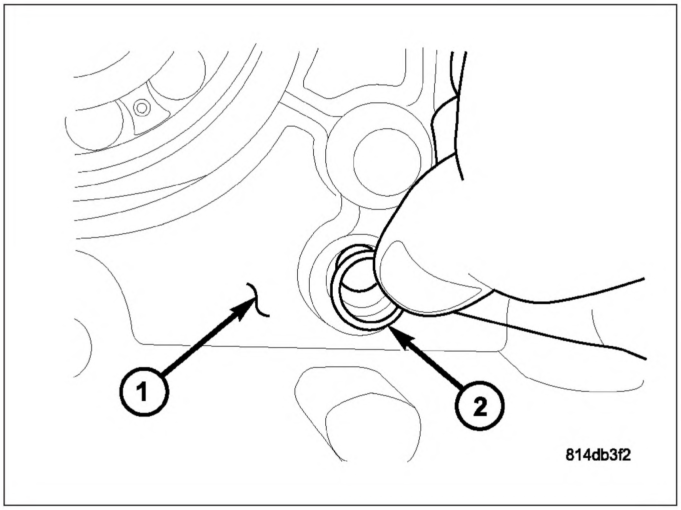
18. Install the shift sector (2) into the front housing (1).



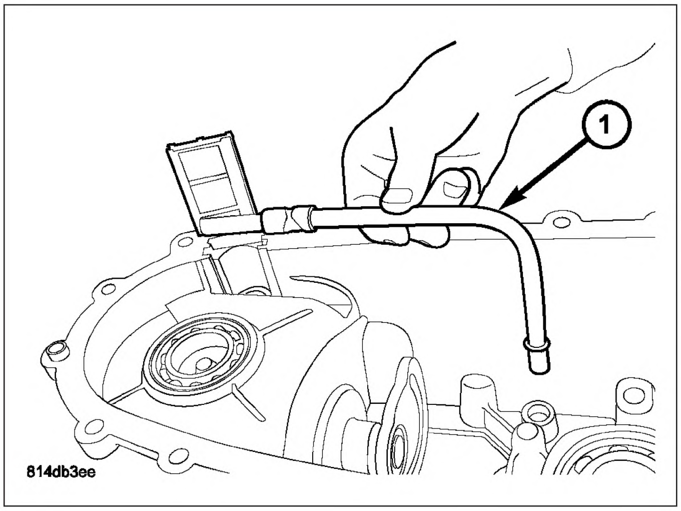
19. Install the retaining ring (2) onto the shift sector shaft (1).



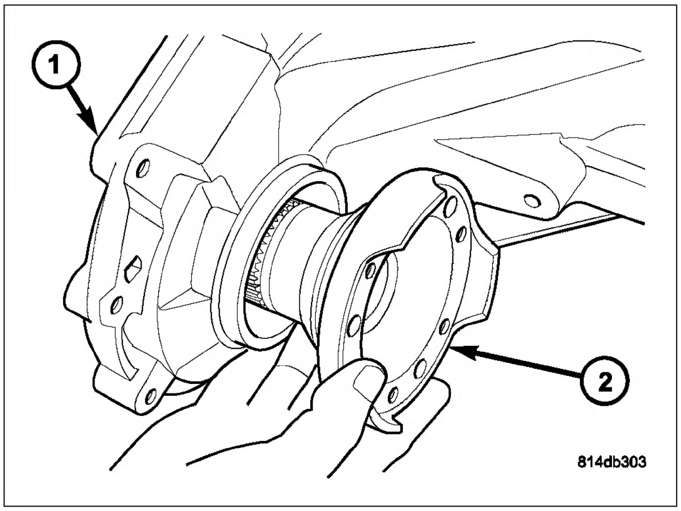
20. Install the oil pick-up tube o-ring (2) into the rear housing (1).



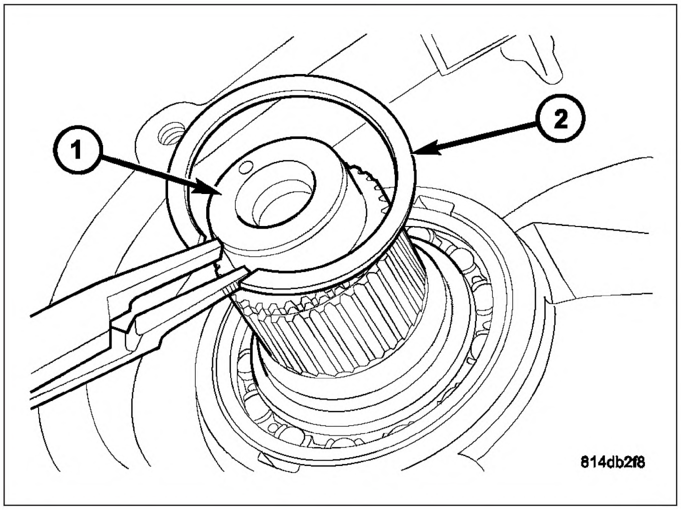
21. Prime the oil pickup tube by pouring a little oil into the tube before installation.
22. Install the oil pick-up tube and screen (1) into the rear housing.



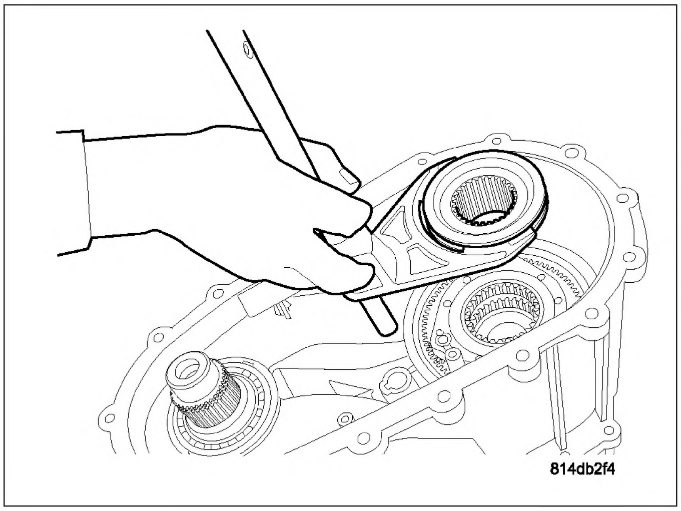
23. Install a new front output shaft seal with Installer 6560.
24. Install the front output shaft (2) into the front housing (1) and the front output shaft front bearing.



25. Install the retaining ring (2) onto the front output shaft (1).



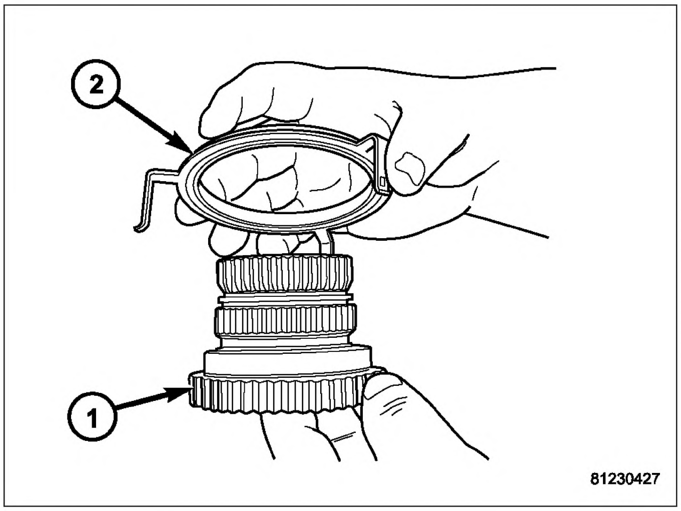
26. Install the range fork (1) and range hub (2) as one into the input gear/low range planetary.



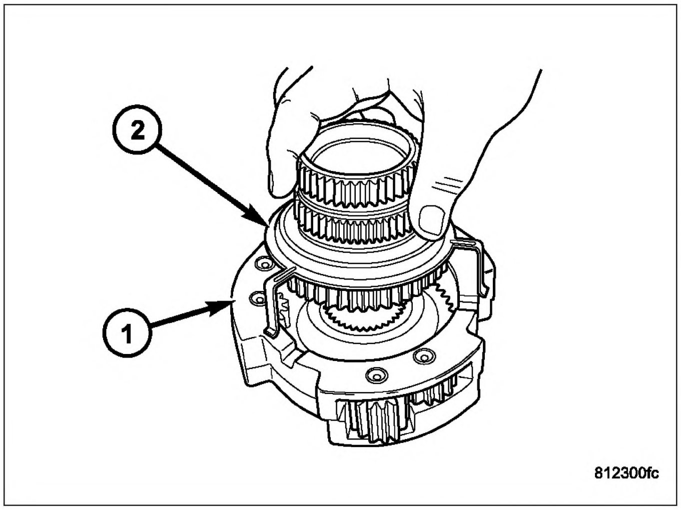
27. Lubricate mainshaft splines with recommended transmission fluid.

NOTE: Replace the mode hub retainer if the legs were distorted during removal.

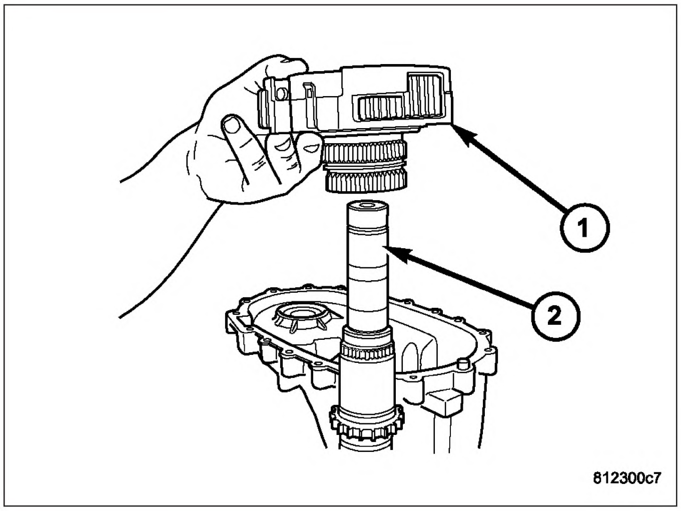
28. Install the mode hub retainer (1) onto the mode hub (2).



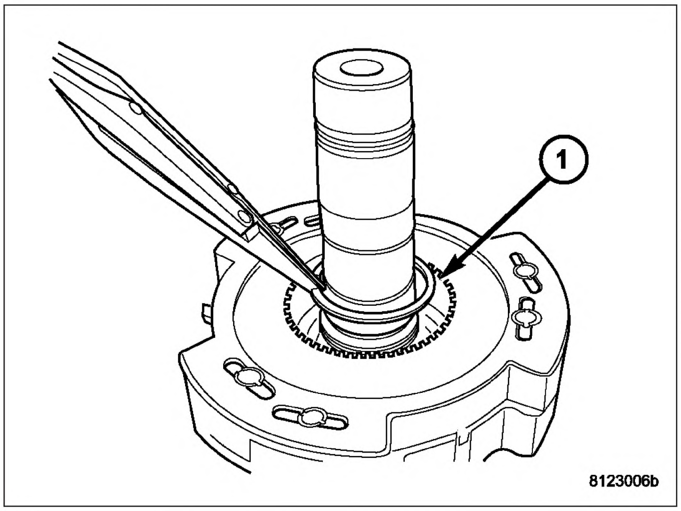
29. Install the mode hub (2) and mode hub retainer onto the differential assembly (1). Make sure the retainer is fully seated onto the differential.



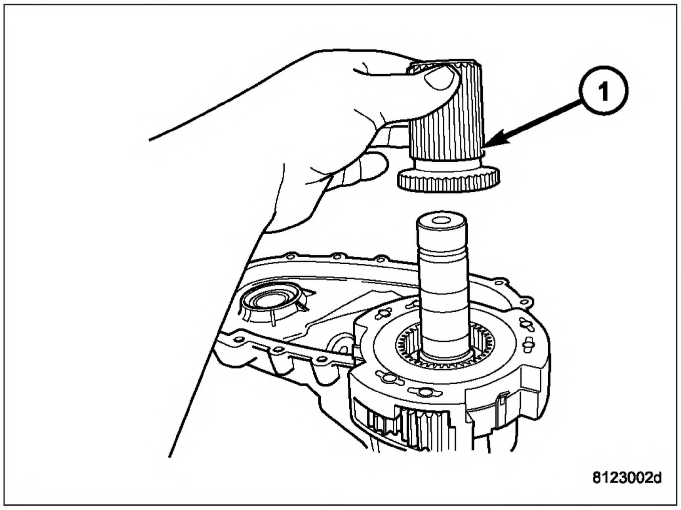
30. Install the differential assembly (1) onto the mainshaft (2).



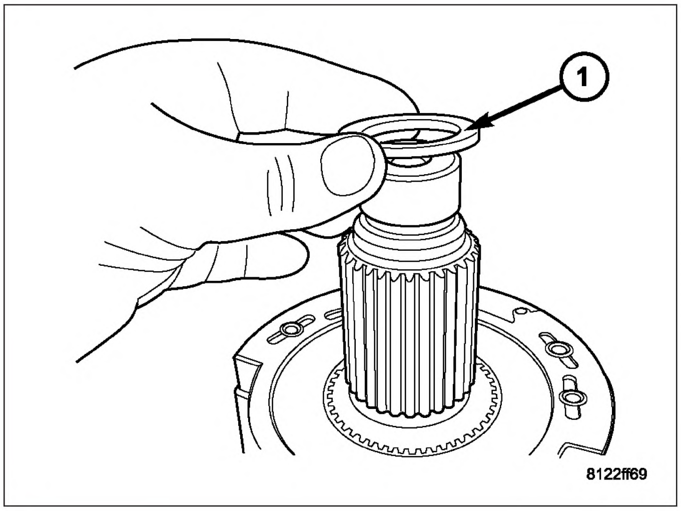
31. Install the differential snap-ring (1).



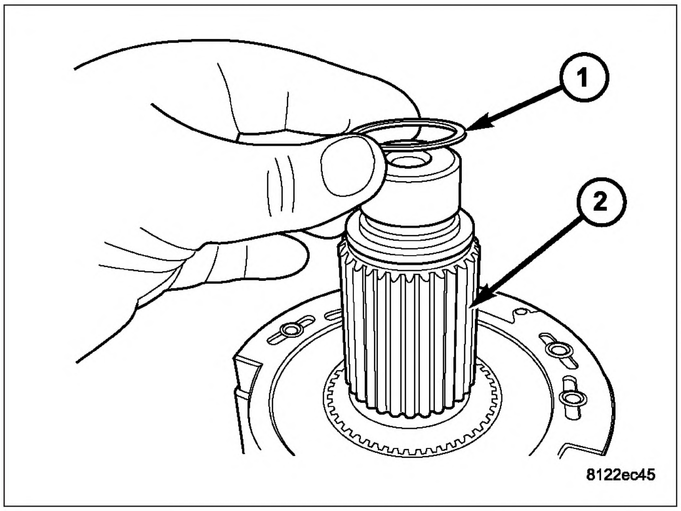
32. Install the intermediate clutch shaft (1).



33. Install the clutch shaft thrust ring (1).



34. Install clutch shaft (2) snap-ring (1).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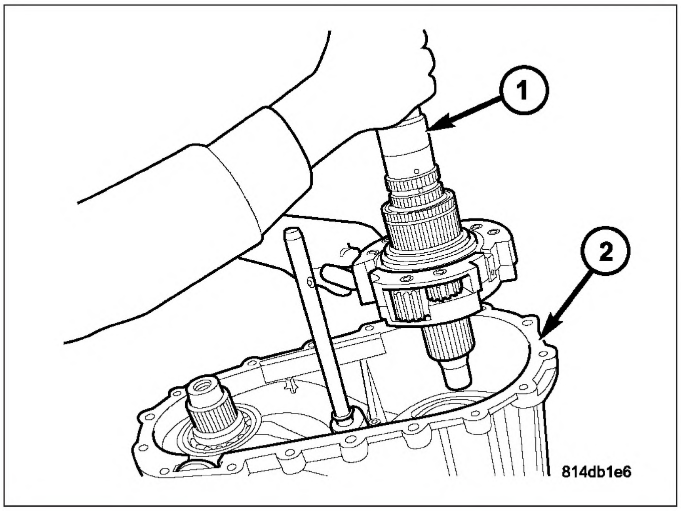
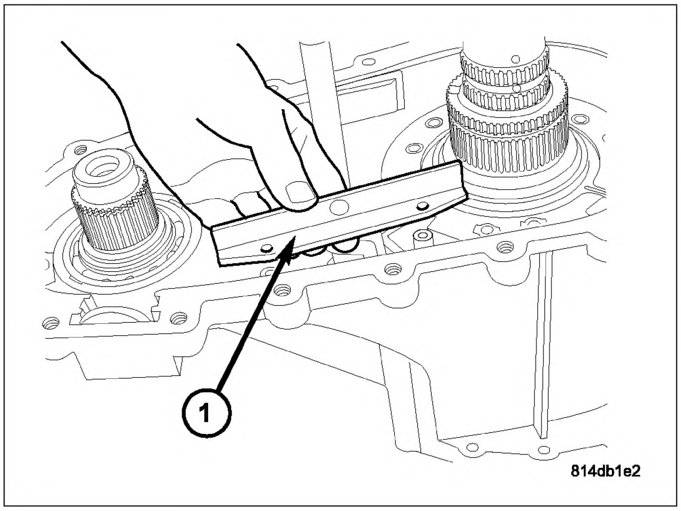
8122ec45

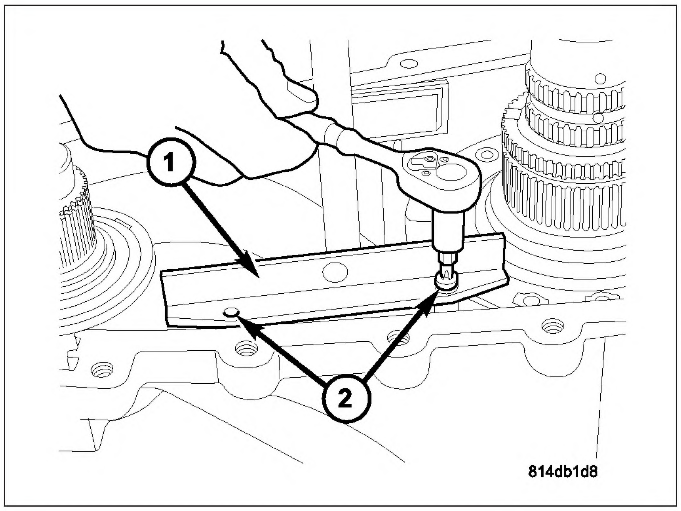
35. Install the mainshaft and differential assembly (1) into the front housing (2), range hub, and input gear/low range planetary.


1
2
814db1e6

36. Install the drive chain guides (1) onto the transfer case.



37. Install the screws (2) to hold the chain guide rails (1) to the front housing. Tighten the screws to 5-8 N·m (44-71 in.lbs.).


1
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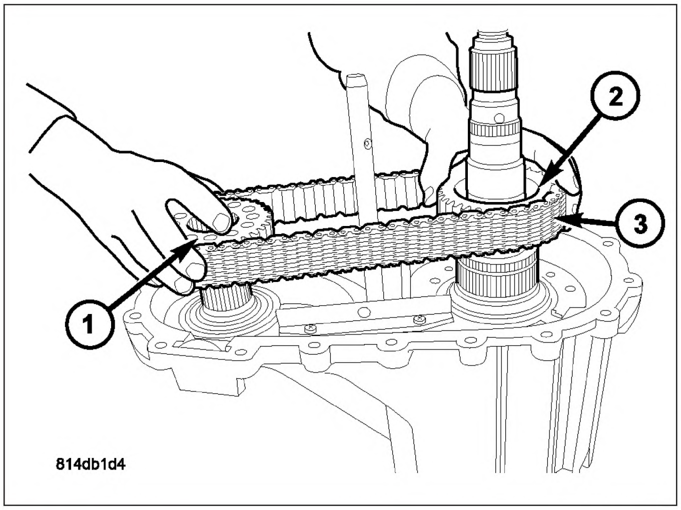
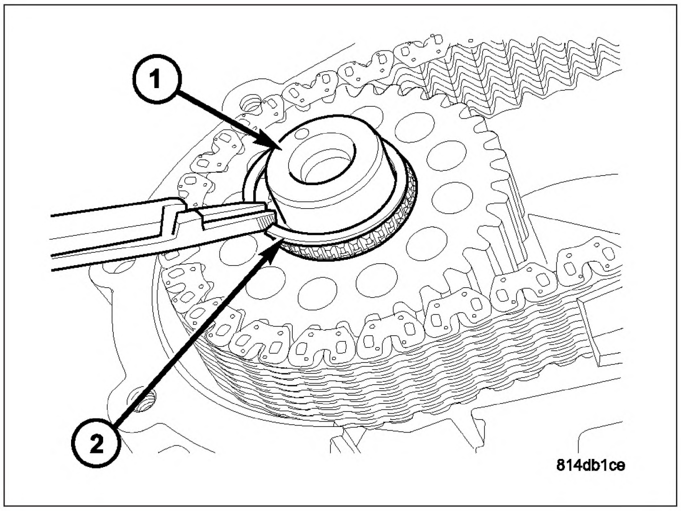
814db1d8

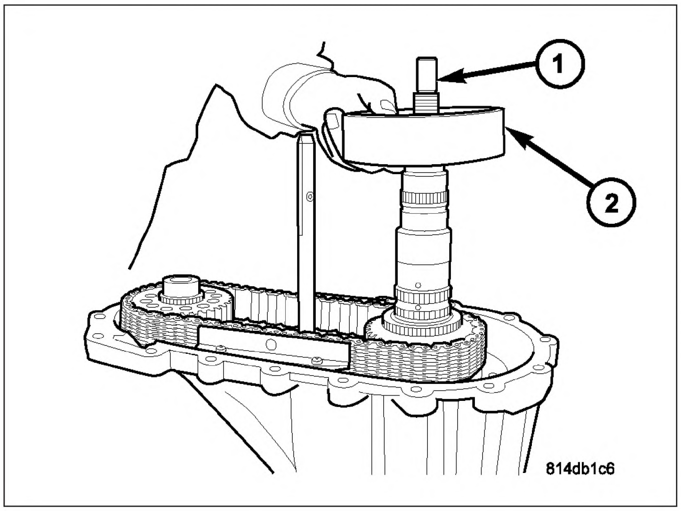
38. Install the front drive sprocket (1), mainshaft drive sprocket (2), and drive chain (3) as one.


2
3
1
814db1d4

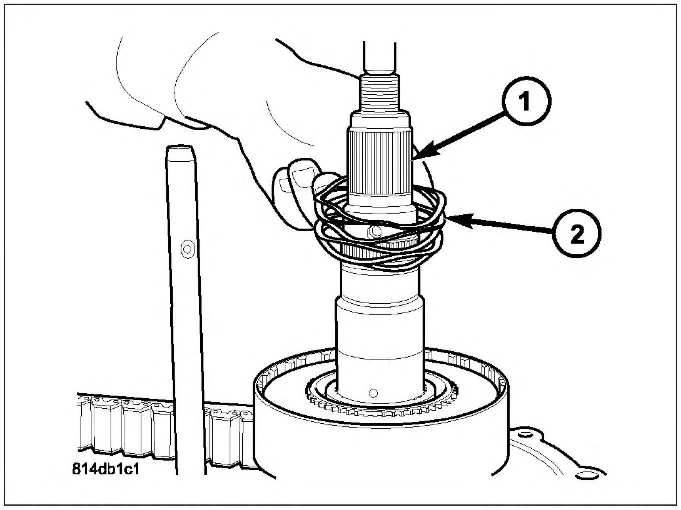
39. Install the front output shaft (1) drive sprocket retaining ring (2).


1
2
814db1ce

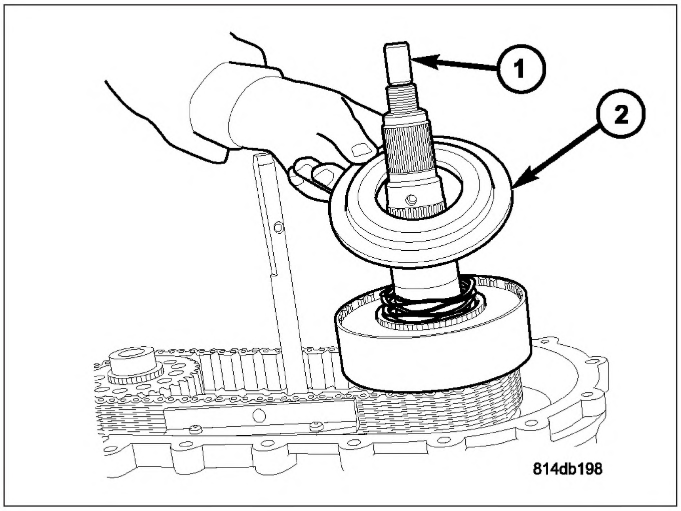
40. Install the clutch assembly (2) onto the output shaft (1).


1
2
814db1c6

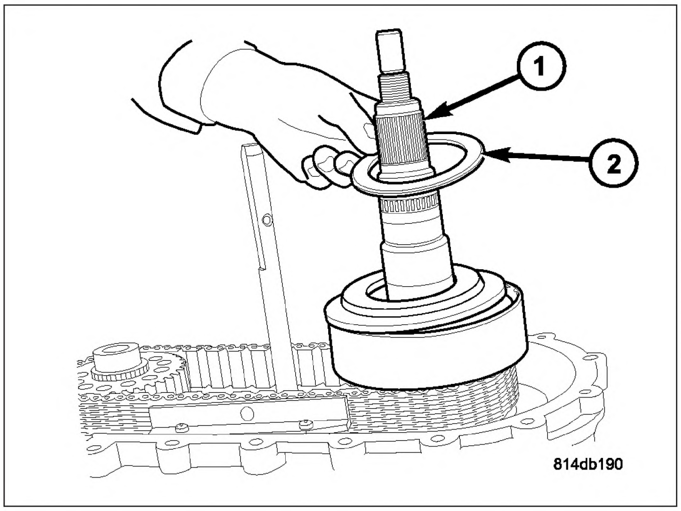
41. Install the wave spring (2) onto the output shaft (1).


1
2
814db1c1

42. Install the clutch pressure plate (2) onto the output shaft (1) and clutch assembly.


1
2
814db198

43. Install the thrust bearing (2) onto the output shaft (1).


1
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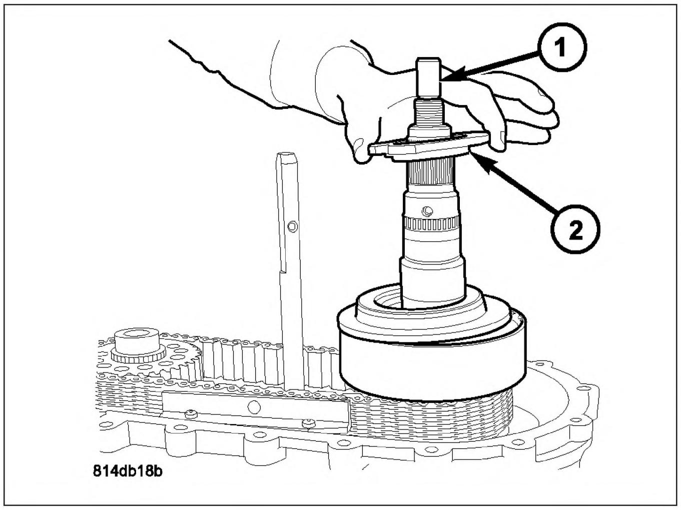
814db190

44. Install the thrust bearing support plate (2) onto the output shaft (1).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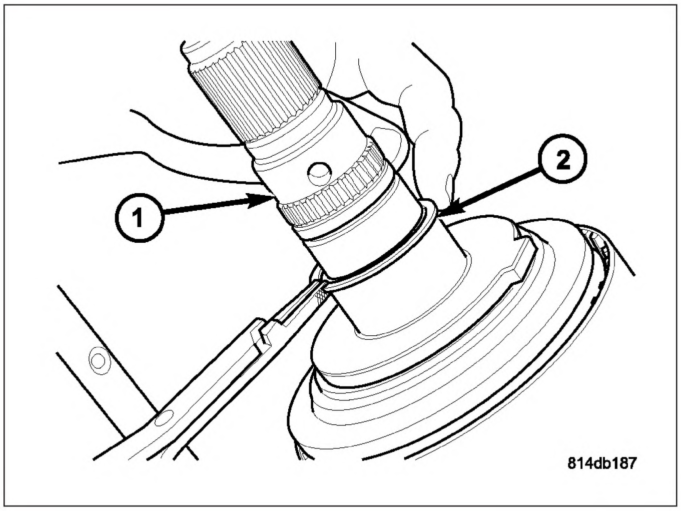
814db18b

45. Install the thrust bearing support plate retaining ring (2) onto the output shaft (1).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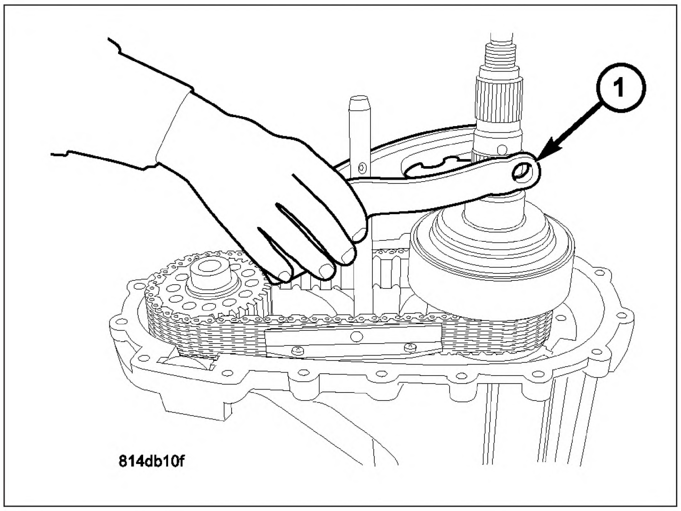
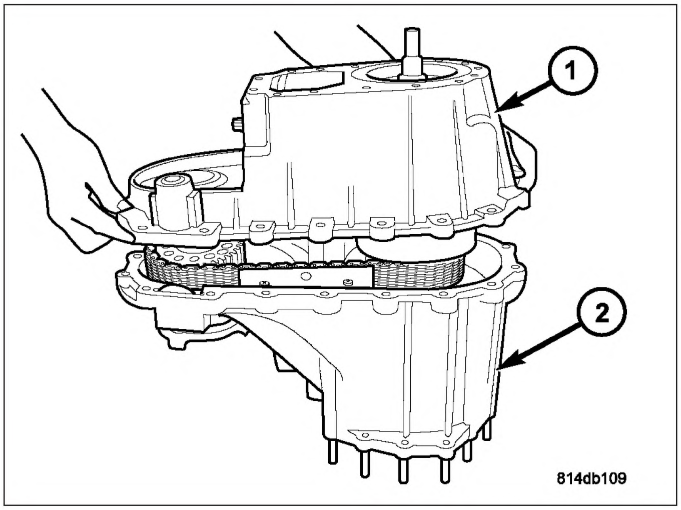
814db187

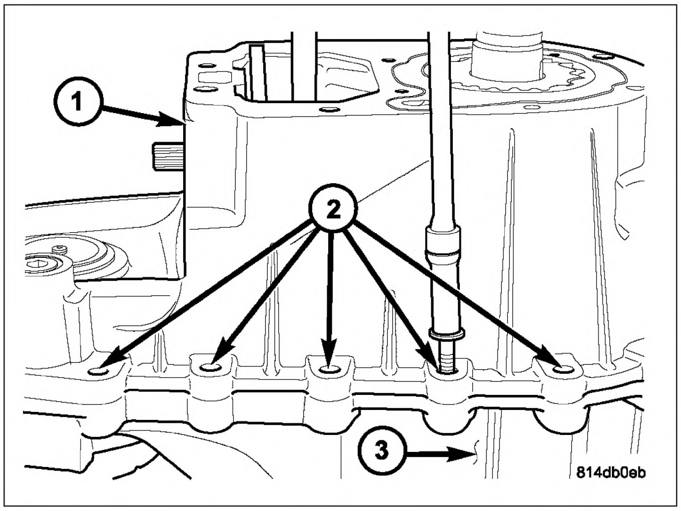
46. Install the clutch lever assembly (1) onto the mainshaft and shift rail.



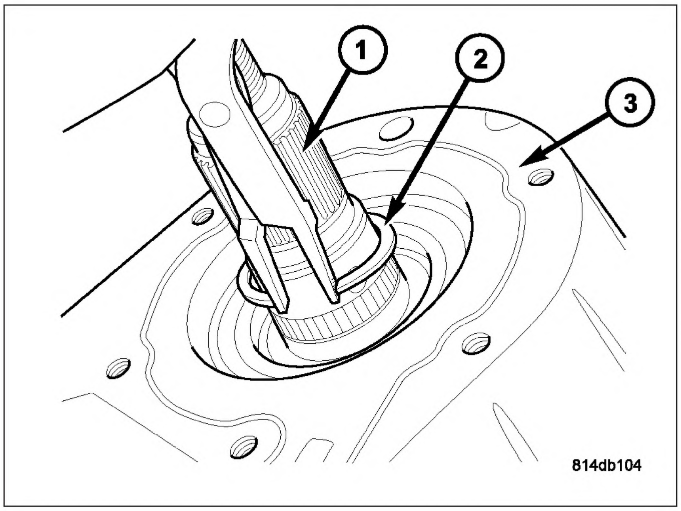
47. Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of front case. Keep sealer bead width to maximum of 3/16 inch. Do not use excessive amount of sealer as excess will be displaced into case interior.
48. Install the rear housing (1) into the front housing (2).



49. Install the bolts (2) to hold the rear housing (1) to the front housing (3). Tighten the bolts to 25-28 N·m (18.5-20.5 ft.lbs.).



50. Install the rear output shaft (1) retaining ring (2).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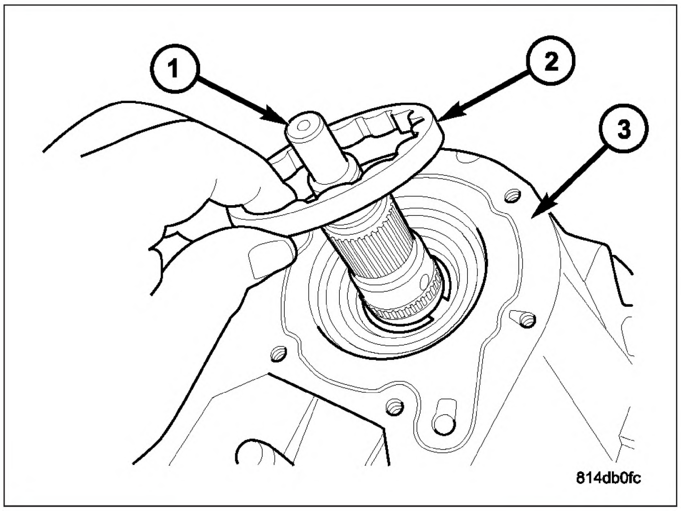
814db104

Lubricate the oil pump components with transmission fluid before installation.

51. Install the oil pump outer rotor (2) onto the output shaft (1) and into the rear housing (3).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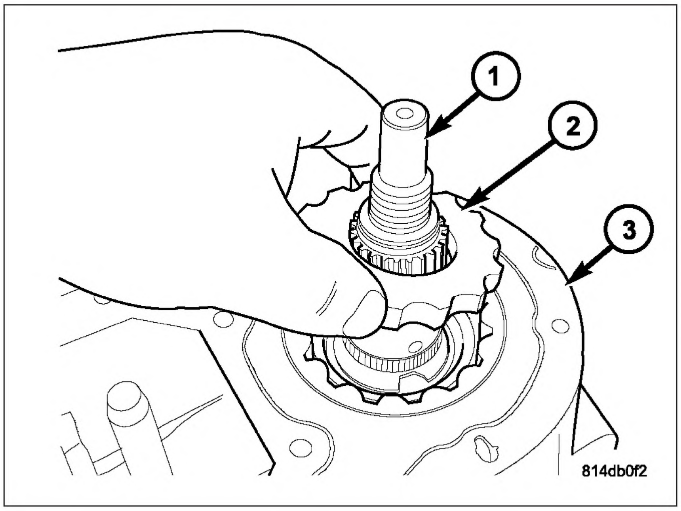
814db0fc

52. Install the oil pump inner rotor (2) onto the output shaft (1) and into the rear housing (3).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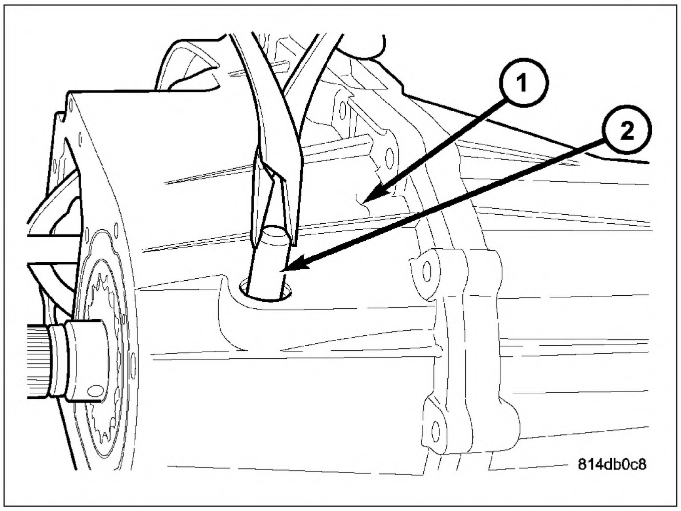
814db0f2

53. Install the clutch lever rail (2) into the rear housing (1) and clutch lever.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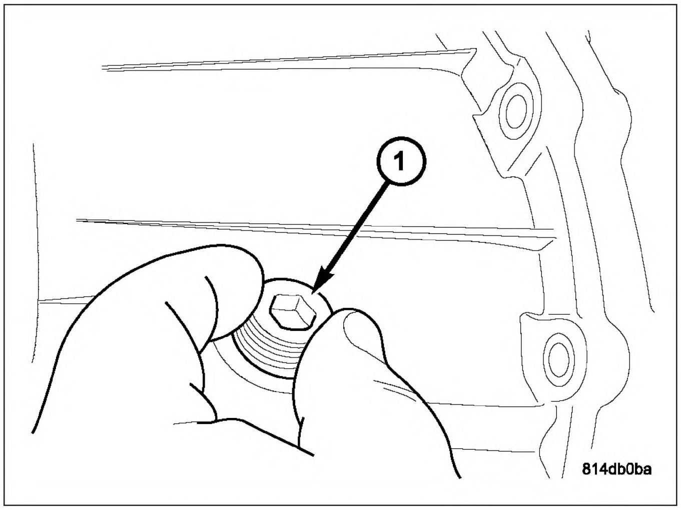
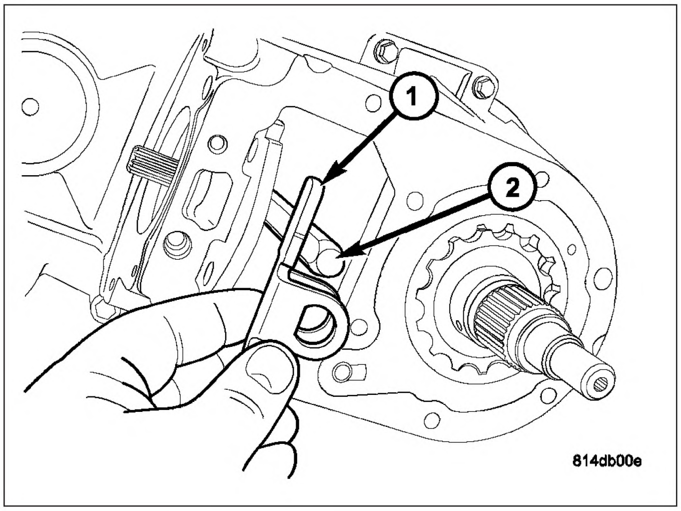
814db0c8

54. Install the clutch lever rail plug (1) into the rear housing.



55. Install the anti-rotation bracket (1) onto the shift rail (2).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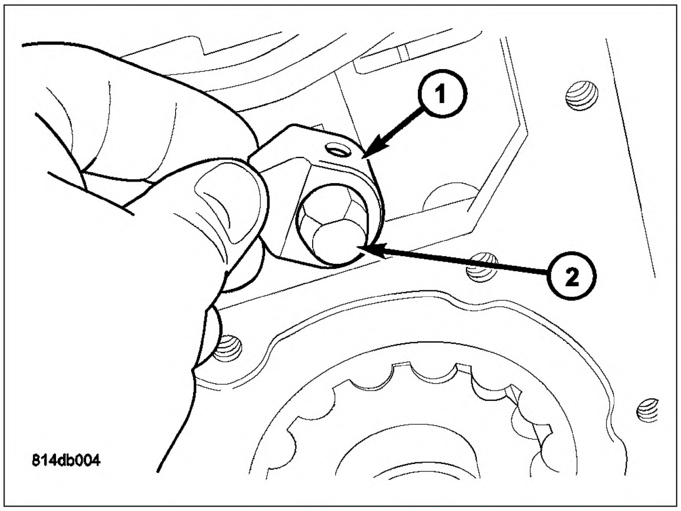
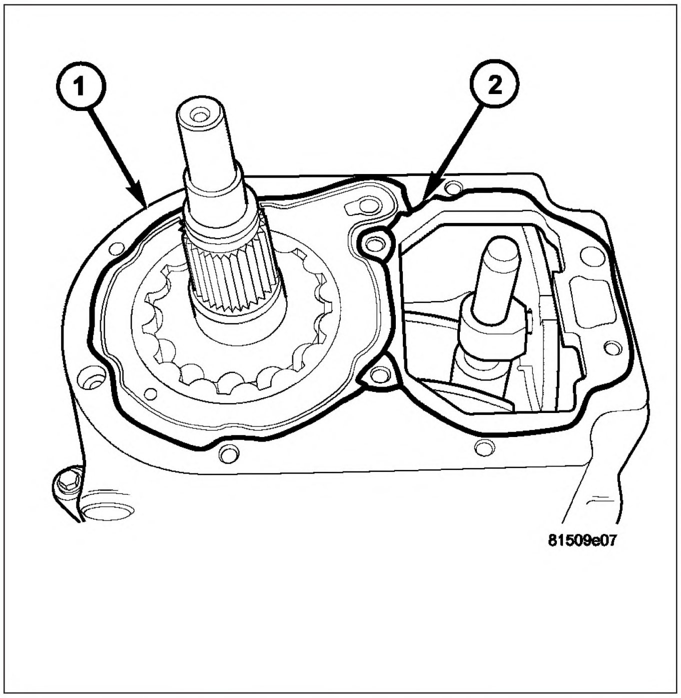
2
814db00e

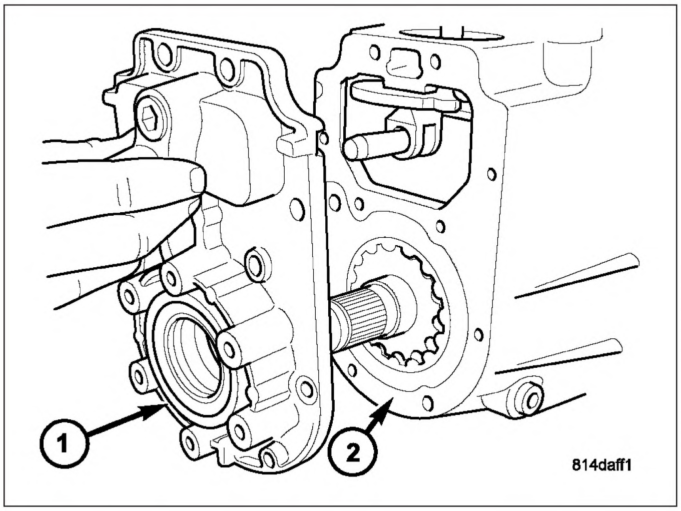
56. Install the sector roller (1) onto the shift rail (2).
57. Using a suitable punch, align the holes in the sector roller with the hole in the shift rail and install the roll-pin to secure the sector roller to the shft rail.



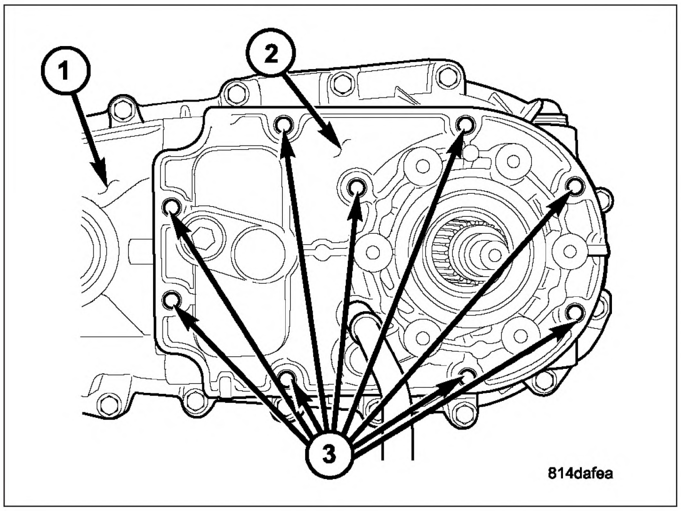
58. Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of rear housing as shown (2). Keep sealer bead width to maximum of 3 mm (1/8 inch). Do not use excessive amount of sealer as excess could be displaced into the oil pump.



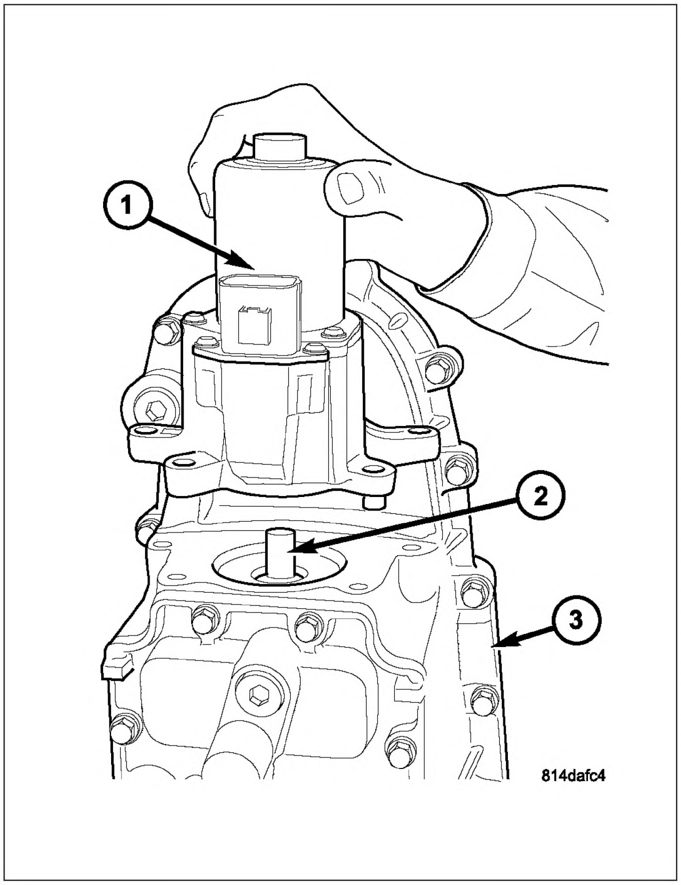
59. Install a new rear output shaft seal into the rear cover with Installer C-3972A.
60. Install the rear cover (1) onto the rear housing (2).



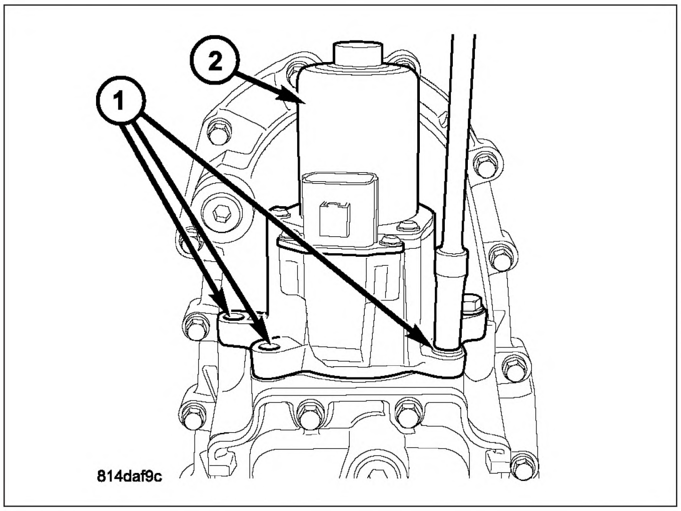
61. Install the bolts (3) holding the rear cover (2) onto the rear housing (1). Tighten the bolts to 25-28 N·m (18.5-20.5 ft.lbs.).



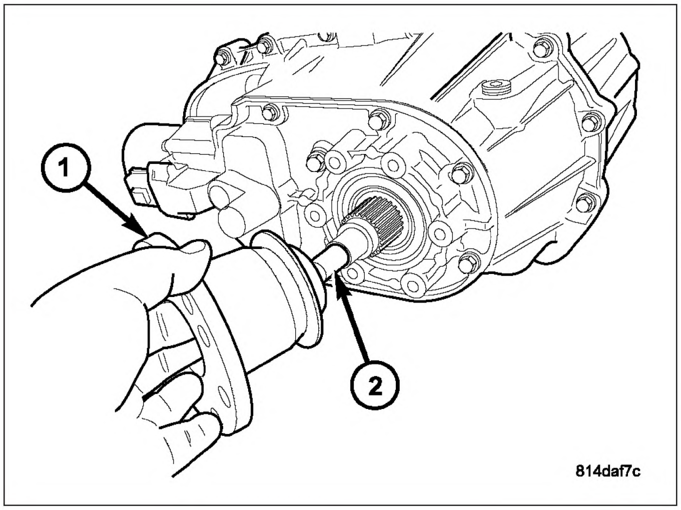
62. Install the shift motor and mode sensor assembly (1) onto the shift sector (2) and the transfer case (3).



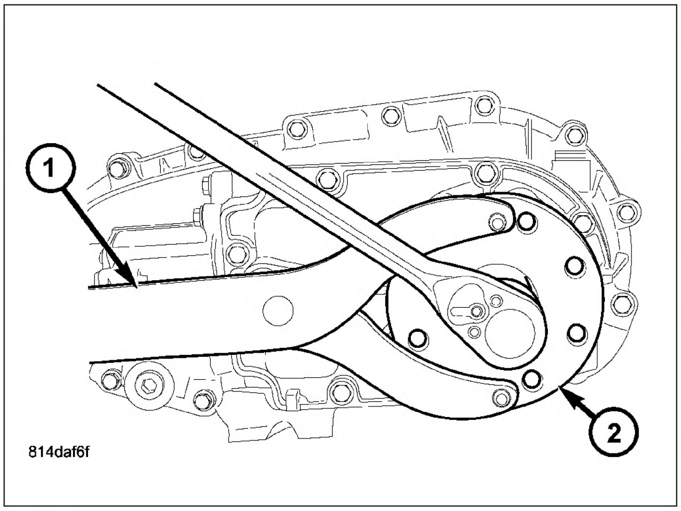
63. Install the bolts (1) to hold the shift motor and mode sensor assembly (2) to the transfer case. Tighten the bolts to 25-28 N·m (18.5-20.5 ft.lbs.).



64. Install the rear output shaft flange (1) onto the output shaft (2).

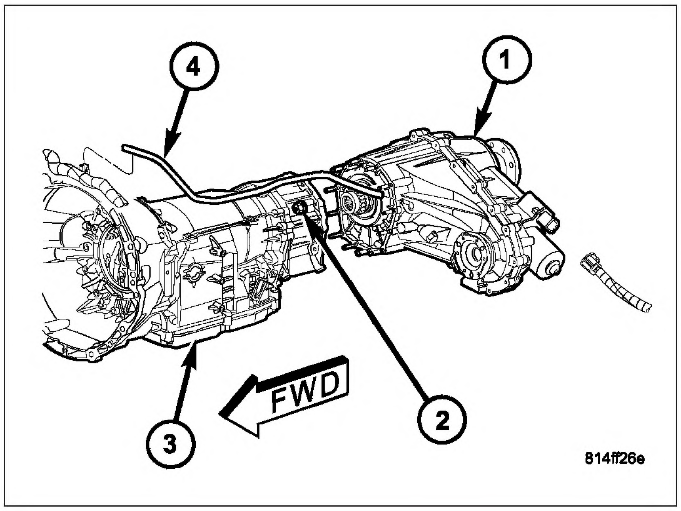


65. Using Holder C-3281 (1), install the rear companion flange (2) nut. Tighten the bolts to 122-176 N·m (90-130 ft.lbs.).

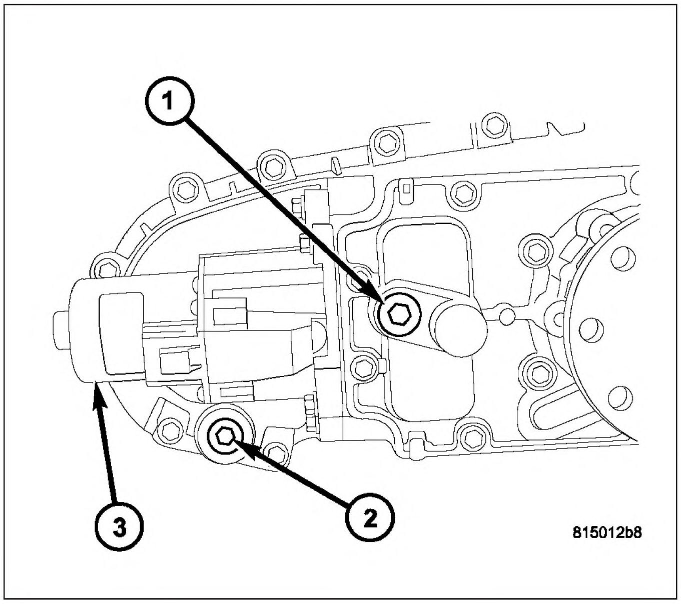


INSTALLATION

1. Mount transfer case (1) on a transmission jack.
2. Secure transfer case to jack with chains.
3. Position transfer case under vehicle.
4. Align transfer case (2) and transmission (3) shafts and install transfer case onto transmission.
5. Install and tighten transfer case attaching nuts (2) to 35 N·m (26 ft. lbs.) torque.
6. Connect the transfer case vent hose (4) to the transfer case.



7. Install rear crossmember and skid plate, if equipped.
8. Remove transmission jack and support stand.
9. Connect front propeller shaft and install rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)
10. Fill transfer case with correct fluid. Check transmission fluid level. Correct as necessary.
11. Install the transfer case fill plug (1). Tighten the plug to 20-34 N·m (15-25 ft.lbs.).
12. Connect the shift motor and mode sensor wiring connector.
13. Lower vehicle and verify transfer case shift operation.



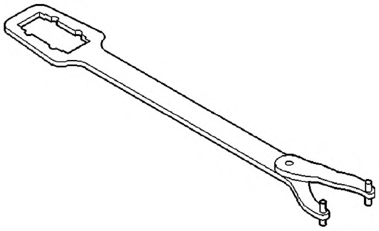
SPECIFICATIONS

TRANSFER CASE - NV245

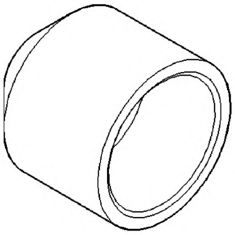
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Crossmember	41-47	30.2-34.7	-
Plug, Clutch Lever Rail	20-34	15-25	-
Plugs, Drain/Fill	20-34	15-25	-
Bolts, Case Half	25-28	18.5-20.5	-
Nut, Companion Flange	122-176	90-130	-
Bolts, Rear Cover	25-28	18.5-20.5	-
Nuts, T-case mount stud	33-41	24.3-30.2	-
Bolts, Shift Motor and Mode Sensor	25-28	18.5-20.5	-
Screws, Chain Guide	5-8	-	44-71

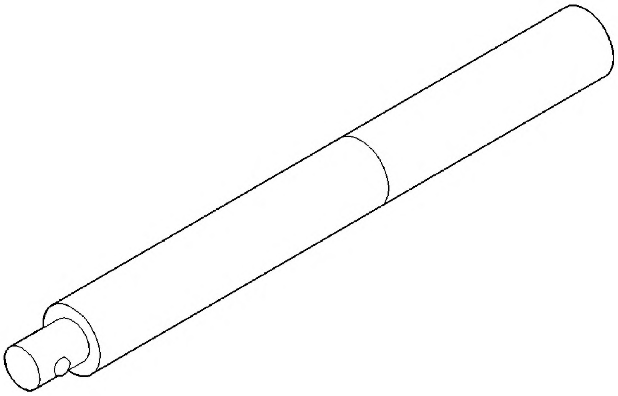
SPECIAL TOOLS - NV245



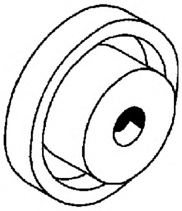
Holder, Flange - C-3281



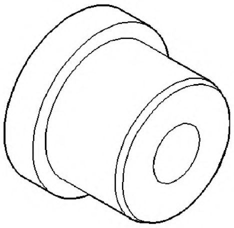
Installer, Seal - C-3972A



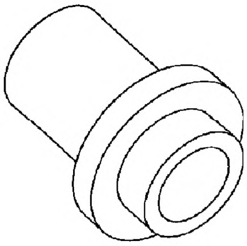
Handle, Universal - C-4171



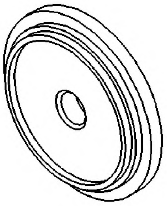
Installer, Seal - C-4210



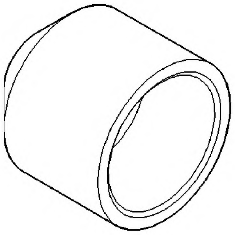
Installer, Bushing - 5066



Installer, Seal - 6560



Installer, Seal - 8281



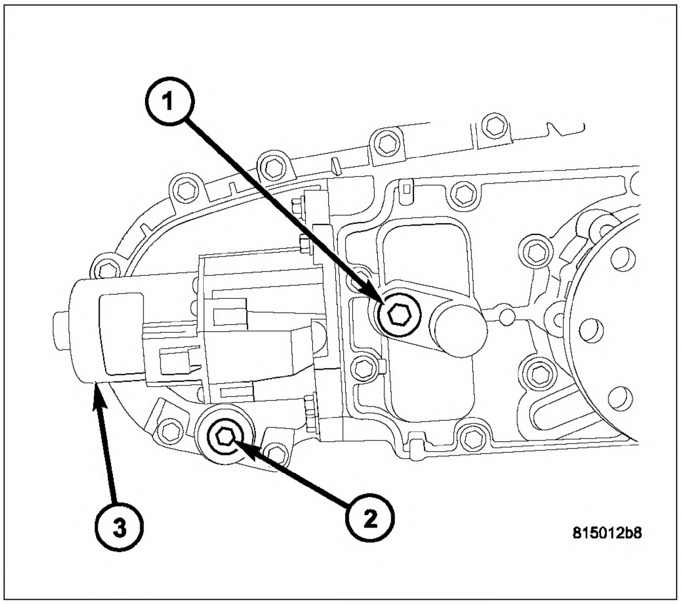
Installer, Seal - 9672

FLUID

STANDARD PROCEDURE - FLUID DRAIN/REFILL

The fill and drain plugs are both in the rear case.

1. Raise vehicle.
2. Position drain pan under transfer case.
3. Remove drain and fill plugs and drain lubricant completely.
4. Install drain plug. Tighten plug to 20-34 N·m (15-25 ft. lbs.).
5. Remove drain pan.
6. Fill transfer case to bottom edge of fill plug opening with the required fluid. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION)
7. Install and tighten fill plug to 20-34 N·m (15-25 ft. lbs.).
8. Lower vehicle.



SEAL-FRONT OUTPUT SHAFT

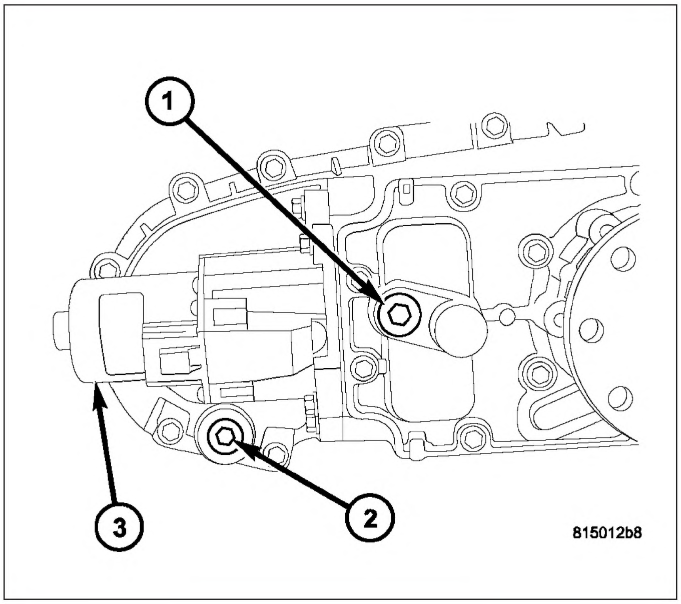
REMOVAL

The front output shaft seal cannot be serviced in the vehicle. The transfer case must be disassembled to remove the front output shaft and seal.

SENSOR-MODE

DESCRIPTION

The transfer case mode sensor (3) provides the Final Drive Control Module (FDCM) feedback about the position of the transfer case. The sensor consists of a linear analog position sensor that converts the motor output shaft position into a DC signal. The sensor may rotate a full 360 degrees. The operating envelope or sector rotation is -5 to 180 degrees. The FDCM must supply 5VDC (+/- 0.5v) to the sensor whenever the FDCM is not in sleep mode and monitors the shift motor position. The sensor position is monitored when the ignition is in the RUN position and for 10 seconds after the ignition is shifted to the OFF position. The sensor is mechanically linked to the shaft of the cam which allows the transfer case to shift. The mode sensor will draw less than 20 mA of current during operation.



OPERATION

During normal vehicle operation, the Final Drive Control Module (FDCM) monitors the mode sensor outputs at least every 2 milliseconds when the shift motor is stationary or active.

Refer to SHAFT ANGLE vs. TRANSFER CASE POSITION for the relative angles of the transfer case shift sector versus the interpreted transfer case gear operating mode.

SHAFT ANGLE vs. TRANSFER CASE POSITION

Shaft Angle (Degrees)	Transfer Case Position
0	AWD
-20	4LOW

NOTE: All the parameter voltages referred to in the following information are calibrated items in the controller software and are subject to change.

NOTE: For a further explanation of Phase 1 through 3 shifting, (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSFER CASE CONTROL MODULE - OPERATION).

The following information describes the different mode sensor positions:

- 4LOCK TARGET REGION - The position shall be considered 4LOCK if the voltage is greater than or equal to encoder_4LOCK_min Volts and it is also less than or equal to encoder_4LOCK_max Volts.
- AWD TARGET REGION - The position shall be considered AWD if the voltage is greater than or equal to encoder_AWD_min Volts and it is also less than or equal to encoder_AWD_max Volts.
- AWD SHIFT LIMIT - During Phase 2 and Phase 3 shifting, shifts may become unidirectional when a voltage is greater than or equal to encoder_AWD_min Volts has been reached.

The mode sensor position will be considered invalid by the FDCM if the voltage is greater than or equal to encoder_High_Range_Limit Volts or if it is less than or equal to encoder_Low_Range_Limit Volts.

If FDCM looses the encoder signal during a shift, the FDCM will respond with a shift back in the opposite direction of travel to first attempt to find the encoder signal. If the signal is not found, the FDCM will drive motor in AWD direction for 1 second.

Refer to MODE SENSOR VOLTAGES table for the mode sensor voltages.

MODE SENSOR VOLTAGES

Parameter Name	Voltage
encoder_4LOW_Min	4.19
encoder_4LOW_Max	4.35
encoder_AWD_Min	0.45
encoder_AWD_Max	0.55
encoder_High_Range_Limit	4.51
encoder_Low_Range _Limit	0.20

SWITCH-TRANSFER CASE SELECTOR

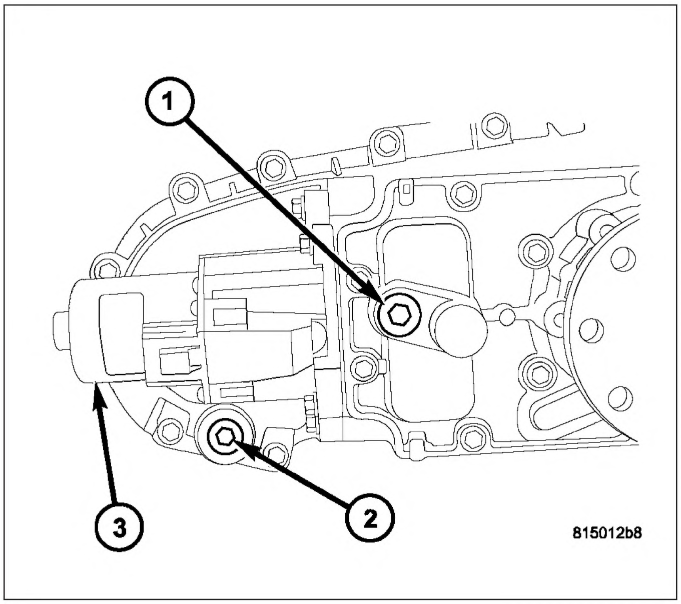
DESCRIPTION

The selector switch assembly is mounted in the right side of the shifter assembly and consists of a momentary contact T-handle for shifts to and from 4LOW and a recessed button for shifts into and out of NEUTRAL.

ASSEMBLY-SHIFT MOTOR/MODE SENSOR

DESCRIPTION

The shift motor (3) is an electromechanical device consisting of a DC permanent magnet motor, a gear train, and an analog position sensor. The shift motors' overall function is to move and lock a gear that moves the range fork and clutch lever found in the transfer case. This allows the transfer case to be shifted electrically to multiple operating positions (4LOW and AWD). The operating current of the shift motor under stall conditions is 30 amps maximum at 72° F with 13.5 volts, at the motor leads.



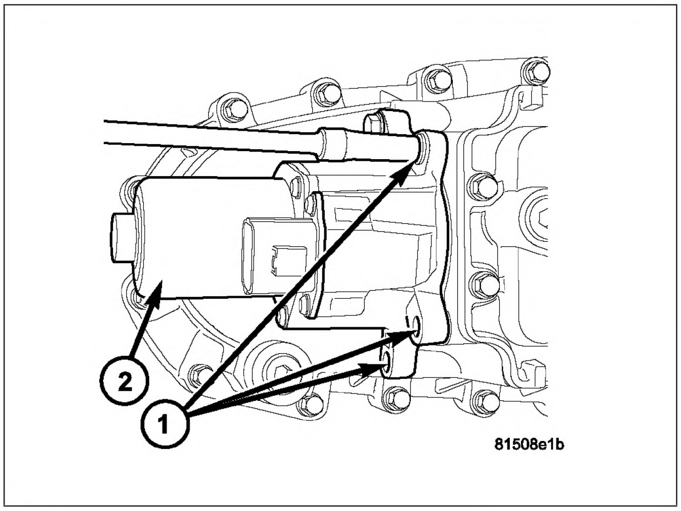
OPERATION

Shifting in the transfer case occurs when a Pulse Width Modulated (PWM) voltage is supplied to the shift motor by the Final Drive Control Module (FDCM). A linear analog position sensor located inside the shift motor, provides the FDCM with the motors' angular, rotational position. With this information, the FDCM continuously knows the motors' position, and therefore allows it to accurately control the motors' operation, including voltage polarity which is used to control motor direction.

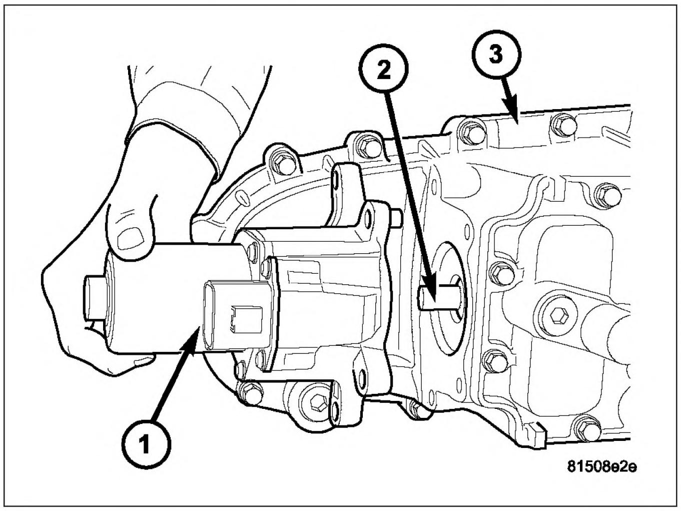
REMOVAL

NOTE: New shift motor assemblies are shipped in the AWD position. If a new shift motor assembly must be installed, it will be necessary to shift the transfer case to the AWD position prior to motor installation.

1. Raise the vehicle on a suitable hoist.
2. Disengage the wiring connector from the shift motor and mode sensor assembly.
3. Remove the bolts (1) holding the shift motor and mode sensor assembly (2) onto the transfer case.



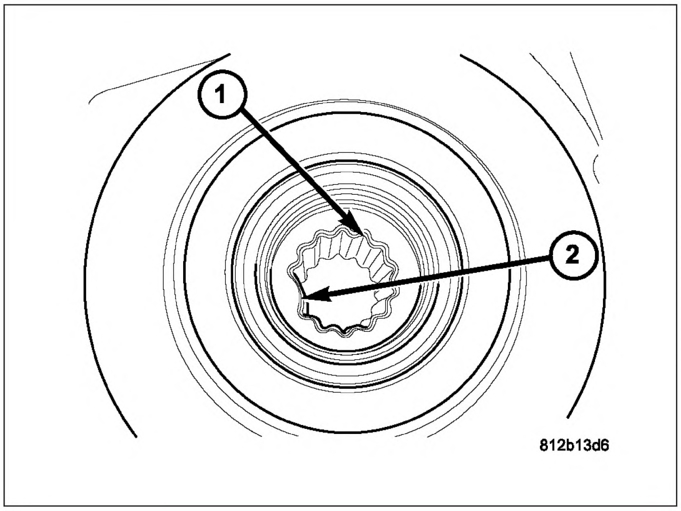
4. Separate the shift motor and mode sensor assembly (1) from the transfer case (3) and shift sector (2).



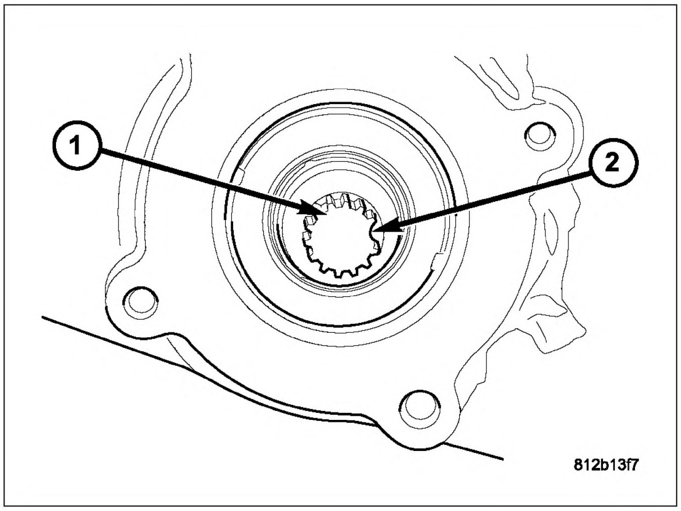
INSTALLATION

1. Verify that the shift motor o-ring is clean and properly positioned inside the machined o-ring groove of the shift motor.
2. Add high temperature grease between the shift motor assembly and the transfer case mating surface for sealing purposes.

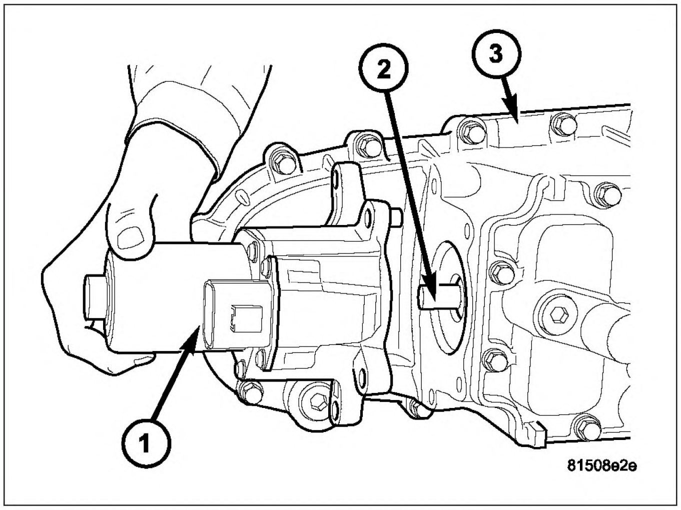
NOTE: Verify that the missing tooth (2) in the shift motor drive spline (1)...



NOTE: ...and the transfer case drive spline (1) missing tooth (2) are aligned. It may be necessary to manually shift the transfer case if the shift motor and transfer case shaft are not aligned.



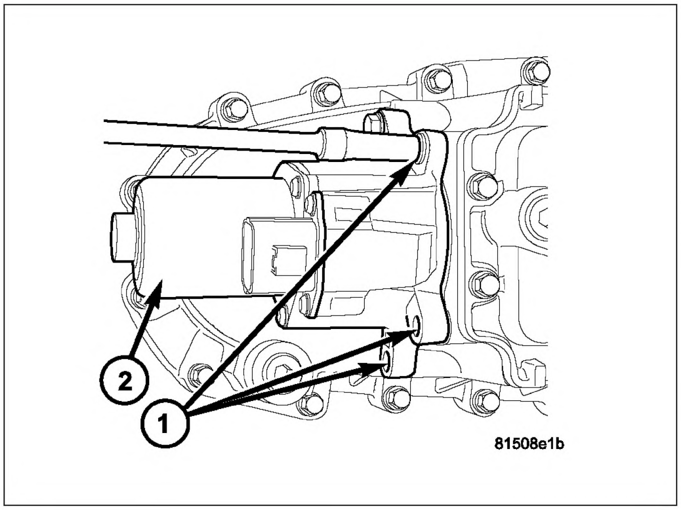
3. Position the shift motor and mode sensor assembly (1) onto the transfer case (3) and shift sector (2).



4. Install the bolts (1) to hold the assembly (2) onto the transfer case. Tighten the bolts to 25-28 N·m (18.5-20.5 ft.lbs.).

CAUTION: If the original shift motor and mode sensor assembly bolts are reused, be sure to use Mopar® Lock & Seal or Loctite™ 242 to replenish the lock patch material originally found on the bolts

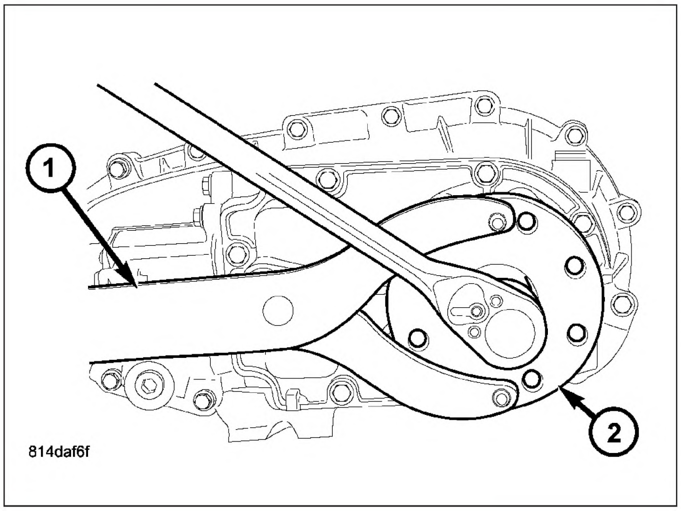
5. Engage the wiring connector to the shift motor and mode sensor assembly.
6. Refill the transfer case as necessary.
7. Lower vehicle and verify transfer case operation.



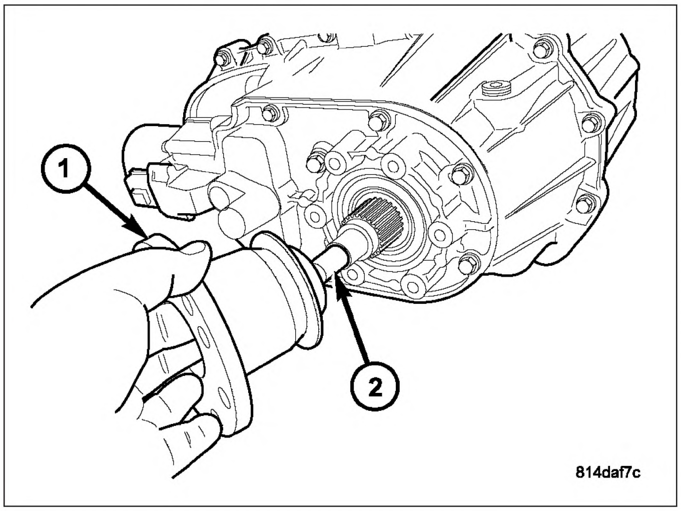
SEAL-REAR OUTPUT SHAFT

REMOVAL

1. Remove the rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
2. Using Holder C-3281 (1), remove the rear companion flange (2) nut.

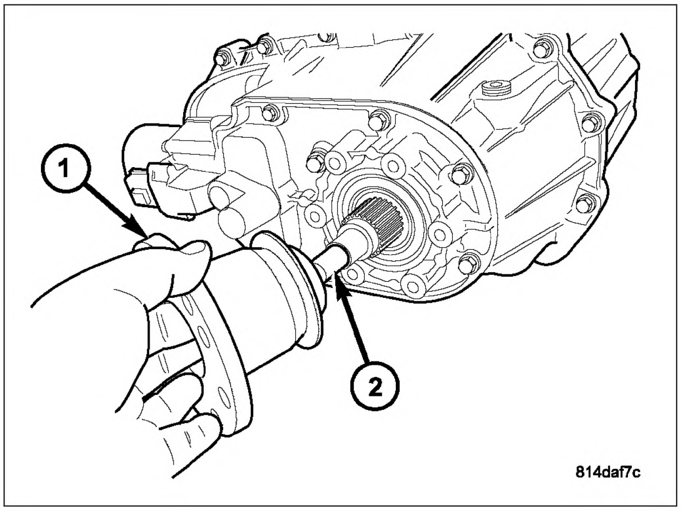


3. Remove the rear output shaft flange (1) from the output shaft (2). If necessary, use a suitable 2 or 3 jaw puller to remove the output shaft flange.
4. Remove the rear output shaft seal with a suitable pry tool or a screw mounted in a slide hammer.

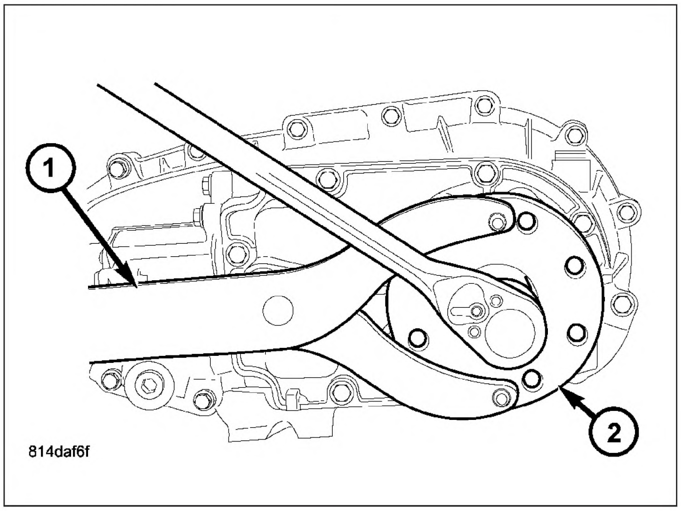


INSTALLATION

1. Install a new rear output shaft seal into the rear cover with Installer C-3972A.
2. Install the rear output shaft flange (1) onto the output shaft (2).



3. Using Holder C-3281 (1), install the rear companion flange (2) nut. Tighten the bolts to 122-176 N·m (90-130 ft.lbs.).
4. Install the rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
5. Check the transfer case fluid level. (Refer to 21 - TRANSMISSION/TRANSFER CASE/FLUID - STANDARD PROCEDURE) Correct as necessary.



TIRES/WHEELS

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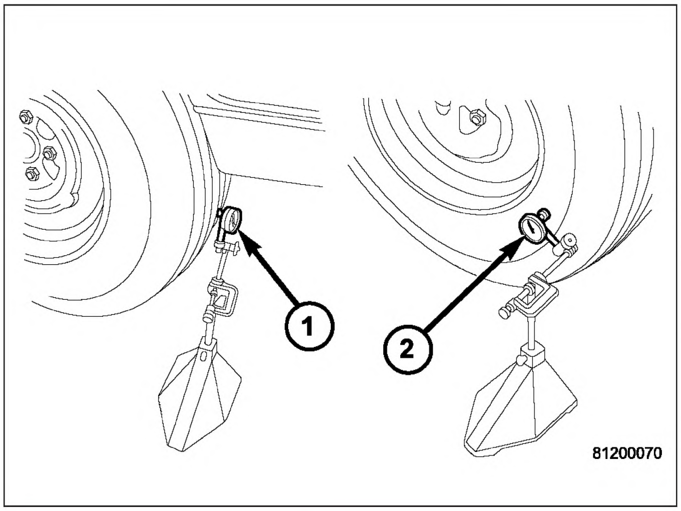
TIRES/WHEELS

DIAGNOSIS AND TESTING

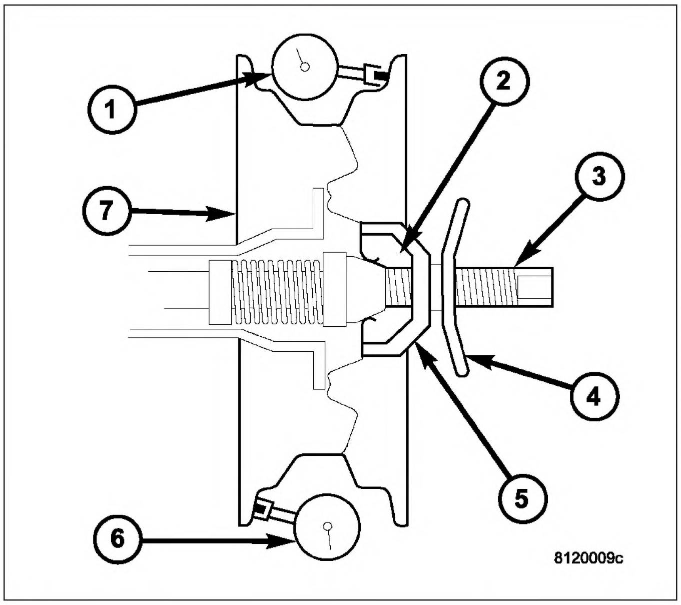
TIRE AND WHEEL RUNOUT

Radial runout is the difference between the high and low points on the tire or wheel.



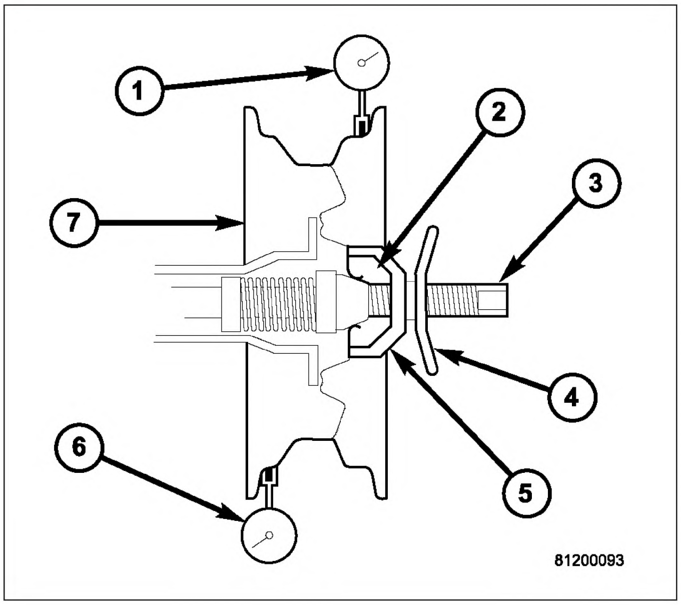
Lateral runout is the **wobble** of the tire or wheel.

Lateral runout of more than 2.0 mm (.080 inch) measured near the shoulder of the tire may cause the vehicle to shake.



Radial runout of more than 1.5 mm (.060 inch) measured at the center line of the tread may cause the vehicle to shake.

Sometimes radial runout can be reduced. Relocate the wheel and tire assembly on the mounting studs (See Method 1). If this does not reduce runout to an acceptable level, the tire can be rotated on the wheel. (See Method 2).



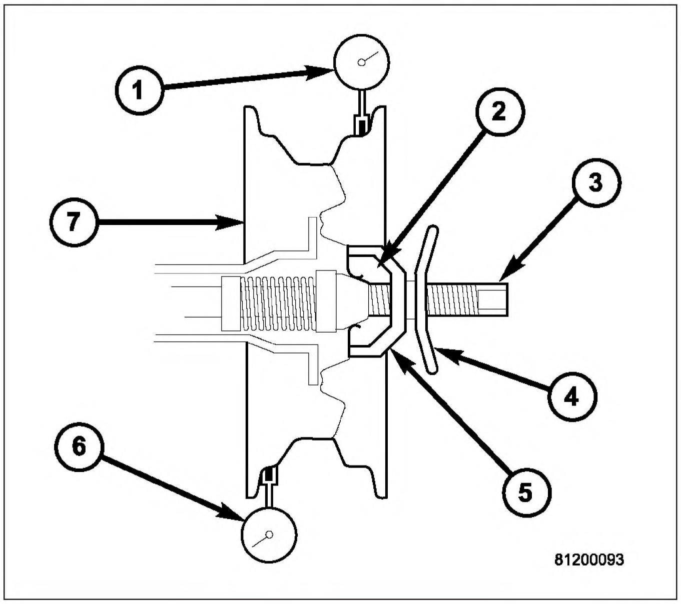
METHOD 1 (RELOCATE WHEEL ON HUB)

1. Drive vehicle a short distance to eliminate tire flat spotting from a parked position.
2. Check wheel bearings and adjust if adjustable or replace if necessary.
3. Check the wheel mounting surface.
4. Relocate wheel on the mounting, two studs over from the original position.
5. Tighten wheel nuts until all are properly torqued, to eliminate brake distortion.
6. Check radial runout. If still excessive, mark tire sidewall, wheel, and stud at point of maximum runout and proceed to Method 2.

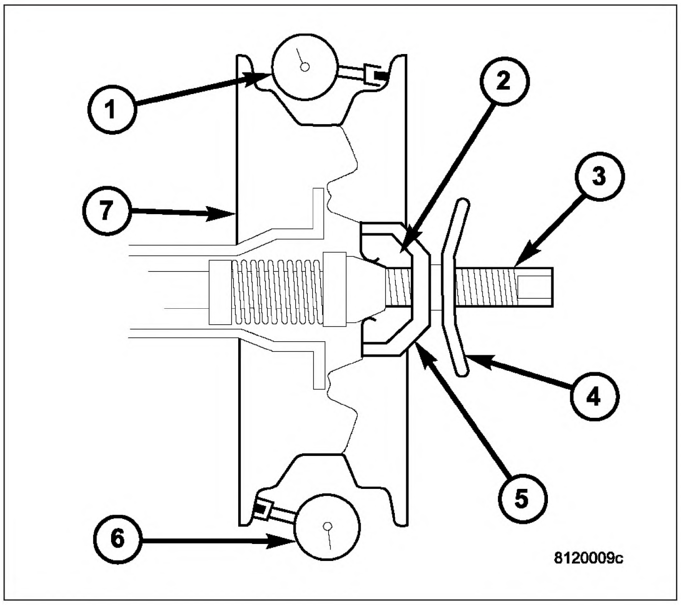
METHOD 2 (RELOCATE TIRE ON WHEEL)

NOTE: Rotating the tire on wheel is particularly effective when there is runout in both tire and wheel.

1. Remove tire from wheel and mount wheel on service dynamic balance machine.
2. Check the wheel radial runout.



3. Check the wheel lateral runout.
   - STEEL WHEELS: Radial runout 0.031 in., Lateral runout 0.031 in. (maximum)
   - ALUMINUM WHEELS: Radial runout 0.02 in., Lateral runout 0.025 in. (maximum)
4. If point of greatest wheel lateral runout is near original chalk mark, remount tire 180 degrees. Recheck runout.



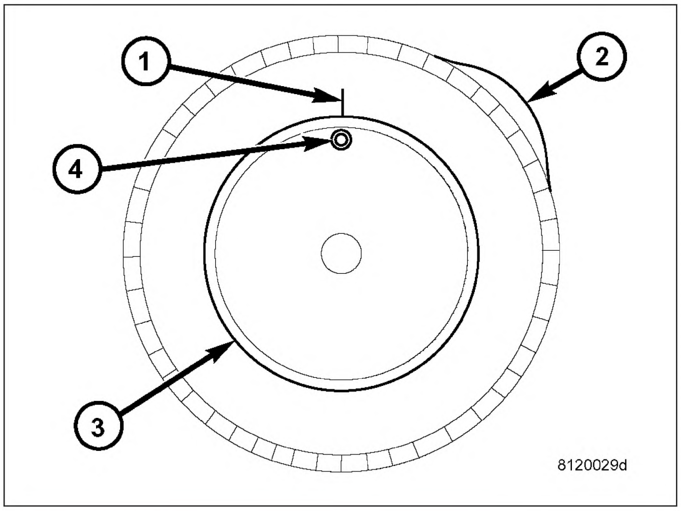
STANDARD PROCEDURE

MATCH MOUNTING

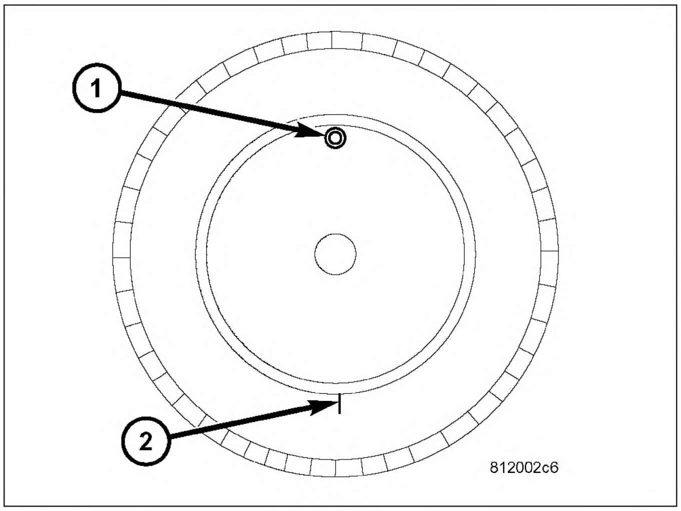
Wheels and tires that are mounted means that the high spot of the tire is matched to the low spot on the wheel rim. Each are marked with a bright colored temporary label on the outboard surface for alignment. The wheel is also marked permanently on the inside of the rim in the tire well. This permanent mark may be a paint dot or line, a permanent label or a stamped impression such as an X. An optional location mark is a small spherical indentation on the vertical face of the outboard flange on some non styled base steel wheels. The tire must be removed to locate the permanent mark on the inside of the wheel.

Before dismounting a tire from its wheel, a reference mark should be placed on the tire at the valve stem location. This reference will ensure that it is remounted in the original position on the wheel.

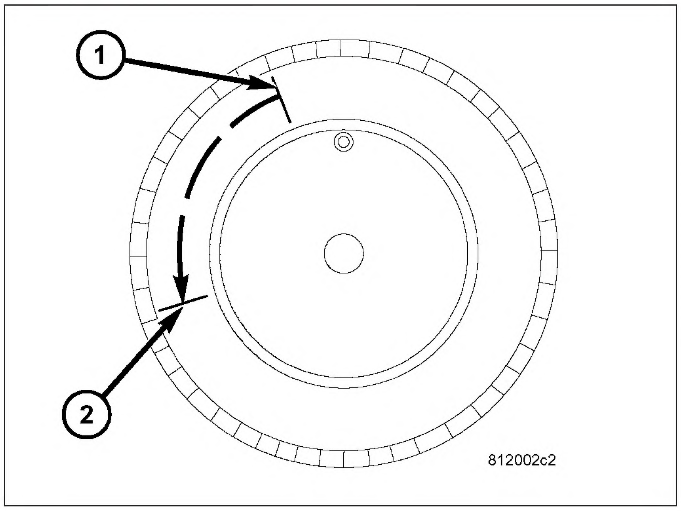
1. Remove the tire and wheel assembly from the vehicle and mount on a service dynamic balance machine.
2. Measure the total runout on the center of the tire tread rib (3) with a dial indicator. Record the indicator reading. Mark the tire to indicate the high spot (2). Place a mark on the tire at the valve stem (4) location (1).



3. Break down the tire and remount it 180 degrees on the rim (1)(2).
4. Measure the total indicator runout again. Mark the tire to indicate the high spot.



5. If runout is still excessive, the following procedures must be done.
   - If the high spot is within 101.6 mm (4.0 in.) of the first spot and is still excessive, replace the tire.
   - If the high spot is within 101.6 mm (4.0 in.) of the first spot on the wheel, the wheel may be out of specifications. Refer to Wheel and Tire Runout.
   - If the high spot is NOT within 101.6 mm (4.0 in.) of either high spot, draw an arrow on the tread from second high spot (1) to first (2). Break down the tire and remount it 90 degrees on rim in that direction. This procedure will normally reduce the runout to an acceptable amount, if not replace the rim.



TIRE AND WHEEL BALANCE

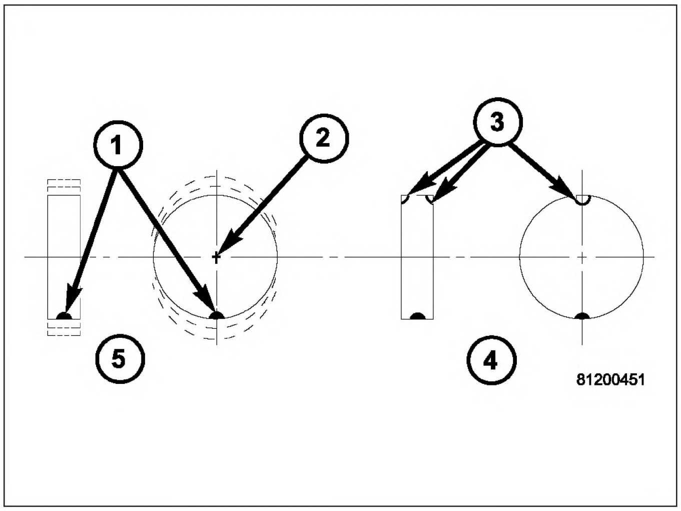
It is recommended that a two plane service dynamic balancer be used when a tire and wheel assembly require balancing. Refer to balancer operation instructions for proper cone mounting procedures. Typically use front cone mounting method for steel wheels. For aluminum wheel use back cone mounting method without cone spring.

NOTE: Static should be used only when a two plane balancer is not available.

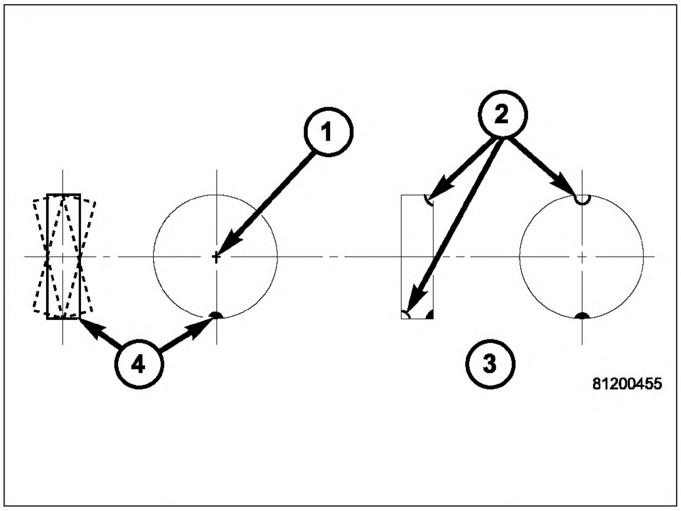
NOTE: Cast aluminum and forged aluminum wheels require coated balance weights and special alignment equipment.

Wheel balancing can be accomplished with either on or off vehicle equipment. When using on-vehicle balancing equipment, remove the opposite wheel/tire. Off-vehicle balancing is recommended.

For static balancing, find the location of the heavy spot (1) causing the imbalance (5). Counter balance wheel directly opposite the heavy spot. Determine weight required to counter balance the area of imbalance (4). Place half of this weight on the **inner** rim flange (3) and the other half on the **outer** rim flange (3).



For dynamic balancing (3), the balancing equipment is designed to locate the amount of weight to be applied to both the inner and outer rim flange (2).

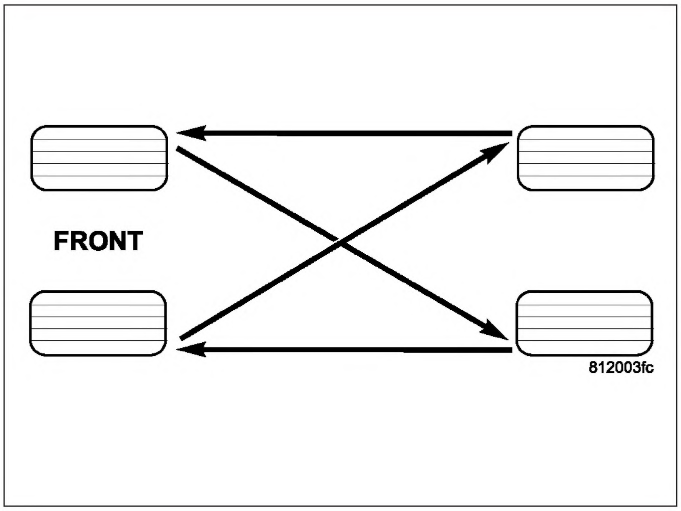


ROTATION

Tires on the front and rear operate at different loads and perform different steering, driving, and braking functions. For these reasons they wear at unequal rates and tend to develop irregular wear patterns. These effects can be reduced by rotating the tires at regular intervals. The benefits of tire rotation are:

- Increase tread life
- Maintain traction levels
- A smooth, quiet ride

The suggested method of tire rotation is shown in graphic. Other rotation methods can be used, but they will not provide all the tire longevity benefits.



SPECIFICATIONS

CAUTION: DO NOT USE CHROME PLATED LUG NUTS WITH CHROME PLATED WHEELS.

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Wheel Lug Nut	136 ± 20	100 ± 15	—
Spare Tire Winch	39	28	250

TIRES

DESCRIPTION

TIRES

Tires are designed and engineered for each specific vehicle. They provide the best overall performance for normal operation. The ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance, and tread life.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain in most cases, much greater mileage than severe use or careless drivers. A few of the driving habits which will shorten the life of any tire are:

- Rapid acceleration
- Severe brake applications
- High speed driving
- Excessive speeds on turns
- Striking curbs and other obstacles

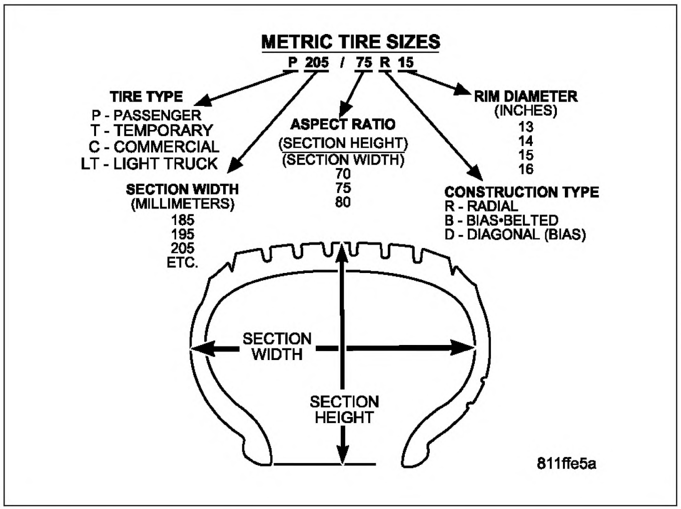
Radial-ply tires are more prone to irregular tread wear. It is important to follow the tire rotation interval (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE). This will help to achieve a greater tread life.

TIRE IDENTIFICATION

Tire type, size, aspect ratio and speed rating are encoded in the letters and numbers imprinted on the side wall of the tire. Refer to the chart to decipher the tire identification code.

Performance tires have a speed rating letter after the aspect ratio number. The speed rating is not always printed on the tire sidewall. These ratings are:

- **Q** up to 100 mph
- **S** up to 112 mph
- **T** up to 118 mph
- **U** up to 124 mph
- **H** up to 130 mph
- **V** up to 149 mph
- **Z** more than 149 mph (consult the tire manufacturer for the specific speed rating)


METRIC TIRE SIZES
P 205 / 75 R 15
TIRE TYPE
P - PASSENGER
T - TEMPORARY
C - COMMERCIAL
LT - LIGHT TRUCK
ASPECT RATIO
(SECTION HEIGHT)
(SECTION WIDTH)
70
75
80
RIM DIAMETER
(INCHES)
13
14
15
16
SECTION WIDTH
(MILLIMETERS)
185
195
205
ETC.
CONSTRUCTION TYPE
R - RADIAL
B - BIAS•BELTED
D - DIAGONAL (BIAS)
SECTION WIDTH
SECTION HEIGHT
811ffe5a

An All Season type tire will have either **M + S, M & S or M–S** (indicating mud and snow traction) imprinted on the side wall.

TIRE CHAINS

Tire snow chains may be used on **certain** models. Refer to the Owner's Manual for more information.

RADIAL-PLY TIRES

Radial-ply tires improve handling, tread life and ride quality, and decrease rolling resistance.

Radial-ply tires must always be used in sets of four. Under no circumstances should they be used on the front only. They may be mixed with temporary spare tires when necessary. A maximum speed of 50 MPH is recommended while a temporary spare is in use.

Radial-ply tires have the same load-carrying capacity as other types of tires of the same size. They also use the same recommended inflation pressures.

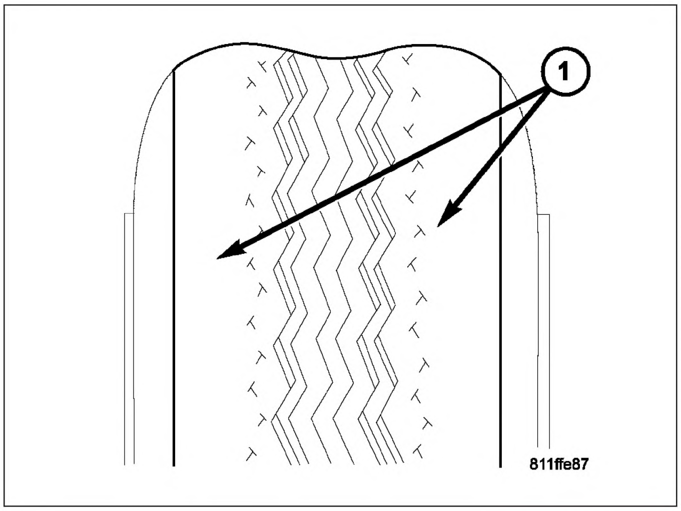
The use of oversized tires, either in the front or rear of the vehicle, can cause vehicle drive train failure. This could also cause inaccurate wheel speed signals when the vehicle is equipped with Anti-Lock Brakes.

The use of tires from different manufactures on the same vehicle is NOT recommended. The proper tire pressure should be maintained on all four tires.

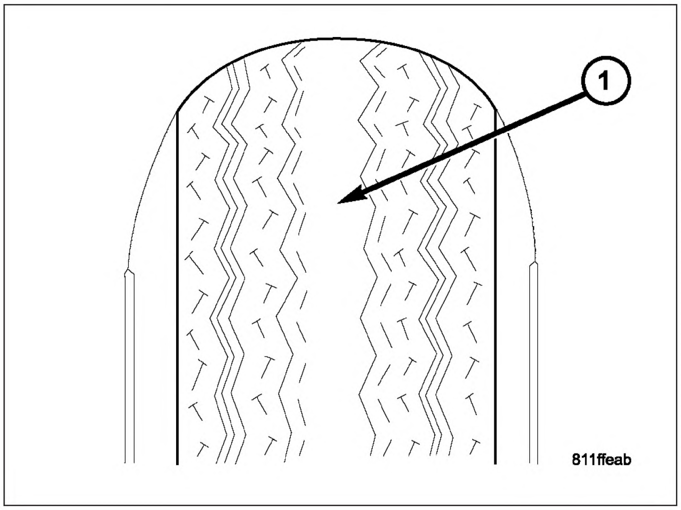
TIRE INFLATION PRESSURES

WARNING: OVER OR UNDER INFLATED TIRES CAN AFFECT VEHICLE HANDLING AND TREAD WEAR. THIS MAY CAUSE THE TIRE TO FAIL SUDDENLY, RESULTING IN LOSS OF VEHICLE CONTROL.

Under inflation will cause rapid shoulder wear (1), tire flexing, and possible tire failure.



Over inflation will cause rapid center wear (1) reduction in the tire's ability to cushion shocks.



Improper inflation can cause:

- Uneven wear patterns
- Reduced tread life
- Reduced fuel economy
- Unsatisfactory ride
- Vehicle drift

For proper tire pressure specification refer to the vehicles Owners Manual.

TIRE PRESSURE FOR HIGH SPEED

Refer to the Vehicles Owners Manual package.

SPARE / TEMPORARY TIRE

The temporary spare tire is designed for emergency use only. The original tire should be repaired or replaced at the first opportunity, then reinstalled. Do not exceed speeds of 50 M.P.H. when using the temporary spare tire. Refer to Owner's Manual for complete details.

FULL SIZE, SPARE WHEEL WITH MATCHING TIRE

The spare is a full usage wheel with a matching tire, It can be used within the (posted legal) speed limits or distance limitations as of the rest of the vehicles four tires. Refer to Owner's Manual for complete details.

REPLACEMENT TIRES

The original equipment tires provide a proper balance of many characteristics such as:

- Ride
- Noise
- Handling
- Durability
- Tread life
- Traction
- Rolling resistance
- Speed capability

It is recommended that tires equivalent to the original equipment tires be used when replacement is needed.

Failure to use equivalent replacement tires may adversely affect the safety and handling of the vehicle.

The use of oversize tires may cause interference with vehicle components. Under extremes of suspension and steering travel, interference with vehicle components may cause tire damage.

WARNING: FAILURE TO EQUIP THE VEHICLE WITH TIRES HAVING ADEQUATE SPEED CAPABILITY CAN RESULT IN SUDDEN TIRE FAILURE.

DIAGNOSIS AND TESTING

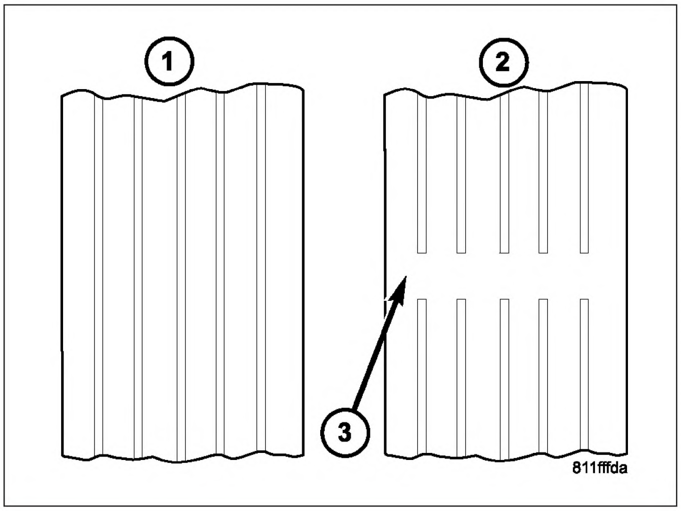
PRESSURE GAUGES

A quality air pressure gauge is recommended to check tire pressure. After checking the air pressure, replace valve cap finger tight.

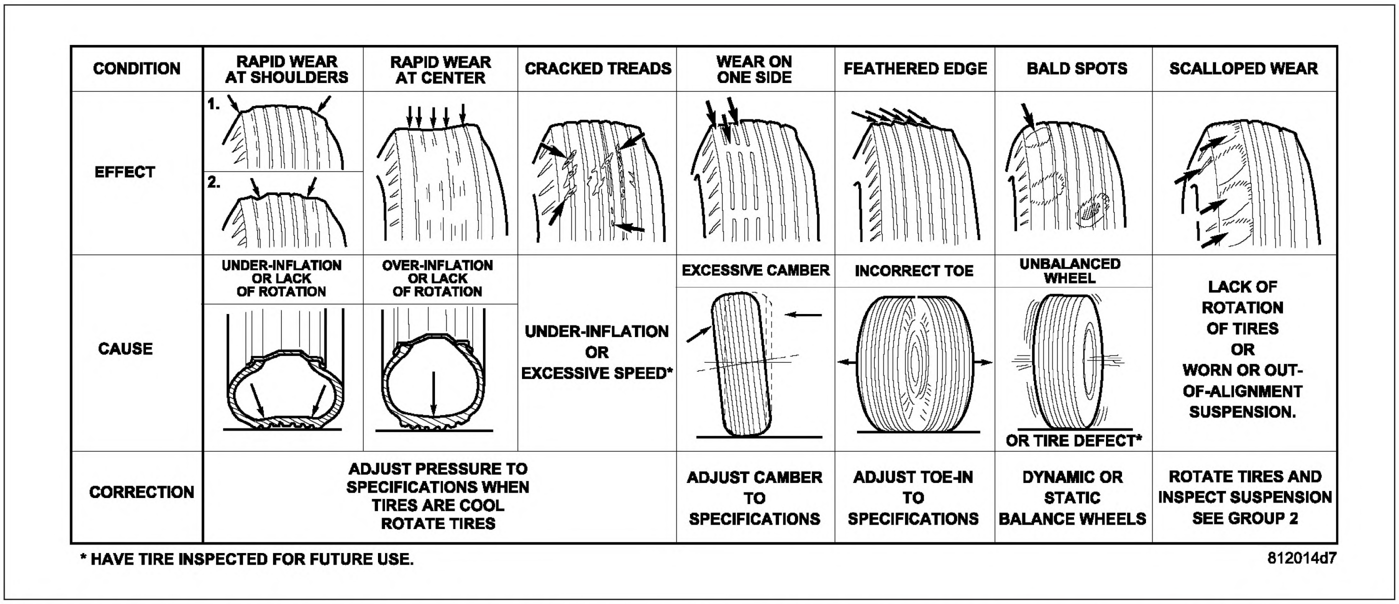
TREAD WEAR INDICATORS

Tread wear indicators (3) are molded into the bottom of the tread grooves. When tread depth is 1.6 mm (1/16 in.), the tread wear indicators (3) will appear as a 13 mm (1/2 in.) band.

Tire replacement is necessary when indicators appear in two or more grooves or if localized balding occurs.



TIRE WEAR PATTERNS



CONDITION	RAPID WEAR AT SHOULDERS	RAPID WEAR AT CENTER	CRACKED TREADS	WEAR ON ONE SIDE	FEATHERED EDGE	BALD SPOTS	SCALLOPED WEAR
EFFECT	1. 2.						
CAUSE	UNDER-INFLATION OR LACK OF ROTATION	OVER-INFLATION OR LACK OF ROTATION	UNDER-INFLATION OR EXCESSIVE SPEED*	EXCESSIVE CAMBER	INCORRECT TOE	UNBALANCED WHEEL OR TIRE DEFECT*	LACK OF ROTATION OF TIRES OR WORN OR OUT-OF-ALIGNMENT SUSPENSION.
CORRECTION	ADJUST PRESSURE TO SPECIFICATIONS WHEN TIRES ARE COOL ROTATE TIRES			ADJUST CAMBER TO SPECIFICATIONS	ADJUST TOE-IN TO SPECIFICATIONS	DYNAMIC OR STATIC BALANCE WHEELS	ROTATE TIRES AND INSPECT SUSPENSION SEE GROUP 2

* HAVE TIRE INSPECTED FOR FUTURE USE.

812014d7

Under inflation will cause wear on the shoulders of tire. Over inflation will cause wear at the center of tire.

Excessive camber causes the tire to run at an angle to the road. One side of tread is then worn more than the other.

Excessive toe-in or toe-out causes wear on the tread edges and a feathered effect across the tread.

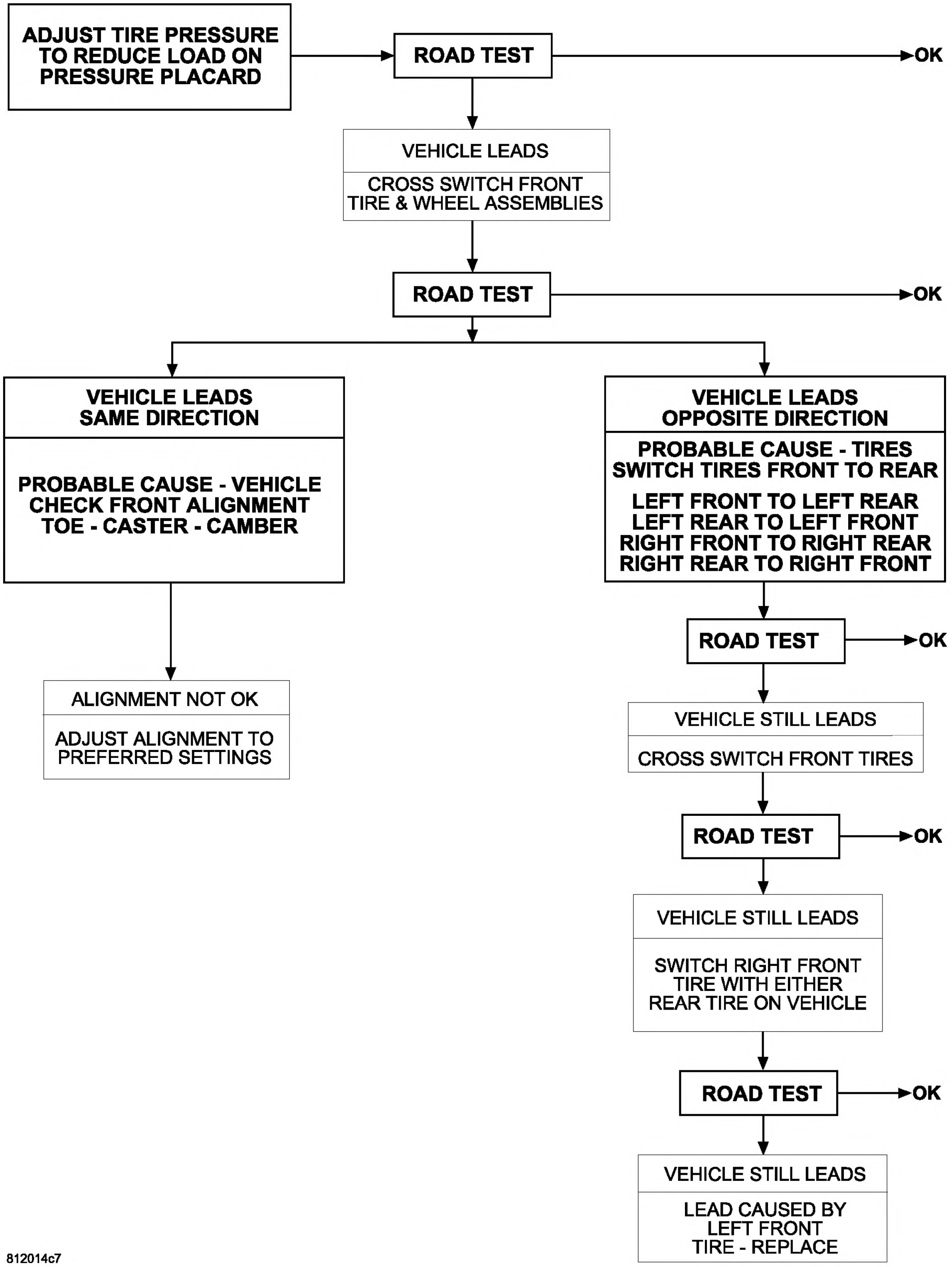
TIRE NOISE OR VIBRATION

Radial-ply tires are sensitive to force impulses caused by improper mounting, vibration, wheel defects, or possibly tire imbalance.

To find out if tires are causing the noise or vibration, drive the vehicle over a smooth road at varying speeds. Note the noise level during acceleration and deceleration. The engine, differential and exhaust noises will change as speed varies, while the tire noise will usually remain constant.

TIRE/VEHICLE LEAD

Use the following Vehicle Lead Diagnosis And Correction Chart to diagnose and correct a vehicle lead or drift problem.


ADJUST TIRE PRESSURE TO REDUCE LOAD ON PRESSURE PLACARD
ROAD TEST
OK
VEHICLE LEADS
CROSS SWITCH FRONT TIRE & WHEEL ASSEMBLIES
ROAD TEST
OK
VEHICLE LEADS SAME DIRECTION
PROBABLE CAUSE - VEHICLE CHECK FRONT ALIGNMENT TOE - CASTER - CAMBER
ALIGNMENT NOT OK
ADJUST ALIGNMENT TO PREFERRED SETTINGS
VEHICLE LEADS OPPOSITE DIRECTION
PROBABLE CAUSE - TIRES SWITCH TIRES FRONT TO REAR
LEFT FRONT TO LEFT REAR
LEFT REAR TO LEFT FRONT
RIGHT FRONT TO RIGHT REAR
RIGHT REAR TO RIGHT FRONT
ROAD TEST
OK
VEHICLE STILL LEADS
CROSS SWITCH FRONT TIRES
ROAD TEST
OK
VEHICLE STILL LEADS
SWITCH RIGHT FRONT TIRE WITH EITHER REAR TIRE ON VEHICLE
ROAD TEST
OK
VEHICLE STILL LEADS
LEAD CAUSED BY LEFT FRONT TIRE - REPLACE
812014c7

STANDARD PROCEDURE

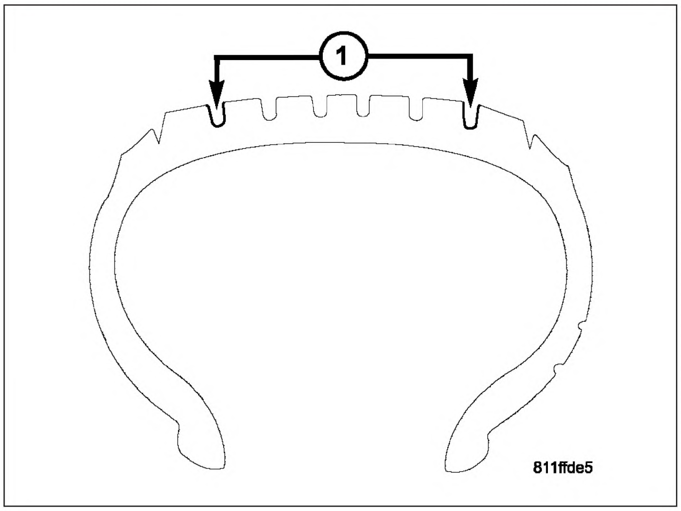
TIRE REPAIR AREA

For proper repairing, a radial tire must be removed from the wheel. Repairs should only be made if the defect, or puncture, is in the tread area (1). The tire should be replaced if the puncture is located in the sidewall.

Deflate tire completely before removing the tire from the wheel. Use lubrication such as a mild soap solution when dismounting or mounting tire. Use tools free of burrs or sharp edges which could damage the tire or wheel rim.

Before mounting tire on wheel, make sure all rust is removed from the rim bead and repaint if necessary.

Install wheel on vehicle, and tighten to proper torque specification.



CLEANING

TIRES

Remove the protective coating on the tires before delivery of a vehicle. This coating may cause deterioration of the tires.

To remove the protective coating, apply warm water and let it soak for a few minutes. Afterwards, scrub the coating away with a soft bristle brush. Steam cleaning may also be used to remove the coating.

NOTE: DO NOT use gasoline, mineral oil, oil-based solvent or a wire brush for cleaning.

SPECIFICATIONS

TIRE REVOLUTIONS PER MILE

DESCRIPTION	SPECIFICATION
TIRE SIZE	REVOLUTIONS PER MILE
P235/65R17	720
P245/65R17	708
245/65R17	684

SPARE TIRE WINCH

REMOVAL

NOTE: ″Do NOT use impact tools on the Spare Tire Winch assembly to raise or lower the Spare Tire.

1. Remove the spare tire.
2. Raise and support the vehicle.
3. Remove the three bolts securing the spare tire winch to the body and then remove the winch.

INSTALLATION

1. Install the winch to the body and tighten the three bolts to 39 N·m (28 ft.lbs.).
2. Lower the vehicle.

NOTE: ″Do NOT use impact tools on the Spare Tire Winch assembly to raise or lower the Spare Tire.

3. Install the spare tire back into position.

WHEELS

DESCRIPTION

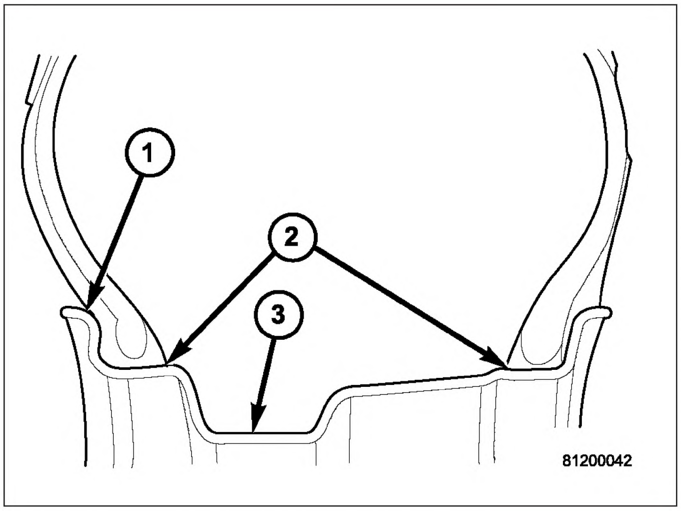
WHEEL DESIGN

The rim size is on the vehicle safety certification label located on the drivers door shut face. The size of the rim is determined by the drivetrain package. Original equipment wheels/rims are designed for operation up to the specified maximum vehicle capacity.

All models use stamped steel, cast aluminum or forged aluminum wheels. Every wheel has raised sections between the rim flanges (1) and rim drop well (3) called safety humps.

Initial inflation of the tire forces the bead over these raised sections. In case of rapid loss of air pressure, the raised sections help hold the tire on the wheel.

The wheel studs and nuts are designed for specific applications. All aluminum and some steel wheels have wheel stud nuts with an enlarged nose. This enlarged nose is necessary to ensure proper retention of the wheels. Do not use replacement studs or nuts with a different design or lesser quality.



DIAGNOSIS AND TESTING

WHEEL INSPECTION

Inspect wheels for:

- Excessive run out
- Dents or cracks
- Damaged wheel lug nut holes
- Air Leaks from any area or surface of the rim

NOTE: Do not attempt to repair a wheel by hammering, heating or welding.

If a wheel is damaged an original equipment replacement wheel should be used. When obtaining replacement wheels, they should be equivalent in load carrying capacity. The diameter, width, offset, pilot hole and bolt circle of the wheel should be the same as the original wheel.

WARNING: FAILURE TO USE EQUIVALENT REPLACEMENT WHEELS MAY ADVERSELY AFFECT THE SAFETY AND HANDLING OF THE VEHICLE. USED WHEELS ARE NOT RECOMMENDED. THE SERVICE HISTORY OF THE WHEEL MAY HAVE INCLUDED SEVERE TREATMENT OR VERY HIGH MILEAGE. THE RIM COULD FAIL WITHOUT WARNING.

STANDARD PROCEDURE

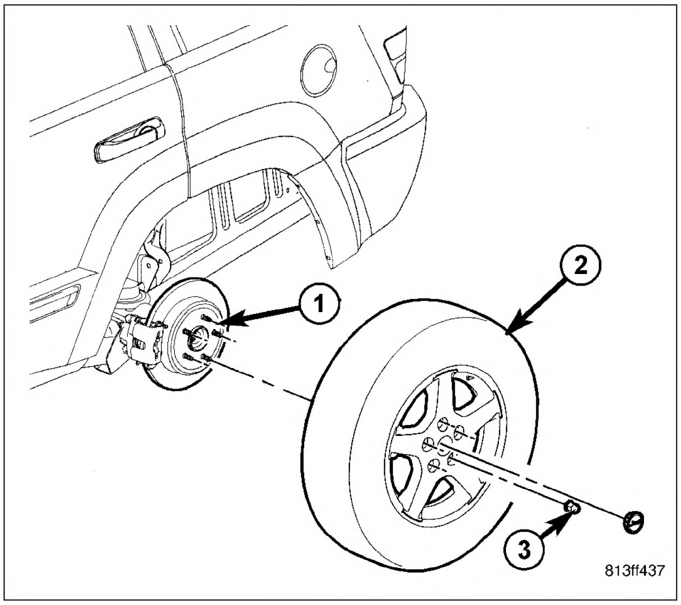
WHEEL INSTALLATION

The wheel studs and nuts are designed for specific applications. They must be replaced with equivalent parts. Do not use replacement parts of lesser quality or a substitute design. All aluminum and some steel wheels have wheel stud nuts which feature an enlarged nose. This enlarged nose is necessary to ensure proper retention of the aluminum wheels.

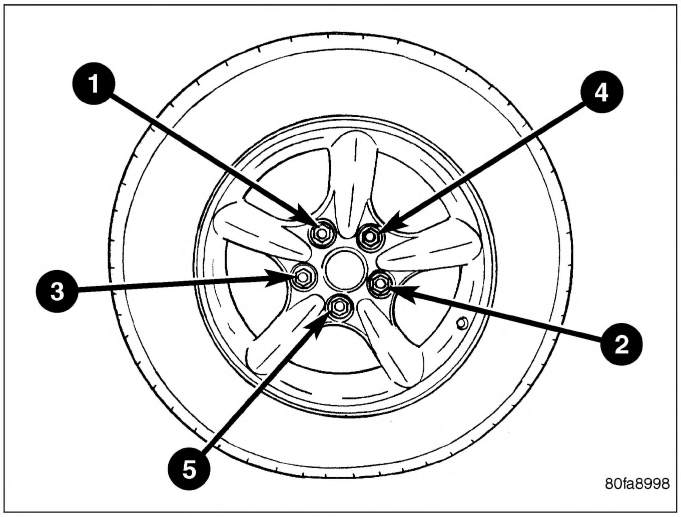
NOTE: Do not use chrome plated lug nuts with chrome plated wheels.

Before installing the wheel, be sure to remove any build up of corrosion on the wheel mounting surfaces (1). Ensure wheels (2) are installed with good metal-to-metal contact. Improper installation could cause loosening of wheel nuts. This could affect the safety and handling of your vehicle.

To install the wheel (2) , first position it properly on the mounting surface (1). All wheel nuts (3) should then be tightened just snug.



Gradually tighten them in sequence to the proper torque specification. **Never use oil or grease on studs or nuts.**



WHEEL REPLACEMENT

The wheel studs and nuts are designed for specific applications. They must be replaced with equivalent parts. Do not use replacement parts of lesser quality or a substitute design. All aluminum and some steel wheels have wheel stud nuts which feature an enlarged nose. This enlarged nose is necessary to ensure proper retention of the aluminum wheels.

NOTE: Do not use chrome plated lug nuts with chrome plated wheels.

Before installing the wheel, be sure to remove any build up of corrosion on the wheel mounting surfaces. Ensure wheels are installed with good metal-to-metal contact. Improper installation could cause loosening of wheel nuts. This could affect the safety and handling of your vehicle.

To install the wheel, first position it properly on the mounting surface. All wheel nuts should then be tightened just snug. Gradually tighten them in sequence to the proper torque specification. **Never use oil or grease on studs or nuts.**

Wheels must be replaced if they have:

- Excessive runout

- Bent or dented
- Leak air through welds
- Have damaged bolt holes

Wheel repairs employing hammering, heating, or welding are not allowed.

Original equipment wheels are available through your dealer. Replacement wheels from any other source should be equivalent in:

- Load carrying capacity
- Diameter
- Pilot Bore Diameter
- Width
- Offset
- Mounting configuration

Failure to use equivalent replacement wheels may affect the safety and handling of your vehicle. Replacement with **used** wheels is not recommended. Their service history may have included severe treatment.

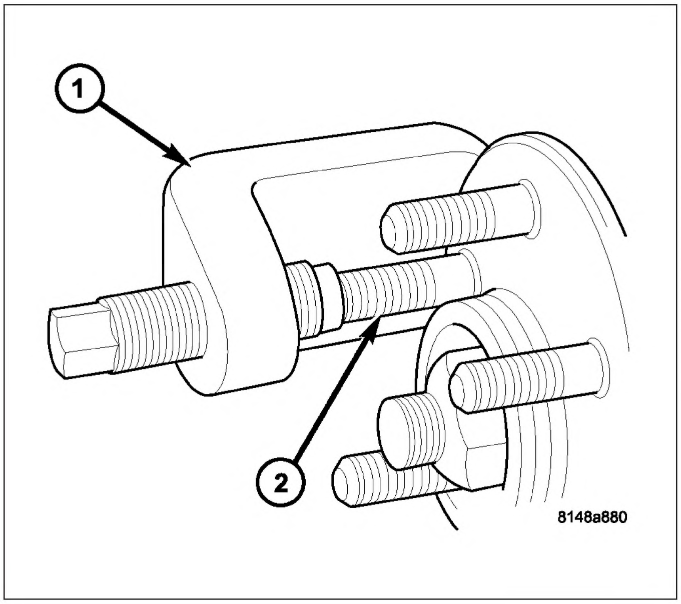
STUDS

REMOVAL

FRONT WHEEL STUD

CAUTION: Do not use a hammer to remove wheel studs.

1. Raise and support vehicle.
2. Remove wheel and tire assembly.
3. Remove brake caliper, caliper adapter and rotor, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ ROTORS - REMOVAL).
4. Remove stud (2) from hub with Remover C-4150-A (1).

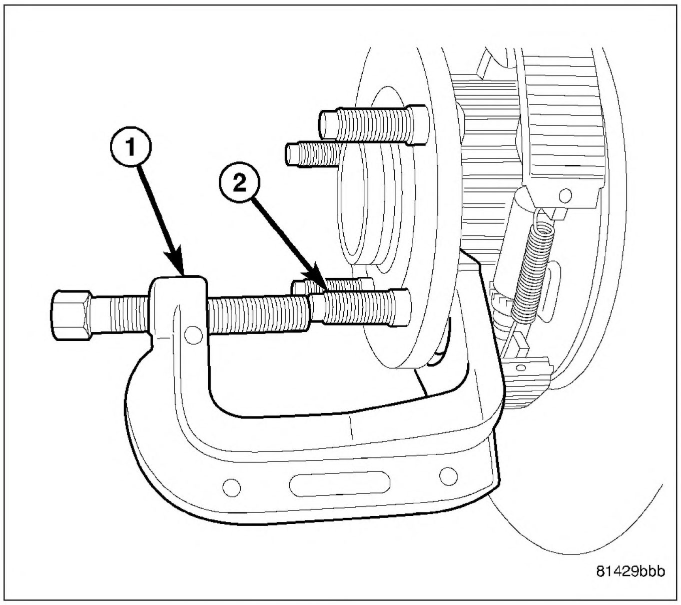


REAR WHEEL STUD

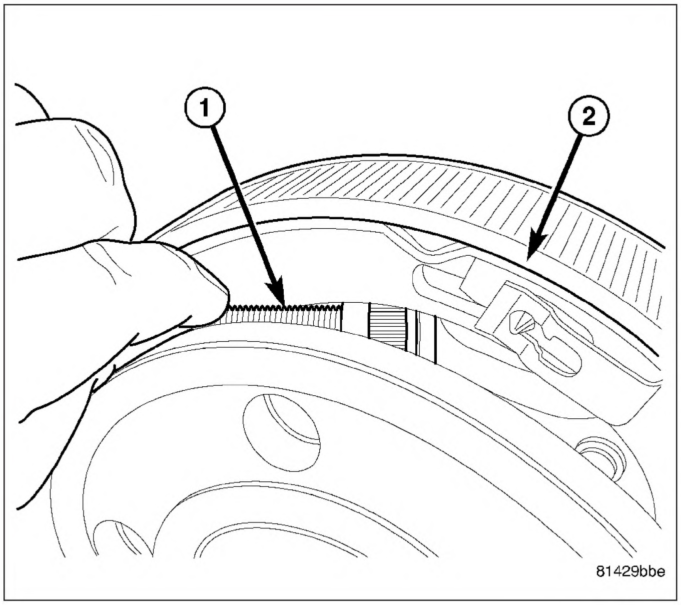
CAUTION: Do not use a hammer to remove wheel studs.

1. Raise and support vehicle.
2. Remove wheel and tire assembly.

3. Remove brake caliper and rotor, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL).
4. Remove stud (2) from hub with Remover 8677 (1).



5. Remove the stud (1) from between the hub/bearing and brake shoes (2)



INSTALLATION

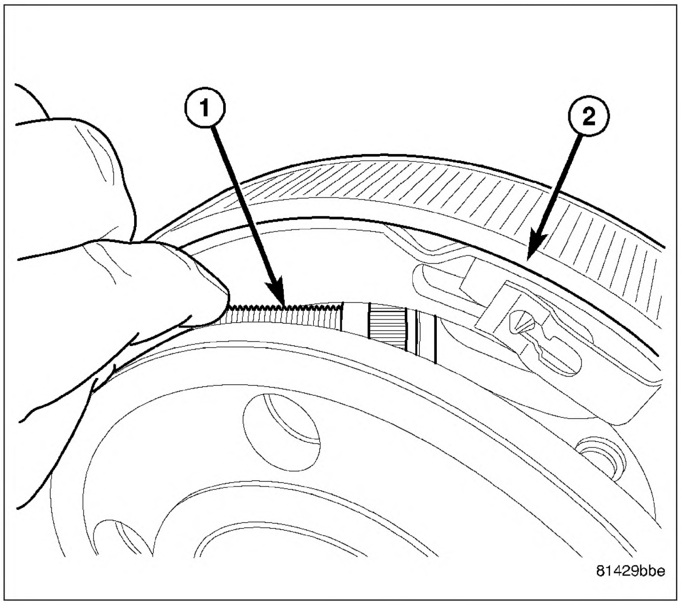
FRONT WHEEL STUD

CAUTION: Do not use a hammer to remove wheel studs.

1. Install the new stud into the hub flange.
2. Install the three washers onto the stud, then install the lug nut with the flat side of the nut against the washers.
3. Tighten the lug nut until the stud is pulled into the hub flange. Verify that the stud is properly seated into the flange.
4. Remove the lug nut and washers.
5. Install the brake rotor, caliper adapter, and caliper, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).
6. Install the wheel and tire assembly, use new lug nut on stud or studs that were replaced.
7. Remove the support and lower vehicle.

REAR WHEEL STUD

1. Install the new stud (1) into the hub flange by rotating the stud (1) in between the hub/bearing and park brake shoes (2).



2. Install the three washers onto the stud, then install the lug nut with the flat side of the nut against the washers.
3. Tighten the lug nut until the stud is pulled into the hub flange. Verify that the stud is properly seated into the flange.
4. Remove the lug nut and washers.
5. Install the brake rotor and caliper, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION).
6. Install the wheel and tire assembly, use new lug nut on stud or studs that were replaced.
7. Remove the support and lower vehicle.

TIRE PRESSURE MONITORING SYSTEM

DESCRIPTION

BASE TIRE PRESSURE MONITORING

This system will consist of tire pressure monitoring sensors attached to each wheel through the valve stem mounting hole, a central receiver module (WCM) and a amber colored indicator lamp. A sensor shall be installed in the spare wheel if the vehicle is equipped with a matching full size spare wheel and tire assembly.

PREMIUM TIRE PRESSURE MONITORING

The system will consist of tire pressure monitoring sensors attached to each wheel through the valve stem mounting hole, a wireless control module (WCM), Three Wheel Sensor transponders are mounted in the wheel wells (2 in the front and 1 in the rear wheel wells). a re-configurable dot matrix display module and an amber colored ISO standard Indicator Lamp. A sensor shall be installed in the spare wheel if the vehicle is equipped with a matching full size spare wheel and tire assembly.

WIRELESS CONTROL MODULE (WCM)

The receiver circuit for the TPM system is integrated into the WCM. The WCM also includes the Remote Keyless Entry (RKE) receiver and the Sentry Key Immobilizer (SKIM) receiver. All three receivers share a number or common components. The WCM decodes the RF signals transmitted by each of the vehicle’s tire pressure sensors. The decoded information is used to determine if ″warning″ or ″fault″ conditions exist within the TPM system.

The WCM communicates with the module that controls the ″ISO Indicator Lamp″ and the text display (Premium system), via the vehicle bus system (CAN B).

Upon detection of a warning or fault condition, the WCM will send a request to illuminate the Indicator Lamp. Also, upon detection of a warning or fault condition, the display module will send a request to sound the ″chime″. A chime will only be requested once per ignition cycle per warning or fault condition detected.

The WCM will store all warning and fault conditions, placard pressure values, low-pressure threshold values and low pressure threshold hysterisis values in memory that can be accessed through diagnostic communication. If new sensors are introduced to the vehicle, the data stored for the sensor being replaced will be deleted.

The WCM will store all wheel sensor ID's and locations and faults in memory that can be accessed through diagnostic communication. All other data values transmitted from each wheel sensor shall be stored in the WCM memory.

OPERATION

BASE TIRE PRESSURE MONITORING

The tire pressure monitoring system is designed to operate without loss of function for all types of standard tire constructions. (Function with different types of run flat tire constructions needs to be evaluated for each design). The wheel sensor shall monitor tire pressure, air temperature inside the tire, wheel acceleration and the sensor internal battery status for all four active road tires. The sensor will broadcast this information, along with a unique 32 bit ID, to a central receiver circuit located inside the WCM. The information received by the WCM will be decoded and stored in memory (RAM) in the WCM. If a ″warning or ″fault″ condition exists, the WCM will send a bus message request to illuminate the amber colored indicator lamp and to sound the chime.

If the WCM detects a warning or fault condition at ignition key ″on″ it will wait ten seconds +/- 10 % before sending the first request to illuminate the Indicator Lamp. This will assure that the display module has concluded its bulb check period. The display module will request a chime once per ignition cycle for each ″warning″ or ″fault″ condition detected. A ″warning″ or ″fault″ condition will remain enabled until the problem causing the condition is corrected and removed/reset.

The WCM shall continuously monitor for the receipt of tire pressure RF message transmissions from the wheel sensors during both the ignition key ″on″ and key ″off″ cycles. The wheel sensor ID's and the location of each sensor (e.g. Tire 1, Tire 2 etc.) are stored in the WCM non-volatile memory during the initial Manufacturing Plant Process, or during a service procedure, as required. The recommended ″placard pressure″, ″low-pressure threshold″ and “Hysteresis Pressure Values” for the tires installed on the vehicle, are stored in the WCM non-volatile memory during the initial Manufacturing Plant Process, or during a service procedure, as required. (Note: For vehicles with optional wheel/tire sizes and significantly different tire placard pressures, the placard pressure value and the low-pressure threshold value shall be re-programmable by the dealer to accommodate the customer selected wheel/tire combinations recommended by DaimlerChrysler).

PREMIUM TIRE PRESSURE MONITORING

The tire pressure monitoring system is designed to operate without loss of function for all types of standard tire constructions. (Function with different types of run flat tire constructions needs to be evaluated for each design). The wheel sensor shall monitor tire pressure, air temperature inside the tire, wheel acceleration and the sensor internal battery status for all four active road tires and the spare tire, if so equipped. The sensor will broadcast this information, along with a unique 32 bit ID, to a central receiver circuit located inside the WCM. The information received by the WCM will be decoded and stored in (RAM) memory in the WCM. The WCM will send bus messages to the re-configurable display module to display the pressures of the four active road tires in vehicle position. The spare tire pressure is monitored but it is not displayed.

If a ″warning″ or ″fault″ condition exists, the WCM will send a bus message request to display the text messages and, when required, illuminate the amber colored ISO Indicator Lamp. ″Warnings″ and ″faults″ are described in more detail below. If the WCM detects a warning or fault condition at ignition key ″on″ it will wait ten seconds +/- 10% before sending the first request to illuminate the Indicator Lamp and to display the text messages. This will assure that the display module has concluded its bulb check period. The display module will request a chime once per ignition cycle for each ″warning″ or ″fault″ condition detected. A ″warning″ or ″fault″ condition will remain enabled until the problem causing the condition is corrected and removed/reset

The WCM shall continuously monitor for the receipt of tire pressure RF message transmissions from the wheel sensors during both the ignition key ″on″ and key ″off″ cycles. The wheel sensor ID's and the location of each sensor (e.g. Left Front, Right Front etc.) are stored in the WCM non-volatile memory during the initial Manufacturing Plant Process, or during a service procedure, as required. The recommended ″placard pressure″, ″low-pressure threshold″ and Hysteresis Pressure Values for the tires installed on the vehicle, are stored in the WCM non-volatile memory during the initial Manufacturing Plant Process, as described later in this document or during a service procedure as required. (Note: For vehicles with optional wheel/tire sizes and significantly different tire placard pressures, the placard pressure value and the low-pressure threshold value shall be re-programmable by the dealer to accommodate the customer selected wheel/tire combinations recommended by DaimlerChrysler).

DIAGNOSIS AND TESTING - TIRE PRESSURE MONITORING SYSTEM

All Tire Pressure Monitoring System Faults are specific to one location. If a ″BATTERY LOW″ or ″SENSOR FAILURE″ fault is detected, the location will be displayed (Premium Systems). The appropriate sensor/transmitter can then be replaced. If a single sensor/transmitter cannot be detected by the WCM, replace that sensor transmitter. If none of the sensors/transmitters can be detected, refer to symptoms in the WCM section. For additional system description and diagnosis, refer to Tire Pressure Monitoring in the Body Diagnostic manual.

SPECIFICATIONS

TORQUE CHART

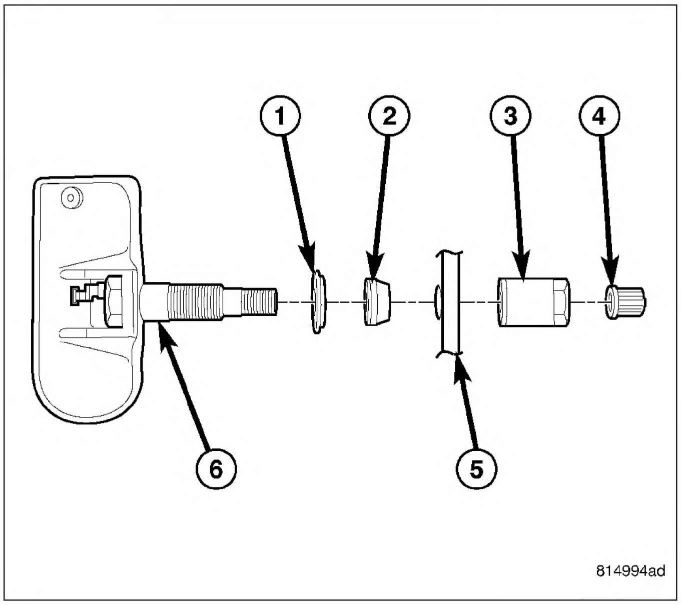
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Tire Pressure Sensor/ Transmitter Mounting Nut	7.5	—	66
Transponder Front	4	—	35
Transponder Rear	3	—	25

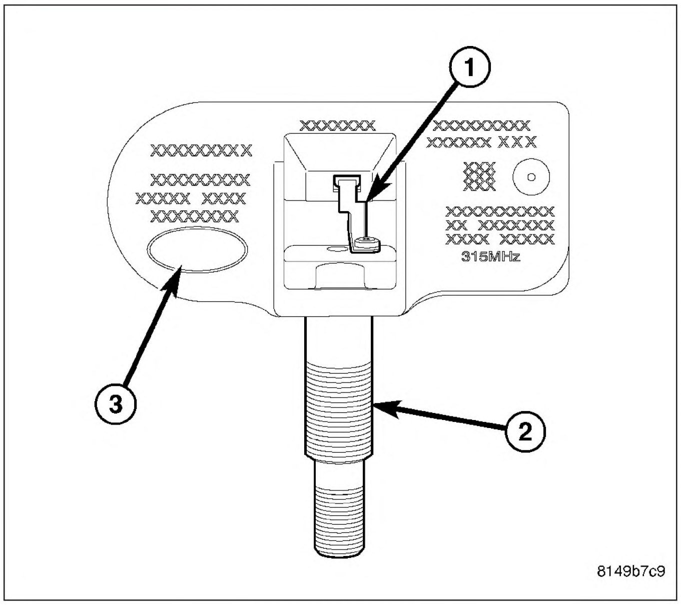
SENSOR

DESCRIPTION

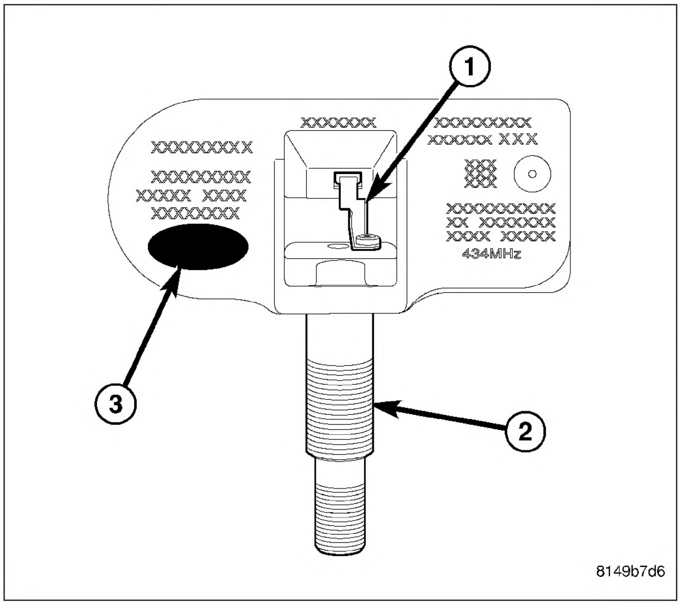
On vehicles equipped with Tire Pressure Monitoring (TPM), one tire pressure sensor (6) is mounted to each wheel (5) in place of the traditional tire valve stem. Each sensor has an internal battery that lasts up to 10 years. The battery is not serviceable. At the time of battery failure, the sensor must be replaced.



The TPM system operates on a 315 MHz radio frequency. The 315 MHz sensors can be easily identified by a white outline oval (black center) insignia (3) on the sensor body.



The Export TPM system operates on a 434 MHz radio frequency. The 434 MHz sensors can be easily identified by a solid white oval insignia (3) on the body.

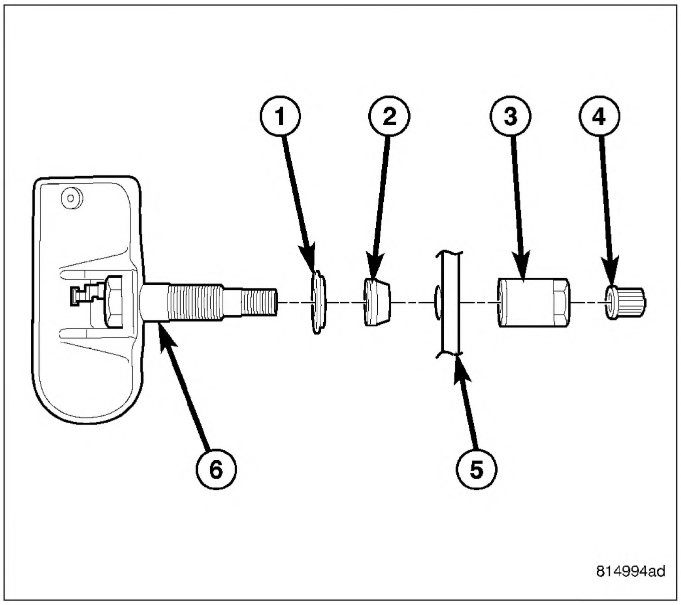


CAUTION: Although 315 MHz and 434 MHz sensors are identical in size and shape, they are not interchangeable. Always make sure the correct sensor is being used.

The TPM sensors are designed for original style factory wheels. **Do not attempt to install a tire pressure sensor in an aftermarket wheel.**

The serviceable components of the tire pressure sensor are :

- Sensor-To-Wheel Seal (2) and Metal Washer (1)
- Valve Stem Cap (4)
- Valve Stem Core
- Valve Stem Nut (with pressed-in washer) (3)



The valve stem caps and cores used are specifically designed for the tire pressure monitoring sensors. Although similar to standard valve stem caps and cores, they are different. The valve stem cap has a special seal inside to keep moisture and corrosion out. The valve stem core has a special nickel coating to protect from corrosion.

OPERATION

The battery operated tire pressure sensors lay dormant (Park Mode), then wake and start transmitting (Drive Mode) when the vehicle first reaches speeds over 20 mph (32 km/h). Once the wheels stop rotating for a period of approximately 20 minutes, the sensors shut down until again awaken. Although not transmitting as when in Drive Mode, while in Park Mode, the sensors still transmit approximately once every 13 hours to let the receiver know air pressure status at that time.

Using an RF signal, each sensor transmits tire pressure data approximately once every minute. Each sensor's (transmitter) broadcast is uniquely coded so that the wireless control module (WCM) can monitor the state of each of the sensors on the four rotating road wheels. The WCM automatically learns and stores the sensor's ID while driving after a sensor has been replaced. **There is no formal retraining procedure necessary.**

For additional information, refer to appropriate diagnostic information.

CAUTION

CAUTION: The use of tire sealants is strictly prohibited for vehicles equipped with the Tire Pressure Monitoring system. Tire sealants can clog tire pressure sensors.

CAUTION: Tire pressure sensor valve stem caps and cores are specially designed for the sensors. Due to risk of corrosion, do not use a standard valve stem cap or core in a tire pressure sensor in place of the original equipment style sensor cap and core.

CAUTION: Do not attempt to install a tire pressure sensor in an aftermarket wheel. Use tire pressure sensors in original style factory wheels only.

CAUTION: Any time a sensor is to be installed in a wheel, a new seal and washer must be installed on the stem to ensure air tight sealing.

NOTE: TPM thresholds have been established for the original tire size equipped on the vehicle. Use original size tires only to maintain system accuracy.

DIAGNOSIS AND TESTING

TIRE PRESSURE SENSOR

NOTE: Tire pressure may increase from 2 to 6 psi (14 to 41 kPa) during normal driving conditions. Do NOT reduce this normal pressure build up.

When diagnosing a tire pressure issue, always check air pressure in the tires first with a known accurate air gauge. Adjust air pressure as necessary to that listed on the Tire Inflation Pressure Label (Placard) provided with the vehicle (usually applied to the driver's side B-pillar). After adjusting air pressure in a tire, allow approximately two minutes for the message or indicator lamp to go out.

Check the tire pressure indicator lamp in the instrument cluster. If the lamp is illuminating continuously, proceed as listed below. If the indicator lamp is flashing on/off for 10 seconds, once every ten minutes, there is a system fault detected. Refer to the appropriate diagnostic information.

If air pressure in any tire is low, inspect **all** the tires for leaks. A water "dunk tank" or other water test may be used to check for a leak around the sensor as long as any water at the valve core is removed once the procedure is completed. The water can be easily expelled from the core area by pushing in on the core for several seconds, allowing escaping air to drive out any moisture. Reinflate the tire as necessary. Always make sure the original valve stem cap is securely installed to keep moisture out of the sensor.

If the gauge-read pressure in the tires does not indicate a tire pressure issue, refer to the appropriate diagnostic information.

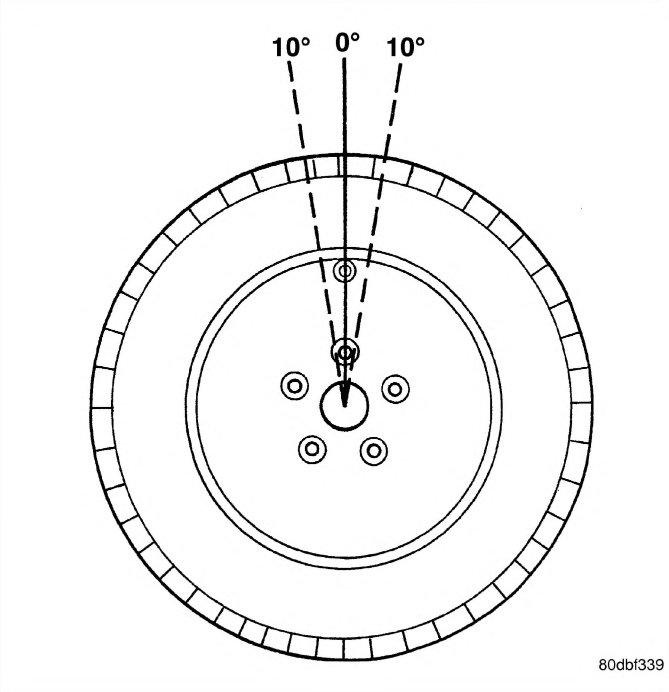
REMOVAL

1. Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)
2. Remove the tire and wheel assembly. (Refer to 22 - TIRES/WHEELS - REMOVAL)

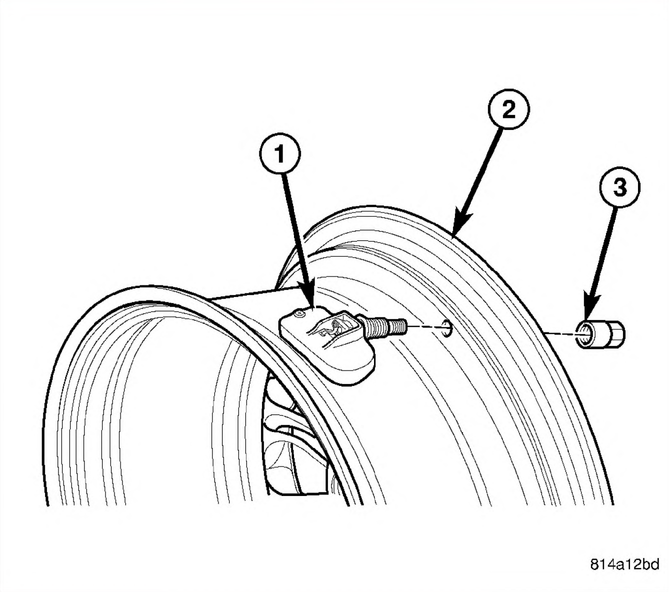
CAUTION: The cap used on this valve stem contains an O-ring seal to prevent contamination and moisture from entering the valve stem. Retain this valve stem cap for reuse. Do not substitute a regular valve stem cap in its place.

CAUTION: The valve stem used on this vehicle is made of aluminum and the core is nickel plated brass. The original valve stem core must be reinstalled and not substituted with a valve stem core made of a different material. This is required to prevent corrosion in the valve stem caused by the different metals.

3. Dismount tire from wheel following tire changer manufacturers instructions while paying special attention to the following to avoid damaging the pressure sensor:
   a. When breaking the tire bead loose from the wheel rim, avoid using the Bead Breaker in the area of the sensor. That includes both front and rear beads of the tire.
   b. When preparing to dismount the tire from the wheel, carefully insert the mounting/dismounting tool at the valve stem ± 10°, then proceed to dismount the tire from the wheel. Use this process on both the upper and lower tire beads.



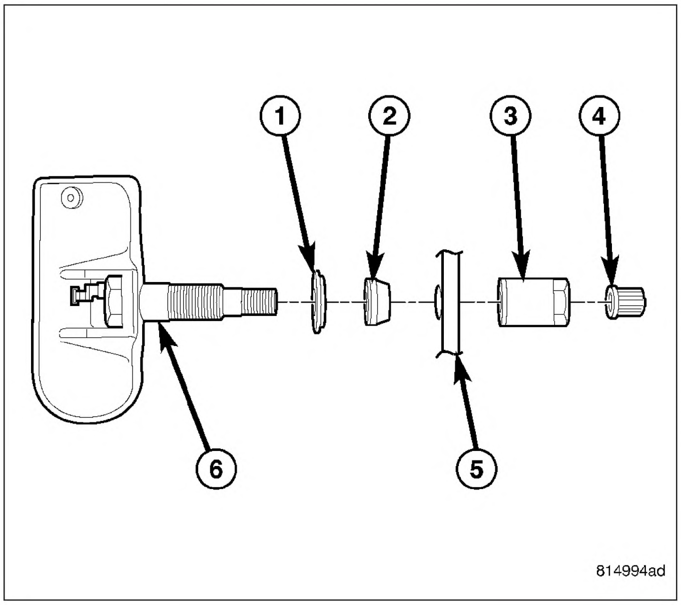
4. Remove sensor nut (3) retaining sensor to wheel. While removing nut, hold pressure against rear of metal valve stem (See Arrow) to keep valve stem from pushing rearward, damaging antenna strap.
5. Remove sensor (1) from wheel (2).



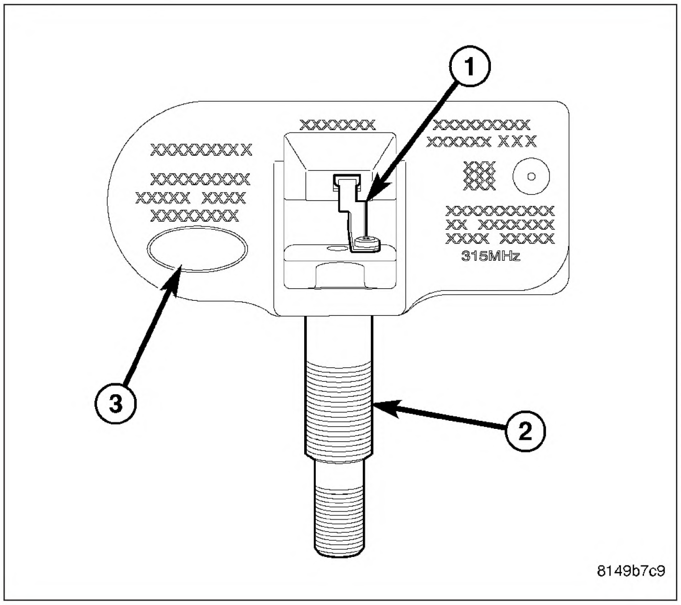
INSTALLATION

NOTE: Before reinstalling an existing tire pressure sensor, replace seal (2) and metal washer (1) at base of sensor valve stem (6) to ensure proper sealing.

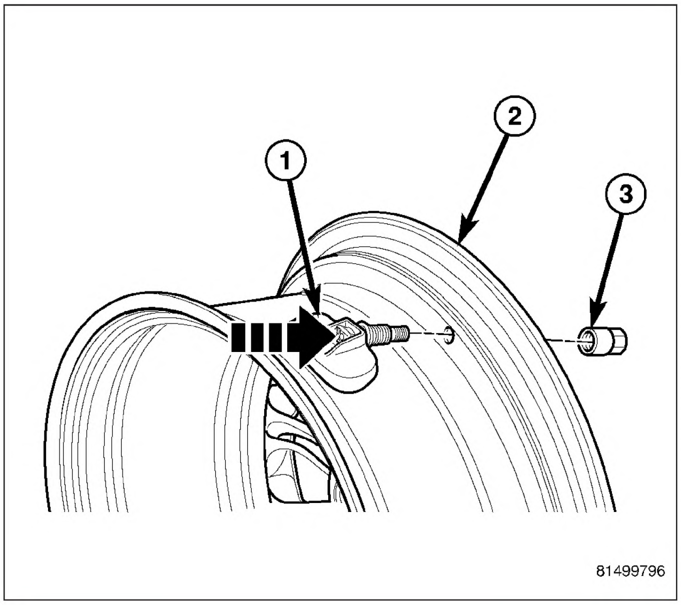
1. Wipe area clean around sensor/valve stem mounting hole in wheel (5). Make sure surface of wheel is not damaged.


1
2
3
4
6
5
814994ad

CAUTION: To avoid damaging sensor antenna strap (1), hold pressure against rear of metal valve stem (2) while sensor is inserted through wheel mounting hole and nut is installed.


1
XXXXXXX
XXXXXXXXX
XXXXXX XXX
XXXXXXXXX
XXXXXXXXX
XXXXX XXXX
XXXXXXXX
XXX
XXX
XXX
XXXXXXXXXX
XX XXXXXXX
XXXX XXXXX
315MHz
3
2
8149b7c9

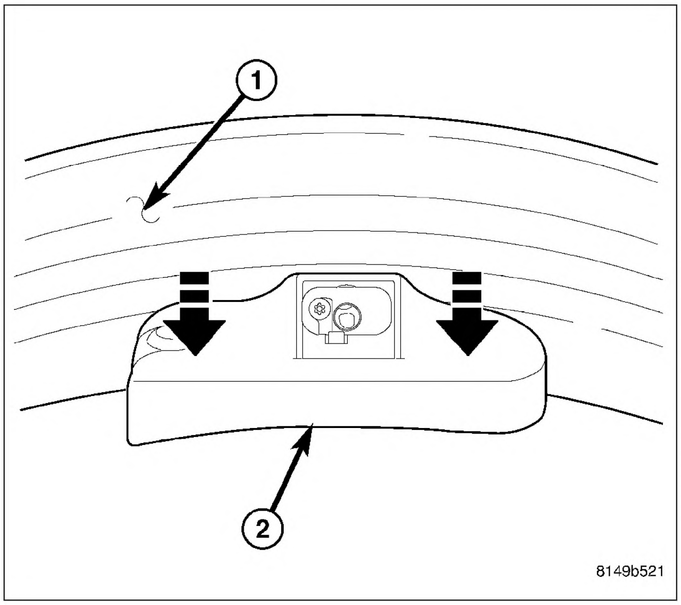
2. Insert sensor (1) through wheel (2) as shown keeping pressure against rear of metal valve stem (See Arrow). Potted side of sensor is to be positioned toward wheel. Do not attempt to mount sensor otherwise, damage may occur.
3. Install sensor nut (with pressed-in washer) (3) by hand.


2
1
3
81499796

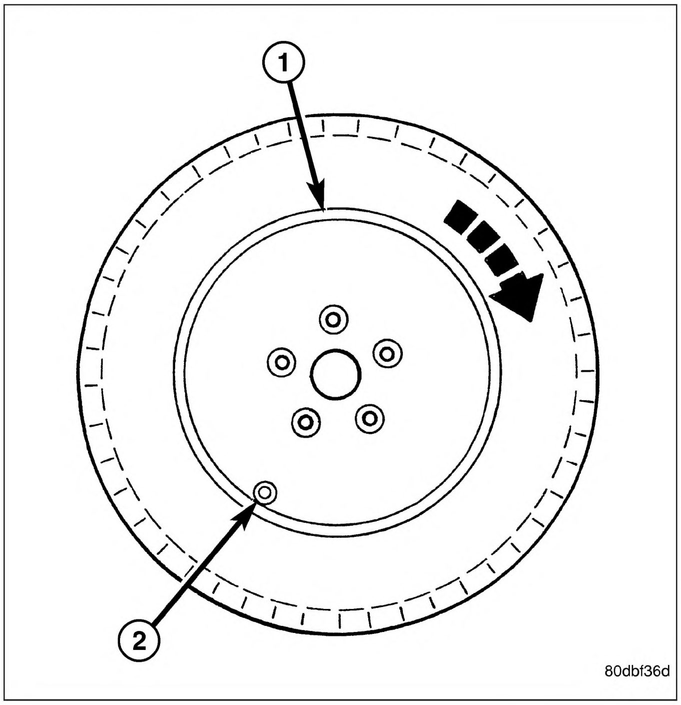
NOTE: Before tightening sensor nut, push downward on sensor housing (2) in an attempt to make it flush with interior contour of wheel (1).

4. While holding sensor in position, tighten sensor nut to 7.5 N·m (66 in. lbs.) torque.

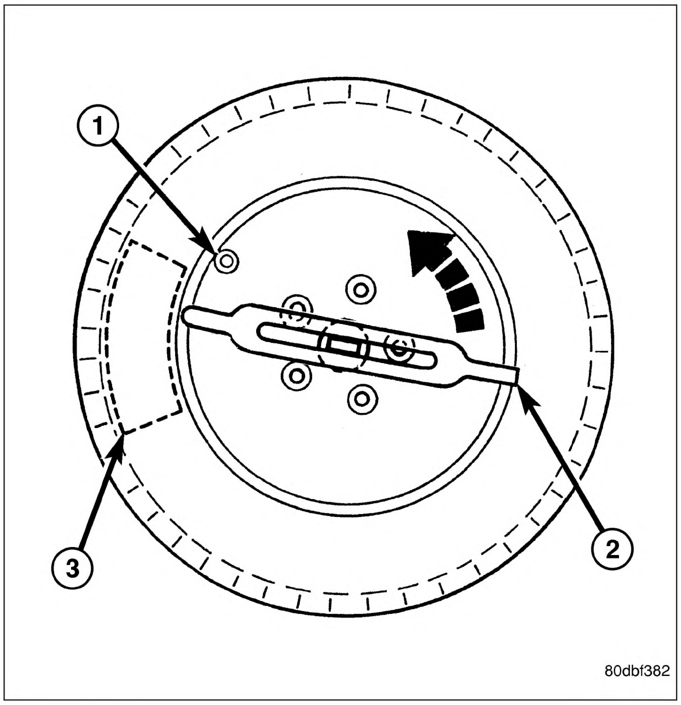
CAUTION: Over-torquing the sensor nut by as little as 12 N·m (106 in. lbs.) may result in sensor separation from the valve stem. Under this condition, the sensor may still function, however, the condition should be corrected immediately.



5. Mount tire on wheel following tire changer manufacturers instructions, paying special attention to the following to avoid damaging tire pressure sensor:
    a. Rotating Wheel Tire Changers- Once the wheel is mounted to the changer, position the sensor valve stem (2) approximately 210° from the head of the changer (located at 1) in a clockwise direction before rotating the wheel (also in a clockwise direction) to mount the tire. Use this procedure on both the upper and lower tire beads.



b. Rotating Tool Tire Changers - Position the wheel on the changer so that the sensor valve stem (1) is located approximately 210° clockwise from the installation end of the mounting/dismounting tool (2) once the tool is mounted for tire installation. Make sure the sensor is clear of the lower bead breaker area (3) to avoid damaging the sensor when the breaker rises. Rotate the tool (2) in a counterclockwise direction to mount the tire. Use this procedure on both the upper and lower tire beads.



6. Adjust air pressure to that listed on Tire Inflation Pressure Label (Placard) provided with vehicle (usually applied to driver's side B-pillar). Make sure **original style** valve stem cap is securely installed to keep moisture out of sensor.
7. Install tire and wheel assembly on vehicle (Refer to 22 - TIRES/WHEELS - INSTALLATION).
8. Lower vehicle.
9. Drive vehicle for a minimum of five minutes while maintaining a continuous speed above 20 mph (32 km/h). During this time the system will learn the new sensor ID code and will clear any DTC's automatically.

NOTE: If a sensor cannot be trained, refer to appropriate diagnostic information.

TRANSPONDER

DESCRIPTION - PREMIUM SYSTEM

A transponder is located in three of the four wheel wells of the vehicle to provide the SKREEM with the location of the tire pressure sensors on the vehicle. The transponders are located in the left front, right front and right rear wheel wells. A fourth transponder is not necessary in the remaining wheel well due to the process-of-elimination theory. Once the system knows the location of the first three sensors it assumes the location of the fourth tire pressure sensor is in the left rear tire.

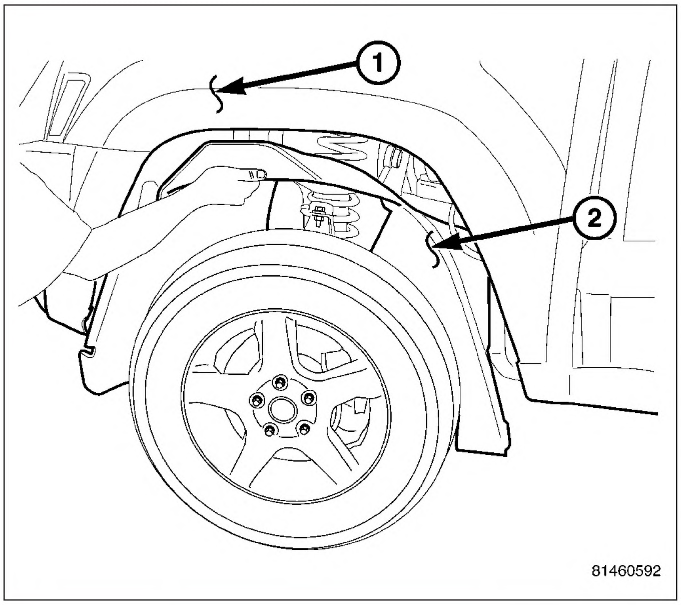
OPERATION - PREMIUM SYSTEM

Transponders located in three of the four wheel wells of the vehicle to provide the Wireless Control Module (WCM) located in the Sentry Key Remote Entry Module (SRKEEM) with the location of the tire pressure sensors on the vehicle. The transponders are located in the left front, right front and right rear wheel wells. A fourth transponder is not necessary in the remaining wheel well due to the process-of-elimination theory. Once the system knows the location of the first three sensors it assumes the location of the fourth tire pressure sensor is in the left rear tire.

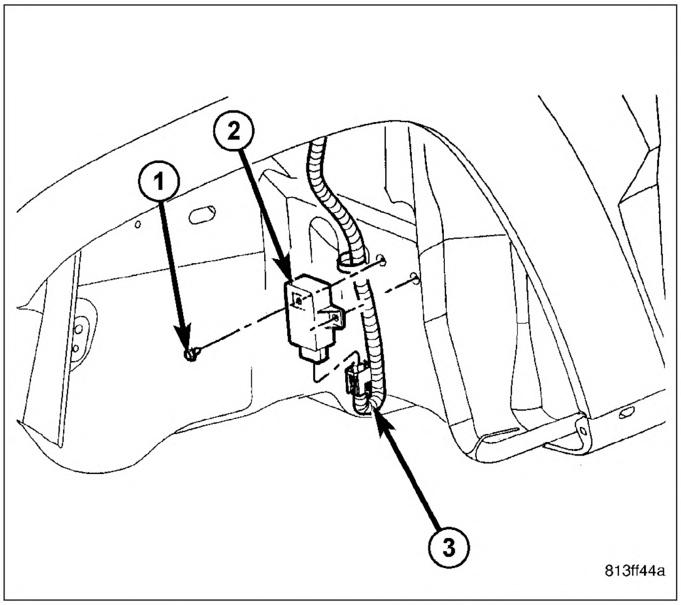
REMOVAL

FRONT TRANSPONDER

1. Raise and support the vehicle.
2. Remove the wheel well housing cover (2).

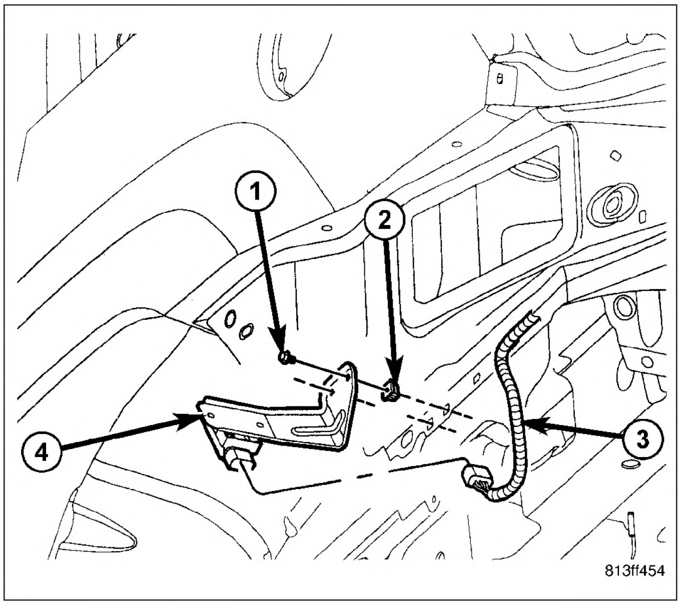


3. Remove the mounting screw (1) for the transponder (2).
4. Disconnect the electrical connector (3) and remove the transponder (2) from the vehicle.



REAR TRANSPONDER

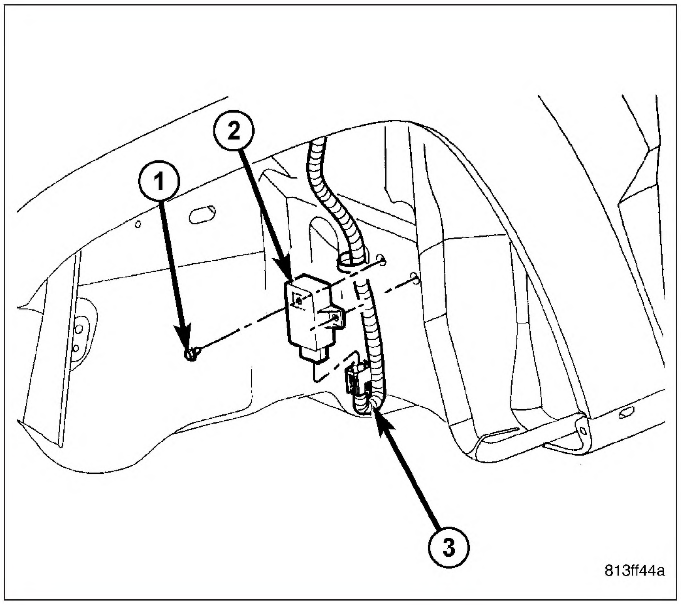
1. Raise and support the vehicle.
2. Remove the mounting screw (1) for the transponder (4).
3. Disconnect the electrical connector (3) and remove the transponder (4) from the vehicle.



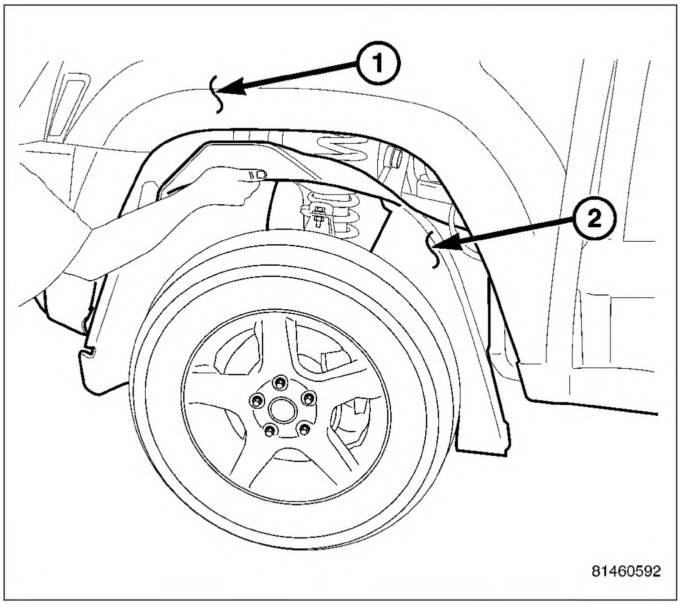
INSTALLATION

FRONT TRANSPONDER

1. Install the transponder (2) to the vehicle and reconnect the electrical connector (3).
2. Install the mounting screw (1) for the transponder (2) Tighten to 4 N·m (35 in. lbs.).

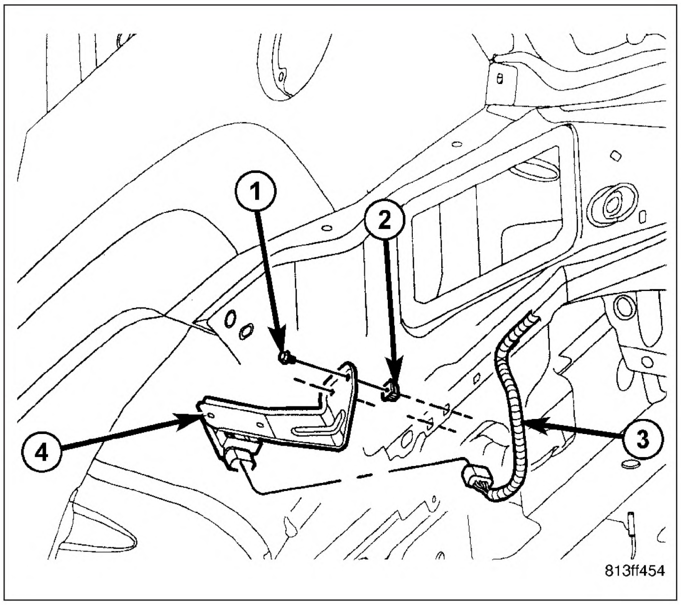


3. Install the wheel well housing cover (2).
4. Lower the vehicle.



REAR TRANSPONDER

1. Install the transponder (4) to the vehicle and reconnect the electrical connector (3).
2. Install the mounting screw (1) for the transponder (4) 3 N·m (25 in. lbs.).
3. Lower the vehicle.



TIRE PRESSURE MONITORING SYSTEM - ELECTRICAL DIAGNOSIS

DIAGNOSIS AND TESTING

C0077-LOW TIRE PRESSURE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  A low pressure condition will exist when the tire pressure falls below or is equal to the low pressure threshold value as specified for the vehicle.

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 4

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Test Complete.

C0077-LOW TIRE PRESSURE (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.
Replace the Tire Pressure Sensor in accordance with the Service Information.
With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).
Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

---

4. INTERMITTENT TIRE PRESSURE SENSOR DTC

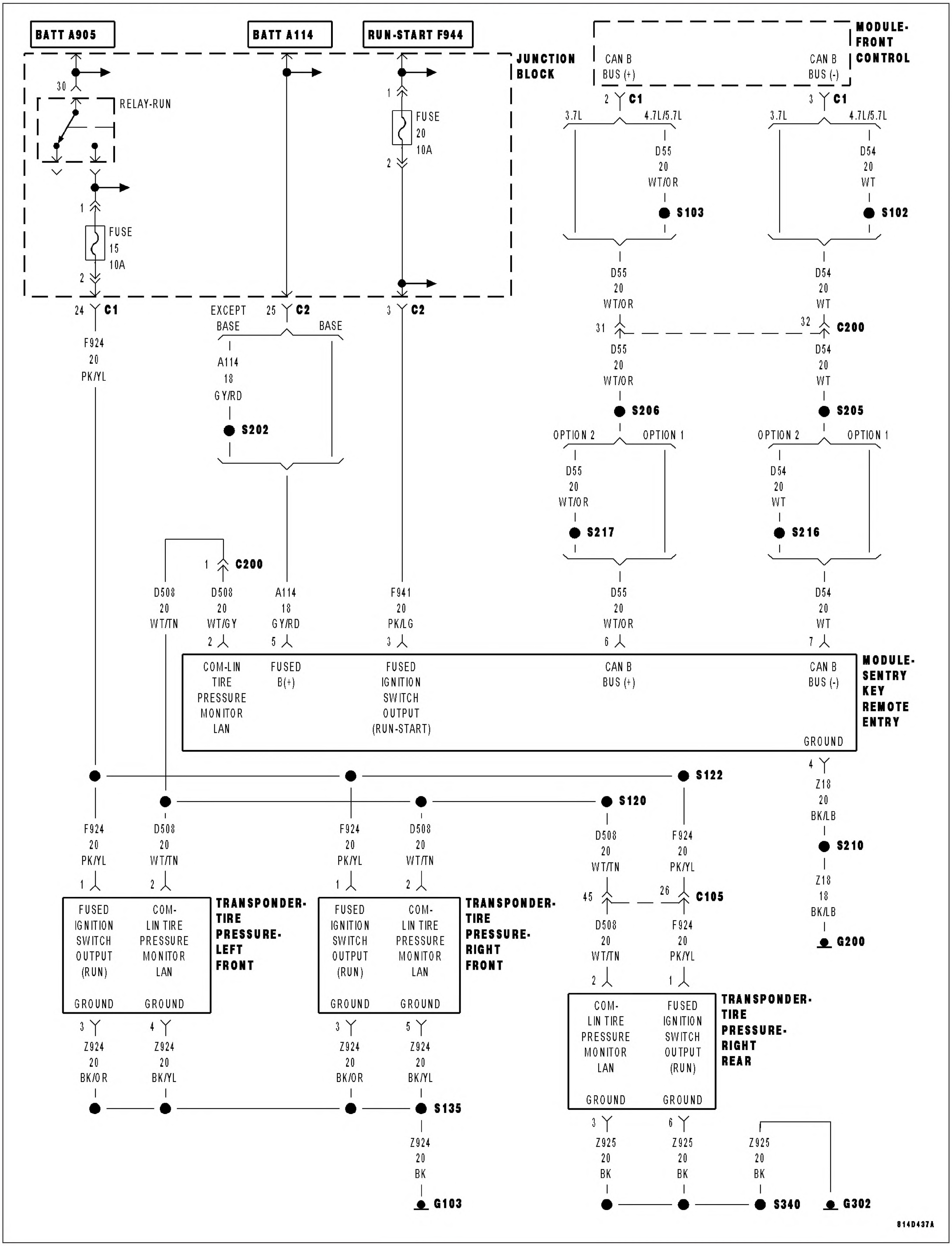
The conditions necessary to set this DTC are not present at this time.
Refer to any Technical Service Bulletins that may apply to this condition.
With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).
Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

C1501–TIRE PRESSURE SENSOR 1 INTERNAL


BATT A905
BATT A114
RUN-START F944
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
JUNCTION BLOCK
30
RELAY-RUN
1
FUSE 20 10A
2
1
FUSE 15 10A
2
24 C1
F924 20 PK/YL
EXCEPT BASE
25 C2
BASE
A114 18 GY/RD
S202
3 C2
2 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
3 C1
3.7L
4.7L/5.7L
D54 20 WT
S102
D55 20 WT/OR
D54 20 WT
31
32
C200
D55 20 WT/OR
D54 20 WT
S206
S205
OPTION 2
OPTION 1
OPTION 2
OPTION 1
D55 20 WT/OR
S217
D54 20 WT
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
F924 20 PK/YL
D508 20 WT/TN
D508 20 WT/TN
F924 20 PK/YL
1
2
1
2
45
26
C105
D508 20 WT/TN
F924 20 PK/YL
2
1
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED IGNITION SWITCH OUTPUT (RUN)
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
Z924 20 BK/OR
Z924 20 BK/YL
3
5
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
3
6
Z925 20 BK
Z925 20 BK
Z925 20 BK
S340
G302
814D437A

C1501–TIRE PRESSURE SENSOR 1 INTERNAL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The tire pressure sensor actively monitors the air pressure and air temperature inside the tire, the sensor internal battery status, and the radial acceleration of the wheel. Each sensor has a unique ID code. The sensor transmits the data at regular intervals via an encoded signal to a receiver circuit located in the Wireless Control Module (SKREEM).

- **When Monitored:**
  With vehicle speed greater than 15 m.p.h. (24 km/h).
- **Set Condition:**
  The WCM (SKREEM) will monitor the signals from the four active road tire sensors. A loss of signal error is detected when eight consecutive blocks of data are not received or cannot be accurately decoded. An internal sensor hardware error condition will be set when an error in the accelerometer, pressure sensor, or temperature sensor is detected.

Possible Causes
INTERMITTENT TIRE PRESSURE SENSOR INTERNAL DTC
TIRE PRESSURE SENSOR
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 4

---

2. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Test Complete.

---

3. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

C1501–TIRE PRESSURE SENSOR 1 INTERNAL (CONTINUED)

4. INTERMITTENT TIRE PRESSURE SENSOR DTC

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

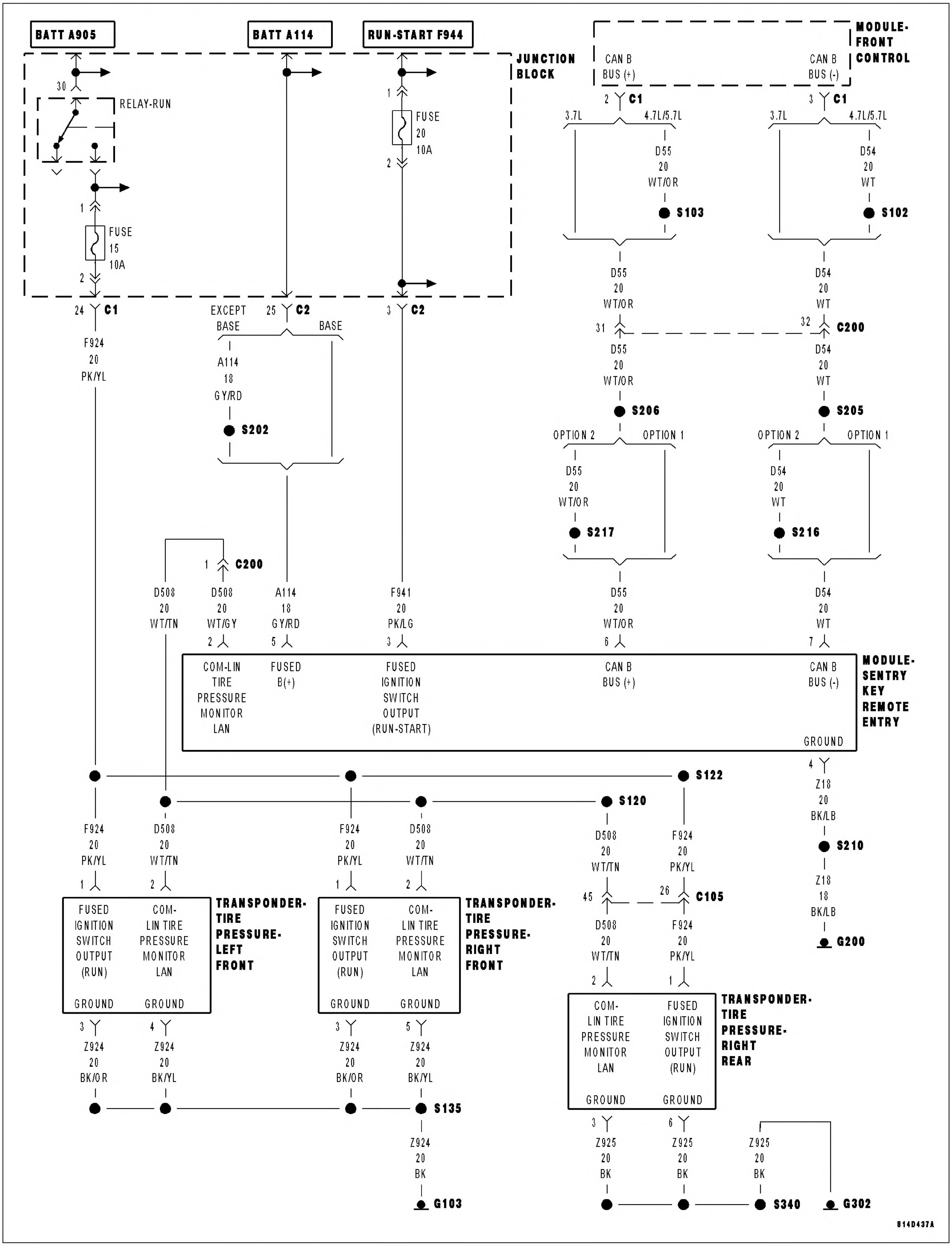
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the beginning of this test and perform the diagnostic procedure as necessary.

No >> Test complete.

C1502–TIRE PRESSURE SENSOR 2 INTERNAL


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
30
RELAY-RUN
1
FUSE 20 10A
2
1
FUSE 15 10A
2
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
D54 20 WT
S102
24 C1
F924 20 PK/YL
EXCEPT BASE
25 C2
BASE
A114 18 GY/RD
S202
3 C2
D55 20 WT/OR
D54 20 WT
31
32 C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
F924 20 PK/YL
D508 20 WT/TN
D508 20 WT/TN
F924 20 PK/YL
45
26 C105
D508 20 WT/TN
F924 20 PK/YL
1
2
1
2
2
1
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED IGNITION SWITCH OUTPUT (RUN)
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
3
5
Z924 20 BK/OR
Z924 20 BK/YL
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
3
6
Z925 20 BK
Z925 20 BK
Z925 20 BK
S340
G302
814D437A

C1502–TIRE PRESSURE SENSOR 2 INTERNAL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The tire pressure sensor actively monitors the air pressure and air temperature inside the tire, the sensor internal battery status, and the radial acceleration of the wheel. Each sensor has a unique ID code. The sensor transmits the data at regular intervals via an encoded signal to a receiver circuit located in the Wireless Control Module (SKREEM).

- **When Monitored:**
  With vehicle speed greater than 15 m.p.h. (24 km/h).
- **Set Condition:**
  The WCM (SKREEM) will monitor the signals from the four active road tire sensors. A loss of signal error is detected when eight consecutive blocks of data are not received or cannot be accurately decoded. An internal sensor hardware error condition will be set when an error in the accelerometer, pressure sensor, or temperature sensor is detected.

Possible Causes
INTERMITTENT TIRE PRESSURE SENSOR INTERNAL DTC
TIRE PRESSURE SENSOR
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 4

---

2. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Test Complete.

---

3. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

C1502–TIRE PRESSURE SENSOR 2 INTERNAL (CONTINUED)

4. INTERMITTENT TIRE PRESSURE SENSOR DTC

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

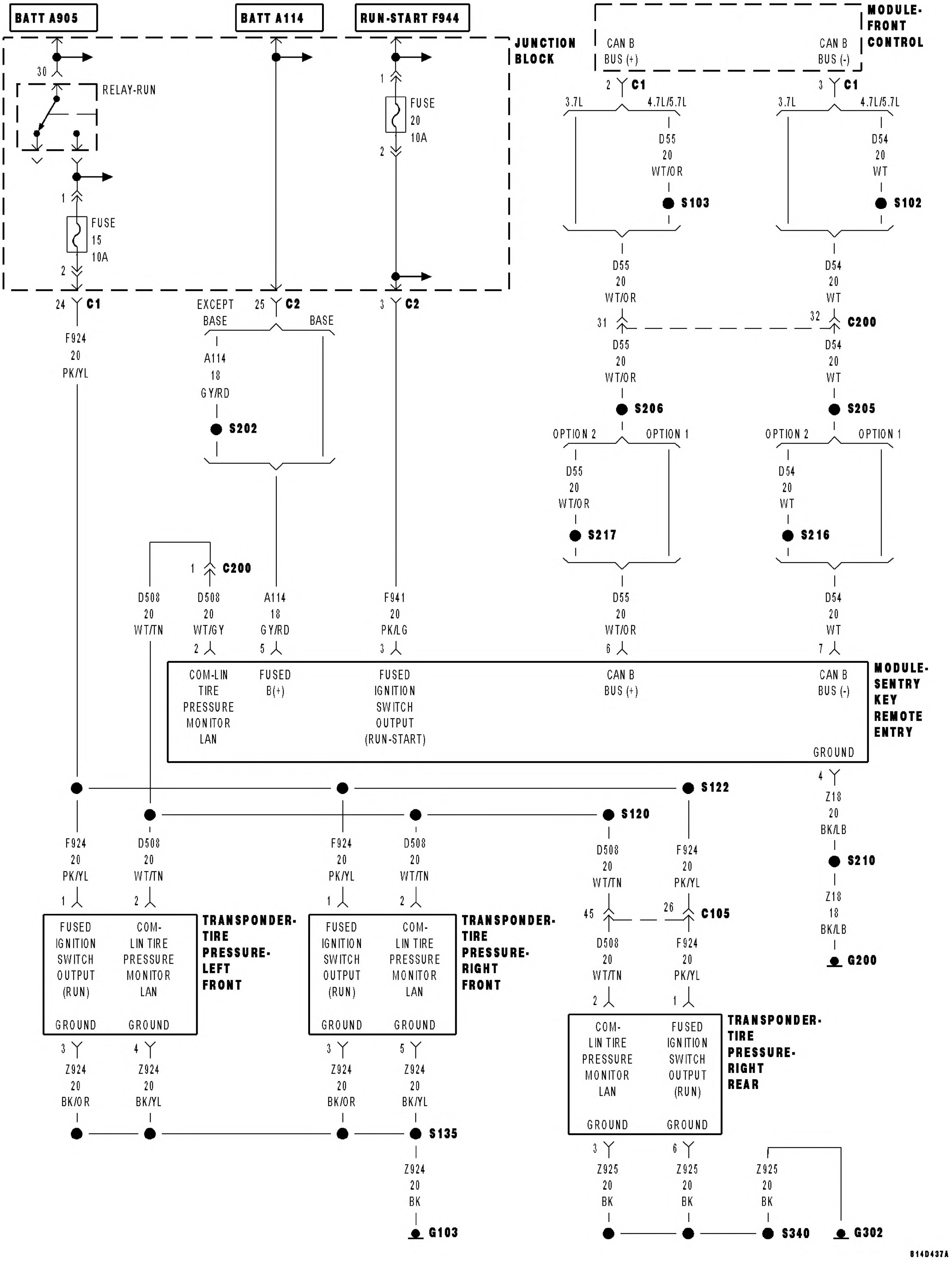
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the beginning of this test and perform the diagnostic procedure as necessary.

No >> Test complete.

C1503–TIRE PRESSURE SENSOR 3 INTERNAL


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
30
RELAY-RUN
1
FUSE 20 10A
2
1
FUSE 15 10A
2
24 C1
EXCEPT BASE
25 C2
BASE
3 C2
F924 20 PK/YL
A114 18 GY/RD
S202
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
3.7L
4.7L/5.7L
D55 20 WT/OR
D54 20 WT
S103
S102
D55 20 WT/OR
D54 20 WT
31
32
C200
D55 20 WT/OR
D54 20 WT
S206
S205
OPTION 2
OPTION 1
OPTION 2
OPTION 1
D55 20 WT/OR
D54 20 WT
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
S122
4
Z18 20 BK/LB
S120
S210
Z18 18 BK/LB
G200
F924 20 PK/YL
D508 20 WT/TN
F924 20 PK/YL
D508 20 WT/TN
D508 20 WT/TN
F924 20 PK/YL
45
26
C105
D508 20 WT/TN
F924 20 PK/YL
1
2
1
2
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
2
1
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED IGNITION SWITCH OUTPUT (RUN)
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
3
5
Z924 20 BK/OR
Z924 20 BK/YL
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
3
6
Z925 20 BK
Z925 20 BK
Z925 20 BK
S340
G302
814D437A

C1503–TIRE PRESSURE SENSOR 3 INTERNAL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The tire pressure sensor actively monitors the air pressure and air temperature inside the tire, the sensor internal battery status, and the radial acceleration of the wheel. Each sensor has a unique ID code. The sensor transmits the data at regular intervals via an encoded signal to a receiver circuit located in the Wireless Control Module (SKREEM).

- **When Monitored:**
  With vehicle speed greater than 15 m.p.h. (24 km/h).
- **Set Condition:**
  The WCM (SKREEM) will monitor the signals from the four active road tire sensors. A loss of signal error is detected when eight consecutive blocks of data are not received or cannot be accurately decoded. An internal sensor hardware error condition will be set when an error in the accelerometer, pressure sensor, or temperature sensor is detected.

Possible Causes
INTERMITTENT TIRE PRESSURE SENSOR INTERNAL DTC
TIRE PRESSURE SENSOR
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 4

---

2. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Test Complete.

---

3. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

C1503–TIRE PRESSURE SENSOR 3 INTERNAL (CONTINUED)

4. INTERMITTENT TIRE PRESSURE SENSOR DTC

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

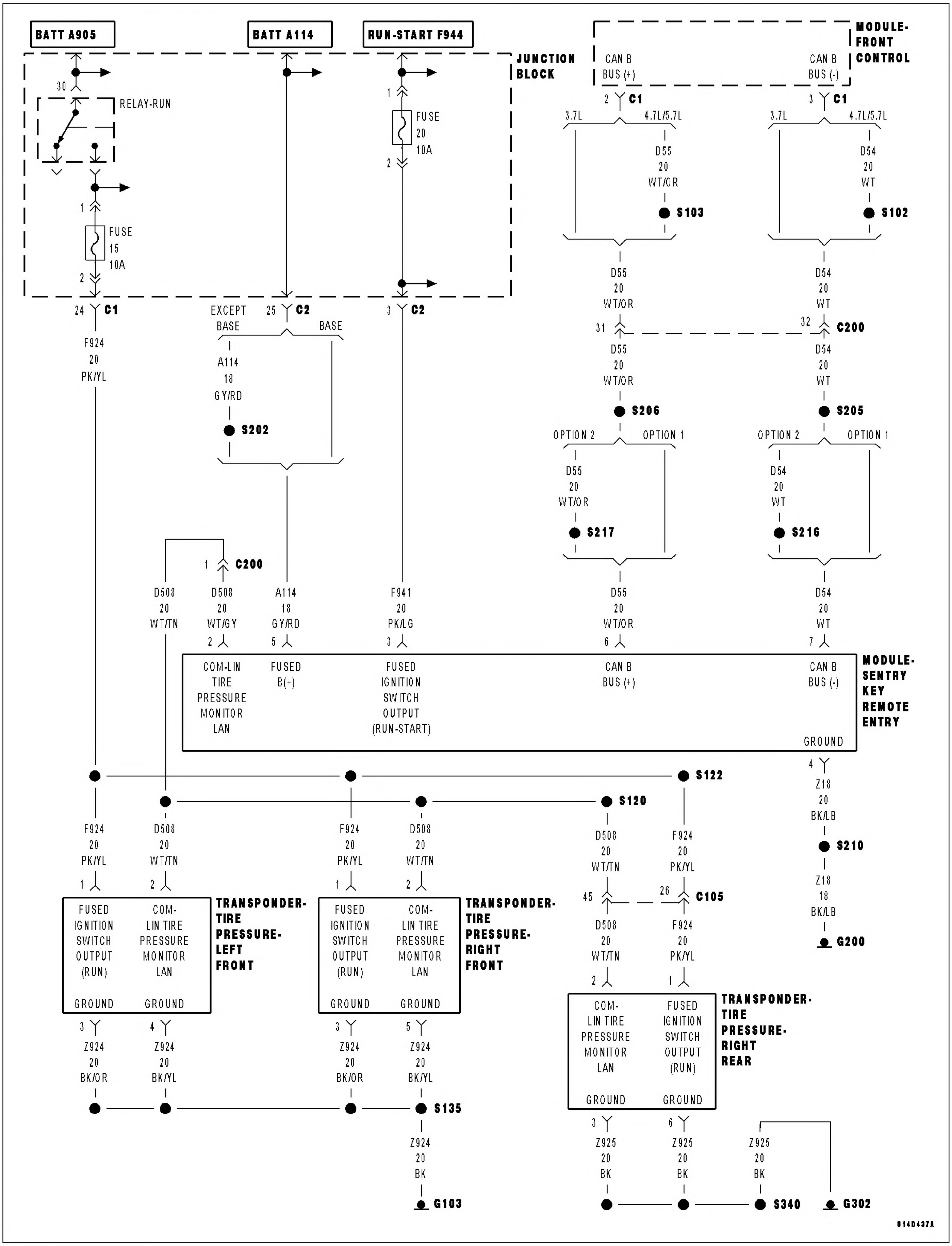
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the beginning of this test and perform the diagnostic procedure as necessary.

No >> Test complete.

C1504–TIRE PRESSURE SENSOR 4 INTERNAL


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
30
RELAY-RUN
1
FUSE 15 10A
2
FUSE 20 10A
24 C1
F924 20 PK/YL
EXCEPT BASE
25 C2
BASE
A114 18 GY/RD
S202
3 C2
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
D54 20 WT
S102
31
32
C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
45
26
C105
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
Z925 20 BK
S340
G302
814D437A

C1504–TIRE PRESSURE SENSOR 4 INTERNAL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The tire pressure sensor actively monitors the air pressure and air temperature inside the tire, the sensor internal battery status, and the radial acceleration of the wheel. Each sensor has a unique ID code. The sensor transmits the data at regular intervals via an encoded signal to a receiver circuit located in the Wireless Control Module (SKREEM).

- **When Monitored:**
  With vehicle speed greater than 15 m.p.h. (24 km/h).
- **Set Condition:**
  The WCM (SKREEM) will monitor the signals from the four active road tire sensors. A loss of signal error is detected when eight consecutive blocks of data are not received or cannot be accurately decoded. An internal sensor hardware error condition will be set when an error in the accelerometer, pressure sensor, or temperature sensor is detected.

Possible Causes
INTERMITTENT TIRE PRESSURE SENSOR INTERNAL DTC
TIRE PRESSURE SENSOR
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 4

---

2. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Test Complete.

---

3. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

C1504–TIRE PRESSURE SENSOR 4 INTERNAL (CONTINUED)

4. INTERMITTENT TIRE PRESSURE SENSOR DTC

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

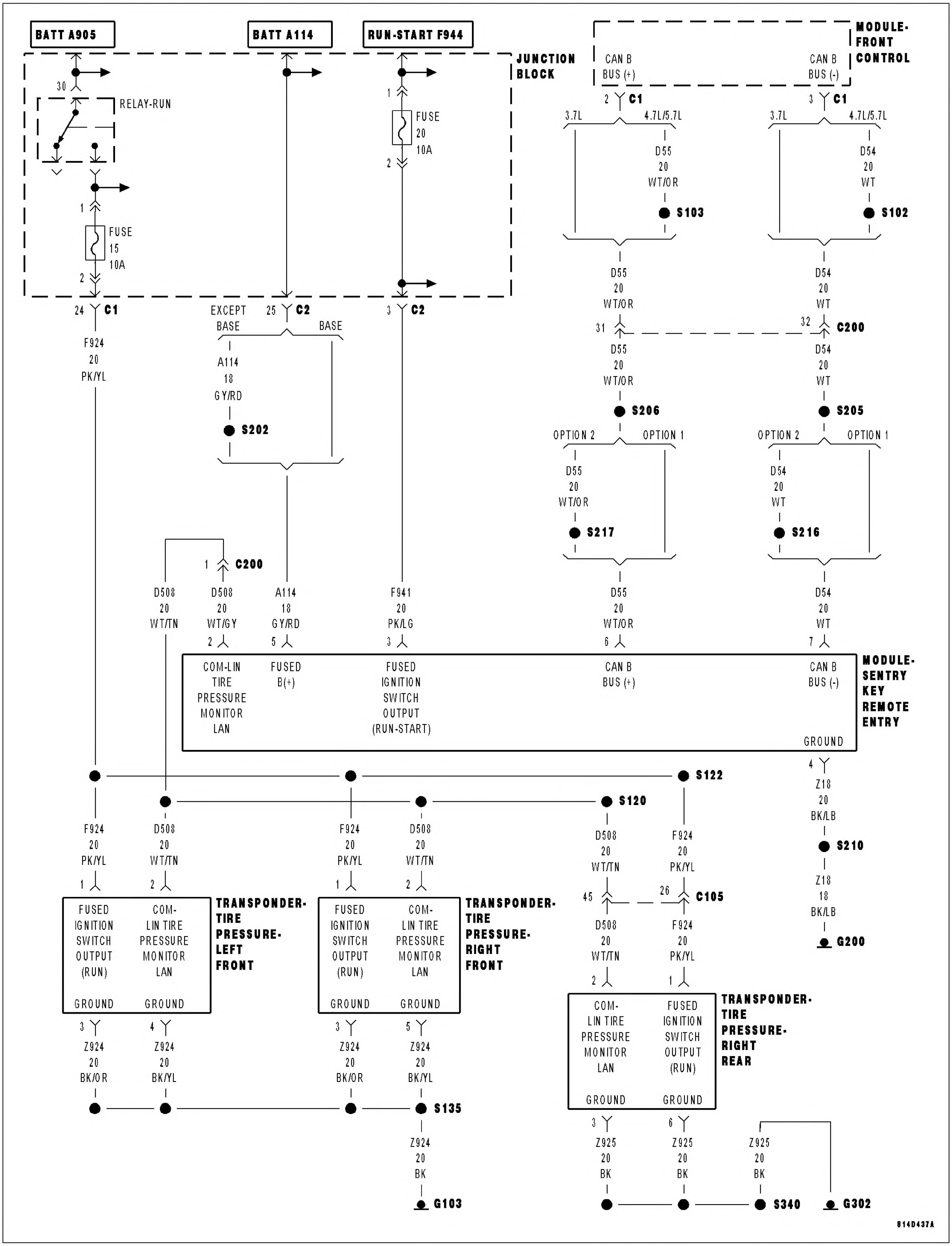
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the beginning of this test and perform the diagnostic procedure as necessary.

No >> Test complete.

C1505–TIRE PRESSURE SENSOR 5 INTERNAL


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
30
RELAY-RUN
1
FUSE 20 10A
2
1
FUSE 15 10A
2
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
D54 20 WT
S102
24 C1
F924 20 PK/YL
EXCEPT BASE
25 C2
BASE
A114 18 GY/RD
S202
3 C2
D55 20 WT/OR
D54 20 WT
31
32
C200
S206
S205
OPTION 2
OPTION 1
D55 20 WT/OR
S217
D54 20 WT
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
S122
S120
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
F924 20 PK/YL
D508 20 WT/TN
F924 20 PK/YL
D508 20 WT/TN
D508 20 WT/TN
F924 20 PK/YL
45
26
C105
D508 20 WT/TN
F924 20 PK/YL
1
2
1
2
2
1
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED IGNITION SWITCH OUTPUT (RUN)
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
Z924 20 BK/OR
Z924 20 BK/YL
3
5
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
3
6
Z925 20 BK
Z925 20 BK
Z925 20 BK
S340
G302
814D437A

C1505–TIRE PRESSURE SENSOR 5 INTERNAL (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The tire pressure sensor actively monitors the air pressure and air temperature inside the tire, the sensor internal battery status, and the radial acceleration of the wheel. Each sensor has a unique ID code. The sensor transmits the data at regular intervals via an encoded signal to a receiver circuit located in the Wireless Control Module (SKREEM).

- **When Monitored:**
  With vehicle speed greater than 15 m.p.h. (24 km/h).
- **Set Condition:**
  The WCM (SKREEM) will monitor the signals from the four active road tire sensors. A loss of signal error is detected when eight consecutive blocks of data are not received or cannot be accurately decoded. An internal sensor hardware error condition will be set when an error in the accelerometer, pressure sensor, or temperature sensor is detected.

Possible Causes
INTERMITTENT TIRE PRESSURE SENSOR INTERNAL DTC
TIRE PRESSURE SENSOR
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 4

---

2. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Test Complete.

---

3. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

C1505–TIRE PRESSURE SENSOR 5 INTERNAL (CONTINUED)

4. INTERMITTENT TIRE PRESSURE SENSOR DTC

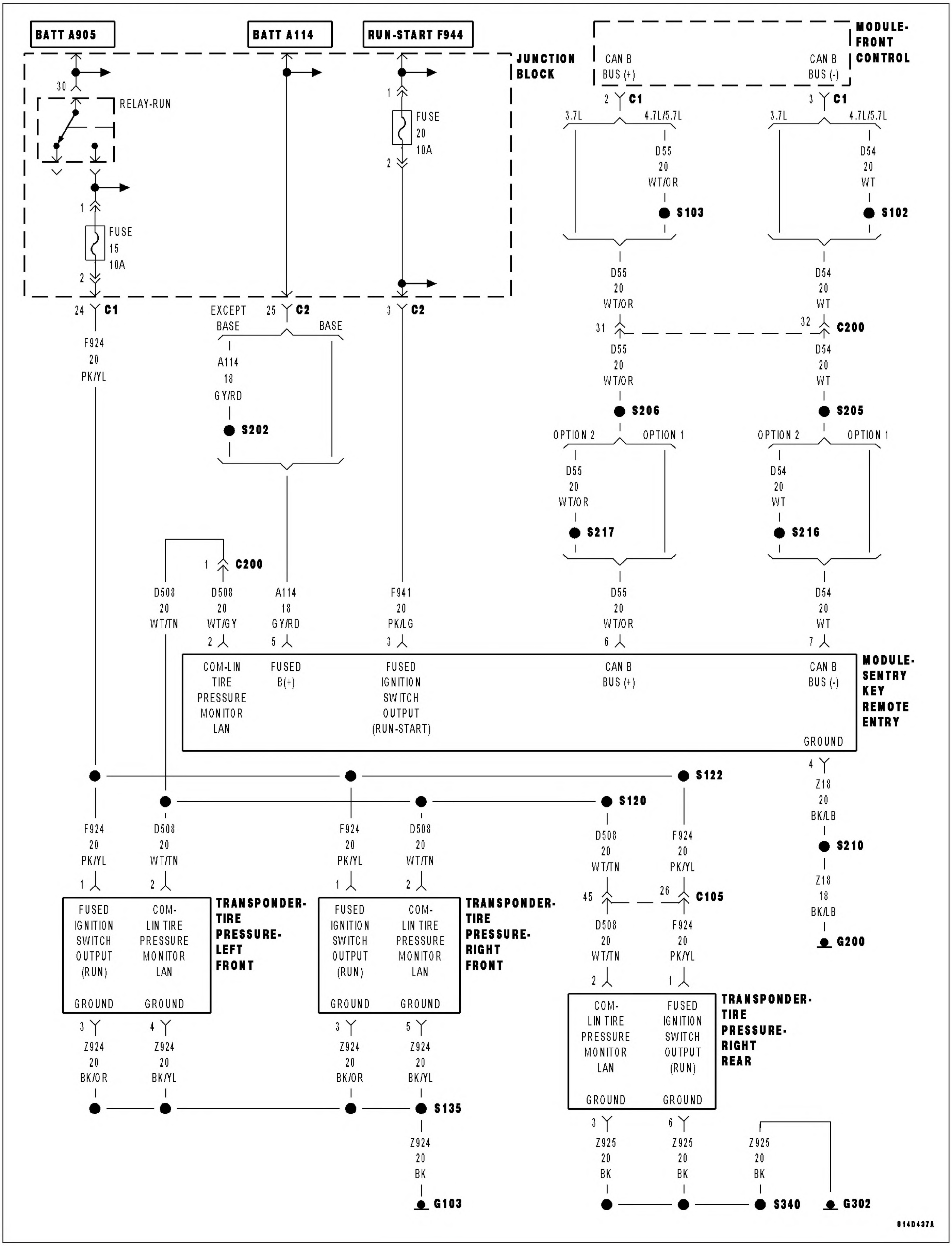
The conditions necessary to set this DTC are not present at this time.
Refer to any Technical Service Bulletins that may apply to this condition.
With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).
Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the beginning of this test and perform the diagnostic procedure as necessary.

No >> Test complete.

C1506–LEFT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
30
RELAY-RUN
1
FUSE
20
10A
2
1
FUSE
15
10A
2
24 C1
EXCEPT BASE
25 C2
BASE
3 C2
F924
20
PK/YL
A114
18
GY/RD
S202
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
D55
20
WT/OR
S103
D54
20
WT
S102
31
32
C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508
20
WT/TN
D508
20
WT/GY
A114
18
GY/RD
F941
20
PK/LG
D55
20
WT/OR
D54
20
WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18
20
BK/LB
S210
Z18
18
BK/LB
G200
S122
S120
F924
20
PK/YL
D508
20
WT/TN
1
2
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
45
26
C105
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
5
6
Z924
20
BK/OR
Z924
20
BK/YL
S135
Z924
20
BK
G103
Z925
20
BK
S340
G302
814D437A

C1506–LEFT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Tire Pressure Trigger Module is used to automatically learn the location of each wheel sensor on the vehicle. The module is controlled and activated in sequence by the Wireless Control Module (SKREEM) over a LIN bus. When activated, the module will generate a 125 KHz signal of sufficient field strength to trigger the tire pressure sensor and force a RF transmission from the sensor.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The WCM (SKREEM) will monitor the messages from each Tire Pressure Trigger Module over the LIN bus. If any of the messages are not received, or are received other than as expected, a DTC will set. When the condition is corrected, or is no longer detected, as acknowledged via a LIN bus message, the WCM will reset the appropriate trigger module fault status.

Possible Causes
INTERMITTENT TIRE PRESSURE TRIGGER MODULE PERFORMANCE DTC
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO VOLTAGE
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO GROUND
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT OPEN OR HIGH RESISTANCE
(F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE
(Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
TIRE PRESSURE TRIGGER MODULE
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 9

C1506–LEFT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

2. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO VOLTAGE

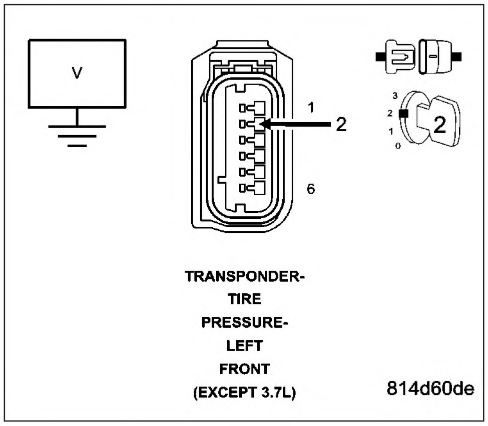
Turn the ignition off.

Disconnect the Tire Pressure Transponder harness connector.

Disconnect the Sentry Key Remote Entry Module harness connector.

Turn the ignition on.

Measure the voltage of the (D508) COM - LIN Tire Pressure Monitor LAN circuit.


V
1
2
6
3
2
1
0
2
TRANSPONDER-
TIRE
PRESSURE-
LEFT
FRONT
(EXCEPT 3.7L)
814d60de

Is there any voltage present?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for a short to voltage.

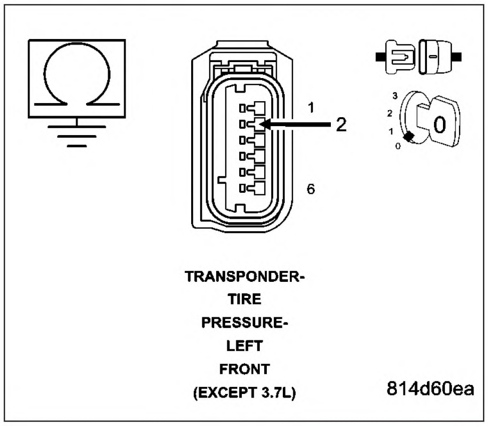
No >> Go to 3

---

3. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D508) COM - LIN Tire Pressure Monitor LAN circuit.


Ω
1
2
6
3
2
1
0
0
TRANSPONDER-
TIRE
PRESSURE-
LEFT
FRONT
(EXCEPT 3.7L)
814d60ea

Is the resistance below 5.0 ohms?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for a short to ground.

No >> Go to 4

C1506–LEFT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

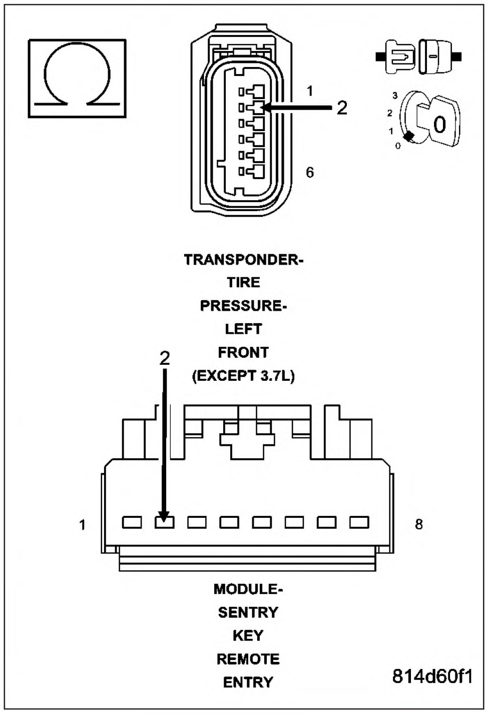
4. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT OPEN OR HIGH RESISTANCE

Measure the resistance of the (D508) COM - LIN Tire Pressure Monitor LAN circuit.

Is the resistance above 5.0 ohms?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for an open circuit or high resistance.

No >> Go to 5


1
2
6
3
2
1
0
0
TRANSPONDER-TIRE PRESSURE-LEFT FRONT (EXCEPT 3.7L)
2
1
8
MODULE-SENTRY KEY REMOTE ENTRY
814d60f1

---

5. (F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition on.

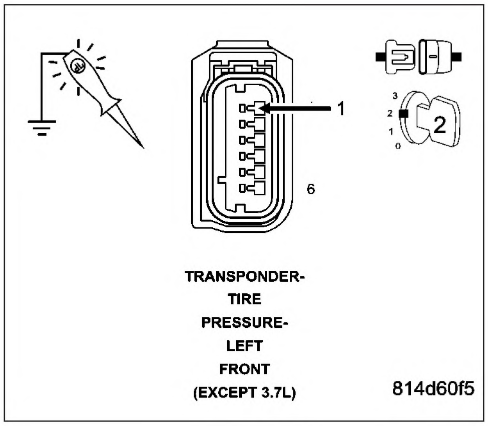
Using a 12–volt test light connect to ground, check the (F924) Fused Ignition Switch Output (Run) circuit.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 6

No >> Repair the (F924) Fused Ignition Switch Output (Run) circuit for an open circuit or high resistance.


1
6
3
2
1
0
2
TRANSPONDER-TIRE PRESSURE-LEFT FRONT (EXCEPT 3.7L)
814d60f5

C1506–LEFT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

6. (Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE

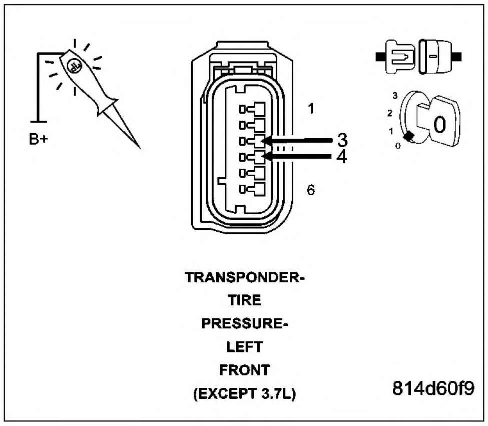
Using a 12–volt test light connect to 12 volts, check each of the (Z924) Ground circuit(s).

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 7

No >> Repair the (Z924) Ground circuit(s) for an open circuit or high resistance.



---

7. TIRE PRESSURE TRIGGER MODULE

Turn the ignition off.

Replace the appropriate Tire Pressure Trigger Module in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 8

No >> Test Complete.

---

8. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

---

9. INTERMITTENT TIRE PRESSURE TRIGGER MODULE DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring schematic as a guide, inspect the wiring and connectors relative to this circuit.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

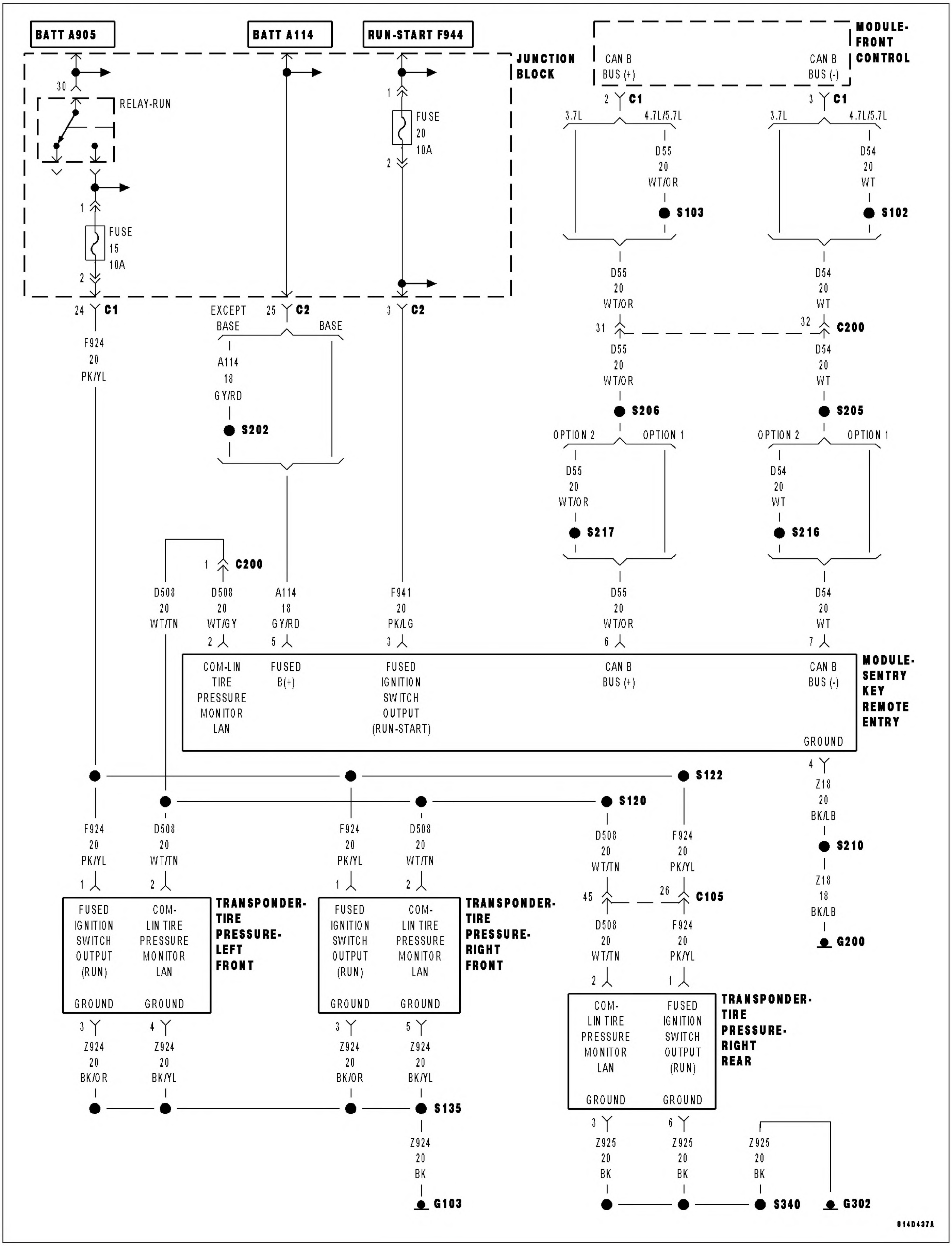
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the first step of this test and perform the diagnostic procedure.

No >> Test complete.

C1507–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
30
RELAY-RUN
1
FUSE 20 10A
2
1
FUSE 15 10A
2
24 C1
F924 20 PK/YL
EXCEPT BASE
25 C2
BASE
A114 18 GY/RD
S202
3 C2
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
D54 20 WT
S102
D55 20 WT/OR
D54 20 WT
31
32 C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
1
2
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
3
4
5
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
45
26 C105
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
Z925 20 BK
S340
G302
814D437A

C1507–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Tire Pressure Trigger Module is used to automatically learn the location of each wheel sensor on the vehicle. The module is controlled and activated in sequence by the Wireless Control Module (SKREEM) over a LIN bus. When activated, the module will generate a 125 KHz signal of sufficient field strength to trigger the tire pressure sensor and force a RF transmission from the sensor.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The WCM (SKREEM) will monitor the messages from each Tire Pressure Trigger Module over the LIN bus. If any of the messages are not received, or are received other than as expected, a DTC will set. When the condition is corrected, or is no longer detected, as acknowledged via a LIN bus message, the WCM will reset the appropriate trigger module fault status.

Possible Causes
INTERMITTENT TIRE PRESSURE TRIGGER MODULE PERFORMANCE DTC
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO VOLTAGE
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO GROUND
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT OPEN OR HIGH RESISTANCE
(F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE
(Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
TIRE PRESSURE TRIGGER MODULE
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 9

C1507–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

2. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO VOLTAGE

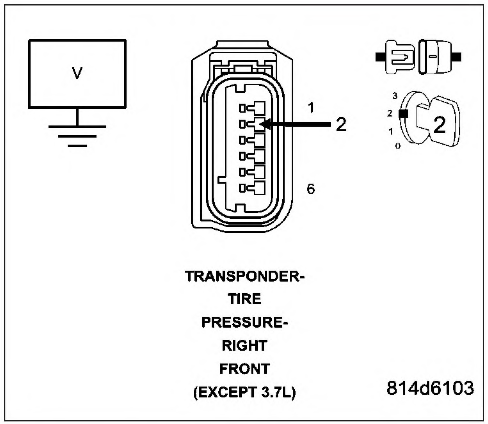
Turn the ignition off.

Disconnect the Tire Pressure Transponder harness connector.

Disconnect the Sentry Key Remote Entry Module harness connector.

Turn the ignition on.

Measure the voltage of the (D508) COM - LIN Tire Pressure Monitor LAN circuit.


V
1
2
6
3
2
1
0
2
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L)
814d6103

Is there any voltage present?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for a short to voltage.

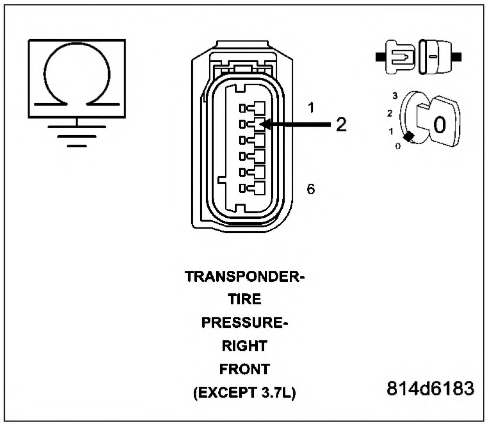
No >> Go to 3

---

3. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D508) COM - LIN Tire Pressure Monitor LAN circuit.


1
2
6
3
2
1
0
0
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L)
814d6183

Is the resistance below 5.0 ohms?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for a short to ground.

No >> Go to 4

C1507–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

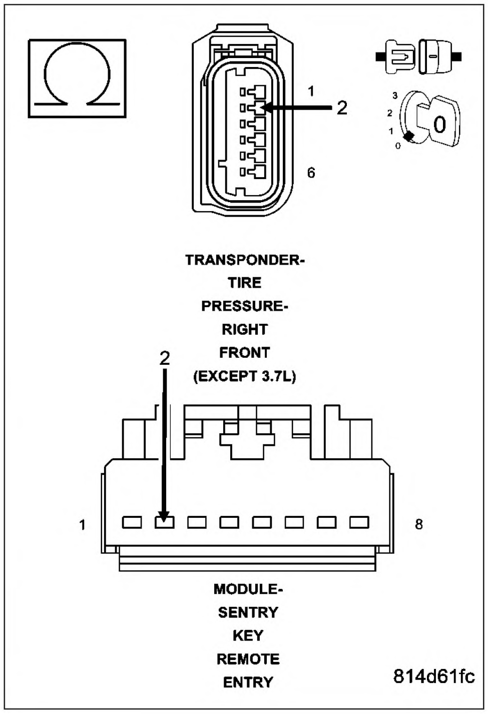
4. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT OPEN OR HIGH RESISTANCE

Measure the resistance of the (D508) COM - LIN Tire Pressure Monitor LAN circuit.

Is the resistance above 5.0 ohms?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for an open circuit or high resistance.

No >> Go to 5



1
2
6
3
2
1
0
0
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L)
2
1
8
MODULE-SENTRY KEY REMOTE ENTRY
814d61fc

---

5. (F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition on.

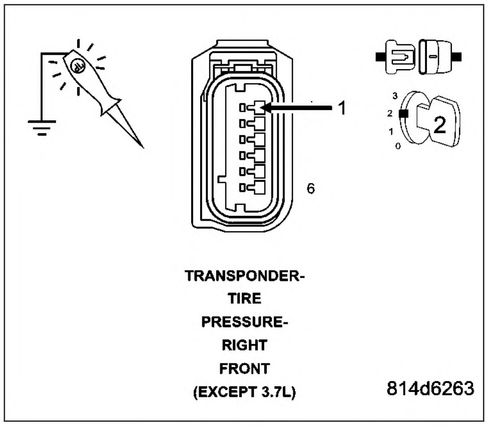
Using a 12–volt test light connect to ground, check the (F924) Fused Ignition Switch Output (Run) circuit.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 6

No >> Repair the (F924) Fused Ignition Switch Output (Run) circuit for an open circuit or high resistance.



1
6
3
2
1
0
2
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT (EXCEPT 3.7L)
814d6263

C1507–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

6. (Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE

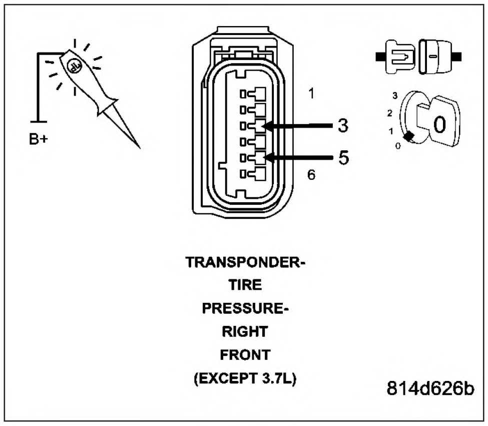
Using a 12–volt test light connect to 12 volts, check each of the (Z924) Ground circuit(s).

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 7

No >> Repair the (Z924) Ground circuit(s) for an open circuit or high resistance.



7. TIRE PRESSURE TRIGGER MODULE

Turn the ignition off.

Replace the appropriate Tire Pressure Trigger Module in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 8

No >> Test Complete.

8. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

9. INTERMITTENT TIRE PRESSURE TRIGGER MODULE DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring schematic as a guide, inspect the wiring and connectors relative to this circuit.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

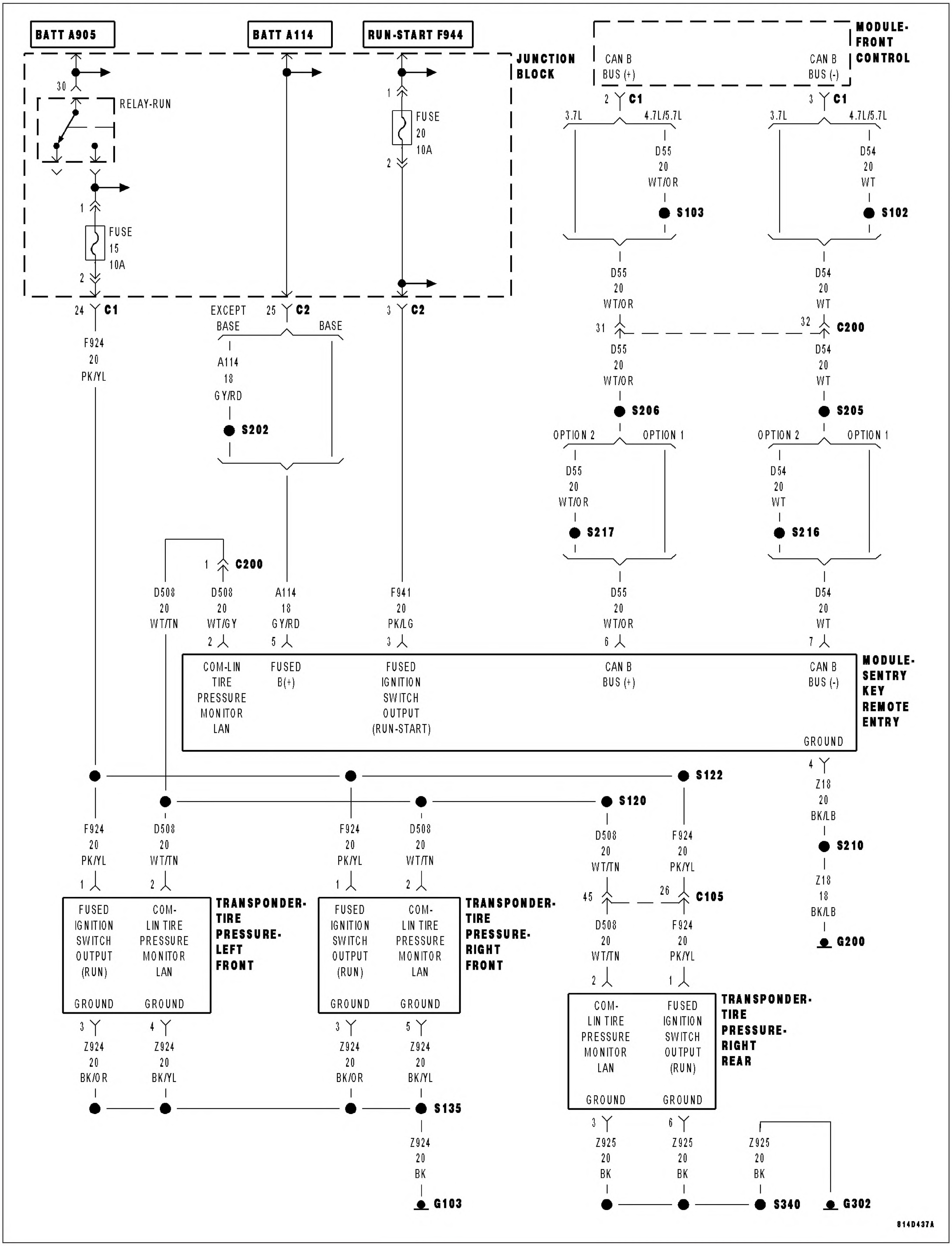
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the first step of this test and perform the diagnostic procedure.

No >> Test complete.

C1509–RIGHT REAR TIRE PRESSURE TRIGGER MODULE PERFORMANCE


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
30
RELAY-RUN
1
FUSE 20 10A
2
1
FUSE 15 10A
2
24 C1
F924 20 PK/YL
EXCEPT BASE
25 C2
BASE
A114 18 GY/RD
S202
3 C2
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
D54 20 WT
S102
31
32
C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
1
2
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
45
26
C105
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
5
6
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
Z925 20 BK
S340
G302
814D437A

C1509–RIGHT REAR TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Tire Pressure Trigger Module is used to automatically learn the location of each wheel sensor on the vehicle. The module is controlled and activated in sequence by the Wireless Control Module (SKREEM) over a LIN bus. When activated, the module will generate a 125 KHz signal of sufficient field strength to trigger the tire pressure sensor and force a RF transmission from the sensor.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The WCM (SKREEM) will monitor the messages from each Tire Pressure Trigger Module over the LIN bus. If any of the messages are not received, or are received other than as expected, a DTC will set. When the condition is corrected, or is no longer detected, as acknowledged via a LIN bus message, the WCM will reset the appropriate trigger module fault status.

Possible Causes
INTERMITTENT TIRE PRESSURE TRIGGER MODULE PERFORMANCE DTC
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO VOLTAGE
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO GROUND
(D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT OPEN OR HIGH RESISTANCE
(F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE
(Z925) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
TIRE PRESSURE TRIGGER MODULE
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 9

C1509–RIGHT REAR TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

2. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO VOLTAGE

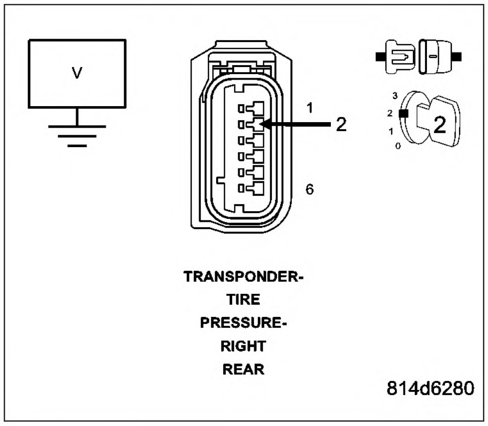
Turn the ignition off.

Disconnect the Tire Pressure Transponder harness connector.

Disconnect the Sentry Key Remote Entry Module harness connector.

Turn the ignition on.

Measure the voltage of the (D508) COM - LIN Tire Pressure Monitor LAN circuit.


V
1
2
6
3
2
1
0
2
TRANSPONDER-
TIRE
PRESSURE-
RIGHT
REAR
814d6280

Is there any voltage present?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for a short to voltage.

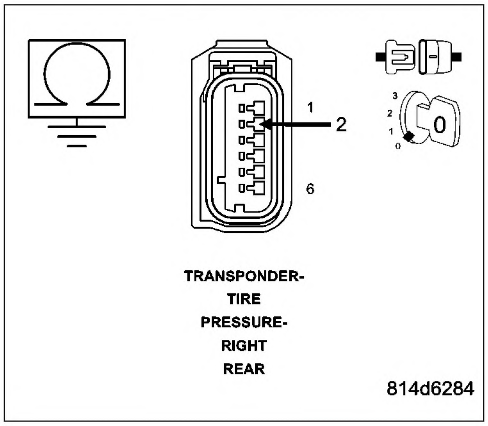
No >> Go to 3

---

3. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT SHORT TO GROUND

Turn the ignition off.

Measure the resistance between ground and the (D508) COM - LIN Tire Pressure Monitor LAN circuit.


1
2
6
3
2
1
0
0
TRANSPONDER-
TIRE
PRESSURE-
RIGHT
REAR
814d6284

Is the resistance below 5.0 ohms?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for a short to ground.

No >> Go to 4

C1509–RIGHT REAR TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

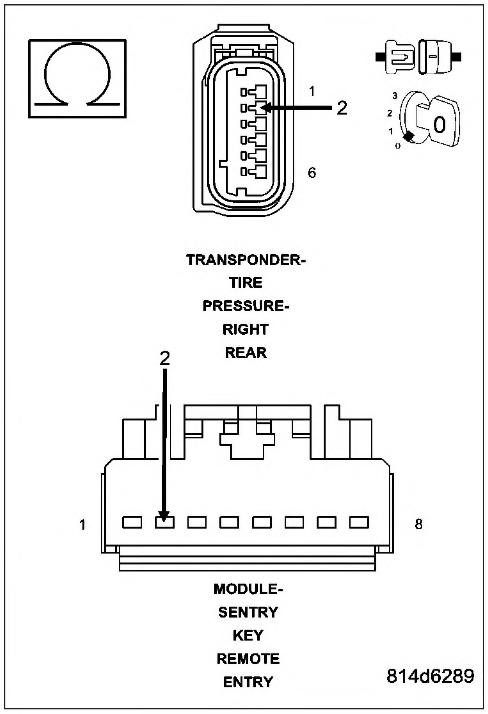
4. (D508) COM - LIN TIRE PRESSURE MONITOR LAN CIRCUIT OPEN OR HIGH RESISTANCE

Measure the resistance of the (D508) COM - LIN Tire Pressure Monitor LAN circuit.

Is the resistance above 5.0 ohms?

Yes >> Repair the (D508) COM - LIN Tire Pressure Monitor LAN circuit for an open circuit or high resistance.

No >> Go to 5


1
2
6
3
2
1
0
0
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
2
1
8
MODULE-SENTRY KEY REMOTE ENTRY

814d6289

---

5. (F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition on.

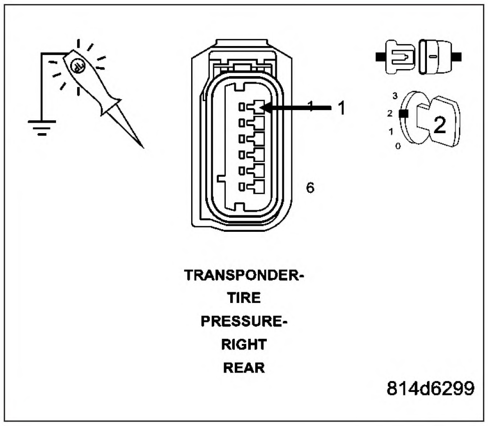
Using a 12–volt test light connect to ground, check the (F924) Fused Ignition Switch Output (Run) circuit.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 6

No >> Repair the (F924) Fused Ignition Switch Output (Run) circuit for an open circuit or high resistance.


1
1
6
3
2
1
0
2
TRANSPONDER-TIRE PRESSURE-RIGHT REAR

814d6299

C1509–RIGHT REAR TIRE PRESSURE TRIGGER MODULE PERFORMANCE (CONTINUED)

6. (Z925) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE

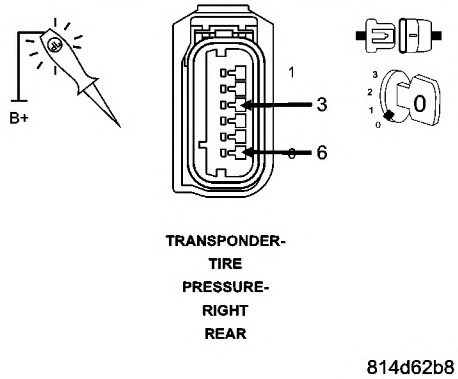
Using a 12–volt test light connect to 12 volts, check each of the (Z925) Ground circuit(s).

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 7

No >> Repair the (Z925) Ground circuit(s) for an open circuit or high resistance.



---

7. TIRE PRESSURE TRIGGER MODULE

Turn the ignition off.

Replace the appropriate Tire Pressure Trigger Module in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 8

No >> Test Complete.

---

8. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

---

9. INTERMITTENT TIRE PRESSURE TRIGGER MODULE DTC

The conditions necessary to set this DTC are not present at this time.

Using the wiring schematic as a guide, inspect the wiring and connectors relative to this circuit.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

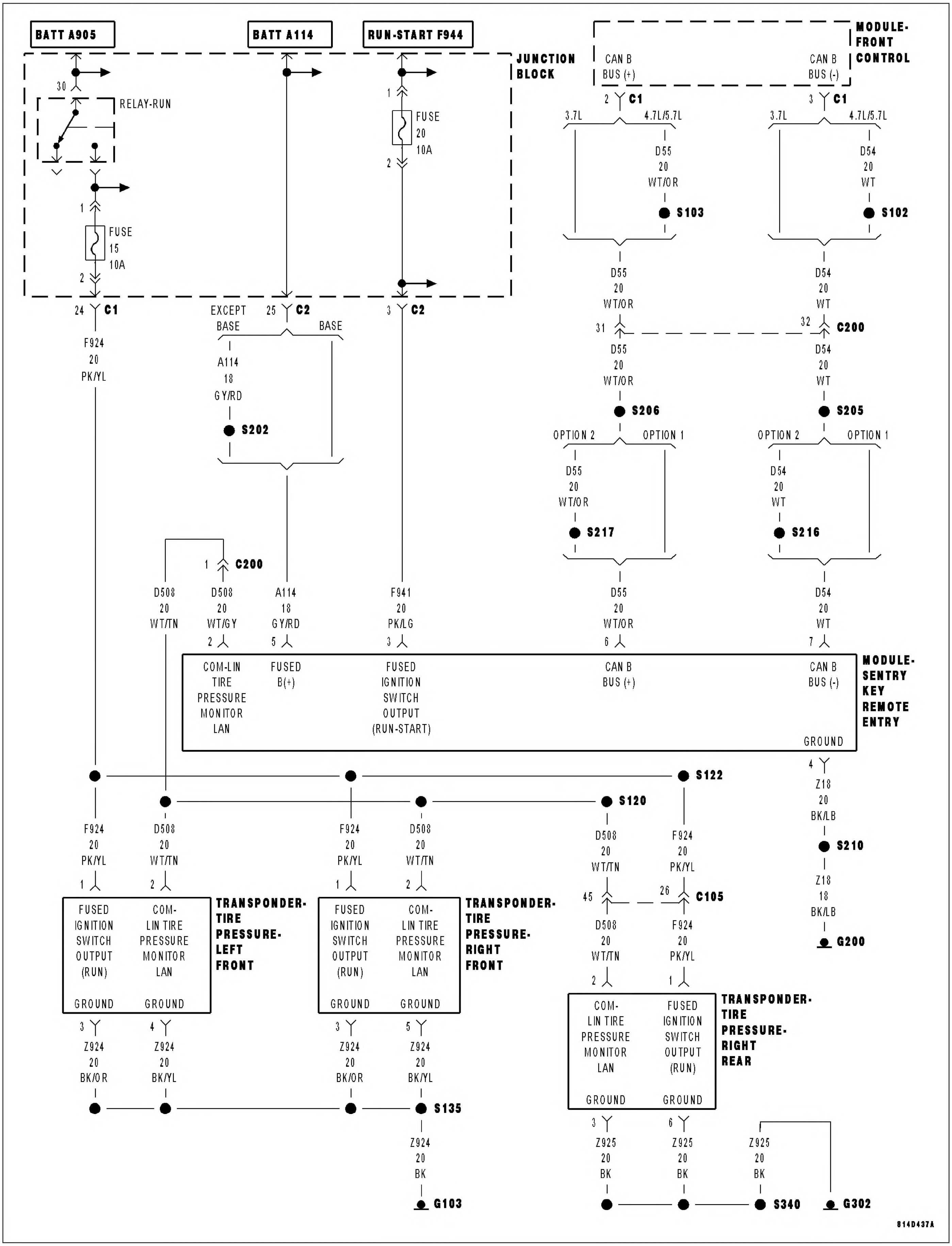
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the first step of this test and perform the diagnostic procedure.

No >> Test complete.

C150A–LEFT FRONT TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
30
RELAY-RUN
1
FUSE 20 10A
2
FUSE 15 10A
24 C1
EXCEPT BASE
25 C2
BASE
3 C2
F924 20 PK/YL
A114 18 GY/RD
S202
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
D54 20 WT
S103
S102
31
32 C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
D55 20 WT/OR
D54 20 WT
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
D508 20 WT/TN
F924 20 PK/YL
45
26 C105
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
Z925 20 BK
S340
G302
814D437A

C150A–LEFT FRONT TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Tire Pressure Trigger Module is used to automatically learn the location of each wheel sensor on the vehicle. The module is controlled and activated in sequence by the Wireless Control Module (SKREEM) over a LIN bus. When activated, the module will generate a 125 KHz signal of sufficient field strength to trigger the tire pressure sensor and force a RF transmission from the sensor.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The WCM receives a message from the Tire Pressure Trigger Module indicating that an over voltage condition has been detected.

Possible Causes
INTERMITTENT TIRE PRESSURE TRIGGER MODULE PERFORMANCE DTC
(F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE
(Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
TIRE PRESSURE TRIGGER MODULE
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

NOTE: If a system or battery voltage high DTC is set in the Wireless Control Module (SKREEM) or in the PCM, repair the voltage DTC before continuing with this test.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 6

---

2. (F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition on.

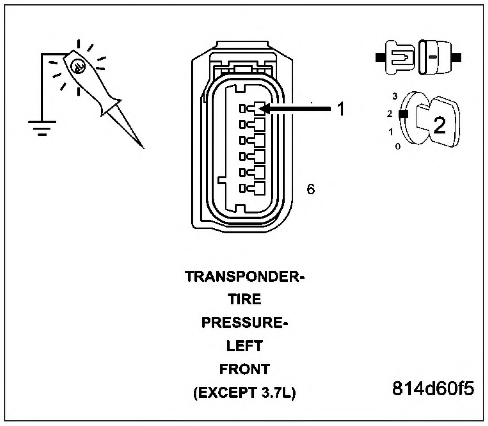
Using a 12–volt test light connect to ground, check the (F941) Fused Ignition Switch Output (Run) circuit.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 3

No >> Repair the (F924) Fused Ignition Switch Output (Run) circuit for an open circuit or high resistance.

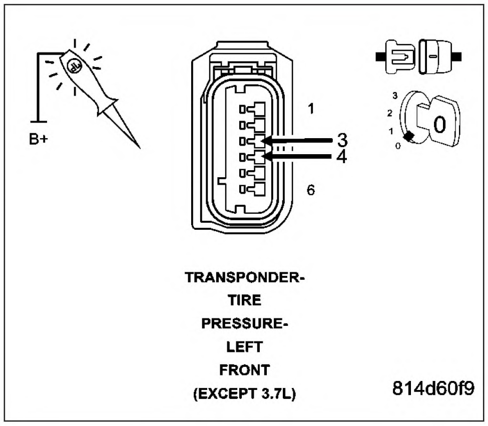


C150A–LEFT FRONT TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH (CONTINUED)

3. (Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE

Using a 12–volt test light connect to 12 volts, check each of the (Z924) Ground circuit(s).

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.



Is the test light illuminated and bright?

Yes >> Go to 4

No >> Repair the (Z924) Ground circuit(s) for an open circuit or high resistance.

---

4. TIRE PRESSURE TRIGGER MODULE

Turn the ignition off.

Replace the appropriate Tire Pressure Trigger Module in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 5

No >> Test Complete.

---

5. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

---

6. INTERMITTENT TIRE PRESSURE TRIGGER MODULE DTC

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

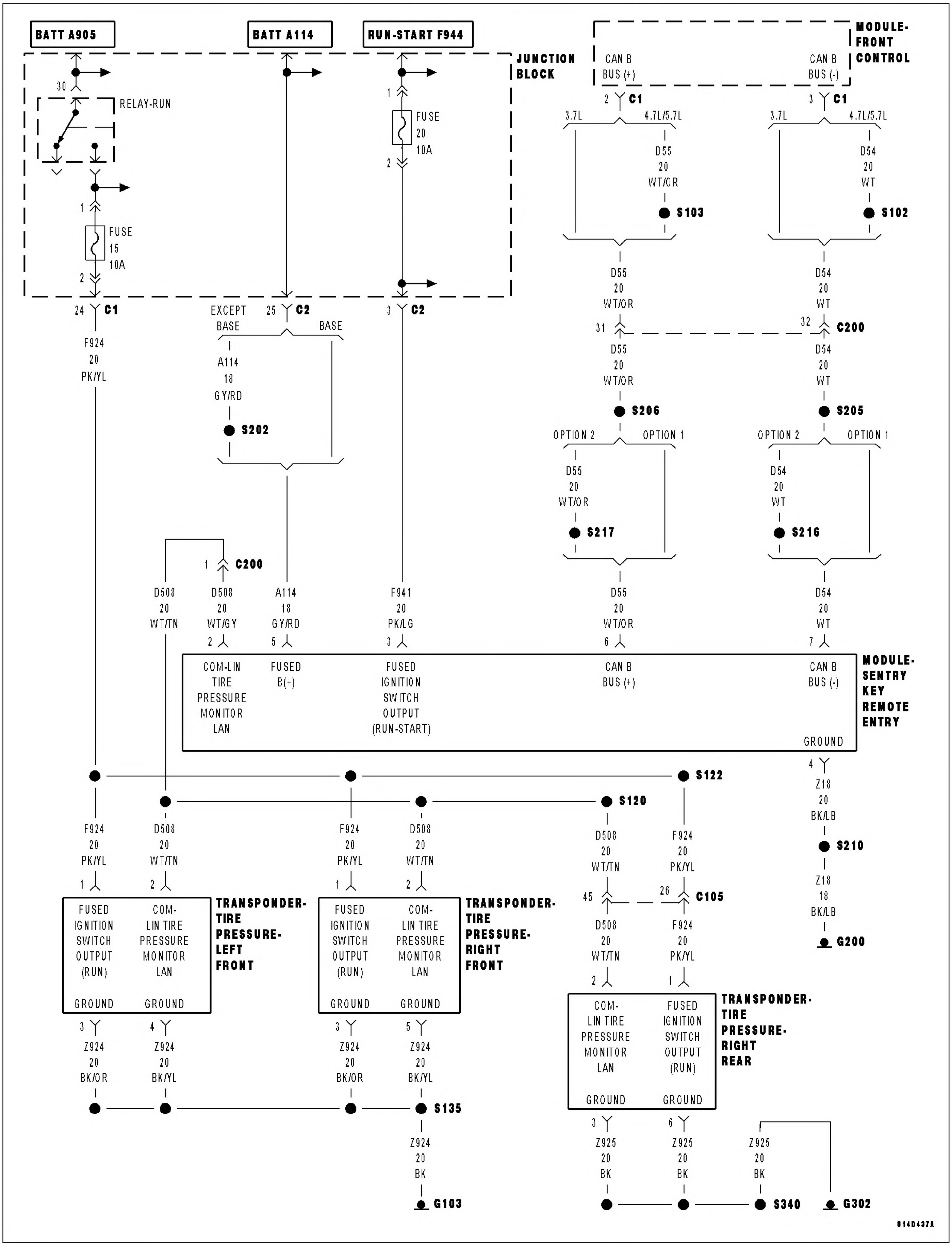
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the first step of this test and perform the diagnostic procedure.

No >> Test complete.

C150B–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
30
RELAY-RUN
1
FUSE 20 10A
2
FUSE 15 10A
24 C1
EXCEPT BASE
25 C2
BASE
3 C2
F924 20 PK/YL
A114 18 GY/RD
S202
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
S103
D54 20 WT
S102
31
32 C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
1
2
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
45
26 C105
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
5
6
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
Z925 20 BK
S340
G302
814D437A

C150B–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Tire Pressure Trigger Module is used to automatically learn the location of each wheel sensor on the vehicle. The module is controlled and activated in sequence by the Wireless Control Module (SKREEM) over a LIN bus. When activated, the module will generate a 125 KHz signal of sufficient field strength to trigger the tire pressure sensor and force a RF transmission from the sensor.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The WCM receives a message from the Tire Pressure Trigger Module indicating that an over voltage condition has been detected.

Possible Causes
INTERMITTENT TIRE PRESSURE TRIGGER MODULE PERFORMANCE DTC
(F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE
(Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
TIRE PRESSURE TRIGGER MODULE
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

NOTE: If a system or battery voltage high DTC is set in the Wireless Control Module (SKREEM) or in the PCM, repair the voltage DTC before continuing with this test.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 6

---

2. (F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition on.

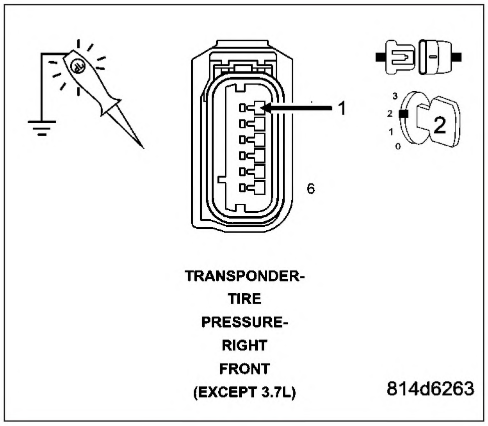
Using a 12–volt test light connect to ground, check the (F924) Fused Ignition Switch Output (Run) circuit.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 3

No >> Repair the (F924) Fused Ignition Switch Output (Run) circuit for an open circuit or high resistance.

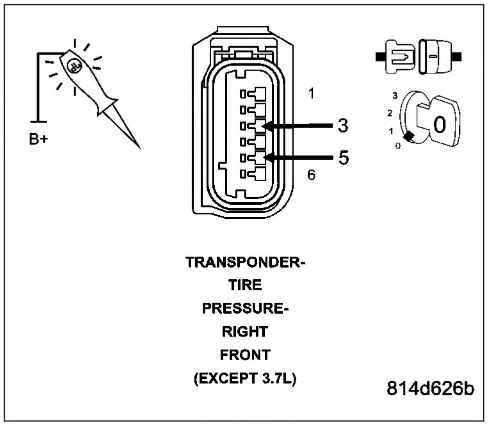


C150B–RIGHT FRONT TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH (CONTINUED)

3. (Z924) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE

Using a 12–volt test light connect to 12 volts, check each of the (Z924) Ground circuit(s).

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.



Is the test light illuminated and bright?

Yes >> Go to 4

No >> Repair the (Z924) Ground circuit(s) for an open circuit or high resistance.

---

4. TIRE PRESSURE TRIGGER MODULE

Turn the ignition off.

Replace the appropriate Tire Pressure Trigger Module in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 5

No >> Test Complete.

---

5. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

---

6. INTERMITTENT TIRE PRESSURE TRIGGER MODULE DTC

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

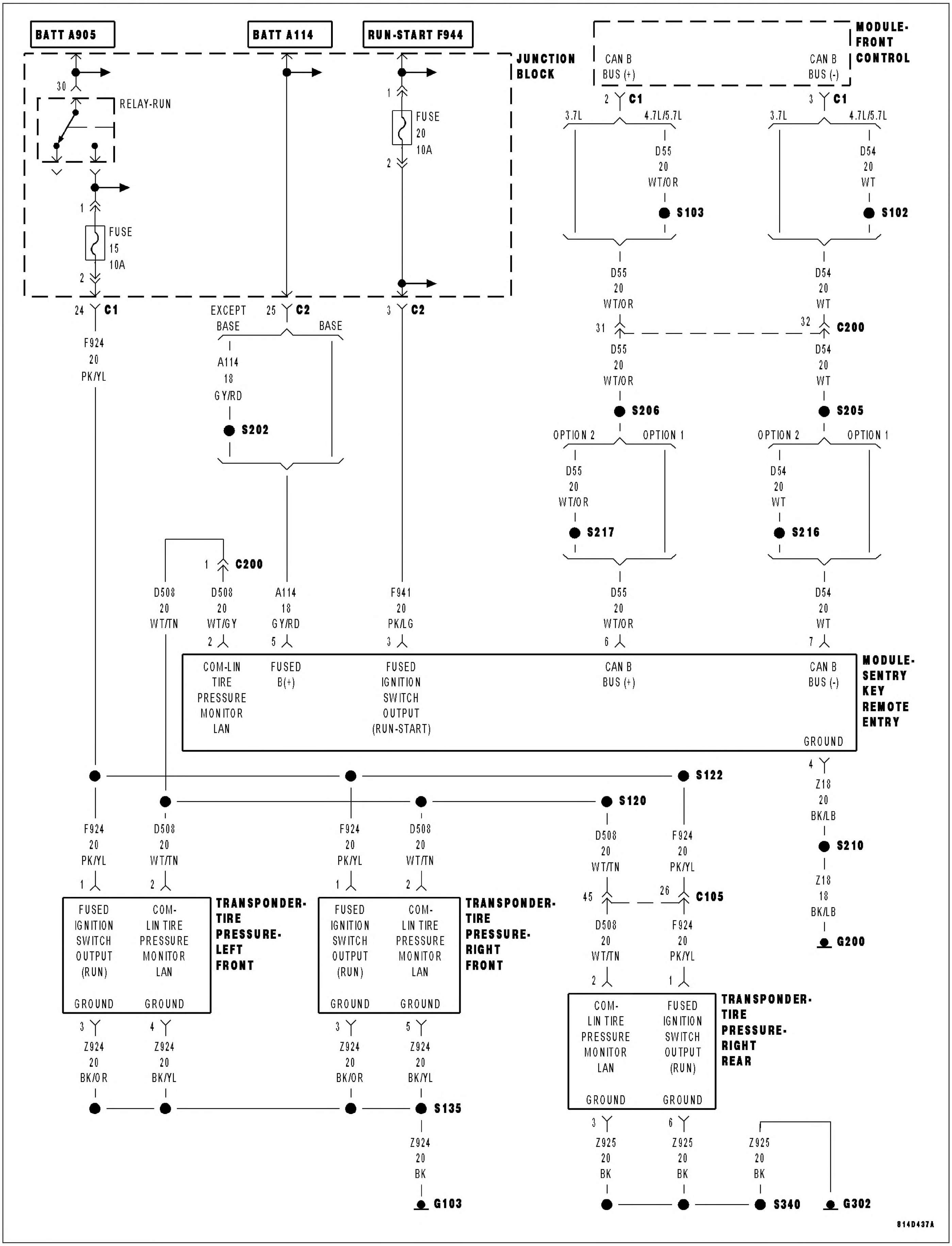
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the first step of this test and perform the diagnostic procedure.

No >> Test complete.

C150C–RIGHT REAR TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH


BATT A905
BATT A114
RUN-START F944
JUNCTION BLOCK
30
RELAY-RUN
1
FUSE 15 10A
2
FUSE 20 10A
24 C1
F924 20 PK/YL
EXCEPT BASE
25 C2
BASE
A114 18 GY/RD
S202
3 C2
MODULE-FRONT CONTROL
CAN B BUS (+)
CAN B BUS (-)
2 C1
3 C1
3.7L
4.7L/5.7L
D55 20 WT/OR
D54 20 WT
S103
S102
31
32 C200
S206
S205
OPTION 2
OPTION 1
S217
S216
1 C200
D508 20 WT/TN
D508 20 WT/GY
A114 18 GY/RD
F941 20 PK/LG
2
5
3
6
7
COM-LIN TIRE PRESSURE MONITOR LAN
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
CAN B BUS (+)
CAN B BUS (-)
GROUND
MODULE-SENTRY KEY REMOTE ENTRY
4
Z18 20 BK/LB
S210
Z18 18 BK/LB
G200
S122
S120
F924 20 PK/YL
D508 20 WT/TN
1
2
FUSED IGNITION SWITCH OUTPUT (RUN)
COM-LIN TIRE PRESSURE MONITOR LAN
GROUND
TRANSPONDER-TIRE PRESSURE-LEFT FRONT
TRANSPONDER-TIRE PRESSURE-RIGHT FRONT
45
26 C105
TRANSPONDER-TIRE PRESSURE-RIGHT REAR
3
4
5
6
Z924 20 BK/OR
Z924 20 BK/YL
S135
Z924 20 BK
G103
Z925 20 BK
S340
G302
814D437A

C150C–RIGHT REAR TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**

Theory of Operation

The Tire Pressure Trigger Module is used to automatically learn the location of each wheel sensor on the vehicle. The module is controlled and activated in sequence by the Wireless Control Module (SKREEM) over a LIN bus. When activated, the module will generate a 125 KHz signal of sufficient field strength to trigger the tire pressure sensor and force a RF transmission from the sensor.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The WCM receives a message from the Tire Pressure Trigger Module indicating that an over voltage condition has been detected.

Possible Causes
INTERMITTENT TIRE PRESSURE TRIGGER MODULE PERFORMANCE DTC
(F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE
(Z925) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE
TIRE PRESSURE TRIGGER MODULE
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.

NOTE: If a system or battery voltage high DTC is set in the Wireless Control Module (SKREEM) or in the PCM, repair the voltage DTC before continuing with this test.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 6

---

2. (F924) FUSED IGNITION SWITCH OUTPUT (RUN) CIRCUIT OPEN OR HIGH RESISTANCE

Turn the ignition on.

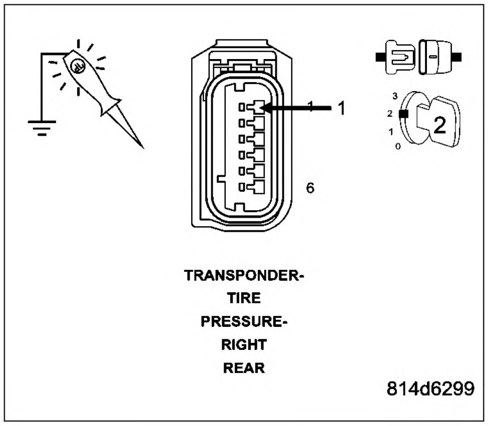
Using a 12–volt test light connect to ground, check the (F941) Fused Ignition Switch Output (Run) circuit.

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.

Is the test light illuminated and bright?

Yes >> Go to 3

No >> Repair the (F924) Fused Ignition Switch Output (Run) circuit for an open circuit or high resistance.

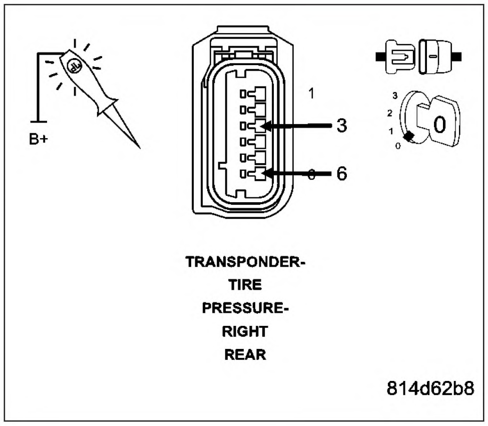


C150C–RIGHT REAR TIRE PRESSURE TRIGGER MODULE VOLTAGE HIGH (CONTINUED)

3. (Z925) GROUND CIRCUIT(S) OPEN OR HIGH RESISTANCE

Using a 12–volt test light connect to 12 volts, check each of the (Z925) Ground circuit(s).

NOTE: The test light should be illuminated and bright. Compare the brightness to that of a direct connection to the battery.



Is the test light illuminated and bright?

Yes >> Go to 4

No >> Repair the (Z925) Ground circuit(s) for an open circuit or high resistance.

---

4. TIRE PRESSURE TRIGGER MODULE

Turn the ignition off.

Replace the appropriate Tire Pressure Trigger Module in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 5

No >> Test Complete.

---

5. WIRELESS CONTROL MODULE (SKREEM)

View repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

---

6. INTERMITTENT TIRE PRESSURE TRIGGER MODULE DTC

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the first step of this test and perform the diagnostic procedure.

No >> Test complete.

TIRE SENSOR 1 LOW PRESSURE ALERT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when there is a low tire pressure condition or sensor pressure measurement failure from the sensor/transmitter.

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 1 LOW PRESSURE ALERT (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

TIRE SENSOR 1 TRANSMIT FAILURE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when the WCM (SKREEM) does not reveive eight consecutive RF transmissions from the sensor/transmitter

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 1 TRANSMIT FAILURE (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

---

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

TIRE SENSOR 2 LOW PRESSURE ALERT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when there is a low tire pressure condition or sensor pressure measurement failure from the sensor/transmitter.

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 2 LOW PRESSURE ALERT (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

---

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

TIRE SENSOR 2 TRANSMIT FAILURE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when the WCM (SKREEM) does not reveive eight consecutive RF transmissions from the sensor/transmitter

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 2 TRANSMIT FAILURE (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

---

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

TIRE SENSOR 3 LOW PRESSURE ALERT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when there is a low tire pressure condition or sensor pressure measurement failure from the sensor/transmitter.

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 3 LOW PRESSURE ALERT (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

TIRE SENSOR 3 TRANSMIT FAILURE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when the WCM (SKREEM) does not reveive eight consecutive RF transmissions from the sensor/transmitter

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 3 TRANSMIT FAILURE (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

---

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

TIRE SENSOR 4 LOW PRESSURE ALERT

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when there is a low tire pressure condition or sensor pressure measurement failure from the sensor/transmitter.

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

---

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 4 LOW PRESSURE ALERT (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

TIRE SENSOR 4 TRANSMIT FAILURE

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously.
- **Set Condition:**
  The fault is set when the WCM (SKREEM) does not reveive eight consecutive RF transmissions from the sensor/transmitter

Possible Causes
INTERMITTENT PERFORMANCE DTC
INCORRECT TIRE PRESSURE
TIRE PRESSURE SENSOR
WCM (SKREEM)

Diagnostic Test

1. TIRE SENSOR LOCATION PROCEDURE

NOTE: If the TPM indicator is illuminated, check for a low tire pressure condition. If the TPM indicator is flashing, check for DTCs.

NOTE: The following test is to locate the Tire Pressure Sensor/Transmitter. If the tires have been rotated, the Tire Pressure Sensor/Transmitter are no longer in sequence from the factory. Faults are linked to the sensor/transmitter IDs. You MUST locate the correct Tire Pressure Sensor/Transmitter that set the fault before continuing.

Set all tire pressures to the recommended specifications and recheck for fault/alert.

The fault will set within two minutes when the at 20 PSI.

Turn the ignition on.

Starting with the left front wheel, deflate the tire down to 20 PSI and wait 2 minutes.

If the TPMS fault was detected and not associated to this Sensor/Transmitter, repeat the process until the faulty Sensor/Transmitter has been identified.

NOTE: Once a fault/alert has set, it will establish the location of the tire pressure sensors/transmitter. Repeat steps until the applicable Tire Pressure Sensor/Transmitter has been located.

Once the correct sensor/transmitter has been located continue.

Continue
Go to 2

2. LOW TIRE PRESSURE

NOTE: The DTC can be caused by many different factors and might not be a sensor/transmitter or a WCM (SKREEM) fault. Interference from other elements will over power the sensor/transmitter RF frequency making erratic operation to the in the TPM system. Check the vehicle for aftermarket accessories that could compromise the RF frequency signal before diagnosing the TPM system.

Correct all tire pressure to the recommended specifications and wait 2 minutes.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Go to 3

No >> Go to 4

TIRE SENSOR 4 TRANSMIT FAILURE (CONTINUED)

3. TIRE PRESSURE SENSOR

Turn the ignition off.

Replace the Tire Pressure Sensor in accordance with the Service Information.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

No >> Test Complete.

---

4. TIRE PRESSURE CORRECTION/INTERMITTENT

NOTE: If the tire pressure was out of specification and by adjusting the pressure corrected the DTC, the test is complete. If the tire pressure was within specification and were unable to reset the DTC an intermittent condition is present and the below steps may aid in identifying the failure.

The conditions necessary to set this DTC are not present at this time.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Repair as necessary.

No >> Test complete.

PRNDL MESSAGE MISSING

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if the PRNDL message is not received for more than 5 seconds.

Possible Causes
INTERMITTENT PRNDL MESSAGE MISSING DTC
PCM DTCS PRESENT
CLUSTER DTCS PRESENT
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 5

---

2. DTCS PRESENT IN PCM

Cycle the ignition off and on.
With the scan tool, select View DTCs in the Powertrain Control Module (PCM).

Are there any DTCs present on the PCM?

Yes >> Refer to the appropriate diagnostic procedure for the PCM DTC.

No >> Go to 3

---

3. DTCS PRESENT IN THE CLUSTER

Cycle the ignition off and on.
With the scan tool, select View DTCs in the Instrument Cluster (CCN).

Are there any DTCs present on the Cluster?

Yes >> Refer to the appropriate diagnostic procedure for the Cluster DTC.

No >> Go to 4

PRNDL MESSAGE MISSING (CONTINUED)

4. WIRELESS CONTROL MODULE (SKREEM)

Inspect the wiring and connectors relative to this circuit.

Monitor the scan tool data relative to this circuit while performing a wiggle test on the wiring and connectors. Look for the DTC to reset or for the data to change other that as expected.

Refer to any Technical Service Bulletins that may apply to this condition.

If no problems are found view repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

5. INTERMITTENT PRNDL MESSAGE MISSING DTC

The conditions necessary to set this DTC are not present at this time.

Inspect the wiring and connectors relative to this circuit.

Monitor the scan tool data relative to this circuit while performing a wiggle test on the wiring and connectors. Look for the DTC to reset or for the data to change other that as expected.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the beginning of this test and perform the diagnostic procedure as necessary.

No >> Test complete.

VEHICLE SPEED MESSAGE MISSING

For a complete wiring diagram **Refer to Section 8W**

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  This DTC will set if the Vehicle Speed message is not received for more than 5 seconds.

Possible Causes
INTERMITTENT VEHICLE SPEED MESSAGE MISSING DTC
PCM DTCS PRESENT
CLUSTER DTCS PRESENT
WIRELESS CONTROL MODULE (SKREEM)

Diagnostic Test

1. DTC STATUS IS ACTIVE

Turn the ignition on.
With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Is the DTC status Active at this time?

Yes >> Go to 2

No >> Go to 5

---

2. DTCS PRESENT IN PCM

Cycle the ignition off and on.
With the scan tool, select View DTCs in the Powertrain Control Module (PCM).

Are there any DTCs present on the PCM?

Yes >> Refer to the appropriate diagnostic procedure for the PCM DTC.

No >> Go to 3

---

3. DTCS PRESENT IN THE CLUSTER

Cycle the ignition off and on.
With the scan tool, select View DTCs in the Instrument Cluster (CCN).

Are there any DTCs present on the Cluster?

Yes >> Refer to the appropriate diagnostic procedure for the Cluster DTC.

No >> Go to 4

VEHICLE SPEED MESSAGE MISSING (CONTINUED)

4. WIRELESS CONTROL MODULE (SKREEM)

Inspect the wiring and connectors relative to this circuit.

Monitor the scan tool data relative to this circuit while performing a wiggle test on the wiring and connectors. Look for the DTC to reset or for the data to change other that as expected.

Refer to any Technical Service Bulletins that may apply to this condition.

If no problems are found view repair.

Repair

Replace the Wireless Control Module (SKREEM) in accordance with the Service Information.

---

5. INTERMITTENT VEHICLE SPEED MESSAGE MISSING DTC

The conditions necessary to set this DTC are not present at this time.

Inspect the wiring and connectors relative to this circuit.

Monitor the scan tool data relative to this circuit while performing a wiggle test on the wiring and connectors. Look for the DTC to reset or for the data to change other that as expected.

Refer to any Technical Service Bulletins that may apply to this condition.

With the scan tool, clear DTCs in the Wireless Control Module (SKREEM).

Test Drive the vehicle for a minimum of 10 minutes with vehicle speed greater than 15 m.p.h.

With the scan tool, select View DTCs in the Wireless Control Module (SKREEM).

Does the DTC reset or is the status Active for this DTC?

Yes >> Return to the beginning of this test and perform the diagnostic procedure as necessary.

No >> Test complete.

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BODY

WARNING

SAFETY PRECAUTIONS AND WARNINGS

WARNING: Use an osha approved breathing filter when spraying paint or solvents in a confined area. Personal injury can result.
- **Avoid prolonged skin contact with petroleum or alcohol – based cleaning solvents. Personal injury can result.**
- **Do not stand under a hoisted vehicle that is not properly supported on safety stands. Personal injury can result.**

CAUTION: When holes must be drilled or punched in an inner body panel, verify depth of space to the outer body panel, electrical wiring, or other components. Damage to vehicle can result.
- **Do not weld exterior panels unless combustible material on the interior of vehicle is removed from the repair area. Fire or hazardous conditions, can result.**
- **Always have a fire extinguisher ready for use when welding.**
- **Disconnect the negative (-) cable clamp from the battery when servicing electrical components that are live when the ignition is OFF. Damage to electrical system can result.**
- **Do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.**
- **Do not use harsh alkaline based cleaning solvents on painted or upholstered surfaces. Damage to finish or color can result.**
- **Do not hammer or pound on plastic trim panel when servicing interior trim. Plastic panels can break.**

DIAGNOSIS AND TESTING

WATER LEAKS

Water leaks can be caused by poor sealing, improper body component alignment, body seam porosity, missing plugs, or blocked drain holes. Centrifugal and gravitational force can cause water to drip from a location away from the actual leak point, making leak detection difficult. All body sealing points should be water tight in normal wet-driving conditions. Water flowing downward from the front of the vehicle should not enter the passenger or luggage compartment. Moving sealing surfaces will not always seal water tight under all conditions. At times, side glass or door seals will allow water to enter the passenger compartment during high pressure washing or hard driving rain (severe) conditions. Overcompensating on door or glass adjustments to stop a water leak that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After completing a repair, water test vehicle to verify leak has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE WATER LEAK TESTS

Verify that floor and body plugs are in place, body drains are clear, and body components are properly aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

WATER LEAK TESTS

WARNING: Do not use electric shop lights or tools in water test area. Personal injury can result.

When the conditions causing a water leak have been determined, simulate the conditions as closely as possible.

- If a leak occurs with the vehicle parked in a steady light rain, flood the leak area with an open-ended garden hose.
- If a leak occurs while driving at highway speeds in a steady rain, test the leak area with a reasonable velocity stream or fan spray of water. Direct the spray in a direction comparable to actual conditions.
- If a leak occurs when the vehicle is parked on an incline, hoist the end or side of the vehicle to simulate this condition. This method can be used when the leak occurs when the vehicle accelerates, stops or turns. If the leak occurs on acceleration, hoist the front of the vehicle. If the leak occurs when braking, hoist the back of the vehicle. If the leak occurs on left turns, hoist the left side of the vehicle. If the leak occurs on right turns, hoist the right side of the vehicle. For hoisting recommendations (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

WATER LEAK DETECTION

To detect a water leak point-of-entry, do a water test and watch for water tracks or droplets forming on the inside of the vehicle. If necessary, remove interior trim covers or panels to gain visual access to the leak area. If the hose cannot be positioned without being held, have someone help do the water test.

Some water leaks must be tested for a considerable length of time to become apparent. When a leak appears, find the highest point of the water track or drop. The highest point usually will show the point of entry. After leak point has been found, repair the leak and water test to verify that the leak has stopped.

Locating the entry point of water that is leaking into a cavity between panels can be difficult. The trapped water may splash or run from the cavity, often at a distance from the entry point. Most water leaks of this type become apparent after accelerating, stopping, turning, or when on an incline.

MIRROR INSPECTION METHOD

When a leak point area is visually obstructed, use a suitable mirror to gain visual access. A mirror can also be used to deflect light to a limited-access area to assist in locating a leak point.

BRIGHT LIGHT LEAK TEST METHOD

Some water leaks in the luggage compartment can be detected without water testing. Position the vehicle in a brightly lit area. From inside the darkened luggage compartment inspect around seals and body seams. If necessary, have a helper direct a drop light over the suspected leak areas around the luggage compartment. If light is visible through a normally sealed location, water could enter through the opening.

PRESSURIZED LEAK TEST METHOD

When a water leak into the passenger compartment cannot be detected by water testing, pressurize the passenger compartment and soap test exterior of the vehicle. To pressurize the passenger compartment, close all doors and windows, start engine, and set heater control to high blower in HEAT position. If engine can not be started, connect a charger to the battery to ensure adequate voltage to the blower. With interior pressurized, apply dish detergent solution to suspected leak area on the exterior of the vehicle. Apply detergent solution with spray device or soft bristle brush. If soap bubbles occur at a body seam, joint, seal or gasket, the leak entry point could be at that location.

WIND NOISE

Wind noise is the result of most air leaks. Air leaks can be caused by poor sealing, improper body component alignment, body seam porosity, or missing plugs in the engine compartment or door hinge pillar areas. All body sealing points should be airtight in normal driving conditions. Moving sealing surfaces will not always seal airtight under all conditions. At times, side glass or door seals will allow wind noise to be noticed in the passenger compartment during high cross winds. Over compensating on door or glass adjustments to stop wind noise that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After a repair procedure has been performed, test vehicle to verify noise has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE TESTS

Verify that floor and body plugs are in place and body components are aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

ROAD TESTING WIND NOISE

1. Drive the vehicle to verify the general location of the wind noise.
2. Apply 50 mm (2 in.) masking tape in 150 mm (6 in.) lengths along weatherstrips, weld seams or moldings. After each length is applied, drive the vehicle. If noise goes away after a piece of tape is applied, remove tape, locate, and repair defect.

POSSIBLE CAUSE OF WIND NOISE

- Moldings standing away from body surface can catch wind and whistle.
- Gaps in sealed areas behind overhanging body flanges can cause wind-rushing sounds.
- Misaligned movable components.
- Missing or improperly installed plugs in pillars.
- Weld burn through holes.

STANDARD PROCEDURE

BODY LUBRICATION

All mechanisms and linkages should be lubricated when necessary. This will maintain ease of operation and provide protection against rust and excessive wear. The weatherstrip seals should be lubricated to prolong their life as well as to improve door sealing.

All applicable exterior and interior vehicle operating mechanisms should be inspected and cleaned. Pivot/sliding contact areas on the mechanisms should then be lubricated.

1. When necessary, lubricate the operating mechanisms with the specified lubricants.
2. Apply silicone lubricant to a cloth and wipe it on door seals to avoid over-spray that can soil passenger’s clothing.
3. Before applying lubricant, the component should be wiped clean. After lubrication, any excess lubricant should be removed.
4. The hood latch, latch release mechanism, latch striker, and safety latch should be lubricated periodically.
5. The door lock cylinders should be lubricated twice each year (preferably autumn and spring).
   - Spray a small amount of lock cylinder lubricant directly into the lock cylinder.
   - Apply a small amount to the key and insert it into the lock cylinder.
   - Rotate it to the locked position and then back to the unlocked position several times.
   - Remove the key. Wipe the lubricant from it with a clean cloth to avoid soiling of clothing.

HEAT STAKING

1. Remove trim panel.
2. Bend or move the trim panel components at the heat staked joints. Observe the heat staked locations and/or component seams for looseness.
3. Heat stake the components.

a. If the heat staked or component seam location is loose, hold the two components tightly together and using a soldering gun with a flat tip, melt the material securing the components together. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

b. If the heat staked material is broken or missing, use a hot glue gun to apply new material to the area to be repaired. The panels that are being heat staked must be held together while the applying the glue. Once the new material is in place, it may be necessary to use a soldering gun to melt the newly applied material. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

4. Allow the repaired area to cool and verify the repair.
5. Install trim panel.

PLASTIC BODY PANEL REPAIR

There are many different types of plastics used in today's automotive environment. We group plastics in three different categories: Rigid, Semi-Rigid, and Flexible. Any of these plastics may require the use of an adhesion promoter for repair. These types of plastic are used extensively on DaimlerChrysler Motors vehicles. Always follow repair material manufacturer's plastic identification and repair procedures.

Rigid Plastics:

Examples of rigid plastic use: Fascias, Hoods, Doors, and other Body Panels, which include SMC, ABS, and Polycarbonates.

Semi-Rigid Plastics:

Examples of semi-rigid plastic use: Interior Panels, Under Hood Panels, and other Body Trim Panels.

Flexible Plastics:

Examples of flexible plastic use: Fascias, Body Moldings, and upper and lower Fascia Covers.

Repair Procedure:

The repair procedure for all three categories of plastics is basically the same. The one difference is the material used for the repair. The materials must be specific for each substrate, rigid repair material for rigid plastic repair, semi-rigid repair material for semi-rigid plastic repair and flexible repair material for flexible plastic repair.

Adhesion Promoter/Surface Modifier:

Adhesion Promoters/Surface Modifiers are required for certain plastics. All three categories may have plastics that require the use of adhesion promoter/surface modifiers. Always follow repair material manufacturer's plastic identification and repair procedures.

SAFETY PRECAUTION AND WARNINGS

WARNING:
- **Eye protection should be used when servicing components. Personal injury can result.**
- **Use an OSHA approved breathing mask when mixing epoxy, grinding, and spraying paint or solvents in a confined area. Personal injury can result.**
- **Avoid prolonged skin contact with resin, petroleum, or alcohol based solvents. Personal injury can result.**
- **Do not venture under a hoisted vehicle that is not properly supported on safety stands. Personal injury can result.**

NOTE:
- **When holes must be drilled or cut in body panels, verify locations of internal body components and electrical wiring. Damage to vehicle can result.**
- **Do not use abrasive chemicals or compounds on undamaged painted surfaces around repair areas. Damage to finish can result.**

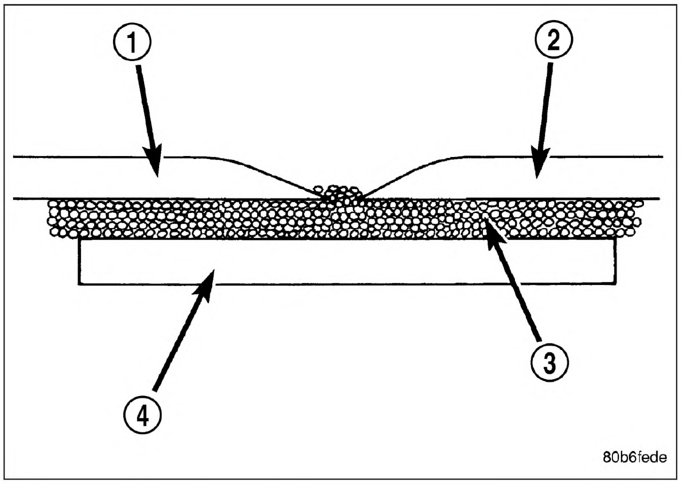
RIGID, SEMI-RIGID, AND FLEXIBLE PLASTIC PARTS TYPES

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
ASA	ACRYLONITRILE STYRENE ACRYLITE	LURAN S	CONSOLES, GRILLES
ABS	ACRYLONITRILE BUTADIENE STYRENE	TERLURAN	″A″ PILLARS, CONSOLES, GRILLES
ABS/PC	ABS/PC ALLOY	PULSE, PROLOY, BAYBLEND	DOORS, INSTRUMENT PANELS
ABS/PVC	ABS/PV ALLOY	PROLOY, PULSE, LUSTRAN, CYCLOVIN	DOOR PANELS, GRILLES, TRIM
BMC	BULK MOLDING COMPOUND	BMC	FENDER EXTENSIONS
EMA	EHTYLENE METHYL ACRYLATE/IONOMER	SURLYN, EMA, IONOMER	BUMPER GUARDS, PADS
METTON	METTON	METTON	GRILLES, KICK PANELS, RUNNING BOARDS
MPPO	MODIFIED POLYPHENYLENE OXIDE	MPPO	SPOILER ASSEMBLY
PA	POLYAMID	ZYTEL, VYDYNE, PA, MINLON	FENDERS, QUARTER PANELS
PET	THERMOPLASTIC POLYESTER	RYNITE	TRIM
PBT/PPO	PBT/PPO ALLOY	GERMAX	CLADDINGS
PBTP	POLYBUTYLENE THEREPTHALATE	PBT, PBTP, POCAN, VALOX	WHEEL COVERS, FENDERS, GRILLES
PBTP/EEBC	POLYBUTYLENE THEREPTHALATE/EEBC ALLOY	BEXLOY, ″M″, PBTP/EEBC	FASCIAS, ROCKER PANEL, MOLDINGS
PC	POLYCARBONATE	LEXAN, MERLON, CALIBRE, MAKROLON PC	TAIL LIGHT LENSES, IP TRIM, VALANCE PANELS
PC/ABS	PC/ABS ALLOY	GERMAX, BAY BLENDS, PULSE	DOORS, INSTRUMENT PANELS
PPO	POLYPHENYLENE OXIDE	AZDEL, HOSTALEN, MARLEX, PRFAX, NORYL, GTX, PPO	INTERIOR TRIM, DOOR PANELS, SPLASH SHIELDS, STEERING COLUMN SHROUD
PPO/PA	POLYPHENYLENE/ POLYAMID	PPO/PA, GTX 910	FENDERS, QUARTER PANELS
PR/FV	FIBERGLASS REINFORCED PLASTIC	FIBERGLASS, FV, PR/FV	BODY PANELS
PS	POLYSTYRENE	LUSTREX, STYRON, PS	DOOR PANELS, DASH PANELS
RTM	RESIN TRANSFER MOLDING COMPOUND	RTM	BODY PANELS
SMC	SHEET MOLDED COMPOUND	SMC	BODY PANELS
TMC	TRANSFER MOLDING COMPOUND	TMC	GRILLES

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
UP	UNSATURATED POLYESTER (THERMOSETTING)	SMC, BMC, TMC, ZMC, IMC, XSMC, UP	GRILLE OPENING PANEL, LIFTGATES, FLARESIDE FENDERS, FENDER EXTENSIONS
EEBC	ETHER/ESTER BLOCKED CO-POLYMER	EEBC	BUMPERS
EEBC/PBTP	EEBC/POLYBUTYLENE TEREPTHALATE	EEBC, PBTP, BEXLOY	BUMPER, ROCKER PANELS
EMPP	ETHYLENE MODIFIED POLYPROPYLENE	EMPP	BUMPER COVERS
EPDM	ETHYLENE/ PROPROPYLENE DIENE MONOMER	EPDM, NORDEL, VISTALON	BUMPERS
EPM	ETHYLENE/ PROPROPYLENE CO-POLYMER	EPM	FENDERS
MPU	FOAM POLYURETHANE	MPU	SPOILERS
PE	POLYETHYLENE	ALATHON, DYLAN, LUPOLEN, MARLEX	-
PP	POLYPROPYLENE (BLENDS)	NORYL, AZDEL, MARLOX, DYLON, PRAVEX	INNER FENDER, SPOILERS, KICK PANELS
PP/EPDM	PP/EPDM ALLOY	PP/EPDM	SPOILERS, GRILLES
PUR	POLYURETHANE	COLONELS, PUR, PU	FASCIAS, BUMPERS
PUR/PC	PUR/PC ALLOY	TEXIN	BUMPERS
PVC	POLYVINYL CHLORIDE	APEX, GEON, VINYLITE	BODY MOLDINGS, WIRE INSULATION, STEERING WHEELS
RIM	REACTION INJECTED MOLDED POLYURETHANE	RIM, BAYFLEX	FRONT FASCIAS, MODULAR WINDOWS
RRIM	REINFORCED REACTION INJECTED MOLDED	PUR, RRIM	FASCIAS, BODY PANELS, BODY TRIMS
TPE	THERMO POLYETHYLENE	TPE, HYTREL, BEXLOY-V	FASCIAS, BUMPERS, CLADDINGS
TPO	THERMOPOLYOLEFIN	POLYTROPE, RENFLEX, SANTOPRENE, VISAFLEX, ETA, APEX, TPO, SHIELDS, CLADDINGS	BUMPERS, END CAPS, TELCAR, RUBBER, STRIPS, SIGHT, INTERIOR B POST
TPP	THERMO-POLYPROPYLENE	TPP	BUMPERS
TPU	THERMOPOLYURETHANE, POLYESTER	TPU, HYTREL, TEXIN, ESTANE	BUMPERS, BODY SIDE, MOLDINGS, FENDERS, FASCIAS

PANEL SECTIONING

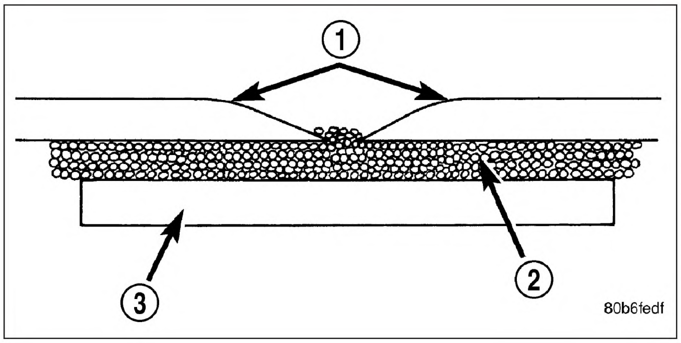
If it is required to section a large panel for a plastic repair, it will be necessary to reinforce the panel. To bond two plastic panels together, a reinforcement must overlap both panels. The panels must be “V’d” at a 20 degree angle. The area to be reinforced should be washed, then sanded. Be sure to wipe off any excess soap and water when finished. Lightly sand or abrade the plastic with an abrasive pad or sandpaper. Blow off any dust with compressed air or wipe with a clean dry rag.



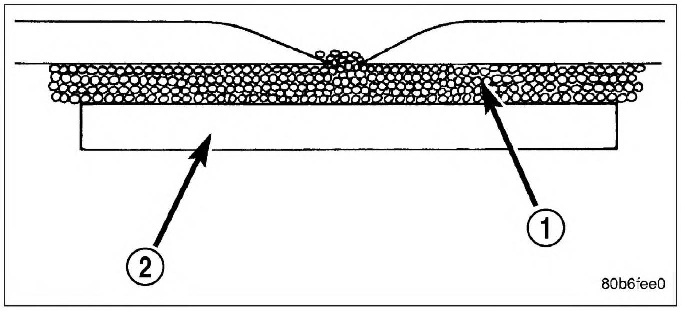
When bonding plastic panels, Follow repair material manufacturers recommendations. Be sure that enough adhesive has been applied to allow squeeze out and to fill the full bond line. Once the pieces have been brought together, do not move them until the adhesive is cured. The assembly can be held together with clamps, rivets, etc. A faster cure can be obtained by heating with a heat lamp or heat gun. After the parts have been bonded and have had time to cure, rough sand the seam and apply the final adhesive filler to the area being repaired. Smooth the filler with a spreader, wooden tongue depressor, or squeegee. For fine texturing, a small amount of water can be applied to the filler surface while smoothing. The cured filler can be sanded as necessary and, as a final step, cleanup can be done with soapy water. Wipe the surface clean with a dry cloth allowing time for the panel to dry before moving on with the repair.

PANEL REINFORCEMENT

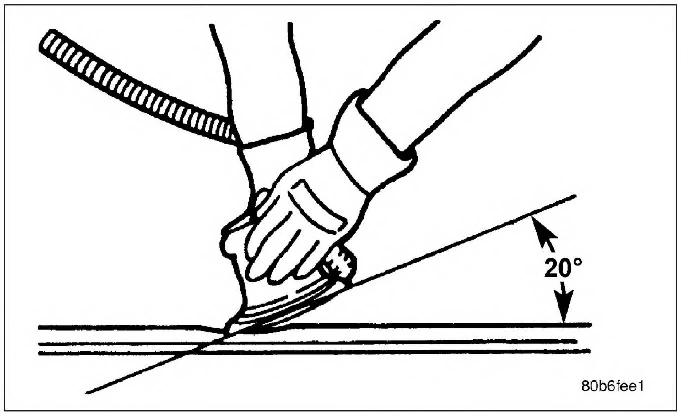
Structural repair procedures for rigid panels with large cracks and holes will require a reinforcement backing. Reinforcements can be made with several applications of glass cloth saturated with structural adhesive. Semi-rigid or flexible repair materials should be used for semi-rigid or flexible backing reinforcement and. Open meshed fiberglass dry wall tape can be used to form a reinforcement. The dry wall tape allows the resin to penetrate through and make a good bond between the panel and the adhesive. Structurally, the more dry wall tape used, the stronger the repair.

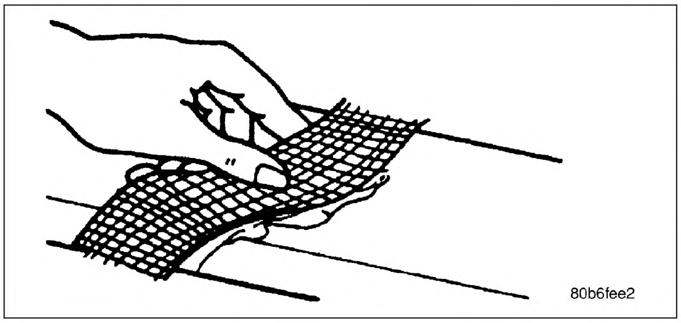


Another kind of repair that can be done to repair large cracks and holes is to use a scrap piece of similar plastic and bond with structural adhesive. The reinforcement should cover the entire break and should have a generous amount of overlap on either side of the cracked or broken area.



When repairing plastic, the damaged area is first “V’d” out, or beveled. Large bonding areas are desirable when repairing plastic because small repairs are less likely to hold permanently. Beveling the area around a crack at a 20 degree angle will increase the bonding surface for a repair. It is recommended that sharp edges be avoided because the joint may show through after the panel is refinished.



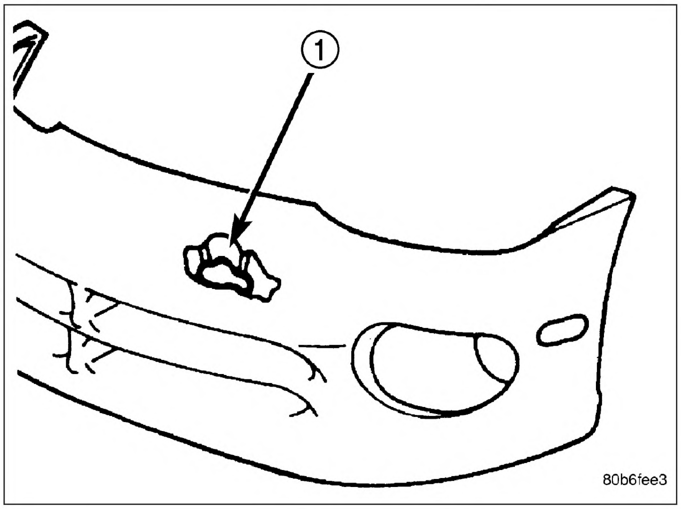


- Panel repair for both flexible and rigid panels are basically the same. The primary difference between flexible panel repair and rigid panel repair is in the adhesive materials used.
- The technician should first decide what needs to be done when working on any type of body panel. One should determine if it is possible to return the damage part to its original strength and appearance without exceeding the value of the replacement part.
- When plastic repairs are required, it is recommended that the part be left on the vehicle when every possible. That will save time, and the panel will remain stationary during the repair. Misalignment can cause stress in the repair areas and can result in future failure.

VISUAL INSPECTION

Composite materials can mask the severity of an accident. Adhesive bond lines, interior structure of the doors, and steel structures need to be inspected carefully to get a true damage assessment. Close inspection may require partial removal of interior trim or inner panels.

Identify the type of repair: Puncture or Crack - Damage that has penetrated completely through the panel. Damage is confined to one general area; a panel section is not required. However, a backer panel, open fiberglass tape, or matted material must be bonded from behind.

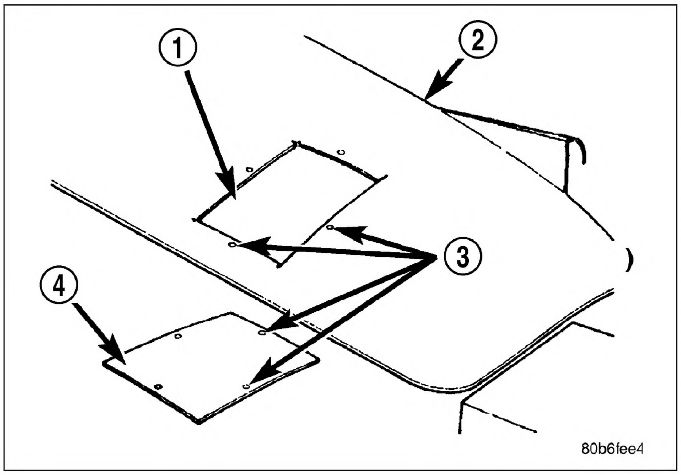


PANEL SURFACE PREPARATION

If a body panel has been punctured, cracked, or crushed, the damaged area must be removed from the panel to achieve a successful repair. All spider web cracks leading away from a damaged area must be stopped or removed. To stop a running crack in a panel, drill a 6 mm (0.250 in.) hole at the end of the crack farthest away from the damage. If spider web cracks can not be stopped, the panel would require replacement. The surfaces around the damaged area should be stripped of paint and freed from wax and oil. Scuff surfaces around repair area with 360 grit wet/dry sandpaper, or equivalent, to assure adhesion of repair materials.

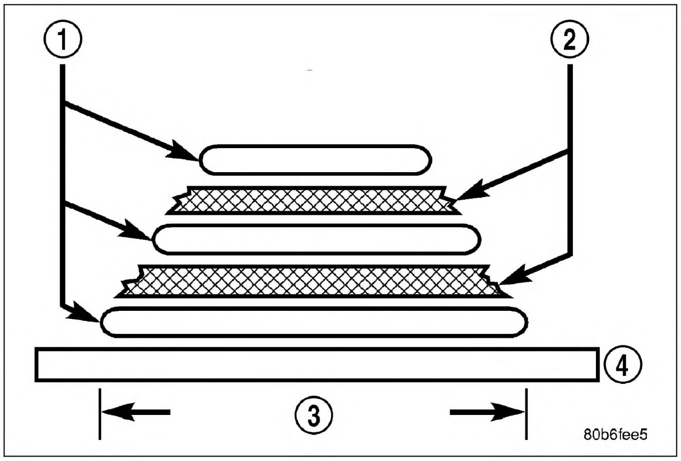
PATCHING PANELS

An panel that has extensive puncture type damage can be repaired by cutting out the damaged material. Use a suitable reciprocating saw or cut off wheel to remove the section of the panel that is damaged. The piece cut out can be used as a template to shape the new patch. It is not necessary to have access to the back of the panel to install a patch. Bevel edges of cutout at 20 degrees to expose a larger bonding area on the outer side. This will allow for an increased reinforcement areas.



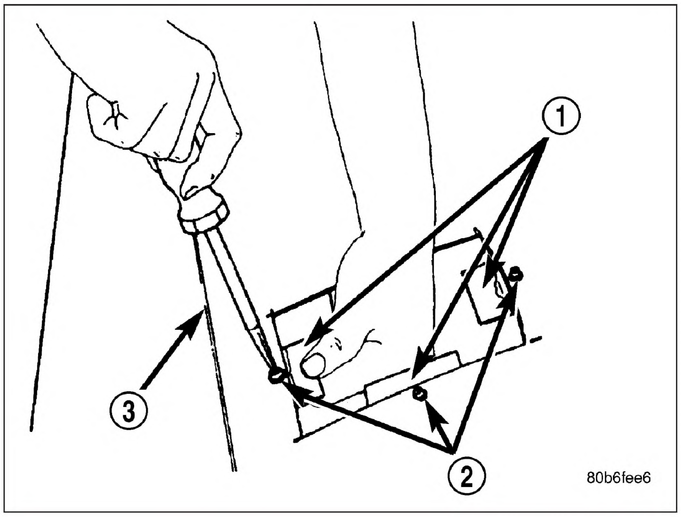
PANEL PATCH FABRICATIONS

A patch can be fabricated from any rigid fiberglass panel that has comparable contour with the repair area. Lift gates and fenders can be used to supply patch material. If existing material is not available or compatible, a patch can be constructed with adhesive and reinforcement mesh (dry wall tape). Perform the following operation if required:

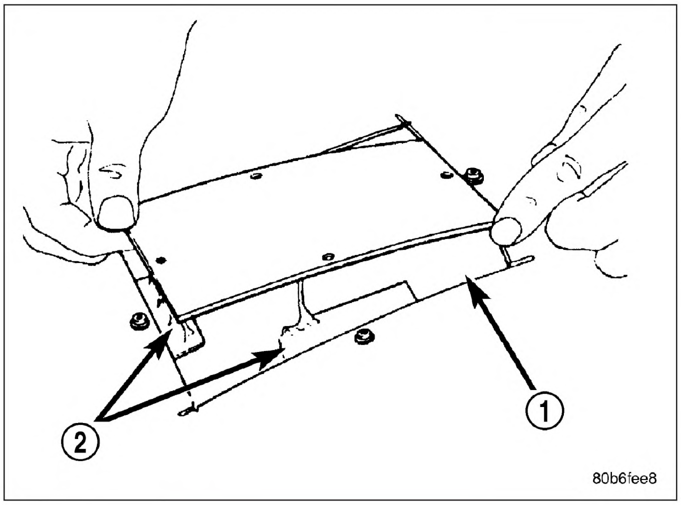


1. Cover waxed paper or plastic with adhesive backed nylon mesh (dry wall tape) larger than the patch required.
2. Tape waxed paper or plastic sheet with mesh to a surface that has a compatible contour to the repair area.
3. Apply a liberal coat of adhesive over the reinforcement mesh. If necessary apply a second or third coat of adhesive and mesh after first coat has cured. The thickness of the patch should be the same as the repair area.
4. After patch has cured, peel waxed paper or plastic from the back of the patch.
5. If desired, a thin film coat of adhesive can be applied to the back of the patch to cover mesh for added strength.

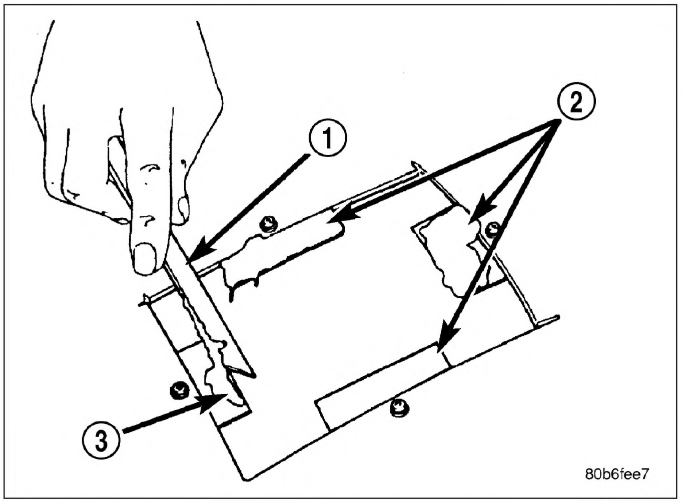
PANEL PATCH INSTALLATION



1. Make a paper or cardboard pattern the size and shape of the cutout hole in the panel.
2. Trim 3 mm (0.125 in.) from edges of pattern so patch will have a gap between connecting surfaces.
3. Using the pattern as a guide, cut the patch to size.
4. Cut scrap pieces of patch material into 50 mm (2 in.) squares to use as patch supports to sustain the patch in the cutout.
5. Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) in from edge of cutout hole.
6. Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) away from edge of patch across from holes drilled around cutout.
7. Drill 3 mm (0.125 in.) holes in the support squares 13 mm (0.5 in.) from the edge in the center of one side.
8. Scuff the backside of the body panel around the cutout hole with a scuff pad or sandpaper.
9. Mix enough adhesive to cover one side of all support squares.
10. Apply adhesive to cover one side of all support squares.
11. Using number 8 sheet metal screws, secure support squares to back side of body panel with adhesive sandwiched between the panel and squares.

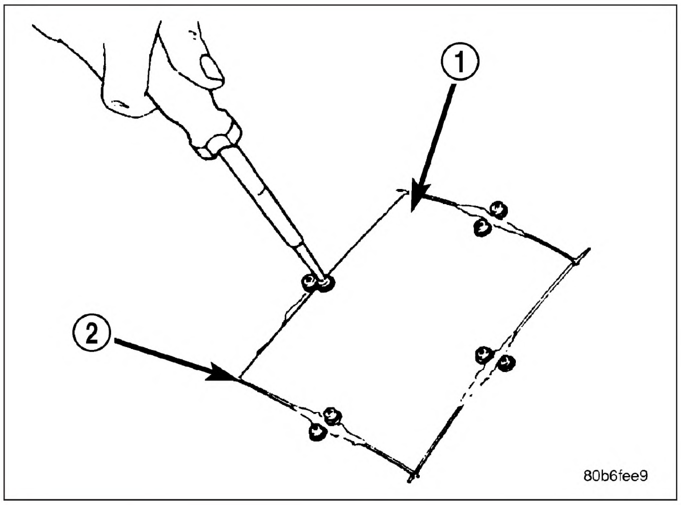


12. Position patch in cutout against support squares and adjust patch until the gap is equal along all sides.
13. Drill 3 mm (0.125 in.) holes in the support squares through the pre-drilled holes in the patch.

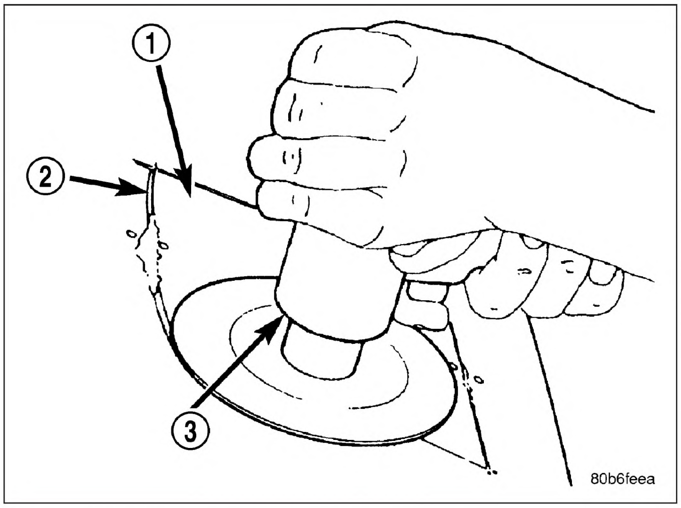


14. Apply a coat of adhesive to the exposed ends of the support squares.

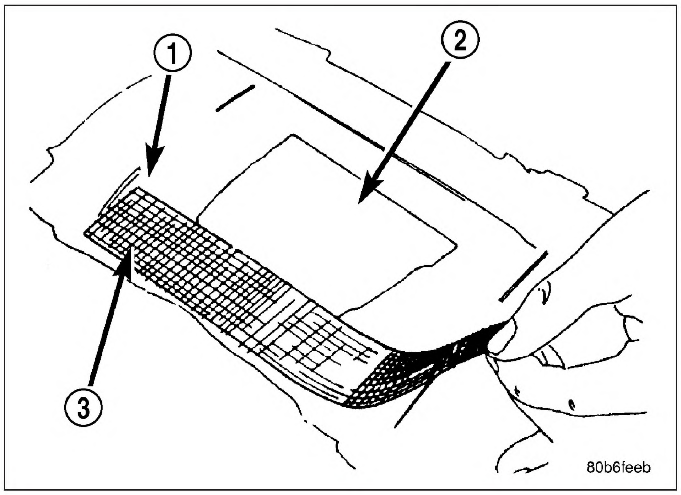
15. Install screws to hold the patch to support squares. Tighten screws until patch surface is flush with panel surface.
16. Allow adhesive to cure, and remove all screws.



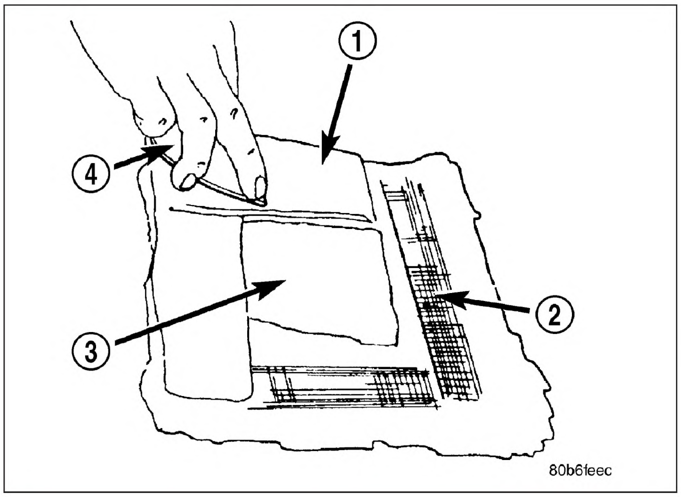
17. Using a 125 mm (5 in.) 24 grit disc grinder, grind a 50 mm (2 in.) to 75 mm (3 in.) wide and 2 mm (0.080 in.) deep path across the gaps around the patch. With compressed air, blow dust from around patch.



18. Apply adhesive backed nylon mesh (dry wall tape) over gaps around patch.
19. Mix enough adhesive to cover the entire patch area.



20. Apply adhesive over the mesh around patch, and smooth epoxy with a wide spreader to reduce finish grinding. Use two to three layers of mesh and adhesive to create a stronger repair.



PATCHED PANEL SURFACING

After patch panel is installed, the patch area can be finished using the same methods as finishing other types of body panels. If mesh material is exposed in the patched area, grind surface down, and apply a coat of high quality rigid plastic body filler. Prime, block sand, and paint as required.

BUZZ, SQUEAK & RATTLE

Buzz, Squeak & Rattles (BSR) may be caused by any one or more of the following and may be corrected as indicated:

- Loose fasteners should be tightened to specifications.
- Damaged or missing clips should be replaced.
- Damaged trim panels should be replaced.
- Incorrectly installed trim panels should be reinstalled properly.

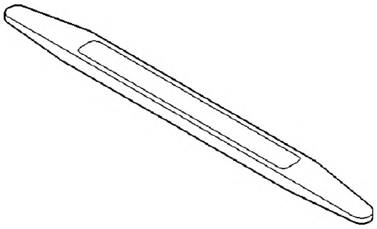
Many BSR complaints such as loose trim, can be serviced using the Mopar® Parts BSR Noise Reduction Kit. This kit contains various tapes including foam, flock and anti-squeak used to eliminate noises caused by metal, plastic and vinyl components. Long life lubricants and greases can also be used on a variety of components. Refer to the Buzz, Squeak & Rattle Kit table for material contents and usage.

Buzz, Squeak & Rattle Kit

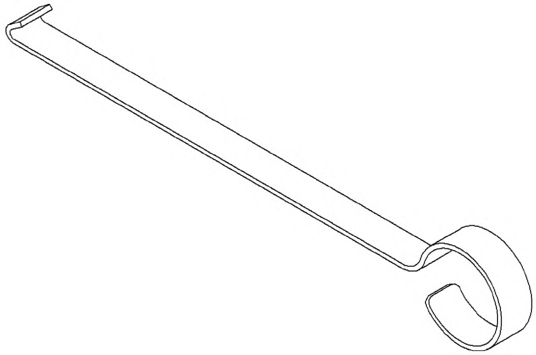
ITEM	FEATURES	APPLICATIONS	SERVICE TEMP
Itch And Squeak Tape	An abrasion resistant material thin enough to conform to most irregular surfaces. Stops most itches and squeaks.	Between metal and metal, metal and plastic, metal and vinyl, vinyl and plastic. Interior. Examples: Trim panels and bezels.	-40° to 225° Fahrenheit (-40° to 107° Celsius)
Black Nylon Flock	Nylon Flock with an aggressive acrylic adhesive. Provides for cushioning and compression fit, also isolates components. Water-resistant.	Between metal and metal, metal and plastic, vinyl and plastic. Examples: Pull cups, bezels, clips, ducts, top cover to glass, cowl panel.	-40° to 180° Fahrenheit (-40° to 82° Celsius)
High Density Urethane Foam	Tear resistant, highly resilient and durable.	Between metal and metal, metal and plastic. Water-resistant. Examples: I/P, heavy metal rattles, isolating brackets.	-40° to 180° Fahrenheit (-40° to 82° Celsius)
Open Cell Foam Tape	Soft foam conforms to irregular surfaces.	Wire harness and connector wrap. Examples: Seals, gasket, wiring, heat ducts.	-40° to 180° Fahrenheit (-40° to 82° Celsius)
Closed Cell Low Density Foam Tape	Soft, conformable. Water-resistant.	Wherever bulk is needed. Prevents closing flutters and rattles when applied to door watershield. Examples: Door, I/P.	-40° to 180° Fahrenheit (-40° to 82° Celsius)
NYE® Grease 880	Long life.	Suspensions. Examples: Strut busings, sway bars.	-40° to 390° Fahrenheit (-40° to 200° Celsius)
Krytox® Oil	Long life. Will not dry out or harm plastics or rubber.	When access is not possible, oil will migrate to condition. Vinyl, rubber, plastic, metal. Examples: Convertible top bushings, pull cups trim panel inserts.	-30° to 400° Fahrenheit (-34° to 205° Celsius)
Krytox® Grease	Long life. Will not dry out or harm plastics or rubber.	Vinyl, rubber, plastic, metal, glass. Examples: Weather-strips, backlite and windshield moldings.	-30° to 400° Fahrenheit (-34° to 205° Celsius)

SPECIAL TOOLS

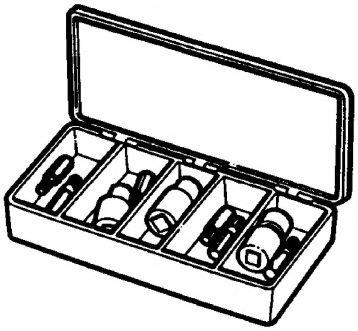
BODY



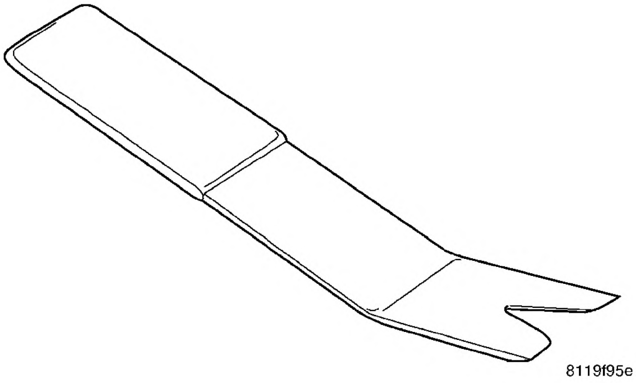
Trim Stick C-4755



Outer Belt Molding Remover - 9093



TORX BIT SET C-4794-B



REMOVER, MOLDINGS C-4829-A

DOOR - FRONT

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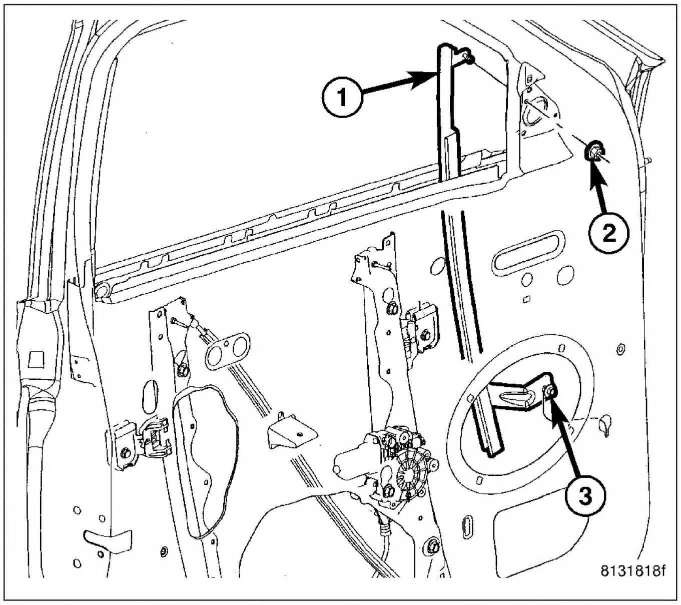
CHANNEL-GLASS

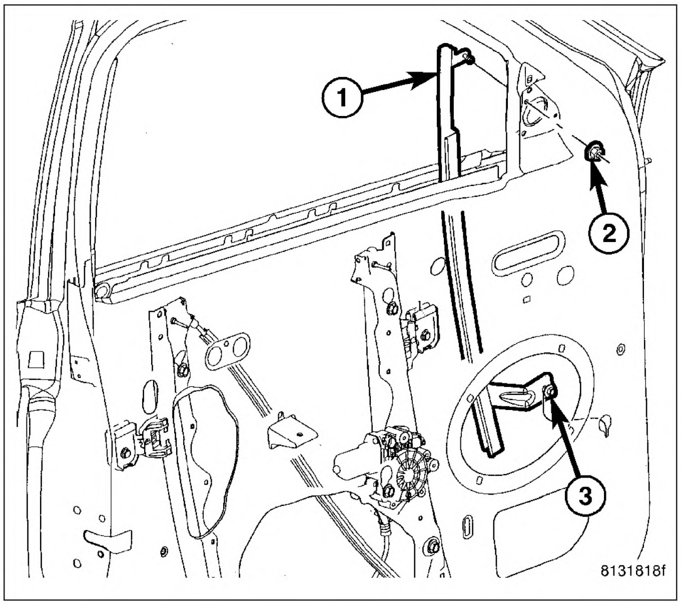
REMOVAL

1. Remove the outside rearview mirror (Refer to 23 - BODY/EXTERIOR/OUTSIDE REARVIEW MIRROR - REMOVAL).
2. Remove the front door glass (Refer to 23 - BODY/DOOR - FRONT/DOOR GLASS - REMOVAL).
3. Remove the weatherstrip from the front glass run channel.
4. Remove the nut (2) that secures the top of the front glass run channel (1) to the inside door panel.
5. Loosen the nut (3) that secures the bottom of the run channel to the keyed hole on the inside door panel.
6. Lift the front glass run channel upward within the door far enough to disengage the nut that secures the bottom of the run channel to the keyed hole on the inside door panel.
7. Remove the front glass run channel from the door.



INSTALLATION

1. Position the front glass run channel (1) onto the door.
2. Engage the nut (3) into the keyed hole on the inside door panel.
3. Install the nut (2) that secures the top of the front glass run channel to the inside door panel. Tighten the nut to 10 N·m (89 in. lbs.).
4. Tighten the nut that secures the bottom of the front glass run channel to the inside door panel to 10 N·m (89 in. lbs.).
5. Install the weatherstrip onto the front glass run channel.
6. Install the front door glass (Refer to 23 - BODY/DOOR - FRONT/DOOR GLASS - INSTALLATION).
7. Install the outside rearview mirror (Refer to 23 - BODY/EXTERIOR/OUTSIDE REARVIEW MIRROR - INSTALLATION).

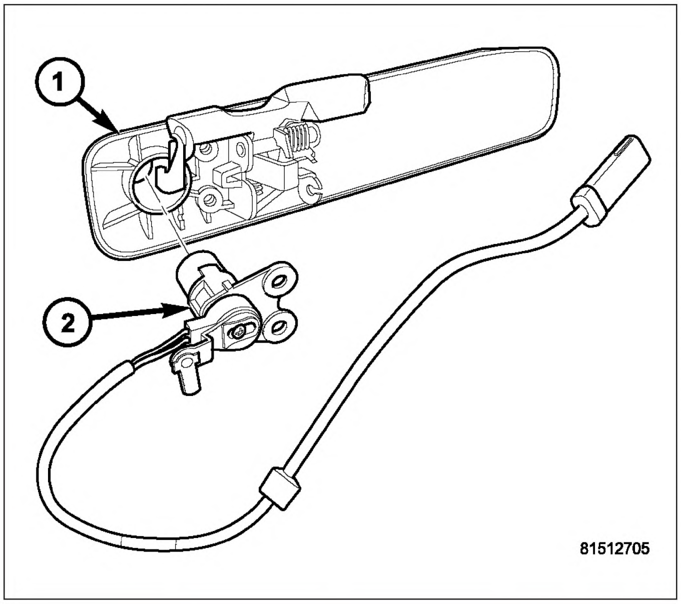


CYLINDER-LOCK

REMOVAL

NOTE: A door lock cylinder is used only on the driver side front door exterior handle.

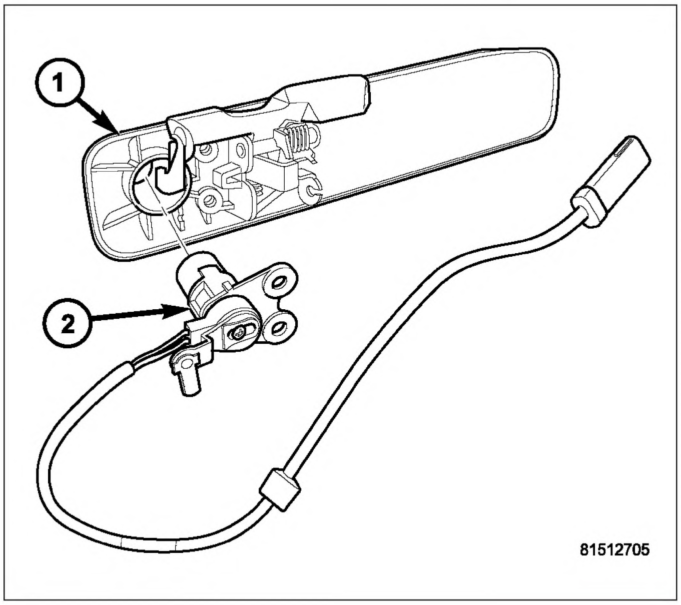
1. Remove the exterior door handle (1) from the outside of the driver side front door (Refer to 23 - BODY/DOOR - FRONT/EXTERIOR HANDLE - REMOVAL).
2. Using hand pressure, push on the face of the lock cylinder (2) until it pops out of the cavity in the back of the door handle.



INSTALLATION

NOTE: A door lock cylinder is used only on the driver side front door exterior handle.

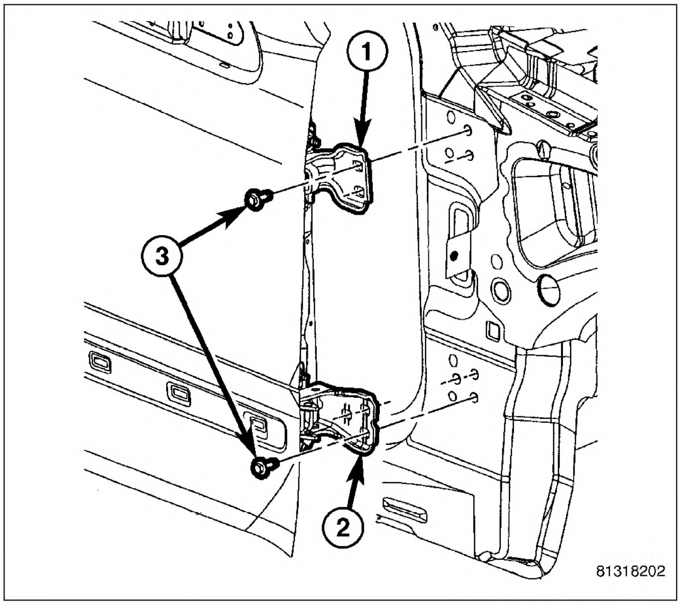
1. Insert the lock cylinder (2) into the cavity on the back of the driver side exterior door handle (1).
2. Align the lock cylinder in the handle by aligning the two screw holes on the lock cylinder housing with the mounting holes of the door handle.
3. Install the exterior door handle onto the outside of the driver side front door (Refer to 23 - BODY/ DOOR - FRONT/EXTERIOR HANDLE - INSTALLATION).



DOOR

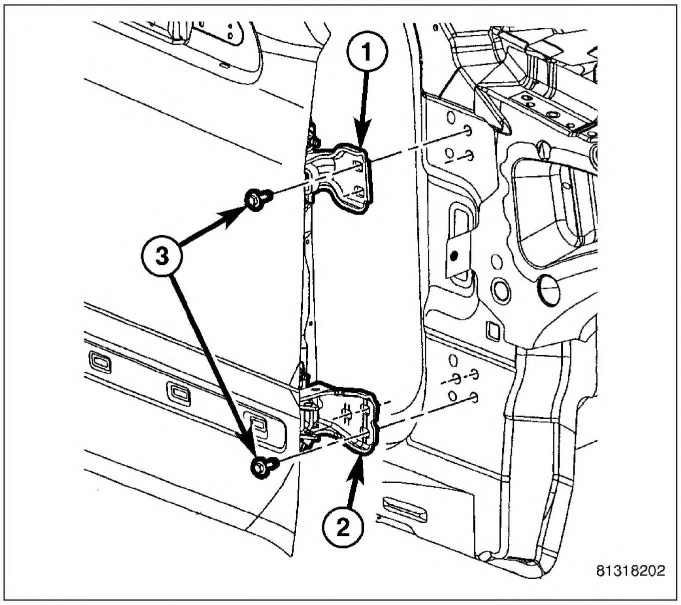
REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Disconnect the front door wire harness connector from the body wire harness.
3. Using a grease pencil or equivalent, mark the location of the front door hinges (1 and 2) on the A-pillar.
4. Support the front door with a suitable lifting device and remove the four bolts (3) that secure the front door hinges to the A-pillar.
5. Carefully remove the door from the body.
6. If required, remove the front door hinges from the door (Refer to 23 - BODY/DOOR - FRONT/HINGE - REMOVAL).



INSTALLATION

1. If removed, install the front door hinges (1 and 2) onto the door (Refer to 23 - BODY/DOOR - FRONT/HINGE - INSTALLATION).
2. Carefully position the door to the body and support the door with a suitable lifting device.
3. Loosely install the four bolts (3) that secure the front door hinges to the A-pillar.
4. Align the door to the body using the reference marks made during the removal procedure and tighten the bolts to 28 N·m (21 ft. lbs.).
5. Connect the front door wire harness to the body wire harness.
6. Reconnect the negative battery cable.
7. If necessary, adjust the front door (Refer to 23 - BODY/DOOR-FRONT - ADJUSTMENTS).



ADJUSTMENTS

ADJUSTMENT

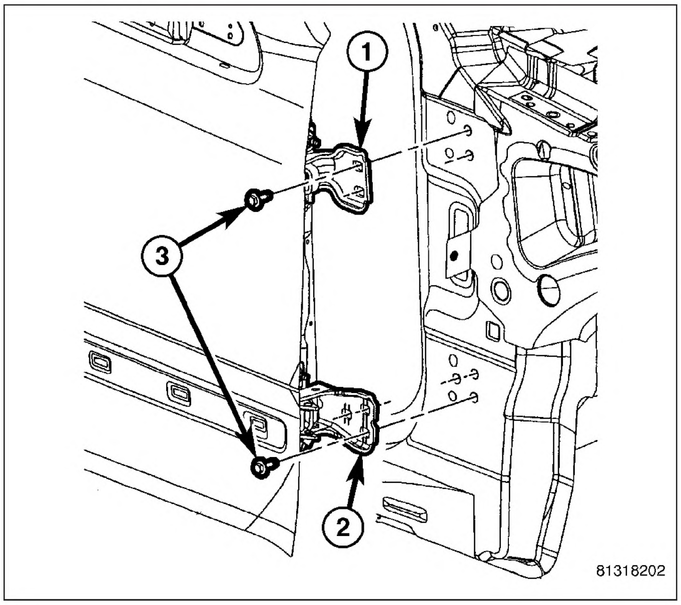
NOTE: It is recommended that you adjust the rear door before adjusting the front door (Refer to 23 - BODY/DOORS - REAR/DOOR - ADJUSTMENTS).

- **Door adjustment measurements should be taken from stationary or welded body panels like the roof, rocker or quarter panels.**
- **During adjustment procedures, it is recommended that all the hinge fasteners be loosened except for the upper most fasteners. Adjustments can be made using the upper bolts to hold the door with final torque of the fasteners occurring after correct door positioning is achieved.**
- **A suitable body sealant should be used when removing or moving the hinges.**

FORE/AFT

NOTE: Fore/aft (lateral) door adjustment is done by loosening the hinge to the body fasteners one hinge at a time and moving the door to the correct position.

1. Support the front door with a suitable lifting device.
2. Loosen the four bolts (3) that secure the front door hinges (1 and 2) to the A-pillar.
3. Adjust the front door to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
4. Tighten the upper bolt of the upper hinge to the A-pillar to 28 N·m (21 ft. lbs.).
5. Tighten the upper bolt of the lower hinge to 28 N·m (21 ft. lbs.).
6. Tighten the remaining hinge bolts to 28 N·m (21 ft. lbs.).

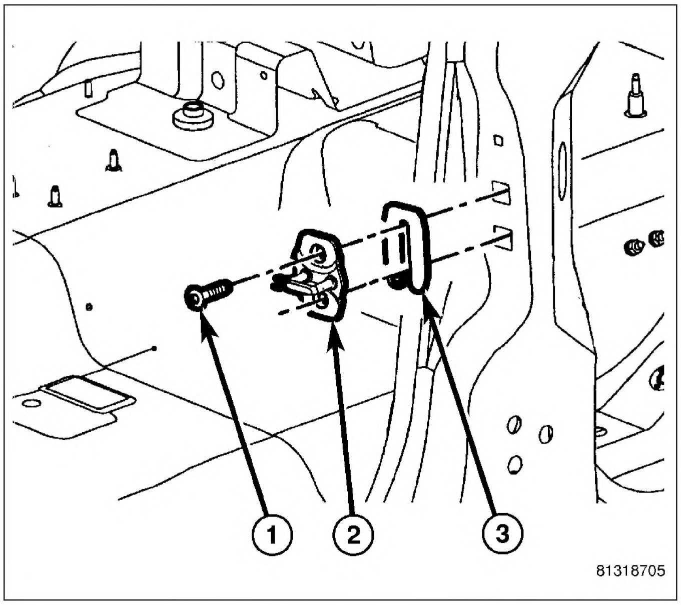


UP/DOWN

NOTE: Up/down door adjustment is done by loosening either the hinge to the body fasteners or the hinge to door fasteners and moving the door to the correct position.

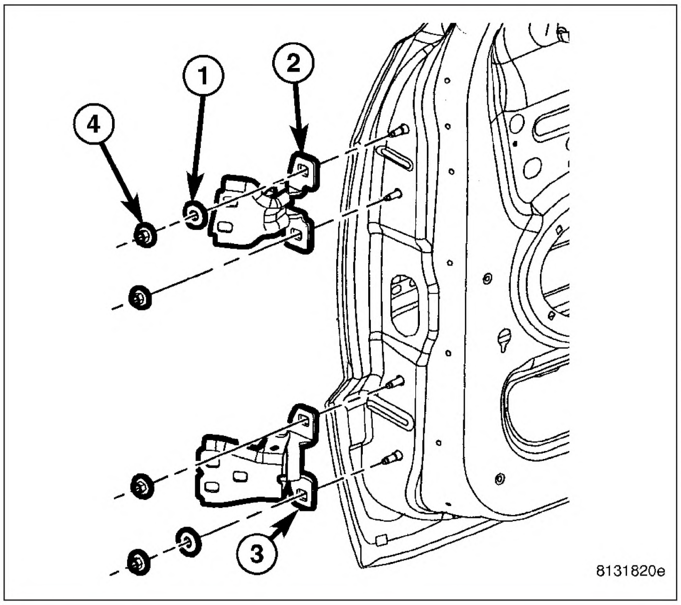
NOTE: When the up/down adjustments are done correctly, the top of the door is positioned over flush to the roof (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

1. Support the front door with a suitable lifting device.
2. Loosen the two bolts (1) that secure the striker (2) and the shim (3) to the B-pillar.

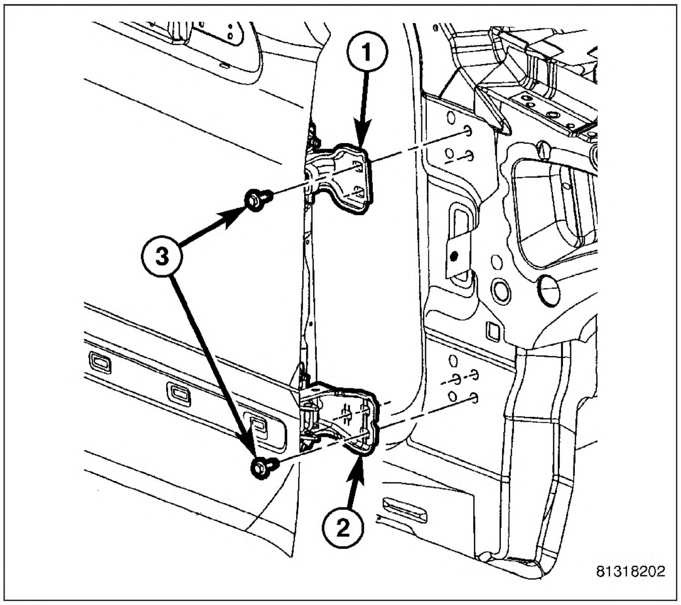


NOTE: When adjustment of the door requires the loosening of the door to hinge fasteners, it will be necessary to separate the epoxy bonded washers with a chisel or other suitable tool.

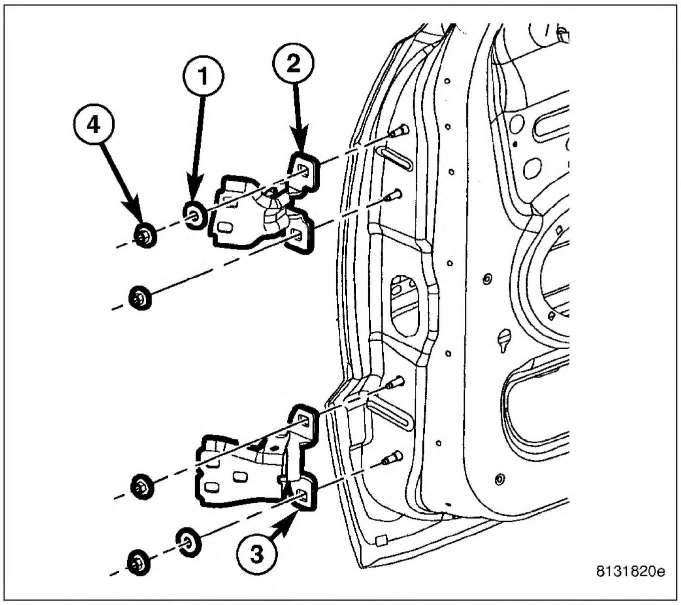
3. If necessary, loosen the four nuts (4) that secure the door hinges (2 and 3) to the front door.
4. Separate the epoxy bonded washers (1) from the hinges with a chisel or other suitable tool.



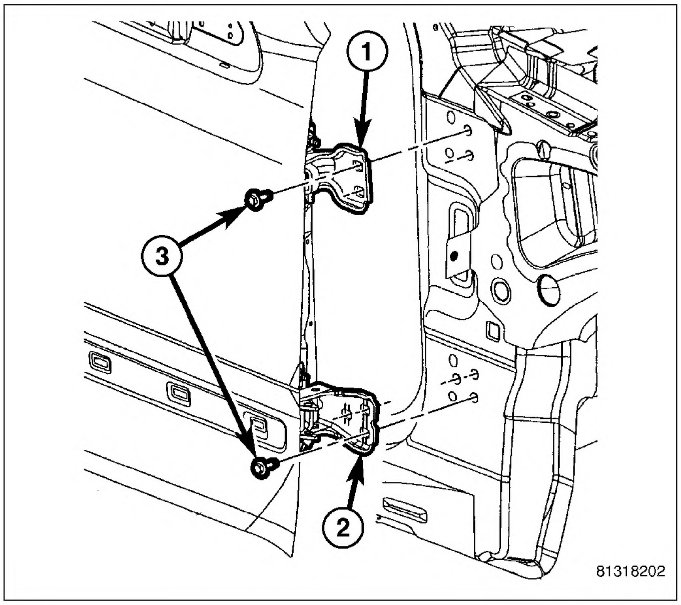
5. If necessary, loosen the four bolts (3) that secure the front door hinges (1 and 2) to the A-pillar.



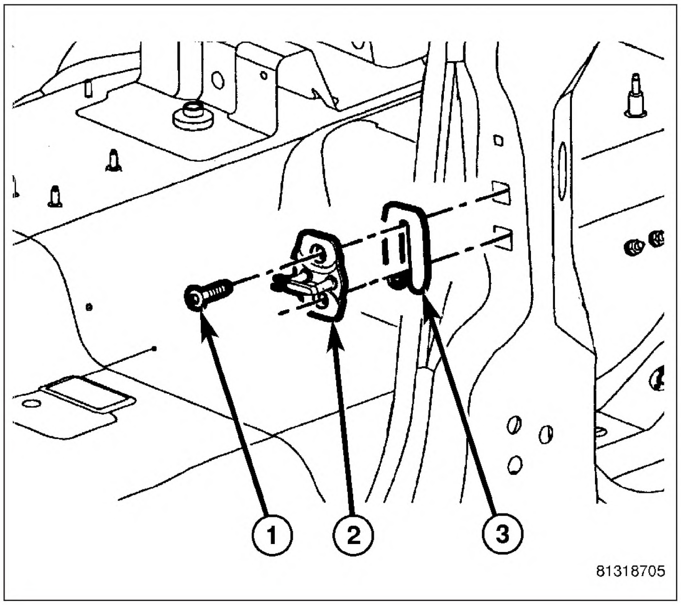
6. Adjust the front door to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
7. Tighten the four nuts (4) that secure the door hinges (2 and 3) to the front door to 28 N·m (21 ft. lbs.).



1. Tighten the upper bolt (3) of the upper hinge (1) to the A-pillar to 28 N·m (21 ft. lbs.).
2. Tighten the upper bolt of the lower hinge (2) to 28 N·m (21 ft. lbs.).
3. Tighten the remaining hinge bolts to 28 N·m (21 ft. lbs.).



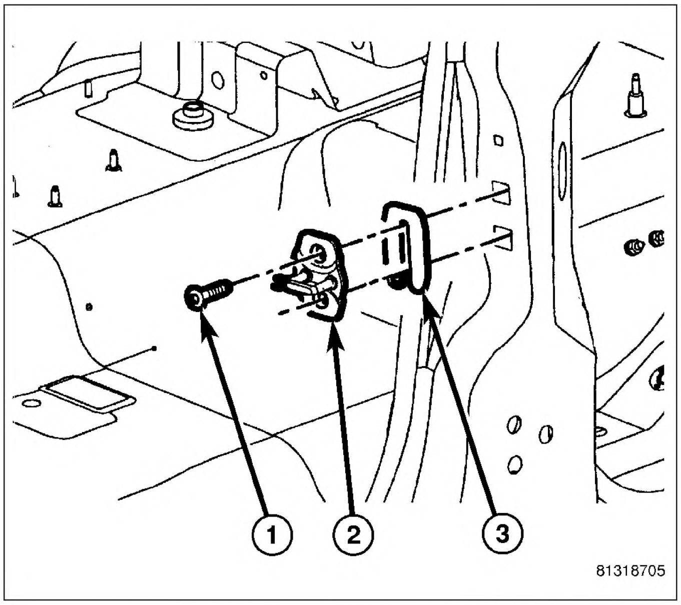
4. Tighten the two bolts (1) that secure the striker (2) and the shim (3) to the B-pillar. Tighten the bolts to 28 N·m (21 ft. lbs.).



IN/OUT

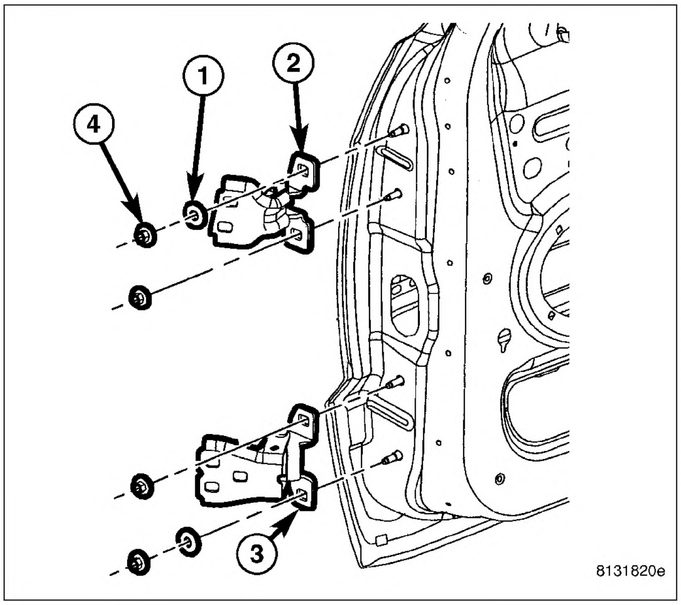
NOTE: In/out door adjustment is done by loosening the hinge to door fasteners one hinge at a time and moving the door to the correct position.

1. Support the front door with a suitable lifting device.
2. Loosen the two bolts (1) that secure the striker (2) and the shim (3) to the B-pillar.

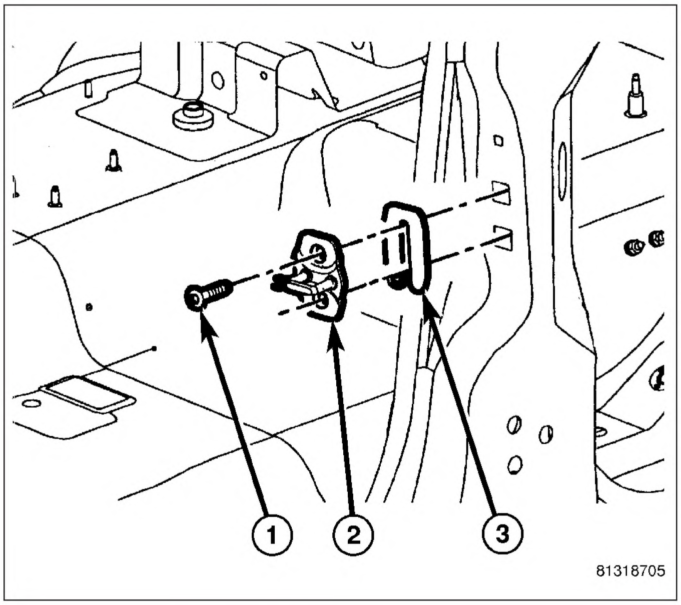


NOTE: When adjustment of the front door requires the loosening of the door to hinge fasteners, it will be necessary to separate the epoxy bonded washers with a chisel or other suitable tool.

3. Loosen the four nuts (4) that secure the door hinges (2 and 3) to the front door.
4. Separate the epoxy bonded washers (1) from the hinges with a chisel or other suitable tool.
5. Adjust the front door to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
6. Tighten the four nuts that secure the door hinges to the front door. Tighten the nuts to 28 N·m (21 ft. lbs.).

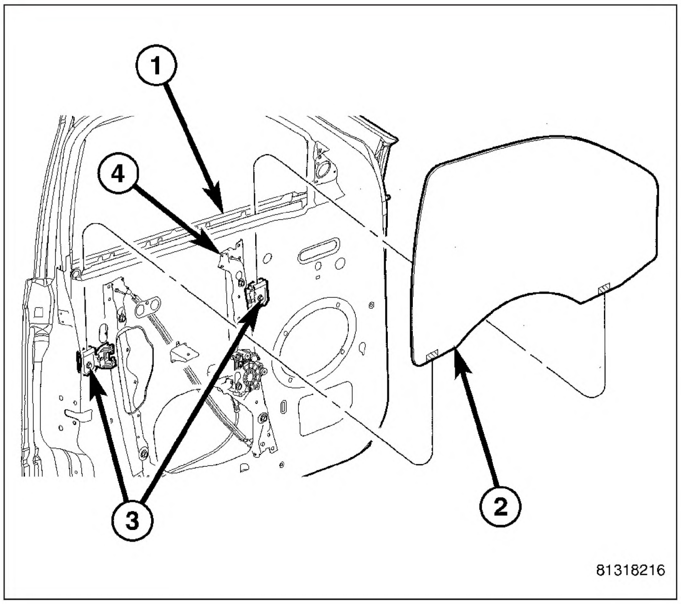


7. Tighten the two bolts (1) that secure the striker (2) and the shim (3) to the B-pillar. Tighten the bolts to 28 N·m (21 ft. lbs.).



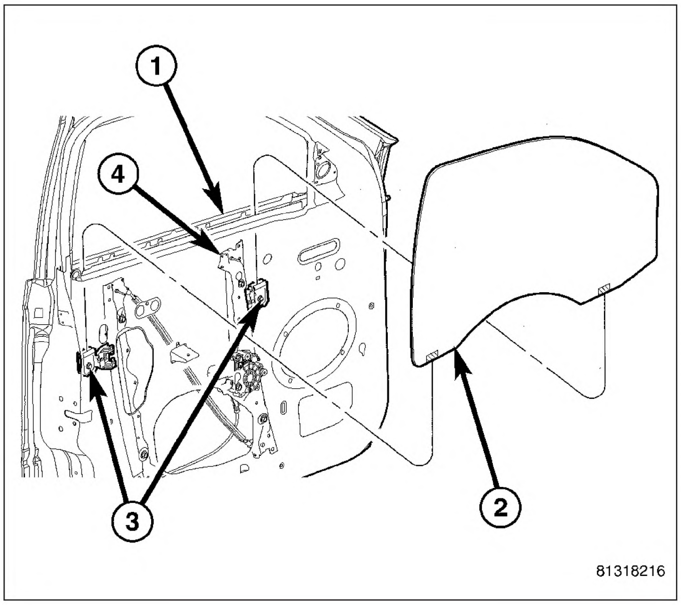
GLASS

REMOVAL



1. Remove the outer belt weatherstrip (1) from the front door.
2. Remove the trim panel from the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
3. Remove the speaker from the inside of the front door (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - REMOVAL).
4. Remove the watershield from the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL).
5. Using the regulator (4), move the front door glass (2) up or down as required to access the two window regulator glass clamp bolts (3).
6. Loosen the bolt in each of the window regulator glass clamps far enough to release the door glass from the clamps.
7. Disengage the door glass from the window regulator glass clamps.
8. Lower the regulator down as required for access to remove the door glass.
9. Carefully rotate the door glass within the window opening and remove the glass from the door through the window opening.

INSTALLATION

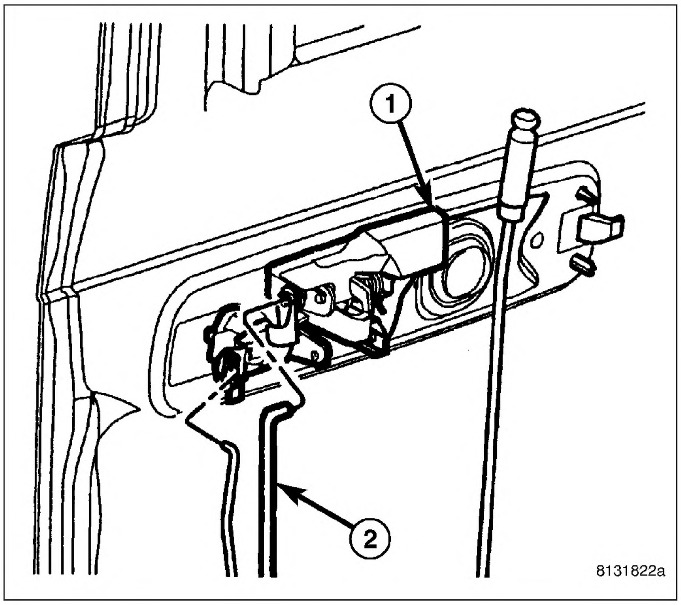


1. Carefully lower the door glass (2) into the door through the window opening.
2. Rotate the door glass into position and engage it to the window regulator glass clamps.
3. Using the regulator (4), move the front door glass up or down as required to access to the two window regulator glass clamp bolts (3).
4. Tighten the bolts in each of the window regulator glass clamps to 10 N·m (90 in. lbs.).
5. Install the watershield onto the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - INSTALLATION).
6. Install the speaker onto the inside of the front door (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - INSTALLATION).
7. Install the trim panel onto the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
8. Install the outer belt weatherstrip (1) onto the front door.

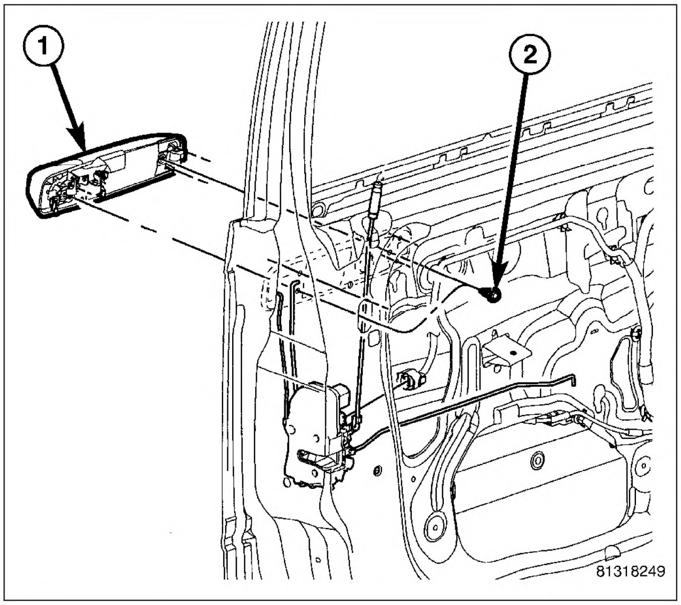
HANDLE-EXTERIOR

REMOVAL

1. Remove the window regulator from the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - REMOVAL).
2. Disconnect the two actuator rods (2) from the front exterior handle (1).
3. If equipped, disconnect the exterior handle wire lead from the wire retainer and the door wire harness connector.

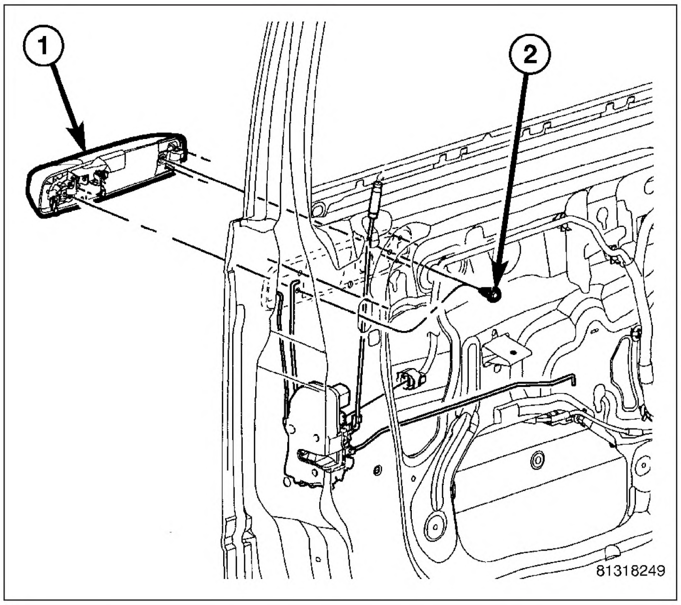


4. Remove the three bolts (2) that secure the exterior handle (1) to the front door and remove the handle.
5. If necessary, remove the lock cylinder from the driver side exterior door handle (Refer to 23 - BODY/DOOR - FRONT/LOCK CYLINDER - REMOVAL).

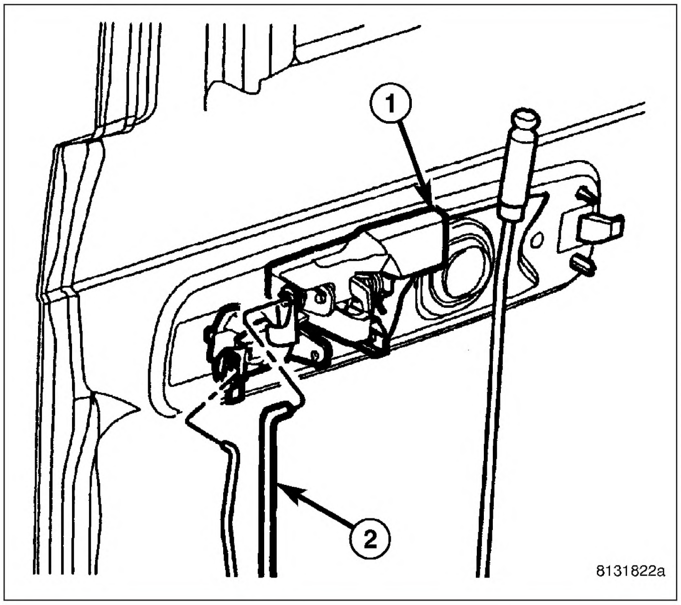


INSTALLATION

1. If removed, install the lock cylinder into the driver side front exterior handle (Refer to 23 - BODY/ DOOR - FRONT/LOCK CYLINDER - INSTALLATION).
2. Position the exterior handle (1) to the mounting hole on the outside of the front door.
3. Install the three bolts (2) that secure that exterior handle to the door. Tighten the bolts to 5 N·m (44 in. lbs.).



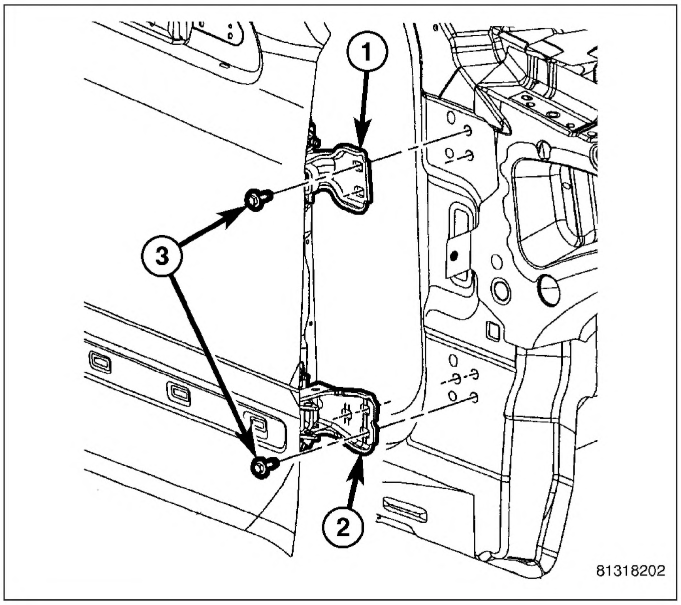
4. Connect the actuator rods (2) to the front exterior handle (1).
5. If equipped, connect the exterior handle wire lead to the wire retainer and the door wire harness connector.
6. Install the front window regulator (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - INSTALLATION).



HINGE

REMOVAL

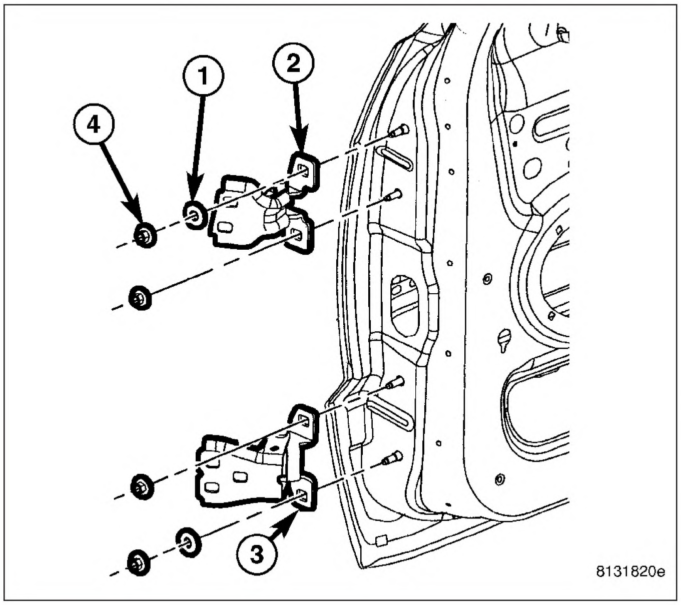
1. Disconnect and isolate the negative battery cable.
2. Disconnect the front door wire harness connector from the body wire harness.
3. Using a grease pencil or equivalent, mark the location of the front door hinges (1 and 2) on the A-pillar.
4. Support the front door with a suitable lifting device and remove the four bolts (3) that secure the front door hinges to the A-pillar.
5. Carefully remove the front door from the body and place it on a workbench.



6. Using a grease pencil or equivalent, mark the location of the door hinges (2 and 3) on the front door.

NOTE: The epoxy bonded washers do not need to be separated from the door hinges. If the washers are removed, the door may need to be readjusted.

7. Remove the four nuts (4) that secure the front door hinges to the door and remove the hinges.
8. If required, remove the washers (1) from the front door hinges.

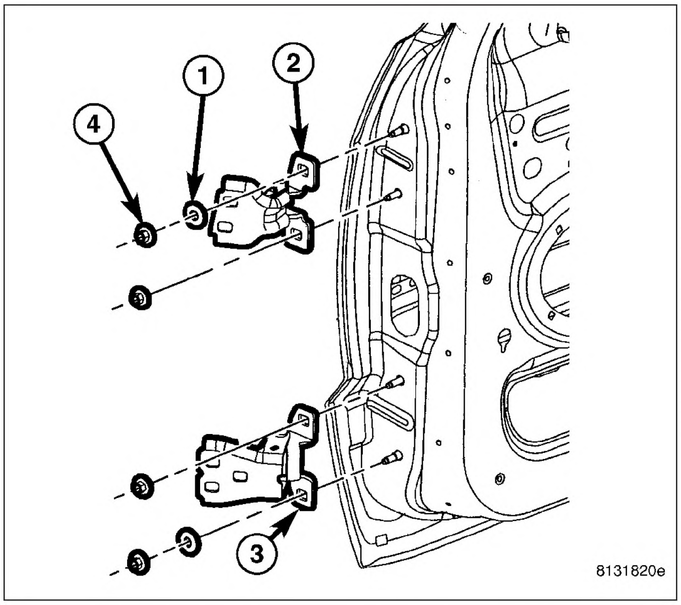


INSTALLATION

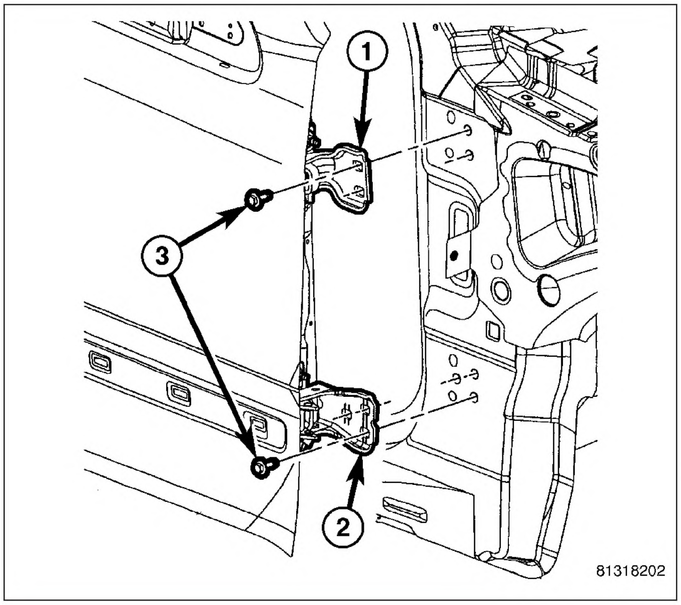
1. Position the front door hinges onto the door.

NOTE: If the epoxy bonded washers are separated from the door hinges, the door may need to be adjusted.

2. If removed, install the epoxy bonded washers (1).
3. Loosely install the nuts (4) that secure the hinges to the front door.
4. Align the hinges to the door using the reference marks made during the removal procedure and tighten the nuts to 28 N·m (21 ft. lbs.).



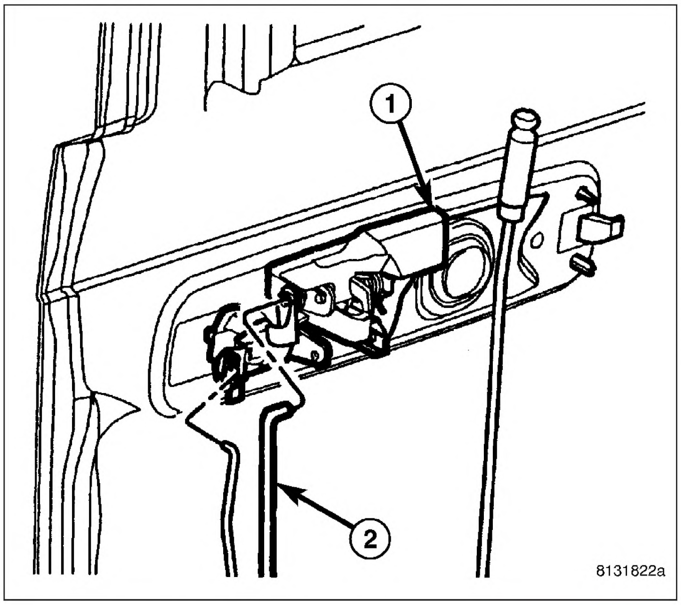
5. Carefully position the front door to the body and support the door with a suitable lifting device.
6. Loosely install the four bolts (3) that secure the front door hinges (1 and 2) to the A-pillar.
7. Align the front door to the body using the reference marks made during the removal procedure and tighten the bolts to 28 N·m (21 ft. lbs.).
8. Connect the front door wire harness to the body wire harness.
9. Reconnect the negative battery cable.
10. If necessary, adjust the front door (Refer to 23 - BODY/DOOR-FRONT - ADJUSTMENTS).



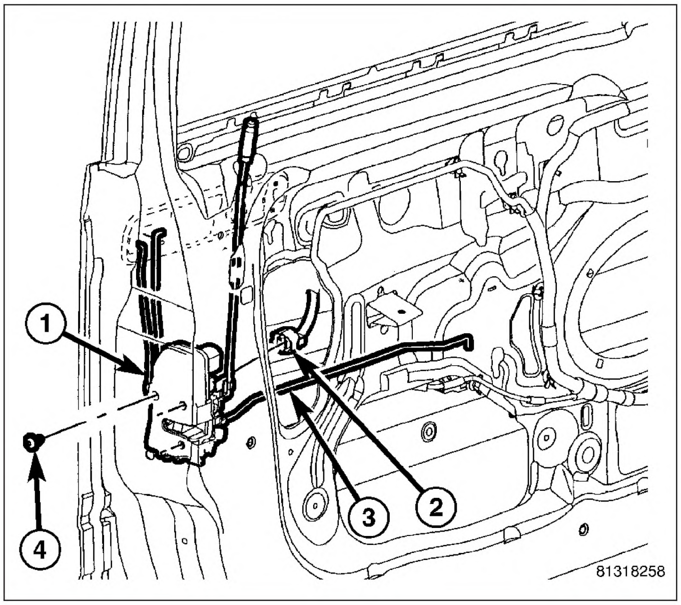
LATCH

REMOVAL

1. Raise the front window to the full up position and remove the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
2. Position the watershield out of the way and disconnect the two actuator rods (2) from the exterior handle (1).

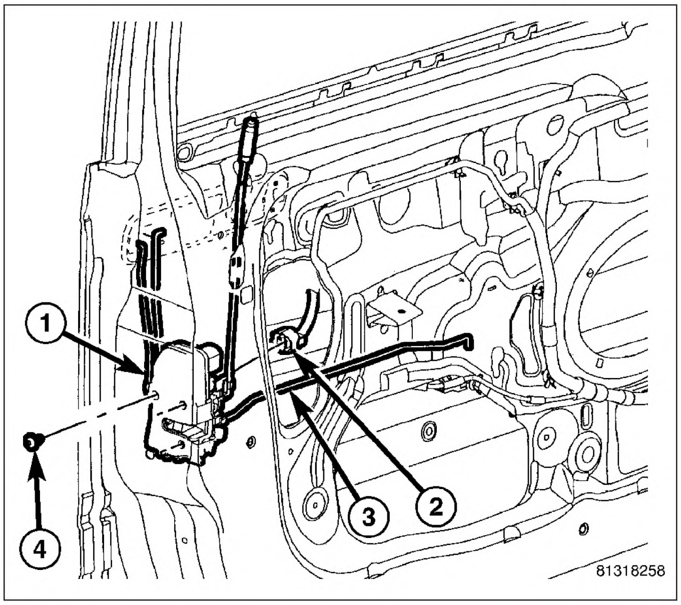


3. Disconnect the interior handle actuator rod (3) from the front door latch (1) and remove the rod.
4. Disconnect the door wire harness connector (2) from the front door latch.
5. Remove the three bolts (4) that secure the front door latch to the door and remove the latch and actuator rods as an assembly.
6. If required, remove all of the actuator rods from the actuator.

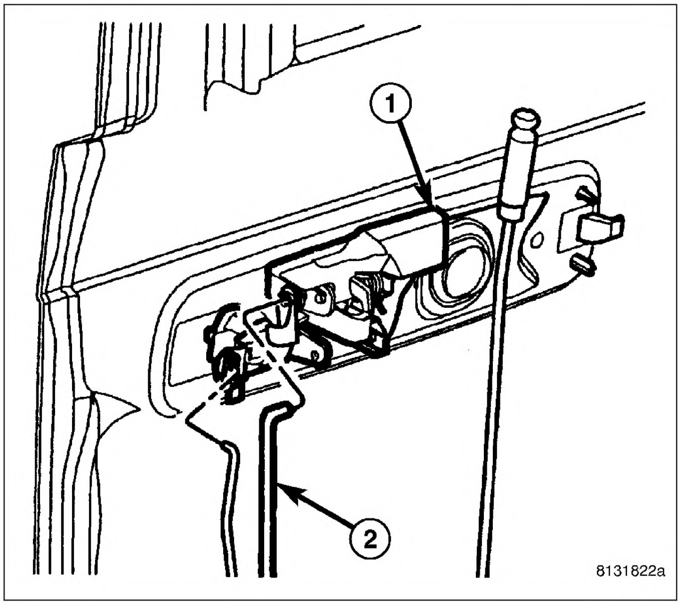


INSTALLATION

1. If removed, install the actuator rods onto the front door latch (1) and engage the retainers.
2. Position the front door latch and actuator rods into the door as an assembly.
3. Install the three bolts (4) that secure the front door latch to the door. Tighten the bolts to 10 N·m (89 in. lbs.).
4. Connect the door wire harness connector (2) to the front door latch.
5. Install the interior handle actuator rod (3) onto the front door latch and engage the retainer.



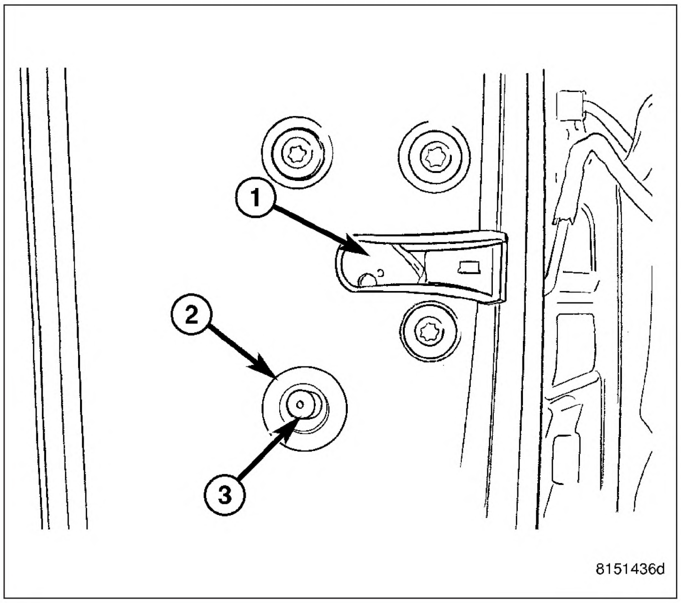
6. Connect the actuator rods (2) to the front exterior handle (1).
7. Reposition the watershield to the front door and install the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
8. If necessary, adjust the front door latch (Refer to 23 - BODY/DOOR - FRONT/LATCH - ADJUSTMENTS).



ADJUSTMENTS

ADJUSTMENT

1. Locate the access hole in the door to adjust the door latch (1) and remove the mylar tape (2).
2. Loosen the adjustment screw (3).
3. Operate the door handles several times to reduce any possible linkage binding and tighten the adjustment screw to 3 N·m (30 in. lbs.).
4. Operate the door handle again to verify proper operation and reinstall the mylar tape.

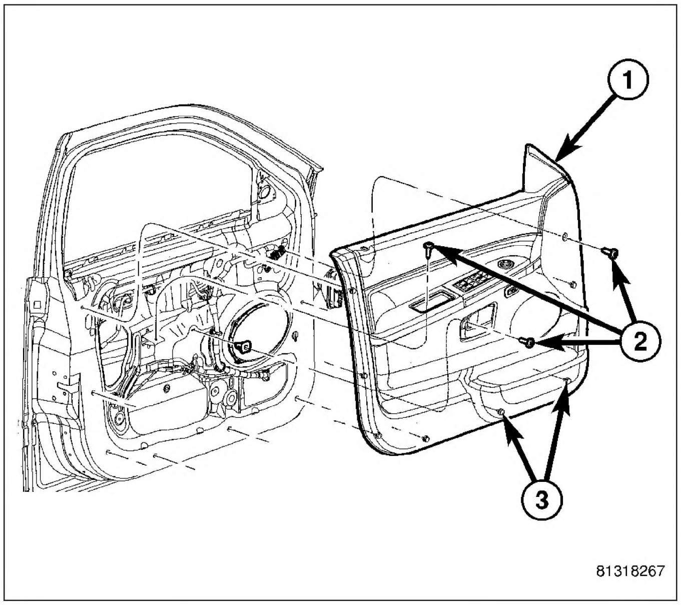


PANEL-TRIM

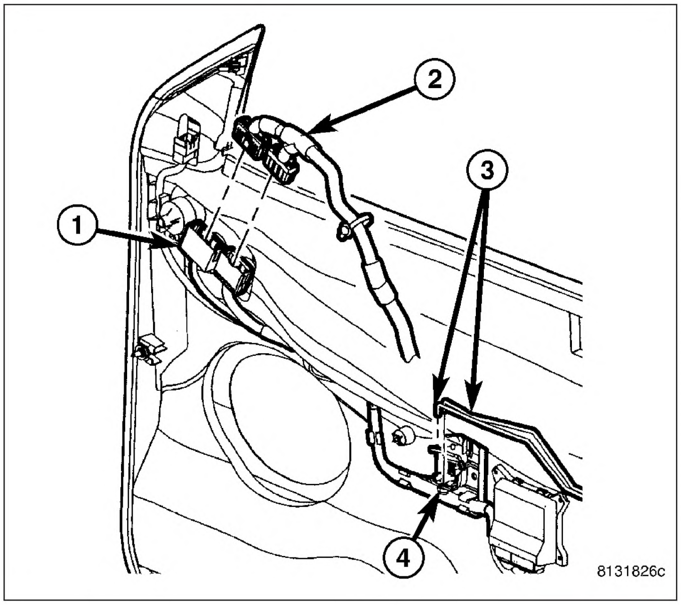
REMOVAL

CAUTION: Door panel retention clips are designed to be used only once. Retention clips should be discarded and replaced with new clips each time the door trim panel is removed from the door. Failure to replace retention clips will result in poor door panel retention and possible customer dissatisfaction.

1. Disconnect and isolate the battery negative cable.
2. Remove the three screws (2) that secure the front door trim panel (1) to the door.
3. Carefully pull the front door trim panel far away enough from the door to disengage the seven plastic door trim panel retention clips (3) from the door.
4. Lift the rear of the panel upward slightly to disengage the interior door latch lock link and knob from the rear of the door panel.



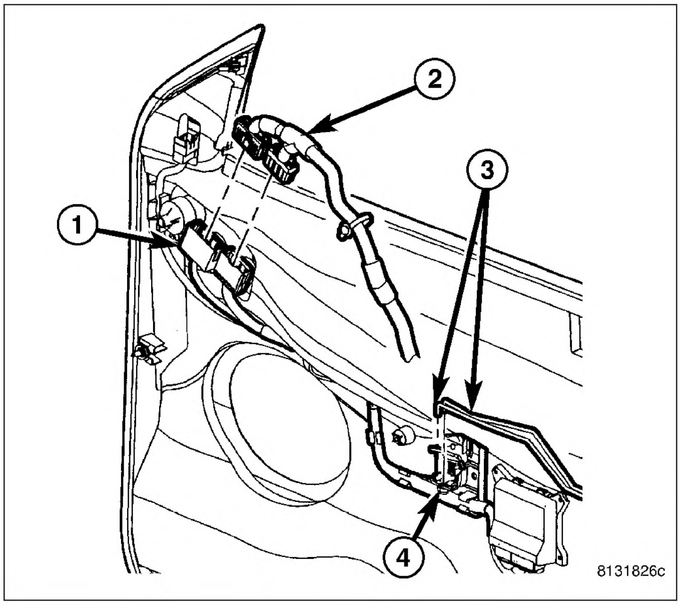
5. Position the front door trim panel far enough away to access the door wire harness connectors (1) and the interior door handle actuator rod (3).
6. Disconnect the interior door handle actuator rod from the interior door handle (4).
7. Disconnect the wire harness connectors (2) from the power door switch assembly.
8. Remove and discard the seven plastic door trim panel retention clips.



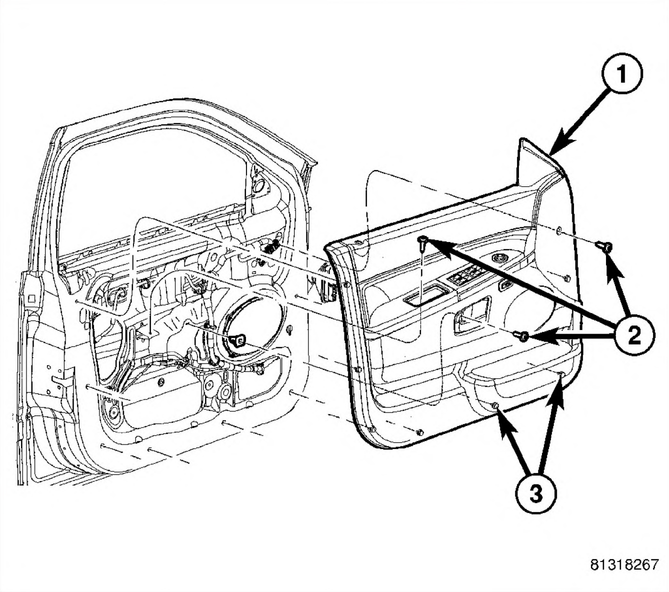
INSTALLATION

CAUTION: Door panel retention clips are designed to be used only once. Retention clips should be discarded and replaced with new clips each time the door trim panel is removed from the door. Failure to replace retention clips will result in poor door panel retention and possible customer dissatisfaction.

1. Install seven new plastic door trim panel retention clips onto the inside of the front door trim panel.
2. Position the door trim panel near the front door and connect the door wire harness connectors (2) to the power door switch assembly connectors (1).
3. Connect the interior door handle actuator rod (3) to the interior door handle (4) and engage the retainer.



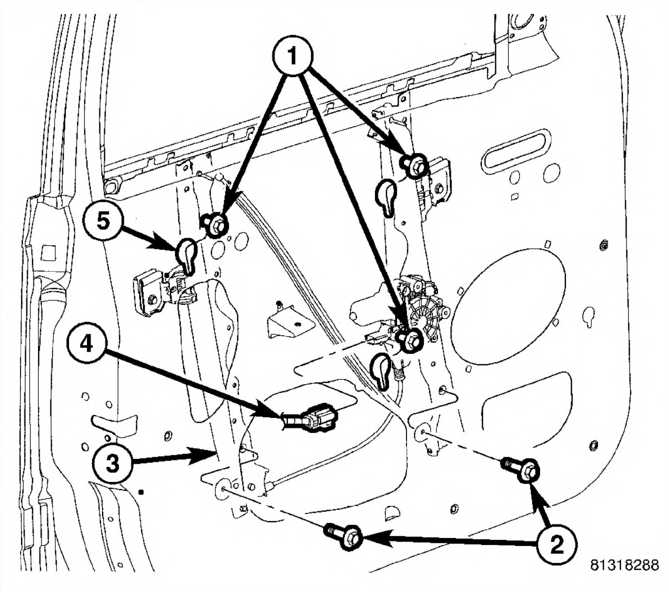
4. Lift the trim panel (1) over the inside of the door far enough to engage the interior door latch lock link and knob into the hole at the upper rear corner of the trim panel.
5. Position the trim panel to the inside of the door and fully engage the seven new plastic door trim panel retention clips (3) to the door.
6. Install the three screws (2) that secure door trim panel to the door. Tighten the screws to 2 N·m (16 in. lbs.).
7. Reconnect the negative battery cable.



REGULATOR-WINDOW

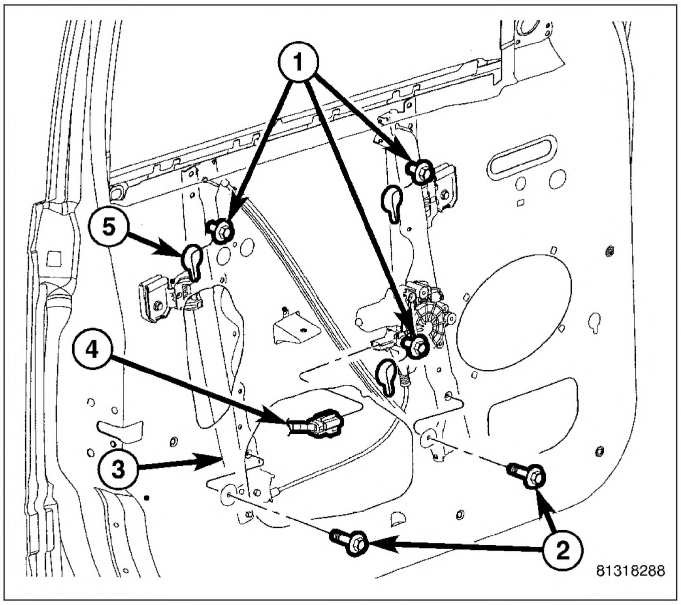
REMOVAL

1. Remove the trim panel from the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
2. Position the watershield out of the way and using the regulator (3), move the front door glass up or down as required to access the two window regulator glass clamp bolts (Refer to 23 - BODY/DOOR - FRONT/DOOR GLASS - REMOVAL).
3. Loosen the bolt in each of the window regulator glass clamps far enough to release the door glass from the clamps.
4. Disengage the door glass from the window regulator glass clamps and lift the glass out of the regulator clamps and into its full up position, then tape the glass securely into place.
5. Remove the two bolts (2) that secure the bottom of the window regulator rails to the inside of the door.
6. Loosen the three bolts (1) that secure the regulator rails to the keyed holes (5) on the inside of the door.



7. Lift the regulator rails upward within the door far enough to disengage the bolts from the three keyed holes in the door.
8. Lower the regulator rails within the door far enough to access and disconnect the wire harness connector (4) from the regulator motor through the large access hole in the center of the door and remove the regulator.

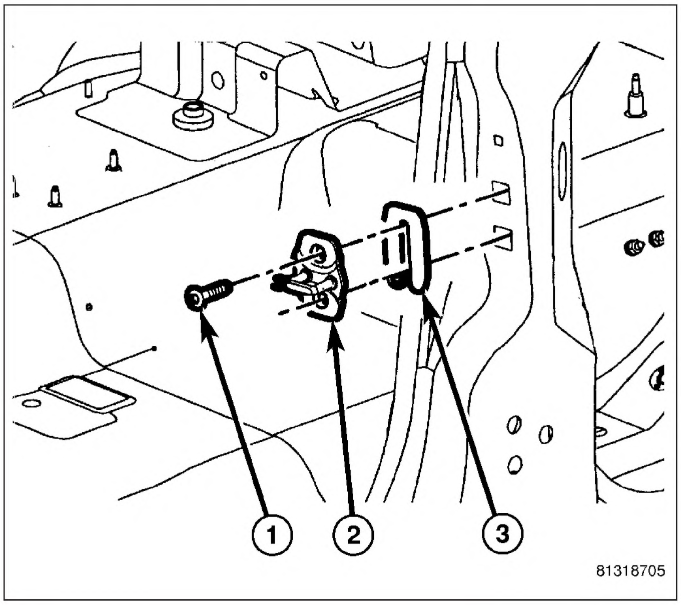
INSTALLATION



1. Load the window regulator (3) into the front door through the large access hole in the center of the door and connect the wire harness connector (4) to the regulator motor.
2. Engage the three bolts (1) into the keyed holes (5) on the inside of the door.
3. Install the two bolts (2) that secure the bottom of the regulator rails to the door. Tighten the bolts to 10 N·m (90 in. lbs.).
4. Tighten the bolts that secure the regulator rails to the three keyed holes on the inside of the door. Tighten the bolts to 10 N·m (90 in. lbs.).
5. Carefully remove the tape securing the door glass in its full up position, then lower the glass and engage it into the two window regulator glass clamps (Refer to 23 - BODY/DOOR - FRONT/ DOOR GLASS - INSTALLATION).
6. Using the regulator, move the front door glass up or down as required to access to the two window regulator glass clamp bolts.
7. Tighten the bolts in each of the window regulator glass clamps to 10 N·m (90 in. lbs.).
8. Install the watershield and the trim panel onto the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/ TRIM PANEL - INSTALLATION).

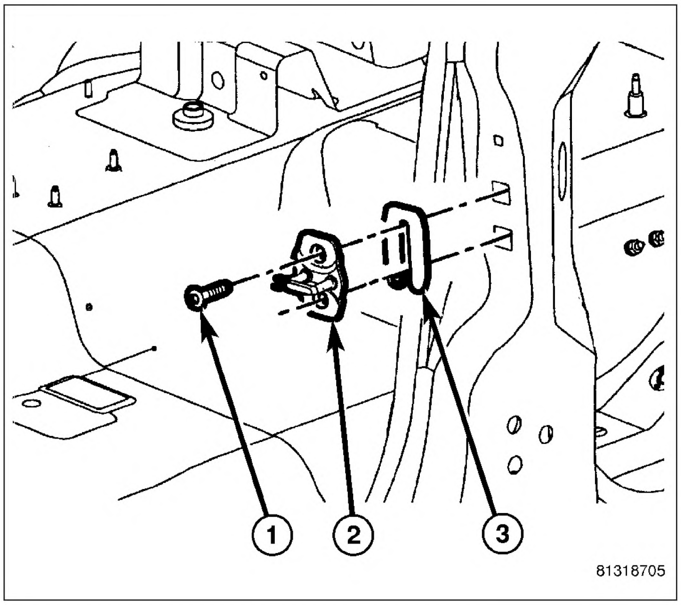
STRIKER

REMOVAL



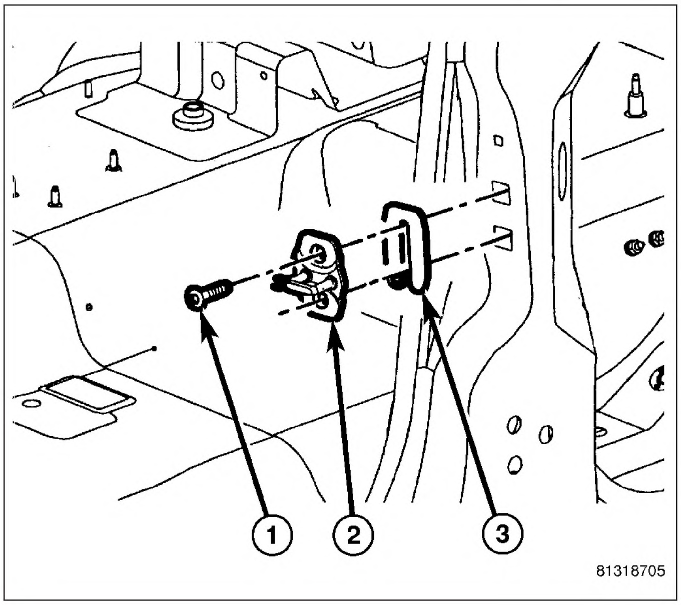
1. Using a grease pencil or equivalent, mark the location of the door latch striker (2) on the B-pillar.
2. Remove the two bolts (1) that secure the striker and the shim (3) to the B-pillar and remove the striker and shim.

INSTALLATION



1. Position the door latch striker (2) and the shim (3) onto the B-pillar and loosely install the two bolts (1).
2. Align the door latch striker to the B-pillar using the reference marks made during the removal procedure and tighten the bolts to 28 N·m (21 ft. lbs.).
3. If necessary, adjust the front door latch striker (Refer to 23 - BODY/DOOR - FRONT/LATCH STRIKER - ADJUSTMENTS).

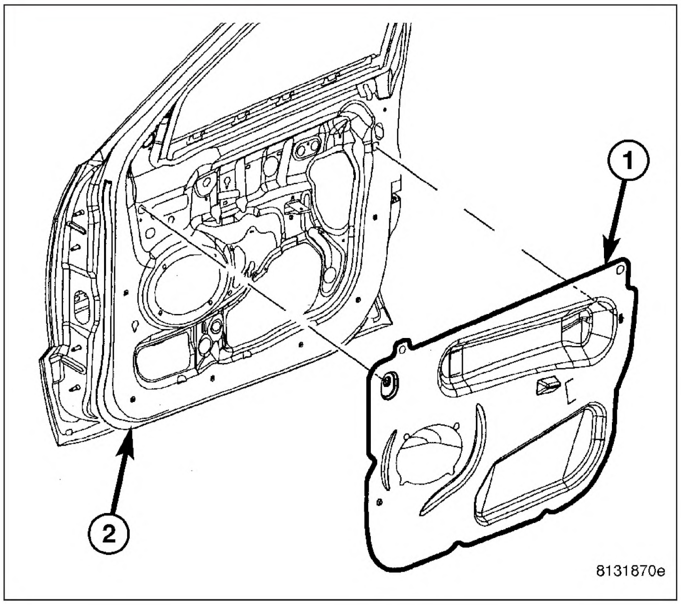
ADJUSTMENTS



1. Using a grease pencil or equivalent, mark the location of the door latch striker (2) and shim (3) on the B-pillar to aid in adjustment.
2. Loosen the two bolts (1) that secure the door latch striker to the B-pillar.
3. To adjust the rear gap and flush measurement, change the position of the door latch striker and then tighten the two bolts to 28 N·m (21 ft. lbs.) (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
4. Verify correct door and latch position.

WATERSHIELD

REMOVAL

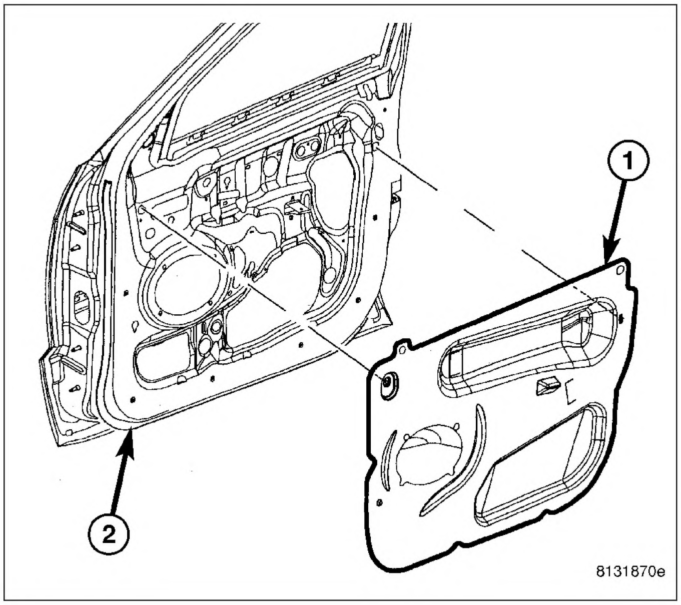


1. Remove the trim panel from the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
2. Remove the speaker from the inside of the front door (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - REMOVAL).

CAUTION: Do not allow the watershield adhesive to become contaminated with dirt or other foreign substances. If the watershield becomes contaminated or damaged, replace it.

3. Carefully remove the watershield (1) from around the perimeter of the door (2).
4. Separate the watershield from the interior handle actuator rod and the door wire harness and remove the watershield.

INSTALLATION



CAUTION: Do not allow the watershield or adhesive to become contaminated with dirt or other foreign substances. If the watershield becomes contaminated or damaged, replace it.

NOTE: Be sure that the watershield is fully sealed around the perimeter of the door.

1. Position the interior handle actuator rod and the wire harness through the holes in the watershield (1) and install the watershield to the door (2).
2. Install the speaker onto the inside of the front door (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - INSTALLATION)
3. Install the trim panel onto the inside of the front door (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

DOORS - REAR

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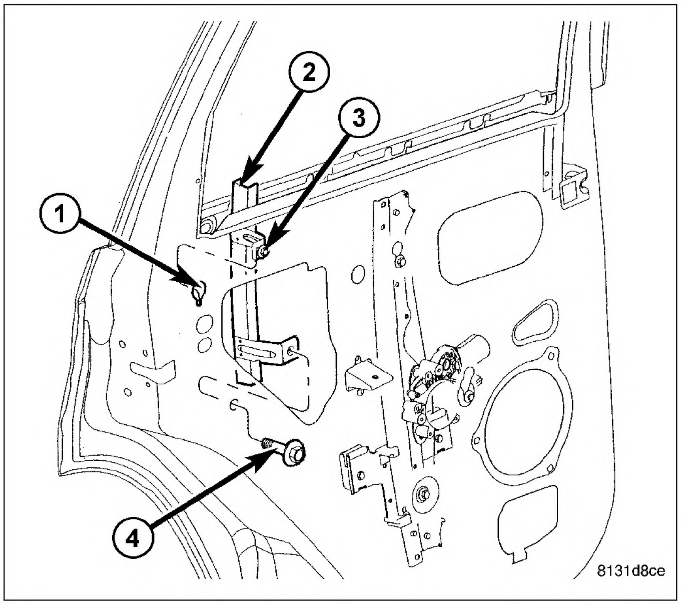
CHANNEL-GLASS

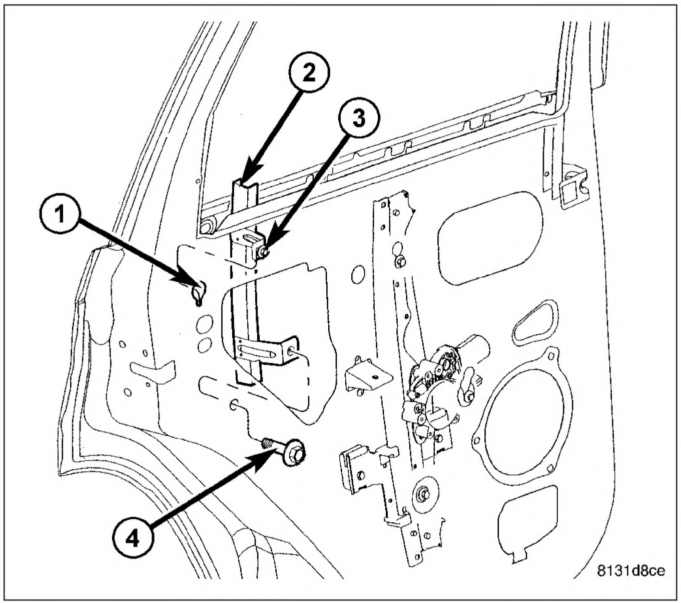
REMOVAL

1. Remove the rear door glass (Refer to 23 - BODY/ DOORS - REAR/DOOR GLASS - REMOVAL).
2. Remove the weatherstrip from the rear glass run channel (2).
3. Loosen the bolt (3) that secures the top of the rear glass run channel to the keyed hole on the inside door panel.
4. Remove the bolt (4) that secures the bottom of the run channel to the inside door panel.
5. Lift the rear glass run channel upward within the door far enough to disengage the bolt that secures the top of the run channel to the keyed hole on the inside door panel.
6. Remove the rear glass run channel from the door.



INSTALLATION

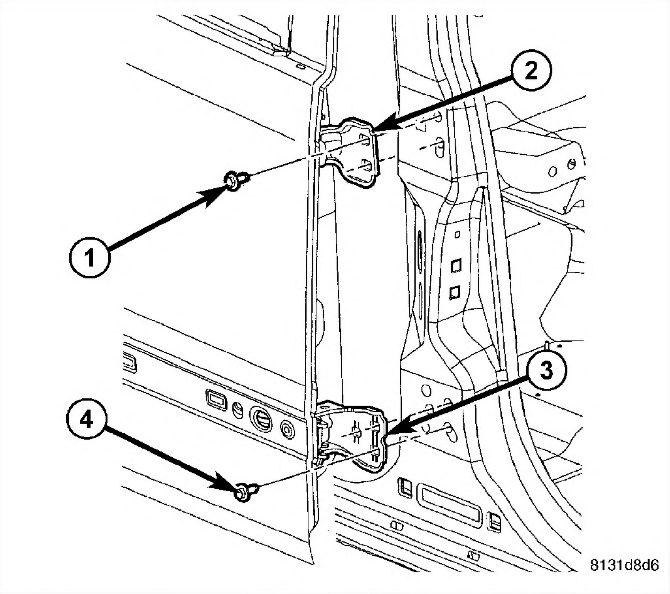
1. Position the rear glass run channel (1) onto the rear door.
2. Engage the bolt (3) into the keyed hole on the inside door panel.
3. Install the bolt (2) that secures the bottom of the rear glass run channel to the inside door panel. Tighten the bolt to 10 N·m (89 in. lbs.).
4. Tighten the bolt that secures the top of the rear glass run channel to the inside door panel to 10 N·m (89 in. lbs.).
5. Install the weatherstrip onto the rear glass run channel.
6. Install the rear door glass (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - INSTALLATION).



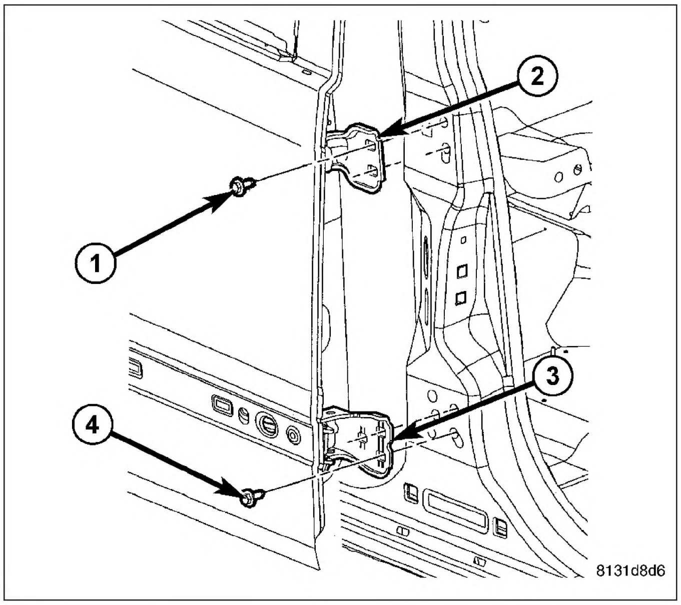
DOOR

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Disconnect the rear door wire harness connector from the body wire harness.
3. Using a grease pencil or equivalent, mark the location of the rear door hinges (2 and 3) on the B-pillar.
4. Support the rear door with a suitable lifting device and remove the four bolts (1 and 4) that secure the rear door hinges to the B-pillar.
5. Carefully remove the door from the body.
6. If required, remove the rear door hinges from the door (Refer to 23 - BODY/DOORS - REAR/HINGE - REMOVAL).



INSTALLATION



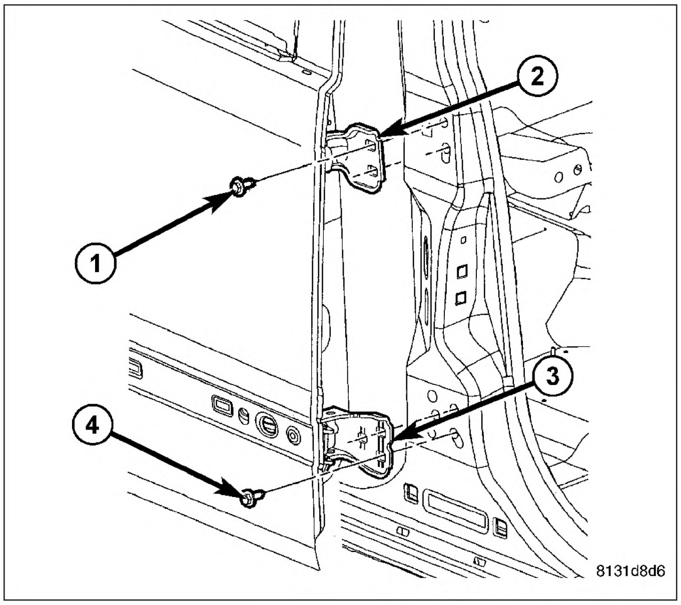
1. If removed, install the rear door hinges (2 and 3) onto the door (Refer to 23 - BODY/DOORS - REAR/HINGE - INSTALLATION).
2. Carefully position the rear door to the body and support the door with a suitable lifting device.
3. Loosely install the four bolts (1 and 4) that secure the rear door hinges to the B-pillar.
4. Align the rear door to the body using the reference marks made during the removal procedure and tighten the bolts to 28 N·m (21 ft. lbs.).
5. Connect the rear door wire harness to the body wire harness.
6. Reconnect the negative battery cable.
7. If necessary, adjust the rear door (Refer to 23 - BODY/DOORS - REAR/DOOR - ADJUSTMENTS).

ADJUSTMENTS

ADJUSTMENT

NOTE: Door adjustment measurements should be taken from stationary or welded body panels like the roof, rocker or quarter panels.
- **During adjustment procedures, it is recommended that all the hinge fasteners be loosened except for the upper most fasteners. Adjustments can be made using the upper bolts to hold the door with final torque of the fasteners occurring after correct door positioning is achieved.**
- **A suitable body sealant should be used when removing or moving the hinges.**

FORE/AFT



NOTE: Fore/aft (lateral) door adjustment is done by loosening the hinge to the body fasteners one hinge at a time and moving the door to the correct position.

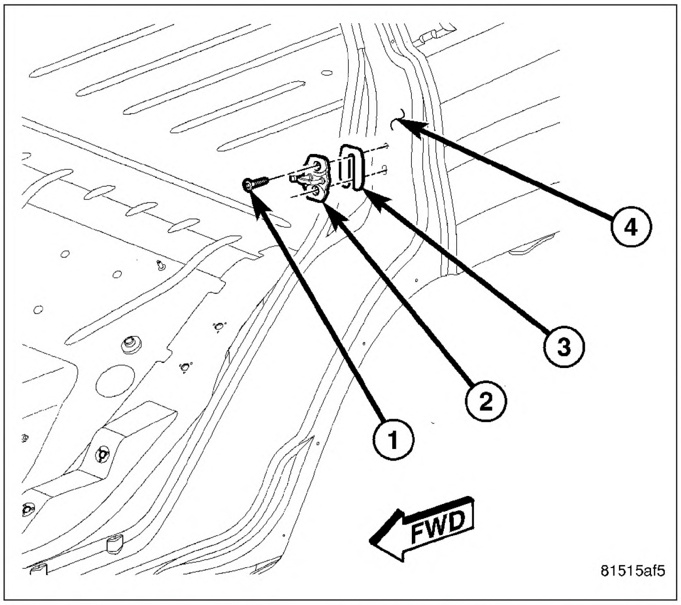
1. Support the rear door with a suitable lifting device.
2. Loosen the four bolts (1 and 4) that secure the rear door hinges (2 and 3) to the B-pillar.
3. Adjust the rear door to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
4. Tighten the upper bolt of the upper hinge to the B-pillar to 28 N·m (21 ft. lbs.).
5. Tighten the upper bolt of the lower hinge to 28 N·m (21 ft. lbs.).
6. Tighten the remaining hinge bolts to 28 N·m (21 ft. lbs.).

UP/DOWN

NOTE: Up/down door adjustment is done by loosening either the hinge to the body fasteners or the hinge to door fasteners and moving the door to the correct position.

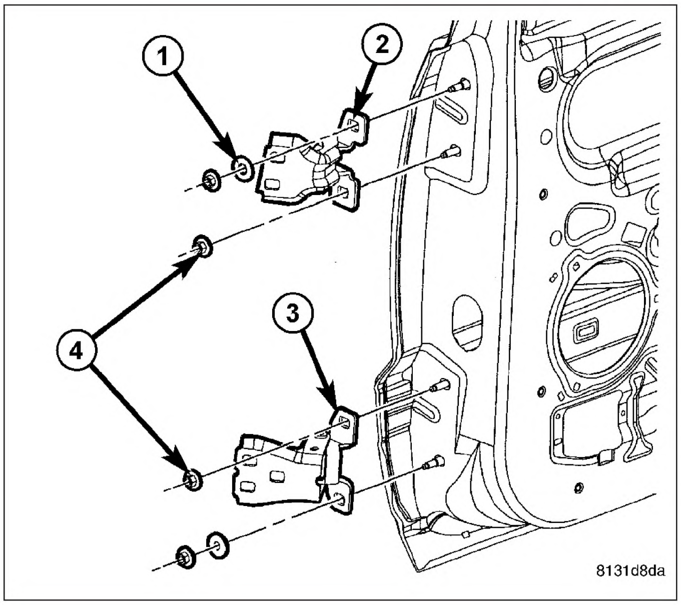
NOTE: When the up/down adjustments are done correctly, the top of the door is positioned over flush to the roof (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

1. Support the rear door with a suitable lifting device.
2. Loosen the two bolts (1) that secure the striker (2) and the shim (3) to the C-pillar.

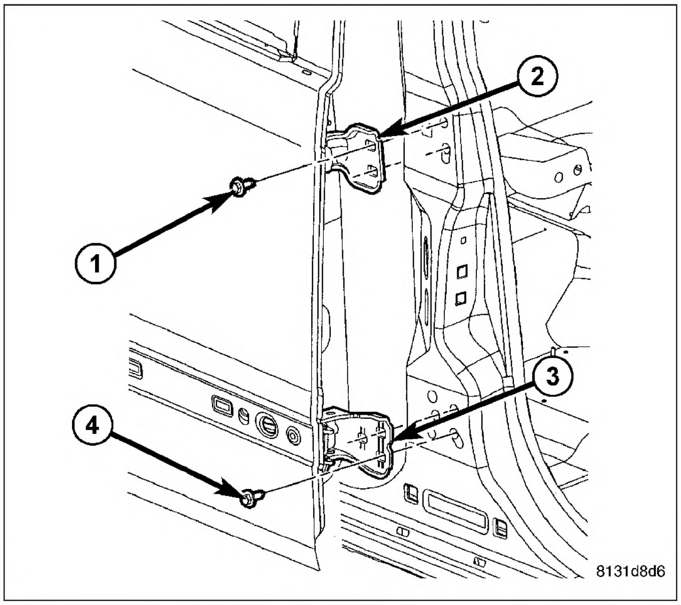


NOTE: When adjustment of the rear door requires the loosening of the door to hinge fasteners, it will be necessary to separate the epoxy bonded washers with a chisel or other suitable tool.

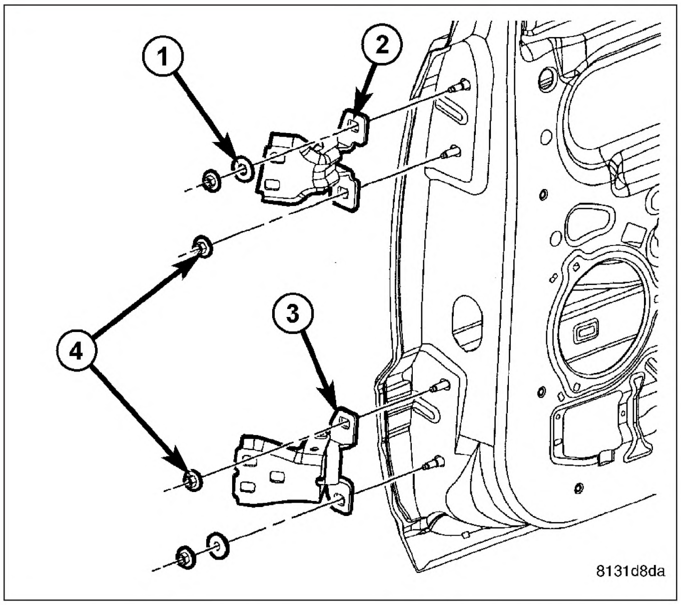
3. If necessary, loosen the four nuts (4) that secure the door hinges (2 and 3) to the rear door.
4. Separate the epoxy bonded washers (1) from the hinges with a chisel or other suitable tool.



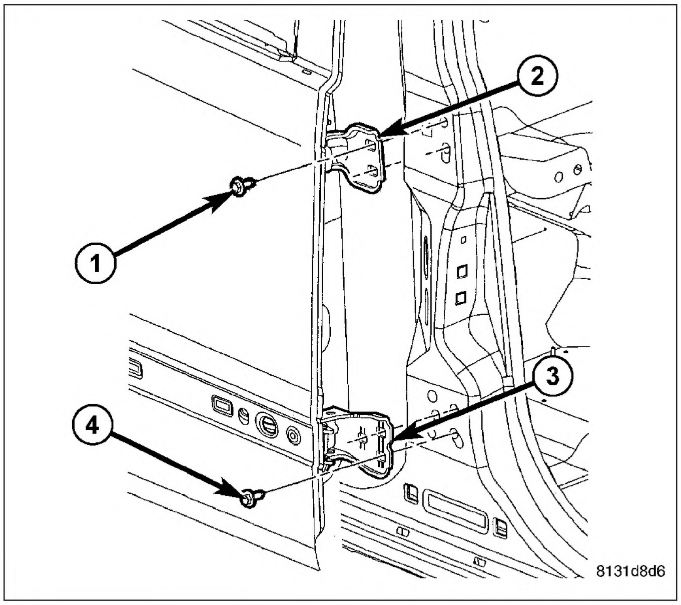
5. If necessary, loosen the four bolts (1 and 4) that secure the rear door hinges (2 and 3) to the B-pillar.



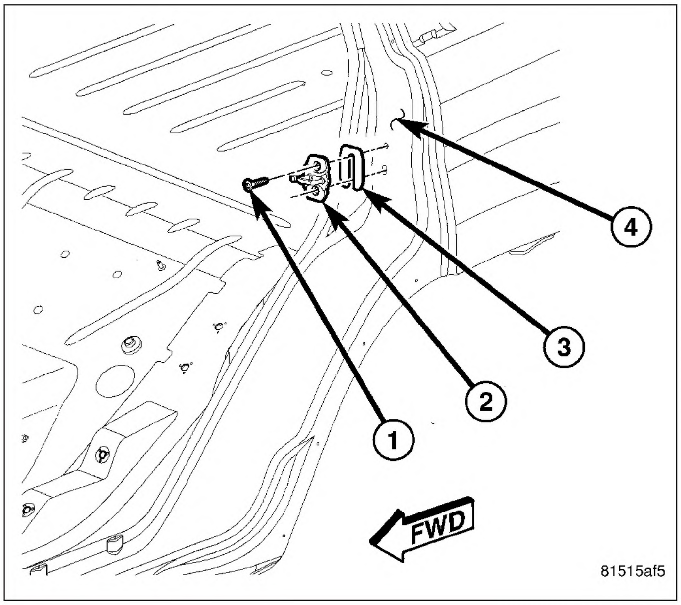
6. Adjust the rear door to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
7. Tighten the four nuts (4) that secure the door hinges (2 and 3) to the rear door to 28 N·m (21 ft. lbs.).



8. Tighten the upper bolt (1) of the upper hinge (2) to the B-pillar to 28 N·m (21 ft. lbs.).
9. Tighten the upper bolt (4) of the lower hinge (3) to 28 N·m (21 ft. lbs.).
10. Tighten the remaining hinge bolts to 28 N·m (21 ft. lbs.).



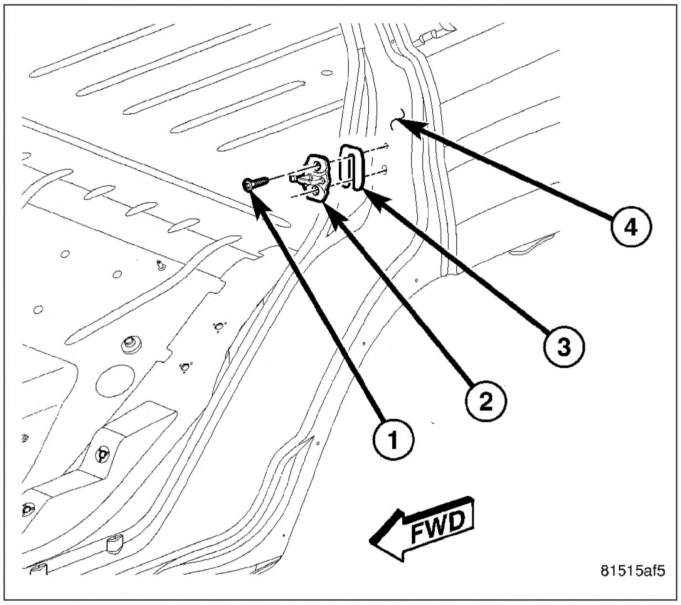
11. Tighten the two bolts (1) that secure the striker (2) and the shim (3) to the C-pillar. Tighten the bolts to 28 N·m (21 ft. lbs.).



IN/OUT

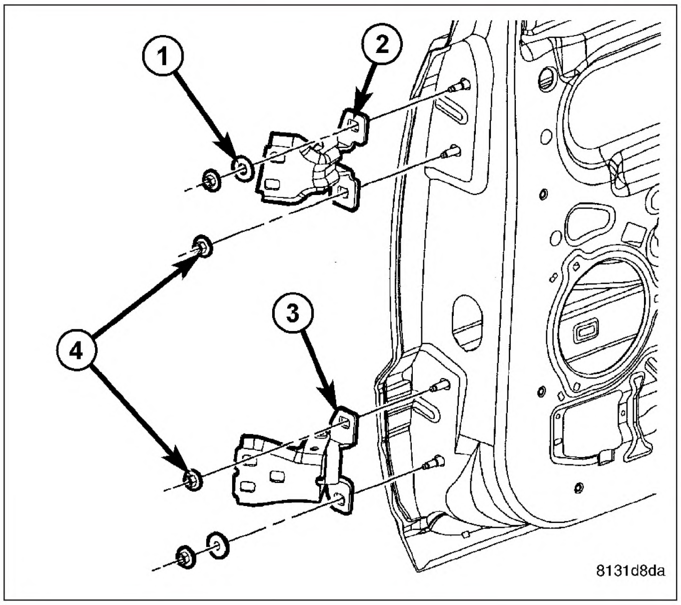
NOTE: In/out door adjustment is done by loosening the hinge to door fasteners one hinge at a time and moving the door to the correct position.

1. Support the rear door with a suitable lifting device.
2. Loosen the two bolts (1) that secure the striker (2) and the shim (3) to the C-pillar.

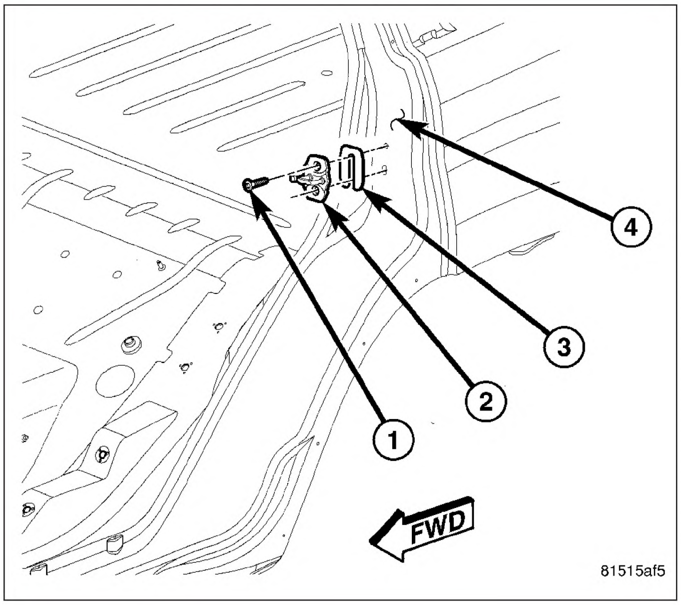


NOTE: When adjustment of the rear door requires the loosening of the door to hinge fasteners, it will be necessary to separate the epoxy bonded washers with a chisel or other suitable tool.

3. Loosen the four nuts (4) that secure the door hinges (2 and 3) to the rear door.
4. Separate the epoxy bonded washers (1) from the hinges with a chisel or other suitable tool.
5. Adjust the rear door to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
6. Tighten the four nuts that secure the door hinges to the rear door. Tighten the nuts to 28 N·m (21 ft. lbs.).

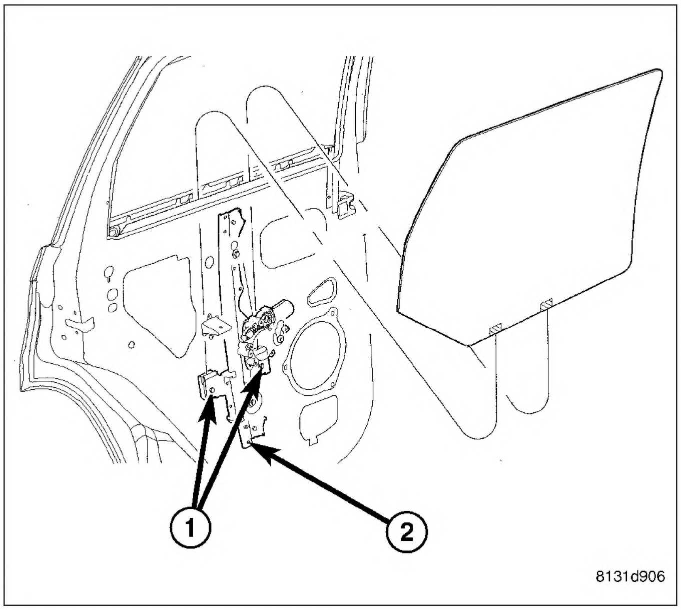


7. Tighten the two bolts (1) that secure the striker (2) and the shim (3) to the C-pillar. Tighten the bolts to 28 N·m (21 ft. lbs.).



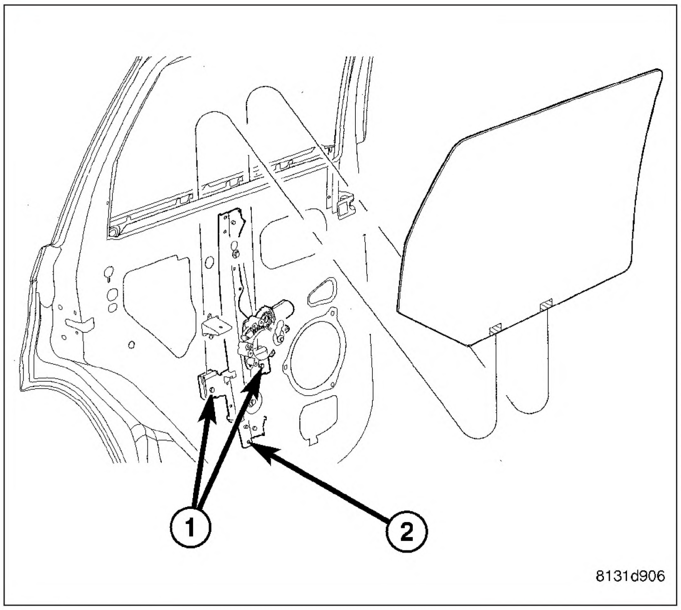
GLASS

REMOVAL



1. Remove the outer belt weatherstrip from the rear door.
2. Remove the trim panel from the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
3. If equipped, remove the speaker from the inside of the rear door (Refer to 8 - ELECTRICAL/AUDIO/ SPEAKER - REMOVAL).
4. Remove the watershield from the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - REMOVAL).
5. Using the regulator (2), move the rear door glass up or down as required to access the two window regulator glass clamp bolts (1).
6. Loosen the bolt in each of the window regulator glass clamps far enough to release the door glass from the clamps.
7. Disengage the door glass from the window regulator glass clamps.
8. Lower the regulator down as required for access to remove the door glass.
9. Carefully rotate the door glass within the window opening and remove the glass from the door through the window opening.

INSTALLATION

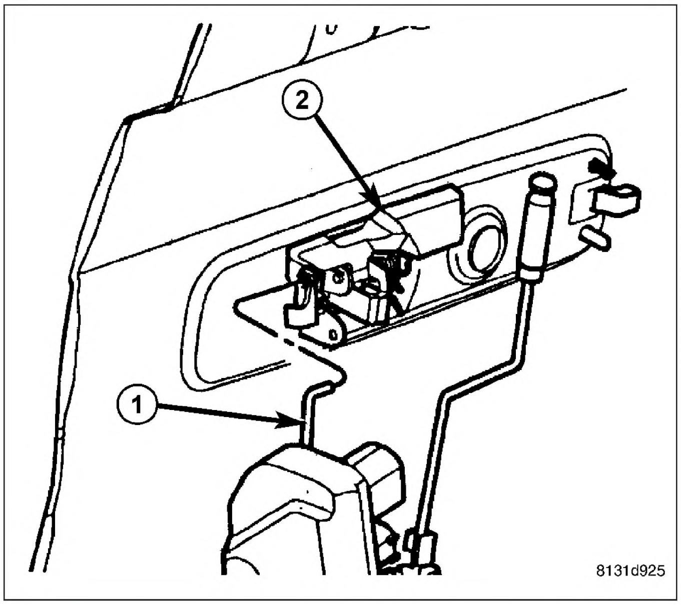


1. Carefully lower the door glass into the rear door through the window opening.
2. Rotate the door glass into position and engage it to the window regulator glass clamps.
3. Using the regulator (2), move the rear door glass up or down as required to access to the two window regulator glass clamp bolts (1).
4. Tighten the bolts in each of the window regulator glass clamps to 10 N·m (90 in. lbs.).
5. Install the watershield onto the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - INSTALLATION).
6. If equipped, install the speaker onto the inside of the rear door (Refer to 8 - ELECTRICAL/AUDIO/ SPEAKER - INSTALLATION).
7. Install the trim panel onto the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
8. Install the outer belt weatherstrip onto the rear door.

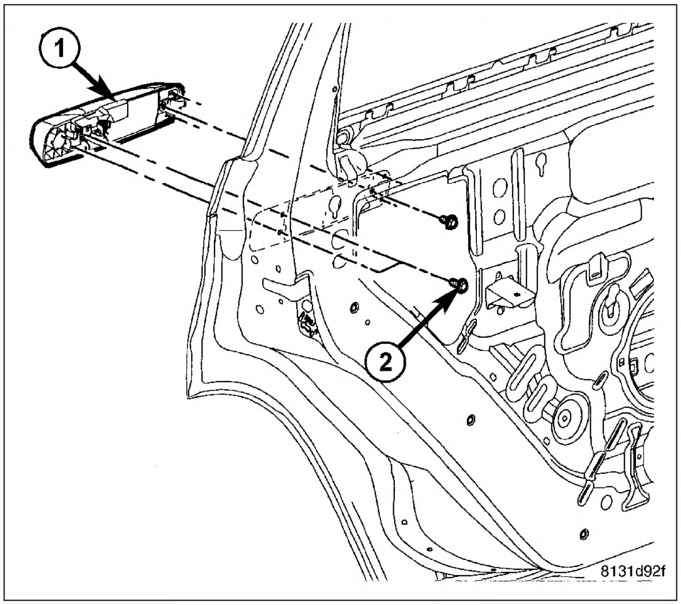
HANDLE-EXTERIOR

REMOVAL

1. Remove the window regulator from the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/WINDOW REGULATOR - REMOVAL).
2. Disconnect the actuator rod (1) from the rear exterior handle (2).

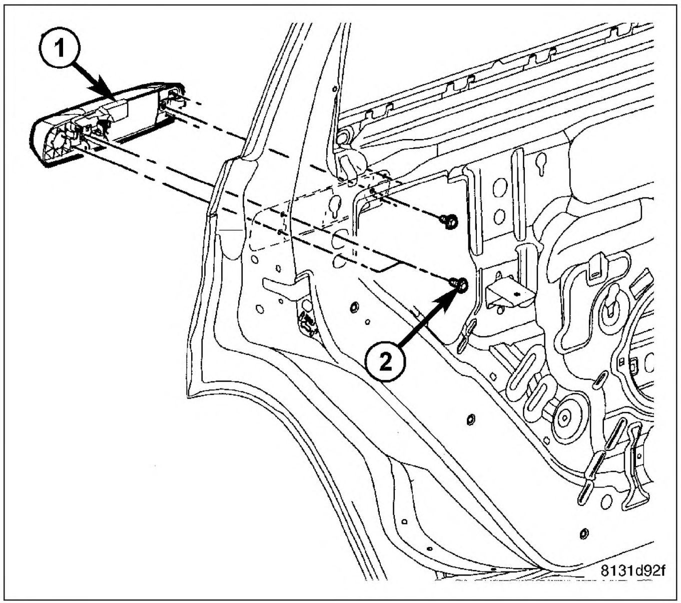


3. Remove the three bolts (2) that secure the exterior handle (1) to the rear door and remove the handle.

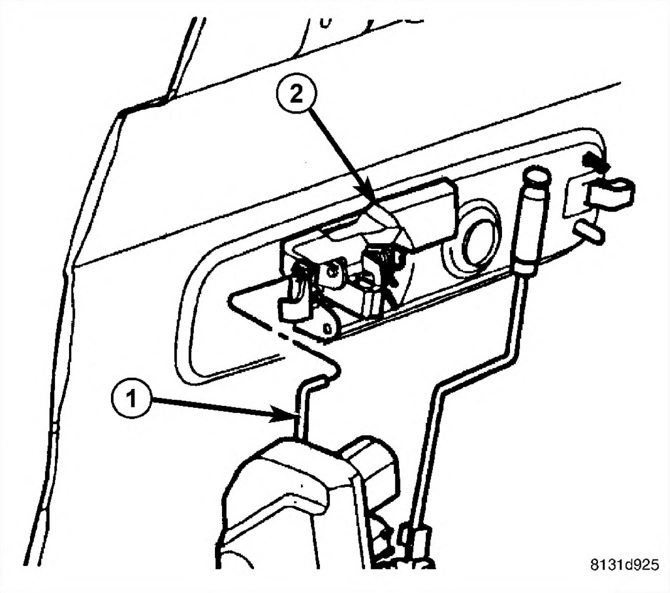


INSTALLATION

1. Position the exterior handle (1) to the mounting hole on the outside of the rear door.
2. Install the three bolts (2) that secure that exterior handle to the door. Tighten the bolts to 5 N·m (44 in. lbs.).



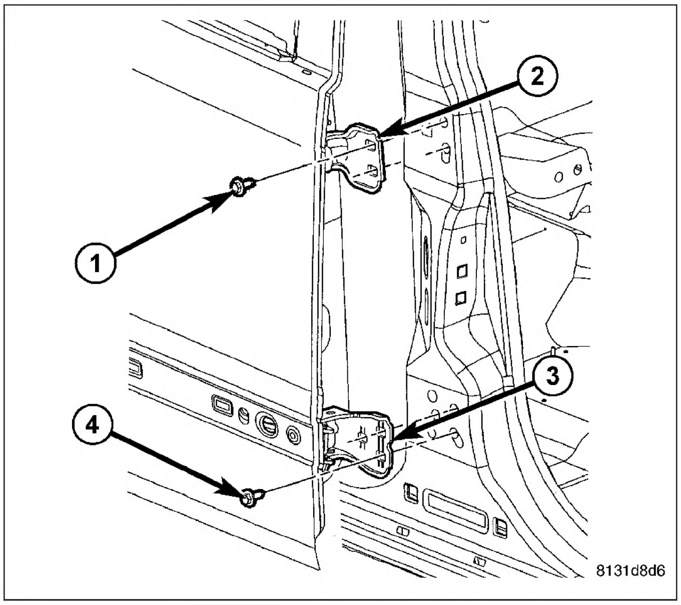
3. Connect the actuator rod (1) to the rear exterior handle (2).
4. Install the rear window regulator (Refer to 23 - BODY/DOORS - REAR/WINDOW REGULATOR - INSTALLATION).



HINGE

REMOVAL

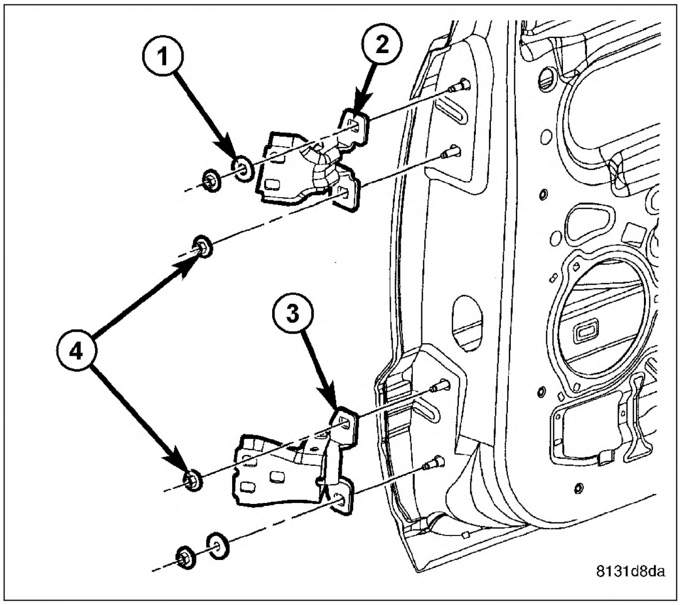
1. Disconnect and isolate the negative battery cable.
2. Disconnect the rear door wire harness connector from the body wire harness.
3. Using a grease pencil or equivalent, mark the location of the rear door hinges (2 and 3) on the B-pillar.
4. Support the rear door with a suitable lifting device and remove the four bolts (1 and 4) that secure the rear door hinges to the B-pillar.
5. Carefully remove the rear door from the body and place it on a workbench.



6. Using a grease pencil or equivalent, mark the location of the door hinges (2 and 3) on the rear door.

NOTE: The epoxy bonded washers do not need to be separated from the door hinges. If the washers are removed, the door may need to be readjusted.

7. Remove the four nuts (4) that secure the rear door hinges to the door and remove the hinges.
8. If required, remove the washers (1) from the rear door hinges.

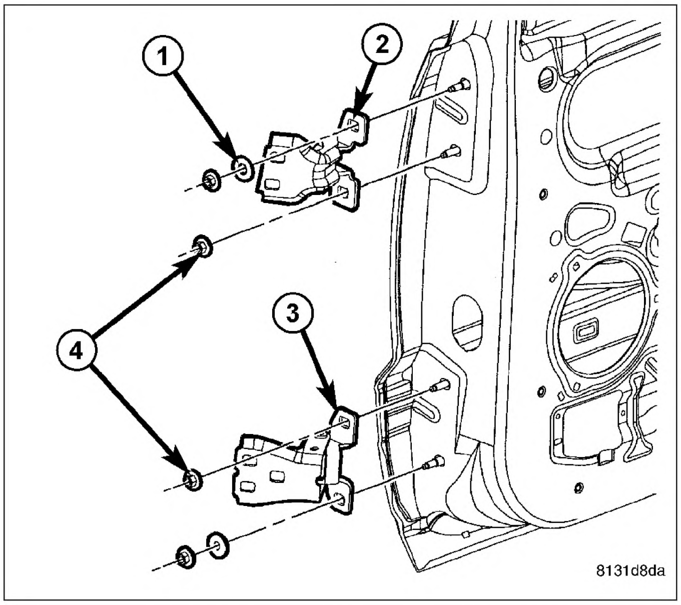


INSTALLATION

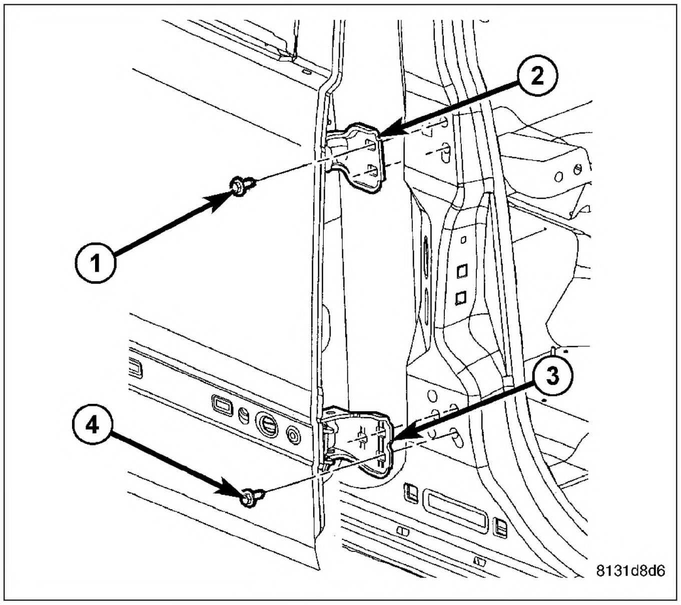
1. Position the rear door hinges onto the door.

NOTE: If the epoxy bonded washers are separated from the door hinges, the door may need to be adjusted.

2. If removed, install the epoxy bonded washers (1).
3. Loosely install the nuts (4) that secure the hinges to the rear door.
4. Align the hinges to the door using the reference marks made during the removal procedure and tighten the nuts to 28 N·m (21 ft. lbs.).



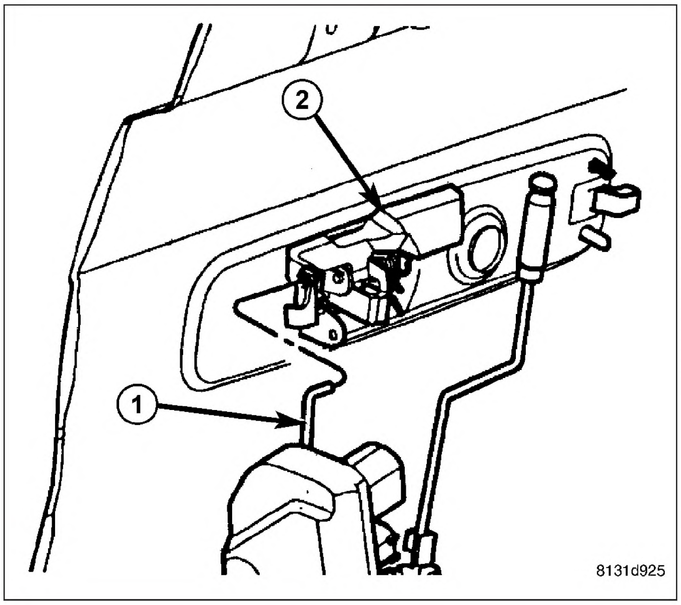
5. Carefully position the rear door to the body and support the door with a suitable lifting device.
6. Loosely install the four bolts (1 and 4) that secure the rear door hinges (2 and 3) to the B-pillar.
7. Align the rear door to the body using the reference marks made during the removal procedure and tighten the bolts to 28 N·m (21 ft. lbs.).
8. Connect the rear door wire harness to the body wire harness.
9. Reconnect the negative battery cable.
10. If necessary, adjust the rear door (Refer to 23 - BODY/DOORS - REAR/DOOR - ADJUSTMENTS).



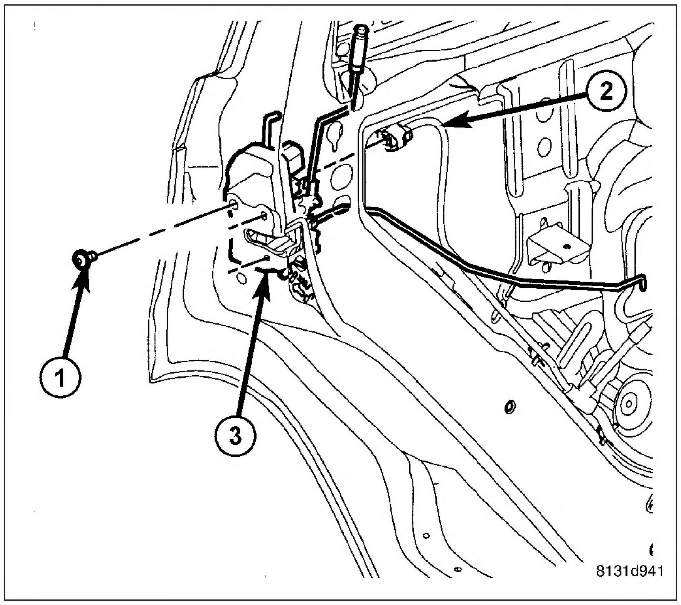
LATCH

REMOVAL

1. Raise the rear window to the full up position and remove the rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
2. Position the watershield out of the way and disconnect the actuator rod (1) from the exterior handle (2).

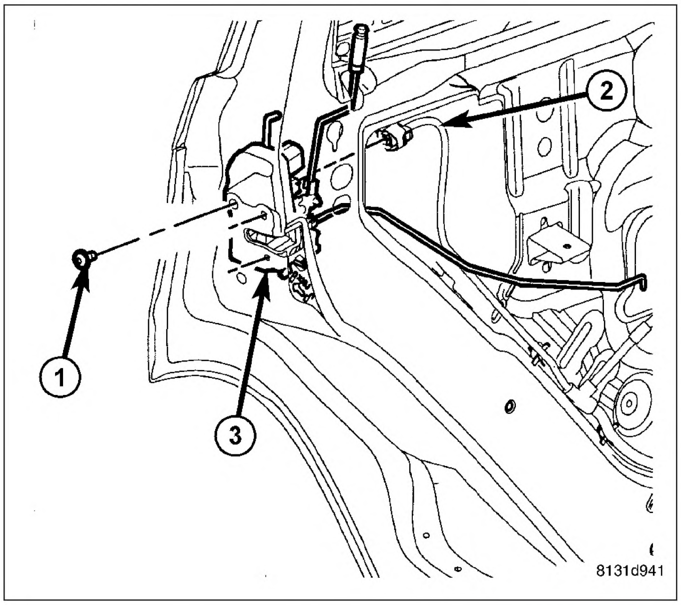


3. Disconnect the interior handle actuator rod from the rear door latch (3) and remove the rod.
4. Disconnect the door wire harness connector (2) from the rear door latch.
5. Remove the three bolts (1) that secure the rear door latch to the door and remove the latch and actuator rods as an assembly.
6. If required, remove all of the actuator rods from the actuator.

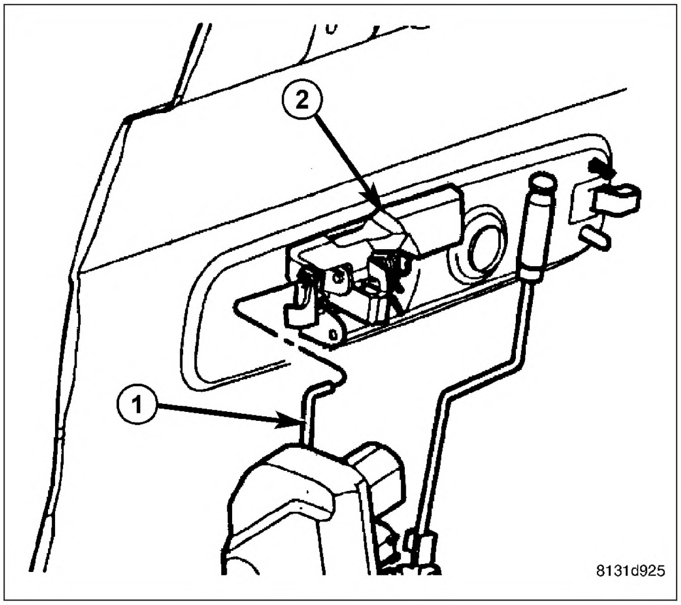


INSTALLATION

1. If removed, install the actuator rods onto the rear door latch (3) and engage the retainers.
2. Position the rear door latch and actuator rods into the door as an assembly.
3. Install the three bolts (1) that secure the rear door latch to the door. Tighten the bolts to 10 N·m (89 in. lbs.).
4. Connect the door wire harness connector (2) to the rear door latch.
5. Install the interior handle actuator rod onto the rear door latch and engage the retainer.



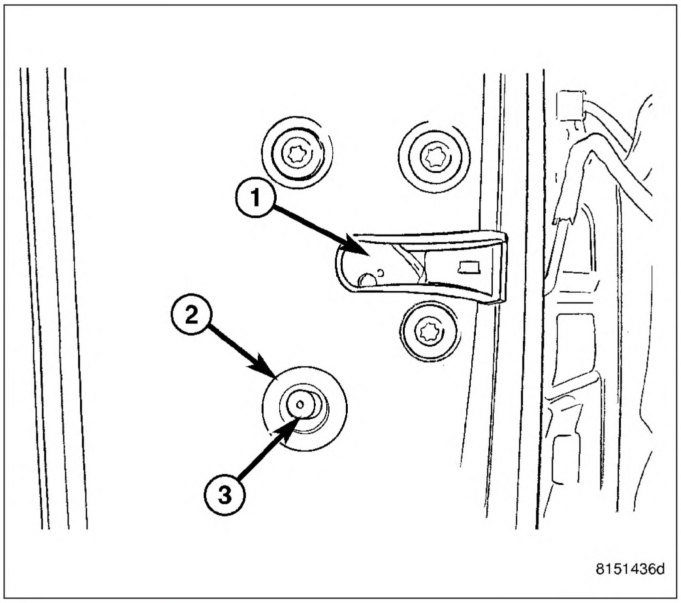
6. Connect the actuator rod (1) to the rear exterior handle (2).
7. Reposition the watershield to the rear door and install the door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
8. If necessary, adjust the rear door latch (Refer to 23 - BODY/DOORS - REAR/LATCH - ADJUSTMENTS).



ADJUSTMENTS

ADJUSTMENT

1. Locate the access hole in the door to adjust the door latch (1) and remove the mylar tape (2).
2. Loosen the adjustment screw (3).
3. Operate the door handles several times to reduce any possible linkage binding and tighten the adjustment screw to 3 N·m (30 in. lbs.).
4. Operate the door handle again to verify proper operation and reinstall the mylar tape.

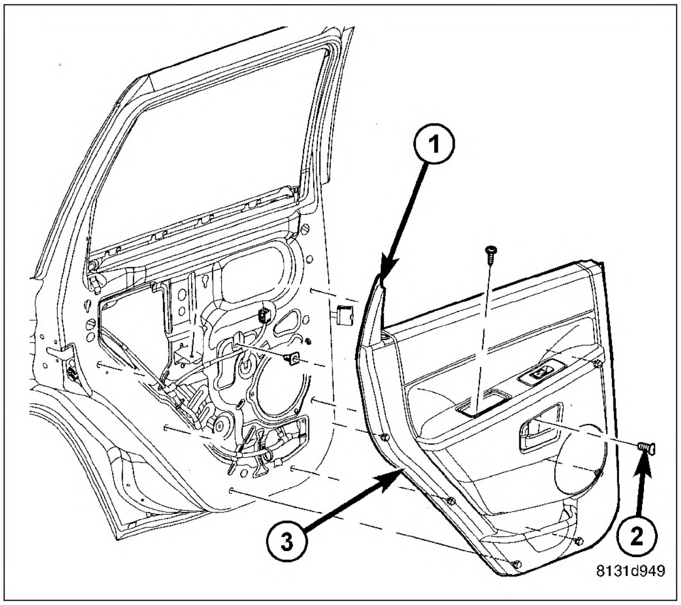


PANEL-TRIM

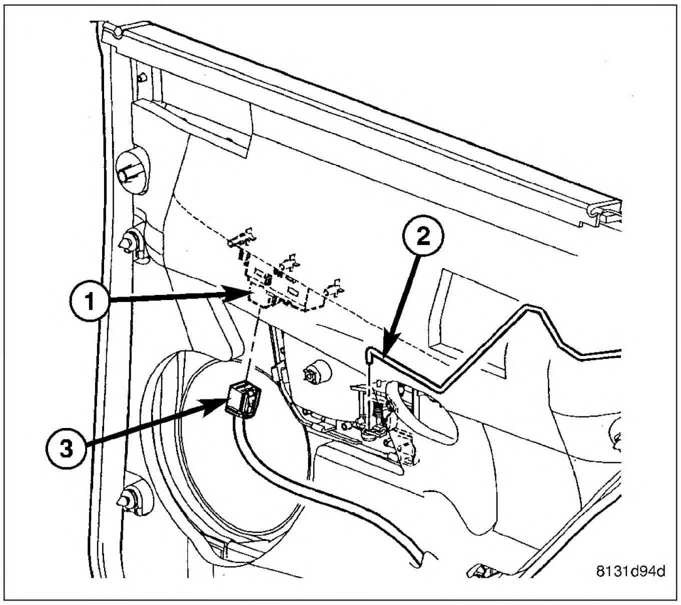
REMOVAL

CAUTION: Door panel retention clips are designed to be used only once. Retention clips should be discarded and replaced with new clips each time the door trim panel is removed from the door. Failure to replace retention clips will result in poor door panel retention and possible customer dissatisfaction.

1. Disconnect and isolate the battery negative cable.
2. Remove the two screws (2) that secure the rear door trim panel (1) to the door.
3. Carefully pull the rear door trim panel far away enough from the door to disengage the six plastic door trim panel retention clips (3) from the door.
4. Lift the rear of the panel upward slightly to disengage the interior door latch lock link and knob from the rear of the door panel.



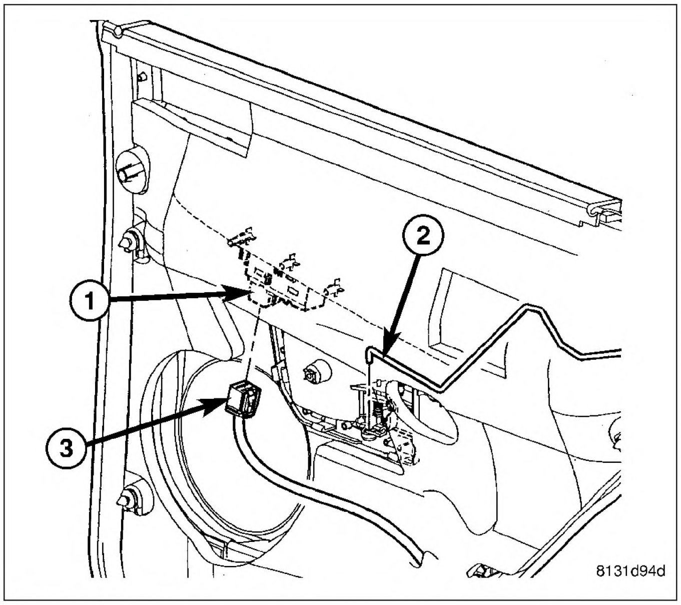
5. Position the rear door trim panel far enough away to access the door panel wire harness connector (1) and the interior door handle actuator rod (2).
6. Disconnect the interior door handle actuator rod from the interior door handle.
7. Disconnect the wire harness connector (3) from the power door switch assembly.
8. Remove and discard the six plastic door trim panel retention clips.



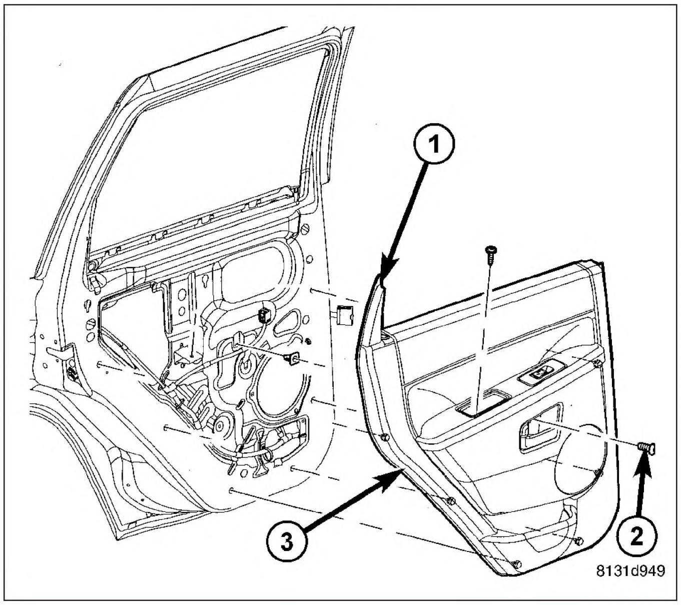
INSTALLATION

CAUTION: Door panel retention clips are designed to be used only once. Retention clips should be discarded and replaced with new clips each time the door trim panel is removed from the door. Failure to replace retention clips will result in poor door panel retention and possible customer dissatisfaction.

1. Install six new plastic door trim panel retention clips onto the inside of the rear door trim panel.
2. Position the door trim panel near the rear door and connect the door wire harness connector (3) to the power door switch assembly (1).
3. Connect the interior door handle actuator rod (3) to the interior door handle and engage the retainer.

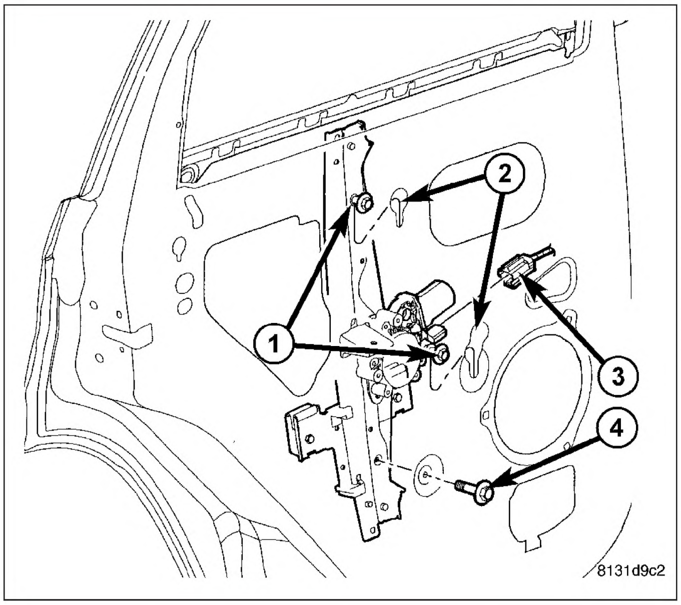


4. Lift the rear trim panel (1) over the inside of the door far enough to engage the interior door latch lock link and knob into the hole at the upper rear corner of the trim panel.
5. Position the trim panel to the inside of the door and fully engage the new plastic door trim panel retention clips (3) to the door.
6. Install the two screws (2) that secure door trim panel to the door. Tighten the screws to 2 N·m (16 in. lbs.).
7. Reconnect the negative battery cable.



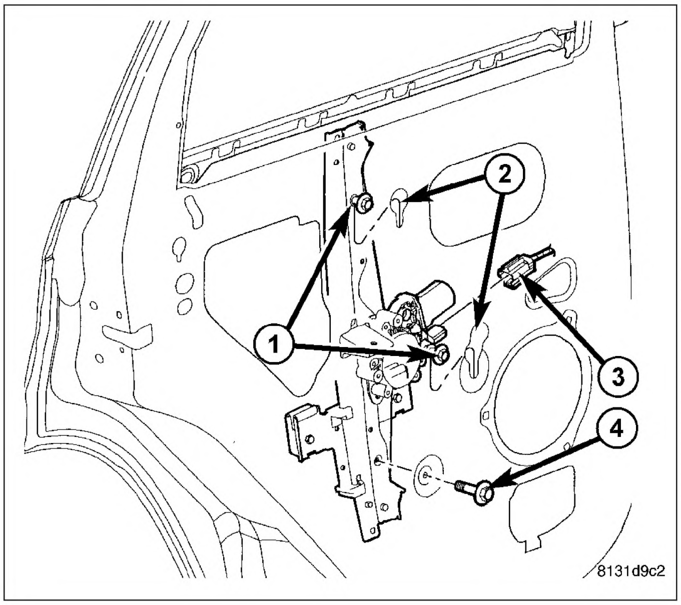
REGULATOR-WINDOW

REMOVAL



1. Remove the trim panel from the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
2. Position the watershield out of the way and using the regulator, move the rear door glass up or down as required to access the two window regulator glass clamp bolts (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - REMOVAL).
3. Loosen the bolt in each of the window regulator glass clamps far enough to release the door glass from the clamps.
4. Disengage the door glass from the window regulator glass clamps and lift the glass out of the regulator clamps and into its full up position, then tape the glass securely into place.
5. Remove the bolt (4) that secures the bottom of the window regulator to the inside of the door.
6. Loosen the two bolts (1) that secure the regulator to the keyed holes (2) on the inside of the door.
7. Lift the regulator upward within the door far enough to disengage the bolts from the two keyed holes in the door.
8. Lower the regulator within the door far enough to access and disconnect the wire harness connector (3) from the regulator motor through the large access hole in the door and remove the regulator.

INSTALLATION

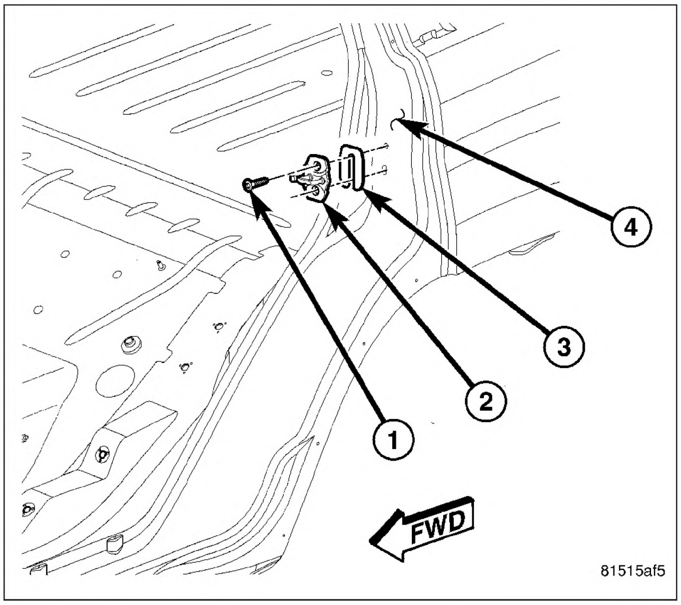


1. Load the window regulator into the rear door through the large access hole in the door and connect the wire harness connector (3) to the regulator motor.
2. Engage the two bolts (1) into the keyed holes (2) on the inside of the door.
3. Install the bolt (4) that secures the bottom of the regulator to the door. Tighten the bolt to 10 N·m (90 in. lbs.).
4. Tighten the bolts that secure the regulator to the two keyed holes on the inside of the door. Tighten the bolts to 10 N·m (90 in. lbs.).
5. Carefully remove the tape securing the rear door glass in its full up position, then lower the glass and engage it into the two window regulator glass clamps (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - INSTALLATION).
6. Using the regulator, move the rear door glass up or down as required to access to the two window regulator glass clamp bolts.
7. Tighten the bolts in each of the window regulator glass clamps to 10 N·m (90 in. lbs.).
8. Install the watershield and the trim panel onto the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

STRIKER

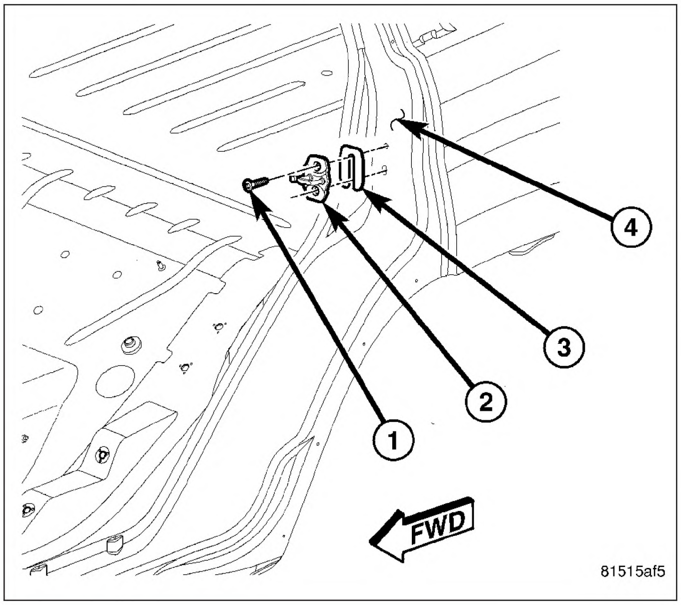
REMOVAL

1. Using a grease pencil or equivalent, mark the location of the door latch striker (2) on the C-pillar.
2. Remove the two bolts (1) that secure the striker and the shim (3) to the C-pillar and remove the striker and shim.



INSTALLATION

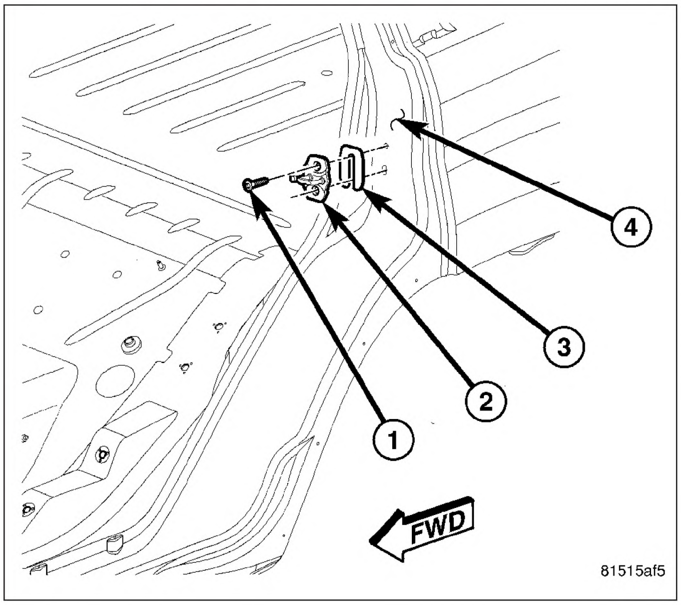
1. Position the door latch striker (2) and the shim (3) onto the C-pillar and loosely install the two bolts (1).
2. Align the door latch striker to the C-pillar using the reference marks made during the removal procedure and tighten the bolts to 28 N·m (21 ft. lbs.).
3. If necessary, adjust the rear door latch striker (Refer to 23 - BODY/DOORS - REAR/LATCH STRIKER - ADJUSTMENTS).



ADJUSTMENTS

ADJUSTMENT

1. Using a grease pencil or equivalent, mark the location of the door latch striker (2) and shim (3) on the C-pillar to aid in adjustment.
2. Loosen the two bolts (1) that secure the door latch striker to the C-pillar.
3. To adjust the rear gap and flush measurement, change the position of the door latch striker and then tighten the two bolts to 28 N·m (21 ft. lbs.) (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
4. Verify correct door and latch position.



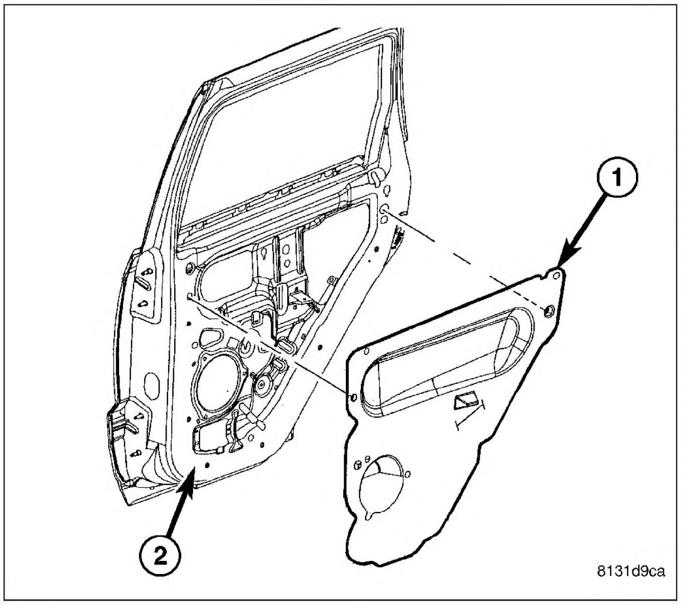
WATERSHIELD

REMOVAL

1. Remove the trim panel from the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
2. If equipped, remove the speaker from the inside of the rear door (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - REMOVAL).

CAUTION: Do not allow the watershield adhesive to become contaminated with dirt or other foreign substances. If the watershield becomes contaminated or damaged, replace it.

3. Carefully remove the watershield (1) from around the perimeter of the door (2).
4. Separate the watershield from the interior handle actuator rod and the door wire harness and remove the watershield.

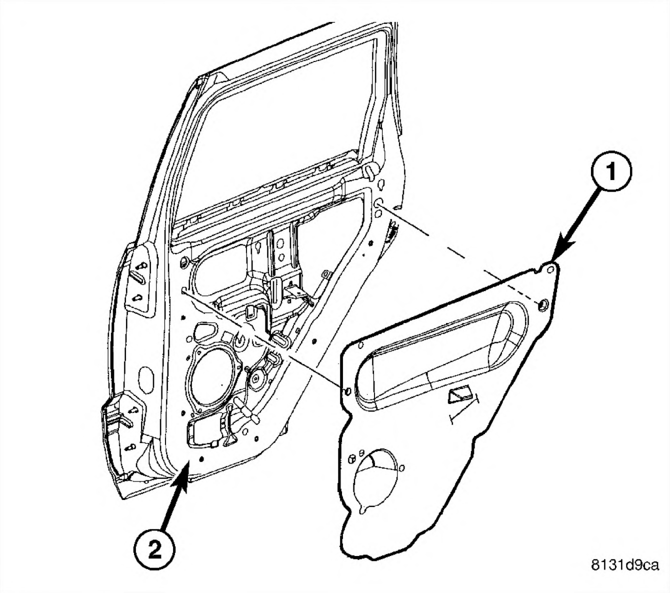


INSTALLATION

CAUTION: Do not allow the watershield or adhesive to become contaminated with dirt or other foreign substances. If the watershield becomes contaminated or damaged, replace it.

NOTE: Be sure that the watershield is fully sealed around the perimeter of the door.

1. Position the interior handle actuator rod and the wire harness through the holes in the watershield (1) and install the watershield to the door (2).
2. If equipped, install the speaker onto the inside of the rear door (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - INSTALLATION)
3. Install the trim panel onto the inside of the rear door (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).



EXTERIOR

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BODY SIDE MOLDINGS

REMOVAL

1. Apply a length of masking tape on the body, parallel to the top edge of the molding to use as a guide, if necessary.
2. Warm the effected adhesive type molding and body metal to approximately 38°C (100°F) using a suitable heat lamp or heat gun.
3. Pull stick-on molding from painted surface.

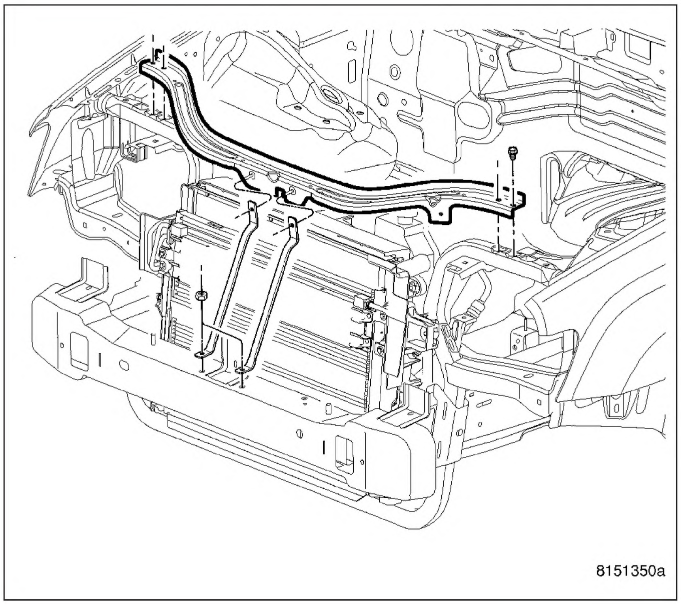
INSTALLATION

1. Clean body surface with MOPAR® Super Kleen solvent or equivalent. Wipe surface dry with lint free cloth.
2. Remove protective cover from tape on back of molding. Apply molding to body below the masking tape guide.
3. Remove masking tape guide and firmly press molding to body surface to assure adhesion.

CROSSMEMBER-RADIATOR

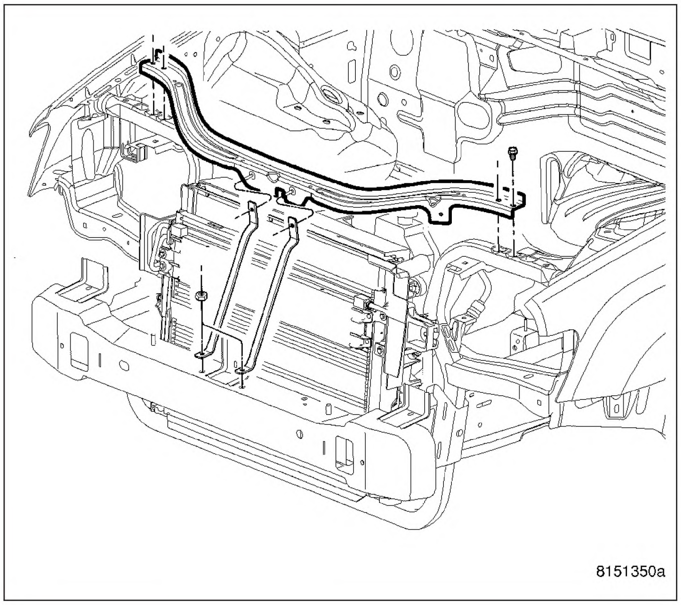
REMOVAL

1. Remove the grill assembly, (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).
2. Remove the front hood seal.
3. Remove the center brace mounting nuts and remove hood latch.
4. Remove the outer crossmember mounting bolts.
5. Remove crossmember.



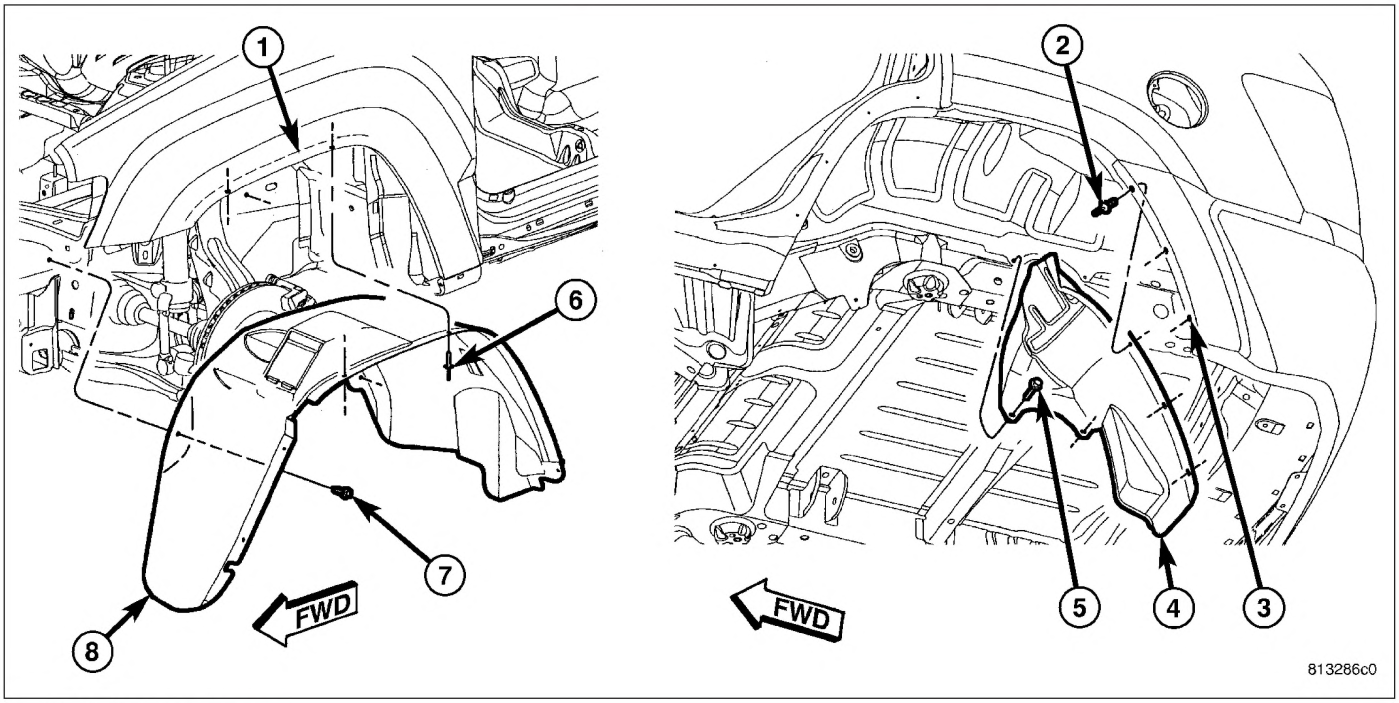
INSTALLATION

1. Install upper crossmember.
2. Install outer mounting bolts and tighten.
3. Install nuts attaching latch to radiator crossmember support. Tighten nuts to 11 N·m (8 ft. lbs.) torque.
4. Install grill assembly, (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
5.
6. Check hood fit and adjust if required. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS)
7. Install hood seal.

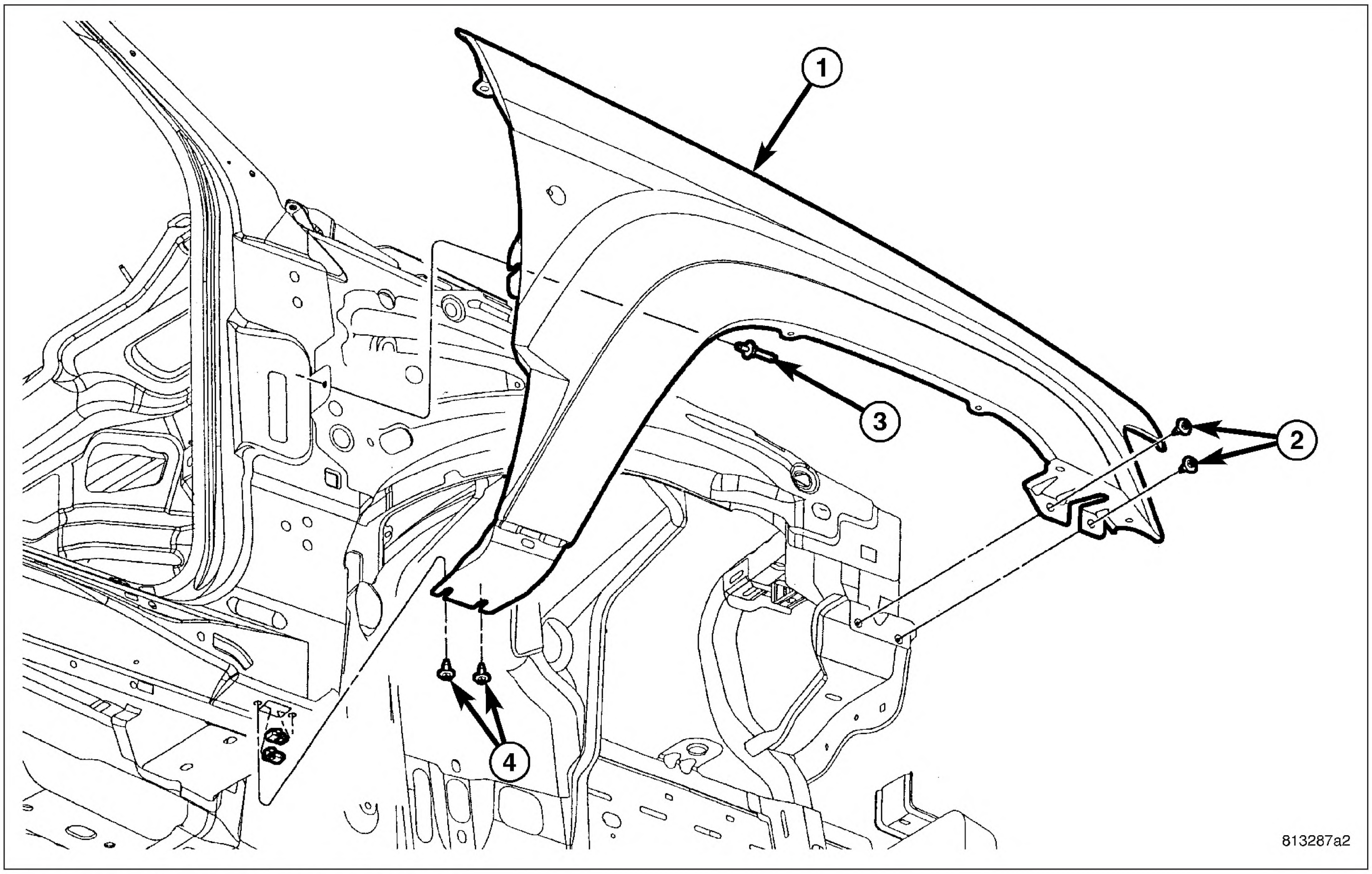


FENDER

REMOVAL



1. Mark fender location.
2. Remove wheel if necessary.
3. Remove wheel liner, (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - REMOVAL).
4. Remove front fascia as necessary, (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).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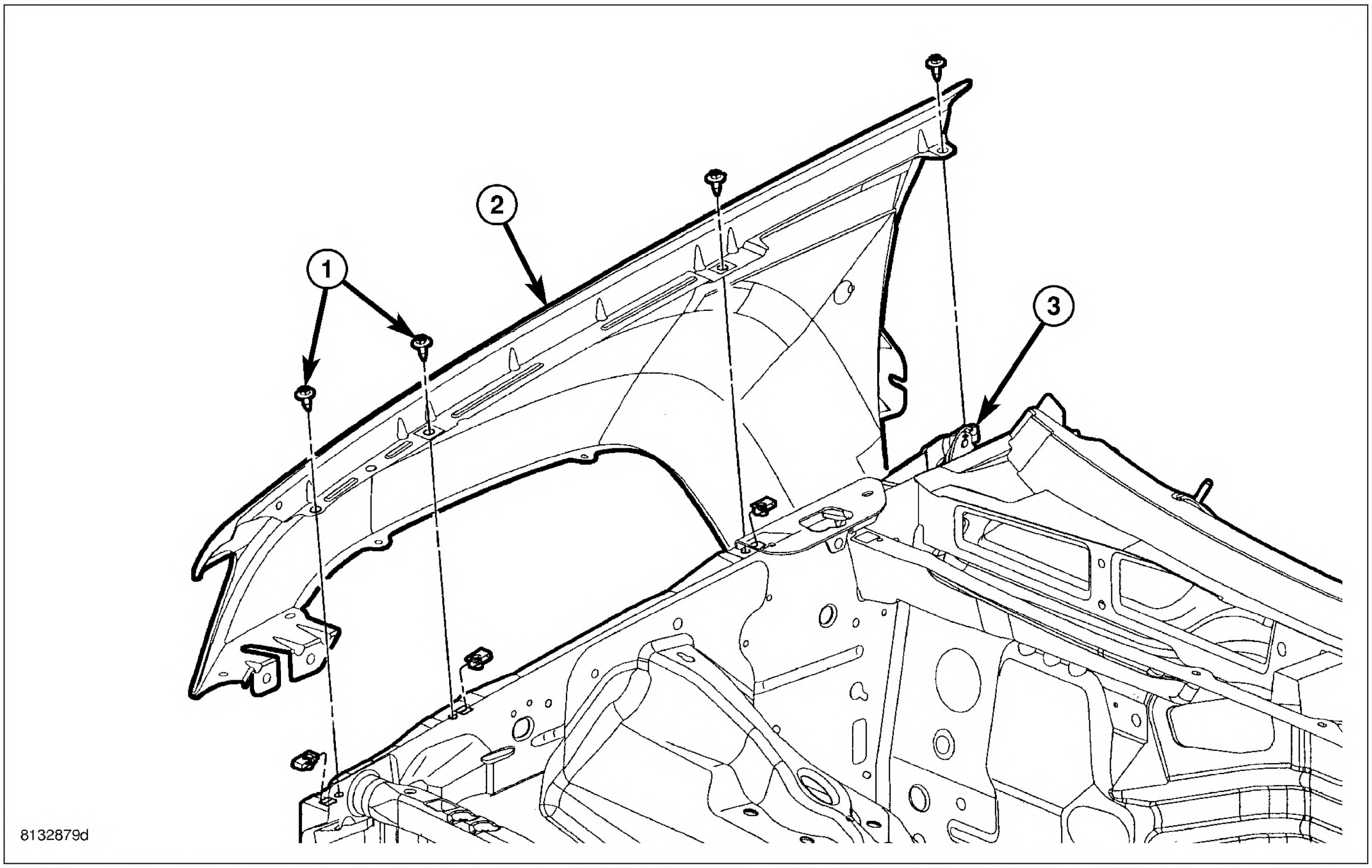
5. Remove front lower mounting bolts.
6. Loosen rocker panel cover as necessary.
7. Remove rear lower mounting bolts.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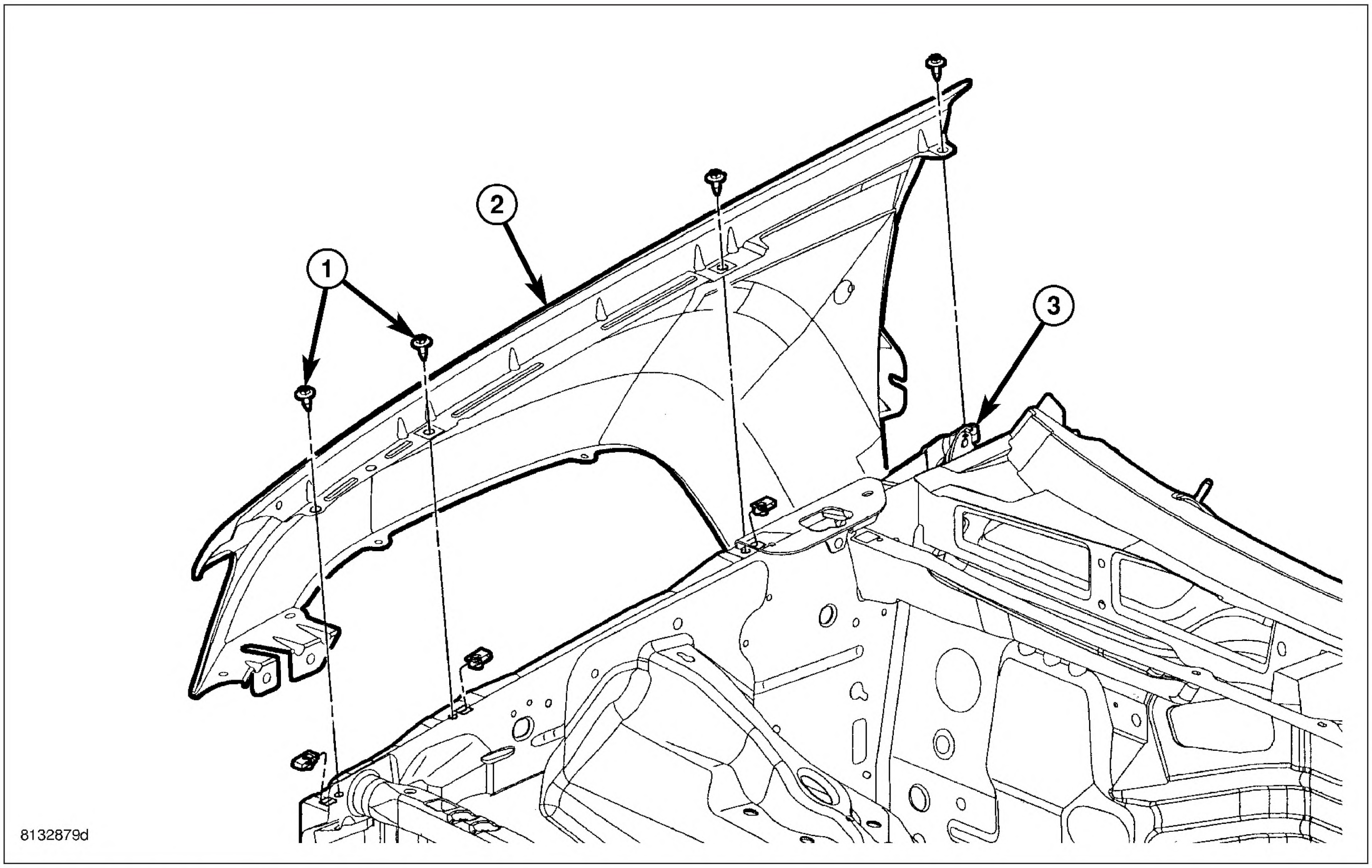
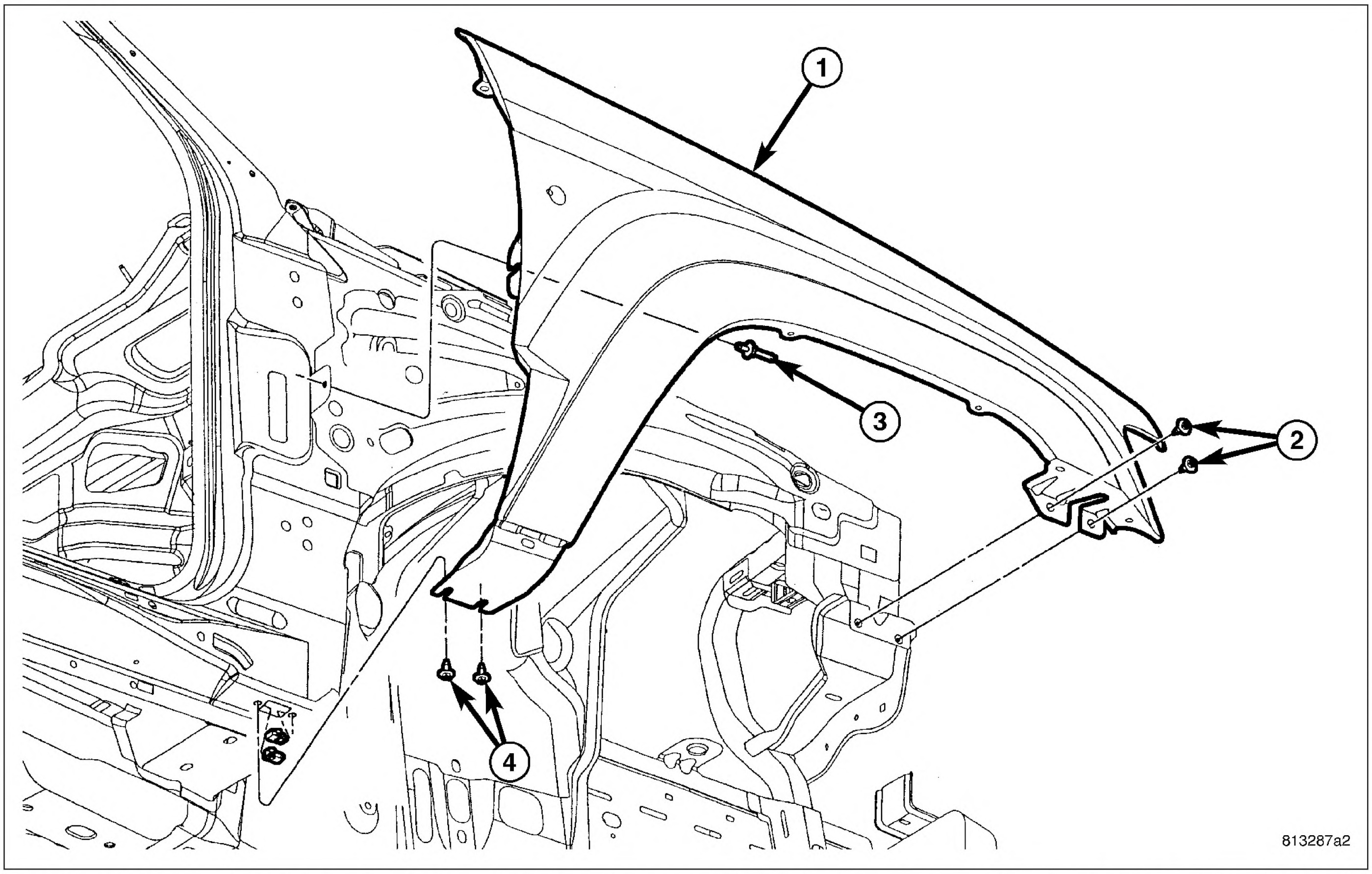
8. Remove upper fender mounting bolts.
9. Remove fender from vehicle.

INSTALLATION



1. Position fender on body.
2. If equipped, install radio antenna. (Refer to 8 - ELECTRICAL/AUDIO/ANTENNA BODY & CABLE - INSTALLATION)
3. Install all screws finger-tight.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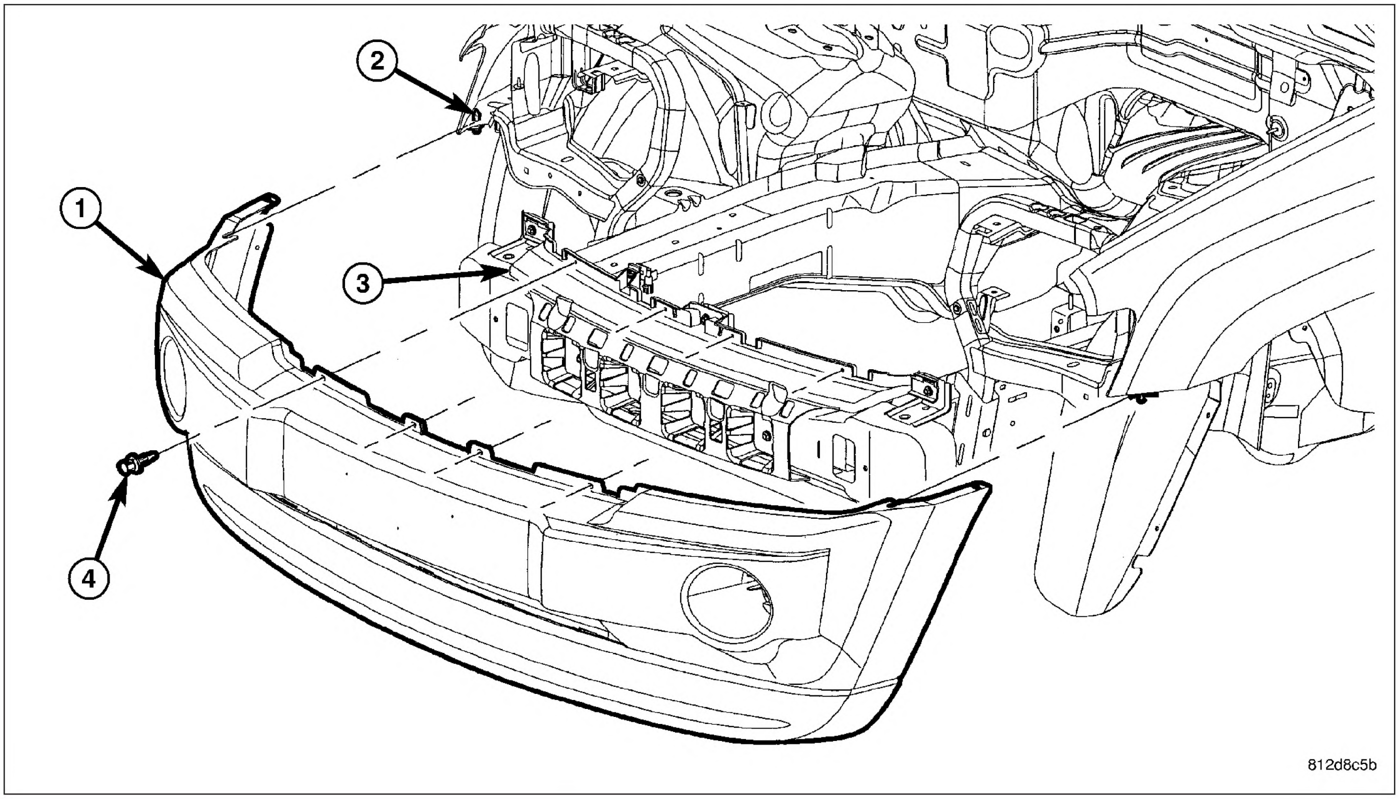
4. Align fender with adjacent body panels and reference marks. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS)
5. Tighten all screws to 12 N·m (9 ft. lbs.).
6. Install rocker panel cover as necessary.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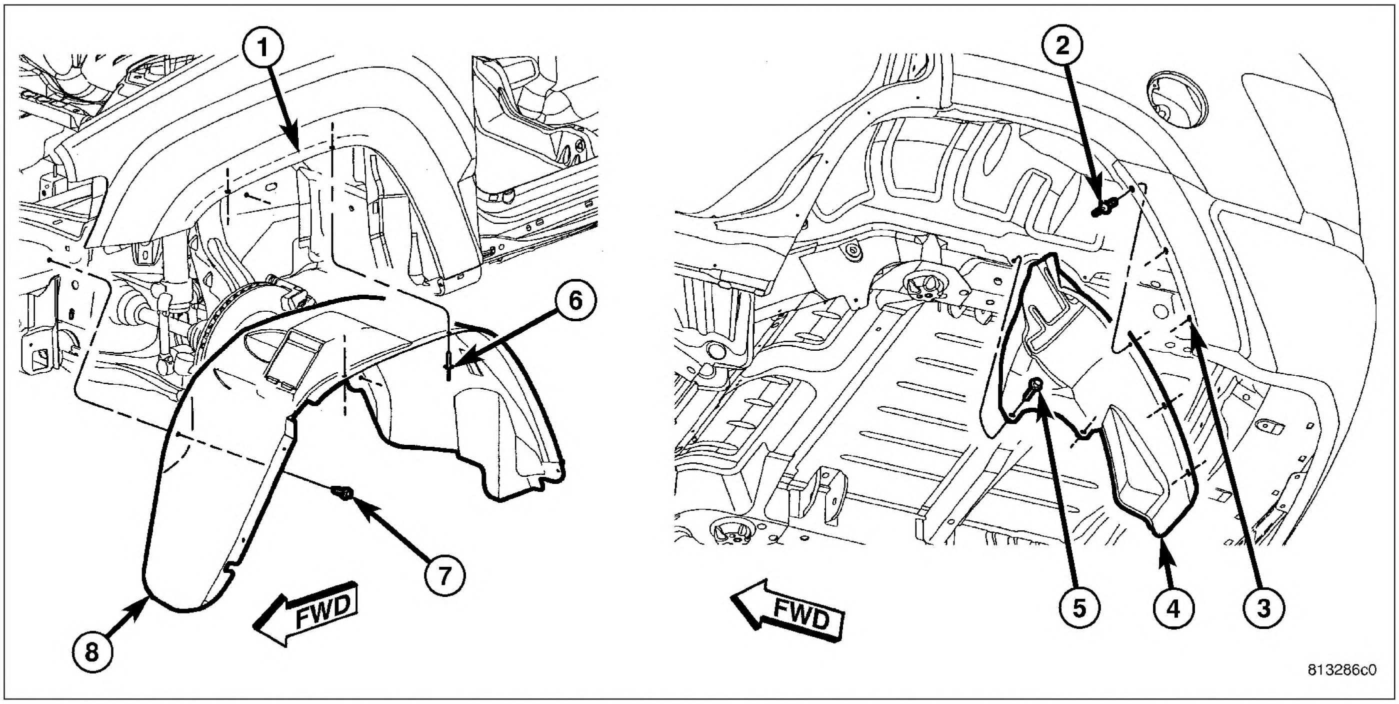
7. Install front fascia as necessary, (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).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FWD
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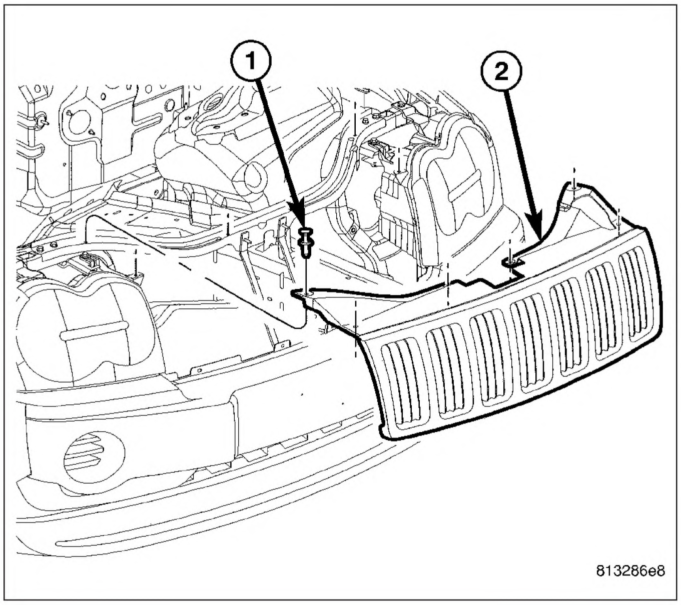
8. Install wheel liner, (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - INSTALLATION).
9. Install wheel if removed.

GRILLE

REMOVAL

1. Remove the 6 upper push pins (1).
2. Tip grill forward and remove grill (2).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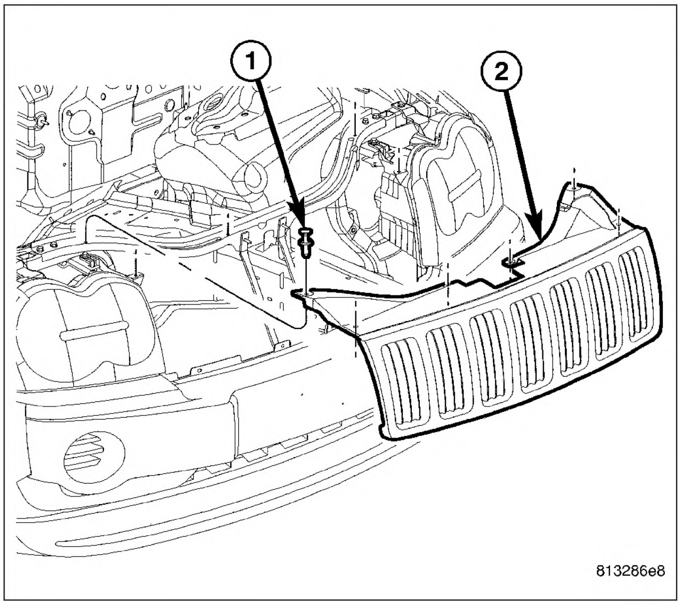
INSTALLATION

1. Tip grill and latch bottom of grill (2) to front facia.
2. Install the 6 upper mounting push pins (1).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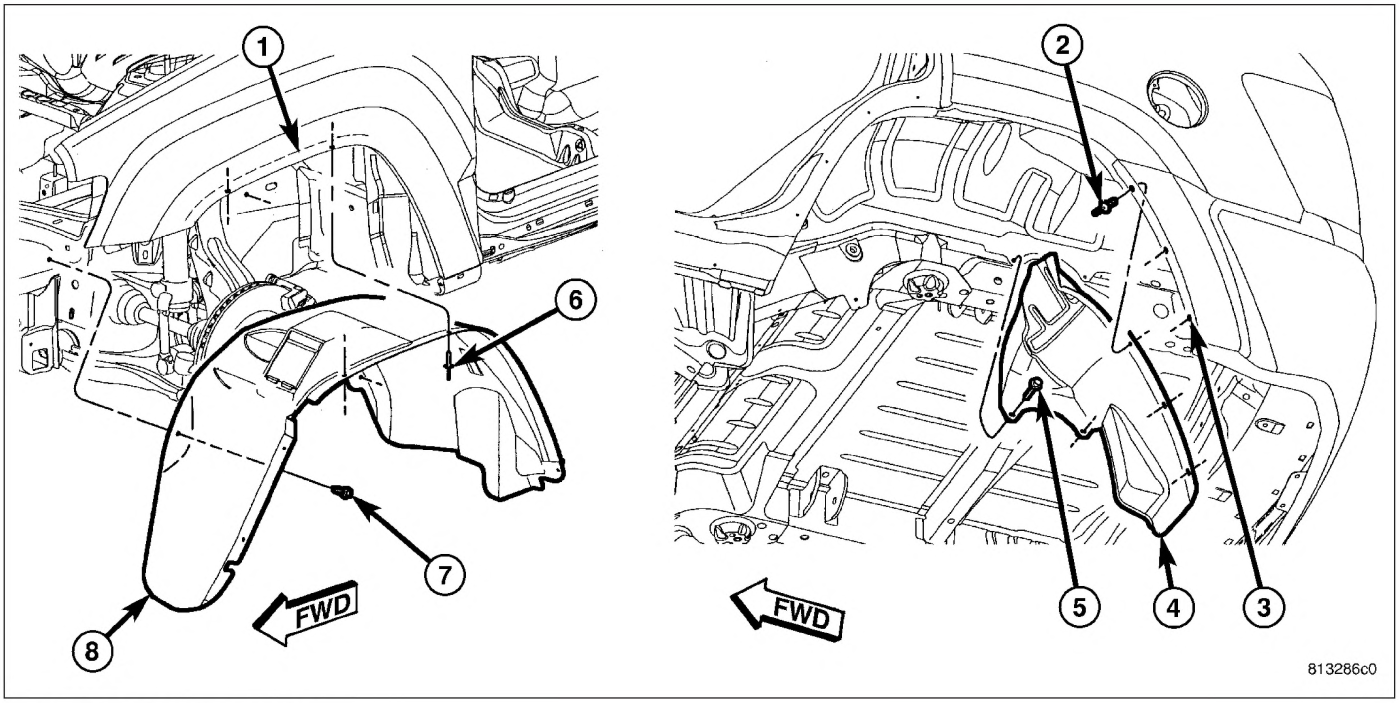
LINER-FENDER & QUARTER PANEL

REMOVAL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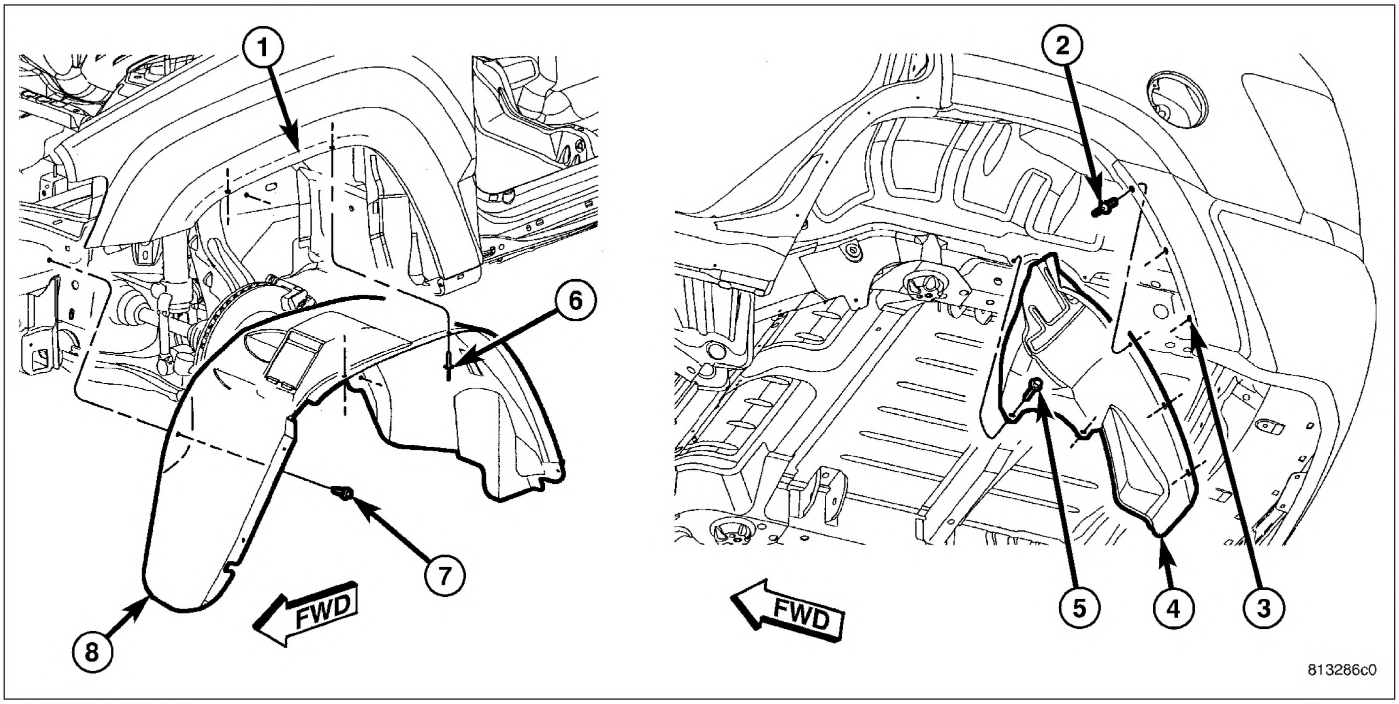
1. If required remove wheel.
2. Remove pushpins.
3. Drill out rivets.
4. Remove liner.

INSTALLATION

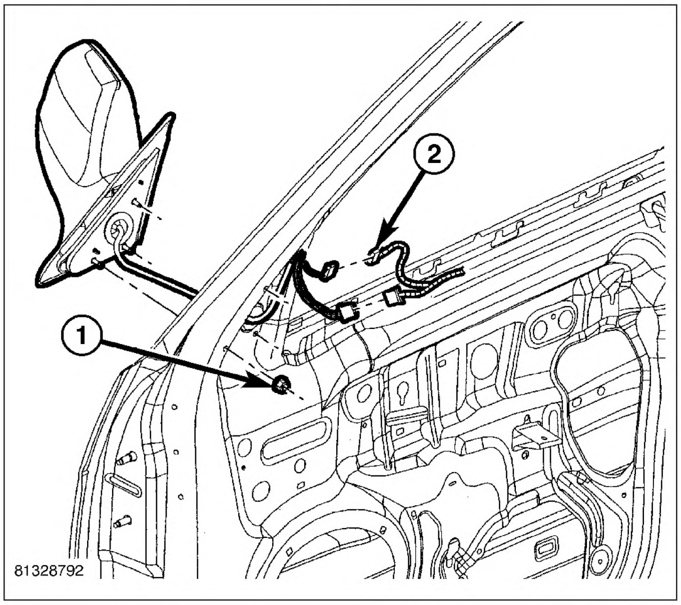


1. Install liner.
2. Install pushpins and rivets.
3. Install wheel if removed.

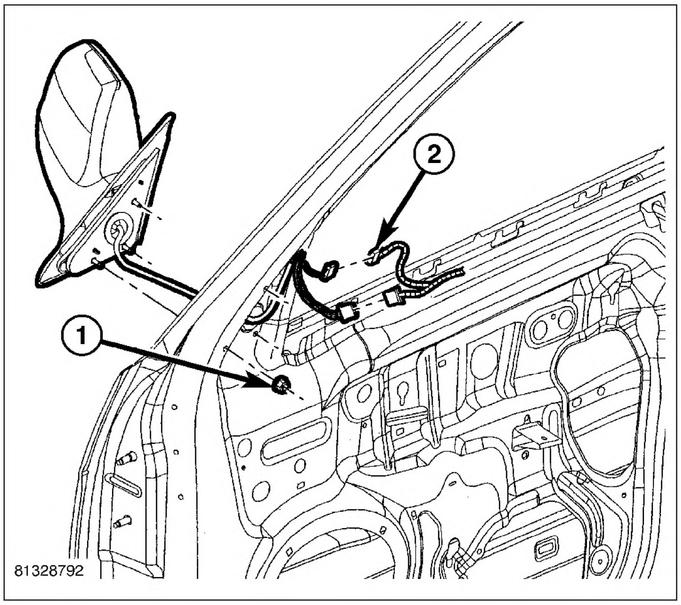
MIRROR-OUTSIDE REARVIEW

REMOVAL

1. Remove the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
2. Disconnect the wire harness connectors (2) from the mirror.
3. Remove the three nuts (1) that secure the mirror to the door and carefully remove the mirror.



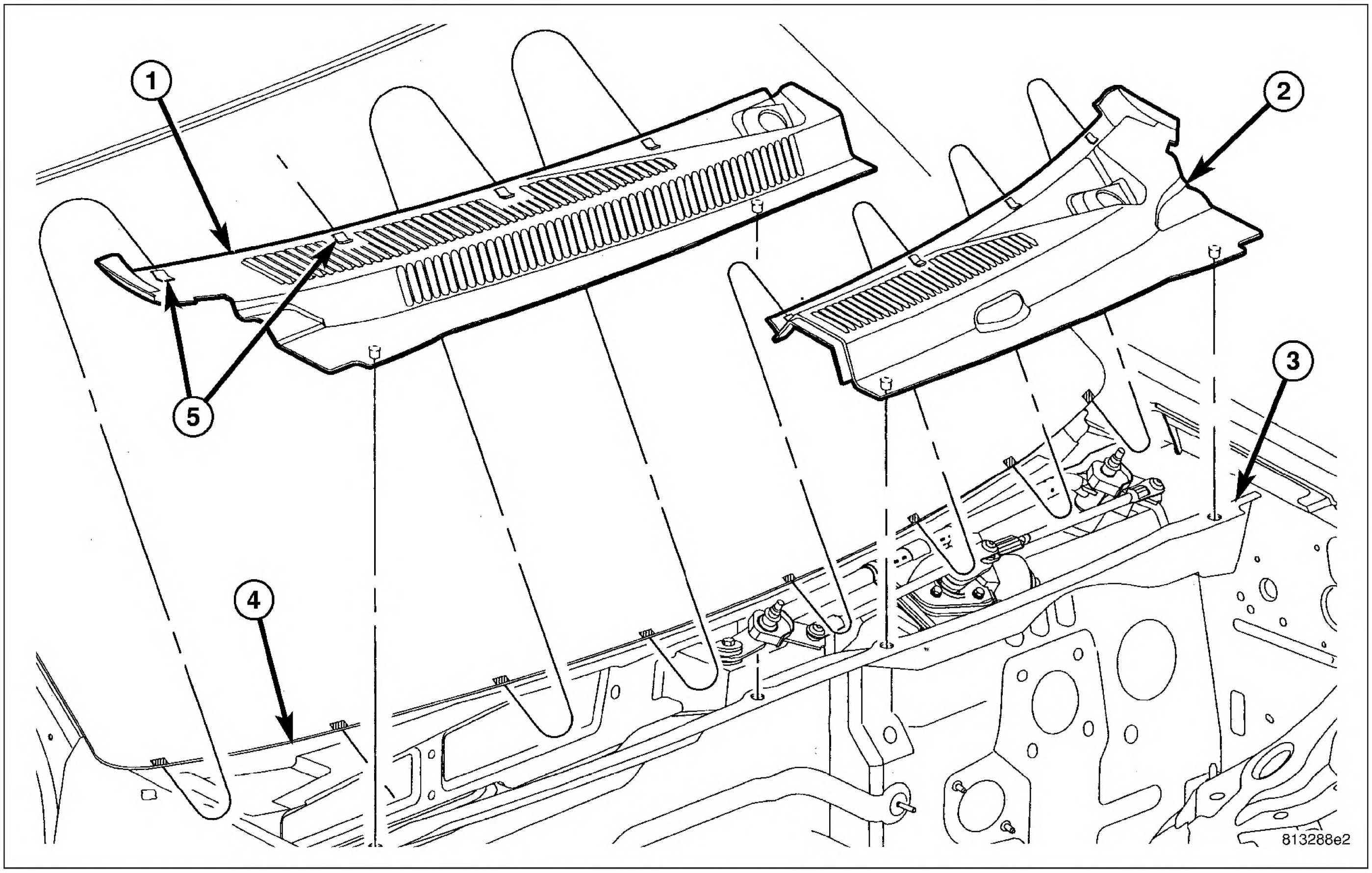
INSTALLATION



1. Position the mirror onto the door.
2. Install the three nuts (1) that secure the mirror to the door. Tighten the nuts to 7 N·m (60 in. lbs.).
3. Connect the wire harness connectors (2) to the mirror.
4. Install the door trim panel (Refer to 23 - BODY/ DOOR - FRONT/TRIM PANEL - INSTALLATION).

PANEL-COWL TOP

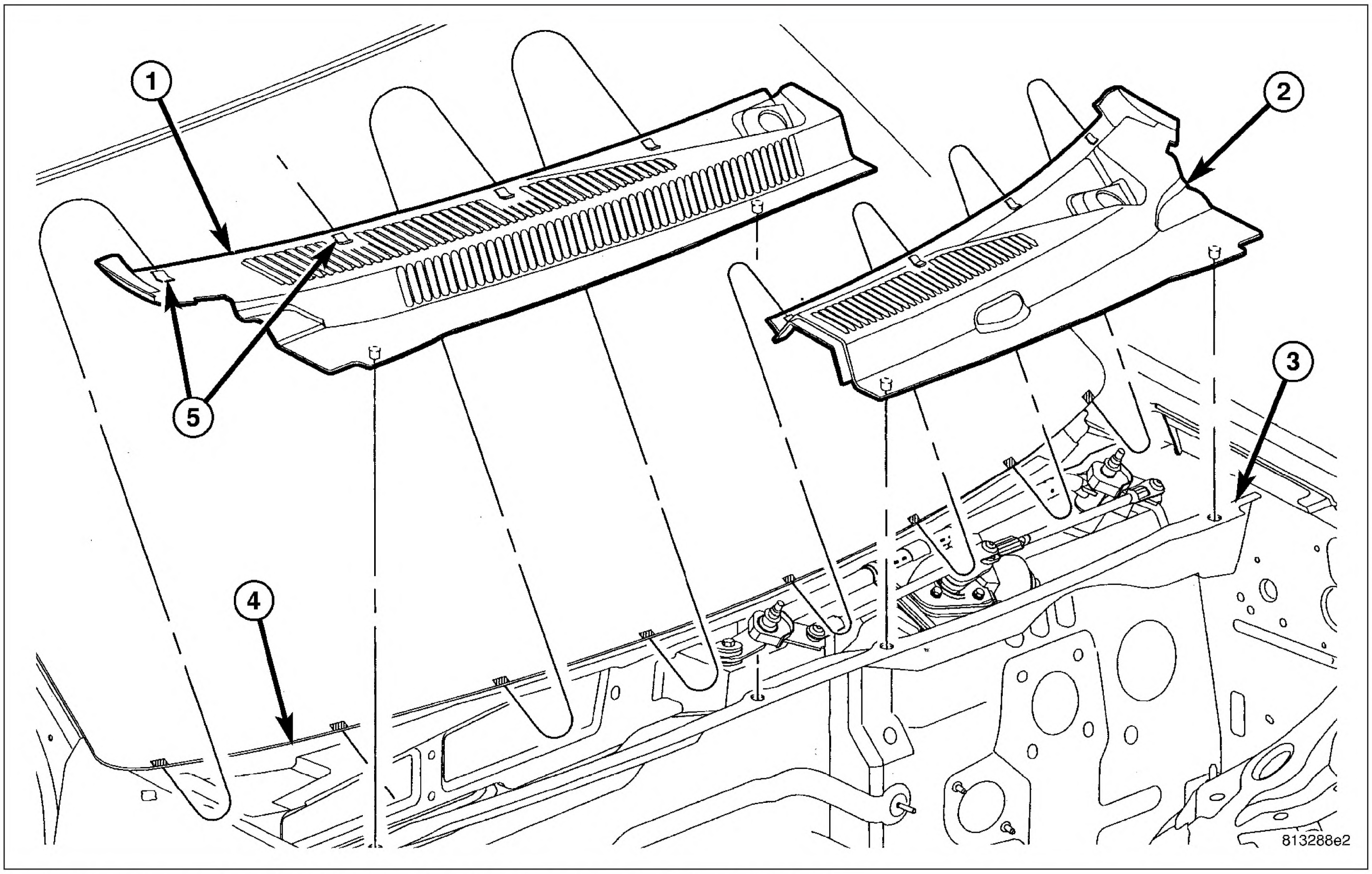
REMOVAL



1. Remove wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - REMOVAL)
2. Remove plenum seal.
3. Remove plastic push nuts attaching cowl cover to cowl.

4. Remove cowl cover from cowl.

INSTALLATION

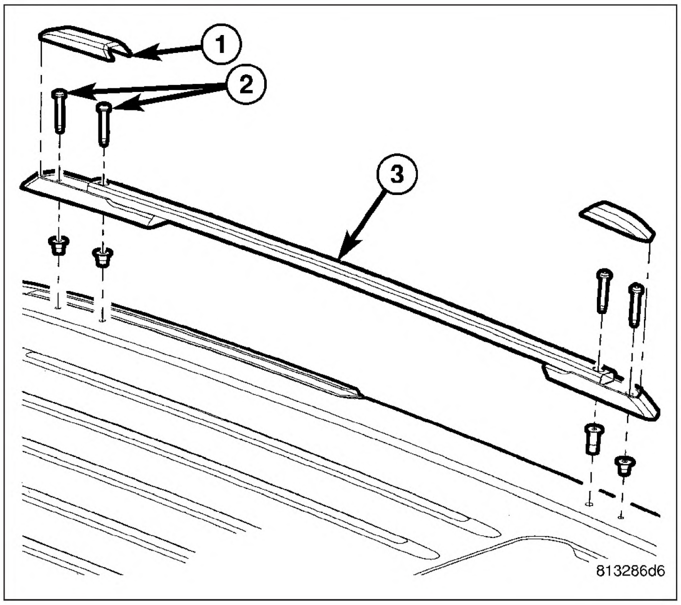


1. Install tabs under windshield and rubber seal on top of windshield.
2. Install locating panel pins into sheet metal.
3. Install rear hood seal and foam blocks.
4. Install wiper arms, (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION).

RACK-LUGGAGE

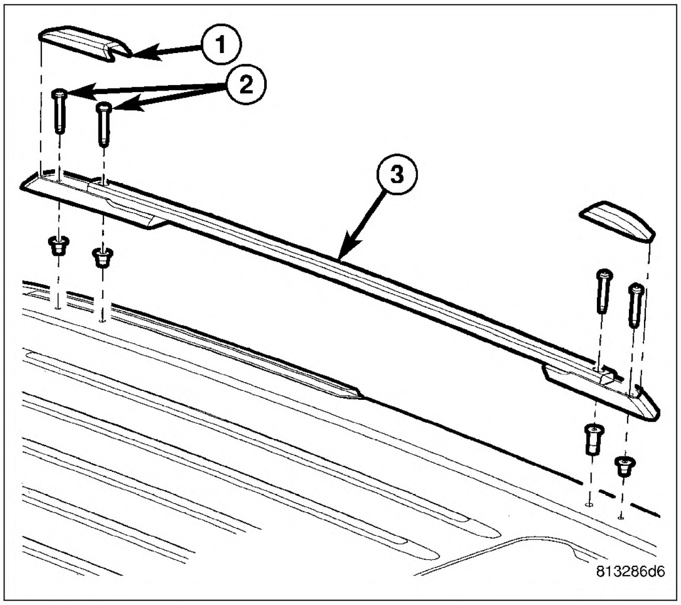
REMOVAL

1. Remove luggage rack end covers, pull straight up.
2. Remove the mounting bolts.
3. Remove luggage rack bars.



INSTALLATION

1. Locate luggage rack bar.
2. Install mounting bolts.
3. Tighten mounting bolts.
4. Install luggage rack bar covers.



HOOD

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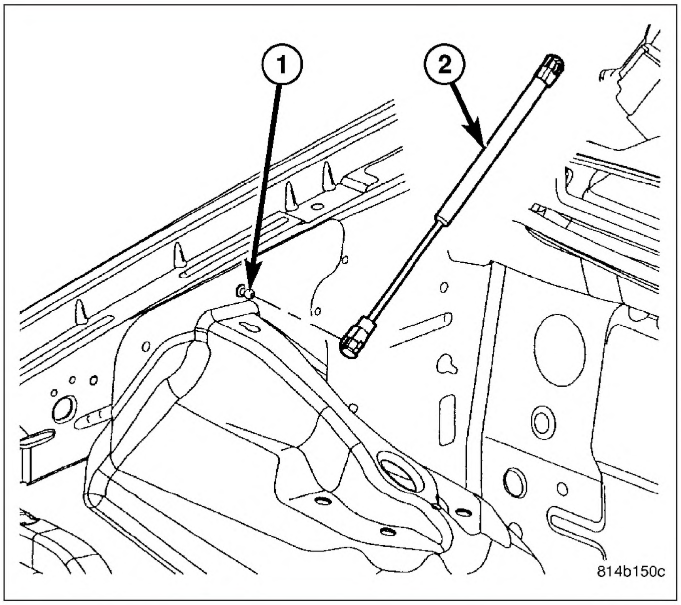
HINGE

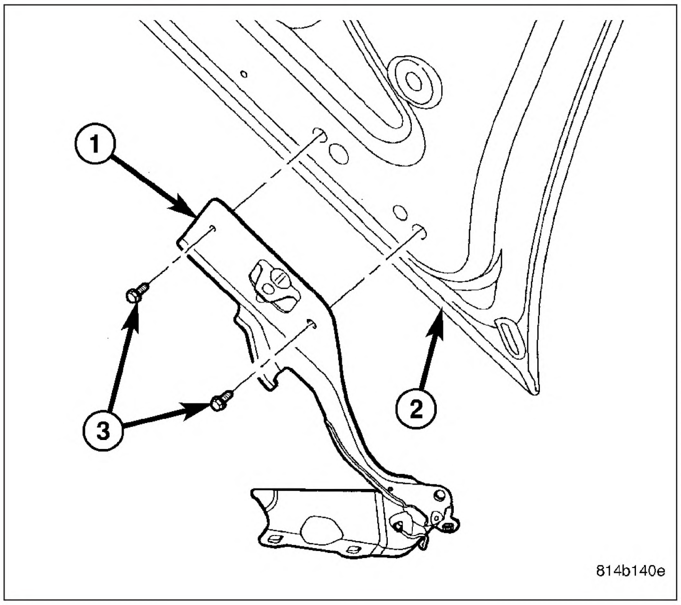
REMOVAL

NOTE: It is not necessary to remove the hood to replace the hood hinges. Hood hinges can be replaced one at a time.

1. Using a grease pencil or equivalent, mark the position of the hood hinge on the hood for the hinge being serviced.
2. Support the hood and disconnect the support cylinder (2) from the hood (Refer to 23 - BODY/HOOD/ SUPPORT CYLINDER - REMOVAL).



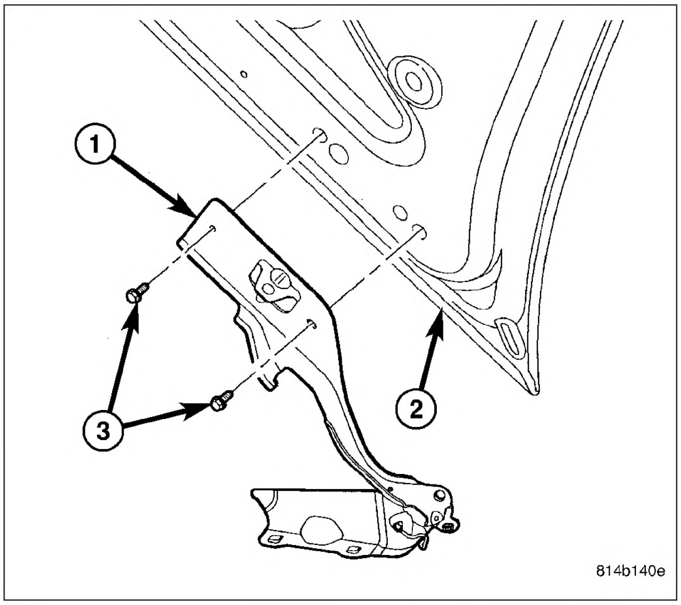
3. Remove the bolts (3) that secureto the hood hinge (1) to the hood (2)..
4. Remove the bolt that secures the hood hinge (1) to the front fender.



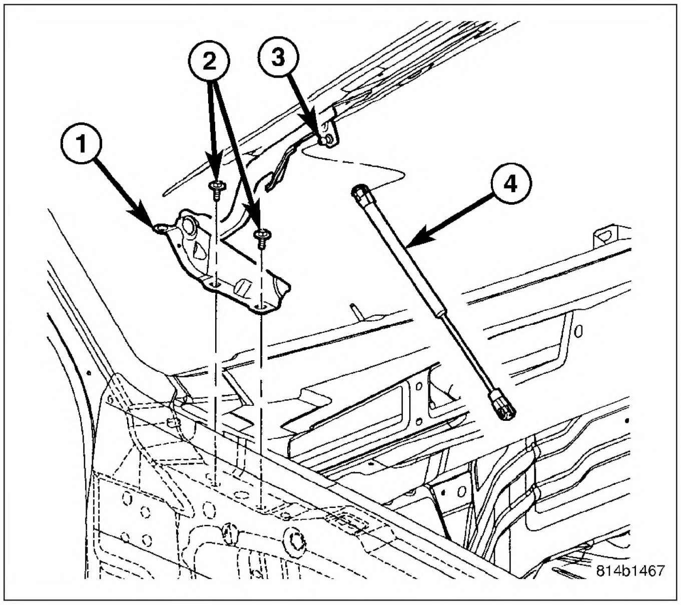
INSTALLATION

NOTE: It is not necessary to remove the hood to replace the hood hinges. Hood hinges can be replaced one at a time.

1. Position the hood hinge (1) onto the hood (2).
2. Align the hood to the hood hinge using the reference marks made during the removal procedure and Install the bolts (3) that secure the hood hinge to the hood (2). Tighten the bolts to 20 N·m (15 ft. lbs.).



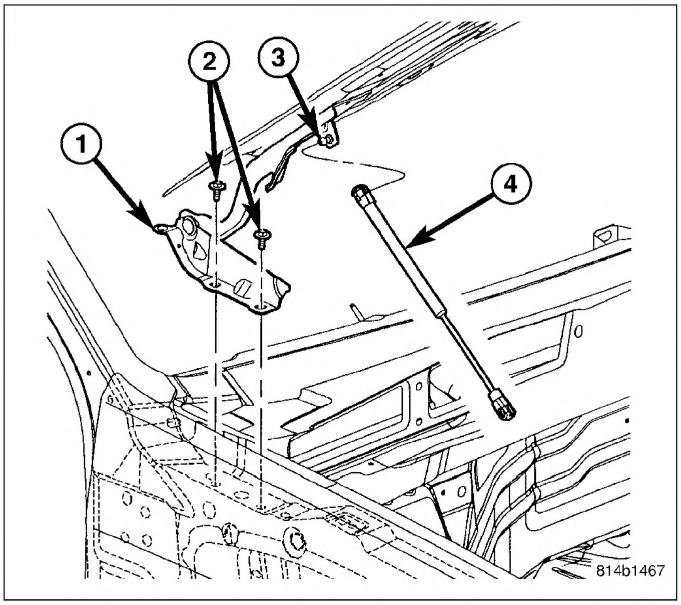
3. Install the bolts (2) that secures the hood hinge (1) to the fender rail. Tighten the bolt to 17 N·m (13 ft. lbs.).
4. Align the hood to the hood hinge using the reference marks made during the removal procedure and tighten the nuts to 23 N·m (17 ft. lbs.).
5. Install the support cylinder (4) (Refer to 23 - BODY/HOOD/SUPPORT CYLINDER - INSTALLATION).
6. If required, adjust the hood to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).



HOOD

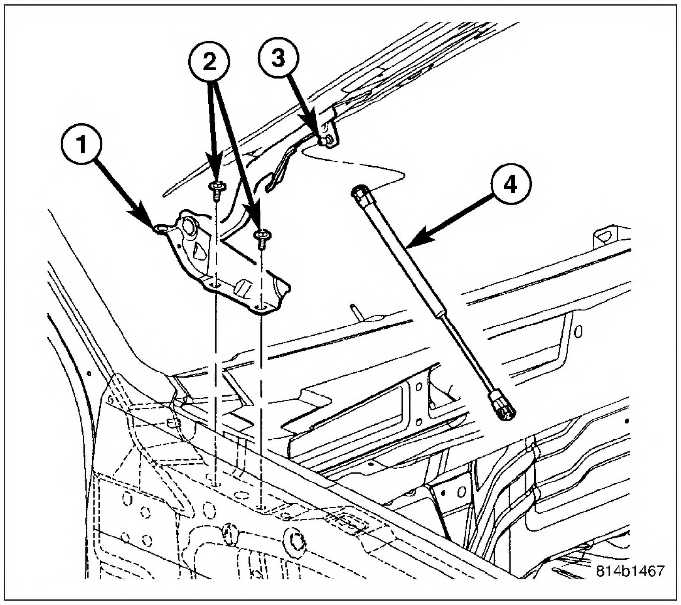
REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Remove the underhood lamp unit from the hood (1) (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/UNDERHOOD LAMP UNIT - REMOVAL).
3. Using a grease pencil or equivalent, mark the position of the hood hinges (1) on the hood.
4. Support the hood and disconnect the support cylinders (4) from the hood (Refer to 23 - BODY/HOOD/SUPPORT CYLINDER - REMOVAL).
5. Remove the two bolts that secure the hood to each hood hinge and remove the hood.



INSTALLATION

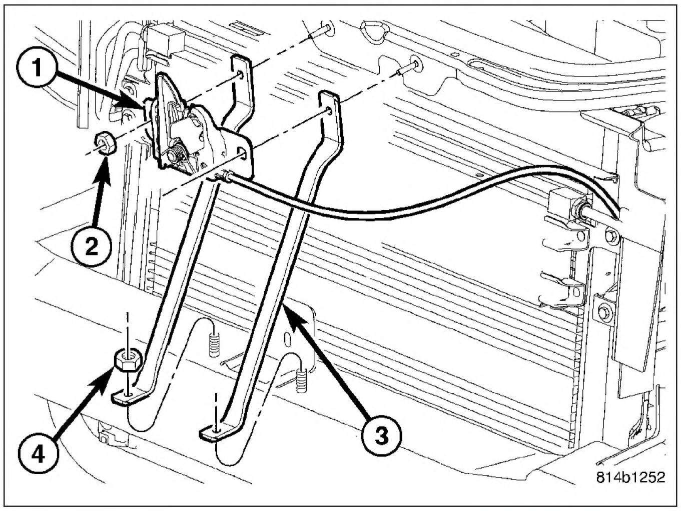
1. Position the hood onto the hood hinges (2) and loosely install the two nuts that secure the hood to each hood hinge (1).
2. Align the hood to the hood hinges (1) using the reference marks made during the Removal procedure and tighten the nuts to 23 N·m (17 ft. lbs.).
3. Install the support cylinders (4) to the hood (Refer to 23 - BODY/HOOD/SUPPORT CYLINDER - INSTALLATION).
4. Install the underhood lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/UNDERHOOD LAMP UNIT - INSTALLATION.
5. Reconnect the negative battery cable.
6. If required, adjust the hood to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).



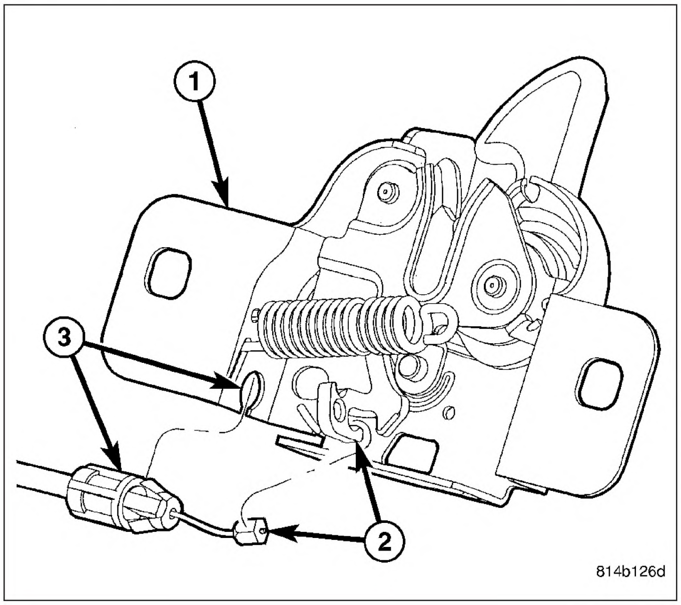
LATCH

REMOVAL

1. Using a grease pencil or equivalent, mark the position of the hood latch (1) on the upper radiator crossmember.
2. Remove the two bolts (2) that secure the hood latch (1) to the upper radiator crossmember.

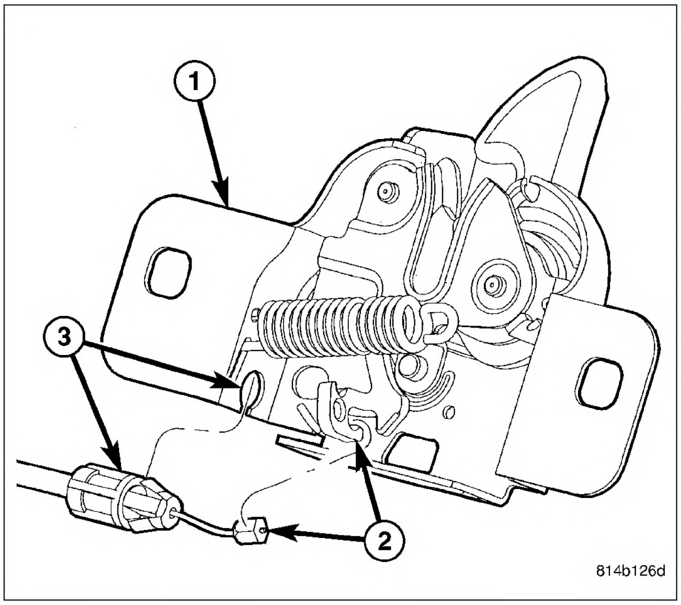


3. Disconnect the hood latch cable (2 and 3) from the hood latch (1).

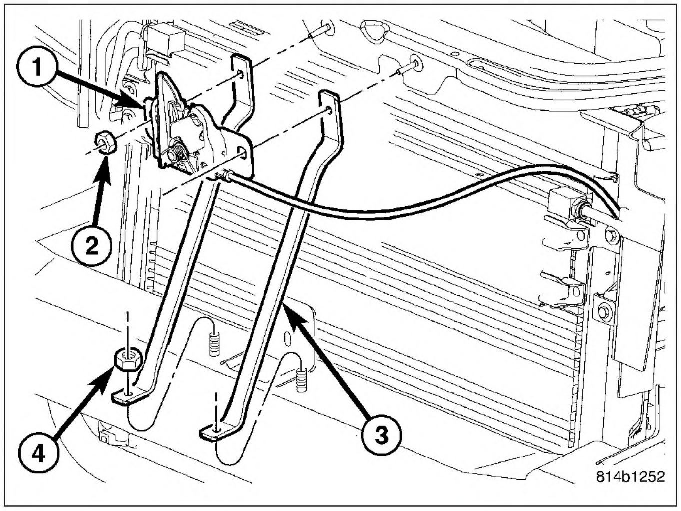


INSTALLATION

1. Connect the hood latch cable (2 and 3) to the hood latch (1).



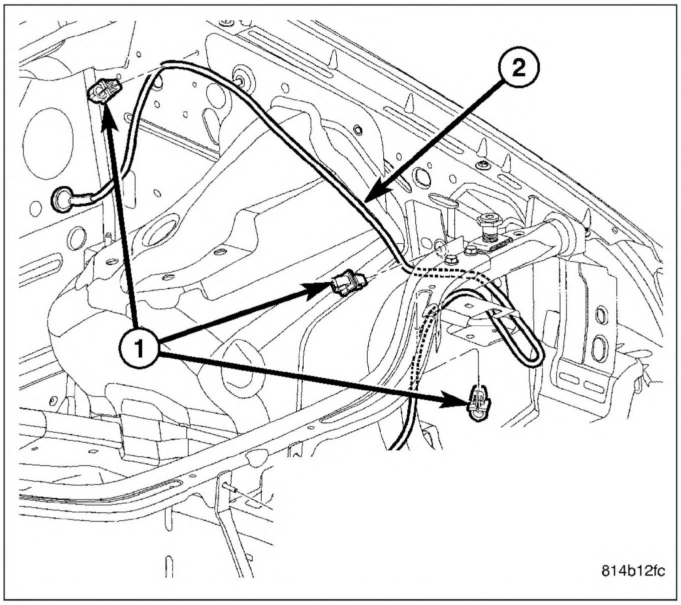
2. Position the hood latch (1) to the upper radiator crossmember and loosely install the two nuts (2) that secure the latch to the crossmember.
3. Align the hood latch (1) to the upper radiator crossmember using the reference marks made during the Removal procedure and tighten the bolts to 11 N·m (8 ft. lbs.).
4. If required, adjust the hood to the correct position (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).



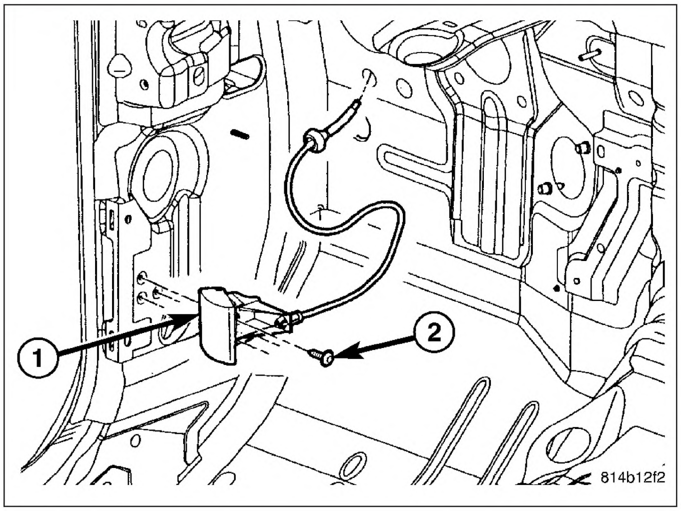
RELEASE-HOOD LATCH

REMOVAL

1. Remove the hood latch (Refer to 23 - BODY/ HOOD/LATCH - REMOVAL).
2. Remove release cable (2) from the three hood release cable retainers (1).

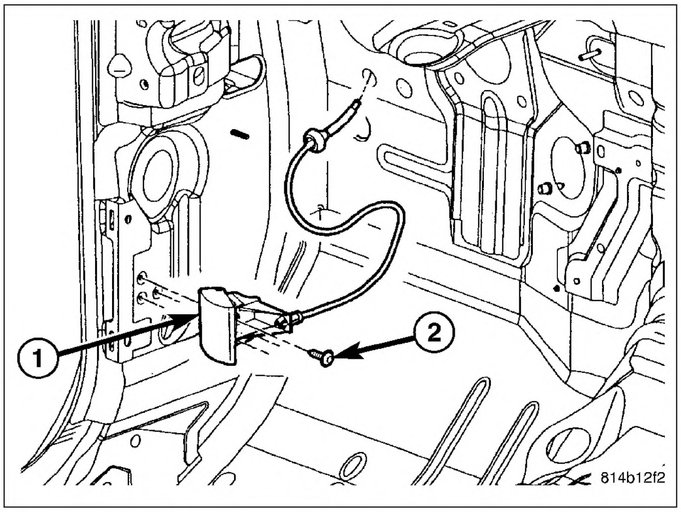


3. From inside the vehicle, remove the two bolts (2) that secure the hood release handle (1) to the cowl trim panel.
4. Remove the grommet from the cowl panel and remove the hood release cable and handle assembly (1).

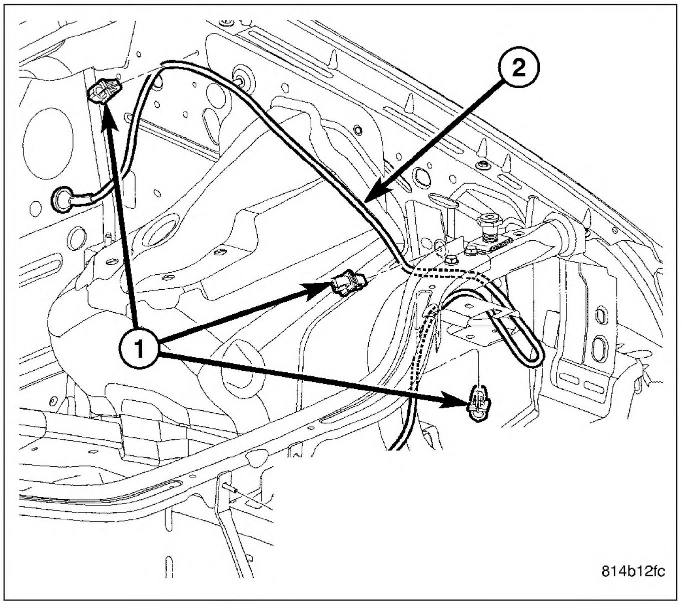


INSTALLATION

1. Route the hood release cable through the cowl panel and install the grommet.
2. Position the hood release handle (2) onto the cowl trim panel.
3. Install the two bolts (2) that secure the hood release handle (1) to the instrument panel bracket. Tighten the bolts to 9 N·m (80 in. lbs.).



4. Route the hood release cable (2) along the left inner fender and the upper radiator crossmember and install the three hood release cable retainers (1).
5. Install the hood latch (Refer to 23 - BODY/HOOD/ LATCH - INSTALLATION).

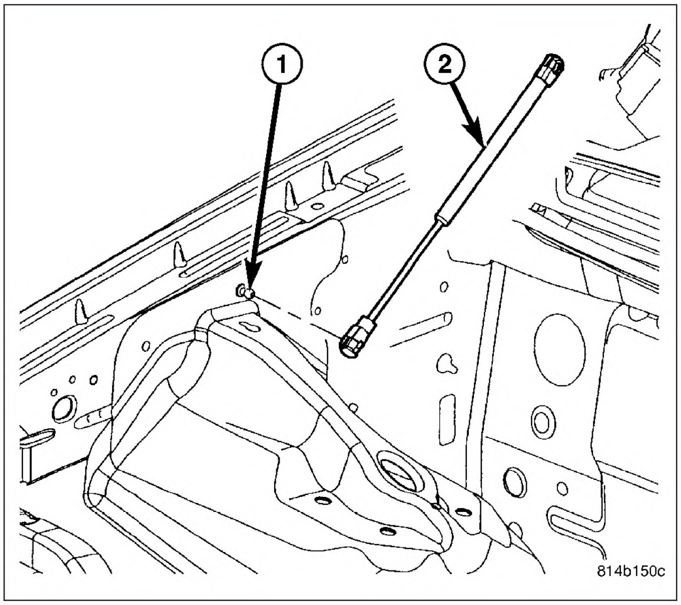


CYLINDER-HOOD SUPPORT

REMOVAL

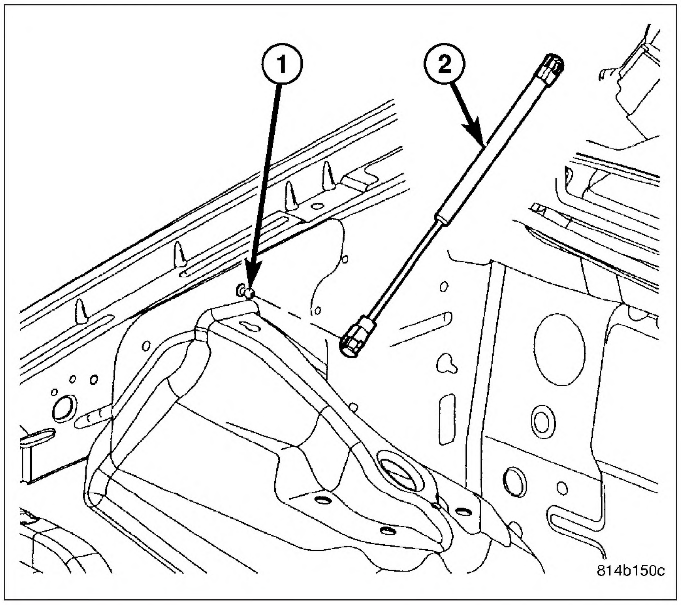
NOTE: Lift the clips only enough to release the ball studs (1).

1. Support hood.
2. Disconnect the hood support cylinder (2) from the hood and the ball stud (1) on the fender rail.
3. If required, remove the upper ball stud from hood and the lower ball stud (1) from the fender rail.



INSTALLATION

1. If removed, install the upper ball stud onto the hood and the lower ball stud (1) onto the fender rail. Install the ball studs securely.



CAUTION: Do not push on the hood support cylinders at the middle of the support cylinder during installation. Failure to follow this caution can result in damage to the hood support cylinders.

NOTE: Install the hood support cylinders with the cylinder end connected to the hood as shown.

NOTE: If required, only release each retaining clip enough to install the ball socket onto the ball stud.

2. Install the hood support cylinder (2) over the upper and lower ball studs (1) and fully engage the retaining clips.

INSTRUMENT PANEL

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INSTRUMENT PANEL

WARNING

RESTRAINT SYSTEM

WARNING: To avoid personal injury or death, during and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the daimlerchrysler mopar parts catalog.

WARNING: To avoid personal injury or death, on vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment.

WARNING: To avoid personal injury or death on vehicles equipped with airbags, before performing any welding operations disconnect and isolate the battery negative (ground) cable and disconnect all wire harness connectors from the airbag control module (acm). Failure to take the proper precautions could result in accidental airbag deployment and other possible damage to the supplemental restraint system circuits and components.

WARNING: To avoid personal injury or death, do not attempt to dismantle an airbag unit or tamper with its inflator. Do not puncture, incinerate, or bring into contact with electricity. Do not store at temperatures exceeding 93° c (200° f). An airbag inflator unit may contain sodium azide and potassium nitrate. These materials are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases (sodium hydroxide is formed in the presence of moisture) or combustible compounds. An airbag inflator unit may also contain a gas canister pressurized to over 2500 psi.

WARNING: To avoid personal injury or death, when handling a seat belt tensioner retractor, proper care should be exercised to keep fingers out from under the retractor cover and away from the seat belt webbing where it exits from the retractor cover.

WARNING: To avoid personal injury or death, replace all restraint system components only with parts specified in the daimlerchrysler mopar parts catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection.

WARNING: To avoid personal injury or death, the fasteners, screws, and bolts originally used for the restraint system components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the restraint system. Any time a new fastener is needed, replace it with the correct fasteners provided in the service package or specified in the daimlerchrysler mopar parts catalog.

WARNING: To avoid personal injury or death, when a steering column has an airbag unit attached, never place the column on the floor or any other surface with the steering wheel or airbag unit face down.

BEZEL-CENTER

REMOVAL

1. Using a trim stick C-4755 or equivalent, separate the clips and the center bezel.
2. Disconnect the electrical connectors.

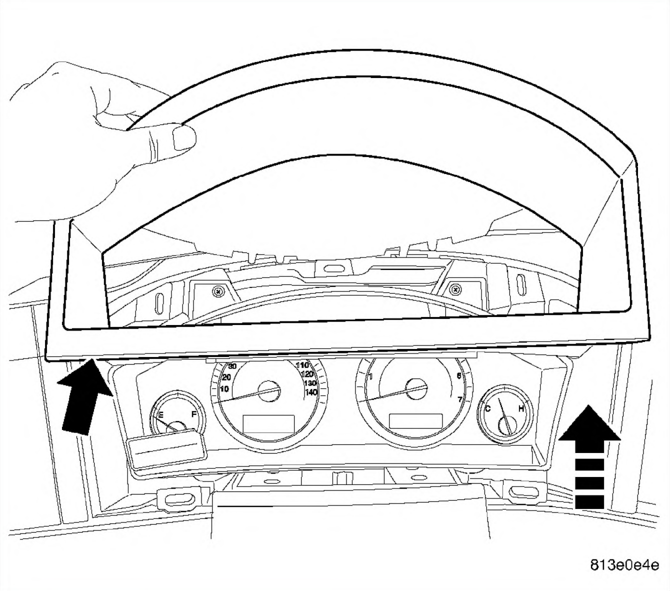
INSTALLATION

1. Connect all electrical connectors as necessary.
2. Position the center bezel in place and seat the clips fully.

BEZEL-CLUSTER

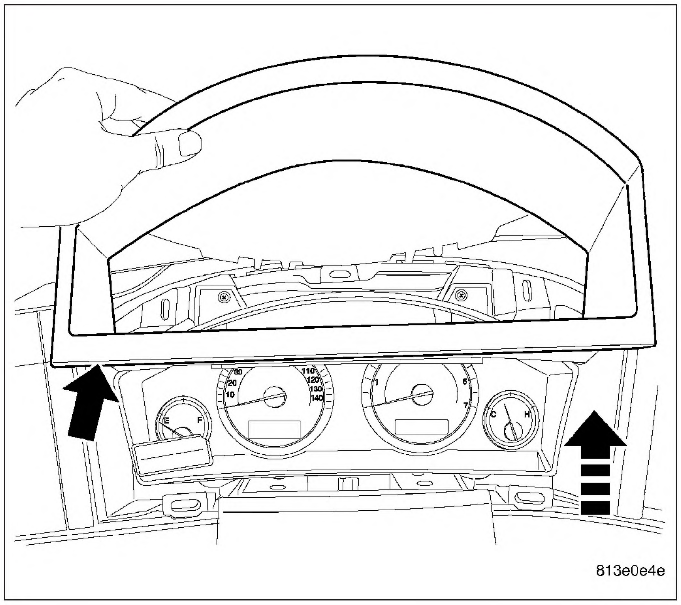
REMOVAL

1. Tilt the steering wheel down.
2. Grasp the upper edge of the cluster bezel and pull up and rearward.



INSTALLATION

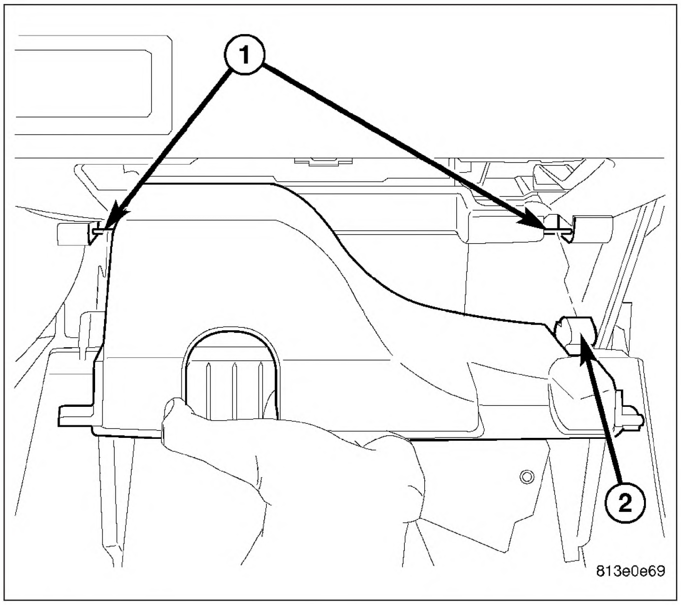
1. Align the cluster bezel over the slots and firmly press into place.



GLOVE BOX ASSEMBLY

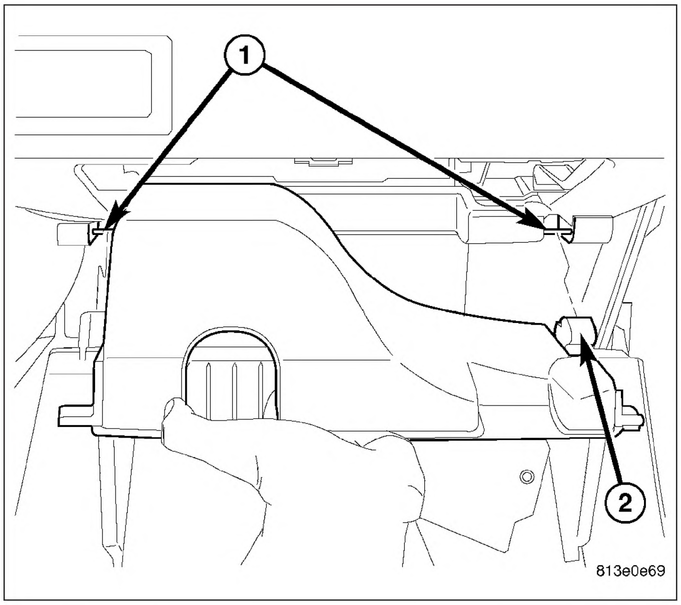
REMOVAL

1. Open the glove box and push the stop tabs down to drop the glove box out of the instrument panel.
2. Rotate the box down and release the door hinges (2) at the bottom and remove the glove box.



INSTALLATION

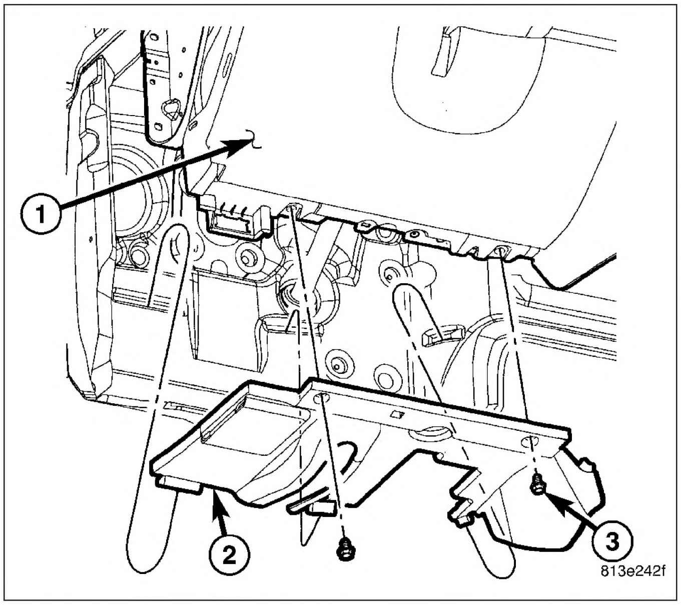
1. Snap the lower glove box hinges (2) over the pivots (1) and rotate up.
2. Push the stop tabs down and close the glove box.



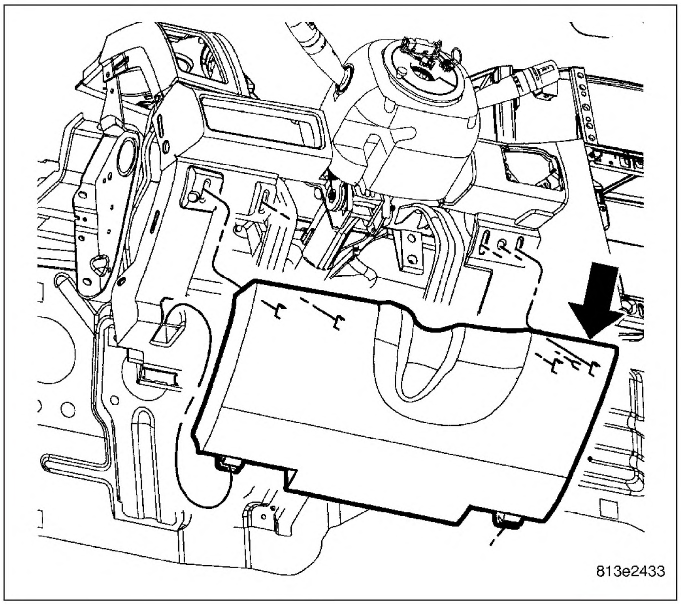
COVER-STEERING COLUMN OPENING

REMOVAL

1. Disconnect and isolate battery negative cable.
2. Remove the bolts (3) and remove the drivers side hush panel (2).

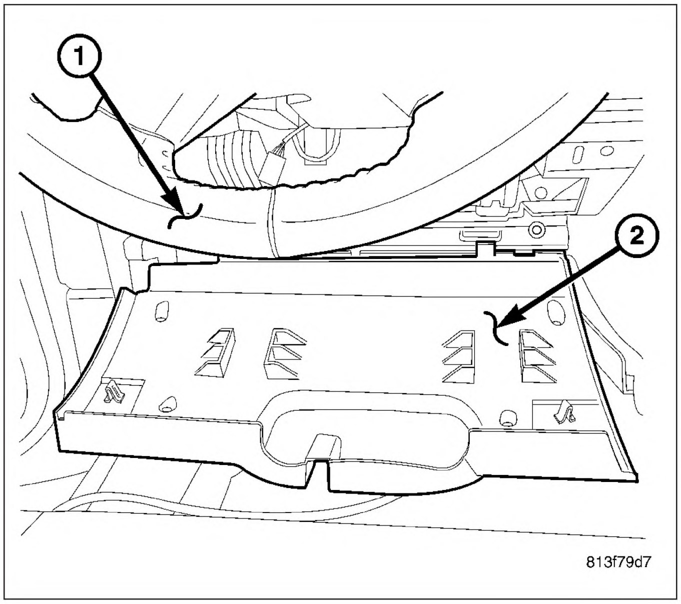


3. Using a trim stick C-4755 or equivalent, separate the upper clips and rotate the cover down and release the lower hinges at the bottom and remove the opening cover.

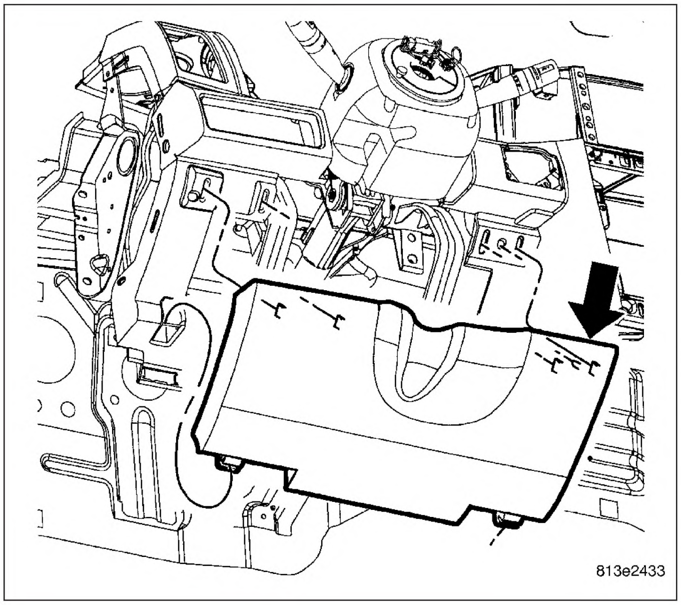


INSTALLATION

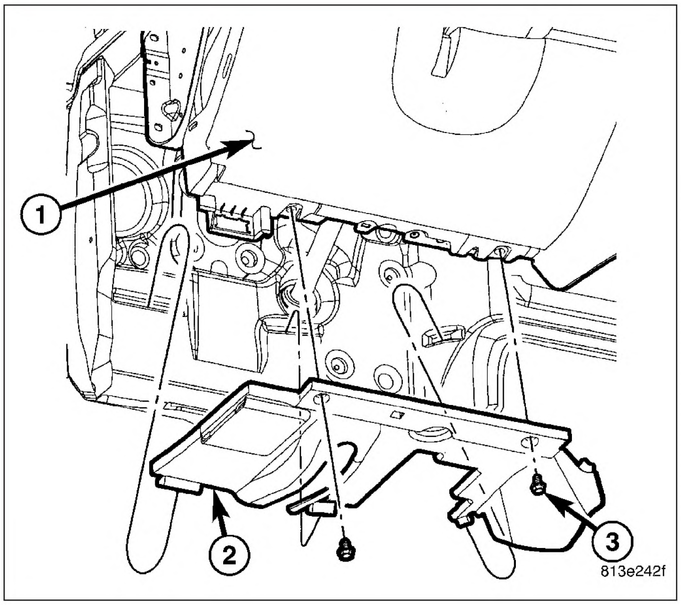
1. Snap the lower steering column opening cover hinges over the pivots and rotate up.



2. Seat the upper fastener clips fully.



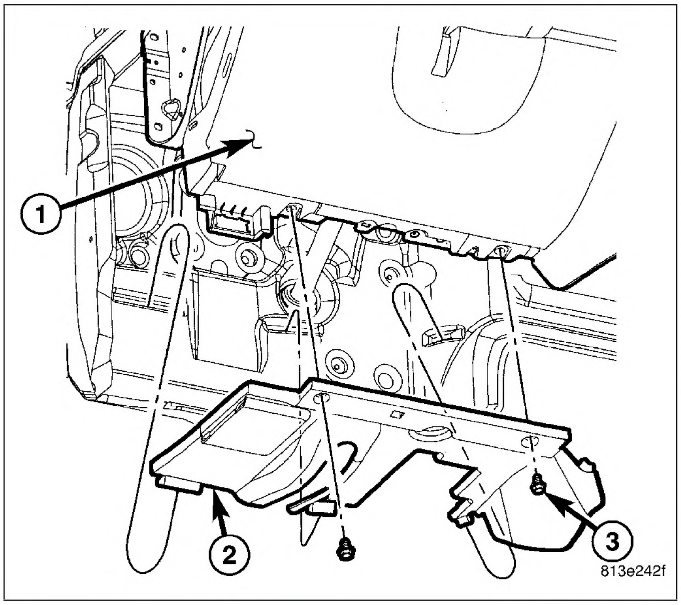
3. Install the hush panel (2) and install the screws (3).



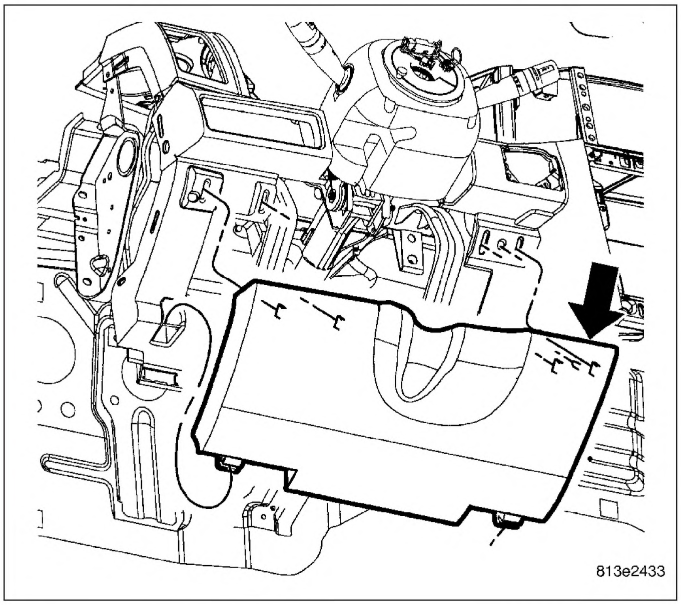
ASSEMBLY-INSTRUMENT PANEL

REMOVAL

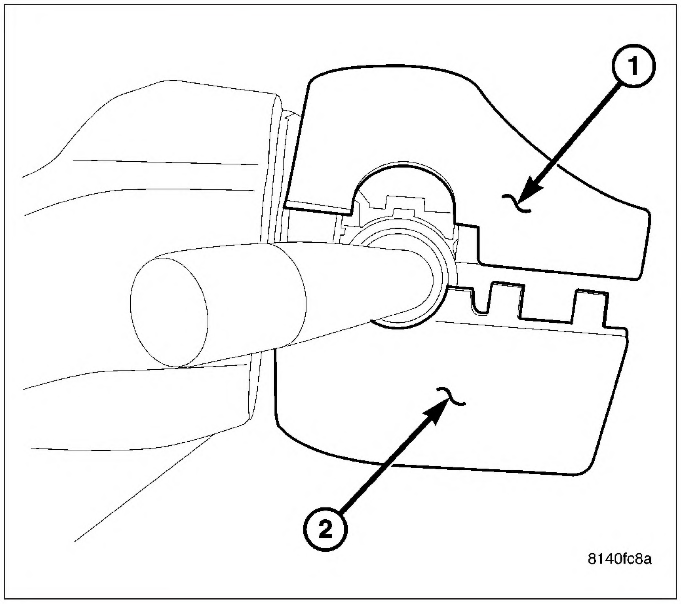
1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/INSTRUMENT PANEL - WARNING)
2. Disconnect and isolate battery negative cable.
3. Remove the bolts (3) and remove the drivers side hush panel (2).



4. Using a trim stick C-4755 or equivalent, separate the upper clips and rotate the cover down and release the lower hinges at the bottom and remove the opening cover.



WARNING: BEFORE SERVICING THE STEERING COLUMN THE AIRBAG SYSTEM MUST BE DISARMED. FAILURE TO DO SO MAY RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIRBAG AND POSSIBLE PERSONAL INJURY. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

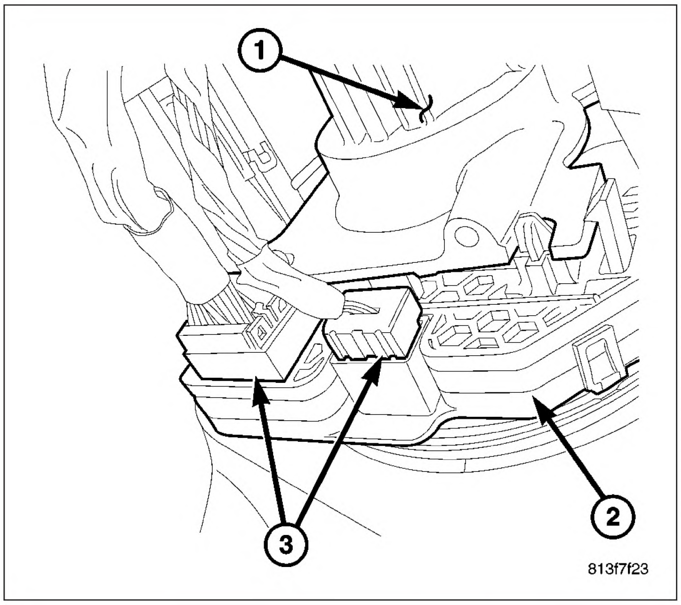


5. Remove the three bolts in the lower shroud (2).

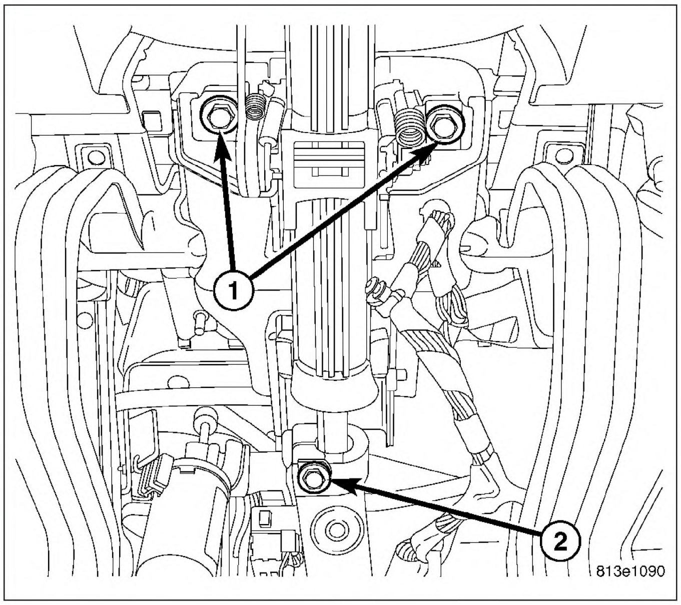
NOTE: Use care not to break off the tangs on the shrouds.

6. Then unsnap the lower shroud (2) from the upper shroud (1).

7. Disconnect the steering column electrical connectors (3).



8. Remove the pinch bolt (2).
9. Remove the column support bolts (1).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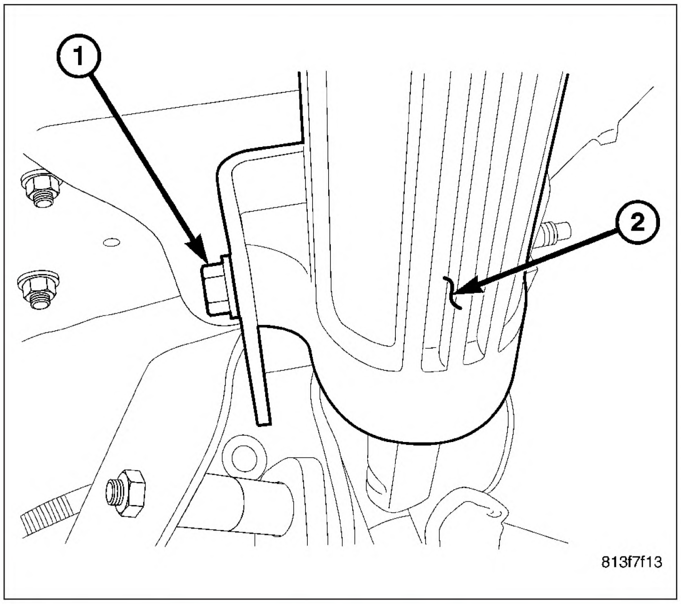
10. Remove the column cross bolt (1) and slide the column (2) downward off the bracket and remove the steering column.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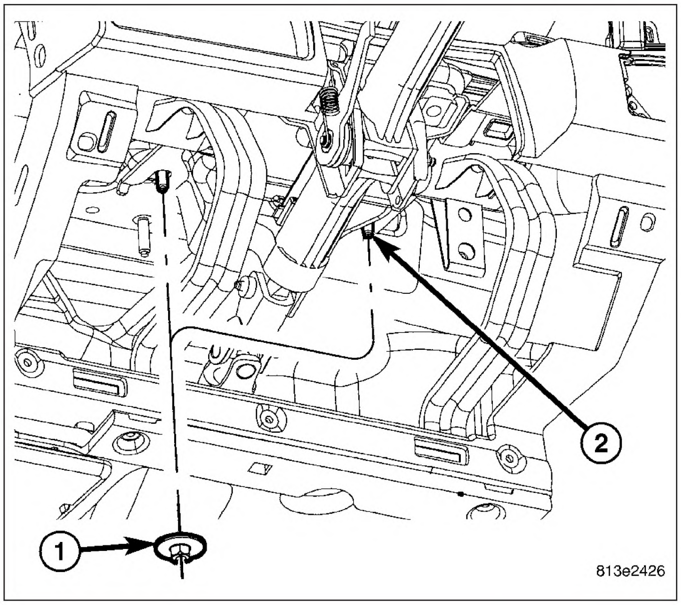
11. Remove the nuts (1) attaching the instrument panel to the pedal support bracket.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1
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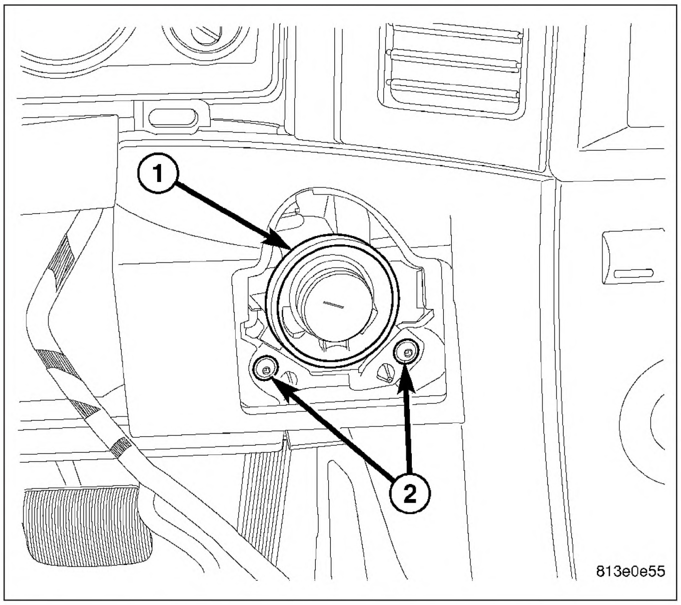
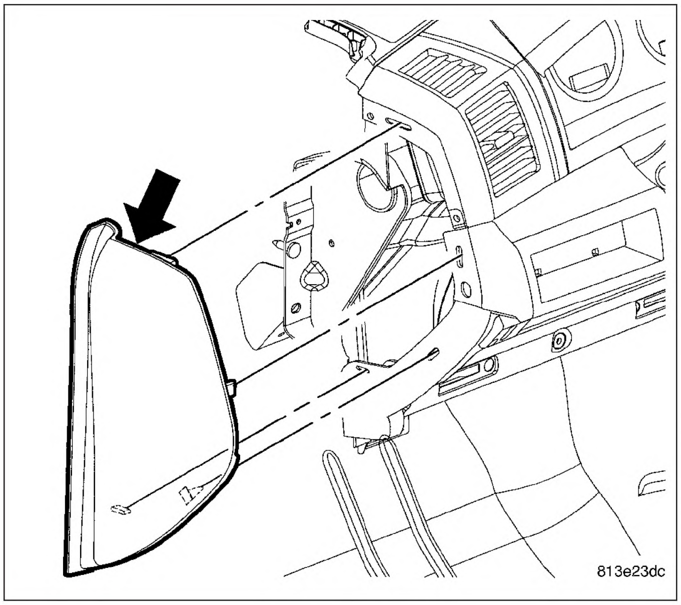
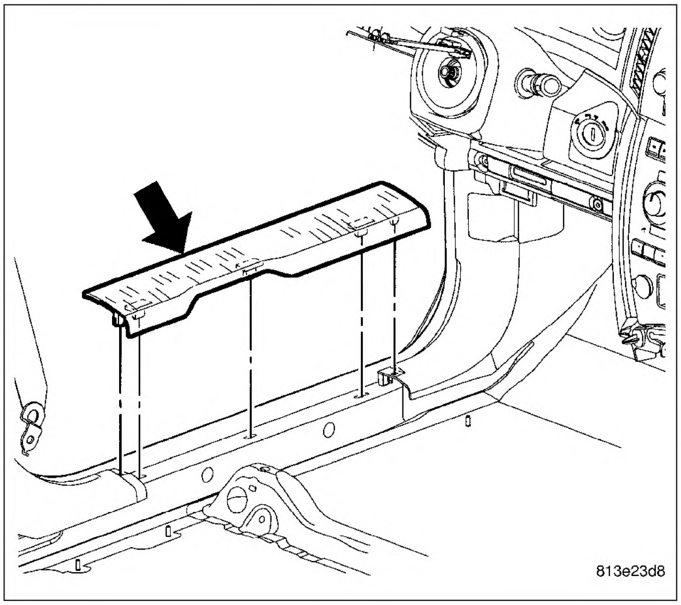
12. Using a trim stick C-4755 or equivalent, remove the ignition cylinder bezel.
13. Remove the screws (2) and remove the ignition cylinder (1).
14. Disconnect the electrical connector.



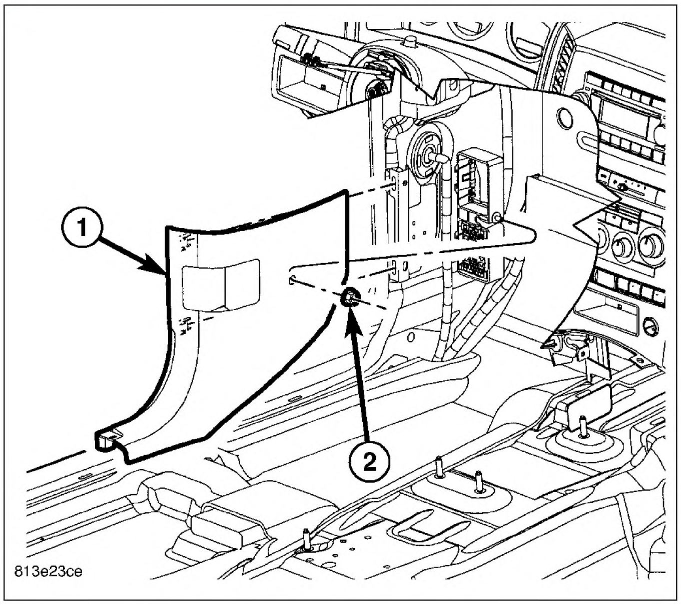
15. Using a trim stick C-4755 or equivalent, remove the left side cover.



16. Remove the left side door sill trim.



17. Remove the drivers side cowl trim panel.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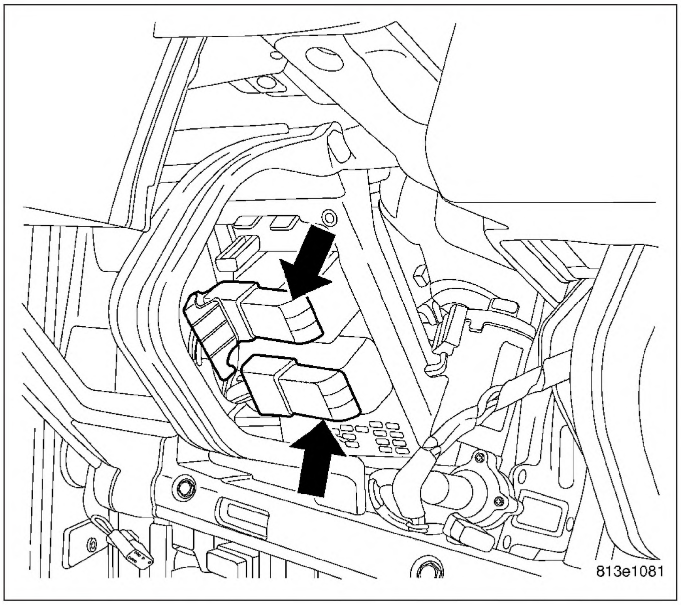
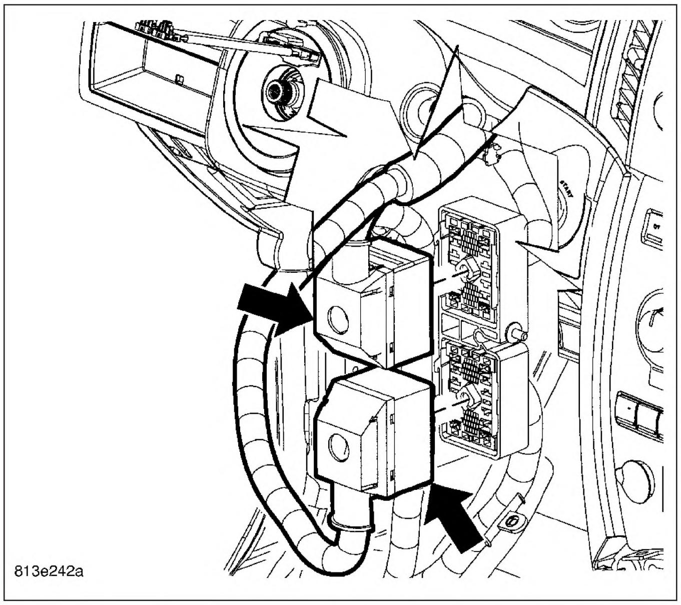
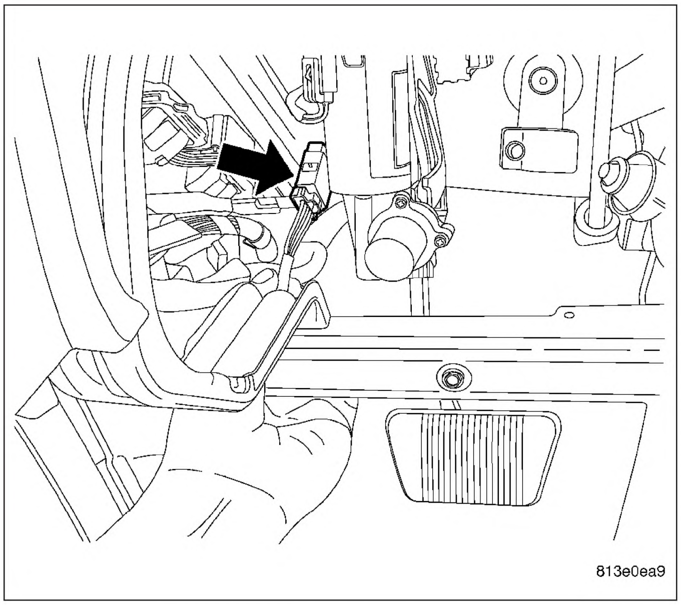
18. Disconnect the electrical connectors.



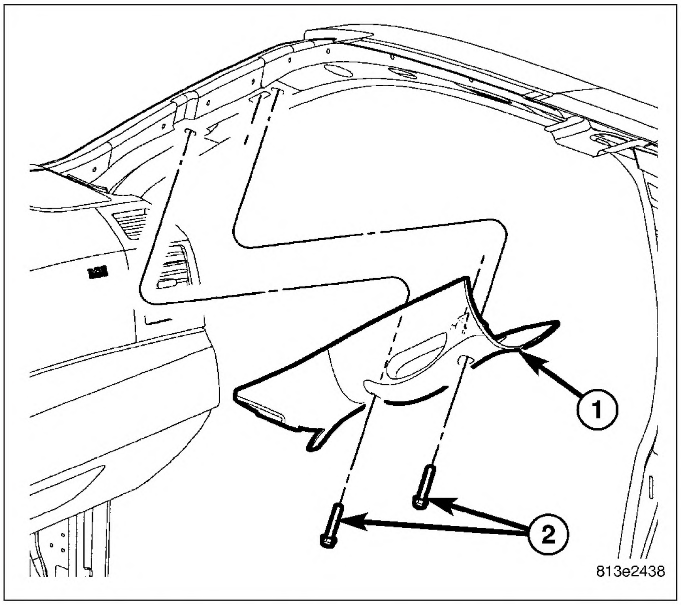
19. Disconnect the electrical connectors.



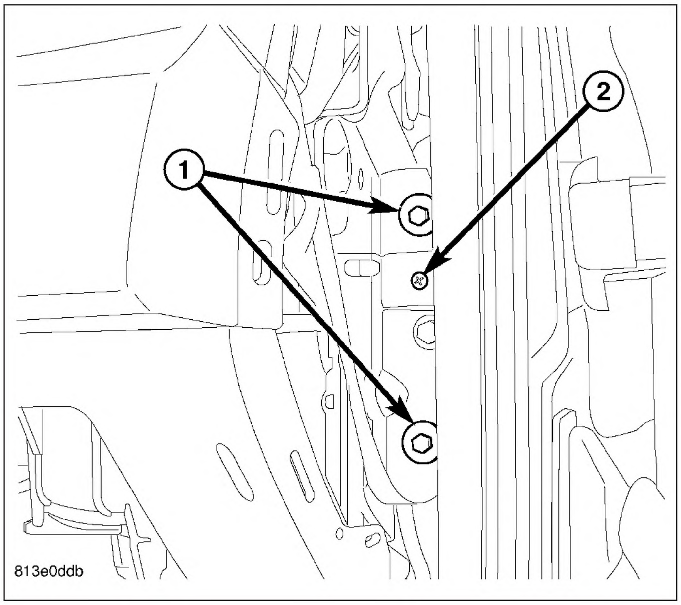
20. Remove the bolts and disconnect the ground wires within the steering column opening to the left of the steering column.
21. Disconnect the white adjustable pedal electrical connector.



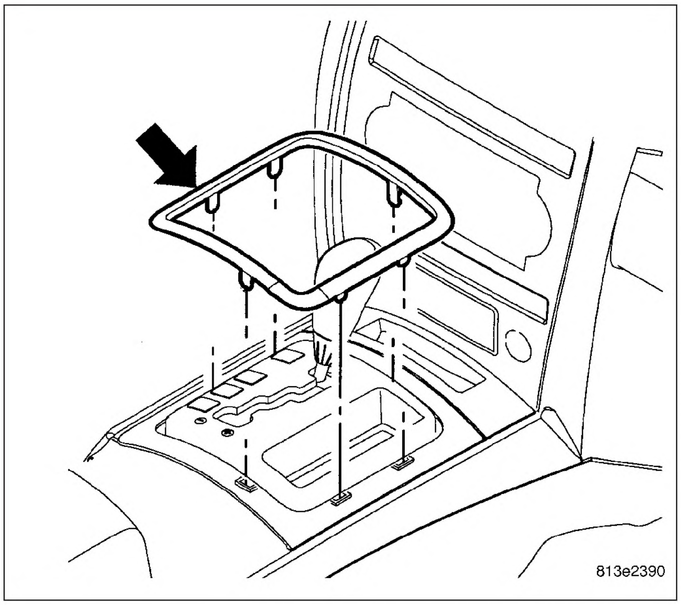
22. Remove the bolts (2) and remove the left a-pillar trim.* Right side shown, left side similar.



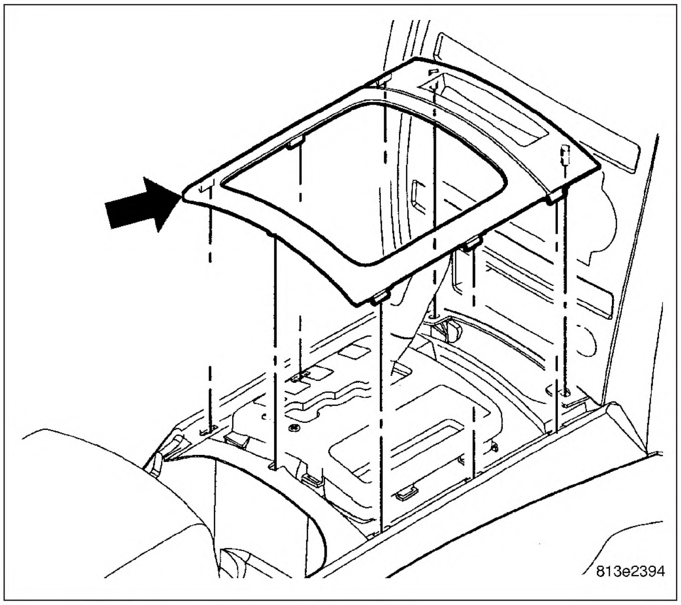
23. Remove the two left side bolts and one screw at the a-pillar support.* Right side shown, left side similar.



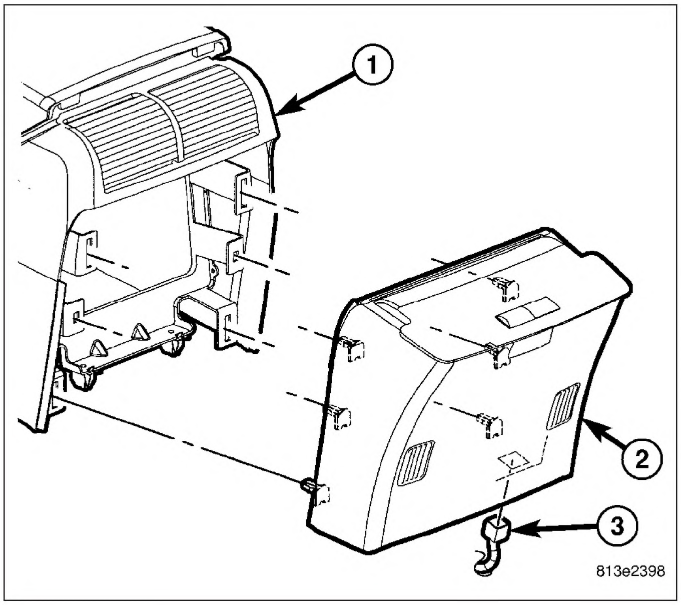
24. Using a trim stick C-4755 or equivalent, remove the shifter bezel ring.



25. Using a trim stick C-4755 or equivalent, remove the shifter bezel.



26. Remove the center console back cover (2) and disconnect the electrical connector (3).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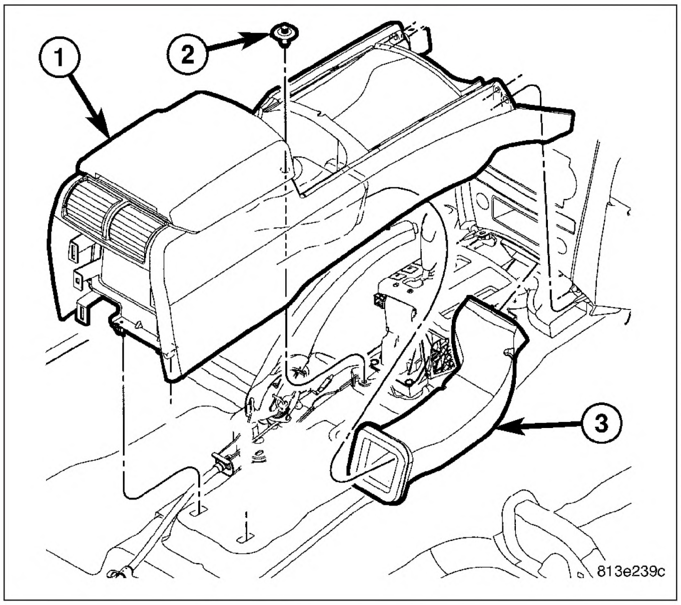
27. Remove the screws (2) and remove the console (1).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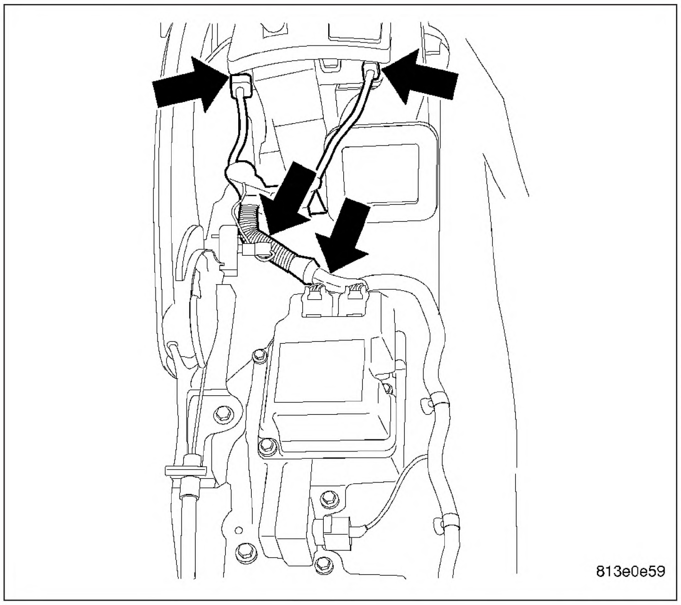
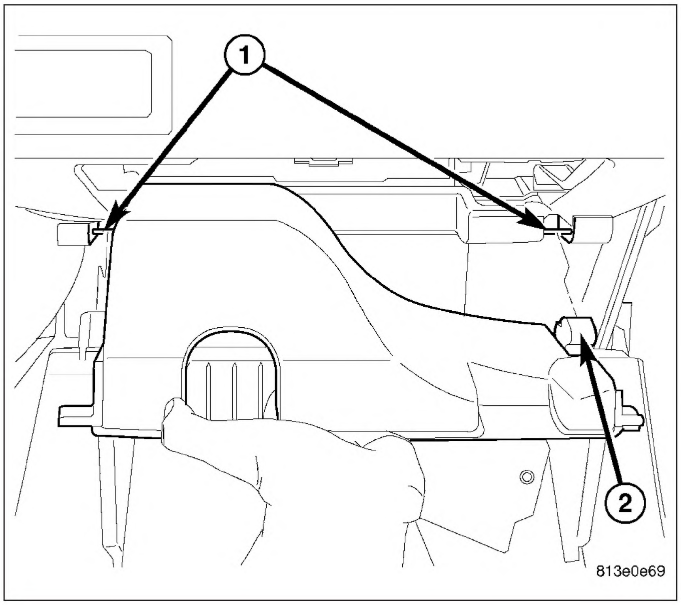
28. Disconnect the electrical connectors under the console.



29. Open the glove box and push the stop tabs down to drop the glove box out of the instrument panel.
30. Rotate the box down and release the door hinges (2) at the bottom and remove the glove box.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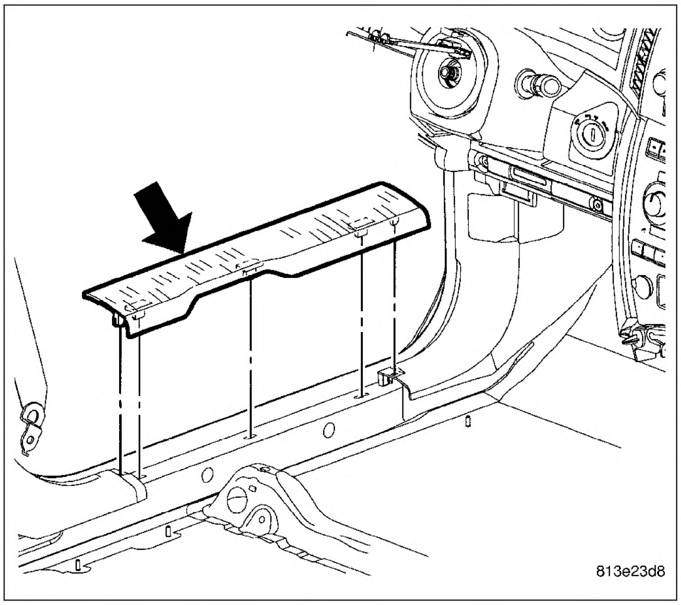
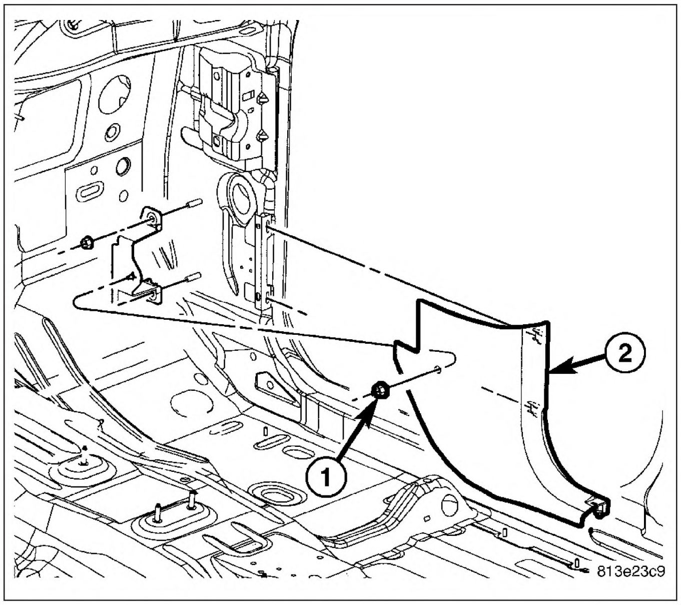
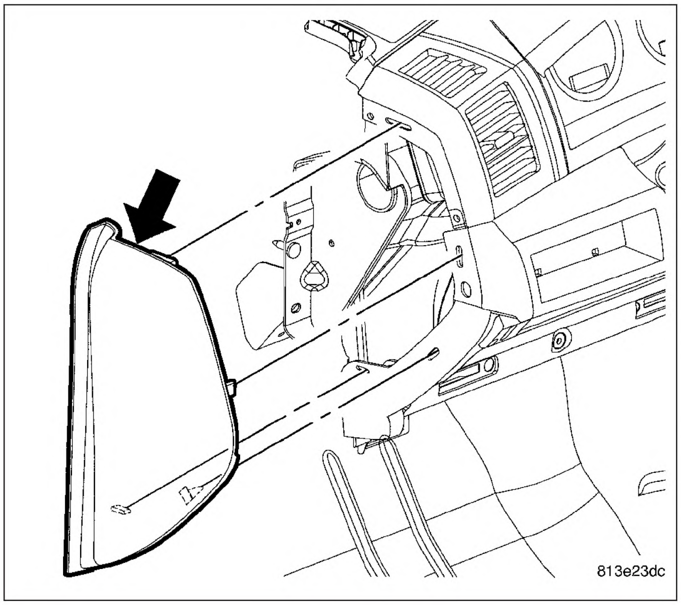
31. Remove the passenger side hush panel.
32. Remove the right side door sill trim.* Left side door sill trim shown, right side similar.



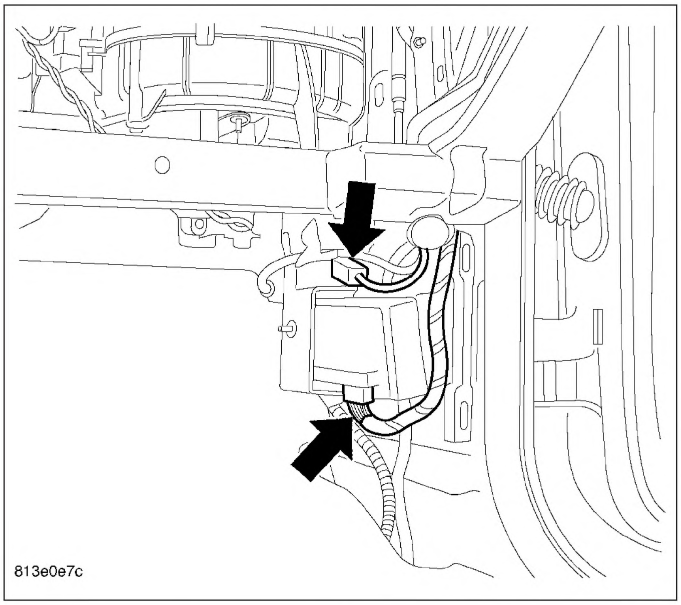
33. Remove the nut (1), separate the right cowl trim panel and remove.



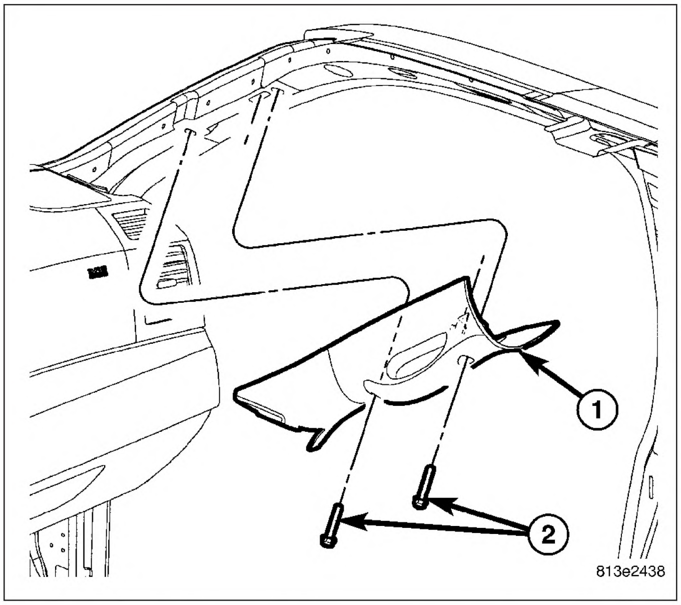
34. Remove the right side end cap.* Left side end cap shown, right side similar.



35. Disconnect the electrical connectors.



36. Remove the bolts and remove the right a-pillar trim panel.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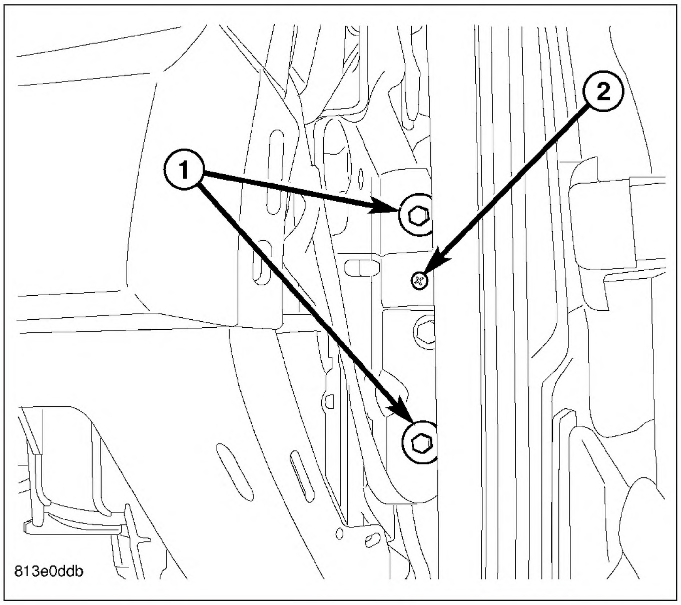
37. Remove the two right side bolts and one screw at the a-pillar support.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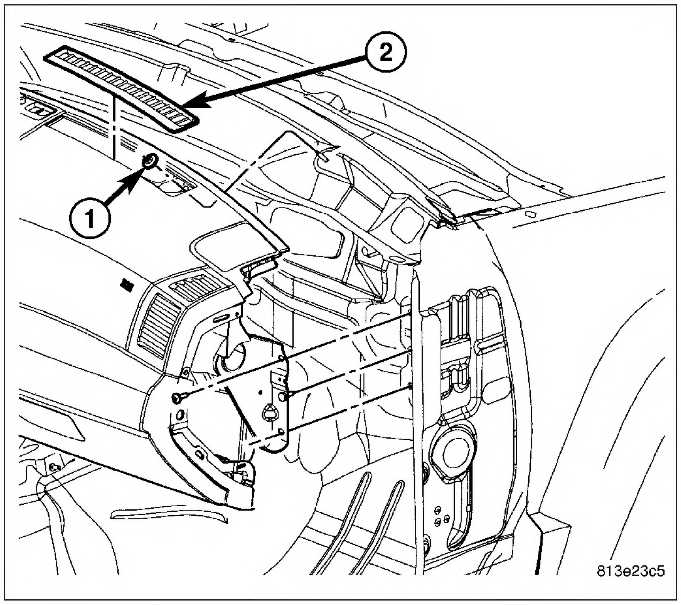
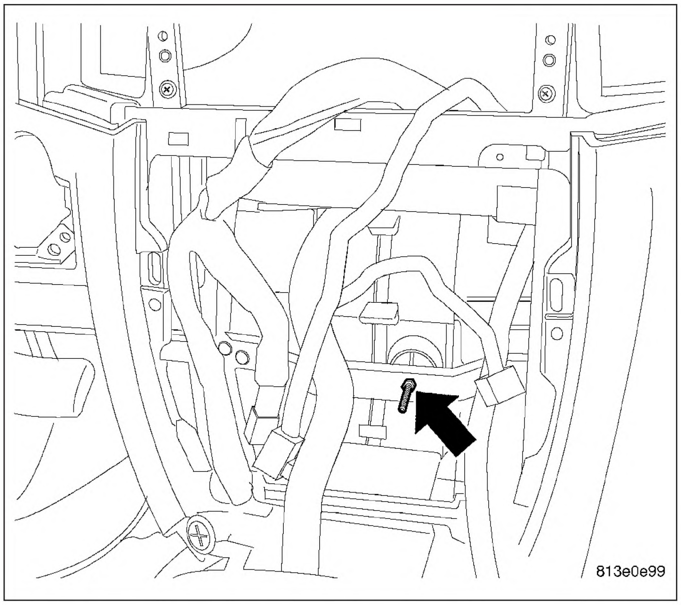
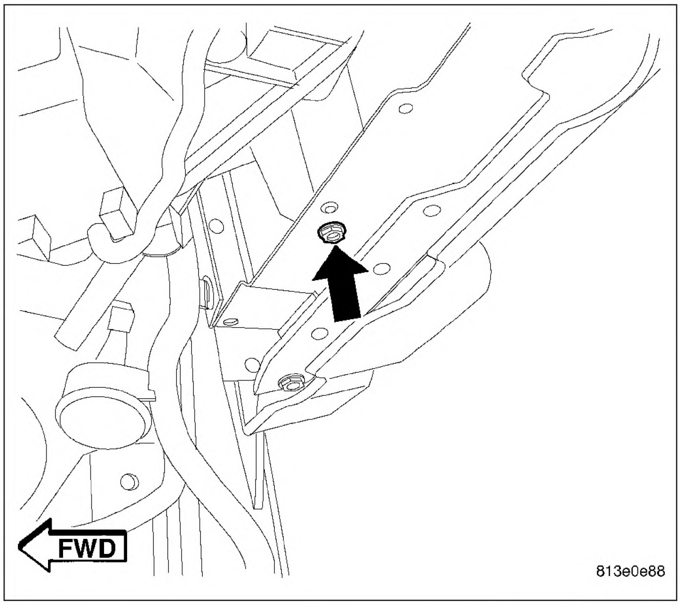
38. Using a trim stick C-4755 or equivalent, remove the defroster grills (2).
39. Remove the two fenceline nuts (1).



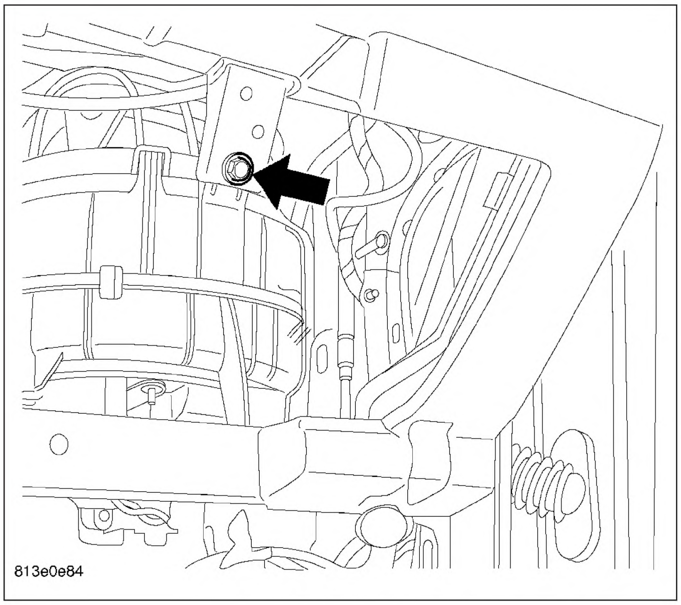
40. Using a trim stick C-4755 or equivalent, remove the radio bezel.
41. Using a trim stick C-4755 or equivalent, remove the center bezel and disconnect the electrical connectors.
42. Remove the nut from the HVAC support stud behind the center bezel.



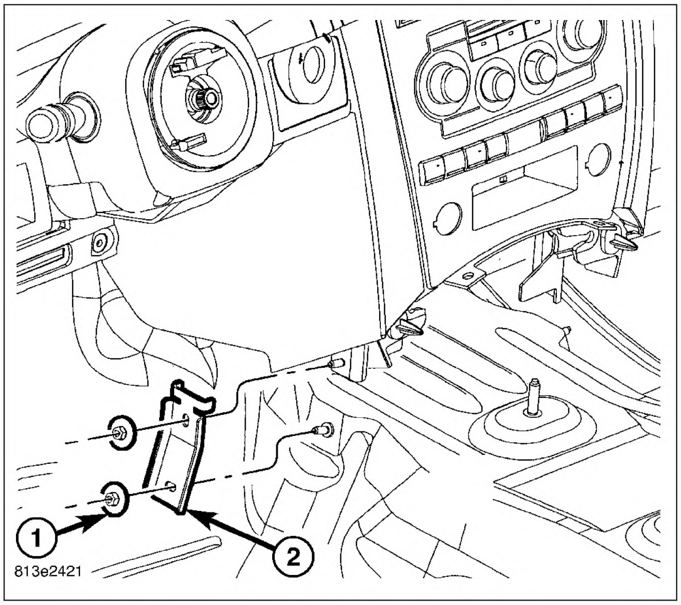
43. Remove the screw to the HVAC from under the glove box opening.



44. Remove the HVAC bracket bolt from the glove box opening.



45. Remove the left and right center support brackets. * Left side shown, right side similar.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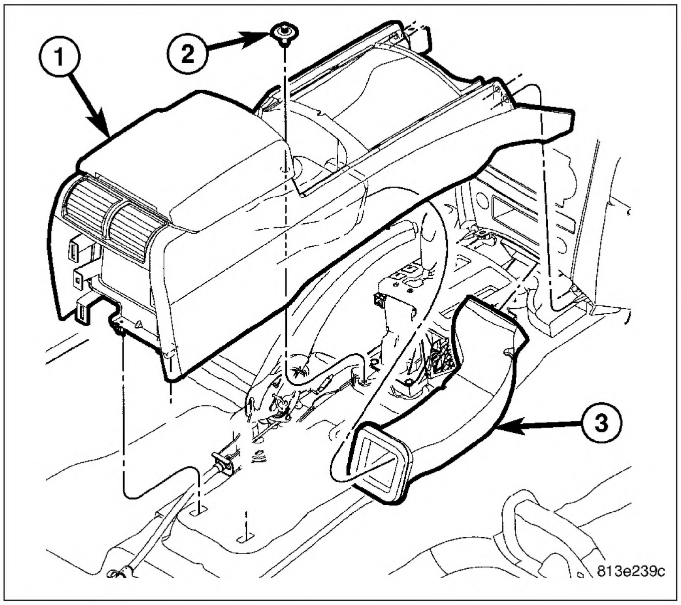
46. Remove the center floor duct (3).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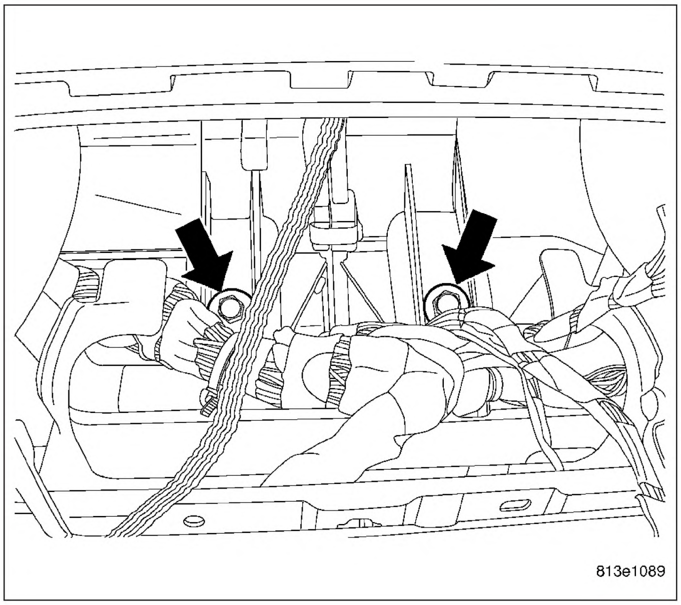
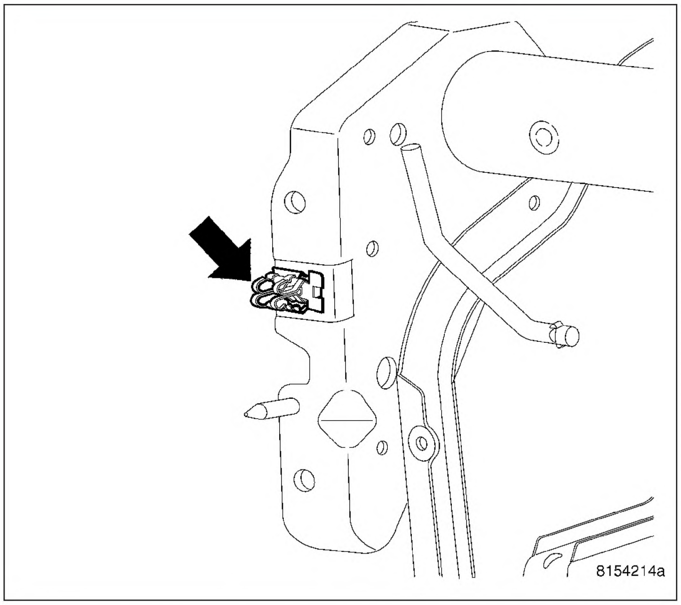
47. Remove the radio.
48. Remove the two HVAC bolts from the radio opening.
49. Remove the instrument panel assembly.

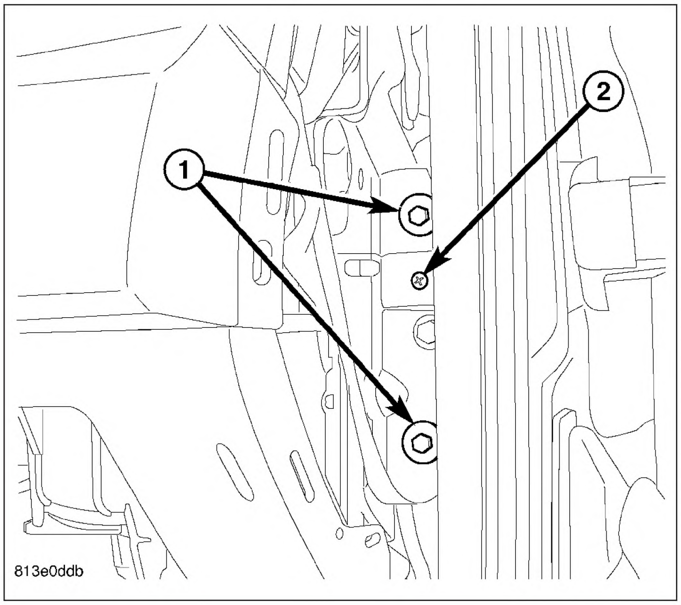


INSTALLATION

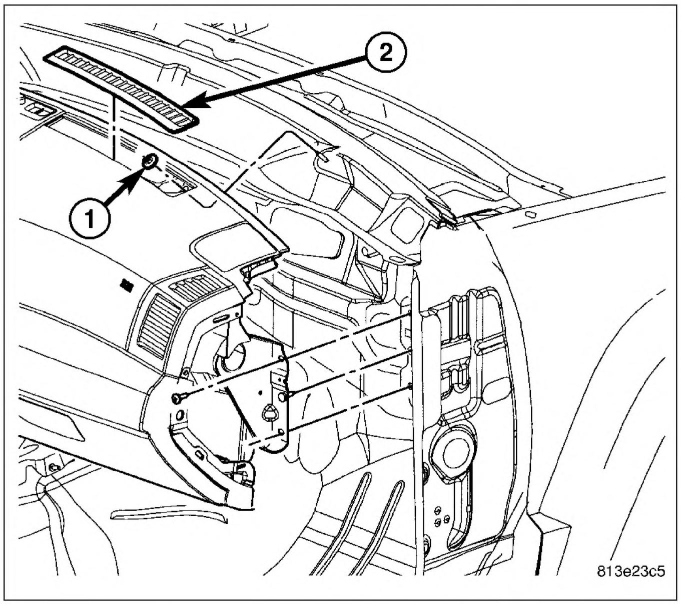
1. Before proceeding with installation of the instrument panel assembly, remove the load clips from each a-pillar and install onto the sides of the panel using the screw.



2. Place the instrument panel into the vehicle and position onto the a-pillars using the load clips (2).
3. Install the two bolts on the right side and tighten the bolts to 11 N·m (95 in. lbs.).



4. Install the two fenceline nuts (1).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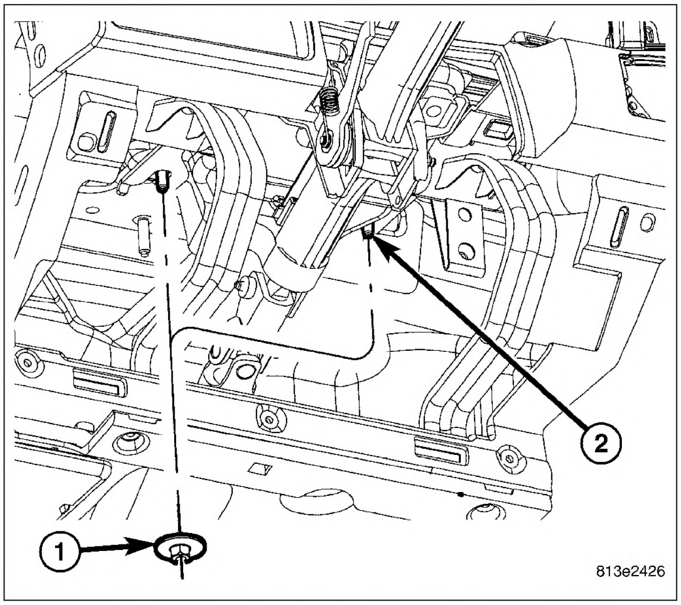
5. Guide the peddle support studs (3) on the drivers side, into the slots in the instrument panel reinforcement.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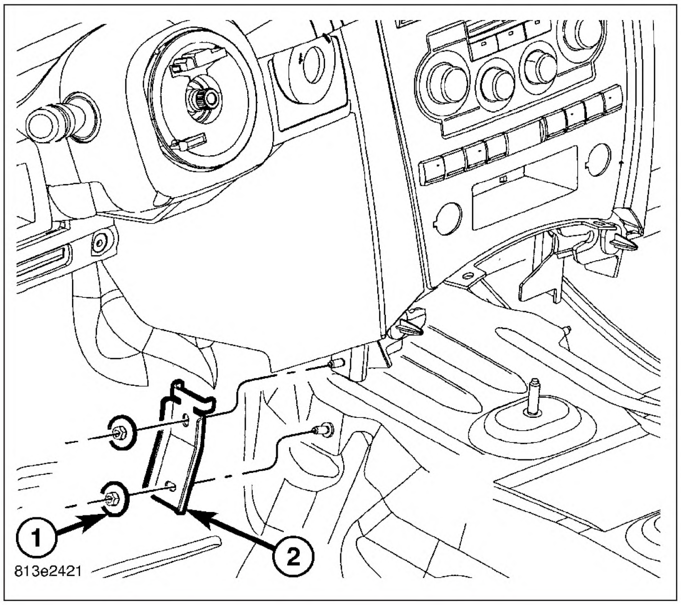
6. Position the center stack brackets (2) in front of the duct work.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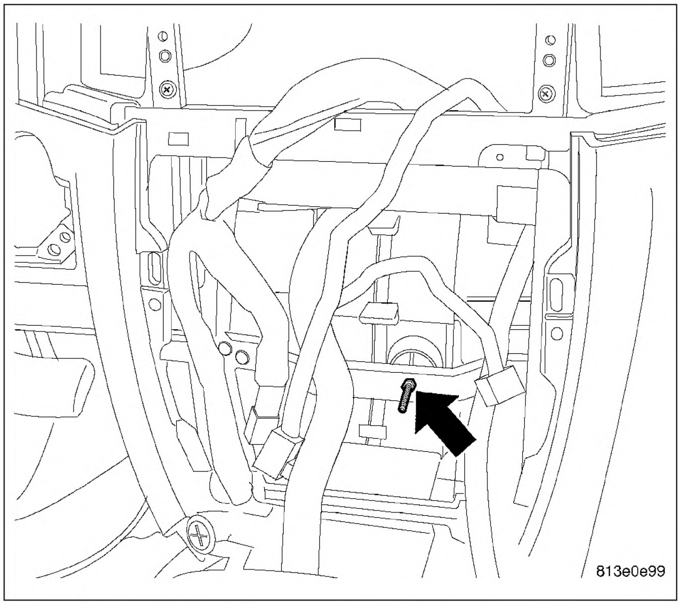
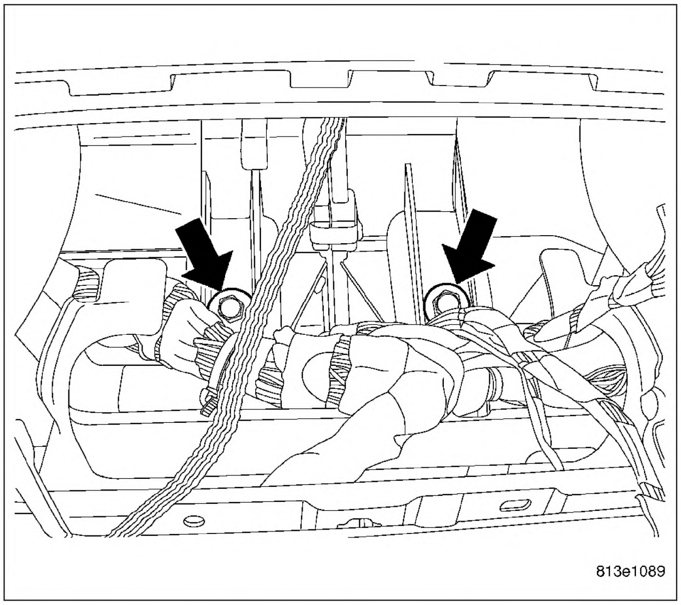
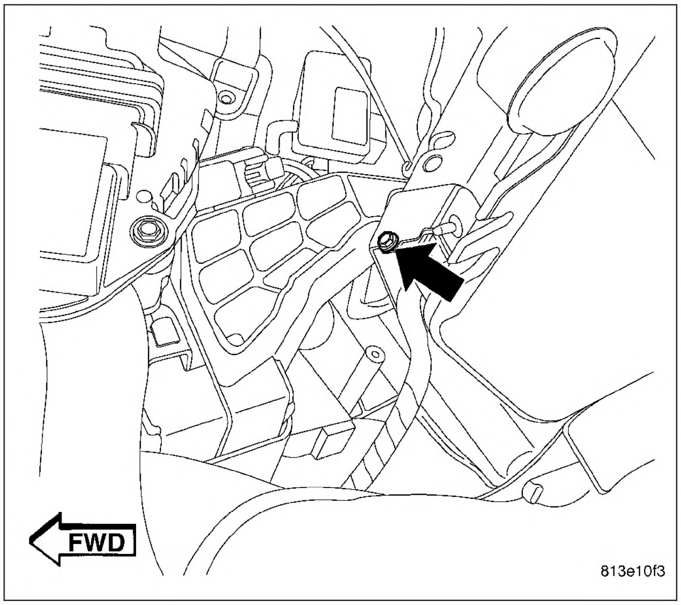
7. Rotate the instrument panel back and guide the HVAC stud.



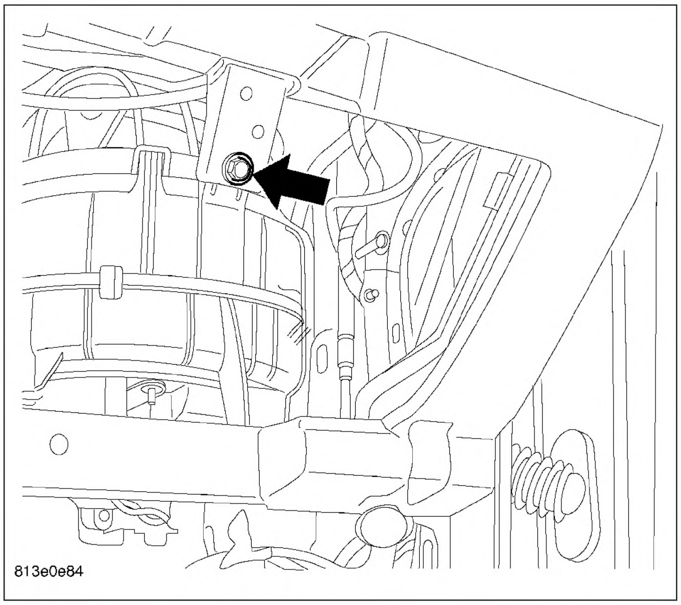
8. Continue to rotate the instrument panel back and guide the tube brackets located in the radio opening, into the HVAC.



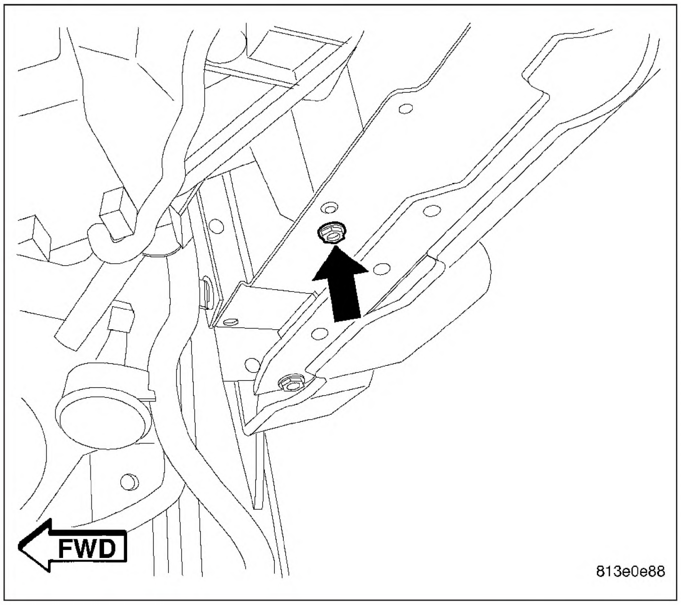
9. Install the screw at the bottom of the column opening next to the center stack up from the bottom attaching the HVAC.



10. Install the bolt at the HVAC blower motor housing.



11. Install the screw at the bottom of the glove box opening to the blower motor housing support.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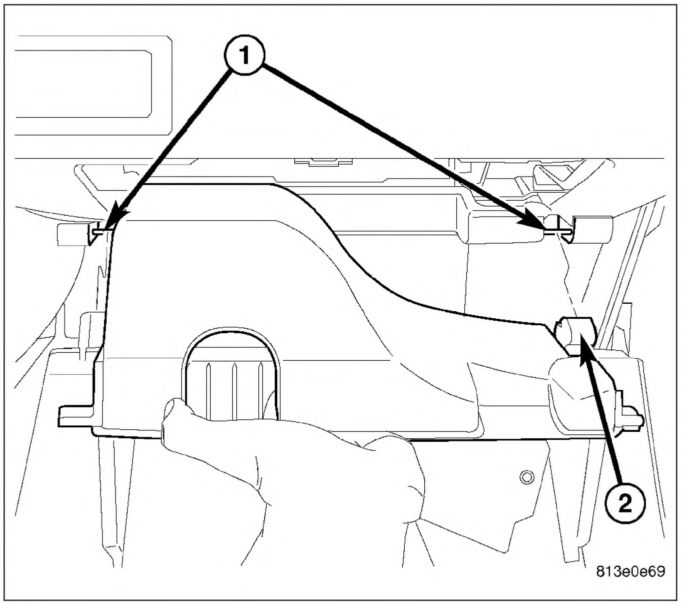
12. Snap the lower glove box hinges (2) over the pivots (1) and rotate up.
13. Push the stop tabs down and close the glove box.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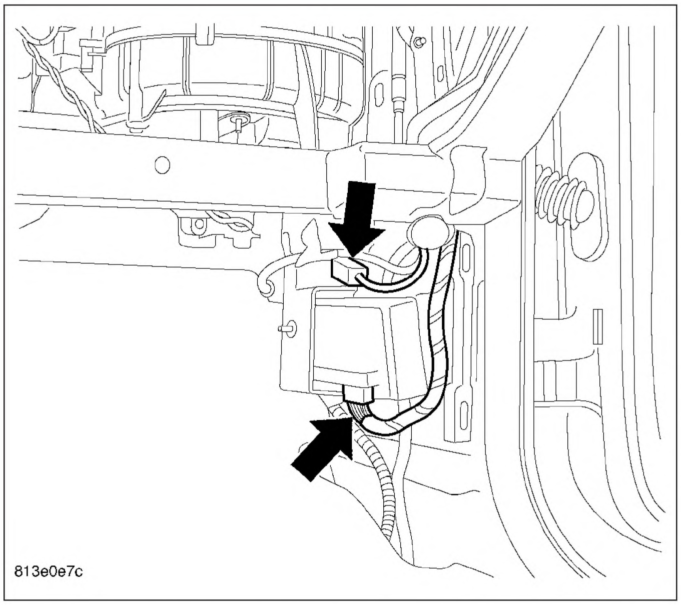
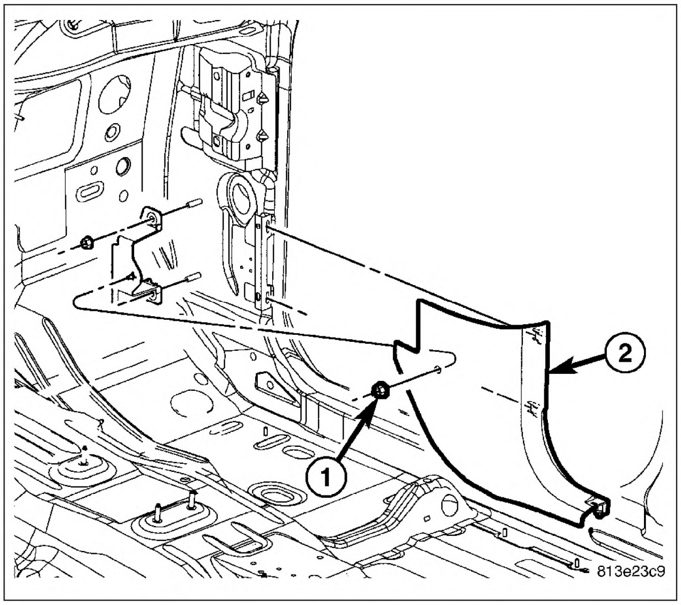
14. Connect the right side wiring.



15. Install the right hush panel trim.
16. Install the right cowl trim and position the door seal back.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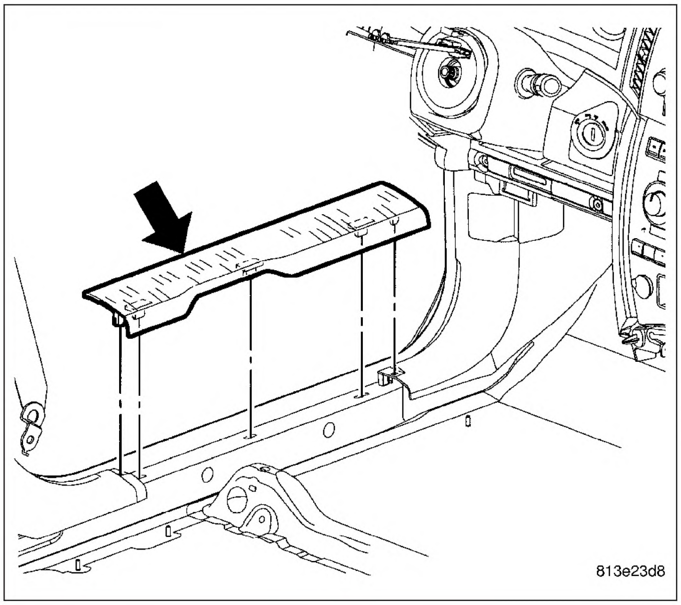
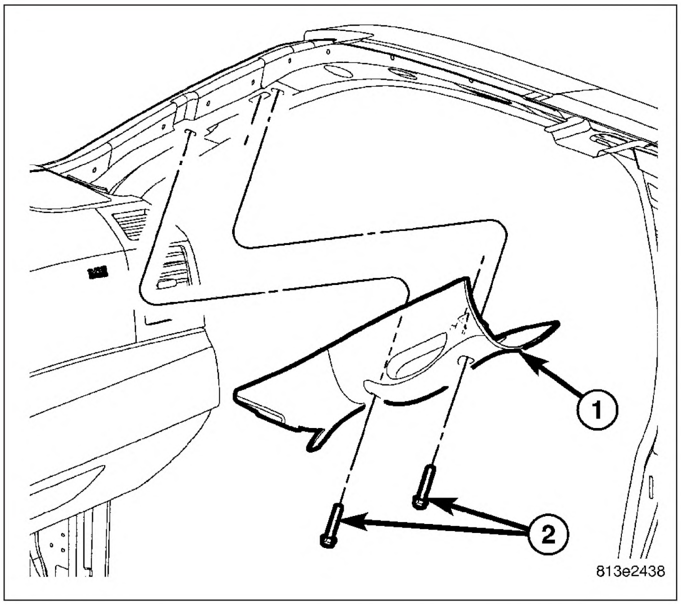
17. Position the right side door sill trim and seat fully.* Left side shown, right side similar.



18. Install the right a-pillar trim, the bolts and position the door seal back.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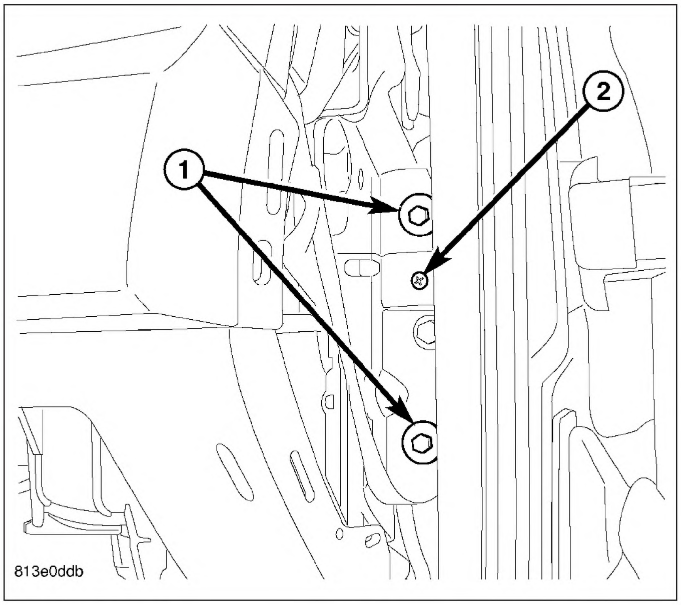
19. Install the two bolts on the left side and tighten to 11 N·m (95 in. lbs.).* Right side shown, left side similar.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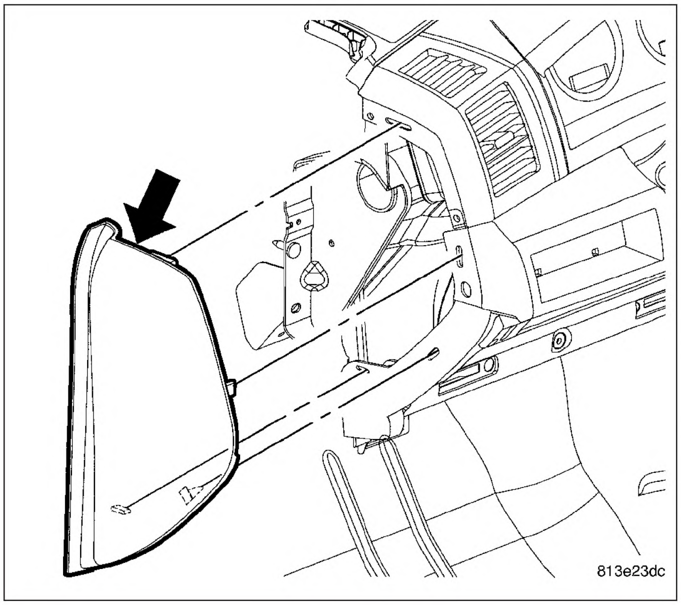
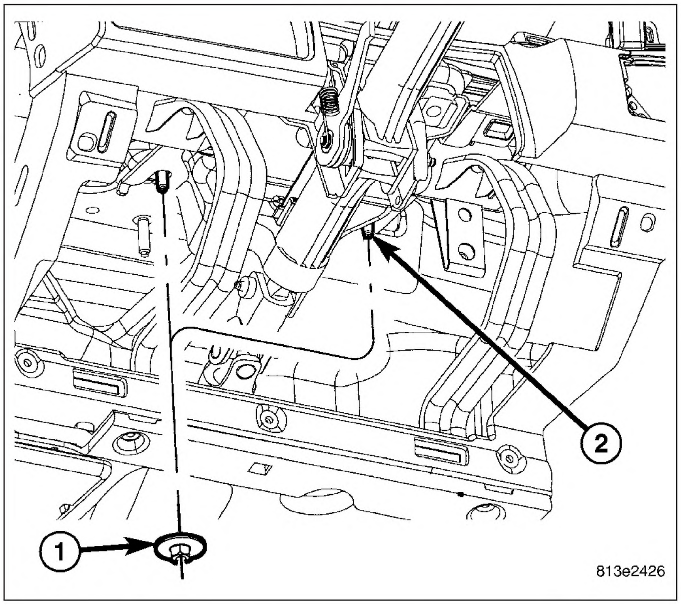
20. Position the right side end cap and seat fully.* Left side shown, right side similar.



21. Install the two nuts (1) on the studs (2) above the column tighten the nuts to 12 N·m (105 in. lbs.).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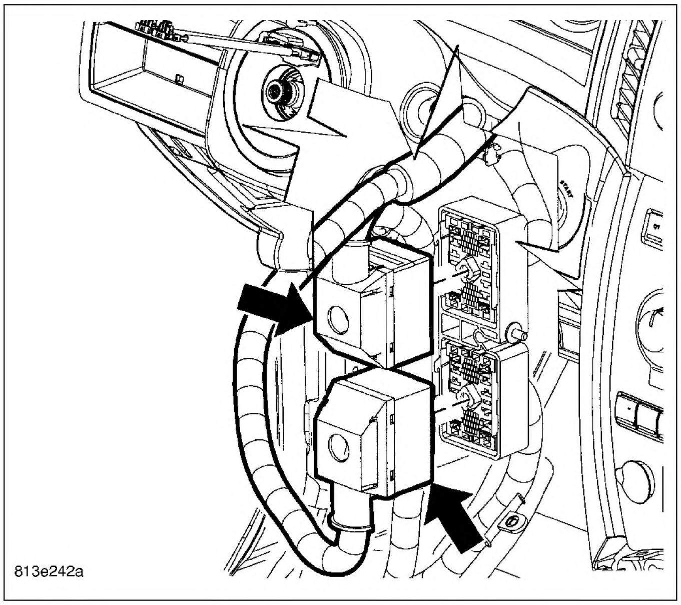
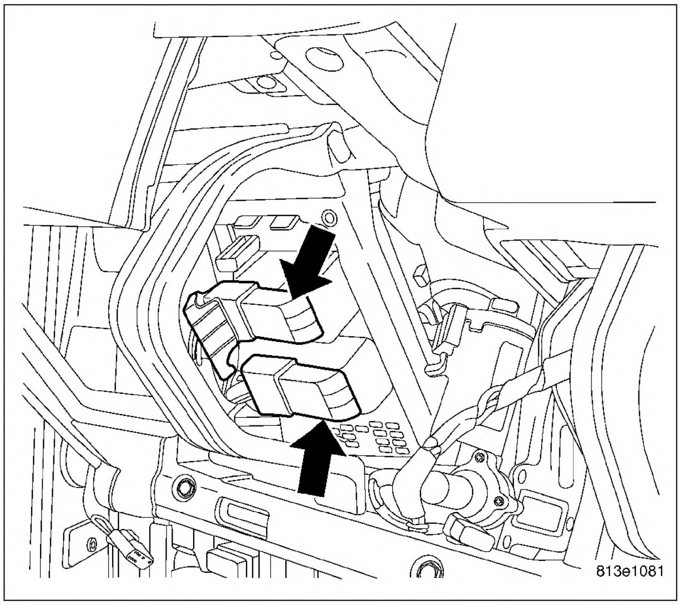
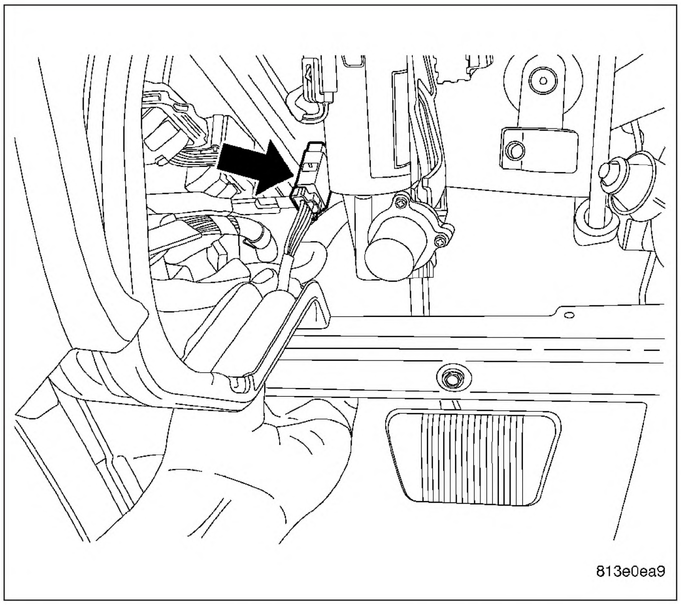
22. Connect the two left bulk connectors.



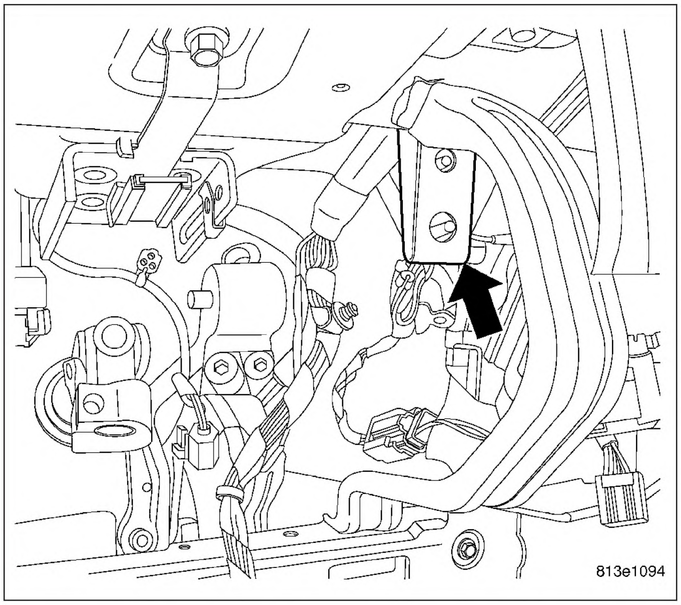
23. Connect the two fuse block connectors.



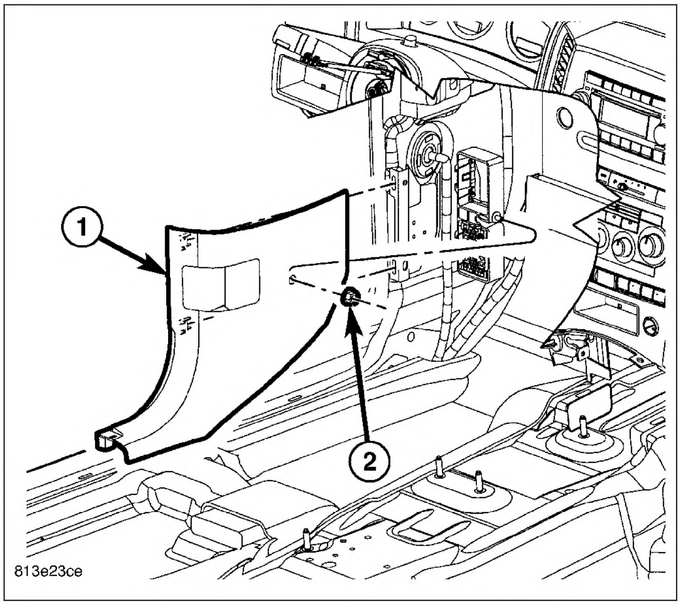
24. Connect the white connector to adjustable brake pedal.



25. Install the grounds within the steering column opening and install the bolts.



26. Install the left cowl trim panel (1) and install the nut (2).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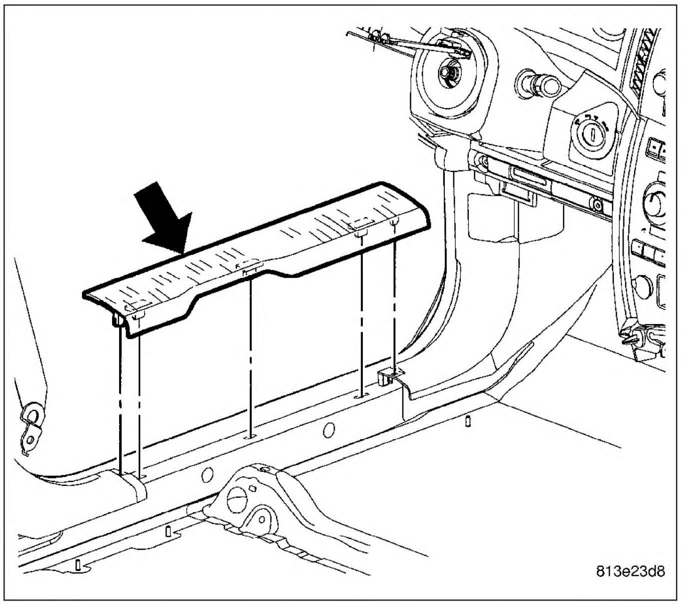
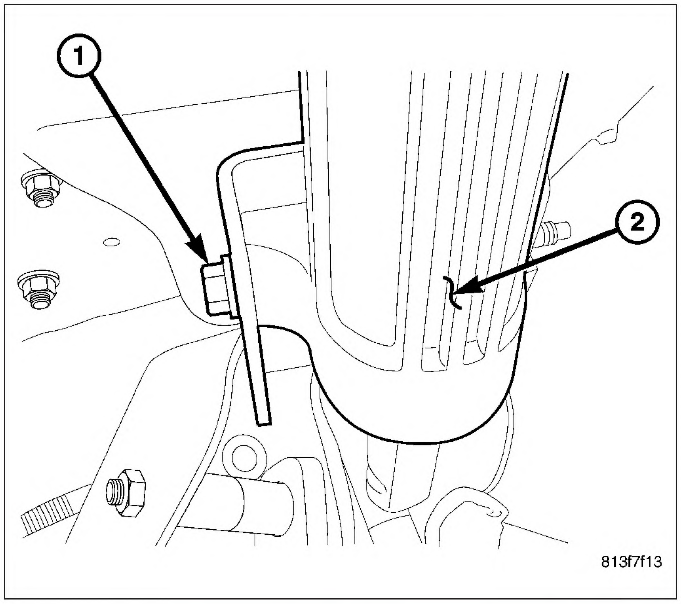
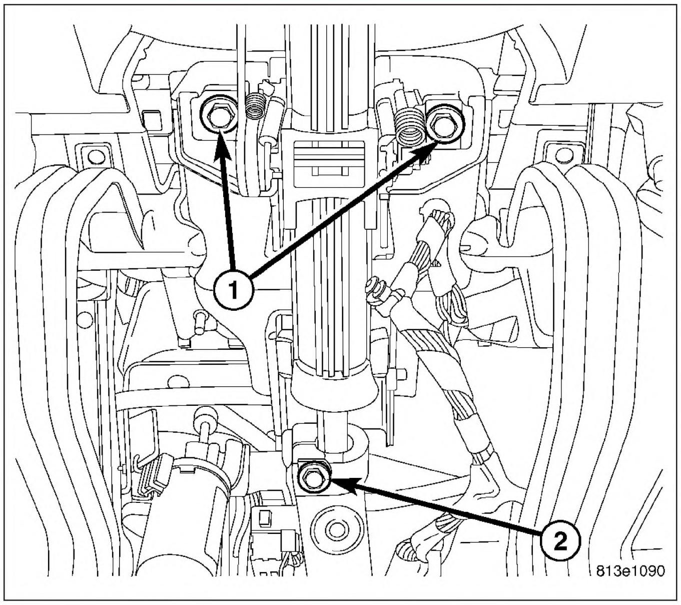
27. Install the left door sill.



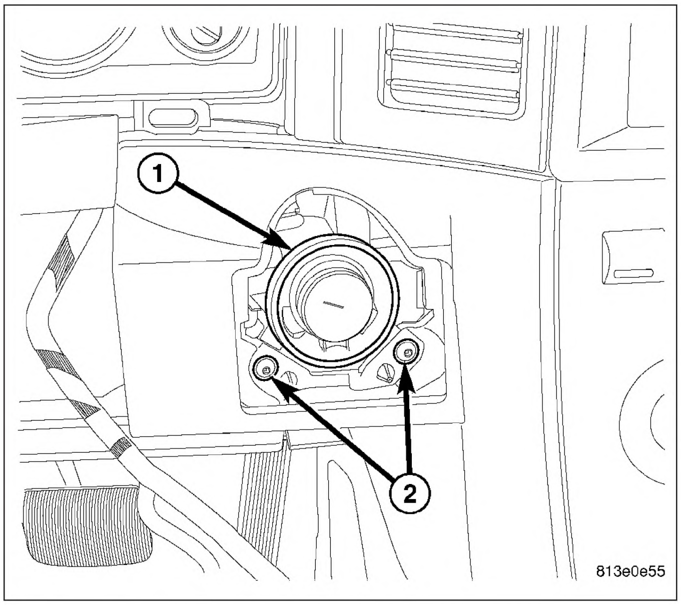
28. Install the column cross bolt (1) and tighten to 12 N·m (105 in. lbs.).



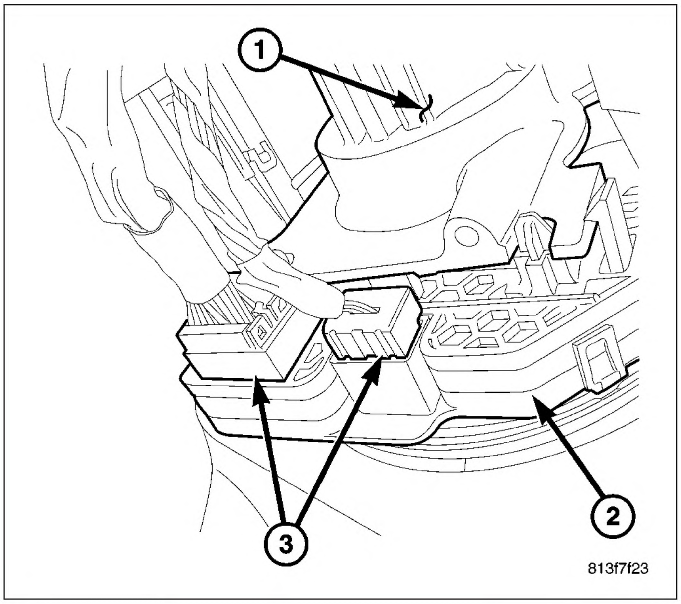
29. Position the steering column shaft into the slip joint.
30. Lift the column into position and install the bolts (1).
31. Tighten the bolts to 12 N·m (105 in. lbs.).
32. Slide the coupler onto the column shaft and install a **new** coupler bolt (2). Tighten the coupler bolt to 49 N·m (36 ft. lbs.).



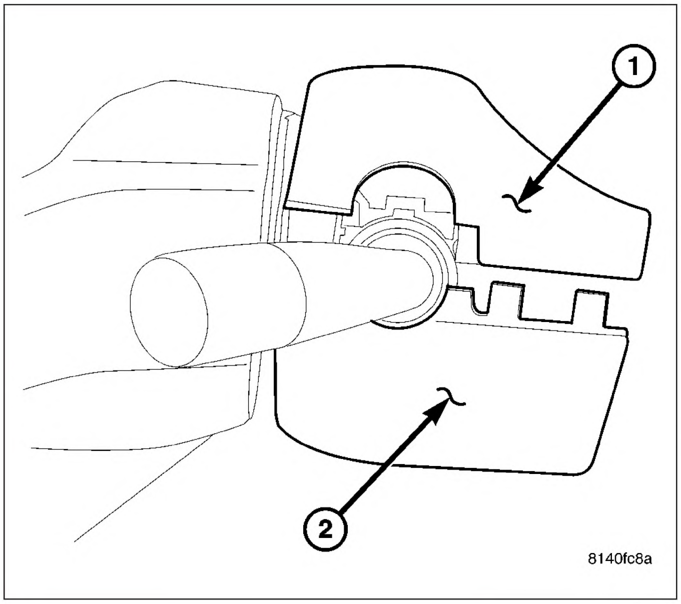
33. Connect the shifter cable and electrical connectors to the ignition.
34. Install the ignition cylinder (1) and install the screws (2).
35. Position the ignition bezel and seat fully.



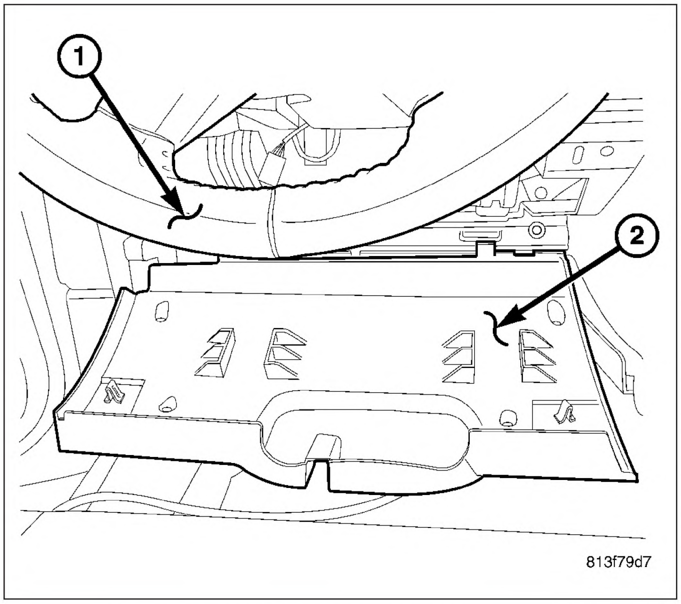
36. Connect the electrical connector (3) for the multi-function switch (2).



37. Install the upper shroud (1) on the column.
38. Install the lower shroud (2) to the column.
39. Snap the two halves back into place.
40. Install the three mounting bolts to secure the shroud in place.



41. Snap the steering column opening cover (2) lower hinges onto the pins and roll cover up.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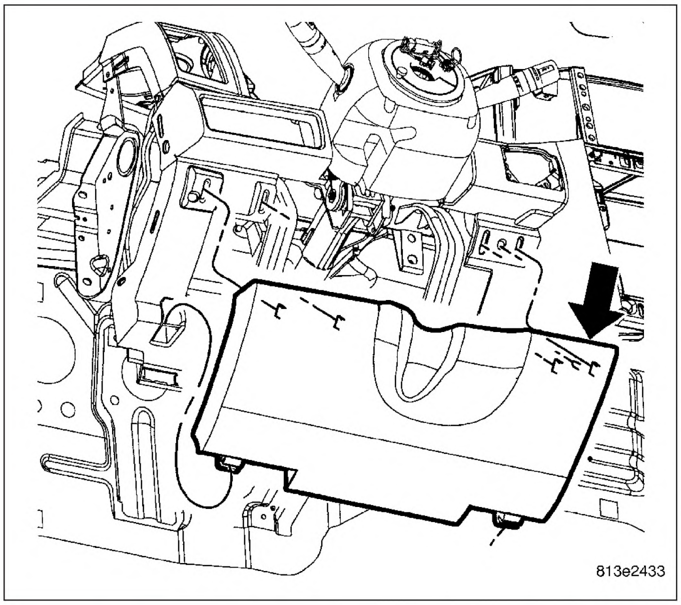
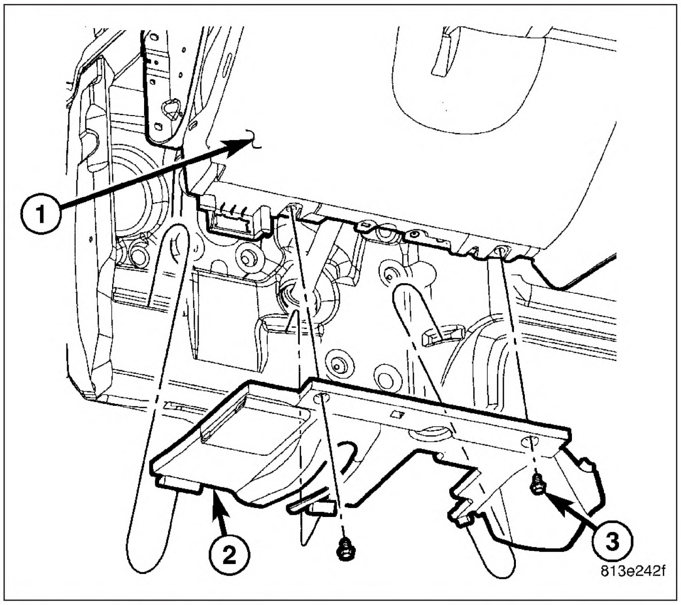
42. Seat the upper retaining clips fully.



43. Install the hush panel.
44. Connect the column electrical connectors.
45. Install the column covers.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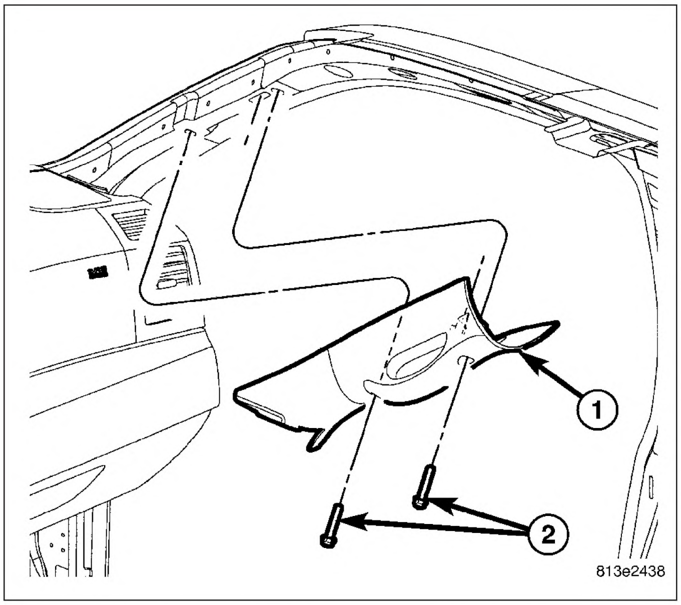
46. Install the left a-pillar trim, the bolts and position the door seal back.* Right a-piller trim shown, left similar.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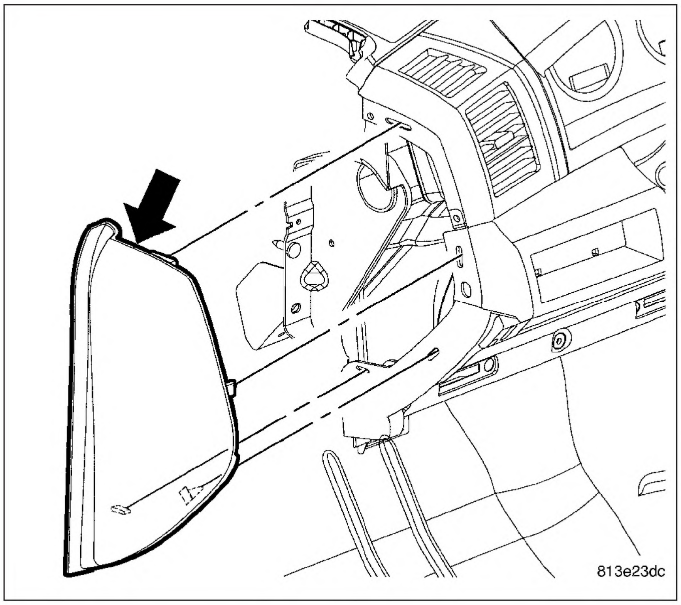
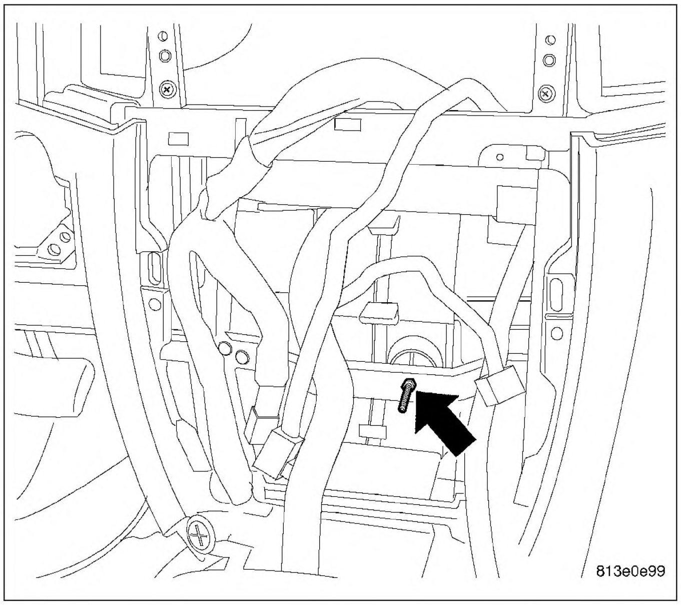
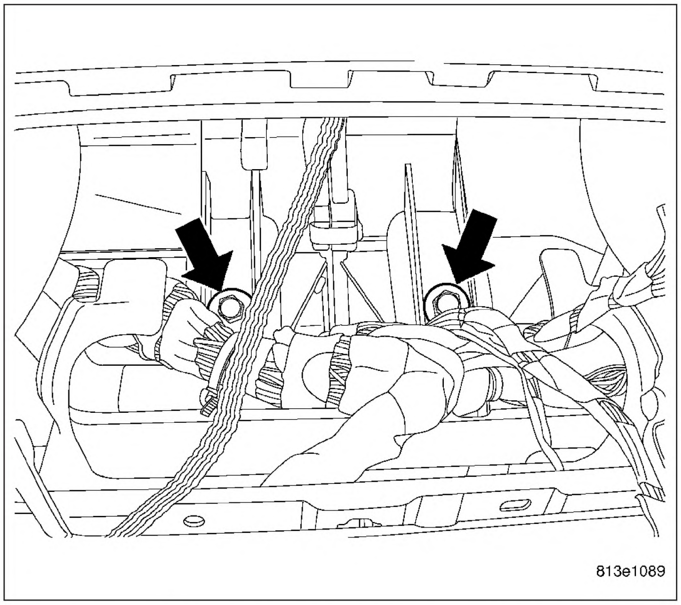
47. Position the left side end cap and seat fully.



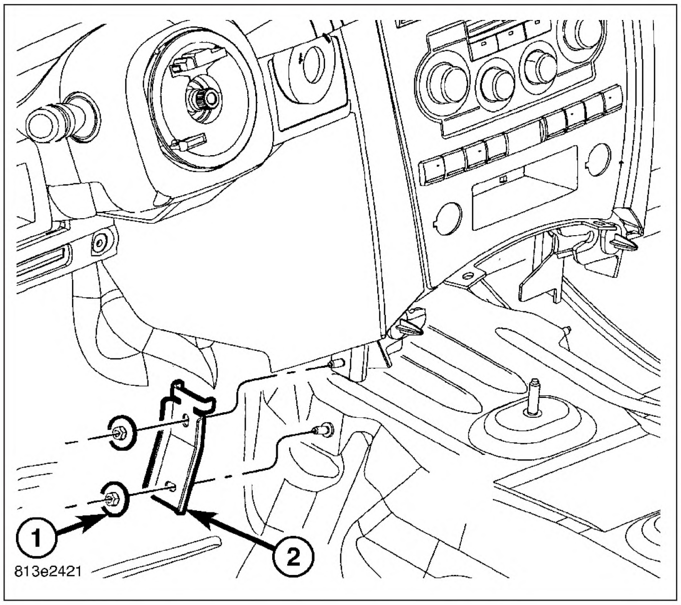
48. Install the center support nut onto the stud.



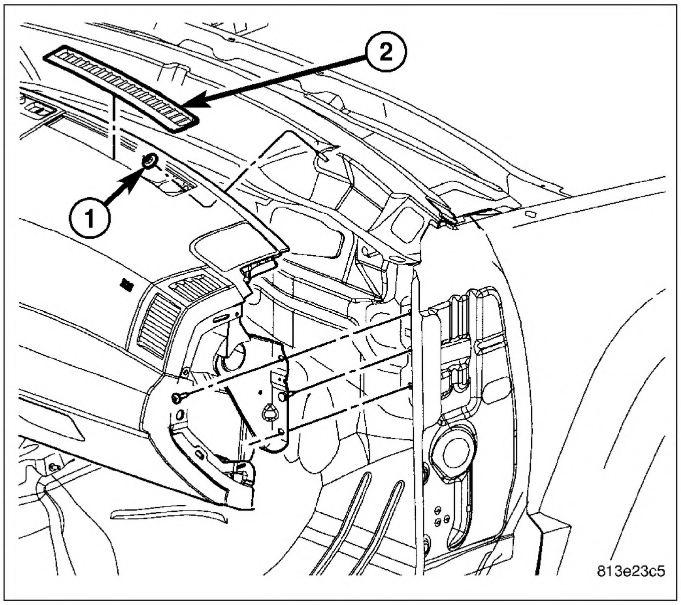
49. Install the two HVAC bolts within the radio opening.
50. Install the radio.
51. Install the radio bezel.



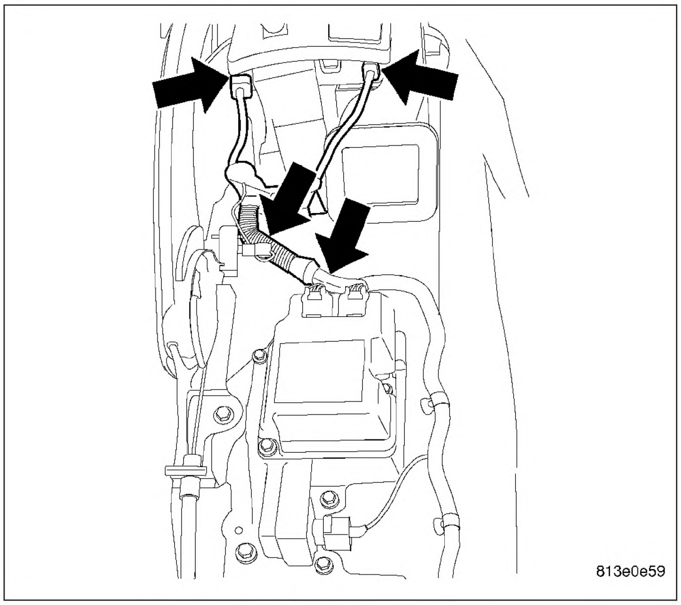
52. Install the left and right center support brackets and nuts and tighten to 12 N·m (105 in. lbs.).* Left side shown, right side similar.



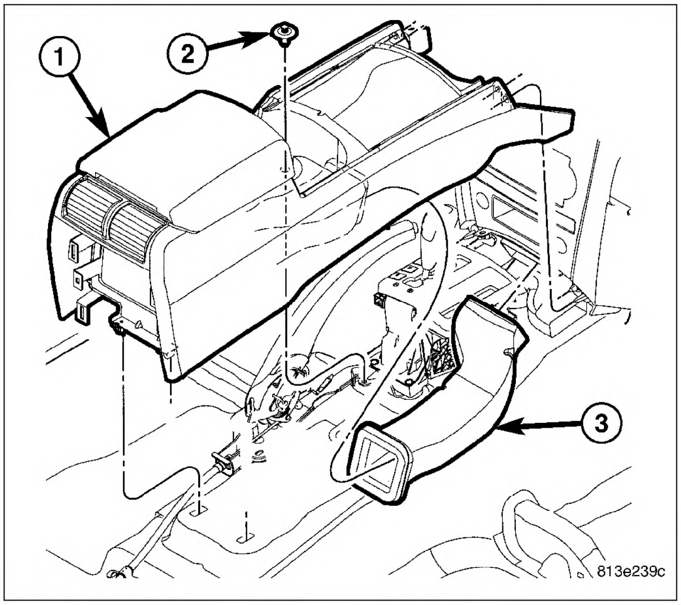
53. Position the center wire harness and connect the electrical connectors.
54. Install the center bezel.
55. Position the defroster vents (2) and seat fully.



56. Connect the center harness electrical connectors (ground, module, shifter, brake lever).



57. Install the center floor duct (3).
58. Position the console (1) into the vehicle and install the screws (2).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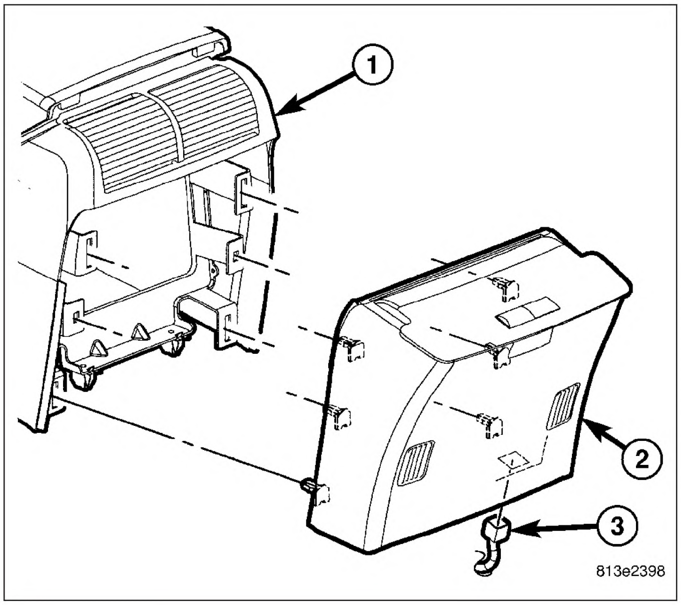
59. Connect the electrical connector (3) and install the rear cover (2) onto the console (1).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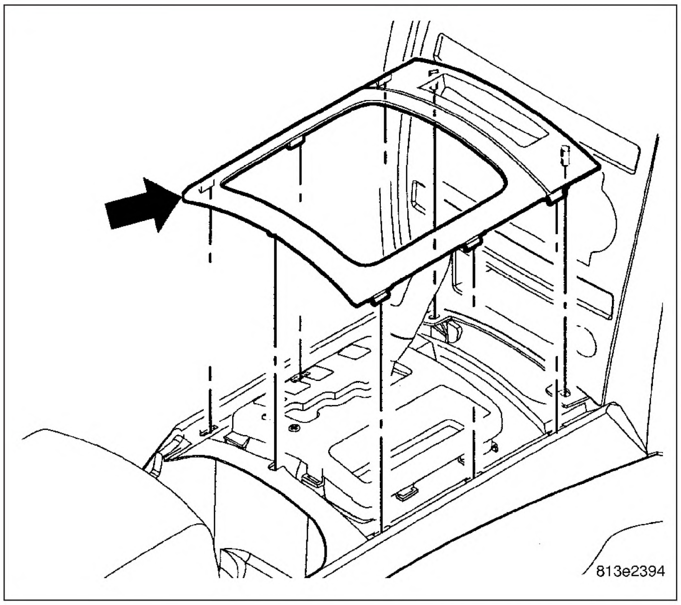
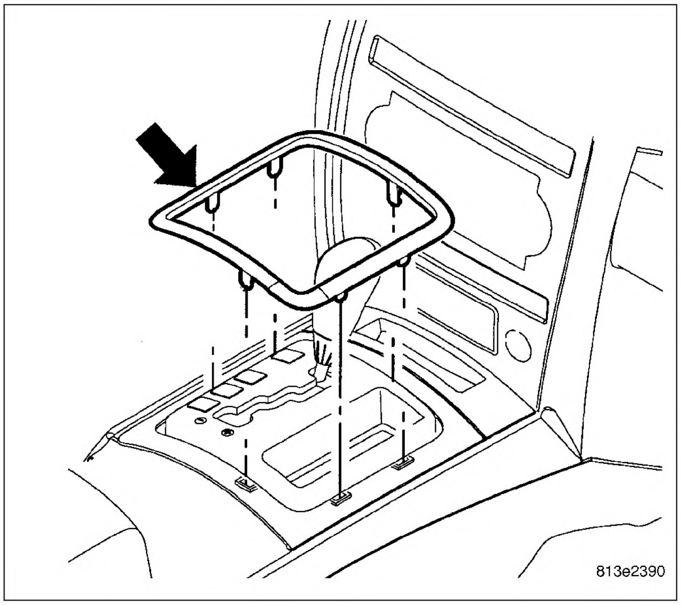
60. Position the shifter bezel and seat fully.



61. Position the shifter bezel trim ring and seat fully.



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INTERIOR

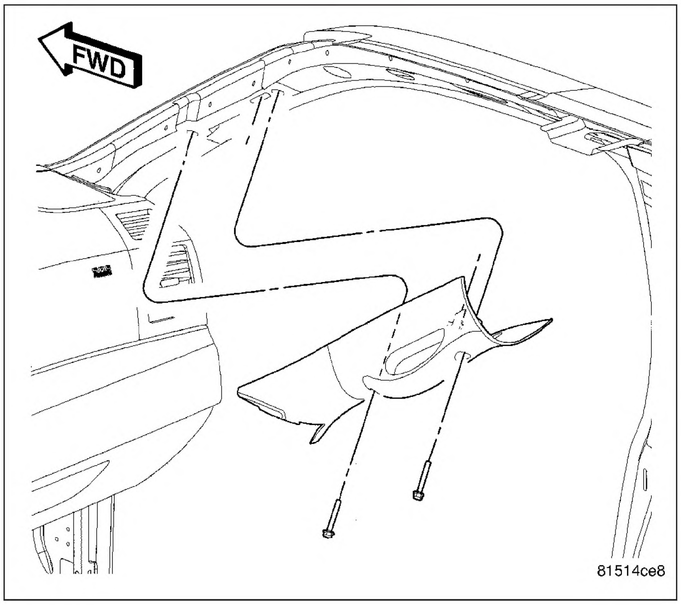
CAUTION

CAUTION:: Do not attempt to remove interior trim panels or moldings without first removing the necessary adjacent trim panels or moldings. To avoid damaging the trim panels, ensure that all the fasteners are removed or disengaged before attempting to remove interior trim panels or moldings. Trim panels are somewhat flexible but can be damaged if handled improperly.

A-PILLAR TRIM/GRAB HANDLE

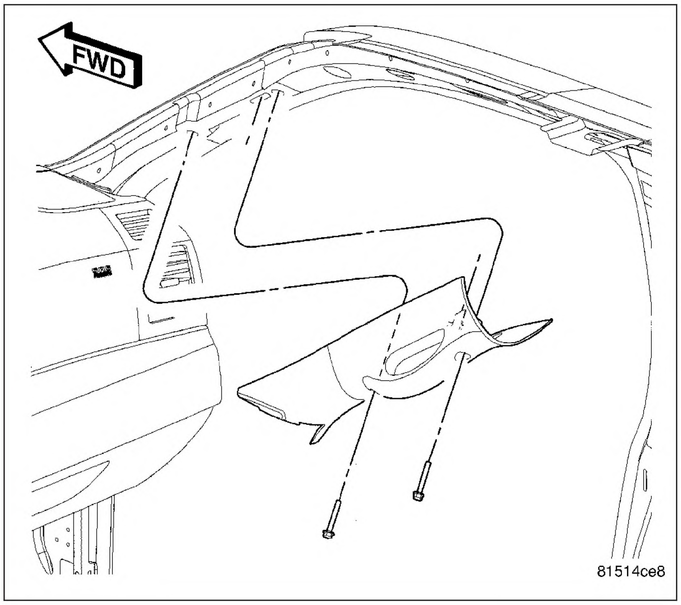
REMOVAL

1. Using a small flat-bladed tool, carefully open the two fastener covers located in the A-pillar trim panel.
2. Remove the two bolts that secure the A-pillar trim panel to the A-pillar and remove the trim panel.



INSTALLATION

1. Position the locating tabs of the A-pillar trim panel into the slots located in the top of the instrument panel.
2. Install the A-pillar trim panel onto the A-pillar and install the two bolts. Tighten the bolts to 6 N·m (55 in. lbs.).
3. Close the two fastener covers located in the A-pillar trim panel.



ASSIST HANDLE

REMOVAL

1. Pull the grab handle downward, remove the two screws that secure the grab handle to the roof panel, and remove the grab handle from the headliner.
2. If equipped, disconnect the reading lamp wire harness connector.

INSTALLATION

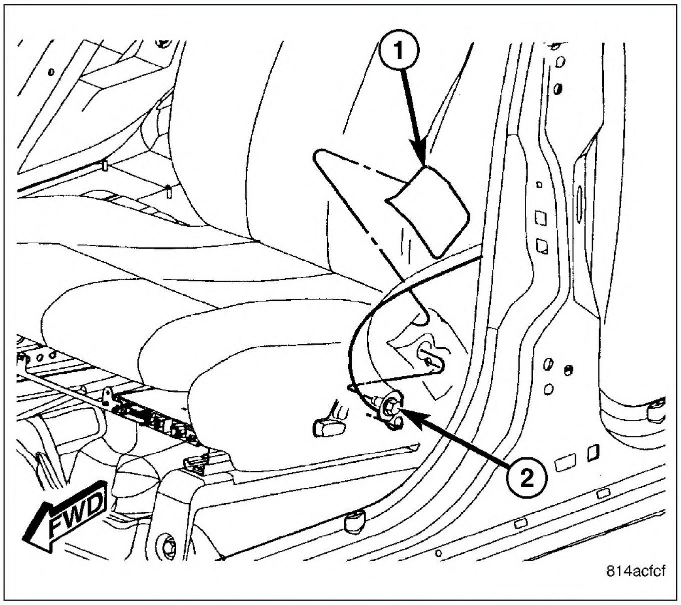
1. If equipped, connect the reading lamp wire harness connector.

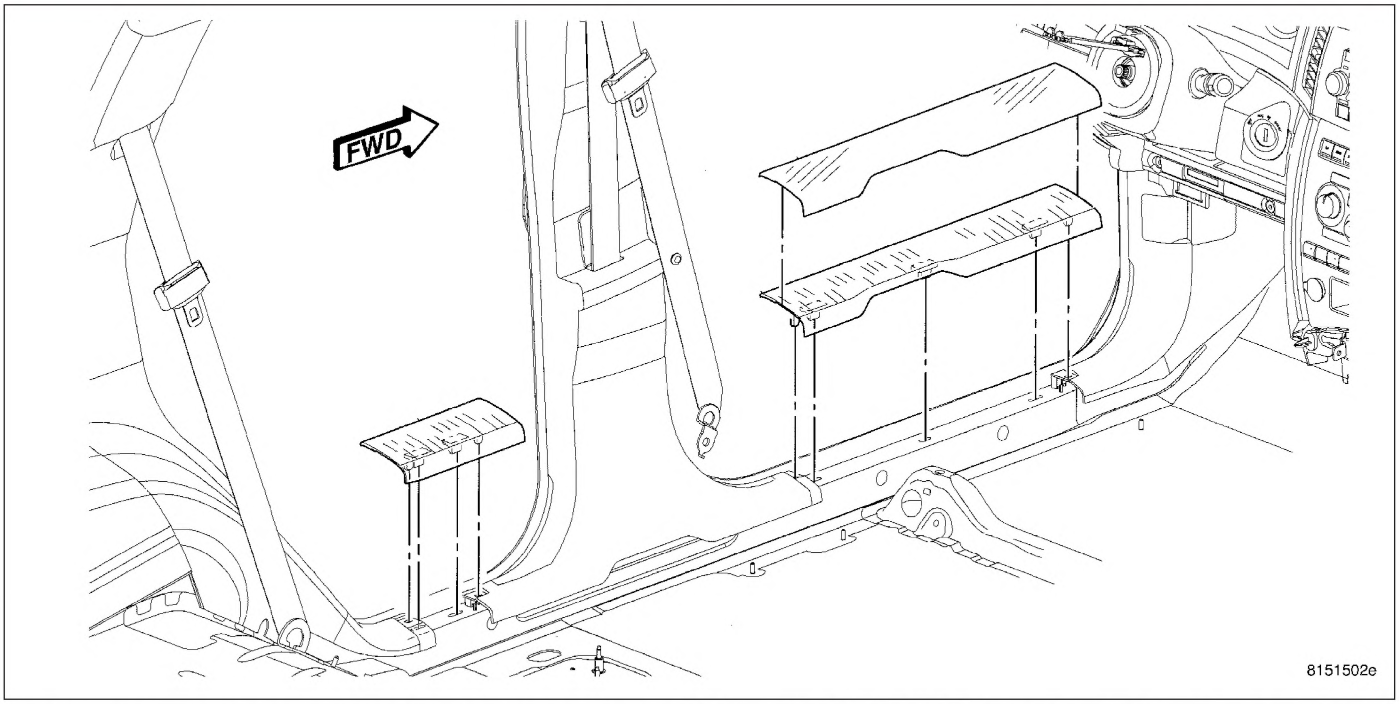
2. Position the grab handle on the headliner and install the two screws that secure the grab handle to the roof panel. Tighten the screws to 2.2 N·m (20 in. lbs.).

B-PILLAR LOWER TRIM

REMOVAL

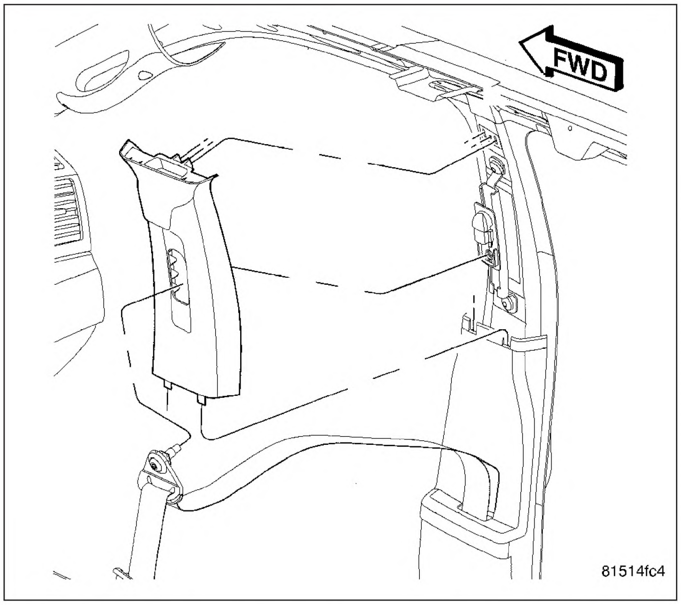
1. Adjust the front seat to its most forward position for easiest access to the front seat belt lower anchor cover (1) and the B-pillar trim.
2. Grasp the upper edge of the lower anchor cover and pull upward to unsnap it from the front seat cushion outboard side shield.
3. Remove the screw (2) that secures the lower anchor to the outboard side of the front seat cushion frame and position the seat belt out of the way.



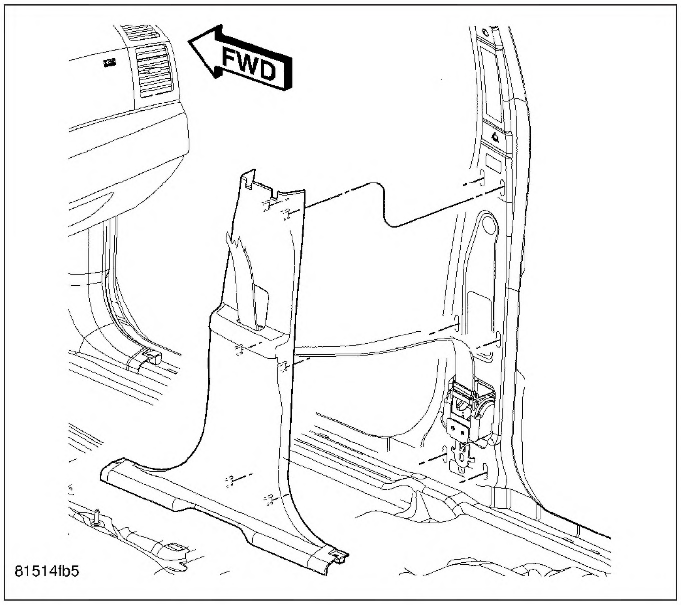


4. Remove the front door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL).
5. Remove the rear passenger door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL).

6. Remove the upper B-pillar trim panel, (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).

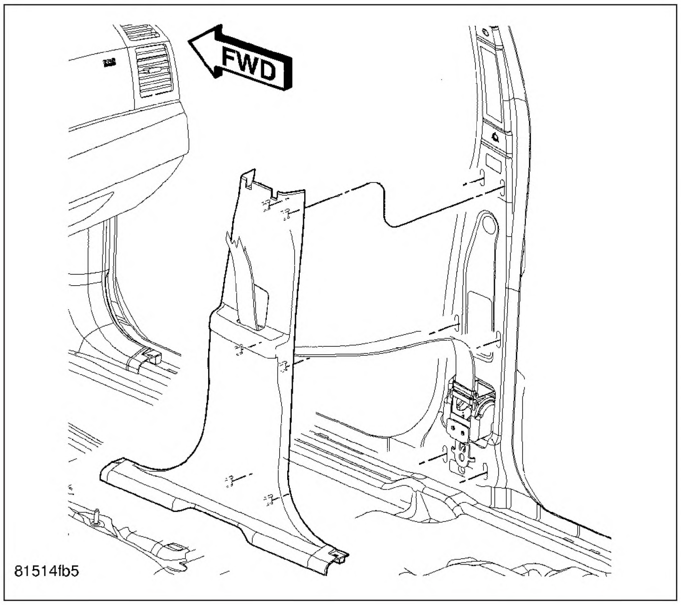


7. Open the access door on the lower B-pillar trim panel.
8. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the lower B-pillar trim panel to the B-pillar.
9. Remove the seat belt from the lower B-pillar trim panel through the access door opening and remove the trim panel.

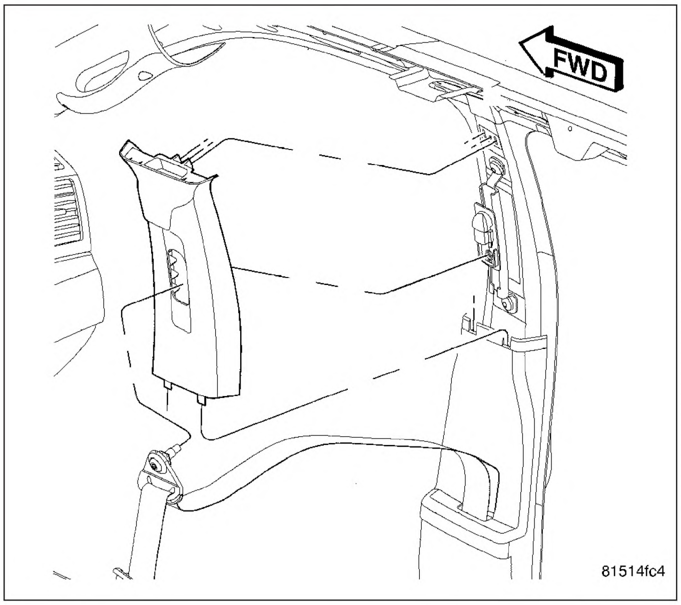


INSTALLATION

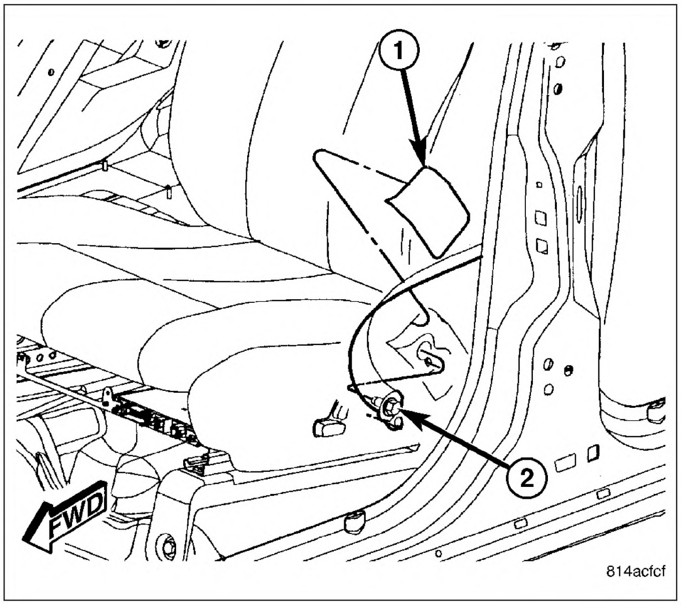
1. Route the seat belt through the access door opening in the lower B-pillar trim panel.
2. Position the lower B-pillar trim panel to the B-pillar and engage the retaining tabs that secure the trim panel to the B-pillar.

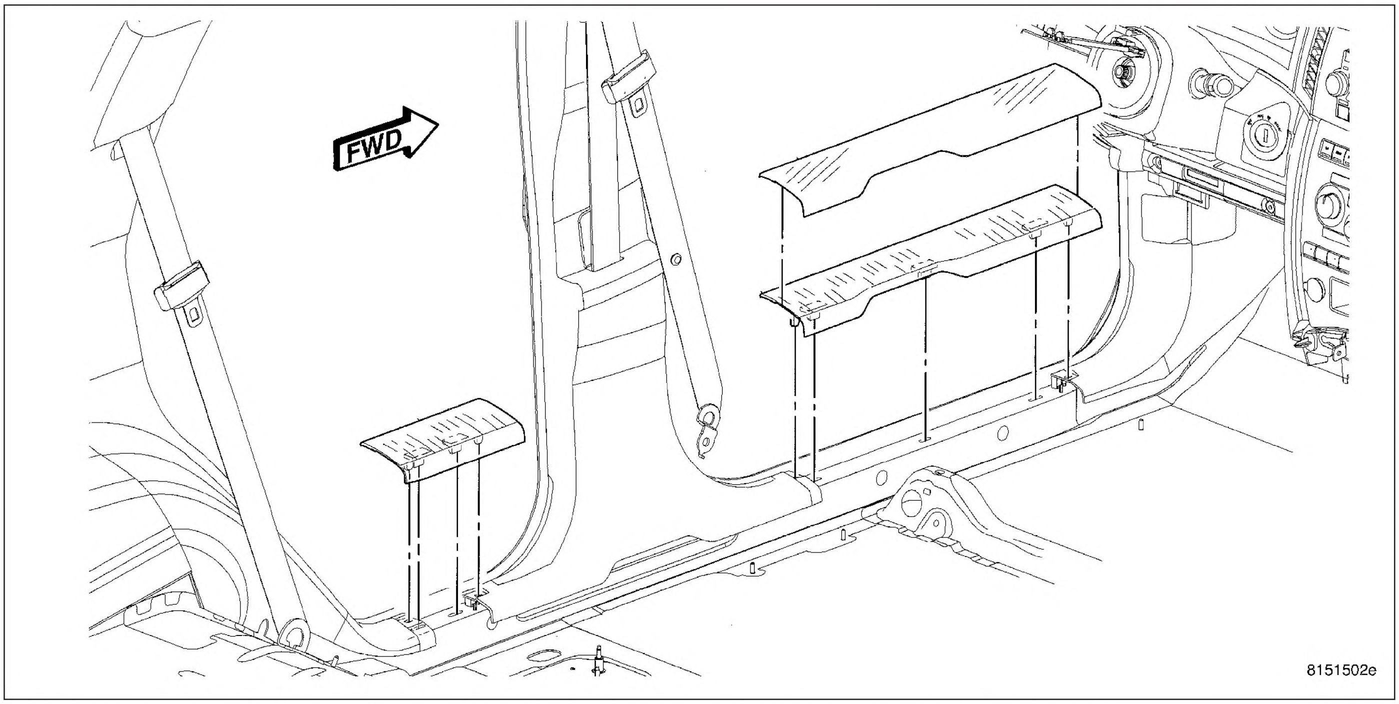


3. Install the upper B-pillar trim panel, (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).



4. Position the seat belt lower anchor to the mounting hole on the outboard side of the front seat cushion frame. Be certain that the seat belt webbing between the turning loop and the lower anchor is not twisted.
5. Install the screw (2) that secures the lower anchor to the seat. Tighten the screw to 39 N·m (29 ft. lbs.).
6. Reinstall the lower anchor cover (1) onto the front seat cushion outboard side shield.



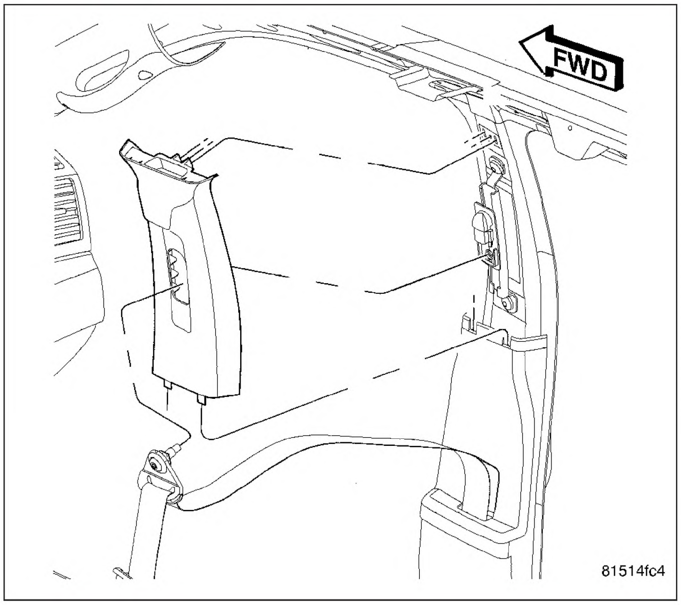


7. Position the seat belt aside and close the access door on the lower B-pillar trim panel.
8. Install the rear door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION).
9. Install the front door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION).

B-PILLAR UPPER TRIM

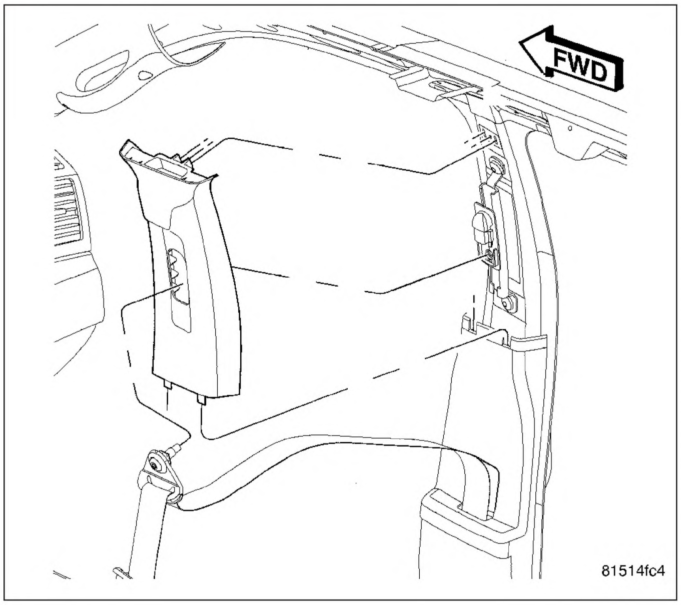
REMOVAL

1. Firmly grasp the lower end of the turning loop trim cover on the upper B-pillar and pull it straight out to unsnap it from the height adjuster, then lift the bottom of the cover upward and pull outward to disengage the upper tabs from the adjuster.
2. Remove the screw that secures the seat belt turning loop to the height adjuster.
3. Remove the seat belt turning loop from the height adjuster and position the seat belt out of the way.
4. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the upper B-pillar trim panel to the B-pillar and remove the trim panel.



INSTALLATION

1. Position the upper B-pillar trim panel to the B-pillar and engage the retaining tabs that secure the trim panel to the B-pillar.
2. Position the seat belt turning loop onto the height adjuster on the upper B-pillar. Be certain that the seat belt webbing between the retractor and the turning loop is not twisted.
3. Install the screw that secures the turning loop to the height adjuster. Tighten the screw to 39 N·m (29 ft. lbs.).
4. Insert the upper tabs of the turning loop trim cover into the slots of the height adjuster on the upper B-pillar, then lower the bottom of the cover and use hand pressure to press firmly and evenly on the cover until it snaps into place.



C-PILLAR UPPER TRIM

REMOVAL

1. Remove the bolts that secure the rear passenger seat cushion to the floor, (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).
2. Position the rear passenger seat cushion to gain access to the bolt that secures the rear outboard seat belt lower anchor and the rear seat back bracket to the rear floor panel.
3. Loosen the bolt that secures the rear outboard seat belt lower anchor and the rear seat back bracket to the rear floor panel.
4. Disengage the lower anchor from the loosened bolt.
5. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the upper C-pillar trim panel to the retaining clips in the C-pillar.
6. Remove the seat belt from the upper C-pillar trim panel through the slot provided and remove the upper C-pillar trim panel.

INSTALLATION

1. Route the seat belt through the slot in the upper C-pillar trim panel.
2. Position the locating tabs on the bottom of the upper C-pillar trim panel into the slots in the top of the quarter trim panel.
3. Align the retaining tabs on the upper C-pillar trim panel with the retaining clips in the C-pillar and engage the retaining tabs that secure the trim panel to the C-pillar.
4. Engage the seat belt lower anchor under the loosened bolt that secures the lower anchor and the rear seat back bracket to the rear floor panel. Be certain the seat belt webbing between the turning loop and the lower anchor is not twisted.
5. Tighten the bolt that secures the lower anchor and the rear seat back bracket to the rear floor panel. Tighten the bolt to 50 N·m (37 ft. lbs.).
6. Reinstall the rear seat cushion into the vehicle. (Refer to 23 - BODY/SEATS/REAR SEAT CUSHION - INSTALLATION).

CARPETS AND FLOOR MATS

REMOVAL

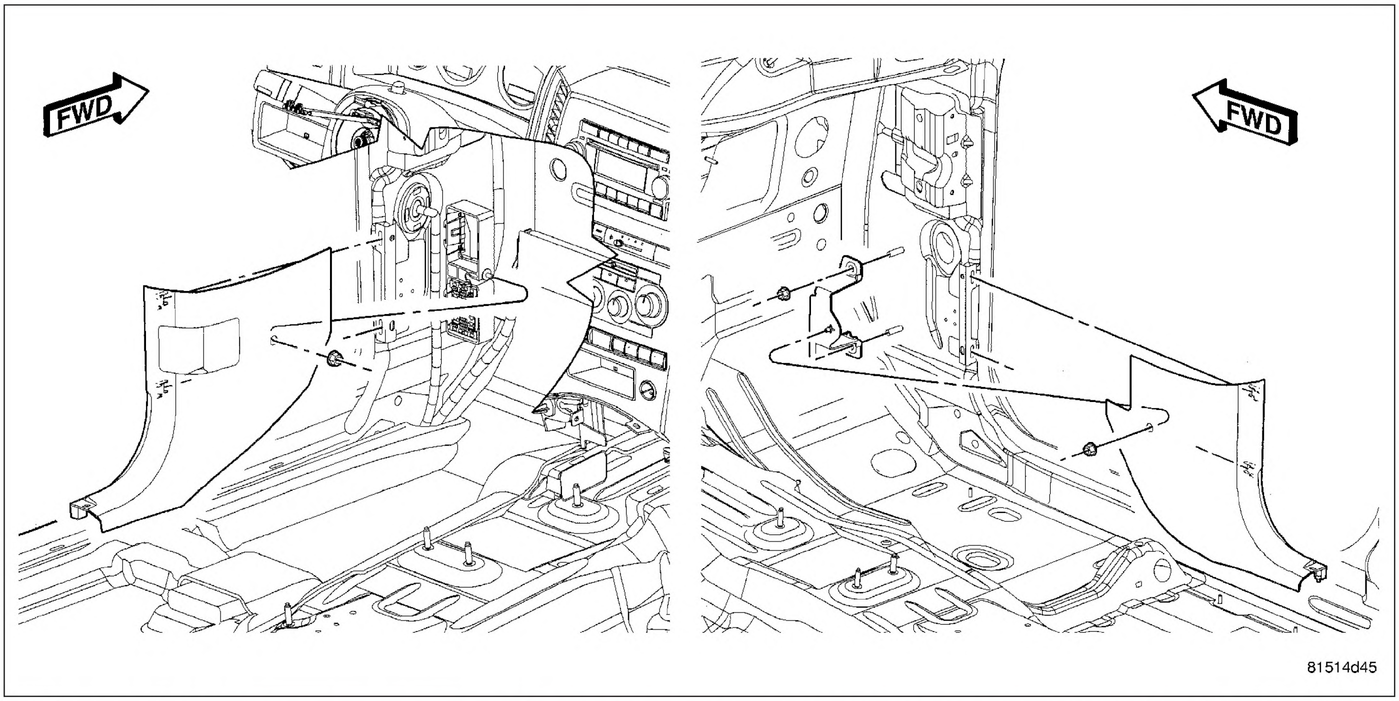
1. Remove the front seats, (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).
2. Remove the rear passenger seat cushion, (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).
3. Remove the floor console, (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).
4. Remove the park assist module, the final drive control module, and the park assist / final drive control module mounting bracket, (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/FINAL DRIVE CONTROL MODULE - REMOVAL).
5. Remove the front door sill scuff plates, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL).
6. Remove the cowl trim panels, (Refer to 23 - BODY/INTERIOR/COWL TRIM - REMOVAL).
7. Remove the rear passenger door sill scuff plates, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL).
8. Remove the lower B-pillar trim panels, (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL)
9. Remove the carpet from the vehicle.

INSTALLATION

1. Install the carpet in the vehicle.
2. Install the floor console, (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).
3. Install the lower B-pillar trim panels, (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).
4. Install the rear passenger door sill scuff plates, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION).
5. Install the cowl trim panels, (Refer to 23 - BODY/INTERIOR/COWL TRIM - INSTALLATION).
6. Install the front door sill scuff plates, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION).
7. Install the park assist / final drive control module mounting bracket, the park assist module, and the final drive control module, (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/FINAL DRIVE CONTROL MODULE - INSTALLATION).
8. Install the rear passenger seat cushion, (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).
9. Install the front seats, (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

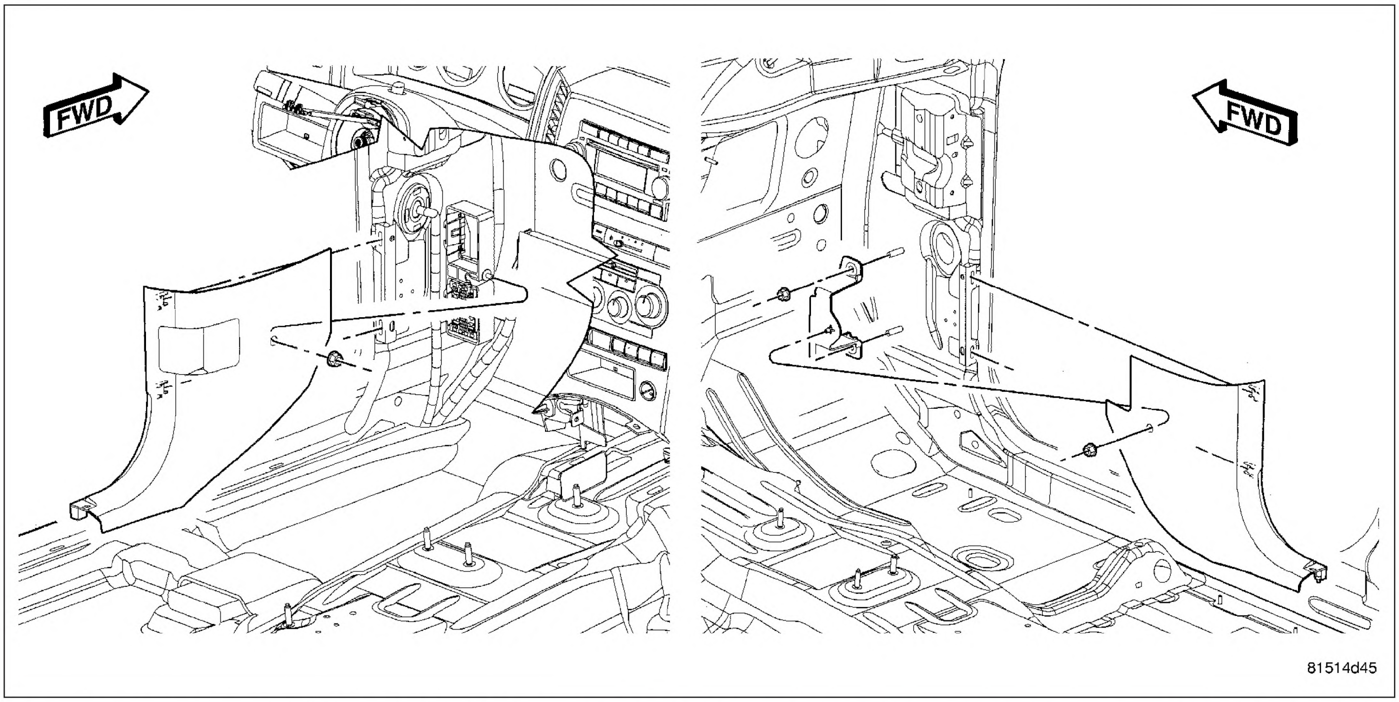
COWL TRIM

REMOVAL



1. Remove the front door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL).
2. Remove the hush panel from underneath the instrument panel.
3. Remove the nut that secures the cowl trim panel to the mounting bracket.
4. Remove the cowl trim panel.

INSTALLATION



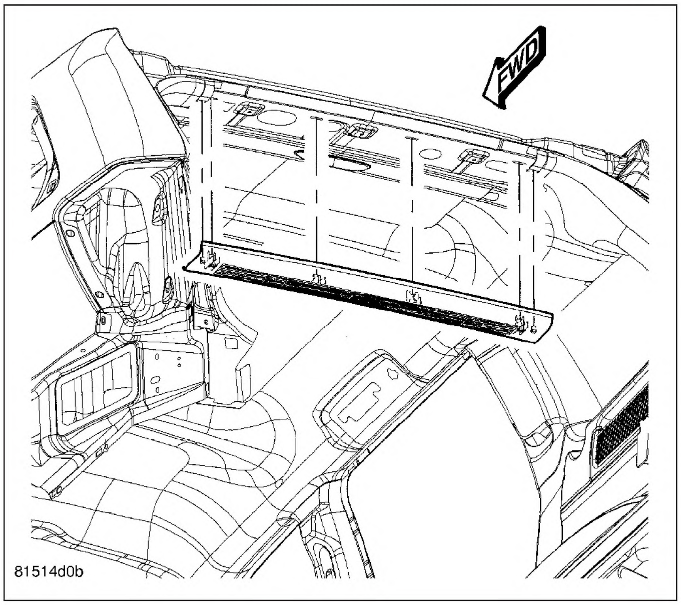
1. Align the fastener hole in the cowl trim panel with the stud on the mounting bracket and then seat the trim panel onto the mounting bracket.

2. Install the nut that secures the cowl trim panel to the mounting bracket.
3. Install the hush panel.
4. Install the front door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION).

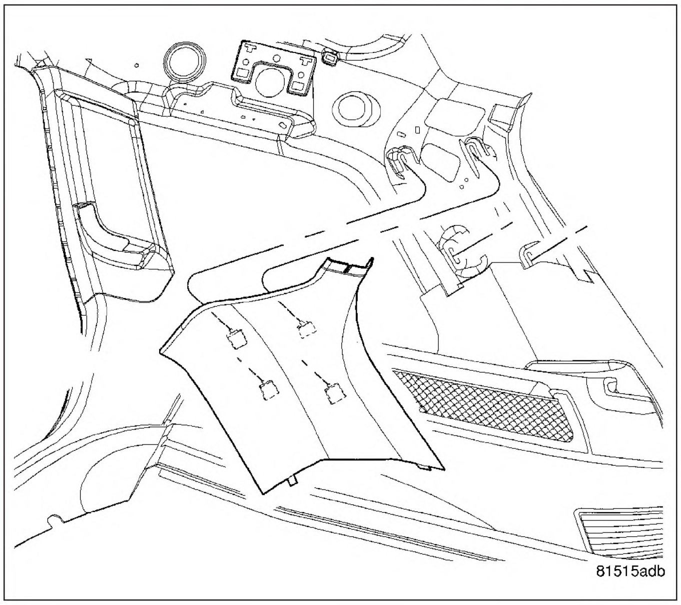
D-PILLAR TRIM

REMOVAL

1. Remove the upper liftgate trim panel, (Refer to 23 - BODY/INTERIOR/LIFTGATE OPENING UPPER TRIM - REMOVAL).

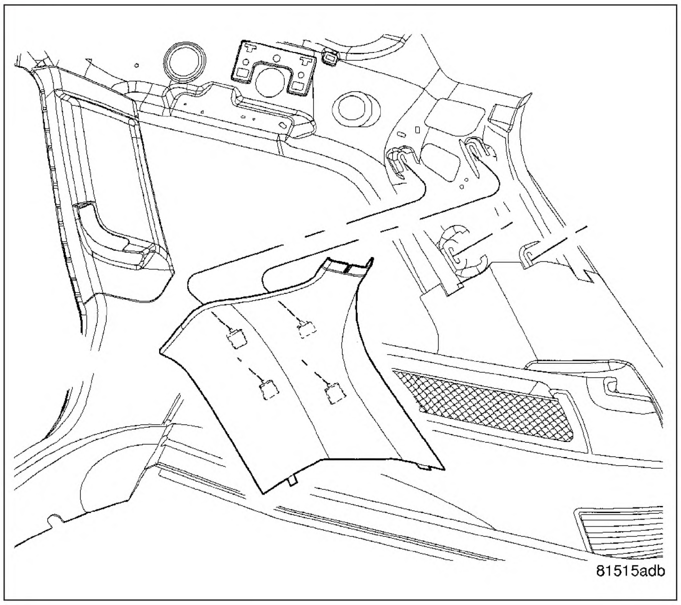


2. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the D-pillar trim panel to the retaining clips in the D-pillar and remove the trim panel.

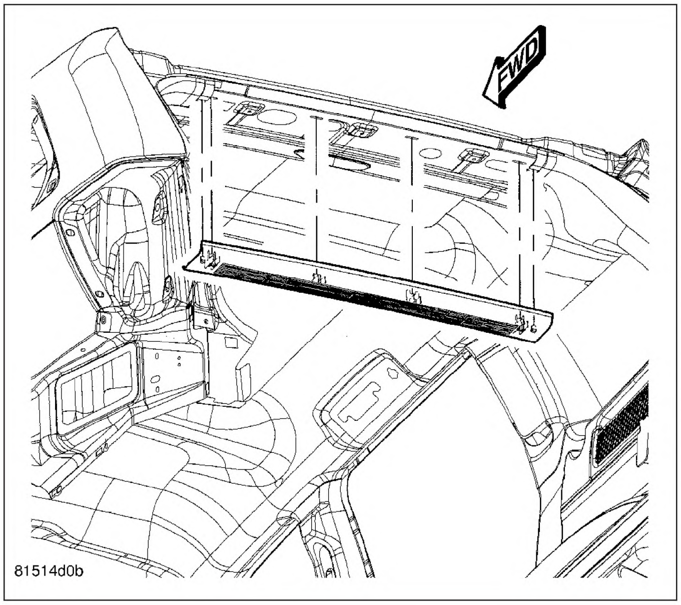


INSTALLATION

1. Position the locating tabs on the bottom of the D-pillar trim panel into the slots in the top of the quarter trim panel.
2. Align the retaining tabs on the D-pillar trim panel with the retaining clips in the D-pillar and engage the retaining tabs that secure the trim panel to the D-pillar.

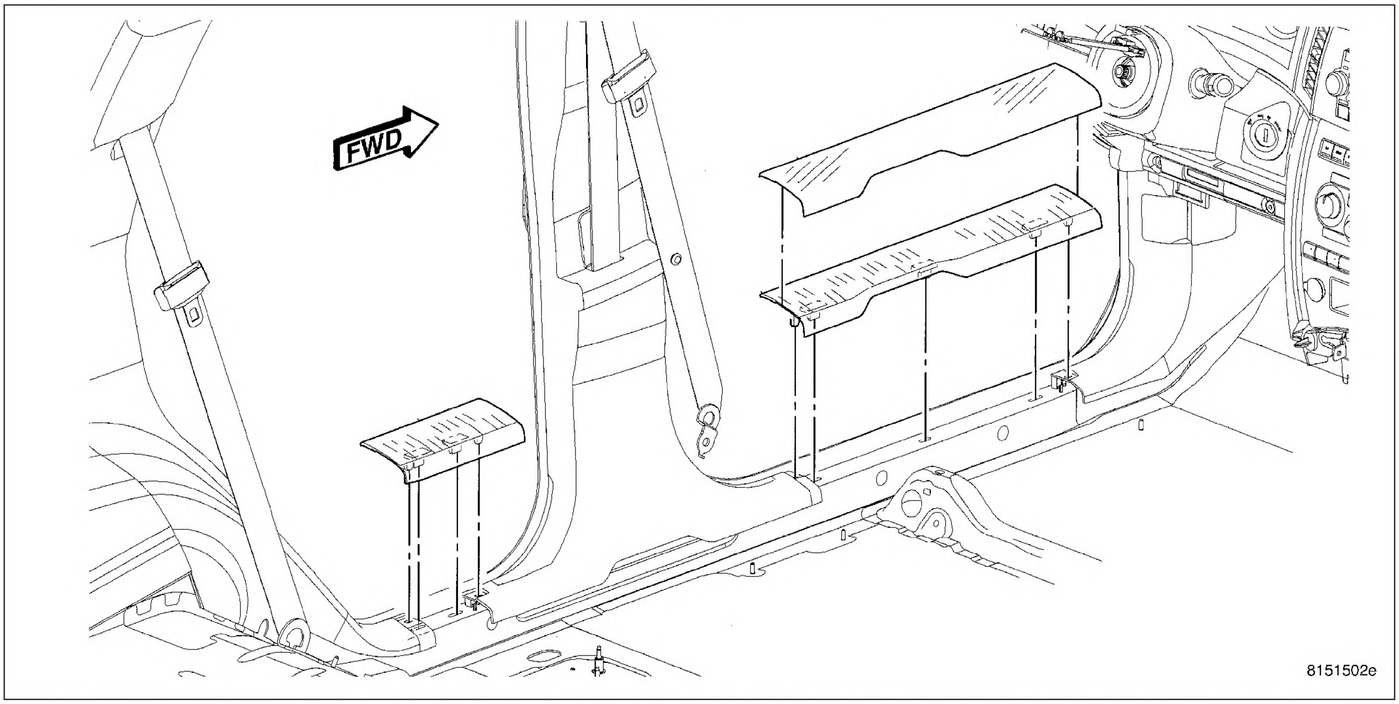


3. Install the upper liftgate trim panel, (Refer to 23 - BODY/INTERIOR/LIFTGATE OPENING UPPER TRIM - INSTALLATION).



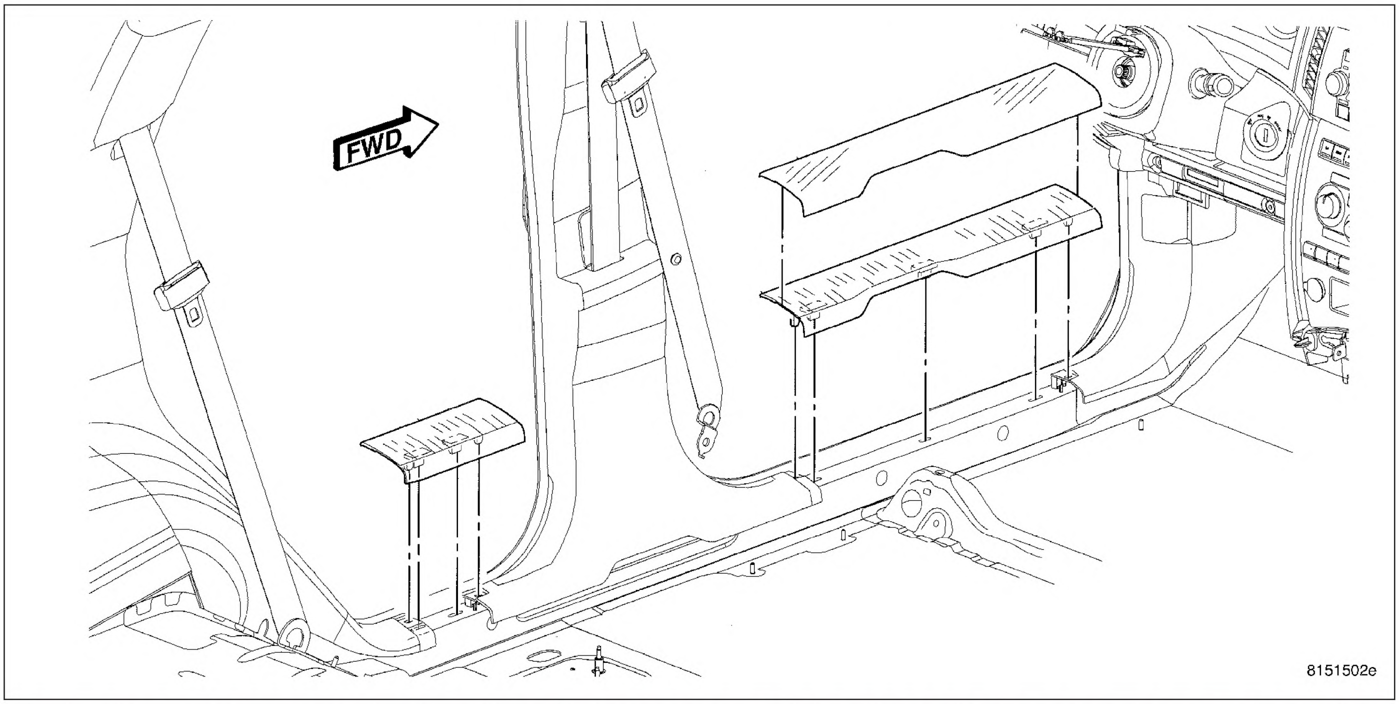
DOOR SILL SCUFF PLATE

REMOVAL



1. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the door sill scuff plate to the retaining clips in the door sill and remove the scuff plate.

INSTALLATION

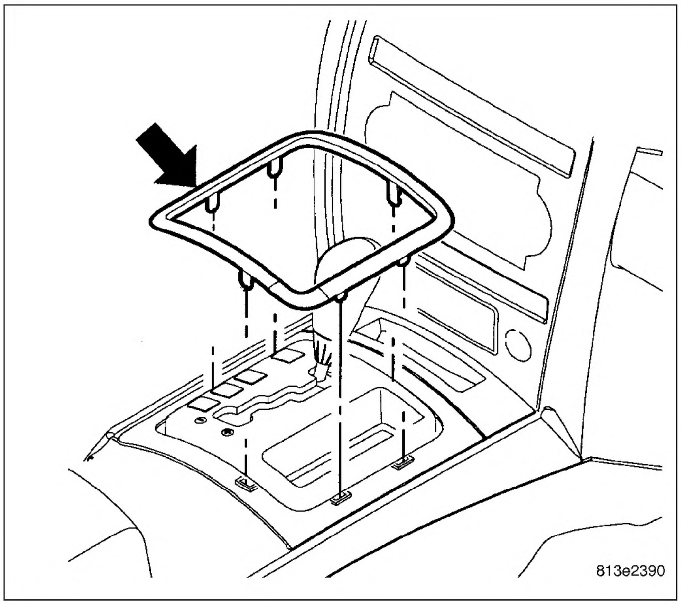


1. Align the retaining tabs on the door sill scuff plate with the retaining clips in the door sill and engage the retaining tabs that secure the scuff plate to the door sill.

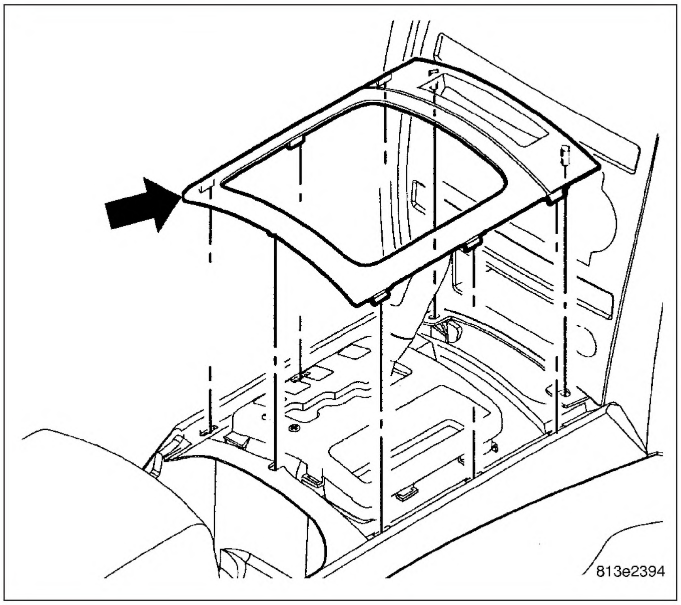
FLOOR CONSOLE

REMOVAL

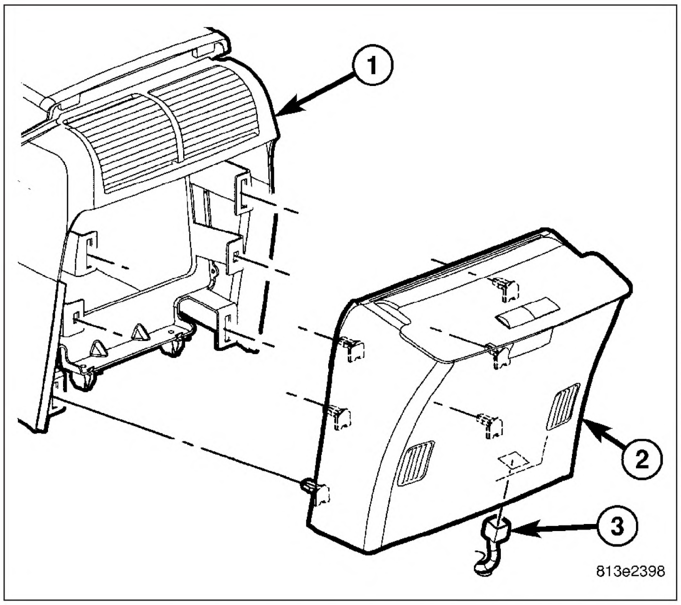
1. Using a trim stick C-4755 or equivalent, remove the shifter bezel ring.



2. Using a trim stick C-4755 or equivalent, remove the shifter bezel.



3. Remove the center console back cover (2) and disconnect the electrical connector (3).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2
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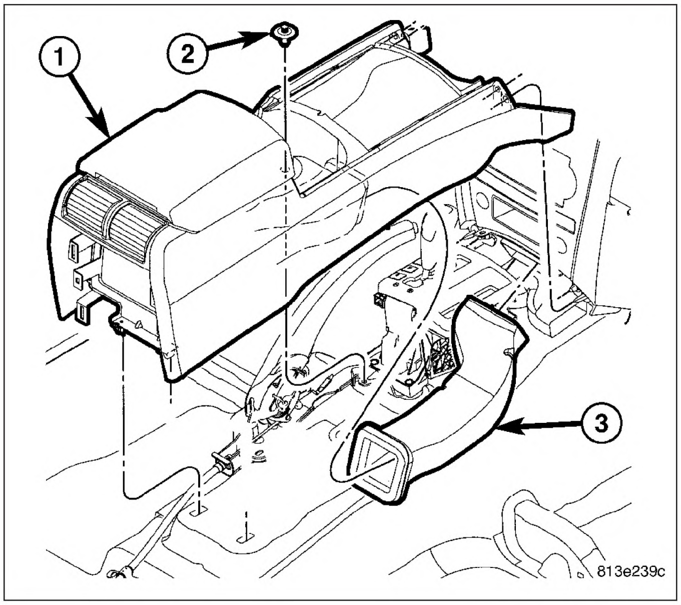
4. Remove the screws (2) and remove the console (1).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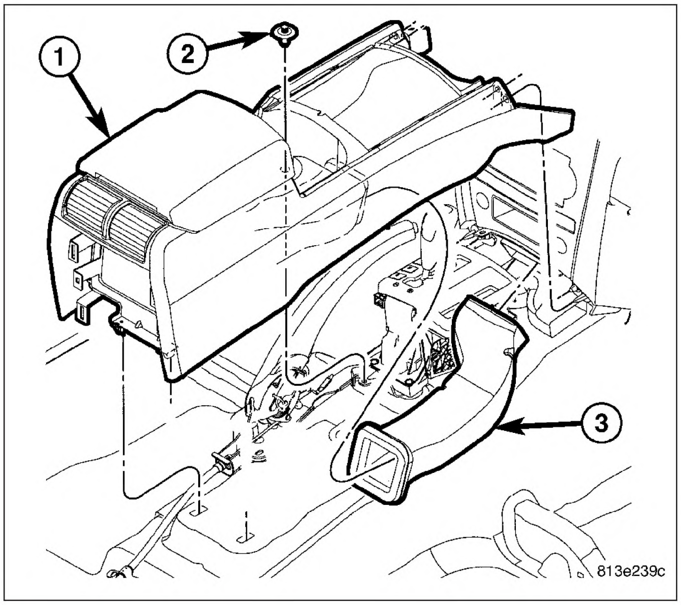
INSTALLATION

1. Position the console (1) into the vehicle and install the screws (2).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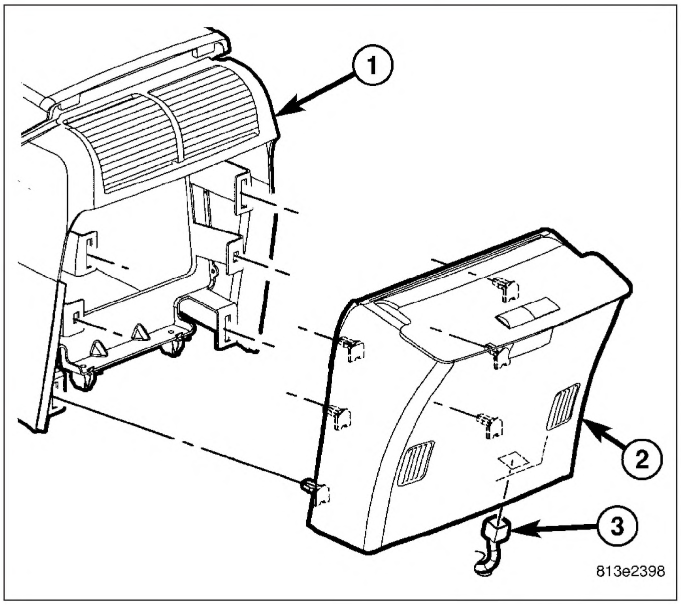
2. Connect the electrical connector (3) and install the rear cover (2) onto the console (1).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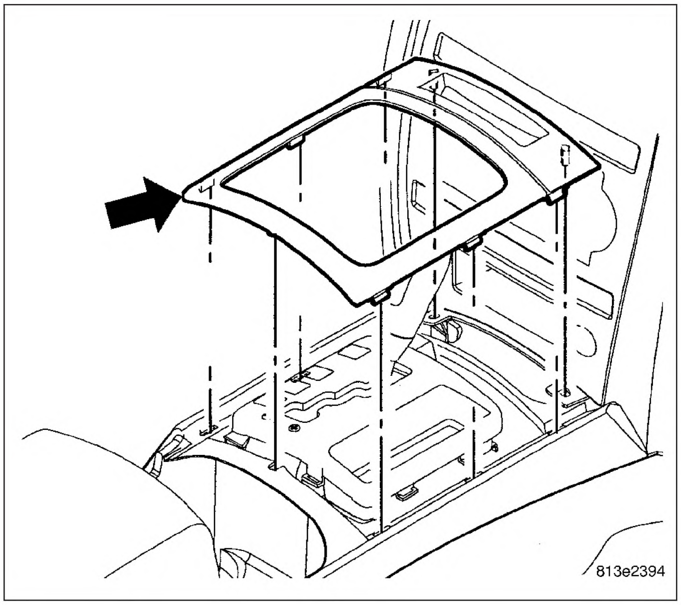
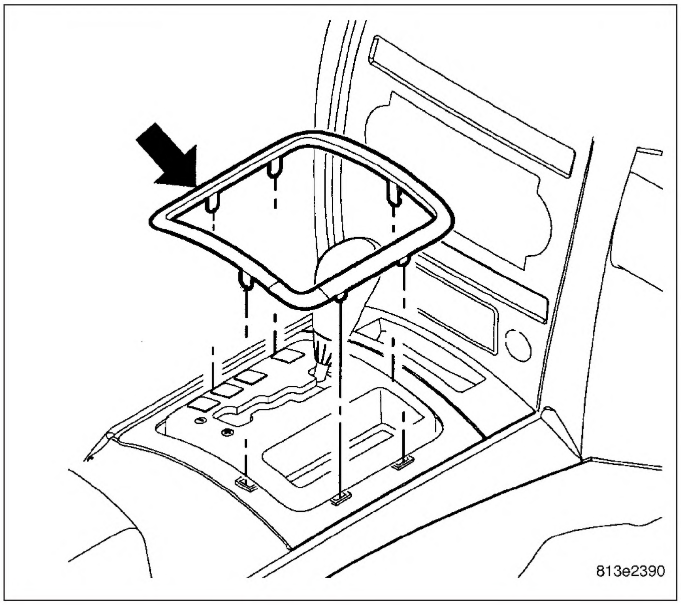
3. Position the shifter bezel and seat fully.



4. Position the shifter bezel trim ring and seat fully.



HEADLINER

REMOVAL

1. Remove the A-pillar trim panels, (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).
2. Remove the upper B-pillar trim panels, (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).
3. Remove the upper C-pillar trim panels, (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - REMOVAL).
4. Remove the upper liftgate trim panel, (Refer to 23 - BODY/INTERIOR/LIFTGATE OPENING UPPER TRIM - REMOVAL).
5. Remove the D-pillar trim panels, (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - REMOVAL).
6. Pull the top of each door seal downward slightly.
7. Fold the rear passenger seats down.
8. Disconnect the headliner wire harness connector located at the left A-pillar.
9. If equipped, disconnect the headliner wire harness connector(s) from the inside rear view mirror.
10. If equipped, disconnect the headliner wire harness connector from the rain sensor.
11. Remove the overhead console, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).
12. Remove the sun visors, (Refer to 23 - BODY/INTERIOR/SUN VISOR - REMOVAL).
13. Remove the sun visor supports, (Refer to 23 - BODY/INTERIOR/SUN VISOR SUPPORT - REMOVAL)
14. Remove the grab handles above each rear passenger door, (Refer to 23 - BODY/INTERIOR/ASSIST HANDLE - REMOVAL).
15. Lower the rear of the headliner downward from the roof panel and disconnect the rear washer hose.
16. Disconnect the headliner wire harness connector located at the left D-pillar.
17.

CAUTION: Be careful not to crease the headliner.Lower the front of the headliner downward and remove the headliner through the liftgate door opening.

INSTALLATION

1.

CAUTION: Be careful not to crease the headliner.Position the headliner in the vehicle through the liftgate door opening.

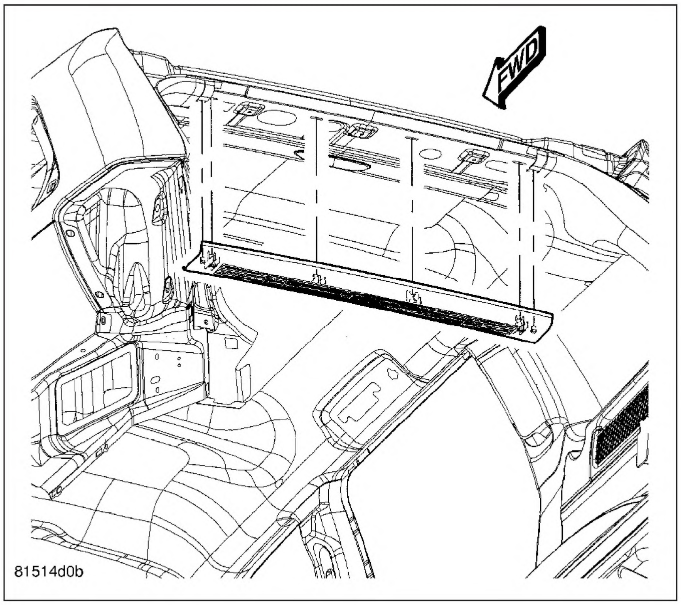
2. Connect the headliner wire harness connector located at the left D-pillar.
3. Connect the rear washer hose.
4. Raise the rear of the headliner upward.
5. Raise the front of the headliner upward and install the sun visor supports, (Refer to 23 - BODY/INTERIOR/SUN VISOR SUPPORT - INSTALLATION).
6. Install the sun visors, (Refer to 23 - BODY/INTERIOR/SUN VISOR - INSTALLATION).
7. Install the overhead console, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).
8. If equipped, connect the headliner wire harness connector(s) to the inside rear view mirror.
9. If equipped, connect the headliner wire harness connector to the rain sensor.
10. Connect the headliner wire harness connector located at the left A-pillar.
11. Install the grab handle above each rear passenger door, (Refer to 23 - BODY/INTERIOR/ASSIST HANDLE - INSTALLATION).
12. Install the A-pillar trim panels, (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).
13. Install the upper B-pillar trim panels, (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).
14. Install the upper C-pillar trim panel, (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - INSTALLATION).
15. Install the D-pillar trim panels, (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - INSTALLATION).

16. Install the upper liftgate trim panel, (Refer to 23 - BODY/INTERIOR/LIFTGATE OPENING UPPER TRIM - INSTALLATION).
17. Seat the top of each of door seal to the door opening.
18. Place the rear passenger seats in the upright position.

LIFTGATE OPENING UPPER TRIM

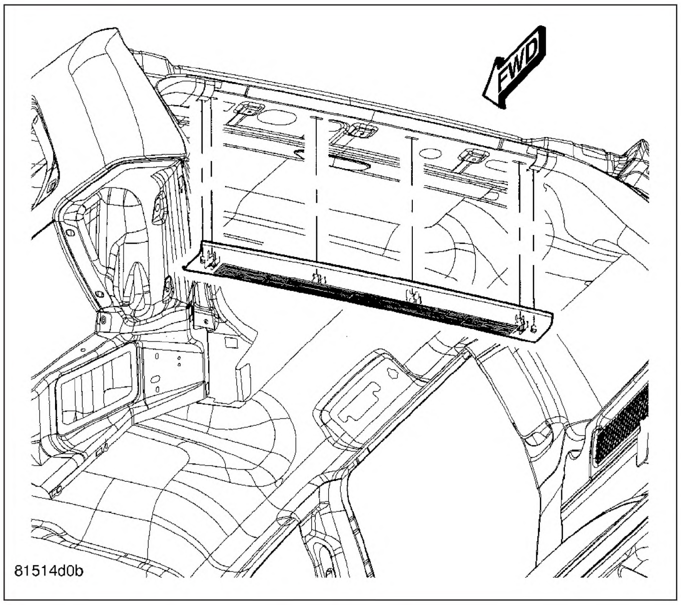
REMOVAL

1. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the upper liftgate trim panel to the retaining clips in the liftgate opening and remove the trim panel.



INSTALLATION

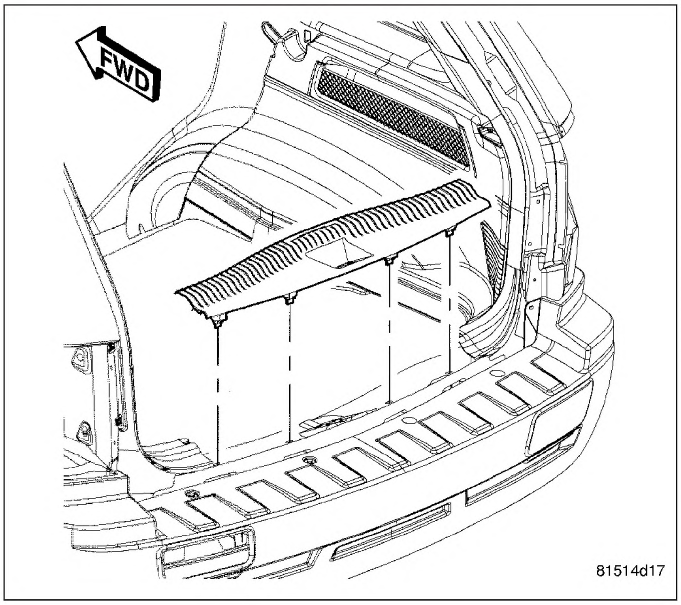
1. Align the retaining tabs on the upper liftgate trim panel with the retaining clips in the liftgate opening and engage the retaining tabs that secure the trim panel to the liftgate opening.



LIFTGATE SCUFF PLATE

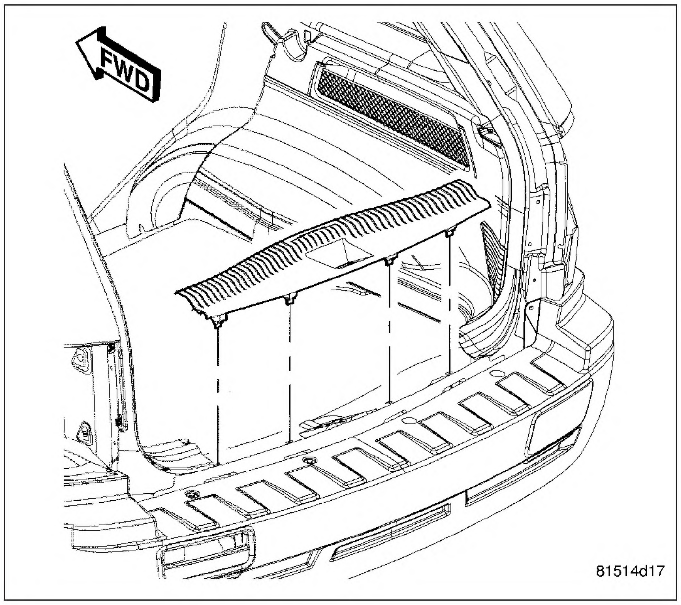
REMOVAL

1. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the liftgate scuff plate to the liftgate door sill and remove the scuff plate.



INSTALLATION

1. Position the liftgate scuff plate to the liftgate door sill and engage the retaining tabs that secure the scuff plate to the door sill.



LOAD FLOOR

REMOVAL

1. Remove the liftgate scuff plate, (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - REMOVAL).
2. Remove the two nuts that secure the load floor to the floor panel.
3. Remove the load floor.

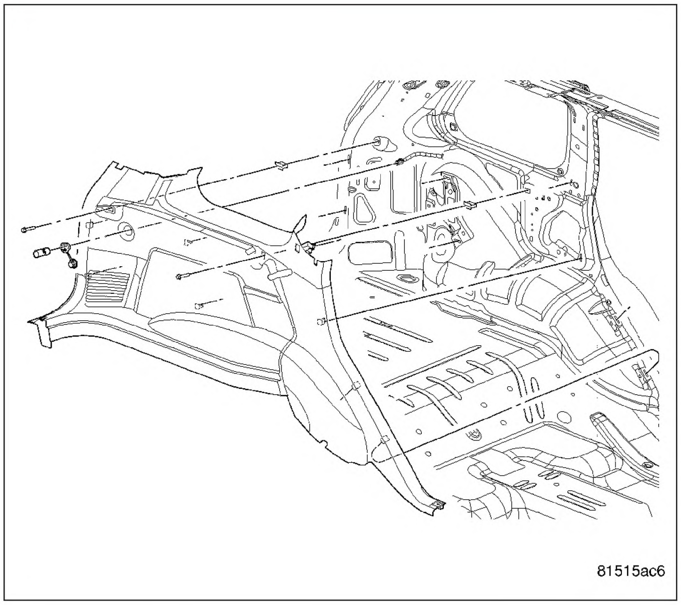
INSTALLATION

1. Position the load floor in the vehicle.
2. Install the two nuts that secure the load floor to the floor panel.

3. Install the liftgate scuff plate, (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - INSTALLATION).

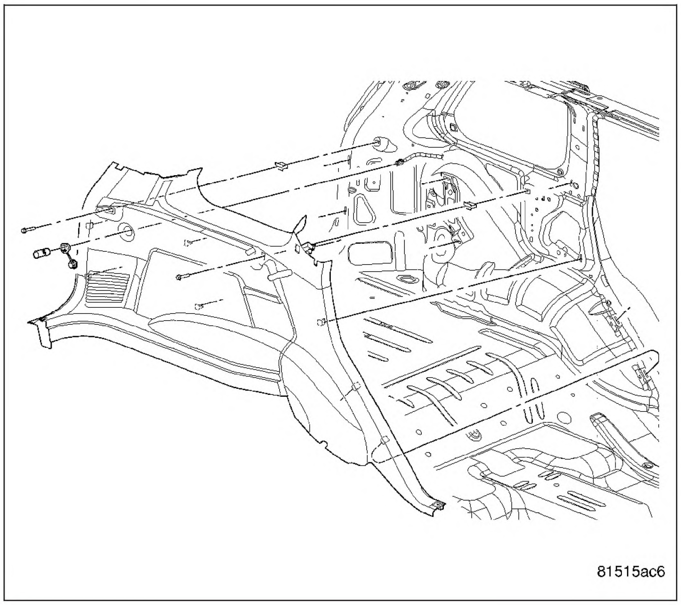
QUARTER TRIM PANEL

REMOVAL


81515ac6

1. Remove the rear passenger seat cushion, (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).
2. Fold the rear passenger seat down.
3. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the upper C-pillar trim panel to the retaining clips in the C-pillar and position the panel and the seat belt out of the way.
4. Remove the rear passenger door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL).
5. If equipped, remove the tonneau cover.
6. Remove the liftgate scuff plate, (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - REMOVAL).
7. Remove the upper liftgate trim panel, (Refer to 23 - BODY/INTERIOR/LIFTGATE OPENING UPPER TRIM - REMOVAL).
8. Remove the D-pillar trim panel, (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - REMOVAL).
9. Remove the load floor, (Refer to 23 - BODY/INTERIOR/LOAD FLOOR - REMOVAL).
10. Remove the two screws that secure the quarter trim panel to the quarter panel.
11. Using a trim stick C-4755 or equivalent, disengage the retaining tabs that secure the quarter trim panel to the quarter panel.
12. Pull the quarter trim panel away from the quarter panel.
13. If equipped, disconnect the power outlet wire harness connector.
14. Remove the quarter trim panel.

INSTALLATION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1. Position the quarter trim panel in the vehicle.
2. If equipped, connect the wire harness connector to the power outlet.
3. Position the flange on the quarter trim panel into the seal ditch and secure the bottom clip first and then the middle clip.
4. Align the two fastener holes in the quarter trim panel with the two fastener holes in the quarter panel and engage the retaining tabs that secure the quarter trim panel to the quarter panel.
5. Install the two screws that secure the quarter trim panel to the quarter panel.
6. Install the load floor, (Refer to 23 - BODY/INTERIOR/LOAD FLOOR - INSTALLATION).
7. Install the D-pillar trim panel, (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - INSTALLATION).

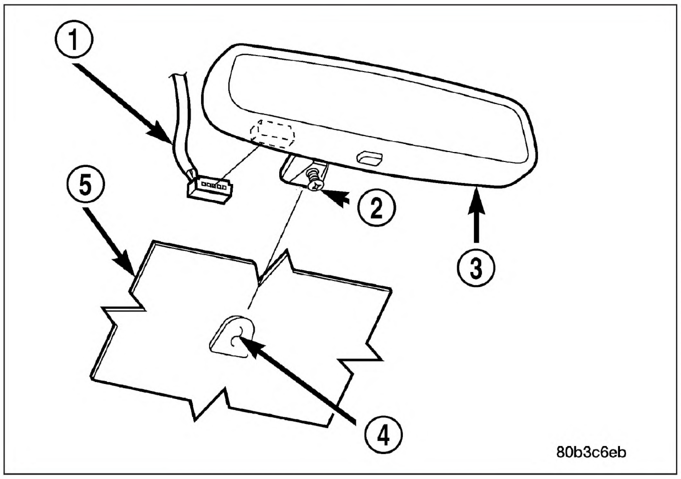
8. Install the upper liftgate trim panel, (Refer to 23 - BODY/INTERIOR/LIFTGATE OPENING UPPER TRIM - INSTALLATION).
9. Install the liftgate scuff plate, (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - INSTALLATION).
10. Position the locating tabs on the bottom of the upper C-pillar trim panel into the slots in the top of the quarter trim panel.
11. Align the retaining tabs on the upper C-pillar trim panel with the retaining clips in the C-pillar and engage the retaining tabs that secure the trim panel to the C-pillar.
12. Place the rear passenger seat in the upright position.
13. Install the rear passenger seat cushion, (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).
14. Install the rear passenger door sill scuff plate, (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION).
15. If equipped, install the tonneau cover.

REAR VIEW MIRROR

REMOVAL

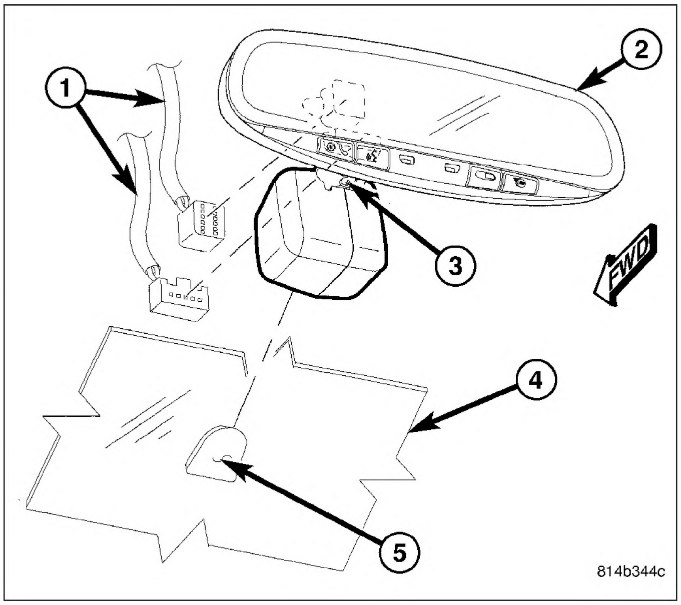
Without Smartbeam

1. If equipped, disconnect the mirror harness connector (1).
2. Loosen the setscrew (2) that secures the mirror base (3) to the bracket (4) on the windshield (5).
3. Slide the mirror base upward and off of the bracket.



With Smartbeam

1. Disconnect mirror harness connectors (1).
2. Loosen the setscrew (3) that secures the mirror base (2) to the bracket (5) on the windshield (4).
3. Slide the mirror base upward and off of the bracket.

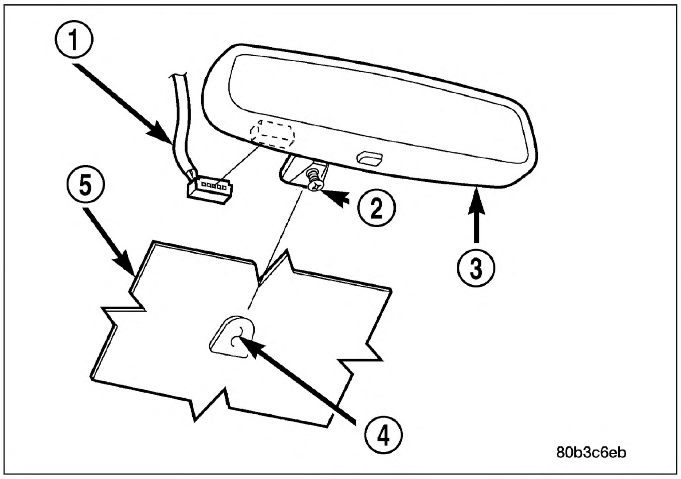


INSTALLATION

INSTALLATION - REAR VIEW MIRROR

Without Smartbeam

1. Position the mirror base (3) on the bracket (4) on the windshield (5) and slide the mirror base downward onto the bracket.
2. Tighten the setscrew (2) to 1 N·m (15 in. lbs.).
3. If equipped, connect mirror harness connector (1).

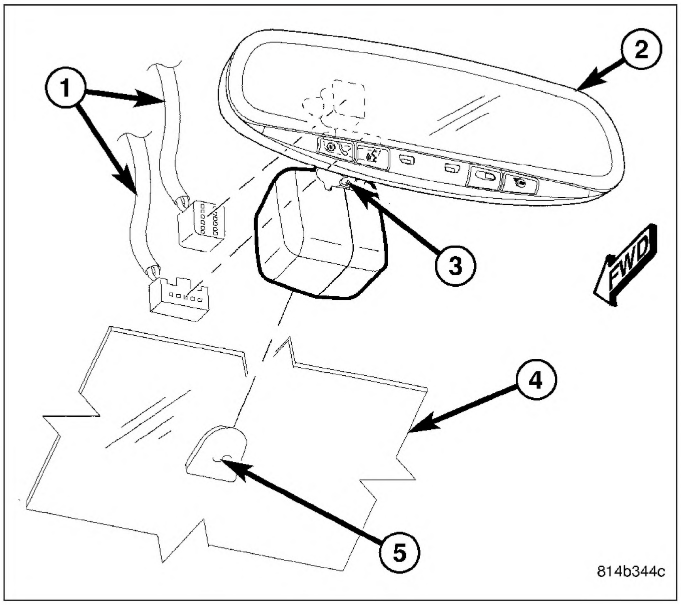


With Smartbeam

1. Position the mirror base (2) on the bracket (5) on the windshield (4) and slide the mirror base downward onto the bracket.
2. Tighten the setscrew (3) to 1 N·m (15 in. lbs.).
3. Connect mirror harness connectors (1).

NOTE: Failure to calibrate the Smartbeam camera may diminish system performance and cause Diagnostic Trouble Codes (DTCs) to set.

4. Perform the Smartbeam System Calibration Procedure, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/SMARTBEAM - STANDARD PROCEDURE).



INSTALLATION - REAR VIEW MIRROR SUPPORT BRACKET

1. Mark the position for the mirror bracket on the outside of the windshield glass with a wax pencil.
2. Clean the bracket contact area on the glass. Use a mild powdered cleanser on a cloth saturated with isopropyl (rubbing) alcohol. Finally, clean the glass with a paper towel dampened with alcohol.
3. Sand the surface on the support bracket with fine grit-sandpaper. Wipe the bracket surface clean with a paper towel.
4. Apply accelerator to the surface on the bracket according to the following instructions:
    a. Crush the vial to saturate the felt applicator.
    b. Remove the paper sleeve.
    c. Apply accelerator to the contact surface on the bracket.
    d. Allow the accelerator to dry for five minutes.
    e. Do not touch the bracket contact surface after the accelerator has been applied.
5. Apply adhesive accelerator to the bracket contact surface on the windshield glass. Allow the accelerator to dry for one minute. Do not touch the glass contact surface after the accelerator has been applied.
6. Install the bracket according to the following instructions:
    a. Apply one drop of adhesive at the center of the bracket contact-surface on the windshield glass.
    b. Apply an even coat of adhesive to the contact surface on the bracket.
    c. Align the bracket with the marked position on the windshield glass.
    d. Press and hold the bracket in place for at least one minute.

NOTE: Verify that the mirror support bracket is correctly aligned, because the adhesive will cure rapidly.

7. Allow the adhesive to cure for 8-10 minutes. Remove any excess adhesive with an alcohol-dampened cloth.
8. Allow the adhesive to cure for an additional 8-10 minutes before installing the mirror.

NOTE: Failure to calibrate the Smartbeam camera may diminish system performance and cause Diagnostic Trouble Codes (DTCs) to set.

9. If equipped, perform the Smartbeam System Calibration Procedure after installing the mirror, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/SMARTBEAM - STANDARD PROCEDURE).

SUN VISOR

REMOVAL

1. Remove the two screws that secure the sun visor to the roof panel and remove the sun visor from the headliner.
2. If equipped, disconnect the illuminated vanity mirror wire harness connector.

INSTALLATION

1. If equipped, connect the illuminated vanity mirror wire harness connector.
2. Position the sun visor on the headliner and install the two screws that secure the sun visor to the roof panel. Tighten the screws to 2.2 N·m (20 in. lbs.).

SUN VISOR SUPPORT

REMOVAL

1. Remove the screw that secures the sun visor support to the roof panel and remove the support from the headliner.

INSTALLATION

1. Position the sun visor support on the headliner and install the screw that secures the support to the roof panel. Tighten the screw to 2.2 N·m (20 in. lbs.).

LIFTGATE

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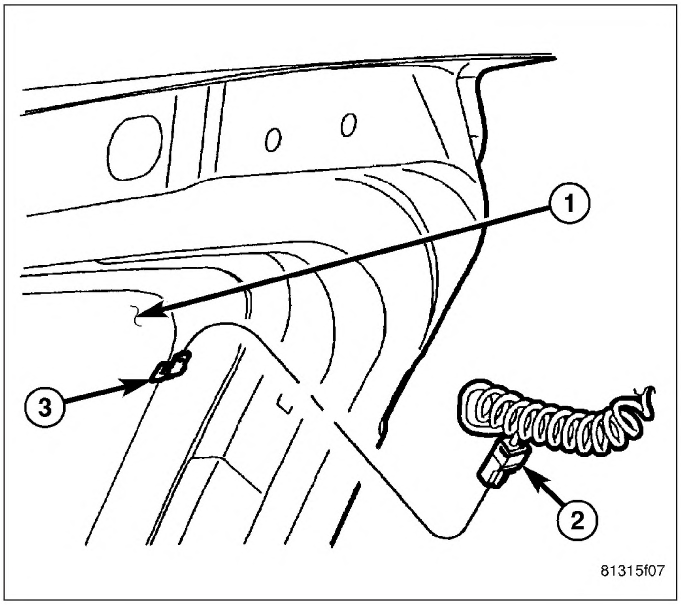
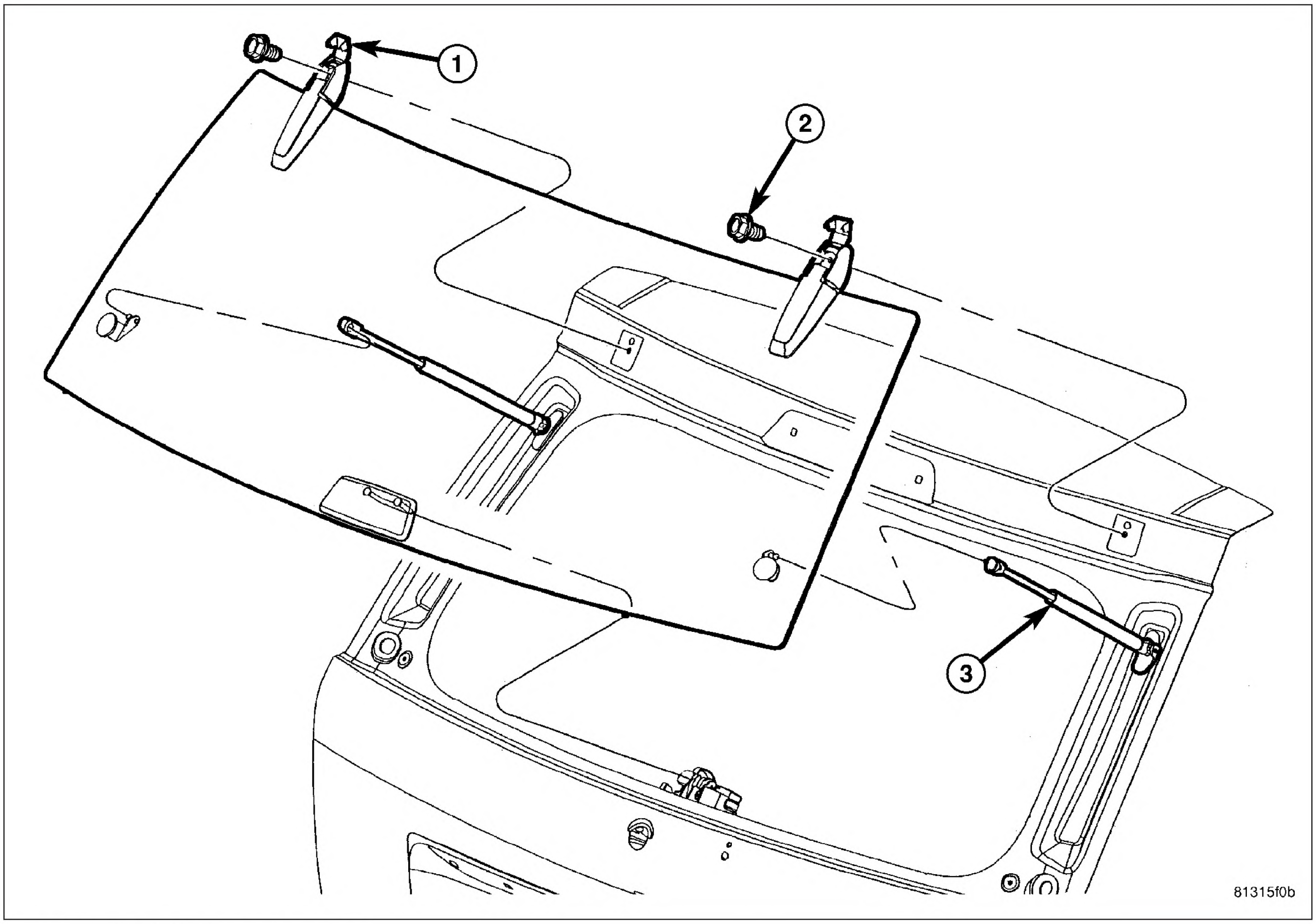
GLASS

REMOVAL

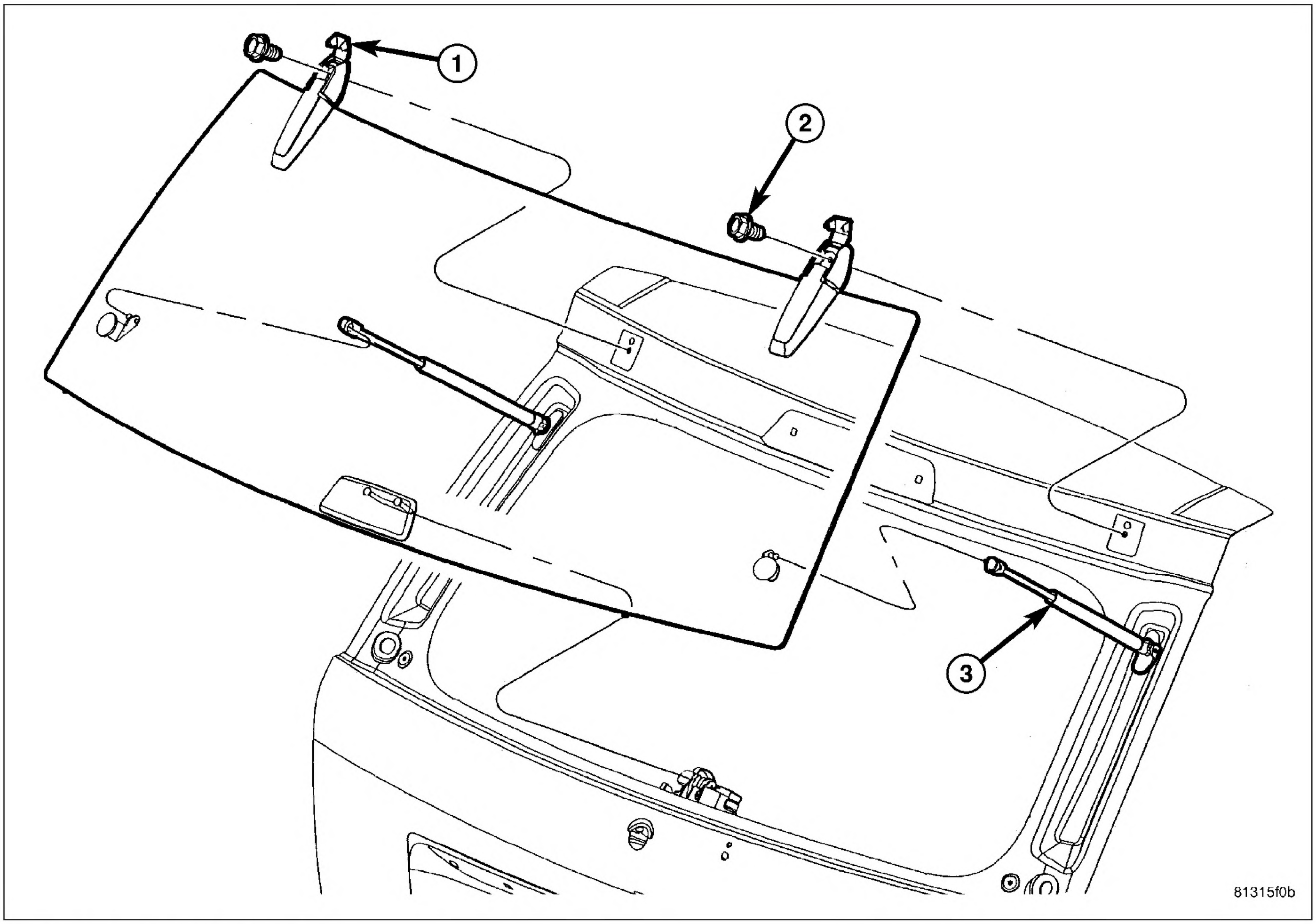
1. Disconnect heated liftgate glass electrical connector (2).



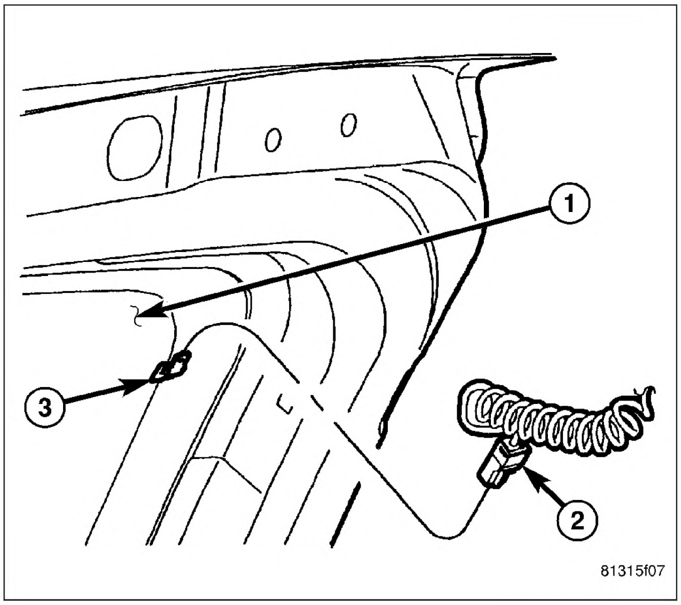


2. Open the liftgate and support.
3. Disconnect liftgate hydraulic cylinders (3) at the lower ball studs.
4. Close liftgate, but not latch in the closed position.
5. Remove hinge covers (1) and remove honge bolts (2).
6. Remove liftgate.

INSTALLATION



1. Position liftgate on vehicle.
2. Install hinge bolts. Center liftgate. Tighten hinge bolts to 7 N·m (60 in. lbs.).
3. Open and support liftgate.
4. Install support cylinders (3) (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/SUPPORT CYLINDER - INSTALLATION).
5. connect heated glass electrical connector (2).
6. Adjust liftgate as necessary (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/FLIP-UP GLASS - ADJUSTMENTS).



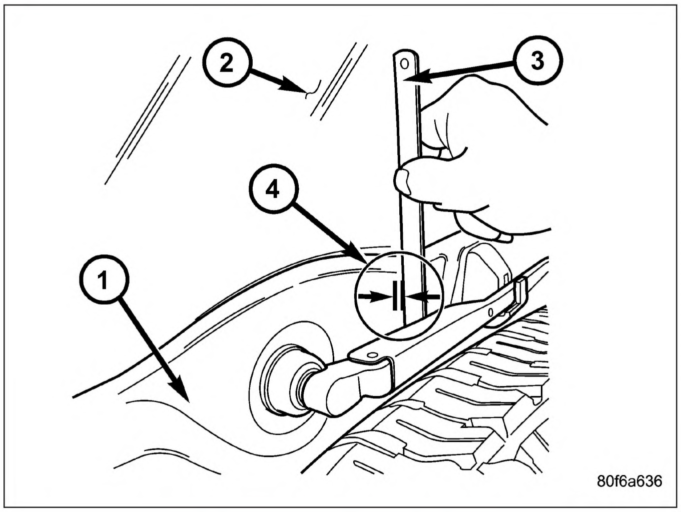
ADJUSTMENTS

ADJUSTMENT

1. Verify that the liftgate is correctly centered in it's opening.
2. Confirm the liftgate adjustment. Hold a straight edge flush against the glass as indicated, and record the gap/space between the straight edge and the liftgate outer vertical panel.

NOTE: The flush specification for the liftgate glass to the outer panel is 0mm - 2mm over flush.

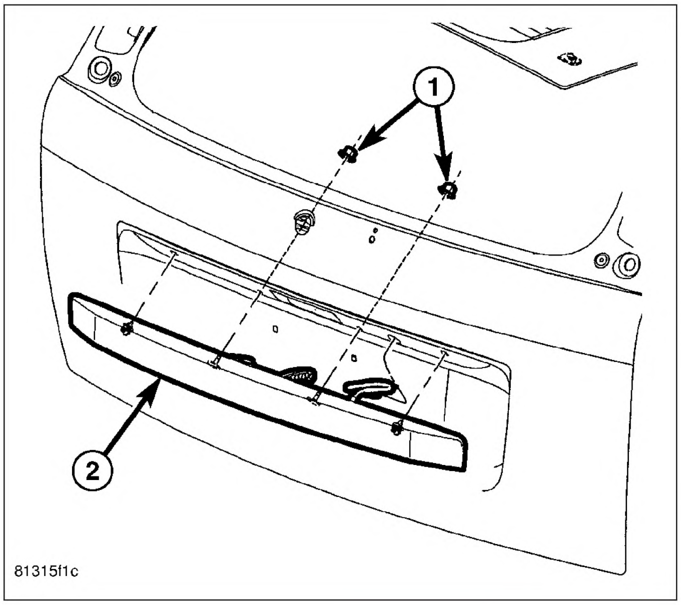
3. If the liftgate needs to be adjusted, loosen the two hinge bolts and move the liftgate in small increments until desired measurement is achieved.
4. Tighten the liftgate hinge bolts 12 N·m (9 ft. lbs.).
5. Verify correct liftgate closing efforts and operation.



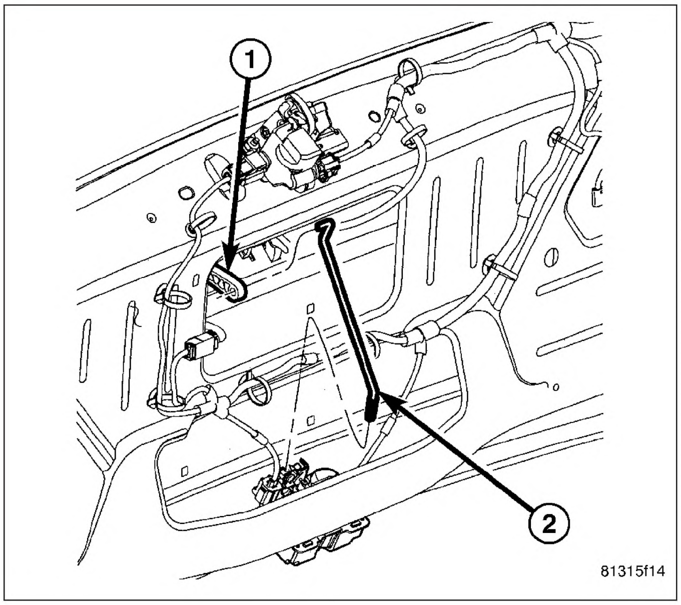
HANDLE

REMOVAL

1. Open the liftgate (4).
2. Disconnect and isolate the battery negative cable.
3. Remove the lower trim panel from the inside of the liftgate. (Refer to 23 - BODY/DECKLID/HATCH/ LIFTGATE/TAILGATE/TRIM PANEL/LOWER - REMOVAL).
4. Disconnect the electrical connector of the latch handle (2) on the inside of the liftgate.
5. Reach through the clearance hole in the inside of the liftgate panel on each side of the latch to access and remove the two nuts (1) that secure the handle to the liftgate.

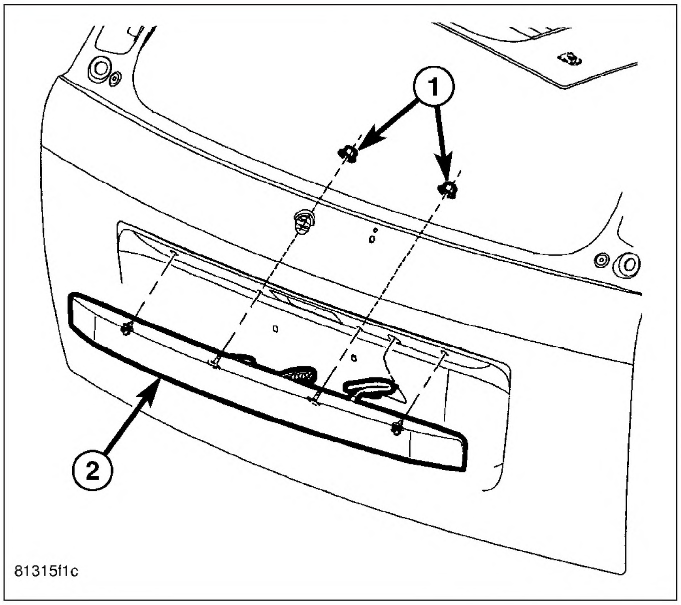


6. Disconnect actuator rod (2) from latch handle.
7. Remove the latch handle from the outside of the liftgate.

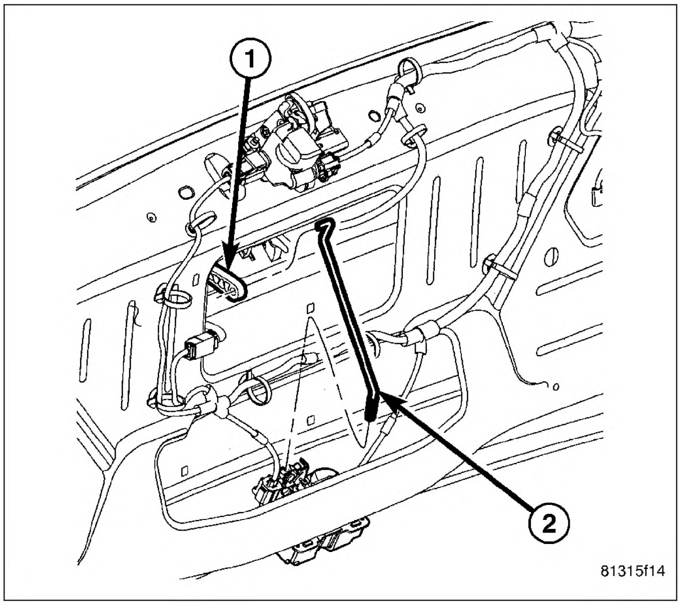


INSTALLATION

1. Position the latch handle (2) onto the outside of the liftgate.
2. Working through the clearance hole in the inside of the liftgate panel, install and tighten the two nuts (1) that secure the handle to the liftgate. Tighten the screws to 9 N·m (7 ft. lbs.).



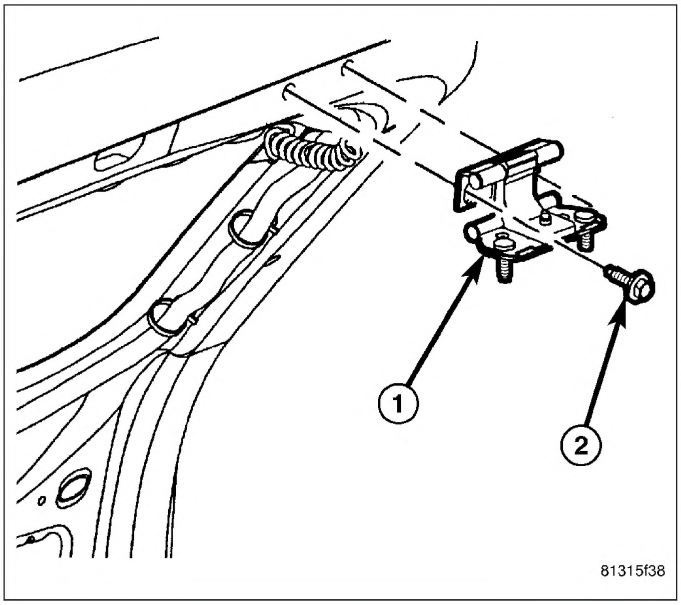
3. Connect actuator rod (2).
4. Connect the electrical connector of the latch handle on the inside of the liftgate.
5. Reinstall the lower trim panel onto the inside of the liftgate. (Refer to 23 - BODY/DECKLID/HATCH/ LIFTGATE/TAILGATE/TRIM PANEL/LOWER - INSTALLATION).
6. Reconnect the battery negative cable.
7. Close the liftgate.



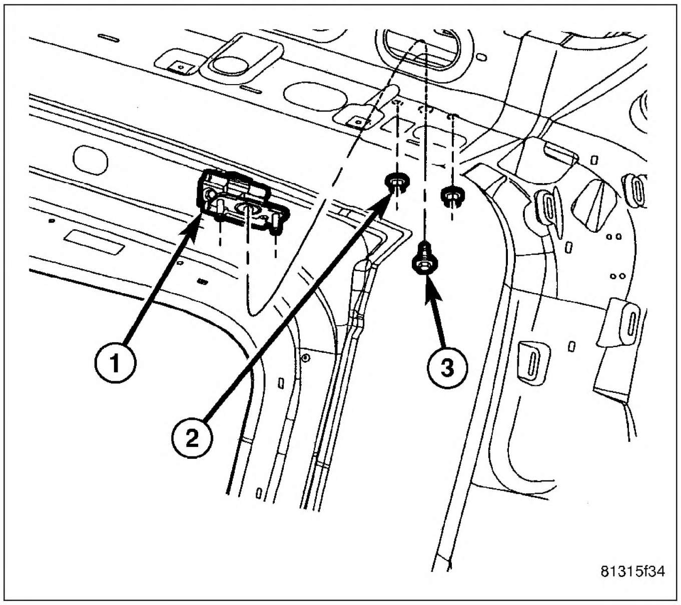
HINGE

REMOVAL

1. Open and support the liftgate (2) with a suitable prop or block.
2. Remove the trim plate from the upper liftgate opening header (4). (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - REMOVAL).
3. Mark the hinge (1) liftgate half location on the liftgate inner panel to aid reinstallation.
4. Remove the two screws (2) that secure the hinge to the liftgate.

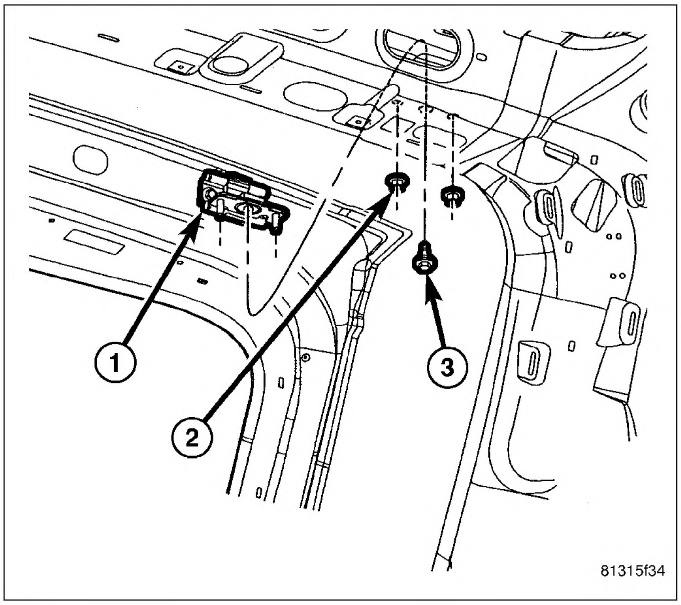


5. Mark the hinge body half location on the upper liftgate opening header to aid reinstallation.
6. Carefully pull the rear edge of the headliner downward from the header far enough to access and remove the two nuts (5) that secure the hinge studs to the underside of the header.
7. Remove the hinge from the vehicle.

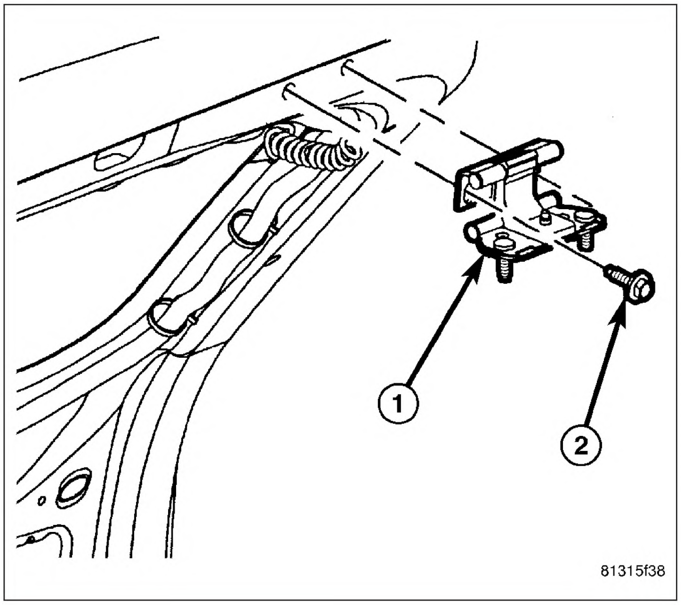


INSTALLATION

1. Position the body half of the liftgate hinge (1) to the upper liftgate opening header (4) on the vehicle.
2. Carefully pull the rear edge of the headliner downward from the header far enough to install and tighten the two nuts (5) that secure the hinge studs to the underside of the header. Tighten the nuts to 28 N·m (21 ft. lbs.).



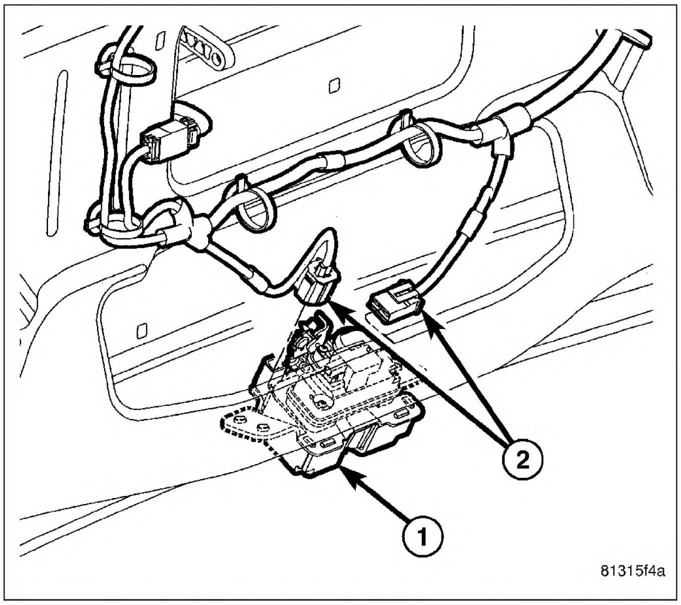
3. Position the liftgate (1) to the liftgate half of the hinge on the vehicle.
4. Install and tighten the two screws (2) that secure the hinge to the liftgate. Tighten the screws to 28 N·m (21 ft. lbs.).
5. Remove the support from the liftgate.
6. Adjust the liftgate hinge position as necessary to achieve proper spacing and operation.
7. Reinstall the trim plate onto the upper liftgate opening header (Refer to 23 - BODY/DECKLID/HATCH/ LIFTGATE/TAILGATE/TRIM PANEL - INSTALLATION).



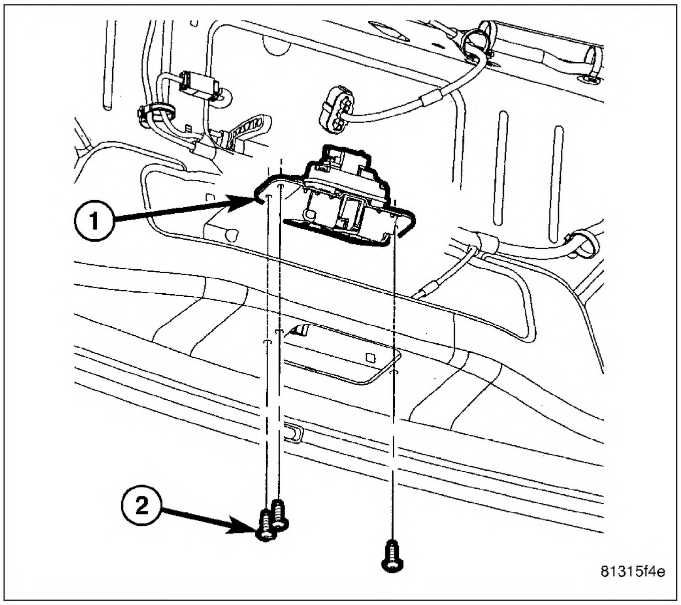
LATCH

REMOVAL

1. Open the liftgate.
2. Disconnect and isolate the battery negative cable.
3. Remove the lower trim panel from the inside of the liftgate (1). (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - REMOVAL).
4. Disconnect the electrical connectors of the latch (2).

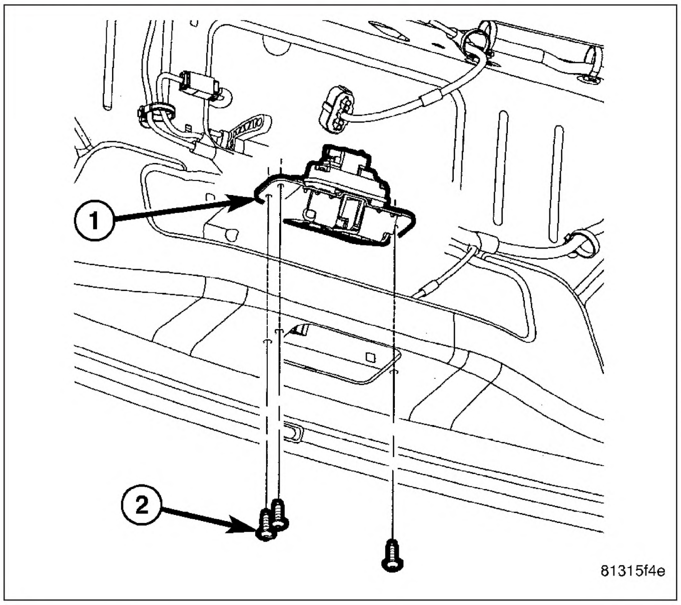


5. Remove the three scews (2) that secure the latch (1) to the liftgate.
6. Remove the liftgate latch (1) from the vehicle.

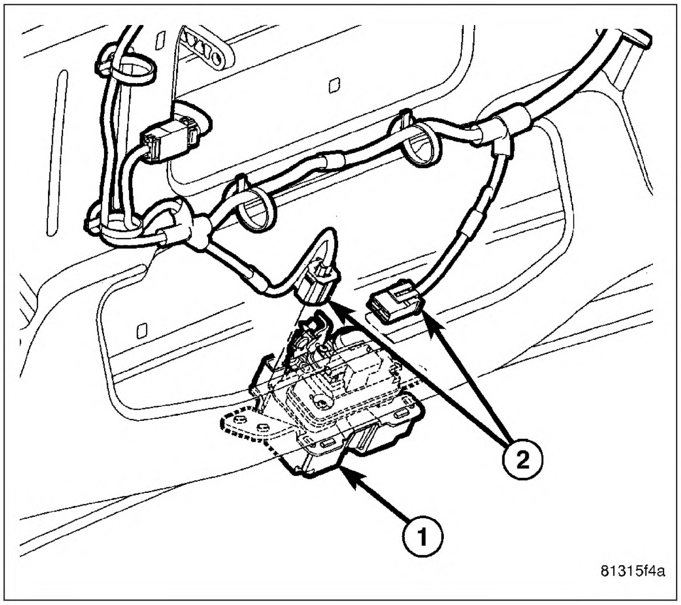


INSTALLATION

1. Position the latch (1) onto the inside of the liftgate.
2. Install and tighten the three bolts (2) that secure the latch (1)to the studs on the inside of the liftgate. Tighten the nuts to 12 N·m (9 ft. lbs.).



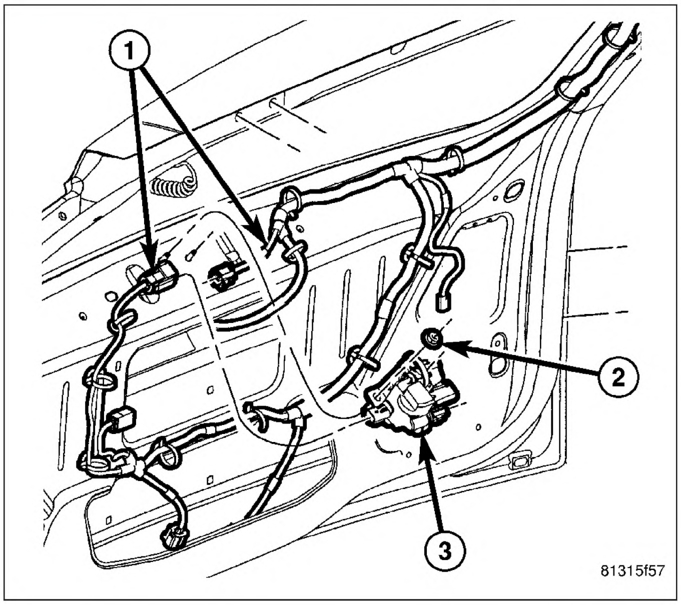
3. Connect electrical connectors (2) to the latch (1).
4. Reinstall the lower trim panel onto the inside of the liftgate. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - INSTALLATION).
5. Reconnect the battery negative cable.
6. Close the liftgate.



LATCH-LIFTGATE GLASS

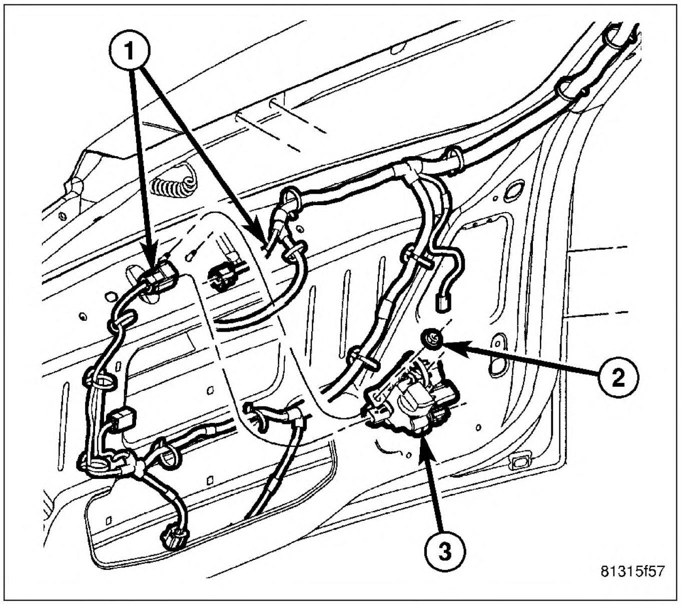
REMOVAL

1. Open the liftgate.
2. Disconnect and isolate the battery negative cable.
3. Remove the lower trim panel from the inside of the liftgate (1). (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - REMOVAL).
4. Disconnect the electrical connectors (1) from the liftgate glass latch (3).
5. Remove the three nuts (2) that secure the latch (3) to the inside of the liftgate.
6. Remove the liftgate glass latch (3) from the vehicle.



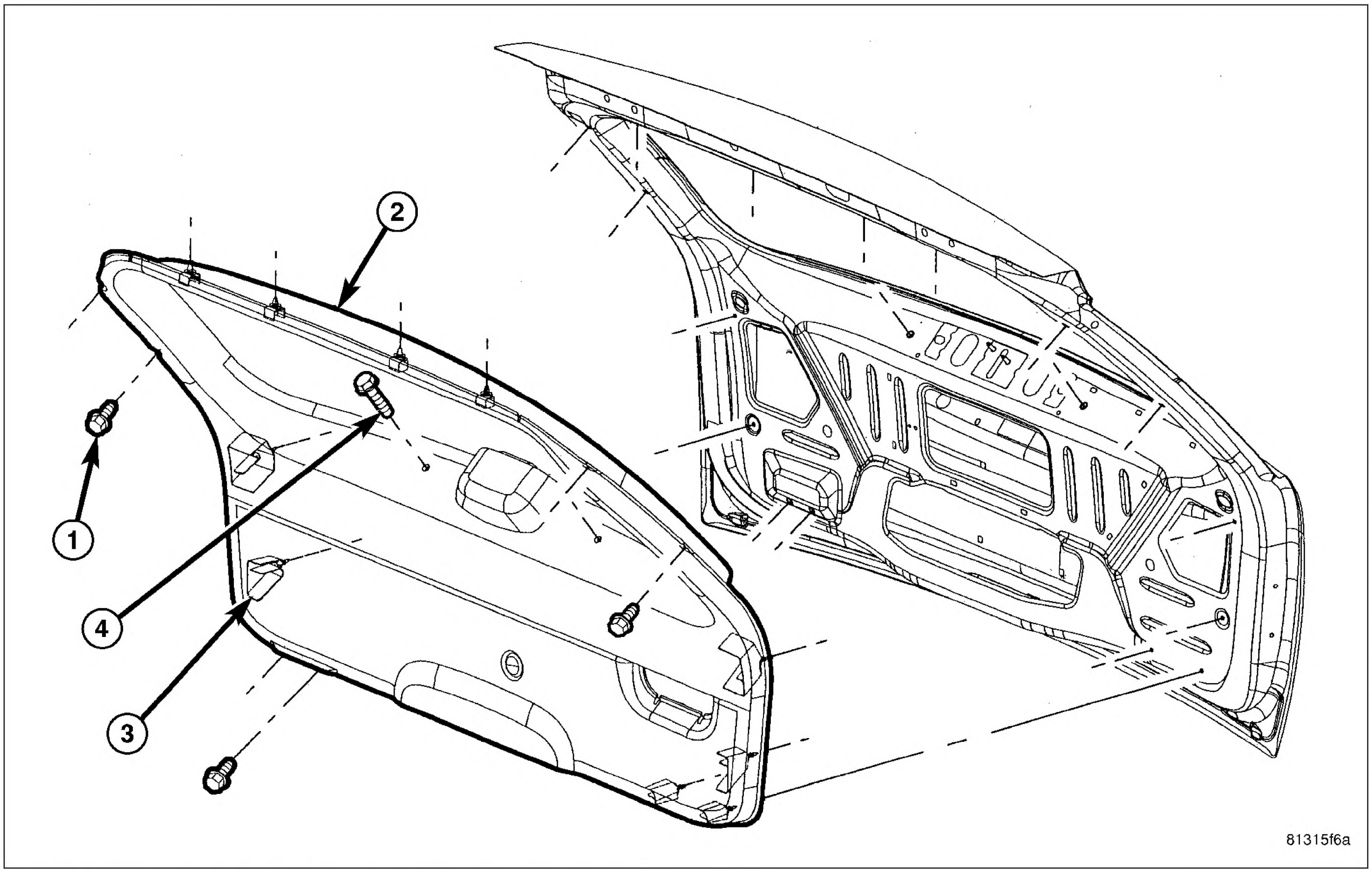
INSTALLATION

1. Position the latch (3) into the inside of the liftgate.
2. Install and tighten the three bolts (2). Tighten the bolts to 12 N·m (9 ft. lbs.).
3. Connect electrical connectors (1) to the latch (3).
4. Install the trim panel onto the inside of the liftgate (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - INSTALLATION).
5. Reconnect the battery negative cable.
6. Close the liftgate.

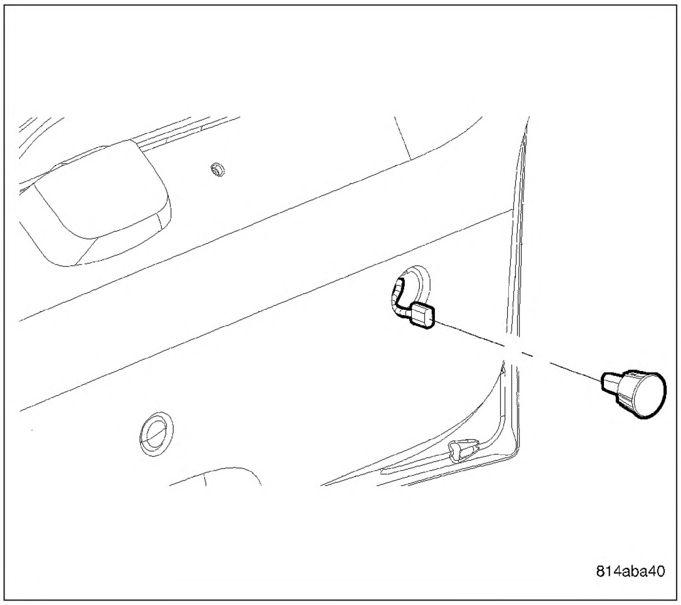


PANEL-TRIM

REMOVAL

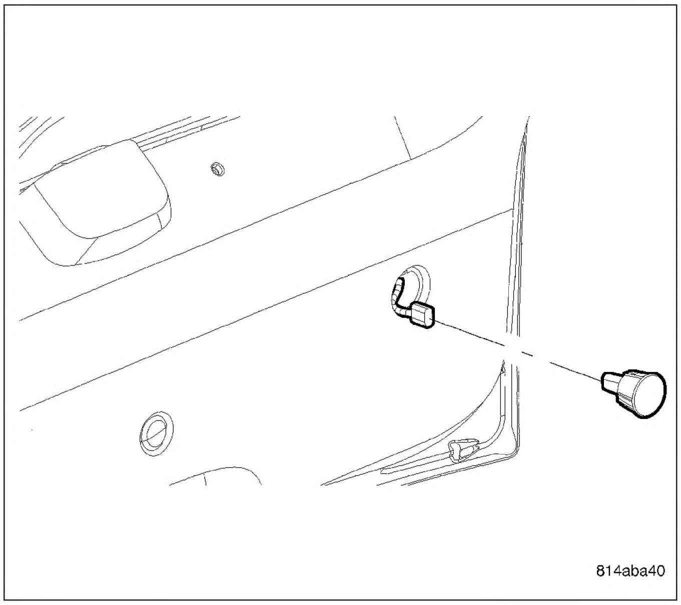


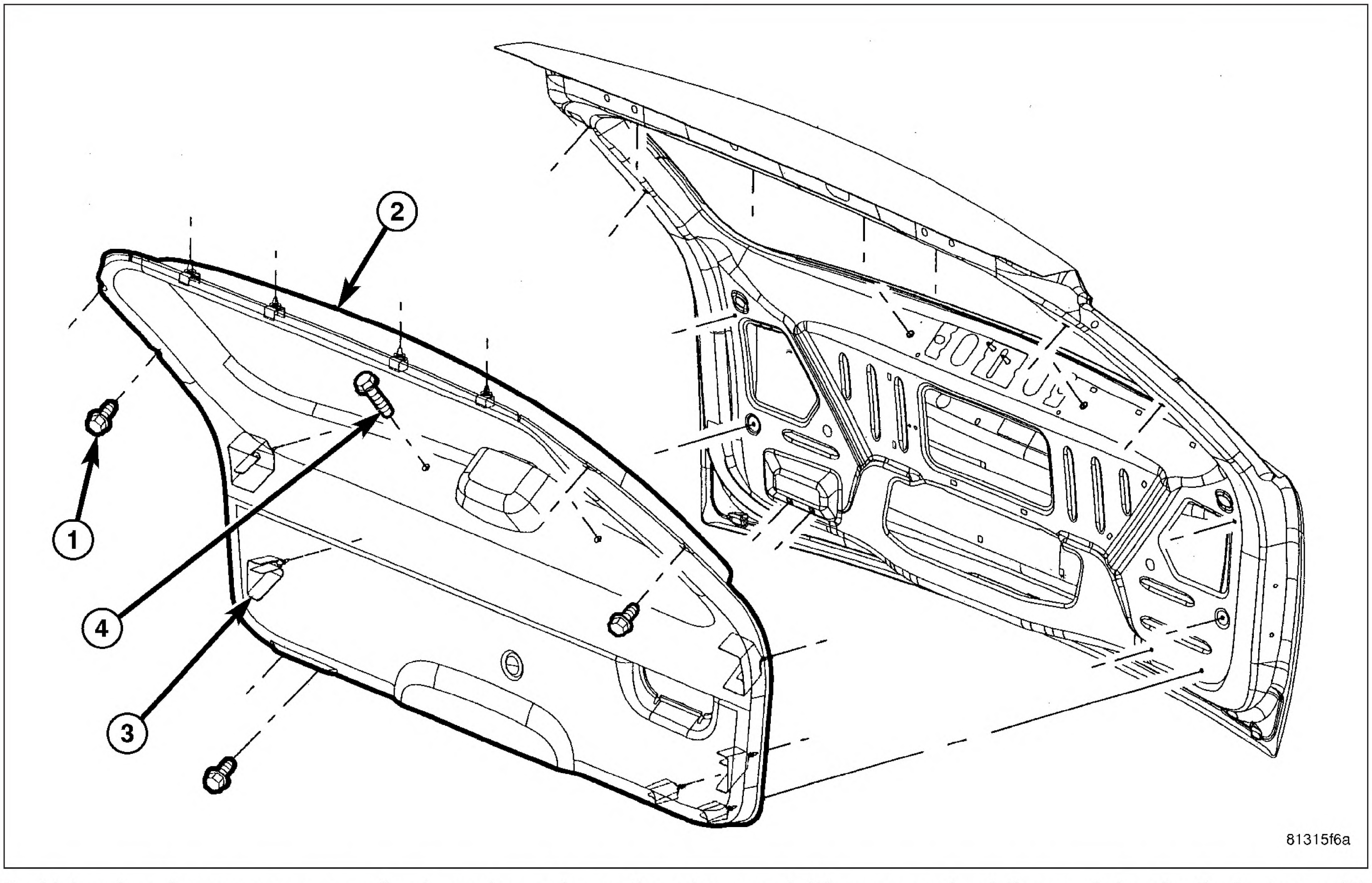
1. Disconnect and isolate the battery negative cable.
2. Remove the srews (1 and 4) from lower trim panel (2).
3. Using a trim stick or another suitable wide flat-bladed tool, carefully pry the trim panel away from the inside of the liftgate to release the push-in plastic fasteners (3) that secure the panel (2) to the liftgate.
4. Disconnect and remove the lamp (2) from the lower liftgate trim panel.
5. Remove the liftgate lower trim panel (2) from the vehicle.



INSTALLATION

1. Check to be certain that the push-in plastic fasteners (3) are properly installed and in good condition on the inside of the trim panel (2).
2. Install the lamp into the liftgate trim panel and connect electrical connector.



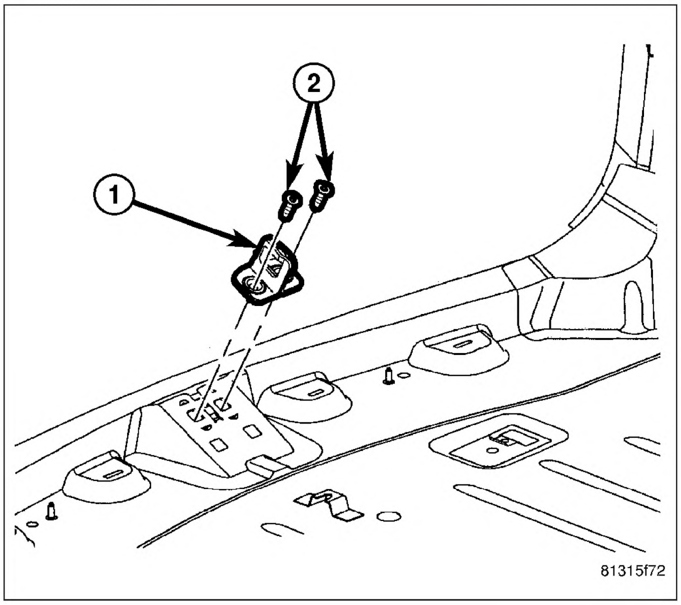


3. Using hand pressure, press firmly and evenly on the trim panel (2) over each of the push-in plastic fastener (3) locations until the fasteners are fully engaged in the holes on the inside of the liftgate.
4. Install and tighten the screws (1 and 4) that secure the trim panel (2) to the inside of the liftgate. Tighten the screws to 3 N·m (27 in. lbs.).
5. Reconnect the battery negative cable.

STRIKER-LATCH

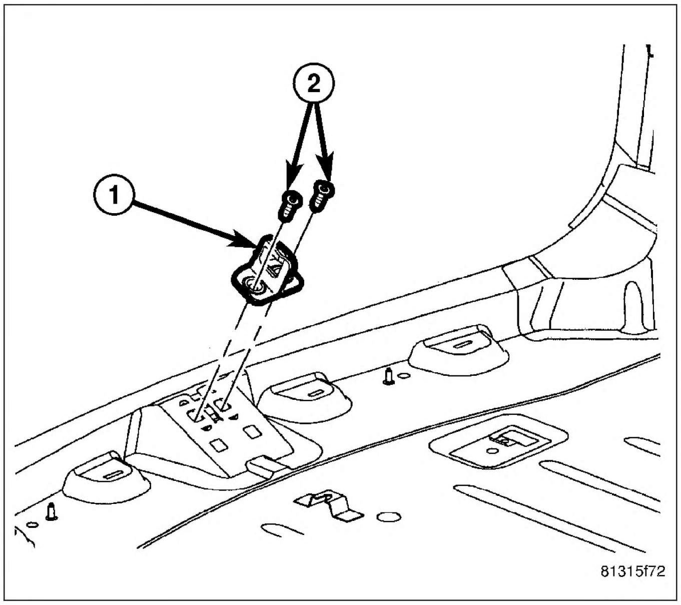
REMOVAL

1. Open the liftgate.
2. Remove the scuff plate trim panel from the inside of the liftgate opening lower panel.
3. Mark the latch striker (1) location on the inside of the liftgate opening lower panel to aid reinstallation.
4. Remove the two screws (2) that secure the latch striker to the inside of the liftgate opening lower panel.
5. Remove the latch striker from the vehicle.



INSTALLATION

1. Position the liftgate latch striker (1) to the inside of the liftgate opening lower panel.
2. Install and tighten the two screws (2) that secure the latch striker to the liftgate opening lower panel. Tighten the screws to 28 N·m (21 ft. lbs.).
3. Adjust the latch striker position as necessary to achieve proper liftgate latch operation.
4. Reinstall the scuff plate trim panel to the liftgate opening lower panel.
5. Close the liftgate.



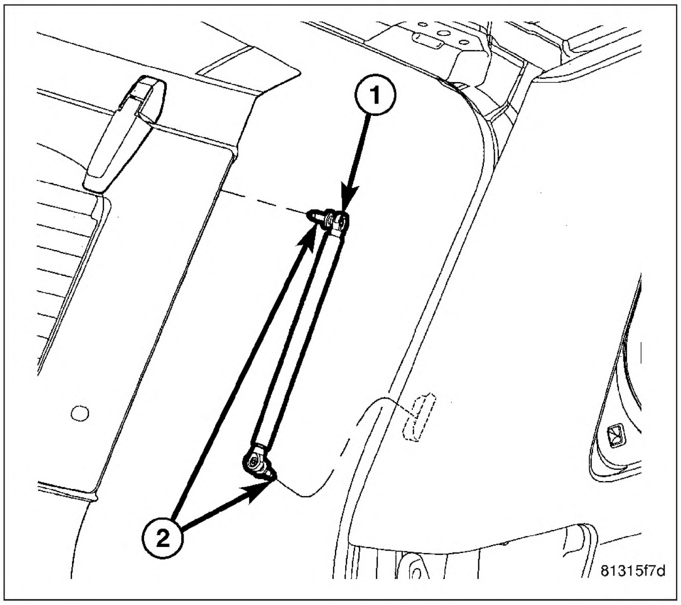
SUPPORT-STRUT

REMOVAL

1. Open and support the liftgate with a suitable prop or block.

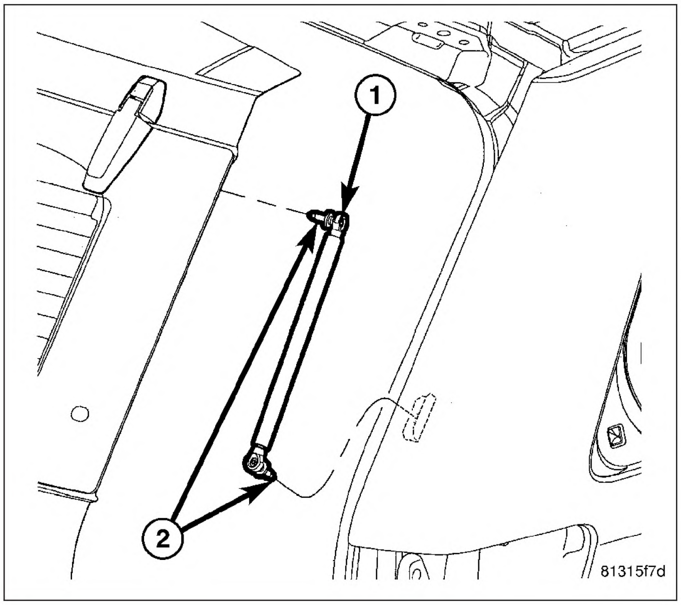
WARNING: To avoid personal injury or death, during service lift the ball socket end retaining clip only far enough to release the socket from the ball stud. Excessive prying or removal of the clip may result in improper clip spring tension. Improper clip tension may result in the support cylinder separating from the ball stud causing sudden, unexpected loss of deck lid support.

2. Insert a small flat-bladed tool into the notch on the outer face of one ball socket end (1) of the support cylinder (1) and carefully pry the retaining clip(2) outward while pulling the ball socket away from the ball stud on the liftgate or the liftgate opening trough.



INSTALLATION

1. Position the ball socket (2) on the rod end of the support cylinder (1) to the ball stud on the liftgate.
2. Using hand pressure, press the ball socket onto the ball stud until the retainer clip snaps into place.
3. Inspect to be certain that the retaining clip on each of the support cylinder ball socket ends is fully seated.
4. Remove the service prop or block and close the liftgate.



PAINT

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PAINT

SPECIFICATIONS - PAINT CODES

EXTERIOR COLORS

EXTERIOR COLOR	DAIMLERCHRYSLER CODE
Deep Lava Red Pearlcoat	ZMQ
Inferno Red Tinted Pearlcoat	WEL
Light Khaki Pearlcoat	AJC
Dark Khaki Pearlcoat	BJT
Deep Beryl Green Pearlcoat	CGV
Shale Green Metallic Clearcoat	XGR
Midnight Blue Pearlcoat	BB8
Bright Silver Metallic Clearcoat	WSB
Brilliant Black Crystal Pearlcoat	AXR
Stone White Clearcoat	SW1
Patriot Blue Pearlcoat	WB7
Graphite Metallic Clearcoat	ZDR

INTERIOR COLORS

INTERIOR COLOR	DAIMLERCHRYSLER CODE
Medium Slate Gray	D5
Khaki	J3
Dark Khaki/Light Graystone	J8/J1

LAREDO FASCIA/CLADDING COLORS

COLOR	DAIMLERCHRYSLER CODE
Deep Gray	ZSP
Taupe	WLP

PAINT CODE

DESCRIPTION

Exterior vehicle body color(s) are identified on the Vehicle Certification Label (Refer to VEHICLE DATA/VEHICLE INFORMATION/VEHICLE CERTIFICATION LABEL - DESCRIPTION) or the Body Code Plate (Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION).

The first digit of the paint code listed on the vehicle indicates the sequence of application, i.e.: P = primary coat, Q = secondary coat. The color names provided in the Paint and Trim Code Description chart are the same color names used on most repair product containers (Refer to 23 - BODY/PAINT - SPECIFICATIONS).

BASECOAT/CLEARCOAT FINISH

DESCRIPTION

The original equipment paint finish is a multi step process that involves cleaning, applying electro de-position (E-coat), anti-chip primer, basecoat, and clearcoat steps.

CAUTION: Do not use abrasive chemicals, abrasive compounds or harsh alkaline based cleaning solvents on the painted surfaces of a vehicle. Failure to follow this caution can result in damage to vehicle finish.

On most vehicles a two-part paint application (basecoat/clearcoat) is used. Color paint that is applied to primer is called basecoat. A clear coat paint is then applied to protect the basecoat from ultraviolet light and to provide a durable high-gloss finish.

PAINT TOUCH-UP

DESCRIPTION

If the painted metal surface of a vehicle becomes scratched or chipped, it should be touched-up as soon as possible to avoid corrosion.

WARNING: Use an OSHA approved respirator and safety glasses when spraying paint or solvents in a confined area. Failure to follow this warning may result in possible personal injury or death.

When repairing painted metal surfaces, for best results, use MOPAR® Scratch Filler/Primer, Touch-Up Paints and Clear Top Coat (Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION) for Body Code Plate information.

STANDARD PROCEDURE

PAINT TOUCH-UP

1. Scrape any loose paint and corrosion from inside the scratch or chip.

WARNING: Avoid prolonged skin contact with petroleum or alcohol–based cleaning solvents. Failure to follow this warning can result in possible personal injury or death.

2. Clean affected area with MOPAR® Tar/Road Oil Remover or equivalent, and allow to dry.
3. Fill the inside of the scratch or chip with a coat of filler/primer. Do not overlap primer onto good surface finish. The applicator brush should be wet enough to puddle-fill the scratch or chip without running. Do not stroke brush applicator on body surface. Allow the filler/primer to dry hard.
4. Cover the filler/primer with color touch-up paint. Do not overlap touch-up color onto the original color coat around the scratch or chip. Butt the new color to the original color, if possible. Do not stroke applicator brush on body surface. Allow touch-up paint to dry hard.
5. On vehicles without clearcoat, the touch-up color can be lightly finesse sanded (1500 grit) and polished with rubbing compound.

6. On vehicles with clearcoat, apply clear top coat to touch-up paint with the same technique as described in Step 4. Allow clear top coat to dry hard. If desired, the clearcoat can be lightly finesse sanded (1500 grit) and polished with rubbing compound.

FINESSE SANDING/BUFFING & POLISHING

DESCRIPTION

CAUTION: Do not remove more than 0.5 mils of clearcoat finish when sanding, hand buffing or polishing. Basecoat paint must retain clearcoat for durability.

CAUTION: If the finish has been finesse sanded in the past, it cannot be repeated. Failure to follow this caution can result in damage to vehicle finish.

NOTE: Finesse sanding should only be performed by a trained automotive paint technician.

Minor acid etching, orange peel, or smudging in a clearcoat or single-stage finish can be reduced with light finesse sanding, hand buffing and polishing. Use a Paint Thickness Gauge #PR-ETG-2X or equivalent to determine clearcoat or single-stage paint thickness before and after the repair.

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SEATS

WARNING

RESTRAINT SYSTEM

During and following any seat belt or child restraint anchor service, carefully inspect all seat belts, buckles, mounting hardware, retractors, tether straps, and anchors for proper installation, operation, or damage. Replace any belt that is cut, frayed, or torn. Straighten any belt that is twisted. Tighten any loose fasteners. Replace any belt that has a damaged or inoperative buckle or retractor. Replace any belt that has a bent or damaged latch plate or anchor plate. Replace any child restraint anchor or the unit to which the anchor is integral that has been bent or damaged. Never attempt to repair a seat belt or child restraint component. Always replace damaged or faulty seat belt and child restraint components with the correct, new and unused replacement parts listed in the DaimlerChrysler Mopar parts catalog. Failure to follow these instructions may result in personal injury or death.

On vehicles equipped with airbags, disable the supplemental restraint system before attempting any steering wheel, steering column, airbag, occupant classification system, seat belt tensioner, impact sensor, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the supplemental restraint system. Failure to take the proper precautions could result in accidental airbag deployment. Failure to follow these instructions may result in personal injury or death.

On vehicles equipped with airbags, before performing any welding operations disconnect and isolate the battery negative (ground) cable and disconnect all wire harness connectors from the Airbag Control Module (ACM). Failure to take the proper precautions could result in accidental airbag deployment and other possible damage to the supplemental restraint system circuits and components. Failure to follow these instructions may result in personal injury or death.

Replace all restraint system components only with parts specified in the DaimlerChrysler Mopar parts catalog. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection. Failure to follow these instructions may result in personal injury or death.

The fasteners, screws, and bolts originally used for the restraint system components must never be replaced with any substitutes. These fasteners have special coatings and are specifically designed for the restraint system. Any time a new fastener is needed, replace it with the correct fasteners provided in the

service package or specified in the DaimlerChrysler Mopar parts catalog. Failure to follow these instructions may result in personal injury or death.

On vehicles equipped with the Occupant Classification System (OCS), do not hang any after market devices from the front passengers seat back. Do not install a front drivers seat back cover with map pocket onto the passenger seat. Failure to follow these instructions may result in personal injury or death.

The Seat Weight Sensor is a sensitive, calibrated unit and must be handled carefully. Do not drop or handle roughly. If dropped or damaged, replace with another sensor. Failure to follow these instructions may result in personal injury or death.

The front passenger seat must be handled carefully as well. When removing the seat, be careful when setting on floor not to drop. If dropped, the sensor may be inoperative. Failure to follow these instructions may result in personal injury or death.

When the seat is on the floor, no one should sit in the front passenger seat. This uneven force may damage the sensing ability of the seat weight sensors. If sat on and damaged, the sensor may be inoperative. Failure to follow these instructions may result in personal injury or death.

ADJUSTERS-FRONT

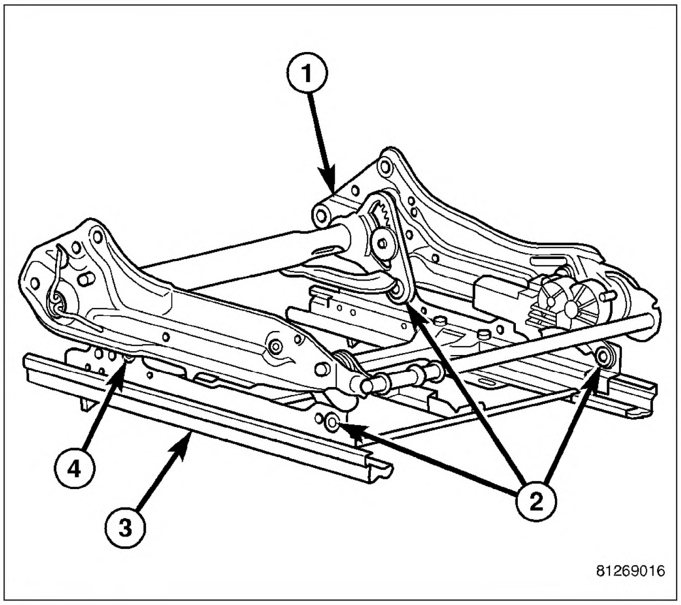
REMOVAL

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Remove the seat cushion as necessary. (Refer to 23 - BODY/SEATS/SEAT CUSHION / COVER - FRONT - REMOVAL)

Power

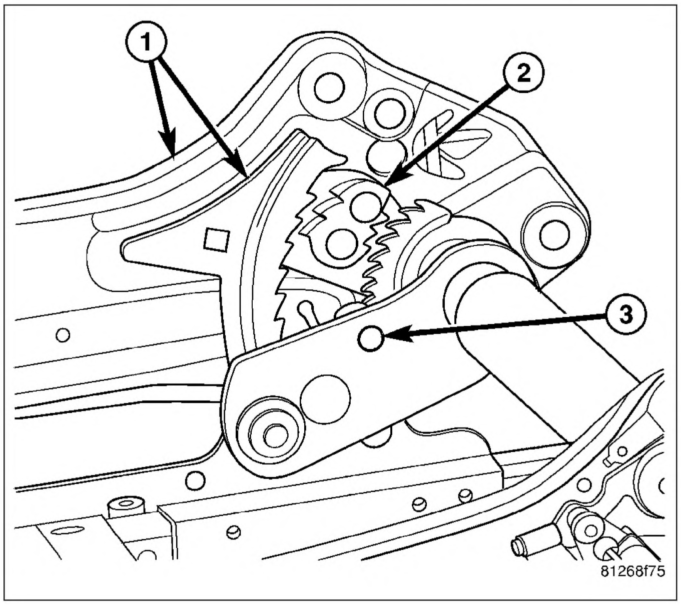
1. Remove the seat risers. (Refer to 23 - BODY/SEATS/SEAT RISER - FRONT - REMOVAL)
2. Remove the bolts and nuts (2 & 4) and separate the height adjuster assembly from the length adjuster assembly (3).

NOTE: Bolt (4) is a different size from the other three bolts (2). Note the location for proper installation.



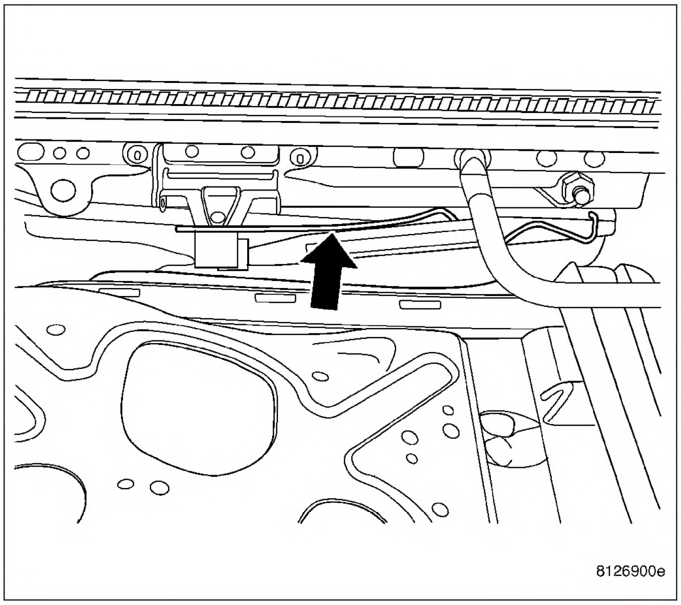
WARNING: A SEAT STRUCTURE THAT HAS SEEN SIGNIFICANT LOAD MAY HAVE THE LOCKING MECHANISM ACTIVATED AND MAY EXHIBIT THE FOLLOWING SYMPTOMS:
- **LOCKING PAWL (2) LOOSE**
- **LOCKING PAWL (2) ENGAGED INTO THE SEAT FRAME SIDEMEMBER (1)**
- **HEIGHT ADJUSTER ONLY WORKS ON OUTBOARD SIDE**
- **BROKEN OR MISSING SHEAR PIN (3)**

IF ANY ONE OR MORE OF THESE SYMPTOMS EXIST REPLACE THE HEIGHT ADJUSTER ASSEMBLY. DO NOT ATTEMPT ANY REPAIRS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY OR DEATH.

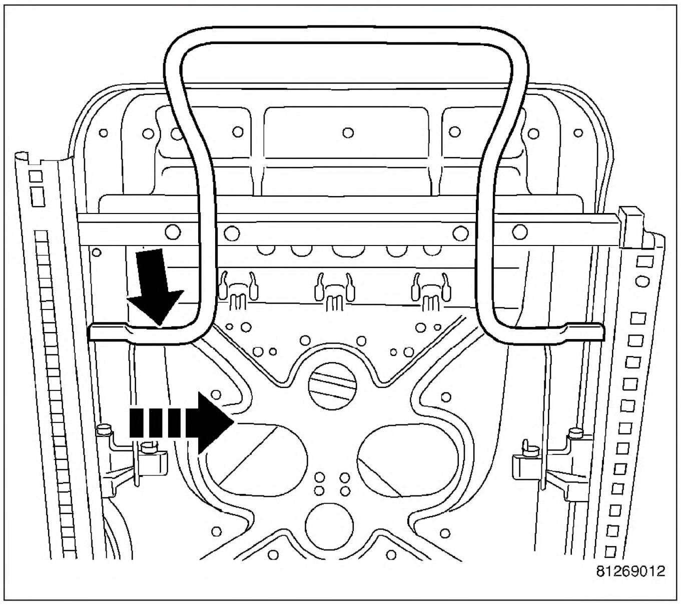


Manual

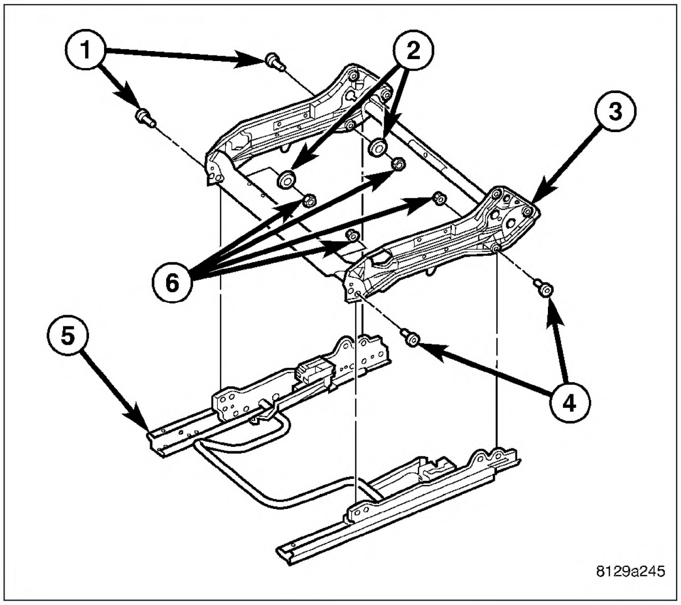
1. Remove the spring clip.



2. Squeeze the towel bar together and pull the towel bar out of the left and right seat tracks.



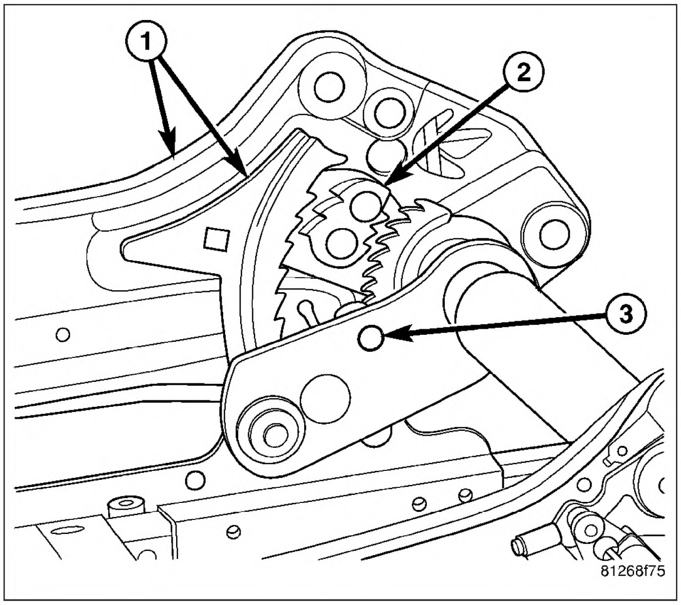
3. Remove the bolts (1 & 4), nuts (6) and spacers (2) and separate the side member assembly (3) from the length adjuster assembly (5).


1
2
3
6
5
4
8129a245

INSTALLATION

Power

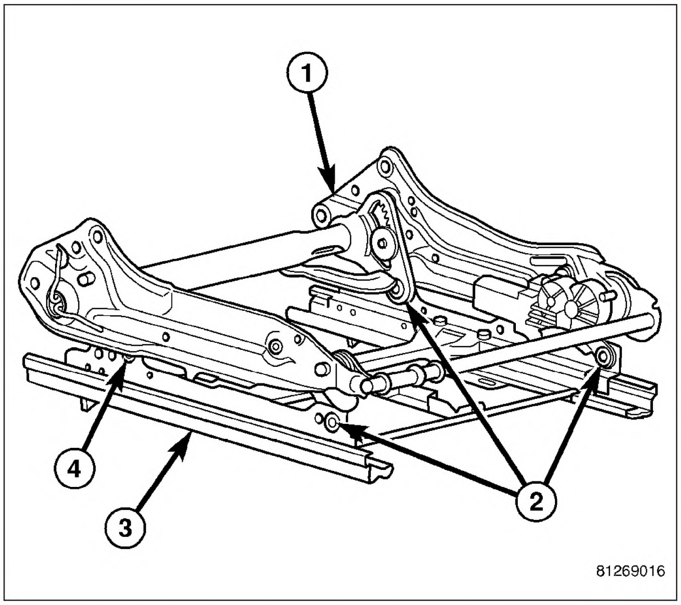
1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)



WARNING: A SEAT STRUCTURE THAT HAS SEEN SIGNIFICANT LOAD MAY HAVE THE LOCKING MECHANISM ACTIVATED AND MAY EXHIBIT THE FOLLOWING SYMPTOMS:
- **LOCKING PAWL (2) LOOSE**
- **LOCKING PAWL (2) ENGAGED INTO THE SEAT FRAME SIDEMEMBER (1)**
- **HEIGHT ADJUSTER ONLY WORKS ON OUTBOARD SIDE**
- **BROKEN OR MISSING SHEAR PIN (3)**

IF ANY ONE OR MORE OF THESE SYMPTOMS EXIST REPLACE THE HEIGHT ADJUSTER ASSEMBLY. DO NOT ATTEMPT ANY REPAIRS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY OR DEATH.

2. Install the seat risers. (Refer to 23 - BODY/SEATS/SEAT RISER - INSTALLATION)
3. Position the height adjuster assembly (1) onto the length adjuster assembly (3) and install the nuts, bolts and spacers on the inboard side.

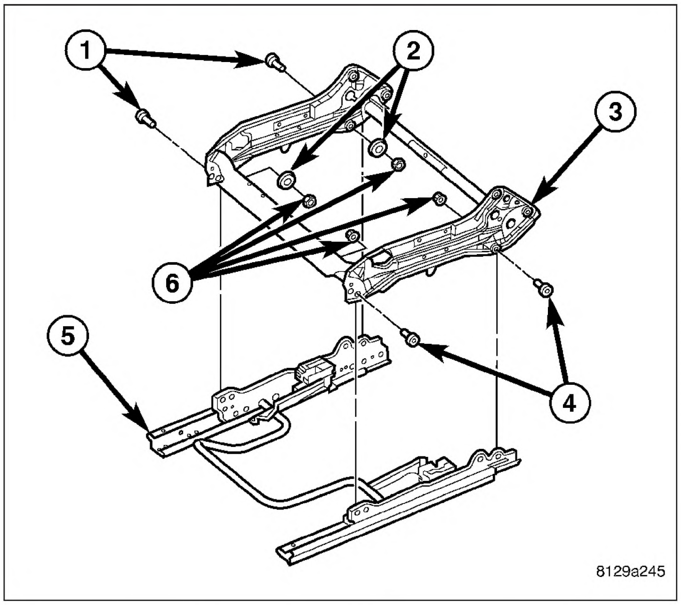


NOTE: Bolts (2) and (4) are different and need to be installed into the correct positions.

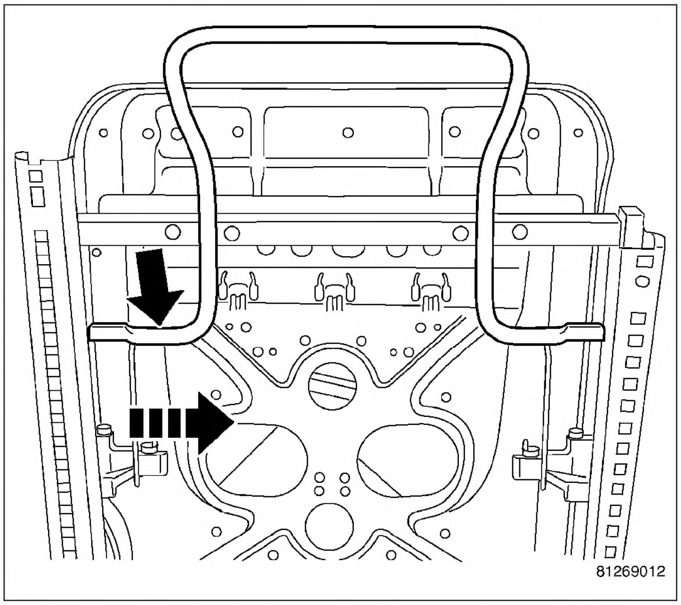
4. Tighten the bolts to 21 N·m (15 ft. lbs.).
5. Install the seat cushion and install the seat. (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - INSTALLATION)

Manual

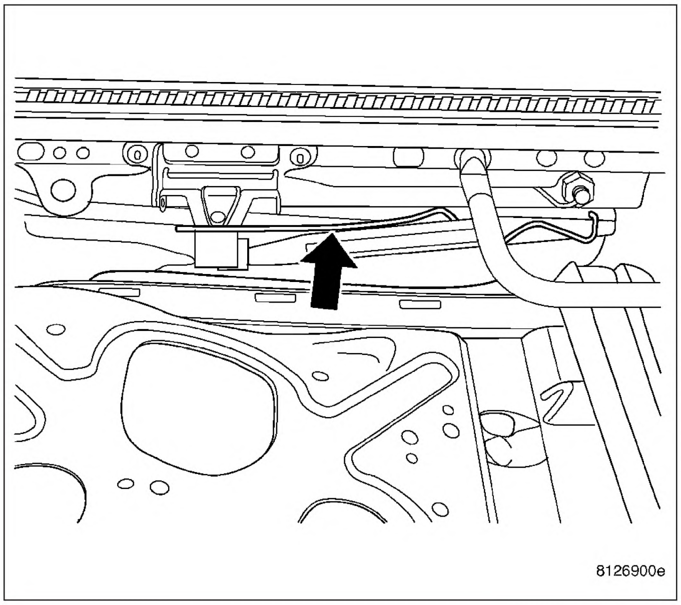
1. Install the seat risers. (Refer to 23 - BODY/SEATS/ SEAT RISER - INSTALLATION)
2. Position the side member assembly (3) onto the length adjuster assembly (5) and install the nuts (6), bolts (1 & 4) and spacers (2) on the inboard side.
3. Tighten the bolts to 42 N·m (31 ft. lbs.).



4. Squeeze the towel bar together and insert the ends into the bushings on both tracks.



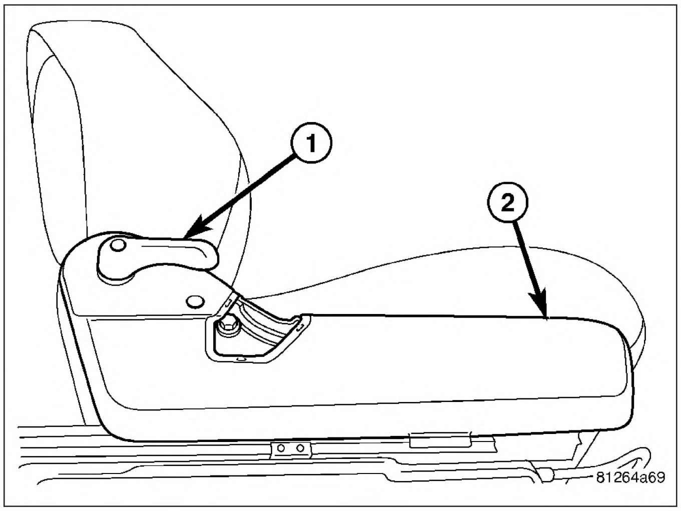
5. Install the spring clip.
6. Install the seat cushion and install the seat. (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - INSTALLATION)



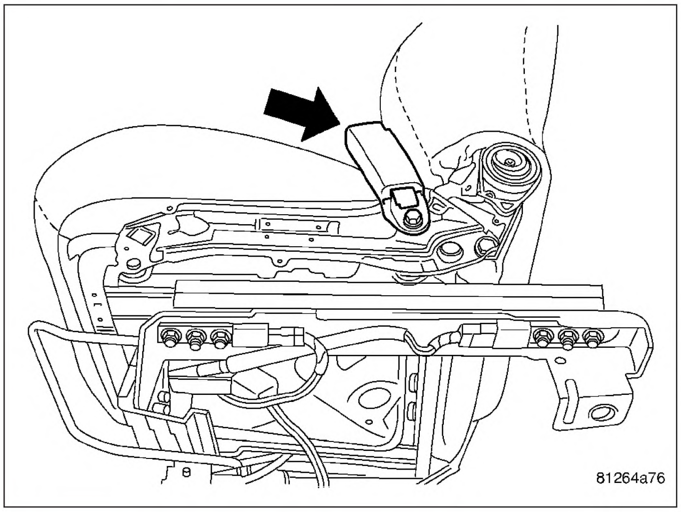
CUSHION/COVER-SEAT BACK - FRONT

REMOVAL

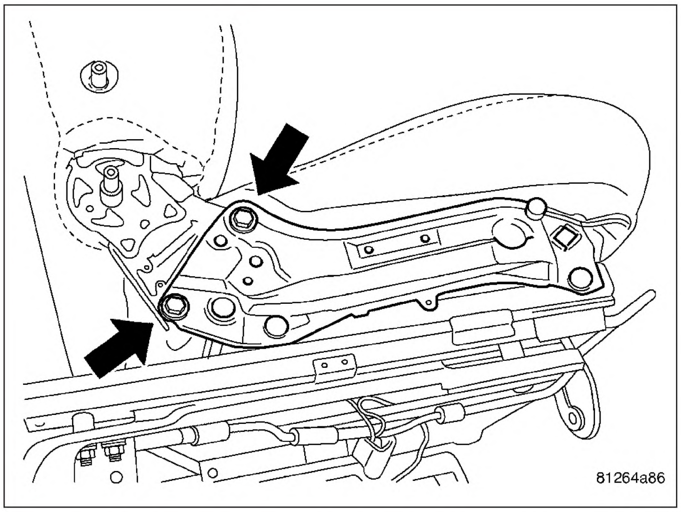
1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Remove the front seat. (Refer to 23 - BODY/SEATS/SEAT - FRONT - REMOVAL)
3. Remove the lumbar and recliner handles (1).
4. Remove the screws and remove the side shields (2).



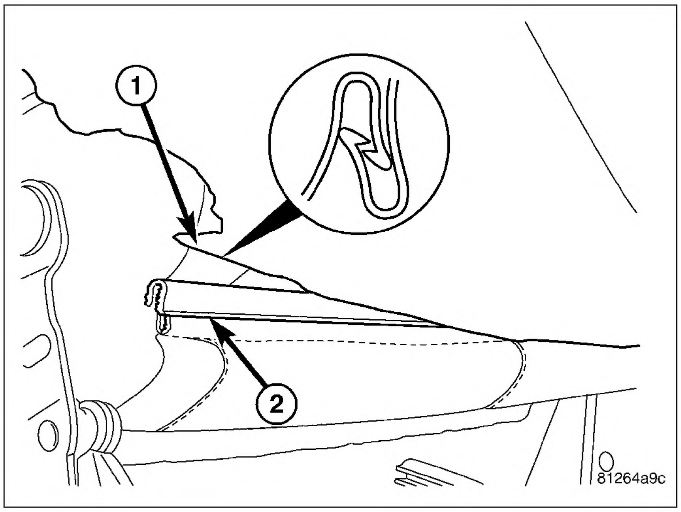
5. Remove the belt buckle.



6. Remove the seat back bolts from both sides.

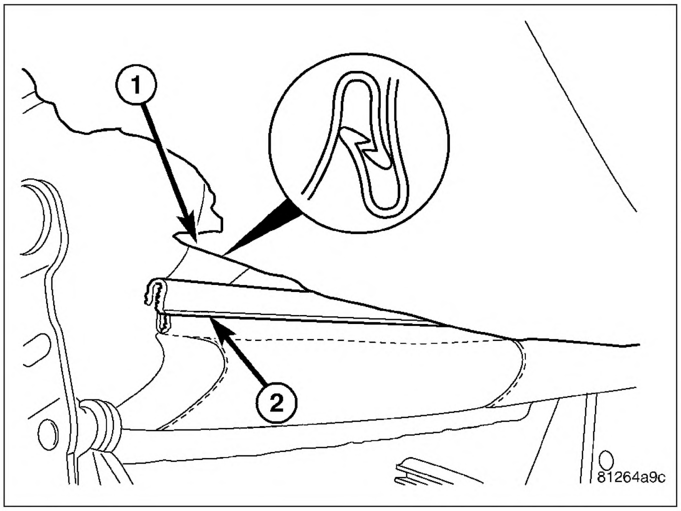


7. Remove the headrest.
8. Separate the j-straps (1 & 2) and pull cover up over frame and remove cushion.
9. Remove the headrest sleeves and remove the cover.

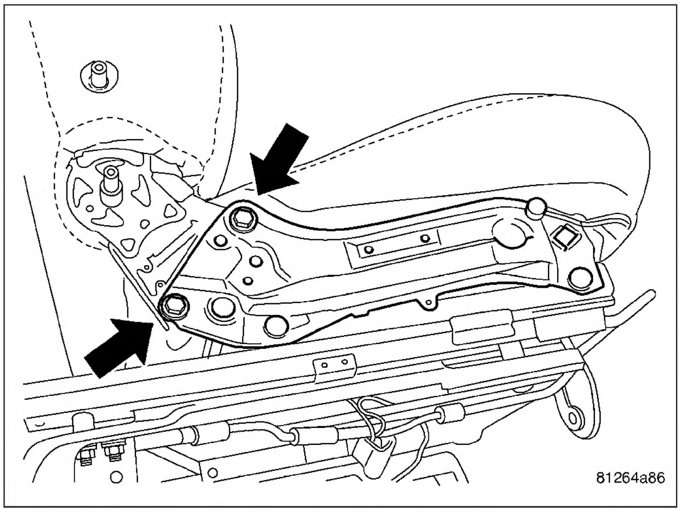


INSTALLATION

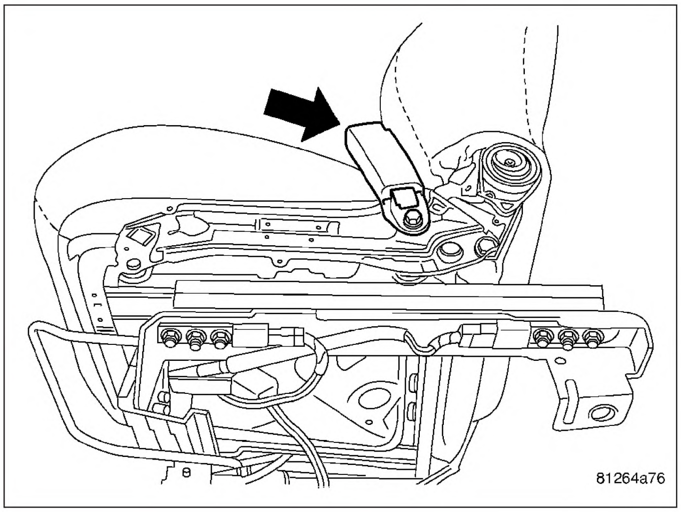
1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Position the seat back cover over the seat back frame and install the headrest sleeves.
3. Position the seat back cushion on the frame and position the cover over the cushion.
4. Connect the j-straps (1 & 2).



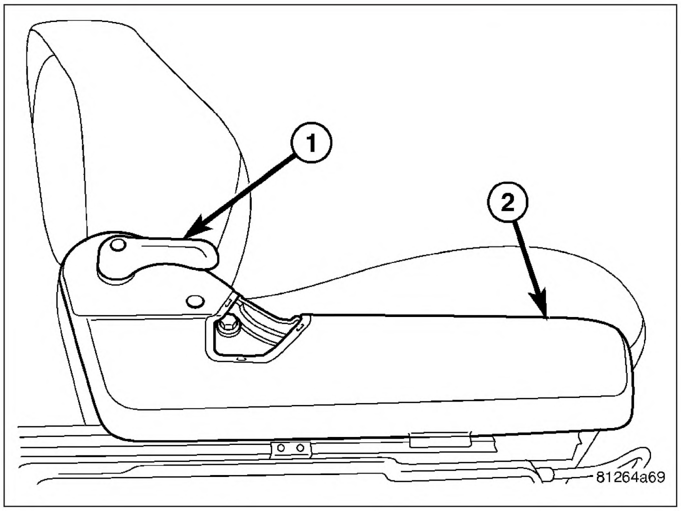
5. Install the seat back bolts and tighten to 40 N·m (30 ft. lbs.).



6. Position the front seat belt buckle lower anchor onto the stud near the rear of the inboard seat cushion frame. Be certain the anti-rotation tab on the anchor is engaged in the clearance hole of the frame.
7. Tighten the nut to 43 N·m (32 ft. lbs.)



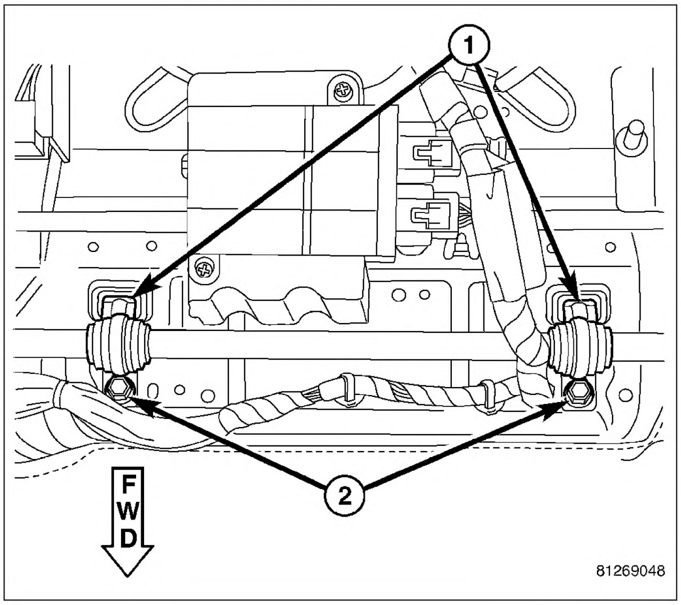
8. Install the side shields (2) and install the screws.
9. Install the lumbar and recliner handles (1 & 4).



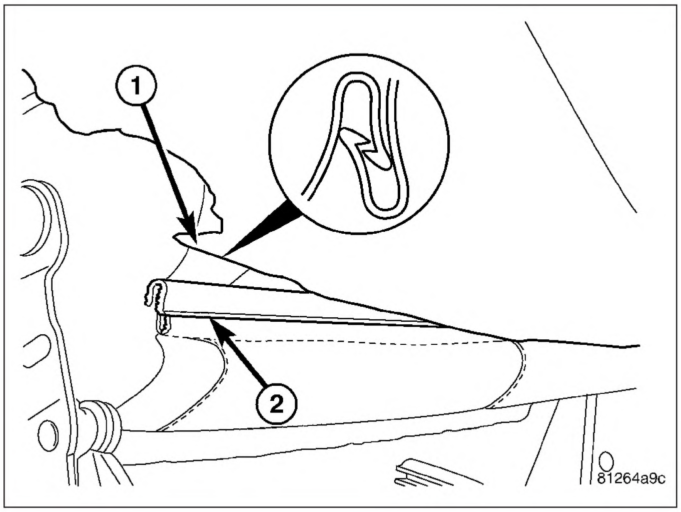
CUSHION/COVER-CUSHION - FRONT

REMOVAL

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Move the seat to the forward position and disconnect and isolate the batter negative cable.
3. Remove the bolts (2) and the clamps (1) and remove the seat cushion.
4. Disconnect the electrical connector, if equipped.

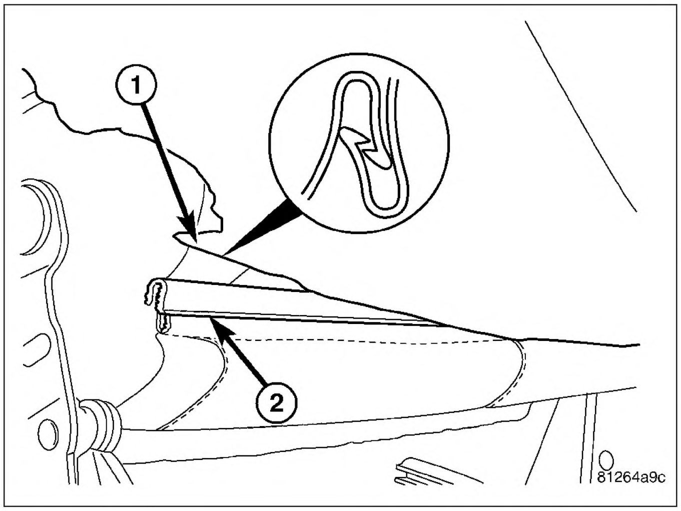


5. Separate the j-straps (1 & 2) and seat cushion cover and foam.

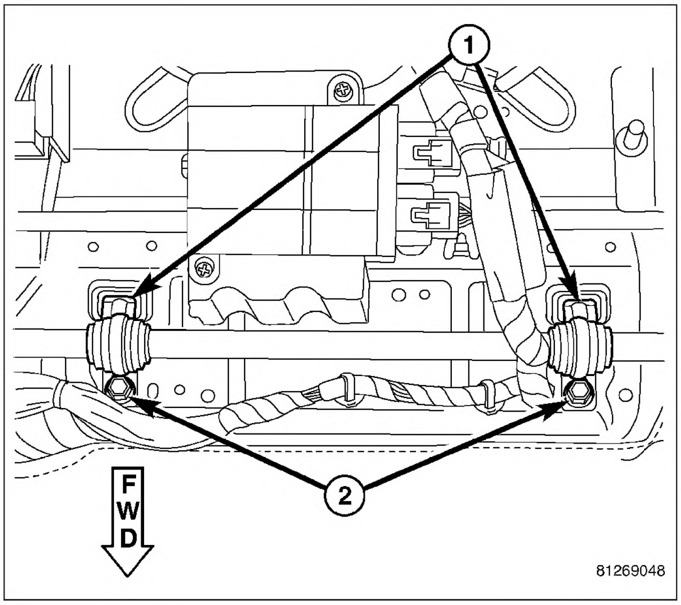


INSTALLATION

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Position the cushion cover and foam over the seat pan and connect the j-straps (1 & 2).



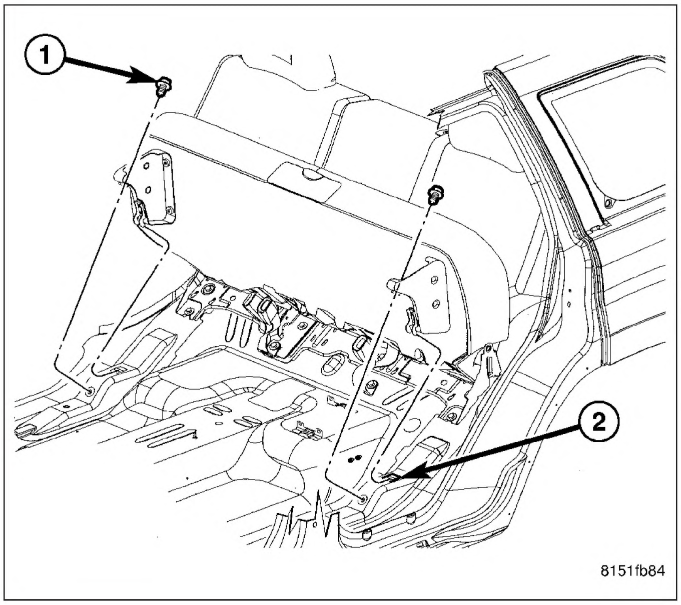
3. Position the seat cushion assembly onto the seat frame and install the clamps (1).
4. Connect the wire harness to the seat cushion pan, if equipped.
5. Install the bolts (2) and tighten to 10 N·m (90 in. lbs.).
6. Connect battery negative cable.



CUSHION-REAR SEAT

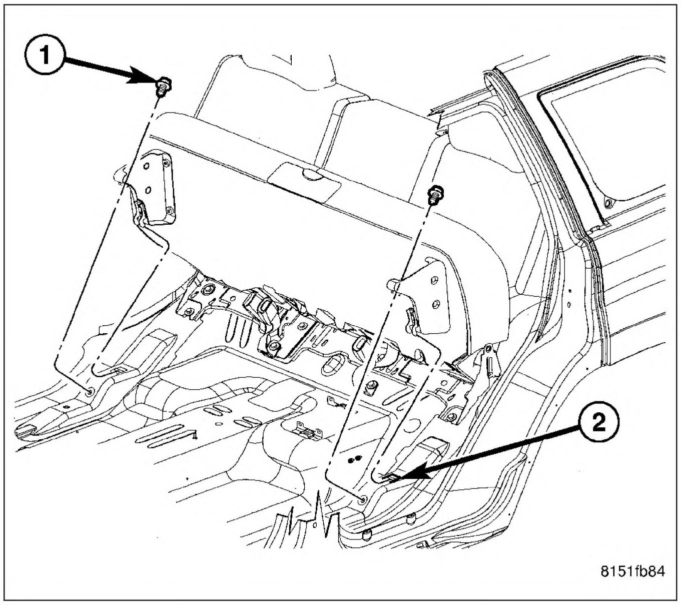
REMOVAL

1. Remove the two mounting bolts (1), one from each side of the vehicle.
2. Slide the rear seat cushion forward to release the hooks (2) from the body pan.



INSTALLATION

1. Tuck the rear of the seat cushion underneath the seat back and as you are doing so, make sure the hooks are sliding into the slots in the body (2).
2. Install the two bolts to the rear seat cushion. Tighten to 50 N·m (37 ft. lbs.).

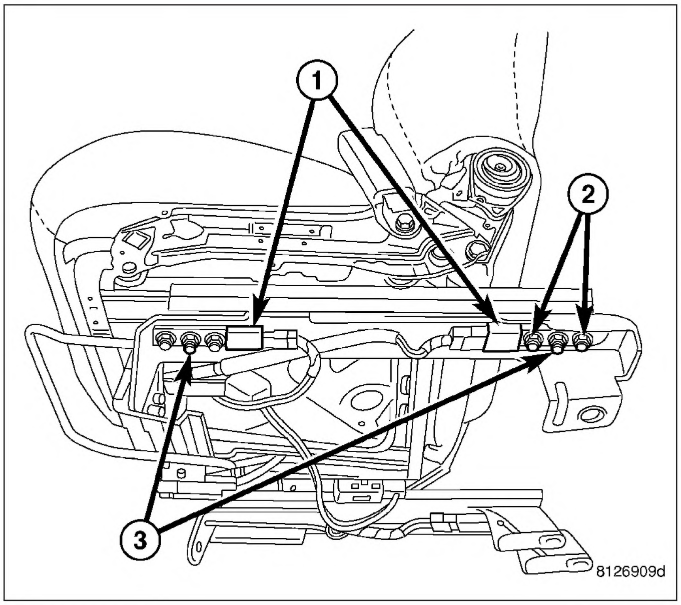


RISER-FRONT

REMOVAL

Manual Length Adjuster

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Remove the seat. (Refer to 23 - BODY/SEATS/SEAT - REMOVAL)
3. Move the seat to the forward position on the tracks and remove the seat adjuster bolts/nuts (3).
4. Move the seat to the reward position on the tracks and remove the front seat adjuster bolts/nuts (3).

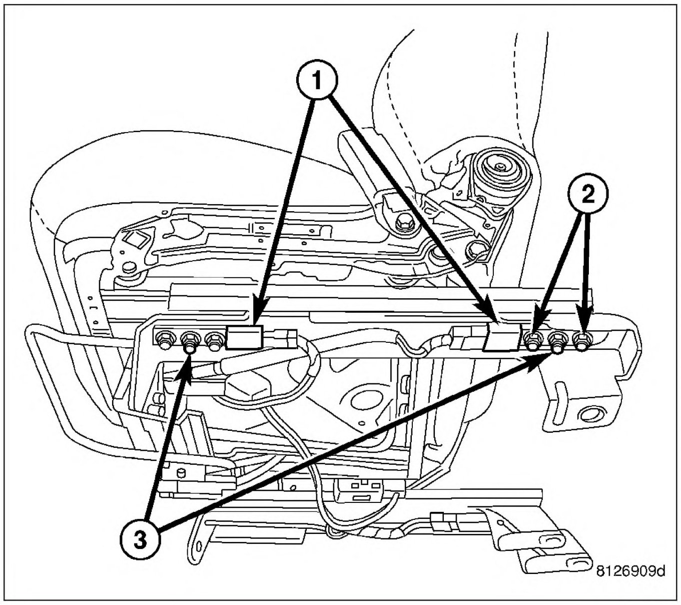


NOTE: Passenger seat with strain gauges shown, drivers side seat similar.

5. Disconnect strain gauge electrical connectors (1), if equipped.
6. If equipped, remove the strain gauge bolts (2) and remove the strain gauges as necessary.

Power Length Adjuster

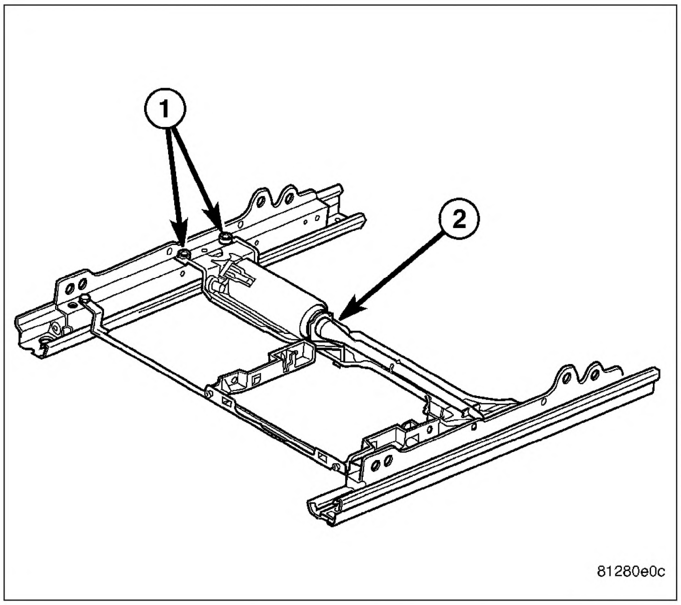
1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Unbolt the seat from the floor as necessary to gain access to the riser bolts. (Refer to 23 - BODY/SEATS/SEAT - REMOVAL)
3. Move the seat to the forward position on the tracks, tip the seat backwards in vehicle and remove the seat adjuster bolts/nuts (3).
4. Move the seat to the reward position on the tracks and remove the front seat adjuster bolts/nuts (3).



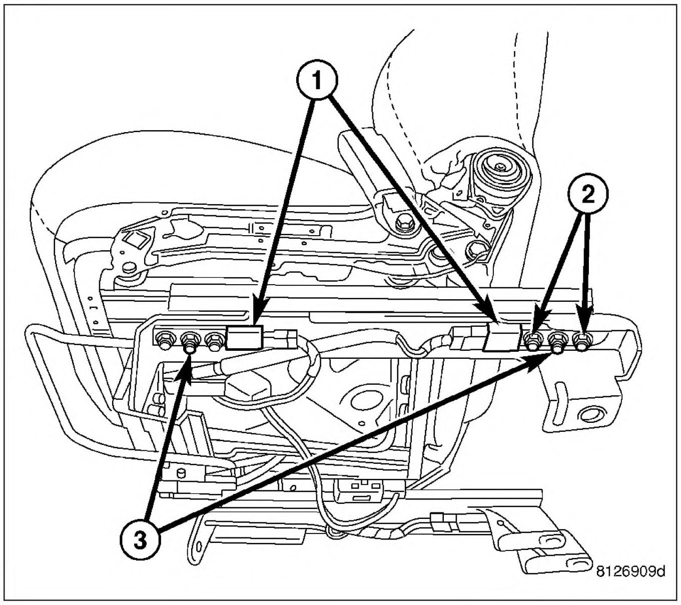
NOTE: Manual seat length adjuster shown, power similar.

5. If the seat cannot be moved forward or backward, remove the seat cushion. (Refer to 23 - BODY/SEATS/SEAT CUSHION COVER - REMOVAL)
6. Remove the four bolts (1) and remove the motor and cable assembly (2) from the length adjuster assembly.

CAUTION: When the motor and cable assembly are removed from the tracks discard the length adjuster assembly and replace with a new one.



7. Disconnect and isolate battery negative cable.
8. Remove the seat off of the risers and disconnect the electrical connectors.
9. Disconnect strain gauge electrical connectors (1), if equipped.
10. If equipped, remove the strain gauge bolts (2) and remove the strain gauges as necessary.

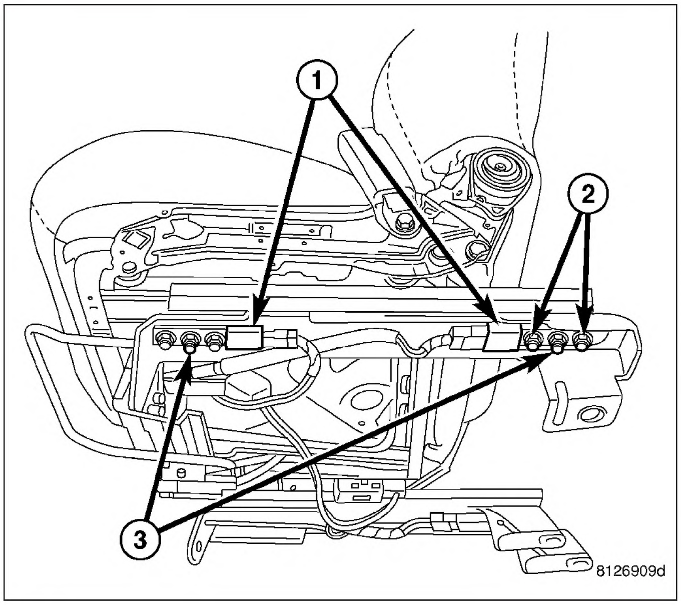


INSTALLATION

Manual Length Adjuster

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)

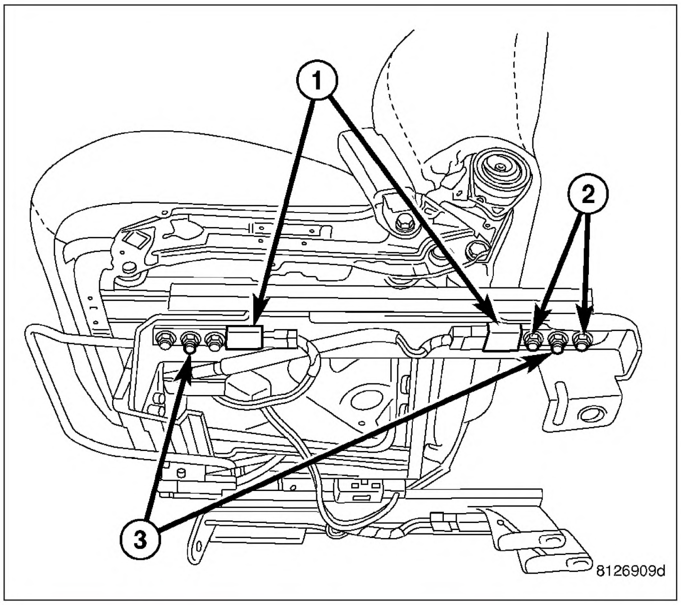
NOTE: Passenger seat with strain gauges shown, drivers side seat similar.



2. If equipped, install the strain gauges and install the bolts (2).
3. Tighten the bolts to 40 N·m (30 ft. lbs.).
4. If necessary, connect the electrical connections (1).
5. Move the seat to the forward position on the tracks and install the rear seat adjuster bolts/nuts (3).
6. Tighten the bolts to 45 N·m (33 ft. lbs.).
7. Move the seat to the reward position on the tracks and install the front seat adjuster bolts/nuts (3).
8. Tighten the bolts to 45 N·m (33 ft. lbs.).
9. Install the seat. (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION)

Power Length Adjuster

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. If equipped, install the strain gauges and install the bolts (2).
3. Tighten the bolts to 40 N·m (30 ft. lbs.).
4. Position the seat into the vehicle onto the risers and connect the electrical connectors.
5. Move the seat to the forward position on the tracks and install the seat adjuster bolts/nuts (3).
6. Tighten the bolts attaching the adjuster to the risers/strain gauges to 45 N·m (33 ft. lbs.).
7. Move the seat to the reward position on the tracks and install the front seat adjuster bolts/nuts (3).
8. Tighten the bolts attaching the adjuster to the risers/strain gauges to 45 N·m (33 ft. lbs.).
9. If necessary, connect the strain gauge electrical connections (1).



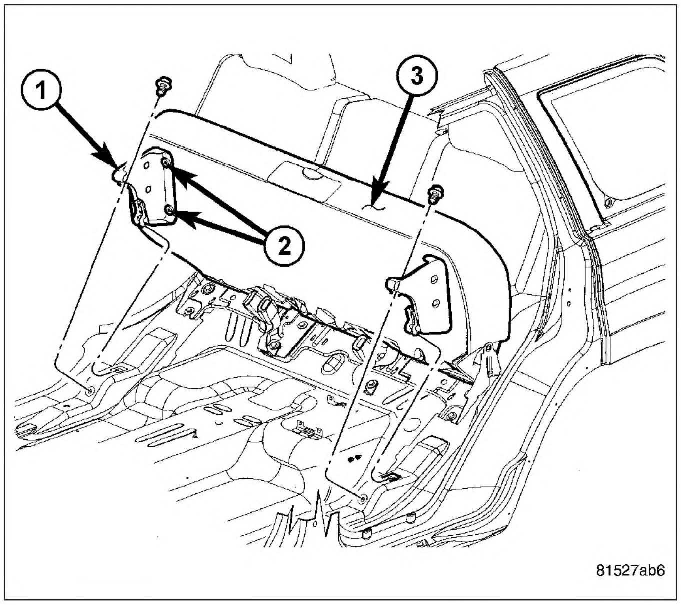
CAUTION: When the motor and cable assembly are removed from the tracks discard the length adjuster assembly and replace with a new one.

10. Bolt the seat to the floor. (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION)

RISER-REAR

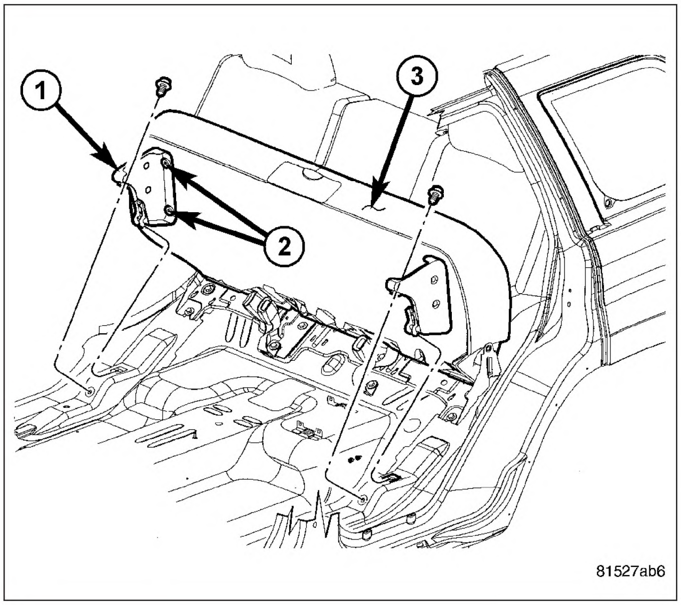
REMOVAL

1. Remove rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).
2. Remove the two bolt (2) holding the riser (1) to the seat cushion (3).



INSTALLATION

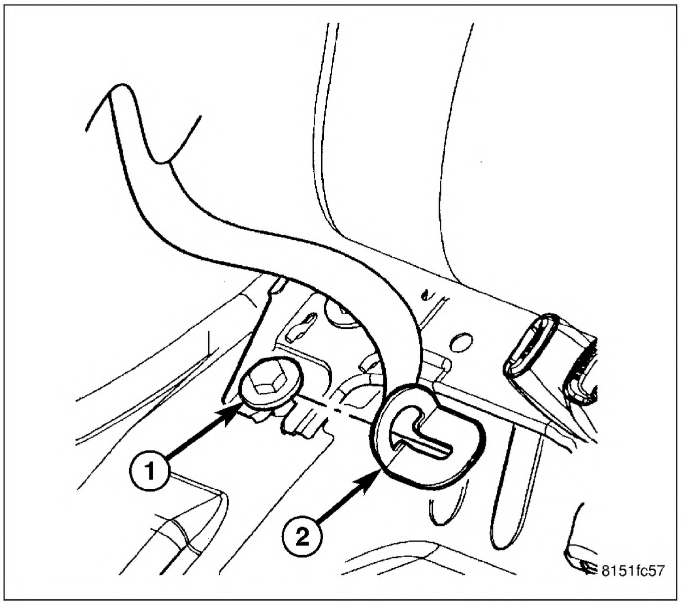
1. Align the riser (1) onto the seat cushion (3) and install the two mounting bolts (2). Tighten bolts to 45 N·m (33 ft. lbs.).
2. Install the seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).



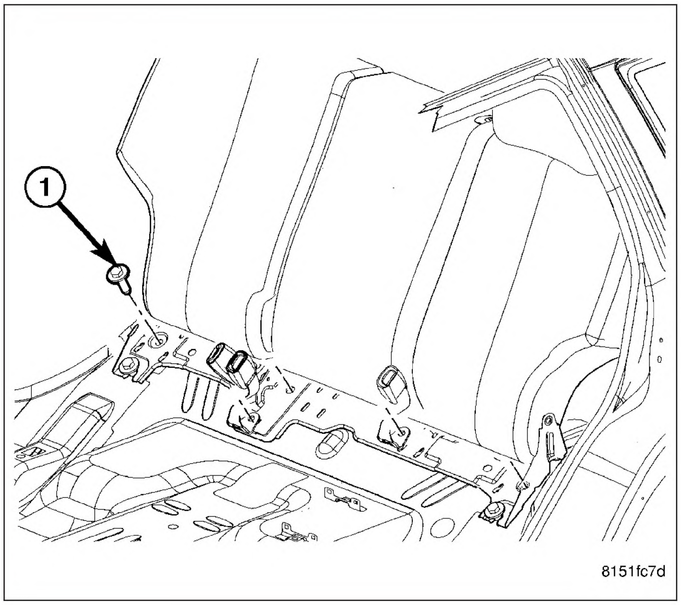
SEAT BACK-REAR

REMOVAL

1. Remove the rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).
2. Loosen outboard lower anchor bolts (1) and slide the rear seat belt anchor (2) off the bolt.

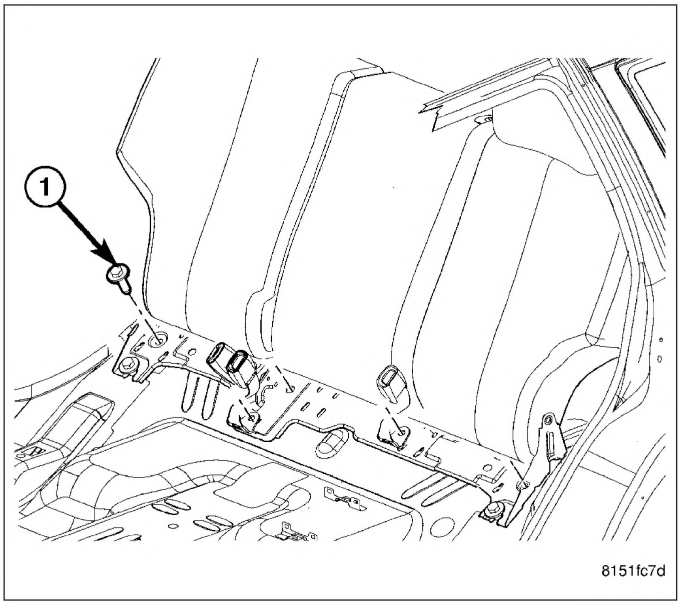


3. Remove the four rear seat back mounting bolts (1) and remove seat back from vehicle.

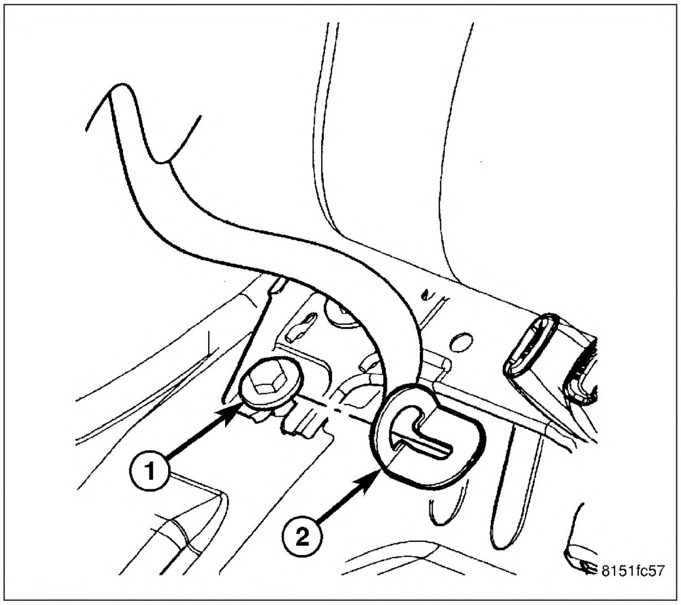


INSTALLATION

1. Place the rear seat back into position by slipping the hinge bracket onto the two outboard lower bolts.
2. Install the other four mounting bolts (1). Remember to install the three inner seat belt buckles. Torque the bolts to 50 N·m (37 ft. lbs.).



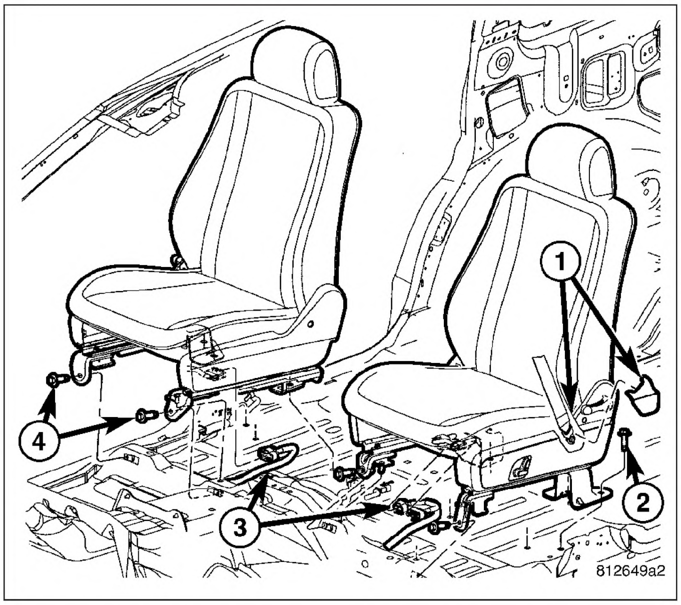
3. Slide the two outboard seat belt anchors (2) onto the outboard lower bolts (1). Tighten bolts to 50 N·m (37 ft. lbs.).
4. Install the rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).



SEAT-FRONT

REMOVAL

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)



WARNING: The Seat Weight Sensor is a sensitive, calibrated unit and must be handled carefully. Do not drop or handle roughly. If dropped or damaged, replace with another sensor. Failure to follow these instructions may result in personal injury or death.

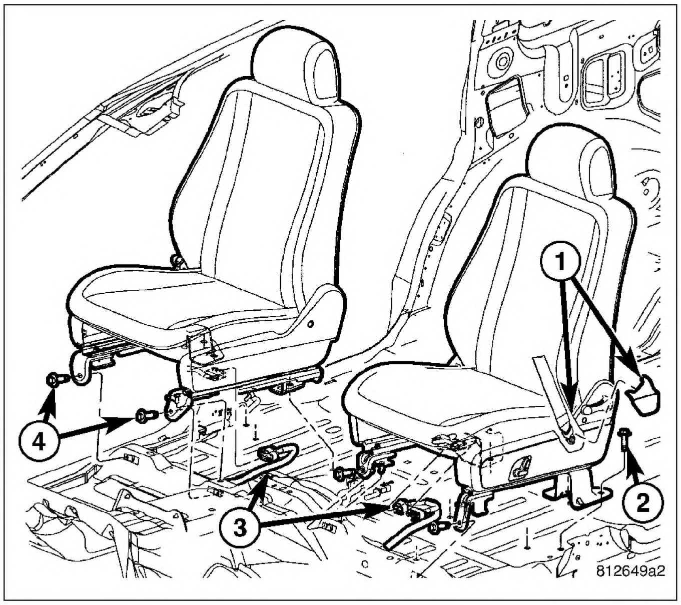
WARNING: The front passenger seat must be handled carefully as well. When removing the seat, be careful when setting on floor not to drop. If dropped, the sensor may be inoperative. Failure to follow these instructions may result in personal injury or death.

WARNING: When the seat is on the floor, no one should sit in the front passenger seat. This uneven force may damage the sensing ability of the seat weight sensors. If sat on and damaged, the sensor may be inoperative. Failure to follow these instructions may result in personal injury or death.

2. Move the seat forward to gain access to the rear bolts.
3. Disconnect and isolate battery negative cable.
4. Remove the cover and lower seat belt anchor (1).
5. Remove the two front (4) and three rear (2) bolts.
6. Disconnect the electrical connectors (3), if equipped, and remove the seat from the vehicle.

INSTALLATION

1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)



WARNING: The Seat Weight Sensor is a sensitive, calibrated unit and must be handled carefully. Do not drop or handle roughly. If dropped or damaged, replace with another sensor. Failure to follow these instructions may result in personal injury or death.

WARNING: The front passenger seat must be handled carefully as well. When removing the seat, be careful when setting on floor not to drop. If dropped, the sensor may be inoperative. Failure to follow these instructions may result in personal injury or death.

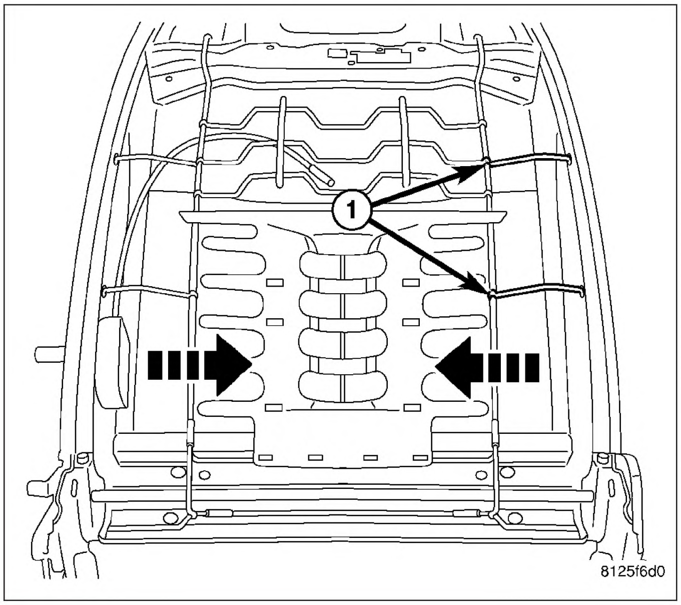
WARNING: When the seat is on the floor, no one should sit in the front passenger seat. This uneven force may damage the sensing ability of the seat weight sensors. If sat on and damaged, the sensor may be inoperative. Failure to follow these instructions may result in personal injury or death.

2. Position the seat into the vehicle and connect the electrical connectors (3), if equipped.
3. Install the two front bolts (4) and three rear bolts (2).
4. Tighten the front inner bolt to 27 N·m (20 ft. lbs.) then tighten the front outer bolt to 27 N·m (20 ft. lbs.).
5. Tighten the rear bolts to 47 N·m (35 ft. lbs.).
6. Install the lower seat belt anchor (1) and install the bolt.
7. Tighten the bolt to 39 N·m (29 ft. lbs.) and install the trim cover (1).
8. Do not reconnect the battery negative cable at this time. The supplemental restraint system verification test procedure should be performed following service of any supplemental restraint system component. (Refer to 8 - ELECTRICAL/RESTRAINTS - STANDARD PROCEDURE - VERIFICATION TEST).
9. Following successful completion of the supplemental restraint system verification test procedure, perform the Occupant Classification System Verification Test using a scan tool. (Refer to 8 - ELECTRICAL/RESTRAINTS - *OCS VERIFICATION TEST - VER 1)

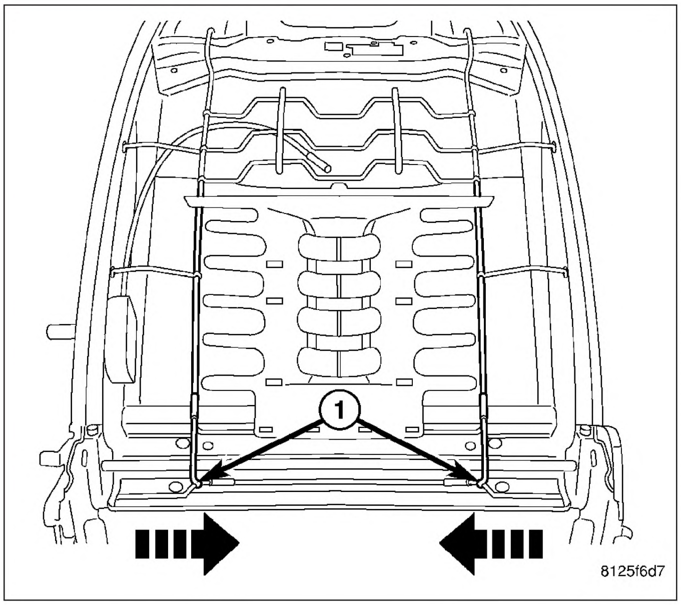
SUPPORT-LUMBAR

REMOVAL

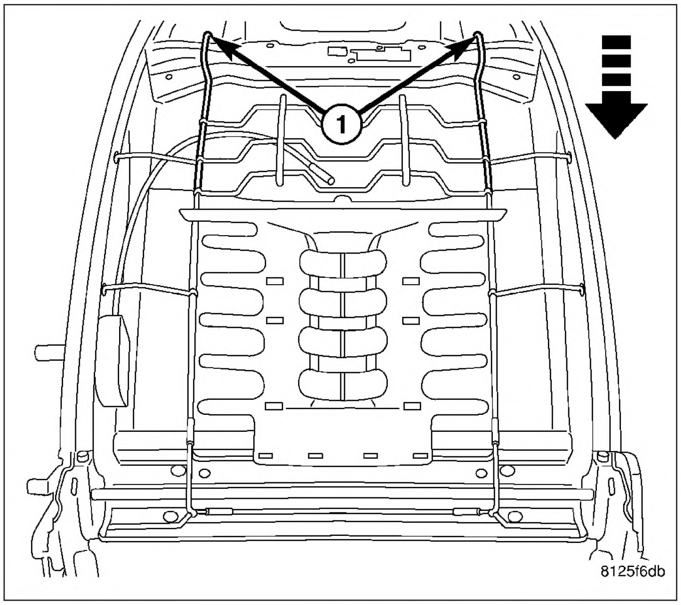
1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Remove the seat back cushion/cover. (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION / COVER - FRONT - REMOVAL)
3. Release the lumbar mat side wires (1) by pulling out on the wire supports and then pulling them in.



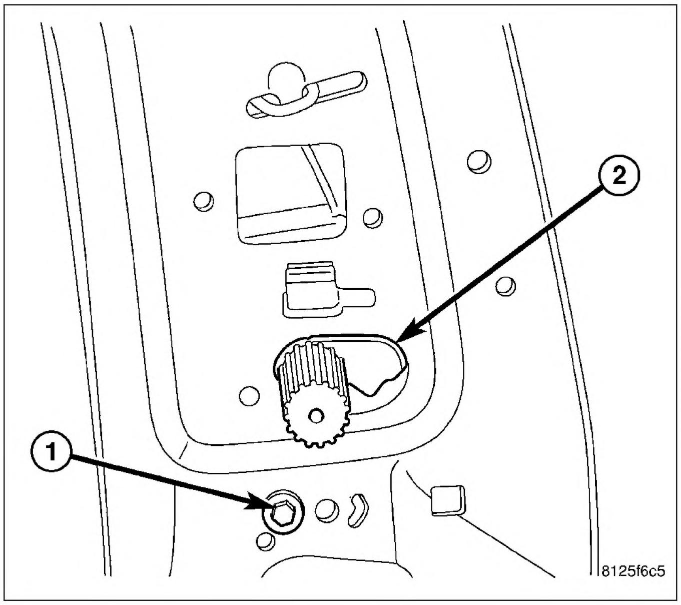
4. Squeeze the lower support wires (1) in and release the lower wires.



5. Pull the upper support wires (1) down and release the lumbar mat from the seat back frame.



6. Remove the rivet (1) and remove the lumbar mechanism (2).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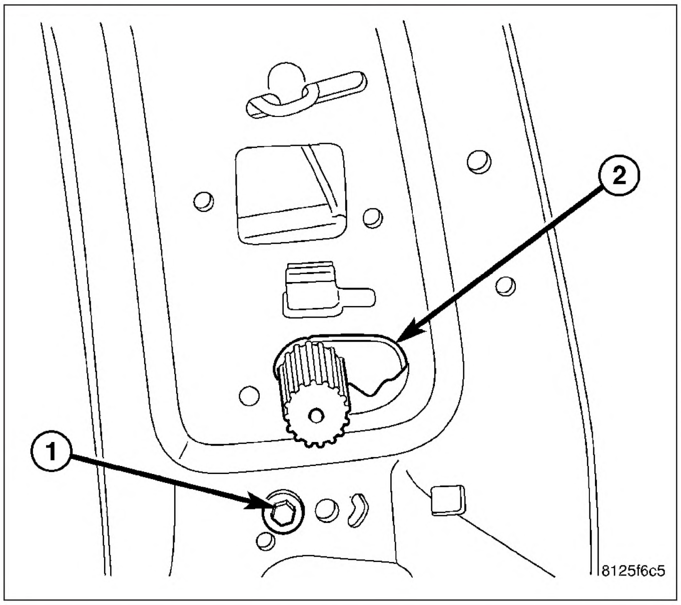
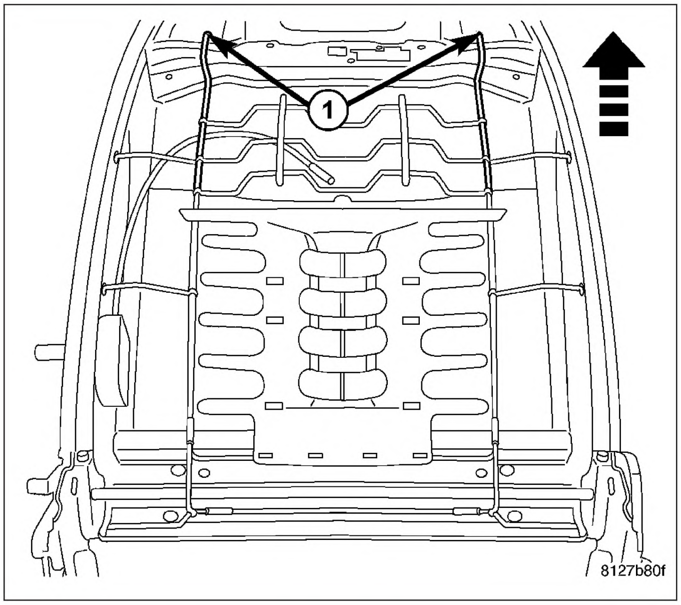
INSTALLATION

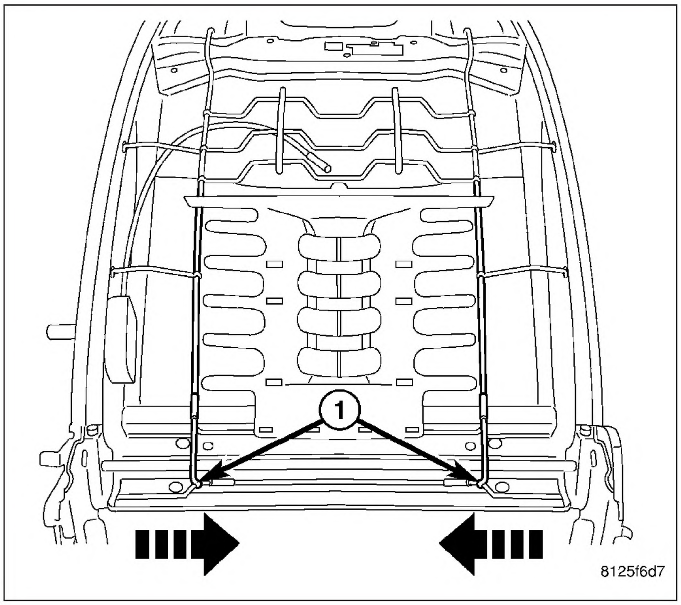
1. Before proceeding with the following repair procedure, review all warnings and cautions. (Refer to 23 - BODY/SEATS - WARNING)
2. Install the lumbar mechanism (2) and install a new rivet (1).



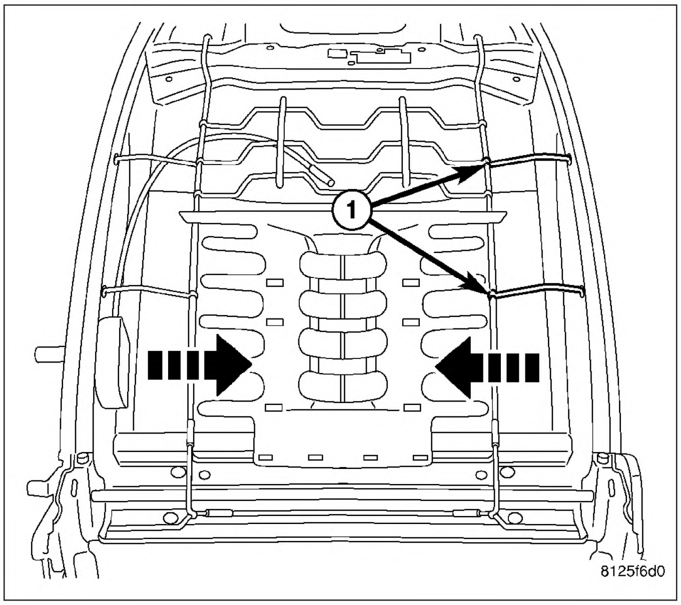
3. Place lumbar mat onto seat back frame and insert the upper support wires (1) into the frame.



4. Squeeze the lower support wires (1) together and insert into the lower frame.



5. Squeeze the side support wires together and insert them into the sides of the seat back frame.
6. Install the seat back cushion/cover. (Refer to 23 - BODY/SEATS/SEAT BACK CUSHION / COVER - FRONT - INSTALLATION)



STATIONARY GLASS

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STATIONARY GLASS

WARNING

WINDSHIELD SAFETY PRECAUTIONS

WARNING: Do not operate the vehicle within 24 hours of windshield installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the windshield may not perform properly in an accident.

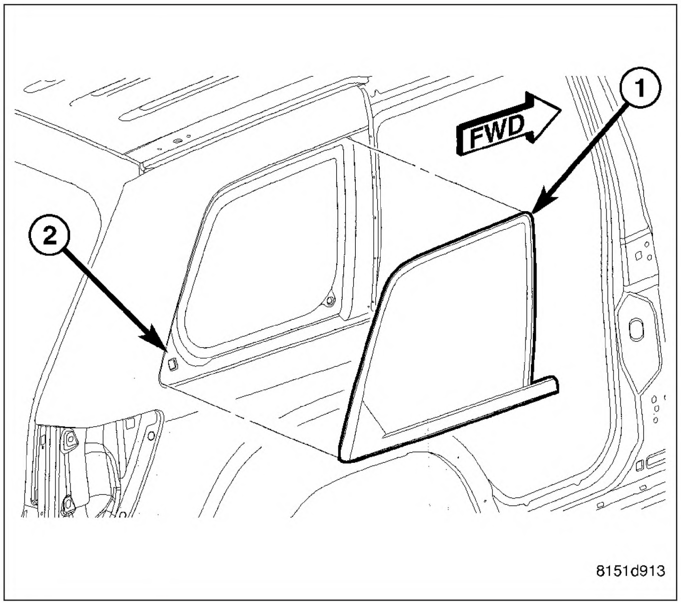
- **Urethane adhesives are applied as a system. Use glass cleaner, glass prep solvent, glass primer, pvc (vinyl) primer and pinch weld (fence) primer provided by the adhesive manufacturer. If not, structural integrity could be compromised.**
- **Daimlerchrysler does not recommend glass adhesive by brand. Technicians should review product labels and technical data sheets, and use only adhesives that their manufactures warrant will restore a vehicle to the requirements of fmvss 212. Technicians should also insure that primers and cleaners are compatible with the particular adhesive used.**
- **Be sure to refer to the urethane manufacturer's directions for curing time specifications, and do not use adhesive after its expiration date.**
- **Vapors that are emitted from the urethane adhesive or primer could cause personal injury. Use them in a well-ventilated area.**
- **Skin contact with urethane adhesive should be avoided. Personal injury may result.**
- **Always wear eye and hand protection when working with glass.**

CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers. Be careful not to damage painted surfaces when removing moldings or cutting urethane around windshield.

QUARTER GLASS

REMOVAL

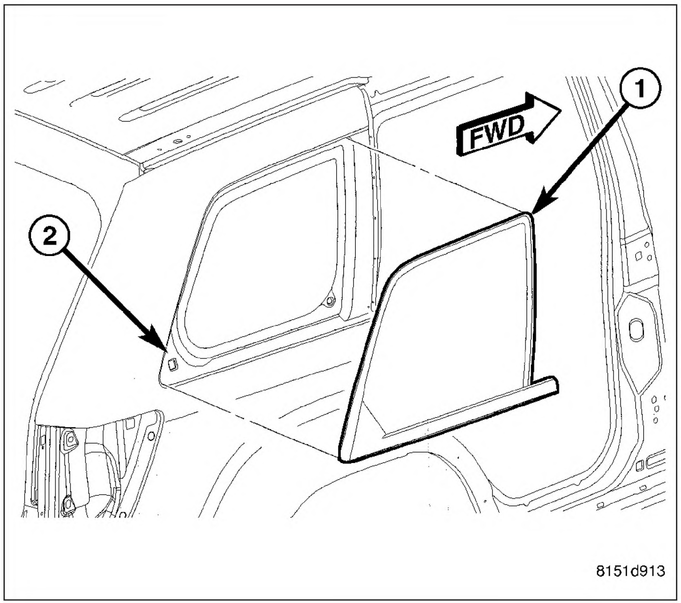
1. Before proceeding with the following repair procedure, review all warnings and cautions (Refer to 23 - BODY/STATIONARY GLASS - WARNING).
2. Remove the quarter panel trim from the side of the vehicle being serviced (Refer to 23 - BODY/INTERIOR/QUARTER PANEL TRIM - REMOVAL).
3. Carefully pull down the headliner to access the upper mounting studs that secure the quarter glass (1) to the window fence (2) and, remove the nuts from the studs.
4. Remove the nuts that secure the lower mounting studs to the window fence and, remove the nuts from the studs.
5. Using razor knife, cut butyl sealer between the mounting studs that secure the quarter glass to window fence.
6. Carefully push the quarter window glass from the opening.



INSTALLATION

CAUTION: Roll down the left and right front door glass and open the liftgate glass before installing quarter glass to avoid pressurizing the passenger compartment if a door is slammed before urethane is cured. Water leaks can result.

NOTE: The quarter glass fence should be cleaned of all old butyl sealer. Do not grind sealer off the fence, the paint finish will be adversely affected.



1. Apply 6 mm (0.25 in.) wide butyl tape around perimeter of the quarter glass (1) approximately 5 mm (0.2 in.) from the edge of the glass. Ensure the butyl tape is wrapped around the mounting studs.
2. Place the quarter glass into the window opening (2) and insert mounting studs through the holes in the window fence.
3. Install the nuts that secure the quarter glass to the window fence. Tighten the nuts to 4.5 N·m (40 in. lbs.).
4. Install the headliner.
5. Install the quarter panel trim (Refer to 23 - BODY/INTERIOR/QUARTER PANEL TRIM - INSTALLATION).

WINDSHIELD

DESCRIPTION

The windshield is attached to the window frame (fence) with urethane adhesive. The urethane adhesive is applied cold and seals the surface area between the window opening and the glass. The primer adheres the urethane adhesive to the windshield.

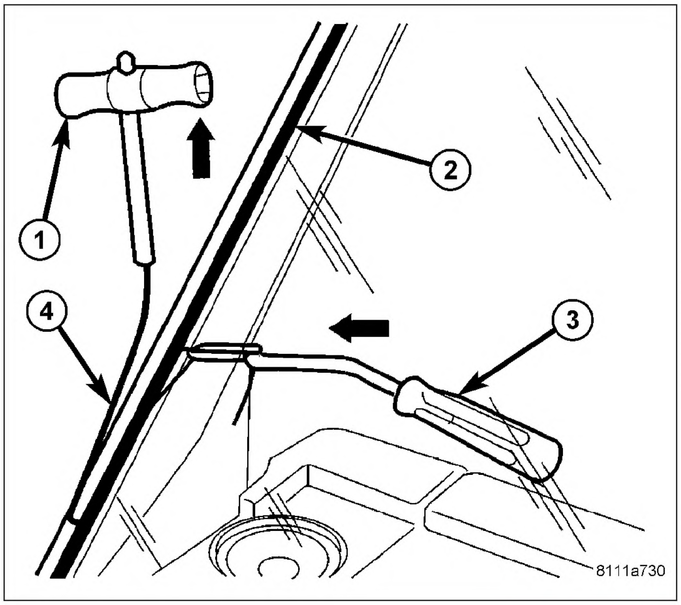
It is difficult to salvage a windshield during the removal operation. The windshield is part of the structural support for the roof. The urethane bonding used to secure the windshield to the fence is difficult to cut or clean from any surface. If the rubber seals are set in urethane, it would also be unlikely they could be salvaged. Before removing the windshield, check the availability of the windshield and seals from the parts supplier.

REMOVAL

1. Before proceeding with the following repair procedure, review all warnings and cautions (Refer to 23 - BODY/STATIONARY GLASS - WARNING).
2. Remove the rear view mirror (Refer to 23 - BODY/INTERIOR/REAR VIEW MIRROR - REMOVAL).
3. Remove the rain sensor module from the windshield (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/RAIN SENSOR MODULE - REMOVAL).
4. Remove the cowl grille (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL.)

CAUTION: Be careful not to damage painted surfaces when removing moldings or cutting urethane around the windshield.

5. Remove molding from the top of the windsield.
6. Using an assistant and a wire-type windshield cutout tool (1, 3 and 4), cut and separate the urethane adhesive (2) securing the windshield to the windshield fence.
7. Carefully remove the windshield from the vehicle.



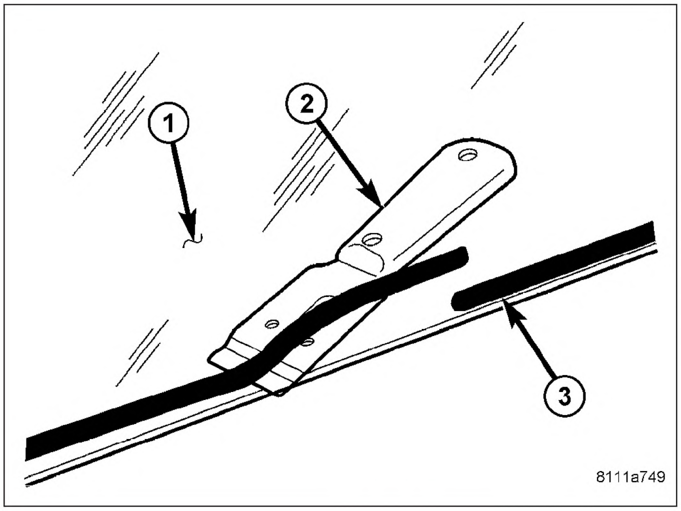
INSTALLATION

WARNING: Do not operate the vehicle within 24 hours of windshield installation. It takes at least 24 hours for urethane adhesive to cure. If it is not cured, the windshield may not perform properly if the vehicle is in an accident.

CAUTION: To help prevent water leaks, partially roll down the left and right door glass before installing the windshield. This avoids pressurizing the passenger compartment if a door is slammed before the urethane is cured.

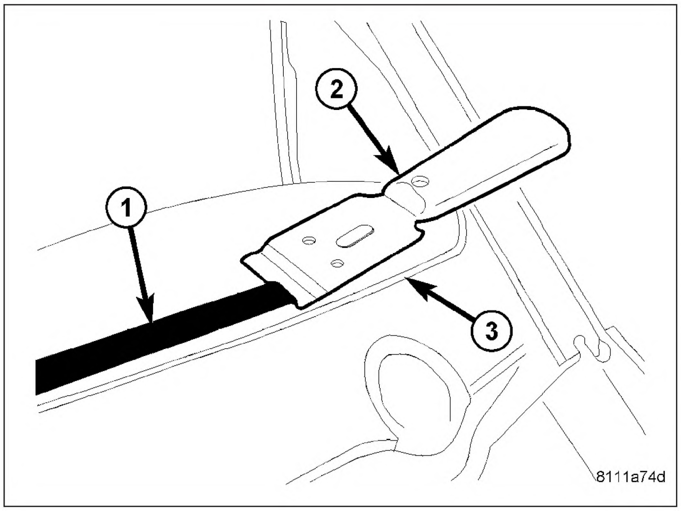
CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers.

1. If the windshield (1) is being reused, remove the as much original urethane (3) as possible from the glass surface using a razor knife (2).

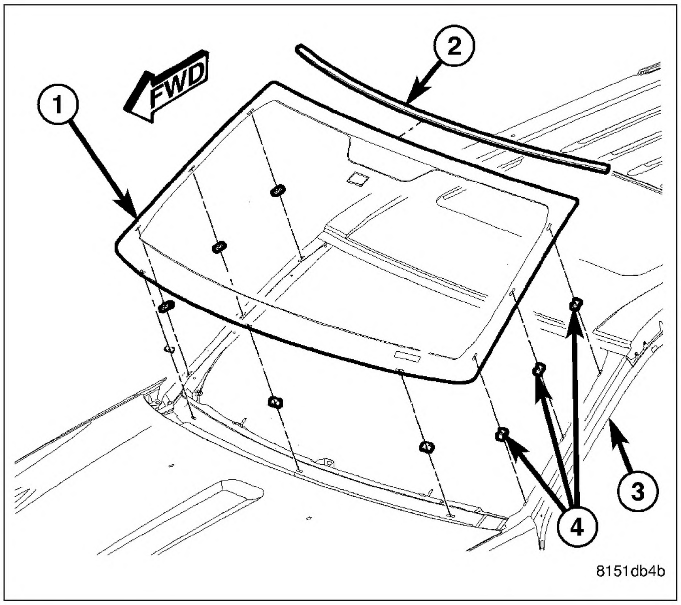


NOTE: To prevent corrosion, do not damage paint on windshield fence when removing original urethane.

NOTE: The windshield fence should be cleaned of most of its old urethane adhesive. A small amount of old urethane, approximately 1 mm in height should remain on the fence. Do not completely remove all old urethane from the fence, the paint finish and bonding strength will be adversely affected. Support spacers located near the cowl at the bottom of the windshield fence should be replaced with new spacers. Replace any missing or damaged spacers around the perimeter of the windshield fence.

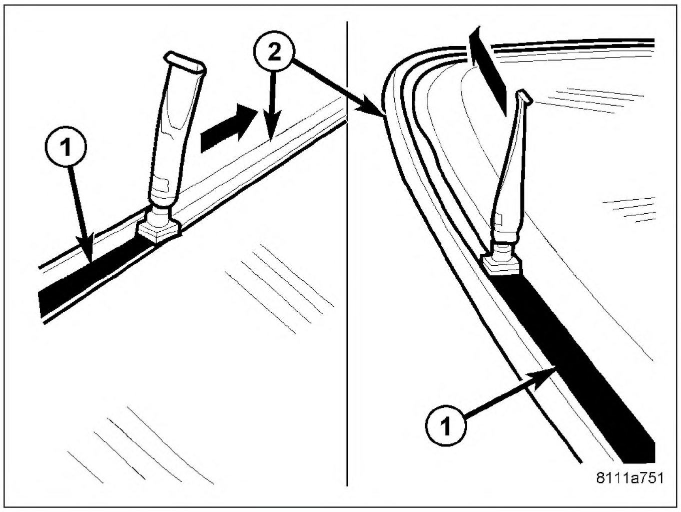


2. Using a razor knife (2), level the original bead of urethane (1) on the windshield fence (3) to a thickness of approximately 1 mm (0.04 in.) and remove any damaged adhesive backed spacers.
3. Install new adhesive backed spacers (4) along the windshield fence as required.
4. Install a new rubber seal (2) along the top of the windshield (1).
5. Using an assistant, position the windshield into the windshield opening and against the windshield fence (3) and spacers.
6. Verify the windshield lays evenly against the fence at the top, bottom and sides of the opening. If not, the fence must be formed to the shape of the windshield.
7. Mark the windshield and the windshield fence with a grease pencil or pieces of masking tape to use as a reference for installation.
8. Using an assistant, remove the windshield from the windshield opening and place it on a suitable padded work surface.

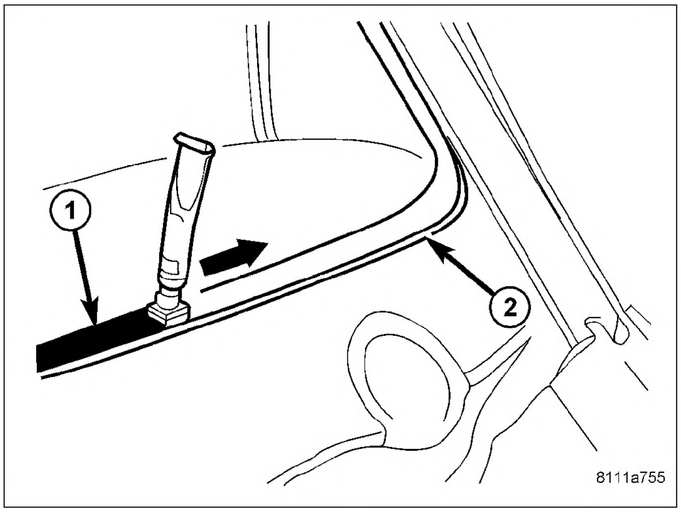


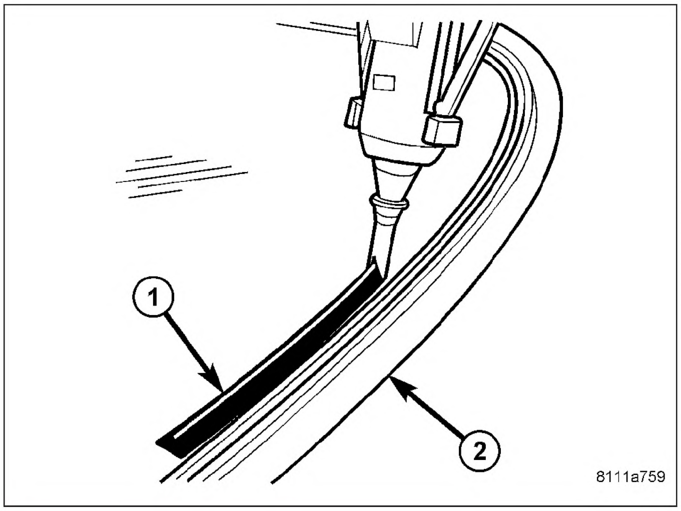
WARNING: Do not use solvent based glass cleaners to clean the windshield before applying glass prep and primer or poor glass adhesion may result.

9. Clean the inside of the windshield with an ammonia based glass cleaner and a lint-free cloth.
10. Apply glass prep adhesion promoter 25 mm (1 in.) wide (1) around the perimeter of the windshield (2) and 5 mm (0.2 in.) from the edge of the glass and wipe dry with a clean lint-free cloth until no streaks are visible.
11. Apply glass primer 25 mm (1 in.) wide (1) around the perimeter of the windshield (2) and 5 mm (0.2 in.) from the edge of the glass. Allow at least three minutes drying time.



12. Using a flashlight, verify that the primer is completely and evenly installed along the perimeter of the windshield.
13. Re-prime any area that is not fully and evenly primed.
14. Clean the windshield fence with an ammonia based glass cleaner and a lint-free cloth.
15. Apply pinch weld primer 15 mm (0.75 in.) wide (1) around the windshield fence (2). Allow at least three minutes drying time.
16. Using a flashlight, verify that the primer is completely and evenly installed along the windshield fence.
17. Re-prime any area that is not fully and evenly primed.



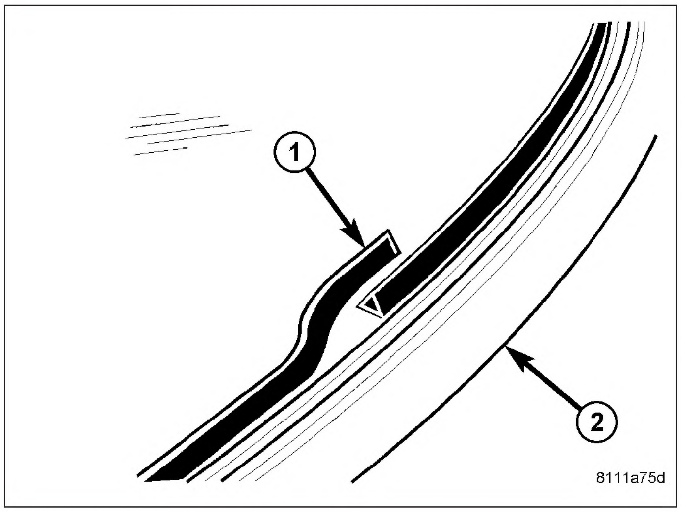


CAUTION: Always apply the bead of adhesive to the windshield. Always install the windshield within 5 minutes after applying the adhesive.

NOTE: If the original urethane adhesive has been exposed for more than 12 hours, the entire adhesive area will need to be re-primed prior to installing new adhesive.

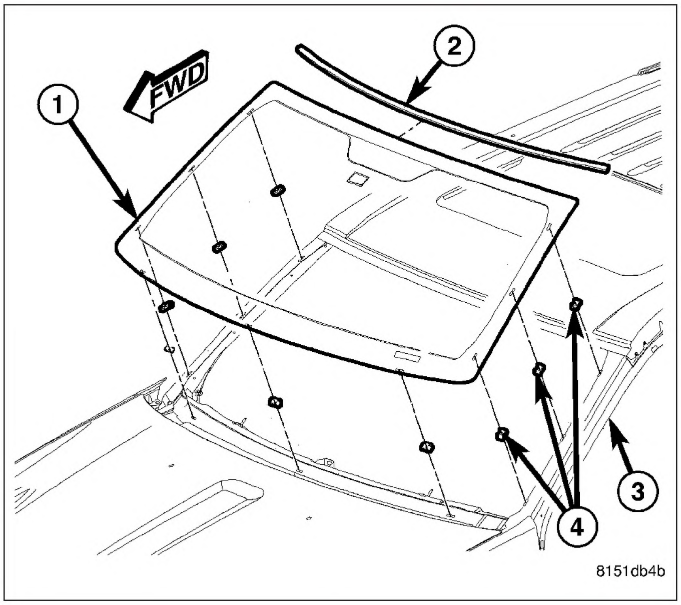
18. Apply approximately a 10 mm (0.4 in.) wide bead of adhesive (1) with a triangular nozzle approximately 6 mm (0.230 in.) from the edge of the glass (2) starting at the bottom center of the windshield.

19. Run the end of the adhesive bead (1) on the windshield (2) parallel to the start of the bead and smooth the ends flush.



20. Using an assistant, position the windshield (1) over the windshield opening.
21. Using the grease pencil marks or tape as reference points, align the windshield to the windshield opening.
22. Carefully lower the windshield into the windshield opening. Guide the windshield and the rubber seal (2) at the top the windshield into its proper location.

CAUTION: It is not possible to move the windshield after installation. The windshield should never be pressed into place by more than one person, because the windshield can break if pressed simultaneously on both sides.



23. Push the windshield inward until the windshield comes into contact with the spacers (4) located on each side and the bottom of the windshield fence (3).
24. Install the cowl grill (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).
25. Install the rear view mirror onto the windshield (Refer to 23 - BODY/INTERIOR/REAR VIEW MIRROR - INSTALLATION).
26. Install the rain sensor module onto the windshield (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/RAIN SENSOR MODULE - INSTALLATION).

SUNROOF - SERVICE INFORMATION

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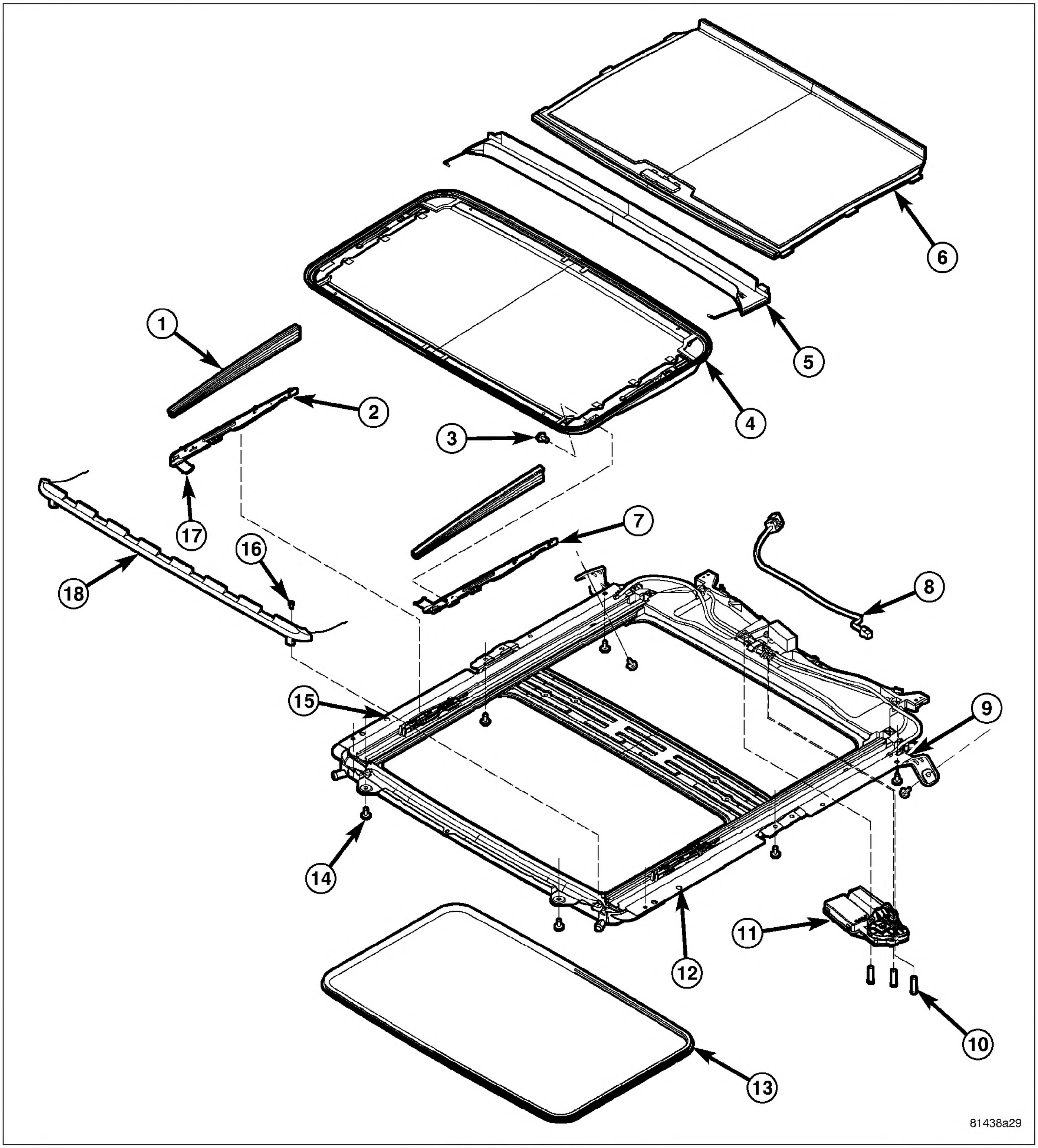
SUNROOF - SERVICE INFORMATION

DESCRIPTION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EXPLODED VIEW

Parts List

1 - MECHANISM COVERS (2)	10 - MOTOR FASTENERS (3)
2 - RIGHT HAND GLASS GUIDE	11 - SUNROOF MOTOR/MODULE ASSEMBLY
3 - GLASS FASTENERS (4)	12 - ALIGNMENT HOLE
4 - GLASS ASSEMBLY	13 - TRIM LACE
5 - DRAIN CHANNEL	14 - ASSEMBLY FASTENERS (10)
6 - SUNSHADE	15 - ALIGNMENT HOLE
7 - LEFT SUNROOF GLASS GUIDE	16 - WIND DEFLECTOR STRAP SCREWS (2)
8 - WIRE HARNESS	17 - GLASS GUIDE FOOT
9 - SUNROOF ASSEMBLY	18 - WIND DEFLECTOR

The power sunroof system allows the sunroof to be opened, closed or placed in the vent position electrically by actuating a switch in the overhead console. The sunroof system receives battery feed through a fuse in the Power Distribution Center (PDC). The sunroof will operate normally with the key in any position while the Accessory Delay system is active.

The sunroof glass panel tilts upward at the rear for ventilation and slides rearward under the roof when open. The panel seals flush with the roof in the closed position to eliminate wind noise. The sunroof includes a manual-sliding sunshade to cover the deep-tinted glass panel.

In addition to the standard power sunroof operation, this vehicle offers several additional features. There is an express (one-touch) opening and closing feature as well as Excessive Force Limitation (EFL). The EFL function detects obstacles trapped between the glass and the vehicle roof during a closing motion. Upon sensing an obstacle the EFL function will reverse direction of the glass to allow removal of the obstacle.

The main components of the power sunroof system are:

- The motor/module assembly
- The power sunroof glass and frame assembly
- The power sunroof switch
- The manual-sliding sunshade

OPERATION

This vehicle has a vent, tilt and slide power sunroof system with express (one-touch) open and closing feature. The sunroof system receives constant battery feed through a fuse in the Power Distribution Center (PDC). The sunroof will operate normally with the key in any position while the Accessory Delay system is active. If the sunroof is moving when the key is turned to the START position (crank engine), all motions stop until the key is released, then the previously requested sunroof motion will resume. The sunroof will also complete a requested motion if the Accessory Delay system goes inactive while the motion is in progress.

A combination push-button and rocker switch module mounted in the overhead console controls sunroof operation. The sunroof switch is a rocker design with a push button in the center of the two halves of the rocker. Pressing the rocker towards the front of the car commands the sunroof closed. Pressing the rocker towards the rear of the car commands the sunroof open. Pressing the center push button commands the sunroof up into the vent position (Rear of sunroof glass raises above the vehicle roof with glass still covering the sunroof opening). All switch commands operate with the glass starting in any position. (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - OPERATION) for additional information.

An electronic control system, integral to the motor/module assembly, provides the express open and close functions. Pressing the ″open″ or ″close″ end of the rocker switch moves the sunroof glass panel to the full open or full closed position, respectively. During express closing, anytime an obstacle is detected in the way of the glass, the motor will stop and reverse travel to avoid pinching an occupant's finger, ice in the track, etc. This function is called Excessive Force Limitation (EFL). There are two methods of overriding the EFL function.

1. When three EFL events occur without the glass being allowed to fully close, the next close attempt will only move while the close switch is continuously actuated. This allows the sunroof to be forced closed if multiple close attempts fail.

2. If the sunroof close switch is continuously actuated during an EFL event, through the reversal, and during a two second wait time, then continuing to hold the close switch will cause the roof to move towards close with the EFL protection disabled. This allows the sunroof to be forced closed if it is known that a reversal will occur.

While in EFL override, the closing motion will cease if the sunroof switch is released at any time.

The motor/module is programmed to learn the speed required to drive the panel based on position and recalibrates itself as needed. If the sunroof becomes uncalibrated, it will only respond to the vent switch. If the vent switch is pressed, the glass will move toward vent; if the switch is released, all motion stops. In the event that the sunroof system becomes uncalibrated perform the sunroof position calibration procedure, (Refer to 8 - ELECTRICAL/ POWER TOP/MOTOR - STANDARD PROCEDURE -SUNROOF POSITION CALIBRATION).

DIAGNOSIS AND TESTING

POWER TOP - SUNROOF

Any diagnosis of the power sunroof system should begin with the use of a scan tool and the proper Diagnostic Procedures Information. The scan tool can provide confirmation that the Controller Area Network (CAN) Data Bus is functional, that all of the electronic modules are sending and receiving the proper messages on the CAN Data Bus, and that the power sunroof motor is being sent the proper hard wired output by the sunroof switch.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

Refer to the appropriate diagnostic information.

SUNROOF

Refer to SUNROOF DIAGNOSIS CHART for possible causes. Before beginning sunroof diagnostics verify that all other power accessories are in proper operating condition. If not, a common electrical problem may exist. Refer to Wiring Diagrams, in this publication for circuit, splice and component descriptions. Check the condition of the circuit protection (20 amp circuit breaker in the Junction Block). Inspect all wiring connector pins for proper engagement and continuity. Check for battery voltage at the power sunroof controller, refer to Wiring Diagrams, for circuit information. If battery voltage of more than 10 volts is detected at the controller, proceed with the following tests (the controller will not operate at less than 10 volts).

Before beginning diagnosis for wind noise or water leaks, verify that the problem was not caused by releasing the control switch before the sunroof was fully closed. The sunroof module has a water-management system. If however, the sunroof glass is in a partial closed position, high pressure water may be forced beyond the water management system boundaries and onto the headlining.

Every time the sunroof module loses power it must be initialized. This is done by connecting power to the sunroof and moving the sunroof toward the closed position. When initialization occurs a slight “kick” in the sunroof module will be seen and heard. This is the indication that the sunroof module is initialized

SUNROOF DIAGNOSIS CHART

SYMPTOM	POSSIBLE CAUSE
Sunroof motor inoperative.	Faulty control switch. Faulty circuit ground between sunroof module, control switch, and body harness. Faulty power circuit between sunroof module, control switch, and body harness. Faulty sunroof drive motor. Faulty sunroof module.
Audible whine when switch is depressed, sunroof does not operate.	Faulty sunroof drive motor. Binding cable.
Audible clicking or ratcheting when switch is pressed, sunroof does not operate.	Broken or worn drive cable. Worn drive motor gear. Mechanisms not synchronized.
Sunroof vents and opens, but does not close.	Broken or disengaged trough guide Binding cable. Faulty circuit. Faulty control switch. Faulty sunroof module. Faulty drive motor.
Sunroof vents, but does not open.	Binding cable or mechanism. Faulty circuit. Faulty switch. Faulty sunroof module.
Sunroof does not vent	Binding cable or mechanism. Faulty circuit. Faulty control switch. Faulty sunroof module.
Sunroof water leak.	Drain tubes clogged or kinked or disconnected from the sunroof. Glass panel improperly adjusted. Faulty glass panel seal.
Gurgling sound from sunroof	Low spot in drain hose routing, allowing water to stand.
Wind noise from sunroof.	Glass panel compression to the roof opening not consistent. Wind deflector not deploying properly. Glass not installed or adjusted properly. Faulty glass panel seal.

SYMPTOM	POSSIBLE CAUSE
Buzz, Squeak, Rattles from sunroof	Loose or broken attaching hardware. No lubrication in track. Worn or broken mechanism. Cables bunched or kinked.
Sunshade will not function or does not operate smoothly	Sunshade feet are broken. Sunshade feet are in the wrong track. Track obstructions or interference. Trim lace incorrectly installed in track.
Glass movement not consistent or glass does not operate smoothly	Glass and Track timing. Glass and Track alignment. Cables and Guide alignment.
Broken or jammed guide mechanism	Mechanism cover was not installed correctly.

WATER DRAINAGE AND WIND NOISE DIAGNOSIS

The sliding glass panel is designed to seal water entry with a snug fit between the roof and the seal. The fit can be checked by inserting a business card or equivalent, between the roof and the seal. The piece of paper should have some resistance when pulled out when the glass panel is in the closed position. The sunroof housing will drain off a minimum amount of water. Excessive wind noise could result if the gap clearances are exceeded. The sunroof glass panel may need to be adjusted. (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS)

Adequate drainage is provided by a drain trough in the sunroof housing which encircles the sliding glass panel and leads to drain hoses. If a wet headliner or other water leak complaints are encountered, before performing any adjustments, first ensure that the drainage system is not plugged or disconnected. Use a pint container to pour water into the sunroof housing drain trough. If water flow is restricted, use compressed air to blow out any material plugging the drain system. Retest system again.

To further check for a disconnected drain hose:

NOTE: Care must be taken not to fold or kink the headliner upon removal.

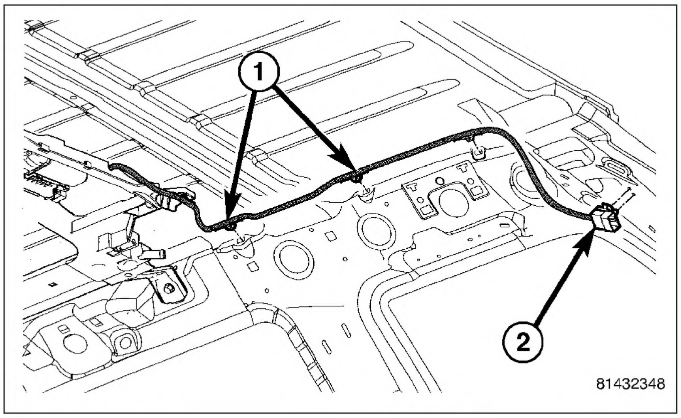
1. Lower headliner as necessary to gain access to sunroof housing drain tubes. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL)
2. Repair as necessary.

ASSEMBLY-MODULE

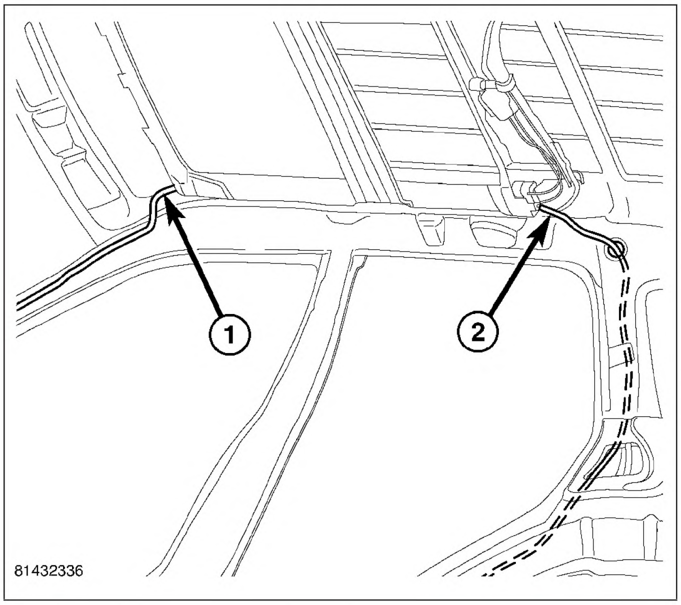
REMOVAL

WARNING: The Excessive Force Limitation (EFL) feature must be calibrated any time a sunroof motor/module is replaced with a new component. Failure to perform this procedure could result in vehicle damage and/or personal injury. (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION) for the appropriate procedure.

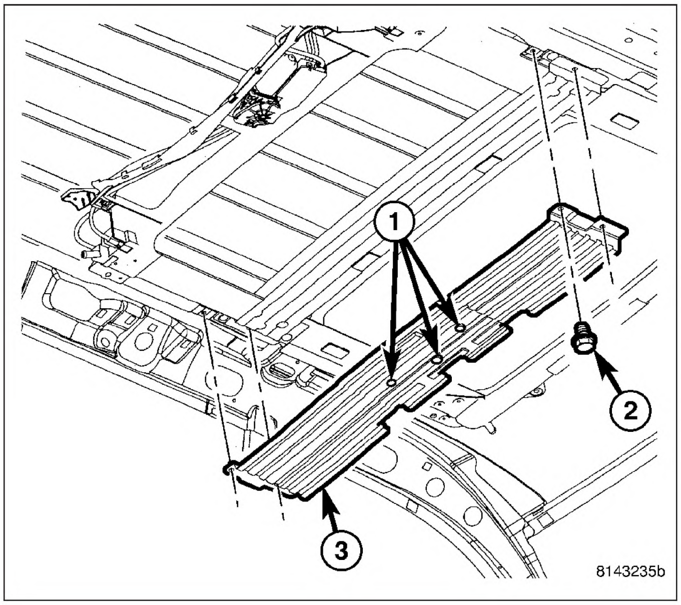
1. Move glass panel to the fully closed position.
2. Disconnect and isolate the battery negative cable.

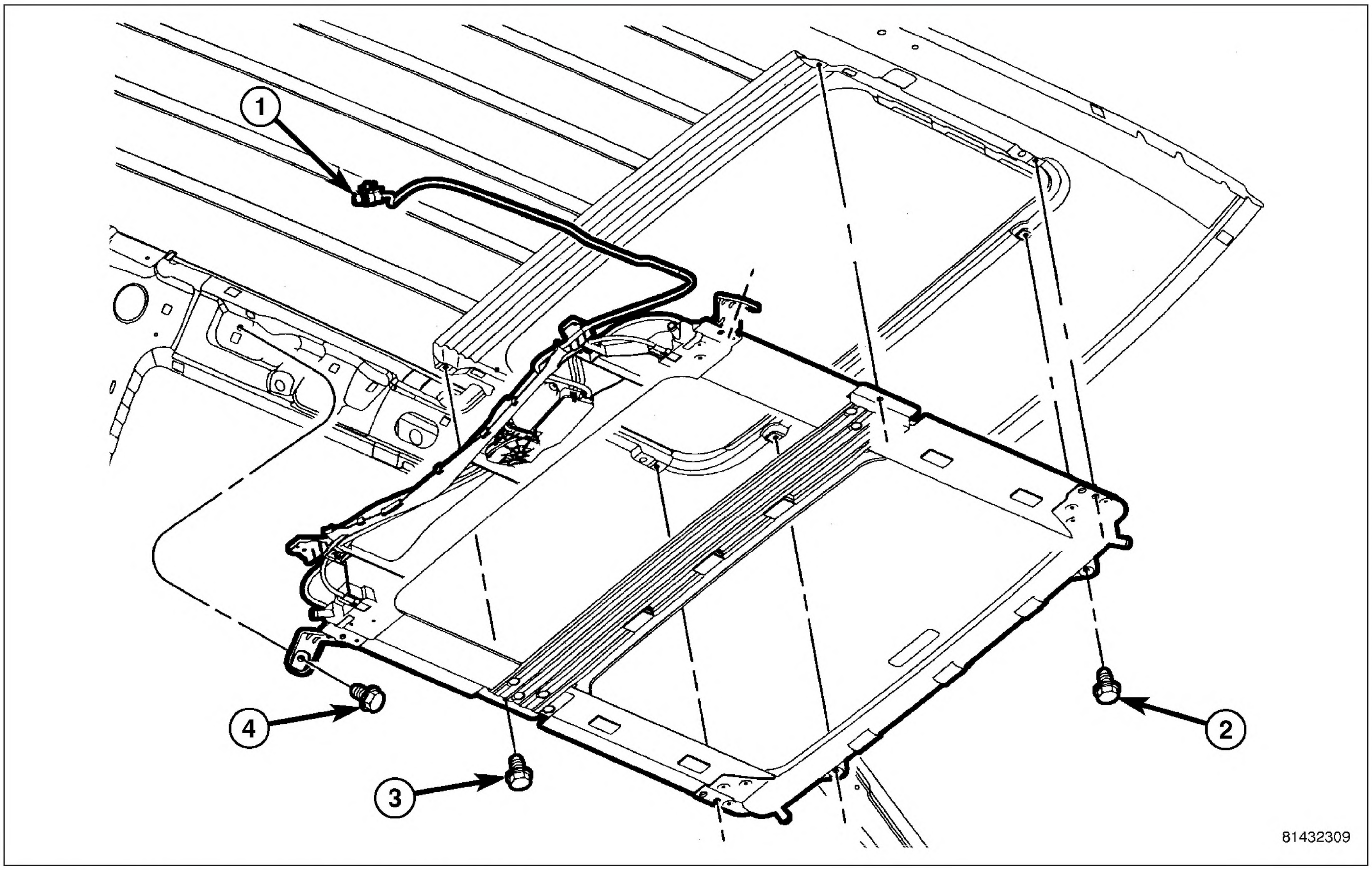


3. Remove headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
4. Disconnect the sunroof wire harness electrical connector (2) and separate the harness support clips (1) from the body.
5. Disconnect the front (1) and rear (2) drain tubes from sunroof housing.



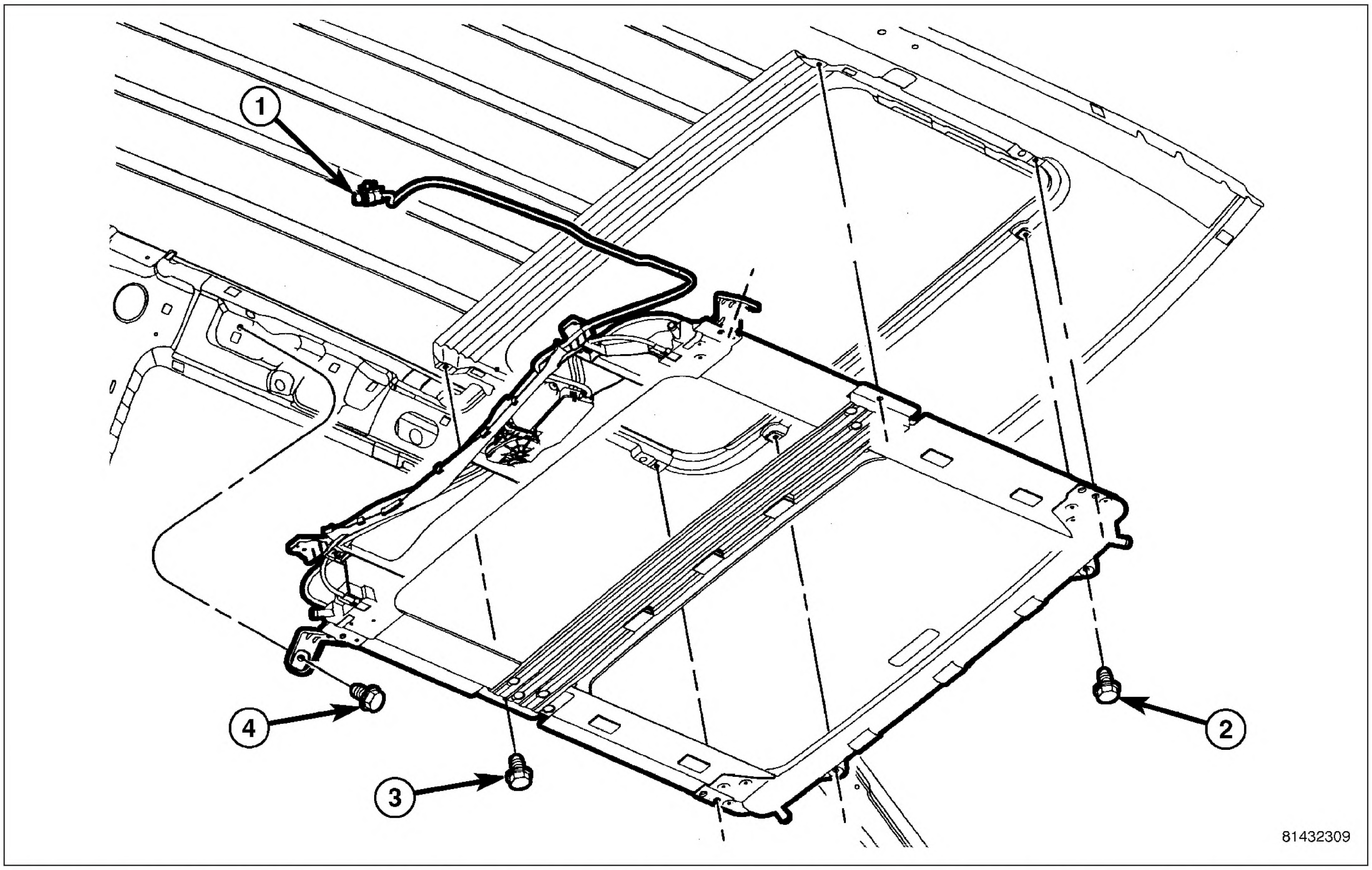
6. Remove the fasteners (1) and (2) and remove the DVD support bracket, if equipped.





7. Remove the front (2) and rear (4) fasteners.
8. With the aid of a helper, support the sunroof and remove the fasteners (3) attaching sunroof assembly to roof panel.
9. Remove the sunroof from vehicle.

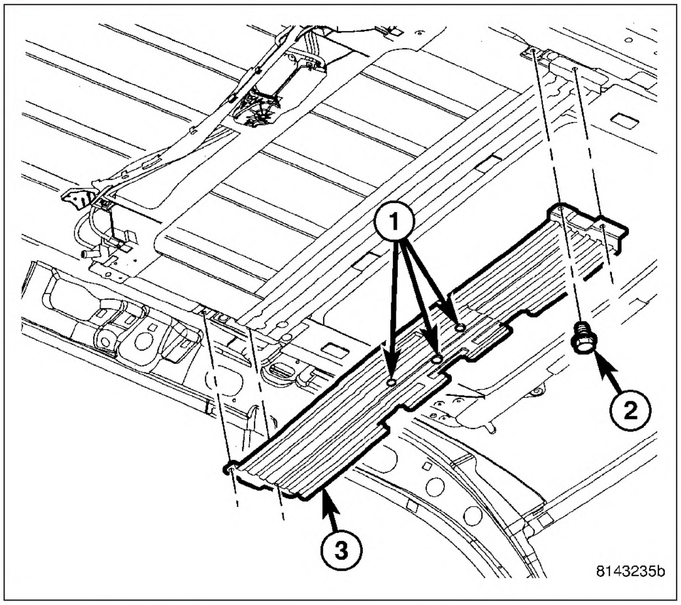
INSTALLATION



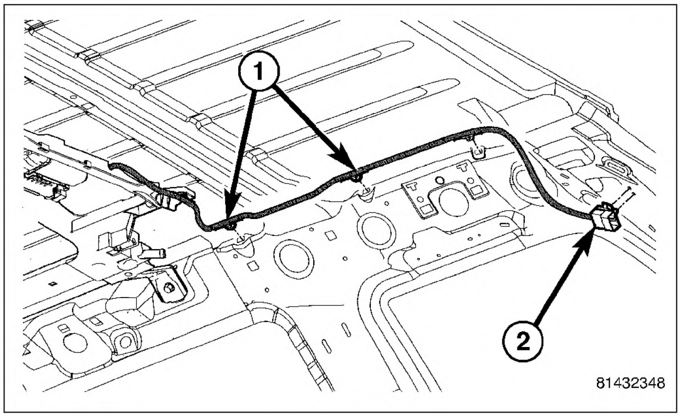
WARNING: The Excessive Force Limitation (EFL) feature must be calibrated any time a sunroof motor/module is replaced with a new component. Failure to perform this procedure could result in vehicle damage and/or personal injury. (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION) for the appropriate procedure.

1. Verify that glass panel is loose and slightly retracted.
2. Raise sunroof module assembly and guide it carefully into position.
3. Hand start the eight screws (2), (3) and (4).
4. Position special tool # 9582 pins through the locating holes and confirm the module assembly is properly aligned.
5. Tighten the eight attaching screws to 9 N·m (80 in. lbs.) and remove the special tool.

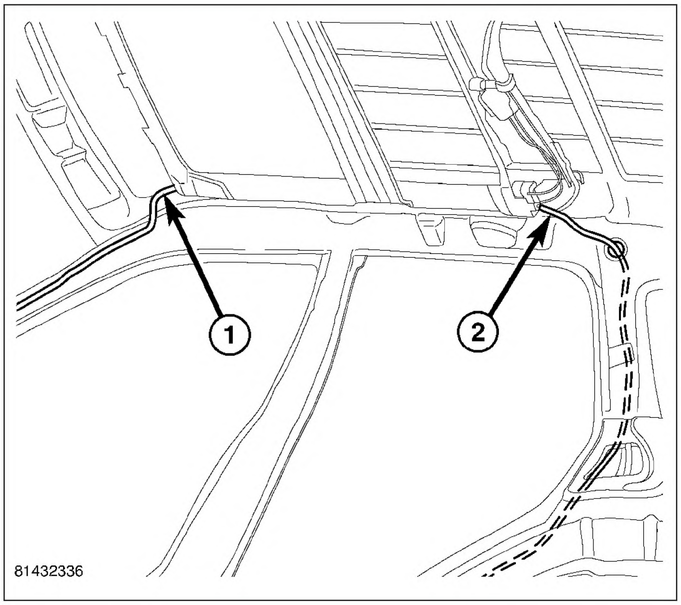
6. Install the DVD support bracket (3), if equipped.
7. Install the bolts (2) and tighten to 9 N·m (80 in. lbs.).
8. Install the bolts (1) and tighten to 10 N·m (85 in. lbs.).



9. Connect the electrical connector (2) and seat the three support clips (1) fully.



10. Connect the front (1) and rear (2) drain tubes to the sunroof.
11. Adjust the sunroof glass. (Refer to 23 - BODY/ SUNROOF/GLASS PANEL - ADJUSTMENTS)
12. Connect battery negative cable.
13. Install the vehicle headliner, (Refer to 23 - BODY/ INTERIOR/HEADLINER - INSTALLATION).
14. Perform the sunroof position calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION).
15. Perform the Excessive Force Limitation (EFL) calibration, (Refer to 8 - ELECTRICAL/POWER TOP/ MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION).
16. Verify proper operation of the power sunroof system.

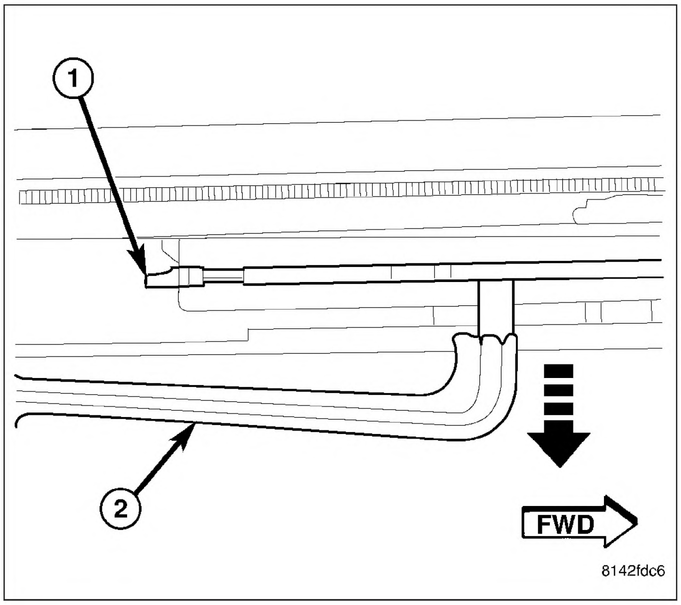


CHANNEL-DRAIN

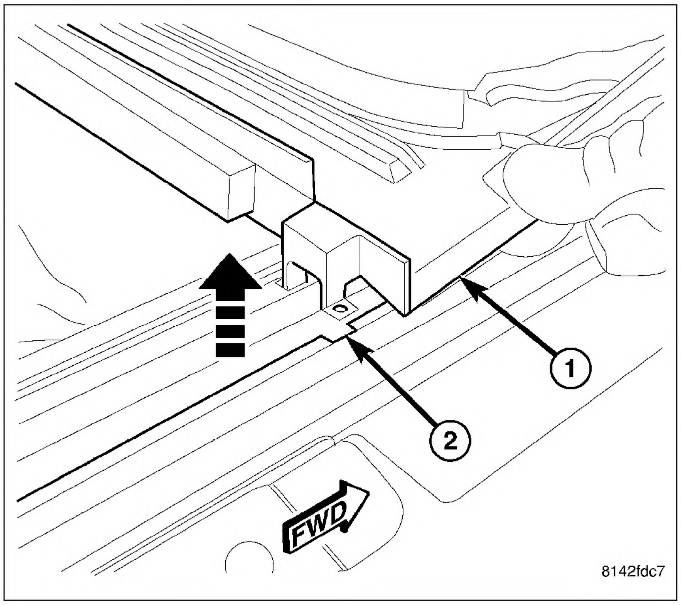
REMOVAL

1. Remove glass panel (2). (Refer to 23 - BODY/ SUNROOF/GLASS PANEL - REMOVAL)
2. Separate the drain channel arms (2) from the guide mechanisms (1) one at a time.

CAUTION: Do not pry the channel arms apart at the same time or you could break the drain channel.

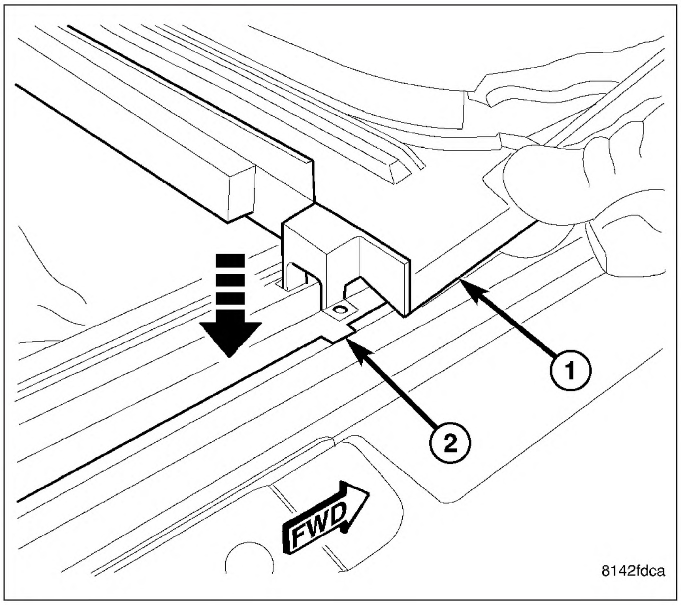


3. Carefully slide the drain channel (1) forward to the notches (2) in the frame and remove from the vehicle.



INSTALLATION

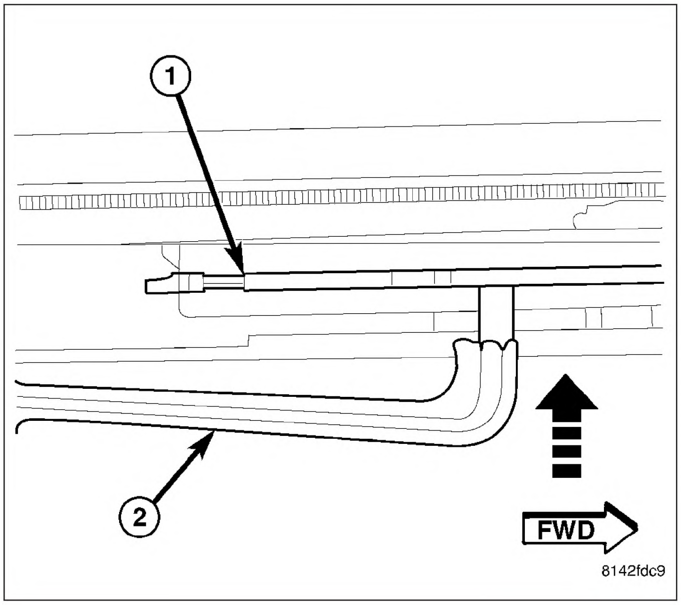
1. Carefully position the drain channel (1) into the notches (2) in the frame and slide rearward.



2. Install the drain channel arms (2) into the mechanism (1) holes one at a time with the reinforcements on the inside of mechanism arms.

CAUTION: Do not pry the channel arms apart at the same time or you could break the drain channel.

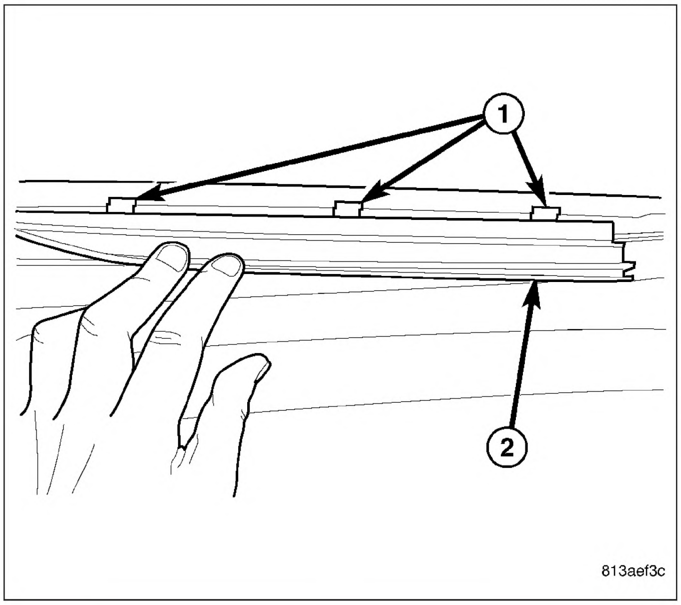
3. Install the sunroof glass. (Refer to 23 - BODY/ SUNROOF/GLASS PANEL - INSTALLATION)



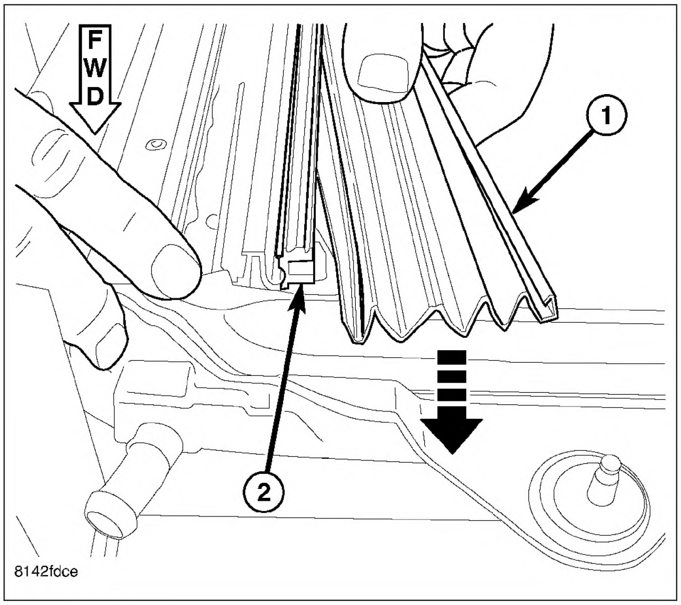
COVER-GUIDE MECHANISM

REMOVAL

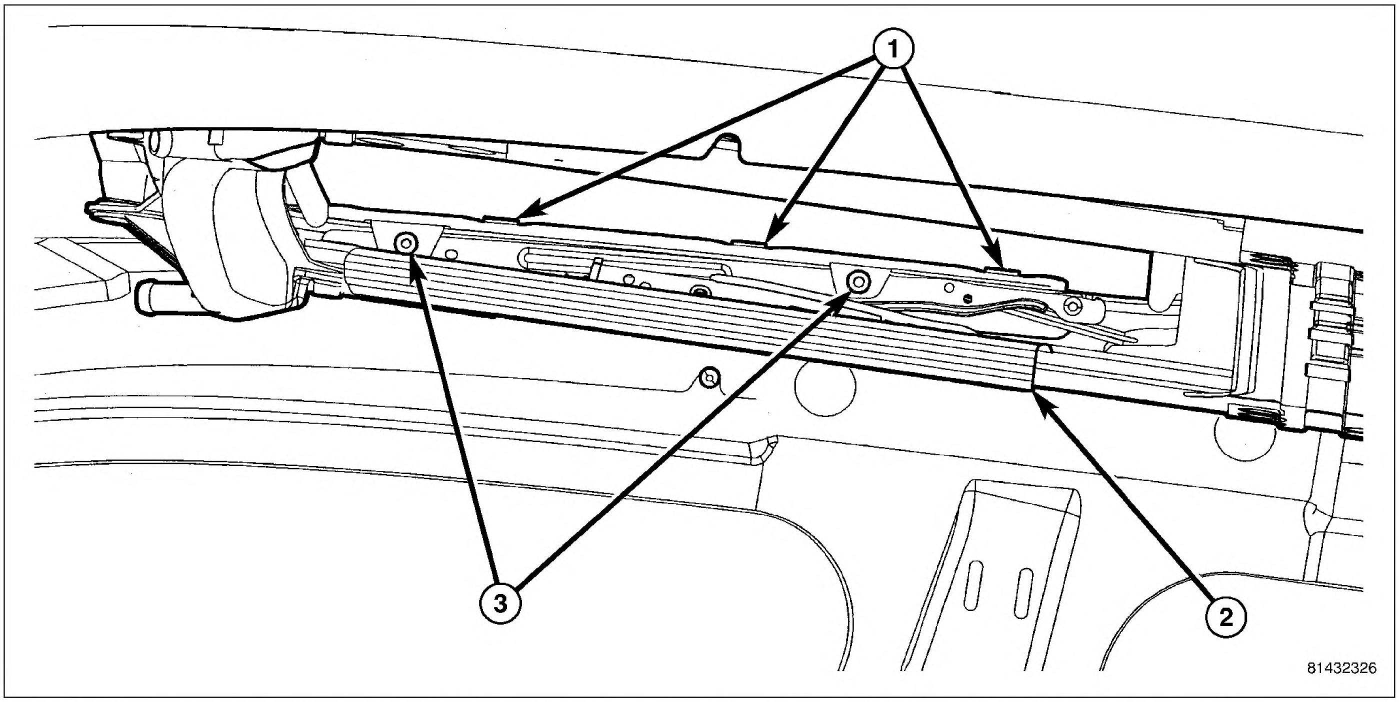
1. Move the glass panel to the full closed position.
2. Slide sunshade rearward to the open position.
3. Separate the mechanism covers (2) from the tabs (1) on the glass panel.



4. Hold both mechanism covers down and open the sunroof fully.
5. Slide the mechanism covers (1) out the front of the guide in the frame (2).



INSTALLATION

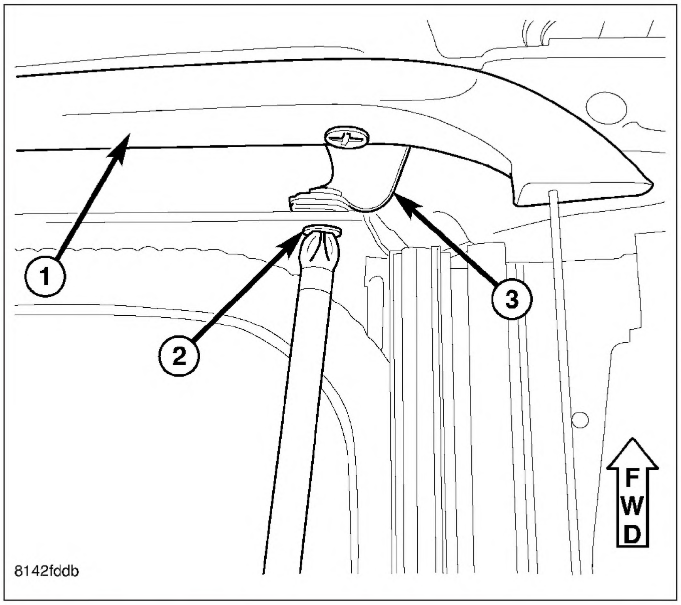


1. With the sunroof in the open position, snap the mechanism cover (2) into the lower guide channel.
2. Hold down each cover and close the sunroof.
3. Snap the upper portion of the cover into the retaining clips (1) on the glass panel between the locating features.

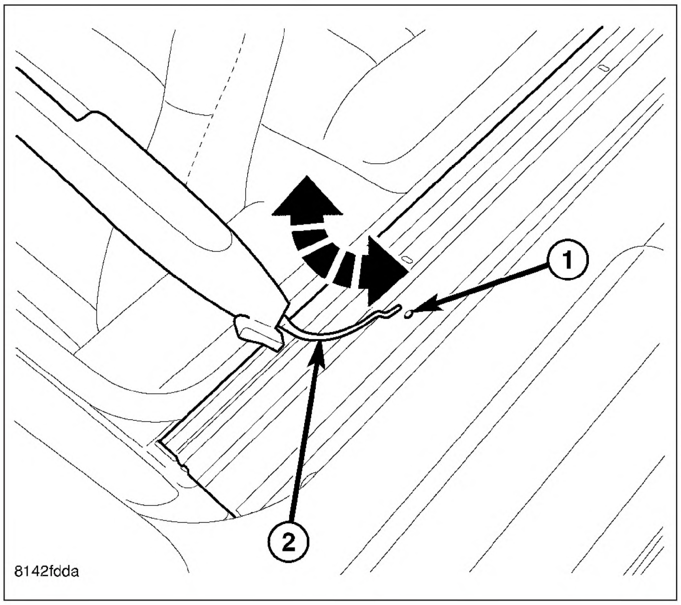
DEFLECTOR-WIND

REMOVAL

1. Open the sunroof fully.
2. Remove the strap screws (2) from the beam area release the strap (3).



3. Rotate the deflector up and remove springs (2) from the holes in the frame (1).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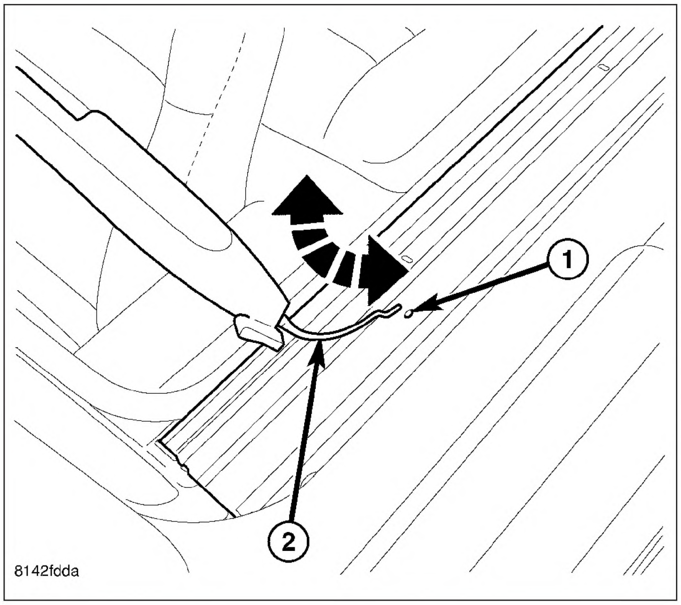
INSTALLATION

1. Position the deflector spring arms (2) into the holes of the frame (1).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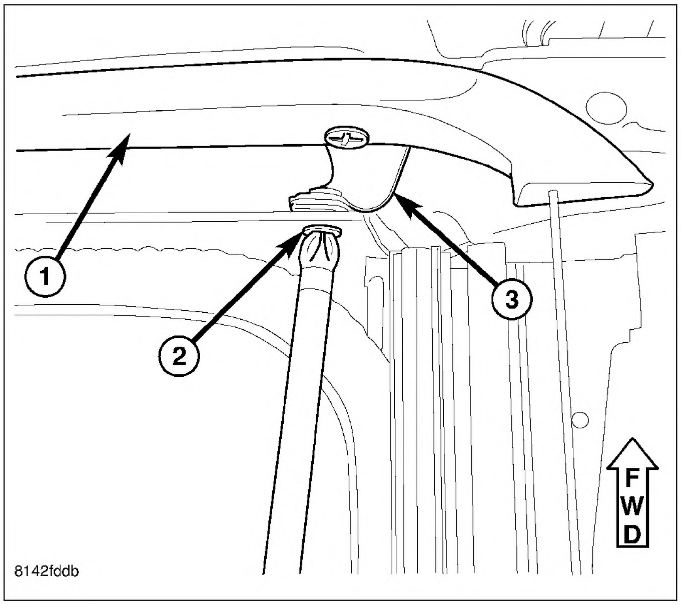
2. Rotate the deflector down, attach the straps (3) and install the strap screws (2) into the front beam.
3. Verify sunroof operation and alignment.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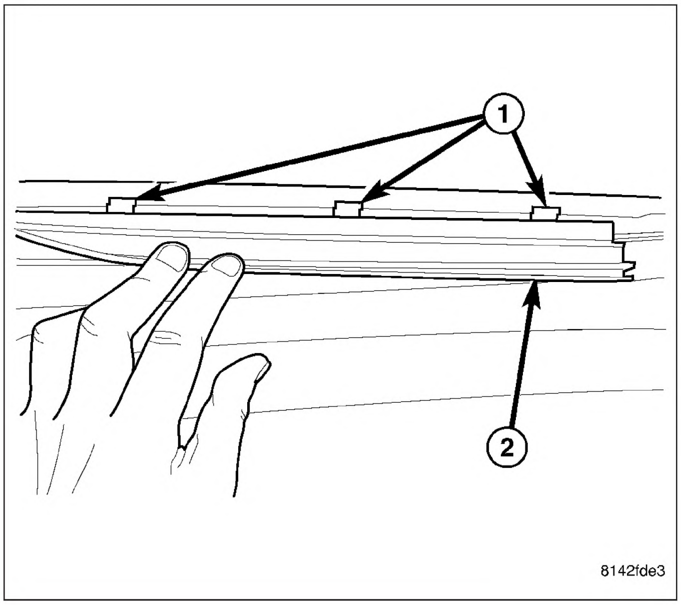
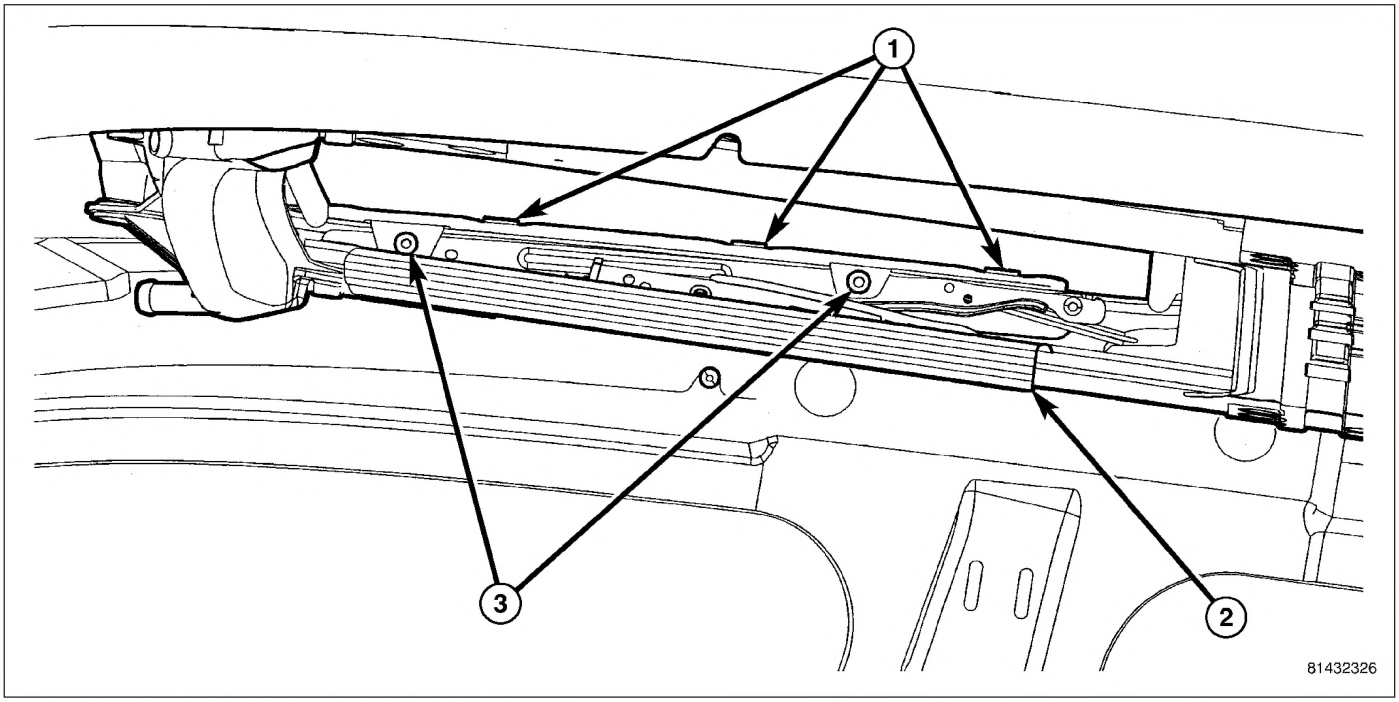
GLASS

REMOVAL

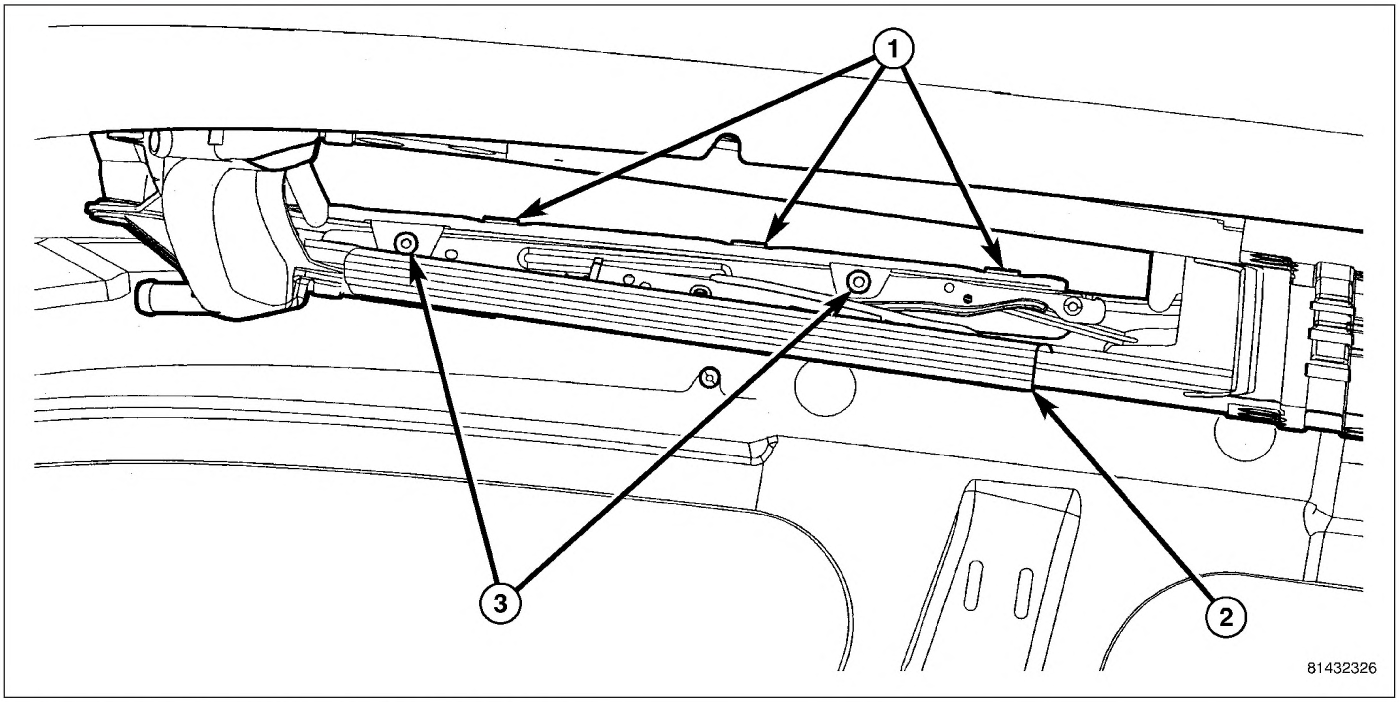
1. Move the glass panel (2) to the full closed position.
2. Slide sunshade rearward to the open position.
3. Separate the mechanism covers (2) from the tabs (1) on the glass panel.





4. Remove the glass panel screws (3).
5. Lift off glass panel and remove from vehicle.

INSTALLATION



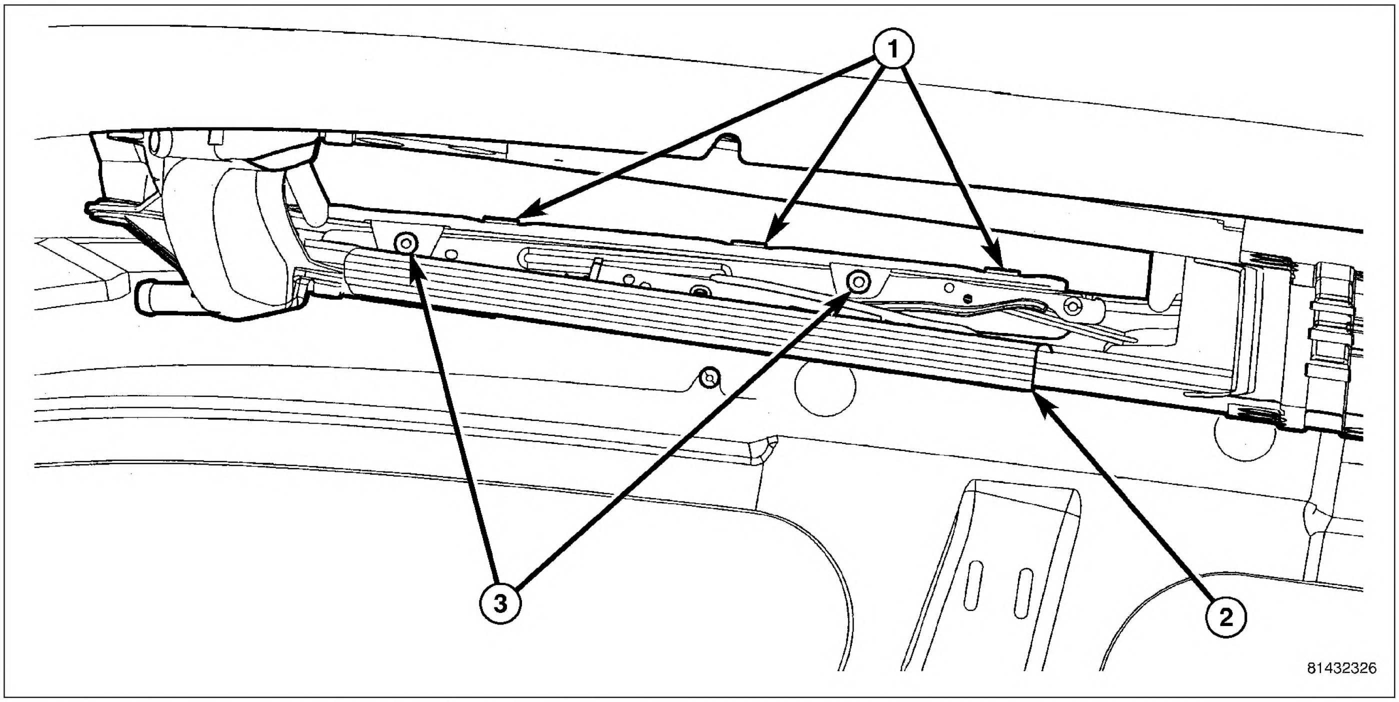
1. Position glass panel on to mechanism lift arms.

CAUTION: Verify that the retaining tabs are located on the INSIDE of the guide mechanism arms.

2. Start the attaching screws (3).
3. Connect a 12v power supply and verify that the sunroof is in the closed position.
4. Adjust sunroof glass to fit flush with roof line (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).
5. Tighten the screws (3) to 3.5 N·m (30 in. lbs.).
6. Position the mechanism covers (2) over the glass tabs (1) between the locating features and seat fully.
7. Verify sunroof operation and alignment.

ADJUSTMENTS

ADJUSTMENT

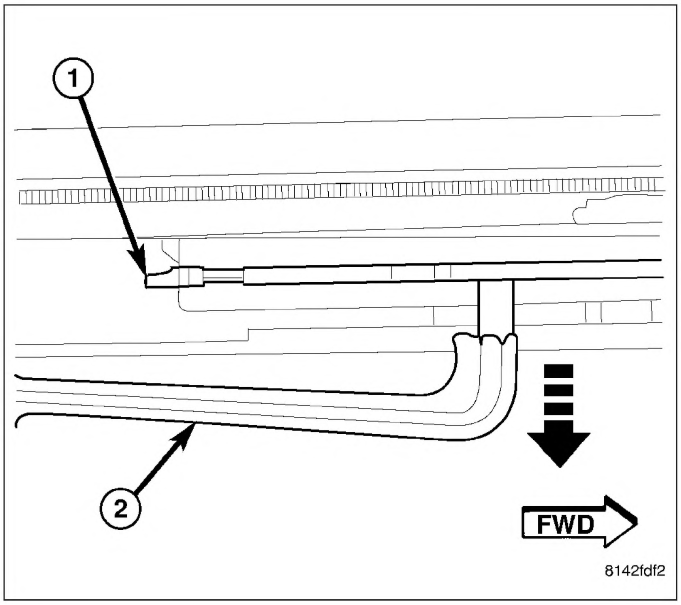


1. Move the sunshade rearward to the open position.
2. Separate the mechanism covers (2) from the tabs (1) on the glass panel.
3. Verify the sunroof glass panel is in the fully closed position.
4. Loosen the forward attaching screws (3) on each side enough to permit the front of the glass to adjust up or down.
5. Adjust the front surface of the sunroof glass panel 0.00 mm to 2 mm (0.00 in. to 0.08 in.) **below** the top surface of the roof.
6. Tighten the front glass panel attaching screws to 3.5 N·m (30 in. lbs.).
7. Loosen the rear screws (3) on each side enough to make the rear adjustment.
8. Adjust the rear surface of the sunroof glass panel 0.00 mm to 2 mm (0.03 in. to 0.08 in.) **above** the top surface of the roof.
9. Tighten the rear glass panel attaching screws to 3.5 N·m (30 in. lbs.).
10. Check for proper fit. If not OK, repeat glass panel adjustment.
11. Position the mechanism covers (2) over the glass tabs (1) between the locating features and seat fully.
12. Verify sunroof operation and alignment.

GUIDE-SUNROOF GLASS

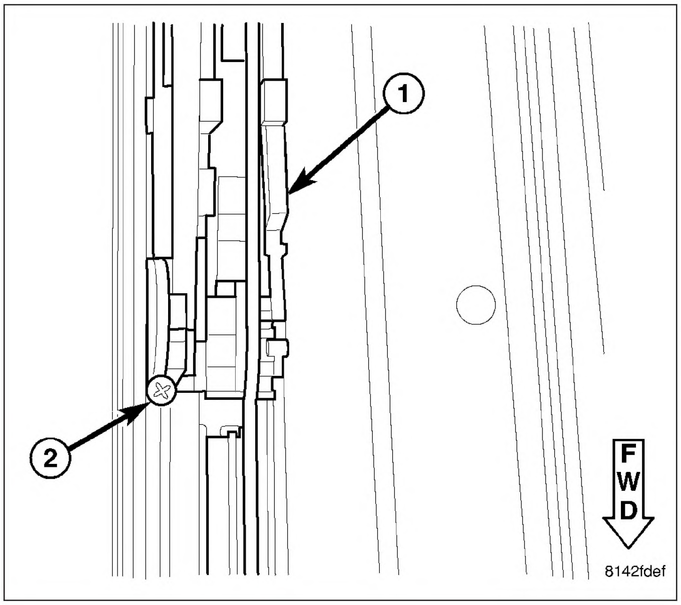
REMOVAL

1. Place the sunroof in the vent position.
2. Remove the sunroof assembly. (Refer to 23 - BODY/SUNROOF/ASSEMBLY-MODULE - REMOVAL)
3. Remove the motor. (Refer to 8 - ELECTRICAL/POWER TOP - SUNROOF SERVICE INFO/MOTOR/MODULE-SUNROOF - REMOVAL)
4. Remove the glass. (Refer to 23 - BODY/SUNROOF/GLASS - REMOVAL)
5. Remove the wind deflector. (Refer to 23 - BODY/SUNROOF/DEFLECTOR-WIND - REMOVAL)
6. Separate the drain channel arms (2) from the guide mechanisms (1) one at a time.

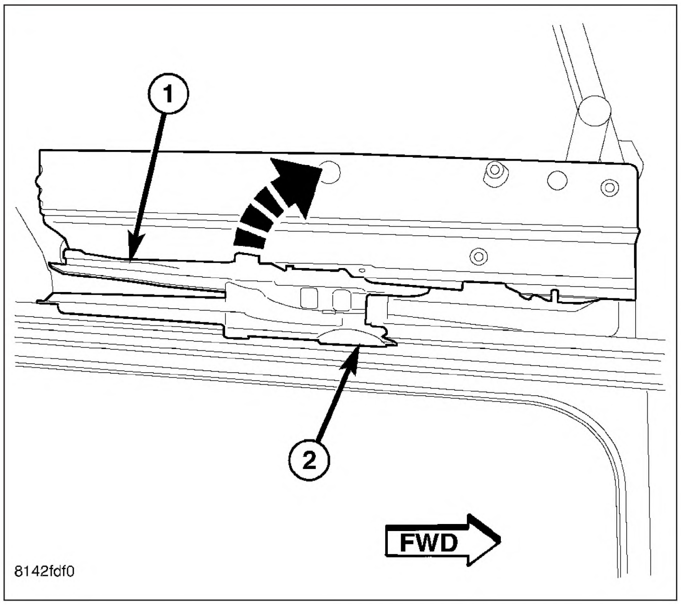


CAUTION: Do not pry the channel arms apart at the same time or you could break the drain channel.

7. Slide the drain channel rearward out of the way.
8. Remove the hard stop screw from the frame.



9. push the drive cable and guide plate forward past the hard stop screw location until the glass guide comes loose.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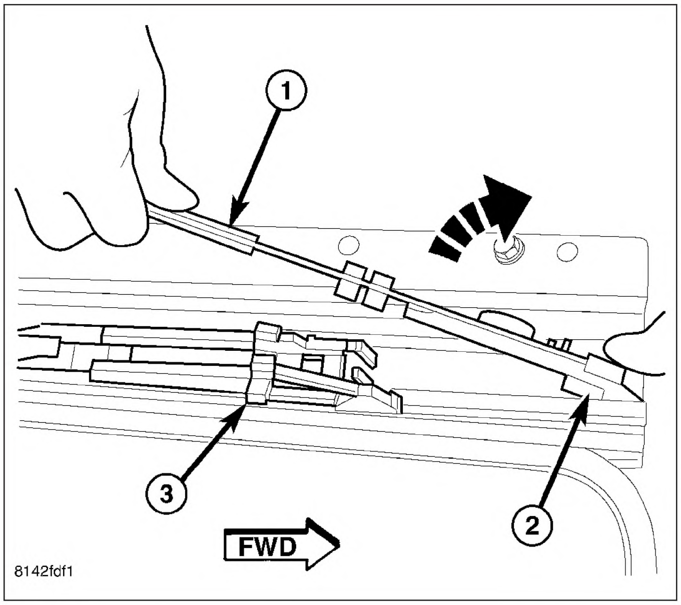
10. Rotate the guide (1) up and out of the front beam (3) and release the front foot (2) from the channel guide.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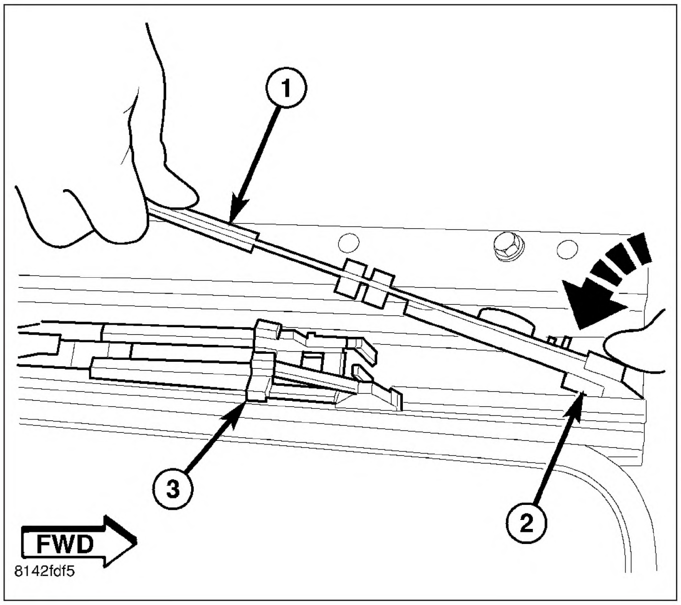
INSTALLATION

1. With the drive cable plate aligned insert the front foot (2) into the guide channel and engage the feet with the front beam (3).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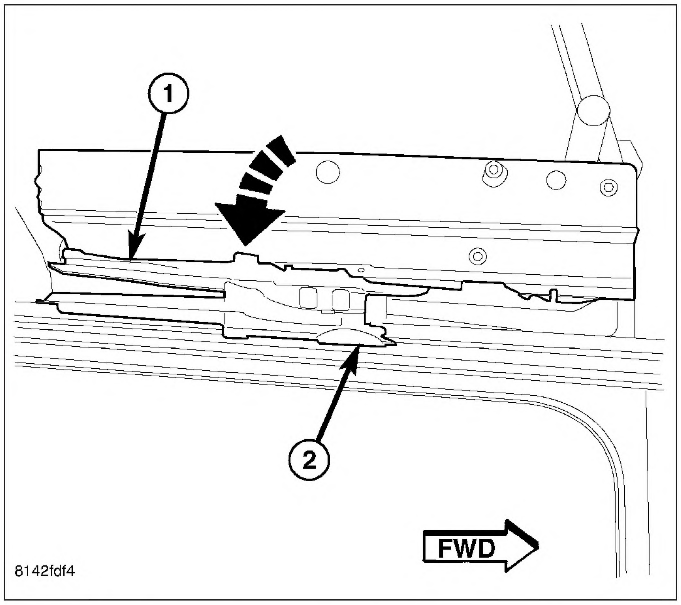
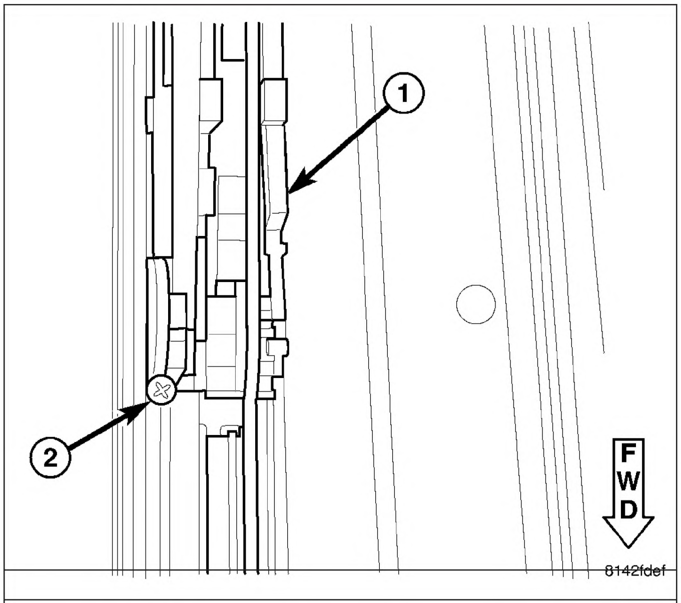
2. Rotate the guide plate (1) inboard until the feet of the guide are engaged into the front beam (2).

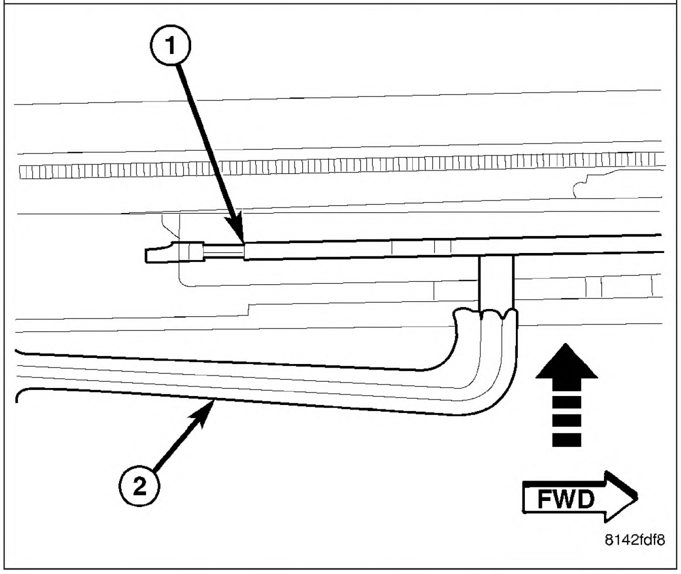


3. Push the guide assembly (1) and drive cable rearward past the hard stop location.
4. Install the hard stop screw (2) and push the drive cable and guide assembly (1) up against the hard stop screw (2).
5. Verify that the opposite guide assembly is also positioned up against the hard stop screw.
6. Install the wind deflector as necessary. (Refer to 23 - BODY/SUNROOF/DEFLECTOR-WIND - INSTALLATION)
7. Install the motor as necessary. (Refer to 8 - ELECTRICAL/POWER TOP - SUNROOF SERVICE INFO/MOTOR/MODULE-SUNROOF - INSTALLATION)



8. Install the drain channel arms (2) into the mechanism (1) holes one at a time with the reinforcements on the inside of mechanism arms.

CAUTION: Do not pry the channel arms apart at the same time or you could break the drain channel.



9. Install the sunroof assembly into the vehicle. (Refer to 23 - BODY/SUNROOF/ASSEMBLY-MODULE - INSTALLATION)
10. Perform the sunroof position calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF POSITION CALIBRATION).
11. Perform the Excessive Force Limitation (EFL) calibration, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - EXCESSIVE FORCE LIMITATION (EFL) CALIBRATION).
12. Install the glass as necessary. (Refer to 23 - BODY/SUNROOF/GLASS - INSTALLATION)

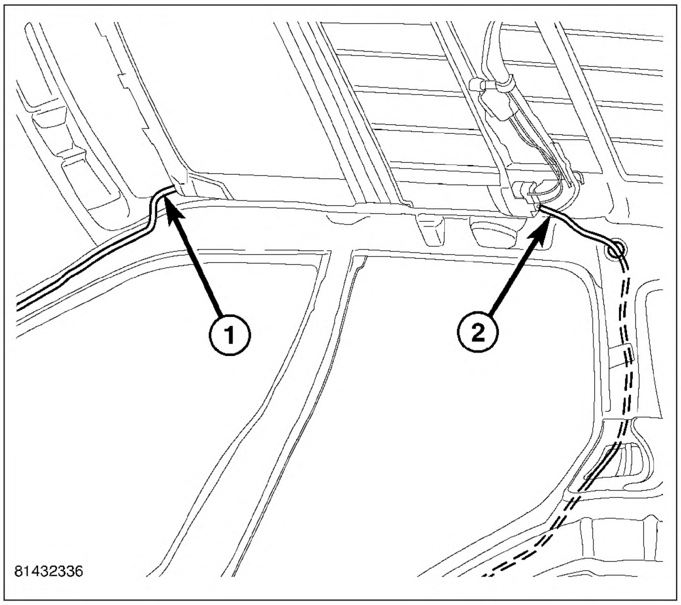
13. Adjust sunroof glass to fit flush with roof line (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).
14. Verify proper operation of the power sunroof system.

HOSE-DRAIN

REMOVAL

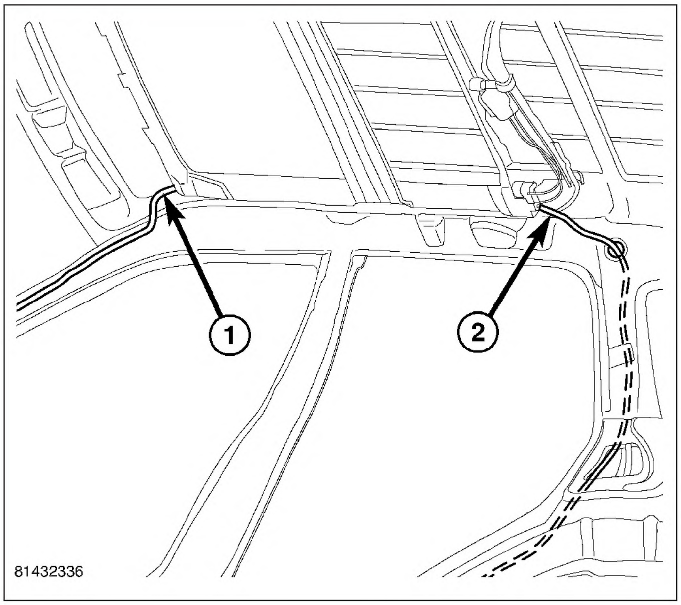
FRONT HOSES

1. Remove headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
2. Disconnect the drain hose from the sunroof housing (1).
3. Separate the lower tube from the grommet in the body.
4. Drain any liquid from hose connection, if necessary.
5. Release the clips and remove the tube.



REAR HOUSING HOSE

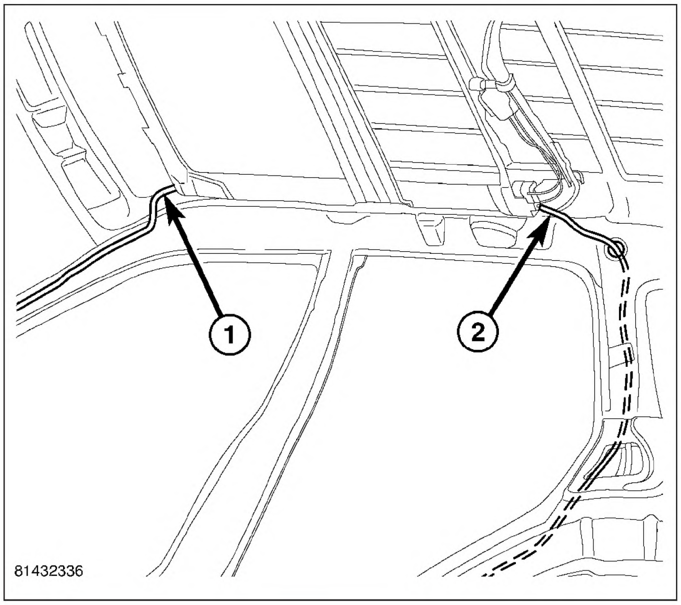
1. Remove headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
2. Disconnect the drain hose from the sunroof housing (2).
3. Drain any liquid from hose connection, if necessary.
4. Release the push pin fasteners and separate the lower tube from the grommet in the body.



INSTALLATION

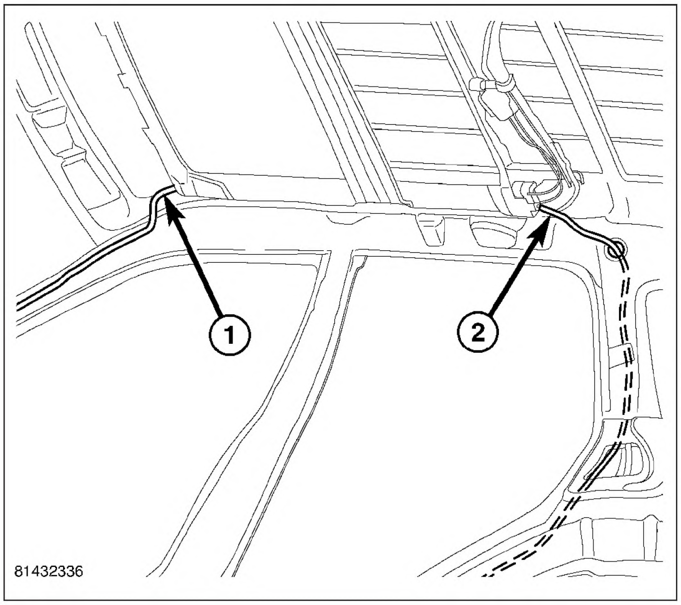
FRONT HOSES

1. Position the lower portion through the grommet in the body.
2. Connect the new drain hose to the sunroof housing (1) and test drainage.
3. Position the hose into the support clips.
4. Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).



REAR HOUSING HOSE

1. Install the rear hose and seat the push pin fasteners fully.
2. Position the lower portion through the grommet in the body.
3. Connect the new drain hose to the sunroof housing (2) and test drainage.
4. Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).



MOTOR

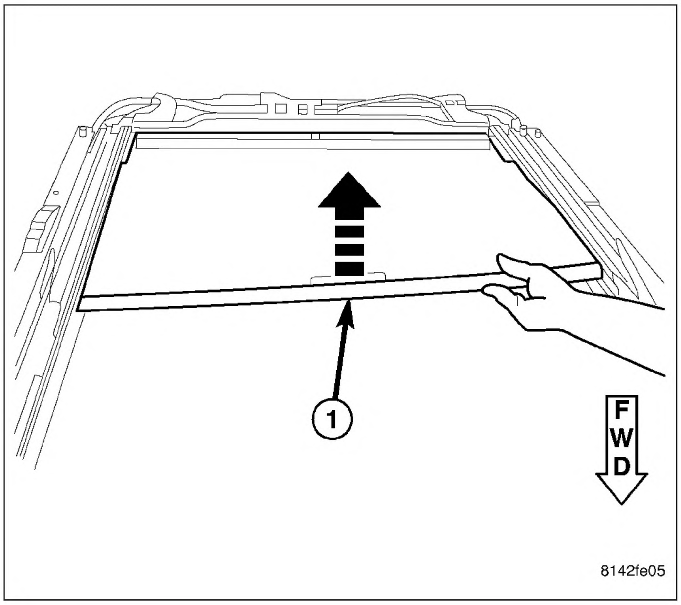
DESCRIPTION

For service information refer to (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - DIAGNOSIS AND TESTING).

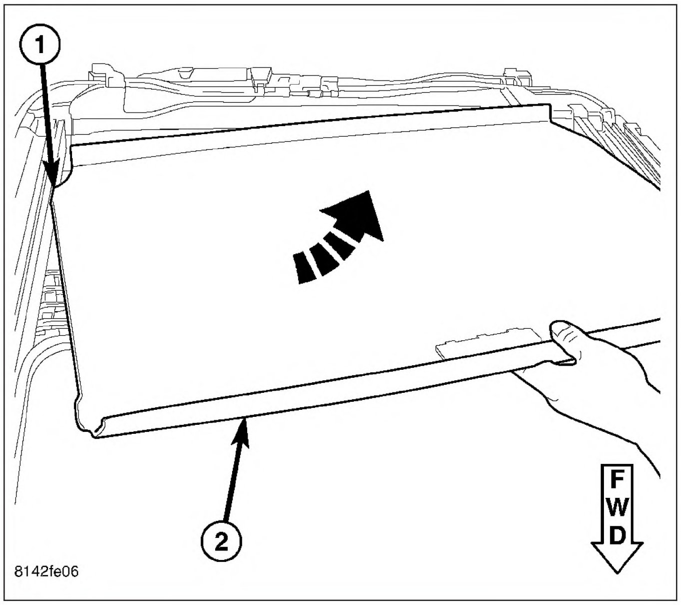
SUNSHADE

REMOVAL

1. Remove the drain channel. (Refer to 23 - BODY/SUNROOF/CHANNEL-DRAIN - REMOVAL)
2. Push up the front center of the sunshade (1) to pop out the front two feet.

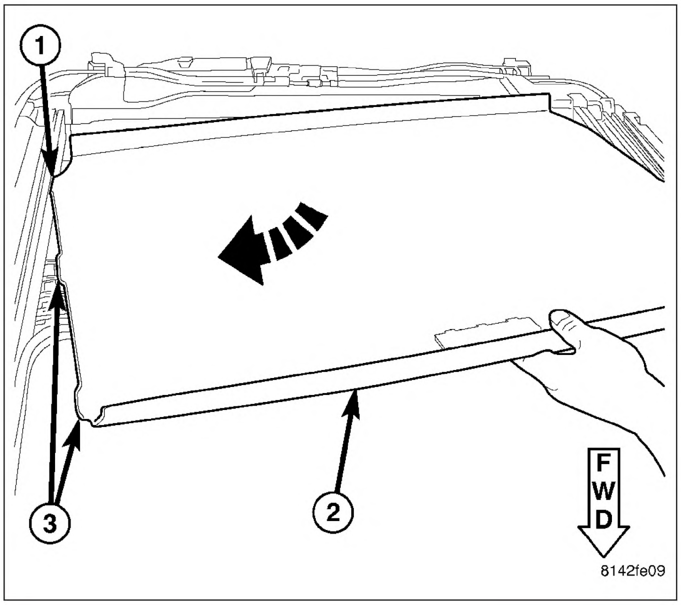


3. Rotate the sunshade (2) so that the other feet (1) are removed from the guide track.

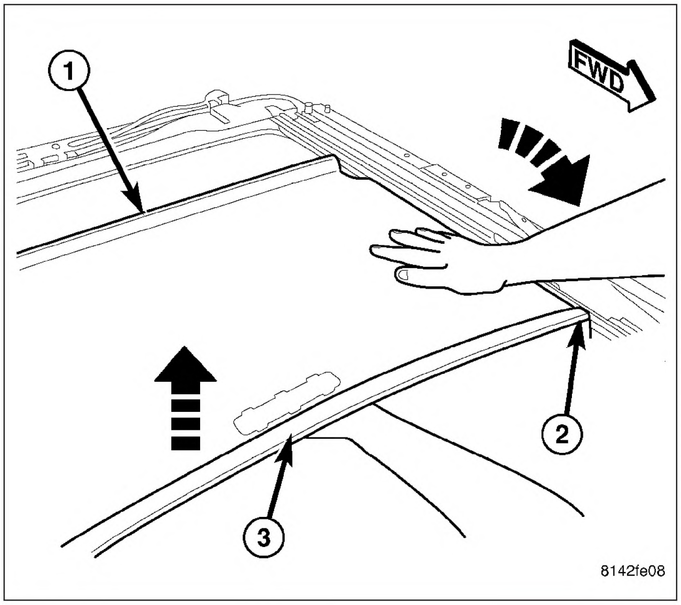


INSTALLATION

1. Verify the sunshade track is free of obstructions like the trim lace/ring.
2. Start with sunshade (2) at an angle with one foot (1) in the track.
3. Rotate the sunshade so the other rear foot is in the track as well as the 2 other feet (3) on the same side as the first foot.



4. To insert the remaining two feet (2) apply force to the middle front of sunshade (3) and guide them into the track.
5. Check that all the feet are in the right track and verify sunshade operation.
6. Install the drain channel. (Refer to 23 - BODY/SUNROOF/CHANNEL-DRAIN - INSTALLATION)



SWITCH-SUNROOF

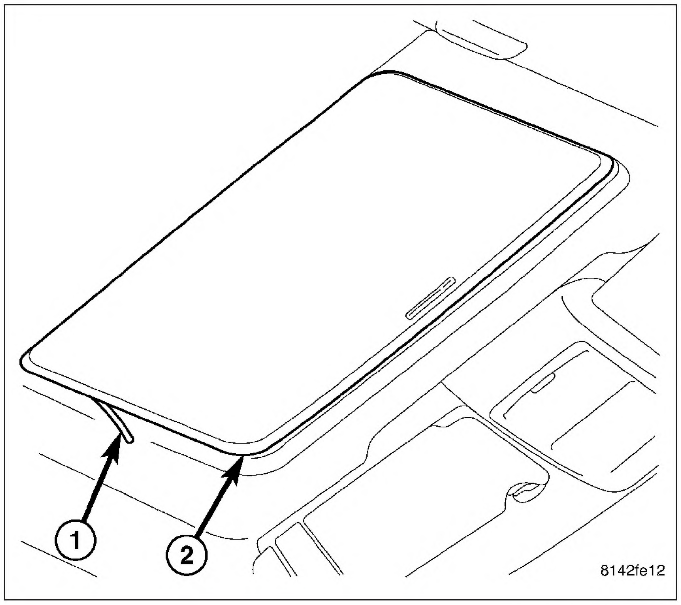
DESCRIPTION

For service information refer to (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - DIAGNOSIS AND TESTING).

TRIM LACE

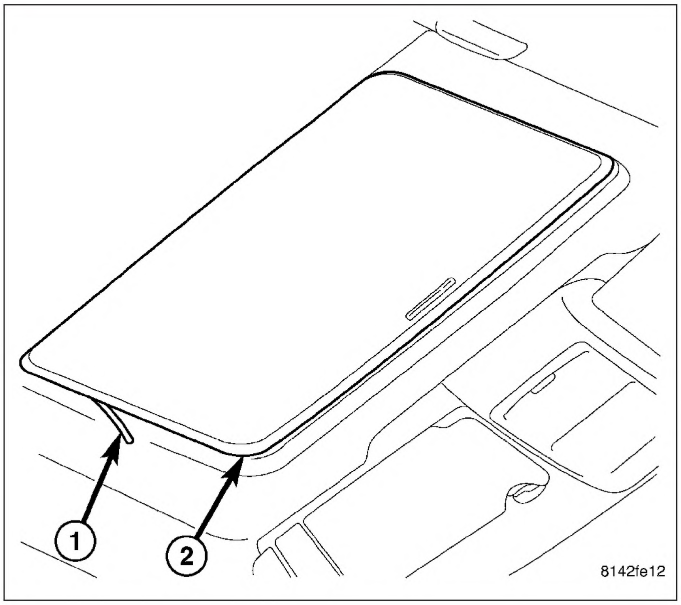
REMOVAL

1. Remove trim lace (2) by holding one end of the trim lace at the butt joint and pulling horizontally into the opening until lace is completely loose from the headliner/sunroof joint.



INSTALLATION

1. Place butt joint of trim lace into position starting at the drivers side middle of the opening at the butt joint notch in the u-frame.
2. Push lace into position.
3. Ensure that the corner radii is fully engage.
4. Once the trim lace is attached to sunroof module using a trim stick C-4755 or equivalent, begin tucking the headliner under the lip on the trim lace working all the way around the opening. When installing a new trim lace, begin tucking the headliner under the lip as the tear cord (1) is removed working all the way around the opening.



BODY STRUCTURE

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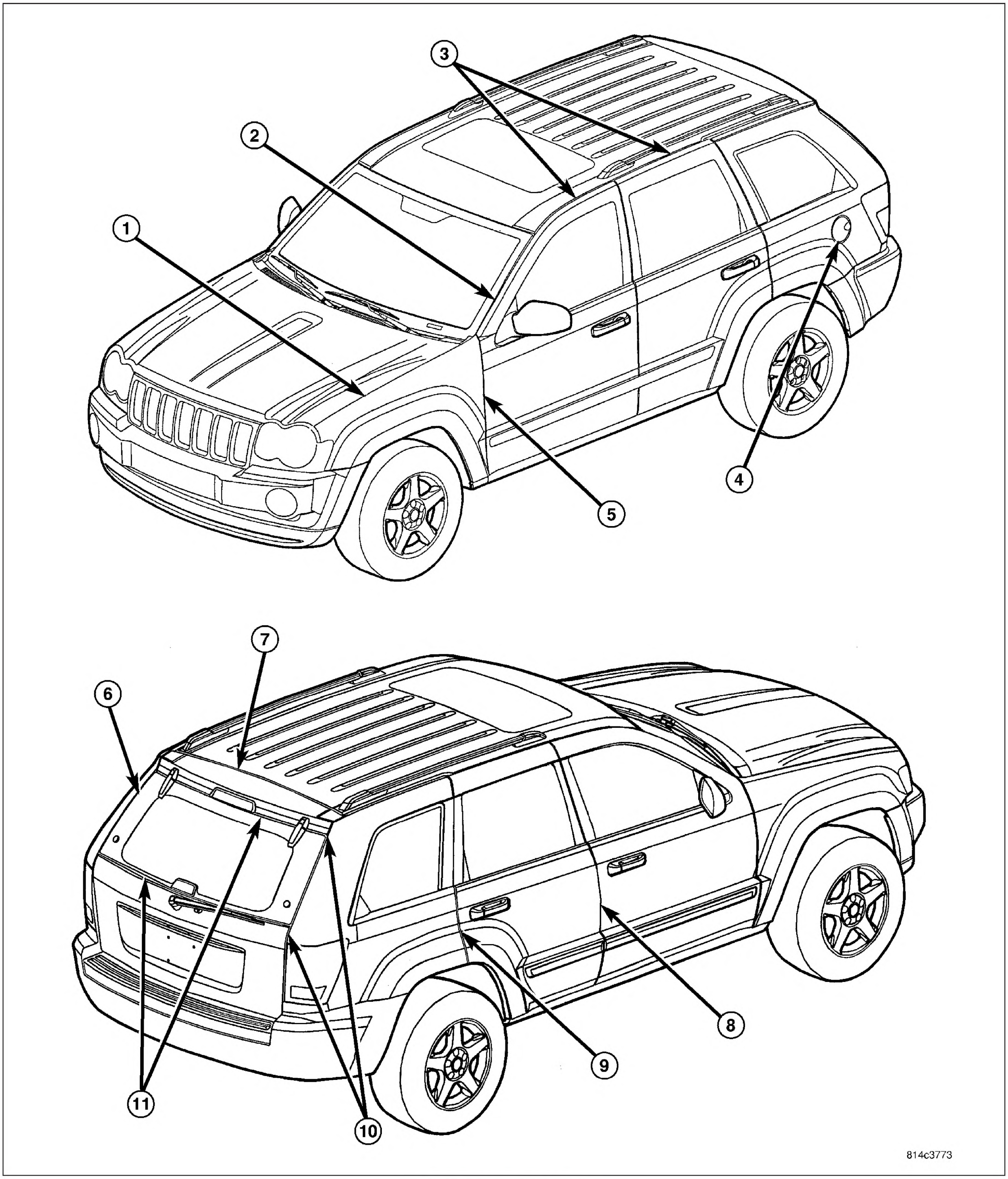
GAP AND FLUSH

SPECIFICATIONS

GAP AND FLUSH SPECIFICATIONS


3
2
1
4
5
7
6
8
9
11
10
814c3773

GAP AND FLUSH

NOTE:
All measurements are in mm.

DIMENSION	DESCRIPTION	GAP	FLUSH
1	HOOD TO FENDER	4.0 ± 1.5 PARALLEL WITHIN 1.5	HOOD UNDERFLUSH -0.5 ± 1.5 PARALLEL WITHIN 1.5
2	WINDSHIELD MOLDING TO FRONT DOOR	6.0 ± 2.0	MOLDING OVERFLUSH 3.0 ± 1.0
3	FRONT AND REAR DOORS TO ROOF	6.0 ± 1.5 PARALLEL WITHIN 2.5	DOORS OVERFLUSH 2.0 ± 1.5
4	FUEL DOOR TO BODY SIDE	3.0 ± 1.0	FUEL DOOR UNDERFLUSH -0.5 ± 1.0
5	FENDER TO FRONT DOOR	4.5 ± 1.25 PARALLEL WITHIN 1.25	FENDER OVERFLUSH 0.5 ± 1.0
6	FLIPPER GLASS TO BODY SIDE	4.0 ± 1.5 PARALLEL WITHIN 1.5 SIDE TO SIDE WITHIN 1.5	GLASS UNDERFLUSH -2.5 ± 2.5
7	LIFTGATE TO ROOF	9.0 ± 2.0	LIFTGATE UNDERFLUSH -1.0 ± 1.5 PARALLEL WITHIN 1.5
8	FRONT DOOR TO REAR DOOR	4.5 ± 1.0 PARALLEL WITHIN 1.0	0.0 ± 1.25 PARALLEL WITHIN 1.5
9	REAR DOOR TO BODY SIDE	4.5 ± 1.0 PARALLEL WITHIN 1.0	0.0 ± 1.25 PARALLEL WITHIN 1.5
10	LIFTGATE TO BODY SIDE	4.0 ± 1.5 PARALLEL WITHIN 1.5 SIDE TO SIDE WITHIN 1.5	LIFTGATE UNDERFLUSH -0.5 ± 1.5
11	FLIPPER GLASS TO LIFTGATE	5.0 ± 1.5	—

OPENING DIMENSIONS

SPECIFICATIONS

OPENING DIMENSIONS

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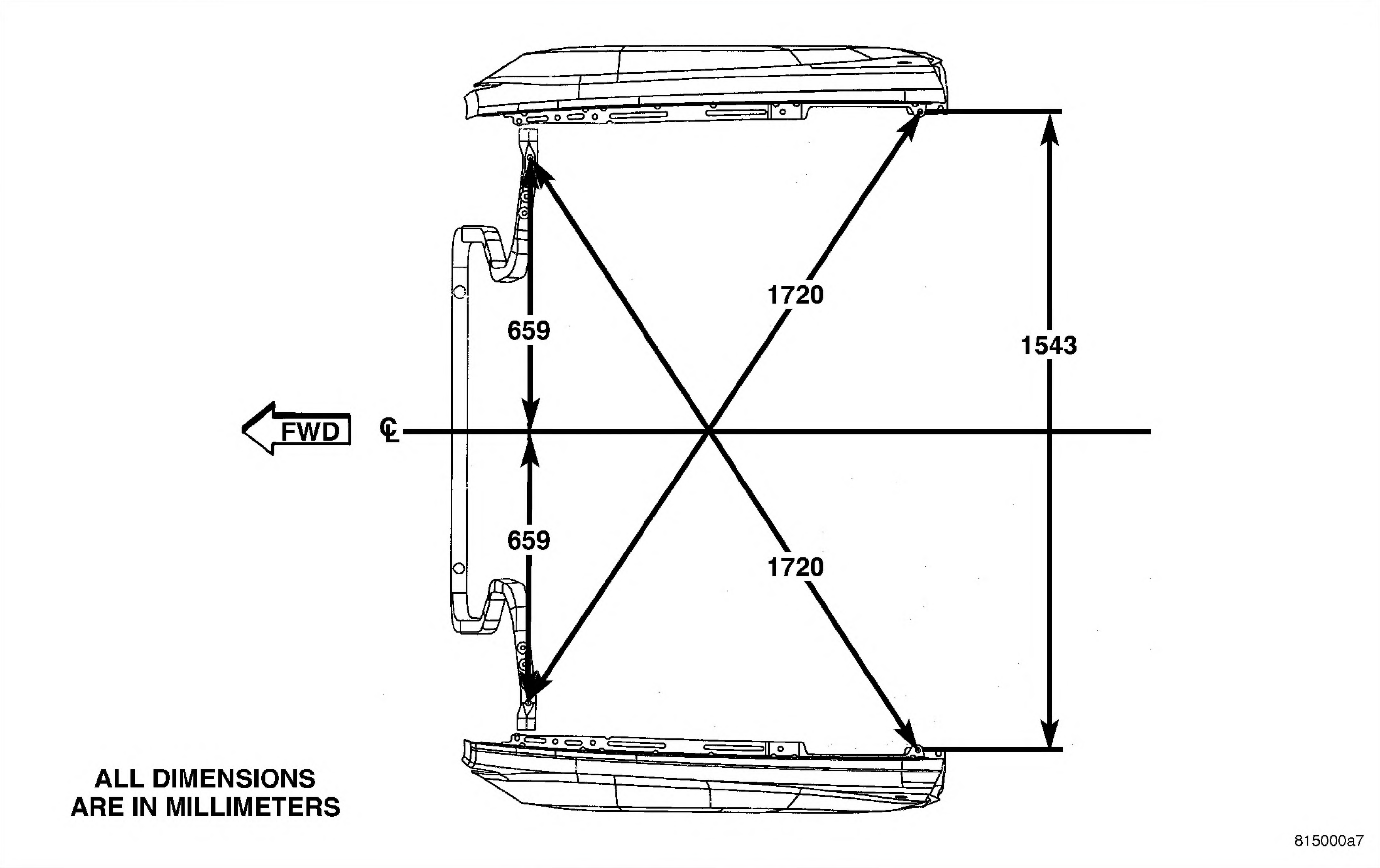
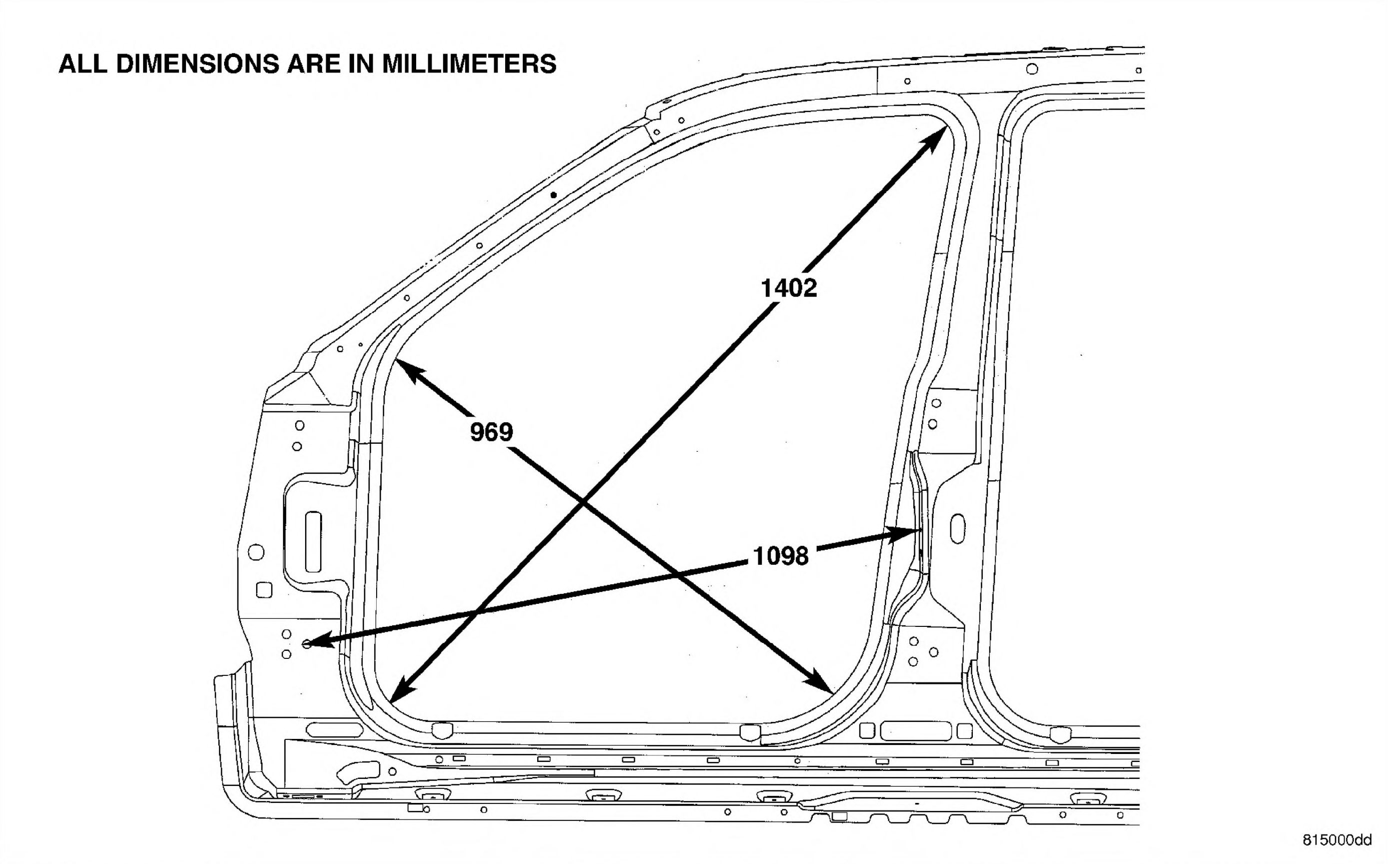

1720
659
1543
FWD
℄
659
1720
ALL DIMENSIONS
ARE IN MILLIMETERS
815000a7

Fig. 1 ENGINE COMPARTMENT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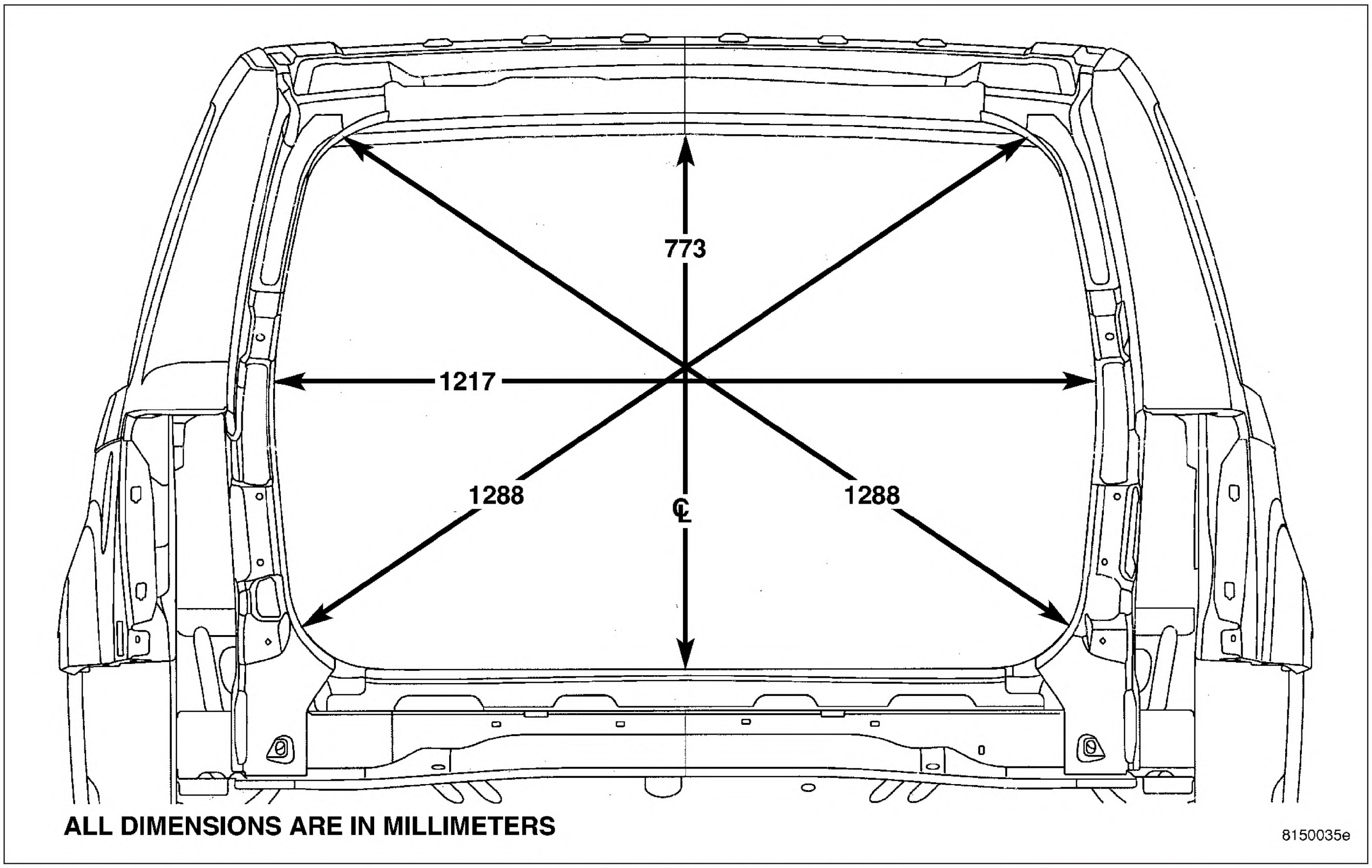
815000dd

Fig. 2 FRONT DOOR OPENING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1217
1288
1288
℄
ALL DIMENSIONS ARE IN MILLIMETERS
8150035e

Fig. 3 LIFTGATE OPENING

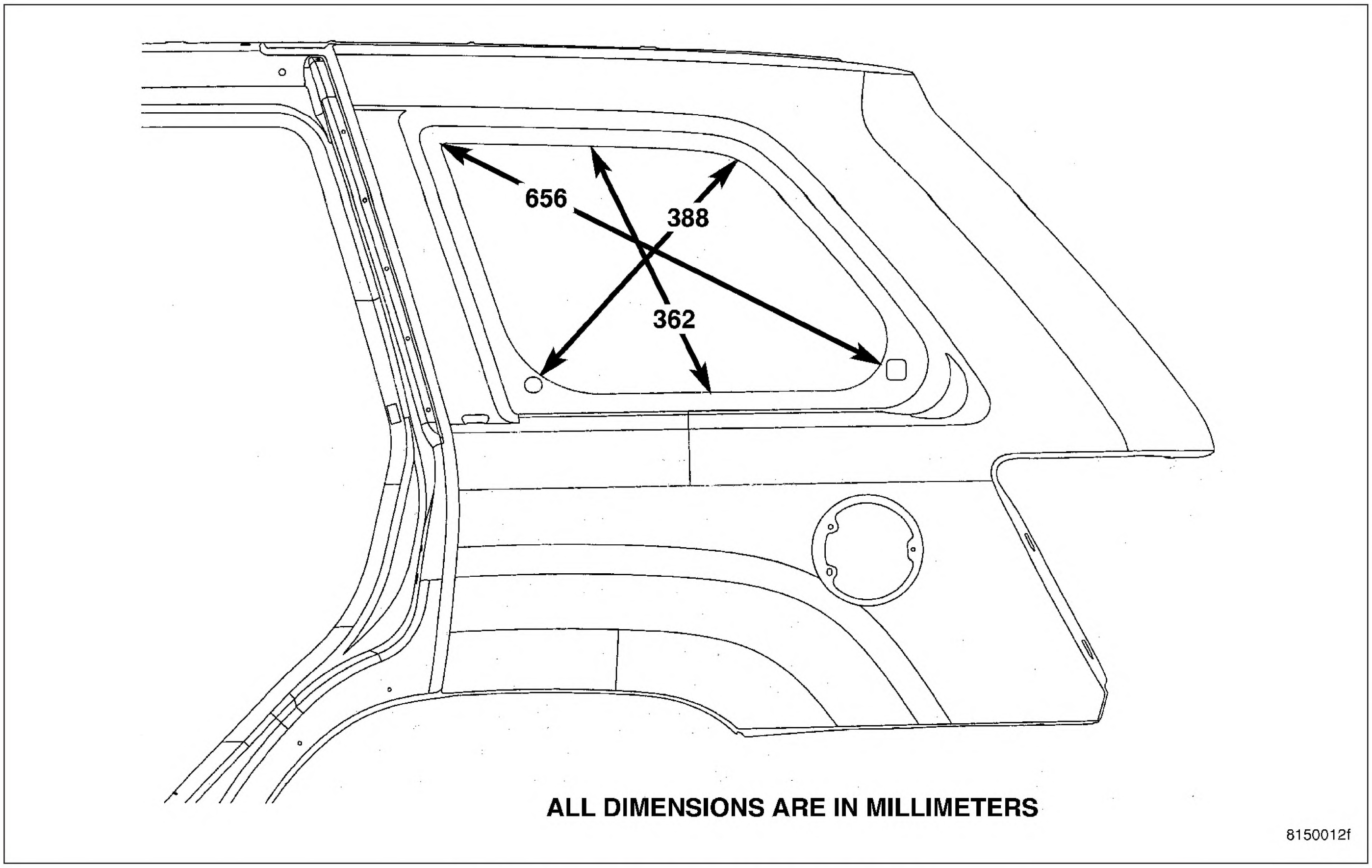
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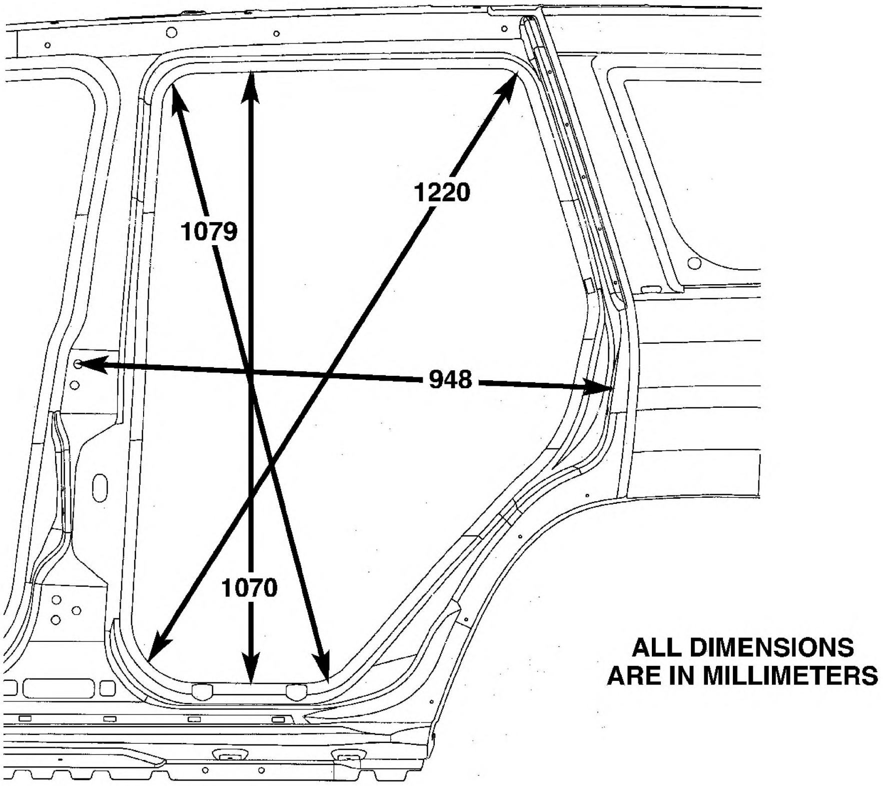
Fig. 4 QUARTER WINDOW OPENING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948
1070
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ARE IN MILLIMETERS
815000e2

Fig. 5 REAR DOOR OPENING

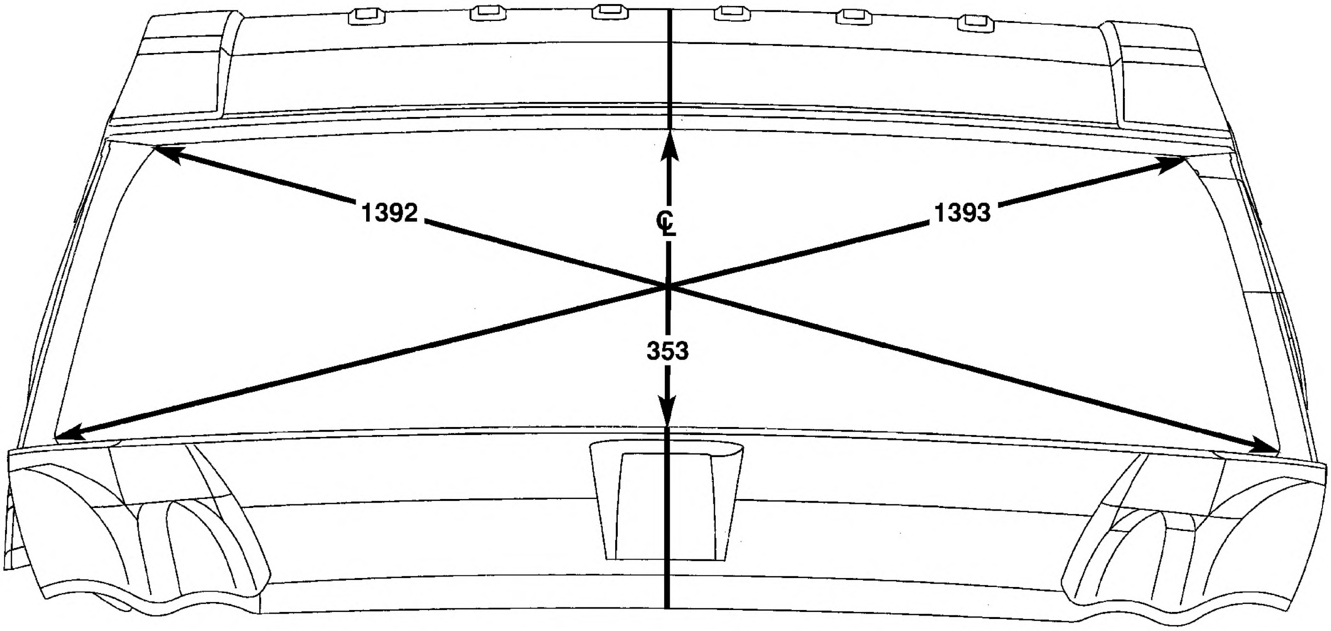
1392
℄
1393
353
ALL DIMENSIONS ARE IN MILLIMETERS
815000d8

Fig. 6 WINDSHIELD OPENING

SEALER LOCATIONS

SPECIFICATIONS

SEALER LOCATIONS

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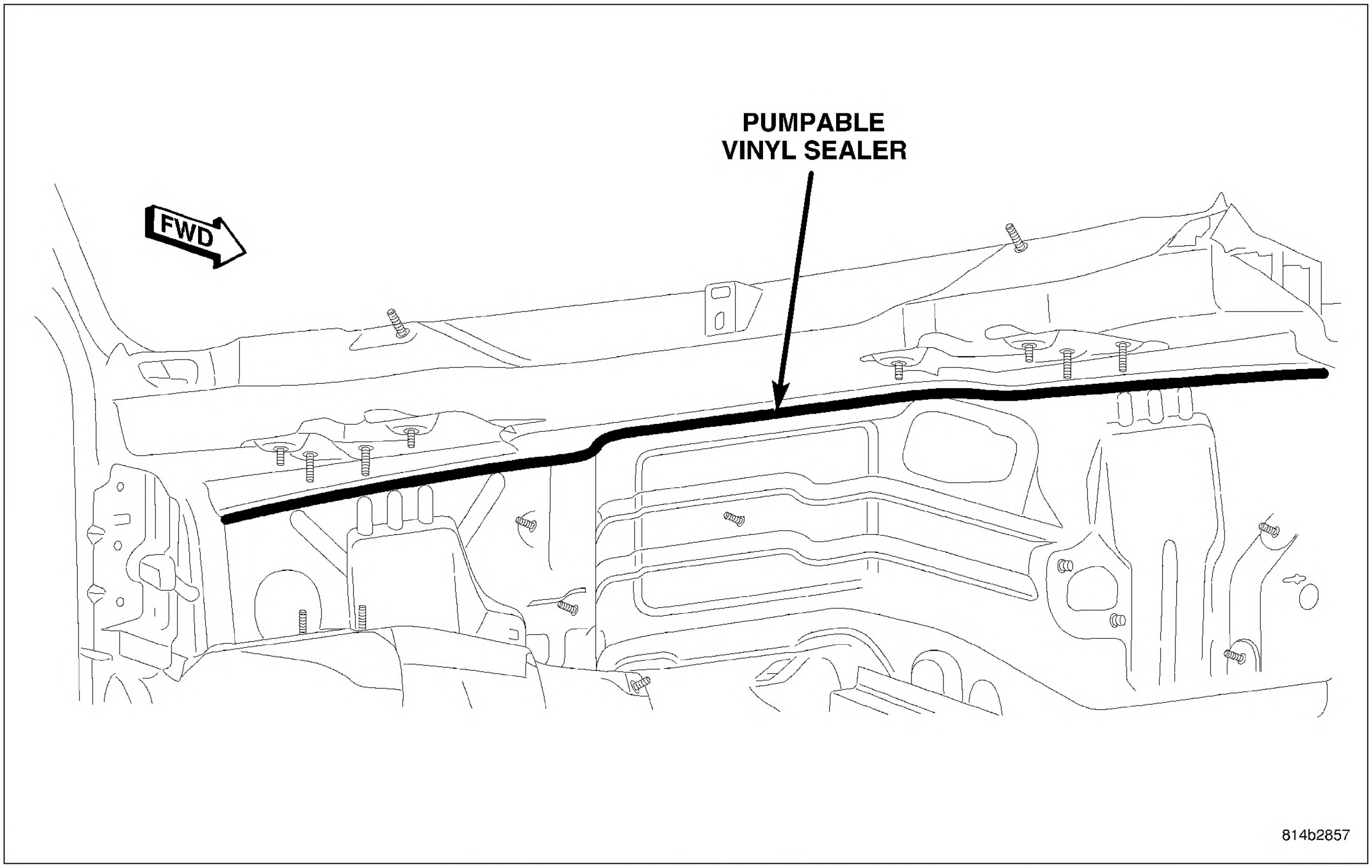
PUMPABLE
VINYL SEALER
FWD
814b2857

Fig. 7 DASH PANEL/LOWER PLENUM

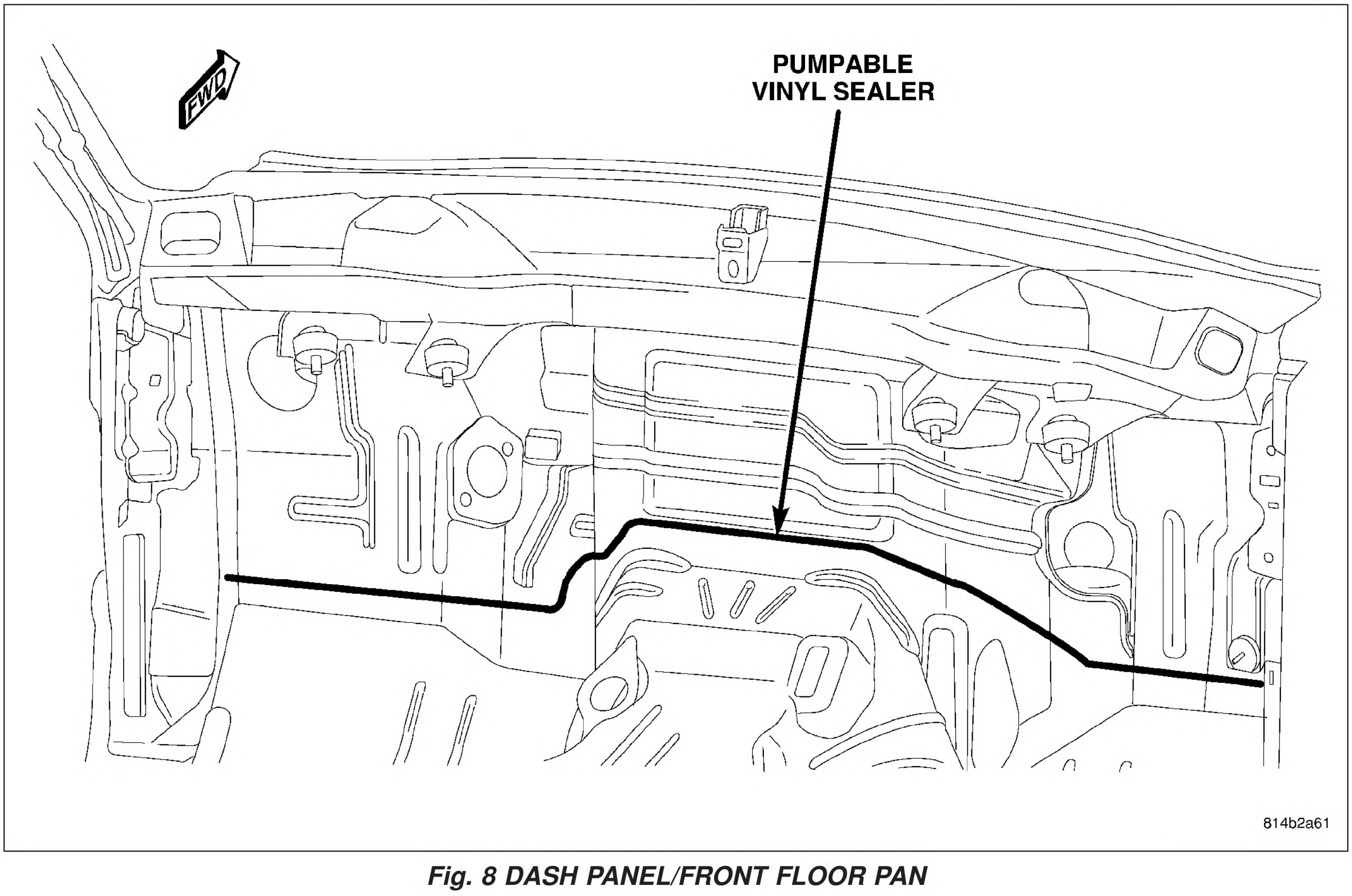
PUMPABLE
VINYL SEALER
FWD
814b2a61

Fig. 8 DASH PANEL/FRONT FLOOR PAN

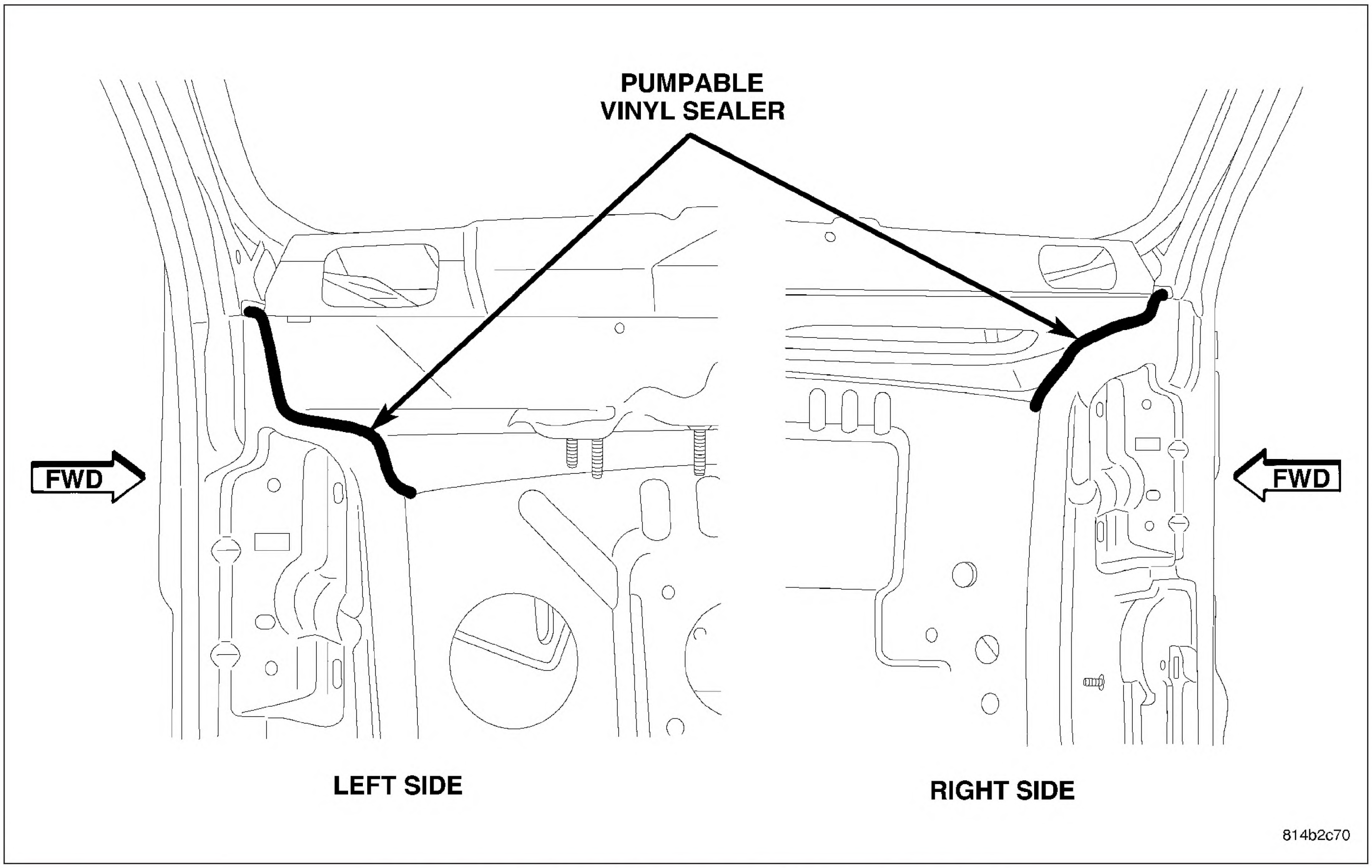
PUMPABLE VINYL SEALER
FWD
FWD
LEFT SIDE
RIGHT SIDE
814b2c70

Fig. 9 COWL SIDE/LOWER PLENUM (UNDERSIDE)

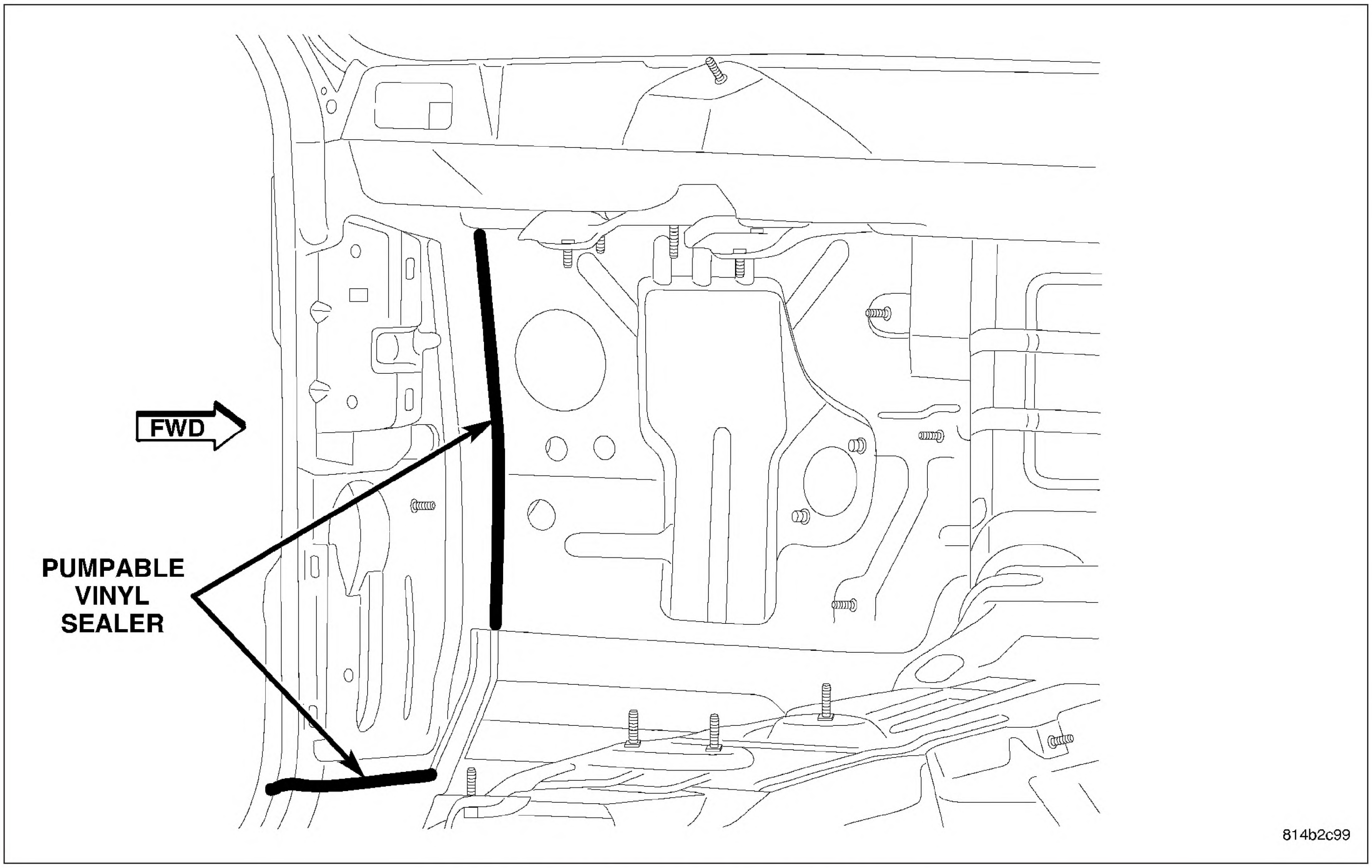
FWD
PUMPABLE VINYL SEALER
814b2c99

Fig. 10 COWL SIDE/DASH PANEL/SILL

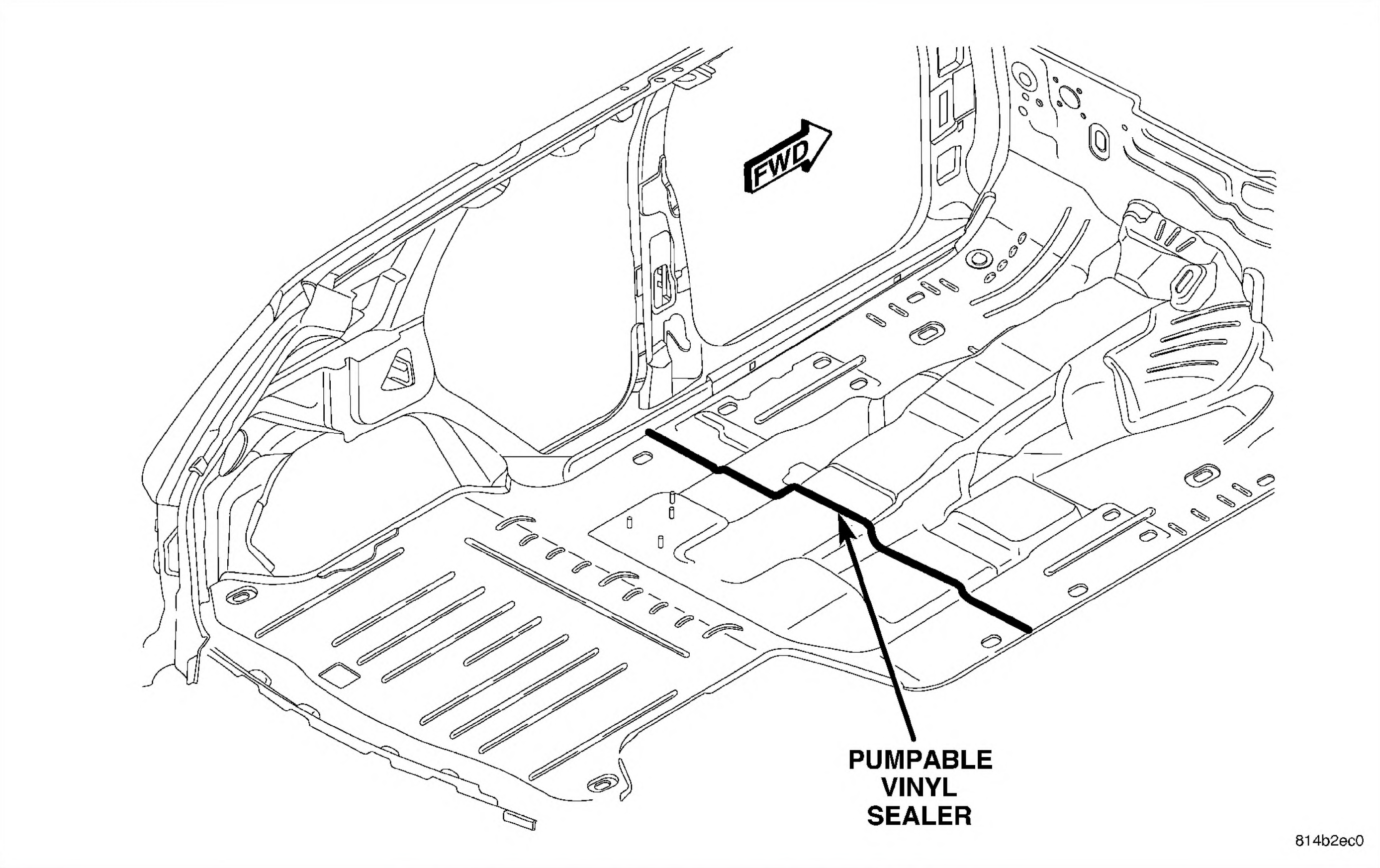
FWD
PUMPABLE
VINYL
SEALER
814b2ec0

Fig. 11 FRONT FLOOR PAN/REAR FLOOR PAN

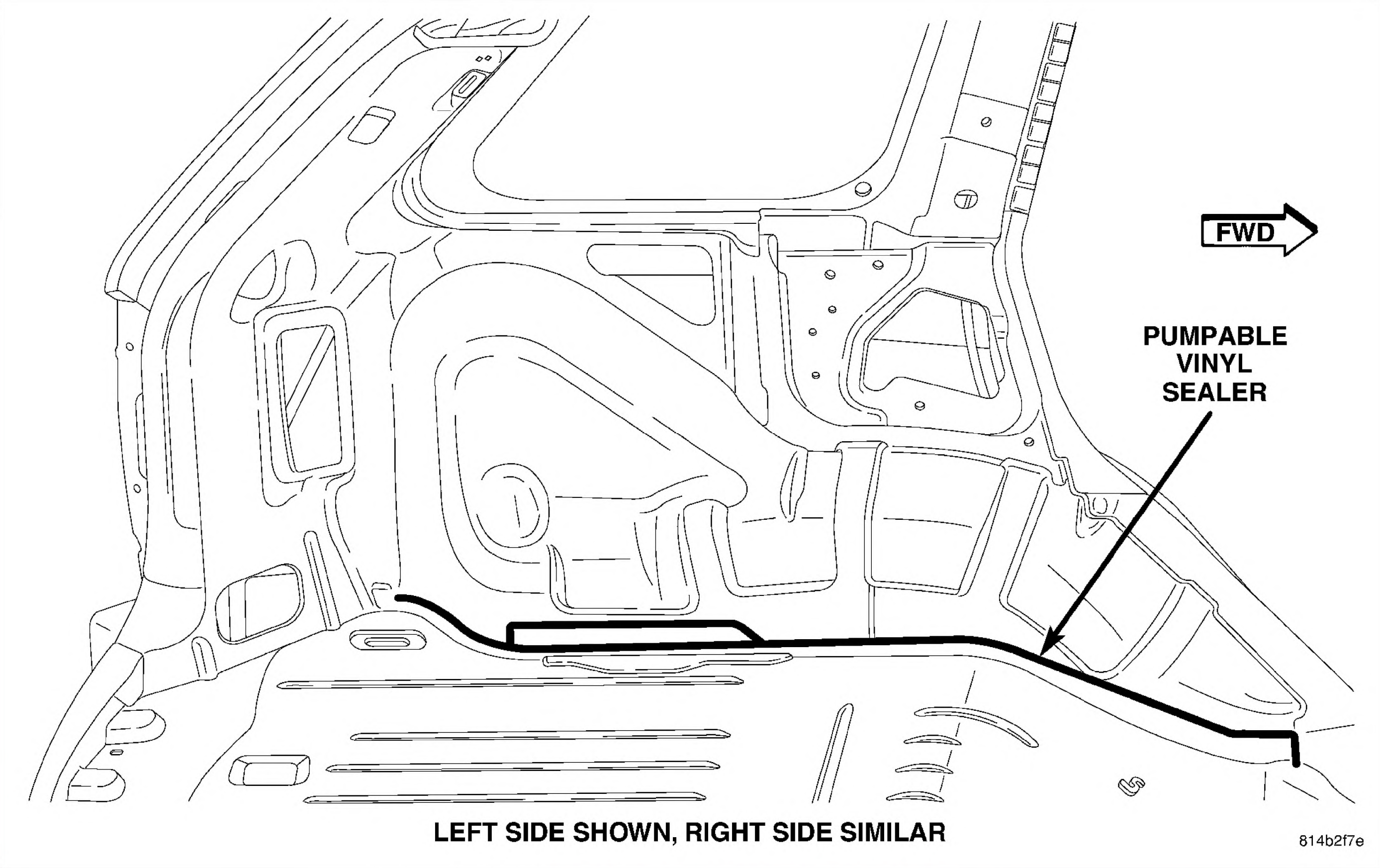
FWD
PUMPABLE
VINYL
SEALER
LEFT SIDE SHOWN, RIGHT SIDE SIMILAR
814b2f7e

Fig. 12 REAR FLOOR PAN/SILL/PARKING BRAKE

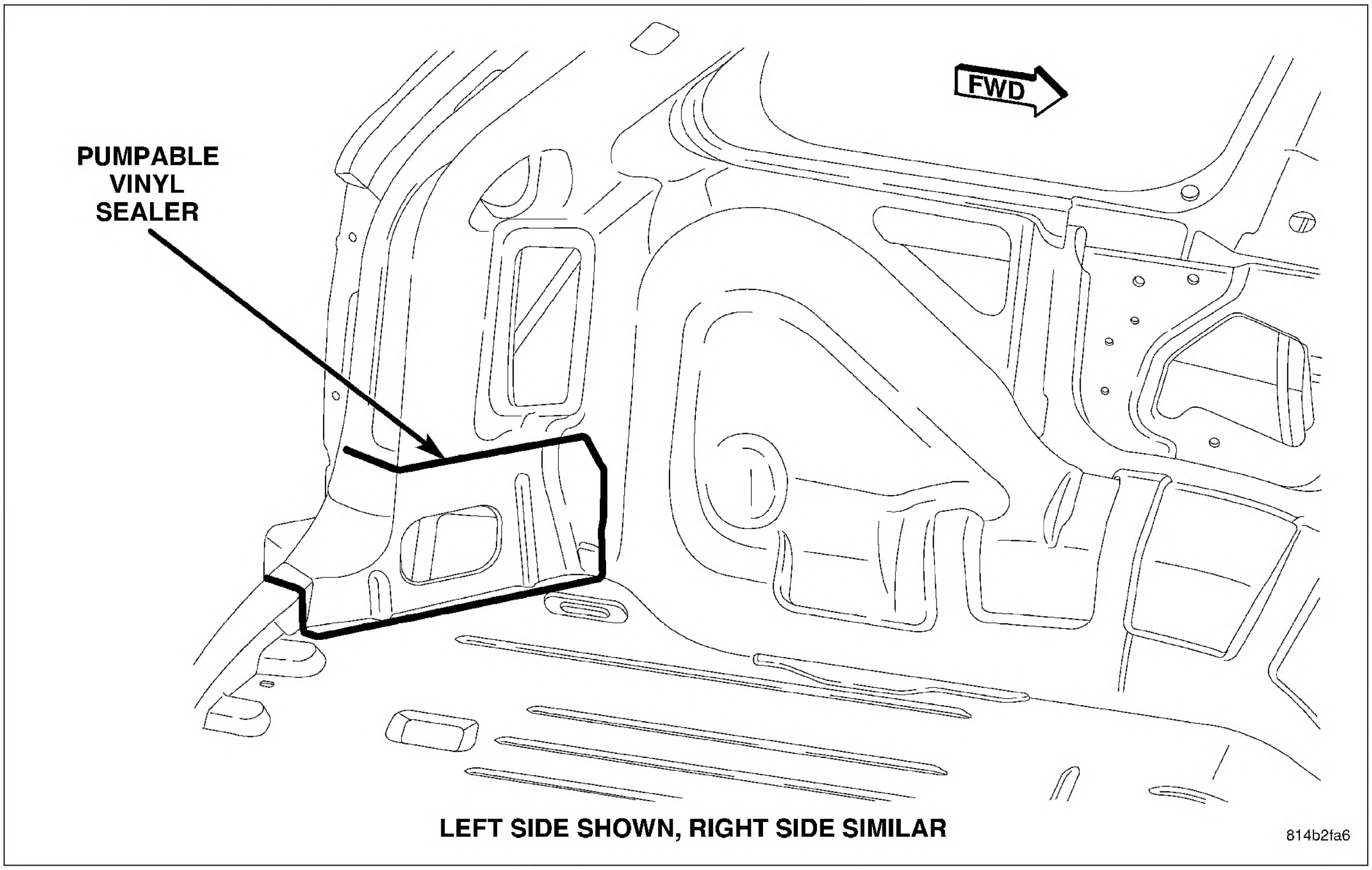
FWD
PUMPABLE
VINYL
SEALER
LEFT SIDE SHOWN, RIGHT SIDE SIMILAR
814b2fa6

Fig. 13 D- PILLAR GUSSET

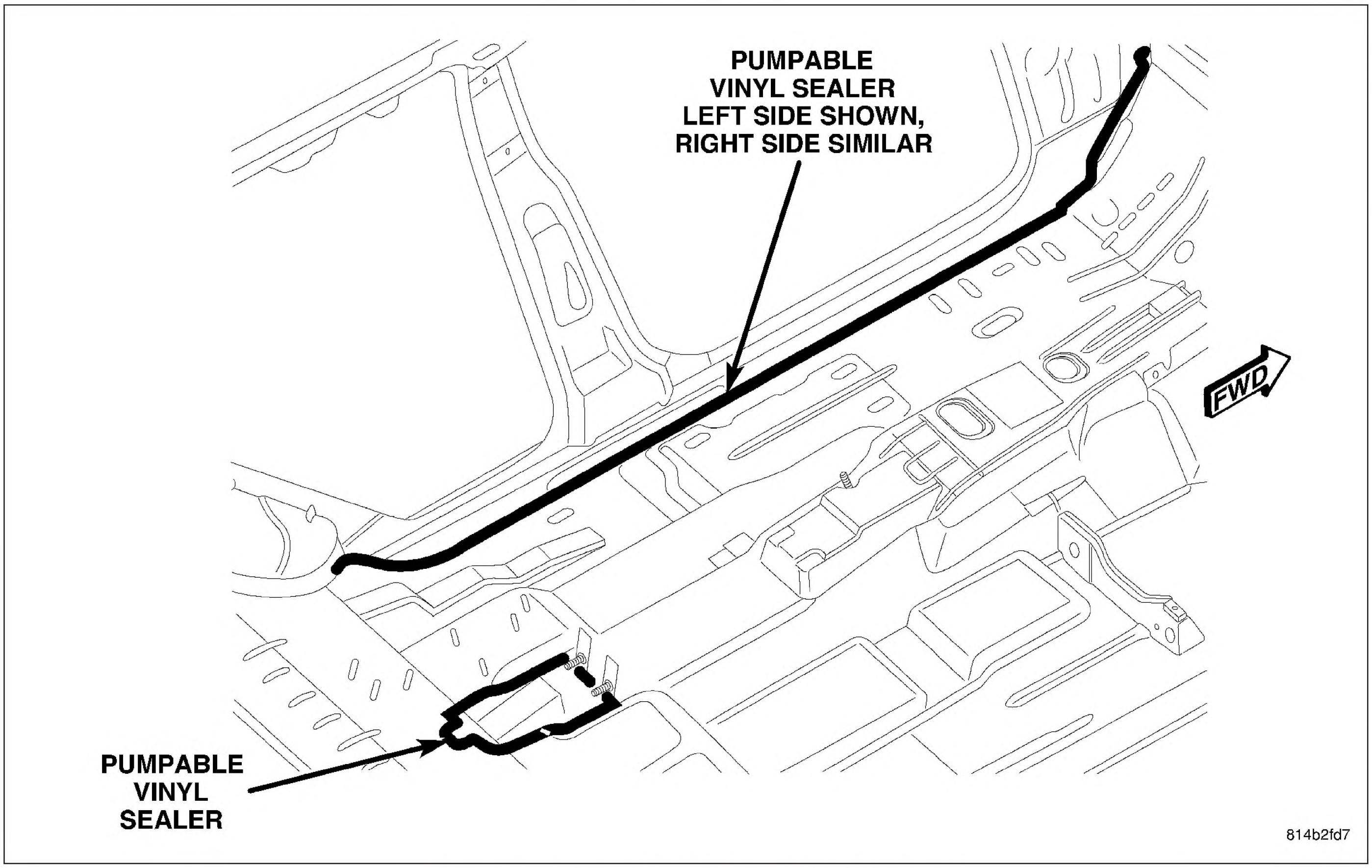
PUMPABLE
VINYL SEALER
LEFT SIDE SHOWN,
RIGHT SIDE SIMILAR
FWD
PUMPABLE
VINYL
SEALER
814b2fd7

Fig. 14 FLOOR PAN/SILL/PARKING BRAKE

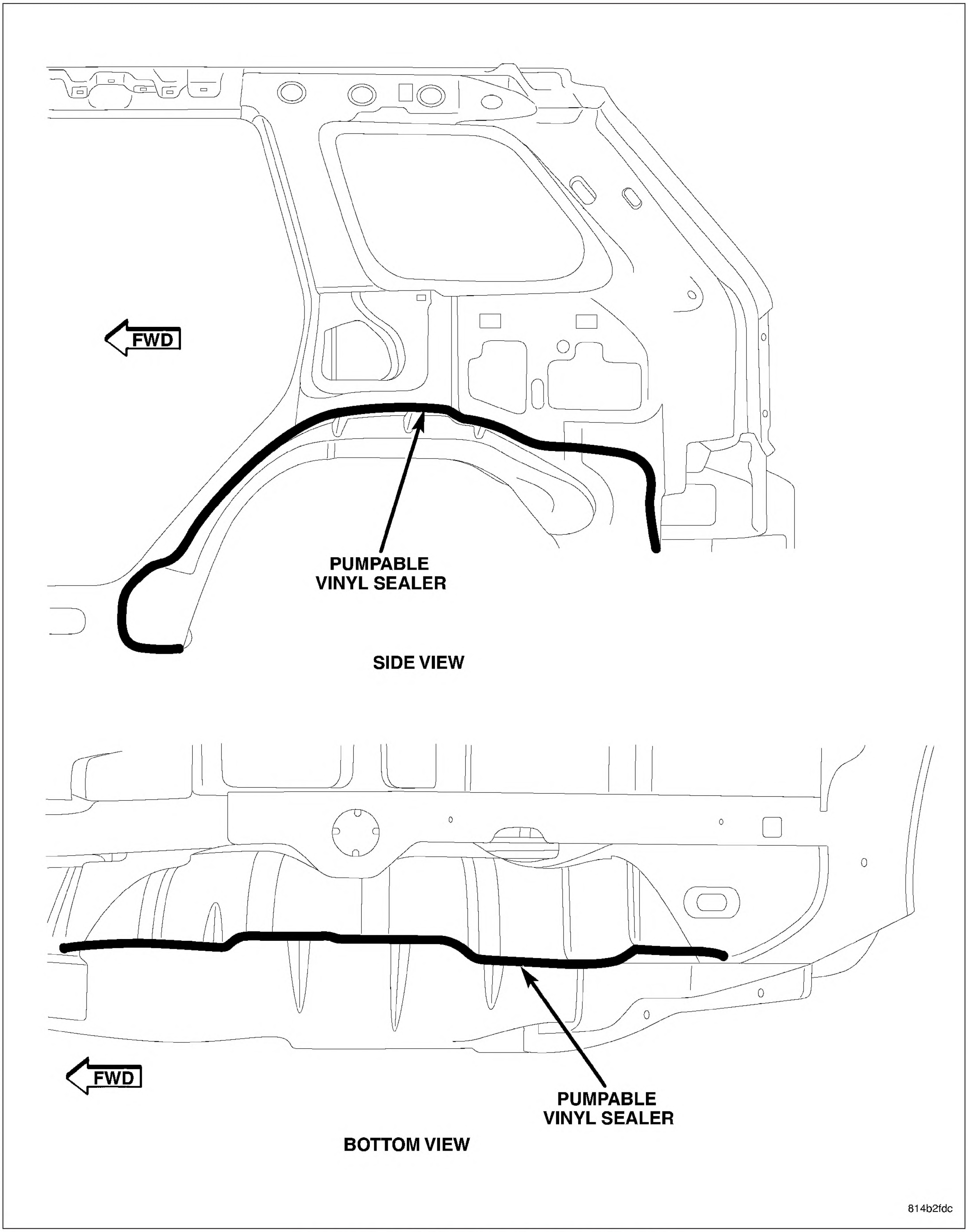
FWD
PUMPABLE VINYL SEALER
SIDE VIEW
FWD
PUMPABLE VINYL SEALER
BOTTOM VIEW
814b2fdc

Fig. 15 REAR WHEELHOUSE - RIGHT SIDE

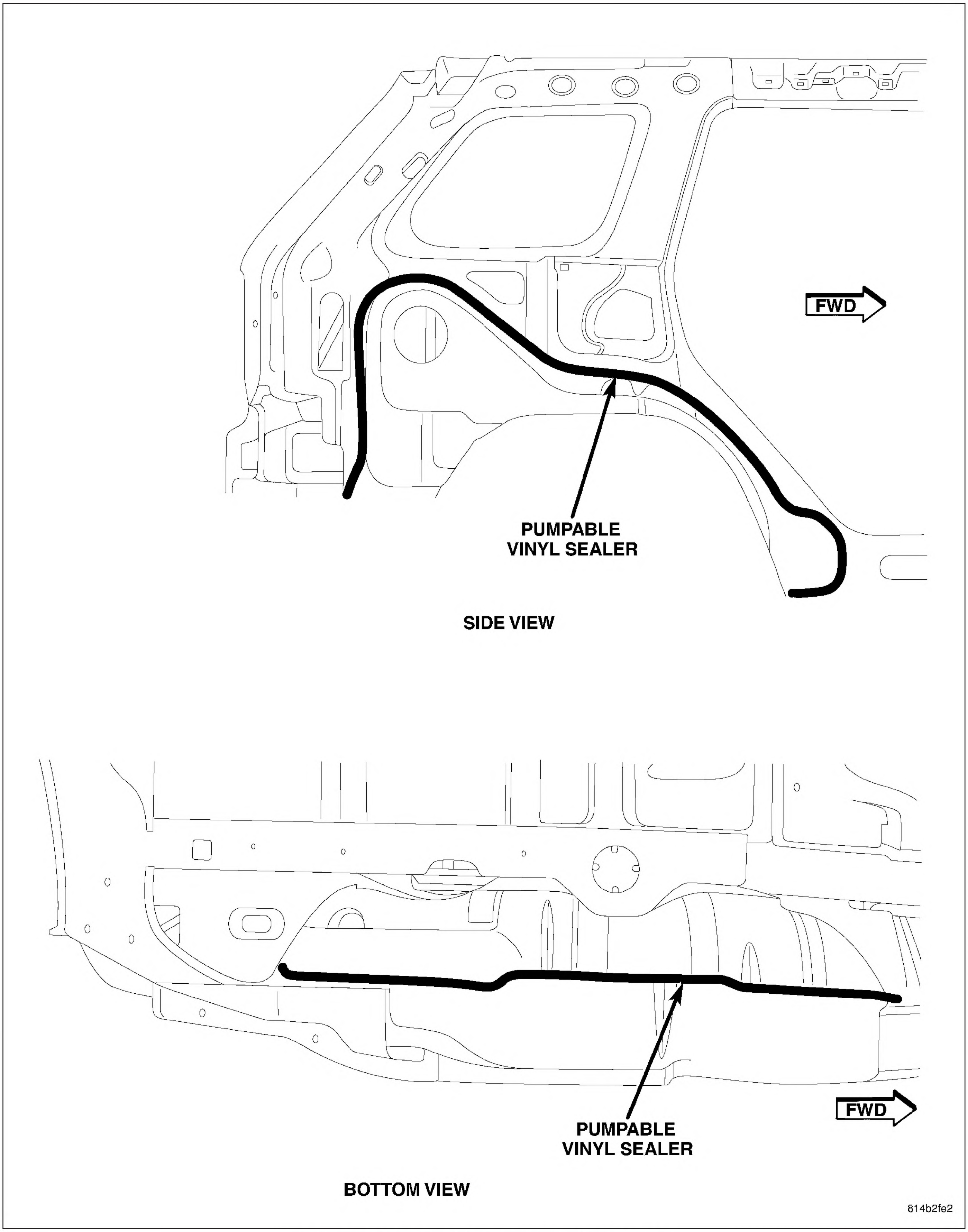
FWD
PUMPABLE VINYL SEALER
SIDE VIEW
FWD
PUMPABLE VINYL SEALER
BOTTOM VIEW
814b2fe2

Fig. 16 REAR WHEELHOUSE - LEFT SIDE

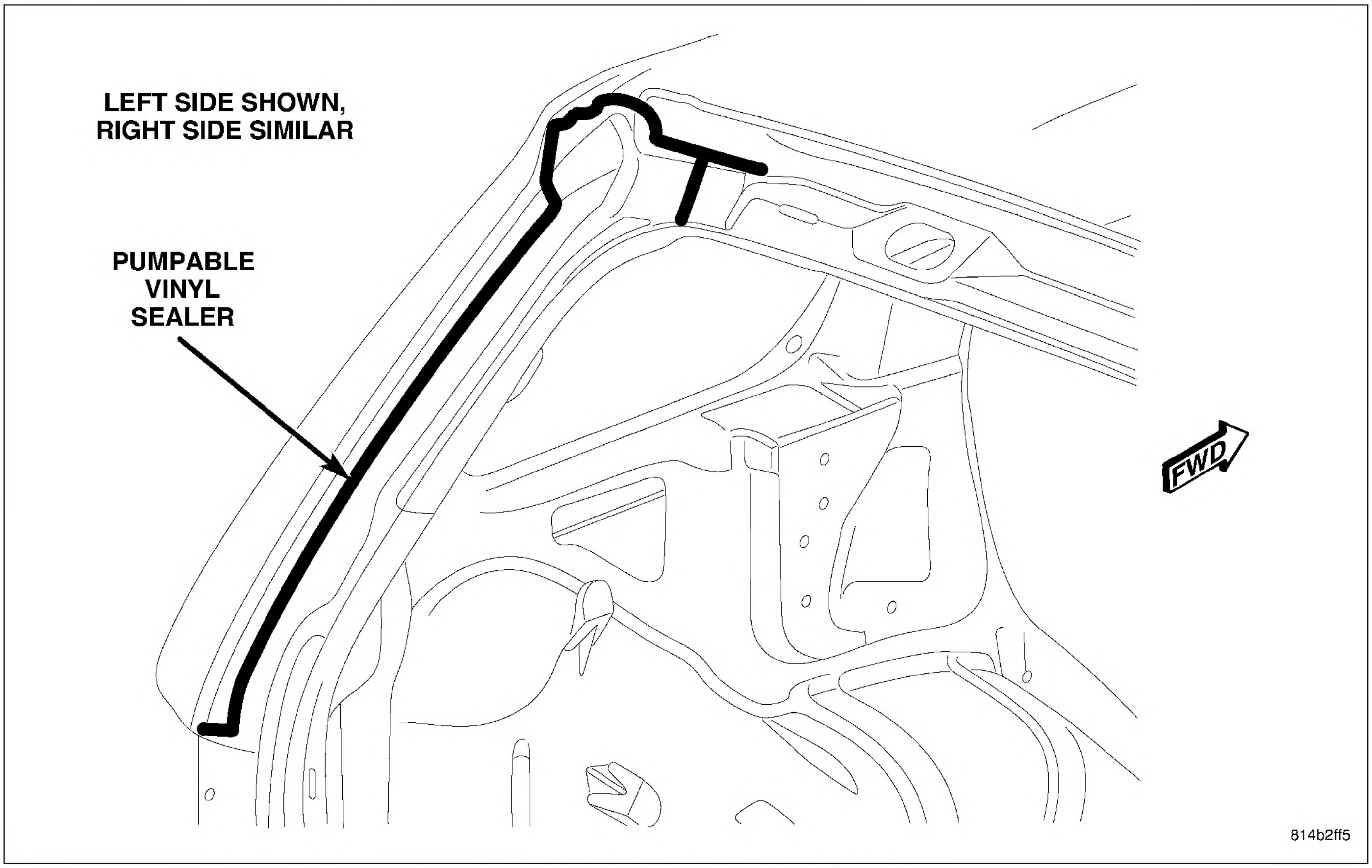
LEFT SIDE SHOWN,
RIGHT SIDE SIMILAR
PUMPABLE
VINYL
SEALER
FWD
814b2ff5

Fig. 17 D- PILLAR/REAR HEADER

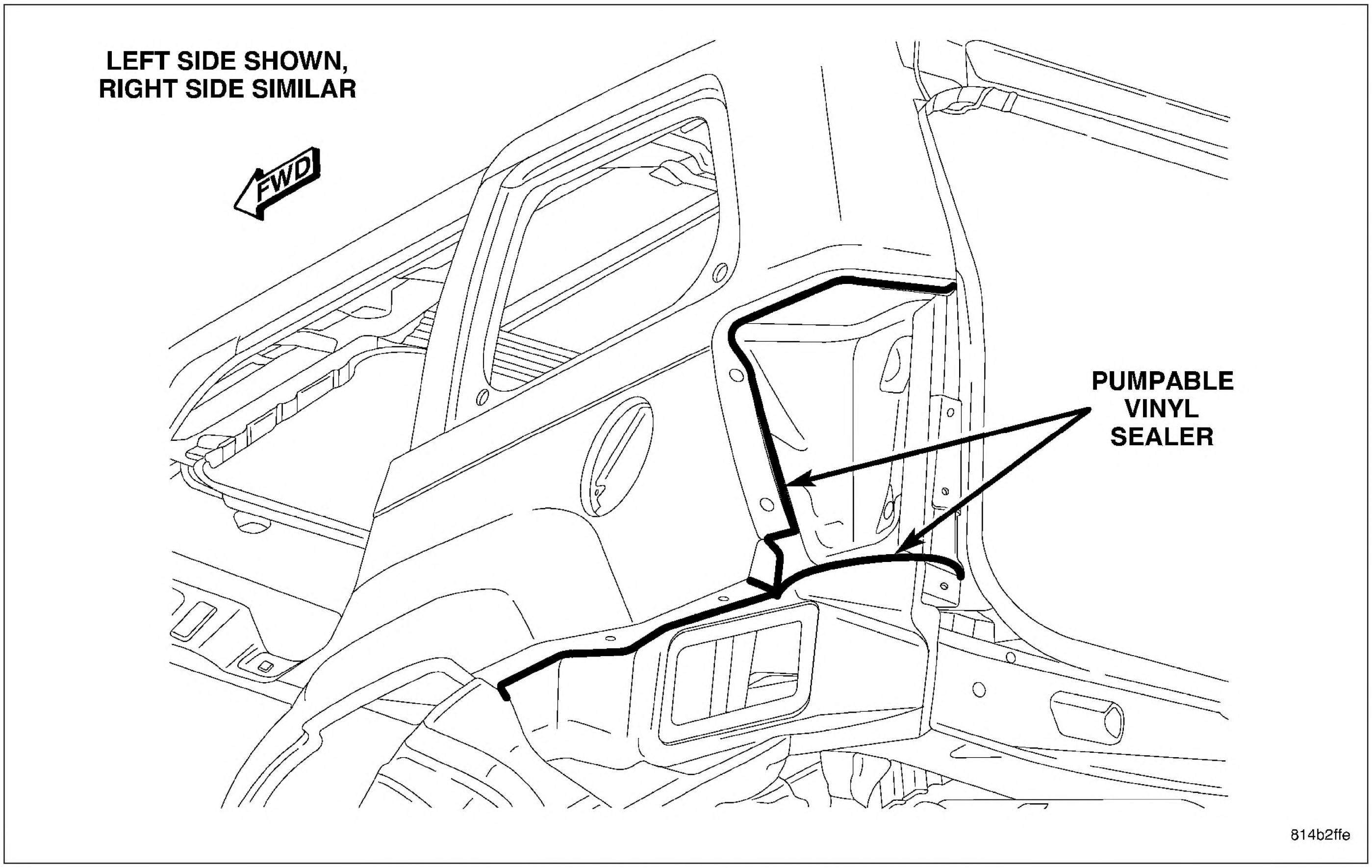
LEFT SIDE SHOWN,
RIGHT SIDE SIMILAR
FWD
PUMPABLE
VINYL
SEALER
814b2ffe

Fig. 18 TAIL LAMP CAN/BODY SIDE EXTENSION

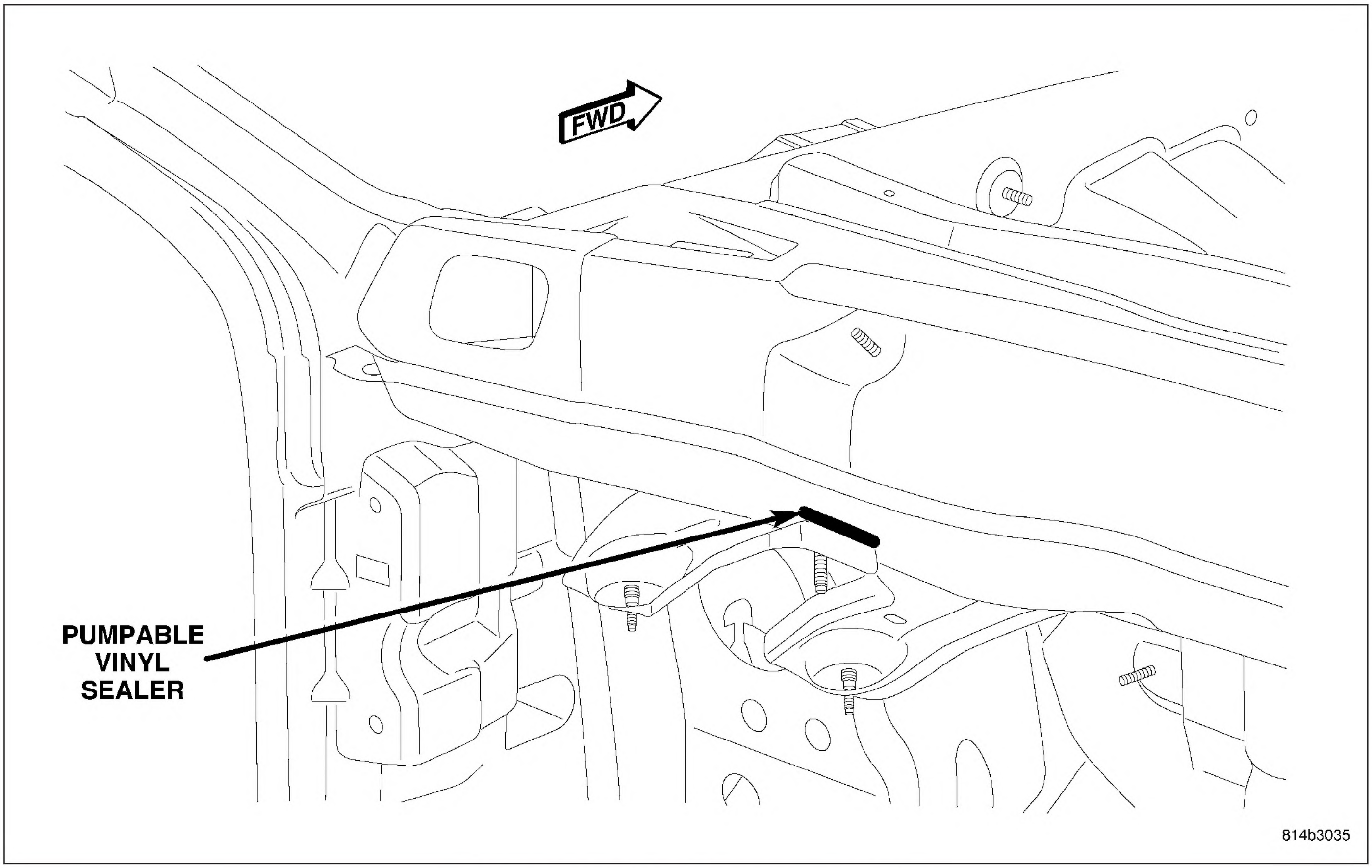
FWD
PUMPABLE VINYL SEALER
814b3035

Fig. 19 STEERING COLUMN BRACKET

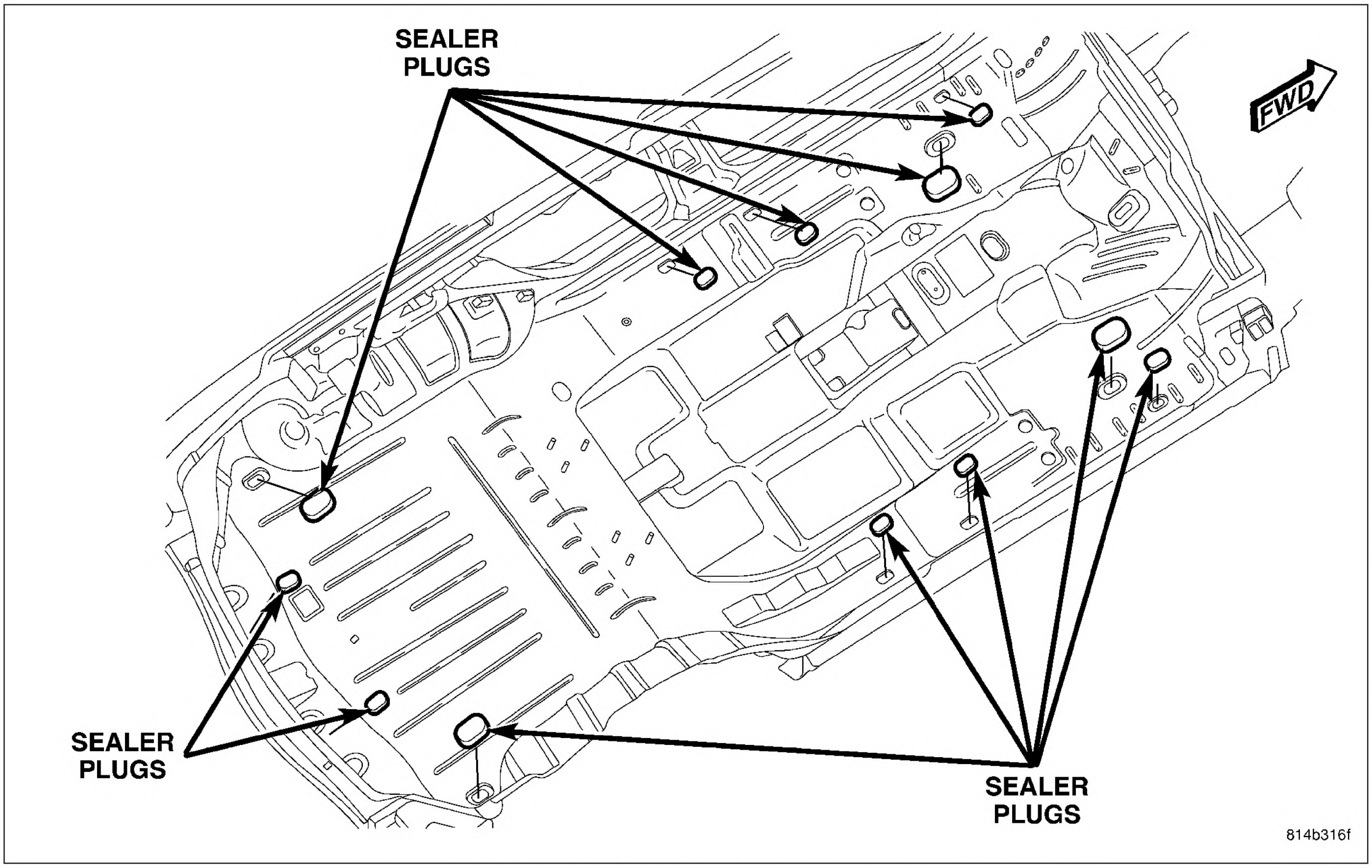
SEALER PLUGS
FWD
SEALER PLUGS
SEALER PLUGS
814b316f

Fig. 20 FLOOR PAN SEALER PLUGS

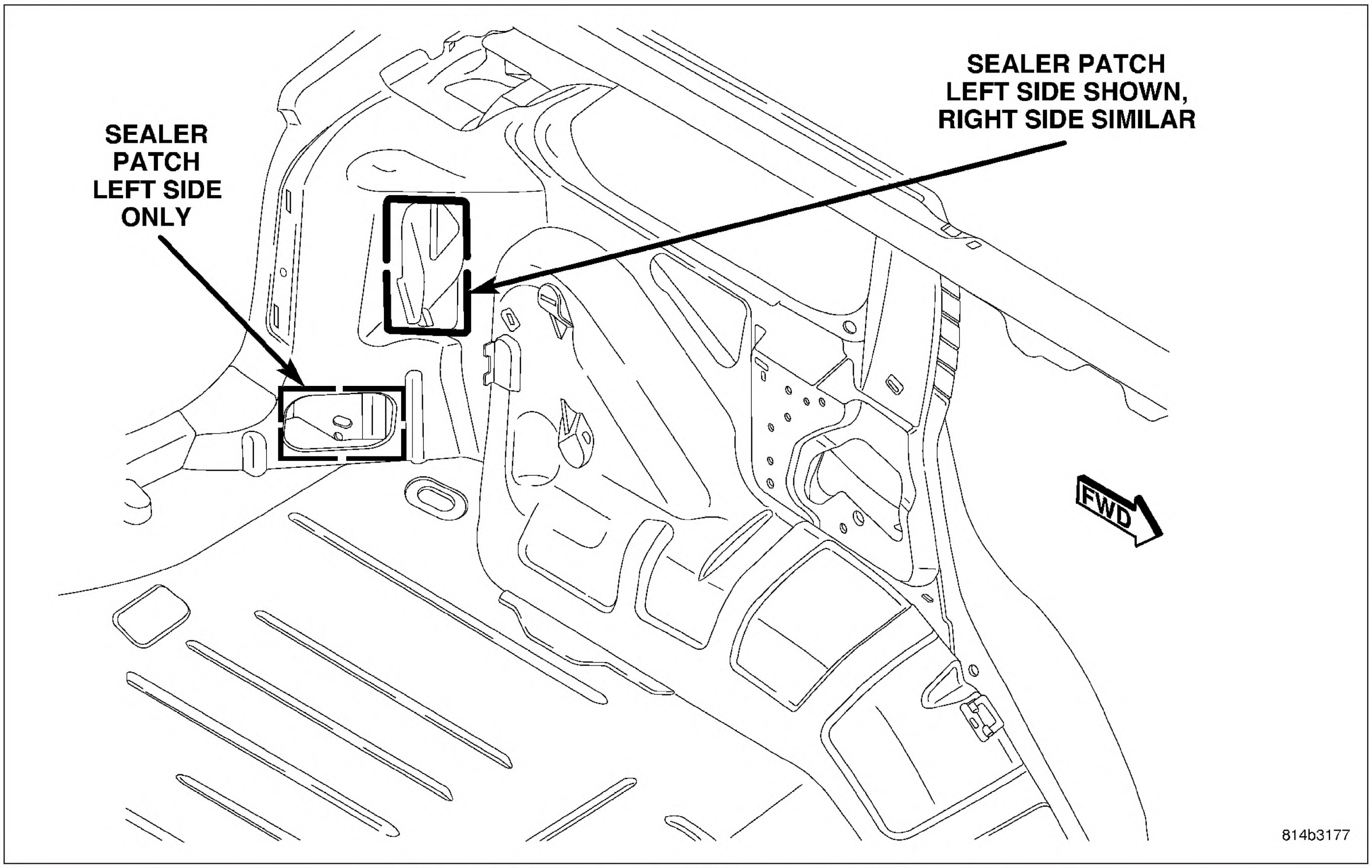
SEALER PATCH
LEFT SIDE ONLY
SEALER PATCH
LEFT SIDE SHOWN,
RIGHT SIDE SIMILAR
FWD
814b3177

Fig. 21 015 D-PILLAR GUSSET SEALER PATCHES

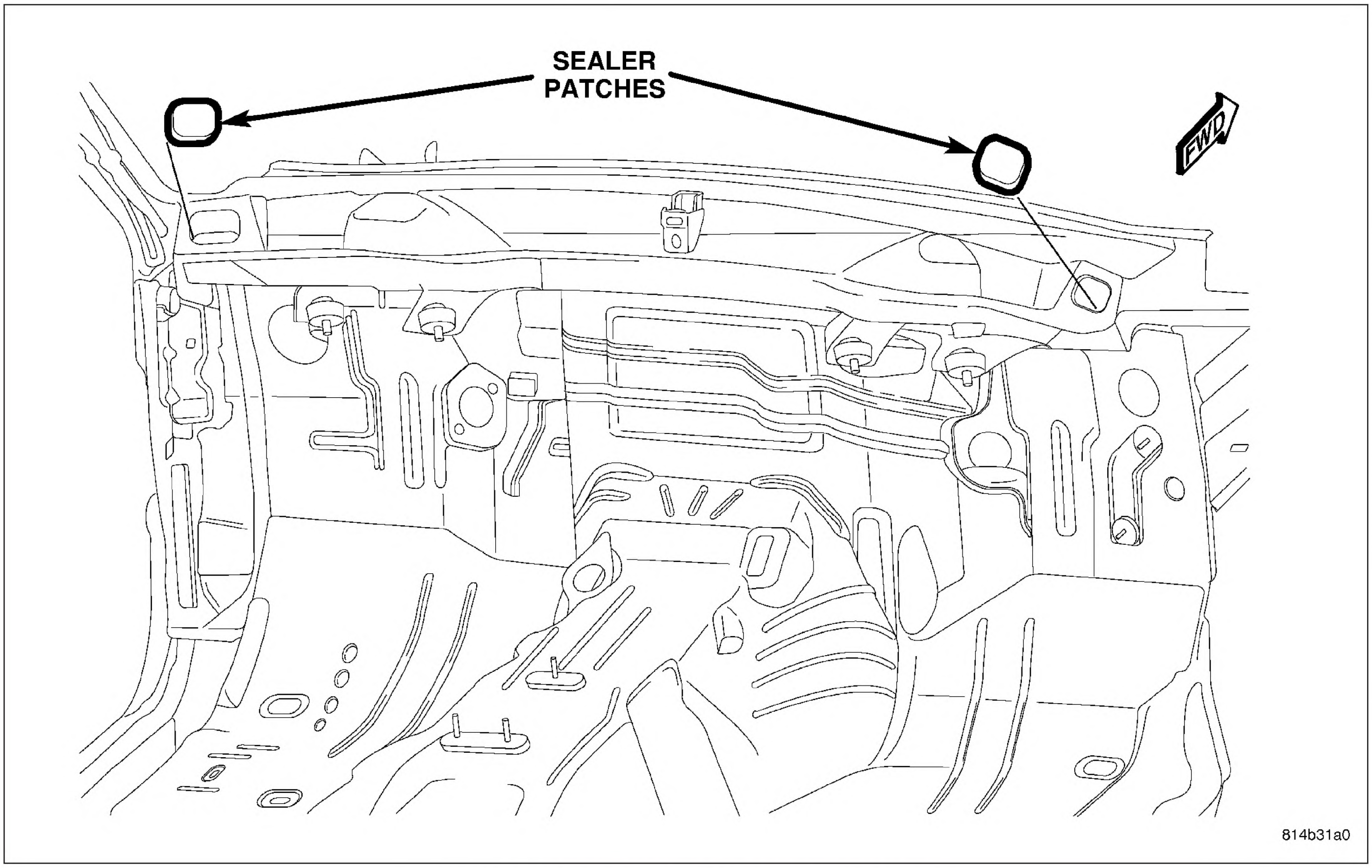
SEALER PATCHES
FWD
814b31a0

Fig. 22 COWL TOP SEALING PATCHES

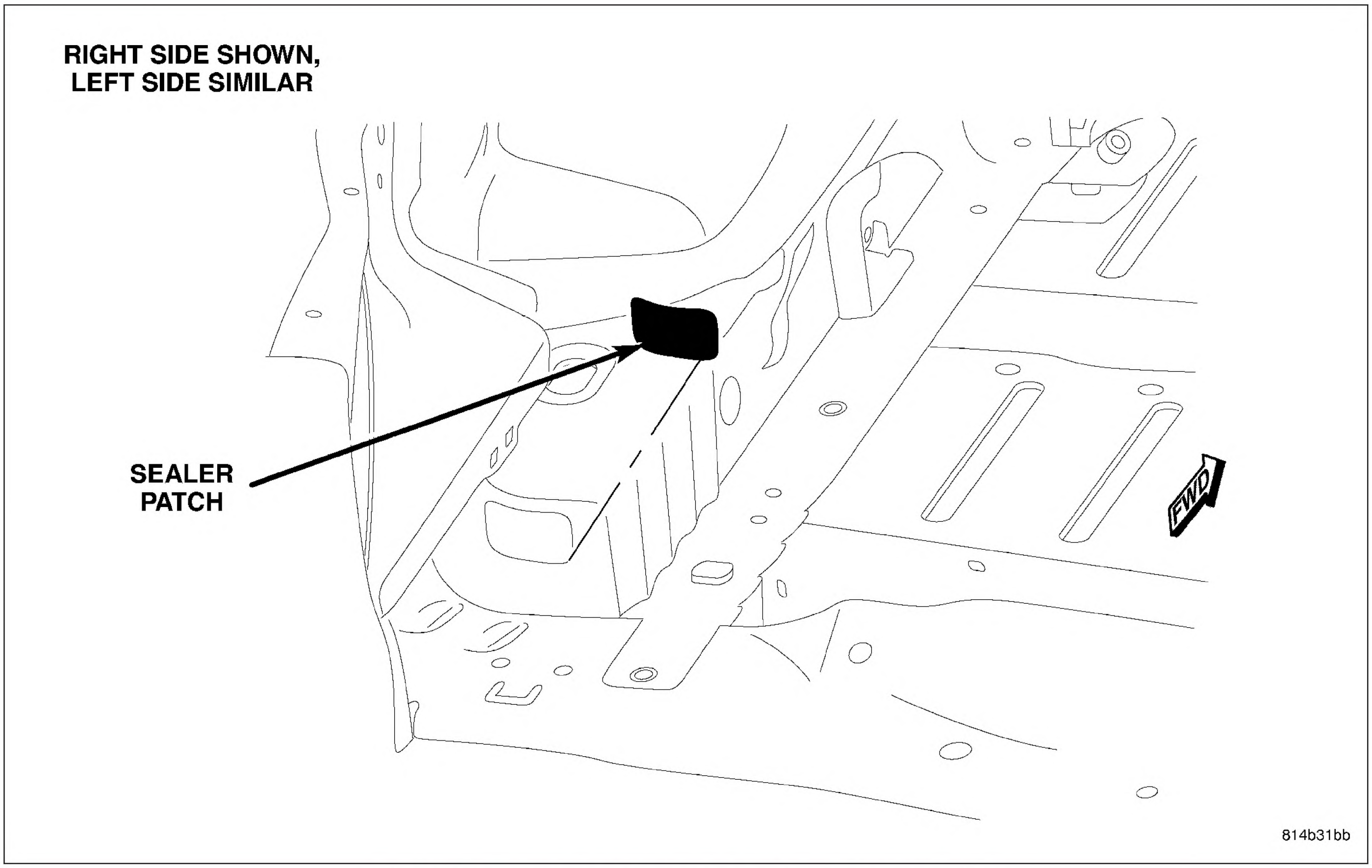
RIGHT SIDE SHOWN,
LEFT SIDE SIMILAR
SEALER
PATCH
FWD
814b31bb

Fig. 23 REAR CROSSMEMBER SEALER PATCHES

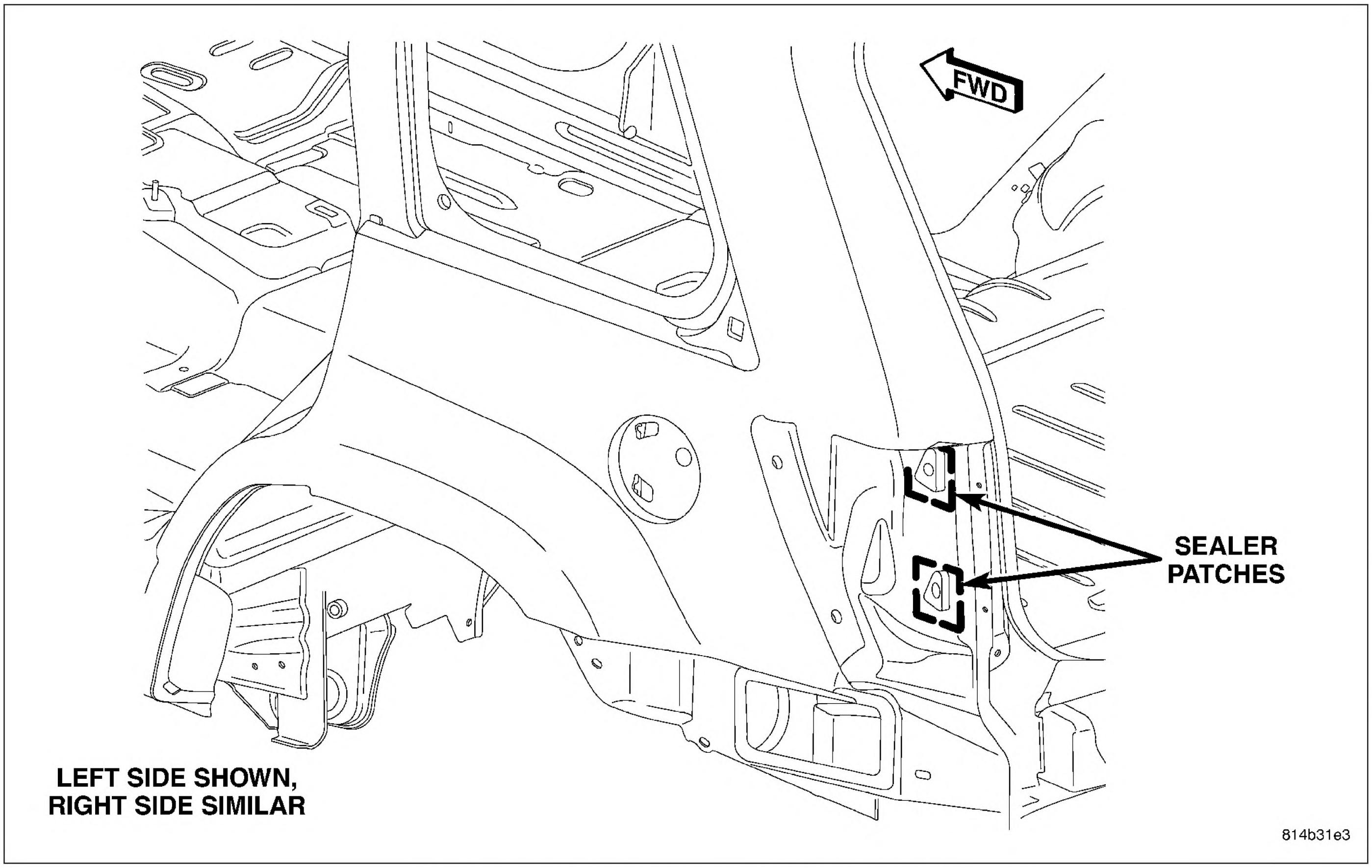
FWD
SEALER
PATCHES
LEFT SIDE SHOWN,
RIGHT SIDE SIMILAR
814b31e3

Fig. 24 TAIL LAMP CAN SEALER PATCHES

STRUCTURAL ADHESIVE LOCATIONS

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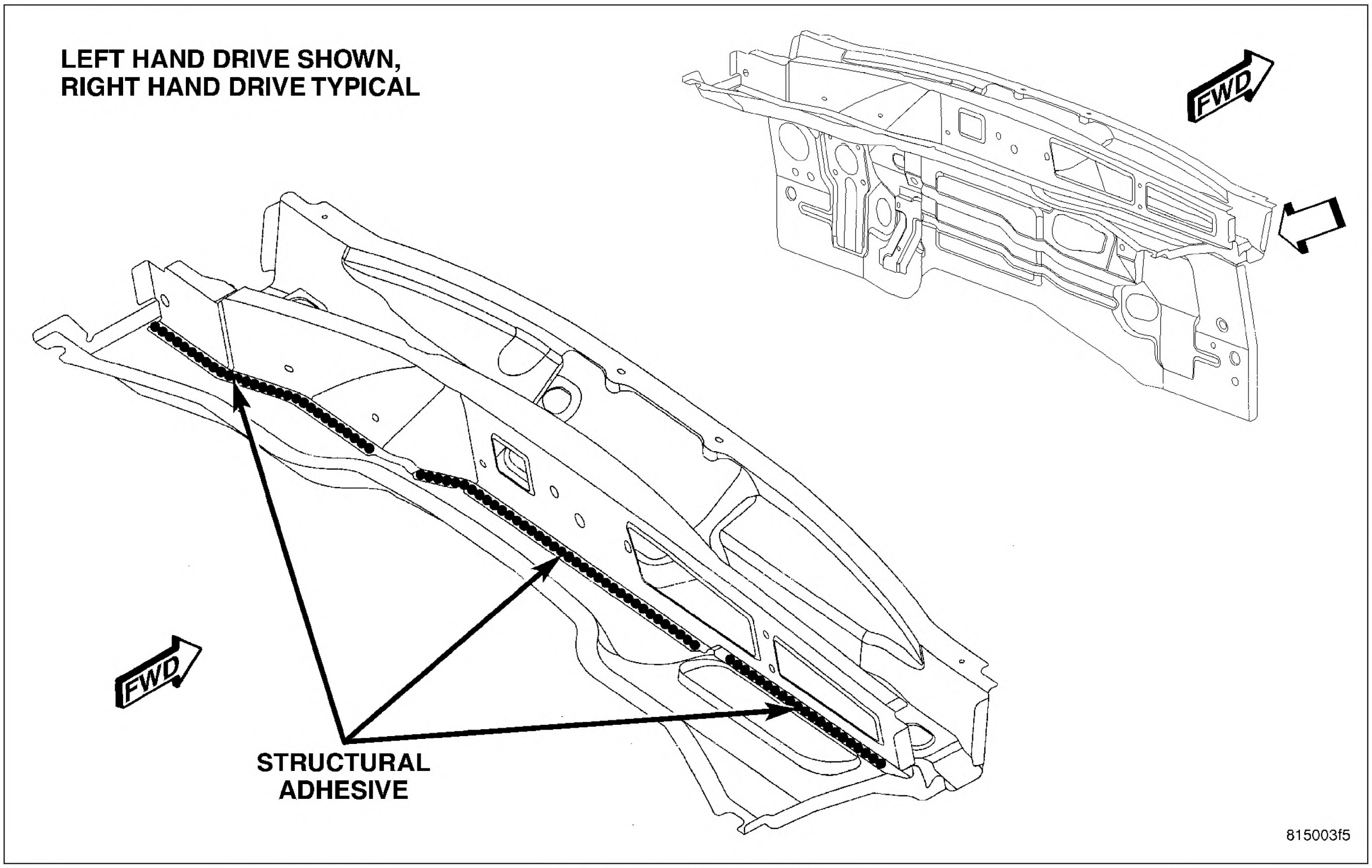
LEFT HAND DRIVE SHOWN,
RIGHT HAND DRIVE TYPICAL
FWD
FWD
STRUCTURAL
ADHESIVE
815003f5

Fig. 25 DASH/PLENUM

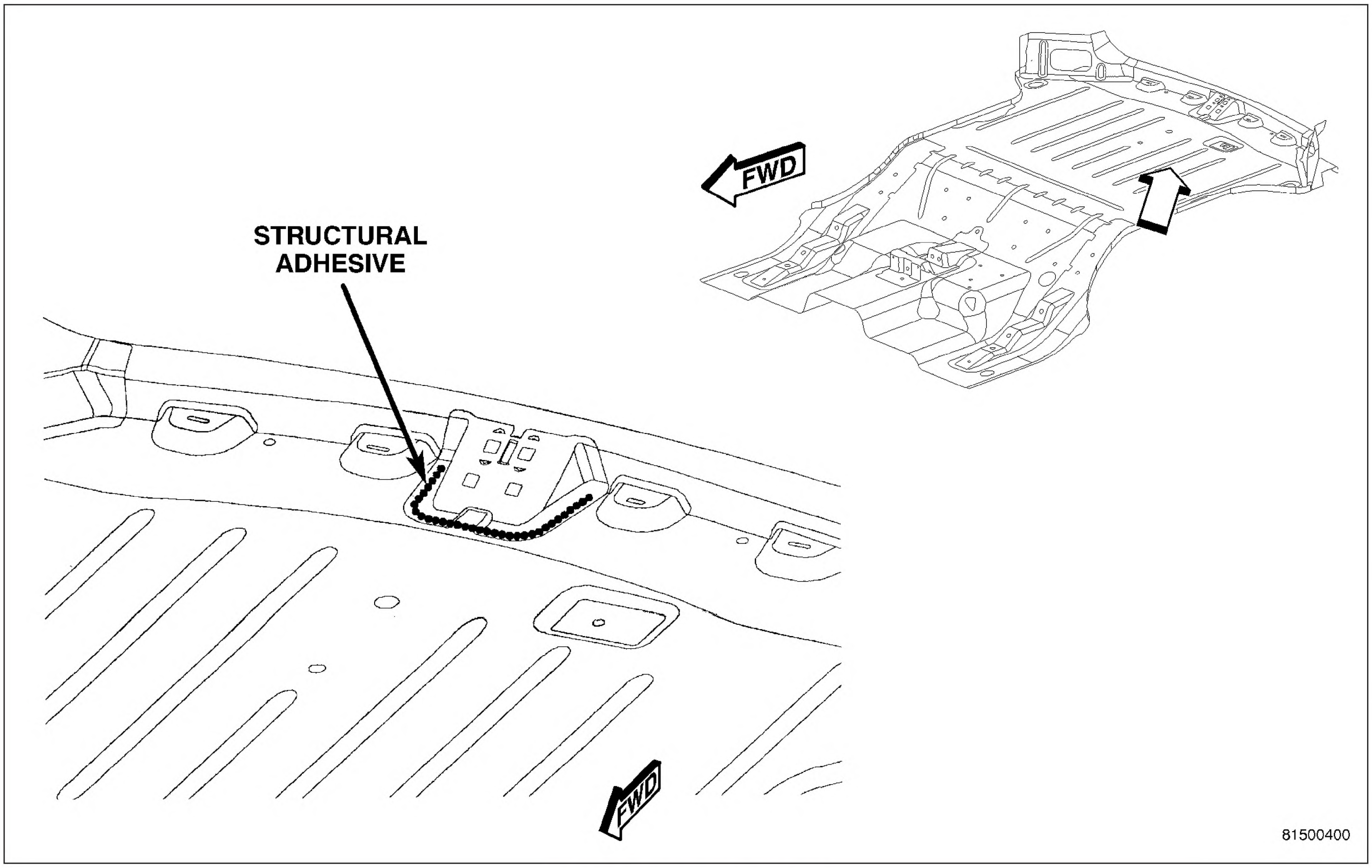
FWD
STRUCTURAL
ADHESIVE
FWD
81500400

Fig. 26 REAR FLOOR

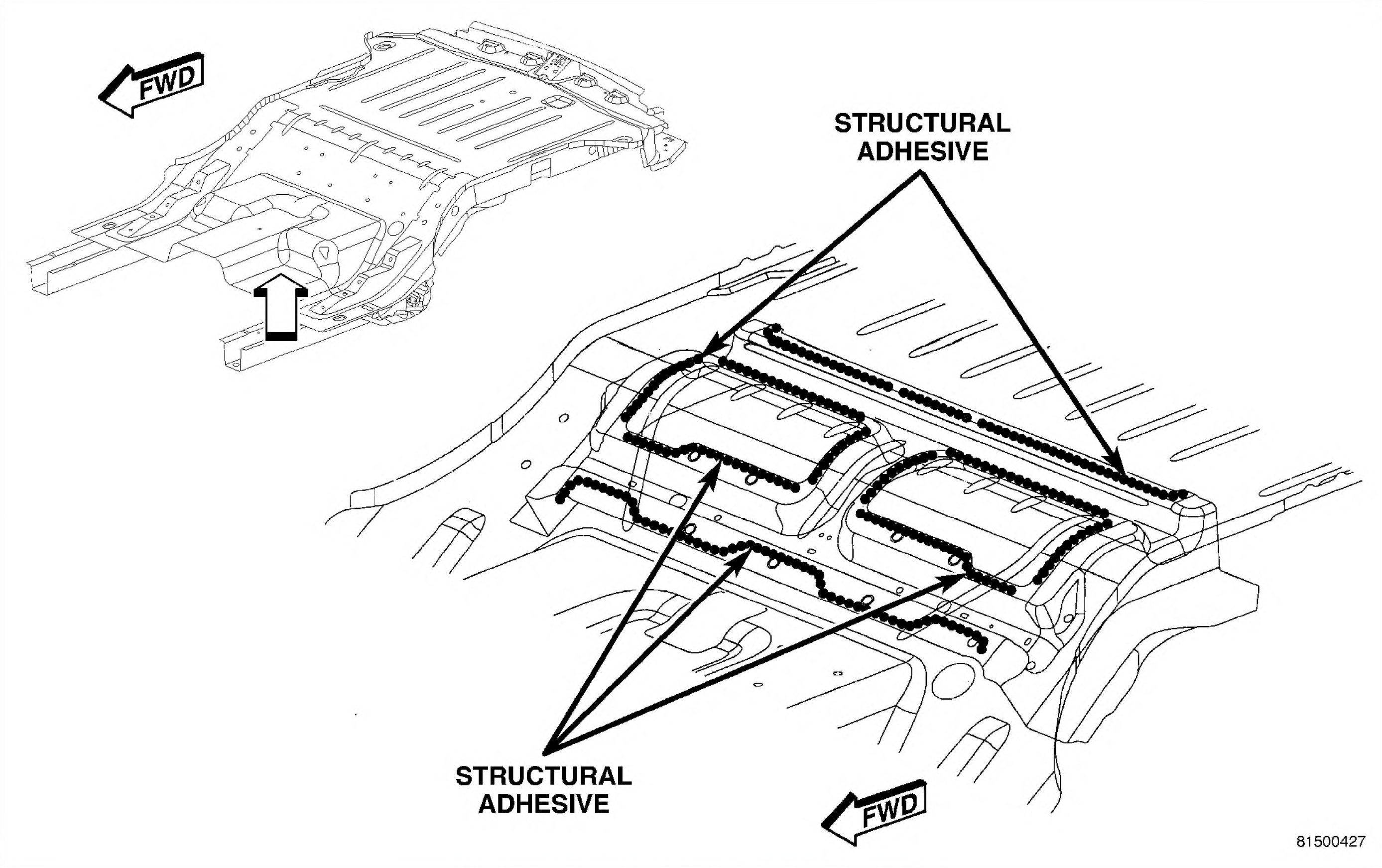
FWD
STRUCTURAL ADHESIVE
STRUCTURAL ADHESIVE
FWD
81500427

Fig. 27 REAR FLOOR/LADDER (1 OF 3)

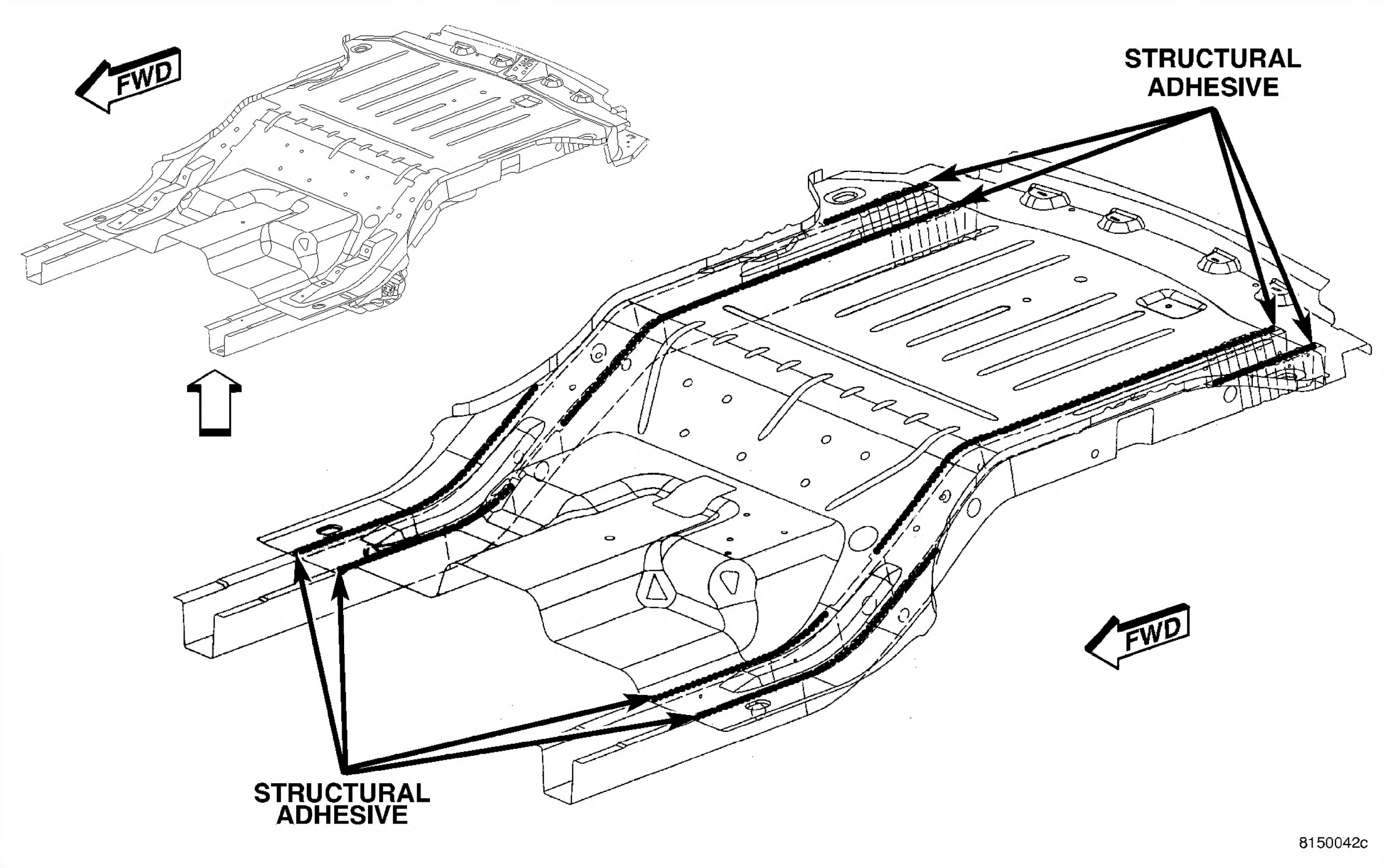
FWD
STRUCTURAL ADHESIVE
FWD
STRUCTURAL ADHESIVE
8150042c

Fig. 28 REAR FLOOR/LADDER (2 OF 3)

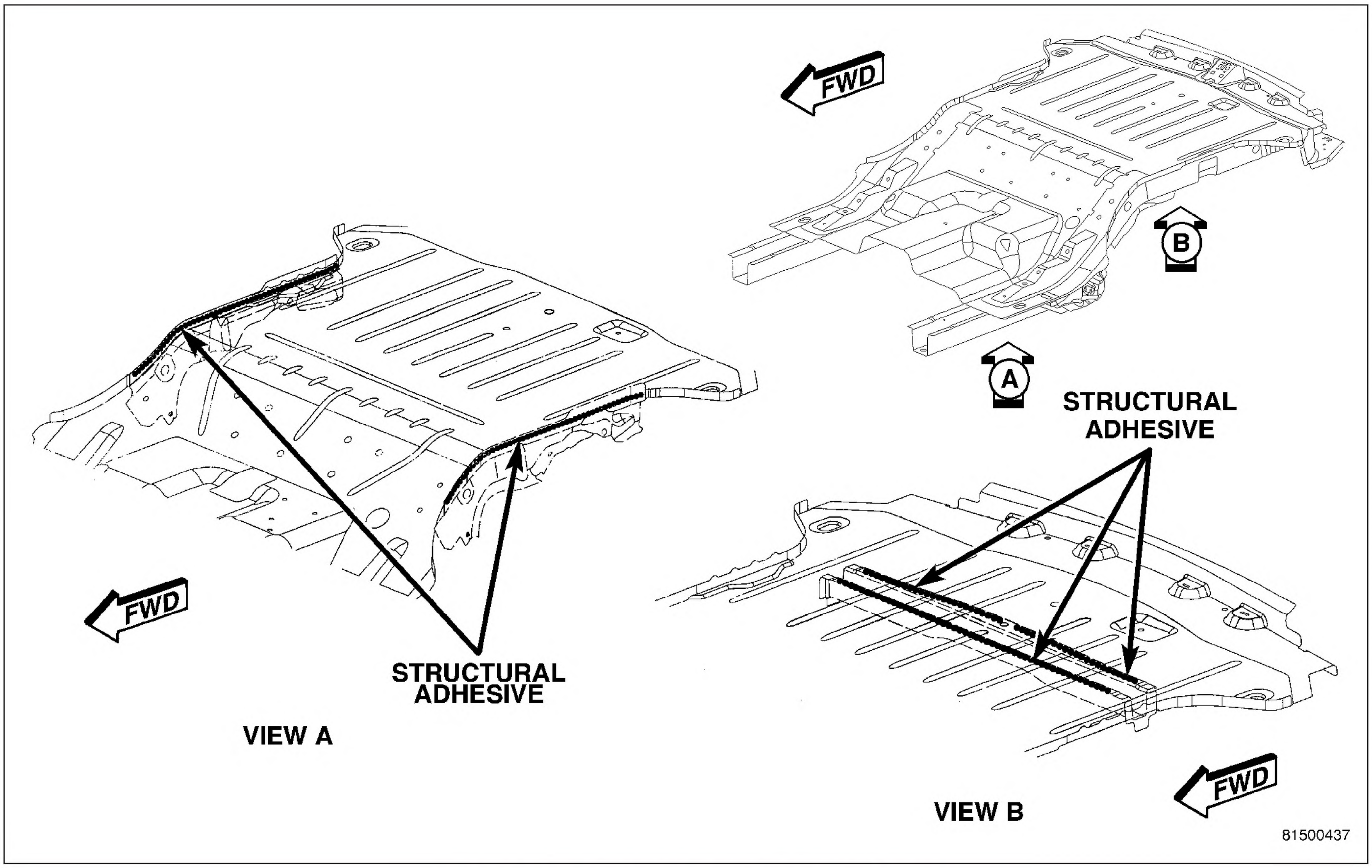
FWD
B
A
STRUCTURAL ADHESIVE
FWD
STRUCTURAL ADHESIVE
VIEW A
VIEW B
FWD
81500437

Fig. 29 REAR FLOOR/LADDER (3 OF 3)

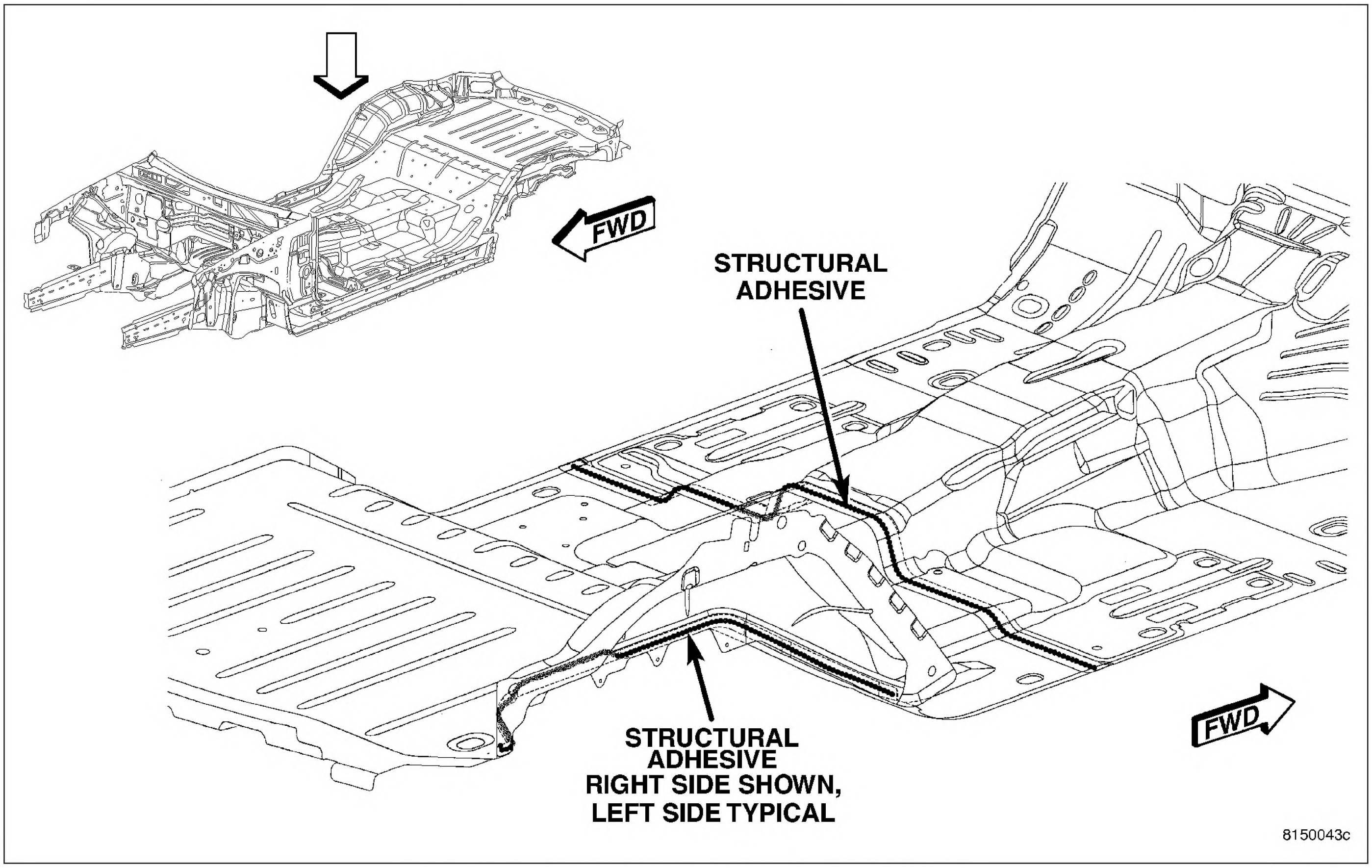
FWD
STRUCTURAL ADHESIVE
STRUCTURAL ADHESIVE RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
FWD
8150043c

Fig. 30 UNDERBODY - COMPLETE (1 OF 2)

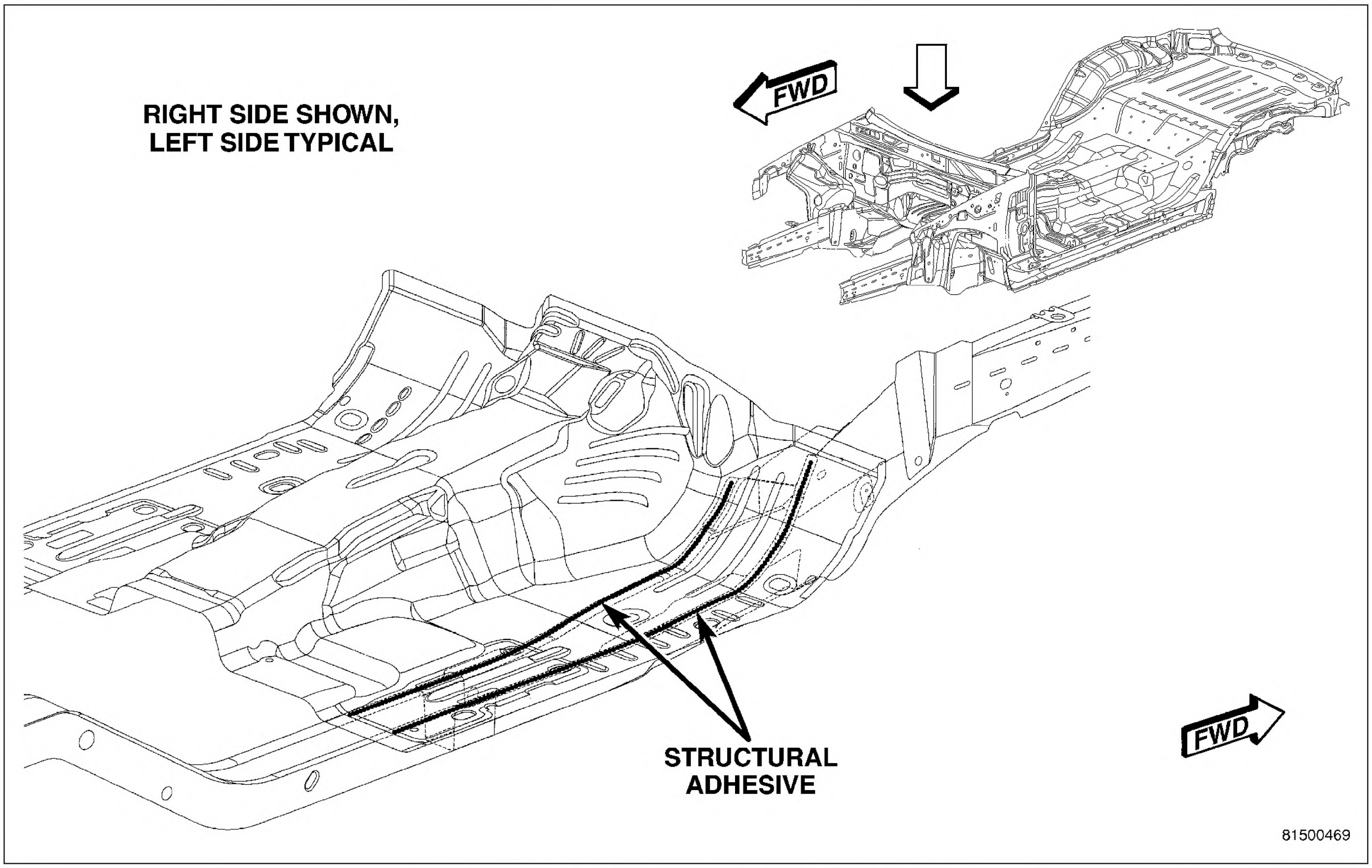
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
STRUCTURAL
ADHESIVE
FWD
81500469

Fig. 31 UNDERBODY - COMPLETE (2 OF 2)

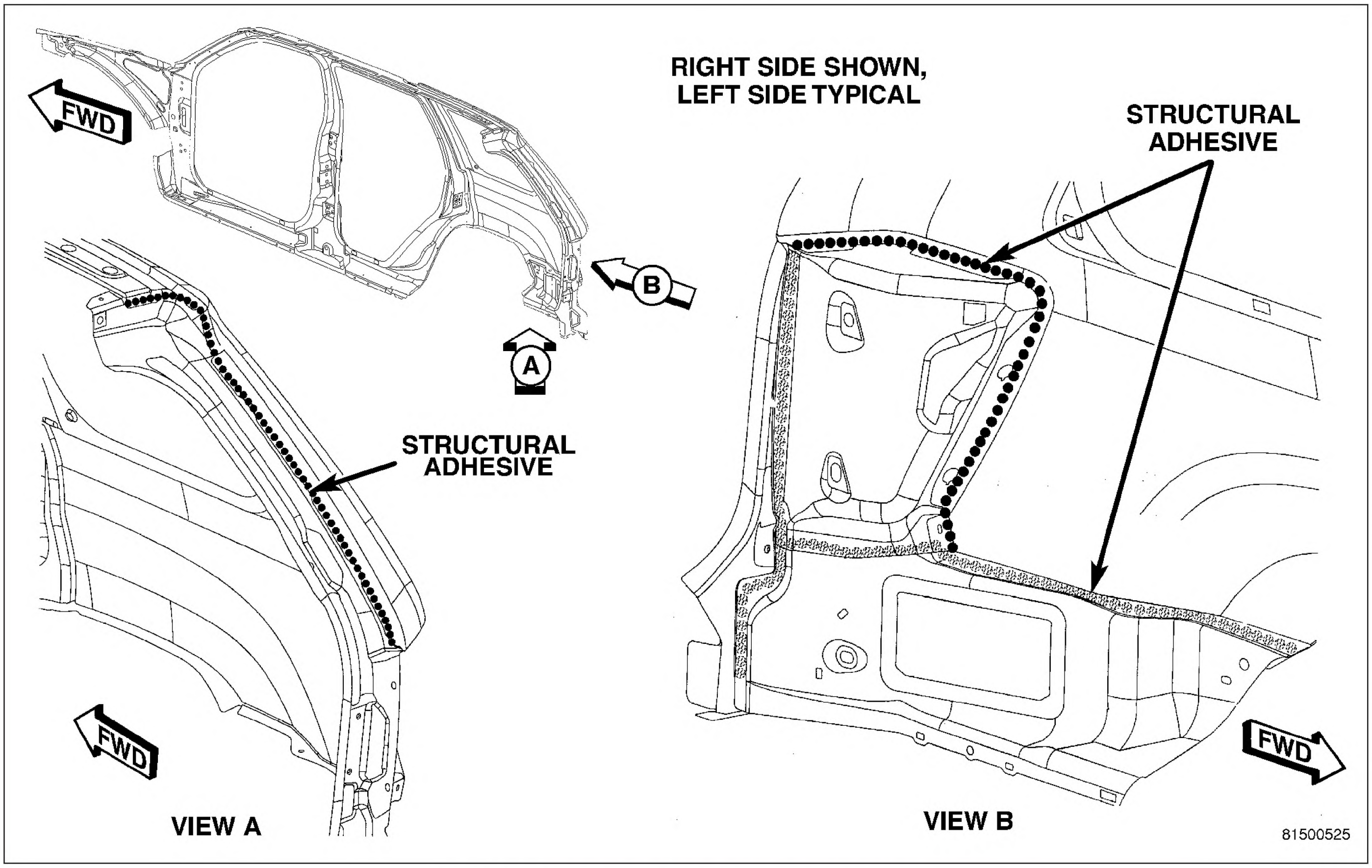
FWD
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
STRUCTURAL
ADHESIVE
B
A
STRUCTURAL
ADHESIVE
FWD
VIEW A
VIEW B
FWD
81500525

Fig. 32 OUTER BODY SIDE APERTURE

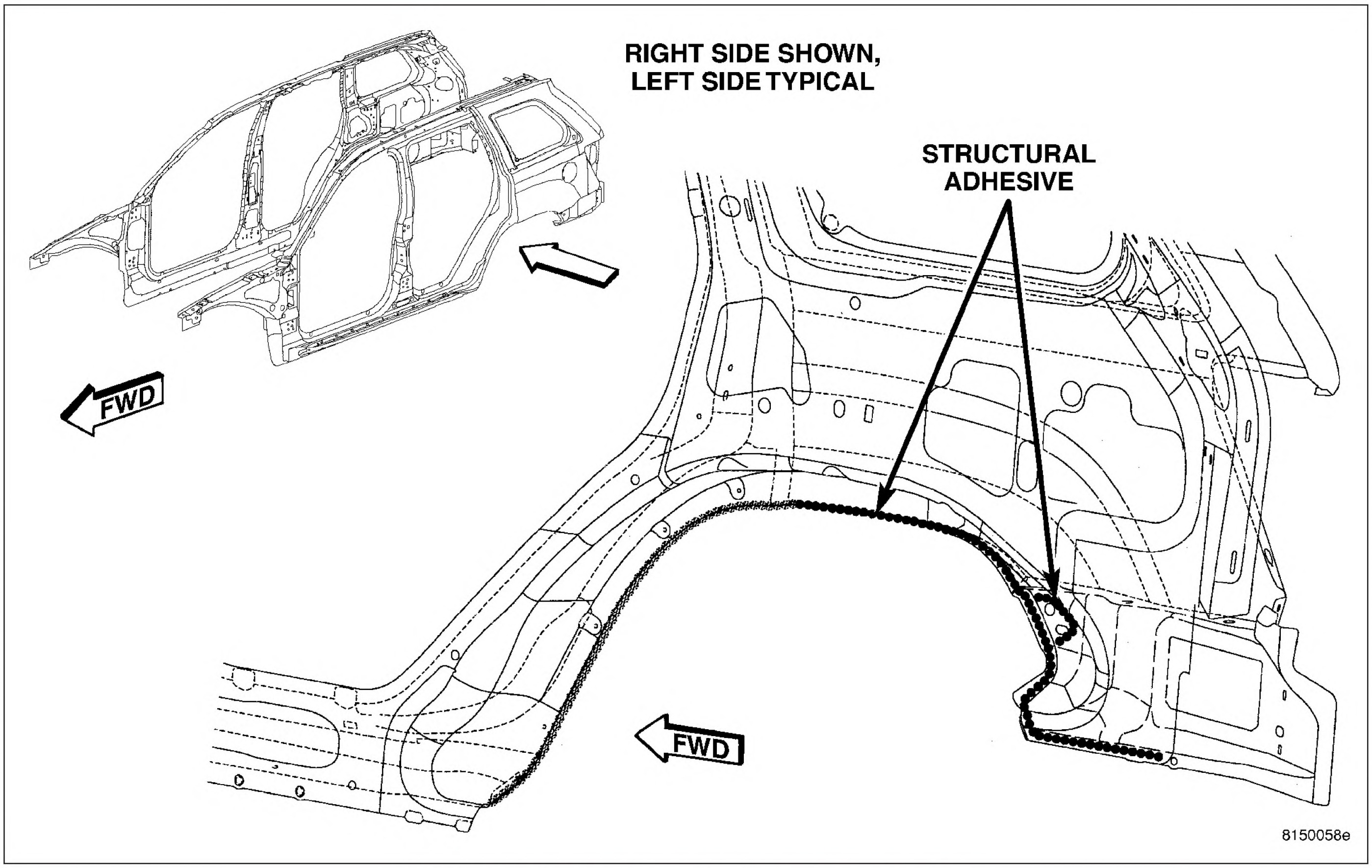
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
STRUCTURAL
ADHESIVE
FWD
FWD
8150058e

Fig. 33 BODY SIDE APERTURE - COMPLETE

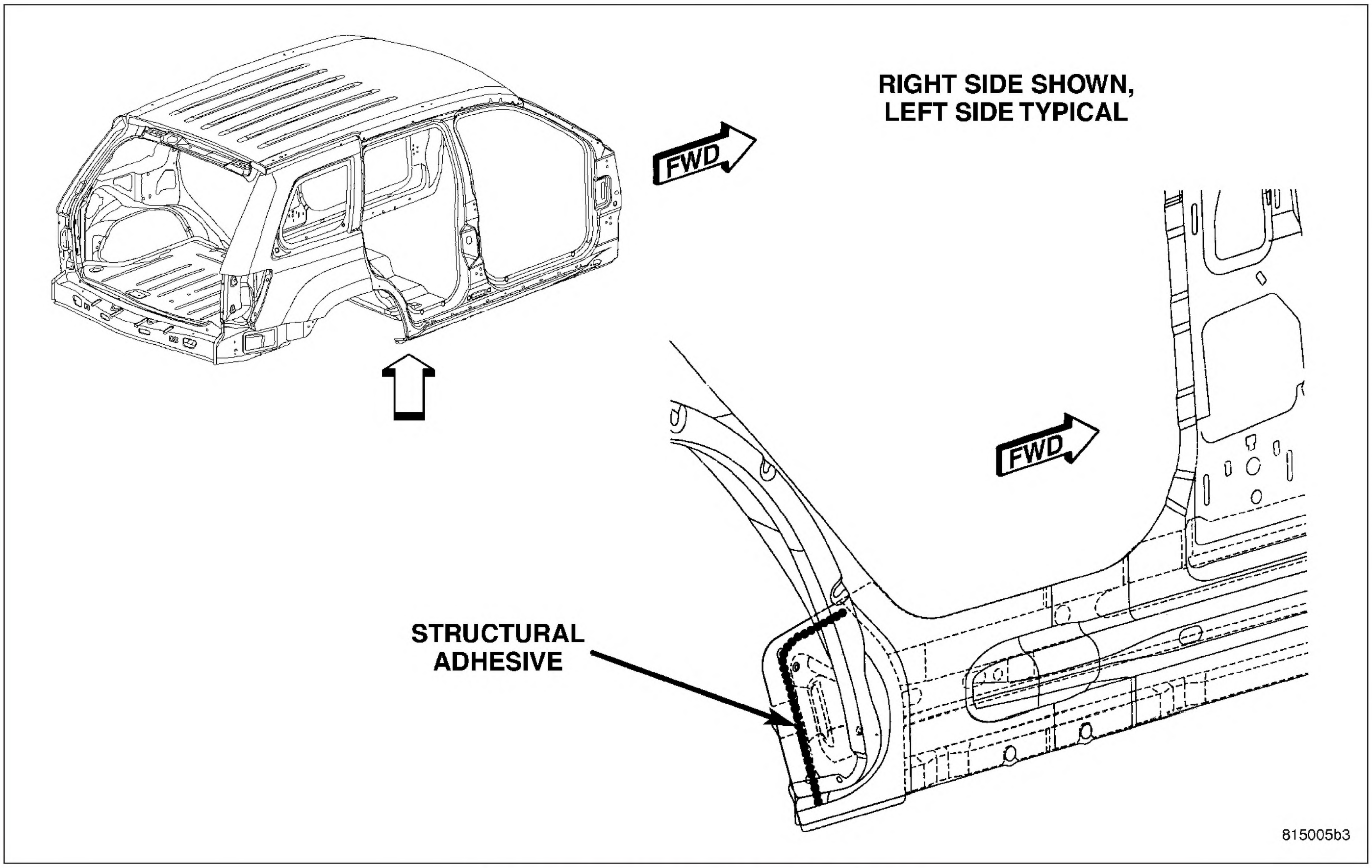
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
FWD
STRUCTURAL
ADHESIVE
815005b3

Fig. 34 BODY SIDE SILL/EXTENSION

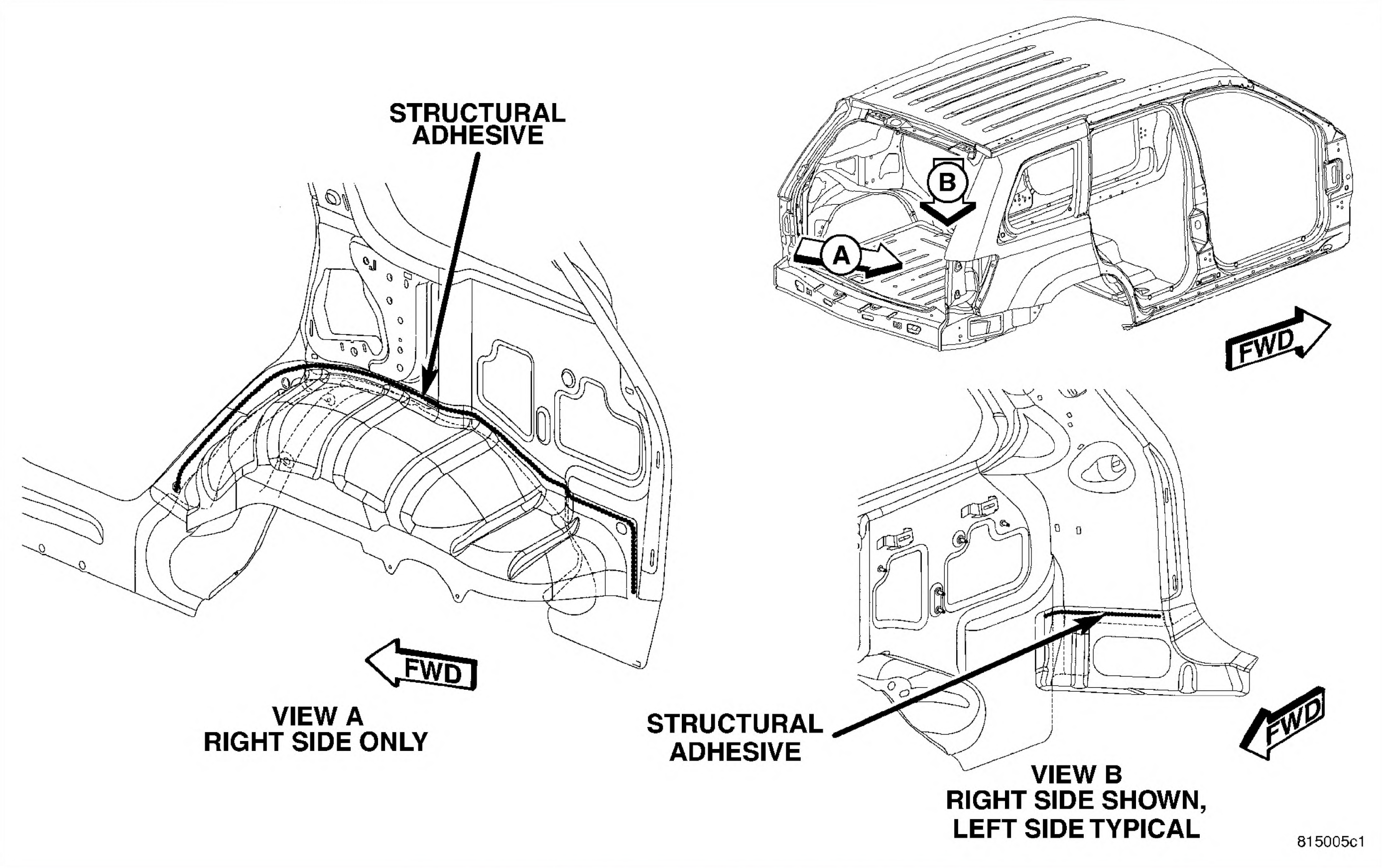
STRUCTURAL ADHESIVE
B
A
FWD
FWD
VIEW A
RIGHT SIDE ONLY
STRUCTURAL ADHESIVE
FWD
VIEW B
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
815005c1

Fig. 35 INNER REAR WHEELHOUSE (1 OF 2)

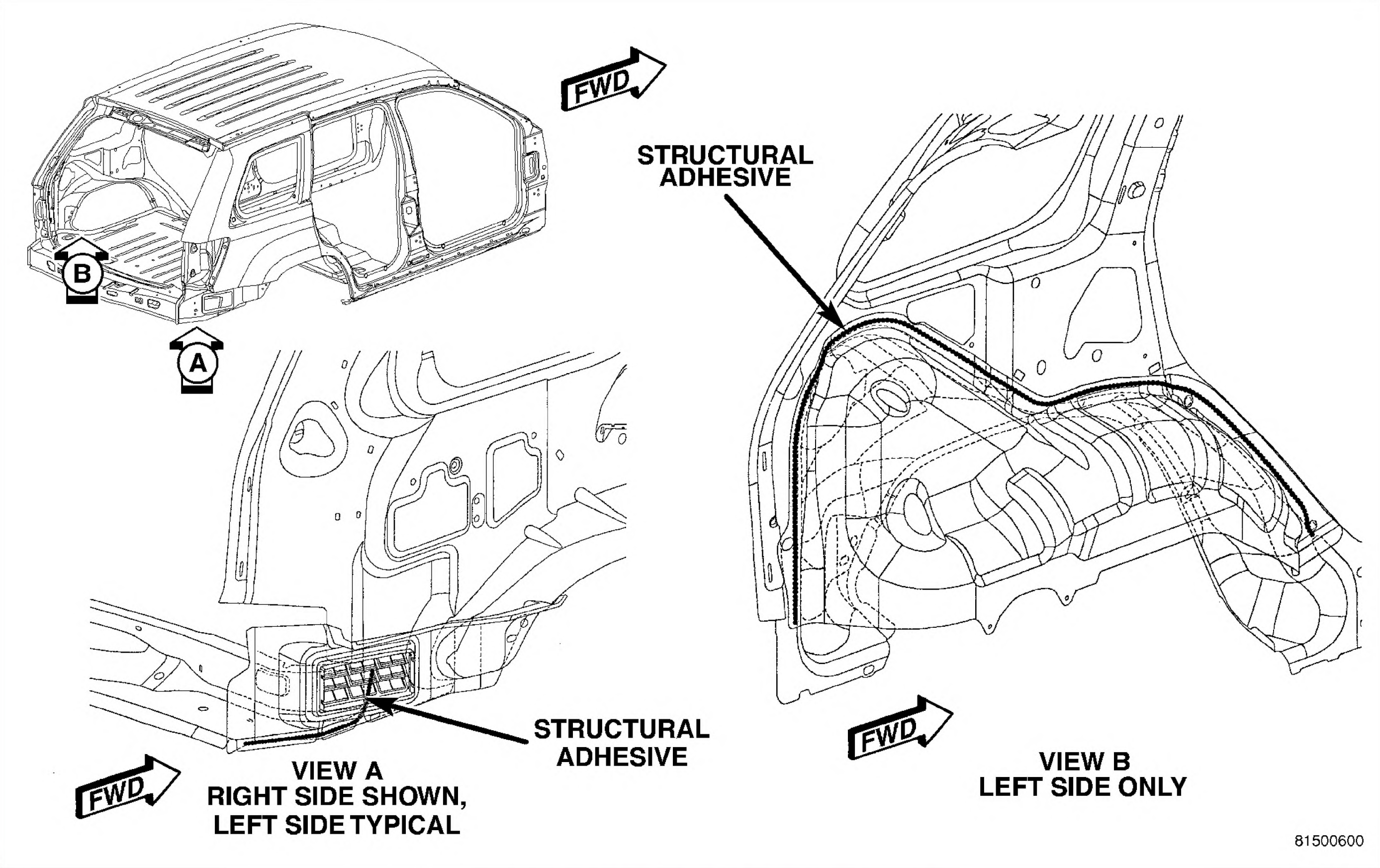
FWD
STRUCTURAL ADHESIVE
B
A
STRUCTURAL ADHESIVE
FWD
FWD
VIEW A
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
VIEW B
LEFT SIDE ONLY
81500600

Fig. 36 INNER REAR WHEELHOUSE (2 OF 2)

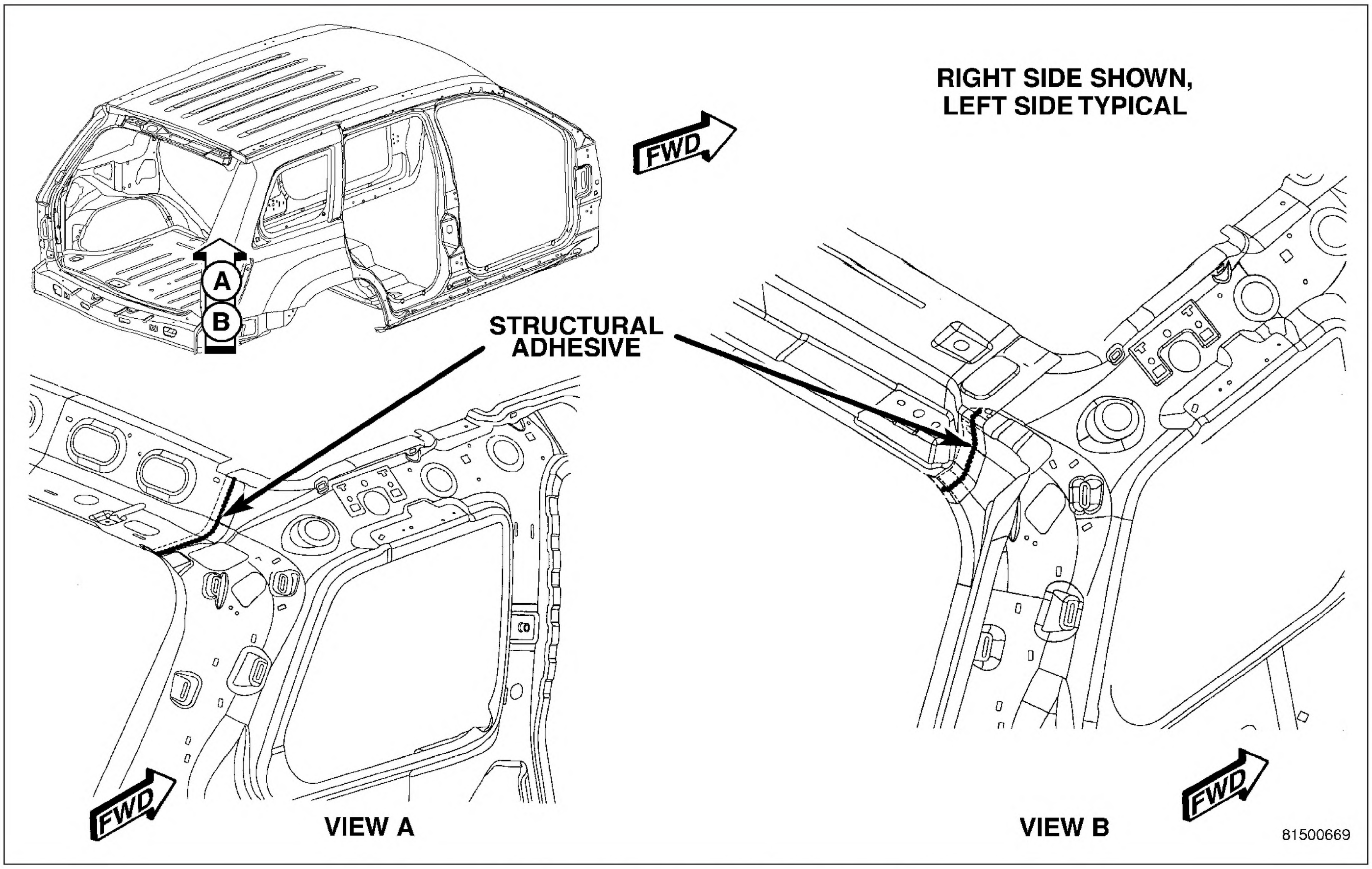
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
A
B
STRUCTURAL
ADHESIVE
FWD
VIEW A
VIEW B
FWD
81500669

Fig. 37 LIFTGATE OPENING HEADER

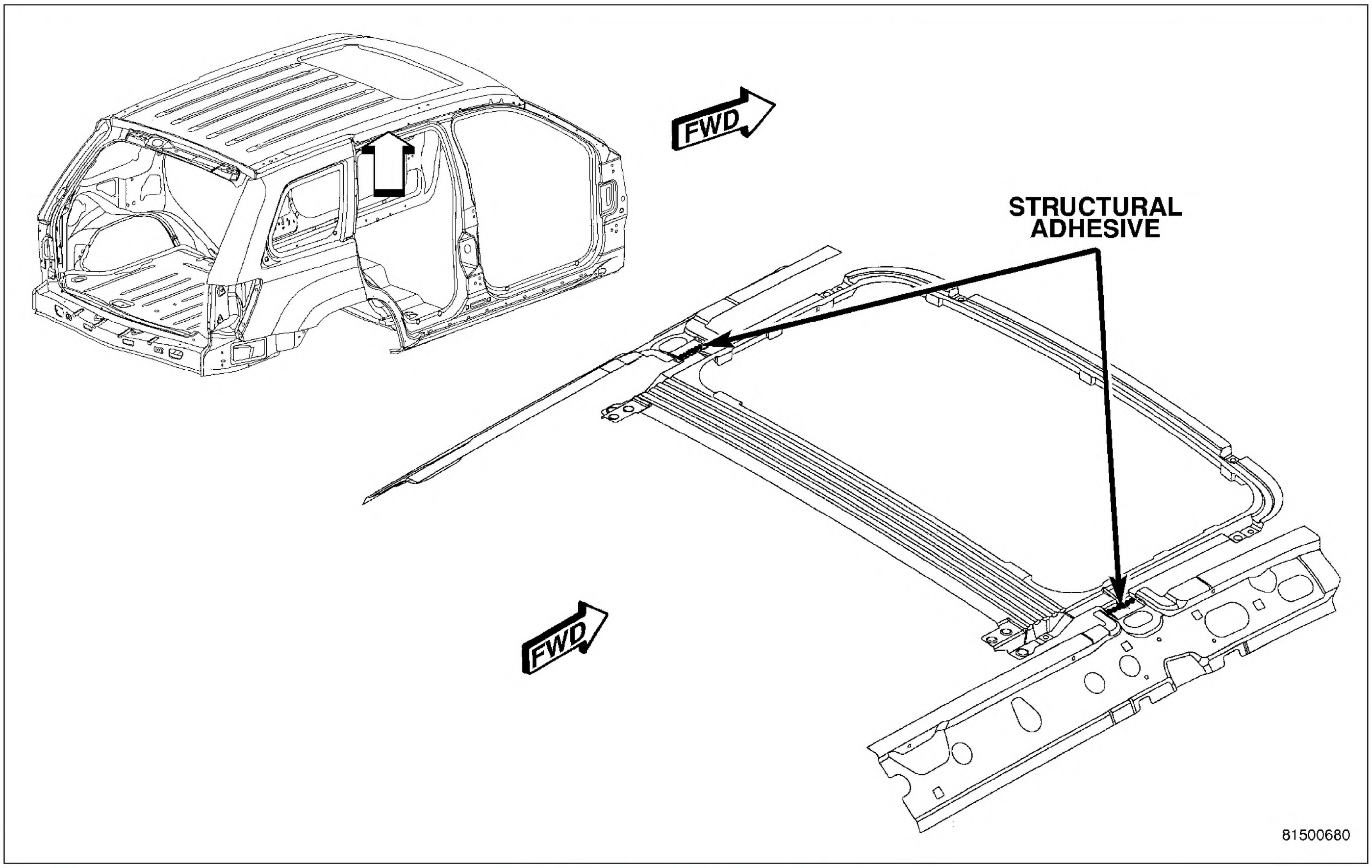
FWD
STRUCTURAL
ADHESIVE
FWD
81500680

Fig. 38 SUNROOF FRAME

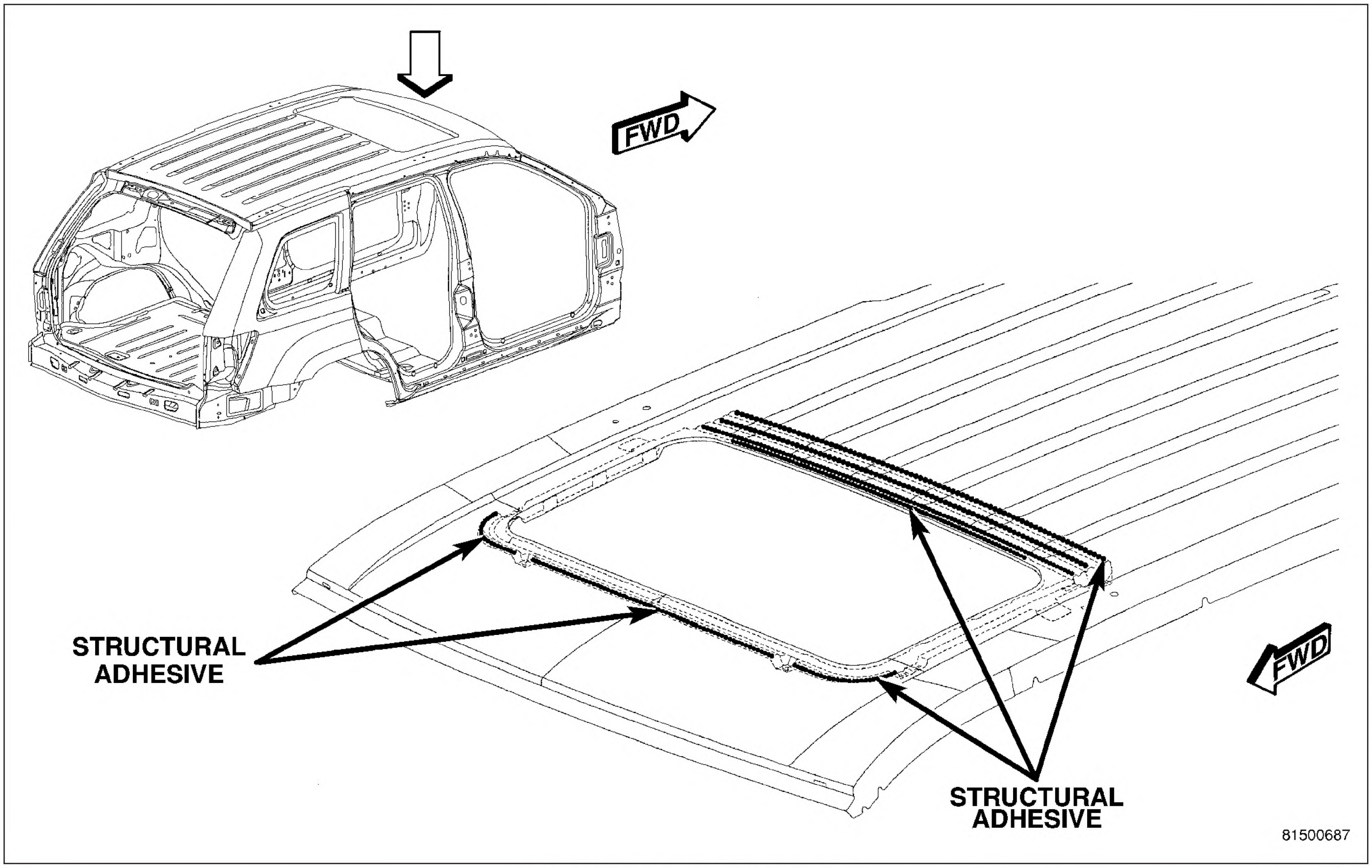
FWD
STRUCTURAL ADHESIVE
STRUCTURAL ADHESIVE
FWD
81500687

Fig. 39 ROOF/SUNROOF

WELD LOCATIONS

SPECIFICATIONS

WELD LOCATIONS

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BODY SIDE APERTURE - COMPLETE (6 OF 9)	127
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BODY W/O ROOF (6 OF 12)	145
BODY W/O ROOF (7 OF 12)	146
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BODY - COMPLETE (5 OF 7)	156
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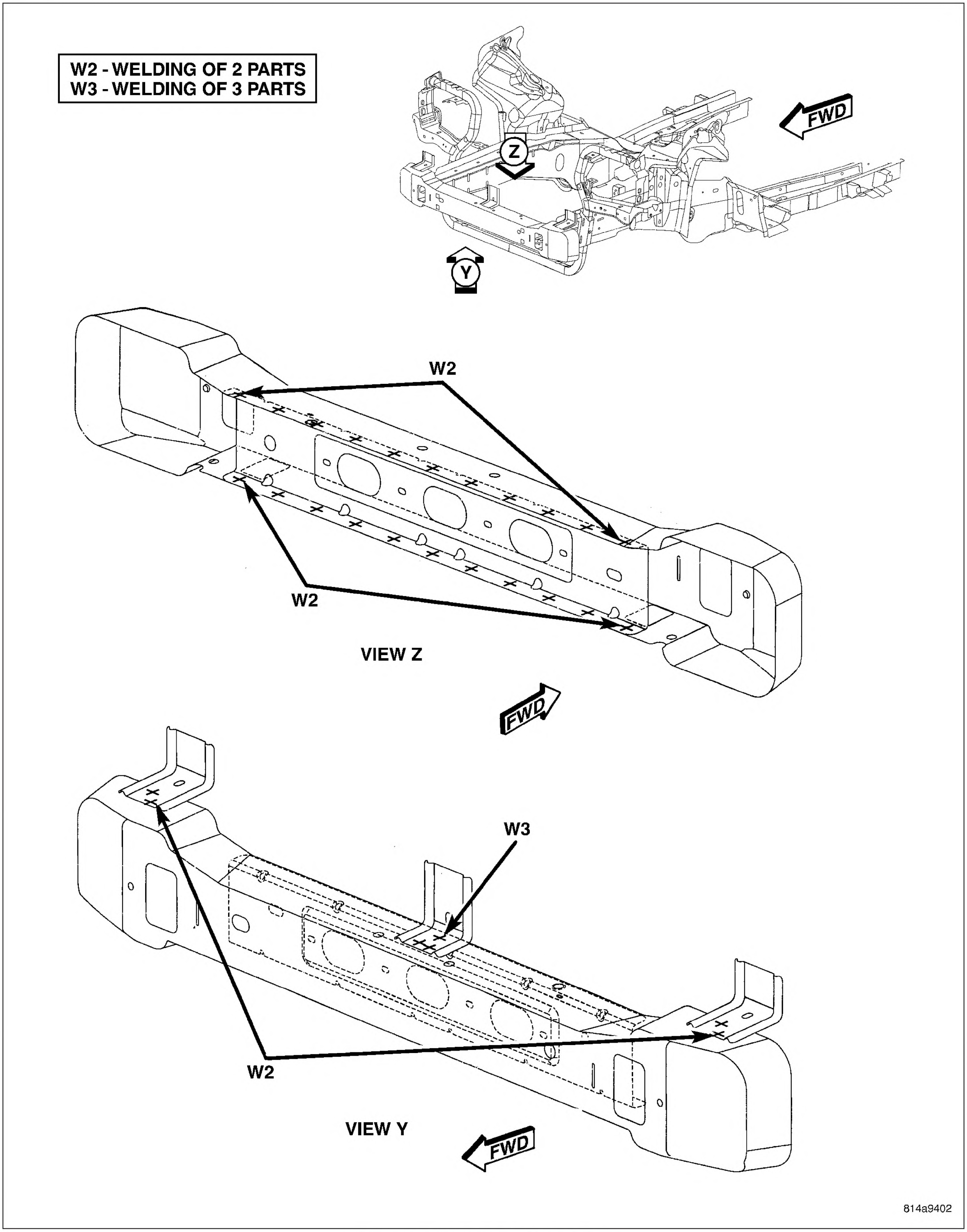

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
Z
Y
W2
W2
VIEW Z
FWD
W3
W2
VIEW Y
FWD
814a9402

Fig. 40 ENGINE BOX (1 OF 4)

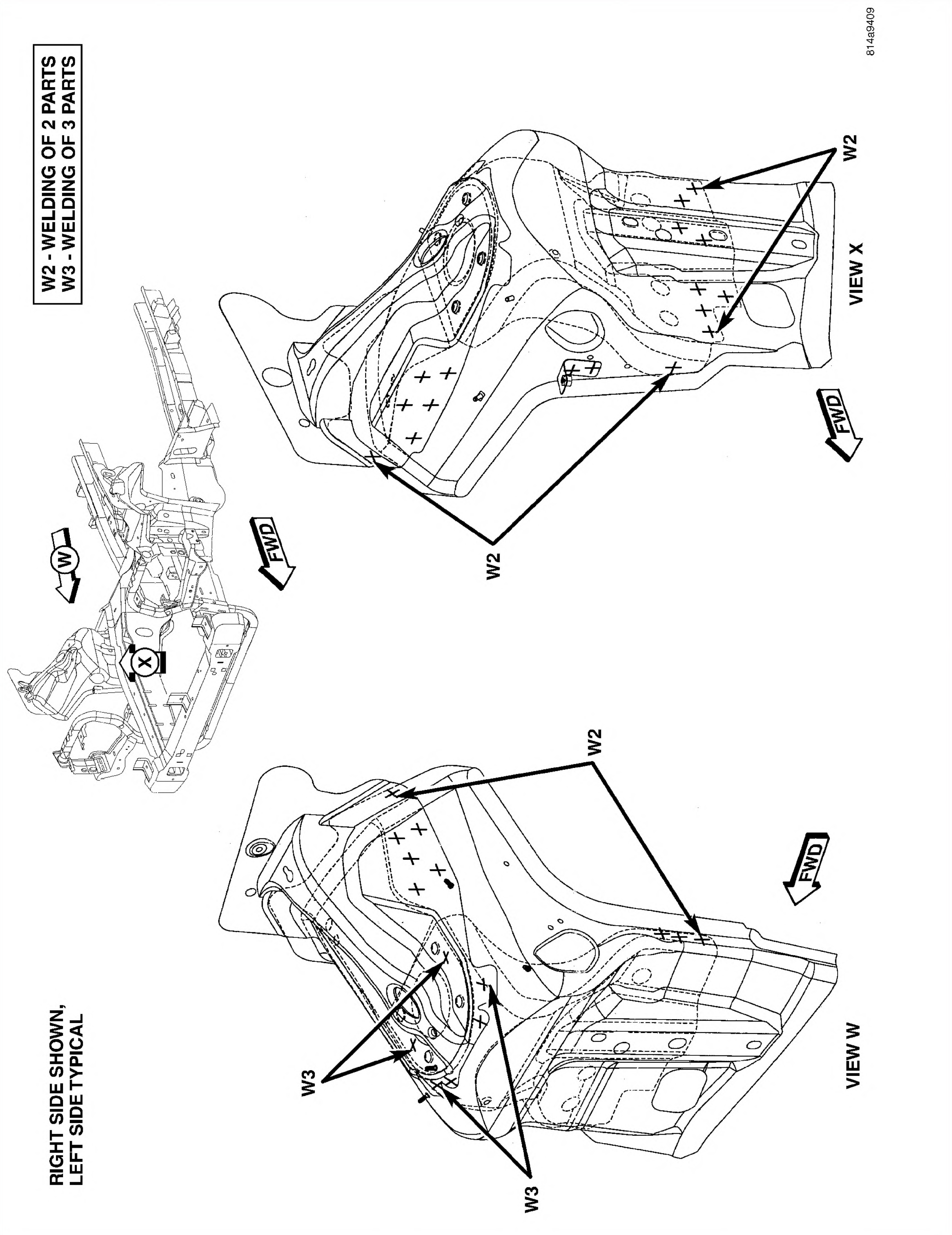

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
814a9409
W2
VIEW X
FWD
W2
FWD
W
X
W2
FWD
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W3
VIEW W
W3

Fig. 41 ENGINE BOX (2 OF 4)

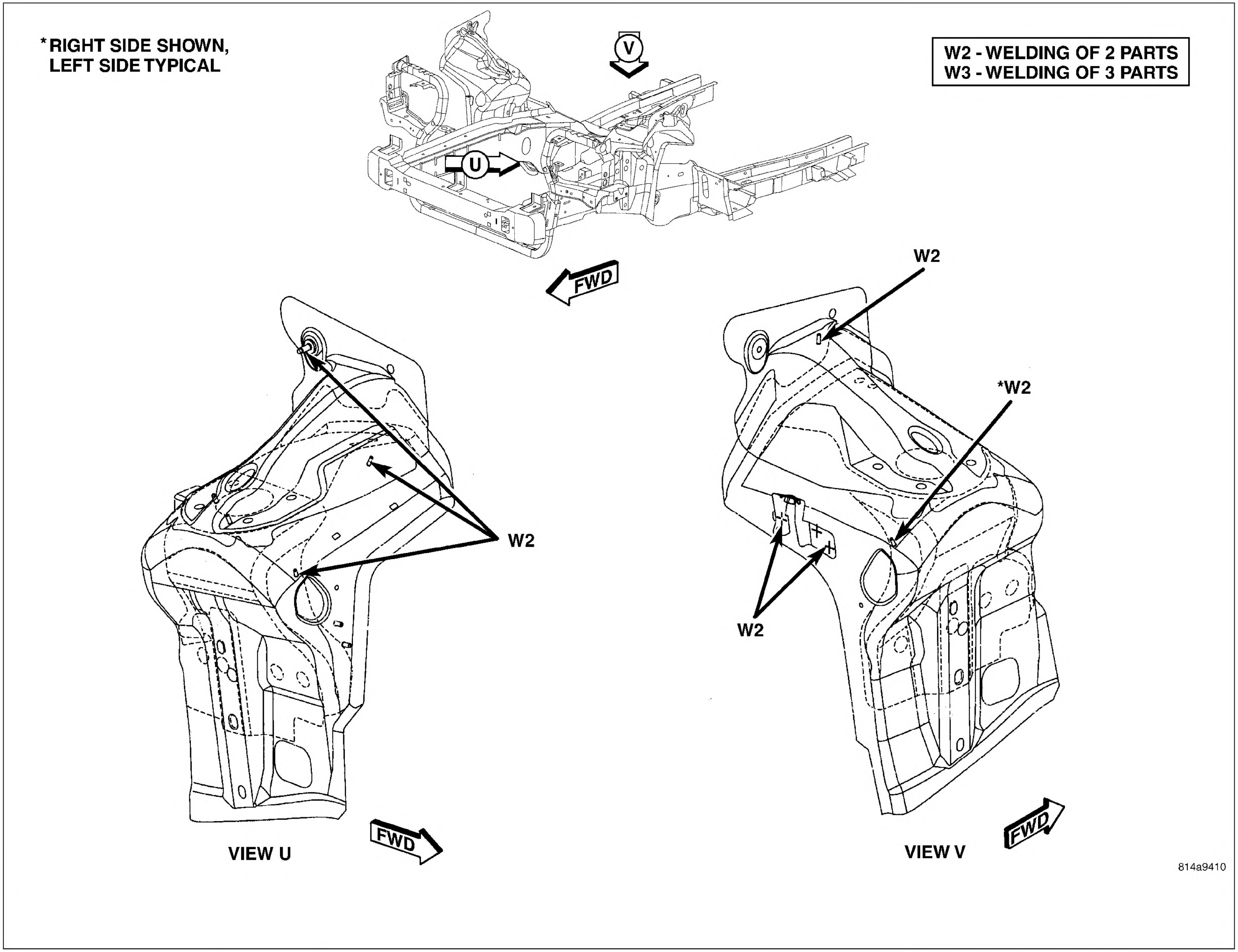

*RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
V
U
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
*W2
W2
W2
FWD
VIEW U
FWD
VIEW V
814a9410

Fig. 42 ENGINE BOX (3 OF 4)

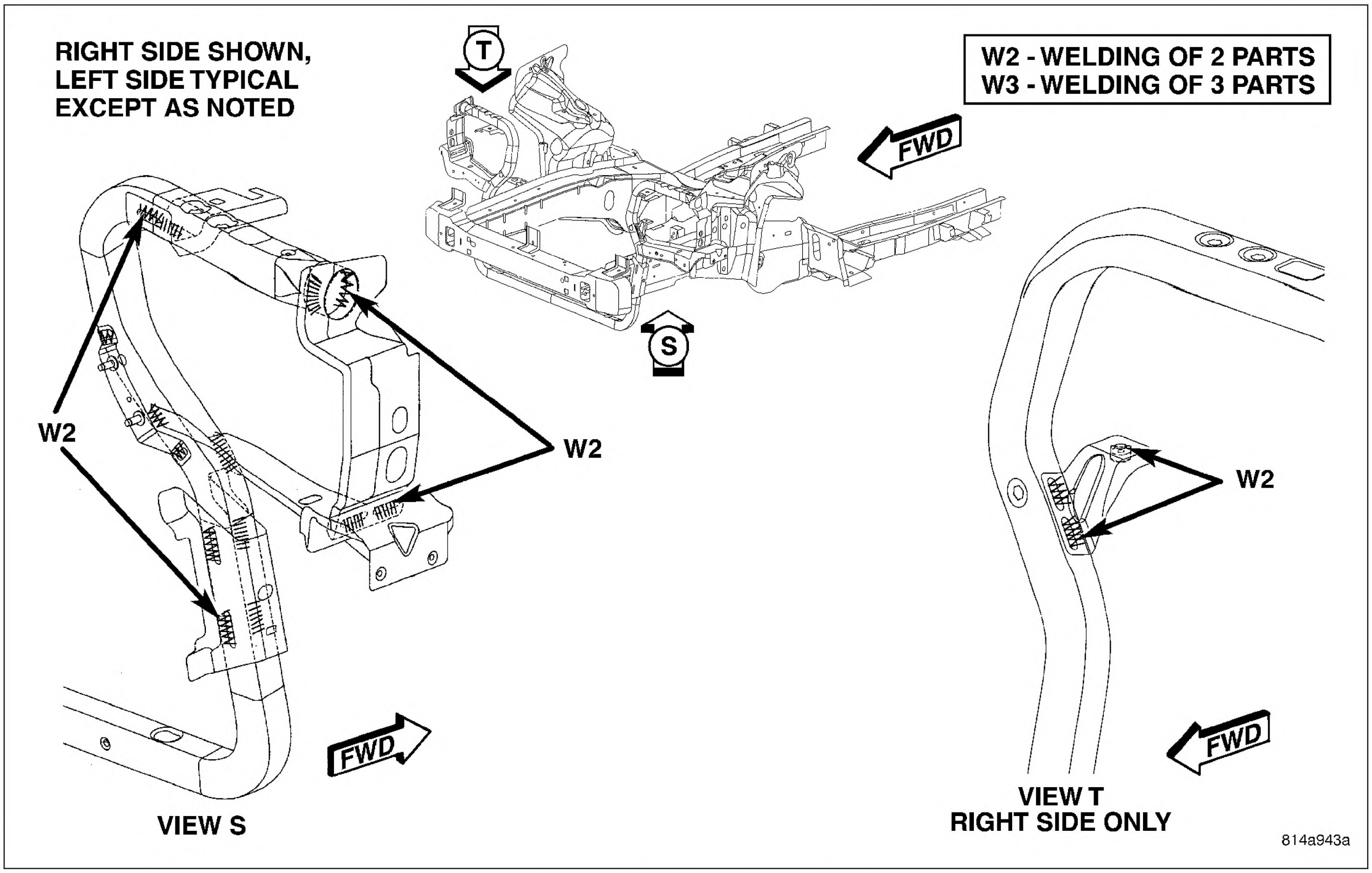

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
T
S
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W2
W2
FWD
FWD
VIEW S
VIEW T
RIGHT SIDE ONLY
814a943a

Fig. 43 ENGINE BOX (4 OF 4)

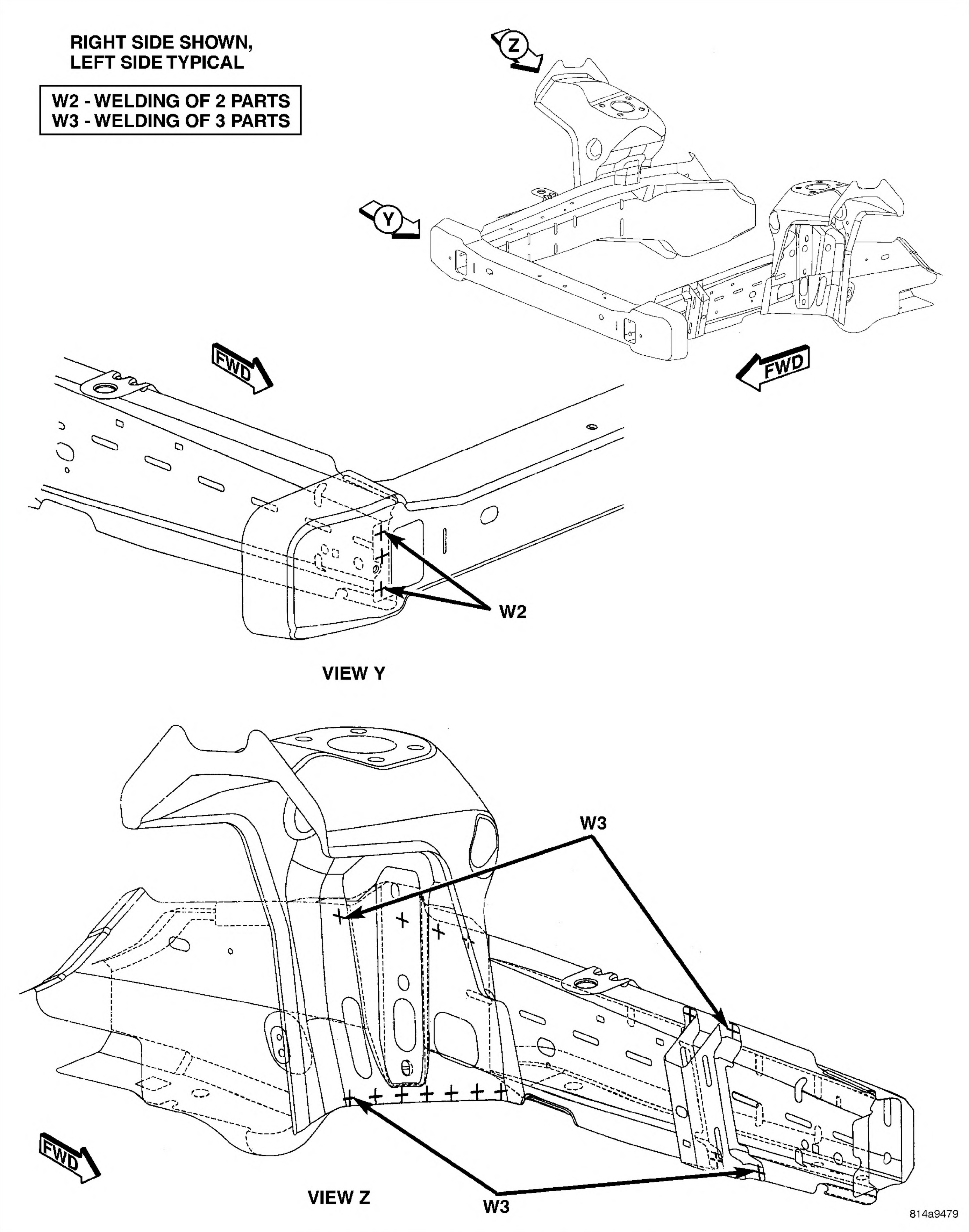
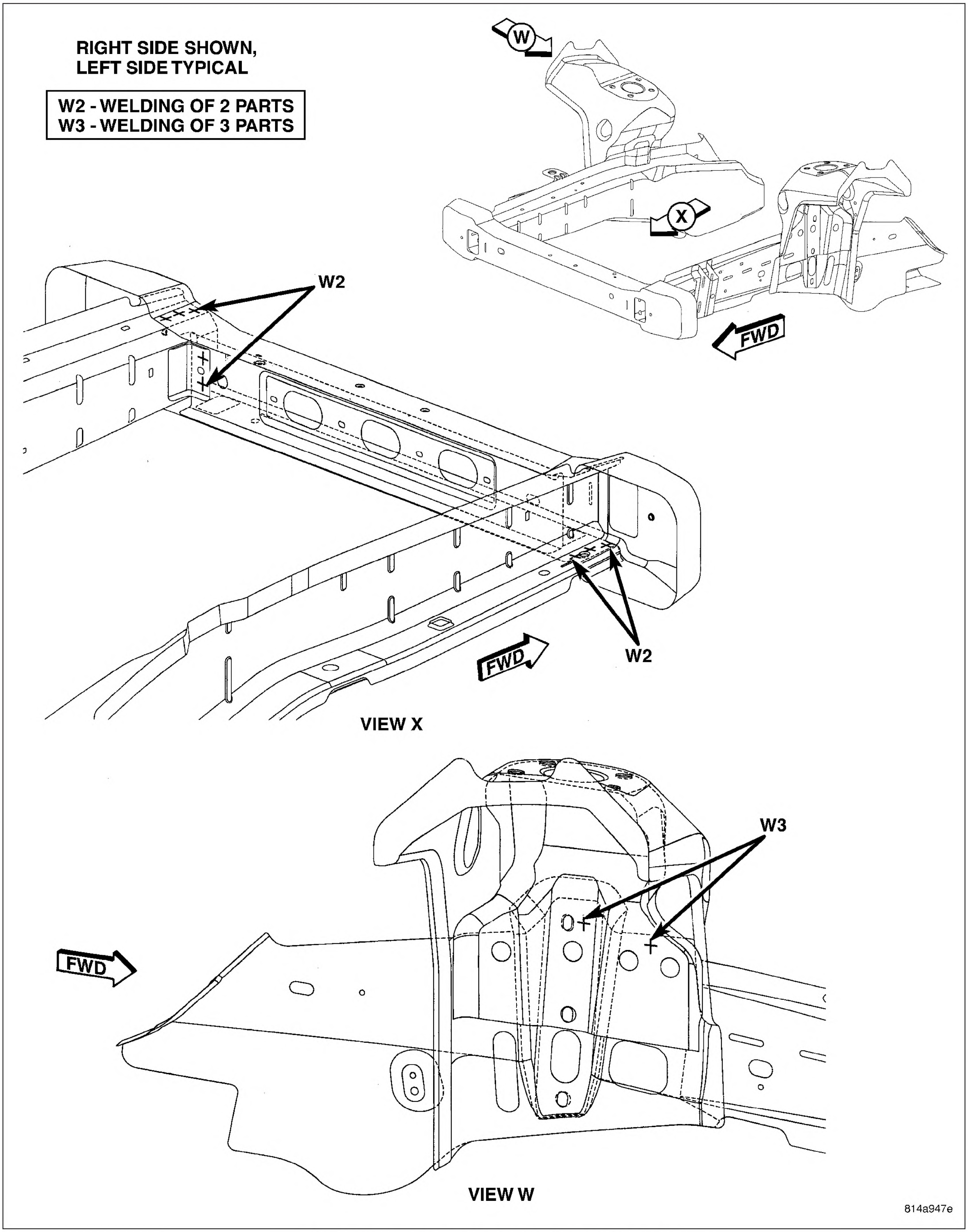

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
Z
Y
FWD
FWD
W2
VIEW Y
W3
FWD
VIEW Z
W3
814a9479

Fig. 44 ENGINE BOX - COMPLETE (1 OF 2)


RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS

W
X
FWD
W2
FWD
W2
VIEW X
W3
FWD
VIEW W
814a947e

Fig. 45 ENGINE BOX - COMPLETE (2 OF 2)

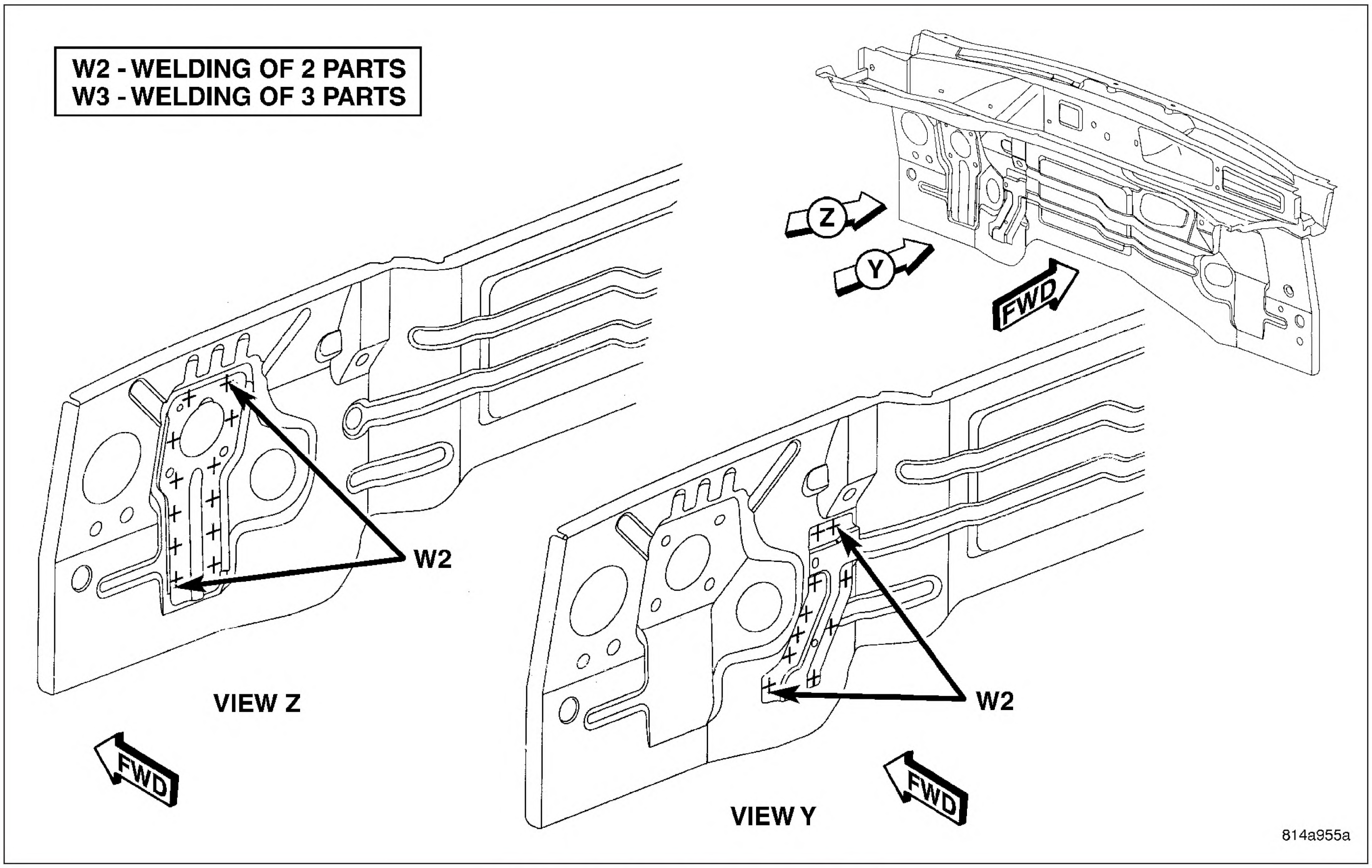

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
Z
Y
FWD
W2
W2
VIEW Z
FWD
VIEW Y
FWD
814a955a

Fig. 46 DASH/PLENUM (1 OF 5)

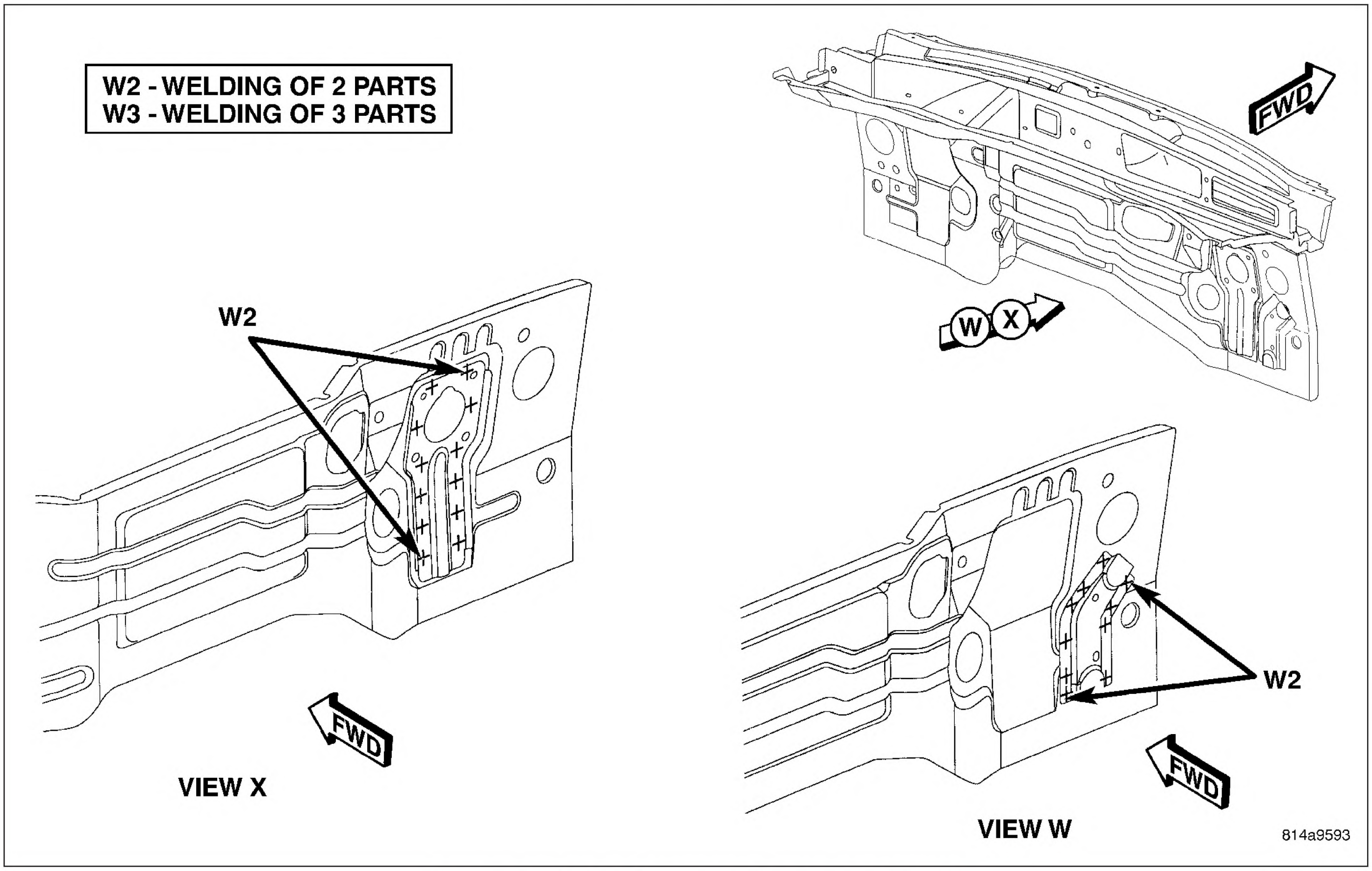

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W
X
W2
FWD
VIEW X
W2
FWD
VIEW W
814a9593

Fig. 47 DASH/PLENUM (2 OF 5) RHD ONLY

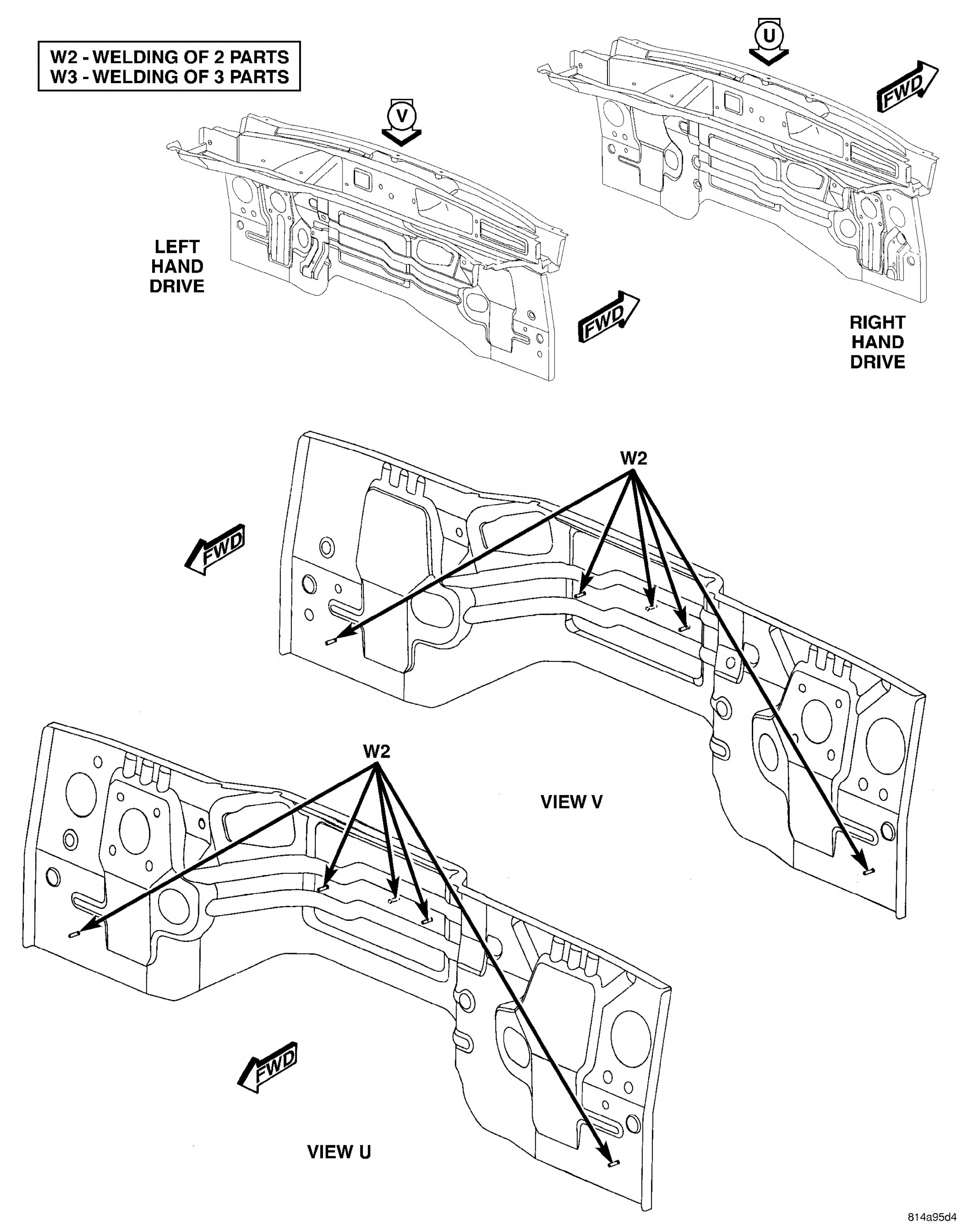

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
V
U
FWD
FWD
LEFT HAND DRIVE
RIGHT HAND DRIVE
W2
FWD
VIEW V
W2
FWD
VIEW U
814a95d4

Fig. 48 DASH/PLENUM (3 OF 5)

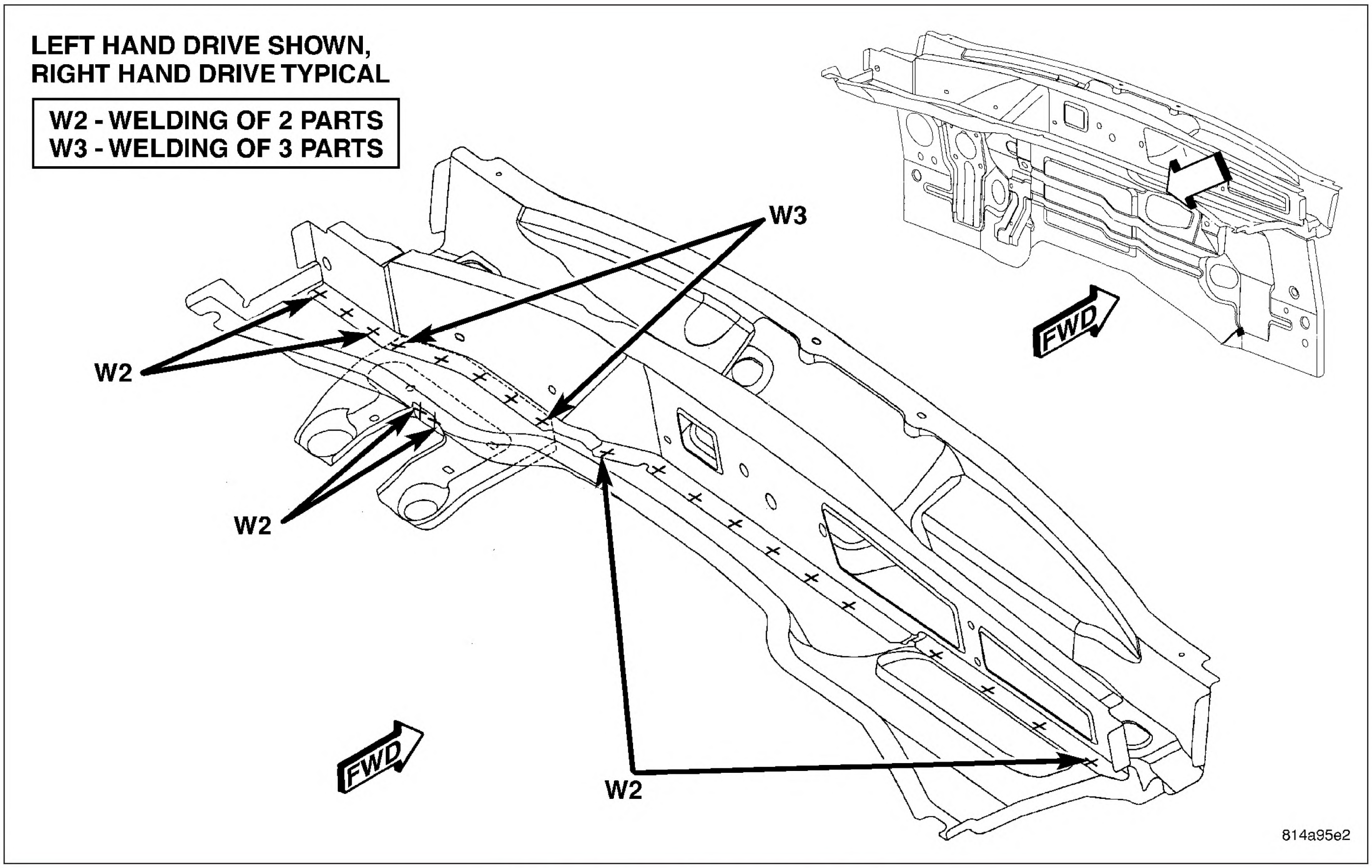

LEFT HAND DRIVE SHOWN,
RIGHT HAND DRIVE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W3
W2
W2
W2
FWD
FWD
814a95e2

Fig. 49 DASH/PLENUM (4 OF 5)

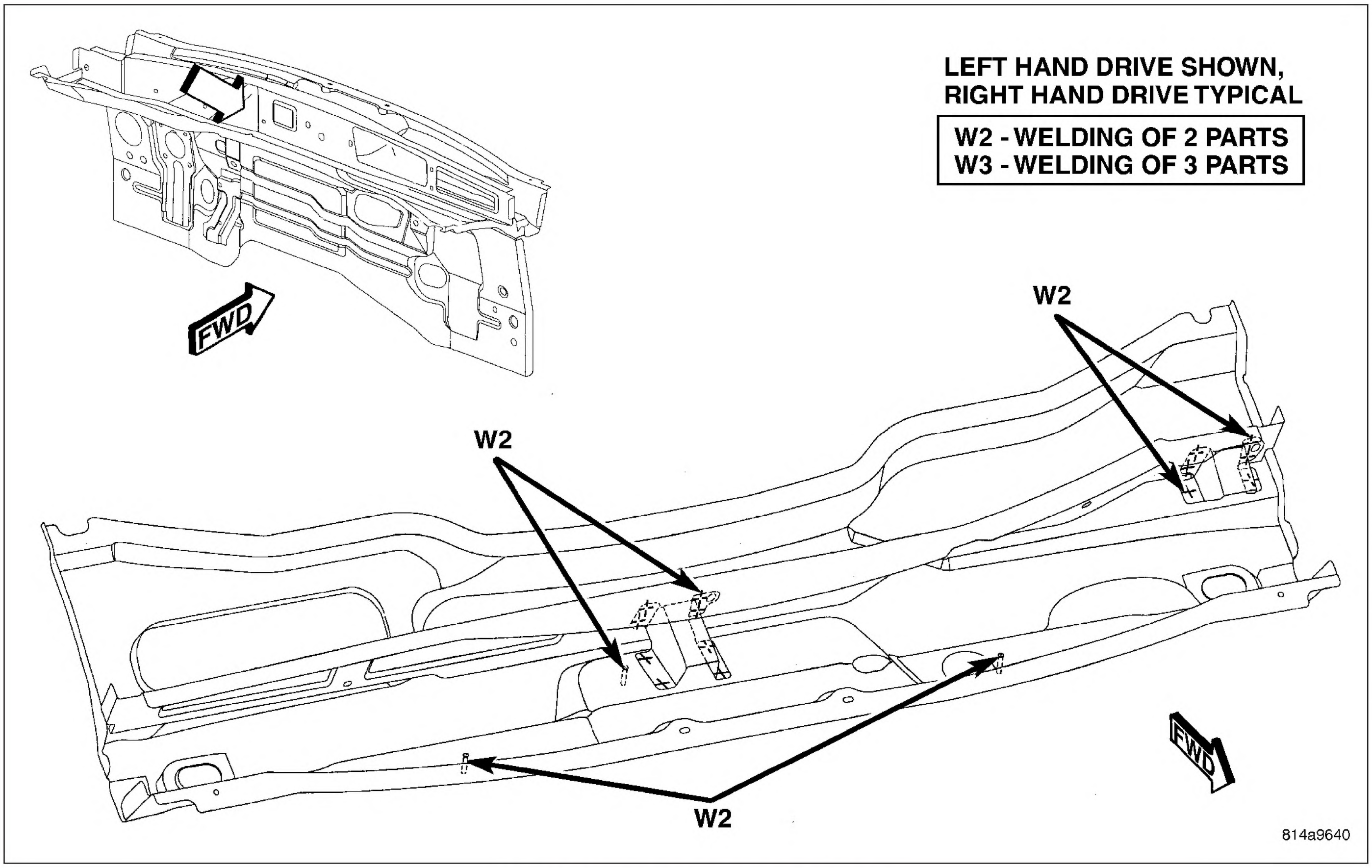

LEFT HAND DRIVE SHOWN,
RIGHT HAND DRIVE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W2
W2
FWD
814a9640

Fig. 50 DASH/PLENUM (5 OF 5)

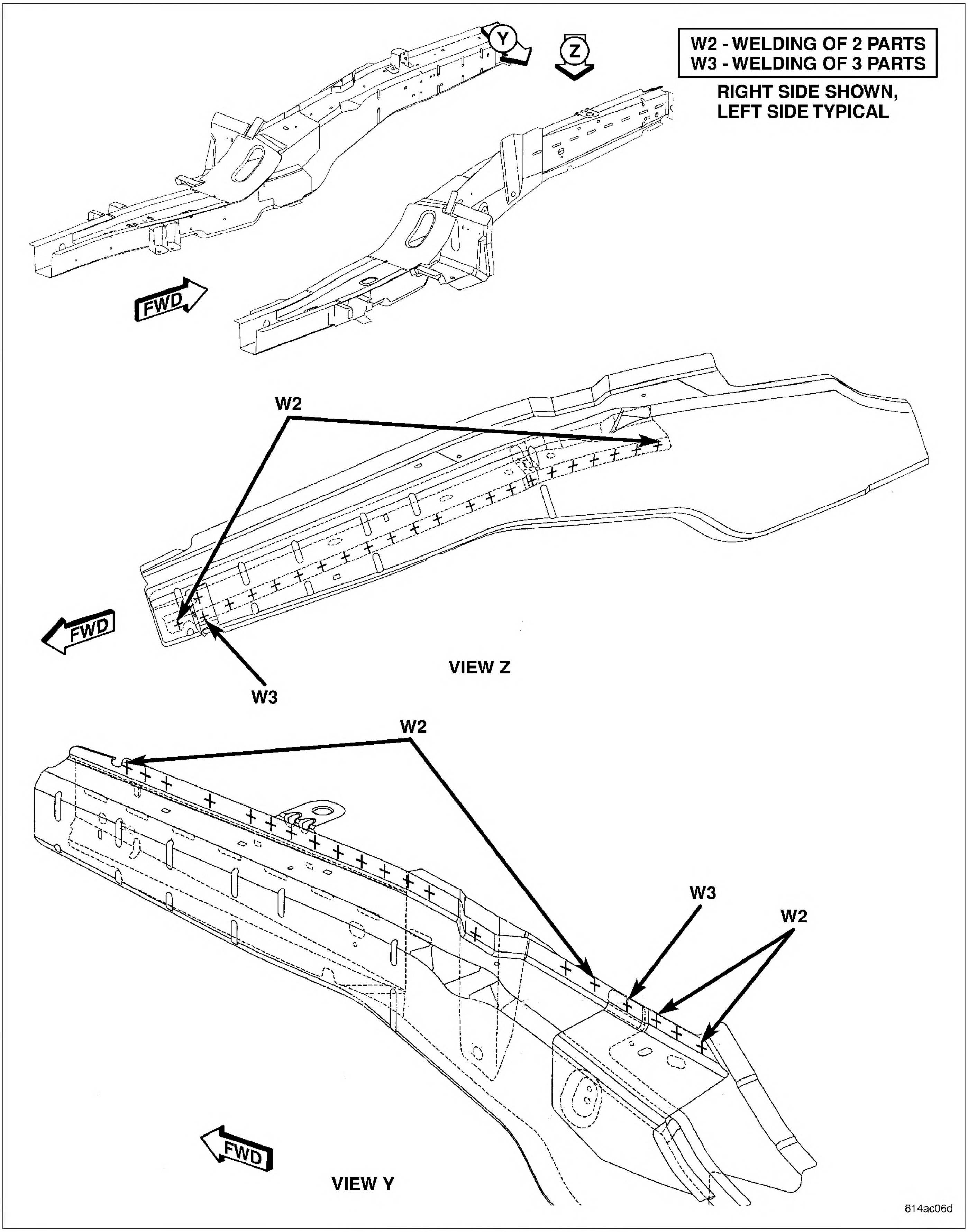

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
Y
Z
FWD
W2
FWD
VIEW Z
W3
W2
W3
W2
FWD
VIEW Y
814ac06d

Fig. 51 FRONT RAILS (1 OF 11)

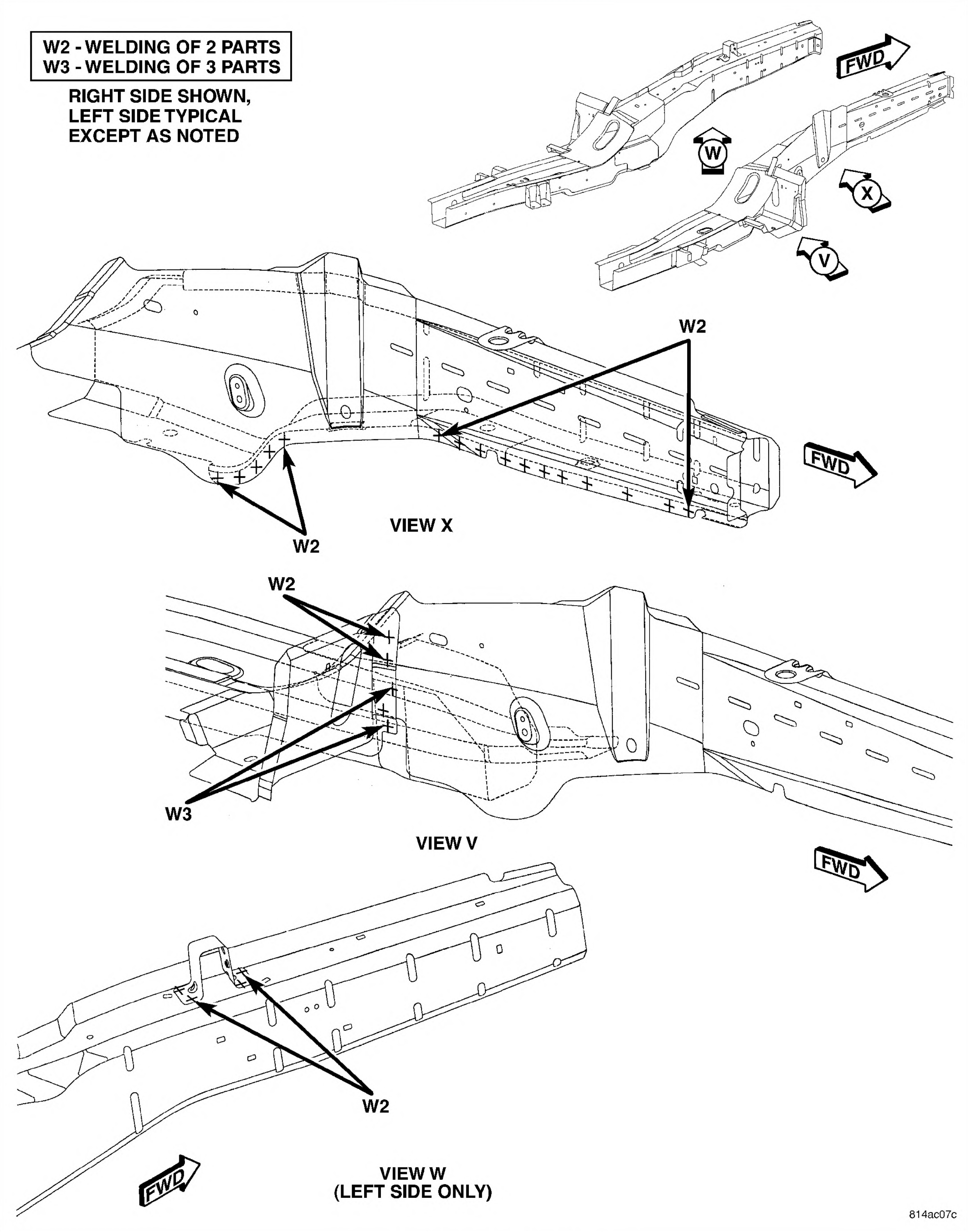

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
FWD
W
X
V
W2
W2
VIEW X
FWD
W2
W3
VIEW V
FWD
W2
FWD
VIEW W
(LEFT SIDE ONLY)
814ac07c

Fig. 52 FRONT RAILS (2 OF 11)

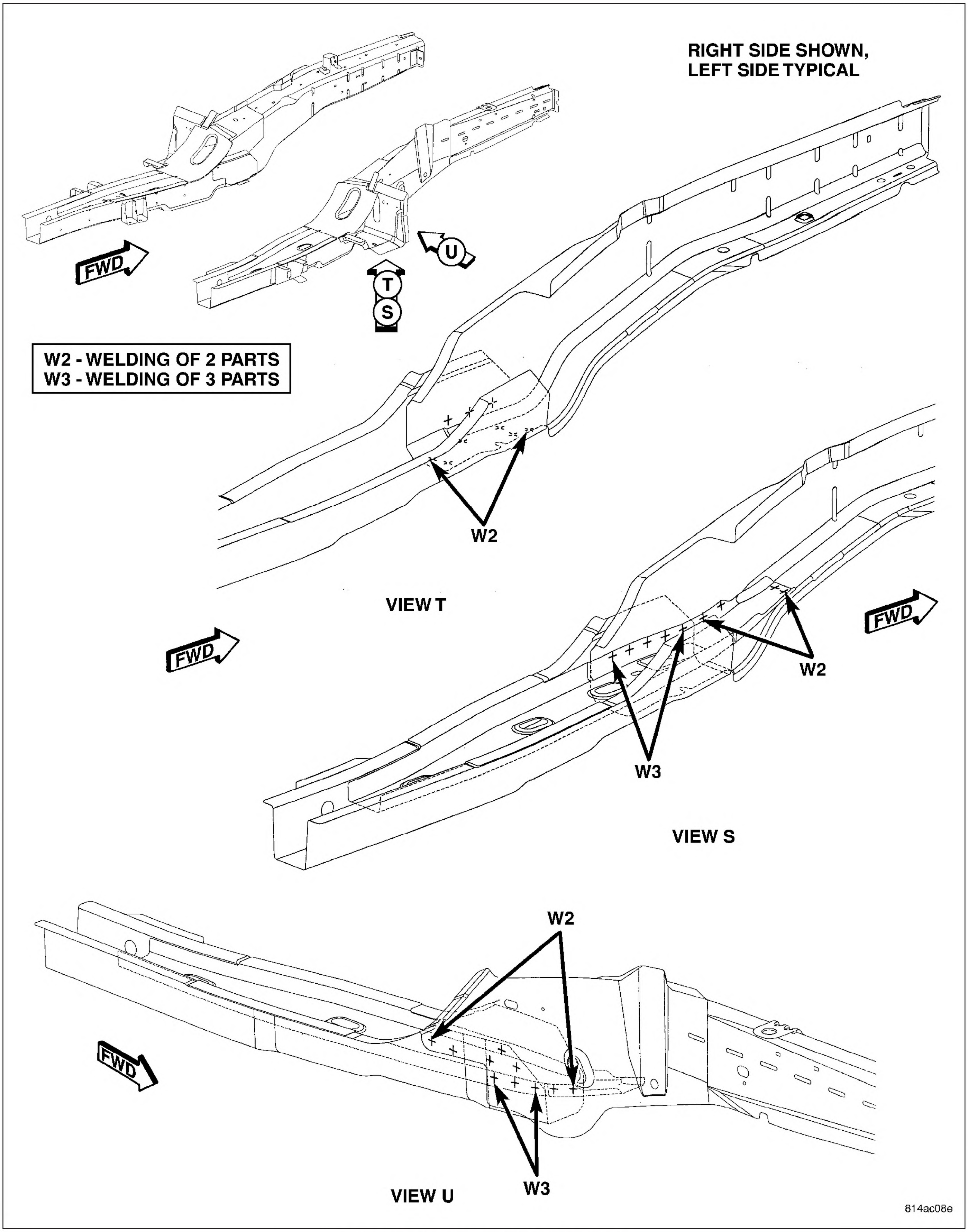

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
U
T
S
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
VIEW T
FWD
FWD
W2
W3
VIEW S
W2
FWD
W3
VIEW U
814ac08e

Fig. 53 FRONT RAILS (3 OF 11)

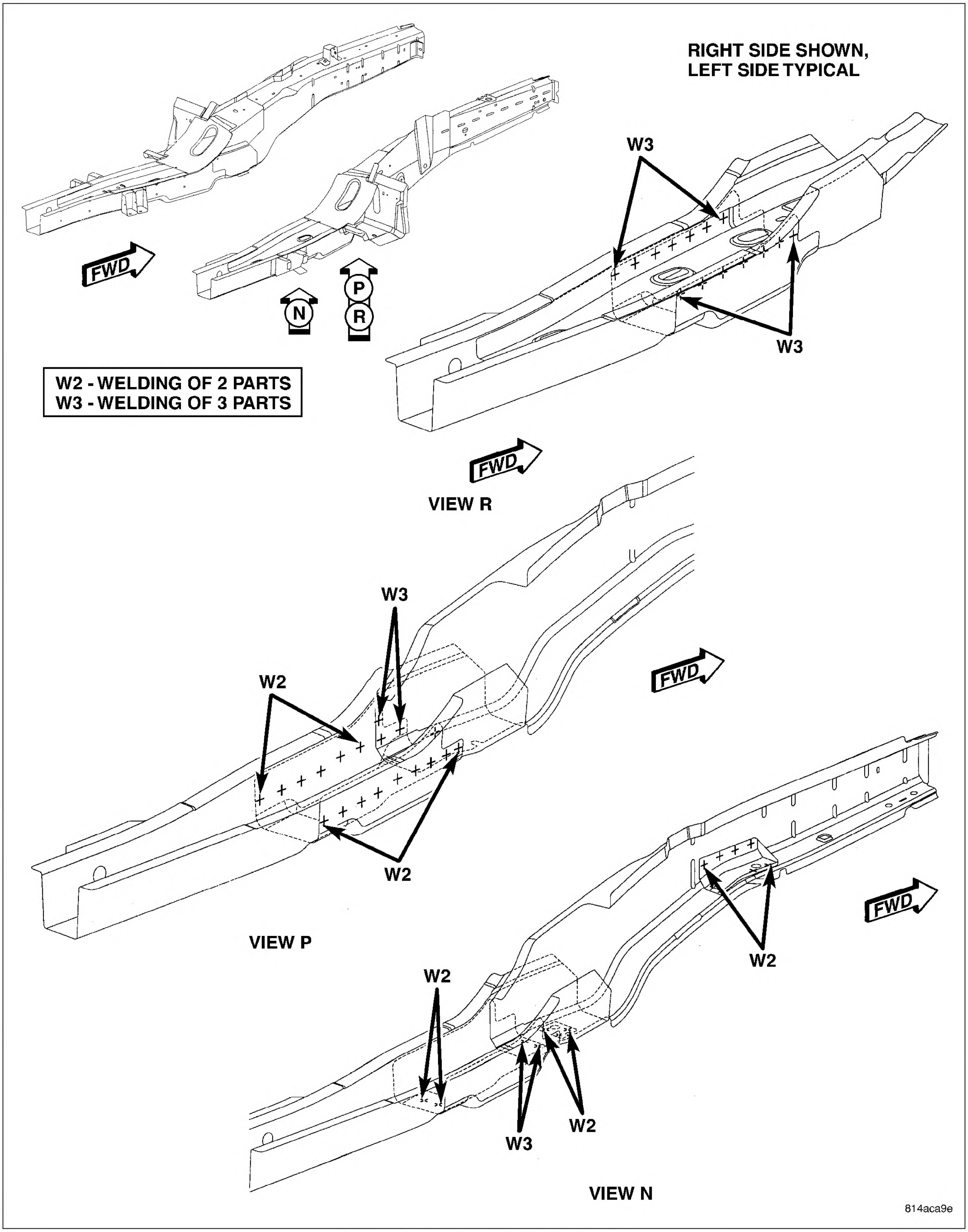

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W3
W3
FWD
N
P
R
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
VIEW R
W3
W2
FWD
W2
VIEW P
W2
W2
FWD
W2
W3
VIEW N
814aca9e

Fig. 54 FRONT RAILS (4 OF 11)

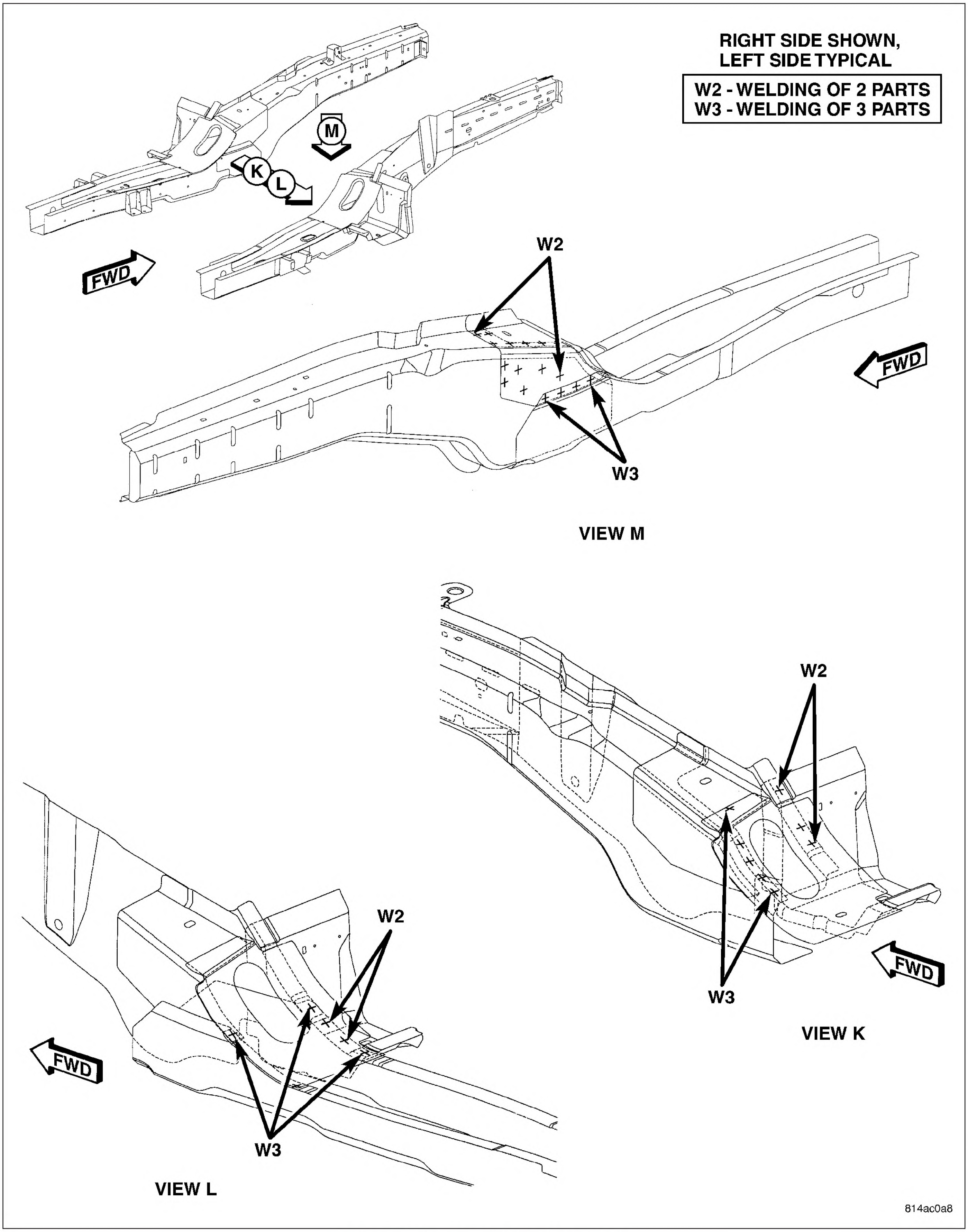
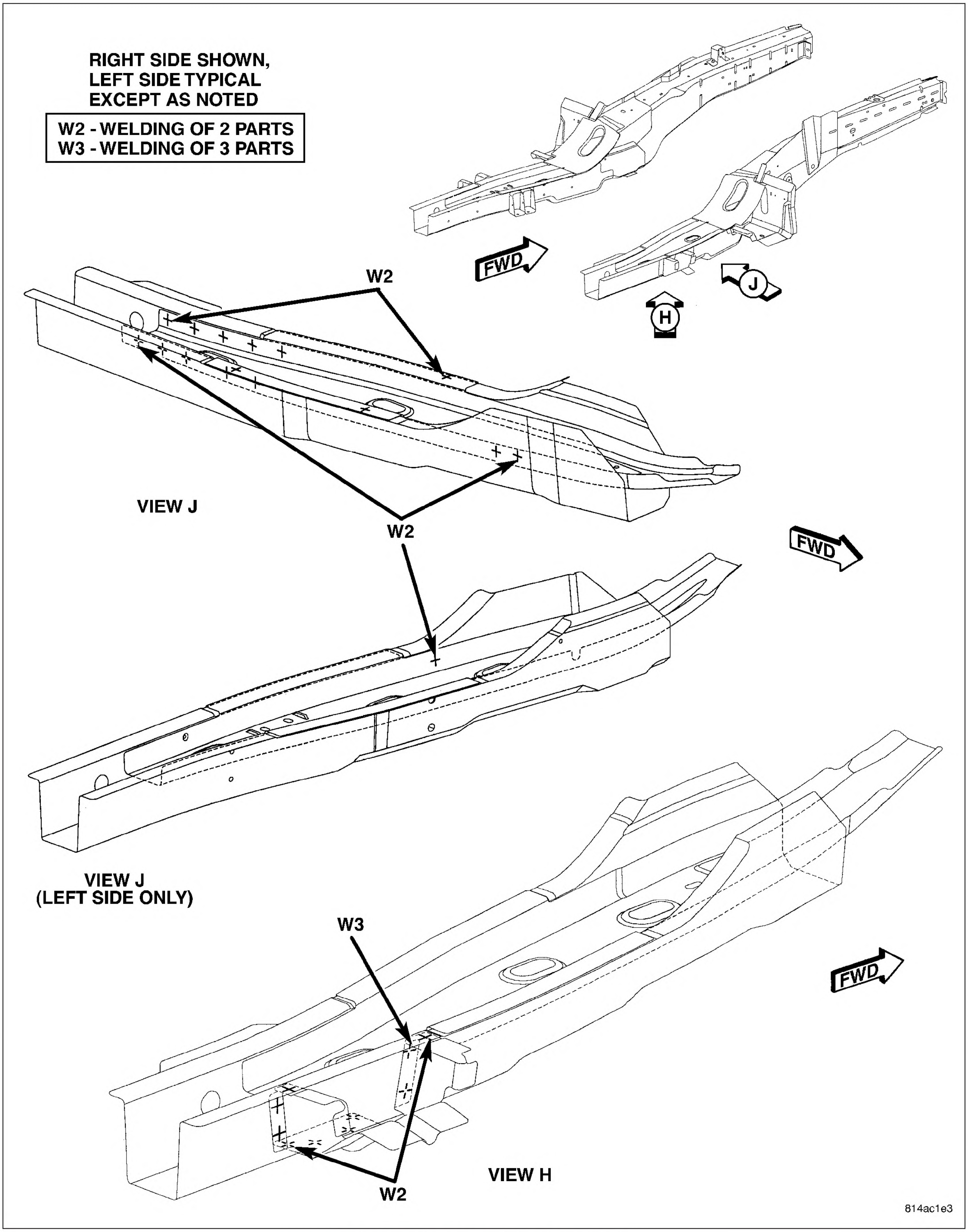

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
M
K
L
FWD
W2
W3
FWD
VIEW M
W2
W3
FWD
VIEW K
FWD
W2
W3
VIEW L
814ac0a8

Fig. 55 FRONT RAILS (5 OF 11)



RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS

FWD
J
H
W2
VIEW J
W2
FWD
VIEW J
(LEFT SIDE ONLY)
W3
FWD
VIEW H
W2
814ac1e3

Fig. 56 FRONT RAILS (6 OF 11)

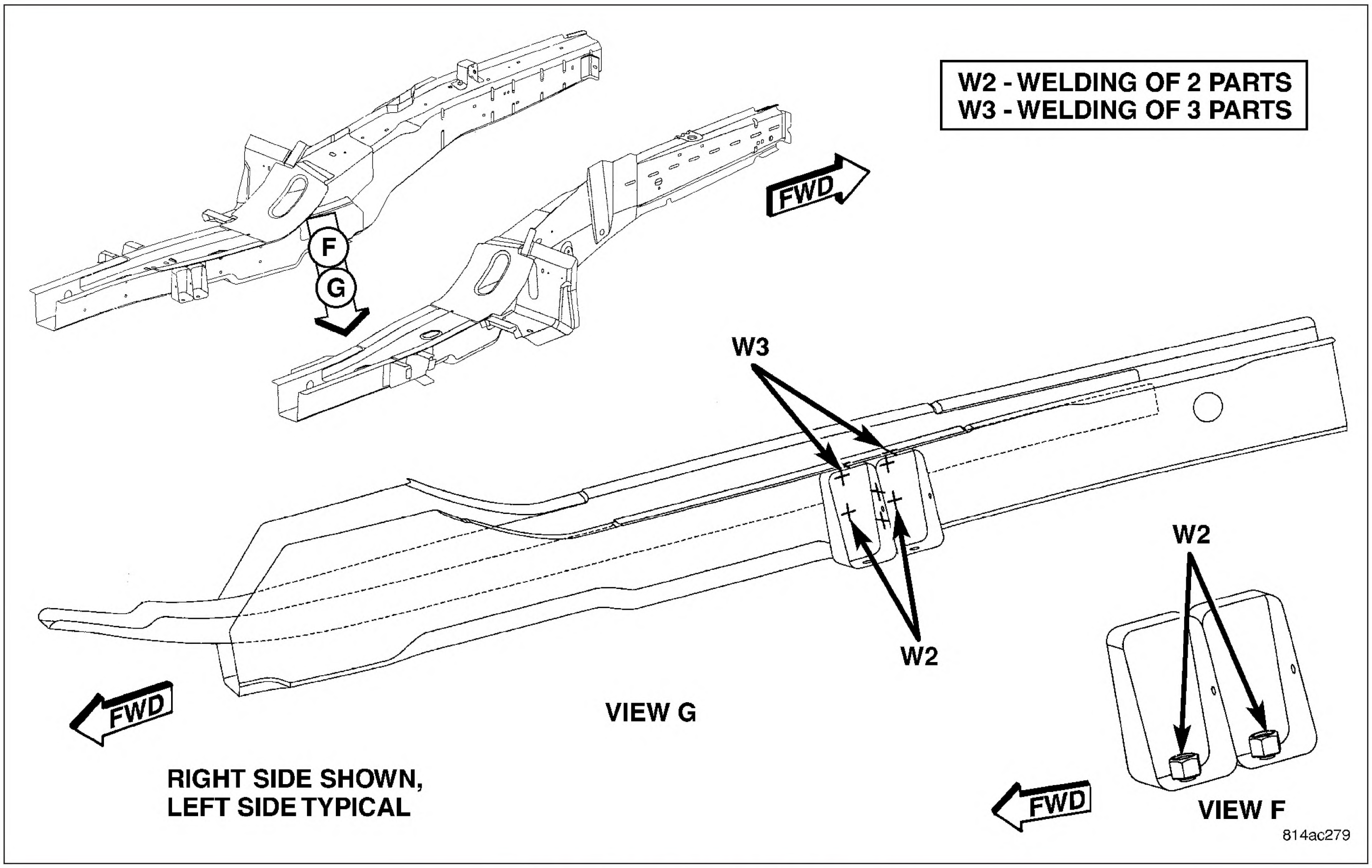

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
F
G
W3
W2
W2
VIEW G
FWD
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
VIEW F
814ac279

Fig. 57 FRONT RAILS (7 OF 11)

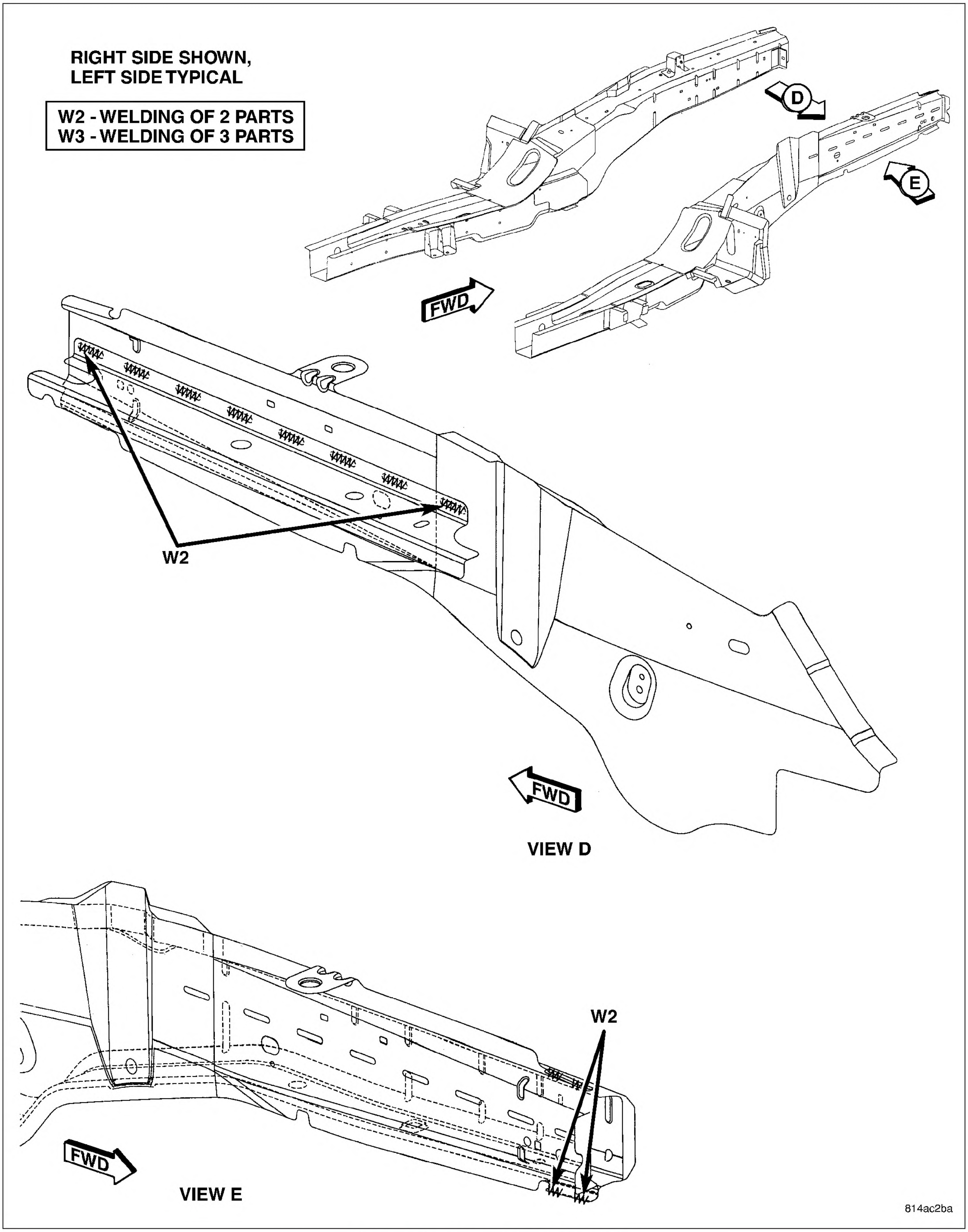

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
D
E
FWD
W2
FWD
VIEW D
W2
FWD
VIEW E
814ac2ba

Fig. 58 FRONT RAILS (8 OF 11)

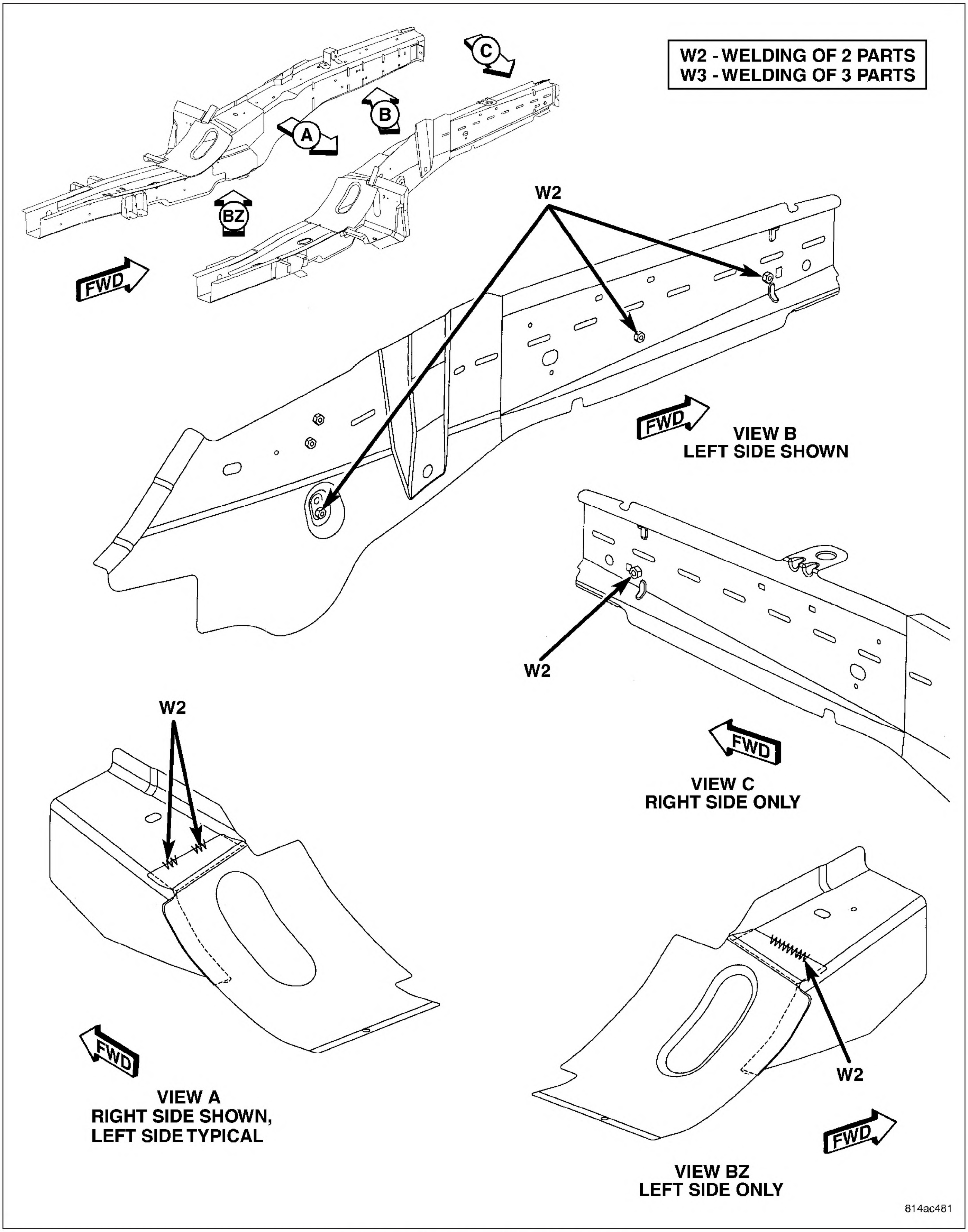

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
A
B
C
BZ
FWD
W2
VIEW B
LEFT SIDE SHOWN
W2
VIEW C
RIGHT SIDE ONLY
W2
VIEW A
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
VIEW BZ
LEFT SIDE ONLY
814ac481

Fig. 59 FRONT RAILS (9 OF 11)

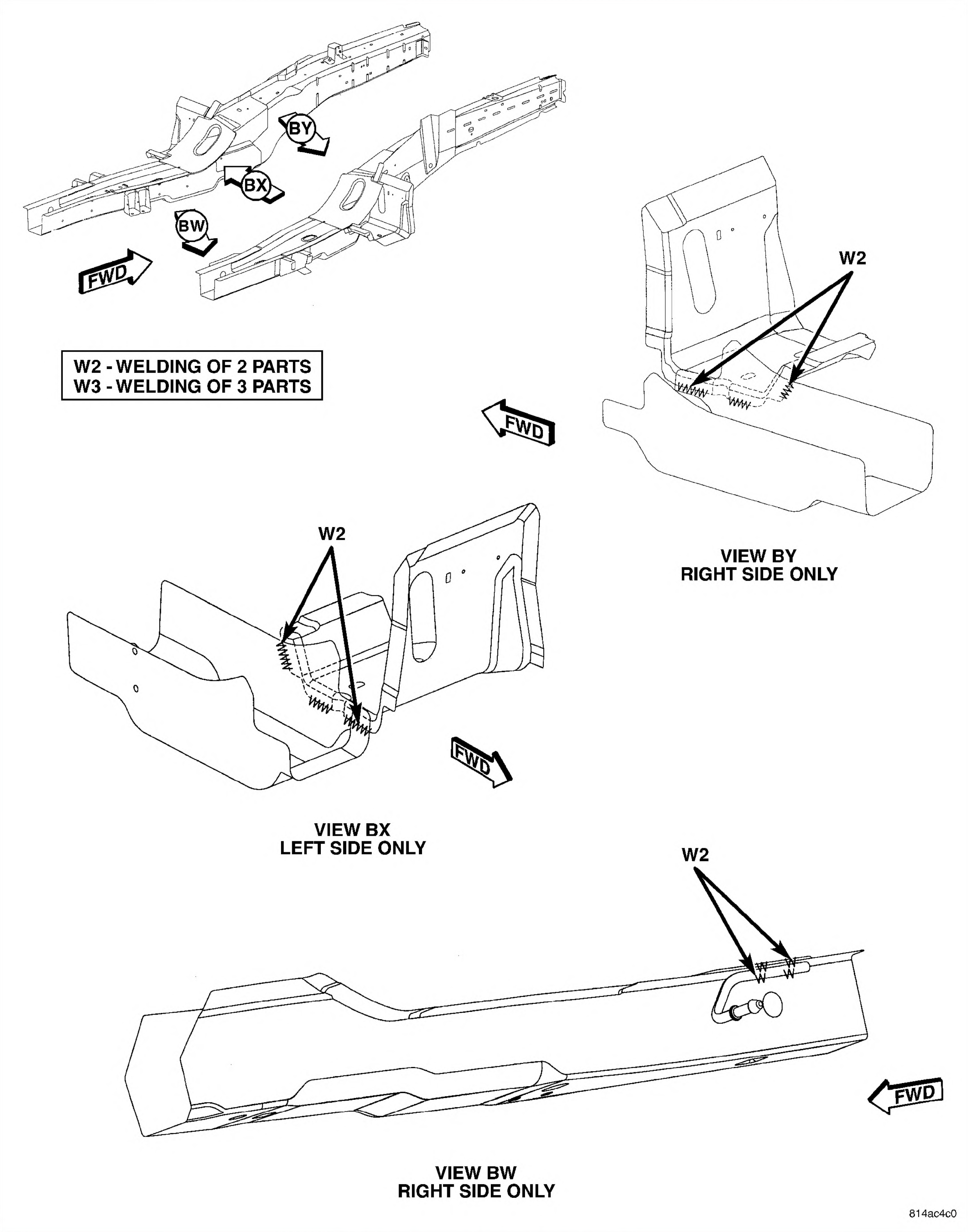

BY
BX
BW
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
VIEW BY
RIGHT SIDE ONLY
W2
FWD
VIEW BX
LEFT SIDE ONLY
W2
FWD
VIEW BW
RIGHT SIDE ONLY
814ac4c0

Fig. 60 FRONT RAILS (10 OF 11)

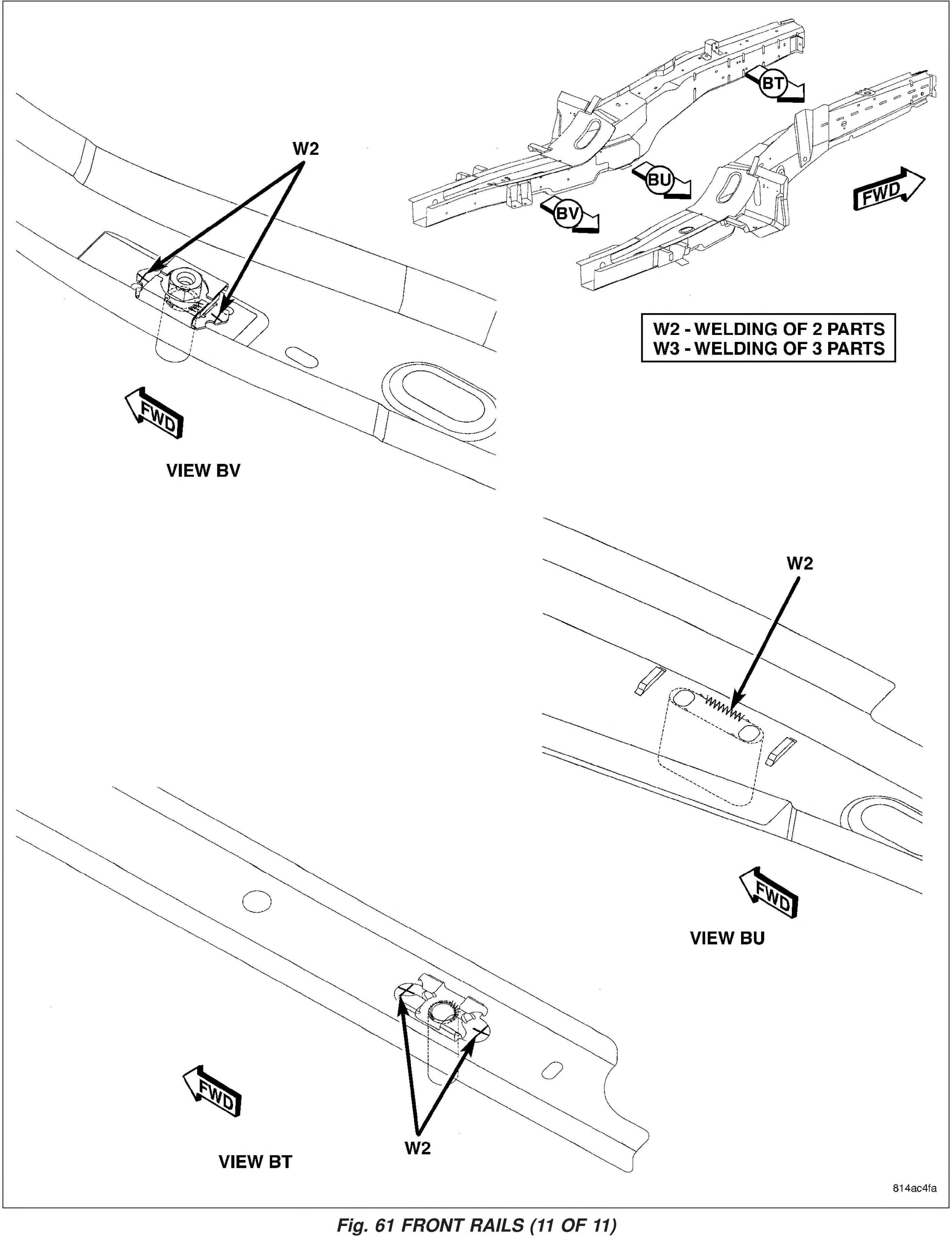

W2
BT
BU
BV
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
VIEW BV
W2
FWD
VIEW BU
FWD
W2
VIEW BT
814ac4fa

Fig. 61 FRONT RAILS (11 OF 11)

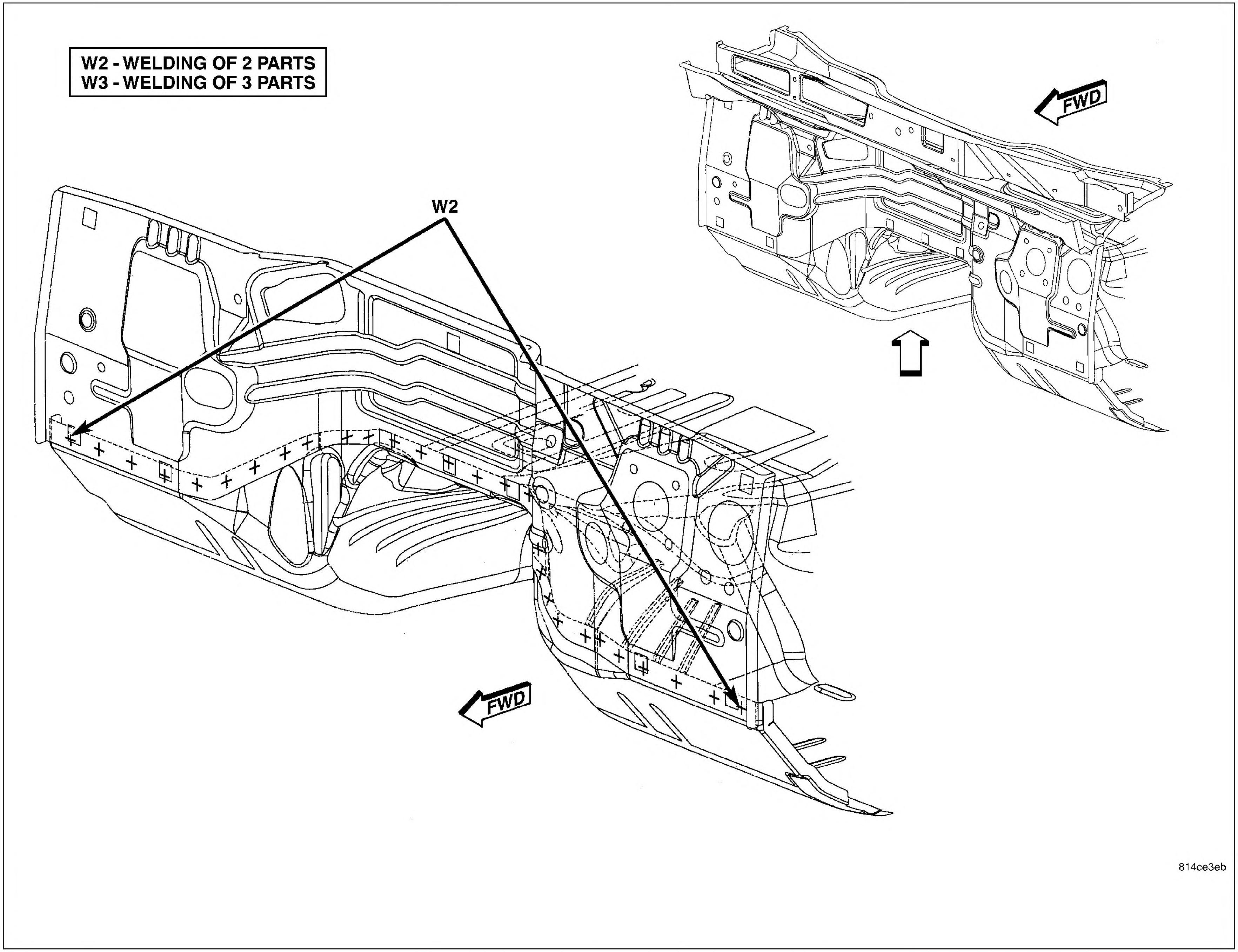

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
FWD
FWD
814ce3eb

Fig. 62 FRONT FLOOR/DASH/PLENUM (1 OF 2)

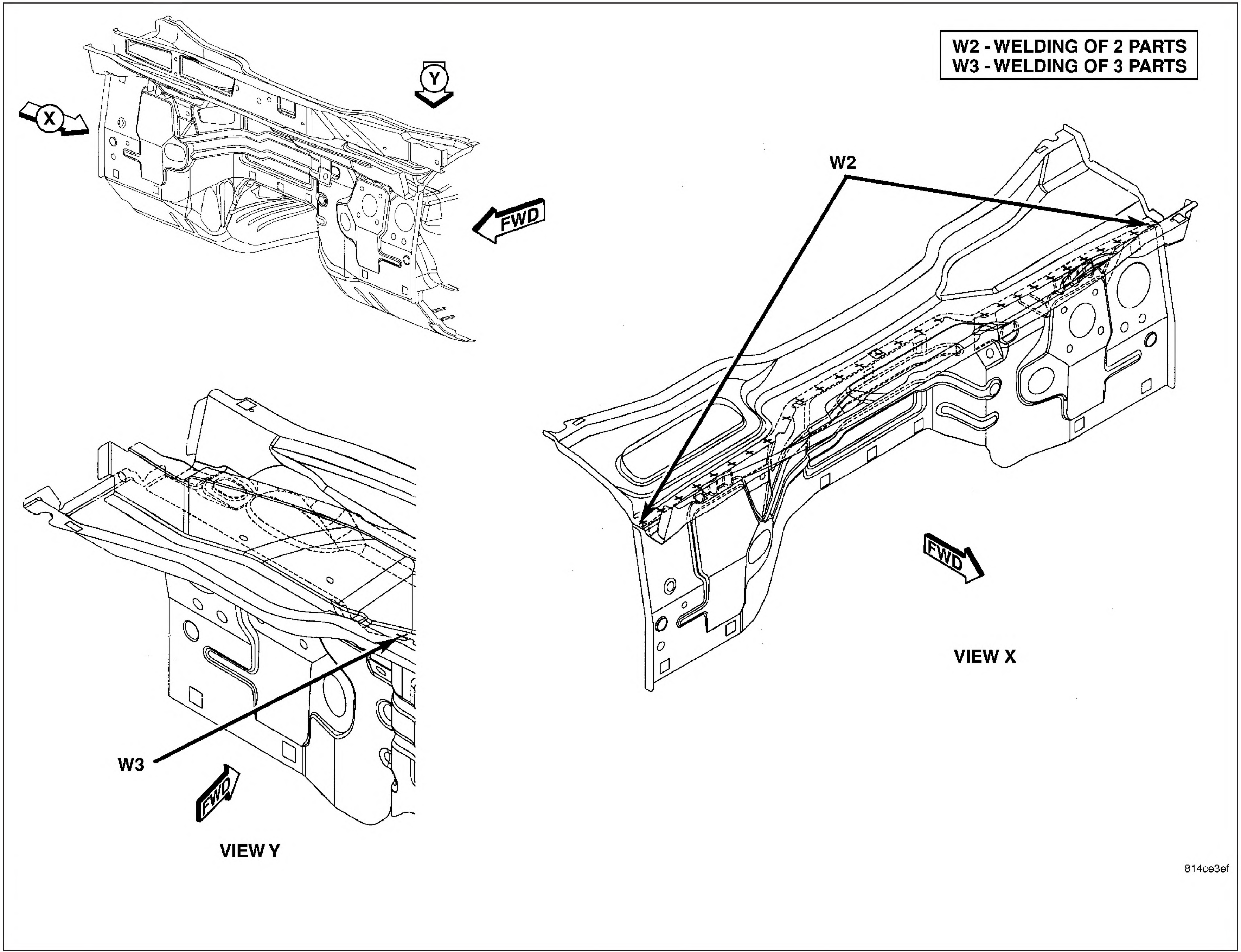

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
Y
X
FWD
W2
FWD
VIEW X
W3
FWD
VIEW Y
814ce3ef

Fig. 63 FRONT FLOOR/DASH/PLENUM (2 OF 2)

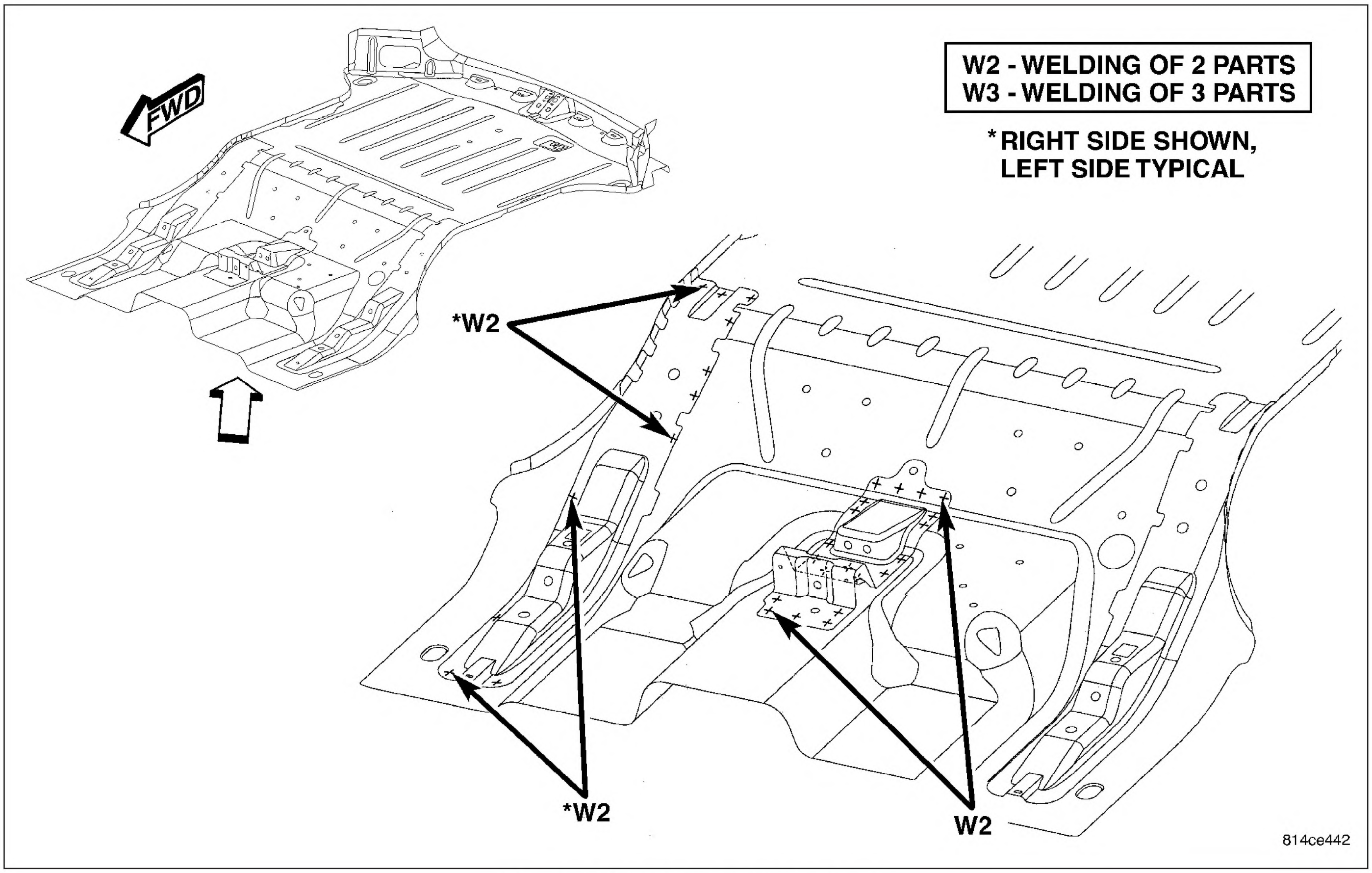

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
*RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
FWD
*W2
*W2
W2
814ce442

Fig. 64 REAR FLOOR (1 OF 2)

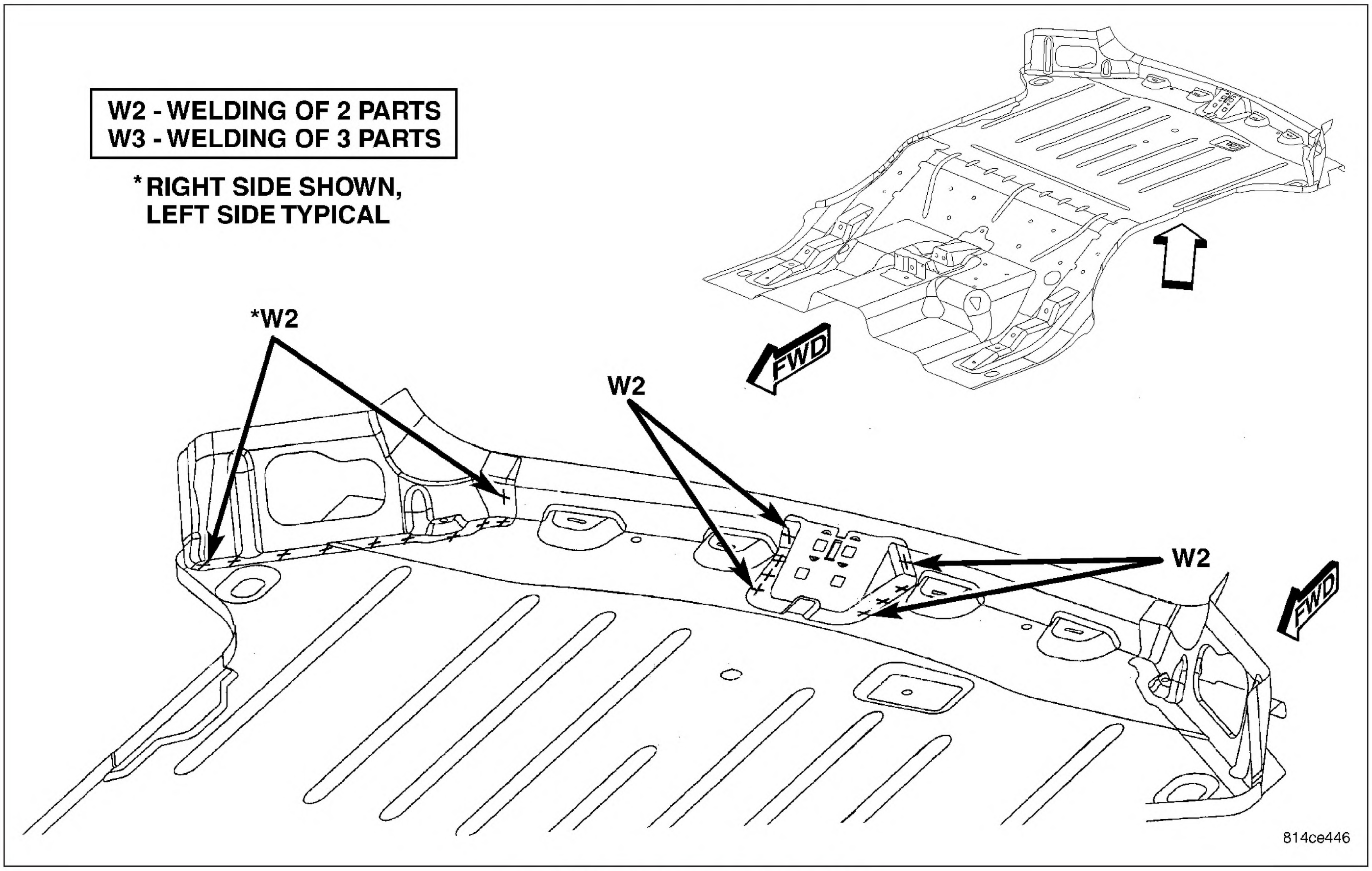

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
*RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
*W2
W2
FWD
W2
FWD
814ce446

Fig. 65 REAR FLOOR (2 OF 2)

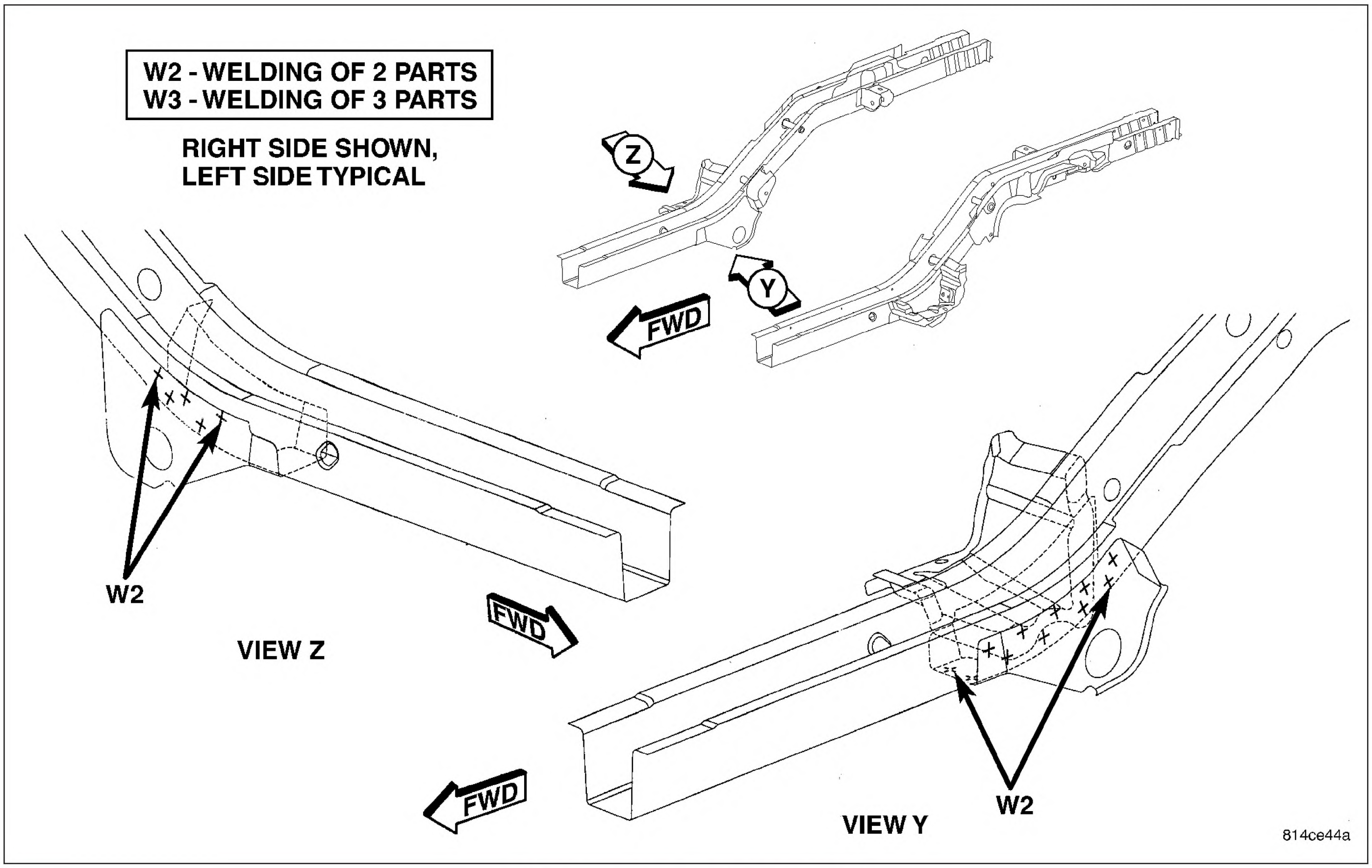

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
Z
Y
FWD
W2
VIEW Z
FWD
FWD
VIEW Y
W2
814ce44a

Fig. 66 REAR RAILS (1 OF 8)

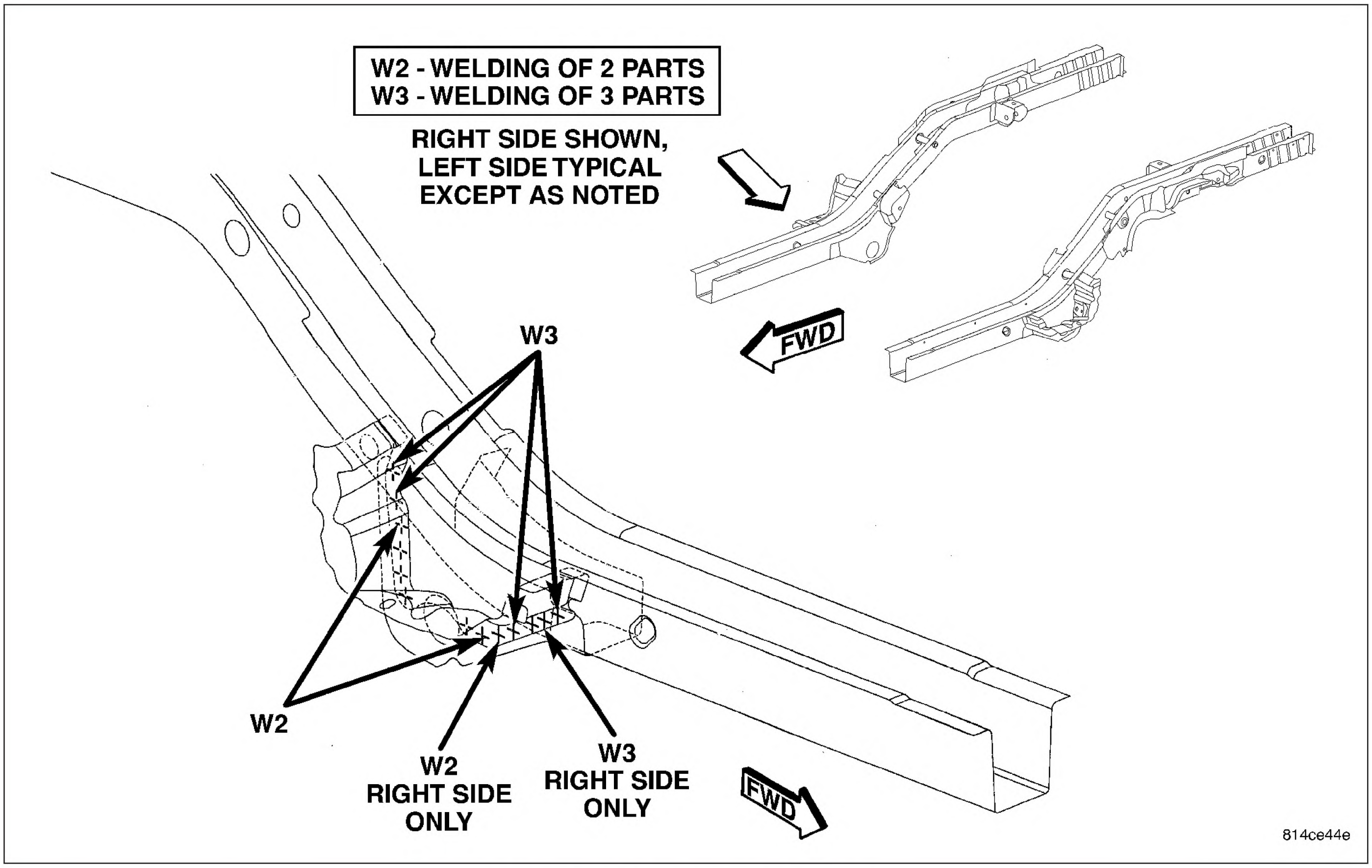

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
FWD
W3
W2
W2
RIGHT SIDE
ONLY
W3
RIGHT SIDE
ONLY
FWD
814ce44e

Fig. 67 REAR RAILS (2 OF 8)

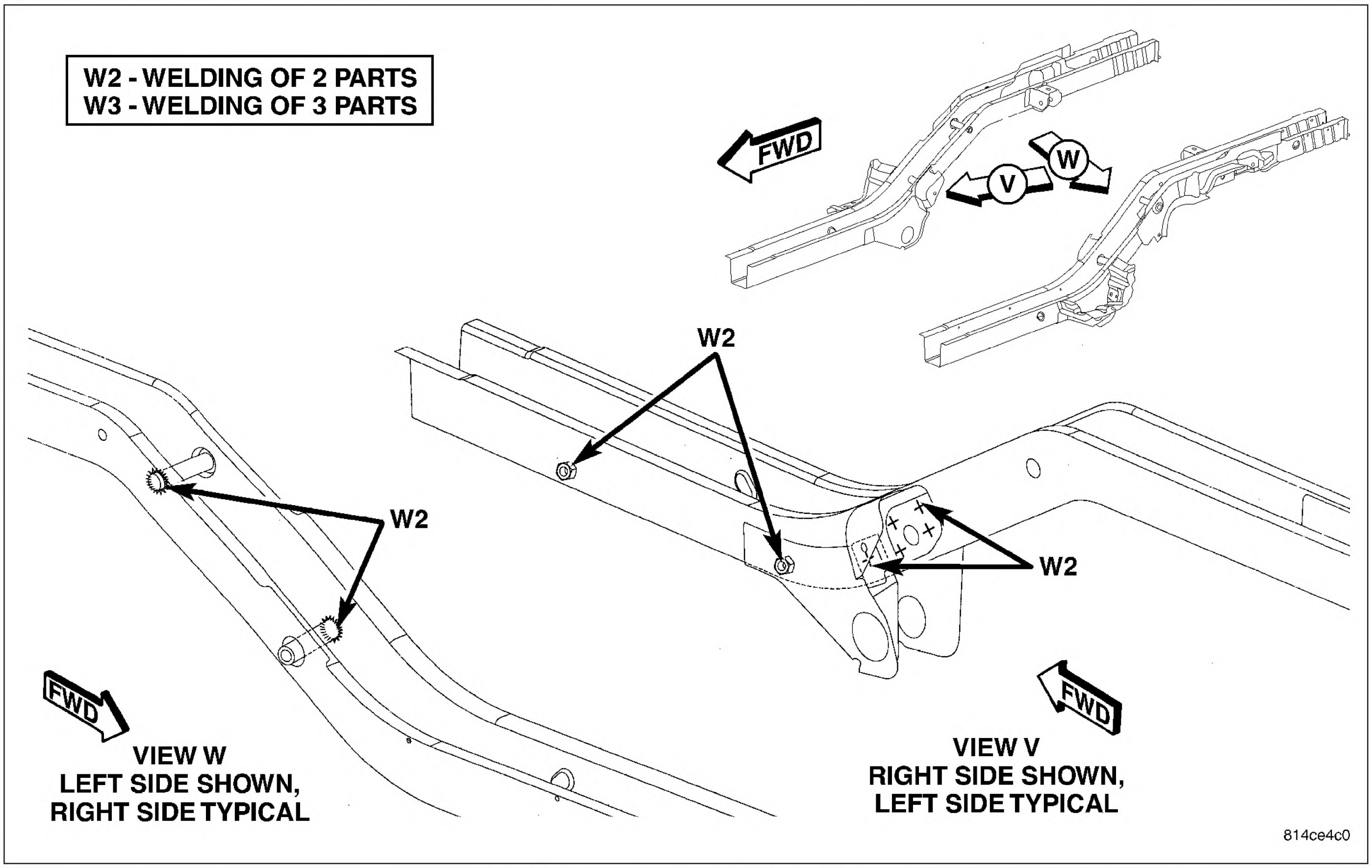

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
V
W
W2
W2
W2
FWD
FWD
VIEW W
LEFT SIDE SHOWN,
RIGHT SIDE TYPICAL
VIEW V
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
814ce4c0

Fig. 68 REAR RAILS (3 OF 8)

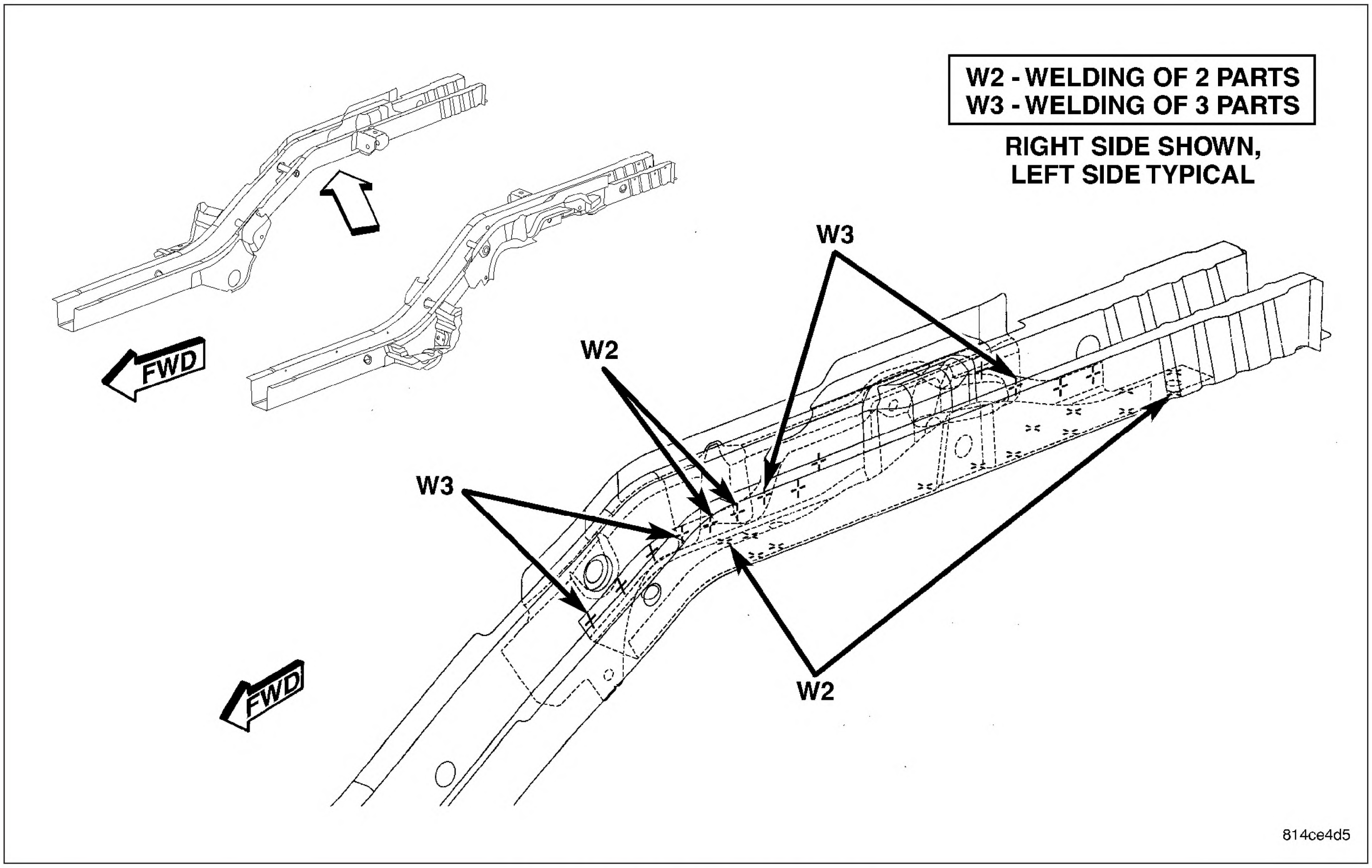

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W3
W2
W3
FWD
FWD
W2
814ce4d5

Fig. 69 REAR RAILS (4 OF 8)

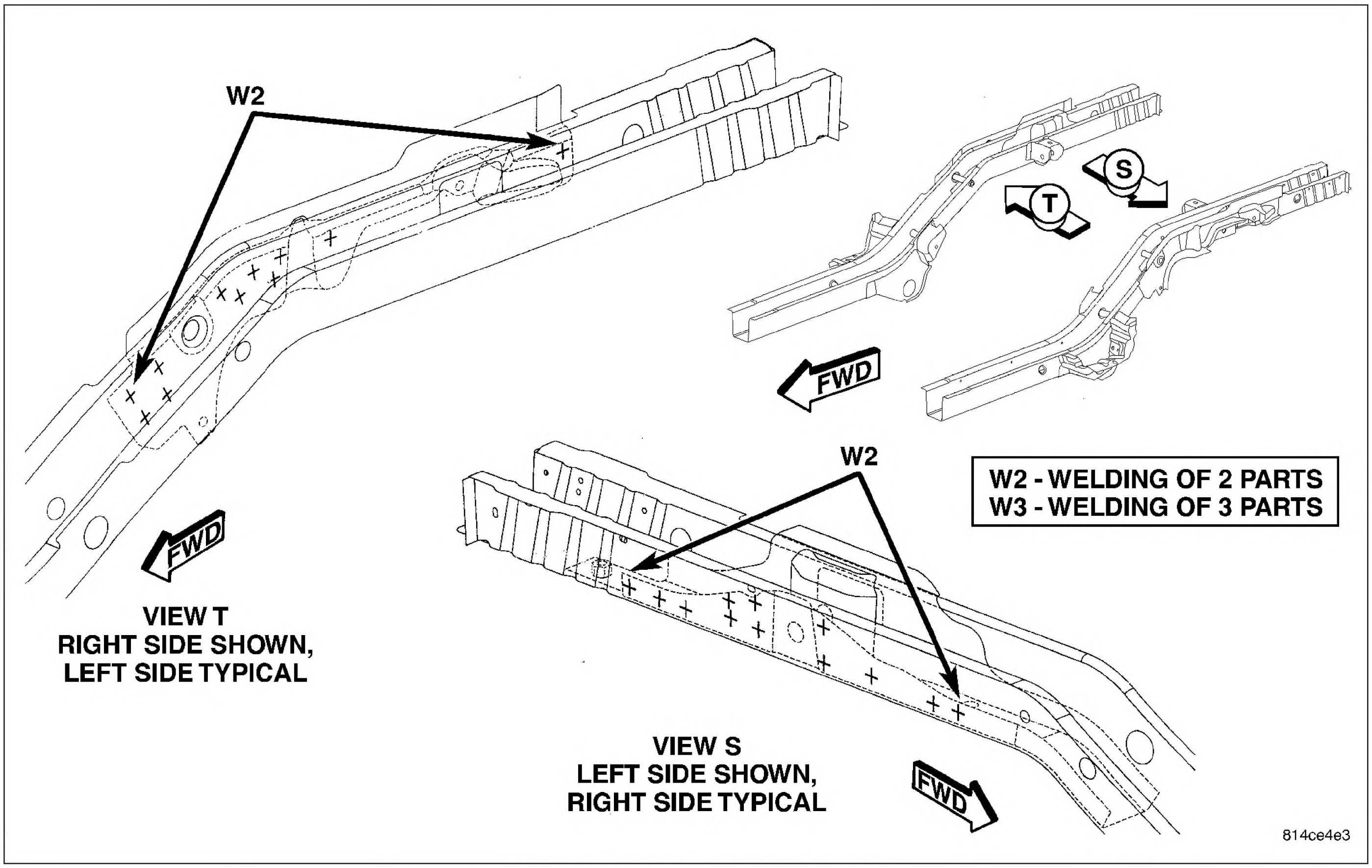

W2
W2
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
S
T
FWD
FWD
FWD
VIEW T
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
VIEW S
LEFT SIDE SHOWN,
RIGHT SIDE TYPICAL
814ce4e3

Fig. 70 REAR RAILS (5 OF 8)

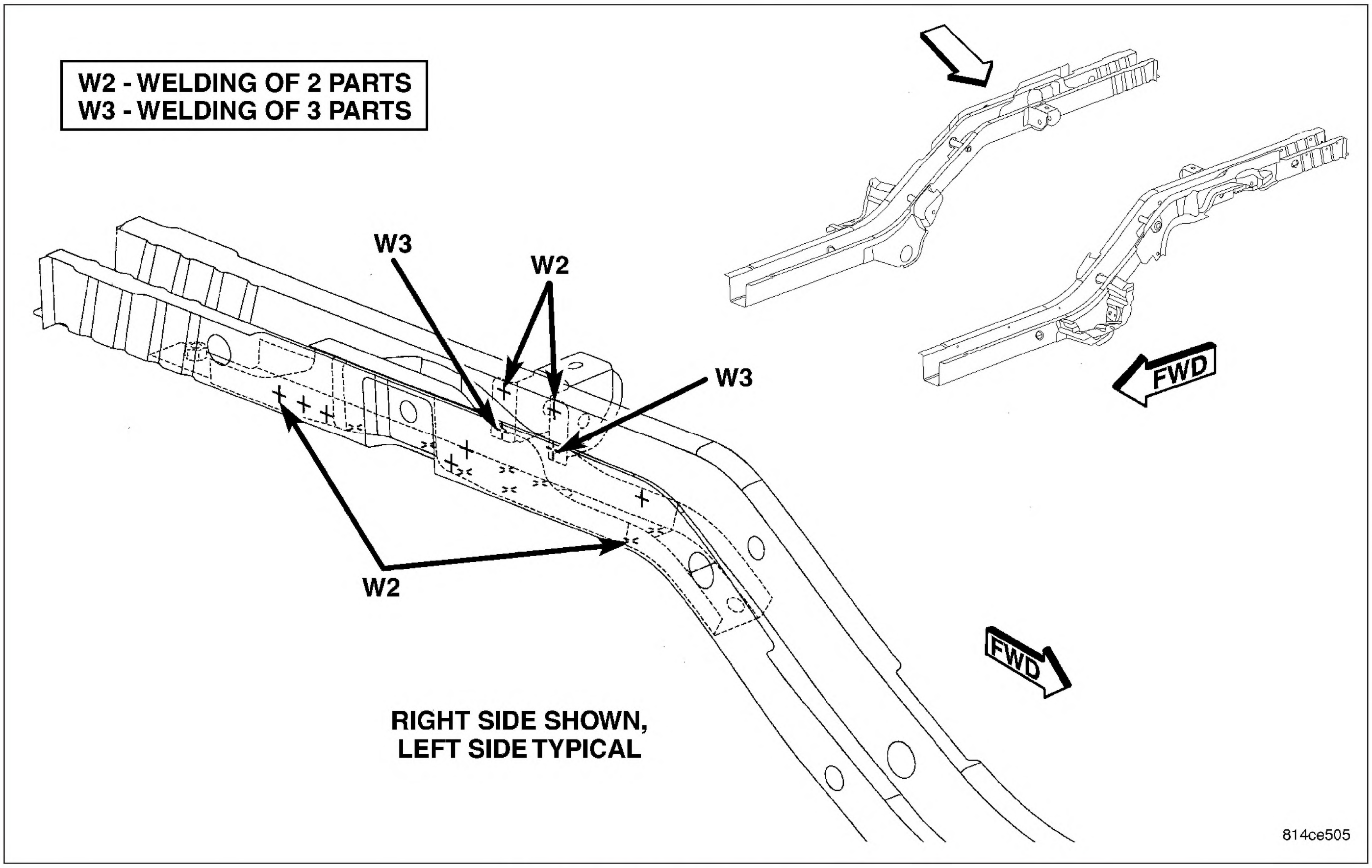

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W3
W2
W3
W2
FWD
FWD
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
814ce505

Fig. 71 REAR RAILS (6 OF 8)

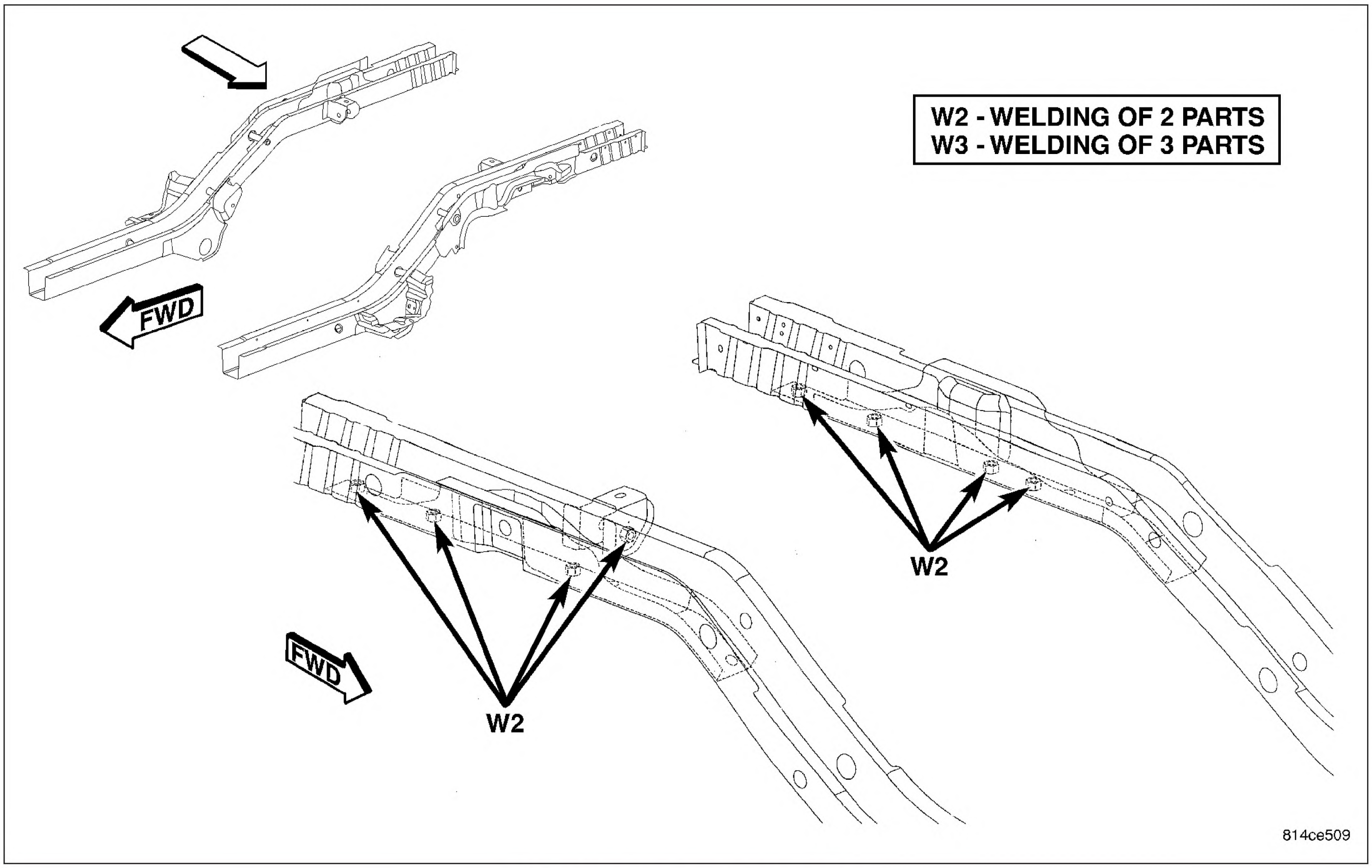

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
FWD
W2
W2
814ce509

Fig. 72 REAR RAILS (7 OF 8)

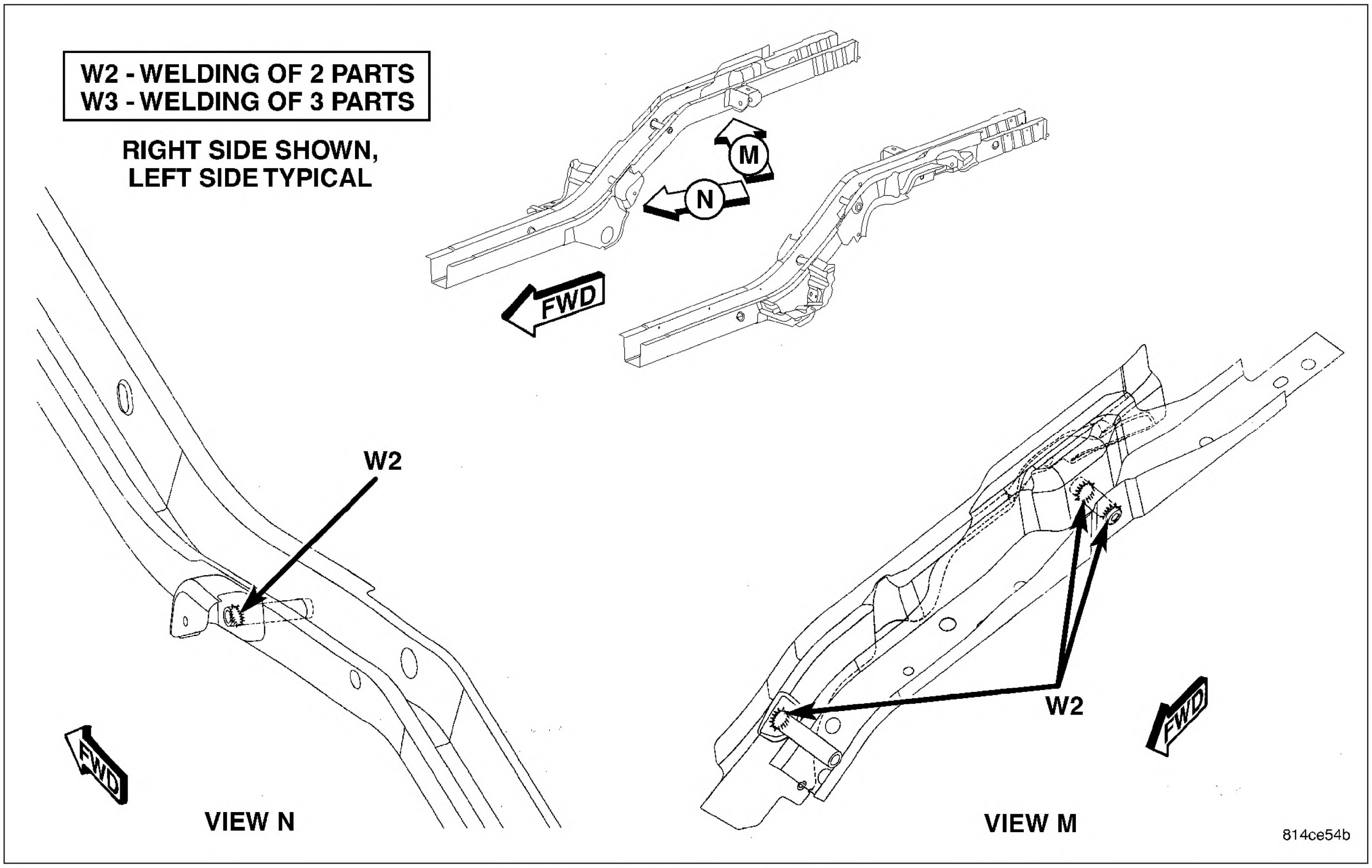

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
M
N
FWD
W2
W2
FWD
FWD
VIEW N
VIEW M
814ce54b

Fig. 73 REAR RAILS (8 OF 8)

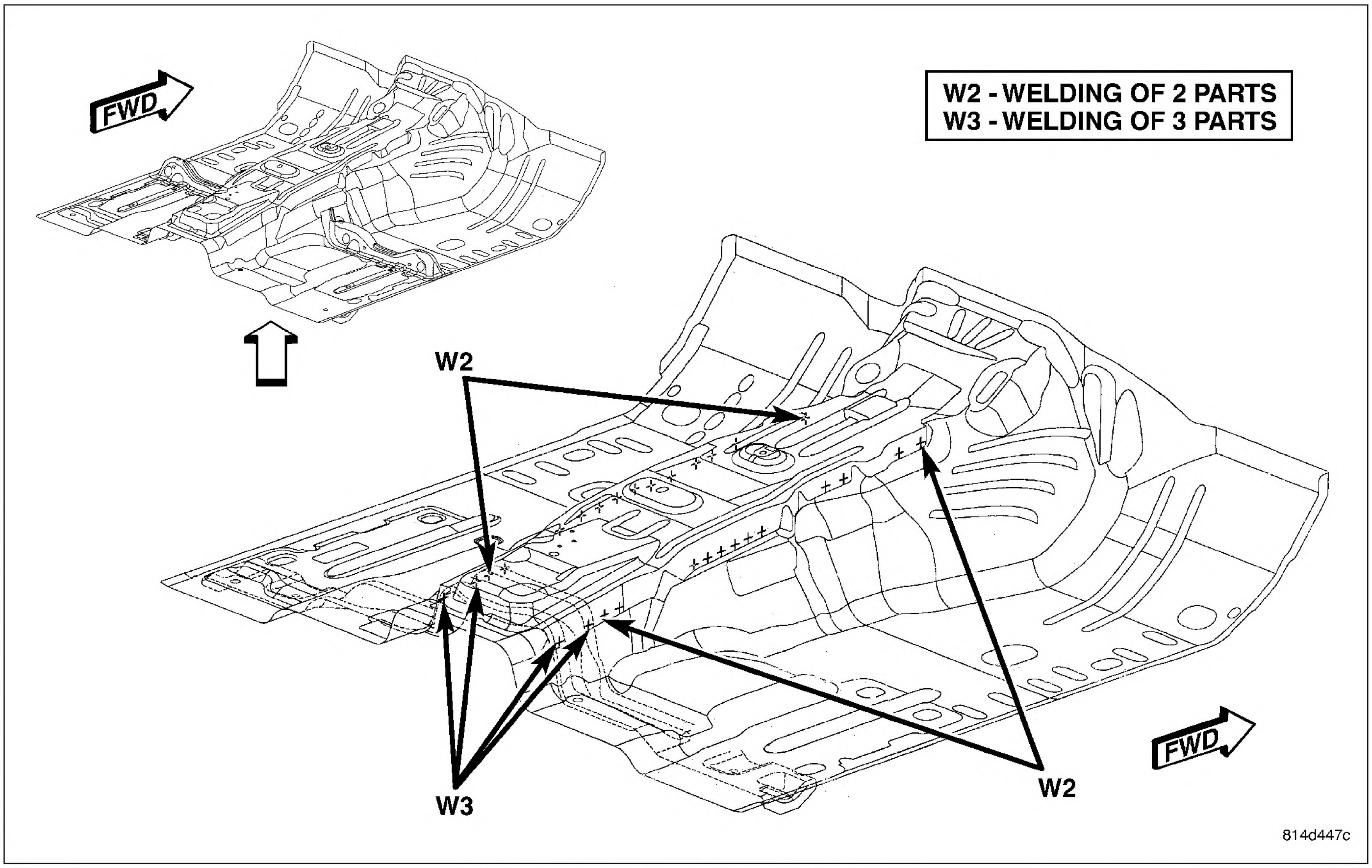

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W3
W2
FWD
814d447c

Fig. 74 FRONT FLOOR PAN (1 OF 9)

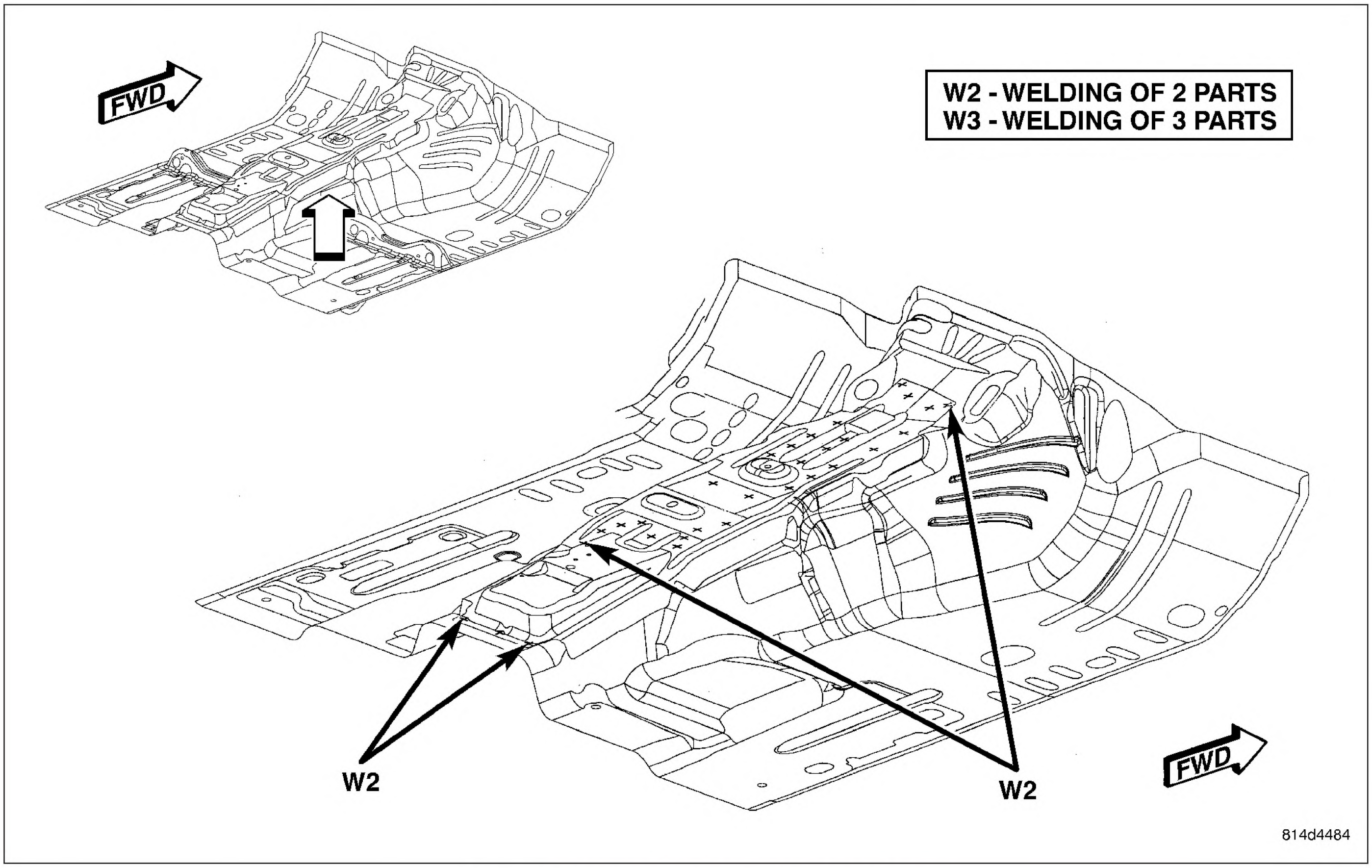

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W2
FWD
814d4484

Fig. 75 FRONT FLOOR PAN (2 OF 9)

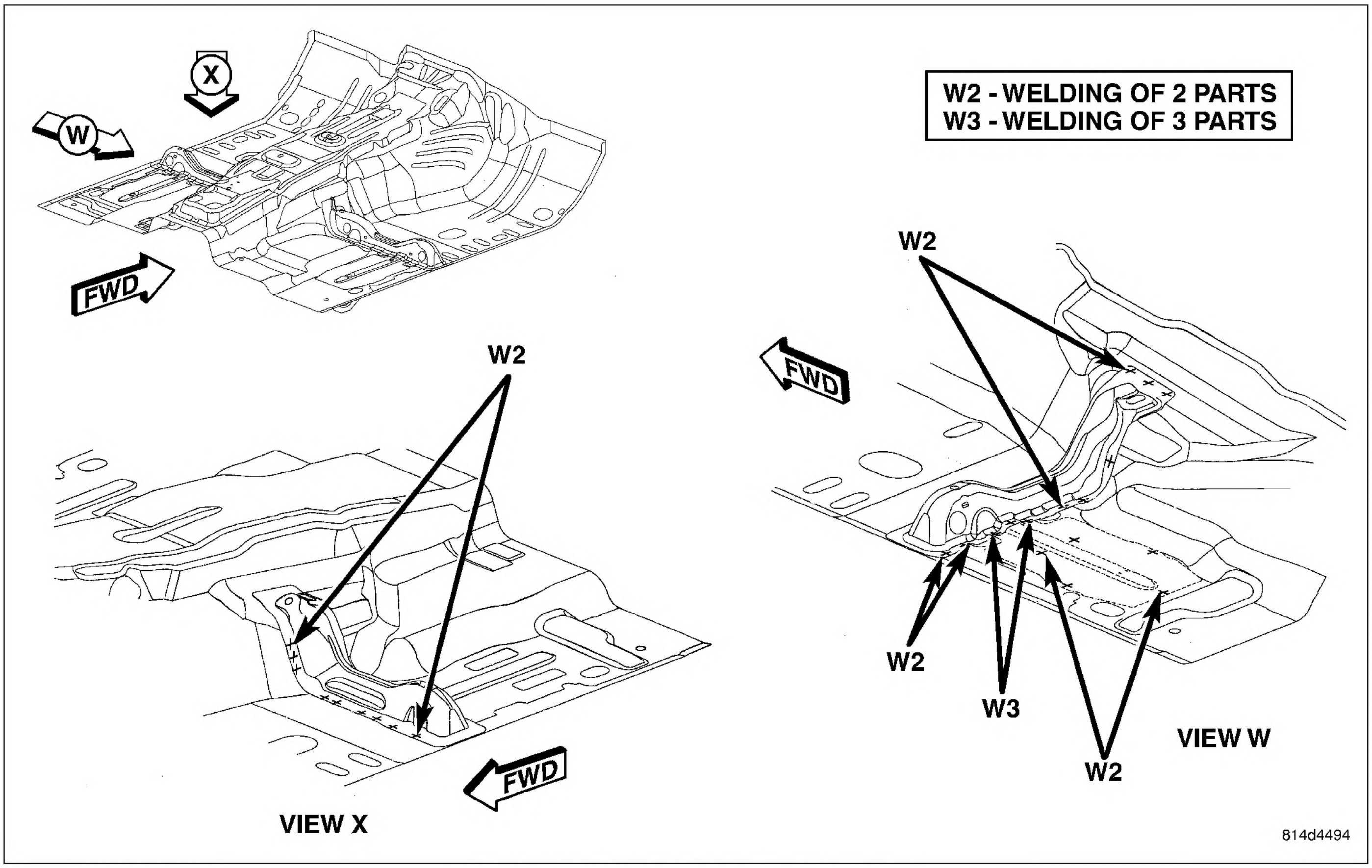

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
X
W
FWD
W2
FWD
FWD
VIEW X
W2
W2
W3
W2
VIEW W
814d4494

Fig. 76 FRONT FLOOR PAN (3 OF 9)

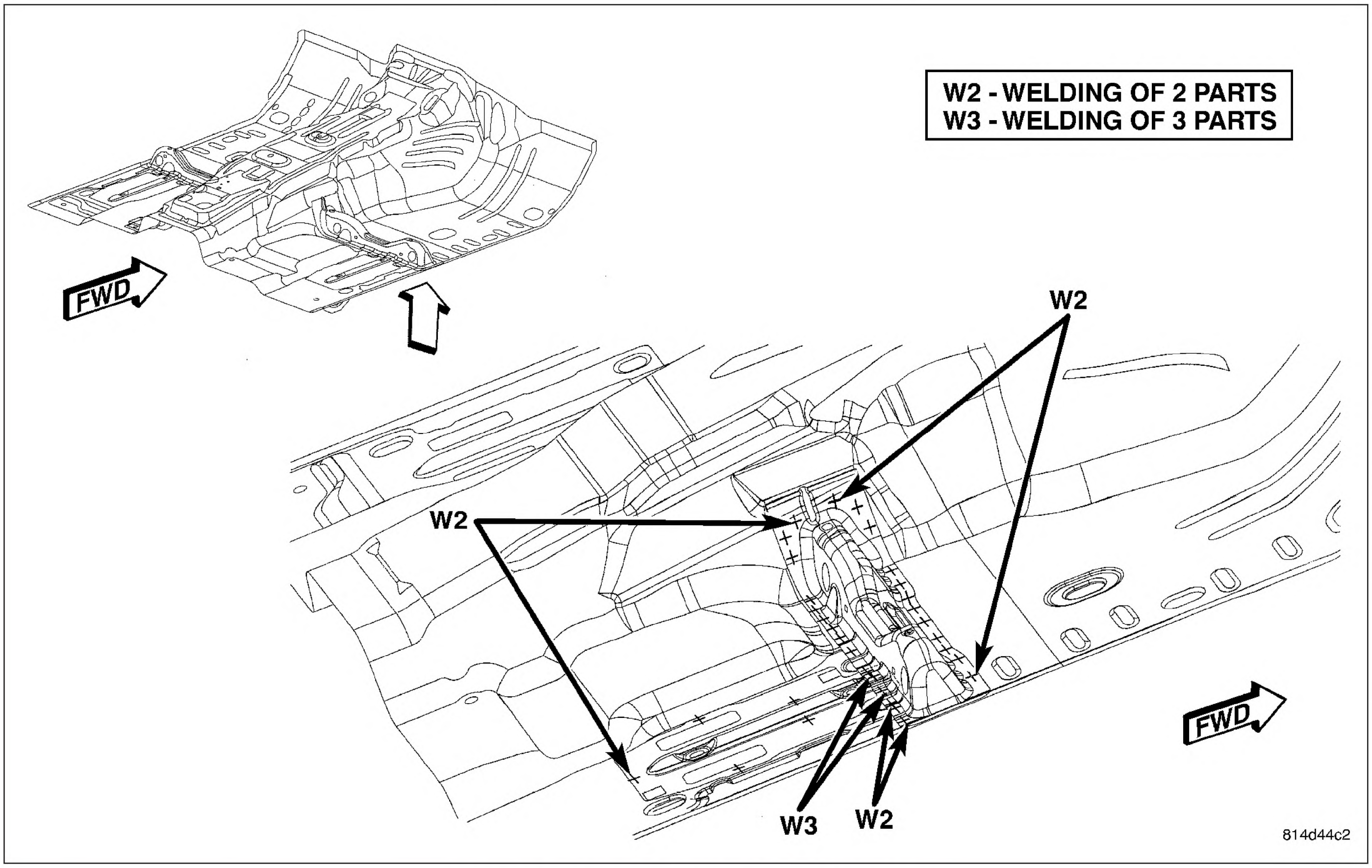

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W2
FWD
W3
W2
814d44c2

Fig. 77 FRONT FLOOR PAN (4 OF 9)

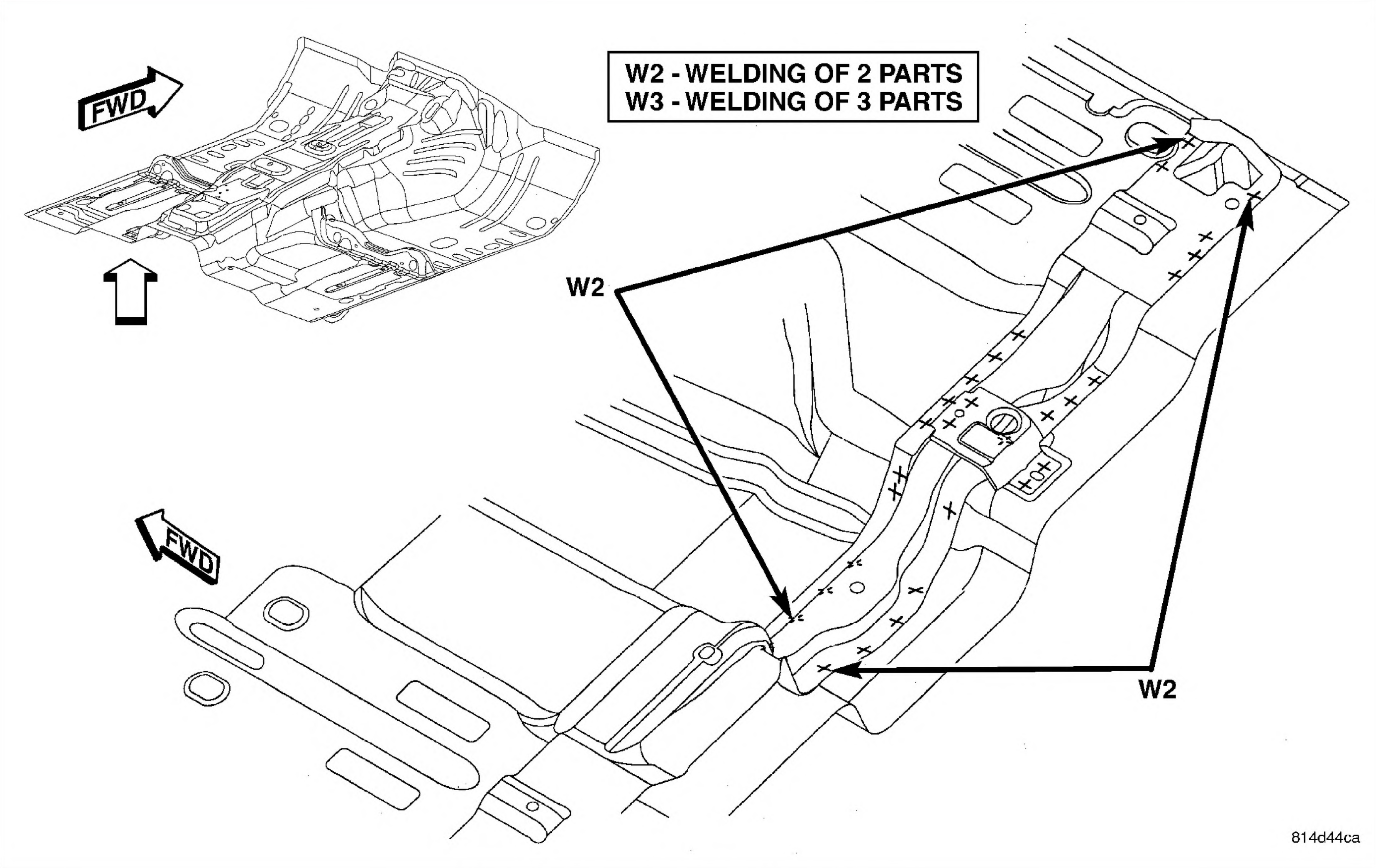

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
FWD
W2
814d44ca

Fig. 78 FRONT FLOOR PAN (5 OF 9)

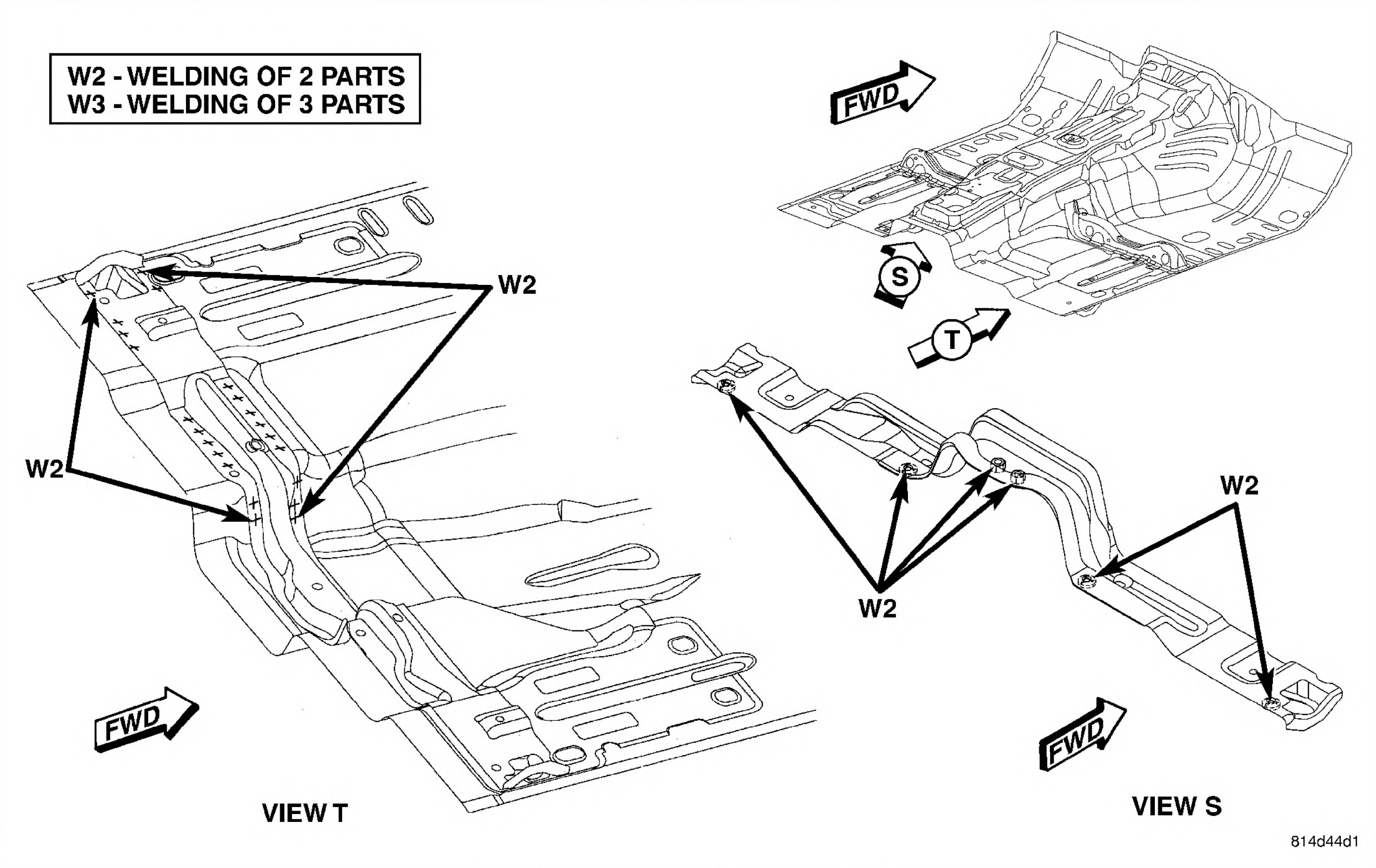

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
FWD
VIEW T
FWD
S
T
W2
W2
FWD
VIEW S
814d44d1

Fig. 79 FRONT FLOOR PAN (6 OF 9)

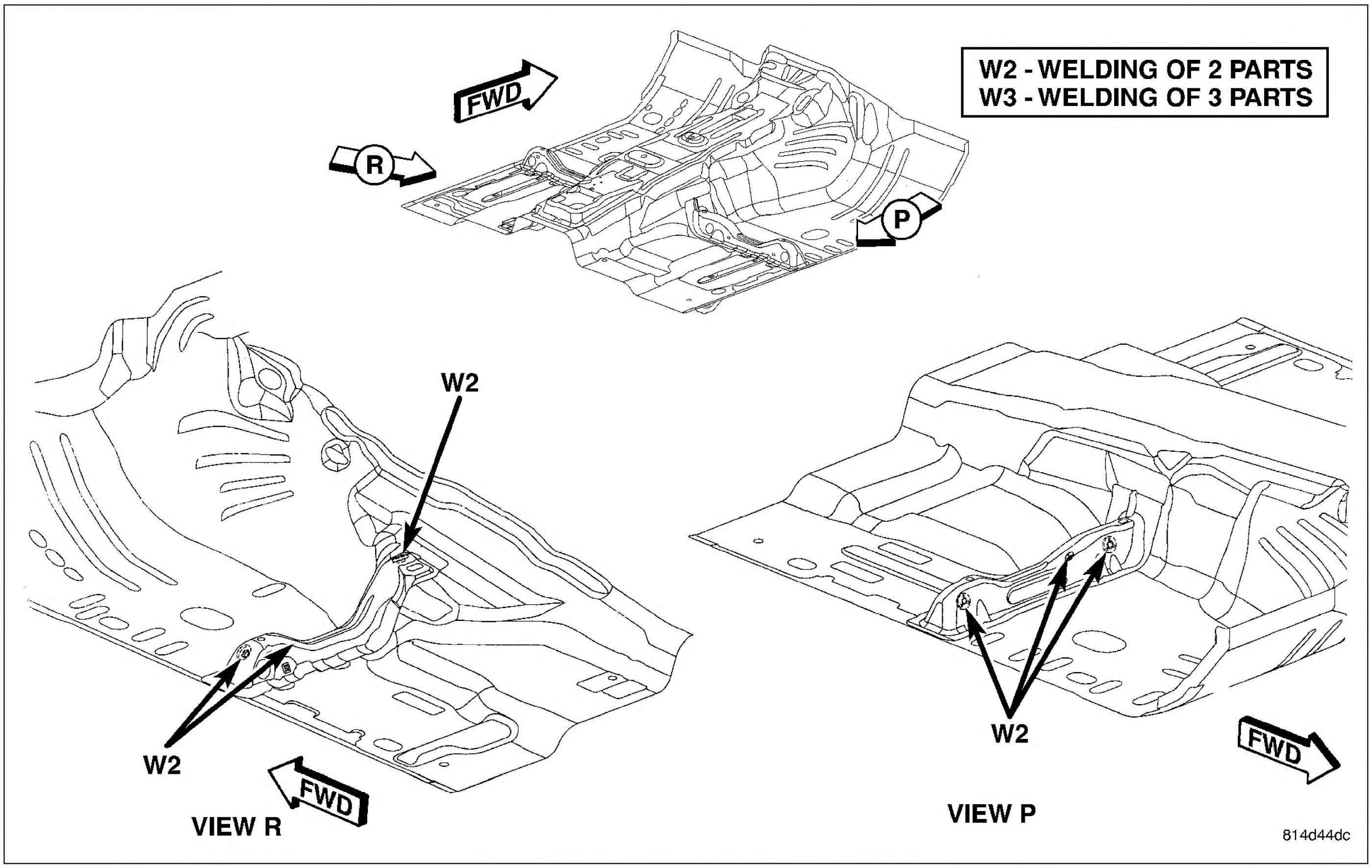

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
R
P
W2
W2
VIEW R
FWD
W2
VIEW P
FWD
814d44dc

Fig. 80 FRONT FLOOR PAN (7 OF 9)

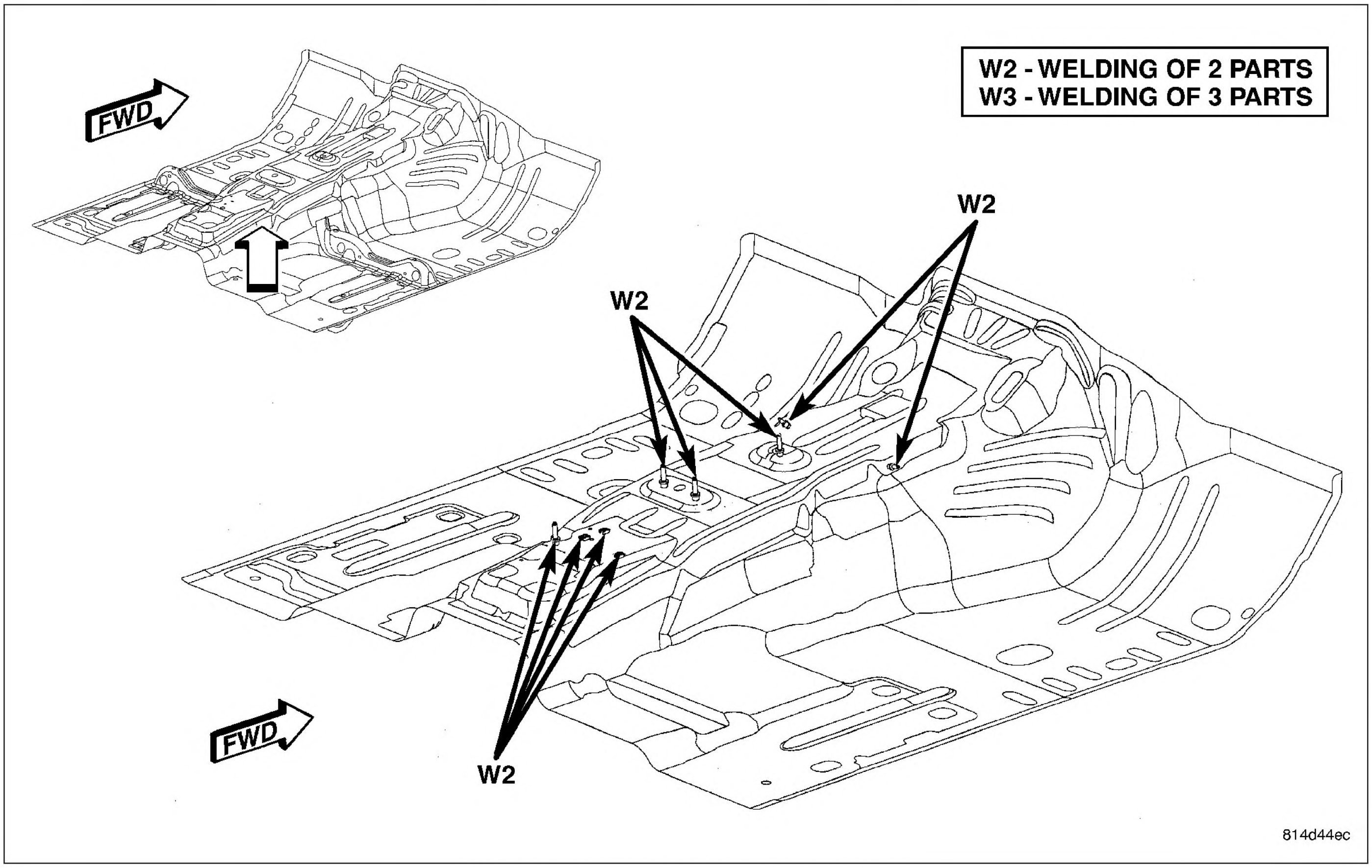

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W2
FWD
W2
814d44ec

Fig. 81 FRONT FLOOR PAN (8 OF 9)

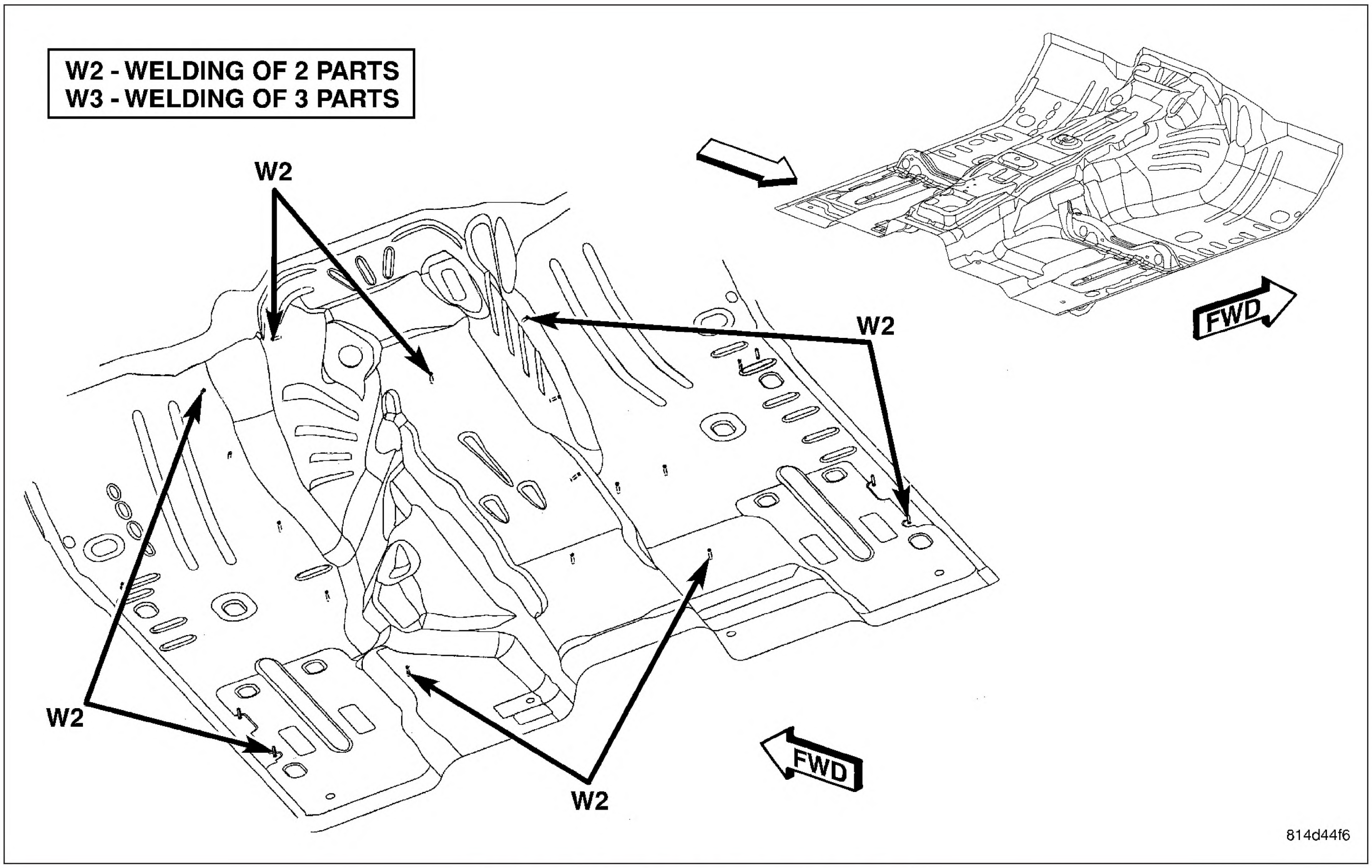

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
W2
W2
FWD
FWD
814d44f6

Fig. 82 FRONT FLOOR PAN (9 OF 9)

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS

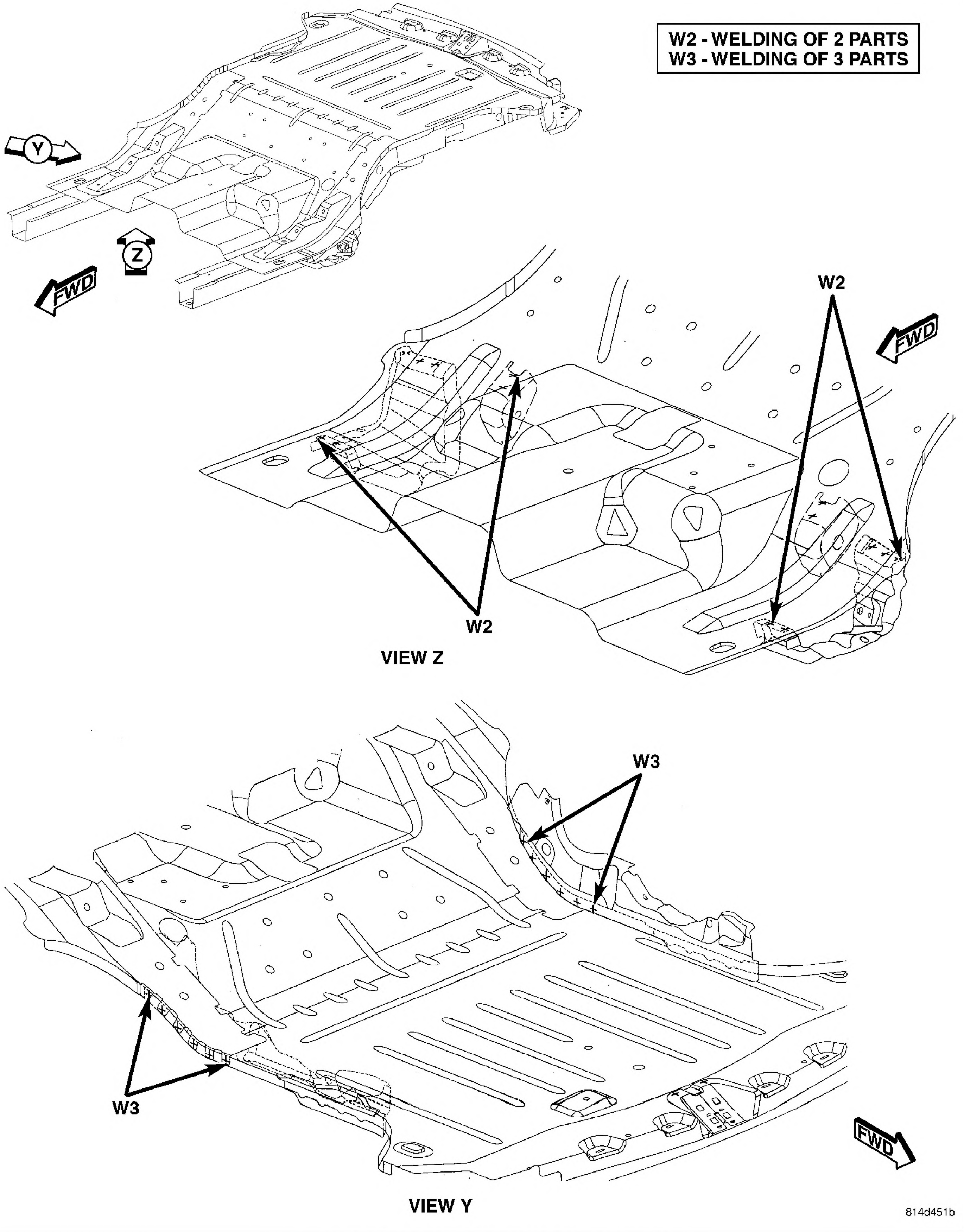

Y
Z
FWD
W2
FWD
W2
VIEW Z
W3
W3
FWD
VIEW Y
814d451b

Fig. 83 REAR FLOOR & LADDER (1 OF 12)

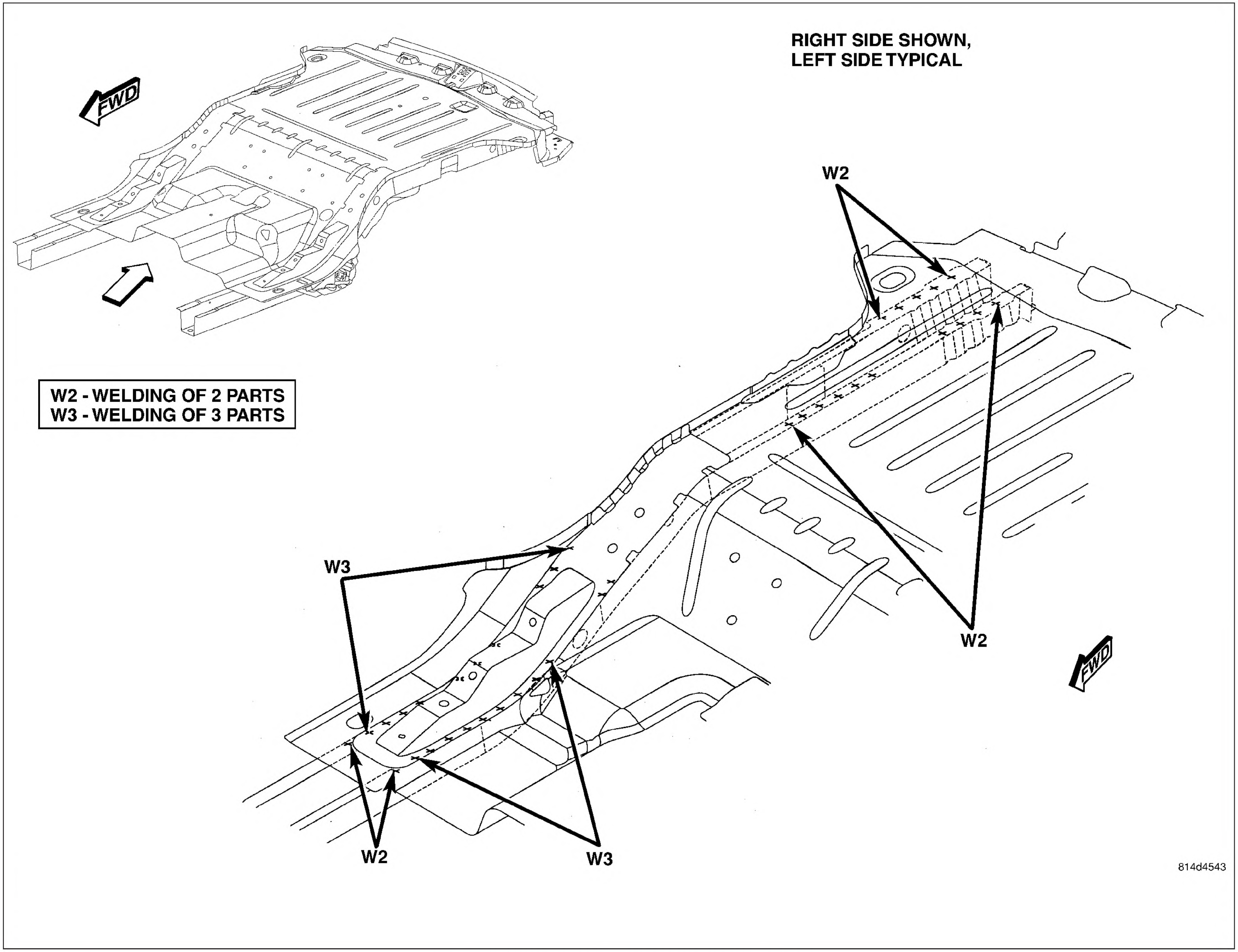

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
W3
W2
W3
FWD
814d4543

Fig. 84 REAR FLOOR & LADDER (2 OF 12)

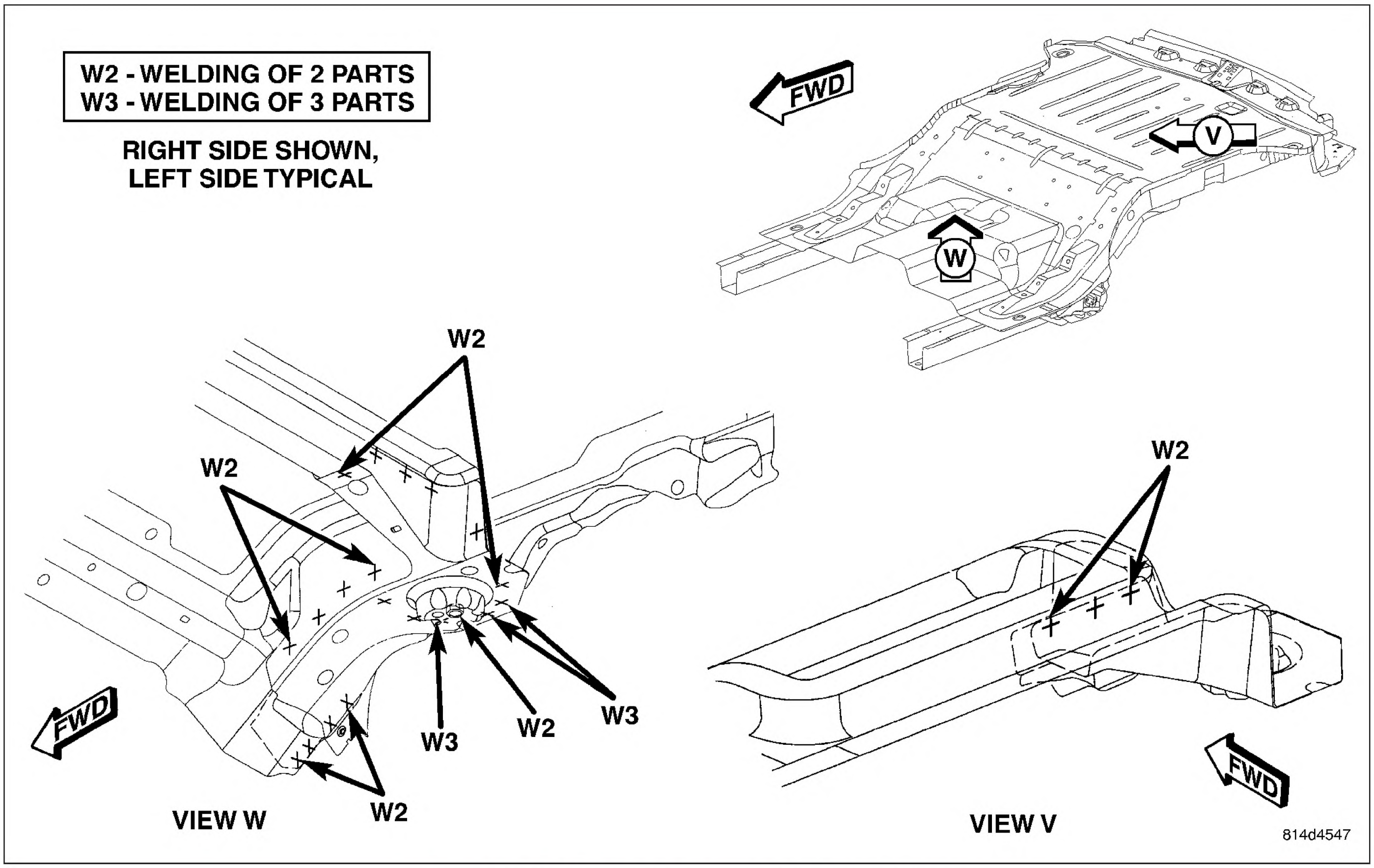

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
V
W
W2
W2
W2
W3
W2
W3
W2
VIEW W
FWD
FWD
W2
VIEW V
814d4547

Fig. 85 REAR FLOOR & LADDER (3 OF 12)

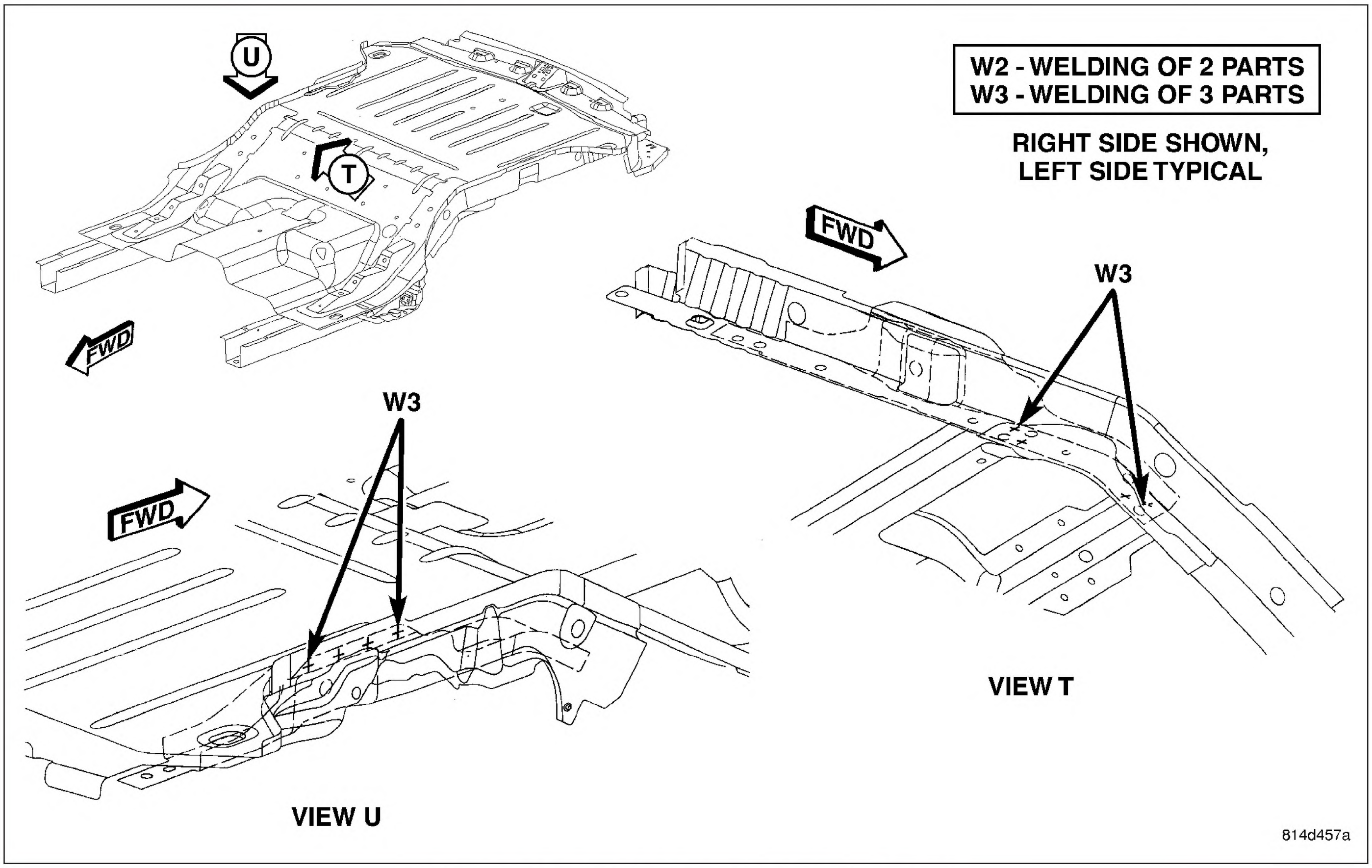

U
T
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W3
W3
FWD
VIEW U
VIEW T
814d457a

Fig. 86 REAR FLOOR & LADDER (4 OF 12)

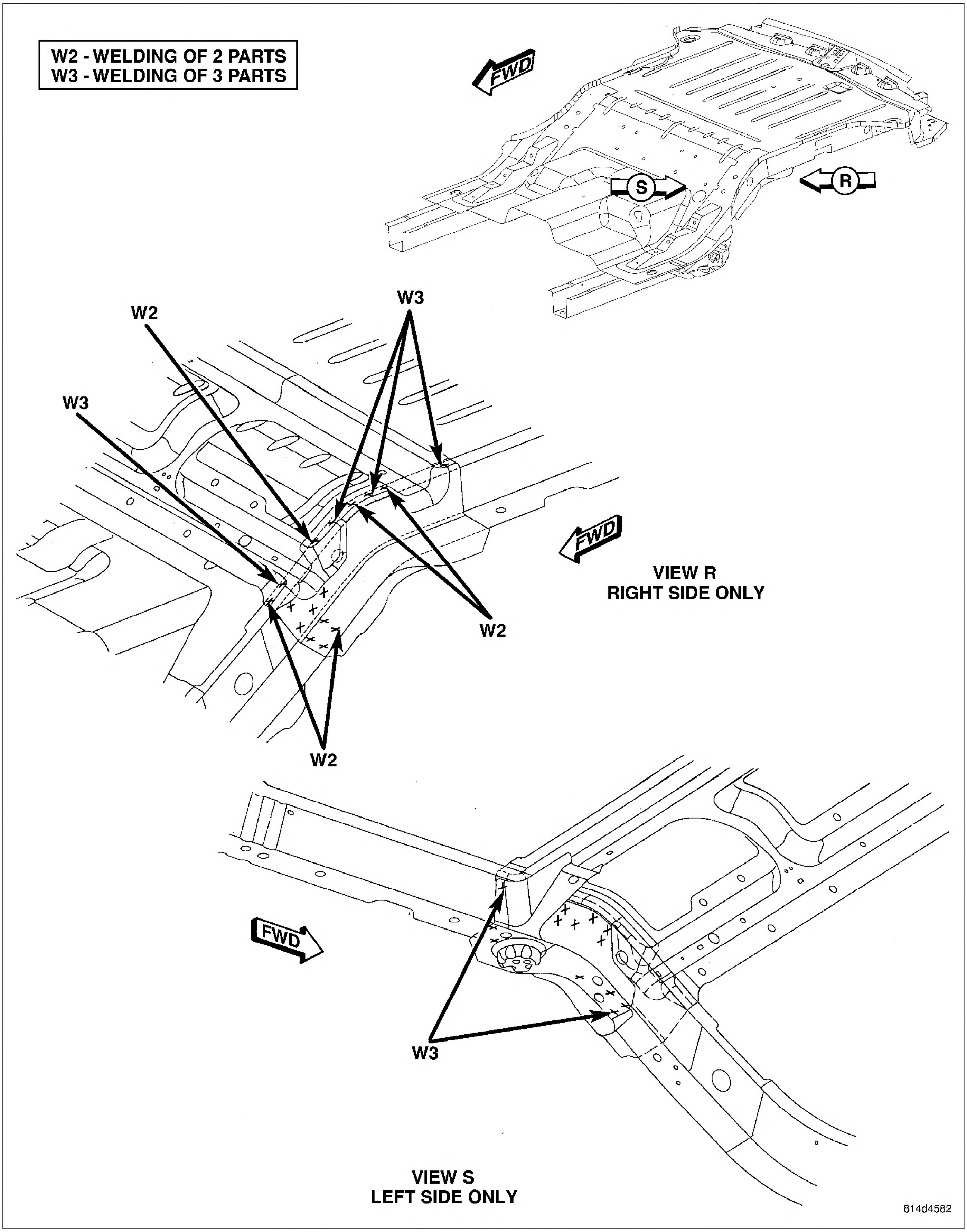

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
S
R
W2
W3
W3
W2
W2
FWD
VIEW R
RIGHT SIDE ONLY
FWD
W3
VIEW S
LEFT SIDE ONLY
814d4582

Fig. 87 REAR FLOOR & LADDER (5 OF 12)

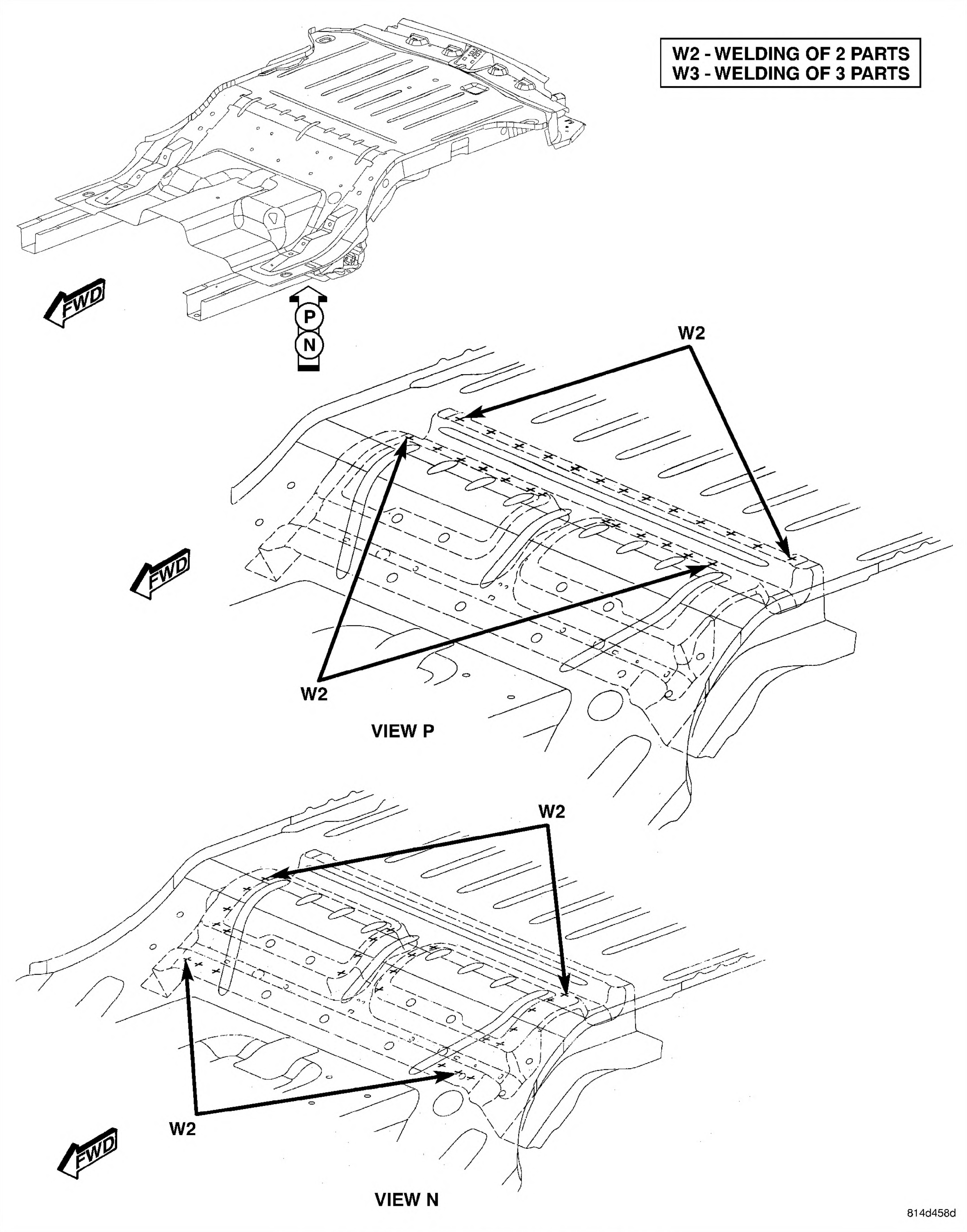

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
P
N
W2
W2
FWD
VIEW P
W2
W2
FWD
VIEW N
814d458d

Fig. 88 REAR FLOOR & LADDER (6 OF 12)

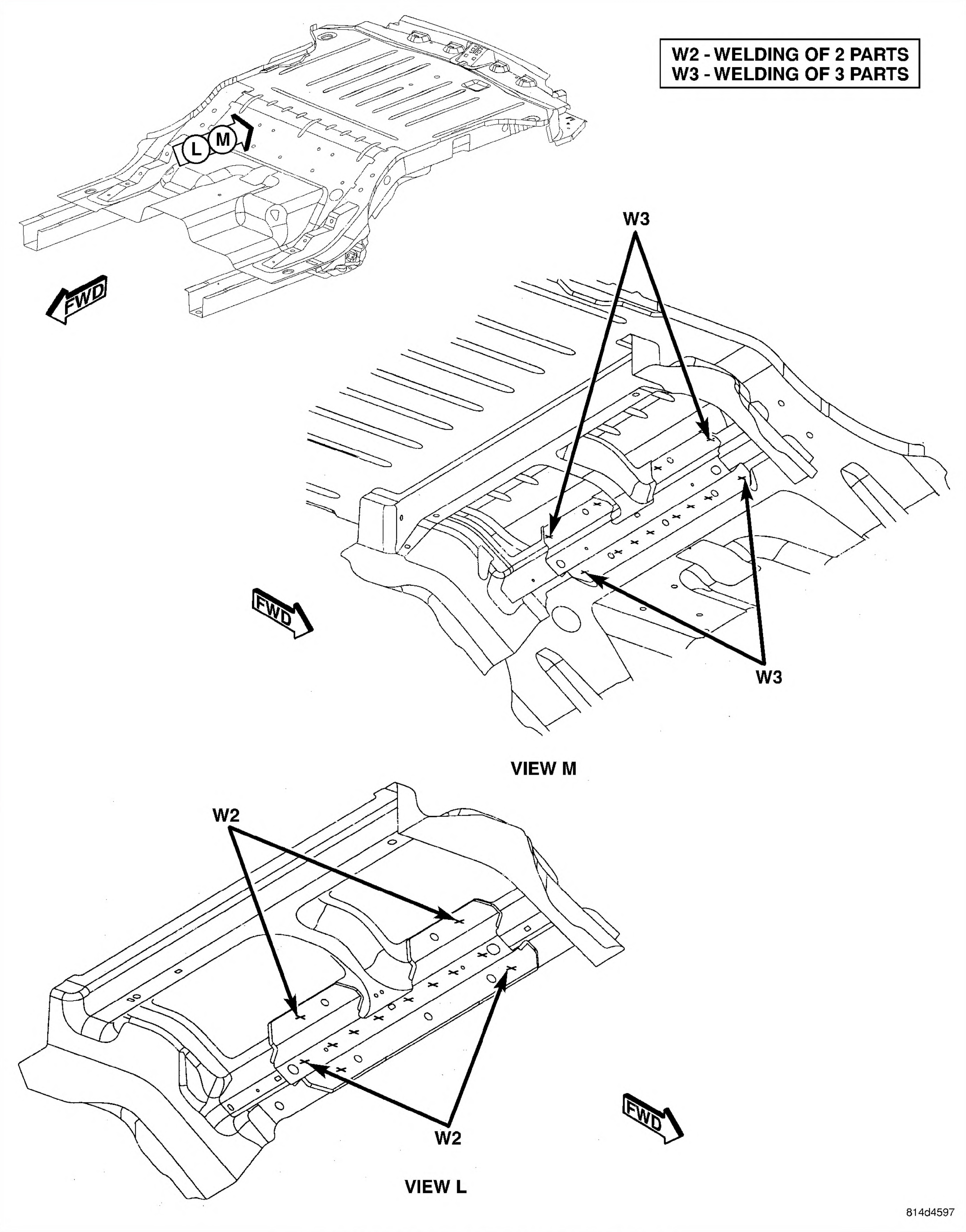

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
L
M
FWD
W3
FWD
W3
VIEW M
W2
FWD
W2
VIEW L
814d4597

Fig. 89 REAR FLOOR & LADDER (7 OF 12)

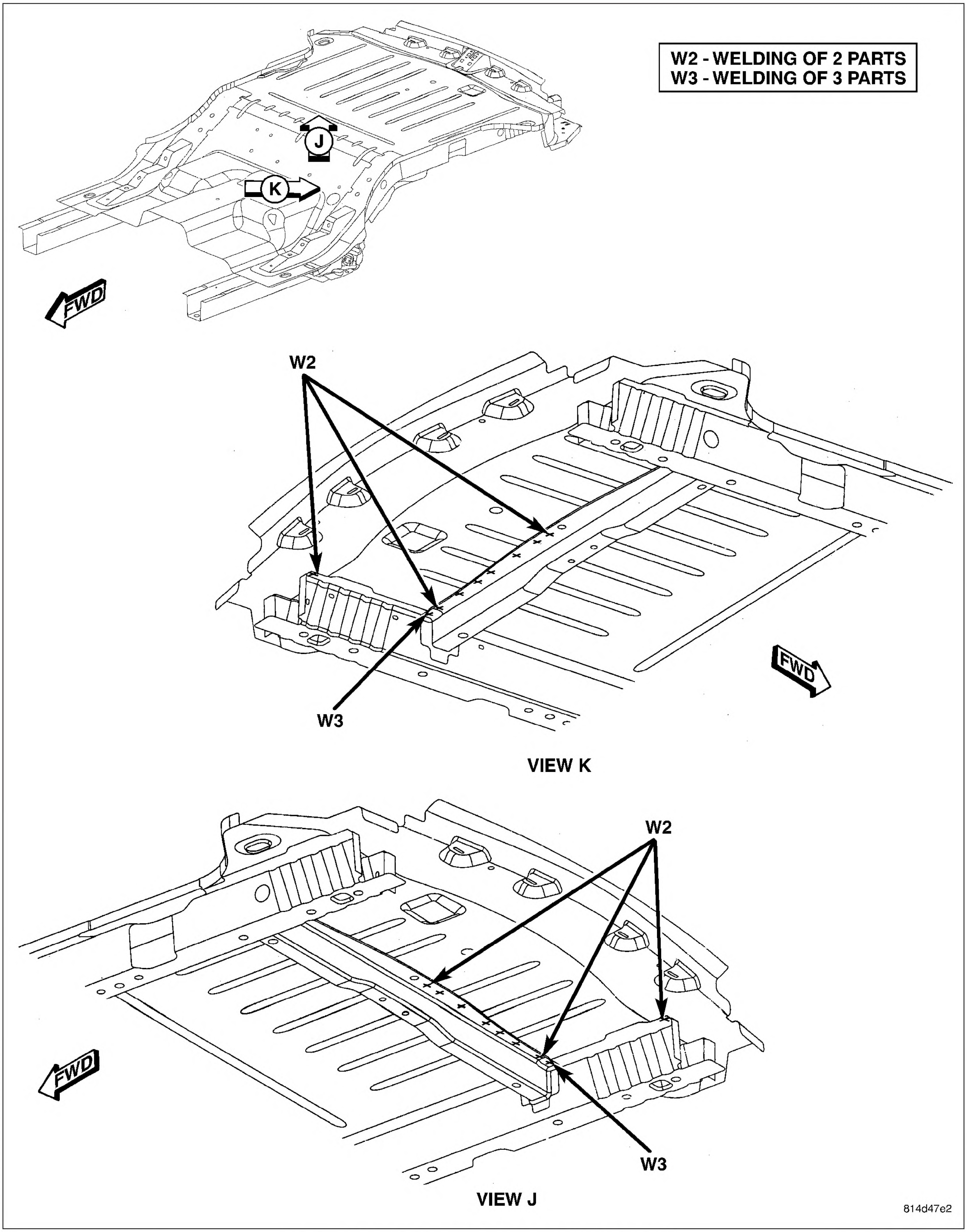

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
J
K
FWD
W2
W3
FWD
VIEW K
W2
FWD
W3
VIEW J
814d47e2

Fig. 90 REAR FLOOR & LADDER (8 OF 12)

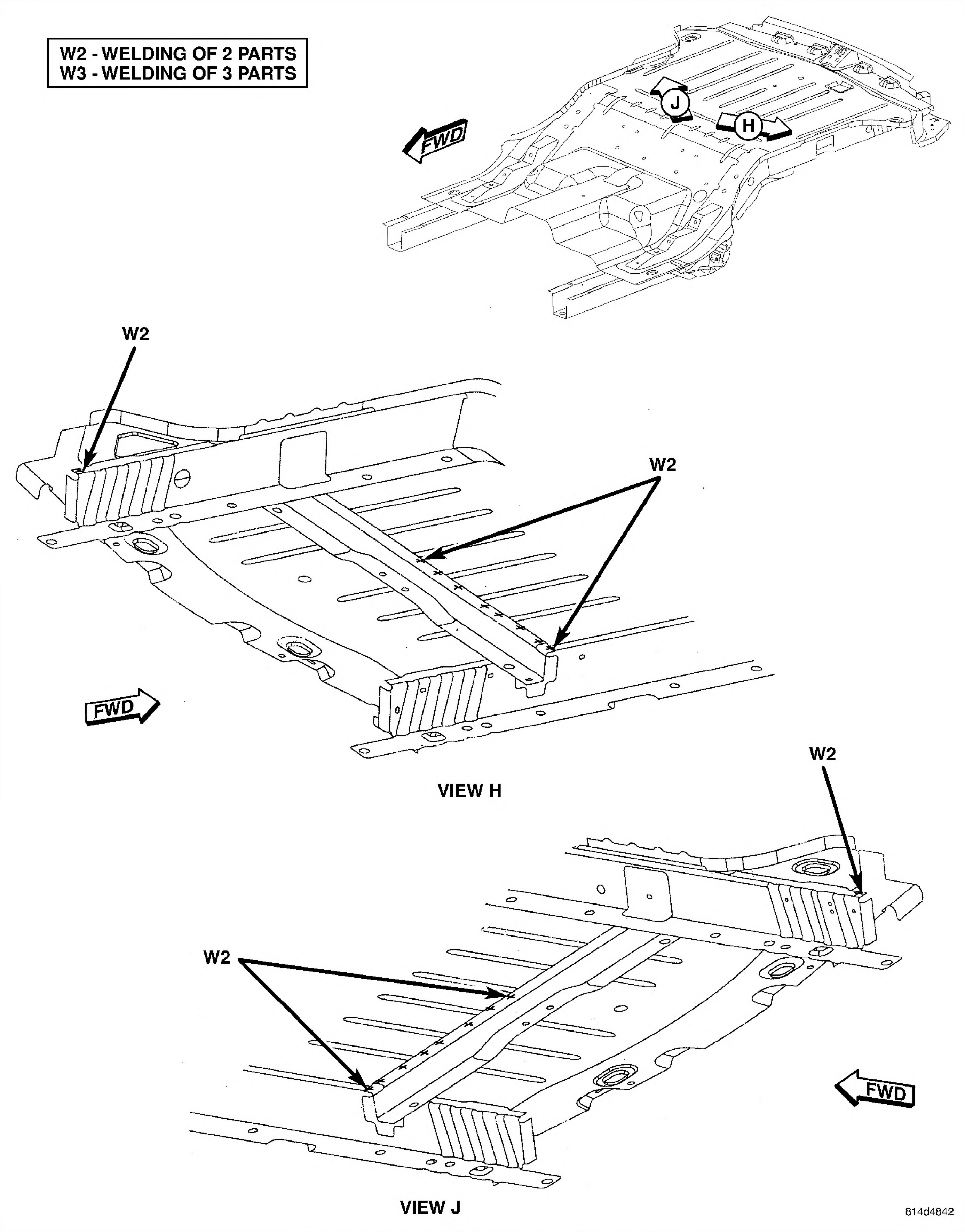

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
J
H
W2
W2
FWD
VIEW H
W2
W2
FWD
VIEW J
814d4842

Fig. 91 REAR FLOOR & LADDER (9 OF 12)

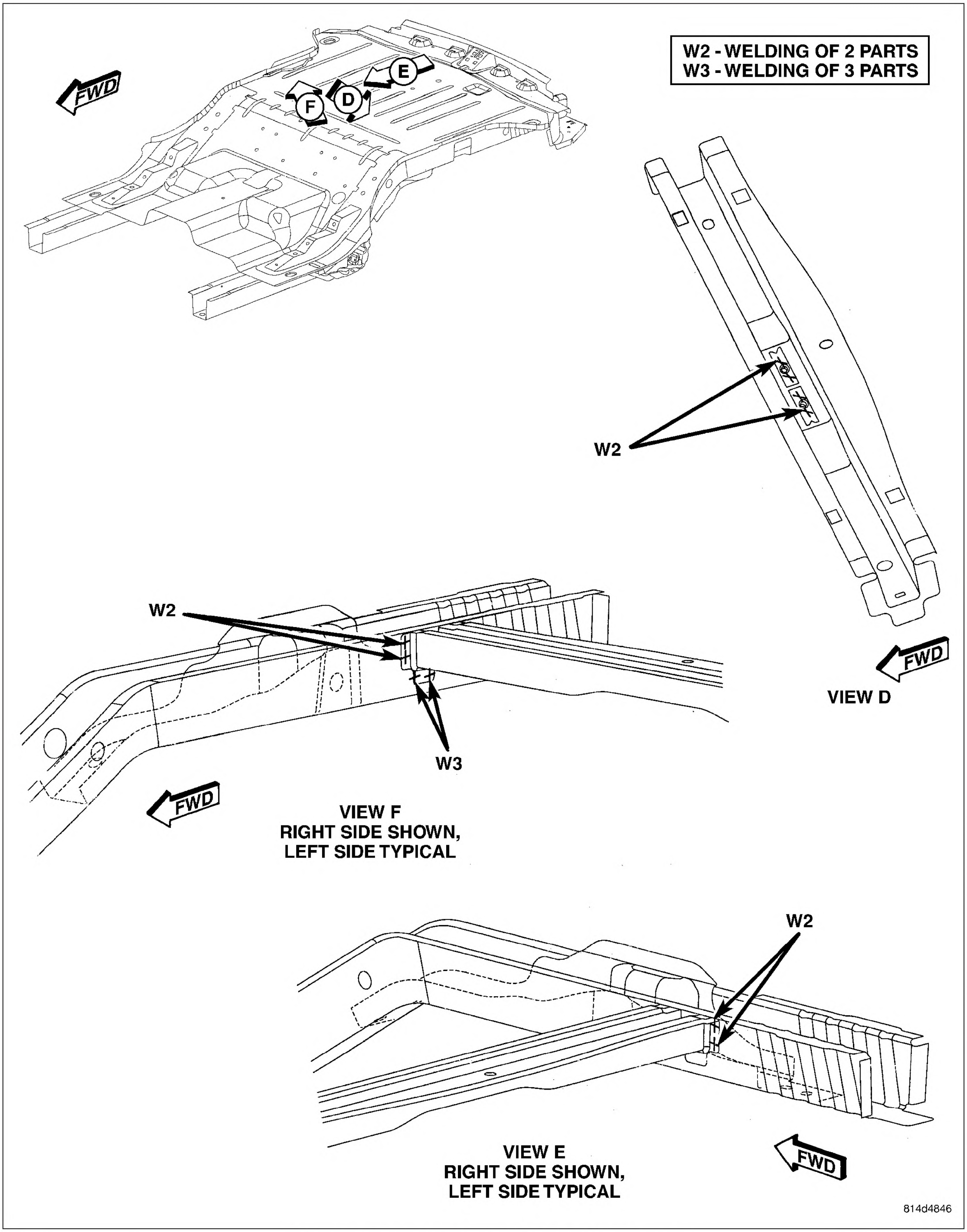

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
E
D
F
W2
FWD
VIEW D
W2
W3
FWD
VIEW F
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
FWD
VIEW E
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
814d4846

Fig. 92 REAR FLOOR & LADDER (10 OF 12)

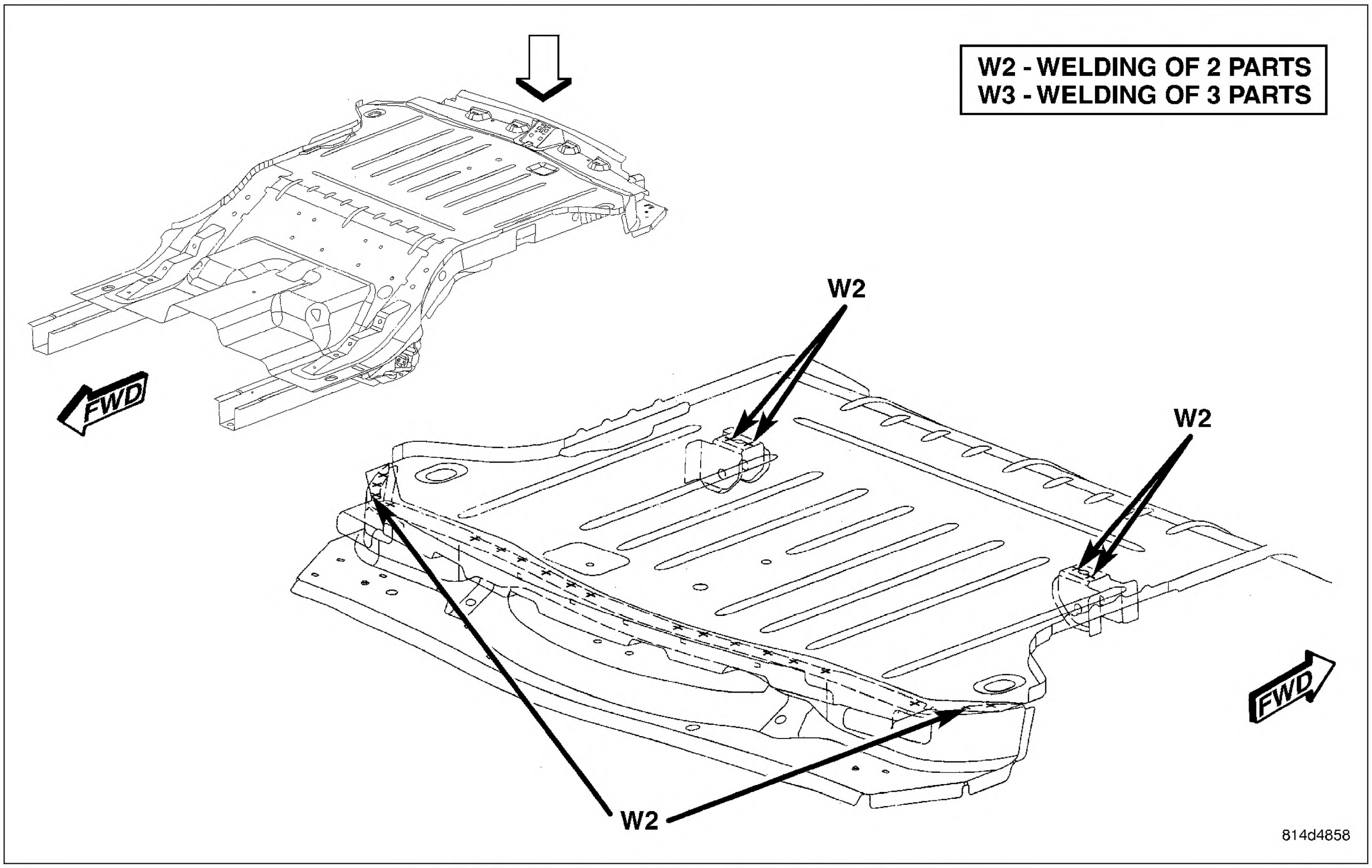

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W2
FWD
W2
814d4858

Fig. 93 REAR FLOOR & LADDER (11 OF 12)

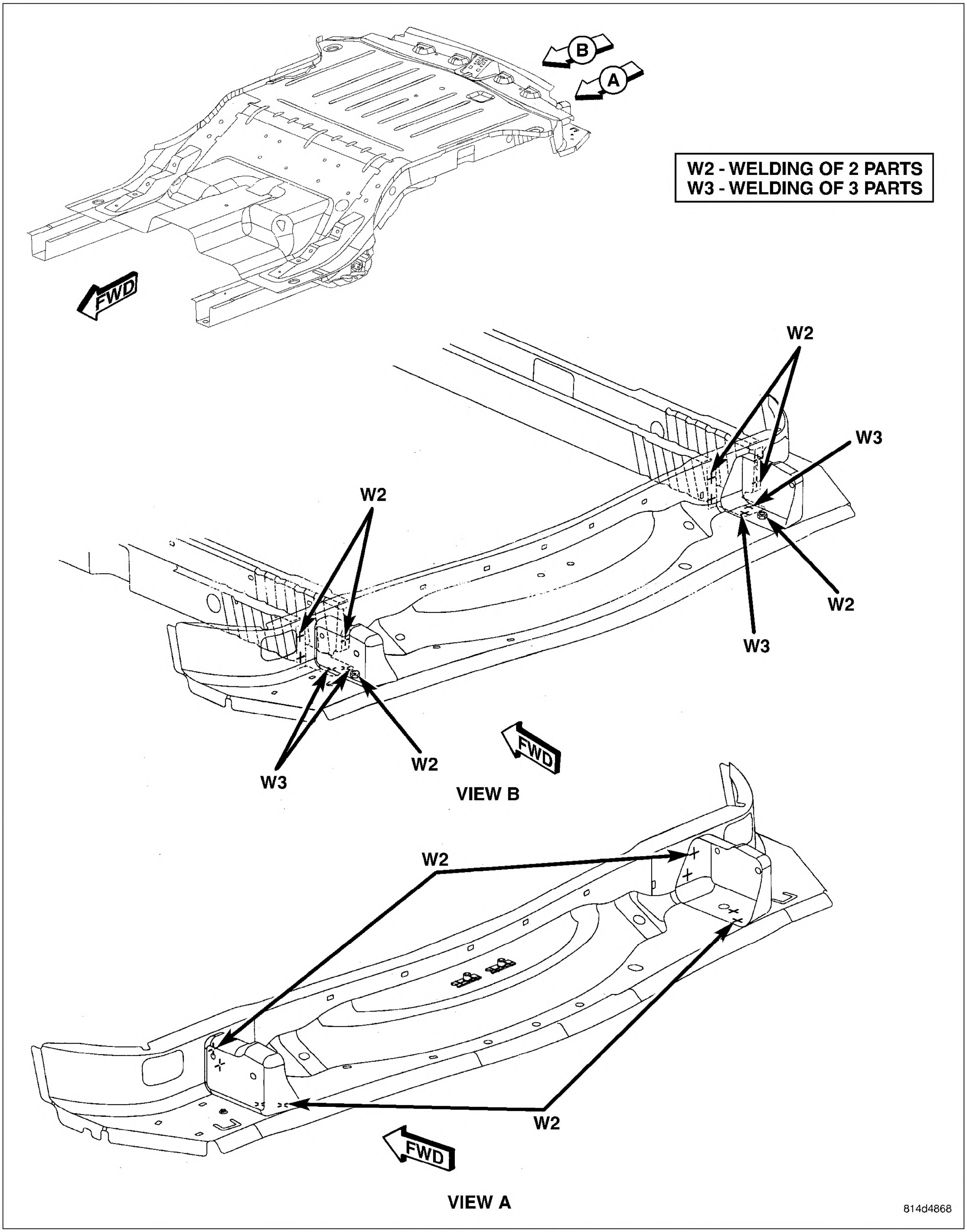

B
A
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W3
W2
W2
W3
W3
W2
FWD
VIEW B
W2
W2
FWD
VIEW A
814d4868

Fig. 94 REAR FLOOR & LADDER (12 OF 12)

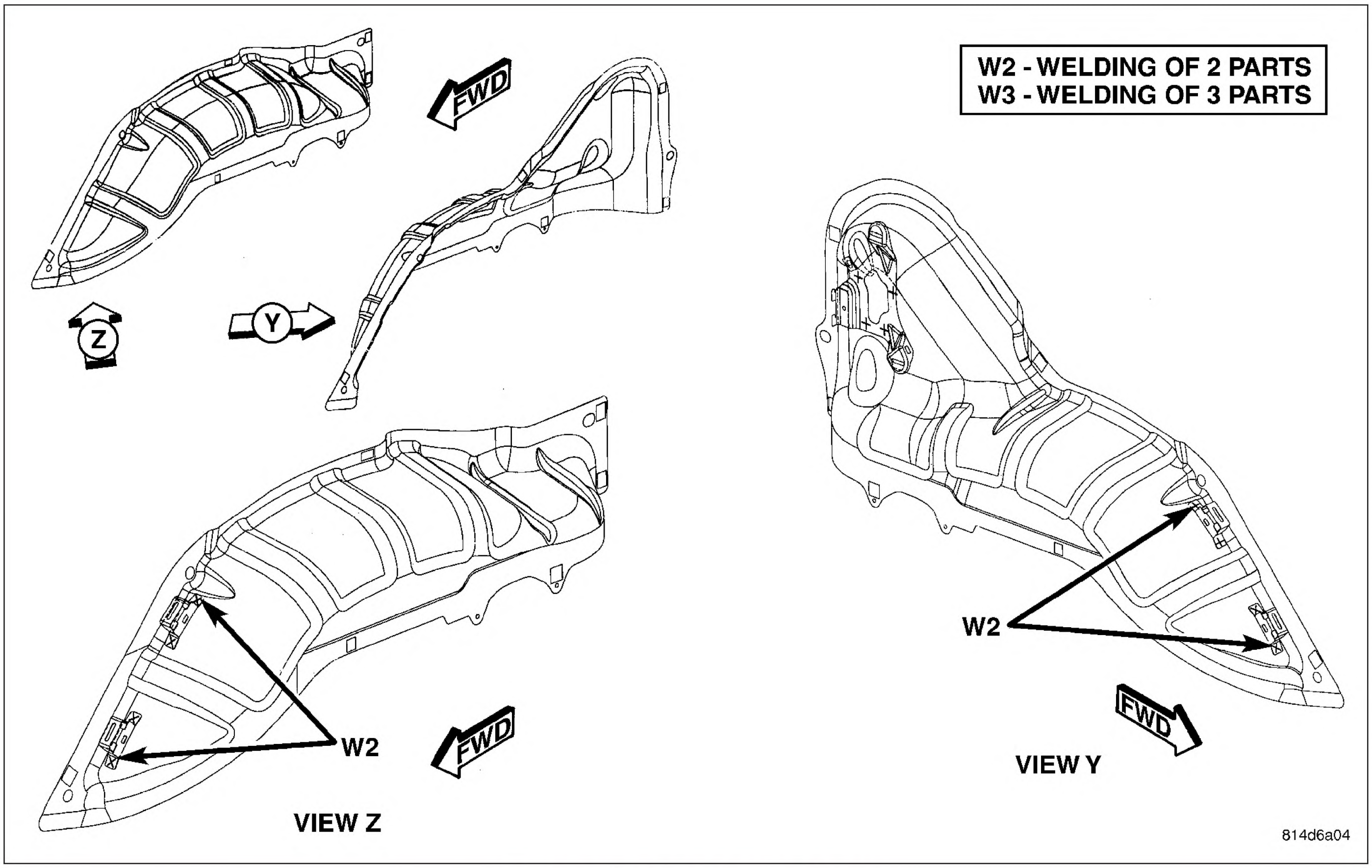

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
Z
Y
W2
FWD
VIEW Z
W2
FWD
VIEW Y
814d6a04

Fig. 95 UNDERBODY (1 OF 3)

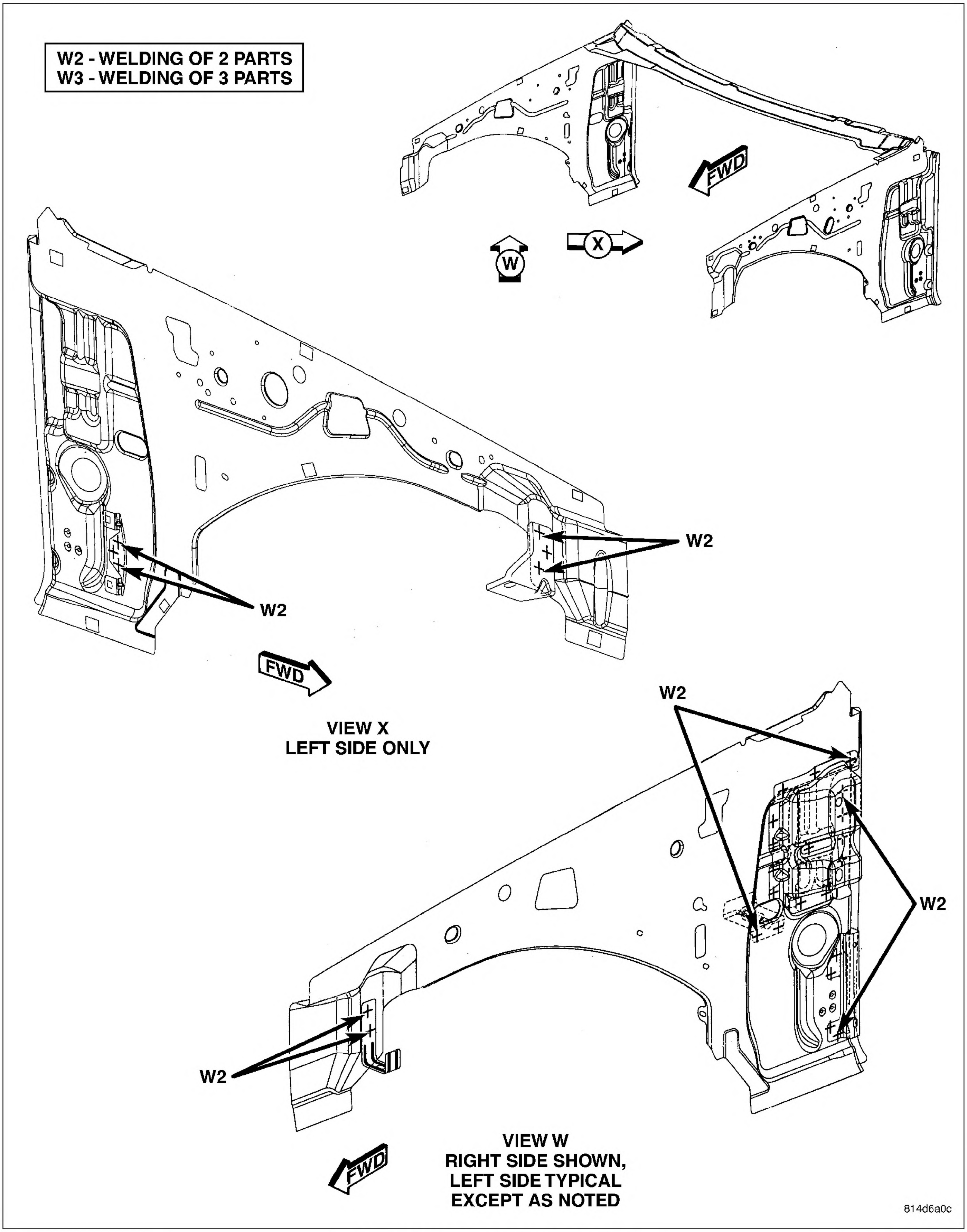

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W
X
W2
W2
FWD
VIEW X
LEFT SIDE ONLY
W2
W2
W2
FWD
VIEW W
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
814d6a0c

Fig. 96 UNDERBODY (2 OF 3)

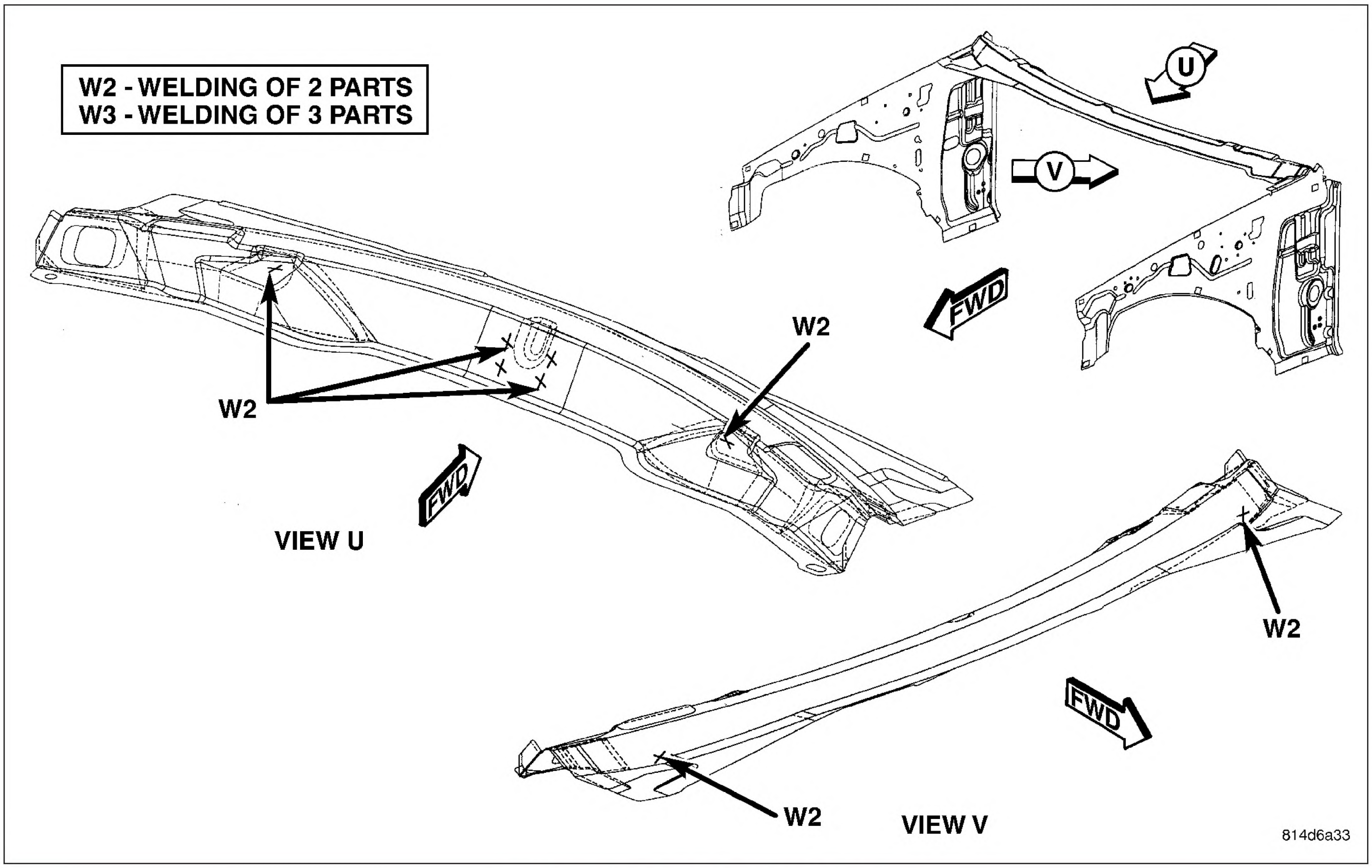

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
U
V
FWD
W2
W2
FWD
VIEW U
W2
W2
FWD
W2
VIEW V
814d6a33

Fig. 97 UNDERBODY (3 OF 3)

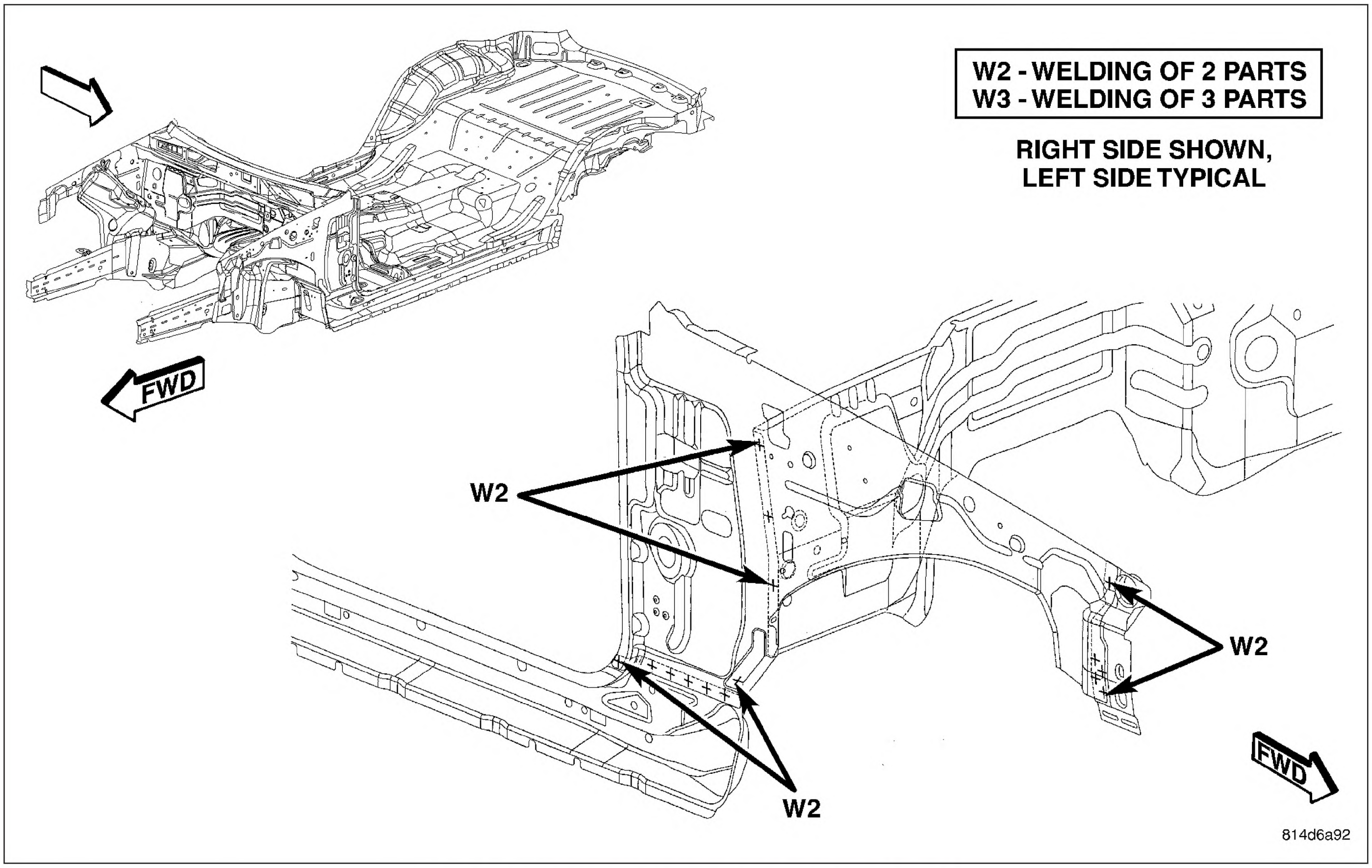

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W2
W2
W2
FWD
814d6a92

Fig. 98 UNDERBODY COMPLETE (1 OF 17)

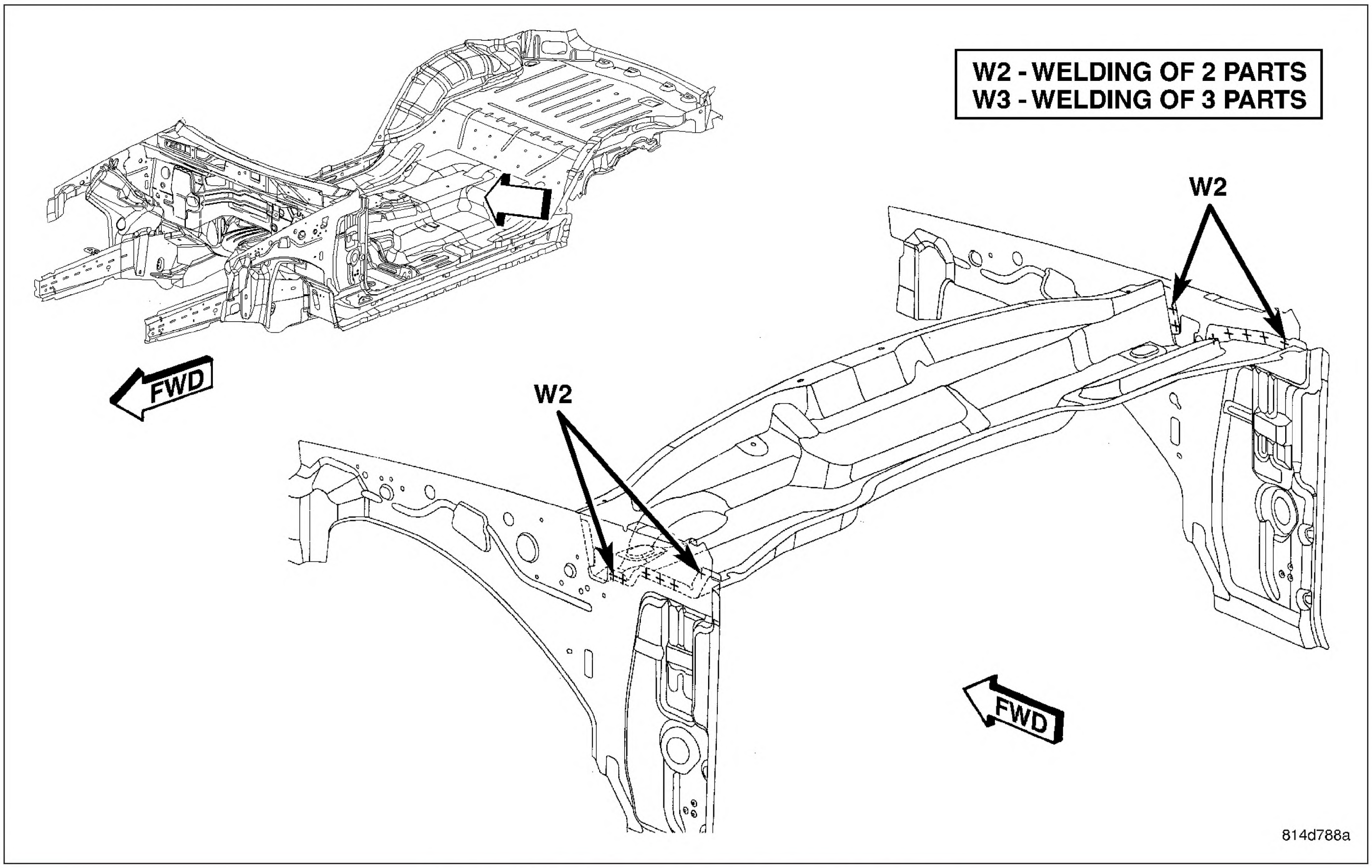

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
FWD
FWD
814d788a

Fig. 99 UNDERBODY COMPLETE (2 OF 17)

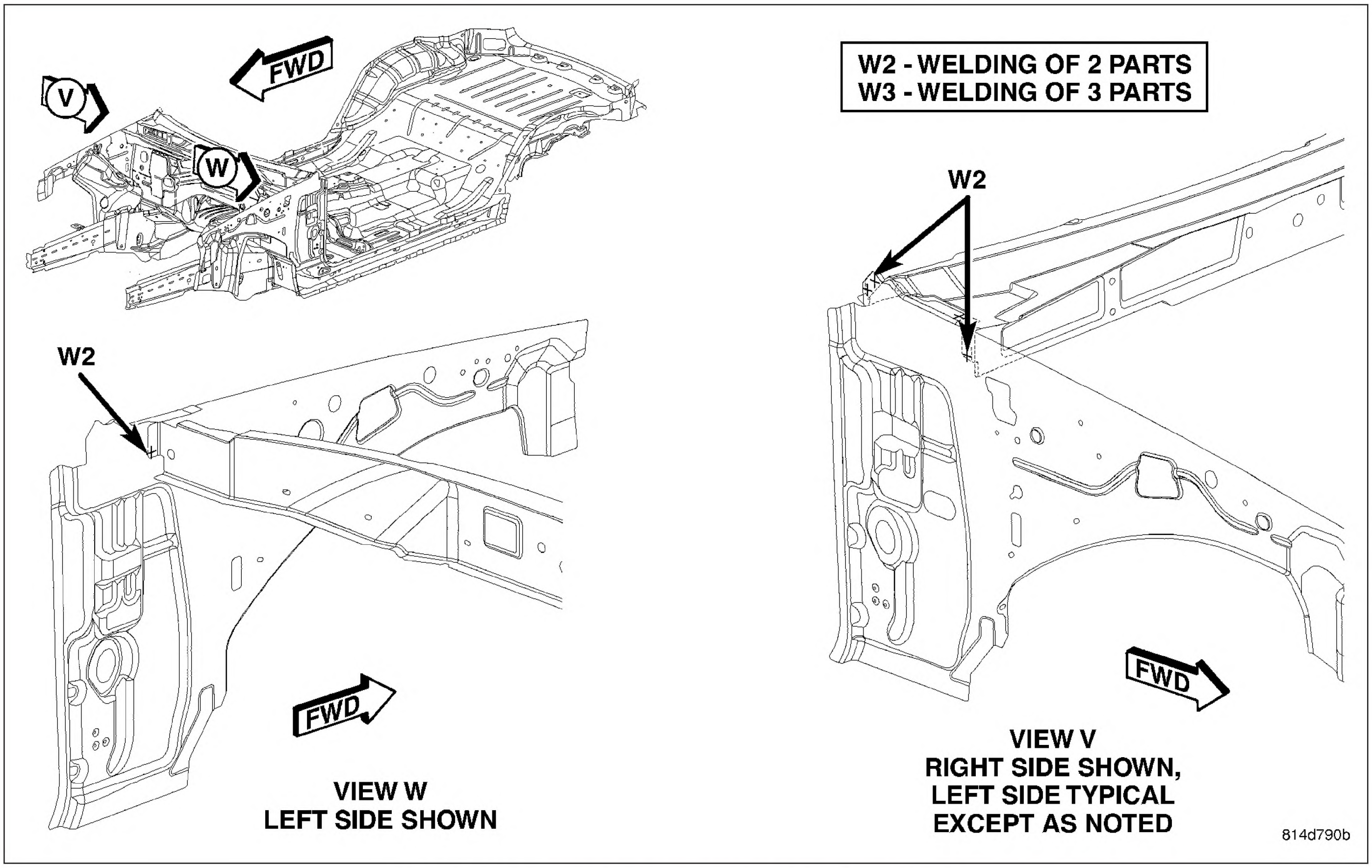

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
V
W
FWD
W2
W2
FWD
FWD
VIEW W
LEFT SIDE SHOWN
VIEW V
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
814d790b

Fig. 100 UNDERBODY COMPLETE (3 OF 17)

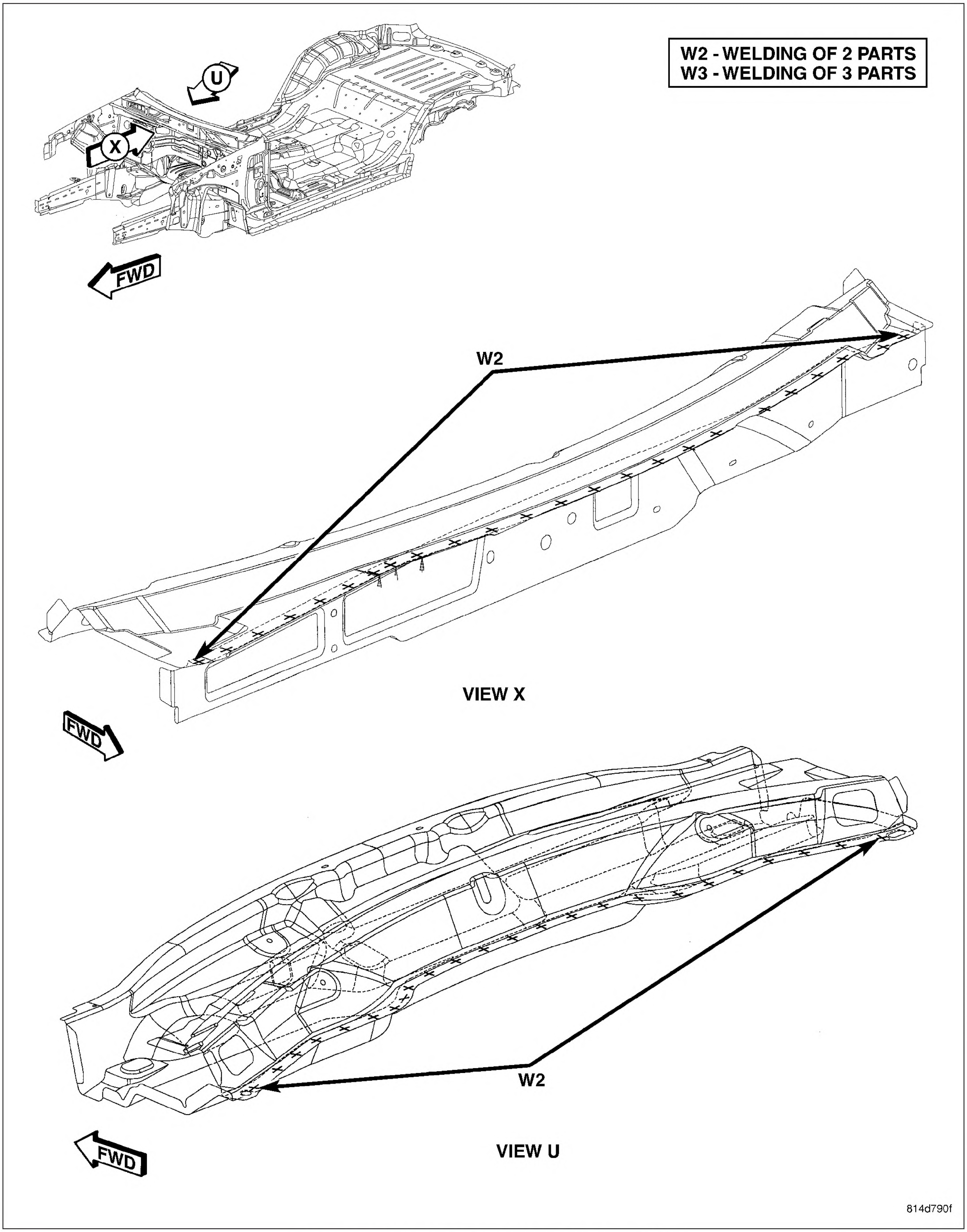

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
U
X
FWD
W2
VIEW X
FWD
W2
VIEW U
FWD
814d790f

Fig. 101 UNDERBODY COMPLETE (4 OF 17)

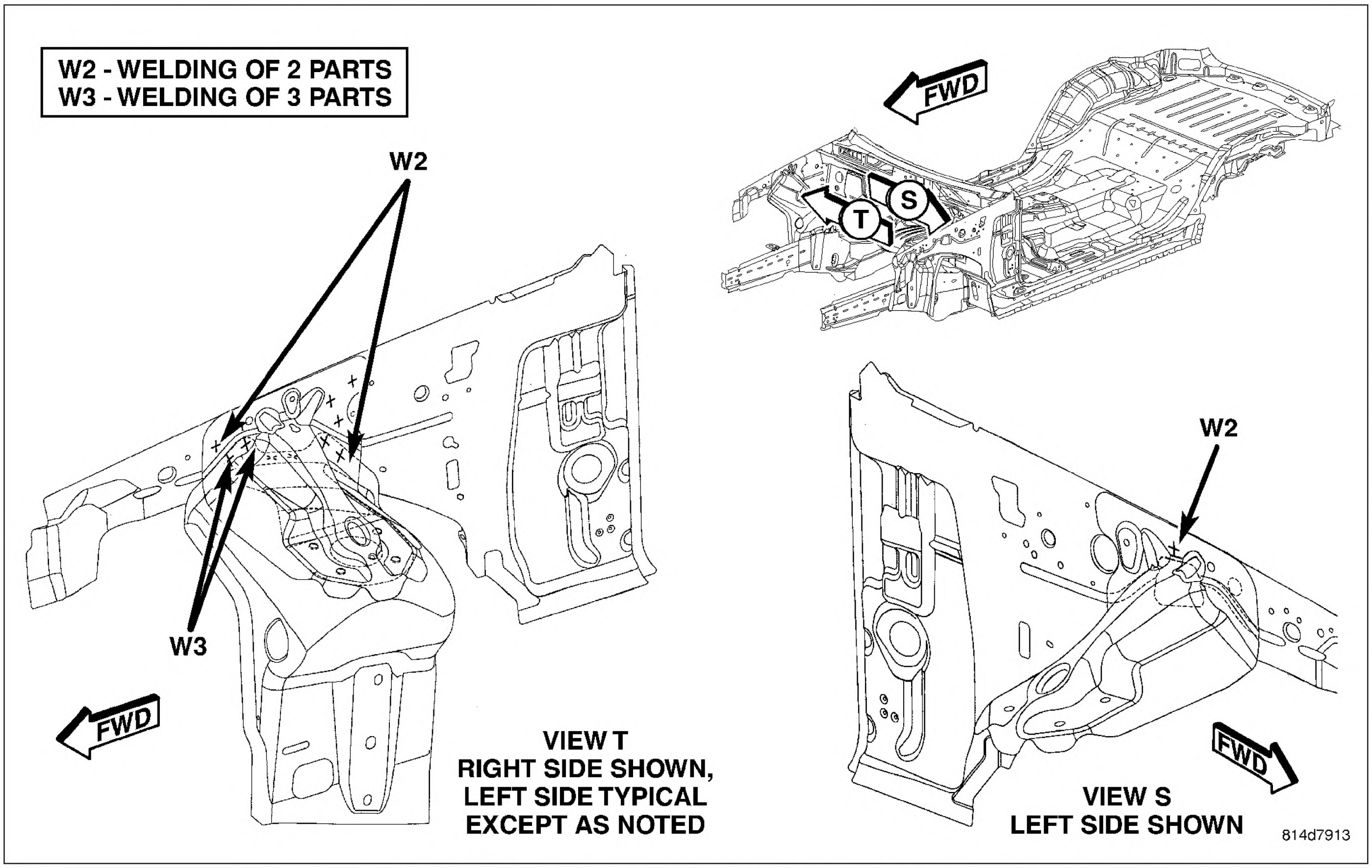

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W3
FWD
FWD
T
S
W2
VIEW T
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
FWD
VIEW S
LEFT SIDE SHOWN
814d7913

Fig. 102 UNDERBODY COMPLETE (5 OF 17)

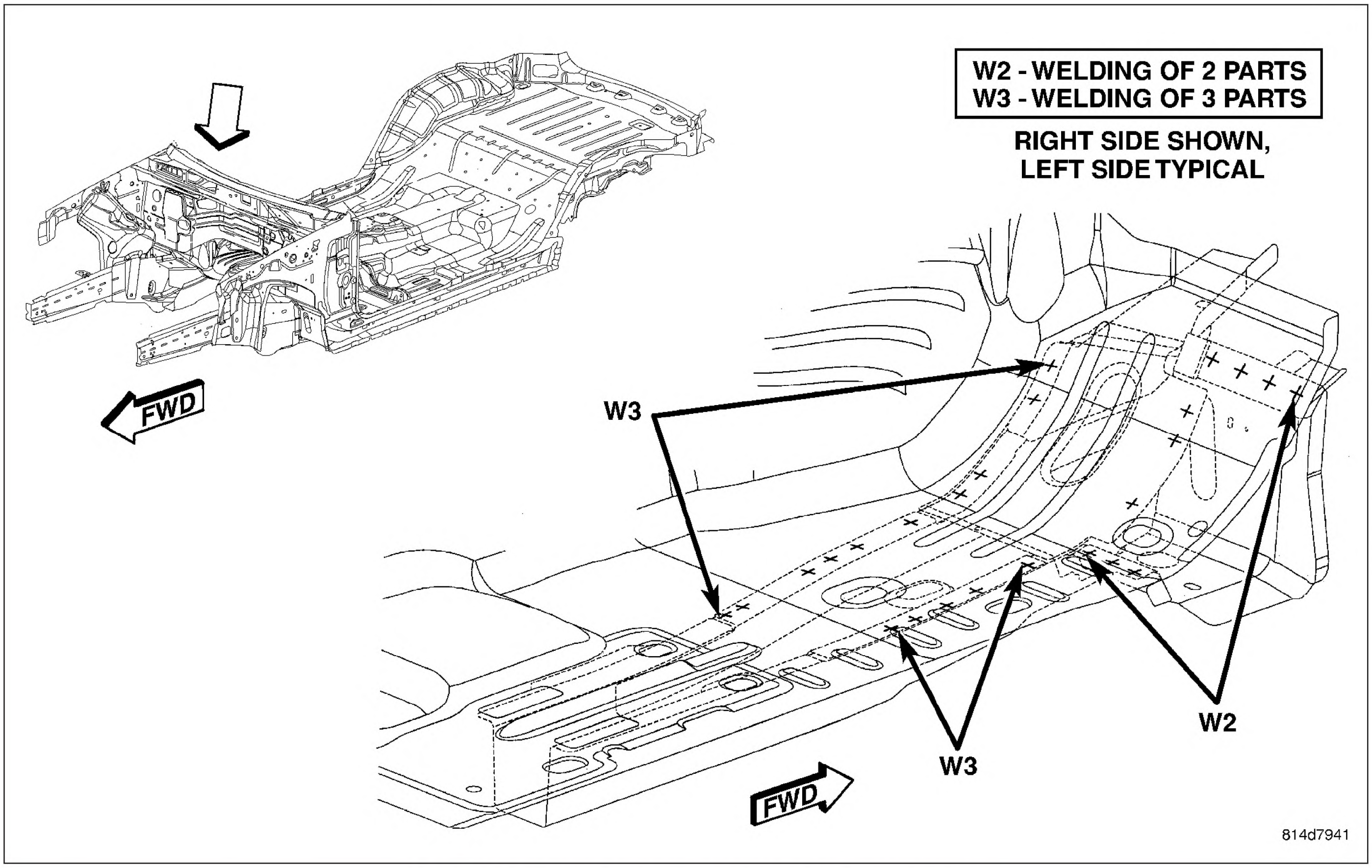

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W3
W3
W2
FWD
814d7941

Fig. 103 UNDERBODY COMPLETE (6 OF 17)

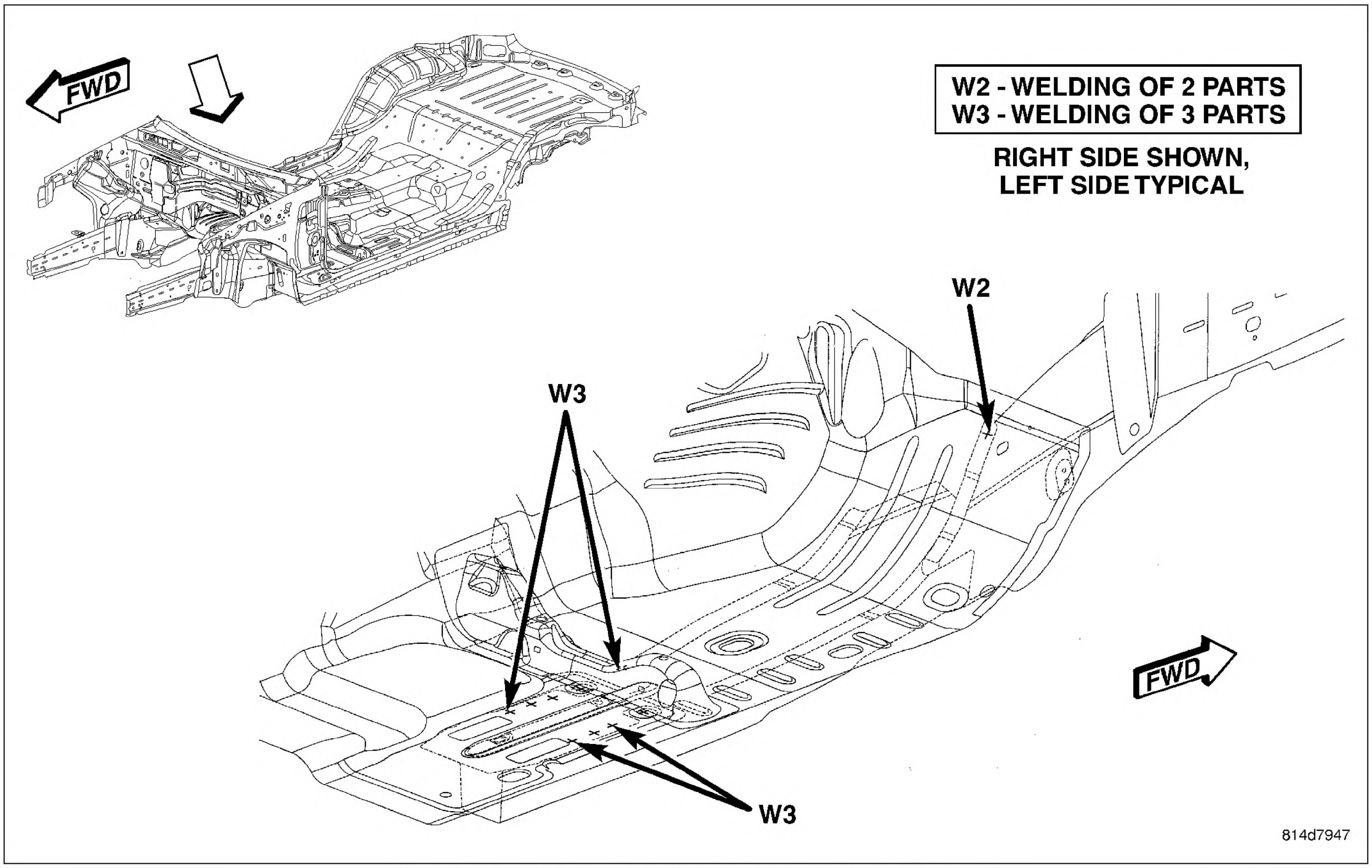

FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
W3
W3
FWD
814d7947

Fig. 104 UNDERBODY COMPLETE (7 OF 17)

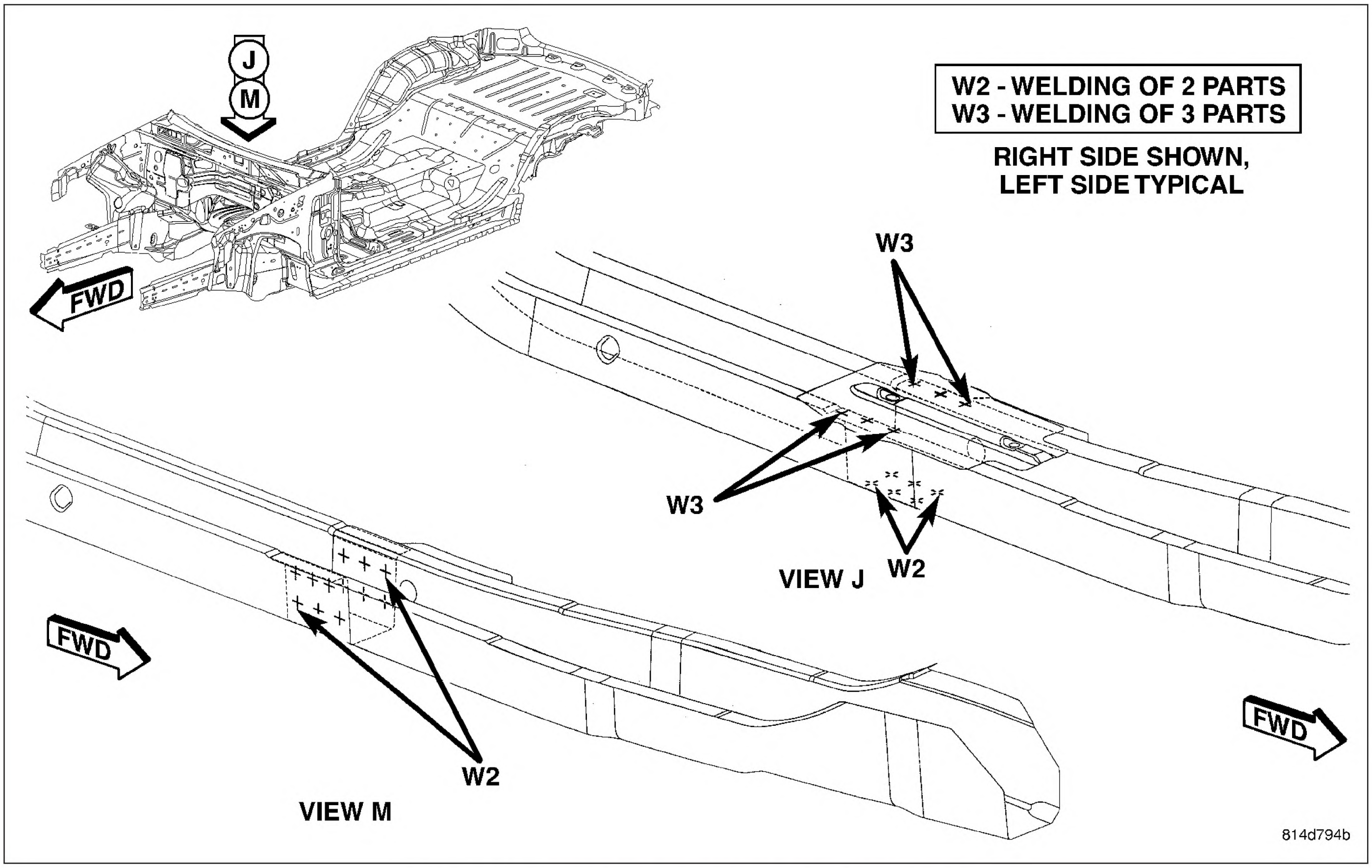

J
M
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W3
W3
VIEW J
W2
FWD
W2
VIEW M
FWD
814d794b

Fig. 105 UNDERBODY COMPLETE (8 OF 17)

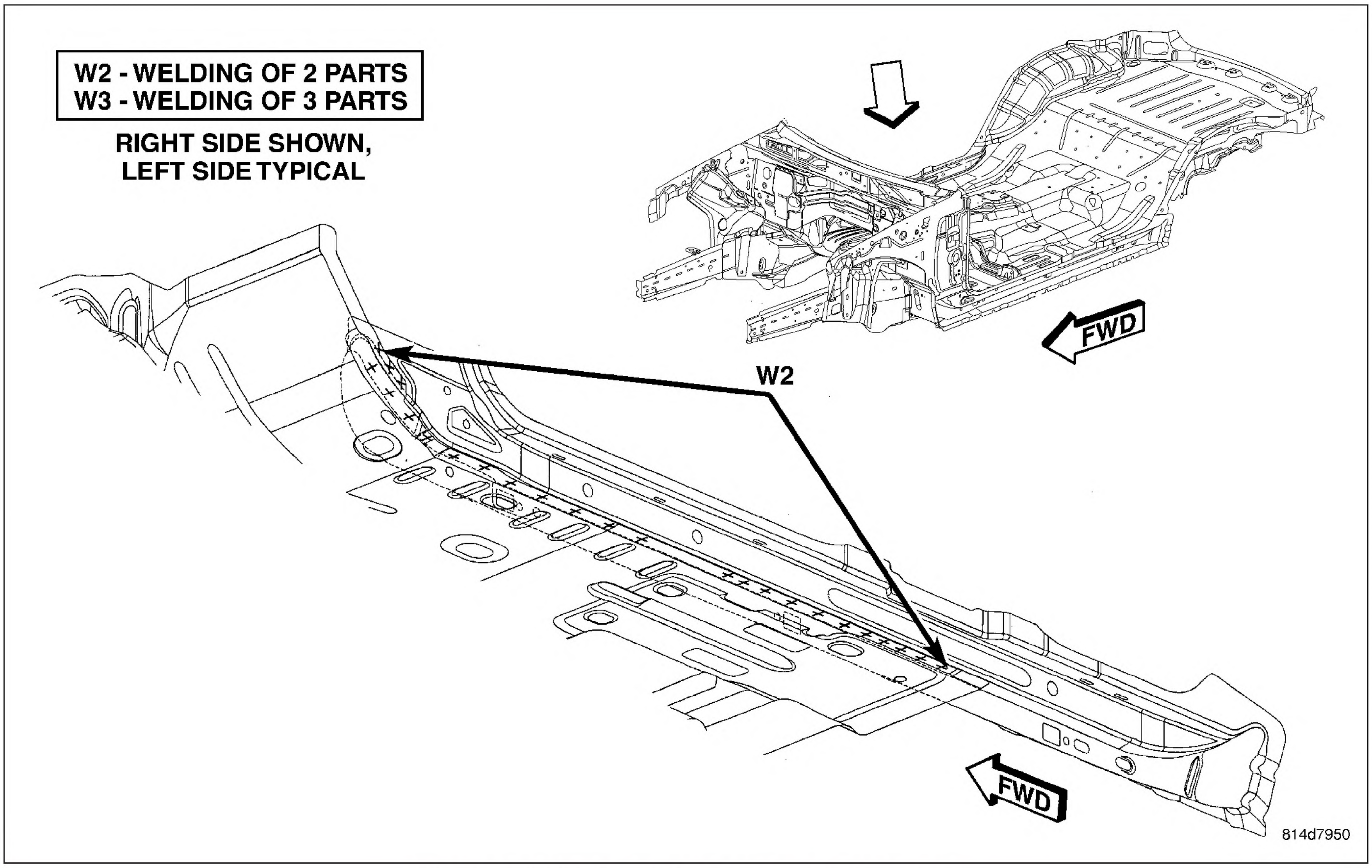

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
FWD
FWD
814d7950

Fig. 106 UNDERBODY COMPLETE (9 OF 17)

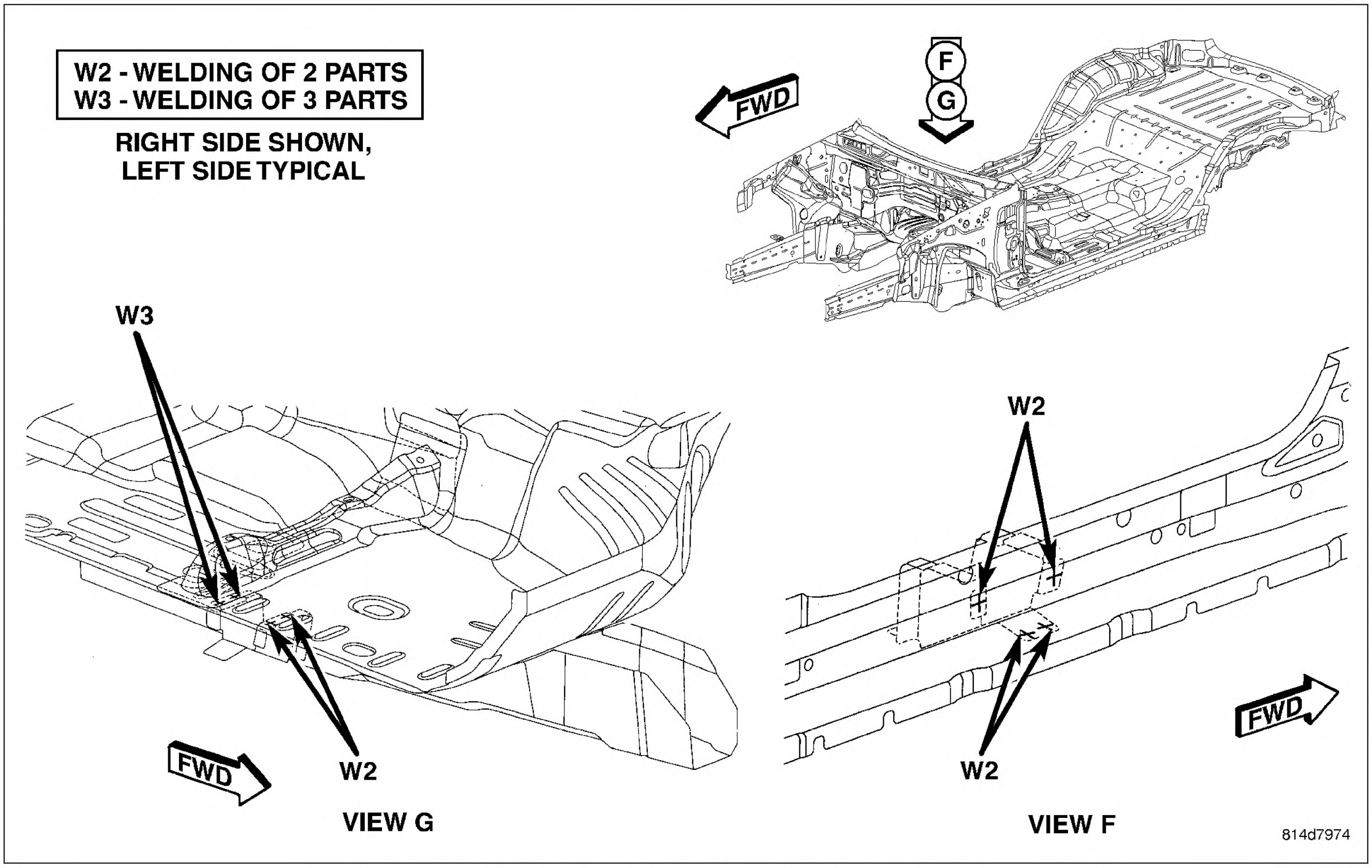

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
F
G
FWD
W3
W2
FWD
VIEW G
W2
W2
FWD
VIEW F
814d7974

Fig. 107 UNDERBODY COMPLETE (10 OF 17)

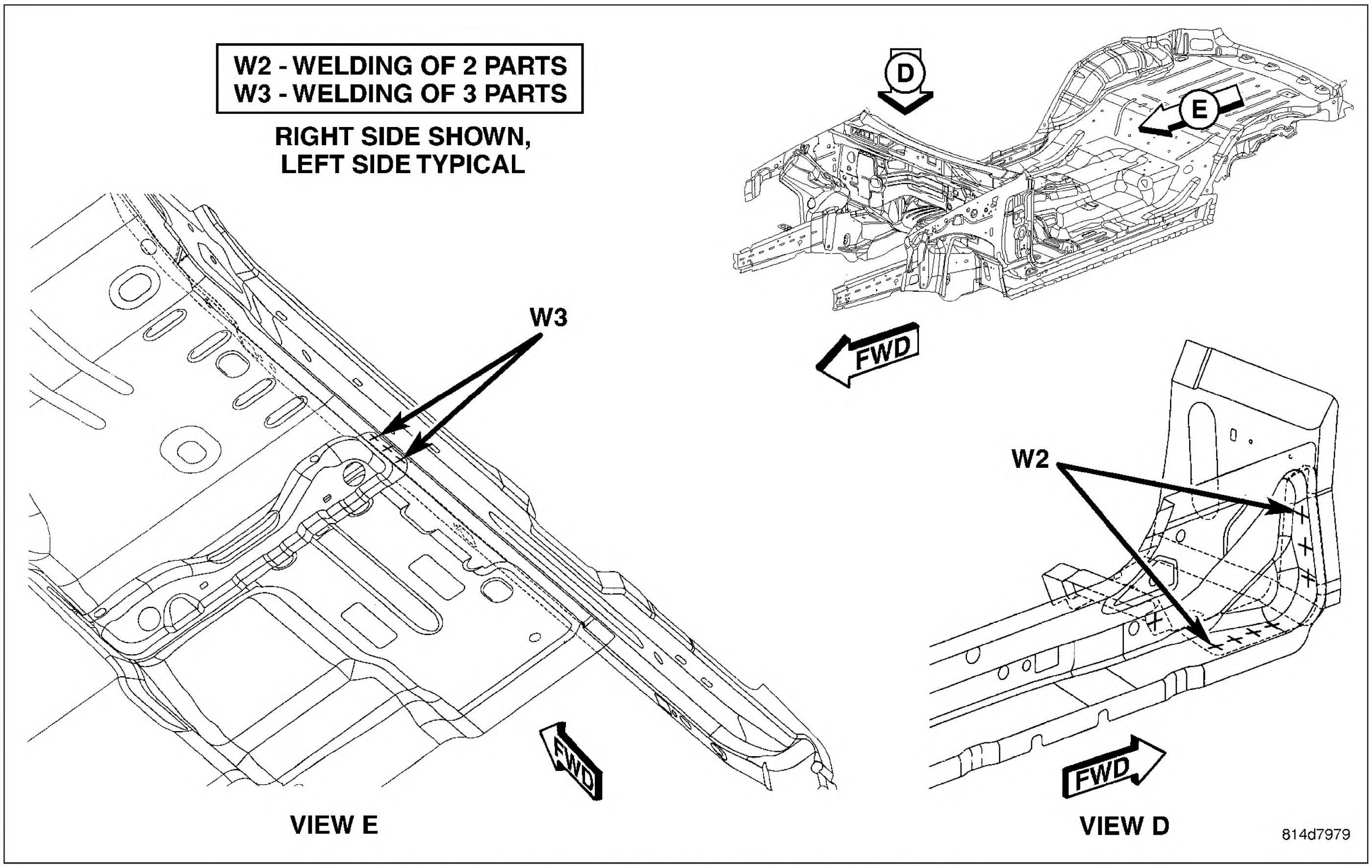

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
D
E
FWD
W3
W2
FWD
FWD
VIEW E
VIEW D
814d7979

Fig. 108 UNDERBODY COMPLETE (11 OF 17)

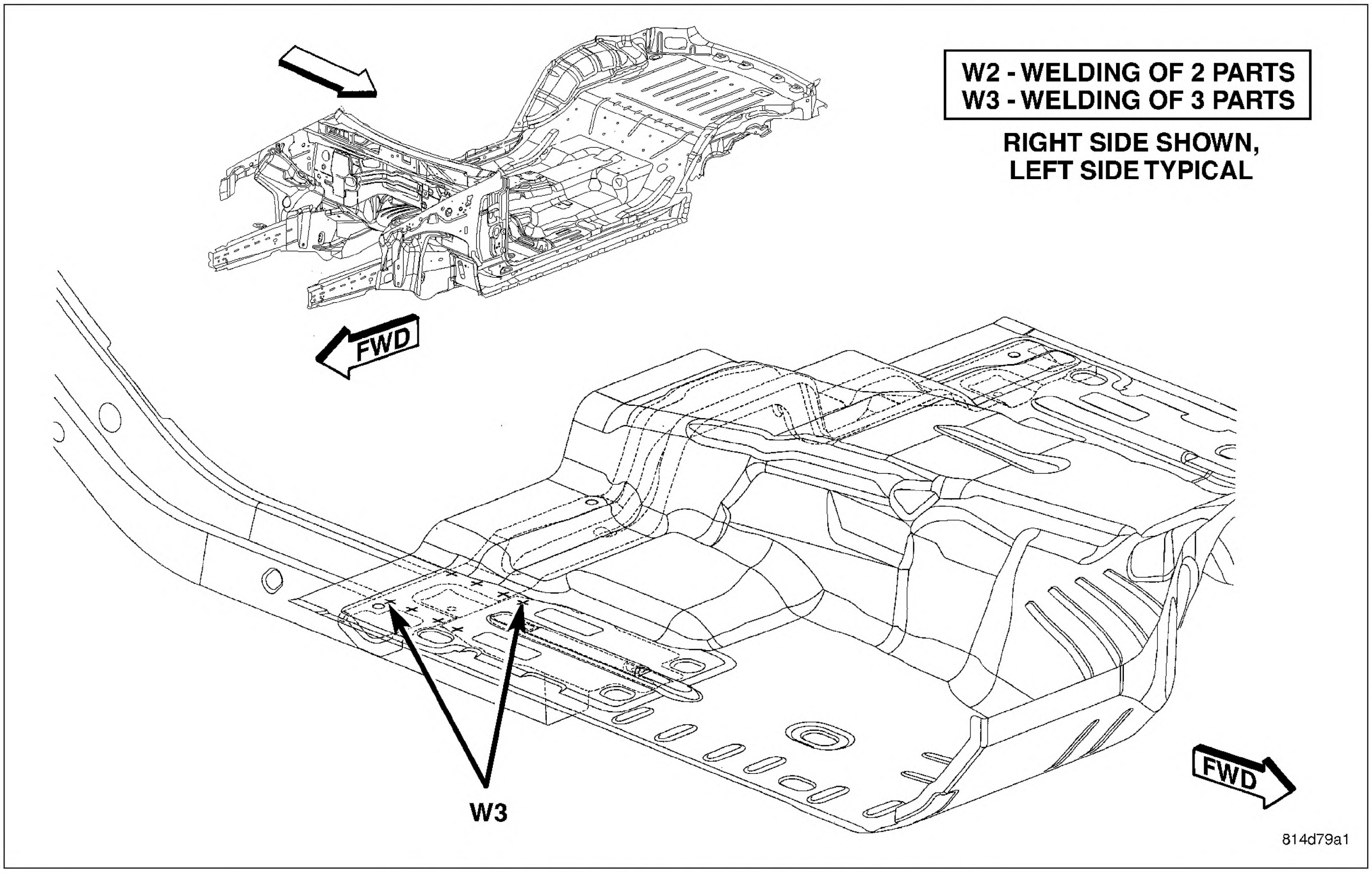

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W3
FWD
814d79a1

Fig. 109 UNDERBODY COMPLETE (12 OF 17)

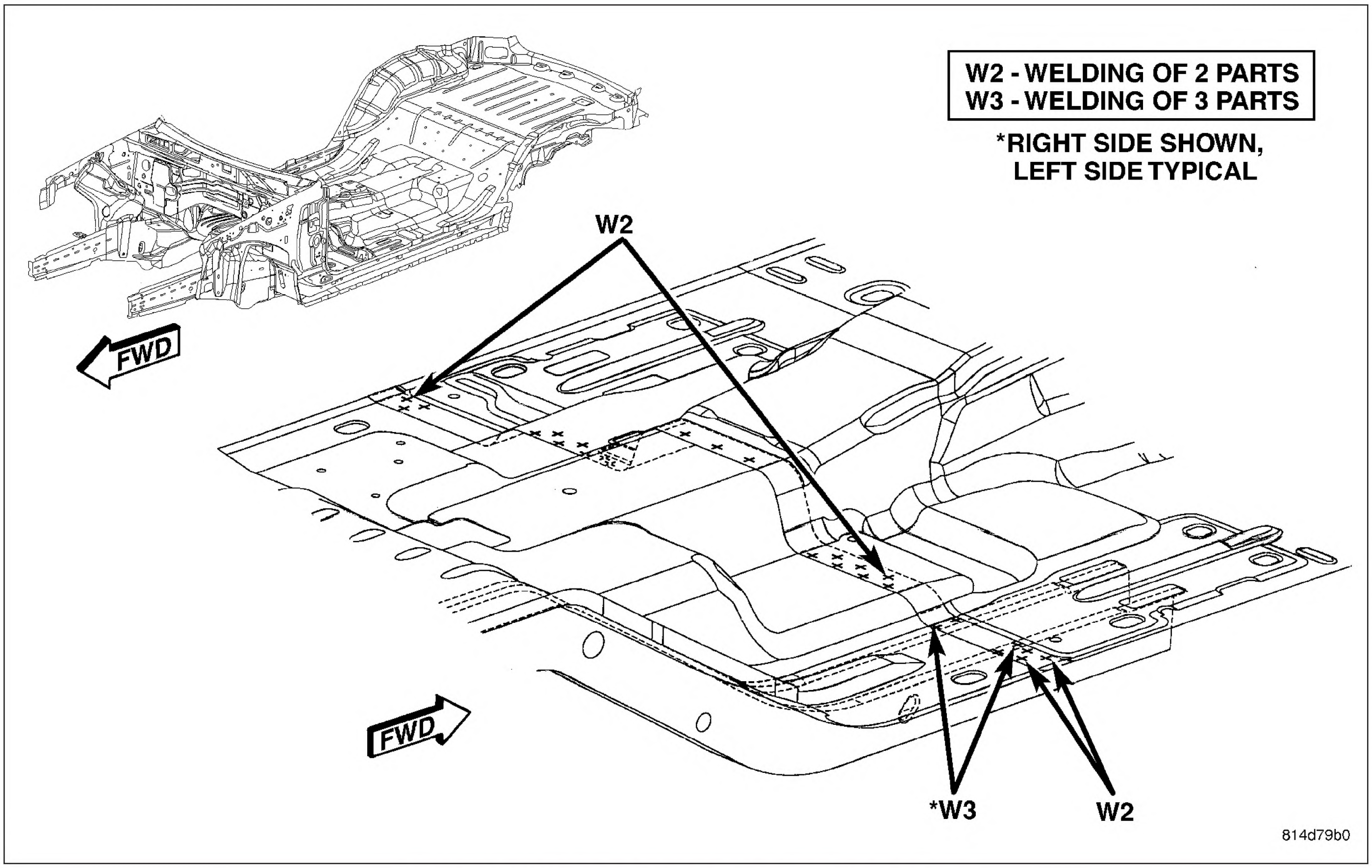

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
*RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
FWD
FWD
*W3
W2
814d79b0

Fig. 110 UNDERBODY COMPLETE (13 OF 17)

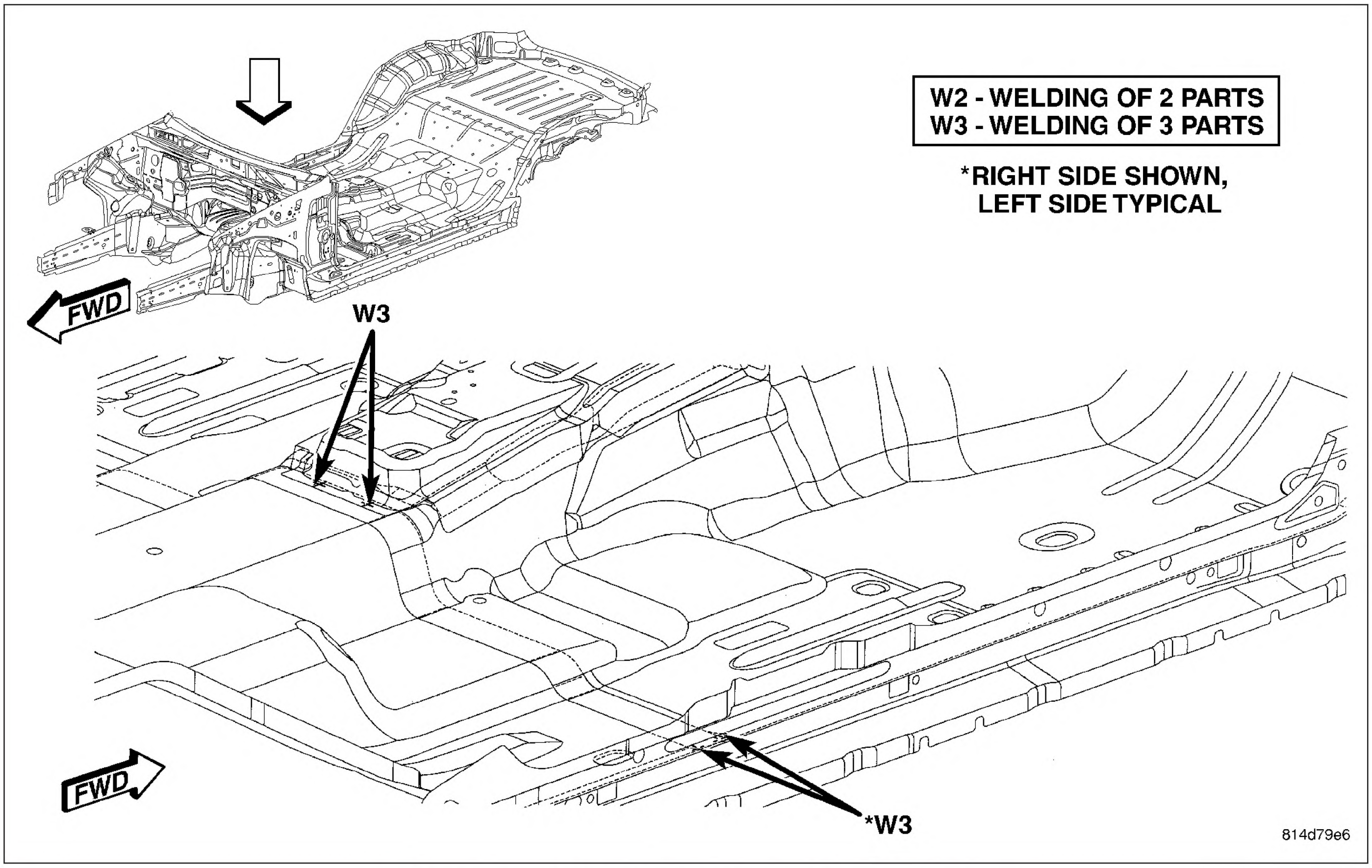

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
*RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W3
FWD
*W3
814d79e6

Fig. 111 UNDERBODY COMPLETE (14 OF 17)

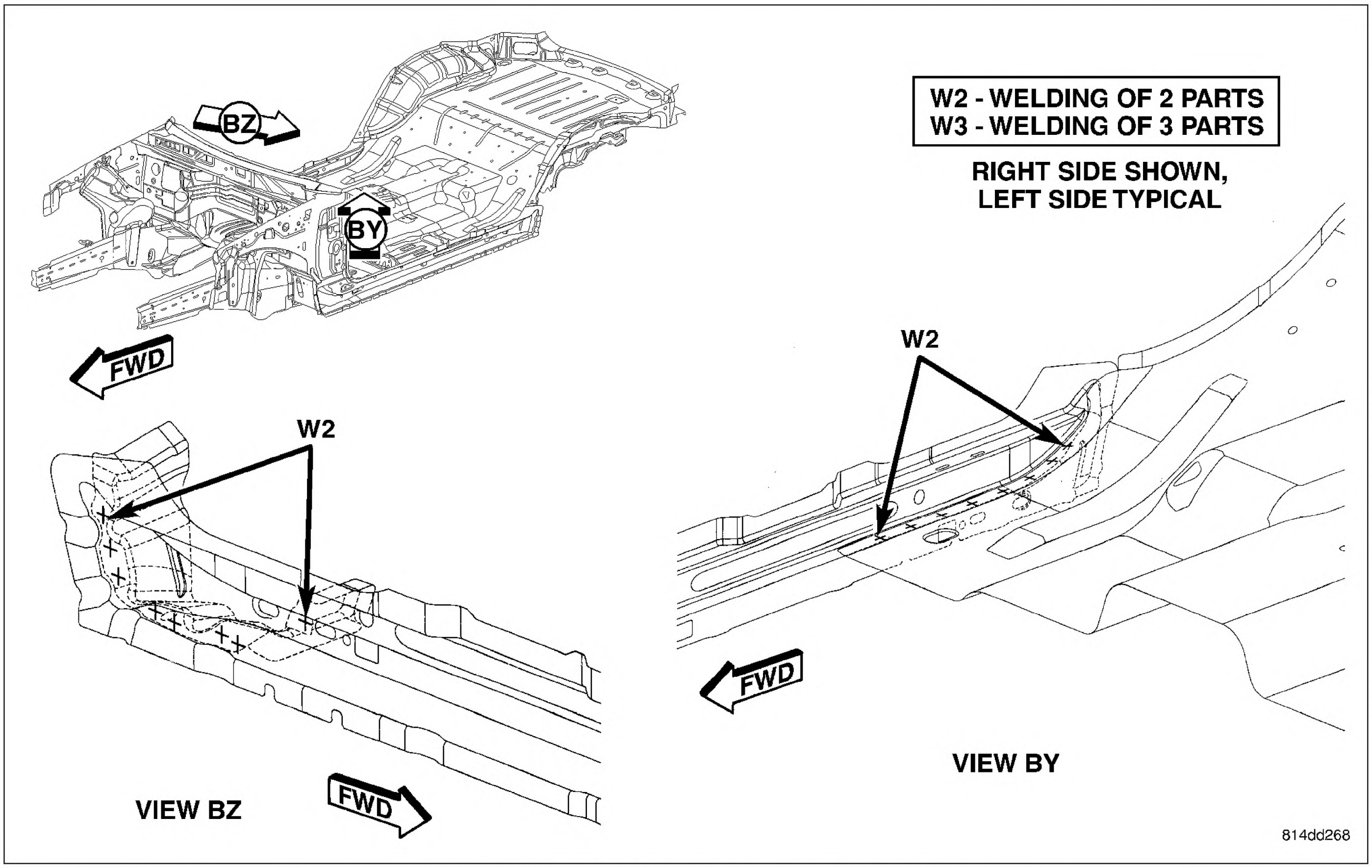

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
BZ
BY
FWD
W2
W2
FWD
VIEW BY
VIEW BZ
FWD
814dd268

Fig. 112 UNDERBODY COMPLETE (15 OF 17)

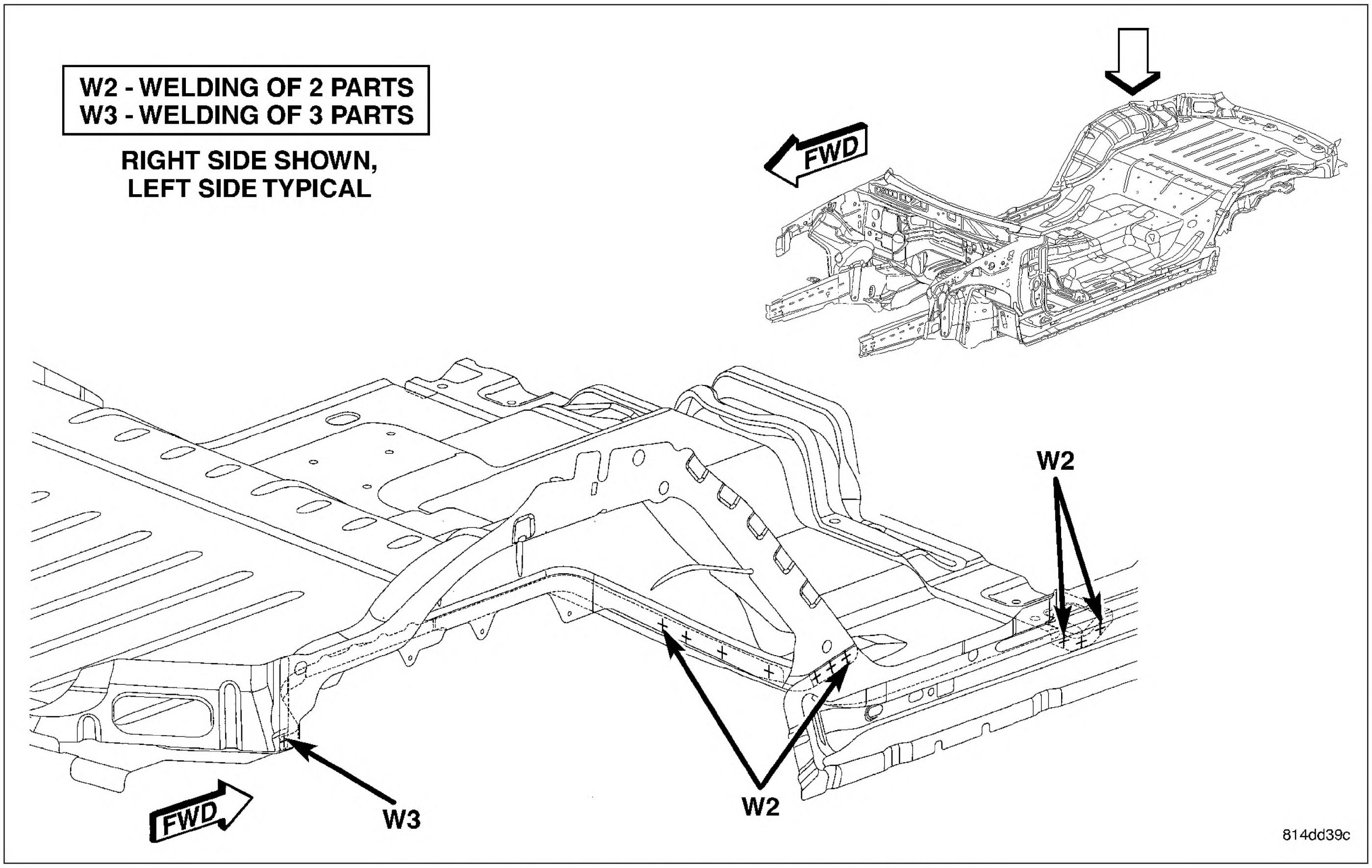

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W2
FWD
W3
W2
814dd39c

Fig. 113 UNDERBODY COMPLETE (16 OF 17)

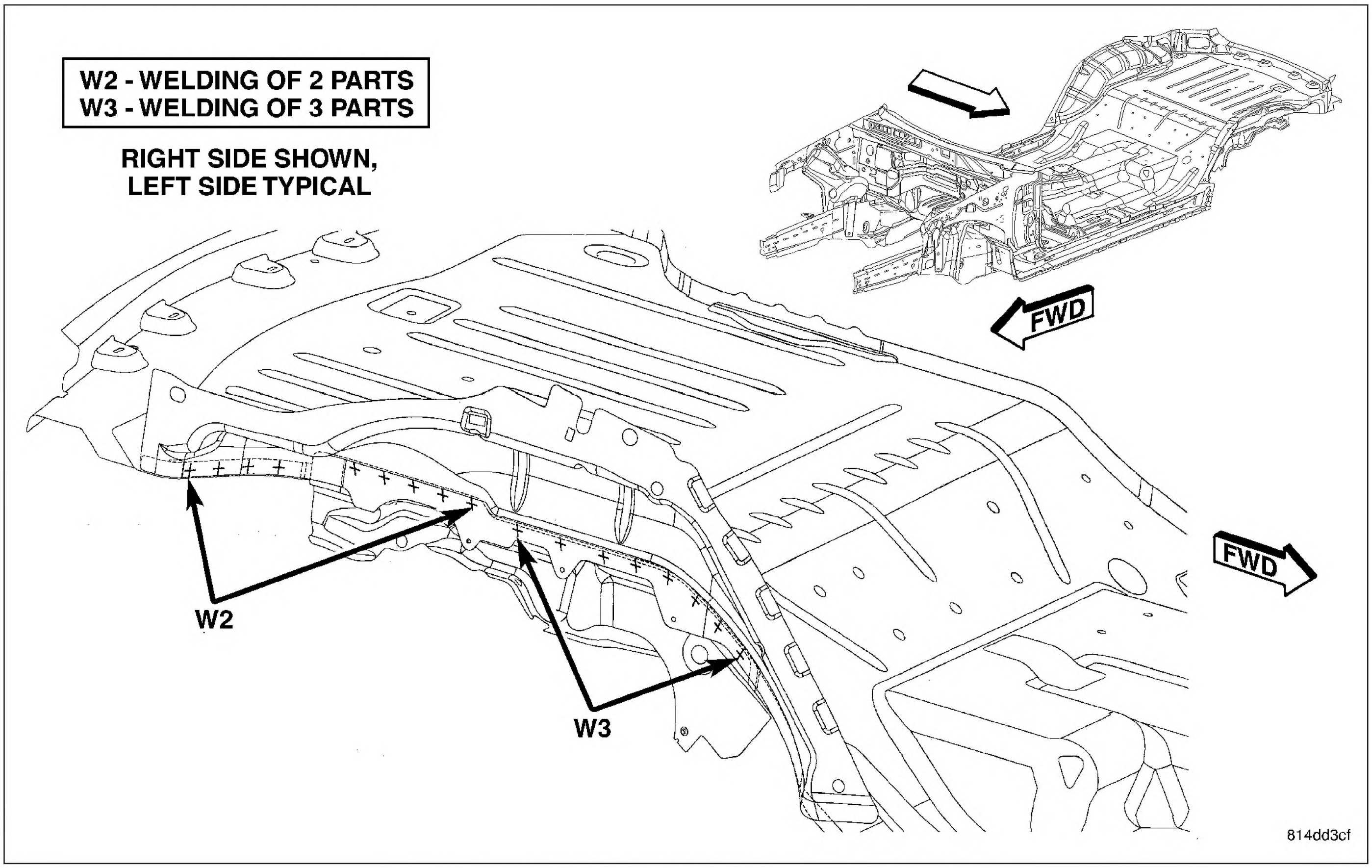

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
FWD
FWD
W2
W3
814dd3cf

Fig. 114 UNDERBODY COMPLETE (17 OF 17)

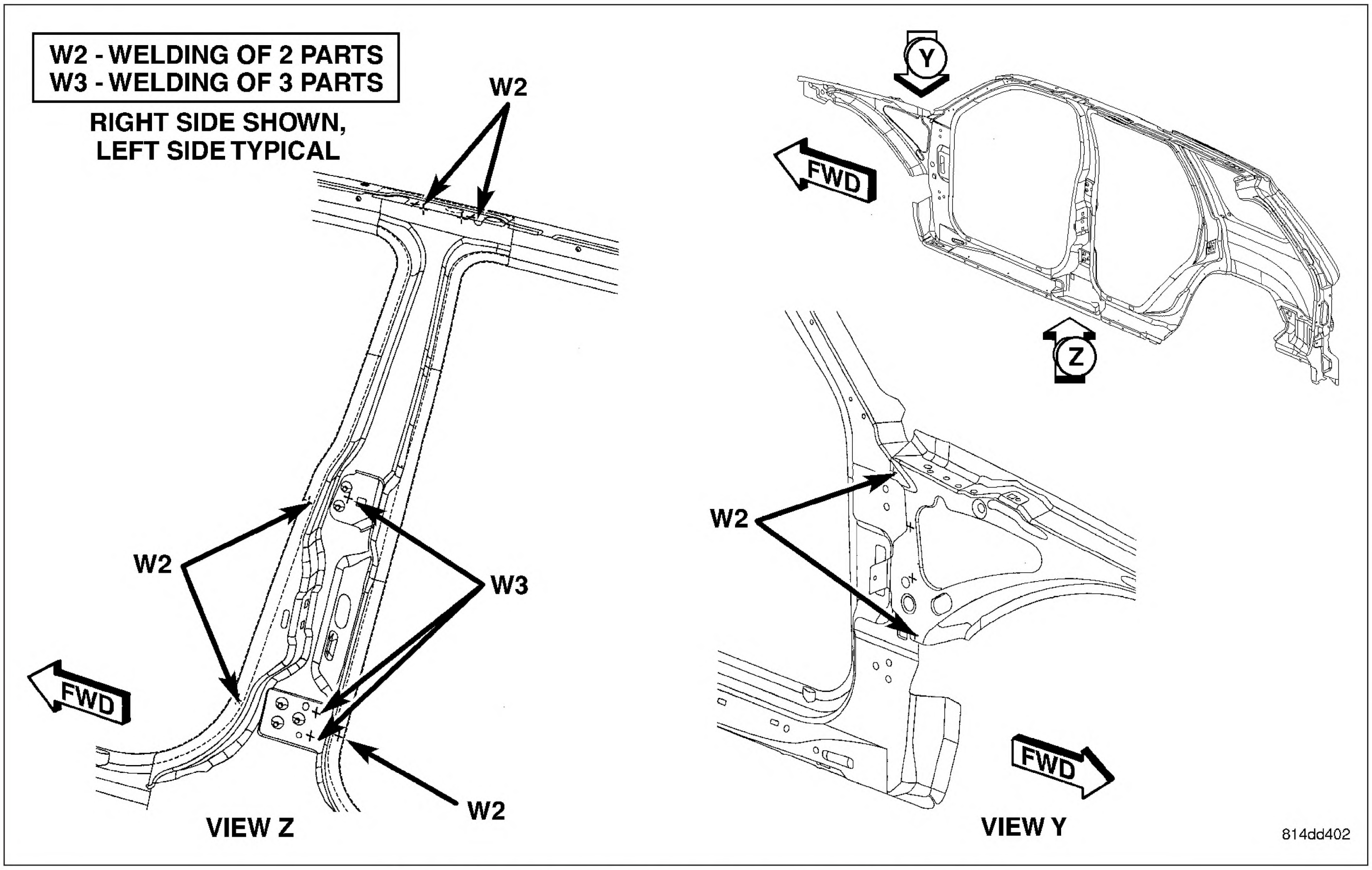

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
W2
Y
FWD
Z
W2
W3
W2
FWD
W2
FWD
VIEW Z
VIEW Y
814dd402

Fig. 115 BODY SIDE APERTURE - OUTER (1 OF 3)

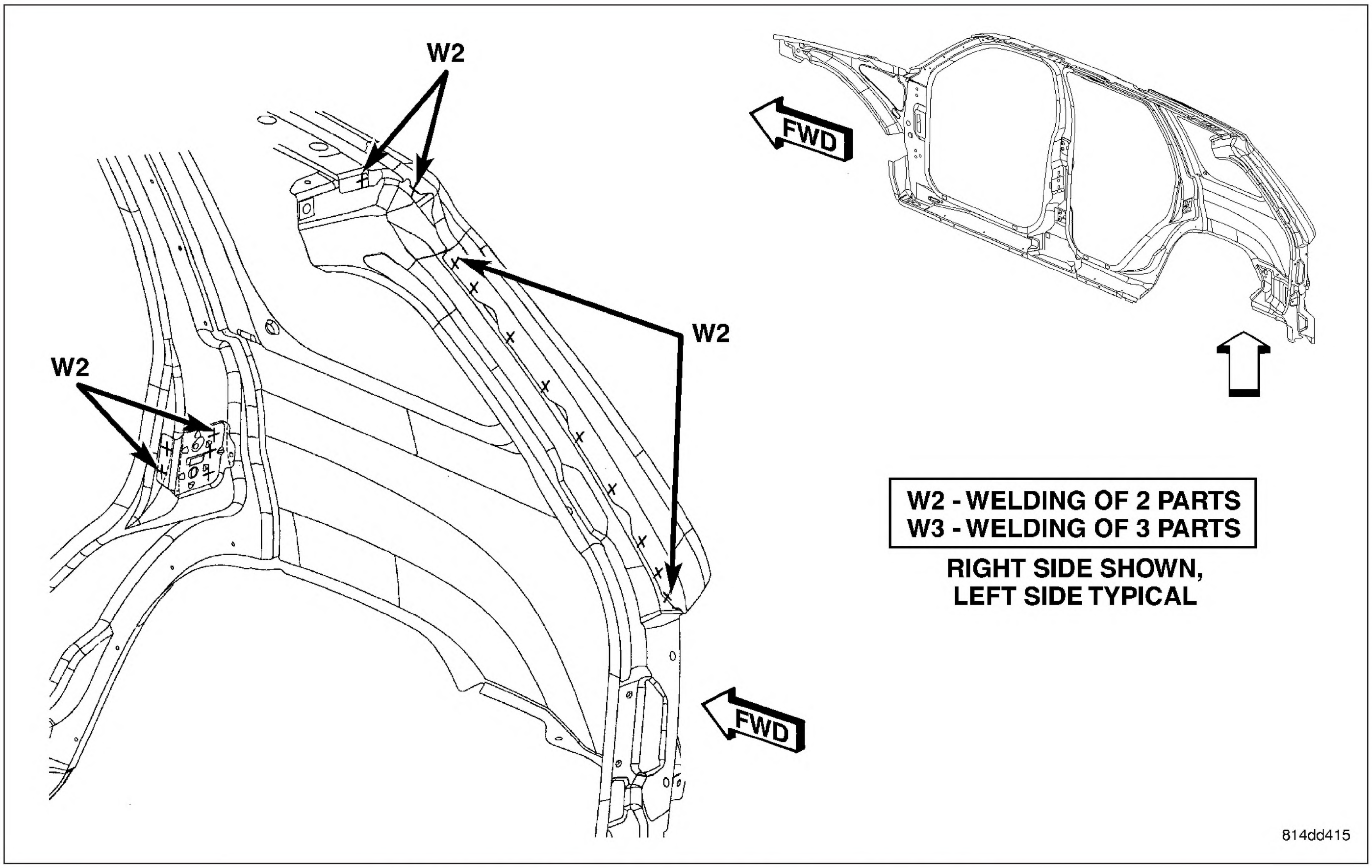

W2
W2
W2
FWD
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
814dd415

Fig. 116 BODY SIDE APERTURE - OUTER (2 OF 3)

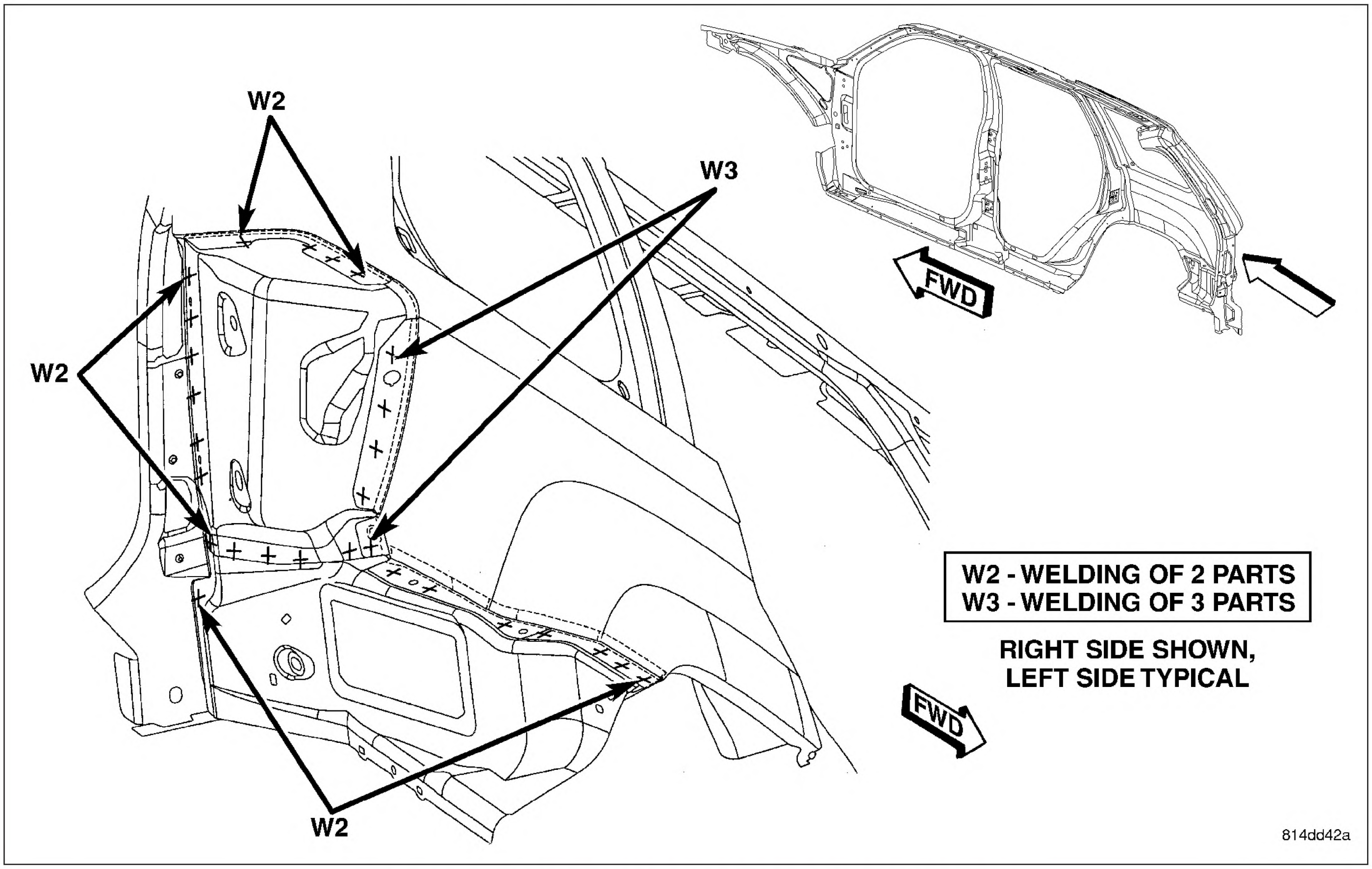

W2
W3
W2
W2
FWD
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
814dd42a

Fig. 117 BODY SIDE APERTURE - OUTER (3 OF 3)

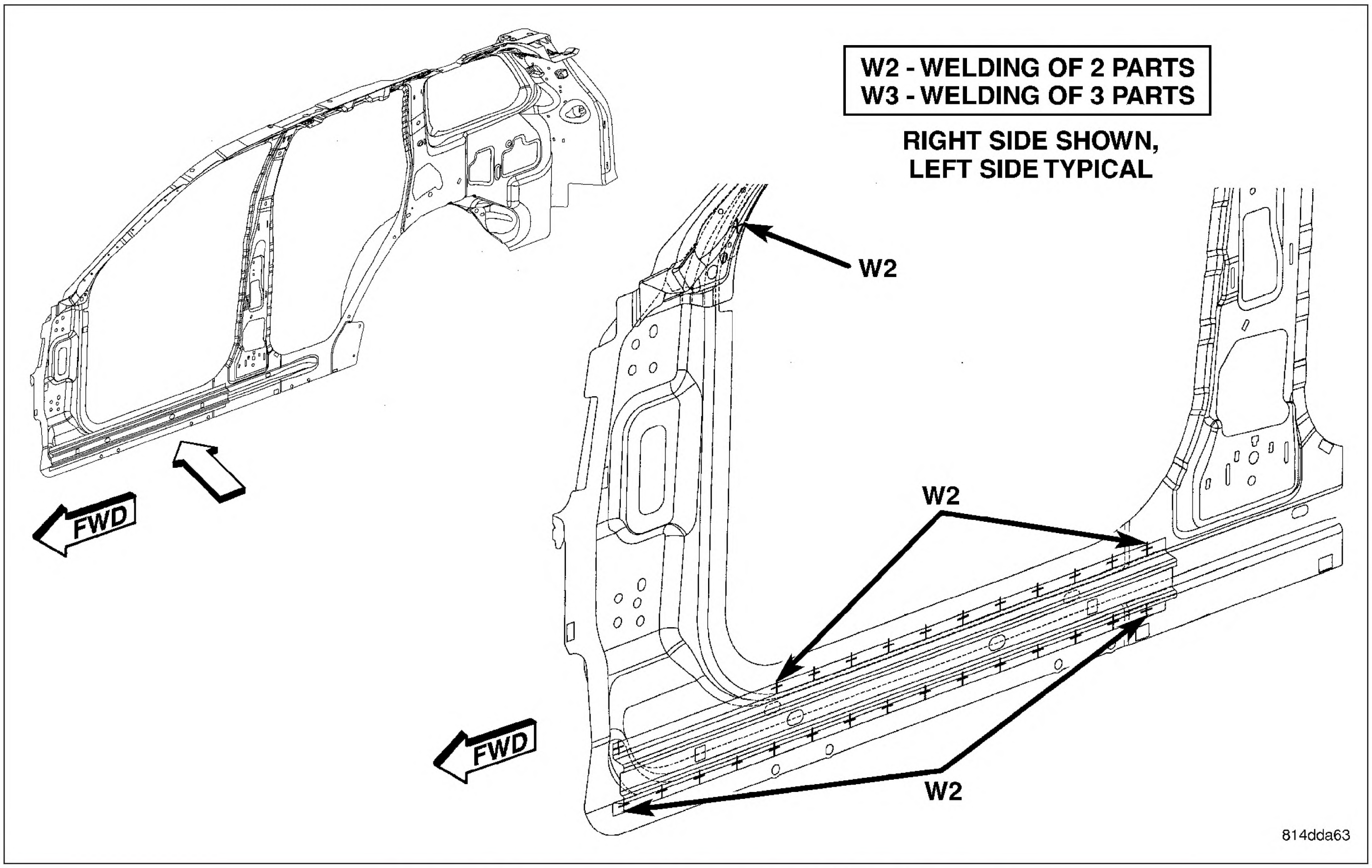

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
W2
W2
FWD
FWD
814dda63

Fig. 118 BODY SIDE APERTURE - INNER (1 OF 4)

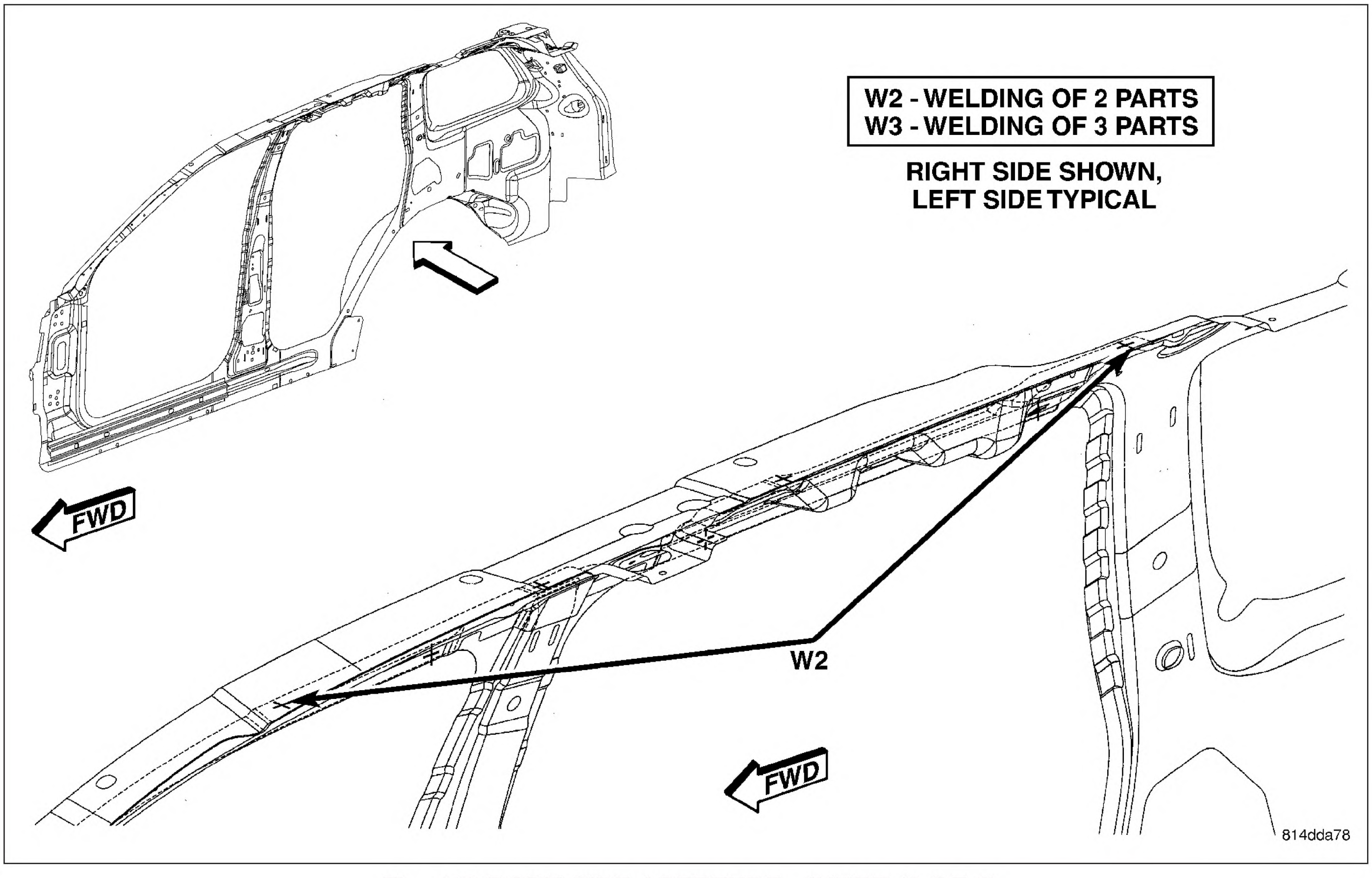

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
FWD
FWD
814dda78

Fig. 119 BODY SIDE APERTURE - INNER (2 OF 4)

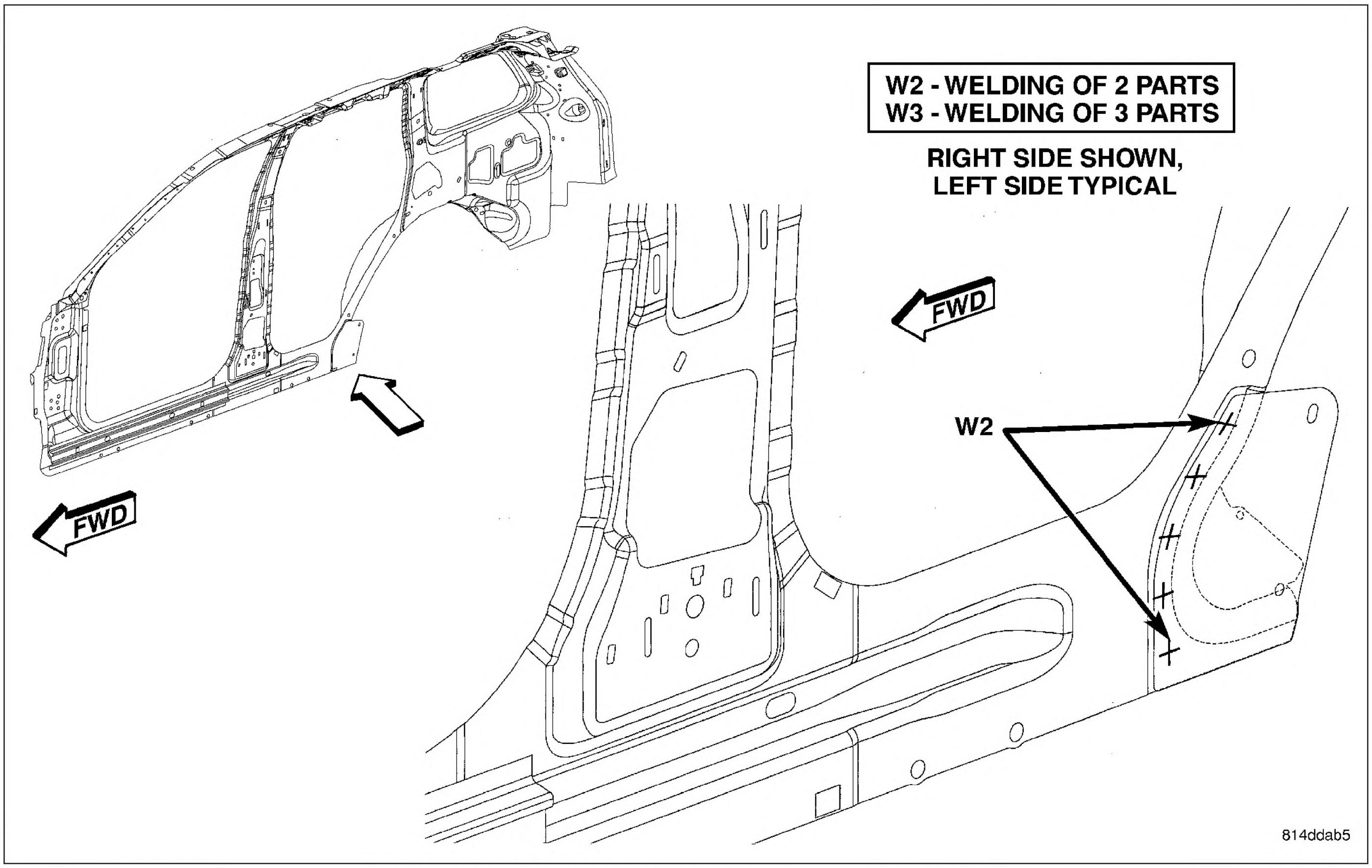

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
FWD
FWD
W2
814ddab5

Fig. 120 BODY SIDE APERTURE - INNER (3 OF 4)

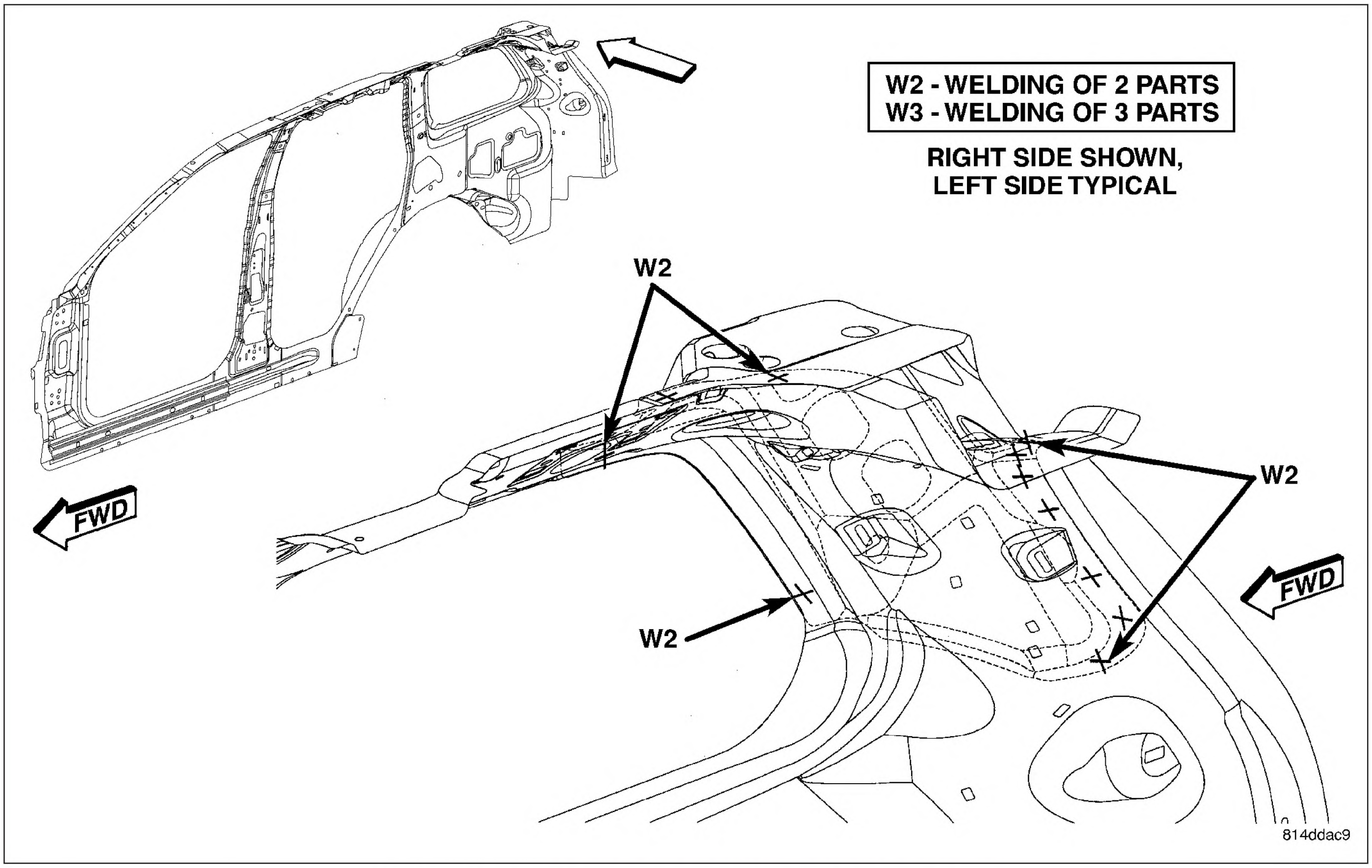

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
W2
W2
W2
FWD
FWD
814ddac9

Fig. 121 BODY SIDE APERTURE - INNER (4 OF 4)

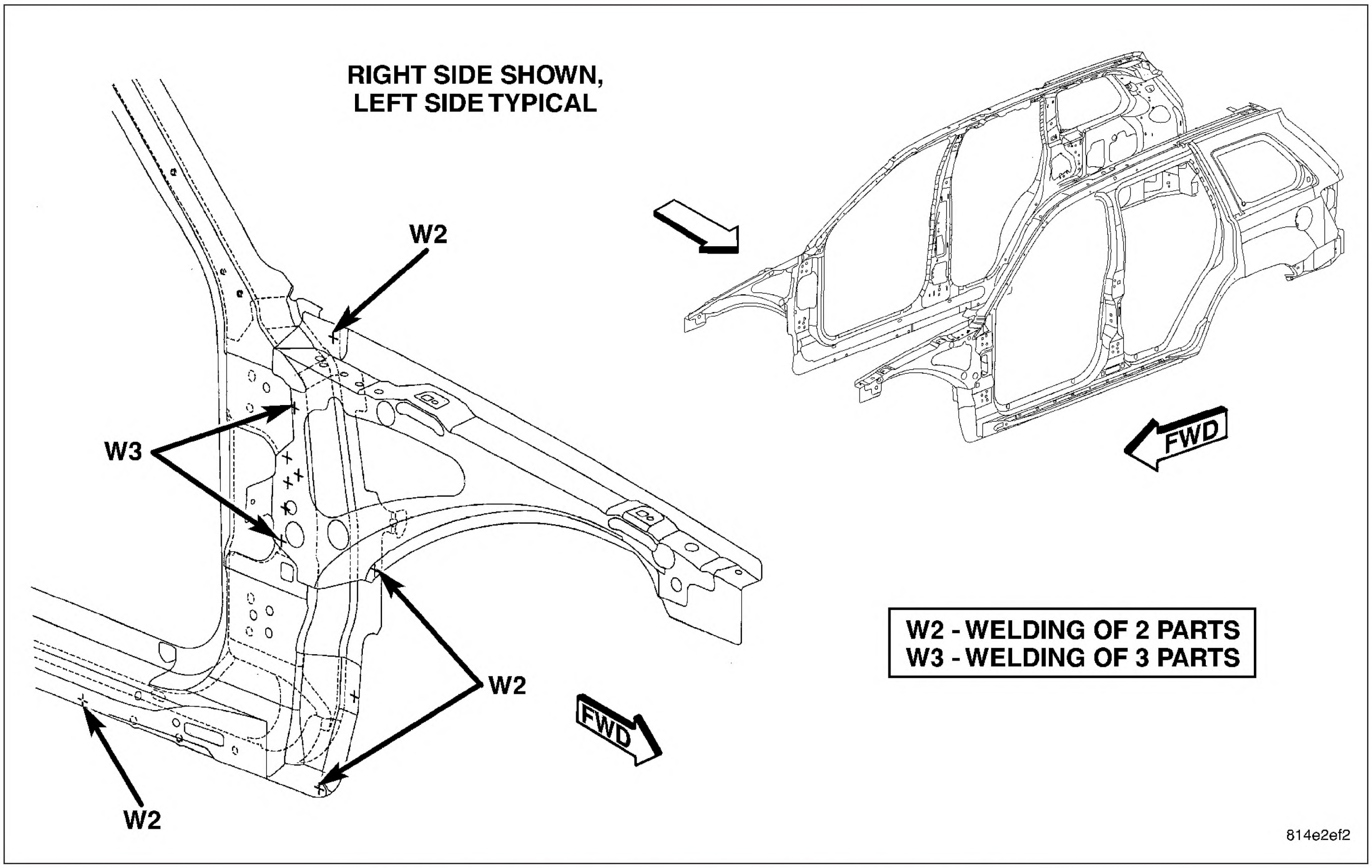

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
W3
W2
W2
FWD
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
814e2ef2

Fig. 122 BODY SIDE APERTURE - COMPLETE (1 OF 9)

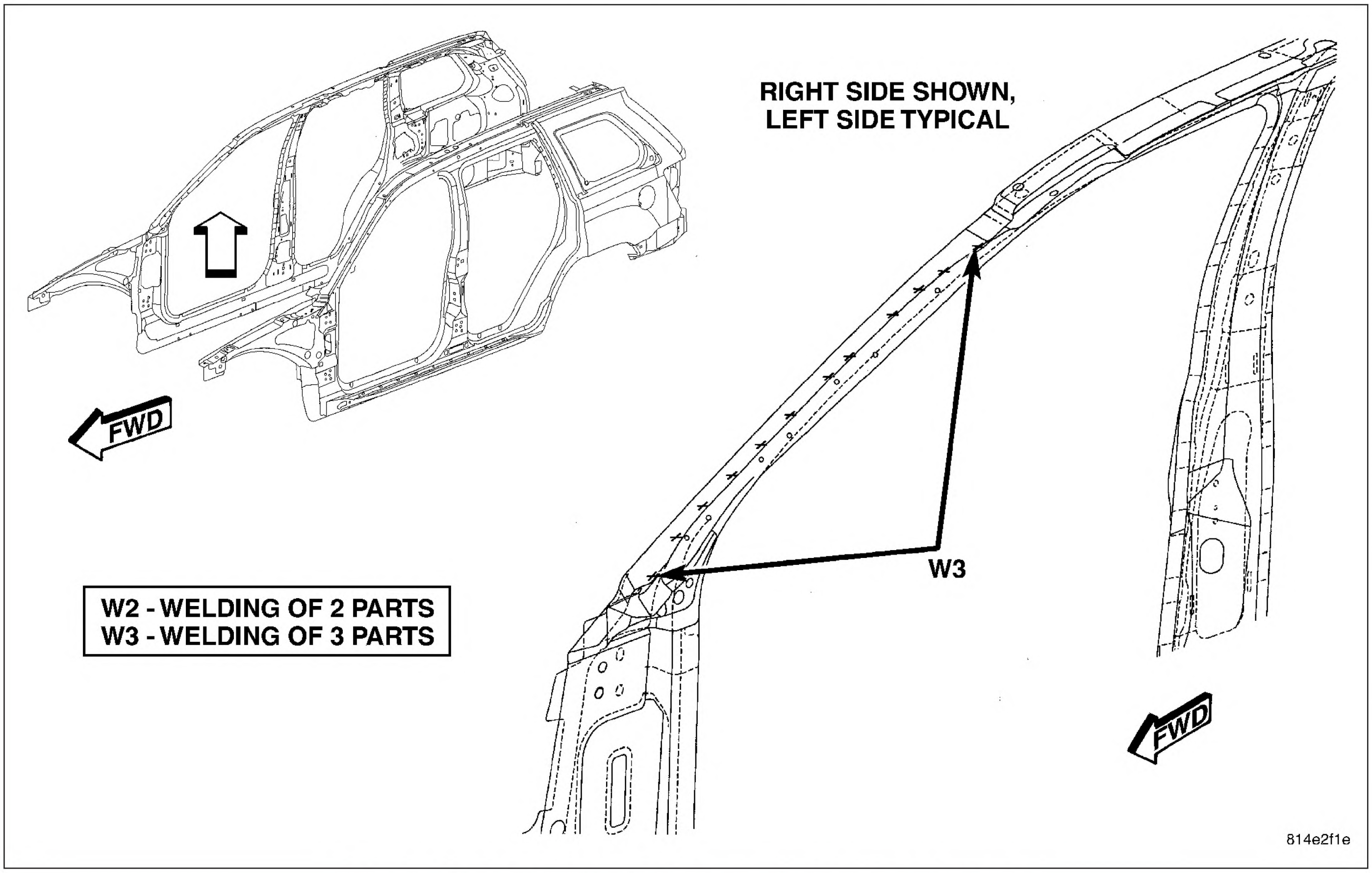

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W3
FWD
814e2f1e

Fig. 123 BODY SIDE APERTURE - COMPLETE (2 OF 9)

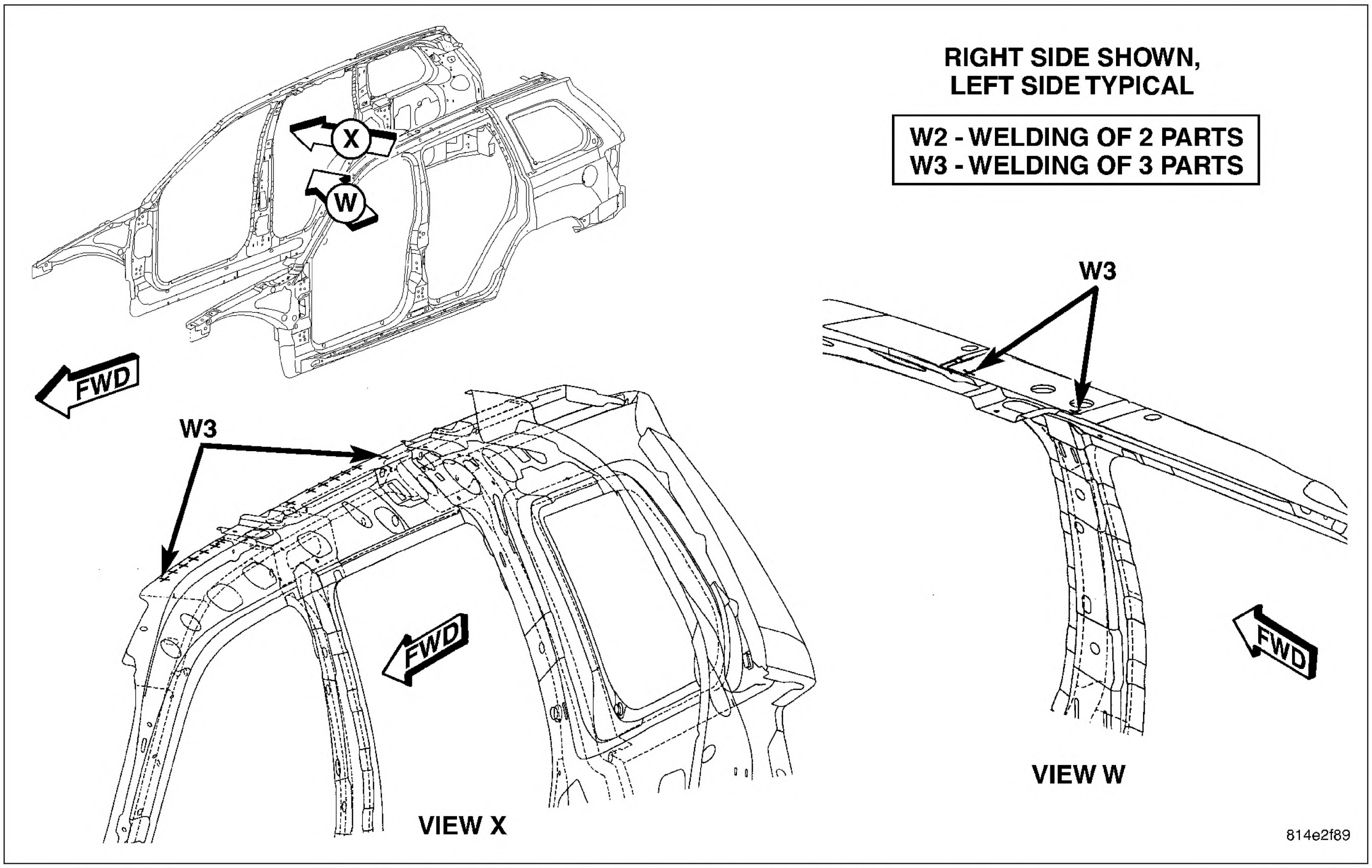

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
X
W
FWD
W3
W3
FWD
FWD
VIEW X
VIEW W
814e2f89

Fig. 124 BODY SIDE APERTURE - COMPLETE (3 OF 9)

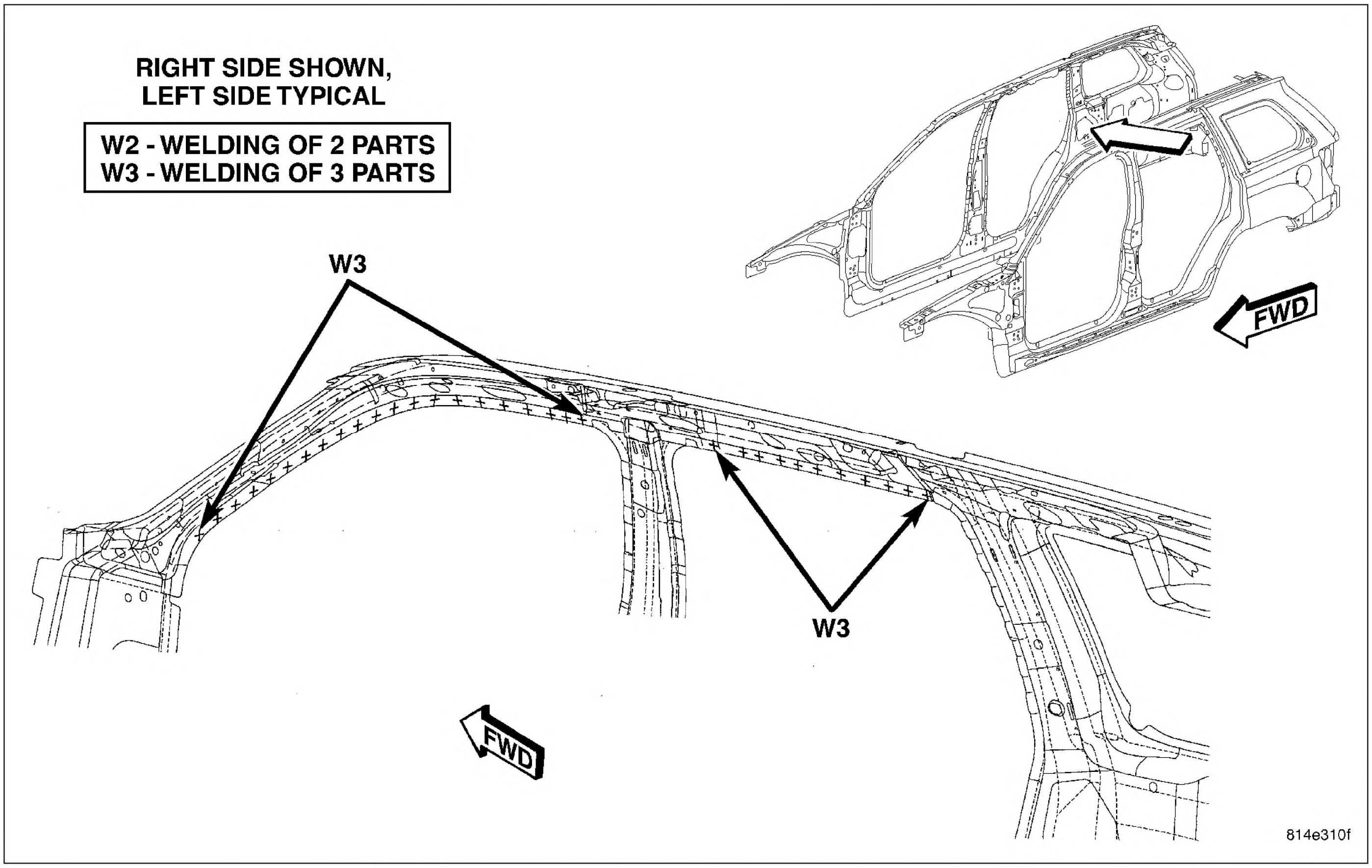

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W3
FWD
W3
FWD
814e310f

Fig. 125 BODY SIDE APERTURE - COMPLETE (4 OF 9)

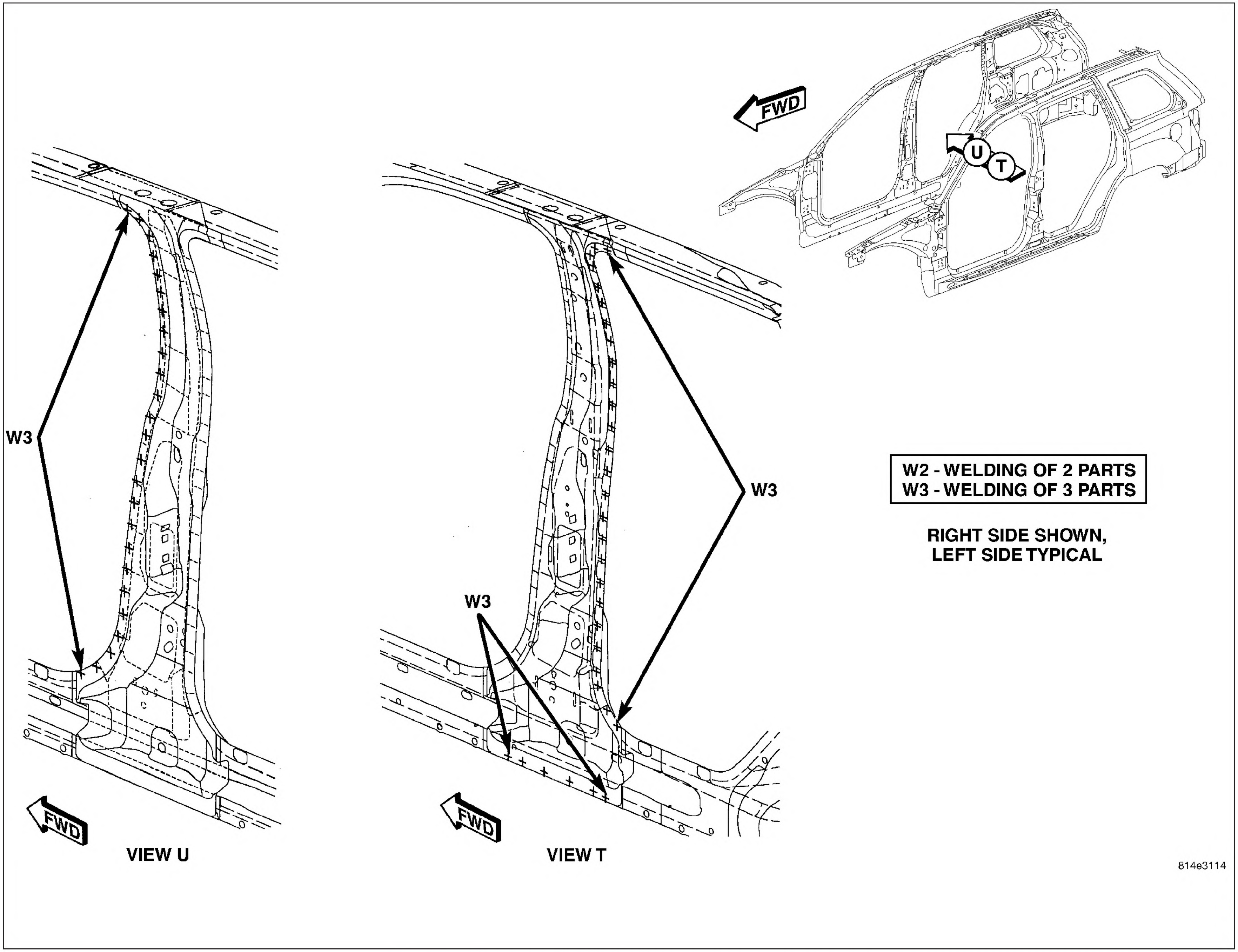

FWD
U
T
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W3
W3
W3
FWD
VIEW U
FWD
VIEW T
814e3114

Fig. 126 BODY SIDE APERTURE - COMPLETE (5 OF 9)

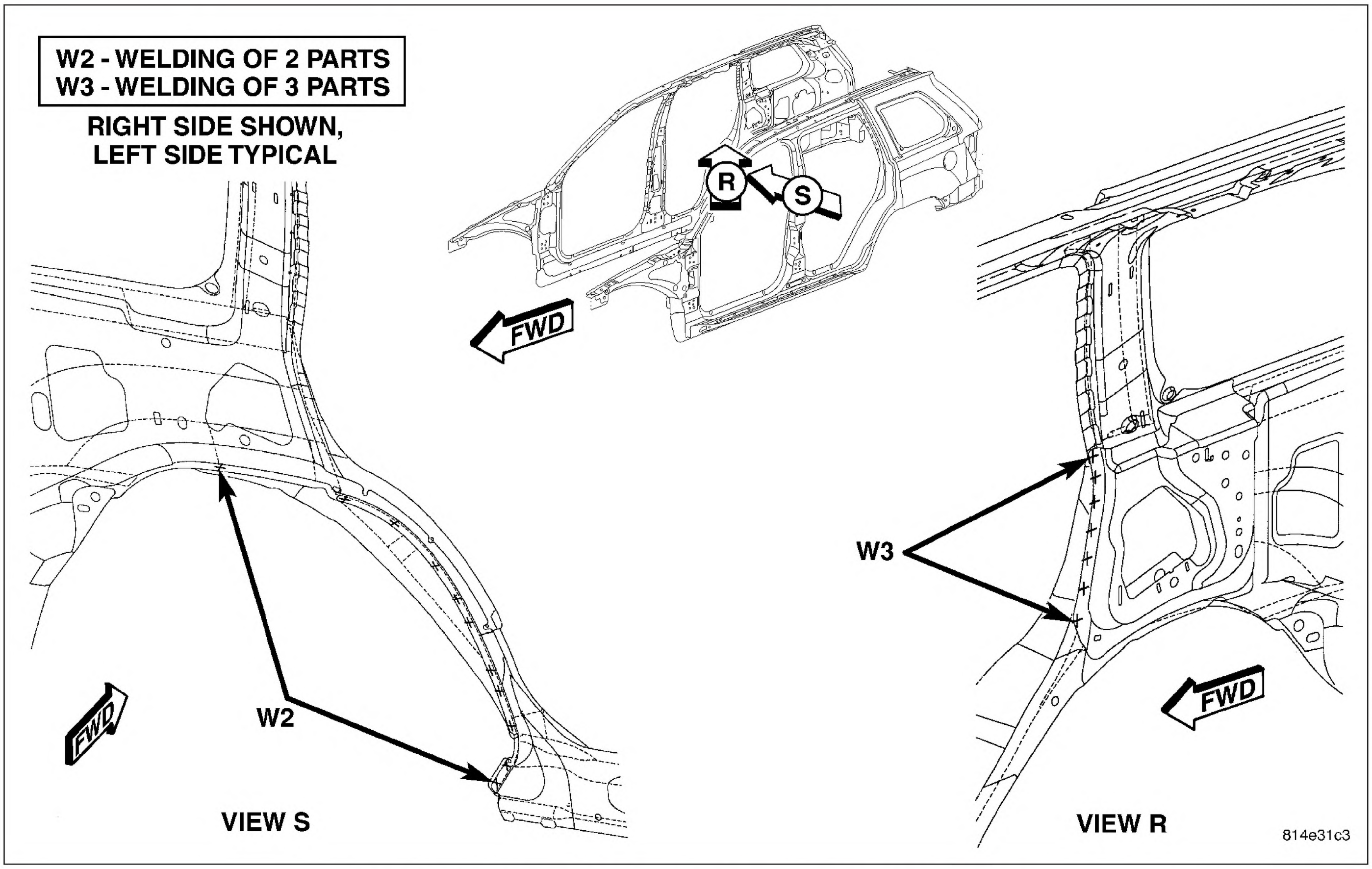

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
R
S
FWD
W2
FWD
VIEW S
W3
FWD
VIEW R
814e31c3

Fig. 127 BODY SIDE APERTURE - COMPLETE (6 OF 9)

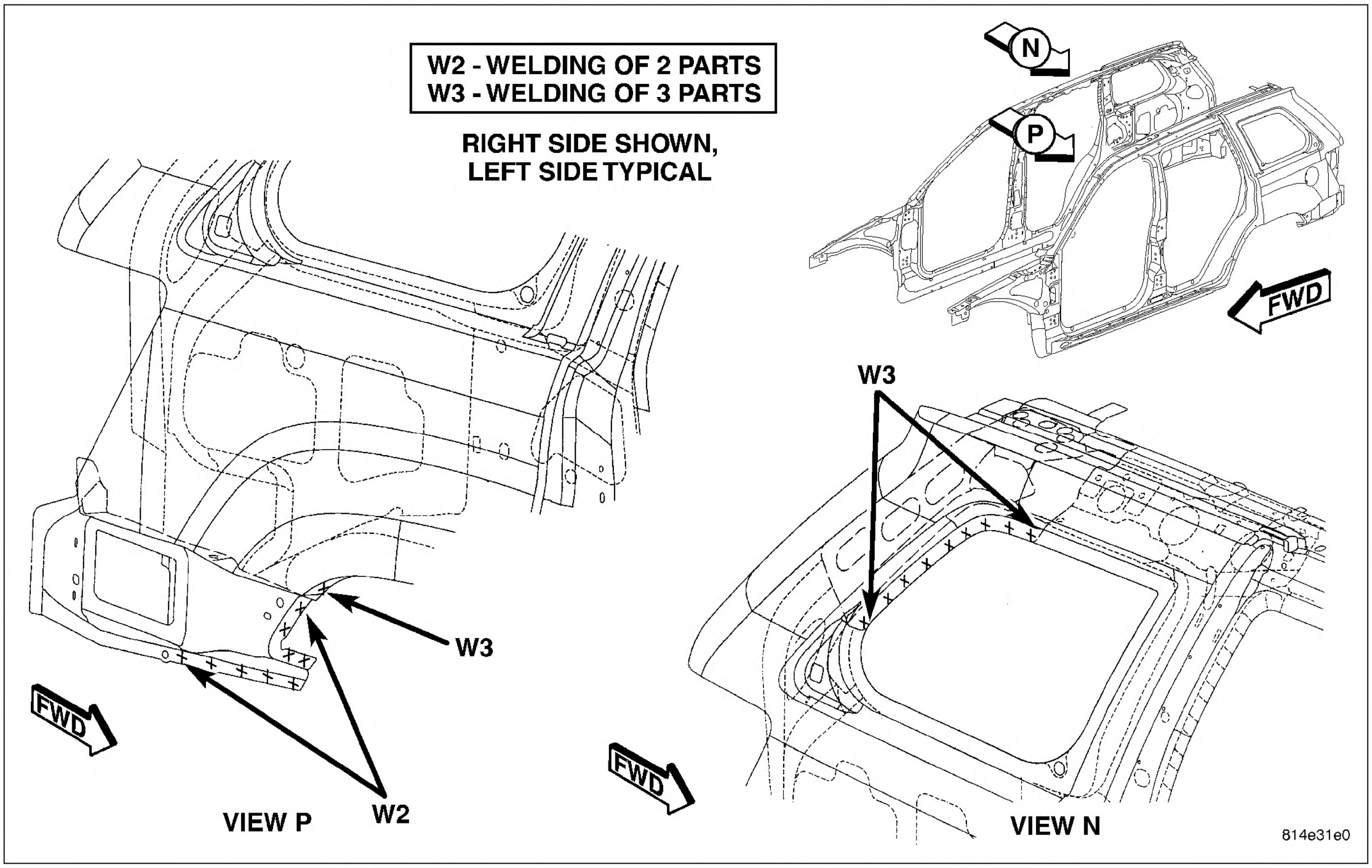

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
N
P
FWD
W3
W3
FWD
W2
VIEW P
FWD
VIEW N
814e31e0

Fig. 128 BODY SIDE APERTURE - COMPLETE (7 OF 9)

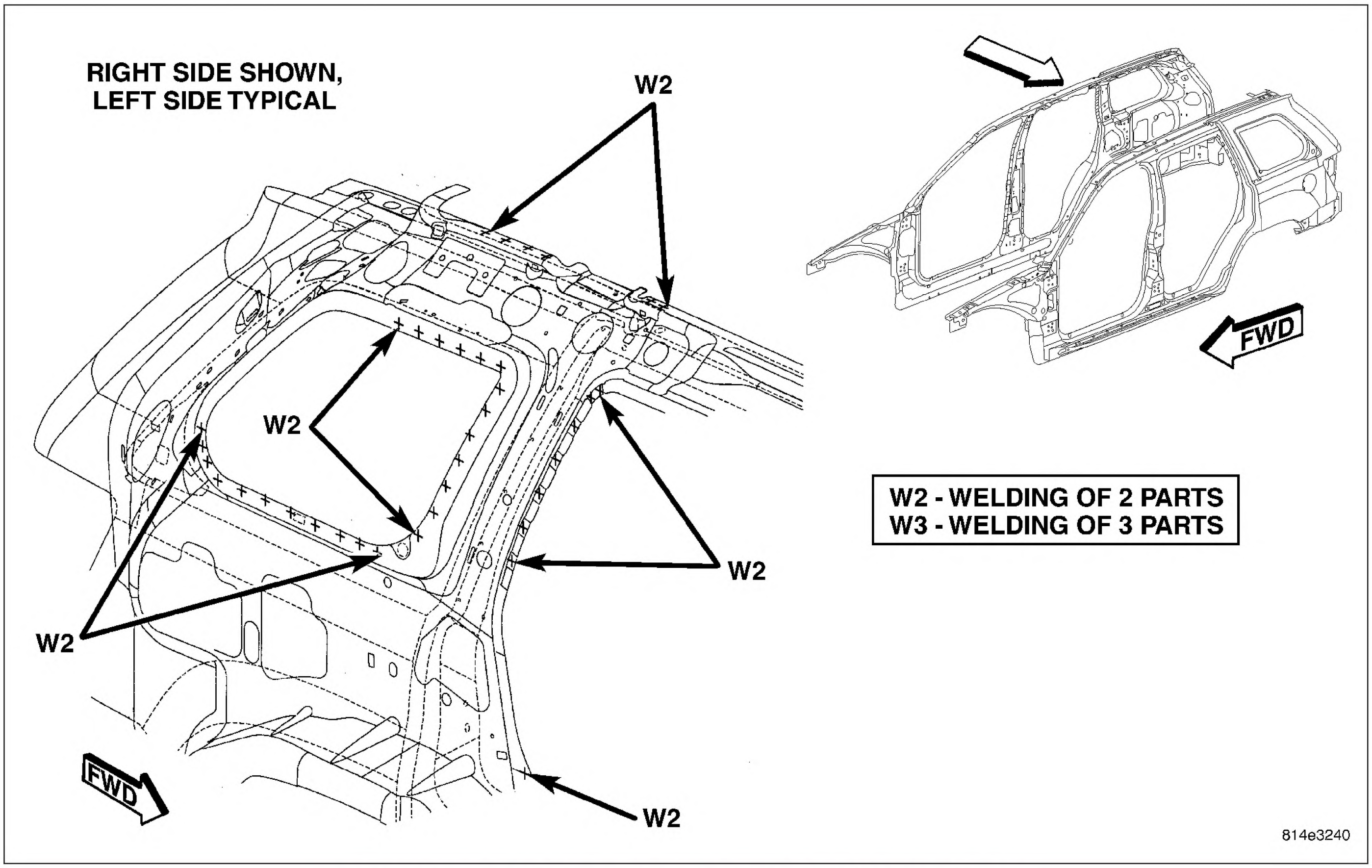

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
W2
W2
W2
W2
FWD
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
814e3240

Fig. 129 BODY SIDE APERTURE - COMPLETE (8 OF 9)

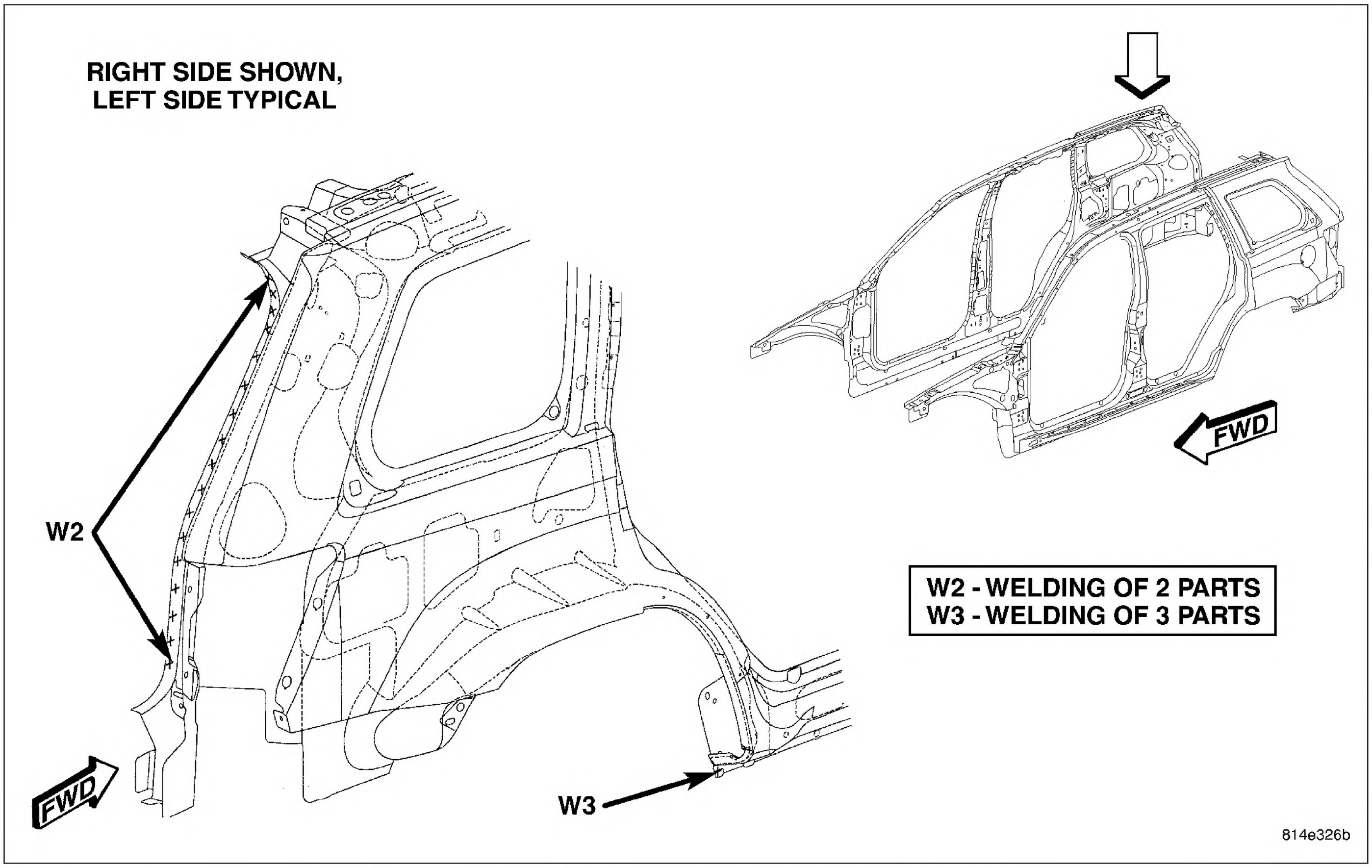

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
FWD
W3
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
814e326b

Fig. 130 BODY SIDE APERTURE - COMPLETE (9 OF 9)

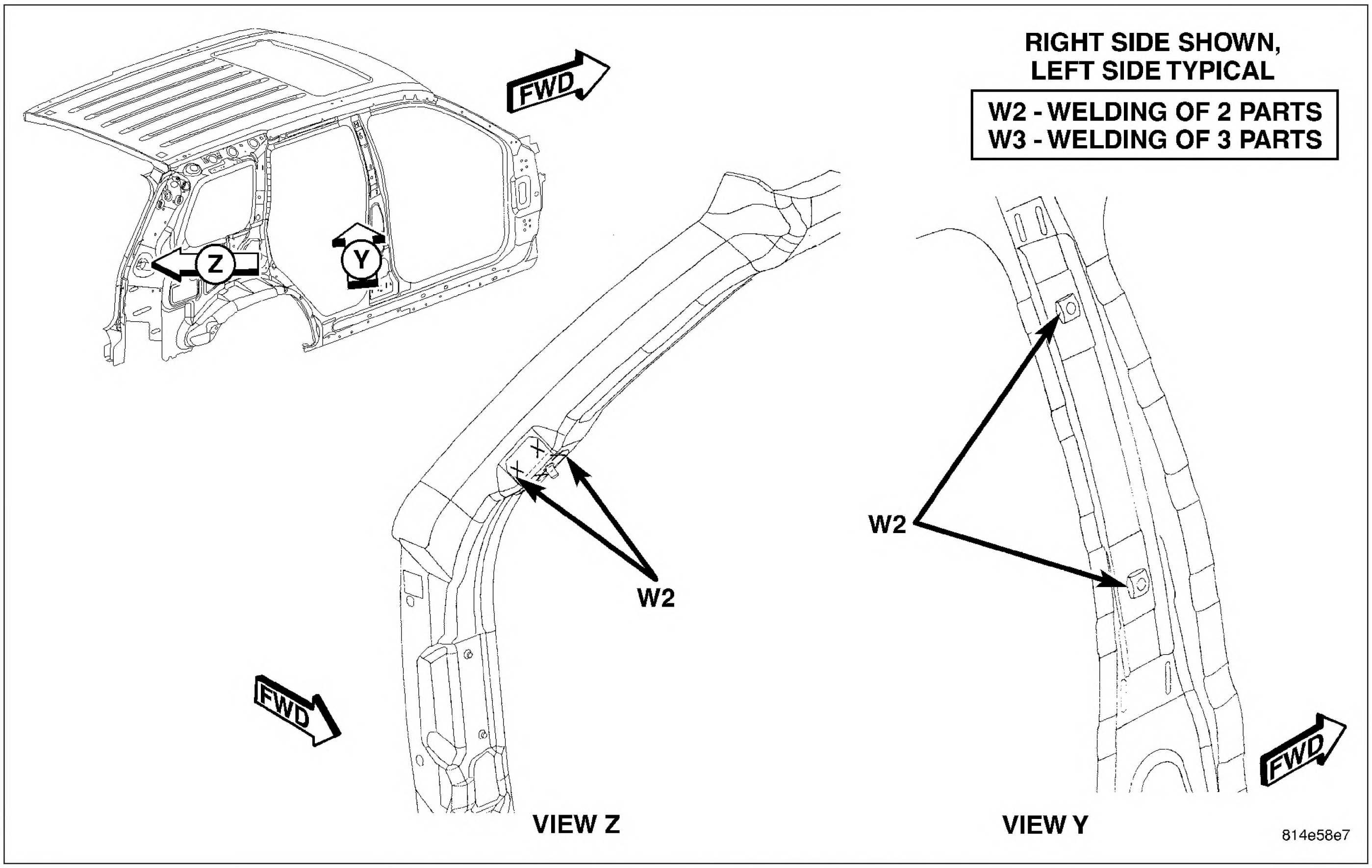

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
Z
Y
W2
W2
FWD
FWD
VIEW Z
VIEW Y
814e58e7

Fig. 131 MISCELLANEOUS BODY (1 OF 9)

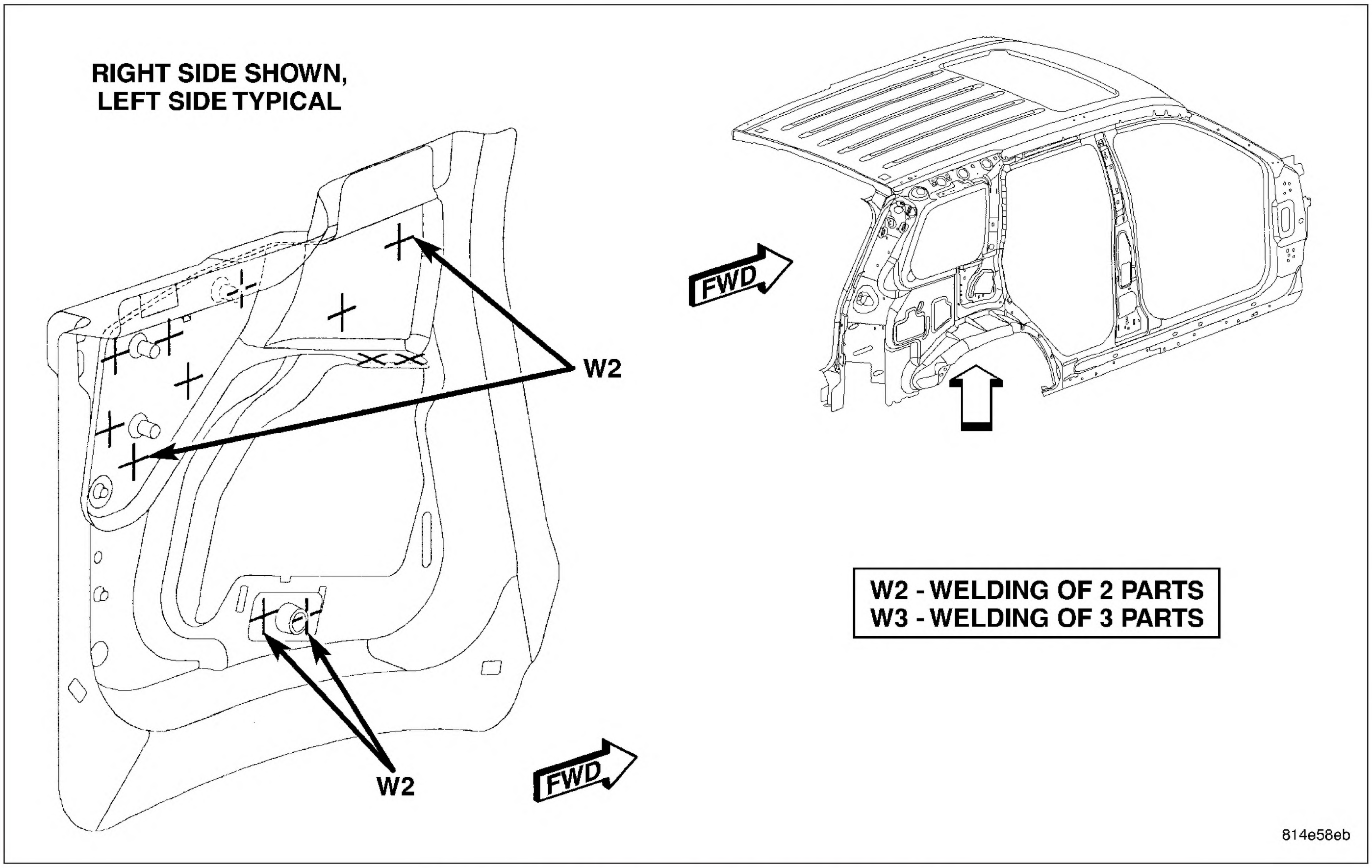

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
W2
FWD
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
814e58eb

Fig. 132 MISCELLANEOUS BODY (2 OF 9)

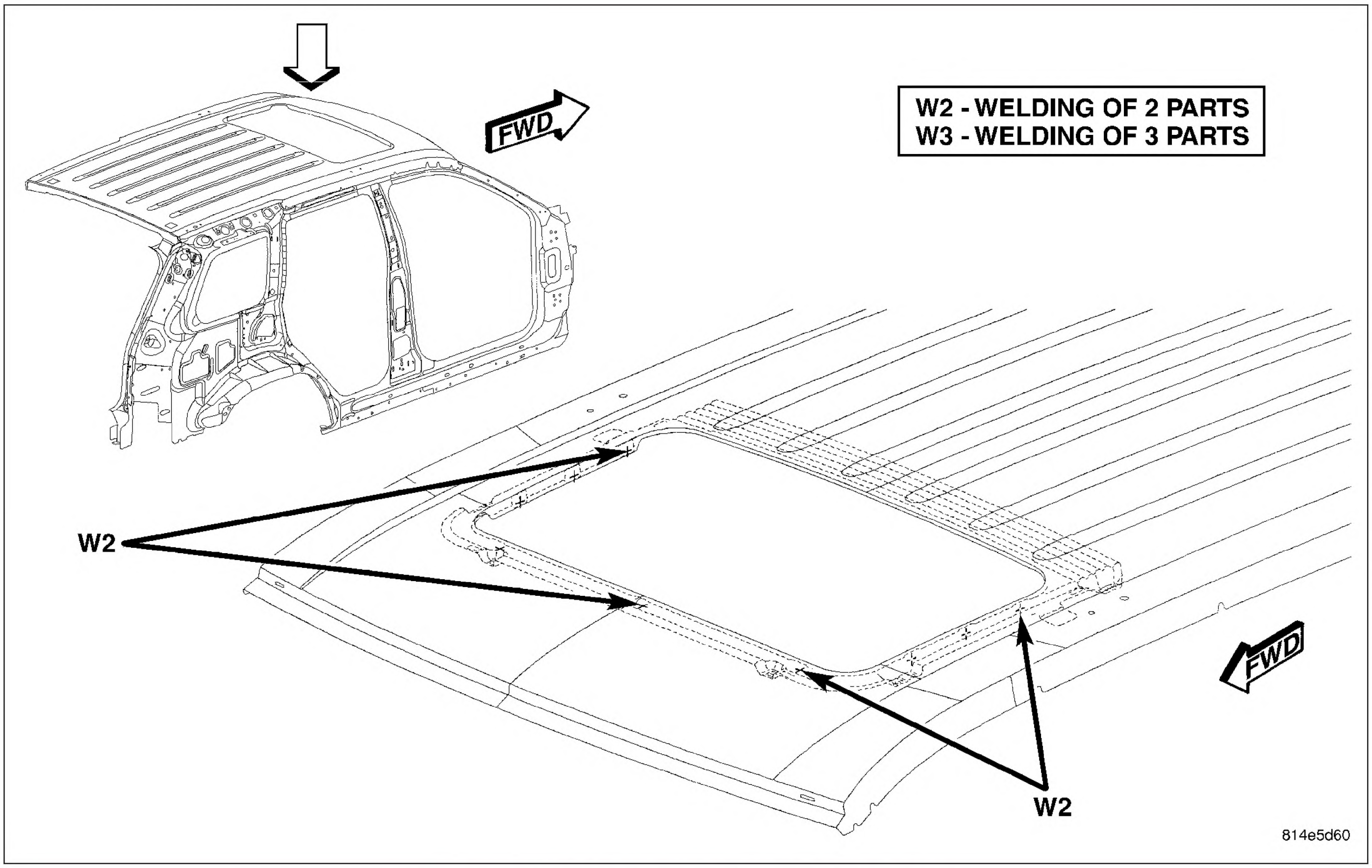

FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
FWD
814e5d60

Fig. 133 MISCELLANEOUS BODY (3 OF 9)

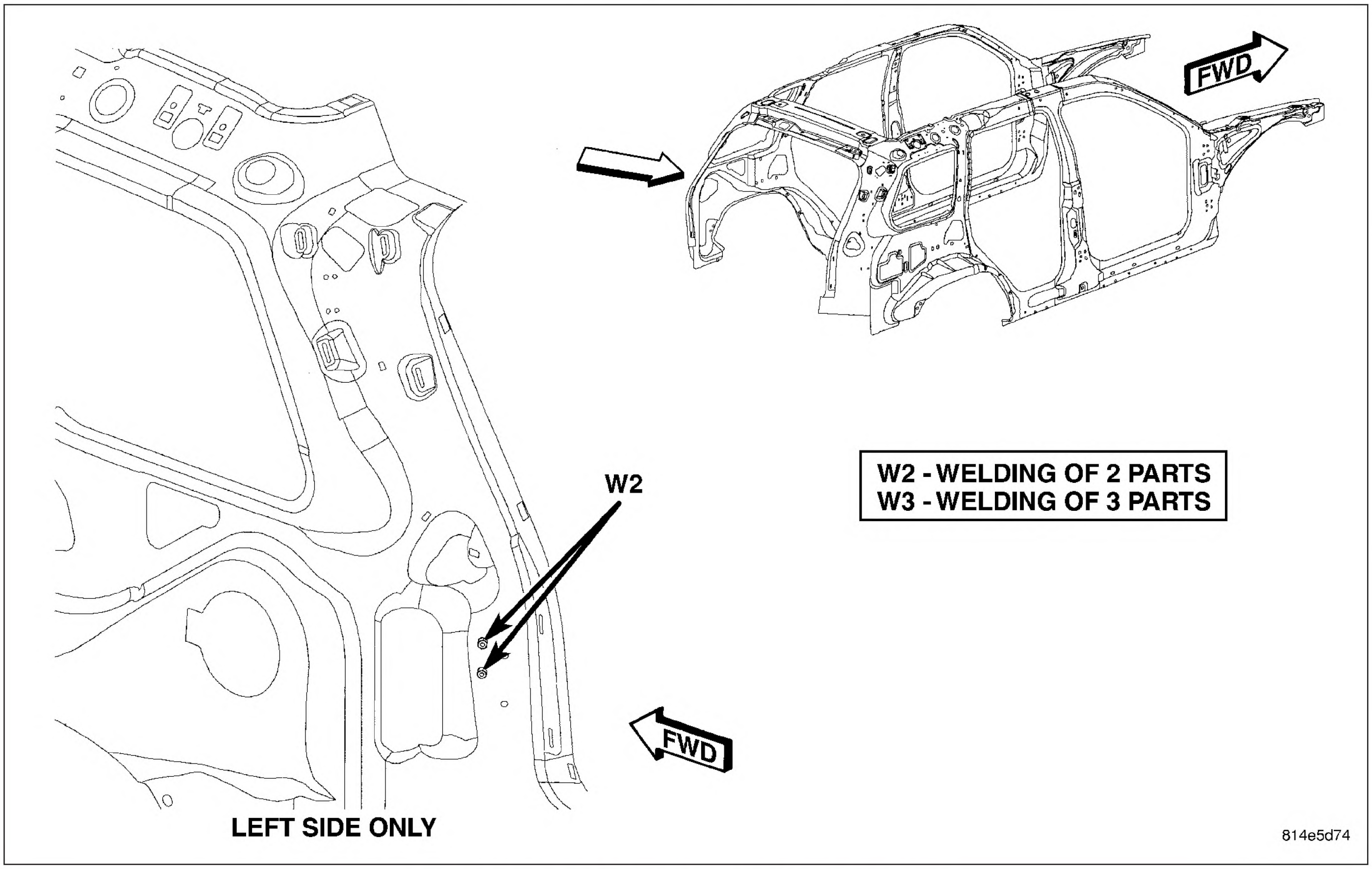

FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
FWD
LEFT SIDE ONLY
814e5d74

Fig. 134 MISCELLANEOUS BODY (4 OF 9)

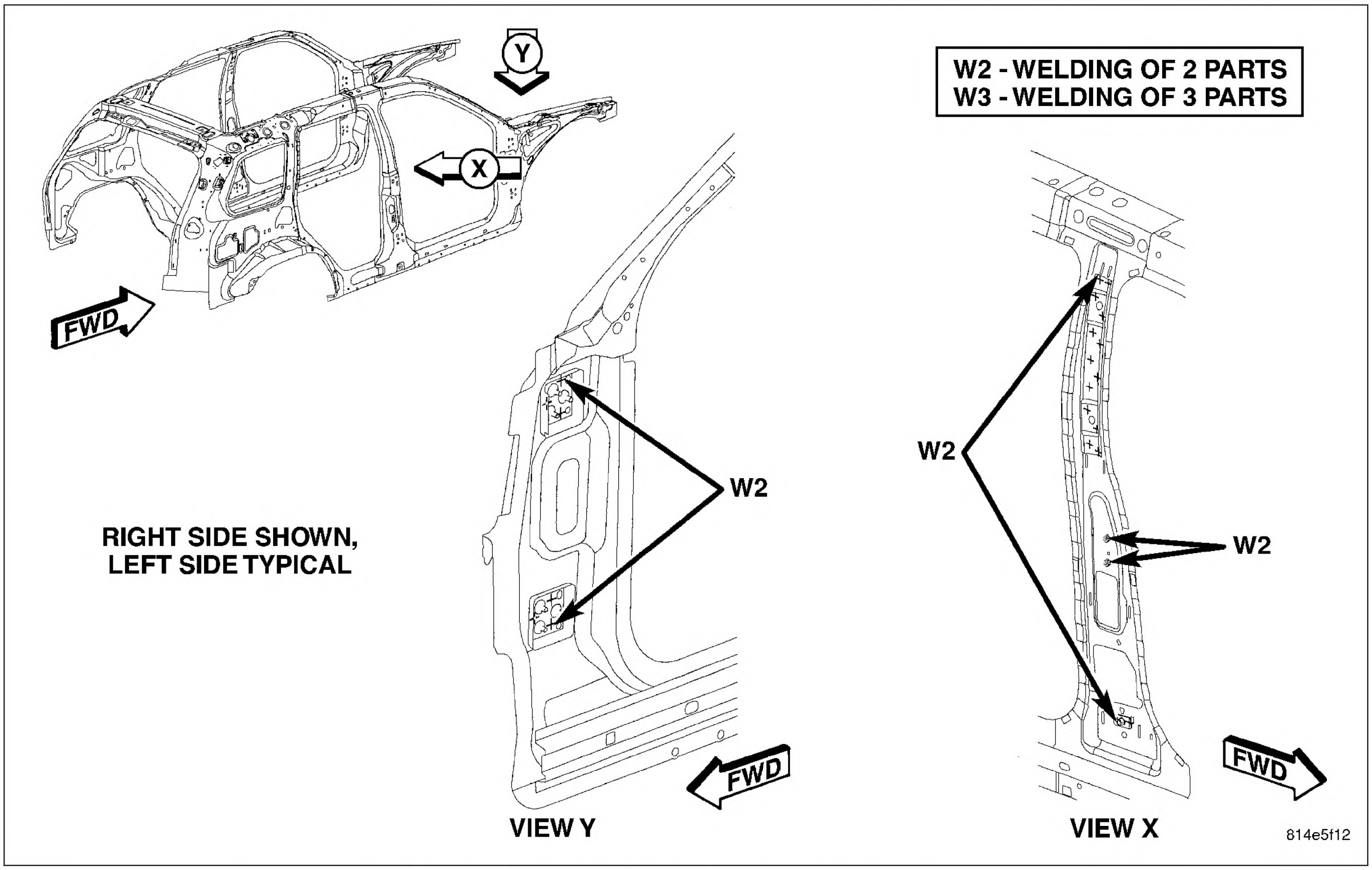

Y
X
FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
W2
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
FWD
VIEW Y
VIEW X
814e5f12

Fig. 135 MISCELLANEOUS BODY (5 OF 9)

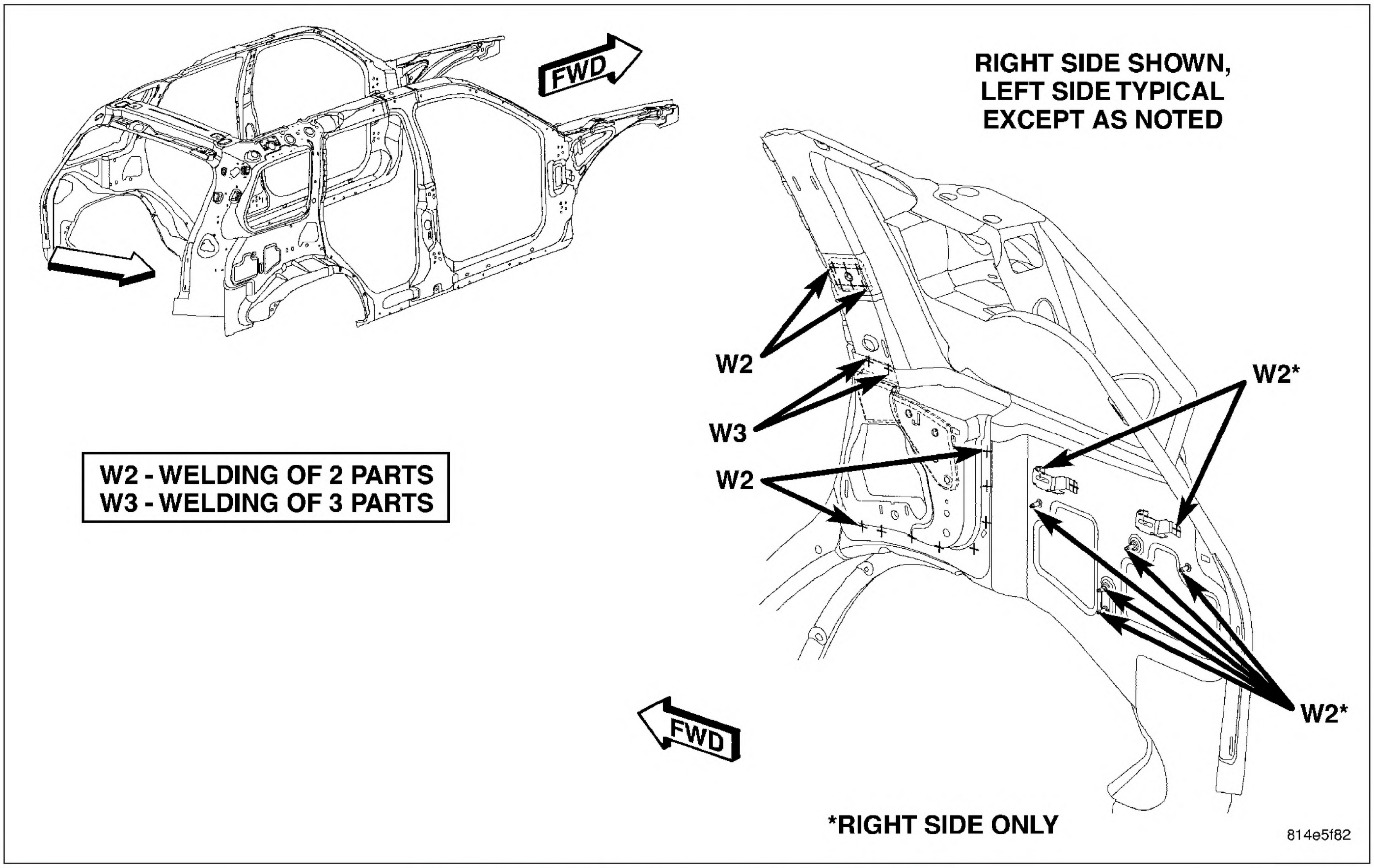

FWD
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
W2
W2*
W3
W2
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2*
FWD
*RIGHT SIDE ONLY
814e5f82

Fig. 136 MISCELLANEOUS BODY (6 OF 9)

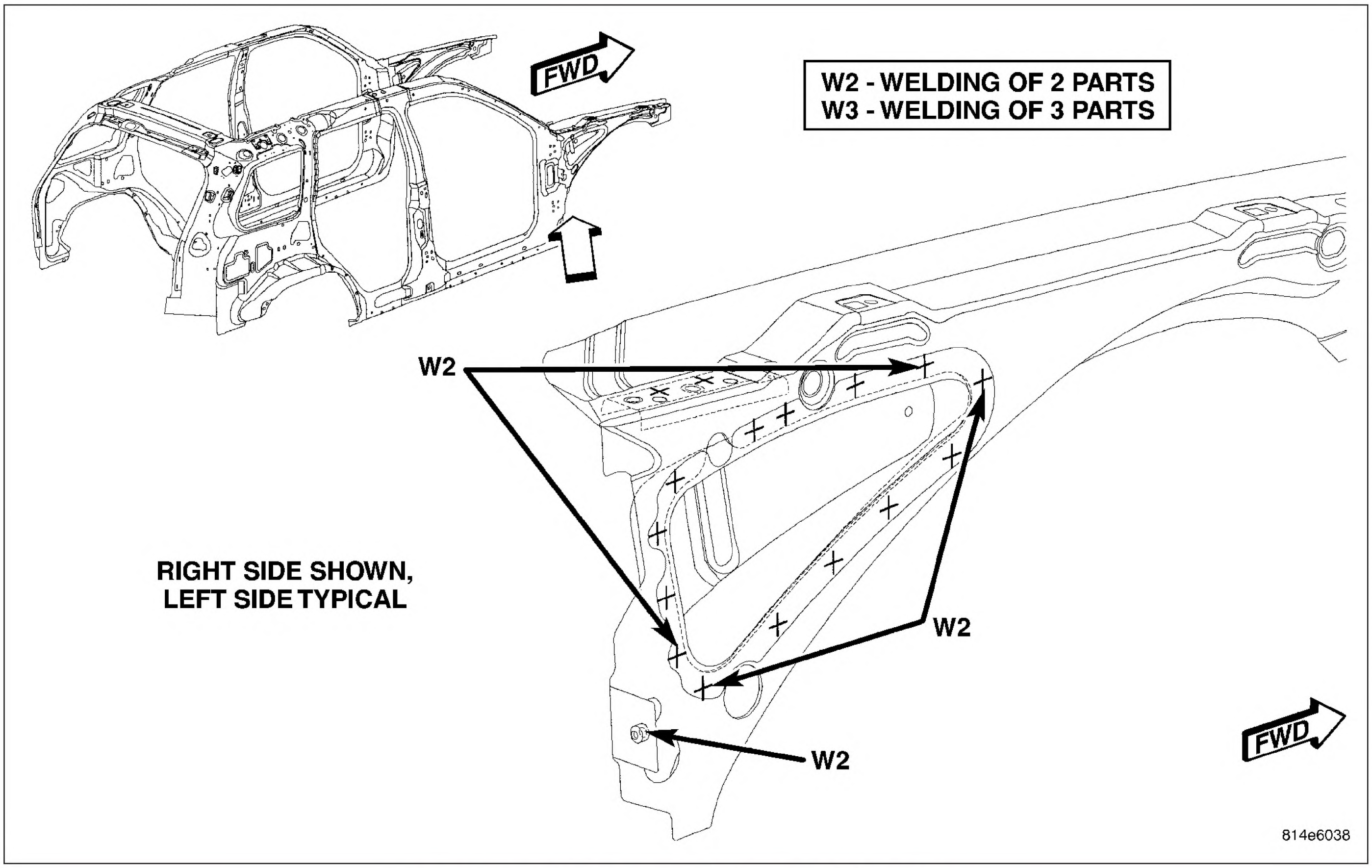

FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
W2
FWD
814e6038

Fig. 137 MISCELLANEOUS BODY (7 OF 9)

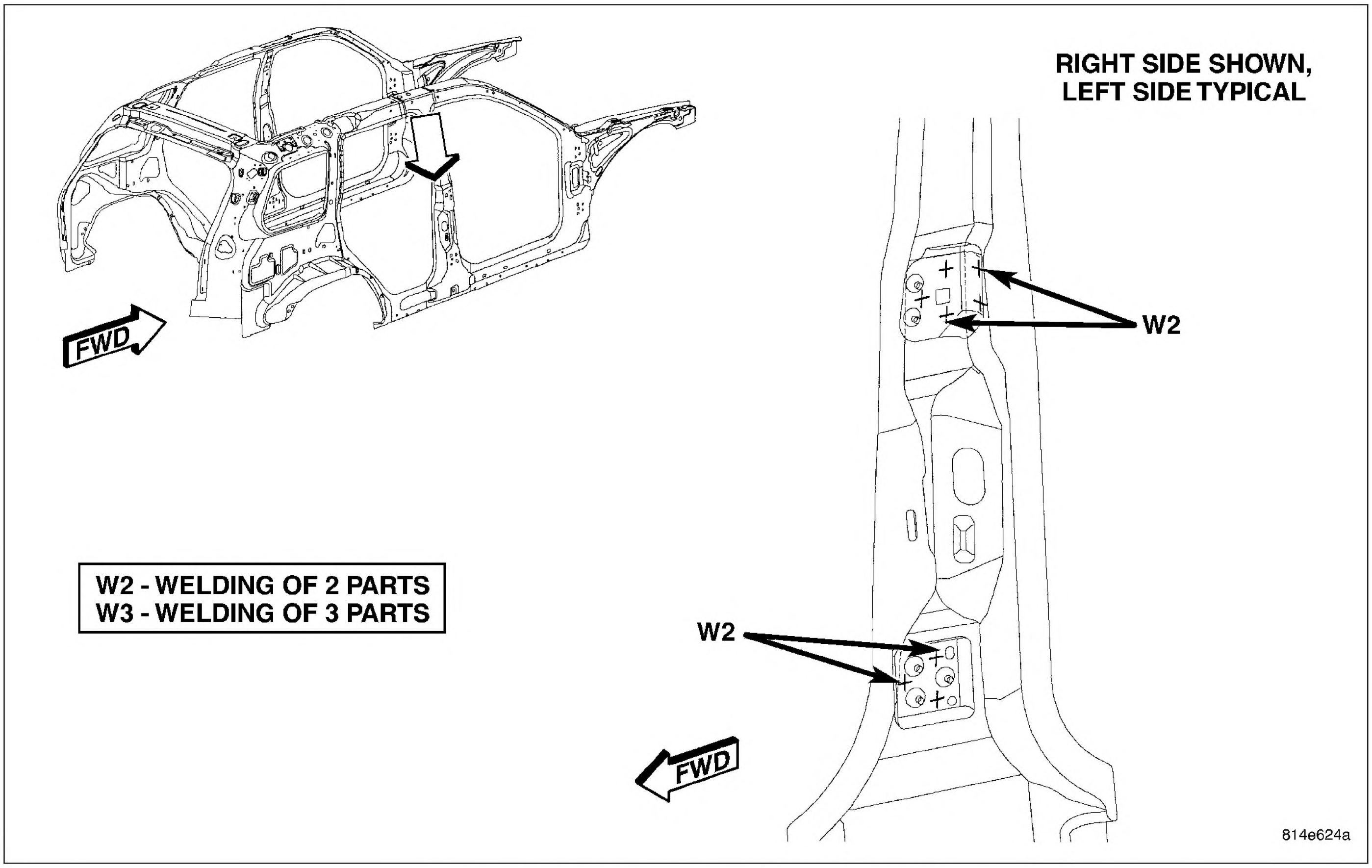

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W2
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
FWD
814e624a

Fig. 138 MISCELLANEOUS BODY (8 OF 9)

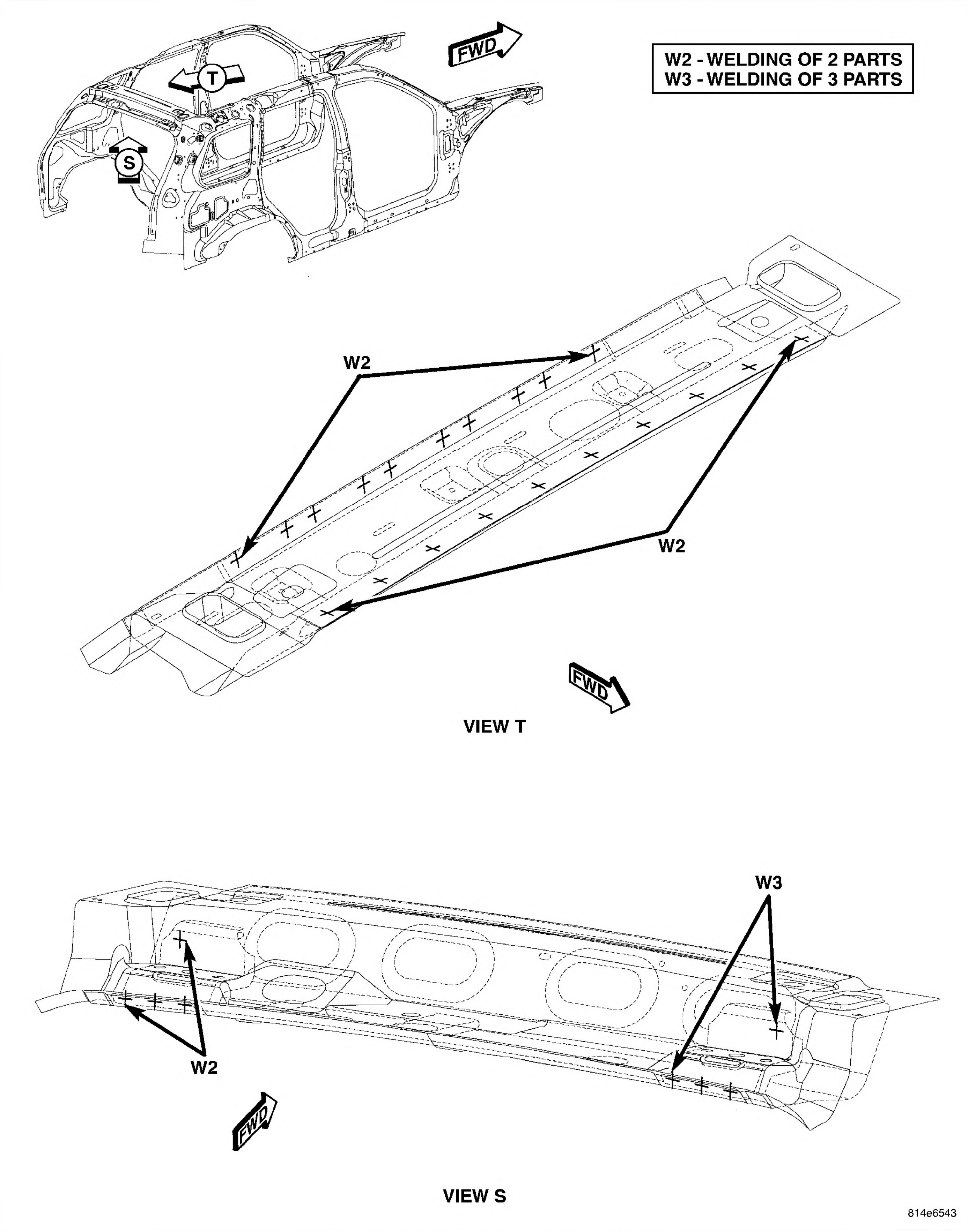

FWD
T
S
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
FWD
VIEW T
W3
W2
FWD
VIEW S
814e6543

Fig. 139 MISCELLANEOUS BODY (9 OF 9)

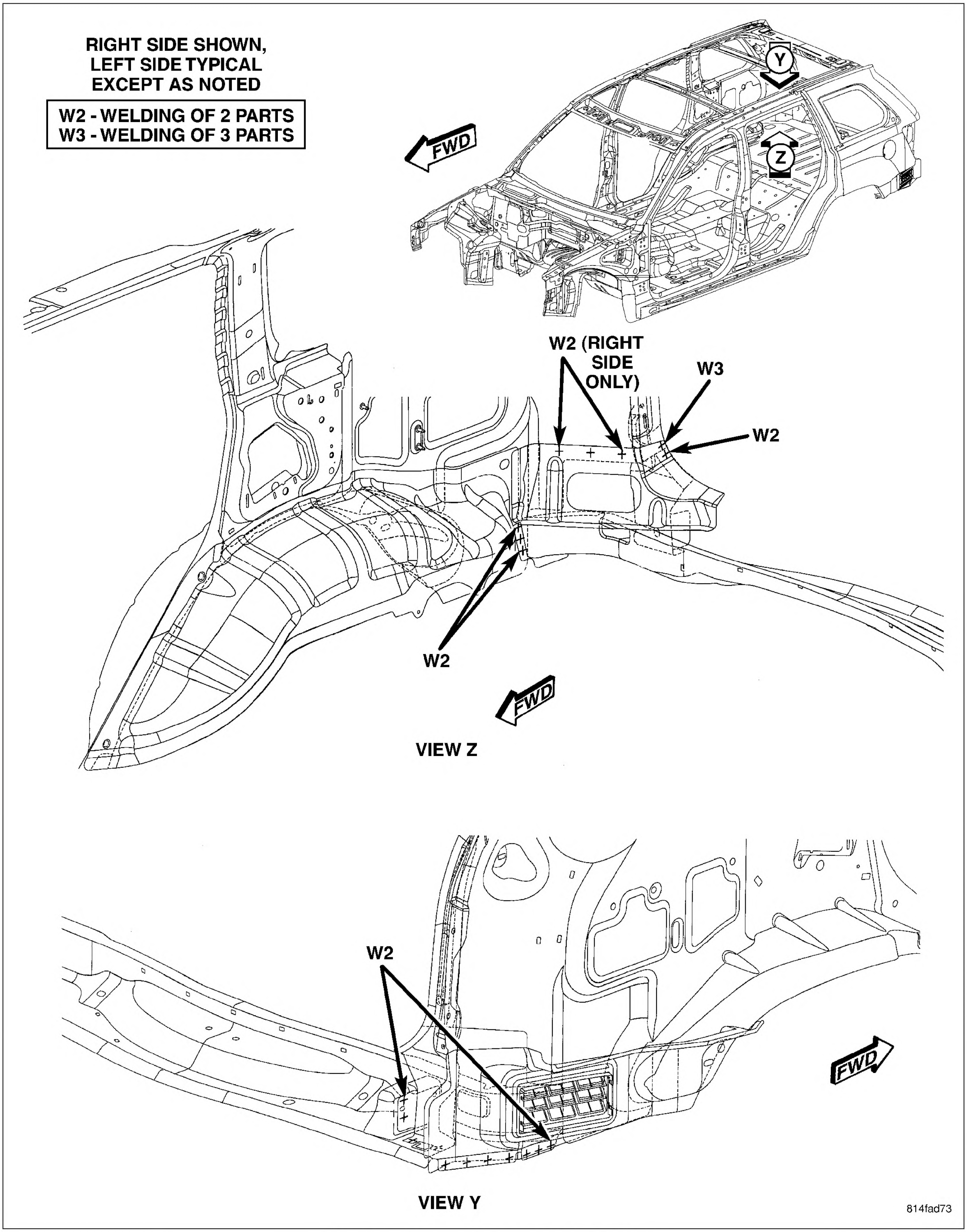

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
Y
Z
W2 (RIGHT SIDE ONLY)
W3
W2
W2
FWD
VIEW Z
W2
FWD
VIEW Y
814fad73

Fig. 140 BODY W/O ROOF (1 OF 12)

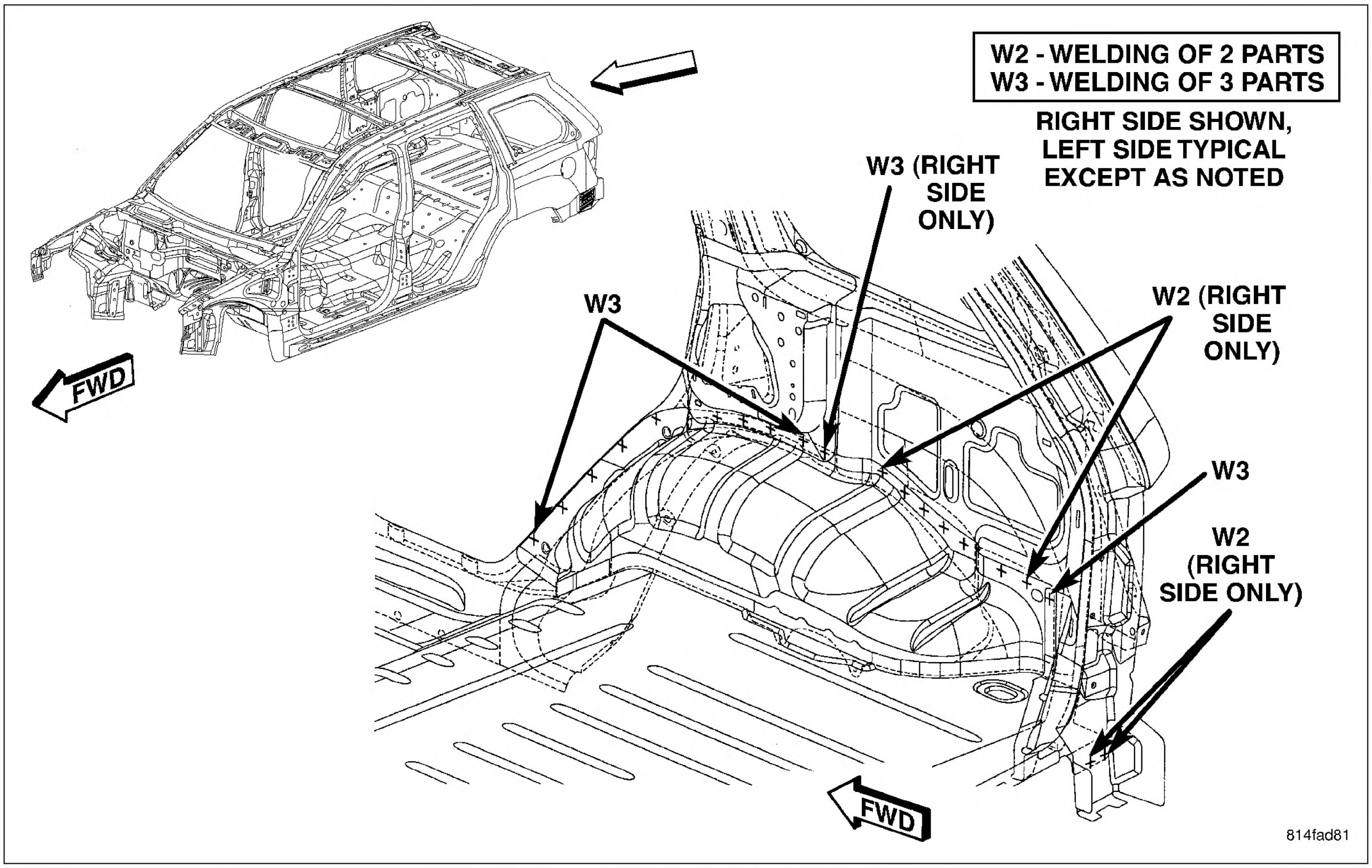

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN, LEFT SIDE TYPICAL EXCEPT AS NOTED
W3 (RIGHT SIDE ONLY)
W3
W2 (RIGHT SIDE ONLY)
W3
W2 (RIGHT SIDE ONLY)
FWD
FWD
814fad81

Fig. 141 BODY W/O ROOF (2 OF 12)

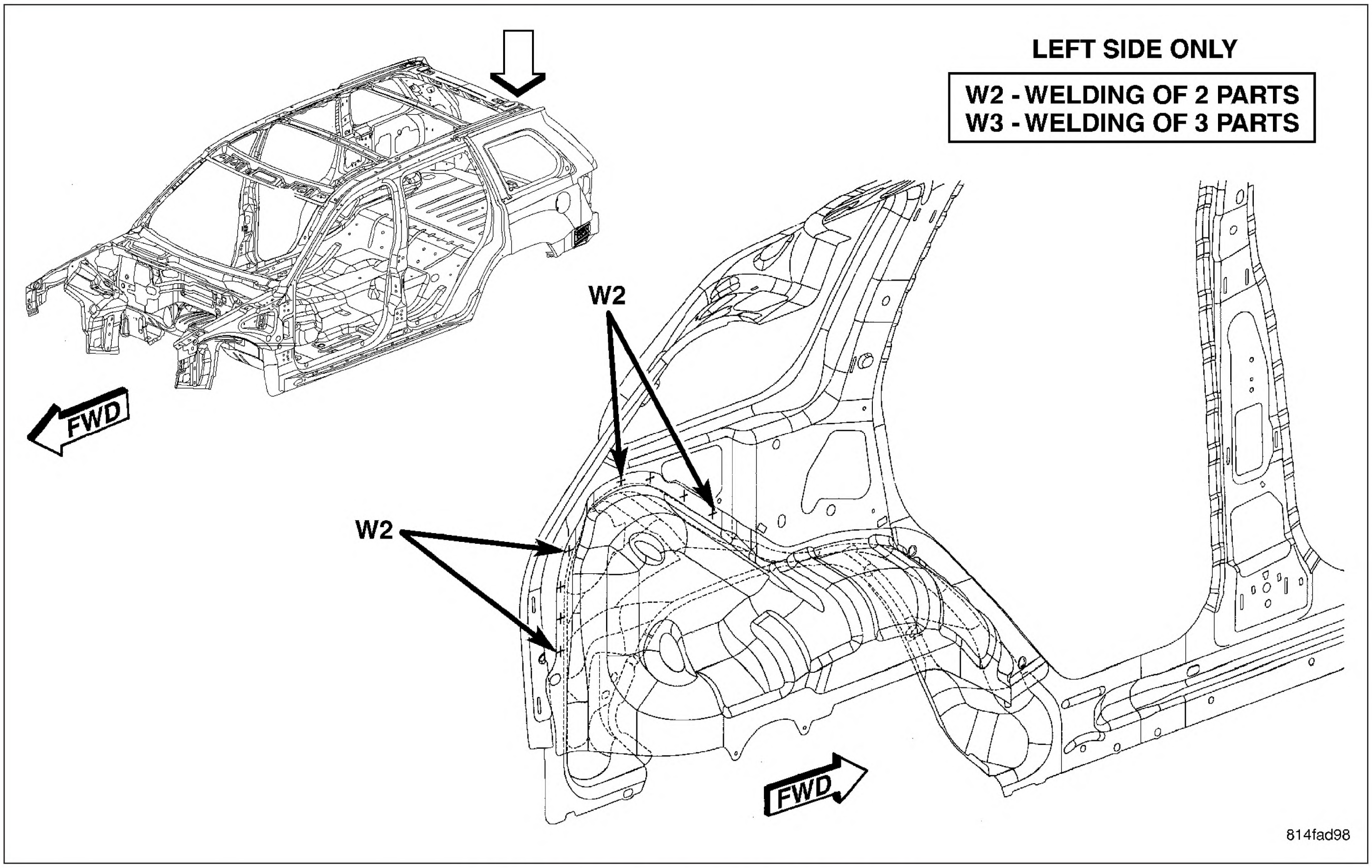

LEFT SIDE ONLY
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W2
FWD
FWD
814fad98

Fig. 142 BODY W/O ROOF (3 OF 12)

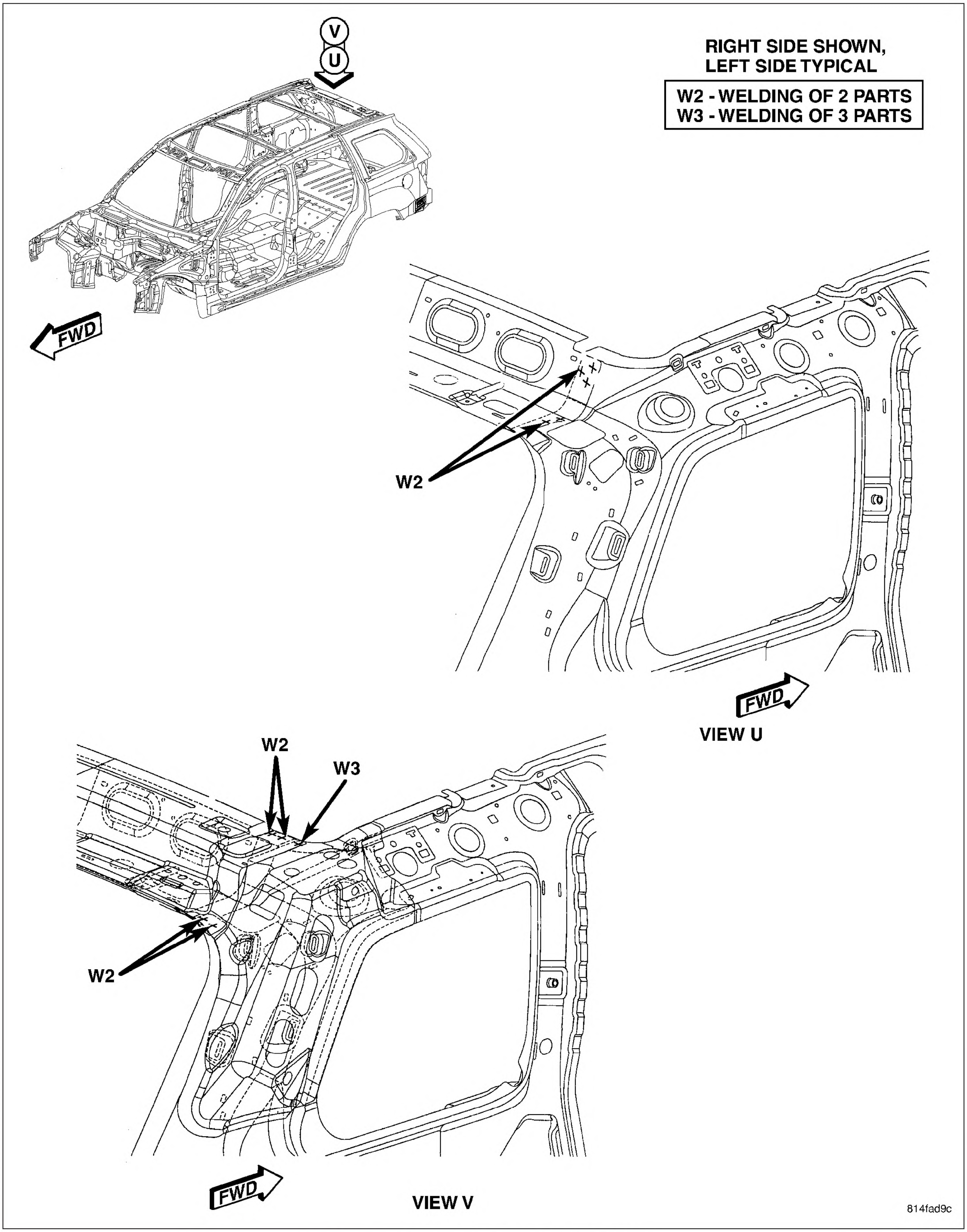

V
U
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
FWD
VIEW U
W2
W3
W2
FWD
VIEW V
814fad9c

Fig. 143 BODY W/O ROOF (4 OF 12)

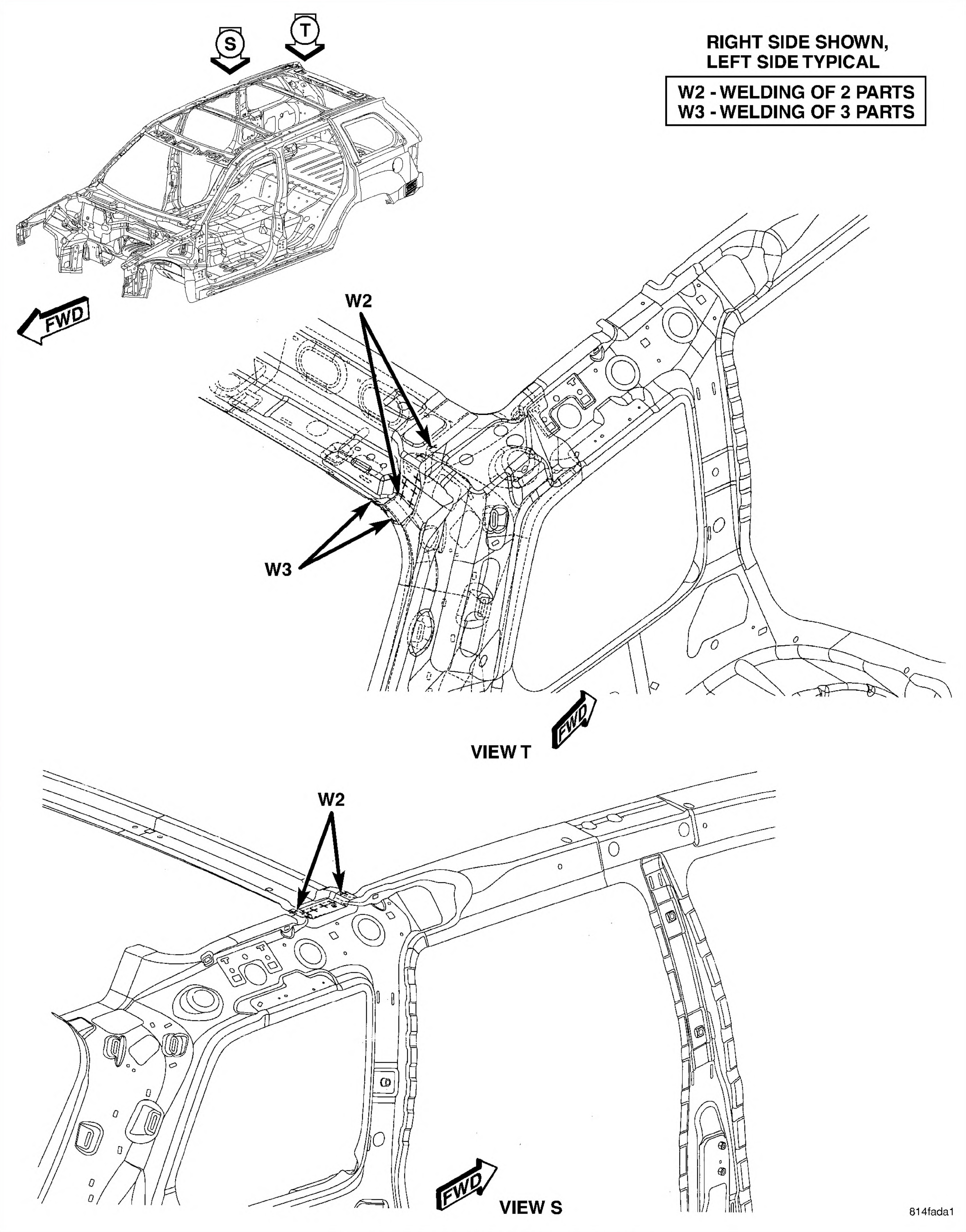

S
T
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W3
FWD
VIEW T
W2
FWD
VIEW S
814fada1

Fig. 144 BODY W/O ROOF (5 OF 12)

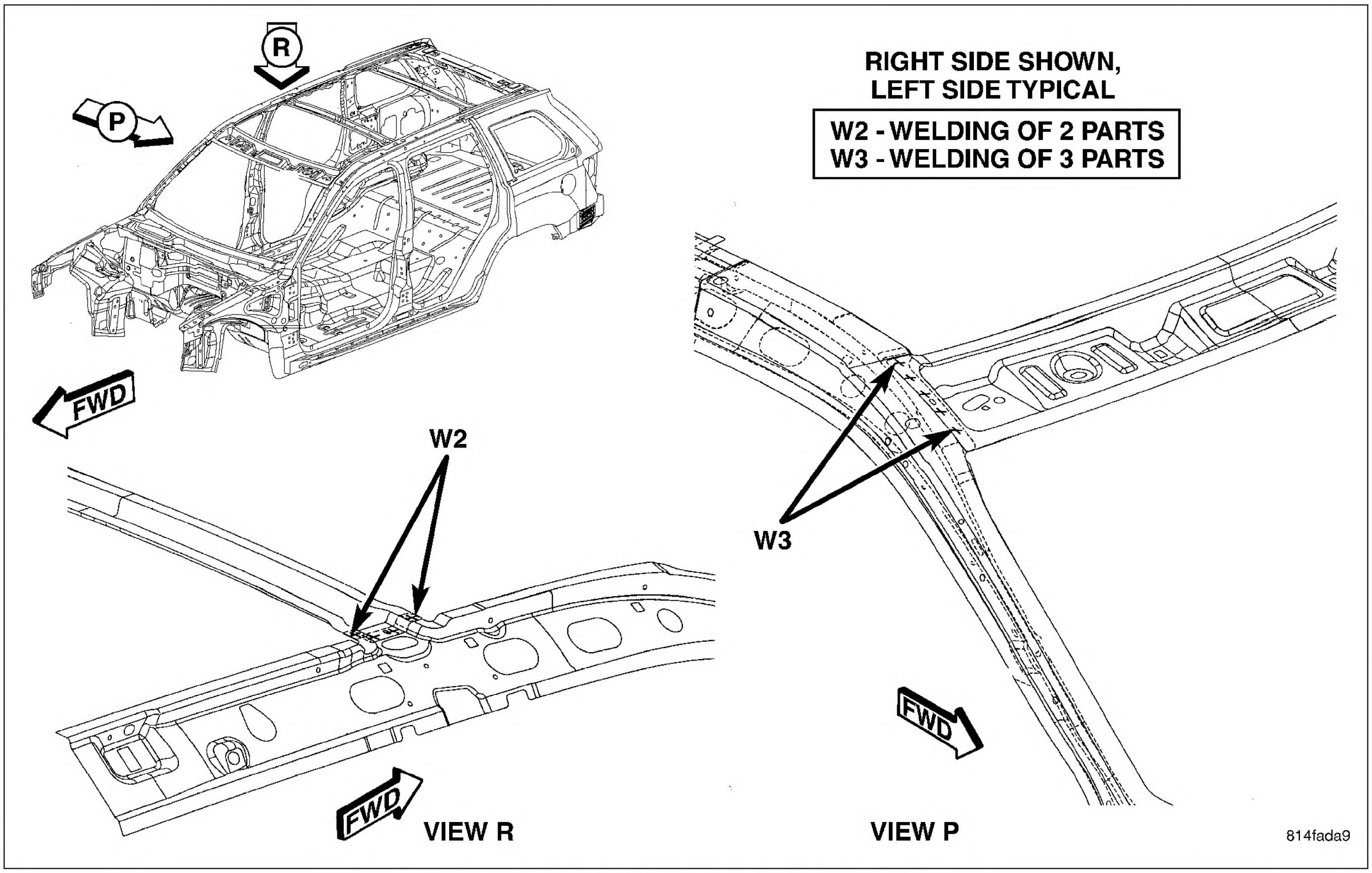
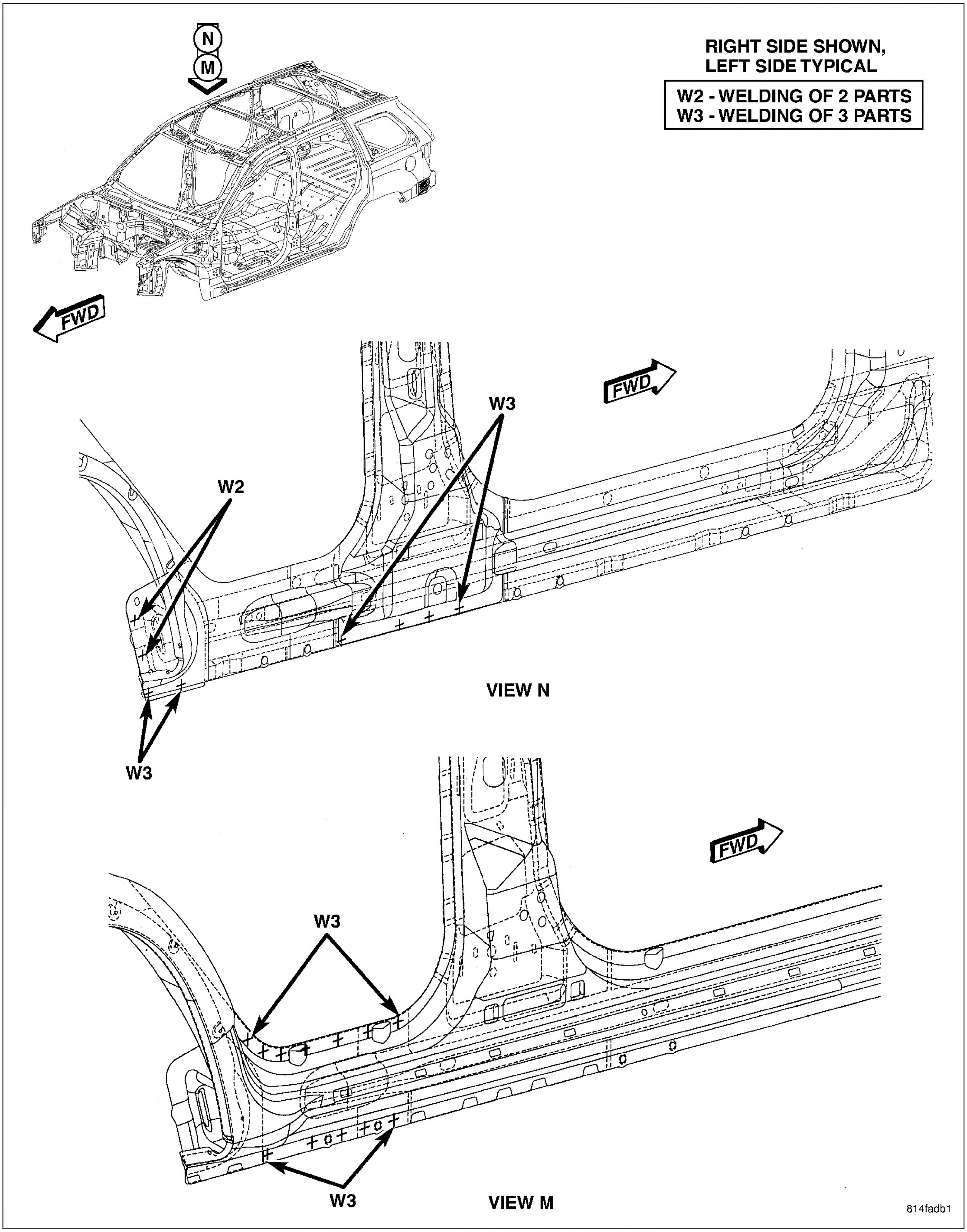

R
P
FWD
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
W3
FWD
FWD
VIEW R
VIEW P
814fada9

Fig. 145 BODY W/O ROOF (6 OF 12)



RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS

N
M
FWD
FWD
W3
W2
W3
VIEW N
FWD
W3
W3
VIEW M
814fadb1

Fig. 146 BODY W/O ROOF (7 OF 12)

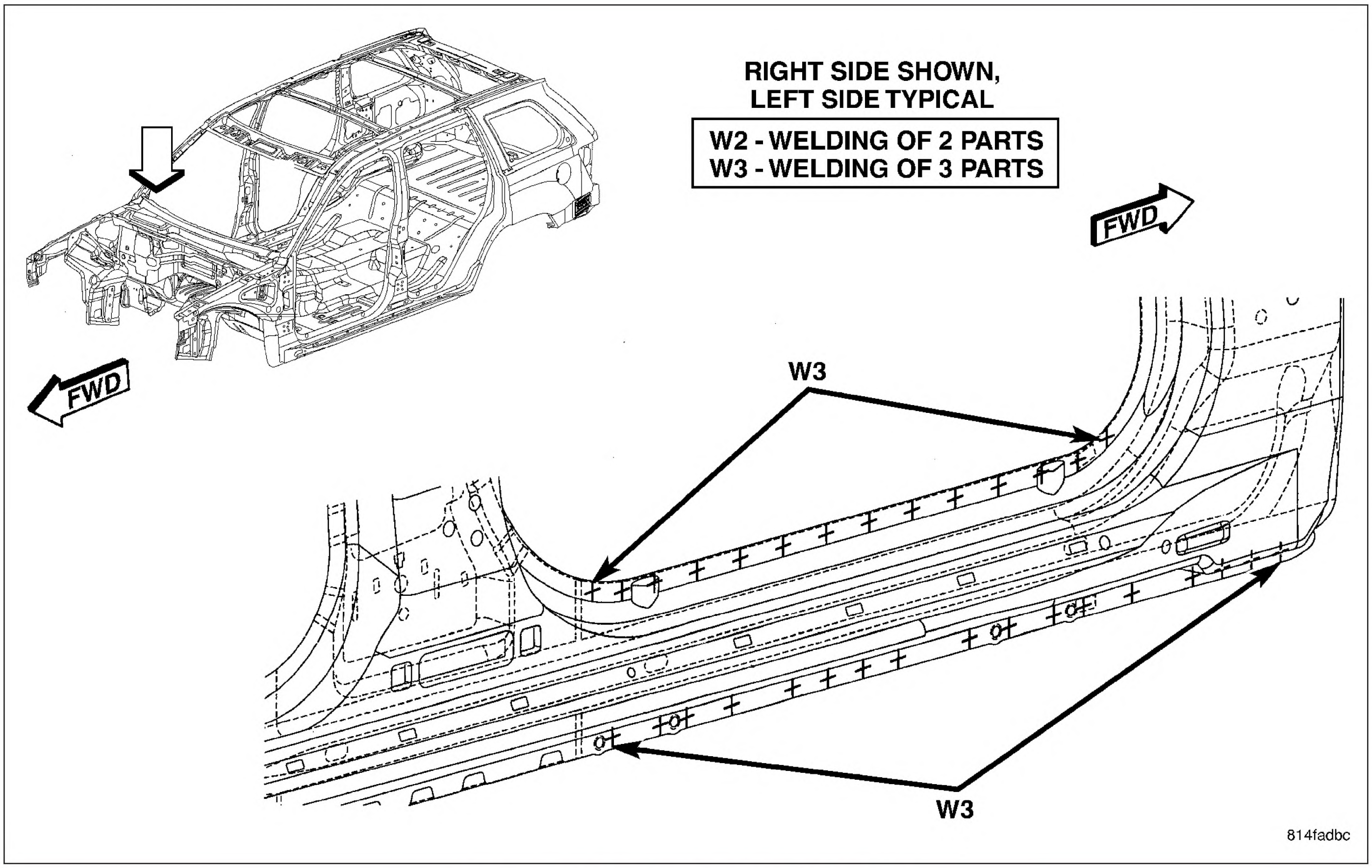

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
FWD
W3
W3
814fadbc

Fig. 147 BODY W/O ROOF (8 OF 12)

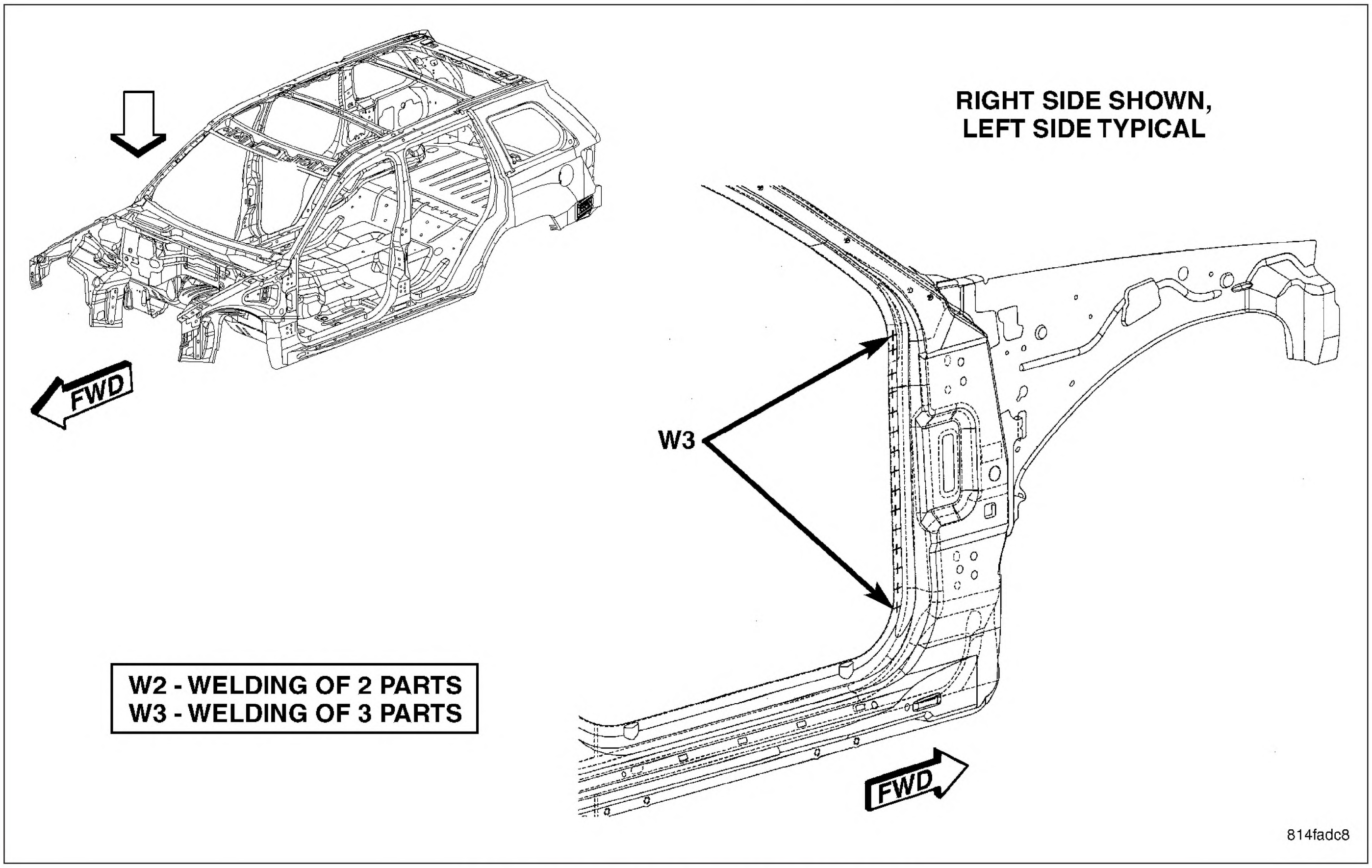

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
FWD
W3
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
814fadc8

Fig. 148 BODY W/O ROOF (9 OF 12)

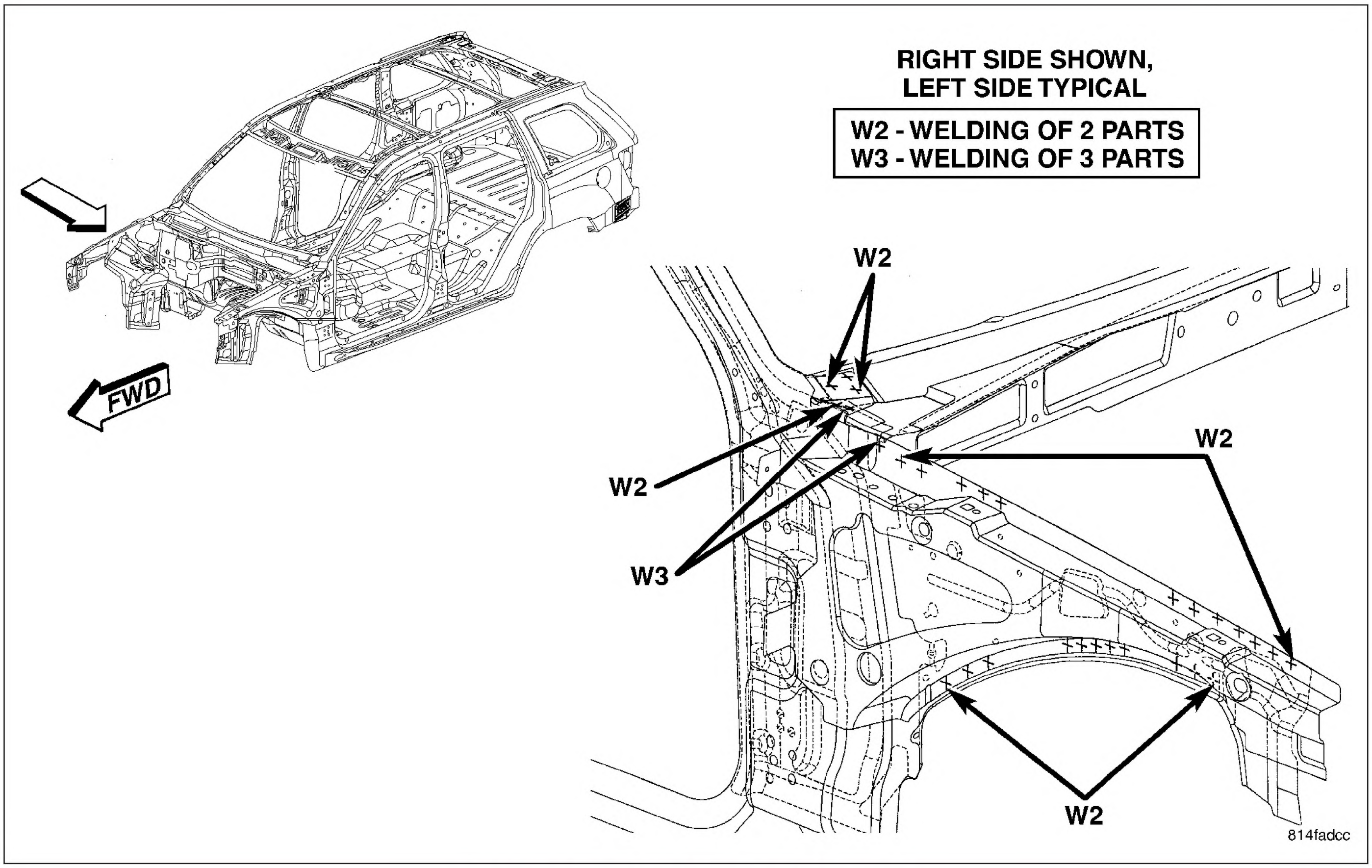

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
W2
W2
W2
W3
W2
814fadcc

Fig. 149 BODY W/O ROOF (10 OF 12)

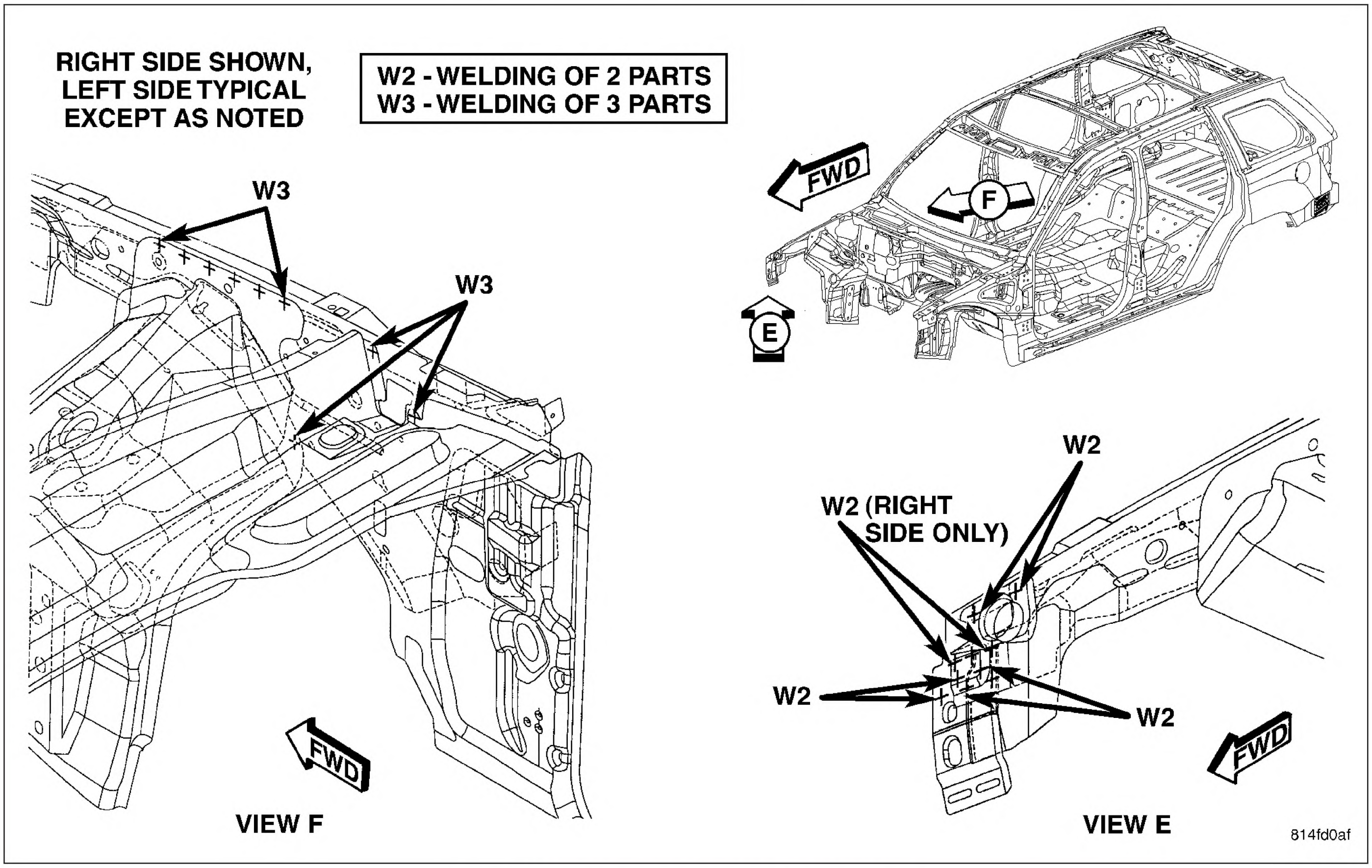

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS NOTED
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W3
W3
FWD
F
E
W2
W2 (RIGHT
SIDE ONLY)
W2
W2
FWD
FWD
VIEW F
VIEW E
814fd0af

Fig. 150 BODY W/O ROOF (11 OF 12)

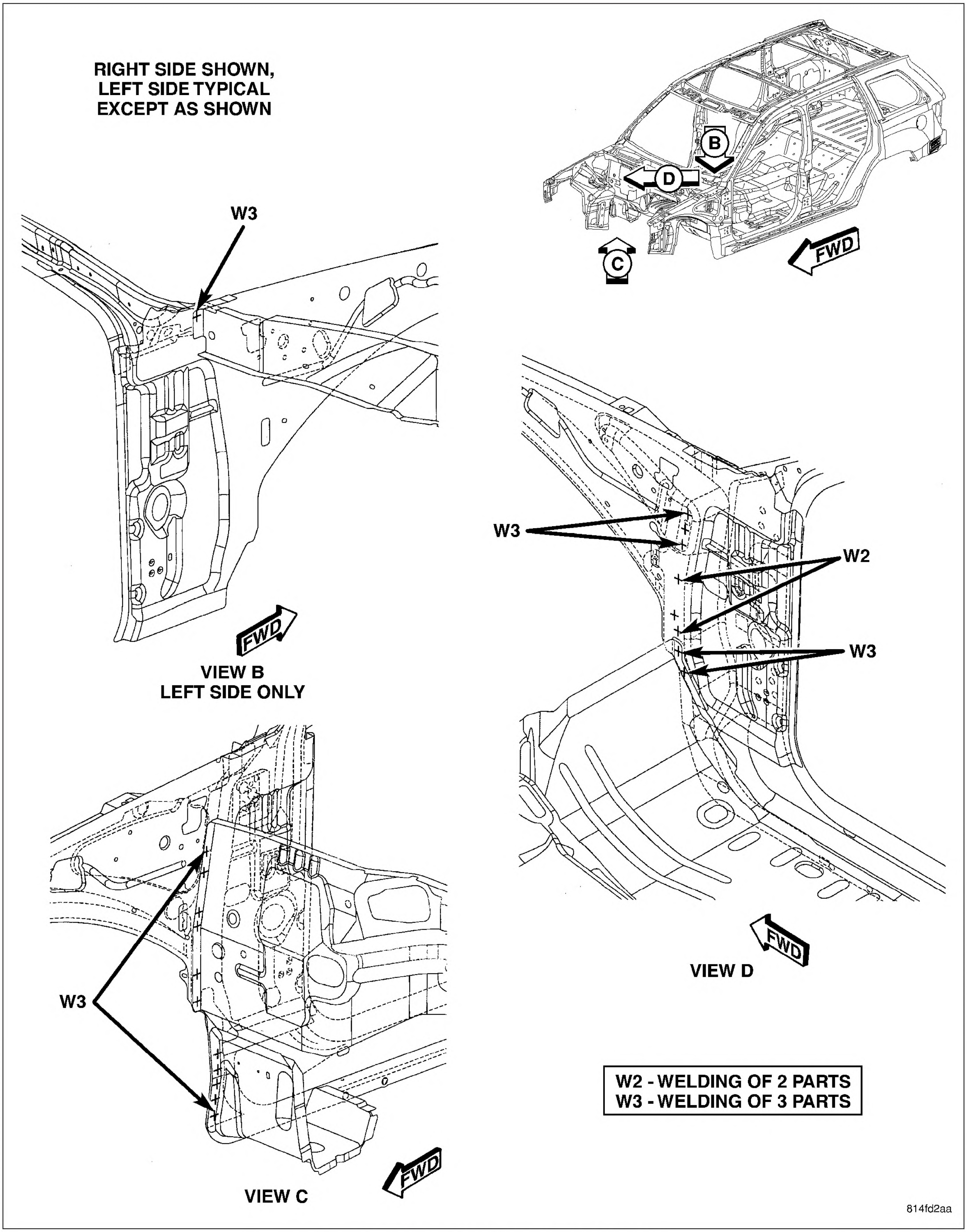

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
EXCEPT AS SHOWN
B
D
C
FWD
W3
FWD
VIEW B
LEFT SIDE ONLY
W3
W2
W3
FWD
VIEW D
W3
FWD
VIEW C
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
814fd2aa

Fig. 151 BODY W/O ROOF (12 OF 12)

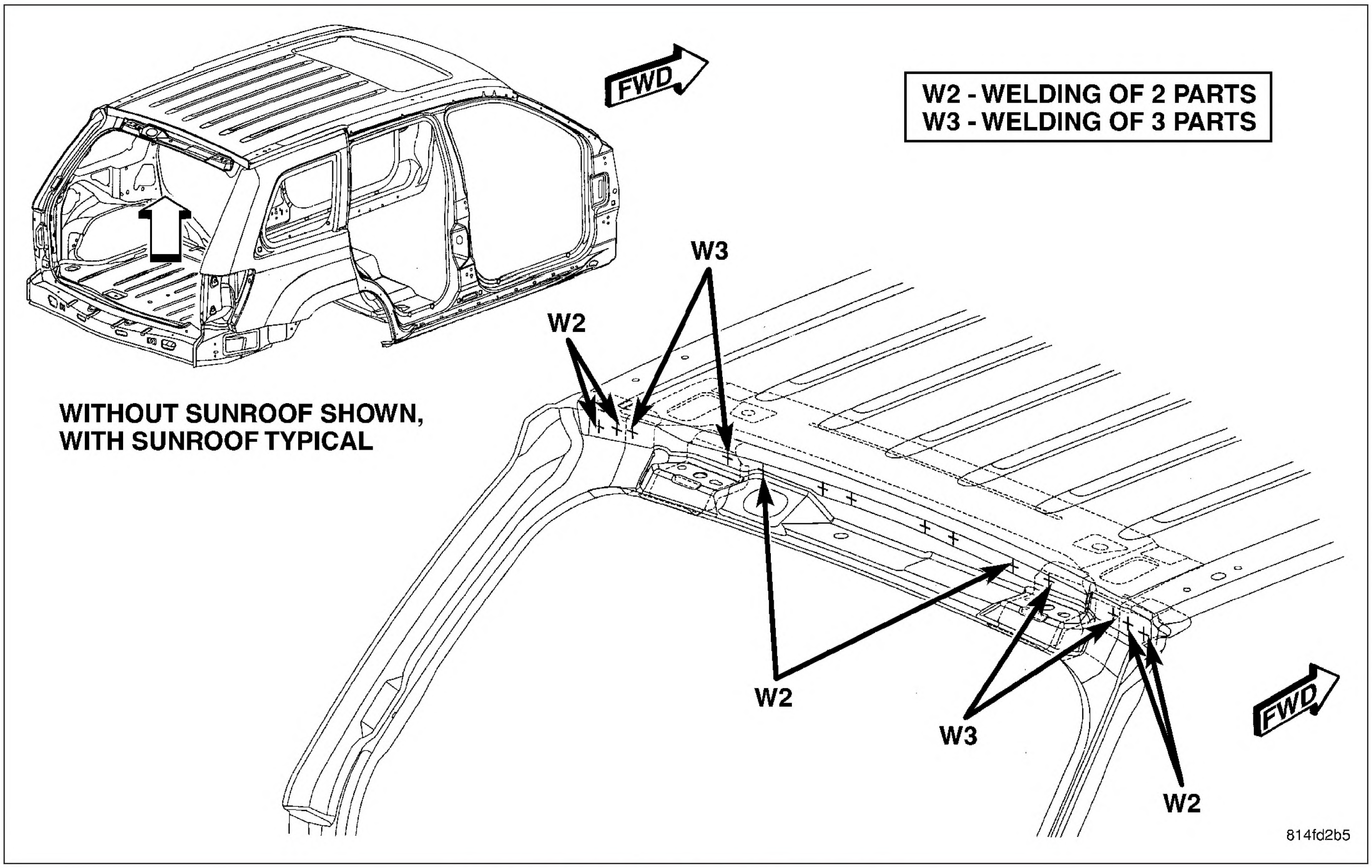

FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
WITHOUT SUNROOF SHOWN,
WITH SUNROOF TYPICAL
W3
W2
W2
W3
W2
FWD
814fd2b5

Fig. 152 BODY - COMPLETE (1 OF 7)

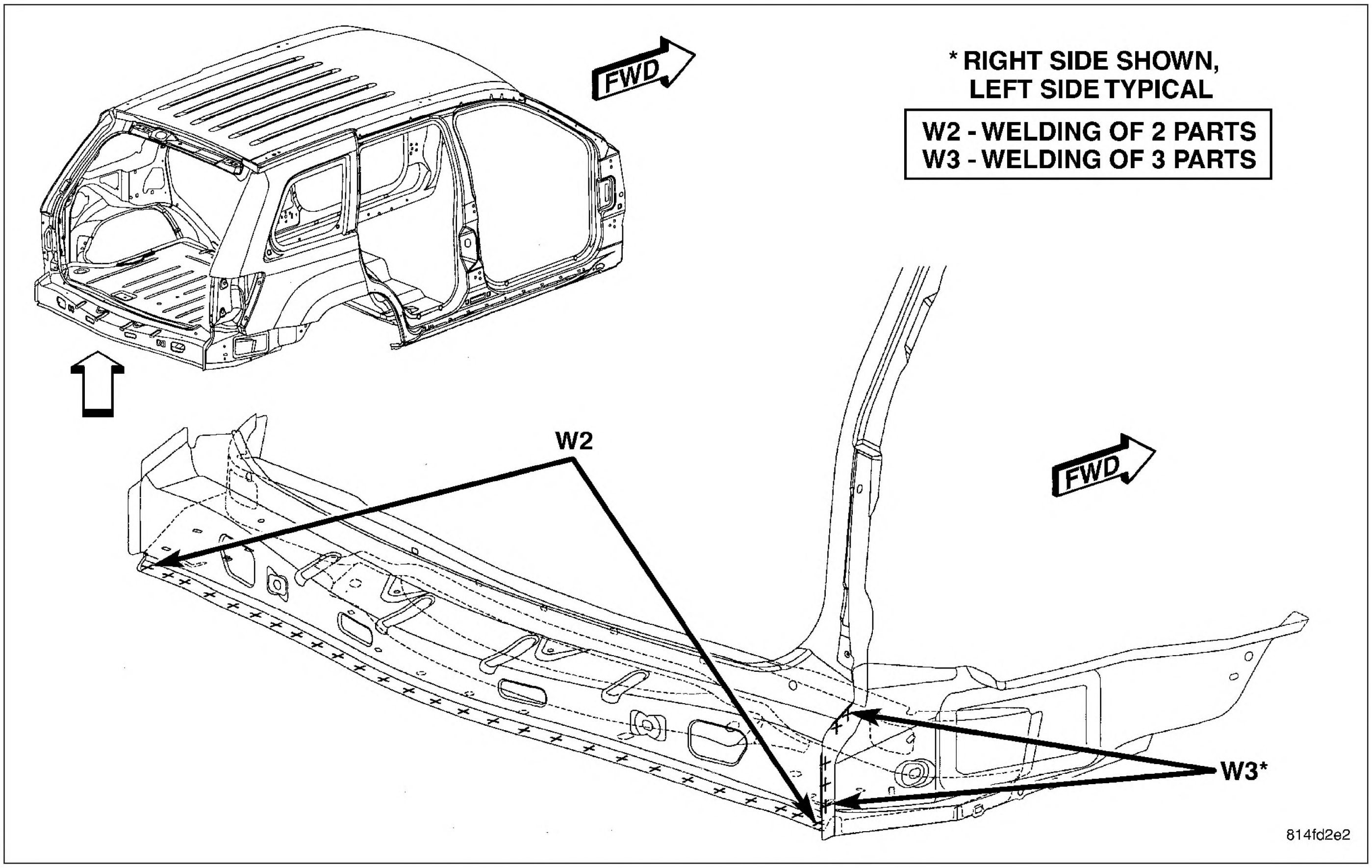

FWD
* RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W2
FWD
W3*
814fd2e2

Fig. 153 BODY - COMPLETE (2 OF 7)

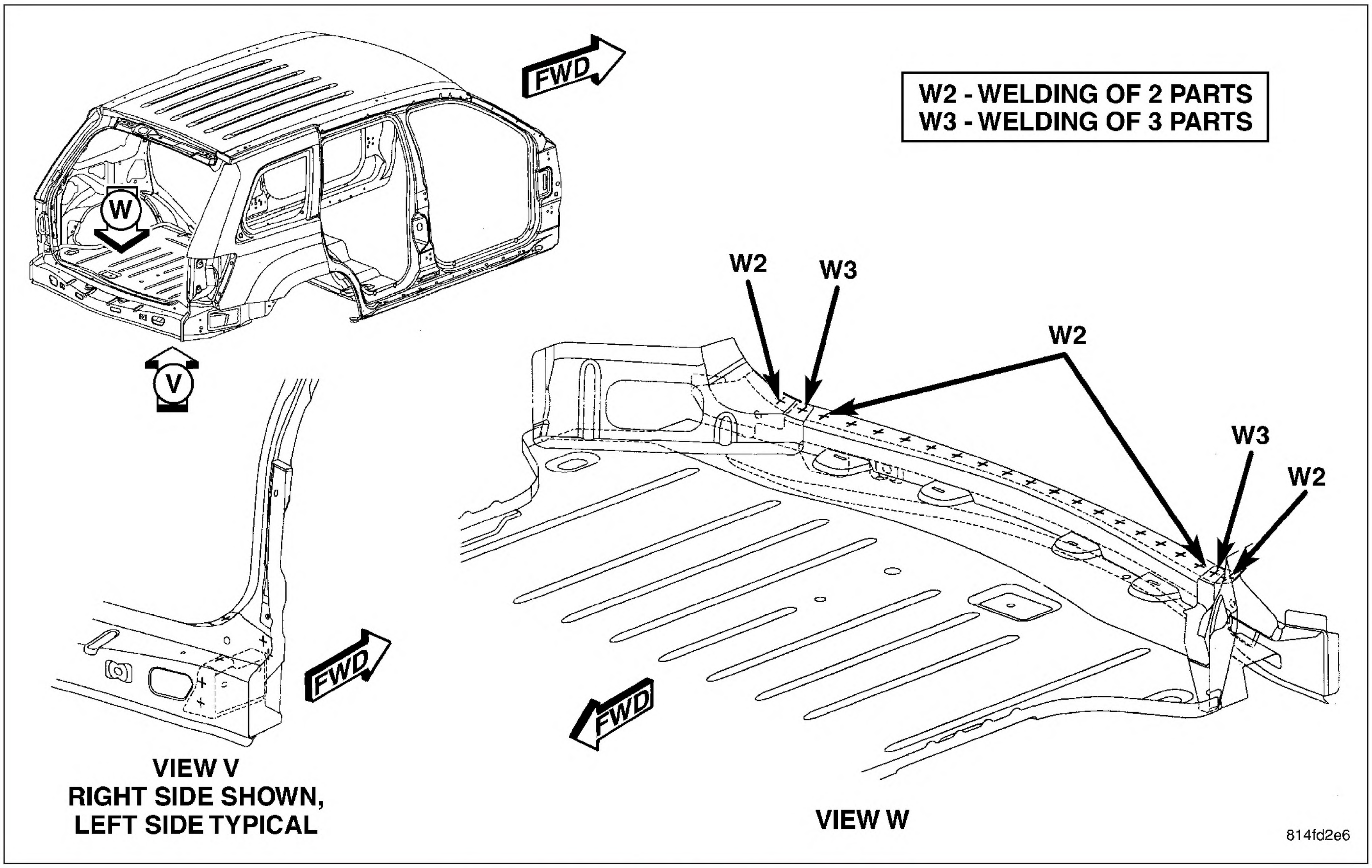

FWD
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W
V
W2
W3
W2
W3
W2
FWD
FWD
VIEW V
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
VIEW W
814fd2e6

Fig. 154 BODY - COMPLETE (3 OF 7)

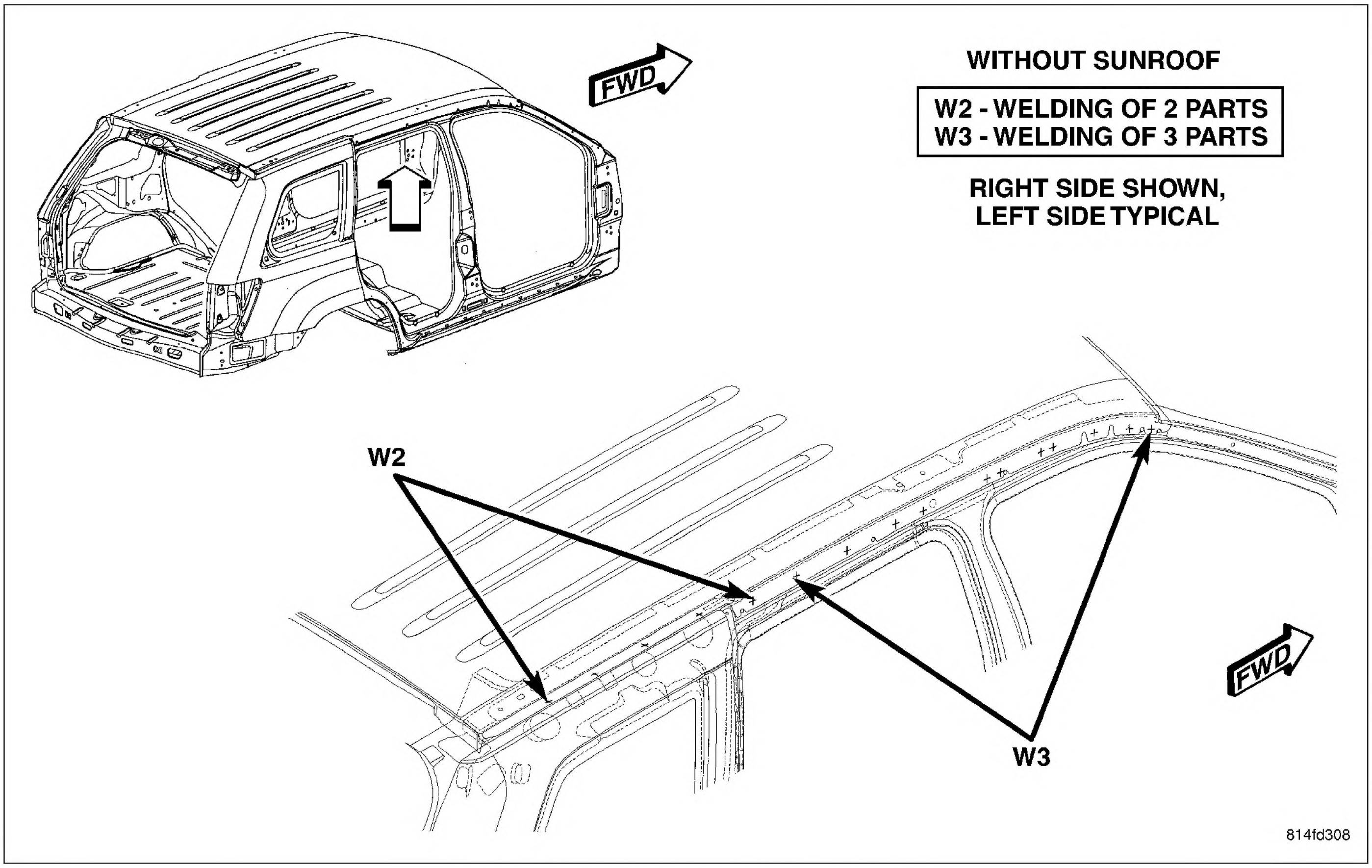

FWD
WITHOUT SUNROOF
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL
W2
W3
FWD
814fd308

Fig. 155 BODY - COMPLETE (4 OF 7)

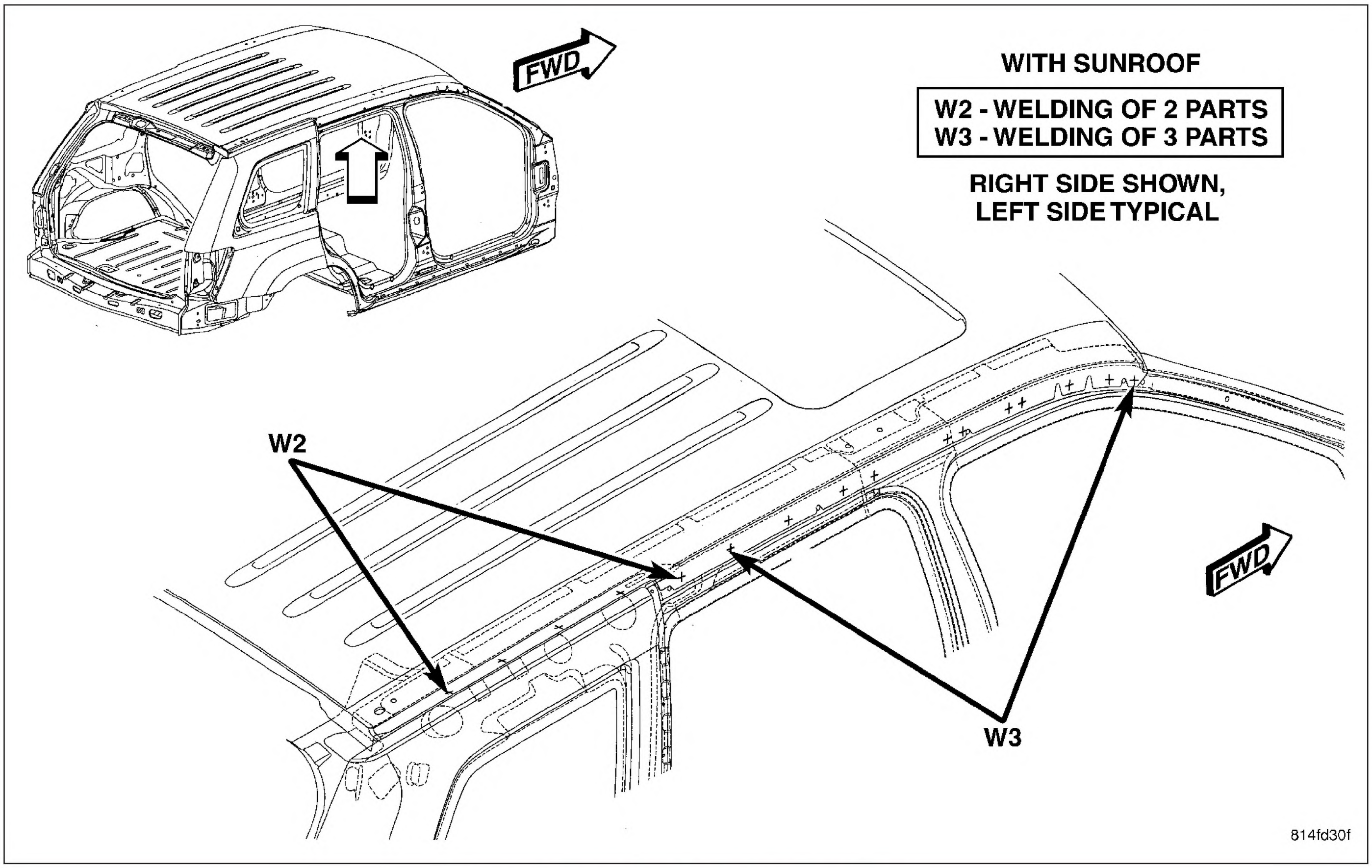

WITH SUNROOF
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
RIGHT SIDE SHOWN, LEFT SIDE TYPICAL
FWD
FWD
W2
W3
814fd30f

Fig. 156 BODY - COMPLETE (5 OF 7)

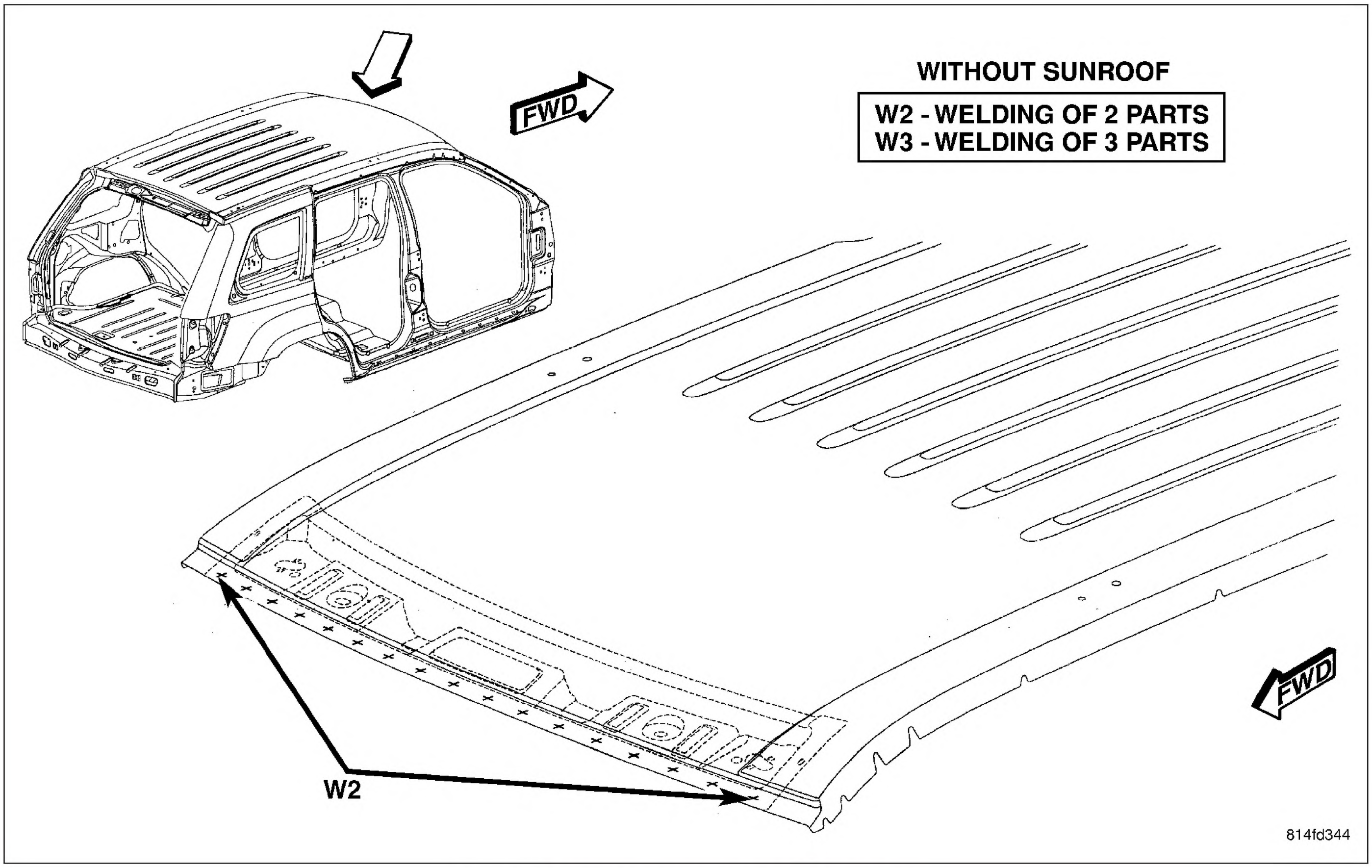

WITHOUT SUNROOF
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
FWD
W2
814fd344

Fig. 157 BODY - COMPLETE (6 OF 7)

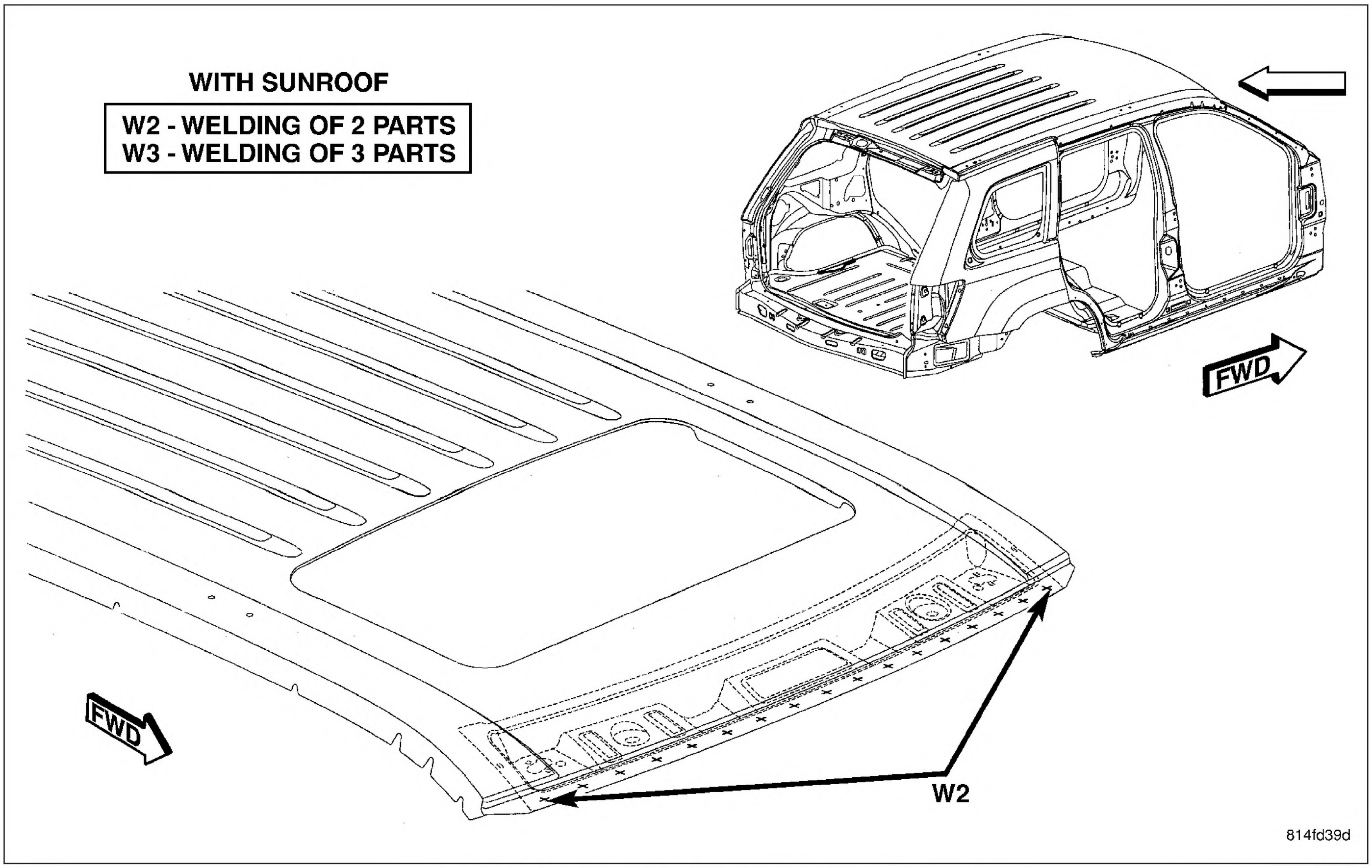

WITH SUNROOF
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
FWD
FWD
W2
814fd39d

Fig. 158 BODY - COMPLETE (7 OF 7)

HEATING & AIR CONDITIONING

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HVAC - ELECTRICAL DIAGNOSTICS

DIAGNOSIS AND TESTING

11–MODE POT OPEN (MTC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the mode pot fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

12–MODE POT SHORTED (MTC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the mode pot fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

13–TEMP POT OPEN (MTC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the temp pot fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

14–TEMP POT SHORTED (MTC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the temp pot fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

18–BLEND DOOR RANGE TOO SMALL (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects too few commutator pulses when calibrating the left blend door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too few commutator pulses when calibrating the left blend door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
LEFT BLEND DOOR BINDING, OBSTRUCTED
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

18–BLEND DOOR RANGE TOO SMALL (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE LEFT BLEND DOOR TO BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the left blend door to bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

18–BLEND DOOR RANGE TOO SMALL (MTC) (CONTINUED)

3. CHECK LEFT BLEND DOOR TRAVEL

Remove the Left Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 90 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Left Blend Door Actuator in accordance with the Service Information. Then, Go To 4.

No >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 18?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

21–BLEND DOOR RANGE TOO LARGE (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects too many commutator pulses when calibrating the left blend door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too many commutator pulses when calibrating the left blend door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
LEFT BLEND DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, BROKEN
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

21–BLEND DOOR RANGE TOO LARGE (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

2. CHECK FOR A BROKEN LEFT BLEND DOOR ACTUATOR

Turn the ignition off.

Remove the Left Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

21–BLEND DOOR RANGE TOO LARGE (MTC) (CONTINUED)

3. CHECK THE LEFT BLEND DOOR & A/C HEATER HOUSING FOR WARPED, WORN, & DAMAGED COMPONENTS

Inspect for excessively worn door linkage and for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 90 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Left Blend Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 21?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

22–FRONT MODE DOOR RANGE TOO SMALL (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects too few commutator pulses when calibrating the front mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too few commutator pulses when calibrating the front mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
FRONT MODE DOOR BINDING, OBSTRUCTED
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

22–FRONT MODE DOOR RANGE TOO SMALL (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE FRONT MODE DOOR TO BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the front mode door to bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

22–FRONT MODE DOOR RANGE TOO SMALL (MTC) (CONTINUED)

3. CHECK FRONT MODE DOOR TRAVEL

Remove the Front Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 350 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Front Mode Door Actuator in accordance with the Service Information. Then, Go To 4.

No >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 22?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

23–FRONT MODE DOOR RANGE TOO LARGE (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control’s memory. If the A/C Heater Control detects too many commutator pulses when calibrating the front mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too many commutator pulses when calibrating the front mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
FRONT MODE DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, BROKEN
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

23–FRONT MODE DOOR RANGE TOO LARGE (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

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2. CHECK FOR A BROKEN FRONT MODE DOOR ACTUATOR

Turn the ignition off.

Remove the Front Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

23–FRONT MODE DOOR RANGE TOO LARGE (MTC) (CONTINUED)

3. CHECK THE FRONT MODE DOOR & A/C HEATER HOUSING FOR WARPED, WORN, & DAMAGED COMPONENTS

Inspect for excessively worn door linkage and for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 350 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 23?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

24–REAR MODE DOOR RANGE TOO SMALL (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects too few commutator pulses when calibrating the rear mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too few commutator pulses when calibrating the rear mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
REAR MODE DOOR BINDING, OBSTRUCTED
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

24–REAR MODE DOOR RANGE TOO SMALL (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE REAR MODE DOOR TO BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the rear mode door to bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

24–REAR MODE DOOR RANGE TOO SMALL (MTC) (CONTINUED)

3. CHECK REAR MODE DOOR TRAVEL

Remove the Rear Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 155 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Rear Mode Door Actuator in accordance with the Service Information. Then, Go To 4.

No >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 24?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

25–REAR MODE DOOR RANGE TOO LARGE (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects too many commutator pulses when calibrating the rear mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too many commutator pulses when calibrating the rear mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
REAR MODE DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, BROKEN
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

25–REAR MODE DOOR RANGE TOO LARGE (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK FOR A BROKEN REAR MODE DOOR ACTUATOR

Turn the ignition off.

Remove the Rear Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

25–REAR MODE DOOR RANGE TOO LARGE (MTC) (CONTINUED)

3. CHECK THE REAR MODE DOOR & A/C HEATER HOUSING FOR WARPED, WORN, & DAMAGED COMPONENTS

Inspect for excessively worn door linkage and for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 155 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Rear Mode Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

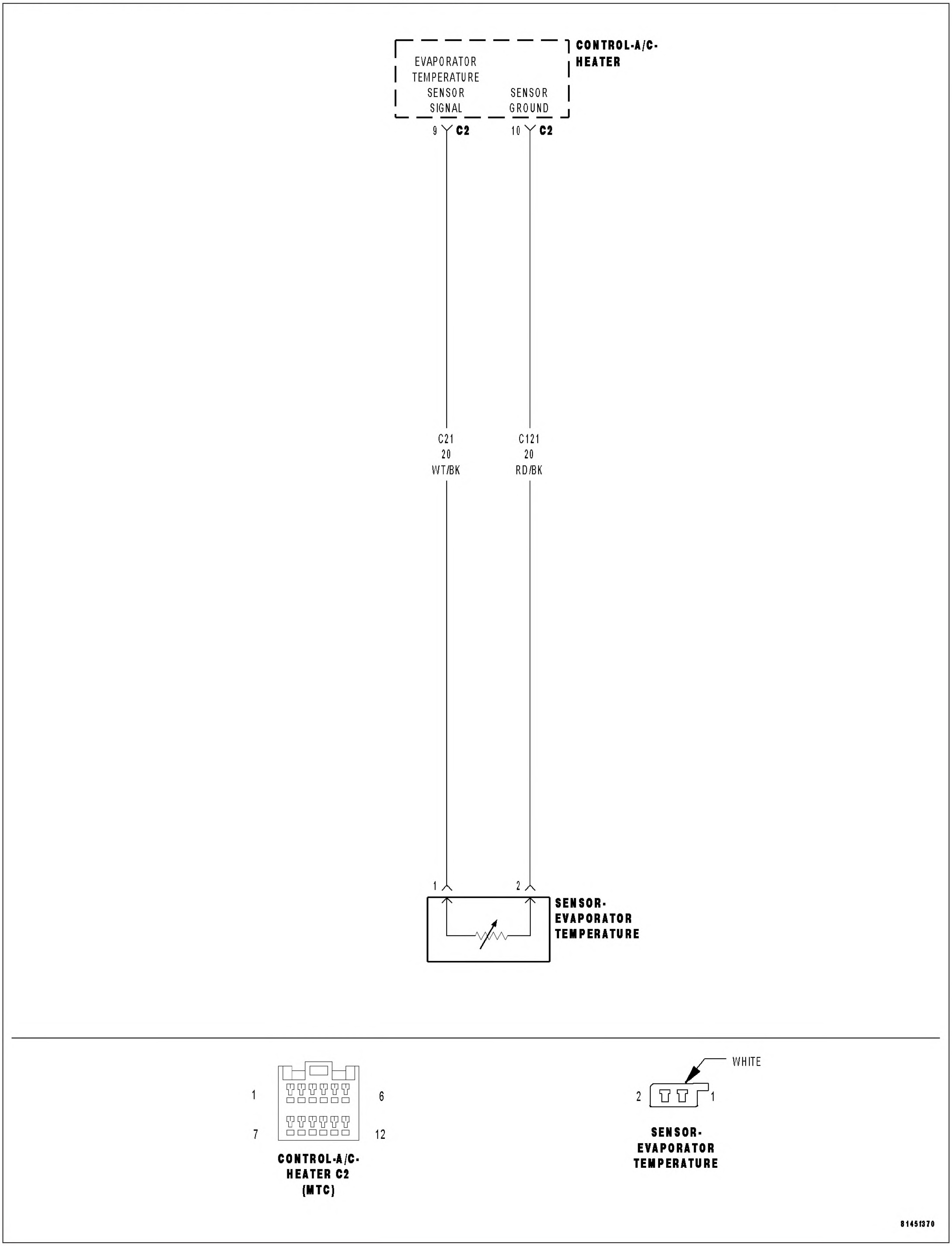
Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 25?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

31–EVAPORATOR SENSOR OPEN (MTC)


CONTROL-A/C-HEATER
EVAPORATOR TEMPERATURE SENSOR SIGNAL
SENSOR GROUND
9 C2
10 C2
C21
20
WT/BK
C121
20
RD/BK
1
2
SENSOR-EVAPORATOR TEMPERATURE
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
WHITE
2
1
SENSOR-EVAPORATOR TEMPERATURE
81451370

31–EVAPORATOR SENSOR OPEN (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Evaporator Temperature Sensor input is out of range toward the high voltage threshold.

Possible Causes
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN
(C121) SENSOR GROUND CIRCUIT OPEN
EVAPORATOR TEMPERATURE SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

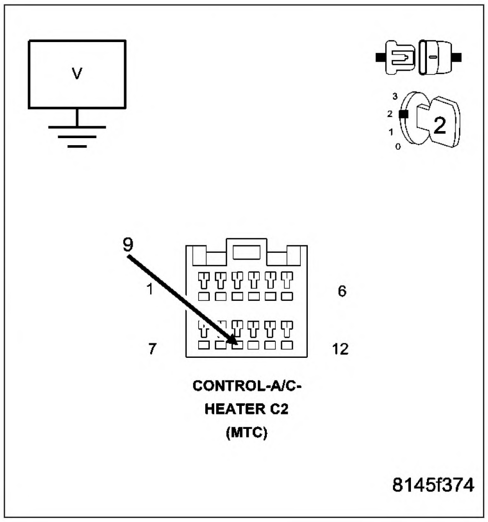
1. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C21) Evaporator Temperature Sensor Signal circuit.



Is the voltage above 0.2 volts?

Yes >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

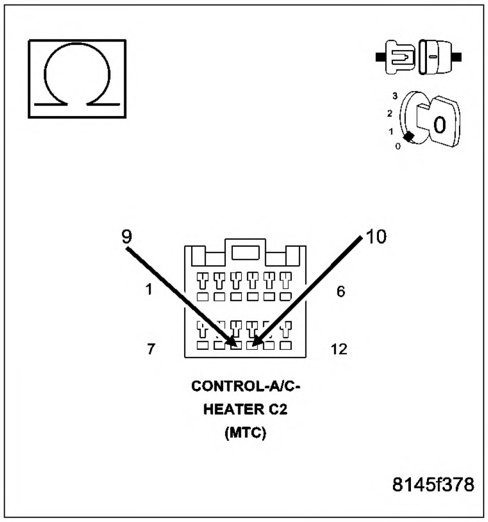
31–EVAPORATOR SENSOR OPEN (MTC) (CONTINUED)

2. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT, (C121) SENSOR GROUND CIRCUIT, & EVAPORATOR TEMPERATURE SENSOR

Turn the ignition off.

Measure the resistance between the (C21) Evaporator Temperature Sensor Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector. The approximate circuit resistance should be as follows:

- 1468 ohms @ 40°C (104°F)
- 1800 ohms @ 35°C (95°F)
- 2221 ohms @ 30°C (86°F)
- 2757 ohms @ 25°C (77°F)
- 3443 ohms @ 20°C (68°F)
- 4330 ohms @ 15°C (59°F)
- 5485 ohms @ 10°C (50°F)
- 6998 ohms @ 5°C (41°F)
- 7354 ohms @ 4°C (39°F)
- 7731 ohms @ 3°C (37°F)
- 8130 ohms @ 2°C (36°F)
- 8553 ohms @ 1°C (34°F)
- 9000 ohms @ 0°C (32°F)



Is the resistance within the specifications?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

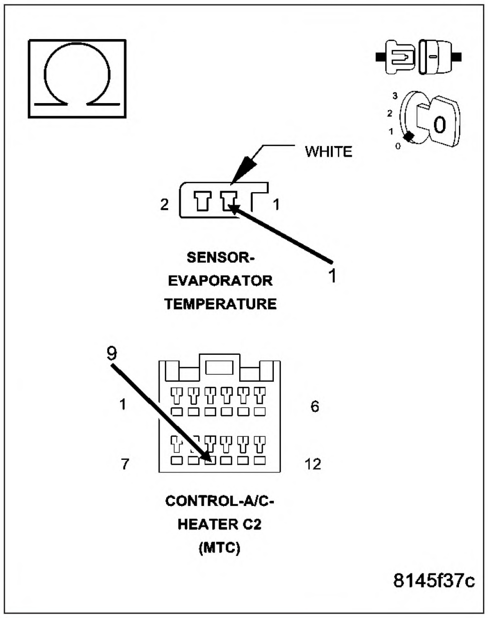
No >> Go To 3

---

3. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR AN OPEN

Disconnect the Evaporator Temperature Sensor harness connector.

Measure the resistance of the (C21) Evaporator Temperature Sensor Signal circuit between the Evaporator Temperature Sensor harness connector and the A/C Heater Control C2 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Go To 4

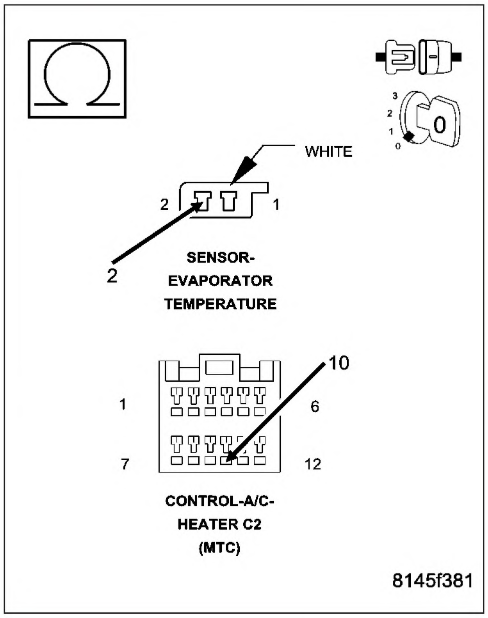
No >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

31–EVAPORATOR SENSOR OPEN (MTC) (CONTINUED)

4. CHECK (C121) SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (C121) Sensor Ground circuit between the Evaporator Temperature Sensor harness connector and the A/C Heater Control C2 harness connector.


WHITE
2
1
2
SENSOR-
EVAPORATOR
TEMPERATURE
10
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
8145f381

Is the resistance below 5.0 ohms?

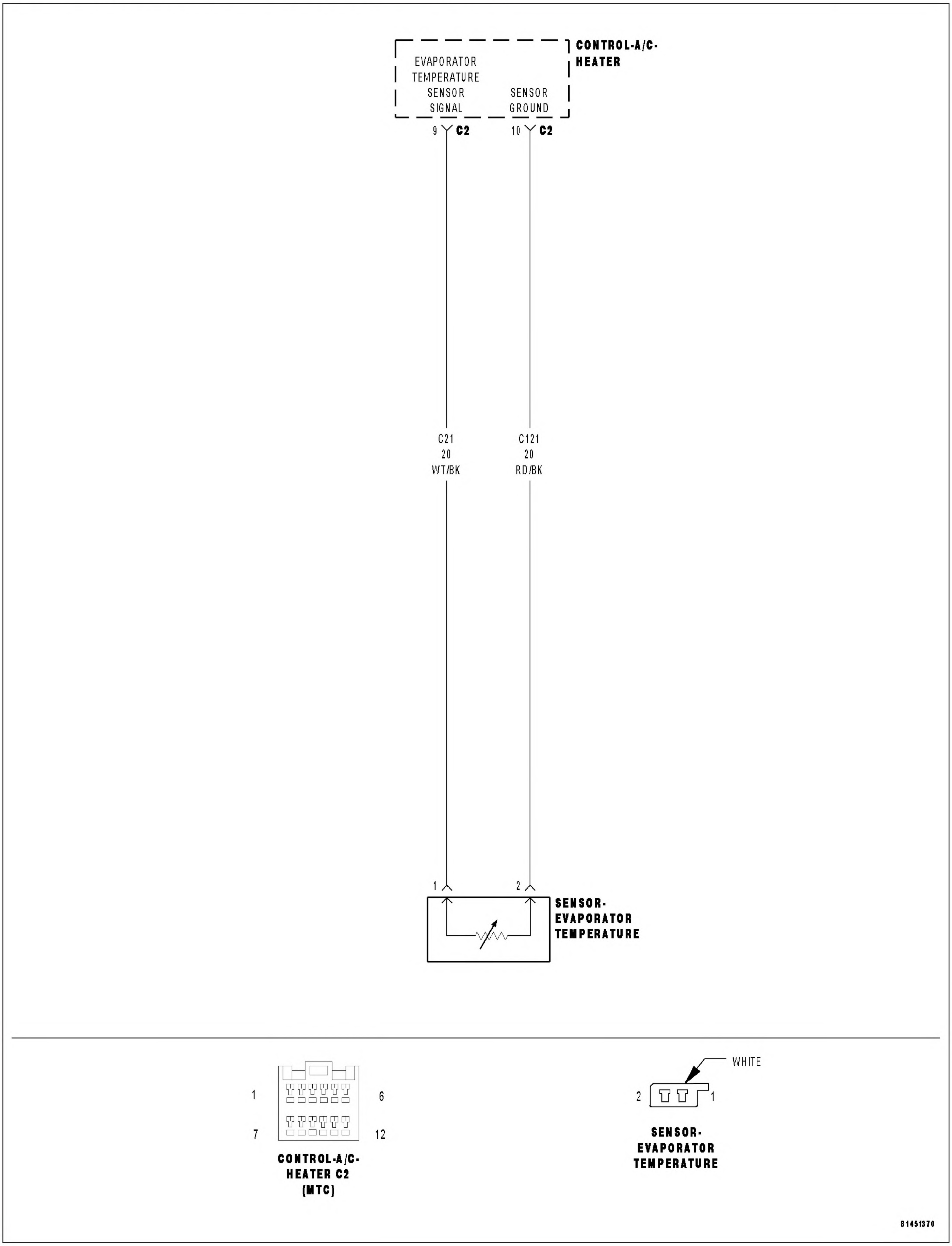
Yes >> Replace the Evaporator Temperature Sensor in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C121) Sensor Ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

32–EVAPORATOR SENSOR SHORTED (MTC)


CONTROL-A/C-
HEATER
EVAPORATOR
TEMPERATURE
SENSOR
SIGNAL
SENSOR
GROUND
9 C2
10 C2
C21
20
WT/BK
C121
20
RD/BK
1
2
SENSOR-
EVAPORATOR
TEMPERATURE
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
WHITE
2
1
SENSOR-
EVAPORATOR
TEMPERATURE
81451370

32–EVAPORATOR SENSOR SHORTED (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Evaporator Temperature Sensor input is out of range toward the low voltage threshold.

Possible Causes
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO (C121) SENSOR GROUND CIRCUIT
EVAPORATOR TEMPERATURE SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

1. CHECK FOR DTC 32–EVAPORATOR SENSOR SHORTED WITH EVAPORATOR TEMPERATURE SENSOR HARNESS CONNECTOR DISCONNECTED

Turn the ignition off.

Disconnect the Evaporator Temperature Sensor harness connector.

Turn the ignition on.

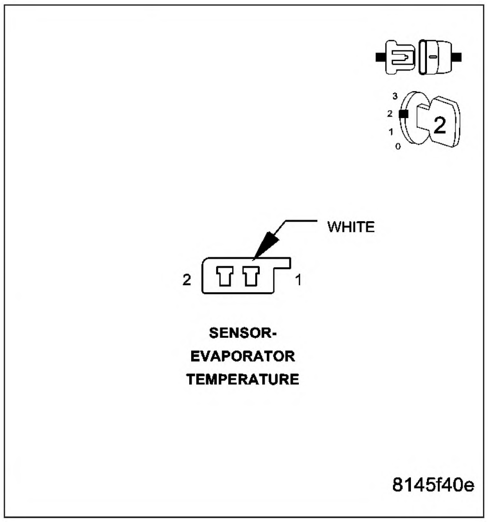
Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.



NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 32?

Yes >> Go To 2

No >> Replace the Evaporator Temperature Sensor in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

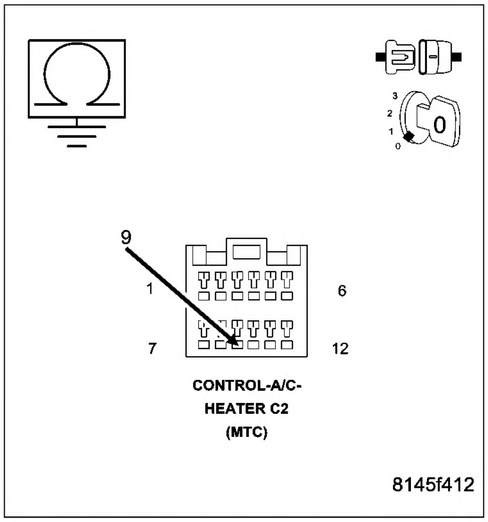
32–EVAPORATOR SENSOR SHORTED (MTC) (CONTINUED)

2. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C21) Evaporator Temperature Sensor Signal circuit between ground and the A/C Heater Control C2 harness connector.



8145f412

Is the resistance below 10k ohms?

Yes >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for a short to ground.

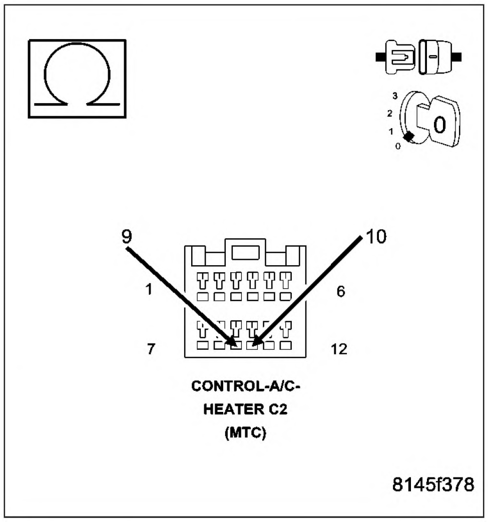
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

3. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO (C121) SENSOR GROUND CIRCUIT

Measure the resistance between the (C21) Evaporator Temperature Sensor Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector.



8145f378

Is the resistance below 10k ohms?

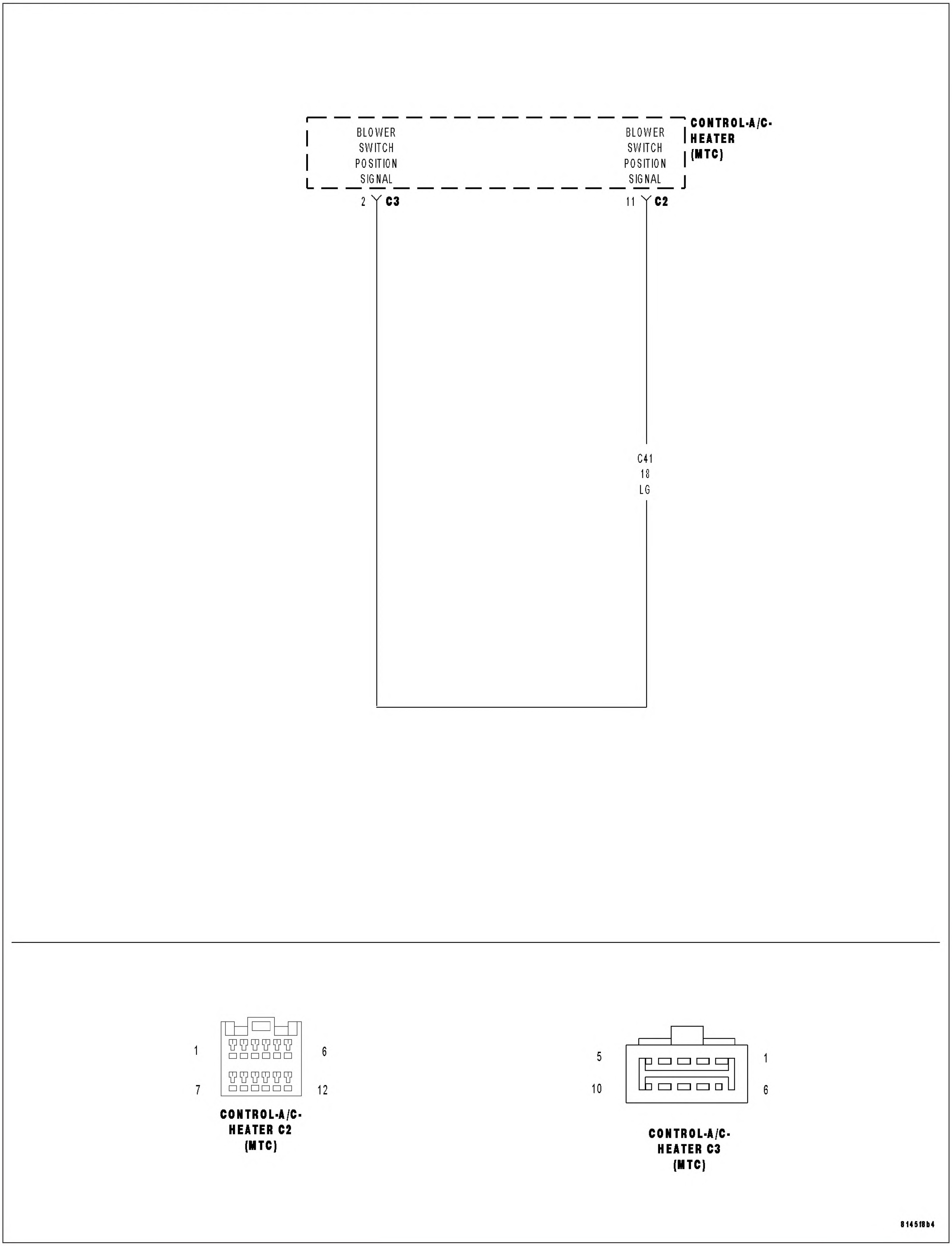
Yes >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for a short to the (C121) Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

33–A/C MODE SWITCH STUCK (MTC)


CONTROL-A/C-
HEATER
(MTC)
BLOWER
SWITCH
POSITION
SIGNAL
BLOWER
SWITCH
POSITION
SIGNAL
2
C3
11
C2
C41
18
LG
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
5
1
10
6
CONTROL-A/C-
HEATER C3
(MTC)
8145f9b4

33–A/C MODE SWITCH STUCK (MTC) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The switch input changes when the switch is pushed down. A stored DTC 33 indicates that the A/C mode switch was stuck in a pushed position for more than 10 minutes, but has since returned to its normal state. An active DTC 33 indicates that the A/C mode switch is stuck in a pushed position. An active DTC 33 will prevent the control from entering diagnostic mode and performing certain diagnostic functions. It will also prevent proper A/C mode switch and status indicator function. For additional information about the A/C Heater Control's on-board diagnostics, refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C mode switch stays in a pushed position for more than 10 minutes.

Possible Causes
OBJECT HOLDING A/C MODE SWITCH IN A PUSHED POSITION
SUBSTANCE CAUSING A/C MODE SWITCH TO GET STUCK IN A PUSHED POSITION
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO VOLTAGE
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO (C121) SENSOR GROUND CIRCUIT
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT OPEN
A/C STATUS INDICATOR INOPERATIVE
A/C HEATER CONTROL

Diagnostic Test

1. INSPECT THE A/C HEATER CONTROL FOR DAMAGE

Turn the ignition off.

Inspect the A/C Heater Control for damage.

Is the A/C Heater Control damaged?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

---

2. INSPECT FOR OBJECT OR SUBSTANCE CAUSING THE A/C MODE SWITCH TO STAY OR STICK IN A PUSHED POSITION

Inspect the A/C Heater Control for anything that would cause the A/C mode switch to stay or stick in a pushed position.

Is anything present that would cause the A/C mode switch to stay or stick in a pushed position?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

33–A/C MODE SWITCH STUCK (MTC) (CONTINUED)

3. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT VOLTAGE

Disconnect the A/C Heater Control C3 harness connector.

Turn the ignition on.

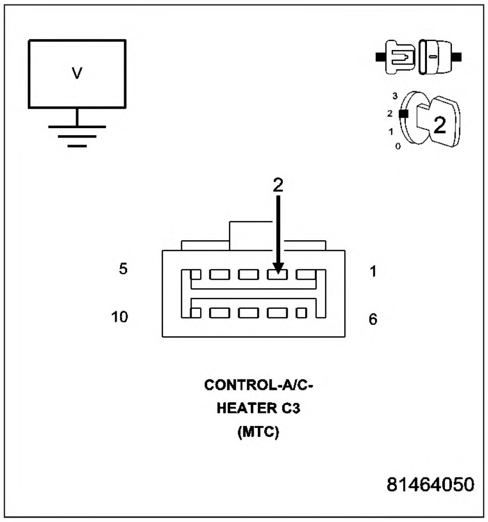
Measure the voltage of the (C41) Blower Switch Position Signal circuit.

What is the voltage?

Below 4.8 Volts
Go To 4

Above 5.2 Volts
Go To 7

4.8 Volts To 5.2 Volts
Go To 8



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4. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C121) SENSOR GROUND CIRCUIT

Turn the ignition off.

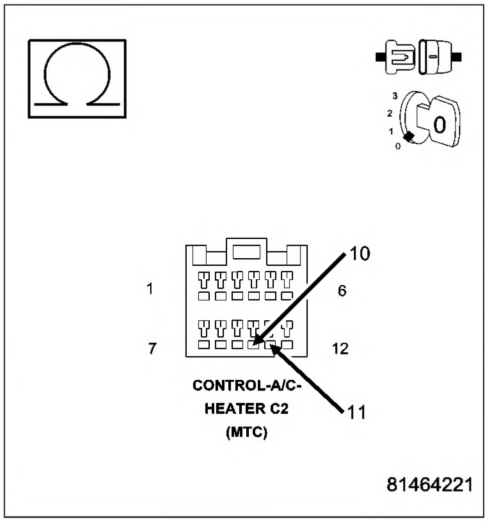
Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C41) Blower Switch Position Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 10K ohms?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to the (C121) Sensor Ground circuit.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

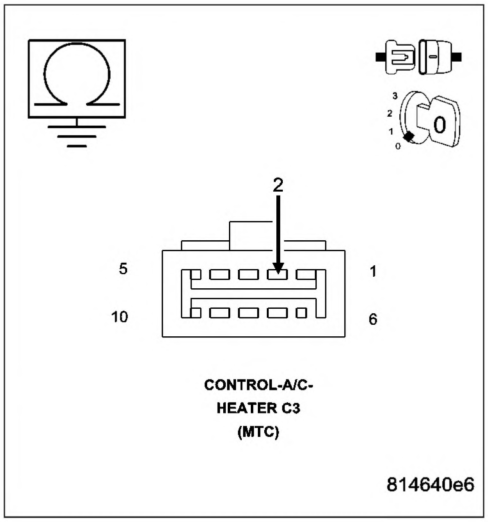
No >> Go To 5



33–A/C MODE SWITCH STUCK (MTC) (CONTINUED)

5. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance of the (C41) Blower Switch Position Signal circuit between ground and the A/C Heater Control C3 harness connector.



Is the resistance below 10K ohms?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to ground.

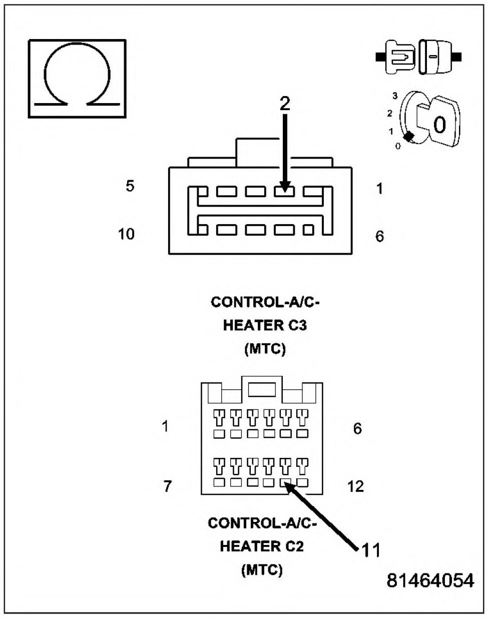
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (C41) Blower Switch Position Signal circuit between the A/C Heater Control C2 harness connector and the A/C Heater Control C3 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C41) Blower Switch Position Signal circuit for an open.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

33–A/C MODE SWITCH STUCK (MTC) (CONTINUED)

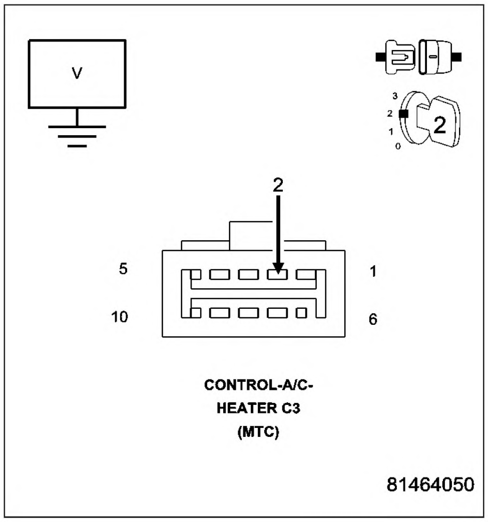
7. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C41) Blower Switch Position Signal circuit.



Is the voltage above 0.2 volts?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

8. CHECK FOR NORMAL A/C MODE SWITCH & STATUS INDICATOR FUNCTION

Turn the ignition off.

Reconnect the A/C Heater Control C3 harness connector.

Turn the ignition on.

Turn the Blower control on.

Press the A/C mode switch on and off several times while observing the A/C status indicator.

Does the A/C status indicator turn on and off with respect to the switch position?

Yes >> Go To 9

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

9. CHECK A/C HEATER CONTROL OPERATION BY ATTEMPTING TO ENTER DIAGNOSTIC MODE

If illuminated, turn off the A/C status indicator and the EBL status indicator.

Actuate the display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

When entry mode is recognized, the A/C status indicator and the EBL status indicator will illuminate for 5 seconds and then display DTCs, if present. The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated. However, if no DTCs are present, both status indicators will turn off and the system will exit diagnostic mode.

Did the A/C Heater Control enter diagnostic mode?

Yes >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

34–EBL MODE SWITCH STUCK (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The switch input changes when the switch is pushed down. A stored DTC 34 indicates that the EBL mode switch was stuck in a pushed position for more than 10 minutes, but has since returned to its normal state. An active DTC 34 indicates that the EBL mode switch is stuck in a pushed position. An active DTC 34 will prevent the control from performing certain diagnostic functions and it will prevent proper EBL mode switch and status indicator function. For additional information about the A/C Heater Control's on-board diagnostics, refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the EBL mode switch stays in a pushed position for more than 10 minutes.

Possible Causes
A/C HEATER CONTROL DAMAGED
OBJECT HOLDING EBL MODE SWITCH IN A PUSHED POSITION
SUBSTANCE CAUSING EBL MODE SWITCH TO GET STUCK IN A PUSHED POSITION
A/C HEATER CONTROL

Diagnostic Test

1. INSPECT THE A/C HEATER CONTROL FOR DAMAGE

Inspect the A/C Heater Control for damage.

Is the A/C Heater Control damaged?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

---

2. INSPECT FOR OBJECT OR SUBSTANCE CAUSING THE EBL MODE SWITCH TO STAY OR STICK IN A PUSHED POSITION

Inspect the A/C Heater Control for anything that would cause the EBL mode switch to stay or stick in a pushed position.

Is anything present that would cause the EBL mode switch to stay or stick in a pushed position?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

34–EBL MODE SWITCH STUCK (MTC) (CONTINUED)

3. CHECK FOR NORMAL EBL MODE SWITCH & STATUS INDICATOR FUNCTION

Turn the ignition on.

Press the EBL mode switch on and off several times while observing the EBL status indicator.

Does the EBL status indicator turn on and off with respect to the switch position?

Yes >> Go To 4

No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK A/C HEATER CONTROL OPERATION BY ATTEMPTING TO RUN THE ACTUATOR CIRCUIT TEST/DOOR CALIBRATION FUNCTION

If illuminated, turn off the A/C status indicator and the EBL status indicator.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch.

While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately.

Did the A/C Heater Control run the test / function?

Yes >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

35–FAILED COOL DOWN (MTC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Cooldown Test is executed.
- **Set Condition:**
  If the A/C system is unable to lower the evaporator temperature 11.11°C (20°F).

Possible Causes
PREREQUISITES NOT MET BEFORE RUNNING THE COOLDOWN TEST
ANOTHER RELATED SYSTEM NOT FUNCTIONING CORRECTLY
POWERTRAIN SYSTEM FAULTS PRESENT

NOTE: This DTC will display as active if the ignition is not cycled after running the Cooldown Test. Otherwise, it will display as stored until cleared.

Diagnostic Test

1. VERIFY THAT ALL OF THE COOLDOWN TEST PREREQUISITES WERE MET

Review the list of Cooldown Test prerequisites.

- **DTC 31 or 32 must not be active.**
- **The refrigerant system must be adequately charged.**
- **The blower motor must operate correctly in all speeds.**
- **The work area ambient temperature must be above 18.3°C (65°F).**
- **The evaporator temperature must be above 18.3°C (65°F).**
- **The A/C compressor must be turned off.**

Were all of the prerequisites met before running the Cooldown Test?

Yes >> Go To 2

No >> Run the Cooldown Test again after all of the prerequisites are met. Then, if DTC 35 is still present, Go To 2. Otherwise, perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

2. CHECK FOR DTCs IN THE PCM

With the scan tool, select PCM.

Are any DTCs present in the PCM?

Yes >> Diagnose and repair the DTC(s). (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) for PCM DTCs. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Refer to the Service Information for additional Cooldown Test related diagnostic information and testing procedures. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

36–EEPROM CHECKSUM ERROR (MTC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the calculated checksum does not match the stored value.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

37–ROM CHECKSUM ERROR (MTC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the calculated checksum does not match the stored value.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

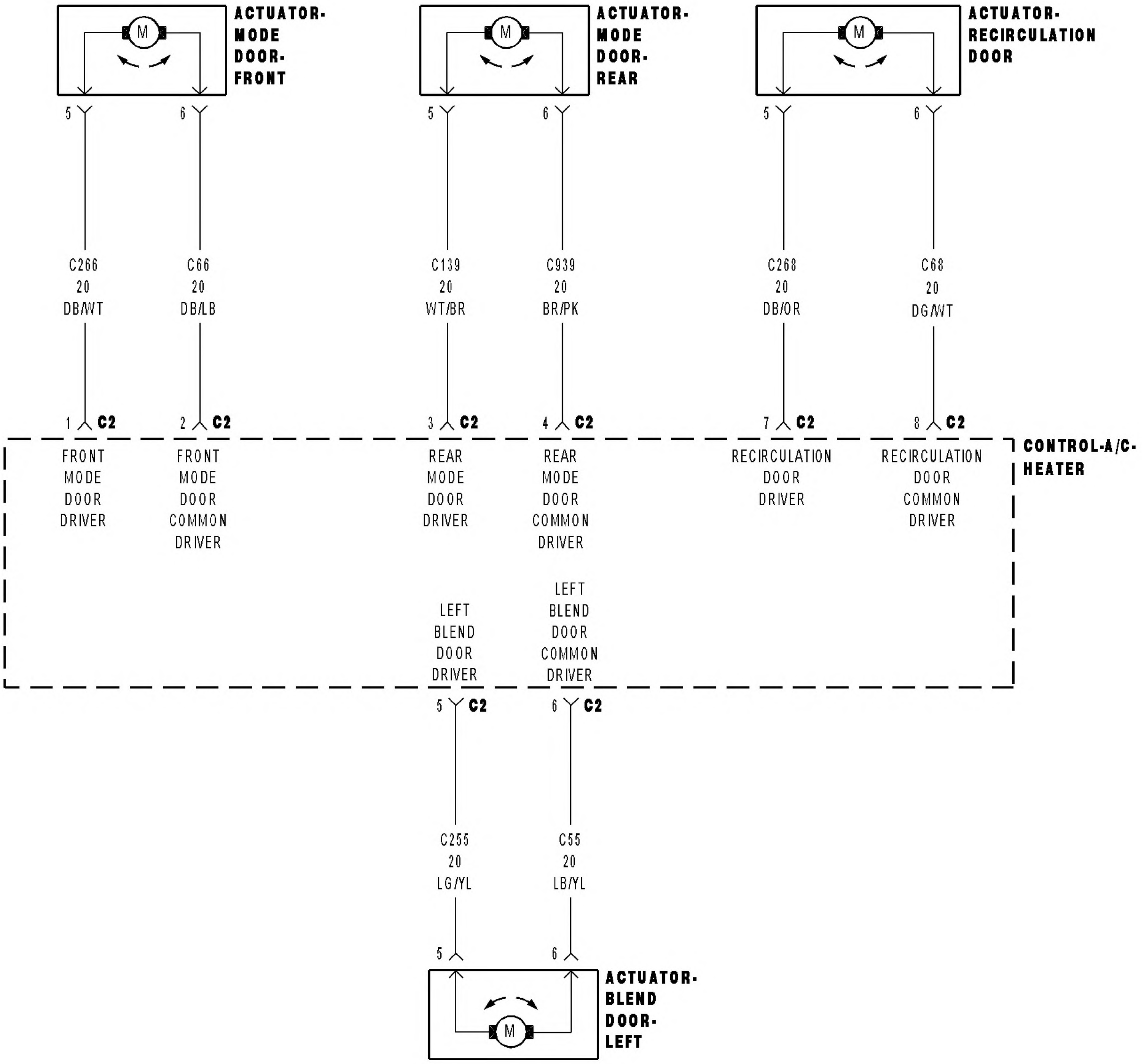
1. REPLACE THE A/C HEATER CONTROL

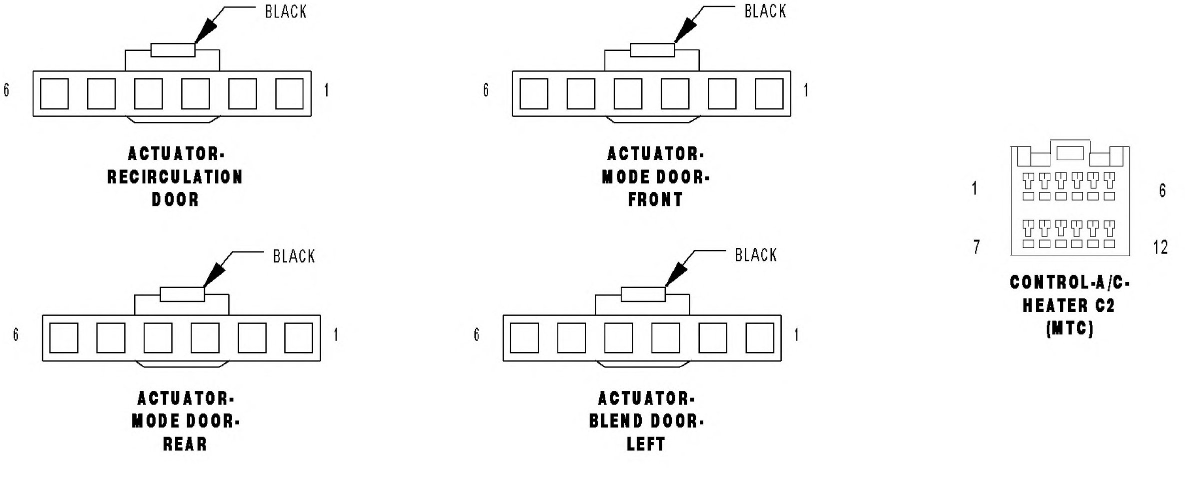
Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

41–FRONT MODE OVERCURRENT (MTC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
3 C2
4 C2
7 C2
8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255 20 LG/YL
C55 20 LB/YL
5
6
ACTUATOR-BLEND DOOR-LEFT


BLACK
6
1
ACTUATOR-RECIRCULATION DOOR
BLACK
6
1
ACTUATOR-MODE DOOR-FRONT
BLACK
6
1
ACTUATOR-MODE DOOR-REAR
BLACK
6
1
ACTUATOR-BLEND DOOR-LEFT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81476196

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When actuator movement is requested.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on any of the door driver circuits while attempting to drive this door actuator. Note that only one overcurrent DTC can set per ignition cycle.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED TO VOLTAGE
DOOR DRIVER CIRCUIT(S) SHORTED TO GROUND
DOOR DRIVER CIRCUITS SHORTED TOGETHER
FRONT MODE DOOR ACTUATOR
REAR MODE DOOR ACTUATOR
LEFT BLEND DOOR ACTUATOR
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the result of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

Diagnostic Test

1. RUN THE ACTUATOR CIRCUIT TEST / DOOR CALIBRATION FUNCTION & THEN CHECK FOR ACTUATOR CIRCUIT TEST FAULTS

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44).

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the Actuator Circuit Test faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

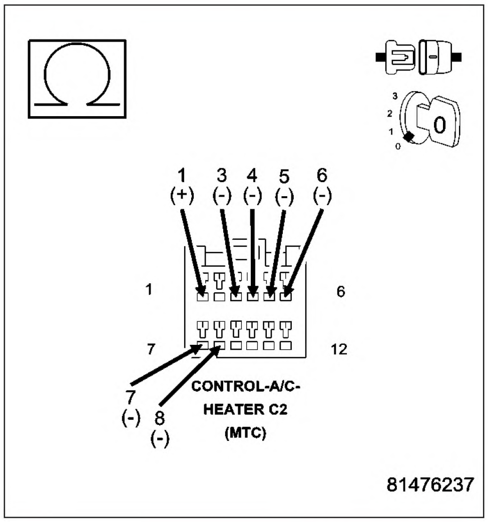
No >> Go To 2

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

2. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Turn the ignition off.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

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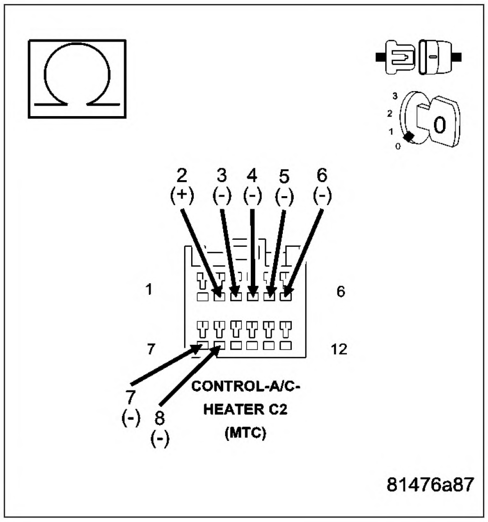
3. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C66) Front Mode Door Common Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C66) Front Mode Door Common Driver circuit.

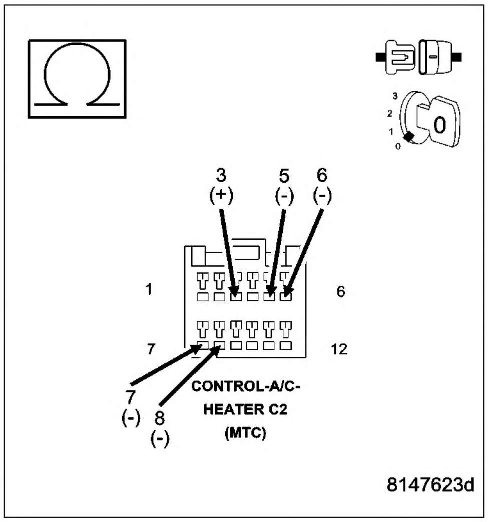
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

4. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

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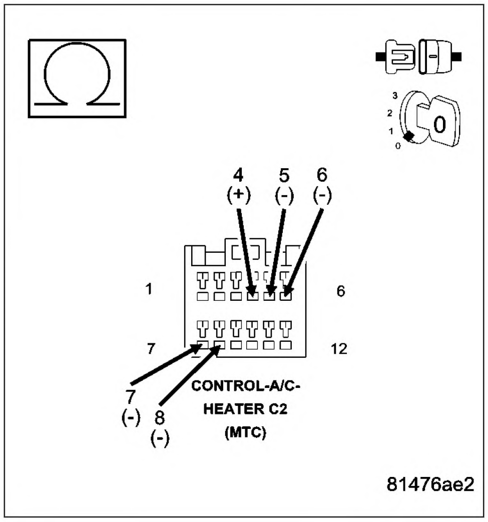
5. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C939) Rear Mode Door Common Driver circuit and (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C939) Rear Mode Door Common Driver circuit.

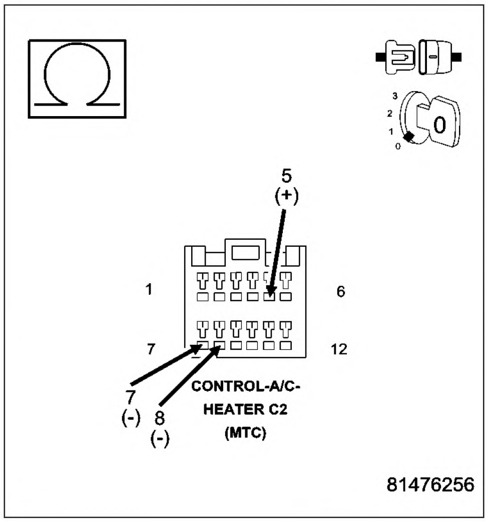
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

6. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C255) Left Blend Door Driver circuit.

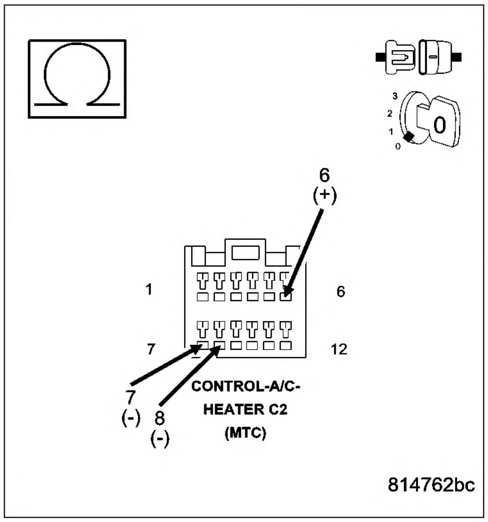
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 7

---

7. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C55) Left Blend Door Common Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C55) Left Blend Door Common Driver circuit.

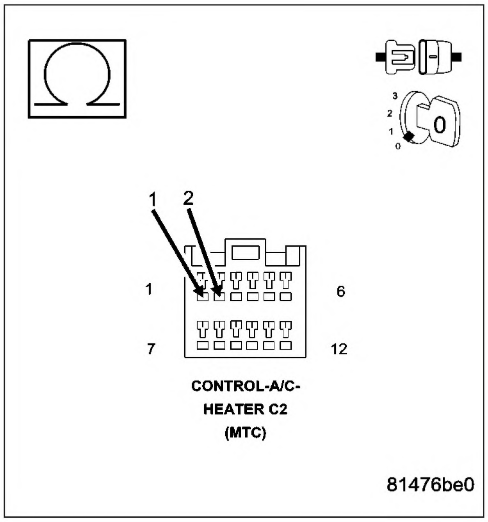
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 8

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

8. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

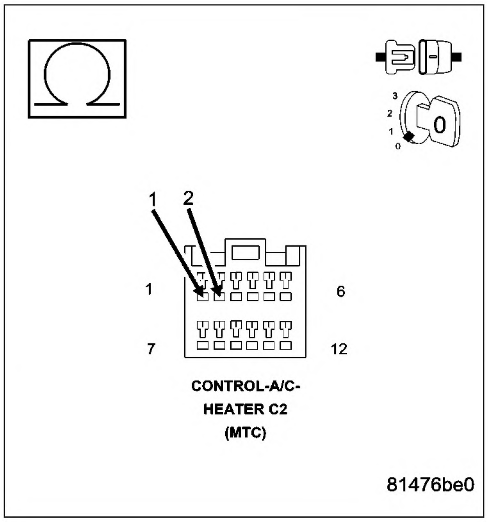
Yes >> Go To 9

No >> Go To 10

9. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C66) Front Mode Door Common Driver Circuit for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

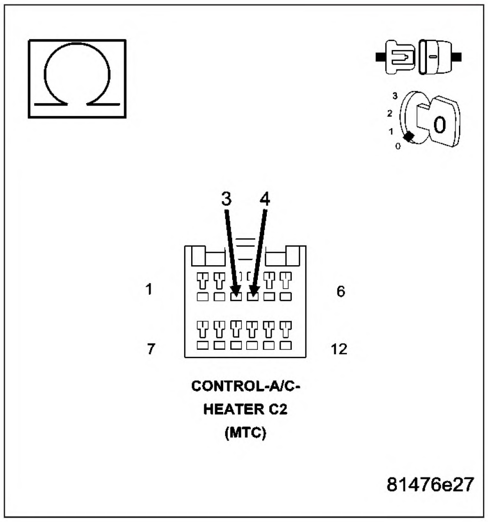
No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

10. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 11

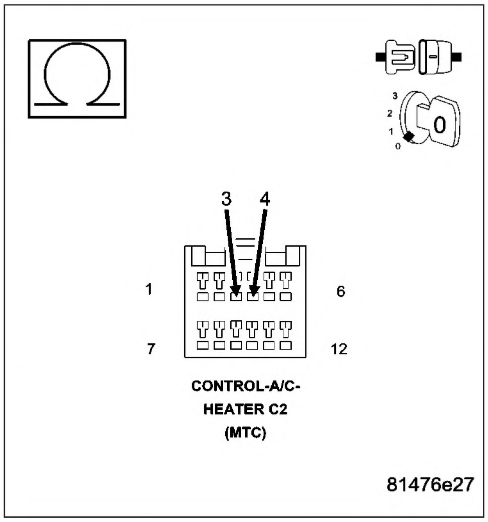
No >> Go To 12

---

11. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C939) Rear Mode Door Common Driver Circuit for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

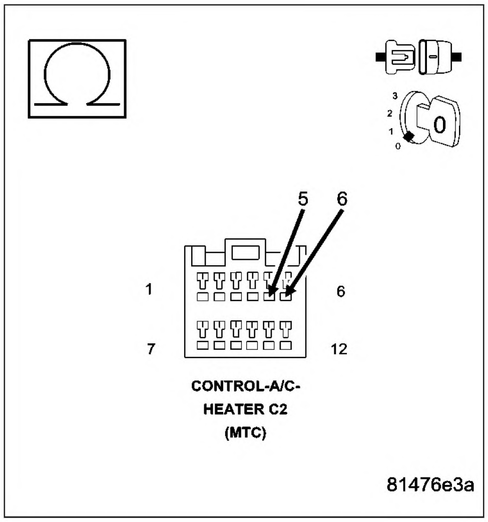
No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

12. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 13

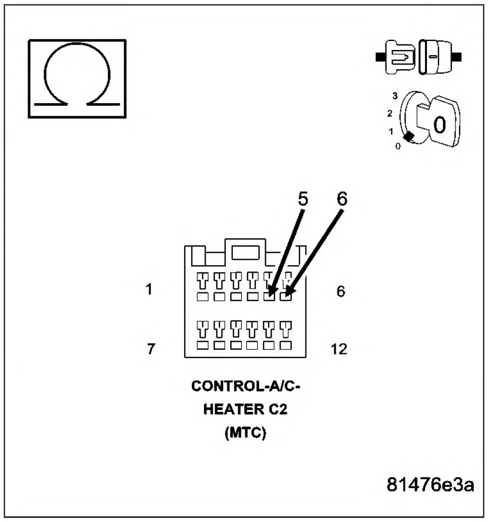
No >> Go To 14

---

13. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C55) Left Blend Door Common Driver Circuit for a short to the (C255) Left Blend Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

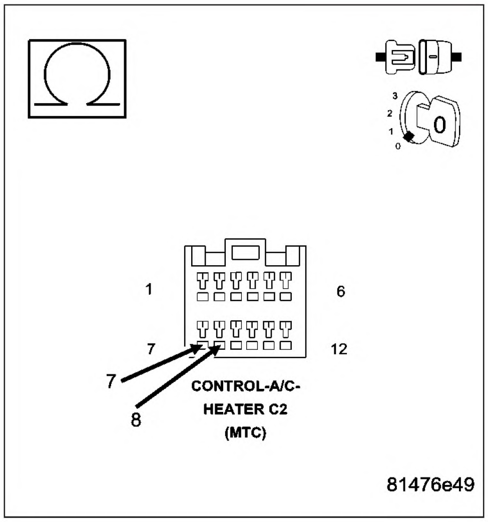
No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

14. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 15

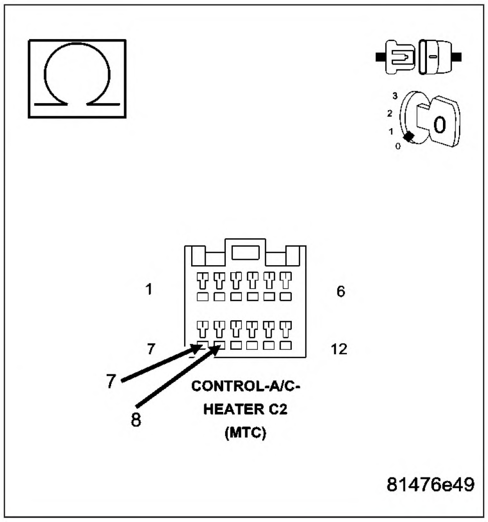
No >> Go To 16

---

15. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C68) Recirculation Door Common Driver Circuit for a short to the (C268) Recirculation Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

41–FRONT MODE OVERCURRENT (MTC) (CONTINUED)

16. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Reconnect all of the door actuator harness connectors.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 41?

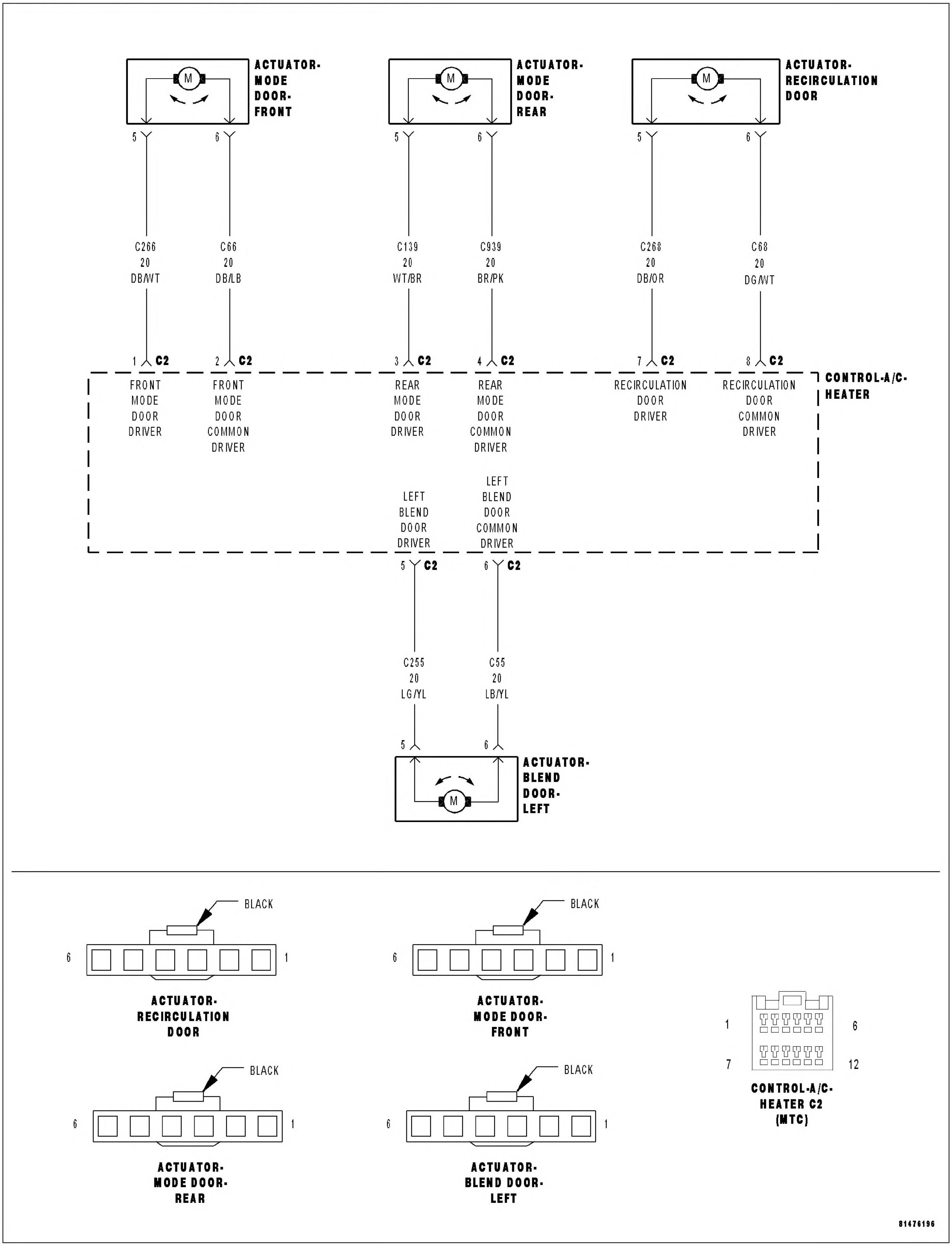
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

42–REAR MODE OVERCURRENT (MTC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
3 C2
4 C2
7 C2
8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255 20 LG/YL
C55 20 LB/YL
ACTUATOR-BLEND DOOR-LEFT
BLACK
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-BLEND DOOR-LEFT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81476196

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When actuator movement is requested.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on any of the door driver circuits while attempting to drive this door actuator. Note that only one overcurrent DTC can set per ignition cycle.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED TO VOLTAGE
DOOR DRIVER CIRCUIT(S) SHORTED TO GROUND
DOOR DRIVER CIRCUITS SHORTED TOGETHER
FRONT MODE DOOR ACTUATOR
REAR MODE DOOR ACTUATOR
LEFT BLEND DOOR ACTUATOR
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the result of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

Diagnostic Test

1. RUN THE ACTUATOR CIRCUIT TEST / DOOR CALIBRATION FUNCTION & THEN CHECK FOR ACTUATOR CIRCUIT TEST FAULTS

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44).

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the Actuator Circuit Test faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

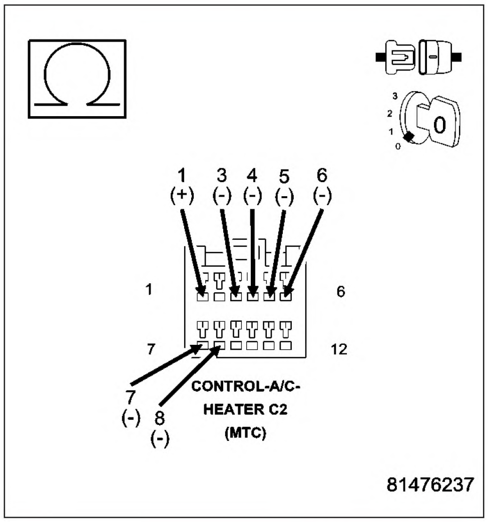
No >> Go To 2

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

2. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Turn the ignition off.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

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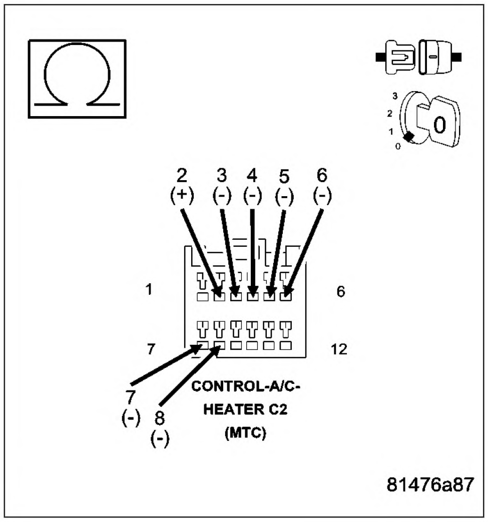
3. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C66) Front Mode Door Common Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C66) Front Mode Door Common Driver circuit.

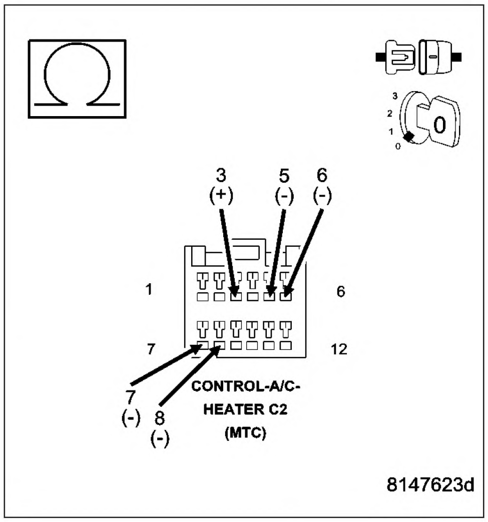
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

4. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C139) Rear Mode Door Driver circuit.

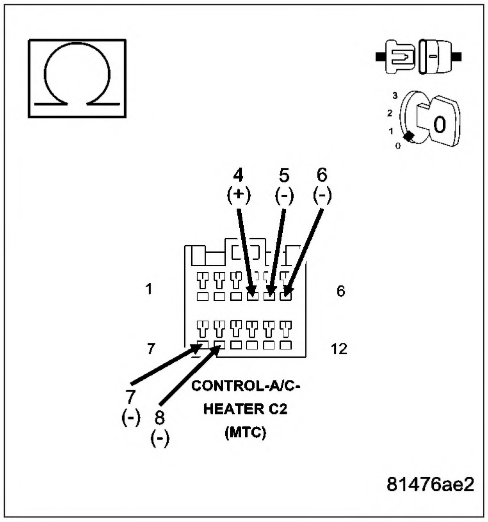
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

---

5. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C939) Rear Mode Door Common Driver circuit and (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C939) Rear Mode Door Common Driver circuit.

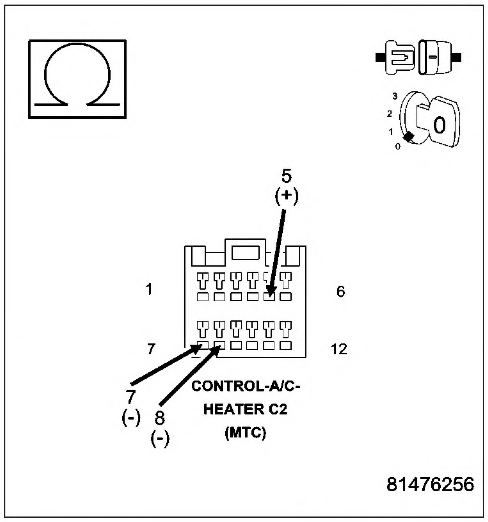
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

6. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

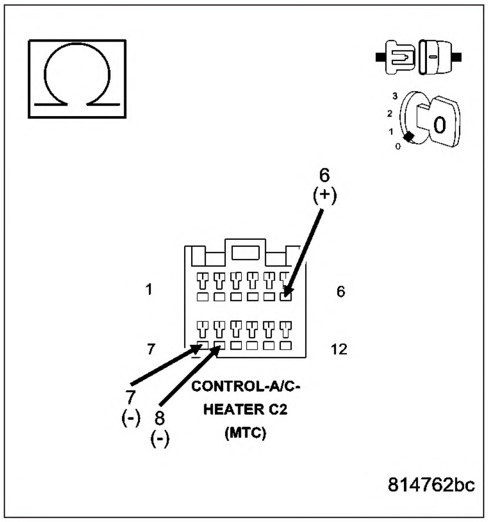
Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C255) Left Blend Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 7

7. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C55) Left Blend Door Common Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C55) Left Blend Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 8

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

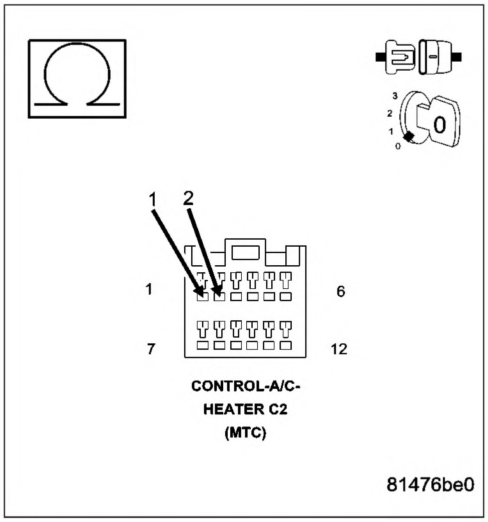
8. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 30.0 ohms?

Yes >> Go To 9

No >> Go To 10



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9. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.

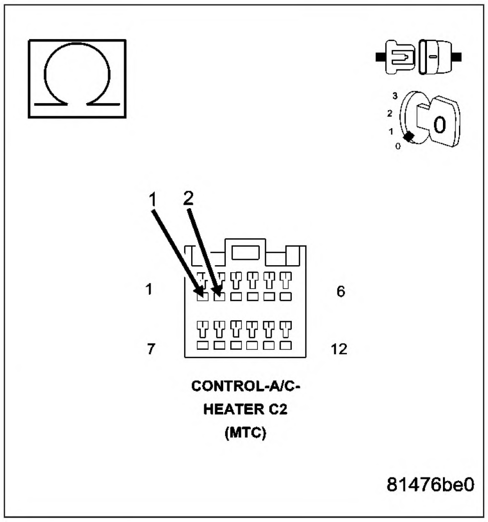
Is the resistance below 10k ohms?

Yes >> Repair the (C66) Front Mode Door Common Driver Circuit for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

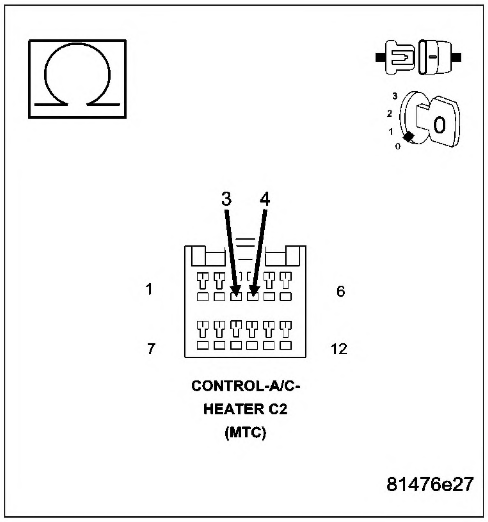
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

10. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 11

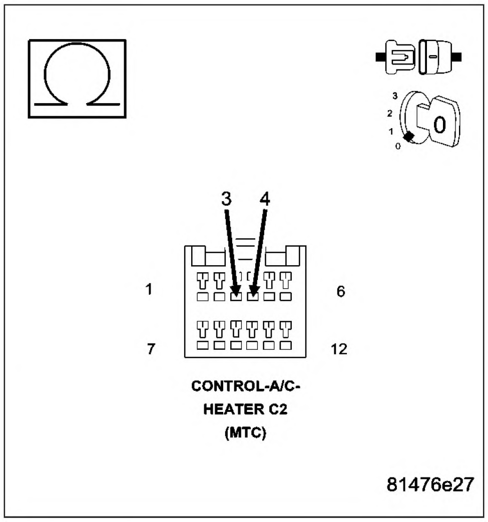
No >> Go To 12

---

11. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C939) Rear Mode Door Common Driver Circuit for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

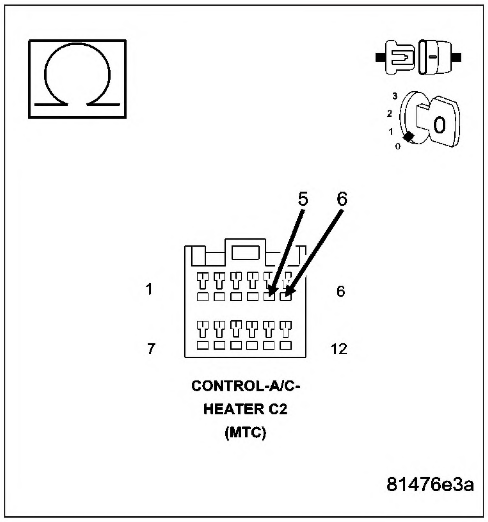
No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

12. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 13

No >> Go To 14

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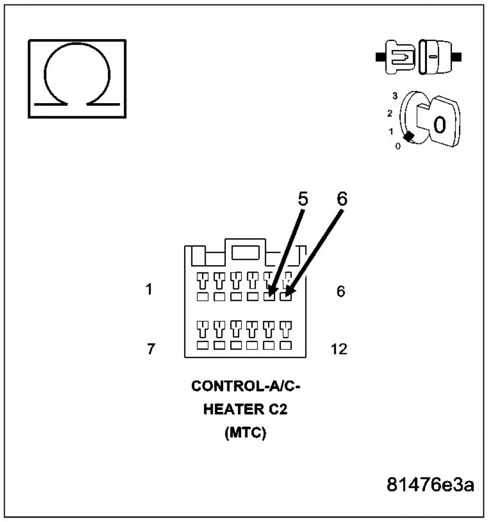
13. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C55) Left Blend Door Common Driver Circuit for a short to the (C255) Left Blend Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

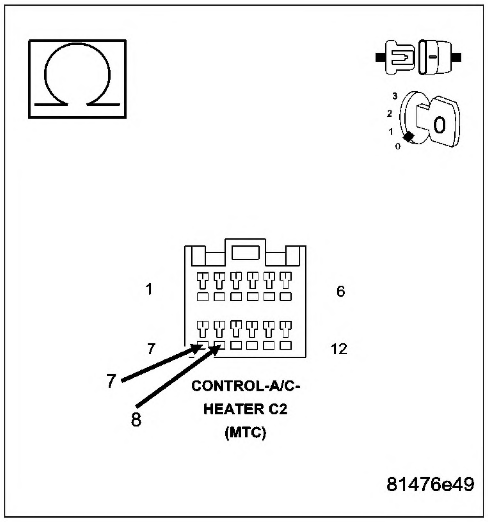
No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

14. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 15

No >> Go To 16

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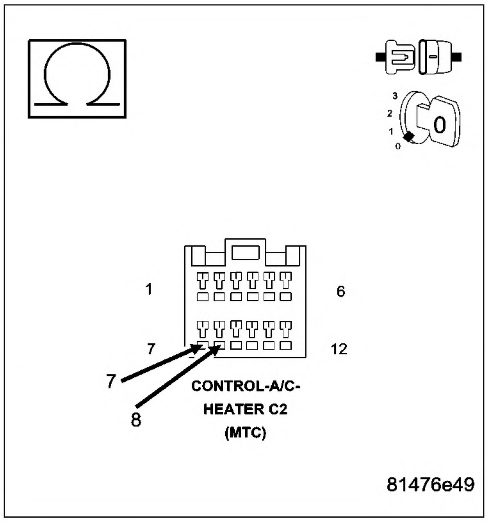
15. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C68) Recirculation Door Common Driver Circuit for a short to the (C268) Recirculation Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

42–REAR MODE OVERCURRENT (MTC) (CONTINUED)

16. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Reconnect all of the door actuator harness connectors.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 42?

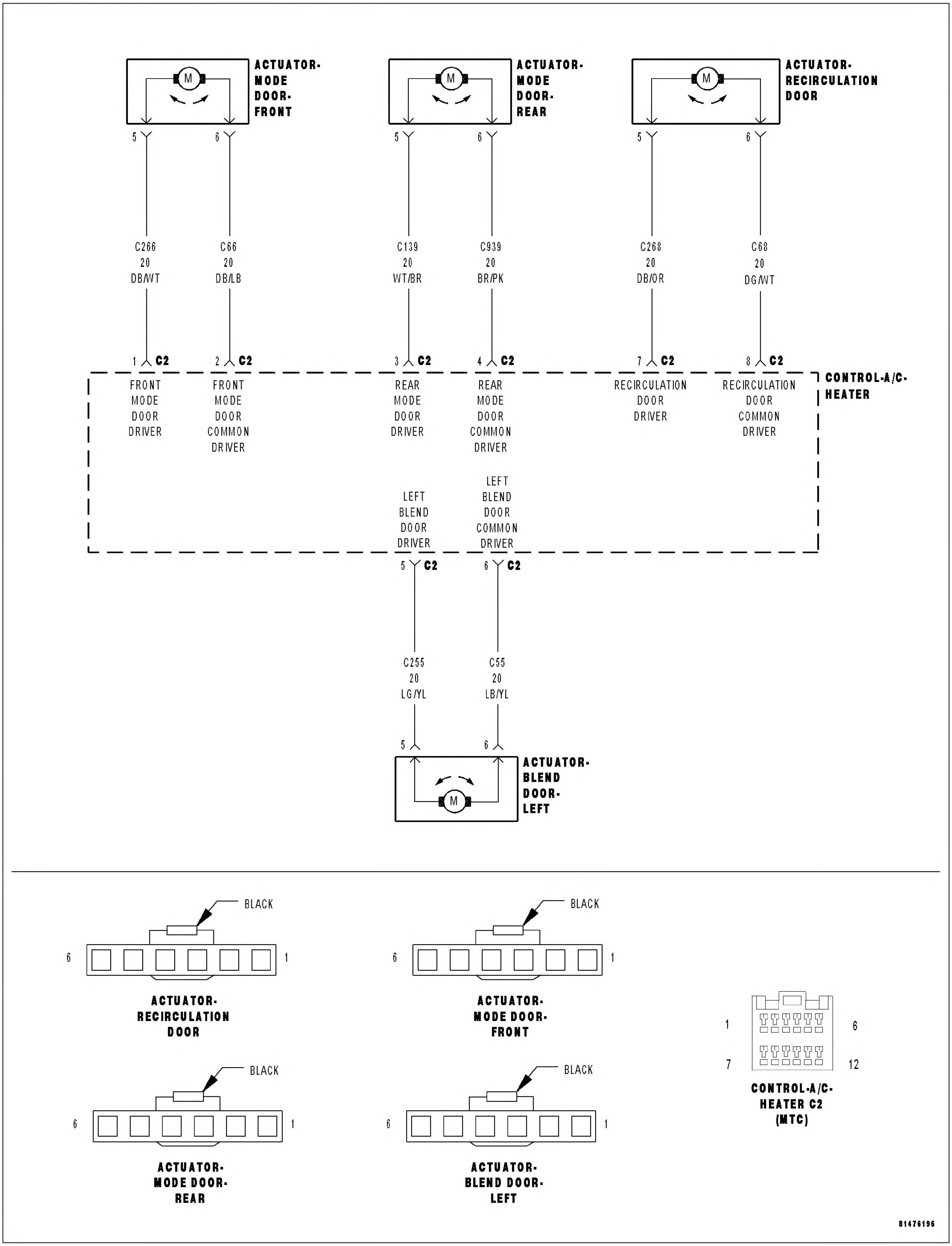
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

43–BLEND OVERCURRENT (MTC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
3 C2
4 C2
7 C2
8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255 20 LG/YL
C55 20 LB/YL
ACTUATOR-BLEND DOOR-LEFT
BLACK
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-BLEND DOOR-LEFT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
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43–BLEND OVERCURRENT (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When actuator movement is requested.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on any of the door driver circuits while attempting to drive this door actuator. Note that only one overcurrent DTC can set per ignition cycle.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED TO VOLTAGE
DOOR DRIVER CIRCUIT(S) SHORTED TO GROUND
DOOR DRIVER CIRCUITS SHORTED TOGETHER
FRONT MODE DOOR ACTUATOR
REAR MODE DOOR ACTUATOR
LEFT BLEND DOOR ACTUATOR
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the result of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

43–BLEND OVERCURRENT (MTC) (CONTINUED)

Diagnostic Test

1. RUN THE ACTUATOR CIRCUIT TEST / DOOR CALIBRATION FUNCTION & THEN CHECK FOR ACTUATOR CIRCUIT TEST FAULTS

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44).

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the Actuator Circuit Test faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

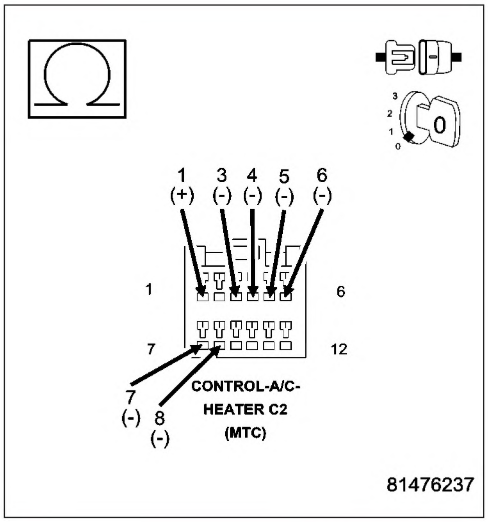
No >> Go To 2

43–BLEND OVERCURRENT (MTC) (CONTINUED)

2. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Turn the ignition off.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

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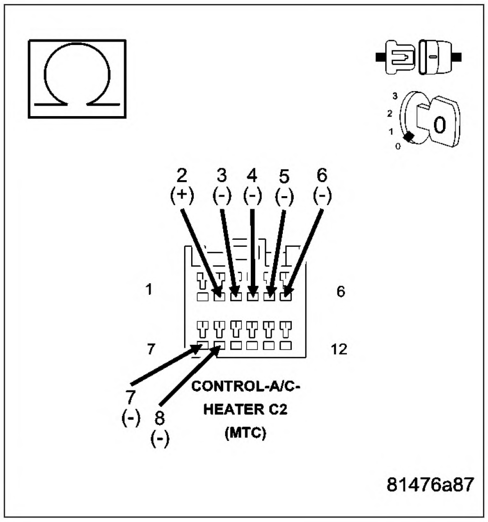
3. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C66) Front Mode Door Common Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C66) Front Mode Door Common Driver circuit.

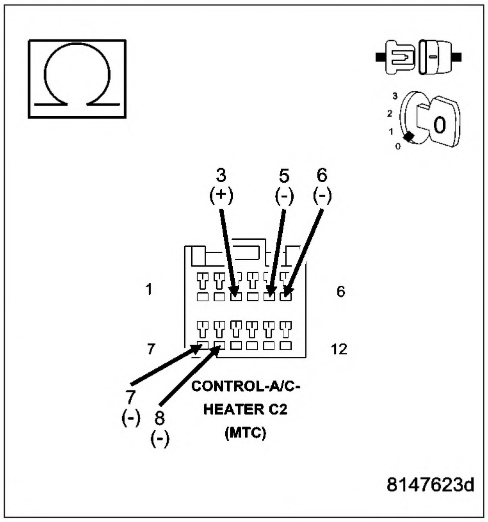
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

43–BLEND OVERCURRENT (MTC) (CONTINUED)

4. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

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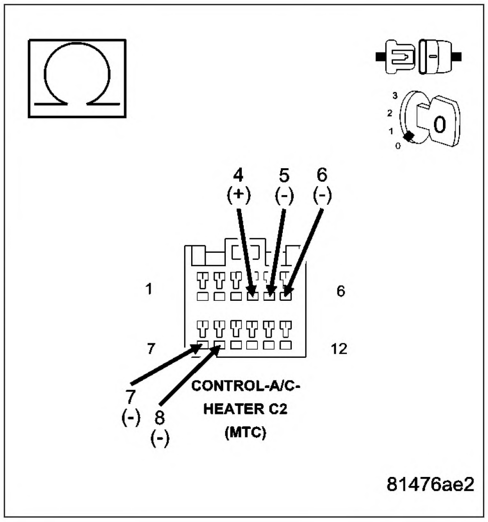
5. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C939) Rear Mode Door Common Driver circuit and (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C939) Rear Mode Door Common Driver circuit.

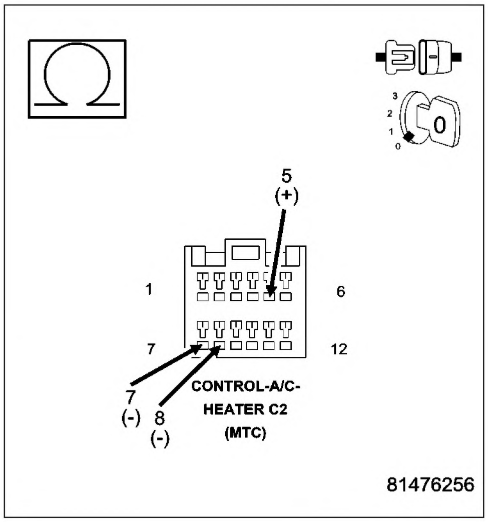
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

43–BLEND OVERCURRENT (MTC) (CONTINUED)

6. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

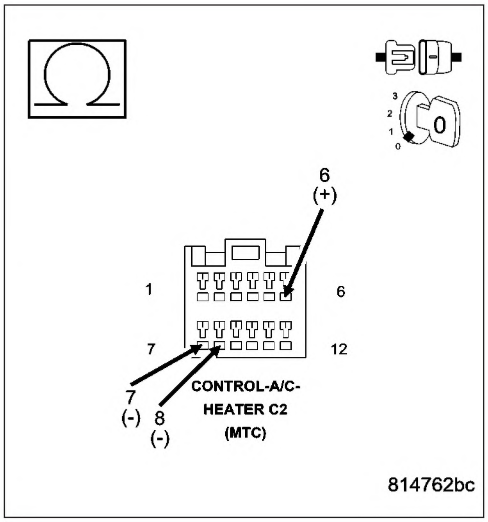
Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C255) Left Blend Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 7

7. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C55) Left Blend Door Common Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C55) Left Blend Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 8

43–BLEND OVERCURRENT (MTC) (CONTINUED)

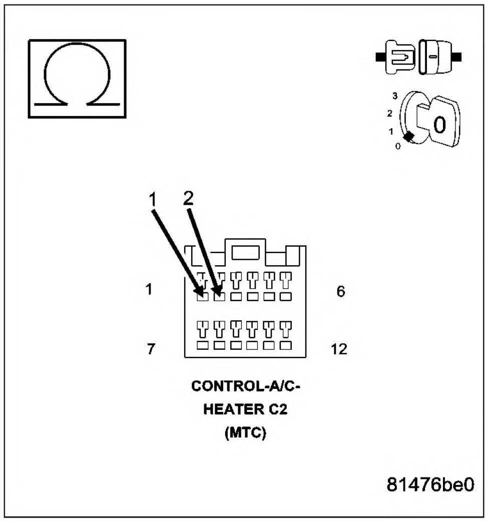
8. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 30.0 ohms?

Yes >> Go To 9

No >> Go To 10



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9. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.

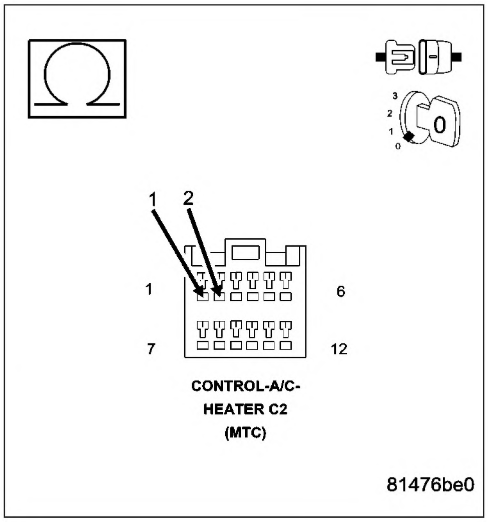
Is the resistance below 10k ohms?

Yes >> Repair the (C66) Front Mode Door Common Driver Circuit for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

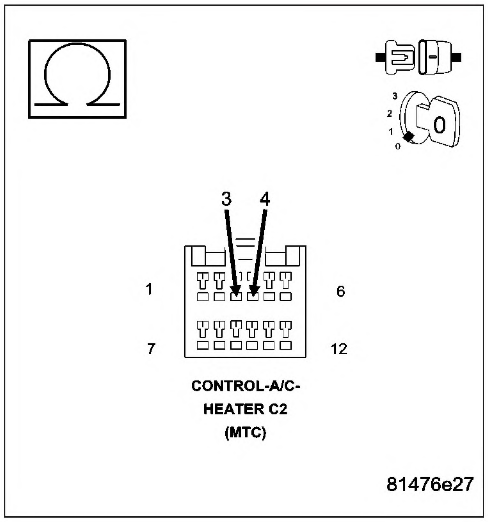
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



43–BLEND OVERCURRENT (MTC) (CONTINUED)

10. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 11

No >> Go To 12

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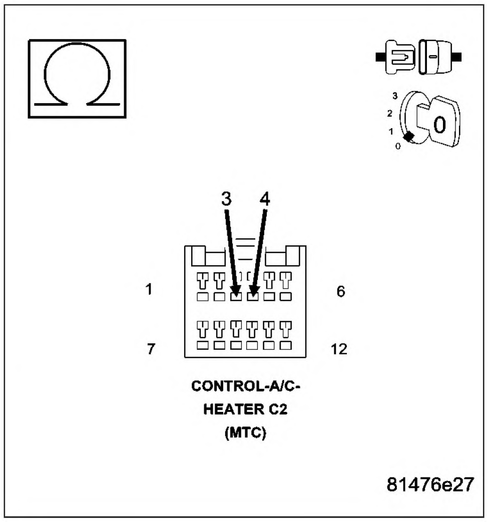
11. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C939) Rear Mode Door Common Driver Circuit for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

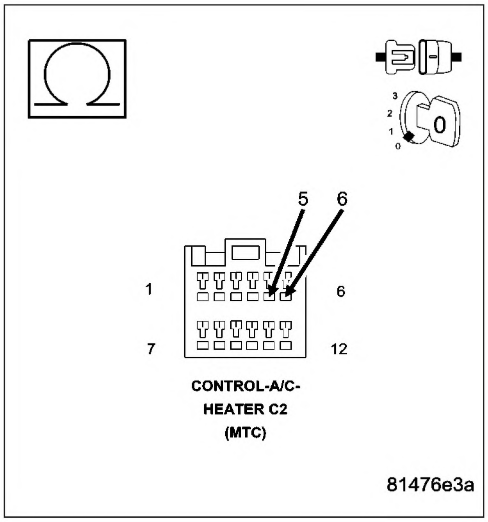
No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

43–BLEND OVERCURRENT (MTC) (CONTINUED)

12. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 13

No >> Go To 14

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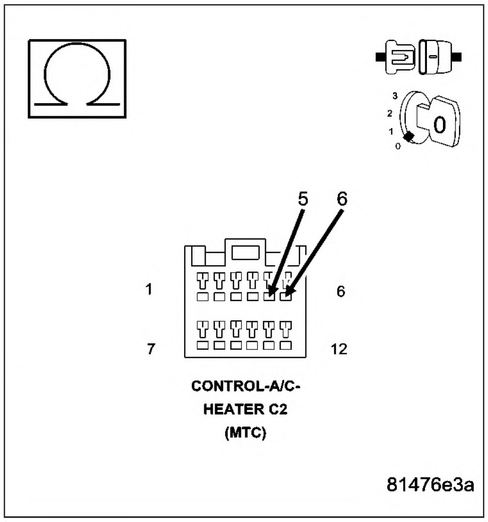
13. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C55) Left Blend Door Common Driver Circuit for a short to the (C255) Left Blend Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

43–BLEND OVERCURRENT (MTC) (CONTINUED)

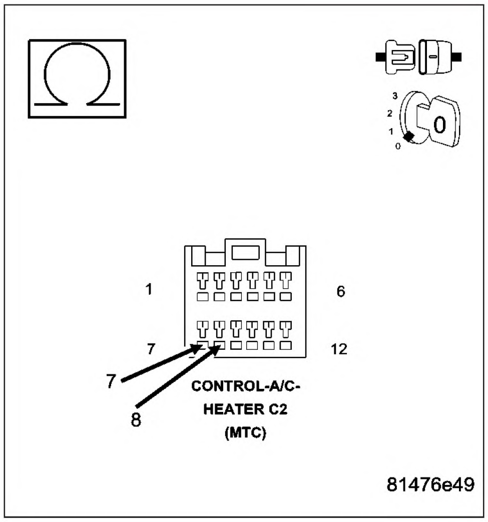
14. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 30.0 ohms?

Yes >> Go To 15

No >> Go To 16



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15. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.

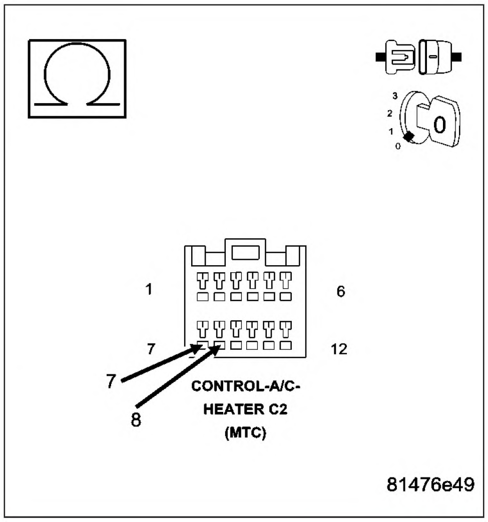
Is the resistance below 10k ohms?

Yes >> Repair the (C68) Recirculation Door Common Driver Circuit for a short to the (C268) Recirculation Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



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43–BLEND OVERCURRENT (MTC) (CONTINUED)

16. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Reconnect all of the door actuator harness connectors.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 43?

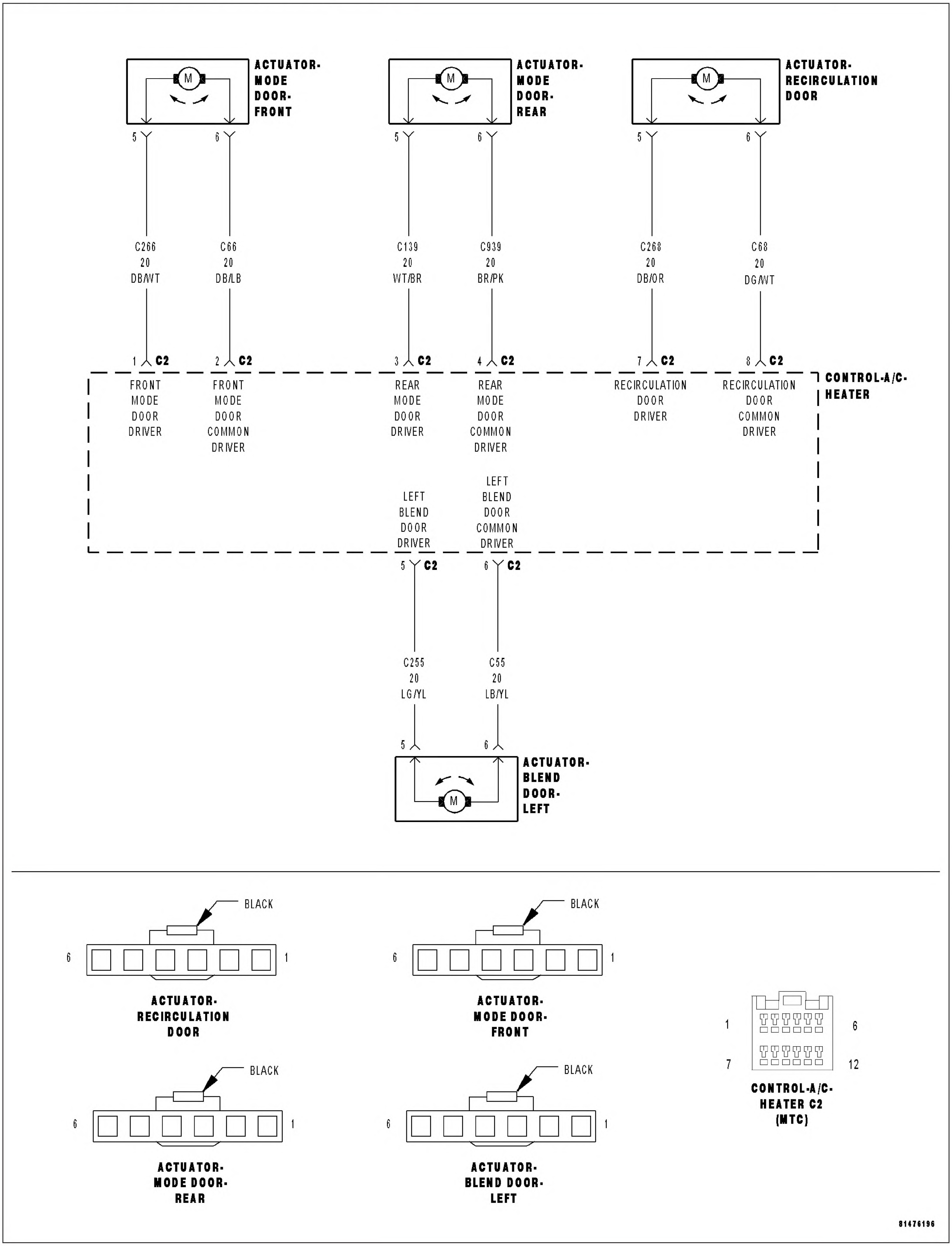
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

44–RECIRC OVERCURRENT (MTC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
3 C2
4 C2
7 C2
8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255 20 LG/YL
C55 20 LB/YL
ACTUATOR-BLEND DOOR-LEFT
BLACK
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-BLEND DOOR-LEFT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
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44–RECIRC OVERCURRENT (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When actuator movement is requested.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on any of the door driver circuits while attempting to drive this door actuator. Note that only one overcurrent DTC can set per ignition cycle.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED TO VOLTAGE
DOOR DRIVER CIRCUIT(S) SHORTED TO GROUND
DOOR DRIVER CIRCUITS SHORTED TOGETHER
FRONT MODE DOOR ACTUATOR
REAR MODE DOOR ACTUATOR
LEFT BLEND DOOR ACTUATOR
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the result of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

Diagnostic Test

1. RUN THE ACTUATOR CIRCUIT TEST / DOOR CALIBRATION FUNCTION & THEN CHECK FOR ACTUATOR CIRCUIT TEST FAULTS

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44).

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the Actuator Circuit Test faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

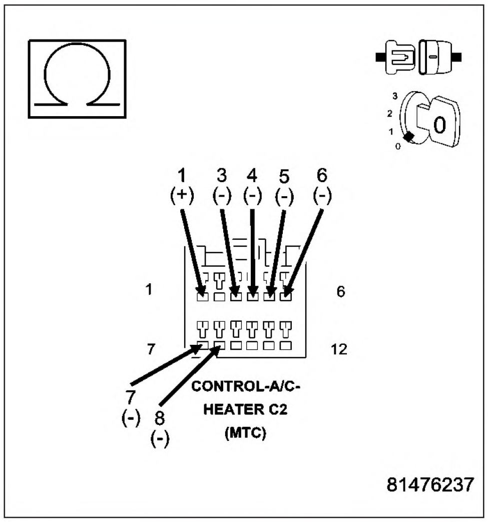
No >> Go To 2

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

2. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Turn the ignition off.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C266) Front Mode Door Driver circuit.

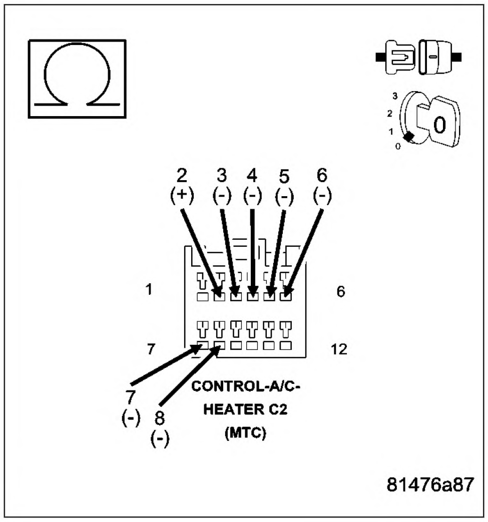
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

3. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C66) Front Mode Door Common Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C66) Front Mode Door Common Driver circuit.

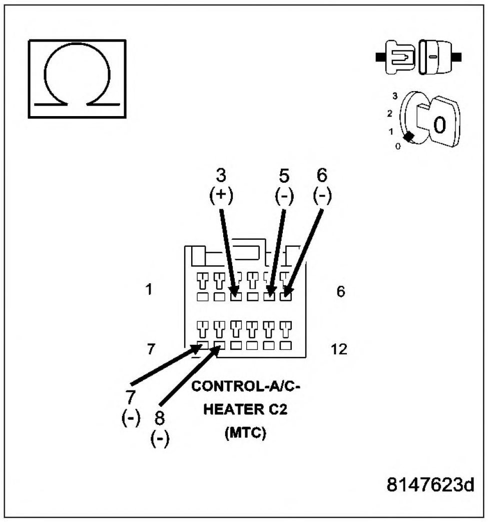
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

4. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C139) Rear Mode Door Driver circuit.

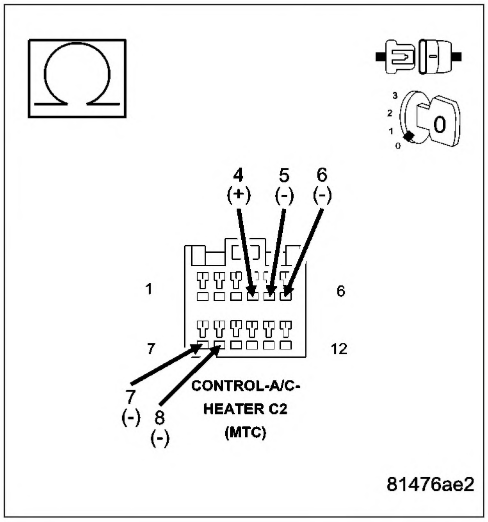
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

---

5. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C939) Rear Mode Door Common Driver circuit and (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C939) Rear Mode Door Common Driver circuit.

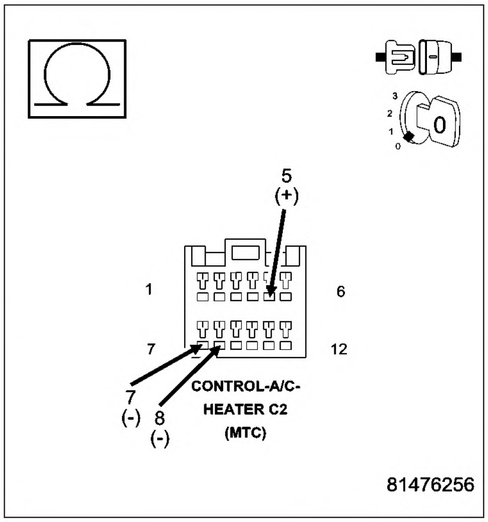
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

6. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C255) Left Blend Door Driver circuit.

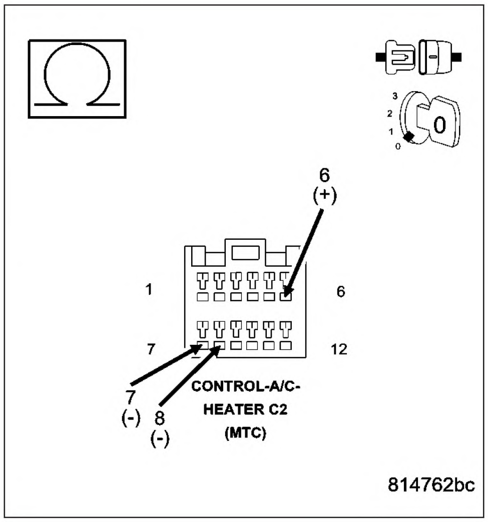
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 7

---

7. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C55) Left Blend Door Common Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C55) Left Blend Door Common Driver circuit.

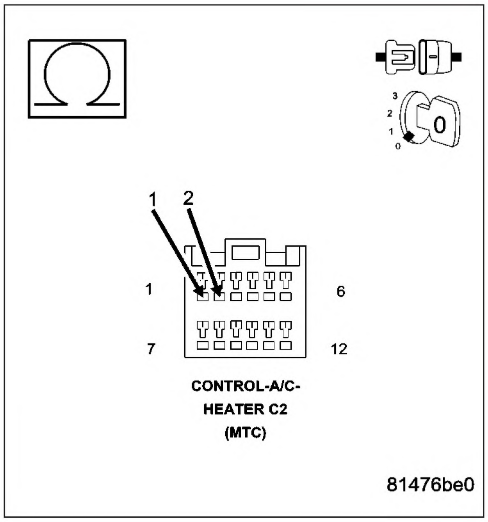
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 8

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

8. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 9

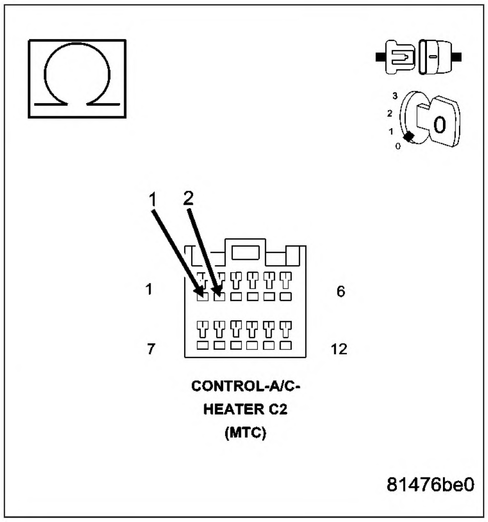
No >> Go To 10

---

9. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C66) Front Mode Door Common Driver Circuit for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

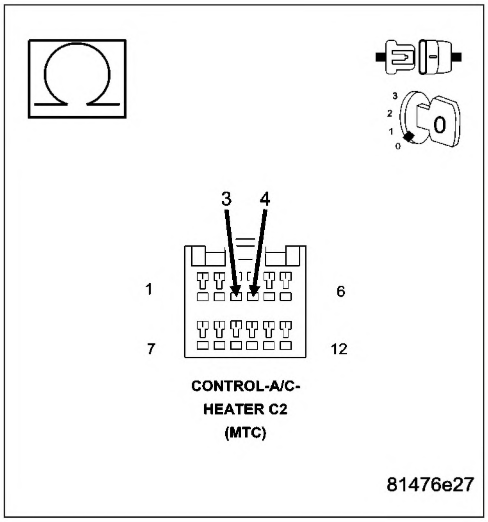
No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

10. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 11

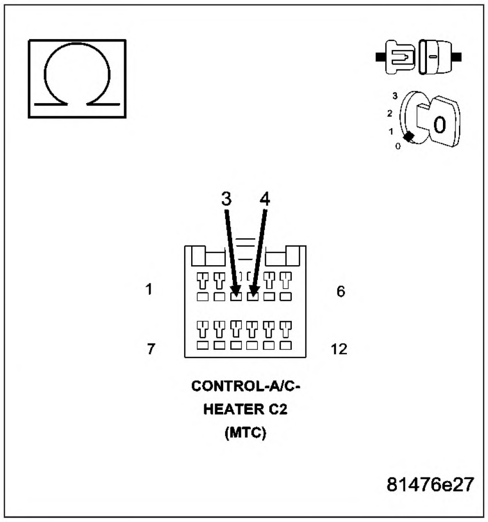
No >> Go To 12

---

11. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C939) Rear Mode Door Common Driver Circuit for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

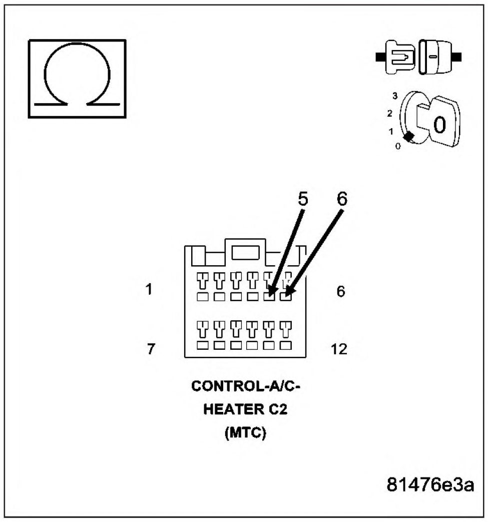
No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

12. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 13

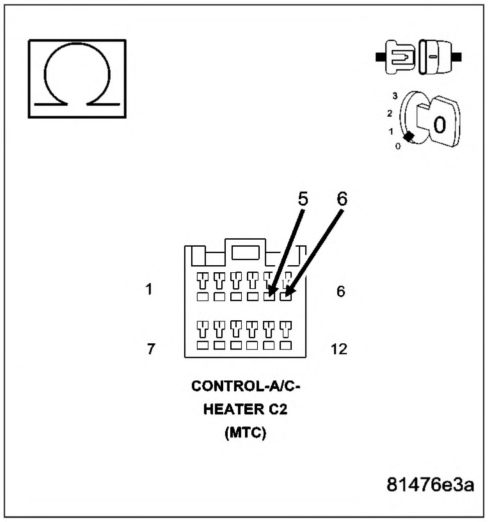
No >> Go To 14

---

13. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C55) Left Blend Door Common Driver Circuit for a short to the (C255) Left Blend Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

44–RECIRC OVERCURRENT (MTC) (CONTINUED)

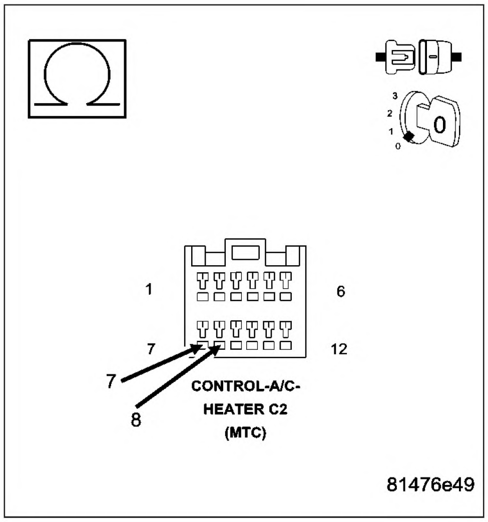
14. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 30.0 ohms?

Yes >> Go To 15

No >> Go To 16



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15. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.

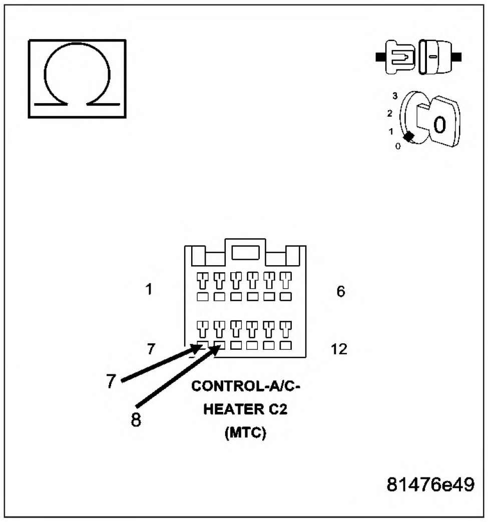
Is the resistance below 10k ohms?

Yes >> Repair the (C68) Recirculation Door Common Driver Circuit for a short to the (C268) Recirculation Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



44–RECIRC OVERCURRENT (MTC) (CONTINUED)

16. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Reconnect all of the door actuator harness connectors.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 44?

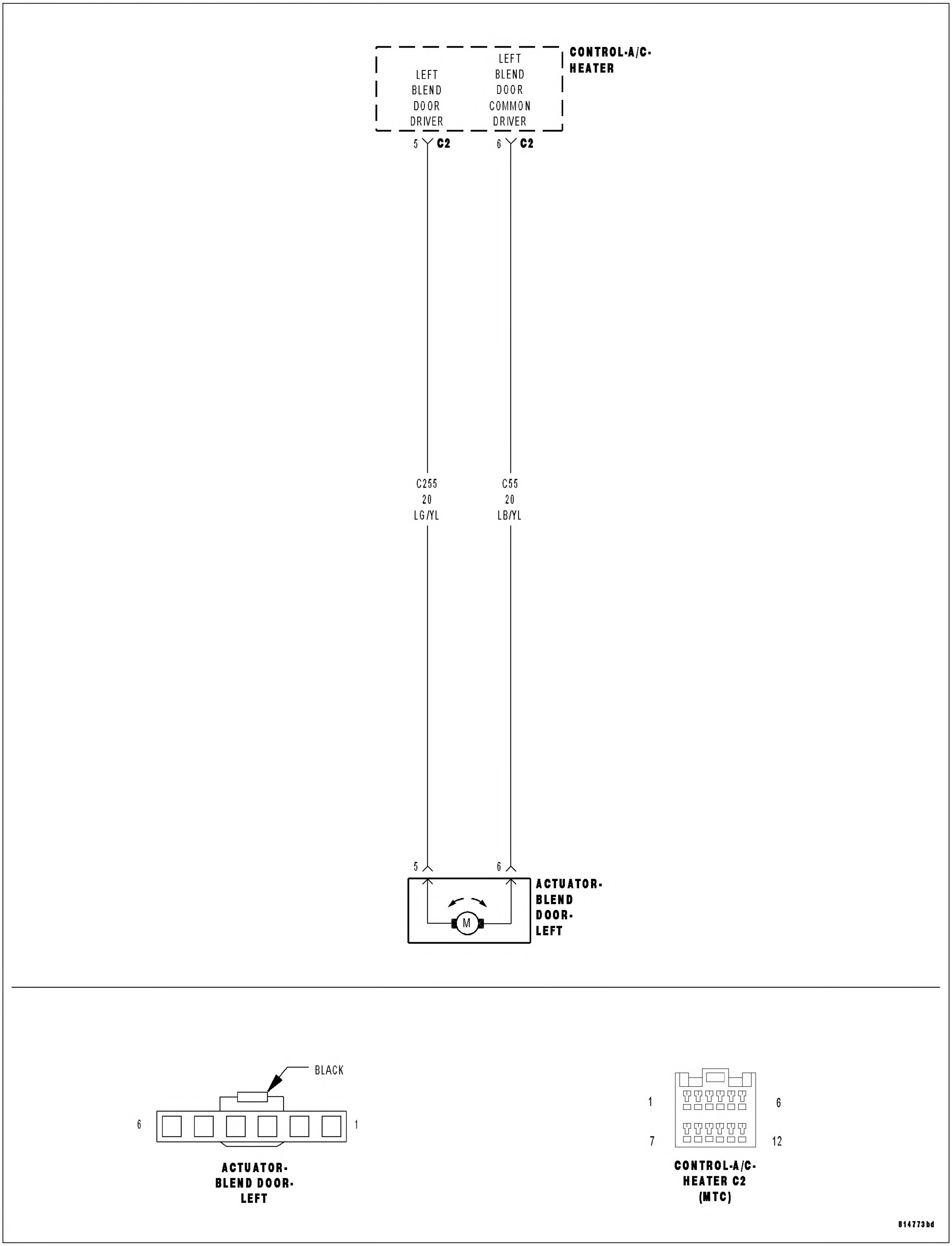
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

45–BLEND DOOR BOUND (MTC)


CONTROL-A/C-
HEATER
LEFT
BLEND
DOOR
DRIVER
LEFT
BLEND
DOOR
COMMON
DRIVER
5 C2
6 C2
C255
20
LG/YL
C55
20
LB/YL
5
6
ACTUATOR-
BLEND
DOOR-
LEFT
M
BLACK
6
1
ACTUATOR-
BLEND DOOR-
LEFT
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
814773bd

45–BLEND DOOR BOUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects no commutator pulses when calibrating the left blend door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects no commutator pulses when calibrating the left blend door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
(C255) LEFT BLEND DOOR DRIVER CIRCUIT OPEN
(C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT OPEN
LEFT BLEND DOOR SEIZED, OBSTRUCTED
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

45–BLEND DOOR BOUND (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

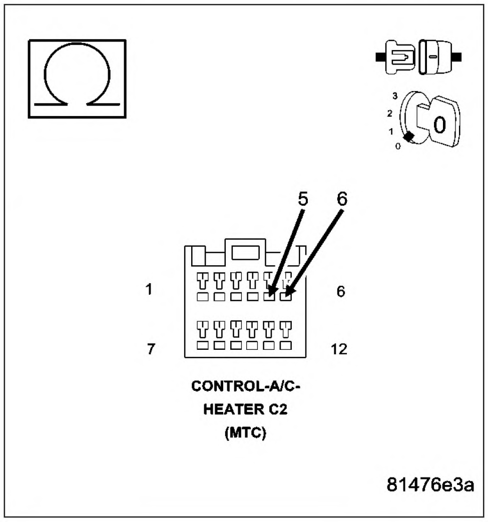
Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C55) Left Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance above 70.0 ohms?

Yes >> Go To 3

No >> Go To 5

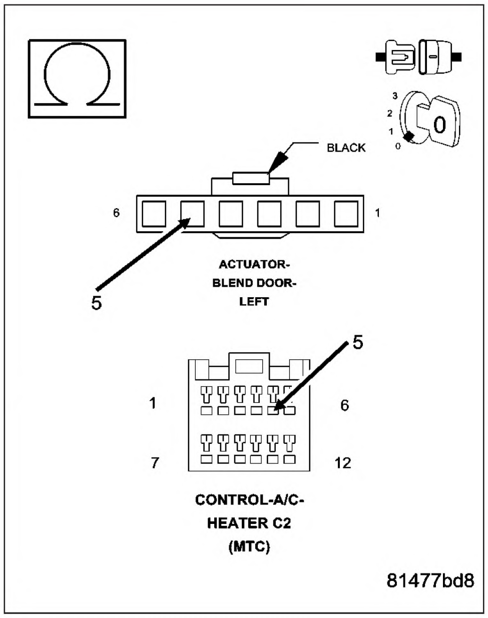


45–BLEND DOOR BOUND (MTC) (CONTINUED)

3. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance of the (C255) Left Blend Door Driver circuit between the A/C Heater Control C2 harness connector and the Left Blend Door Actuator harness connector.



81477bd8

Is the resistance below 5.0 ohms?

Yes >> Go To 4

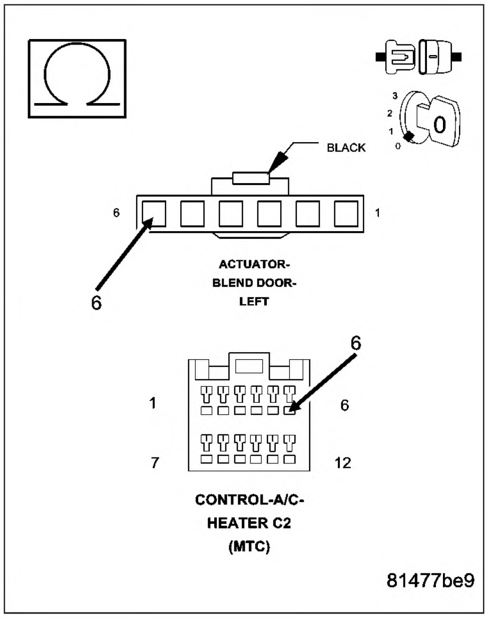
No >> Repair the (C255) Left Blend Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C55) Left Blend Door Common Driver Circuit between the A/C Heater Control C2 harness connector and the Left Blend Door Actuator harness connector.



81477be9

Is the resistance below 5.0 ohms?

Yes >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C55) Left Blend Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

45–BLEND DOOR BOUND (MTC) (CONTINUED)

5. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE LEFT BLEND DOOR TO SEIZE

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the left blend door to seize.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK LEFT BLEND DOOR TRAVEL

Remove the Left Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 90 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Left Blend Door Actuator in accordance with the Service Information. Then, Go To 7.

No >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

45–BLEND DOOR BOUND (MTC) (CONTINUED)

7. VERIFY THAT FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

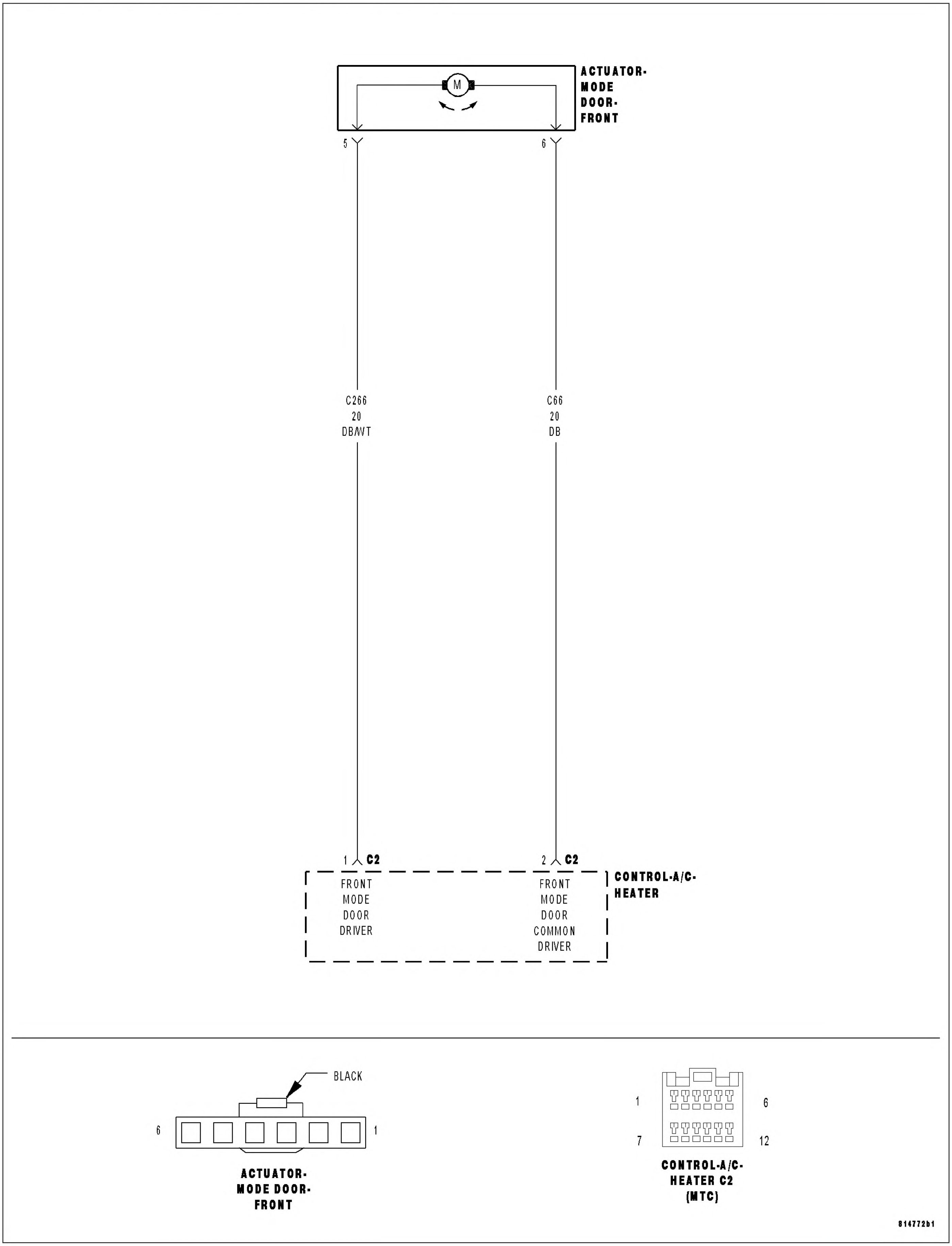
Does the A/C status indicator display DTC 45?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

46–FRONT MODE DOOR BOUND (MTC)


ACTUATOR-MODE DOOR-FRONT
M
5
6
C266
20
DB/WT
C66
20
DB
1 C2
2 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
BLACK
6
1
ACTUATOR-MODE DOOR-FRONT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
814772b1

46–FRONT MODE DOOR BOUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects no commutator pulses when calibrating the front mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects no commutator pulses when calibrating the front mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
(C266) FRONT MODE DOOR DRIVER CIRCUIT OPEN
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT OPEN
FRONT MODE DOOR SEIZED, OBSTRUCTED
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

46–FRONT MODE DOOR BOUND (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

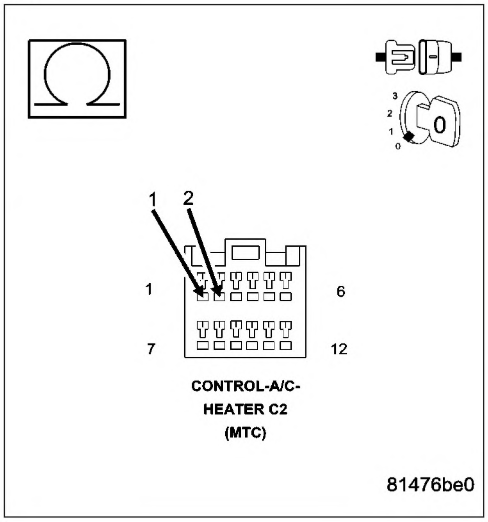
Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C66) Front Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance above 70.0 ohms?

Yes >> Go To 3

No >> Go To 5

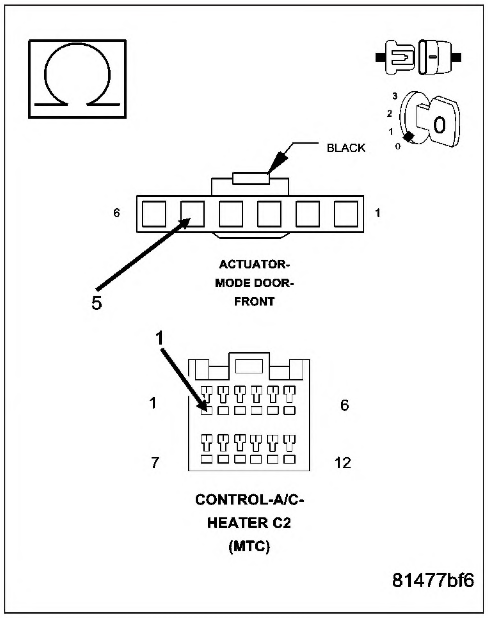


46–FRONT MODE DOOR BOUND (MTC) (CONTINUED)

3. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance of the (C266) Front Mode Door Driver circuit between the A/C Heater Control C2 harness connector and the Front Mode Door Actuator harness connector.


BLACK
3
2
1
0
6
1
5
ACTUATOR-
MODE DOOR-
FRONT
1
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
81477bf6

Is the resistance below 5.0 ohms?

Yes >> Go To 4

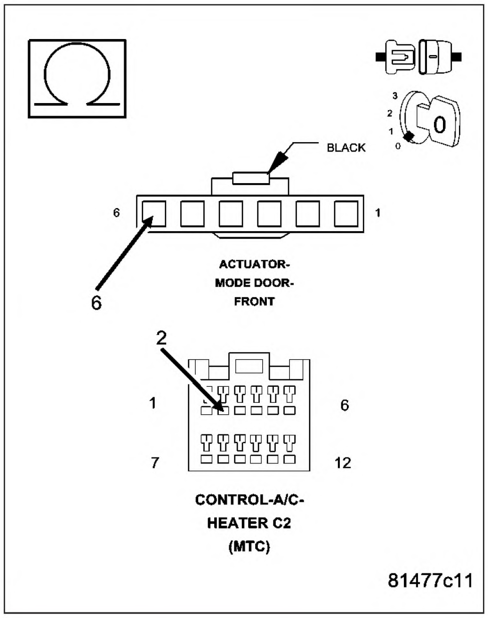
No >> Repair the (C266) Front Mode Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C66) Front Mode Door Common Driver Circuit between the A/C Heater Control C2 harness connector and the Front Mode Door Actuator harness connector.


BLACK
3
2
1
0
6
1
6
ACTUATOR-
MODE DOOR-
FRONT
2
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
81477c11

Is the resistance below 5.0 ohms?

Yes >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C66) Front Mode Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

46–FRONT MODE DOOR BOUND (MTC) (CONTINUED)

5. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE FRONT MODE DOOR TO SEIZE

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the front mode door to seize.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK FRONT MODE DOOR TRAVEL

Remove the Front Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 350 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Front Mode Door Actuator in accordance with the Service Information. Then, Go To 7.

No >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

46–FRONT MODE DOOR BOUND (MTC) (CONTINUED)

7. VERIFY THAT FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

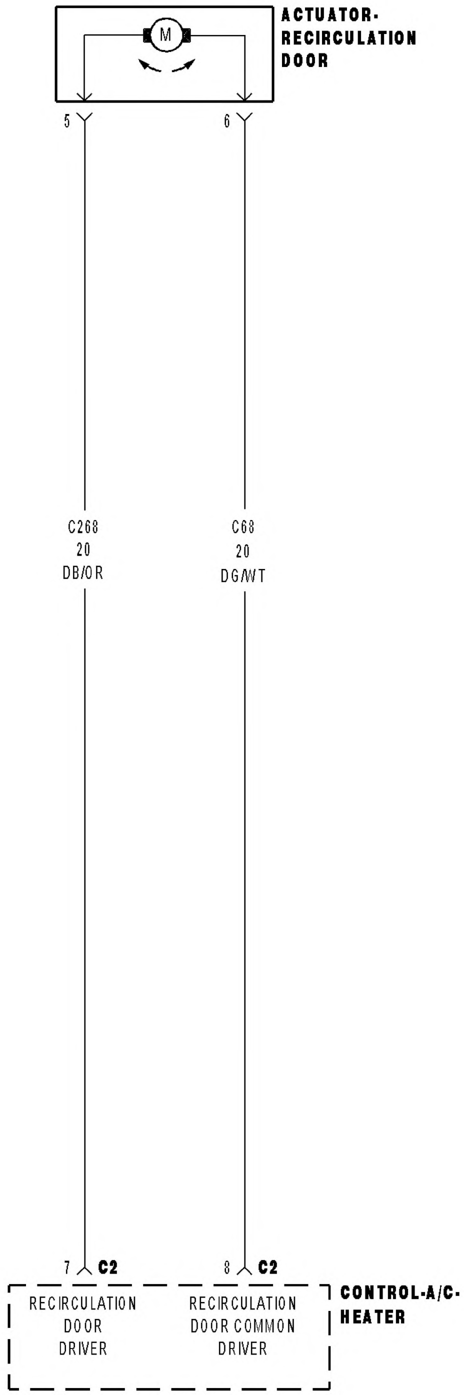
Does the A/C status indicator display DTC 46?

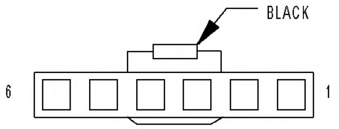
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

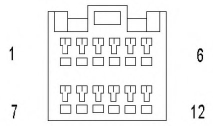
No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

47–RECIRC DOOR BOUND (MTC)


ACTUATOR-
RECIRCULATION
DOOR
M
5
6
C268
20
DB/OR
C68
20
DG/WT
7 C2
8 C2
RECIRCULATION
DOOR
DRIVER
RECIRCULATION
DOOR COMMON
DRIVER
CONTROL-A/C-
HEATER



ACTUATOR-RECIRCULATION DOOR



CONTROL-A/C-HEATER C2 (MTC)

81477529

47–RECIRC DOOR BOUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects no commutator pulses when calibrating the recirculation door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects no commutator pulses when calibrating the recirculation door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
(C268) RECIRCULATION DOOR DRIVER CIRCUIT OPEN
(C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT OPEN
RECIRCULATION DOOR SEIZED, OBSTRUCTED
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

47–RECIRC DOOR BOUND (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

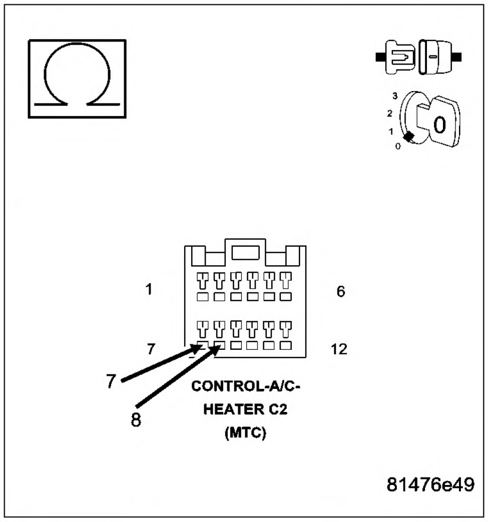
Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance above 70.0 ohms?

Yes >> Go To 3

No >> Go To 5

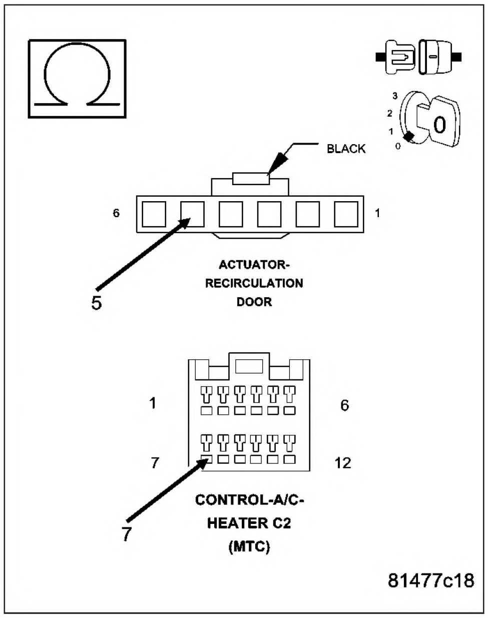


47–RECIRC DOOR BOUND (MTC) (CONTINUED)

3. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance of the (C268) Recirculation Door Driver circuit between the A/C Heater Control C2 harness connector and the Recirculation Door Actuator harness connector.


BLACK
3
2
1
0
0
6
1
5
ACTUATOR-
RECIRCULATION
DOOR
1
6
7
12
7
CONTROL-A/C-
HEATER C2
(MTC)
81477c18

Is the resistance below 5.0 ohms?

Yes >> Go To 4

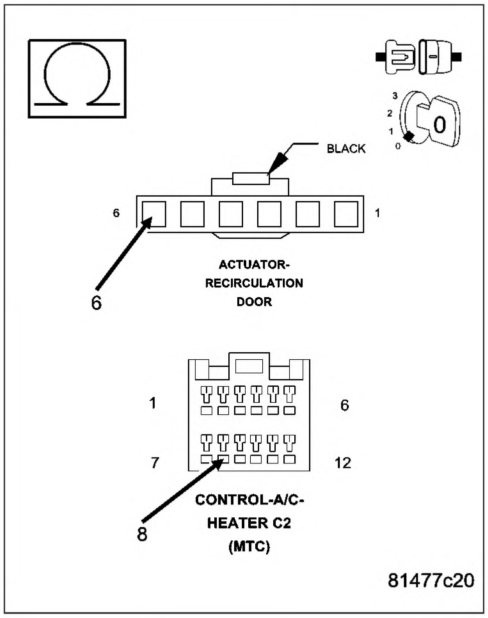
No >> Repair the (C268) Recirculation Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C68) Recirculation Door Common Driver Circuit between the A/C Heater Control C2 harness connector and the Recirculation Door Actuator harness connector.


BLACK
3
2
1
0
0
6
1
6
ACTUATOR-
RECIRCULATION
DOOR
1
6
7
12
8
CONTROL-A/C-
HEATER C2
(MTC)
81477c20

Is the resistance below 5.0 ohms?

Yes >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C68) Recirculation Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

47–RECIRC DOOR BOUND (MTC) (CONTINUED)

5. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE RECIRCULATION DOOR TO SEIZE

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the recirculation door to seize.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK RECIRCULATION DOOR TRAVEL

Remove the Recirculation Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 85 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Recirculation Door Actuator in accordance with the Service Information. Then, Go To 7.

No >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

47–RECIRC DOOR BOUND (MTC) (CONTINUED)

7. VERIFY THAT FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

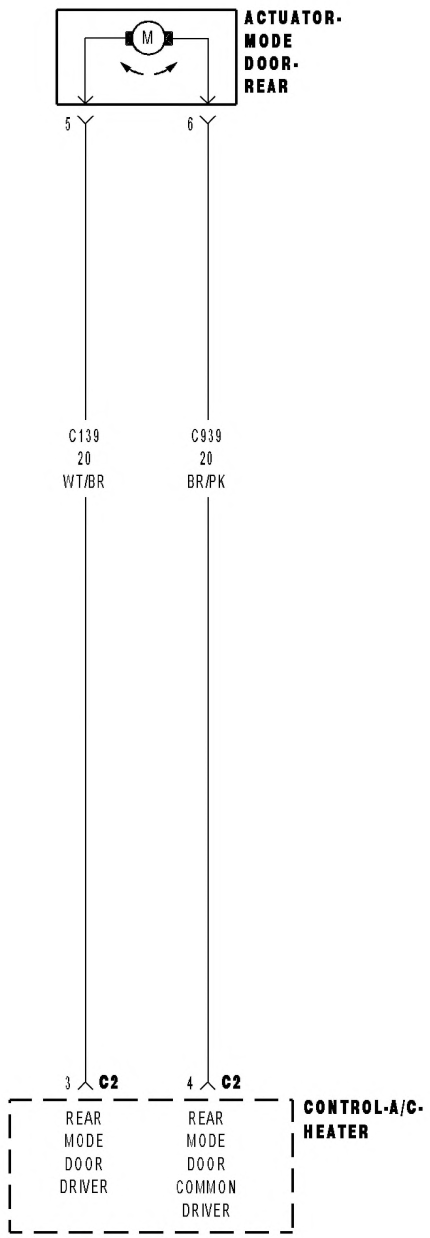
Does the A/C status indicator display DTC 47?

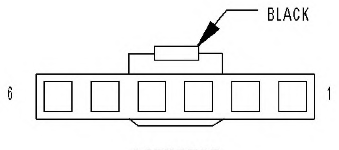
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

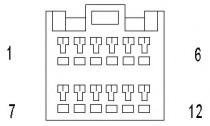
No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

48–REAR MODE DOOR BOUND (MTC)


ACTUATOR-
MODE
DOOR-
REAR
M
5
6
C139
20
WT/BR
C939
20
BR/PK
3
C2
4
C2
REAR
MODE
DOOR
DRIVER
REAR
MODE
DOOR
COMMON
DRIVER
CONTROL-A/C-
HEATER



ACTUATOR-
MODE DOOR-
REAR



CONTROL-A/C-
HEATER C2
(MTC)

81477347

48–REAR MODE DOOR BOUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects no commutator pulses when calibrating the rear mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects no commutator pulses when calibrating the rear mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
(C139) REAR MODE DOOR DRIVER CIRCUIT OPEN
(C939) REAR MODE DOOR COMMON DRIVER CIRCUIT OPEN
REAR MODE DOOR SEIZED, OBSTRUCTED
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

48–REAR MODE DOOR BOUND (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

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2. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

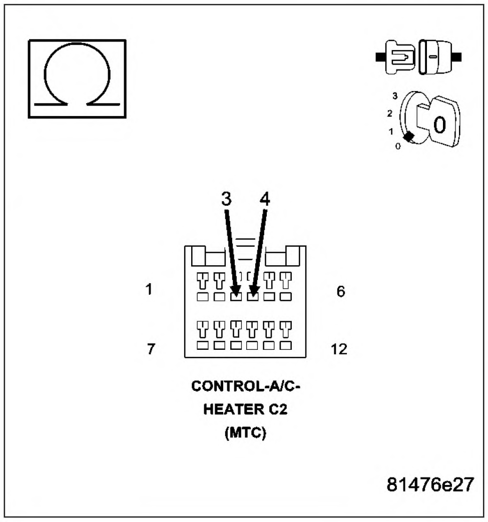
Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance above 70.0 ohms?

Yes >> Go To 3

No >> Go To 5

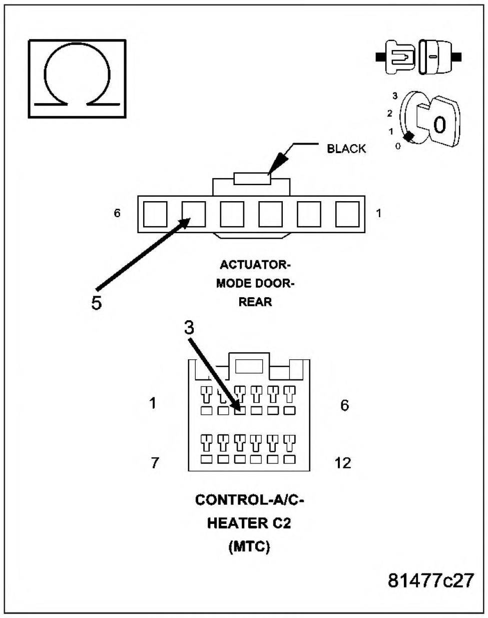


48–REAR MODE DOOR BOUND (MTC) (CONTINUED)

3. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance of the (C139) Rear Mode Door Driver circuit between the A/C Heater Control C2 harness connector and the Rear Mode Door Actuator harness connector.



3
2
1
0
0
BLACK
6
1
5
ACTUATOR-MODE DOOR-REAR
3
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81477c27

Is the resistance below 5.0 ohms?

Yes >> Go To 4

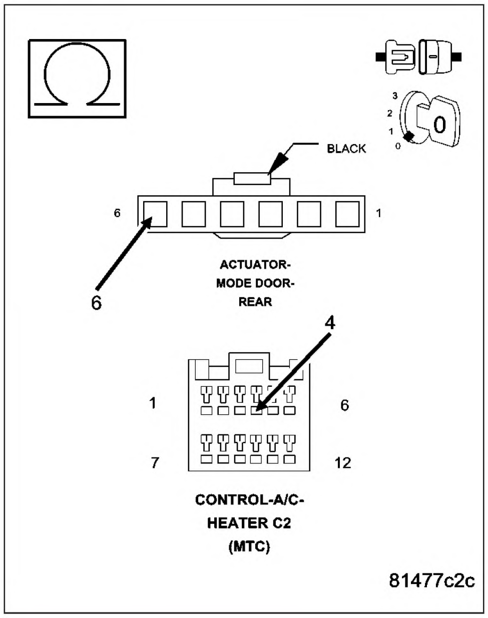
No >> Repair the (C139) Rear Mode Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C939) Rear Mode Door Common Driver Circuit between the A/C Heater Control C2 harness connector and the Rear Mode Door Actuator harness connector.



3
2
1
0
0
BLACK
6
1
6
ACTUATOR-MODE DOOR-REAR
4
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81477c2c

Is the resistance below 5.0 ohms?

Yes >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C939) Rear Mode Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

48–REAR MODE DOOR BOUND (MTC) (CONTINUED)

5. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE REAR MODE DOOR TO SEIZE

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the rear mode door to seize.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK REAR MODE DOOR TRAVEL

Remove the Rear Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 155 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Rear Mode Door Actuator in accordance with the Service Information. Then, Go To 7.

No >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

48–REAR MODE DOOR BOUND (MTC) (CONTINUED)

7. VERIFY THAT FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 48?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

51–RECIRC DOOR RANGE TOO SMALL (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects too few commutator pulses when calibrating the recirculation door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too few commutator pulses when calibrating the recirculation door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
RECIRCULATION DOOR BINDING, OBSTRUCTED
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

51–RECIRC DOOR RANGE TOO SMALL (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE RECIRCULATION DOOR TO BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the recirculation door to bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

51–RECIRC DOOR RANGE TOO SMALL (MTC) (CONTINUED)

3. CHECK RECIRCULATION DOOR TRAVEL

Remove the Recirculation Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 85 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Recirculation Door Actuator in accordance with the Service Information. Then, Go To 4.

No >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 51?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

52–RECIRC DOOR RANGE TOO LARGE (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects too many commutator pulses when calibrating the recirculation door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects too many commutator pulses when calibrating the recirculation door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
RECIRCULATION DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, BROKEN
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

52–RECIRC DOOR RANGE TOO LARGE (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

2. CHECK FOR A BROKEN RECIRCULATION DOOR ACTUATOR

Turn the ignition off.

Remove the Recirculation Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

52–RECIRC DOOR RANGE TOO LARGE (MTC) (CONTINUED)

3. CHECK THE RECIRCULATION DOOR & A/C HEATER HOUSING FOR WARPED, WORN, & DAMAGED COMPONENTS

Inspect for excessively worn door linkage and for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 85 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 52?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

53–FRONT MODE DOOR LINKAGE BROKEN (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects and excessive amount of commutator pulses when calibrating the front mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects and excessive amount of commutator pulses when calibrating the front mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
FRONT MODE DOOR OR A/C HEATER HOUSING COMPONENTS DISCONNECTED, MISSING, BROKEN
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

53–FRONT MODE DOOR LINKAGE BROKEN (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK FOR A BROKEN FRONT MODE DOOR ACTUATOR

Turn the ignition off.

Remove the Front Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

53–FRONT MODE DOOR LINKAGE BROKEN (MTC) (CONTINUED)

3. CHECK THE FRONT MODE DOOR & A/C HEATER HOUSING FOR DISCONNECTED, MISSING, & BROKEN COMPONENTS

Inspect for disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly and a broken door. Rotate the door from stop to stop. The door should rotate approximately 350 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 53?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

54–REAR MODE DOOR LINKAGE BROKEN (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects and excessive amount of commutator pulses when calibrating the rear mode door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects and excessive amount of commutator pulses when calibrating the rear mode door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
REAR MODE DOOR OR A/C HEATER HOUSING COMPONENTS DISCONNECTED, MISSING, BROKEN
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

54–REAR MODE DOOR LINKAGE BROKEN (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK FOR A BROKEN REAR MODE DOOR ACTUATOR

Turn the ignition off.

Remove the Rear Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

54–REAR MODE DOOR LINKAGE BROKEN (MTC) (CONTINUED)

3. CHECK THE REAR MODE DOOR & A/C HEATER HOUSING FOR DISCONNECTED, MISSING, & BROKEN COMPONENTS

Inspect for disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly and a broken door. Rotate the door from stop to stop. The door should rotate approximately 155 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Rear Mode Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 54?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

55–BLEND DOOR LINKAGE BROKEN (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects an excessive amount of commutator pulses when calibrating the left blend door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects an excessive amount of commutator pulses when calibrating the left blend door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
LEFT BLEND DOOR OR A/C HEATER HOUSING COMPONENTS DISCONNECTED, MISSING, BROKEN
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

55–BLEND DOOR LINKAGE BROKEN (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK FOR A BROKEN LEFT BLEND DOOR ACTUATOR

Turn the ignition off.

Remove the Left Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

55–BLEND DOOR LINKAGE BROKEN (MTC) (CONTINUED)

3. CHECK THE LEFT BLEND DOOR & A/C HEATER HOUSING FOR DISCONNECTED, MISSING, & BROKEN COMPONENTS

Inspect for disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly and a broken door. Rotate the door from stop to stop. The door should rotate approximately 90 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Left Blend Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 55?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

56–RECIRC DOOR LINKAGE BROKEN (MTC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the A/C Heater Control detects and excessive amount of commutator pulses when calibrating the recirculation door, this DTC will set.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the A/C Heater Control detects and excessive amount of commutator pulses when calibrating the recirculation door.

Possible Causes
ACTUATOR CIRCUIT TEST FAULTS PRESENT
OVERCURRENT FAULTS PRESENT
RECIRCULATION DOOR OR A/C HEATER HOUSING COMPONENTS DISCONNECTED, MISSING, BROKEN
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

56–RECIRC DOOR LINKAGE BROKEN (MTC) (CONTINUED)

Diagnostic Test

1. VERIFY IF ANY ACTUATOR CIRCUIT TEST FAULTS OR OVERCURRENT FAULTS ARE PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any of the following DTCs: 41, 42, 43, 44, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, or 72?

Yes >> As present, diagnose and repair the faults in the following order: DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, then DTCs 63, 65, 67, or 69, and finally DTCs 41, 42, 43, or 44. Refer to the Table Of Contents in this section for a complete list of HVAC related symptoms.

No >> Go To 2

---

2. CHECK FOR A BROKEN RECIRCULATION DOOR ACTUATOR

Turn the ignition off.

Remove the Recirculation Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

56–RECIRC DOOR LINKAGE BROKEN (MTC) (CONTINUED)

3. CHECK THE RECIRCULATION DOOR & A/C HEATER HOUSING FOR DISCONNECTED, MISSING, & BROKEN COMPONENTS

Inspect for disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly and a broken door. Rotate the door from stop to stop. The door should rotate approximately 85 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information. Then, Go To 4.

---

4. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

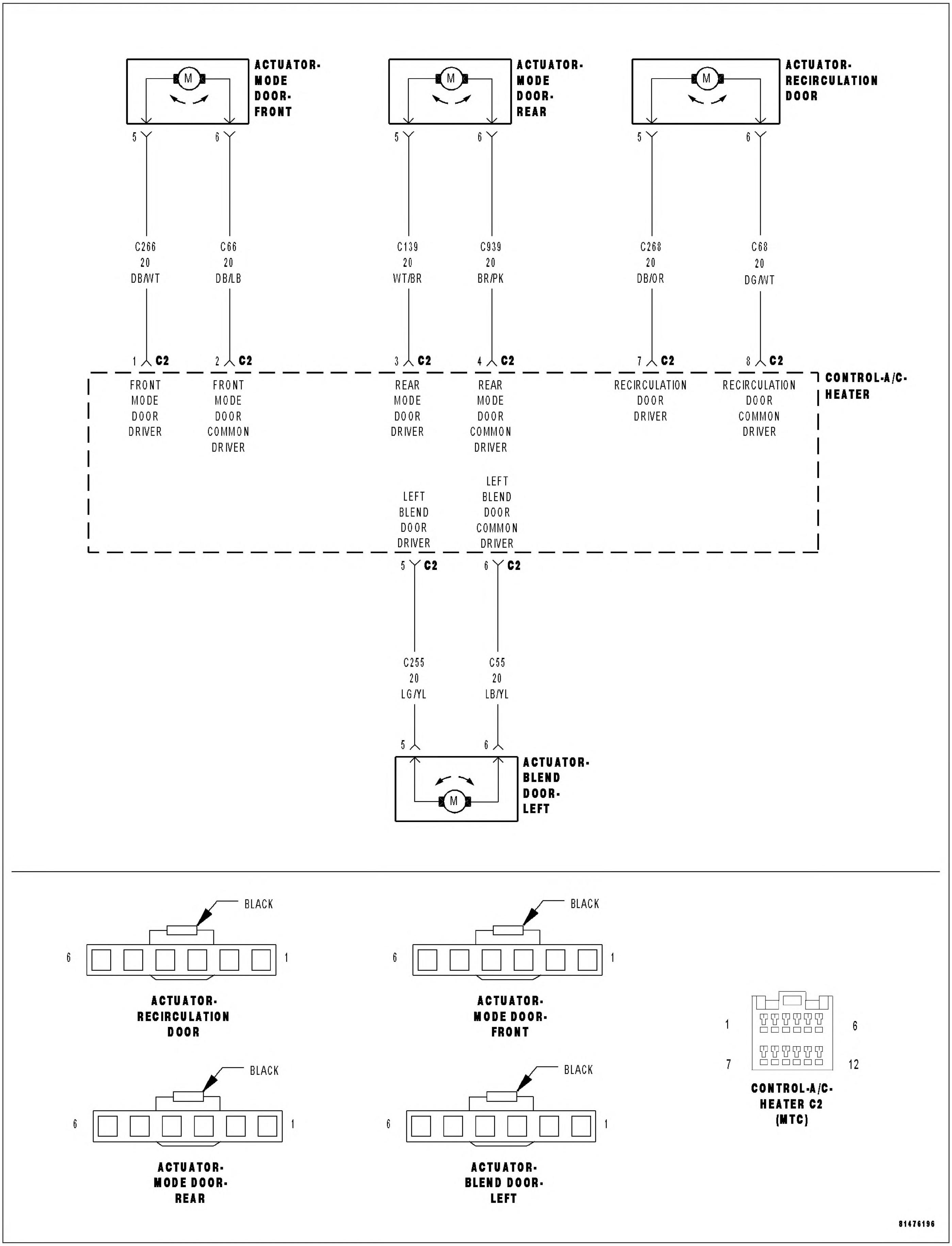
Does the A/C status indicator display DTC 56?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
3 C2
4 C2
7 C2
8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255 20 LG/YL
C55 20 LB/YL
ACTUATOR-BLEND DOOR-LEFT
BLACK
6
1
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-BLEND DOOR-LEFT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81476196

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

For the Manual Temperature Control circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to ground on the (C66) Front Mode Door Common Driver circuit / (C939) Rear Mode Door Common Driver circuit / (C55) Left Blend Door Common Driver circuit / (C68) Recirculation Door Common Driver circuit.

Possible Causes
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT / (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT / (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT / (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT / (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT / (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT / (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
FRONT MODE DOOR ACTUATOR
REAR MODE DOOR ACTUATOR
LEFT BLEND DOOR ACTUATOR
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

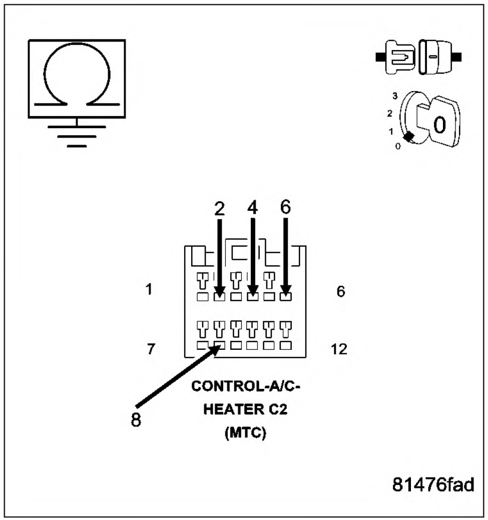
Diagnostic Test

1. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT, THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C66) Front Mode Door Common Driver Circuit, the (C939) Rear Mode Door Common Driver circuit, the (C55) Left Blend Door Common Driver circuit, and the (C68) Recirculation Door Common Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to ground.

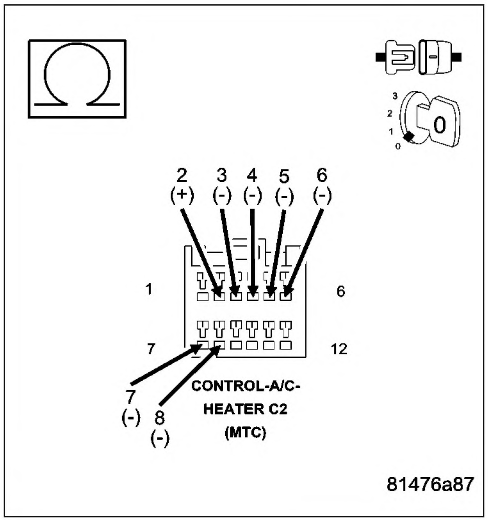
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

---

2. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C66) Front Mode Door Common Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C66) Front Mode Door Common Driver circuit.

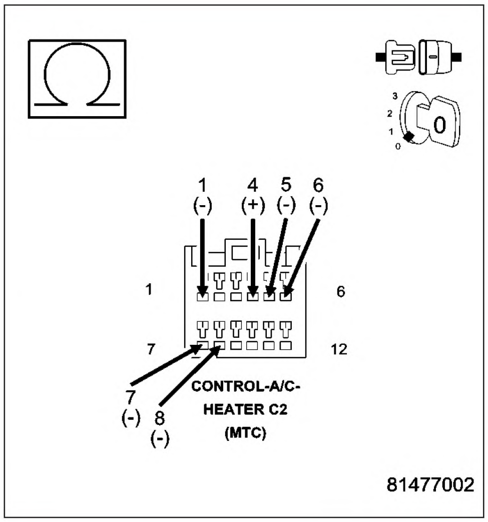
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

3. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C939) Rear Mode Door Common Driver circuit and the (C266) Front Mode Door Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C939) Rear Mode Door Common Driver circuit.

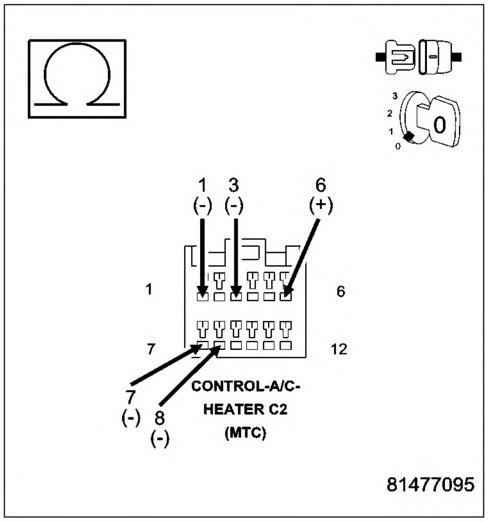
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT, (C139) REAR MODE DOOR DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C55) Left Blend Door Common Driver circuit and the (C266) Front Mode Door Driver circuit, (C139) Rear Mode Door Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C55) Left Blend Door Common Driver circuit.

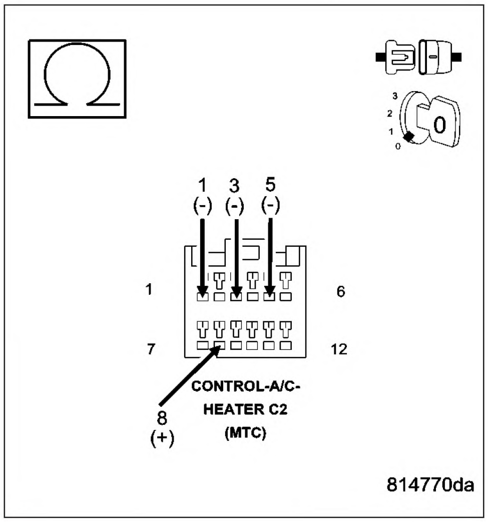
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

5. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT, (C139) REAR MODE DOOR DRIVER CIRCUIT, & THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT

Measure the resistance between the (C68) Recirculation Door Common Driver circuit and the (C266) Front Mode Door Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C68) Recirculation Door Common Driver circuit.

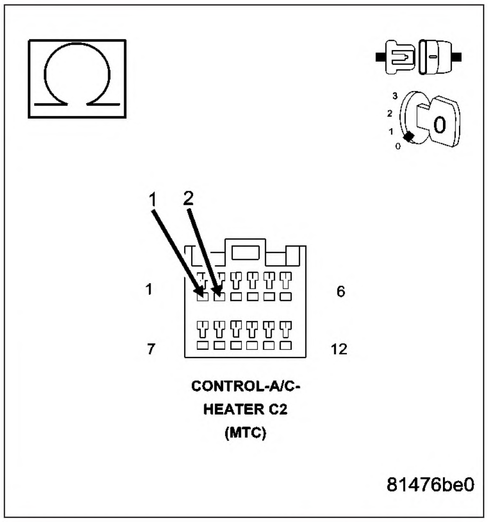
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 7

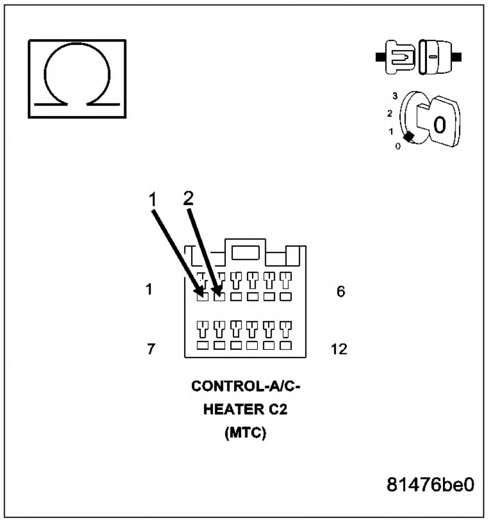
No >> Go To 8

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

7. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C66) Front Mode Door Common Driver Circuit for a short to the (C266) Front Mode Door Driver circuit.

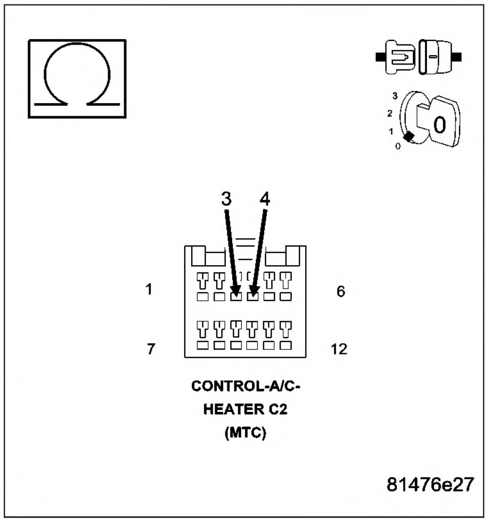
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

8. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 9

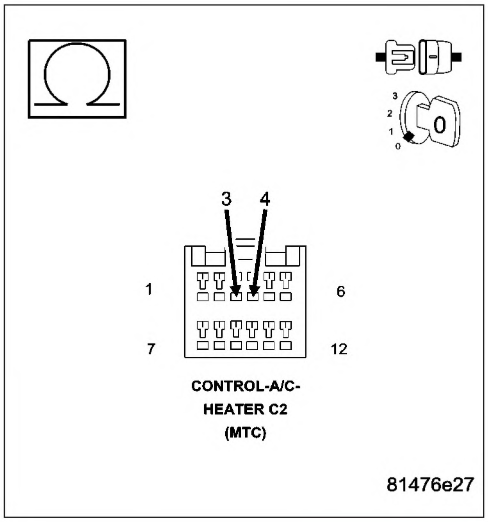
No >> Go To 10

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

9. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C939) Rear Mode Door Common Driver Circuit for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

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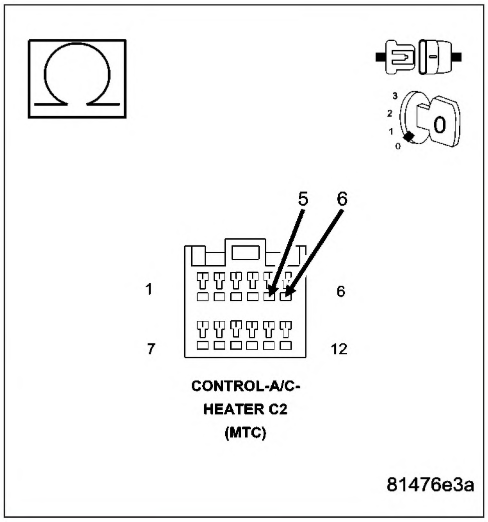
10. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 11

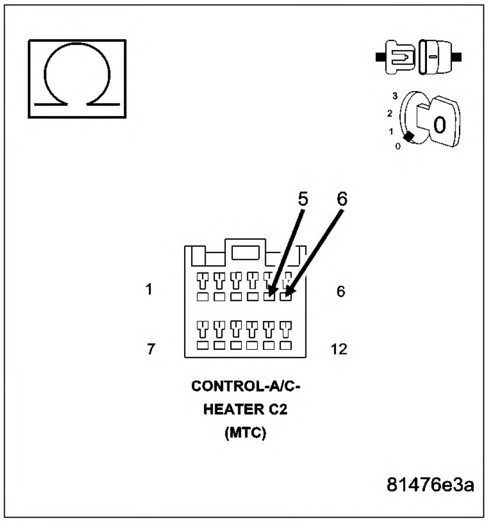
No >> Go To 12

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

11. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C55) Left Blend Door Common Driver Circuit for a short to the (C255) Left Blend Door Driver circuit.

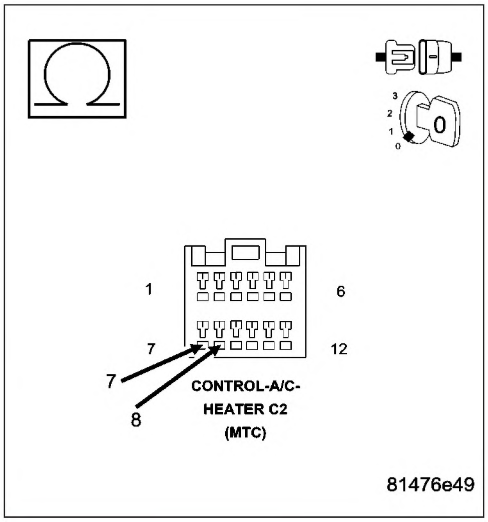
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

12. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 13

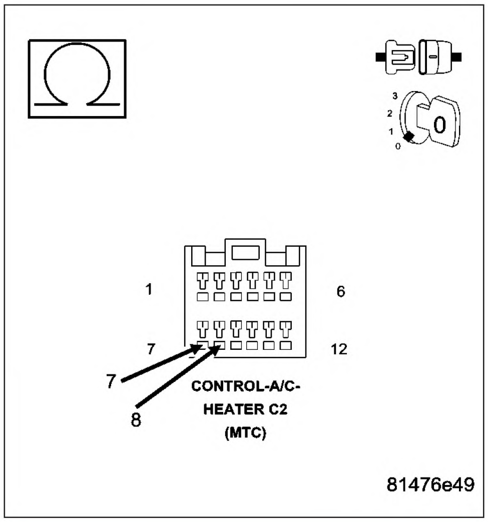
No >> Go To 14

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

13. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C68) Recirculation Door Common Driver Circuit for a short to the (C268) Recirculation Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

61–COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

14. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 61?

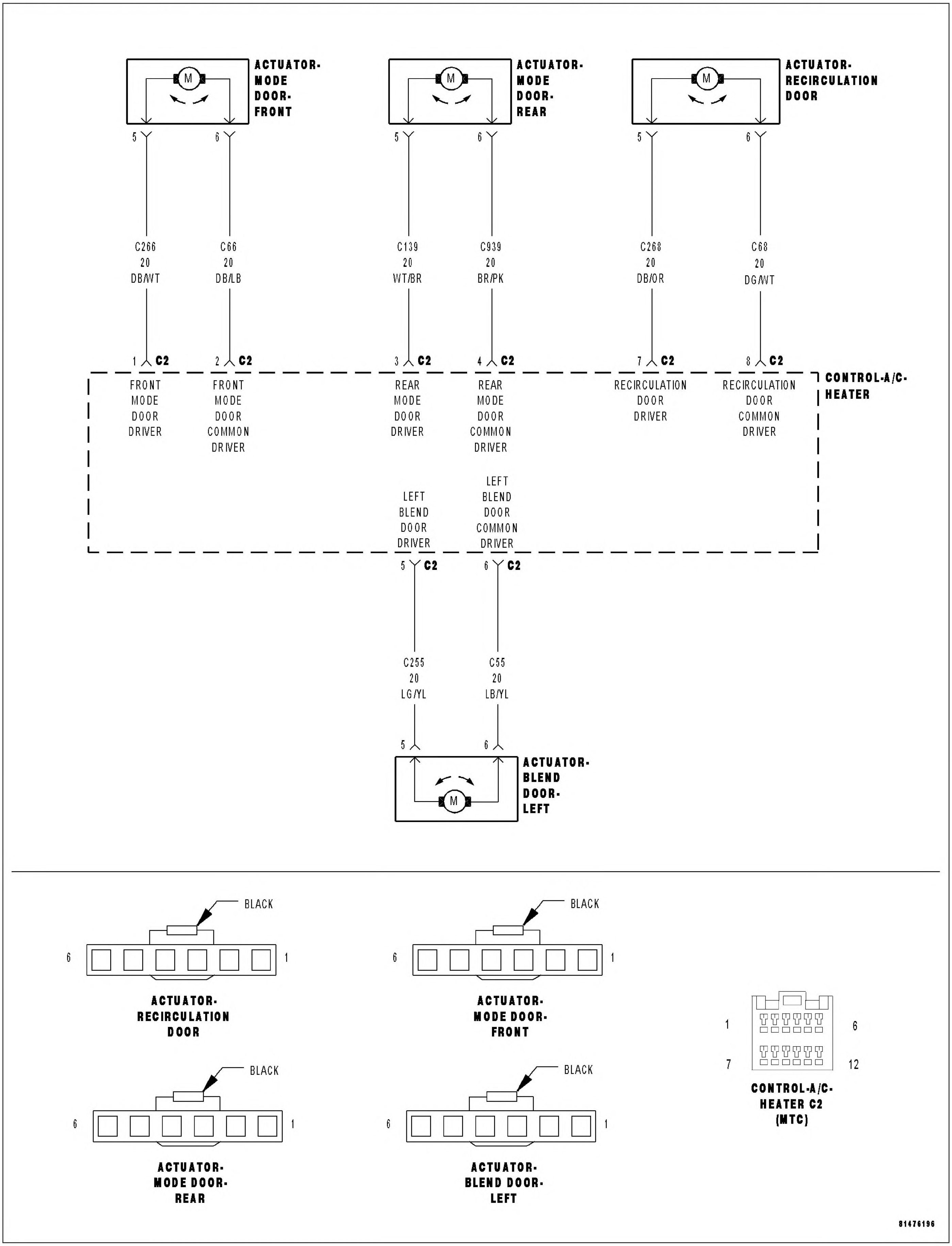
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

62–COMMON DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
3 C2
4 C2
7 C2
8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255 20 LG/YL
C55 20 LB/YL
ACTUATOR-BLEND DOOR-LEFT
BLACK
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-BLEND DOOR-LEFT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81476196

62–COMMON DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to voltage on the (C66) Front Mode Door Common Driver circuit / (C939) Rear Mode Door Common Driver circuit / (C55) Left Blend Door Common Driver circuit / (C68) Recirculation Door Common Driver circuit.

Possible Causes
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT / (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT / (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT / (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

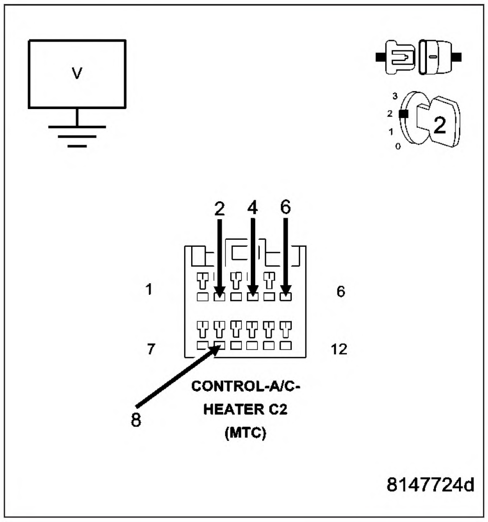
1. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C66) Front Mode Door Common Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C55) Left Blend Door Common Driver circuit, (C68) Recirculation Door Common Driver circuit.



Is the voltage above 0.2 volts on any of the circuits?

Yes >> Repair all circuits with a voltage above 0.2 volts for a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

62–COMMON DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

2. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 62?

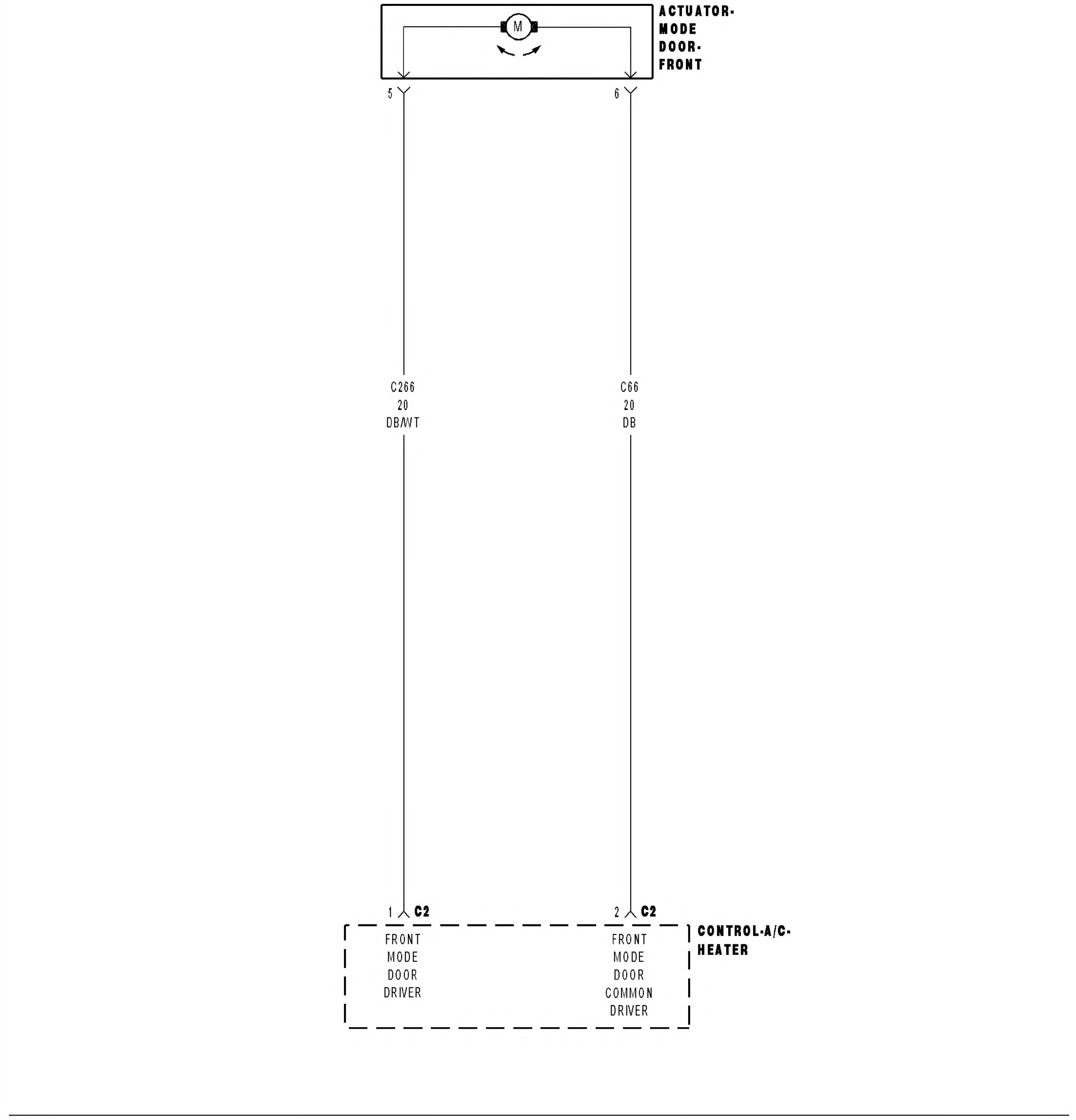
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

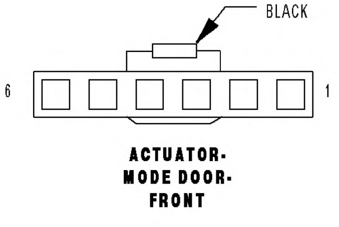
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

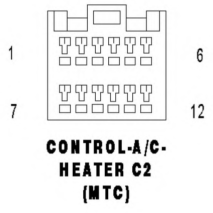
No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

63–FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC)


ACTUATOR-
MODE
DOOR-
FRONT
M
5
6
C266
20
DB/WT
C66
20
DB
1 C2
2 C2
FRONT
MODE
DOOR
DRIVER
FRONT
MODE
DOOR
COMMON
DRIVER
CONTROL-A/C-
HEATER


BLACK
6
1
ACTUATOR-
MODE DOOR-
FRONT


1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)

814772b1

63–FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to ground on the (C266) Front Mode Door Driver circuit.

Possible Causes
(C266) FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C266) FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

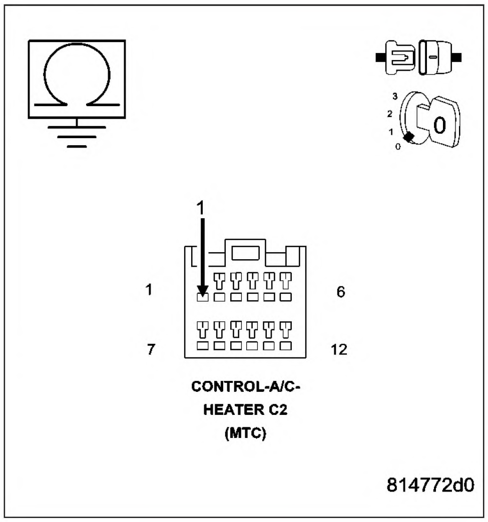
Diagnostic Test

1. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C266) Front Mode Door Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

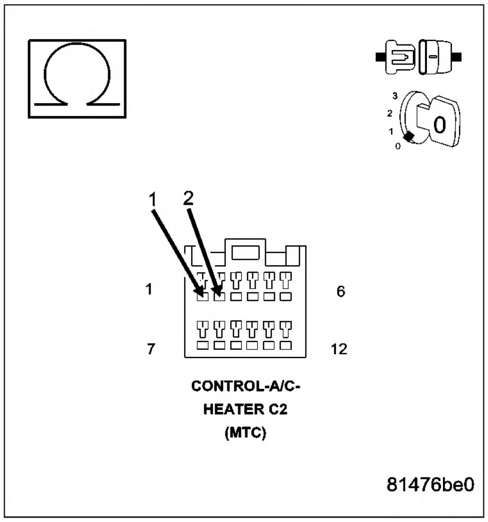
Yes >> Repair the (C266) Front Mode Door Driver circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

63–FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

2. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C66) Front Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

No >> Go To 4

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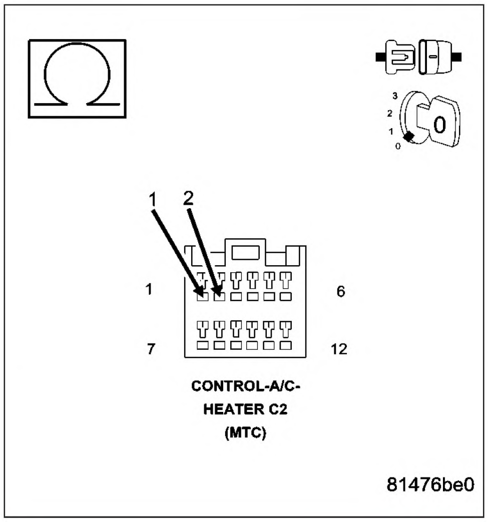
3. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C66) Front Mode Door Common Driver Circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C266) Front Mode Door Driver circuit for a short to the (C66) Front Mode Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

63–FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

4. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 63?

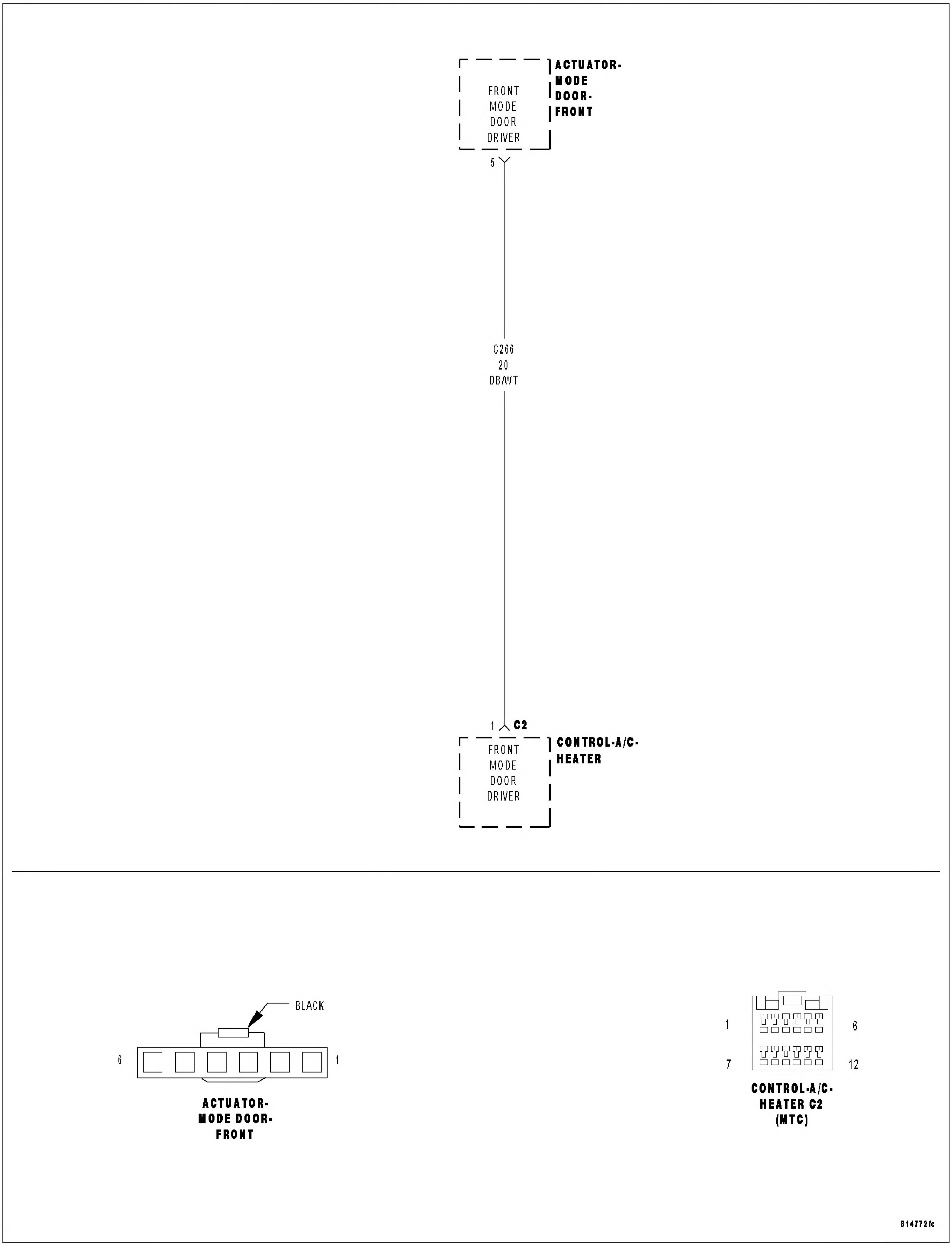
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

64–FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC)


FRONT MODE DOOR DRIVER
ACTUATOR-MODE DOOR-FRONT
5
C266
20
DB/WT
1
C2
FRONT MODE DOOR DRIVER
CONTROL-A/C-HEATER
BLACK
6
1
ACTUATOR-MODE DOOR-FRONT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
814772fc

64–FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to voltage on the (C266) Front Mode Door Driver circuit.

Possible Causes
(C266) FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

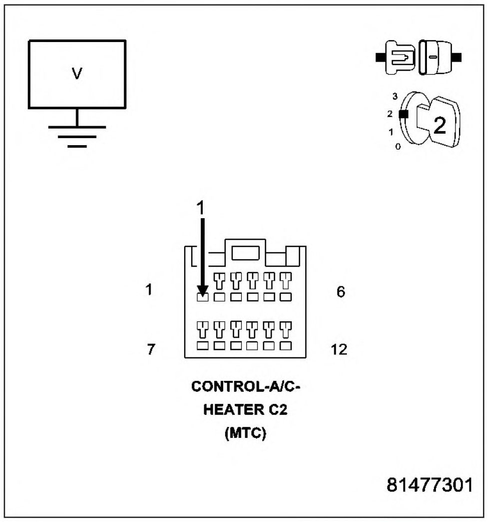
Turn the ignition on.

Measure the voltage of the (C266) Front Mode Door Driver circuit.

Is the voltage above 0.2 volts?

Yes >> Repair the (C266) Front Mode Door Driver circuit for a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2



64–FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

2. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 64?

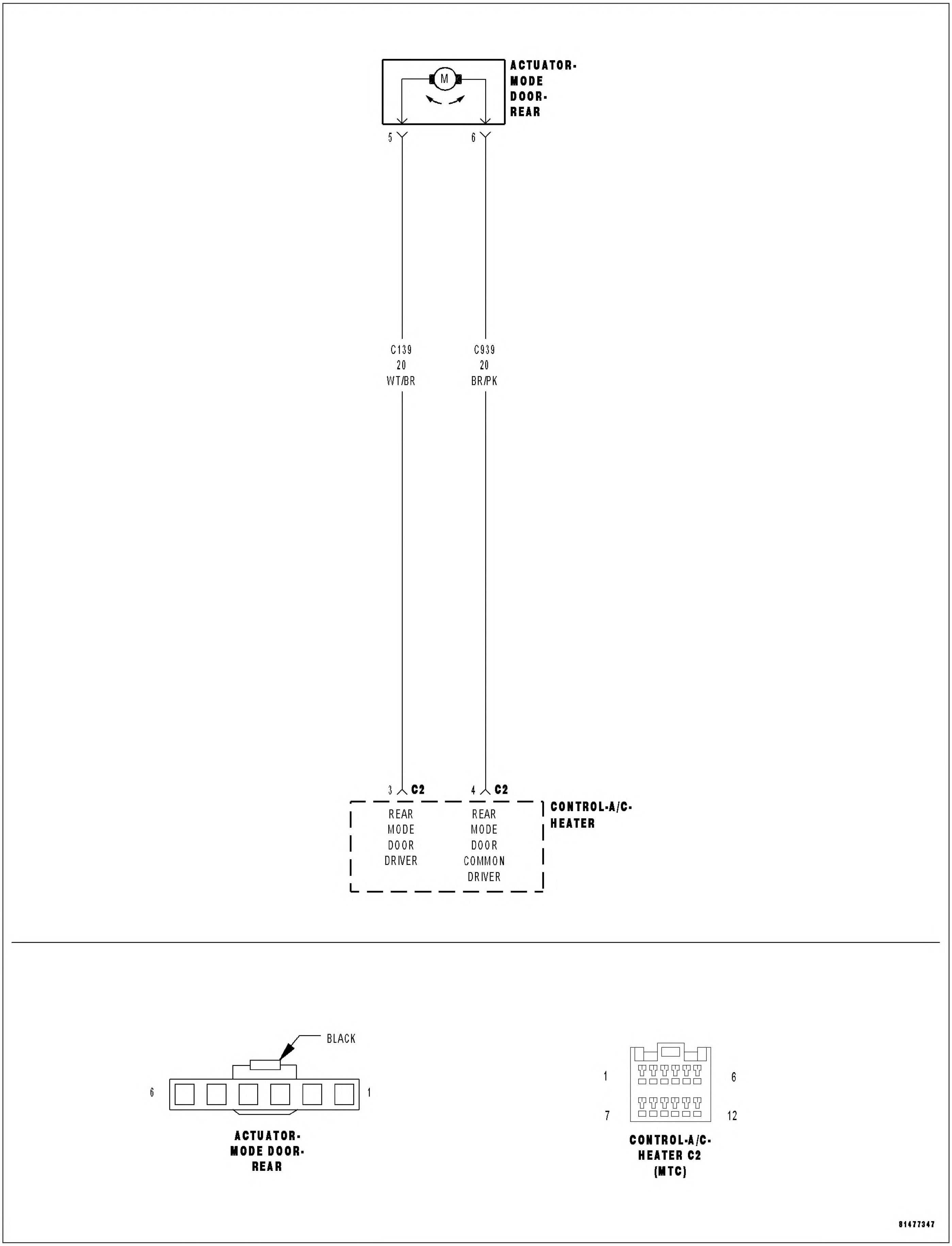
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

65–REAR MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC)


ACTUATOR-
MODE
DOOR-
REAR
M
5
6
C139
20
WT/BR
C939
20
BR/PK
3 C2
4 C2
REAR
MODE
DOOR
DRIVER
REAR
MODE
DOOR
COMMON
DRIVER
CONTROL-A/C-
HEATER
BLACK
6
1
ACTUATOR-
MODE DOOR-
REAR
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
81477347

65–REAR MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to ground on the (C139) Rear Mode Door Driver circuit.

Possible Causes
(C139) REAR MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C139) REAR MODE DOOR DRIVER CIRCUIT SHORTED TO (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

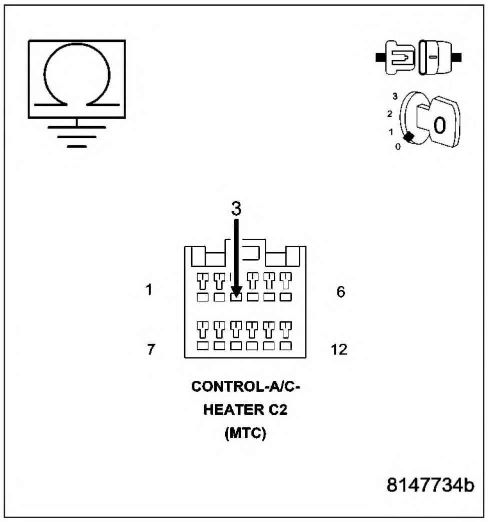
Diagnostic Test

1. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C139) Rear Mode Door Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

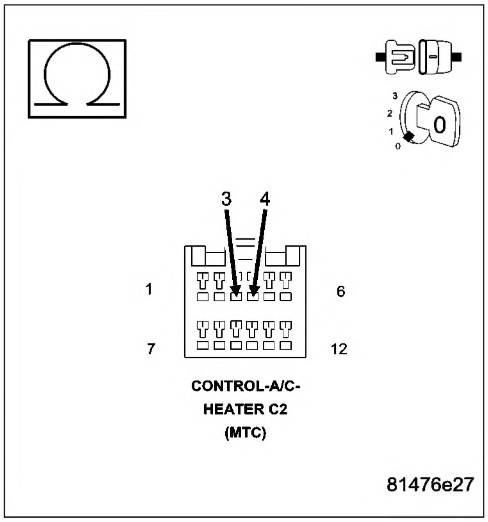
Yes >> Repair the (C139) Rear Mode Door Driver circuit for a short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

65–REAR MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

2. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

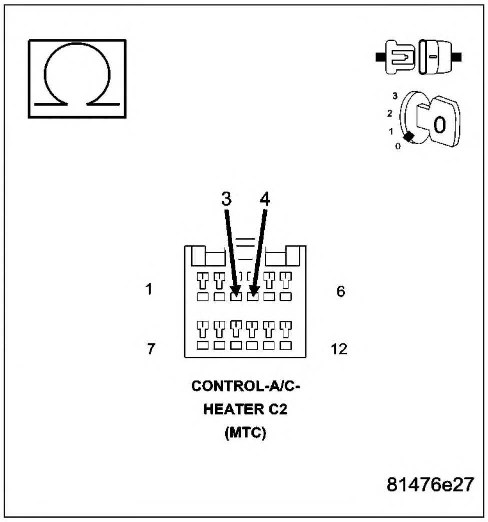
No >> Go To 4

---

3. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C939) Rear Mode Door Common Driver Circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C139) Rear Mode Door Driver circuit for a short to the (C939) Rear Mode Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

65–REAR MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

4. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 65?

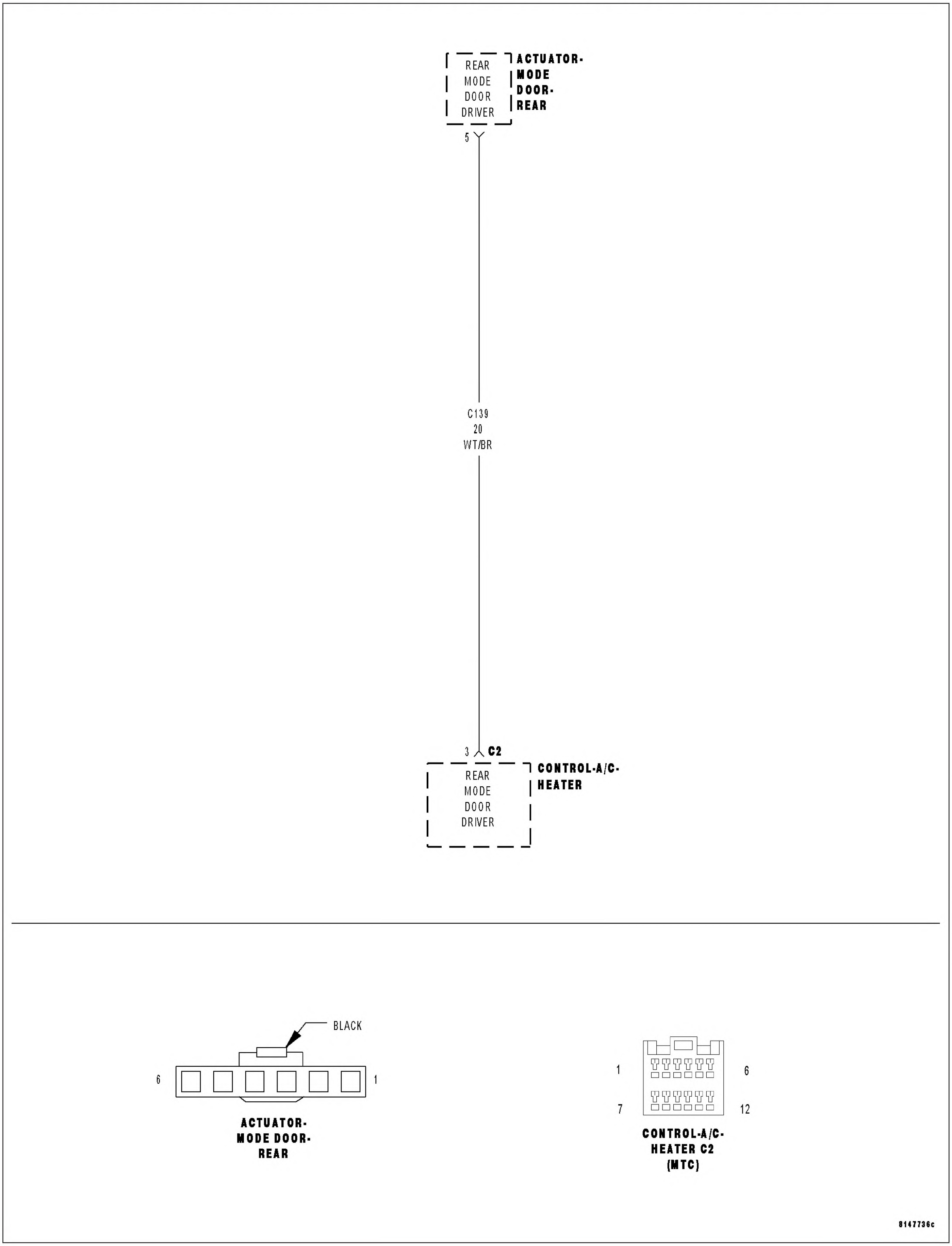
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

66–REAR MODE DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC)


REAR
MODE
DOOR
DRIVER
ACTUATOR-
MODE
DOOR-
REAR
5
C139
20
WT/BR
3
C2
REAR
MODE
DOOR
DRIVER
CONTROL-A/C-
HEATER
BLACK
6
1
ACTUATOR-
MODE DOOR-
REAR
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
8147736c

66–REAR MODE DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to voltage on the (C139) Rear Mode Door Driver circuit.

Possible Causes
(C139) REAR MODE DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

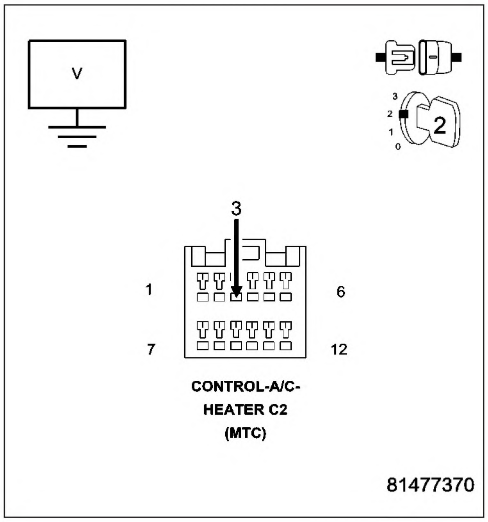
1. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C139) Rear Mode Door Driver circuit.



Is the voltage above 0.2 volts?

Yes >> Repair the (C139) Rear Mode Door Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

66–REAR MODE DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

2. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 66?

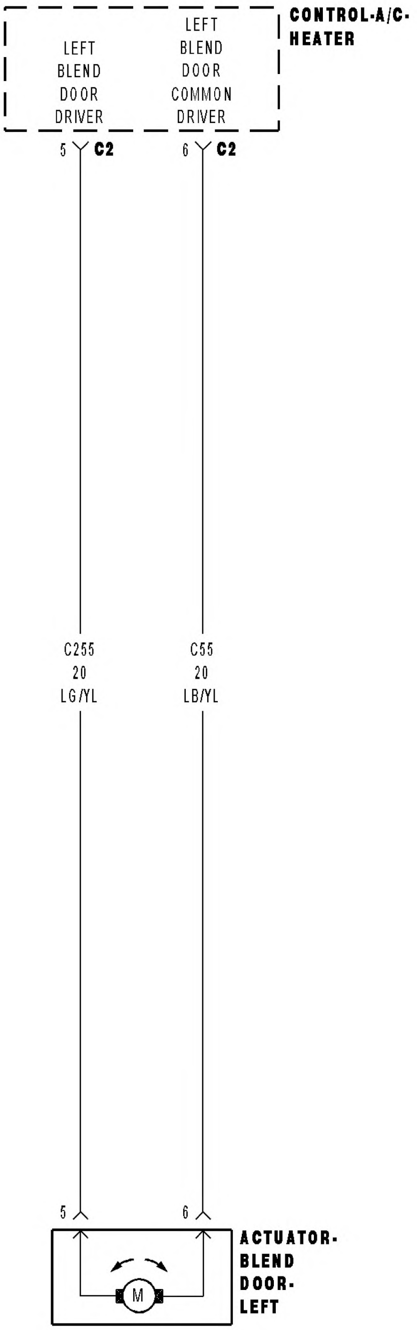
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

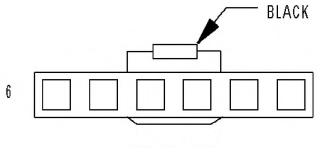
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

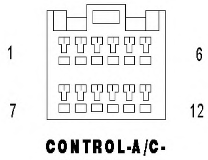
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

67–BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC)


CONTROL-A/C-
HEATER
LEFT
BLEND
DOOR
DRIVER
LEFT
BLEND
DOOR
COMMON
DRIVER
5 C2
6 C2
C255
20
LG/YL
C55
20
LB/YL
5
6
M
ACTUATOR-
BLEND
DOOR-
LEFT



**ACTUATOR-
BLEND DOOR-
LEFT**



**CONTROL-A/C-
HEATER C2
(MTC)**

814773bd

67–BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to ground on the (C255) Left Blend Door Driver circuit.

Possible Causes
(C255) LEFT BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C255) LEFT BLEND DOOR DRIVER CIRCUIT SHORTED TO (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

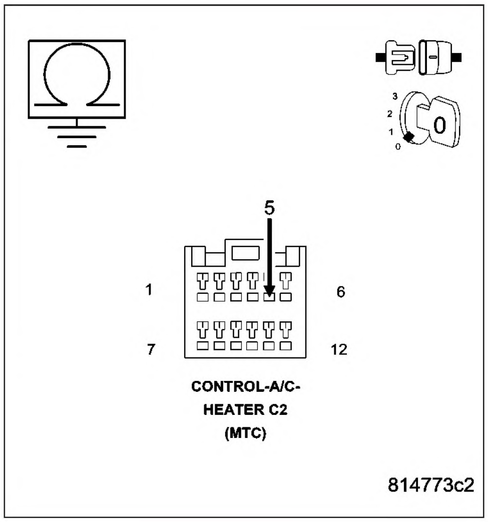
Measure the resistance of the (C255) Left Blend Door Driver circuit between ground and the A/C Heater Control C2 harness connector.

Is the resistance below 10k ohms?

Yes >> Repair the (C255) Left Blend Door Driver circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

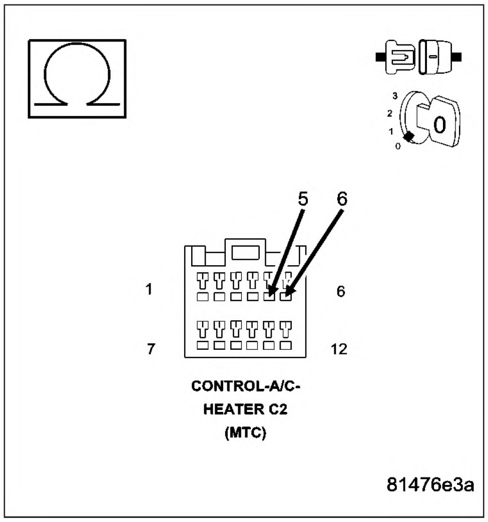
No >> Go To 2



67–BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

2. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C55) Left Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

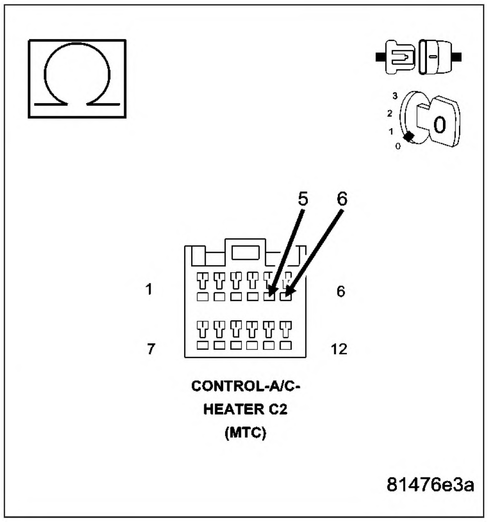
No >> Go To 4

---

3. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C55) Left Blend Door Common Driver Circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C255) Left Blend Door Driver circuit for a short to the (C55) Left Blend Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

67–BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

4. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 67?

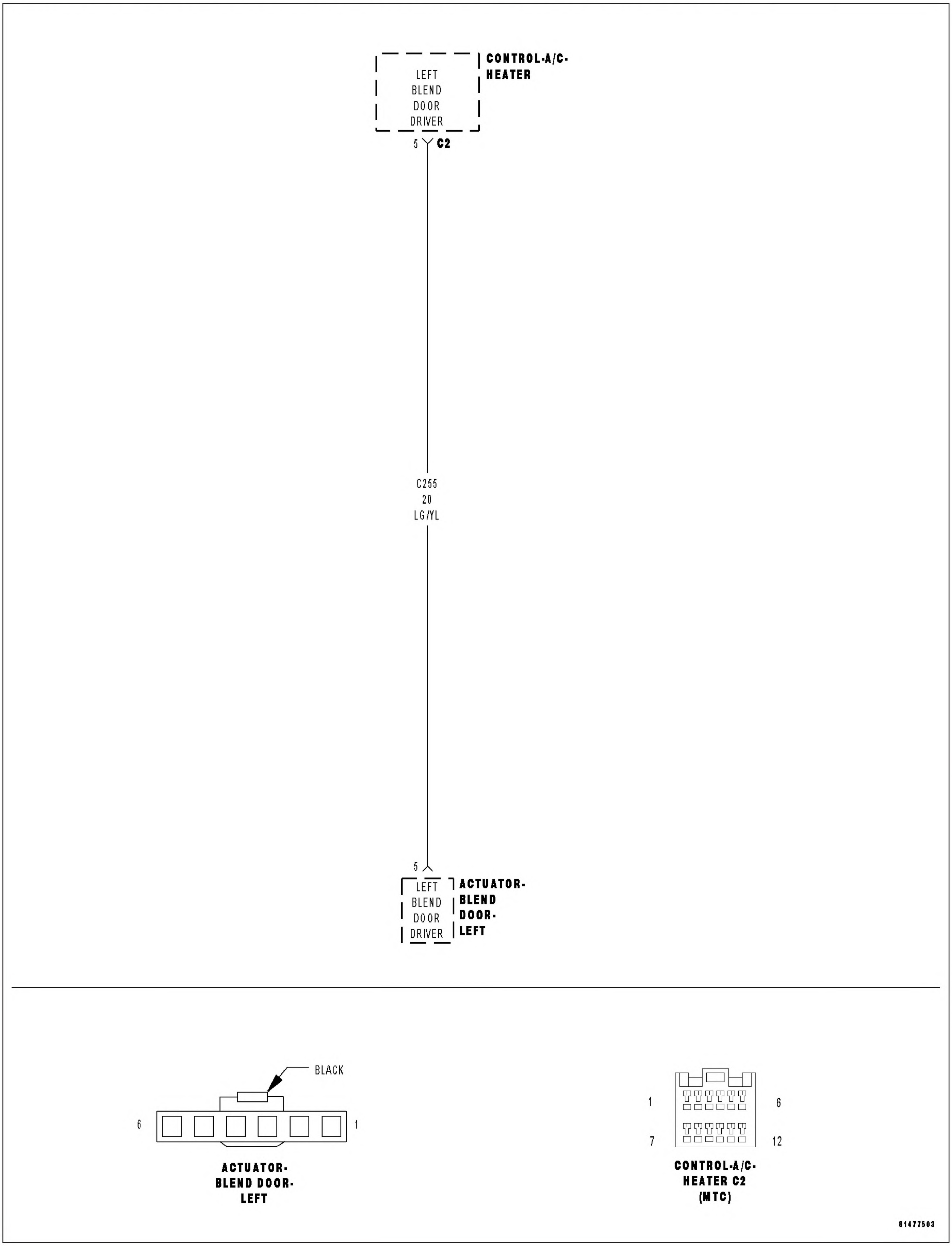
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

68–BLEND DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC)


CONTROL-A/C-
HEATER
LEFT
BLEND
DOOR
DRIVER
5
C2
C255
20
LG/YL
5
LEFT
BLEND
DOOR
DRIVER
ACTUATOR-
BLEND
DOOR-
LEFT
BLACK
6
1
ACTUATOR-
BLEND DOOR-
LEFT
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
81477503

68–BLEND DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to voltage on the (C255) Left Blend Door Driver circuit.

Possible Causes
(C255) LEFT BLEND DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

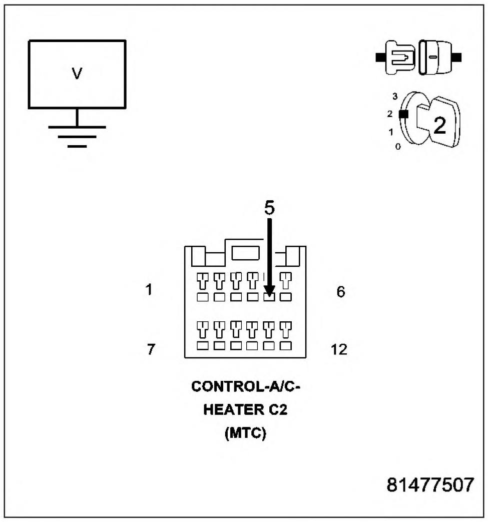
Turn the ignition on.

Measure the voltage of the (C255) Left Blend Door Driver circuit.

Is the voltage above 0.2 volts?

Yes >> Repair the (C255) Left Blend Door Driver circuit for a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2



68–BLEND DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

2. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 68?

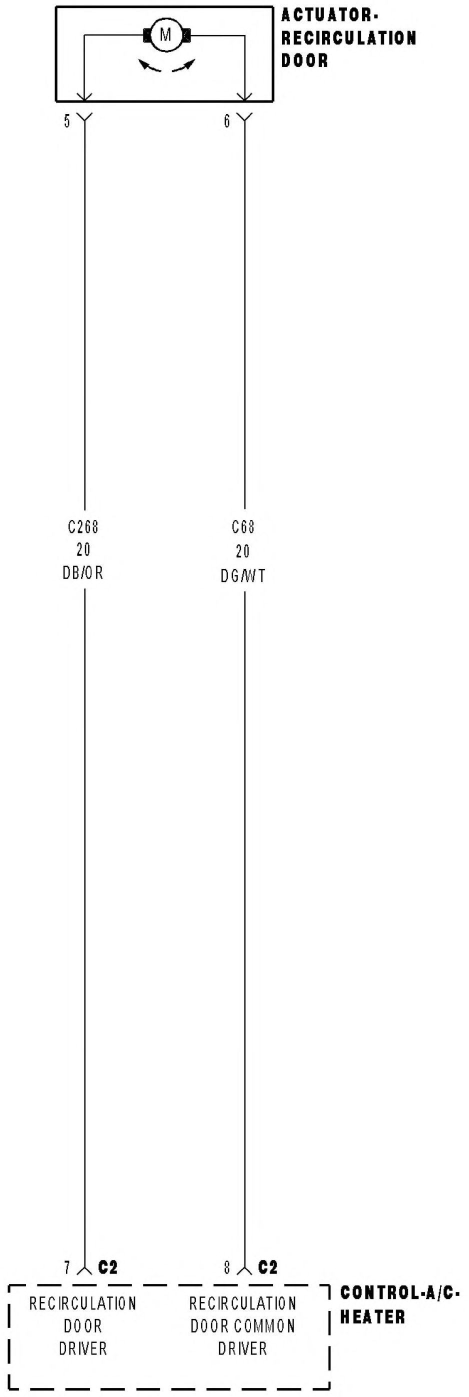
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

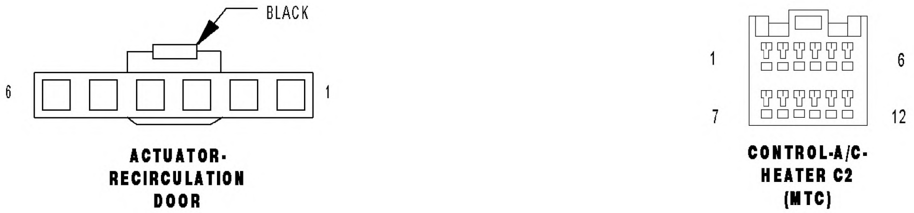
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

69–RECIRC DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC)


ACTUATOR-
RECIRCULATION
DOOR
M
5
6
C268
20
DB/OR
C68
20
DG/WT
7 C2
8 C2
RECIRCULATION
DOOR
DRIVER
RECIRCULATION
DOOR COMMON
DRIVER
CONTROL-A/C-
HEATER


BLACK
6
1
ACTUATOR-
RECIRCULATION
DOOR
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
81477529

69–RECIRC DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

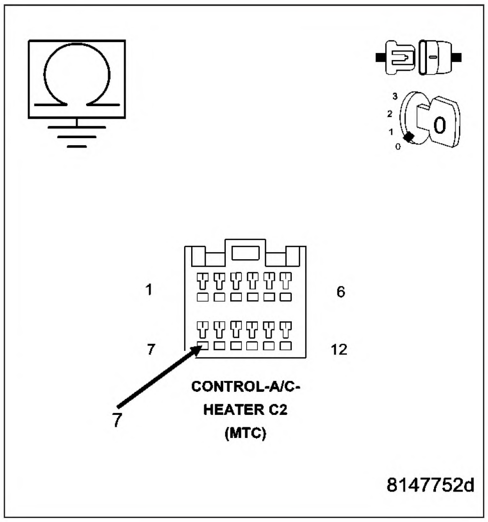
NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to ground on the (C268) Recirculation Door Driver circuit.

Possible Causes
(C268) RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C268) RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT FOR A SHORT TO GROUND



Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C268) Recirculation Door Driver circuit between ground and the A/C Heater Control C2 harness connector.

Is the resistance below 10k ohms?

Yes >> Repair the (C268) Recirculation Door Driver circuit for a short to ground.

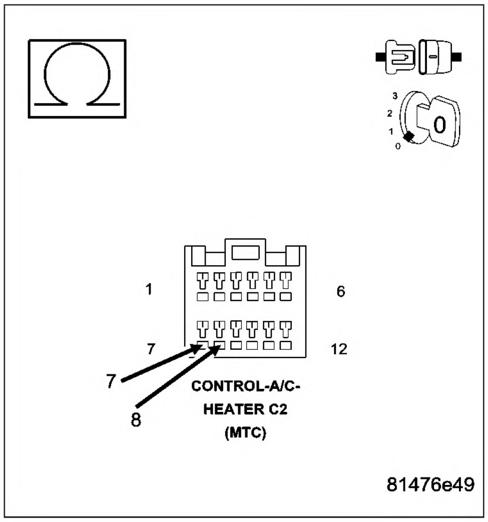
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

69–RECIRC DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

2. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

No >> Go To 4

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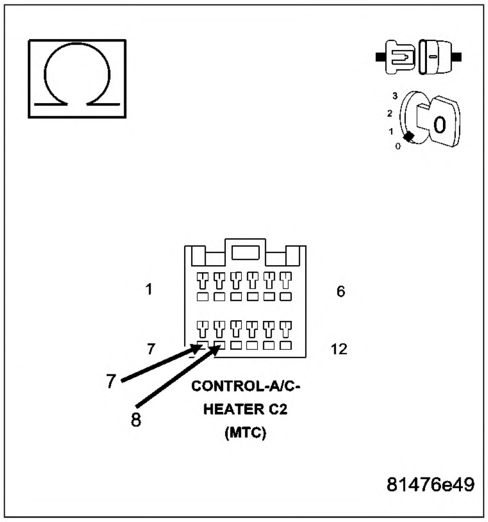
3. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver Circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C268) Recirculation Door Driver circuit for a short to the (C68) Recirculation Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

69–RECIRC DOOR DRIVER CIRCUIT SHORTED TO GROUND (MTC) (CONTINUED)

4. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 69?

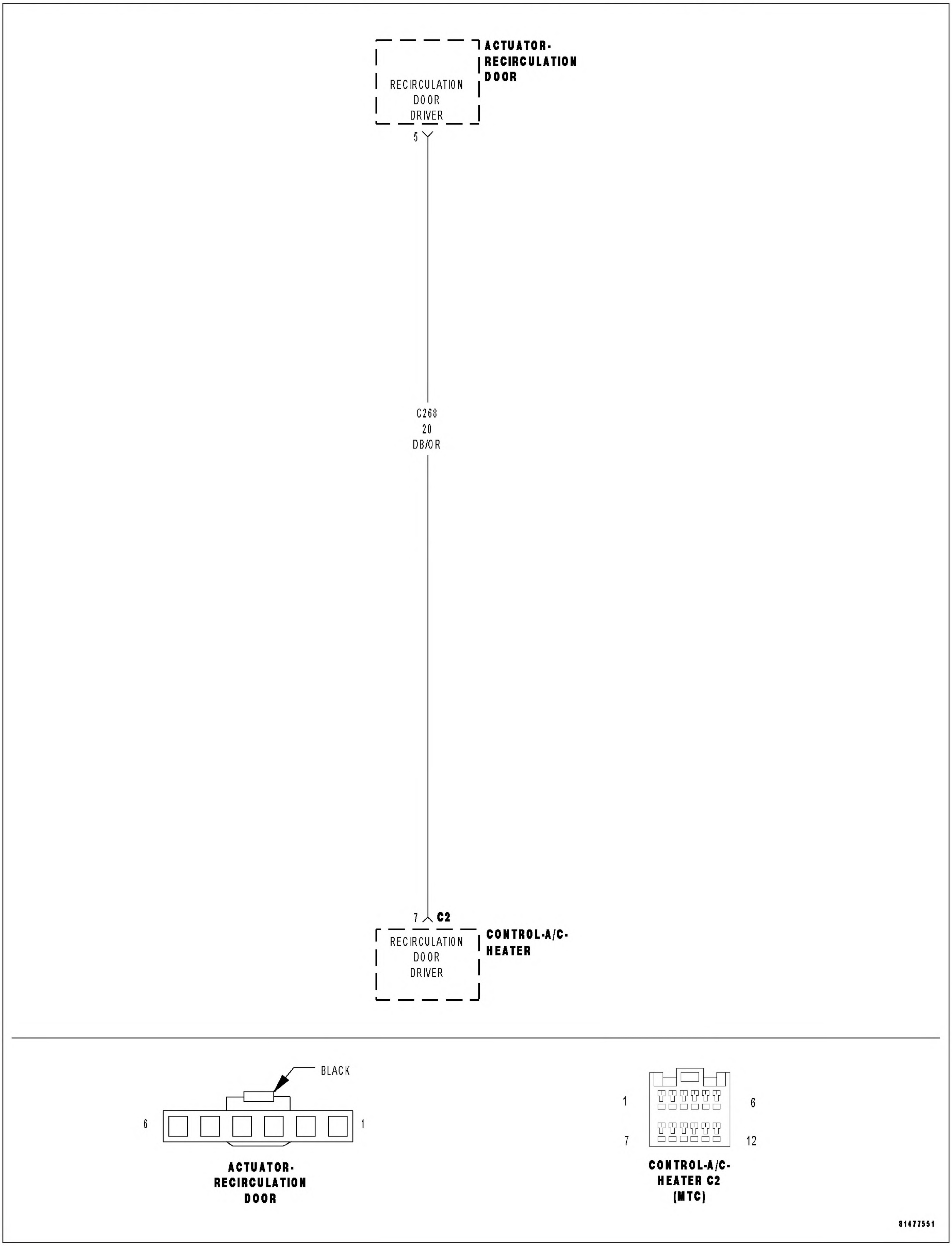
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

71–RECIRC DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC)


ACTUATOR-RECIRCULATION DOOR
RECIRCULATION DOOR DRIVER
5
C268
20
DB/OR
7
C2
CONTROL-A/C-HEATER
RECIRCULATION DOOR DRIVER
BLACK
6
1
ACTUATOR-RECIRCULATION DOOR
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81477551

71–RECIRC DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

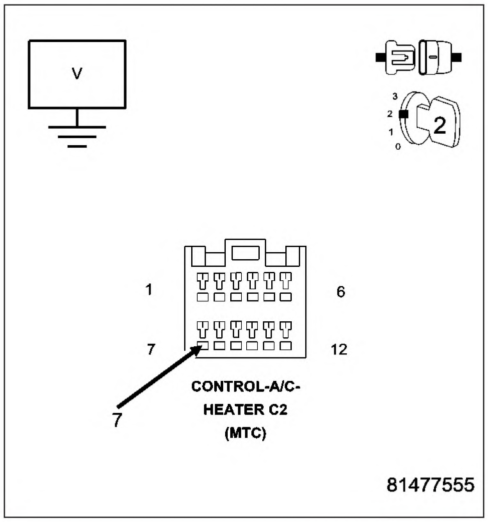
NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects a short to voltage on the (C268) Recirculation Door Driver circuit.

Possible Causes
(C268) RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT FOR A SHORT TO VOLTAGE



Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C268) Recirculation Door Driver circuit.

Is the voltage above 0.2 volts?

Yes >> Repair the (C268) Recirculation Door Driver circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

71–RECIRC DOOR DRIVER CIRCUIT SHORTED TO IGNITION (MTC) (CONTINUED)

2. VERIFY THAT THE FAULT IS STILL PRESENT

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 71?

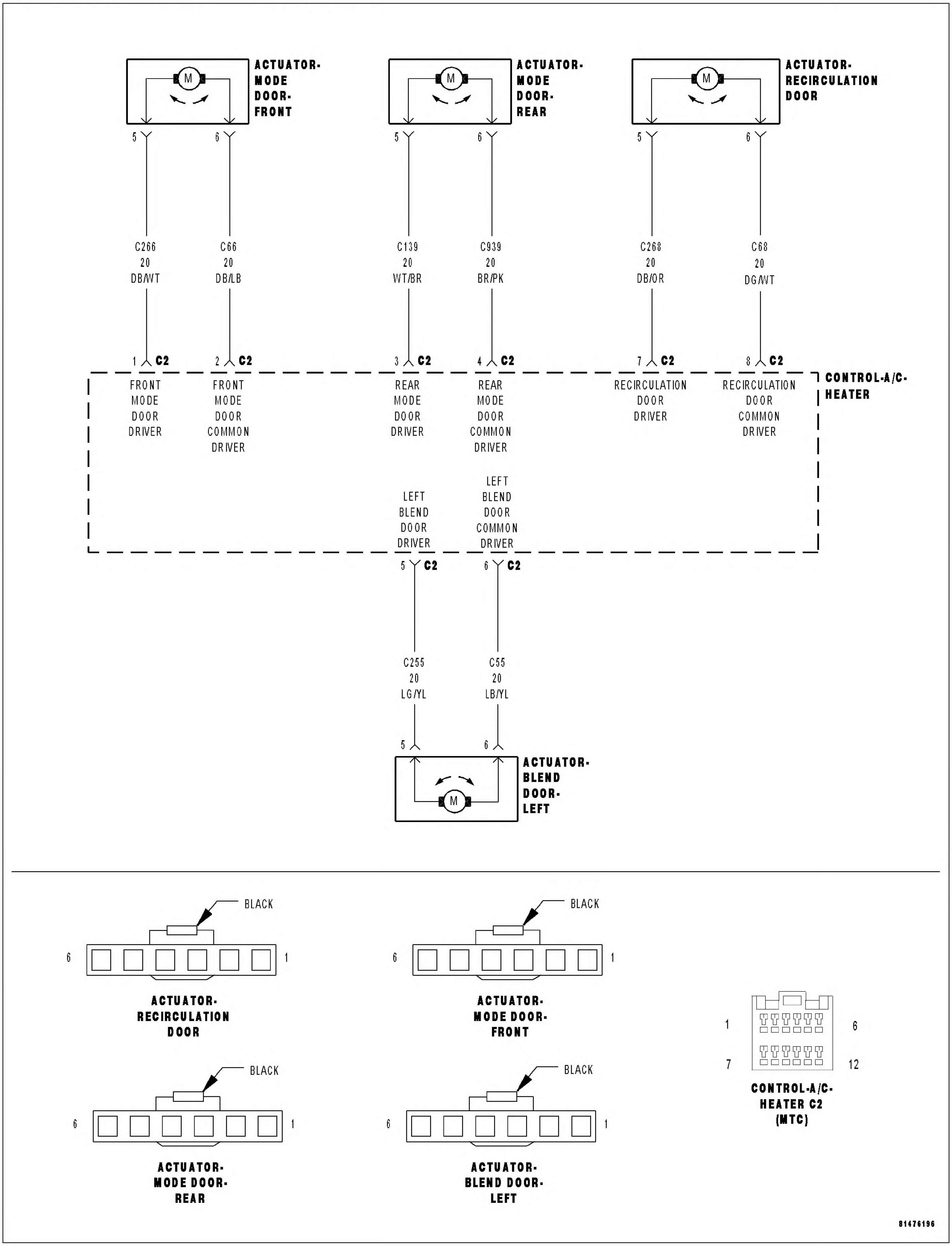
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

72–SHORT TOO COMPLEX (MTC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
3 C2
4 C2
7 C2
8 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255 20 LG/YL
C55 20 LB/YL
ACTUATOR-BLEND DOOR-LEFT
BLACK
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-BLEND DOOR-LEFT
1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)
81476196

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

NOTE: This DTC will display as active if the ignition is not cycled after running the Actuator Circuit Test / Door Calibration Function. Otherwise, it will display as stored until cleared.By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

- **When Monitored:**
  When running the Actuator Circuit Test / Door Calibration Function.
- **Set Condition:**
  If the A/C Heater Control detects more than three door driver circuits shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to voltage and one door driver circuit shorted to ground.

Possible Causes
MORE THAN THREE DOOR DRIVER CIRCUITS SHORTED TO VOLTAGE
MORE THAN THREE DOOR DRIVER CIRCUITS SHORTED TO GROUND
TWO OR MORE DOOR DRIVER CIRCUITS SHORTED WITH AT LEAST ONE SHORTED TO IGNITION AND ONE SHORTED TO GROUND
FRONT MODE DOOR ACTUATOR
REAR MODE DOOR ACTUATOR
LEFT BLEND DOOR ACTUATOR
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

Diagnostic Test

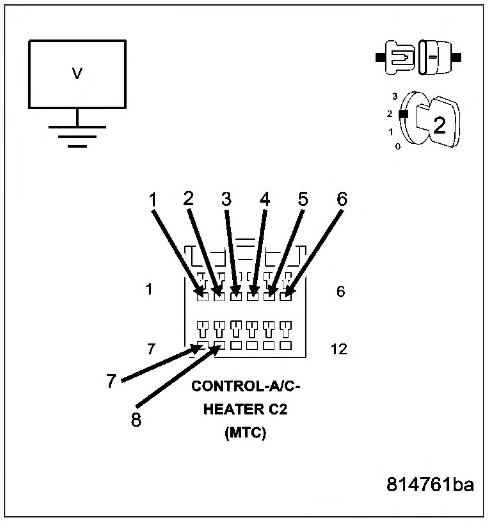
1. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT, (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT, (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit.



814761ba

Is the voltage above 0.2 volts on any of the circuits?

Yes >> Repair all circuits with voltage above 0.2 volts for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

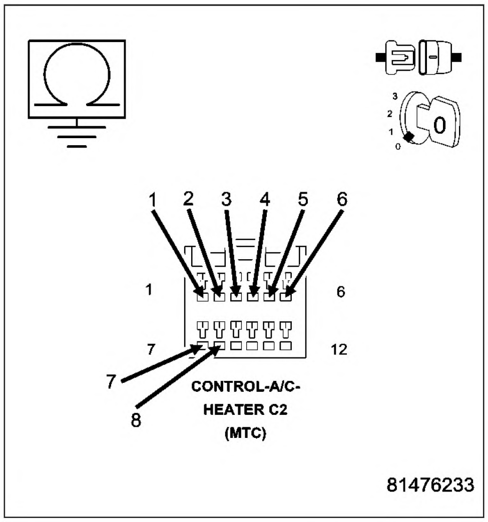
No >> Go To 2

---

2. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT, (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT, (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Measure the resistance of the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit between ground and the A/C Heater Control C2 harness connector.



81476233

Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to ground.

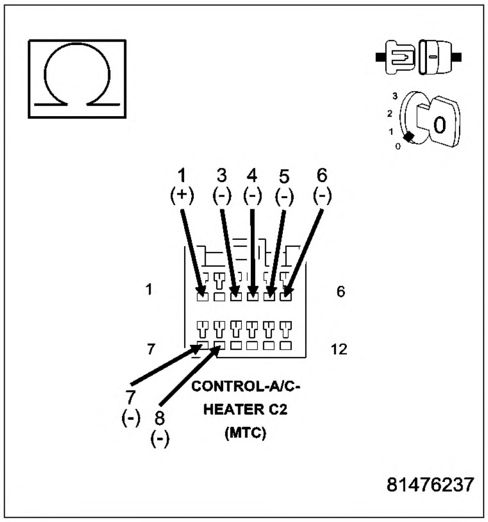
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

3. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C266) Front Mode Door Driver circuit.

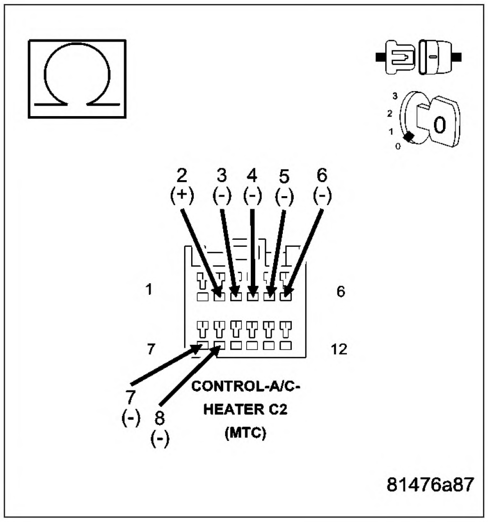
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT, (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT, (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C66) Front Mode Door Common Driver circuit and the (C139) Rear Mode Door Driver circuit, (C939) Rear Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C66) Front Mode Door Common Driver circuit.

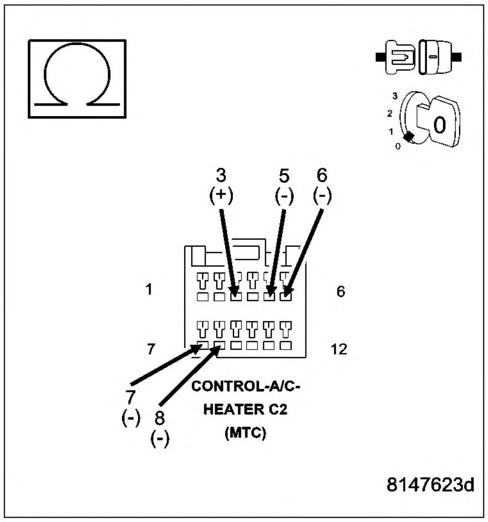
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

5. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



8147623d

Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C139) Rear Mode Door Driver circuit.

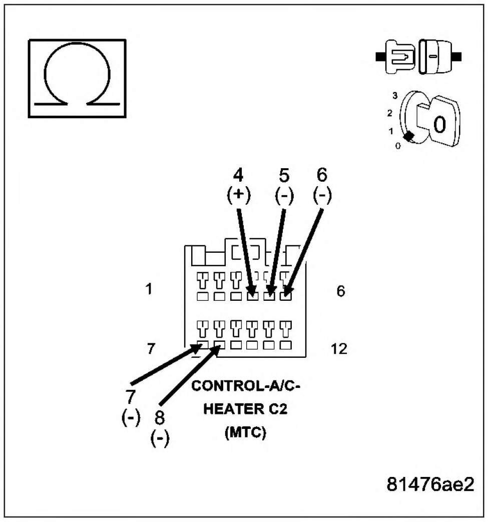
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT, (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT, (C268) RECIRCULATION DOOR DRIVER CIRCUIT, & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C939) Rear Mode Door Common Driver circuit and (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C268) Recirculation Door Driver circuit, and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



81476ae2

Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C939) Rear Mode Door Common Driver circuit.

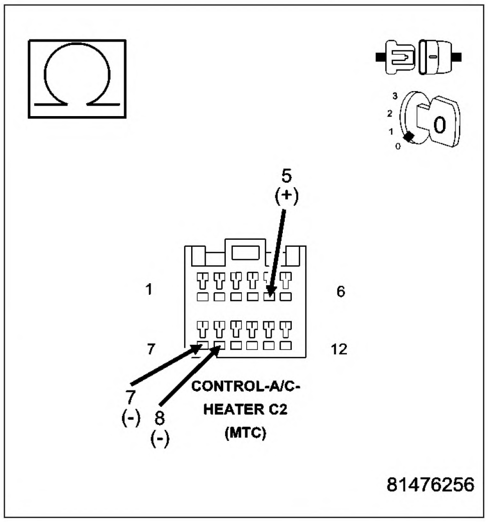
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 7

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

7. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C255) Left Blend Door Driver circuit.

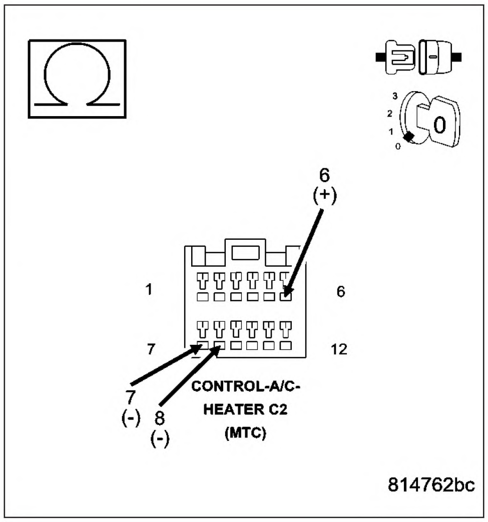
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 8

---

8. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Measure the resistance between the (C55) Left Blend Door Common Driver circuit and the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on any of the circuits?

Yes >> Repair all circuits with a resistance below 10k ohms for a short to the (C55) Left Blend Door Common Driver circuit.

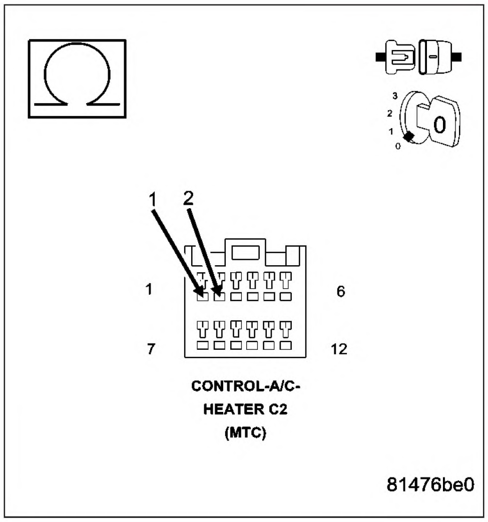
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 9

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

9. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 10

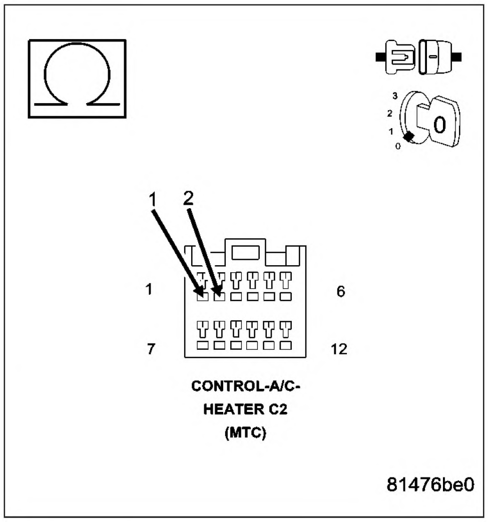
No >> Go To 11

---

10. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C266) FRONT MODE DOOR DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C66) Front Mode Door Common Driver Circuit and the (C266) Front Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C66) Front Mode Door Common Driver Circuit for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

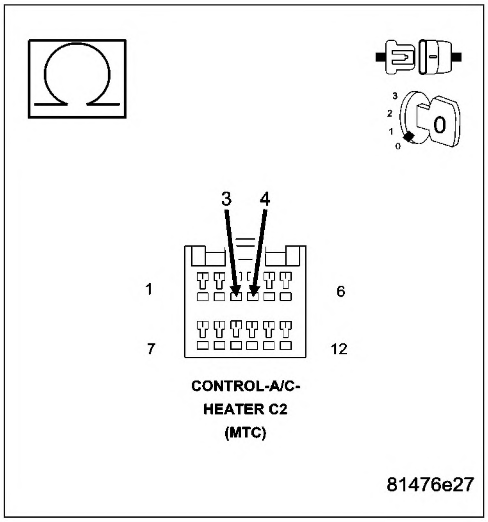
No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

11. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 12

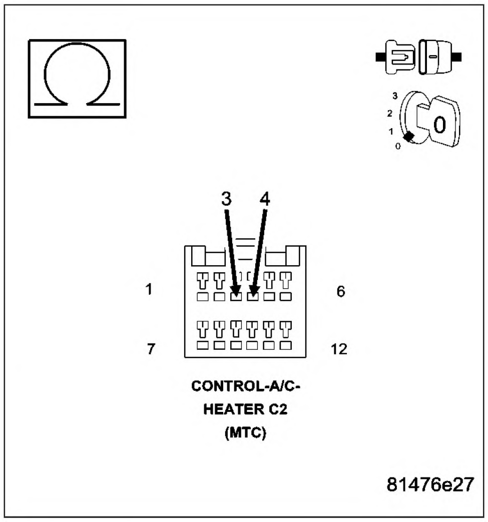
No >> Go To 13

---

12. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C139) REAR MODE DOOR DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C939) Rear Mode Door Common Driver Circuit and the (C139) Rear Mode Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C939) Rear Mode Door Common Driver Circuit for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

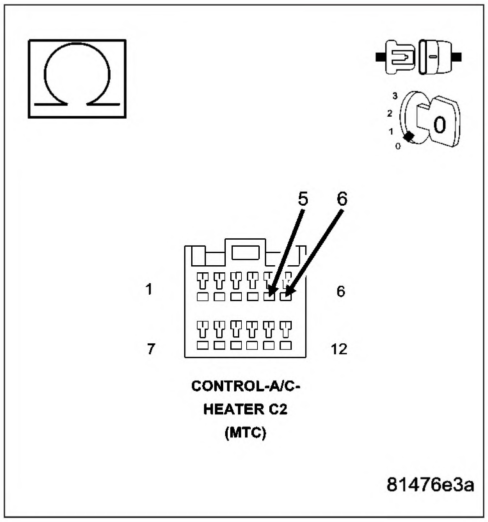
No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

13. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 14

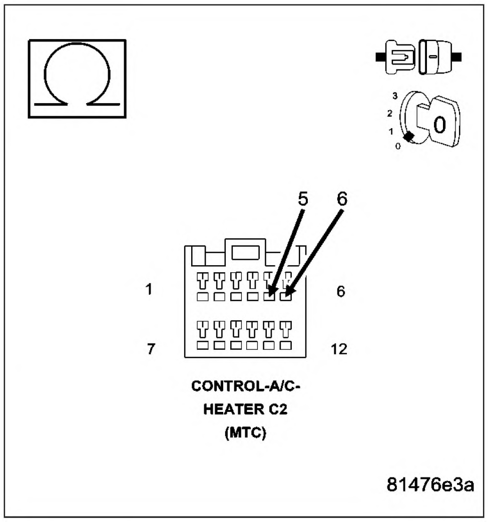
No >> Go To 15

---

14. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C55) Left Blend Door Common Driver Circuit and the (C255) Left Blend Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C55) Left Blend Door Common Driver Circuit for a short to the (C255) Left Blend Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

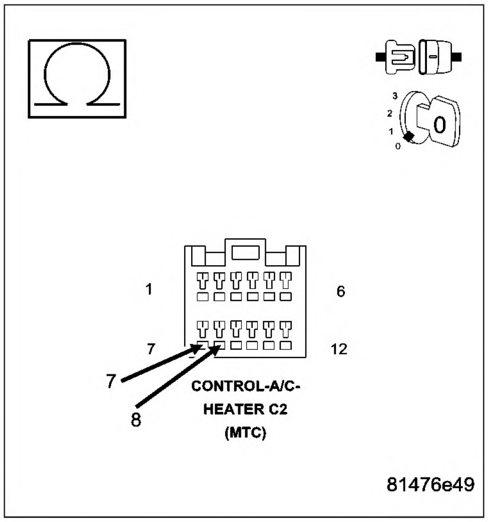
No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

15. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 16

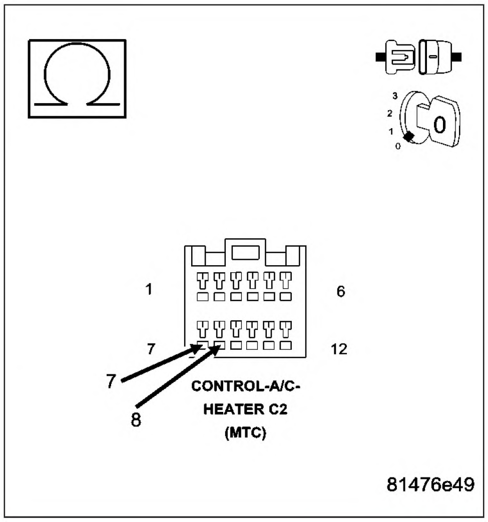
No >> Go To 17

---

16. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C68) Recirculation Door Common Driver Circuit and the (C268) Recirculation Door Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C68) Recirculation Door Common Driver Circuit for a short to the (C268) Recirculation Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

72–SHORT TOO COMPLEX (MTC) (CONTINUED)

17. VERIFY THAT THE FAULT IS STILL PRESENT

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 72?

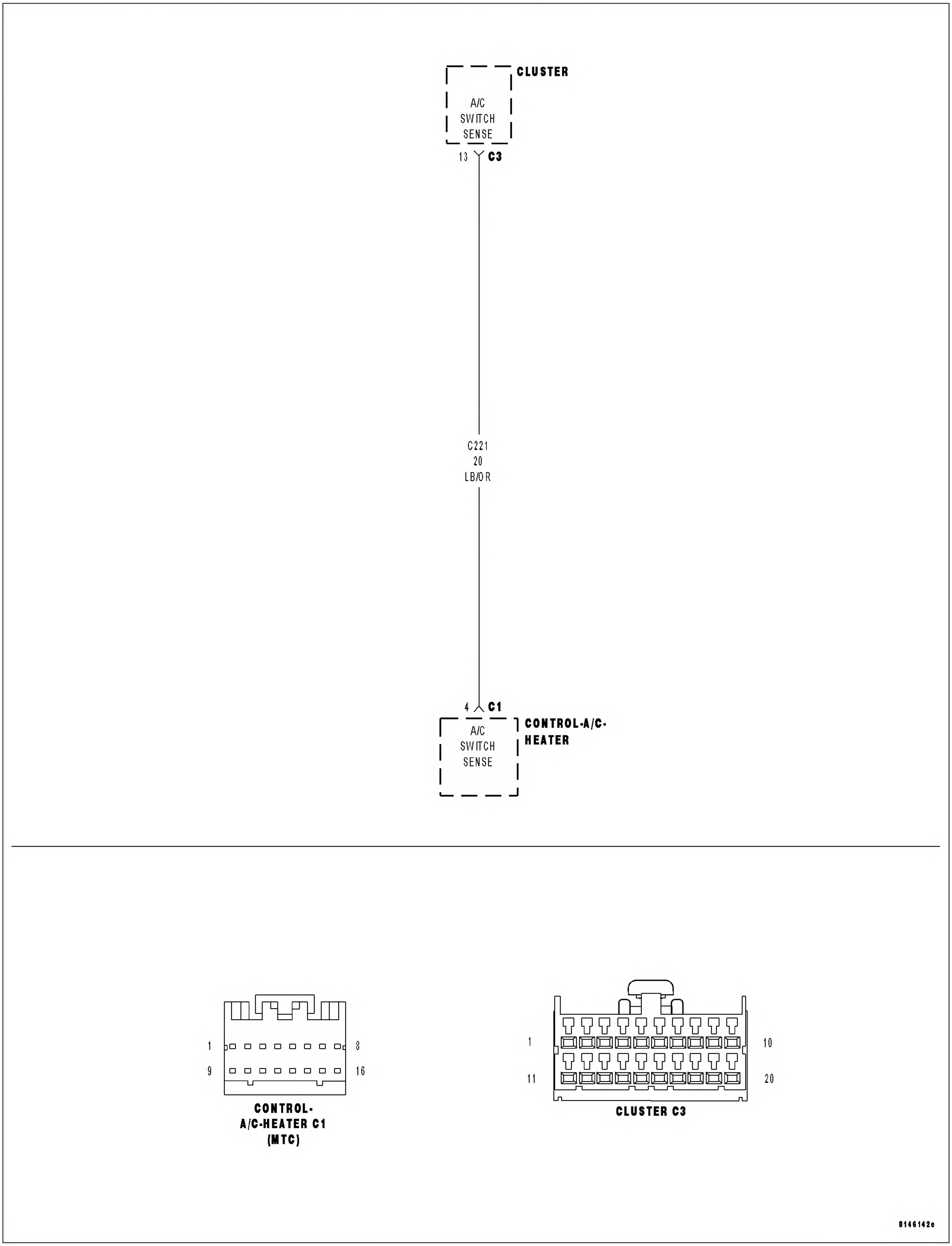
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short that set the original fault. Repair as necessary. Then, if present, diagnose and repair all other DTCs. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

73–AC REQUEST OUTPUT SIGNAL TOO HIGH (MTC)


CLUSTER
A/C SWITCH SENSE
13
C3
C221
20
LB/OR
4
C1
A/C SWITCH SENSE
CONTROL-A/C-HEATER
1
8
9
16
CONTROL-A/C-HEATER C1 (MTC)
1
10
11
20
CLUSTER C3
8146142e

73–AC REQUEST OUTPUT SIGNAL TOO HIGH (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects voltage above 4.49 volts on the (C221) A/C Switch Sense circuit.

Possible Causes
(C221) A/C SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
INSTRUMENT CLUSTER (CCN)
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

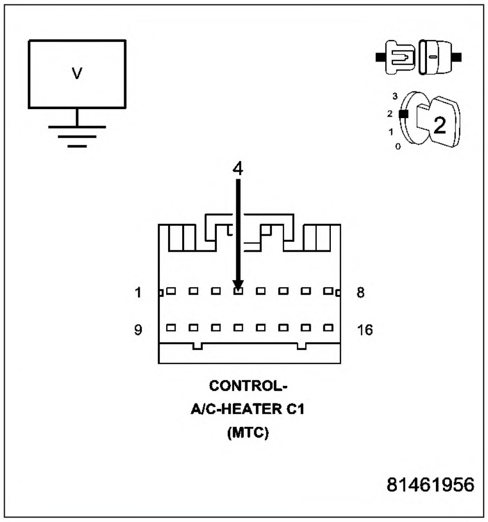
1. CHECK (C221) A/C SWITCH SENSE CIRCUIT VOLTAGE AT A/C HEATER CONTROL C1 HARNESS CONNECTOR

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

Measure the voltage of the (C221) A/C Switch Sense circuit.



Is the voltage above 5.2 volts?

Yes >> Go To 2

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

73–AC REQUEST OUTPUT SIGNAL TOO HIGH (MTC) (CONTINUED)

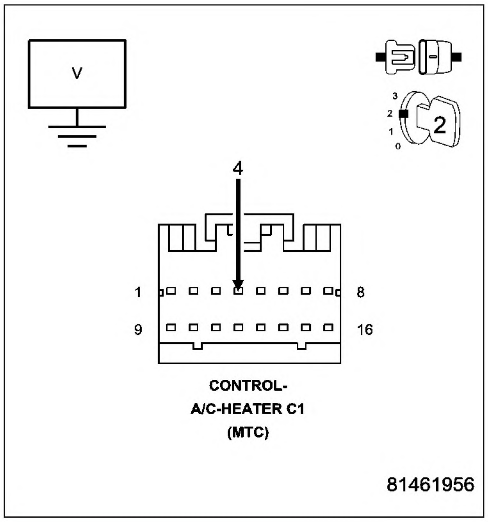
2. CHECK (C221) A/C SWITCH SENSE CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Instrument Cluster C3 harness connector.

Turn the ignition on.

Measure the voltage of the (C221) A/C Switch Sense circuit.



Is the voltage above 0.2 volts?

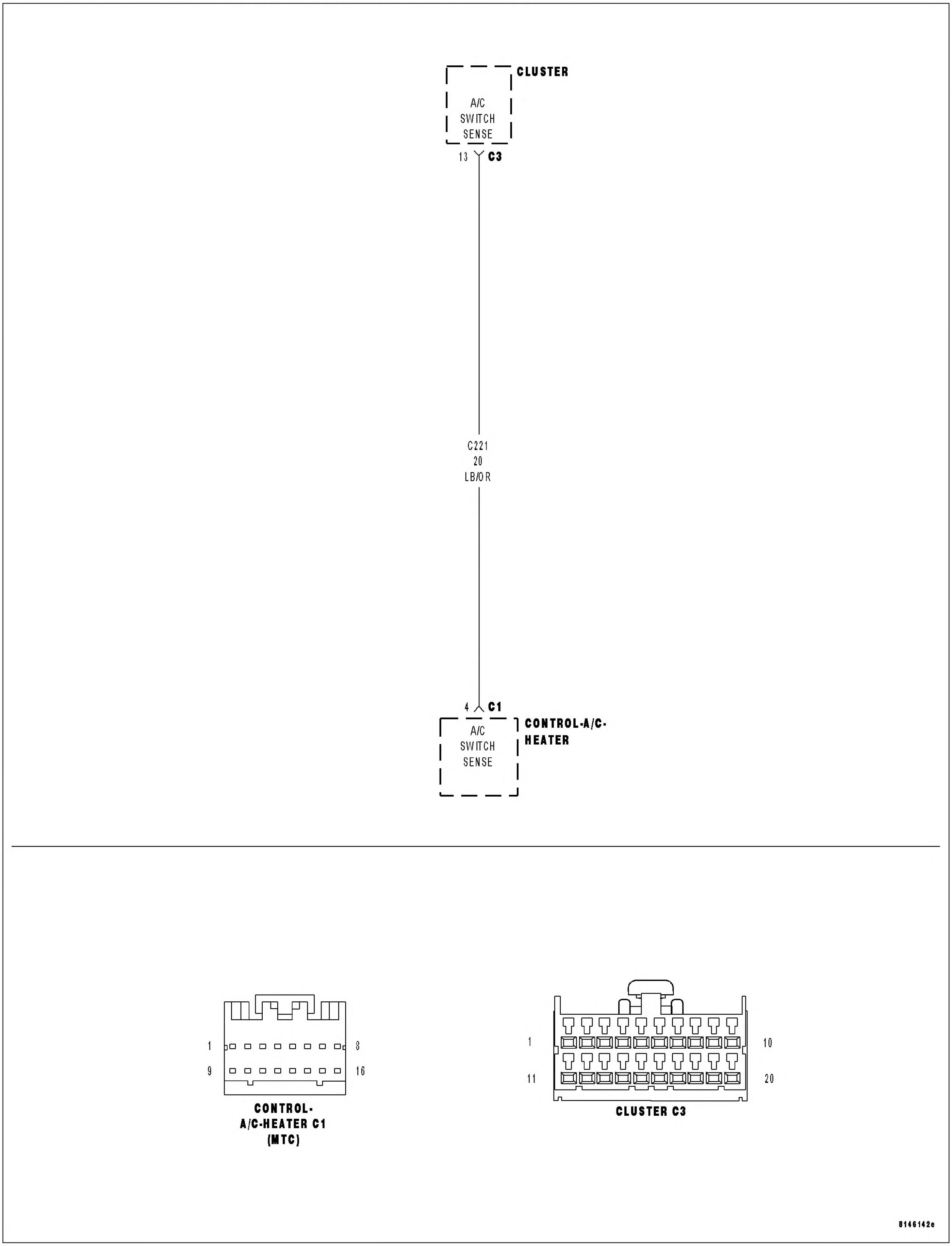
Yes >> Repair the (C221) A/C Switch Sense circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Instrument Cluster (CCN) in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

74–AC REQUEST OUTPUT SIGNAL TOO LOW (MTC)


CLUSTER
A/C
SWITCH
SENSE
13
C3
C221
20
LB/OR
4
C1
CONTROL-A/C-
HEATER
A/C
SWITCH
SENSE
1
8
9
16
CONTROL-
A/C-HEATER C1
(MTC)
1
10
11
20
CLUSTER C3
8146142e

74–AC REQUEST OUTPUT SIGNAL TOO LOW (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects voltage below 1.51 volts on the (C221) A/C Switch Sense circuit.

Possible Causes
(C221) A/C SWITCH SENSE CIRCUIT SHORTED TO GROUND
(C221) A/C SWITCH SENSE CIRCUIT OPEN
INSTRUMENT CLUSTER (CCN)
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

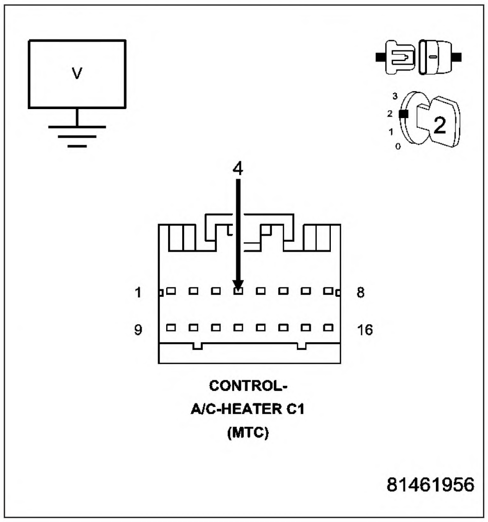
1. CHECK (C221) A/C SWITCH SENSE CIRCUIT VOLTAGE AT A/C HEATER CONTROL C1 HARNESS CONNECTOR

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

Measure the voltage of the (C221) A/C Switch Sense circuit.



Is the voltage below 4.8 volts?

Yes >> Go To 2

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

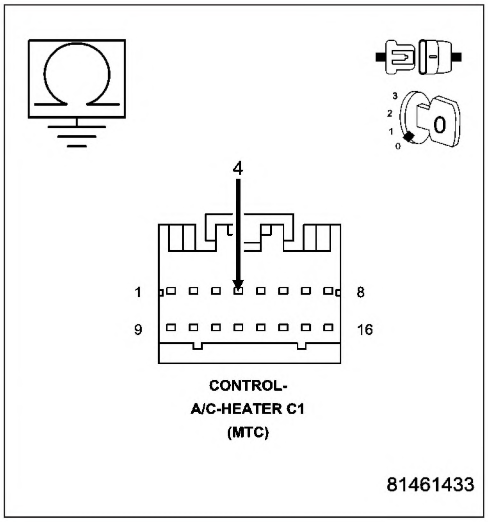
74–AC REQUEST OUTPUT SIGNAL TOO LOW (MTC) (CONTINUED)

2. CHECK (C221) A/C SWITCH SENSE CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C3 harness connector.

Measure the resistance of the (C221) A/C Switch Sense circuit between ground and the A/C Heater Control C1 harness connector.



Is the resistance below 10K ohms?

Yes >> Repair the (C221) A/C Switch Sense circuit for a short to ground.

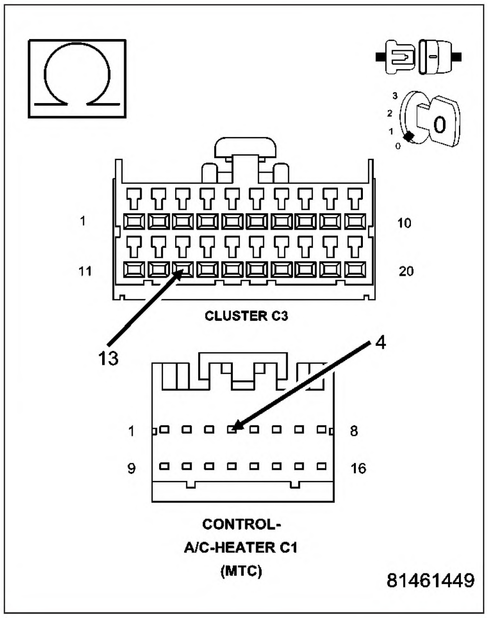
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

3. CHECK (C221) A/C SWITCH SENSE CIRCUIT FOR AN OPEN

Measure the resistance of the (C221) A/C Switch Sense circuit between the A/C Heater Control C1 harness connector and the Instrument Cluster C3 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Replace the Instrument Cluster (CCN) in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C221) A/C Switch Sense circuit for an open.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

75–AC REQUEST OUTPUT SIGNAL HIGH WHEN DRIVEN LOW (MTC)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects voltage above 4.49 volts on the (C221) A/C Switch Sense circuit with the A/C switched on.

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Refer to 73–AC REQUEST OUTPUT SIGNAL TOO HIGH for the diagnostic test procedure.

76–AC REQUEST OUTPUT SIGNAL LOW WHEN DRIVEN HIGH (MTC)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

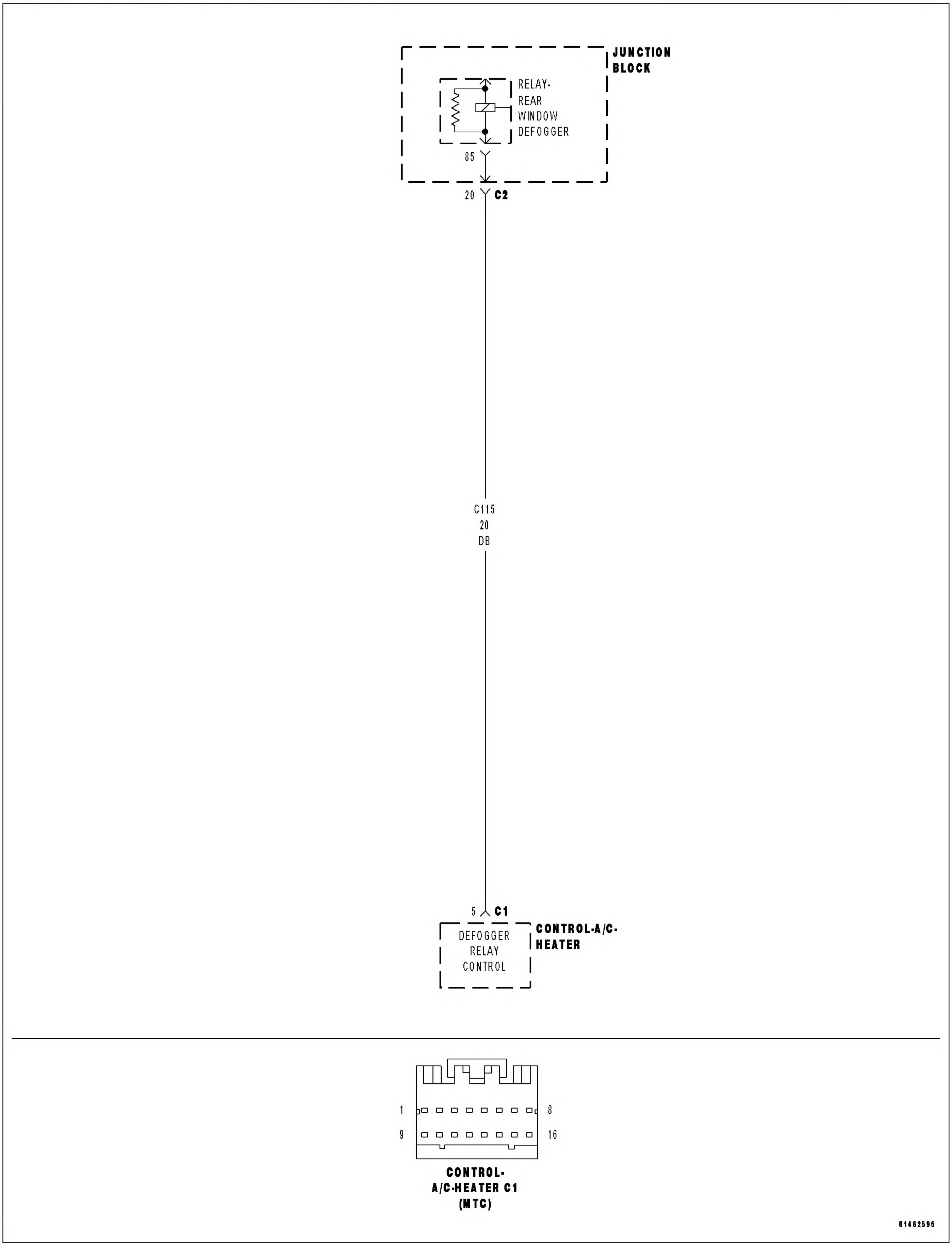
For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects voltage below 1.51 volts on the (C221) A/C Switch Sense circuit when the A/C is switched off.

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Refer to 74–AC REQUEST OUTPUT SIGNAL TOO LOW for the diagnostic test procedure.

77–EBL OUTPUT SHORTED HIGH


JUNCTION BLOCK
RELAY-REAR WINDOW DEFOGGER
85
20 C2
C115
20
DB
5 C1
DEFOGGER RELAY CONTROL
CONTROL-A/C-HEATER
1
8
9
16
CONTROL-A/C-HEATER C1 (MTC)
81462595

77–EBL OUTPUT SHORTED HIGH (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the Ignition on and the EBL mode switch on.
- **Set Condition:**
  If the A/C Heater Control senses excessive current on the (C115) Defogger Relay Control circuit.

Possible Causes
EBL RELAY SHORTED TO BATTERY
(C115) DEFOGGER RELAY CONTROL CIRCUIT SHORTED TO BATTERY
JUNCTION BLOCK
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (MTC) for stored DTC test procedures.

Diagnostic Test

1. CHECK THE EBL RELAY FOR A SHORT TO BATTERY

Turn the ignition off.

Install a known good relay in place of the EBL relay.

Turn the ignition on.

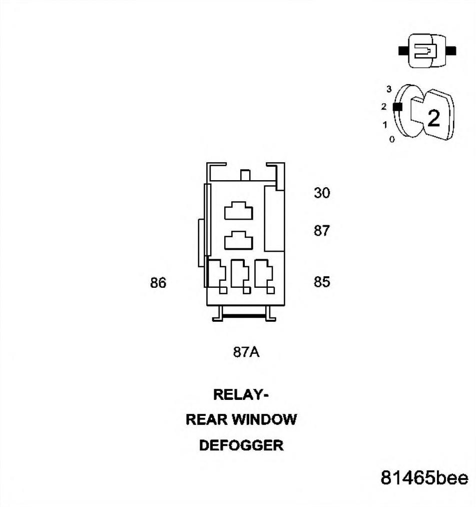
Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Press the EBL mode switch on.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.



NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 77?

Yes >> Go To 2

No >> Replace the original EBL Relay in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

77–EBL OUTPUT SHORTED HIGH (CONTINUED)

2. CHECK FOR A SHORTED A/C HEATER CONTROL

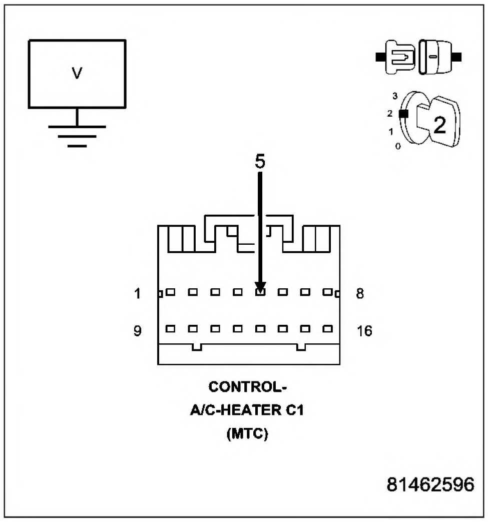
Turn the ignition off.

Remove the replacement EBL relay.

Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

Measure the voltage of the (C115) Defogger Relay Control circuit.



Is the voltage above 0.2 volts?

Yes >> Go To 3

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

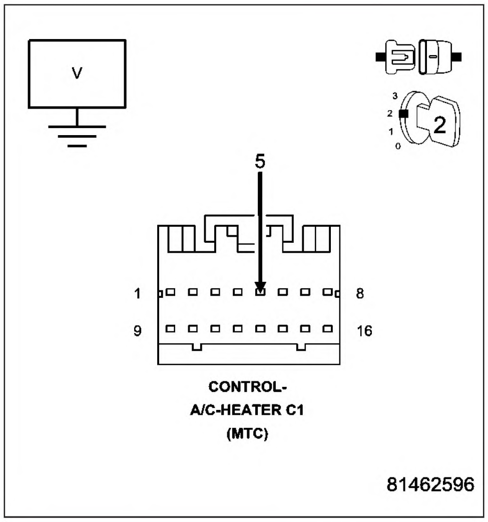
3. CHECK THE (C115) DEFOGGER RELAY CONTROL CIRCUIT FOR A SHORT TO BATTERY

Turn the ignition off.

Disconnect the Junction Block C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C115) Defogger Relay Control circuit.



Is the voltage above 0.2 volts?

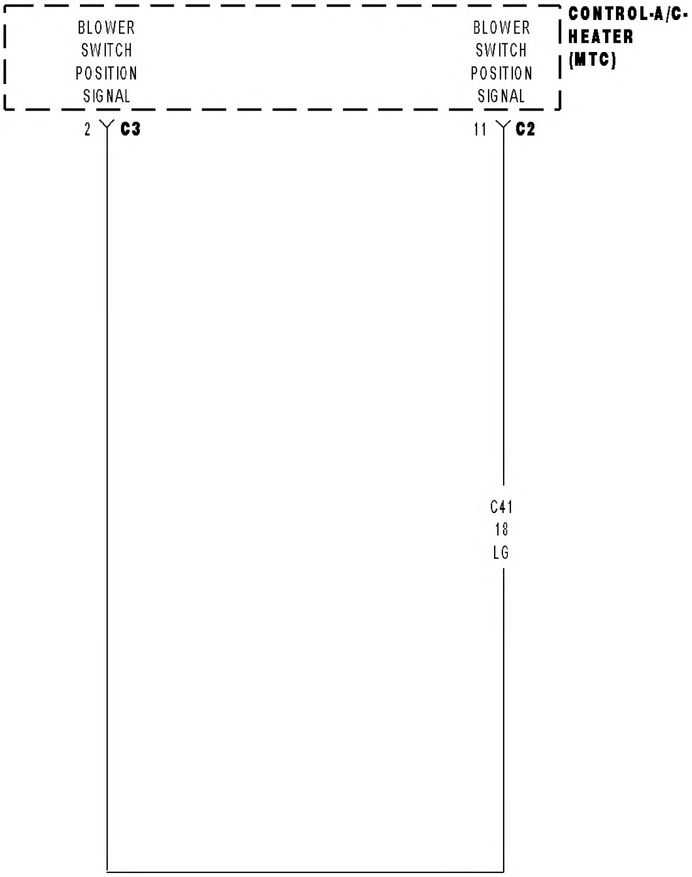
Yes >> Repair the (C115) Defogger Relay Control circuit for a short to battery.

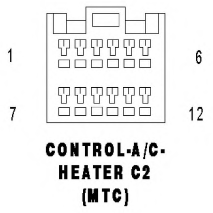
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

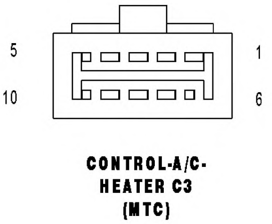
No >> Replace the Junction Block in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

81–BLOWER NOT ON HIGH AT START OF COOLDOWN TEST (MTC)


BLOWER SWITCH POSITION SIGNAL
BLOWER SWITCH POSITION SIGNAL
CONTROL-A/C-HEATER (MTC)
2 C3
11 C2
C41
18
LG


1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)


5
1
10
6
CONTROL-A/C-HEATER C3 (MTC)

8145f8b4

81–BLOWER NOT ON HIGH AT START OF COOLDOWN TEST (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When executing the Cooldown Test.
- **Set Condition:**
  If the A/C Heater Control sensed that the blower was not operating at high speed when executing the Cooldown Test.

Possible Causes
BLOWER CONTROL NOT SET TO HIGH SPEED WHEN EXECUTING THE COOLDOWN TEST
BLOWER MOTOR / RELATED CIRCUITS
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO (C121) SENSOR GROUND CIRCUIT
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT OPEN
A/C HEATER CONTROL

NOTE: This DTC will display as active if the ignition is not cycled after running the Cooldown Test. Otherwise, it will display as stored until cleared.

Diagnostic Test

1. CHECK THE BLOWER SPEED SETTING

Was the blower control set to high speed before executing the Cooldown Test?

Yes >> Go To 2

No >> Start the engine, set the blower control to high speed, and then run the Cooldown Test again.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

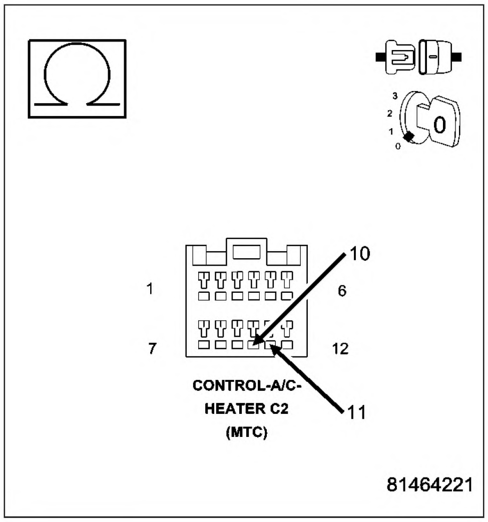
---

2. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C121) SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C41) Blower Switch Position Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10K ohms?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to the (C121) Sensor Ground circuit. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

81–BLOWER NOT ON HIGH AT START OF COOLDOWN TEST (MTC) (CONTINUED)

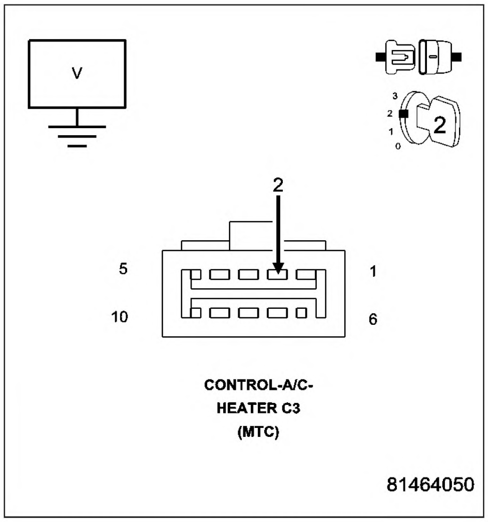
3. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT VOLTAGE

Reconnect the A/C Heater Control C2 harness connector.

Disconnect the A/C Heater Control C3 harness connector.

Turn the ignition on.

Measure the voltage of the (C41) Blower Switch Position Signal circuit.



Is the voltage above 4.8 volts?

Yes >> Check the blower motor and related circuits for the cause of blower operation problems and repair as necessary. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

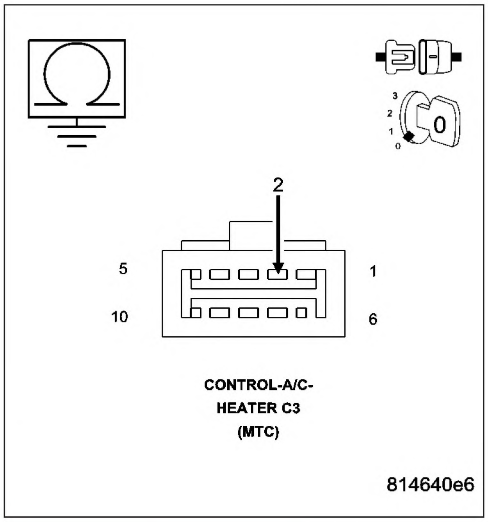
---

4. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C41) Blower Switch Position Signal circuit between ground and the A/C Heater Control C3 harness connector.



Is the resistance below 10K ohms?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to ground. Run the Cooldown Test again after the repair is complete.

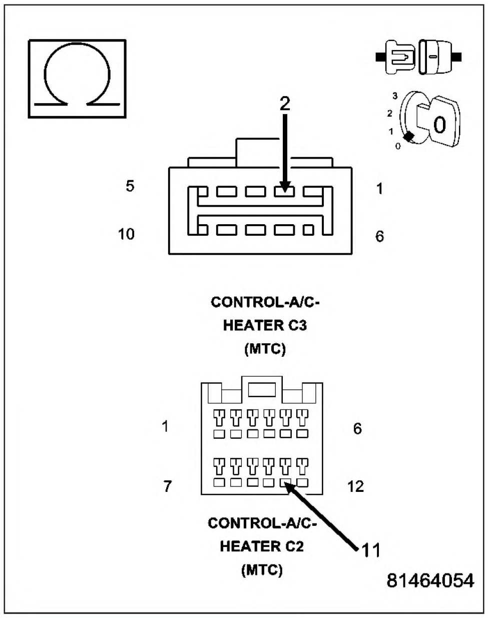
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

81–BLOWER NOT ON HIGH AT START OF COOLDOWN TEST (MTC) (CONTINUED)

5. CHECK (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (C41) Blower Switch Position Signal circuit between the A/C Heater Control C2 harness connector and the A/C Heater Control C3 harness connector.



Is the resistance below 5.0 ohms?

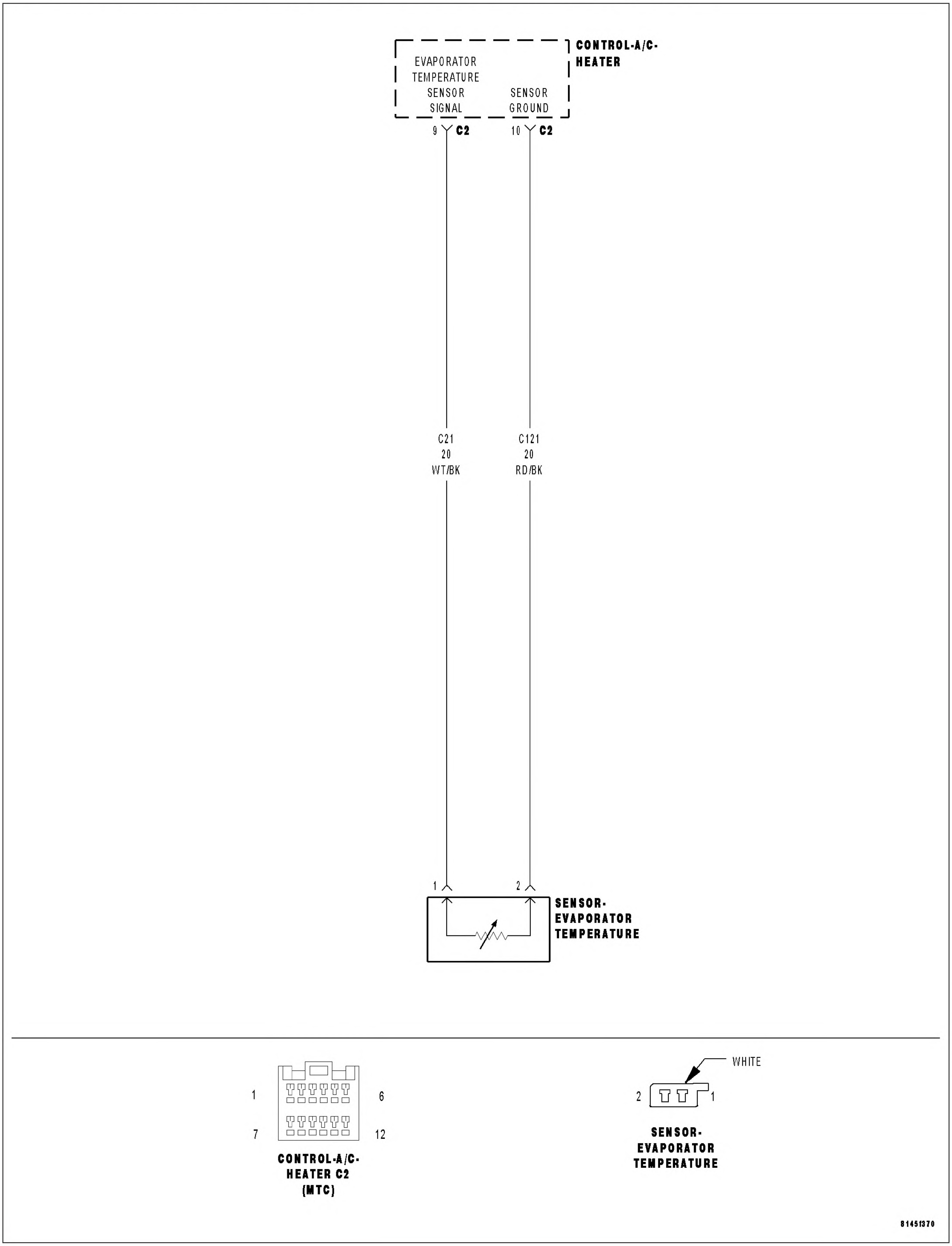
Yes >> Replace the A/C Heater Control in accordance with the Service Information. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C41) Blower Switch Position Signal circuit for an open. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

82–SENSOR TOO COLD TO START COOLDOWN TEST (MTC)


CONTROL-A/C-
HEATER
EVAPORATOR
TEMPERATURE
SENSOR
SIGNAL
SENSOR
GROUND
9
C2
10
C2
C21
20
WT/BK
C121
20
RD/BK
1
2
SENSOR-
EVAPORATOR
TEMPERATURE
1
6
7
12
CONTROL-A/C-
HEATER C2
(MTC)
WHITE
2
1
SENSOR-
EVAPORATOR
TEMPERATURE
81451370

82–SENSOR TOO COLD TO START COOLDOWN TEST (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When executing the Cooldown Test.
- **Set Condition:**
  If the A/C Heater Control senses that the evaporator temperature is below 18.3°C (65°F) when executing the Cooldown Test.

Possible Causes
FAULTS PRESENT IN THE HVAC SYSTEM
EVAPORATOR TEMPERATURE BELOW 18.3°C (65°F) AT START OF COOLDOWN TEST
HIGH RESISTANCE ON (C121) SENSOR GROUND CIRCUIT
HIGH RESISTANCE ON (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT
EVAPORATOR TEMPERATURE SENSOR
A/C HEATER CONTROL

NOTE: This DTC will display as active if the ignition is not cycled after running the Cooldown Test. Otherwise, it will display as stored until cleared.

Diagnostic Test

1. CHECK FOR ACTIVE DTC 31, 32, 83, OR 84 IN THE A/C HEATER CONTROL

Turn the ignition on.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 31, 32, 83, or 84?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this section for a complete list of HVAC related symptoms. Run the Cooldown Test again after the repair is complete.

No >> Go To 2

---

2. ERASE DTCs IN THE A/C HEATER CONTROL

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins displaying DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

Turn the ignition off.

>> Go To 3

82–SENSOR TOO COLD TO START COOLDOWN TEST (MTC) (CONTINUED)

3. VERIFY IF DTC 82 SET DUE TO EVAPORATOR TEMPERATURE BEING BELOW 18.3°C (65°F)

CAUTION: The work area ambient temperature and the evaporator temperature must be above 18.3°C (65°F) in order to test A/C system performance.

Start the engine.

Set the Mode switch to the panel position.

Press the A/C mode switch off (status indicator not illuminated/compressor not running).

Turn the blower control to high speed. Allow the blower to run for 5 minutes before proceeding.

Turn the blower control off.

Actuate the Cooldown Test by performing the following:

- Press and hold the A/C mode switch down and then turn the blower motor control to high speed. Continue to hold the A/C mode switch down until the A/C status indicator begins flashing, Then, release the mode switch. While the test is running, the A/C status indicator will flash once per second. If the test passes, the A/C status indicator will stop flashing. If the test fails, the A/C and EBL status indicators will flash alternately. Allow the test to run to completion before proceeding.

>> Go To 4

---

4. CHECK FOR DTCS IN THE A/C HEATER CONTROL

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display DTC 82?

Yes, & No Other DTCs Present

Go To 5

Yes, & Other DTCs Present

Diagnose and repair the other DTC(s). Refer to the Table of Contents in this section for a complete list of HVAC related symptoms. Run the Cooldown Test again after the repair is complete.

No, But Other DTCs Present

Diagnose and repair the DTC(s). Refer to the Table of Contents in this section for a complete list of HVAC related symptoms. Run the Cooldown Test again after the repair is complete.

No, & No Other DTCs Present

Perform additional testing as necessary.

82–SENSOR TOO COLD TO START COOLDOWN TEST (MTC) (CONTINUED)

5. CHECK THE (C121) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

NOTE: Ensure that the voltmeter leads are connected for positive polarity and that they meet the terminals in the connector. Also ensure that there is a good terminal to wire connection.

Turn the ignition off.

Back probe the (C121) Sensor Ground circuit between the Evaporator Temperature Sensor harness connector and the A/C Heater Control C2 harness connector.

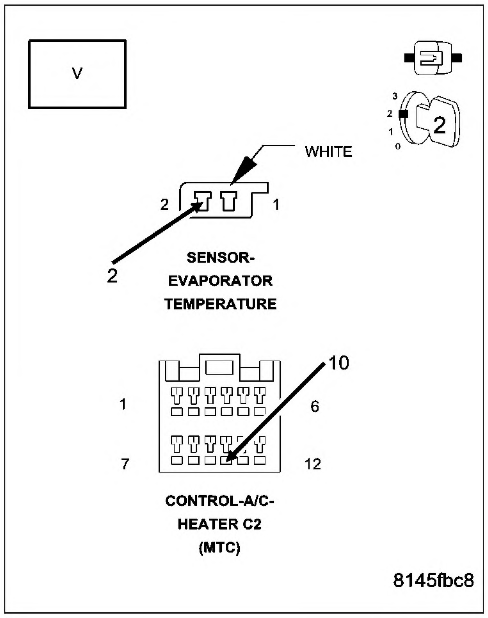
Turn the ignition on.

Is the voltage below 0.10 volts?

Yes >> Go To 6

No >> Repair the (C121) Sensor Ground circuit for high resistance. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



---

6. CHECK THE (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

NOTE: Ensure that the voltmeter leads are connected for positive polarity and that they meet the terminals in the connector. Also ensure that there is a good terminal to wire connection.

Turn the ignition off.

Back probe the (C21) Evaporator Temperature Sensor Signal circuit between the Evaporator Temperature Sensor harness connector and the A/C Heater Control C2 harness connector.

Turn the ignition on.

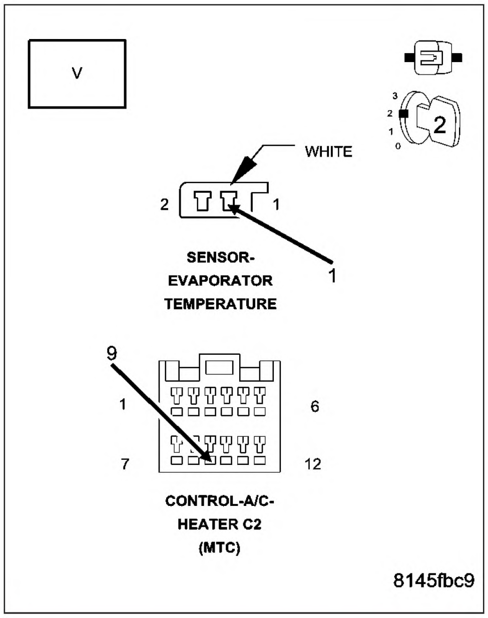
Is the voltage below 0.10 volts?

Yes >> Replace the A/C Heater Control in accordance with the Service Information. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for high resistance. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).



83–SENSOR FAILED OPEN DURING COOLDOWN TEST (MTC)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When executing the Cooldown Test.
- **Set Condition:**
  If the Evaporator Temperature Sensor input is out of range toward the high voltage threshold when executing the Cooldown Test.

NOTE: This DTC will display as active if the ignition is not cycled after running the Cooldown Test. Otherwise, it will display as stored until cleared.

Refer to 31–EVAPORATOR SENSOR OPEN for the diagnostic test procedure.

84–SENSOR FAILED SHORTED DURING COOLDOWN TEST (MTC)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

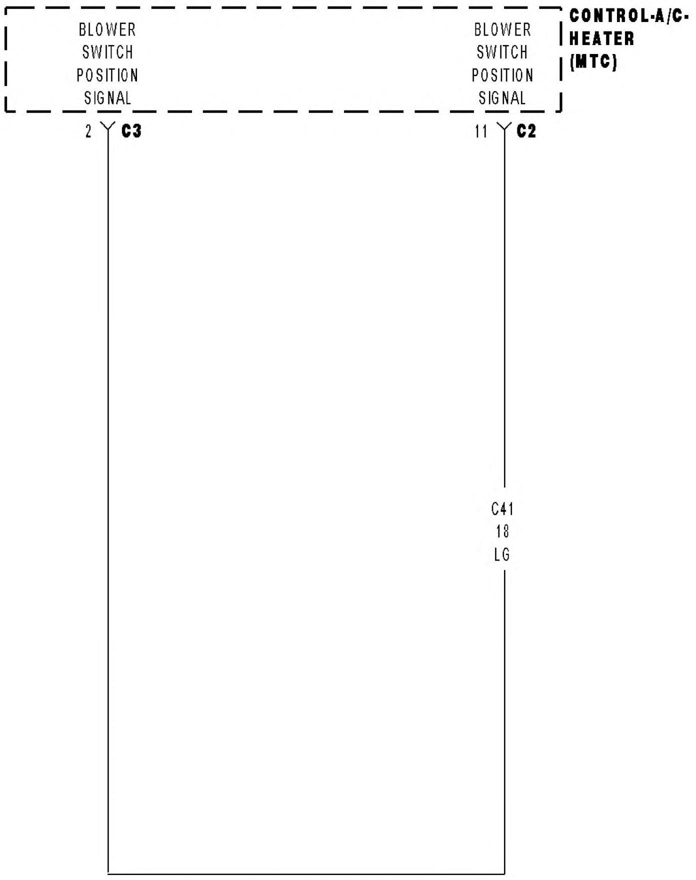
For a complete wiring diagram **Refer to Section 8W**.

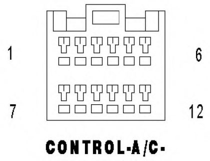
- **When Monitored:**
  When executing the Cooldown Test.
- **Set Condition:**
  If the Evaporator Temperature Sensor input is out of range toward the low voltage threshold when executing the Cooldown Test.

NOTE: This DTC will display as active if the ignition is not cycled after running the Cooldown Test. Otherwise, it will display as stored until cleared.

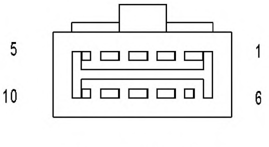
Refer to 32–EVAPORATOR SENSOR SHORTED for the diagnostic test procedure.

85–BLOWER NOT ON HIGH DURING COOLDOWN TEST (MTC)


CONTROL-A/C-
HEATER
(MTC)
BLOWER
SWITCH
POSITION
SIGNAL
2
C3
BLOWER
SWITCH
POSITION
SIGNAL
11
C2
C41
18
LG



**CONTROL-A/C-
HEATER C2
(MTC)**



**CONTROL-A/C-
HEATER C3
(MTC)**

8145f8b4

85–BLOWER NOT ON HIGH DURING COOLDOWN TEST (MTC) (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When executing the Cooldown Test.
- **Set Condition:**
  If the A/C Heater Control sensed that the blower was not operating at high speed while the Cooldown Test was running.

Possible Causes
BLOWER CONTROL DID NOT REMAIN ON THE HIGH SPEED SETTING FOR THE ENTIRE COOLDOWN TEST
BLOWER MOTOR / RELATED CIRCUITS
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO (C121) SENSOR GROUND CIRCUIT
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT OPEN
A/C HEATER CONTROL

NOTE: This DTC will display as active if the ignition is not cycled after running the Cooldown Test. Otherwise, it will display as stored until cleared.

Diagnostic Test

1. CHECK THE BLOWER SPEED SETTING

Was the blower control set to high speed for the entire Cooldown Test?

Yes >> Go To 2

No >> Start the engine, set the blower control to high speed, and then run the Cooldown Test again.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

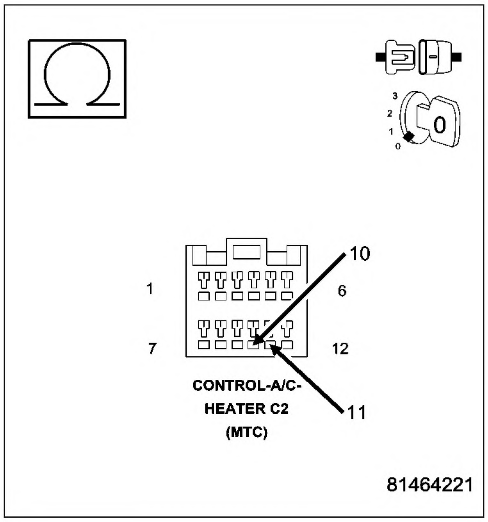
---

2. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C121) SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C41) Blower Switch Position Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10K ohms?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to the (C121) Sensor Ground circuit. Run the Cooldown Test again after the repair is complete.
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

85–BLOWER NOT ON HIGH DURING COOLDOWN TEST (MTC) (CONTINUED)

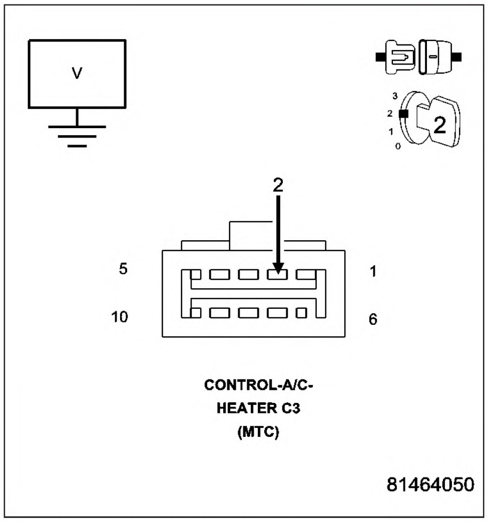
3. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT VOLTAGE

Reconnect the A/C Heater Control C2 harness connector.

Disconnect the A/C Heater Control C3 harness connector.

Turn the ignition on.

Measure the voltage of the (C41) Blower Switch Position Signal circuit.



Is the voltage above 4.8 volts?

Yes >> Check the blower motor and related circuits for the cause of blower operation problems and repair as necessary. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

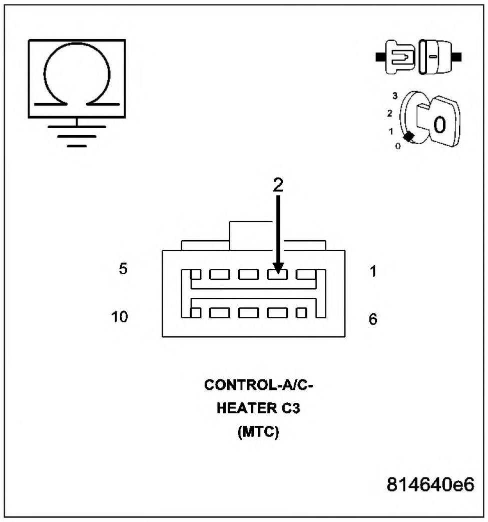
---

4. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C41) Blower Switch Position Signal circuit between ground and the A/C Heater Control C3 harness connector.



Is the resistance below 10K ohms?

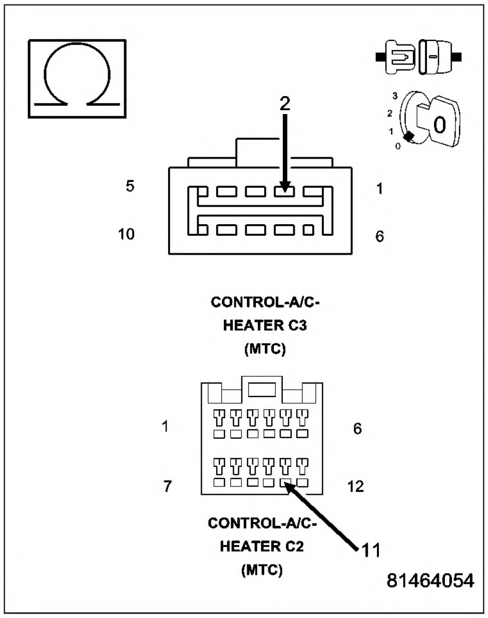
Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to ground. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

85–BLOWER NOT ON HIGH DURING COOLDOWN TEST (MTC) (CONTINUED)

5. CHECK (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR AN OPEN



Measure the resistance of the (C41) Blower Switch Position Signal circuit between the A/C Heater Control C2 harness connector and the A/C Heater Control C3 harness connector.

Is the resistance below 5.0 ohms?

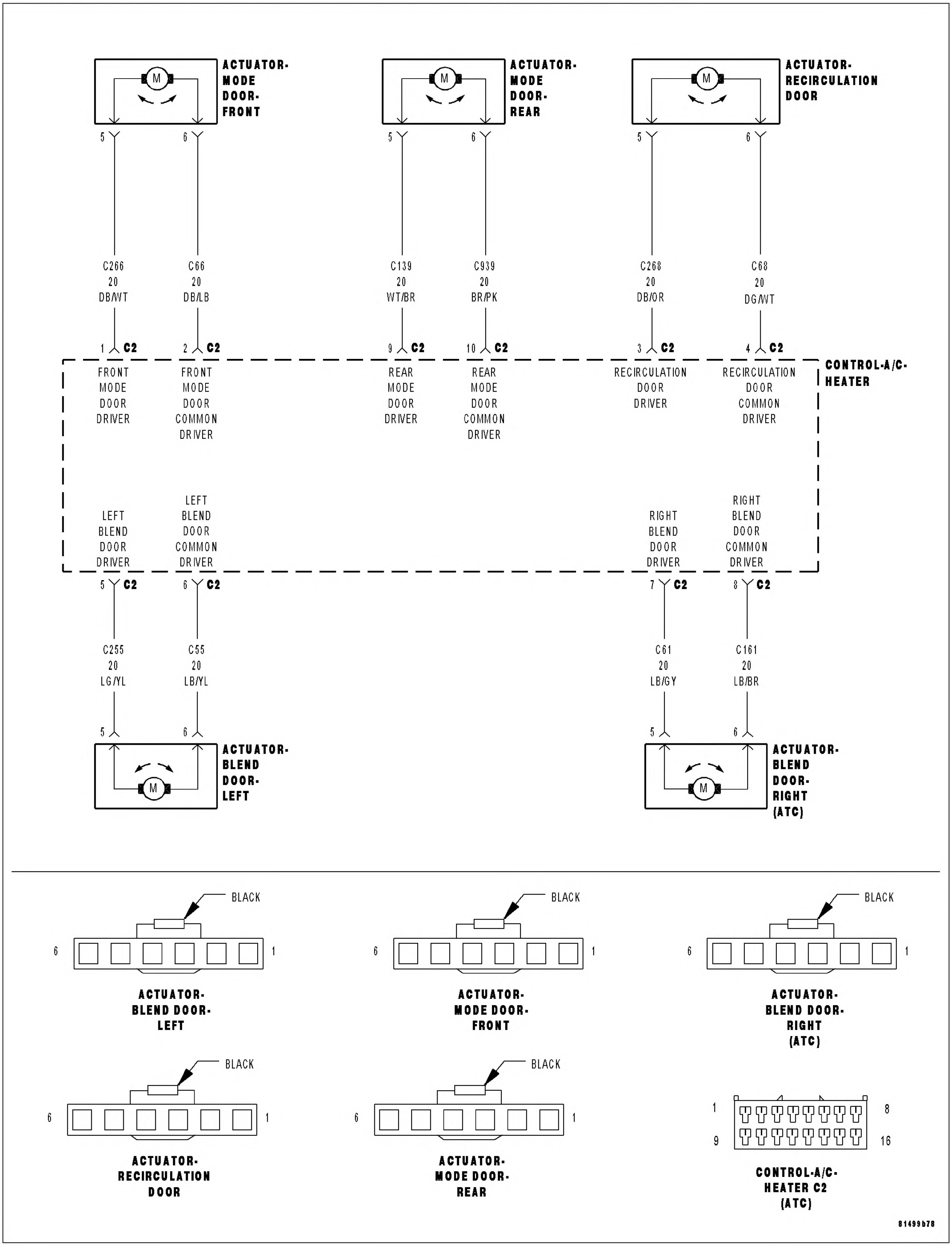
Yes >> Replace the A/C Heater Control in accordance with the Service Information. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C41) Blower Switch Position Signal circuit for an open. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AA–RIGHT BLEND DOOR CONTROL CIRCUIT LOW (ATC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
9 C2
10 C2
3 C2
4 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
RIGHT BLEND DOOR DRIVER
RIGHT BLEND DOOR COMMON DRIVER
5 C2
6 C2
7 C2
8 C2
C255 20 LG/YL
C55 20 LB/YL
C61 20 LB/GY
C161 20 LB/BR
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
BLACK
6
1
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-REAR
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
81499b78

B10AA–RIGHT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C61) Right Blend Door Driver circuit or the (C161) Right Blend Door Common Driver circuit is shorted to ground.

Possible Causes
(C61) RIGHT BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(C61) RIGHT BLEND DOOR DRIVER CIRCUIT SHORTED TO (C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT
(C61) RIGHT BLEND DOOR DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
(C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
RIGHT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

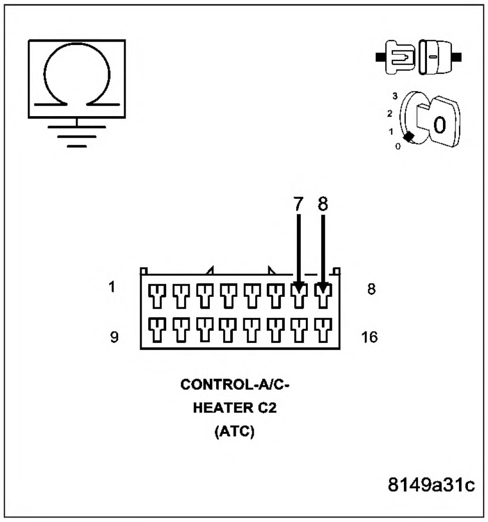
1. CHECK THE (C61) RIGHT BLEND DOOR DRIVER CIRCUIT & THE (C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C61) Right Blend Door Driver circuit between ground and the A/C Heater Control C2 harness connector.

Measure the resistance of the (C161) Right Blend Door Common Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on either circuit?

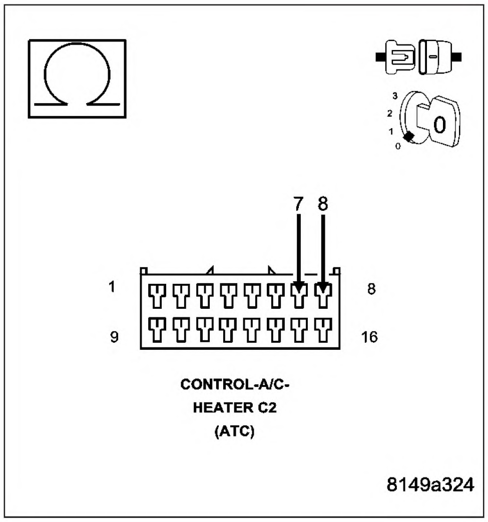
Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B10AA–RIGHT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK THE RIGHT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C61) Right Blend Door Driver circuit and the (C161) Right Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

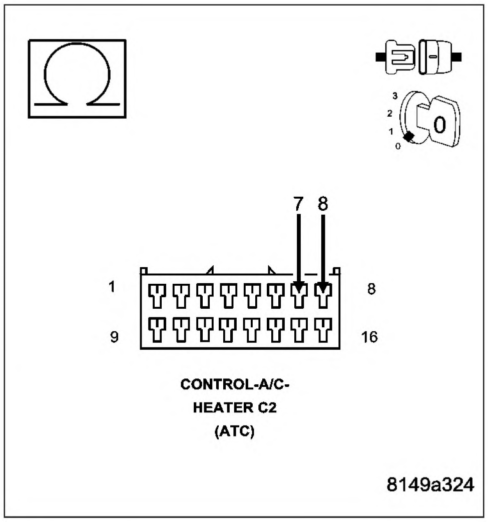
No >> Go To 4

---

3. CHECK THE (C61) RIGHT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT

Disconnect the Right Blend Door Actuator harness connector.

Measure the resistance between the (C61) Right Blend Door Driver circuit and the (C161) Right Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C61) Right Blend Door Driver circuit for a short to the (C161) Right Blend Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

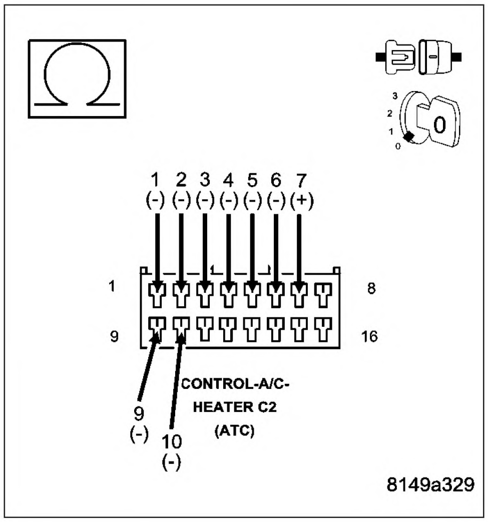
No >> Replace the Right Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AA–RIGHT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

4. CHECK THE (C61) RIGHT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS

Measure the resistance between the (C61) Right Blend Door Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms between the (C61) Right Blend Door Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C61) Right Blend Door Driver circuit.

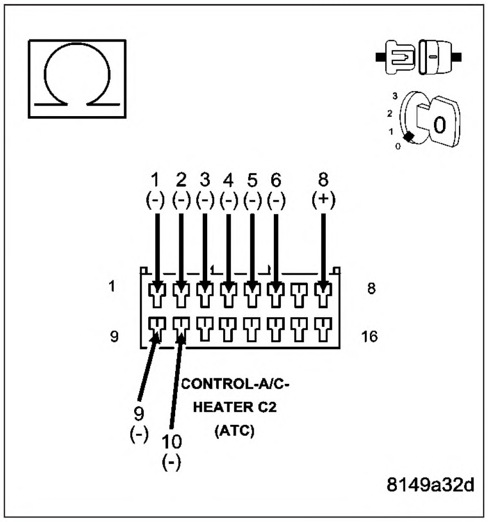
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

---

5. CHECK THE (C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS

Measure the resistance between the (C161) Right Blend Door Common Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms between the (C161) Right Blend Door Common Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C161) Right Blend Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B10AA–RIGHT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

6. RUN THE ACTUATOR DTC DETECTION TEST

Reconnect the A/C Heater Control C2 harness connector.

Reconnect the Right Blend Door Actuator harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B10AA–RIGHT BLEND DOOR CONTROL CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

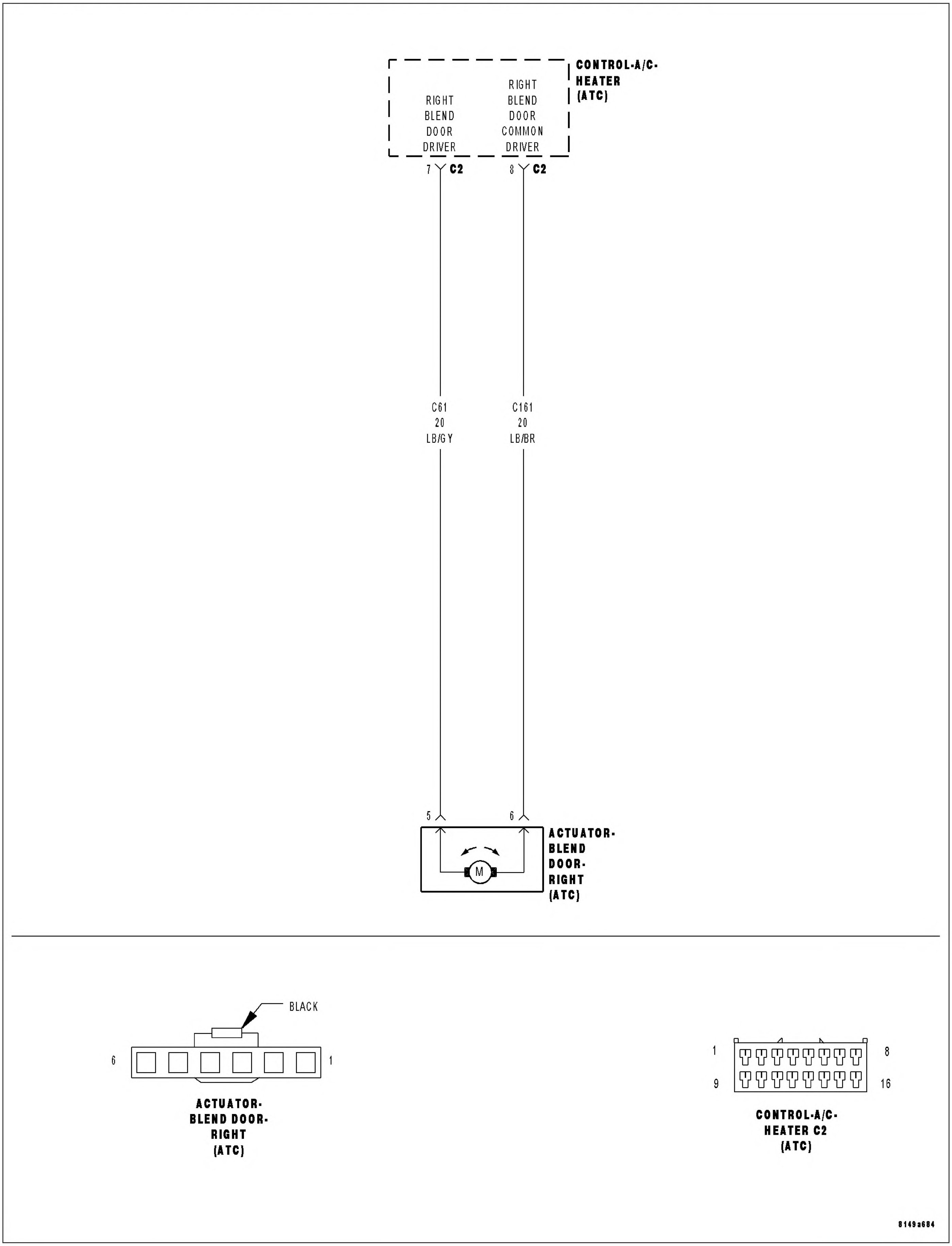
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AB–RIGHT BLEND DOOR CONTROL CIRCUIT HIGH (ATC)


CONTROL-A/C-
HEATER
(ATC)
RIGHT
BLEND
DOOR
DRIVER
RIGHT
BLEND
DOOR
COMMON
DRIVER
7 C2
8 C2
C61
20
LB/GY
C161
20
LB/BR
5
6
M
ACTUATOR-
BLEND
DOOR-
RIGHT
(ATC)
BLACK
6
1
ACTUATOR-
BLEND DOOR-
RIGHT
(ATC)
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a684

B10AB–RIGHT BLEND DOOR CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C61) Right Blend Door Driver circuit or the (C161) Right Blend Door Common Driver circuit is shorted to voltage.

Possible Causes
(C61) RIGHT BLEND DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
(C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C61) RIGHT BLEND DOOR DRIVER CIRCUIT & THE (C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

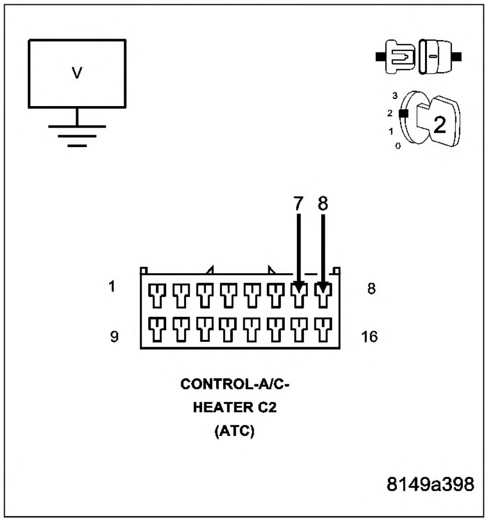
Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C61) Right Blend Door Driver circuit.

Measure the voltage of the (C161) Right Blend Door Common Driver circuit.



Is the voltage above 0.2 volts on either circuit?

Yes >> Repair the circuit(s) with voltage above 0.2 volts a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B10AB–RIGHT BLEND DOOR CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

2. RUN THE ACTUATOR DTC DETECTION TEST

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B10AB–RIGHT BLEND DOOR CONTROL CIRCUIT HIGH?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

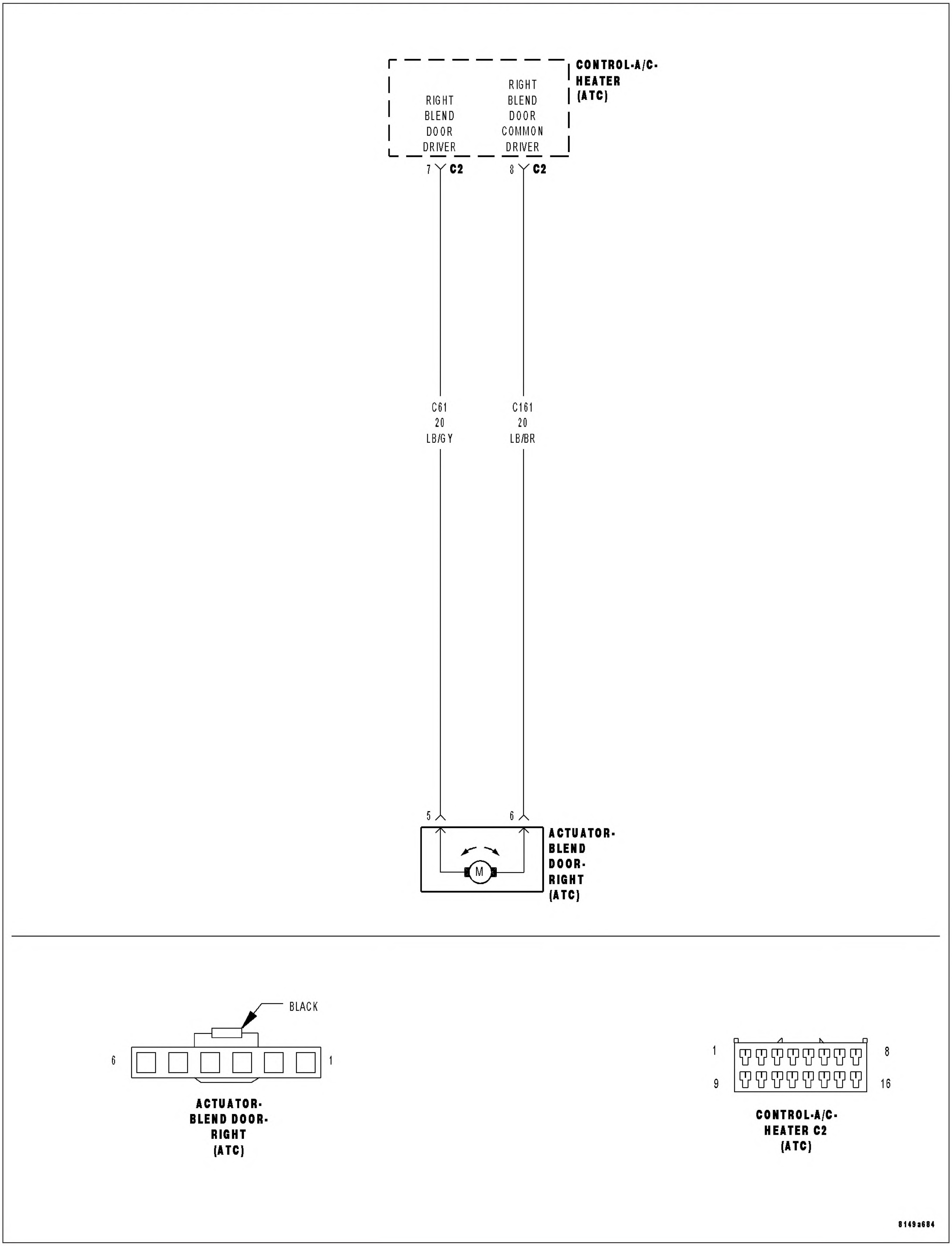
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AC–RIGHT BLEND DOOR CONTROL CIRCUIT OPEN (ATC)


CONTROL-A/C-
HEATER
(ATC)
RIGHT
BLEND
DOOR
DRIVER
RIGHT
BLEND
DOOR
COMMON
DRIVER
7 C2
8 C2
C61
20
LB/GY
C161
20
LB/BR
5
6
M
ACTUATOR-
BLEND
DOOR-
RIGHT
(ATC)
BLACK
6
1
ACTUATOR-
BLEND DOOR-
RIGHT
(ATC)
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a684

B10AC–RIGHT BLEND DOOR CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the (C61) Right Blend Door Driver circuit or the (C161) Right Blend Door Common Driver circuit is open.

Possible Causes
(C61) RIGHT BLEND DOOR DRIVER CIRCUIT OPEN
(C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT OPEN
RIGHT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

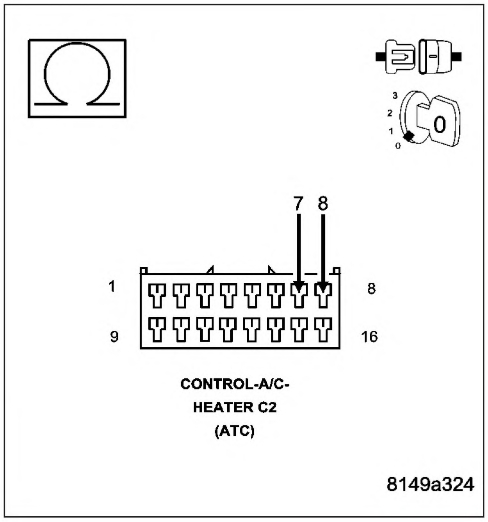
---

2. CHECK THE RIGHT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C61) Right Blend Door Driver circuit and the (C161) Right Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance above 70.0 ohms?

Yes >> Go To 3

No >> Replace the A/C Heater Control in accordance with the Service Information.

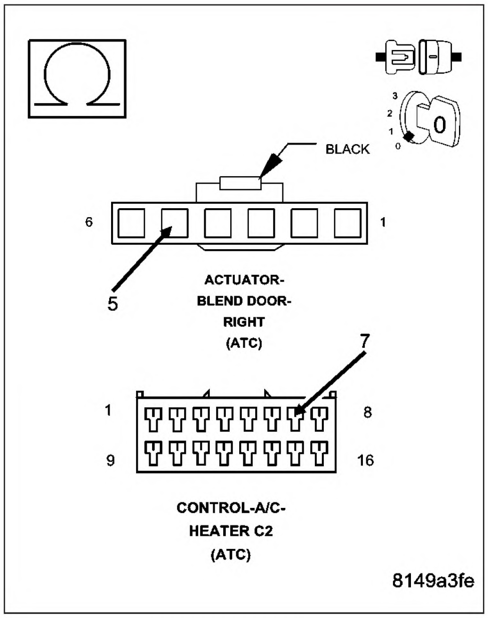
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AC–RIGHT BLEND DOOR CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

3. CHECK THE (C61) RIGHT BLEND DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Right Blend Door Actuator harness connector.

Measure the resistance of the (C61) Right Blend Door Driver circuit between the Right Blend Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
6
1
5
ACTUATOR-
BLEND DOOR-
RIGHT
(ATC)
7
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a3fe

Is the resistance below 5.0 ohms?

Yes >> Go To 4

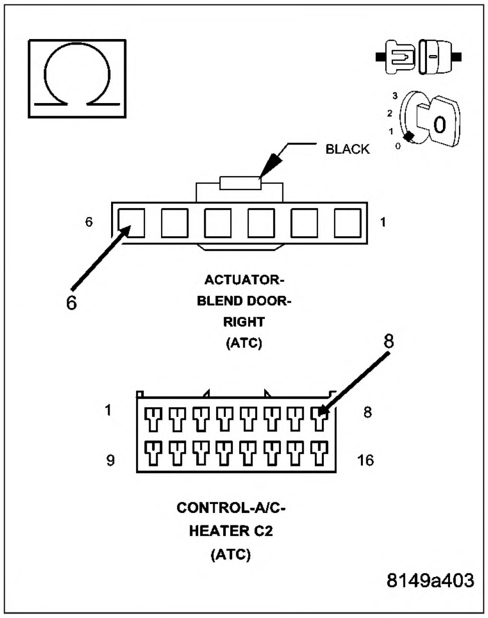
No >> Repair the (C61) Right Blend Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C161) RIGHT BLEND DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C161) Right Blend Door Common Driver circuit between the Right Blend Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
6
1
6
ACTUATOR-
BLEND DOOR-
RIGHT
(ATC)
8
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a403

Is the resistance below 5.0 ohms?

No >> Replace the Right Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes >> Repair the (C161) Right Blend Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AD–RIGHT BLEND DOOR TRAVEL RANGE TOO SMALL (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value is less than the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Right Blend Door is less than the low range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
RIGHT BLEND DOOR SEIZED, BINDING, OBSTRUCTED
RIGHT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10AD–RIGHT BLEND DOOR TRAVEL RANGE TOO SMALL (ATC) (CONTINUED)

3. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE RIGHT BLEND DOOR TO SEIZE OR BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the right blend door to seize or bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK RIGHT BLEND DOOR TRAVEL

Remove the Right Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 90 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Right Blend Door Actuator in accordance with the Service Information. Then, Go To 5.

No >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

5. RUN THE ACTUATOR CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B10AD–RIGHT BLEND DOOR TRAVEL RANGE TOO SMALL?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AE–RIGHT BLEND DOOR TRAVEL RANGE TOO LARGE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value exceeds the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Right Blend Door exceeds the high range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
RIGHT BLEND DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, MISSING, BROKEN
RIGHT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10AE–RIGHT BLEND DOOR TRAVEL RANGE TOO LARGE (ATC) (CONTINUED)

3. CHECK FOR A BROKEN RIGHT BLEND DOOR ACTUATOR

Turn the ignition off.

Remove the Right Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Right Blend Door Actuator in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK THE RIGHT BLEND DOOR & A/C HEATER HOUSING FOR WARPED, WORN, DAMAGED, MISSING, & BROKEN COMPONENTS

Inspect for excessively worn, disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 90 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Right Blend Door Actuator in accordance with the Service Information. Then, Go To 5.

---

5. RUN THE ACTUATOR THE CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B10AE–RIGHT BLEND DOOR TRAVEL RANGE TOO LARGE?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10AF–RIGHT BLEND DOOR ACTUATOR PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for conditions that prevent proper door operation. If a pulse count error is detected the A/C Heater Control reports the fault as a Actuator Performance DTC. It is important to note that this DTC only indicates that a fault occurred while driving a door actuator and that additional testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  When actuator movement is requested.
- **Set Condition:**
  If the A/C Heater Control detects a pulse count error while attempting to drive this door actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED HIGH, SHORTED LOW, SHORTED TOGETHER, OPEN
DOOR ACTUATOR(S) BINDING, BROKEN
DOOR ACTUATOR(S) LINKAGE BINDING, DISCONNECTED, MISSING, BROKEN
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs and then all short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10AF–RIGHT BLEND DOOR ACTUATOR PERFORMANCE (ATC) (CONTINUED)

3. RUN ACTUATOR CALIBRATION TEST

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 4

---

4. CHECK MODE, BLEND & RECIRCULATION DOOR OPERATION

Start the engine.

Set the blower to high speed.

Operate each door in all positions in one direction and then in the opposite direction while monitoring the following:

- For the Mode Doors, verify that air flows from each vent accordingly for the position selected on the A/C Heater Control.
- For the Blend Door, verify that the airflow air temperature changes accordingly for the temperature range selected on the A/C Heater Control.
- For the Recirculation Door, verify that the sound of the air flow get louder as the recirculation door opens to bring in recirculated air or gets softer as the recirculation door closes to bring in fresh air.

Does each door operate properly?

Yes >> The condition causing the fault has cleared at this time.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Remove the door actuator of the affected door from the A/C Heater Housing Assembly. By hand, attempt to rotate the actuator in both directions. Inspect the A/C Heater Housing for damage, for disconnected, missing, or broken linkage, and for broken or binding doors. Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A0–PANEL MODE DOOR 2 TRAVEL RANGE TOO LARGE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value exceeds the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Rear Mode Door exceeds the high range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
REAR MODE DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, MISSING, BROKEN
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10A0–PANEL MODE DOOR 2 TRAVEL RANGE TOO LARGE (ATC) (CONTINUED)

3. CHECK FOR A BROKEN REAR MODE DOOR ACTUATOR

Turn the ignition off.

Remove the Rear Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Rear Mode Door Actuator in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK THE REAR MODE DOOR & A/C HEATER HOUSING FOR WARPED, WORN, DAMAGED, MISSING, & BROKEN COMPONENTS

Inspect for excessively worn, disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 155 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Rear Mode Door Actuator in accordance with the Service Information. Then, Go To 5.

---

5. RUN THE ACTUATOR THE CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B10A0–PANEL MODE DOOR 2 TRAVEL RANGE TOO LARGE?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A1–PANEL MODE DOOR 2 ACTUATOR PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for conditions that prevent proper door operation. If a pulse count error is detected the A/C Heater Control reports the fault as a Actuator Performance DTC. It is important to note that this DTC only indicates that a fault occurred while driving a door actuator and that additional testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  When actuator movement is requested.
- **Set Condition:**
  If the A/C Heater Control detects a pulse count error while attempting to drive this door actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED HIGH, SHORTED LOW, SHORTED TOGETHER, OPEN
DOOR ACTUATOR(S) BINDING, BROKEN
DOOR ACTUATOR(S) LINKAGE BINDING, DISCONNECTED, MISSING, BROKEN
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs and then all short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10A1–PANEL MODE DOOR 2 ACTUATOR PERFORMANCE (ATC) (CONTINUED)

3. RUN ACTUATOR CALIBRATION TEST

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 4

---

4. CHECK MODE, BLEND & RECIRCULATION DOOR OPERATION

Start the engine.

Set the blower to high speed.

Operate each door in all positions in one direction and then in the opposite direction while monitoring the following:

- For the Mode Doors, verify that air flows from each vent accordingly for the position selected on the A/C Heater Control.
- For the Blend Door, verify that the airflow air temperature changes accordingly for the temperature range selected on the A/C Heater Control.
- For the Recirculation Door, verify that the sound of the air flow get louder as the recirculation door opens to bring in recirculated air or gets softer as the recirculation door closes to bring in fresh air.

Does each door operate properly?

Yes >> The condition causing the fault has cleared at this time.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Remove the door actuator of the affected door from the A/C Heater Housing Assembly. By hand, attempt to rotate the actuator in both directions. Inspect the A/C Heater Housing for damage, for disconnected, missing, or broken linkage, and for broken or binding doors. Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A2–LEFT BLEND DOOR CONTROL CIRCUIT/PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for shorts to ground, shorts to battery, and shorts to other door driver circuits. If detected, the A/C Heater Control reports these types of faults as Control Circuit/Performance DTCs. It is important to note that Control Circuit/Performance DTCs do not indicate where or what type of short is present and that additional system testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, or the (C939) Rear Mode Door Common Driver circuit while attempting to drive the Left Blend Door Actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

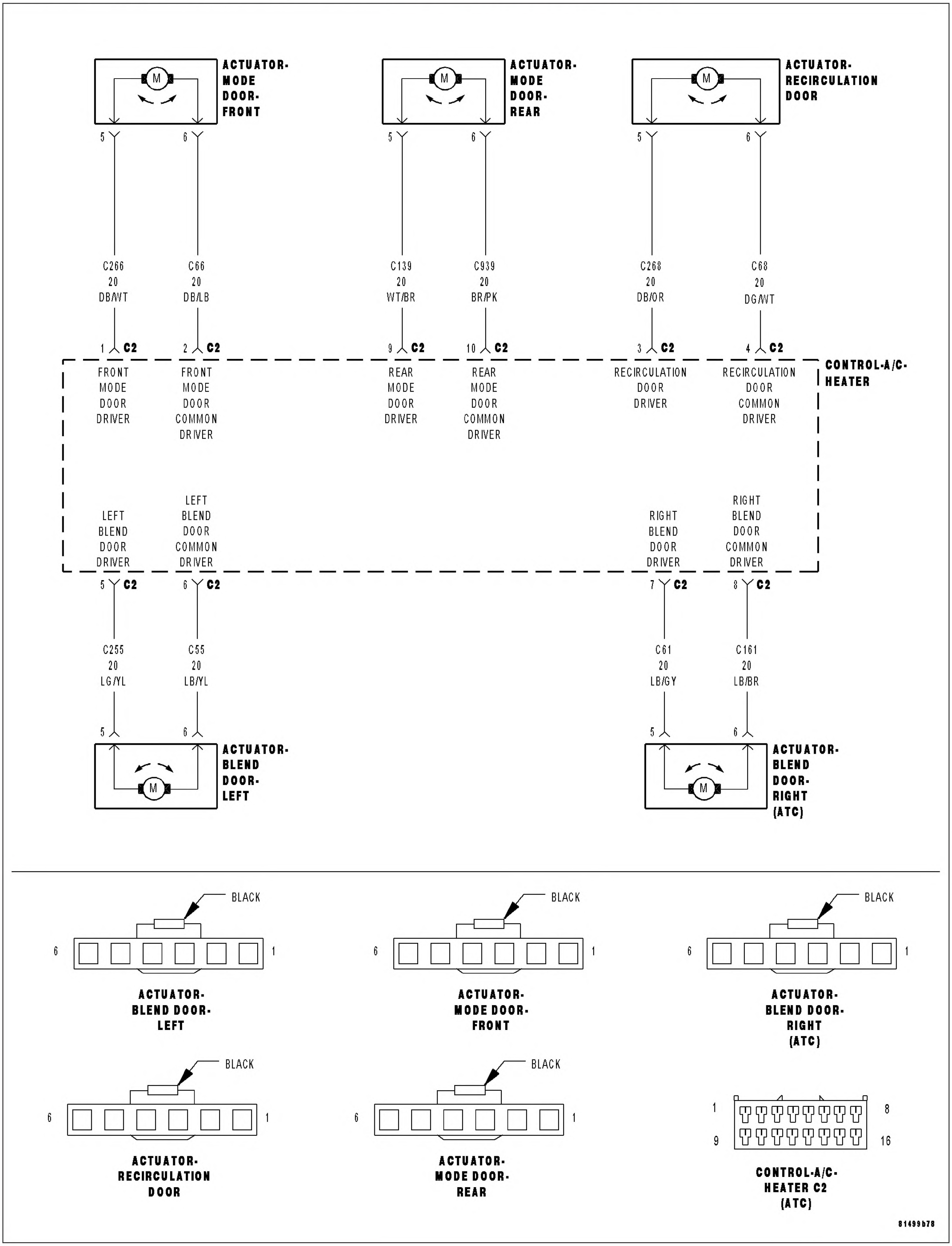
Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Repair

Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

B10A3–LEFT BLEND DOOR CONTROL CIRCUIT LOW (ATC)


ACTUATOR-MODE DOOR-FRONT
M
5
6
C266 20 DB/WT
C66 20 DB/LB
ACTUATOR-MODE DOOR-REAR
5
6
C139 20 WT/BR
C939 20 BR/PK
ACTUATOR-RECIRCULATION DOOR
5
6
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
9 C2
10 C2
3 C2
4 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
RIGHT BLEND DOOR DRIVER
RIGHT BLEND DOOR COMMON DRIVER
5 C2
6 C2
7 C2
8 C2
C255 20 LG/YL
C55 20 LB/YL
C61 20 LB/GY
C161 20 LB/BR
5
6
ACTUATOR-BLEND DOOR-LEFT
5
6
ACTUATOR-BLEND DOOR-RIGHT (ATC)
BLACK
6
1
ACTUATOR-BLEND DOOR-LEFT
BLACK
6
1
ACTUATOR-MODE DOOR-FRONT
BLACK
6
1
ACTUATOR-BLEND DOOR-RIGHT (ATC)
BLACK
6
1
ACTUATOR-RECIRCULATION DOOR
BLACK
6
1
ACTUATOR-MODE DOOR-REAR
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
81499b78

B10A3–LEFT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C255) Left Blend Door Driver circuit or the (C55) Left Blend Door Common Driver circuit is shorted to ground.

Possible Causes
(C255) LEFT BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(C255) LEFT BLEND DOOR DRIVER CIRCUIT SHORTED TO (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT
(C255) LEFT BLEND DOOR DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
(C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

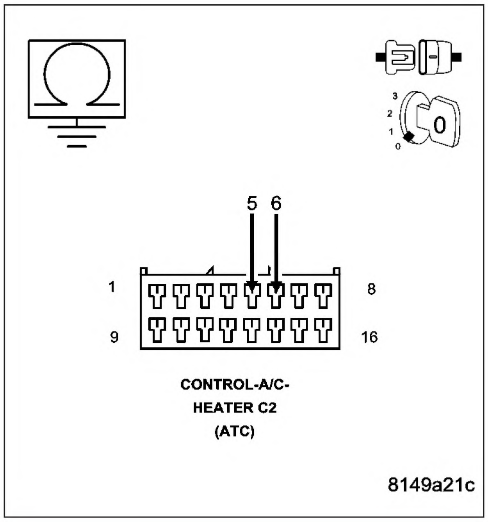
1. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT & THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C255) Left Blend Door Driver circuit between ground and the A/C Heater Control C2 harness connector.

Measure the resistance of the (C55) Left Blend Door Common Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on either circuit?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to ground.

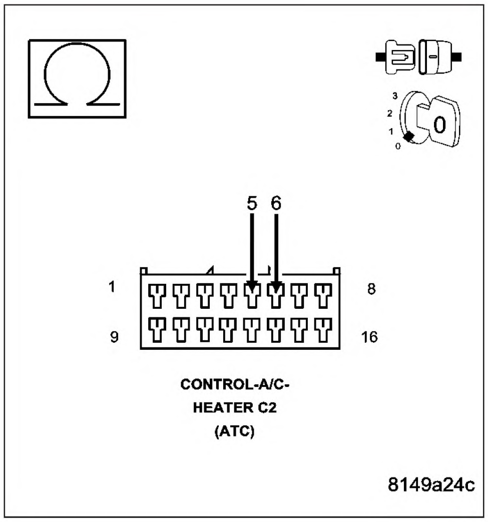
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B10A3–LEFT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C55) Left Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

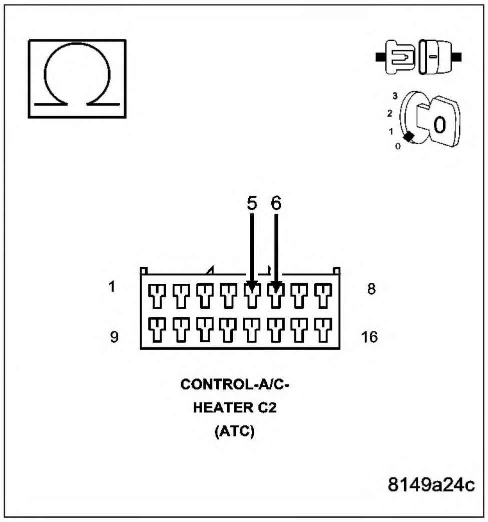
No >> Go To 4

---

3. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C55) Left Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C255) Left Blend Door Driver circuit for a short to the (C55) Left Blend Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

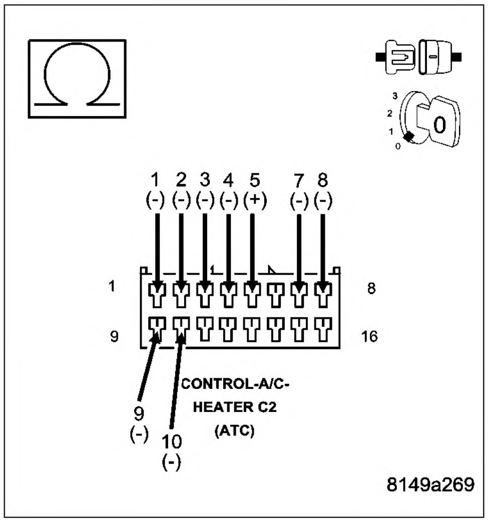
No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A3–LEFT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

4. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms between the (C255) Left Blend Door Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C255) Left Blend Door Driver circuit.

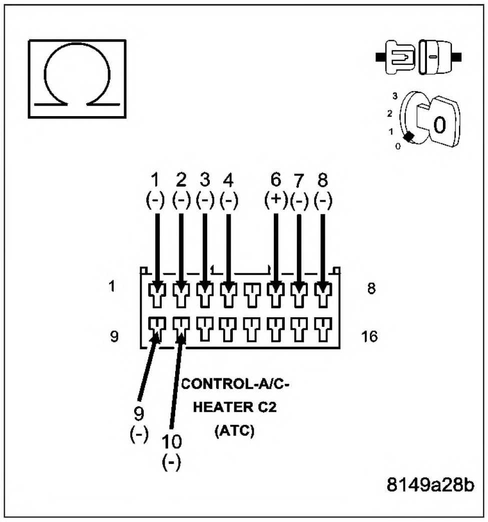
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

---

5. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS

Measure the resistance between the (C55) Left Blend Door Common Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms between the (C55) Left Blend Door Common Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C55) Left Blend Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B10A3–LEFT BLEND DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

6. RUN THE ACTUATOR DTC DETECTION TEST

Reconnect the A/C Heater Control C2 harness connector.

Reconnect the Left Blend Door Actuator harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B10A3–LEFT BLEND DOOR CONTROL CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

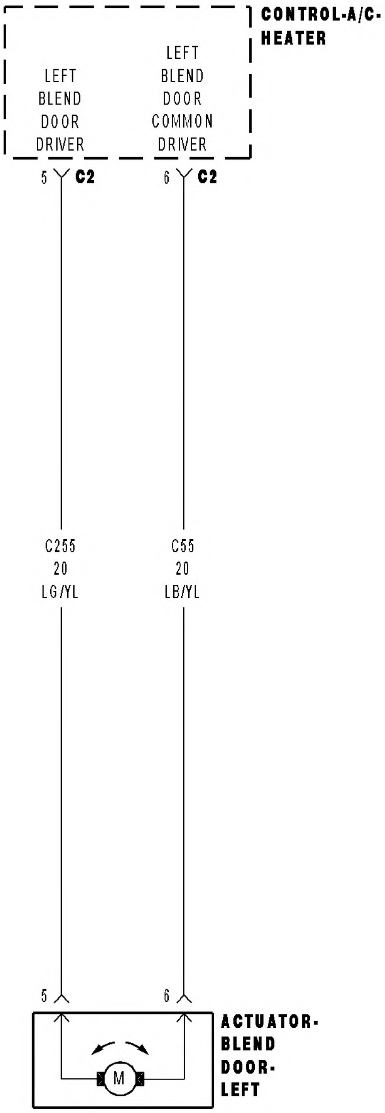
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

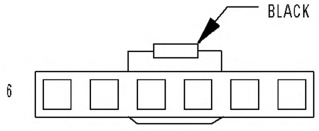
No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

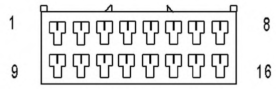
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A4–LEFT BLEND DOOR CONTROL CIRCUIT HIGH (ATC)


CONTROL-A/C-
HEATER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
5 C2
6 C2
C255
20
LG/YL
C55
20
LB/YL
5
6
M
ACTUATOR-
BLEND
DOOR-
LEFT



**ACTUATOR-
BLEND DOOR-
LEFT**


1
8
9
16

**CONTROL-A/C-
HEATER C2
(ATC)**

8149a5bd

B10A4–LEFT BLEND DOOR CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C255) Left Blend Door Driver circuit or the (C55) Left Blend Door Common Driver circuit is shorted to voltage.

Possible Causes
(C255) LEFT BLEND DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
(C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT & THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

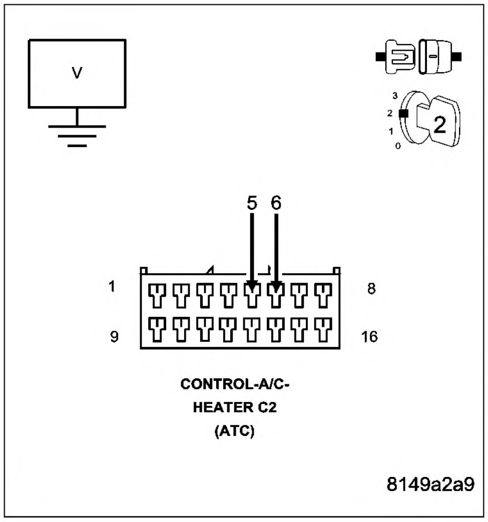
Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C255) Left Blend Door Driver circuit.

Measure the voltage of the (C55) Left Blend Door Common Driver circuit.



Is the voltage above 0.2 volts on either circuit?

Yes >> Repair the circuit(s) with voltage above 0.2 volts a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B10A4–LEFT BLEND DOOR CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

2. RUN THE ACTUATOR DTC DETECTION TEST

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B10A4–LEFT BLEND DOOR CONTROL CIRCUIT HIGH (ATC)?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

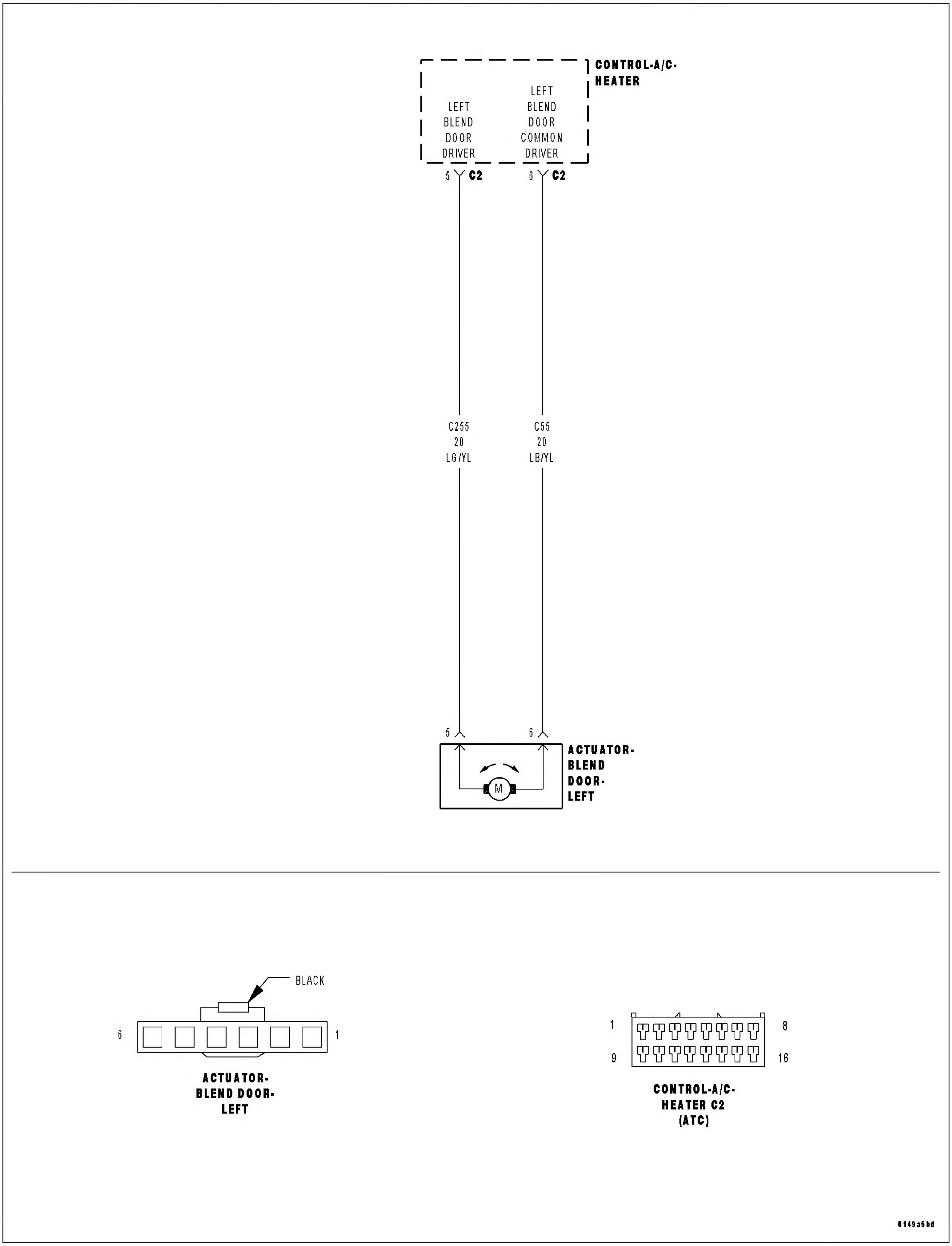
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A5–LEFT BLEND DOOR CONTROL CIRCUIT OPEN (ATC)


CONTROL-A/C-
HEATER
LEFT
BLEND
DOOR
DRIVER
LEFT
BLEND
DOOR
COMMON
DRIVER
5 C2
6 C2
C255
20
LG/YL
C55
20
LB/YL
5
6
M
ACTUATOR-
BLEND
DOOR-
LEFT
BLACK
6
1
ACTUATOR-
BLEND DOOR-
LEFT
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a5bd

B10A5–LEFT BLEND DOOR CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the (C255) Left Blend Door Driver circuit or the (C55) Left Blend Door Common Driver circuit is open.

Possible Causes
(C255) LEFT BLEND DOOR DRIVER CIRCUIT OPEN
(C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT OPEN
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

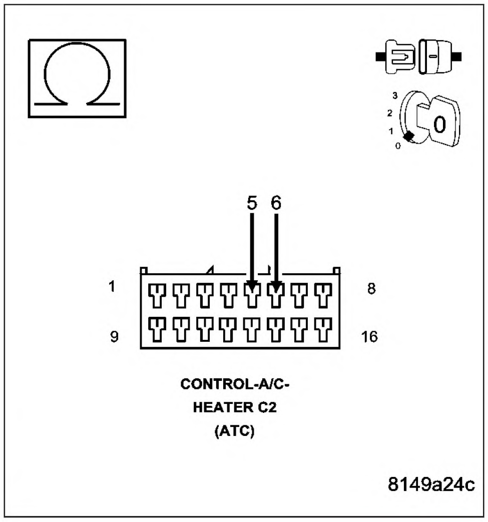
---

2. CHECK THE LEFT BLEND DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C255) Left Blend Door Driver circuit and the (C55) Left Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance above 70.0 ohms?

Yes >> Go To 3

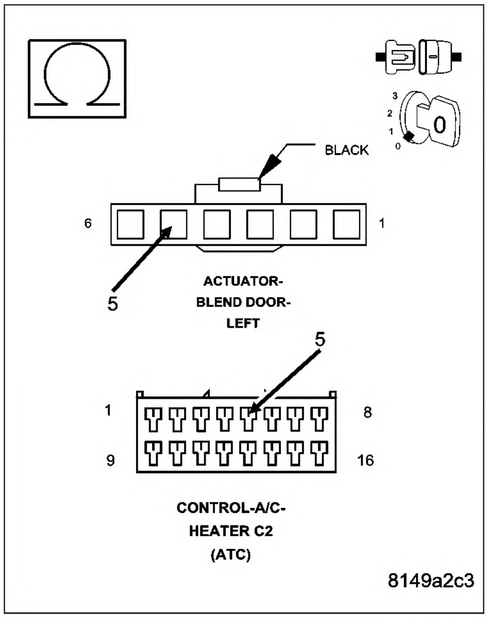
No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A5–LEFT BLEND DOOR CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

3. CHECK THE (C255) LEFT BLEND DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Left Blend Door Actuator harness connector.

Measure the resistance of the (C255) Left Blend Door Driver circuit between the Left Blend Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
6
1
5
ACTUATOR-
BLEND DOOR-
LEFT
5
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
3
2
1
0
0
8149a2c3

Is the resistance below 5.0 ohms?

Yes >> Go To 4

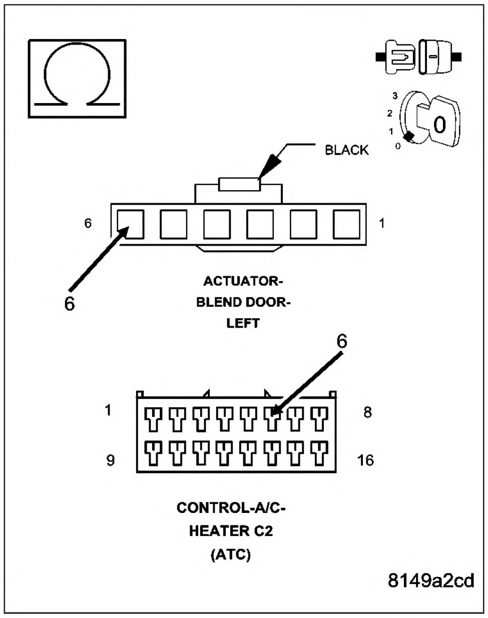
No >> Repair the (C255) Left Blend Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C55) LEFT BLEND DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C55) Left Blend Door Common Driver circuit between the Left Blend Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
6
1
6
ACTUATOR-
BLEND DOOR-
LEFT
6
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
3
2
1
0
0
8149a2cd

Is the resistance below 5.0 ohms?

No >> Replace the Left Blend Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes >> Repair the (C55) Left Blend Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A6–LEFT BLEND DOOR TRAVEL RANGE TOO SMALL (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value is less than the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Left Blend Door is less than the low range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
LEFT BLEND DOOR SEIZED, BINDING, OBSTRUCTED
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10A6–LEFT BLEND DOOR TRAVEL RANGE TOO SMALL (ATC) (CONTINUED)

3. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE LEFT BLEND DOOR TO SEIZE OR BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the left blend door to seize or bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK LEFT BLEND DOOR TRAVEL

Remove the Left Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 90 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Left Blend Door Actuator in accordance with the Service Information. Then, Go To 5.

No >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

5. RUN THE ACTUATOR CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B10A6–LEFT BLEND DOOR TRAVEL RANGE TOO SMALL?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A7–LEFT BLEND DOOR TRAVEL RANGE TOO LARGE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value exceeds the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Left Blend Door exceeds the high range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
LEFT BLEND DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, MISSING, BROKEN
LEFT BLEND DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10A7–LEFT BLEND DOOR TRAVEL RANGE TOO LARGE (ATC) (CONTINUED)

3. CHECK FOR A BROKEN LEFT BLEND DOOR ACTUATOR

Turn the ignition off.

Remove the Left Blend Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Left Blend Door Actuator in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK THE LEFT BLEND DOOR & A/C HEATER HOUSING FOR WARPED, WORN, DAMAGED, MISSING, & BROKEN COMPONENTS

Inspect for excessively worn, disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 90 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Left Blend Door Actuator in accordance with the Service Information. Then, Go To 5.

---

5. RUN THE ACTUATOR THE CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B10A7–LEFT BLEND DOOR TRAVEL RANGE TOO LARGE?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A8–LEFT BLEND DOOR ACTUATOR PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for conditions that prevent proper door operation. If a pulse count error is detected the A/C Heater Control reports the fault as a Actuator Performance DTC. It is important to note that this DTC only indicates that a fault occurred while driving a door actuator and that additional testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  When actuator movement is requested.
- **Set Condition:**
  If the A/C Heater Control detects a pulse count error while attempting to drive this door actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED HIGH, SHORTED LOW, SHORTED TOGETHER, OPEN
DOOR ACTUATOR(S) BINDING, BROKEN
DOOR ACTUATOR(S) LINKAGE BINDING, DISCONNECTED, MISSING, BROKEN
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs and then all short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B10A8–LEFT BLEND DOOR ACTUATOR PERFORMANCE (ATC) (CONTINUED)

3. RUN ACTUATOR CALIBRATION TEST

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 4

4. CHECK MODE, BLEND & RECIRCULATION DOOR OPERATION

Start the engine.

Set the blower to high speed.

Operate each door in all positions in one direction and then in the opposite direction while monitoring the following:

- For the Mode Doors, verify that air flows from each vent accordingly for the position selected on the A/C Heater Control.
- For the Blend Door, verify that the airflow air temperature changes accordingly for the temperature range selected on the A/C Heater Control.
- For the Recirculation Door, verify that the sound of the air flow get louder as the recirculation door opens to bring in recirculated air or gets softer as the recirculation door closes to bring in fresh air.

Does each door operate properly?

Yes >> The condition causing the fault has cleared at this time.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Remove the door actuator of the affected door from the A/C Heater Housing Assembly. By hand, attempt to rotate the actuator in both directions. Inspect the A/C Heater Housing for damage, for disconnected, missing, or broken linkage, and for broken or binding doors. Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10A9–RIGHT BLEND DOOR CONTROL CIRCUIT/PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for shorts to ground, shorts to battery, and shorts to other door driver circuits. If detected, the A/C Heater Control reports these types of faults as Control Circuit/Performance DTCs. It is important to note that Control Circuit/Performance DTCs do not indicate where or what type of short is present and that additional system testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, or the (C939) Rear Mode Door Common Driver circuit while attempting to drive the Right Blend Door Actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Repair

Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

B10B0–INFRARED SENSOR THERMISTOR CIRCUIT LOW (ATC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the IR Sensor fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. **REPLACE THE A/C HEATER CONTROL**

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10B1–INFRARED SENSOR THERMISTOR CIRCUIT HIGH (ATC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the IR Sensor fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B10B2–A/C COOL DOWN TEST PERFORMANCE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Cooldown Test is executed.
- **Set Condition:**
  If the A/C system is unable to lower the evaporator temperature 11.11°C (20°F) within two minutes.

Possible Causes
PREREQUISITES NOT MET BEFORE RUNNING THE TEST
ANOTHER RELATED SYSTEM NOT FUNCTIONING CORRECTLY
POWERTRAIN SYSTEM FAULTS PRESENT

Diagnostic Test

1. VERIFY THAT ALL OF THE COOLDOWN TEST PREREQUISITES WERE MET

Review the list of Cooldown Test prerequisites.

- **DTCs B1031 and B1032 must not be active.**
- **The refrigerant system must be adequately charged.**
- **The blower motor must operate correctly in all speeds.**
- **The work area ambient temperature must be above 18.3°C (65°F).**
- **The evaporator temperature must be above 18.3°C (65°F).**
- **The A/C compressor must be turned off.**

Were all of the prerequisites met before running the Cooldown Test?

Yes >> Go To 2

No >> Run the Cooldown Test again after all of the prerequisites are met. Then, if DTC B10B2 is still active, Go To 2. Otherwise, Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

2. CHECK FOR DTCs IN THE PCM

With the scan tool, select PCM.

Are any DTCs present in the PCM?

Yes >> Diagnose and repair the DTC(s). (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) for PCM DTCs. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Refer to the Service Information for additional Cooldown Test related diagnostic information and testing procedures. Run the Cooldown Test again after the repair is complete.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B100A–RECIRCULATION SWITCH REQUEST INPUT CIRCUIT LOW (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The switch input changes when the switch is pushed down. A stored DTC B100A indicates that the Recirculation mode switch was stuck in a pushed position for more than 10 minutes, but has since returned to its normal state. An active DTC B100A indicates that the Recirculation mode switch is stuck in a pushed position. An active DTC B100A will prevent proper Recirculation mode switch and status indicator function.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Recirculation mode switch stays in a pushed position for more than 10 minutes.

Possible Causes
A/C HEATER CONTROL DAMAGED
OBJECT HOLDING RECIRCULATION MODE SWITCH IN A PUSHED POSITION
SUBSTANCE CAUSING RECIRCULATION MODE SWITCH TO GET STUCK IN A PUSHED POSITION
A/C HEATER CONTROL

Diagnostic Test

1. INSPECT THE A/C HEATER CONTROL FOR DAMAGE

Inspect the A/C Heater Control for damage.

Is the A/C Heater Control damaged?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

---

2. INSPECT FOR OBJECT OR SUBSTANCE CAUSING THE RECIRCULATION MODE SWITCH TO STAY OR STICK IN A PUSHED POSITION

Inspect the A/C Heater Control for anything that would cause the Recirculation mode switch to stay or stick in a pushed position.

Is anything present that would cause the Recirculation mode switch to stay or stick in a pushed position?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

B100A–RECIRCULATION SWITCH REQUEST INPUT CIRCUIT LOW (ATC) (CONTINUED)

3. CHECK FOR NORMAL RECIRCULATION MODE SWITCH & STATUS INDICATOR FUNCTION

Turn the ignition on.

Press the Recirculation mode switch on and off several times while observing the Recirculation status indicator.

Does the Recirculation status indicator turn on and off?

Yes >> Go To 4

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

4. VERIFY THAT DTC B100A–RECIRCULATION SWITCH REQUEST INPUT CIRCUIT LOW IS STILL ACTIVE

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on. Wait 10 minutes before proceeding.

With the scan tool, read HVAC DTCs.

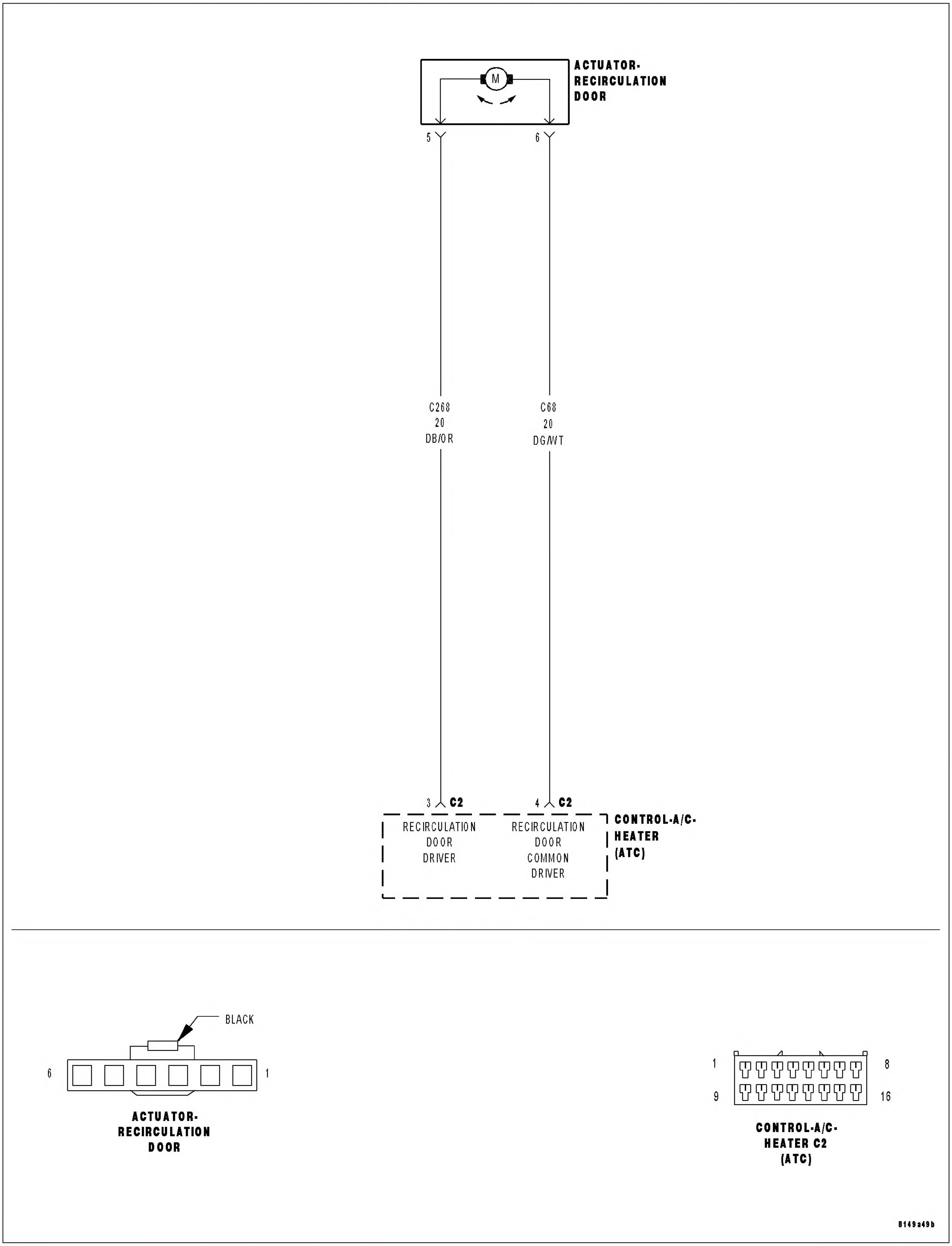
Does the scan tool display active: B100A–RECIRCULATION SWITCH REQUEST INPUT CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B105A–RECIRCULATION DOOR CONTROL CIRCUIT HIGH (ATC)


ACTUATOR-
RECIRCULATION
DOOR
M
5
6
C268
20
DB/OR
C68
20
DG/WT
3 C2
4 C2
RECIRCULATION
DOOR
DRIVER
RECIRCULATION
DOOR
COMMON
DRIVER
CONTROL-A/C-
HEATER
(ATC)
BLACK
6
1
ACTUATOR-
RECIRCULATION
DOOR
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a49b

B105A–RECIRCULATION DOOR CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C268) Recirculation Door Driver circuit or the (C68) Recirculation Door Common Driver circuit is shorted to voltage.

Possible Causes
(C268) RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
(C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

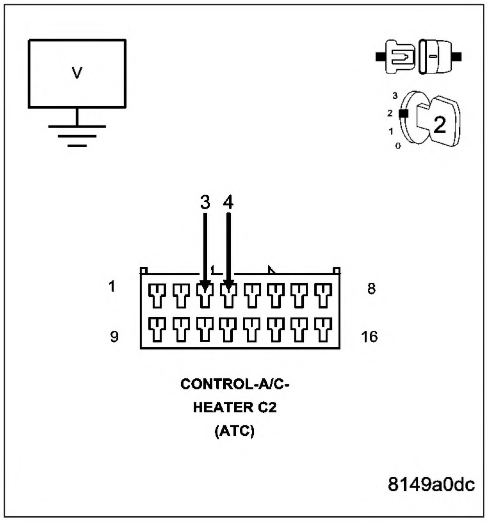
Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C268) Recirculation Door Driver circuit.

Measure the voltage of the (C68) Recirculation Door Common Driver circuit.



Is the voltage above 0.2 volts on either circuit?

Yes >> Repair the circuit(s) with voltage above 0.2 volts a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B105A–RECIRCULATION DOOR CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

2. RUN THE ACTUATOR DTC DETECTION TEST

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B105A–RECIRCULATION DOOR CONTROL CIRCUIT HIGH?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

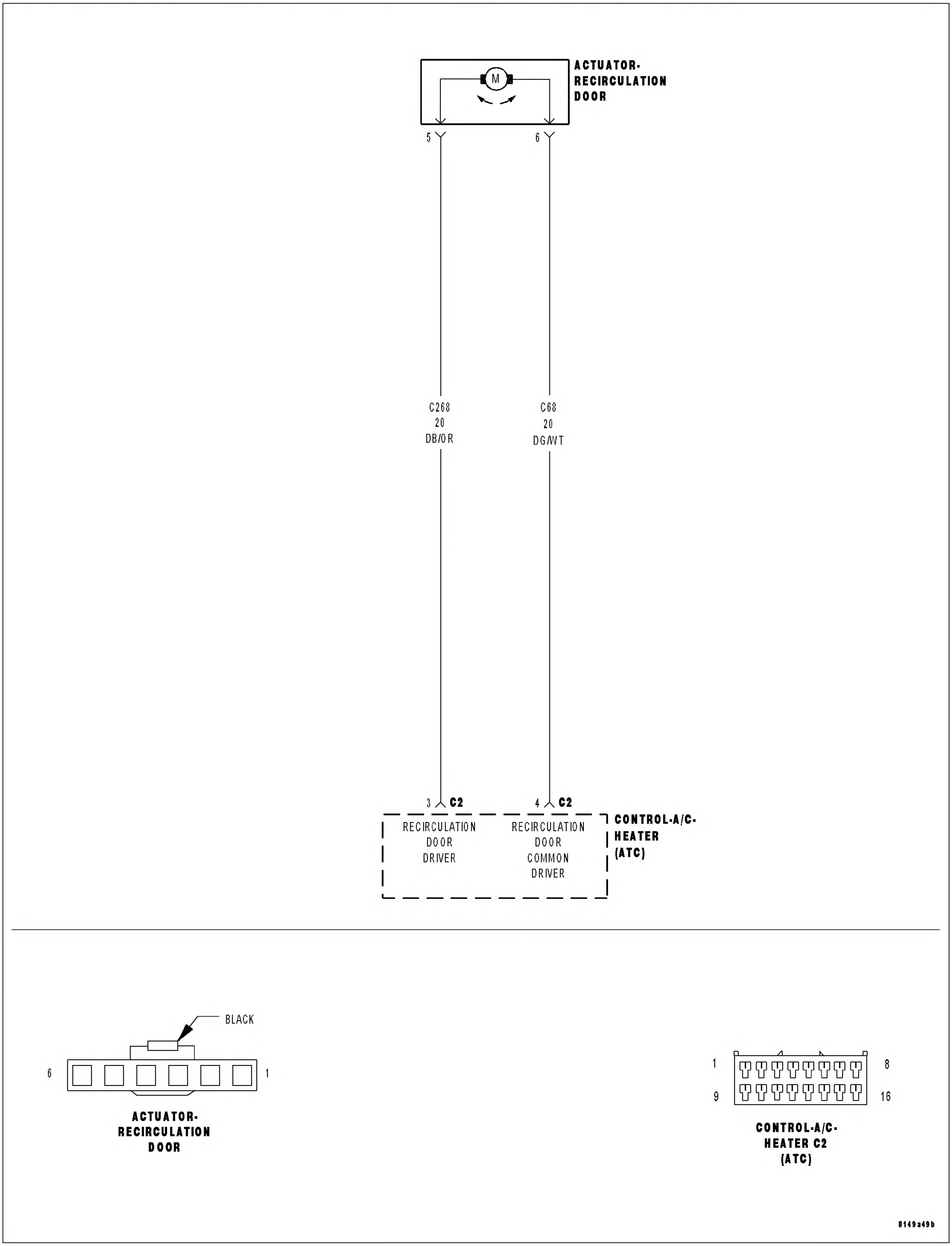
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B105B–RECIRCULATION DOOR CONTROL CIRCUIT OPEN (ATC)


ACTUATOR-
RECIRCULATION
DOOR
M
5
6
C268
20
DB/OR
C68
20
DG/WT
3 C2
4 C2
RECIRCULATION
DOOR
DRIVER
RECIRCULATION
DOOR
COMMON
DRIVER
CONTROL-A/C-
HEATER
(ATC)
BLACK
6
1
ACTUATOR-
RECIRCULATION
DOOR
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a49b

B105B–RECIRCULATION DOOR CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the (C268) Recirculation Door Driver circuit or the (C68) Recirculation Door Common Driver circuit is open.

Possible Causes
(C268) RECIRCULATION DOOR DRIVER CIRCUIT OPEN
(C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT OPEN
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

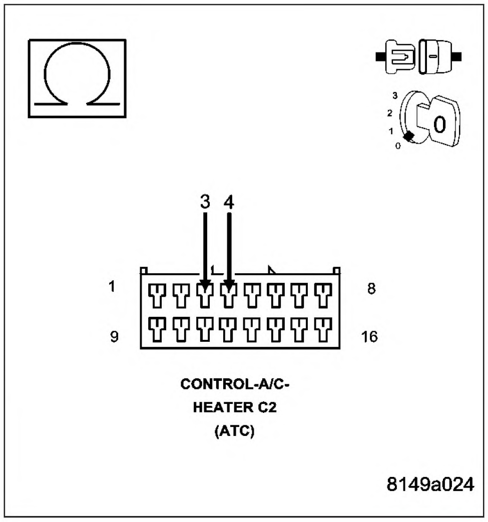
---

2. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance above 70.0 ohms?

Yes >> Go To 3

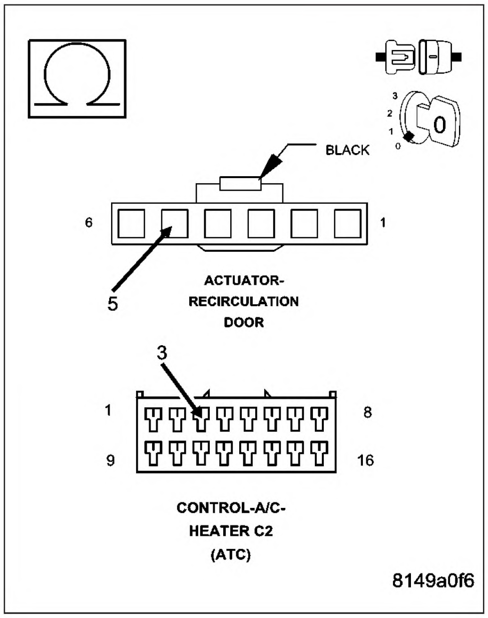
No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B105B–RECIRCULATION DOOR CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

3. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance of the (C268) Recirculation Door Driver circuit between the Recirculation Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
3
2
1
0
0
6
1
5
ACTUATOR-
RECIRCULATION
DOOR
3
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a0f6

Is the resistance below 5.0 ohms?

Yes >> Go To 4

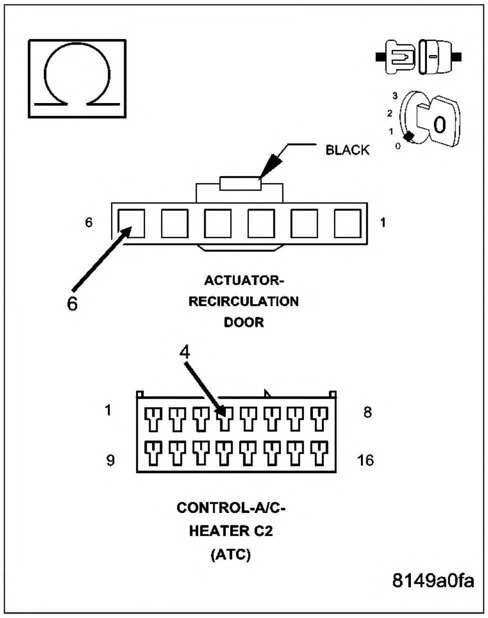
No >> Repair the (C268) Recirculation Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C68) Recirculation Door Common Driver circuit between the Recirculation Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
3
2
1
0
0
6
1
6
ACTUATOR-
RECIRCULATION
DOOR
4
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a0fa

Is the resistance below 5.0 ohms?

No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes >> Repair the (C68) Recirculation Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B105C–RECIRCULATION DOOR TRAVEL RANGE TOO SMALL (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value is less than the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Recirculation Door is less than the low range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
RECIRCULATION DOOR SEIZED, BINDING, OBSTRUCTED
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B105C–RECIRCULATION DOOR TRAVEL RANGE TOO SMALL (ATC) (CONTINUED)

3. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE RECIRCULATION DOOR TO SEIZE OR BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the recirculation door to seize or bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK RECIRCULATION DOOR TRAVEL

Remove the Recirculation Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 85 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Recirculation Door Actuator in accordance with the Service Information. Then, Go To 5.

No >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

5. RUN THE ACTUATOR CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B105C–RECIRCULATION DOOR TRAVEL RANGE TOO SMALL?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B105D–RECIRCULATION DOOR TRAVEL RANGE TOO LARGE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value exceeds the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Recirculation Door exceeds the high range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
RECIRCULATION DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, MISSING, BROKEN
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B105D–RECIRCULATION DOOR TRAVEL RANGE TOO LARGE (ATC) (CONTINUED)

3. CHECK FOR A BROKEN RECIRCULATION DOOR ACTUATOR

Turn the ignition off.

Remove the Recirculation Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Recirculation Door Actuator in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK THE RECIRCULATION DOOR & A/C HEATER HOUSING FOR WARPED, WORN, DAMAGED, MISSING, & BROKEN COMPONENTS

Inspect for excessively worn, disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 85 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Recirculation Door Actuator in accordance with the Service Information. Then, Go To 5.

---

5. RUN THE ACTUATOR CALIBRATION TEST

Turn the ignition on.

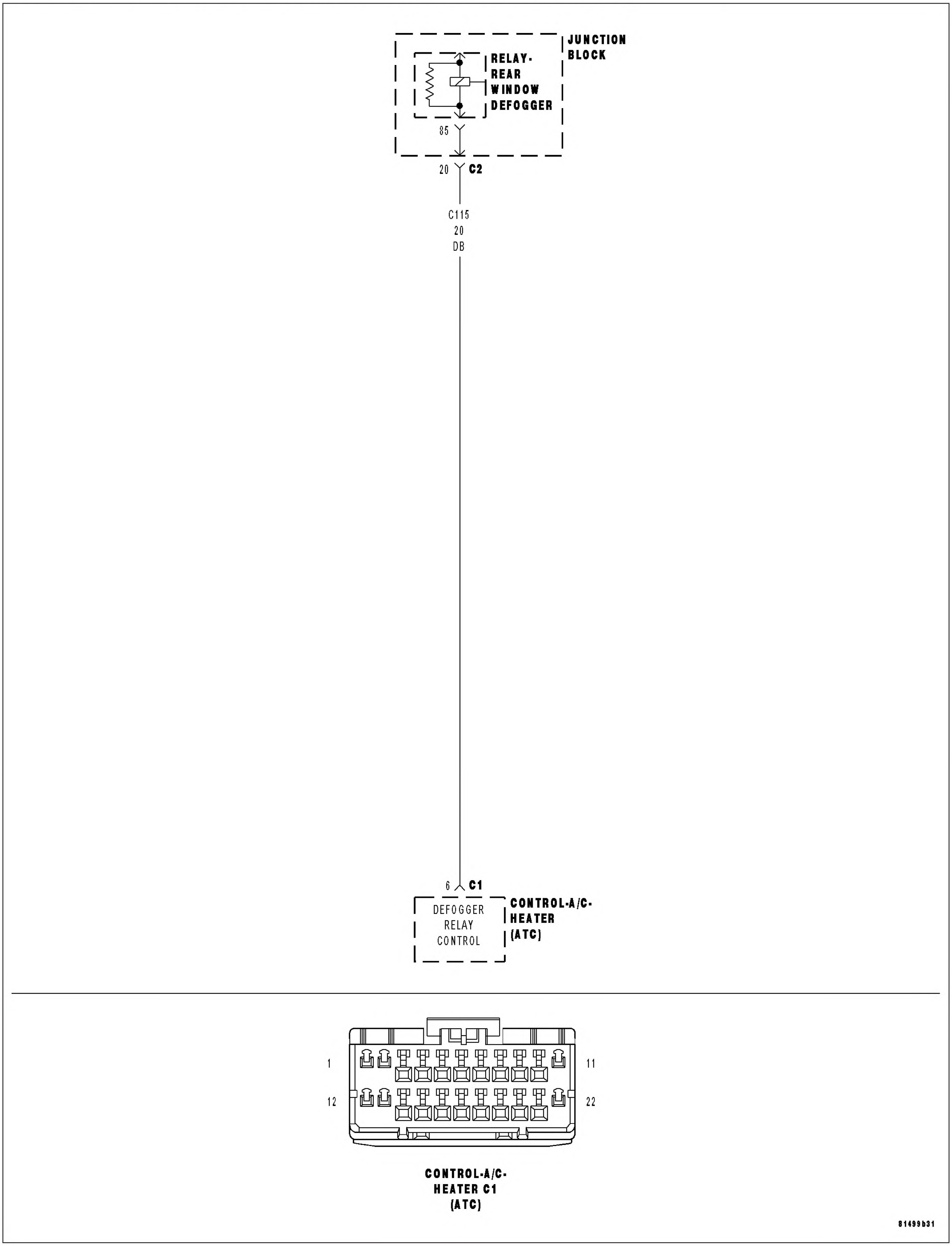
With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B105D–RECIRCULATION DOOR TRAVEL RANGE TOO LARGE?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B106B–REAR DEFROST CONTROL CIRCUIT LOW (ATC)


JUNCTION BLOCK
RELAY-REAR WINDOW DEFOGGER
85
20
C2
C115
20
DB
6
C1
DEFOGGER RELAY CONTROL
CONTROL-A/C-HEATER (ATC)
1
11
12
22
CONTROL-A/C-HEATER C1 (ATC)
81499b31

B106B–REAR DEFROST CONTROL CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on and the EBL output turned off.
- **Set Condition:**
  If the (C115) Rear Window Defogger Relay Control circuit is shorted to ground.

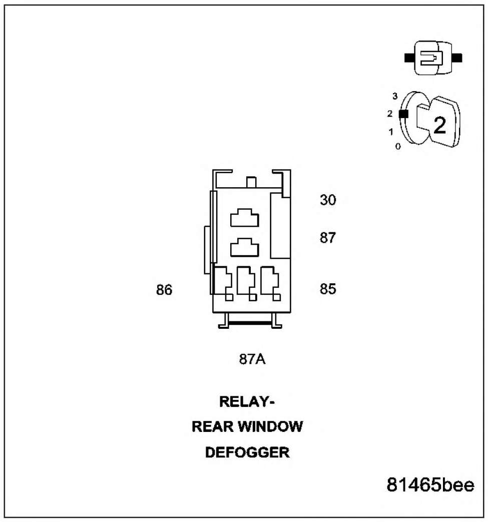
Possible Causes
(C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT SHORTED TO GROUND
(C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT OPEN
REAR WINDOW DEFOGGER RELAY
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. INSTALL A SUBSTITUTE REAR WINDOW DEFOGGER RELAY & THEN CHECK FOR DTC B106B–REAR DEFROST CONTROL CIRCUIT LOW

Turn the ignition on.
Verify that the EBL mode switch is off.
Turn the ignition off.
Install a substitute Rear Window Defogger Relay.
Turn the ignition on.
With the scan tool, erase HVAC DTCs.
Turn the ignition off, wait 10 seconds, and turn the ignition on.
With the scan tool, read HVAC DTCs.



Does the scan tool display: B106B–REAR DEFROST CONTROL CIRCUIT LOW?

Yes >> Go To 2

No >> Replace the original Rear Window Defogger Relay in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B106B–REAR DEFROST CONTROL CIRCUIT LOW (ATC) (CONTINUED)

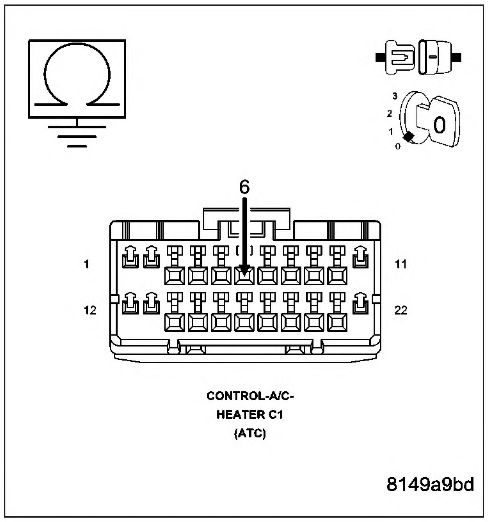
2. CHECK (C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Remove the substitute Rear Window Defogger Relay.

Disconnect the A/C Heater Control C1 harness connector.

Measure the resistance of the (C115) Rear Window Defogger Relay Control circuit between ground and the A/C Heater Control C1 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C115) Rear Window Defogger Relay Control circuit for a short to ground. Reinstall the original Rear Window Defogger Relay.

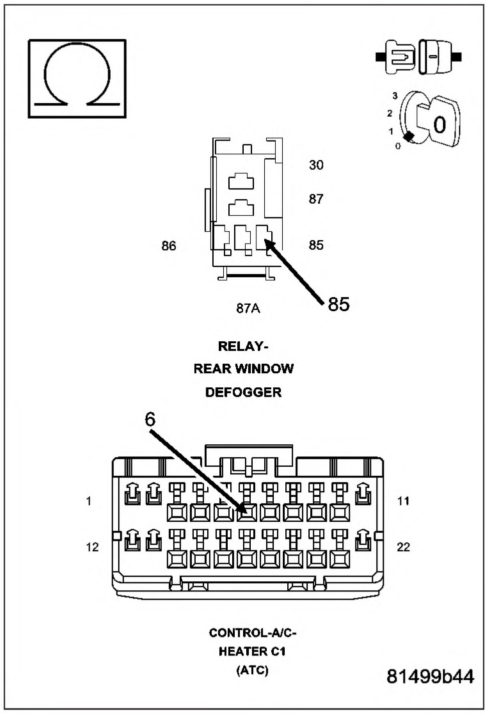
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

3. CHECK (C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT FOR AN OPEN

Measure the resistance of the (C115) Rear Window Defogger Relay Control circuit between the Rear Window Defogger Relay connector terminal 85 in the JB and the A/C Heater Control C1 harness connector.



Is the resistance below 5.0 ohms?

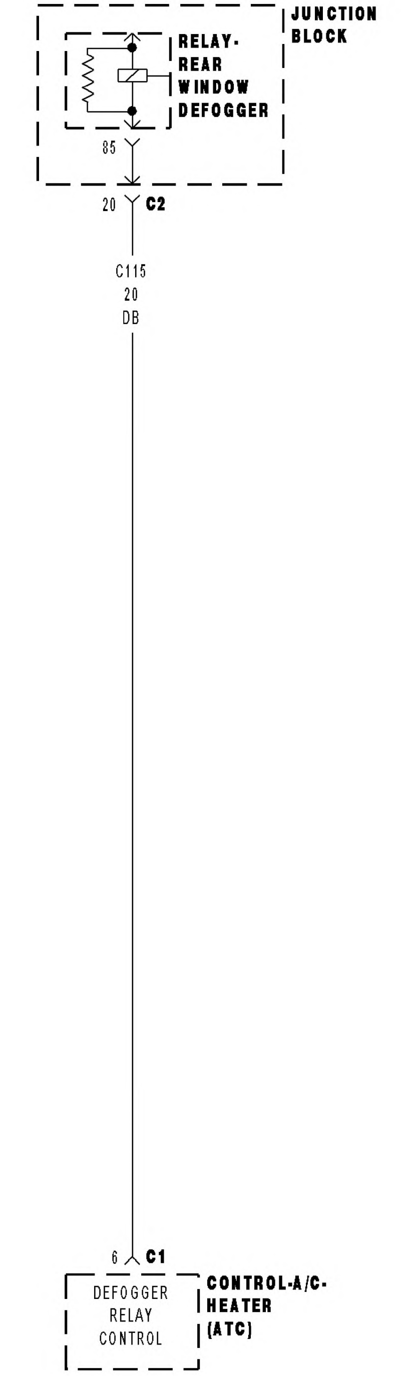
Yes >> Replace the A/C Heater Control in accordance with the Service Information. Reinstall the original Rear Window Defogger Relay.

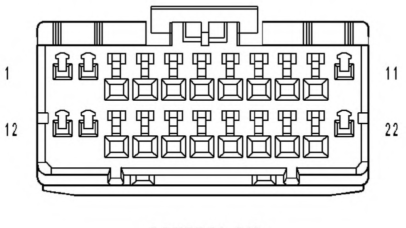
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C115) Rear Window Defogger Relay Control circuit for an open. Reinstall the original Rear Window Defogger Relay.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B106C–REAR DEFROST CONTROL CIRCUIT HIGH (ATC)


JUNCTION BLOCK
RELAY-REAR WINDOW DEFOGGER
85
20
C2
C115
20
DB
6
C1
DEFOGGER RELAY CONTROL
CONTROL-A/C-HEATER (ATC)



CONTROL-A/C-HEATER C1 (ATC)

81499b31

B106C–REAR DEFROST CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the EBL output is turned on and the (C115) Rear Window Defogger Relay Control circuit is either shorted to voltage or open.

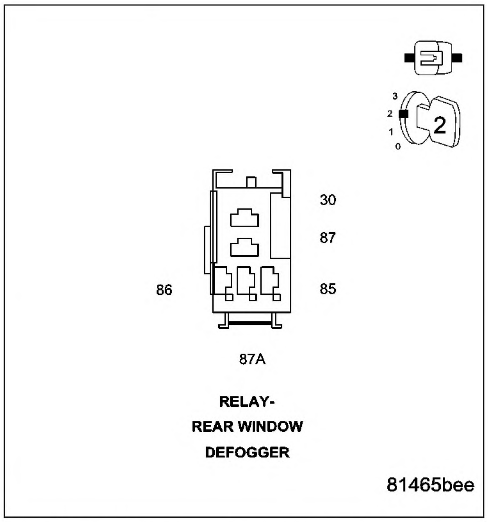
Possible Causes
(C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT SHORTED TO VOLTAGE
(C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT OPEN
REAR WINDOW DEFOGGER RELAY
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. INSTALL A SUBSTITUTE REAR WINDOW DEFOGGER RELAY & THEN CHECK FOR DTC B106C–REAR DEFROST CONTROL CIRCUIT HIGH

Turn the ignition on.
Verify that the EBL mode switch is off.
Turn the ignition off.
Install a substitute Rear Window Defogger Relay.
Turn the ignition on.
With the scan tool, erase HVAC DTCs.
Turn the ignition off, wait 10 seconds, and turn the ignition on.
Press the EBL mode switch is on.
With the scan tool, read HVAC DTCs.



Does the scan tool display: B106C–REAR DEFROST CONTROL CIRCUIT HIGH?

Yes >> Go To 2

No >> Replace the original Rear Window Defogger Relay in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B106C–REAR DEFROST CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

2. CHECK (C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition on.

Verify that the EBL mode switch is off.

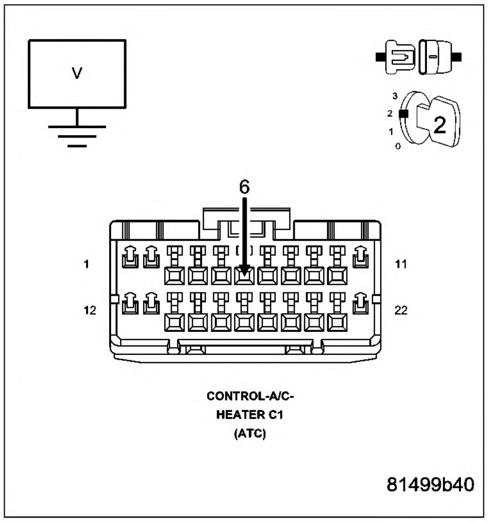
Turn the ignition off.

Remove the substitute Rear Window Defogger Relay.

Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

Measure the voltage of the (C115) Rear Window Defogger Relay Control circuit.



Is the voltage above 0.2 volts?

Yes >> Repair the (C115) Rear Window Defogger Relay Control circuit for a short to voltage. Reinstall the original Rear Window Defogger Relay.

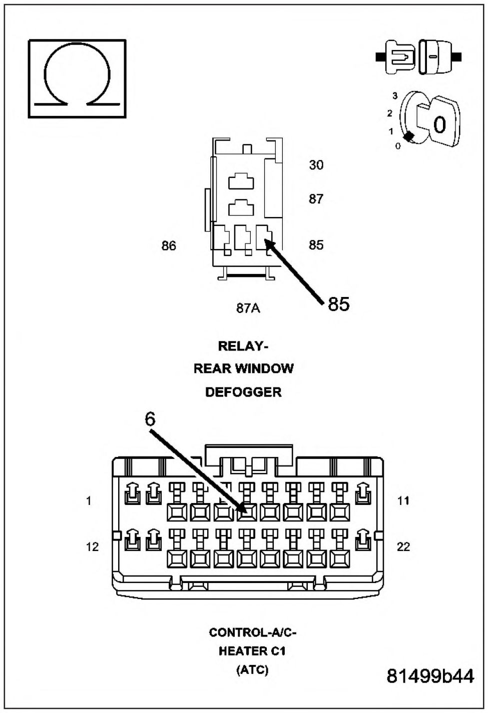
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

3. CHECK (C115) REAR WINDOW DEFOGGER RELAY CONTROL CIRCUIT FOR AN OPEN

Turn the ignition off.

Measure the resistance of the (C115) Rear Window Defogger Relay Control circuit between the Rear Window Defogger Relay connector terminal 85 in the JB and the A/C Heater Control C1 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Replace the A/C Heater Control in accordance with the Service Information. Reinstall the original Rear Window Defogger Relay.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C115) Rear Window Defogger Relay Control circuit for an open. Reinstall the original Rear Window Defogger Relay.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B109B–PANEL MODE DOOR 2 CONTROL CIRCUIT/PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for shorts to ground, shorts to battery, and shorts to other door driver circuits. If detected, the A/C Heater Control reports these types of faults as Control Circuit/Performance DTCs. It is important to note that Control Circuit/Performance DTCs do not indicate where or what type of short is present and that additional system testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, or the (C939) Rear Mode Door Common Driver circuit while attempting to drive the Rear Mode Door Actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

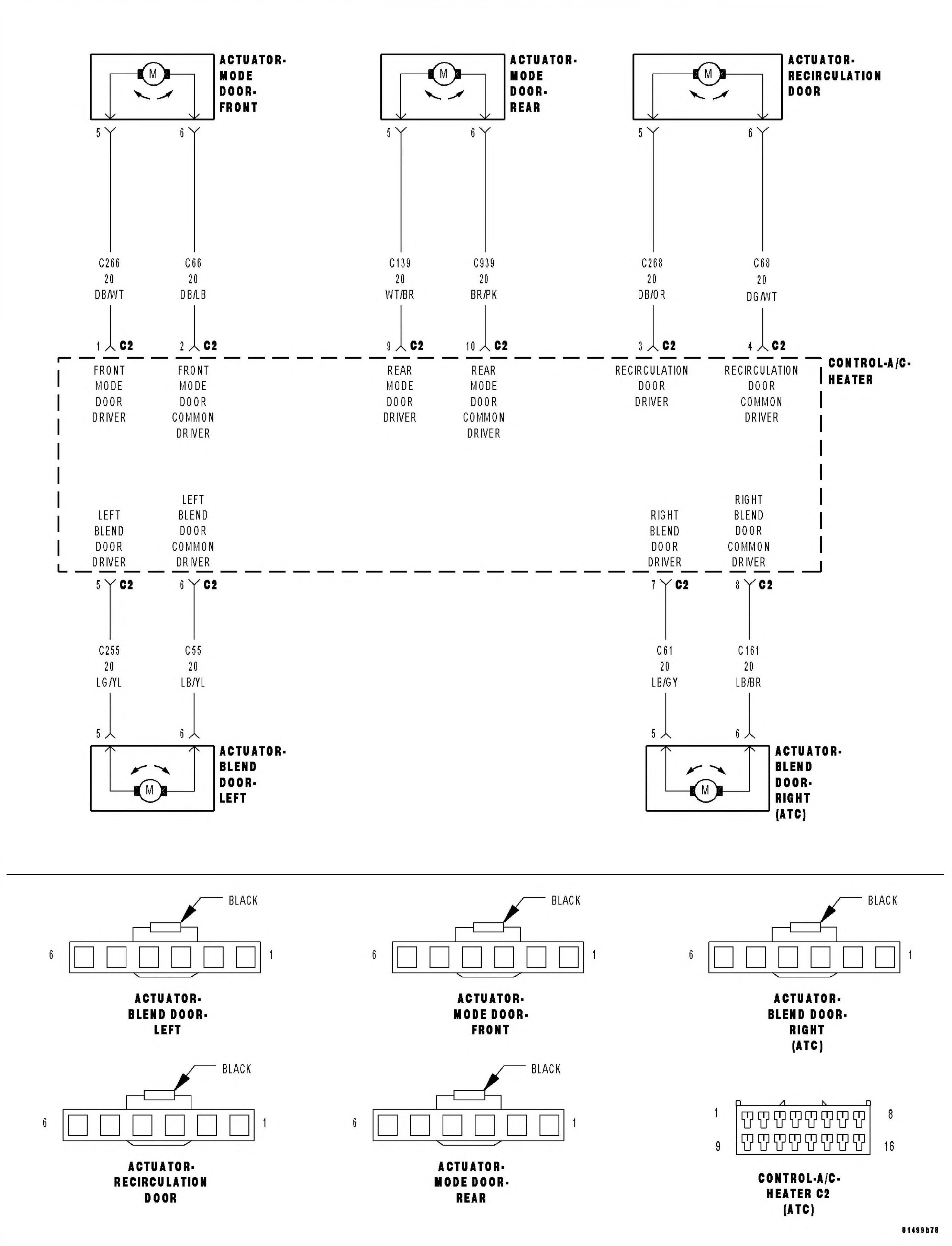
Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Repair

Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

B109C–PANEL MODE DOOR 2 CONTROL CIRCUIT LOW (ATC)


ACTUATOR-MODE DOOR-FRONT
M
5
6
C266 20 DB/WT
C66 20 DB/LB
ACTUATOR-MODE DOOR-REAR
C139 20 WT/BR
C939 20 BR/PK
ACTUATOR-RECIRCULATION DOOR
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
9 C2
10 C2
3 C2
4 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
RIGHT BLEND DOOR DRIVER
RIGHT BLEND DOOR COMMON DRIVER
5 C2
6 C2
7 C2
8 C2
C255 20 LG/YL
C55 20 LB/YL
C61 20 LB/GY
C161 20 LB/BR
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
BLACK
6
1
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-REAR
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
81499b78

B109C–PANEL MODE DOOR 2 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C139) Rear Mode Door Driver circuit or the (C939) Rear Mode Door Common Driver circuit is shorted to ground.

Possible Causes
(C139) REAR MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C939) REAR MODE DOOR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(C139) REAR MODE DOOR DRIVER CIRCUIT SHORTED TO (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT
(C139) REAR MODE DOOR DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
(C939) REAR MODE DOOR COMMON DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

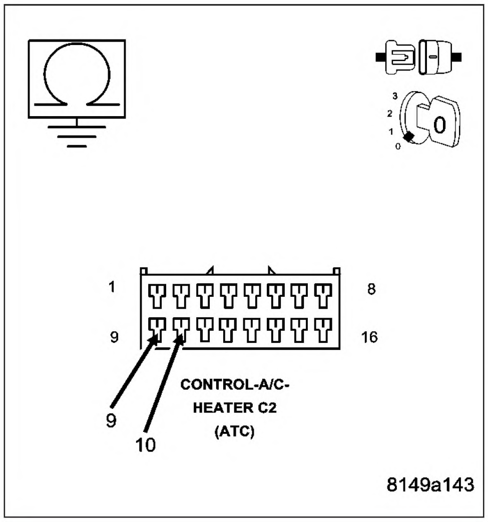
1. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT & THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C139) Rear Mode Door Driver circuit between ground and the A/C Heater Control C2 harness connector.

Measure the resistance of the (C939) Rear Mode Door Common Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on either circuit?

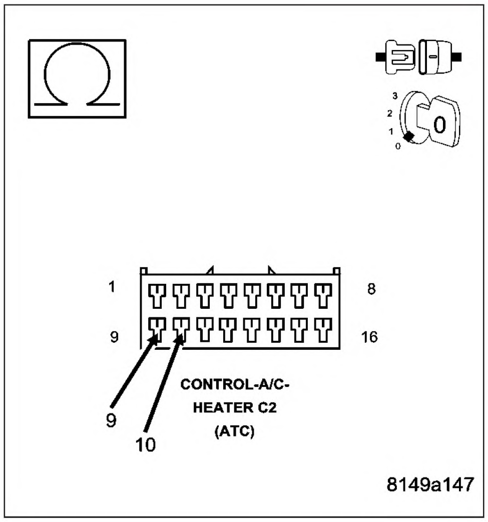
Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B109C–PANEL MODE DOOR 2 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

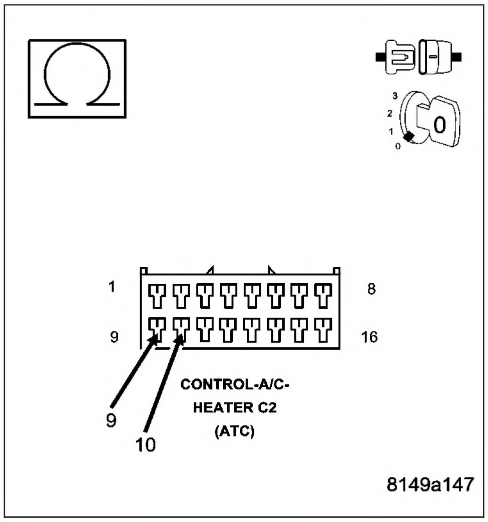
No >> Go To 4

---

3. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C139) Rear Mode Door Driver circuit for a short to the (C939) Rear Mode Door Common Driver circuit.

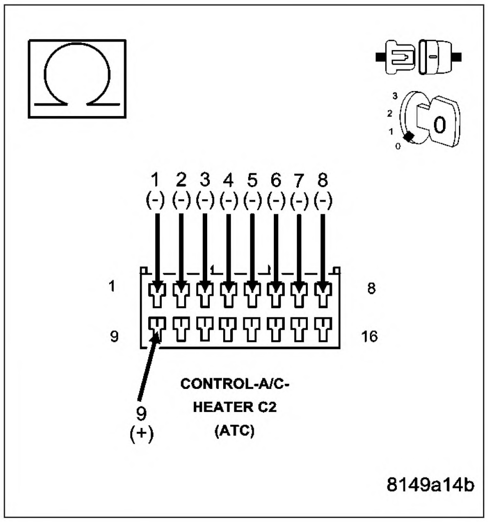
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B109C–PANEL MODE DOOR 2 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

4. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS



Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, the (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, and the (C161) Right Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 10k ohms between the (C139) Rear Mode Door Driver circuit and any of the other door driver circuits?

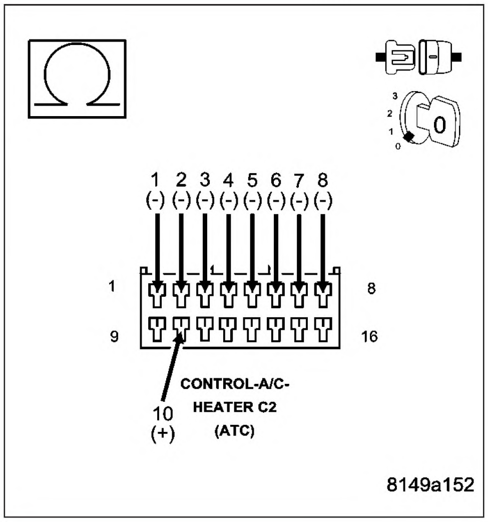
Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C139) Rear Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

---

5. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS



Measure the resistance between the (C939) Rear Mode Door Common Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, the (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, and the (C161) Right Blend Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 10k ohms between the (C939) Rear Mode Door Common Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C939) Rear Mode Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B109C–PANEL MODE DOOR 2 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

6. RUN THE ACTUATOR DTC DETECTION TEST

Reconnect the A/C Heater Control C2 harness connector.

Reconnect the Rear Mode Door Actuator harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B109C–PANEL MODE DOOR 2 CONTROL CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

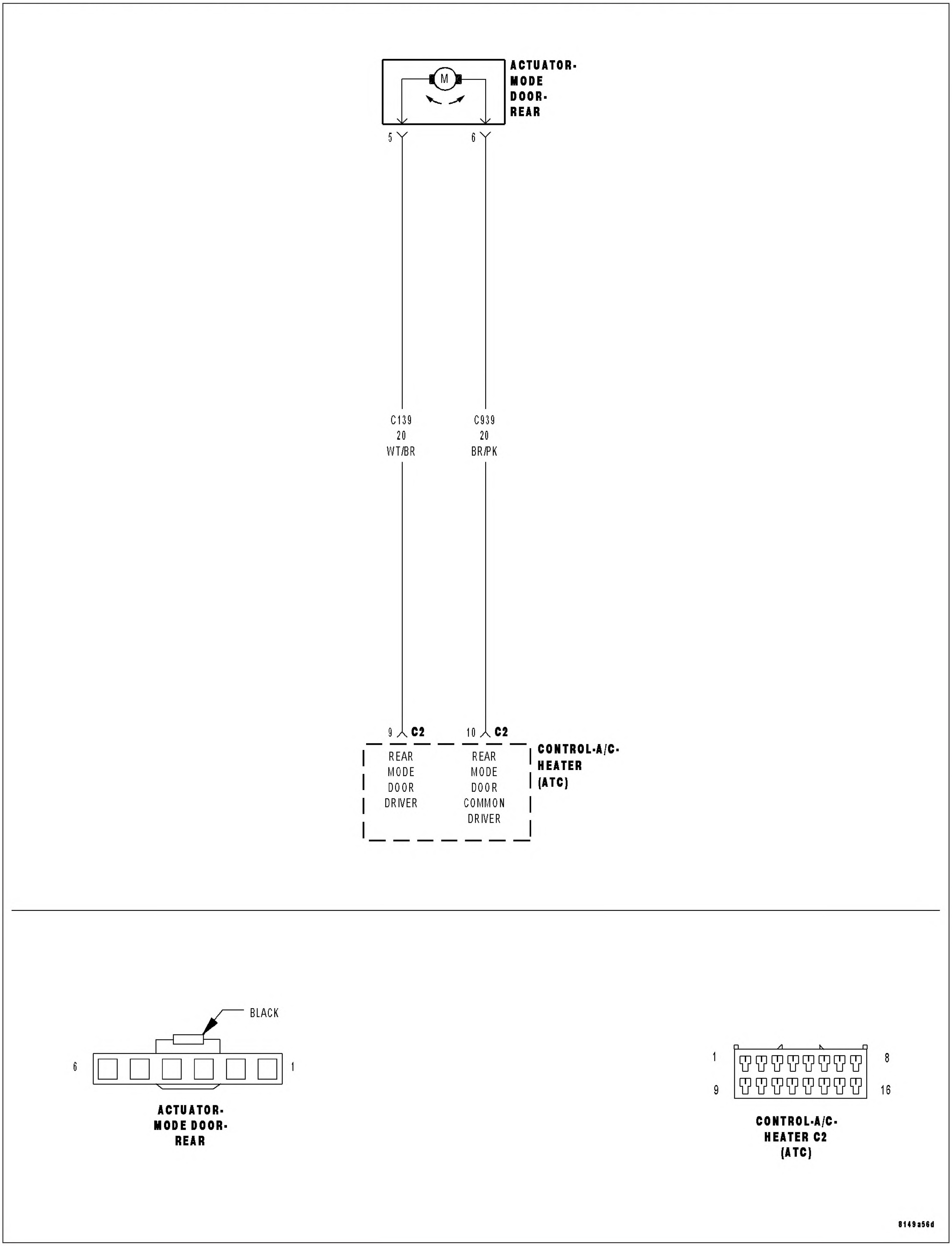
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B109D–PANEL MODE DOOR 2 CONTROL CIRCUIT HIGH (ATC)


ACTUATOR-MODE DOOR-REAR
M
5
6
C139
20
WT/BR
C939
20
BR/PK
9 C2
10 C2
CONTROL-A/C-HEATER (ATC)
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
BLACK
6
1
ACTUATOR-MODE DOOR-REAR
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
8149a56d

B109D–PANEL MODE DOOR 2 CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C139) Rear Mode Door Driver circuit or the (C939) Rear Mode Door Common Driver circuit is shorted to voltage.

Possible Causes
(C139) REAR MODE DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
(C939) REAR MODE DOOR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT & THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

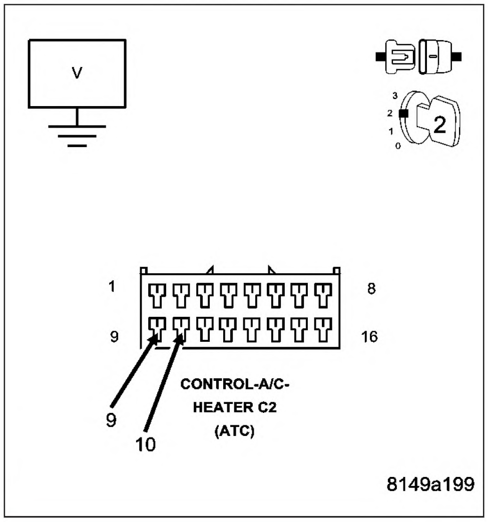
Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C139) Rear Mode Door Driver circuit.

Measure the voltage of the (C939) Rear Mode Door Common Driver circuit.



Is the voltage above 0.2 volts on either circuit?

Yes >> Repair the circuit(s) with voltage above 0.2 volts a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B109D–PANEL MODE DOOR 2 CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

2. RUN THE ACTUATOR DTC DETECTION TEST

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B109D–PANEL MODE DOOR 2 CONTROL CIRCUIT HIGH?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

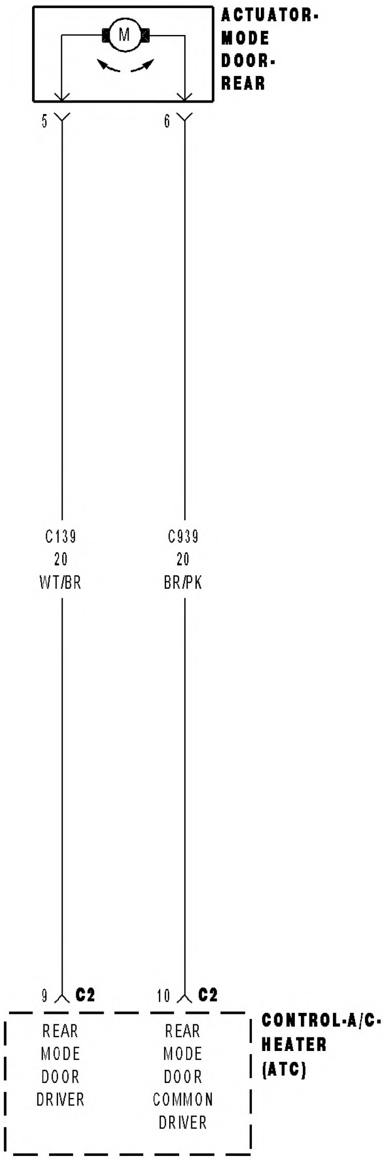
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

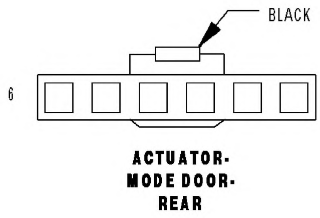
No, And No Other DTCs Displayed

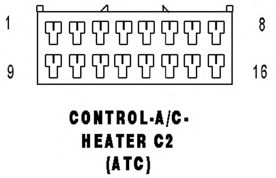
Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B109E–PANEL MODE DOOR 2 CONTROL CIRCUIT OPEN (ATC)


ACTUATOR-MODE DOOR-REAR
M
5
6
C139
20
WT/BR
C939
20
BR/PK
9 C2
10 C2
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
CONTROL-A/C-HEATER (ATC)


BLACK
6
1
ACTUATOR-MODE DOOR-REAR


1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)

8149a56d

B109E–PANEL MODE DOOR 2 CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the (C139) Rear Mode Door Driver circuit or the (C939) Rear Mode Door Common Driver circuit is open.

Possible Causes
(C139) REAR MODE DOOR DRIVER CIRCUIT OPEN
(C939) REAR MODE DOOR COMMON DRIVER CIRCUIT OPEN
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

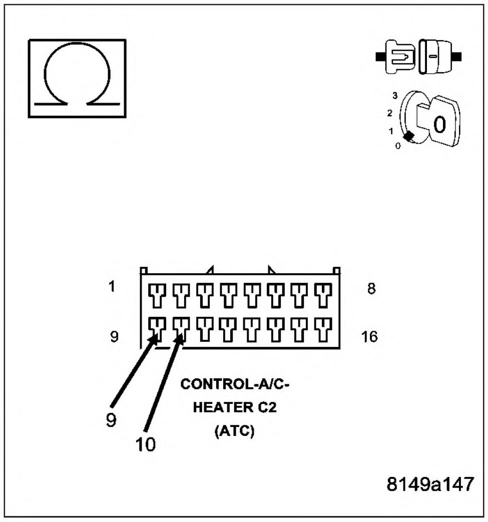
---

2. CHECK THE REAR MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C139) Rear Mode Door Driver circuit and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance above 70.0 ohms?

Yes >> Go To 3

No >> Replace the A/C Heater Control in accordance with the Service Information.

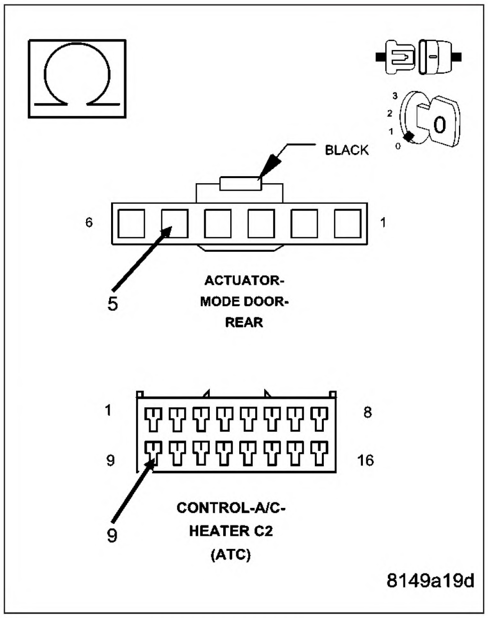
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B109E–PANEL MODE DOOR 2 CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

3. CHECK THE (C139) REAR MODE DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Rear Mode Door Actuator harness connector.

Measure the resistance of the (C139) Rear Mode Door Driver circuit between the Rear Mode Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
3
2
1
0
0
6
1
5
ACTUATOR-
MODE DOOR-
REAR
1
8
9
16
9
CONTROL-A/C-
HEATER C2
(ATC)
8149a19d

Is the resistance below 5.0 ohms?

Yes >> Go To 4

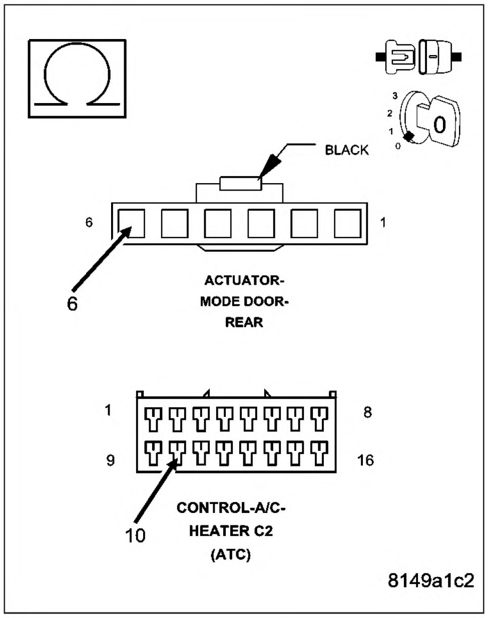
No >> Repair the (C139) Rear Mode Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C939) REAR MODE DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C939) Rear Mode Door Common Driver circuit between the Rear Mode Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
3
2
1
0
0
6
1
6
ACTUATOR-
MODE DOOR-
REAR
1
8
9
16
10
CONTROL-A/C-
HEATER C2
(ATC)
8149a1c2

Is the resistance below 5.0 ohms?

No >> Replace the Rear Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes >> Repair the (C939) Rear Mode Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B109F–PANEL MODE DOOR 2 TRAVEL RANGE TOO SMALL (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value is less than the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Rear Mode Door is less than the low range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
REAR MODE DOOR SEIZED, BINDING, OBSTRUCTED
REAR MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B109F–PANEL MODE DOOR 2 TRAVEL RANGE TOO SMALL (ATC) (CONTINUED)

3. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE REAR MODE DOOR TO SEIZE OR BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the rear mode door to seize or bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK REAR MODE DOOR TRAVEL

Remove the Rear Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 155 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Rear Mode Door Actuator in accordance with the Service Information. Then, Go To 5.

No >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

5. RUN THE ACTUATOR CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B109F–PANEL MODE DOOR 2 TRAVEL RANGE TOO SMALL?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B222A–VEHICLE LINE MISMATCH (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The EBL and AC status indicators will flash when this DTC is active. The status indicators will continue to flash across ignition cycles and battery disconnects. The vehicle line and country code data transmitted on the CAN B Bus must correspond with data stored in the A/C Heater Control to stop the status indicators from flashing.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If vehicle line and country code data transmitted on the CAN B Bus doesn't correspond with data stored in the A/C Heater Control.

Possible Causes
INCORRECT PCM
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. CHECK VEHICLE LINE IN PCM

With the scan tool compare the vehicle line that is programmed into the PCM to the vehicle line of the vehicle.

Does the vehicle line programmed into the PCM match the vehicle?

Yes >> Replace the A/C Heater Control in accordance with the service information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace and program the Powertrain Control Module in accordance with the service information. Ensure the PCM is replaced with the correct vehicle line PCM.
Perform POWERTRAIN VERIFICATION TEST. (Refer to 9 - ENGINE - STANDARD PROCEDURE).

B1001–A/C SWITCH REQUEST INPUT CIRCUIT LOW (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The switch input changes when the switch is pushed down. A stored DTC B1001 indicates that the A/C mode switch was stuck in a pushed position for more than 10 minutes, but has since returned to its normal state. An active DTC B1001 indicates that the A/C mode switch is stuck in a pushed position. An active DTC B1001 will prevent proper A/C mode switch and status indicator function.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C mode switch stays in a pushed position for more than 10 minutes.

Possible Causes
A/C HEATER CONTROL DAMAGED
OBJECT HOLDING A/C MODE SWITCH IN A PUSHED POSITION
SUBSTANCE CAUSING A/C MODE SWITCH TO GET STUCK IN A PUSHED POSITION
A/C HEATER CONTROL

Diagnostic Test

1. **INSPECT THE A/C HEATER CONTROL FOR DAMAGE**

Inspect the A/C Heater Control for damage.

Is the A/C Heater Control damaged?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

---

2. **INSPECT FOR OBJECT OR SUBSTANCE CAUSING THE A/C MODE SWITCH TO STAY OR STICK IN A PUSHED POSITION**

Inspect the A/C Heater Control for anything that would cause the A/C mode switch to stay or stick in a pushed position.

Is anything present that would cause the A/C mode switch to stay or stick in a pushed position?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

B1001–A/C SWITCH REQUEST INPUT CIRCUIT LOW (ATC) (CONTINUED)

3. CHECK FOR NORMAL A/C MODE SWITCH & STATUS INDICATOR FUNCTION

Turn the ignition on.

Press the A/C mode switch on and off several times while observing the A/C status indicator.

Does the A/C status indicator turn on and off?

Yes >> Go To 4

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

4. VERIFY THAT DTC B1001–A/C SWITCH REQUEST INPUT CIRCUIT LOW IS STILL ACTIVE

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on. Wait 10 minutes before proceeding.

With the scan tool, read HVAC DTCs.

Does the scan tool display active: B1001–A/C SWITCH REQUEST INPUT CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1016–REAR DEFROST SWITCH REQUEST INPUT CIRCUIT LOW (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The switch input changes when the switch is pushed down. A stored DTC B1016 indicates that the EBL mode switch was stuck in a pushed position for more than 10 minutes, but has since returned to its normal state. An active DTC B1016 indicates that the EBL mode switch is stuck in a pushed position. An active DTC B1016 will prevent proper EBL mode switch and status indicator function.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the EBL mode switch stays in a pushed position for more than 10 minutes.

Possible Causes
A/C HEATER CONTROL DAMAGED
OBJECT HOLDING EBL MODE SWITCH IN A PUSHED POSITION
SUBSTANCE CAUSING EBL MODE SWITCH TO GET STUCK IN A PUSHED POSITION
A/C HEATER CONTROL

Diagnostic Test

1. INSPECT THE A/C HEATER CONTROL FOR DAMAGE

Inspect the A/C Heater Control for damage.

Is the A/C Heater Control damaged?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

---

2. INSPECT FOR OBJECT OR SUBSTANCE CAUSING THE EBL MODE SWITCH TO STAY OR STICK IN A PUSHED POSITION

Inspect the A/C Heater Control for anything that would cause the EBL mode switch to stay or stick in a pushed position.

Is anything present that would cause the EBL mode switch to stay or stick in a pushed position?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

B1016–REAR DEFROST SWITCH REQUEST INPUT CIRCUIT LOW (ATC) (CONTINUED)

3. CHECK FOR NORMAL EBL MODE SWITCH & STATUS INDICATOR FUNCTION

Turn the ignition on.

Press the EBL mode switch on and off several times while observing the EBL status indicator.

Does the EBL status indicator turn on and off?

Yes >> Go To 4

No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. VERIFY THAT DTC B1016–REAR DEFROST SWITCH REQUEST INPUT CIRCUIT LOW IS STILL ACTIVE

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on. Wait 10 minutes before proceeding.

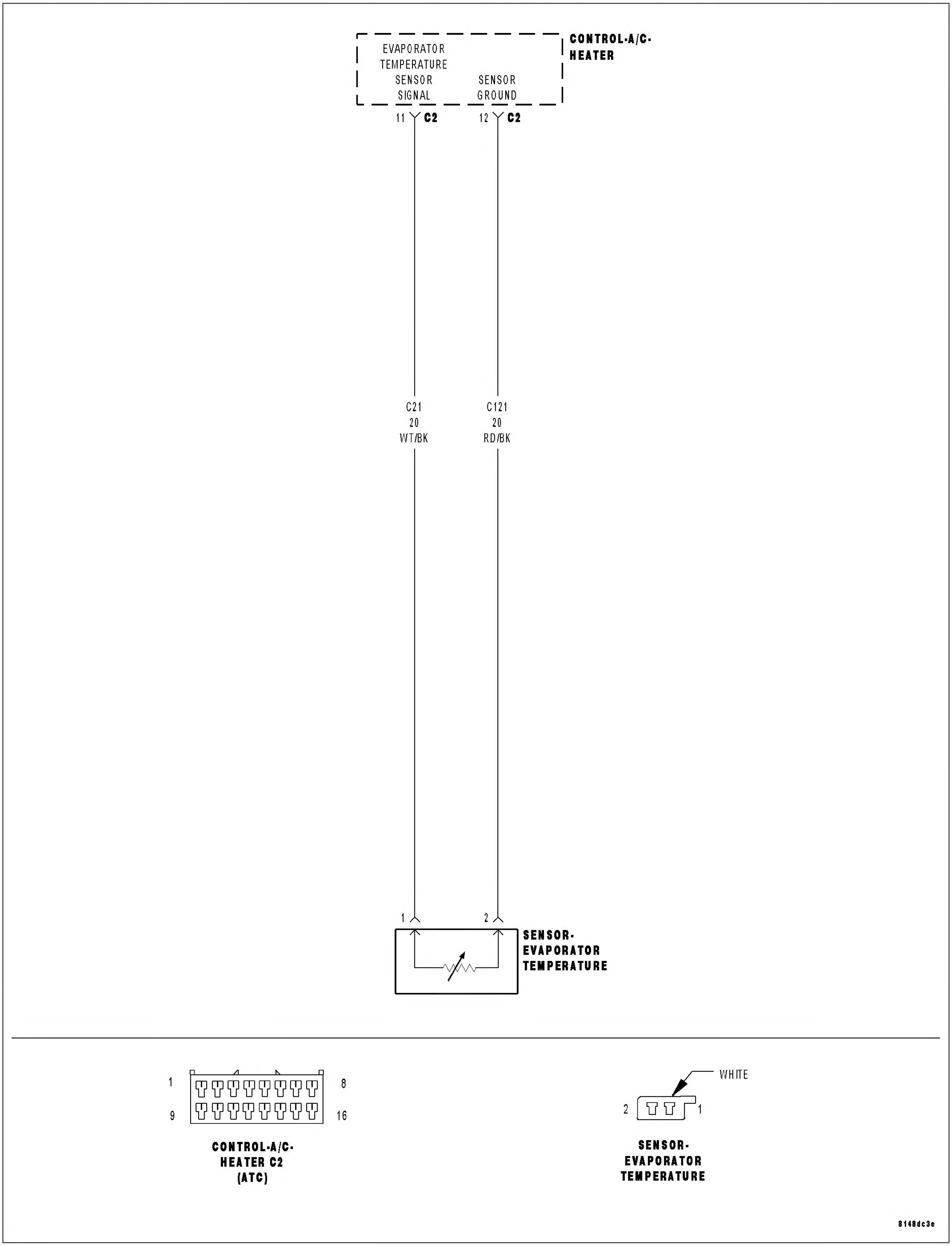
With the scan tool, read HVAC DTCs.

Does the scan tool display active: B1016–REAR DEFROST SWITCH REQUEST INPUT CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1031–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT LOW (ATC)


CONTROL-A/C-
HEATER
EVAPORATOR
TEMPERATURE
SENSOR
SIGNAL
SENSOR
GROUND
11 C2
12 C2
C21
20
WT/BK
C121
20
RD/BK
1
2
SENSOR-
EVAPORATOR
TEMPERATURE
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
WHITE
2
1
SENSOR-
EVAPORATOR
TEMPERATURE
8148dc3e

B1031–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Evaporator Temperature Sensor input is out of range toward the low voltage threshold.

Possible Causes
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO (C121) SENSOR GROUND CIRCUIT
EVAPORATOR TEMPERATURE SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. CHECK FOR DTC B1031–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT LOW WITH EVAPORATOR TEMPERATURE SENSOR HARNESS CONNECTOR DISCONNECTED

Turn the ignition off.

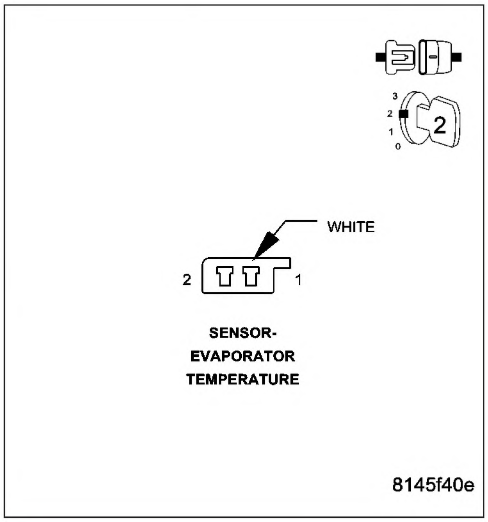
Disconnect the Evaporator Temperature Sensor harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, read HVAC DTCs.



Does the scan tool display active: B1031–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> Replace the Evaporator Temperature Sensor in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

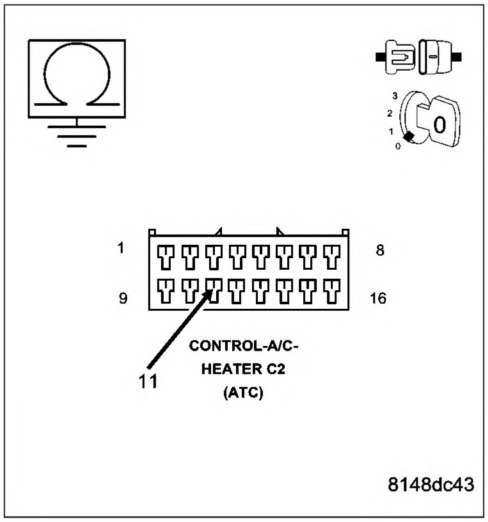
B1031–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C21) Evaporator Temperature Sensor Signal circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for a short to ground.

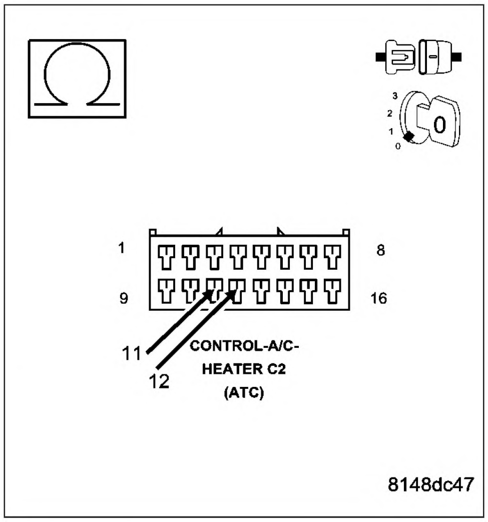
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

3. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO (C121) SENSOR GROUND CIRCUIT

Measure the resistance between the (C21) Evaporator Temperature Sensor Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

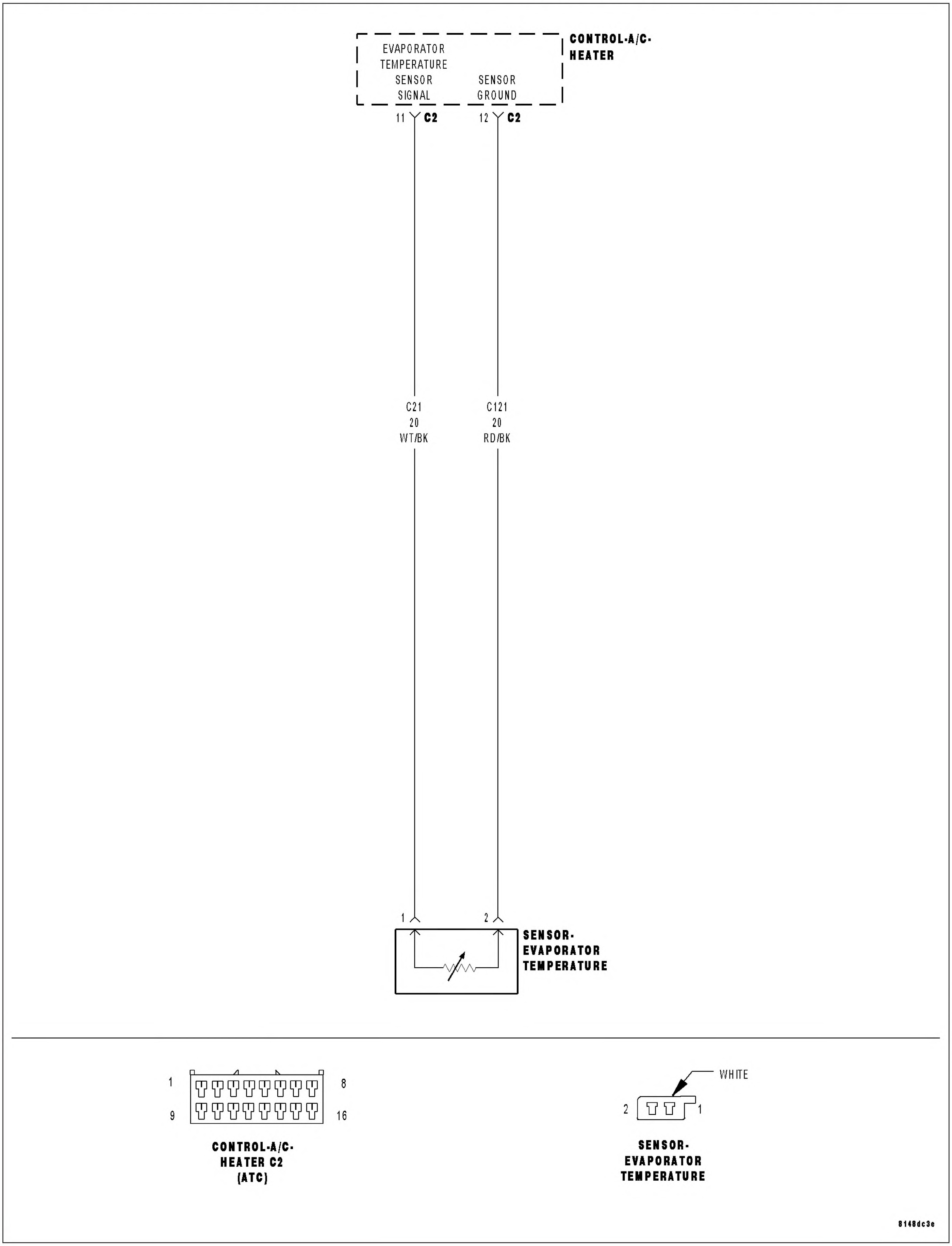
Yes >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for a short to the (C121) Sensor Ground circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1032–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT HIGH (ATC)


CONTROL-A/C-
HEATER
EVAPORATOR TEMPERATURE SENSOR SIGNAL
SENSOR GROUND
11 C2
12 C2
C21
20
WT/BK
C121
20
RD/BK
1
2
SENSOR-
EVAPORATOR
TEMPERATURE
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
WHITE
2
1
SENSOR-
EVAPORATOR
TEMPERATURE
8148dc3e

B1032–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Evaporator Temperature Sensor input is out of range toward the high voltage threshold.

Possible Causes
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
(C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN
(C121) SENSOR GROUND CIRCUIT OPEN
EVAPORATOR TEMPERATURE SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

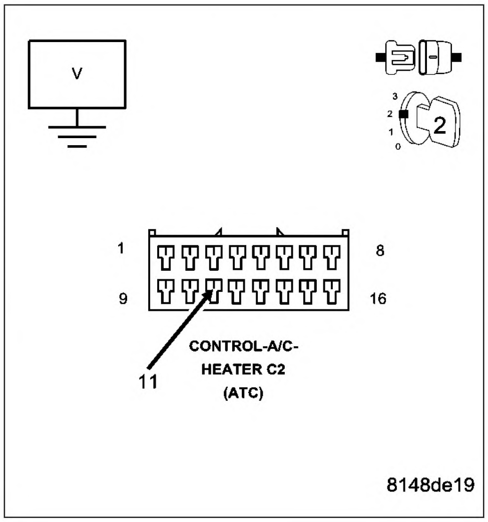
1. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C21) Evaporator Temperature Sensor Signal circuit.



Is the voltage above 0.2 volts?

Yes >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

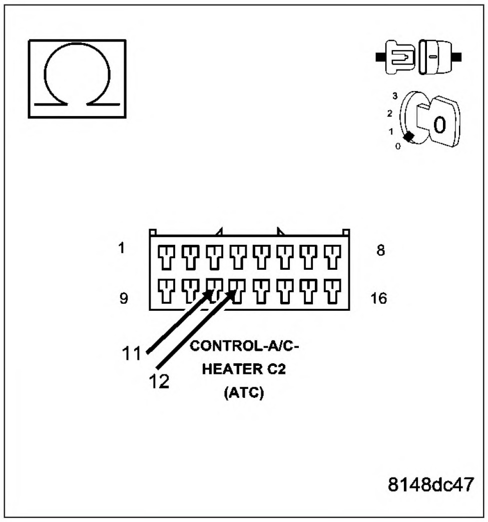
No >> Go To 2

B1032–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

2. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT, (C121) SENSOR GROUND CIRCUIT, & EVAPORATOR TEMPERATURE SENSOR

Turn the ignition off.

Measure the resistance between the (C21) Evaporator Temperature Sensor Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector. The approximate circuit resistance should be as follows:



- 1468 ohms @ 40°C (104°F)
- 1800 ohms @ 35°C (95°F)
- 2221 ohms @ 30°C (86°F)
- 2757 ohms @ 25°C (77°F)
- 3443 ohms @ 20°C (68°F)
- 4330 ohms @ 15°C (59°F)
- 5485 ohms @ 10°C (50°F)
- 6998 ohms @ 5°C (41°F)
- 7354 ohms @ 4°C (39°F)
- 7731 ohms @ 3°C (37°F)
- 8130 ohms @ 2°C (36°F)
- 8553 ohms @ 1°C (34°F)
- 9000 ohms @ 0°C (32°F)

Is the resistance within the specifications?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

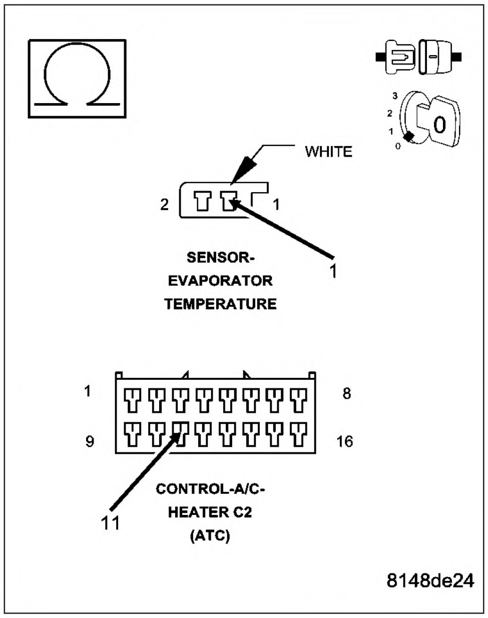
No >> Go To 3

---

3. CHECK (C21) EVAPORATOR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR AN OPEN

Disconnect the Evaporator Temperature Sensor harness connector.

Measure the resistance of the (C21) Evaporator Temperature Sensor Signal circuit between the Evaporator Temperature Sensor harness connector and the A/C Heater Control C2 harness connector.



Is the resistance below 5.0 ohms?

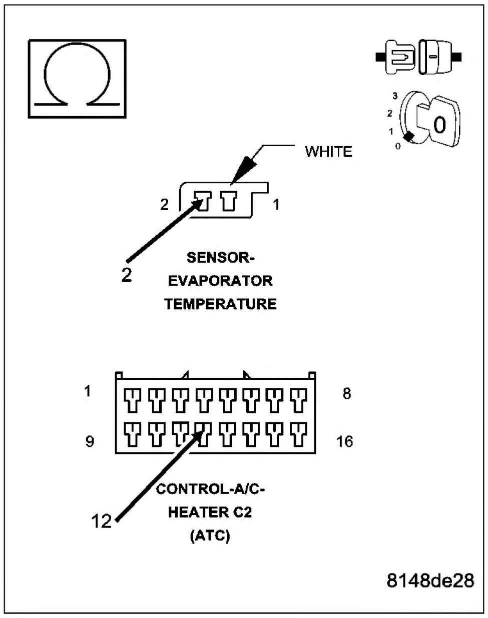
Yes >> Go To 4

No >> Repair the (C21) Evaporator Temperature Sensor Signal circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1032–EVAPORATOR FIN TEMPERATURE SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

4. CHECK (C121) SENSOR GROUND CIRCUIT FOR AN OPEN

Measure the resistance of the (C121) Sensor Ground circuit between the Evaporator Temperature Sensor harness connector and the A/C Heater Control C2 harness connector.


WHITE
3
2
1
0
0
2
1
2
SENSOR-
EVAPORATOR
TEMPERATURE
1
8
9
16
12
CONTROL-A/C-
HEATER C2
(ATC)
8148de28

Is the resistance below 5.0 ohms?

Yes >> Replace the Evaporator Temperature Sensor in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C121) Sensor Ground circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1034–INFRARED TEMPERATURE SENSOR INPUT CIRCUIT LOW (ATC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the IR Sensor fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1035–INFRARED TEMPERATURE SENSOR INPUT CIRCUIT HIGH (ATC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the IR Sensor fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1036–INFRARED SENSOR PERIOD TOO LONG OR TOO SHORT (ATC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the IR Sensor fails the internal self test.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. REPLACE THE A/C HEATER CONTROL

Repair

Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1040–PANEL MODE DOOR 1 CONTROL CIRCUIT/PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for shorts to ground, shorts to battery, and shorts to other door driver circuits. If detected, the A/C Heater Control reports these types of faults as Control Circuit/Performance DTCs. It is important to note that Control Circuit/Performance DTCs do not indicate where or what type of short is present and that additional system testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, or the (C939) Rear Mode Door Common Driver circuit while attempting to drive the Front Mode Door Actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

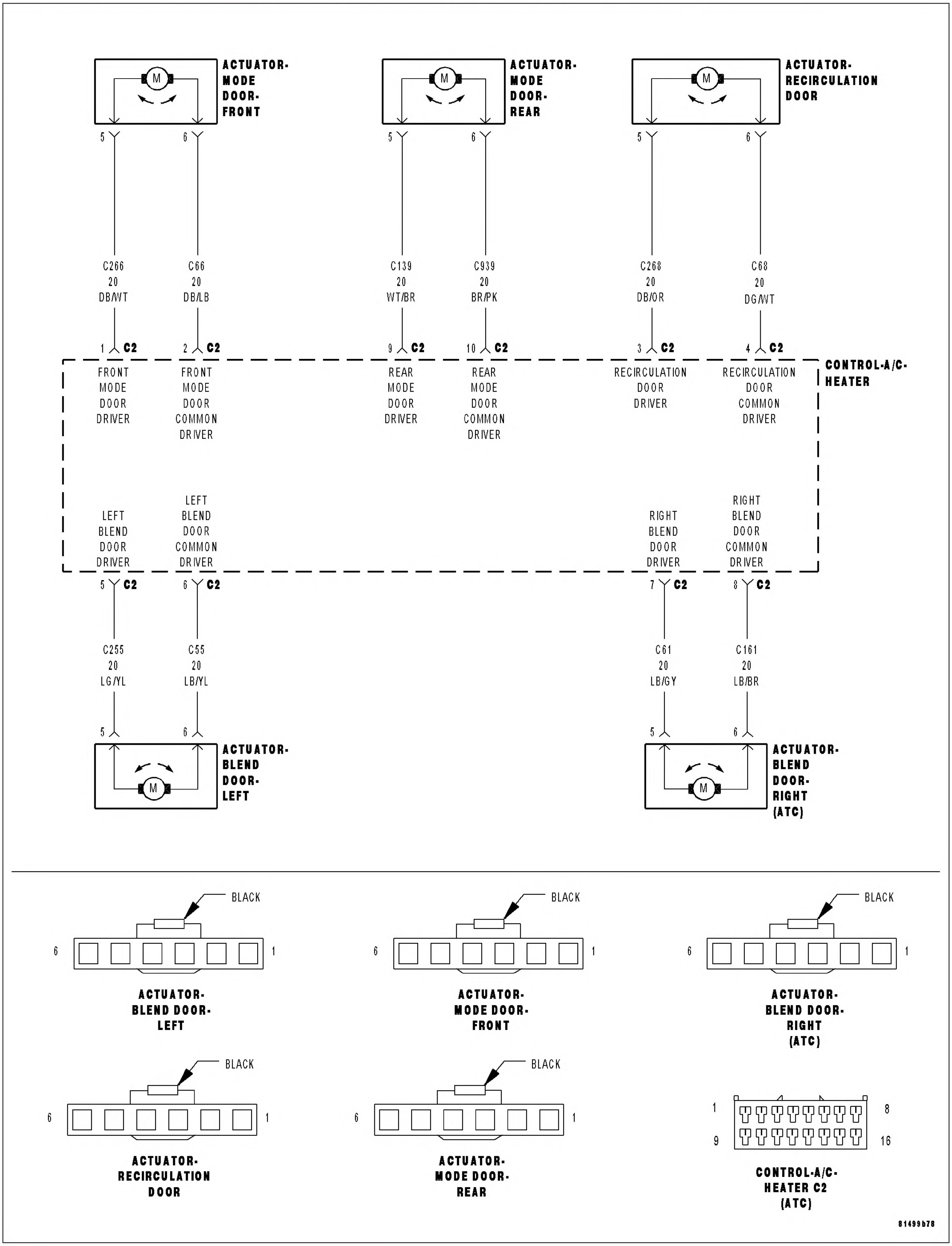
Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Repair

Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

B1041–PANEL MODE DOOR 1 CONTROL CIRCUIT LOW (ATC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
9 C2
10 C2
3 C2
4 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
RIGHT BLEND DOOR DRIVER
RIGHT BLEND DOOR COMMON DRIVER
5 C2
6 C2
7 C2
8 C2
C255 20 LG/YL
C55 20 LB/YL
C61 20 LB/GY
C161 20 LB/BR
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
BLACK
6
1
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-REAR
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
81499b78

B1041–PANEL MODE DOOR 1 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C266) Front Mode Door Driver circuit or the (C66) Front Mode Door Common Driver circuit is shorted to ground.

Possible Causes
(C266) FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(C266) FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT
(C266) FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

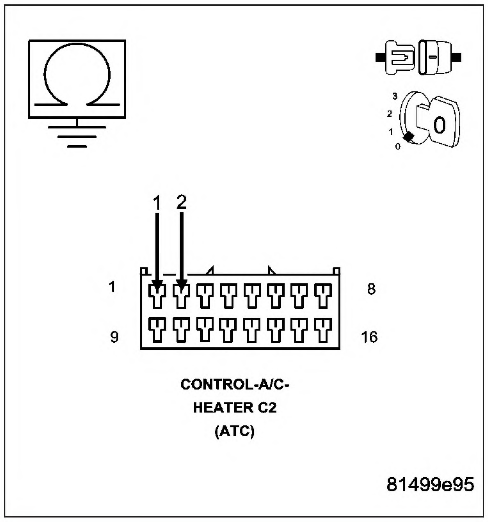
1. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT & THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C266) Front Mode Door Driver circuit between ground and the A/C Heater Control C2 harness connector.

Measure the resistance of the (C66) Front Mode Door Common Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on either circuit?

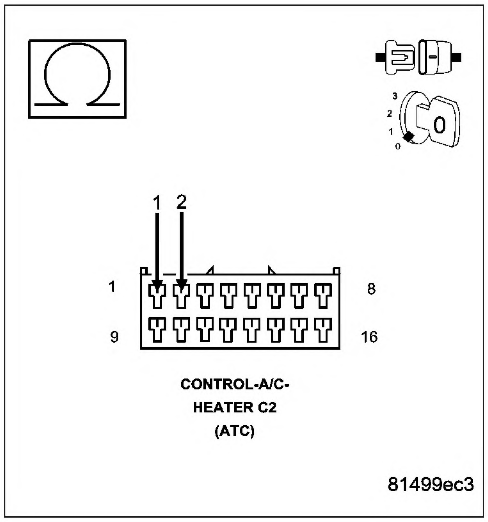
Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B1041–PANEL MODE DOOR 1 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C66) Front Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

No >> Go To 4

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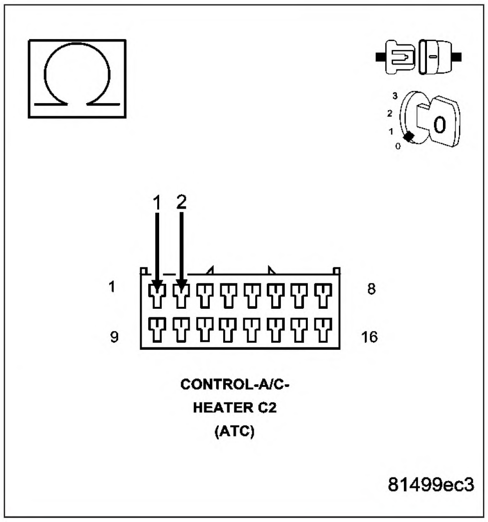
3. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C66) Front Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C266) Front Mode Door Driver circuit for a short to the (C66) Front Mode Door Common Driver circuit.

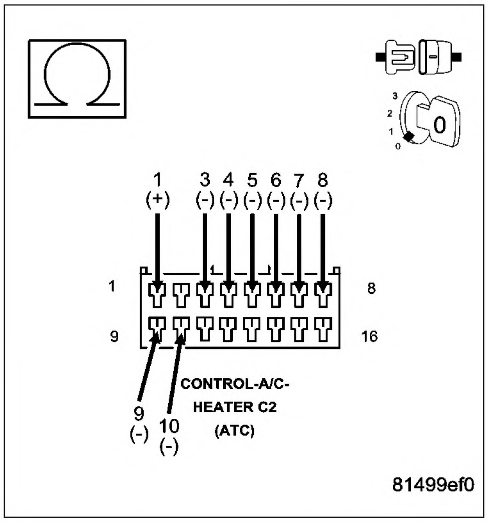
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1041–PANEL MODE DOOR 1 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

4. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS



Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.

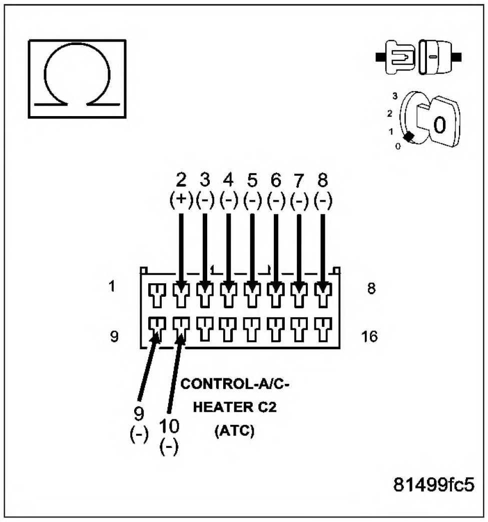
Is the resistance below 10k ohms between the (C266) Front Mode Door Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C266) Front Mode Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

5. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS



Measure the resistance between the (C66) Front Mode Door Common Driver circuit and the (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance below 10k ohms between the (C66) Front Mode Door Common Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C66) Front Mode Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1041–PANEL MODE DOOR 1 CONTROL CIRCUIT LOW (ATC) (CONTINUED)

6. RUN THE ACTUATOR DTC DETECTION TEST

Reconnect the A/C Heater Control C2 harness connector.

Reconnect the Front Mode Door Actuator harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B1041–PANEL MODE DOOR 1 CONTROL CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

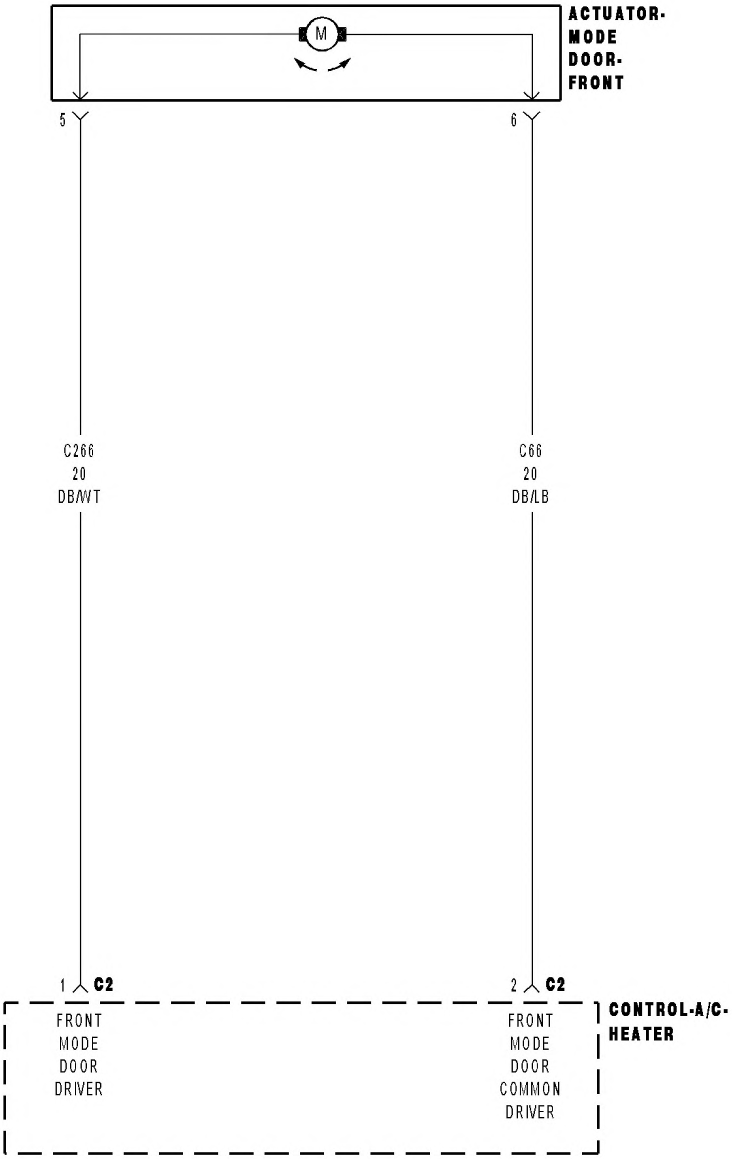
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

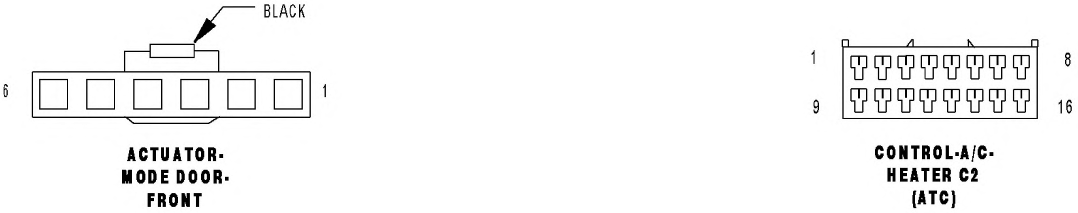
No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1042–PANEL MODE DOOR 1 CONTROL CIRCUIT HIGH (ATC)


ACTUATOR-MODE DOOR-FRONT
M
5
6
C266
20
DB/WT
C66
20
DB/LB
1 C2
2 C2
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
CONTROL-A/C-HEATER


BLACK
6
1
ACTUATOR-MODE DOOR-FRONT
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
8149a420

B1042–PANEL MODE DOOR 1 CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C266) Front Mode Door Driver circuit or the (C66) Front Mode Door Common Driver circuit is shorted to voltage.

Possible Causes
(C266) FRONT MODE DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT SHORTED TO VOLTAGE
A/C HEATER CONTROL

Diagnostic Test

1. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT & THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

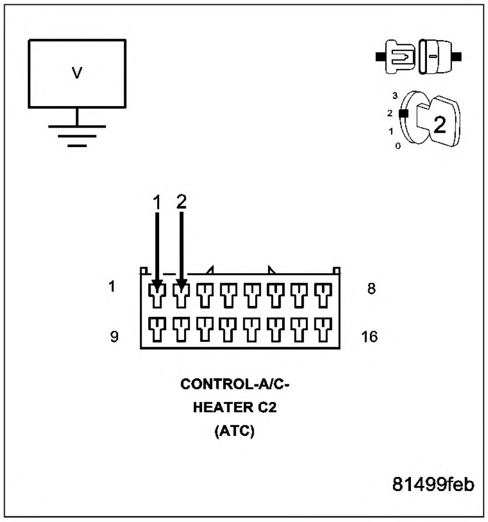
Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C266) Front Mode Door Driver circuit.

Measure the voltage of the (C66) Front Mode Door Common Driver circuit.



Is the voltage above 0.2 volts on either circuit?

Yes >> Repair the circuit(s) with voltage above 0.2 volts a short to voltage.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B1042–PANEL MODE DOOR 1 CONTROL CIRCUIT HIGH (ATC) (CONTINUED)

2. RUN THE ACTUATOR DTC DETECTION TEST

Turn the ignition off.

Reconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B1042–PANEL MODE DOOR 1 CONTROL CIRCUIT HIGH?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

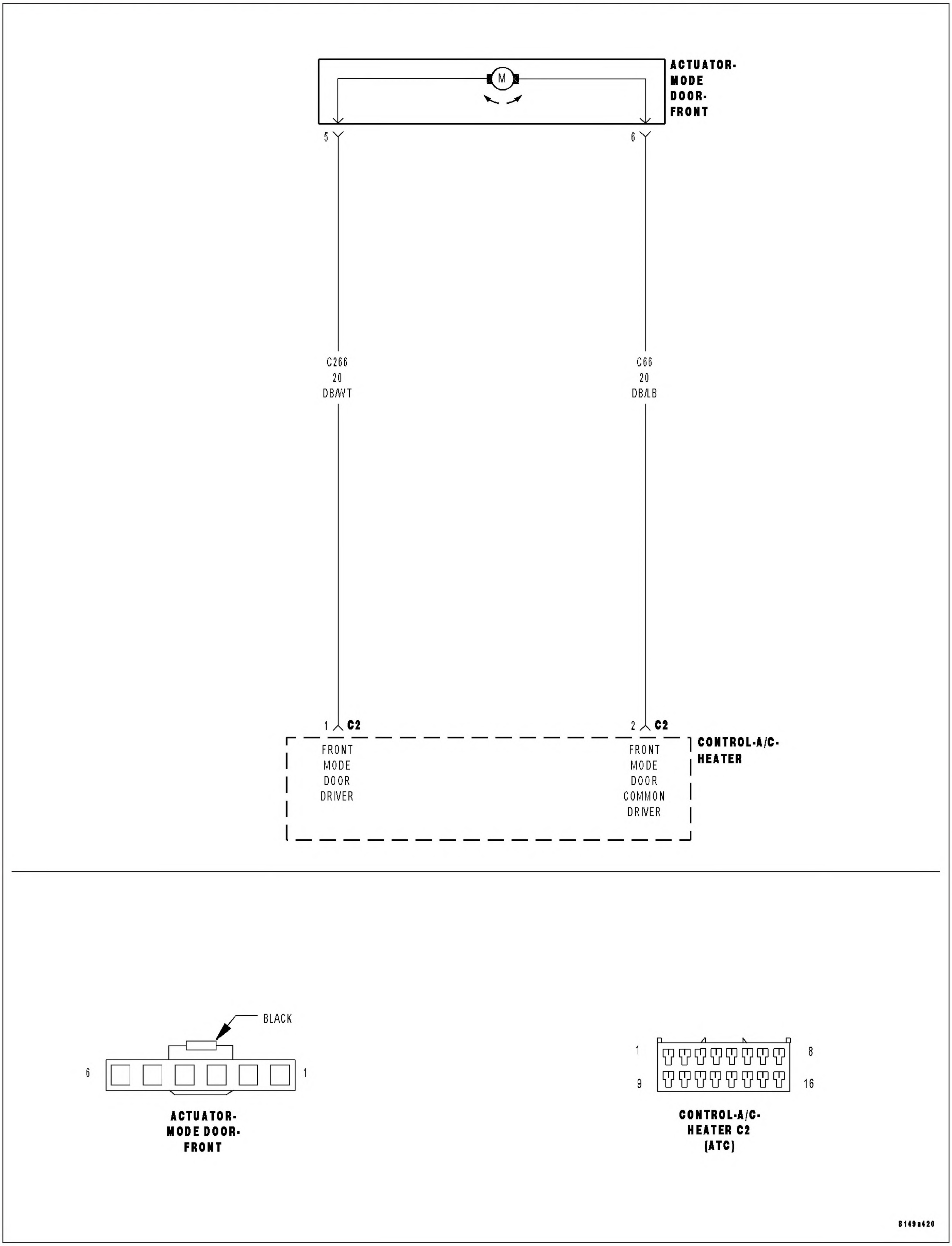
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1043–PANEL MODE DOOR 1 CONTROL CIRCUIT OPEN (ATC)


M
ACTUATOR-MODE DOOR-FRONT
5
6
C266
20
DB/WT
C66
20
DB/LB
1 C2
2 C2
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
CONTROL-A/C-HEATER
BLACK
6
1
ACTUATOR-MODE DOOR-FRONT
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
8149a420

B1043–PANEL MODE DOOR 1 CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the (C266) Front Mode Door Driver circuit or the (C66) Front Mode Door Common Driver circuit is open.

Possible Causes
(C266) FRONT MODE DOOR DRIVER CIRCUIT OPEN
(C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT OPEN
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. CHECK THE FRONT MODE DOOR ACTUATOR CIRCUIT RESISTANCE

Turn the ignition off.

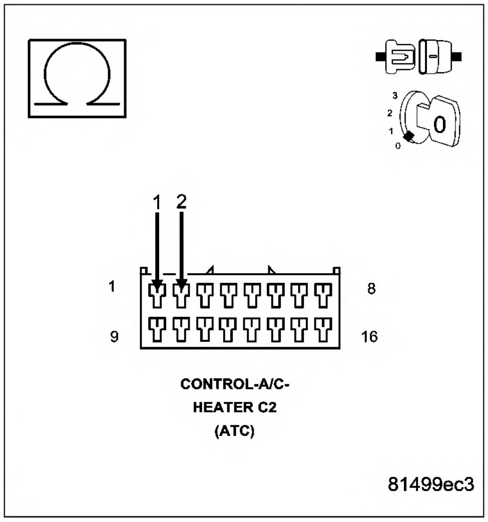
Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C266) Front Mode Door Driver circuit and the (C66) Front Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.

Is the resistance above 70.0 ohms?

Yes >> Go To 3

No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

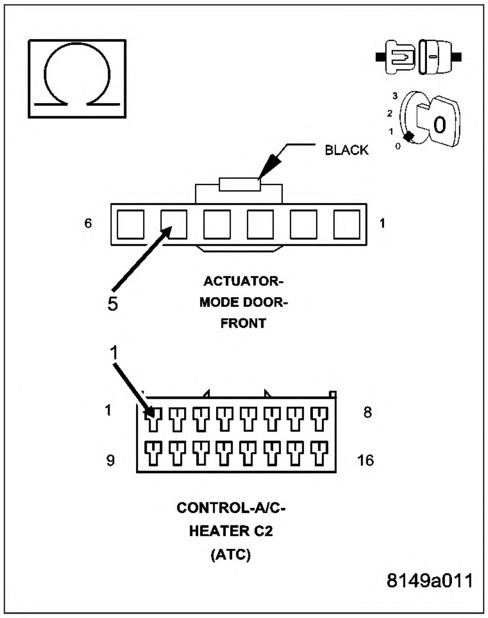


B1043–PANEL MODE DOOR 1 CONTROL CIRCUIT OPEN (ATC) (CONTINUED)

3. CHECK THE (C266) FRONT MODE DOOR DRIVER CIRCUIT FOR AN OPEN

Disconnect the Front Mode Door Actuator harness connector.

Measure the resistance of the (C266) Front Mode Door Driver circuit between the Front Mode Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
6
1
5
ACTUATOR-
MODE DOOR-
FRONT
1
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a011

Is the resistance below 5.0 ohms?

Yes >> Go To 4

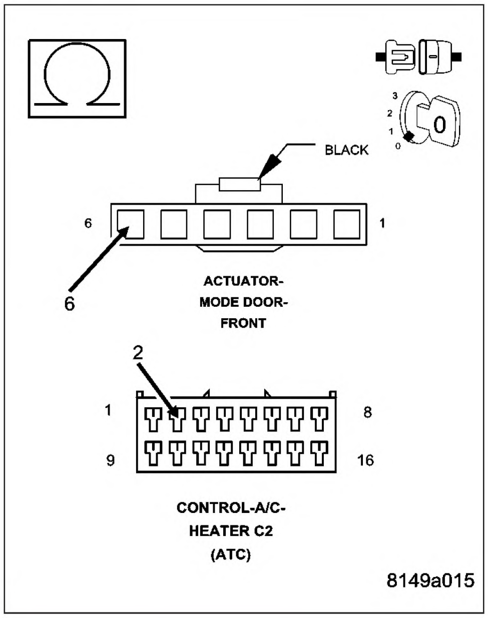
No >> Repair the (C266) Front Mode Door Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK THE (C66) FRONT MODE DOOR COMMON DRIVER CIRCUIT FOR AN OPEN

Measure the resistance of the (C66) Front Mode Door Common Driver circuit between the Front Mode Door Actuator harness connector and the A/C Heater Control C2 harness connector.


BLACK
6
1
6
ACTUATOR-
MODE DOOR-
FRONT
2
1
8
9
16
CONTROL-A/C-
HEATER C2
(ATC)
8149a015

Is the resistance below 5.0 ohms?

No >> Replace the Front Mode Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Yes >> Repair the (C66) Front Mode Door Common Driver circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1044–PANEL MODE DOOR 1 TRAVEL RANGE TOO SMALL (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value is less than the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Front Mode Door is less than the low range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
FRONT MODE DOOR SEIZED, BINDING, OBSTRUCTED
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B1044–PANEL MODE DOOR 1 TRAVEL RANGE TOO SMALL (ATC) (CONTINUED)

3. INSPECT ACTUATOR & HOUSING ASSEMBLY FOR A CONDITION CAUSING THE FRONT MODE DOOR TO SEIZE OR BIND

Turn the ignition off.

Inspect the actuator, linkage, and housing assembly for a condition causing the front mode door to seize or bind.

Are there any physical or mechanical problems with the door, housing, linkage, or actuator?

Yes >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK FRONT MODE DOOR TRAVEL

Remove the Front Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the door in both directions. The door should operate smoothly in both directions over the entire span of travel (approximately 350 degrees).

Does the door operate smoothly in both directions over the entire span of travel?

Yes >> Replace the Front Mode Door Actuator in accordance with the Service Information. Then, Go To 5.

No >> Repair as necessary in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

5. RUN THE ACTUATOR CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B1044–PANEL MODE DOOR 1 TRAVEL RANGE TOO SMALL?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1045–PANEL MODE DOOR 1 TRAVEL RANGE TOO LARGE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control calibrates each actuator individually. Automatic calibration occurs upon power up after installing a new A/C Heater Control. Manual calibration occurs by sending a command with the scan tool. The purpose of actuator calibration is to determine the total span of door travel between physical stops. To calibrate the actuator, the A/C Heater Control first moves the door to its soft stop, and then counts the number of pulses it takes to move the door to its other stop. An expected range of span is stored in the control's memory. If the measured calibration value exceeds the expected range for this actuator, this DTC will set. Note that the control clears all stored calibration faults at the beginning of the calibration procedure.

- **When Monitored:**
  During actuator calibration.
- **Set Condition:**
  If the total span of the Front Mode Door exceeds the high range limit.

Possible Causes
DOOR DRIVER ELECTRICAL CIRCUIT(S)
FRONT MODE DOOR OR A/C HEATER HOUSING COMPONENTS WARPED, WORN, DAMAGED, MISSING, BROKEN
FRONT MODE DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

1. CHECK FOR ACTIVE CONTROL CIRCUIT/PERFORMANCE & CONTROL CIRCUIT OPEN DTCs

Turn the ignition on.

With the scan tool, read active HVAC DTCs.

Does the scan tool display any active: XXXX CONTROL CIRCUIT/PERFORMANCE or XXXX CONTROL CIRCUIT OPEN DTCs?

Yes >> Diagnose and repair the DTC(s). If present, diagnose and repair all Control Circuit/Performance DTCs before diagnosing Control Circuit Open DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 2

---

2. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool in HVAC, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs first, all short low DTCs second, and all open DTCs last. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> Go To 3

B1045–PANEL MODE DOOR 1 TRAVEL RANGE TOO LARGE (ATC) (CONTINUED)

3. CHECK FOR A BROKEN FRONT MODE DOOR ACTUATOR

Turn the ignition off.

Remove the Front Mode Door Actuator from the A/C Heater Housing Assembly.

By hand, attempt to rotate the actuator in both directions.

Does the actuator turn in either direction?

Yes >> Replace the Front Mode Door Actuator in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

---

4. CHECK THE FRONT MODE DOOR & A/C HEATER HOUSING FOR WARPED, WORN, DAMAGED, MISSING, & BROKEN COMPONENTS

Inspect for excessively worn, disconnected, missing, or broken door linkage. Inspect for a damaged or broken A/C Heater Housing Assembly. Inspect for a warped or broken door, and missing door seals. Rotate the door from stop to stop. The door should rotate approximately 350 degrees.

Are there any physical or mechanical problems with the door or housing?

Yes >> Repair as necessary in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Front Mode Door Actuator in accordance with the Service Information. Then, Go To 5.

---

5. RUN THE ACTUATOR THE CALIBRATION TEST

Turn the ignition on.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display: B1045–PANEL MODE DOOR 1 TRAVEL RANGE TOO LARGE?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1058–RECIRCULATION DOOR CONTROL CIRCUIT/PERFORMANCE (ATC)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The A/C Heater Control monitors the door driver circuits during actuator operation for shorts to ground, shorts to battery, and shorts to other door driver circuits. If detected, the A/C Heater Control reports these types of faults as Control Circuit/Performance DTCs. It is important to note that Control Circuit/Performance DTCs do not indicate where or what type of short is present and that additional system testing is necessary to provide more details about the reported fault.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control detects an excessive current draw on the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C268) Recirculation Door Driver circuit, (C68) Recirculation Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, or the (C939) Rear Mode Door Common Driver circuit while attempting to drive the Recirculation Door Actuator.

Possible Causes
DOOR DRIVER CIRCUIT(S) SHORTED

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. RUN THE ACTUATOR DTC DETECTION TEST

With the scan tool, erase HVAC DTCs.

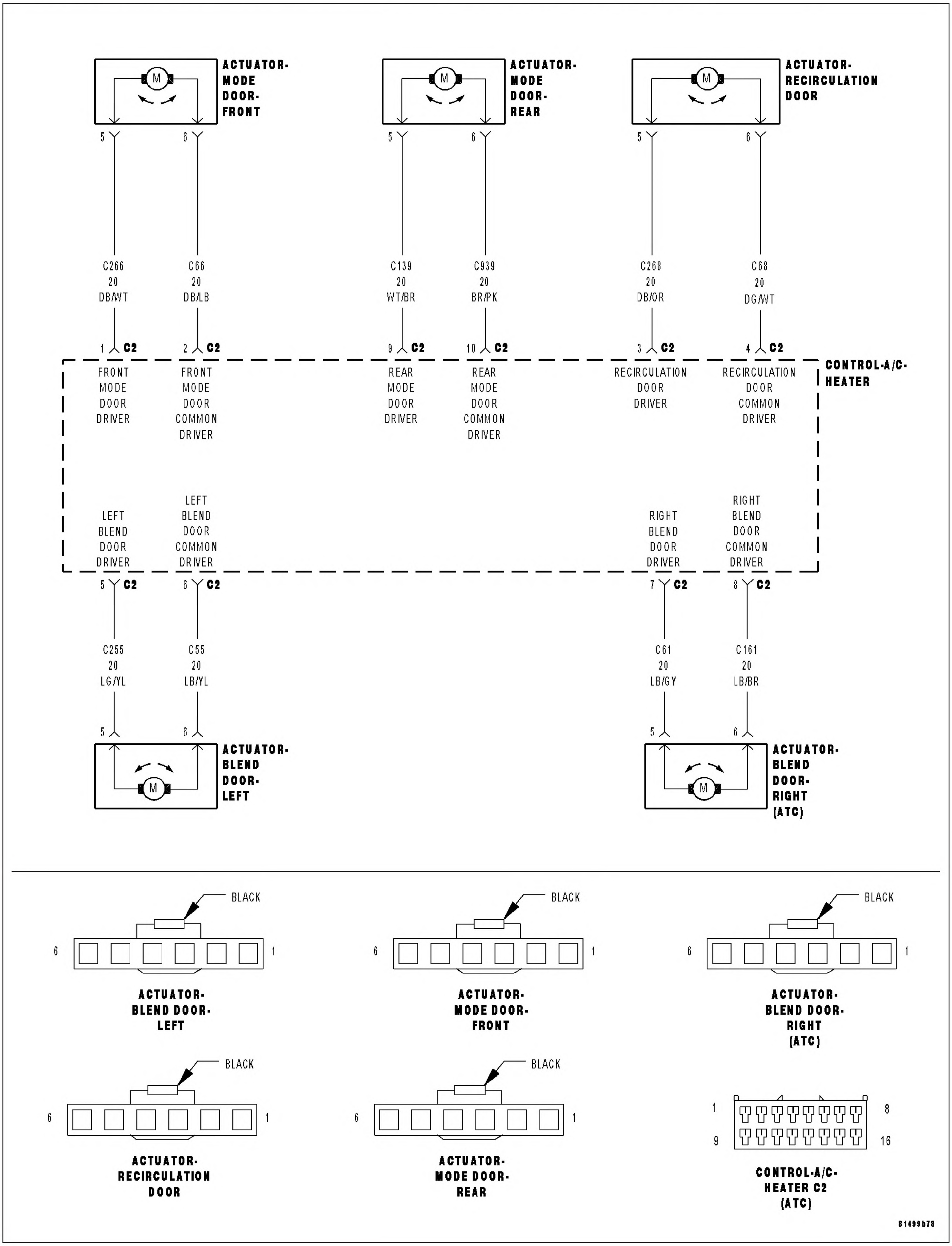
Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Repair

Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

B1059–RECIRCULATION DOOR CONTROL CIRCUIT LOW (ATC)


ACTUATOR-MODE DOOR-FRONT
ACTUATOR-MODE DOOR-REAR
ACTUATOR-RECIRCULATION DOOR
M
5
6
C266 20 DB/WT
C66 20 DB/LB
C139 20 WT/BR
C939 20 BR/PK
C268 20 DB/OR
C68 20 DG/WT
1 C2
2 C2
9 C2
10 C2
3 C2
4 C2
CONTROL-A/C-HEATER
FRONT MODE DOOR DRIVER
FRONT MODE DOOR COMMON DRIVER
REAR MODE DOOR DRIVER
REAR MODE DOOR COMMON DRIVER
RECIRCULATION DOOR DRIVER
RECIRCULATION DOOR COMMON DRIVER
LEFT BLEND DOOR DRIVER
LEFT BLEND DOOR COMMON DRIVER
RIGHT BLEND DOOR DRIVER
RIGHT BLEND DOOR COMMON DRIVER
5 C2
6 C2
7 C2
8 C2
C255 20 LG/YL
C55 20 LB/YL
C61 20 LB/GY
C161 20 LB/BR
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
BLACK
6
1
ACTUATOR-BLEND DOOR-LEFT
ACTUATOR-MODE DOOR-FRONT
ACTUATOR-BLEND DOOR-RIGHT (ATC)
ACTUATOR-RECIRCULATION DOOR
ACTUATOR-MODE DOOR-REAR
1
8
9
16
CONTROL-A/C-HEATER C2 (ATC)
81499b78

B1059–RECIRCULATION DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  When the Actuator DTC Detection Test is executed.
- **Set Condition:**
  If the (C268) Recirculation Door Driver circuit or the (C68) Recirculation Door Common Driver circuit is shorted to ground.

Possible Causes
(C268) RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO GROUND
(C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT SHORTED TO GROUND
(C268) RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT
(C268) RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
(C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT SHORTED TO OTHER DOOR DRIVER CIRCUIT(S)
RECIRCULATION DOOR ACTUATOR
A/C HEATER CONTROL

Diagnostic Test

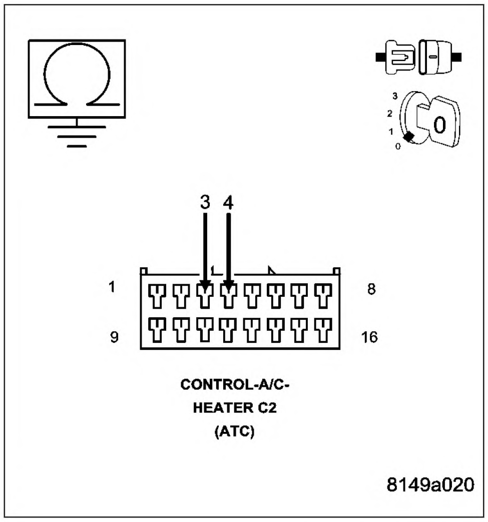
1. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT & THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance of the (C268) Recirculation Door Driver circuit between ground and the A/C Heater Control C2 harness connector.

Measure the resistance of the (C68) Recirculation Door Common Driver circuit between ground and the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms on either circuit?

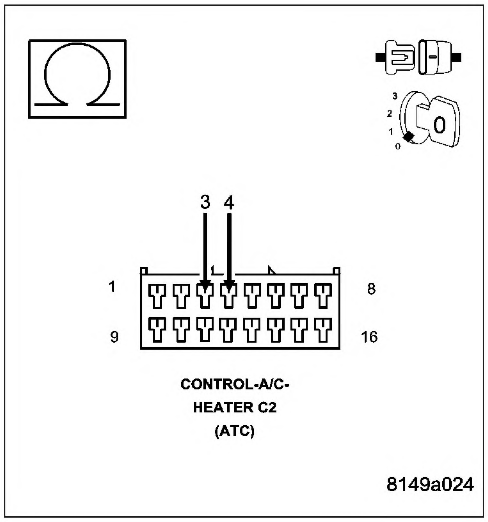
Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to ground.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

B1059–RECIRCULATION DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK THE RECIRCULATION DOOR ACTUATOR CIRCUIT RESISTANCE

Measure the resistance between the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 30.0 ohms?

Yes >> Go To 3

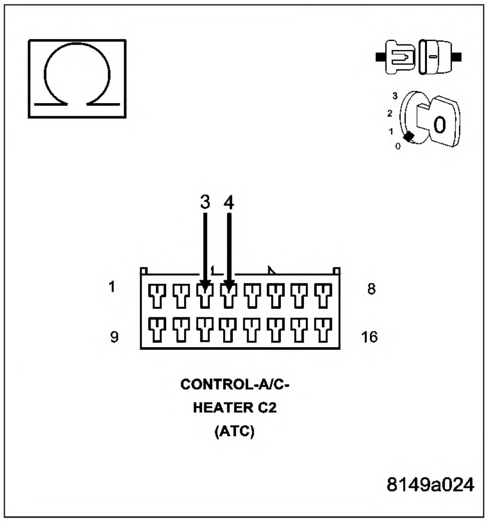
No >> Go To 4

---

3. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT FOR A SHORT TO THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT

Disconnect the Recirculation Door Actuator harness connector.

Measure the resistance between the (C268) Recirculation Door Driver circuit and the (C68) Recirculation Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (C268) Recirculation Door Driver circuit for a short to the (C68) Recirculation Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

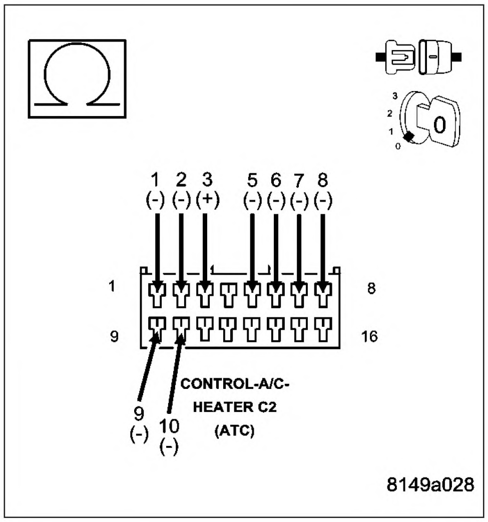
No >> Replace the Recirculation Door Actuator in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1059–RECIRCULATION DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

4. CHECK THE (C268) RECIRCULATION DOOR DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS

Measure the resistance between the (C268) Recirculation Door Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms between the (C268) Recirculation Door Driver circuit and any of the other door driver circuits?

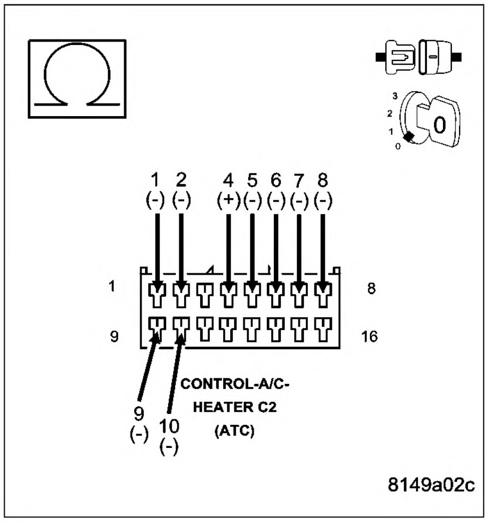
Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C268) Recirculation Door Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

5. CHECK THE (C68) RECIRCULATION DOOR COMMON DRIVER CIRCUIT FOR A SHORT TO OTHER DOOR DRIVER CIRCUITS

Measure the resistance between the (C68) Recirculation Door Common Driver circuit and the (C266) Front Mode Door Driver circuit, (C66) Front Mode Door Common Driver circuit, (C255) Left Blend Door Driver circuit, (C55) Left Blend Door Common Driver circuit, (C61) Right Blend Door Driver circuit, (C161) Right Blend Door Common Driver circuit, (C139) Rear Mode Door Driver circuit, and the (C939) Rear Mode Door Common Driver circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10k ohms between the (C68) Recirculation Door Common Driver circuit and any of the other door driver circuits?

Yes >> Repair the circuit(s) with a resistance below 10k ohms for a short to the (C68) Recirculation Door Common Driver circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

B1059–RECIRCULATION DOOR CONTROL CIRCUIT LOW (ATC) (CONTINUED)

6. RUN THE ACTUATOR DTC DETECTION TEST

Reconnect the A/C Heater Control C2 harness connector.

Reconnect the Recirculation Door Actuator harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and then turn the ignition on.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool only display: B1059–RECIRCULATION DOOR CONTROL CIRCUIT LOW?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No, Other DTC(s) Displayed

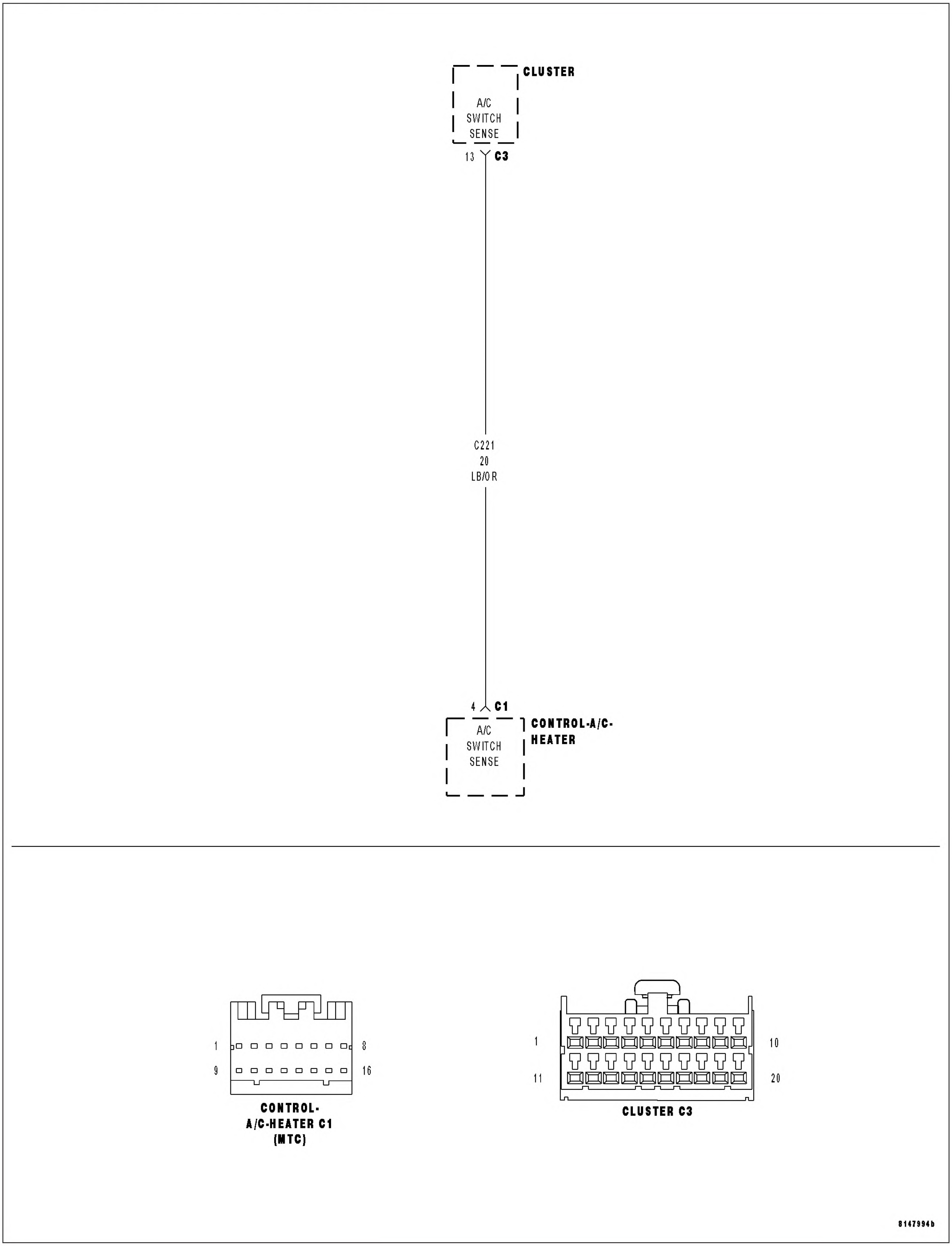
Diagnose and repair the other DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs before diagnosing short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No, And No Other DTCs Displayed

Using the wiring diagram as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1082–HVAC MUX CIRCUIT LOW


CLUSTER
A/C
SWITCH
SENSE
13
C3
C221
20
LB/OR
4
C1
A/C
SWITCH
SENSE
CONTROL-A/C-
HEATER
1
8
9
16
CONTROL-
A/C-HEATER C1
(MTC)
1
10
11
20
CLUSTER C3
8147994b

B1082–HVAC MUX CIRCUIT LOW (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Instrument Cluster (CCN) detects voltage below 0.55 volts for 10 seconds on the (C221) A/C Switch Sense circuit.

Possible Causes
(C221) A/C SWITCH SENSE CIRCUIT SHORTED TO GROUND
INSTRUMENT CLUSTER (CCN)
A/C HEATER CONTROL

Diagnostic Test

1. VERIFY DTC B1082–HVAC MUX CIRCUIT LOW IS ACTIVE

Turn the ignition on.

With the scan tool, erase CCN DTCs.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

With the scan tool, read CCN DTCs.

Does the scan tool display active: B1082–HVAC MUX CIRCUIT LOW?

Yes >> Go To 2

No >> Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also, inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

2. CHECK FOR DTC B1082–HVAC MUX CIRCUIT LOW WITH A/C HEATER CONTROL C1 HARNESS CONNECTOR DISCONNECTED

Turn the ignition off.

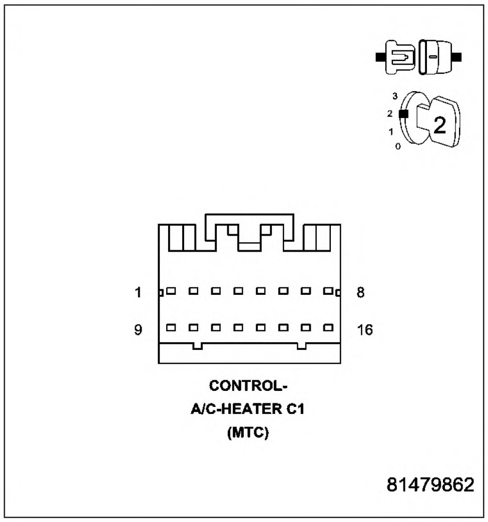
Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

With the scan tool, erase CCN DTCs.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

With the scan tool, read CCN DTCs.



Does the scan tool display: B1082–HVAC MUX CIRCUIT LOW?

Yes >> Go To 3

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

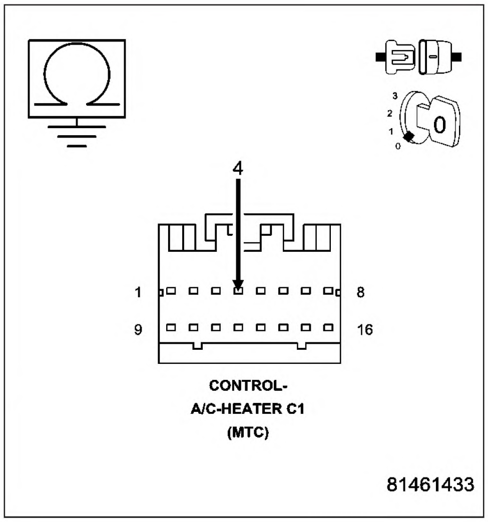
B1082–HVAC MUX CIRCUIT LOW (CONTINUED)

3. CHECK (C221) A/C SWITCH SENSE CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the Instrument Cluster C3 harness connector.

Measure the resistance of the (C221) A/C Switch Sense circuit between ground and the A/C Heater Control C1 harness connector.



Is the resistance below 10k ohms?

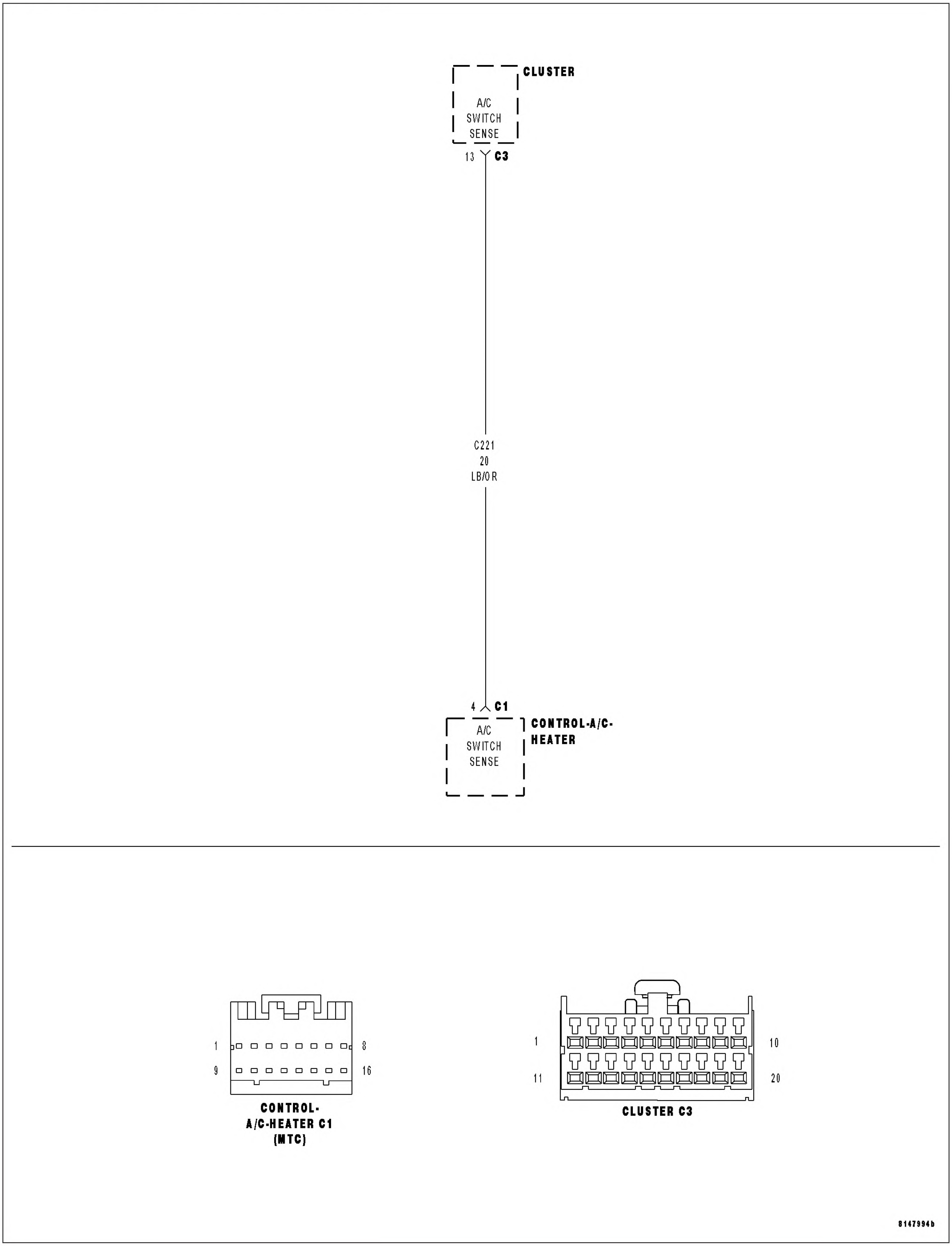
Yes >> Repair the (C221) A/C Switch Sense circuit for a short to ground.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Instrument Cluster (CCN) in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1083–HVAC MUX CIRCUIT HIGH


CLUSTER
A/C
SWITCH
SENSE
13
C3
C221
20
LB/OR
4
C1
CONTROL-A/C-
HEATER
A/C
SWITCH
SENSE
1
8
9
16
CONTROL-
A/C-HEATER C1
(MTC)
1
10
11
20
CLUSTER C3
8147994b

B1083–HVAC MUX CIRCUIT HIGH (CONTINUED)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the Instrument Cluster (CCN) detects voltage above 4.5 volts for 10 seconds on the (C221) A/C Switch Sense circuit.

Possible Causes
(C221) A/C SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
(C221) A/C SWITCH SENSE CIRCUIT OPEN
INSTRUMENT CLUSTER (CCN)
A/C HEATER CONTROL

Diagnostic Test

1. VERIFY DTC B1083–HVAC MUX CIRCUIT HIGH IS ACTIVE

Turn the ignition on.

With the scan tool, erase CCN DTCs.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

With the scan tool, read CCN DTCs.

Does the scan tool display active: B1083–HVAC MUX CIRCUIT HIGH?

Yes >> Go To 2

No >> Check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also, inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1083–HVAC MUX CIRCUIT HIGH (CONTINUED)

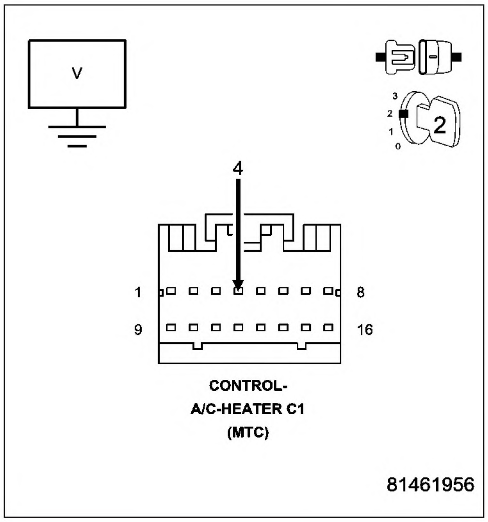
2. CHECK (C221) A/C SWITCH SENSE CIRCUIT VOLTAGE AT A/C HEATER CONTROL C1 HARNESS CONNECTOR

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

Measure the voltage of the (C221) A/C Switch Sense circuit.



What is the voltage?

Below 4.8 Volts
Go To 3

4.8 to 5.2 Volts
Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

Above 5.2 Volts
Go To 4

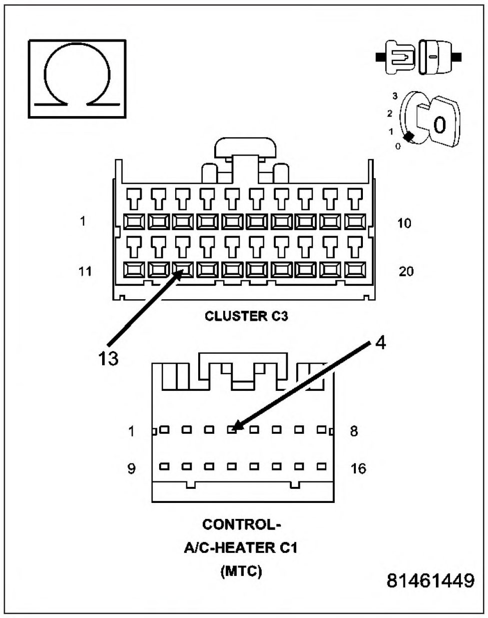
---

3. CHECK (C221) A/C SWITCH SENSE CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the Instrument Cluster C3 harness connector.

Measure the resistance of the (C221) A/C Switch Sense circuit between the A/C Heater Control C1 harness connector and the Instrument Cluster C3 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Replace the Instrument Cluster (CCN) in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C221) A/C Switch Sense circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1083–HVAC MUX CIRCUIT HIGH (CONTINUED)

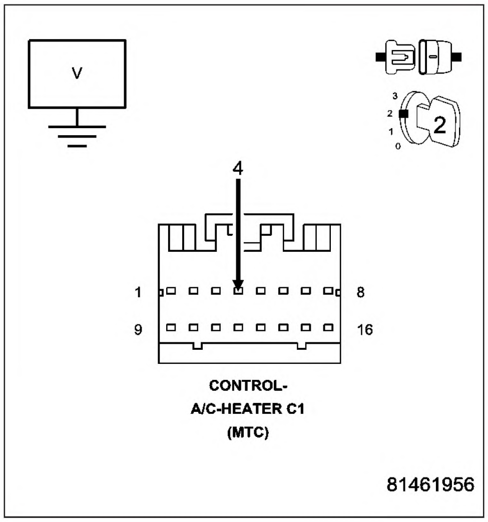
4. CHECK (C221) A/C SWITCH SENSE CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the Instrument Cluster C3 harness connector.

Turn the ignition on.

Measure the voltage of the (C221) A/C Switch Sense circuit.



Is the voltage above 0.2 volts?

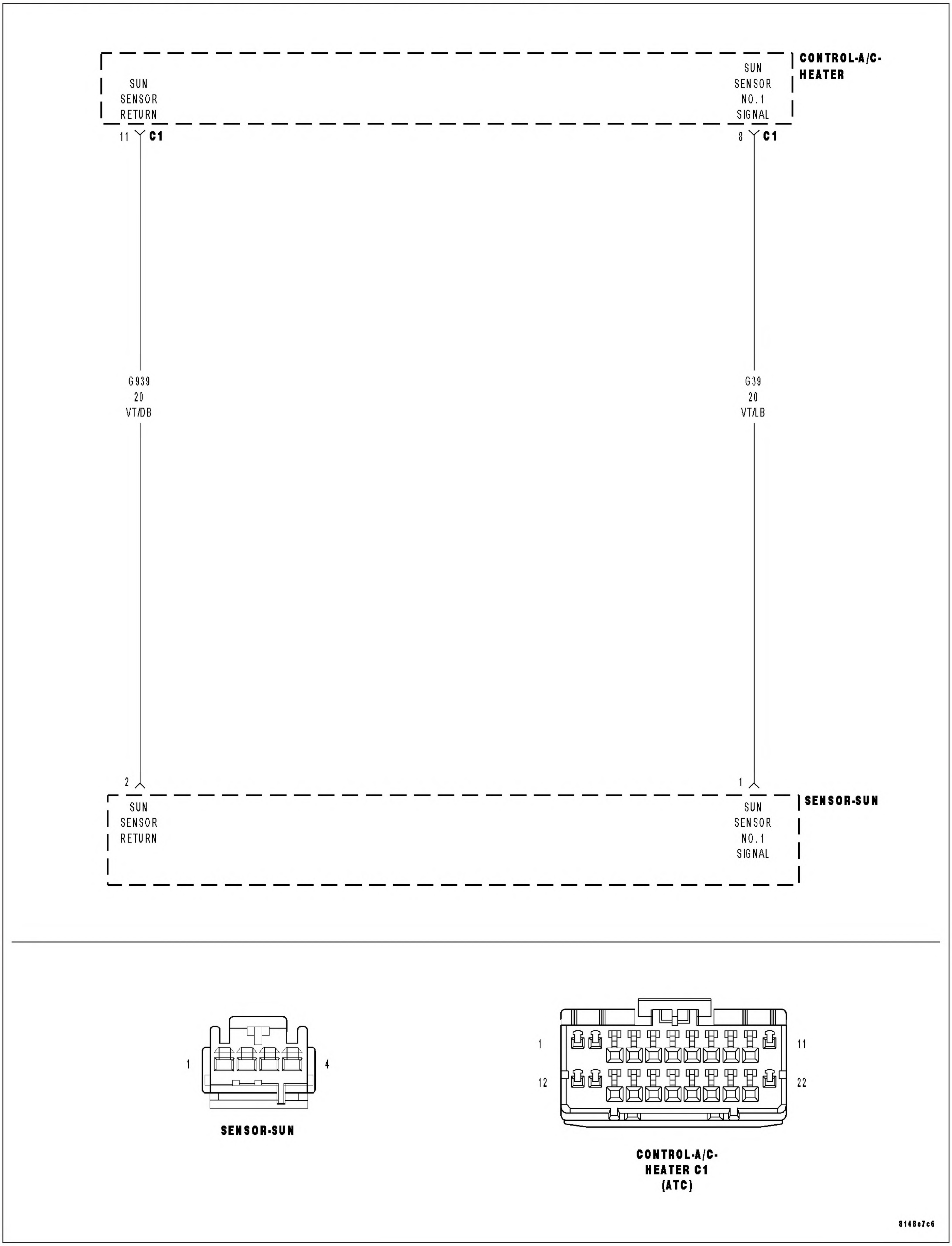
Yes >> Repair the (C221) A/C Switch Sense circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the Instrument Cluster (CCN) in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1601–LEFT SOLAR SENSOR CIRCUIT LOW (ATC)


CONTROL-A/C-
HEATER
SUN
SENSOR
RETURN
SUN
SENSOR
NO. 1
SIGNAL
11
C1
8
C1
G939
20
VT/DB
G39
20
VT/LB
2
1
SENSOR-SUN
SUN
SENSOR
RETURN
SUN
SENSOR
NO. 1
SIGNAL
1
4
SENSOR-SUN
1
11
12
22
CONTROL-A/C-
HEATER C1
(ATC)
8148e7c6

B1601–LEFT SOLAR SENSOR CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the Left Sunload Sensor input is out of range toward the low voltage threshold.

Possible Causes
(G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT SHORTED TO GROUND
(G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT SHORTED TO (G939) SUN SENSOR RETURN CIRCUIT
SUN SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. CHECK FOR DTC B1601–LEFT SOLAR SENSOR CIRCUIT LOW WITH SUN SENSOR HARNESS CONNECTOR DISCONNECTED

Turn the ignition off.

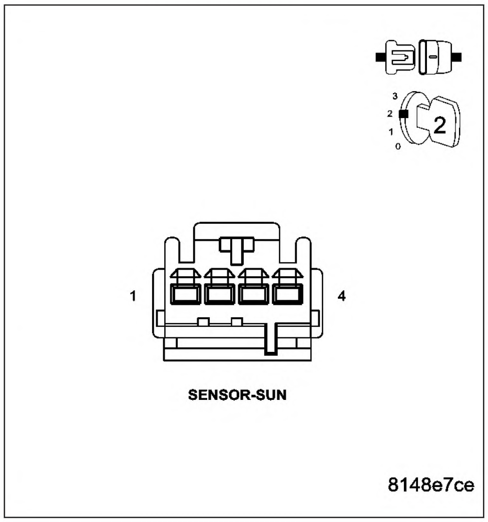
Disconnect the Sun Sensor harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

With the scan tool, read HVAC DTCs.



Does the scan tool display: B1601–LEFT SOLAR SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> Replace the Sun Sensor in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

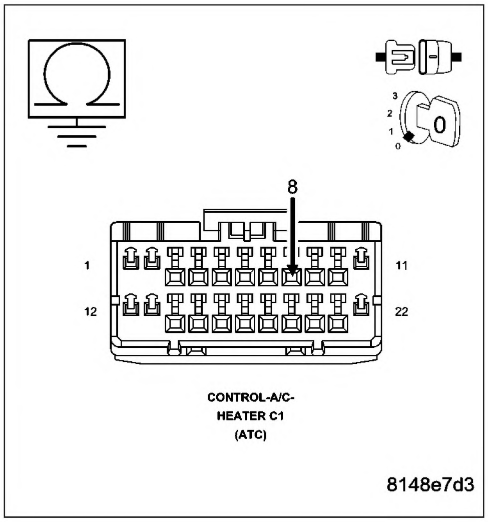
B1601–LEFT SOLAR SENSOR CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK (G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Measure the resistance of the (G39) Sun Sensor No. 1 Signal circuit between ground and the A/C Heater Control C1 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (G39) Sun Sensor No. 1 Signal circuit for a short to ground.

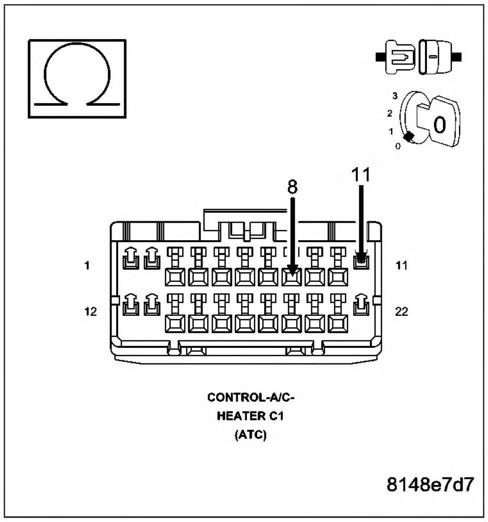
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

3. CHECK (G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT FOR A SHORT TO (G939) SUN SENSOR RETURN CIRCUIT

Measure the resistance between the (G39) Sun Sensor No. 1 Signal circuit and the (G939) Sun Sensor Return circuit in the A/C Heater Control C1 harness connector.



Is the resistance below 10k ohms?

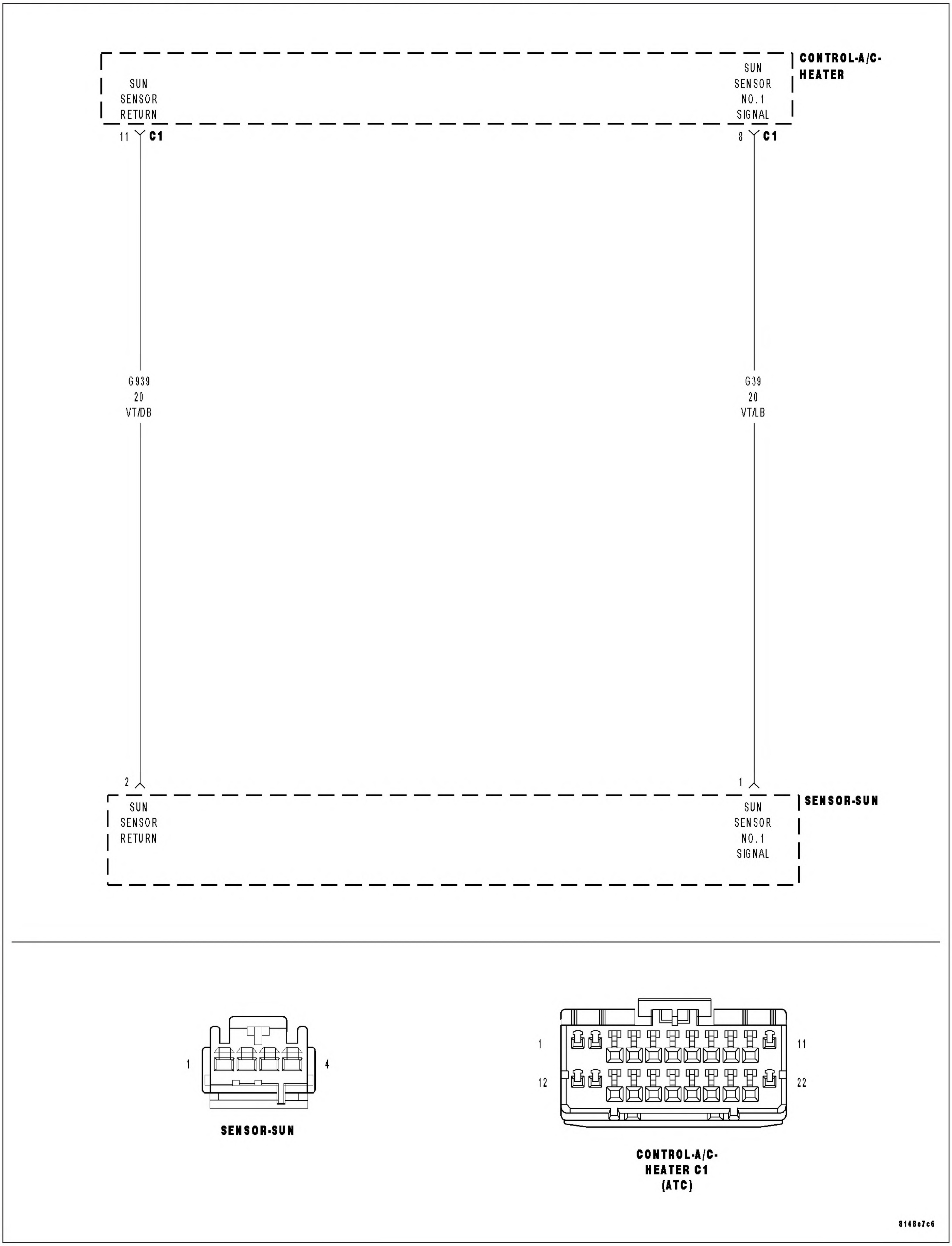
Yes >> Repair the (G39) Sun Sensor No. 1 Signal circuit for a short to the (G939) Sun Sensor Return circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1602–LEFT SOLAR SENSOR CIRCUIT HIGH (ATC)


CONTROL-A/C-
HEATER
SUN
SENSOR
RETURN
SUN
SENSOR
NO.1
SIGNAL
11
C1
8
C1
G939
20
VT/DB
G39
20
VT/LB
2
1
SENSOR-SUN
SUN
SENSOR
RETURN
SUN
SENSOR
NO.1
SIGNAL
1
4
SENSOR-SUN
1
11
12
22
CONTROL-A/C-
HEATER C1
(ATC)
8148e7c6

B1602–LEFT SOLAR SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the Left Sunload Sensor input is out of range toward the high voltage threshold.

Possible Causes
(G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT SHORTED TO VOLTAGE
(G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT OPEN
(G939) SUN SENSOR RETURN CIRCUIT OPEN
SUN SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

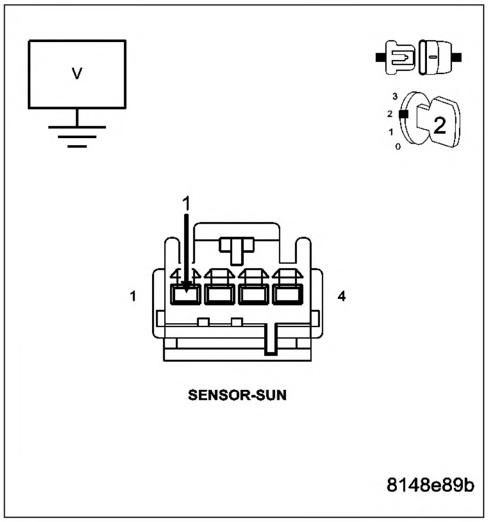
1. CHECK (G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT VOLTAGE

Turn the ignition off.

Disconnect the Sun Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (G39) Sun Sensor No. 1 Signal circuit.



What voltage is present?

Above 5.2 Volts
Go To 2

4.8 Volts to 5.2 Volts
Go To 3

Below 4.8 Volts
Go To 5

B1602–LEFT SOLAR SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

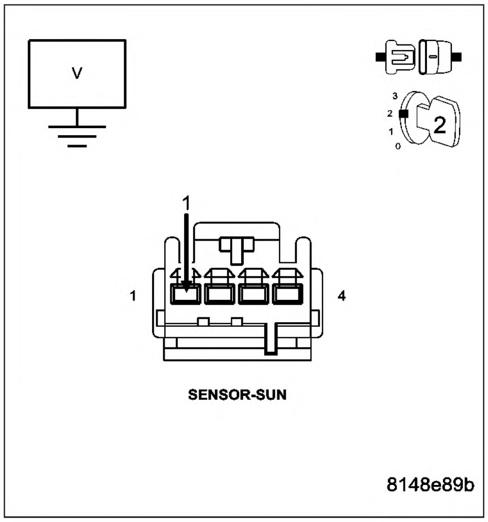
2. CHECK (G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

Measure the voltage of the (G39) Sun Sensor No. 1 Signal circuit.



8148e89b

Is the voltage above 0.2 volts?

Yes >> Repair the (G39) Sun Sensor No. 1 Signal circuit for a short to voltage.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

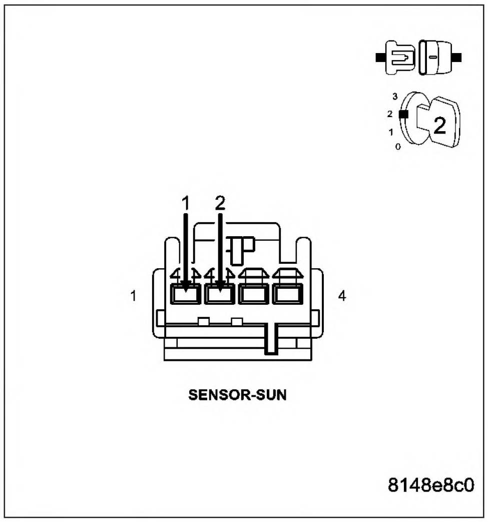
3. CHECK (G939) SUN SENSOR RETURN CIRCUIT FUNCTION

Turn the ignition off.

Connect a jumper wire between the (G39) Sun Sensor No. 1 Signal circuit and the (G939) Sun Sensor Return circuit in the Sun Sensor harness connector.

Turn the ignition on.

With the scan tool in HVAC, select Data Display and read the Left Solar Sensor voltage.



8148e8c0

Is the voltage below 0.2 volts?

Yes >> Replace the Sun Sensor in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

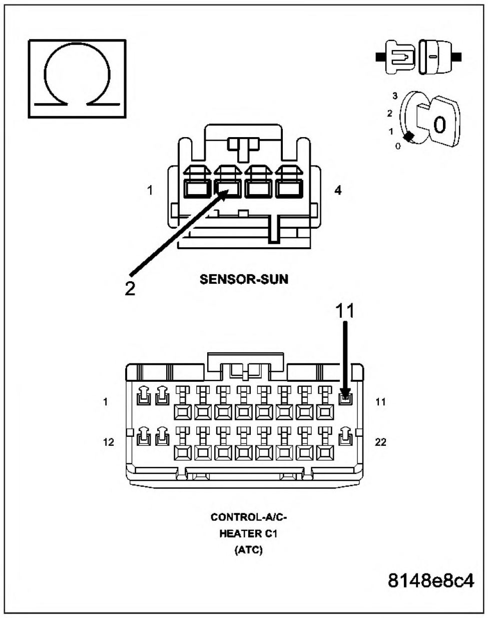
B1602–LEFT SOLAR SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

4. CHECK (G939) SUN SENSOR RETURN CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Measure the resistance of the (G939) Sun Sensor Return circuit between the Sun Sensor harness connector and the A/C Heater Control C1 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (G939) Sun Sensor Return circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

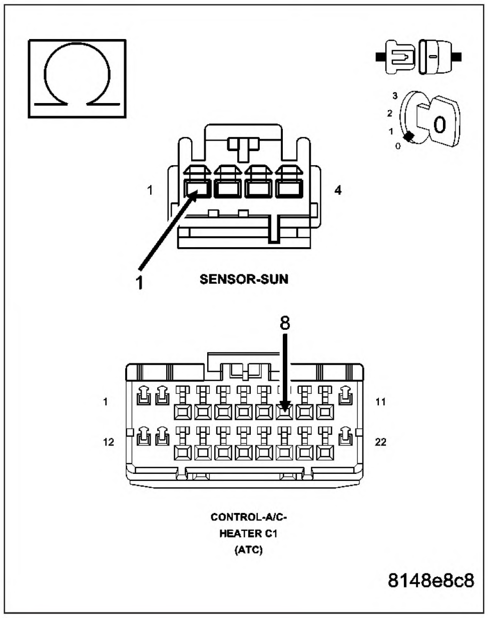
---

5. CHECK (G39) SUN SENSOR NO. 1 SIGNAL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Measure the resistance of the (G39) Sun Sensor No. 1 Signal circuit between the Sun Sensor harness connector and the A/C Heater Control C1 harness connector.



Is the resistance below 5.0 ohms?

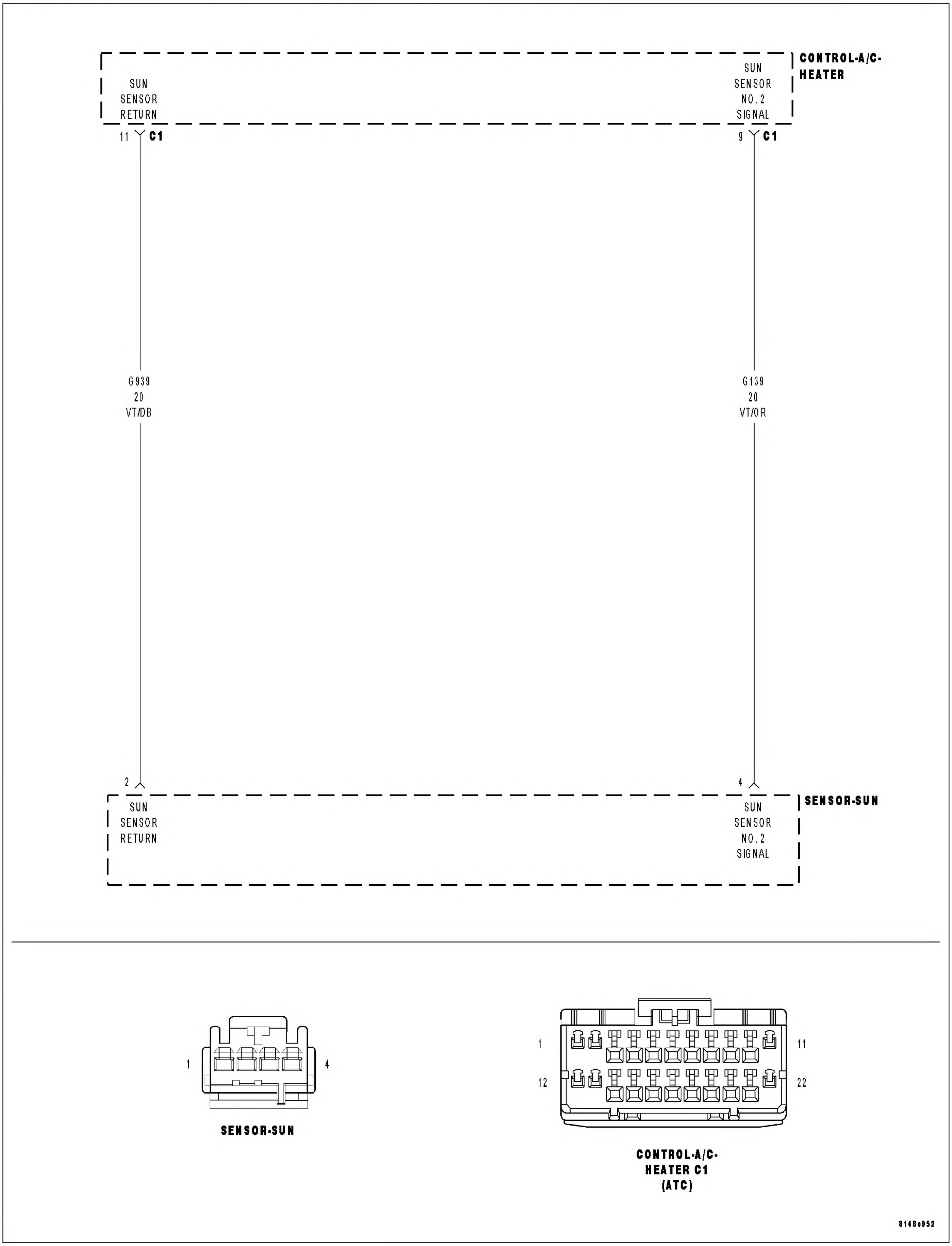
Yes >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (G39) Sun Sensor No. 1 Signal circuit for an open.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1604–RIGHT SOLAR SENSOR CIRCUIT LOW (ATC)


CONTROL-A/C-HEATER
SUN SENSOR RETURN
SUN SENSOR NO.2 SIGNAL
11 C1
9 C1
G939
20
VT/DB
G139
20
VT/OR
2
4
SENSOR-SUN
SUN SENSOR RETURN
SUN SENSOR NO.2 SIGNAL
1
4
SENSOR-SUN
1
11
12
22
CONTROL-A/C-HEATER C1 (ATC)
8148e952

B1604–RIGHT SOLAR SENSOR CIRCUIT LOW (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the Right Sunload Sensor input is out of range toward the low voltage threshold.

Possible Causes
(G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT SHORTED TO GROUND
(G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT SHORTED TO (G939) SUN SENSOR RETURN CIRCUIT
SUN SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

1. CHECK FOR DTC B1604–RIGHT SOLAR SENSOR CIRCUIT LOW WITH SUN SENSOR HARNESS CONNECTOR DISCONNECTED

Turn the ignition off.

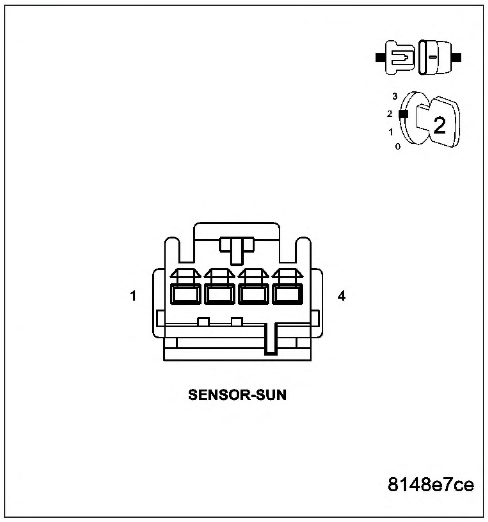
Disconnect the Sun Sensor harness connector.

Turn the ignition on.

With the scan tool, erase HVAC DTCs.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

With the scan tool, read HVAC DTCs.



Does the scan tool display: B1604–RIGHT SOLAR SENSOR CIRCUIT LOW?

Yes >> Go To 2

No >> Replace the Sun Sensor in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

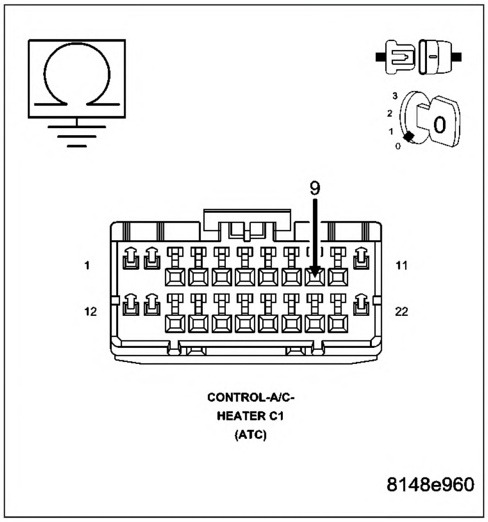
B1604–RIGHT SOLAR SENSOR CIRCUIT LOW (ATC) (CONTINUED)

2. CHECK (G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT FOR A SHORT TO GROUND

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Measure the resistance of the (G139) Sun Sensor No. 2 Signal circuit between ground and the A/C Heater Control C1 harness connector.



Is the resistance below 10k ohms?

Yes >> Repair the (G139) Sun Sensor No. 2 Signal circuit for a short to ground.

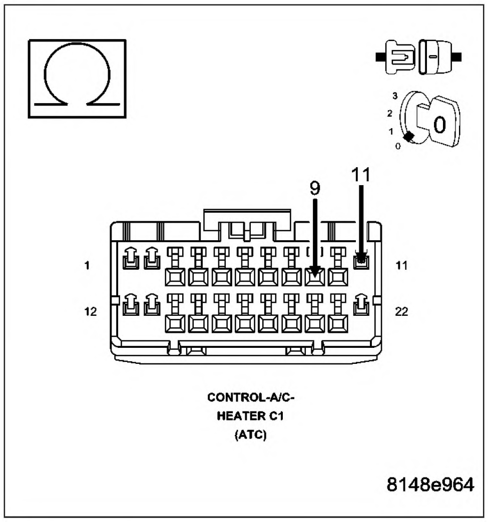
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

3. CHECK (G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT FOR A SHORT TO (G939) SUN SENSOR RETURN CIRCUIT

Measure the resistance between the (G139) Sun Sensor No. 2 Signal circuit and the (G939) Sun Sensor Return circuit in the A/C Heater Control C1 harness connector.



Is the resistance below 10k ohms?

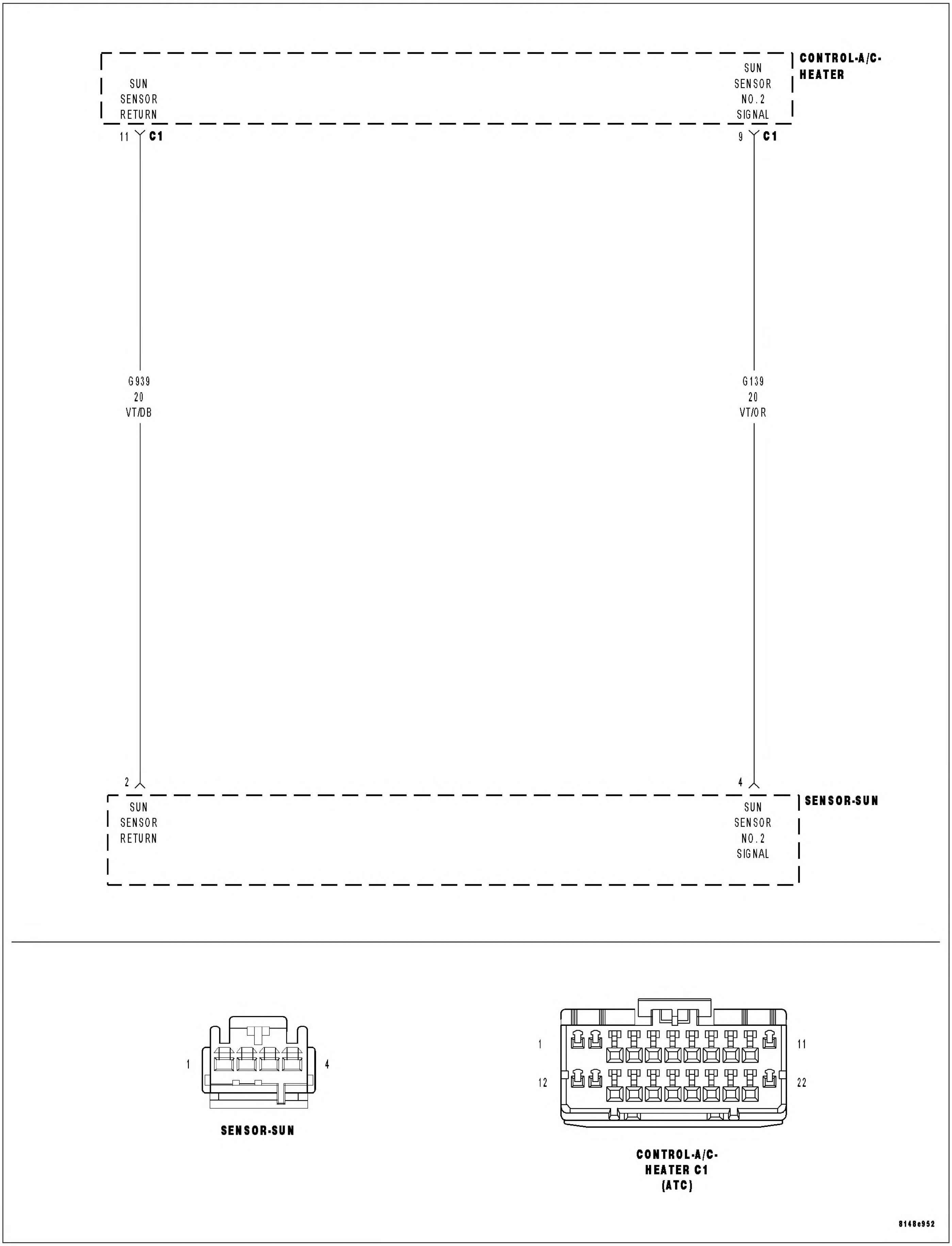
Yes >> Repair the (G139) Sun Sensor No. 2 Signal circuit for a short to the (G939) Sun Sensor Return circuit.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B1605–RIGHT SOLAR SENSOR CIRCUIT HIGH (ATC)


CONTROL-A/C-HEATER
SUN SENSOR RETURN
SUN SENSOR NO.2 SIGNAL
11 C1
9 C1
G939 20 VT/DB
G139 20 VT/OR
2
4
SENSOR-SUN
SUN SENSOR RETURN
SUN SENSOR NO.2 SIGNAL
1
4
SENSOR-SUN
1
11
12
22
CONTROL-A/C-HEATER C1 (ATC)
8148e952

B1605–RIGHT SOLAR SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With ignition on.
- **Set Condition:**
  If the Right Sunload Sensor input is out of range toward the high voltage threshold.

Possible Causes
(G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT SHORTED TO VOLTAGE
(G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT OPEN
(G939) SUN SENSOR RETURN CIRCUIT OPEN
SUN SENSOR
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

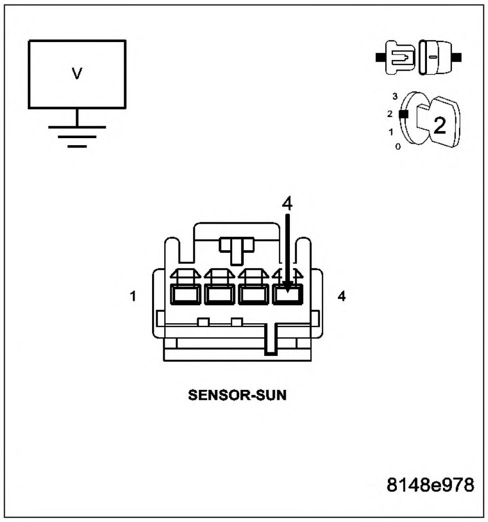
1. CHECK (G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT VOLTAGE

Turn the ignition off.

Disconnect the Sun Sensor harness connector.

Turn the ignition on.

Measure the voltage of the (G139) Sun Sensor No. 2 Signal circuit.



What voltage is present?

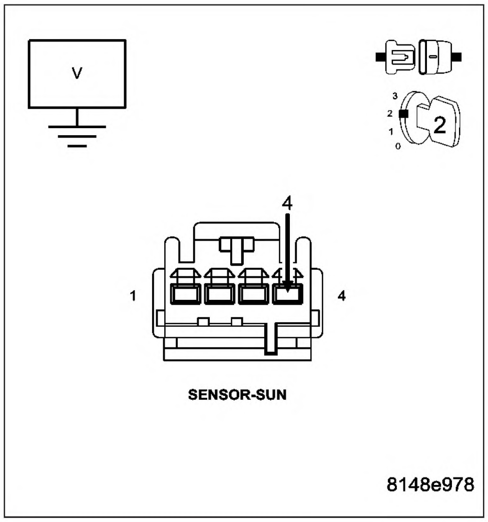
Above 5.2 Volts
Go To 2

4.8 Volts to 5.2 Volts
Go To 3

Below 4.8 Volts
Go To 5

B1605–RIGHT SOLAR SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

2. CHECK (G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE



Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Turn the ignition on.

Measure the voltage of the (G139) Sun Sensor No. 2 Signal circuit.

Is the voltage above 0.2 volts?

Yes >> Repair the (G139) Sun Sensor No. 2 Signal circuit for a short to voltage.

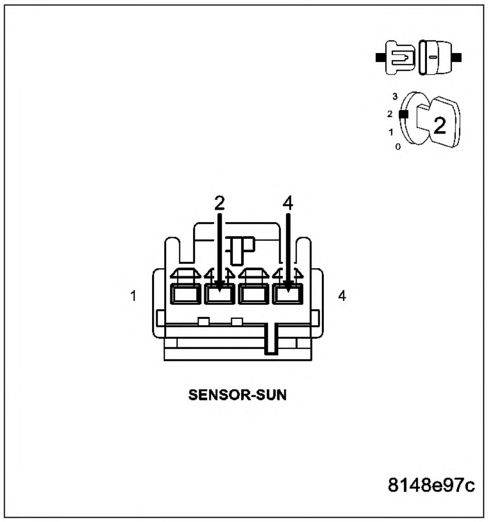
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

3. CHECK (G939) SUN SENSOR RETURN CIRCUIT FUNCTION



Turn the ignition off.

Connect a jumper wire between the (G139) Sun Sensor No. 2 Signal circuit and the (G939) Sun Sensor Return circuit in the Sun Sensor harness connector.

Turn the ignition on.

With the scan tool in HVAC, select Data Display and read the Right Solar Sensor voltage.

Is the voltage below 0.2 volts?

Yes >> Replace the Sun Sensor in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 4

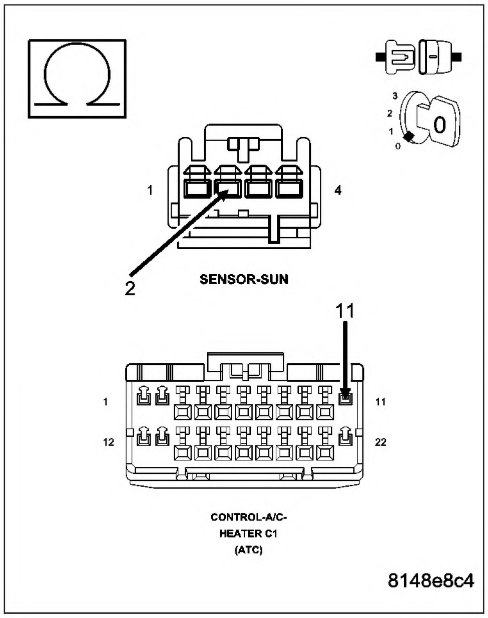
B1605–RIGHT SOLAR SENSOR CIRCUIT HIGH (ATC) (CONTINUED)

4. CHECK (G939) SUN SENSOR RETURN CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Measure the resistance of the (G939) Sun Sensor Return circuit between the Sun Sensor harness connector and the A/C Heater Control C1 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (G939) Sun Sensor Return circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

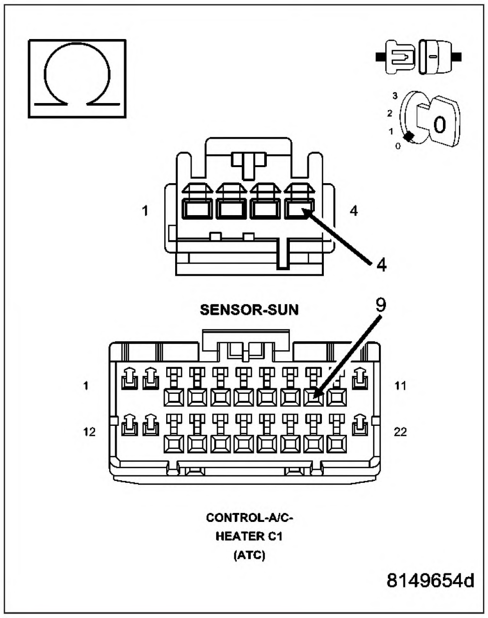
---

5. CHECK (G139) SUN SENSOR NO. 2 SIGNAL CIRCUIT FOR AN OPEN

Turn the ignition off.

Disconnect the A/C Heater Control C1 harness connector.

Measure the resistance of the (G139) Sun Sensor No. 2 Signal circuit between the Sun Sensor harness connector and the A/C Heater Control C1 harness connector.



Is the resistance below 5.0 ohms?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (G139) Sun Sensor No. 2 Signal circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

B2214–(HVAC) CLIMATE CONTROL INTERNAL (ATC)

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control has an internal fault.

Possible Causes
A/C HEATER CONTROL

NOTE: This DTC must be active for the results of this test to be valid. Do not perform this test if this DTC is stored. Refer to HVAC System Test (ATC) for stored DTC test procedures.

Diagnostic Test

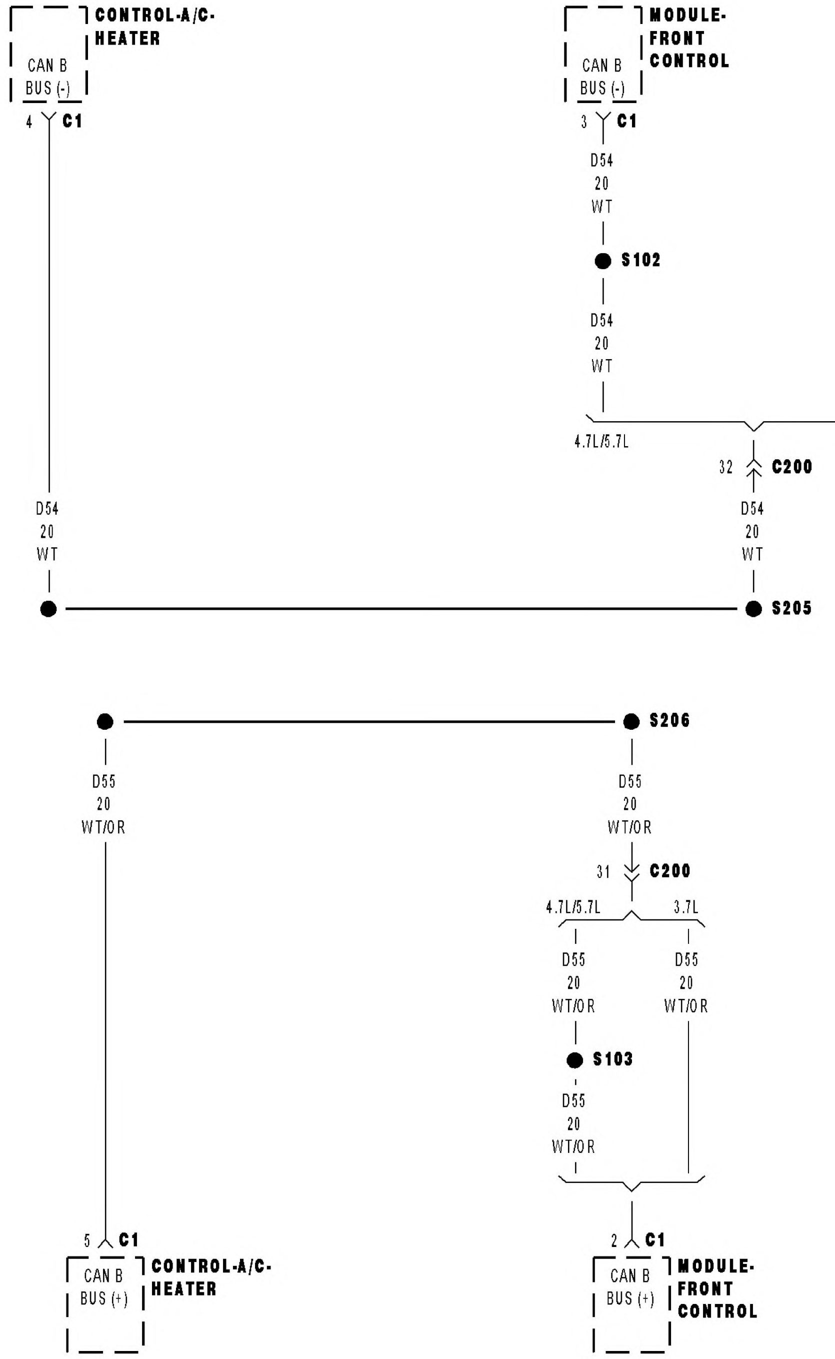
1. REPLACE THE A/C HEATER CONTROL

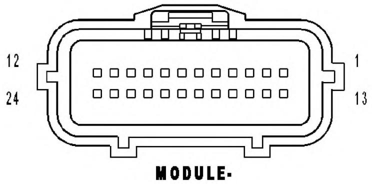
Repair

Replace the A/C Heater Control in accordance with the Service Information.

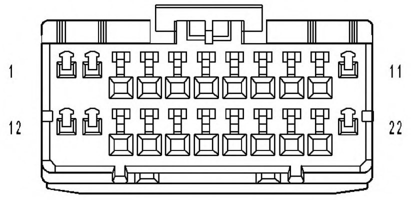
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0019–CAN B BUS (ATC)


CONTROL-A/C-HEATER
CAN B BUS (-)
4 C1
MODULE-FRONT CONTROL
CAN B BUS (-)
3 C1
MODULE-FRONT CONTROL
CAN B BUS (-)
3 C1
D54 20 WT
S102
D54 20 WT
D54 20 WT
4.7L/5.7L
3.7L
32 C200
D54 20 WT
D54 20 WT
S205
S206
D55 20 WT/OR
D55 20 WT/OR
31 C200
4.7L/5.7L
3.7L
D55 20 WT/OR
D55 20 WT/OR
S103
D55 20 WT/OR
5 C1
CAN B BUS (+)
CONTROL-A/C-HEATER
2 C1
CAN B BUS (+)
MODULE-FRONT CONTROL



MODULE-FRONT CONTROL C1



CONTROL-A/C-HEATER C1 (ATC)

81499b54

U0019–CAN B BUS (ATC) (CONTINUED)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  Continuously
- **Set Condition:**
  If the CAN B Bus (+) or CAN B Bus (-) circuit is open, shorted to voltage, or shorted to ground.

Possible Causes
ACTIVE U0019 CAN B BUS DTC IN FRONT CONTROL MODULE
(D55) CAN B BUS (+) CIRCUIT OPEN
(D54) CAN B BUS (-) CIRCUIT OPEN
A/C HEATER CONTROL

Diagnostic Test

1. VERIFY DTC U0019–CAN B BUS IS ACTIVE

Turn the ignition on.

With the scan tool, read HVAC DTCs.

Does the scan tool display active: U0019–CAN B BUS?

Yes >> Go To 2

No >> If the DTC is stored, check for an intermittent condition by inspecting the related wiring harness for chaffed, pierced, pinched, and partially broken wires. Also, inspect the related connectors for broken, bent, pushed out, spread, corroded, or contaminated terminals.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

2. CHECK FOR ACTIVE CAN B BUS RELATED DTCS IN THE FRONT CONTROL MODULE (FCM)

With the scan tool, read Front Control Module (FCM) DTCs

Does the scan tool display any active CAN B BUS related DTCs?

Yes >> Diagnose and repair the DTC(s). (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING).

No >> Go To 3

U0019–CAN B BUS (ATC) (CONTINUED)

3. CHECK (D55) CAN B BUS (+) CIRCUIT FOR AN OPEN

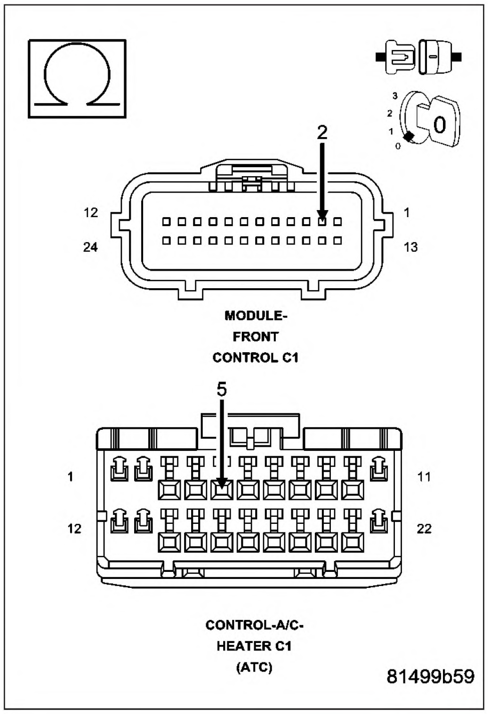
Turn the ignition off.

Disconnect the negative battery cable.

Disconnect the A/C Heater Control C1 harness connector.

Disconnect the Front Control Module (FCM) C1 harness connector.

Measure the resistance of the (D55) CAN B Bus (+) circuit between the Front Control Module C1 harness connector and the A/C Heater Control C1 harness connector.


2
12
1
24
13
MODULE-
FRONT
CONTROL C1
5
1
11
12
22
CONTROL-A/C-
HEATER C1
(ATC)
81499b59

Is the resistance below 2.0 ohms?

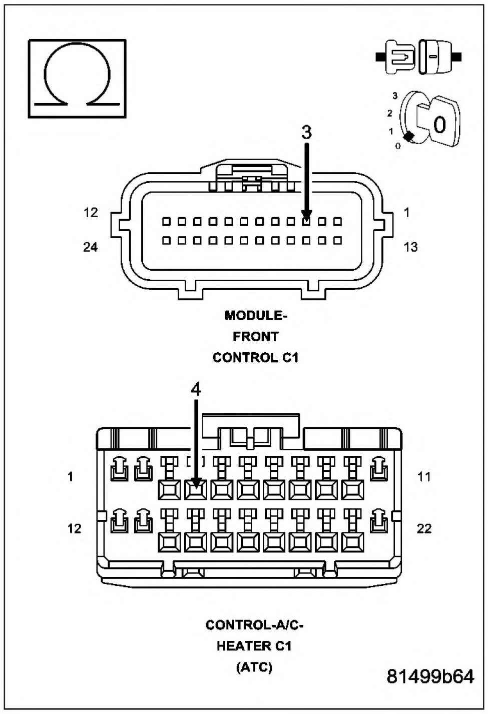
Yes >> Go To 4

No >> Repair the (D55) CAN B Bus (+) circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. CHECK (D54) CAN B BUS (–) CIRCUIT FOR AN OPEN

Measure the resistance of the (D54) CAN B Bus (–) circuit between the Front Control Module C1 connector and the A/C Heater Control C1 harness connector.


3
12
1
24
13
MODULE-
FRONT
CONTROL C1
4
1
11
12
22
CONTROL-A/C-
HEATER C1
(ATC)
81499b64

Is the resistance below 2.0 ohms?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (D54) CAN B Bus (–) circuit for an open.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

U0141–LOST COMMUNICATION WITH FRONT CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Front Control Module (FCM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0151–LOST COMMUNICATION WITH OCCUPANT RESTRAINT CONTROLLER (ORC) (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Occupant Restraint Controller (ORC).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0154–LOST COMMUNICATION WITH OCCUPANT CLASSIFICATION MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Occupant Classification Module (OCM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0155–LOST COMMUNICATION WITH CLUSTER/CCN (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Cluster (CCN).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0156–LOST COMMUNICATION WITH EOM (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Compass Temperature Module (EOM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0159–LOST COMMUNICATION WITH PARKING ASSIST CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Parktronics (PTS).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0167–LOST COMMUNICATION WITH INTRUSION TRANSCEIVER CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Intrusion Transceiver Control Module (ITM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0168–LOST COMMUNICATION WITH VEHICLE SECURITY CONTROL MODULE (SKREEM/WCM) (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Vehicle Security Control Module (SKREEM/WCM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0169–LOST COMMUNICATION WITH SUNROOF CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Sunroof Control Module (SCM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0184–LOST COMMUNICATION WITH RADIO (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Radio.

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0186–LOST COMMUNICATION WITH AUDIO AMPLIFIER (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Amplifier (AMP).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0195–LOST COMMUNICATION WITH SDARS (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Satellite Audio Receiver (SDARS).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0196–LOST COMMUNICATION WITH VEHICLE ENTERTAINMENT CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Vehicle Entertainment System (VES).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0197–LOST COMMUNICATION WITH HANDS FREE PHONE MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Hands Free Phone Module (HFM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0199–LOST COMMUNICATION WITH DRIVER DOOR MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Driver Door Module (DDM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0200–LOST COMMUNICATION WITH PASSENGER DOOR MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Passenger Door Module (PDM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0208–LOST COMMUNICATION WITH HEATED SEAT CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Heated Seat Module (HSM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0209–LOST COMMUNICATION WITH MEMORY SEAT CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Memory Seat Module (MSM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0212–LOST COMMUNICATION WITH SCCM - CAN-B (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Steering Column Control Module (SCCM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0231–LOST COMMUNICATION WITH RAIN SENSING MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Rain Sensing Module (RSM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

U0241–LOST COMMUNICATION WITH AUTO HIGHBEAM HEADLAMP CONTROL MODULE (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

- **When Monitored:**
  With the ignition on.
- **Set Condition:**
  If the A/C Heater Control looses communication with the Auto High Beam Module (AHBM).

(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING) for the diagnostic test procedure.

*HVAC SYSTEM TEST (ATC)

For the Automatic Temperature Control (ATC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The HVAC System Test provides a starting point in the diagnostic process by identifying the appropriate diagnostic procedure or system test to perform when diagnosing a given symptom, condition, or DTC. It also provides a means for testing the entire HVAC system by utilizing the A/C Heater Control's On-Board System Tests. The On-Board System Tests can also assist in diagnosing stored DTCs. (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING) for additional information about on-board diagnostics.

Diagnostic Test

1. HVAC SYSTEM TEST

NOTE: Diagnose and repair all active DTCs before diagnosing and repairing stored DTCs.

Make a selection based on the symptom, condition, or DTC that you want to diagnose.

For Any Active DTC
Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

Scan Tool Indicates HVAC Not Active On Bus
(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - DIAGNOSIS AND TESTING)

Complete HVAC System Test
Go To 2

A/C System Performance Test
Go To 2

General System Operation & Function Test
Go To 3

Actuator DTC Detection Test
Go To 4

Actuator Calibration Test
Go To 5

*HVAC SYSTEM TEST (ATC) (CONTINUED)

2. A/C SYSTEM PERFORMANCE TEST

NOTE: The following are prerequisites of the Cooldown Test. Verify each of the following before running the test:

- **If active, diagnose and repair DTC B1031 or B1032 before proceeding. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.**
- **Verify that the refrigerant system has an adequate charge. Check and repair as necessary before proceeding. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS).**
- **Verify that the blower motor operates correctly in all speeds. Diagnose and repair all blower related faults before proceeding.**
- **Verify that the work area ambient temperature is above 18.3°C (65°F) before proceeding. Move the vehicle to a warmer work area if necessary.**
- **Verify that the evaporator temperature is above 18.3°C (65°F) before proceeding.**
- **Verify that the A/C compressor is not running. If the A/C compressor is running, turn the A/C off and allow the evaporator to warm up before proceeding.**

Once all of the prerequisites have been met, actuate the Cooldown Test by performing the following:

Start the engine.

With the scan tool in HVAC, select System Tests and then select Cooldown test.

NOTE: The Cooldown Test can take up to two minutes to run. While the test is running, the A/C status indicator will flash. If the test passes, the A/C status indicator will stop flashing. However, if the test fails, both the A/C and EBL status indicators will flash alternately and an active DTC B10B2 will set. The status indicators will continue to flash until either a successful Cooldown Test is executed or until the vehicle is driven a specified number of miles. In addition, DTC B10B2 will remain active until a successful Cooldown Test is executed. The test will stop running if any of the following occurs:

- **The ignition is turned off.**
- **The A/C compressor is requested off.**
- **The blower control is moved to the off position, unless the control was in the off position when the test was started. In this case, moving the blower control out of the off position and then returning it to the off position will stop the test**
- **DTC B1031 or B1032 sets during the test.**
- **the control receives a bus message to stop the test.**

Allow the test to run to completion before proceeding.

With the scan tool, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and Repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms. Run the Cooldown Test again after the repair is complete.

No >> As necessary, either Go To 3, or 4, or 5, or Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*HVAC SYSTEM TEST (ATC) (CONTINUED)

3. GENERAL SYSTEM OPERATION & FUNCTION TEST

NOTE: If at anytime a DTC becomes active during this test, proceed to the conclusion question.

NOTE: If multiple DTCs become active, diagnose those that relate to a short circuit first.

If not do so previously, start the engine.

Turn the blower control to manual low.

Turn the Left and Right Blend controls to full cold.

Turn the Mode control to panel.

Monitor the scan tool for active HVAC DTCs while performing the following test steps.

Press the A/C mode switch on, wait 30 seconds, press it off, and then proceed to the next step.

Press the Rear Defrost mode switch on, wait 30 seconds, press it off, and then proceed to the next step.

Press the Recirculation mode switch on, wait 30 seconds, press it off, and then proceed to the next step.

Turn the Left Blend control to full hot, wait 30 seconds, turn it to full cold, and then proceed to the next step.

Turn the Right Blend control to full hot, wait 30 seconds, turn it to full cold, and then proceed to the next step.

Turn the Mode control to every door position. Leave it in each position for 30 seconds.

Does the scan tool display any active DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

No >> If you are here due to a stored DTC, it is possible that a technician may not have erased the DTC following a repair. If possible, verify if the vehicle was recently in for this type of service. Otherwise, Go To either 4 or 5, or visually inspect the related wiring harness for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent, pushed out, and corroded terminals, and repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

4. ACTUATOR DTC DETECTION TEST

If not done so previously, start the engine.

With the scan tool, select System Tests and then select Actuator DTC Detection. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). If multiple DTCs are present, diagnose and repair all short high DTCs and then all short low DTCs. Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> If you are here due to a stored DTC, it is possible that a technician may not have erased the DTC following a repair. If possible, verify if the vehicle was recently in for this type of service. Otherwise, either Go To 5 or visually inspect the related wiring harness for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent, pushed out, and corroded terminals, and repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*HVAC SYSTEM TEST (ATC) (CONTINUED)

5. ACTUATOR CALIBRATION TEST

If not done so previously, start the engine.

With the scan tool, select System Tests and then select Actuator Calibration Test. When the test is complete, select View DTCs.

Does the scan tool display any DTCs?

Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

No >> No problem found. However, if you are here due to a stored DTC, it is possible that a technician may not have erased the DTC following a repair. If possible, verify if the vehicle was recently in for this type of service. Otherwise, visually inspect the related wiring harness for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent, pushed out, and corroded terminals, and repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*HVAC SYSTEM TEST (MTC)

For the Manual Temperature Control (MTC) circuit diagram (Refer to 24 - HEATING & AIR CONDITIONING - SCHEMATICS AND DIAGRAMS).

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

The HVAC System Test provides a starting point in the diagnostic process by identifying the appropriate diagnostic procedure or system test to perform when diagnosing a given symptom, condition, or DTC. It also provides a means for testing the entire HVAC system by utilizing the A/C Heater Control's On-Board System Tests. The On-Board System Tests can also assist in diagnosing stored DTCs. (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING) for additional information about on-board diagnostics.

Diagnostic Test

1. HVAC SYSTEM TEST

NOTE: Diagnose and repair all active DTCs before diagnosing and repairing stored DTCs.

Make a selection based on the symptom, condition, or DTC that you want to diagnose.

For Any Active DTC
Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

Complete HVAC System Test
Go To 2

A/C System Performance Test
Go To 2

General System Operation & Function Test
Go To 3

Actuator Ckt Test / Door Cal Function
Go To 4

Control Won't Display Active / Stored DTCs
Refer to *A/C Heater Control Will Not Enter Diagnostic Mode for the diagnostic test procedure.

Control Won't Run System Tests
Refer to *A/C Heater Control Will Not Enter Diagnostic Mode for the diagnostic test procedure.

*HVAC SYSTEM TEST (MTC) (CONTINUED)

2. A/C SYSTEM PERFORMANCE TEST

NOTE: The following are prerequisites of the Cooldown Test. Verify each of the following before running the test:

- **If active, diagnose and repair DTC 31 or 32 before proceeding. Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.**
- **Verify that the refrigerant system has an adequate charge. Check and repair as necessary before proceeding (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS).**
- **Verify that the blower motor operates correctly in all speeds. Diagnose and repair all blower related faults before proceeding.**
- **Verify that the work area ambient temperature is above 18.3°C (65°F) before proceeding. Move the vehicle to a warmer work area if necessary.**
- **Verify that the evaporator temperature is above 18.3°C (65°F) before proceeding.**
- **Verify that the A/C compressor is not running. If the compressor is running, turn the A/C off and allow the evaporator to warm up before proceeding.**

Once all of the prerequisites have been met, actuate the Cooldown Test by performing the following:

- If not done so previously, start the engine.
- Press and hold the A/C mode switch down and then turn the blower motor control to high speed. Continue to hold the A/C mode switch down until the A/C status indicator begins flashing, Then, release the mode switch.
-

NOTE: The Cooldown Test can take up to two minutes to run. While the test is running, the A/C status indicator will flash once per second. If the test passes, the A/C status indicator will stop flashing. If the test fails, the A/C and EBL status indicators will flash alternately. The test will stop running if the either ignition is turned off, or the blower control is turned to any position other than high, or if DTC 31 or 32 sets during the test.

- Allow the test to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any DTCs?

Yes >> Diagnose and Repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of HVAC related symptoms. Run the Cooldown Test again after the repair is complete.

No >> As necessary, either Go To 3 or 4, or Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*HVAC SYSTEM TEST (MTC) (CONTINUED)

3. GENERAL SYSTEM OPERATION & FUNCTION TEST

If not do so previously, start the engine.

Turn the blower control on.

Turn the Blend control to full cold.

Turn the Mode control to panel.

Press the A/C mode switch on, wait 30 seconds, press it off, and then proceed to the next step.

Press the EBL mode switch on, wait 30 seconds, press it off, and then proceed to the next step.

Turn the Blend control to full hot, wait 30 seconds, turn it to full cold, and then proceed to the next step.

Turn the Mode control to every door position. Leave it in each position for 30 seconds. When complete, proceed to the next step.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

NOTE: If multiple DTCs are active, diagnose those that relate to a short circuit first.

Read DTCs from the A/C status indictor.

Does the A/C status indicator display any DTCs?

Yes >> Diagnose and repair the DTC(s). Go To 4 if Overcurrent faults (DTC 41, 42, 43, and 44) are present and run the Actuator Circuit Test / Door Calibration Function. Otherwise, refer to the Table of Contents in this Section for a complete list of HVAC related symptoms.

No >> If you are here due to a stored DTC, it is possible that a technician may not have erased the DTC following a repair. If possible, verify if the vehicle was recently in for this type of service. Otherwise, either Go To 4 or visually inspect the related wiring harness for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent, pushed out, and corroded terminals, and repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*HVAC SYSTEM TEST (MTC) (CONTINUED)

4. ACTUATOR CIRCUIT TEST / DOOR CALIBRATION FUNCTION

NOTE: By running the Actuator Circuit Test / Door Calibration Function, the A/C Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

If not done so previously, turn the ignition on.

Actuate the Clear DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.
- When the A/C status indicator begins flashing DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds. However, if no DTCs were present, both status indicators will tun off and the system will exit diagnostic mode.

Turn the ignition off, wait 10 seconds, and turn the ignition on.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately. Allow the test / function to run to completion before proceeding.

Actuate the Display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

NOTE: The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated.

Read DTCs from the A/C status indictor.

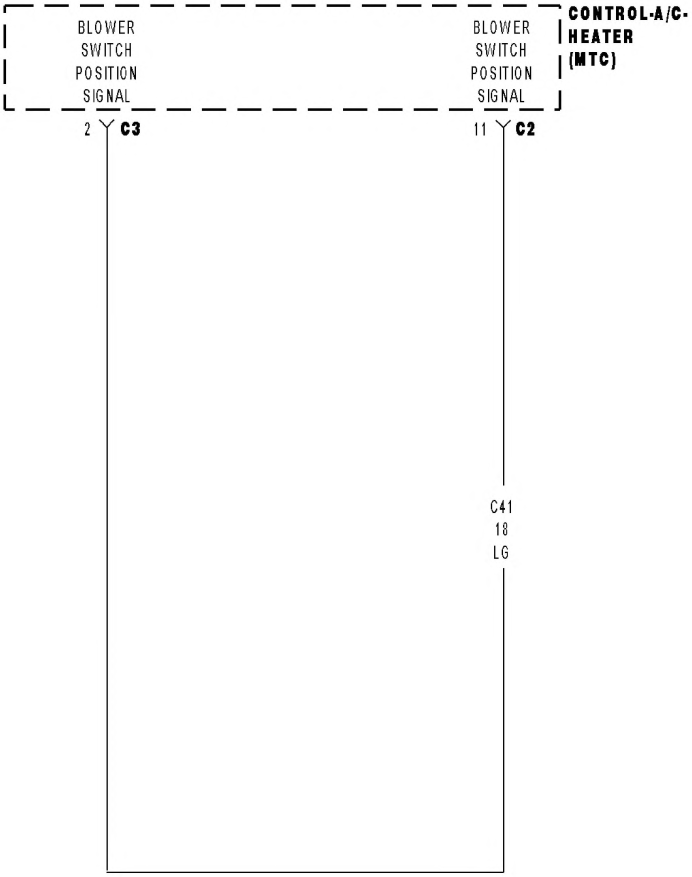
Does the A/C status indicator display any DTCs?

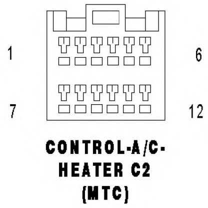
Yes >> Diagnose and repair the DTC(s). Refer to the Table of Contents in this Section for a complete list of all HVAC related symptoms.

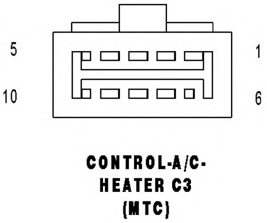
No >> No problem found. However, if you are here due to a stored DTC, it is possible that a technician may not have erased the DTC following a repair. If possible, verify if the vehicle was recently in for this type of service. Otherwise, visually inspect the related wiring harness for chafed, pierced, pinched, and partially broken wires and the wiring harness connectors for broken, bent, pushed out, and corroded terminals, and repair as necessary.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC)


BLOWER SWITCH POSITION SIGNAL
BLOWER SWITCH POSITION SIGNAL
CONTROL-A/C-HEATER (MTC)
2 C3
11 C2
C41
18
LG


1
6
7
12
CONTROL-A/C-HEATER C2 (MTC)


5
1
10
6
CONTROL-A/C-HEATER C3 (MTC)

8145f8b4

*A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) (CONTINUED)

For a complete wiring diagram **Refer to Section 8W**.

Theory of Operation

An active DTC 33 will prevent the control from entering diagnostic mode and performing certain diagnostic functions, it will also prevent proper A/C mode switch and status indicator function. An active DTC 34 will prevent the control from performing certain diagnostic functions and it will prevent proper EBL mode switch and status indicator function. In addition, a short or an open (C41) Blower Switch Position Signal circuit will also prevent the control from entering diagnostic mode. For additional information about the A/C Heater Control's on-board diagnostics, refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING.

Possible Causes
OBJECT HOLDING A/C MODE SWITCH / EBL MODE SWITCH IN A PUSHED POSITION
SUBSTANCE CAUSING A/C MODE SWITCH / EBL MODE SWITCH TO GET STUCK IN A PUSHED POSITION
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO VOLTAGE
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO (C121) SENSOR GROUND CIRCUIT
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT SHORTED TO GROUND
(C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT OPEN
A/C STATUS INDICATOR / EBL STATUS INDICATOR INOPERATIVE
A/C HEATER CONTROL

Diagnostic Test

1. INSPECT THE A/C HEATER CONTROL FOR DAMAGE

Turn the ignition off.

Inspect the A/C Heater Control for damage.

Is the A/C Heater Control damaged?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 2

---

2. INSPECT FOR OBJECT OR SUBSTANCE CAUSING THE A/C MODE SWITCH OR EBL MODE SWITCH TO STAY OR STICK IN A PUSHED POSITION

Inspect the A/C Heater Control for anything that would cause the A/C mode switch or the EBL mode switch to stay or stick in a pushed position.

Is anything present that would cause the A/C mode switch or EBL mode switch to stay or stick in a pushed position?

Yes >> Repair as necessary.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 3

---

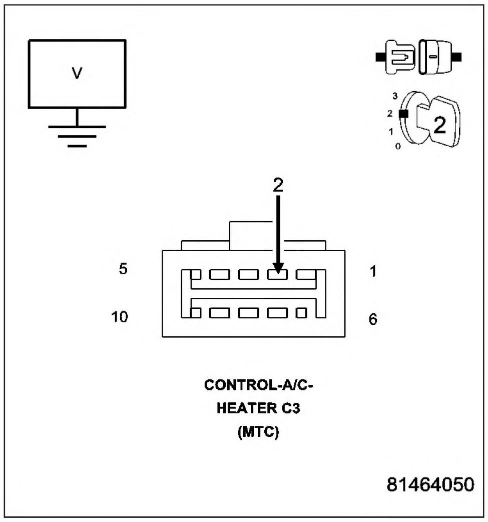
*A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) (CONTINUED)

3. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT VOLTAGE

Disconnect the A/C Heater Control C3 harness connector.

Turn the ignition on.

Measure the voltage of the (C41) Blower Switch Position Signal circuit.



What is the voltage?

Below 4.8 Volts
Go To 4

Above 5.2 Volts
Go To 7

4.8 Volts To 5.2 Volts
Go To 8

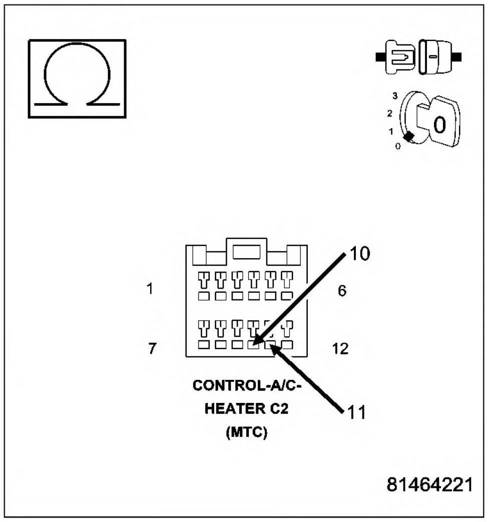
---

4. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO THE (C121) SENSOR GROUND CIRCUIT

Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Measure the resistance between the (C41) Blower Switch Position Signal circuit and the (C121) Sensor Ground circuit in the A/C Heater Control C2 harness connector.



Is the resistance below 10K ohms?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to the (C121) Sensor Ground circuit.

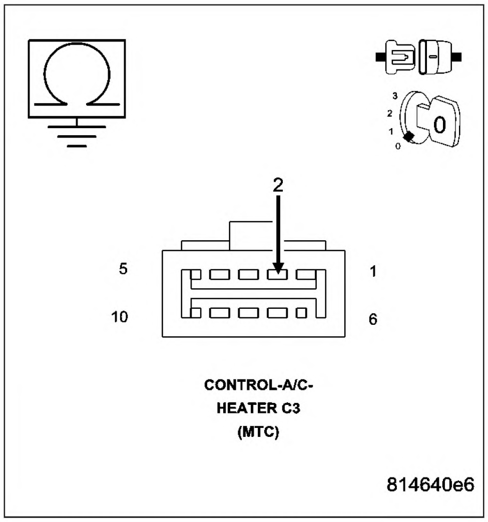
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 5

*A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) (CONTINUED)

5. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure the resistance of the (C41) Blower Switch Position Signal circuit between ground and the A/C Heater Control C3 harness connector.



CONTROL-A/C-HEATER C3 (MTC)

814640e6

Is the resistance below 10K ohms?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to ground.

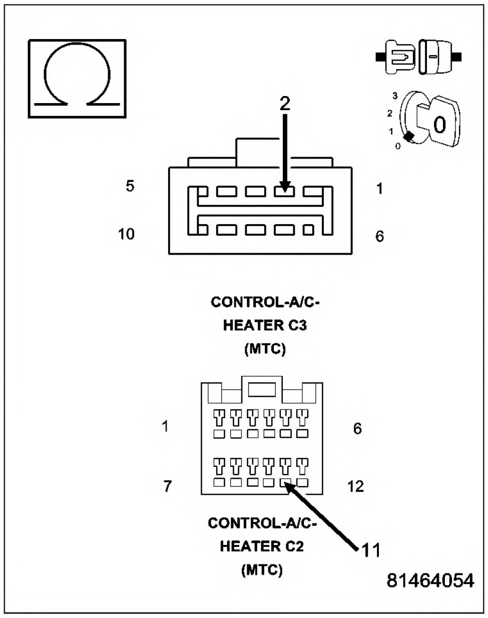
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Go To 6

---

6. CHECK (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR AN OPEN

Measure the resistance of the (C41) Blower Switch Position Signal circuit between the A/C Heater Control C2 harness connector and the A/C Heater Control C3 harness connector.



CONTROL-A/C-HEATER C2 (MTC)

81464054

Is the resistance below 5.0 ohms?

Yes >> Replace the A/C Heater Control in accordance with the Service Information.

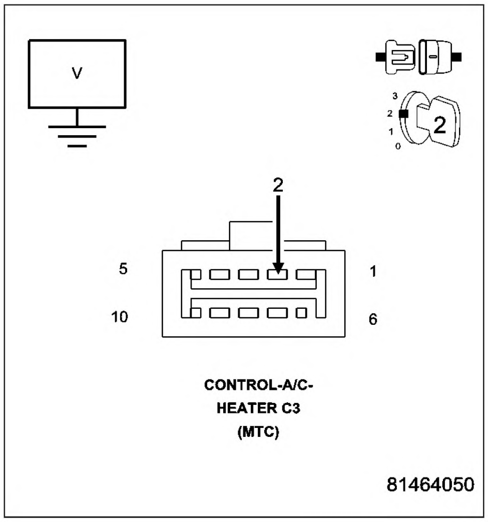
Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Repair the (C41) Blower Switch Position Signal circuit for an open.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

*A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) (CONTINUED)

7. CHECK THE (C41) BLOWER SWITCH POSITION SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE



Turn the ignition off.

Disconnect the A/C Heater Control C2 harness connector.

Turn the ignition on.

Measure the voltage of the (C41) Blower Switch Position Signal circuit.

Is the voltage above 0.2 volts?

Yes >> Repair the (C41) Blower Switch Position Signal circuit for a short to voltage.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST - VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

8. CHECK FOR NORMAL A/C MODE SWITCH & STATUS INDICATOR FUNCTION

Turn the ignition off.

Reconnect the A/C Heater Control C3 harness connector.

Turn the ignition on.

Turn the blower control on.

Press the A/C mode switch on and off several times while observing the A/C status indicator.

Does the A/C status indicator turn on and off with respect to the switch position?

Yes >> Go To 9

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

9. CHECK FOR NORMAL EBL MODE SWITCH & STATUS INDICATOR FUNCTION

Turn the blower control off.

Press the EBL mode switch on and off several times while observing the EBL status indicator.

Does the EBL status indicator turn on and off with respect to the switch position?

Yes >> Go To 10

No >> Replace the A/C Heater Control in accordance with the Service Information.

Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

*A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) (CONTINUED)

10. CHECK THE A/C HEATER CONTROL BY ATTEMPTING TO ENTER DIAGNOSTIC MODE

If illuminated, turn off the A/C status indicator and the EBL status indicator.

Actuate the display DTC function by performing the following:

- Turn the blower control on.
- Press the A/C mode switch down, turn the blower control to off, wait 5 seconds and then release the A/C mode switch.

When entry mode is recognized, the A/C status indicator and the EBL status indicator will illuminate for 5 seconds and then, if present, will begin displaying DTCs. The A/C status indicator displays active DTCs when the EBL status indictor is not illuminated and stored DTCs when the EBL status indicator is illuminated. However, if no DTCs are present, both status indicators will turn off and the system will exit diagnostic mode.

Did the A/C Heater Control enter diagnostic mode?

Yes >> Go To 11

No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

---

11. CHECK THE A/C HEATER CONTROL BY ATTEMPTING TO RUN THE ACTUATOR CIRCUIT TEST/ DOOR CALIBRATION FUNCTION

Turn the ignition off, wait 10 seconds, then turn the ignition on.

If illuminated, turn off the A/C status indicator and the EBL status indicator.

Actuate the Actuator Circuit Test / Door Calibration Function by performing the following:

- Turn the blower control off.
- Press and hold the EBL mode switch down and then turn the blower control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the EBL mode switch.

While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. If the test / function fails, the A/C and EBL status indicators will flash alternately.

Did the A/C Heater Control run the test / function?

Yes >> Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

No >> Replace the A/C Heater Control in accordance with the Service Information.
Perform BODY VERIFICATION TEST – VER 1. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES - STANDARD PROCEDURE).

SCHEMATICS AND DIAGRAMS

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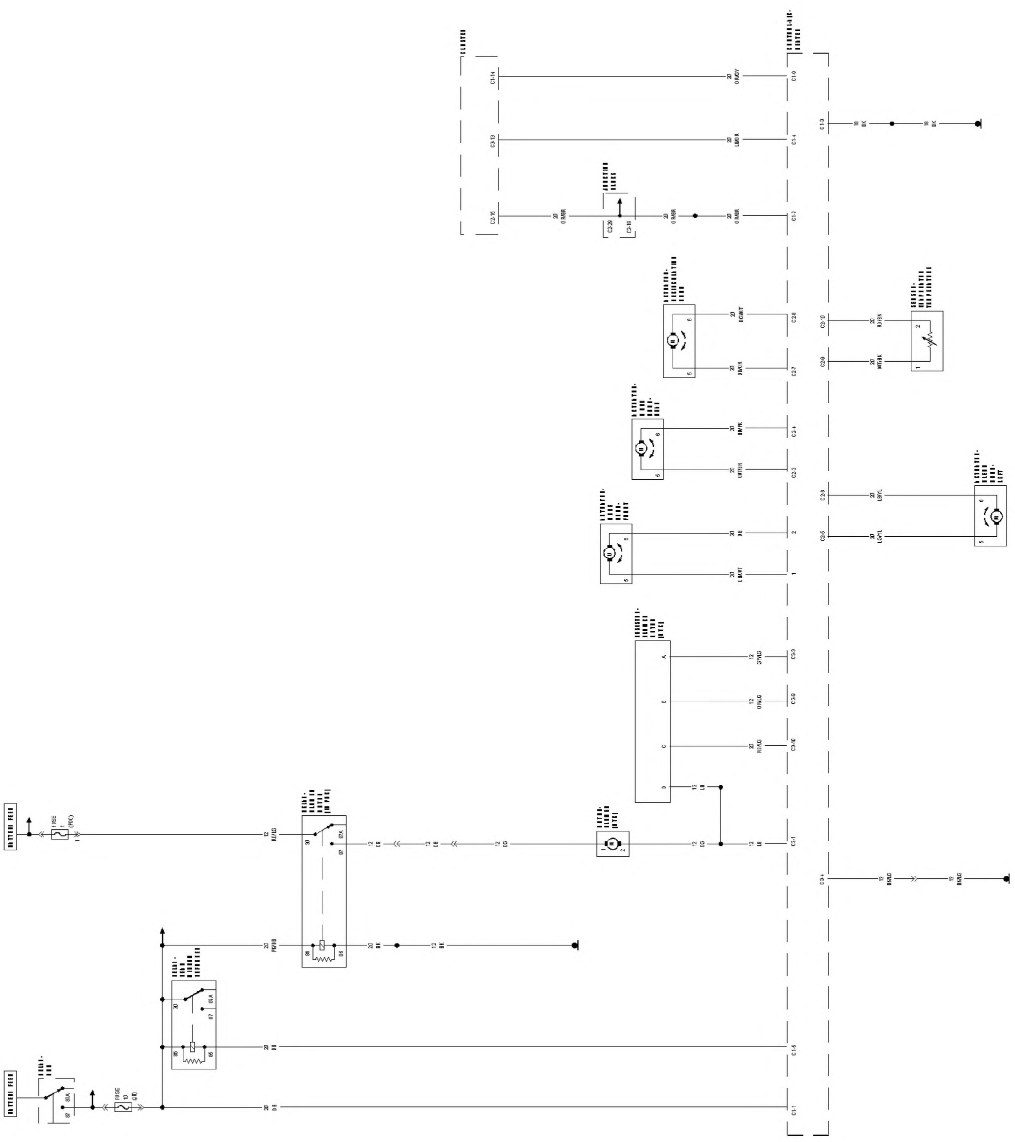
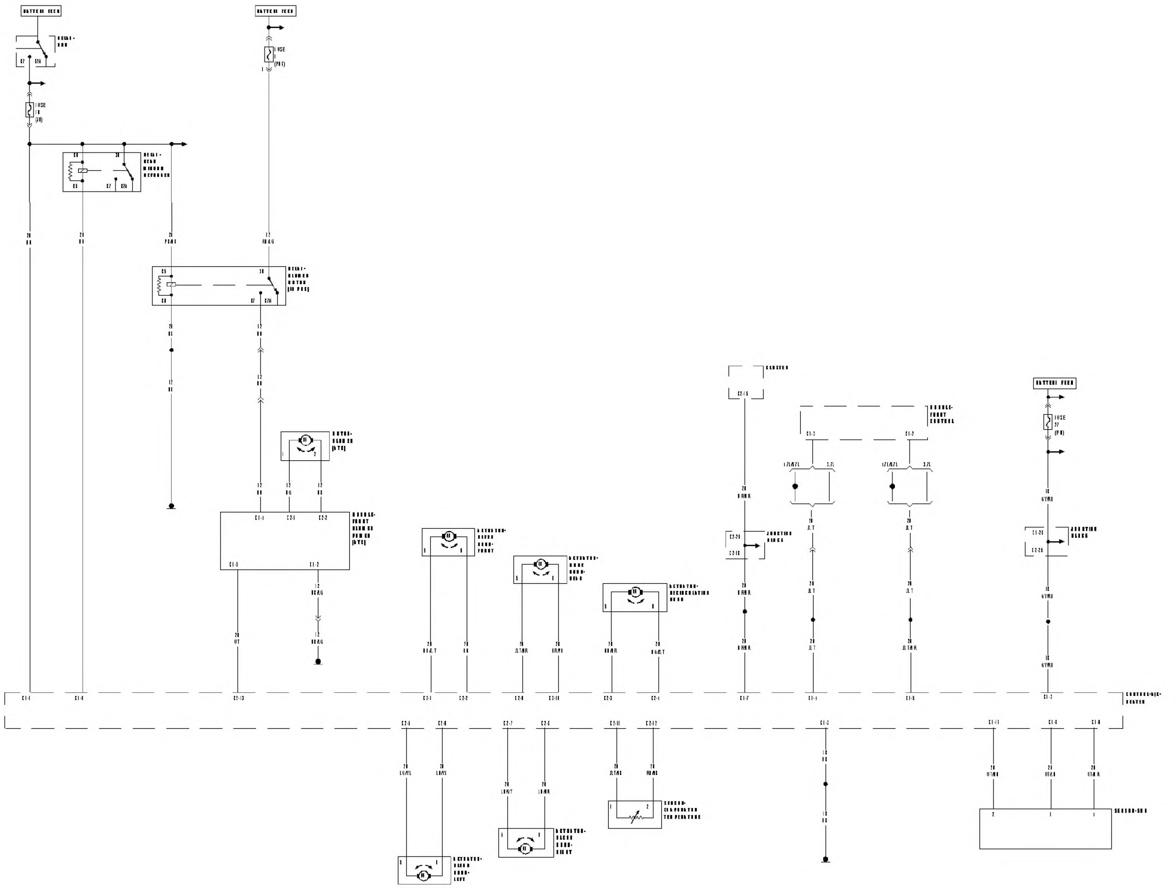


MANUAL TEMPERATURE CONTROL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AUTO TEMPERATURE CONTROL

HVAC - SERVICE INFORMATION

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HVAC - SERVICE INFORMATION

DESCRIPTION

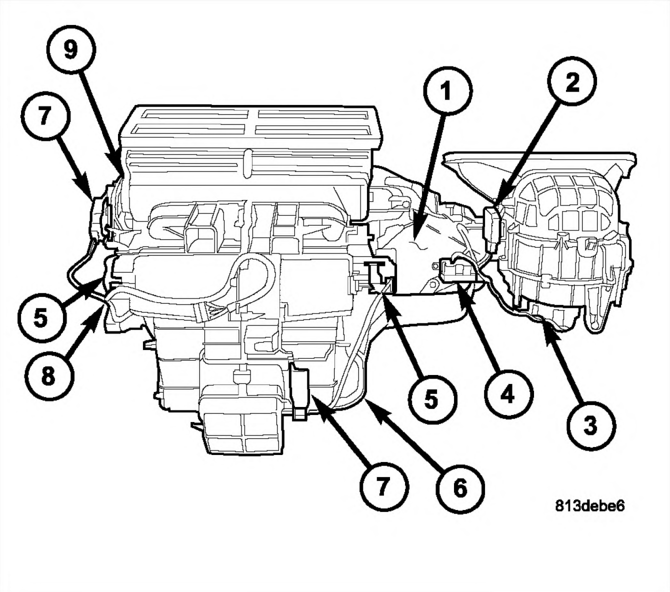
A manual temperature control (MTC) single zone type heating-A/C system or a fully adjustable automatic temperature control (ATC) dual zone type heating-A/C system is available on this vehicle.

To maintain the performance level of the heating, ventilation and air conditioning (HVAC) system, the engine cooling system must be properly maintained. The use of a bug screen is not recommended. Any obstructions in front of the radiator or A/C condenser will reduce the performance of the A/C and engine cooling systems.

The engine cooling system includes the radiator, thermostat, radiator hoses and the engine coolant pump. Refer to 7 - Cooling for more information before opening or attempting any service to the engine cooling system.

All vehicles are equipped with a common heater, ventilation and air conditioning (HVAC) housing (1). The heating-A/C system combines A/C, heating, and ventilating capabilities in a single HVAC housing mounted within the passenger compartment beneath the instrument panel. The HVAC housing includes:

- Recirculation-air door and actuator (2)
- Blower motor (3)
- Blower motor resistor (MTC) or blower motor power module (ATC) (4)
- Blend-air door(s) and actuator(s) (5)
- Heater core (6)
- Mode-air doors and actuator (7)
- Evaporator temperature sensor (8)
- A/C evaporator (9)



Based upon the system and selected mode, conditioned air can exit the HVAC housing through one or a combination of the three main housing outlets: defrost, panel or floor. The defrost and panel outlets are located on the top of the HVAC housing and the floor outlets are located at the rear of the HVAC housing. Once the conditioned air exits the HVAC housing, it is further directed through molded plastic ducts to the outlets within the vehicle interior. These outlets and their locations are as follows:

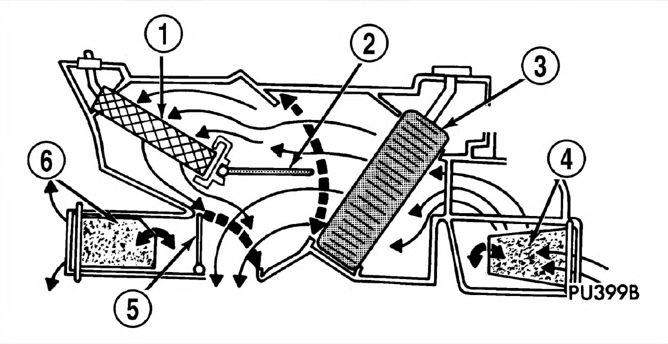
- **Defroster Outlets** - Two large defroster outlets are located near the center of the instrument panel top cover, near the base of the windshield.
- **Side Window Demister Outlets** - There are two side window demister outlets, one is located at each outboard end of the instrument panel top cover, near the belt line at the A-pillars.

- **Panel Outlets** - There are four panel outlets in the instrument panel, one located near each outboard end of the instrument panel facing the rear of the vehicle and one located on each side of the instrument panel center bezel.
- **Floor Outlets** - There is one floor outlet located above each side of the floor panel center tunnel near the dash panel. There is also one outlet located under each front seat.
- **Console Outlets** - There are two console outlets located at the back of the center floor console facing the rear of the vehicle.

OPERATION

Both the manual temperature control (MTC) and the automatic temperature control (ATC) heating-A/C system are blend-air type systems. In a blend-air system, a blend-air door controls the amount of conditioned air that is allowed to flow through, or around, the heater core. In the available dual zone system, two blend-air doors are used to provide completely independent side-to-side temperature control of the discharge air. The temperature control(s) determines the discharge air temperature(s) by operating the blend door actuator(s), which move the blend-air door(s). This design allows almost immediate control of output air temperature(s).

The heating-A/C system pulls outside (ambient) air through the cowl opening at the base of the windshield, then into the air inlet housing and through the A/C evaporator (3). Air flow can be directed either through or around the heater core (1). This is done by adjusting the blend-air door(s) (2) with the temperature control(s) located on the A/C-heater control in the instrument panel. The air flow can then be directed from the panel, floor and defrost outlets in various combinations using the mode control located on the A/C-heater control. Air flow velocity can be adjusted with the blower speed control located on the A/C-heater control.



The outside (fresh) air intake can be shut off by selecting the Recirculation Mode with the mode control. This will operate an electrically actuated recirculation-air door (4) that closes off the fresh air intake and recirculates the air that is already inside the vehicle.

The A/C compressor can be engaged in any mode by pressing the snowflake, A/C on/off button. It can also be engaged by placing the mode control in the mix to defrost positions. This will remove heat and humidity from the air before it is directed through or around the heater core. The mode control on the A/C-heater control is used to also direct the conditioned air to the selected system outlets. The mode control uses an electric actuator to control the mode-air doors (5 and 6).

The two slot-type defroster outlets receive airflow from the HVAC housing through the molded plastic defroster ducts, which connect to the HVAC housing defroster outlets. The airflow from the defroster outlets is directed by fixed vanes in the defroster outlet grilles and cannot be adjusted. The defroster outlet grilles are serviceable from the instrument panel top cover.

The side window demister outlets receive airflow from the HVAC housing through the molded plastic demister ducts. The demisters direct air from the HVAC housing through the outlets located on the top corners of the instrument panel. The airflow from the side window demister outlets is directed by fixed vanes in the demister outlet grilles and cannot be adjusted. The side window demister outlet grilles are not serviceable from the instrument panel. The demisters operate when the controls are set in Heat, Bi-level, Mix and Defrost modes.

The four instrument panel outlets receive airflow from the HVAC housing through two molded plastic main panel ducts. One duct directs air flow out of the right side instrument panel outlets, while the other duct delivers air flow to the left side outlets. Each of these outlets can be individually adjusted to direct the flow of air.

The floor outlets receive airflow from the HVAC housing through the floor distribution ducts which are connected to the rear of the HVAC air distribution housing. Two plastic rear distribution ducts and one center console duct attach to the rear of the air distribution housing and provide conditioned air to the rear seating positions. The two console outlets can be individually adjusted to direct the flow of air, but the floor outlets cannot be adjusted.

NOTE: It is important to keep the HVAC air intake opening clear of debris. Leaf particles and other debris that is small enough to pass through the cowl opening screen can accumulate within the HVAC housing. The closed, warm, damp and dark environment created within the housing is ideal for the growth of certain molds, mildews and other fungi. Any accumulation of decaying plant matter provides an additional food source for fungal spores, which enter the housing with the fresh intake-air. Excess debris, as well as objectionable odors created by decaying plant matter and growing fungi can be discharged into the passenger compartment during heater-A/C operation if the air intake opening is not kept clear of debris.

The A/C system is designed for the use of non-CFC, R-134a refrigerant and uses an A/C expansion valve to meter the flow of refrigerant to the A/C evaporator. The A/C evaporator cools and dehumidifies the incoming air prior to blending it with the heated air. To maintain minimum evaporator temperatures and prevent evaporator freezing, an evaporator temperature sensor is used. The sensor is located downstream of the evaporator and supplies an evaporator temperature signal to the A/C-heater control. For the ATC system, the A/C-heater control broadcasts the A/C request on the controller area network (CAN) B bus, where it is read and processed by the front control module (FCM), which in turn broadcasts it on the CAN C bus, where it is read and processed by the powertrain control module (PCM). For the MTC system, the A/C-heater control sends the request for A/C to the CCN via a dedicated mux circuit. The CCN then broadcasts the A/C request on the CAN B bus, where it is read and processed by the FCM, which in turn broadcasts it on the CAN C bus, where it is read and processed by the PCM.

DIAGNOSIS AND TESTING

HEATING AND A/C SYSTEMS

ON-BOARD DIAGNOSTICS

CAUTION: Do not exchange A/C-Heater Controls from vehicle to vehicle. Software versions differ between models and model years. Installing an A/C-Heater Control with software that is incompatible for a given vehicle can result in either improper or failed HVAC system operation.

SETTING FAULTS - ATC AND MTC SYSTEMS

Both the automatic temperature control (ATC) and the manual temperature control (MTC) systems are controlled by the A/C-heater control located on the center bezel of the instrument panel. The ATC system communicates on the controller area network (CAN) B bus and is fully addressable with a scan tool. The MTC system is NOT connected to the CAN bus and is NOT addressable with a scan tool. The A/C-heater control's primary means of fault detection for both heating-A/C systems is through active and stored diagnostic trouble codes (DTCs). The control continuously monitors various internal parameters during normal system operation. If it detects a fault, both an active and a stored diagnostic trouble code (DTC) will set for that parameter. When the offending parameter returns to an acceptable value, the control automatically clears the active DTC. However, the stored DTC remains until cleared (either manually or automatically). Note that DTCs will not set or clear if supply voltage is low.

The A/C-heater control's secondary means of fault detection for both heating-A/C systems is through system tests. For ATC systems, these tests include the HVAC System Test, the Cooldown Test, Actuator Calibration, and the Actuator DTC Detection Test. For MTC systems, these tests include the HVAC System Test, the Cooldown Test, Actuator Calibration (new MTC installation only), and the Actuator Circuit Test / Door Calibration Function. Refer to System Tests in this Section for a detailed description of each test.

DISPLAYING FAULTS AND READING FAULTS - ATC SYSTEM

Use a scan tool to display DTCs stored in the A/C-heater control of the ATC system (Refer to 24 - HVAC - Electrical Diagnostics for more information).

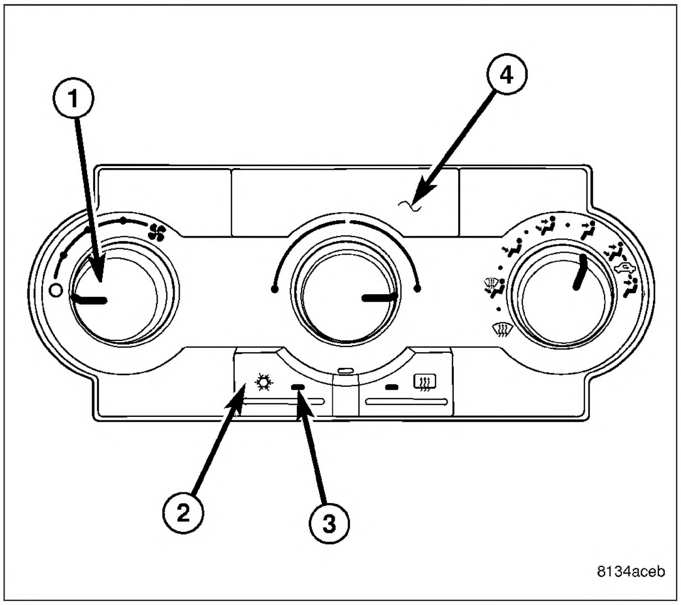
DISPLAYING FAULTS AND READING FAULTS - MTC SYSTEM

Use the A/C-heater control to display DTCs stored in the A/C-heater control of the MTC system. Refer to Entering Display DTC Mode - MTC System; Display Sequencing - MTC System; Reading Diagnostic Trouble Codes - MTC System; Active DTCs - ATC and MTC Systems; Stored DTCs - ATC and MTC Systems; and Clearing Faults - MTC System in this section for additional information.

ENTERING DISPLAY DTC MODE - MTC SYSTEM

To enter the MTC system's Display DTC Mode, perform the following:

NOTE: An active DTC 33 will prevent the control from entering diagnostic mode and performing certain diagnostic functions. It will also prevent proper A/C mode switch and status indicator function. If this occurs, refer to *A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) in 24 - HVAC - Electrical Diagnostics for the diagnostic test procedure.

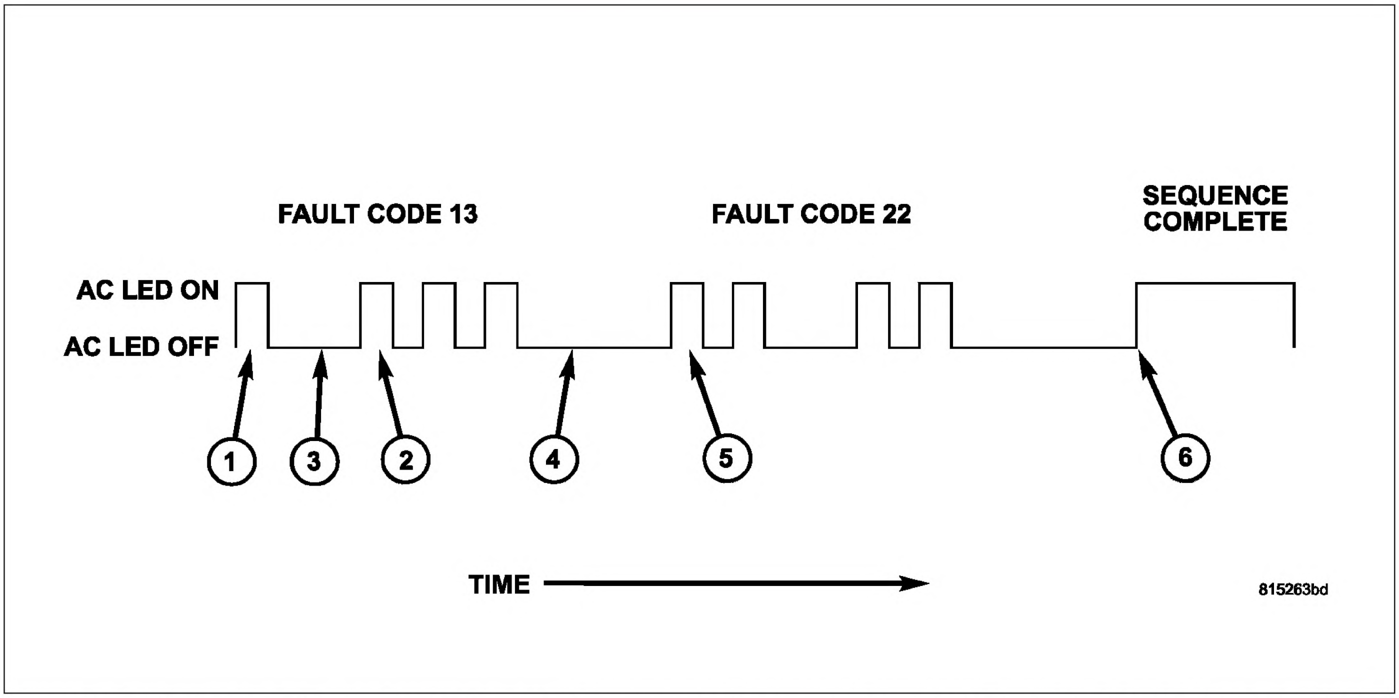


1. Turn the ignition to the On position.
2. Turn the blower motor control (1) to the On position.
3. Press the A/C mode switch (2) down, turn the blower motor control to the Off position, wait 5 seconds and then release the A/C switch. If there are active or stored DTCs to display, the A/C status indicator (3) will begin to flash. If there are no active or stored DTCs to display, the LEDs on the A/C-heater control (4) will turn off and the system will automatically exit the mode of operation.
4. To manually exit Display DTC Mode, either turn the ignition off or disconnect the negative battery cable from the battery.

DISPLAY SEQUENCING - MTC SYSTEM

MTC system DTCs will display in ascending numerical order but not in chronological order. Active DTCs will display before stored DTCs. If there are active and stored DTCs for the same parameter, the A/C-heater control will NOT display the stored DTC for that parameter. The EBL status indicator will illuminate and remain illuminated while the A/C-heater control is displaying stored DTCs. After displaying all active and stored DTCs, the A/C-heater control restarts at the beginning, displaying all DTCs again. To restart the sequence from the beginning while the A/C-heater control is displaying DTCs, press the EBL mode switch down, and then release it. This will cause the A/C-heater control to quit displaying the present code, turn off all LEDs for 2.0 seconds, and then it will begin flashing all DTCs again from the beginning.

READING DIAGNOSTIC TROUBLE CODES - MTC SYSTEM



All active and stored DTCs for the MTC system have an assigned code number. The A/C status indicator flashes in a series of pulses to display the code numbers. Each pulse has an indicator on time of 1.5 seconds. The tens unit value (1) is flashed first followed by the ones unit value (2). A 2.0 second indicator off-time (3) separates the unit values. When displaying multiple DTCs, the A/C status indicator will go off for five seconds (4) before displaying the next DTC (5). To indicate that the A/C-heater control has completed displaying all DTCs, the A/C status indicator will illuminate for two seconds (6) and then go off for two seconds before beginning to flash the DTCs over again.

ACTIVE DTCs - ATC AND MTC SYSTEMS

Refer to 24 - HVAC - Electrical Diagnostics to diagnose HVAC system DTCs.

STORED DTCs - ATC AND MTC SYSTEMS

The HVAC System Test, found in 24 - HVAC - Electrical Diagnostics, provides a means for diagnosing stored DTCs. The HVAC System Test consists of multiple diagnostic procedures which cover:

- A/C System Performance
- System Controls
- Air-door Functionality

Either perform the entire diagnostic procedure for a complete system test or perform an individual procedure if diagnosing a specific symptom, condition, or DTC.

CLEARING FAULTS - ATC SYSTEM

For every fault that sets, the A/C-heater control maintains an independent count of the number of key cycles since the active DTC cleared, the odometer reading when the DTC set, and the elapsed ignition on time that the DTC was active. When the number of key cycles (by parameter) reaches a global number, the system automatically clears all of the information associated with that DTC. A loss of battery voltage will also clear all active DTCs and associated data from memory. However, upon reconnecting the battery and activating the A/C-heater control (″Ignition″ line going ″HIGH″), the system will again evaluate all parameters and will set active DTCs for parameters outside of acceptable limits.

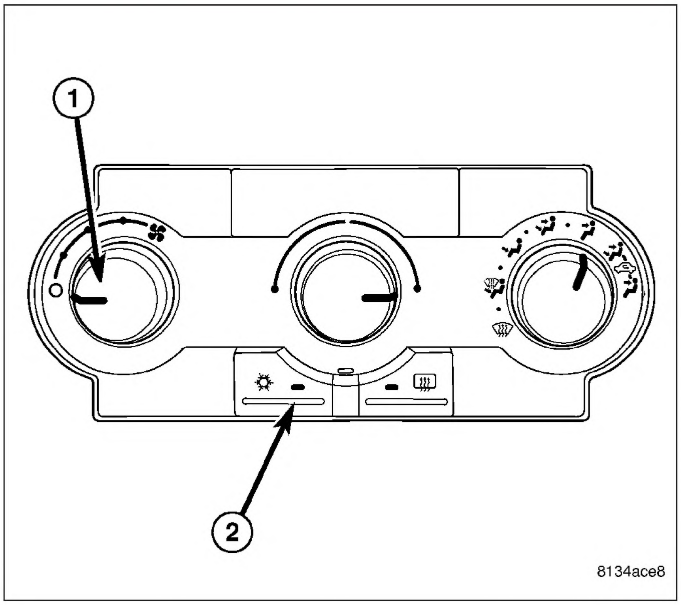
DTCs can also be cleared manually from the A/C-heater control (which also resets key cycle counters). Use a scan tool to clear DTCs stored in the A/C-heater control of the ATC system (Refer to 24 - HVAC - Electrical Diagnostics for more information).

CLEARING FAULTS - MTC SYSTEM

To clear DTCs stored in the A/C-heater control of the MTC system, perform the following:

NOTE: An active DTC 33 will prevent the control from entering diagnostic mode and performing certain diagnostic functions. It will also prevent proper A/C mode switch and status indicator function. If this occurs, refer to *A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) in 24 - HVAC - Electrical Diagnostics for the diagnostic test procedure.

NOTE: An active DTC 34 will prevent the control from performing certain diagnostic functions and it will prevent proper EBL mode switch and status indicator function. If active, diagnose and repair DTC 34 before proceeding. Refer to 24 - HVAC - Electrical Diagnostics for the diagnostic test procedure.



1. Turn the ignition to the On position.
2. Turn the blower motor control (1) to the On position.
3. Press the A/C mode switch (2) down, turn the blower motor control to the Off position, wait 5 seconds and then release the A/C mode switch.
4. When the A/C status indicator begins flashing DTCs, set the Mode switch to the floor position, simultaneously press the A/C mode switch and the EBL mode switch down for 5 seconds and then release the mode switches. Stored DTCs will clear from memory in approximately two seconds.

SYSTEM TESTS

HVAC SYSTEM TEST - ATC AND MTC SYSTEMS

The HVAC System Test, found in 24 - HVAC - Electrical Diagnostics, provides a starting point in the diagnostic process by identifying the appropriate diagnostic procedure or system test to perform when diagnosing a given symptom, condition, or DTC. It also provides a means for testing the entire HVAC system by utilizing the A/C-heater control's On-Board System Tests. The On-Board System Tests can also assist in diagnosing stored DTCs.

ACTUATOR CALIBRATION - ATC SYSTEM

The Actuator Calibration function homes and repositions the air-door actuators, removes accumulated positioning errors, and checks for air-door span faults. Once actuated, the entire process takes approximately 90 seconds. Upon completion, all air-door actuators should return to the position that the system is currently requesting. Running the Actuator Calibration function is the only way to detect air-door travel too large faults and air-door travel too small faults. These faults, if present, will display on the scan tool after running the Actuator Calibration function.

STARTING ACTUATOR CALIBRATION - ATC SYSTEM

Use a scan tool to start the Actuator Calibration function.

ACTUATOR CALIBRATION - MTC SYSTEM

NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The A/C-Heater Control automatically runs the Actuator Calibration function upon ignition on after installing a new A/C-Heater Control. The Actuator Calibration function homes and repositions the air-door actuators, removes accumulated positioning errors, and checks for air-door span faults. Once actuated, the entire process takes approximately 90 seconds. Upon completion, all air-door actuators should return to the position that the system is currently requesting. Running the Actuator Calibration function is the only way to detect air-door travel too large faults, air-door travel too small faults, air-door bound faults, and air-door broken linkage faults. These faults, if present, will display when checking for DTCs in the A/C-heater control.

STARTING ACTUATOR CALIBRATION MANUALLY - MTC SYSTEM

Refer to Starting The Actuator Circuit Test / Door Calibration Function - MTC System in this section.

ACTUATOR DTC DETECTION TEST - ATC SYSTEM

The Actuator DTC Detection Test tests the air-door electrical circuits for shorts. This test supplements the continuous actuator drive system diagnostics and can provide greater detail about shorted air-door electrical circuits by identifying up to three door driver circuits shorted simultaneously. Running the Actuator DTC Detection Test is the only way to detect air-door actuator control circuit low and air-door actuator control circuit high faults. These faults, if present, will display on the scan tool after running the Actuator DTC Detection Test.

STARTING ACTUATOR DTC DETECTION TEST - ATC SYSTEM

Use a scan tool to start the Actuator DTC Detection Test.

ACTUATOR CIRCUIT TEST / DOOR CALIBRATION FUNCTION - MTC SYSTEM

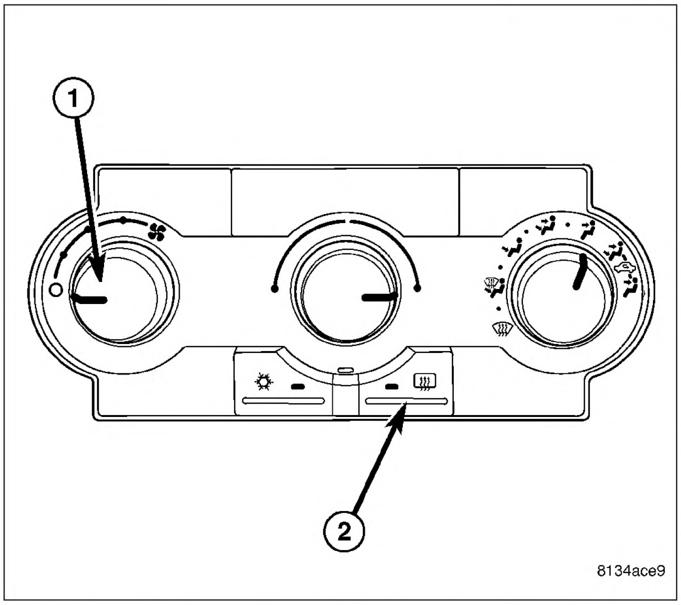
NOTE: Diagnose and repair Actuator Circuit Test faults (DTC 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, and 72) before diagnosing Overcurrent faults (DTC 41, 42, 43, and 44) and Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56). Diagnose and repair Overcurrent faults (DTC 41, 42, 43, and 44) before diagnosing Calibration faults (DTC 18, 21, 22, 23, 24, 25, 45, 46, 47, 48, 51, 52, 53, 54, 55, and 56).

The Actuator Circuit Test / Door Calibration function first tests the air-door electrical circuits for shorts and then it homes and repositions the air-doors to remove accumulated positioning errors and to check for air-door span faults. This test / function supplements the continuous actuator drive system diagnostics and can provide greater detail about shorted air-door electrical circuits by identifying up to three door driver circuits shorted simultaneously. This test will also detect air-door travel too large faults, air-door travel too small faults, air-door bound faults, and air-door broken linkage faults. The Actuator Circuit Test / Door Calibration function must be manually actuated. Faults detected will display when checking for DTCs in the A/C-heater control.

STARTING THE ACTUATOR CIRCUIT TEST / DOOR CALIBRATION FUNCTION - MTC SYSTEM

NOTE: By running the Actuator Circuit Test / Door Calibration Function, the A/C-Heater Control can identify up to three door driver circuits shorted simultaneously. A DTC 72 will set if more than three door driver circuits are shorted in the same direction (e.g. four door driver circuits all shorted to ground) or if two or more door driver circuits are shorted with at least one door driver circuit shorted to ignition and one door driver circuit shorted to ground. To ensure a proper diagnosis, diagnose and repair Actuator Circuit Test faults in the following order: If present, diagnose and repair DTC 72 first, then DTC 62, then DTC 61, then DTCs 64, 66, 68, or 71, and finally DTCs 63, 65, 67, or 69. In addition, always test the door driver circuits after each repair by clearing DTCs, and then running the Actuator Circuit Test / Door Calibration Function, and then checking for DTCs.

To start the Actuator Circuit Test / Door Calibration function for the MTC system, perform the following:



NOTE: An active DTC 34 will prevent the control from performing certain diagnostic functions and it will prevent proper EBL mode switch and status indicator function. If this occurs, diagnose and repair DTC 34 before running the Actuator Circuit Test / Door Calibration function. Refer to 24 - HVAC - Electrical Diagnostics for the diagnostic test procedure.

1. Turn the ignition to the On position.
2. Turn the blower motor control (1) to the Off position.
3. Press and hold the EBL mode switch (2) down and then turn the blower motor control on. Continue to hold the EBL mode switch down until the EBL status indicator begins flashing. Then, release the mode switch. While the test / function is running, the EBL status indicator will flash once per second. If the test / function passes, the EBL status indicator will stop flashing. However, if the test / function fails, the A/C and EBL status indicators will flash alternately. Faults detected will display when checking for DTCs in the A/C-heater control.

COOLDOWN TEST - ATC AND MTC SYSTEMS

The Cooldown Test checks A/C system performance by measuring the system's ability to lower the evaporator temperature 11.11° C (20° F) as measured by the evaporator temperature sensor. The following are prerequisites of the Cooldown Test. Verify each of the following before running the Cooldown Test:

- For the ATC system, the Cooldown Test will NOT start if DTC B1031 or B1032 is active. If active, diagnose and repair either DTC before proceeding (Refer to 24 - HVAC - Electrical Diagnostics for a complete list of HVAC related symptoms).
- For the MTC system, the Cooldown Test will NOT start if DTC 31 or 32 is active. If active, diagnose and repair either DTC before proceeding (Refer to 24 - HVAC - Electrical Diagnostics for a complete list of HVAC related symptoms).
- For both systems, verify that the refrigerant system has an adequate charge. Check and repair as necessary before proceeding (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS).
- For both systems, verify that the blower motor operates correctly in all speeds. Diagnose and repair all blower motor related faults before proceeding.
- For both systems, verify that the ambient temperature of the work area is above 18.3° C (65° F) before proceeding. Move the vehicle to a warmer work area if necessary.
- For both systems, verify that the evaporator temperature is above 18.3° C (65° F) before proceeding.
- For both systems, verify that the A/C compressor is NOT running. If the A/C compressor is running, turn the A/C off and allow the evaporator to warm up before proceeding.

STARTING THE COOLDOWN TEST - ATC SYSTEM

Once all of the prerequisites have been met, the Cooldown Test for the ATC system can be actuated by sending a command with a scan tool. Once started, the ATC A/C-heater control automatically sets the blower speed and positions the air-doors for optimal A/C performance. It also sends a request for A/C operation on the CAN B bus. The Cooldown Test can take up to two minutes to run and, will stop running if any of the following occurs:

- The ignition is turned off.
- The A/C compressor is requested off.
- The blower motor control is moved to the Off position, unless the control was in the Off position when the Cooldown Test was started. In this case, moving the blower motor control out of the Off position and then returning it to the Off position will stop the test.

- DTC B1031 or B1032 sets during the Cooldown Test.
- The A/C-heater control receives a bus message to stop the Cooldown Test.

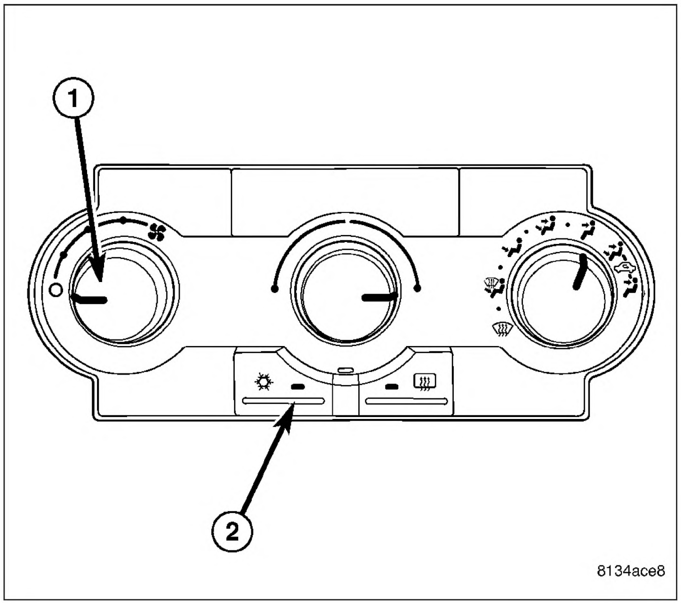
While the Cooldown Test is running, the A/C status indicator will flash. During this time the A/C-heater control will ignore most of its inputs. If the ATC system passes the test, the A/C status indicator will stop flashing. However, if the ATC system fails the test, both the A/C and EBL status indicators will flash alternately and an active DTC B10B2 will set. The status indicators will continue to flash until either a successful Cooldown Test is executed or until the vehicle is driven a specified number of miles. In addition, DTC B10B2 will remain active until a successful Cooldown Test is executed. Always check for DTCs in the A/C-heater control after running the Cooldown Test.

STARTING THE COOLDOWN TEST - MTC SYSTEM

Once all of the prerequisites have been met, the Cooldown Test for the MTC system can be actuated by performing the following:

NOTE: An active DTC 33 will prevent the control from entering diagnostic mode and performing certain diagnostic functions. It will also prevent proper A/C mode switch and status indicator function. If this occurs, refer to *A/C HEATER CONTROL WILL NOT ENTER DIAGNOSTIC MODE (MTC) in 24 - HVAC - Electrical Diagnostics for the diagnostic test procedure.

1. Verify that the ignition is in the Off position.
2. Turn the blower motor control (1) to the Off position.
3. Start the engine.
4. Press and hold the A/C mode switch (2) down and then turn the blower motor control to high speed. Continue to hold the A/C mode switch down until the A/C status indicator begins flashing, Then, release the mode switch.



Once actuated, the MTC A/C-heater control automatically positions the air-doors for optimal A/C performance and sends a request for A/C operation to the cluster (CCN) via hardwired circuits. The Cooldown Test can take up to two minutes to run. The test will stop running if any of the following occurs:

- The ignition is turned to the Off position.
- The blower motor control is turned to the any position other than high speed.
- DTC 31 or 32 sets during the Cooldown Test.

While the Cooldown Test is running, the A/C status indicator will flash. During this time the A/C-heater control will ignore most of its inputs. If the MTC system passes the test, the A/C status indicator will stop flashing. However, if the MTC system fails the test, both the A/C and EBL status indicators will flash alternately and an active DTC 35 will set. The status indicators will continue to flash until either a successful Cooldown Test is executed or until the vehicle's ignition on time has exceeded a specified value. In addition, DTC 35 will remain active until a successful Cooldown Test is executed. Always check for and diagnose DTCs present in the A/C-heater control after running the Cooldown Test. If the Cooldown Test fails, service the heating-A/C system as required.

A/C PERFORMANCE

The A/C system is designed to provide the passenger compartment with low temperature and low humidity air. The A/C evaporator, located in the HVAC housing is cooled to temperatures near the freezing point. As warm damp air passes over the fins of the A/C evaporator, the air transfers its heat to the refrigerant in the evaporator coils and the moisture in the air condenses on the evaporator fins. During periods of high heat and humidity, an A/C system will be more effective in the Recirculation mode (max-A/C). With the system in the Recirculation mode, only air from the passenger compartment passes through the A/C evaporator. As the passenger compartment air dehumidifies, the A/C system performance levels rise.

Humidity has an important bearing on the temperature of the air delivered to the interior of the vehicle. It is important to understand the effect that humidity has on the performance of the A/C system. When humidity is high, the A/C evaporator has to perform a double duty. It must lower the air temperature, and it must lower the temperature of the moisture in the air that condenses on the evaporator fins. Condensing the moisture in the air transfers heat energy into the evaporator fins and coils. This reduces the amount of heat the A/C evaporator can absorb from the air. High humidity greatly reduces the ability of the A/C evaporator to lower the temperature of the air.

However, evaporator capacity used to reduce the amount of moisture in the air is not wasted. Wringing some of the moisture out of the air entering the vehicle adds to the comfort of the passengers. Although, an owner may expect too much from their A/C system on humid days. A performance test is the best way to determine whether the system is performing up to design standards. This test also provides valuable clues as to the possible cause of trouble with the A/C system. The ambient air temperature in the location where the vehicle will be tested must be a minimum of 21° C (70° F) for this test.

A/C PERFORMANCE TEST

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

1. Perform the A/C System Performance Test found within the HVAC System Test (refer to 24 - HVAC Electrical Diagnostics). If no diagnostic trouble codes (DTCs) are found in the A/C-heater control or the powertrain control module (PCM), go to Step 2. If any DTCs are found, repair as required, then proceed to Step 2.
2. Connect a tachometer and a manifold gauge set.
3. Set the A/C-heater control to the Recirculation mode (max-A/C) position, the temperature control to the full cool position, and the blower motor control to the highest speed position.
4. Start the engine and hold the idle at 1,000 rpm with the compressor clutch engaged. If the A/C compressor does not engage, see the A/C Diagnosis chart.
5. The engine should be at operating temperature, the doors should be closed and the windows opened.
6. Insert a thermometer in the driver side center panel outlet. Operate the A/C system until it stabilizes.
7. With the A/C compressor clutch engaged, compare the air temperature at the center panel outlet and the A/C compressor discharge pressure (high side) to the A/C Performance and Pressure chart. The compressor clutch may cycle, depending upon the ambient temperature and humidity. If the clutch cycles, use the readings obtained before the clutch disengaged.

A/C PERFORMANCE TEMPERATURE AND PRESSURE

Ambient Air Temperature	21°C (70°F)	27°C (80°F)	32°C (90°F)	38°C (100°F)	43°C (110°F)
Maximum Allowable Air Temperature at Center Panel Outlet	9°C (48°F)	9°C (48°F)	12°C (54°F)	15°C (59°F)	18°C (65°F)
Suction Pressure at Service Port (Low Side)	138 to 207 kPa (20 to 30 psi)	138 to 207 kPa (20 to 30 psi)	207 to 276 kPa (30 to 40 psi)	207 to 276 kPa (30 to 40 psi)	241 to 310 kPa (35 to 45 psi)
Discharge Pressure at Service Port (High Side)	1034 to 1724 kPa (150 to 250 psi)	1379 to 2068 kPa (200 to 300 psi)	1551 to 2241 kPa (225 to 325 psi)	1724 to 2413 kPa (250 to 350 psi)	2068 to 2758 kPa (300 to 400 psi)

8. If the air outlet temperature fails to meet the specifications in the A/C Performance Temperature and Pressure chart, or if the A/C compressor discharge pressure is high, refer to the A/C Pressure Diagnosis chart.

A/C PRESSURE DIAGNOSIS

Condition	Possible Causes	Correction
Rapid A/C compressor clutch cycling (ten or more cycles per minute).	Very low refrigerant system charge.	See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
Equal pressures, but the compressor clutch does not engage.	1. No refrigerant in the refrigerant system.	1. See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	2. Faulty fuse.	2. Check the fuses in the Integrated Power Module. Repair the shorted circuit or component and replace the fuses, if required. Refer to Group 8.
	3. Faulty A/C compressor clutch coil.	3. See A/C Compressor Clutch Coil in this group. Test the compressor clutch coil and replace, if required.
	4. Faulty A/C compressor clutch relay.	4. See A/C Compressor Clutch Relay in this group. Test the compressor clutch relay and relay circuits. Repair the circuits or replace the relay, if required.
	5. Improperly installed or faulty evaporator temperature sensor.	5. See Evaporator Temperature Sensor in this group. Test the sensor and replace, if required.
	6. Faulty A/C pressure transducer.	6. See A/C Pressure Transducer in this group. Test the sensor and replace, if required.
	7. Faulty Powertrain Control Module (PCM).	7. Refer to Group 9 - Engine Electrical Diagnostics for testing of the PCM. Test the PCM and replace, if required.
Normal pressures, but A/C Performance Test air temperatures at center panel outlet are too high.	1. Excessive refrigerant oil in system.	1. See Refrigerant Oil Level in this group. Recover the refrigerant from the refrigerant system and inspect the refrigerant oil content. Restore the refrigerant oil to the proper level, if required.
	2. Blend door actuator (s) improperly installed or faulty.	2. See Blend Door Actuator in this group. Inspect the actuator(s) for proper operation and replace, if required.
	3. Blend-air door(s) inoperative or sealing improperly.	3. See HVAC Housing in this group. Inspect the blend-air door(s) for proper operation and sealing. Repair if required.
The low side pressure is normal or slightly low, and the high side pressure is too low.	1. Low refrigerant system charge.	1. See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	2. Refrigerant flow through the A/C evaporator is restricted.	2. See A/C Evaporator in this group. Replace the restricted A/C evaporator, if required.
	3. Faulty A/C compressor.	3. See A/C Compressor in this group. Replace the A/C compressor, if required.

Condition	Possible Causes	Correction
The low side pressure is normal or slightly high, and the high side pressure is too high.	1. A/C condenser air flow restricted.	1. Check the A/C condenser for damaged fins, foreign objects obstructing air flow through the condenser fins, and missing or improperly installed air seals. Clean, repair, or replace components as required.
	2. Refrigerant flow through the receiver/drier is restricted.	2. See Receiver/Drier in this group. Replace the restricted receiver/drier, if required.
	3. Inoperative radiator cooling fan.	3. Test the radiator cooling fan and replace, if required. Refer to Group 7 - Cooling.
	4. Refrigerant system overcharged.	4. See Refrigerant System Charge in this group. Recover the refrigerant from the refrigerant system. Charge the refrigerant system to the proper level, if required.
	5. Air in the refrigerant system.	5. See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	6. Engine overheating.	6. Test the engine cooling system and repair, if required. Refer to Group 7 - Cooling.
The low side pressure is too high, and the high side pressure is too low.	1. Accessory drive belt slipping.	1. Inspect the accessory drive belt condition and tension. Repair as required. Refer to Group 7 - Cooling.
	2. Faulty A/C orifice valve.	2. See A/C Orifice Valve in this group. Replace the valve, if required.
	3. Faulty A/C compressor.	3. See A/C Compressor in this group. Replace the A/C compressor, if required.
The low side pressure is too low, and the high side pressure is too high.	1. Restricted refrigerant flow through the refrigerant lines.	1. See Liquid Line, Suction Line and Discharge Line in this group. Inspect the refrigerant lines for kinks, tight bends or improper routing. Correct the routing or replace the refrigerant line, if required.
	2. Restricted refrigerant flow through the A/C orifice valve.	2. See A/C Orifice Valve in this group. Replace the valve, if required.
	3. Restricted refrigerant flow through the A/C condenser.	3. See A/C Condenser in this group. Replace the restricted A/C condenser, if required.

HEATER PERFORMANCE

Before performing the following tests, refer to Group 7 - Cooling for the procedures to check the engine coolant level and flow, engine coolant reserve/recovery system operation, accessory drive belt condition and tension, radiator air flow and the fan drive operation. Perform the A/C System Performance Test, which is found within the HVAC System Test (refer to 24 - HVAC Electrical Diagnostics). If any diagnostic trouble codes (DTCs) are found in the A/C-heater control or the powertrain control module (PCM), repair as necessary.

MAXIMUM HEATER OUTPUT

Engine coolant is delivered to the heater core through two heater hoses. With the engine idling at normal operating temperature, set the temperature control to the full hot position, the mode control to the floor position, and the blower motor control to the highest speed position. Using a test thermometer, check the temperature of the air being discharged at the front floor outlets. Compare the test thermometer reading to the Heater Temperature Reference chart.

HEATER TEMPERATURE REFERENCE

Ambient Air Temperature	15.5° C (60° F)	21.1° C (70° F)	26.6° C (80° F)	32.2° C (90° F)
Minimum Heater System Air Outlet Temperature	52.2° C (126° F)	56.1° C (133° F)	59.4° C (139° F)	62.2° C (144° F)

If the heater outlet air temperature is below the minimum specification, refer to Group 7 - Cooling. Both of the heater hoses should be hot to the touch. The coolant return heater hose should be slightly cooler than the coolant supply heater hose. If the return hose is much cooler than the supply hose, locate and repair the engine coolant flow obstruction in the cooling system. Refer to Group 7 - Cooling for more information.

OBSTRUCTED COOLANT FLOW

Possible locations or causes of obstructed coolant flow are as follows:

- Faulty water pump.
- Faulty thermostat.
- Pinched or kinked heater hoses.
- Improper heater hose routing.
- Plugged heater hoses or supply and return ports at the cooling system connections.
- Plugged heater core.

If proper coolant flow through the cooling system is verified, and heater outlet air temperature is low, a mechanical problem may exist.

MECHANICAL PROBLEMS

Possible locations or causes of insufficient heat due to mechanical problems are as follows:

- Obstructed cowl air intake.
- Obstructed heater system outlets.
- Blend-air door(s) or actuator(s) not functioning properly.
- Faulty blower motor system
- Faulty A/C-heater control

TEMPERATURE CONTROL

If the heater outlet air temperature cannot be adjusted with the temperature control on the A/C-heater control, the following could require service:

- Faulty A/C-heater control.
- Faulty blend door actuator(s).
- Faulty, obstructed or improperly installed blend-air door.
- Faulty related wiring harness or connectors.
- Improper engine coolant temperature.

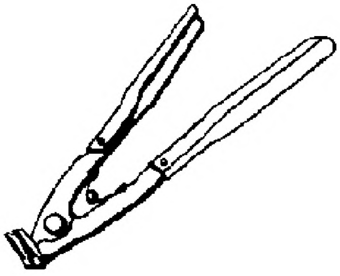
SPECIFICATIONS

A/C SYSTEM

Item	Description	Notes
A/C Compressor	Denso 10S17	ND-8 PAG oil
Freeze–up Control	Evaporator Temperature Sensor	HVAC housing mounted
Low psi Control	A/C Pressure Transducer	Discharge line mounted - opens below 110 kPa (16 psi), closes above 220 kPa (32 psi)
High psi Control	A/C Pressure Transducer	Discharge line mounted - opens above 3219 kPa (476 psi), closed below 2937 kPa (426 psi)
Refrigerant Charge Capacity	Refer to the A/C Underhood Specification Label located in the engine compartment	R-134a refrigerant
A/C Clutch Coil Draw	3.3 amps	@ 12V ± 0.5V @ 21° C (70° F)
A/C Clutch Coil Resistance	3.6 ± 0.2 ohms	When measured across coil lead connector
A/C Clutch Air Gap	0.35 - 0.60 mm (0.014 - 0.024 in.)	

SPECIAL TOOLS

HEATING-A/C SYSTEM



Snap Ring Pliers C-4574 are required to service the A/C clutch and field coil.

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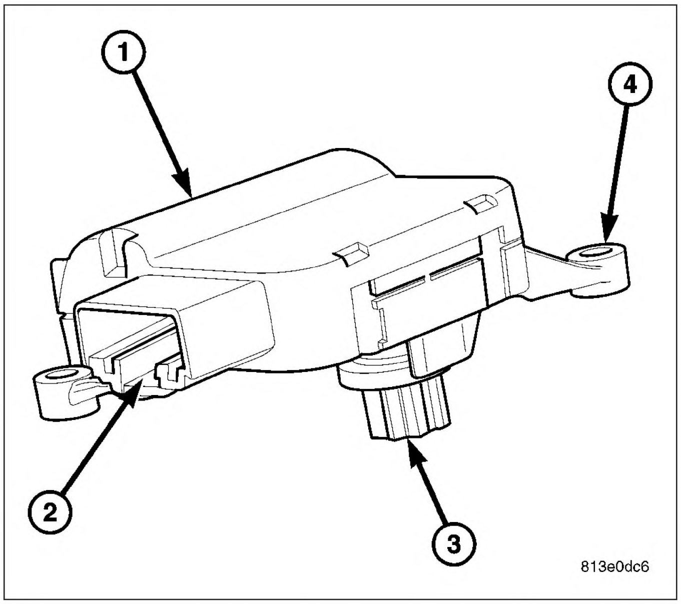
ACTUATOR-BLEND DOOR

DESCRIPTION



The blend door actuators (1) are reversible, 12 volt direct current (DC), servo motors. Models equipped with the MTC single zone heating-A/C system have a single blend-air door, which is controlled by a single blend door actuator. Models with the ATC dual zone heating-A/C system have two blend-air doors, which are controlled by two blend door actuators.

The blend door actuator for the single zone heating-A/C system is located on the driver side end of the HVAC air distribution housing, close to the dash panel.

For the dual zone heating-A/C system, the same blend door actuator used for the single zone system becomes the driver side blend door actuator, which is mechanically connected to only the driver side blend-air door. A second separate blend door actuator is also located on the passenger side of the HVAC air distribution housing which is mechanically connected to only the passenger side blend-air door.

The blend door actuators are interchangeable with each other, as well as with the actuators for the mode-air door and the recirculation-air door. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle (2). Each actuator also has an identical output shaft with splines (3) that connects it to its respective door linkage and three integral mounting tabs (4) that allow the actuator to be secured to the HVAC housing. The blend door actuators do not require mechanical indexing to the blend-air doors, as they are electronically calibrated by the A/C-heater control.

OPERATION

The blend door actuators are connected to the A/C-heater control through the vehicle electrical system by a dedicated two-wire lead and connector of the HVAC wire harness. The blend door actuator(s) can move the blend-air door(s) in two directions. When the A/C-heater control pulls the voltage on one side of the motor connection high and the other connection low, the blend-air door will move in one direction. When the A/C-heater control reverses the polarity of the voltage to the motor, the blend-air door moves in the opposite direction.

When the A/C-heater control makes the voltage to both connections high or both connections low, the blend-air door(s) stops and will not move. The A/C-heater control uses a pulse-count positioning system to monitor the operation and relative position of the blend door actuators and the blend-air doors. The A/C-heater control learns the blend-air doors stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the blend door actuator circuits.

Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information.

The blend door actuator(s) cannot be adjusted or repaired and, if faulty or damaged, they must be replaced.

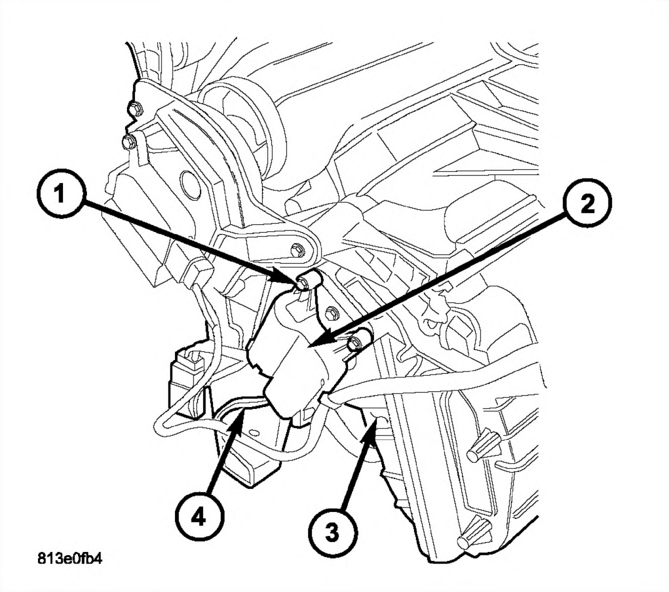
REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: The single zone heater-A/C system is equipped with a single blend door actuator. The dual zone system has two blend door actuators, one for the driver side blend-air door and one for the passenger side blend-air door.

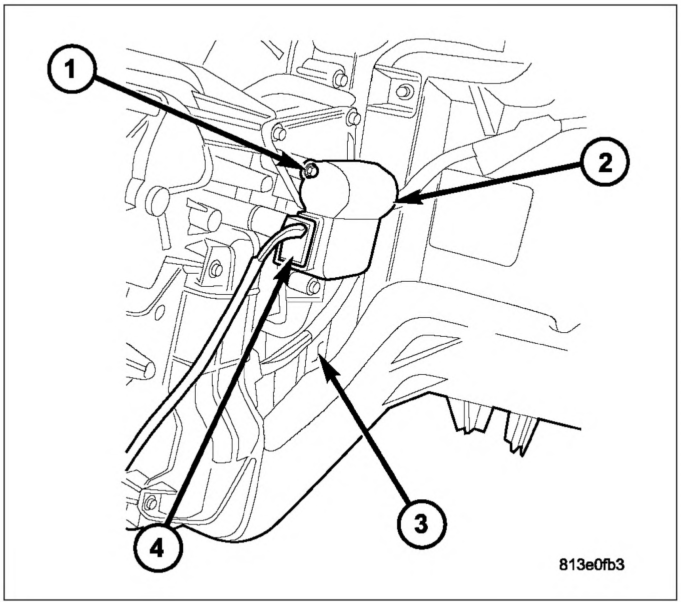
SINGLE ZONE/DUAL ZONE DRIVER SIDE

1. Disconnect and isolate the negative battery cable.
2. Remove the instrument panel silencer from the driver side of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - REMOVAL).
3. Remove the three screws (1) that secure the blend door actuator (2) to the driver side of the HVAC air distribution housing (3).
4. Remove the blend door actuator from the air distribution housing and disconnect the HVAC wire harness connector (4) from the actuator.
5. Remove the blend door actuator from the vehicle.



DUAL ZONE PASSENGER SIDE

1. Disconnect and isolate the negative battery cable.
2. Remove the glove box from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/GLOVE BOX - REMOVAL).
3. Remove the three screws (1) that secure the blend door actuator (2) to the passenger side of the HVAC air distribution housing (3).
4. Remove the blend door actuator from the air distribution housing and disconnect the HVAC wire harness connector (4) from the actuator.
5. Remove the blend door actuator from the vehicle.

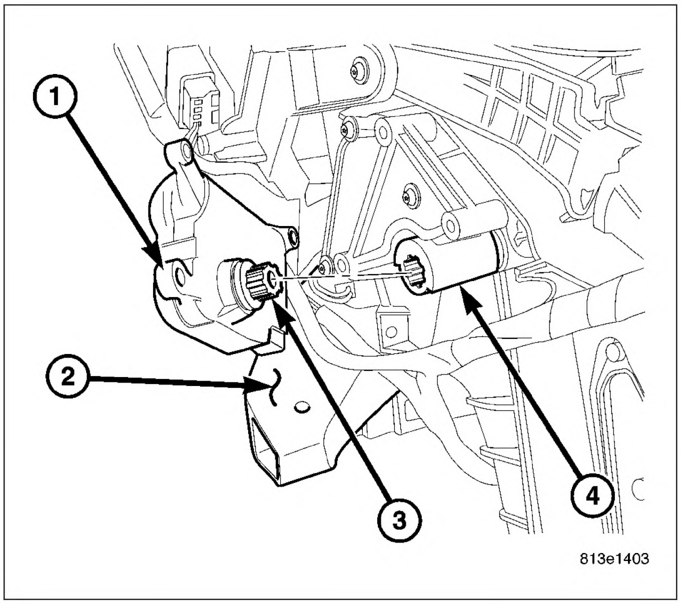


INSTALLATION

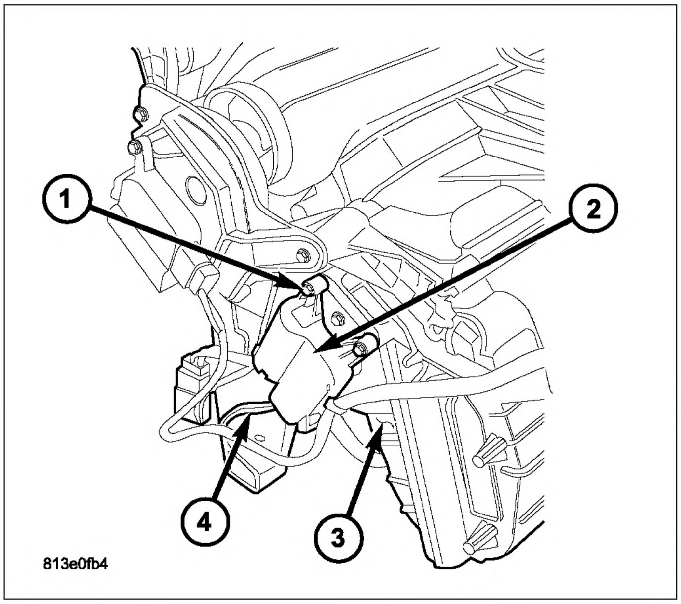
NOTE: The single zone heater-A/C system is equipped with a single blend door actuator. The dual zone system has two blend door actuators, one for the driver side blend-air door and one for the passenger side blend-air door.

SINGLE ZONE/DUAL ZONE DRIVER SIDE

1. Position the blend door actuator (1) into the vehicle.
2. Install the blend door actuator onto the driver side of the HVAC air distribution housing (2). If necessary, rotate the actuator slightly to align the splines on the actuator output shaft (3) with those on the blend door cam (4).

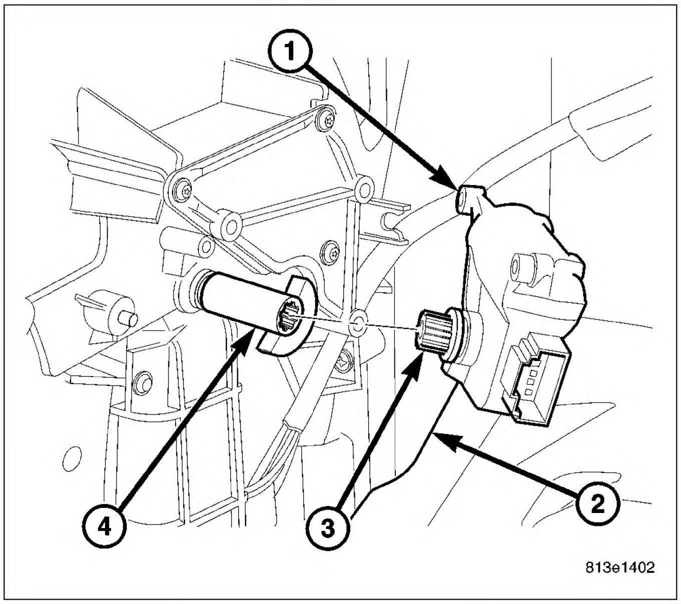


3. Install the screws (1) that secure the blend door actuator (2) to the driver side of the air distribution housing (3). Tighten the screws to 2 N·m (17 in. lbs.).
4. Connect the HVAC wire harness connector (4) to the blend door actuator.
5. Install the instrument panel silencer onto the driver side of the instrument panel (Refer to 23 - BODY/ INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - INSTALLATION).
6. Reconnect the negative battery cable.

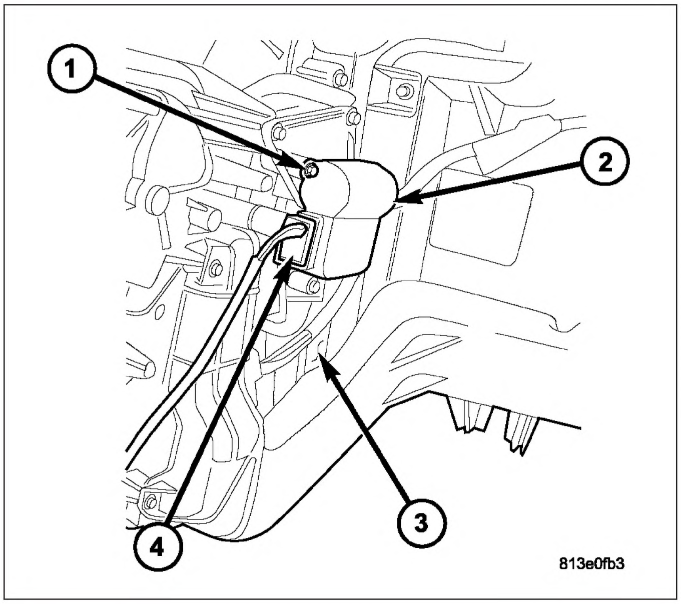


DUAL ZONE PASSENGER SIDE

1. Position the blend door actuator (1) into the vehicle.
2. Install the blend door actuator onto the passenger side of the HVAC air distribution housing (2). If necessary, rotate the actuator slightly to align the splines on the actuator output shaft (3) with those on the blend door cam (4).

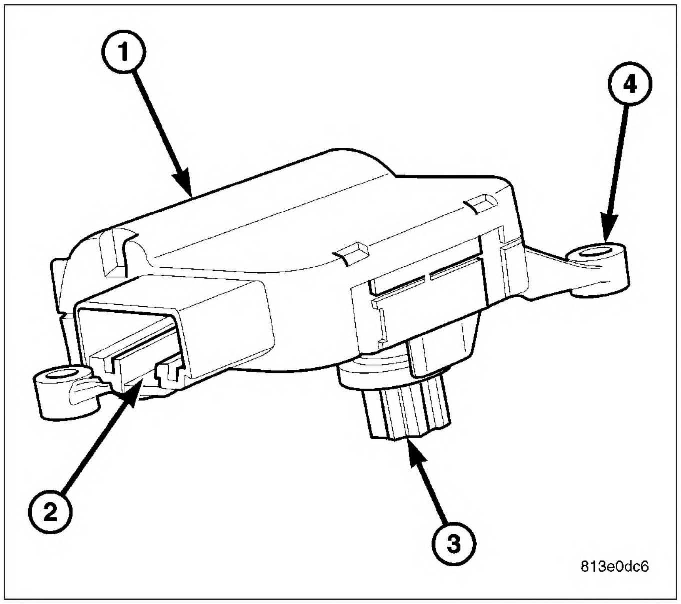


3. Install the screws (1) that secure the blend door actuator (2) to the passenger side of the air distribution housing (3). Tighten the screws to 2 N·m (17 in. lbs.).
4. Connect the HVAC wire harness connector (4) to the blend door actuator.
5. Install the glove box into the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - INSTALLATION).
6. Reconnect the negative battery cable.



ACTUATOR-MODE DOOR

DESCRIPTION



This vehicle uses two mode door actuators (1) which are reversible, 12-volt direct current (DC), servo motors. The mode door actuator for the panel/defrost/demist/floor air doors is located on the driver side end of the HVAC air distribution housing. The mode door actuator for the rear floor/console air door is located on the rear of the air distribution housing near the front of the floor console area. The mode door actuators are mechanically connected to the mode-air doors.

The mode door actuator is interchangeable with the actuators for the blend-air door(s) and the recirculation-air door. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle (2). Each actuator also has an identical output shaft with splines (3) that connects it to its door linkage and three integral mounting tabs (4) that allow the actuator to be secured to the HVAC housing. The mode door actuator does not require mechanical indexing to the mode-air doors, as it is electronically calibrated by the A/C-heater control.

OPERATION

The two mode door actuators are connected to the A/C-heater control through the vehicle electrical system by dedicated two-wire leads and connectors of the HVAC wire harness. The mode door actuators can move the panel/defrost/demist/floor air doors in two directions. When the A/C-heater control pulls the voltage on one side of the motor connection high and the other connection low, the mode-air doors will move in one direction. When the A/C-heater control reverses the polarity of the voltage to the motor, the mode-air doors moves in the opposite direction.

When the A/C-heater control makes the voltage to both connections high or both connections low, the mode-air door stops and will not move. The A/C-heater control uses a pulse-count positioning system to monitor the operation and relative position of the mode door actuators and the mode-air doors. The A/C-heater control learns the mode-air doors stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the mode door actuator circuits.

Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING and to 24 - HVAC Electrical Diagnostics for more information.

The mode door actuators cannot be adjusted or repaired and, if faulty or damaged, they must be replaced.

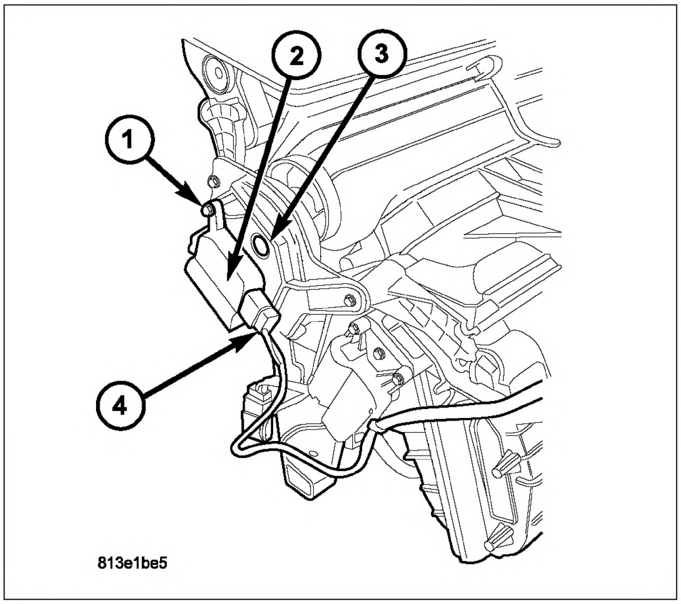
REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: The heater-A/C system is equipped with two mode door actuators. One for the air doors for the outlets in the instrument panel and one for the air door for the rear seat/console outlets.

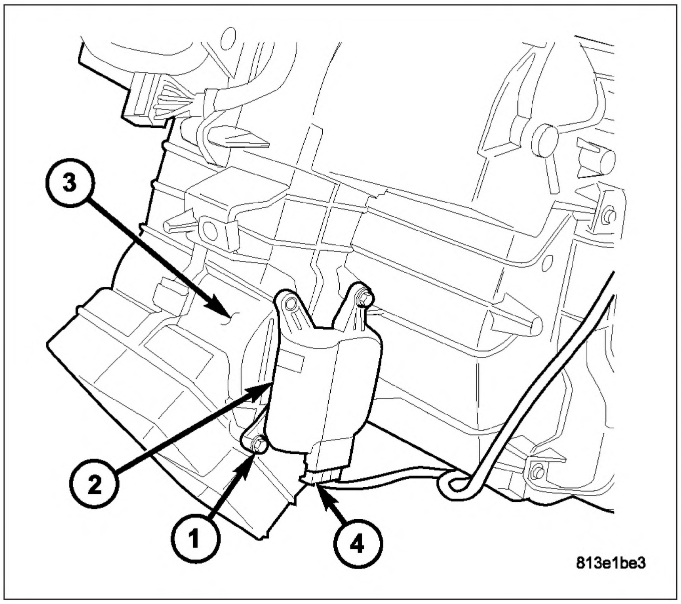
PANEL/DEFROST/DEMIST/FLOOR

1. Disconnect and isolate the negative battery cable.
2. Remove the instrument panel silencer from the driver side of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - REMOVAL).
3. Remove the three screws (1) that secure the mode door actuator (2) to the driver side of the HVAC air distribution housing (3).
4. Remove the mode door actuator from the air distribution housing and disconnect the HVAC wire harness connector (4) from the actuator.
5. Remove the mode door actuator from the vehicle.



REAR FLOOR/CONSOLE

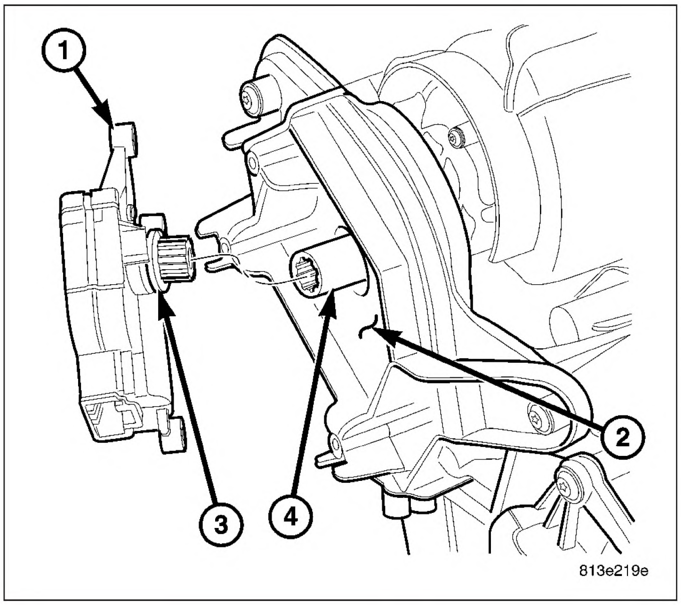
1. Disconnect and isolate the negative battery cable.
2. Remove the instrument panel from the vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
3. Remove the two screws (1) that secure the mode door actuator (2) to the rear of the HVAC air distribution housing (3).
4. Remove the mode door actuator from the air distribution housing and disconnect the HVAC wire harness connector (4) from the actuator.
5. Remove the mode door actuator from the vehicle.



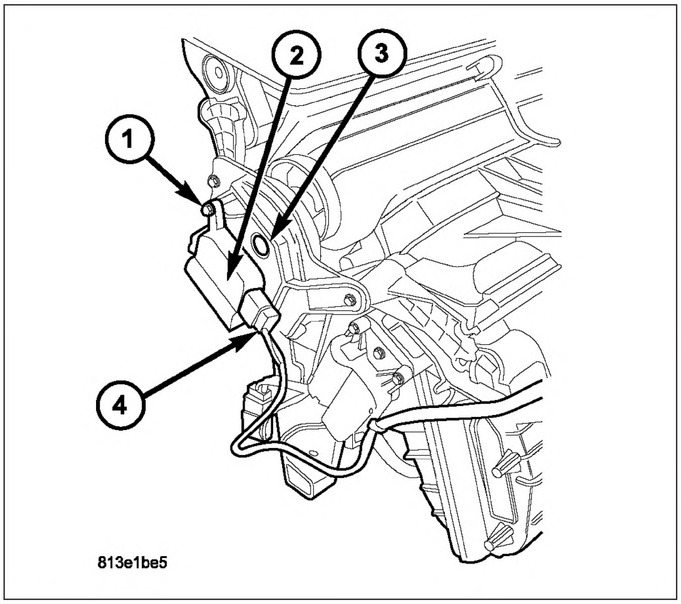
INSTALLATION

PANEL/DEFROST/DEMIST/FLOOR

1. Position the mode door actuator (1) into the vehicle.
2. Install the mode door actuator onto the driver side of the HVAC air distribution housing (2). If necessary, rotate the actuator slightly to align the splines on the actuator output shaft (3) with those on the mode door cam (4).

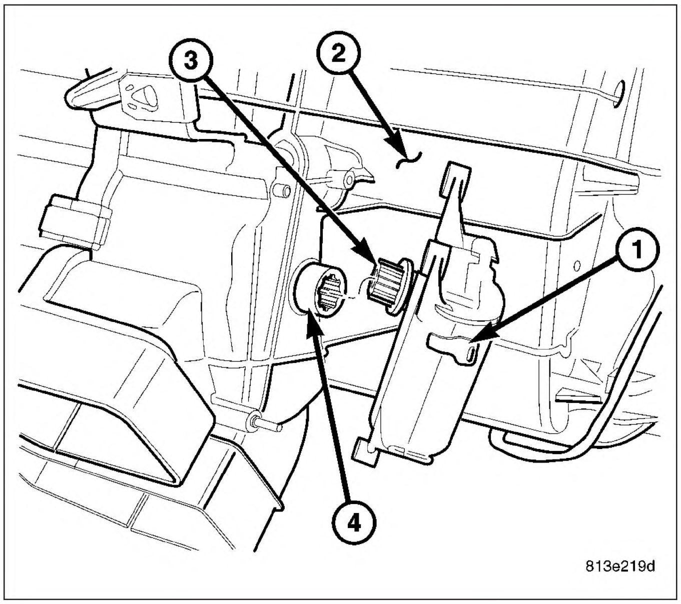


3. Install the screws (1) that secure the mode door actuator (2) to the driver side of the air distribution housing (3). Tighten the screws to 2 N·m (17 in. lbs.).
4. Connect the HVAC wire harness connector (4) to the mode door actuator.
5. Install the instrument panel silencer onto the driver side of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - INSTALLATION).
6. Reconnect the negative battery cable.

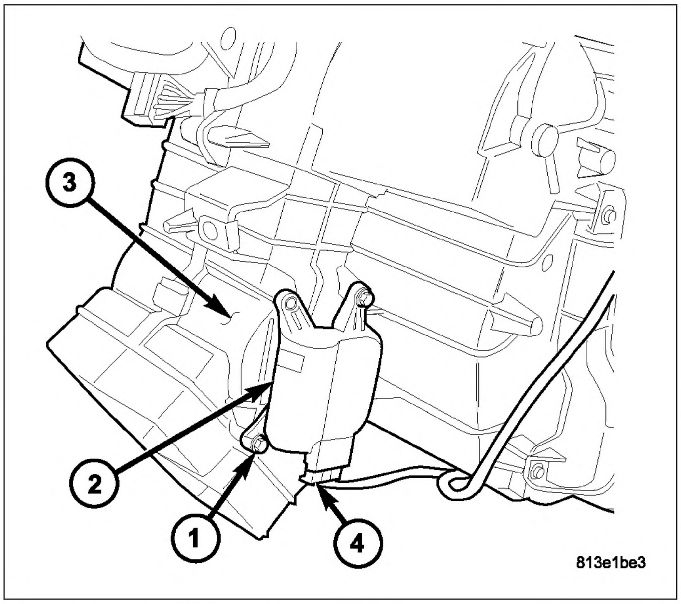


REAR FLOOR/CONSOLE

1. Position the mode door actuator (1) into the vehicle.
2. Install the mode door actuator onto the rear of the HVAC air distribution housing (2). If necessary, rotate the actuator slightly to align the splines on the actuator output shaft (3) with those on the pivot shaft of the rear floor/console air door (4).



3. Install the two screws (1) that secure the mode door actuator (2) to the rear of the air distribution housing (3). Tighten the screws to 2 N·m (17 in. lbs.).
4. Connect the HVAC wire harness connector (4) to the mode door actuator.
5. Install the instrument panel (Refer to 23 - BODY/ INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).
6. Reconnect the negative battery cable.

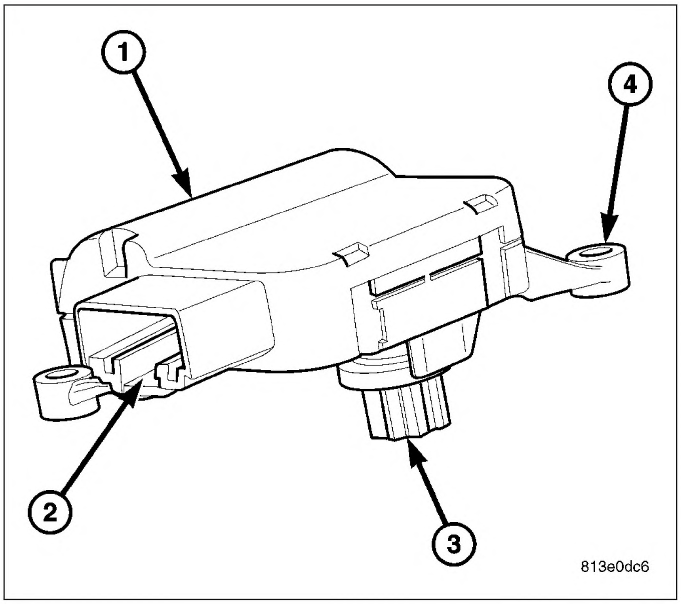


ACTUATOR-RECIRCULATION DOOR

DESCRIPTION

The recirculation door actuator (1) is a reversible, 12 volt direct current (DC), servo motor. The recirculation door actuator is located on the left side of the HVAC air inlet housing and is directly connected to the pivot shaft of the recirculation-air door.

The recirculation door actuator is interchangeable with the actuators for the blend-air door(s) and the mode-air doors. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle (2). Each actuator also has an identical output shaft with splines (3) that connects it to its door linkage and three integral mounting tabs (4) that allow the actuator to be secured to the air inlet housing. The recirculation door actuator does not require mechanical indexing to the recirculation-air door, as it is electronically calibrated by the A/C-heater control.



OPERATION

The recirculation door actuator is connected to the A/C-heater control through the vehicle electrical system by a dedicated two-wire lead and connector of the HVAC wire harness. The recirculation door actuator can move the recirculation-air door in two directions. When the A/C-heater control pulls the voltage on one side of the motor connection high and the other connection low, the recirculation-air door will move in one direction. When the A/C-heater control reverses the polarity of the voltage to the motor, the recirculation-air door moves in the opposite direction.

When the A/C-heater control makes the voltage to both connections high or both connections low, the recirculation-air door stops and will not move. The A/C-heater control uses a pulse-count positioning system to monitor the operation and relative position of the recirculation door actuator and the recirculation-air door. The A/C-heater control learns the recirculation-air door stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the recirculation door actuator circuits.

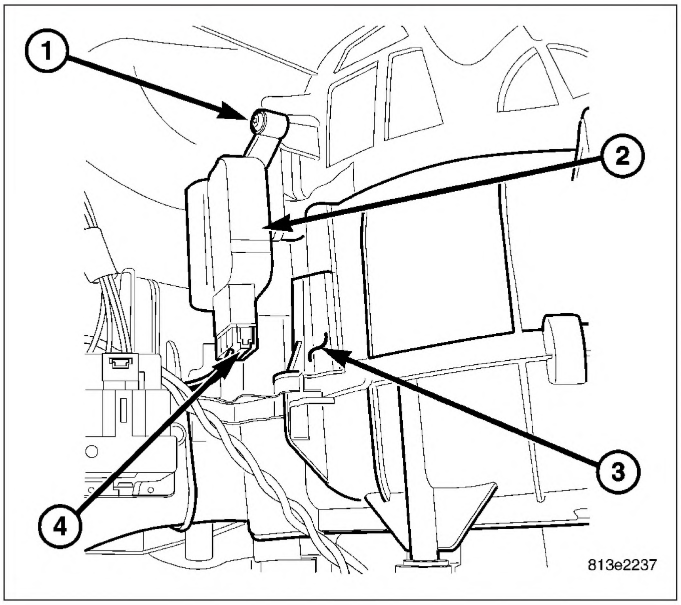
Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information.

The recirculation door actuator cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

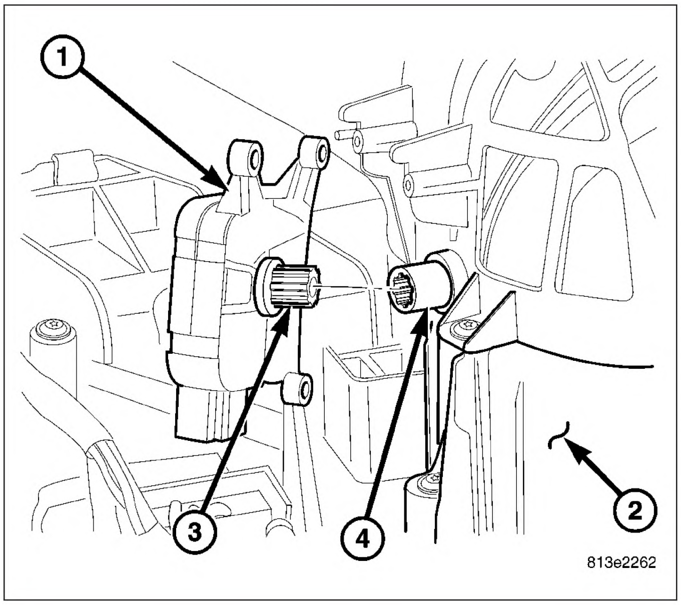
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

1. Disconnect and isolate the negative battery cable.
2. Remove the glove box from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - REMOVAL).
3. Remove the two screws (1) that secure the recirculation door actuator (2) to the left side of the HVAC air inlet housing (3).
4. Remove the recirculation door actuator from the air inlet housing and disconnect the HVAC wire harness connector (4) from the actuator.
5. Remove the recirculation door actuator from the vehicle.

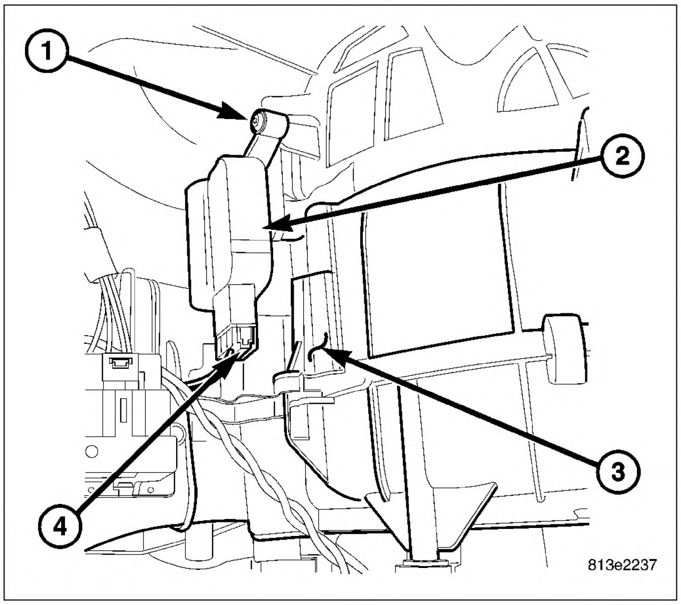


INSTALLATION

1. Position the recirculation door actuator (1) into the vehicle.
2. Install the recirculation door actuator onto the left side of the HVAC air inlet housing (2). If necessary, rotate the actuator slightly to align the splines on the actuator output shaft (3) with those on the recirculation door pivot shaft (4).



3. Install the three screws (1) that secure the recirculation door actuator (2) to the left side of the HVAC air inlet housing (3). Tighten the screws to 2 N·m (17 in. lbs.).
4. Connect the HVAC wire harness connector (4) to the recirculation door actuator.
5. Install the glove box into the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/GLOVE BOX - INSTALLATION).
6. Reconnect the negative battery cable.

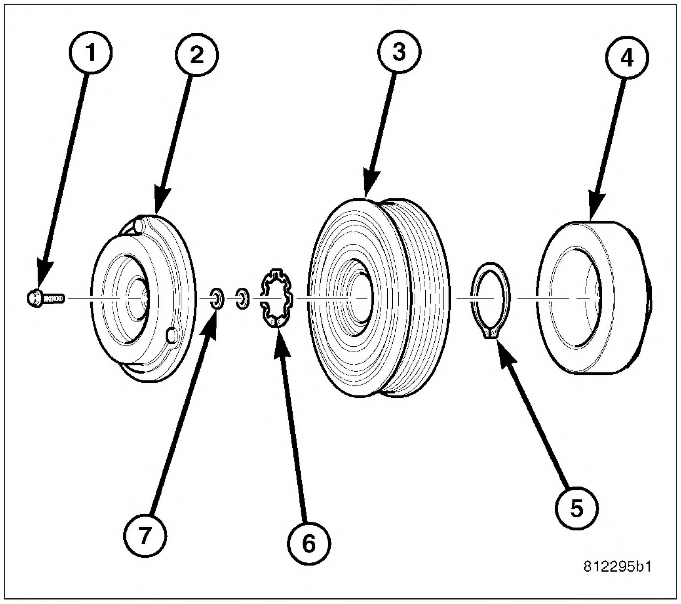


CLUTCH-A/C COMPRESSOR

DESCRIPTION

The A/C compressor clutch assembly consists of a stationary electromagnetic A/C clutch field coil (4), pulley bearing and pulley assembly (3), clutch plate (2) and shims (7). These components provide the means to engage and disengage the A/C compressor from the engine accessory drive belt.

The A/C clutch field coil and the pulley bearing and pulley assembly are both retained on the nose of the A/C compressor with snap rings (5 and 6). The clutch plate is splined to the compressor shaft and secured with a bolt (1).



OPERATION

The A/C compressor clutch components provide the means to engage and disengage the A/C compressor from the engine accessory drive belt. When the electromagnetic A/C clutch field coil is energized, it magnetically draws the clutch plate into contact with the clutch pulley and drives the compressor shaft. When the coil is not energized, the pulley freewheels on the clutch hub bearing, which is part of the pulley assembly.

A/C compressor clutch engagement is controlled by the powertrain control module (PCM) or the engine control module (ECM), depending on engine application.

The A/C compressor clutch components cannot be repaired and, if faulty or damaged, they must be replaced.

DIAGNOSIS AND TESTING

A/C COMPRESSOR CLUTCH COIL

The A/C compressor clutch coil electrical circuit is controlled by the powertrain control module (PCM) through the A/C clutch relay. The A/C clutch coil can be tested by either measuring cluch field coil resistance or by measuring current draw. Begin testing of a suspected compressor clutch coil problem by performing the preliminary checks.

PRELIMINARY CHECKS

1. If the A/C compressor clutch will not engage, refer to 24 - HVAC Electrical Diagnostics to perform the A/C System Performance Test, which is found within the HVAC System Test. If no diagnostic trouble codes (DTCs) are found in the A/C-heater control or the powertrain control module (PCM), go to Step 2. If any DTCs are found, repair as required.
2. If the A/C compressor clutch still will not engage, verify the refrigerant charge level (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS). If the refrigerant charge level is OK, go to COIL RESISTANCE TEST and/or COIL CURRENT DRAW TEST . If the refrigerant charge level is not OK, adjust the refrigerant charge as required.

COIL RESISTANCE TEST

1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector from the A/C clutch field coil lead connector.
3. Use an ohm meter and measure the resistance of the clutch coil at the coil lead connector terminals.
4. Refer to the A/C Clutch Coil Specifications chart for the acceptable A/C clutch coil resistance. Specifications apply for a work area temperature of 21° C (70° F).
   a. If the A/C clutch coil reading is below specifications, the coil is shorted and must be replaced.
   b. If the A/C clutch coil reading is above specifications, the coil is open and must be replaced.

COIL CURRENT DRAW TEST

1. Verify the battery state of charge (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - DIAGNOSIS AND TESTING).
2. Connect an ammeter (0 to 10 ampere scale selected) in series with the clutch coil feed terminal. Connect a voltmeter (0 to 20 volt scale selected) to measure voltage across the battery and the clutch coil.
3. With the A/C-heater control in the A/C mode and the blower motor at low speed, start the engine and allow it to run at a normal idle speed.
4. The A/C compressor clutch should engage immediately, and the clutch coil supply voltage should be within two volts of the battery voltage. If the coil supply voltage is OK, go to Step 5. If the coil supply voltage is not within two volts of battery voltage, test the clutch coil feed circuit for excessive voltage drop and repair as necessary.
5. Refer to the A/C Clutch Coil Specifications chart for the acceptable A/C clutch coil current draw. Specifications apply for a work area temperature of 21° C (70° F). If voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until voltage reads below 12.5 volts.
   a. If the A/C clutch coil current reading is zero, the coil is open and must be replaced.
   b. If the A/C clutch coil current reading is above specifications, the coil is shorted and must be replaced.

A/C CLUTCH COIL SPECIFICATIONS

Compressor	Current Draw	Coil Resistance
Denso 10S17	3.3 amps @ 11.5 - 12.5 volts	3.6 ± 0.2 ohms

STANDARD PROCEDURE

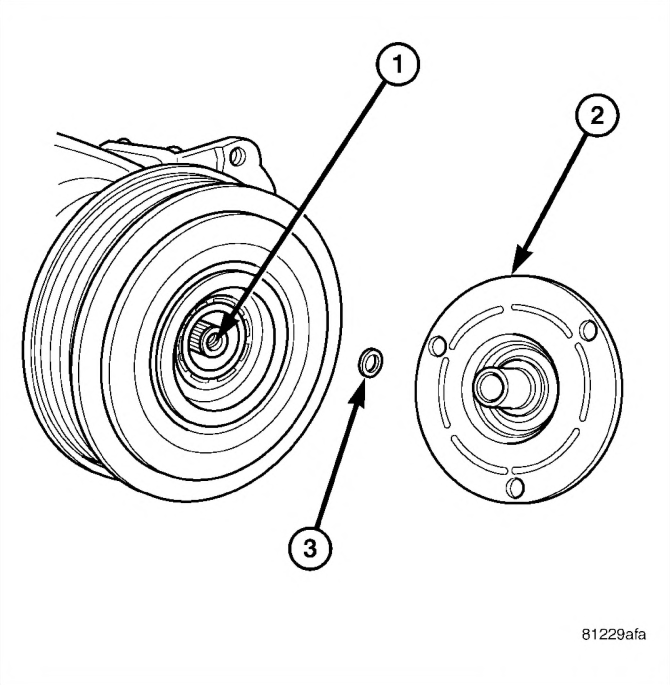
A/C CLUTCH PLATE INSPECTION

NOTE: The A/C clutch can be serviced in the vehicle. The refrigerant system can remain fully-charged during compressor clutch, pulley and bearing assembly, or coil replacement.

Examine the friction surfaces of the pulley and the clutch plate (2) for wear. The pulley and clutch plate should be replaced if there is excessive wear or scoring.

If the friction surfaces are oily, inspect the shaft and nose area of the A/C compressor (1) for refrigerant oil. If refrigerant oil is found, the compressor shaft seal is leaking and the A/C compressor must be replaced.

Check the pulley bearing for roughness or excessive leakage of grease. Replace the pulley and bearing assembly, if required.



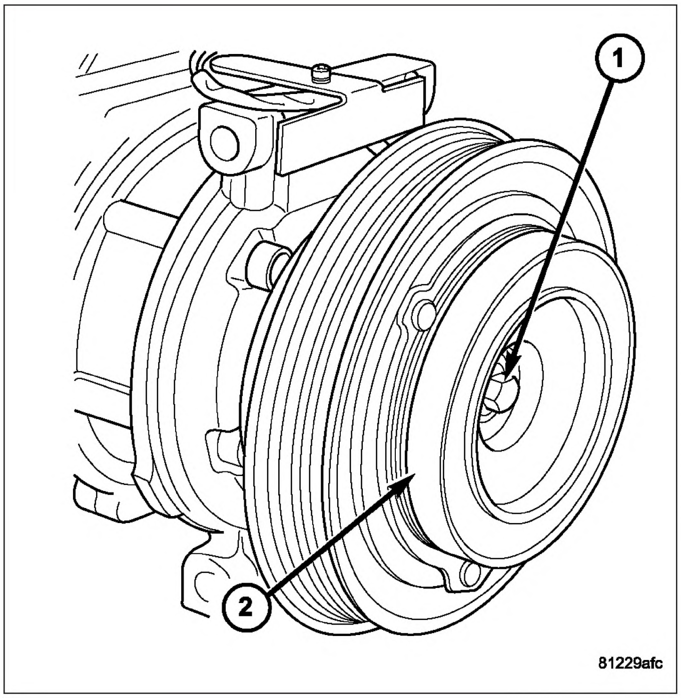
A/C CLUTCH BREAK-IN

After a new A/C compressor clutch has been installed, cycle the compressor clutch approximately twenty times (five seconds on, then five seconds off). During this procedure, set the A/C-heater controls to the A/C Recirculation Mode, the blower motor in the highest speed position, and the engine speed at 1500 to 2000 rpm. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher compressor clutch torque capability.

REMOVAL

NOTE: The A/C compressor clutch can be serviced in the vehicle. The refrigerant system can remain fully-charged during compressor clutch, pulley and bearing assembly, or coil replacement.

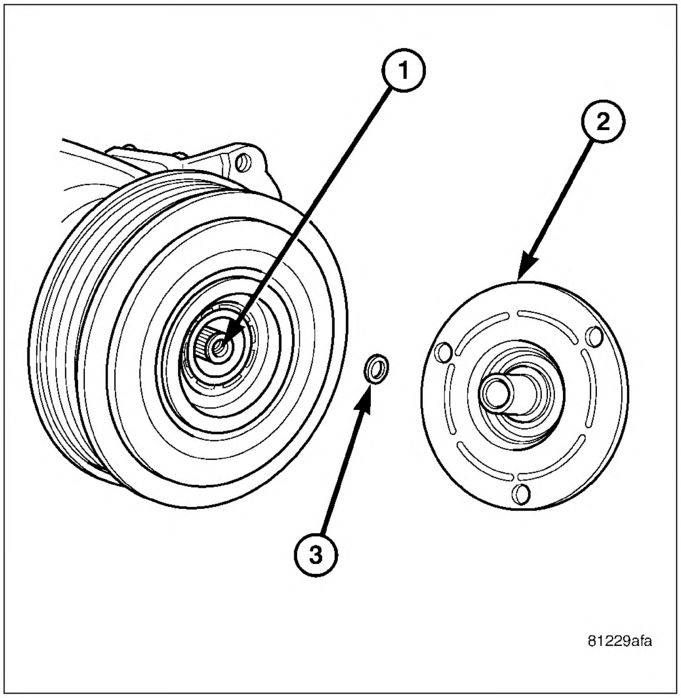
1. Disconnect and isolate the negative battery cable.
2. Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/BELTS-DRIVE - REMOVAL).
3. Disconnect the engine wire harness connector for the A/C compressor clutch coil from the clutch field coil wire harness connector on the top of the A/C compressor.
4. Remove the bolts that secure the A/C compressor to the engine and support the A/C compressor.
5. Remove the compressor shaft bolt (1). A band-type oil filter wrench or a strap wrench may be used to secure the clutch plate (2) during bolt removal.



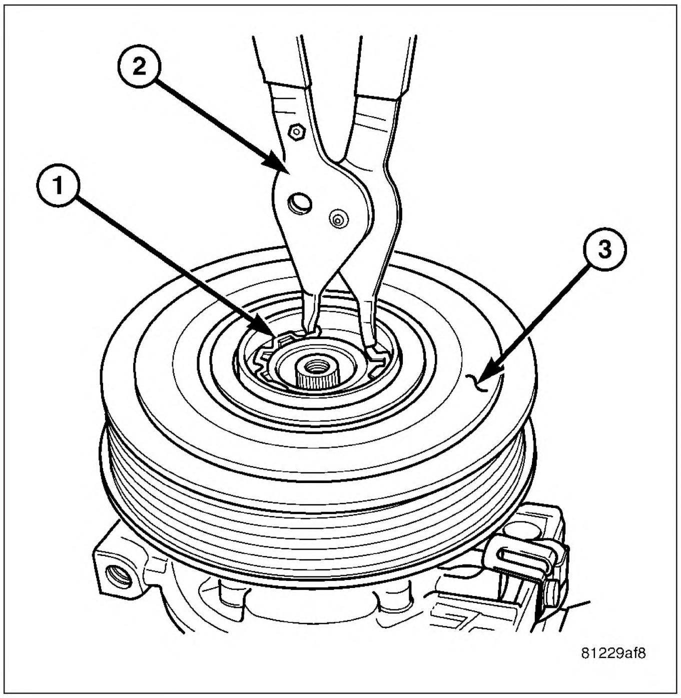
CAUTION: Do not pry between the clutch plate and the pulley and bearing assembly to remove the clutch plate from the compressor shaft as this may damage the clutch plate.

NOTE: Use care not to lose any clutch shim(s) during removal of the clutch plate, as they may be reused during the clutch plate installation process.

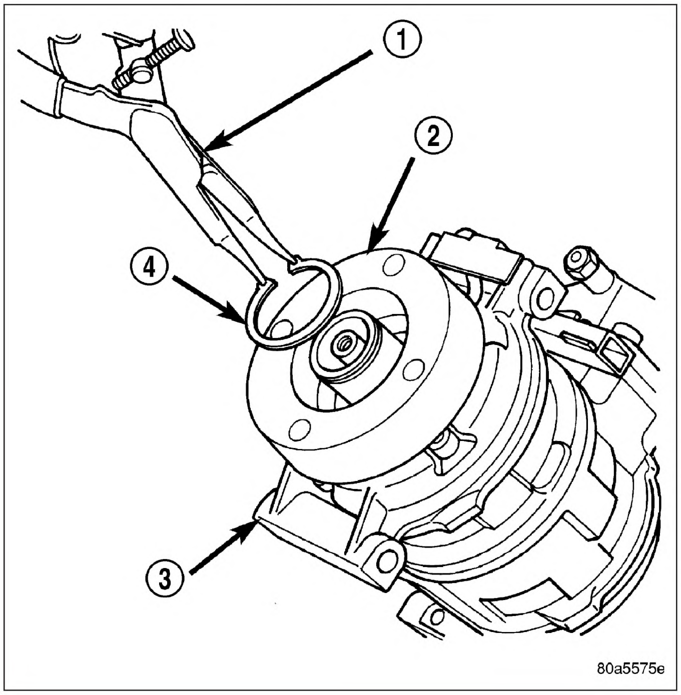
6. Tap the clutch plate (2) lightly with a plastic mallet to release it from the splines on the compressor shaft (1). Remove the clutch plate and shim(s) (3) from the compressor shaft.



7. Using snap ring pliers (Special Tool C-4574 or equivalent) (2), remove the external snap ring (1) that secures the pulley and bearing assembly (3) to the front cover of the A/C compressor, then slide the pulley and bearing assembly off of the A/C compressor.

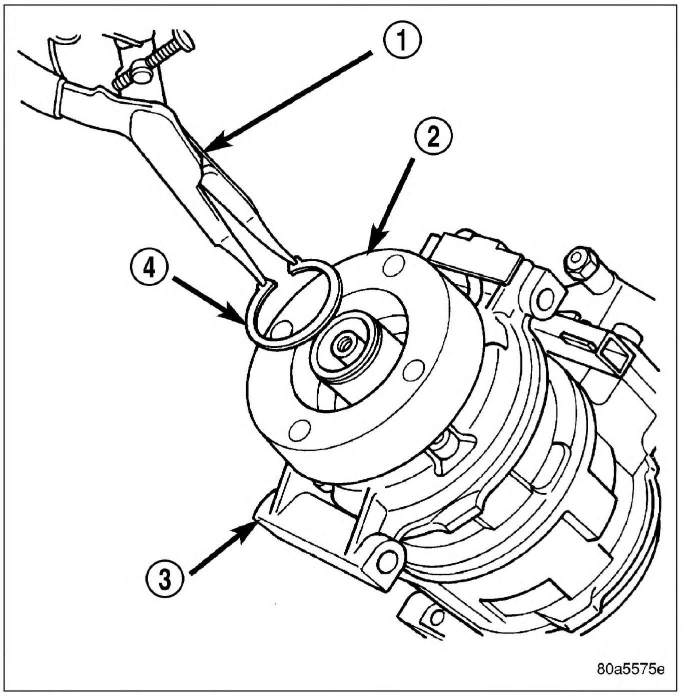


8. Remove the screw that secures the clutch coil pigtail wire connector bracket and ground clip to the top of the compressor housing (3).
9. Using snap ring pliers (Special Tool C-4574 or equivalent) (1), remove the external snap ring (4) that secures the clutch field coil (2) to the front cover of the compressor housing, then slide the clutch field coil off of the A/C compressor.



INSTALLATION

1. Align the dowel pin on the back of the clutch field coil (2) with the hole in the compressor front cover (3) and position the clutch field coil onto the A/C compressor. Be certain that the clutch coil wire harness is properly oriented and routed so that it is not pinched between the compressor front cover and the clutch field coil.



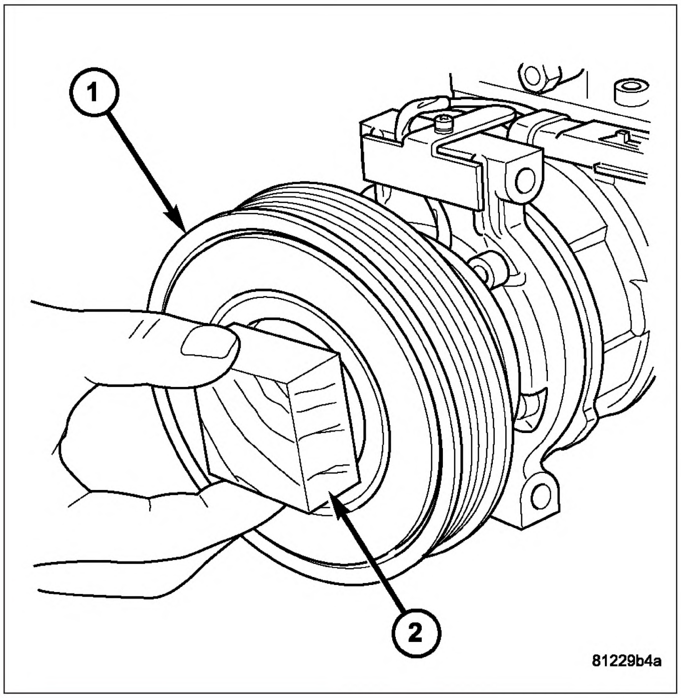
CAUTION: The snap ring must be fully and properly seated in the groove or it will vibrate out, resulting in a clutch failure and severe damage to the A/C compressor.

NOTE: A new snap ring must be used to secure the clutch field coil to the A/C compressor. The bevel side of the snap ring must face outward and both snap ring eyelets must be oriented to the right or to the left of the clutch field coil dowel pin location on the A/C compressor.

2. Using snap ring pliers (Special Tool C-4574 or equivalent) (1), install the external snap ring (4) that secures the clutch field coil to the front cover of the A/C compressor. Be certain that the snap ring is fully and properly seated in the groove and oriented correctly.
3. Install the screw that secures the clutch field coil wire harness connector bracket and ground clip to the top of the compressor housing. Tighten the screw securely.

CAUTION: When installing the pulley and bearing assembly, DO NOT mar the friction surfaces of the pulley or premature failure of the clutch will result.

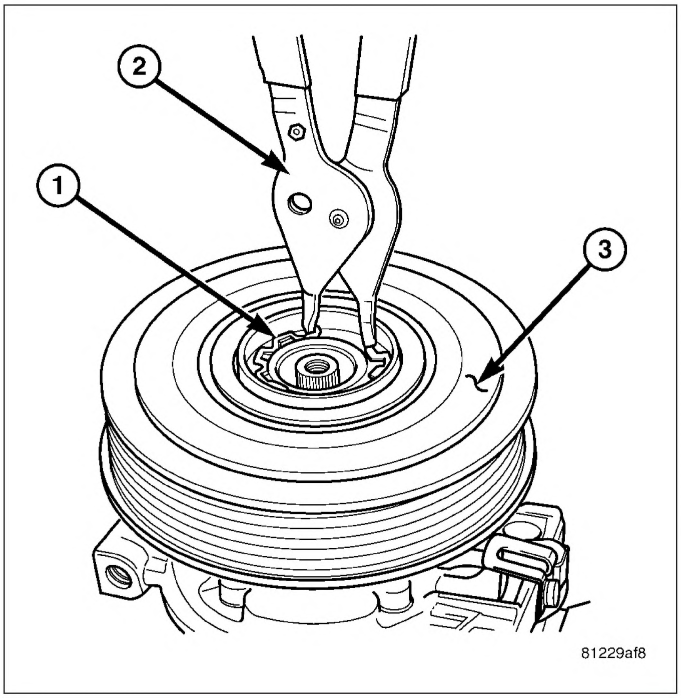
4. Install the pulley and bearing assembly (1) onto the front cover of the A/C compressor. If necessary, tap the pulley gently with a block of wood (2) placed on the pulley friction surface.



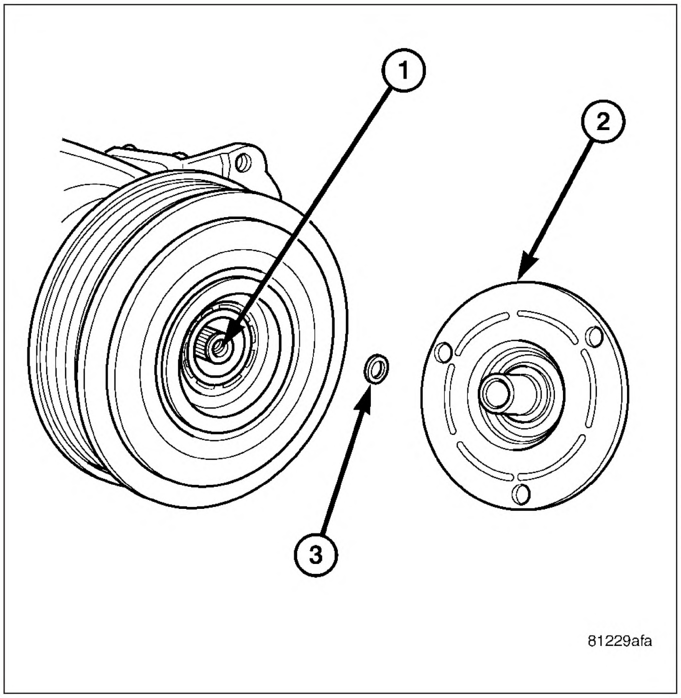
CAUTION: The snap ring must be fully and properly seated in the groove or it will vibrate out, resulting in a clutch failure and severe damage to the A/C compressor.

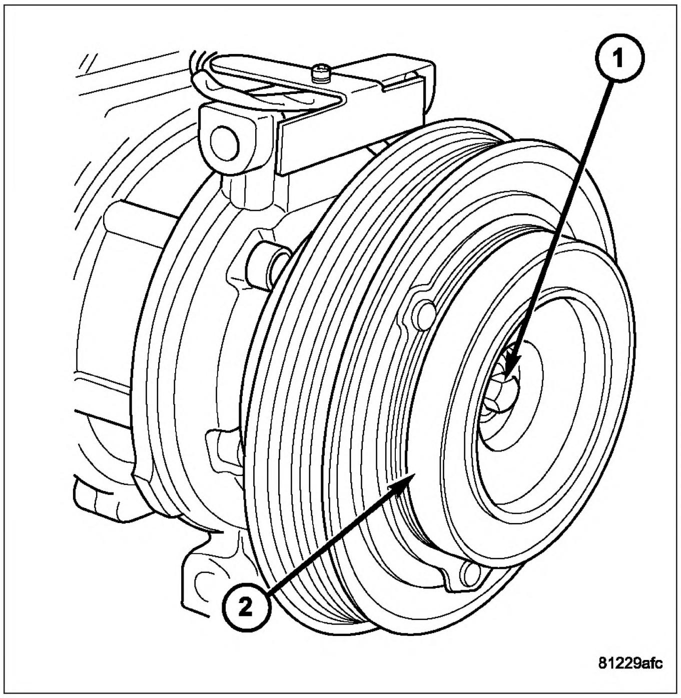
NOTE: A new snap ring must be used to secure the pulley and bearing assembly to the A/C compressor. The bevel side of the snap ring must face outward.

5. Using snap ring pliers (Special Tool C-4574 or equivalent) (2), install the external snap ring (1) that secures the pulley and bearing assembly (3) to the front cover of the A/C compressor. Be certain that the snap ring is fully and properly seated in the groove.



6. If the original clutch plate (2) and pulley and bearing assembly are to be reused, reinstall the original shim(s) (3) on the compressor shaft (1) against the shoulder. If a new clutch plate and/or pulley and bearing assembly are being used, install a trial stack of shims 2.54 mm (0.010 in.) thick on the compressor shaft against the shoulder.





7. Install the clutch plate (2) onto the compressor shaft.
8. Install the compressor shaft bolt (1). Tighten the bolt to 19 N·m (168 in. lbs.).

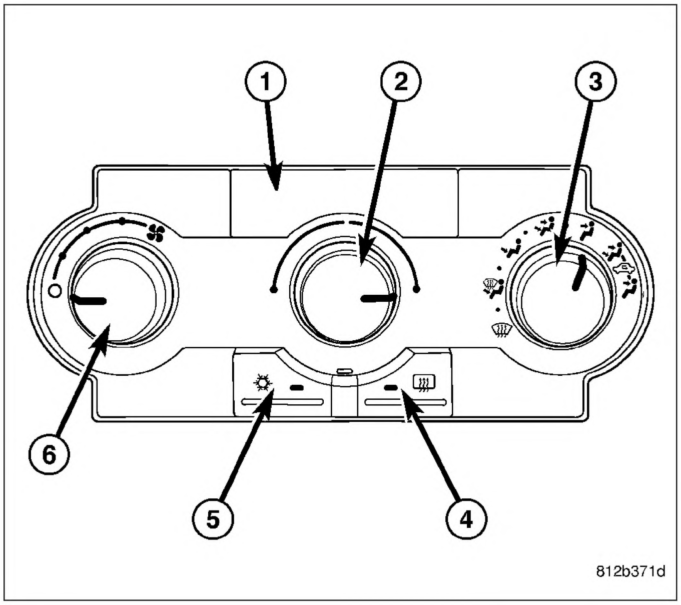
NOTE: The shims may compress after tightening the shaft bolt. Check the air gap in four or more places to verify the air gap is correct. Spin the pulley before performing a final check of the air gap.

9. With the clutch plate assembled tight against the shim(s), measure the air gap between the clutch plate and the pulley and bearing assembly faces with a feeler gauge. The air gap should be between specifications (Refer to 24 - HEATING & AIR CONDITIONING - SPECIFICATIONS). If the proper air gap is not obtained, add or subtract shims as needed until the desired air gap is obtained.
10. Install the bolts that secure the A/C compressor to the engine (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/COMPRESSOR-A/C - INSTALLATION).
11. Connect the engine wire harness connector to the A/C compressor clutch coil.
12. Install the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/BELTS-DRIVE - INSTALLATION).
13. Reconnect the negative battery cable.

CONTROL-A/C-HEATER

DESCRIPTION

MANUAL SINGLE ZONE



The A/C-heater control (1) for the manual temperature control (MTC) single zone heating-A/C system allows one temperature setting for the entire vehicle. All controls are identified by ISO graphic symbols.

The A/C-heater control and integral computer is located in the instrument panel and contains:

- a rotary control knob for temperature control of the discharged air (2).
- a rotary control knob for recirculation and mode control of the discharged air (3).
- a push button rear window defogger on/off control (4). The defogger button contains an LED that illuminates when the rear window defogger system is in operation.
- a push button A/C on/off control (5). The Snowflake button contains an LED that illuminates when the A/C system is in operation.
- a rotary control knob for fan speed selection and turning the heating-A/C system off (6).

Prior to replacing an A/C-heater control, check for any diagnostic trouble codes (DTCs) related to the heating-A/C system and run the calibration procedure to verify that the concern is not a system issue. Refer to 24 - HEATING

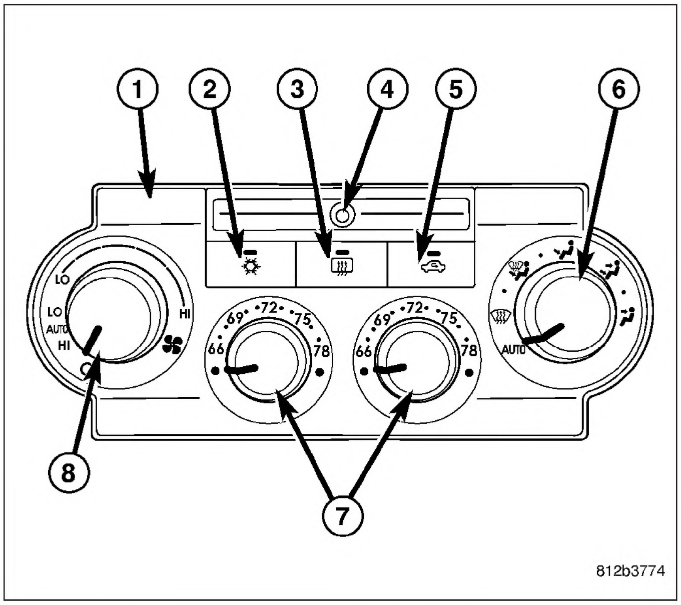
& AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information.

The A/C-heater control cannot be repaired and, if faulty or damaged, it must be replaced.

AUTOMATIC DUAL ZONE

The A/C-heater control (1) for the automatic temperature control (ATC) dual zone heating-A/C system allows both the driver and the front seat passenger the ability to individually regulate air temperature for their side of the vehicle. All controls are identified by ISO graphic symbols.

The ATC A/C-heater control and integral computer is located in the instrument panel and contains:



- a push button A/C on/off control (2). The Snowflake button contains an LED that illuminates when the A/C system is in operation.
- a push button rear window defogger on/off control (3). The defogger button contains an LED that illuminates when the rear window defogger system is in operation.
- an infrared sensor (4) that detects thermal radiation emitted by the front seat occupants and their surroundings
- a push button air recirculation control (5). The Recirculation button contains an LED that illuminates when the recirculation function is manually activated.
- a rotary control knob for mode control of the discharged air (6).
- two rotary control knobs for individual driver and front seat passenger temperature control of the discharged air (7).
- a rotary control knob for manual and automatic fan speed selection and turning the heating-A/C system off (8).
- Auto mode provides variable air recirculation under high temperature and humidity conditions. Because recirculation is generally accompanied by increased fan noise, the proportion of recirculated to outside air gradually approaches full recirculation over a broad temperature range.

The A/C-heater control for the ATC dual zone heating-A/C system is diagnosed using a scan tool. Prior to replacing an A/C-heater control, check for any diagnostic trouble codes (DTCs) related to the heating-A/C system and run the calibration procedure to verify that the concern is not a system issue. Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information.

The A/C-heater control cannot be repaired and, if faulty or damaged, it must be replaced.

The ATC A/C-heater control utilizes integrated circuitry and information carried on the controller area network (CAN) B bus to monitor many sensors and switch inputs throughout the vehicle. In response to those inputs, the internal circuitry and programming of the ATC A/C-heater control allows it to control electronic functions and features of the ATC heating-A/C system.

Some of the inputs received by the A/C-heater control of the ATC heating-A/C system on the CAN B bus are as follows:

- Controlhead backlight dimming
- Refrigerant Pressure
- A/C Clutch Engage
- Vehicle Identification Number
- Vehicle Odometer
- Engine Coolant Temperature
- Ambient Air Temperature
- System Voltage

- Vehicle Speed
- Engine Speed

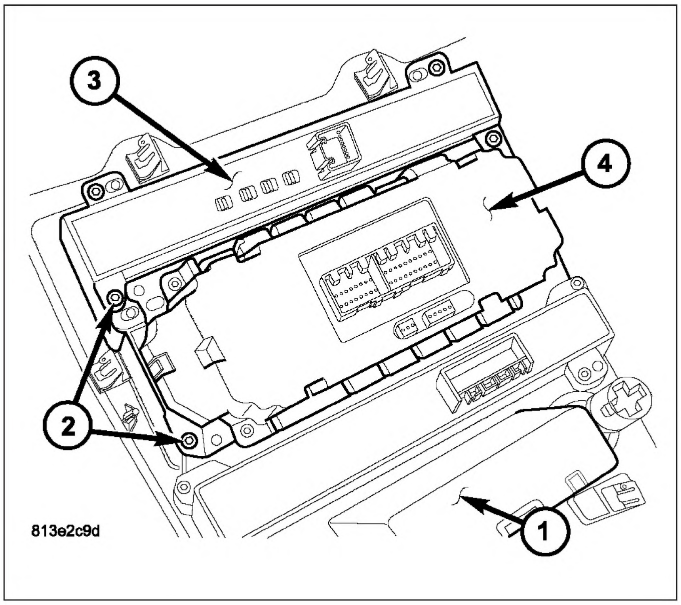
Some of the messages broadcasted by the A/C-heater control of the ATC heating-A/C system on the CAN B bus are as follows:

- A/C Request
- A/C Select
- EBL Status

REMOVAL

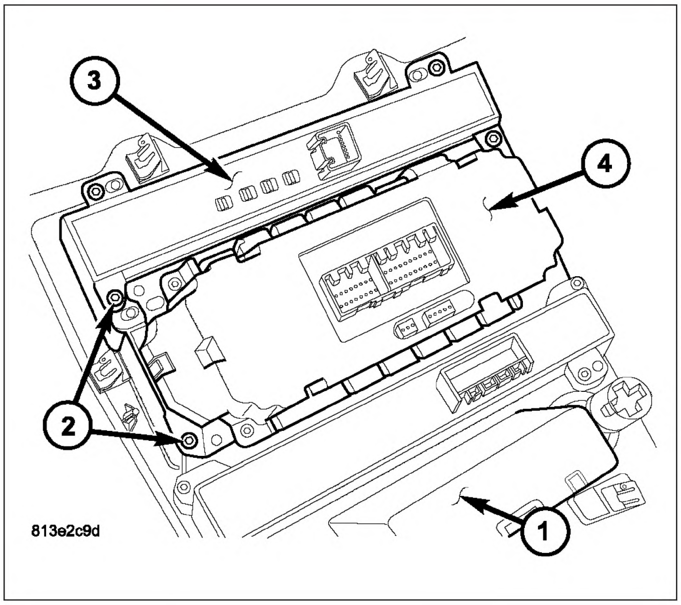
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

1. Disconnect and isolate the negative battery cable.
2. Remove the center bezel (1) from the instrument panel and place it on a workbench (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
3. Remove the screws (2) that secure the electronic vehicle information center (EVIC) control (3) and the A/C-heater control (4) to the center bezel and remove the controls.



INSTALLATION

1. Position the A/C-heater control (4) and the electronic vehicle information center (EVIC) control (3) into the instrument panel center bezel (1).
2. Install the screws (2) that secure the A/C-heater control and the EVIC control to the center bezel. Tighten the screws to 2 N·m (17 in. lbs.).
3. Install the center bezel onto the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).
4. Reconnect the negative battery cable.

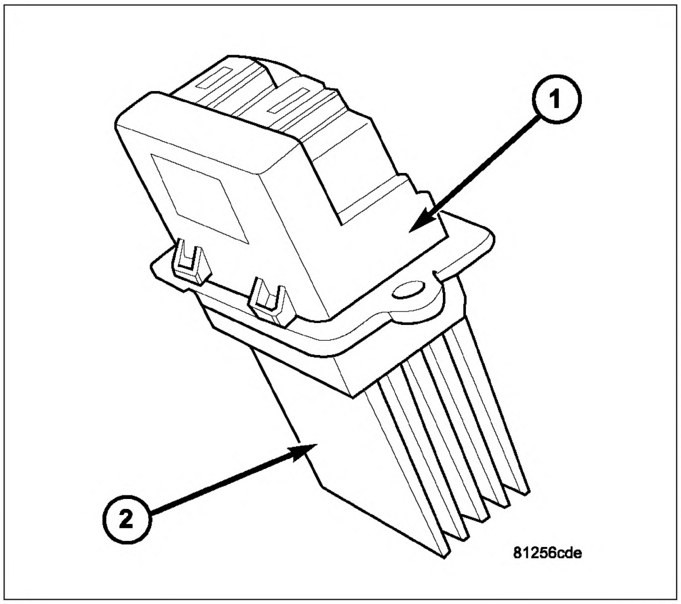


MODULE-POWER-BLOWER MOTOR

DESCRIPTION

A blower motor power module is used on this model when it is equipped with the automatic temperature control (ATC) heating-A/C system. Models equipped with the manual temperature control (MTC) heating-A/C system use a blower motor resistor, instead of the blower motor power module (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RESISTOR-BLOWER MOTOR - DESCRIPTION).

The blower motor power module is mounted to the rear of the HVAC housing, directly behind the glove box. The blower motor power module consists of a molded plastic mounting plate with two integral connector receptacles (1). Concealed behind the mounting plate is the power module electronic circuitry and a large finned heat sink (2). The blower motor power module is accessed for service by removing the glove box.



OPERATION

The blower motor power module is connected to the vehicle electrical system through a dedicated lead and connector of the HVAC wire harness. A second connector receptacle receives the wire harness connector from the blower motor. The blower motor power module allows the microprocessor-based automatic temperature control (ATC) A/C-heater control to calculate and provide infinitely variable blower motor speeds based upon either manual blower switch input or the ATC programming using a pulse width modulated (PWM) circuit strategy.

The PWM voltage is applied to a comparator circuit which compares the PWM signal voltage to the blower motor feedback voltage. The resulting output drives the power module circuitry, which provides a linear output voltage to change or maintain the desired blower speed.

The blower motor power module can be diagnosed using a scan tool.

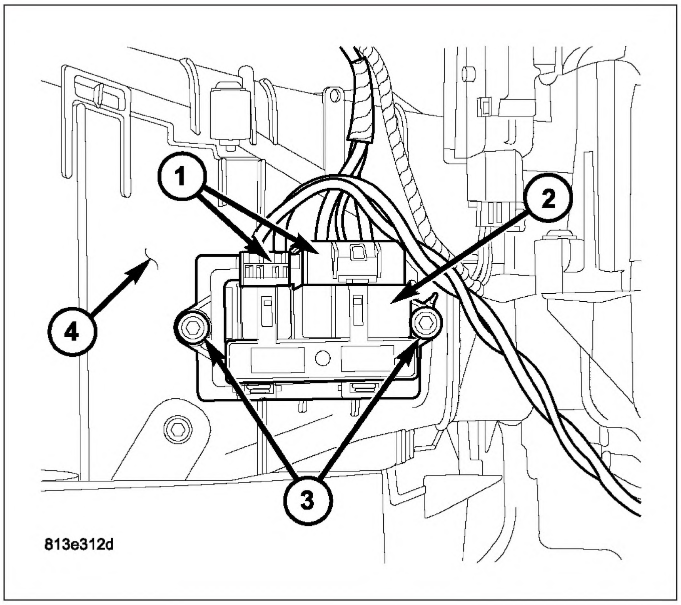
The blower motor power module cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

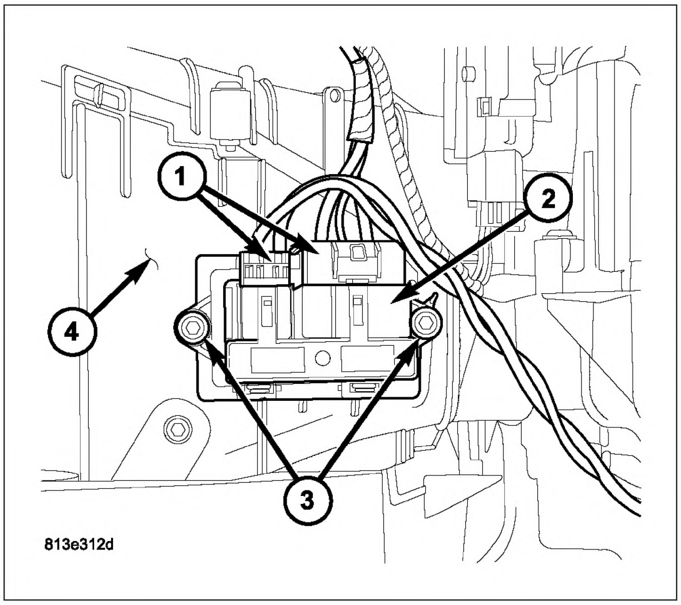
WARNING: The heat sink for the blower motor power module may get very hot during normal operation. If the blower motor was turned on prior to servicing the blower motor power module, wait five minutes to allow the heat sink to cool before performing diagnosis or service. Failure to take this precaution can result in possible personal injury.

1. Disconnect and isolate the negative battery cable.
2. Remove the glove box from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - REMOVAL).
3. Disconnect the two wire harness connectors (1) from the blower motor power module (2).
4. Remove the two screws (3) that secure the blower motor power module to the HVAC housing (4).
5. Remove the blower motor power module from the HVAC housing.



INSTALLATION

1. Position the blower motor power module (2) into the HVAC housing (4).
2. Install the two screws (3) that secure the blower motor power module to the HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).
3. Connect the two wire harness connectors (1) to the blower motor power module.
4. Install the glove box into the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - INSTALLATION).
5. Reconnect the negative battery cable.

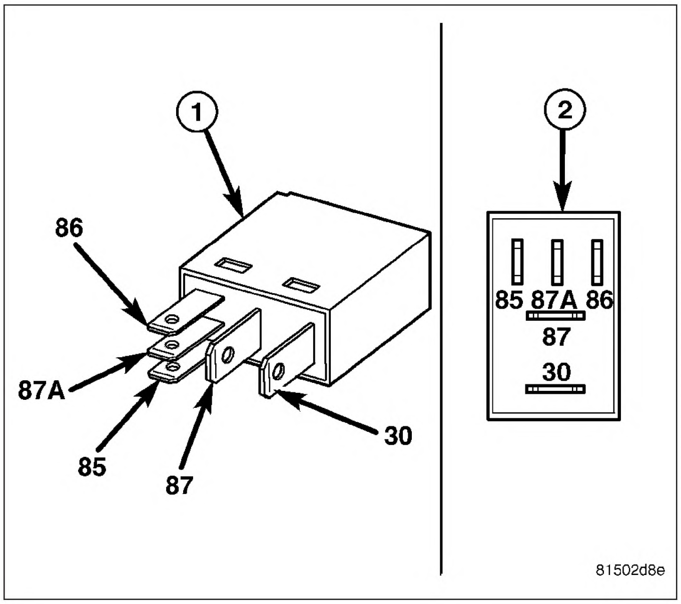


RELAY-A/C CLUTCH

DESCRIPTION

The A/C clutch relay (1) is a International Standards Organization (ISO) micro-relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns (2). The ISO micro-relay terminal functions are the same as a conventional ISO relay. However, the ISO micro-relay terminal pattern (or footprint) is different, the current capacity is lower, and the physical dimensions are smaller than those of the conventional ISO relay.

The A/C clutch relay is located in the power distribution center (PDC) in the engine compartment.



OPERATION

The ISO-standard A/C clutch micro-relay is an electromechanical switch that uses a low current input controlled by the powertrain control module (PCM) to control the high current output to the A/C clutch field coil. The movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to the A/C clutch field coil.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The A/C clutch relay terminals are connected to the vehicle electrical system through a receptacle in the power distribution center (PDC). The inputs and outputs of the A/C clutch relay include:

- Terminal (30) receives fused battery current at all times.
- Terminal (85) receives a ground through the A/C clutch relay control circuit only when the PCM electronically pulls the circuit to ground.
- Terminal (86) receives fused battery current through a ignition switch output circuit only when the ignition switch is in the Run or Start positions.
- Terminal (87) provides battery current to the A/C clutch coil through the A/C clutch relay output circuit only when the A/C clutch relay coil is energized.
- Terminal (87A) is not connected to any circuit in this application, but provides a battery current output only when the A/C clutch relay coil is de-energized.

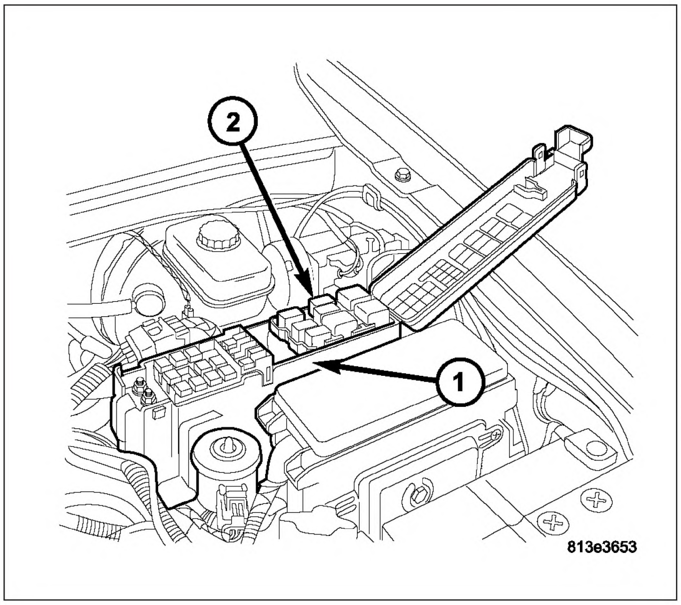
The A/C clutch relay cannot be repaired and, if faulty or damaged, it must be replaced. Refer to the appropriate wiring information for diagnosis and testing of the ISO-standard micro-relay and for complete HVAC wiring diagrams.

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Open the cover of the power distribution center (PDC) (1) located in the engine compartment.

NOTE: Refer to the fuse and relay layout map on the inside of the PDC cover for A/C clutch relay location.

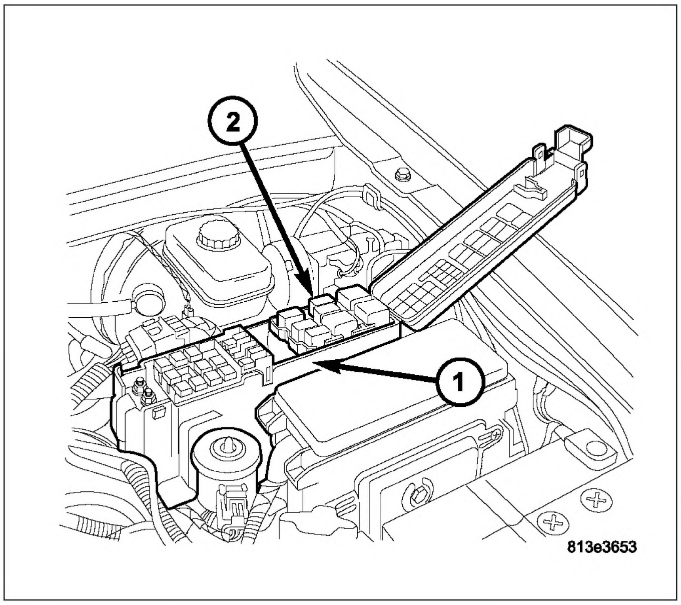
3. Remove the A/C clutch relay (2) from the PDC.



INSTALLATION

NOTE: Refer to the fuse and relay layout map on the inside of the power distribution center (PDC) cover for A/C clutch relay location.

1. Position the A/C clutch relay (2) into the receptacle of the PDC (1).
2. Align the A/C clutch relay terminals with the terminal cavities in the PDC receptacle and push down firmly on the relay until the terminals are fully seated.
3. Close the cover of the PDC.
4. Reconnect the negative battery cable.

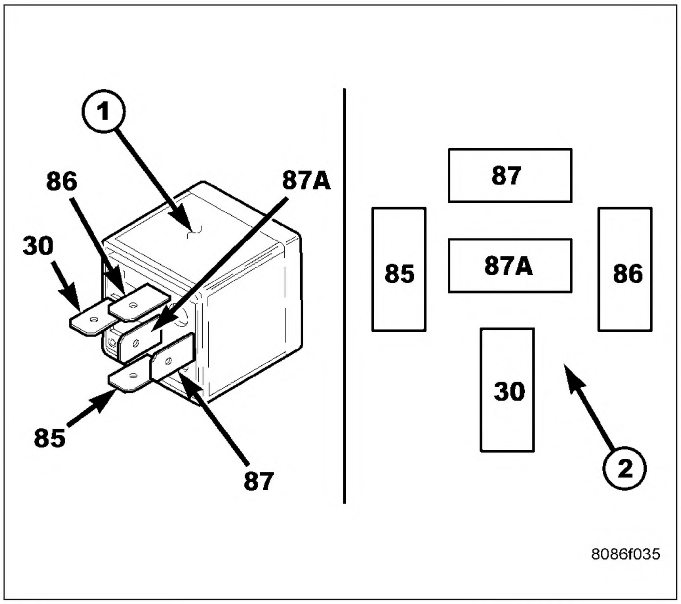


RELAY-BLOWER MOTOR

DESCRIPTION

The blower motor relay (1) for the heating-A/C system is a International Standards Organization (ISO)-type relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns. The blower motor relay is a electromechanical device that switches battery current through a fuse in the power distribution center (PDC) directly to the blower motor when equipped with the manual temperature control (MTC) system, or to the blower motor power module when equipped wth the automatic temperature control (ATC) system. The blower motor relay is energized when the relay coil is provided battery current by the ignition switch.

The blower motor relay is located in the PDC in the engine compartment.



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OPERATION

The ISO-standard blower motor relay is an electromechanical switch that uses a low current input from the ignition switch to control the high current output to the blower motor. The movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to the blower motor.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The blower motor relay terminals are connected to the vehicle electrical system through a receptacle in the power distribution center (PDC). The inputs and outputs of the blower motor relay include:

- Terminal (30) receives fused battery current at all times.
- Terminal (85) is connected to a ground circuit at all times.
- Terminal (86) receives fused battery current through the run relay only when the run relay coil is energized.
- Terminal (87) provides fused battery current to the blower motor through the blower motor relay only when the blower motor relay coil is energized.
- Terminal (87A) is not connected to any circuit in this application, but provides a battery current output only when the blower motor relay coil is de-energized.

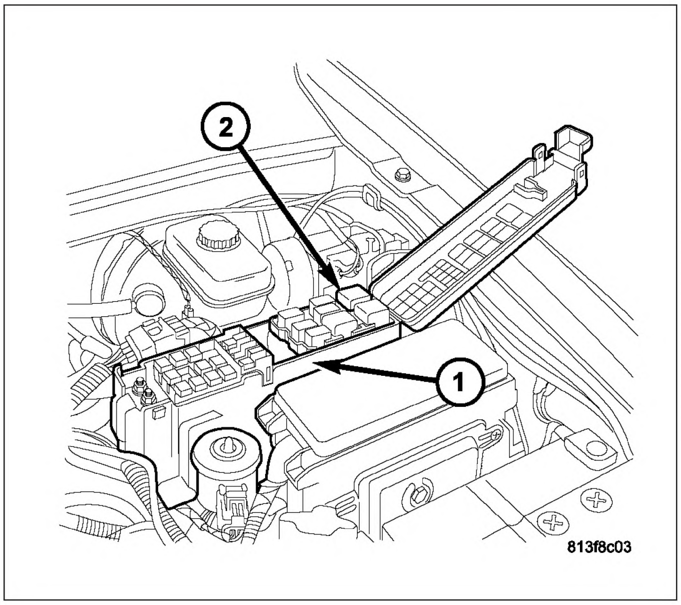
The blower motor relay cannot be repaired and, if faulty or damaged, it must be replaced. Refer to the appropriate wiring information for diagnosis and testing of the ISO-standard relay and for complete HVAC wiring diagrams.

REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Open the cover of the power distribution center (PDC) (1) located in the engine compartment.

NOTE: Refer to the fuse and relay layout map on the PDC cover for blower motor relay location.

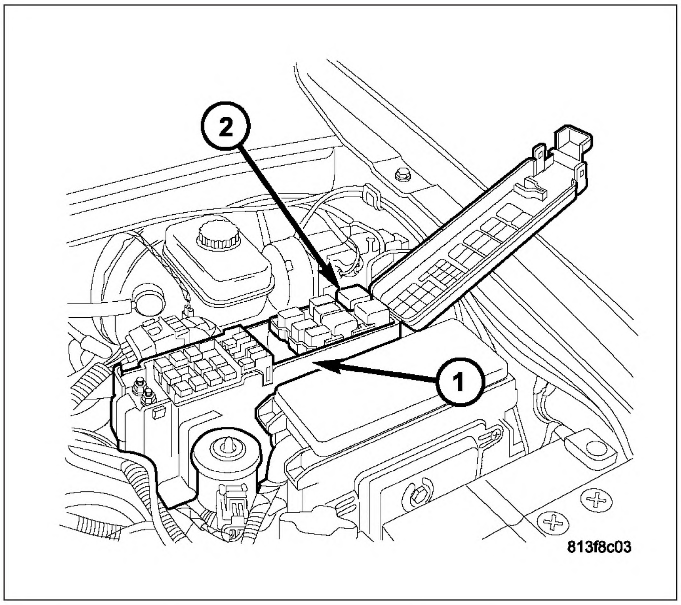
3. Remove the blower motor relay (2) from the PDC.



INSTALLATION

NOTE: Refer to the fuse and relay map on the cover of the power distribution center (PDC) for blower motor relay location.

1. Position the blower motor relay (2) into the proper receptacle of the PDC (1).
2. Align the blower motor relay terminals with the terminal cavities in the PDC receptacle and push down firmly on the relay until the terminals are fully seated.
3. Close the cover of the PDC.
4. Reconnect the negative battery cable.



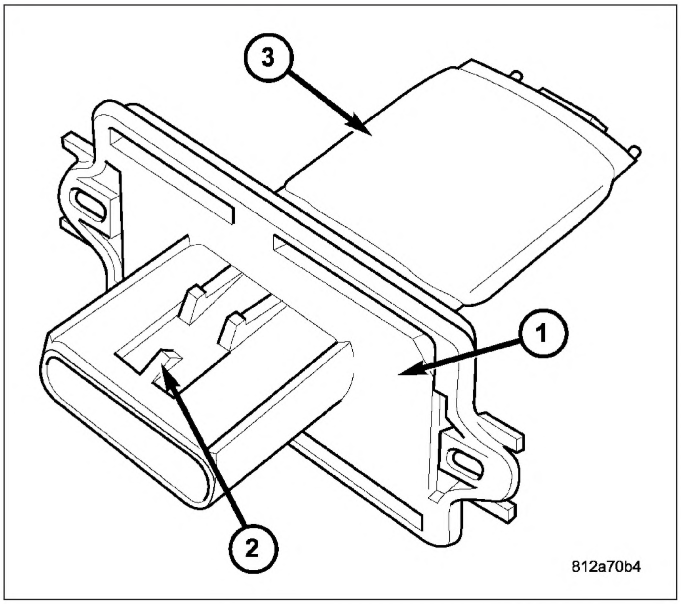
RESISTOR-BLOWER MOTOR

DESCRIPTION

A blower motor resistor is used on vehicles equipped with the manual temperature control (MTC) heating-A/C system. Vehicles equipped with the automatic temperature control (ATC) heating-A/C system use a blower motor power module, instead of the blower motor resistor (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/MODULE-POWER-BLOWER MOTOR - DESCRIPTION).

The blower motor resistor is mounted to the rear of the HVAC housing, directly behind the glove box. The blower motor resistor consists of a molded plastic mounting plate (1) with an integral wire connector receptacle (2). Concealed behind the mounting plate are coiled resistor wires contained within a ceramic heat sink (3).

The blower motor resistor is accessed for service by removing the glove box.



OPERATION

The blower motor resistor is connected to the vehicle electrical system through a dedicated wire lead and connector of the HVAC wire harness. The blower motor resistor has multiple resistor wires, each of which will reduce the current flow through the blower motor to change the blower motor speed.

The blower motor control in the MTC heating-A/C system directs the ground path for the blower motor through the correct resistor wire to obtain the selected speed. With the blower motor control in the lowest speed position, the ground path for the blower motor is applied through all of the resistor wires. Each higher speed selected with the blower motor control applies the blower motor ground path through fewer of the resistor wires, increasing the blower motor speed.

The blower motor resistor cannot be adjusted or repaired and, if faulty or damaged (such as a cracked ceramic heat sink), it must be replaced.

DIAGNOSIS AND TESTING

BLOWER MOTOR RESISTOR

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: For circuit descriptions and diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector from the blower motor resistor (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RESISTOR-BLOWER MOTOR - REMOVAL).

3. Using an ohmmeter, check for continuity between all of the blower motor resistor terminals. In each case there should be continuity. If OK, repair the wire harness circuits between the blower motor switch and the blower motor resistor or blower motor as required. If not OK, replace the faulty blower motor resistor.

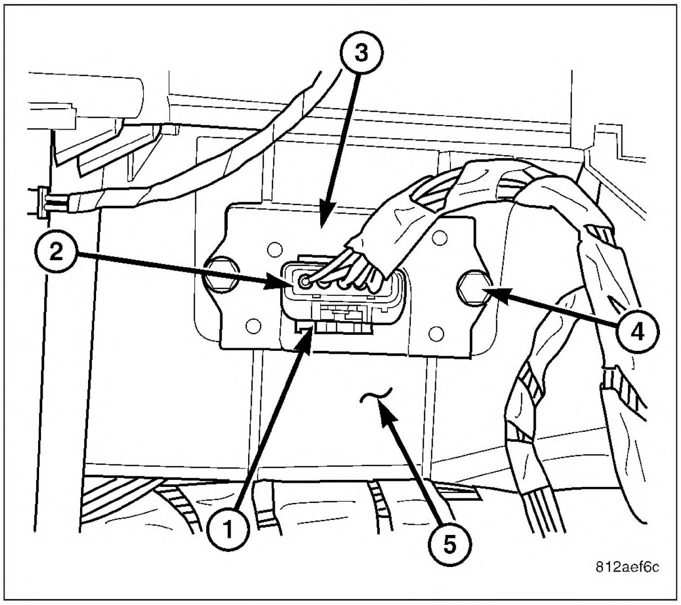
REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: The blower motor resistor may get very hot during normal operation. If the blower motor was turned on prior to servicing the blower motor resistor, wait five minutes to allow the blower motor resistors to cool before performing diagnosis or service. Failure to take this precaution can result in possible personal injury.

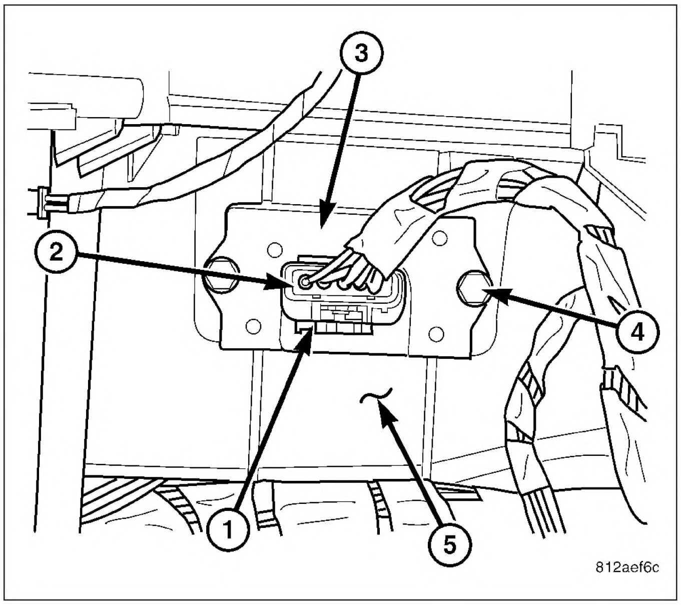
CAUTION: Do not operate the blower motor with the blower motor resistor removed from the circuit. Failure to take this precaution can result in vehicle damage.

1. Disconnect and isolate the negative battery cable.
2. Remove the glove box from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - REMOVAL).
3. Disengage the wire harness connector locking tab (1) and disconnect the wire harness connector (2) from the blower motor resistor (3).
4. Remove the two screws (4) that secure the blower motor resistor to the HVAC housing (5).
5. Remove the blower motor resistor from the HVAC housing.



INSTALLATION

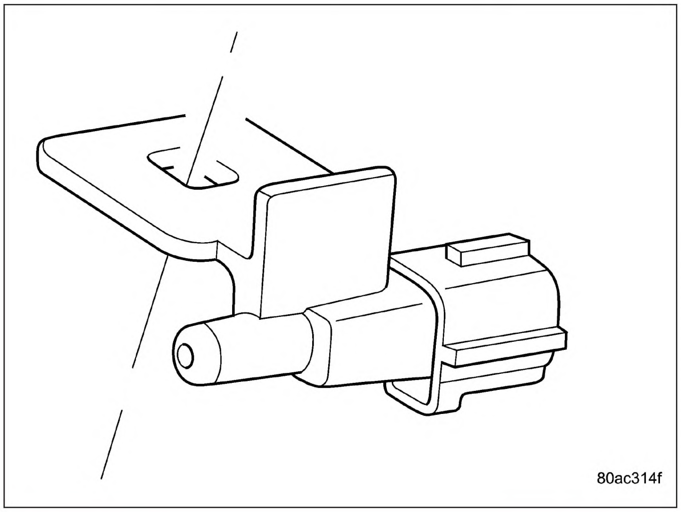
1. Position the blower motor resistor (3) into the HVAC housing (5).
2. Install the two screws (4) that secure the blower motor resistor to the HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).
3. Connect the wire harness connector (2) to the blower motor resistor and engage the wire harness connector locking tab (1).
4. Install the glove box into the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - INSTALLATION).
5. Reconnect the negative battery cable.



SENSOR-AMBIENT AIR TEMPERATURE

DESCRIPTION

The ambient air temperature sensor is a variable resistor that monitors the air temperature outside of the vehicle. The ATC system uses the sensor data to maintain optimum cabin temperature levels. The ambient air temperature sensor is mounted onto the top of the front bumper beam.



OPERATION

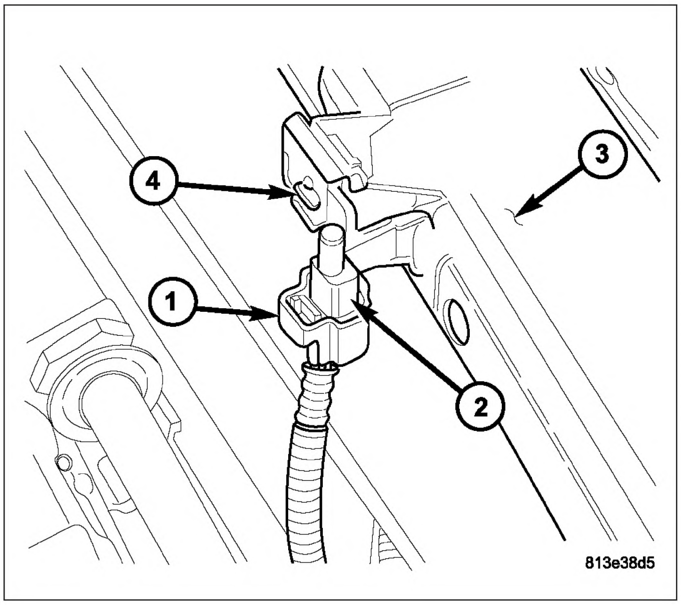
The ambient air temperature sensor is a variable resistor that operates on a 5-volt reference signal sent by the front control module (FCM). The ambient air temperature sensor is connected to the FMC through a two-wire lead and connector of the vehicle wire harness. The ambient air temperature sensor changes its internal resistance in response to changes in the outside air temperature, which either increases or decreases the reference signal voltage read by the FCM. The FCM converts and broadcasts the sensor data over the controller area network (CAN) B bus, where it is read by the ATC A/C-heater control and other vehicle control modules.

The ambient air temperature sensor is diagnosed using the scan tool. Refer to 9 - Engine Electrical Diagnostics for more information.

The ambient air temperature sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

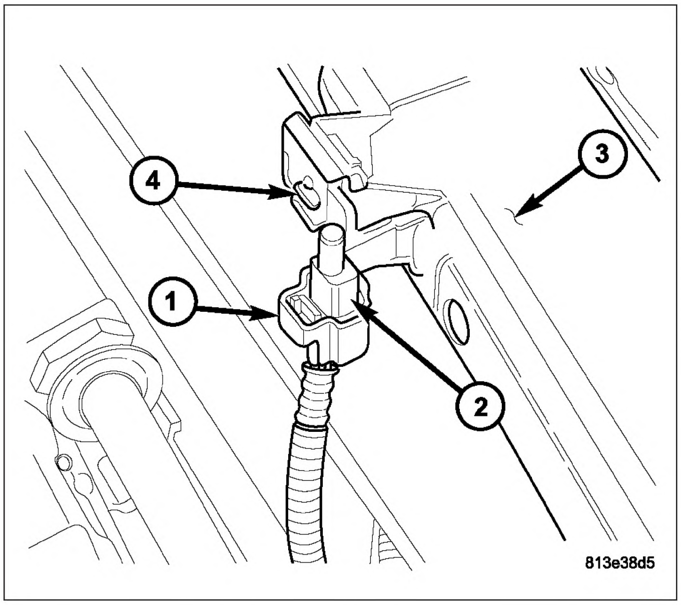
REMOVAL

1. Disconnect and isolate the negative battery cable.
2. Remove the grille (Refer to 23 - BODY/EXTERIOR/ GRILLE - REMOVAL).
3. Disconnect the wire harness connector (1) from the ambient air temperature sensor (2) located at the top of the front bumper beam (3).
4. Disengage the ambient air temperature sensor from the retaining tabs (4) and remove the sensor.



INSTALLATION

1. Install the ambient air temperature sensor (2) onto the top of the front bumper beam (3). Make sure that the retaining tabs (4) are fully engaged.
2. Connect the wire harness connector (1) to the ambient air temperature sensor.
3. Install the grille (Refer to 23 - BODY/EXTERIOR/ GRILLE - INSTALLATION).
4. Reconnect the negative battery cable.

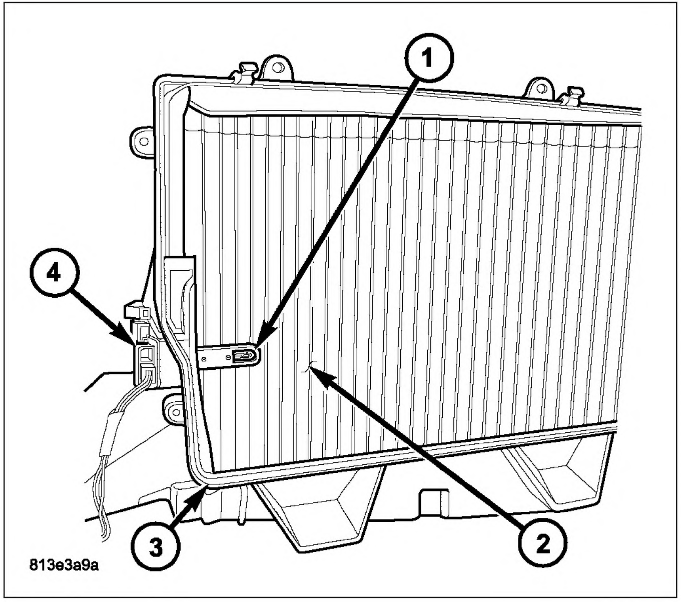


SENSOR-EVAPORATOR TEMPERATURE

DESCRIPTION

The evaporator temperature sensor (1) measures the temperature of the conditioned air downstream of the A/C evaporator (2). The evaporator temperature sensor is an electrical thermistor within a molded plastic case that is inserted into the HVAC housing (3) near the coldest point of the A/C evaporator. Two terminals within the connector receptacle (4) connect the sensor to the vehicle electrical system through a wire lead and connector of the HVAC wire harness.

The external location of the evaporator temperature sensor allows the sensor to be removed or installed without disturbing the refrigerant in the A/C system.



OPERATION

The evaporator temperature sensor is a thermistor that operates on a 5-volt reference signal sent out by the A/C-heater control. The sensor connects to the A/C-heater control through a two-wire lead and connector of the HVAC wire harness. The sensor monitors the temperature of the conditioned air downstream of the A/C evaporator and changes it's internal resistance in response to changes in the air temperature. As the temperature increases, the sensor's resistance decreases which increases the reference signal voltage read by the A/C-heater control. As the temperature decreases, the sensor's resistance increases which decreases the reference signal voltage read by the A/C-heater control.

The A/C-heater control also uses the reference signal voltage as an indication that conditions are correct to request A/C operation, should the operator (manually) or the A/C-heater control (automatically) so desire this function. For the ATC system, the A/C-heater control broadcasts the A/C request on the controller area network (CAN) B bus, where it is read and processed by the front control module (FCM), which in turn broadcasts it on the CAN C bus, where it is read and processed by the powertrain control module (PCM). For the MTC system, the A/C-heater control sends the request for A/C to the CCN via a dedicated mux circuit. The CCN then broadcasts the A/C request on the CAN B bus, where it is read and processed by the FCM, which in turn broadcasts it on the CAN C bus, where it is read and processed by the PCM.

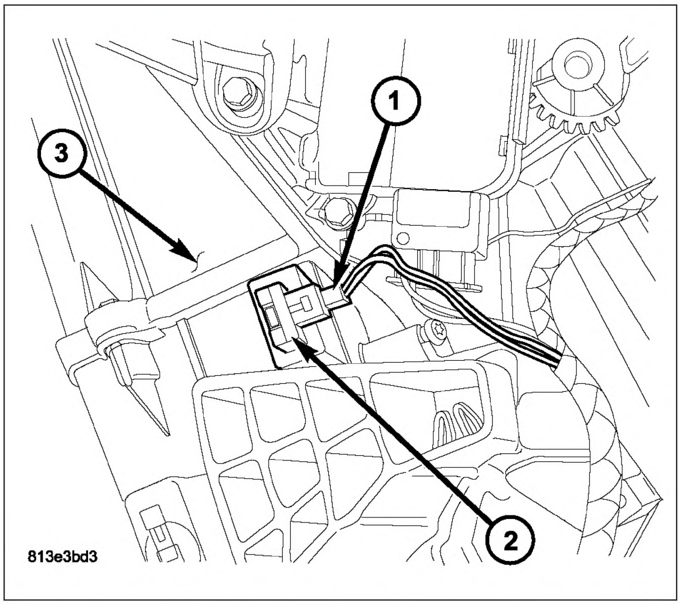
The evaporator temperature sensor is diagnosed using a scan tool (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information).

The evaporator temperature sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

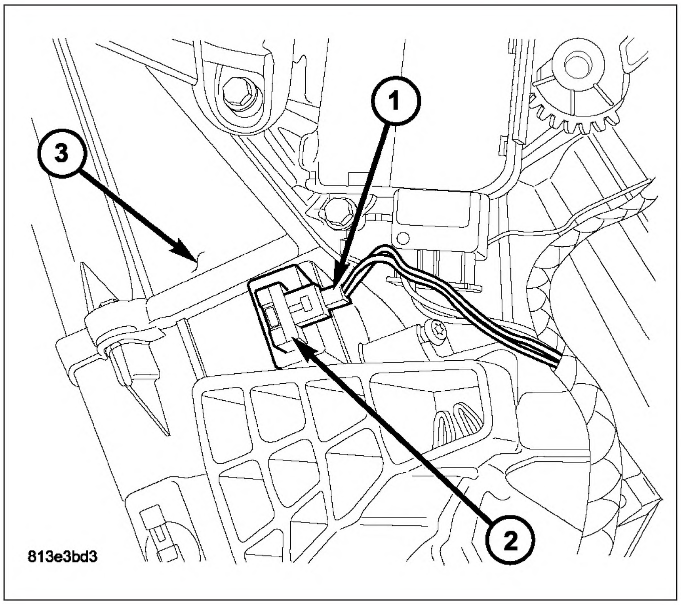
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

1. Disconnect and isolate the negative battery cable.
2. Remove the instrument panel silencer from the driver side of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - REMOVAL).
3. Disconnect the HVAC wire harness connector (1) from the evaporator temperature sensor (2) located on the side of the HVAC housing (3).
4. Remove the evaporator temperature sensor from the HVAC housing.



INSTALLATION

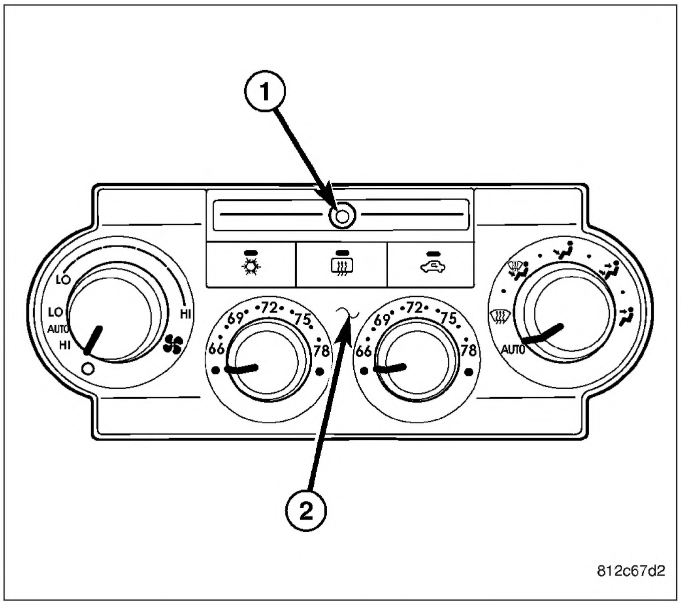
1. Install the evaporator temperature sensor (2) into side of the HVAC housing (3). Make sure that the sensor retaining clips are fully engaged in the housing.
2. Connect the HVAC wire harness connector (1) to the evaporator temperature sensor.
3. Install the instrument panel silencer onto the driver side of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - INSTALLATION).
4. Reconnect the negative battery cable.



SENSOR-INFRARED

DESCRIPTION

The infrared sensor is used only on models equipped with the automatic temperature control (ATC) heating -A/C system. The infrared temperature sensor consists of a infrared transducer concealed behind a clear lens (1) located within the instrument panel mounted A/C-heater control (2).



OPERATION

The infrared sensor detects thermal radiation emitted by the driver and front passenger seat occupants and their surroundings and converts its data into a linear pulse width modulated (PWM) output signal which is read by the automatic temperature control (ATC) A/C-heater control. The ATC A/C-heater control uses the infrared sensor data as one of the inputs necessary to automatically control the interior cabin temperature level. By using thermal radiation (surface temperature) measurement, rather than an air temperature measurement, the ATC heating-A/C system is able to adjust itself to the comfort level as perceived by the occupant. This allows the ATC system to compensate for other ambient conditions affecting comfort levels, such as solar heat gain or evaporative heat loss.

The ATC system logic responds to the infrared sensor message by calculating and adjusting the air flow temperature and air flow rate needed to properly obtain and maintain the selected comfort level temperature of the occupants. The A/C-heater control continually monitors the infrared sensor circuits, and will store diagnostic trouble codes (DTCs) for any problem it detects.

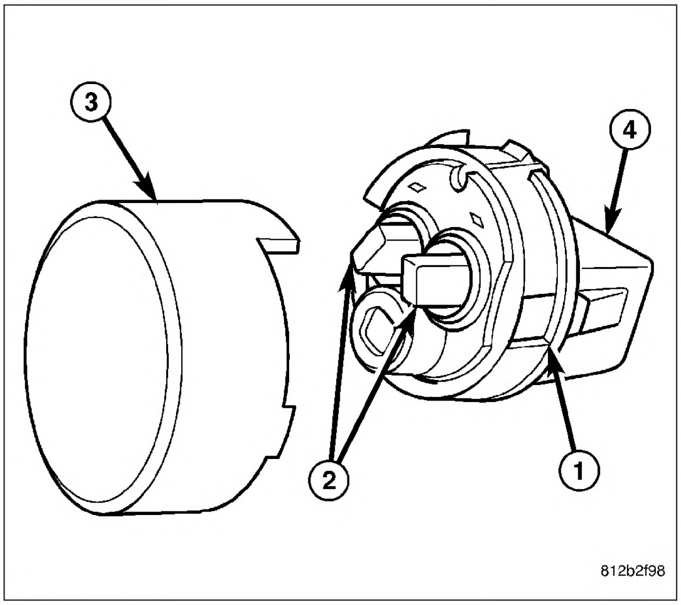
The infrared sensor is diagnosed using a scan tool (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information).

The infrared sensor cannot be adjusted or repaired and, if faulty or damaged, the entire ATC A/C-heater control must be replaced.

SENSOR-SUN

DESCRIPTION

The automatic temperature control (ATC) heating-A/C system uses a sun sensor assembly (1) to measure sun light intensity. The sun sensor assembly incorporates two sun sensors (2) within a molded plastic case which is mounted to the instrument panel and a clear lens (3) that protrudes through the defroster grille. The wire harness receptacle (4) connects the sun sensors to the vehicle electrical system through a wire lead and connector of the instrument panel wire harness.



OPERATION

The ATC heating-A/C system uses two sun sensors to balance the system in response to side-to-side variations in sun light intensity. Passengers in sun and shadow require different functional settings because they experience very different temperatures. The sun sensor assembly provides data to the A/C heater control to help determine proper mode and blend-air door positions and blower motor speeds. The sun sensors are not thermistor type sensors, but rather photo diodes. For this reason the sun sensors responds to sun light intensity rather than temperature. The sun sensor assembly is also used to sense day and night conditions for automatic headlight control on MTC equipped vehicles.

The sun sensor is diagnosed using a scan tool (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information).

The sun sensor assembly cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

DIAGNOSIS AND TESTING

SUN SENSOR

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in an accidental airbag deployment and possible personal injury or death.

The sun sensor assembly is located so that the sun rays will hit the sensors in the same way that it will hit the driver and the passenger. It is important that the area in front of the sun sensor assembly be unobstructed. Check for the following:

- Windshield wipers are properly adjusted.
- Defroster grille or sun sensor is properly installed. The sun sensor lens should protrude above the defroster grille.
- Any stickers on the windshield are not directly in front of the sun sensor.
- Any items laying on top of the instrument panel are not covering the sun sensor.

If the vehicle exhibits a lack of passenger comfort in sunny weather such as in the early afternoon, inspect the position of the sun sensor assembly. The sun sensor lens should protrude above the defroster grille to insure proper operation. If the sun sensor is not properly positioned, perform the following procedure:

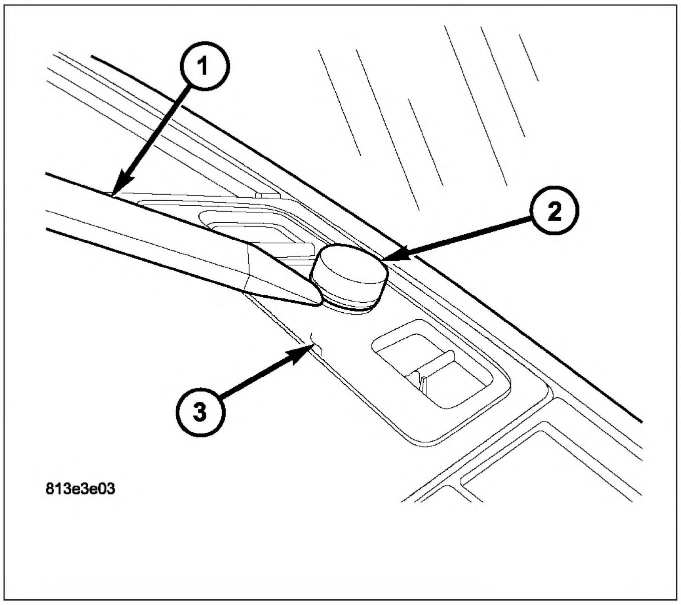
1. Confirm that the defroster grille is properly installed. If not, repair as required.
2. Remove the defroster grille (Refer to 23 - BODY/INSTRUMENT PANEL/DEFROSTER GRILLE - REMOVAL).
3. Verify that the sun sensor is properly installed to the instrument panel (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/SENSOR-SUN - INSTALLATION).
4. Install the defroster grille (Refer to 23 - BODY/INSTRUMENT PANEL/DEFROSTER GRILLE - INSTALLATION).

The A/C-heater control continually monitors the sun sensor circuits and will store diagnostic trouble codes (DTCs) for any problem it detects. The sun sensor can be tested in the vehicle with a scan tool (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - HEATING AND A/C SYSTEMS and to 24 - HVAC Electrical Diagnostics for more information).

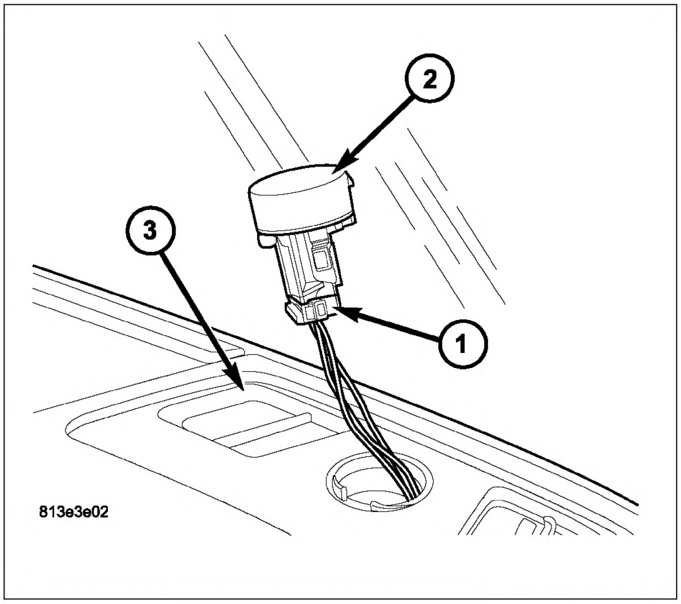
REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in an accidental airbag deployment and possible personal injury or death.

1. Disconnect and isolate the negative battery cable.
2. Using a trim stick or another suitable wide flat-blade tool (1), gently pry between both sides of the sun sensor (2) and the instrument panel (3) to release the snap clip retainers located at the front of the sensor near the windshield.

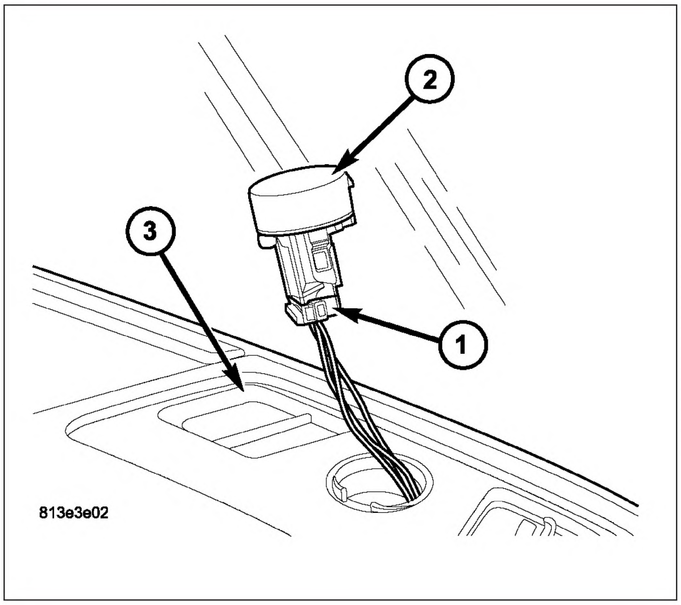


3. Carefully pull the sun sensor (1) partially out of the instrument panel (2) and disconnect the wire harness connector (3) from the sensor.
4. Remove the sun sensor from the vehicle.



INSTALLATION

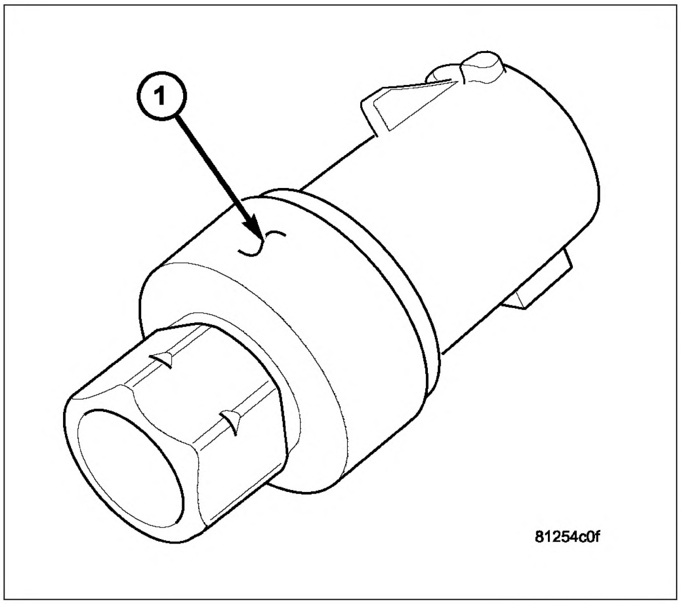
1. Position the sun sensor (2) near the instrument panel (3).
2. Connect the wiring harness connector (1) to the sun sensor.
3. Align the tab on the sun sensor with the opening in the instrument panel and install the sensor onto the instrument panel. Make sure that the sensor's retaining clips located at the front of the sensor near the windshield are fully engaged to the instrument panel.
4. Reconnect the negative battery cable.



TRANSDUCER-A/C PRESSURE

DESCRIPTION

The A/C pressure transducer (1) is a switch that is installed on a fitting located on the A/C discharge line. An internally threaded fitting on the A/C pressure transducer connect it to the externally threaded Schrader-type fitting on the A/C discharge line. A rubber O-ring seals the connection between the A/C pressure transducer and the discharge line fitting. The A/C pressure transducer is connected to the vehicle electrical system by a molded plastic connector with three terminals.



OPERATION

The A/C pressure transducer monitors the pressures in the high side of the refrigerant system through its connection to a fitting on the A/C discharge line. The A/C pressure transducer will change its internal resistance in response to the pressures it monitors. A Schrader-type valve in the discharge line fitting permits the A/C pressure transducer to be removed or installed without disturbing the refrigerant in the A/C system.

The powertrain control module (PCM) provides a five volt reference signal and a sensor ground to the A/C pressure transducer, then monitors the output voltage of the A/C pressure transducer on a sensor return circuit to determine refrigerant pressure. The PCM is programmed to respond to the A/C pressure transducer and other sensor inputs by controlling the operation of the A/C compressor clutch and the radiator cooling fan to help optimize A/C system performance and to protect the system components from damage. The PCM will disengage the A/C compressor clutch when high side pressure rises above 3082 kPa (447 psi) and re-engage the clutch when high side pressure drops below 2937 kPa (426 psi). The A/C pressure transducer will also disengage the A/C compressor clutch if the high side pressure drops below 110 kPa (16 psi) and will re-engage the clutch when the high side pressure rises above 221 kPa (32 psi). If the refrigerant pressure rises above 1655 kPa (240 psi), the PCM will actuate the cooling fan. The A/C pressure transducer input to the PCM will also prevent the A/C compressor clutch from engaging when ambient temperatures are below about 4.5° C (40° F) due to the pressure/temperature relationship of the refrigerant.

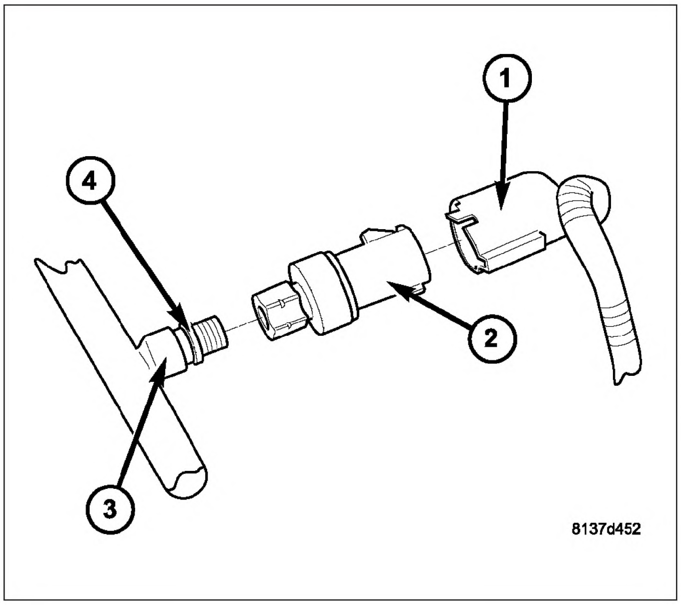
The A/C pressure transducer is diagnosed using a scan tool. Refer to 9 - Engine Electrical Diagnostics for more information.

The A/C pressure transducer cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

NOTE: It is not necessary to discharge the refrigerant system to replace the A/C pressure transducer.

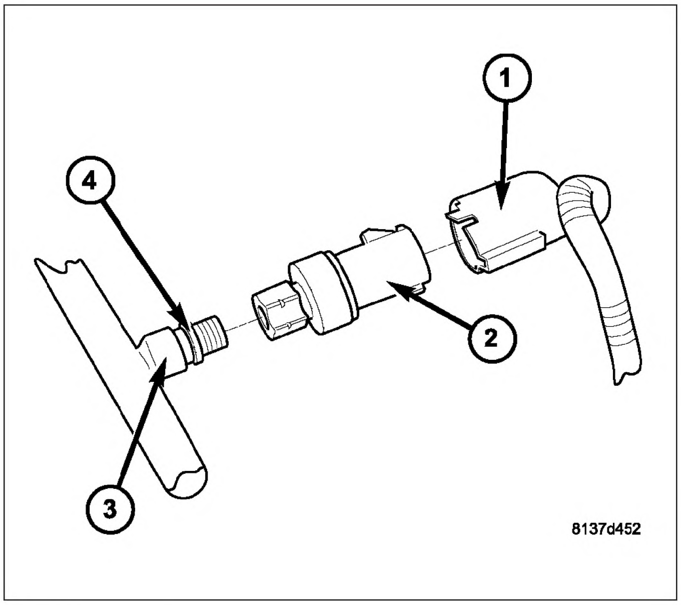
1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector (1) from the A/C pressure transducer (2) located on the A/C discharge line (3).
3. Remove the A/C pressure transducer from the fitting on the A/C discharge line and remove and discard the O-ring seal.



INSTALLATION

NOTE: Use only the specified O-ring as it is made of special material for R-134a. Use only refrigerant oil of the type required for the A/C compressor.

1. Lubricate a new rubber O-ring seal (4) with clean refrigerant oil and install it onto the discharge line fitting (3).
2. Install the A/C pressure transducer (2) onto the A/C discharge line. Tighten the A/C pressure transducer securely.
3. Connect the wire harness connector (1) to the A/C pressure transducer.
4. Reconnect the negative battery cable.



DISTRIBUTION

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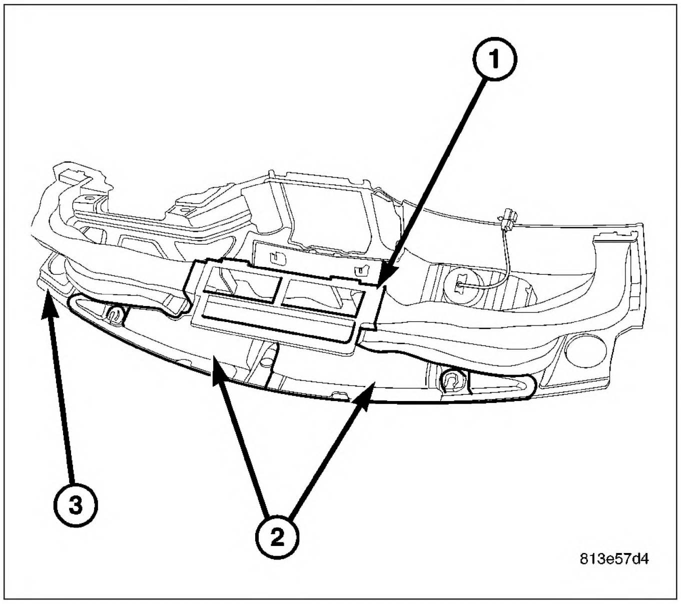
DUCT-DEFROSTER

DESCRIPTION

The two slot-type defroster outlets located near the center of the instrument panel receive airflow from the HVAC housing through the molded plastic main distribution duct (1) and defroster ducts (2), which are attached to the bottom of the instrument panel top cover (3).

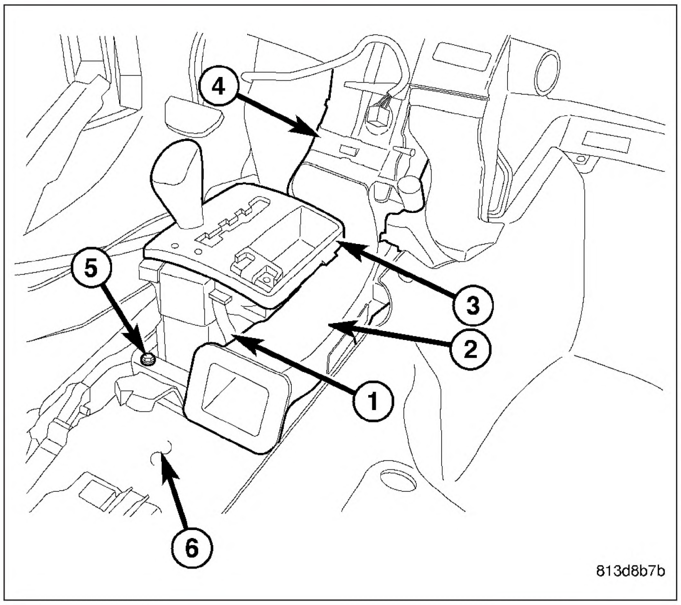
The defroster ducts are integral to the instrument panel top cover and are not serviced separately (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).



DUCT-FLOOR CONSOLE

REMOVAL

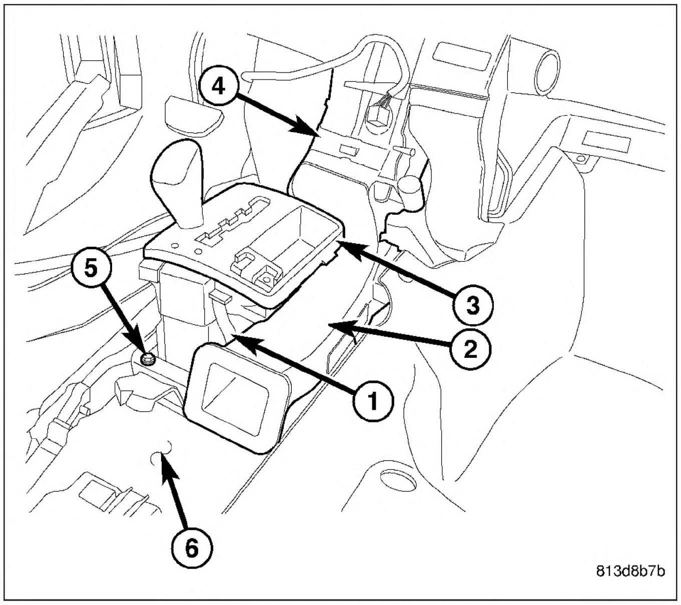
NOTE: Shown with instrument panel removed for clarity.



1. Remove the floor console from the passenger compartment (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).
2. Disengage the push-pin retainer (1) that secures the front console duct (2) to the gear selector (3).
3. Disconnect the front console duct from the air distribution housing (4) and remove the console duct.

INSTALLATION

NOTE: Shown with instrument panel removed for clarity.



1. Position the floor console duct (2) into the vehicle.
2. Connect the front console duct to the air distribution housing (4) and engage the push-pin retainer (1) to the gear selector (3).
3. Install the floor console (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - INSTALLATION).

DUCTS-FLOOR DISTRIBUTION

REMOVAL

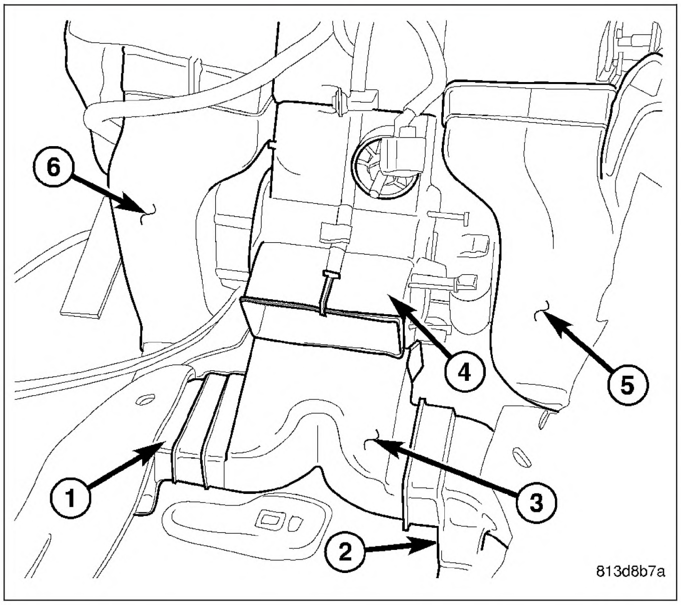
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: Take the proper precautions to protect the front face of the instrument panel from cosmetic damage while performing these procedures.

FRONT FLOOR DUCTS

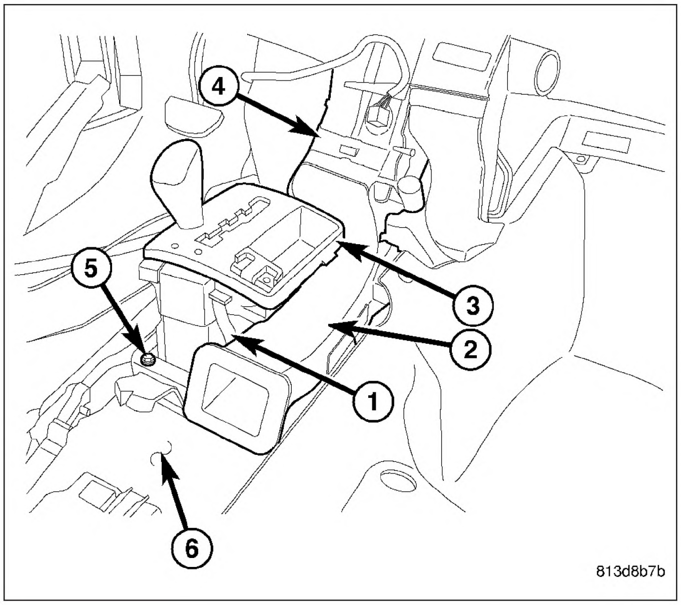
NOTE: Shown with the instrument panel, gear selector and console duct removed for clarity.

1. Remove the instrument panel from the passenger compartment (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
2. Disconnect the right front floor duct (5) and the left front floor duct (6) from the rear of the air distribution housing (4) and remove the front floor ducts from the vehicle.

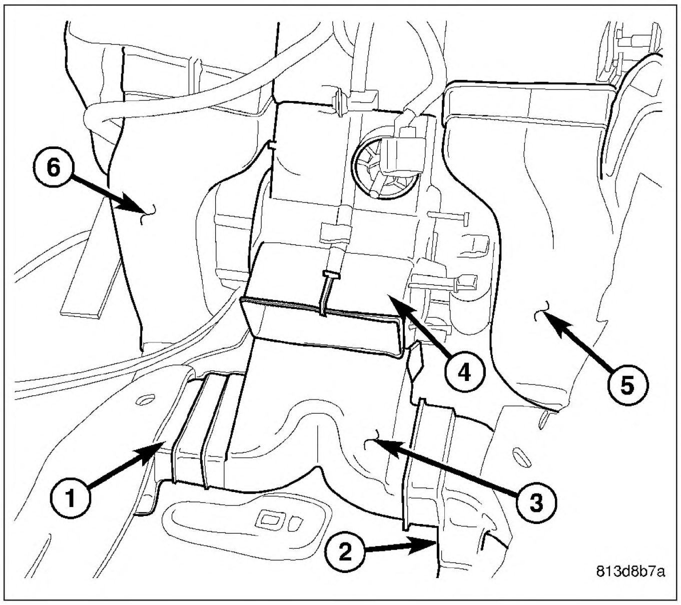


REAR FLOOR DUCTS

1. Remove the floor console from the passenger compartment (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).
2. Remove the front seats (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).
3. Disengage the push-pin retainer (1) that secures the front console duct (2) to the gear selector (3).
4. Disconnect the front console duct from the air distribution housing (4) and remove the console duct.
5. Remove the screws (5) that secure the gear selector to the floor panel (6) and position the gear selector out of the way.



6. Roll back the front floor carpet from under the instrument panel toward the rear of the vehicle (Refer to 23 - BODY/INTERIOR/CARPETS AND FLOOR MATS - REMOVAL).
7. Disconnect the left rear floor duct (1) and the right rear floor duct (2) from the rear floor distribution duct (3).
8. Disengage the retainer that secures the rear floor ducts to the floor support and remove the floor ducts.
9. Disconnect the rear floor distribution duct from the air distribution housing (4) and remove the distribution duct.

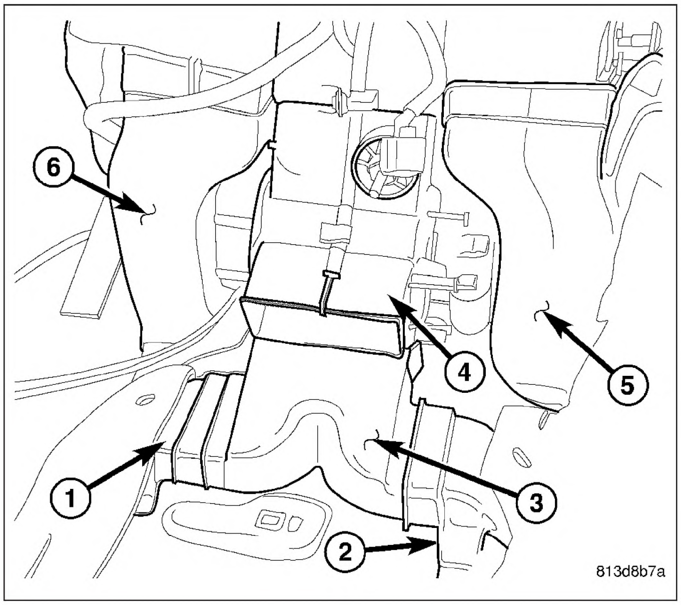


INSTALLATION

FRONT FLOOR DUCTS

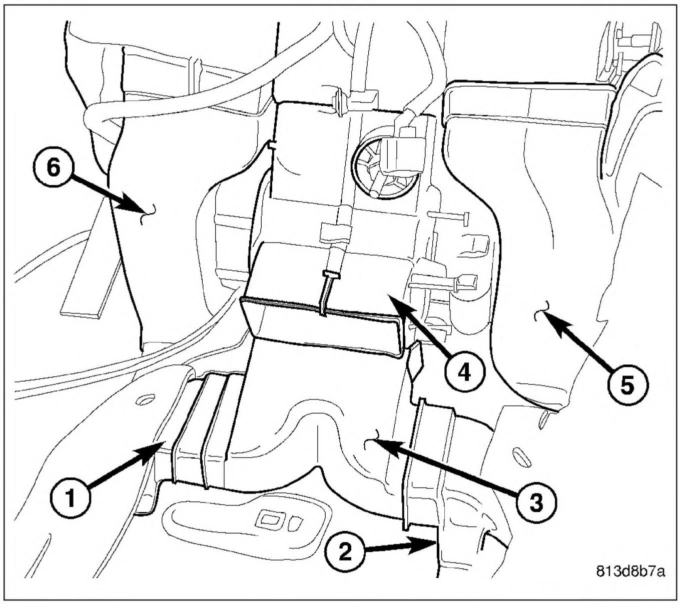
NOTE: Shown with the instrument panel, gear selector and console duct removed for clarity.

1. Position the right front floor duct (5) and left front floor duct (6) into the vehicle
2. Connect the front floor ducts to the rear of the air distribution housing (4).
3. Install the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

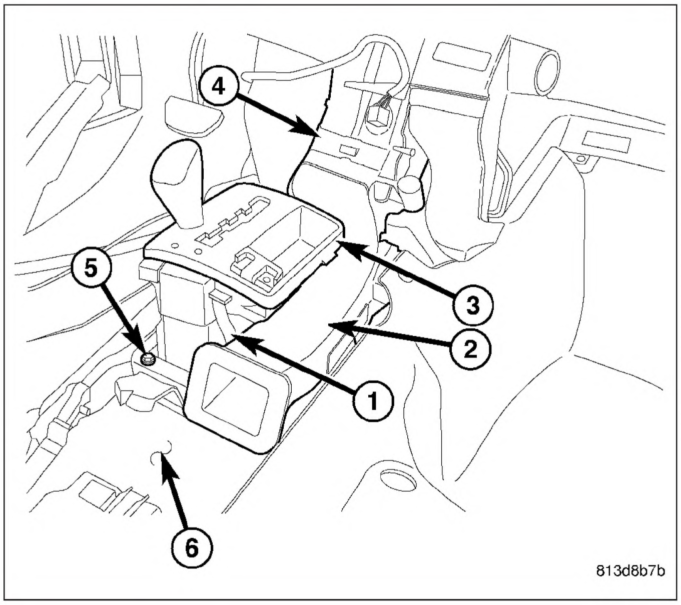


REAR FLOOR DUCTS

1. Position the rear floor distribution duct (3) into the vehicle and connect it to the rear of the HVAC air distribution housing (4).
2. Position the left rear floor duct (1) and right rear floor duct (2) into the vehicle and engage the retainers that secure the floor ducts to the floor support.
3. Connect the rear floor ducts to the rear floor distribution duct.
4. Install the carpet onto the front floor panel and under the instrument panel (Refer to 23 - BODY/ INTERIOR/CARPETS AND FLOOR MATS - INSTALLATION).



5. Position the gear selector (3) to its installed location on the floor panel (6) and securely install the retaining screws (5).
6. Connect the front console duct (2) to the air distribution housing (4) and engage the push-pin retainer (1) to the gear selector.
7. Install the front seats (Refer to 23 - BODY/SEATS/ SEAT - INSTALLATION).
8. Install the floor console duct (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/DUCT-FLOOR CONSOLE - INSTALLATION)
9. Install the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).



DUCT-INSTRUMENT PANEL

REMOVAL

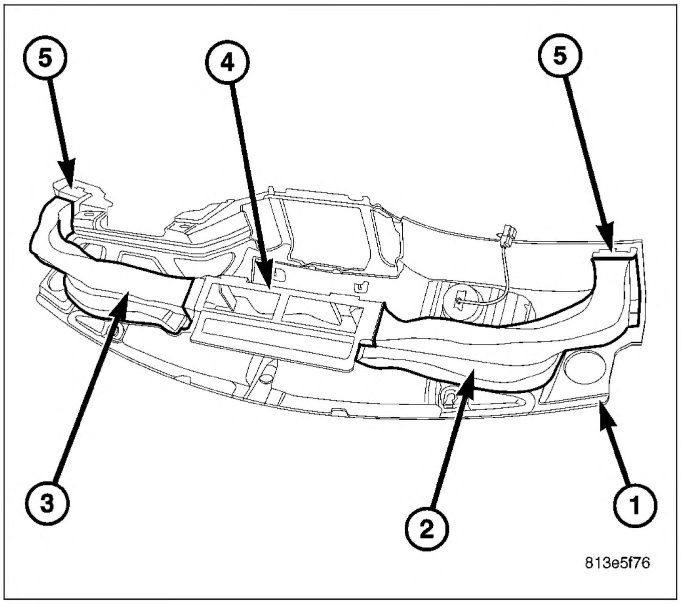
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: The air ducts for the instrument panel and demisters outlets are integral to each other and cannot be serviced separately.

NOTE: Take the proper precautions to protect the front face of the instrument panel from cosmetic damage while performing this procedure.

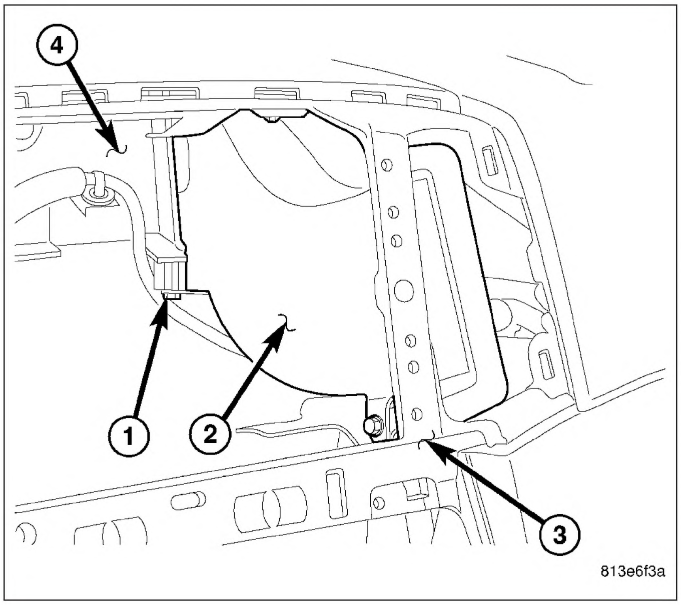
OUTBOARD DUCTS

1. Remove the instrument panel and place it on a workbench (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
2. Remove the instrument panel top cover (1) from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).
3. Remove the screws that secure the passenger side instrument panel duct and demister duct assembly (2) and the driver side instrument panel duct and demister duct assembly (3) to the instrument panel top cover.
4. Disconnect the instrument panel ducts from the main distribution duct (4) and the end outlets (5) and remove the ducts from the instrument panel top cover.



CENTER DUCTS

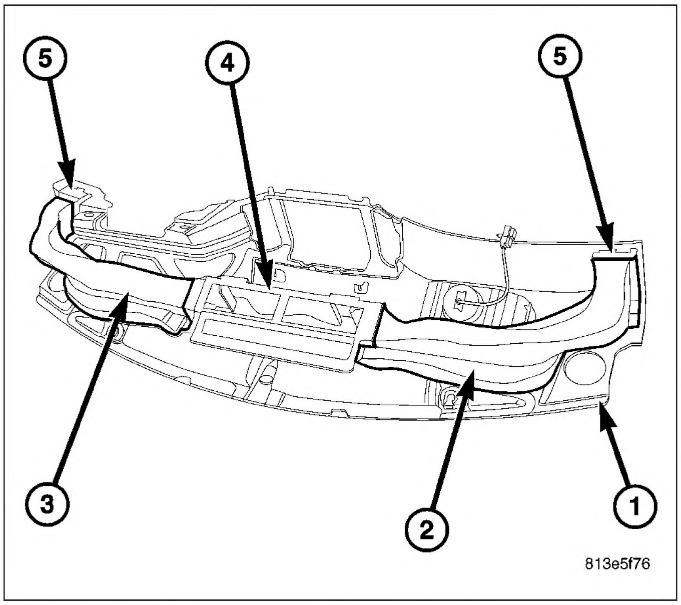
1. Remove the radio from the instrument panel (Refer to 8 - ELECTRICAL/AUDIO/RADIO - REMOVAL).
2. Remove the screws (1) that secure the center instrument panel duct(s) (2) to the instrument panel (3).
3. Disconnect the center instrument panel duct(s) from the main distribution duct (4) and remove the duct(s) through the opening for the radio in the instrument panel.



INSTALLATION

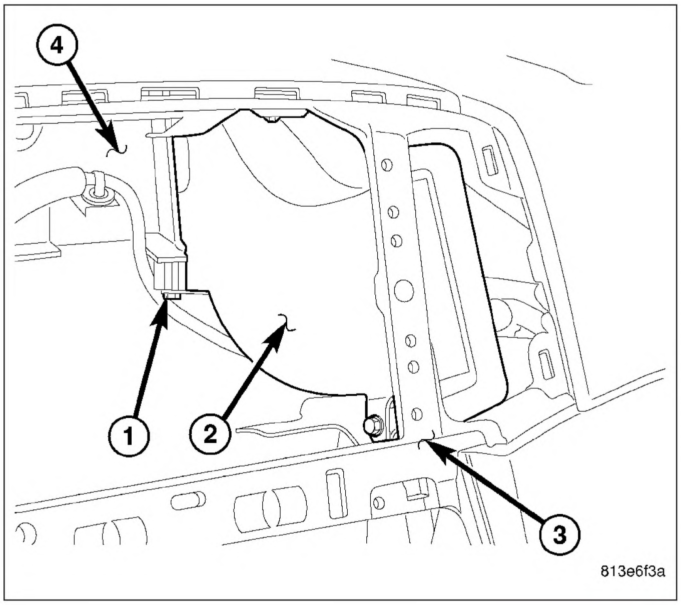
OUTBOARD DUCTS

1. Position the passenger side instrument panel duct and demister duct assembly (2) and the driver side instrument panel duct and demister duct assembly (3) into the instrument panel top cover (1).
2. Connect the instrument panel ducts to the air outlets (5) and the main distribution duct (4). Make sure that the ducts are correctly installed over the instrument panel and demister outlet seals.
3. Install the screws that secure the instrument panel ducts the instrument panel top cover. Tighten the screws to 2 N·m (17 in. lbs.).
4. Install the instrument panel top cover onto the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - INSTALLATION).
5. Install the instrument panel (Refer to 23 - BODY/ INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).



CENTER DUCTS

1. Position the center instrument panel duct(s) (2) into the instrument panel (3) through the opening for the radio.
2. Connect the center instrument panel duct(s) to the main distribution duct (4).
3. Install the screws (1) that secure the center instrument panel duct(s) to the instrument panel. Tighten the screws to 2 N·m (17 in. lbs.).
4. Install the radio into the instrument panel (Refer to 8 - ELECTRICAL/AUDIO/RADIO - INSTALLATION).

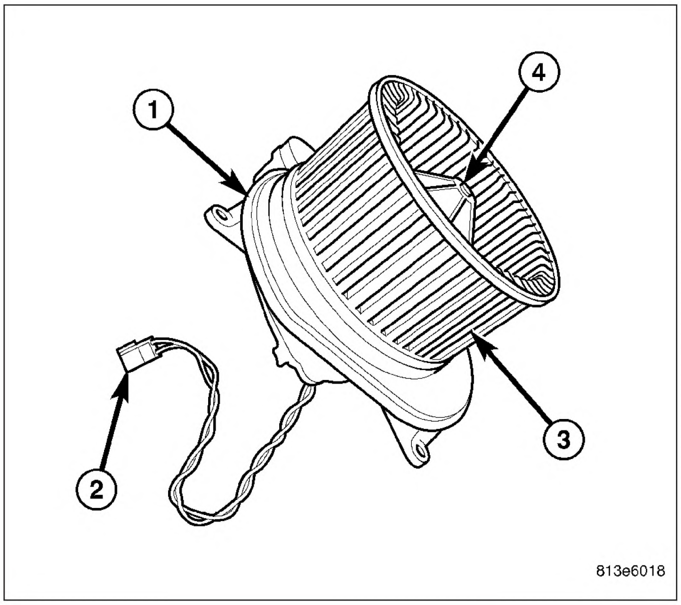


MOTOR-BLOWER

DESCRIPTION

The blower motor (1) is a 12-volt, direct current (DC) motor mounted within a plastic housing with an integral wire lead and connector (2) and squirrel cage-type blower wheel (3) that is secured to the blower motor shaft (4). The blower motor wheel is located in the HVAC air inlet housing which is mounted to the passenger side end of the HVAC housing.

The blower motor can be accessed for service from underneath the instrument panel.



OPERATION

The blower motor is used to control the velocity of air moving through the HVAC housing by spinning the blower wheel within the HVAC air inlet housing at the selected speed or, in the ATC system, at the selected or programmed speed.

On models equipped with the manual temperature control (MTC) heating-A/C system, the blower motor will operate whenever the ignition switch is in the On position and the blower motor control in any position except Off. On models equipped with the automatic temperature control (ATC) system, the blower motor will operate whenever the ignition switch is in the On position and the A/C-heater control power is turned on.

For the MTC system, blower motor speed is controlled by directing the ground path for the blower motor through the correct resistor wire to obtain the selected speed.

For the ATC system, blower motor speed is controlled by the blower motor power module which provides the blower motor with power and a path to ground. The blower motor power module also sends a blower control signal to the A/C-heater control. Using input from the blower motor control (manual mode) or sensor data (automatic mode), the A/C-heater control processes the blower control signal from the power module and sets the speed at which the blower motor will run.

The blower motor and blower motor wheel are factory balanced and cannot be adjusted or repaired. If faulty or damaged, the blower motor and blower wheel must be replaced as an assembly.

DIAGNOSIS AND TESTING

BLOWER MOTOR

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: For circuit descriptions and diagrams, refer to Air Conditioning/Heater in Group 8W - Wiring Diagrams.

OPERATION

Possible causes of an inoperative blower motor include:

- Faulty fuse
- Faulty blower motor resistor or power module (depending on application)
- Faulty blower motor switch
- Faulty mode control switch
- Faulty blower motor
- Faulty blower motor circuit wiring or wire harness connectors

Possible causes of the blower motor not operating in all speeds include:

- Faulty fuse
- Faulty blower motor resistor or power module (depending on application)
- Faulty blower motor switch
- Faulty blower motor
- Faulty blower motor circuit wiring or wire harness connectors

VIBRATION

Possible causes of blower motor vibration include:

- Improper blower motor mounting
- Improper blower wheel mounting
- Deformed blower wheel
- Out of balance blower wheel due to foreign material in the wheel
- Faulty blower motor

NOISE

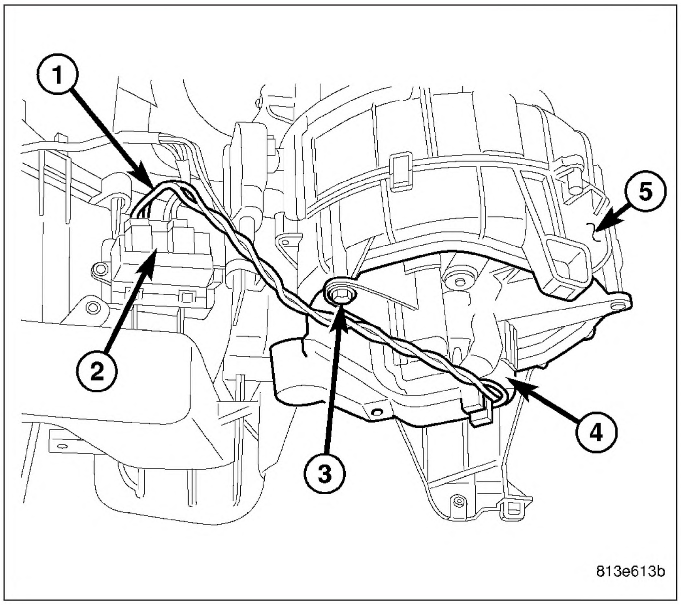
To determine if the blower motor is the source of the noise, simply switch the blower motor from Off to On. To verify that the blower motor is the source of the noise, unplug the blower motor wire harness connector and operate the heater-A/C system. If the noise goes away, possible causes include:

- Foreign material in the HVAC air inlet housing
- Improper blower motor mounting
- Improper blower wheel mounting
- Faulty blower motor

REMOVAL

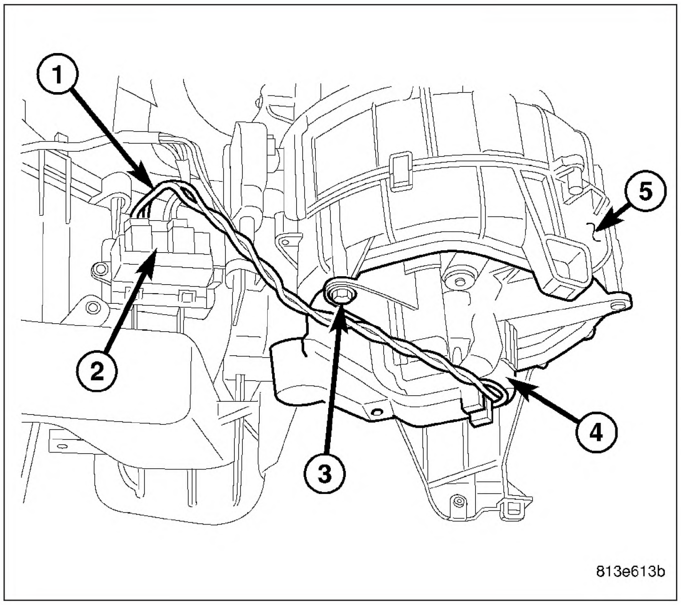
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

1. Disconnect and isolate the negative battery cable.
2. Remove the instrument panel silencer from the passenger side of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - REMOVAL)
3. Remove the glove box from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - REMOVAL).
4. Disconnect the blower motor wire harness connector (1) from the blower motor power module or resistor (2), depending on how equipped.
5. Remove the three screws (3) that secure the blower motor (4) to the HVAC housing (5).
6. Remove the blower motor from the HVAC housing.



INSTALLATION

1. Position the blower motor (4) into the HVAC housing (5).
2. Install the three screws (3) that secure the blower motor to the HVAC housing. Tighten the screws to 2.2 N·m (20 in. lbs.).
3. Connect the wire harness connector (1) to the blower motor power module or resistor (2), depending on how equipped.
4. Install the glove box into the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - INSTALLATION).
5. Install the instrument panel silencer onto the passenger side of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - INSTALLATION)
6. Reconnect the negative battery cable.



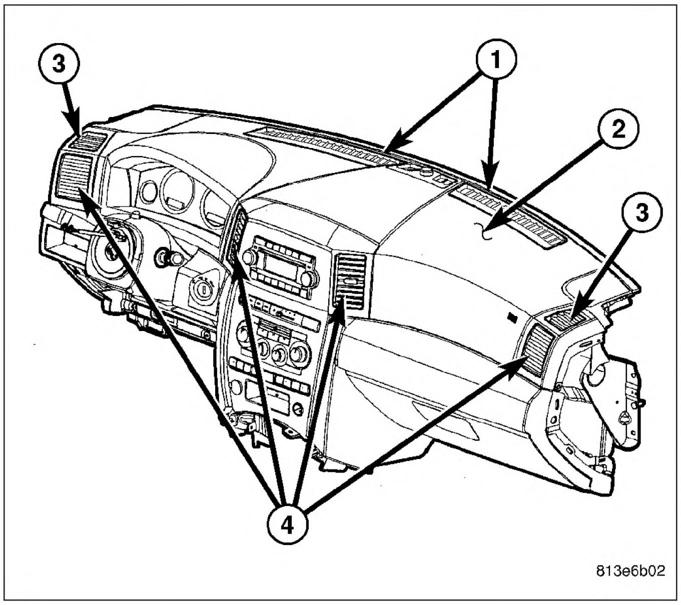
OUTLETS-AIR

DESCRIPTION

There are two defroster air outlets (1) located on the top of the instrument panel (2). The airflow from the defroster outlets is directed by fixed vanes in the defroster grilles and cannot be adjusted. The defroster grilles are serviced individually, however, the defroster outlets are not serviceable from the instrument panel top cover (Refer to 23 - BODY/INSTRUMENT PANEL/ INSTRUMENT PANEL TOP COVER - REMOVAL).

There are two side window demister air outlets (3). One located on each end of the instrument panel top cover. The airflow from the side window demister air outlets is directed by fixed vanes in the outlets and cannot be adjusted. The side window demister air outlets are not serviceable from the instrument panel top cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).

There are four instrument panel air outlets (4). One air outlet is located near each outboard end of the instrument panel facing the rear of the vehicle and one outlet is located on each side of the radio bezel. Each of the instrument panel air outlets contain a non-serviceable grille with movable vanes that are used to direct or shut off the flow of the conditioned air leaving the instrument panel outlets. Only the outboard instrument panel air outlets can be serviced separately. For service of the center instrument panel air outlets, the radio bezel must be replaced.



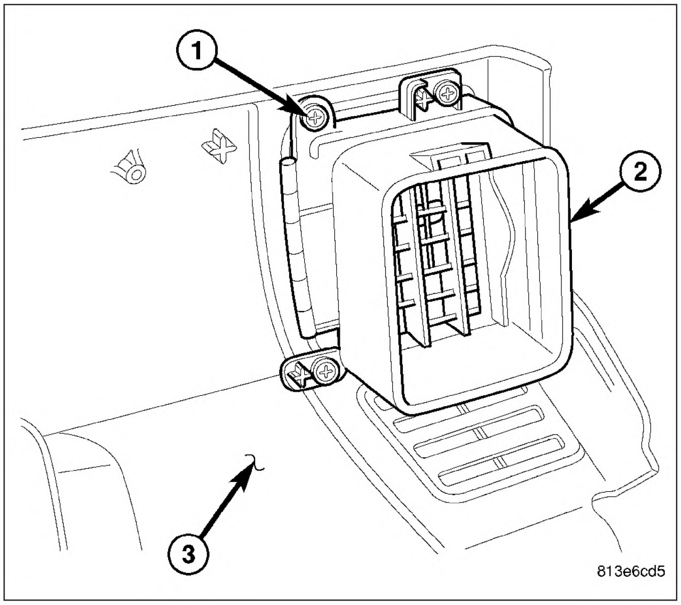
REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: Only the outboard instrument panel air outlets can be serviced separately.

NOTE: Take the proper precautions to protect the front face of the instrument panel from cosmetic damage while performing this procedure.

1. Remove the instrument panel and place it on a workbench (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
2. Remove the instrument panel ducts from the instrument panel (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/DUCTS-INSTRUMENT PANEL - REMOVAL).
3. Remove the three screws (1) that secure the outboard instrument panel air outlet(s) (2) to the instrument panel top cover (3) and remove the outlets.

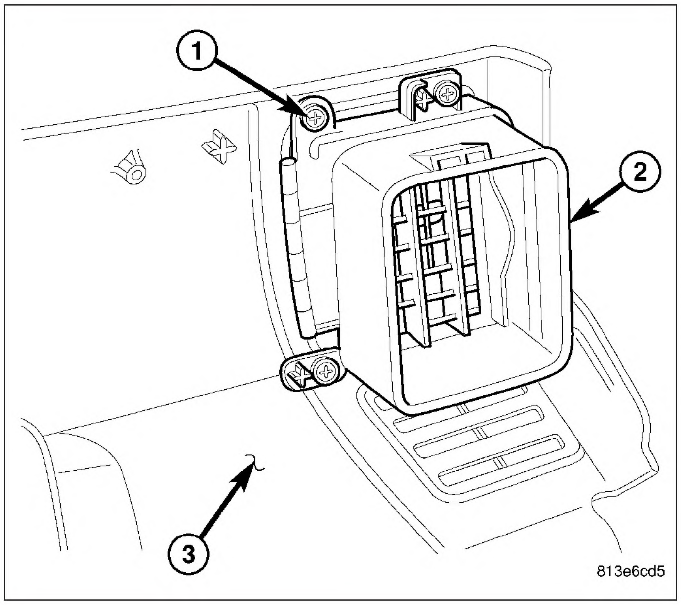


INSTALLATION

1. Position the outboard instrument panel air outlet(s) (2) into the instrument panel top cover (3).

NOTE: Make sure that the air outlet is properly aligned to the instrument panel opening and that the foam seal on the outlet is properly installed.

2. Install the three screws (1) that secure the instrument panel air outlets to the top cover. Tighten the screws to 2 N·m (17 in. lbs.).
3. Install the instrument panel ducts into the instrument panel (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/DUCTS-INSTRUMENT PANEL - INSTALLATION).
4. Install the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

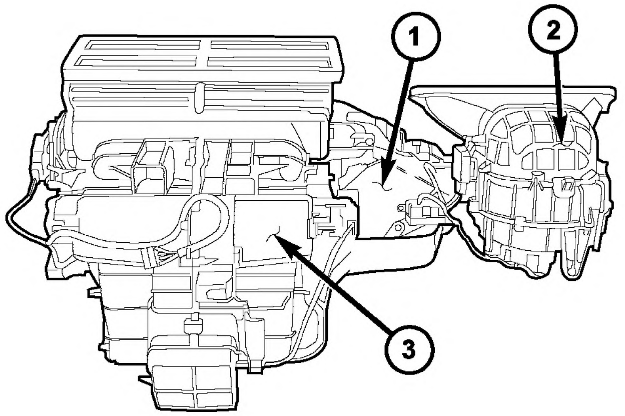


HVAC HOUSING

DESCRIPTION

All models are equipped with a common HVAC housing assembly that combines A/C and heating capabilities into a single unit mounted within the passenger compartment. The HVAC housing assembly consists of three separate housings:

- **HVAC housing** — The HVAC housing (1) is mounted to the dash panel behind the instrument panel and contains the evaporator core and the blower motor resistor block or power model, depending on application. The HVAC housing consists of a upper and a lower housing that are attached together and has mounting provisions for the air inlet housing, blower motor, air distribution housing and the HVAC wire harness.
- **Air inlet housing** — The air inlet housing (2) is mounted to the right end of the HVAC housing and contains the recirculation-air door and actuator.
- **Air distribution housing** — The air distribution housing (3) is mounted to the rear of the HVAC housing and contains the heater core, blend-air door(s) and actuator(s), mode-air doors and actuators and door linkages.



The heating-A/C system is a blend-air type system. The blend-air doors control the amount of conditioned air that is allowed to flow through, or around, the heater core. The dual zone heating A/C system uses two blend door actuators while the single zone system uses only one blend door actuator.

The A/C system is designed for the use of a non-CFC, R-134a refrigerant and uses an A/C evaporator to cool and dehumidify the incoming air prior to blending it with the heated air. A temperature control determines the discharge air temperature by operating the blend door actuator(s), which moves the blend-air door(s). This allows an almost immediate control of the output air temperature of the system. The two mode door actuators operate the mode-air doors which direct the flow of the conditioned air out the various air outlets, depending on the mode selected. The recirculation door actuator operates the recirculation-air door which closes off the fresh air intake and recirculates the air already inside the vehicle. The electric door actuators are connected to the vehicle electrical system by the HVAC wire harness. The blower motor controls the velocity of air flowing through the HVAC housing assembly by spinning the blower wheel within the HVAC housings at the selected speed by use of the blower motor resistor block or power model, depending on application.

The HVAC housing must be removed from the vehicle and disassembled for service of the A/C evaporator. The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors. The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door.

REMOVAL

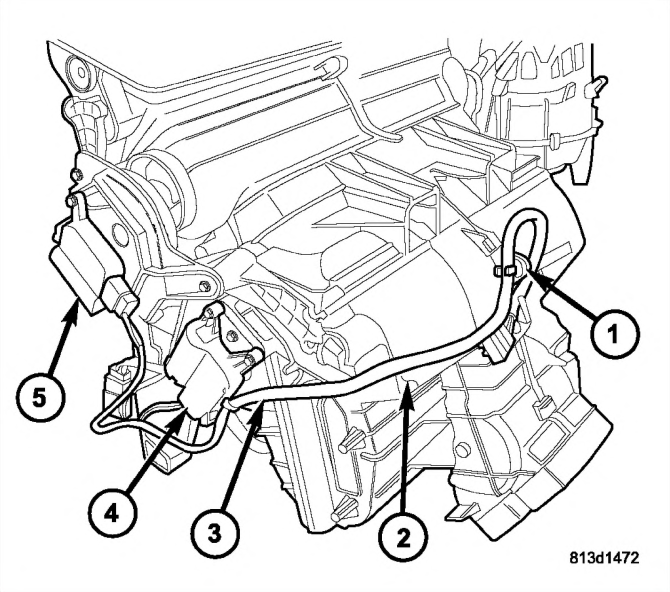
AIR DISTRIBUTION HOUSING

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

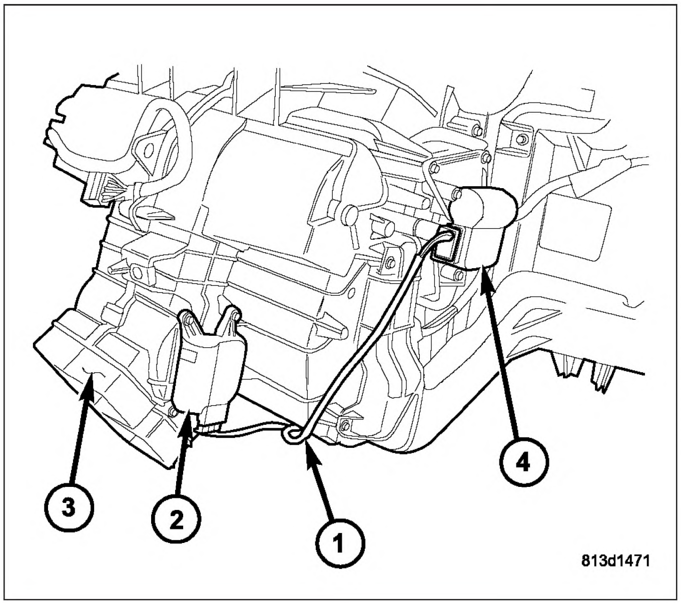
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

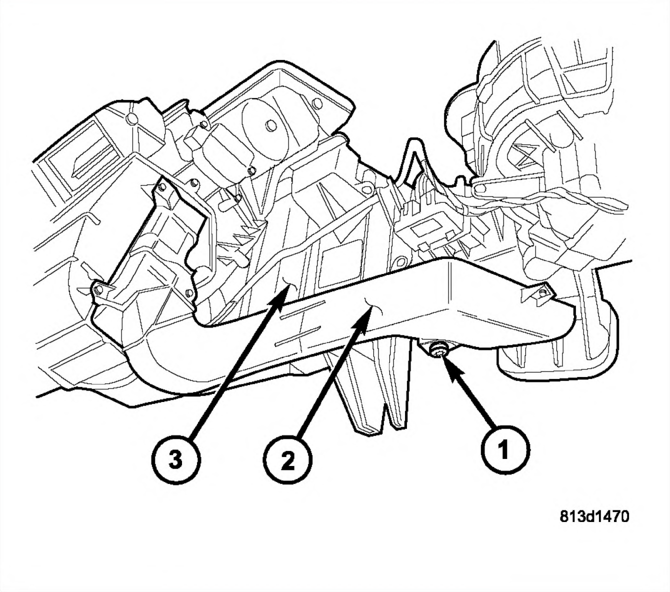
1. Remove the HVAC housing assembly and place it on a workbench (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - HVAC HOUSING ASSEMBLY - REMOVAL).
2. Disengage the HVAC wire harness retainer (1) from the rear of the air distribution housing (2).
3. Disconnect the HVAC wire harness (3) from the blend door actuator (4) and the mode door actuator (5) located on the driver side of the air distribution housing.



4. Disconnect the HVAC wire harness (1) from the mode door actuator (2) located near the bottom of the air distribution housing (3).
5. If equipped with dual zone heating-A/C, disconnect the HVAC wire harness from the blend door actuator (4) located on the passenger side of the air distribution housing.

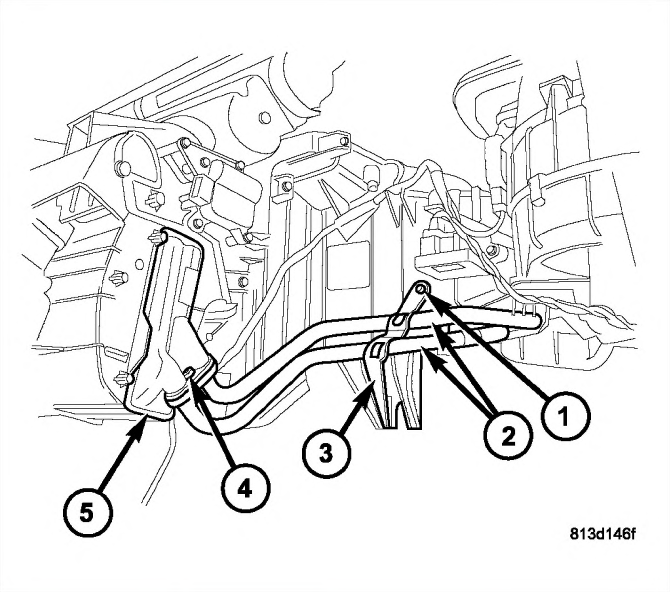


6. Remove the five screws (1) that secure the heater core and tube cover (2) to the HVAC housing (3).
7. Remove the heater core and tube cover from the HVAC housing.

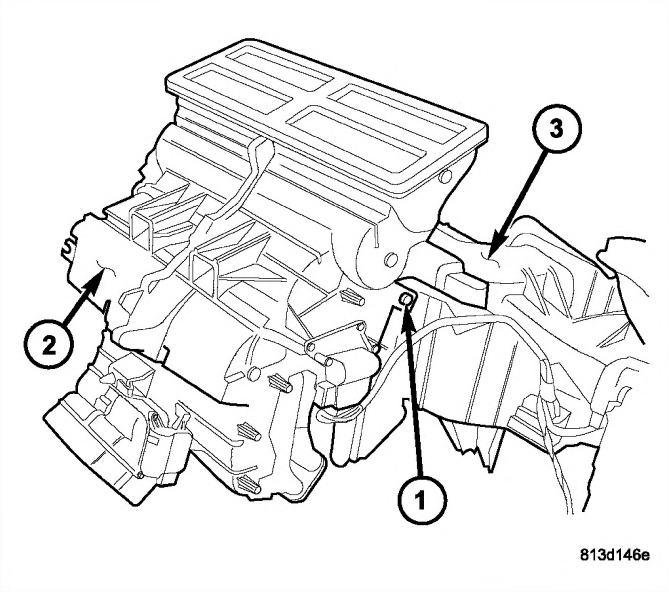


NOTE: Take proper precautions to protect the carpeting from spilled engine coolant. Have absorbent toweling readily available to clean up any spills.

8. Remove the screw (1) that secures the heater core tubes (2) to the HVAC housing (3).
9. Remove the bolt (4) that secures the heater core tubes to the heater core (5).
10. Disconnect the heater core tubes from the heater core and remove and discard the O-ring seals.
11. Install plugs in, or tape over the opened heater core tubes and heater core ports.



12. Remove the seven screws (1) that secure the air distribution housing (2) to the HVAC housing (3).
13. Release the locking tabs located at the top of the distribution housing and tilt the distribution housing downward to disengage the tab-and-slot type retainers located at the bottom of the housing.
14. Remove the air distribution housing from the HVAC housing.
15. If required, disassemble the air distribution housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR DISTRIBUTION HOUSING - DISASSEMBLY).



AIR INLET HOUSING

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

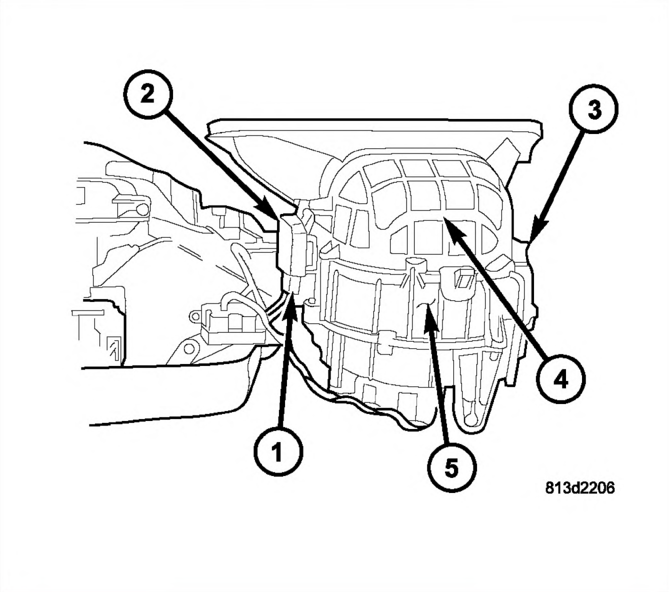
WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door.

1. Remove the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - HVAC HOUSING ASSEMBLY - REMOVAL).
2. Disconnect the HVAC wire harness (1) from the recirculation door actuator (2).
3. Remove the three screws (3) that secure the air inlet housing (4) to HVAC housing (5).
4. Tilt the rear of the air inlet housing upward to disengage the two tab-and-slot type retainers located at the front of the inlet housing and remove the inlet housing from the HVAC housing.

NOTE: If the foam seal on the air inlet housing is deformed or damaged, it must be replaced.

5. If required, disassemble the air inlet housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRI-



BUTION/HOUSING-HVAC - AIR INLET HOUSING - DISASSEMBLY).

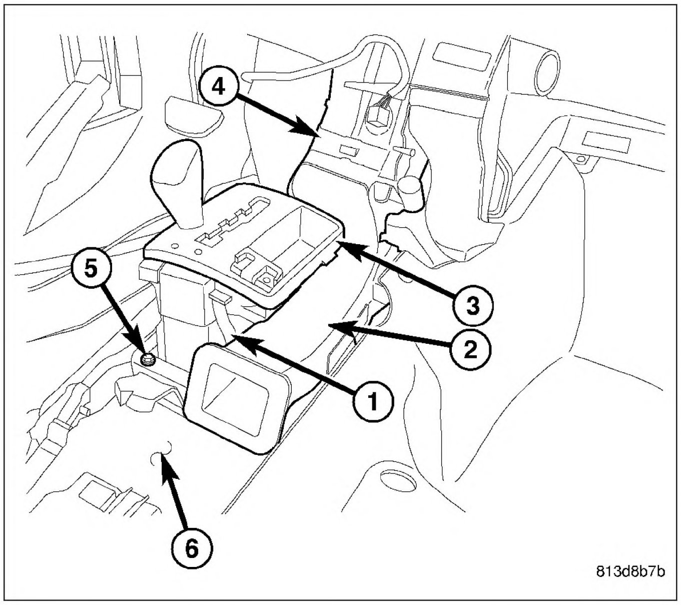
HVAC HOUSING ASSEMBLY

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

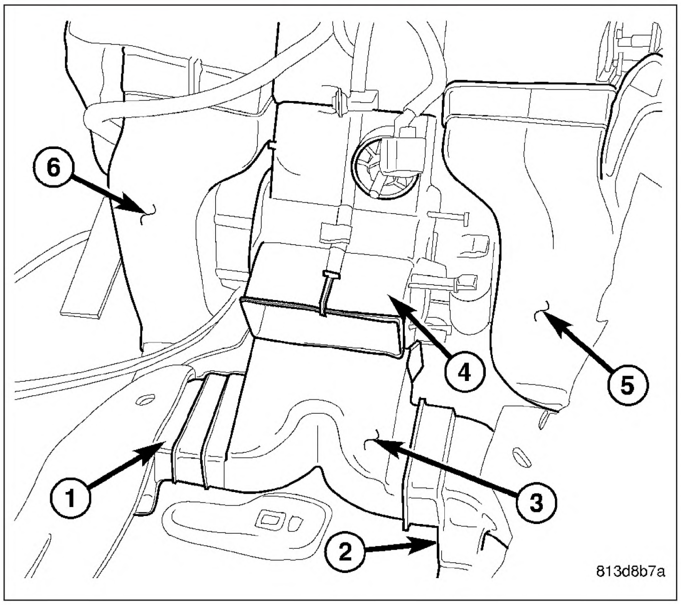
NOTE: The HVAC housing assembly must be removed from the vehicle and disassembled for service of the air inlet housing, air distribution housing and the A/C evaporator.

NOTE: Take the proper precautions to protect the front face of the instrument panel from cosmetic damage while performing this procedure.

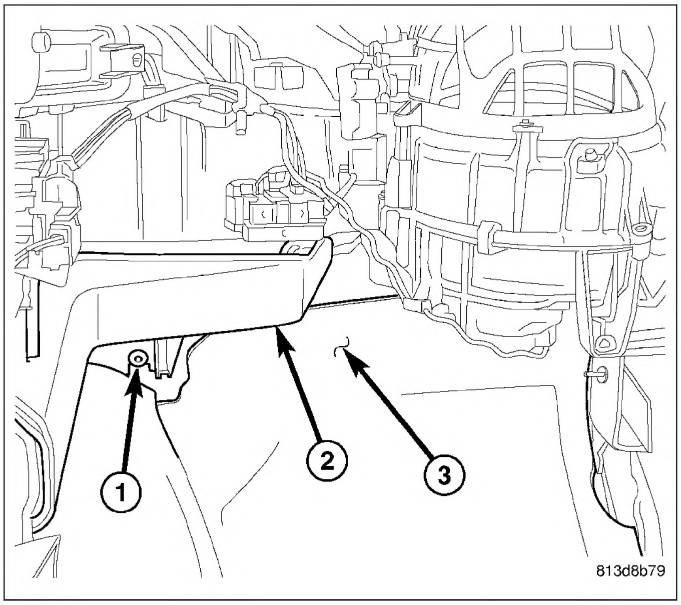


1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Drain the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM DRAIN).
3. Disconnect and isolate the negative battery cable.
4. Remove the front floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).
5. Remove the instrument panel (Refer to 23 - BODY/ INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
6. Disengage the push-pin retainer (1) that secures the front console duct (2) to the gear selector (3).
7. Disconnect the front console duct from the air distribution housing (4) and remove the console duct.
8. Remove the screws (5) that secure the gear selector to the floor panel (6) and position the gear selector out of the way.

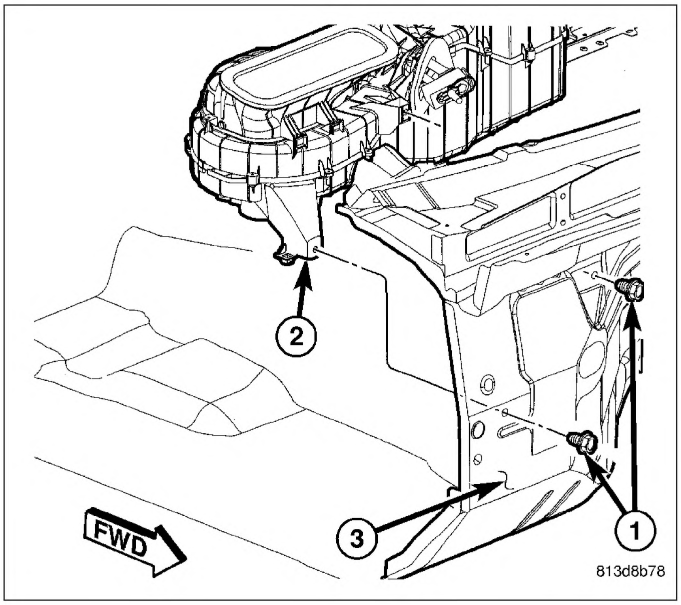
9. Disconnect the left rear floor duct (1) and the right rear floor duct (2) from the rear floor distribution duct (3).
10. Disconnect the rear floor distribution duct from the air distribution housing (4) and remove the distribution duct.
11. Disconnect the right front floor duct (5) and the left front floor duct (6) from the air distribution housing and remove the floor ducts.



12. Remove the nut (1) that secures the HVAC housing assembly (2) to the passenger side of the dash panel (3).



13. Disconnect the A/C liquid line and the A/C suction line from the A/C evaporator (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LINE-A/C LIQUID - REMOVAL).
14. Disconnect the heater hoses from the heater core tubes.
15. Remove the two bolts (1) that secure the HVAC housing assembly (2) to the engine compartment side of the dash panel (3).
16. Lift the HVAC housing assembly upwards so that the condensate drain tube clears the floor panel and remove the HVAC housing assembly from the passenger compartment.
17. If required, disassemble the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC ASSEMBLY - DISASSEMBLY).

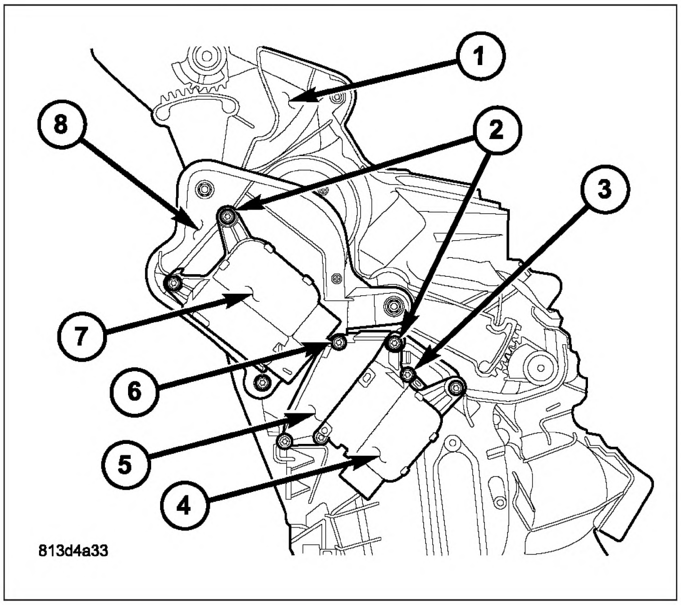


DISASSEMBLY

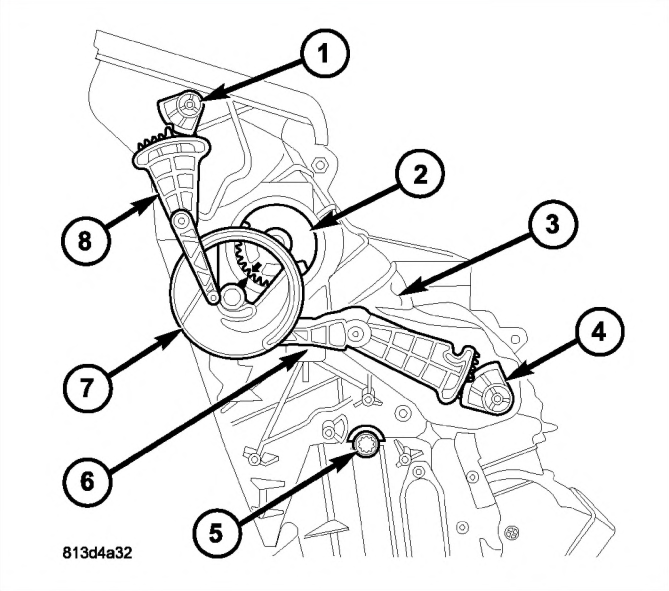
AIR DISTRIBUTION HOUSING

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

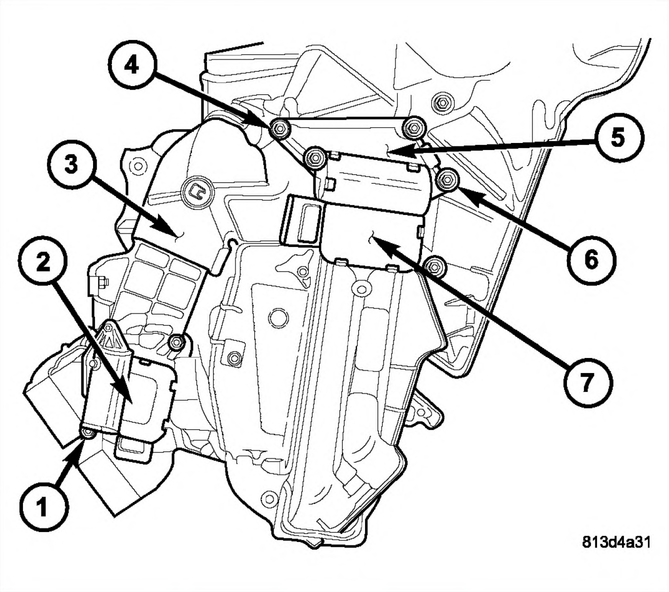
1. Remove the air distribution housing (1) from the HVAC housing and place it on a workbench (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR DISTRIBUTION HOUSING - REMOVAL).
2. Remove the screws (2) that secure the blend door actuator (4) and the mode door actuator (7) to the driver side of the air distribution housing and remove the actuators.
3. Remove the screws (3 and 6) that secure the blend door actuator mounting bracket (5) and the mode door actuator mounting bracket (8) to the driver side of the air distribution housing and remove the mounting brackets.



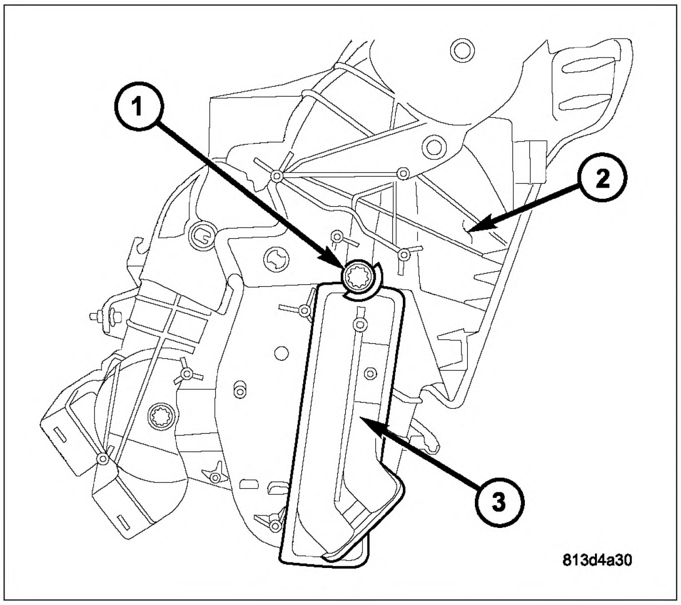
4. Using a flat bladed tool, remove the upper defrost/panel door pivot gear (1), front floor door pivot gear (4) and the blend door stop (5) from the driver side of the air distribution housing (3).
5. Remove the upper defrost/panel door linkage rod (8) and the mode door cam (7) from the air distribution housing.
6. Remove the lower defrost/panel door pivot gear (2) and the front floor door linkage rod (6) from the air distribution housing.



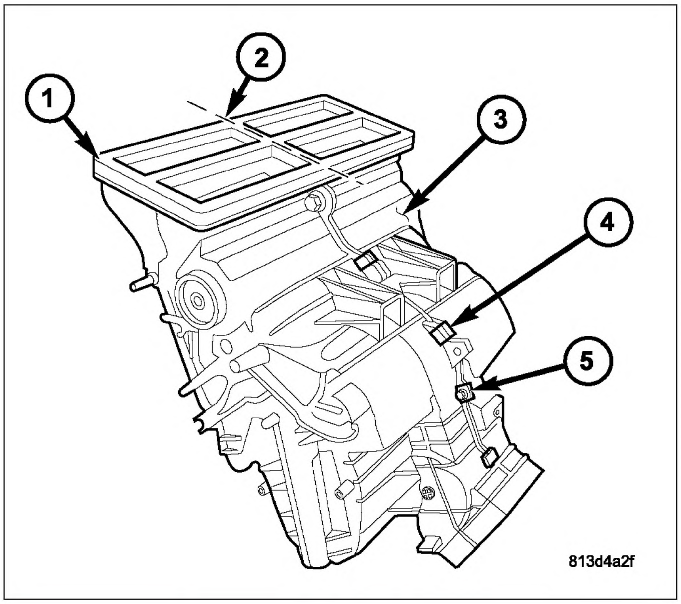
7. Remove the screws (1) that secure the rear floor/console door actuator (2) to the passenger side of the air distribution housing (3) and remove the actuator.
8. If equipped with dual zone heating-A/C, remove the screws (6) that secure the blend door actuator (7) to the passenger side of the air distribution housing and remove the actuator.
9. If equipped with dual zone heating-A/C, remove the screws (4) that secure the blend door actuator mounting bracket (5) to the passenger side of the air distribution housing and remove the mounting bracket.



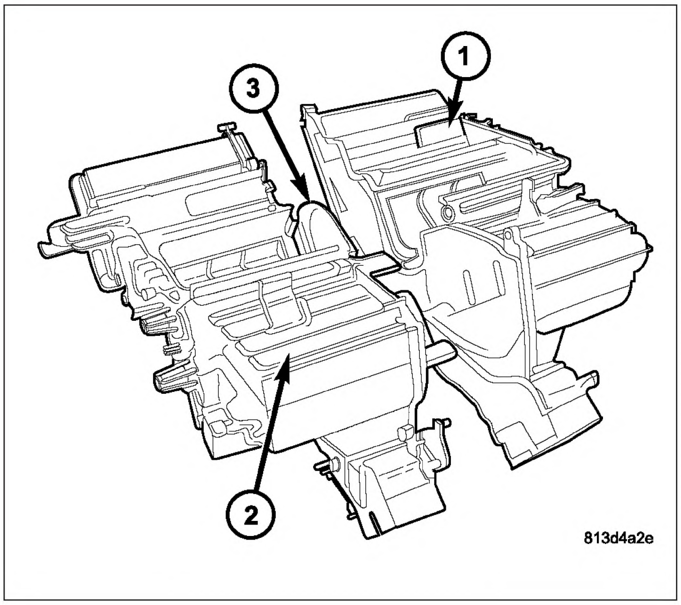
10. If equipped with dual zone heating-A/C, remove the blend door stop (1) from the passenger side of the air distribution housing (2).
11. Carefully pull the heater core (3) out of the passenger side of the air distribution housing.



12. Carefully cut the foam seal (1) along the parting line (2) of the two halves of the air distribution housing (3). If the seal is deformed or damaged, it must be replaced.
13. Remove the 4 metal clips (4) that secure the two halves of the air distribution housing together.
14. Remove the eight screws (5) that secure the two halves of the air distribution housing together.

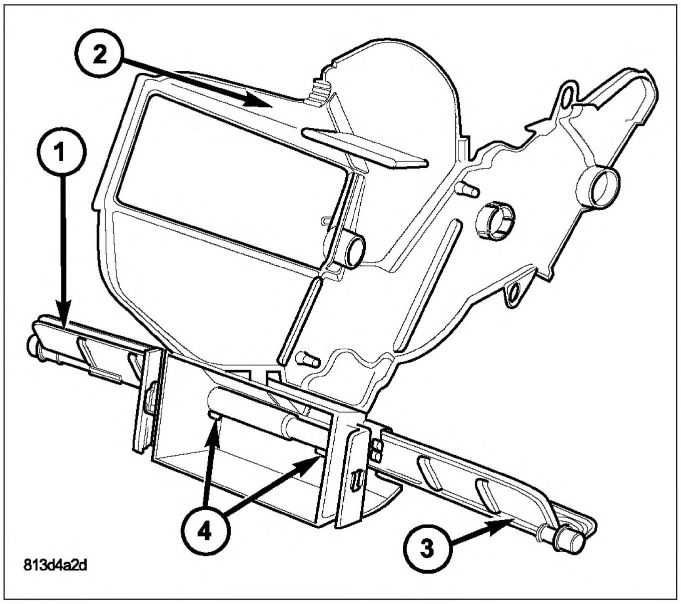


15. Carefully separate the left half of the air distribution housing (1) from the right half of the air distribution housing (2).
16. Remove the center partition (3) from the distribution housing.



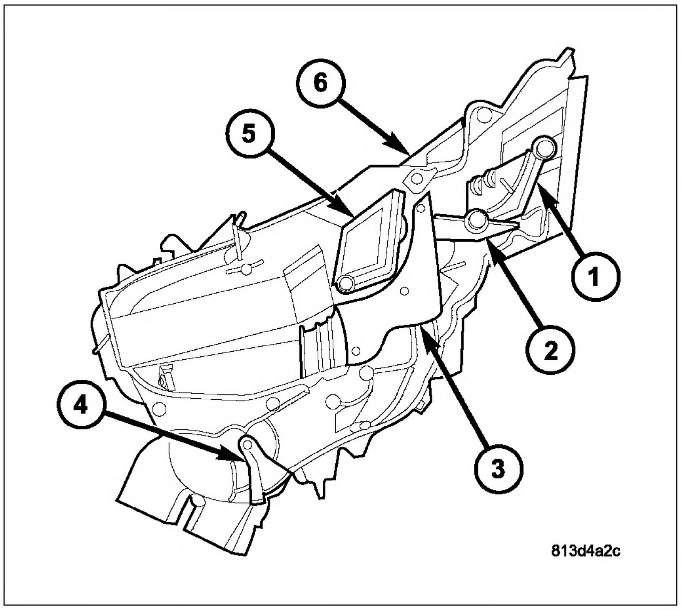
NOTE: If the seal on any air door is deformed or damaged, the air door must be replaced.

17. If required, remove the front floor air doors (1 and 3) from the center partition (2) by disengaging the retaining tabs (4) and pulling the air doors apart from each other.



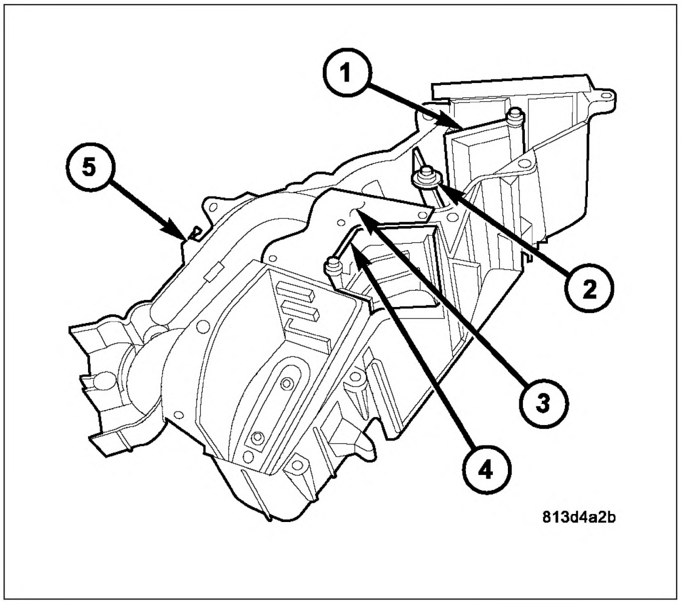
NOTE: If the seal on any air door is deformed or damaged, the air door must be replaced.

18. Remove the upper defrost/panel-air door (1), lower defrost/panel-air door (2), directional vane (3), rear outlet-air door (4) and the blend-air door (5) from the passenger side air distribution housing (6) as required.



NOTE: If the seal on any air door is deformed or damaged, the air door must be replaced.

19. Remove the upper defrost/panel-air door (1), lower defrost/panel-air door (2), directional vane (3) and the blend-air door (4) from the driver side air distribution housing (5) as required.



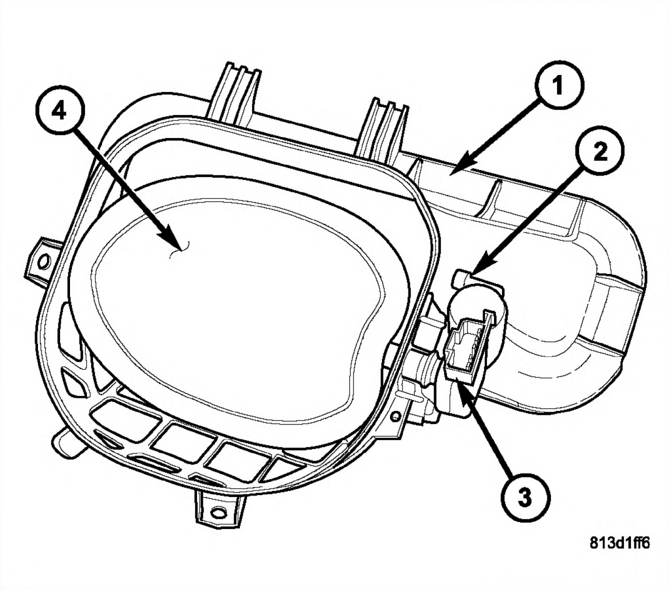
AIR INLET HOUSING

NOTE: The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door.

1. Remove the air inlet housing (1) from the HVAC housing and place it on a workbench (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/ HOUSING-HVAC - AIR INLET HOUSING - REMOVAL)
2. Remove the two screws (2) that secure the recirculation door actuator (3) to the left side of the air inlet housing and remove the actuator.

NOTE: If the foam seal on the recirculation-air door or the air inlet housing is deformed or damaged, it must be replaced.

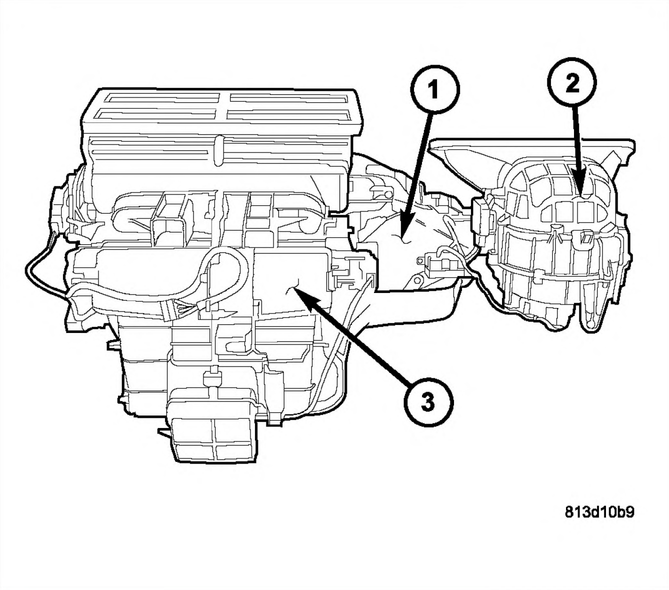
3. Carefully remove the recirculation-air door (4) from the air inlet housing.



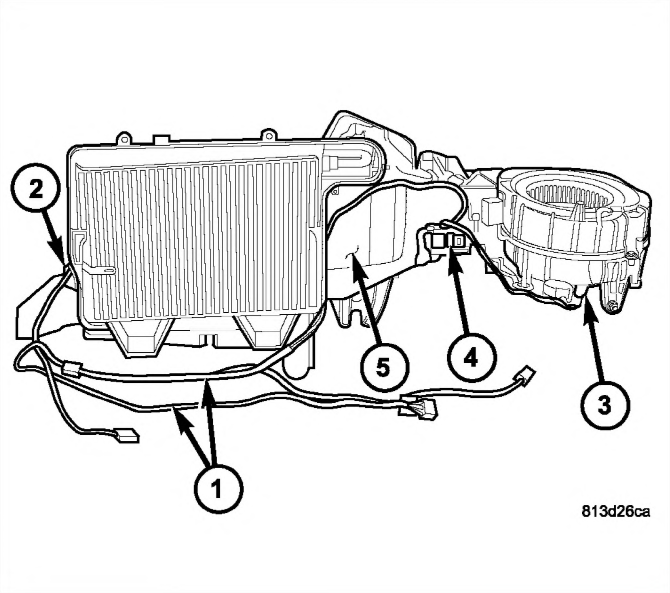
HVAC HOUSING

NOTE: The HVAC housing must be removed from the vehicle and disassembled for service of the A/C evaporator.

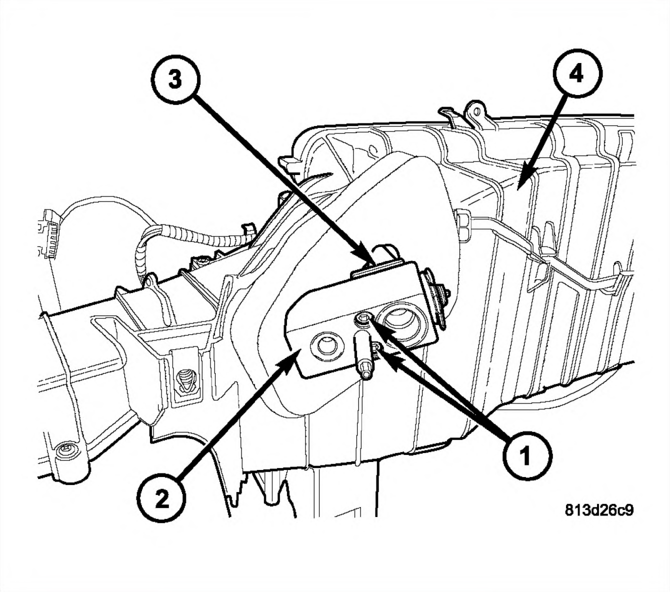
1. Remove the HVAC housing assembly and place it on a workbench (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION /HOUSING-HVAC - HVAC HOUSING ASSEMBLY - REMOVAL).
2. Remove the air distribution housing (3) from the HVAC housing (1) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR DISTRIBUTION HOUSING - REMOVAL).
3. Remove the air inlet housing (2) from the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR INLET HOUSING - REMOVAL).



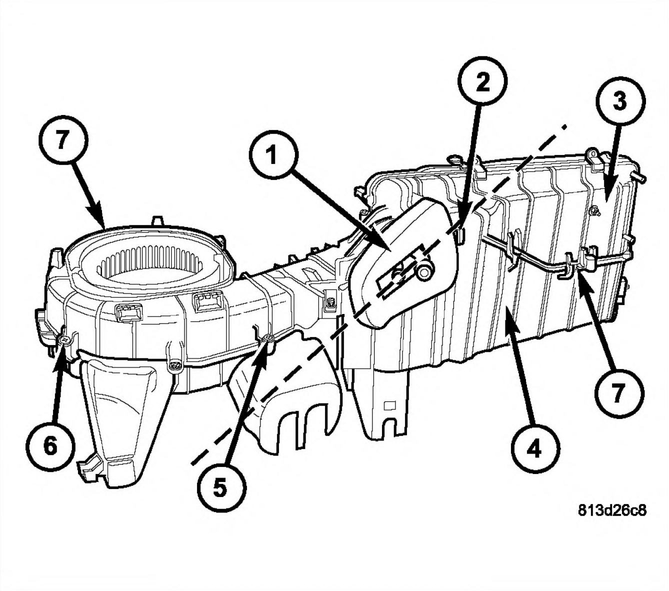
4. Disconnect the HVAC wire harness (1) from the evaporator temperature sensor (2) and the blower motor resistor or power module (4) (depending on application).
5. Disconnect the wire harness for the blower motor (3) from the blower motor resistor or power module (depending on application).
6. Disengage the two HVAC wire harness retainers from the HVAC housing (5) and remove the wire harness.
7. Remove the blower motor (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/MOTOR-BLOWER - REMOVAL).
8. Remove the blower motor resistor or power module, depending on application (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RESISTOR-BLOWER MOTOR - REMOVAL) or (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/MODULE-POWER-BLOWER MOTOR - REMOVAL).
9. Remove the evaporator temperature sensor (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/SENSOR-EVAPORATOR TEMPERATURE - REMOVAL).



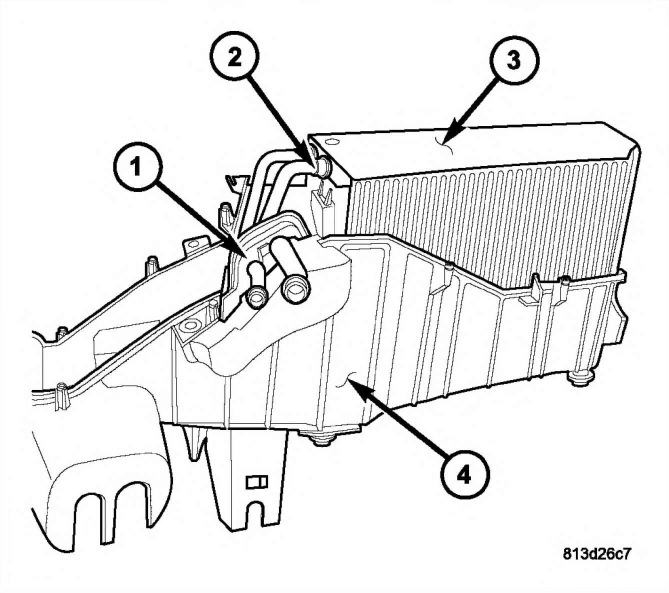
10. Remove the two bolts (1) that secure the A/C expansion valve (2) to the evaporator tube tapping block (3) located at the front of the HVAC housing (4).
11. Remove the A/C expansion valve from the evaporator tube tapping block and remove and discard the O-ring seals.
12. Install plugs in, or tape over the opened evaporator tube fittings and all expansion valve ports.



13. Carefully cut the foam seal (1) along the parting line (2) of the upper half of the HVAC housing (3) and the lower half of the HVAC housing (4). If the seal is deformed or damaged, it must be replaced.
14. Remove the three metal retaining clips (5) that secure the two halves of the HVAC housing together.
15. Remove the ten screws (6) that secure the two halves of the HVAC housing together.
16. Disengage the two plastic retaining clips (7) and separate the two halves of the HVAC housing.



17. Open the rubber seal (1) and carefully lift the A/C evaporator (2) and insulator (3) out of the lower half of the HVAC housing (4).
18. If required, remove the rubber seal from the lower half of the HVAC housing. If the seal is deformed or damaged, it must be replaced.
19. If required, remove the insulator from the A/C evaporator. If the insulator is deformed or damaged, it must be replaced.

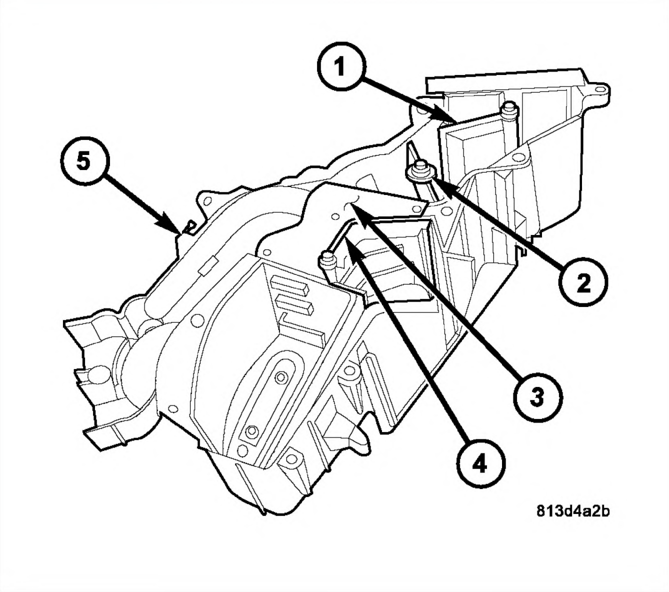


ASSEMBLY

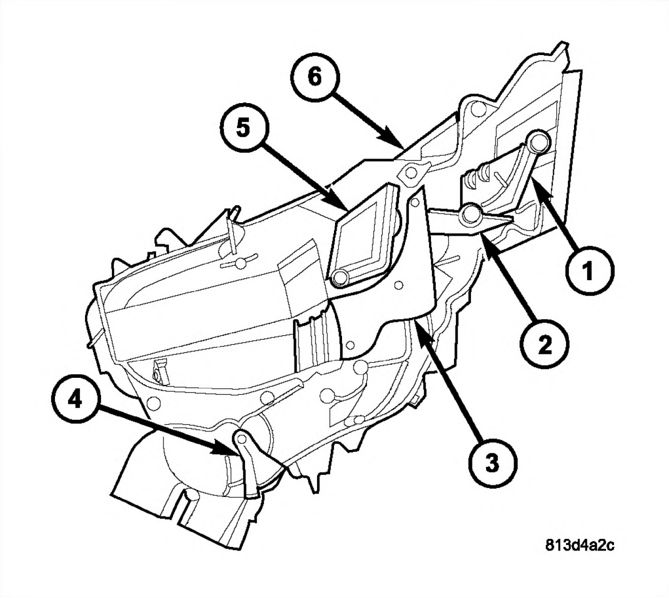
AIR DISTRIBUTION HOUSING

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

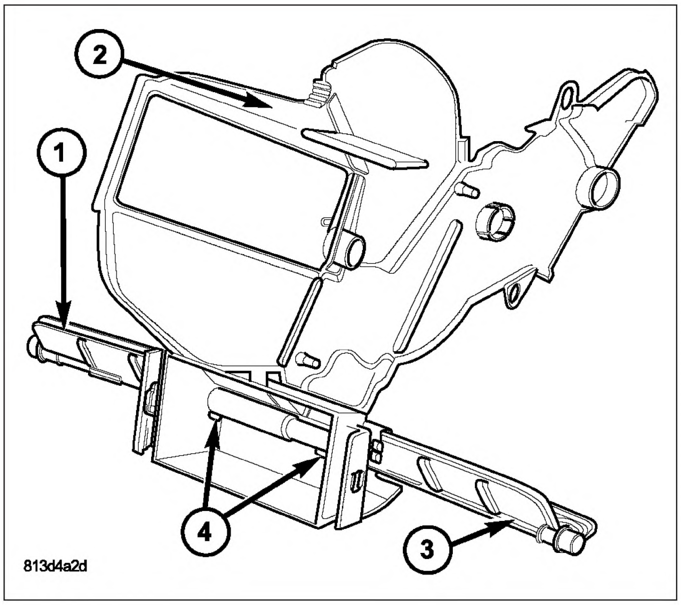
1. Install the upper defrost/panel-air door (1), lower defrost/panel-air door (2), directional vane (3) and the blend-air door (4) into the driver side air distribution housing (5) as required. Align the air doors with the pivot shaft holes in the housing.



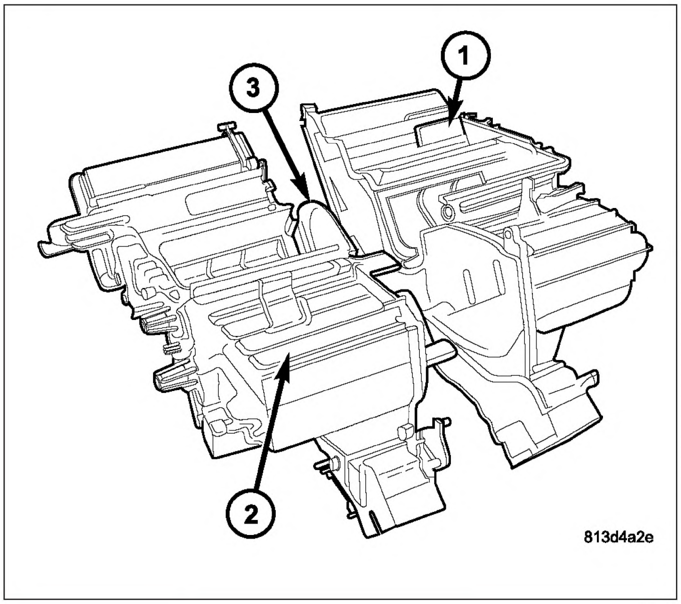
2. Install the upper defrost/panel-air door (1), lower defrost/panel-air door (2), directional vane (3), rear outlet-air door (4) and the blend-air door (5) into the passenger side air distribution housing (6) as required. Align the air doors with the pivot shaft holes in the housing.



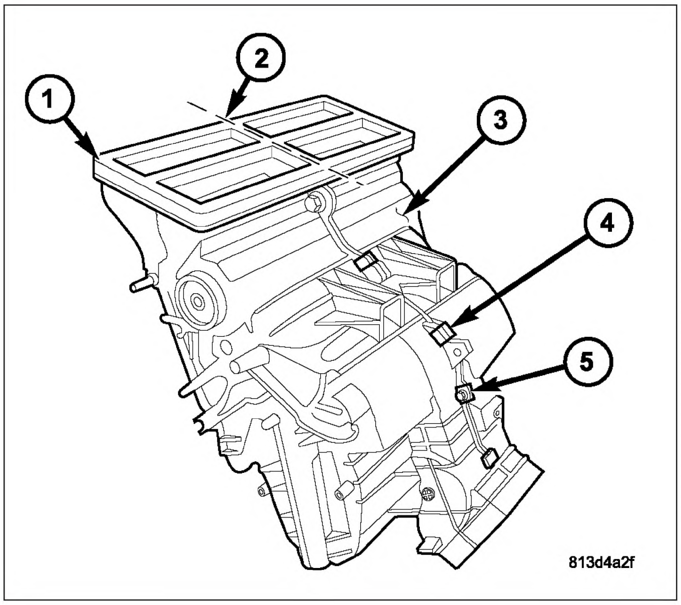
3. If removed, align the front floor-air doors (1 and 3) with each other and install then into the center partition (2). Make sure that the air door retaining tabs (4) are fully engaged.



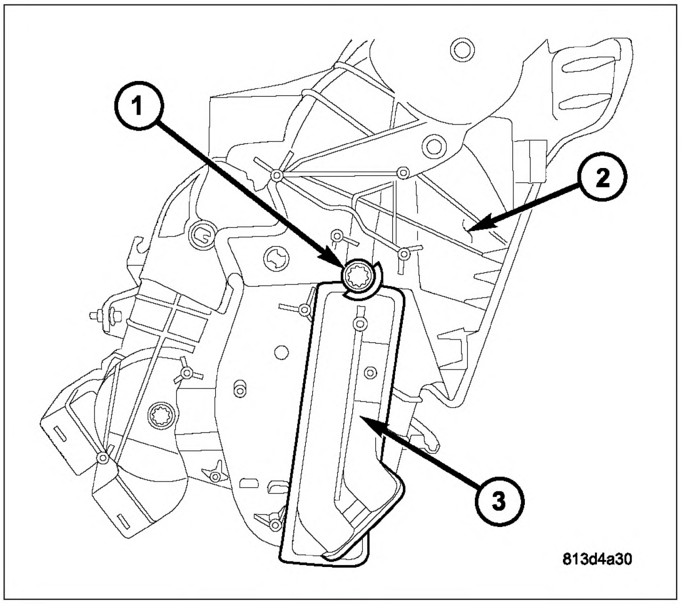
4. Install the center partition (3) into the right half of the air distribution housing (2).
5. Install the left half of the air distribution housing (1) onto the right half of the air distribution housing. Align the air door pivot shafts with each other and with the pivot shaft holes in the housing.

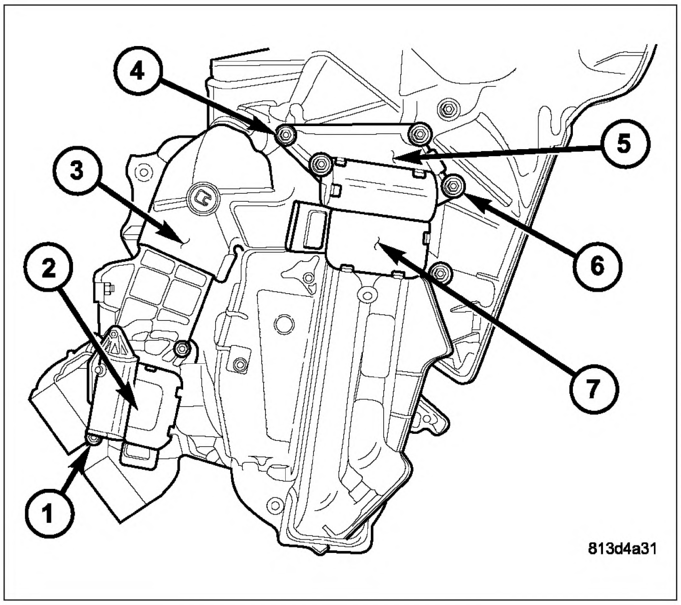


6. Install the eight screws (5) that secure the two halves of the air distribution housing (3) together. Tighten the screws to 2.2 N·m (20 in. lbs.).
7. Install the four metal clips (4) that secure the two halves of the air distribution housing together.
8. Inspect the foam seal (1), especially at the parting line (2). If the seal is deformed or damaged, it must be replaced.

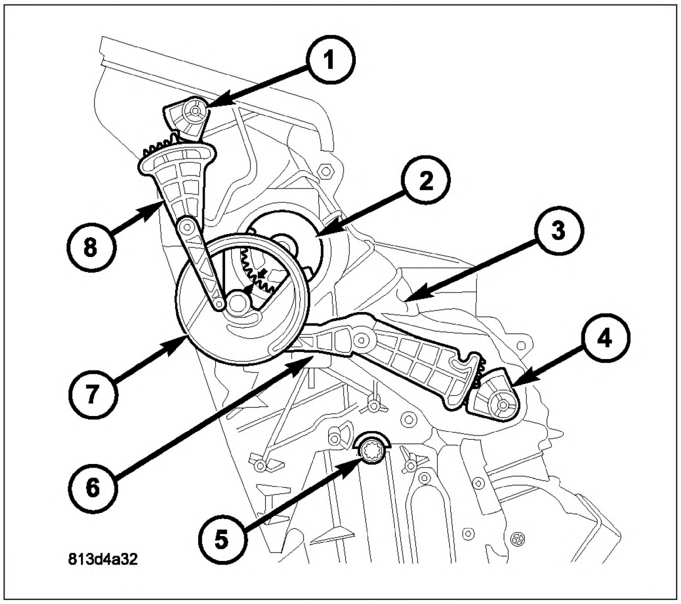


9. Carefully install the heater core (3) into the passenger side of the air distribution housing (2).
10. If equipped with dual zone heating-A/C, install the blend door stop (1) onto the passenger side of the air distribution housing.





11. Position the rear floor/console door actuator (2) onto the passenger side of the air distribution housing (3). If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those on the floor/console door pivot shaft. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ACTUATOR-MODE DOOR - INSTALLATION).
12. Install the screws (1) that secure the rear floor/console door actuator onto the passenger side of the air distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).
13. If equipped with dual zone heating-A/C, position the blend door actuator mounting bracket (5) onto the passenger side of the air distribution housing and install the retaining screws (4). Tighten the screws to 2 N·m (17 in. lbs.).
14. If equipped with dual zone heating-A/C, position the blend door actuator (7) onto the blend door actuator mounting bracket and install the retaining screws (6). Tighten the screws to 2 N·m (17 in. lbs.). If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those on the blend door stop. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ACTUATOR-BLEND DOOR - INSTALLATION).



15. Install the front floor door linkage rod (6) and the lower defrost/panel door pivot gear (2) onto the driver side of the air distribution housing (3).

NOTE: Align the arrow on the lower defrost/panel door pivot gear with the locator in the window of the mode door cam during installation of the mode door cam.

16. Align and install the mode door cam (7) onto the driver side of the air distribution housing.

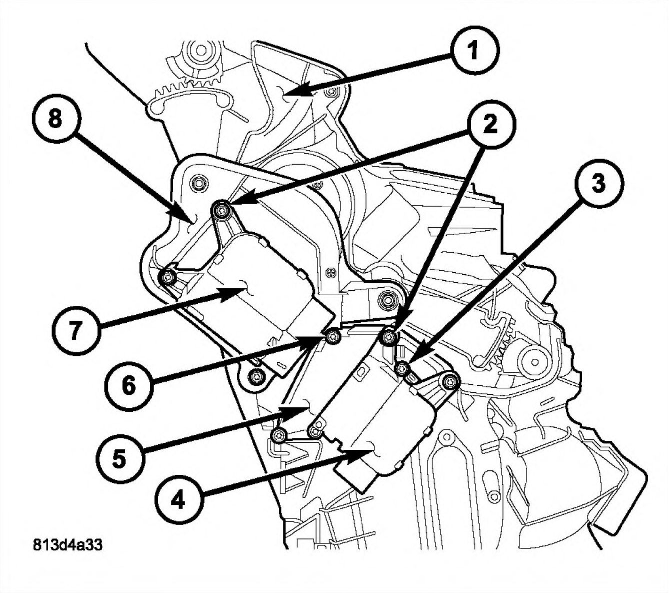
NOTE: Align the guide pin on the upper defrost/panel door linkage rod with the guides in the mode door cam during installation of the upper defrost/panel door linkage rod.

17. Align and install the upper defrost/panel door linkage rod (8) onto the driver side of the air distribution housing.

NOTE: Align the detent in the upper defrost/panel door pivot gear with the locator in the upper defrost/panel door linkage rod during installation of the upper defrost/panel door pivot gear.

18. Align and install the blend door stop (5), front floor door pivot gear (4) and the upper defrost/panel door pivot gear (1) onto the driver side of the air distribution housing.

19. Position the blend door actuator mounting bracket (5) and the mode door actuator mounting bracket (8) onto the driver side of the air distribution housing (1) and install the retaining screws (3 and 6). Tighten the screws to 2 N·m (17 in. lbs.).
20. Position the blend door actuator (4) and the mode door actuator (7) onto the mounting brackets and install the retaining screws (2). Tighten the screws to 2 N·m (17 in. lbs.). If necessary, rotate the actuators slightly to align the splines on the actuator output shaft with those on the mode door cam and the blend door stop (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ACTUATOR-BLEND DOOR - INSTALLATION) and (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ACTUATOR-MODE DOOR - INSTALLATION).
21. Install the air distribution housing onto the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR DISTRIBUTION HOUSING - INSTALLATION).



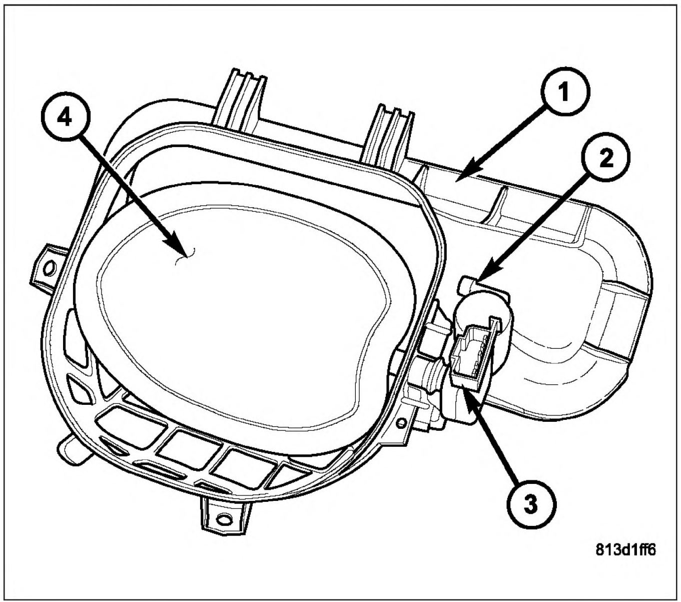
AIR INLET HOUSING

NOTE: The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door.

1. Position the recirculation-air door (4) into the air inlet housing (1).

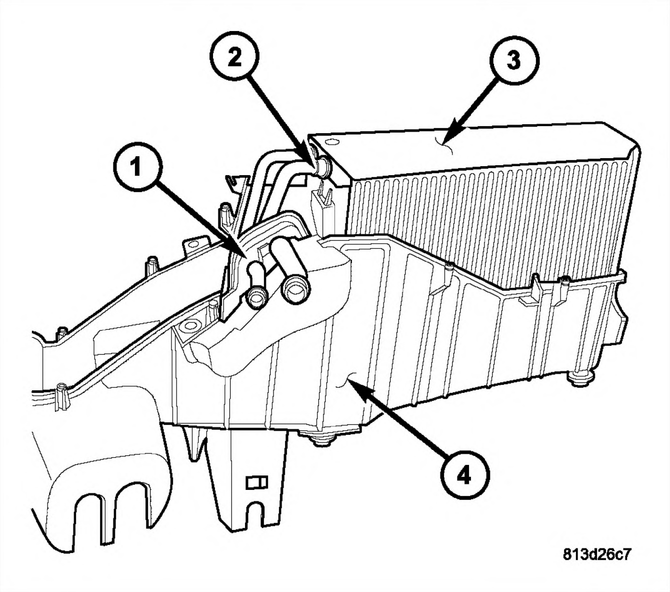
CAUTION: Make sure that the recirculation-air door pivot shaft is properly seated in the pivot seats located on the air inlet housing.

2. Install the recirculation door actuator (3) onto the air inlet housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those on the recirculation door pivot shaft (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ACTUATOR-RECIRCULATION DOOR - INSTALLATION).
3. Install the two screws (2) that secure the recirculation door actuator to the air inlet housing. Tighten the screws to 2 N·m (17 in. lbs.).
4. Install the air inlet housing onto the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR INLET HOUSING - INSTALLATION).

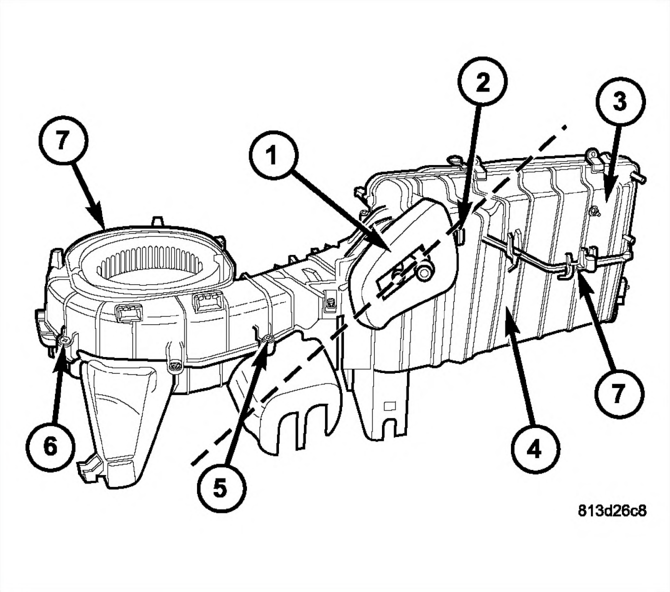


HVAC HOUSING

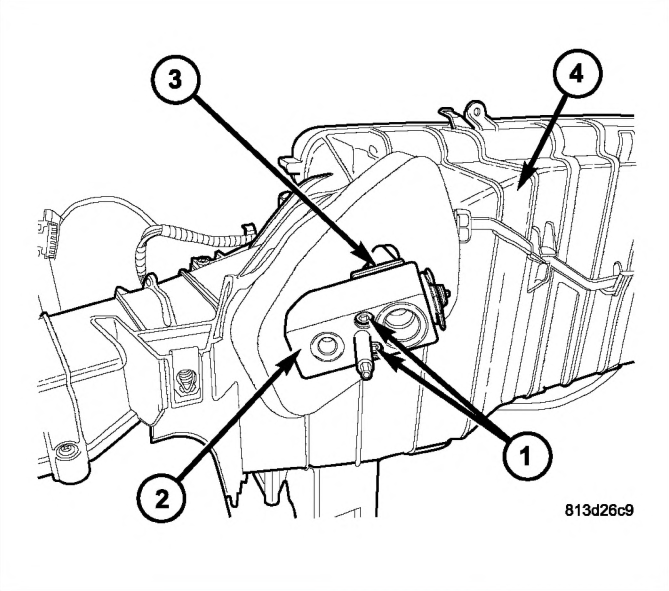
1. If removed, install the insulator (3) over the A/C evaporator (2). If the seal is deformed or damaged, it must be replaced.
2. If removed, install the rubber seal (1) into the lower half of the HVAC housing (4). If the seal is deformed or damaged, it must be replaced.
3. Install the A/C evaporator into the lower half of the HVAC housing. Make sure that the evaporator drain within the HVAC housing is clean and unrestricted and that the insulator and rubber seal are properly installed.



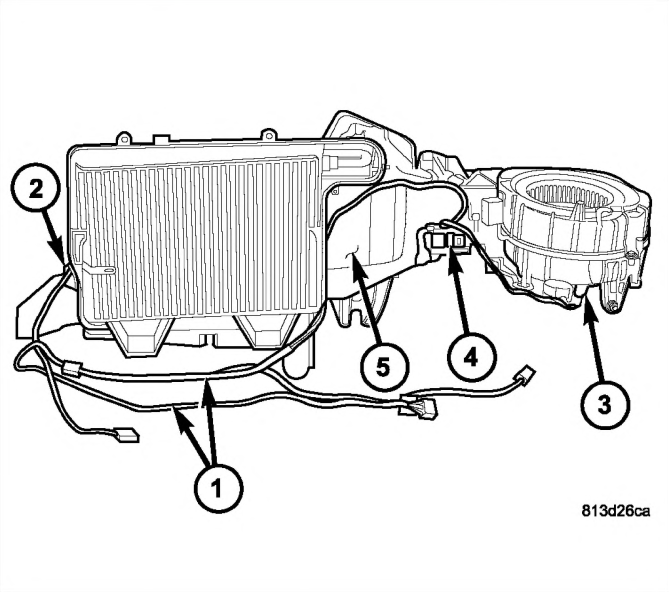
4. Install the upper half of the HVAC housing (3) onto the lower half of the HVAC housing (4) and fully engage the two plastic retaining clips (7).
5. Install the ten screws (2) that secure the two halves of the HVAC housing together. Tighten the screws to 2.2 N·m (20 in lbs.).
6. Install the three metal retaining clips (5) that secure the two halves of the HVAC housing together.



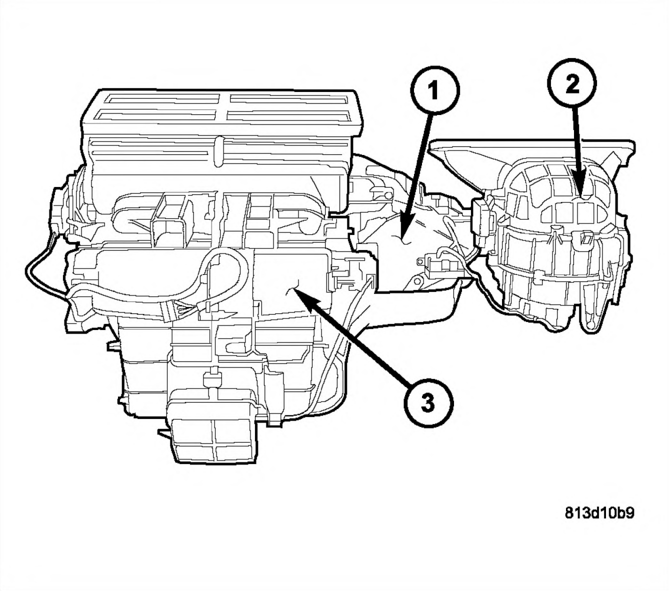
7. Remove the tape or plugs from the evaporator tube fittings and all of the expansion valve ports.
8. Lubricate new rubber O-ring seals with clean refrigerant oil and install them on the evaporator tube fittings. Use only the specified O-rings as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
9. Install the A/C expansion valve (2) onto the evaporator tube tapping block (3) located at the front of the HVAC housing (4).
10. Install the two bolts (1) that secure the A/C expansion valve to the evaporator tube tapping block. Tighten the bolts to 11 N·m (97 in. lbs.).



11. Install the evaporator temperature sensor (2) (Refer to 24 - HEATING & AIR CONDITIONING/ CONTROLS - FRONT/EVAPORATOR TEMPERATURE SENSOR - INSTALLATION).
12. Install the blower motor resistor or power module (4), depending on application (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RESISTOR-BLOWER MOTOR - INSTALLATION) or (Refer to 24 - HEATING & AIR CONDITIONING/ CONTROLS/MODULE-POWER-BLOWER MOTOR - INSTALLATION).
13. Install the blower motor (3) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/MOTOR-BLOWER - INSTALLATION).
14. Install the HVAC wiring harness (1) onto the HVAC housing (5) and engage the two wire harness retainers to the housing.
15. Connect the HVAC wire harness to the evaporator temperature sensor and blower motor resistor or power module (depending on application).
16. Connect the blower motor wire harness to blower motor resistor or power module (depending on application).



17. Install the air inlet housing (2) onto the HVAC housing (1) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR INLET HOUSING - INSTALLATION).
18. Install the air distribution housing (3) onto the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - AIR DISTRIBUTION HOUSING - INSTALLATION).
19. Install the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - HVAC HOUSING ASSEMBLY - INSTALLATION).

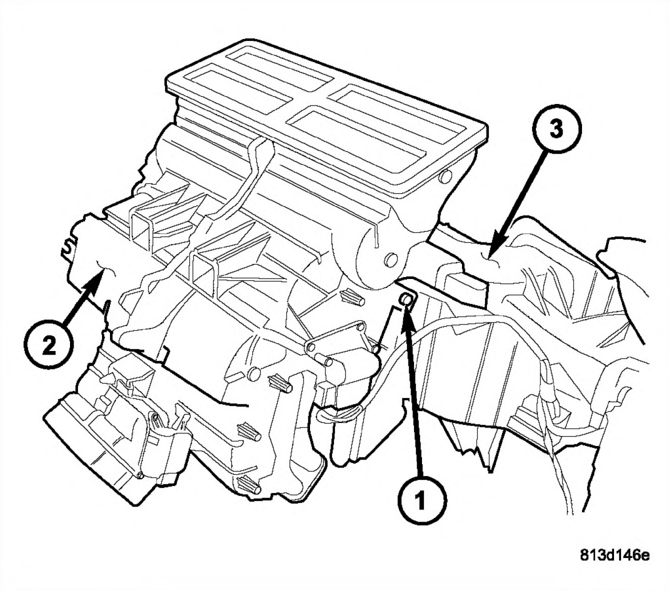


INSTALLATION

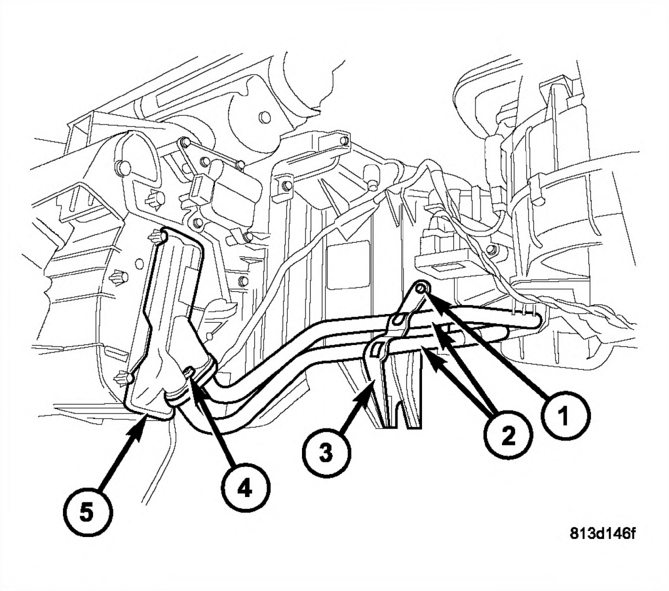
AIR DISTRIBUTION HOUSING

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

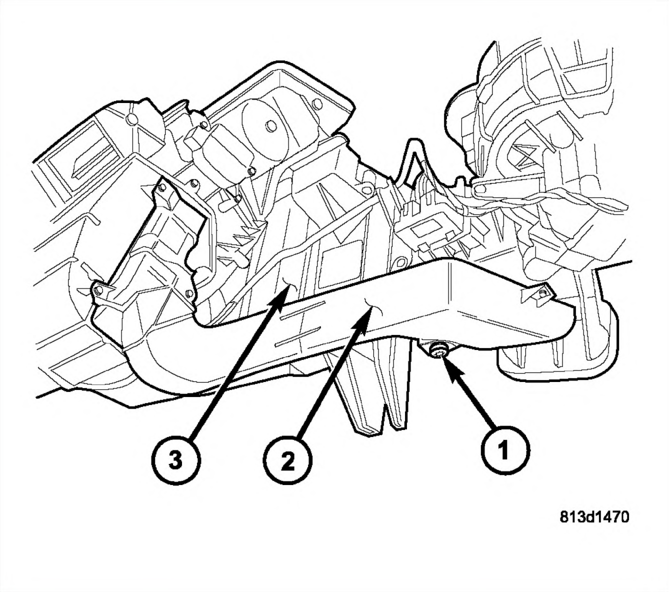
1. Position the air distribution housing (2) onto the rear of the HVAC housing (3) by inserting the tabs on the bottom of the distribution housing into the slots located on the bottom of the HVAC housing.
2. Tip the air distribution housing upward until it is properly aligned with the HVAC housing and the locking tabs at the top of the distribution housing are fully engaged.
3. Install the seven screws (1) that secure the air distribution housing to the HVAC housing. Tighten the screws to 2.2 N·m (20 in. lbs.).



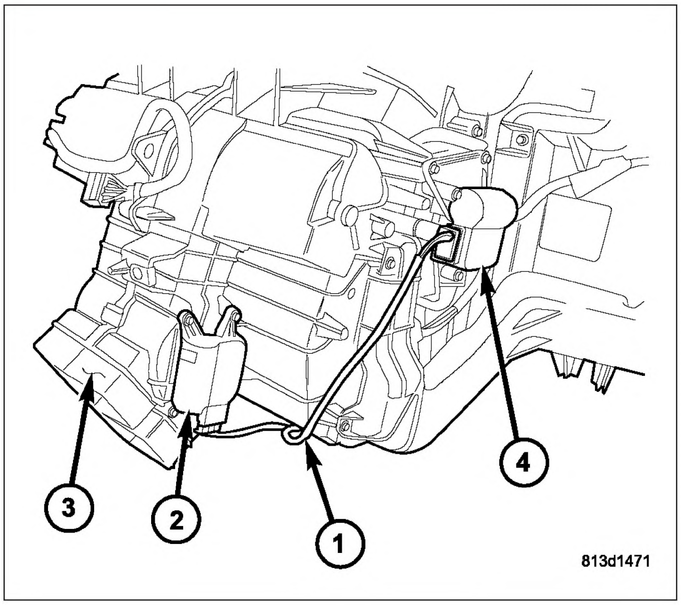
4. Remove the tape or plugs from the heater core tubes (2) and the heater core (5).
5. Lubricate new rubber O-ring seals with clean engine coolant and install them onto the heater core tube fittings. Use only the specified O-rings as they are made of a special material for the engine cooling system.
6. Install the heater core tubes onto the heater core and loosely install the bolt (4) that secures the tubes to the heater core.
7. Install the screw (1) that secures the heater core tubes to the HVAC housing. Tighten the screw to 2.2 N·m (20 in. lbs.).
8. Tighten the bolt that secures the heater core tubes to the heater core to 3 N·m (27 in. lbs.).



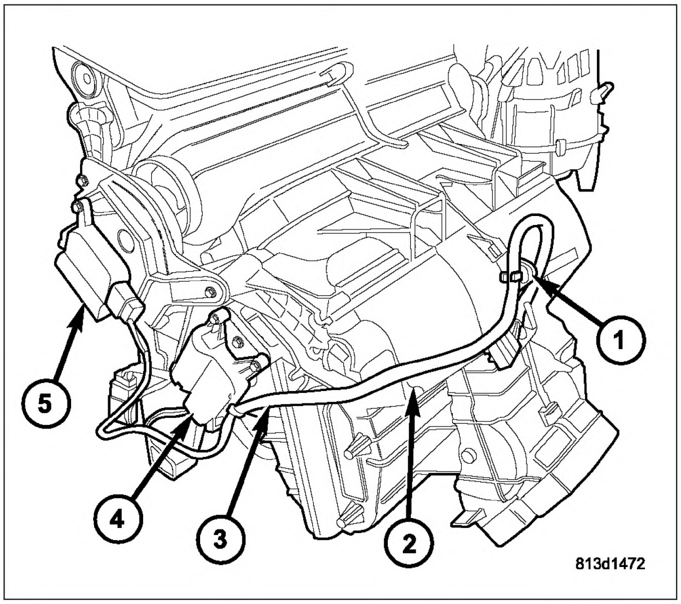
9. Install the heater core and tube cover (2) onto the HVAC housing (3).
10. Install the five screws (1) that secure the heater core and tube cover to the HVAC housing. Tighten the screws to 2.2 N·m (20 in. lbs.).



11. Connect the HVAC wire harness (1) to the mode door actuator (2) located near the bottom of the air distribution housing (3).
12. If equipped with dual zone heating-A/C, connect the HVAC wire harness to the blend door actuator (4) located on the passenger side of the air distribution housing.



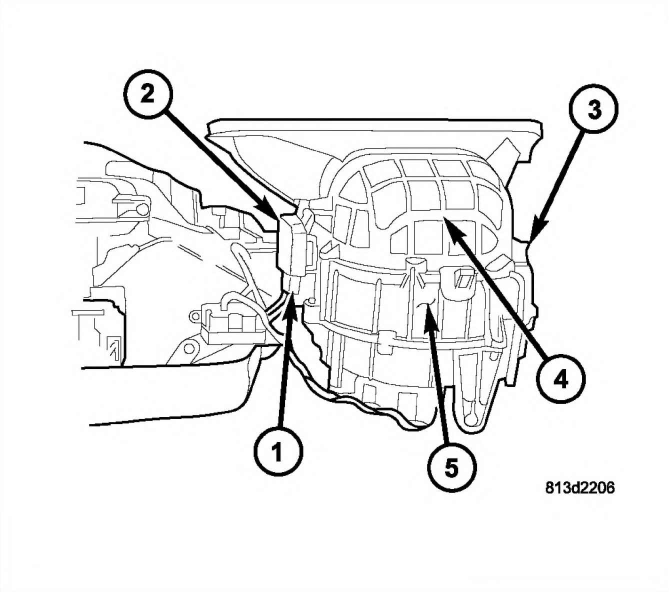
13. Connect the HVAC wire harness (3) to the blend door actuator (4) and the mode door actuator (5) located on the driver side of the air distribution housing (2).
14. Engage the HVAC wire harness retainer (1) to the rear of the air distribution housing.
15. Install the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/ HOUSING-HVAC - HVAC HOUSING ASSEMBLY - INSTALLATION).



AIR INLET HOUSING

NOTE: The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door.

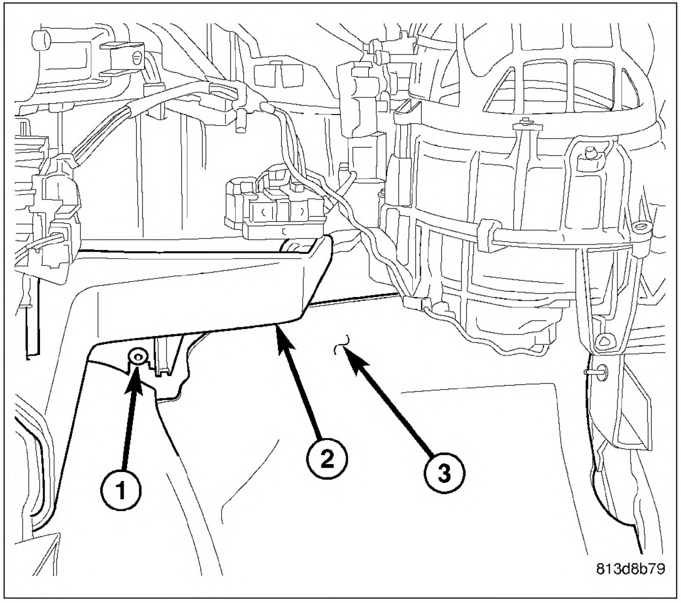
1. Position the air distribution housing (4) onto the top of the HVAC housing (5) by inserting the two tabs located at the front of the air inlet housing into the slots located on the top of the HVAC housing.
2. Tip the air distribution housing downward until it is properly seated on the HVAC housing.
3. Install the three screws (3) that secure the air distribution housing to the HVAC housing. Tighten the screws to 2.2 N·m (20 in. lbs.).
4. Connect the HVAC wire harness (1) to the recirculation door actuator (2).
5. Install the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/ HOUSING-HVAC - HVAC HOUSING ASSEMBLY - INSTALLATION).



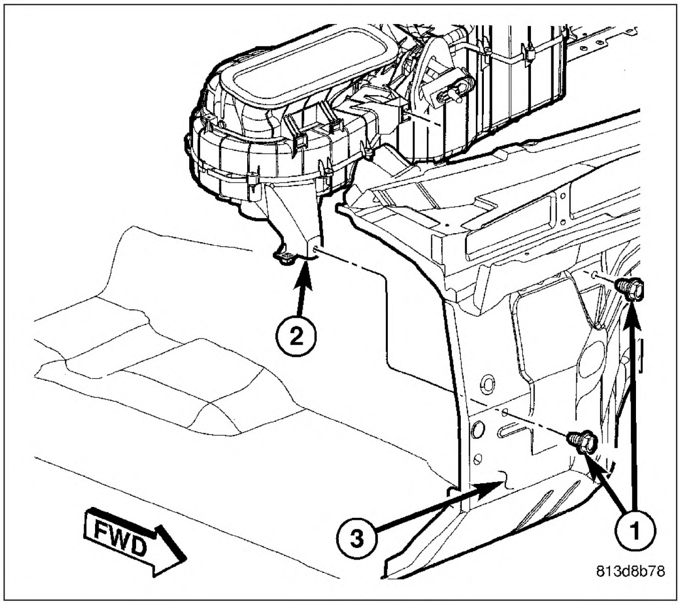
HVAC HOUSING ASSEMBLY

NOTE: The HVAC housing must be removed from the vehicle and disassembled for service of the air inlet housing, air distribution housing and the A/C evaporator.

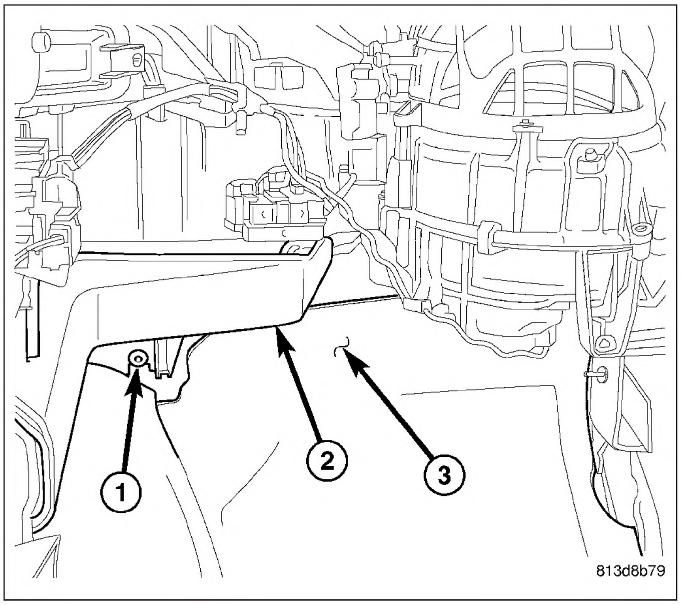
1. Position the HVAC housing assembly (2) into the passenger compartment side of the dash panel (3). Make sure that the condensate drain tube protrudes through the opening in the floor panel.
2. Loosely install the nut (1) that secures the HVAC housing to the passenger compartment side of the dash panel.



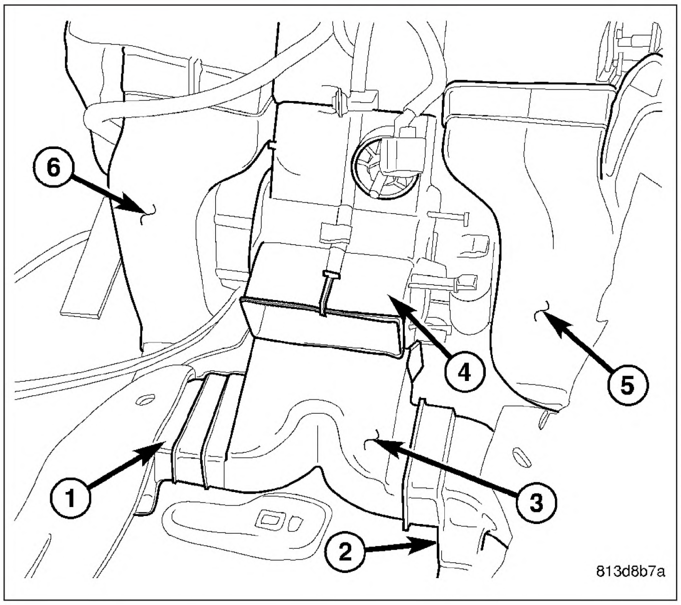
3. Install the two bolts (1) that secure the HVAC housing assembly (2) to the engine compartment side of the dash panel (3). Tighten the bolts to 7 N·m (62 in. lbs.).
4. Connect the heater hoses to the heater core tubes.
5. Connect the A/C suction line and A/C liquid line to the A/C evaporator (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING /LINE-A/C LIQUID - INSTALLATION).



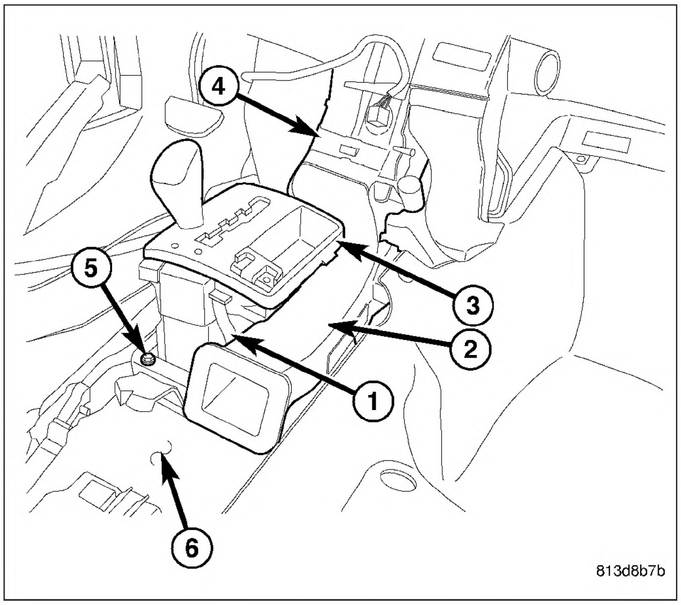
6. Tighten the nut (1) that secures the HVAC housing assembly (2) to the passenger compartment side of the dash panel (3) to 7 N·m (62 in. lbs.).



7. Connect the right front floor duct (5) and left front floor duct (6) to the air distribution housing (4).
8. Connect the rear floor distribution duct (3) to the air distribution housing.
9. Connect the left rear floor duct (1) and the right rear floor duct (2) to the rear floor distribution duct.



10. Position the gear selector (3) to its installed location on the floor panel (6) and securely install the retaining screws (5).
11. Connect the front console duct (2) to the air distribution housing (4) and engage the push-pin retainer (1) to the gear selector.
12. Install the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).
13. Install the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).
14. Reconnect the negative battery cable.
15. If the heater core is being replaced, flush the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM CLEANING/REVERSE FLUSHING).
16. Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM REFILL).



17. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
18. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

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PLUMBING

DESCRIPTION

The A/C refrigerant lines and hoses are used to carry the refrigerant between the various A/C system components. The refrigerant lines and hoses for the R-134a system on this vehicle consist of a barrier-hose design with a nylon tube sandwiched between rubber layers. The nylon tube helps to contain the R-134a refrigerant, which has a smaller molecular structure than R-12 refrigerant. The ends of the refrigerant lines are made from lightweight aluminum or steel, and commonly use braze-less fittings.

Any kinks or sharp bends in the refrigerant lines and hoses will reduce the capacity of the entire A/C system and can reduce the flow of refrigerant in the system. The radius of all bends in the flexible hose refrigerant lines should be at least ten times the diameter of the hose and the refrigerant lines should be routed so they are at least 80 millimeters (3 inches) away from the exhaust manifold(s) and exhaust pipe(s).

OPERATION

High pressures are produced in the refrigerant system when the A/C compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

The refrigerant lines and hoses are coupled to other A/C system components with block-type fittings. A flat steel gasket with an integral O-ring (dual plane seal) is used to mate the refrigerant line fittings with A/C system components to ensure the integrity of the refrigerant system.

The refrigerant lines and hoses cannot be repaired and, if faulty or damaged, they must be replaced.

WARNING

WARNINGS

WARNING: The A/C system contains refrigerant under high pressure. Repairs should only be performed by qualified service personnel. Severe personal injury or death may result from improper service procedures.

WARNING: Avoid breathing the refrigerant and refrigerant oil vapor or mist. Exposure may irritate the eyes, nose, and/or throat. Wear eye protection when servicing the A/C refrigerant system. Serious eye injury can result from direct contact with the refrigerant. If eye contact occurs, seek medical attention immediately.

WARNING: Do not expose the refrigerant to open flame. Poisonous gas is created when refrigerant is burned. An electronic leak detector is recommended. Severe personal injury or death may result from improper service procedures.

WARNING: If accidental system discharge occurs, ventilate the work area before resuming service. Large amounts of refrigerant released in a closed work area will displace the oxygen and cause suffocation and death.

WARNING: The evaporation rate of R-134a refrigerant at average temperature and altitude is extremely high. As a result, anything that comes in contact with the refrigerant will freeze. Always protect the skin or delicate objects from direct contact with the refrigerant.

WARNING: The R-134a service equipment or the vehicle refrigerant system should not be pressure tested or leak tested with compressed air. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures are potentially dangerous, and may result in fire or explosion causing property damage, personal injury or death.

WARNING: The engine cooling system is designed to develop internal pressures of 97 to 123 kilopascals (14 to 18 pounds per square inch). Do not remove or loosen the coolant pressure cap, cylinder block drain plugs, radiator drain, radiator hoses, heater hoses, or hose clamps while the engine cooling system is hot and under pressure. Allow the vehicle to cool for a minimum of 15 minutes before opening the cooling system for service. Failure to observe this warning can result in serious burns from the heated engine coolant.

CAUTION

CAUTIONS

CAUTION: Never add R-12 to a refrigerant system designed to use R-134a. Do not use R-12 equipment or parts on a R-134a A/C system. These refrigerants are not compatible and damage to the A/C system will result.

CAUTION: Never use R-12 refrigerant oil in a A/C system designed to use R-134a refrigerant oil. These refrigerant oils are not compatible and damage to the A/C system will result.

CAUTION: The use of A/C system sealers may result in damage to A/C refrigerant recovery/evacuation/recharging equipment and/or A/C system. Many federal, state/provincial and local regulations prohibit the recharge of A/C systems with known leaks. DaimlerChrysler recommends the detection of A/C system leaks through the use of approved leak detectors and fluorescent leak detection dyes. Vehicles found with A/C system sealers should be treated as contaminated and replacement of the entire A/C refrigerant system is recommended. A/C systems found to be contaminated with A/C system sealers, A/C stop-leak products or seal conditioners voids the warranty for the A/C system.

CAUTION: Recover the refrigerant before opening any fitting or connection. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

CAUTION: If equipped, do not remove the secondary retention clip from any spring-lock coupler connection while the refrigerant system is under pressure. Recover the refrigerant before removing the secondary retention clip. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

CAUTION: The internal parts of the A/C system will remain stable as long as moisture-free refrigerant and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This may cause operational troubles or even serious damage if present in more than very small quantities. Before disconnecting a component, clean the outside of the fittings thoroughly to prevent contamination from entering the refrigerant system. Keep service tools and the work area clean. Do not open the refrigerant system or uncap a replacement component until you are ready to service the system. Immediately after disconnecting a component from the refrigerant system, seal the open fittings with a cap or plug. This will prevent contamination from entering the A/C system.

CAUTION: Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open a container of refrigerant oil until you are ready to use it. Replace the cap on the oil container immediately after using. Store refrigerant oil only in a clean, airtight, and moisture-free container.

CAUTION: Do not overcharge the refrigerant system. Overcharging will cause excessive compressor head pressure and can cause compressor noise and A/C system failure.

DIAGNOSIS AND TESTING

REFRIGERANT SYSTEM LEAKS

WARNING: R-134a service equipment or vehicle A/C system should not be pressure tested or leak tested with compressed air. Mixture of air and R-134a can be combustible at elevated pressures. These mixtures are potentially dangerous and may result in fire or explosion causing property damage, personal injury or death.
Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved service equipment meeting SAE requirements to discharge R-134a system. If accidental system discharge occurs, ventilate work area before resuming service.

If the A/C system is not cooling properly, determine if the refrigerant system is fully charged with R-134a. This is accomplished by performing a system Charge Level-Check or Fill. If while performing this test A/C liquid line pressure is less than 345 kPa (50 psi) proceed to System Empty procedure. If liquid line pressure is greater than 345 kPa (50 psi) proceed to System Low procedure. If the refrigerant system is empty or low in refrigerant charge, a leak at any line fitting or component seal is likely. A review of the fittings, lines and components for oily residue is an indication of the leak location. To detect a leak in the refrigerant system, perform one of the following procedures as indicated by the symptoms.

SYSTEM EMPTY

1. Evacuate the refrigerant system to the lowest degree of vacuum possible (approximately 28 in Hg.). Determine if the system holds a vacuum for 15 minutes. If vacuum is held, a leak is probably not present. If system will not maintain vacuum level, proceed to Step 2.
2. Prepare a 0.284 Kg. (10 oz.) refrigerant charge to be injected into the refrigerant system.
3. Connect and dispense 0.284 Kg. (10 oz.) of refrigerant into the evacuated refrigerant system.
4. Proceed to Step 2 of System Low procedure.

SYSTEM LOW

1. Determine if there is any R-134a refrigerant in the system.
2. Position the vehicle in a wind free work area. This will aid in detecting small leaks.
3. Bring the refrigerant system up to operating temperature and pressure. This is done by allowing the engine to run for five minutes with the A/C system set to the following:
   - Transmission in Park or Neutral with parking brake set
   - Engine idling
   - Mode control set to the outside air position
   - Blower control set to the high speed position
   - A/C set to the ON position
   - All windows open

CAUTION: A leak detector only designed for R-12 refrigerant will not detect leaks in a R-134a refrigerant system.

4. Shut the vehicle Off and wait 2-7 minutes. Then use an electronic leak detector that is designed to detect R-134a refrigerant and search for leaks. Fittings, lines or components that appear to be oily usually indicate a refrigerant leak. To inspect the A/C evaporator for leaks, insert the leak detector probe into the drain tube opening or an air outlet. A dye for R-134a is available to aid in leak detection. Use only DaimlerChrysler approved refrigerant dye.

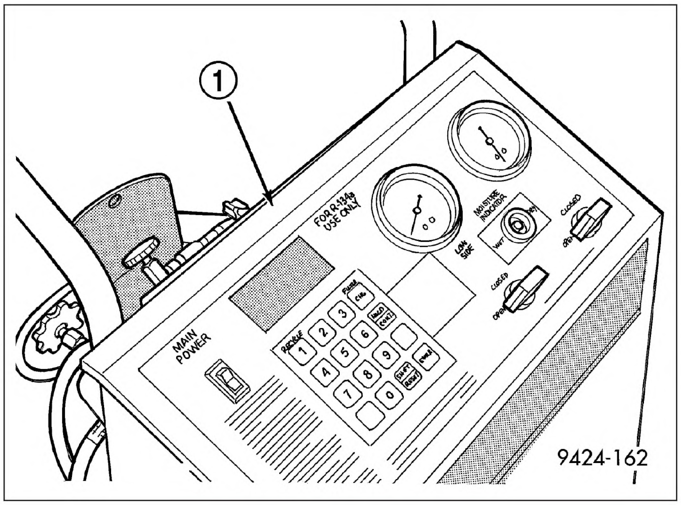
STANDARD PROCEDURE

REFRIGERANT SYSTEM SERVICE EQUIPMENT

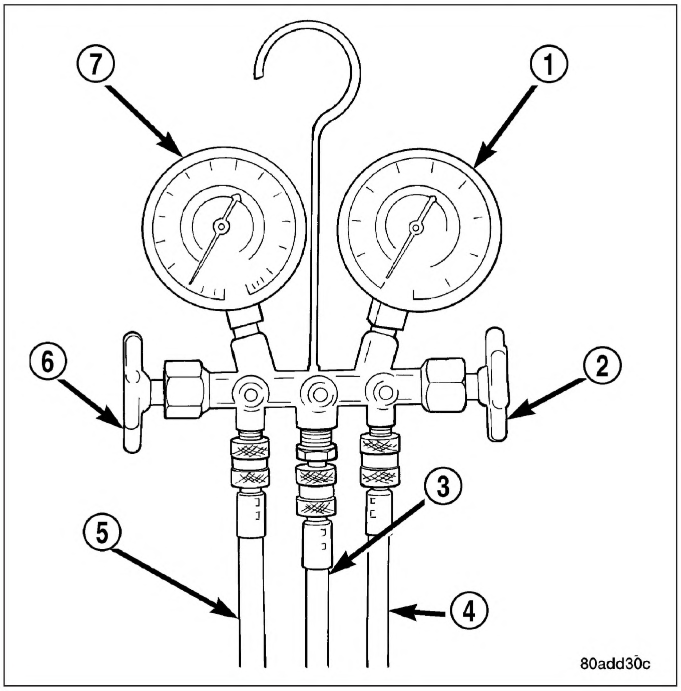
WARNING: Eye protection must be worn when servicing an A/C refrigerant system. Turn all valves off (rotate clockwise) on the equipment being used before connecting or disconnecting service equipment from the refrigerant system. Failure to observe these warnings may result in personal injury or death.

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

When servicing the A/C system, a R-134a refrigerant recovery/recycling/charging station that meets SAE standard J2210 must be used (1). Contact an automotive service equipment supplier for refrigerant recovery/recycling/charging equipment. Refer to the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.



A manifold gauge set (1) may be needed with some recovery/recycling/charging equipment. The manifold gauge set should have manual shut-off valves (2 and 6), or automatic back-flow valves located at the service port connector end of the manifold gauge set hoses (4 and 5). This will prevent refrigerant from being released into the atmosphere.



MANIFOLD GAUGE SET CONNECTIONS

CAUTION: Do not use an R-12 manifold gauge set on an R-134a system. The refrigerants are not compatible and system damage will result.

RECOVERY/RECYCLING/EVACUATION/CHARGING HOSE – The center manifold hose (Yellow, or White, with Black stripe) (3) is used to recover, evacuate, and charge the refrigerant system. When the low or high pressure valves on the manifold gauge set are opened, the refrigerant in the system will escape through this hose.

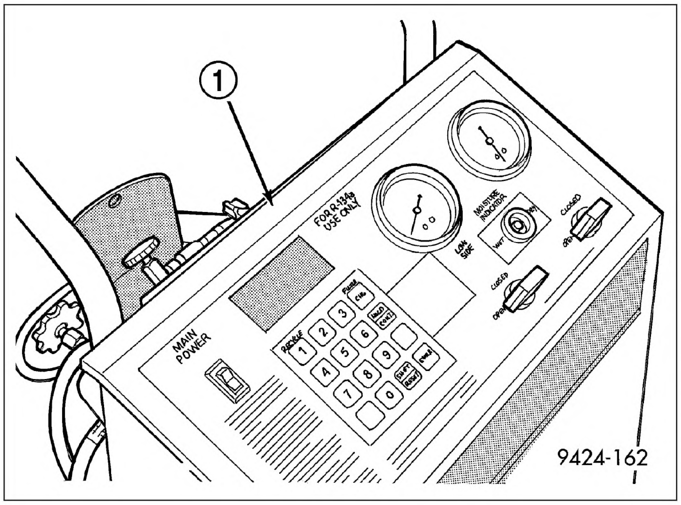
HIGH PRESSURE GAUGE HOSE – The high pressure hose (Red with Black stripe) (4) attaches to the high side service port. This service port is located on the top of the reciever/drier. This model is equipped with an A/C pressure transducer. A/C high-side pressures can be read using a scan tool. Refer to 9 - Engine Electrical Diagnostics for more information.

LOW PRESSURE GAUGE HOSE – The low pressure hose (Blue with Black stripe) (5) attaches to the low side service port. This service port is located on the A/C suction line near the A/C expansion valve.

REFRIGERANT SYSTEM RECOVERY

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

An R-134a refrigerant recovery/recycling/charging station (1) that meets SAE standard J2210 must be used to recover the refrigerant from the R-134a refrigerant system. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.



REFRIGERANT SYSTEM EVACUATE

NOTE: Special effort must be used to prevent moisture from entering the A/C system oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the compressor.

If an A/C compressor designed to use R-134a refrigerant is left open to the atmosphere for an extended period of time. It is recommended that the refrigerant oil be drained and replaced with new oil or a new A/C compressor be used. This will eliminate the possibility of contaminating the refrigerant system.

If the refrigerant system has been open to the atmosphere, it must be evacuated before the system can be filled. Moisture and air mixed with the refrigerant will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the A/C system and damage the A/C compressor. Moisture will boil at near room temperature when exposed to vacuum. To evacuate the refrigerant system:

NOTE: When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

1. Recover the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Connect a suitable charging station, refrigerant recovery machine or a manifold gauge set with vacuum pump and refrigerant recovery equipment (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM SERVICE EQUIPMENT).
3. Open the suction and discharge valves and start the vacuum pump. The vacuum pump should run a minimum of 45 minutes prior to charge to eliminate all moisture in system. When the suction gauge reads -88 kPa (- 26 in. Hg) vacuum or greater for 30 minutes, close all valves and turn off vacuum pump. If the system fails to reach specified vacuum, the refrigerant system likely has a leak that must be corrected. If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the suction and discharge valves. Then allow the system to evacuate an additional 10 minutes.
4. Close all valves. Turn off and disconnect the vacuum pump.
5. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

REFRIGERANT SYSTEM CHARGE

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: Always refer to the underhood HVAC Specification Label for the refrigerant fill specification of the vehicle being serviced.

After all refrigerant system leaks have been repaired and the refrigerant system has been evacuated, a refrigerant charge can be injected into the system. For the proper amount of the refrigerant charge, refer to the underhood HVAC Specification Label.

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to charge the refrigerant system with R-134a refrigerant. Refer to the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

CHARGING PROCEDURE

CAUTION: A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you MUST replenish any oil lost during the recovery process. Refer the equipment manufacturer instructions for more information.

1. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
2. A manifold gauge set and an R-134a refrigerant recovery/recycling/charging station that meets SAE standard J2210 should be connected to the refrigerant system.
3. Measure the proper amount of refrigerant and heat it to 52° C (125° F) with the charging station. See the operating instructions supplied by the equipment manufacturer for proper use of this equipment.
4. Open both the suction and discharge valves, then open the charge valve to allow the heated refrigerant to flow into the system.
5. When the transfer of refrigerant has stopped, close both the suction and discharge valves.
6. If all of the refrigerant charge did not transfer from the dispensing device, open all of the windows in the vehicle and set the heating-A/C system controls so that the A/C compressor is engaged and the blower motor is operating at its lowest speed setting. Run the engine at a steady high idle (about 1400 rpm). If the A/C compressor does not engage, test the compressor clutch control circuit and repair as required.
7. Open the low-side valve to allow the remaining refrigerant to transfer to the refrigerant system.

WARNING: Take care not to open the discharge (high pressure) valve at this time. Failure to follow this warning could result in possible personal injury or death.

8. Disconnect the charging station and manifold gauge set from the refrigerant system service ports.
9. Reinstall the caps onto the refrigerant system service ports.

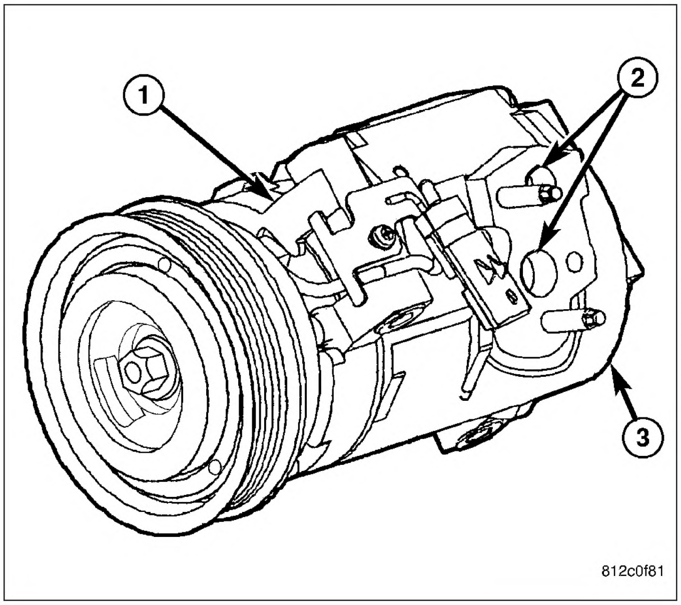
COMPRESSOR-A/C

DESCRIPTION

A/C COMPRESSOR

The A/C system uses a Denso 10S17C ten cylinder, double-acting swash plate-type A/C compressor (1). This A/C compressor has a fixed displacement of 170 cubic centimeters (10.374 cubic inches), and has both the suction and discharge ports (2) located on the cylinder head (3) at the rear of the compressor.

A label identifying the use of R-134a refrigerant is located on the A/C compressor.



HIGH PRESSURE RELIEF VALVE

A high pressure relief valve is located on the compressor cylinder head, which is at the rear of the A/C compressor. This mechanical valve is designed to vent refrigerant from the A/C system to protect against damage to the A/C compressor and other A/C system components, caused by condenser air flow restriction or an overcharge of refrigerant.

OPERATION

A/C COMPRESSOR

The A/C compressor is driven by the engine through an electric clutch, drive pulley and belt arrangement. The A/C compressor is lubricated by refrigerant oil that is circulated throughout the refrigerant system with the refrigerant.

The A/C compressor draws in low-pressure refrigerant vapor from the A/C evaporator through its suction port. It then compresses the refrigerant into a high-pressure, high-temperature refrigerant vapor, which is then pumped to the A/C condenser through the compressor discharge port.

The A/C compressor cannot be repaired and, if faulty or damaged, it must be replaced. The compressor clutch, pulley and bearing assembly, and clutch field coil are available for service.

HIGH PRESSURE RELIEF VALVE

The high pressure relief valve vents refrigerant from the A/C system when a discharge pressure of 3445 to 4135 kPa (500 to 600 psi) or above is reached. The high pressure relief valve closes with a minimum discharge pressure of 2756 kPa (400 psi) is reached.

The high pressure relief valve vents only enough refrigerant to reduce the A/C system pressure, and then re-seats itself. The majority of the refrigerant is conserved in the A/C system. If the high pressure relief valve vents refrigerant, it does not mean the valve is faulty.

The high pressure relief valve is factory-calibrated and cannot be adjusted or repaired, and must not be removed or otherwise disturbed. The valve is only serviced as a part of the A/C compressor.

DIAGNOSIS AND TESTING

A/C COMPRESSOR

When investigating an A/C system related noise, you must first know the conditions under which the noise occurs. These conditions include: weather, vehicle speed, transmission in gear or neutral, engine speed, engine temperature, and any other special conditions. Noises that develop during A/C operation can often be misleading. For example: What sounds like a failed front engine bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets or a loose compressor clutch assembly.

Drive belts are speed sensitive. At different engine speeds and depending upon drive belt tension, drive belts can develop noises that are mistaken for an A/C compressor noise. Improper drive belt tension can cause a misleading noise when the compressor clutch is engaged, which may not occur when the compressor clutch is disengaged. Check the accessory drive belt condition and tension as described in Cooling before beginning this procedure.

1. Select a quiet area for testing. Duplicate the complaint conditions as much as possible. Turn the A/C compressor On and Off several times to clearly identify the compressor noise. Listen to the A/C compressor while the clutch is engaged and disengaged. Probe the A/C compressor with an engine stethoscope or a long screwdriver with the handle held to your ear to better localize the source of the noise.
2. Loosen all of the compressor mounting hardware and retighten. Check the compressor clutch retainer. Be certain that the clutch field coil is mounted securely to the A/C compressor, and that the clutch plate and pulley are properly aligned and have the correct air gap (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/CLUTCH-A/C COMPRESSOR - INSTALLATION).
3. To duplicate high-ambient temperature conditions (high head pressure), restrict the air flow through the A/C condenser. Install a manifold gauge set or a scan tool to be certain that the discharge pressure does not exceed 2760 kPa (400 psi).
4. Check the refrigerant system plumbing for incorrect routing, rubbing or interference, which can cause unusual noises. Also check the refrigerant lines and hoses for kinks or sharp bends that will restrict refrigerant flow, which can cause noises (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DESCRIPTION - REFRIGERANT LINES)
5. If the noise is from opening and closing of the high pressure relief valve, recover, evacuate and recharge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY), (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).
6. If the high pressure relief valve still does not seat properly, replace the A/C compressor (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/COMPRESSOR-A/C - REMOVAL).

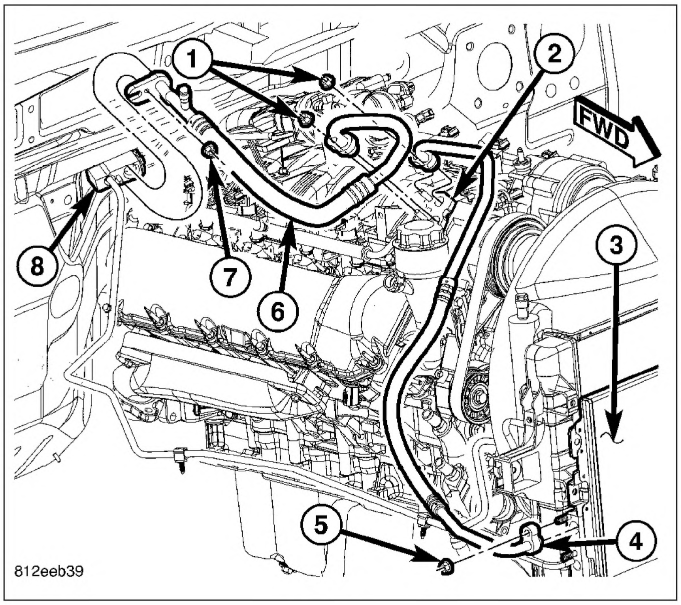
REMOVAL

3.7L/4.7L ENGINES

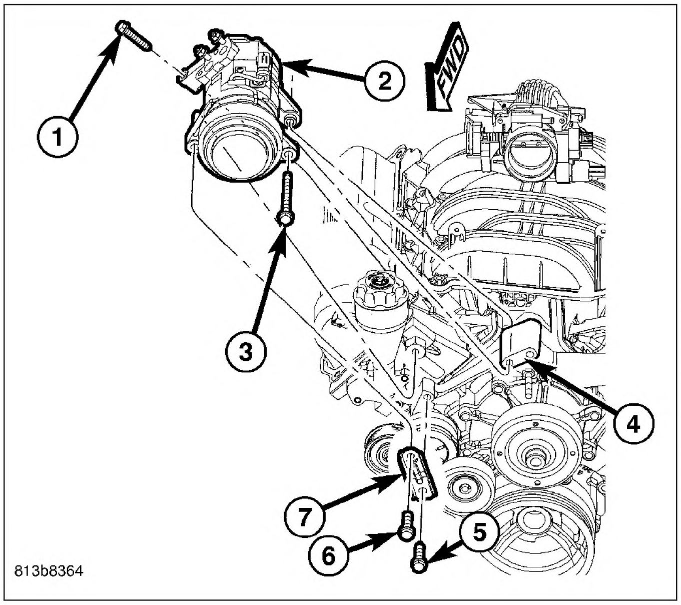
WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The A/C compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system. Discharging is not necessary if servicing the compressor clutch, clutch coil, engine, engine cylinder head or the generator.

1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the resonator from the air cleaner housing and the engine (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - REMOVAL).
4. Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/BELTS-DRIVE - REMOVAL).
5. Remove the nuts (1) that secure the A/C discarge line (4) and the A/C suction line (6) to the A/C compressor (2).
6. Disconnect the refrigerant lines from the A/C compressor and remove and discard the seals.
7. Install plugs in, or tape over all of the opened refrigerant line fittings and the compressor ports.



8. Disconnect the wire harness connector from the A/C compressor.
9. Loosen the bolt (5) that secures the bracket (7) to the accessory mounting bracket (4).
10. Remove the bolts (1, 6 and 3) that secure the A/C compressor (2) to the accessory mounting bracket.
11. Remove the A/C compressor from the engine compartment.

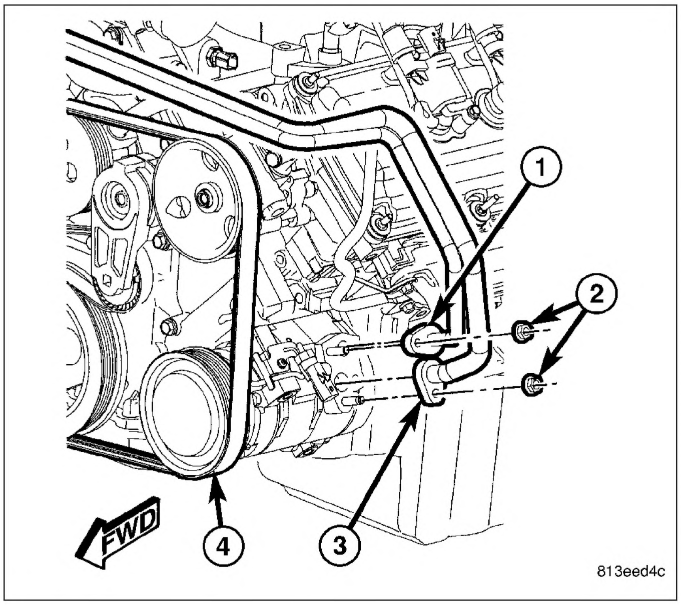


5.7L ENGINE

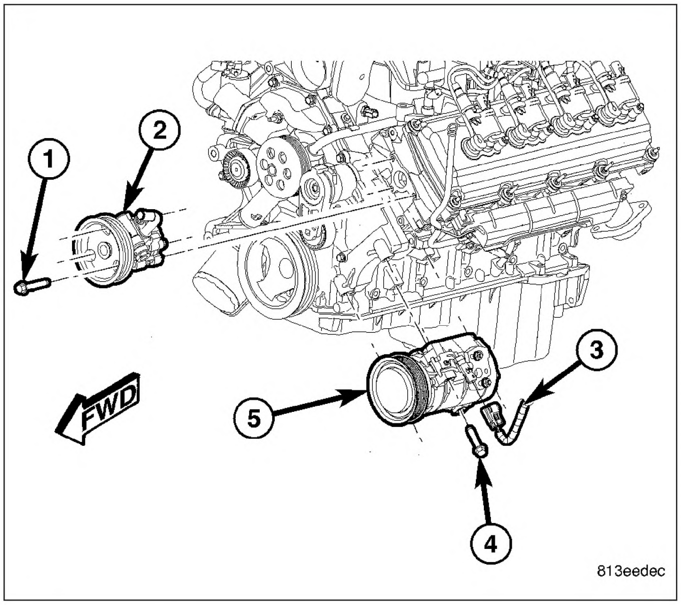
WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The A/C compressor may be removed and repositioned without disconnecting the refrigerant lines or discharging the refrigerant system. Discharging is not necessary if servicing the compressor clutch, clutch coil, engine, engine cylinder head or the generator.

1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the resonator from the air cleaner housing and engine (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - REMOVAL).
4. Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/BELTS-DRIVE - REMOVAL).
5. Remove the nuts (2) that secure the A/C discharge line (1) and A/C suction line (3) to the A/C compressor (4).
6. Disconnect the refrigerant lines from the A/C compressor and remove and discard the seals.
7. Install plugs in, or tape over all of the opened refrigerant line fittings and the compressor ports.



8. Remove the three bolts (1) that secure the power steering pump (2) to the engine and position the pump out of the way (Refer to 19 - STEERING/ PUMP - REMOVAL).
9. Disconnect the wire harness connector (3) from the A/C compressor (5).
10. Support the A/C compressor and remove the bolts (4) that secure the compressor to the engine.
11. Remove the A/C compressor from the engine compartment.

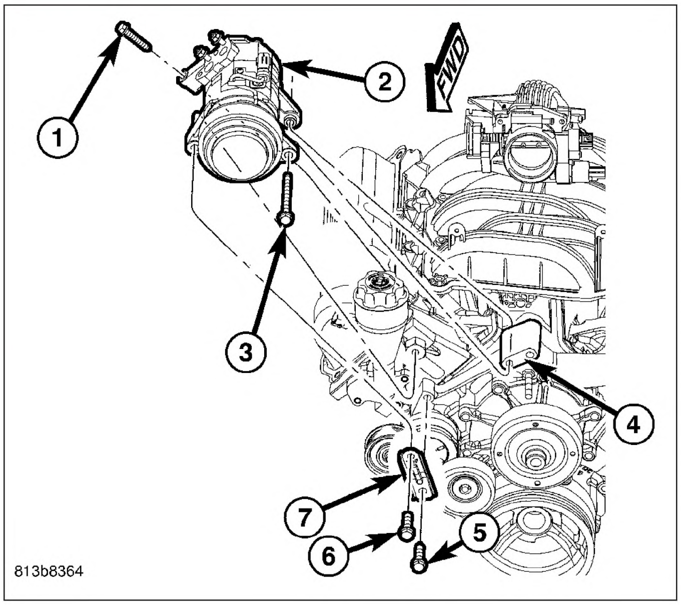


INSTALLATION

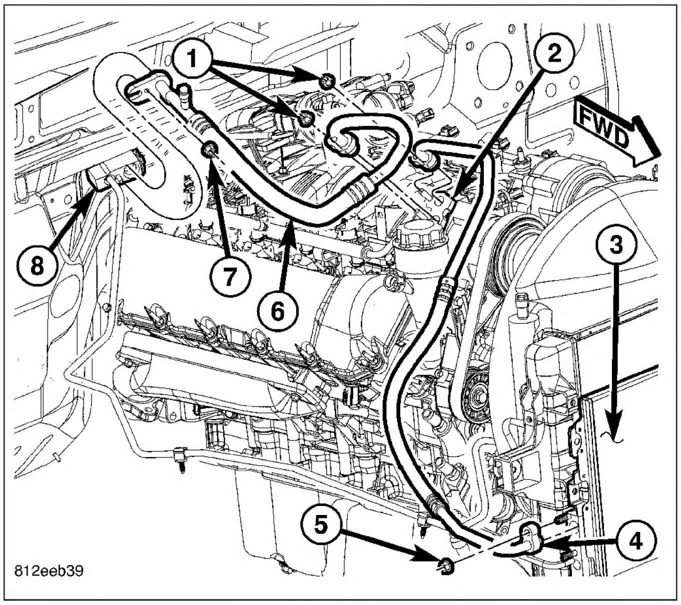
3.7L/4.7L ENGINES

NOTE: If a replacement A/C compressor is being installed, be certain to check the refrigerant oil level. See Refrigerant Oil Level in this group for the procedures. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

1. Position the A/C compressor (2) onto the accessory mounting bracket (4).
2. Install and tighten the bolts in the following sequence:
   - Install bolt (3) and hand tighten.
   - Install bolt (6) and hand tighten.
   - Install bolt (1) and hand tighten.
   - Tighten bolt (3) to 40 N·m (30 ft. lbs.).
   - Tighten bolt (6) to 55 N·m (41 ft. lbs.).
   - Tighten bolt (1) to 55 N·m (41 ft. lbs.).
   - Tighten bolt (5) to 55 N·m (41 ft. lbs.).
3. Connect the wire harness connector to the A/C compressor clutch coil connector.



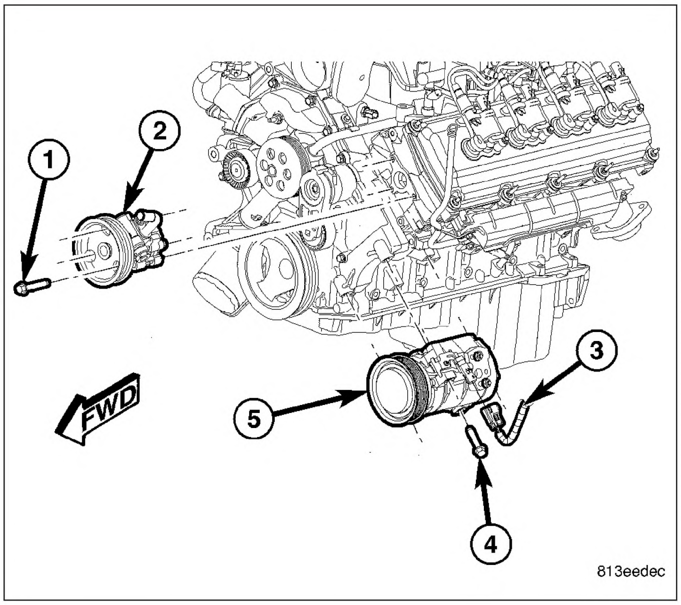
4. Remove the tape or plugs from the opened refrigerant line fittings and the compressor ports.
5. Lubricate new seals with clean refrigerant oil and install them onto the refrigerant line fittings. Use only the specified seals as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
6. Install the A/C suction line (6) and the A/C discharge line (4) onto the A/C compressor (2).
7. Install the nuts (1) that secure the refrigerant lines to the A/C compressor. Tighten the nuts to 20 N·m (15 ft. lbs.).
8. Install the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/BELTS-DRIVE - INSTALLATION).
9. Install the resonator onto the engine and air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).
10. Reconnect the negative battery cable.
11. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
12. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).



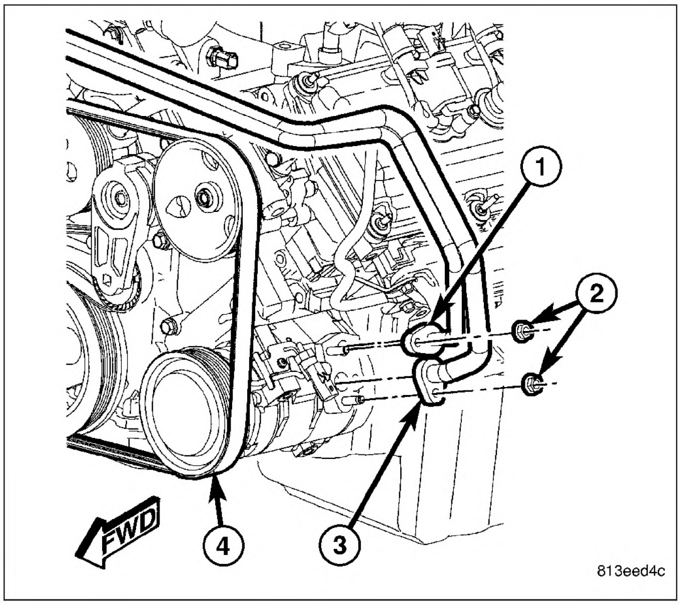
5.7L ENGINE

NOTE: Be certain to check the refrigerant oil level if the A/C compressor is being replaced. See Refrigerant Oil Level in this group for the procedures. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

1. Position the A/C compressor (5) into the engine compartment.
2. Install the bolts (4) that secure the A/C compressor to the engine. Tighten the bolts to 55 N·m (41 ft. lbs.).
3. Connect the wire harness connector (3) to the A/C compressor.
4. Position the power steering pump (2) onto the engine.
5. Install the three bolts (1) that secure the power steering pump to the engine. Tighten the bolts securely.



6. Remove the tape or plugs from the opened refrigerant line fittings and the compressor ports.
7. Lubricate new seals with clean refrigerant oil and install them onto the refrigerant line fittings. Use only the specified seals as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
8. Install the A/C suction line (3) and the A/C discharge line (1) onto the A/C compressor (4).
9. Install the nuts (2) that secure the refrigerant lines to the A/C compressor. Tighten the nuts to 20 N·m (15 ft. lbs.).
10. Install the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/BELTS-DRIVE - INSTALLATION).
11. Install the resonator onto the engine and the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).
12. Reconnect the negative battery cable.
13. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
14. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

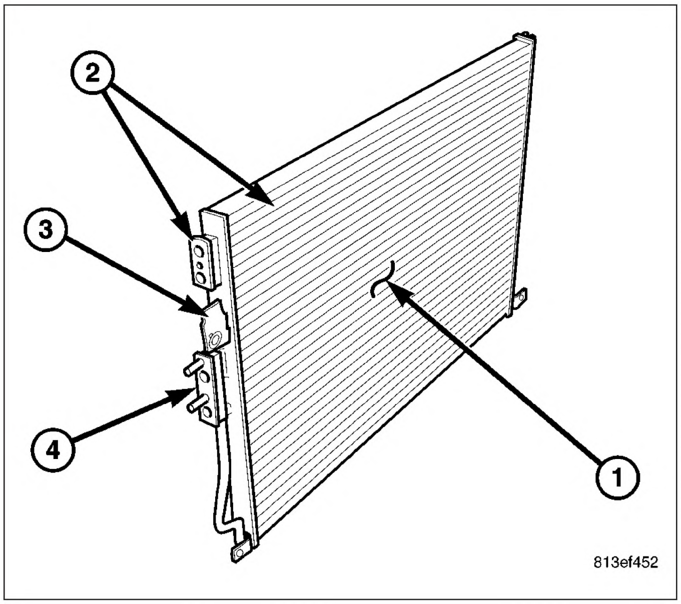


CONDENSER-A/C

DESCRIPTION

The A/C condenser (1) is located in the front of the engine compartment behind the grille. The A/C condenser is a heat exchanger that allows the high-pressure refrigerant gas being discharged by the A/C compressor to give up its heat to the air passing over the condenser fins, which causes the refrigerant to cool and change to a liquid state.

The A/C condenser is equipped with an integral automatic transmission cooler and tapping block (2), mounting provisions for the power steering cooler (3) and a tapping block for the A/C discharge line and the receiver/drier (4).



OPERATION

When air passes through the fins of the A/C condenser, the high-pressure refrigerant gas within the A/C condenser gives up its heat. The refrigerant then condenses as it leaves the A/C condenser and becomes a high-pressure liquid. The volume of air flowing over the condenser fins is critical to the proper cooling performance of the A/C system. Therefore, it is important that there are no objects placed in front of the radiator grille openings at the front of the vehicle or foreign material on the condenser fins that might obstruct proper air flow. Also, any factory-installed air seals or shrouds must be properly reinstalled following radiator or A/C condenser service.

The A/C condenser cannot be repaired and, if faulty or damaged, it must be replaced.

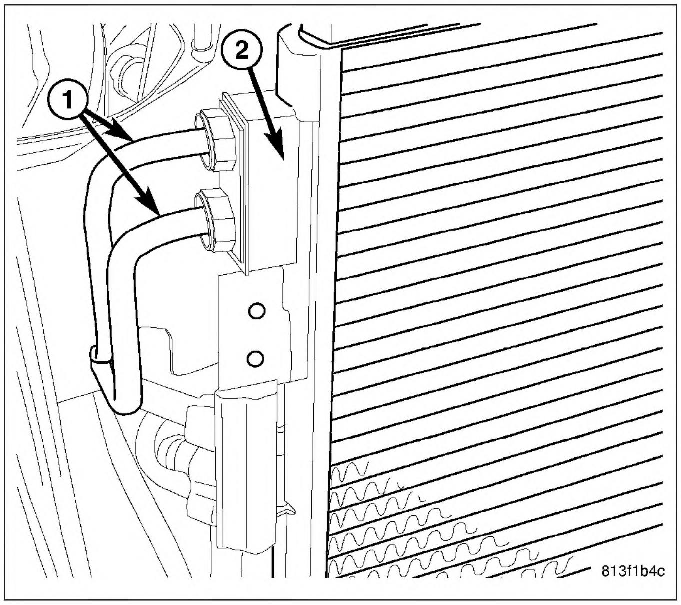
REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the grille (Refer to 23 - BODY/EXTERIOR/ GRILLE - REMOVAL).
4. Remove the air filter housing and air inlet tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/ HOUSING-AIR CLEANER - REMOVAL).

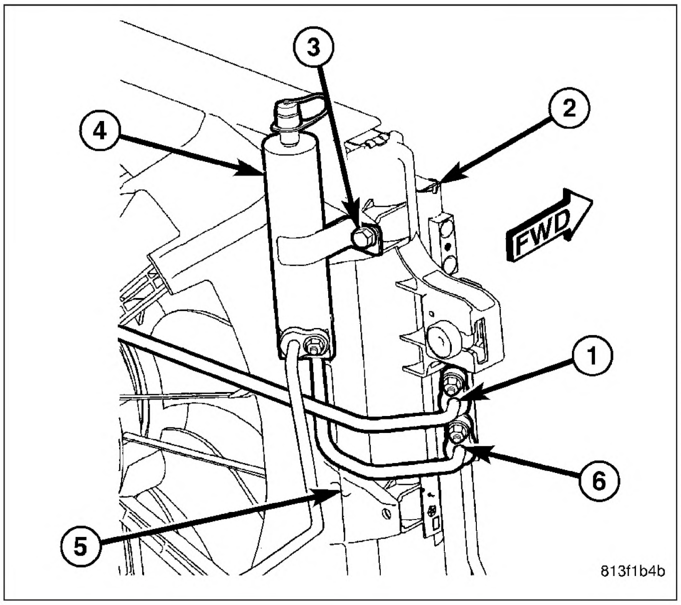
NOTE: It is not necessary to remove the hood latch from the radiator crossmember when servicing the A/C condenser.

5. Remove the upper radiator crossmember and support bracket and position them out of the way (Refer to 23 - BODY/EXTERIOR/CROSSMEMBER-RADIATOR - REMOVAL).

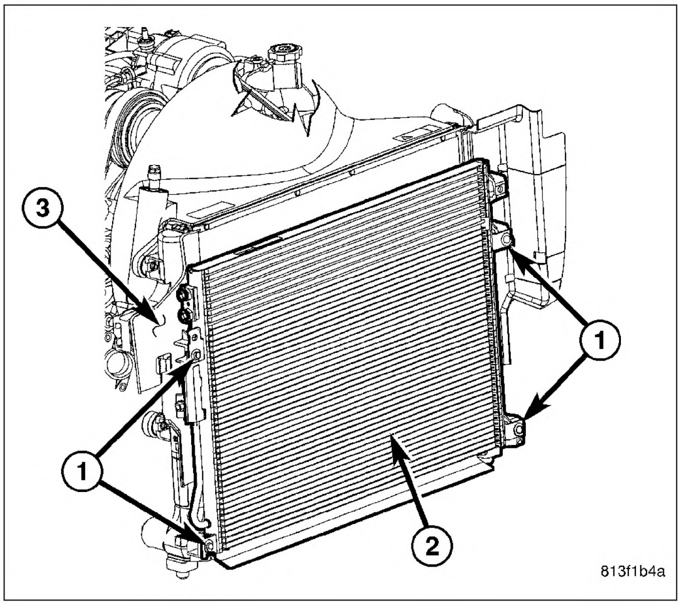


6. Remove the power steering fluid cooler or position it out of the way (depending on application) (Refer to 19 - STEERING/PUMP/COOLER-FLUID - REMOVAL).
7. Disconnect the automatic transmission cooler lines (1) from the transmission fluid cooler (2) (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE - TRANSMISSION COOLER LINE QUICK CONNECT FITTING).
8. Install plugs in, or tape over the automatic transmission cooler line fittings and the fluid cooler ports.

9. Disconnect the A/C discharge line (1) from the A/C condenser (2) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LINE-A/C DISCHARGE - REMOVAL).
10. Loosen the screw (3) that secures the receiver/ drier (4) to the radiator and fan shroud (5).
11. Disconnect the receiver drier inlet tube (6) from the A/C condenser (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/RECEIVER/DRIER - REMOVAL).



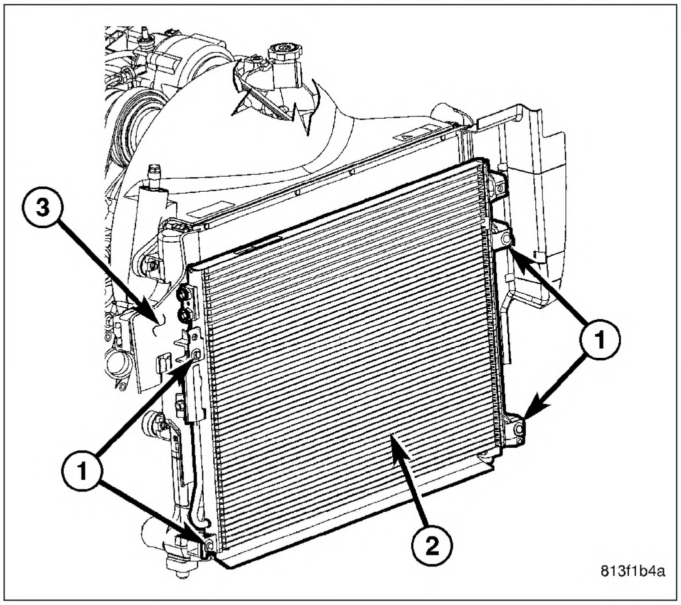
12. Remove the four bolts (1) that secure A/C condenser (2) to the radiator (3).
13. Carefully lift the A/C condenser straight up and out of the engine compartment.



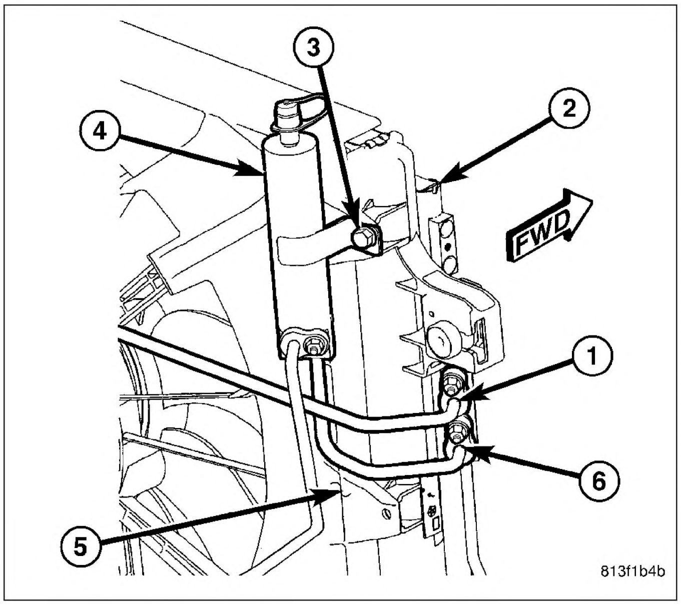
INSTALLATION

NOTE: If the A/C condenser is being replaced, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

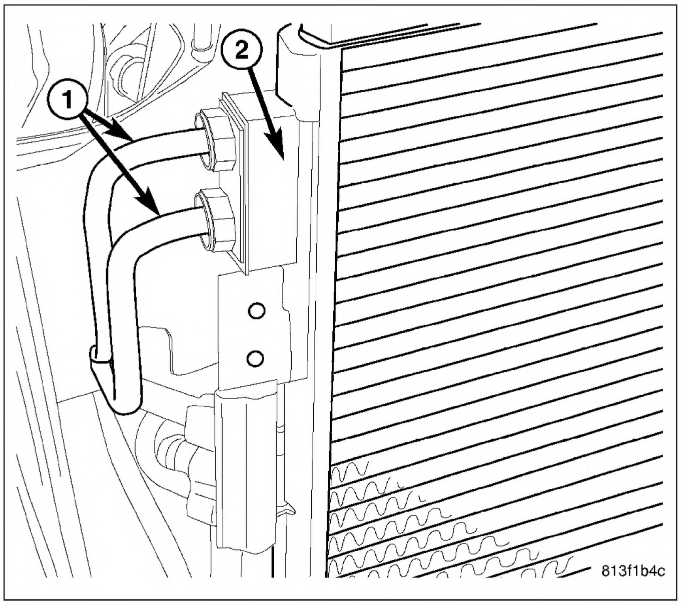
1. Carefully position the A/C condenser (2) onto the radiator (3).
2. Install the four bolts (1) that secure the A/C condenser to the radiator. Tighten the bolts to 5 N·m (45 in. lbs.).



3. Connect the receiver/drier inlet tube (6) to the A/C condenser (2) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/RECEIVER / DRIER - INSTALLATION).
4. Tighten the screw (3) that secures the receiver/drier (4) to the radiator and fan shroud (5). Tighten the screw to to 5 N·m (44 in. lbs.).
5. Connect the A/C discharge line (1) to the A/C condenser (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LINE-A/C DISCHARGE - INSTALLATION) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LINE-A/C LIQUID - INSTALLATION).



6. Remove the tape or plugs from the automatic transmission cooler line fittings and the fluid cooler ports.
7. Connect the automatic transmission cooler lines (1) to the transmission fluid cooler (2) (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE - TRANSMISSION COOLER LINE QUICK CONNECT FITTING).
8. Install the power steering fluid cooler (Refer to 19 - STEERING/PUMP/COOLER-FLUID - INSTALLATION).
9. Install the upper radiator crossmember and support bracket (Refer to 23 - BODY/EXTERIOR/CROSSMEMBER-RADIATOR - INSTALLATION).
10. Install the air filter housing and air inlet tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).
11. Install the grille (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).



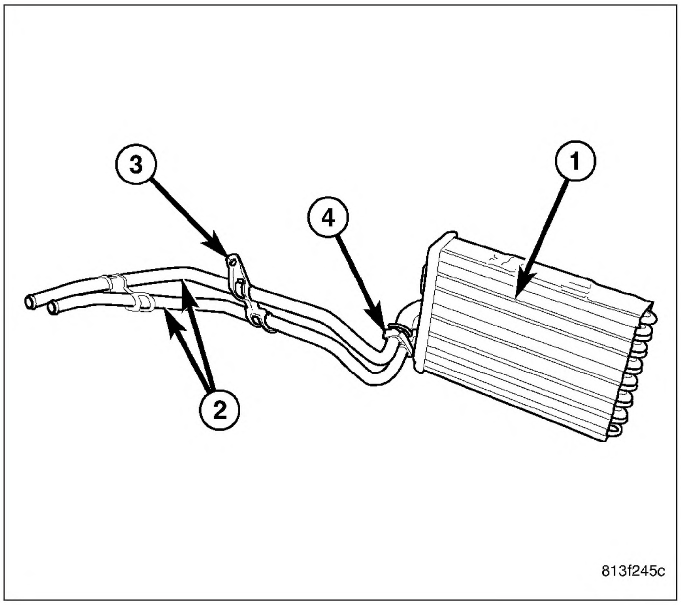
12. Reconnect the negative battery cable.
13. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
14. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).
15. Check the automatic transmission fluid level (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC/FLUID AND FILTER - STANDARD PROCEDURE - CHECK OIL LEVEL). Fill as required (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC /FLUID AND FILTER - STANDARD PROCEDURE - TRANSMISSION FILL).

CORE-HEATER

DESCRIPTION

The heater core (1) is mounted into the HVAC air distribution housing, located behind the instrument panel. The heater core is a heat exchanger made of rows of tubes and fins. The heater core tubes (2) are attached to the HVAC housing by a bracket and screw (3) and to the heater core by a flange and bolt (4).

The heater core can be serviced without removing the air distribution housing from the vehicle.



OPERATION

Engine coolant is circulated through the heater hoses to the heater core at all times. As the coolant flows through the heater core, heat is removed from the engine and is transferred to the heater core tubes and fins. Air directed through the heater core picks up the heat from the heater core fins. The blend-air door(s) allows control of the heater output air temperature by regulating the amount of air flowing through the heater core. The blower motor speed controls the volume of air flowing through the HVAC housing.

The heater core cannot be repaired and, if faulty or damaged, it must be replaced.

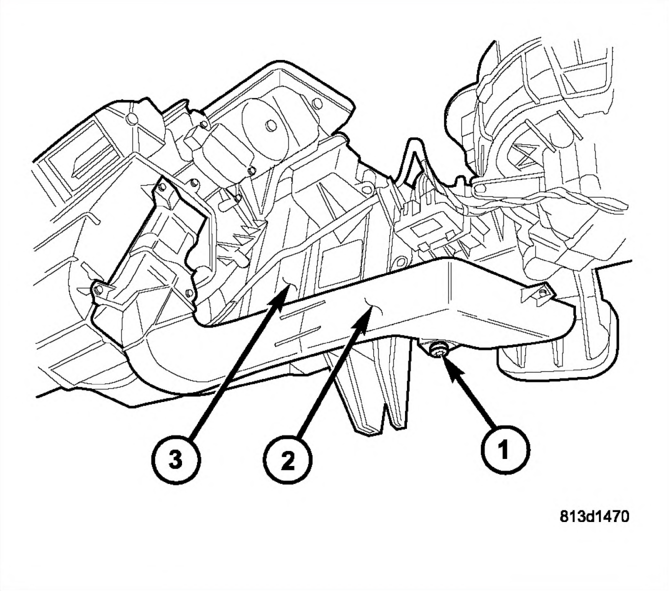
REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: Take the proper precautions to protect the front face of the instrument panel from cosmetic damage while performing this procedure.

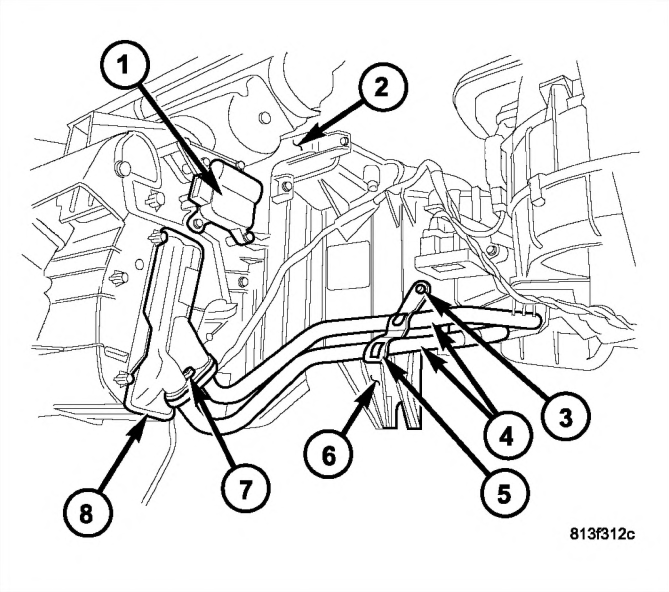
1. Drain the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM DRAIN).
2. Disconnect and isolate the negative battery cable.
3. If required, disconnect the heater hoses from the heater core tubes in the engine compartment.
4. Remove the instrument panel (Refer to 23 - BODY/ INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
5. Remove the five screws (1) that secure the heater core and tube cover (2) to the HVAC housing (3).
6. Remove the heater core and tube cover from the HVAC housing.



7. If equipped with dual zone heating-A/C, remove the blend door actuator (1) from the passenger side of the HVAC air distribution housing (2) (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ACTUATOR-BLEND DOOR - REMOVAL).
8. Remove the screw (3) that secure the heater core tubes (4) and retaining bracket (5) to the HVAC housing (6).

NOTE: Take proper precautions to protect the carpeting from engine coolant. Have absorbent toweling readily available to clean up any spills.

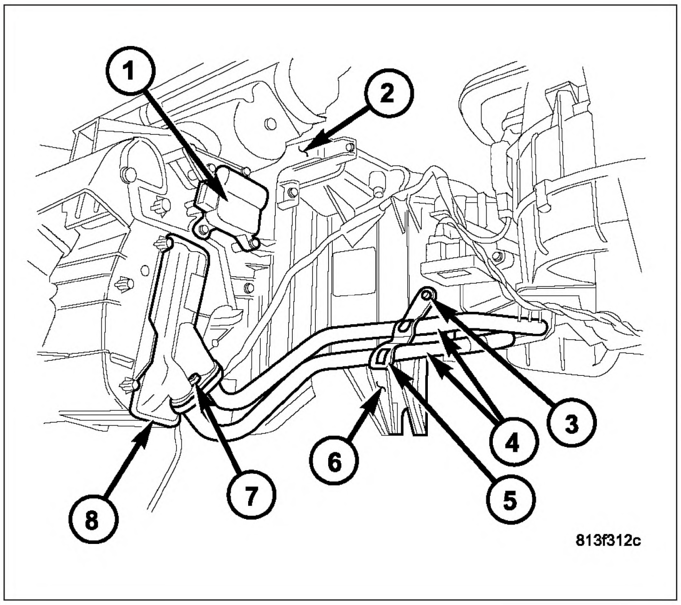
9. Remove the bolt (7) that secures the heater tubes to the heater core (8).
10. Disconnect the heater core tubes from the heater core and remove and discard the O-ring seals.
11. Install plugs in, or tape over the opened heater core ports.



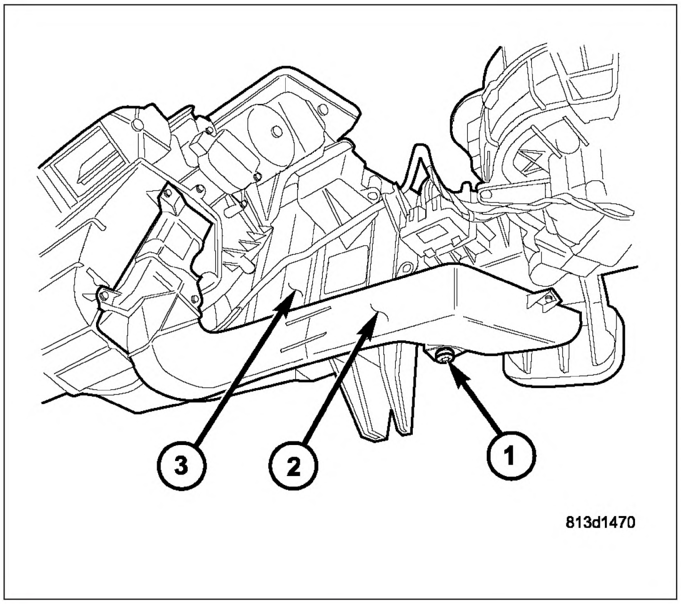
12. Carefully pull the heater core out of the HVAC air distribution housing.
13. If required, remove the heater core tubes from the vehicle.

INSTALLATION

1. Carefully install the heater core (8) into the passenger side of the HVAC air distribution housing (2).
2. Remove the tape or plugs from the heater core ports.
3. If removed, position the heater core tubes (4) into the vehicle.
4. Lubricate new rubber O-ring seals with clean engine coolant and install them onto the heater core tubes. Use only the specified O-ring as they are made of a special material for the engine cooling system.
5. Connect the heater core tubes to the heater core.
6. Install the bolt (7) that secures the heater core tubes to the heater core. Tighten the bolt securely.
7. Install the screw (3) that secures the heater core tube retaining bracket (5) to the HVAC housing (6). Tighten the screw to 2.2 N·m (20 in. lbs.).
8. If equipped with dual zone heating-A/C, install the blend door actuator (1) onto the passenger side of the HVAC air distribution housing (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ACTUATOR-BLEND DOOR - INSTALLATION).



9. Install the heater core and tube cover (2) onto the HVAC housing (3).
10. Install the five screws (1) that secure the heater core and tube cover to the HVAC housing. Tighten the screws to 2.2 N·m (20 in. lbs.).
11. Install the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).
12. If disconnected, connect the heater hoses to the heater core tubes in the engine compartment.
13. Connect the negative battery cable.
14. If the heater core is being replaced, flush the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM CLEANING/REVERSE FLUSHING).
15. Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM REFILL).



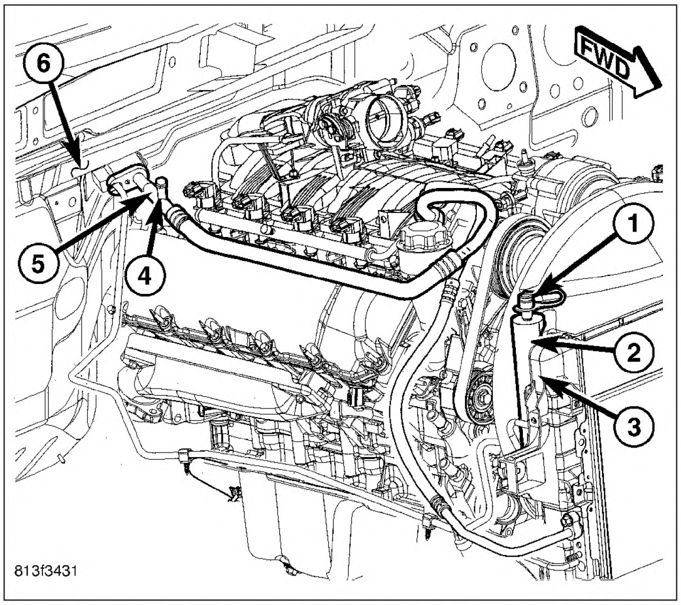
CORE-VALVE-SERVICE PORT

DESCRIPTION

Refrigerant system service ports are used to recover, recycle, evacuate , charge and test the A/C refrigerant system. Unique sizes are used on the two service ports for the R-134a refrigerant system to ensure the system is not accidentally contaminated with R-12 refrigerant or by service equipment used for R-12 refrigerant.

NOTE: 4.7L engine shown in illustration. Service ports for other engines are located in similar locations.

The high side service port (1) is located on the receiver/drier (2) near the right side of the radiator (3) and its protective cap is attached to the service port with a tether strap. The low side service port (4) is located on the A/C suction line (5) near the dash panel (6). Both the high side and low side A/C service port valve cores are serviceable.



NOTE: The protective cap aids in service port sealing and helps protects the refrigerant system from contamination. Remember to always reinstall the protective cap onto the service port when refrigerant system service is complete.

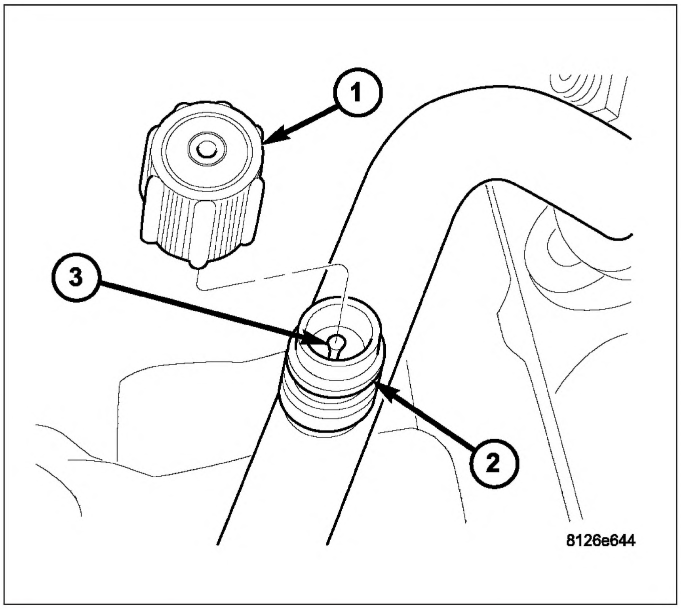
Each of the service ports has a threaded plastic protective cap installed over it from the factory. The service port caps are serviceable items.

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

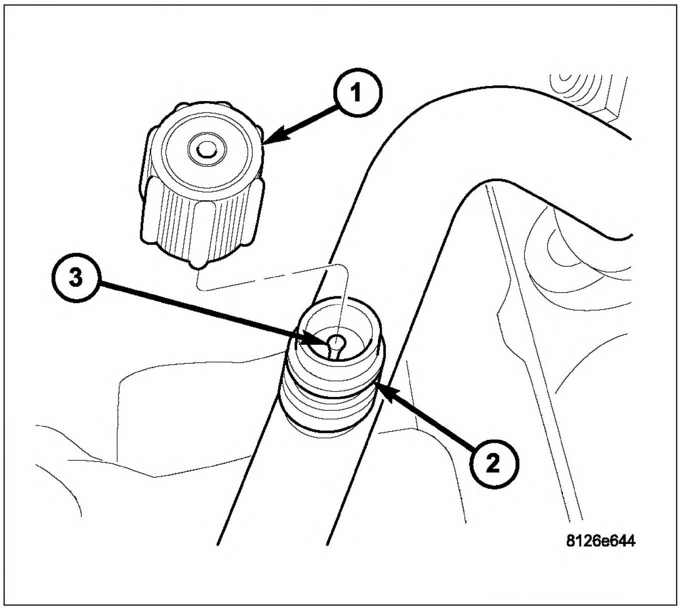
NOTE: Typical A/C service port shown.

1. Remove the protective cap (1) from the service port (2).
2. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
3. Using a Schrader-type valve core tool, remove the valve core (3) from the service port.
4. Install a plug in or tape over the opened service port(s).



INSTALLATION

NOTE: Typical A/C service port shown.



1. Lubricate the valve core (3) with clean refrigerant oil prior to installation. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
2. Remove the tape or plug from the service port (2).

CAUTION: A valve core that is not fully seated in the A/C service port can result in damage to the valve during refrigerant system evacuation and charge. Such damage may result in a loss of system refrigerant while uncoupling the charge adapters.

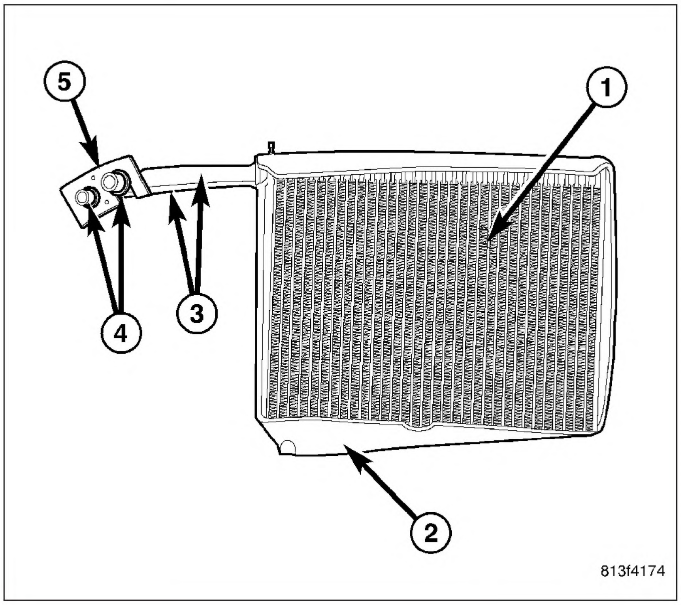
3. Using a Schrader-type valve core tool, install and tighten the valve core into the service port(s).
4. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
5. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

NOTE: The protective cap helps aid in service port sealing and helps protects the refrigerant system from contamination. Remember to always reinstall the protective cap onto the service port when refrigerant system service is complete.

6. Install the protective cap (1) onto the service port.

EVAPORATOR-A/C

DESCRIPTION



The A/C evaporator (1) for the heating-A/C system is located within the HVAC housing, behind the instrument panel. The A/C evaporator and it’s insulator (2) are positioned in the HVAC housing so that all air entering the housing must pass over the evaporator fins before it is distributed through the heating-A/C system ducts and outlets. However, air passing over the evaporator fins will only be conditioned when the A/C compressor is engaged and circulating refrigerant through the A/C evaporator.

The A/C evaporator tubes (3) are connected and sealed to the A/C expansion valve by use of rubber O-rings (4) and a tapping block (5).

The A/C evaporator can only be serviced by removing and disassembling the HVAC housing assembly.

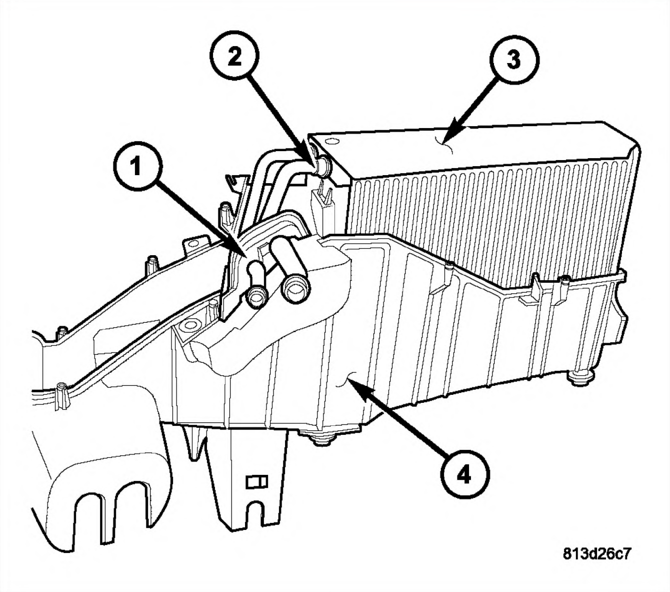
OPERATION

Refrigerant enters the A/C evaporator from the A/C expansion valve as a low-temperature, low-pressure mixture of liquid and gas. As air flows over the fins of the A/C evaporator, the humidity in the air condenses on the fins, and the heat from the air is absorbed by the refrigerant. Heat absorption causes the refrigerant to boil and vaporize. The refrigerant becomes a low-pressure gas when it leaves the A/C evaporator.

The A/C evaporator cannot be repaired and, if faulty or damaged, it must be replaced.

REMOVAL

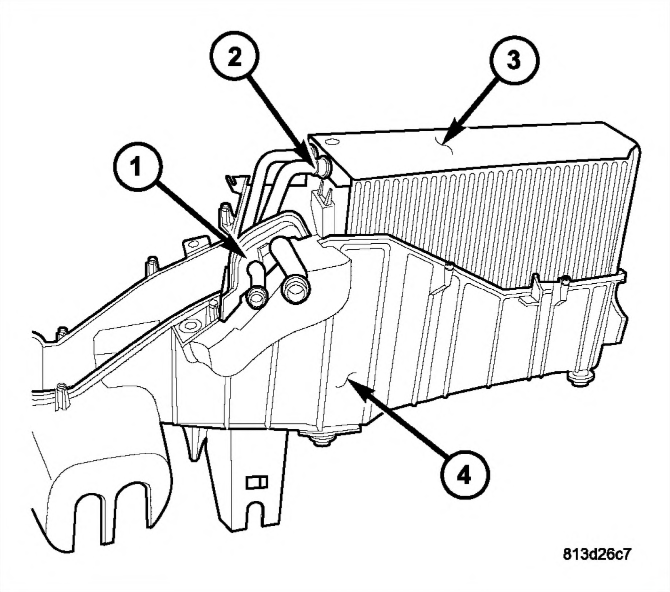
1. Remove the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - REMOVAL).
2. Disassemble the HVAC housing as necessary to access the A/C evaporator (1) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - DISASSEMBLY).
3. Open the rubber seal (1) and carefully lift the A/C evaporator (2) and insulator (3) out of the lower half of the HVAC housing (4).
4. If required, remove the rubber seal from the lower half of the HVAC housing. If the seal is deformed or damaged, it must be replaced.
5. If required, remove the insulator from the A/C evaporator. If the insulator is deformed or damaged, it must be replaced.



INSTALLATION

NOTE: If the front A/C evaporator is being replaced, add 60 milliliters (2 fluid ounces) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

1. If removed, install the insulator (3) over the A/C evaporator (2). If the seal is deformed or damaged, it must be replaced.
2. If removed, install the rubber seal (1) into the lower half of the HVAC housing (4). If the seal is deformed or damaged, it must be replaced.
3. Install the A/C evaporator into the lower half of the HVAC housing. Make sure that the evaporator drain within the HVAC housing is clean and unrestricted and that the insulator and rubber seal are properly installed.
4. Assemble the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - ASSEMBLY).
5. Install the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HOUSING-HVAC - INSTALLATION).

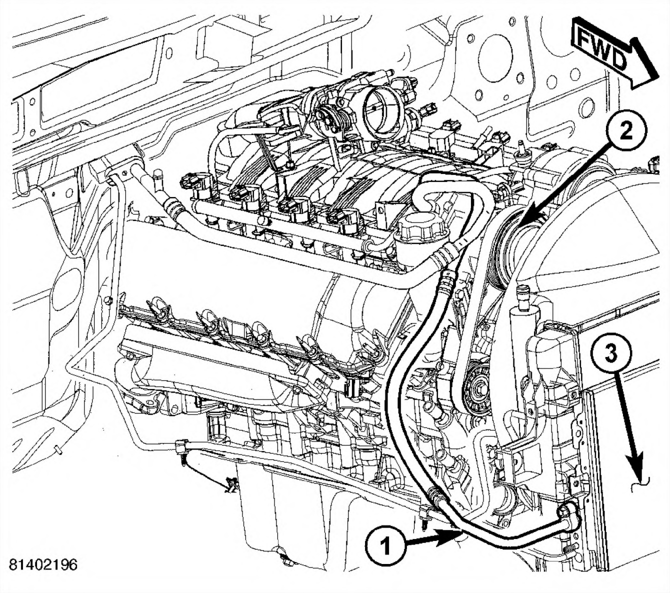


LINE-A/C DISCHARGE

DESCRIPTION

NOTE: 4.7L engine shown in illustration. A/C discharge line for other engines are similar.

The A/C discharge line (1) is the refrigerant line that carries refrigerant from the A/C compressor (2) to the A/C condenser (3). The A/C discharge line on models equipped with the 5.7L engine include a fitting for the A/C pressure transducer. For more information refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/TRANSDUCER-A/C PRESSURE - DESCRIPTION.



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CAUTION: Use only seals specified for the vehicle. Failure to use the correct seals will cause the refrigerant system connections to leak.

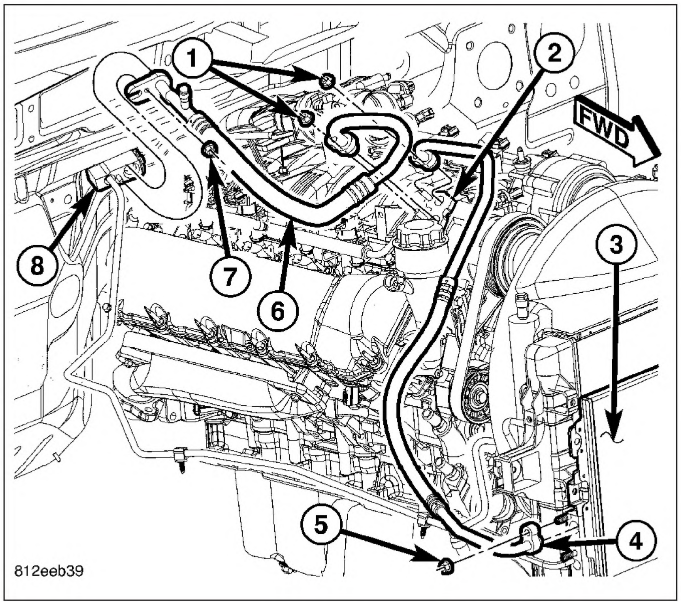
The A/C discharge line has no serviceable parts except for the dual plane seals. The seals used on the connections are made from a special type of rubber not affected by R-134a refrigerant. The seals must be replaced whenever the A/C discharge line is removed and installed.

If the A/C discharge line is found to be leaking or is damaged, it must be replaced.

REMOVAL

3.7L/4.7L ENGINES

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.



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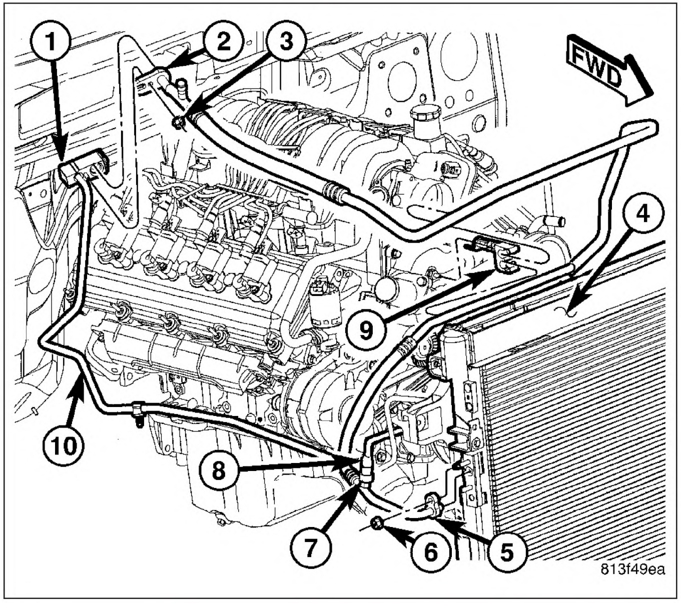
1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the grille (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).
4. Remove the air cleaner housing, air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - REMOVAL).
5. Remove the nut (1) that secures the A/C discharge line (4) to the A/C compressor (2).
6. Disconnect the A/C discharge line from the A/C compressor and remove and discard the dual plane seal.
7. Remove the nut (5) that secures the A/C discharge line to the A/C condenser (3).

8. Disconnect the A/C discharge line from the A/C condenser and remove and discard the dual plane seal.
9. Install plugs in, or tape over the opened discharge line fittings and the compressor and condenser ports.
10. Remove the A/C discharge line from the engine compartment.

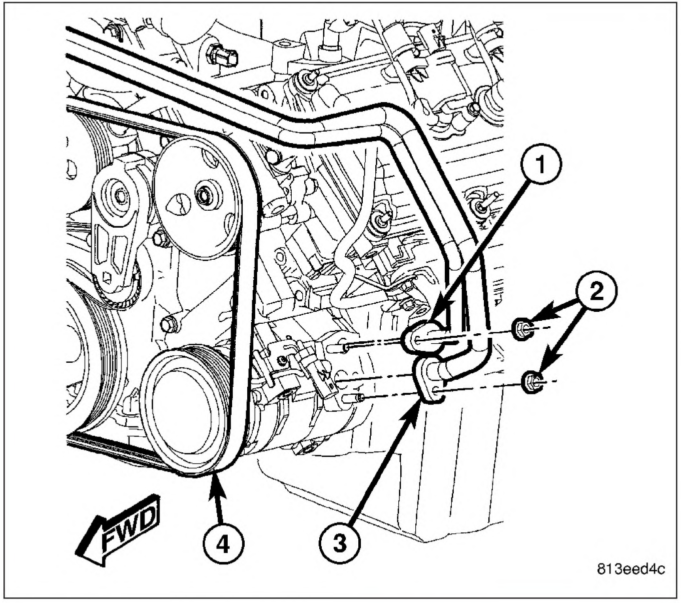
5.7L ENGINE

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the grille (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).
4. Remove the air cleaner housing, air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - REMOVAL).
5. Disconnect the wire harness connector (8) from the A/C pressure transducer (7) and remove the transducer from the A/C discharge line (5), if required.
6. Remove the nut (6) that secures the A/C discharge line to the A/C condenser (4).
7. Disconnect the A/C discharge line from the A/C condenser and the retaining bracket (9) and remove and discard the dual plane seal.

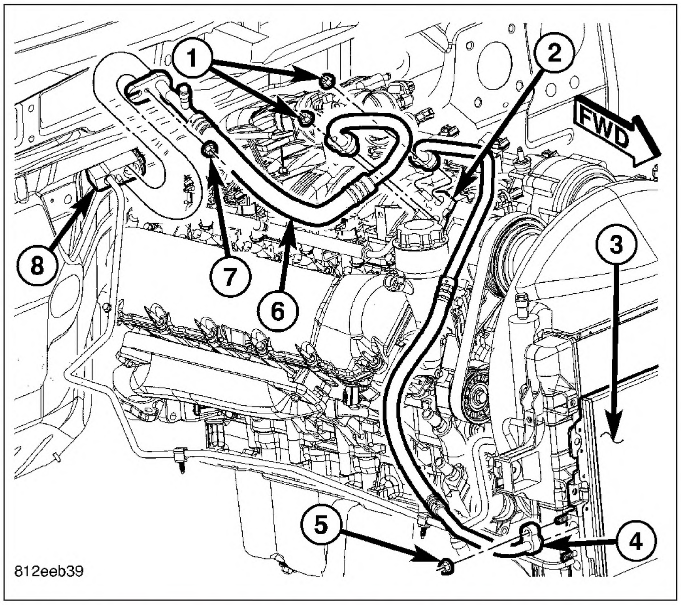


8. Remove the nut (2) that secures the A/C discharge line (1) to the A/C compressor (4).
9. Disconnect the A/C discharge line from the A/C compressor and remove and discard the dual plane seal.
10. Install plugs in, or tape over the opened refrigerant line fittings and the compressor and condenser ports.
11. Remove the A/C discharge line from the engine compartment.



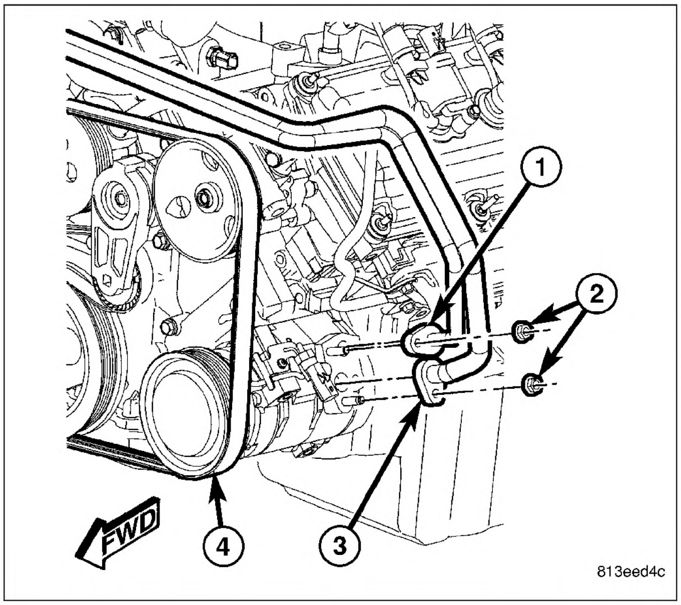
INSTALLATION

3.7L/4.7L ENGINES



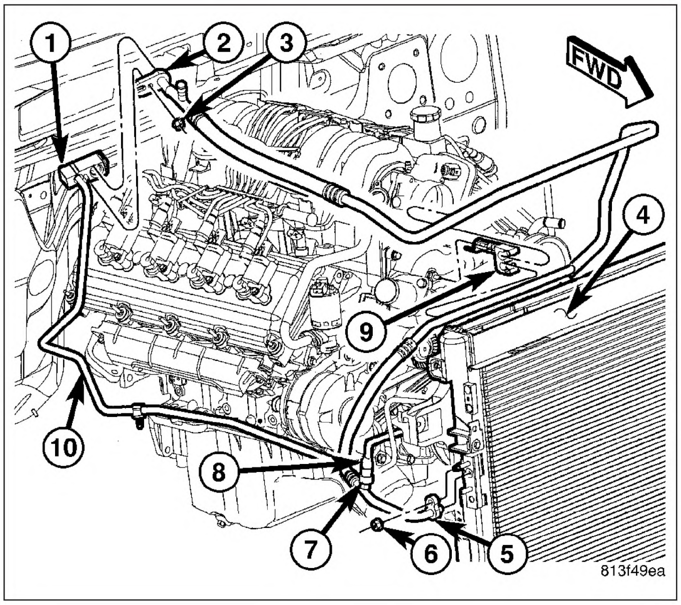
1. Position the A/C discharge line (4) into the engine compartment.
2. Remove the tape or plugs from the discharge line fittings and the A/C compressor (2) and A/C condenser (3).
3. Lubricate new dual plane seals with clean refrigerant oil and install them onto the A/C discharge line. Use only the specified seals as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
4. Install the A/C discharge line onto the A/C compressor.
5. Install the nut (1) that secures the A/C discharge line to the A/C compressor. Tighten the nut to 20 N·m (15 ft. lbs.).
6. Install the A/C discharge line onto the A/C condenser.
7. Install the nut (5) that secures the A/C discharge line to the A/C condenser. Tighten the nut to 20 N·m (15 ft. lbs.).
8. Install the air cleaner housing, air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).
9. Install the grille (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
10. Reconnect the negative battery cable.
11. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
12. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

5.7L ENGINE



1. Position the A/C discharge line (1) into the engine compartment.
2. Remove the tape or plugs from the opened discharge line fittings and the compressor and condenser ports.
3. Lubricate new dual plane seals with clean refrigerant oil and install them onto the discharge line fittings. Use only the specified seals as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
4. Install the A/C discharge line onto the A/C compressor (4).
5. Install the nut (2) that secures the A/C discharge line to the A/C compressor. Tighten the nut to 20

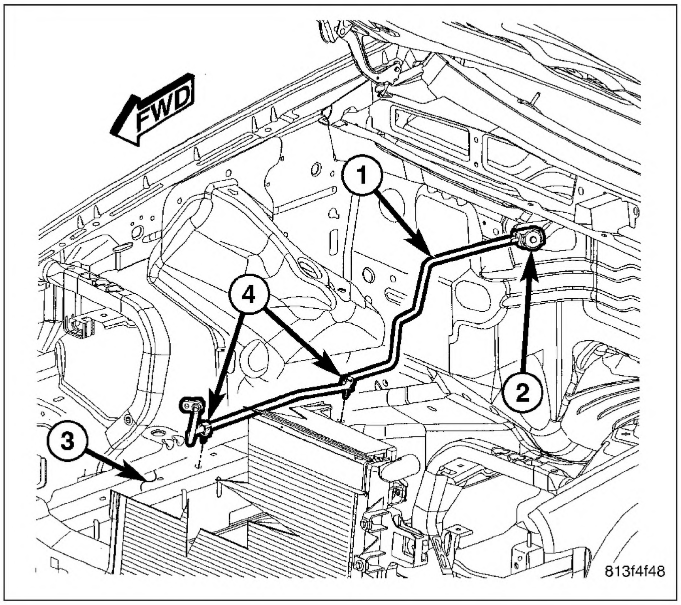
N·m (15 ft. lbs.).



6. Install the A/C discharge line (5) into the retaining bracket (9) and to the A/C condenser (4).
7. Install the nut (6) that secures the A/C discharge line to the A/C condenser. Tighten the nut to 20 N·m (15 ft. lbs.).
8. If removed, install the A/C pressure transducer (7) onto the A/C discharge line. Tighten the A/C pressure transducer securely.
9. Connect the wire harness connector (8) to the A/C pressure transducer.
10. Install the air cleaner housing, air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).
11. Install the grille (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
12. Reconnect the negative battery cable.
13. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
14. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

LINE-A/C LIQUID

DESCRIPTION



The A/C liquid line (1) is the refrigerant line that carries refrigerant from the reciever/drier to the A/C expansion valve (2). The A/C liquid is serviced in one section and is secured to the right side frame (3) rail by two plastic retainer clips (4).

CAUTION: Use only seals specified for the vehicle. Failure to use the correct seals will cause the refrigerant system connections to leak.

The A/C liquid line has no serviceable parts except for the O-ring and dual plane seal. The seals used on the connections are made from a special type of rubber not affected by R-134a refrigerant. The seals must be replaced whenever the A/C liquid line is removed and installed.

If the A/C liquid line is found to be leaking or damaged, it must be replaced.

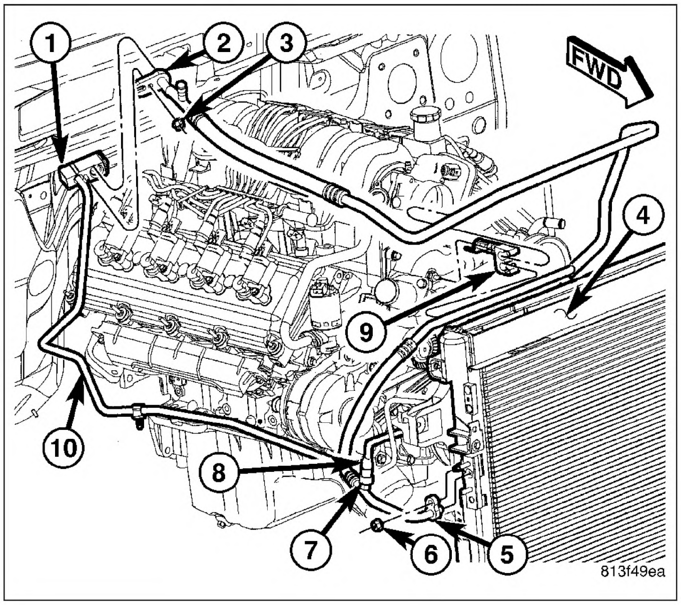
REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

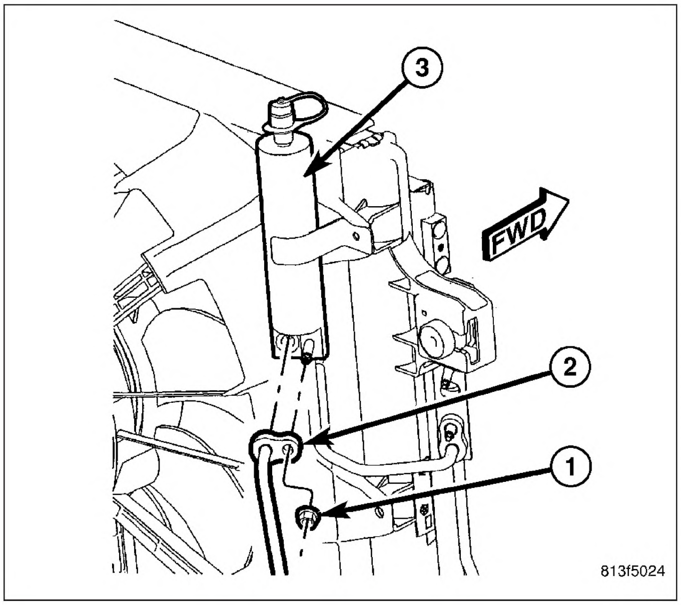
1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the air cleaner housing, air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - REMOVAL).

NOTE: 4.7L engine shown in illustration. Vehicles equipped with other engines are similar.

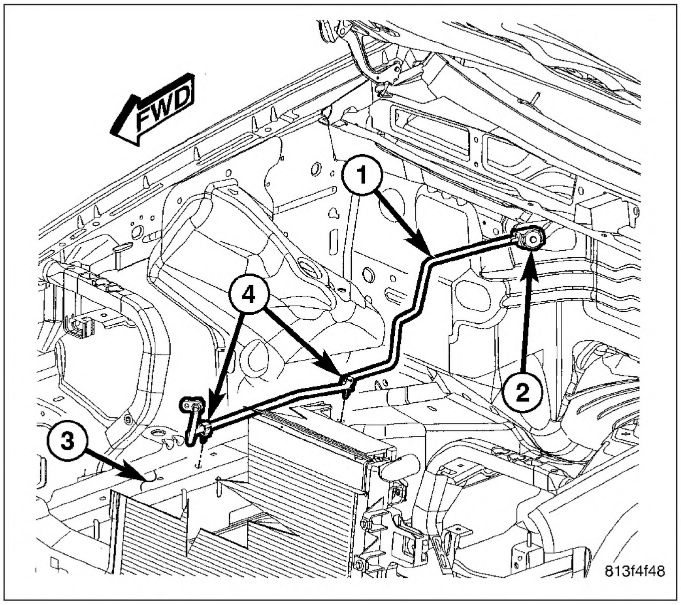
4. Remove the nut (3) that secures the A/C suction line (2) and the A/C liquid line (10) to the A/C expansion valve (1).
5. Disconnect the A/C suction line from the A/C expansion valve and remove and discard the O-ring seal.



6. Remove the nut (1) that secures the A/C liquid line (2) to the receiver/drier (3).
7. Disconnect the A/C liquid line from the receiver/ drier and remove and discard the dual plane seal.

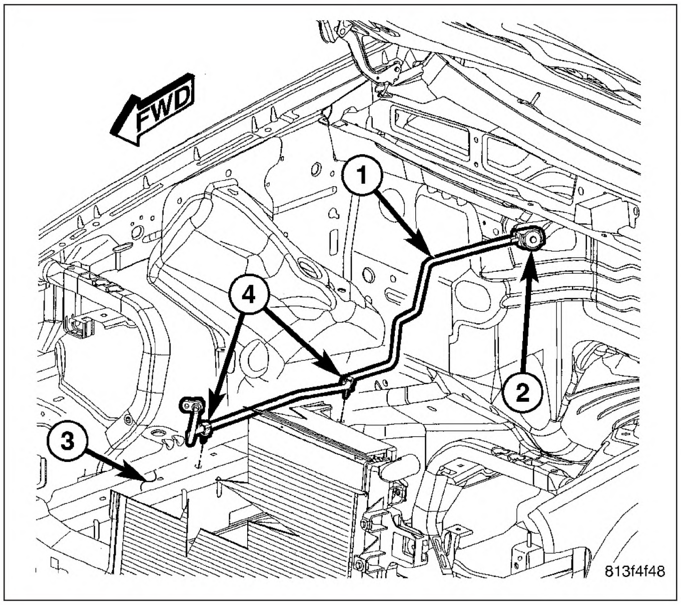


8. Disengage the two liquid line retainer clips (4) from the right frame rail (3). If required remove the clips from the liquid line
9. Disconnect the A/C liquid line (1) from the A/C expansion valve (2) and remove and discard the O-ring seal.
10. Install plugs in, or tape over the opened liquid and suction line fittings and the receiver/drier and expansion valve ports.
11. Remove the A/C liquid line from the engine compartment.

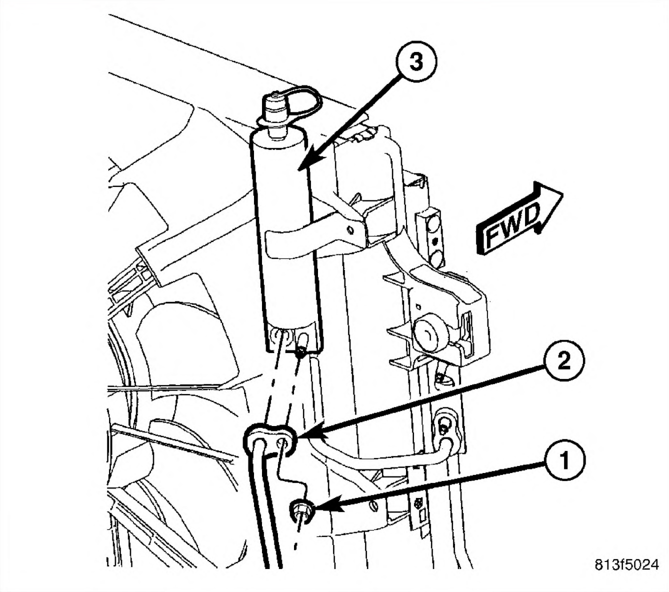


INSTALLATION

1. Position the A/C liquid line (1) into the engine compartment.
2. Remove the tape or plugs from the opened liquid and suction line fittings and the receiver/drier and expansion valve ports.
3. Lubricate a new O-ring seal with clean refrigerant oil and install it onto the rear liquid line fitting. Use only the specified seal as it is made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
4. Connect the A/C liquid line to the A/C expansion valve (2) and engage the two liquid line retainer clips (4) to the frame rail (3).



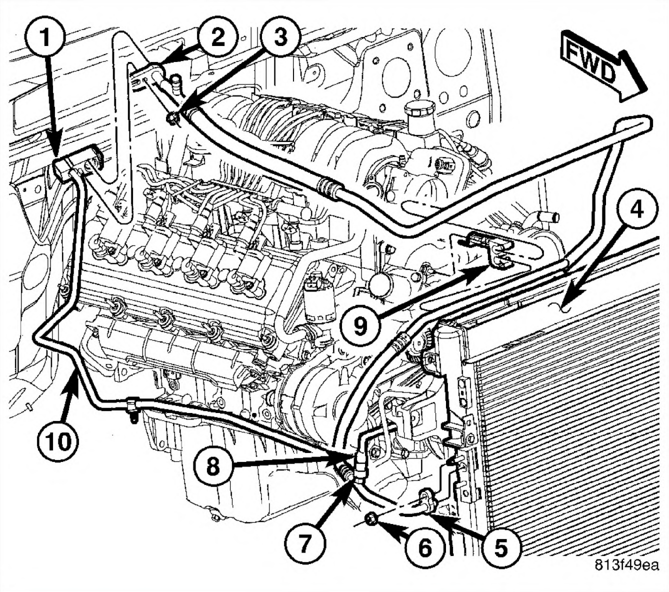
5. Lubricate a new dual plane seal with clean refrigerant oil and install it onto the front liquid line fitting. Use only the specified seal as it is made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
6. Connect the A/C liquid line (2) to the receiver/drier (3).
7. Install the nut (1) that secures the A/C liquid line to the receiver/drier. Tighten the nut to 20 N·m (15 ft. lbs.).



8. Lubricate a new O-ring seal with clean refrigerant oil and install it onto the rear suction line fitting. Use only the specified seal as it is made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

NOTE: 4.7L engine shown in illustration. Vehicles equipped with other engines are similar.

9. Connect the A/C suction line (2) to the A/C expansion valve (1).
10. Install the nut (3) that secures the A/C suction line and the A/C liquid line (10) to the A/C expansion valve. Tighten the nut to 23 N·m (17 ft. lbs.).
11. Install the air cleaner housing, air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).

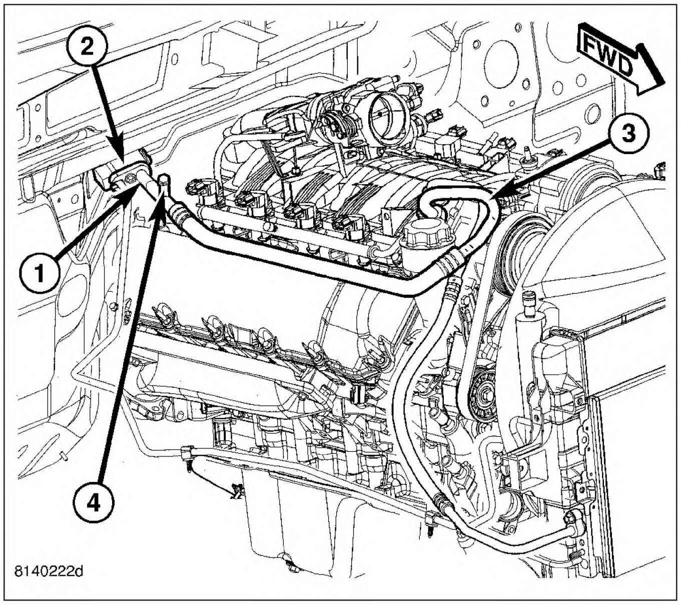


12. Reconnect the negative battery cable.
13. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
14. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

LINE-A/C SUCTION

DESCRIPTION

NOTE: 4.7L engine shown in illustration. A/C discharge line for other engines are similar.



The A/C suction line (1) is the refrigerant line that carries refrigerant from the evaporator and A/C expansion valve (2) to the A/C compressor (3). The A/C suction line includes the low side service port (4).

CAUTION: Use only seals specified for the vehicle. Failure to use the correct seals will cause the refrigerant system connections to leak.

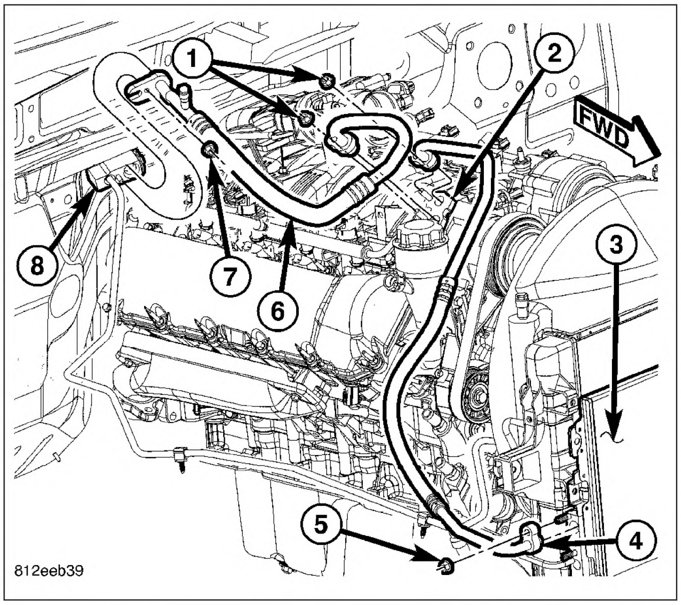
The A/C suction line has no serviceable parts except for the O-ring and dual plane seal, low-side service port valve and protective cap. The seals used on the connections are made from a special type of rubber not affected by R-134a refrigerant. The seals must be replaced whenever the A/C suction line is removed and installed.

If the A/C suction line is found to be leaking or damaged, it must be replaced.

REMOVAL

3.7L/4.7L ENGINES

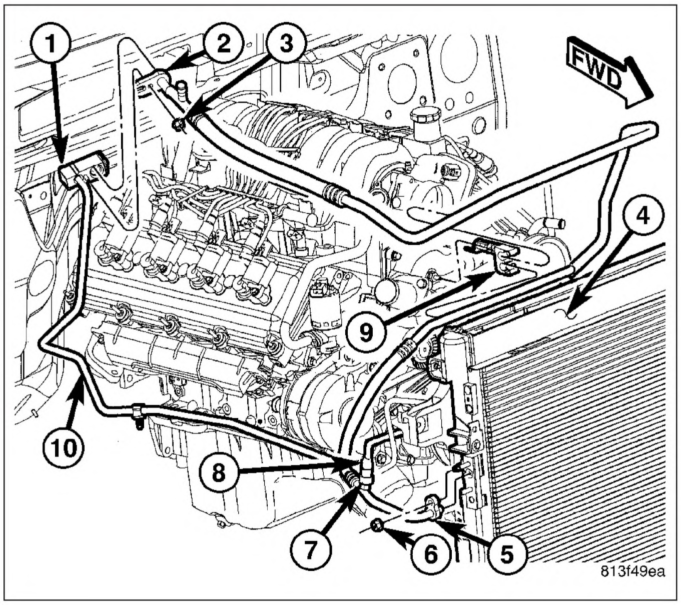
WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.



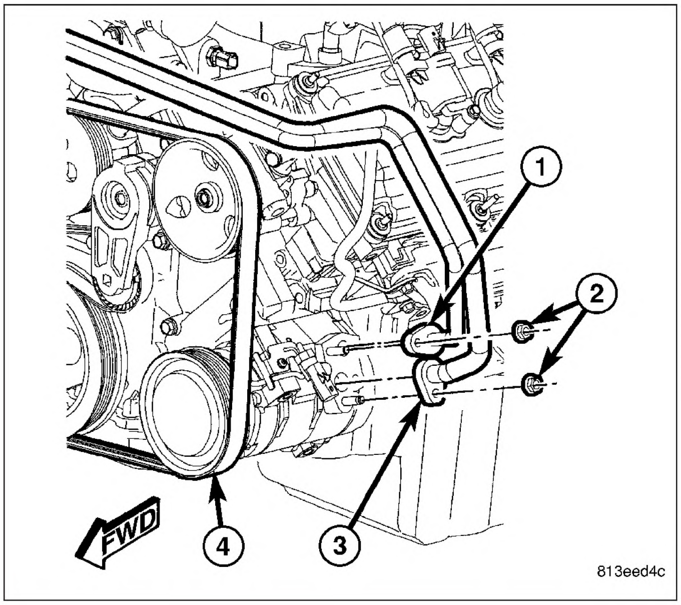
1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - REMOVAL).
4. Remove the nut (1) that secures the A/C suction line (6) to the A/C compressor (2).
5. Disconnect the A/C suction line from the A/C compressor and remove and discard the dual plane seal.
6. Remove the nut (7) that secures the A/C suction line to the A/C expansion valve (8).
7. Disconnect the A/C suction line from the A/C expansion valve and remove and discard the O-ring seal.
8. Install plugs in, or tape over the opened suction line fittings and the compressor and expansion valve ports.
9. Remove the A/C suction line from the engine compartment.

5.7L ENGINE

1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/ HOUSING-AIR CLEANER - REMOVAL).
4. Remove the nut (3) that secures the A/C suction line (2) to the A/C expansion valve (1).
5. Disconnect the A/C suction line from the A/C expansion valve and the retaining bracket (9) and remove and discard the O-ring seal.

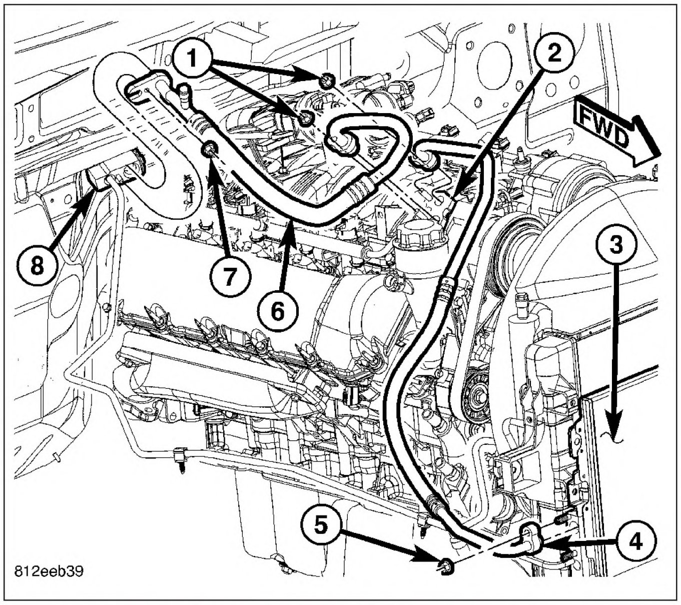


6. Remove the nut (2) that secures the A/C suction line (3) to the A/C compressor (4).
7. Disconnect the A/C suction line from the A/C compressor and remove and discard the dual plane seal.
8. Install plugs in, or tape over the opened suction line fittings and the compressor and expansion valve ports.
9. Remove the A/C suction line from the engine compartment.



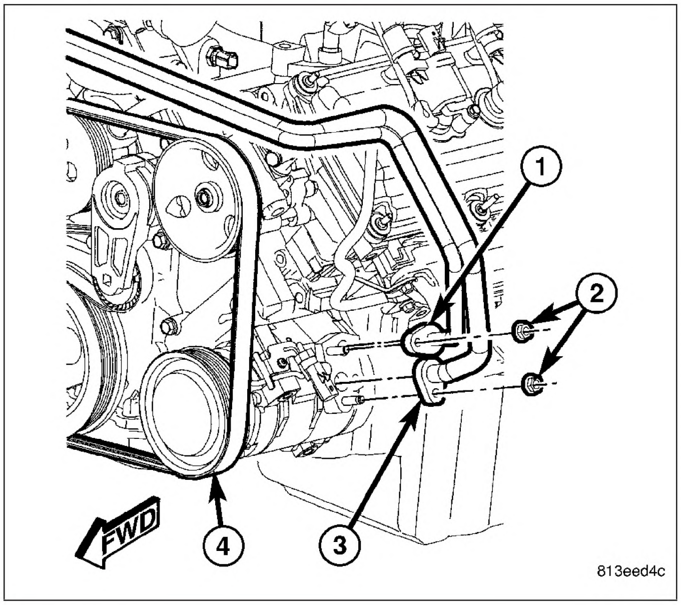
INSTALLATION

3.7L/4.7L ENGINES



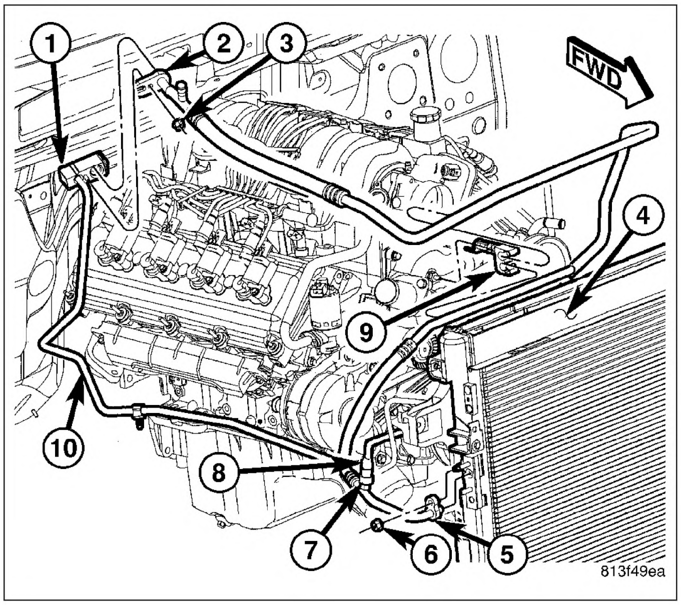
1. Position the A/C suction line (6) into the engine compartment.
2. Remove the tape or plugs from the suction line fittings and the A/C compressor (2) and A/C expansion valve (8).
3. Lubricate a new O-ring and a dual plane seal with clean refrigerant oil and install them onto the A/C suction line. Use only the specified seals as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
4. Install the A/C suction line onto the A/C compressor.
5. Install the nut (1) that secures the A/C suction line to the A/C compressor. Tighten the nut to 20 N·m (15 ft. lbs.).
6. Install the A/C suction line onto the A/C expansion valve.
7. Install the nut (7) that secures the A/C suction line to the A/C expansion valve. Tighten the nut to 23 N·m (17 ft. lbs.).
8. Install the air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).
9. Reconnect the negative battery cable.
10. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
11. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

5.7L ENGINE



1. Position the A/C suction line (3) into the engine compartment.
2. Remove the tape or plugs from the opened suction line fittings and the compressor and expansion valve ports.
3. Lubricate a new O-ring and a new dual plane seal with clean refrigerant oil and install them onto the A/C suction line. Use only the specified seals as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
4. Install the A/C suction line onto the A/C compressor (4).
5. Install the nut (2) that secures the A/C suction line to the A/C compressor. Tighten the nut to 20 N·m (15 ft. lbs.).

6. Install the A/C suction line (2) into the retaining bracket (9) and to the A/C expansion valve (1).
7. Install the nut (3) that secures the A/C suction line to the A/C expansion valve. Tighten the nut to 23 N·m (17 ft. lbs.).
8. Install the air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).
9. Reconnect the negative battery cable.
10. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
11. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).



OIL-A/C REFRIGERANT

DESCRIPTION

The refrigerant oil used in R-134a refrigerant systems is a synthetic-based, polyalkylene glycol (PAG), wax-free lubricant. Mineral-based R-12 refrigerant oils are not compatible with PAG oils, and should never be introduced to an R-134a refrigerant system.

There are different PAG oils available, and each contains a different additive package. The Denso 10S17 A/C compressor used in this vehicle is designed to use ND-8 PAG refrigerant oil. Use only this type of refrigerant oil the refrigerant system.

OPERATION

After performing any refrigerant recovery or recycling operation, always replenish the refrigerant system with the same amount of the recommended refrigerant oil as was removed. Too little refrigerant oil can cause A/C compressor damage, and too much can reduce A/C system performance.

PAG refrigerant oil is more hygroscopic than mineral oil, and will absorb any moisture it comes into contact with, even moisture in the air. The PAG oil container should always be kept tightly capped until it is ready to be used. After use, recap the oil container immediately to prevent moisture contamination.

STANDARD PROCEDURE

REFRIGERANT OIL LEVEL

When an A/C system is assembled at the factory, all components except the A/C compressor are refrigerant oil free. After the refrigerant system has been charged and operated, the refrigerant oil in the A/C compressor is dispersed throughout the refrigerant system. The receiver/drier, A/C evaporator, A/C condenser and the A/C compressor will each retain a significant amount of the needed refrigerant oil.

It is important to have the correct amount of refrigerant oil in the A/C system. This ensures proper lubrication of the A/C compressor. Too little oil will result in damage to the A/C compressor, while too much oil will reduce the cooling capacity of the A/C system and consequently result in higher discharge air temperatures.

CAUTION: The oil used in the Denso 10S17 A/C compressor is ND-8 PAG R-134a refrigerant oil. Only refrigerant oil of the same type should be used to service the A/C system. Do not use any other refrigerant oil. The oil container should be kept tightly capped until it is ready for use and then tightly capped after use to prevent contamination from dirt and moisture. Refrigerant oil will quickly absorb any moisture it comes in contact with, therefore, special effort must be used to keep all R-134a system components moisture-free. Moisture in the refrigerant oil is very difficult to remove and will cause a reliability problem with the A/C compressor.

NOTE: Most reclaim/recycling equipment will measure the lubricant being removed during recovery. This amount of lubricant should be added back into the system. Refer to the reclaim/recycling equipment manufacturers instructions.

It will not be necessary to check the oil level in the A/C compressor or to add oil, unless there has been an oil loss. An oil loss may occur due to a rupture or leak from a refrigerant line, a connector fitting, a component, or a component seal. If a leak occurs, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system after the repair has been made. Refrigerant oil loss will be evident at the leak point by the presence of a wet, shiny surface around the leak.

Refrigerant oil must be added when a receiver/drier, A/C evaporator or A/C condenser is replaced. See the Refrigerant Oil Capacities chart. When an A/C compressor is replaced, the refrigerant oil must be drained from the old compressor and measured. Drain all of the refrigerant oil from the new A/C compressor, then fill the new compressor with the same amount of refrigerant oil that was drained out of the old compressor.

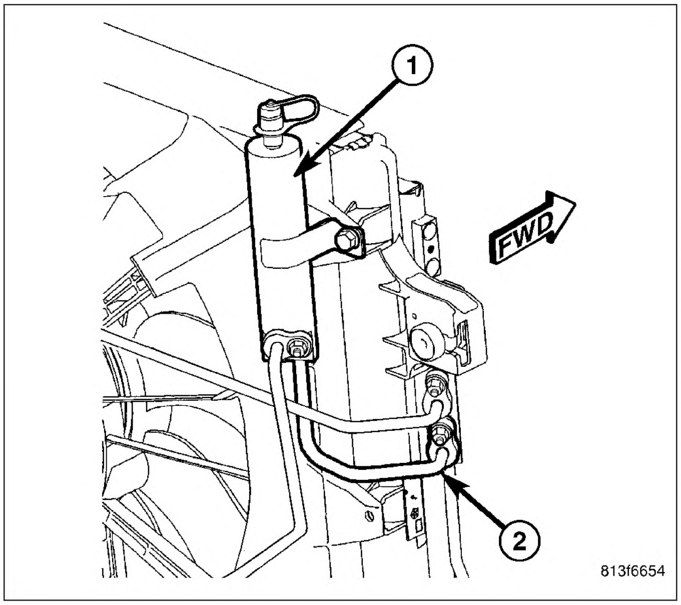
REFRIGERANT OIL CAPACITIES

COMPONENT NAME	ml.	oz.
Total System Fill	130 ml.	4.4 oz.
A/C Condenser	30 ml.	1.0 oz.
A/C Evaporator	40 ml.	1.4 oz.
Receiver/drier	30 ml.	1.0 oz.
A/C Compressor	Drain and measure the oil from the old compressor. See text.	

RECEIVER/DRIER-A/C

DESCRIPTION

The receiver/drier (1) stores unnecessary refrigerant, filters the refrigerant, helps remove moisture from the refrigerant and retains any refrigerant vapor that may leave the A/C condenser (2) until it becomes a liquid. The receiver/drier is installed on the high-side of the A/C system and is connected directly to the right end of the A/C condenser. The receiver/drier can be easily serviced by removing the grille and air cleaner housing.



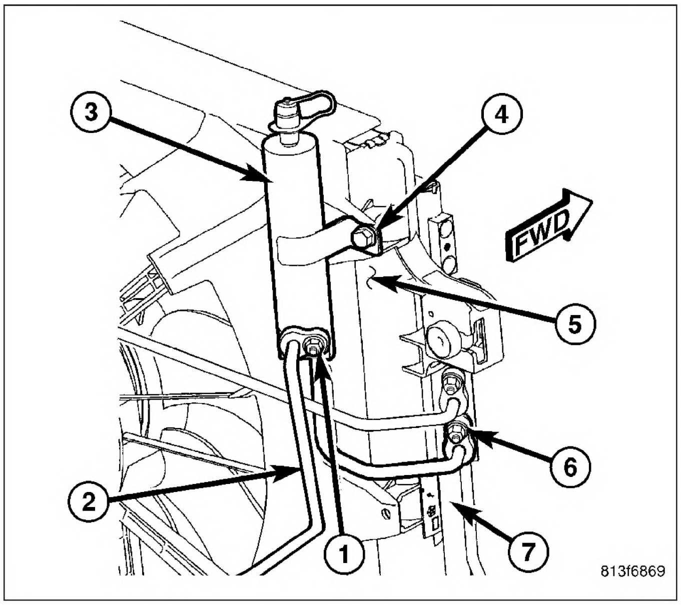
OPERATION

The receiver/drier performs a filtering action to prevent foreign material in the refrigerant from contaminating the A/C expansion valve. Refrigerant enters the receiver/drier as a high-pressure, low temperature liquid. Desiccant inside the receiver/drier absorbs any moisture which may have entered and become trapped within the refrigerant system. In addition, during periods of high demand operation of the A/C system, the receiver/drier acts as a reservoir to store surplus refrigerant.

The receiver/drier cannot be repaired. If the receiver/drier is faulty or damaged, or if the refrigerant system has been contaminated or left open to the atmosphere for an indeterminable period or if the A/C compressor has failed, it must be replaced.

REMOVAL

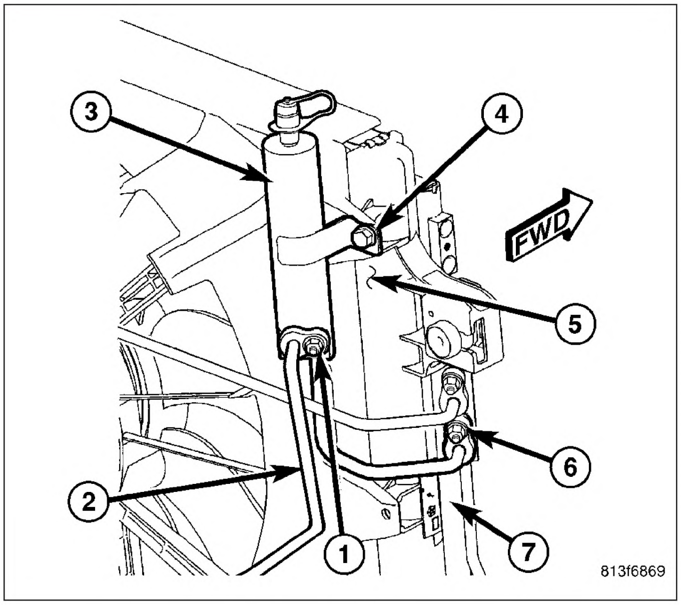
WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.



1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the grille (Refer to 23 - BODY/EXTERIOR/ GRILLE - REMOVAL).
4. Remove the air cleaner housing and air inlet tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/ HOUSING-AIR CLEANER - REMOVAL).
5. Remove the nut (1) that secures the A/C liquid line (2) to the receiver/drier (3).
6. Remove the A/C liquid line from the receiver/drier and remove and discard the dual-plane seal.
7. Remove the screw (4) that secures the receiver/ drier to the radiator and fan shroud (5).
8. Remove the nut (6) that secures the receiver/drier to the A/C condenser (7).
9. Disconnect the receiver/drier from the A/C condenser and remove and discard the dual-plane seal.
10. Install plugs in, or tape over the opened receiver/drier fitting and port and the condenser port.

INSTALLATION

NOTE: If the receiver/drier is being replaced, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system. Use only the refrigerant oil of the type recommended for the A/C compressor in the vehicle.



1. Position the receiver/drier (3) into the engine compartment.
2. Remove the tape or plugs from the receiver/drier fitting and port and the port of the A/C condenser (7).
3. Lubricate a new dual-plane seal with clean refrigerant oil and install it onto the receiver/drier fitting. Use only the specified seal as it is made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
4. Connect the receiver/drier to the right end of the A/C condenser.
5. Install the nut (6) that secures the receiver/drier to the A/C condenser. Tighten the nut to 20 N·m (15 ft. lbs.).
6. Install the screw (4) that secures the receiver/drier to the radiator and fan shroud (5). Tighten the screw to to 5 N·m (44 in. lbs.).
7. Lubricate a new dual-plane seal with clean refrigerant oil and install it onto the A/C liquid line (2) Use only the specified seal as it is made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
8. Install the nut (1) that secures the A/C liquid line to the receiver/drier. Tighten the nut to 20 N·m (15 ft. lbs.).
9. Install the air cleaner housing and air intake tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).
10. Install the grille (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
11. Reconnect the negative battery cable.
12. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
13. Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

REFRIGERANT-A/C

DESCRIPTION

The refrigerant used in this air conditioning system is a HydroFluoroCarbon (HFC), type R-134a. Unlike R-12, which is a ChloroFluoroCarbon (CFC), R-134a refrigerant does not contain ozone-depleting chlorine. R-134a refrigerant is a non-toxic, non-flammable, clear, and colorless liquefied gas.

Even though R-134a does not contain chlorine, it must be reclaimed and recycled just like CFC-type refrigerants. This is because R-134a is a greenhouse gas and can contribute to global warming.

OPERATION

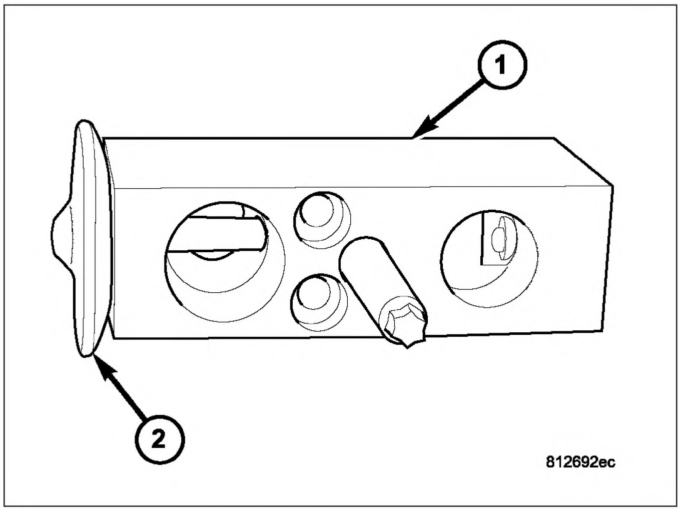
R-134a refrigerant is not compatible with R-12 refrigerant in an A/C system. Even a small amount of R-12 refrigerant added to an R-134a refrigerant system will cause A/C compressor failure, refrigerant oil sludge or poor A/C system performance. In addition, the polyalkylene glycol (PAG) synthetic refrigerant oils used in an R-134a refrigerant system are not compatible with the mineral-based refrigerant oils used in an R-12 refrigerant system.

R-134a refrigerant system service ports, service tool couplers and refrigerant dispensing bottles have all been designed with unique fittings to ensure that an R-134a refrigerant system is not accidentally contaminated with the wrong refrigerant (R-12). There are also labels posted in the engine compartment of the vehicle and on the A/C compressor to identify that the A/C system is equipped with R-134a refrigerant.

VALVE-A/C EXPANSION

DESCRIPTION

The A/C expansion valve controls the amount of refrigerant entering the A/C evaporator and is of a thermostatic expansion valve (TXV) design. The A/C expansion valve consists of an aluminum H-valve type body (1) with an integral thermal sensor (2) and is located at the dash panel between the A/C refrigerant lines and the A/C evaporator.



OPERATION

The A/C expansion valve controls the high-pressure, low temperature liquid refrigerant from the liquid line and converts it into a low-pressure, low-temperature mixture of liquid and gas before it enters the A/C evaporator. A mechanical sensor in the A/C expansion valve monitors the temperature and pressure of the refrigerant leaving the A/C evaporator through the suction line, and adjusts the orifice size at the liquid line port to let the proper amount of refrigerant into the A/C evaporator to meet the vehicle A/C cooling requirements. Controlling the refrigerant flow through the A/C evaporator ensures that none of the refrigerant leaving the A/C evaporator is still in a liquid state, which could damage the A/C compressor.

The A/C expansion valve is factory calibrated and cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

DIAGNOSIS AND TESTING

A/C EXPANSION VALVE

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The A/C expansion valve should only be tested following testing of the A/C compressor.

NOTE: Liquid CO^2 is required to test the A/C expansion valve. This material is available from most welding supply facilities. Liquid CO^2 is also available from companies which service and sell fire extinguishers.

When testing the A/C expansion valve, the work area and the vehicle temperature must be 21° to 27° C (70° to 85° F). To test the expansion valve:

1. Connect a charging station or manifold gauge set to the refrigerant system service ports. Verify the refrigerant charge level.
2. Close all doors, windows and vents to the passenger compartment.
3. Set the A/C-heater controls so that the A/C compressor is operating, the temperature control is in the highest temperature position, the mode-air doors is directing air output to the floor and the blower motor operating is operating at the highest speed.

4. Start the engine and allow it to idle. After the engine has reached normal operating temperature, allow the passenger compartment to heat up. This will create the need for maximum refrigerant flow into the A/C evaporator.
5. If the refrigerant charge is sufficient, the discharge (high pressure) gauge should read 827 kPa to 1655 kPa (120 psi to 240 psi). The suction (low pressure) gauge should read 207 kPa to 345 kPa (30 psi to 50 psi). If OK, go to Step 6. If not OK, replace the faulty A/C expansion valve.

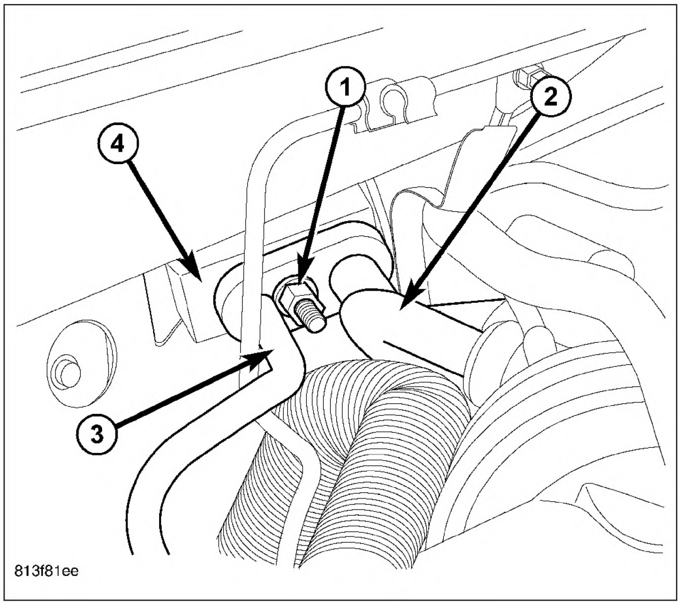
WARNING:
Protect the skin and eyes from exposure to liquid CO^2 or personal injury can result.

6. If the suction (low pressure) gauge reads within the specified range, freeze the A/C expansion valve for 30 seconds using liquid CO^2 or another suitable super-cold material.**Do not spray R-134a or R-12 refrigerant on the A/C expansion valve for this test.** The suction (low pressure) gauge reading should drop by 69 kPa (10 psi). If OK, go to Step 7 If not OK, replace the faulty A/C expansion valve.
7. Allow the expansion valve control head to thaw. The suction (low pressure) gauge reading should stabilize at 207 kPa to 345 kPa (30 psi to 50 psi). If not OK, replace the faulty A/C expansion valve.
8. When expansion valve testing is complete, test the overall A/C system performance (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - A/C PERFORMANCE TEST).

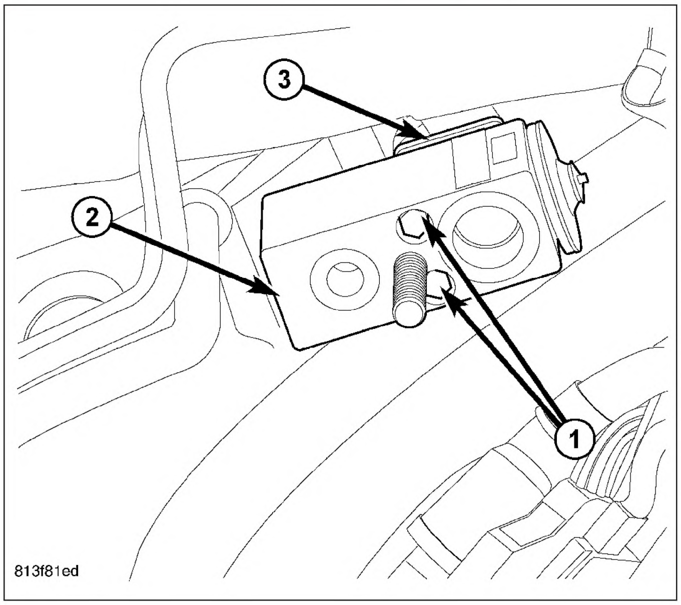
REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

1. Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
2. Disconnect and isolate the negative battery cable.
3. Remove the air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/ HOUSING-AIR CLEANER - REMOVAL).
4. Remove the nut (1) that secures the A/C suction line (2) and the A/C liquid line (3) to the A/C expansion valve (4).
5. Disconnect the A/C suction and liquid lines from the A/C expansion valve and remove and discard the O-ring seals.
6. Install plugs in, or tape over the opened refrigerant line fittings and position the lines out of the way.

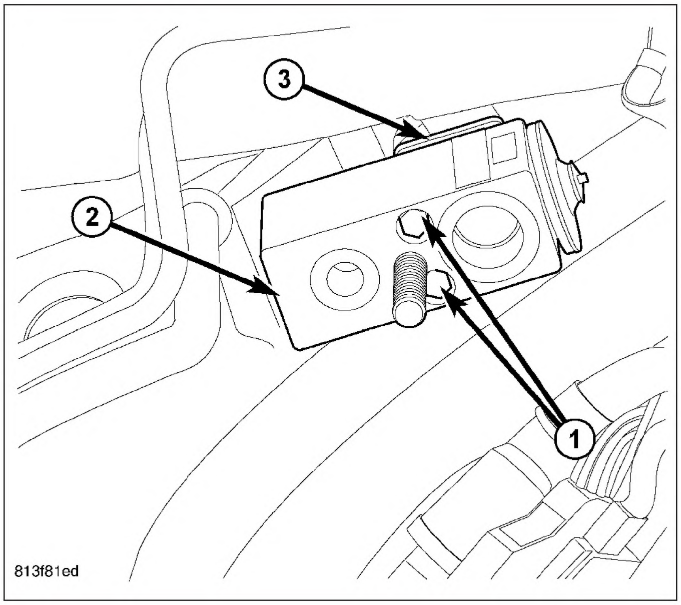


7. Remove the two bolts (1) that secure the A/C expansion valve (2) to the evaporator tube tapping block (3).
8. Remove the A/C expansion valve from the evaporator tube tapping block and remove and discard the O-ring seals.
9. Install plugs in, or tape over the opened evaporator tube fittings and all expansion valve ports.

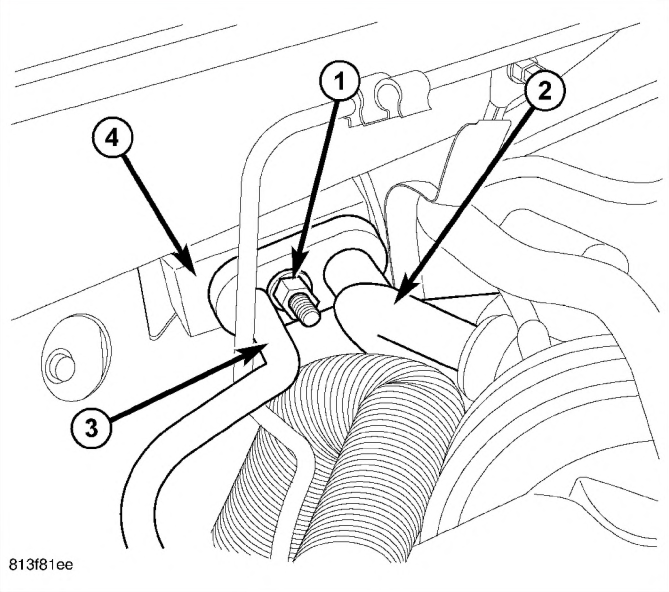


INSTALLATION

1. Remove the tape or plugs from the evaporator tube fittings and all of the expansion valve ports.
2. Lubricate new O-ring seals with clean refrigerant oil and install them onto the evaporator tube fittings. Use only the specified seals as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
3. Install the A/C expansion valve (2) onto the evaporator tube tapping block (3).
4. Install the two bolts (1) that secure the A/C expansion valve to the evaporator tube tapping block. Tighten the bolts to 11 N·m (97 in. lbs.).



5. Remove the tape or plugs from the A/C suction line (2) and the A/C liquid line (3).
6. Lubricate new O-ring seals with clean refrigerant oil and install them onto the A/C suction and liquid lines. Use only the specified seas as they are made of a special material for the R-134a system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
7. Connect the A/C suction and liquid lines to the A/C expansion valve (4).
8. Install the nut (1) that secures the A/C suction and liquid lines to the A/C expansion valve. Tighten the nut to 23 N·m (17 ft. lbs.).
9. Install the air intake tube and the resonator (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/HOUSING-AIR CLEANER - INSTALLATION).
10. Reconnect the negative battery cable.
11. Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
12. Recharge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).



EMISSIONS CONTROL

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EMISSIONS 3.7L/4.7L/5.7L

DESCRIPTION

STATE DISPLAY TEST MODE

The switch inputs to the Powertrain Control Module (PCM) have two recognized states; HIGH and LOW. For this reason, the PCM cannot recognize the difference between a selected switch position versus an open circuit, a short circuit, or a defective switch. If the State Display screen shows the change from HIGH to LOW or LOW to HIGH, assume the entire switch circuit to the PCM functions properly. Connect the DRB scan tool to the data link connector and access the state display screen. Then access either State Display Inputs and Outputs or State Display Sensors.

CIRCUIT ACTUATION TEST MODE

The Circuit Actuation Test Mode checks for proper operation of output circuits or devices the Powertrain Control Module (PCM) may not internally recognize. The PCM attempts to activate these outputs and allow an observer to verify proper operation. Most of the tests provide an audible or visual indication of device operation (click of relay contacts, fuel spray, etc.). Except for intermittent conditions, if a device functions properly during testing, assume the device, its associated wiring, and driver circuit work correctly. Connect a scan tool to the data link connector and access the Actuators screen.

DESCRIPTION - DIAGNOSTIC TROUBLE CODES

A Diagnostic Trouble Code (DTC) indicates the PCM has recognized an abnormal condition in the system.

Remember that DTC's are the results of a system or circuit failure, but do not directly identify the failed component or components.

BULB CHECK

Each time the ignition key is turned to the ON position, the malfunction indicator (check engine) lamp on the instrument panel should illuminate for approximately 2 seconds then go out. This is done for a bulb check.

OBTAINING DTC'S USING DRB SCAN TOOL

1. Obtain the applicable Powertrain Diagnostic Manual.
2. Obtain the DRB Scan Tool.
3. Connect the DRB Scan Tool to the data link (diagnostic) connector. This connector is located in the passenger compartment; at the lower edge of instrument panel; near the steering column.
4. Turn the ignition switch on and access the "Read Fault" screen.
5. Record all the DTC's and "freeze frame" information shown on the DRB scan tool.

6. To erase DTC's, use the "Erase Trouble Code" data screen on the DRB scan tool. **Do not erase any DTC's until problems have been investigated and repairs have been performed.**

TASK MANAGER

The PCM is responsible for efficiently coordinating the operation of all the emissions-related components. The PCM is also responsible for determining if the diagnostic systems are operating properly. The software designed to carry out these responsibilities is call the 'Task Manager'.

TRIP DEFINITION

The term "Trip" has different meanings depending on what the circumstances are. If the MIL (Malfunction Indicator Lamp) is OFF, a Trip is defined as when the Oxygen Sensor Monitor and the Catalyst Monitor have been completed in the same drive cycle.

When any Emission DTC is set, the MIL on the dash is turned ON. When the MIL is ON, it takes 3 good trips to turn the MIL OFF. In this case, it depends on what type of DTC is set to know what a "Trip" is.

For the Fuel Monitor or Mis-Fire Monitor (continuous monitor), the vehicle must be operated in the "Similar Condition Window" for a specified amount of time to be considered a Good Trip.

If a Non-Contiuous OBDII Monitor fails twice in a row and turns ON the MIL, re-running that monitor which previously failed, on the next start-up and passing the monitor, is considered to be a Good Trip. These will include the following:

- Oxygen Sensor
- Catalyst Monitor
- Purge Flow Monitor
- Leak Detection Pump Monitor (if equipped)
- EGR Monitor (if equipped)
- Oxygen Sensor Heater Monitor

If any other Emission DTC is set (not an OBDII Monitor), a Good Trip is considered to be when the Oxygen Sensor Monitor and Catalyst Monitor have been completed; or 2 Minutes of engine run time if the Oxygen Sensor Monitor or Catalyst Monitor have been stopped from running.

It can take up to 2 Failures in a row to turn on the MIL. After the MIL is ON, it takes 3 Good Trips to turn the MIL OFF. After the MIL is OFF, the PCM will self-erase the DTC after 40 Warm-up cycles. A Warm-up cycle is counted when the ECT (Engine Coolant Temperature Sensor) has crossed 160°F and has risen by at least 40°F since the engine has been started.

COMPONENT MONITORS

There are several components that will affect vehicle emissions if they malfunction. If one of these components malfunctions the Malfunction Indicator Lamp (MIL) will illuminate.

Some of the component monitors are checking for proper operation of the part. Electrically operated components now have input (rationality) and output (functionality) checks. Previously, a component like the Throttle Position sensor (TPS) was checked by the PCM for an open or shorted circuit. If one of these conditions occurred, a DTC was set. Now there is a check to ensure that the component is working. This is done by watching for a TPS indication of a greater or lesser throttle opening than MAP and engine rpm indicate. In the case of the TPS, if engine vacuum is high and engine rpm is 1600 or greater, and the TPS indicates a large throttle opening, a DTC will be set. The same applies to low vacuum if the TPS indicates a small throttle opening.

All open/short circuit checks, or any component that has an associated limp-in, will set a fault after 1 trip with the malfunction present. Components without an associated limp-in will take two trips to illuminate the MIL.

OPERATION

TASK MANAGER

The Task Manager determines which tests happen when and which functions occur when. Many of the diagnostic steps required by OBD II must be performed under specific operating conditions. The Task Manager software organizes and prioritizes the diagnostic procedures. The job of the Task Manager is to determine if conditions are appropriate for tests to be run, monitor the parameters for a trip for each test, and record the results of the test. Following are the responsibilities of the Task Manager software:

- Test Sequence
- MIL Illumination
- Diagnostic Trouble Codes (DTCs)
- Trip Indicator
- Freeze Frame Data Storage
- Similar Conditions Window

Test Sequence

In many instances, emissions systems must fail diagnostic tests more than once before the PCM illuminates the MIL. These tests are know as 'two trip monitors.' Other tests that turn the MIL lamp on after a single failure are known as 'one trip monitors.' A trip is defined as 'start the vehicle and operate it to meet the criteria necessary to run the given monitor.'

Many of the diagnostic tests must be performed under certain operating conditions. However, there are times when tests cannot be run because another test is in progress (conflict), another test has failed (pending) or the Task Manager has set a fault that may cause a failure of the test (suspend).

- Pending
  Under some situations the Task Manager will not run a monitor if the MIL is illuminated and a fault is stored from another monitor. In these situations, the Task Manager postpones monitors **pending** resolution of the original fault. The Task Manager does not run the test until the problem is remedied.
  For example, when the MIL is illuminated for an Oxygen Sensor fault, the Task Manager does not run the Catalyst Monitor until the Oxygen Sensor fault is remedied. Since the Catalyst Monitor is based on signals from the Oxygen Sensor, running the test would produce inaccurate results.
- Conflict
  There are situations when the Task Manager does not run a test if another monitor is in progress. In these situations, the effects of another monitor running could result in an erroneous failure. If this **conflict** is present, the monitor is not run until the conflicting condition passes. Most likely the monitor will run later after the conflicting monitor has passed.
  For example, if the Fuel System Monitor is in progress, the Task Manager does not run the EGR Monitor. Since both tests monitor changes in air/fuel ratio and adaptive fuel compensation, the monitors will conflict with each other.
- Suspend
  Occasionally the Task Manager may not allow a two trip fault to mature. The Task Manager will **suspend** the maturing of a fault if a condition exists that may induce an erroneous failure. This prevents illuminating the MIL for the wrong fault and allows more precis diagnosis.
  For example, if the PCM is storing a one trip fault for the Oxygen Sensor and the EGR monitor, the Task Manager may still run the EGR Monitor but will suspend the results until the Oxygen Sensor Monitor either passes or fails. At that point the Task Manager can determine if the EGR system is actually failing or if an Oxygen Sensor is failing.

MIL Illumination

The PCM Task Manager carries out the illumination of the MIL. The Task Manager triggers MIL illumination upon test failure, depending on monitor failure criteria.

The Task Manager Screen shows both a Requested MIL state and an Actual MIL state. When the MIL is illuminated upon completion of a test for a third trip, the Requested MIL state changes to OFF. However, the MIL remains illuminated until the next key cycle. (On some vehicles, the MIL will actually turn OFF during the third key cycle) During the key cycle for the third good trip, the Requested MIL state is OFF, while the Actual MILL state is ON. After the next key cycle, the MIL is not illuminated and both MIL states read OFF.

Diagnostic Trouble Codes (DTCs)

With OBD II, different DTC faults have different priorities according to regulations. As a result, the priorities determine MIL illumination and DTC erasure. DTCs are entered according to individual priority. DTCs with a higher priority overwrite lower priority DTCs.

Priorities

- Priority 0 —Non-emissions related trouble codes
- Priority 1 — One trip failure of a two trip fault for non-fuel system and non-misfire.
- Priority 2 — One trip failure of a two trip fault for fuel system (rich/lean) or misfire.
- Priority 3 — Two trip failure for a non-fuel system and non-misfire or matured one trip comprehensive component fault.
- Priority 4 — Two trip failure or matured fault for fuel system (rich/lean) and misfire or one trip catalyst damaging misfire.

Non-emissions related failures have no priority. One trip failures of two trip faults have low priority. Two trip failures or matured faults have higher priority. One and two trip failures of fuel system and misfire monitor take precedence over non-fuel system and non-misfire failures.

DTC Self Erasure

With one trip components or systems, the MIL is illuminated upon test failure and DTCs are stored.

Two trip monitors are components requiring failure in two consecutive trips for MIL illumination. Upon failure of the first test, the Task Manager enters a maturing code. If the component fails the test for a second time the code matures and a DTC is set.

After three good trips the MIL is extinguished and the Task Manager automatically switches the trip counter to a warm-up cycle counter. DTCs are automatically erased following 40 warm-up cycles if the component does not fail again.

For misfire and fuel system monitors, the component must pass the test under a Similar Conditions Window in order to record a good trip. A Similar Conditions Window is when engine RPM is within ±375 RPM and load is within ±10% of when the fault occurred.

NOTE: It is important to understand that a component does not have to fail under a similar window of operation to mature. It must pass the test under a Similar Conditions Window when it failed to record a Good Trip for DTC erasure for misfire and fuel system monitors.

DTCs can be erased anytime with a diagnostic scan tool. Erasing the DTC with the scan tool erases all OBD II information. The scan tool automatically displays a warning that erasing the DTC will also erase all OBD II monitor data. This includes all counter information for warm-up cycles, trips and Freeze Frame.

Trip Indicator

The **Trip** is essential for running monitors and extinguishing the MIL. In OBD II terms, a trip is a set of vehicle operating conditions that must be met for a specific monitor to run. All trips begin with a key cycle.

Good Trip

The Good Trip counters are as follows:

- Specific Good Trip
- Fuel System Good Trip
- Misfire Good Trip
- Alternate Good Trip (appears as a Global Good Trip on a scan tool)
  - Comprehensive Components
  - Major Monitor
- Warm-Up Cycles

Specific Good Trip

The term Good Trip has different meanings depending on the circumstances:

- If the MIL is OFF, a trip is defined as when the Oxygen Sensor Monitor and the Catalyst Monitor have been completed in the same drive cycle.
- If the MIL is ON and a DTC was set by the Fuel Monitor or Misfire Monitor (both continuous monitors), the vehicle must be operated in the Similar Condition Window for a specified amount of time.
- If the MIL is ON and a DTC was set by a Task Manager commanded once-per-trip monitor (such as the Oxygen Sensor Monitor, Catalyst Monitor, Purge Flow Monitor, Leak Detection Pump Monitor, EGR Monitor or Oxygen Sensor Heater Monitor), a good trip is when the monitor is passed on the next start-up.

- If the MIL is ON and any other emissions DTC was set (not an OBD II monitor), a good trip occurs when the Oxygen Sensor Monitor and Catalyst Monitor have been completed, or two minutes of engine run time if the Oxygen Sensor Monitor and Catalyst Monitor have been stopped from running.

Fuel System Good Trip

To count a good trip (three required) and turn off the MIL, the following conditions must occur:

- Engine in closed loop
- Operating in Similar Conditions Window
- Short Term multiplied by Long Term less than threshold
- Less than threshold for a predetermined time

If all of the previous criteria are met, the PCM will count a good trip (three required) and turn off the MIL.

Misfire Good Trip

If the following conditions are met the PCM will count one good trip (three required) in order to turn off the MIL:

- Operating in Similar Condition Window
- 1000 engine revolutions with no misfire

Warm-Up Cycles

Once the MIL has been extinguished by the Good Trip Counter, the PCM automatically switches to a Warm-Up Cycle Counter that can be viewed on the DRB III. Warm-Up Cycles are used to erase DTCs and Freeze Frames. Forty Warm-Up cycles must occur in order for the PCM to self-erase a DTC and Freeze Frame. A Warm-Up Cycle is defined as follows:

- Engine coolant temperature must start below and rise above 160° F
- Engine coolant temperature must rise by 40° F
- No further faults occur

Freeze Frame Data Storage

Once a failure occurs, the Task Manager records several engine operating conditions and stores it in a Freeze Frame. The Freeze Frame is considered one frame of information taken by an on-board data recorder. When a fault occurs, the PCM stores the input data from various sensors so that technicians can determine under what vehicle operating conditions the failure occurred.

The data stored in Freeze Frame is usually recorded when a system fails the first time for two trip faults. Freeze Frame data will only be overwritten by a different fault with a higher priority.

CAUTION: Erasing DTCs, either with a scan tool or by disconnecting the battery, also clears all Freeze Frame data.

Similar Conditions Window

The Similar Conditions Window displays information about engine operation during a monitor. Absolute MAP (engine load) and Engine RPM are stored in this window when a failure occurs. There are two different Similar conditions Windows: Fuel System and Misfire.

FUEL SYSTEM

- **Fuel System Similar Conditions Window** — An indicator that 'Absolute MAP When Fuel Sys Fail' and 'RPM When Fuel Sys Failed' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.
- **Absolute MAP When Fuel Sys Fail** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.
- **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.
- **RPM When Fuel Sys Fail** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.
- **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.
- **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adaptive to calculate the Adaptive Memory Factor for total fuel correction.
- **Upstream O2S Volts** — A live reading of the Oxygen Sensor to indicate its performance. For example, stuck lean, stuck rich, etc.

- **SCW Time in Window (Similar Conditions Window Time in Window)** — A timer used by the PCM that indicates that, after all Similar Conditions have been met, if there has been enough good engine running time in the SCW without failure detected. This timer is used to increment a Good Trip.
- **Fuel System Good Trip Counter** — A Trip Counter used to turn OFF the MIL for Fuel System DTCs. To increment a Fuel System Good Trip, the engine must be in the Similar Conditions Window, Adaptive Memory Factor must be less than calibrated threshold and the Adaptive Memory Factor must stay below that threshold for a calibrated amount of time.
- **Test Done This Trip** — Indicates that the monitor has already been run and completed during the current trip.

MISFIRE

- **Same Misfire Warm-Up State** — Indicates if the misfire occurred when the engine was warmed up (above 160° F).
- **In Similar Misfire Window** — An indicator that 'Absolute MAP When Misfire Occurred' and 'RPM When Misfire Occurred' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.
- **Absolute MAP When Misfire Occurred** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.
- **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.
- **RPM When Misfire Occurred** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.
- **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.
- **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adaptive to calculate the Adaptive Memory Factor for total fuel correction.
- **200 Rev Counter** — Counts 0–100 720 degree cycles.
- **SCW Cat 200 Rev Counter** — Counts when in similar conditions.
- **SCW FTP 1000 Rev Counter** — Counts 0–4 when in similar conditions.
- **Misfire Good Trip Counter** — Counts up to three to turn OFF the MIL.
- **Misfire Data**— Data collected during test.
- **Test Done This Trip**— Indicates YES when the test is done.

NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems and conditions that could have malfunctions causing driveability problems. The PCM might not store diagnostic trouble codes for these conditions. However, problems with these systems may cause the PCM to store diagnostic trouble codes for other systems or components. **EXAMPLE:** a fuel pressure problem will not register a fault directly, but could cause a rich/lean condition or misfire. This could cause the PCM to store an oxygen sensor or misfire diagnostic trouble code

FUEL PRESSURE

The fuel pressure regulator controls fuel system pressure. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line fuel filter, or a pinched fuel supply or return line. However, these could result in a rich or lean condition causing the PCM to store an oxygen sensor or fuel system diagnostic trouble code.

SECONDARY IGNITION CIRCUIT

The PCM cannot detect an inoperative ignition coil, fouled or worn spark plugs, ignition cross firing, or open spark plug cables.

CYLINDER COMPRESSION

The PCM cannot detect uneven, low, or high engine cylinder compression.

EXHAUST SYSTEM

The PCM cannot detect a plugged, restricted or leaking exhaust system, although it may set a fuel system fault.

FUEL INJECTOR MECHANICAL MALFUNCTIONS

The PCM cannot determine if a fuel injector is clogged, the needle is sticking or if the wrong injector is installed. However, these could result in a rich or lean condition causing the PCM to store a diagnostic trouble code for either misfire, an oxygen sensor, or the fuel system.

EXCESSIVE OIL CONSUMPTION

Although the PCM monitors engine exhaust oxygen content when the system is in closed loop, it cannot determine excessive oil consumption.

THROTTLE BODY AIR FLOW

The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.

VACUUM ASSIST

The PCM cannot detect leaks or restrictions in the vacuum circuits of vacuum assisted engine control system devices. However, these could cause the PCM to store a MAP sensor diagnostic trouble code and cause a high idle condition.

PCM SYSTEM GROUND

The PCM cannot determine a poor system ground. However, one or more diagnostic trouble codes may be generated as a result of this condition. The module should be mounted to the body at all times, also during diagnostic.

PCM CONNECTOR ENGAGEMENT

The PCM may not be able to determine spread or damaged connector pins. However, it might store diagnostic trouble codes as a result of spread connector pins.

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EVAPORATIVE EMISSIONS

DESCRIPTION

HIGH AND LOW LIMITS

The PCM compares input signal voltages from each input device with established high and low limits for the device. If the input voltage is not within limits and other criteria are met, the PCM stores a diagnostic trouble code in memory. Other diagnostic trouble code criteria might include engine RPM limits or input voltages from other sensors or switches that must be present before verifying a diagnostic trouble code condition.

DIAGNOSIS AND TESTING

OBD II Monitor Information

Comprehensive Components Monitor (Includes All Engine Hardware Sensor, Switches, Solenoids, etc.)	Major Monitors Non Fuel Control & Non Misfire (Monitors Entire Emission System)	Major Monitors Fuel Control & misfire (Monitors Entire System)
Most are one trip Faults	Most are Two Trips Faults	Two Trip Faults
Usually Turns on The Mill and Sets DTC After One Failure	Turns On The Mil and Sets DTC after Two Consecutive Failure	The Mil and Sets DTC After Two Consecutive Failure
Priority 3	**Priority 1 or 3**	**Priority 2 or 4**
All Checked For Continuity	Done Stop Test = Yes	**Fuel Control Monitor**
Open Short To Ground Short To Voltage	Oxygen Sensor Heater Oxygen Sensor Response	Monitors Fuel Control System For: Fuel System Lean Fuel System Rich
Inputs Checked For Rationality	Catalytic Converter Efficiency Except EWMA up to 6 test per trip and a one trip fault (SBEC) and two trip fault on (JTEC)	
Outputs Checked For Functionality		Requires 3 Consecutive Fuel System Good Trips to Extinguish the MIL
	EGR System	**Misfire Monitor**
	Evaporative Emission System (purge and leak) Non-LDP LDP	Monitors for Engine Misfire At: 4 X 1000 RPM Counter (4000 Revs) (Type B) **200 X 3 (600) RPM counter (Type A)
Requires 3 Consecutive Global Good Trips to Extinguish the MIL*	Requires 3 Consecutive Global Good Trips to Extinguish the MIL*	Requires 3 Consecutive Global Good Trips to Extinguish the MIL
*40 Warm Up Cycles are required to erase DTCs after the MIL has been extinguished		** Type A misfire is a one trip failure on pre-1999, 2 trip failure on 1999 and later. The MIL will illuminate at the first or second failure, based on MY.

OBD II MONITOR RUN PROCESS

The following procedure has been established to assist Chrysler Dealer Technicians in the field with enabling and running OBD II Monitors. The order listed in the following procedure is intended to allow the technician to effectively complete each monitor and to set the CARB Readiness Status in the least time possible.

NOTE: A. Once the monitor run process has begun, do not turn off the ignition. By turning the ignition key off, monitor enabling conditions will be lost. NVLD Monitor runs after key off.B. By performing a Battery Disconnect, or Selecting Erase DTCs, the CARB Readiness and all additional OBD II information will be cleared.

Monitor Preliminary Checks:

1. Plug a SCAN TOOL into the vehicle's Data Link Connector (DLC).

2. Turn the ignition, KEY ON - ENGINE OFF. Watch for MIL lamp illumination during the bulb check. MIL lamp must have illuminated, if not, repair MIL lamp.
3. On the SCAN TOOL Select #1Stand-alone.
4. Select #1 1998-2004 Diagnostics.
5. Select #1 Engine.
6. Select #2 DTCs and Related Functions.
7. Select #1 Read DTCs.
   - Verify that No Emissions Related DTCs are Present.
   - * If an Emissions DTC is Present, the OBD II Monitors may not run and the CARB Readiness will not update.
   - The Emissions related DTC, will need to be repaired, then cleared. By clearing DTCs, the OBD Monitors will need to be run and completed to set the CARB Readiness Status.
8. Return to Engine Select Function Menu and Select #9, OBD II Monitors.
9. Select #3 CARB Readiness Status.

Do all the CARB Readiness Status Locations read YES?.

- *YES, then all monitors have been completed and this vehicle is ready to be I/M or Emission Tested.
- *NO, then the following procedure needs to be followed to run/complete all available monitors.

NOTE: A. Only the monitors, which are not YES in the CARB Readiness Status, need to be completed.B. Specific criteria need to be met for each monitor. Each monitor has a Pre-Test screen to assist in running the monitor. For additional information, refer to the DaimlerChrysler Corporation Technical Training Workbook titled On Board Diagnostics: OBD II/EOBD, part number 81-699-01050.C. The most efficient order to run the monitors has been outlined below, including suggestions to aid the process.

Natural Vacuum Leak Detection with Purge Monitor

This monitor requires a cool down cycle, usually an overnight soak for at least 8 hours without the engine running. The ambient temperature must decrease overnight - parking the vehicle outside is advised. To run this test the fuel level must be between 15-85% full. For the monitor run conditions select the EVAP MON PRE-TEST in the SCAN TOOL, OBD II Monitors Menu.The Purge monitor will run if the small leak test reports a pass. Criteria for NVLD monitor:

- Engine off time greater than @ one hour.
- Fuel Level between 15% and 85 %.
- Start Up ECT and IAT within 10 C (18 F).
- Vehicle started and run until Purge Monitor reports a result.

NOTE: If the vehicle does not report a result and the conditions where correct. It may take up to two weeks to fail the small leak monitor. DO NOT use this test to attempt to determine a fault. Use the appropriate service information procedure for finding a small leak. If there are no faults and the conditions are correct this test will run and report a pass. Note the Small leak test can find leaks less than 10 thousands of an inch. If a small leak is present it takes approximately one week of normal driving to report a failure.

Catalyst / O2 Monitor

With NGC, Catalyst and O2 Monitor information are acquired and processed at the same time. Most vehicles will need to be driven at highway speed (< 50 mph) for a few minutes.Some trucks run the monitor at idle in drive. If the vehicle is equipped with a manual transmission, using 4th gear may assist in meeting the monitor running criteria. For the monitor run conditions, select the BANK 1 CAT MON PRE-TEST in the SCAN TOOL, OBD II Monitors Menu.

EGR Monitor

The EGR monitor now runs in a closed throttle decel or at idle on a warm vehicle. However, it is necessary to maintain the TPS, Map and RPM ranges to allow the monitor to complete itself. For the monitor run conditions, select the EGR PRE-TEST in the SCAN TOOL, OBD II Monitors Menu.

O2 Sensor Heater Monitor

This monitor is now continuously running once the heaters are energized. Pass information will be processed at power down. For the monitor run conditions, select the O2S HEATER MON PRE-TEST in the SCAN TOOL, OBD II Monitors Menu.

SPECIFICATIONS

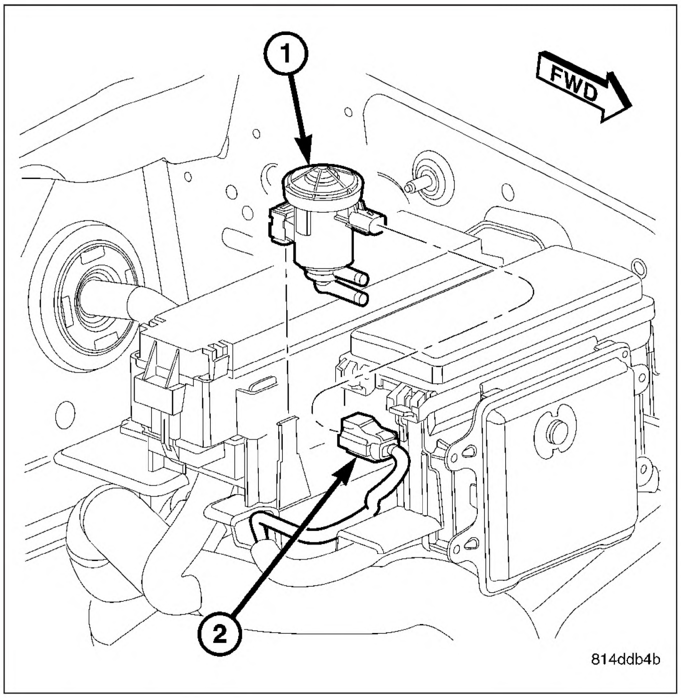
TORQUE - EVAP SYSTEM

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
EVAP Canister Mounting Nuts	11	-	95
EVAP Canister Mounting Bracket-to-Frame Bolts	14	10	125
NVLD Pump Mounting Bolts	11	-	95
NVLD Pump Filter Mounting Bolt	11	-	95

SOLENOID-EVAP/PURGE

DESCRIPTION

The duty cycle EVAP canister purge solenoid (2) is located in the engine compartment attached to a bracket.



OPERATION

The Powertrain Control Module (PCM) operates the solenoid.

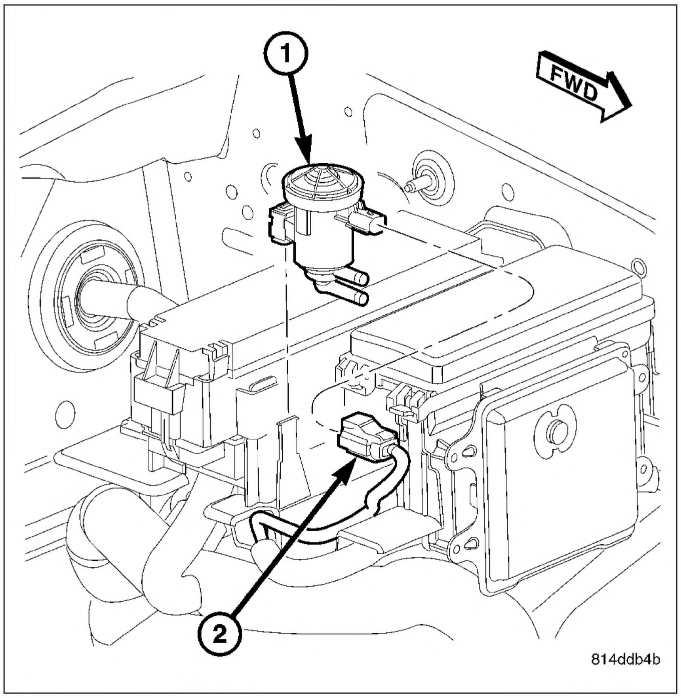
During the cold start warm-up period and the hot start time delay, the PCM does not energize the solenoid. When de-energized, no vapors are purged. The PCM de-energizes the solenoid during open loop operation.

The engine enters closed loop operation after it reaches a specified temperature and the time delay ends. During closed loop operation, the PCM energizes and de-energizes the solenoid 5 or 10 times per second, depending upon operating conditions. The PCM varies the vapor flow rate by changing solenoid pulse width. Pulse width is the amount of time the solenoid energizes. The PCM adjusts solenoid pulse width based on engine operating condition.

REMOVAL

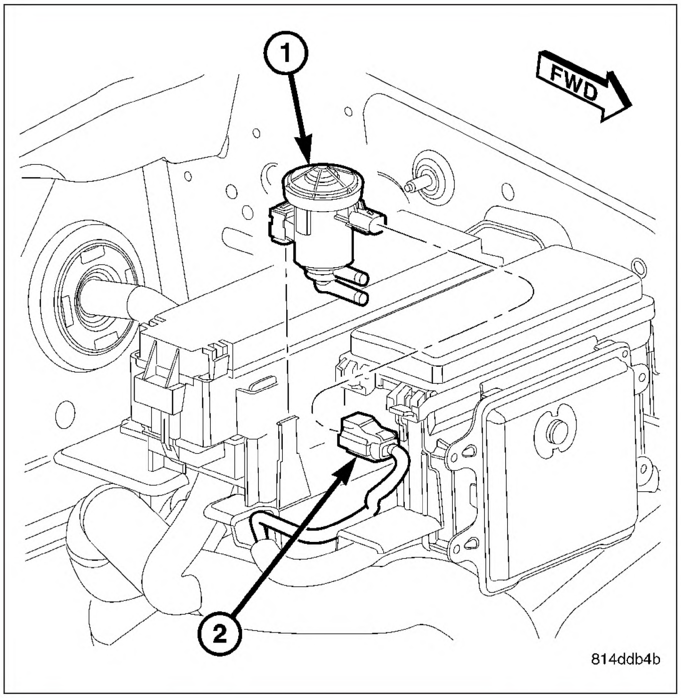
The duty cycle EVAP canister purge solenoid (1) is located in the engine compartment attached to a bracket.

1. Disconnect electrical wiring connector (2) at solenoid.
2. Disconnect vacuum lines at solenoid.
3. Remove solenoid from mounting bracket by lifting straight up.



INSTALLATION

1. Install solenoid assembly (1) to mounting bracket.
2. Connect vacuum harness.
3. Connect electrical connector (2).



CAP-FUEL FILLER

DESCRIPTION

The plastic fuel tank filler tube cap is threaded onto the end of the fuel fill tube. Certain models are equipped with a 1/4 turn cap.

OPERATION

The loss of any fuel or vapor out of fuel filler tube is prevented by the use of a pressure-vacuum fuel fill cap. Relief valves inside the cap will release fuel tank pressure at predetermined pressures. Fuel tank vacuum will also be released at predetermined values. This cap must be replaced by a similar unit if replacement is necessary. This is in order for the system to remain effective.

CAUTION: Remove fill cap before servicing any fuel system component to relieve tank pressure. If equipped with a Leak Detection Pump (LDP), or NVLD system, the cap must be tightened securely. If cap is left loose, a Diagnostic Trouble Code (DTC) may be set.

REMOVAL

REMOVAL/INSTALLATION

If replacement of the 1/4 turn fuel tank filler tube cap is necessary, it must be replaced with an identical cap to be sure of correct system operation.

CAUTION: Remove the fuel tank filler tube cap to relieve fuel tank pressure. The cap must be removed prior to disconnecting any fuel system component or before draining the fuel tank.

ORVR

DESCRIPTION

The ORVR (On-Board Refueling Vapor Recovery) system consists of a unique fuel tank, flow management valve, fluid control valve, one-way check valve and vapor canister.

OPERATION

The ORVR (On-Board Refueling Vapor Recovery) system is used to remove excess fuel tank vapors. This is done while the vehicle is being refueled.

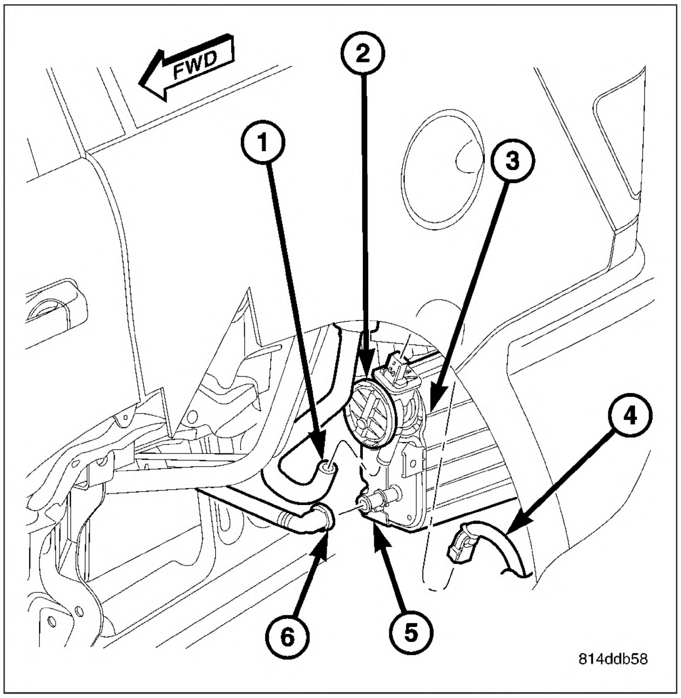
Fuel flowing into the fuel filler tube (approx. 1” I.D.) creates an aspiration effect drawing air into the fuel fill tube. During refueling, the fuel tank is vented to the EVAP canister to capture escaping vapors. With air flowing into the filler tube, there are no fuel vapors escaping to the atmosphere. Once the refueling vapors are captured by the EVAP canister, the vehicle’s computer controlled purge system draws vapor out of the canister for the engine to burn. The vapor flow is metered by the purge solenoid so that there is no, or minimal impact on driveability or tailpipe emissions.

As fuel starts to flow through the fuel fill tube, it opens the normally closed check valve and enters the fuel tank. Vapor or air is expelled from the tank through the control valve and on to the vapor canister. Vapor is absorbed in the EVAP canister until vapor flow in the lines stops. This stoppage occurs following fuel shut-off, or by having the fuel level in the tank rise high enough to close the control valve. This control valve contains a float that rises to seal the large diameter vent path to the EVAP canister. At this point in the refueling process, fuel tank pressure increases, the check valve closes (preventing liquid fuel from spiting back at the operator), and fuel then rises up the fuel filler tube to shut off the dispensing nozzle.

PUMP-NATURAL VAC LEAK DETECTION

DESCRIPTION

The NVLD pump (2) is attached to the EVAP canister (3). This assembly is located in the left-rear quarter-panel behind the left-rear tire. Refer to NVLD Removal / Installation for additional information.



OPERATION

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that will first be used on vehicles equipped with the Next Generation Controller (NGC). This new system replaces the leak detection pump as the method of evaporative system leak detection. This is to detect a leak equivalent to a 0.020″ (0.5 mm) hole. This system has the capability to detect holes of this size very dependably.

The basic leak detection theory employed with NVLD is the ″Gas Law″. This is to say that the pressure in a sealed vessel will change if the temperature of the gas in the vessel changes. The vessel will only see this effect if it is indeed sealed. Even small leaks will allow the pressure in the vessel to come to equilibrium with the ambient pressure. In addition to the detection of very small leaks, this system has the capability of detecting medium as well as large evaporative system leaks.

A vent valve seals the canister vent during engine off conditions. If the vapor system has a leak of less than the failure threshold, the evaporative system will be pulled into a vacuum, either due to the cool down from operating temperature or diurnal ambient temperature cycling. The diurnal effect is considered one of the primary contributors to the leak determination by this diagnostic. When the vacuum in the system exceeds about 1″ H2O (0.25 KPA), a vacuum switch closes. The switch closure sends a signal to the NGC. The NGC, via appropriate logic strategies, utilizes the switch signal, or lack thereof, to make a determination of whether a leak is present.

The NVLD device is designed with a normally open vacuum switch, a normally closed solenoid, and a seal, which is actuated by both the solenoid and a diaphragm. The NVLD is located on the atmospheric vent side of the canister. The NVLD assembly may be mounted on top of the canister outlet, or in-line between the canister and atmospheric vent filter. The normally open vacuum switch will close with about 1″ H2O (0.25 KPA) vacuum in the evaporative system. The diaphragm actuates the switch. This is above the opening point of the fuel inlet check valve in the fill tube so cap off leaks can be detected. Submerged fill systems must have recirculation lines that do not have the in-line normally closed check valve that protects the system from failed nozzle liquid ingestion, in order to detect cap off conditions.

The normally closed valve in the NVLD is intended to maintain the seal on the evaporative system during the engine off condition. If vacuum in the evaporative system exceeds 3″ to 6″ H2O (0.75 to 1.5 KPA), the valve will be pulled off the seat, opening the seal. This will protect the system from excessive vacuum as well as allowing sufficient purge flow in the event that the solenoid was to become inoperative.

The solenoid actuates the valve to unseal the canister vent while the engine is running. It also will be used to close the vent during the medium and large leak tests and during the purge flow check. This solenoid requires an initial

1.5 amps of current to pull the valve open, but after 100 mili-seconds, will be duty cycled down to an average of about 150 mA for the remainder of the drive cycle.

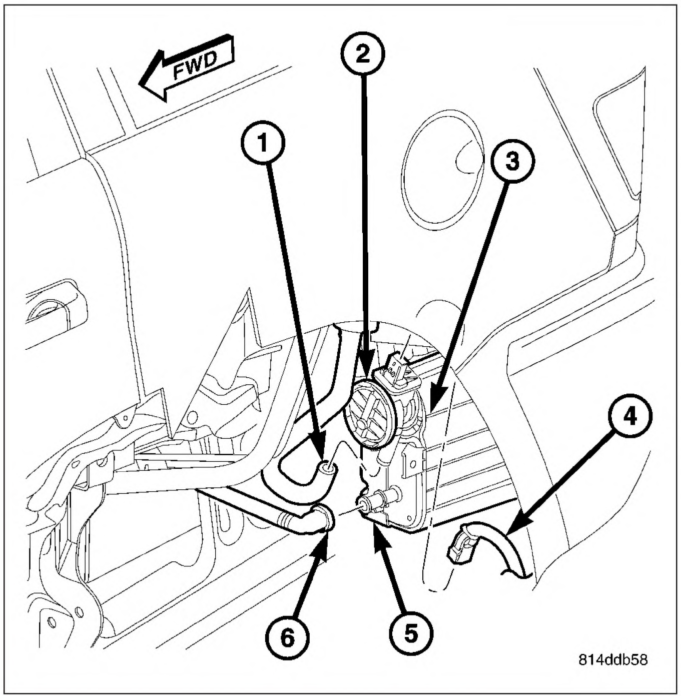
Another feature in the device is a diaphragm that will open the seal in the NVLD with pressure in the evaporative system. The device will ″blow off″ at about 0.5″ H2O (0.12 KPA) pressure to permit the venting of vapors during refueling. An added benefit to this is that it will also allow the tank to ″breathe″ during increasing temperatures, thus limiting the pressure in the tank to this low level. This is beneficial because the induced vacuum during a subsequent declining temperature will achieve the switch closed (pass threshold) sooner than if the tank had to decay from a built up pressure.

The device itself has 3 wires: Switch sense, solenoid driver and ground. It also includes a resistor to protect the switch from a short to battery or a short to ground. The NGC utilizes a high-side driver to energize and duty-cycle the solenoid.

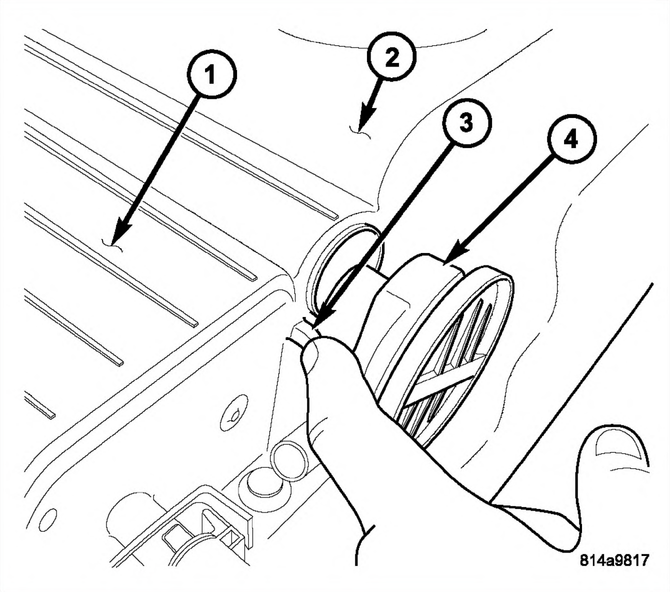
REMOVAL

The NVLD pump (2) is attached to the EVAP canister (3). This assembly is located in the left-rear quarter-panel behind the left-rear tire.

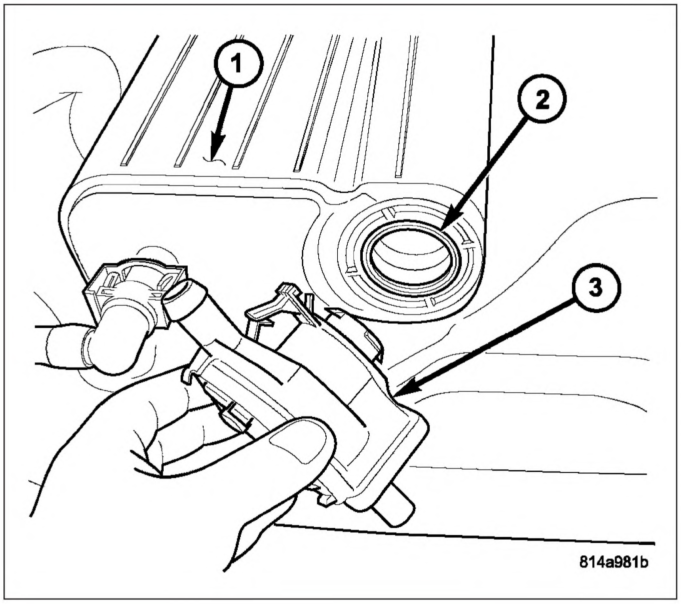
1. Raise and support vehicle.
2. Remove left-rear tire.
3. To access EVAP canister or NVLD pump, remove plastic splash shield at rear of left-rear tire.
4. Disconnect electrical connector (4) at pump.
5. Carefully remove vapor/vacuum hoses at pump.



6. Pry outward on tab (3) and rotate pump **clockwise** about 70 degrees for removal.

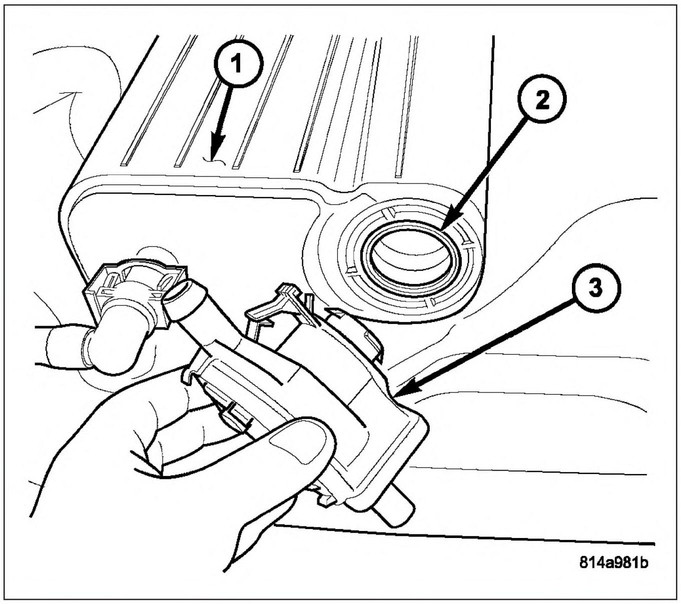


7. Remove NVLD pump o-ring (2) from EVAP canister (1).


1
2
3
814a981b

INSTALLATION

1. Install new NVLD pump o-ring (2) to EVAP canister (1).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2
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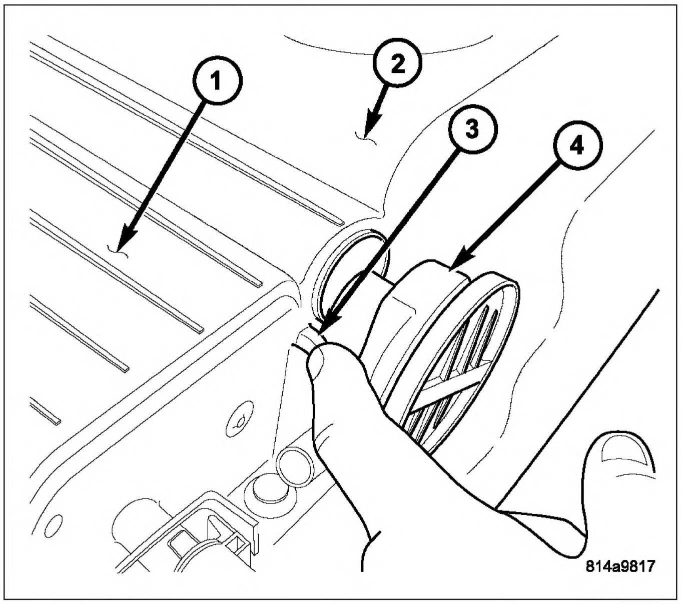
2. Position NVLD pump (4) into EVAP canister (1).
3. Rotate pump (4) until tab (3) aligns with notch in EVAP canister (1).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2
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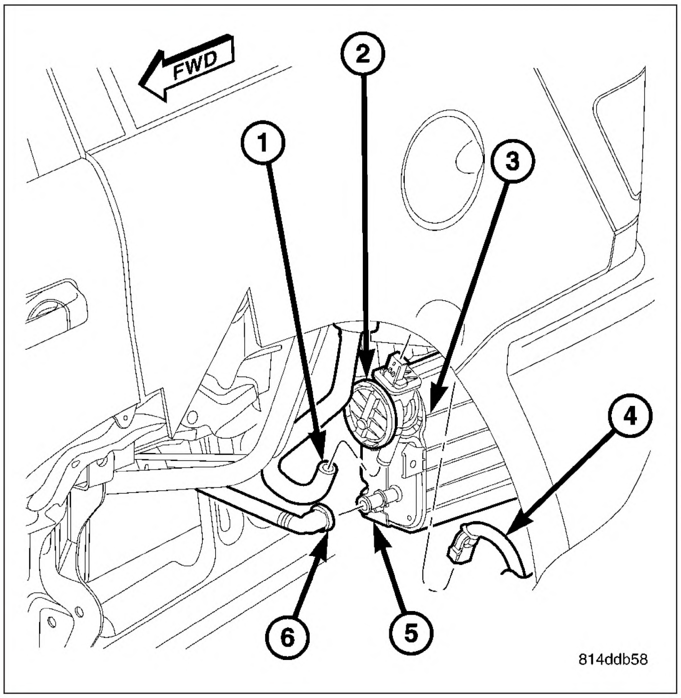
814a9817

4. Carefully install vapor/vacuum lines (1) and (6) to NVLD pump and EVAP canister. **The vapor/vacuum lines and hoses must be firmly connected. Check the vapor/vacuum lines at the NVLD pump, filter and EVAP canister purge solenoid for damage or leaks. If a leak is present, a Diagnostic Trouble Code (DTC) may be set.**
5. Connect electrical connector (4) to pump.
6. Install plastic splash shield at rear of left-rear tire.
7. Install left-rear tire.



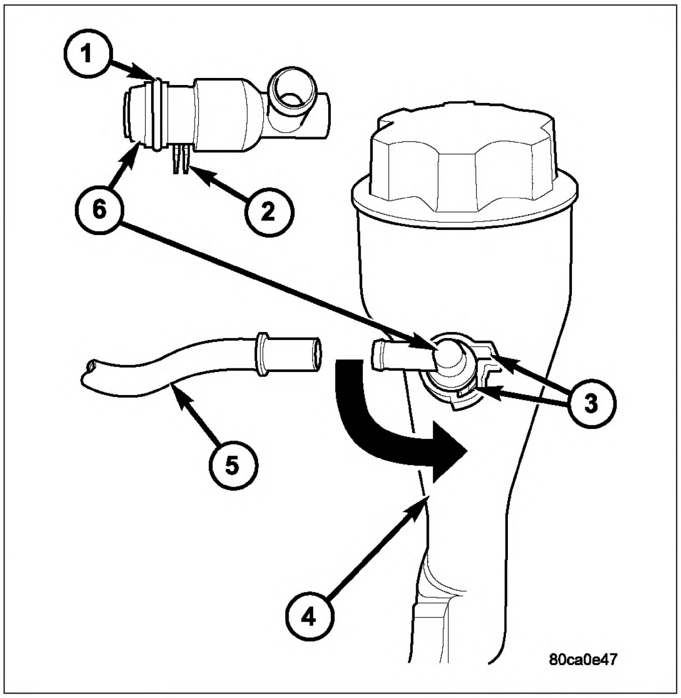
VALVE-PCV

DESCRIPTION

3.7L V-6 / 4.7L V-8

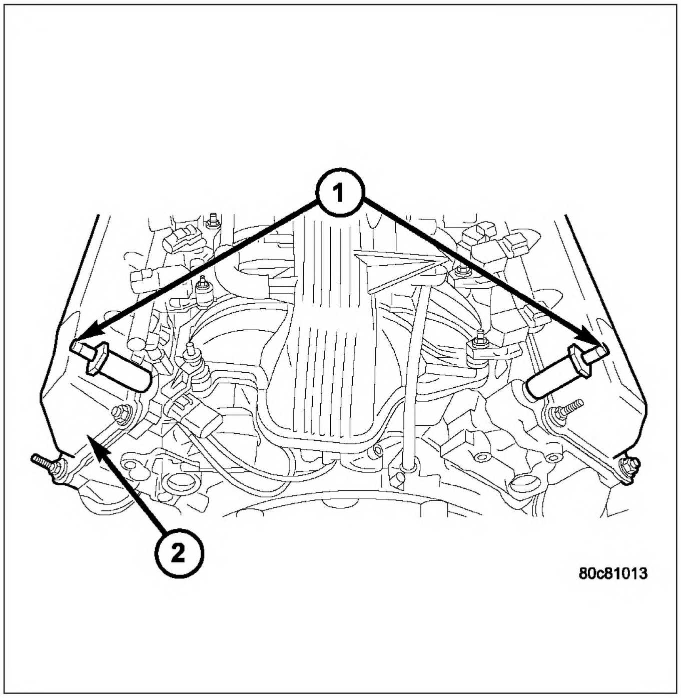
The 3.7L V-6 and 4.7L V-8 engines are equipped with a closed crankcase ventilation system. The Positive Crankcase Ventilation (PCV) valve (6) is mounted to the oil filler housing (4).

The PCV valve is sealed to the oil filler housing with an o-ring (1).



Two interconnected breathers (1) threaded into the rear of each cylinder head are used with the system.

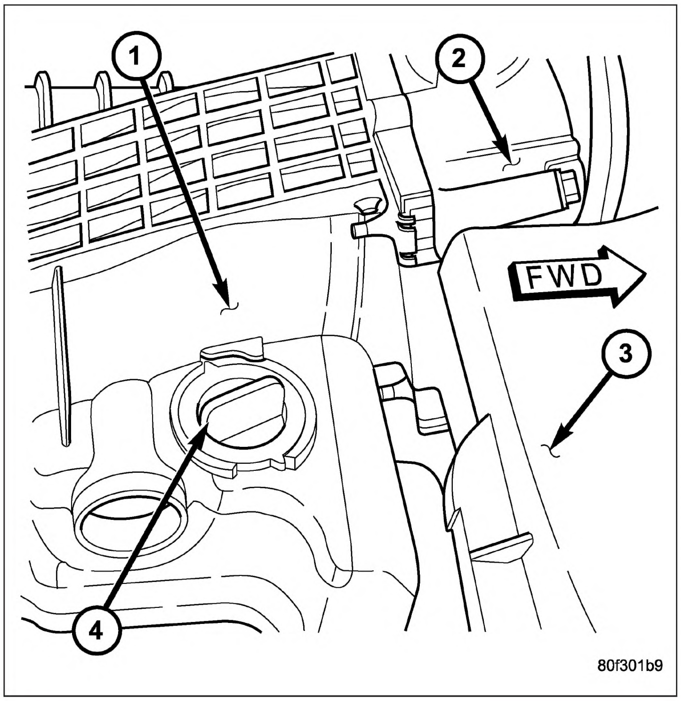
The system also includes the air cleaner housing and various tubes and hoses to connect the system components.

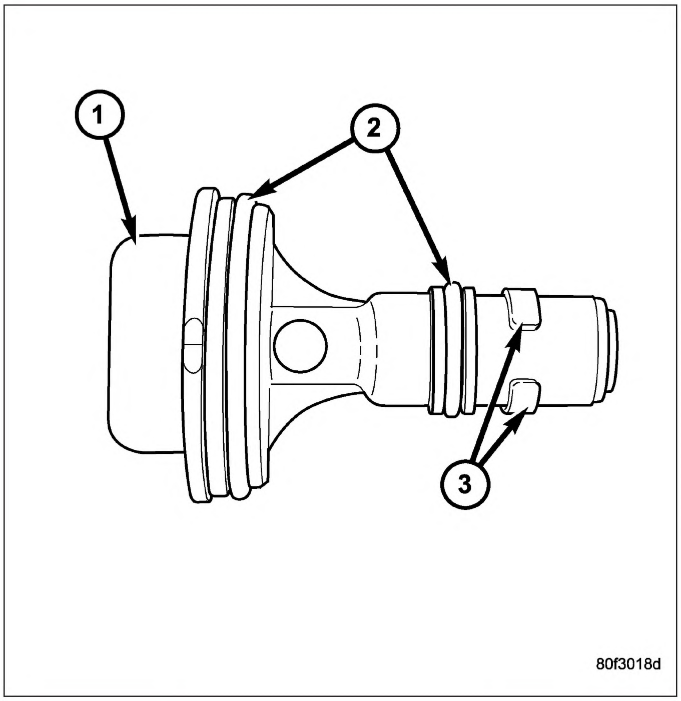


5.7L V-8

The 5.7L V-8 engine is equipped with a closed crankcase ventilation system and a Positive Crankcase Ventilation (PCV) valve.

A PCV valve (4) mounted into the top of the intake manifold (1), located to the right / rear of the throttle body (2) is used.

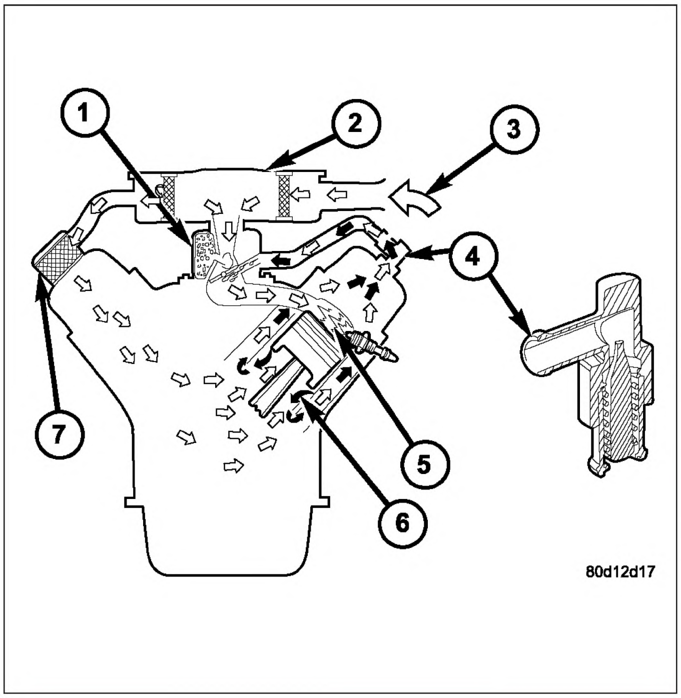




The PCV valve (1) is sealed to the intake manifold with two o-rings (2).

The system also consists of passages in the intake manifold, and various tubes and hoses to connect the system components.

OPERATION

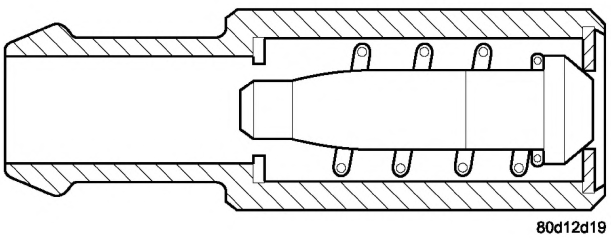


A typical enclosed crankcase ventilation system is shown in the graphic.

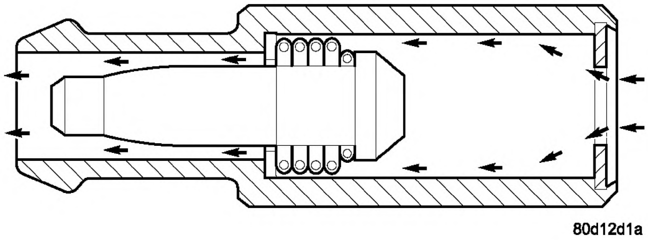
The PCV system operates by engine intake manifold vacuum. Filtered air is routed into the crankcase through the air cleaner hose. The metered air, along with crankcase vapors, are drawn through the PCV valve (4) and into a passage in the intake manifold. The PCV system manages crankcase pressure and meters blow by gases to the intake system, reducing engine sludge formation.

The PCV valve contains a spring loaded plunger. This plunger meters the amount of crankcase vapors routed into the combustion chamber based on intake manifold vacuum.

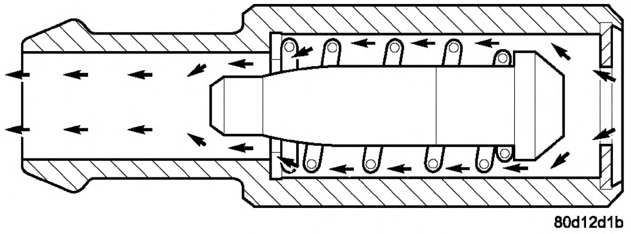
When the engine is not operating or during an engine pop-back, the spring forces the plunger back against the seat. This will prevent vapors from flowing through the valve.



During periods of high manifold vacuum, such as idle or cruising speeds, vacuum is sufficient to completely compress spring. It will then pull the plunger to the top of the valve. In this position there is minimal vapor flow through the valve.

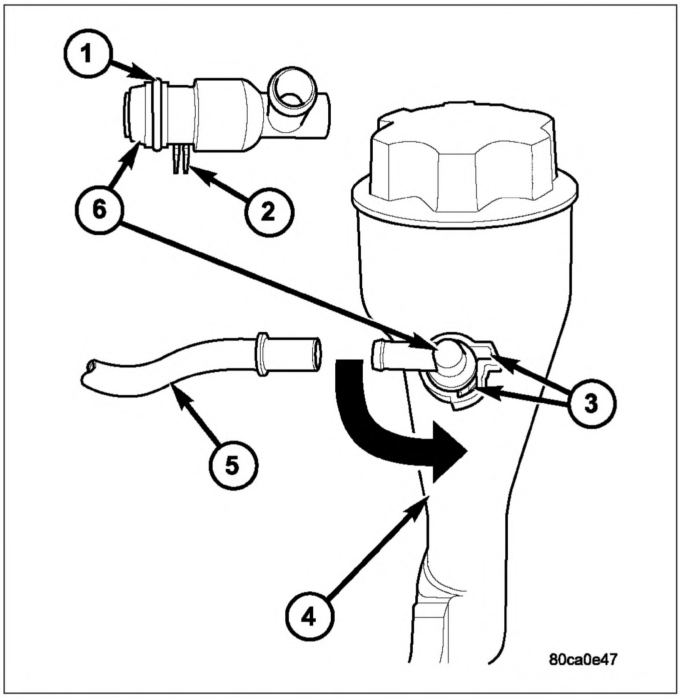


During periods of moderate manifold vacuum, the plunger is only pulled part way back from inlet. This results in maximum vapor flow through the valve.



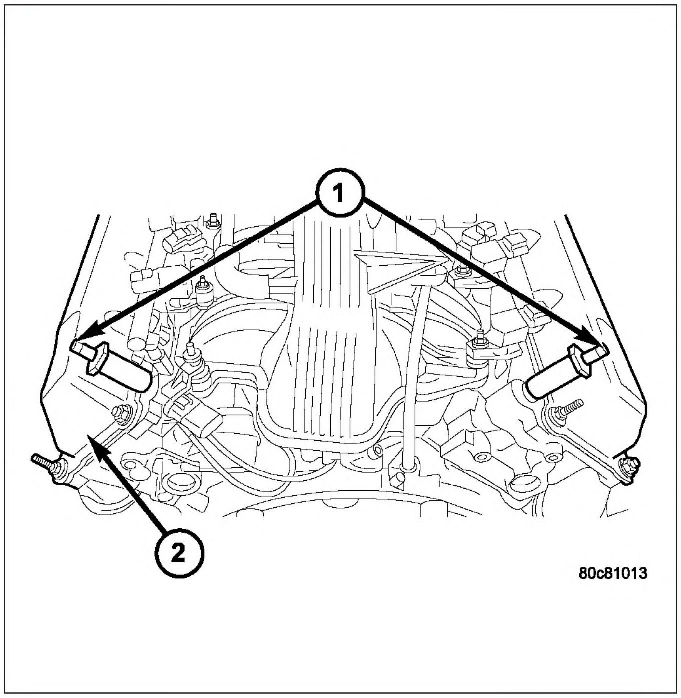
DIAGNOSIS AND TESTING

PCV VALVE - 3.7L V-6/ 4.7L V-8

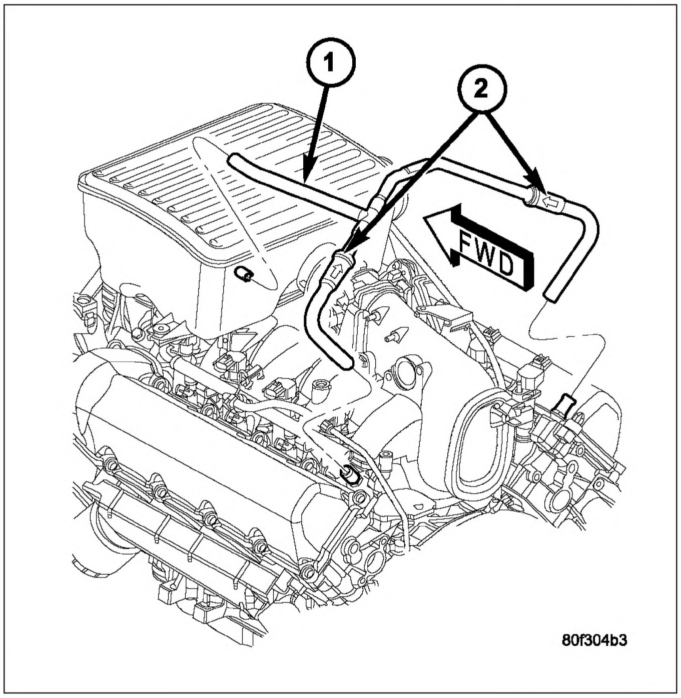


1. Disconnect PCV line/hose (5) by disconnecting rubber connecting hose at PCV valve fitting.
2. Remove PCV valve at oil filler tube by rotating PCV valve downward until locating tabs (2) have been freed at cam lock (3). After tabs have cleared, pull valve straight out from filler tube. **To prevent damage to PCV valve locating tabs, valve must be pointed downward for removal. Do not force valve from oil filler tube.**
3. After valve is removed, check condition of valve o-ring (1). Also, PCV valve should rattle when shaken.
4. Reconnect PCV valve to its connecting line/hose.
5. Start engine and bring to idle speed.
6. If valve is not plugged, a hissing noise will be heard as air passes through valve. Also, a strong vacuum should be felt with a finger placed at valve inlet.
7. If vacuum is not felt at valve inlet, check line/hose for kinks or for obstruction. If necessary, clean out intake manifold fitting at rear of manifold. Do this by turning a 1/4 inch drill (by hand) through the fitting to dislodge any solid particles. Blow out the fitting with shop air. If necessary, use a smaller drill to avoid removing any metal from the fitting.
8. **Do not attempt to clean the old PCV valve.**
9. Return PCV valve back to oil filler tube by placing valve locating tabs (2) into cam lock (3). Press PCV valve in and rotate valve upward. A slight click will be felt when tabs have engaged cam lock. Valve should be pointed towards rear of vehicle.
10. Connect PCV line/hose (5) and connecting rubber hose to PCV valve.
11. Disconnect rubber hose from fresh air fitting at air cleaner resonator box. Start engine and bring to idle speed. Hold a piece of stiff paper (such as a parts tag) loosely over the opening of the disconnected rubber hose.
12. The paper should be drawn against the hose opening with noticeable force. This will be after allowing approximately one minute for crankcase pressure to reduce.

13. If vacuum is not present, disconnect each PCV system hose at top of each crankcase breather (1). Check for obstructions or restrictions.
14. If vacuum is still not present, remove each PCV system crankcase breather (1) from each cylinder head. Check for obstructions or restrictions. If plugged, replace breather. Tighten breather to 12 N·m (106 in. lbs.) torque. Do not attempt to clean breather.



15. If vacuum is still not present, disconnect each PCV system hose (1) at each fitting, and at each check valve (2). Check for obstructions or restrictions.

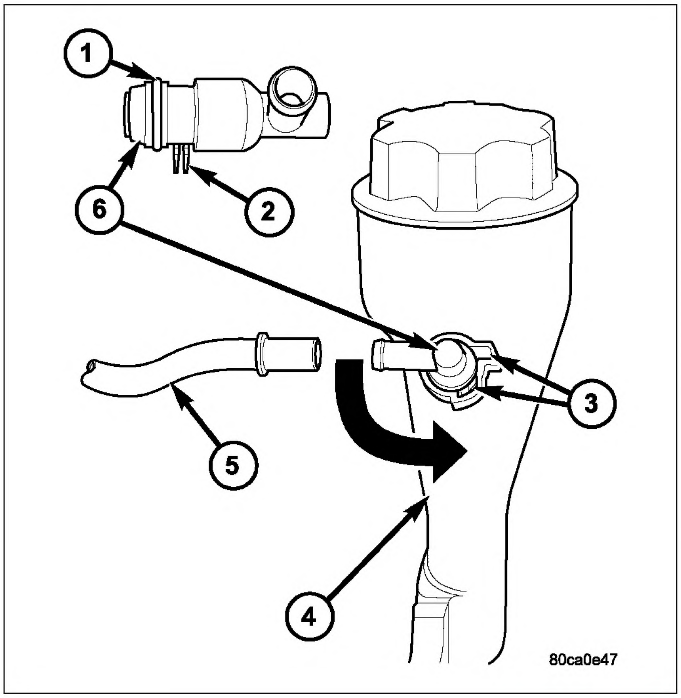


REMOVAL

3.7L V-6 / 4.7L V-8

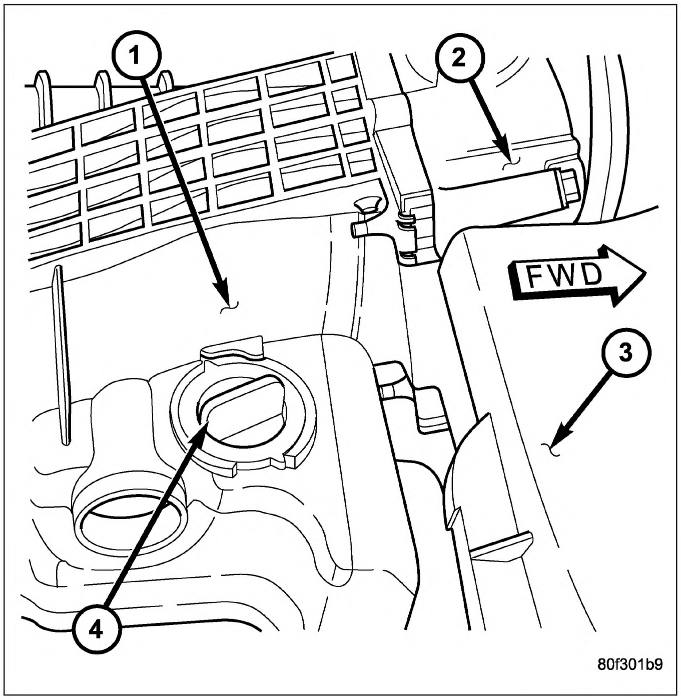
The PCV valve (6) is located on the oil filler tube (4). Two locating tabs are located on the side of the valve (2). These 2 tabs fit into a cam lock (3) in the oil filler tube. An o-ring (1) seals the valve to the filler tube.

1. Disconnect PCV line/hose (5) by disconnecting rubber hose at PCV valve fitting.
2. Remove PCV valve at oil filler tube by rotating PCV valve downward (counter-clockwise) until locating tabs (2) have been freed at cam lock (3). After tabs have cleared, pull valve straight out from filler tube. **To prevent damage to PCV valve locating tabs, valve must be pointed downward for removal. Do not force valve from oil filler tube.**
3. After valve is removed, check condition of valve o-ring (1).

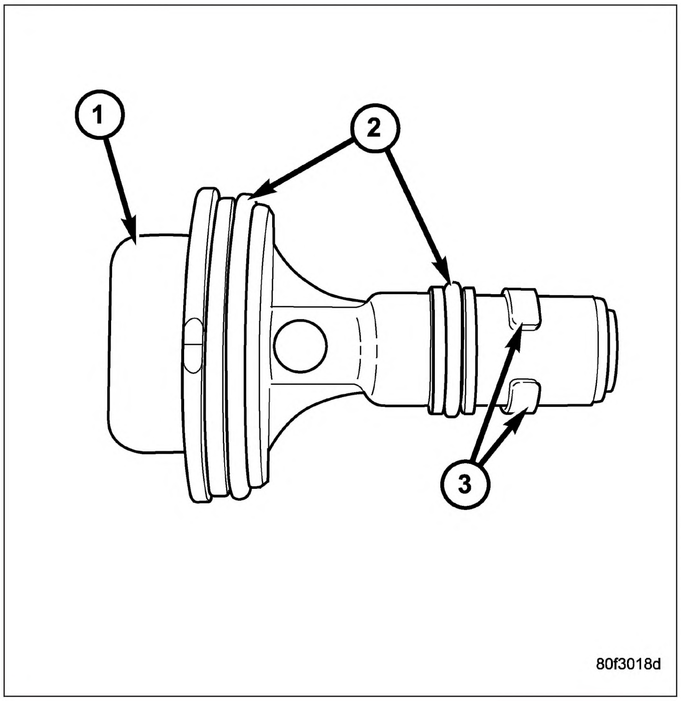


5.7L V-8

The PCV valve (4) is mounted into the top of the intake manifold (1). This is located to the right / rear of the throttle body (2).



1. The PCV valve is sealed to the intake manifold with 2 O-rings (2).
2. Remove PCV valve by rotating counter-clockwise 90 degrees until locating tabs (3) have been freed. After tabs have cleared, pull valve straight up from intake manifold.
3. After valve is removed, check condition of 2 valve O-rings (2).



INSTALLATION

3.7L V6 / 4.7L V-8

The PCV valve is located on the oil filler tube. Two locating tabs are located on the side of the valve. These 2 tabs fit into a cam lock in the oil filler tube. An o-ring seals the valve to the filler tube.

1. Return PCV valve back to oil filler tube by placing valve locating tabs into cam lock. Press PCV valve in and rotate valve upward. A slight click will be felt when tabs have engaged cam lock. Valve should be pointed towards rear of vehicle.
2. Connect PCV line/hose and rubber hose to PCV valve.

5.7L V-8

1. Clean out intake manifold opening.
2. Check condition of 2 o-rings on PCV valve.
3. Apply engine oil to 2 o-rings.
4. Place PCV valve into intake manifold and rotate 90 degrees clockwise for installation.

LINES-VACUUM

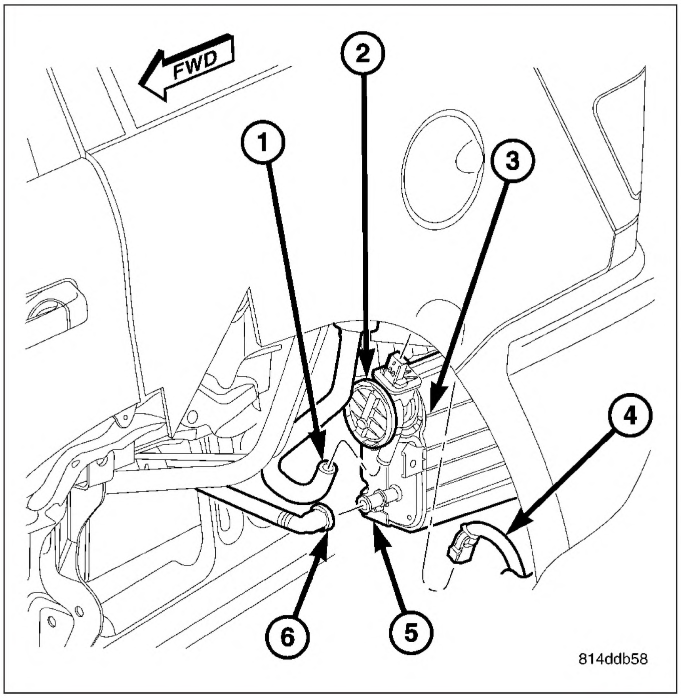
DESCRIPTION

A vacuum schematic for emission related items can be found on the vehicles VECI label. Refer to Vehicle Emission Control Information (VECI) Label for label location.

CANISTER-VAPOR

DESCRIPTION

The EVAP canister (3) is located in the left-rear quarter-panel behind the left-rear tire.



OPERATION

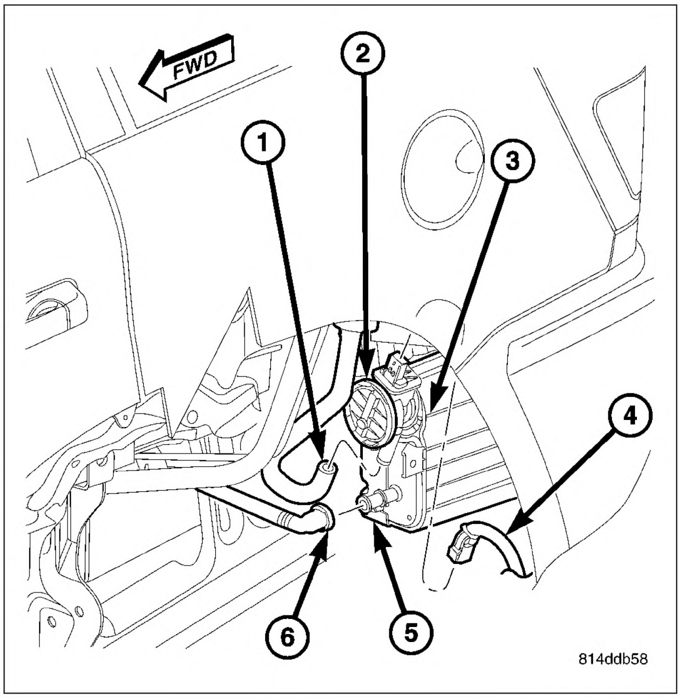
The EVAP canister is filled with granules of an activated carbon mixture. Fuel vapors entering the EVAP canister is absorbed by the charcoal granules.

Fuel tank pressure vents into the EVAP canister. Fuel vapors are temporarily held in the canister until they can be drawn into the intake manifold. The duty cycle EVAP canister purge solenoid allows the EVAP canister to be purged at predetermined times and at certain engine operating conditions.

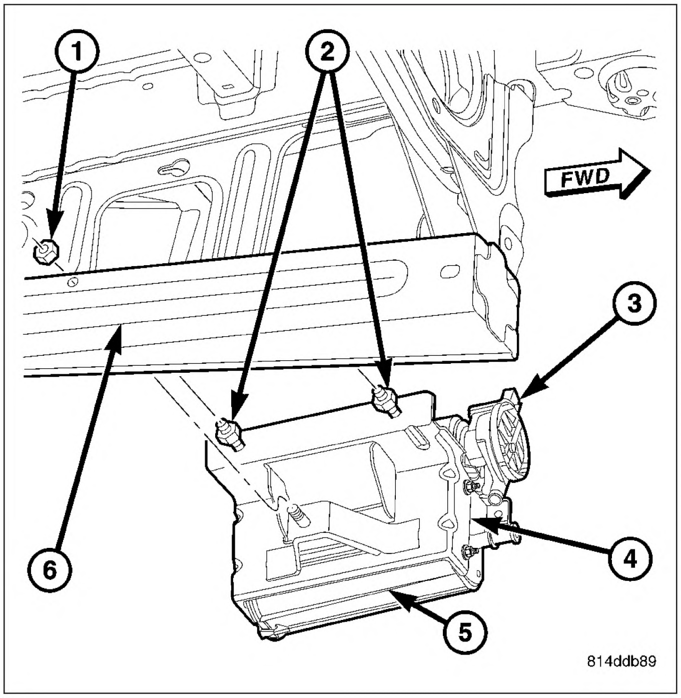
REMOVAL

The NVLD pump (2) is attached to the EVAP canister (3). This assembly is located in the left-rear quarter-panel behind the left-rear tire.

1. Raise and support vehicle.
2. Remove left-rear tire.
3. To access EVAP canister or NVLD pump, remove plastic splash shield at rear of left-rear tire.
4. Disconnect electrical connector (4) at pump.
5. Carefully remove vapor/vacuum hoses (1) and (6) at pump.

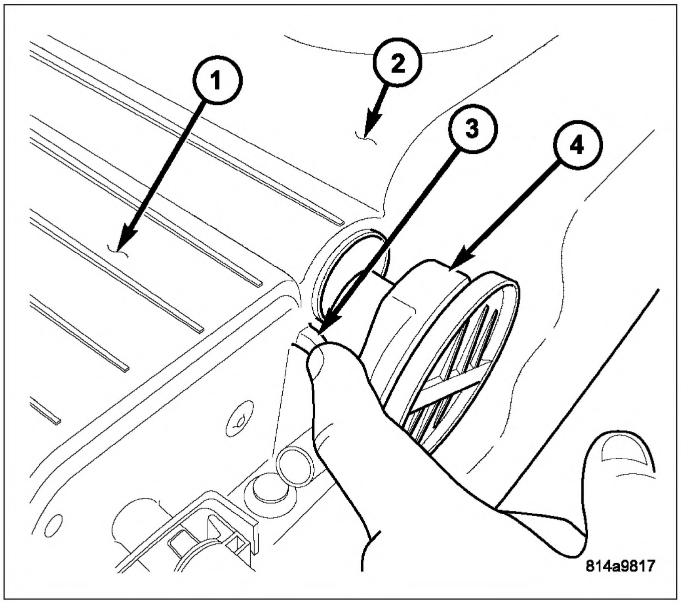


6. Remove three canister bracket-to-body nuts (1) and (2).
7. Separate canister from mounting bracket by removing two canister-to-bracket nuts at front of canister (4). The opposite end of canister is equipped with two alignment pins. Remove canister from support bracket by pulling these two pins from the two rubber grommets

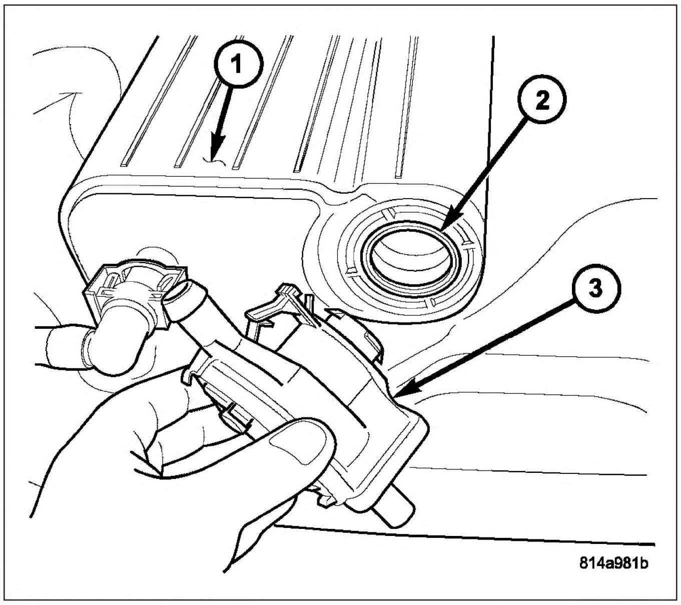


To Separate NVLD Pump from EVAP canister:

8. Pry outward on tab (3) and rotate pump **clockwise** about 70 degrees for removal.



9. Remove NVLD pump o-ring (2) from EVAP canister (1).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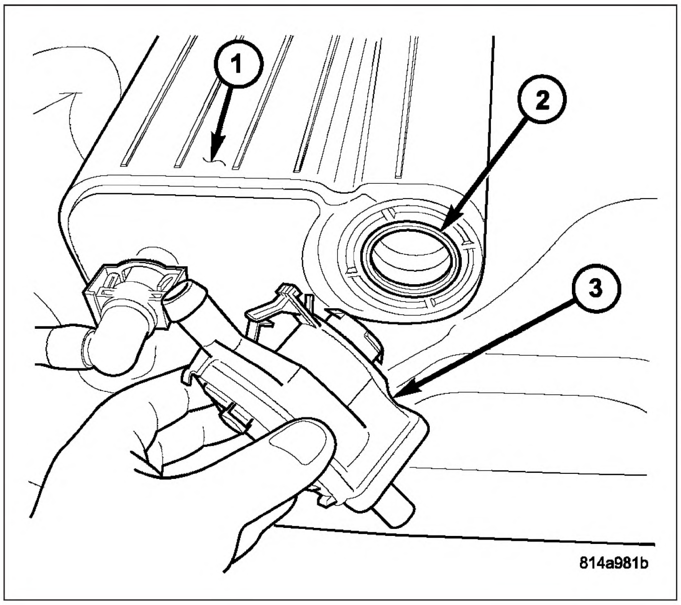
INSTALLATION

To Install NVLD Pump to EVAP canister:

1. Install new NVLD pump o-ring (2) to EVAP canister (1).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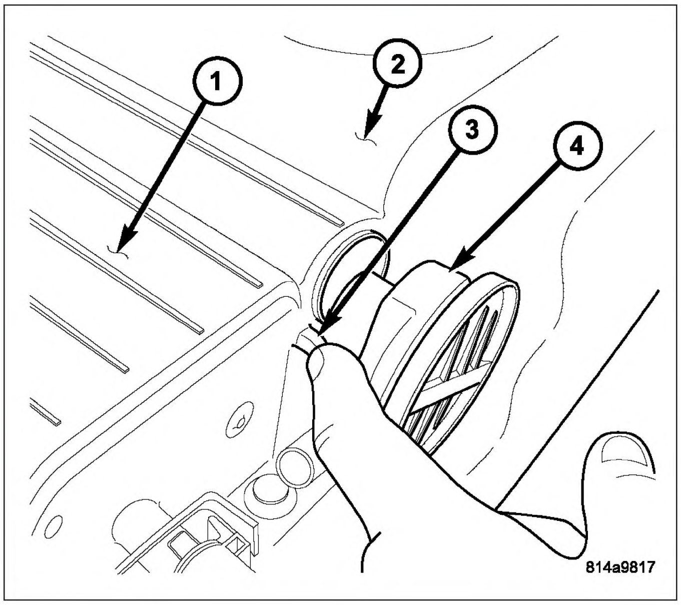
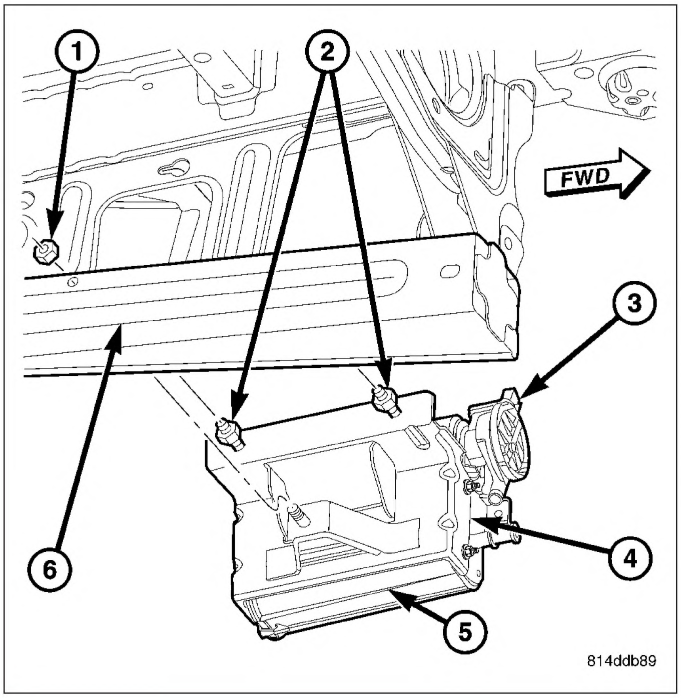
2. Position NVLD pump (4) into EVAP canister (1).
3. Rotate pump (4) until tab (3) aligns with notch in EVAP canister (1).

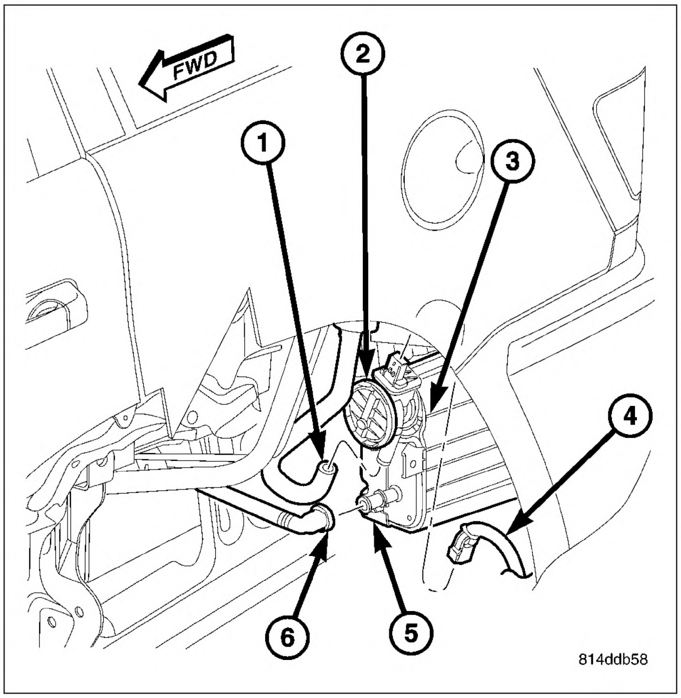


To Install EVAP canister:

4. Position canister (5) into mounting bracket (4). Install and tighten two canister-to-mounting bracket nuts.
5. Position canister/pump assembly to body. Install and tighten three mounting bracket-to-body nuts.



6. Carefully install vapor/vacuum lines (1) and (6) to NVLD pump and EVAP canister. **The vapor/vacuum lines and hoses must be firmly connected. Check the vapor/vacuum lines at the NVLD pump, filter and EVAP canister purge solenoid for damage or leaks. If a leak is present, a Diagnostic Trouble Code (DTC) may be set.**
7. Connect electrical connector (4) to pump.
8. Install plastic splash shield at rear of left-rear tire.
9. Install left-rear tire.



EXHAUST GAS RECIRCULATION

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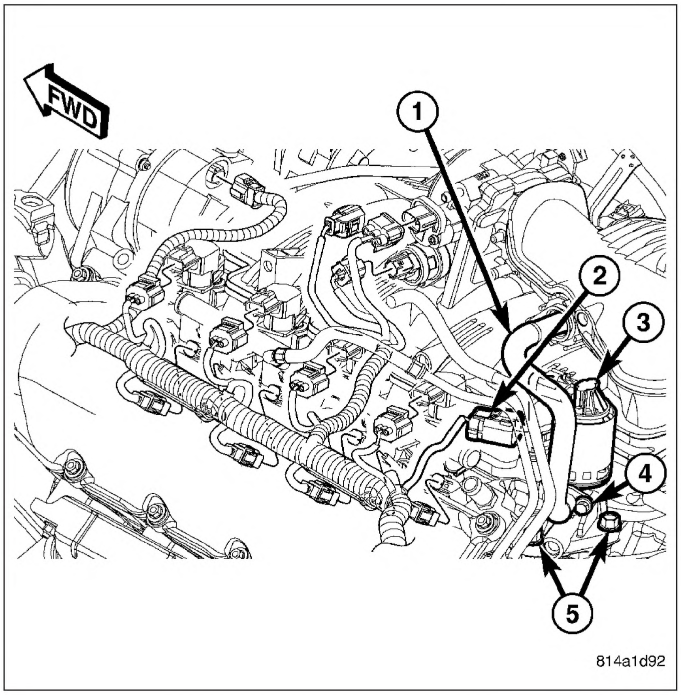
VALVE-EGR

DESCRIPTION

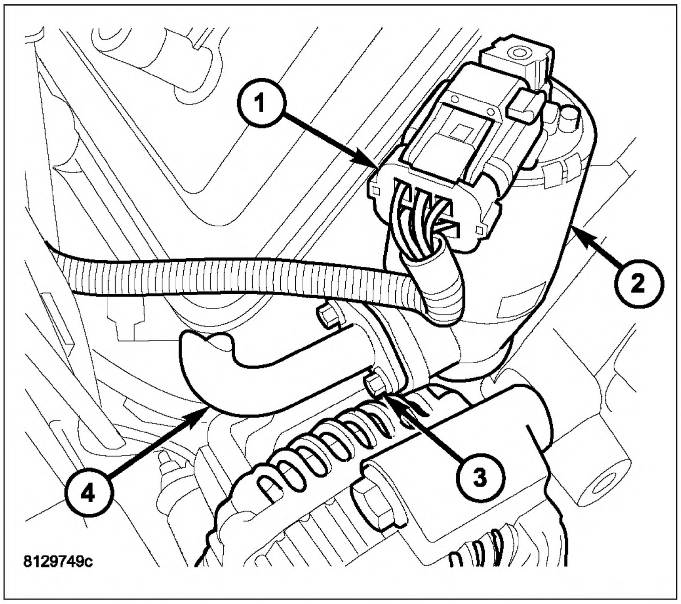
4.7L Engine

The electronic EGR valve and solenoid assembly (3) is attached to the rear of the left cylinder head. An exhaust gas routing tube (1) connects the EGR valve to the intake manifold.



5.7L Engine

The electronic EGR valve and solenoid assembly (2) is attached to the front of the right cylinder head. An exhaust gas routing tube (4) connects the EGR valve to the intake manifold.



OPERATION

Exhaust gas recirculation flow is determined by the Powertrain Control Module (PCM) and is controlled by an electronic EGR valve assembly. For a given set of conditions, the PCM knows the ideal exhaust gas recirculation flow to optimize NOx and fuel economy as a function of the pintle position. Pintle position is obtained from the position sensor. The PCM adjusts the duty cycle of 128 Hz power supplied to the solenoid coil to obtain the correct position.

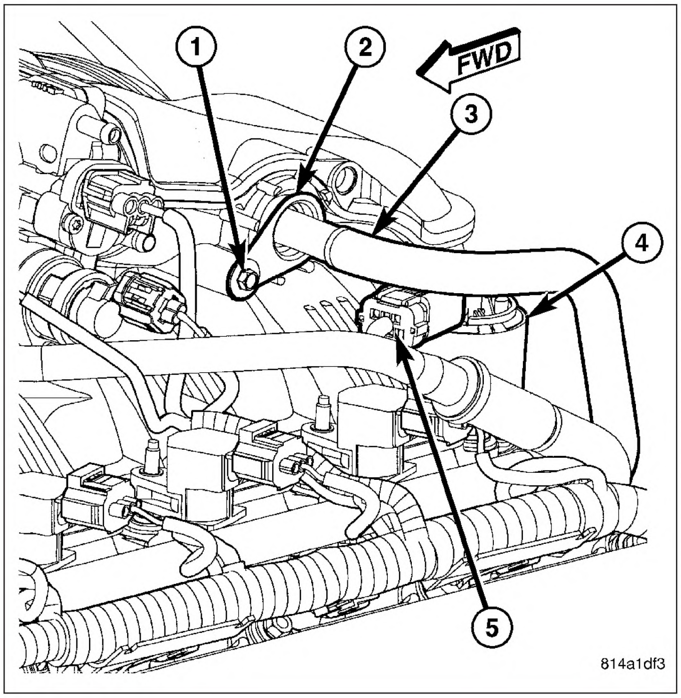
The electronic EGR valve assembly consists of a pintle, valve seat, and housing which contains and regulates exhaust gas flow. An armature, return spring, and solenoid coil provide the operating force to regulate exhaust gas flow by changing the pintle position. The solenoid coil assembly is wired in parallel with a diode that connects two internal connectors.

REMOVAL

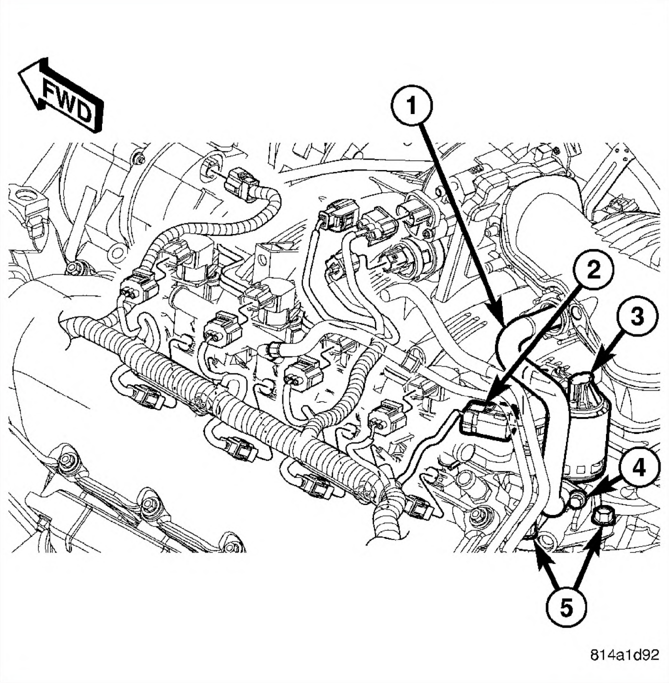
4.7L Engine

The electronic EGR valve and solenoid assembly (4) is attached to the rear of the left cylinder head. An exhaust gas routing tube (3) connects the EGR valve to the intake manifold.

1. Remove electrical connector (5) at top of EGR valve solenoid.
2. Remove tube mounting bolt (1) at intake manifold.

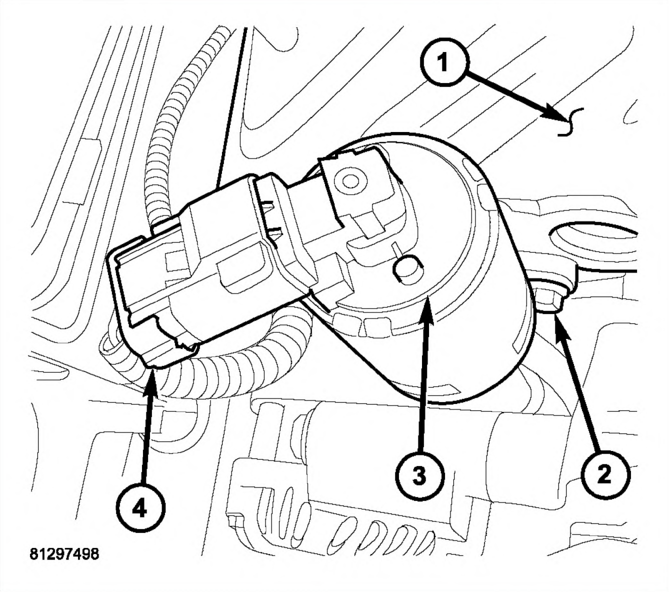


3. Remove two bolts (4) connecting EGR tube (1) to valve assembly.
4. Remove gasket located between EGR tube flange and EGR valve assembly.
5. Remove two EGR valve mounting bolts (5).
6. Separate valve assembly (3) from engine.
7. Remove and discard metal gasket located between cylinder head and valve assembly.

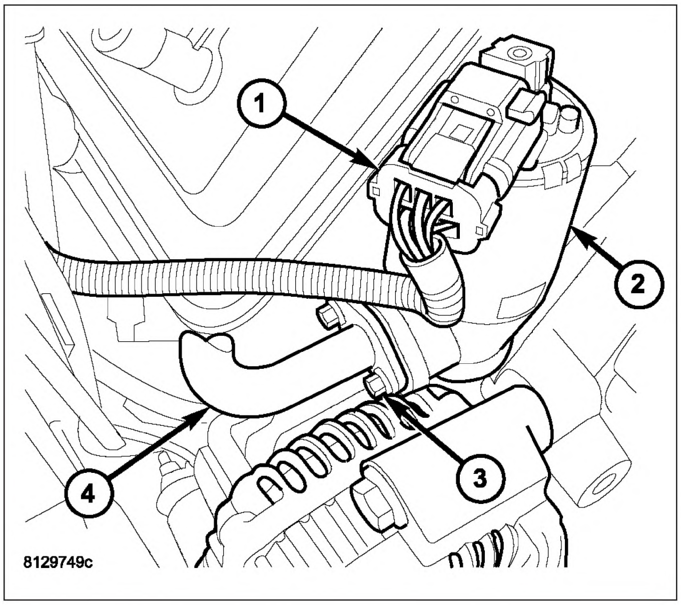


5.7L Engine

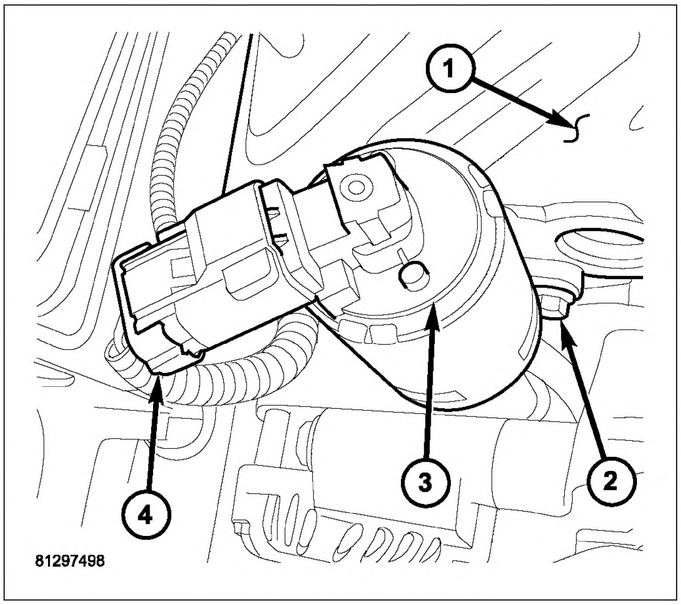
The electronic EGR valve and solenoid assembly (3) is attached to the front of the right cylinder head (1). An exhaust gas routing tube connects the EGR valve to the intake manifold.



1. Disconnect electrical connector (1) from EGR solenoid (2).
2. Remove two bolts (3) connecting EGR tube (4) to valve assembly.
3. Remove gasket located between EGR tube flange and EGR valve assembly.



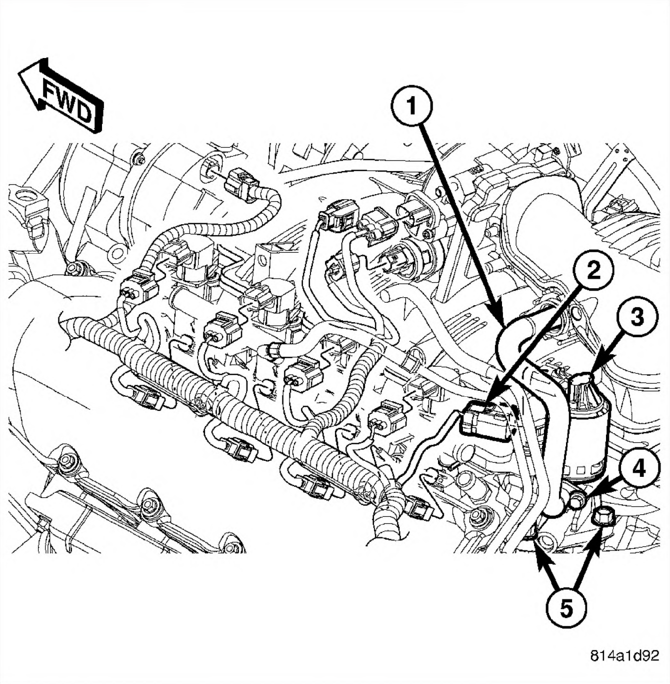
4. Remove two mounting bolts (2).
5. Separate valve assembly (3) from cylinder head (1).
6. Remove and discard metal gasket located between cylinder head and valve assembly.



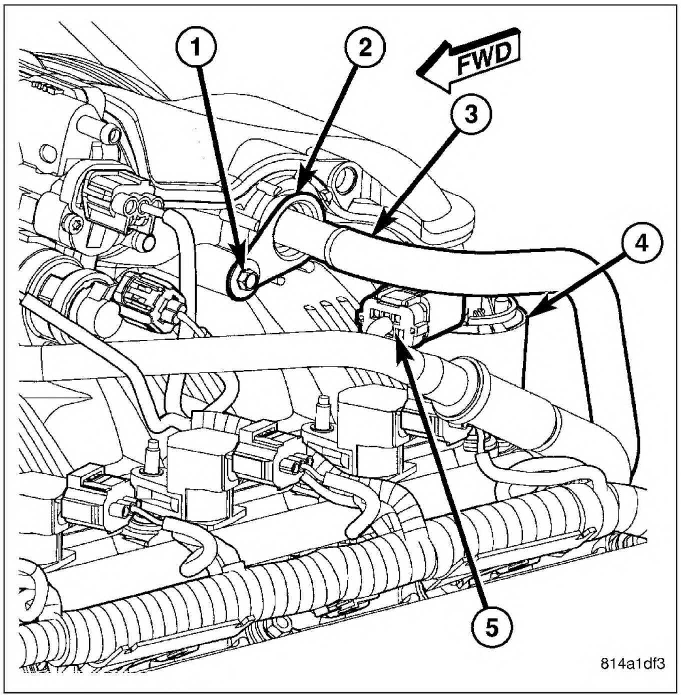
INSTALLATION

4.7L Engine

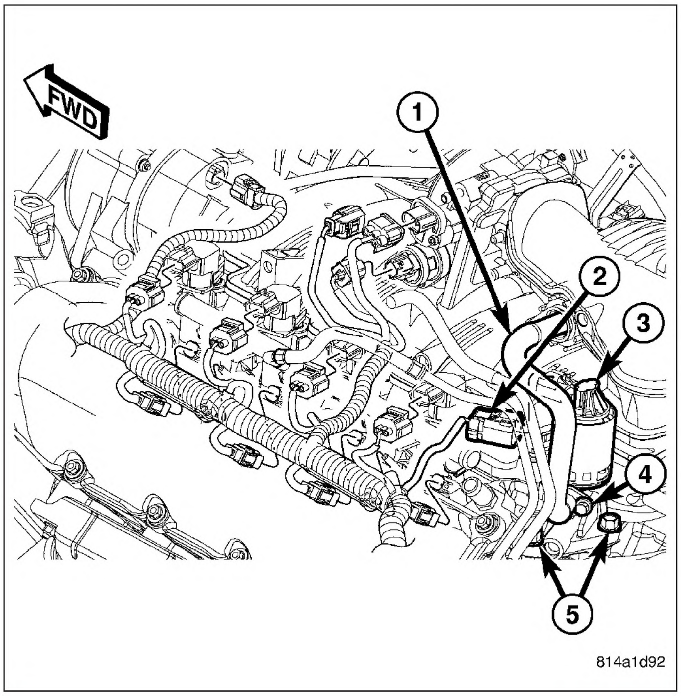
1. Clean area at rear of left cylinder head where it joins base of EGR valve.
2. Clean EGR tube where it joins EGR valve.
3. Position new gasket between EGR valve and cylinder head.
4. Position EGR valve to cylinder head. Install and tighten two bolts (5). Refer to Torque Specifications.
5. Position new gasket between EGR tube flange and EGR valve assembly.
6. Position EGR tube (1) to side of EGR valve and into intake manifold. Install two bolts (4) finger tight (temporarily).



7. Install EGR tube flange bolt (1) at intake manifold. Tighten bolt. Refer to Torque Specifications.
8. Connect electrical connector (5) to top of EGR valve solenoid (2).



9. Do a final tightening of two EGR tube bolts (4). Refer to Torque Specifications.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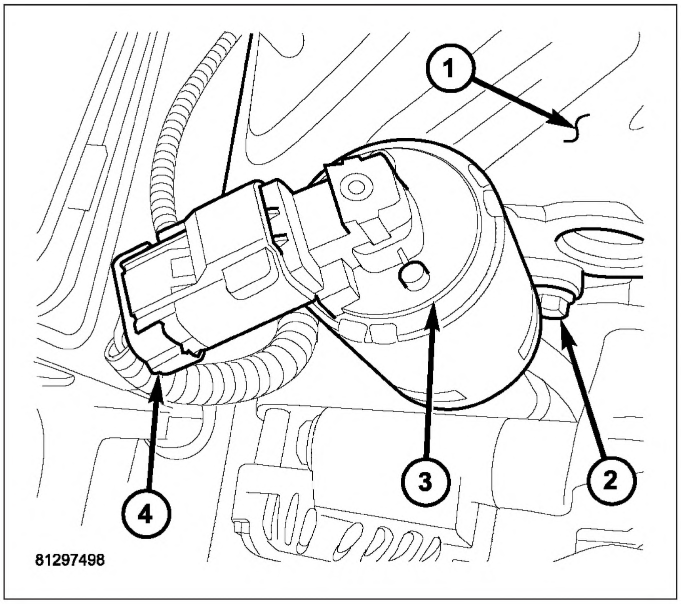
5.7L Engine

1. Position a new metal gasket between cylinder head (1) and valve assembly (3).
2. Install two mounting bolts (2) and tighten. Refer to Torque Specifications.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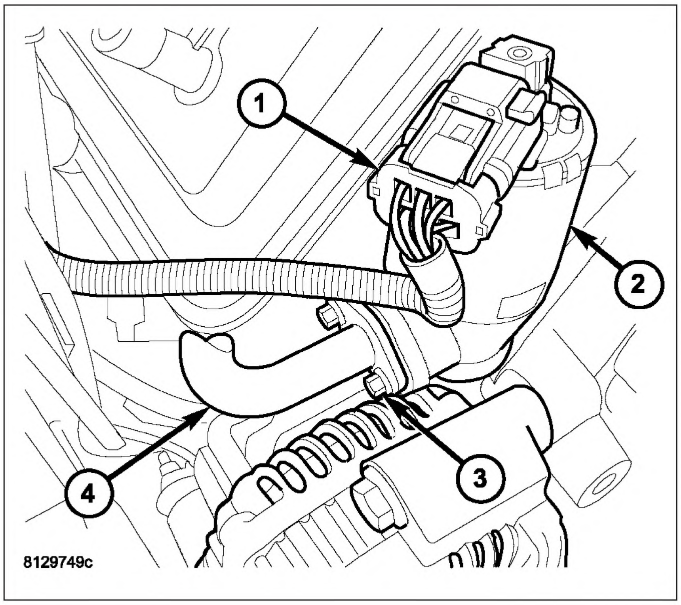
3. Clean EGR tube where it joins EGR valve.
4. Position new gasket between EGR tube flange and EGR valve assembly.
5. Install two bolts (3) connecting EGR tube (4) to valve assembly (2). Tighten bolts. Refer to Torque Specifications.
6. Connect electrical connector (1) to EGR solenoid (2).



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SERVICE MANUAL COMMENTS

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